

Sensors



- Photoelectric Sensors
- Inductive Proximity Sensors
- Ultrasonic Sensors
- Capacitive Proximity Sensors
- Limit Switches
- Encoders
- Solid-State Condition Sensing Switches
- Connection Systems
- Network Media
- DeviceNet™ Sensors
- RFID



LISTEN.
THINK.
SOLVE.®

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Important User Information

This guide has been developed as a quick reference tool to Allen-Bradley industrial automation controls and factory assemblies. It is not intended to replace factory user manuals or technical documentation supplied with Allen-Bradley equipment.

Because of the variety of uses for the products described in this publication, those responsible for the application and use of these products must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes, and standards. Factory provided user manuals and technical documentation should not be solely relied on for those purposes.

Rockwell Automation reserves the right to change the features or characteristics of its products at any time. Therefore, the information contained in this publication is subject to change at any time without notice.

The illustrations, charts, diagrams, and layout examples shown in this guide are intended solely as examples. Since there are many variables and requirements associated with any particular installation, Rockwell Automation can not assume responsibility or liability (including intellectual property infringement liability) for actual use based upon the examples shown in this publication.

Allen-Bradley Publication SGI-1.1 "General Information Safety Guidelines for Solid-State Control" (available from your local Rockwell Automation office) describes some important differences between solid-state equipment and electromechanical devices, which should be taken into consideration when applying products such as those described in this publication.

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Rockwell Automation offers a conformal coating solution on selected Allen-Bradley products to satisfy customers who demand that their automation equipment have additional protection against corrosive elements, such as sulfuric acid, chlorine, fungus, salt, and other chemicals and gases.

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Service & Installation Conditions

Unless otherwise noted, the products described in this publication are designed to meet "usual service and installation conditions" as defined in NEMA (National Electrical Manufacturers Association) Standards Publication—Part ICS 1-108. Open-style devices must be provided with environmental and safety protection by proper mounting in enclosures designed for specific application conditions. See NEMA Standards Publication 250 and IEC Publication 529, as

applicable, for explanations of the degrees of protection provided by different types of enclosures.

Performance Data

Performance data given in this publication is provided only as a guide for the user in determining suitability and do not constitute a performance warranty of any kind. Such data may represent the results of accelerated testing at elevated stress levels, and the user is responsible for correlating the data to actual application requirements. ALL WARRANTIES AS TO ACTUAL PERFORMANCE, WHETHER EXPRESS OR IMPLIED, ARE EXPRESSLY DISCLAIMED.

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Refer to Rockwell Automation *Proximity Sensors*, *Forever Warranty* publication number 871-SB001C-EN-P on www.theautomationbookstore.com.

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Published or advertised weights and dimensions are estimates or approximations only and are not warranted.

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order acknowledgment. Billable service time includes travel time to and from the job site and all time Seller's representatives are available for work and waiting (whether on or off the job site) to perform the services.

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Buyer-requested order changes, including those affecting the identity, scope and delivery of the Products, must be documented in writing and are subject to Seller's prior approval and adjustments in price, scheduling and other affected terms and conditions. In any event, Seller reserves the right to reject any change that it deems unsafe, technically inadvisable or inconsistent with established engineering or quality guidelines and standards, or incompatible with Seller's design or manufacturing capabilities. Seller further reserves the right to substitute using the latest superseding revision or series or equivalent Product having comparable form, fit and function.

Returns

All returns of Products will be pursuant to Seller's instructions. Non-warranty returns of unused and resalable Products for credit will be subject to Seller's return policies in effect at the time, including applicable restocking charges and other conditions of return. Products returned under warranty must be properly packed and shipped to Seller-specified locations. Shipping containers must be clearly

marked per Seller's instruction and shipped freight prepaid by Buyer. Notwithstanding the foregoing, all sales of "Open Box" Products and any third-party branded products are final and do not qualify for non-warranty return.

Order Cancellation

Cancellation by Buyer prior to shipment is permitted only by written notice and upon payment to Seller of reasonable cancellation and restocking charges, including reimbursement for direct costs. Cancellation charges associated with orders for custom Products or Products specifically manufactured to Buyer's specification may equal the actual selling price of the Products. Seller has the right to cancel an order for cause at any time by written notice, and Seller will be entitled to cancellation and restocking charges as identified above. No termination by Buyer for cause will be effective unless and until Seller has failed to correct such alleged cause within forty-five (45) days after receipt of Buyer's written notice specifying such cause.

Force Majeure

Seller will not be liable for any loss, damage or delay arising out of its failure (or that of its subcontractors) to perform hereunder due to causes beyond its reasonable control, including without limitation, acts of God, acts

or omissions of Buyer, acts of civil or military authority, fires, strikes, floods, epidemics, quarantine restrictions, war, riots, acts of terrorism, delays in transportation, or transportation embargoes. In the event of such delay, Seller's performance date(s) will be extended for such length of time as may be reasonably necessary to compensate for the delay.

Government Clauses and Contracts

Application of government contract regulations and clauses to the Products or the agreement evidenced by these terms and conditions are subject to the separate review and consent by an authorized representative at Seller's headquarters. Products sold or licensed hereunder are not intended to be used, nor should they be used, in any nuclear-related application either as a "Basic Component" as defined under United States nuclear regulations or under similar nuclear laws and regulations of any other country or otherwise.

Export Control

Products and associated materials supplied or licensed hereunder may be subject to various export laws and regulations. It is the responsibility of the exporter to comply with all such laws and regulations. Notwithstanding any other provision herein to the contrary, in the event that U.S. or local law requires export authorization for the export or re-export of any Product or associated technology, no delivery can be made until such export authorization is obtained, regardless of any otherwise promised delivery date. In the event that any required export authorization is denied, Seller will be relieved of any further obligation relative to the sale and/or license and delivery of the Product(s) subject to such denial without liability of any kind relative to Buyer or any other party. Seller will not comply with boycott related requests except to the extent permitted by U.S. law and then only at Seller's discretion.

Disputes

The parties will attempt in good faith promptly to resolve any dispute arising hereunder by negotiations between representatives of the parties who have authority to settle the dispute. If unsuccessful, the parties further will attempt in good faith to settle the dispute by nonbinding third-party mediation, with mediator fees and expenses apportioned equally to each side. Any dispute not so resolved by negotiation or mediation may then be submitted to a court of competent jurisdiction in accordance with the terms hereof. These procedures are the exclusive procedures for the resolution of all such disputes between the parties.

General Terms & Conditions of Sale/Maintenance of Solid-State Control

Governing Law and Forum

The agreement evidenced hereby and all disputes arising thereunder will be governed by and interpreted in accordance with the internal laws and will be subject to the exclusive jurisdiction of the courts of the state, province or other governmental jurisdiction in which Seller's principal place of business resides, but specifically excluding the provisions of the 1980 UN Convention on Contracts for the International Sales of Goods. Should any term or provision hereof be held wholly or partly invalid or unenforceable under applicable law, the remainder of the agreement evidenced hereby will not be affected thereby.

Assignment

The agreement evidenced hereby may not be assigned by either party without the written consent of the other (which consent will not be unreasonably withheld). However, consent will not be required for internal transfers and assignments as between Seller and its parent company, subsidiaries or affiliates as part of a consolidation, merger or any other form of corporate reorganization.

Language

The parties acknowledge that they have required that the agreement evidenced hereby be drawn up in English. Les parties reconnaissent avoir exigé la rédaction en anglais du Contrat. In the event of a conflict between the English and other language versions, the English version will prevail.

Maintenance of Solid-State Control

This section is excerpted from Allen-Bradley publication SGI-1.1, Safety Guidelines for the Application, Installation, and Maintenance of Solid-State Control. It is formatted so that explanatory comments from Rockwell Automation appear in blue headings along with the corresponding parts of Section 5 of NEMA Standards Publication No. ICS 1.1-1987, titled Safety Guidelines for the Application, Installation, and Maintenance of Solid-State Control. The text from the NEMA Standard has been reprinted verbatim, with NEMA's permission captioned "NEMA Standard Text." "Explanatory Information," contains the Rockwell Automation comments. The comments provide information to help readers better understand the characteristics of industrial equipment employing solid state technology. NEMA text is provided solely as a convenience to the reader, and Rockwell Automation assumes no responsibility for its completeness or validity.

NEMA Standards Publication No. ICS 1.1-1984, Rev. No. 1 - October 1987, is available from the National Electrical Manufacturers Association, 2101 L Street, N.W., Washington, DC 20037. Allen-Bradley

publication SGI-1.1 is available from your local Rockwell Automation office.

NEMA Standard Text Section 5 Preventive Maintenance and Repair Guidelines

5.1 General

A well-planned and executed maintenance program is essential to the satisfactory operation of solid-state electrical equipment. The kind and frequency of the maintenance operation will vary with the kind and complexity of the equipment as well as with the nature of the operating conditions. Maintenance recommendations of the manufacturer or appropriate product standards should be followed.

Useful reference publications for setting up a maintenance program are NFPA 70B-1983, Maintenance of Electrical Equipment, and NFPA 70E-1983, Electrical Safety Requirements for Employee Workplaces.

5.2 Preventive Maintenance

The following factors should be considered when formulating a maintenance program:

1. Maintenance must be performed by qualified personnel familiar with the construction, operation, and hazards involved with the control.
2. Maintenance should be performed with the control out of operation and disconnected from all sources of power. If maintenance must be performed while the control is energized, the safety related practices of NFPA 70E should be followed.
3. Care should be taken when servicing electrostatic sensitive components. The manufacturer's recommendations for these components should be followed.
4. Ventilation passages should be kept open. If the equipment depends upon auxiliary cooling, e.g., air, water, or oil, periodic inspection (with filter replacement when necessary) should be made of these systems.
5. The means employed for grounding or insulating the equipment from ground should be checked to assure its integrity (see 4.5).
6. Accumulations of dust and dirt on all parts, including on semiconductor heat sinks, should be removed according to the manufacturer's instructions, if provided; otherwise, the manufacturer should be consulted. Care must be taken to avoid damaging any delicate components and to avoid displacing dust, dirt, or debris in a way that permits it to enter or settle into parts of the control equipment.
7. Enclosures should be inspected for evidence of deterioration. Accumulated dust and dirt should be removed from the top of the enclosures before opening doors or removing covers.

8. Certain hazardous materials removed as part of maintenance or repair procedure (e.g., polychlorinated biphenyls (PCB) found in some liquid filled capacitors) must be disposed of as described in Federal regulations.

C.5.2 Preventive Maintenance [Explanatory Information (Supplementary Comments—Not part of NEMA Standards Publication No. ICS 1.1)]

Lithium batteries are frequently used for memory backup in solid state equipment due to their excellent shelf life and high energy-to-weight ratio. Lithium is a highly reactive metal that can cause burns if there is contact with skin. The batteries are sealed so there is seldom a problem of contact with lithium as long as reasonable care is exercised when handling them. They should only be used in their intended application and not subjected to rough handling. When batteries are replaced in equipment, the batteries removed should be disposed of in accordance with the battery supplier's instructions.

The Department of Transportation has certain regulations that prohibit shipment of equipment with batteries installed if the batteries contain 0.5 grams or greater of lithium. The batteries must be removed from equipment and shipped separately in a container approved by the Department of Transportation. Additional Department of Transportation restrictions apply to the shipment of lithium batteries.

NEMA Standards Publication No. ICS 1.3-1986, Preventive Maintenance of Industrial Control and System Equipment, is recommended for personnel responsible for maintenance of equipment.

5.3 Repair

If equipment condition indicates repair or replacement, the manufacturer's instruction manual should be followed carefully. Diagnostic information within such a manual should be used to identify the probable source of the problem, and to formulate a repair plan. The level of field repair recommended by the manufacturer should be followed.

When solid state equipment is repaired, it is important that any replacement part be in accordance with the recommendations of the equipment manufacturer. Care should be taken to avoid the use of parts which are no longer compatible with other changes in the equipment. Also, replacement parts should be inspected for deterioration due to "shelf life" and for signs of rework or wear, which may involve factors critical to safety.

After repair, proper start-up procedures should be followed. Special precautions should be taken to protect personnel from hazards during start-up.

C.5.3 Repair [Explanatory Information (Supplementary Comments—Not part of NEMA Standards Publication No. ICS 1.1)]

Follow manufacturer's instructions exactly when replacing power semiconductors mounted on heatsinks since improper installation may become the source of further difficulties. Torque semiconductors or bolts retaining semiconductors to the value specified with a torque wrench. Too much pressure against a heatsink can damage a semiconductor, while too little can restrict the amount of heat transferred from the semiconductor to the heatsink, and resulting in operation at higher temperature with decreased reliability.

Exercise care when removing modules from a system during maintenance. Failed modules are frequently returned to the manufacturer for repair. Any physical damage sustained during removal may result in more expensive repair or render the module unrepairable if damage is too great.

Modules with electrostatic sensitive components should be handled by the edges without touching components or printed circuit conductors. Use packaging material supplied with the replacement module when shipping the module to the manufacturer for repair.

When the scope of repairs exceeds the manufacturer's recommendations for field repair, the module(s) should be returned to the manufacturer for repair. Doing so will help to ensure that only properly selected components are used and that all necessary hardware and firmware revisions are incorporated into the repair. Failure to make necessary updates may result in safety, compatibility, or performance problems, which may not become apparent for some time after the repaired module has been placed back in service. When firmware is protected by copyright law, updates can be provided legally only by the manufacturer or licensee.

5.4 Safety Recommendations for Maintenance Personnel

All maintenance work should be done by qualified personnel familiar with the construction, operation, and hazards involved with the equipment. The appropriate work practices of NFPA 70E should be followed.

Product Compliance Information

For your quick reference, product certification information can be found at the following URL (<http://www.ab.com/certification/> <http://www.ab.com/certification/>) Actual product certification is indicated by the label(s) on the product and not by a listing on this web site or in product literature.

UL Certification

Generally, Rockwell Automation pursues applicable UL certification for its products. There are four relevant types of certification granted by Underwriters Laboratories (UL):

- UL Recognized or Recognized to Canadian safety requirements under the Component Recognition Program of Underwriters Laboratories, Inc.:



Actual UL recognition is indicated by the label on the product, and not by statements in this catalog or any product literature.

- UL Listed, UL Listed to Canadian, or UL Listed to US and Canadian safety standards.



Actual UL listing is indicated by the label on the product, and not by statements in this catalog or any product literature.

CSA Certification

Generally, Rockwell Automation pursues applicable CSA certification for its products. CSA certifies products for general use as well as for use in hazardous locations. Products in this catalog might be certified in one of these two ways:

- CSA Class I, Division 2 Hazardous Location Certification: This product is listed by the Canadian Standards Association as certified for use in Class I, Division 2, Group A, B, C, D, or non-hazardous locations only.



Although Rockwell Automation is only using the Class I Division 2 Group A, B, C, D designation on its products, it should be noted that this hazardous location classification is equivalent to the internationally defined Class I Zone 2 Group IIC area classification (see IEC publication 79-10). Therefore, products labeled Class I Division 2 Group A, B, C, D may be used in Class I Zone 2 Group IIC environments.

- CSA Certification: The product is certified by the Canadian Standards Association for non-hazardous locations.



Actual CSA certification is indicated by the label on the product, and not by statements in this catalog or any product literature.

ISO 9001 Registration

Rockwell Automation has registered facilities encompassing more than 45 separate sites around the world to the ISO 9001 standard. This registration means that itsour quality system governing the design, development, manufacture, and delivery of itsour products has been verified by third-party audits.



DEMKO Certification

A limited number of Allen-Bradley branded products have DEMKO certification. DEMKO certifies products for general use as well as hazardous locations. As a Notified Body for the European Hazardous Location Directives, DEMKO verifies that our products comply with the applicable European directives and standards for use in hazardous locations. Refer to the specific product nameplate for the actual hazardous location rating.



CENELEC Intrinsically Safe (IS) Approval

A limited number of Allen-Bradley branded products have CENELEC IS Approval. CENELEC approves products for use in hazardous locations.



Actual CENELEC Approval is indicated by the label on the product, and by statements in the installation publication for the product.

Compliance with European Union Directives

Allen-Bradley branded products covered by European Union Directives are intended for sale and use within the European market and conform to the essential requirements of these directives:

- Products specifically required to do so bear the CE marking per the relevant European Union Directives and CE marking regulations
- Declarations of Conformity for Allen-Bradley branded products are available as required
- The necessary technical documentation is on file within Rockwell Automation.



Actual CE conformity is indicated by the label on the product or its packaging, and not by statements in this catalog or any product literature.

C-Tick Compliance

Allen-Bradley branded products covered by Australian acts are intended for sale and use within the Australian market and conform with the essential requirements of these acts. Declarations of Conformity for Allen-Bradley branded products are available as required.



Actual C-Tick conformity is indicated by the label on the product, and not by statements in this catalog or any product literature.

FM Approved

A limited number of Allen-Bradley branded products have Factory Mutual Approval. FM approves products for general use as well as for use in hazardous locations. Products in this catalog may be FM Approved in one of these two ways:

- FM Class 1 Division 2 Hazardous Location Approval: The product is approved by Factory Mutual Research Corporation for use in Class 1, Division 2, Group A, B, C, and D, or non-hazardous locations only.



Class 1, Division 2, Group A, B, C, D

- FM Approval: The product is approved by Factory Mutual Research Corporation for use with specific FM Approved Class 1, Division 2 products.



Actual FM Approval is indicated by the label on the product, and not by statements in this catalog or any product literature.

ControlNet Conformance

ControlNet International's "Conformance Tested" certification mark is a ControlNet International logo, the authorized use of which indicates that a product has passed conformance testing at an official ControlNet International test lab.



DeviceNet Conformance

The DeviceNet conformance-tested service mark may be placed on a product, its literature, and/or advertising, only after it has successfully passed conformance testing at an official independent test lab of the Open DeviceNet Vendor Association.



Certification for Marine and Off-Shore Applications

If a product or its packaging has a certification for marine and off-shore applications, it is listed in the Marine Certification Applications publication CIG-2.2.

Many Allen-Bradley branded products, such as selected PLC-5 programmable controllers, 1771 I/O, and Dataliner Message Displays, have been certified for use in marine and offshore applications around the world by:

- Lloyd's Register
- Registro Italiano Navale
- Germanischer Lloyd
- Korean Register of Shipping
- American Bureau of Shipping
- Bureau Veritas
- Det Norske Veritas



Contacting Standards Organizations

Use the addresses and phone numbers below to contact the organizations regarding standards that may impact the installation, application and/or interoperability of Allen-Bradley branded products.

American National Standards Institute (ANSI)

Sales Department
11 West 42nd Street
New York, NY 10036
Phone: 212-642-4900
Fax: 212-398-0023
URL: <http://www.ansi.org/>

CSA International

178 Rexdale Boulevard
Etobicoke (Toronto), ON M9W 1R3
Phone: 416-747-4058
Fax: 416-747-4149
e-mail: info@csa.ca
URL: <http://www.csa-international.org>

ControlNet International, Ltd.

20423 State Road 7
Suite 315
Boca Raton, FL 33498
Phone: 561-477-7966
Fax: 561-477-6621
e-mail: controlnet@powerinternet.com
URL: <http://www.controlnet.org>

DEMKO

Lyskaer 8, P.O. Box 514
DK-2730 Herlev
Phone: 45-44-85-6565
Fax: 45-44-85-6500
e-mail: info@demko.dk
URL: <http://www.demko.dk>

European Committee for Electrotechnical Standardization (CENELEC)

Rue de Stassart 35
B-1050 Brussels
Belgium
Phone: 32 2 519 68 71
Fax: 32 2 519 69 19
e-mail: general@cenelec.be
URL: <http://www.cenelec.eu>

Factory Mutual

FM Global Corporate Headquarters
PO Box 7500
Johnston, R.I. 02919
USA
Phone: 877-364-6726
e-mail: information@fmglobal.com
URL: <http://www.fmglobal.com>

Institute of Electrical and Electronics Engineers

(IEEE), Inc.
IEEE Standards Information
445 Hoes Lane
P.O. Box 1331
Piscataway, NJ 08855-1331
Phone: 732-562-3800
Fax: 732-562-1571
e-mail: stds.info@ieee.org
URL: <http://www.ieee.org>

International Association of Classification Societies LTD.

(IACS)
5 Old Queen Street
London SW1H 9JA
United Kingdom
Phone: +44 (0) 171 976 0660
Fax: +44 (0) 171 976 0440
e-mail: permsec@iacs.org.uk
URL: <http://www.iacs.org.uk>

ISA (International Society for Measurement and Control)

ISA
67 Alexander Drive
P.O. Box 12277
Research Triangle Park, NC 27709
Phone: 919-549-8411
Fax: 919-549-8288
e-mail: info@isa.org
URL: <http://www.isa.org>

International Electrotechnical Commission (IEC)

3 Rue de Varembe
P.O. Box 131
1211 Geneva 20
Switzerland
Phone: +41 22 919 02 11
Fax: +41 22 919 03 00
e-mail: info@iec.ch
URL: <http://www.iec.ch/>

International Organization for Standardization (ISO)

ISO Central Secretariat
1 Rue de Varembe
Case Postale 56
CH-1211 Geneva 20
Switzerland
Phone: +41 22 749 01 11
Fax: +41 22 733 34 30
e-mail: central@iso.ch
URL: <http://www.iso.ch/>

National Electrical Manufacturers Association (NEMA)

1300 North 17th Street
Suite 1847
Rosslyn, VA 22209
Phone: 703-841-3200
Fax: 703-841-3300
e-Mail: webmaster@nema.org
URL: <http://www.nema.org/>

National Fire Protection Association (NFPA)

1 Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101
Phone: 800-344-3555
Fax: 617-770-0700
e-mail: library@nfpa.org
URL: <http://www.nfpa.org>

National Institute of Standards and Technology (NIST)

National Center for Standards and Certification Information
100 Bureau Drive, Stop 3460
Gaithersburg, MD 20899
Phone: 301-975-6478
e-Mail: inquiries@nist.gov
URL: <http://www.nist.gov/>

Open DeviceNet Vendors Association, Inc. (ODVA)

20423 State Road 7
Suite 499
Boca Raton, FL 33498
Phone: 954-340-5412
Fax: 954-340-5413
e-mail: odva@powerinternet.com
URL: <http://www.odva.org>

Standards Council of Canada

Standards Sales Section
45 O'Connor Street
Suite 1200
Ottawa, ON K1P 6N7
Phone: 613-238-3222 or 800/267-8220 (in Canada)
Fax: 613-995-4564
e-Mail: info@scc.ca
URL: <http://www.scc.ca/>

TÜV Süddeutschland

TÜV America Inc.
5 Cherry Hill Drive
Danvers, MA 01923
Toll Free in US: 800-TUV-0123
Phone: 978-739-7000
Fax: 978-777-8441
URL: <http://www.tuvglobal.com>

Underwriters Laboratories, Inc. (UL)

333 Pfingsten Road
Northbrook, IL 60062-2096
Phone: 847-272-8800
Fax: 847-272-8129
e-Mail: northbrook@ul.com
URL: <http://www.ul.com/>

NEMA Enclosures

Enclosure Selection Criteria

Enclosures for Nonhazardous Locations

For a Degree of Protection Against:	Designed to Meet Tests No. ①	Type								
		For Indoor Use			Outdoor Use		Indoor or Outdoor			
		1	12	13	3R	3	4	4X	6P	
Incidental contact with enclosed equipment	6.2	✓	✓	✓	✓	✓	✓	✓	✓	✓
Falling dirt	6.2	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rust	6.8	✓	✓	✓	✓	✓	✓	✓	✓	✓
Circulating dust, lint, fibers and flyings ②	6.5.1.2 (2)		✓	✓		✓	✓	✓	✓	✓
Windblown dust	6.5.1.1 (2)					✓	✓	✓	✓	✓
Falling liquids and light splashing	6.3.2.2		✓	✓		✓	✓	✓	✓	✓
Rain (Test evaluated per 6.4.2.1)	6.4.2.1				✓	✓	✓	✓	✓	✓
Rain (Test evaluated per 6.4.2.2)	6.4.2.2					✓	✓	✓	✓	✓
Snow and sleet	6.6.2.2				✓	✓	✓	✓	✓	✓
Hosedown and splashing water	6.7						✓	✓	✓	✓
Occasional prolonged submersion	6.11 (2)									✓
Oil and coolant	6.3.2.2		✓	✓						
Oil or coolant spraying and splashing	6.12			✓						
Corrosive agents	6.9				✓	✓		✓	✓	✓

① See below for abridged description of NEMA enclosure test requirements. Refer to NEMA Standards Publication No. 250 for complete test specifications.

② Nonhazardous materials, not Class III ignitable or combustible.

NEMA Enclosures/IEC Enclosures

NEMA Enclosures

Selection Criteria

Enclosures for Hazardous Locations (Division 1 or 2) ❶

For A Degree of Protection Against Atmospheres Typically Containing: ❸	Designed to Meet Tests: ❷	Class (National Electrical Code)	Type							
			7, Class I Group:				9, Class II Group:			
			A	B	C	D	E	F	G	
Acetylene	Explosion Test	I	✓							
Hydrogen, Manufactured Gas		I	✓	✓						
Diethyl Ether, Ethylene, Hydrogen Sulfide	Hydrostatic Test	I			✓					
Acetone, Butane, Gasoline, Propane, Toluene		I			✓	✓				
Metal dusts and other combustible dusts with resistivity of less than 10 ⁵ ohm-cm.	Dust Penetration Test	II					✓			
Carbon black, charcoal, coal or coke dusts with resistivity between 10 ² - 10 ⁸ ohm-cm.		II							✓	
Combustible dusts with resistivity of 10 ⁵ ohm-cm or greater.	Temperature Test with Dust Blanket	II								✓
Fibers, flyings	❹	III								✓

❶ For indoor locations only unless cataloged with additional NEMA Type enclosure number(s) suitable for outdoor use as shown in table on page General-10. Some control devices (if so listed in the catalog) are suitable for **Division 2** hazardous location use in enclosures for non-hazardous locations. For explanation of CLASSES, DIVISIONS and GROUPS, refer to the National Electrical Code.
Note: Classifications of hazardous locations are subject to the approval of the authority having jurisdiction. Refer to the National Electrical Code.

- ❷ See abridged description of test requirements below. For complete requirements, refer to UL Standard 698, compliance with which is required by NEMA enclosure standards.
- ❸ For listing of additional materials and information noting the properties of liquids, gases and solids, refer to NFPA 497M-1991, Classification of Gases, Vapors, and Dusts for Electrical Equipment in Hazardous (Classified) Locations.
- ❹ UL 698 does not include test requirements for Class III. Products that meet Class II, Group G requirements are acceptable for Class III.

IEC Enclosure Classification

The degree of protection is indicated by two letters (IP) and two numerals. International Standard IEC 529 contains descriptions and associated test requirements that define the degree of protection each numeral specifies. The following table indicates the *general* degree of protection—refer to Abridged Descriptions of IEC Enclosure Test Requirements below. **For complete test requirements refer to IEC 529.**

First Numeral ❸		Second Numeral ❸	
Protection of persons against access to hazardous parts and protection against penetration of solid foreign objects.		Protection against ingress of water under test conditions specified in IEC 529.	
0	Nonprotected	0	Nonprotected
1	Back of hand; objects greater than 50 mm (1.97 in.) diameter	1	Vertically falling drops of water
2	Finger; objects greater than 12.5 mm (0.49 in.) diameter	2	Vertically falling drops of water with enclosure tilted 15°
3	Tools or objects greater than 2.5 mm (0.1 in.) diameter	3	Spraying water
4	Tools or objects greater than 1.0 mm (0.04 in.) diameter	4	Splashing water
5	Dust-protected (dust may enter during specified test but must not interfere with operation of the equipment or impair safety)	5	Water jets
6	Dusttight (no dust observable inside enclosure at end of test)	6	Powerful water jets
		7	Temporary submersion
		8	Continuous submersion
		9	Close range high pressure washdown

Example: IP41 describes an enclosure that is designed to protect against the entry of tools or objects greater than 1mm in diameter and to protect against vertically dripping water under specified test conditions.

Note: All first numerals and second numerals up to and including characteristic numeral 6, imply compliance also with the requirements for all lower characteristic numerals in their respective series (first or second). Second numerals 7 and 8 do **not** imply suitability for exposure to water jets (second characteristic numeral 5 or 6) unless dual coded; e.g., IP_5/IP_7.

- ❸ The IEC standard permits use of certain supplementary letters with the characteristic numerals, e.g., IP69K (K signifies high temperature water).

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Quick Selection Guide

Specifications	 42EF RightSight™	 42KL MiniSight™	 44R AccuSight™	 42CA 18 mm Cylindrical
Features	<ul style="list-style-type: none"> Patented housing design with 1200 psi washdown rating Universal 18 mm and thru-hole mounting options 360° visible status indicators DC only and universal supply models Variety of sensing modes Variety of output types 	<ul style="list-style-type: none"> Industry standard housing design with 1200 psi washdown rating Universal 18 mm and thru-hole mounting options 360° visible status indicators 2- and 3-wire models Variety of sensing modes 2 m cable and micro QD connections 	<ul style="list-style-type: none"> Patented status indicators Low profile housing design Universal 18 mm and thru-hole mounting options 360° visible status indicators Low voltage DC operation Variety of sensing modes 2 m cable and micro QD connections 	<ul style="list-style-type: none"> Industry standard 18 mm housing design Patented ASIC design offers linear sensitivity adjustment, stability indication, and excellent noise immunity Stability Indication for ease of alignment and forewarning against detection of background Complementary light/dark outputs
Applications	<ul style="list-style-type: none"> Medium range, general purpose sensing Washdown applications 	<ul style="list-style-type: none"> Medium range, general purpose sensing Washdown applications 	<ul style="list-style-type: none"> Medium range, general purpose sensing Conveyors 	<ul style="list-style-type: none"> Medium range, general purpose sensing Embedded mounting
Sensing Modes and Max. Range	<ul style="list-style-type: none"> Polarized retroreflective 3 m (10 ft) Retroreflective 4.5 m (14.7 ft) Diffuse 500 mm (20 in.) Background suppression 50 mm (2 in.), 100 mm (4 in.) Transmitted beam 20 m (60 ft), 4 m (13 ft), 8 m (26 ft) Large aperture fiber optic Sharp cutoff diffuse 130 mm (5 in.) 	<ul style="list-style-type: none"> Retroreflective 5 m (16.4 ft) or 2.5 m (8.2 ft) Polarized retroreflective 2 m (6.6 ft) or 1 m (3.3 ft) Diffuse 380 mm (15 in.) or 190 mm (7.5 in.) Wide angle diffuse 180 mm (7 in.) or 90 mm (3.5 in.) Fixed focus diffuse 43 mm (1.7 in.) or 16 mm (0.63 in.) Transmitted beam 30 m (98 ft) or 10 m (33 ft) Large aperture fiber optic Small aperture fiber optic 	<ul style="list-style-type: none"> Polarized retroreflective 3 m (10 ft) Diffuse 300 mm (12 in.) Wide angle diffuse 200 mm (7.8 in.) 	<ul style="list-style-type: none"> Retroreflective 4.8 m (15.7 ft) and 7 m (23 ft) Polarized retroreflective 3.8 m (12.5 ft) Diffuse 100, 400 and 1000 mm (3.94, 15.75, and 39.37 in.) Transmitted Beam 16 m (52.5 ft)
Operating Voltage	<ul style="list-style-type: none"> 10.8...30V DC 21.6...264V AC/DC 	<ul style="list-style-type: none"> 10.8...30V DC 21.6...250V AC/DC 	<ul style="list-style-type: none"> 10...30V DC 	<ul style="list-style-type: none"> 10...30V DC
Output Type	<ul style="list-style-type: none"> NPN or PNP 100 mA Dual NPN/PNP 100 mA MOSFET 100 mA 	<ul style="list-style-type: none"> Dual NPN/PNP 100 mA 2-wire AC 100 mA 	<ul style="list-style-type: none"> NPN or PNP 100 mA NPN and PNP 100 mA 	<ul style="list-style-type: none"> NPN or PNP 100 mA
Response Time	<ul style="list-style-type: none"> 1...16 ms 	<ul style="list-style-type: none"> DC = 1 ms DC high speed=300 μs AC = 8.3 ms 	<ul style="list-style-type: none"> 10 ms 	<ul style="list-style-type: none"> 1 ms 0.5 ms (background suppression)
Connections	<ul style="list-style-type: none"> 300V PVC cable 2 m Micro and pico QD 	<ul style="list-style-type: none"> 300V PVC cable 2 m Micro and pico QD 	<ul style="list-style-type: none"> 300V PVC cable 2 m Micro QD (6 in.) pigtail 	<ul style="list-style-type: none"> 2 m cable Micro QD
Enclosure	<ul style="list-style-type: none"> Mindel, Acrylic NEMA 4X, 6P; IP67, IP69K 1200 psi washdown 	<ul style="list-style-type: none"> Noryl®, Acrylic NEMA 4X, 6P; IP67 1200 psi washdown 	<ul style="list-style-type: none"> Valox® NEMA 12; IP51 	<ul style="list-style-type: none"> PBT IP67
Additional Info	<ul style="list-style-type: none"> See page 1-31 	<ul style="list-style-type: none"> See page 1-40 	<ul style="list-style-type: none"> See page 1-48 	<ul style="list-style-type: none"> See page 1-52





 <p>42CM 18 mm Metal Cylindrical</p>	 <p>42CF 12 mm Metal Cylindrical</p>	 <p>Series 9000 Standard and Timing</p>	 <p>44B Adjustable Background and Foreground Suppression</p>	 <p>42BT Long Range Background Suppression</p>
<ul style="list-style-type: none"> • 18 mm industry standard package • Wide selection of sensing modes • 30V DC operation • NPN or PNP outputs • Fast response time • Variety of connection types 	<ul style="list-style-type: none"> • Industry standard 12 mm housing design • Durable metal housing • Low voltage DC operation • Fast response time • Variety of sensing modes • 2 m cable and micro QD connections 	<ul style="list-style-type: none"> • Industry standard housing design with 1200 psi washdown rating • Universal 30 mm and thru-hole mounting options • 360° visible status indicators • DC and AC only models • Variety of sensing modes • Variety of output types 	<ul style="list-style-type: none"> • Adjustable background and Foreground suppression models • Power, output and stability status indication • Micro QD connection with 90° swivel 	<ul style="list-style-type: none"> • Adjustable long range background suppression sensing mode • Industry accepted housing design • 360° visible status indicators • Low voltage DC operation • Dual NPN and PNP outputs • 2 m cable, pico and micro QD connections
<ul style="list-style-type: none"> • Short range, general purpose sensing • Embedded mounting 	<ul style="list-style-type: none"> • Short range, general purpose sensing • Embedded mounting 	<ul style="list-style-type: none"> • Long range, general purpose sensing • Washdown applications 	<ul style="list-style-type: none"> • Medium range background suppression, foreground suppression • Material handling and packaging applications 	<ul style="list-style-type: none"> • Long range, background suppression sensing • Light duty industrial environments
<ul style="list-style-type: none"> • Retroreflective 3 mm...4 m (0.12 in...13.2 ft) • Polarized retroreflective 3 mm...3 m (0.12 in...9.9 ft) • Standard diffuse 0...100 mm (3.9 in.) (Adjustable) and 0...400 mm (13.6 in.) (Adjustable) • Background Suppression 50 mm (1.97 in.) and 100 mm (3.9 in.) • Transmitted beam 3 mm...14 m (0.12 in...45.9 ft) (Adjustable) 	<ul style="list-style-type: none"> • Polarized retroreflective 2 m (6.6 ft) • Standard diffuse 100 mm (3.9 in.) and 300 mm (11.8 in.) • Transmitted beam 4 m (13.1 ft) 	<ul style="list-style-type: none"> • Retroreflective 9.14 m (30 ft) • Polarized retroreflective 5 m (16 ft) • Standard diffuse 1.5 m (5 ft) • Long range diffuse 3 m (10 ft) • Transmitted beam 61 m (200 ft) • Long range transmitted beam 152 m (500 ft) • Large aperture fiber optic • Small aperture fiber optic 	<ul style="list-style-type: none"> • Background suppression 300 mm (11.8 in.) • Foreground suppression 200 mm (7.87 in.) 	<ul style="list-style-type: none"> • 1 m or 2 m (3.28 or 6.56 ft) mechanically adjusted background suppression
<ul style="list-style-type: none"> • 10...30V DC 	<ul style="list-style-type: none"> • 10...30V DC 	<ul style="list-style-type: none"> • 10...40V DC • 10...55V DC; 20...40V AC • 70...264V AC/DC • 45...264V AC; 40...264V DC 	<ul style="list-style-type: none"> • 20...30V DC 	<ul style="list-style-type: none"> • 12...24V DC
<ul style="list-style-type: none"> • NPN or PNP 100 mA 	<ul style="list-style-type: none"> • NPN or PNP 100 mA 	<ul style="list-style-type: none"> • NPN and PNP 250 mA • EM relay 2 A • Isolated NO solid state 300 mA 	<ul style="list-style-type: none"> • NPN and PNP 100 mA 	<ul style="list-style-type: none"> • NPN or PNP 100 mA
<ul style="list-style-type: none"> • 2 ms (0.5 ms for background suppression) 	<ul style="list-style-type: none"> • 1.25...2.0 ms 	<ul style="list-style-type: none"> • 2...15 ms 	<ul style="list-style-type: none"> • 1 ms 	<ul style="list-style-type: none"> • 2 ms
<ul style="list-style-type: none"> • 2 m cable • 4-pin DC micro QD 	<ul style="list-style-type: none"> • 300V PVC cable 2 m • Micro QD 	<ul style="list-style-type: none"> • 300V PVC cable 2 m • Mini QD • Micro QD 	<ul style="list-style-type: none"> • Micro QD 	<ul style="list-style-type: none"> • 300V PVC cable 2 m • Pico QD • Micro QD
<ul style="list-style-type: none"> • Nickel-plated brass • IP67 	<ul style="list-style-type: none"> • Nickel-plated brass • IP67 	<ul style="list-style-type: none"> • Valox® • NEMA 3, 4X, 6P, 12 & 13; IP67, IP69K • 1200 psi washdown 	<ul style="list-style-type: none"> • Acrylic • NEMA 3, 4X, 6P, 12, 13, IP67 	<ul style="list-style-type: none"> • Polyarylate • IP65
<ul style="list-style-type: none"> • See page 1-57 	<ul style="list-style-type: none"> • See page 1-62 	<ul style="list-style-type: none"> • See page 1-65 	<ul style="list-style-type: none"> • See page 1-72 	<ul style="list-style-type: none"> • See page 1-76






Quick Selection Guide

Specifications	 42BC Long Range Background Suppression	 42BA Short-Range Background Suppression	 42JS VisiSight™	 42KA Subminiature Flat Pack
Features	<ul style="list-style-type: none"> Adjustable long range background suppression sensing mode Industry accepted housing design 360° visible status indicators DC and AC only models Transistor or EM-Relay output models Screw terminal connections 	<ul style="list-style-type: none"> Adjustable short range background suppression sensing mode Industry accepted housing design 360° visible status indicators Low voltage DC operation Fast response time Diagnostic output 2 m cable connections 	<ul style="list-style-type: none"> Visible light source offered on all models for ease of alignment Patented ASIC design offers linear sensitivity adjustment, stability indication and excellent noise immunity Compact sealed housing and cavity-free design to minimize collection of dust and debris while allowing for easy sensor cleanup 	<ul style="list-style-type: none"> Subminiature form factor Side and end-view options High visibility LED status indicators Variety of sense modes Low voltage DC operation 2 m cable connection
Applications	<ul style="list-style-type: none"> Long range, background suppression sensing Light duty industrial environments 	<ul style="list-style-type: none"> Short range, background suppression sensing Small parts assembly 	<ul style="list-style-type: none"> Medium range, general purpose sensing Material handling, packaging and assembly 	<ul style="list-style-type: none"> Short range general purpose sensing Small parts assembly
Sensing Modes and Max. Range	<ul style="list-style-type: none"> Background Suppression 1 m (3.3 ft) and 2 m (6.6 ft) 	<ul style="list-style-type: none"> Sharp cutoff diffuse: small sensor 3...5 cm (1.18...1.97 in.); large sensor 10...20 cm (3.94...7.87 in.) 	<ul style="list-style-type: none"> Polarized retroreflective 3.5 m (11.5 ft) Diffuse 800 mm (31.5 in.) Transmitted Beam: Red LED source 10 m (32.8 ft) Infrared LED source 10 m (32.8 ft) 	<ul style="list-style-type: none"> Standard diffuse 3...5 cm (1.18...1.97 in.) Sharp cutoff diffuse 3 cm (1.18 in.) Transmitted beam 50 cm (19.7 in.)
Operating Voltage	<ul style="list-style-type: none"> 12...24V DC ±10% 30 mA 24...240V AC/DC ±10% 30 mA (DC) 15 mA (AC) 	<ul style="list-style-type: none"> 11...26V DC 	<ul style="list-style-type: none"> 10...30V DC 	<ul style="list-style-type: none"> 12...24V DC 24V DC ±10% (transmitted beam)
Output Type	<ul style="list-style-type: none"> NPN/PNP Selectable 100 mA S.P.S.T. N.O. Relay 3A (250V AC, 750V A) 3A (30V DC, 90 W) 	<ul style="list-style-type: none"> NPN: 100 mA stability - 50 mA PNP: 100 mA 	<ul style="list-style-type: none"> NPN or PNP 100 mA 	<ul style="list-style-type: none"> NPN or PNP 80 mA
Response Time	<ul style="list-style-type: none"> 20 ms 30 ms 	<ul style="list-style-type: none"> 0.35 ms 	<ul style="list-style-type: none"> 1 ms 	<ul style="list-style-type: none"> 0.5 ms
Connections	<ul style="list-style-type: none"> Screw terminals accepts up to two 16 AWG (1.3 mm sq.) conductors 	<ul style="list-style-type: none"> 300V PVC cable 2 m 	<ul style="list-style-type: none"> 2 m cable Micro QD Pico QD 	<ul style="list-style-type: none"> 300V PVC cable 2 m
Enclosure	<ul style="list-style-type: none"> Polycarbonate NEMA 1, 12, 13 IP65 (IEC529) 	<ul style="list-style-type: none"> Polyarylate/ABS NEMA 1, 4, 6P, 12 & 13; IP67 	<ul style="list-style-type: none"> ABS/PMMA IP67 	<ul style="list-style-type: none"> Polyester NEMA 1 & IP40
Additional Info	<ul style="list-style-type: none"> See page 1-78 	<ul style="list-style-type: none"> See page 1-81 	<ul style="list-style-type: none"> See page 1-84 	<ul style="list-style-type: none"> See page 1-88

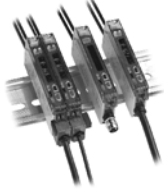



 <p>42KB Micro Rectangular</p>	 <p>42KC Miniature Rectangular</p>	 <p>Series 7000 Miniature Rectangular</p>	 <p>Series 7000 LTD Miniature Rectangular</p>	 <p>42EF LaserSight™ RightSight™</p>
<ul style="list-style-type: none"> Industry standard form factor Diagnostic output High visibility LED status indicator Variety of sense modes Low voltage DC operation 2 m cable or pico QD connections 	<ul style="list-style-type: none"> Industry standard form factor Diagnostic output High visibility LED status indicator Variety of sense modes Low voltage DC operation 2 m cable or pico QD connections 	<ul style="list-style-type: none"> Industry standard form factor High visibility LED status indicator Variety of sense modes Complimentary light/dark outputs Low voltage DC operation 2 m cable or micro QD connections 	<ul style="list-style-type: none"> Economy with performance Industry standard form factor High visibility LED status indicator Standard sense modes Low voltage DC operation 2 m cable or micro QD connections 	<ul style="list-style-type: none"> Universal 18 mm and thru-hole mounting options 360° visible status indicators Class 1 eye-safe visible laser
<ul style="list-style-type: none"> Short range general purpose sensing Small parts assembly 	<ul style="list-style-type: none"> Short range general purpose sensing Small parts assembly 	<ul style="list-style-type: none"> Short range general purpose sensing Small parts assembly 	<ul style="list-style-type: none"> Short range general purpose sensing Small parts assembly 	<ul style="list-style-type: none"> Medium range, general purpose sensing Material handling, assembly and packaging
<ul style="list-style-type: none"> Retroreflective 2 m (6.56 ft) Standard diffuse 70/200/300/400 mm (2.75/7.87/11.81/15.75 in.) Transmitted beam 1/7/10 m (3.3/22.75/32.8 ft) Sharp cutoff diffuse 30/40 mm (0.18/1.57 in.) 	<ul style="list-style-type: none"> Polarized retroreflective 1.5 m (5 ft) Standard diffuse 50 cm (19.68 in.) Transmitted beam 7 m (22.96 ft) 	<ul style="list-style-type: none"> Retroreflective 3.66 m (12 ft) Polarized retroreflective 1.98 m (6.5 ft) Standard diffuse 0.30 m (12 in.) Wide angle diffuse 0.28 m (11 in.) Fixed focus diffuse 17.8 mm (0.60 in.) Transmitted beam 7.62/9.15 m (25/30 ft) Small aperture fiber optic Transparent object detection 	<ul style="list-style-type: none"> Retroreflective 0.76/2.13/3.65 m (2.5/7/12 ft) Standard diffuse 0.30 m (12 in.) Antiglare retroreflective 1/2 m (3.28/6.5 ft) 	<ul style="list-style-type: none"> Polarized retroreflective 15 m (49 ft) Diffuse 300 mm (11.8 in.) Transmitted Beam 40 m (131 ft)
<ul style="list-style-type: none"> 11...26V DC 	<ul style="list-style-type: none"> 11...26V DC 	<ul style="list-style-type: none"> 11...28V DC 	<ul style="list-style-type: none"> 11...28V DC 	<ul style="list-style-type: none"> 10...30V DC
<ul style="list-style-type: none"> NPN or PNP 100 mA 	<ul style="list-style-type: none"> NPN or PNP 100 mA 	<ul style="list-style-type: none"> NPN or PNP 100 mA 	<ul style="list-style-type: none"> NPN or PNP 100 mA 	<ul style="list-style-type: none"> NPN and PNP 100 mA
<ul style="list-style-type: none"> 0.35 ms 	<ul style="list-style-type: none"> 0.5 ms 	<ul style="list-style-type: none"> 0.5...1 ms 	<ul style="list-style-type: none"> 1 ms 	<ul style="list-style-type: none"> 1 ms (4 ms for transmitted beam)
<ul style="list-style-type: none"> 300V PVC cable 2 m Pico QD 	<ul style="list-style-type: none"> 300V PVC cable 2 m 	<ul style="list-style-type: none"> PVC cable 3 m Micro QD 	<ul style="list-style-type: none"> PVC cable 3 m Micro QD 	<ul style="list-style-type: none"> 2 m cable Micro QD
<ul style="list-style-type: none"> Polyarylate NEMA 1, 4, 6, 12 & 13; IP67 	<ul style="list-style-type: none"> Polyarylate NEMA 1, 4, 6P, 12 & 13; IP67 	<ul style="list-style-type: none"> Valox® NEMA 3, 4X, 6P, 12 & 13; IP67 	<ul style="list-style-type: none"> Valox® NEMA 12 & 13; IP62 	<ul style="list-style-type: none"> Mindel/Acrylic IP54
<ul style="list-style-type: none"> See page 1-92 	<ul style="list-style-type: none"> See page 1-98 	<ul style="list-style-type: none"> See page 1-102 	<ul style="list-style-type: none"> www.ab.com/catalogs 	<ul style="list-style-type: none"> See page 1-108






Quick Selection Guide

Specifications	 Series 9000 LaserSight™	 42CM 18 mm Cylindrical LaserSight™	 45MLD Laser Background Suppression	 45CPD Analog and Discrete Output
Features	<ul style="list-style-type: none"> • Class 2 visible red laser source • Polarized retroreflective and transmitted beam sensing modes • Industry standard housing design with 1200 psi washdown rating • Universal 30 mm and thru-hole mounting options • 360° visible status indicators • DC and AC only models 	<ul style="list-style-type: none"> • Industry standard 18 mm housing design • Metal housing for heavy duty industrial applications • Class 1 eye safe visible laser • Small spot size 	<ul style="list-style-type: none"> • Short range laser background suppression sensing mode • Adjustable sensing range and beam focus (0.5 mm (0.02 in.)) • Industry accepted housing design • Low voltage DC operation • Fast response time • Pico QD connections 	<ul style="list-style-type: none"> • Multiple programming modes (object detection, object position) • Easy set-up using teach-in buttons • Class 1 eye safe visible laser for operation • Class 2 visible red laser for set-up
Applications	<ul style="list-style-type: none"> • Long range, general purpose sensing • Small parts placement 	<ul style="list-style-type: none"> • Medium range, general purpose sensing • Embedded mounting 	<ul style="list-style-type: none"> • Short range, precise sensing • Small parts assembly 	<ul style="list-style-type: none"> • Long range, general purpose analog sensing • Object positioning, analog measuring
Sensing Modes and Max. Range	<ul style="list-style-type: none"> • Polarized retroreflective 40 m (130 ft) • Transmitted beam 300 m (1000 ft) 	<ul style="list-style-type: none"> • Polarized retroreflective 30 m (98 ft) • Diffuse 300 mm (11.8 in.) • Transmitted Beam 50 m (164 ft) 	<ul style="list-style-type: none"> • Background suppression diffuse 50...300 mm (1.9...11.8 in.) 	<ul style="list-style-type: none"> • Diffuse 6 m (20 ft)
Operating Voltage	<ul style="list-style-type: none"> • 10...40V DC • 70...264V AC/DC 	<ul style="list-style-type: none"> • 10...30V DC 	<ul style="list-style-type: none"> • 10...30V DC 	<ul style="list-style-type: none"> • 18...30V DC
Output Type	<ul style="list-style-type: none"> • NPN and PNP 250 mA • Em-Relay 2 A 	<ul style="list-style-type: none"> • NPN or PNP 100 mA 	<ul style="list-style-type: none"> • NPN or PNP 100 mA 	<ul style="list-style-type: none"> • Analog output: 4...20 mA; • Discrete: two PNP outputs
Response Time	<ul style="list-style-type: none"> • 500 μsec...15 ms 	<ul style="list-style-type: none"> • 0.7 ms 	<ul style="list-style-type: none"> • 200 μsec 	<ul style="list-style-type: none"> • Fast/slow: 13 ms/30 ms
Connections	<ul style="list-style-type: none"> • 300V PVC cable 2 m • Mini QD • Micro QD 	<ul style="list-style-type: none"> • 2 m cable • Micro QD 	<ul style="list-style-type: none"> • 4-pin pico QD 	<ul style="list-style-type: none"> • Micro QD
Enclosure	<ul style="list-style-type: none"> • Valox®, Acrylic • NEMA 3, 4X, 6P, 12 & 13; IP67 	<ul style="list-style-type: none"> • Nickel-plated brass/glass • IP67 	<ul style="list-style-type: none"> • Polyamide • IP65 	<ul style="list-style-type: none"> • ABS/PMMA • IP67
Additional Info	<ul style="list-style-type: none"> • See page 1-112 	<ul style="list-style-type: none"> • See page 1-115 	<ul style="list-style-type: none"> • See page 1-119 	<ul style="list-style-type: none"> • See page 1-121





 45BPD Analog and Discrete Output	 45BRD Analog Output	 42CRC Color Registration	 Series 9000 ColorSight™	 45CLR ColorSight™
<ul style="list-style-type: none"> • Industry accepted 50 mm (1.97 in.) compact enclosure • Self-contained laser measurement solution • Class 2 visible red laser 	<ul style="list-style-type: none"> • Industry accepted 50 mm (1.97 in.) compact enclosure • 20 μm resolution • Class 2 visible red laser • 270° rotatable connector 	<ul style="list-style-type: none"> • Selectable red or green light sources • Manual or teachable operation • Diagnostic output • Fast response time • Selectable pulse stretcher output • Durable IP66 housing design 	<ul style="list-style-type: none"> • Teachable true RGB color sensor • Fiber optic sensing for application flexibility • Industry standard housing design with 1200 psi washdown rating • Universal 30 mm and thru-hole mounting options • 8 color match precision levels • Low voltage DC operation 	<ul style="list-style-type: none"> • Three channel color matching (3 outputs) • Wide sensing range tolerance (±6 mm (±0.24 in.)) • Adjustable tolerance for high precision general color matching • External teach capability • Compact size enclosure • RS-485 communication models available
<ul style="list-style-type: none"> • Medium range, general purpose analog sensing • Object positioning, analog measuring 	<ul style="list-style-type: none"> • Short range, precision general purpose measurement • Object positioning, analog measuring 	<ul style="list-style-type: none"> • High speed contrast sensing • Color registration 	<ul style="list-style-type: none"> • Precise color match sensing • Part inspection and sortation 	<ul style="list-style-type: none"> • Precise color match sensing • Part inspection and sortation
<ul style="list-style-type: none"> • Diffuse 300 mm (11.8 in.) 	<ul style="list-style-type: none"> • Diffuse 85 mm (3.35 in.) 	<ul style="list-style-type: none"> • Color registration mark control 12.7 mm (0.5 in.) 	<ul style="list-style-type: none"> • Large aperture fiber optic 	<ul style="list-style-type: none"> • Diffuse 12...32 mm (0.47...1.26 in.)
<ul style="list-style-type: none"> • 18...30V DC 	<ul style="list-style-type: none"> • 18...30V DC 	<ul style="list-style-type: none"> • 10...30V DC 	<ul style="list-style-type: none"> • 10...30V DC 	<ul style="list-style-type: none"> • 18...30V DC
<ul style="list-style-type: none"> • Analog output: 4...20 mA; Discrete: PNP (100 mA) 	<ul style="list-style-type: none"> • Analog output: 0...10V DC 	<ul style="list-style-type: none"> • NPN and PNP 100 mA • Diagnostic alarm NPN 30 mA 	<ul style="list-style-type: none"> • Bipolar output 	<ul style="list-style-type: none"> • 3 PNP outputs (discrete models) • RS485 models: 1 PNP or 1 NPN output by cat. no.
<ul style="list-style-type: none"> • 0.4 ms 	<ul style="list-style-type: none"> • 30 ms 	<ul style="list-style-type: none"> • 0.25 ms 	<ul style="list-style-type: none"> • Selectable 1.5...16 ms 	<ul style="list-style-type: none"> • 1 ms
<ul style="list-style-type: none"> • Micro QD 	<ul style="list-style-type: none"> • Micro QD 	<ul style="list-style-type: none"> • Micro QD 	<ul style="list-style-type: none"> • 300V PVC cable 2 m • Micro QD 	<ul style="list-style-type: none"> • Micro QD
<ul style="list-style-type: none"> • ABS/PMMA • IP67 	<ul style="list-style-type: none"> • ABS/PMMA • IP67 	<ul style="list-style-type: none"> • Epoxy-coated aluminum • NEMA 3, 4, 6, 12 & 13; IP66 	<ul style="list-style-type: none"> • Valox®, Acrylic • NEMA 4; IP54 	<ul style="list-style-type: none"> • ABS/PMMA • IP67
<ul style="list-style-type: none"> • See page 1-123 	<ul style="list-style-type: none"> • See page 1-125 	<ul style="list-style-type: none"> • See page 1-127 	<ul style="list-style-type: none"> • See page 1-130 	<ul style="list-style-type: none"> • See page 1-134





Quick Selection Guide

Specifications	 45FVL Digital Fiber Optic	 45FSL Slim DIN-Rail Fiber Optic	 42FT 42FT Visible Red or Green Plastic Fiber Optic	 42FA Slim Fiber Optic
Features	<ul style="list-style-type: none"> Teachable contrast sensor Accepts all plastic fiber optic cables Automatic and manual configuration with LCD display Red, green, blue, and white light source models "Power bus" feature reduces wiring DIN Rail mountable housing design 	<ul style="list-style-type: none"> Adjustable plastic fiber optic contrast sensor Fast response time Red or white light source models "Power bus" feature reduces wiring Crosstalk protection DIN Rail mountable housing design 	<ul style="list-style-type: none"> Red or green light source Local and remote self-teach operation Supports 1.5 mm and 1.25 mm plastic fiber optic cables Selectable pulse-stretcher Selectable hysteresis Dual "RUN" modes to prevent crosstalk with other sensors 	<ul style="list-style-type: none"> In-line fiber optic sensor Accepts all plastic fiber optic cables Fast response time Red light source models Low voltage DC operation DIN Rail mount option
Applications	<ul style="list-style-type: none"> General contrast sensing Color registration, part inspection and sortation 	<ul style="list-style-type: none"> High speed contrast sensing Color registration, part inspection and sortation 	<ul style="list-style-type: none"> General contrast sensing Color registration, part inspection and sortation 	<ul style="list-style-type: none"> Short range sensing Small part assembly
Sensing Modes and Max. Range	<ul style="list-style-type: none"> Retroreflective (bifurcated fiber) Standard diffuse (bifurcated fiber) Transmitted beam (individual fiber) 	<ul style="list-style-type: none"> Retroreflective (bifurcated fiber) Standard diffuse (bifurcated fiber) Transmitted beam (individual fiber) 	<ul style="list-style-type: none"> Small aperture fiber optic 	<ul style="list-style-type: none"> Small aperture fiber optic
Operating Voltage	<ul style="list-style-type: none"> 12...24V DC 	<ul style="list-style-type: none"> 12...24V DC 	<ul style="list-style-type: none"> 12...24V DC 	<ul style="list-style-type: none"> 12...24V DC ±10% 12...24V DC ±10%
Output Type	<ul style="list-style-type: none"> NPN or PNP 100 mA 	<ul style="list-style-type: none"> NPN or PNP 100 mA Stability 100 mA 	<ul style="list-style-type: none"> NPN or PNP by model 	<ul style="list-style-type: none"> NPN 100 mA PNP 100 mA
Response Time	<ul style="list-style-type: none"> 600 μsec 	<ul style="list-style-type: none"> 30 μsec, 250 μsec 	<ul style="list-style-type: none"> 500 μsec 	<ul style="list-style-type: none"> 500 μsec
Connections	<ul style="list-style-type: none"> 300V PVC cable 2 m 4 pin pico QD Power Bus 	<ul style="list-style-type: none"> 300V PVC cable 2 m 4 pin pico QD Power Bus 	<ul style="list-style-type: none"> 2 m 500V 5 conductor cable 	<ul style="list-style-type: none"> 3-pin pico QD
Enclosure	<ul style="list-style-type: none"> ABS NEMA 1 & IP40 	<ul style="list-style-type: none"> ABS NEMA 1 & IP40 	<ul style="list-style-type: none"> ABS resin NEMA 1, 4X, 12, 13; IP66 (IEC 529) 	<ul style="list-style-type: none"> Noryl® NEMA 1, 12, 13; IP65 (IEC 529)
Additional Info	<ul style="list-style-type: none"> See page 1-137 	<ul style="list-style-type: none"> See page 1-139 	<ul style="list-style-type: none"> See page 1-141 	<ul style="list-style-type: none"> See page 1-144





 ClearSight™ Series*	 45LPT Optical Label Sensor	 45LFM Capacitive Label Sensor	 45LSP Optical Fork Sensor	 45LST Optical Fork Sensor
<ul style="list-style-type: none"> Optimized for clear object detection Three types from high performance (Series 9000, * pictured), to economical (RightSight and Series 7000) Washdown rated models DC and AC only models Variety of output types 	<ul style="list-style-type: none"> One-touch local and remote teach operation Industrial aluminum housing design Highly visible LED status indicators Low voltage DC operation Fast response time Pico QD connection 	<ul style="list-style-type: none"> Senses wide variety of label colors and material Industrial aluminum housing design Highly visible LED status indicators Low voltage DC operation Fast response time Micro QD connection 	<ul style="list-style-type: none"> Teach-in sensitivity adjustment Light or dark operate selectable Remote teach capability (4-pin models) Plastic housing 	<ul style="list-style-type: none"> Ideal for small parts detection Manual adjustment with LED status indicators Rugged aluminum construction Seven fork widths to choose from Fast response time Pico QD connections
<ul style="list-style-type: none"> Clear object sensing Plastic and glass bottles, films 	<ul style="list-style-type: none"> Optical label sensing Translucent labels 	<ul style="list-style-type: none"> Capacitive label sensing Translucent, clear, metalized labels 	<ul style="list-style-type: none"> Smart parts detection Beam breakage sensing 	<ul style="list-style-type: none"> Beam breakage sensing Small parts assembly
<ul style="list-style-type: none"> Polarized retroreflective 	<ul style="list-style-type: none"> Transmitted beam (3 mm (0.12 in.) gap) 	<ul style="list-style-type: none"> Capacitive (0.76 mm (0.03 in.) gap) 	<ul style="list-style-type: none"> Transmitted beam gap (30...120 mm (1.18...4.72 in.)) 	<ul style="list-style-type: none"> Transmitted beam (2...225 mm (0.08...8.86 in.) gap)
<ul style="list-style-type: none"> 10...40V DC 40...264V AC/DC 70...264V AC/DC 	<ul style="list-style-type: none"> 10...30V DC 	<ul style="list-style-type: none"> 11...30V DC 	<ul style="list-style-type: none"> 10...30V DC 	<ul style="list-style-type: none"> 10...30V DC
<ul style="list-style-type: none"> NPN and PNP 250 mA SPDT EM relay 2 A Isolated NO solid state 300 mA 	<ul style="list-style-type: none"> NPN or PNP 100 mA 	<ul style="list-style-type: none"> NPN or PNP 150 mA 	<ul style="list-style-type: none"> PNP or NPN 100 mA 	<ul style="list-style-type: none"> NPN or PNP 100 mA
<ul style="list-style-type: none"> 1...10 ms 	<ul style="list-style-type: none"> 50 μsec 	<ul style="list-style-type: none"> 10 μsec 	<ul style="list-style-type: none"> 250 μs 	<ul style="list-style-type: none"> 30 μs...1 ms
<ul style="list-style-type: none"> 300V PVC cable 2 m Mini QD Micro QD 	<ul style="list-style-type: none"> 4-pin pico QD 	<ul style="list-style-type: none"> 5-pin micro QD 	<ul style="list-style-type: none"> Pico QD 	<ul style="list-style-type: none"> 4-pin pico QD
<ul style="list-style-type: none"> Valox®, Acrylic NEMA 3, 4X, 6P, 12 & 13; IP67 	<ul style="list-style-type: none"> Aluminum IP65 	<ul style="list-style-type: none"> Anodized aluminum IP54 	<ul style="list-style-type: none"> Polycarbonate IP67 	<ul style="list-style-type: none"> Aluminum IP65
<ul style="list-style-type: none"> See page 1-147 	<ul style="list-style-type: none"> See page 1-151 	<ul style="list-style-type: none"> See page 1-153 	<ul style="list-style-type: none"> See page 1-155 	<ul style="list-style-type: none"> See page 1-157

Quick Selection Guide

Specifications	 45MLA Measuring Arrays & Controllers	 45DLA Discrete Light Arrays	 45AST Area Arrays	 45PVA Verification Array
Features	<ul style="list-style-type: none"> Height measuring capability Slim profile array housing Long operating range Fast reaction time and measurement speed Controllers available in I/O and serial communications (RS485 and CAN) models 	<ul style="list-style-type: none"> Integrated light array controller Simple, flexible mounting Optically synchronized Wiring selectable range and output state (light/dark operate) 30mm resolution 	<ul style="list-style-type: none"> Two-dimensional array scanning technology 11...17 mm resolution 50, 100, 150 mm scanning height models Durable aluminum housing Bracket-free mounting Low voltage DC operation 	<ul style="list-style-type: none"> 35 mm object resolution Robust aluminum enclosure Four heights to choose from Highly visible JOB and FAULT indicators Crosstalk immunity Low voltage DC operation
Applications	<ul style="list-style-type: none"> Height based measurement and sorting Overheight/overhang detection 	<ul style="list-style-type: none"> Error proofing Part detection 	<ul style="list-style-type: none"> Small parts assembly Parts ejection sensing 	<ul style="list-style-type: none"> Error proofing Bin picking
Sensing Modes and Max. Range	<ul style="list-style-type: none"> Transmitted beam up to 4 m (13 ft) 	<ul style="list-style-type: none"> Transmitted beam upto 8 m (26.2 ft) 	<ul style="list-style-type: none"> Transmitted beam up to 2.5 m (8 ft) 	<ul style="list-style-type: none"> Transmitted Beam 2 m (6.5 ft)
Operating Voltage	<ul style="list-style-type: none"> 12...24V DC 	<ul style="list-style-type: none"> 12...24V DC 	<ul style="list-style-type: none"> 12...24V DC 	<ul style="list-style-type: none"> 12...24V DC
Output Type	<ul style="list-style-type: none"> NPN and PNP or serial communications (selectable by model) 	<ul style="list-style-type: none"> NPN and PNP (single push/pull) 	<ul style="list-style-type: none"> NPN or PNP 100 mA 	<ul style="list-style-type: none"> NPN or PNP 50 mA
Response Time	<ul style="list-style-type: none"> See 45MLA Controller User Manual 	<ul style="list-style-type: none"> 25...165 ms by cat. no. 	<ul style="list-style-type: none"> 4...8 ms 	<ul style="list-style-type: none"> 25...98 ms
Connections	<ul style="list-style-type: none"> PVC cable with 8 pin micro-QD, 500 mm (19.7 in) between array and controller 	<ul style="list-style-type: none"> PVC cable with 4-pin DC micro (M12), 150 mm (6 in.) cable pigtail 	<ul style="list-style-type: none"> 300V PVC cable 2 m 	<ul style="list-style-type: none"> 300V PVC cable with micro QD
Enclosure	<ul style="list-style-type: none"> Arrays: Aluminum housing, polycarbonate lens, IP54 Controller: ABS housing IP54 Terminal strip: IP20 	<ul style="list-style-type: none"> Aluminum housing, polycarbonate lens IP54 	<ul style="list-style-type: none"> Aluminum housing, acrylic window IP67 	<ul style="list-style-type: none"> Aluminum housing, acrylic window IP62
Additional Info	<ul style="list-style-type: none"> See page 1-160 	<ul style="list-style-type: none"> See page 1-166 	<ul style="list-style-type: none"> See page 1-169 	<ul style="list-style-type: none"> See page 1-171

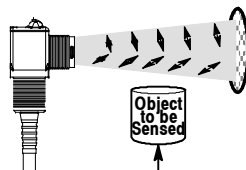
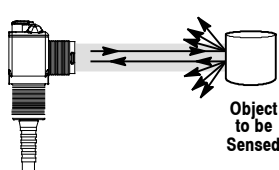
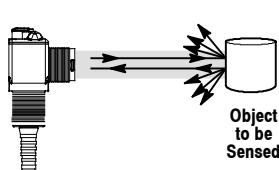
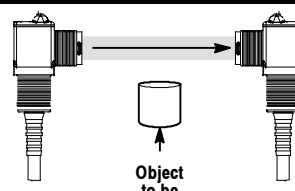
 <p>44N Zone Control Sensor</p>	 <p>22ZC Zone Controller</p>	 <p>Series 9000 Intrinsically Safe</p>	 <p>Series 5000 Intrinsically Safe</p>
<ul style="list-style-type: none"> • Integral zone control logic • Supports singulation and slug operation • Compatible with variety of valves • Polarized retroreflective sense mode • Durable housing and connections • Low voltage DC operation 	<ul style="list-style-type: none"> • Selectable pneumatic or powered roller zone control logic • Selectable advanced zone logic functions • Selectable RUN/STOP delay timers • Accepts mechanical or photoelectric sensor inputs • Drives pneumatic valve or powered roller driver • Proven flat cable IDC technology 	<ul style="list-style-type: none"> • FM approved intrinsically safe design • Transmitted beam sensing mode • Compatible with Series 897H IS barriers • Industry standard housing design with 1200 psi washdown rating • Universal 30 mm and thru-hole mounting options • 360° visible status indicators 	<ul style="list-style-type: none"> • FM approved intrinsically safe design • Multiple sensing modes • Compatible with Series 897H IS barriers • Modular housing design • Screw terminal connections
<ul style="list-style-type: none"> • Zero pressure accumulation conveyors • Pneumatically driven systems 	<ul style="list-style-type: none"> • Accumulation conveyors • Pneumatically and powered roller driven systems 	<ul style="list-style-type: none"> • Intrinsically safe systems • Hazardous (Classified) locations 	<ul style="list-style-type: none"> • Intrinsically safe systems • Hazardous (Classified) locations
<ul style="list-style-type: none"> • Polarized Retroreflective 50.8...4.87 m (2...16 ft) 	<ul style="list-style-type: none"> • Compatible with a wide variety of photoelectric and mechanical switches 	<ul style="list-style-type: none"> • Transmitted Beam • 106 m (350 ft) 	<ul style="list-style-type: none"> • Retroreflective 10 m (33 ft) • Polarized retroreflective 6 m (20 ft) • Standard diffuse 2.1 m (7 ft) • Large aperture fiber optic/fixed focus/wide angle diffuse
<ul style="list-style-type: none"> • 10...30V DC 	<ul style="list-style-type: none"> • 24V DC 	<ul style="list-style-type: none"> • 13...30V DC • 25 mA 	<ul style="list-style-type: none"> • 13...29.5V DC
<ul style="list-style-type: none"> • PNP 100 mA 	<ul style="list-style-type: none"> • Output signal for powered roller and drive for pneumatic valve 	<ul style="list-style-type: none"> • PNP/8.5 mA • NPN/15 mA 	<ul style="list-style-type: none"> • NPN and PNP 20 mA at 29.5V DC
<ul style="list-style-type: none"> • Variable 200 ms...10 s 	<ul style="list-style-type: none"> • 1 ms 	<ul style="list-style-type: none"> • 10 ms max. 	<ul style="list-style-type: none"> • 1 ms
<ul style="list-style-type: none"> • 838 mm (33 in.) pigtail • 381 mm (15 in.) pigtail • Pico (M8) connector 	<ul style="list-style-type: none"> • IDC flat cable 	<ul style="list-style-type: none"> • 2 m 300V cable • 4-pin micro QD • 4-pin mini QD 	<ul style="list-style-type: none"> • Screw terminals
<ul style="list-style-type: none"> • Valox® • NEMA 4, 4X, 6, 12, IP67 	<ul style="list-style-type: none"> • Valox® • NEMA 1, IP20 (IEC 529) 	<ul style="list-style-type: none"> • Valox® • NEMA 3, 4X, 6P, 12, 13, IP67, 1200 psi washdown 	<ul style="list-style-type: none"> • Valox® • NEMA 3, 4, 12, 13 (IP66)
<ul style="list-style-type: none"> • See page 1-177 	<ul style="list-style-type: none"> • See page 1-180 	<ul style="list-style-type: none"> • See page 1-184 	<ul style="list-style-type: none"> • See page 1-187

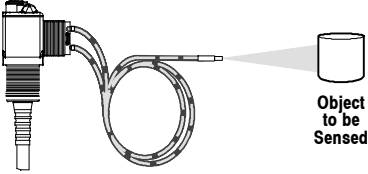
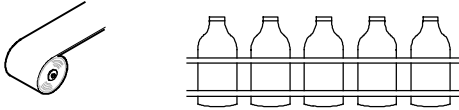
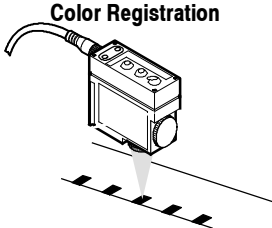
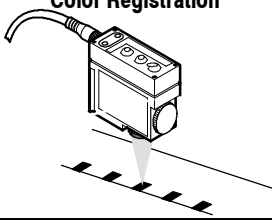
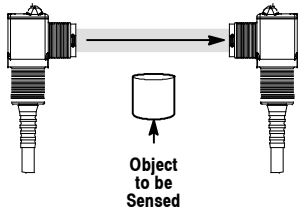

Quick Selection Guide



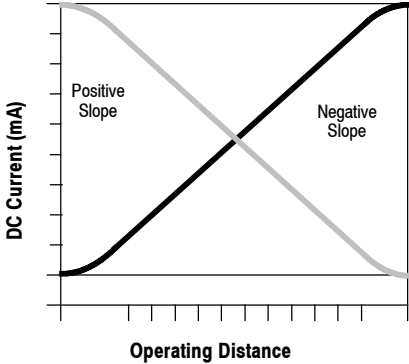
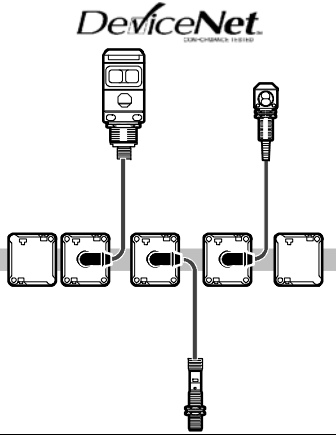
Specifications	 <p>48MS MultiSight™</p>	 <p>Series 9000 Gate Entry</p>	 <p>Series 9000 Diagnostic</p>	 <p>Series 9000 Darkroom</p>
Features	<ul style="list-style-type: none"> Ten or 32 virtual detectors Standalone vision sensor Compact, sturdy industrial housing with IP67 rating Optional EtherNet/IP with RSLogix 5000 Add-On profile for I/O data Multiple evaluation methods: pattern matching, brightness, contrast and contour matching. 	<ul style="list-style-type: none"> UL325 and UL508 approved Industry standard housing design with 1200 psi washdown rating Offered as kits or individual components 	<ul style="list-style-type: none"> Selectable static or dynamic operation Industry standard housing design with 1200 psi washdown rating Universal 30 mm (1.18 in.) and thru-hole mounting options 360° visible status indicators DC and AC only models Variety of sensing modes 	<ul style="list-style-type: none"> 880 nm wavelength for darkroom applications Fast response time Industry standard housing design DC and AC only models Variety of sensing modes Variety of output types
Applications	<ul style="list-style-type: none"> Error proofing applications Packaging, assembly 	<ul style="list-style-type: none"> Automatic access control Vehicle access systems 	<ul style="list-style-type: none"> Long range, general purpose sensing Requirement for diagnostic output 	<ul style="list-style-type: none"> Darkroom, general purpose sensing Film processing
Sensing Modes and Max. Range	<ul style="list-style-type: none"> Vision sensor (infinite depending on lighting conditions) 	<ul style="list-style-type: none"> Retroreflective 9 m (30 ft) Transmitted beam 61 m (200 ft) 	<ul style="list-style-type: none"> Retroreflective 9.14 m (30 ft) Polarized retroreflective 5 m (16 ft) Standard diffuse 1.5 m (5 ft) Transmitted beam 61 m (200 ft) 	<ul style="list-style-type: none"> Retroreflective 9.14 m (30 ft) Standard diffuse 0.91 m (3 ft) Transmitted beam 30 m (100 ft)
Operating Voltage	<ul style="list-style-type: none"> 24V DC 	<ul style="list-style-type: none"> 10...55V DC/20...40V AC 70...264V AC/DC 	<ul style="list-style-type: none"> 10...30V DC 90...264V AC 95...264V DC 	<ul style="list-style-type: none"> 10...40V DC 70...264V AC/DC
Output Type	<ul style="list-style-type: none"> 4 x PNP (200 mA per output) 	<ul style="list-style-type: none"> SPDT EM Relay 	<ul style="list-style-type: none"> Switch selectable NPN and PNP NO—NC 100 mA EM relay: sensor - 2 A diagnostic - 1 A 	<ul style="list-style-type: none"> NPN and PNP 250 mA SPDT EM relay, 2 A
Response Time	<ul style="list-style-type: none"> 50...250 ms 	<ul style="list-style-type: none"> 23 ms 	<ul style="list-style-type: none"> 2...15 ms 	<ul style="list-style-type: none"> 2...23 ms
Connections	<ul style="list-style-type: none"> Power I/O Ethernet 	<ul style="list-style-type: none"> 2 m cable AC mini QD 	<ul style="list-style-type: none"> Mini quick-disconnect Micro quick-disconnect 	<ul style="list-style-type: none"> 300V PVC cable 2 m Mini quick-disconnect Micro quick-disconnect
Enclosure	<ul style="list-style-type: none"> Polycarbonate IP67 	<ul style="list-style-type: none"> Valox/Acrylic NEMA 2, 4, 4X, 6P, IP67, 1200 psi (8270 kPa) washdown 	<ul style="list-style-type: none"> Valox® NEMA 3, 4X, 6P, 12 & 13; IP67 	<ul style="list-style-type: none"> NEMA 3,4X, 6P, 12 & 13; IP67
Additional Info	<ul style="list-style-type: none"> See page 1-191 	<ul style="list-style-type: none"> See page 1-198 	<ul style="list-style-type: none"> See page 1-201 	<ul style="list-style-type: none"> www.ab.com/catalogs

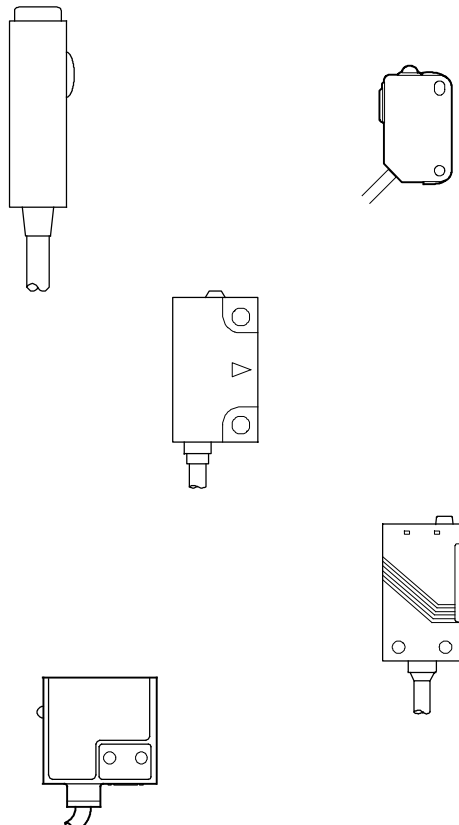
 <p>Series 6000 Compact</p>	 <p>Series 5000 Modular</p>	 <p>Series 4000B Long Range</p>	 <p>Series 10,000 Teachable</p>
<ul style="list-style-type: none"> • Compact cylindrical housing design • Manual sensitivity adjustment • Dual NPN and PNP outputs • Variety of sense modes • DC and AC only models • 2 m cable and micro QD connections 	<ul style="list-style-type: none"> • Multiple connection base and photohead options • Multiple plug-in output modules • Multiple plug-in logic modules • DC and AC only models 	<ul style="list-style-type: none"> • Durable housing design • DC and AC only models • Variety of sensing modes • Multiple plug-in output modules • Multiple plug-in logic modules • Screw terminal connections 	<ul style="list-style-type: none"> • Manual or teachable operation • LCD display for easy setup • Automatic sensitivity control with diagnostic output • Industry standard housing design with 1200 psi washdown rating • Low voltage DC operation • Variety of sensing modes
<ul style="list-style-type: none"> • Medium range, general purpose sensing • Cold temperature environments 	<ul style="list-style-type: none"> • Long range, general purpose sensing • Modular approach for maximum flexibility 	<ul style="list-style-type: none"> • Long range, general purpose sensing • Harsh duty installations 	<ul style="list-style-type: none"> • Precise contrast sensing • Small parts assembly
<ul style="list-style-type: none"> • Retroreflective 8.5 m (28 ft) • Polarized retroreflective 3 m (10 ft) • Standard diffuse 0.76 m (30 in.) • Wide angle diffuse 0.46 m (18 in.) • Fixed focus diffuse 27.9 mm (1.1 in.) • Transmitted beam 36.5 m (120 ft) • Large aperture fiber optic • Small aperture fiber optic • Sharp cutoff diffuse 0.25...7.6 cm (0.1...3 in.) 	<ul style="list-style-type: none"> • Retroreflective 6...10 m (20...33 ft) • Polarized retroreflective 6 m (20 ft) • Standard diffuse 1.5...3 m (5...10 ft) • Background suppression diffuse 6.3...30.5 cm (2.5...12 in.) • Wide angle diffuse 0.46 m (18 in.) • Fixed focus diffuse 50.8 mm (2.0 in.) • Large aperture fiber optic 	<ul style="list-style-type: none"> • Retroreflective 10.6 m (35 ft) • Polarized retroreflective 7 m (23 ft) • Standard diffuse 3.6 m (12 ft) • Transmitted beam 274 m (900 ft) 	<ul style="list-style-type: none"> • ClearSight 1.2 m (48 in.) • Retroreflective 9 m (30 ft) • Polarized retroreflective 4.6 m (15 ft) • Standard diffuse 2.7 m (8.9 ft) • Large aperture fiber optic • Small aperture fiber optic • Green fiber optic
<ul style="list-style-type: none"> • 10...30V DC • 20...132V AC/DC • 20...264V AC/DC 	<ul style="list-style-type: none"> • 102...132V AC • 204...254V AC • 10...30V DC • 40...54V AC/DC • 20...30V AC/DC 	<ul style="list-style-type: none"> • 102...132V AC • 195...253V AC • 40...58V AC • 18...28V AC/DC 	<ul style="list-style-type: none"> • 10...30V DC
<ul style="list-style-type: none"> • NPN and PNP 220 mA • Power MOSFET 150...300 mA 	<ul style="list-style-type: none"> • EM relay 2 A • Triac 750 mA • FET 30 mA • NPN and PNP 100 mA 	<ul style="list-style-type: none"> • EM relay 5 A • Triac 1 A • FET 30 mA • NPN 250 mA • DCV 30 mA 	<ul style="list-style-type: none"> • NPN and PNP • Diagnostic alarm, NPN or PNP
<ul style="list-style-type: none"> • 0.2...18 ms 	<ul style="list-style-type: none"> • 1...20 ms 	<ul style="list-style-type: none"> • 5...20 ms 	<ul style="list-style-type: none"> • Selectable 250 μsec...4 ms
<ul style="list-style-type: none"> • PVC cable 3 m 	<ul style="list-style-type: none"> • Vinyl cable 3 m • Screw terminals • Mini QD 	<ul style="list-style-type: none"> • Terminals 	<ul style="list-style-type: none"> • 300V PVC cable 2 m • Mini QD • Micro QD
<ul style="list-style-type: none"> • Noryl® • NEMA 3, 4X 6, 12 & 13; IP67 	<ul style="list-style-type: none"> • Valox® • NEMA 3, 4, 12 & 13; IP66 	<ul style="list-style-type: none"> • Noryl® • NEMA 3, 4, 12 & 13; IP66 	<ul style="list-style-type: none"> • Valox® • NEMA 3, 4X, 6P, 12 & 13; IP67
<ul style="list-style-type: none"> • See page 1-207 	<ul style="list-style-type: none"> • See page 1-213 	<ul style="list-style-type: none"> • See page 1-227 	<ul style="list-style-type: none"> • www.ab.com/catalogs

Product Application Selector

Standard Industrial Application	Sensing Modes	Maximum Sensing Range	Series	Page		
	Retroreflective	4.8 m (15.7 ft)	42CA	1-52		
		7.2 m (23.6 ft)	42CA	1-52		
	Retroreflective	4.5 m (14.7 ft)	RightSight	1-31		
		5 m (16.4 ft)	MiniSight	1-40		
		9 m (30 ft)	Series 9000	1-68		
	Polarized Retroreflective	3 m (9.8 ft)	AccuSight	1-48		
		3 m (9.8 ft)	RightSight	1-31		
		3 m (9.8 ft)	42CA	1-52		
		2 m (6.6 ft)	MiniSight	1-40		
		5 m (16 ft)	Series 9000	1-69		
	Standard Diffuse	500 mm (20 in.)	RightSight	1-31		
		380 mm (15 in.)	MiniSight	1-40		
		380 mm (1.5 in.)	AccuSight	1-48		
		1.5 m (5 ft)	Series 9000	1-69		
		400 mm (13.6 in.)	42CA	1-52		
		100 mm (4 in.)	42CA	1-52		
		1000 mm (39.4 in.)	42CA	1-52		
	Background Suppression	50 mm (2 in.)	RightSight	1-31		
		300 mm (11.8 in.)	44B	1-72		
		100 mm (4 in.)	RightSight	1-31		
		1 m (3.3 ft)	42BT	1-76		
		2 m (6.5 ft)	42BC	1-78		
		1 m (3.3 ft)	42BT	1-76		
		2 m (6.5 ft)	42BC	1-78		
		30 mm (1.2 in.)	42BA	1-81		
		50 mm (2 in.)	42CA	1-52		
		50 mm (2 in.)	42BA	1-81		
		100 mm (4 in.)	42CA	1-52		
		100 mm (4 in.)	42BA	1-81		
		200 mm (8 in.)	42BA	1-81		
	Sharp Cutoff Diffuse	100 mm (4 in.)	AccuSight	1-48		
		130 mm (5 in.)	RightSight	1-31		
		30 mm (1.2 in.)	42KA	1-88		
		30 mm (1.2 in.)	42KB	1-96		
		40 mm (1.6 in.)	42KB	1-96		
			Transmitted Beam	4 m (15 ft)	RightSight	1-31
				16 m (52.5 ft)	42CA	1-52
20 m (65 ft)	RightSight			1-31		
20 m (65 ft)	MiniSight			1-40		
61 m (200 ft)	Series 9000			1-65		
152 m (500 ft)	Series 9000			1-65		

Standard Industrial Application	Sensing Modes	Maximum Sensing Range	Series	Page
	Fiber Optic, Infrared Glass	Varies with FO cable	MiniSight	1-40
		Varies with FO cable	RightSight	1-31
		Varies with FO cable	Series 9000	1-65
	Fiber Optic, Visible Red Plastic	Varies with FO cable	MiniSight	1-40
		Varies with FO cable	Series 9000	1-65
		Varies with FO cable	45FVL	1-137
		Varies with FO cable	42FA	1-144
	Fiber Optic, Visible Green Plastic	Varies with FO cable	45FSL	1-139
		Varies with FO cable	45FVL	1-137
	Fiber Optic, Visible Blue Plastic	Varies with FO cable	45FVL	1-137
Fiber Optic, Visible White Plastic	Varies with FO cable	45FSL	1-139	
	Varies with FO cable	45FVL	1-137	
Clear Bottles, Films 	Clear Object	1.4 m (4.5 ft)	ClearSight 9000	1-147
			ClearSight 10000	1-147
		1.5 m (5 ft)	ClearSight 7000	1-150
		1 m (3.28 ft)	ClearSight RightSight	1-150
Color Registration 	Color Recognition	Up to 25.5 mm (1 in.)	ColorSight	1-130
		12...32 mm (0.4...1.26 in.)	45CLR ColorSight	1-134
Color Registration 	Contrast	Up to 12 mm (0.5 in.)	45FVL	1-137
		12.7 mm (0.5 in.)	42CRC	1-127
Long Range Sensing 	Transmitted Beam	152 m (500 ft)	Series 9000	1-65
	Laser	300 m (1000 ft)	LaserSight	1-112
High Temperature (70...480°C) 	Fiber Optic	Varies with FO cable	45FVL	1-137
	Fiber Optic	Varies with FO cable	42FT	1-141
	Fiber Optic	Varies with FO cable	45FSL	1-139
	Fiber Optic	Varies with FO cable	RightSight	1-31
	Fiber Optic	Varies with FO cable	MiniSight	1-40
		Varies with FO cable	Series 9000	1-65

Standard Industrial Application	Sensing Modes	Maximum Sensing Range	Series	Page
High Speed (250 ms or better) 	Retroreflective	5 m (16.4 ft)	MiniSight	1-40
	Polarized Retroreflective	2 m (6.6 ft)	MiniSight	1-40
	Standard Diffuse	380 mm (15 in.)	MiniSight	1-40
	Wide Angle Diffuse	180 mm (7 in.)	MiniSight	1-40
	Transmitted Beam	30 m (98 ft)	MiniSight	1-40
	Glass (Infrared) Fiber Optic	Varies with FO cable	MiniSight	1-40
	Plastic (Visible) Fiber Optic	Varies with FO cable	MiniSight	1-40
Varies with FO cable		45FSL	1-139	
Hazardous (Classified) Location 	Retroreflective	10 m (33 ft)	Series 5000	1-213
	Polarized Retroreflective	6 m (20 ft)	Series 5000	1-213
	Standard Diffuse	2 m (7 ft)	Series 5000	1-213
	Fixed Focus Diffuse	50 mm (2 in.)	Series 5000	1-213
	Wide Angle Diffuse	500 mm (20 in.)	Series 5000	1-213
	Transmitted Beam	106 m (350 ft)	Series 9000	1-186
	Glass Fiber Optic	Varies with FO cable	Series 5000	1-213
Analog Output 	Retroreflective	4.6 m (15 ft)	Series 5000	1-213
	Standard Diffuse	1.5 m (5 ft)	Series 5000	1-213
	Fixed Focus Diffuse	50 mm (2 in.)	Series 5000	1-213
	Wide Angle Diffuse	500 mm (20 in.)	Series 5000	1-213
	Glass (Infrared) Fiber Optic	500 mm (20 in.)	Series 5000	1-213
	Retroreflective	9 m (30 ft)	SmartSight 9000	10-10
	Polarized Retroreflective	3 m (9.8 ft)	RightSight	10-4
		5 m (16 ft)	SmartSight 9000	10-10
	Standard Diffuse	500 mm (20 in.)	RightSight	10-6
		1.5 m (5 ft)	SmartSight 9000	10-11
	Transmitted Beam	4 m (15 ft)	RightSight	10-7
		20 m (65 ft)	RightSight	10-7
		61 m (200 ft)	SmartSight 9000	10-11
		130 m (425 ft)	SmartSight 9000	10-11
	Fiber Optic, Infrared Glass	Varies with FO cable	RightSight	10-7
Varies with FO cable		SmartSight 9000	10-11	

Miniature-UltraMiniature Sensors	Sensing Modes	Maximum Sensing Range	Series	Page	
	Retroreflective	2 m (6.5 ft)	42KB	1-95	
		3.6 m (12 ft)	Series 7000	1-102	
	Polarized Retroreflective	1.5 m (4.9 ft)	42KC	1-98	
		2 m (6.5 ft)	Series 7000	1-102	
		2 m (6.5 ft)	42CF	1-62	
		3.5 m (11.5 ft)	42JS	1-84	
		Standard Diffuse	30 mm (1.2 in.)	42KA	1-88
	50 mm (2 in.)		42KA	1-88	
	70 mm (2.8 in.)		42KB	1-96	
	200 mm (8 in.)		42KB	1-96	
	300 mm (11.8 in.)		42KB	1-96	
	400 mm (15.8 in.)		42KB	1-96	
	500 mm (20 in.)		42KC	1-98	
	100 mm (4 in.)		42CF	1-62	
	300 mm (11.8 in.)		42CF	1-62	
	300 mm (11.8 in.)		Series 7000	1-102	
	800 mm (31.5 in.)		42JS	1-84	
	Background Suppression		30 mm (1.2 in.)	42BA	1-81
			50 mm (2 in.)	42BA	1-81
		100 mm (4 in.)	42BA	1-81	
		200 mm (8 in.)	42BA	1-81	
	Sharp Cutoff Diffuse	30 mm (1.2 in.)	42KA	1-88	
		30 mm (1.2 in.)	42KB	1-96	
		40 mm (1.6 in.)	42KB	1-96	
	Wide Angle Diffuse	280 mm (11 in.)	Series 7000	1-102	
	Transmitted Beam	500 mm (20 in.)	42KA	1-88	
		1 m (3.3 ft)	42KB	1-97	
		7 m (23 ft)	42KB	1-97	
10 m (33 ft)		42KB	1-97		
7 m (23 ft)		42KC	1-98		
7.6 m (25 ft)		Series 7000	1-102		
9.2 m (30 ft)		Series 7000	1-102		
533 mm (21 in.)		Series 7000	1-102		
4 m (13 ft)		42CF	1-62		
10 m (33 ft)	42JS	1-84			

AC Coupled Amplifier: An amplifier in which only pulsed (AC) signals are amplified and direct (DC) signals are ignored. (Direct signals generated by sunlight, heat sources and other.)

Alignment: Positioning of light source and receiver, reflector, or target in which a maximum signal strength is obtained.

Ambient Light: Illumination of a receiver not generated by its light source.

Analog: Electronic circuit with a current or voltage output signal that varies as a function of the light intensity received by the photodetector.

Angstrom: Unit of measurement used to determine the wavelength of light. 10 Angstrom (A) is equal to 1 nanometer (nm)

Attenuation: The reduction of signal strength. An example is when light travels through a fiber optic cable. The degree of attenuation depends on the fiber material and on the total length of the fiber optic cable.

Bifurcated: A fiber optic bundle that divides in two legs, forming a Y.

Complementary Output: Output circuit with a dual output device such that when one output is energized the other output is de-energized (similar to SPDT contact).

Dark Operate: A dark operate sensor energizes an output when the light intensity on the photodetector has sufficiently decreased.

Diagnostic: Advanced warning of loss in signal strength due to misalignment, dust and more, prior to loss of control output signal.

Differential Travel (Hysteresis): The distance between the operating point and the release point (see hysteresis).

Diffuse Reflection (Proximity): A photoelectric sensing method in which the light emitted by the light source hits the target surface and is then diffused from the surface in all directions.

Digital Output: An output circuit with only two operating states that are either "On" or "Off." These operating states often are called "Hi" or "Low."

Dwell-Time: The adjustable or fixed time length of an output pulse, independent of input signal duration.

Excess Gain: See operating margin.

False Pulse: An undesired change in the state of the output of the proximity switch that lasts for more than two milliseconds.

False Pulse Protection: Circuitry designed to avoid false pulses during power on or power down action.

Ferrule: Tip or termination of a fiber optic cable.

Field of View: The region that is illuminated by the light source and that can be seen by the receiver. Field of view is expressed in degrees but is three dimensional.

Gating: The provision to apply an external signal to a sensor in order to prevent undesirable operation.

Hysteresis: The distance between the operating point and the release point.

Infrared: Invisible light radiation starting at a wavelength of 690 nanometer (or 6900 Angstrom) and longer.

Intrinsic Safety: A design technique applied to electrical equipment and wiring for hazardous locations. It is based on limiting electrical and thermal energy to a level below that required to ignite hazardous atmospheric mixtures.

LED (Light Emitting Diode): Semi-conductor that generates monochromatic light when current flows in the conductive direction. An LED is the standard light source for most photoelectric sensors.

Leakage Current: Small current flowing through a solid state output when in the off state.

Light Operate: A light operate sensor energizes an output when the light intensity on the photodetector has sufficiently increased.

Nanometer (nm): 1 Nanometer is equal to 10⁻⁹ meter.

Noise: Presence of undesirable voltage, current, or light that may cause the sensor to malfunction.

Normally Closed: Output opens when an object is detected in the active switching area.

Normally Open: Output closes when an object is detected in the active switching area.

Operating Margin: The ratio of electrical signal available at a given sensing range to the minimum signal required to trigger the amplifier and output.

Operating Mode: See light and dark operate.

Optical Crosstalk: Optical crosstalk occurs when a photoelectric receiver responds to the signal from an adjacent emitter. Crosstalk can usually be resolved by repositioning the sensors.

Photoelectric Sensor: Electronic device recognizing changes in light intensity and converting these changes into a change in output state.

Pulse: A sudden fast change of a normally constant or relatively slow changing value such as voltage, current or light intensity.

Response Time: The sum of the time needed for a string of electronic circuits to translate a change in light into a change of output status.

Reverse Polarity Protection: A circuit that uses a diode to avoid damage to the control in case the polarity of the power supply is accidentally reversed.

Ripple %: The percentage of alternating component left on a DC signal after rectifying. Measured peak to peak of the alternating component and compared to the DC signal value.

Rise Time (10% Levels): The time required for an analog voltage or current output value to rise from 10% of its maximum value to 90% of its maximum value.

Sink (Current): Transistor output that requires the current to flow from positive (+) through the load and then through the output to negative (-). A current sink output uses an NPN transistor.

Source (Current): Transistor output that requires the current to flow from positive (+) through the output and then through the load to negative (-). A current source output uses a PNP transistor.

Transmitted Beam: A sensing mode where the light source and the receiver are opposite each other and where the target breaks the beam.

Wavelength: Distance traveled by light while completing one complete sine-wave. Is expressed in nanometers (nm). Each color has a specific wavelength.

White Paper Response: A calibration procedure performed on retroreflective sensors to eliminate all response to white paper with 90% reflectance.

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Photoelectric sensors are used in many applications and industries to provide accurate detection of objects without physical contact.

In its most basic form, a photoelectric sensor can be thought of as a “limit switch-like” device, where the mechanical actuator or lever arm function is replaced by a beam of light.

Photoelectric sensors operate by sensing a change in the amount of light that is either reflected or blocked by an object to be detected (target). The change in light could be the result of the presence or absence of the target, or as the result in a change of the size, shape, reflectivity or color of a target.

A photoelectric sensor can be used in applications to sense targets at distances from less than 5 mm (0.2 in.) to over 250m (820 ft).

Successful sensing with a photoelectric sensor requires that the object to be detected (target) causes a sufficient change of light level detected by the sensor and that the user has a clear understanding of the sensing requirements.

The following must be clearly understood:

- The sensing requirements,
- The sensing environment, and
- The capabilities and limitations of the photoelectric sensor.

Be prepared to answer the following questions:

- What is the size, shape and/or opacity of the object to be detected?
- Does the object to be detected have any reflective properties?
- What response time is required of the sensor?
- What mounting configuration is required for the sensor? Are there position or physical restraints to consider?
- What is the frequency of operation and what requirement does the operating rate impose on the output device?
- What are the load requirements, such as voltage, current, load impedance?

- What voltage and current supply are available to operate the sensor?
- What is the ambient temperature surrounding the photoelectric sensor?
- Are there other environmental conditions such as dirt or high humidity that are unique to the area surrounding the photoelectric sensor?

There are a vast number of photoelectric sensors to choose from. Each offers a unique combination of sensing performance, output characteristics and mounting options. Many sensors also offer unique embedded logic or device networking capabilities.

This introduction will help you select the optimal photoelectric sensor for each application.

Basic Concepts and Components

There are four basic components to any photoelectric sensor:

- Light source
- Light detector
- Lenses
- Output switching device

Light Source

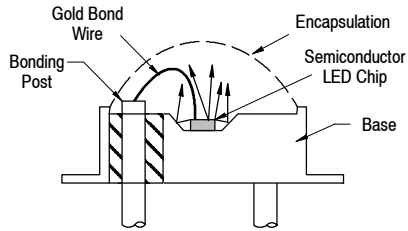
A light emitting diode (LED) is a solid-state semiconductor that emits light when current is applied. *Figure 1* (on page 1-20) shows the construction of an LED. LEDs are made to emit specific wavelengths or colors of light. Infrared, visible red, green, and blue LEDs are used as the light source (emitter) in most photoelectric sensors.

Different LED colors offer different desirable characteristics. Infrared LEDs are the most efficient, they generate the most light and the least heat of any LED color. Infrared LEDs are used in sensors where maximum light output is required for an extended sensing range.

In many applications, a visible beam of light is desirable to aid setup or confirm sensor operation. Visible red is most efficient for this requirement.

Introduction

Figure 1
LED Light-Emitting Diode



Visible red, blue, and yellow LEDs are also used in special applications where specific colors or color contrasts must be detected. These LEDs are also used as status indicators on photoelectric sensors.

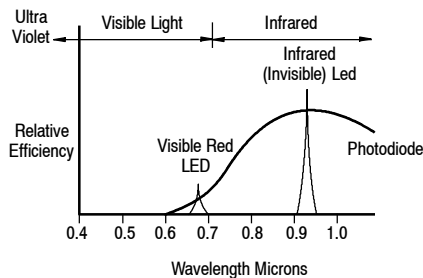
LEDs are rugged and reliable components, making them ideal for use in photoelectric sensors. They operate over a wide temperature range and are very resistant to damage from shock and vibration.

Light Detector

A photodetector is the component used to detect the light source. A photodiode or phototransistor is a robust solid-state component that provides a change in conducted current depending on the amount of light detected.

Photodetectors are more sensitive to certain wavelengths of light. The spectral response of a photodetector determines its sensitivity to different wavelengths in the light spectrum. To improve sensing efficiency, the LED and photodetector are often spectrally matched. An example is shown in Figure 2.

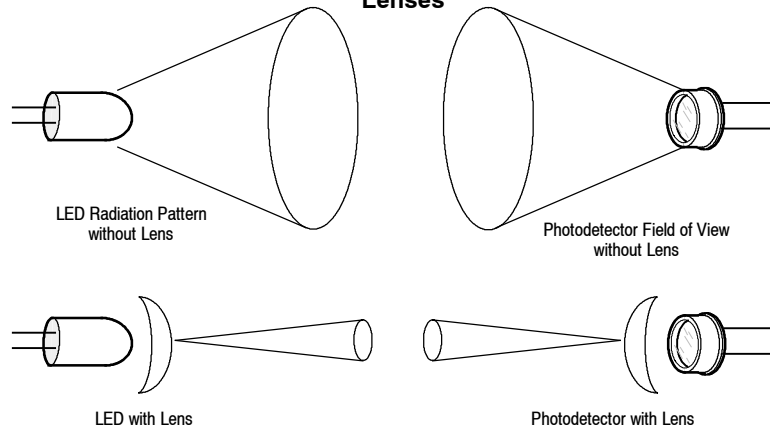
Figure 2
Spectral Response



The invisible (infrared) LED is a spectral match for this silicon phototransistor, and has much greater efficiency than a visible (red) LED.

The photodetector and associated circuitry are referred to as the receiver.

Figure 3
Lenses



Lens

LEDs typically emit light and photodetectors are sensitive to light over a broad area. Lenses are used with LED light sources and photodetectors to narrow this area. As the area is narrowed, the range of the LED or photodetector increases. As a result, lenses also increase the sensing distance of photoelectric sensors (see Figure 3).

The light beam from an LED and lens combination is typically conical in shape. The area of the cone increases with distance.

Some photoelectric sensors are optimized for extra sensing distance. The light beam (or field of view) emitted by these sensors is fairly narrow. However, alignment can be difficult if the field of view is too narrow. Other photoelectric sensors are designed for detection of objects within a broad area. These sensors have a wider field of view, but a shorter overall range.

Output Device

Once a sufficient change of light level is detected, the photoelectric sensor switches an output device to provide an interface to machine logic. Many types of discrete and variable (analog) outputs are available, each with particular strengths and weaknesses.

Margin

Margin (operating margin, excess gain) is an important concept to understand when applying photoelectric sensors. The amount of maintenance required for a photoelectric sensing application can be minimized by obtaining the best margin levels for that application.

Margin is a measurement of the amount of light from the light source that is detected by the receiver. Margin is best explained by example:

- A margin of zero occurs when none of the light emitted by the light source can be detected by the light detector.
- A margin of one is obtained when just enough light is detected to switch the state of the output device (from OFF to ON or from ON to OFF).
- A margin of 20 is reached when 20 times the minimum light level required to switch the state of the output device is detected.

Margin is defined as:

$$\frac{\text{Actual amount of light detected}}{\text{Minimum amount required to change the output device state}}$$

and is usually expressed as a ratio or as a whole number followed by "X." A margin of 6 may be expressed as 6:1 or as 6X.

LED Modulation

The amount of light generated by the LED in the light source is determined by the amount of current it is conducting. To increase the range of a photoelectric sensor, the amount of current must be increased. However, LEDs also generate heat—there is an upper limit of heat that can be generated before an LED is damaged or destroyed.

Photoelectric sensors rapidly switch on and off or modulate the current conducted by the LED. A low duty cycle (typically less than 5%) allows the amount of current, and therefore the amount of emitted light, to far exceed

what would be allowable under continuous operation, see *Figure 4*.

**Figure 4
Modulation**



The modulation rate or frequency is often in excess of 5 kHz, much faster than can be detected by eye.

Synchronous Detection

The receiver is designed to detect a pulsed light source from a modulated light source. To further enhance sensing reliability, the receiver and light source are synchronized. The receiver watches for light pulses that are identical to the pulses generated by the light source.

Synchronous detection helps a photoelectric sensor to ignore light pulses from other photoelectric sensors nearby or from other pulsed light sources such as fluorescent lights.

Synchronous detection is only possible when the light source and receiver are in the same housing, which is true for all sensing modes except transmitted beam as explained below.

Photoelectric Sensing Modes

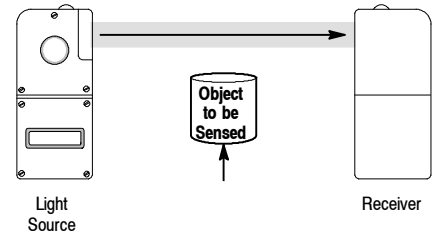
Different methods of sensing are referred to as sensing modes. There are three basic types:

- Transmitted beam (sometimes called through-beam or thru-beam)
- Retroreflective (sometimes referred to as reflex)
- Diffuse (also known as proximity)
- While many applications can be handled by any of these sensing modes, each offers specific strengths and weaknesses to consider. These strengths and weaknesses are summarized in *Table 1*.

Transmitted Beam

In this mode (*Figure 5*) the light source and receiver are contained in separate housings. These two units are positioned opposite each other so that the light from the light source shines directly on the receiver. Targets must break (block) the beam between light source and receiver.

**Figure 5
Transmitted Beam Sensing**



**Table 1
Photoelectric Sensing Modes Advantages and Cautions**

Sensing Mode	Applications	Advantages	Cautions
Transmitted Beam	General purpose sensing Parts counting	<ul style="list-style-type: none"> • High margin for contaminated environments • Longest sensing distances • Not affected by second surface reflections • Probably most reliable when you have highly reflective objects 	<ul style="list-style-type: none"> • More expensive because of separate light source and receiver required, more costly wiring • Alignment important • Avoid detecting objects of clear material
Retroreflective	General purpose sensing	<ul style="list-style-type: none"> • Moderate sensing distances • Less expensive than transmitted beam because simpler wiring • Ease of alignment 	<ul style="list-style-type: none"> • Shorter sensing distance than transmitted beam • Less margin than transmitted beam • May detect reflections from shiny objects (use polarized instead)
Polarized Retroreflective	General purpose sensing of shiny objects	<ul style="list-style-type: none"> • Ignores first surface reflections • Uses visible red beam for ease of alignment 	<ul style="list-style-type: none"> • Shorter sensing distance than standard retroreflective • May see second surface reflections
Standard Diffuse	Applications where both sides of the object cannot be accessed	<ul style="list-style-type: none"> • Access to both sides of the object not required • No reflector needed • Ease of alignment 	<ul style="list-style-type: none"> • Can be difficult to apply if the background behind the object is sufficiently reflective and close to the object
Sharp Cutoff Diffuse	Short-range detection of objects with the need to ignore backgrounds that are close to the object.	<ul style="list-style-type: none"> • Access to both sides of the object not required • Provides some protection against sensing of close backgrounds • Detects objects regardless of color within specified distance 	<ul style="list-style-type: none"> • Only useful for very short distance sensing • Not used with backgrounds close to object
Background Suppression Diffuse	General purpose sensing Areas where you need to ignore backgrounds that are close to the object	<ul style="list-style-type: none"> • Access to both sides of the target not required • Ignores backgrounds beyond rated sensing distance regardless of reflectivity • Detect objects regardless of color at specified distance 	<ul style="list-style-type: none"> • More expensive than other types of diffuse sensors • Limited maximum sensing distance
Fixed Focus Diffuse	Detection of small targets Detects objects at a specific distance from sensor Detection of color marks	<ul style="list-style-type: none"> • Accurate detection of small objects in a specific location 	<ul style="list-style-type: none"> • Very short distance sensing • Not suitable for general purpose sensing • Object must be accurately positioned
Wide Angle Diffuse	Detection of objects not accurately positioned Detection of very fine threads over a broad area	<ul style="list-style-type: none"> • Good at ignoring background reflections • Detecting objects that are not accurately positioned • No reflector needed 	<ul style="list-style-type: none"> • Short distance sensing
Fiber Optics	Allows photoelectric sensing in areas where a sensor cannot be mounted because of size or environment considerations	<ul style="list-style-type: none"> • Glass fiber optic cables available for high ambient temperature applications • Shock and vibration resistant • Plastic fiber optic cables can be used in areas where continuous movement is required • Insert in limited space • Noise immunity • Corrosive areas placement 	<ul style="list-style-type: none"> • More expensive than lensed sensors • Short distance sensing

Introduction

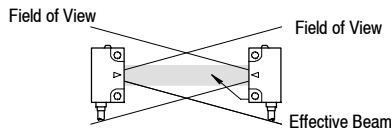
Transmitted beam sensors provide the longest sensing distances and the highest level of operating margin. For example, PHOTOSWITCH® Series 4000B Transmitted Beam sensors are capable of sensing distances of up to 274 m (900 ft).

Transmitted beam application margins at ranges of less than 10 m (3.1 ft) can exceed 10,000X. For this reason, transmitted beam is the best sensing mode when operating in very dusty or dirty industrial environments.

Another example: Series 9000 Transmitted Beam photoelectric sensors offer 300X margin at a sensing distance of 3 m (9.8 ft). At this distance, these sensors will continue to operate even if 99.67% of the combined lens area of the light source and receiver is covered with contamination.

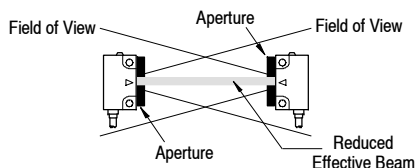
The “effective beam” of a transmitted beam sensor is equivalent to the diameter of the lens on the light source and receiver (*Figure 6*). Reliable detection occurs when the target is opaque and breaks at least 50% of the effective beam.

Figure 6
Effective Beam



Detection of objects smaller than the effective beam can best be achieved by reducing the beam diameter through means of apertures placed in front of the light source and receiver (*Figure 7*). Apertures are available for most 42KL, 42KB and 42EF transmitted beam sensors. Some users have created their own apertures for other sensor families.

Figure 7
Effective Beam with Apertures



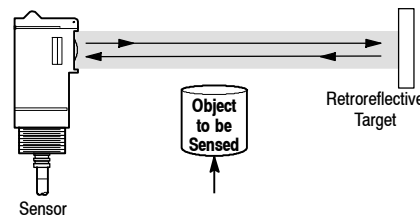
The most reliable transmitted beam applications have a very high margin when the target is absent, and a margin of zero (or close to zero) when the target is present.

Transmitted beam sensing may not be suitable for detection of translucent or transparent targets. The high margin levels allow the sensor to “see through” these targets. While it is often possible to reduce the sensitivity of the receiver, retroreflective or diffuse sensing may provide a better solution.

Retroreflective

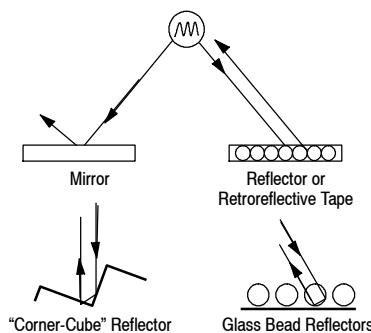
Retroreflective (reflex) is the most popular sensing mode. A retroreflective sensor contains both the light source and receiver in one housing. The light beam emitted by the light source is reflected by a special reflective object and detected by the receiver. The target is detected when it breaks this light beam (*Figure 8*).

Figure 8
Retroreflective Sensing



Special reflectors or reflective tapes are used for retroreflective sensing. Unlike mirrors or other flat reflective surfaces, these reflective objects do not have to be aligned perfectly perpendicular to the sensor. Misalignment of a reflector or reflective tape of up to 15° will typically not significantly reduce the margin of the sensing system (see *Figure 9*).

Figure 9
Retroreflective Materials



A wide selection of reflectors and reflective tapes are available.

The maximum available sensing distance of a sensor and reflector will depend in part upon the efficiency of the reflector or reflective tape. These reflective materials (page 1-306) are rated with a reflective index.

The PHOTOSWITCH standard 78 mm (3 in.) diameter round reflector (catalog number 92-39) is used to determine the maximum sensing distance of most PHOTOSWITCH sensors.

The 92-39 reflector has a reflective index of 100. The 92-99 reflective tape has a reflective index of 77 meaning that it will reflect only 77% as much light as a 92-39 reflector.

Retroreflective sensors are easier to install than transmitted beam sensors. Only one sensor housing must be installed and wired. However, margins when the target is absent are typically 10 to 1000 times lower than transmitted beam sensing, making retroreflective sensing less desirable in highly contaminated environments.

Caution must be used when applying standard retroreflective sensors in applications where shiny or highly reflective targets must be sensed.

Reflections from the target itself may be detected. It may be possible to orient the sensor and reflector or reflective tape so that the shiny target reflects light away from the receiver. However, for most applications with shiny targets, *polarized retroreflective* sensing offers a better solution.

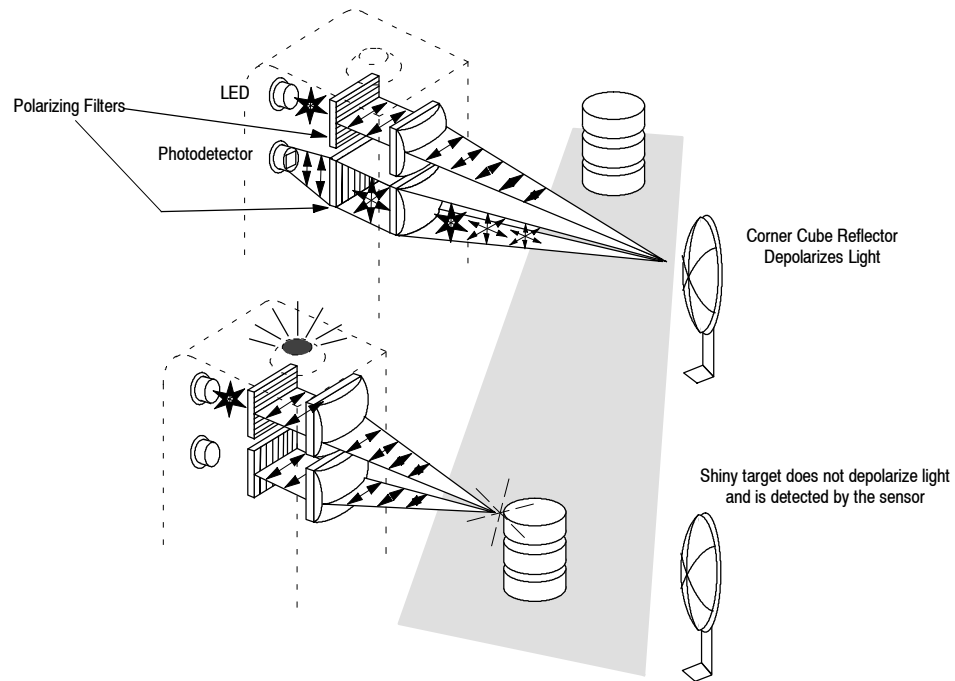
Polarized retroreflective sensors contain polarizing filters in front of the light source and receiver. These filters are perpendicular or 90° out of phase with each other (*Figure 10*, on page 1-23).

The sensor cannot see light reflected by most targets. The reflected polarized light cannot pass through the polarizing filter located in front of the receiver.

Reflectors depolarize reflected light. Some of the reflected depolarized light can pass through the polarizing filter in front of the receiver and can be detected by the sensor.

In summary, the sensor can “see” the reflection from a reflector, and it cannot “see” the reflection from most shiny targets.

Figure 10
Polarized Retroreflective Sensing



Polarized retroreflective sensors offer 30...40% shorter range (and less margin) than standard retroreflective sensors. Instead of infrared LEDs, polarized retroreflective sensors must use a less efficient visible light source (typically a visible red LED). There are additional light losses caused by the polarizing filters.

Polarized sensors will only ignore “first surface” reflections from an exposed reflective surface. Polarized light is depolarized as it passes through most plastic film or stretch wrap. Therefore, a shiny object may create reflections that are detected by the receiver when it is wrapped in clear plastic film. In the latter case, the shiny object becomes the “second surface” behind the plastic wrap. Other sensing modes must be considered for these applications.

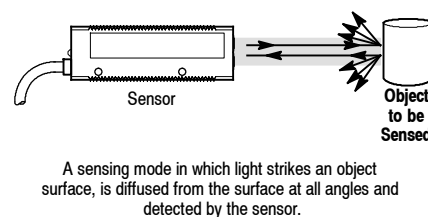
All standard reflectors depolarize light and are suitable for polarized retroreflective sensing. However, most reflective tapes do not depolarize light and are suitable only for use with standard retroreflective sensors. Specially constructed reflective tapes for polarized retroreflective sensing are available. Look for reflective tapes specifically identified as suitable for use with polarized retroreflective sensors.

Diffuse

Transmitted beam and standard or polarized retroreflective sensing creates a beam of light between light source and receiver or between sensor and reflector. Access to opposite sides of the target is required.

Sometimes it is difficult, or even impossible, to obtain access on both sides of a target. In these applications, it is necessary to point the light source directly at the target. Light is scattered by the surface at all angles and a small portion is reflected back to be detected by the receiver contained in the same housing. This mode of sensing is called diffuse or proximity (see Figure 11).

Figure 11
Diffuse Sensing



There are a number of different types of diffuse sensing. The simplest, *standard diffuse*, is discussed here. Other types, sharp cutoff diffuse, fixed focus

diffuse, wide angle diffuse, and background suppression diffuse, are explained in later sections.

The goal of standard diffuse sensing is to obtain a relatively high margin when sensing the target. When the target is absent, reflections from any background behind the target should provide a margin as close to zero as possible.

Target reflectivity can vary widely. Relatively shiny surfaces may reflect most of the light away from the receiver, making detection very difficult. The sensor face must be parallel with these types of target surfaces.

Very dark, matte objects may absorb most of the light and reflect very little for detection. These targets may be hard to detect unless the sensor is positioned very close.

The specified maximum sensing distance of a photoelectric sensor is determined using a calibrated diffuse target. Allen-Bradley uses a 216 x 292 mm (8.5 x 11 in.) sheet of white paper that has been specially formulated to be 90% reflective—meaning that 90% of the light energy from the light source will be reflected by the paper.

Introduction

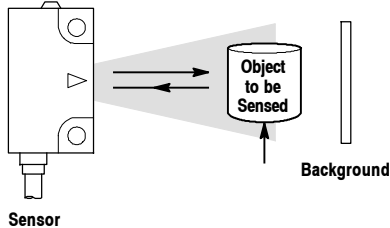
“Real world” diffuse targets are often considerably less reflective, as shown in *Table 2*.

Table 2

Target	Typical Relative Reflectivity
Polished aluminum	500
White paper (reference)	100
White typing paper	90
Cardboard	40
Cut lumber	20
Black paper	10
Neoprene	5
Tire rubber	4
Black felt	2

Detecting targets positioned close to reflective backgrounds can be particularly challenging. It may be impossible to adjust the sensor to obtain sufficient margin from the target without detecting, or coming close to detecting, the background (*Figure 12*). Other types of diffuse sensing may be more appropriate.

Figure 12



Sharp Cutoff Diffuse

Sharp cutoff diffuse sensors are designed so that the light beam from the light source and the area of detection of the receiver are angled towards each other. This makes these sensors more sensitive at short range, and less sensitive than a longer range. This can provide more reliable sensing of targets that are positioned close to reflective backgrounds.

Note that this sensing mode provides some degree of improvement over standard diffuse sensing when a reflective background is present. However, a background that is very reflective may still be detected.

An even better solution is provided by background suppression diffuse sensors.

Background Suppression Diffuse

Instead of attempting to ignore the background behind a target, background suppression sensors use sophisticated electronics to actively sense the presence of both the target and the background. The two signals are compared, and the output will change state upon active detection of the target, or active detection of the background.

In simple terms, background suppression sensing can allow the sensor to ignore the presence of a very reflective background almost directly behind a dark, less-reflective target. For many applications, it is the ideal diffuse sensing mode. However, background suppression sensors are more complex, and therefore more expensive than other diffuse sensors.

Fixed Focus Diffuse

In a fixed focus (convergent beam) sensor, the light beam from the light source and the detection area of the receiver are focused to a very narrow point (focal point) at a fixed distance in front of the sensor. The sensor is very sensitive at this point, and much less sensitive before and beyond this focal point.

Fixed focus sensors have three primary applications:

- Reliable detection of small targets. Because the sensor is very sensitive at the focal point, a small target can be readily detected.
- Detection of objects at a fixed distance. As a fixed focus sensor is most sensitive at the focal point, it can be used in some applications to detect a target at the focal point, and ignore it when it is in front of or behind the focal point.
- Detection of color printing marks (color registration mark detection). In some applications, it is important to detect the presence of a printing mark on a continuous web of wrapping material. A fixed focus sensor with a specific visible light source color (typically red, green or blue) may be selected to provide the greatest sensitivity to the mark.

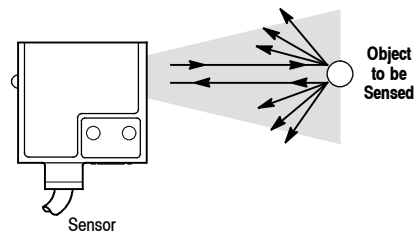
Wide Angle Diffuse

Wide angle diffuse sensors project the light source and detection area of the receiver over a wide area (*Figure 13*).

These sensors are ideal for two applications:

- Thread detection—a wide angle diffuse sensor can detect the presence of extremely thin strands of thread or other material positioned close to the sensor. The presence or absence (thread break) of the thread can be reliably detected even when the thread moves from side to side in front of the sensor.
- Ignoring holes or imperfections in targets—because wide angle diffuse sensors can sense over a broad area, they can ignore small holes or imperfections in diffuse targets.

Figure 13
Wide Angle Diffuse



Fiber Optics

Fiber optic sensors permit the attachment of “light pipes” called fiber optic cables. Emitted light from the light source is transmitted through transparent fibers in the cables and emerges at the end of the fiber. The transmitted or reflected beam is then carried back to the receiver through different fibers.

Fiber optic cables can be mounted in locations that would otherwise be inaccessible to photoelectric sensors. They can be used where there is a high ambient temperature and in applications where extreme shock and vibration or continuous movement of the sensing point is required (as described below).

Both glass and plastic are used as transparent materials to create fiber optic cables.

Glass

Glass fiber optic cables contain multiple strands of very thin glass fiber that are bundled together in a flexible sheath.

Glass fiber optic cables are typically more durable than plastic fiber optic cables. Glass cables will withstand

much higher temperatures. Standard Allen-Bradley glass fiber optic cables with a stainless steel sheath rated up to 260°C (500°F). Special order cables can be obtained with temperature ratings of up to 480°C (900°F).

Most glass cables are available with a choice of PVC or flexible stainless steel sheath. PVC-sheathed cables are typically less expensive. Stainless steel sheathing adds even greater durability and allows the cables to operate at higher temperatures

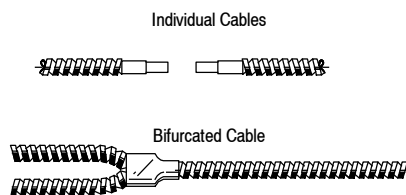
Plastic

Plastic fiber optic cables are typically constructed of a single acrylic monofilament. There is no protective sheathing, making plastic fiber optic cables less durable, but typically less expensive than glass cables.

Plastic cables can be used in applications where continuous flexing of the fiber optic cable is required. Coiled plastic cables are also available for these applications.

Fiber optic cables are available in *individual* or *bifurcated* configurations (Figure 14).

Figure 14
Fiber Optic Cables



Two individual cables are used for transmitted beam sensing. Some individual cables are packaged separately, others are sold in packages of two. Order carefully to receive two cables.

Comparison of Fiber Optic Cables

	Glass	Plastic
Construction	Thin glass strands bundled in stainless steel or PVC sheath	Single acrylic monofilament
Temperature Range	-40...260°C (-40...500°F) with stainless steel sheath. Special order up to 480°C (900°F).	-30...70°C (-20...158°F)
Durability	Very durable	Adequate for many applications
Continuous Flexing	Will quickly break glass fibers	Will work very well, coiled versions available
Light Source	Visible or infrared OK	Must use visible light
Range	Can be longer range because of larger diameter	Adequate for many applications

Bifurcated cables are used for diffuse or retroreflective sensing modes. Standard diffuse sensing with fiber optic cables are similar to sensing with lensed photoelectric sensors.

Retroreflective sensing is possible with either reflectors or reflective tapes. Polarized retroreflective sensing is not possible. In some applications it will be necessary to reduce the sensitivity of the sensor to prevent diffuse detection of the target.

Glass fibers can be used with infrared or visible LEDs. Plastic fibers absorb infrared light and therefore are most efficient when used with visible red LEDs.

A wide selection of fiber optic cables is available and many special configurations can be obtained.

Clear Object Detection

Clear materials present a unique application challenge for photoelectric sensors. Most clear objects and films provide insufficient contrast to be reliably detected using general purpose retroreflective or polarized retroreflective sensors. Various forms of diffuse sensing do not offer a preferred solution because the exact location of the clear target cannot be detected.

Rockwell Automation/Allen-Bradley offers ClearSight™ photoelectric sensors that are specifically designed for clear object and clear film sensing applications. These modified polarized retroreflective sensors contain special optical assemblies designed to optimize the amount of contrast generated by clear objects and films. Special electronics and software features further enhance sensing reliability.

For detailed information about solving the challenges of clear object detection, refer to the white paper "Clear Object Detection Using Photoelectric Sensors."

Introduction

45FVL/FSL Light Source Selector Guide for Color Contrast Sensing

Target \ Background	White	Yellow	Orange	Red	Green	Blue	Black
White	Ⓢ	B	B	B	R	R	R
Yellow	B	Ⓢ	G	G	R	R	R
Orange	B	G	Ⓢ	G	G	G	R
Red	B	G	G	Ⓢ	R	B	R
Green	R	R	G	R	Ⓢ	B	G
Blue	R	R	G	B	B	Ⓢ	B
Black	R	R	R	R	G	B	Ⓢ

R = Red; B = Blue; G = Green

Ⓢ 42QA ColorSight sensor suggested for shades of same color.

Note: White LED light source can be used selectively in place of red, blue and green.

Photoelectric Sensor Specifications

Light/Dark Operate Output

The terms 'light operate' and 'dark operate' are used to describe the action of a sensor output when a target is present or absent.

A light operate output is ON (energized, logic level one) when the receiver can "see" sufficient light from the light source.

For transmitted beam and retroreflective sensing, a light operate output is ON when the target is absent and light can travel from the light source to the receiver. For diffuse sensing (all types), the output is ON when the target is present and reflecting light from the light source to the receiver.

A dark operate output is ON (energized, logic level one) when the receiver cannot "see" the light from the light source.

For transmitted beam and retroreflective sensing, a dark operate output is ON when the target is present and light from the light source is blocked and cannot reach the receiver. For diffuse sensing (all types), a dark operate output is ON when the target is absent.

Maximum Sensing Distance

This specification refers to the sensing distance from:

- Sensor to reflector in retroreflective and polarized retroreflective sensors,
- From sensor to specified target in all types of diffuse sensors, and,
- Light source to receiver in transmitted beam sensors.

This sensing distance is guaranteed by the manufacturer. PHOTOSWITCH photoelectric sensors are conservatively rated; the actual available sensing distance will typically exceed this specification.

Note that this distance is specified at a margin of 1X, meaning that just enough light from the light source will be detected by the receiver to change the state of the output.

Most industrial environments will create contamination on the sensor lenses and reflectors or targets. Sensors should be applied at shorter distances to increase the margin to an acceptable value and enhance application reliability.

Minimum Sensing Distance

Many retroreflective, polarized retroreflective, and diffuse (most types) sensors have a small "blind" area near the sensor (Figure 15). Reflectors, reflective tapes, or diffuse targets should be located further away from the sensor than this minimum sensing distance for reliable operation.

Typical Response Curve

The catalog pages for most PHOTOSWITCH photoelectric sensors contain a curve that shows what the typical margin will be depending on sensing distance.

A margin of at least 2X is generally recommended for industrial environments.

Figure 16 shows an example curve for a diffuse sensor. The maximum sensing range (margin=1X) of this sensor is 1 m (39.4 in.) to a specified white paper target. A margin of 4X can be achieved at approximately half that distance, or 500 mm (19.7 in.).

Figure 15 Blind Area

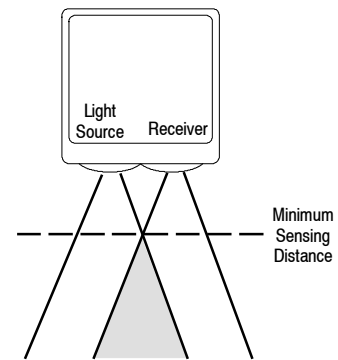
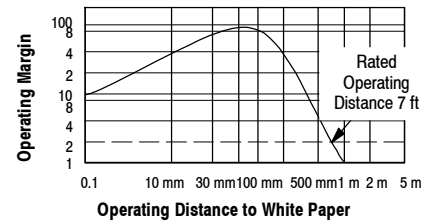


Figure 16 Margin



Response Time

The response time of a sensor is the amount of time that elapses between the detection of a target and the change of state of the output device from ON to OFF or from OFF to ON. It is also the amount of time it takes for the output device to change state once the target is no longer detected by the sensor.

For most sensors, the response time is a single specification for both the ON time and OFF time. For other sensors, two different values may be given.

Response times are dependent on sensor design and choice of output device. Slower sensors usually offer longer sensing ranges. Very fast sensors typically have shorter sensing ranges. PHOTOSWITCH photoelectric sensors response times vary from 30 μs to 30 ms.

Field of View

For most photoelectric sensors, the light beam from the light source and the area of detection in front of the receiver project away from the sensor in a conical shape. Field of view is a measurement (in degrees) of this conical area.

The Field of View is a useful specification to determine the available sensing area at a fixed distance away from a photoelectric sensor.

Refer to *Figure 17* for this example. The 42SRU-6002 retroreflective sensor has a 3° field of view. The figure shows that at a sensing distance of 3.0 m (10 ft) the detection area will be a circle that is approximately 168 mm (6.6 in.) diameter (56 mm (2.2 in.) per degree).

Sensors with a wide field of view typically have shorter sensing distances. However, a wider field of view can make alignment easier.

Beam Patterns

Beam patterns are included for several lines of Allen-Bradley photoelectric sensors to help predict the performance of these sensors in a variety of applications. A beam pattern is defined as the sensing area for a photoelectric sensor. It is the pattern generated by comparing the response of the receiver to the emitted signal over the operating distance of the sensor.

All beam patterns are drawn in two dimensions and are assumed to be symmetrical in all planes about the optical axis of the sensor. The maximum operating margin is located at the optical axis and decreases towards the outer boundary of the beam pattern.

All beam patterns are generated under clean sensing conditions with optimal sensor alignment. The beam pattern represents the largest typical sensing area, and should not be considered exact. Dust, contamination, fog, etc. will decrease the sensing area and operating range of the sensor.

Transmitted Beam Patterns

The beam pattern for a transmitted beam sensor represents the boundary where the receiver effectively receives the signal of the emitter, assuming there is no angular misalignment. Angular misalignment between the emitter and receiver will decrease the size of the sensing area. Beam patterns for transmitted beam sensors are useful for determining the minimum spacing required between adjacent transmitted beam sensor pairs to prevent optical crosstalk from one pair of sensors to the next.

Retroreflective Beam Patterns

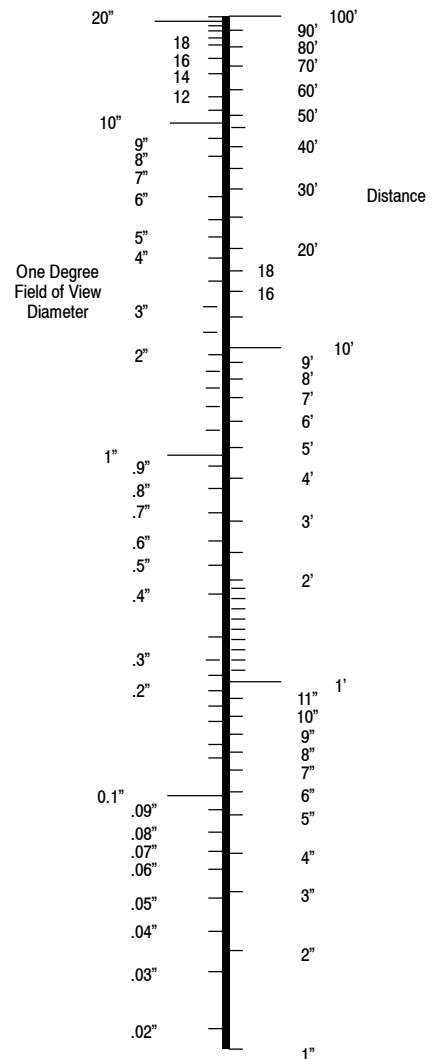
Beam patterns for retroreflective and polarized retroreflective sensors represent the boundary within which the sensor will respond to a retroreflective target as it passes by the sensors optics. The retroreflective target is held perpendicular to the sensor's optical axis while the beam diameter is plotted. The model 92-39 76 mm diameter retroreflective target is used to generate retroreflective beam patterns unless otherwise noted.

For reliable operation, the object to be sensed must be equal to or larger than the beam diameter indicated in the beam pattern. A smaller retroreflective target should be used for accurate detection of smaller objects.

Diffuse, Sharp Cutoff, and Background Suppression Beam Patterns

The beam pattern for a diffuse sensor represents the boundary within which the edge of a white reflective target that will be detected as it passes by the sensor. Diffuse beam patterns are generated using a 90% reflective sheet of 216 x 279 mm (8.5 x 11 in.) white paper held perpendicular to the sensor's optical axis. The sensing area will be smaller for materials that are less reflective, and larger for more reflective materials. Smaller objects may decrease the size of the beam pattern of some diffuse sensors at longer ranges. Diffuse targets with surfaces that are not perpendicular to the sensor's optical axis will also significantly decrease sensor response.

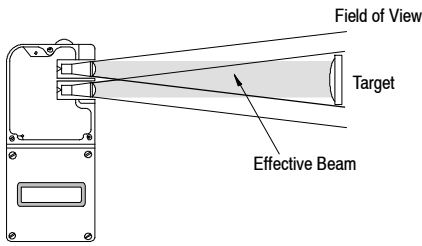
Figure 17
Field of View Diameter vs. Distance



It is important to note that the effective size of the beam of the retroreflective control is equal to the size of the retroreflective target. Additional reflective targets in the field of view will increase the excess gain and operating distance, if the field of view is bigger than the initial target as depicted in (*Figure 18*, on page 1-28).

Introduction

Figure 18
Retroreflective Sensors



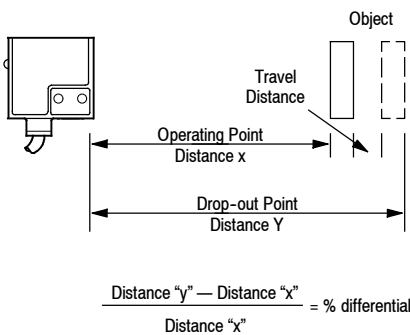
Hysteresis

Photoelectric sensors exhibit hysteresis (or differential).

The hysteresis of a photoelectric sensor is the difference between the distance when a target can be detected as it moves towards the sensor, and the distance it has to move away from the sensor to no longer be detected.

An example is shown in *Figure 19*. As the target moves toward the sensor, it will be detected at distance X. As it then moves away from the sensor, it will still be detected until it gets to distance Y.

Figure 19
Hysteresis



The high hysteresis in most photoelectric sensors is useful for detecting large opaque objects in retroreflective, polarized retroreflective and transmitted beam applications. In diffuse applications a large difference in reflected light from target and background also allows the use of high hysteresis sensors.

Low hysteresis requires smaller changes in light level. The Series 10,000 and 42FT allow selection of low hysteresis for these applications.

Aligning a Photoelectric Sensor

Proper alignment of the sensor will create a more rugged sensing solution that requires less maintenance.

Retroreflective or Polarized Retroreflective

Aim the sensor at the reflector (or reflective tape). Slowly pan the sensor left until the reflector is no longer detected. Note this position, then slowly scan the sensor to the right and note when the reflector is no longer detected. Center the sensor between these two positions, then pan it up and down to center it in the vertical plane.

Diffuse (all types)

Aim the sensor at the target. Pan the sensor up and down, left and right to center the beam on the target.

Reduce the sensitivity just until the target is no longer detected and note the position of the sensitivity adjustment.

Remove the target and increase the sensitivity until the background is detected. Adjust the sensitivity to the mid point between detection of the target and detection of the background.

Transmitted Beam

Aim the receiver at the light source. Slowly pan the receiver left until the light source is no longer detected. Note this position, then slowly scan the receiver to the right and note when the reflector is no longer detected. Center the receiver between these two positions, then pan it up and down to center it in the vertical plane.

Digital Output Devices

Once the sensor has detected the target, an output device switches the electrical power in the user's control circuit. The output is either ON or OFF, making the sensor a digital device.

There are many types of outputs available, each with different benefits and weaknesses. The types available with Allen-Bradley PHOTOSWITCH photoelectric sensors are described below, and summarized in *Table 3*.

Electromechanical Relay

An electromechanical relay (or simply "relay") offers a reliable, positive means of switching electrical energy. Its major advantages are high switching current and electrical isolation from the sensor power source.

Because of the electrical isolation from the power source of the sensor, and due to the absence of leakage current, relays from multiple sensors can readily be connected in series and/or parallel.

Contact ratings will vary from 1...5 A at 120/240V AC 50/60 Hz resistive, depending on the sensor selected.

There are a number of different contact arrangements available:

- SPST—Single pole, single throw
- SPDT—Single pole, double throw
- DPDT—Double pole, double throw

Relays have a finite life span, typically measured in millions of operations. Inductive loads can shorten the life span considerably. Solid-state outputs should be considered for applications that require frequent switching by the sensor.

Table 3

Output Type	Strengths	Weaknesses
Electromechanical Relay <i>AC or DC switching</i>	<ul style="list-style-type: none"> • Output is electrically isolated from supply power • Easy series and/or parallel connection of sensor outputs • High switching current 	<ul style="list-style-type: none"> • No short circuit protection possible • Finite relay life
FET <i>AC or DC switching</i>	<ul style="list-style-type: none"> • Very low leakage current • Fast switching speed 	<ul style="list-style-type: none"> • Low output current
Power MOSFET <i>AC or DC switching</i>	<ul style="list-style-type: none"> • Very low leakage current • Fast switching speed 	<ul style="list-style-type: none"> • Moderately high output current
TRIAC <i>AC switching only</i>	<ul style="list-style-type: none"> • High output current 	<ul style="list-style-type: none"> • Relatively high leakage current • Slow output switching
NPN or PNP Transistor <i>DC switching only</i>	<ul style="list-style-type: none"> • Very low leakage current • Fast switching speed 	<ul style="list-style-type: none"> • No AC switching

Response times of relays are typically 15...25 ms, much slower than most solid-state outputs.

FET

The FET (Field Effect Transistor) is a solid-state device that provides for fast switching of AC or DC power and very low leakage current. Its switching current is limited. The FET output on the Series 4000B switches only 30 mA of current.

FET outputs can be connected in parallel like electromechanical relay contacts.

Power MOSFET

A Power MOSFET (Metal Oxide Semiconductor Field Effect Transistor) provides the very low leakage and fast response time benefits of an FET with high switching current capacity.

The Power MOSFET used in Series 6000 and Series 9000 sensors can switch up to 300 mA of current.

TRIAC

A TRIAC is a solid-state output device designed for AC switching only. TRIACs offer high switching current, making them suitable for connection to large contactors and solenoids.

TRIACs exhibit much higher leakage current than FETs and Power MOSFETs. Leakage current from TRIACs can exceed 1 mA, making them unsuitable as input devices for programmable controllers and other solid-state inputs. A zero crossing of the 50/60 Hz AC power cycle is required to activate a TRIAC, meaning that the minimum response time is 8.3 ms.

For most applications, Power MOSFETs provide better output characteristics.

NPN/PNP Transistor

Transistors are the typical solid-state output device for low voltage DC sensors.

A sensor with an NPN transistor output device has a sinking output. The load must be connected between the sensor output and the (+) power connection.

A sensor with a PNP transistor output device has a sourcing output. The load must be connected between the sensor output and the (-) power connection.

Transistors exhibit very low leakage current (measured in μA) and relatively high switching current (typically 100 mA) for easy interface to most DC loads. Response times of sensors with transistor outputs can vary from 2 ms to as fast as 30 μs .

Analog Output

Analog sensors provide an output that is proportional, or inversely proportional, to the quantity of light seen by the receiver.

Series 5000 analog output sensors provide a selectable voltage or current output that is proportional or inversely proportional to the amount of light detected by the receiver.

Timing and Logic

Photoelectric sensors are somewhat unique among presence sensors because many offer timing or logic functions. These functions may be available in special versions of the sensors, or in plug-in modules.

On Delay and Off Delay

On Delay and Off Delay are the most common timing modes.

An On Delay timer will delay the operation of an output after a target is detected.

An Off Delay timer will delay the operation of an output after the target is no longer detected.

The delay time of most sensors is adjustable from less than a second to 10 seconds or more.

Some high speed sensors (less than 1 ms response time) such as the 42FB and 42FT contain a selectable 50 ms off delay time. This "pulse stretcher" is useful when it is necessary to slow down the OFF response time to allow a slower PLC or other machine logic to respond to the movement of materials in high speed applications.

One-Shot

One-shot logic provides a single pulse output regardless of the speed that a target moves past the sensor. The length of the pulse is adjustable.

One-shot operation can provide different application solutions:

- In high speed operations—provides a pulse each time a target moves past the sensor that is sufficiently long to allow other slower logic to respond.
- In slower speed operations—provides a brief pulse each time a target moves past the sensor to trigger a solenoid or other impulse device.
- Provides a leading edge signal regardless of target length.
- Provides a trailing edge signal regardless of target length.

Delayed One-Shot

Delayed one-shot logic adds an adjustable time delay before the one-shot output pulse occurs.

Motion Detector

Motion detection logic provides the unique capability to detect the continuous movement of targets. The sensor will provide an output if it does not detect the motion of successive targets within the adjustable delay time.

Motion detector logic is useful to detect a jam or void in material handling applications.

Notes



RightSight DC model with short 18 mm base

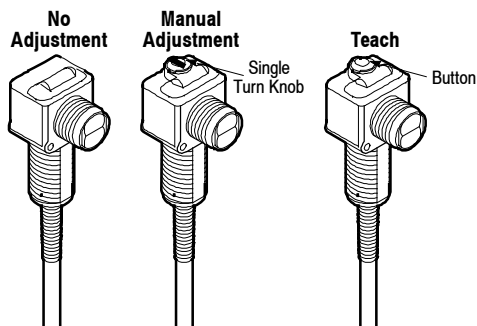
Features

- Compact right angle housing
- Flexible 18 mm mounting options
- 1200 psi washdown rating
- Non-adjustable, adjustable and teach versions
- 360° visible LED indicators
- Reverse polarity protection
- Short-circuit protected outputs
- Fast 1 ms response time (DC)
- False pulse protection
- Variety of output types
- Laser models available (see page 1-108)

Specifications

Environmental	
Certifications	UL Listed, CSA Certified and CE Marked for all applicable directives
Operating Environment	NEMA 4X, 6P, IP67 (IEC 529); 1200 psi (8270 kPa) washdown, IP69K
Operating Temperature [C (F)]	-25...+70° (-13...+158°) ≤ 132V AC/DC -25...+55° (-13...+131°) ≥ 132V AC/DC
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60068-2-6
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60068-2-27
Relative Humidity	5...95% (noncondensing)
Ambient Light Immunity	Incandescent light 5000 lux
Optical	
Sensing Modes	Retroreflective, polarized retroreflective, diffuse, background suppression, sharp cutoff, fixed focus, fiber optic, transmitted beam
Sensing Range	See Product Selection table on page 1-34
Field of View	See Product Selection table on 1-34
Light Source	Visible red LED (660 nm) or infrared LED (880 nm)
LED Indicators	See User Interface below
Adjustments	Sensitivity potentiometer, teach button, or fixed by cat. no.
Electrical	
Voltage	10.8...30V DC, 21.6...264V AC
Current Consumption	35 mA max (DC), 25 mA max (AC)
Sensor Protection	False pulse, reverse polarity, overload, short circuit
Outputs	
Response Time	1 ms (4 ms for transmitted beam) DC models 8.3 ms (16.6 ms for transmitted beam) AC models
Output Type	PNP or NPN by cat. no., PNP and NPN, N-MOSFET
Output Mode	Complementary light or dark operate, light or dark operate by cat. no.
Output Current	100 mA
Output Leakage Current	0.1 mA max (DC); 0.4 mA max (AC)
Mechanical	
Housing Material	Mindel
Lens Material	Acrylic
Cover Material	Udel
Connection Types	2 m cable, 4-pin DC micro (M12) QD, 4-pin pico (M8) QD
Supplied Accessories	18 mm fastening nuts
Optional Accessories	See mounting brackets, reflectors, and cordsets on page 1-39

User Interface



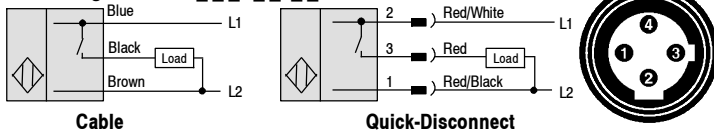
Color	State	Status—Nonteach Version	Status—Teach Version
Yellow	OFF	Output de-energized	Output de-energized
	ON	Output energized	Output energized
	Flashing	SCP active	NA
Orange	OFF	Margin < 2.5	Normal operation
	ON	Margin > 2.5	Teach mode active
	Flashing	Output SCP active (AC models only)	Teach mode active or output SCP active
Green	OFF	Sensor not powered, SCP active, output active	Sensor not powered
	ON	Sensor powered	Sensor powered
	Flashing	NA	Unstable margin condition or output SCP active

Note: For DC models output and margin LEDs alternate flashing when SCP active.

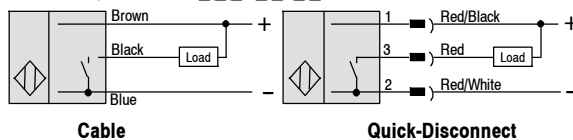
Wiring Diagrams ①②

21.6...264V AC/DC Sensors

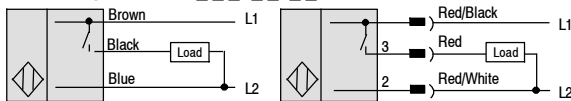
AC Wiring for 42EF- C - Models



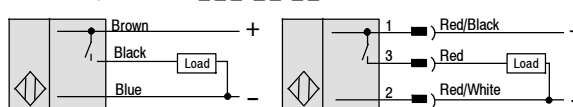
DC Wiring for 42EF- C - Models



AC Wiring for 42EF- F - Models

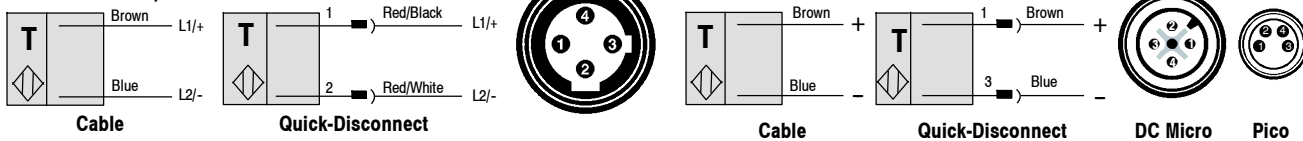


DC Wiring for 42EF- F - Models



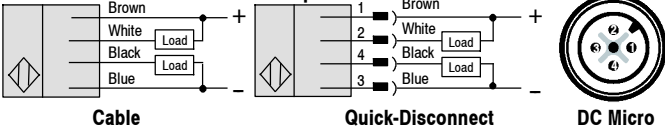
Transmitted Beam Source

21.6...264V AC/DC

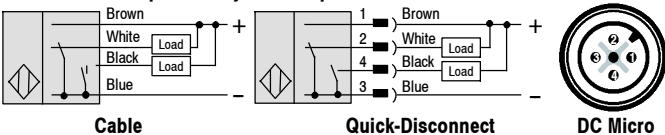


10.8...30V DC Sensors

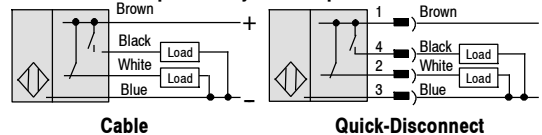
Models with Dual NPN and PNP Outputs



Models with Complementary NPN Outputs



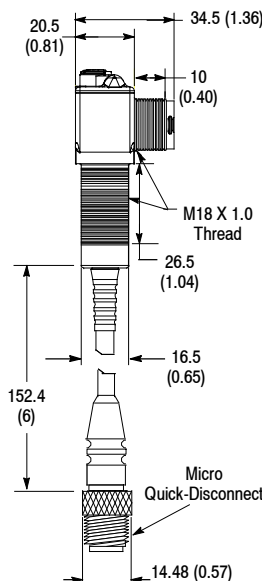
Models with Complementary PNP Outputs



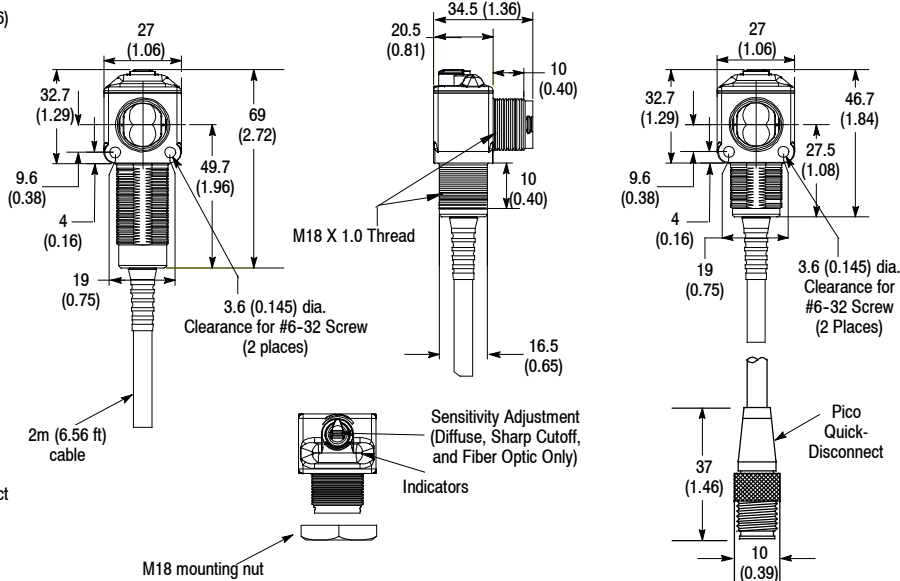
- ① For Rockwell Automation programmable controller compatible interface, refer to publication 42-2.0.
- ② All wire colors on quick-disconnect models refer to Rockwell Automation cordsets.

Approximate Dimensions [mm (in.)]

AC/DC and DeviceNet Models



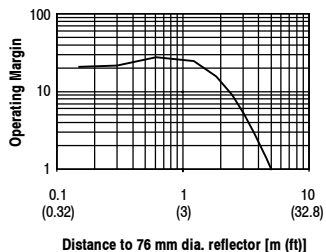
DC Models



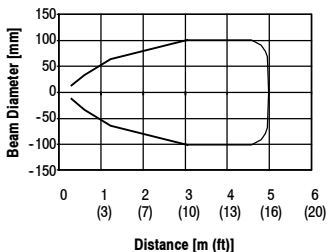
Note: All sensors supplied with one M18 mounting nut (Cat. No. 75012-097-01) except fiber optic models which come with two M18 mounting nuts (Cat. No. 75012-025-01).

Typical Response Curve

Retroreflective

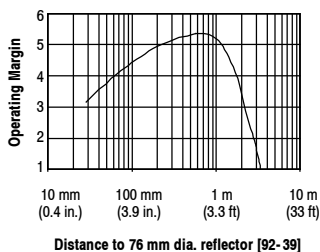


Beam Pattern

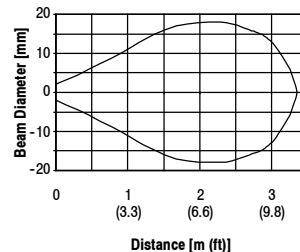


Typical Response Curve

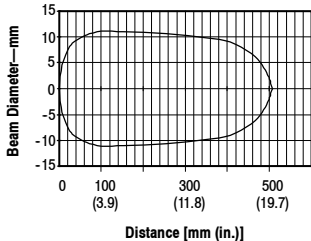
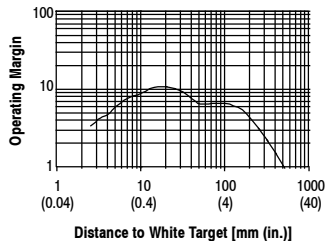
Polarized Retroreflective



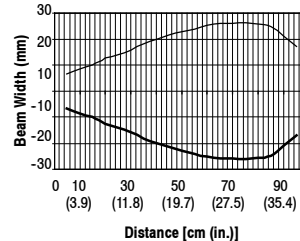
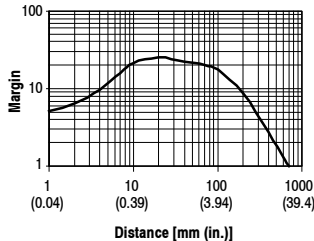
Beam Pattern



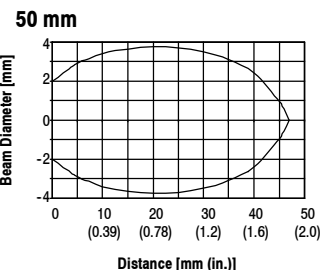
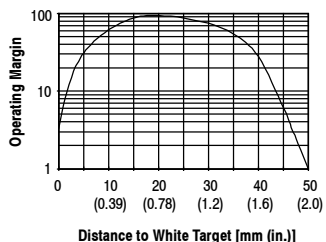
Standard Diffuse—Nonteach



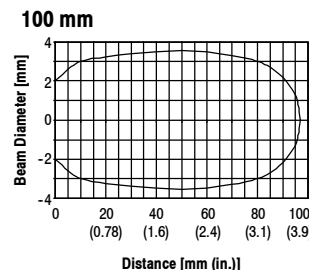
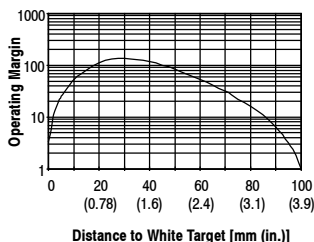
Standard Diffuse—Teach



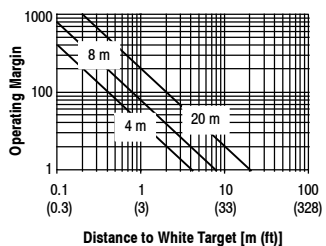
Background Suppression 50 mm



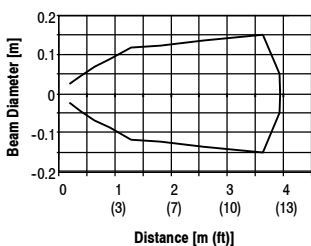
Background Suppression 100 mm



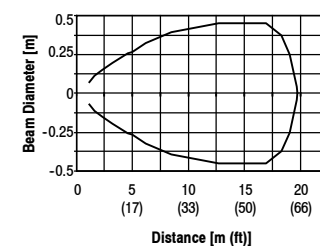
Transmitted Beam



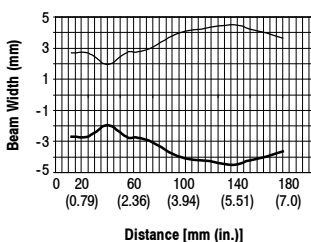
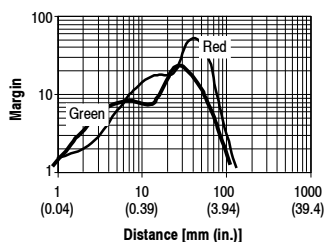
4 m Receiver Models



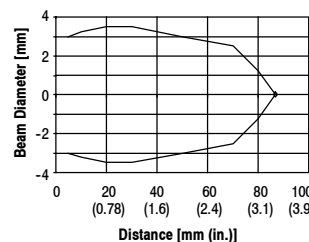
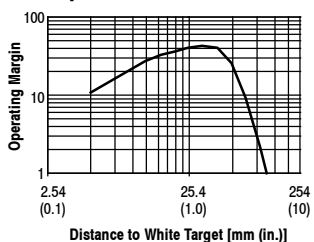
Transmitted Beam 20 m Receiver Models



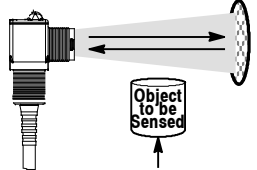
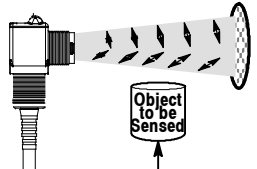
Fixed Focus



Sharp Cutoff Diffuse



Product Selection

Sensing Mode	Current @ Voltage	Sensing Distance	Adjustment Type	Output Energized	Output Type/ Capacity Response Time	Connection Type	Cat. No.	
 <p>Retroreflective Field of View: 2.5° Emitter LED: Visible red 660 nm</p>	35 mA @ 10.8...30V DC	25 mm...4.5 m (1 in...14.7 ft)	No Adjustment	Dark Operate	NPN and PNP 100 mA 1 ms	2 m 300V cable	42EF-U2KBB-A2	
				Light Operate		4-pin DC micro	42EF-U2KBB-F4	
				Dark Operate		2 m 300V cable	42EF-U2JBB-A2	
				Light Operate		4-pin DC micro	42EF-U2JBB-F4	
	Dark Operate			N-MOSFET* 100 mA 8.3 ms	2 m 300V cable	42EF-U2SCB-A2		
	Light Operate				4-pin AC micro	42EF-U2SCB-G4		
	Dark Operate				2 m 300V cable	42EF-U2RCB-A2		
	Light Operate				4-pin AC micro	42EF-U2RCB-G4		
 <p>Polarized Retroreflective Field of View: 1.5° Emitter LED: Visible red 660 nm</p>	35 mA @ 10.8...30V DC	25 mm...3 m (1 in...9.8 ft)	No Adjustment	Dark Operate	NPN and PNP 100 mA 1 ms	2 m 300V cable	42EF-P2KBB-A2	
				Light Operate		4-pin DC micro	42EF-P2KBB-F4	
				Complementary Light and Dark Operate		NPN 100 mA 1 ms	2 m 300V cable	42EF-P2MNB-A2
							4-pin DC micro	42EF-P2MNB-F4
					PNP 100 mA 1 ms	4-pin pico QD	42EF-P2MNB-Y4	
						2 m 300V cable	42EF-P2MPB-A2	
						4-pin DC micro	42EF-P2MPB-F4	
						4-pin pico QD	42EF-P2MPB-Y4	
	Dark Operate			N-MOSFET 100 mA 8.3 ms	2 m 300V cable	42EF-P2SCB-A2		
	Light Operate				4-pin AC micro	42EF-P2SCB-G4		
	Dark Operate				2 m 300V cable	42EF-P2RCB-A2		
	Light Operate				4-pin AC micro	42EF-P2RCB-G4		

① P-MOSFET models are available. Refer to www.ab.com/sensors.

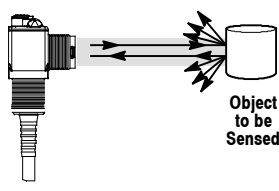
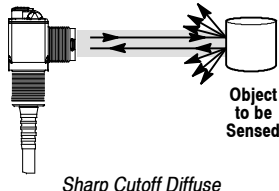
ATTENTION



P-MOSFET models have a lower in-rush current threshold for short-circuit protection than N-MOSFET. Therefore, they may be susceptible to false trigger of short-circuit protection due to induced noise.

Refer to page 1-39 for cordsets and accessories.

Product Selection (continued)

Sensing Mode	Current @ Voltage	Sensing Distance	Adjustment Type	Output Energized	Output Type/ Capacity Response Time	Connection Type	Cat. No.	
 <p>Standard Diffuse Field of View: 5° Emitter LED: Infrared 880 nm</p>	35 mA @ 10.8...30V DC	3...500 mm (0.12...20 in.)	Single-Turn Knob	Dark Operate	NPN and PNP 100 mA 1 ms	2 m 300V cable	42EF-D1KBAK-A2	
				Light Operate		4-pin DC micro	42EF-D1KBAK-F4	
	30 mA @ 10.8...30V DC	3...700 mm (0.12...27.6 in.)	Teach Button	Light Operate	NPN and PNP 100 mA 1 ms	2 m 300V cable	42EF-D1JBCK-A2	
				Dark Operate		4-pin DC micro	42EF-D1JBCK-F4	
	35 mA @ 10.8...30V DC	3...500 mm (0.12...20 in.)	Single-Turn Knob	Complementary Light and Dark Operate	NPN 100 mA 1 ms	2 m 300V cable	42EF-D1MNAK-A2	
						4-pin DC micro	42EF-D1MNAK-F4	
	15 mA @ 21.6...264V AC/DC				PNP 100 mA 1 ms	4-pin pico QD	42EF-D1MNAK-Y4	
						2 m 300V cable	42EF-D1MPAK-A2	
					N-MOSFET* 100 mA 8.3 ms	4-pin DC micro	42EF-D1MPAK-F4	
						4-pin pico QD	42EF-D1MPAK-Y4	
	 <p>Sharp Cutoff Diffuse Field of View: 7° Emitter LED: Infrared 880 nm</p>	25 mA @ 10.8...30V DC	3...130 mm (0.12...5 in.)	Single-Turn Knob	Dark Operate	NPN and PNP 100 mA 1 ms	2 m 300V cable	42EF-S1KBA-A2
					Light Operate		4-pin DC micro	42EF-S1KBA-F4
25 mA @ 10.8...30V DC		3...130 mm (0.12...5 in.)	Single-Turn Knob	Complementary Light and Dark Operate	PNP 100 mA 1 ms	2 m 300V cable	42EF-S1JBA-A2	
						4-pin DC micro	42EF-S1JBA-F4	
15 mA @ 21.6...264V AC/DC					NPN 100 mA 1 ms	4-pin DC micro	42EF-S1MPA-A2	
						4-pin pico QD	42EF-S1MPA-F4	
					N-MOSFET 100 mA 8.3 ms	4-pin pico QD	42EF-S1MPA-Y4	
						2 m 300V cable	42EF-S1MNA-A2	
					N-MOSFET 100 mA 8.3 ms	4-pin DC micro	42EF-S1MNA-F4	
						4-pin pico QD	42EF-S1MNA-Y4	
					N-MOSFET 100 mA 8.3 ms	2 m 300V cable	42EF-S1RCA-A2	
						4-pin AC micro	42EF-S1RCA-G4	
				N-MOSFET 100 mA 8.3 ms	2 m 300V cable	42EF-S1SCA-A2		
					4-pin AC micro	42EF-S1SCA-G4		

* P-MOSFET models are available. Refer to www.ab.com/sensors.

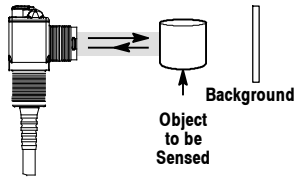
ATTENTION



P-MOSFET models have a lower in-rush current threshold for short-circuit protection than N-MOSFET. Therefore, they may be susceptible to false trigger of short-circuit protection due to induced noise.

Refer to page 1-39 for cordsets and accessories.

Product Selection (continued)

Sensing Mode	Current @ Voltage	Sensing Distance	Adjustment Type	Output Energized	Output Type/ Capacity Response Time	Connection Type	Cat. No.
 <p>Background Suppression</p> <p>Field of View: 50 mm (2 in.); 20° 100 mm (3.9 in.); 8°</p> <p>Emitter LED: Infrared 880 nm</p>	35 mA @ 10.8...30V DC	50 mm (1.97 in.)	No Adjustment	Dark Operate	NPN and PNP 100 mA 1 ms	2 m 300V cable	42EF-B1KBBC-A2
				Light Operate		4-pin DC micro	42EF-B1KBBC-F4
				Dark Operate		2 m 300V cable	42EF-B1JBBC-A2
							4-pin DC micro
				Light Operate		2 m 300V cable	42EF-B1JBBE-A2
							4-pin DC micro
		3...50 mm (0.12...2 in.)		NPN 100 mA 1 ms	2 m 300V cable	42EF-B1MNBC-A2	
					4-pin DC micro	42EF-B1MNBC-F4	
					4-pin pico QD	42EF-B1MNBC-Y4	
				PNP 100 mA 1 ms	2 m 300V cable	42EF-B1MPBC-A2	
					4-pin DC micro	42EF-B1MPBC-F4	
					4-pin pico QD	42EF-B1MPBC-Y4	
	3...100 mm (0.12...3.9 in.)	NPN 100 mA 1 ms	2 m 300V cable	42EF-B1MNBE-A2			
			4-pin DC micro	42EF-B1MNBE-F4			
			4-pin pico QD	42EF-B1MNBE-Y4			
		PNP 100 mA 1 ms	2 m 300V cable	42EF-B1MPBE-A2			
			4-pin DC micro	42EF-B1MPBE-F4			
			4-pin pico QD	42EF-B1MPBE-Y4			
15 mA @ 21.6...132V AC/DC	3...50 mm (0.12...2 in.)	No Adjustment	Light Operate	PNP-FET 100 mA 8.3 ms	2 m 300V cable	42EF-B1RFBC-A2	
			Dark Operate		4-pin AC micro	42EF-B1RFBC-G4	
			Light Operate		2 m 300V cable	42EF-B1SFBC-A2	
						4-pin AC micro	42EF-B1SFBC-G4
			Dark Operate		2 m 300V cable	42EF-B1RFBE-A2	
						4-pin AC micro	42EF-B1RFBE-G4
	3...100 mm (0.12...3.9 in.)		N-MOSFET❶ 100 mA 8.3 ms	Light Operate	2 m 300V cable	42EF-B1RCBC-A2	
				Dark Operate	4-pin AC micro	42EF-B1RCBC-G4	
				Light Operate	2 m 300V cable	42EF-B1SCBC-A2	
			4-pin AC micro			42EF-B1SCBC-G4	
			Dark Operate	2 m 300V cable	42EF-B1RCBE-A2		
					4-pin AC micro	42EF-B1RCBE-G4	
Dark Operate	2 m 300V cable	42EF-B1SCBE-A2					
		4-pin AC micro	42EF-B1SCBE-G4				

❶ P-MOSFET models are available. Refer to www.ab.com/sensors.

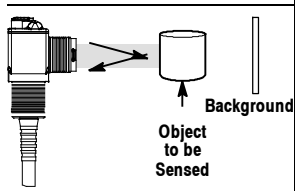
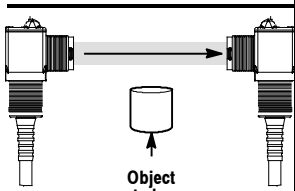
ATTENTION



P-MOSFET models have a lower in-rush current threshold for short-circuit protection than N-MOSFET. Therefore, they may be susceptible to false trigger of short-circuit protection due to induced noise.

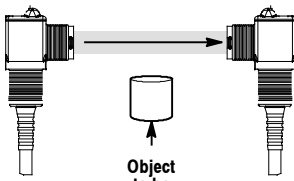
Refer to page 1-39 for cordsets and accessories.

Product Selection (continued)

Sensing Mode	Current @ Voltage	Sensing Distance	Adjustment Type	Output Energized	Output Type/ Capacity Response Time	Connection Type	Cat. No.
 <p>Fixed Focus Diffuse Spot Size: 4 mm Emitter LED: Visible red (660 nm)</p>	10.8...30V DC @ 30 mA max.	Red LED 43 mm (1.69 in.)	Teach Button	Light Operate	NPN and PNP 100 mA 1 ms	2 m 300V cable	42EF-F2JBC-A2
				Dark Operate		4-pin DC micro	42EF-F2JBC-F4
				Dark Operate		2 m 300V cable	42EF-F2KBC-A2
				Dark Operate		4-pin DC micro	42EF-F2KBC-F4
 <p>Transmitted Beam Field of View: 7° Emitter LED: Infrared 880nm</p>	10.8...30V DC 25 mA	Depends on Receiver	NA	NA	NA	2 m 300V cable	42EF-E1EZB-A2
	21.6...264V AC/DC 15 mA					4-pin DC micro	42EF-E1EZB-F4
						4-pin pico QD	42EF-E1EZB-Y4
						2 m 300V cable	42EF-E1QZB-A2
	4-pin AC micro					42EF-E1QZB-G4	

Refer to page 1-39 for cordsets and accessories.

Product Selection for Receivers

Sensing Mode	Current @ Voltage	Sensing Distance [m (ft)]	Adjustment Type	Output Energized	Output Type/ Capacity Response Time	Connection Type	Cat. No.
 <p>Object to be Sensed</p> <p>Transmitted Beam</p> <p>Field of View: 7° Emitter LED: Infrared 880nm (See Note 2.)</p>	25 mA @ 10.8...30V DC	20 m (65.6 ft)	No Adjustment	Dark Operate	NPN and PNP 100 mA 4 ms	2 m 300V cable	42EF-R9KBB-A2
				Light Operate		4-pin DC micro	42EF-R9KBB-F4
		Dark Operate		4 m (13.1 ft)		2 m 300V cable	42EF-R9JBB-A2
		Light Operate				4-pin DC micro	42EF-R9JBB-F4
		Dark Operate		8 m (26.25 ft)		2 m 300V cable	42EF-R9KBBV-A2
		Light Operate				4-pin DC micro	42EF-R9KBBV-F4
		Dark Operate		4 m (13 ft)		2 m 300V cable	42EF-R9JBBV-A2
		Light Operate				4-pin DC micro	42EF-R9JBBV-F4
		Dark Operate		8 m (26.25 ft)		2 m 300V cable	42EF-R9KBBT-A2
		Light Operate				4-pin DC micro	42EF-R9KBBT-F4
		Dark Operate		20 m (65.6 ft)		2 m 300V cable	42EF-R9JBBT-A2
		Light Operate				4-pin DC micro	42EF-R9JBBT-F4
	15 mA @ 21.6...264V AC/DC	Complementary Light and Dark Operate	4 m (13 ft)	NPN 100 mA 4 ms	2 m 300V cable	42EF-R9MNBV-A2	
				PNP 100 mA 4 ms	4-pin DC micro	42EF-R9MNBV-F4	
			8 m (26.25 ft)	NPN 100 mA 4 ms	4-pin DC pico	42EF-R9MNBV-Y4	
				PNP 100 mA 4 ms	2 m 300V cable	42EF-R9MPBV-A2	
			20 m (65.6 ft)	NPN 100 mA 4 ms	4-pin DC micro	42EF-R9MPBV-F4	
				PNP 100 mA 4 ms	4-pin DC pico	42EF-R9MPBV-Y4	
			4 m (13 ft)	NPN 100 mA 4 ms	2 m 300V cable	42EF-R9MNB-T-A2	
				PNP 100 mA 4 ms	4-pin DC micro	42EF-R9MNB-T-F4	
			8 m (26.25 ft)	NPN 100 mA 4 ms	4-pin DC pico	42EF-R9MNB-T-Y4	
				PNP 100 mA 4 ms	2 m 300V cable	42EF-R9MPBT-A2	
			20 m (65.6 ft)	NPN 100 mA 4 ms	4-pin DC micro	42EF-R9MPBT-F4	
				PNP 100 mA 4 ms	4-pin DC pico	42EF-R9MPBT-Y4	
4 m (13 ft)	N-MOSFET 100 mA 16.6 ms	Dark Operate	2 m 300V cable	42EF-R9SCBV-A2			
		Light Operate	4-pin AC micro	42EF-R9SCBV-G4			
	8 m (26.25 ft)	Dark Operate	2 m 300V cable	42EF-R9RCBV-A2			
		Light Operate	4-pin AC micro	42EF-R9RCBV-G4			
	20 m (65.6 ft)	Dark Operate	2 m 300V cable	42EF-R9SCBT-A2			
		Light Operate	4-pin AC micro	42EF-R9SCBT-G4			

ⓘ P-MOSFET models are available. Refer to www.ab.com/sensors.

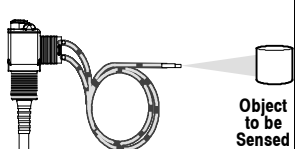
ATTENTION



P-MOSFET models have a lower in-rush current threshold for short-circuit protection than N-MOSFET. Therefore, they may be susceptible to false trigger of short-circuit protection due to induced noise.

Refer to page 1-39 for cordsets and accessories.

Product Selection (continued)

Sensing Mode	Current @ Voltage	Sensing Distance	Adjustment Type	Output Energized	Output Type/ Capacity Response Time	Connection Type	Cat. No.		
 <p>Large Aperture Fiber Optic (See Note 3.)</p> <p>Field of View: Depends on Glass Fiber Optic cable selected</p> <p>Emitter LED: Infrared 880nm</p>	35 mA @ 10.8...30V DC	Depends on Glass Fiber Optic cable selected	Single-Turn Knob	Dark Operate	NPN and PNP 100 mA 1 ms	2 m 300V cable	42EF-G1KBA-A2		
				Light Operate		4-pin DC micro	42EF-G1KBA-F4		
					Complementary Light and Dark Operate	NPN 100 mA 1 ms	2 m 300V cable	42EF-G1JBA-A2	
				4-pin DC micro			42EF-G1JBA-F4		
				Complementary Light and Dark Operate	PNP 100 mA 1 ms	4-pin pico	42EF-G1MNA-Y4		
						2 m 300V cable	42EF-G1MPA-A2		
	4-pin DC micro			42EF-G1MPA-F4					
				4-pin pico	42EF-G1MPA-Y4				
	15 mA @ 21.6...264V AC/DC						Light Operate	N-MOSFET 100 mA 8.3 ms	2 m 300V cable
				Dark Operate					4-pin AC micro
							Light Operate		2 m 300V cable
				Dark Operate					

ⓘ P-MOSFET models are available. Refer to www.ab.com/sensors.

ATTENTION



P-MOSFET models have a lower in-rush current threshold for short-circuit protection than N-MOSFET. Therefore, they may be susceptible to false trigger of short-circuit protection due to induced noise.

Note 1: For color registration mark applications, refer to light source selection guide at www.ab.com/sensors.

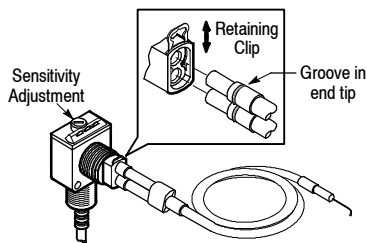
Note 2: For maximum performance, transmitted beam sources should be combined with matched operating voltage receivers, i.e., AC/DC source with AC/DC receiver or DC source with DC receiver. Reduced operating distance and margin will result from mixed operating voltage pairs.

Note 3: For use with glass fiber optic cables. See page 1-231 for more information.

Cordsets and Accessories

Description	Cat. No.	Description	Cat. No.	Description	Cat. No.
DC Micro QD Cordset, Straight, 4-pin, 2 m	889D-F4AC-2	76 mm (3 in.) Diameter Reflector	92-39	Apertures, 1 mm Slot	60-2660
AC Micro QD Cordset, Straight, 4-pin, 2 m	889R-F4AEA-2	32 mm (1.25 in.) Diameter Reflector	92-47	Apertures, 2 mm Slot	60-2661
Pico QD Cordset, Straight, 4-pin, 2 m	889P-F4AB-2	Mounting Bracket Swivel/Tilt	60-2649	Apertures, 4 mm Slot	60-2662
				Aperture Set	60-2659
Bifurcated Fiber Optic Cable—38 mm (1.5 in.) typical range	43GR-TBB25SL	Individual Fiber Optic Cable—457 mm (18 in.) typical range	43GT-FAS25SL		
Bifurcated Fiber Optic Cable—21 mm (0.8 in.) typical range	43GR-TFS10ML	Individual Fiber Optic Cable—152 mm (6 in.) typical range	43GT-TFS10ML		

Glass Fiber Optic Cables





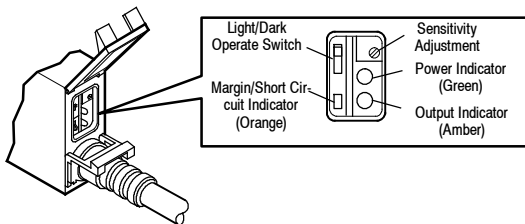
Specifications

Environmental	
Certifications	UL, CSA and CE Marked for all applicable directives
Operating Environment	NEMA 4X, 6P, IP67, 1200 psi (8270 kPa) washdown
Operating Temperature [C (F)]	-20...+70° (-4...+158°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...95%
Optical	
Sensing Modes	Retroreflective, polarized retroreflective, diffuse, wide angle diffuse, fixed focus diffuse, transmitted beam, fiber optic
Sensing Range	See Product Selection table on page 1-45
Field of View	See Product Selection table on page 1-45
Light Source	Visible red LED (660 nm), infrared LED (880 nm)
LED Indicators	See User Interface below
Adjustments	Multi-turn potentiometer
Electrical	
Voltage	10.8...30V DC, 21.6...250V AC/DC
Current Consumption	30 mA max. (DC)
Sensor Protection	Overload, short circuit, reverse polarity, false pulse
Outputs	
Response Time	See Product Selection table on page 1-45
Output Type	PNP and NPN (DC), MOSFET (AC/DC)
Output Mode	Light operate or dark operate selectable
Output Current	100 mA @ 30V DC max
Output Leakage Current	0.1 mA max (DC), 1.7 mA (AC/DC)
Mechanical	
Housing Material	Noryl 190X
Lens Material	Acrylic
Connection Types	2 m cable (24 AWG), 4-pin DC micro (M12) QD, 3-pin AC micro (M12)
Supplied Accessories	75012-097-01 18 mm locknut
Optional Accessories	See mounting brackets, reflectors, and cordsets on page 1-47

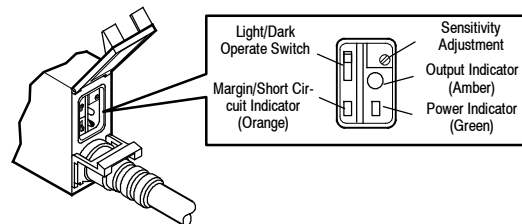
Features

- Compact rectangular size with standard 18 mm mounting nose
- Visible indicators for power, output, and 2.5X margin/short circuit
- Short circuit protection in all versions, including two-wire universal voltage versions
- False pulse protection
- Switch selectable light or dark operation
- Access to sensor adjustments through captive cover that does not require tools for access
- Eight sensing modes available
- Rated to withstand high temperature 1200 psi washdowns
- 300 μs high speed DC versions
- No tools are required to attach fiber optic cables to either glass or plastic fiber optic sensors

User Interface



NOTE: The power indicator will turn off when the output indicator is on. The cat. no. for the Rear Snap Cover is 60-2679.

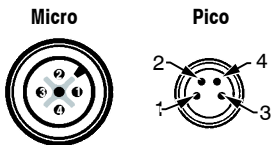
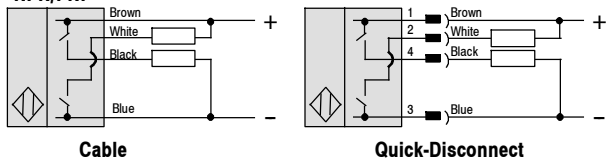


NOTE: The power indicator will turn off when the output indicator is on. The cat. no. for the Rear Snap Cover is 60-2679.

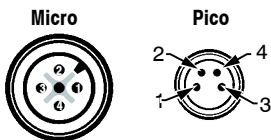
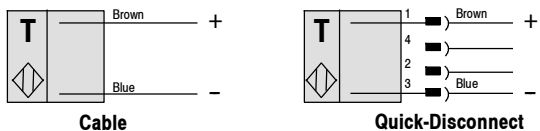
Wiring Diagrams ①②

11...30V DC Sensors

NPN/PNP

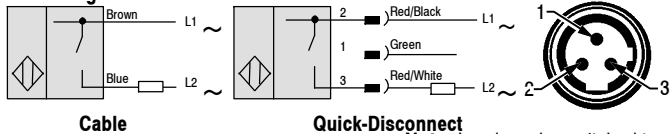


Transmitted Beam Source

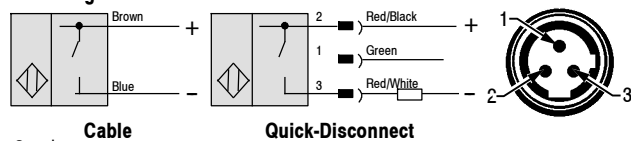


22...250V AC/DC Sensors

AC Wiring

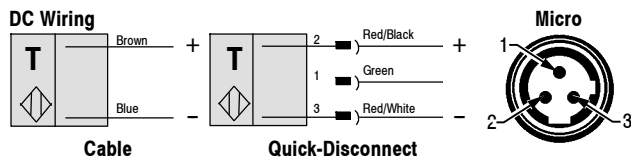
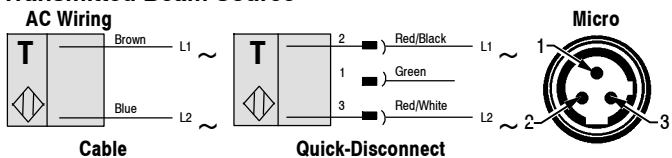


DC Wiring



Note: Load can be switched to pin 2 or brown.

Transmitted Beam Source

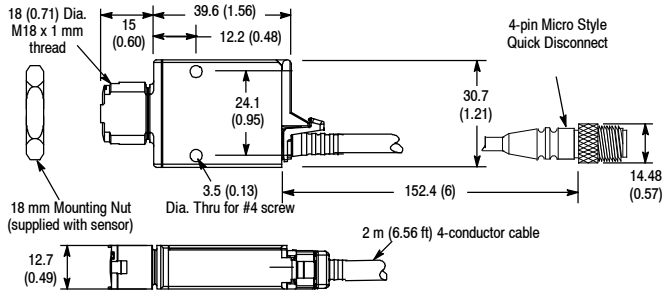


① For Rockwell Automation programmable controller compatible interface, refer to PHOTOSWITCH® Photoelectric Sensors and Programmable Controller Interface Manual at www.ab.com/literature.

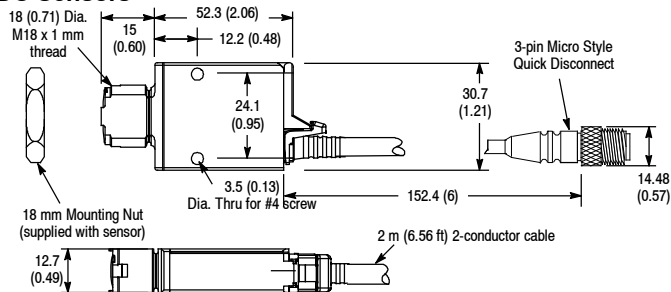
② Quick-disconnect wiring codes shown are valid for Rockwell Automation cables only.

Approximate Dimensions [mm (in.)]

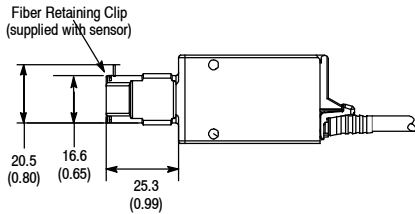
DC Sensors



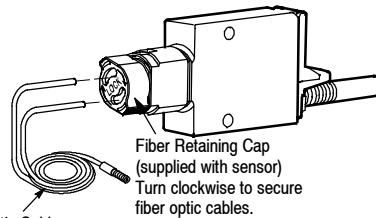
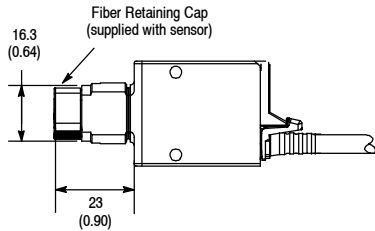
AC/DC Sensors



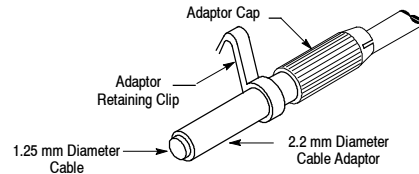
Infrared Glass Fiber Optic Sensors



Visible Red Plastic Fiber Optic Sensors



Plastic Fiber Optic Cable
2.2 mm (0.09 in.) jacket
diameter on control end tip



Special Glass Fiber Optic cables are also available with 2.2 mm (0.09 in.) diameter control end tips.

NOTE: Cat. No. 61-6731 adaptors are required for smaller fiber optic cables with jacket diameters of 1.25 mm (0.05 in.).

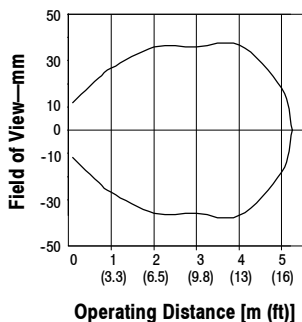
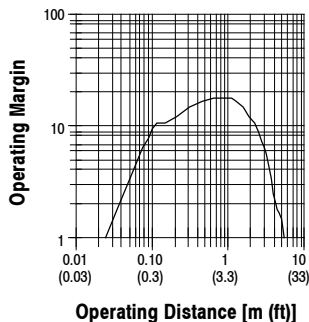
Typical Response Curve

Beam Pattern

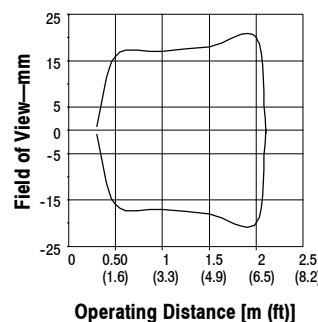
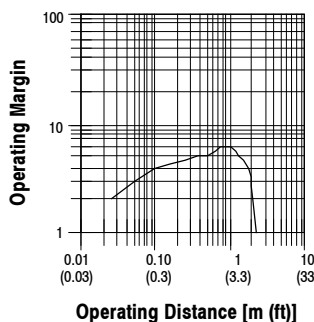
Typical Response Curve

Beam Pattern

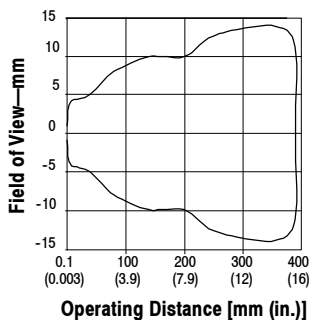
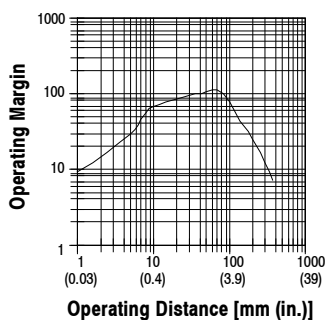
Retroreflective



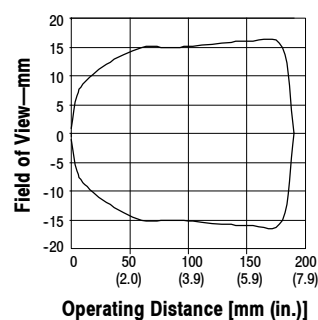
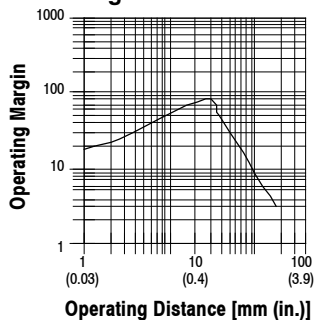
Polarized Retroreflective



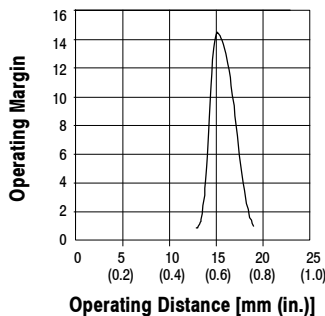
Standard Diffuse



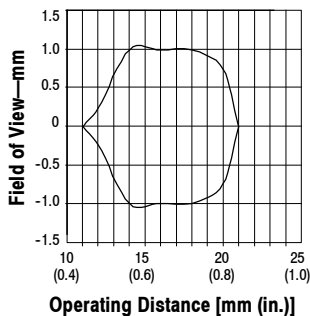
Wide Angle Diffuse



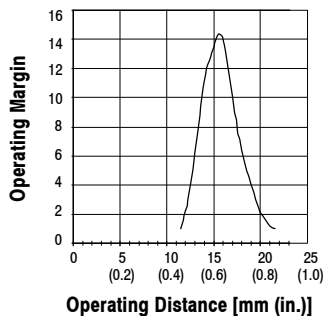
Fixed Focus Diffuse
16 mm Red LED



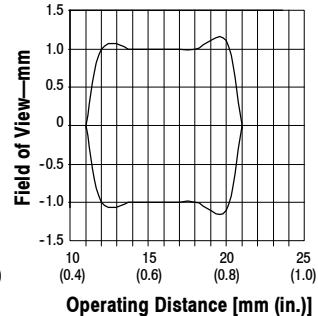
16 mm Red LED



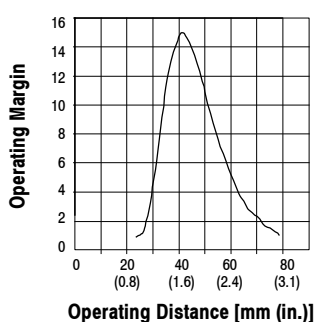
Fixed Focus Diffuse
16 mm Green LED



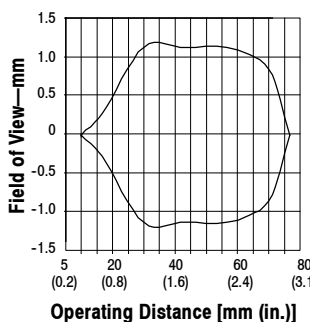
16 mm Green LED



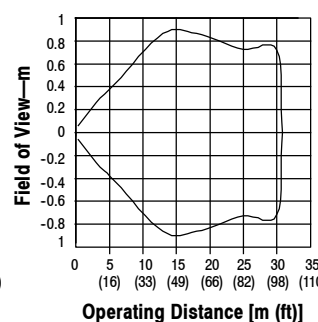
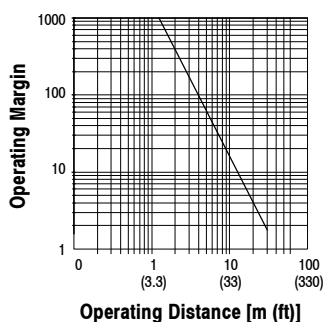
Fixed Focus Diffuse
43 mm Red LED



43 mm Red LED

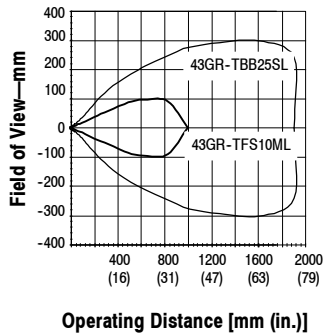
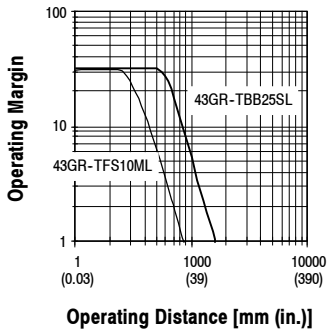


Transmitted Beam



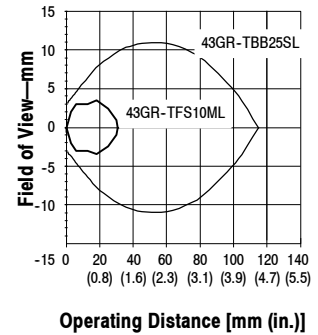
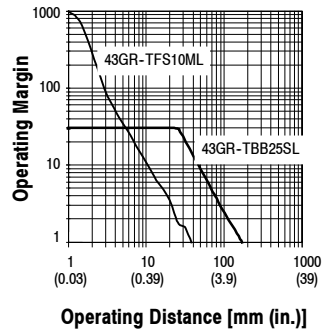
Typical Response Curve Beam Pattern

Large Aperture Fiber Optic Retroreflective (using 3 in. dia. reflector)

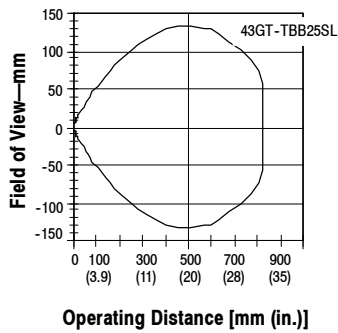
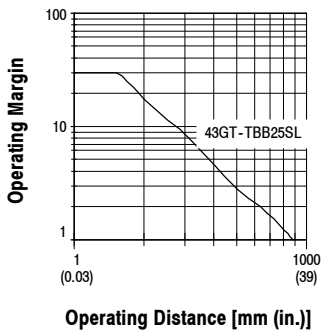


Typical Response Curve Beam Pattern

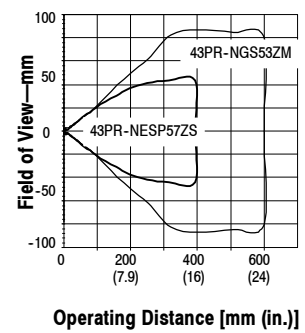
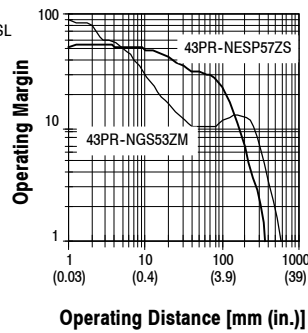
Large Aperture Fiber Optic Diffuse



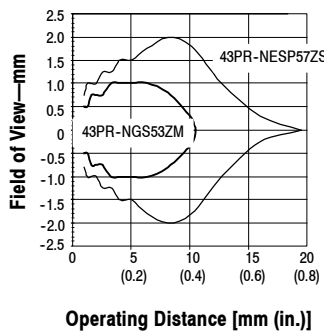
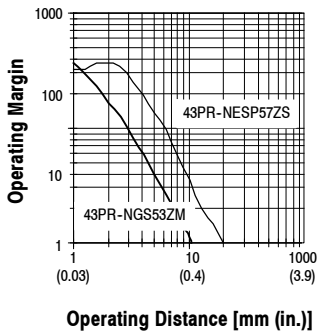
Large Aperture Fiber Optic Transmitted Beam



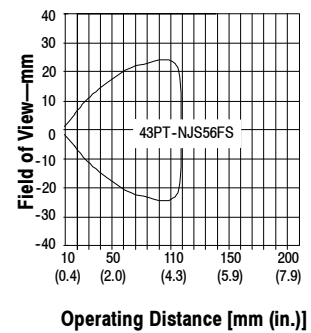
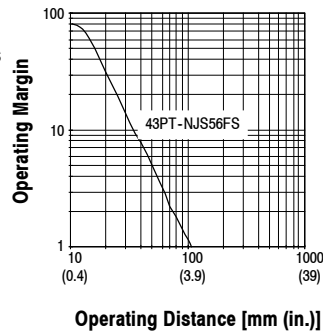
Small Aperture Fiber Optic Retroreflective (using 3 in. dia. reflector)



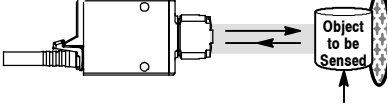
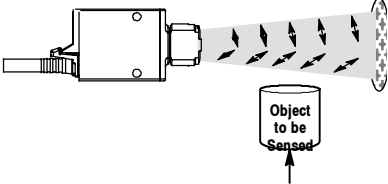
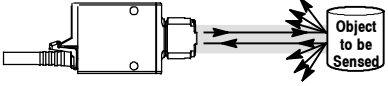
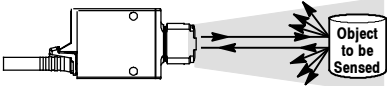
Small Aperture Fiber Optic Diffuse



Small Aperture Fiber Optic Transmitted Beam

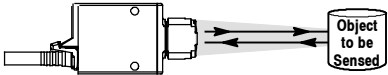
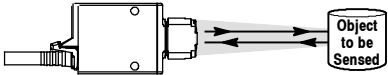
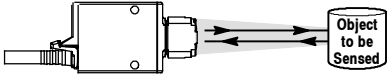
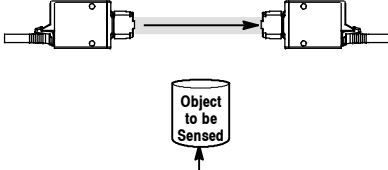


Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.
 <p><i>Retroreflective</i></p> <p>Field of View: 1.5° Emitter LED: Visible red 660 nm</p>	10.8...30V DC 35 mA	25 mm...5 m (0.98 in...16.4 ft)	Light/Dark Selectable	NPN/PNP 100 mA 1 ms	2 m 300V cable	42KL-U2LB-A2
		21.6...250V AC/DC			25 mm...2.5 m (0.98 in...8.2 ft)	4-pin DC micro
	4-pin pico QD					42KL-U2LB-Y4
	Power MOSFET 2-wire 100 mA 8.3 ms			2 m 300V cable		42KL-U2LQ-A2
		4-pin DC micro		42KL-U2LQ-F4		
		4-pin pico QD		42KL-U2LQ-Y4		
 <p><i>Polarized Retroreflective</i></p> <p>Field of View: 1.5° Emitter LED: Visible red 660 nm</p>	10.8...30V DC 35 mA	25 mm...2 m (0.98 in...6.6 ft)	Light/Dark Selectable	NPN/PNP 100 mA 1 ms	2 m 300V cable	42KL-P2LB-A2
		21.6...250V AC/DC			25 mm...1 m (0.98 in...3.3 ft)	4-pin DC micro
	4-pin pico QD					42KL-P2LB-Y4
	Power MOSFET 2 wire 100 mA 8.3 ms			2 m 300V cable		42KL-P2LQ-A2
		4-pin DC micro		42KL-P2LQ-F4		
		4-pin pico QD		42KL-P2LQ-Y4		
 <p><i>Standard Diffuse</i></p> <p>Field of View: 5° Emitter LED: Infrared 880 nm</p>	10.8...30V DC 35 mA	1...380 mm (0.04...15 in.)	Light/Dark Selectable	NPN/PNP 100 mA 1 ms	2 m 300V cable	42KL-D1LB-A2
		21.6...250V AC/DC			1...190 mm (0.04...7.5 in.)	4-pin DC micro
	4-pin pico QD					42KL-D1LB-Y4
	Power MOSFET 2 wire 100 mA 8.3 ms			2 m 300V cable		42KL-D1LQ-A2
		4-pin DC micro		42KL-D1LQ-F4		
		4-pin pico QD		42KL-D1LQ-Y4		
 <p><i>Wide Angle Diffuse</i></p> <p>Field of View: 18° Emitter LED: Infrared 880 nm</p>	10.8...30V DC 35 mA	1...180 mm (0.04...7.0 in.)	Light/Dark Selectable	NPN/PNP 100 mA 1 ms	2 m 300V cable	42KL-W1LB-A2
		21.6...250V AC/DC			1...90 mm (0.04...3.5 in.)	4-pin DC micro
	4-pin pico QD					42KL-W1LB-Y4
	Power MOSFET 2 wire 100 mA 8.3 ms			2 m 300V cable		42KL-W1LQ-A2
		4-pin DC micro		42KL-W1LQ-F4		
		4-pin pico QD		42KL-W1LQ-Y4		
	21.6...250V AC/DC				2 m 300V cable	42KL-W1TC-A2
					3-pin AC micro	42KL-W1TC-G3

Refer to page 1-47 for cordsets and accessories.

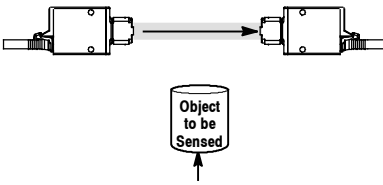
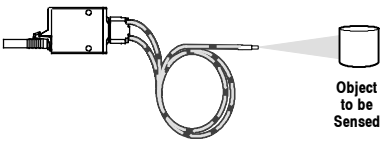
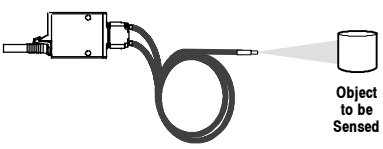
Product Selection (continued)

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.	
 <p>Fixed Focus Diffuse</p> <p>Emitter LED: Visible red (660 nm) ①</p>	10.8...30V DC 35 mA	16 mm (0.63 in.)	Light/Dark Selectable	NPN/PNP 100 mA 1 ms	2 m 300V cable	42KL-F2LBS-A2	
					4-pin DC micro	42KL-F2LBS-F4	
					4-pin pico QD	42KL-F2LBS-Y4	
	21.6...250V AC/DC			NPN/PNP 100 mA 300 μs	2 m 300V cable	42KL-F2LBSQ-A2	
					4-pin DC micro	42KL-F2LBSQ-F4	
					4-pin pico QD	42KL-F2LBSQ-Y4	
 <p>Fixed Focus Diffuse</p> <p>Emitter LED: Visible green (525 nm) ①</p>	10.8...30V DC 35 mA	43 mm (1.7 in.)	Light/Dark Selectable	NPN/PNP 100 mA 1 ms	2 m 300V cable	42KL-F3LBS-A2	
					4-pin DC micro	42KL-F3LBS-F4	
					4-pin pico QD	42KL-F3LBS-Y4	
	21.6...250V AC/DC			NPN/PNP 100 mA 300 μs	2 m 300V cable	42KL-F3LBSQ-A2	
					4-pin DC micro	42KL-F3LBSQ-F4	
					4-pin pico QD	42KL-F3LBSQ-Y4	
 <p>Fixed Focus Diffuse</p> <p>Emitter LED: Visible red (660 nm)</p>	10.8...30V DC 35 mA	43 mm (1.7 in.)	Light/Dark Selectable	NPN/PNP 100 mA 1 ms	2 m 300V cable	42KL-F2LBL-A2	
					4-pin DC micro	42KL-F2LBL-F4	
					4-pin pico QD	42KL-F2LBL-Y4	
	21.6...250V AC/DC			NPN/PNP 100 mA 300 μs	2 m 300V cable	42KL-F2LBLQ-A2	
					4-pin DC micro	42KL-F2LBLQ-F4	
					4-pin pico QD	42KL-F2LBLQ-Y4	
 <p>Transmitted Beam Light Source</p> <p>Field of View: 7°</p> <p>Emitter LED: Infrared 880 nm</p>	10.8...30V DC 35 mA	1...30 m (98 ft)	—	—	2 m 300V cable	42KL-E1EZB-A2	
					4-pin DC micro	42KL-E1EZB-F4	
					4-pin pico QD	42KL-E1EZB-Y4	
	21.6...250V AC/DC 5 mA	1...10 m (33 ft)	—	—	—	2 m 300V cable	42KL-E1QZB-A2
						3-pin AC micro	42KL-E1QZB-G3
						4-pin DC micro	42KL-E1EZBQ-A2
	10.8...30V DC 35 mA	1...10 m (33 ft)	—	—	—	4-pin DC micro	42KL-E1EZBQ-F4
						4-pin pico QD	42KL-E1EZBQ-Y4

① For color registration mark applications, refer to light source selection guide at www.ab.com/sensors.

Refer to page 1-47 for cordsets and accessories.

Product Selection (continued)

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.
 <p>Transmitted Beam Receiver</p> <p>Field of View: 7° Emitter LED: Infrared 880 nm</p>	10.8...30V DC 25 mA	30 m (98 ft)	Light/Dark Selectable	NPN/PNP 100 mA 1 ms	2 m 300V cable	42KL-RLB-A2
	21.6...250V AC/DC				4-pin DC micro	42KL-RLB-F4
					4-pin pico QD	42KL-RLB-Y4
	10.8...30V DC 25 mA	10 m (33 ft)	Light/Dark Selectable	NPN/PNP 100 mA 900 µs	2 m 300V cable	42KL-RLBQ-A2
	21.6...250V AC/DC				4-pin DC micro	42KL-RLBQ-F4
					4-pin pico QD	42KL-RLBQ-Y4
 <p>Large Aperture Fiber Optic</p> <p>Field of View: Depends on Fiber Optic cable selected Emitter LED: Infrared 880 nm</p>	10.8...30V DC 35 mA	Depends on Fiber Optic cable selected	Light/Dark Selectable	NPN/PNP 100 mA 1 ms	2 m 300V cable	42KL-G1LB-A2
	21.6...250V AC/DC				4-pin DC micro	42KL-G1LB-F4
					4-pin pico QD	42KL-G1LB-Y4
					NPN/PNP 100 mA 300 µs	2 m 300V cable
	4-pin DC micro					42KL-G1LBQ-F4
	4-pin pico QD					42KL-G1LBQ-Y4
 <p>Small Aperture Plastic Fiber Optic</p> <p>Field of View: Depends on Fiber Optic cable selected Emitter LED: Visible red 660nm</p>	10.8...30V DC 35 mA	Depends on Fiber Optic cable selected	Light/Dark Selectable	NPN/PNP 100 mA 1 ms	2 m 300V cable	42KL-L2LB-A2
	21.6...250V AC/DC 15 mA				4-pin DC micro	42KL-L2LB-F4
					4-pin pico QD	42KL-L2LB-Y4
					NPN/PNP 100 mA 300 µs	2 m 300V cable
	4-pin DC micro					42KL-L2LBQ-F4
	4-pin pico QD					42KL-L2LBQ-Y4
Power MOSFET 2-wire 100 mA 8.3 ms	2 m 300V cable	42KL-L2TC-A2				
	3-pin AC micro	42KL-L2TC-G3				

⊗ For fiber optic selection guide, see pages 1-231.

Cordsets and Accessories

Description	Cat. No.	Description	Cat. No.	Description	Cat. No.
DC Micro QD Cordset, Straight, 4-pin, 2 m	889D-F4AC-2	Pico QD Cordset, Straight, 4-pin, 2 m	889P-F4AB-2	32 mm (1.25 in.) Diameter Reflector	92-47
AC Micro QD Cordset, Straight, 3-pin, 2 m	889R-F3AEA-2	76 mm (3 in.) Diameter Reflector	92-39		

Transmitted Beam—Maximum Operating Distance with Apertures

Aperture Slot Size	Maximum Range		Cat. No.
	Standard Speed	High Speed	
1 mm	2.1 m (6.9 ft)	0.7 m (2.3 ft)	60-2673
2 mm	10.5 m (34.5 ft)	3.5 m (11.4 ft)	60-2674
4 mm	18.6 m (61.0 ft)	6.1 m (20.1 ft)	60-2675
1, 2, 4 mm kit	—	—	60-2676



Features

- Narrow 27 mm deep housing
- 18 mm nose and through-hole mounting options
- LED indicators with 360° visibility
- No user adjustments required
- Multiple sensing modes
- Low voltage 24V DC operation
- Variety of connection types

Specifications

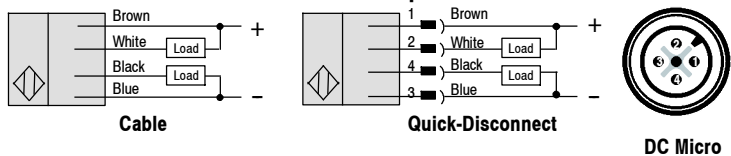
Environmental	
Certifications	cULus and CE Marked for all applicable directives
Operating Environment	NEMA 12, IP51
Operating Temperature [C (F)]	0...+50° (32...+122°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...95%
Optical	
Sensing Modes	Diffuse, polarized retroreflective, wide angle, sharp cutoff
Sensing Range	See Product Selection table on page 1-51
Field of View	See Product Selection table on page 1-51
Light Source	Visible red LED (660 nm), infrared LED (880 nm)
LED Indicators	See User Interface below
Adjustments	None
Electrical	
Voltage	10...30V DC
Current Consumption	35 mA max
Sensor Protection	Overload, short circuit, reverse polarity, false pulse
Outputs	
Response Time	10 ms
Output Type	PNP or NPN by cat. no., both PNP and NPN models
Output Mode	Light or dark operate by cat. no.
Output Current	100 mA @ 30V DC max
Output Leakage Current	0.1 mA max
Mechanical	
Housing Material	Valox®
Lens Material	Acrylic
Connection Types	2 m cable (24 AWG), 4-pin DC micro (M12) QD
Supplied Accessories	75012-097-01 18 mm locknut
Optional Accessories	See mounting brackets, reflectors, and cordsets on page 1-51

User Interface

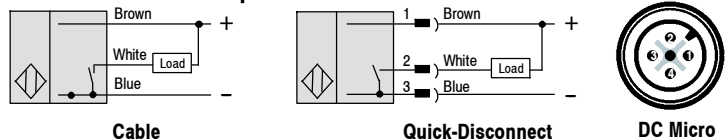
Label	Color	State	Status
Output	Yellow	OFF	Sensor output de-activated
		ON	Sensor output activated
Margin	Red	OFF	Margin < 1.2
		ON	Margin > 1.2
Power	Green	OFF	Sensor not powered
		ON	Sensor powered

Wiring Diagrams①

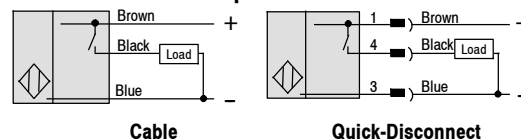
Models with Dual NPN and PNP Outputs



Models with NPN Outputs



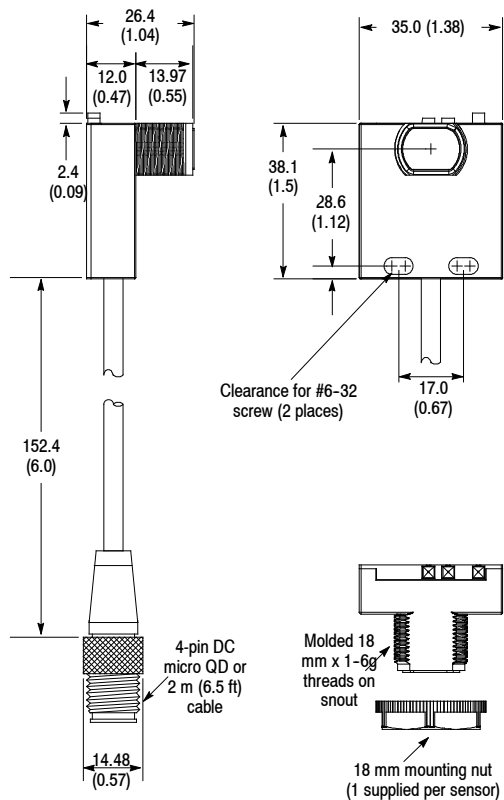
Models with PNP Outputs



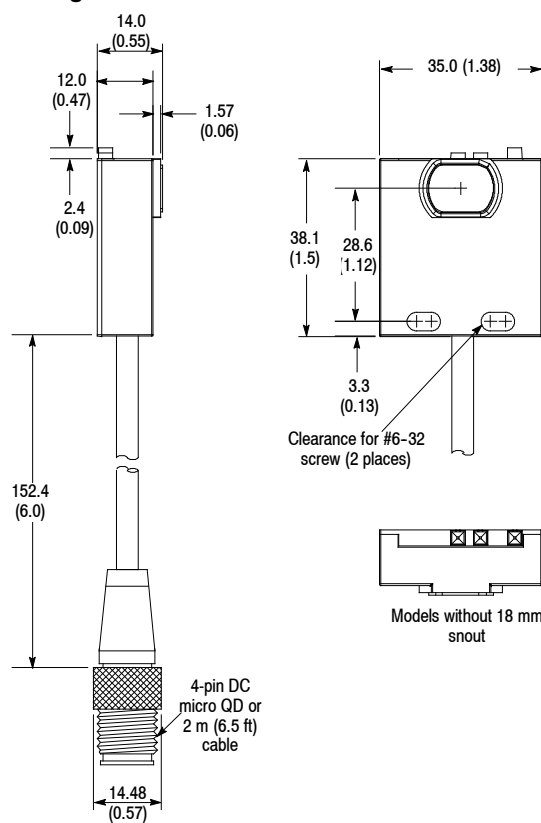
① All wire colors on quick-disconnect models refer to Rockwell Automation 889D cordsets.

Approximate Dimensions [mm (in.)]

Polarized Retroreflective and Standard Diffuse Models



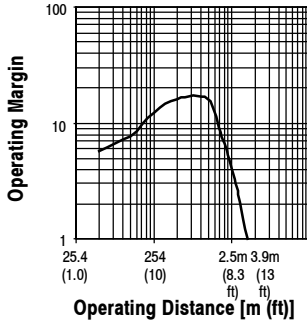
Wide Angle Diffuse Models



Note: All sensors except wide angle diffuse models are supplied with one M18 mounting nut (Cat. No. 75012-097-01).

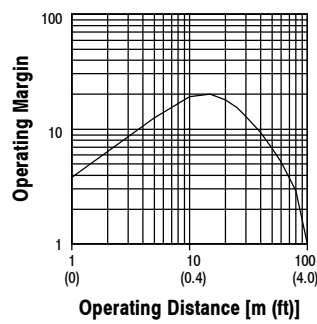
Typical Response Curve

Polarized Retroreflective

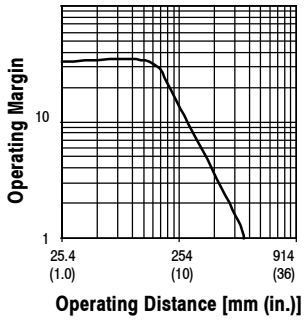


Typical Response Curve

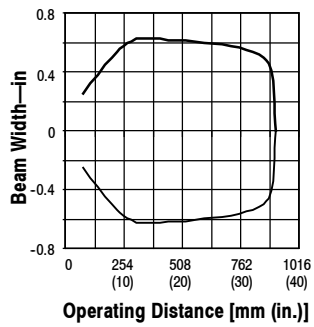
Sharp Cutoff Diffuse



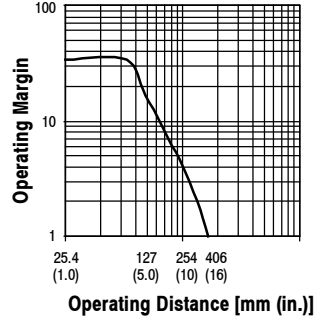
Standard Diffuse



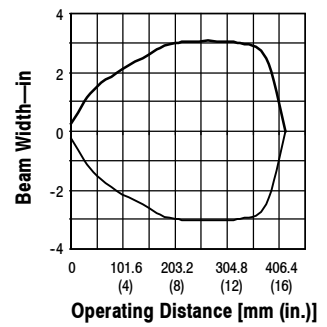
Beam Pattern



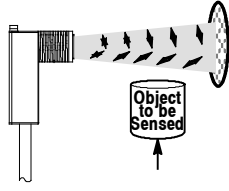
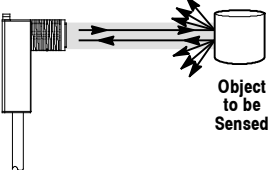
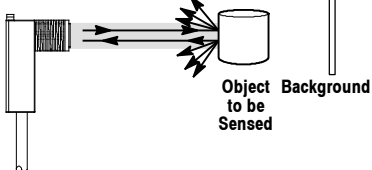
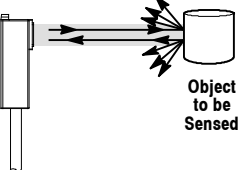
Wide Angle Diffuse



Beam Pattern



Product Selection

Sensing Mode	Operating Voltage/ Current	Sensing Distance	Output Energized	Output Type/ Capacity Response Time	Connection Type	Cat. No.
 <p><i>Polarized Retroreflective</i> Field of View: 1.5° Emitter LED: Visible red 660 nm</p>	10...30V DC 35 mA	25 mm...1.5 m (1 in...4.9 ft)	Dark Operate	NPN and PNP 100 mA 10 ms	2 m 300V cable	44RSP-2KBE1-A2
					4-pin DC micro	44RSP-2KBE1-F4
		Light Operate	2 m 300V cable		44RSP-2JBE3-A2	
			4-pin DC micro		44RSP-2JBE3-F4	
		Dark Operate	2 m 300V cable	44RSP-2KBE3-A2		
			4-pin DC micro	44RSP-2KBE3-F4		
		Light Operate	25 mm...3 m (1 in...9.8 ft)	NPN/100 mA 10 ms	2 m 300V cable	44RSP-2JNE3-A2
					4-pin DC micro	44RSP-2JNE3-F4
					3-pin Molex	44RSP-2JNE3-Z6
		PNP/100 mA 10 ms	2 m 300V cable	44RSP-2JPE3-A2		
	4-pin DC micro	44RSP-2JPE3-F4				
 <p><i>Standard Diffuse</i> Field of View: 5° Emitter LED: Infrared 880 nm</p>	10...30V DC 35 mA	3...380 mm (0.12...15 in.)	Light Operate	NPN/100 mA 10 ms	2 m 300V cable	44RSD-1JNC38-A2
					4-pin DC micro	44RSD-1JNC38-F4
				PNP/100 mA 10 ms	2 m 300V cable	44RSD-1JPC38-A2
					4-pin DC micro	44RSD-1JPC38-F4
 <p><i>Sharp Cutoff Diffuse</i> Field of View: 5° Emitter LED: Infrared 880 nm</p>	10...30V DC 35 mA	3...100 mm (0.12...4 in.)	Light Operate	NPN/100 mA 10 ms	2 m 300V cable	44RSS-1JNB1-A2
					4-pin DC micro	44RSS-1JNB1-F4
 <p><i>Wide Angle Diffuse</i> Field of View: Approx. 60° Emitter LED: Infrared 880 nm</p>	10...30V DC 35 mA	3...200 mm (0.12...7.8 in.)	Light Operate	NPN/100 mA 10 ms	2 m 300V cable	44RSW-1JNC20-A2
					4-pin DC micro	44RSW-1JNC20-F4
				PNP/100 mA 10 ms	2 m 300V cable	44RSW-1JPC20-A2
					4-pin DC micro	44RSW-1JPC20-F4

Cordsets and Accessories

Description	Cat. No.	Description	Cat. No.
DC Micro QD Cordset, Straight, 4-pin, 2 m	889D-F4AC-2	Right Angle Mounting Bracket	60-2657
76 mm (3 in.) Diameter Reflector	92-39	Mounting Screws (not supplied)	2 x #6-32
32 mm (1.25 in.) Diameter Reflector	92-47		

42CA

18 mm Cylindrical



Description

The 42CA 18 mm cylindrical family of general purpose photoelectric sensors is intended for light to medium duty industrial applications.

The 42CA family provides an indication if the sensor operation is unstable. An indicator flashes if the signal level is too close to the detection threshold. This helps for easy alignment of the sensor and forewarns against detection of a background.

Features

- 18 mm industry standard enclosure
- Extended range high-speed models
- Patented ASIC design offers linear sensitivity adjustment, stability indication and excellent noise immunity
- Two LED indicators provide status of power, output, unstable operation and short-circuit protection
- Complementary light and dark

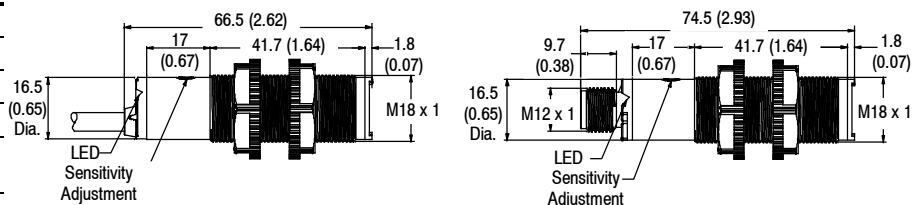
Specifications

Environmental	
Certifications	cULus and CE Marked for all applicable directives
Operating Environment	IP67
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...95% (noncondensing)
Ambient Light Immunity	Incandescent light 5000 lux
Optical	
Sensing Modes	Retroreflective, polarized retroreflective, diffuse, background suppression, transmitted beam
Sensing Range	See Product Selection table on page 1-55
Light Source	Visible red LED (660 nm) or infrared LED (880 nm)
LED Indicators	Green and yellow, see User Interface below
Adjustments	Sensitivity potentiometer on select models
Electrical	
Voltage	10...30V DC
Current Consumption	30 mA max
Sensor Protection	Reverse polarity, overload, short circuit
Outputs	
Response Time	See Product Selection table on page 1-55
Output Type	PNP or NPN by cat. no.
Output Mode	Complementary light or dark operate, selectable light or dark operate for background suppression models
Output Current	100 mA
Output Leakage Current	10 µA max
Mechanical	
Housing Material	PBT
Lens Material	PMMA
Connection Types	2 m cable, 4-pin DC micro (M12) QD
Supplied Accessories	18 mm fastening nuts
Optional Accessories	See mounting brackets, reflectors, and cordsets on page 1-56

User Interface

LED Color	State	Status
Yellow	OFF	Output de-energized❶
	ON	Output energized❶
Green	OFF	Power is OFF
	ON	Power is ON
	Flashing (6 Hertz)	Unstable (0.5 < Margin < 2)
	Flashing (1.5 Hertz)	Output short-circuit protection active

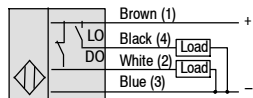
Approximate Dimensions [mm (in.)]



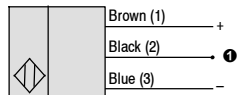
❶ Black wire or pin 4 of connector.

Wiring Diagrams

PNP Models with Complementary Outputs

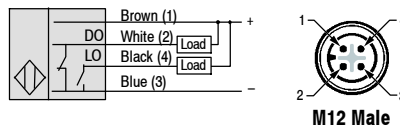


Transmitted Beam Emitter



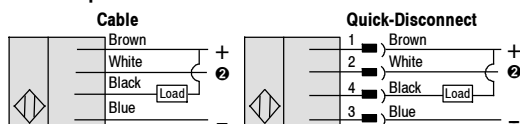
① For normal operation, black wire (pin 2) needs no connection. To disable light source, connect black wire (pin 2) to -V.

NPN Models with Complementary Outputs

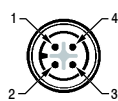


Additional Wiring Options for Background Suppression and Transmitted Beam

NPN Output

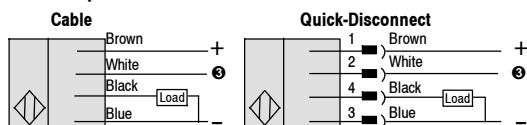


Face View Male Receptacle (Sensor) DC Micro

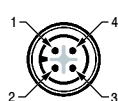


② Open circuit or tie white (2) and brown (1) conductors together for L.O. Tie white (2) and blue (3) conductors together for D.O.

PNP Output



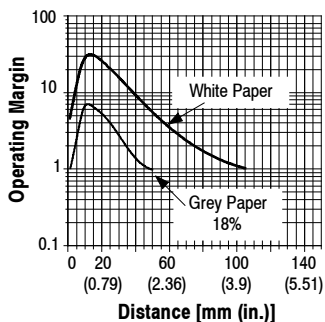
Face View Male Receptacle (Sensor) DC Micro



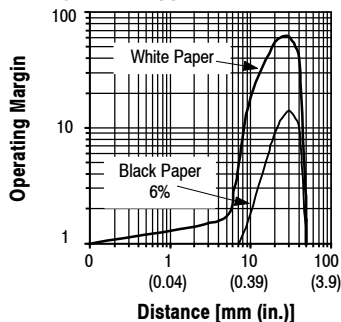
③ Tie white (2) and brown (1) conductors together for L.O. Open circuit or tie white (2) and blue (3) conductors together for D.O.

Typical Response Curves

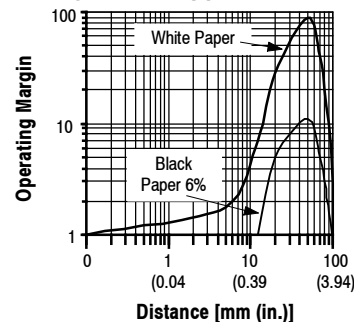
Standard Diffuse [100 mm]



Background Suppression [50 mm]

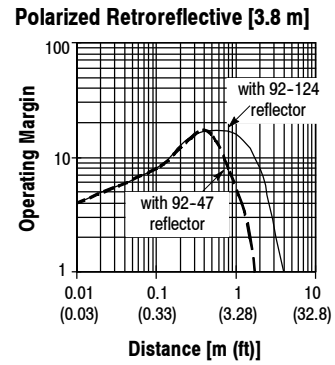
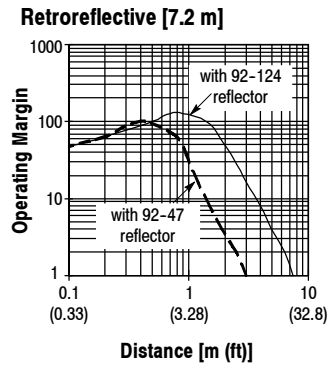
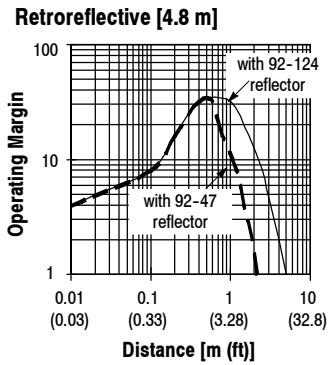


Background Suppression [100 mm]

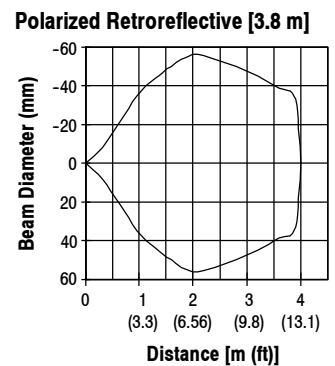
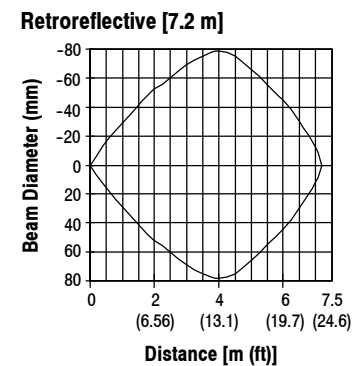
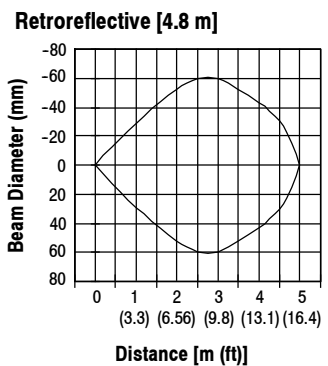


Typical Response Curves (continued)

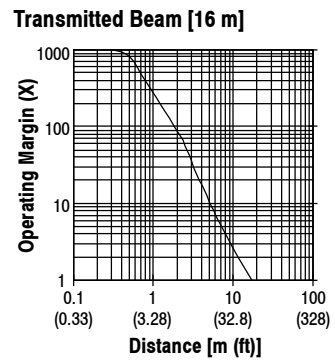
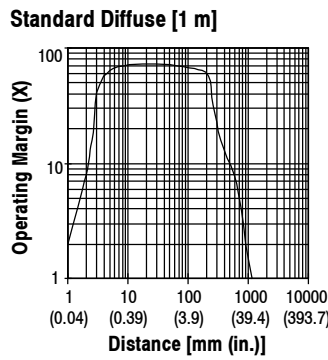
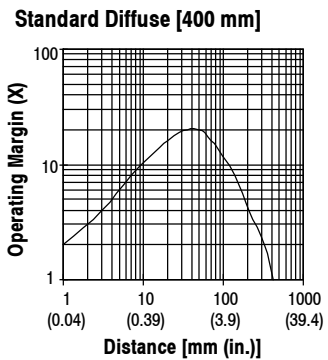
Operating Margin



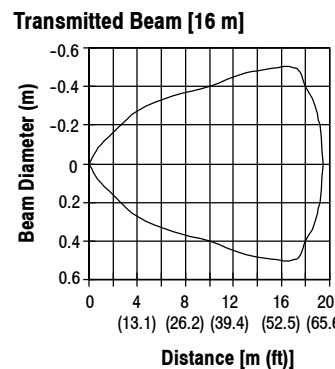
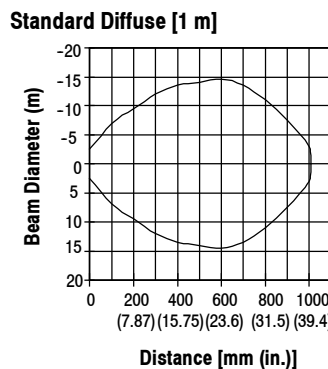
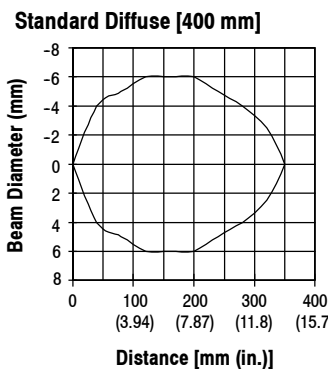
Beam Pattern



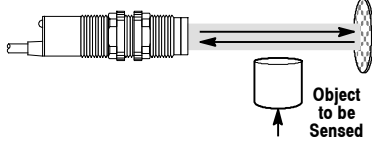
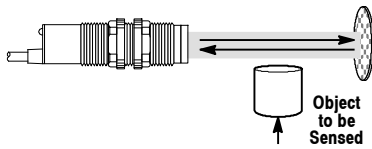
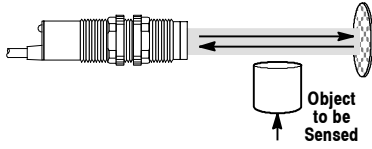
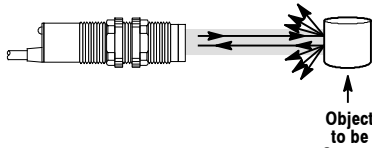
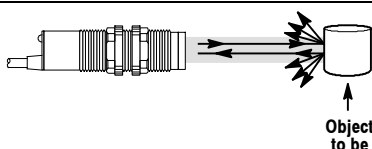
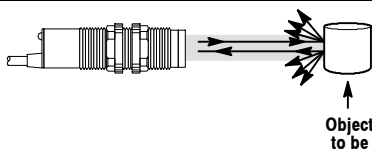
Operating Margin



Beam Pattern



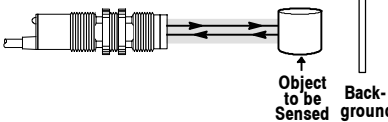
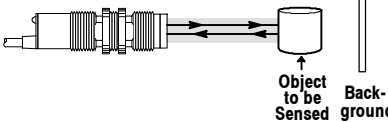
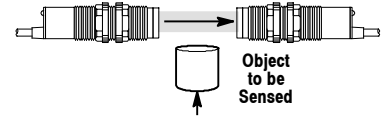
Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type/ Response Time	Sensitivity Adjust	Cat. No.❶
 Retroreflective Field of View: 1.2° Emitter LED: Visible red 660 nm	10...30V DC 25 mA max.	2 mm...4.8 m (0.08 in...15.7 ft)	Complementary light and dark operate	NPN 100 mA 1 ms	No adjustment	42CA-U2MNB-D4
				PNP 100 mA 1 ms	No adjustment	42CA-U2MPB-D4
 Retroreflective Field of View: 1.2° Emitter LED: Visible red 660 nm	10...30V DC 25 mA max.	2 mm...7.2 m (0.08 in...23.6 ft)	Complementary light and dark operate	NPN 100 mA 0.5 ms	Single turn potentiometer	42CA-U2MNA-D4
				PNP 100 mA 0.5 ms	Single turn potentiometer	42CA-U2MPA-D4
 Polarized Retroreflective Field of View: 1.3° Emitter LED: Visible red 660 nm	10...30V DC 25 mA max.	2 mm...3.8 m (0.08 in...12.5 ft)	Complementary light and dark operate	NPN 100 mA 1 ms	No adjustment	42CA-P2MNB-D4
				PNP 100 mA 1 ms	No adjustment	42CA-P2MPB-D4
 Standard Diffuse Field of View: 3° Emitter LED: Infrared 880 nm	10...30V DC 30 mA max.	0...100 mm (0...3.94 in.)	Complementary light and dark operate	NPN 100 mA 1 ms	Single turn potentiometer	42CA-D1MNAE-D4❷
				PNP 100 mA 1 ms	Single turn potentiometer	42CA-D1MPAE-D4❷
 Standard Diffuse Field of View: 7.5° Emitter LED: Infrared 880 nm	10...30V DC 25 mA max.	0...400 mm (0...15.7 in.)	Complementary light and dark operate	NPN 100 mA 1 ms	Single turn potentiometer	42CA-D1MNAJ-D4
				PNP 100 mA 1 ms	Single turn potentiometer	42CA-D1MPAJ-D4
 Standard Diffuse Field of View: 5° Emitter LED: Infrared 880 nm	10...30V DC 30 mA max.	0...1000 mm (0...39.4 in.)	Complementary light and dark operate	NPN 100 mA 0.5 ms	Single turn potentiometer	42CA-D1MNAL-D4
				PNP 100 mA 0.5 ms	Single turn potentiometer	42CA-D1MPAL-D4

❶ Suffix -D4 denotes 4-pin DC micro connection type. For 2 m cable without QD replace suffix -D4 with -A2 (e.g. 42CA-P2MPB-A2).

❷ Refer to www.ab.com/sensors for updated information.

Product Selection (continued)

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type/ Response Time	Sensitivity Adjust	Cat. No.❶
 <p>Background Suppression</p> <p>Field of View: 5.7° Emitter LED: Visible red 660 nm</p>	10...30V DC 30 mA max.	50 mm (1.97 in.)	Selectable light or dark operate	NPN 100 mA 0.5 ms	No adjustment	42CA-B2LNBC-D4❷
				PNP 100 mA 0.5 ms	No adjustment	42CA-B2LPBC-D4❷
 <p>Background Suppression</p> <p>Field of View: 3.4° Emitter LED: Visible red 660 nm</p>	10...30V DC 30 mA max.	100 mm (3.94 in.)	Selectable light or dark operate	NPN 100 mA 0.5 ms	No adjustment	42CA-B2LNBE-D4❷
				PNP 100 mA 0.5 ms	No adjustment	42CA-B2LPBE-D4❷
 <p>Transmitted Beam</p> <p>Field of View: 1.5° Emitter LED: Infrared 880 nm</p>	10...30V DC 30 mA max.	3 mm...16 m (0.12 in...52.5 ft)	NA infrared light source	NA	No adjustment	42CA-E1EZB1-D4
	10...30V DC 25 mA max.		NPN 100 mA 1 ms	Single turn potentiometer	42CA-R1MNA1-D4	
			PNP 100 mA 1 ms	Single turn potentiometer	42CA-R1MPA1-D4	

❶ Suffix -D4 denotes 4-pin DC micro connection type. For 2 m cable without QD replace suffix -D4 with -A2 (e.g. 42CA-P2MPB-A2).

❷ Refer to www.ab.com/sensors for updated information.

Cordsets and Accessories

Cordset		Accessories			
Description	Cat. No.	Description	Cat. No.	Description	Cat. No.
DC Micro QD Cordset, 4-pin, 2 m	889D-F4AC-2	Mounting Bracket	60-2657	Reflector	92-124
Right Angle DC Micro QD Cordset, 4-pin, 2 m	889D-R4AC-2	Straight Mounting Bracket	60-2656	Reflector	92-47
		Snap-Clamp Mounting Bracket	871A-SCBP18		
		Right Angle Mounting Bracket	60-2654		



Features

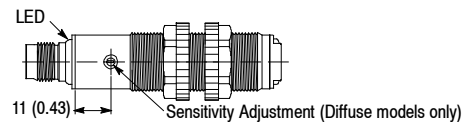
- 18 mm industry standard package
- Wide selection of sensing modes
- 30V DC operation
- NPN or PNP outputs
- Fast response time
- Variety of connection types
- Laser models available (see page 1-115)

Specifications

Environmental	
Certifications	cULus and CE Marked for all applicable directives
Operating Environment	IP67
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60068-2-6
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60068-2-27
Relative Humidity	5...95%
Ambient Light Immunity	Incandescent light 3000 lux
Optical	
Sensing Modes	Retroreflective, polarized retroreflective, diffuse, background suppression, transmitted beam
Sensing Range	See Product Selection table on page 1-60
Field of View	See Product Selection table on page 1-60
Light Source	Visible red LED (660 nm) or infrared LED (880 nm)
LED Indicators	Yellow LED for output indication
Adjustments	Sensitivity potentiometer (diffuse models only)
Electrical	
Voltage	10...30V DC
Current Consumption	30 mA max
Sensor Protection	Reverse polarity, overload, short circuit
Outputs	
Response Time	2 ms (0.5 ms for background suppression)
Output Type	PNP or NPN by cat. no.
Output Mode	Complementary light operate or dark operate, selectable light operate or dark operate for background suppression models
Output Current	100 mA
Output Leakage Current	10 µA max
Mechanical	
Housing Material	Nickel-plated brass
Lens Material	PMMA/PC
Connection Types	2 m cable, 4-pin DC micro (M12) QD
Supplied Accessories	18 mm fastening nuts
Optional Accessories	See mounting brackets, reflectors, and cordsets on page 1-61

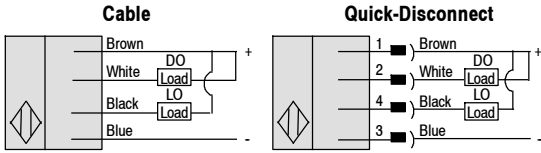
User Interface Panel

Label	Color	State	Status
Output	Yellow	OFF	Sensor output de-activated
		ON	Sensor output activated



Wiring Diagrams

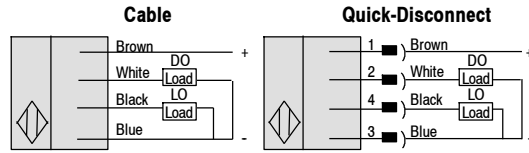
Diffuse
NPN Output



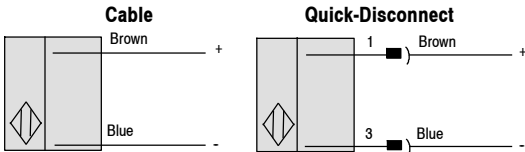
Face View Male
Receptacle (Sensor)
DC Micro



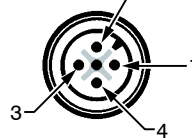
PNP Output



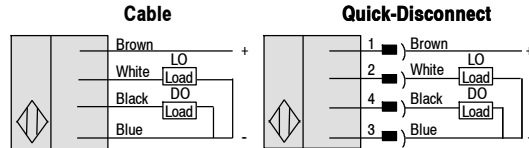
Transmitted Beam, Retroreflective, Polarized Retroreflective



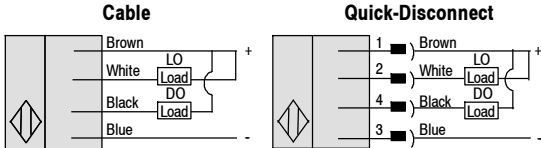
Face View Male
Receptacle (Sensor)
DC Micro



PNP Output

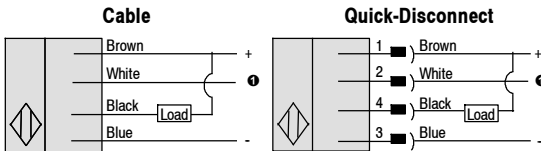


NPN Output

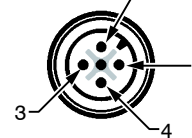


Background Suppression

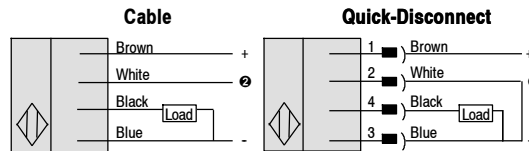
NPN Output



Face View Male
Receptacle (Sensor)
DC Micro

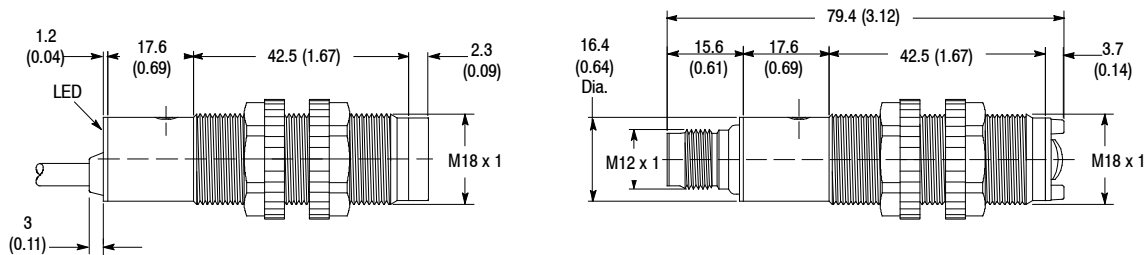


PNP Output



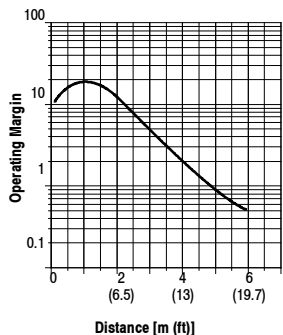
- ❶ Open circuit or tie white (2) and brown (1) conductors together for L.O. Tie white (2) and blue (3) conductors together for D.O.
- ❷ Tie white (2) and brown (1) conductors together for L.O. or tie white (2) and blue (3) conductors together for D.O.

Approximate Dimensions [mm (in.)]

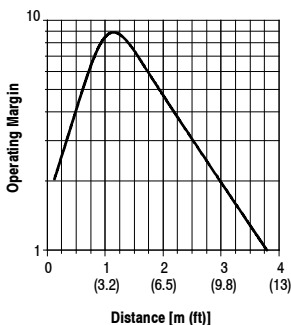


Typical Response Curve

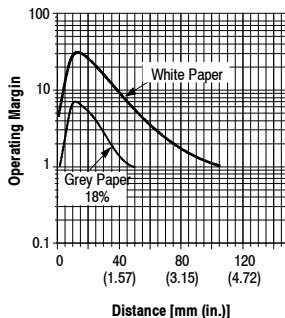
Retroreflective



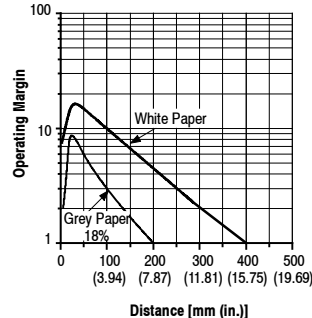
Polarized Retroreflective



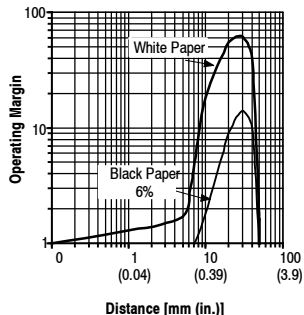
Standard Diffuse 100 mm



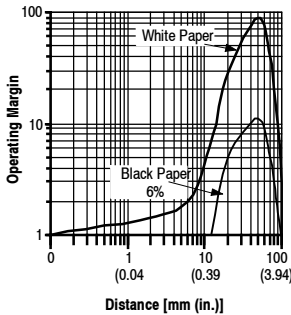
Standard Diffuse 400 mm



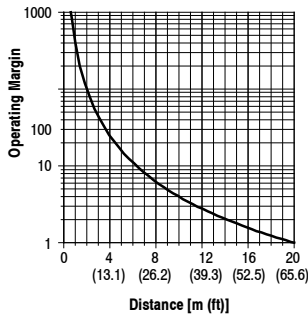
Background Suppression 50 mm



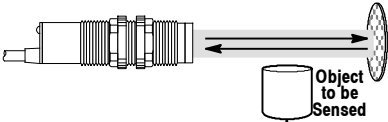
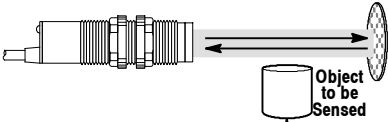
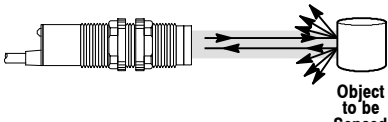
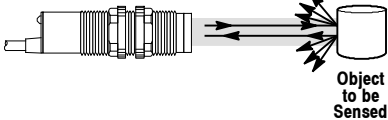
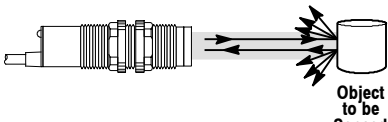
Background Suppression 100 mm



Transmitted Beam

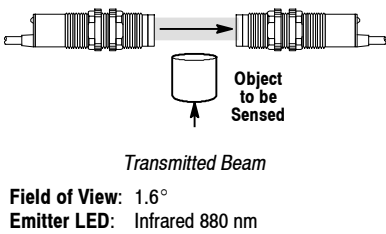


Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance @ 1X Margin	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.
 <p>Retroreflective</p> <p>Field of View: 1.9°</p> <p>Emitter LED: Infrared 880 nm</p>	10...30V DC 30 mA	3 mm...4 m (0.12 in... 13.2 ft)	LO/DO Complementary	NPN 100 mA 4 ms	2 m 300V cable	42CM-U1MNB-A2
					4-pin DC micro	42CM-U1MNB-D4
				PNP 100 mA 4 ms	2 m 300V cable	42CM-U1MPB-A2
					4-pin DC micro	42CM-U1MPB-D4
 <p>Polarized Retroreflective</p> <p>Field of View: 1.8°</p> <p>Emitter LED: Visible red 660 nm</p>	10...30V DC 30 mA	3 mm...3 m (0.12 in...9.9 ft)	LO/DO Complementary	NPN 100 mA 4 ms	2 m 300V cable	42CM-P2MNB-A2
					4-pin DC micro	42CM-P2MNB-D4
				PNP 100 mA 4 ms	2 m 300V cable	42CM-P2MPB-A2
					4-pin DC micro	42CM-P2MPB-D4
 <p>Standard Diffuse</p> <p>Field of View: 6.6°</p> <p>Emitter LED: Visible Red 660 nm</p>	10...30V DC 30 mA	100 mm (3.9 in.) (Adjustable)	LO/DO Complementary	NPN 100 mA 2 ms	2 m 300V cable	42CM-D2MNAE-A2
					4-pin DC micro	42CM-D2MNAE-D4
				PNP 100 mA 2 ms	2 m 300V cable	42CM-D2MPAE-A2
					4-pin DC micro	42CM-D2MPAE-D4
 <p>Standard Diffuse</p> <p>Field of View: 6.6°</p> <p>Emitter LED: Infrared 880 nm</p>	10...30V DC 30 mA	400 mm (13.6 in.) (Adjustable)	LO/DO Complementary	NPN 100 mA 2 ms	2 m 300V cable	42CM-D1MNAL-A2
					4-pin DC micro	42CM-D1MNAL-D4
				PNP 100 mA 2 ms	2 m 300V cable	42CM-D1MPAL-A2
					4-pin DC micro	42CM-D1MPAL-D4
 <p>Background Suppression</p> <p>Field of View: 50 mm = 5.7° 100 mm = 3.4°</p> <p>Emitter LED: Visible red 660 nm</p>	10...30V DC 30 mA	50 mm (1.97 in.)	L.O./D.O. Selectable	NPN 100 mA 0.5 ms	2 m 300V cable	42CM-B2LNBC-A2
					4-pin DC micro	42CM-B2LNBC-D4
				PNP 100 mA 0.5 ms	2 m 300V cable	42CM-B2LPBC-A2
					4-pin DC micro	42CM-B2LPBC-D4
		100 mm (3.9 in.)		NPN 100 mA 0.5 ms	2 m 300V cable	42CM-B2LNBE-A2
					4-pin DC micro	42CM-B2LNBE-D4
				PNP 100 mA 0.5 ms	2 m 300V cable	42CM-B2LPBE-A2
					4-pin DC micro	42CM-B2LPBE-D4

Refer to page 1-61 for cordsets and accessories.

Product Selection (continued)

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.
 <p>Field of View: 1.6° Emitter LED: Infrared 880 nm</p>	10...30V DC 25 mA	3 mm...20 m (0.12 in... 65.6 ft)	NA Light Source		2 m 300V cable	42CM-E1EZB-A2
					4-pin DC micro	42CM-E1EZB-D4
			L.O./D.O. Complementary	NPN 100 mA 2 ms	2 m 300V cable	42CM-R1MNB-A2
					4-pin DC micro	42CM-R1MNB-D4
				PNP 100 mA 2 ms	2 m 300V cable	42CM-R1MPB-A2
					4-pin DC micro	42CM-R1MPB-D4

Cordsets and Accessories

Cordset		Accessories			
Description	Cat. No.	Description	Cat. No.	Description	Cat. No.
DC Micro QD Cordset, 4-pin, 2 m	889D-F4AC-2	Mounting Brackets	60-2657	Reflectors	92-39
DC Micro QD Cordset, 4-pin, 2 m	889D-F4AC-2	Mounting Brackets	60-2649	Mounting Brackets	60-2664
		Snap-Clamp Mounting Brackets	871A-SCBP18		

42CF

12 mm Metal Cylindrical



Features

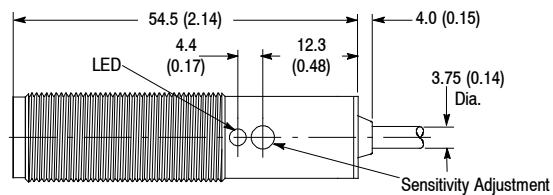
- 12 mm industry standard package
- Wide selection of sensing modes
- 30V DC operation
- NPN or PNP outputs
- Fast response time
- Variety of connection types
- Local teach button
- Accepts remote (diffuse and polarized retroreflective only) teach input

Specifications

Environmental	
Certifications	cULus and CE Marked for all applicable directives
Operating Environment	IP67
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60068-2-6
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60068-2-27
Relative Humidity	5...95%
Ambient Light Immunity	Incandescent light 3000 lux
Optical	
Sensing Modes	Polarized retroreflective, standard diffuse, transmitted beam
Sensing Range	See Product Selection table on page 1-64
Field of View	See Product Selection table on page 1-64
Light Source	Visible red LED (660 nm) or infrared LED (880 nm)
LED Indicators	Yellow LED for output indication
Adjustments	Sensitivity potentiometer
Electrical	
Voltage	10...30V DC
Current Consumption	30 mA max
Sensor Protection	Reverse polarity, overload, short circuit
Outputs	
Response Time	2 ms (transmitted beam), 1.25 ms (diffuse and polarized retroreflective)
Output Type	PNP or NPN by cat. no.
Output Mode	Selectable light operate or dark operate
Output Current	100 mA
Output Leakage Current	10 µA max
Mechanical	
Housing Material	Nickel plated brass
Lens Material	Acrylic
Connection Types	2 m cable, 4-pin DC micro (M12) QD
Optional Accessories	See mounting brackets, reflectors, and cordsets on page 1-64

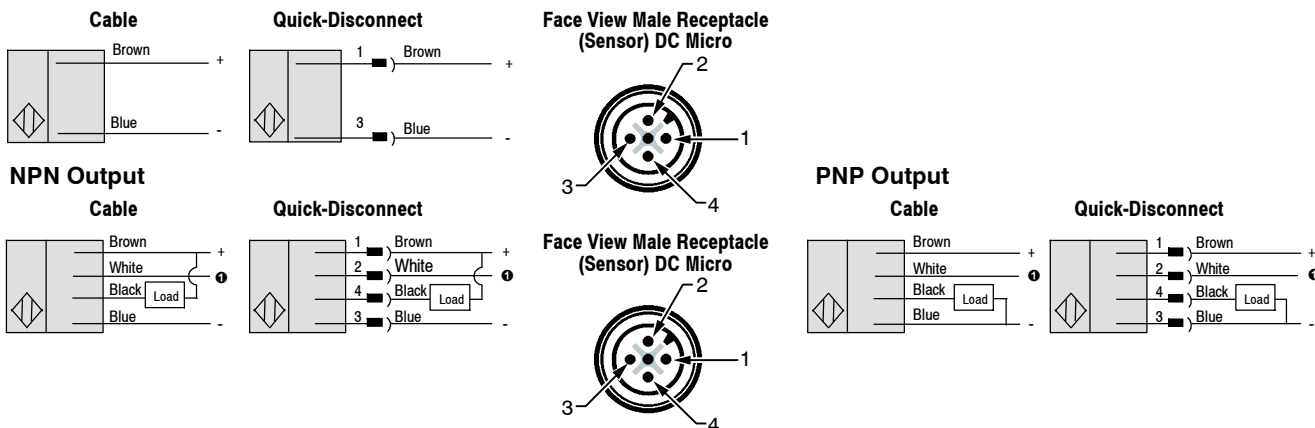
User Interface Panel

Label	Color	State	Status
Output	Yellow	OFF	Sensor output de-activated
		ON	Sensor output activated



Wiring Diagrams

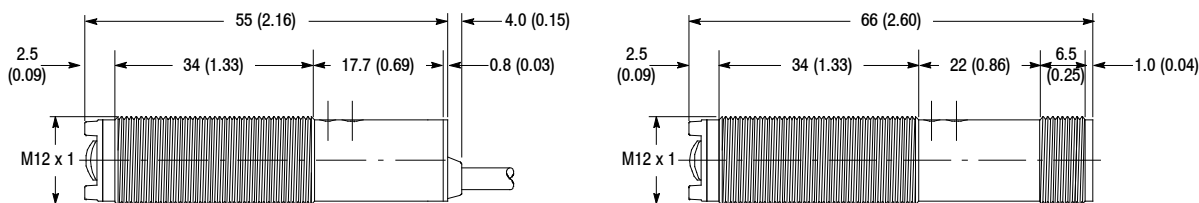
Diffuse, Polarized Retroreflective and Transmitted Beam



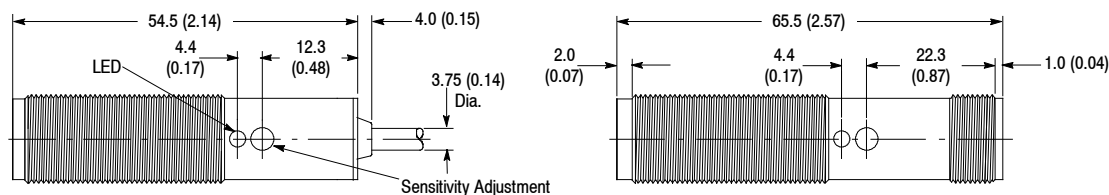
- **Polarized retroreflective:** Open circuit for dark operate. Connect white (2) and brown (1) together for light operate. Connect white (2) and blue (3) together for remote teach.
- **Diffuse:** Open circuit for light operate. Connect white (2) and brown (1) together for dark operate. Connect white (2) and blue (3) together for remote teach.
- **Transmitted beam:** Open circuit for dark operate. Connect white (2) and brown (1) together for light operate. Connect white (2) and blue (3) together for dark operate. This model does not have remote teach.

Approximate Dimensions [mm (in.)]

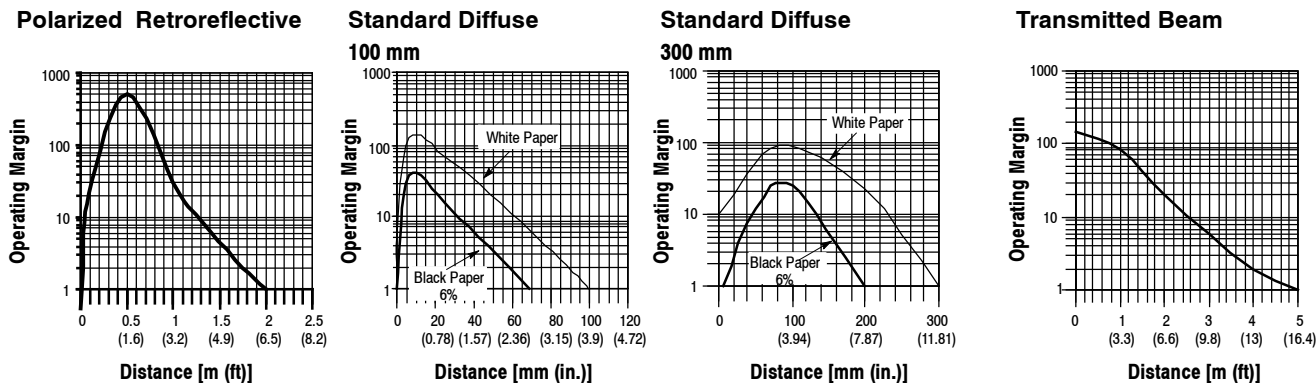
Diffuse and Polarized Retroreflective



Transmitted Beam



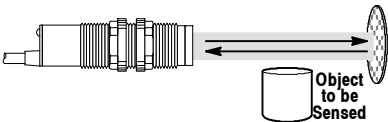
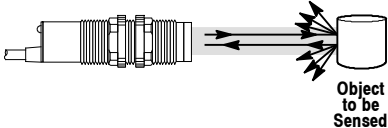
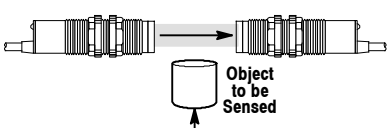
Typical Response Curve



42CF

12 mm Metal Cylindrical

Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance @ 1X Margin	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.
 <p><i>Polarized Retroreflective</i></p> <p>Field of View: 2.3° Emitter LED: Visible red 660 nm</p>	10...30V DC 30 mA	3 mm...2 m (0.12 in...6.5 ft)	L.O./D.O. Selectable	NPN 100 mA 1.25 ms	2 m 300V cable	42CF-P2LNA1-A2
					4-pin DC micro	42CF-P2LNA1-D4
				PNP 100 mA 1.25 ms	2 m 300V cable	42CF-P2LPA1-A2
					4-pin DC micro	42CF-P2LPA1-D4
 <p><i>Standard Diffuse</i></p> <p>Field of View: 11.4° (100 mm) 5.3° (300 mm) Emitter LED: Infrared 880 nm</p>	10...30V DC 30 mA	0...100 mm (0...3.9 in.) (adjustable)	L.O./D.O. Selectable	NPN 100 mA 1.25 ms	2 m 300V cable	42CF-D1LNA1-A2
					4-pin DC micro	42CF-D1LNA1-D4
		PNP 100 mA 1.25 ms		2 m 300V cable	42CF-D1LPA1-A2	
				4-pin DC micro	42CF-D1LPA1-D4	
		NPN 100 mA 1.25 ms		0...300 mm (0...12.2 in.) (adjustable)	2 m 300V cable	42CF-D1LNA2-A2
					4-pin DC micro	42CF-D1LNA2-D4
PNP 100 mA 1.25 ms	2 m 300V cable	42CF-D1LPA2-A2				
4-pin DC micro	42CF-D1LPA2-D4					
 <p><i>Transmitted Beam</i></p> <p>Field of View: 1.4° Emitter LED: Infrared 880 nm</p>	10...30V DC 25 mA	3 mm...4 m (0.12 in... 13.2 ft)	L.O./D.O. Selectable	—	2 m 300V cable	42CF-E1EZB-A2
	10...30V DC 20 mA				4-pin DC micro	42CF-E1EZB-D4
				NPN 100 mA 2 ms	2 m 300V cable	42CF-R1LNB1-A2
	4-pin DC micro	42CF-R1LNB1-D4				
	PNP 100 mA 2 ms			2 m 300V cable	42CF-R1LPB1-A2	
				4-pin DC micro	42CF-R1LPB1-D4	

Cordsets and Accessories

Cordset		Accessories			
Description	Cat. No.	Description	Cat. No.	Description	Cat. No.
DC Micro QD Cordset, 4-pin, 2 m	889D-F4AC-2	Mounting Bracket	871A-BRNR	Reflectors	92-39
		Snap-Clamp Mounting Bracket	871A-SCBP12		



Features

- Wide selection of sensing modes
- Wide selection of operating modes
- Both DC and AC/DC operation
- Models with teach function
- Standard ON/OFF and timing versions
- Fast response time
- Variety of connection types
- Laser models available (see page 1-112)

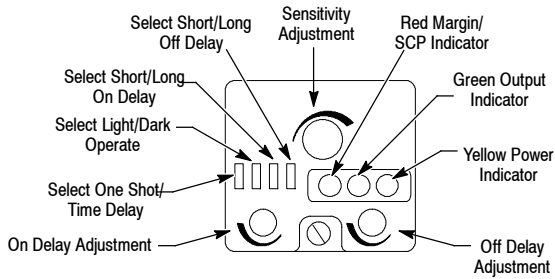
Specifications

Environmental	
Certifications	UL Listed, CSA Approved, CE Marked for all applicable directives
Operating Environment	NEMA 3, 4X, 6P, 12, 13, IP67 (IEC529) 1200 psi (8270 kPa) washdown, IP69K, ECOLAB certification on cable models
Operating Temperature [C (F)]	-34...+70° (-29...+158°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...95%
Ambient Light Immunity	Incandescent light 5000 lux
Optical	
Sensing Modes	Retroreflective, polarized retroreflective, diffuse, long range diffuse, fiber optic, extended range fiber optic, transmitted beam
Sensing Range	See Product Selection table on page 1-69
Field of View	See Product Selection table on page 1-69
Light Source	Visible red (660 nm), Infrared (880 nm)
LED Indicators	See User Interface table below
Adjustments	Single-turn potentiometer for sensitivity
Electrical	
Voltage	10...30V DC , 40...264V AC/DC models (see Product Selection table on page 1-69)
Current Consumption	30 mA max (DC models), 15 mA max (AC/DC models)
Sensor Protection	Overload, short circuit, reverse polarity, false pulse
Outputs	
Response Time	2 ms (DC models), 15 ms (AC/DC models), 2 ms (MOSFET models)
Output Type	PNP and NPN (DC models), SPDT relay (AC/DC models), MOSFET (AC/DC models)
Output Mode	Light operate or dark operate selectable
Output Current	250 mA @ 30V DC (all models except 42GLP and 42GSP); 2 A @ 132 V AC (SPDT relay models), 1 A @ 264V AC (SPDT relay); 300 mA @ 264V AC (MOSFET models)
Output Leakage Current	10 µA max (DC) , 1 mA (AC)
Mechanical	
Housing Material	Valox®
Lens Material	Acrylic
Cover Material	Neoprene
Connection Types	2 m (6.5 ft) cable, 4-pin DC micro QD, 4-pin DC mini QD, 5-pin DC micro QD
Supplied Accessories	129-130 mounting kit
Optional Accessories	See mounting brackets, reflectors, and cordsets on page 1-71

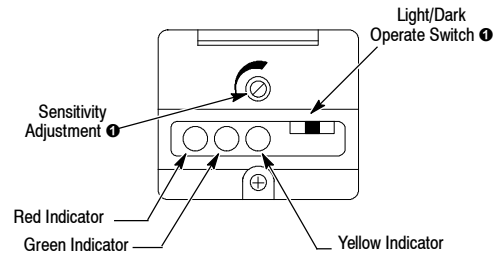
User Interface—Standard Models (Refer to installation instructions for 42GLP and 42GSP versions)

Label	Color	State	Status
Output	Green	OFF	Sensor output de-activated
		ON	Sensor output activated
Margin/SCP	Red	OFF	Margin < 2.5
		ON	Margin >2.5
		Flashing	Output SCP active
Power	Yellow	OFF	Sensor not powered
		ON	Sensor powered

42GTx Versions—Top View Detail



42GRx Versions—Top View Detail

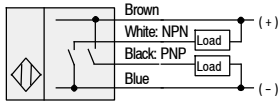


① Push button on 42GSP models.

Wiring Diagrams ①②

All Models Except Transmitted Beam Source

Cable Model: 9__0



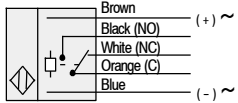
4-pin DC Micro QD Model: 9__0-QD



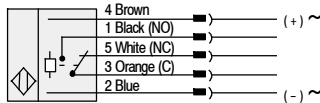
4-pin DC Mini QD Model: 9__0-QD1



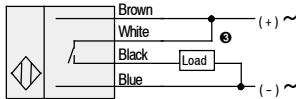
Cable Model: 9__1, 9__2



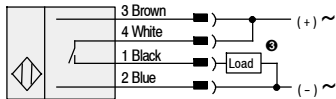
5-pin AC/DC Mini QD Model: 9__1-QD, 9__2-QD



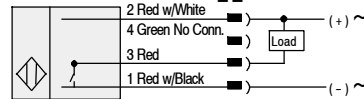
Cable Model: 9__3



AC/DC Mini QD Model: 9__3-QD

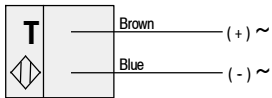


AC/DC Micro QD Model: 9__3-QD1

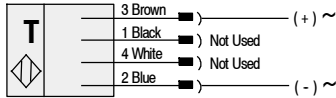


Transmitted Beam Source

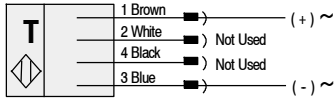
Cable Model: 42GRL-90__



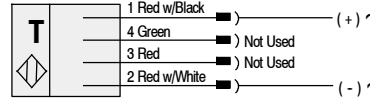
AC/DC Mini QD Model: 42GRL-90__-QD



DC Micro QD Model: 42GRL-90__-QD



4-pin DC Micro QD Model: 42GRL-90__-QD1



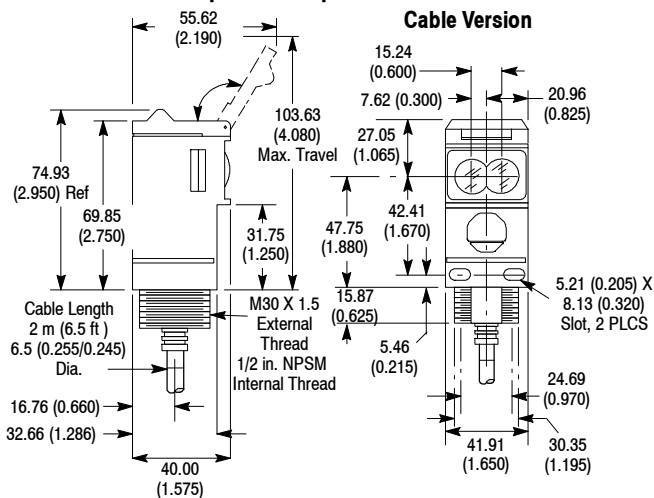
① For Allen-Bradley programmable controller compatible interface, refer to publication 42-2.0.

② Quick-disconnect wiring codes shown are valid for Allen-Bradley cables only.

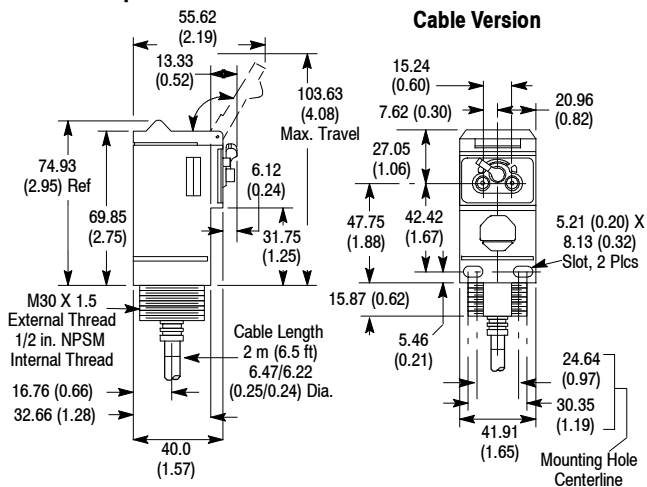
③ Load can be placed on either black or white wire to create sourcing or sinking respectively.

Approximate Dimensions [mm (in.)]

All Versions Except Fiber Optic

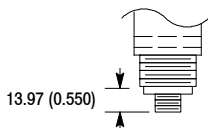


Fiber Optic

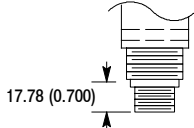


Connector Version

Micro Style



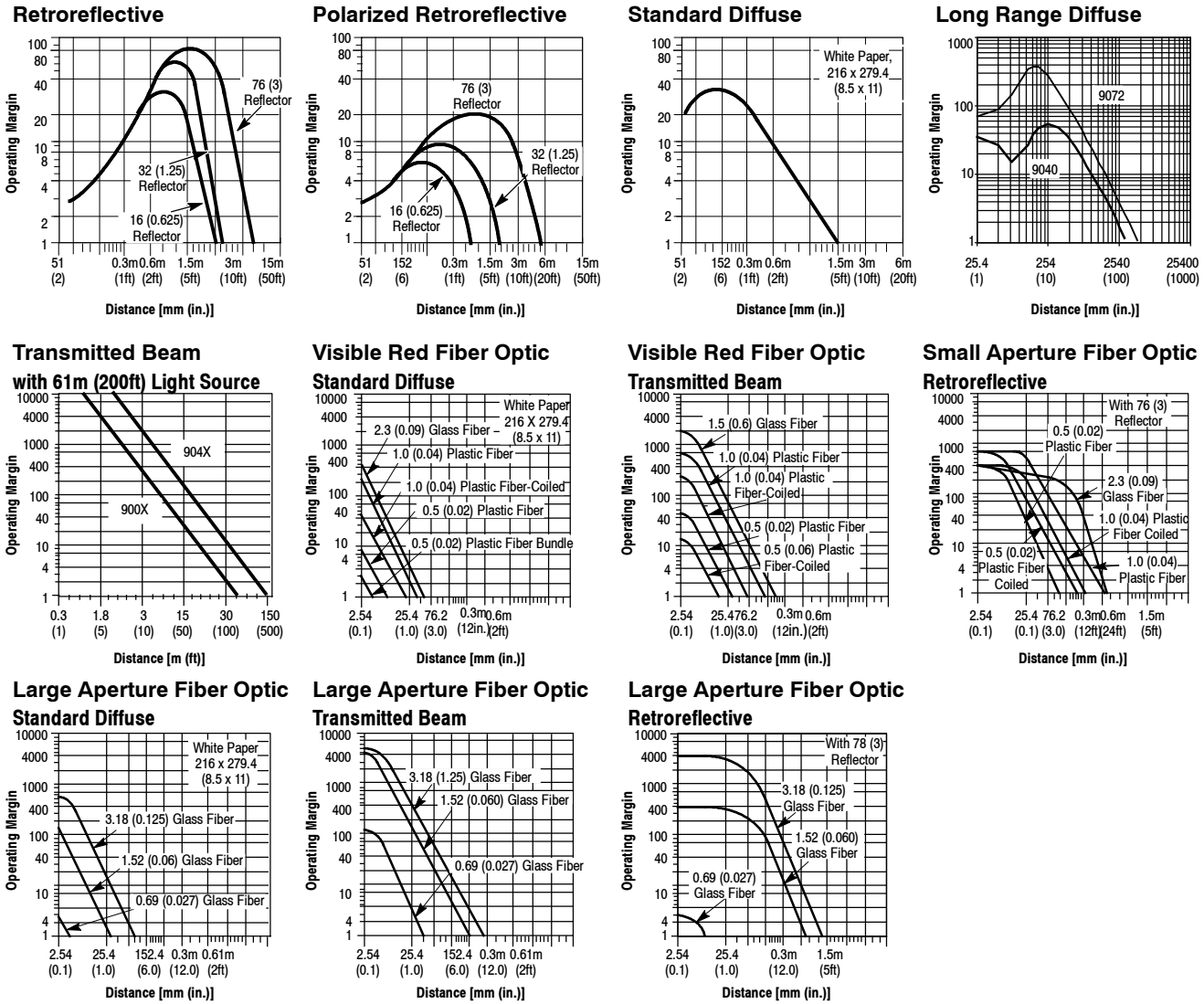
Mini Style



Thread Size

	AC	DC
Micro Style	1/2-20 UNF 2 Keyways	M12 x 1 1 Keyway
Mini Style	7/8-16 UN 1 Keyway	

Typical Response Curve

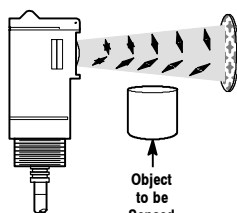
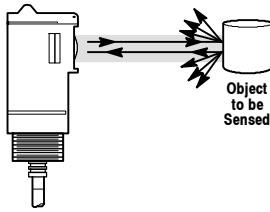
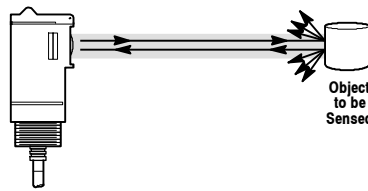


Product Selection for On/Off and Timing Sensors

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.
<p>Retroreflective</p> <p>Field of View: 1.5° Emitter LED: Visible red 660 nm</p>	10...30V DC 30 mA	50.8 mm... 9.14 m (2 in...30 ft) with 76 mm (3 in.) Reflector	Light/Dark Selectable	NPN/PNP 250 mA 2 ms	2 m 300V cable	42GⓈU-9000
					4-pin DC micro	42GⓈU-9000-QD
					4-pin mini	42GⓈU-9000-QD1
	70...264V AC/DC 50/60 Hz 15 mA			2 m 300V cable	SPDT EM Relay 2 A/132V AC 1 A/264V AC 1 A/150V DC 15 ms	42GⓈU-9002
					5-pin mini	42GⓈU-9002-QD
					2 m 300V cable 2 m 600V cable	Solid State Isolated N.O. 300 mA 2 ms
	4-pin mini			42GⓈU-9003-QD		
	4-pin AC micro			42GⓈU-9003-QD1		

Ⓢ R for standard (i.e. 42GRU-9000); T for timing (i.e. 42GTU-9000)

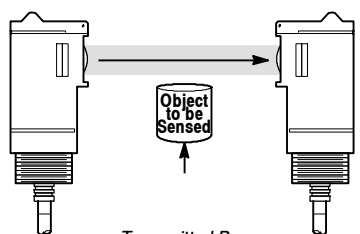
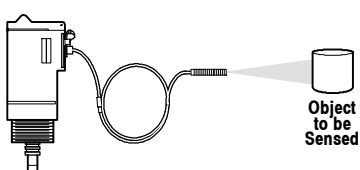
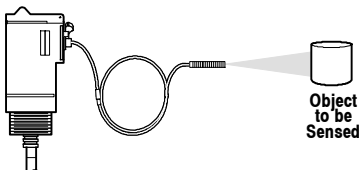
Product Selection for On/Off and Timing Sensors

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.	
 <p><i>Polarized Retroreflective</i></p> <p>Field of View: 1.5° Emitter LED: Visible red 660 nm</p>	10...30V DC 30 mA	50.8 mm... 4.87 m (2 in... 16 ft) with 76 mm (3 in.) Reflector	Light/Dark Selectable	NPN/PNP 250 mA 2 ms	2 m 300V cable	42G⊗U-9200	
	70...264V DC/ 60...264V AC 50/60 Hz 15 mA				4-pin DC micro	42G⊗U-9200-QD	
					4-pin mini	42G⊗U-9200-QD1	
	70...264V DC/ 40...264V AC 50/60 Hz 15 mA			2 m 300V cable	SPDT EM Relay 2 A/132V AC 1 A/264V AC 1 A/150V DC 15 ms	42G⊗U-9202	
					5-pin mini	42G⊗U-9202-QD	
				2 m 300V cable	Solid State Isolated N.O. 300 mA 2 ms	2 m 600V cable	42G⊗U-9203
	4-pin mini						42G⊗U-9203H
	4-pin AC micro						42G⊗U-9203-QD 42G⊗U-9203-QD1
	 <p><i>Standard Diffuse</i></p> <p>Field of View: 3.5° Emitter LED: Infrared 880 nm</p>			10...30V DC 30 mA	50.8 mm... 1.52 m (2 in...5 ft) to White Paper	Light/Dark Selectable	NPN/PNP 100 mA 2 ms
70...264V DC/ 60...264V AC 50/60 Hz 15 mA		4-pin DC micro	42GLP-9000-QD				
		4-pin mini	42GSP-9000				
70...264V DC/ 40...264V AC 50/60 Hz 15 mA		2 m 300V cable	Teach function Light/Dark Selectable	42GSP-9000			
			4-pin DC micro	42GSP-9000-QD			
		2 m 300V cable	NPN/PNP 250 mA 2 ms	Light/Dark Selectable			2 m 300V cable
4-pin DC micro							42G⊗P-9000-QD
4-pin mini							42G⊗P-9000-QD1
70...264V DC/ 60...264V AC 50/60 Hz 15 mA		2 m 300V cable	SPDT EM Relay 2 A/132V AC 1 A/264V AC 1 A/150V DC 15 ms	42G⊗P-9002			
	5-pin mini		42G⊗P-9002-QD				
	2 m 300V cable	Solid State Isolated N.O. 300 mA 2 ms	2 m 600V cable	42G⊗P-9003			
4-pin mini				42G⊗P-9003H			
4-pin AC micro				42G⊗P-9003-QD 42G⊗P-9003-QD1			
 <p><i>Long Range Diffuse</i></p> <p>Field of View: 6.5° Emitter LED: Infrared 880 nm</p>	10...30V DC 30 mA	50.8 mm... 3.04 m (2 in...10 ft)	Light/Dark Selectable	NPN/PNP 250 mA 2 ms	2 m 300V cable	42GRP-9040	
	70...264V AC/DC 50/60 Hz 15 mA				4-pin DC micro	42GRP-9040-QD	
					4-pin mini	42GRP-9040-QD1	
	70...264V DC/ 40...264V AC 50/60 Hz 15 mA			2 m 300V cable	SPDT EM Relay 2 A/132V AC 1 A/264V AC 1 A/150V DC 15 ms	42GRP-9042	
					5-pin mini	42GRP-9042-QD	
				2 m 300V cable	Solid State Isolated N.O. 300 mA 2 ms	2 m 600V cable	42GRP-9043
	4-pin mini						42GRP-9043H
	4-pin AC micro						42GRP-9043-QD 42GRP-9043-QD1
	10...40V DC 30 mA			50.8 mm...4.2 m (2 in...14ft)	Light/Dark Selectable	NPN/PNP 250 mA 2 ms	2 m 300V cable
SPDT EM Relay 2 A/132V AC 1 A/264V AC 1 A/150V DC 15 ms		4-pin DC micro	42GRP-9070-QD				
		2 m 300V cable	42GRP-9072				
70...264V AC/DC 50/60 Hz 15 mA	3 m 300V cable	5-pin mini	42GRP-9072-3				
			42GRP-9072-QD				

⊗ R for standard (i.e. 42GRU-9000); T for timing (i.e. 42GTU-9000)

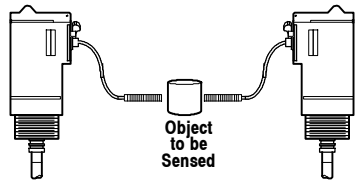
Refer to page 1-71 for cordsets and accessories.

Product Selection (continued)

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.				
 <p>Transmitted Beam</p> <p>Field of View: 1.5° Emitter LED: Infrared 880 nm</p>	10...264V AC/DC 50/60 Hz 15 mA	25.4 mm...61 m (1 in...200 ft)	NA Light Source		2 m 300V cable	42GRL-9000				
		25.4 mm... 152 m (1 in...500 ft)			2 m 600V cable	42GRL-9000H				
					4-pin DC micro	42GRL-9000-QD				
					4-pin mini	42GRL-9002-QD				
					2 m 300V cable	42GRL-9040				
					4-pin DC micro	42GRL-9040-QD				
	4-pin mini		42GRL-9042-QD							
	10...30V DC 25 mA	Depends on Light Source	Receiver Light or Dark Output Selectable		NPN and PNP 250 mA 5 ms	2 m -300V cable	42G⊗R-9000			
						4-pin DC micro	42G⊗R-9000-QD			
						4-pin mini	42G⊗R-9000-QD1			
2 m 300V cable						42G⊗R-9002				
	5-pin mini	42G⊗R-9002-QD								
70...264V AC/DC, 50/60 Hz 10 mA	Depends on Light Source	Receiver Light or Dark Output Selectable		SPDT EM Relay 2 A/132V AC, 1 A/264V AC 1 A/150V DC 23 ms	2 m 300V cable	42G⊗R-9002				
					5-pin mini	42G⊗R-9002-QD				
					2 m 300V cable	42GRR-9003				
2 m 600V cable	42GRR-9003H									
4-pin mini	42GRR-9003-QD									
70...264V DC, 40...264V AC 50/60 Hz 10 mA	Depends on Light Source	Receiver Light or Dark Output Selectable		Solid State Isolated N.O. 300 mA 15 ms	2 m 300V cable	42GRR-9003				
					2 m 600V cable	42GRR-9003H				
4-pin AC micro	42GRR-9003-QD1									
 <p>Small Aperture Red Fiber Optic</p> <p>Emitter LED: Visible red 660 nm</p>	10...30V DC 30 mA	Depends on Fiber Optic cable	Light/Dark Selectable	NPN/PNP 250 mA 2 ms	2 m 300V cable	42G⊗F-9100				
					70...264V AC/DC 50/60 Hz 15 mA	Depends on Fiber Optic cable	Light/Dark Selectable	SPDT EM Relay 2 A/132V AC, 1 A/264V AC 1 A/150V DC 15 ms	4-pin DC micro	42G⊗F-9100-QD
									2 m 300V cable	42G⊗F-9102
	5-pin mini	42G⊗F-9102-QD								
	70...264V DC/ 40...264V AC 50/60 Hz 15 mA	Depends on Fiber Optic cable	Light/Dark Selectable	Solid State Isolated N.O. 300 mA 2 ms	2 m 300V cable	42G⊗F-9103				
					4-pin mini	42G⊗F-9103-QD				
4-pin AC micro					42G⊗F-9103-QD1					
 <p>Large Aperture Fiber Optic</p> <p>Emitter LED: Infrared 880 nm</p>	10...30V DC 30 mA	Depends on Fiber Optic cable	Light/Dark Selectable	NPN/PNP 250 mA 2 ms	2 m 300V cable	42G⊗F-9000				
					70...264V AC/DC, 50/60 Hz 15 mA	Depends on Fiber Optic cable	Light/Dark Selectable	SPDT EM Relay 2 A/132V AC, 1 A/264V AC 1 A/150V DC 15 ms	4-pin DC micro	42G⊗F-9000-QD
	2 m 300V cable			42G⊗F-9002						
									5-pin mini	42G⊗F-9002-QD
	70...264V DC/ 40...264V AC 50/60 Hz 15 mA			Depends on Fiber Optic cable					Light/Dark Selectable	Solid State Isolated N.O. 300 mA 2 ms
					2 m 600V cable	42G⊗F-9003H				
4-pin mini		42G⊗F-9003-QD								
4-pin AC micro	42G⊗F-9003-QD1									

⊗ R for standard (i.e. 42GRU-9000); T for timing (i.e. 42GTU-9000)

Product Selection (continued)

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.	
 <p>Extended Range Large Aperture Fiber Optic Emitter LED: Infrared 880 nm</p>	10...264V AC/DC, 56/60 Hz 15 mA	See table below.		NA Light Source	2 m 300V cable	42GRLF-9040	
					4-pin DC micro	42GRLF-9040-QD	
	10...40V DC 30 mA	See table below.	Light/Dark Selectable	NPN/PNP 250 mA 2 ms	2 m 300V cable	42GRRF-9000	
					4-pin DC micro	42GRRF-9000-QD	
	70...264V AC/DC, 50/60 Hz 15 mA				SPDT EM Relay 2 A/132V AC, 1 A/264V AC 1 A/150V DC 15 ms	2 m 300V cable	42GRRF-9002
						5-pin mini	42GRRF-9002-QD

Typical Sensing Distance—Extended Range Infrared Fiber Optic

Sensing Mode	Sensor	Fiber Optic Cable	Range Extender	Sensing Distance (1X margin.)
Transmitted Beam	42GRLF-9040 with individual fiber optic cable	43GT-FAS25SL Individual Fiber Optic Cable, smooth tip	none	914 mm (36 in.)
		43GT-TBB25SL Individual Fiber Optic Cable, with 5/16 inch threaded tip		
		43GT-FAS25SL Individual Fiber Optic Cable, smooth tip	60-1844	6 m (20 ft)
		43GT-TBB25SL Individual Fiber Optic Cable, with 5/16 inch threaded tip	60-2559	12 m (40 ft)
		43GT-TBB25SL Individual Fiber Optic Cable, with 5/16 inch threaded tip	60-2323	6 m (20 ft)
		60-2738	12 m (40 ft)	
	42GRLF-9040 with bifurcated fiber optic cable	43GR-FAS25SL Bifurcated Fiber Optic Cable, smooth tip	none	1.2 m (48 in.)
		43GR-TBB25SL Bifurcated Fiber Optic Cable, with 5/16 inch threaded tip		
		43GR-FAS25SL Bifurcated Fiber Optic Cable, with smooth tip	60-1844	7.6 m (25 ft)
		43GR-TBB25SL Bifurcated Fiber Optic Cable, with 5/16 inch threaded tip	60-2559	15.2 m (50 ft)
43GR-TBB25SL Bifurcated Fiber Optic Cable, with 5/16 inch threaded tip		60-2323	7.6 m (25 ft)	
	60-2738	15.2 m (50 ft)		

- Sensing ranges are for fiber optic cables shown. Range will vary with other fiber optic cable types.
- When using individual fiber optic cable, second port must be blocked with the provided plug (60-2744).
- Receiver Sensor (42GRRF) requires only individual fiber optic cable.

Cordsets and Accessories

Description	Cat. No.	Description	Cat. No.
1.8 m (6 ft) 4-pin, Mini QD Cordset	889N-F4AF-6F	32 mm (1.25 in.) Diameter Reflector	92-47
1.8 m (6 ft) 5-pin, Mini QD Cordset	889N-F5AF-6F	Range Extender	60-1844
2 m (6.5 ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2	Range Extender	60-2559
2 m (6.5 ft) 4-pin, AC Micro QD Cordset	889R-F4AEA-2	Range Extender	60-2738
76 mm (3 in.) Diameter Reflector	92-39	Replacement Plug	60-2744

44B Adjustable Background and Foreground Suppression

50 mm Rectangular



Features

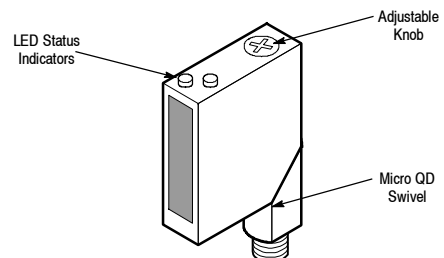
- Adjustable background and foreground suppression models
- Power, output, and stability status indicators
- Micro QD connection with 90° swivel
- Low voltage 24V DC operation
- Protected from miswiring
- Dual NPN and PNP outputs
- Fast 1 ms response time

Specifications

Environmental	
Certifications	cULus and CE Marked for all applicable directives
Operating Environment	NEMA 3, 4X, 6P, 12, 13, IP67
Operating Temperature [C (F)]	0...+70° (32...+158°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 947-5-2
Relative Humidity	5...95%
Optical	
Sensing modes	Background suppression or foreground suppression
Sensing Range	20...300 mm (0.78...11.8 in.) adjustable for background suppression 20...200 mm (0.78...7.8 in.) adjustable for foreground suppression
Spot Size	See Product Selection table on page 1-74
Light Source	Infrared LED (880 nm)
LED Indicators	See User Interface Panel below
Adjustments	6-turn adjustment knob
Electrical	
Voltage	20...30V DC
Current Consumption	22 mA max
Sensor Protection	False pulse, reverse polarity, overload, output short circuit
Outputs	
Response Time	1 ms max
Output Type	PNP and NPN
Output Mode	Light or dark operate by cat. no.
Output Current	100 mA
Output Leakage Current	10 µA max
Mechanical	
Housing Material	Acrylic
Lens Material	Acrylic
Connection Types	4-pin DC micro (M12) QD
Supplied Accessories	None
Optional Accessories	See mounting brackets and cordsets on page 1-73

User Interface Panel

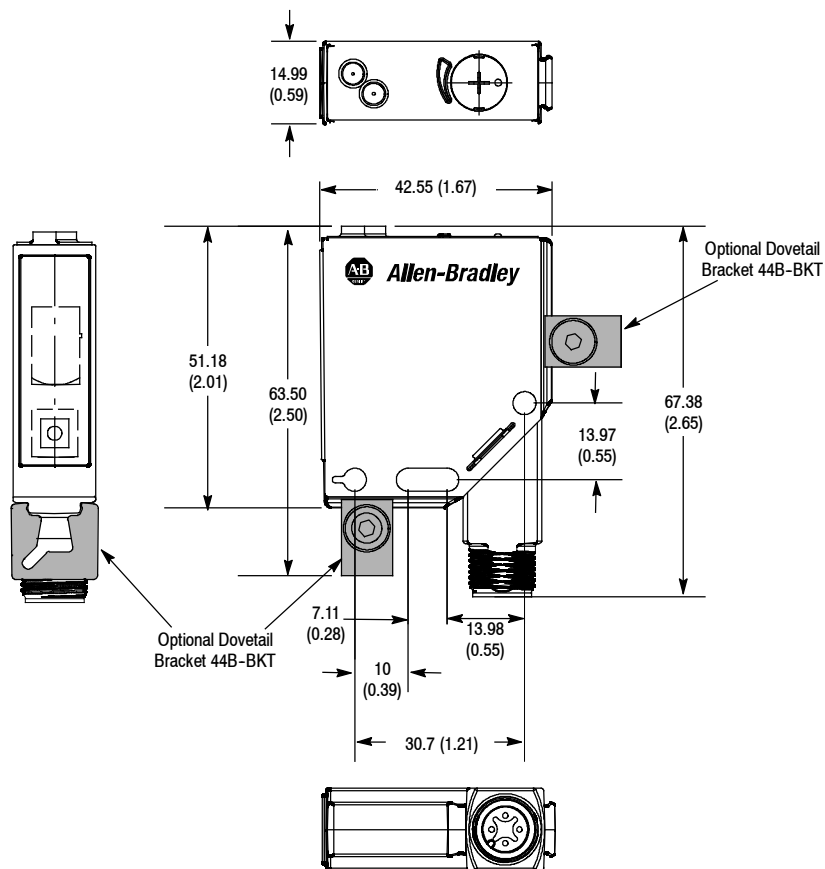
Color	State	Status
Green	OFF	Sensor not powered, SCP active
	ON	Sensor powered
	Flashing	Unstable margin
Orange	OFF	Output not activated
	ON	Output activated



44B Adjustable Background and Foreground Suppression

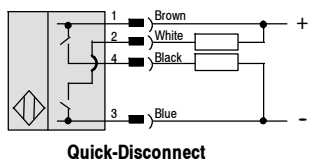
50 mm Rectangular

Approximate Dimensions [mm (in.)]



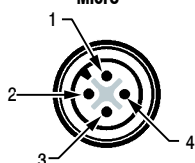
Wiring Diagram

NPN/PNP

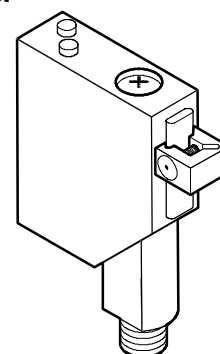


Quick-Disconnect

Micro



Dovetail Bracket
(Optional)
44B-BKT



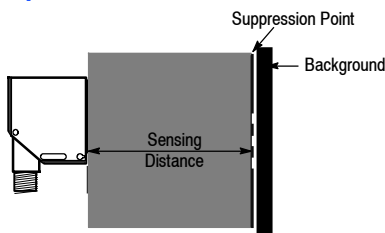
Cordsets & Accessories

Description	Cat. No.
2 m (6.5 ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2
Dovetail Bracket	44B-BKT
Mounting Bracket	60-BKTL-SS

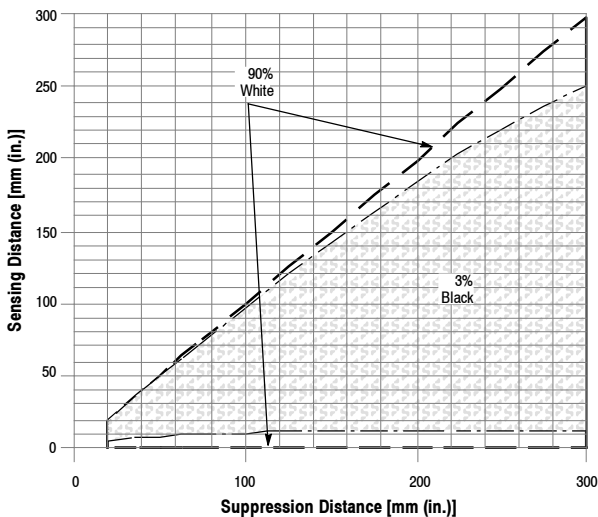
44B Adjustable Background and Foreground Suppression

50 mm Rectangular

Typical Response Curve

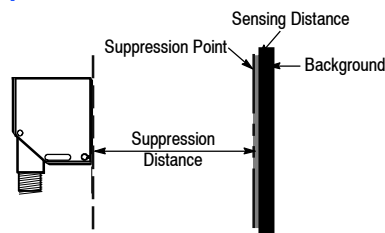


Background Suppression

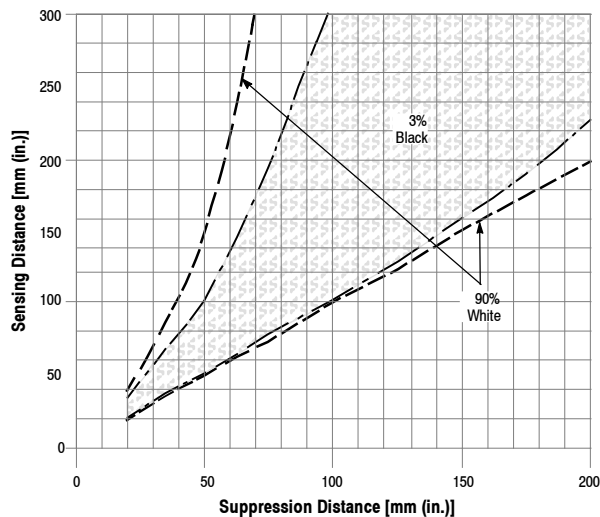


Example: With a suppression point set at 200 mm, the sensing distance will be between the sensor face and just under 200 mm for 90% white reflective targets and between 12 mm and 185mm for 3% black reflective targets.

Typical Response Curve



Foreground Suppression



Example: With a suppression point set at 50 mm, the sensing distance will be between just over 50 mm and 150 mm for 90% white reflective targets and between just over 50 mm and 100 mm for 3% black reflective targets.

Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance (Adjustable)	LED Source	Output Energized	Output Type/ Capacity Response Time	Connection Type	Cat. No.
<p>Background Suppression ① 20 mm spot size @ 300 mm</p>	20...30V DC 22 mA	20...300 mm (0.78...11.8 in)	Infrared 880 nm	Light Operate	PNP and NPN 100 mA 1 ms	4-pin DC micro	44BSB-1JBA1-D4
				Dark Operate			44BSB-1KBA1-D4
<p>Foreground Suppression ② 15 mm spot size @ 200 mm</p>		20...200 mm (0.78...7.9 in)		Dark Operate			44BSN-1KBA1-D4
		Light Operate		44BSN-1JBA1-D4			

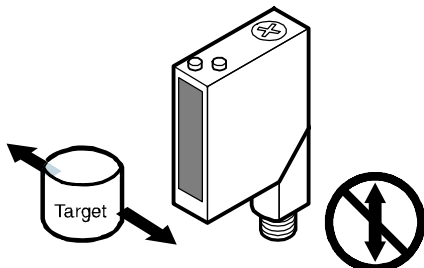
- ① Detection by presence of reflected light from the target.
- ② Detection by absence of reflected light from the background.

44B Adjustable Background and Foreground Suppression

50 mm Rectangular

Application Notes

1. Due to the detection method used by these sensors, it is important that the sensor be mounted in such a way as to ensure that the target passes in an orientation perpendicular to the sensor's lenses.



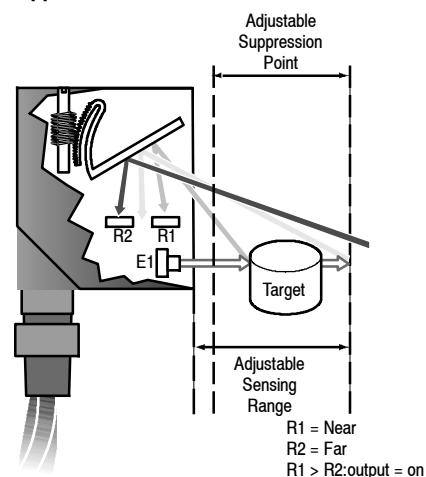
2. For installations with a fixed background up to 300 mm from the 44BSB sensor, set the suppression point to just before the background. If no background is present, set the suppression point to just beyond the target to be sensed so that adequate margin is achieved.
3. Avoid installing the 44BSB sensor directly perpendicular to a mirror-like background. This can cause a false output. If this occurs, use a nonreflective background or angle the sensor or background to minimize this condition.

4. The performance curves for the 44BSN and 44BSB are based on a 90% white and 3% black reflective paper. Use the table below to compare reflectivity levels of various industrial targets.

Target	Typical Relative Reflectivity
Polished aluminum	500
White paper (reference)	100
White typing paper	90
Cardboard	40
Cut lumber	20
Black paper	10
Neoprene	5
Tire rubber	4
Black felt	2

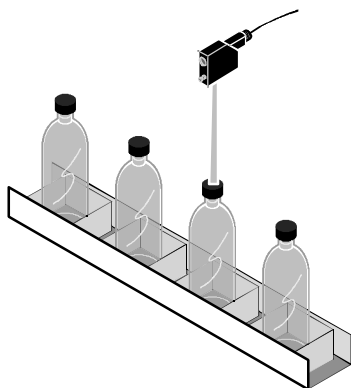
5. For foreground suppression dark operate model (44BSN-1KBA1-D4), the output turns on when a target is detected. For light operate model (44BSN-1JBA1-D4), the output turns off when a target is detected.
6. For background suppression light operate model (44BSB-1JBA1-D4), the output turns on when a target is detected. For dark operate model (44BSB-1KBA1-D4), the output turns off when the target is detected.

Operation of Adjustable Background Suppression

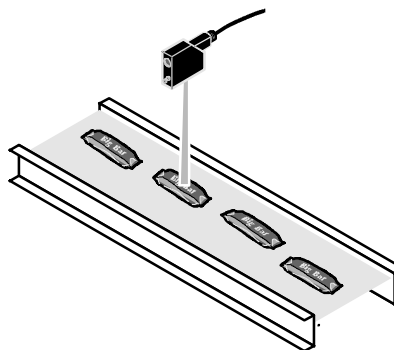


Application Examples

Background Suppression



Foreground Suppression



PHOTOSWITCH® Photoelectric Sensors
42BT Long Range Background Suppression
Slim Flatpack



Features

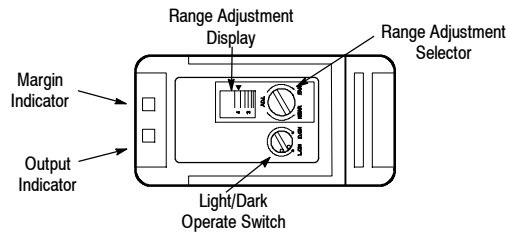
- Long range background suppression diffuse sensing mode
- Adjustable range settings
- Slim flatpack housing design
- Highly visible LED Indicators
- Pico QD and 2 m cable versions
- Both NPN and PNP outputs
- Short-circuit protected outputs
- Fast 2 ms response time

Specifications

Environmental	
Certifications	cULus Listed and CE Marked for all applicable directives
Operating Environment	IP65
Operating Temperature [C (F)]	-5...+55° (+23...+131°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	35...85%
Ambient Light Immunity	Incandescent light: 3000 lux, sunlight immunity: 10000 lux
Optical	
Sensing Modes	Background suppression
Sensing Range	1 m or 2 m by cat. no.
Field of View	See Product Selection table on page 1-77
Light Source	Visible red LED (650 nm), infrared LED (880 nm)
LED Indicators	See User Interface Panel below
Adjustments	5-turn sensitivity potentiometer
Electrical	
Voltage	12...24V DC
Current Consumption	30 mA
Sensor Protection	Short circuit
Outputs	
Response Time	2 ms max
Output Type	PNP and NPN
Output Mode	Light operate or dark operate selectable
Output Current	100 mA @ 24V DC
Output Leakage Current	0.1 mA max
Mechanical	
Housing Material	Polyarilate
Lens Material	Polyarilate
Connection Types	2 m cable, 4-pin pico (M8) QD on 6-inch pigtail
Supplied Accessories	Screwdriver
Optional Accessories	See mounting brackets and cordsets on page 1-77

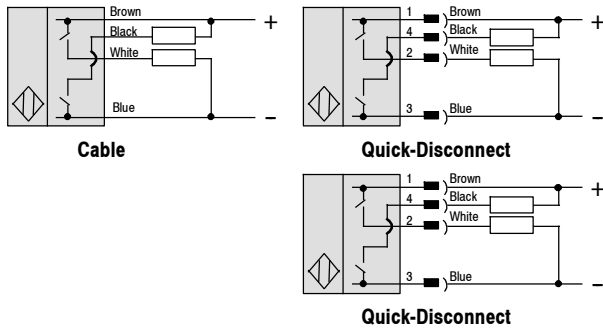
User Interface Panel

Label	Color	State	Status
Margin	Green	OFF	Margin < 2.5
		ON	Margin > 2.5
Status	Red	OFF	Output not activated
		ON	Output activated

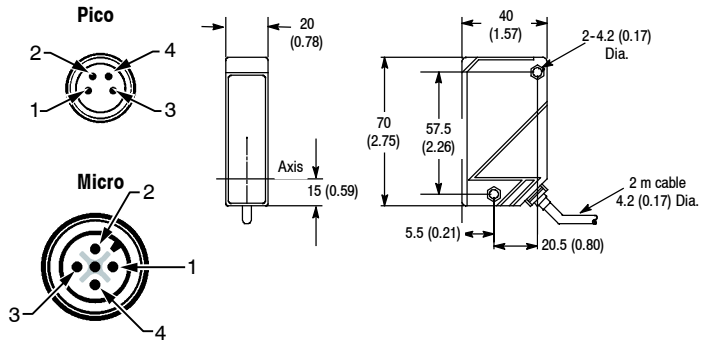


Wiring Diagrams

NPN/PNP

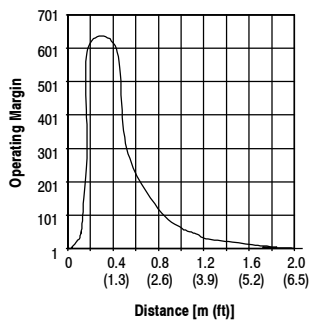


Approximate Dimensions [mm (in.)]

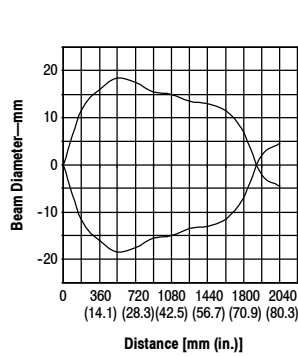


Typical Response Curve

42BT-B1LBSN

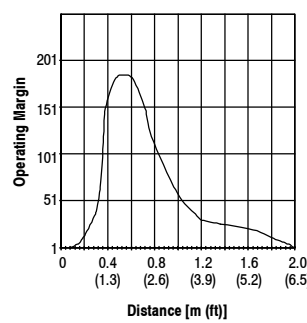


Beam Pattern

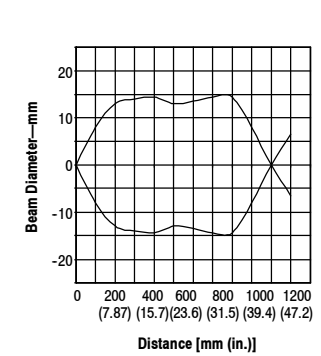


Typical Response Curve

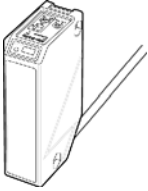
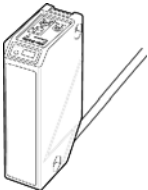
42BT-B2LBSL



Beam Pattern



Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	LED Source	Output Energized	Output Type/ Capacity Response Time	Connection Type	Cat. No.
 Background Suppression Field of View: 1.7°	12...24V DC ± 10% 30 mA	0.2...1 m (0.66...3.3 ft)	Visible Red 650 nm	L.O./D.O. selectable	PNP and NPN 2 ms (max)	2 m 300V cable	42BT-B2LBSL-A2
						4-pin DC micro	42BT-B2LBSL-F4
						4-pin DC pico	42BT-B2LBSL-Y4
 Background Suppression Field of View: 2.8°	12...24V DC ± 10% 30 mA	0.2...2 m (0.66...6.4 ft)	Infrared 880 nm	L.O./D.O. selectable	PNP and NPN 2 ms (max)	2 m 300V cable	42BT-B1LBSN-A2
						4-pin DC micro	42BT-B1LBSN-F4
						4-pin DC pico	42BT-B1LBSN-Y4

Cordsets and Accessories

Description	Cat. No.	Description	Cat. No.
2 m (6.5 ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2	Vertical Mounting Bracket	61-6738
2 m (6.5 ft) 4-pin, Pico QD Cordset	889P-F4AB-2	Horizontal Mounting Bracket	61-6739

PHOTOSWITCH® Photoelectric Sensors
42BC Long Range Background Suppression
Slim Housing



Features

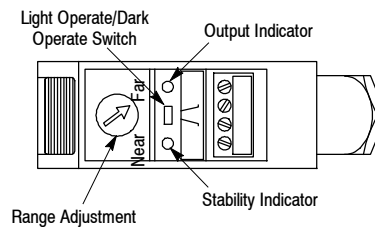
- Long range background suppression diffuse sensing mode
- Adjustable range settings
- Slim housing style
- Highly visible LED Indicators
- Screw terminal connections
- Both NPN and PNP outputs (DC)
- SPST relay output (AC)
- Short-circuit protected outputs

Specifications

Environmental	
Certifications	UL Listed, CSA Certified and CE Marked for all applicable directives
Operating Environment	NEMA 1, 12, 13, IP65
Operating Temperature [C (F)]	-25...+55° (-13...+131°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...85%
Ambient Light Immunity	Incandescent light: 3000 lux, sunlight immunity: 10000 lux
Optical	
Sensing Modes	Background suppression
Sensing Range	1 m or 2 m by cat. no.
Field of View	See Product Selection table on page 1-80
Light Source	Infrared LED (880 nm)
LED Indicators	See User Interface Panel below
Adjustments	Sensitivity potentiometer
Electrical	
Voltage	12...24V DC, 24...240V DC
Current Consumption	30 mA
Sensor Protection	Short circuit for DC models, reverse polarity, false pulse, transient
Outputs	
Response Time	20 ms max (DC models), 30 ms max (AC models)
Output Type	PNP and NPN, SPDT N.O. relay (AC models)
Output Mode	Light operate or dark operate selectable
Output Current	100 mA @ 24V DC, 3 A @ 240V AC
Output Leakage Current	0.5 mA max
Mechanical	
Housing Material	Polycarbonate
Lens Material	Polycarbonate
Cover Material	Acrylic
Connection Types	Screw terminal, 16 AWG (1.3 mm ²)
Supplied Accessories	Right angle mounting bracket
Optional Accessories	See mounting brackets and cordsets on page 1-80

User Interface Panel

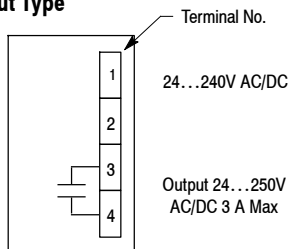
Label	Color	State	Status
Margin	Green	OFF	0.8>margin<1.2
		ON	0.8<margin>1.2
Output	Red	OFF	Output not activated
		ON	Output activated



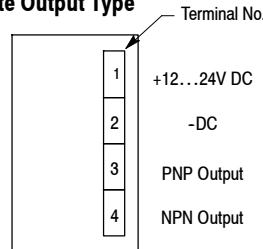
Wiring Diagrams

Terminal Version

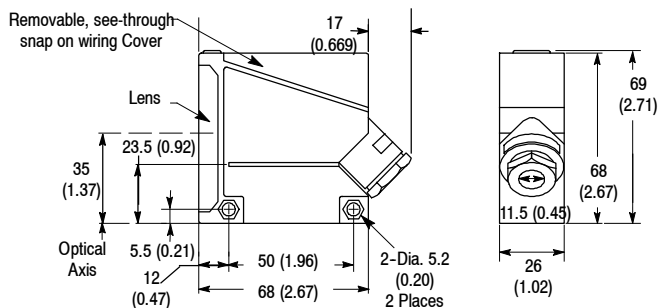
Relay Output Type



Solid-State Output Type

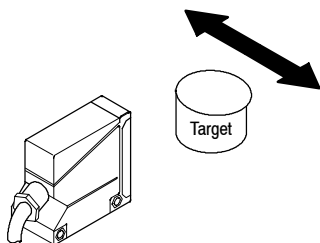


Approximate Dimensions [mm (in.)]



Detection Direction

Due to the detection method, the sensor must be positioned such that the target passes in the direction illustrated. Motion in up/down direction cannot be detected.



Minimum Sensing Distances

Near Setting

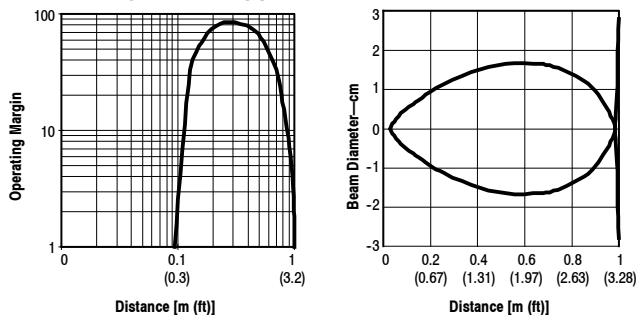
2.5% black 8 cm (3.15 in.) at 2X margin
 100% white 3 cm (1.18 in.) at 2X margin

Far Setting

2.5% black 20 cm (7.9 in.) at 2X margin
 100% white 4 cm (1.57 in.) at 2X margin

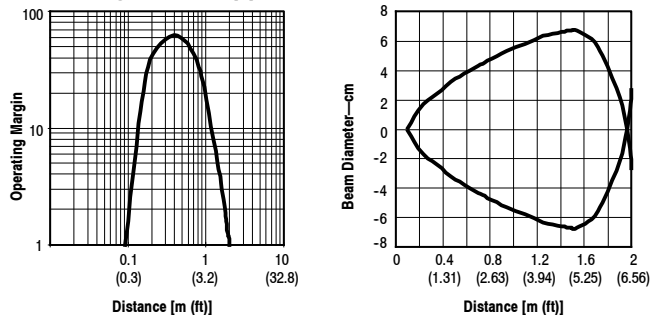
Typical Response Curve Beam Pattern

1 m Background Suppression



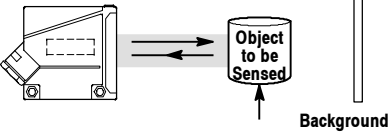
Typical Response Curve Beam Pattern

2 m Background Suppression



PHOTOSWITCH® Photoelectric Sensors
42BC Long Range Background Suppression
Slim Housing

Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.
 <p><i>Background Suppression</i></p> <p>Field of View: 3.5° Minimum Sensing Distance: 30 mm (1.2 in.) Emitter LED: Infrared 880 nm</p>	12...24V DC ±10% 30 mA	1 m (3.3 ft)	Light/Dark Selectable	NPN/PNP 100 mA 20 ms	Screw terminals accepts up to (2) 16 AWG (1.3 mm sq.) conductors	42BC-B1LBAL-T4
		2 m (6.6 ft)				42BC-B1LBAN-T4
	24...240V AC/DC ±10% 30 mA (DC) 15 mA (AC)	1 m (3.3 ft)		S.P.S.T. N.O. Relay 3 A (250V AC, 750V AC) 3 A (30V DC, 90 W) 30 ms		42BC-B1CRAL-T4
		2 m (6.6 ft)				42BC-B1CRAN-T4

Cordsets and Accessories

Description	Cat. No.
DC Micro QD Cordset, Straight, 4-pin, 2 m	889D-F4AC-2
Receptacle, 4-pin DC Micro QD	888D-M4AC1-0M3
Mounting Bracket	60-2637
Replacement Cover	60-2669
Receptacle, 4-pin Mini QD	60-2668

PHOTOSWITCH® Photoelectric Sensors
42BA Short Range Background Suppression
Compact Housing



Features

- Short-range background suppression diffuse sensing mode
- Adjustable range settings
- Compact housing style
- Highly visible LED indicators
- NPN or PNP output models
- Diagnostic output
- Short-circuit protected outputs
- 2 m cable connection

Specifications

Environmental	
Certifications	UL Listed, CSA Certified, and CE Marked for all applicable directives
Operating Environment	NEMA 1, 4, 6P, 12, 13, IP67 (IEC 529)
Operating Temperature [C (F)]	-25...+55° (-13...+131°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...85%
Optical	
Sensing Mode	Background suppression
Sensing Range	See Product Selection table on page 1-83
Field of View	See Product Selection table on page 1-83
Light Source	Visible red LED (700 nm), infrared LED (880 nm)
LED Indicators	See User Interface Panel below
Adjustments	Sensitivity potentiometer
Electrical	
Voltage	10...30V DC
Current Consumption	33 mA max
Sensor Protection	Short circuit, reverse polarity, false pulse, transient noise
Outputs	
Response Time	350 μs
Output Type	PNP or NPN by cat. no.
Output Mode	Light operate or dark operate selectable
Output Current	100 mA max @ 24V DC
Output Leakage Current	1 μA max
Mechanical	
Housing Material	Polyarylate (30 mm and 50 mm models) ABS resin (100 mm and 200 mm models)
Lens Material	Polyarylate (30 mm and 50 mm models) Polysulfone (100 mm and 200 mm models)
Connection Types	2 m cable
Supplied Accessories	60-2636 mounting bracket

User Interface Panel

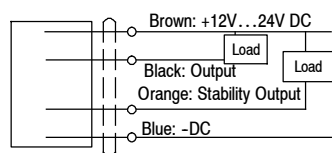
Label	Color	State	Status
STB	Green	OFF	0.8 < margin < 1.2
		ON	0.8 < margin > 1.2
OUT	Red	OFF	Output not activated
		ON	Output activated

Sensitivity Potentiometer
Stability Indicator
Output Indicator

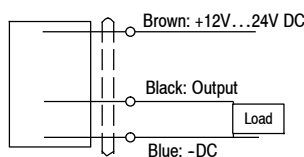
Sensitivity Potentiometer
Stability Indicator
Output Indicator
Light Operate/Dark Operate Switch

Wiring Diagrams

NPN Output



PNP Output

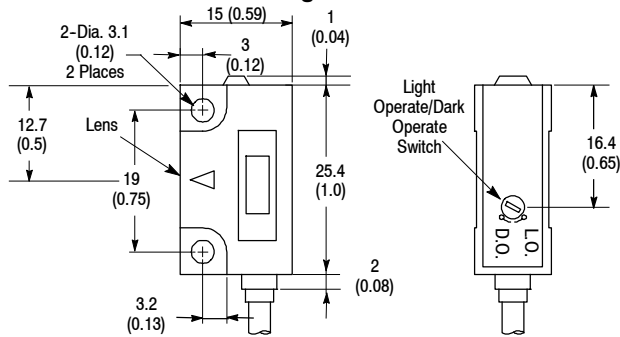


Note: Details regarding connection of Rockwell Automation 42BA photoelectric sensors to Rockwell Automation Programmable Controllers can be found in "PHOTOSWITCH® Photoelectric Sensors and Programmable Controller Interface Manual" on www.ab.com/Literature.

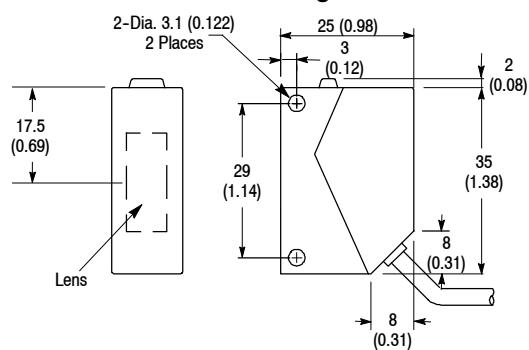
PHOTOSWITCH® Photoelectric Sensors
42BA Short Range Background Suppression
Compact Housing

Approximate Dimensions [mm (in.)]

30 mm and 50 mm Sensing Distance Versions



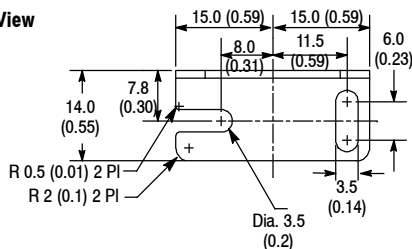
100 mm and 200 mm Sensing Distance Versions



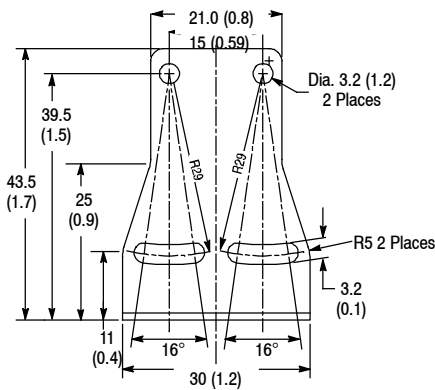
Stainless Steel Mounting Bracket—60-2636

Stainless steel mounting bracket and hardware supplied with all 42BA sensors.

Bottom View



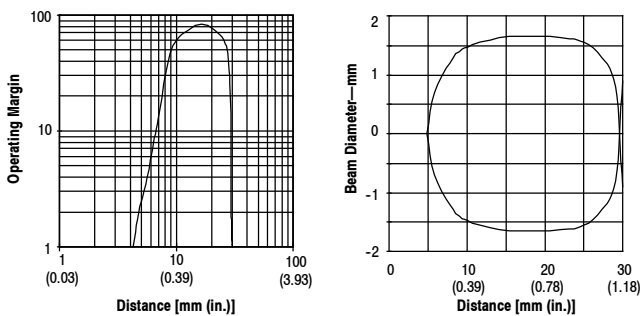
Side View



Note: Replacement mounting assemblies and reflectors available on page 1-293.

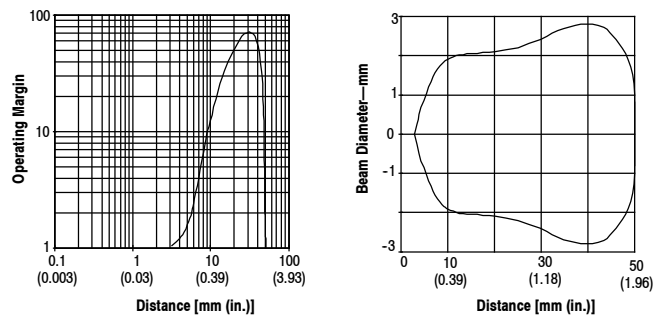
Typical Response Curve Beam Pattern

30 mm

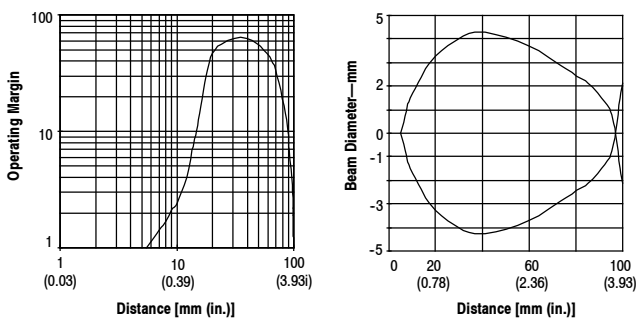


Typical Response Curve Beam Pattern

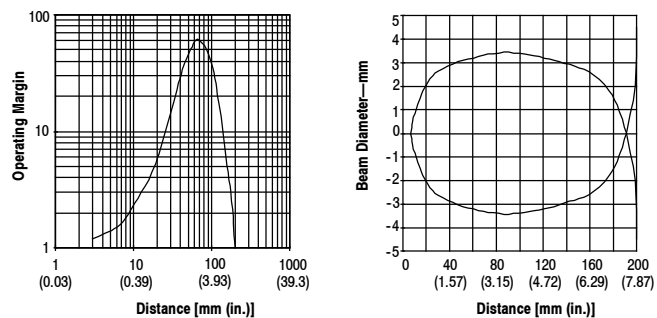
50 mm



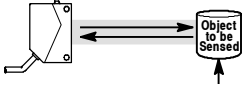
100 mm



200 mm



Product Selection

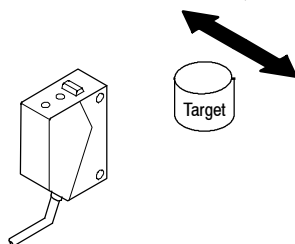
Sensing Mode	Operating Voltage Supply Current	Sensing Distance [mm (in.)]	Field of View	Output Energized	LED Source	Output Type Capacity Response Time	Connection Type	Cat. No.
	12...24V DC ±10% 27 mA	10...30 (0.39...1.2)	9°	Light/Dark Selectable	Visible red 700 nm	NPN Output: 100 mA, Stability: 50 mA 350 µs	2 m 500V cable	42BA-S2LNAA-A2
	12...24V DC ±10% 30 mA					PNP Output: 100 mA, 350 µs		42BA-S2LPAA-A2
	12...24V DC ±10% 27 mA	10...50 (0.39...2.0)				NPN Output: 100 mA, Stability: 50 mA 350 µs		42BA-S2LNAC-A2
	12...24V DC ±10% 30 mA					PNP Output: 100 mA, 350 µs		42BA-S2LPAC-A2
	12...24V DC ±10% 33 mA	10...100 (0.39...3.9)				NPN Output: 100 mA Stability: 50 mA 350 µs		42BA-S2LNAE-A2
	12...24V DC ±10% 30 mA					PNP Output: 100 mA 350 µs		42BA-S2LPAE-A2
	12...24V DC ±10% 30 mA	10...200 (0.39...7.9)	5°		Infrared 880 nm	NPN Output: 100 mA Stability: 50 mA 350 µs	42BA-S1LNAG-A2	
	12...24V DC ±10% 33 mA					PNP Output: 100 mA 350 µs	42BA-S1LPAG-A2	

Operating Distance with White Paper

Min Sensitivity [mm (in.)]	Max Sensitivity [mm (in.)]	Cat. No.
12...25 (0.47...0.98)	2...30 (0.078...1.18)	42BA-S2LNAA-A2 42BA-S2LPAA-A2
9.5...39 (0.37...1.54)	2.7...50 (0.106...1.97)	42BA-S2LNAC-A2 42BA-S2LPAC-A2
17...75 (0.67...2.95)	6...100 (0.24...3.94)	42BA-S2LNAE-A2 42BA-S2LPAE-A2
25...160 (0.98...6.29)	1...200 (0.039...7.87)	42BA-S1LNAG-A2 42BA-S1LPAG-A2

Detection Direction

Due to the detection method, the sensor must be positioned such that the target passes in the horizontal direction illustrated.



Motion in the vertical direction cannot be reliably detected.



Description

The 42JS VisiSight family of sensors offers a full range of sensing modes in a miniature rectangular housing. Visible light source is offered in all models for ease of alignment. Additional transmitted beam infrared LED source models are offered for superior crosstalk immunity.

The 42JS VisiSight family provides an indication if the sensor operation is unstable. An indicator flashes if the signal level is too close to the detection threshold. This helps for easy alignment of the sensor and forewarns against detection of a background.

Features

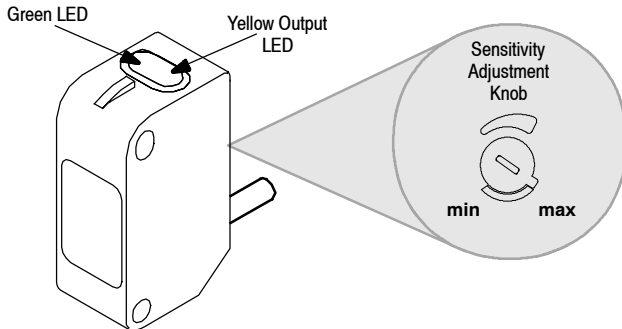
- Visible light source offered on all models for ease of alignment
- Optional snap-on adaptor enables 18 mm mount and makes sensor replacement a snap
- Patented ASIC design offers linear sensitivity adjustment, stability indication, and excellent noise immunity
- Compact sealed housing and cavity free design to minimize collection of dust and debris while allowing for easy sensor cleanup
- Threaded metal M12 or M8 connector on pigtail
- 360° visible LED status indicators
- Additional transmitted beam models available with infrared light source for superior cross talk immunity
- Input to disable light source on transmitted beam emitter

Specifications

Environmental	
Certifications	cULus and CE Marked for all applicable directives
Operating Environment	IP67
Operating Temperature [C (F)]	-20...+60° (-4...+140°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...95% (noncondensing)
Ambient Light Immunity	Incandescent light 5000 lux
Optical	
Sensing Modes	Polarized retroreflective, diffuse, transmitted beam
Sensing Range	See Product Selection table on page 1-87
Field of View	See Product Selection table (on page 1-87)
Light Source	Visible red LED (660 nm) or infrared LED (880 nm)
LED Indicators	See User Interface on page 1-85
Adjustments	Sensitivity potentiometer or fixed by cat. no.
Electrical	
Voltage	10...30V DC
Current Consumption	25 mA max
Sensor Protection	Short circuit, overload, false pulse, transient noise, reverse polarity
Outputs	
Response Time	1 ms
Output Type	PNP or NPN by cat. no.
Output Mode	Complementary light or dark operate
Output Current	100 mA
Output Leakage Current	10 µA max
Mechanical	
Housing Material	ABS
Lens Material	PMMA
Cover Material	PMMA
Connection Types	2 m cable, 4-pin DC micro (M12) QD, 4-pin pico (M8) QD
Supplied Accessories	Mounting hardware (M3 x 25) stainless steel screws
Optional Accessories	See snap-on adaptor for 18 mm mounting (IP40), mounting brackets, cordsets, and reflectors on page 1-87

User Interface

Sensor Indicators



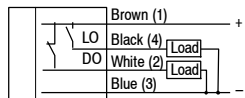
LED Color	State	Status
Green	OFF	Power is Off
Green	ON	Power is On
	Flashing (6 Hz)	Unstable (0.5 < Margin < 2)
	Flashing (1.5 Hz)	Output short-circuit protection active
Yellow	OFF	Output de-energized ❶
	ON	Output energized ❶

❶ Black wire or pin 4 of connector.

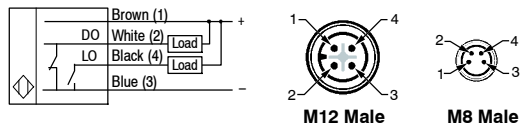
Wiring Diagrams

Cable connection is shown in the following diagrams. Pin numbers correspond to an M12 or M8 male connector on the sensor.

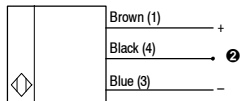
PNP Models with Complementary Outputs



NPN Models with Complementary Outputs

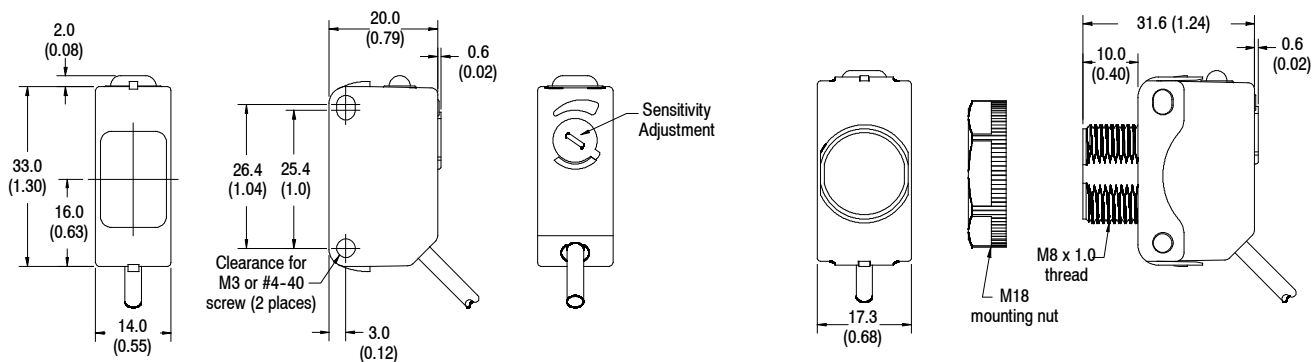


Transmitted Beam Emitter



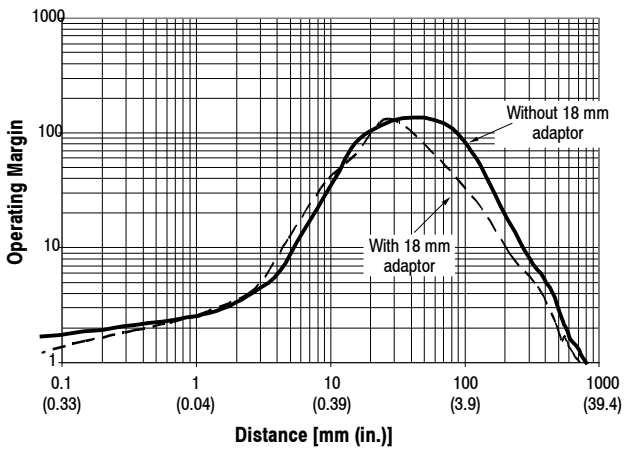
❷ For normal operation, black wire (pin 4) needs no connection. To disable light source, connect black wire (pin 4) to +V.

Approximate Dimensions [mm (in.)]

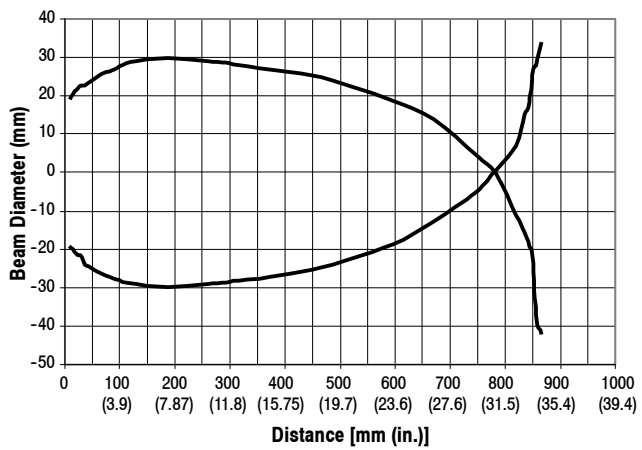


Typical Response Curves

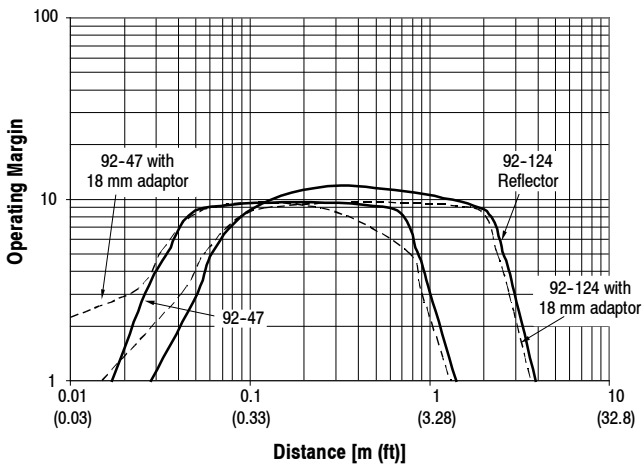
Standard Diffuse



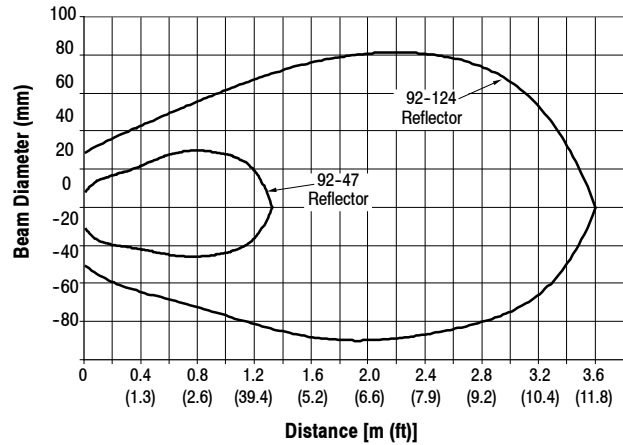
Standard Diffuse—Beam Pattern



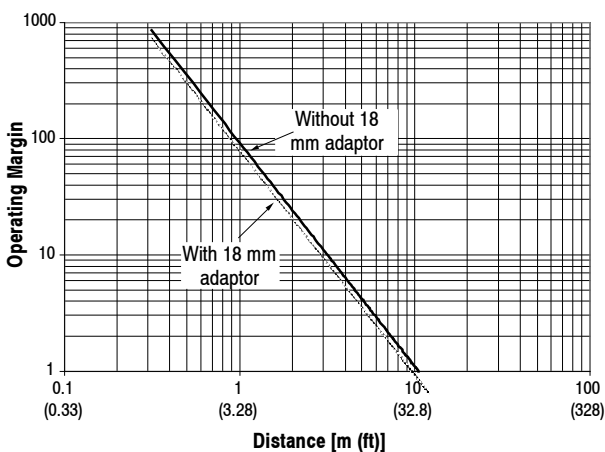
Polarized Retroreflective



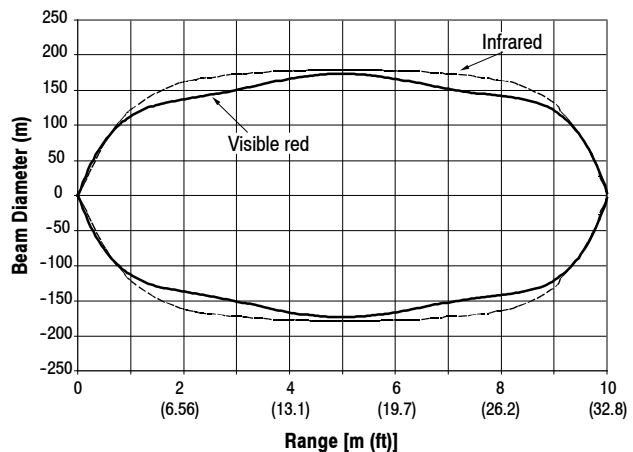
Polarized Retroreflective—Beam Pattern



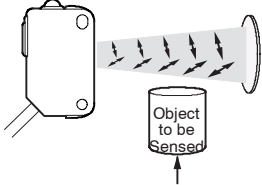
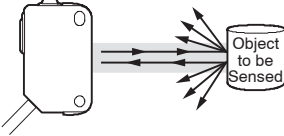
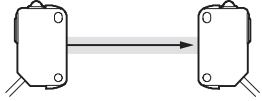
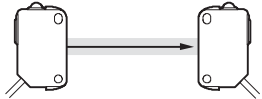
Transmitted Beam—Visible Red and Infrared



Transmitted Beam—Beam Pattern



Product Selection

Sensing Mode (max. range)	Operating Voltage/Current	Sensing Distance	Output Energized	Output Type Capacity	Sensitivity Adjustment	Cat. No. ❶
 <p><i>Polarized Retroreflective</i> Field of View: 2.8° Emitter LED: Visible red 645 nm</p>	10...30V DC 25 mA max.	25 mm...3.5 m (0.98 in...11.5 ft)	Complementary light and dark operate	NPN	No adjustment	42JS-P2MNB1-F4
				PNP		42JS-P2MPB1-F4
				NPN	Single-turn potentiometer	42JS-P2MNA2-F4
				PNP		42JS-P2MPA2-F4
 <p><i>Standard Diffuse</i> Field of View: 4° Emitter LED: Visible red 645 nm</p>		3...800 mm (0.12...31.5 in.)	Complementary light and dark operate	NPN	Single-turn potentiometer	42JS-D2MNA1-F4
				PNP		42JS-D2MPA1-F4
 <p><i>Transmitted Beam</i> Field of View: 4° Emitter LED: Visible red 645 nm</p>		10 m (32.8 ft)	NA	NA	No adjustment	42JS-E2EZB1-F4
			Complementary light and dark operate	NPN	Single-turn potentiometer	42JS-R9MNA1-F4
PNP		42JS-R9MPA1-F4				
 <p><i>Transmitted Beam</i> Field of View: 4° Emitter LED: Infrared 850 nm</p>		10 m (32.8 ft)	NA	NA	No adjustment	42JS-E1EZB1-F4
			Complementary light and dark operate	NPN	Single-turn potentiometer	42JS-R9MNA2-F4
PNP		42JS-R9MPA2-F4				

❶ The suffix -F4 denotes 4-pin DC micro connection type with 6-inch cable. For 4-pin DC pico QD with 6-inch cable replace the suffix -F4 with -Y4 (e.g. 42JS-P2MPB1-Y4). For 2 m cable without QD replace the suffix -F4 with -A2 (e.g. 42JS-P2MPB1-A2).

Cordsets and Accessories

Cordset		Accessories			
Description	Cat. No.	Description	Cat. No.	Description	Cat. No.
DC Micro QD Cordset, 4-pin, 2 m	889D-F4AC-2	Mounting Bracket	60-BJS-L1	18 mm Snap-on Adaptor	60-AJS-18
DC Pico QD Cordset, 4-pin, 2 m	889P-F4AB-2	Mounting Bracket	60-BJS-L2	32 mm (1.5 in.) Reflector	92-47
		Mounting Bracket	60-BKTL-SS	76 mm (3 in.) Reflector	92-124



Features

- Subminiature package style
- Three sensing modes
- Models with and without sensitivity adjustment
- Highly visible LED Indicators
- NPN or PNP output models
- 2 m cable connection

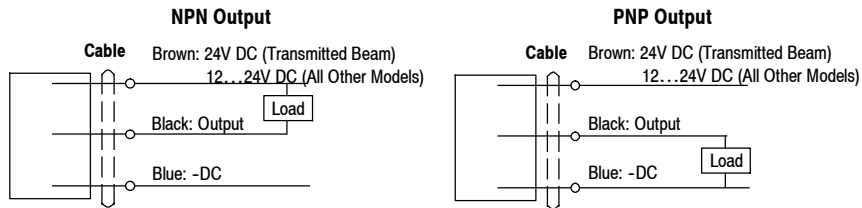
Specifications

Environmental	
Certifications	UL Listed, CSA Approved, and CE Marked for all applicable directives
Operating Environment	NEMA 1, IP40
Operating Temperature [C(F)]	-25...+55° (-13...+131°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60068-2-6
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60068-2-27
Relative Humidity	5...85%
Optical	
Sensing Modes	Diffuse, sharp cutoff, transmitted beam
Sensing Range	See Product Selection table on page 1-91
Field of View	See Product Selection table on page 1-91
Light Source	Visible red LED (660 nm)
LED Indicators	See User Interface below
Adjustments	See Product Selection table on page 1-91
Electrical	
Voltage	12...24V DC
Current Consumption	30 mA max
Sensor Protection	Reverse polarity for standard diffuse without adjustment, transient noise
Outputs	
Response Time	500 μS
Output Type	PNP or NPN by cat. no.
Output Mode	See Product Selection table on page 1-91
Output Current	80 mA @ 24V DC
Output Leakage Current	0.5 mA max
Mechanical	
Housing Material	Polyester
Lens Material	Polycarbonate
Connection Types	2 m cable

User Interface Panel

Label	Color	State	Status
STB	Green	OFF	0.8<math><1.2</math>
		ON	0.8>math>>1.2</math>
OUT	Red	OFF	Output not activated
		ON	Output activated

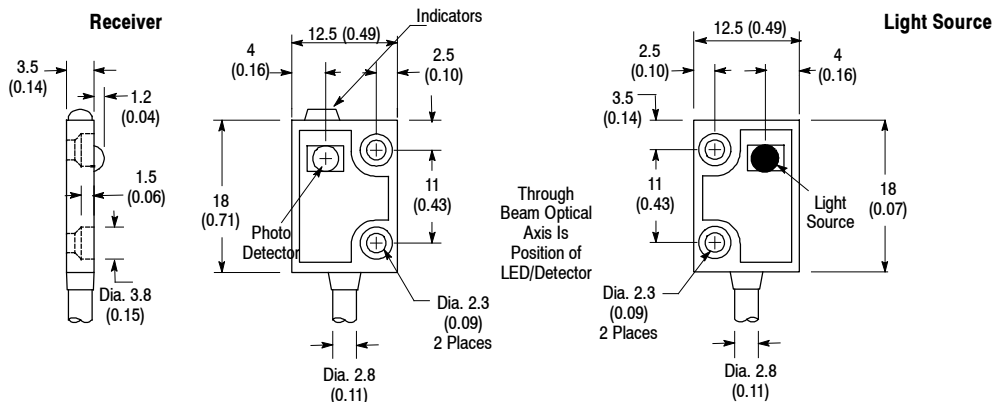
Wiring Diagrams



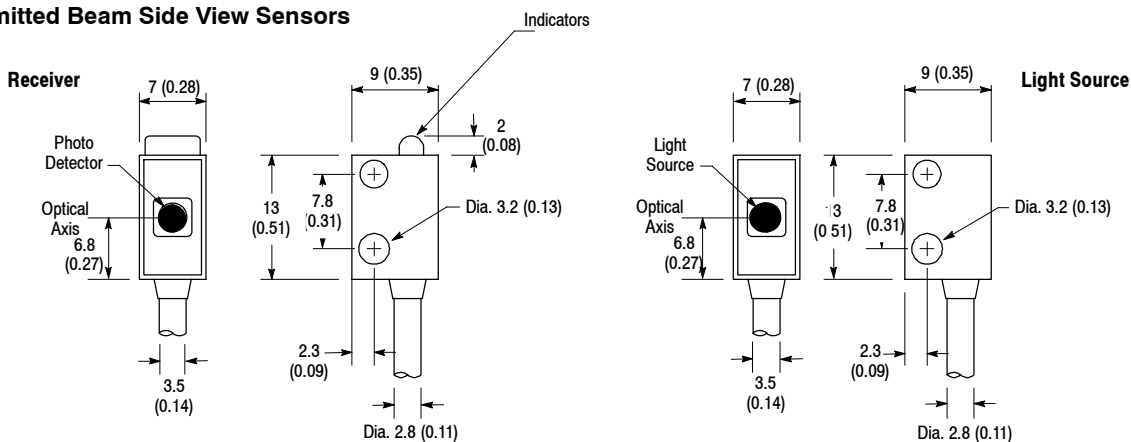
Note: Details regarding connection of Rockwell Automation Bulletin 42KA photoelectric sensors to Rockwell Automation Programmable Controllers can be found in publication 42-2.0.

Approximate Dimensions [mm (in.)]

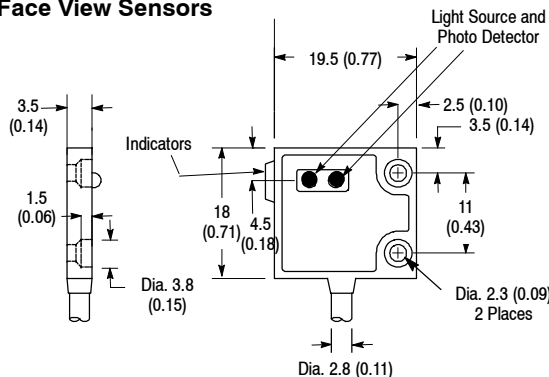
Transmitted Beam Face View Sensors



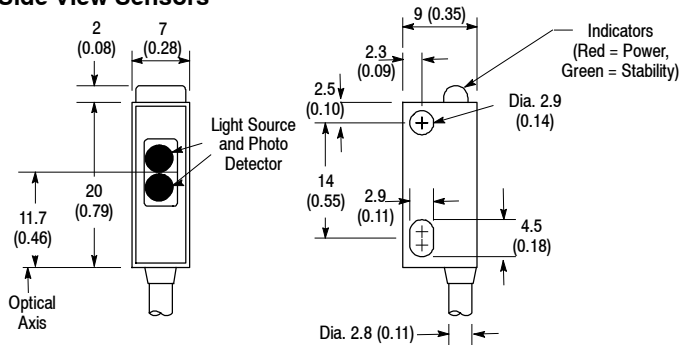
Transmitted Beam Side View Sensors



Face View Sensors

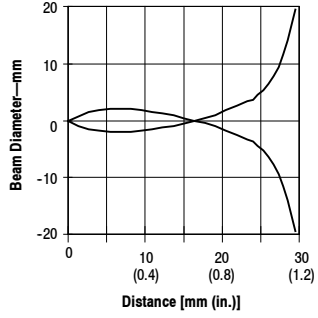
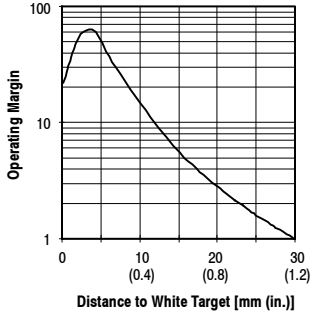


Side View Sensors



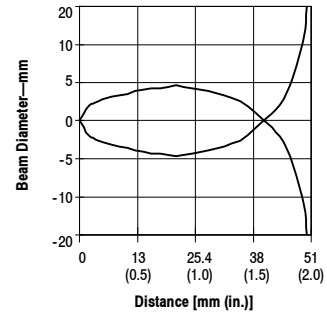
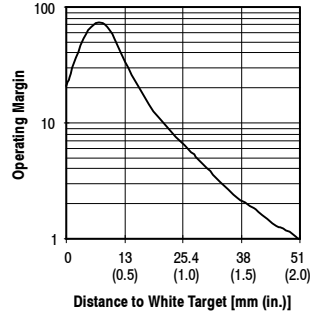
Typical Response Curve Beam Pattern

Standard Diffuse—30 mm

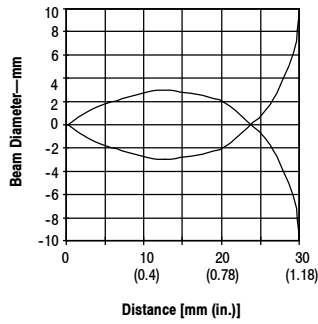
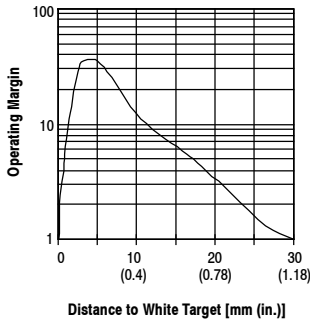


Typical Response Curve Beam Pattern

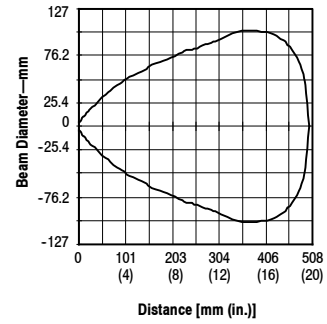
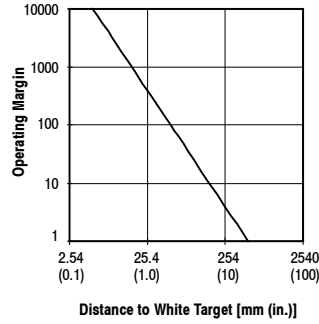
Standard Diffuse—50 mm



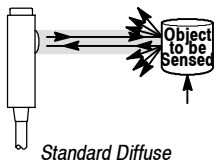
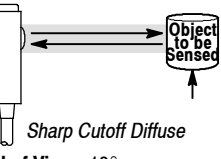
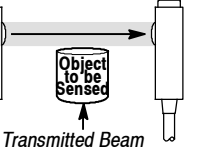
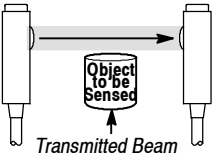
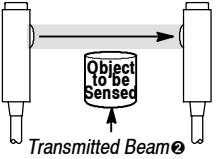
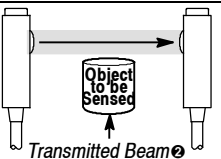
Sharp Cutoff Diffuse



Transmitted Beam



Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energ.	Output Type Capacity Response Time	Face or Side View	Sensitiv. Adjust.	Connection Type	Cat. No.
 <p>Standard Diffuse</p> <p>Field of View: 18° Emitter LED: Visible red 660 nm Face or Side View: Face View</p>	12...24V DC ±10% 20 mA	3...50 mm (0.12... 2.0 in.)	Light	NPN 80 mA 0.5 ms	Face	No	2 m 500V cable	42KA-D2JNHC-A2
	12...24V DC ±10% 29 mA			PNP 80 mA 0.5 ms				42KA-D2JPHC-A2
	12...24V DC ±10% 27 mA			NPN 80 mA 0.5 ms	Face	Yes		42KA-D2JNFC-A2
	12...24V DC ±10% 29 mA			PNP 80 mA 0.5 ms				42KA-D2JPFC-A2
 <p>Sharp Cutoff Diffuse</p> <p>Field of View: 18° Emitter LED: Red 660 nm</p>	12...24V DC ±10% 27 mA	3...30 mm (0.12... 1.2 in.)	Light Operate	NPN 80 mA 0.5 ms	Side	Yes	2 m 500V cable	42KA-S2JNSA-A2
	12...24V DC ±10% 29 mA			PNP 80 mA 0.5 ms				42KA-S2JPASA-A2
 <p>Transmitted Beam</p> <p>Field of View: 40° Emitter LED: Red 660 nm</p>	24V DC ±10% Source: 15 mA Receiver: 15 mA			NPN 80 mA 0.5 ms	Face	No		42KA-T2KNHK-A2
					Side			42KA-T2KNTK-A2
 <p>Transmitted Beam</p> <p>Field of View: 50° Emitter LED: Red 660 nm</p>	24V DC ±10% Source: 15 mA Receiver: 22 mA	3...500 mm (0.12... 19.7 in.)	Dark		Face	Yes	2 m 500V cable	42KA-T2KNFK-A2
 <p>Transmitted Beam</p> <p>Field of View: 40° Emitter LED: Red 660 nm</p>	24V DC ±10% Source: 15 mA Receiver: 17 mA				Face	No		42KA-T2KPHK-A2
					Side	42KA-T2KPTK-A2		
 <p>Transmitted Beam</p> <p>Field of View: 50° Emitter LED: Red 660 nm</p>	24V DC ±10% Source: 15 mA Receiver: 24 mA				Face	Yes		42KA-T2KPFK-A2

① See page 1-89 for detailed dimensions.

② Both a light source (emitter) and receiver are included in the package. To identify the light source, replace the "T" in the cat. no. with "E." To identify the receiver, replace the "T" in the cat. no. with "R." Example: 42KA-T2KNHK-A2 contains one 42KA-E2KNHK-A2 light source and one 42KA-R2KNHK-A2 receiver. Light sources and receivers are not available separately.



Features

- Compact rectangular package
- Four sensing modes
- Sensitivity adjustment
- Selectable light/dark operate
- Highly visible LED Indicators
- NPN or PNP output models
- 2 m cable or pico connections

Specifications

Environmental	
Certifications	cULus Listed and CE Marked for all applicable directives
Operating Environment	NEMA 1, 4, 6, 12, 13; IP67 (IEC 60529)
Operating Temperature [C (F)]	-25...+55° (-13...+131°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...85%
Optical	
Sensing Mode	Retroreflective, diffuse, sharp cutoff diffuse, transmitted beam
Sensing Range	See Product Selection table on page 1-95
Field of View	See Product Selection table on page 1-95
Light Source	Visible red LED (660 nm), infrared LED (880 nm)
LED Indicators	See User Interface Panel below
Adjustments	Sensitivity potentiometer
Electrical	
Voltage	12...24V DC
Current Consumption	30 mA max
Sensor Protection	Short circuit (NPN models only), reverse polarity, false pulse, transient noise
Outputs	
Response Time	350 μs
Output Type	PNP or NPN by cat. no., stability output for NPN models only
Output Mode	Light or dark operate selectable
Output Current	100 mA max @ 24V DC
Output Leakage Current	0.5 mA max
Mechanical	
Housing Material	Polyarylate
Lens Material	Acrylic, polycarbonate, polyarylate by cat. no.
Connection Types	2 m cable, 3-pin DC pico (M8) QD
Supplied Accessories	Mounting bracket, adhesive apertures (transmitted beam models), screwdriver, reflector (retroreflective models)
Optional Accessories	See mounting brackets and cordsets on page 1-97

User Interface Panel

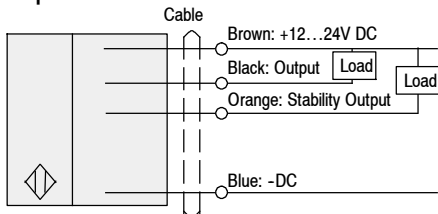
Label	Color	State	Status
STB	Green	OFF	0.8<math><1.2</math>
		ON	0.8>math>>1.2</math>
OUT	Red	OFF	Output not activated
		ON	Output activated

Stability Indicator (Green)
Output Indicator (Red)
Sensitivity Potentiometer

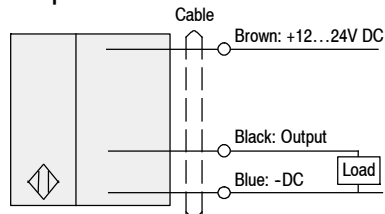
Stability Indicator (Green)
Output Indicator (Red)
Sensitivity Potentiometer

Wiring Diagrams

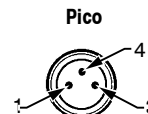
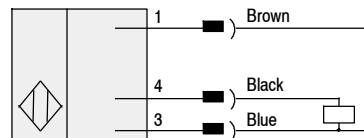
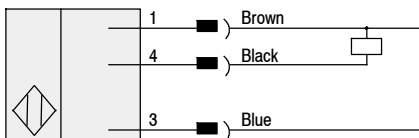
Cable
NPN Output



PNP Output



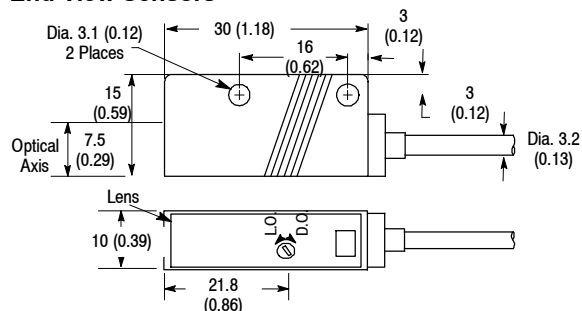
Quick-Disconnect



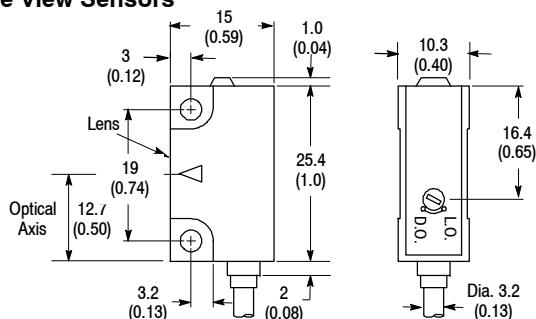
Note: Details regarding connection of Rockwell Automation Bulletin 42KB photoelectric sensors to Rockwell Automation Programmable Controllers can be found in "PHOTOSWITCH® Photoelectric Sensors and Programmable Controller Interface Manual" on www.ab.com/literature.

Approximate Dimensions [mm (in.)]

End View Sensors

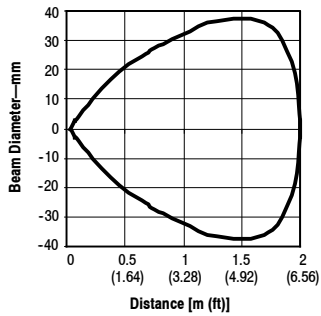
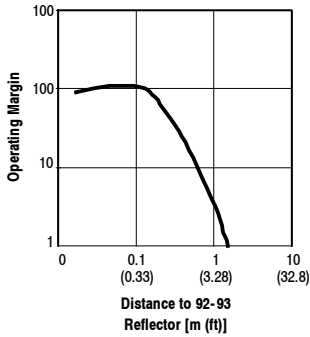


Side View Sensors



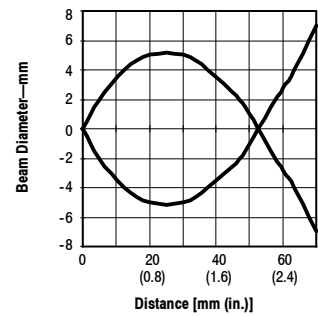
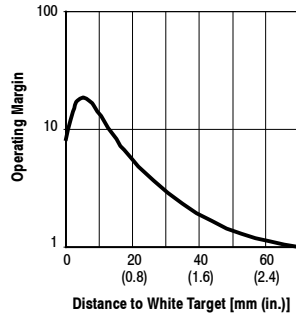
Typical Response Curve Beam Pattern

Retroreflective

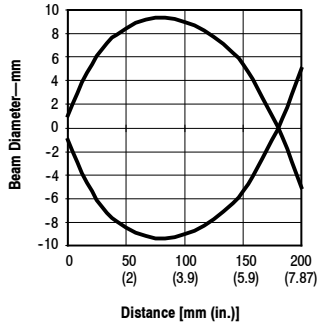
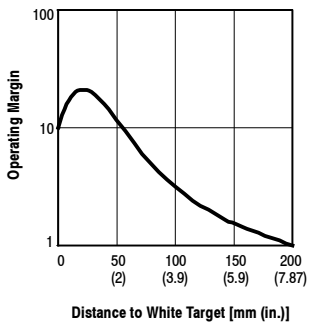


Typical Response Curve Beam Pattern

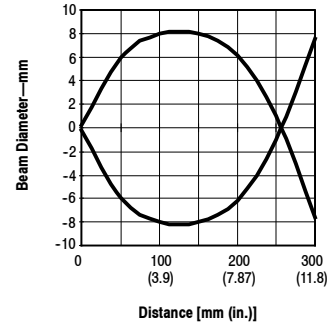
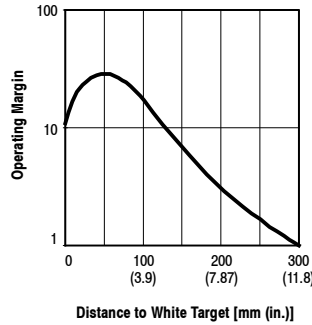
Standard Diffuse—70 mm



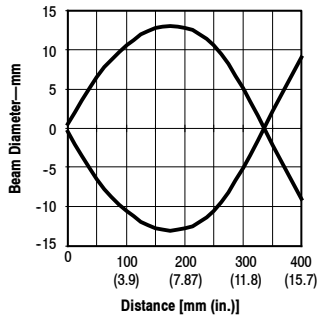
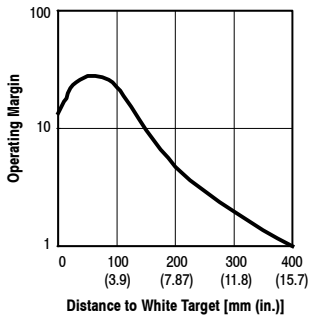
Standard Diffuse—200 mm



Standard Diffuse—300 mm

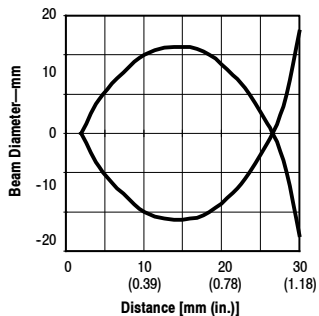
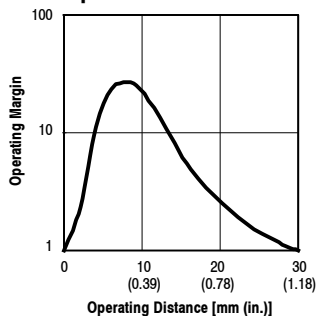


Standard Diffuse—400 mm



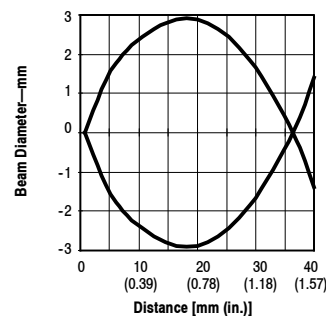
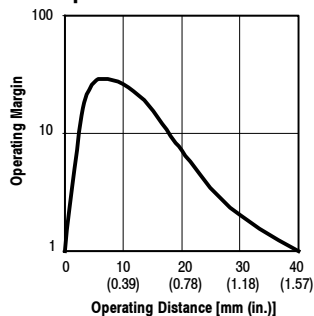
Typical Response Curve Beam Pattern

Sharp Cutoff Diffuse—30 mm

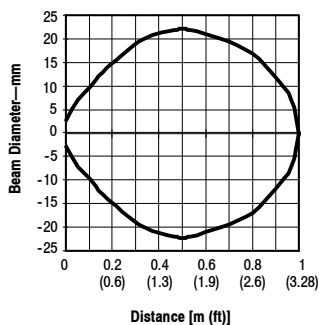
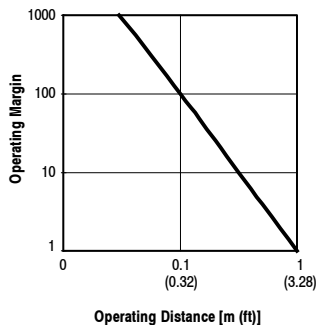


Typical Response Curve Beam Pattern

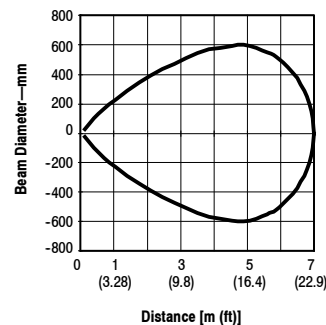
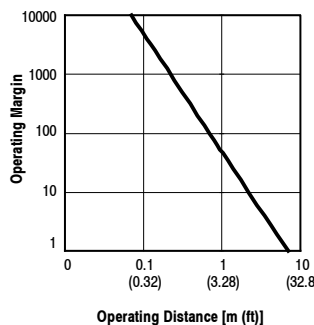
Sharp Cutoff Diffuse—40 mm



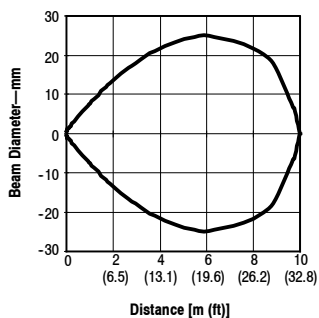
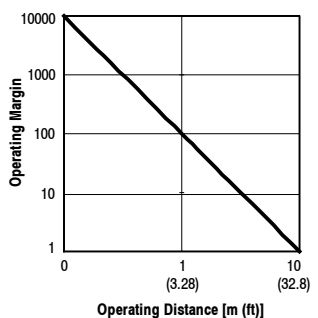
Transmitted Beam—1 m



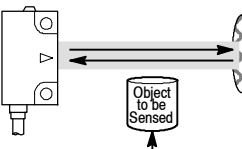
Transmitted Beam—7 m



Transmitted Beam—10 m

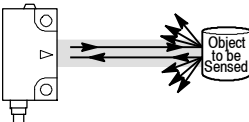
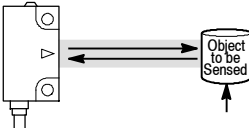


Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	LED Source	Output Type Capacity Response Time	End or Side View	Connection Type	Cat. No.
 <p>Retroreflective</p> <p>Field of View: 5°</p> <p>Emitter LED: Visible red 660 nm</p>	12...24V DC ±10% 20 mA	3 mm... 2 m (0.12 in... 6.6 ft)	Light/Dark Selectable	—	NPN Output: 100 mA Stability: 50 mA 350 μs	Side	2 m 500V cable	42KB-U2LNSN-A2
							3-pin pico	42KB-U2LNSN-Y3
	12...24V DC ±10% 25 mA				PNP Output: 100 mA 350 μs		2 m 500V cable	42KB-U2LPSN-A2
							3-pin pico	42KB-U2LPSN-Y3

Refer to page 1-97 for cordsets and accessories.

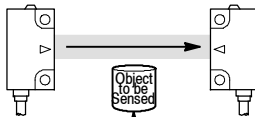
Product Selection (continued)

Sensing Mode	Operating Voltage Supply Current	Sensing Distance [mm (in.)]	Output Energized	LED Source	Output Type Capacity Response Time	End or Side View	Connection Type	Cat. No.
 <p>Standard Diffuse</p> <p>Field of View: 50 mm Infrared sensors: 20°; All others: 12° Emitter LED: See Product Selection</p>	12...24V DC ±10% 25 mA	3...70 (0.12...2.8)	Light/Dark Selectable	IR 950 nm	NPN Output: 100 mA, Stability: 50 mA 350 µs	End	2 m 500V cable	42KB-D1LNED-A2
						3-pin pico	42KB-D1LNED-Y3	
	12...24V DC ±10% 28 mA	Side			2 m 500V cable	42KB-D1LNSD-A2		
		3-pin pico			42KB-D1LNSD-Y3			
	12...24V DC ±10% 22 mA	3...200 (0.12...7.9)		IR 900 nm	NPN Output: 100 mA, Stability: 50 mA 350 µs	End	2 m 500V cable	42KB-D1LPED-A2
						3-pin pico	42KB-D1LPED-Y3	
	12...24V DC ±10% 25 mA	3...300 (0.12...11.8)		Red 700 nm	PNP Output: 100 mA 350 µs	Side	2 m 500V cable	42KB-D1LPSD-A2
						3-pin pico	42KB-D1LPSD-Y3	
	12...24V DC ±10% 20 mA	3...300 (0.12...11.8)		Red 700 nm	NPN Output: 100 mA, Stability: 50 mA 350 µs	End	2 m 500V cable	42KB-D1LNEG-A2
							3-pin pico	42KB-D1LNEG-Y3
	12...24V DC ±10% 25 mA	3...300 (0.12...11.8)		IR 900 nm	PNP Output: 100 mA 350 µs		2 m 500V cable	42KB-D1LPEG-A2
							3-pin pico	42KB-D1LPEG-Y3
12...24V DC ±10% 20 mA	3...300 (0.12...11.8)	Red 700 nm	PNP Output: 100 mA 350 µs	End	2 m 500V cable	42KB-D2LNEH-A2		
					3-pin pico	42KB-D2LNEH-Y3		
12...24V DC ±10% 25 mA	3...300 (0.12...11.8)	IR 900 nm	NPN Output: 100 mA, Stability: 50 mA 350 µs	Side	2 m 500V cable	42KB-D2LPEH-A2		
					3-pin pico	42KB-D2LPEH-Y3		
12...24V DC ±10% 20 mA	3...400 (0.12...15.8)	Red 700 nm	PNP Output: 100 mA 350 µs		2 m 500V cable	42KB-D1LNSH-A2		
					3-pin pico	42KB-D1LNSH-Y3		
12...24V DC ±10% 25 mA	3...400 (0.12...15.8)	IR 900 nm	NPN Output: 100 mA, Stability: 50 mA 350 µs	Side	2 m 500V cable	42KB-D1LPSH-A2		
					3-pin pico	42KB-D1LPSH-Y3		
12...24V DC ±10% 20 mA	3...400 (0.12...15.8)	Red 700 nm	PNP Output: 100 mA 350 µs	Side	2 m 500V cable	42KB-D2LNSG-A2		
					3-pin pico	42KB-D2LNSG-Y3		
12...24V DC ±10% 25 mA	3...400 (0.12...15.8)	IR 900 nm	NPN Output: 100 mA, Stability: 50 mA 350 µs	Side	2 m 500V cable	42KB-D2LPSG-A2		
					3-pin pico	42KB-D2LPSG-Y3		
 <p>Sharp Cutoff Diffuse</p> <p>Field of View: Infrared sensors: 15°; Visible red sensors: 20° Emitter LED: Infrared 900 nm or Visible red 660 nm (See Product Selection)</p>	12...24V DC ±10% 20 mA	3...30 (0.12...1.2)	Light/Dark Selectable	Red 660 nm	NPN Output: 100 mA Stability: 50 mA 350 µs	Side	2 m 500V cable	42KB-S2LNSA-A2
		3-pin pico					42KB-S2LNSA-Y3	
	12...24V DC ±10% 22 mA	3...40 (0.12...1.6)		IR 900 nm			2 m 500V cable	42KB-S1LNSB-A2
							3-pin pico	42KB-S1LNSB-Y3
	12...24V DC ±10% 25 mA	3...30 (0.12...1.2)		Red 660 nm			2 m 500V cable	42KB-S2LPSA-A2
							3-pin pico	42KB-S2LPSA-Y3
12...24V DC ±10% 25 mA	3...40 (0.12...1.6)	IR 900 nm	2 m 500V cable	42KB-S1LPSB-A2				
			3-pin pico	42KB-S1LPSB-Y3				

See page 1-93 for detailed dimensions.

Refer to page 1-97 for cordsets and accessories.

Product Selection (continued)

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	LED Source	Output Type Capacity Response Time	End or Side View ^①	Connection Type	Cat. No.		
 <p>Transmitted Beam^②</p> <p>Field of View: 1 m sensors: 50°; All others: 24° Emitter LED: Infrared 880 nm or Visible red 700 nm (See Product Selection)</p>	12...24V DC ±10% Source: 23 mA Receiver: 18 mA	3 mm...1 m (0.12 in... 3.2 ft)	Light/Dark Selectable	IR 880 nm	NPN Output: 100 mA, Stability: 50 mA 350 μs	End	2 m 500V cable	42KB-T1LNEL-A2 ^③		
							3-pin pico	42KB-T1LNEL-Y3		
		Side				2 m 500V cable	42KB-T1LNLSL-A2 ^③			
						3-pin pico	42KB-T1LNLSL-Y3			
		End				2 m 500V cable	42KB-T1LNEQ-A2			
						3-pin pico	42KB-T1LNEQ-Y3			
	Side	2 m 500V cable		42KB-T1LNSQ-A2 ^③						
		3-pin pico		42KB-T1LNSQ-Y3						
	12...24V DC ±10% Source: 20 mA Receiver: 18 mA	3 mm...10 m (0.12 in... 32.8 ft)		Red 700 nm	Light/Dark Selectable	Red 700 nm	PNP Output: 100 mA 350 μs	Side	2 m 500V cable	42KB-T2LNSR-A2 ^③
									3-pin pico	42KB-T2LNSR-Y3
		End						2 m 500V cable	42KB-T1LPEL-A2 ^③	
								3-pin pico	42KB-T1LPEL-Y3	
Side		2 m 500V cable	42KB-T1LPSL-A2 ^③							
		3-pin pico	42KB-T1LPSL-Y3							
End	2 m 500V cable	42KB-T1LPEQ-A2								
	3-pin pico	42KB-T1LPEQ-Y3								
Side	2 m 500V cable	42KB-T1LPSQ-A2 ^③								
	3-pin pico	42KB-T1LPSQ-Y3								
12...24V DC ±10% Source: 20 mA Receiver: 21 mA	3 mm...10 m (0.12 in... 32.8 ft)	Red 700 nm	Light/Dark Selectable	Red 700 nm	PNP Output: 100 mA 350 μs	Side	2 m 500V cable	42KB-T2LPSR-A2 ^③		
							3-pin pico	42KB-T2LPSR-Y3		

- ① See page 1-93 for detailed dimensions.
- ② Adhesive 1 mm apertures are included with these sensors.
- ③ Optional metal apertures are available for these sensors under Accessories .
- ④ Both a light source (emitter) and receiver are included in the package. To identify the light source, replace the "T" in the cat. no. with "E." To identify the receiver, replace the "T" in the cat. no. with "R." Example: 42KB-T2KNHK-A2 contains one 42KB-E2KNHK-A2 light source and one 42KB-R2KNHK-A2 receiver. Light sources and receivers are not available separately.

Maximum Operating Distance with Apertures

Aperture Cat. No.				Sensor Cat. No.	
61-6726	61-6727	61-6728	61-6729		
100 mm (3.93 in.)	300 mm (11.8 in.)	400 mm (15.7 in.)	300 mm (11.8 in.)	42KB-T1LNLSL-A2	42KB-T1LPSL-A2
400 mm (1.57 in.)	1 m (39.3 in.)	3 m (9.8 ft)	2 m (6.56 ft)	42KB-T2LNSR-A2	42KB-T2LPSR-A2
300 mm (11.8 in.)	1 m (39.3 in.)	2.5 m (8.2 ft)	1.7 m (5.6 ft)	42KB-T1LNSQ-A2	42KB-T1LPSQ-A2

Cordsets and Accessories

Description	Cat. No.	Description	Cat. No.
Pico QD Cordset, 3-pin 2 m	889P-F3AB-2	Aperture, 2 mm (10 pcs)	61-6727
End View Bracket (included)	60-2632	Aperture, 3 mm (10 pcs)	61-6728
Side View Bracket (included)	60-2633	Aperture, 1 x 5 mm (10 pcs)	61-6729
Aperture, 1 mm (10 pcs)	61-6726	Reflectors (included)	92-93



Features

- Compact rectangular package
- Three sensing modes
- Diagnostic output
- Sensitivity adjustment
- Selectable light/dark operate
- Highly visible LED indicators
- NPN or PNP output models
- 2 m cable or pico connections

Specifications

Environmental	
Certifications	UL Listed, CSA Certified, and CE Marked for all applicable directives
Operating Environment	NEMA 1, 4X, 6P, 12, 13; IP67
Operating Temperature [C (F)]	-25...+55° (-13...+131°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...85%
Optical	
Sensing Mode	Polarized retroreflective, diffuse, transmitted beam
Sensing Range	See Product Selection table on page 1-101
Field of View	See Product Selection table on page 1-101
Light Source	Visible red LED (700 nm)
LED Indicators	See User Interface Panel below
Electrical	
Voltage	12...24V DC
Current Consumption	35 mA max
Sensor Protection	Short circuit (NPN models only), reverse polarity, false pulse, transient noise
Outputs	
Response Time	350 μS
Output Type	PNP or NPN by cat. no.
Output Mode	Light or dark operate selectable
Output Current	100 mA max @ 24V DC
Output Leakage Current	0.5 mA max
Mechanical	
Housing Material	Polyarylate
Lens Material	Acrylic
Connection Types	2 m cable, 4-pin DC pico (M8) QD
Supplied Accessories	Mounting bracket, screwdriver, reflector (retroreflective models)
Optional Accessories	See mounting brackets and cordsets on page 1-101

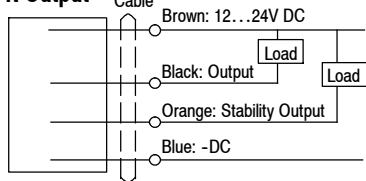
User Interface Panel

Label	Color	State	Status
STB	Green	OFF	0.8< margin < 1.2
		ON	0.8> margin > 1.2
OUT	Red	OFF	Output not activated
		ON	Output activated

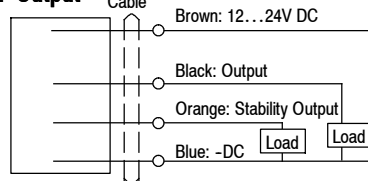
Wiring Diagrams

Cable Version

NPN Output



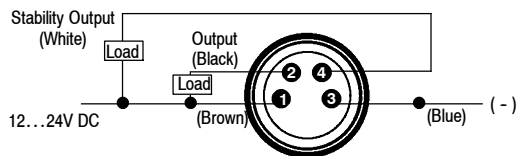
PNP Output



Pico Quick-Disconnect Version

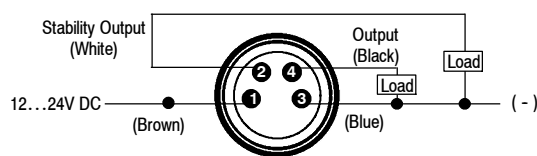
NPN Output

Face View Male Receptacle (Sensor)



PNP Output

Face View Male Receptacle (Sensor)

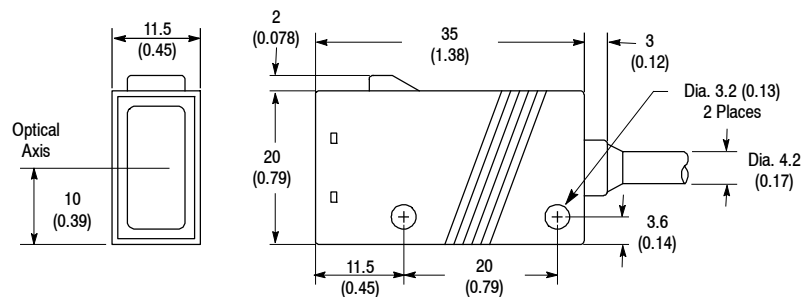


Note: Details regarding connection of Rockwell Automation Bulletin 42KC photoelectric sensors to Rockwell Automation Programmable Controllers can be found in publication 42-2.0.

Approximate Dimensions [mm (in.)]

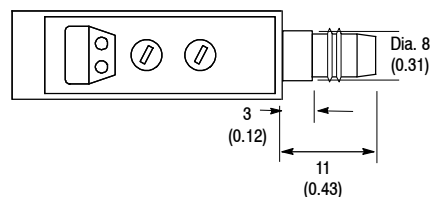
End View Sensors

Cable Version



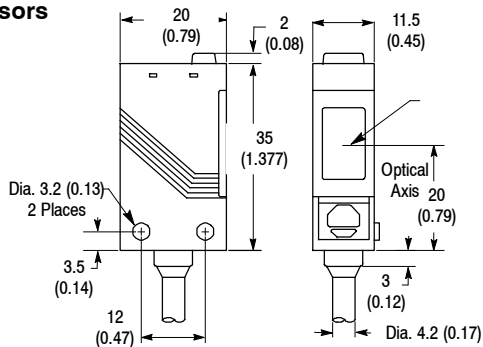
End View Sensors

Pico Quick-Disconnect Version



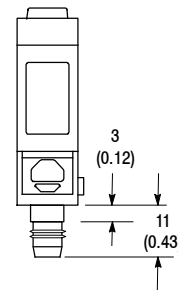
Side View Sensors

Cable Version



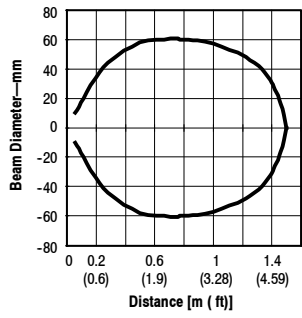
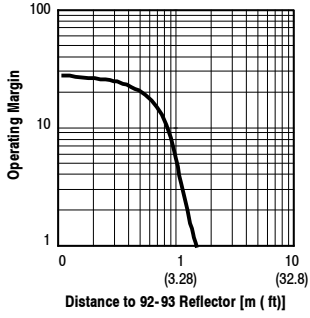
Side View Sensors

Pico Quick-Disconnect Version



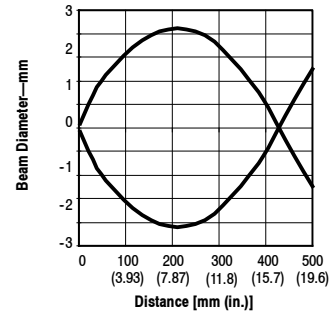
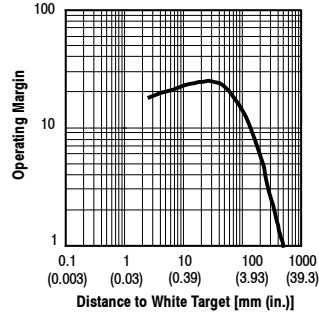
Typical Response Curve Beam Pattern

Polarized Retroreflective

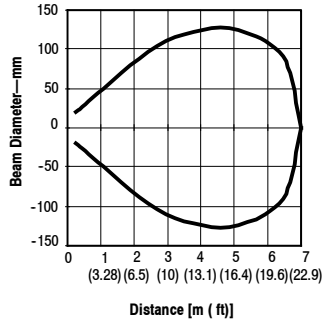
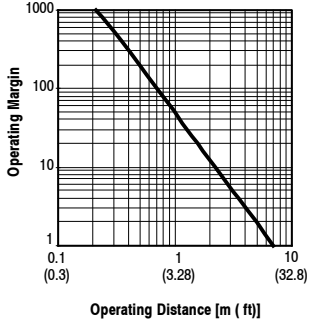


Typical Response Curve Beam Pattern

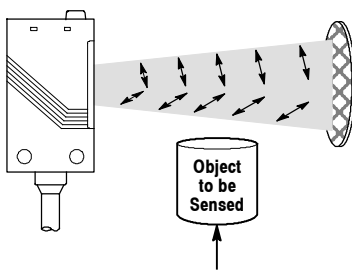
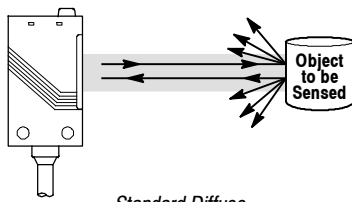
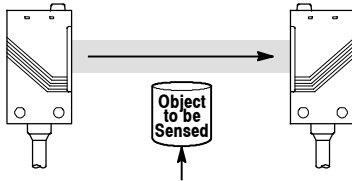
Standard Diffuse



Transmitted Beam



Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	End or Side View	Connection Type	Cat. No.
 <p><i>Polarized Retroreflective</i></p> <p>Field of View: 8° Emitter LED: Visible red 700 nm</p>	12...24V DC ±10% 30 mA	50 mm... 1.5 m (1.9 in... 4.9 ft)	Light/Dark Selectable	NPN Output: 100 mA Stability: 50 mA 0.5 ms	End	2 m 500V cable	42KC-P2LNEM-A2
	12...24V DC ±10% 35 mA					4-pin pico	42KC-P2LNEM-P4
					5V DC ±10% 25 mA	Side	2 m 500V cable
	4-pin pico						42KC-P2LNSM-P4
	Side				2 m 500V cable	42KC-P2LPEM-A2	
					4-pin pico	42KC-P2LPEM-P4	
 <p><i>Standard Diffuse</i></p> <p>Field of View: 7° Emitter LED: Visible red 700 nm</p>	12...24V DC ±10% 30 mA	3...500 mm (0.12... 19.7 in.)	Light/Dark Selectable	NPN Output: 100 mA Stability: 50 mA 0.5 ms	End	2 m 500V cable	42KC-D2LNEK-A2
	12...24V DC ±10% 35 mA					4-pin pico	42KC-D2LNEK-P4
					Side	2 m 500V cable	42KC-D2LNSK-A2
	4-pin pico					42KC-D2LNSK-P4	
	End				2 m 500V cable	42KC-D2LPEK-A2	
					4-pin pico	42KC-D2LPEK-P4	
Side	2 m 500V cable	42KC-D2LPSK-A2					
	4-pin pico	42KC-D2LPSK-P4					
 <p><i>Transmitted Beam</i></p> <p>Field of View: 10° Emitter LED: Visible red 700 nm</p>	12...24V DC ±10% Source: 20 mA Receiver: 20 mA	50 mm... 7 m (1.9 in... 23.0 ft)	Light/Dark Selectable	NPN Output: 100 mA Stability: 50 mA 0.5 ms	End	2 m 500V cable	42KC-T2LNGP-A2
	12...24V DC ±10% Source: 20 mA Receiver: 25 mA					4-pin pico	42KC-T2LNGP-P4
					Side	2 m 500V cable	42KC-T2LNTP-A2
	4-pin pico					42KC-T2LNTP-P4	
	End				2 m 500V cable	42KC-T2LPGP-A2	
					4-pin pico	42KC-T2LPGP-P4	
Side	2 m 500V cable	42KC-T2LPTP-A2					
	4-pin pico	42KC-T2LPTP-P4					

① See page 1-99 for detailed dimensions.

② Both a light source (emitter) and receiver are included in the package. To identify the light source, replace the "T" in the cat. no. with "E." To identify the receiver, replace the "T" in the cat. no. with "R." Example: 42KC-T2LNGP-A2 contains one 42KC-E2LNGP-A2 light source and one 42KC-R2LNGP-A2 receiver. Light sources and receivers are not available separately.

Cordsets and Accessories

Description	Cat. No.
Pico QD Cordset, 4-pin 2 m	889P-F4AB-2
End View Bracket	60-2634
Side View Bracket	60-2635
Reflectors (included)	92-93



Description

The Series 7000 is a family of general purpose photoelectric sensors intended for light to medium duty industrial applications. They offer a compact package, wide variety of sensing modes, and high speed response time.

The Series 7000 is available in eight sensing modes thereby ensuring an optimal solution for most applications. Even clear object detection applications can be solved with the use of the ClearSight version.

Features

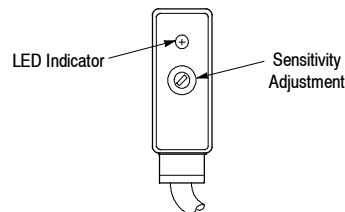
- Compact rectangular package
- Wide selection of sensing modes
- 24V DC operation
- N.O. and N.C. outputs
- Fast response time
- Variety of connection types

Specifications

Environmental	
Certifications	UL Listed, CSA Approved, and CE Marked for all applicable directives
Operating Environment	NEMA 3, 4X, 6P, 12, 13; IP67
Operating Temperature [C (F)]	-40...+65° (-40...+150°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...95%
Optical	
Sensing Modes	Retroreflective, polarized retroreflective, diffuse, wide angle diffuse, transmitted beam, fixed focus diffuse, fiber optic
Sensing Range	See Product Selection table on page 1-105
Field of View	See Product Selection table on page 1-105
Light Source	Visible red LED (660 nm) or infrared LED (880 nm)
LED Indicators	See User Interface Panel below
Adjustments	Sensitivity potentiometer
Electrical	
Voltage	11...28V DC
Current Consumption	46 mA max
Sensor Protection	Reverse polarity
Outputs	
Response Time	See Product Selection table on page 1-105
Output Type	PNP or NPN by cat. no.
Output Mode	Complementary light and dark operate
Output Current	100 mA @ 28V DC
Output Leakage Current	10 µA max
Mechanical	
Housing Material	Valox®
Lens Material	Acrylic
Connection Types	3 m (9.8 ft) cable, 4-pin DC micro QD on 12-inch pigtail
Supplied Accessories	None
Optional Accessories	See mounting brackets, reflectors, and cordsets on page 1-107

User Interface Panel

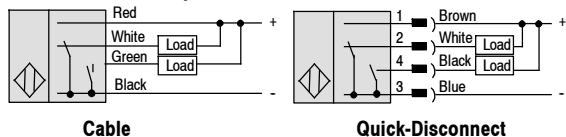
Label	Color	State	Status
Output	Red	OFF	Sensor output de-activated
		ON	Sensor output activated



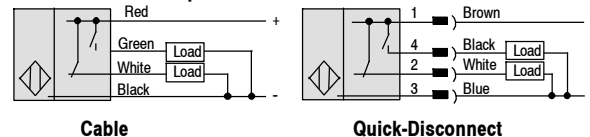
Wiring Diagrams

10.8...30V DC Sensors

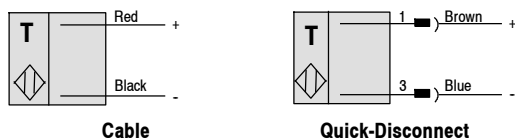
Models with NPN Outputs



Models with PNP Outputs



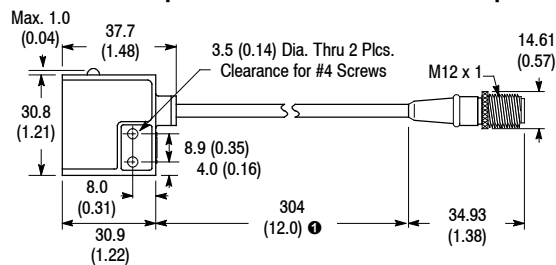
Transmitted Beam Source—All Models



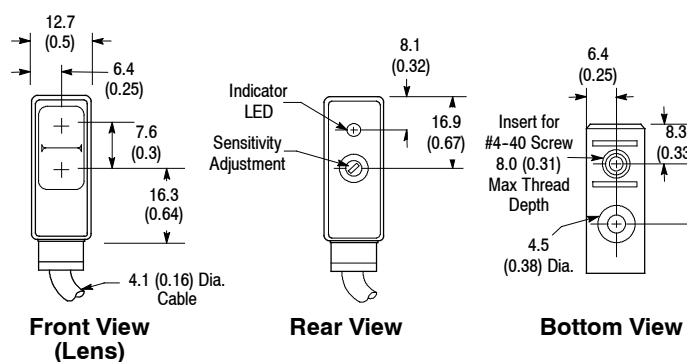
Note: Details regarding connection of Rockwell Automation Bulletin Series 7000 photoelectric sensors to Rockwell Automation Programmable Controllers can be found in the *PHOTOSWITCH® Interface Manual*. Refer to www.ab.com/literature to obtain this publication.

Approximate Dimensions [mm (in.)]

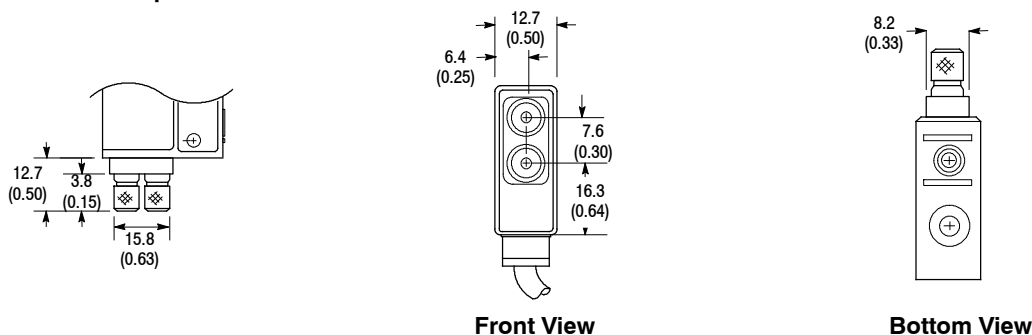
All Models Except Visible Red Plastic Fiber Optic



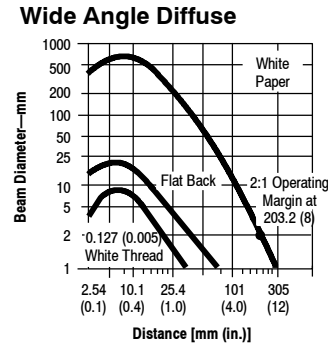
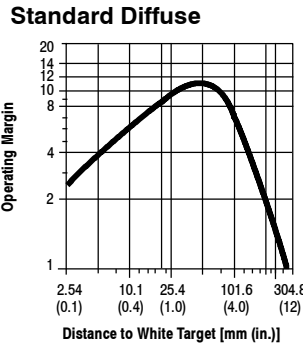
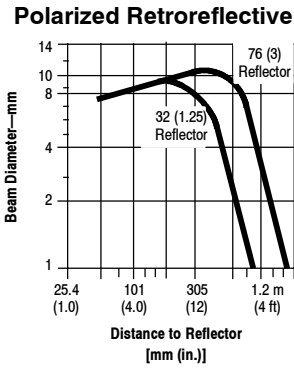
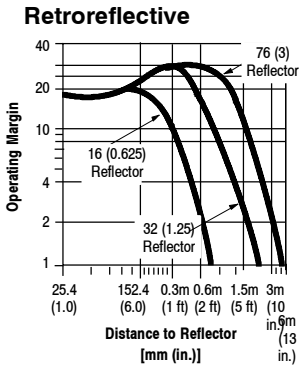
Ⓢ Quick-disconnect cable length shown. Cable versions length is 3 m (10 ft).



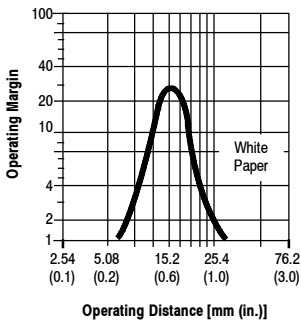
Visible Red Plastic Fiber Optic Models



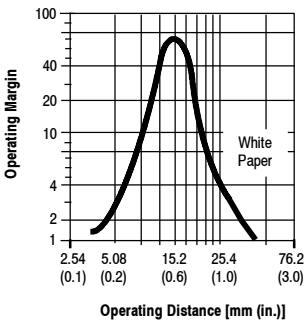
Typical Response Curve



Fixed Focus Diffuse Green LED

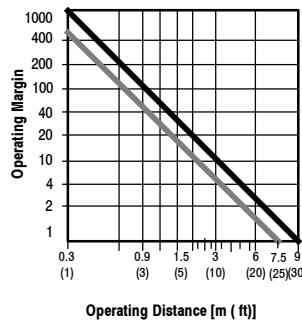


Fixed Focus Diffuse Red LED



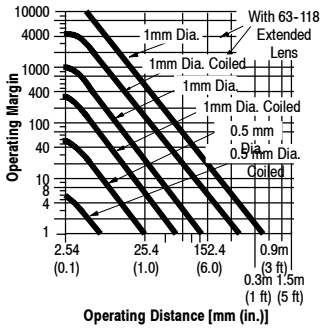
Transmitted Beam

— (IR) 42SML-7100 & 42SMR-7100/7101
 — (RED) 42SML-7110 & 42SMR-7110/7111

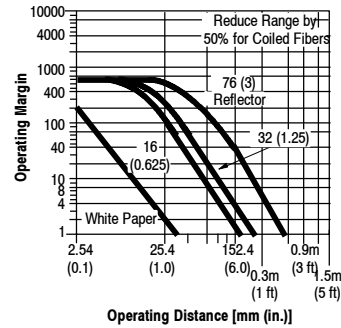


Small Aperture Fiber Optic

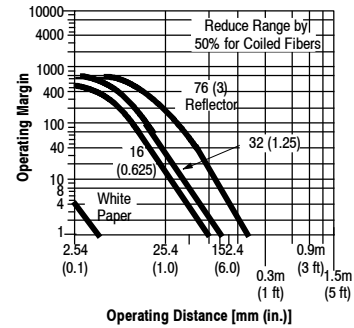
Transmitted Beam for 0.5 (0.02) Dia. and 1 (0.04) Dia. Plastic Fibers



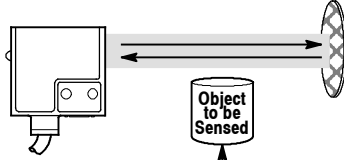
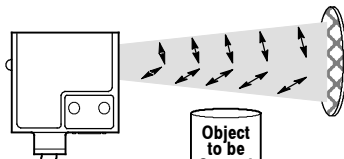
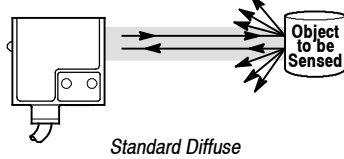
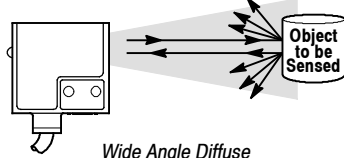
Retroreflective Beam for 1 (0.04) Dia. Plastic Fibers



Reflective Beam for 0.5 (0.02) Dia. Plastic Fibers

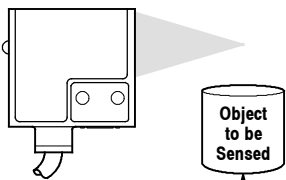


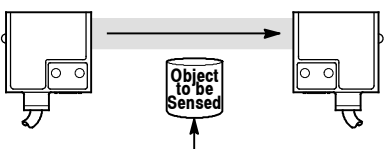
Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.
 <p><i>Retroreflective</i></p> <p>Field of View: 3° Emitter LED: Visible red 660 nm</p>	11...28V DC 46 mA	25.4 mm...3.7m (1 in...12.0 ft)	Complementary L.O./D.O.	NPN 100 mA 500 μs	3 m cable	42SMU-7000
					4-pin DC micro	42SMU-7000-QD
				PNP 100 mA 500 μs	3 m cable	42SMU-7001
					4-pin DC micro	42SMU-7001-QD
 <p><i>Polarized Retroreflective</i></p> <p>Field of View: 3° Emitter LED: Visible red 660 nm</p>	11...28V DC 46 mA	50.8 mm...2 m (2 in...6.6 ft)	Complementary L.O./D.O.	NPN 100 mA 500 μs	3 m cable	42SMU-7200
					4-pin DC micro	42SMU-7200-QD
				PNP 100 mA 500 μs	3 m cable	42SMU-7201
					4-pin DC micro	42SMU-7201-QD
 <p><i>Standard Diffuse</i></p> <p>Field of View: 7° Emitter LED: Infrared 880 nm</p>	11...28V DC 46 mA	25.4...229 mm (1...9.0 in.)	Complementary L.O./D.O.	NPN 100 mA 500 μs	3 m cable	42SMP-7000
					4-pin DC micro	42SMP-7000-QD
				PNP 100 mA 500 μs	3 m cable	42SMP-7001
					4-pin DC micro	42SMP-7001-QD
 <p><i>Wide Angle Diffuse</i></p> <p>Field of View: 43° Emitter LED: Infrared 880 nm</p>	11...28V DC 46 mA	5...280 mm (0.2...11 in.)	Complementary L.O./D.O.	NPN 100 mA 500 μs	3 m cable	42SMP-7010
					4-pin DC micro	42SMP-7010-QD
				PNP 100 mA 500 μs	3 m cable	42SMP-7011
					4-pin DC micro	42SMP-7011-QD

Refer to page 1-107 for cordsets and accessories.

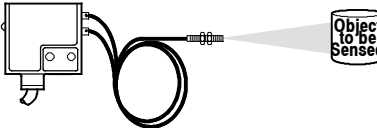
Product Selection (continued)

Sensing Mode	Operating Voltage Supply Current	Emitter LED	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.
 <p>Fixed Focus Diffuse</p>	11...28V DC 46 mA	Red 660 nm 15.2 mm sensing range	Complementary L.O./D.O.	NPN 100 mA 500 μs	3 m cable	42SMP-7020
					4-pin DC micro	42SMP-7020-QD
				PNP 100 mA 500 μs	3 m cable	42SMP-7021
					4-pin DC micro	42SMP-7021-QD
		Green 570 nm 15.2 mm sensing range		NPN 100 mA 1 ms	3 m cable	42SMP-7320
					4-pin DC micro	42SMP-7320-QD
				PNP 100 mA 1 ms	3 m cable	42SMP-7321
					4-pin DC micro	42SMP-7321-QD

Sensing Mode	Operating Voltage Supply Current	Sensing Range/Field of View	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.	
 <p>Transmitted Beam Standard Diffuse</p> <p>Emitter LED (Infrared, 42SML-7100) Emitter LED (Visible Red, 42SML-7110)</p>	11...28V DC 45 mA	10 mm...9.2 m (0.39 in...30 ft)/ 3°	NA Light Source		3 m cable	42SML-7100	
					4-pin DC micro	42SML-7100-QD	
		11...28V DC 35 mA			10 mm...7.6m (0.39 in...25 ft)/ 3°	3 m cable	42SML-7110
						4-pin DC micro	42SML-7110-QD
	11...28V DC 25 mA	8° (For IR Light Source)			NPN 100 mA 1 ms ON/1.5 ms OFF	3 m cable	42SMR-7100
						4-pin DC micro	42SMR-7100-QD
					PNP 100 mA 1 ms ON/1.5 ms OFF	3 m cable	42SMR-7101
						4-pin DC micro	42SMR-7101-QD
		2° (For IR Light Source)	NPN 100 mA 1 ms ON/1.5 ms OFF	3 m cable	42SMR-7120		
				4-pin DC micro	42SMR-7120-QD		
			PNP 100 mA 1 ms ON/1.5 ms OFF	3 m cable	42SMR-7121		
				4-pin DC micro	42SMR-7121-QD		
		8° (For VR Light Source)	NPN 100 mA 1 ms ON/1.5 ms OFF	3 m cable	42SMR-7110		
				4-pin DC micro	42SMR-7110-QD		
			PNP 100 mA 1 ms ON/1.5 ms OFF	3 m cable	42SMR-7111		
				4-pin DC micro	42SMR-7111-QD		
2° (For VR Light Source)	NPN 100 mA 1 ms ON/1.5 ms OFF	3 m cable	42SMR-7130				
		4-pin DC micro	42SMR-7130-QD				
	PNP 100 mA 1 ms ON/1.5 ms OFF	3 m cable	42SMR-7131				
		4-pin DC micro	42SMR-7131-QD				

Refer to page 1-107 for cordsets and accessories.

Product Selection (continued)

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.
 <p><i>Small Aperture Fiber Optic</i></p> <p>Field of View: Depends on the fiber optic cable selected</p> <p>Emitter LED: Visible red 660 nm</p>	<p>11...28V DC 46 mA</p>	<p>Depends on Fiber Optic cable selected</p>	<p>Complementary L.O./D.O.</p>	<p>NPN 100 mA 1 ms</p>	3 m cable	42SMF-7100
					4-pin DC micro	42SMF-7100-QD
				<p>PNP 100 mA 1 ms</p>	3 m cable	42SMF-7101
					4-pin DC micro	42SMF-7101-QD

Cordsets and Accessories

Description	Cat./Page No.	Description	Cat./Page No.	Description	Cat./Page No.
DC Micro QD Cordset, 4-pin, 2 m	889D-F4AC-2	76 mm (3 in.) Diameter Reflector	92-39	Bifurcated Fiber Optic Cables, 1 mm Diameter	43PT-NDS57ZS
Tilt/Swivel Bracket	60-2619	32 mm (1.25 in.) Diameter Reflector	92-47	Individual Fiber Optic Cables, 1 mm Diameter	43PT-NBS56FM



General Specifications

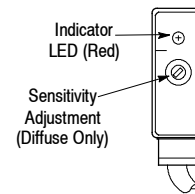
Light Source	See Product Selection
Unit Protection	Reverse polarity
Supply Voltage	See Product Selection
Current Consumption	46 mA maximum
Output Type	NPN or PNP
Output Mode	Light operate
Output Rating	100 mA @ 28V DC
Max Leakage Current	10 µA
Response Time	1 ms
Housing Material	Valox®
Lens Material	Acrylic
LED Indicators	See User Interface below
Connection Types	3m 300V cable; 4-pin DC micro QD on 12-inch pigtail
Supplied Accessories	None
Optional Accessories	Mounting brackets, reflectors, cordsets
Operating Environment	NEMA 12 (IP62)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Operating Temperature [C (F)]	-40...+65° (-40...+150°)
Relative Humidity	5...95%
Certifications	UL Listed, CSA Approved, and CE Marked for all applicable directives

Features

- Low cost sensing solution
- Compact rectangular package
- Wide selection of sensing modes
- 24V DC operation
- NPN or PNP outputs
- Fast response time
- Variety of connection types

User Interface Panel

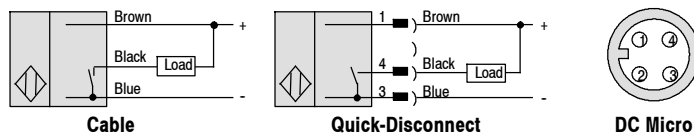
Label	Color	State	Status
Output	Red	OFF	Sensor output de-activated
		ON	Sensor output activated



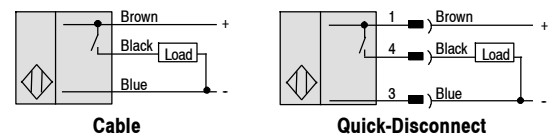
Wiring Diagrams

All Models with Output

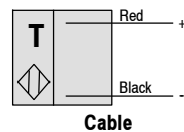
Models with NPN Output



Models with PNP Output



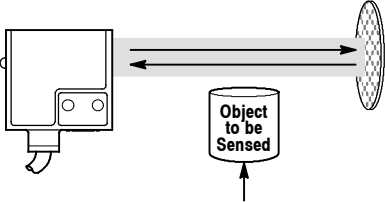
Transmitted Beam Source



Note: Details regarding connection of Allen-Bradley Series 7000 photoelectric sensors to Allen-Bradley Programmable Controllers can be found in publication 42-2.0.

All wire colors shown refer to Allen-Bradley quick-disconnect cables.

Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.
Retroreflective Sensors						
 <p>Retroreflective and Anti-Glare Retroreflective</p> <p>Field of View: 5°</p> <p>Emitter LED: Visible red 660nm</p>	10...30V DC 30 mA	50 mm (2 in.)... 3.6 m (12.0 ft)	Light	NPN 100 mA 1 ms	3 m cable	42SMU-7600
					4-pin DC micro QD	42SMU-7600-QD
				PNP 100 mA 1 ms	3 m cable	42SMU-7601
					4-pin DC micro QD	42SMU-7601-QD

Refer to the next page for cordsets and accessories.

PHOTOSWITCH® Photoelectric Sensors

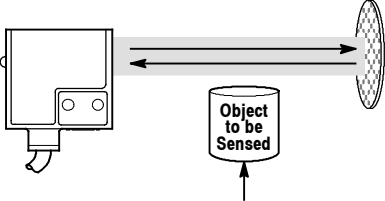
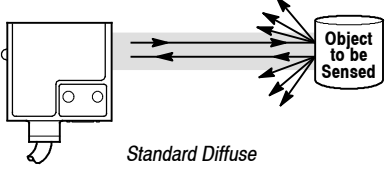
Series 7000 LTD

Miniature Rectangular Style

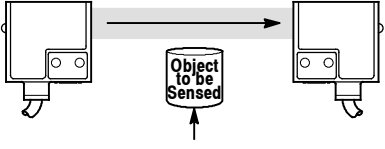
Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Field of View	Output Type Capacity Response Time	Connection Type	Cat. No.
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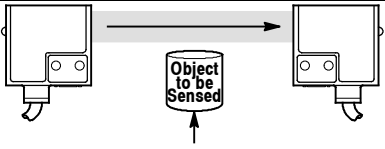
Product Selection for Antiglare Retroreflective Sensors

 <p><i>Retroreflective and Anti-Glare Retroreflective</i></p> <p>Field of View: 5° Emitter LED: Visible red 660 nm</p>	10...30V DC 20 mA	50mm (2in) to 2.0m (6.6ft)	Light	NPN 100 mA 1 ms	3 m cable	42SMU-7800	
					4-pin DC micro	42SMU-7800-QD	
					PNP 100 mA 1 ms	3 m cable	42SMU-7801
						4-pin DC micro	42SMU-7801-QD
 <p><i>Standard Diffuse</i></p> <p>Field of View: 6° Emitter LED: Infrared 880 nm</p>	10...30V DC 30 mA	5mm (0.2in) to 210mm (8.5in)	Light	NPN 100 mA 1 ms	3 m cable	42SMP-7600	
					4-pin DC micro	42SMP-7600-QD	
					PNP 100 mA 1 ms	3 m cable	42SMP-7601
						4-pin DC micro	42SMP-7601-QD

Product Selection for Light Source

 <p><i>Transmitted Beam</i></p> <p>Emitter LED: 950 nm (37.4 in.)</p>	11...27V DC 25 mA	10 mm (0.39 in.)... 6.4 m (21 ft)	3°	Infrared	3 m cable	42SML-7600-3
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Product Selection for Receivers to Use With Infrared Light Sources

 <p><i>Transmitted Beam</i></p> <p>Emitter LED: 950 nm (37.4 in.)</p>	11...27V DC 25 mA	Light Operate	8°	NPN 100 mA 1 ms	3 m cable	42SMR-7600-3
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Cordsets and Accessories

Description	Cat. No.	Description	Cat. No.
DC Micro QD Cordset, 4-pin, 2 m	889D-F4AC-2	76 mm (3 in.) Diameter with Center Mount Hole	92-39
Mounting Assemblies	1-293	32 mm (1.25 in.) Diameter	92-47



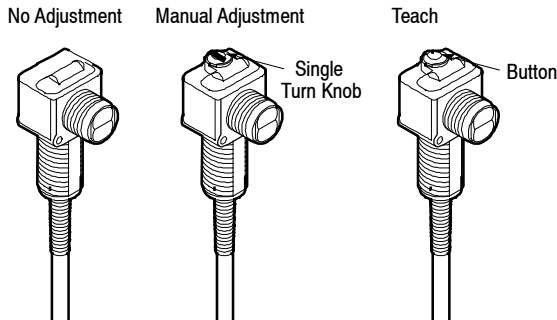
Features

- Class 1 eye safe visible laser
- Models with teach function
- Compact right angle housing
- Flexible 18 mm mounting options
- 360° visible LED indicators
- Reverse polarity protection
- Short-circuit protected outputs
- 1 ms response time
- False pulse protection
- NPN and PNP outputs

Specifications

Environmental	
Certifications	UL Listed, CSA Certified, and CE Marked for all applicable directives
Operating Environment	IP54 (IEC 60529)
Operating Temperature [C (F)]	-10...+40° (14...+104°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...95% (noncondensing)
Optical	
Sensing Modes	Polarized retroreflective, diffuse, transmitted beam
Sensing Range	See Product Selection table on page 1-111
Field of View	See Product Selection table on page 1-111
Light Source	Class 1 visible red laser (660 nm)
LED Indicators	See User Interface below
Electrical	
Voltage	24V DC ± 10%
Current Consumption	30 mA max
Sensor Protection	Overload, short circuit, reverse polarity, false pulse
Outputs	
Response Time	1 ms (4 ms for transmitted beam)
Output Type	PNP and NPN
Output Mode	Light or dark operate by cat. no.
Output Current	100 mA @ 24V DC max
Output Leakage Current	0.1 mA max
Mechanical	
Housing Material	Mindel
Lens Material	Acrylic
Connection Types	2 m cable (24 AWG), 4-pin DC micro (M12) QD
Supplied Accessories	18 mm mounting nut
Optional Accessories	See mounting brackets, reflectors, and cordsets on page 1-111

User Interface

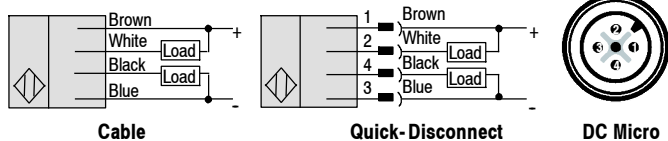


LED Color	State	Status—Teachable and Adjustable Versions	Status—Transmitted Beam Receiver
Yellow	OFF	Output de-energized	
	ON	Output energized	
	Flashing	NA	Output SCP active
Orange	OFF	Normal operation	Margin < 2.5x
	ON	Teach mode active	Margin > 2.5x
Green	Flashing	Output SCP active Teach mode active	NA
	OFF	Sensor not powered	Sensor not powered, output on, or SCP active
	ON	Sensor powered	
	Flashing	Unstable margin condition (0.7x...2.0x) or output SCP active	NA

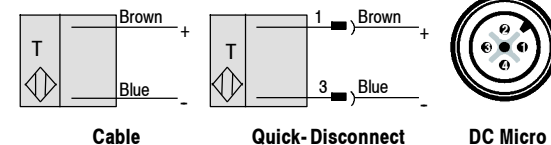
Note: For laser models, output and margin LEDs flash simultaneously when SCP active.

Wiring Diagrams ①②

Output Versions



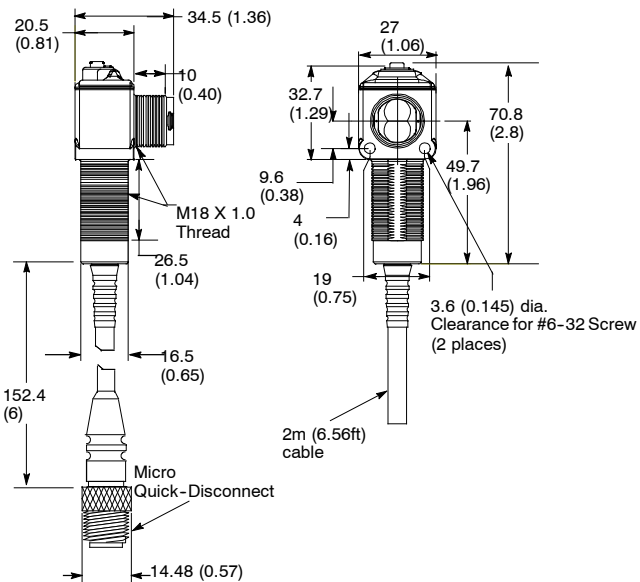
Transmitted Beam Source



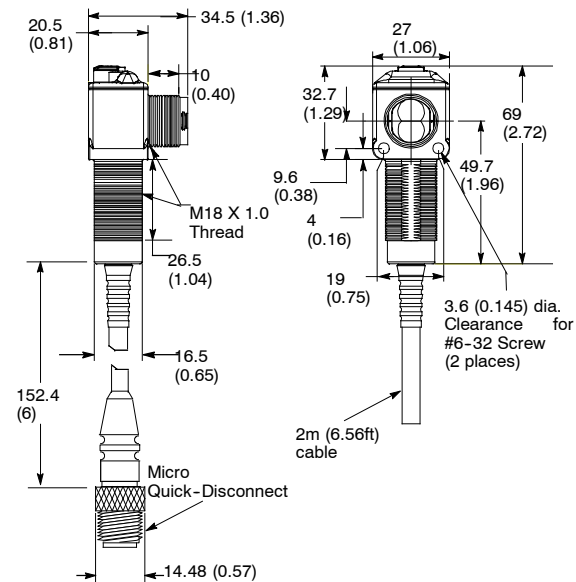
- ① For Rockwell Automation programmable controller compatible interface, refer to publication 42-2.0.
- ② All wire colors on quick-disconnect models refer to Rockwell Automation 889D cordsets.

Approximate Dimensions [mm (in.)]

Teach Function Models



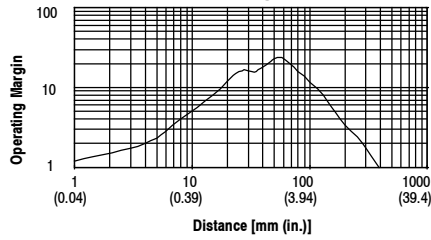
Adjustable Models



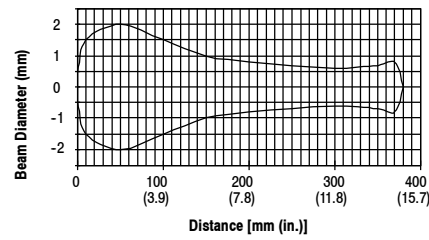
Note: All sensors supplied with one M18 mounting nut (Cat. No. 75012-097-01).

Typical Response Curve

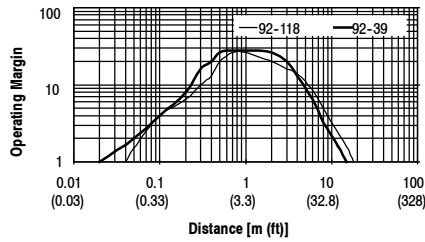
Standard Diffuse—Margin



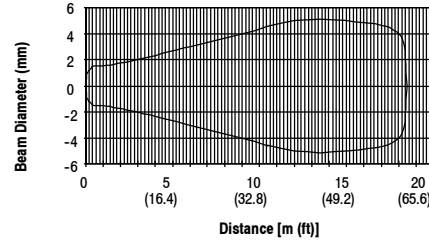
Standard Diffuse—Beam Pattern



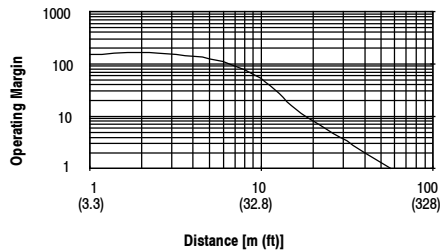
Polarized Retroreflective—Margin



Polarized Retroreflective—Beam Pattern



Transmitted Beam—Margin

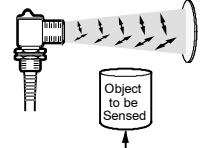
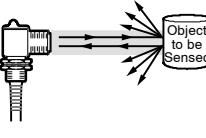
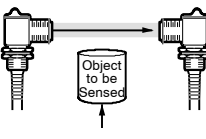


Typical Spot Size

Model	Distance	300 mm	15 m	40 m
Polarized Retroreflective ❶	Spot Size	2 x 3.5	16 x 20 mm	—
Diffuse		2 x 3.5	—	—
Transmitted Beam ❶		2 x 3.5	16 x 20 mm	50 mm x 70 m

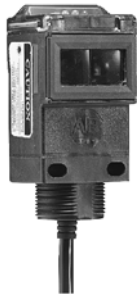
❶ Actual spot size may be smaller.

Product Selection

Sensing Mode	Supply Voltage	Sensing Distance [mm (in.)]	Adjustment Type	Output Energized	Output Type/ Rating/ Response Time	Connection Type	Cat. No.	
 Polarized Retroreflective	24V DC ±10%	0.05...15 m (0.16...49.2 ft)	Teach Button	Dark Operate	NPN and PNP/ 100 mA/ 1 ms max.	2 m 300V cable	42EF-P8KBC-A2	
						4-pin DC micro QD	42EF-P8KBC-F4	
 Standard Diffuse		300 (11.8)	Single-Turn Knob	Light Operate	NPN and PNP/ 100 mA/ 1 ms max.	2 m 300V cable	42EF-D8JBA-A2	
						4-pin DC micro QD	42EF-D8JBA-F4	
 Transmitted Beam		300 (11.8)	Teach Button	Light Operate	NPN and PNP/ 100 mA/ 1 ms max.	2 m 300V cable	42EF-D8JBC-A2	
						4-pin DC micro QD	42EF-D8JBC-F4	
		Light Source	NA	NA	NA	2 m 300V cable	42EF-E8EZB-A2	
						4-pin DC micro QD	42EF-E8EZB-F4	
			0.015...40 m (0.05...131.2 ft)	No Adjustment	Dark Operate	NPN and PNP/ 100 mA/ 4 ms max.	2 m 300V cable	42EF-R7KBB-A2
						4-pin DC micro QD	42EF-R7KBB-F4	

Cordsets and Accessories

Description	Cat. No.
2 m (6.5 ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2
Microcube reflector for polarized retroreflective laser sensors	92-118
Swivel/Tilt bracket allows ±10° vertical and 360° rotation adjustment	60-2649
Right Angle Bracket	60-2677



Features

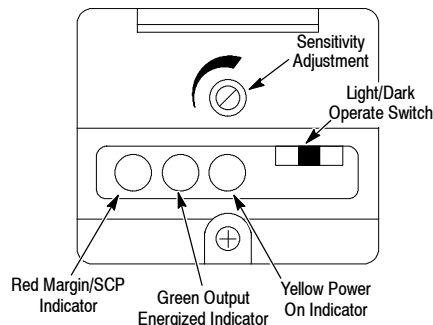
- Class II laser light source
- Long range polarized retroreflective and transmitted beam sensing modes
- Visible red beam for easy alignment
- Robust 30 mm housing
- Both NPN and PNP outputs (DC)
- SPDT relay output (AC)
- Selectable light/dark operate
- Micro, mini QD, 2 m cable connections

Specifications

Environmental	
Certifications	UL Listed, CSA Approved, CE Marked for all applicable directives
Operating Environment	NEMA 3, 4X, 6P, 12, 13; IP67 (IEC529) 1200 psi (8270 kPa) washdown, IP69K
Operating Temperature [C (F)]	-10...+40° (14...+104°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...95%
Ambient Light Immunity	Incandescent light 5000 lux
Optical	
Sensing Modes	Polarized retroreflective and transmitted beam
Sensing Range	See Product Selection table on page 1-114
Field of View	See Product Selection table on page 1-114
Light Source	Class 2 laser
LED Indicators	See User Interface Panel below
Adjustments	Single-turn potentiometer for sensitivity
Electrical	
Voltage	10...30V DC, 110...132V AC models, 10...264 V AC/DC models
Current Consumption	45 mA max (DC models), 10 mA max (AC/DC models), 70 mA max AC models
Sensor Protection	Overload (DC only), short circuit (DC only), reverse polarity, false pulse
Outputs	
Response Time	See Product Selection table on page 1-114
Output Type	PNP and NPN (DC only), EM relay
Output Mode	Light operate or dark operate selectable
Output Current	See Product Selection table on page 1-114
Output Leakage Current	10 µA max
Mechanical	
Housing Material	Valox®
Lens Material	Acrylic
Cover Material	Neoprene
Connection Types	2 m 300V AC cable, 4-pin DC micro QD, 4-pin DC mini QD, 5-pin DC micro QD
Supplied Accessories	129-130 mounting kit
Optional Accessories	See mounting brackets, reflectors, and cordsets on page 1-114

User Interface Panel

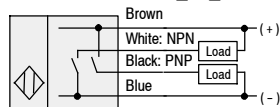
Label	Color	State	Status
Margin/SCP	Red	OFF	Margin < 2.5
		ON	Margin > 2.5
		Flashing	Output SCP active
Output	Green	OFF	Output not activated
		ON	Output activated
Power	Yellow	OFF	Sensor not powered
		ON	Sensor powered



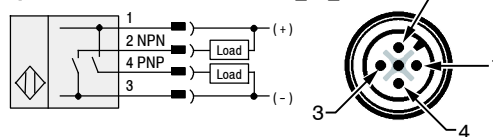
Wiring Diagrams

DC Models

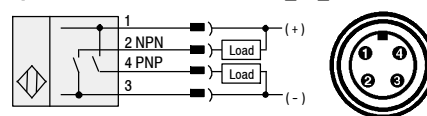
Cable Model: 42GR_-9_L0



4-pin DC Micro QD Model: 42GR_-9_L0-QD

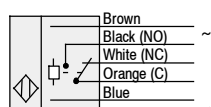


4-pin DC Mini QD Model: 42GR_-9_L0-QD1

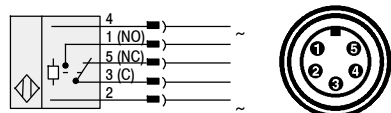


AC Models

Cable Model: 42GR_-9_L2

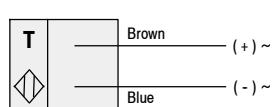


5-pin AC Mini QD Model: 42GR_-9_L2-QD

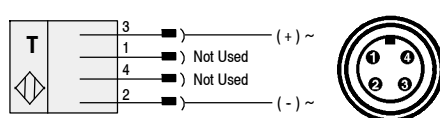


Transmitted Beam Source

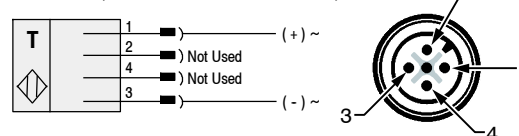
Cable Model: 42GRL-90L0



AC/DC Mini QD Model: 42GRL-90L2-QD

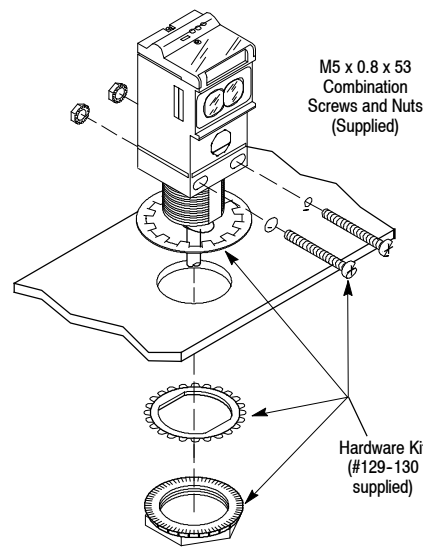
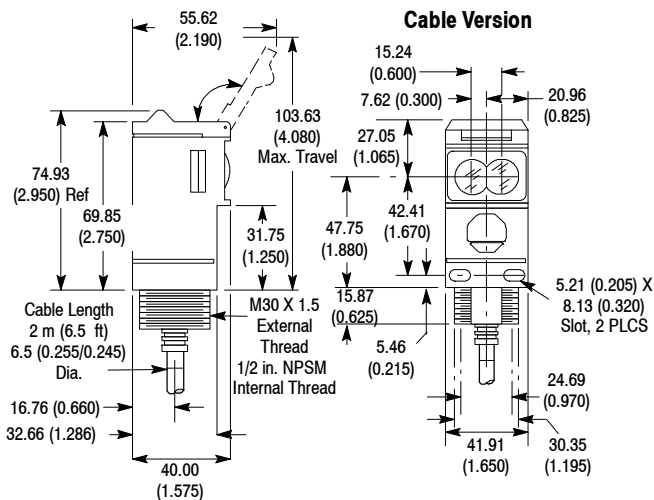


DC Micro QD Model: 42GRL-90L0-QD



Approximate Dimensions [mm (in.)]

All Versions



Connector Version

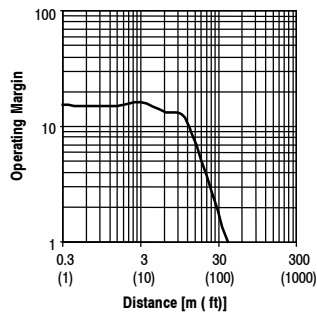


Thread Size

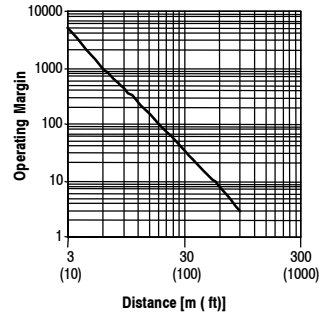
Micro Style	M12 x 1 1 Keyway
Mini Style	7/8-16 UN 1 Keyway

Typical Response Curve

Polarized Retroreflective



Transmitted Beam



Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type/ Capacity Response Time	Connection Type	Cat. No.	
<p><i>Polarized Retroreflective</i></p> <p>Spot Size: 19 mm (3/4 in.) @ 40 m (130 ft) Emitter LED: Visible Laser, 650 nm</p>	10...30V DC 45 mA	0.3...40 m (1...130 ft)	Selectable Light/Dark Operate	PNP/250 mA NPN/250 mA 500 ms	2 m 300V cable	42GRU-92L0	
					4-pin DC micro	42GRU-92L0-QD	
	110...132V AC 70 mA	2 m 300V cable	4-pin DC mini	42GRU-92L0-QD1			
			5-pin mini	42GRU-92L2-QD			
<p><i>Transmitted Beam</i></p> <p>Emitter LED: Visible Laser, 650 nm</p>	10...264V AC/DC 10 mA	300 m (1000 ft)	NA Light Source		2 m 300V cable	42GRL-90L0 ①	
					4-pin micro	42GRL-90L0-QD①	
					4-pin mini	42GRL-90L2-QD①	
	10...40V DC 25 mA	2 m 300V cable	5...300 m (16...1000 ft)	Selectable Light/Dark Operate	PNP/250 mA NPN/250 mA 5 ms max.	4-pin micro	42GRR-90L0-QD
						4-pin mini	42GRR-90L0-QD1
						5-pin mini	42GRR-90L2-QD
70...264V AC/DC 10 mA	2 m 300V cable	SPDT EM Relay 2 A/132V AC 1 A/150V DC 23 ms	4-pin DC mini	42GRR-90L2			
			5-pin mini	42GRR-90L2-QD			

① Temperature rating -10...+40°C for 24V DC operation. Reduce by 5°C for 120V AC and 10°C for 220V AC operation.

Cordsets and Accessories

Description	Cat. No.
1.8 m (6 ft) 4-pin mini QD cordset	889N-F4AF-6F
1.8 m (6 ft) 5-pin mini QD cordset	889N-F5AF-6F
2 m (6.5 ft) 4-pin DC micro QD cordset	889D-F4AC-2
Tilt/Swivel Bracket	60-2439
Microcube reflector	92-118




Specifications

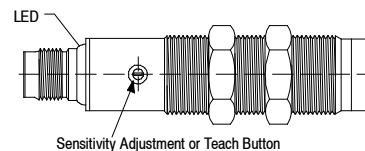
Environmental	
Certifications	cULus and CE Marked for all applicable directives
Operating Environment	IP67
Operating Temperature [C (F)]	-10...+55° (+14...+131°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60068-2-6
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60068-2-27
Relative Humidity	15...95%
Ambient Light Immunity	Incandescent light 5000 lux
Optical	
Sensing Modes	Polarized retroreflective, diffuse, and transmitted beam
Sensing Range	See Product Selection table on page 1-118
Light Source	Class 1 laser 650 nm
LED Indicators	See User Interface Panel below
Adjustments	Sensitivity potentiometer or teach button
Electrical	
Voltage	10...30V DC
Current Consumption	25 mA max
Sensor Protection	Reverse polarity, overload, short circuit
Outputs	
Response Time	0.5 ms (transmitted beam), 0.7 ms (diffuse, polarized retroreflective)
Output Type	PNP or NPN by cat. no.
Output Mode	Complementary light or dark operate
Output Current	100 mA
Output Leakage Current	10 µA max
Mechanical	
Housing Material	Nickel-plated brass
Lens Material	Glass
Connection Types	2 m cable, 4-pin DC micro (M12) QD
Supplied Accessories	18 mm fastening nuts (871C-N3)
Optional Accessories	See mounting brackets, reflectors, and cordsets on page 1-118


Features

- Class 1 laser
- Small spot size—0.1 mm @ 100 mm sensing distance
- Metal housing for heavy duty industrial applications
- 18 mm industry standard package
- Three sensing modes
- 30V DC operation
- NPN or PNP outputs
- Fast response time—less than 0.7 ms
- 2 m cable or micro QD connector

User Interface Panel

LED Color	State	Status	LO Output	DO Output
Yellow	OFF	Dark condition	OFF	ON
	Flashing 	Light condition (excess gain < 2)	ON	OFF
	ON	Light condition (excess gain > 2)	ON	OFF
Green	ON	Power On	—	—



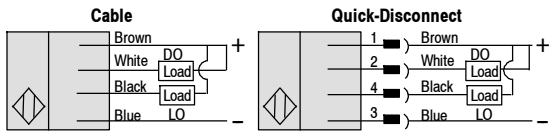
 Transmitted beam receivers do not have a "Flashing" (low margin) state.

PHOTOSWITCH® Photoelectric Sensors
42CM LaserSight™
18 mm Metal Cylindrical, Class 1 Laser Sensor

Wiring Diagrams

Diffuse

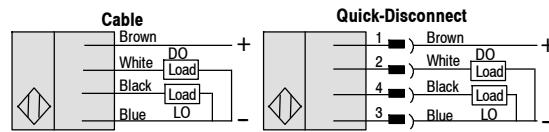
NPN Output



Face View Male Receptacle (Sensor) DC Micro

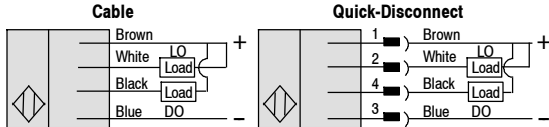


PNP Output

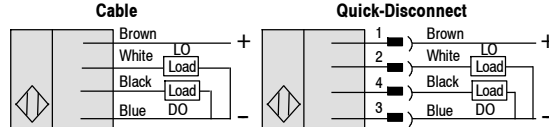


Transmitted Beam, Polarized Retroreflective

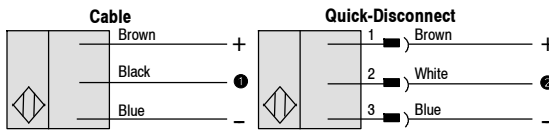
NPN Output



PNP Output



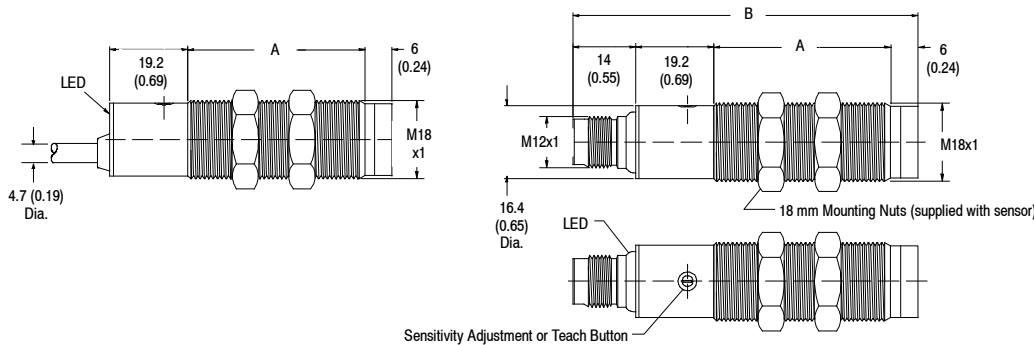
Laser Transmitted Beam Emitter (Standard LED)



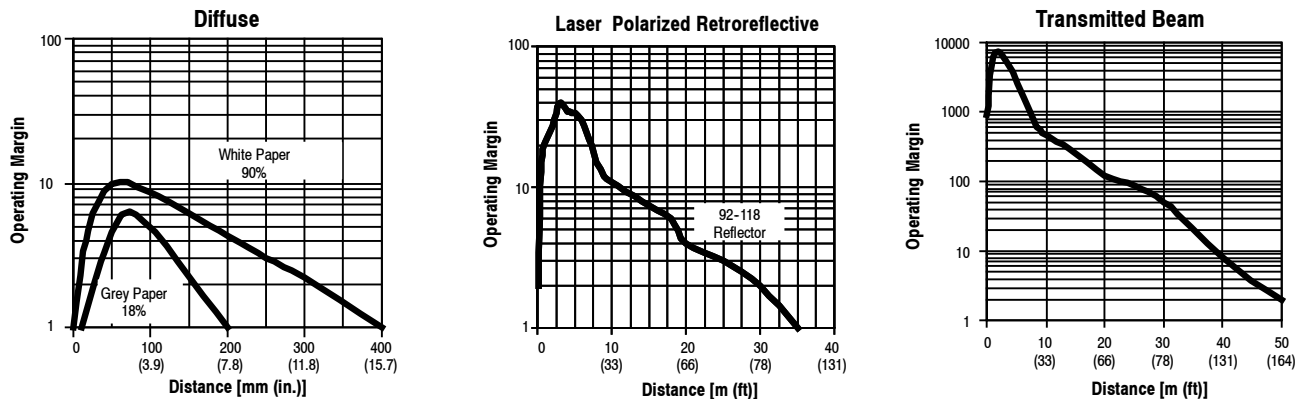
- Black open circuit to enable laser. Tie black to blue/V- to disable laser.
- Pin 2/white open circuit to enable laser. Tie pin 2/white to blue/V- to disable laser.

Approximate Dimensions [mm (in.)]

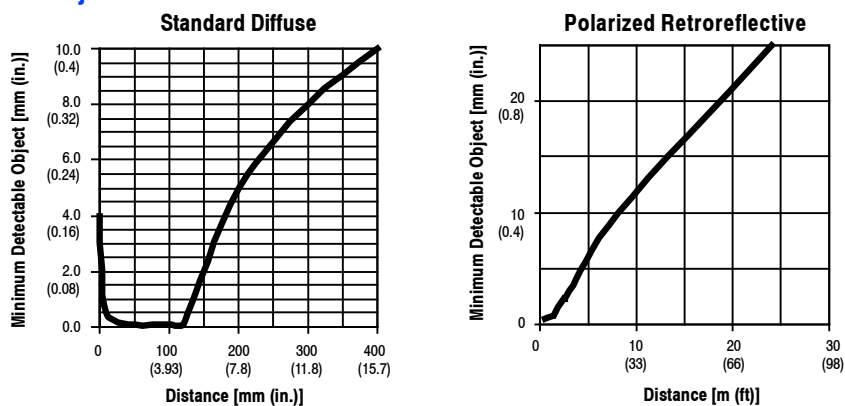
Dimension	Laser Receiver [mm (in.)]	Other Laser Models [mm (in.)]
A	42.7 (1.68)	57.5 (2.26)
B	82.8 (3.26)	97.7 (3.85)



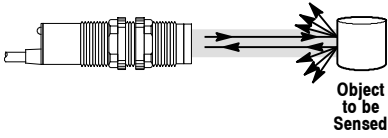
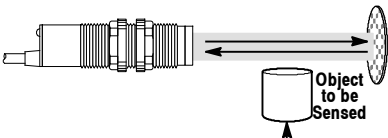
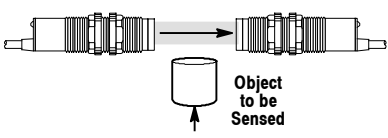
Typical Response Curve



Minimum Detectable Object



Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance @ 2X Margin	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.	
 <p><i>Standard Diffuse</i> Emitter: Class 1—Visible laser 650 nm</p>	10...30V DC 25 mA	3...300 mm (0.12...11.8 in.) (Teachable)	L.O./D.O. Complementary	NPN 100 mA 0.7 ms	2 m 300V cable	42CM-D8MNA-A2	
					4-pin DC micro	42CM-D8MNA-D4	
				PNP 100 mA 0.7 ms	2 m 300V cable	42CM-D8MPA-A2	
					4-pin DC micro	42CM-D8MPA-D4	
 <p><i>Polarized Retroreflective</i> Emitter: Class 1—Visible laser 650 nm</p>	10...30V DC 25 mA	3 mm...30 m (0.12 in...78 ft) (Teachable)	L.O./D.O. Complementary	NPN 100 mA 0.7 ms	2 m 300V cable	42CM-P8MNB-A2	
					4-pin DC micro	42CM-P8MNB-D4	
				PNP 100 mA 0.7 ms	2 m 300V cable	42CM-P8MPB-A2	
					4-pin DC micro	42CM-P8MPB-D4	
 <p><i>Transmitted Beam</i> Emitter: Class 1—Visible laser 650 nm</p>	10...30V DC 25 mA	3 mm...50 m (0.12 in...164 ft) (Adjustable)	L.O./D.O. Complementary	NA Light Source	2 m 300V cable	42CM-E8EZB-A2	
					4-pin DC micro	42CM-E8EZB-D4	
					NPN 100 mA 0.5 ms	2 m 300V cable	42CM-R8MNB-A2
						4-pin DC micro	42CM-R8MNB-D4
					PNP 100 mA 0.5 ms	2 m 300V cable	42CM-R8MPB-A2
						4-pin DC micro	42CM-R8MPB-D4

Cordsets and Accessories

Cordset		Accessories			
Description	Cat. No.	Description	Cat. No.	Description	Cat. No.
DC micro QD cordset, 4-pin, 2 m	889D-F4AC-2	Mounting bracket	60-2657	Micro cube reflector	92-118
18 mm fastening nuts	871C-N3	Swivel/tilt bracket	60-2649		



Description

The 45MLD is a Class 2 laser sensor designed for packaging, material handling and semiconductor industries. Offering a 300 mm (11.8 in.) adjustable sensing range, the 45MLD provides background suppression by triangulation, establishing a fixed focal point and suppressing anything beyond the focal point. The rotatable lens also allows the user to adjust the laser beam spot size at the focal point down to 0.5 mm (0.02 in.) for accurate sensing of small targets such as gap, chip and crack detection in semiconductor and packaging applications. Target presence status is provided through a discrete NPN or PNP output.

Features

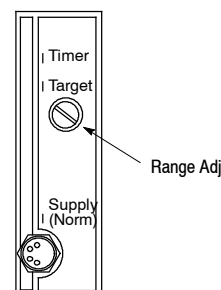
- Class 2 laser
- Fast response time
- Rotatable focus lens allows adjustment of laser spot to 0.5 mm (0.01 in.)
- 50...300 mm (1.96...11.8 in.) sensing distance
- Background suppression
- IP65

Specifications

Environmental	
Certifications	cULus and CE Marked for all applicable directives
Operating Environment	IP65
Operating Temperature [C (F)]	0...+50° (32...+122°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Ambient Light Immunity	Incandescent light 5000 lux
Optical	
Sensing Modes	Laser background suppression
Sensing Range	50...300 mm (1.96...11.8 in.)
Light Source	Class 2 laser
LED Indicators	See User Interface Panel below
Adjustments	Optical spot size adjustment knob, 30-turn range adjustment screw
Electrical	
Voltage	10...30V DC
Current Consumption	35 mA max
Sensor Protection	Overload, short circuit
Outputs	
Response Time	200 μS
Output Type	PNP or NPN selectable
Output Mode	Light or dark operate selectable
Output Current	100 mA @ 30V DC max
Mechanical	
Housing Material	Polyamide
Lens Material	PMMA
Connection Types	4-pin pico (M8) QD
Optional Accessories	See mounting brackets and cordsets on page 1-120

User Interface Panel

Label	Color	State	Status
Target	Green	OFF	No target present
		ON	Target present
Timer	Red	OFF	40 ms pulse OFF
		ON	40 ms pulse ON
Supply (Norm)	Red	ON	Normal wiring Brn = (+), Blu = (-)
		OFF	Reverse wiring Brn = (-), Blue = (+)

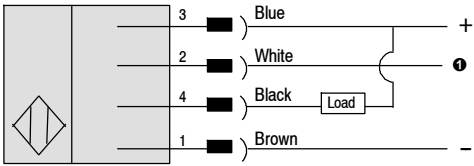


45MLD

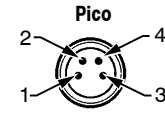
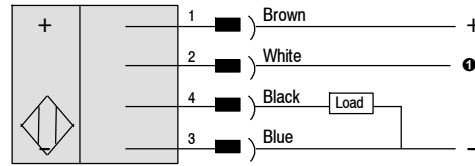
Laser Diffuse Sensor

Wiring Diagrams

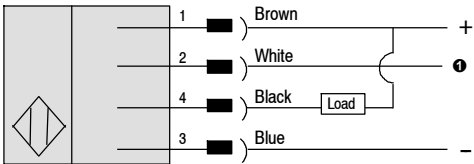
NPN (Light Operate)



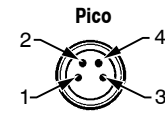
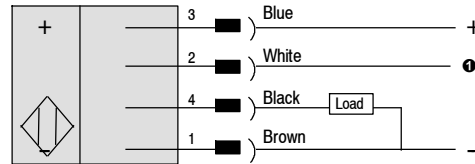
PNP (Light Operate)



NPN (Dark Operate)

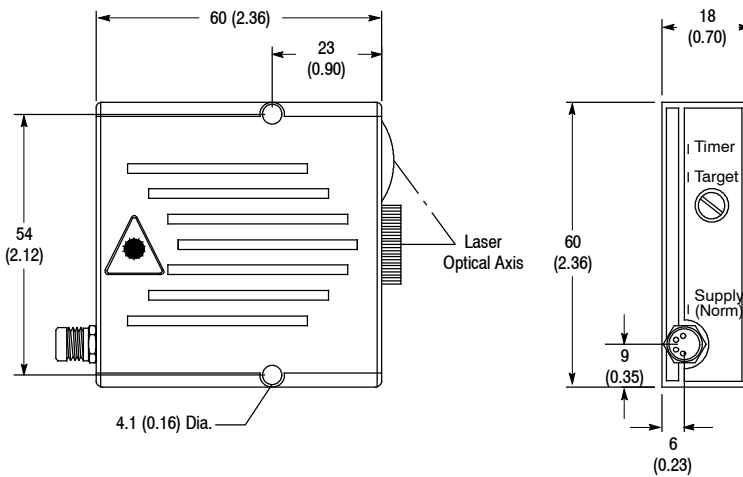


PNP (Dark Operate)



① 40 ms pulse stretcher ON = Connect **white wire** to (+) positive terminal.
 40 ms pulse stretcher OFF = Open circuit or connect **white wire** to (-) negative terminal.

Approximate Dimensions [mm (in.)]



Product Selection

Operating Voltage Supply Current	Sensing Distance [mm (in.)]	Output Energized	Output Type Response Time	Connection Type	Cat. No.
10...30V DC 35 mA	50...300 (1.9...11.8)	L.O./D.O. Selectable	NPN or PNP 200 μs	4-pin DC Pico QD	45MLD-8LEA1-P4

Cordsets and Accessories

Description	Cat. No.
2 m (6.5 ft) 4-pin, DC Pico QD Cordset	889P-F4AB-2
Mounting Bracket	60-2677



Description

The 45CPD sensor is a Class 1 infrared laser sensor that provides long distance sensing with both analog and discrete outputs. It is set up using the Teach-In buttons on the top of the sensor and can be programmed for several modes depending on the application: object detection (single or dual output), object position (analog output), object detection (background suppression), or object detection (reflector mode).

This sensor utilizes the time of flight principle and has a relatively small beam spot for applications typical for this sensing range (up to 6 m). The sensor is completely self contained in an IP67 enclosure and does not require any external control devices which add cost and require additional mounting space.

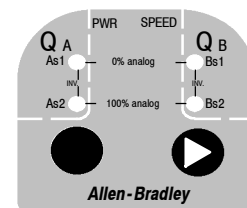
For convenience purposes, the 45CPD utilizes a visible red Class 2 laser for alignment purposes during the set up of the sensor in an application. The Class 2 laser is automatically shut down when the sensor is placed in normal operation and the Class 1 “eye safe” laser is used.

The 45CPD can be easily set up by mounting the sensor such that the target is within the operating range of the sensor, and teaching in the appropriate set points required for the application. The sensor can be set with any combination of one or two discrete PNP outputs and 4...20 mA analog output. The discrete outputs can be set for Light Operate (L.O.) or Dark Operate (D.O.) and the analog output is automatically scaled between the taught set points with either a positive or negative slope.

Specifications

Environmental	
Certifications	cULus and CE Marked for all applicable directives
Operating Environment	IP67
Operating Temperature [C (F)]	-20...+50° (-4...+122°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Optical	
Sensing Range	0.2...6 m (0.7...19.7 ft)
Spot Size	4 x 7 mm @ 2 m (0.16 x 0.28 in. @ 6.5 ft) 4x 12 mm @ 6 m (0.16 x 0.47 in. @19.7 ft)
Linearity Tolerance	±40 mm (1.57 in.)
Repeatability	Fast/slow: ±15/±10 mm (±0.6/±0.4 in.)
Hysteresis	30 mm (1.2 in.) fixed
Temperature Drift	1.3mm/°C
Light Source	Sensing beam: Class 1 laser (905 nm) Alignment beam: Class 2 visible red laser (650 nm)
LED Indicators	See Features on page 1-122
Electrical	
Voltage	18...30V DC
Current Consumption	125 mA max @ 24V DC
Sensor Protection	Overload, short circuit, reverse polarity, false pulse, transient noise
Outputs	
Response Time	Fast/slow: 13 ms/30 ms
Output Type	Discrete: Two PNP outputs, analog output: 4...20 mA current
Output Mode	Light or dark operate for discrete outputs
Output Current	100 mA max for discrete output, 500W max impedance for analog
Mechanical	
Housing Material	Plastic—ABS
Lens Material	PMMA
Connection Types	5-pin DC micro (M12) QD
Supplied Accessories	None
Optional Accessories	See mounting brackets and cordsets on page 1-122

The 45CPD is an excellent solution for long range detection and measurement applications including: distance measurement, verifying material position, stack level, thickness measurement, roll diameter, web winding/unwinding, positioning fixtures, error proofing, inspection, long standoff distance (hot or limited space), level monitoring, and box width measurement.

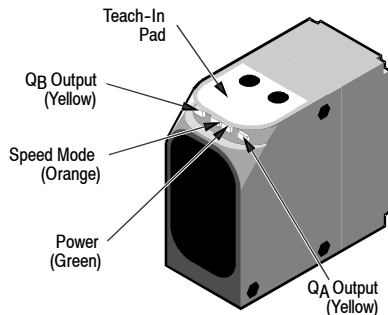


45CPD

Analog and Discrete Output

Features

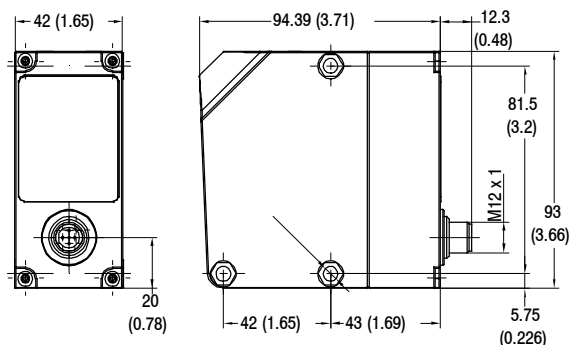
- Eye Safe Class 1 laser for operation
- Visible red Class 2 laser for set-up
- Six meter sensing range
- Two discrete outputs (PNP) and analog output (4...20 mA)
- Easy set-up using teach-in buttons IP67 enclosure
- Self-contained sensor



Product Selection

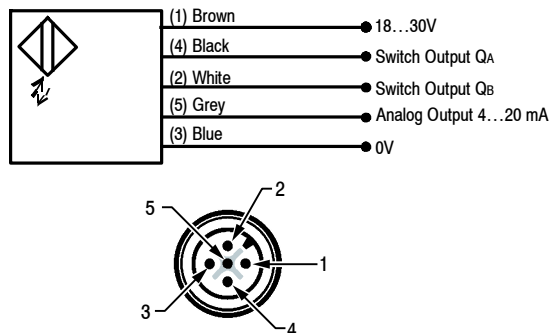
Sensing Range [mm (in.)]	Measuring Range [mm (in.)]	Spot Size	Cat. No.
200...6000 (7.87...236.22)	5800 (228.35)	4 x 7 mm @ 2 m (0.16 x 0.28 in. @ 6.5 ft)	45CPD-8LTB1-D5

Approximate Dimensions [mm (in.)]



Wiring Diagrams

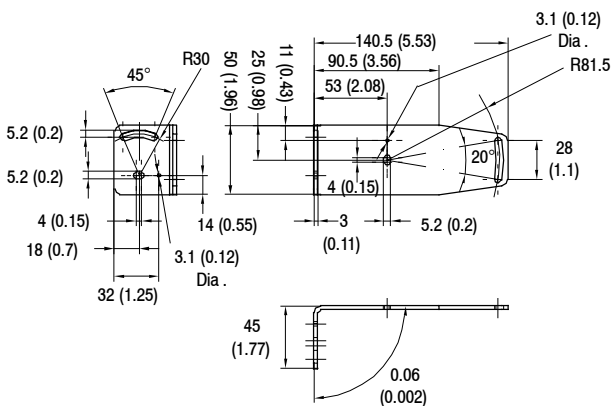
45CPD-8LTB1-D5



Cordsets and Accessories

Description	Cat. No.
2 m (6.5 ft) 5-pin, DC Micro QD Cordset	889D-F5AC-2
Mounting Bracket	45CPD-BKT1

Mounting Bracket 45CPD-BKT1





Description

The 45BPD analog output sensor is a Class 2 visible red laser sensor that provides sensing with both an analog and discrete output. It is set up using the Teach-In buttons and LED indicators on the top of the sensor.

This sensor utilizes the triangulation principle for precise measurement and the visible red beam spot is useful for alignment in small part detection and measurement applications. The sensor is completely self contained in an IP67 enclosure and does not require any external control devices which add cost and require additional mounting space.

The 45BPD can be easily set up by mounting the sensor such that the target is within the operating range of the sensor and teaching in the appropriate set points required for the application. The sensor can be set with both a discrete PNP output and a 4...20 mA analog output. The discrete output can be set for normally open (N.O.) or normally closed (N.C.) operation and the analog output is automatically scaled between the taught set points with either a positive or negative slope.

The 45BPD is an excellent solution for several noncontact measurement applications including: distance measurement, part profiling, thickness measurement, error proofing, inspection, verifying material position, hole depth, warpage, and positioning.

Features

- Noncontact measurement
- Visible red Class 2 laser
- Analog and discrete outputs
- Scalable analog output (4...20 mA)

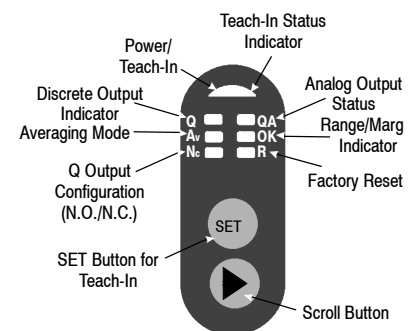
Specifications

Environmental	
Certifications	cULus and CE Marked for all applicable directives
Operating Environment	IP67
Operating Temperature [C (F)]	-10...+45° (14...+140°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Optical	
Sensing Range	See Product Selection table on page 1-124
Linearity	< 0.25 % of measuring range
Resolution	< 0.1% of measuring range
Temperature Drift	< 0.02%/°C
Light Source	Class 2 visible red laser (650 nm)
LED Indicators	See User Interface below
Electrical	
Voltage	18...28V DC
Current Consumption	40 mA max @ 24V DC
Sensor Protection	Overload, short circuit, reverse polarity, false pulse, transient noise
Outputs	
Response Time	Speed mode: 0.4 ms (applicable with synchronously switched laser and target)
Output Type	Discrete: PNP, analog output: 4...20 mA current
Output Mode	Normally open or normally close for discrete output
Output Current	100 mA max for discrete output, 500Ω max impedance for analog
Mechanical	
Housing Material	Plastic — ABS
Lens Material	PMMA
Connection Types	4-pin DC micro (M12) QD, 270° rotatable connector
Supplied Accessories	None
Optional Accessories	See mounting brackets and cordsets on page 1-124

Features (cont.)

- Configurable discrete output (N.O./N.C.)
- IP67 enclosure
- 270° rotatable connector
- Set point adjustment via push buttons
- Self-contained sensor
- Laser-disable control
- Teach-in lock out
- Averaging and speed mode

User Interface



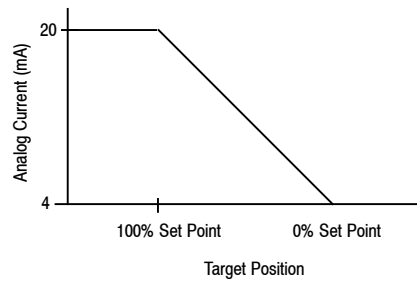
45BPD Laser Sensor

Analog and Discrete Output

Product Selection

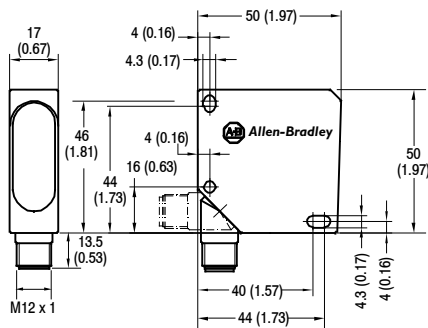
Sensing Range [mm (in.)]	Measuring Range [mm (in.)]	Spot Size	Cat. No.
30...100 (1.18...3.93)	70 (2.75)	1.5 x 3 mm/1.5 x 3.25 mm (0.06 x 0.12 in./0.06 x 0.13)	45BPD-8LTB1-D5
80...300 (3.14...11.8)	220 (8.66)	1.5 x .53 mm/2.0 x 4.5 mm (0.06 x 0.14 in./0.08 x 0.18)	45BPD-8LTB2-D5

Analog Output

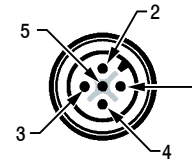


Approximate Dimensions [mm (in.)]

Dimensions are not intended to be used for installation purposes.



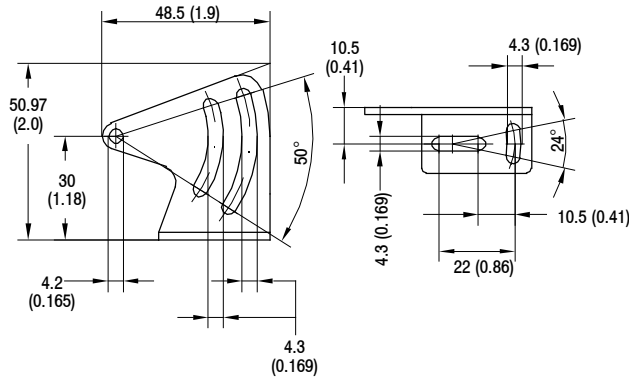
Wiring Diagrams



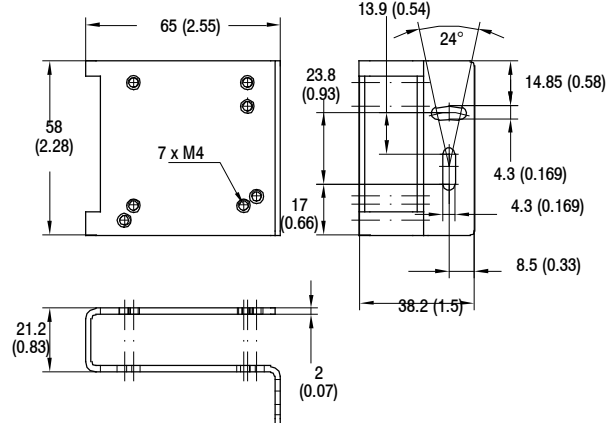
Cordsets and Accessories

Description	Cat. No.	Description	Cat. No.	Description	Cat. No.
2 m (6.5 ft) micro QD cordset	889D-F5AC-2	Mounting brackets	45BPD-BKT1	Protective mounting bracket	45BPD-BKT2

Mounting Bracket 45BPD-BKT1



Protective Mounting Bracket 45BPD-BKT2





Description

The 45BRD analog output sensor is a Class 2 visible red laser sensor that provides exceptional resolution at an economical cost. This sensor utilizes the triangulation principle for precise measurement and has a small beam spot for small part detection and measurement. The sensor is completely self-contained in an IP67 enclosure and does not require any external control devices which add cost and require additional mounting space.

The 45BRD can be easily set up by mounting the sensor such that the target is within the operating range of the sensor. There are no additional adjustments for the sensor and the 0...10V output is scaled linearly over the range of the sensor [45...85 mm (1.77...3.35 in.)].

The 45BRD is an excellent solution for precision noncontact measurement applications including: distance measurement, part profiling, thickness measurement, hole depth, warpage, and positioning.

Features

- Visible red Class 2 laser
- 20 μm resolution
- 40 mm measuring range
- 0...10V DC analog output
- IP67 enclosure
- 270° rotatable connector
- No user adjustments
- Contamination indicator
- Self-contained sensor

Specifications

Environmental	
Certifications	cULus and CE Marked for all applicable directives
Operating Environment	IP67
Operating Temperature [C (F)]	0...+45° (32...+113°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Optical	
Sensing Range	45...85 mm (1.77...3.35 in.)
Spot Size	< 0.8 mm (0.03 in.) beam spot @ 65 mm (2.56 in.)
Measuring Range	40 mm (1.57 in.)
Linearity	< 1 %
Resolution	20 μm
Temperature Drift	18 $\mu\text{m}/^{\circ}\text{C}$
Light Source	Class 2 visible red laser (670 nm)
LED Indicators	Green: power, red : lens contamination
Electrical	
Voltage	18...28V DC
Current Consumption	35 mA max @ 24V DC
Sensor Protection	Overload, short circuit, reverse polarity, false pulse, transient noise
Outputs	
Response Time	30 ms
Output Type	Analog output 0...10V DC
Output Current	3 mA max
Mechanical	
Housing Material	Plastic — ABS
Lens Material	PMMA
Connection Types	4-pin DC micro (M12) QD, 270° rotatable connector
Supplied Accessories	None
Optional Accessories	See mounting brackets and cordsets on page 1-126

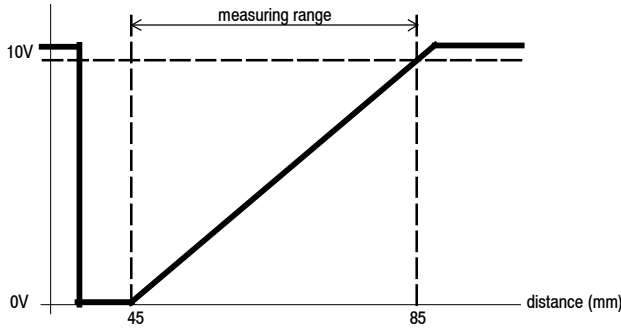
45BRD Laser Sensor

Analog Output

Product Selection

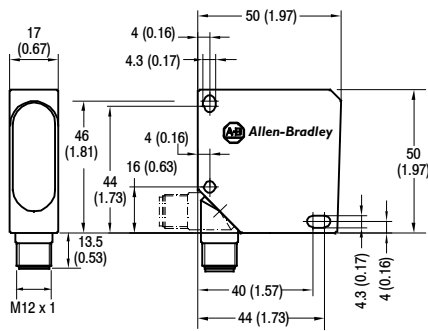
Sensing Range [mm (in.)]	Measuring Range [mm (in.)]	Spot Size	Cat. No.
45...85 (1.77...3.35)	40 (1.57)	<0.8 mm @ 65 mm	45BRD-8JKB1-D4

Analog Output

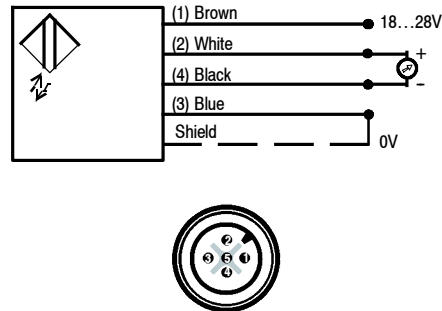


Approximate Dimensions [mm (in.)]

Dimensions are not intended to be used for installation purposes.



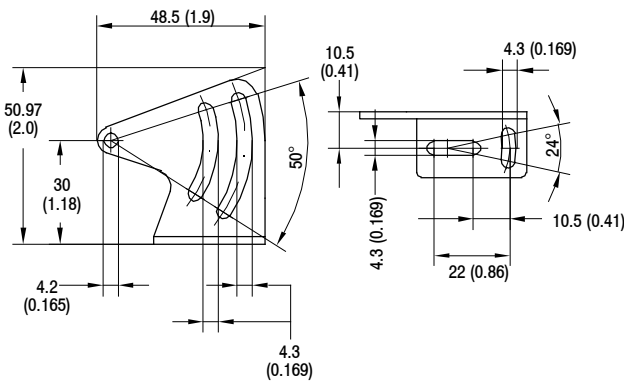
Wiring Diagrams



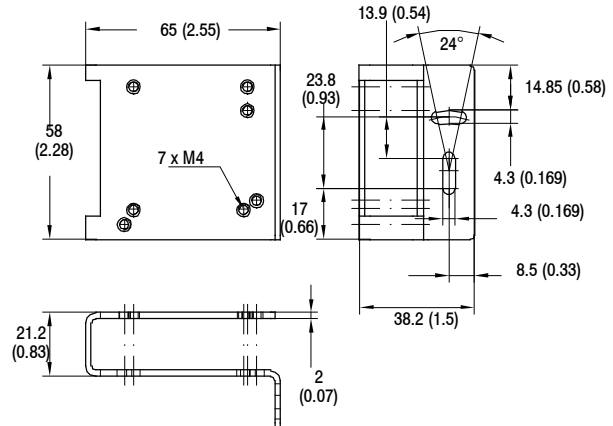
Cordsets and Accessories

Description	Cat. No.	Description	Cat. No.	Description	Cat. No.
2 m (6.5 ft) Micro QD Cordset	889D-F4EC-2	Mounting brackets	45BPD-BKT1	Protective mounting bracket	45BPD-BKT2

Mounting Bracket 45BPD-BKT1



Protective Mounting Bracket 45BPD-BKT2





Specifications

Environmental	
Certifications	UL Listed, CSA Certified, and CE Marked for all applicable directives
Operating Environment	NEMA 3,4,12,13; IP66 (IEC 529)
Operating Temperature [C(F)]	0...+70° (32...+158°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...95%
Optical	
Sensing Modes	Fixed focus color registration
Sensing Range	12.7 mm
Field Depth	± 2 mm
Light Source	Visible red LED (630 nm) or visible green (570 nm) selectable
LED Indicators	See User Interface Panel below
Electrical	
Voltage	10...30V DC
Current Consumption	70 mA max
Sensor Protection	Overload, short circuit, reverse polarity, false pulse
Outputs	
Response Time	250 µs
Output Type	PNP or NPN by cat. no.
Output Mode	Leading edge or trailing edge of a light or dark mark
Output Current	100 mA @ 30V DC
Output Leakage Current	1 µA max
Mechanical	
Housing Material	Anodized and epoxy coated aluminum
Lens Material	Glass
Connection Types	5-pin DC micro (M12) QD
Optional Accessories	See mounting brackets and cordsets on page 1-129

Description

The 42CRC Color Registration Control is a specialized photoelectric sensor designed to detect registration marks by sensing the difference in greyscale response between the mark and background.

The sensor automatically adjusts the sensitivity, compensating for variations in background colors and lens contamination.

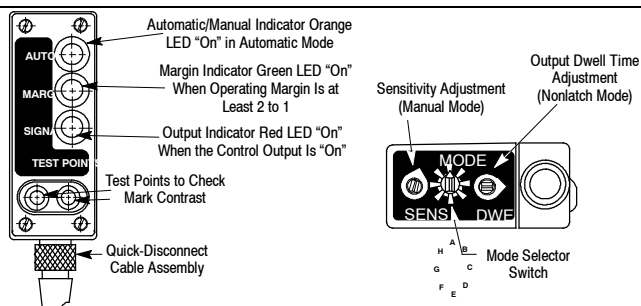
Switch selectable red or green light sources provide capability to sense a wide range of marks and background colors, including difficult pastels.

Features

- Automatic or manual sensitivity adjustment
- Selectable red or green light source
- Selectable lens position
- Fast 250 µs response time
- Separate diagnostic output
- Adjustable pulse-stretcher
- Selectable latching output with reset
- Selectable gated input operation
- Selectable NPN or PNP output
- 5-pin micro QD connection

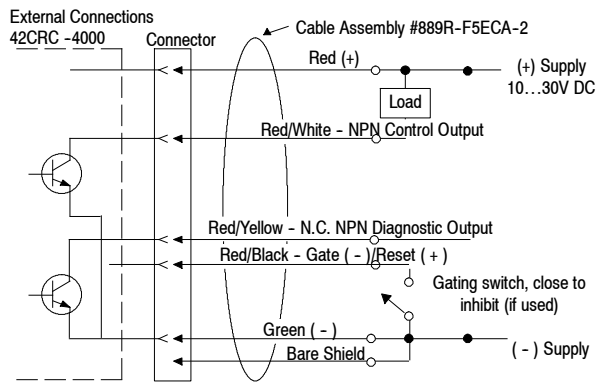
User Interface Panel

Label	Color	State	Status
Margin	Green	OFF	Margin < 2X
		ON	Margin > 2X
Auto	Orange	OFF	Sensor in manual configuration mode
		ON	Sensor in automatic configuration mode
Signal	Red	OFF	Sensor output activated
		ON	Sensor output de-activated

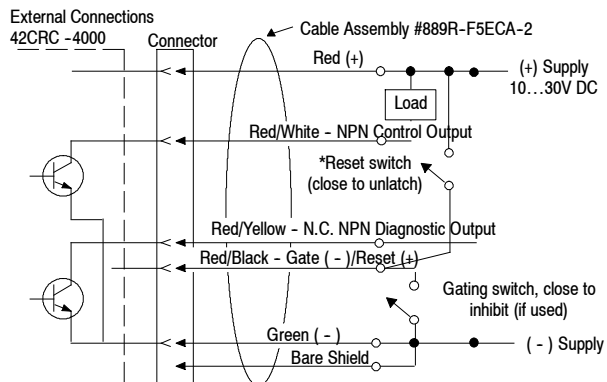


Wiring Diagrams

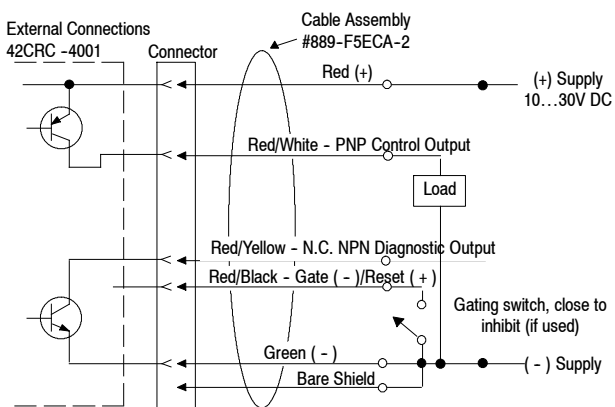
NPN Output 42CRC-4000
Non-Latched Output—Function Switch Positions
“E” Through “H” with or without External Gating



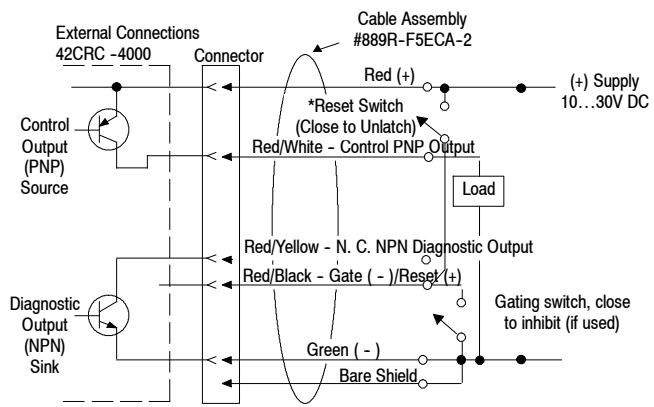
NPN Output 42CRC-4000
Latched Output—Function Switch Positions
“A” Through “D” with or without External Gating



PNP Output 42CRC-4001
Non-Latched Output—Function Switch Positions
“E” Through “H” with or without External Gating



PNP Output 42CRC-4001
Latched Output—Function Switch Positions
“A” Through “D” with or without External Gating

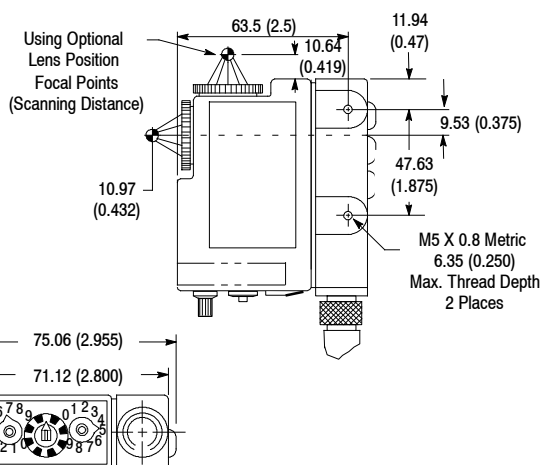
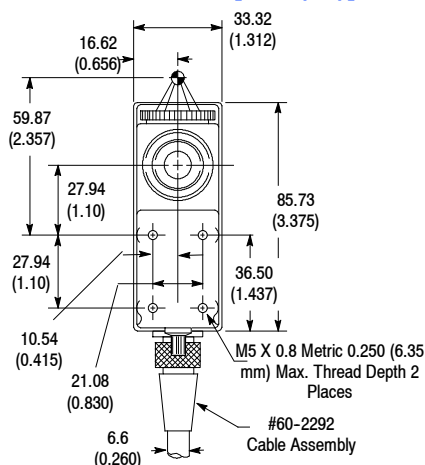


ATTENTION

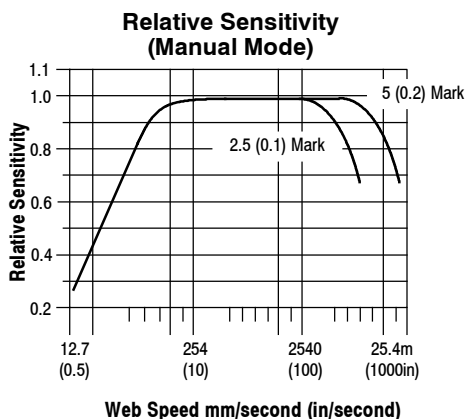
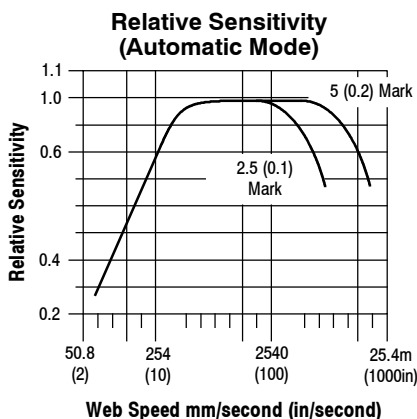


Do not close the reset and gating switches simultaneously.

Approximate Dimensions [mm (in.)]



Typical Response Curve



Product Selection

Sensing Mode	Operating Voltage Supply Current	Output Energized	Output Type Capacity Response Time	Diagnostic Output	Focal Point	Depth of Field	Min Web Velocity	Cat. No.
<p>Emitter LED: Visible red 630 nm or visible green 570 nm (selectable)</p>	10...30V DC 70 mA max	Leading Edge or Trailing Edge of a Light or Dark Mark	NPN 100 mA at 30V DC 250 μs	NPN 30 mA at 30V DC	12.7 mm (0.5 in.)	±2 mm (0.08 in.)	51 mm/sec (2 in./sec)	42CRC-4000
			PNP 100 mA at 30V DC 250 μs					42CRC-4001

Cordsets and Accessories

Description	Cat. No.	Description	Cat. No.	Description	Cat. No.
5-pin AC Micro QD Cordset	889R-F5ECA-2	Lens	61-6312	Cover	61-6333



Description

The ColorSight photoelectric sensor is a true RGB color recognition sensor designed for industrial use. Unlike sensors which measure only greyscale contrast between the target and background, ColorSight provides true color measurement capabilities.

Features

- Fiber optic sensing design
- True RGB color discrimination
- Color only (C) and color plus intensity (C+I) operating modes
- Eight precision settings
- Local and remote self-teach
- Adjustable sampling rates
- Selectable gated input
- Selectable 50 ms pulse stretcher

Specifications

Environmental	
Certifications	cULus and CE Marked for all applicable directives
Operating Environment	Sensor enclosure: NEMA 4 (IP54), optics assembly: IP40
Operating Temperature [C (F)]	0...+55° (32...+131°)
Temperature Drift [C (F)]	±10° (+50°) from learned temperature
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...95%
HF Ambient Light Rejection	7.62 m (25 ft) candles
Incandescent Light Rejection	152.4 m (500 ft) candles
Optical	
Sensing Mode	Fixed focus fiber optic color sensor
Color Discrimination Operating Mode	Color only, color plus intensity (DIP switch selectable)
Color Sampling Operating Mode	Single, average (DIP switch selectable)
Sensing Range	27 mm with 60-2694 fiber optic cable, 114 mm using 60-2738 range extender
Spot Size	5 mm using 60-2694 fiber optic cable nominal
Light Source	Red, green, blue LED
LED Indicators	See User Interface Panel below
Adjustments	8-position rotary switch
Electrical	
Voltage	10...30V DC
Current Consumption	50 mA nominal
Sensor Protection	Overload, short circuit, reverse polarity, false pulse, transient
Outputs	
Response Time	1.3 ms (single mode), 10 ms (C+I average mode) 2.6 ms (single mode), 10 ms (C only average mode)
Output Type	Selectable PNP or NPN
Output Mode	Match or no match selectable
Output Current	100 mA max @ 30V DC
Output Leakage Current	10 µA max
Mechanical	
Housing Material	Valox®
Lens Material	Acrylic
Cover Material	Radel
Connection Types	2 m cable, 5-pin DC micro QD
Supplied Accessories	129-130 mounting kit
Optional Accessories	See mounting brackets, reflectors, and cordsets on page 1-133

User Interface Panel

	Switch	Label	Function	Switch Up	Switch Down
	S1	None	Not used	—	—
	S2	≠ / =	Select target match/no match	Output inactive (no match)	Output active (match) ❶
	S3	TD/0	Enable/disable time delay	50 ms time delay active	No time delay ❶
	S4	CI/C	Select color + intensity mode/color only mode	Color + intensity mode active ❶	Color only mode active
	S5	SG/AV	Select single/average mode	Single sample mode active	Average sample mode active ❶
	S6	GT/LRN	Select gate/remote learn mode	Input functions as gating input	Input functions as remote learn ❶

Indicators

Label	Color	State	Condition
PWR	Green	OFF	Sensor power not present
		Steady	Sensor power present
OUTPUT/LEARN	Yellow	OFF	Output inactive
		Steady	Output active
		Flash	Learn mode activated
FAULT/SCP	Red	OFF	Sensor operating normally ❷
		Steady	Marginal detection of target ❸
		Flash	Output SCP active

- ❶ Factory default
- ❷ LED also OFF when LEARN push button depressed.
- ❸ Includes failure to learn color during LEARN process.

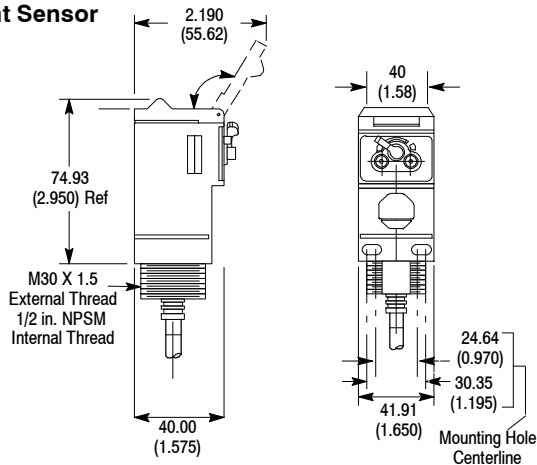
Wiring Diagrams

Designation	Lead Color	Pin Assignment	Cable version wired with PNP outputs		Cable version wired with NPN outputs	
	2 m Cable	5-pin Micro QD				
V+ or V- ❹	Brown	1				
V- or V+ ❹	Blue	3				
Signal output ❺	Black	4				
Fault output ❻	Orange	5				
Learn/Gate input	White	2				

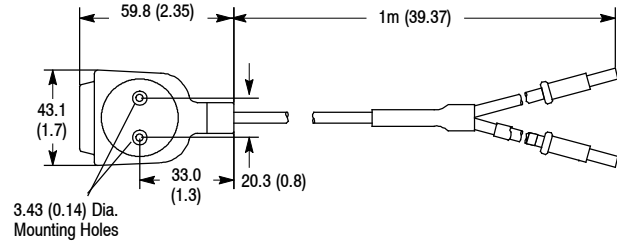
- ❹ Polarity of supply voltage defines sensor output type –i.e. PNP or NPN
- ❺ PNP when brown lead connected to V+ and blue lead connected to V-
NPN when brown lead connected to V- and blue lead connected to V+

Approximate Dimensions [mm (in.)]

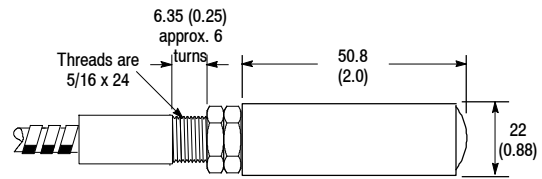
ColorSight Sensor



#60-2694 Fiber Optic Cable

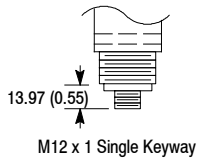


#60-2738 Range Extender
(shown fitted to a 43GR fiber optic cable)

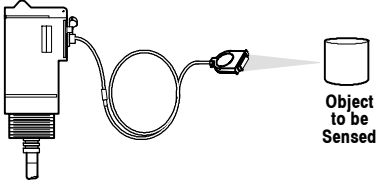


Connector Version

Micro Style



Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type/ Capacity Response Time	Connection Type	Cat. No.
 <p>Spot Size: 5 mm (0.20 in.) with A-B #60-2694 FO cable Emitter LED: Tri-color red, green, blue Indicators: Yellow: Output/Learn Green: Power Red: Fault/SCP</p>	10...30V DC 50 mA	27 mm (1 1/16 in.) with A-B #60-2694 FO cable	Selectable match/no match	PNP or NPN 30V DC @ 100 mA 1.3...10 ms	2 m 300V cable	42QA-G5LE-A2
					5-pin DC micro	42QA-G5LE-D5

Recommended Fiber Optic Cables

Type	Sensing Tip Material	Fiber Diameter [mm (in.)]	Sheathing Material	Nominal Sensing Range [mm (in.)]	Cat. No.
Bifurcated	Brass	3.2 (0.125)	Stainless Steel	10 (0.4) ❶	43GR-TBB25SL
			PVC		43GR-TBB25ML
	Plastic (Lensed)			27 (1.06)	60-2694

❶ Sensing distance may be increased between approximately 38 mm (1.5 in.) and 114 mm (4.5 in.) when used with 60-2738 range extender.

Cordsets and Accessories

Description	Cat. No.
2 m (6.5 ft) 5-pin Micro QD Cordset	889D-F5AC-2
Tilt/Swivel Bracket	60-2439
Lensed Fiber Optic Cable	60-2694
Range Extender	60-2738
Universal Mounting Assembly (for #60-2694 fiber optic cable)	60-2008



Description

The 45CLR ColorSight is a self-contained color detection sensor with three output channels, allowing for the concurrent sensing of three different colors. The colors to be sensed are taught quickly and easily with the touch of a button on the sensor or through remote teach.

Models are also available with RS-485 communications with the capability of matching up to five colors and communicate true RGB values for remote processing of additional colors.

The 45CLR ColorSight can be set up to detect:

- A single color per channel with adjustable tolerance
- Scan an area of various colors on the same surface
- Detect multiple individual colors per channel

This sensor offers a wide sensing range tolerance for reliable sensing when target distance varies from the taught settings.

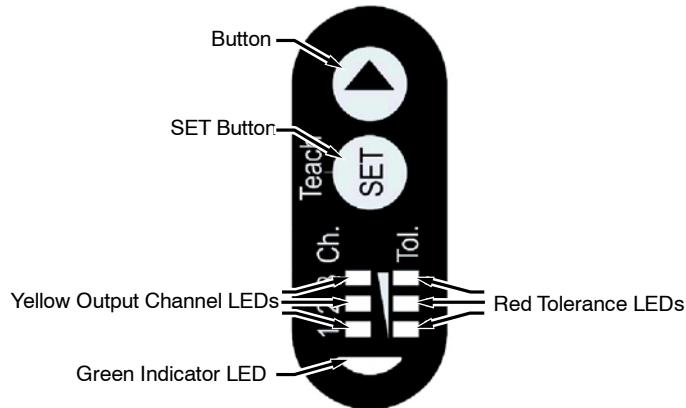
Features

- Wide sensing range tolerance
- Three channel color matching (3 outputs)
- Gating input (also known as inhibiting input)
- Adjustable tolerance for high precision to general color matching
- Pulse stretching capability (50 ms off delay)
- Teach colors via push buttons
- External teach capability (1 output)
- Teach button lockout
- 270° rotatable connector
- Compact size IP67 enclosure

Specifications

Environmental	
Certifications	cULus and CE Marked for all applicable directives
Operating Environment	IP67
Operating Temperature [C(F)]	-10...+55° (14...+131°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Optical	
Sensing Mode	True color (diffuse)
Sensing Range	See Product Selection table on page 1-135
Light Source	White LED
LED Indicators	See User Interface below
Adjustments	Push buttons
Electrical	
Voltage	18...28V DC
Current Consumption	40 mA max @ 24V DC
Sensor Protection	Overload, short circuit, reverse polarity, false pulse, transient noise
Outputs	
Response Time	1 ms on each channel, 2 ms for channel 3 in remote teach
Output Type	Discrete: 3 PNP outputs RS485 models: 1 PNP or 1 NPN output by cat. no.
Output Mode	Light operate
Output Current	100 mA @ 30V DC max
Output Leakage Current	0.1 mA max
Mechanical	
Housing Material	ABS
Lens Material	PMMA
Connection Types	8-pin DC micro (M12) QD
Supplied Accessories	None
Optional Accessories	See mounting brackets and cordsets on page 1-136

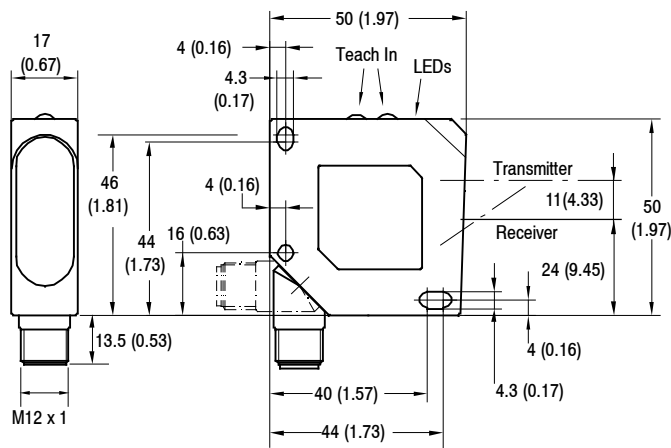
User Interface



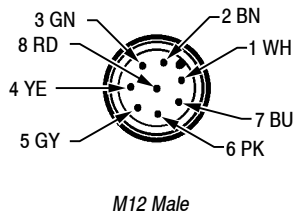
Product Selection

Sensing Range [mm (in.)]	Sensing Range Tolerance	Spot Size [mm (in.)]	Output Type	Cat. No.
12...32 (0.47...1.26)	±6 mm (0.24 in.)	4 (0.16) @ 22 (0.86)	3 PNP	45CLR-5JPC1-D8
15...30 (0.59...1.18)	±5 mm (0.20 in.)	2 x 2 (0.07 x 0.07) @ 22 (0.86)	3 PNP	45CLR-5JPC2-D8
18...22 (0.70...0.86)	±2 mm (0.08 in.)	5 x 1 (0.19) @ 22 (0.86)	3 PNP	45CLR-5JPC3-D8
12...32 (0.47...1.26)	±6 mm (0.24 in.)	4 (0.16) @ 22 (0.86)	RS-485, 1 PNP	45CLR-5LPS1-D8
12...32 (0.47...1.26)	±6 mm (0.24 in.)	4 (0.16) @ 22 (0.86)	RS-485, 1 NPN	45CLR-5LNS1-D8
15...30 (0.59...1.18)	±5 mm (0.20 in.)	2 x 2 (0.07 x 0.07) @ 22 (0.86)	RS-485, 1 PNP	45CLR-5LPS2-D8
15...30 (0.59...1.18)	±5 mm (0.20 in.)	2 x 2 (0.07 x 0.07) @ 22 (0.86)	RS-485, 1 NPN	45CLR-5LNS2-D8
18...22 (0.70...0.86)	±2 mm (0.08 in.)	5 x 1 (0.19) @ 22 (0.86)	RS-485, 1 PNP	45CLR-5LPS3-D8
18...22 (0.70...0.86)	±2 mm (0.08 in.)	5 x 1 (0.19) @ 22 (0.86)	RS-485, 1 NPN	45CLR-5LNS3-D8

Approximate Dimensions [mm (in.)]

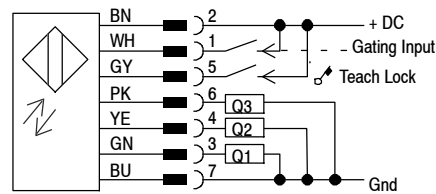


Pinout and Color Codes

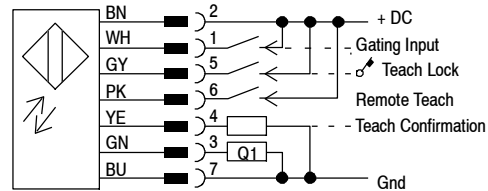


Pin	Color	Connection
1	White	Gate Input
2	Brown	V+ 12...28V DC
3	Green	OUT 1
4	Yellow	OUT 2/Teach Confirmation
5	Grey	Teach Button Lock
6	Pink	OUT 3/Remote Teach
7	Blue	V- 0V DC
8	Red	Not Connected

Wiring Diagrams

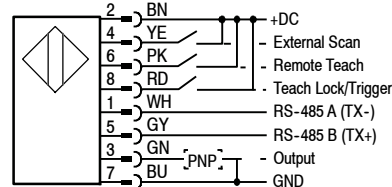


Remote Teach



The control input (pin 5) can be used to lock the ColorSight push buttons by connecting it to the +DC (18...28V DC). When working with the sensor in remote teach, we recommend the use of push button lockout to prevent accidental tampering of the configuration.

RS-485 Models



Note: For NPN output models one terminal of the load should be connected to Pin 3 (output) and the other terminal of the load should be connected to +DC.

ATTENTION



Pin 1 and pin 5 are the RS 485 interface connections and must not be connected to the power supply. This can permanently damage the sensor.

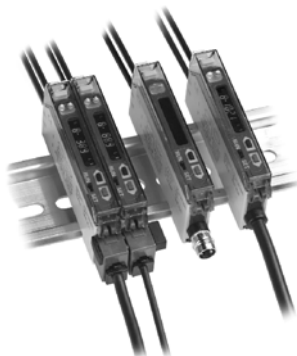
Cordsets and Accessories

Description	Cat. No.
DC Micro Style QD Cordset, 8-Pin	889D-F8AB-2
Mounting Bracket	45BPD-BKT1
Mounting Bracket	45BPD-BKT2
Communications Cable (RS-485) for MicroLogix	1763-NC01

PHOTOSWITCH® Photoelectric Sensors

45FVL Visible Red, Blue, Green or White Plastic Fiber Optic

Self-Teach with Digital Display



Features

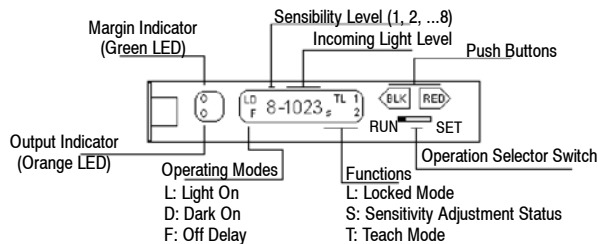
- Choose from, red, green, blue, white light source
- Self-teach capability
- Manual or automatic sensitivity adjustment
- Back-lit LCD display
- Selectable 40 ms off delay output timer
- DIN Rail mountable
- "Power-Bus" option
- Dual channel interference protection
- Reverse polarity, false pulse and transient noise protection (500V)

Specifications

Environmental	
Certifications	CE Marked for all applicable directives
Operating Environment	NEMA 1; IP40
Operating Temperature [C (F)]	-25...+55° (-13...+131°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	50 g, 3 directions, 3 times
Relative Humidity	35...85%
Ambient Light Immunity	Incandescent light 10,000 lux max
Optical	
Sensing Mode	Diffuse or transmitted beam depends on fiber optic cable selected
Light Source	Red LED (660 nm), green LED (525 nm), blue LED (470 nm), white LED
LED Indicators	See User Interface Panel below
Adjustments	Push buttons
Electrical	
Voltage	12...24V DC
Current Consumption	50 mA max
Sensor Protection	Overload, short circuit, reverse polarity, false pulse
Outputs	
Response Time	Channel 1 = 600 μs, channel 2 = 700 μs
Output Type	PNP or NPN by cat. no.
Output Mode	Light or dark operate selectable
Output Current	100 mA max @ 30V DC max
Output Leakage Current	0.5 mA max
Mechanical	
Housing Material	ABS resin
Connection Types	4-pin DC pico (M8) QD, power bus cables
Supplied Accessories	60-2638 mounting assembly
Optional Accessories	See mounting bracket and cordsets on page 1-138

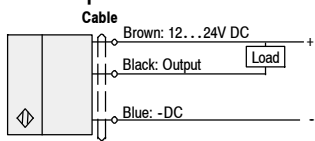
User Interface Panel

LED	State	Condition
Green	OFF	Unstable light signal
	ON	Stable light signal
Orange	OFF	Output OFF
	ON	Output ON

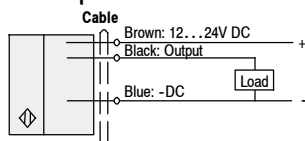


Wiring Diagrams

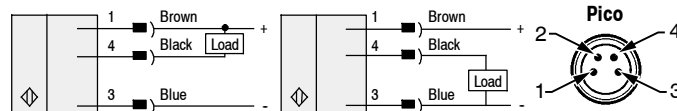
Cable NPN Output



Cable PNP Output



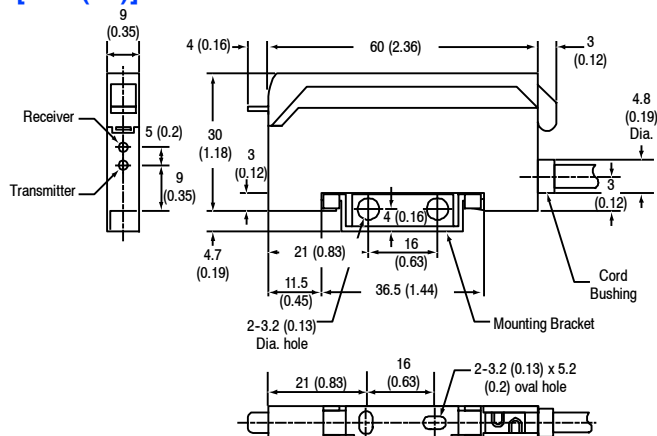
Quick-Disconnect



45FVL Visible Red, Blue, Green or White Plastic Fiber Optic

Self-Teach with Digital Display

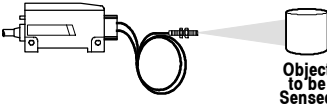
Approximate Dimensions [mm (in.)]



Typical Plastic Fiber Optic Cable Selection

LED	Sensing Mode	Plastic Fiber Diameter [mm (in.)]	Typical Fiber Model	Typical Range
Red	Diffuse (Bifurcated Fiber)	1 (0.040)	43PR-NES57ZS	Refer to the Fiber Optic section on page 1-231.
		0.5 (0.020)	43PR-NJS53ZM	
	Transmitted Beam (Individual Fiber)	1 (0.040)	43PT-NJS56FS	
		0.5 (0.020)	43PT-NBS52FM	
Green	Diffuse (Bifurcated Fiber)	1 (0.040)	43PR-NES57ZS	
	Transmitted Beam (Individual Fiber)		43PT-NJS56FS	
Blue	Diffuse (Bifurcated Fiber)		43PR-NES57ZS	
	Transmitted Beam (Individual Fiber)		43PT-NJS56FS	
White	Diffuse (Bifurcated Fiber)		43PR-NES57ZS	
	Transmitted Beam (Individual Fiber)		43PT-NJS56FS	

Product Selection

Sensing Mode	Operating Voltage	Response Time	Output Characteristics		LED	Cat. No.		
			Type	Max Load Current		Cable	Pico	Power Bus (QD required)
 <p>Field of View: Refer to Plastic Fiber Optic section page 1-270</p> <p>Emitter LED: Visible red 660 nm, Visible green 565 nm or Visible blue 470 nm, Visible white</p> <p>Indicators: Orange: Output, Green: Stability</p>	12...24V DC ±10%	600 μs	PNP	Output: 100 ma	Red	45FVL-2LHE-A2	45FVL-2LHE-P4	45FVL-2LHE-C4 ①
					Green	45FVL-3LHE-A2	45FVL-3LHE-P4	45FVL-3LHE-C4 ①
					Blue	45FVL-6LHE-A2	45FVL-6LHE-P4	45FVL-6LHE-C4 ①
					White	45FVL-5LHE-A2	45FVL-5LHE-P4	45FVL-5LHE-C4 ①
					Red	45FVL-2LGE-A2	45FVL-2LGE-P4	45FVL-2LGE-C4 ①
			Green		45FVL-3LGE-A2	45FVL-3LGE-P4	45FVL-3LGE-C4 ①	
			Blue		45FVL-6LGE-A2	45FVL-6LGE-P4	45FVL-6LGE-C4 ①	
			White		45FVL-5LGE-A2	45FVL-5LGE-P4	45FVL-5LGE-C4 ①	

① PowerBus master/3 conductor QD = 45F-A3C-A2. PowerBus slave/1 conductor QD = 45F-A1C-A2

Cordsets and Accessories

Description	Cat./Page No.	Description	Cat./Page No.
Pico QD Cordset, Straight, 4-pin, 2 m	889P-F4AB-2	PowerBus master/3 conductor QD	45F-A3C-A2
Fiber Optic Cables	1-231	PowerBus slave/1 conductor QD	45F-A1C-A2
Fiber Optic Adaptor Replacements		PowerBus caps	
1.25...2.2 mm O.D.	61-6731	Male	45F-AMC
1.00...2.2 mm O.D.	61-6742	Female	45F-AFC
Mounting Assembly	60-2638		

PHOTOSWITCH® Photoelectric Sensors

45FSL Visible Red or White Plastic Fiber Optic

General Purpose DIN Style



Features

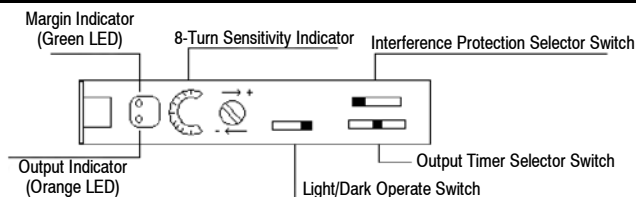
- Choose from red or white light source
- Dual LED indicators
- Manual sensitivity adjustment
- Selectable 40 ms on/off delay output timer
- DIN Rail mountable
- “Power-Bus” option
- A 4/8 sensor cross-talk protection
- Reverse polarity, false pulse and transient noise protection (500V)

Specifications

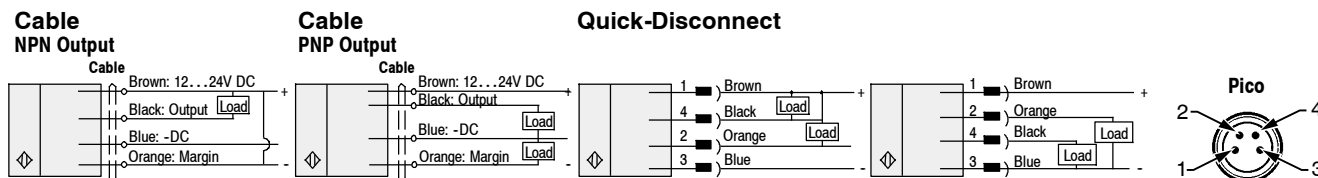
Environmental	
Certifications	CE Marked for all applicable directives
Operating Environment	NEMA 1; IP40
Operating Temperature [C (F)]	-25...+55° (-13...+131°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	10 g , 3 directions, 3 times
Relative Humidity	35...85%
Ambient Light Immunity	Incandescent light 10,000 lux max
Optical	
Sensing Mode	Diffuse or transmitted beam depends on fiber optic cable selected
Light Source	Visible red LED (660 nm), visible white LED
LED Indicators	See User Interface Panel below
Adjustments	8-turn sensitivity potentiometer
Electrical	
Voltage	12...24V DC
Current Consumption	40 mA max
Sensor Protection	Overload, short circuit, reverse polarity, false pulse
Outputs	
Response Time	30 μs, 250 μs, 500 μs
Output Type	PNP or NPN by cat. no.
Output Mode	Light or dark operate selectable
Output Current	100 mA max @ 30V DC max 50 mA stability output @ 30V DC max
Output Leakage Current	0.5 mA max
Mechanical	
Housing Material	ABS resin
Connection Types	2 m conductor cable (24 AWG), 4-pin DC pico QD, power bus cables
Supplied Accessories	60-2638 mounting assembly
Optional Accessories	See mounting bracket and cordsets on page 1-140

User Interface Panel

LED	State	Condition
Green	OFF	Unstable light signal Stable light signal
	ON	
Orange	OFF	Output OFF Output ON
	ON	



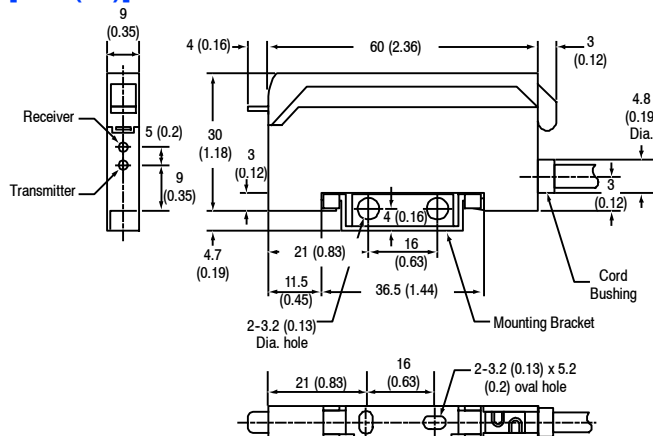
Wiring Diagrams



Note: Details regarding connection of Rockwell Automation 45FSL photoelectric sensors to Rockwell Automation Programmable Controllers can be found in “PHOTOSWITCH® Photoelectric Sensors and Programmable Controller Interface Manual” on www.ab.com/literature.

PHOTOSWITCH® Photoelectric Sensors
45FSL Visible Red or White Plastic Fiber Optic
General Purpose DIN Style

Approximate Dimensions [mm (in.)]



Typical Plastic Fiber Optic Cable Selection

LED	Sensing Mode	Plastic Fiber Diameter [mm (in.)]	Typical Fiber Model	Typical Range
Red	Diffuse (Bifurcated Fiber)	1 (0.040)	43PR-NES57ZS	Refer to the Fiber Optic section on page 1-231.
		0.5 (0.020)	43PR-NJS53ZM	
	Transmitted Beam (Individual Fiber)	1 (0.040)	43PT-NJS56FS	
		0.5 (0.020)	43PT-NBS52FM	
White	Diffuse (Bifurcated Fiber)	1 (0.040)	43PR-NES57ZS	
	Transmitted Beam (Individual Fiber)		43PT-NJS56FS	

Product Selection

Sensing Mode	Operating Voltage	Response Time	Output Characteristics		LED	Cat. No.		
			Type	Max Load Current		Cable	Pico	Power Bus (QD required)
<p>Field of View: Refer to Plastic Fiber Optic section page 1-270</p> <p>Emitter LED: Visible red 660 nm, Visible white</p> <p>Indicators: Orange: Output, Green: Stability</p>	12...24V DC ±10%	Selectable 250 μs or 500 μs	PNP	Output: 100 ma Stability: 50 ma	Red	45FSL-2LHE-A2	45FSL-2LHE-P4	45FSL-2LHE-C4 Ⓢ
					White	45FSL-5LHE-A2	45FSL-5LHE-P4	45FSL-5LHE-C4 Ⓢ
			Red		45FSL-2LGE-A2	45FSL-2LGE-P4	45FSL-2LGE-C4 Ⓢ	
			White		45FSL-5LGE-A2	45FSL-5LGE-P4	45FSL-5LGE-C4 Ⓢ	
		Red	45FSL-2LWE-A2		45FSL-2LWE-P4	45FSL-2LWE-C4 Ⓢ		
		White	45FSL-5LWE-A2		45FSL-5LWE-P4	45FSL-5LWE-C4 Ⓢ		
		Red	45FSL-2LVE-A2		45FSL-2LVE-P4	45FSL-2LVE-C4 Ⓢ		
		White	45FSL-5LVE-A2		45FSL-5LVE-P4	45FSL-5LVE-C4 Ⓢ		
		Red	45FSL-2LHE-A2	45FSL-2LHE-P4	45FSL-2LHE-C4 Ⓢ			
		White	45FSL-5LHE-A2	45FSL-5LHE-P4	45FSL-5LHE-C4 Ⓢ			

Ⓢ PowerBus master/4 conductor QD = 45F-A4C-A2
 PowerBus slave/2 conductor QD = 45F-A2C-A2

Cordsets and Accessories

Description	Cat./Page No.	Description	Cat./Page No.
Pico QD Cordset, Straight, 4-pin, 2 m	889P-F4AB-2	PowerBus master/4 conductor QD	45F-A4C-A2
Fiber Optic Cables	1-231	PowerBus slave/2 conductor QD	45F-A2C-A2
Fiber Optic Adaptor Replacements 1.25...2.2 mm O.D. 1.00...2.2 mm O.D.	61-6731 61-6742	PowerBus caps Male Female	45F-AMC 45F-AFC
Mounting Assembly	60-2638		



Description

The 42FT is a compact, DIN Rail mount fiber optic photoelectric sensor with sophisticated part detection, diagnostic, and self-teach capabilities.

Five LED indicators provide diagnostic and alignment information. A dynamic diagnostic output signals when margin levels are below a predetermined threshold for seven successive detections.

The self-teach capability allows the Bulletin 42FT to determine an optimum sensitivity and hysteresis setting for a specific application. The remote lockout feature can be used to help prevent unauthorized changes to these adjustments. A switch selectable 50 ms off-delay (“pulse stretcher”) is useful in high speed applications where the output pulse must be lengthened to allow time for the machine logic to respond.

Features

- Choose from red or green light source
- Local and remote self-teach operation
- Supports 1.5 mm and 1.25 mm plastic fiber optic cables
- Fast 500 μs response time
- Selectable pulse-stretcher
- Selectable hysteresis
- Selectable light/dark operate
- Dual “RUN” modes to prevent crosstalk with other sensors
- Both NPN and PNP outputs

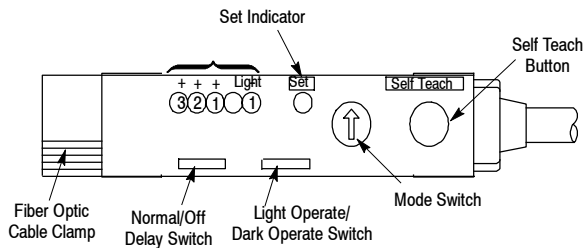
Specifications

Environmental	
Certifications	UL Listed, CSA Certified, and CE Marked for all applicable directives
Operating Environment	NEMA 1, 4X, 12, 13; IP66 (IEC 529)
Operating Temperature [C (F)]	-25...+55° (-13...+131°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...85%
Optical	
Sensing Mode	Fiber optic
Light Source	Red or green
LED Indicators	See User Interface Panel on page 1-142
Adjustments	Local teach and remote self teach
Electrical	
Voltage	12...24V DC
Current Consumption	60 mA max
Sensor Protection	Overload, short circuit, reverse polarity, false pulse
Outputs	
Response Time	500 μs
Output Type	PNP or NPN by cat. no.
Output Mode	Light or dark operate selectable
Output Current	100 mA max @ 24V DC max
Mechanical	
Housing Material	ABS resin
Connection Types	2 m conductor cable
Supplied Accessories	60-2638 mounting assembly, fiber optic adaptor
Optional Accessories	See mounting bracket and cordsets on page 1-143

PHOTOSWITCH® Photoelectric Sensors
42FT Visible Red or Green Plastic Fiber Optic
Self-Teach

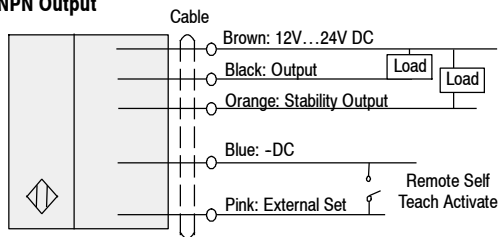
User Interface Panel

Label	Color	State	Status
Set	Green	OFF	Sensor not powered
		ON	Sensor powered, configuration verified
		Flashing	Self-teach mode active
-1... +3		ON	0.8X...1.6X margin
Light	Red	OFF	1X margin, output not activated
		ON	1X margin, output activated

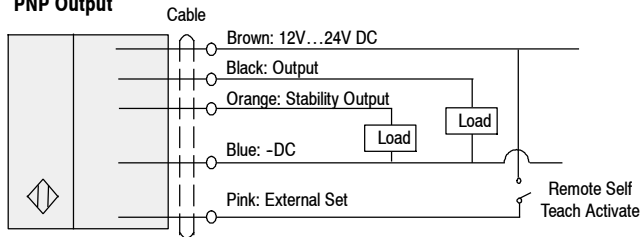


Wiring Diagrams

Cable NPN Output



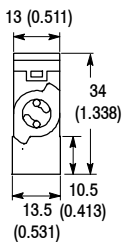
PNP Output



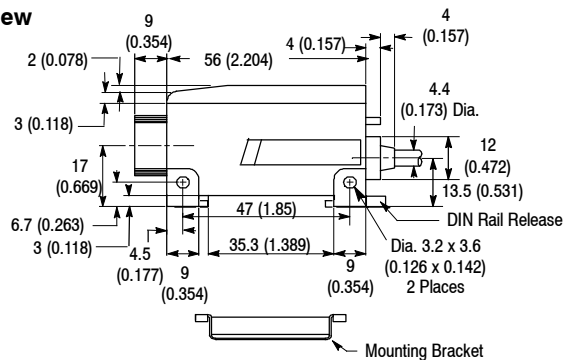
Note: Details regarding connection of Allen-Bradley Bulletin 42FT photoelectric sensors to Allen-Bradley Programmable Controllers can be found in publication 42-2.0. Refer to www.ab.com/literature for more information.

Approximate Dimensions [mm (in.)]

End View



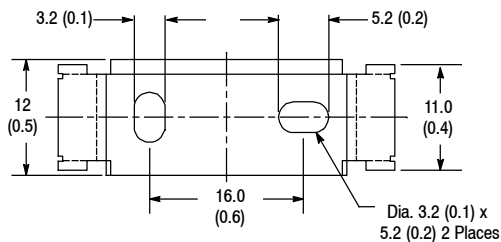
Side View



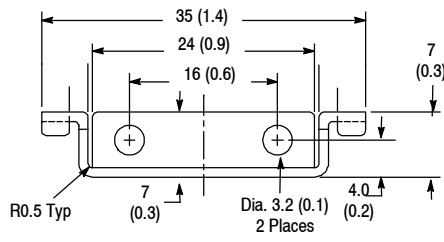
Mounting Assembly—60-2638

Stainless steel mounting bracket for installing the 42FT without a DIN Rail.

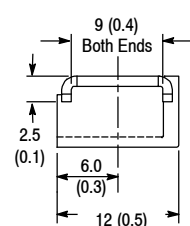
Top View



Side View

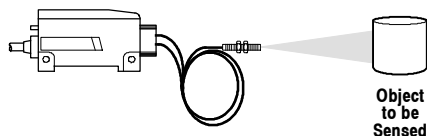


End View



42FT Visible Red or Green Plastic Fiber Optic

Self-Teach

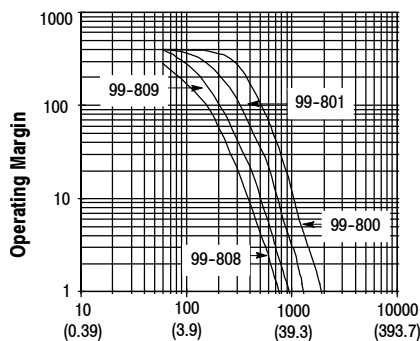


QD Cordsets and Accessories

Description	Cat./Page No.
Fiber Optic Cables	1-231
Mounting Assemblies	1-293
Fiber Optic Cable Adaptors	61-6731
76 mm (3 in.) Diameter with Center Mount Hole	92-39
32 mm (1.25 in.) Diameter with Center Mount Hole	92-47

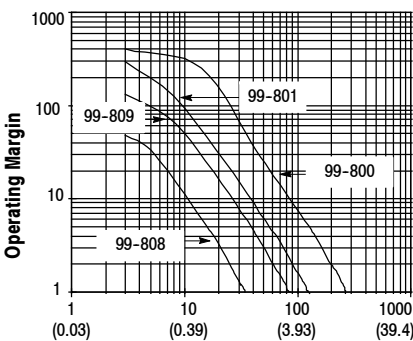
Typical Response Curves for Visible Red LED

Retroreflective



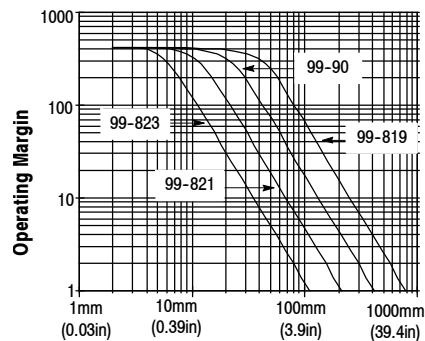
Distance to 76 mm Reflector Model 92-39 [mm (in.)]

Diffuse



Distance to White Target [mm (in.)]

Transmitted Beam



Operating Distance [mm (in.)]

Product Selection

Operating Voltage Supply Current	Max Sensing Distance @ 1X Margin	Output Energized	Emitter LED	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Cat. No.
12...24V DC ±10% 60 mA	Depends on Fiber Optic Cable Selected	Light/Dark Selectable	Red 660 nm	PNP Output: 100 mA Stability: 50 mA 500 μs	0.5 mA	2 m 500V cable	42FT-F2LPA-A2
			Green 565 nm			2 m 500V cable	42FT-F3LPA-A2
12...24V DC ±10% 50 mA			Red 660 nm	NPN Output: 100 mA Stability: 50 mA 500 μs		2 m 500V cable	42FT-F2LNA-A2
			Green 565 nm			2 m 500V cable	42FT-F3LNA-A2

PHOTOSWITCH® Photoelectric Sensors
42FA Visible Red Plastic Fiber Optic
Slim Housing



Features

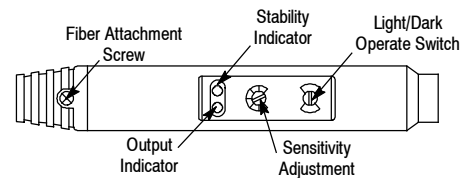
- Compact 8 x 10 mm size
- Dual LED indicators: output (red), stability (green)
- Fast 500 μs response time
- Visible red light source
- Selectable light or dark operate
- Can be DIN Rail mounted or mounted separately

Specifications

Environmental	
Certifications	UL Listed, CSA Certified, and CE Marked for all applicable directives
Operating Environment	NEMA 1, 12, 13; IP65 (IEC 529)
Operating Temperature [C (F)]	-25...+55° (-13...+131°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...85%
Optical	
Sensing Mode	Fiber optic
Sensing Range	Depends on fiber optic selected
Field of View	Depends on fiber optic selected
Light Source	Visible red LED (660 nm)
LED Indicators	See User Interface Panel below
Adjustments	Sensitivity potentiometer
Electrical	
Voltage	12...24V DC
Current Consumption	30 mA max
Sensor Protection	Reverse polarity, false pulse, transient noise
Outputs	
Response Time	500 μs
Output Type	PNP or NPN by cat. no.
Output Mode	Light or dark operate selectable
Output Current	100 mA max @ 24V DC
Mechanical	
Housing Material	Noryl®
Lens Material	Not applicable
Connection Types	3-pin DC pico (M8) QD
Supplied Accessories	Mounting bracket, adhesive apertures (transmitted beam models), screwdriver, reflector (retroreflective models)
Optional Accessories	See cordsets and 35 mm DIN Rail on page 1-146

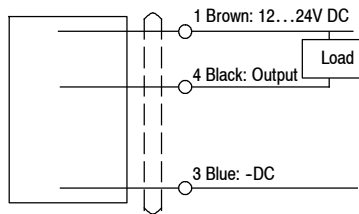
User Interface Panel

Label	Color	State	Status
STB	Green	OFF	0.8X < Margin < 1X
		ON	0.8X > Margin > 1X
OUT	Red	OFF	Output not activated
		ON	Output activated

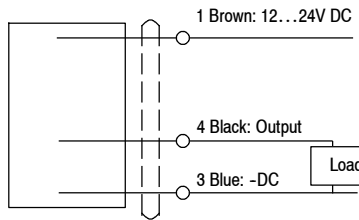


Wiring Diagrams

NPN Output



PNP Output



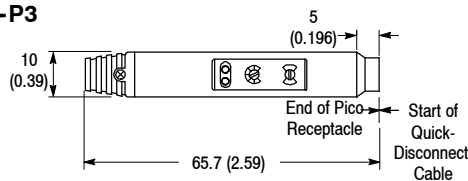
Face View Male Receptacle (Sensor)



Note: Details regarding connection of Rockwell Automation Bulletin 42FA photoelectric sensors to Rockwell Automation Programmable Controllers can be found in the *PHOTOSWITCH® Interface Manual*. Refer to www.ab.com/literature for more information.

Approximate Dimensions [mm (in.)]

Pico Quick-Disconnect Versions
42FA-F2LPA-P3
42FA-F2LNA-P3

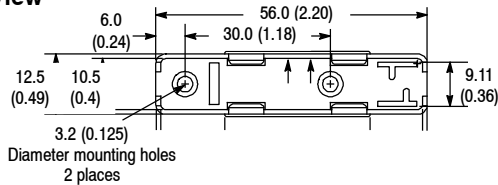


DIN Rail Mounting Assembly—60-2639 (included with sensor)

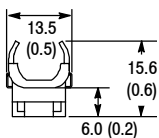
Mounting bracket and hardware for DIN rail mounting.

Approximate Dimensions [mm (in.)]

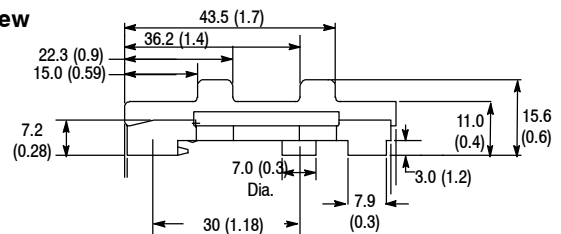
Top View



End View



Side View

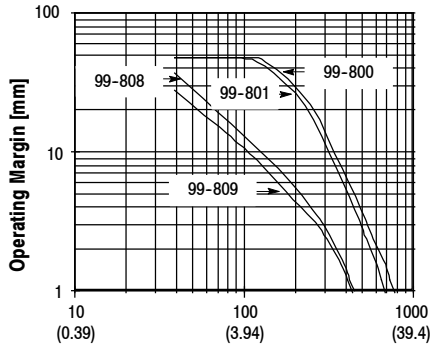


Note: Replacement mounting assembly and fiber optic cable adaptors are available on page 1-293.

PHOTOSWITCH® Photoelectric Sensors
42FA Visible Red Plastic Fiber Optic
Slim Housing

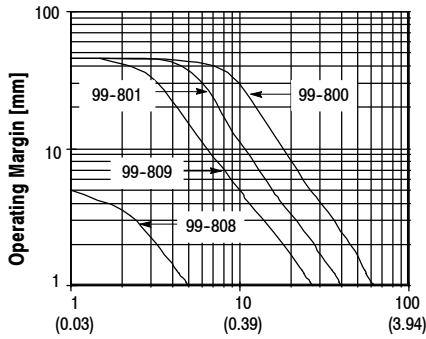
Typical Response Curves

Retroreflective



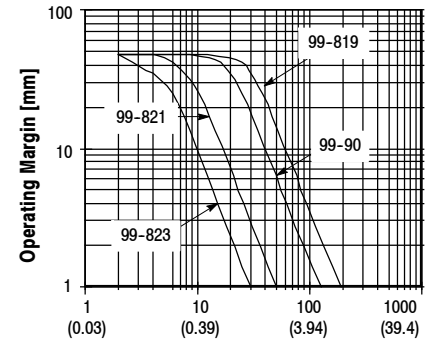
Distance to 76 mm Reflector Model 92-39 [mm (in.)]

Diffuse



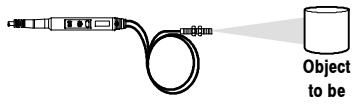
Distance to White Target [mm (in.)]

Transmitted Beam



Operating Distance [mm (in.)]

Product Selection

 <p>Field of View: Refer to Fiber Optic section Emitter LED: Visible red 660 nm</p>	<p>Operating Voltage Supply Current</p>	<p>Output Type Capacity Response Time</p>	<p>Max Leakage Current</p>	<p>Connection Type</p>	<p>Cat. No.</p>
	<p>12...24V DC ±10% 25 mA</p>	<p>NPN 100 mA 500 μs</p>			
	<p>12...24V DC ±10% 30 mA</p>	<p>PNP 100 mA 500 μs</p>		<p>3-pin pico</p>	<p>42FA-F2LPA-P3</p>

Cordsets and Accessories

Description	Cat./Page No.
2 m (6.5 ft) 3-pin Pico QD Cordset	889P-S3AB-2
Plastic Fiber Optic Cables	1-270
Adaptor for 1.25 mm Fiber Optic Cables	61-6731
DIN Rail Mounting Bracket	60-2639



ClearSight 9000



ClearSight RightSight



ClearSight 7000

Features

Three product families for application flexibility

- Configurable ClearSight 9000 for harsh duty glass and PET bottle detection
- ClearSight RightSight and 7000 for general purpose plastic film and stretch-wrap detection

Specifications

	9000	RightSight	7000
Environmental			
Certifications	cULus Listed and CE Marked for all applicable directives		
Operating Environment	NEMA 3, 4X, 6P, 12, 13, IP67 (IEC529); 1200 psi (8270 kpa) washdown for RightSight and Series 9000 models		
Operating Temperature [C (F)]	-34...+70° (-29...+158°)	-25...+55° (-13...+131°)	-40...+65° (+13...+150°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2		
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2		
Relative Humidity	35...85%		
Ambient Light Immunity	Incandescent light: 5000 lux		
Optical			
Sensing Modes	Clear object		
Sensing Range	1.2 m max	1 m max	1.5 m max
Field of View	See Product Selection table on page 1-149		
Light Source	Visible red LED (660 nm)		
Electrical			
Voltage	10...40V DC; 70...264V AC/DC	10.8...30V DC	11.8...28V DC
Current Consumption	30 mA max	35 mA max	46 mA max
Sensor Protection	Short circuit, false pulse, reverse polarity, overload		
Outputs			
Response Time	See Product Selection table on page 1-149		
Output Type	PNP and NPN, SDPT, SS relay, diagnostic output, see Product Selection table on page 1-149		
Output Mode	Light or dark operate selectable, light or dark operate by cat. no. (see Product Selection table on page 1-149)		
Output Current	Refer to Product Selection table on page 1-149		
Mechanical			
Housing Material	Valox®	Mindel®	Valox
Lens Material	Acrylic		
Connection Types	See Product Selection table on page 1-149		
Supplied Accessories	92-90 Reflector		
Optional Accessories	See mounting brackets and cordsets on page 1-150		

Wiring Diagrams

For Wiring Diagrams, please refer to base product specifications:

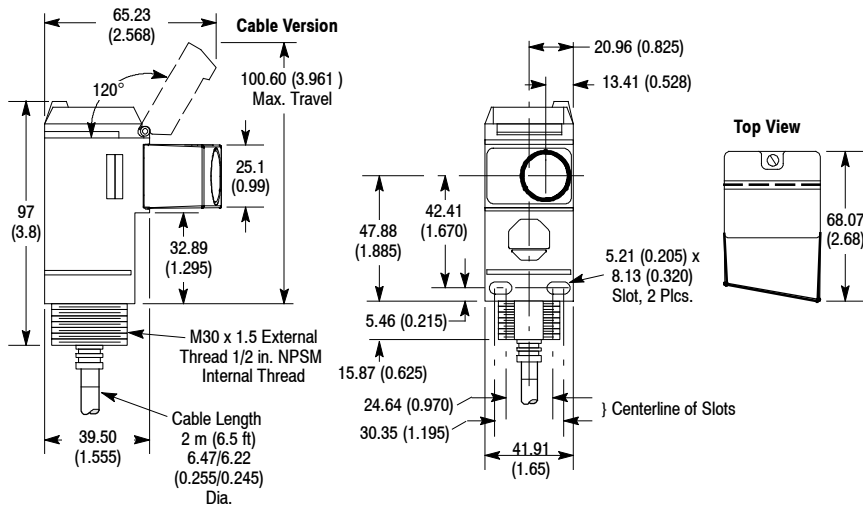
ClearSight RightSight see page 1-32

ClearSight 9000 see page 1-66

ClearSight 7000 see page 1-103

Approximate Dimensions [mm (in.)]

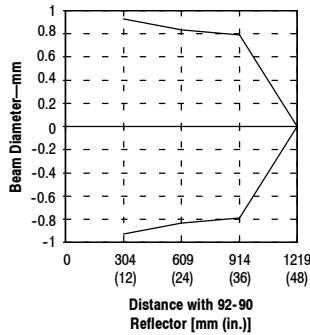
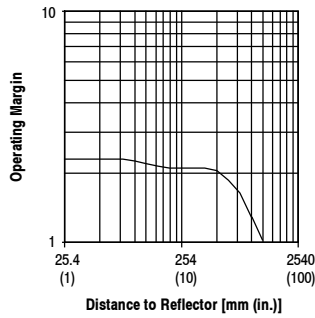
ClearSight 9000



Dimensions for ClearSight RightSight and ClearSight 7000 are located on page 1-32 and 1-103, respectively.

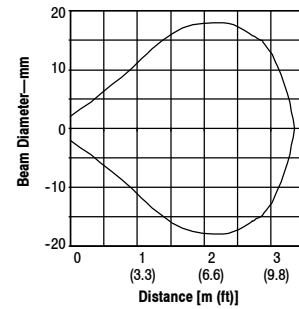
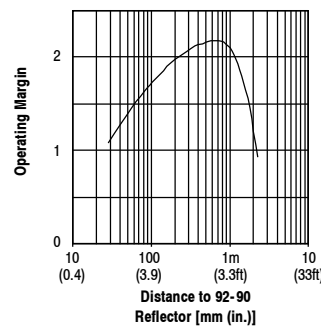
Typical Response Curve Beam Pattern

9000

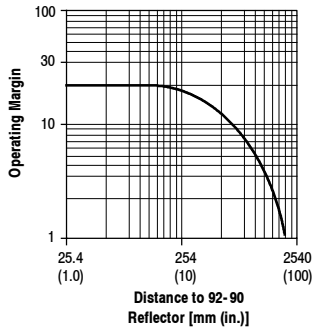


Typical Response Curve Beam Pattern

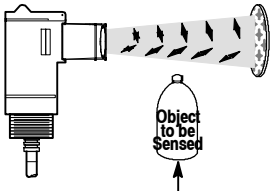
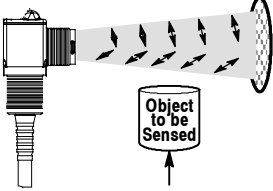
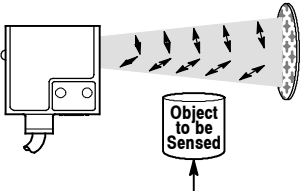
RightSight



7000



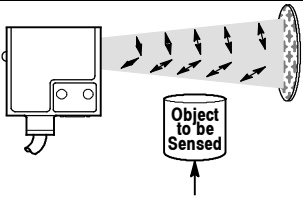
Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.
On/Off Sensors and Timing						
 <p>9000 Field of View: 1.5° Emitter LED: Visible red 660 nm</p>	10...40V DC 30 mA	0.025...1.2 m (0.08...4 ft)	Light/Dark Selectable	NPN/PNP 250 mA 2 ms	2 m 300V cable	42G⊗C-9200
	70...264V AC/DC 50/60 Hz 15 mA			SPDT EM Relay 2 A/132V AC/ 1 A/264V AC 1 A/150V DC 15 ms	2 m 300V cable	42G⊗C-9200-QD
				4-pin mini	42G⊗C-9200-QD1	
	45...264V DC/ 40...264V AC 50/60 Hz 15 mA	Solid State Isolated N.O. 300 mA 2 ms	2 m 300V cable	42G⊗C-9203		
			4-pin mini	42G⊗C-9203-QD		
		4-pin AC micro	42G⊗C-9203-QD1			
 <p>RightSight Field of View: 1.5° Emitter LED: Visible red 660 nm</p>	21.6...264V AC/DC 15 mA	25 mm...1 m (1 in...3.28 ft)	Dark Operate	N-MOSFET/100 mA 8.3 ms	2 m 300V cable	42EF-C2SCA-A2
	10.8...30V DC 35 mA			4-pin AC micro	42EF-C2SCA-G4	
		NPN/PNP 100 mA 1 ms	2 m 300V cable	42EF-C2KBA-A2		
			4-pin DC micro	42EF-C2KBA-F4		
Linear Polarized Sensors for Detection of Clear Films						
 <p>7000 Field of View: 3° Emitter LED: Visible red 660 nm</p>	11...28V DC 46 mA	50 mm...1.5 m (2 in...4.9 ft)	Comple- mentary L.O./D.O.	NPN 100 mA 1 ms	3 m cable	42SMU-7250
					4-pin DC micro	42SMU-7250-QD
				PNP 100 mA 1 ms	3 m cable	42SMU-7251
					4-pin DC micro	42SMU-7251-QD

⊗ R for standard (i.e. 42GRC-9200)
T for timing (i.e. 42GTC-9200)

Refer to page 1-150 for cordsets and accessories.

Product Selection (continued)

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.
Circular Polarized Sensors for Detection of Clear Objects (Bottles, Clear Packages)						
 <p>7000</p> <p>Field of View: 3° Emitter LED: Visible red 660 nm</p>	11...28V DC 46 mA	50 mm...1.5 m (2 in...4.9 ft)	Complementary L.O./D.O.	NPN 100 mA 1 ms	3 m cable	42SMU-7260
					4-pin DC micro	42SMU-7260-QD
				PNP 100 mA 1 ms	3 m cable	42SMU-7261
					4-pin DC micro	42SMU-7261-QD

Cordsets and Accessories

Description	Cat. No.	Description	Cat. No.
2 m (6.5 ft), 4-pin DC Micro QD Cordset	889D-F4AC-2	Mounting Bracket Swivel/Tilt for ClearSight 7000	60-2619
2 m (6.5 ft) 5-pin DC Micro QD Cordset	889D-F5AC-2	Mounting Bracket Swivel/Tilt for ClearSight RightSight	60-2649
2 m (6.5 ft), 4-pin AC Micro QD Cordset, Straight	889R-F4AEA-2	Mounting Bracket Swivel/Tilt for ClearSight 9000 and 10,000	60-2681
1.8 m (6 ft) 4-pin, Mini QD Cordset	889N-F4AF-6F	Reflector	92-90 (included)
1.8 m (6 ft) 5-pin Mini QD Cordset	889N-F5AF-6F		



Description

The 45LPT is an optical label sensor designed exclusively for the detection of standard or opaque labels on a high speed web. The 45LPT provides a solution for packaging industry applications such as label counting and web, “double sheet” and mark detection on a translucent film.

Features

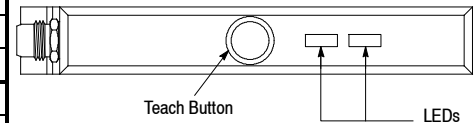
- “One Touch” local and remote teach capability
- 10...30V DC operation
- Fast 50 µsec response time
- User interface lockout feature
- IP65 housing
- Industrial anodized aluminum housing

Specifications

Environmental	
Certifications	cULus and CE Marked for all applicable directives
Operating Environment	IP65
Operating Temperature [C (F)]	-20...+60° (-4...+140°)
Vibration/Shock	10...55 Hz, 1.5 mm amplitude; meets or exceeds IEC 60947-5-2
Relative Humidity	5...95% (noncondensing)
Ambient Light Immunity	Incandescent light 3000 lux
Optical	
Sensing Mode	Transmitted beam
Sensing Gap	3 mm (0.12 in.)
Light Source	Nonpulsed infrared
Adjustments	Push button for sensitivity adjustment, local and remote teach
Electrical	
Voltage	10...30V DC
Current Consumption	40 mA max
Sensor Protection	Short circuit, overload, transient noise, reverse polarity
Power ON Delay	350 ms
Outputs	
Response Time	50 µs
Output Type	PNP or NPN selectable
Output Mode	Light or dark operate selectable
Output Current	100 mA max @ 30 V DC
Output Leakage Current	12V Supply: 0.78 mA @ 10 mA load, 6.9 mA @100 mA load 24V Supply: 0.30 mA @ 10 mA load, 3 mA @ 100 mA load
Mechanical	
Housing Material	Aluminum
Connection Types	4-pin pico (M8) QD
Supplied Accessories	None
Optional Accessories	Cordsets

User Interface

Label	Color	State	Condition
—	Green ①	OFF	Sensor power not present
		Steady	Sensor power present
		Flash	Fine teach—translucent label teach
—	Red ①	OFF	Output inactive
		Steady	Interface lockout
		Flash	Standard label teach



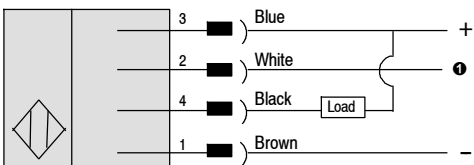
① Red and green LED flash: SCP active or label too translucent or web to opaque.

45LPT

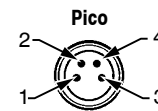
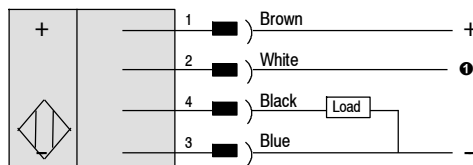
Optical Label Sensor

Wiring Diagrams

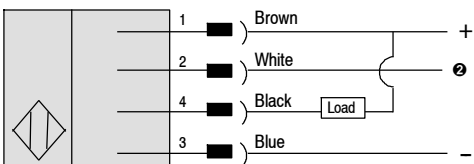
NPN (Light Operate)



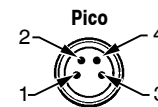
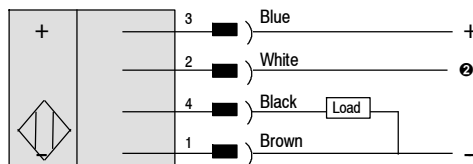
PNP (Light Operate)



NPN (Dark Operate)



PNP (Dark Operate)



① Remote teach = Connect **white wire** to (+) positive terminal.

② Remote teach = Connect **white wire** to (-) negative terminal.

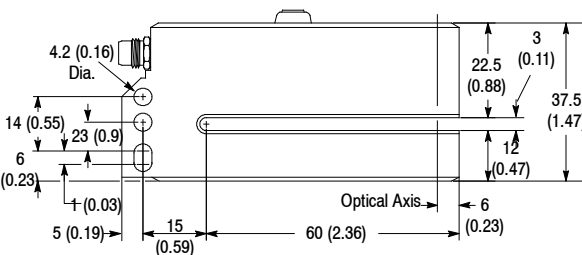
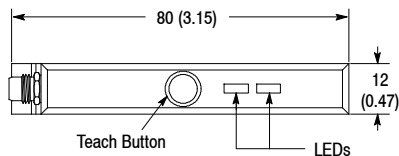
Note: If remote teach (white wire) is not used, connect it to (-) negative terminal.

Note: In the event of power failure, the sensor remembers the last threshold taught-in.

IMPORTANT

For Label detection use Dark operate. For Web detection use Light operate.

Approximate Dimensions [mm (in.)]



Product Selection

Operating Voltage	Sensing Gap [mm (in.)]	Output Energized	Output Type	Response Time	Connection Type	Cat. No.
10...30V DC	3 (0.12)	L.O./D.O. Selectable	NPN or PNP Selectable	50 μsec	4-pin Pico	45LPT-1LEB1-P4
2 m (6.5 ft) pico QD Cordset						889P-F4AB-2



Description

The Allen-Bradley 45LFM capacitive label sensor uses an innovative electronic design to sense and/or count labels. Its unique technology enables it to sense the leading or trailing edges of labels that are not detectable by other similar sensors. The 45LFM provides an auto-teach function and a display to aid in initial setup and operational efficiency.

Features

- Consistently senses the presence of most labels on a web
 - Clear labels on clear backing
 - Clear labels on opaque backing
 - Metallic labels on clear backing
 - Opaque labels on clear backing
 - Metallic labels on opaque backing
 - Opaque labels on opaque backing
- Count 50,000 labels per minute with registration error less than 0.01 inch
- Heavy-duty metal housing
- Ideal for label counting and label registering applications

Specifications

Environmental

Certifications	45LFM-CMBA1-D5 meets CE Marked for all applicable directives
Operating Environment	IP54
Operating Temperature [C (F)]	4...+50° (40...+120°)

Target Detection

Sensing Modes	Capacitive
Registration Accuracy	0.025 mm (0.01 in.)
Minimum Sensing Gap	0.76 mm (0.03 in.)
LED Indicators	Edge, zero
Adjustments	Multi-turn potentiometer, selectable output polarity by wire

Electrical

Voltage	11...28V DC
Current Consumption	50 mA
Sensor Protection	Short circuit, overload, reverse polarity
Power On delay	10 μs

Outputs

Response Time	10 μs
Output Type	PNP and NPN
Output Mode	Selectable output polarity by wire
Output Current	150 mA max
Output Leakage Current	5 μA max

Mechanical

Housing Material	Anodized aluminum
Connection Types	5-pin DC micro (M12) QD

User Interface—45LFM-CMBA1-D5

Label	Function
Gain	Sensitivity Adjustment
Zero	Gap Adjustment

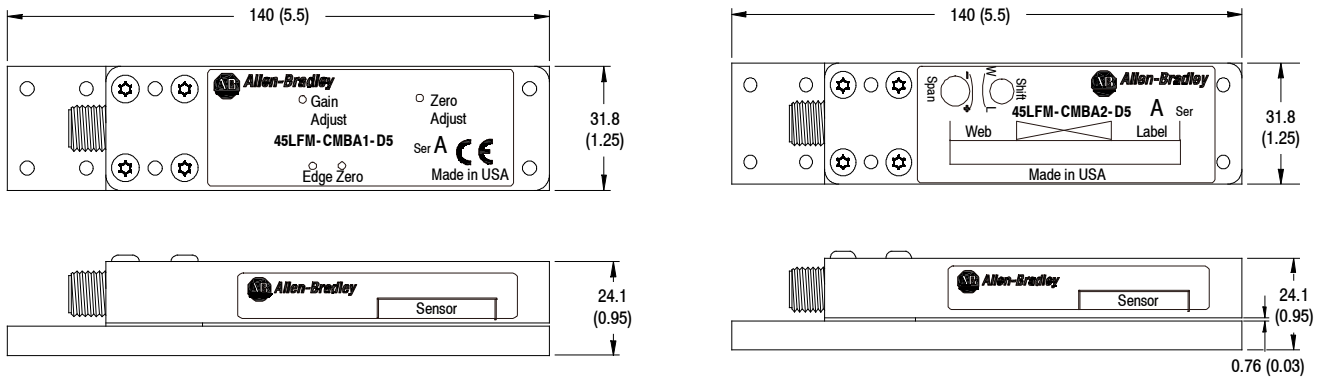
User Interface—45LFM-CMBA2-D5

Label	Function
Shift	Adjusts position of illuminated LED on display
Span	Sensitivity Adjustment

45LFM

Capacitive Label Sensor

Approximate Dimensions [mm (in.)]



Wiring

Designation	Lead Color (Cordset)	5-Pin Micro QD Pin Assignment
Termination		
V+	Brown	1
-V	Blue	2
PNP Output	Black	3
NPN Output	White	4
Output Polarity	Grey	5

Product Selection

Operating Voltage	Labels Sensed	Output Type	Response Time	Connection Type	Cat. No.
11...28V DC	Opaque Clear	NPN and PNP	10 μs	5-pin DC micro	45LFM-CMBA1-D5
	Opaque Clear Metallic				45LFM-CMBA2-D5
2 m (6.5 ft) Micro QD Cordset					889D-F5AC-2

Note: Pin 5 must be connected to +V or ground for reliable detection.



Description

The 45LSP is family of optical fork sensors housed in a plastic enclosure. Fork sensors offer self-contained transmitted beam sensing, ideal for applications that require reliable parts detection. The simple push button teach-in sensitivity adjustment, several connection options and multiple mounting features (via side thru-holes, rear threaded inserts, or optional dovetail brackets) make the 45LSP an economical, easy to use solution for typical applications such as small parts detection, edge detection, parts counting, gear tooth detection, dimension verifications, etc.

Features

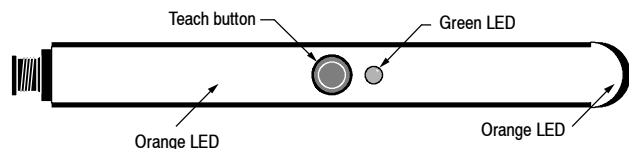
- Detection of objects as small as 0.2 mm (0.008 in.)
- Highly visible power and output LED indicators with output indication along both sides of the fork
- Remote teach and teach button lock on 4-pin models
- Light or dark operate selectable
- Multiple mounting options: thru-holes, threaded holes and dovetail
- Easy installation with no alignment required
- 3- and 4-pin pico (M8) QD models

Specifications

Environmental	
Certifications	cULus Listed and CE Marked for all applicable directives
Operating Environment	IP67
Operating Temperature [C (F)]	-20...+60° (-4...+140°)
Optical	
Sensing Modes	Transmitted beam
Sensing Gap	30, 50, 80, and 120 mm
Light Source	Visible red LED (640 nm)
LED Indicators	See User Interface below
Adjustments	Teach button
Electrical	
Voltage	10...30V DC
Current Consumption	30 mA max
Sensor Protection	Short circuit, reverse polarity
Outputs	
Response Time	250 μS
Output Type	PNP or NPN by cat. no.
Output Mode	Light or dark operate selectable (via teach button or remote)
Output Current	100 mA max
Mechanical	
Housing Material	Polycarbonate
Connection Types	4-pin DC pico (M8) QD connector, 3-pin DC pico (M8) QD connector
Optional Accessories	Cordsets and dovetail mounting brackets

User Interface

LED Color	State	Status
Orange	OFF	Output de-energized
	ON	Output energized
	Flashing	Teach mode or short circuit protection active
Green	OFF	Power is OFF
	ON	Power is ON
	Flashing	Teach mode

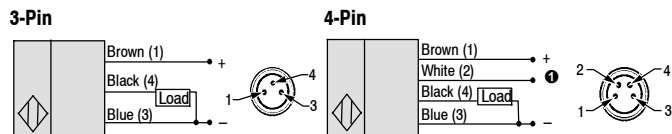


45LSP

Optical Fork Sensor

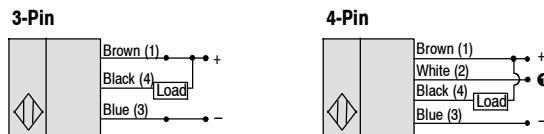
Wiring Diagrams

PNP Models

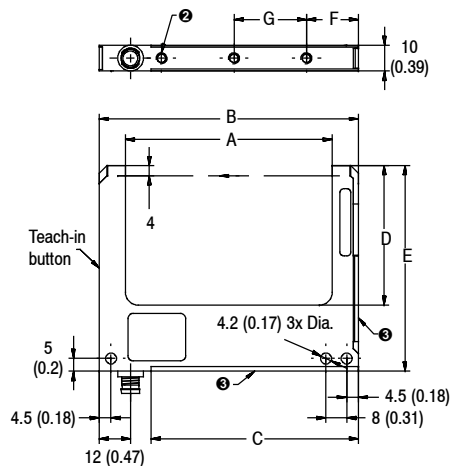


① Remote teach.

NPN Models



Approximate Dimensions [mm (in.)]



Cordsets and Accessories

Description	Cat. No.
2 m (6.5 ft) 3-pin DC pico QD	889P-F3AB-2
2 m (6.5 ft) 4-pin DC pico QD	889P-F4AB-2
Dovetail mounting bracket	44B-BKT

- ② M4 threaded inserts, 6 mm maximum depth.
- ③ Dovetail mounting

Gap Size	A	B	C	D	E	F	G
30 mm	30 (1.18)	50 (1.97)	30 (1.18)	34 (1.34)	59.5 (2.34)	20 (0.79)	—
50 mm	50 (1.97)	70 (2.76)	50 (1.97)	54 (2.13)	79.5 (3.13)	20 (0.79)	28 (1.10)
80 mm	80 (3.15)	100 (3.93)	80 (3.15)	54 (2.13)	79.5 (3.13)	20 (0.79)	2 x 28
120 mm	120 (4.72)	140 (5.51)	120 (4.72)	54 (2.13)	79.5 (3.13)	20 (0.79)	3 x 28

Product Selection

Sensing Gap	Resolution [mm (in.)]Ⓞ	Operating Voltage	Output Mode	Connection Type	Output Type	Cat. No.
30 mm	0.2 (0.008)Ⓞ	10...30 V DC	Light or dark operate selectable	3-pin pico	PNP	45LSP-2LPA1-P3
					NPN	45LSP-2LNA1-P3
4-pin pico	PNP			45LSP-2LPA1-P4		
	NPN			45LSP-2LNA1-P4		
50 mm	0.2 (0.008)			3-pin pico	PNP	45LSP-2LPA2-P3
					NPN	45LSP-2LNA2-P3
4-pin pico	PNP			45LSP-2LPA2-P4		
	NPN			45LSP-2LNA2-P4		
80 mm	0.2 (0.008)	3-pin pico	PNP	45LSP-2LPA3-P3		
			NPN	45LSP-2LNA3-P3		
4-pin pico	PNP	45LSP-2LPA3-P4				
	NPN	45LSP-2LNA3-P4				
120 mm	0.4 (0.016)	3-pin pico	PNP	45LSP-2LPA4-P3		
			NPN	45LSP-2LNA4-P3		
4-pin pico	PNP	45LSP-2LPA4-P4				
	NPN	45LSP-2LNA4-P4				

Ⓞ Not over the entire temperature range. For maximum precision, allow for a heating period of approximately 15 minutes.
 Ⓞ For detection of objects less than 0.9 mm (0.035 in.), the object should be placed ≥10 mm away from the LED light source.



Description

The 45LST optical fork sensor is designed for small part detection on machines and conveyors. With available slot widths from 2...225 mm (0.08...8.86 in.), these sensors feature adjustable sensitivity and selectable NPN/PNP with L.O./D.O. energized output in a heavy-duty IP65 aluminum housing. Applications include label detection on clear substrates, cap detection on bottles, and part sensing on conveyors for the packaging and material handling industries. The 45LST sensors are also ideal for the automotive, paper, and food industries.

Features

- 10...30V DC operation
- Fast 30 μ sec response time for selected models
- NPN/PNP output
- IP65 housing
- Industrial aluminum housing
- cULus Listed and CE Marked for all applicable directives

Specifications

Environmental	
Certifications	cULus Listed and CE Marked for all applicable directives
Operating Environment	IP65
Operating Temperature [C (F)]	-20...+60° (-4...+10°)
Ambient Light Immunity	Incandescent light 3000 lux
Optical	
Sensing Modes	Transmitted beam
Sensing Gap	2...225 mm (0.08...8.86 in.)
Light Source	Nonmodulated infrared, infrared LED (880 nm)
LED Indicators	See User Interface below
Adjustments	25 turn potentiometer
Electrical	
Voltage	10...30V DC
Current Consumption	40 mA max
Sensor Protection	Short circuit, reverse polarity, transient, overload
Power On Delay	129 ms
Outputs	
Response Time	1 ms , 30 μ S (45LST-1LEA1-P4 only)
Output Type	PNP or NPN selectable
Output Mode	Light or dark operate selectable
Output Current	100 mA max
Output Leakage Current	12V DC supply : 0.78 mA @ 10 mA load, 6.9 mA @ 100 mA load 24V DC supply : 0.30 mA @ 10 mA load, 3.0 mA @ 100 mA load
Mechanical	
Housing Material	Anodized aluminum
Connection Types	4-pin DC pico (M8) QD connector
Optional Accessories	Cordsets

User Interface

Label	Color	State	Condition
—	Green	OFF	Sensor power not present
		Steady	Sensor power present
—	Red	OFF	Output inactive
		Steady	Output active

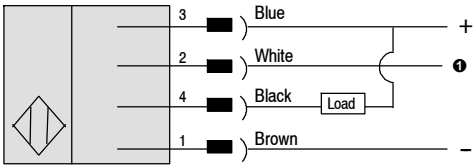
Red and green LED flash: SCP active

45LST

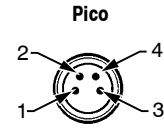
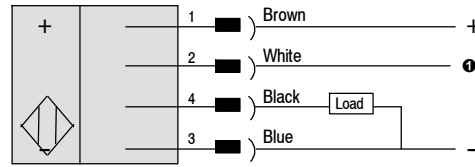
Optical Fork Sensor

Wiring Diagrams

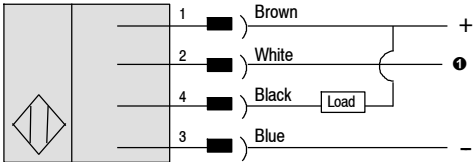
NPN (Light Operate)



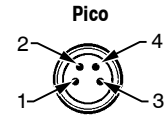
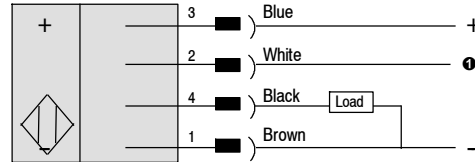
PNP (Light Operate)



NPN (Dark Operate)

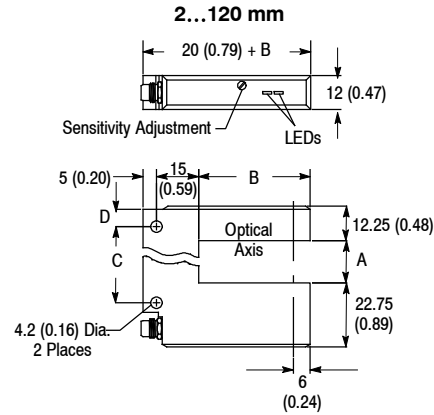
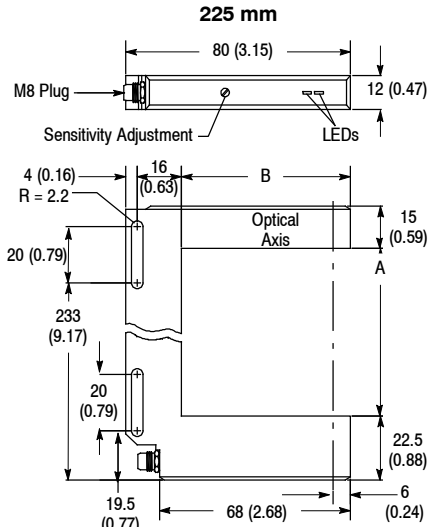


PNP (Dark Operate)



① White wire not used.

Approximate Dimensions [mm (in.)]



Dimensions [mm (in.)]

Fork Size	A	B	C	D
2...120 (0.08...4.72)	2 (0.08)	40 (1.57)	14 (0.55)	6.25 (0.25)
	15 (0.59)	40 (1.57)	27 (1.06)	6.25 (0.25)
	30 (1.18)	40 (1.57)	42 (1.65)	6.25 (0.25)
	50 (1.97)	57 (2.24)	40 (1.57)	17.25 (0.68)
	80 (3.15)	57 (2.24)	70 (2.75)	17.25 (0.68)
	120 (4.72)	57 (2.24)	110 (4.33)	17.25 (0.68)
225 (8.86)	225 (8.86)	60 (2.36)	—	—

Product Selection

Operating Voltage	Sensing Gap [mm (in.)]	Output Energized	Output Type	Light Source Emission	Response Time	Connection Type	Cat. No.
10...30V DC	2 (0.08)	LO/DO Selectable	NPN or PNP Selectable	Continuous	30 μ sec	4-pin pico	45LST-1LEA1-P4
	15 (0.59)			Modulated	1 ms		45LST-1LEA2-P4
	30 (1.18)						45LST-1LEA3-P4
	50 (1.96)						45LST-1LEA4-P4
	80 (3.15)						45LST-1LEA5-P4
	120 (4.72)						45LST-1LEA6-P4
	225 (8.86)						45LST-1LEA7-P4
2 m (6.5 ft) pico QD Cordset							889P-F4AB-2

45MLA**Measuring Arrays and Controllers****Description**

The Allen-Bradley 45MLA is a measurement sensor that utilizes an array of transmitted beam photoelectric sensor pairs to detect and measure objects. The array housing is extremely compact, allowing for easy installation in a range of applications.

The 45MLA are packaged as transmitted beam pairs—the emitter and receiver arrays are both included. The system requires an Allen-Bradley 45MLA controller, which must be ordered separately. Three versions of the controller (I/O, RS485, CAN) are available, each offering a different communications platform that can be selected to function with a range of PLCs.

The controller drives the photoelectric elements in the emitter and reads out the receiver beam information. Use of this external controller allows the flexibility to configure up to four separate sensing zones with independent outputs or the communication of individual beam status via serial protocols. Additionally, the 45MLA can also be customized for application specific overhang and over-height detection.

Features

- Height measuring capability
- Slim profile array housing
- Long operating range—4 m (13 ft)
- Fast reaction time and measurement speed
- Individual beam status available via controller (serial communication models only)

Specifications

Environmental	45MLA Arrays	45MLA Controller
Certifications	CE Marked for all applicable directives	
Operating Environment	IP54	Housing IP54, terminal strip IP20
Operating Temperature [C (F)]	0...55° (32...131°)	
Storage Temperature [C (F)]	-20...70° (-4...158°)	-25...70° (-13...158°)
Vibration	10...55 Hz; amplitude 0.35 mm (0.01 in.); meets or exceeds IEC 60068-2-6	
Shock	Acceleration 10 g, pulse duration 16 ms, 10...55 Hz; amplitude 0.35 mm (0.01 in.); meets or exceeds IEC 60068-2-29	
Relative Humidity	15...95%	15...95%
Optical		
Sensing modes	Transmitted beam pair	—
Sensing Range	0...4 m (0...13 ft)	—
Field of View	3.2°	—
Light Source	940 nm	—
Beam Spacing	10 mm (0.4 in.) or 25 mm (1.0 in.)	—
Resolution	18 mm (0.7 in.) or 33 mm (1.3 in.)	—
LED Indicators	Red: Status Green: Alignment	Alignment, target present, outputs, inputs, power
Electrical		
Voltage	Provided by controller	20.4...27.6V DC ±5% max. ripple
Current Consumption	—	<300 mA with max. no. of beams to controller, outputs not connected
Sensor Protection	EN61000-4-2, EN 61000-4-4 and EN 61000-4-5; short circuit (SCP), reverse polarity, and overload	
Outputs		
Response Time	See <i>45MLA Controller User Manual</i>	
Output Type	—	NPN and PNP (push/pull output)
Output Mode	—	Dark operate (when connected as PNP)
Output Current	—	150 mA max. each
Mechanical		
Housing Material	Aluminum	ABS(FR) UL94-V0
Lens Material	Polycarbonate	—
Cover Material	Aluminum	Polycarbonate
Connection Types	8-pin DC micro (M12) female QD on 500 mm (20 in.) cable pigtail—controller connection only	Spring loaded terminal connections
Supplied Accessories	Adjustable mounting kit (445L-AF6143)	
Required Accessories	Controller 45MLA controller I/O model Cat. No. 45MLA-CTRL 45MLA controller RS45 Cat. No.: 45MLA-CTRL-485 45MLA controller CAN Cat. No. 45MLA-CTRL-CAN Light array to controller connecting cable 3 m (9.8 ft) M12—RJ45 Cat. No. 445L-AC8RJ3 5 m (16.4 ft) M12—RJ45 Cat. No. 445L-AC8RJ5 8 m (26.2 ft) M12—RJ45 Cat. No. 445L-AC8RJ8 Max. system length cannot exceed 10 m (32.8 ft)	
Optional Accessories	Flat mounting kit Cat. No. 445L-AF6145	

User Interface

The following table indicates LED status and descriptions for LEDs on the emitter and receiver light arrays.

Location	LED	Description	Status	Meaning
Emitter and Receiver Arrays	Green	Light array alignment	Off	Arrays not aligned (or target present)
			On	Arrays aligned (and target not present)
			Flashing	Low margin/light intensity inadequate
	Red	Light array status	Off	Target not present (and arrays aligned)
			On	Target present (or arrays not aligned)

The following table indicates the status and description for each LED on the controller's main PCB.

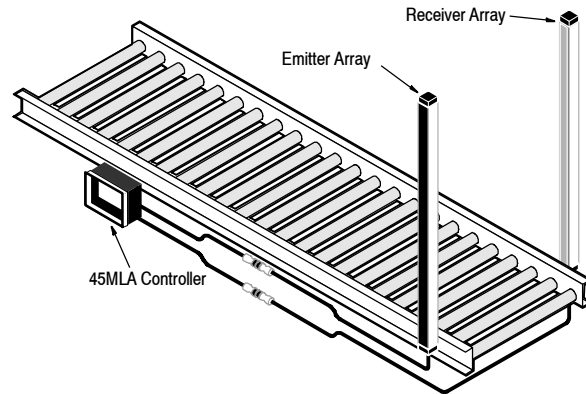
LED	Description	Color	Meaning
D1	Light Array OK	Off	Target present or light arrays not aligned
		Green	Target not present and light arrays aligned
		Green flashing	Low margin/light intensity inadequate
D2	Light array status	Off	Target not present
		Red	Target present
		Red Flashing	Height Measurement Error
D3	Out1	Off	Output 1 inactive
		Green	Output 1 active
D4	Out2	Off	Output 2 inactive
		Green	Output 2 active
D5	In1	Off	Input 1 inactive
		Green	Input 1 active
D6	In2	Off	Input 2 inactive
		Green	Input 2 active
D7	Power	Off	Power off
		Green	Power on

45MLA

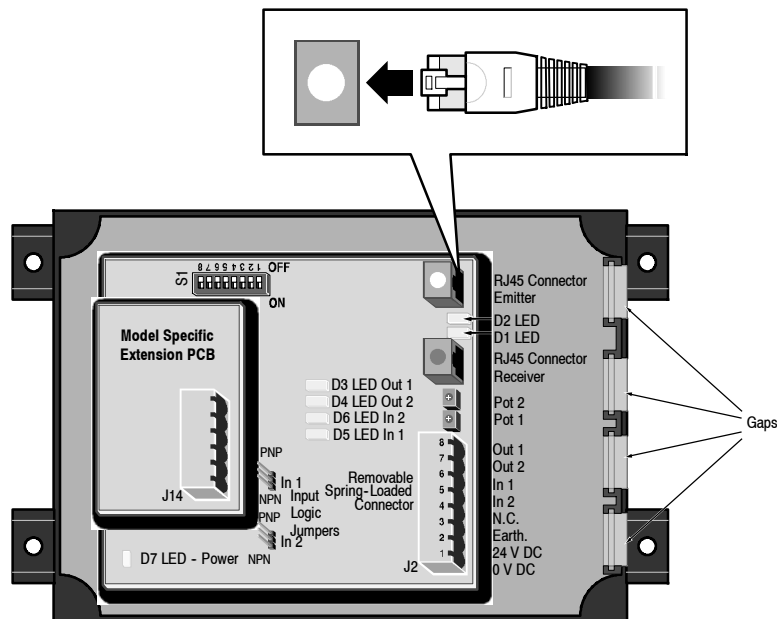
Measuring Arrays and Controllers

Wiring Diagrams

The 45MLA is a "Three Box System." Every setup consists of an emitter array, a receiver array, and an external controller.



Each controller has the same base PCB and a pre-installed extension PCB with model-specific functionality and additional connections.



Connector J2 on the base PCB has the following pinout for all controller models.

Pin	Signal	Description
1	0V DC	Power
2	+24V DC	Power
3	Ground	Ground
4	Not connected	Not connected
5...8	Model specific functions (see below)	

Pins 5...8 on connector J2 (on the base PCB) have different functionality with each controller model. The following tables show the pin connections for each specific model.

I/O Model

Pin	Signal	Description	Remarks
5	In 2	Trigger and hold	DIP switch S1 (7) = 0
		Overhang back sensor	DIP switch S1 (7) = 1
6	In 1	Not used	DIP switch S1 (7) = 0
		Overhang front sensor	DIP switch S1 (7) = 1
7	Out 2	Light array interrupted❶	0 V DC = interrupted 24 V DC = not interrupted
8	Out 1	Overhang	0 V DC = overhang 24 V DC = no overhang

❶ Or over-height (special function)

RS485 and CAN models

Pin	Signal	Description	Remarks
5	In 2	Trigger and hold	Special function
6	In 1	Not used	Not used
7	Out 2	Light interrupted❶	0V = interrupted
8	Out 1	Overhang	0V = overhang

The extension PCB has connections specific to the functionality of each individual model. Here are the pin connections for each model. The connectors are labeled on the PCB.

**I/O Model
Connector J14**

Pin	Signal	0V DC	+24V DC
1	Out 3	Zone Z1 interrupted	Zone Z1 not interrupted
2	Out 4	Zone Z2 interrupted	Zone Z2 not interrupted
3	Out 5	Zone Z3 interrupted	Zone Z3 not interrupted
4	Out 6	Zone Z4 interrupted	Zone Z4 not interrupted

**RS485 Model
Connector J16**

Pin	2 Wire	4 Wire
1	0V DC	0V DC
2	—	Rx+
3	Shielding	Shielding
4	—	Rx-
5	B	Tx+
6	A	Tx-

**CAN Model
Connectors J12 and J13 (RJ45)**

Pin	Signal
1	CAN H
2	CAN L
3	0V DC
4	Not connected
5	Not connected
6	Shield
7	0V DC
8	CAN V+

Product Selection

Arrays

No. of Beams	A Housing Height [mm (in.)]	B Sensing Height [mm (in.)]	Beam Spacing [mm (in.)]	Length x Width [mm (in.)]	Cat. No.
30	320 (12.6)	300 (11.8)	10 (0.39)	20 x 16 (0.79 x 0.62)	45MLA-AT0300P10
60	630 (24.4)	600 (23.6)	10 (0.39)	20 x 16 (0.79 x 0.62)	45MLA-AT0600P10
90	920 (36.2)	900 (35.4)	10 (0.39)	20 x 16 (0.79 x 0.62)	45MLA-AT0900P10
120	1220 (48.0)	1200 (47.2)	10 (0.39)	20 x 16 (0.79 x 0.62)	45MLA-AT1200P10
36	920 (36.2)	900 (35.4)	25 (0.98)	20 x 16 (0.79 x 0.62)	45MLA-AT0900P25
48	1220 (48.0)	1200 (47.2)	25 (0.98)	20 x 16 (0.79 x 0.62)	45MLA-AT1200P25

Controllers

Description	Cat. No.
I/O Model	45MLA-CTRL
RS485	45MLA-CTRL-485
CAN	45MLA-CTRL-CAN

Accessories

Description	Cat. No.
Flat mounting kit (four pieces/set)	445L-AF6145
180° adjustable mounting kit (four pieces/set, included with arrays)	445L-AF6143
Cable—Light array to controller	
3 m M12—RJ45	445L-AC8RJ3
5 m M12—RJ45	445L-AC8RJ5
8 m M12—RJ45	445L-AC8RJ8

45DLA**Discrete Light Arrays****Description**

The Allen-Bradley 45DLA discrete light array is an ON/OFF sensor that utilizes an array of transmitted beam photoelectric sensor pairs to detect objects over a much wider span than traditional sensors. The 45DLA are packaged as transmitted beam pairs (the emitter and receiver arrays are both included). The controls are integrated into the array housing and no separate controller is required. The emitter and receiver are optically synchronized and therefore do not need to be wired together.

Features

- Integrated light array controller
- IP54
- Simple, flexible mounting
- Optically synchronized (no electrical connection between emitter and receiver required)
- Push/pull (PNP/NPN) outputs (connect to sinking or sourcing inputs)
- Wiring selectable range and output state (light/dark operate)
- 30 mm resolution
- Sensing height of 118...734 mm (4.6...28.9 in.)

Specifications

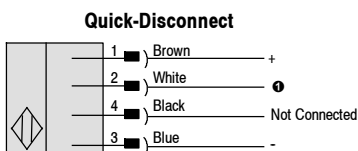
Environmental	
Certifications	CE Marked for all applicable directives
Operating Environment	IP54
Operating Temperature [C (F)]	-20°...+65° (-4°...+149°)
Vibration	2 g, 10...200 Hz; 20 sweeps each axis; meets or exceeds EN 60068-2-6
Shock	15 g, 11 ms, 3 x each axis; 10 g, 16 ms, 100 x each axis; meets or exceeds EN 60068-2-27 and EN 60068-2-29
Relative Humidity	5...95% (noncondensing)
Ambient Light Immunity	75,000 Lux
Optical	
Sensing Modes	Transmitted beam pair
Sensing Range	200...1500 mm (7.9...59 in.) or 1.0...8.0 m (3.3...26.2 ft)
Field of View	Emitter (long range selected): 15° @ 3.0 m (9.8 ft) Receiver (when emitter has long range selected): 35° @ 3.0 m (9.8 ft)
Light Source	Infrared LED (880 nm)
LED Indicators	Green (transmitter only) = power, orange (receiver only) = target present
Adjustments	Selectable range (by wiring input)
Resolution	30 mm (1.2 in.)
Beam Pitch	22 mm (0.87 in.)
Number of Beams	4...32 by Cat. No.
Sensing Height	118...734 mm (4.65...28.9 in.) by cat. no.
Electrical	
Voltage	14...30V DC
Current Consumption	50 mA @ 24V DC without load connected
Sensor Protection	Short circuit (SCP), reverse polarity
Outputs	
Response Time	25...165 ms by cat. no.
Power-On Time	100 ms + response time
Output Type	PNP/NPN (single push/pull output)
Output Mode	Dark or light operate selectable (by wiring)
Output Current	120 mA max.
Mechanical	
Housing Material	Aluminum
Housing Height	266...882 mm (10.5...34.7 in.) by cat. no.
Lens Material	Polycarbonate
Cable Material	PVC
Connection Type	4-pin DC micro (M12) on 150 mm (6 in.) cable pigtail

User Interface Panel

LED	Description	Status	Meaning
Emitter Array	Emitter Status	Off	No Power
		Green	Power OK
Receiver Array	Receiver Status	Off	No power OR target not present
		Orange	Power OK and target present (or arrays not aligned)

Wiring Diagrams

Emitter



Ⓢ Pin 2 (white wire): Connect to 0V or not connected for 1.0...8.0 m (3.3...26.2 ft) range; connect to V+ (24V) for 0.2...1.5 m (0.6...4.9 ft) range.

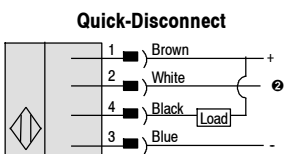
Note: In applications with multiple 45DLA pairs in one area, it is recommended to use the shorter range option (by connecting Pin 2/white wire to 24V) to reduce the potential for interference between separate pairs.

Note: For applications with a range of less than 1 m (3.3 ft) it is recommended to use the shorter range option to improve the response time.

Receiver:

The 45DLA uses a push/pull transistor output that can be wired as either a PNP or NPN style output.

Wired as NPN output:



Ⓢ Pin 2 (white wire): Connect to V+ (24V) or not connected for D.O.; connect to 0V for L.O.

Wired as PNP output:

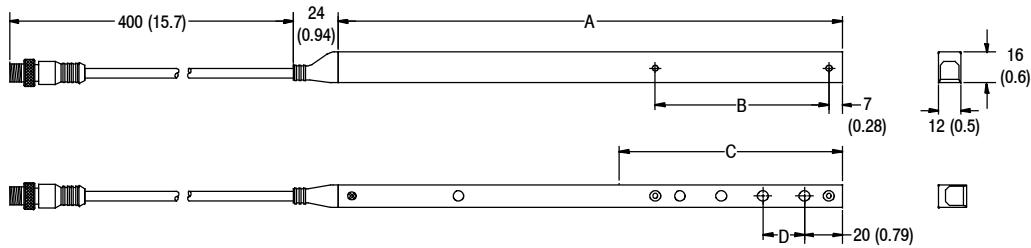


Ⓢ Pin 2 (white wire): Connect to V+ (24V) or not connected for L.O.; connect to 0V for D.O.

45DLA

Discrete Light Arrays

Approximate Dimensions [mm (in.)]



Note: Mounting from the front of the array (lens side) requires M4 flat head (countersunk) screws (included). Mounting from the side of the array requires M4 pan head screws.

No. of Beams	Approximate Dimensions [mm (in.)]				Cat. No.
	A: Housing Height	B: Mounting Holes	C: Sensing Height	D: Pitch	
4	266 (10.5)	92 (3.6)	118 (4.65)	22 (0.87)	45DLA-1LEB1T-F4
8	354 (13.9)	180 (7.1)	206 (8.11)	22 (0.87)	45DLA-1LEB2T-F4
16	530 (20.9)	356 (14.0)	382 (15.04)	22 (0.87)	45DLA-1LEB4T-F4
24	706 (27.8)	532 (20.9)	558 (21.97)	22 (0.87)	45DLA-1LEB6T-F4
32	882 (34.7)	708 (27.9)	734 (28.9)	22 (0.87)	45DLA-1LEB8T-F4

Product Selection

Sensing Height [mm (in.)]	Response Time	Cat. No.
118 (4.65)	25 ms	45DLA-1LEB1T-F4
206 (8.11)	45 ms	45DLA-1LEB2T-F4
382 (15.04)	85 ms	45DLA-1LEB4T-F4
558 (21.97)	125 ms	45DLA-1LEB6T-F4
734 (28.9)	165 ms	45DLA-1LEB8T-F4

Note: Both emitter (light source) and receiver arrays are included in the package.

Cordsets and Accessories

Cordset		Accessories	
Description	Cat. No.	Description	Cat. No.
DC Micro QD Cordset, 4-pin, 2 m (6.5 ft)	889D-F4AC-2	DC Micro Splitter	879D-F4DM
DC Micro QD Patchcord, 4-pin, 2 m (6.5 ft)	889D-F4ACDM-2		



Features

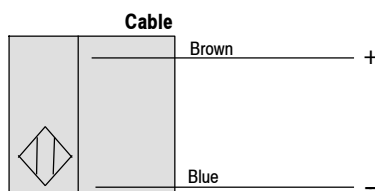
- Introduces Two-Dimensional Array Scanning Technology
- PNP or NPN Output
- Minimum object resolution from 11...17 mm (0.43...0.66 in.)
- Sensing ranges up to 2.5 m (8.2 ft)
- IP67 rated housing
- CE Marked for all applicable directives
- Easy bracket-free mounting
- Highly visible alignment LEDs

Specifications

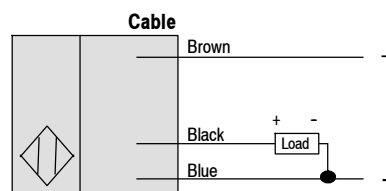
Environmental	
Certifications	cULus and CE Marked for all applicable directives
Operating Environment	IP67
Operating Temperature [C (F)]	-5...+55° (23...+131°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	35...85%
Ambient Light Immunity	500 lux max.
Optical	
Sensing Modes	Transmitted beam
Sensing Range	See Product Selection table on page 1-170
Number of Optical Axis	See Product Selection table on page 1-170
Light Source	Infrared LED (860 nm)
LED Indicators	Green LED for transmitted, green LED for alignment on receiver, and three orange LEDs for output
Electrical	
Voltage	12...24V DC ±10% ripple
Current Consumption	See Product Selection table on page 1-170
Sensor Protection	Reverse polarity, short circuit protection
Outputs	
Response Time	4 ms or 8 ms max by cat. no.
Output Type	PNP or NPN by cat. no.
Output Mode	Light operate
Output Current	100 mA @ 24V DC
Output Leakage Current	10 µA max
Mechanical	
Housing Material	Aluminum
Lens Material	Acrylic
Connection Types	2 m cable, 4-pin DC micro (M12) pigtail
Supplied Accessories	None
Optional Accessories	Mounting brackets, reflectors, cordsets

Wiring Diagrams

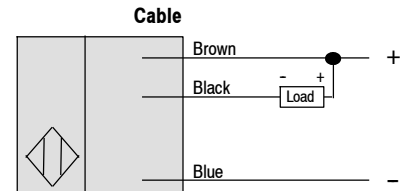
Emitter



PNP Output

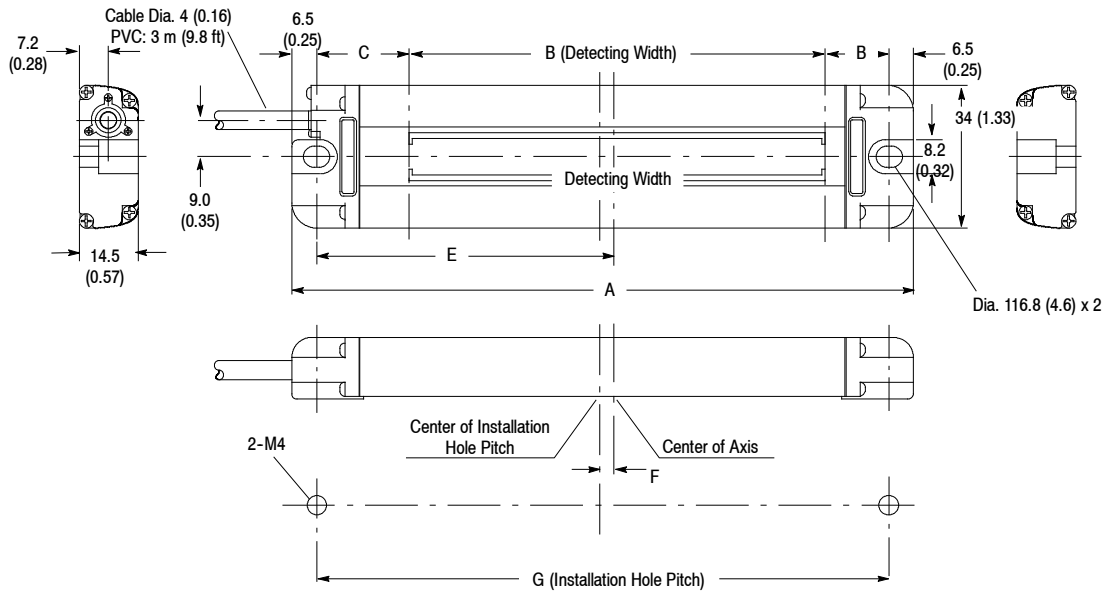


NPN Output



PHOTOSWITCH® Photoelectric Sensors
45AST Area Array

Approximate Dimensions [mm (in.)]



Model	[mm (in.)]						
	A	B	C	D	E	F	G
45AST-1J Ⓢ B1-A2	100 (3.93)	50 (1.96)	22.5 (0.88)	14.5 (0.57)	47.5 (1.87)	4 (0.15)	87 (3.42)
45AST-1J Ⓢ B2-A2	150 (5.9)	100 (3.93)	22 (0.86)	15 (0.59)	72 (2.83)	3.5 (0.13)	137 (5.39)
45AST-1J Ⓢ B3-A2							137 (5.39)
45AST-1J Ⓢ B4-A2	200 (7.87)	150 (5.9)	22 (0.86)	15 (0.59)	97 (3.81)	3.5 (0.13)	187 (7.36)

① N = NPN and P = PNP.

Product Selection

Current Consumption (max.)		Range	Number of Optical Axis	Response Time (max)	Resolution Diameter [mm (in.)]	Sensing Height [mm (in.)]	Output Type	Cat. No. ③
Transmitter	Receiver							
70 mA	65 mA	0.5...2 m (1.6...6.5 ft)	5	4 ms	15 (0.59)	50 (1.96)	PNP	45AST-1JPB1-A2
							NPN	45AST-1JNB1-A2 ②
80 mA	110 mA	0.15...0.8 m (0.49...2.62 ft)	10	8 ms	11 (0.43)	100 (3.93)	PNP	45AST-1JPB2-A2
							NPN	45AST-1JNB2-A2 ②
80 mA	110 mA	0.5...2.5 m (1.6...8.2 ft)	10	8 ms	13 (0.51)	100 (3.93)	PNP	45AST-1JPB3-A2
							NPN	45AST-1JNB3-A2 ②
80 mA	110 mA	0.15...0.8 m (0.49...2.62 ft)	10	8 ms	17 (0.66)	150 (5.9)	PNP	45AST-1JPB4-A2
							NPN	45AST-1JNB4-A2 ②

② NPN versions available with longer lead times.

③ Micro QD (M12) connector on pigtail models available. Refer to www.ab.com/sensors for more information.



Description

The Allen-Bradley 45PVA is a photoelectric Parts Verification Array designed for bin picking applications and object detection in the parts assembly industry. When used as part of a suitably configured bin-picking system, the 45PVA effectively prevents mispicks to enhance efficiency and minimize down time. It is also the ideal solution to address the “error proofing” initiatives prevalent in the automotive industry.

The 45PVA uses an array of LEDs to create a light screen that can be spanned across bins at an assembly station. By mounting the sensors on parts bins and wiring them into a controller programmed with the necessary logic, a virtually error-free bin-picking process can be achieved. “Job lights” on the 45PVA will not only show the assembler the bins required to complete the current process, but will also indicate the correct picking sequence. In the event the assembler attempts to pick an incorrect part, a selectable warning light on the 45PVA will illuminate to indicate the error; additional fault enunciation can be achieved via controller logic in conjunction with a tower light or

In addition to increasing efficiency and quality control by preventing faults in the bin-picking process, the 45PVA is instrumental in personnel stress reduction and the simplification of personnel training—especially in multi-lingual facilities.

Specifications

Environmental	
Certifications	cULus and CE Marked for all applicable directives
Operating Environment	NEMA 12; IP62
Operating Temperature [C (F)]	Transmitted beam: 0...+50° (32...+122°) Retroreflective/diffuse: -10...+50° (14...+122°)
Vibration	10...55 Hz, 1.5 mm amplitude, 2 hours, X, Y, and Z direction
Shock	500 m/s, 3 times X, Y, and Z direction
Ambient Light Immunity	10,000 lux max
Optical	
Sensing Modes	Transmitted beam or retroreflective/diffuse selectable
Sensing Range	Transmitted beam or retroreflective: 2 m (6.5 ft), Diffuse: 400 mm (15.7 in.)
Field of View	
Light Source	Infrared LED (880 nm) or visible red (640 nm)
LED Indicators	See Approximate Dimensions on page 1-173
Adjustments	DIP switches
Electrical	
Voltage	12...264V DC
Current Consumption	46 mA max
Sensor Protection	Short circuit protection
Outputs	
Response Time	See Product Selection table on page 1-174
Output Type	PNP or NPN output selectable
Output Mode	Light or dark operate selectable
Output Current	50 mA @ 30V DC max
Output Leakage Current	10 µA max
Mechanical	
Housing Material	Aluminum
Lens Material	Polycarbonate
End Plate Material	Resin
Connection Types	4-pin DC micro (M12) QD on 2 m pigtail
Supplied Accessories	Basic mounting brackets, reflective tape (retro/diffuse models)
Optional Accessories	See mounting brackets, reflectors, and cordsets on page 1-174

Features

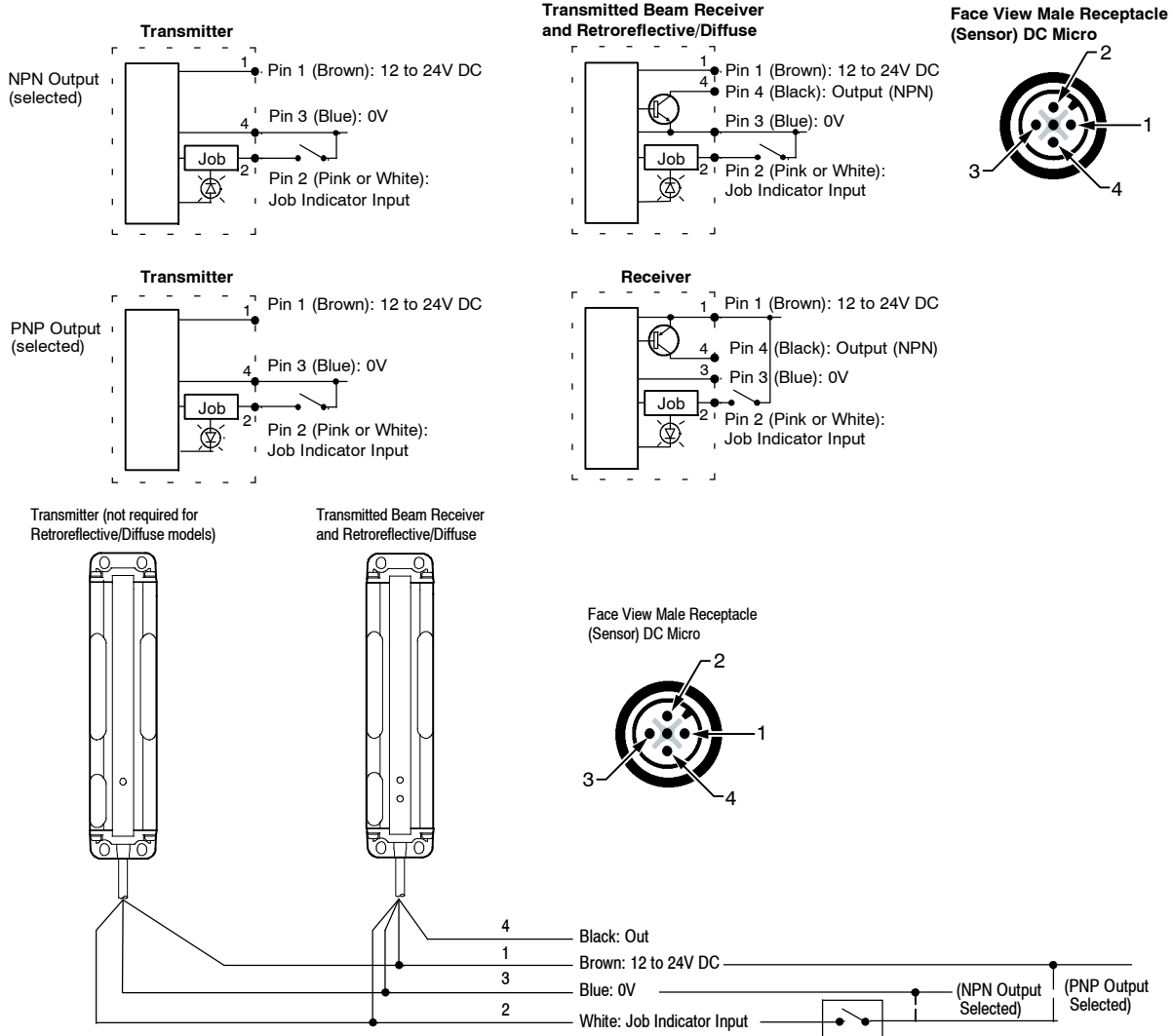
- Robust metal enclosure with super slim 13 mm profile
- Large highly-visible job indicator lights
- Optional red fault light indicator to notify operator of incorrect component selection
- Dip switch selectable lighting operation for job lights
- NPN or PNP dip switch selectable output reduces inventory
- Two frequency dip switch selectable crosstalk protection
- Different sizes are available for different component racks. Transmitted beam models are available in four sizes (100 mm (4 in.), 225 mm (9 in.), 300 mm (12 in.), and 375 mm (15 in.)). Retroreflective/diffuse models are available in two sizes (100 mm (4 in.) and 225 mm (9 in.)).

45PVA Verification Array

Slim Type Picking Sensor

Input/Output Circuit and Wiring Diagrams

The NPN/PNP input of the job indicator and the NPN/PNP output are selected by mode switch.

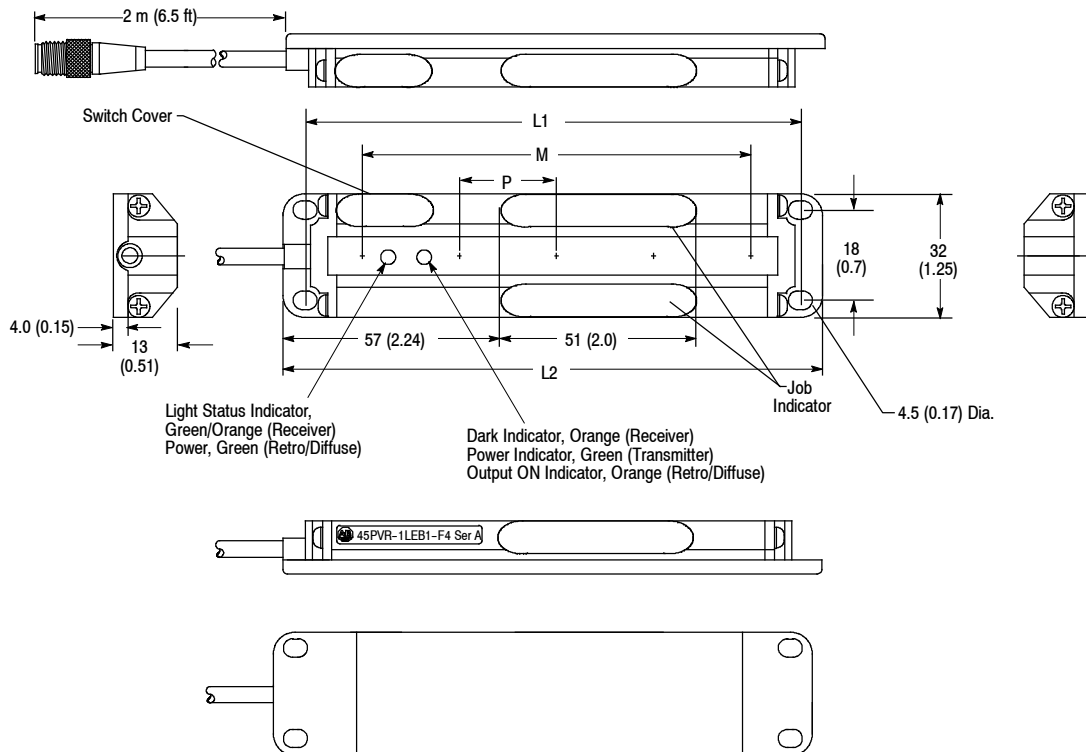


45PVA Verification Array

Slim Type Picking Sensor

Approximate Dimensions [mm (in.)]

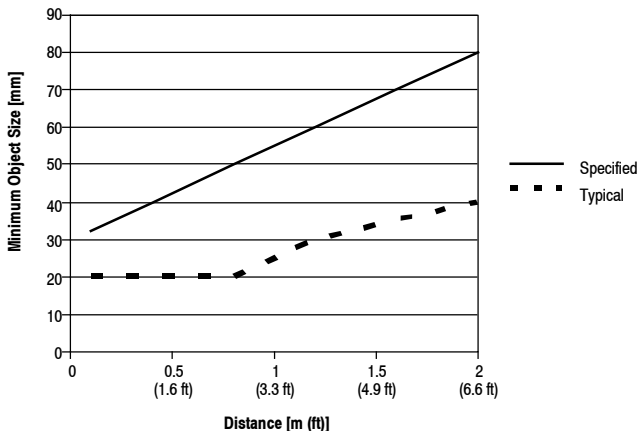
Dimensions are not intended to be used for installation purposes.



Approximate Dimensions [mm (in.)]					Cat. No.
N	M	L1	L2	P	
5	100 (3.9)	130 (5.1)	140 (5.5)	25 (1.0)	45PVA-1LEB1-F4
10	225 (8.9)	255 (10.0)	265 (10.4)	25 (1.0)	45PVA-1LEB2-F4
13	300 (11.8)	330 (13.0)	340 (13.4)	25 (1.0)	45PVA-1LEB3-F4
16	375 (14.8)	405 (16.0)	415 (16.3)	25 (1.0)	45PVA-1LEB4-F4
4	87 (3.4)	130 (5.1)	140 (5.5)	29 (1.1)	45PVA-2LEA1-F4
8	203 (8.0)	255 (10.0)	265 (10.4)	29 (1.1)	45PVA-2LEA2-F4

Minimum Detectable Object Size

Retroreflective Mode



45PVA Verification Array

Slim Type Picking Sensor

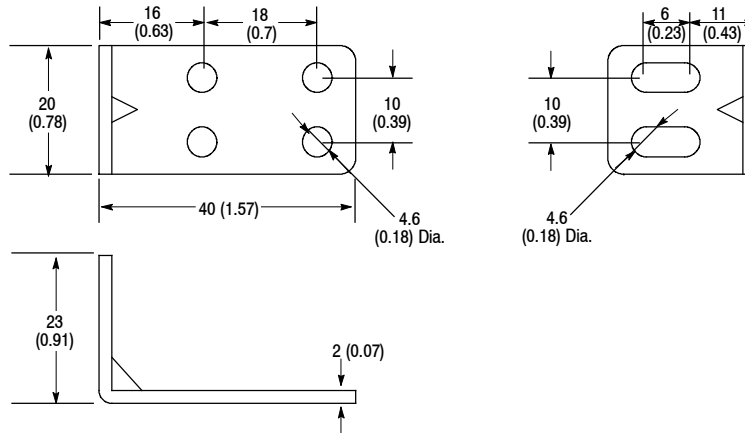
Product Selection

Sensing Mode	Light Source	Number of Optical Axis [mm (in.)]	Detection Width [mm (in.)]	Current Consumption	Response Time	Cat. No.
Transmitted Beam	Infrared LED, Wave-length 880 nm	5	100 (3.93)	130 mA	Standard: Standard: Light on: 35 ms/Dark on: 25 ms Interference Protection: Light on: 45 ms/Dark on: 28 ms	45PVA-1LEB1-F4
		10	225 (8.85)	140 mA	Standard: Light on: 68 ms/Dark on: 42 ms Interference Protection: Light on: 84 ms/Dark on: 52 ms	45PVA-1LEB2-F4
		13	300 (11.8)	150 mA	Standard: Light on: 70 ms/Dark on: 42 ms Interference Protection: Light on: 88 ms/Dark on: 54 ms	45PVA-1LEB3-F4
		16	375 (14.7)	155 mA	Standard: Light on: 94 ms/Dark on: 58 ms Interference Protection: Light on: 116 ms/Dark on: 72 ms	45PVA-1LEB4-F4
Retroreflective/ Diffuse	Visible Red LED, 640 nm	4	100 (3.93)	68 mA	120 ms	45PVA-2LEA1-F4
		8	225 (8.85)	78 mA		45PVA-2LEA2-F4

Accessories

Mounting Brackets

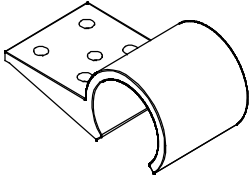
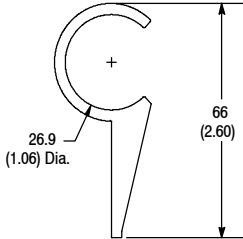
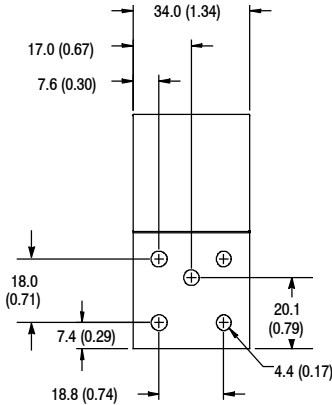
#60-2773 (2 brackets)
(included)



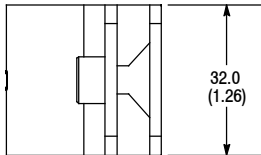
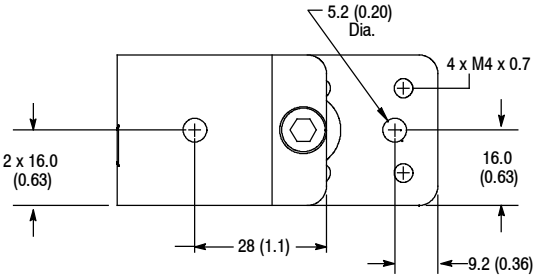
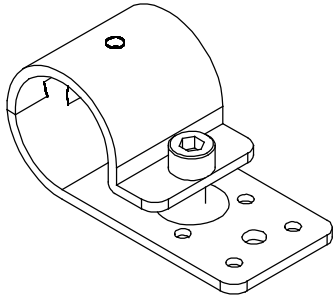
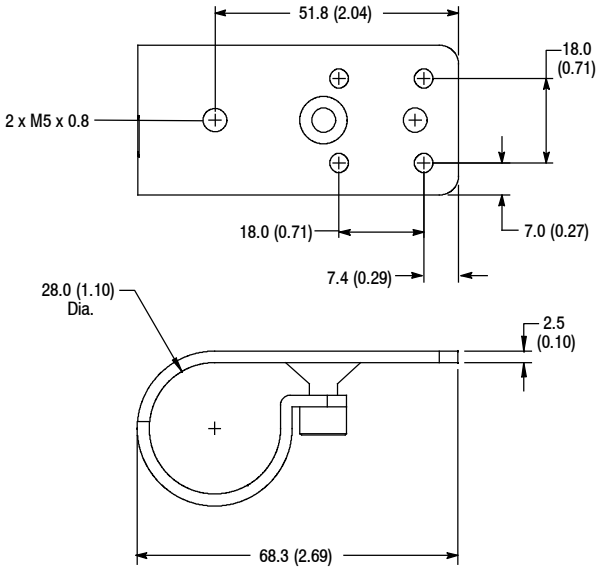
Optional Mounting Brackets

Mounting brackets available as an option (not included with sensor).

Plastic Bracket #60-2779 (2 brackets)



Metal Bracket #60-2772 (2 brackets)



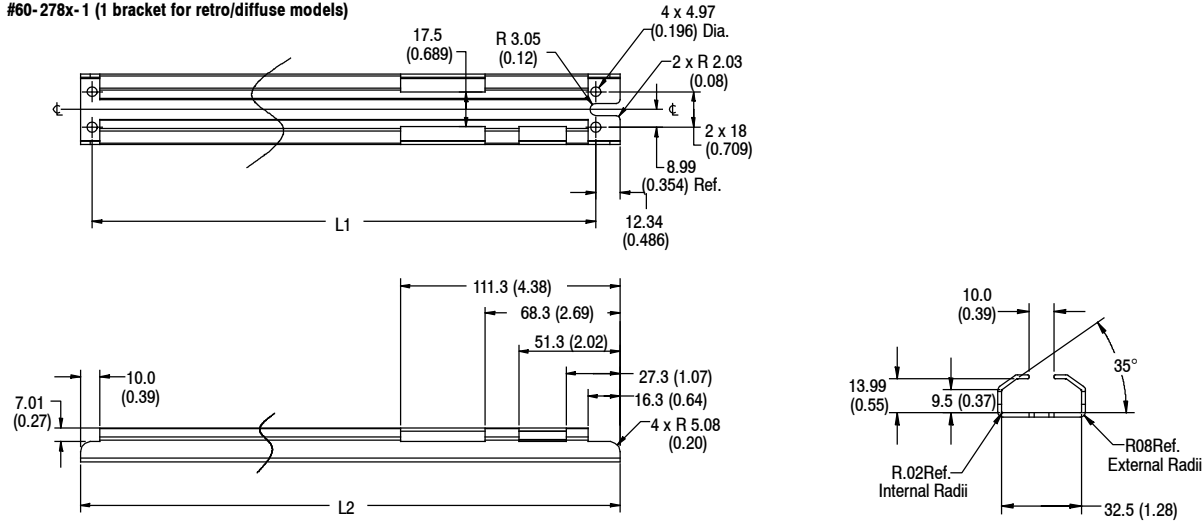
45PVA Verification Array

Slim Type Picking Sensor

Protective Metal Bracket

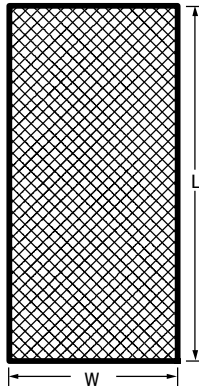
#60-277x-1 (2 brackets for transmitted beam models)

#60-278x-1 (1 bracket for retro/diffuse models)



L1 [mm (in.)]	L2 [mm (in.)]	Material	Cat. No. (1 Bracket)	Cat. No. (2 Brackets)
130 (5.11)	148.36 (5.84)	Galvanized Steel	60-2785-1	60-2775-1
254 (10.03)	273.35 (10.76)		60-2786-1	60-2776-1
330 (12.99)	348.36 (13.71)		NA	60-2777-1
405 (15.94)	423.34 (196.6)		NA	60-2778-1

Reflective Tape (included with retroreflective/diffuse models)



Dimensions		Reflective Tape Cat. No.	Included with Cat. No.
Width [mm (in.)]	Length [mm (in.)]		
50 (2)	120 (4.7)	—	45PVA-2LEA1-F4
50 (2)	245 (9.6)	—	45PVA-2LEA2-F4
25 (1)	2540 (100)	92-100	—



Description

The 44N provides an economical, noncontact, solution to zero pressure accumulation conveyor systems by combining built-in zone control with a photoelectric sensor. This simple approach replaces the conventional mechanical switch sensing device, central PLC, and large quantities of interconnecting wiring.

The use of a photoelectric sensor eliminates the need for minimum weight restrictions required by mechanically actuated switches. The polarized retroreflective sensing mode ensures reliable detection of even shiny packages over a 4.8 m (16 ft) range.

The 44N comes complete with micro QD connections to both an upstream and downstream 44N along with a variety of connection options for common pneumatic valves. Power for the 44N and the valve is distributed through these connections.

The zone logic of the 44N ensures that product being loaded on the conveyor will be separated into zone length gaps thus providing zero pressure accumulation throughout the conveyor system. Once product has accumulated, it may be released individually (singulate) or simultaneously as a train (slug). This release is activated through an external contact closure.

Features

- Singulation release
- Slug release
- Adjustable 200 ms...10 secs ON (run) delay
- NEMA 4X rated

Specifications

Environmental	
Certifications	cULus Listed and CE Marked for all applicable directives
Operating Environment	NEMA 4, 4X, 6, 12; IP67
Operating Temperature [C(F)]	-20...+70° (-4...+158°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...95% (noncondensing)
Optical	
Sensing Modes	Polarized retroreflective
Sensing Range	50.8 mm...4.8 m (50.8 in...16 ft) with 92-39 reflector
Field of View	1.5°
Light Source	Visible red (660 nm)
Adjustments	On delay (200 ms...10 s), DIP switch
LED Indicators	Green output LED indicator
Electrical	
Voltage	10...30V DC
Current Consumption	20 mA max
Sensor Protection	Overload, short circuit, reverse polarity, false pulse
Outputs	
Response Time	2 ms
Output Type	PNP
Output Mode	Light or dark operate selectable by dip switch (1 L.O., 0 D.O.)
Output Current	100 mA @ 30V DC max
Mechanical	
Housing Material	Valox®
Lens Material	Acrylic
Connection Types	838 mm (33 in.) pigtail with 4-pin DC male micro QD (downstream) 838 mm (33 in.) pigtail with 4-pin DC female micro QD (upstream) Cable connector for load (see Product Selection table)
Supplied Accessories	129-130 mounting nut
Optional Accessories	See mounting brackets, reflectors, and cordsets on page 1-179

System Overview, Installation, and Operation

Install one 44N at the downstream side of each zone and make both upstream and downstream connections using the micro QD connectors. Connect the actuator lead of the 44N to the valve within its zone. Using an **889D-F4BC-2** cordset, connect 24V DC to a suitable power supply. A 4A supply will provide power for up to 25 zones when using a 1W pneumatic valve. Connect the black lead to the singulation release push button and the white lead to the slug release push button. Both push buttons should be normally open and maintained.

Loading Product Onto the Conveyor

With power applied to the system, all zones will immediately drive feeding product onto the conveyor. As product passes the 44N mounted at the infeed zone, a gap will be formed equal to the zone length. This will ensure zero pressure throughout the system. Once the first product reaches the discharge zone (1), it will stop and await release from the conveyor.

Release of Product from the Conveyor:

Once product has been transported and accumulated at the discharge end of the conveyor (Zone 1), it may be released in one of two manners.

Singulation Release

With the singulation release signal active, only product in the discharge zone (1) will release. As the product clears the sensor, the adjacent upstream zones will advance into the discharge zone. Product will continue to discharge as long as the zone release push button remains closed.

Slug Release

With the slug release push button closed and maintained, all accumulated product on the conveyor will release simultaneously. When the slug release push button is released, the remaining product will resume normal accumulation. This function overrides the 44N logic and can be used to load and unload product as a slug.

Figure 1. System Overview

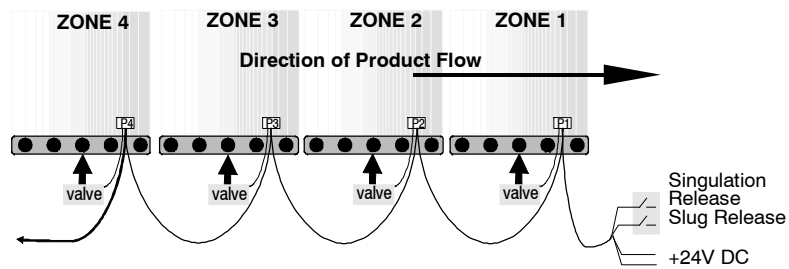


Figure 2. Loading the Conveyor

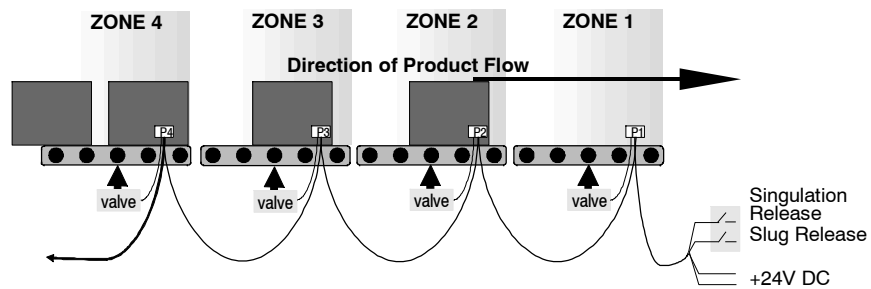


Figure 3. Singulation Release of Accumulated Product

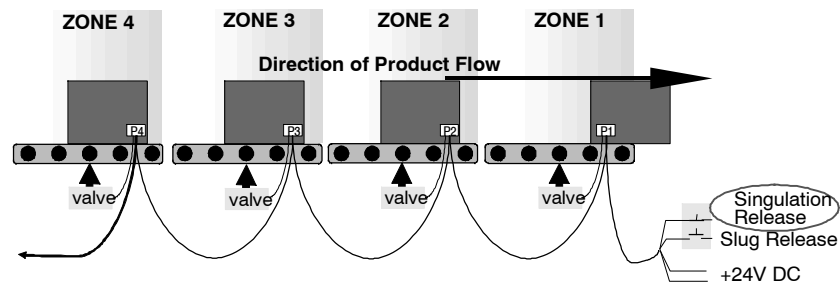
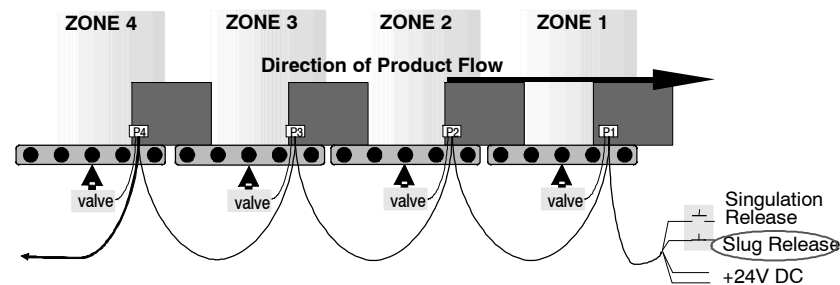
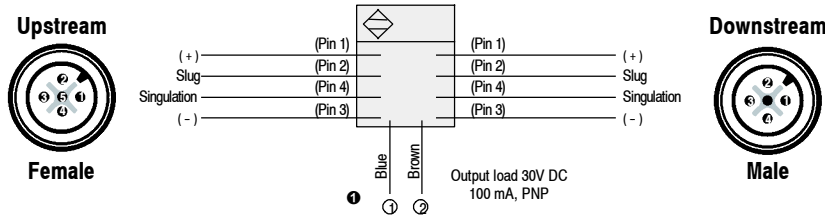


Figure 4. Slug Release of Accumulated Product



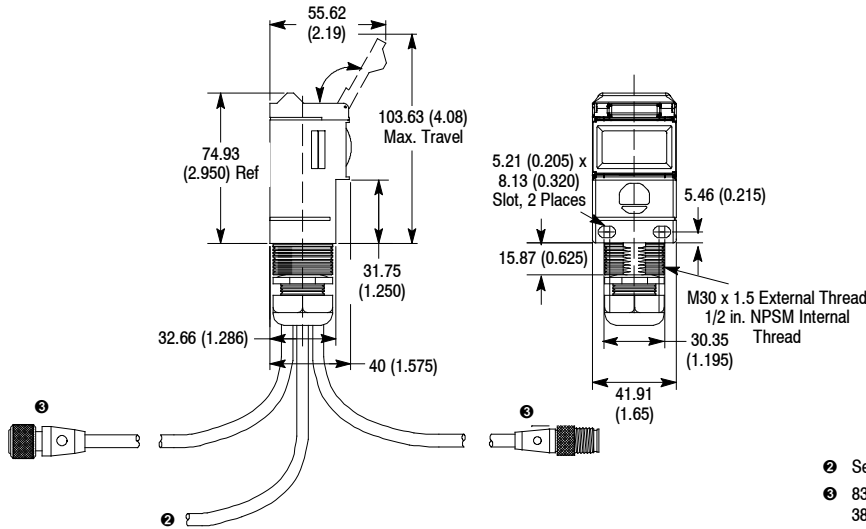
Refer to www.ab.com/sensors for more information.

Wiring Diagrams

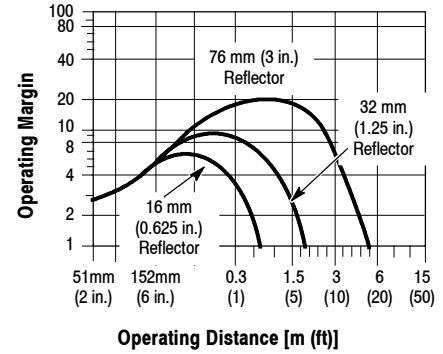


① Product comes with 22 AWG cable. Contact Rockwell Automation for DIN valve connection options.

Approximate Dimensions [mm (in.)]



Typical Response Curve



② See Product Selection table below for connection information.
③ 838 (33) pigtail for 44NSP-2JPBD5-Z01 and 44NSP-2JPBD5-Z02.
381 (15) pigtail for 44NSP-2JPBD5-Z03.

Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Load Connection Type	Cat. No.③
 Polarized Retroreflective Field of View: 1.5° Emitter LED: Visible red 660 nm	10...30V DC 40 mA	50.8 mm... 4.87 m (2 in...16 ft)	Light Operate	PNP 100 mA Variable 200 ms to 10 seconds	304.8 mm (12 in.) cable	44NSP-2JPBD5-Z01
					533.4 mm (21 in.) right angle pico (M8) female QD	44NSP-2JPBD5-Z02
						44NSP-2JPBD5-Z03

④ See Approximate Dimensions.

Cordsets and Accessories

Description	Cat. No.	Description	Cat. No.	Description	Cat. No.
Male cordset, 2 m cable	889D-M4BC-2	Patchcord, 3.3 ft	889F-F4BCDM-1	Torx screw	129-135
Reflector, 3 in. diameter	92-39	Cordset, for external release	889D-F4BC-2	Torx screwdriver	57-144
Mounting Bracket, for 44N	60-2439	Power Supply (24V DC/4 A)	1606-XLP100E		

PHOTOSWITCH® Photoelectric Sensors
22ZC Zone Controller



Description

The 22ZC Zone Controller bridges the gap between the 44N Zone Control Sensor and the 1799 embedded I/O module solutions. It offers the simplicity of a smart sensor, yet provides many of the advanced zone logic functions found in a networked, programmable device.

By placing the zone logic in a single zone controller, the user is given the flexibility to choose from a variety of both sensor input types (mechanical, optical) and actuator types (pneumatic, powered roller, DC motor).

The 22ZC uses a proven, industrial, IDC displacement flat media scheme for a high power transfer to maximize the number of zones connected to a single power supply.

The 22ZC offers two basic, switch selectable operating modes. First, is the single zone operation which is a run-on-demand system ideally suited for powered roller and DC motor applications. The second is a basic mode which provides a constant drive for both zero and low pressure accumulation.

Other advanced logic functions include selectable ON (RUN) and OFF (STOP) time delays, power conservation, jam detection, along with air-to-drive and air-to-brake operation.

Specifications

Environmental	
Certifications	cULus Listed and CE Marked for all applicable directives
Operating Environment	NEMA 1; IP50
Operating Temperature [C (F)]	0...+50° (32...+122°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...85% (noncondensing)
Zone Control	
Zone Logic	Switch selectable single or basic operating modes for zero and low pressure accumulation with singulation and slug release
Advanced Zone Logic	JAM respond function, sleep function, air-to-drive or air-to-brake operation, ON/OFF time delays
Adjustments	Rotary switches, DIP switches
LED Indicators	Orange (zone status, fault)
Electrical	
Voltage	24V DC
Current Consumption	16 mA max
Sensor Protection	Over-voltage, reverse polarity, short-circuit (SCP)
Outputs/Inputs	
Response Time	1 ms
Sensor Input	NPN
Actuator Output	NPN
Output Mode	Light or dark operate selectable by dip switch (1 L.O., 0 D.O.)
Actuator Output Current	100 mA @ 24V DC max
Mechanical	
Housing Material	Valox®
Lens Material	Acrylic
Connection Types	Input: 3-pin MOLEX; Output: 4-pin MOLEX; Power/Signal: IDC Cable
Required Accessories	Sensing device, actuating device, flat media
Optional Accessories	Mounting brackets, reflectors, cordsets

System Overview for Pneumatically Driven Conveyor Systems

Install one 22ZC in each zone of the conveyor and attach a suitable sensing and actuating device. Note that the infeed module (22ZC-343) must be installed at the beginning of your zone control system (zone 4 on Figure 1 on page 1-182) and the master module (22ZC-413) at the discharge end of your system (zone 1 on Figure 1). Size, cut and install the flat media between each controller. Connect a suitable 24V DC power supply to any controller within the system. It is recommended to make this connection to the center controller for balanced power distribution. A 4 A power supply will provide power for up to 25 zones when using a 1 W pneumatic valve. Wire the infeed and discharge zone external connection as required using the wiring diagram shown on Figure 1.

Loading Product Onto the Conveyor (Figure 2 on page 1-182)

With power applied to the system, all zones will immediately drive feeding product onto the conveyor. As product passes the sensor mounted at the infeed zone, a gap will be formed equal to the zone length. This will ensure zero pressure throughout the whole system. Once the first product reaches the discharge zone (zone 1), it will stop and await release from the conveyor.

Release of Product

Once the product has been transported and accumulated at the discharge end of the conveyor (zone 1) it may be release in one of two manners:

Singulation Release (Figure 3 on page 1-182)

With the singulation release signal activate, only product in the discharge end of the conveyor (zone 1) will release. As the product clears the sensors, the adjacent upstream zones

will advance into the discharge zone. Product will continue to discharge as long as the singulation release signal remains active.

Slug Release (Figure 4 on page 1-182)

With the slug release signal active, all accumulated product on the conveyor will release simultaneously. When the slug release signal is deactivated, the remaining product will resume normal accumulation. Predetermined slug lengths can be configured through the use of the slug respond switch on each controller.

For more information on these and other features refer to the 22ZC installation instructions or visit our website at www.ab.com/sensors.

System Overview for Powered Roller Driven Conveyor Systems

Install one 22ZC in each zone of the conveyor and attach a suitable sensing and actuating device. Note that the infeed module (22ZC-343) must be installed at the beginning of your zone control system (zone 4 on Figure 1) and the master module (22ZC-413) at the discharge end of your system (zone 1 on Figure 1). Size, cut and install the flat media between each controller.

Connect a suitable 24V DC power supply to any controller within the system. It is recommended to make this connection to the center controller for balanced power distribution. Note that the power for the powered roller and amplifier are not provided by the 22ZC, only the RUN signal. Wire the infeed and discharge zone external connection as required using the wiring diagram shown on Figure 1.

Loading Product onto the Conveyor (Figure 2 on page 1-182)

With power applied to the system, all zones will be OFF until either the infeed

sensor is blocked or the zone feed input is closed and maintained. As product passes the sensor mounted at the infeed zone, a gap will be formed equal to the zone length. This will ensure zero pressure throughout the whole system. Once the first product reaches the discharge zone (zone 1), it will stop and await release from the conveyor. If a low pressure accumulation is desired, a system wide OFF time delay can be configured to minimize product spacing on the conveyor.

Release of Product

Once the product has been transported and accumulated at the discharge end of the conveyor (zone 1) it may be release in one of two manners:

Singulation Release (Figure 3 on page 1-182)

With the singulation release signal activate, only product in the discharge end of the conveyor (zone 1) will release. As the product clears the sensors, the adjacent upstream zones will advance into the discharge zone. Product will continue to discharge as long as the singulation release signal remains active.

Slug Release (Figure 4 on page 1-182)

With the slug release signal active, all accumulated product on the conveyor will release simultaneously. When the slug release signal is deactivated, the remaining product will resume normal accumulation. Predetermined slug lengths can be configured through the use of the slug respond switch on each controller.

For more information on these and other features refer to the 22ZC installation instructions or visit our website at www.ab.com/sensors.

Figure 1. System Overview

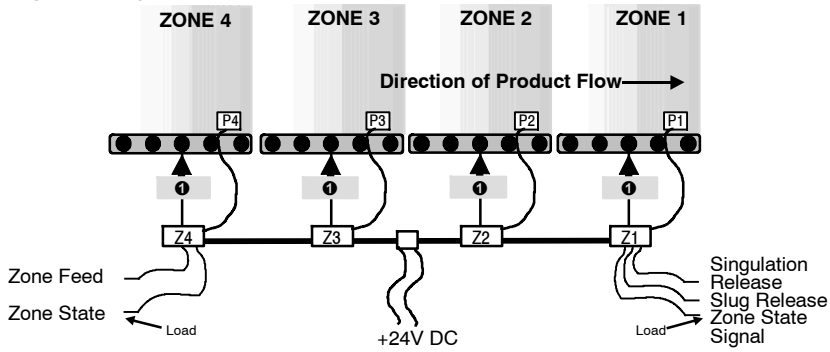


Figure 2. Loading the Conveyor

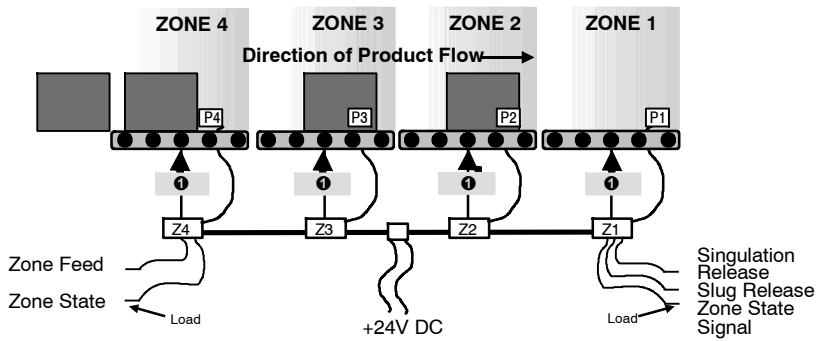


Figure 3. Singulation Release of Accumulated Product

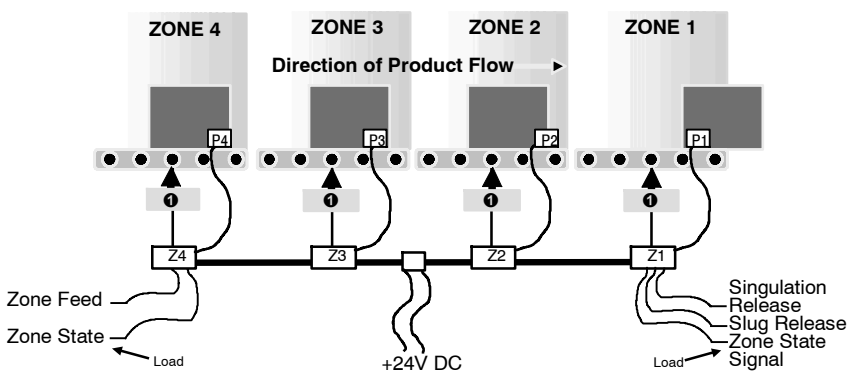
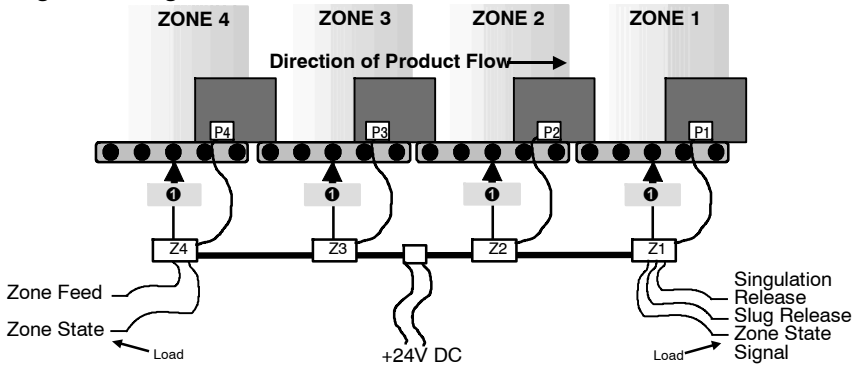


Figure 4. Slug Release of Accumulated Product



● Amplifier or Valve

System Overview for Powered Roller Driven Conveyor Systems

Install one 22ZC in each zone of the conveyor and attach a suitable sensing and actuating device. Size, cut and install the flat media between each controller. Using a 22ZC-PWR cordset, connect to a suitable 24V DC power supply to any controller within the system. It is recommended to make this connection to the center controller for maximum power distribution. A 4A supply will provide power for up to 50 zones. Note that the power for the powered roller and amplifier are not provided by the 22ZC, only the RUN signal. Wire the infeed and discharge zone external connections as required using the wiring diagram to the right. Note that the zone and slug release,

and the zone feed push buttons should be normally open and maintained.

Loading Product onto the Conveyor

With power applied to the system, all zones will be OFF until either the infeed sensor is blocked or the zone feed contact is closed and maintained. As product passes the sensor mounted at the infeed zone, a gap will be formed equal to the zone length. This will ensure zero pressure throughout the system. Once the first product reaches the discharge zone (1), it will stop and await release from the conveyor. If a low pressure accumulation is desired, a system-wide, 1 second OFF time delay can be configured to minimize product spacing on the conveyor.

Release of Product

Once product has been transported and accumulated at the discharge end of

the conveyor (Zone 1), it may be released in one of two manners.

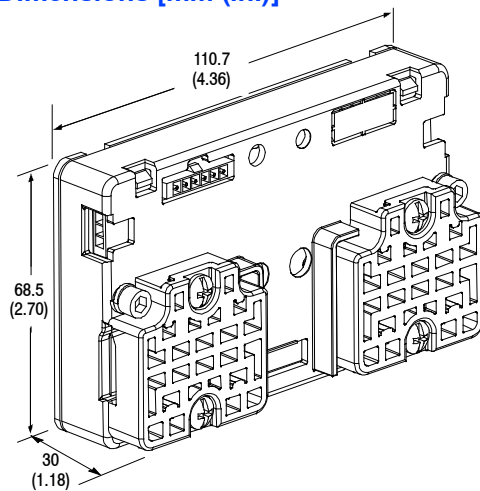
Singulation Release

With the zone release push button closed and maintained, only product in the discharge zone (1) will release. As the product clears the sensor, the adjacent upstream zones will advance into the discharge zone. Product will continue to discharge as long as the zone release push button remains closed.

Slug Release

With the slug release push button closed and maintained, all accumulated product on the conveyor will release simultaneously. When the slug release push button is released, the remaining product will resume normal accumulation. Predetermined slug lengths can be configured through the use of the SLUG RESPOND switch on each controller.

Approximate Dimensions [mm (in.)]



Description	Cat. No.	Description	Cat. No.	Description	Cat. No.
Zone Controllers	22ZC-413 (master)	Flat Media, 75 m spool	1485C-P1L75	Reflector, 3 in. diameter	92-39
	22ZC-223 (basic)	Power Supply, 24V DC/4 A	1606-XLP100E	Mounting Bracket, sensor	60-2657
	22ZC-343 (infeed)	Power Tap	22ZC-PWR		
Photoelectric Sensor	44RSP-2JNE3-Z6	Power Tap, IDC	1485T-P1H4-R5		

Refer to www.ab.com/sensors for more information.



Description

The Series 9000 transmitted beam photoelectric sensors are designed and approved as an intrinsically safe device under the FM and CSA entity concept. It may be installed into a Class I, II, III; Division 1 hazardous location when connected to an appropriate safety barrier. The sensor is also approved as non-incendive for installation into Class I; Division 2 hazardous locations without the need for a safety barrier.

Typical applications

- Automotive
- Petrochemical
- Grain processing

Information on the Series 897H intrinsic safety barriers may be found on page 12-2.

Features

- Intrinsically safe to North American standards
- Transmitted beam sensing mode
- Compatible with Series 897H intrinsic safety barriers
- 30 mm harsh duty package
- Fast response time
- Variety of connection types

Specifications

Environmental	
Certifications	UL Listed, FM Approved, and CE Marked for all applicable directives
Operating Environment	NEMA 3, 4X, 6P, 12, 13; IP67, 1200 psi washdown, IP69K
Operating Temperature [C (F)]	-40...+65° (-40...+150°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...95% max
Ambient Light Immunity	Incandescent light 5000 lux
Optical	
Sensing Modes	Transmitted Beam
Light Source	Infrared LED (880 nm)
LED Indicators	Red LED for output indication
Adjustments	Sensitivity potentiometer
Electrical	
Voltage	13...30V DC
Current Consumption	25 mA max
Sensor Protection	Overload, short circuit, reverse polarity, false pulse
Outputs	
Response Time	10 ms max
Output Type	PNP and NPN
Output Mode	Light operate and dark operate selectable
Output Current	8.5 mA for PNP, 15 mA for NPN
Output Leakage Current	10 µA max
Mechanical	
Housing Material	Valox®
Lens Material	Acrylic
Connection Types	2 m cable, 4-pin DC micro (M12) QD, 4-pin DC mini QD
Supplied Accessories	129-130 mounting kit
Optional Accessories	Series 897H intrinsic safety barriers, cordsets, mounting brackets

Selection Guide for Intrinsic Safety Barriers

The 42GRx-95x0 is approved as an intrinsically safe apparatus under the entity concept by FM and CSA. Therefore, any safety barrier which meets both the stated operational and safety requirements (see Table 1) of the

sensor may be used. Note that the sensor is also approved as non-incendive (FM) for installation into Class I; Division 2 hazardous locations without the need for a safety barrier.

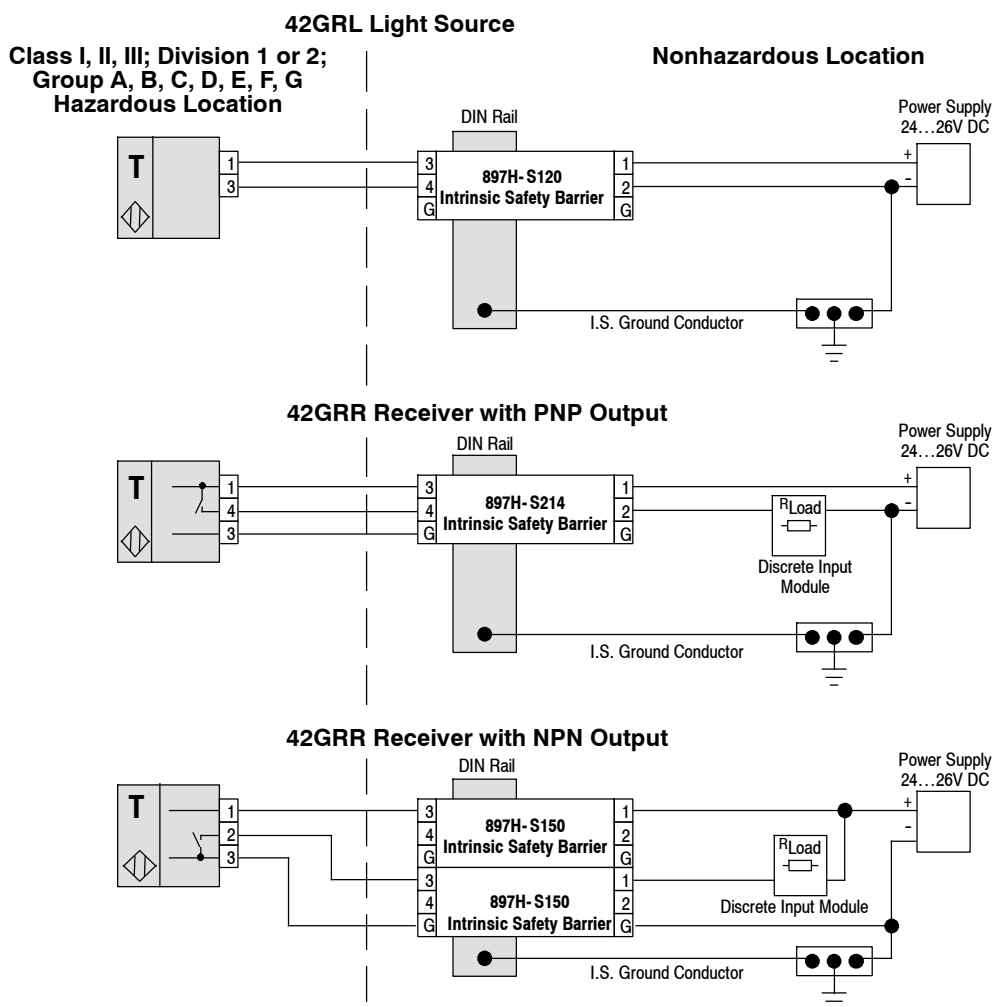
**Table 1
Entity Parameters**

	Sensor		Barrier
V_{max}	31.5V	≥	V_t
I_{max}	150 mA	≥	I_t
P_{max}	0.95 W	≥	P_t
$C_i + C_{leads}$	0 µF	≤	C_a
$L_i + L_{leads}$	0 mH	≤	L_a

User Interface

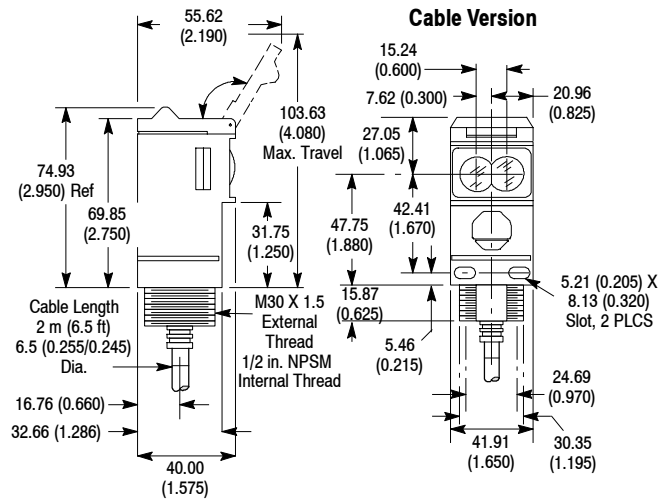
Label	Color	State	Status
Output	Green	OFF	Sensor output de-activated
		ON	Sensor output activated
Margin/SCP	Red	OFF	Margin <2.5
		ON	Margin >2.5
		Flashing	Output SCP active
Power	Yellow	OFF	Sensor not powered
		ON	Sensor powered

Wiring Diagrams

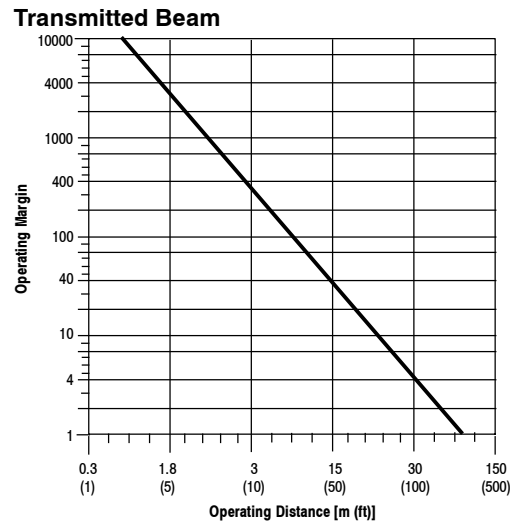


IMPORTANT See Control Drawing #75002-200.

Approximate Dimensions [mm (in.)]



Typical Response Curve



Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Connection Type	Cat. No.
Light Sources	14...30V DC 16 mA	25.4 mm...106 m (2 in...350 ft)	—	—	2 m 300V cable	42GRL-9540
					4-pin micro	42GRL-9540-QD
					4-pin mini	42GRL-9540-QD1
Receivers						
 Transmitted Beam Object to be Sensed Field of View: 1.5° Receiver Emitter LED: Infrared 880 nm	13...30V DC 25 mA	25.4 mm...106 m (2 in...350 ft)	Light/Dark Operate	NPN/15 mA PNP/8.5 mA 10 ms max.	2 m 300V cable	42GRR-9500
					4-pin micro	42GRR-9500-QD
					4-pin mini	42GRR-9500-QD1

Cordsets and Accessories

Description	Cat. No.
1.8 m (6 ft) 4-pin, Mini QD Cordset	889N-F4AF-6F ❶
2 m (6.5 ft) 4-pin, DC Micro QD Blue Cordset	889D-F4LC-2 ❷
Mounting Bracket	60-2439

- ❶ Intrinsically Safe wiring labels 897H-L1 or 897H-L2 must be applied every 7.6 m (25 ft).
- ❷ Blue cable does not require labels to denote intrinsically safe wiring.



Description

The Series 5000 intrinsically safe sensors are designed for the installation in hazardous locations. They can be used in Class I, II, III; Division 1, 2; groups A, B, C, D, E, F, and G locations with intrinsic Safety Zener Diode Barriers. They can also be used in Class I, II, II; Division 2 only without intrinsic safety zener diode barriers.

Features

- Intrinsically Safe to North American standards
- Nonincendive for Division 2 hazardous (classified) locations
- Modular package for increased flexibility
- Wide variety of sensing modes
- Selectable light/dark operation
- Both NPN and PNP outputs
- Screw terminal connections

Specifications

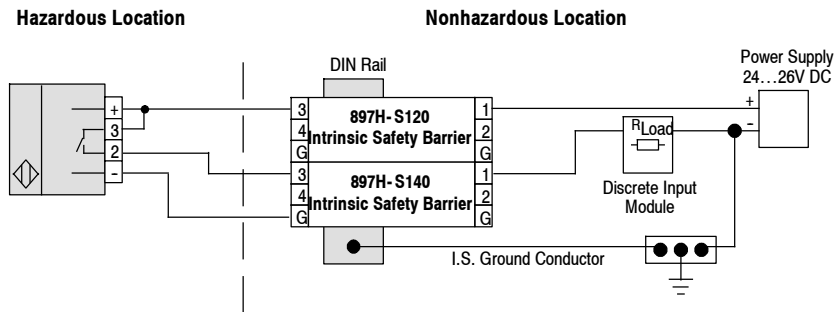
Environmental	
Certifications	UL Listed, FM Approved, and CE Marked for all applicable directives
Operating Environment	NEMA 3, 4, 12, 13; IP66
Operating Temperature [C (F)]	-40...+65° (-40...+150°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	90% max
Ambient Light Immunity	Incandescent light 5000 lux
Optical	
Sensing Modes	Retroreflective, diffuse, polarized retroreflective, fiber optic
Sensing Range	See Product Selection table on page 1-189
Field of View	See Product Selection table on page 1-189
Light Source	Infrared LED (880 nm)
LED Indicators	Red LED for output indication
Adjustments	Sensitivity potentiometer
Electrical	
Voltage	24V DC with suitable intrinsically safe barrier
Current Consumption	30 mA max
Sensor Protection	False pulse
Outputs	
Response Time	1 ms
Output Type	PNP and NPN
Output Mode	Light and dark operate selectable
Output Current	20 mA @ 28V DC
Output Leakage Current	1 μA
Mechanical	
Housing Material	Valox®
Lens Material	Acrylic (glass on polarized lens)
Connection Types	2 m (6.5 ft) cable, screw terminal
Supplied Accessories	None
Optional Accessories	See mounting brackets, reflectors, and cordsets on page 1-190

User Interface

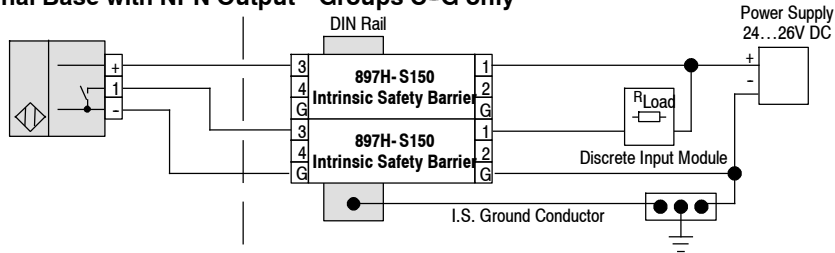
Label	Color	State	Status
Output	Red	OFF	Sensor output de-activated
		ON	Sensor output activated

Wiring Diagrams

Photohead and Terminal Base with PNP Output



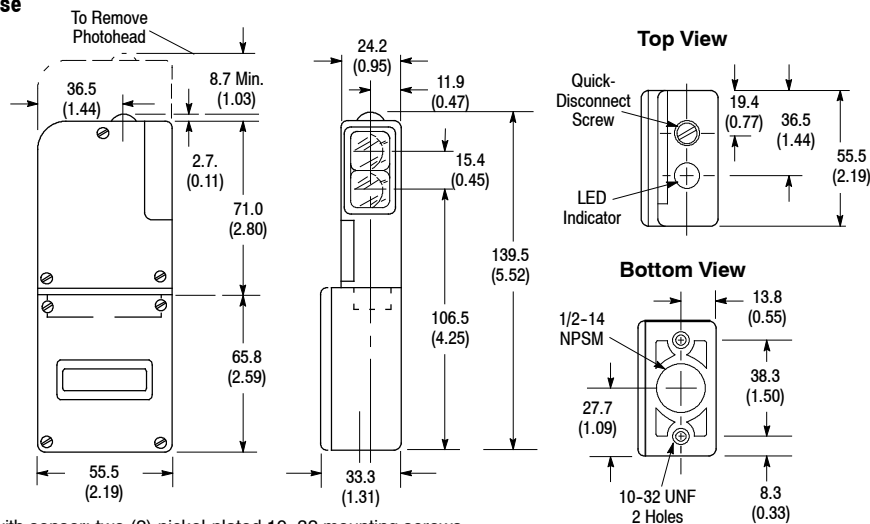
Photohead and Terminal Base with NPN Output—Groups C-G only



IMPORTANT See Control Drawing #133-451.

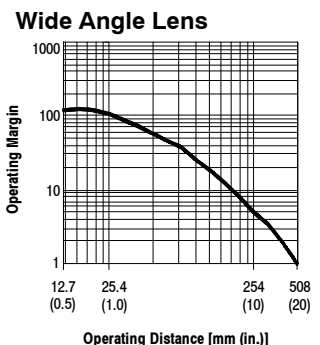
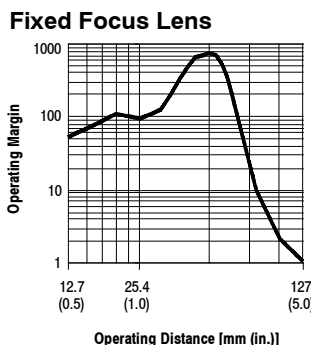
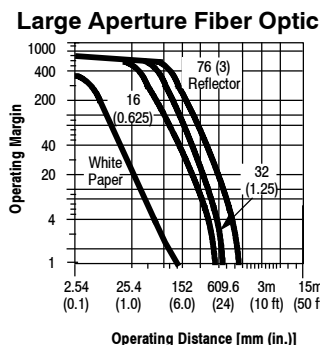
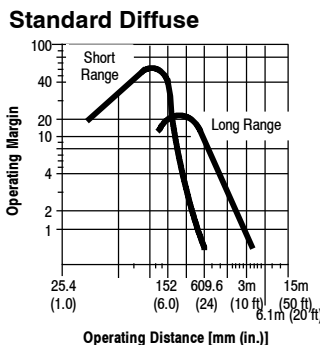
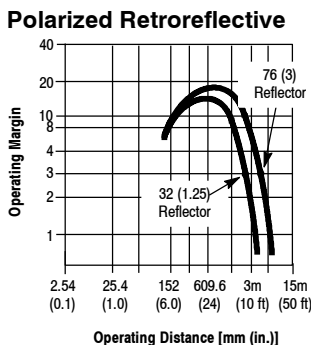
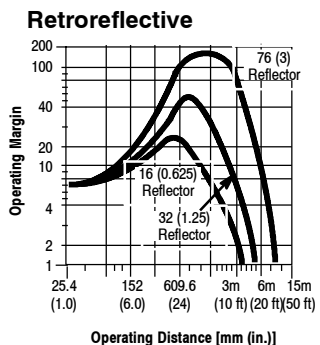
Approximate Dimensions (Applies to all versions) [mm (in.)]

Terminal Style Power Base



Note: Hardware included with sensor: two (2) nickel-plated 10-32 mounting screws.

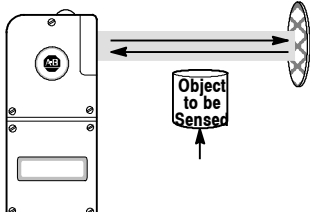
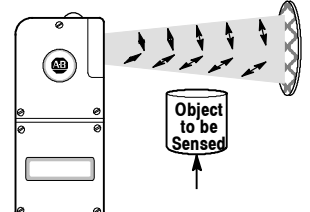
Typical Response Curve



Fibers #43GR-FAS25SSL through #43GR-BAA72ML
See Fiber Optic section in this catalog for additional information.

Product Selection

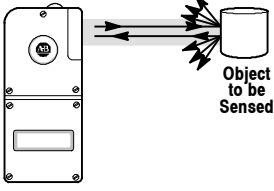
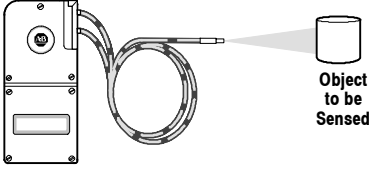
Photohead

Sensing Mode	Sensing Distance	Output Energized	Output Type Capacity	Response Time	Cat. No.
 Retroreflective Field of View: 2.5° Emitter LED: Infrared 880 nm	50.8 mm... 10 m (2 in... 33 ft) with 76 mm (3 in.) Reflector	Light/Dark Selectable	NPN and PNP 20 mA at 29.5V DC	1 ms	42DRU-5500
 Polarized Retroreflective Field of View: 2.5° Emitter LED: Visible 660 nm	50.8 mm... 6 m (2 in... 20 ft) with 76 mm (3 in.) Reflector	Light/Dark Selectable	NPN and PNP 20 mA at 29.5V DC	1 ms	42DRU-5700

Refer to page 1-190 for cordsets and accessories.

Product Selection (continued)

Photohead

Sensing Mode	Sensing Distance	Output Energized	Output Type Capacity	Response Time	Cat. No.
 <p>Standard Diffuse</p> <p>Field of View: 3° Emitter LED: Infrared 880 nm</p>	50.8 mm (2 in.)...Short Range: 0.4 m (16 in.) Long Range: 2.1 m (7 ft) with White Paper	Light/Dark Selectable	NPN and PNP 20 mA at 29.5V DC	1 ms	42DRP-5500
 <p>Large Aperture Fiber Optic</p> <p>Field of View: Depends on the glass fiber optics and lens type Emitter LED: Infrared 880 nm</p>	—	Light/Dark Selectable	NPN & PNP 20 mA at 29.5V DC	1 ms	42DRA-5500 ①

① Lens assembly required, see below.

Power Base

Style	Operating Voltage	Supply Current	Cat. No.
Terminal	13...29.5V DC	26 mA max at 13V DC 30 mA max at 29.5V DC	42DTB-5500

Lens Assembly

Lens Type	Cat. No.
Fiber Optic	61-5550
Fixed Focus	61-5551
Wide Angle	61-5611

Cordsets and Accessories

Description	Page No.
Mounting Assemblies	1-293
Intrinsic Safety Barriers	12-2
76 mm (3 in.) Diameter Reflector	92-39
32 mm (1.25 in.) Diameter Reflector	92-47



Description

The MultiSight is an optical multi-pixel sensor with a pass/fail PNP output. The MultiSight uses several different methods of evaluation (pattern matching, contrast, brightness, and contour matching) to detect or differentiate objects by means of previously defined optical characteristics, e.g. for separating “good” and “bad” parts. The main applications are in the field of industrial automation for quality assurance purposes. The MultiSight is an easy-to-use economical alternative to conventional vision systems for detecting presence or absence, completeness, position, markings, labeling, packaging, and components.

Features

- Standalone vision sensor
- Easy handling and setup
- Compact, sturdy industrial housing with IP67 rating
- Integrated lighting
- Optional EtherNet/IP™ connection with RSLogix™ 5000 Add-On Profile for I/O data
- Adjustable focus from 20 mm to infinity
- Short evaluation time (50...250 ms)
- Multiple evaluation methods: pattern matching, brightness, contrast, and contour matching
- Ten or 32 virtual detectors
- Individual virtual detectors can be logically linked or grouped for evaluation of different objects with several characteristics for inspection
- Ethernet connection for setup

Specifications

	Standard Models	EtherNet/IP Models
Certifications	cULus Certified and CE Marked for all applicable directives	
Lighting and Optics		
Imager	640 x 480 pixels, CCD-monochrome; 256 level (8-bit) greyscale	
Lighting	Integrated LEDs; 6 x white, 2 x red	
Lens Type	6 mm or 12 mm integrated lens, adjustable focus	
Field of View	12 mm Lens: @ 200 mm; X = 60 mm, Y = 40 mm 6 mm Lens: @ 200 mm; X = 150 mm Y = 100 mm (see Field of View table for details)	
Sensing Range	Min. range: 20 mm; max. range: infinite but dependent on illumination	
Depth of Field	±5% of focusing distance	
Electrical		
Operating Voltage	24V DC ±10%	
Current Consumption	≤200 mA	
Open Circuit Protection	Short circuit, overload, false pulse, transient noise, reverse polarity	
Outputs	OUT1 (pass/fail), OUT2 (position), OUT3 (illumination), OUT4 (ready)	
Output Type	4 x PNP type (sourcing MOSFET)	
Output Rating	200 mA per output; max. 9.6 W	
Input Type	IN1 (trigger) and IN2 (control); high 10...30V DC, low 0...3V DC	
Ethernet Interface	Configuration only	Configuration (TCP/IP) and I/O (EtherNet/IP)
Mechanical		
Housing Material	Aluminum and ABS Plastic	
Lens Material	Plastic (PMMA)	
LED Indicators	Green: Power; Red: Error; Yellow (2): Q1, Q2 output	
Connection Type	Power-I/O: 8-pin micro QD (M12); Ethernet: 8-pin micro QD (M12)	Power-I/O: 8-pin micro QD (M12); Ethernet: 4-pin d-code micro QD (M12)
Enclosure Type Rating	IP67	
Vibration	10...55 Hz, 1.5 mm amplitude; 3 planes; meets or exceeds IEC 60947-5-2	
Shock	30 g; 11 ms; meets or exceeds IEC 60947-5-2	
Operating Temperature [C (F)]	0...50° (32...122°)	
Accessories		
Supplied Accessory	Dovetail bracket (48MS-BKTD), focus adjustment screwdriver, 3 mounting screws, Allen-wrench, software CD	
Additional Required Accessory	PWR and I/O cordset, ethernet cable	
Optional Accessory	Mounting brackets, cordsets, external lighting, trigger sensors	
Detectors		
Detector Types	Pattern matching, brightness, contrast	Pattern matching, brightness, contrast, contour matching
Number of Detectors	Up to 10 detectors	Up to 32 detectors
Angular Displacement	±5° (for pattern matching); 360° (for contour matching)	
Typical Cycle Time	Pattern 50...100 ms; brightness 40...50 ms; contrast 40...50 ms; contour 120...500 ms	
Number of Job Selects	Combination of 10 detectors and job selections	Combination of 32 detectors and job selections

Benefits

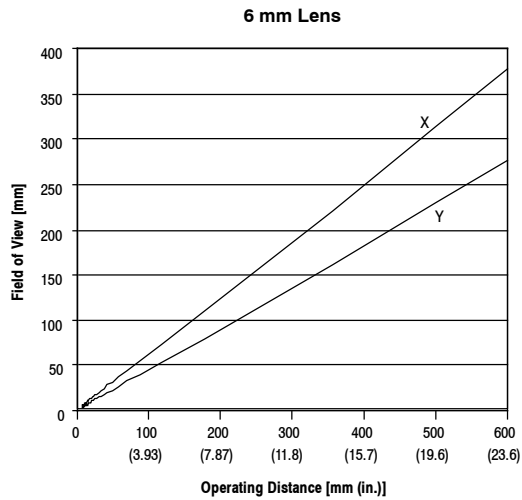
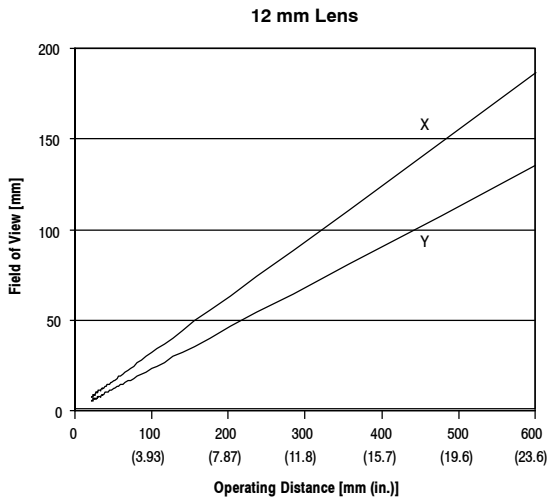
- Perform multiple inspections with one sensor
- Simple setup using PC and configuration software
- Multiple job storage to facilitate flexible product changeovers
- Simple inspection tools for detecting presence or absence, completeness, position, markings, labeling, packaging, and components
- Economical alternative to conventional vision system

Product Selection

Focal Length of Lens	Field of View	EtherNet/IP	Cat. No.
12 mm	12 mm @ 200 mm; X = 60 mm, Y = 40 mm	No	48MS-SE1PF2-M2
6 mm	6 mm @ 200 mm; X = 150 mm, Y = 100 mm	No	48MS-SE1PF1-M2 ❶
12 mm	12 mm @ 200 mm; X = 60 mm, Y = 40 mm	Yes	48MS-SN1PF2-M2
6 mm	6 mm @ 200 mm; X = 150 mm, Y = 100 mm	Yes	48MS-SN1PF1-M2 ❶

❶ The 6 mm lens models typically require external lighting because the integrated lighting does not illuminate the entire field of view, i.e., the edges of the image are dark.

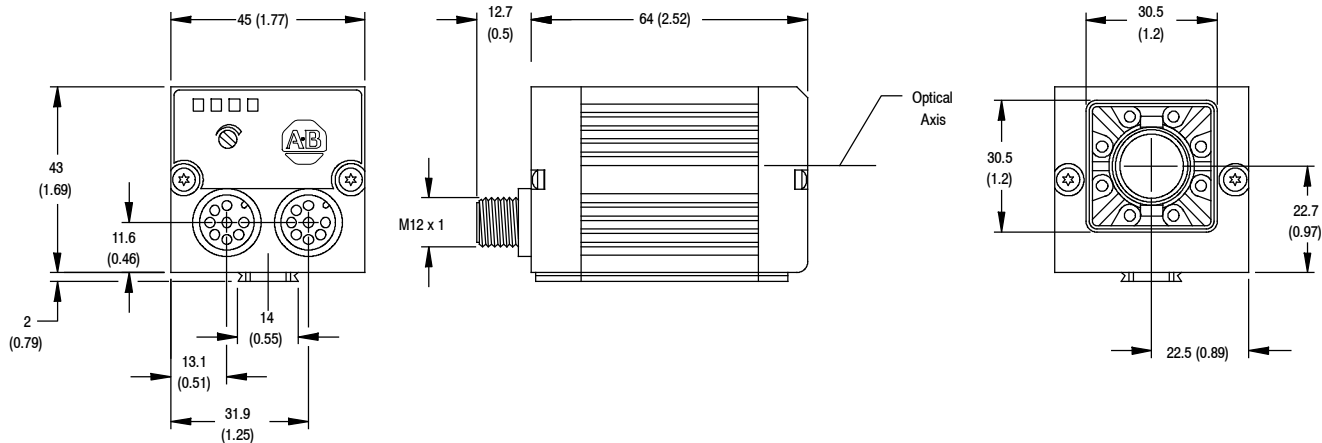
Field of View



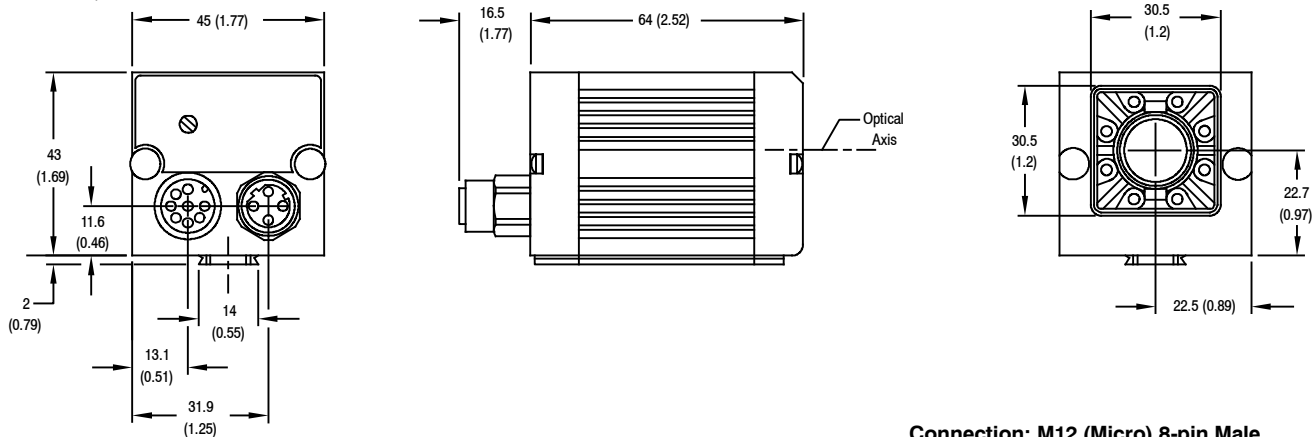
Approximate Dimensions [mm (in.)]

Dimensions are not intended to be used for installation purposes.

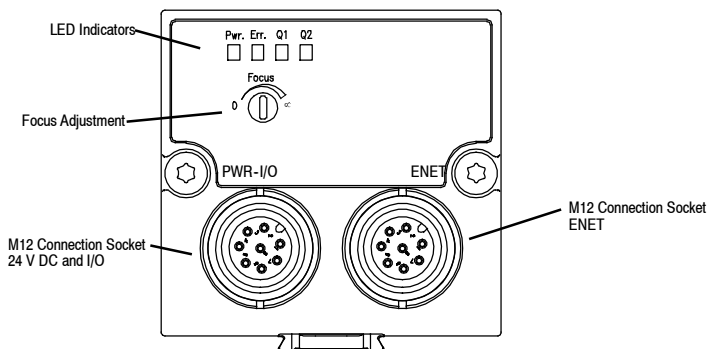
Standard Models



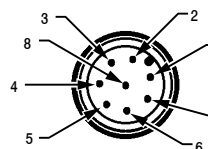
EtherNet/IP Models



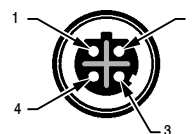
Rear View of the MultiSight



Connection: M12 (Micro) 8-pin Male QD (PWR and I/O; Ethernet on standard models)



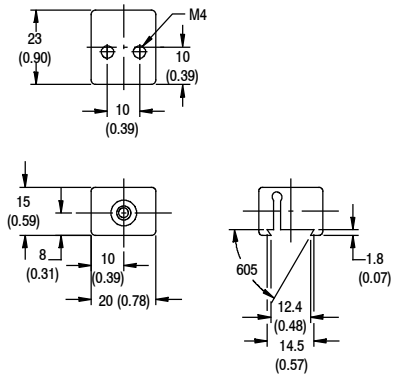
Connection: 4-pin D Code Female QD (Ethernet connection for EtherNet/IP models)



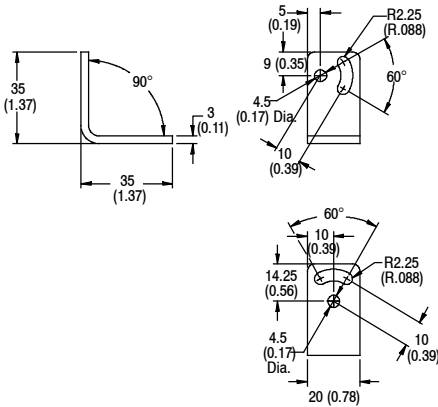
Approximate Dimensions [mm (in.)] (continued)

Dimensions are not intended to be used for installation purposes.

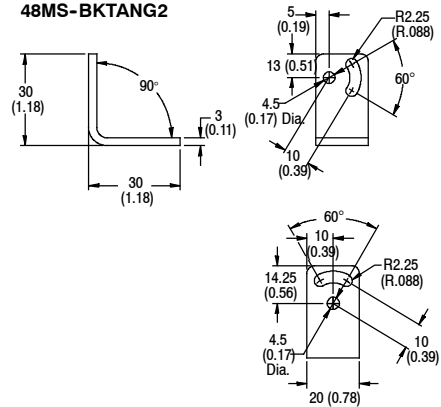
Dovetail Bracket—48MS-BKTD
(included with MultiSight)



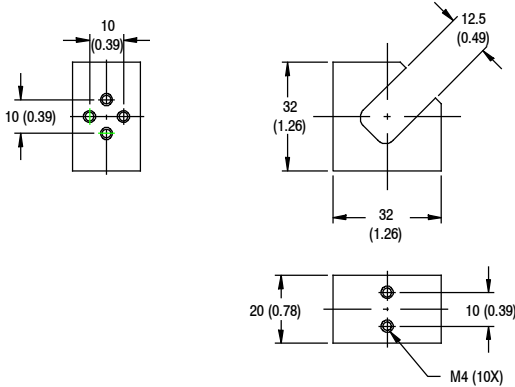
Angle Bracket—48MS-BKTANG



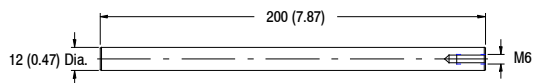
Angle Bracket for Ring Light—
48MS-BKTANG2



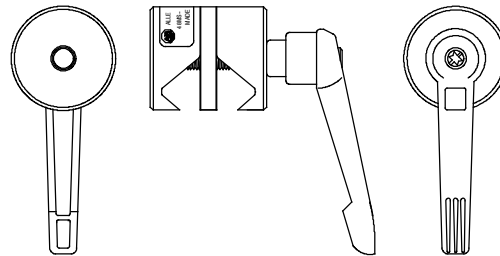
Rod Bracket—48MS-BKTROD



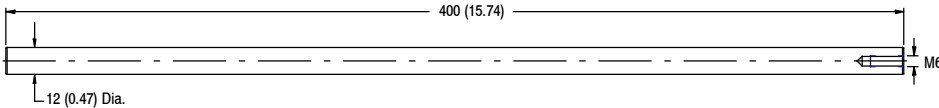
Mounting Rod 200—48MS-ROD200



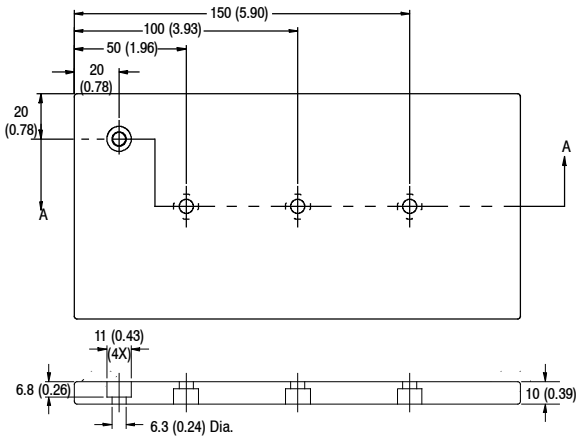
Rod Clamp—48MS-CLAMP



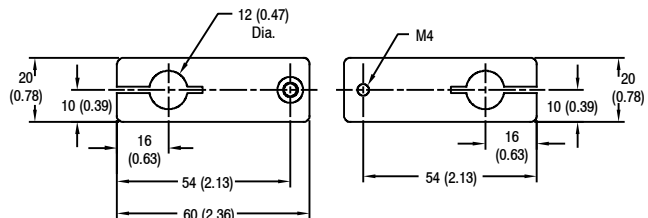
Mounting Rod 400—48MS-ROD400



Mounting Plate—48MS-MTPLATE



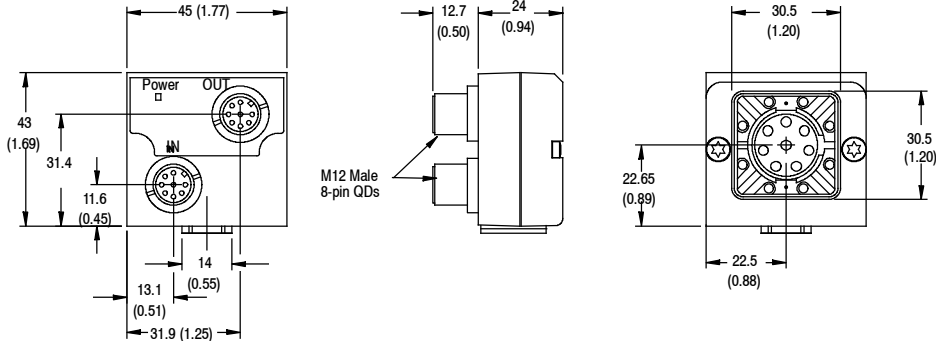
Rod Link—48MS-RODLINK



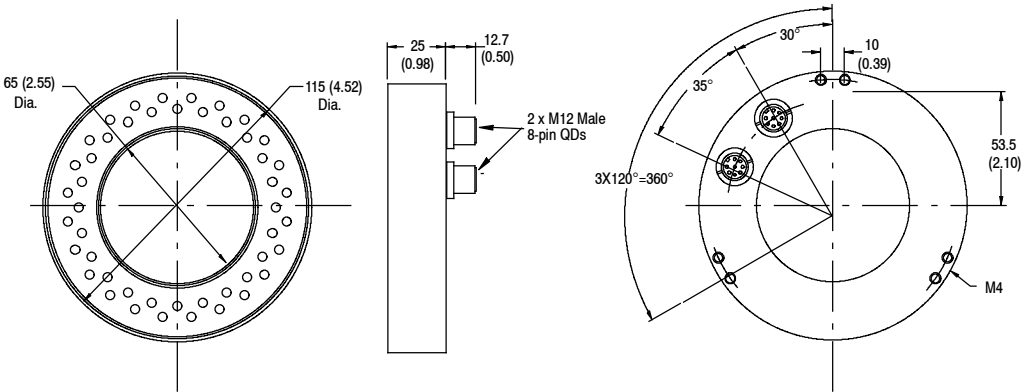
Approximate Dimensions [mm (in.)] (continued)

Dimensions are not intended to be used for installation purposes.

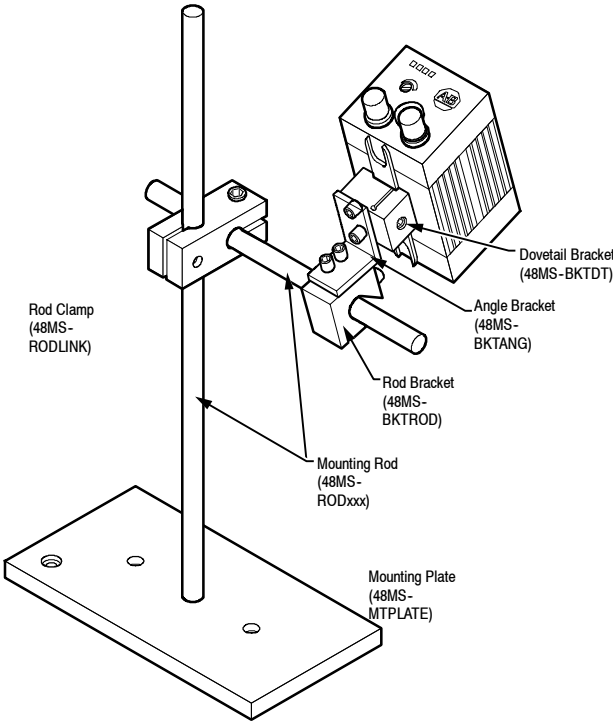
Area Light (White Light)—48MS-ALWH



Ring Light (White Light)—48MS-RLWH



Mounting Setup



Wiring

Power I/O Connection

Pin (M12)	Color	Use
1	White	IN1 (external trigger)
2	Brown	24V DC (V+)
3	Green	OUT1 (pass/fail); display LED = Q1
4	Yellow	OUT4 (ready) ❶
5	Grey	IN2 (control input)
6	Pink	OUT3 (external illuminated trigger)
7	Blue	GND (V+)
8	Red	OUT2 (position); display LED = Q2

❶ Indicates sensor evaluation is valid for OUT1 and OUT2, except in special cases as noted in the *MultiSight User Manual*.

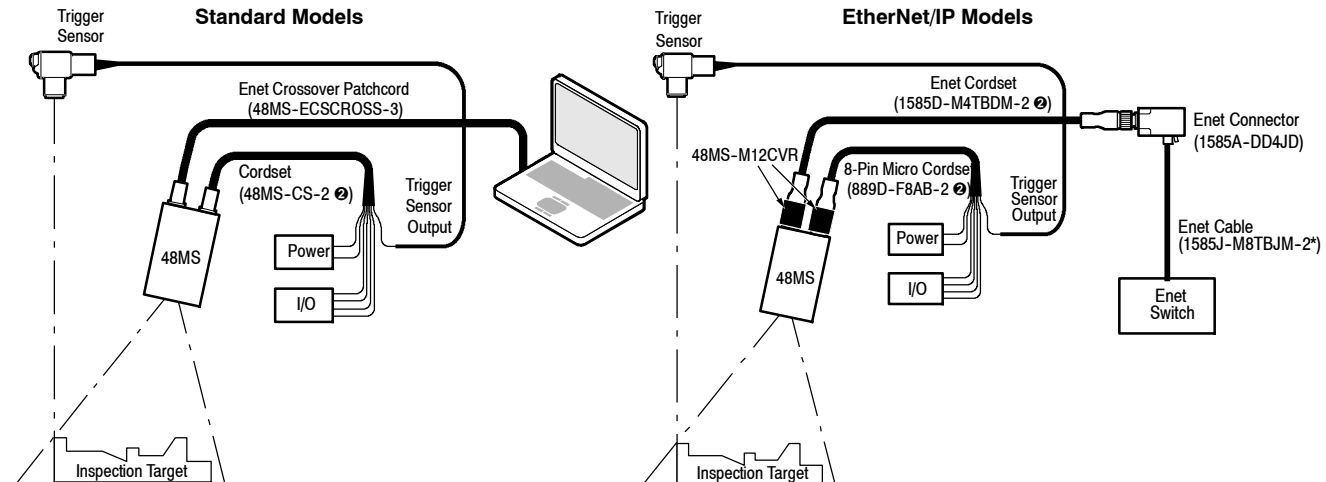
Ethernet (Standard Models)

Pin (M12)	Use
1	—
2	—
3	—
4	TxD-
5	RxD+
6	TxD+
7	RxD-
8	—

Ethernet (EtherNet/IP Models)

Pin (M12 D-Code)	Use
1	Tx+
2	Rx+
3	Tx-
4	Rx-

Setup and Wiring



❷ Other lengths available: replace 2 with length in meters (5 m and 10 m are standard lengths).

Accessories

Product Descriptor	Cat. No.
Dovetail Bracket	48MS-BKTDT ❶
Angle Bracket	48MS-BKTANG
Rod Bracket	48MS-BKTROD
Mounting Rod 200 mm	48MS-ROD200
Mounting Rod 400 mm	48MS-ROD400
Rod Link	48MS-RODLINK
Rod Clamp	48MS-CLAMP
Mount Plate	48MS-MTPLATE
RJ45 Connector	48MS-RJ45CONN
Ethernet Crossover Cable, RJ45 to RJ45	48MS-ECROSS
Area Light—White Light	48MS-ALWH
Ring Light—White Light	48MS-RLWH
Angle Bracket for Ring Light	48MS-BKTANG2
Lighting Cable	48MS-LCS
Lighting Cable Right Angle	48MS-LCRT
MultiSight Test Box	48MS-TESTBOX

Standard Model

Product Descriptor	Cat. No.
Cordset 2 m	48MS-CS-2
Cordset 5 m	48MS-CS-5
Cordset 10 m	48MS-CS-10
Cordset Right Angle 2 m	48MS-CSRT-2
Cordset Right Angle 5 m	48MS-CSRT-5
ENET Cordset Crossover 3 m	48MS-ECSCROSS-3
ENET Cordset 3 m	48MS-ECS-3
Sealing Cap—M12 Male Connector	889A-DCAP

EtherNet/IP Model

Product Descriptor	Cat. No.
Power and I/O cordset—M12 8-pin female, 2 m	889D-F8AB-2 ❷
Cable Connector Cover (nonconducting)—M12	48MS-M12CVR ❶
Sealing Cap—M12 Female Connector	1485A-M12
Ethernet Patchcord M12 D-code to RJ45—2 m	1585D-M4TBJM-2 ❷
Ethernet Patchcord M12 D-code to M12 D-code—2 m	1585D-M4TBDM-2 ❷
Ethernet M12 D-code to RJ45 converter	1585A-DD4JD
Ethernet Cable RJ45 to RJ45—2 m	1585J-M8PBJM-2 ❷
Ethernet Patchcord Crossover M12 D-code to RJ45—3 m	48MS-EPC-3

❶ Included with MultiSight Sensor.

❷ Other lengths available: replace 2 with length in meters (5 m and 10 m are standard lengths).

Note: Additional accessories (longer cordsets and additional LED colors for external lighting) available with longer lead times. Consult your local Rockwell Automation sales office or Allen-Bradley distributor for additional information.

Series 9000

Gate Entry



Description

These UL 325 Recognized and UL 508 Listed photoelectric sensing solutions are based on the industry proven Series 9000 and are specifically designed for noncontact detection of vehicles in automatic access control (gate entry) applications. These sensors are available individually or as bundled kits.

Features

- Complete sensing solutions based on the industry proven Series 9000 photoelectric sensors
- SPDT electro-mechanical relay output
- 24V AC/DC and 120/220V AC/DC models
- -34...+70°C (-29...+158°F) operating temperature range
- NEMA 3, 4X, 6P, 12, 14 (IP 67) environmental rating
- 1200 psi washdown rating
- Offered as kits or individual components

Specifications

Environmental	
Operating Temperature [C (F)]	-34...+70° (-29...+158°)
Relative Humidity	5...95% noncondensing
Operating Environment	NEMA 2, 4, 4X, 6P, 13; IP67 (IEC 602529), 1200 psi (8270 kPa) washdown
Certifications	UL 325 Recognized component for US and Canada and CE Marked for all applicable directives
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2

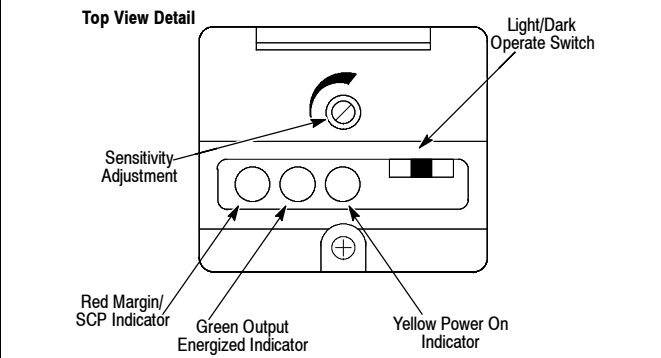
Optical	
Sensing Mode	Retroreflective, transmitted beam
Sensing Distance	25.4 mm...9.15 m (1 in...30 ft) with AB #92-39 reflector, 25.4 mm...6 m (1 in...20 ft) transmitted beam
Transmitting LED	Visible red 660 nm, infrared (880 nm)
Field of View	1.5°
Operating Mode	Light or dark operate selectable
Sensitivity Adjustment	See User Interface on page 1-199

Electrical	
Supply Current	40 mA
Power Consumption	2.2 W/1.6V A
Protection	False pulse, reverse polarity, overload, short circuit
Output Type	SPDT EM Relay
Output Load Current/Voltage	1 A @ 264V AC, 2 A @ 132V AC, 1 A @ 150V DC
Response Time	23 ms max.
Leakage Current	Not applicable

Mechanical	
Housing Material	Valox®
Lens Material	Acrylic
Mounting Bracket	#12 steel impact bracket
Connection Type	2 m 300V cable, 5-pin, AC mini QD

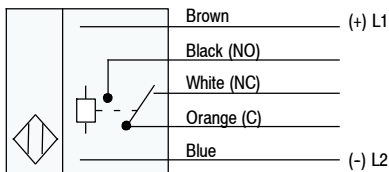
User Interface

Label	Color	State	Status
Output	Green	OFF	Sensor output de-activated
		ON	Sensor output activated
Margin/SCP	Red	OFF	Margin < 2.5
		ON	Margin > 2.5
		Flashing	Output SCP active
Power	Yellow	OFF	Sensor not powered
		ON	Sensor powered

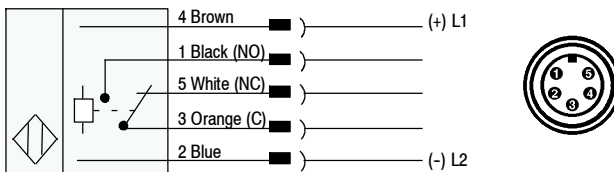


Wiring Diagrams

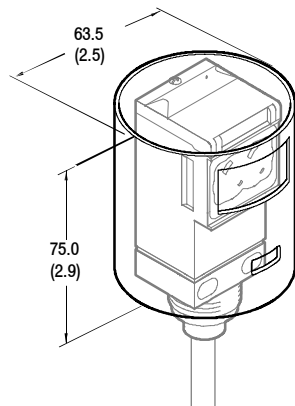
Cable Models



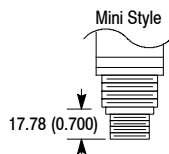
5-Pin AC/DC Mini QD Models



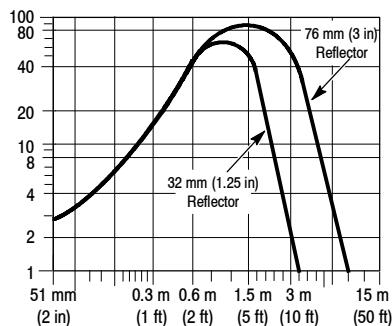
Approximate Dimensions [mm (in.)]



Mini Connector



Typical Response Curve



Series 9000

Gate Entry

Product Selection—UL 325 Rated Retroreflective Sensor Kits

Description	Contents	Sensor Operating Voltage	Cat. No.
24V UL 325 Kit	Sensor: 60-2728 Mounting Bracket: 60-2421 Reflector: 92-39 Impact Bracket: 60-2725	10...55V DC/20...40V AC	60-GR1-24UL325
120/220V UL 325 Kit	Sensor: 60-2730 Mounting Bracket: 60-2421 Reflector: 92-39 Impact Bracket: 60-2725	70...264V AC/DC	60-GR1-120UL325

Product Selection—UL 508 Rated Sensor Kits (General Purpose)

Description	Contents of Kit	Cat. No.
24V AC/DC Retroreflective Kit	42GRU-9001, 60-2421 Bracket, 92-39 Reflector	60-GR1-24
120/220V AC/DC Retroreflective Kit	42GRU-9002, 60-2421 Bracket, 92-39 Reflector	60-GR1-120
24V AC/DC Transmitted Beam Kit	42GRL-9000, 42GRR-9001, 60-2421 Bracket (2 pcs.)	60-GRR1-24
120/220V AC/DC Transmitted Beam Kit	42GRL-9000, 42GRR-9002, 60-2421 Bracket (2 pcs.)	60-GRR1-120

Refer to Series 9000 in the *Sensors* catalog for detailed specifications for sensor models included in above kits.

Replacement Sensors Product Selection

Description	Details	Cat. No.
24V UL 325 Retroreflective	Retroreflective with 2 m Cable	60-2728
	Retroreflective with 5-pin Mini QD	60-2729
120/220V UL 325 Retroreflective	Retroreflective with 2 m Cable	60-2730
	Retroreflective with 5-pin Mini QD	60-2731

Cordsets and Accessories

Description	Cat. No.
Spare impact bracket for Series 9000 photoelectric sensor	60-2725
Spare mounting bracket for Series 9000 photoelectric sensor	60-2421
Spare reflector, 76 mm (3 in.) diameter with mounting hole	92-39
Spare reflector, 32 mm (1.25 in.) diameter with mounting hole	92-47
1.8 m (6 ft) 5-pin, mini QD cordset	889N-F5AF-6F



Description

The Series 9000 photoelectric sensors with diagnostic output are designed to provide both a visual and electrical indication of a “dirty lens” condition. This is useful in applications where dirt and dust build-up on the optic lens are expected. This action will reduce the return light signal to the sensor thereby reducing its capability to reliably detect passing targets.

Features

- Both visual and electrical indication of “dirty lens” condition
- Supports both static and diagnostic modes of operation
- Harsh duty 30 mm package
- Wide selection of sensing modes
- Both DC and AC/DC operation
- Fast response time
- Variety of connection types

Specifications

Environmental	
Certifications	UL Listed, CSA Approved, CE Marked for all applicable directives
Operating Environment	NEMA 3, 4X, 6P, 12, 13; IP67 (IEC 529) 1200 psi (8270 kPa) washdown, IP69K
Operating Temperature [C (F)]	0...+70° (32...+158°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...95%
Ambient Light Immunity	Incandescent light 5000 lux
Optical	
Sensing Modes	Retroreflective, polarized retroreflective, diffuse, transmitted beam
Sensing Range	See Product Selection table on page 1-205
Field of View	See Product Selection table on page 1-205
Light Source	Visible red (660 nm), Infrared (880 nm)
LED Indicators	See User Interface on page 1-202
Adjustments	Single-turn potentiometer for sensitivity
Electrical	
Voltage	10...30V DC, 95...264V AC/DC models
Current Consumption	30 mA max (DC models), 15 mA max (AC/DC models)
Sensor Protection	Overload, short circuit, reverse polarity, false pulse
Outputs	
Response Time	2 ms (DC models), 15 ms (AC/DC models)
Output Type	PNP and NPN both sensor and diagnostic output (DC models) SPST relay (sensor) with SPDT relay for diagnostic (AC/DC models)
Output Mode	Light or dark operate selectable
Output Current	100 mA max @ 30V DC, 2 A @ 132V (AC/DC sensor and diagnostic), 11 A @ 264V (AC/DC sensor and diagnostic)
Output Leakage Current	10 µA max
Mechanical	
Housing Material	Valox®
Lens Material	Acrylic
Cover Material	Neoprene
Connection Types	4-pin DC micro QD, 4-pin DC mini QD, 5-pin DC micro QD
Supplied Accessories	129-130 mounting kit
Optional Accessories	See mounting brackets, reflectors, and cordsets on page 1-206

User Interface

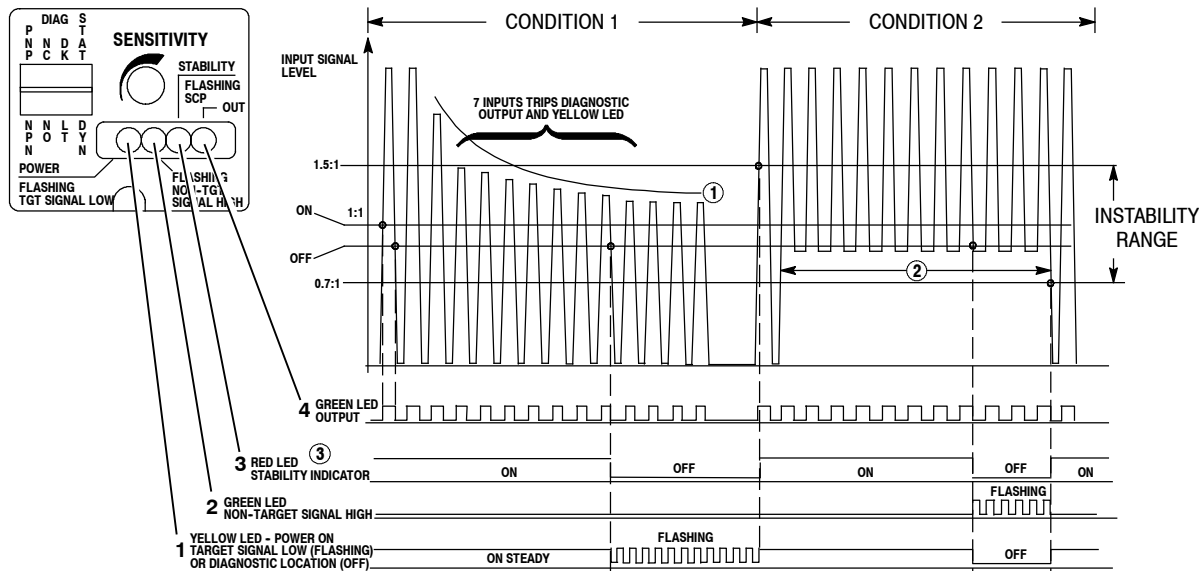
Label	Color	State	Diagnostic Operating Mode	
			Static	Dynamic
POWER FLASHING TGT SIGNAL LOW	Yellow	On Steady	Sensor Power On	
		Flashing	Unstable operation (0.7 < Margin < 1.5)	1.0 < Margin > 1.5 for seven successive operations Diffuse: Target margin too low Retro/Polarized Retro: Reflector margin too low Transmitted Beam unbroken beam margin too low
FLASHING NON-TGT SIGNAL HIGH	Green	Flashing	Unstable operation (0.7 < Margin < 1.5)	0.7 < Margin > 1.0 for seven successive operations Diffuse: Background margin too high Retro / Polarized Retro: Target margin too high Transmitted Beam broken beam margin to high
STABILITY ^❶ FLASHING SCP	Red	On Steady	Stable operation (Margin < 0.7 or Margin > 1.5)	
		Off	Unstable operation (0.7 < Margin < 1.5)	
		Flashing ^❷	Overload or short circuit at sensor output	
OUTPUT	Green	On	Output energized	

❶ To prevent potentially confusing indications during rapid signal transitions, the red STABILITY indicator has a typical delay of 100 ms before it turns **off**. As a result, the indicator will not turn **off** for quick, brief events. (The Diagnostic Output has no delay.)

❷ 10...30V DC sensors only.

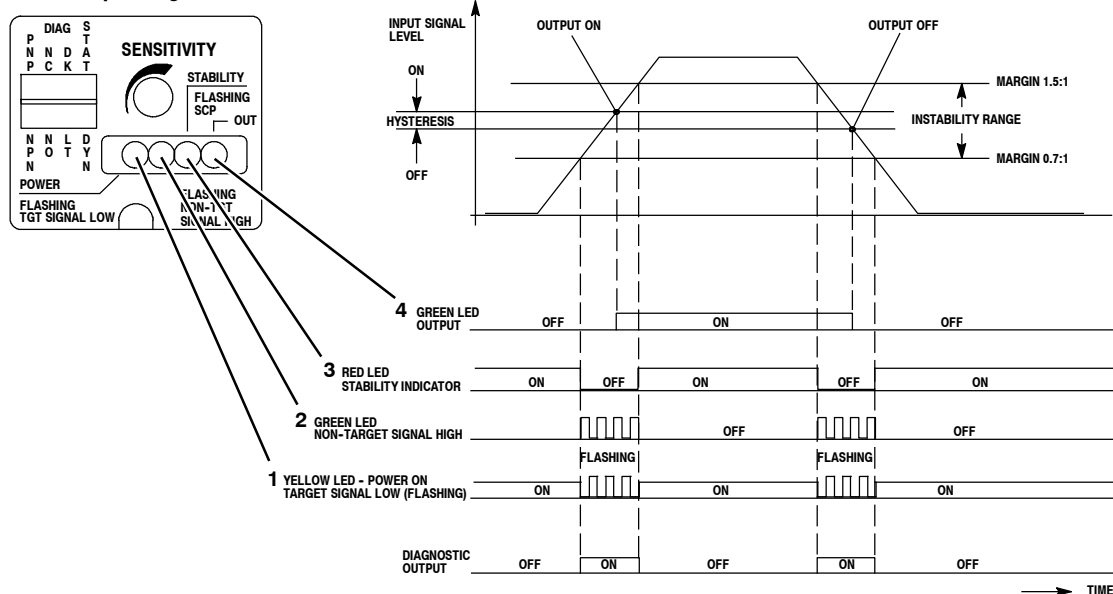
User Interface Panel—DC model shown

DYNAMIC Operating Mode



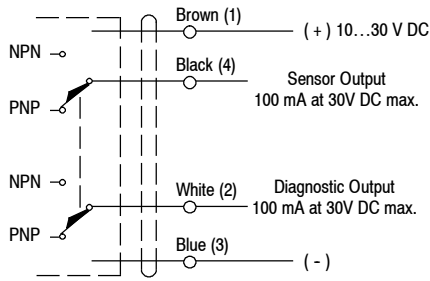
User Interface Panel—DC model shown (continued)

STATIC Operating Mode

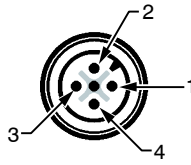


Wiring Diagrams

DC Sensors



Micro Quick-Disconnect Version (QD)



Mini Quick-Disconnect Version (QD1)



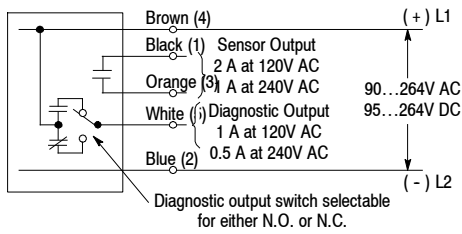
ATTENTION



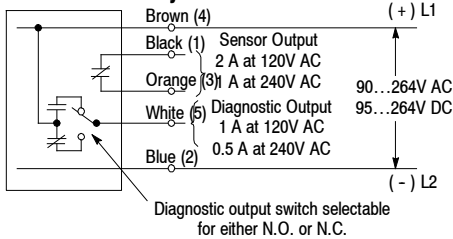
DO NOT connect both an NPN and PNP load at the same time!

AC Sensors

Normally Open



Normally Closed

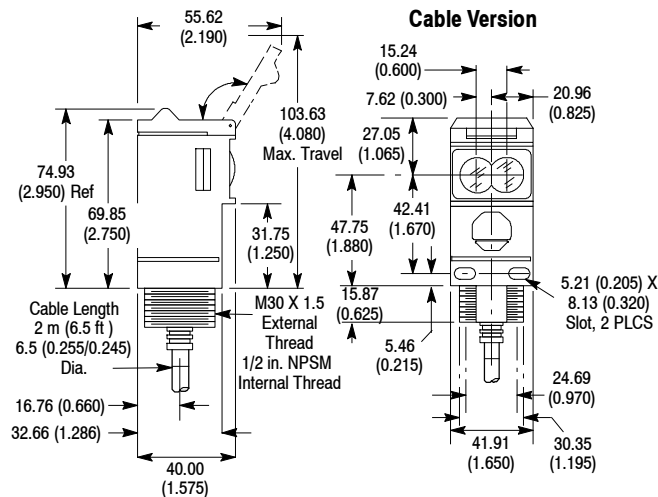


Mini Quick-Disconnect Version (QD)

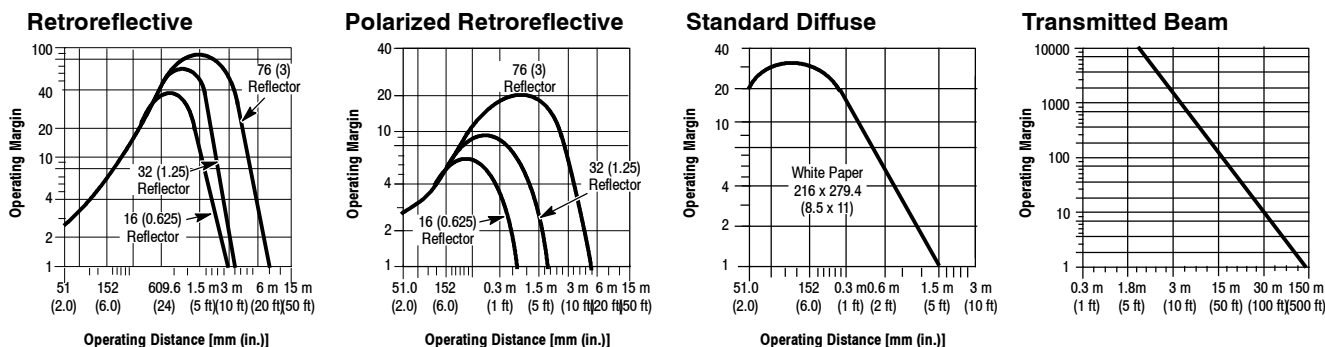


Approximate Dimensions [mm (in.)]

All Versions



Typical Response Curve

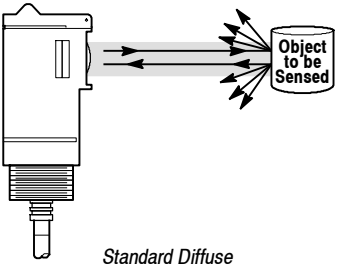


Product Selection

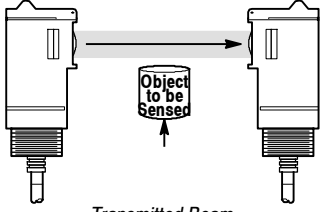
Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Response Time	Connection Type	Cat. No.
<p><i>Retroreflective</i></p> <p>Field of View: 1.5° Emitter LED: Visible Red 660 nm</p>	10...30V DC 30 mA	50.8 mm ...9.14 m (2 in...30 ft) with 76 mm (3 in.) Reflector	Light/Dark Selectable	NPN and PNP (Sensor and Diagnostic) 100 mA @ 30V DC 2 ms	4-pin DC micro	42GDU-9000-QD
	90...264V AC 95...264V DC 15 mA			SPST Relay N.O. (Sensor) 15 ms SPDT Relay, N.O. and N.C. (Diagnostic) 15 ms	5-pin mini	42GDU-9004-QD
				SPST Relay N.C. (Sensor) 15 ms SPDT Relay, N.O. and N.C. (Diagnostic) 15 ms	5-pin mini	42GDU-9005-QD
<p><i>Polarized Retroreflective</i></p> <p>Field of View: 1.5° Emitter LED: Visible Red 660 nm</p>	10...30V DC 30 mA	50.8 mm... 4.87 m (2 in...16 ft) with 76 mm (3 ft) Reflector	Light/Dark Selectable	NPN and PNP (Sensor and Diagnostic) 100 mA @ 30V DC 2 ms	4-pin DC micro	42GDU-9200-QD
	90...264V AC 95...264V DC 15 mA			SPST Relay N.O. (Sensor) 15 ms SPDT Relay, N.O. and N.C. (Diagnostic) 15 ms	5-pin mini	42GDU-9204-QD
				SPST Relay N.C. (Sensor) 15 ms SPDT Relay, N.O. and N.C. (Diagnostic) 15 ms	5-pin mini	42GDU-9205-QD

Refer to page 1-206 for cordsets and accessories.

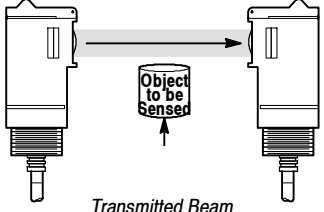
Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type/ Response Time	Connection Type	Cat. No.
 <p>Standard Diffuse</p> <p>Field of View: 3.5° Emitter LED: Infrared 880 nm</p>	10...30V DC 30 mA	50.8 mm... 1.52 m (2 in...5 ft) to White Paper	Light/Dark Selectable	NPN and PNP (Sensor and Diagnostic) 100 mA @ 30V DC/2 ms	4-pin DC micro	42GDP-9000-QD
	90...264V AC 95...264V DC 15 mA			SPST Relay N.O. (Sensor) 15 ms SPDT Relay, N.O. and N.C. (Diagnostic)/15 ms	5-pin mini	42GDP-9004-QD
				SPST Relay N.C. (Sensor) 15 ms SPDT Relay, N.O. and N.C. (Diagnostic)/15 ms	5-pin mini	42GDP-9005-QD

For Light Sources

 <p>Transmitted Beam</p> <p>Field of View: 1.5° Emitter LED: Infrared 880 nm</p>	10...264V AC/DC 15 mA	25.4 mm... 61 m (1 in...200 ft)	—	—	4-pin DC micro	42GRL-9000-QD
					4-pin mini	42GRL-9002-QD
	10...264V AC/DC 15 mA	25.4 mm... 152 m (1 in...500 ft)	—	—	4-pin DC micro	42GRL-9040-QD
					4-pin mini	42GRL-9042-QD

For Receivers

 <p>Transmitted Beam</p> <p>Field of View: 1.5° Emitter LED: Infrared 880 nm</p>	10...30V DC 30 mA	—	Receiver Light/Dark Selectable	NPN and PNP (Sensor and Diagnostic) 100 mA @ 30V DC/2 ms	4-pin DC micro	42GDR-9000-QD
					4-pin mini	42GDR-9000-QD1
	90...264V AC 95...264V DC 15 mA	—	Light/Dark Selectable	SPST Relay N.O. (Sensor) 15 ms SPDT Relay, N.O. and N.C. (Diagnostic)/15 ms	5-pin mini	42GDR-9004-QD
					5-pin mini	42GDR-9005-QD

Cordsets and Accessories

Description	Cat. No.	Description	Cat. No.	Description	Cat. No.
1.8 m (6 ft) 4-pin, Mini QD Cordset	889N-F4AF-6F	2 m (6.5 ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2	76 mm (3 in.) Diameter with Center Mount Hole	92-39
1.8 m (6 ft) 5-pin, Mini QD Cordset	889N-F5AF-6F	Mounting Bracket	60-2439	32 mm (1.25 in.) Diameter	92-47

Description

Series 9000 darkroom sensors are designed for use in areas where the emission of visible light must be sharply reduced, such as in the manufacture of photographic films and papers. These On/Off sensors have been specifically designed and constructed to reduce visible light emission to less than 0.003 millilux measured 25 mm (1 in.) from the sensor.

Series 9000 darkroom sensors use an LED light source with very little visible light emission. Visible light radiation from the sensor is further controlled through the use of special construction techniques and lens and housing materials.

Like standard Series 9000 On/Off sensors, these sensors contain Power, Output, and Margin/Short Circuit indicators. Using these indicators can speed setup and maintenance. During normal "lights out" operation, the opaque sensor cover must be closed and the cover screw tightened with a torque equal to 0.226 to 0.452 Newton-meter (2 to 4 inch-pounds) to prevent visible light emission from these indicators.

Series 9000 darkroom version sensors are available in several versions that operate from supply voltages of 10...40V DC or 70...264V AC/DC. DC models are available with NPN and PNP outputs. The AC/DC models are available with SPDT electro-mechanical relay outputs, allowing the sensor and output to be supplied with different AC and/or DC voltage levels.

General Specifications

Light Source	Infrared LED (940 nm)
Unit Protection	Overload, short circuit, reverse polarity, false pulse
Supply Voltage	24V DC, 120V AC, 220V AC (see Product Selection tables)
Current Consumption	See Product Selection tables
Output Type	NPN and PNP (DC models); SPDT relay (AC/DC models)
Output Mode	Light/Dark operate selectable
Output Rating	100 mA @ 30V DC (DC models); 2 A @ 132V AC (AC/DC sensor); 1 A @ 264V AC (AC/DC sensor)
Response Time	2 ms (DC models); 15 ms (AC/DC models)
Housing Material	Valox®
Lens Material	Acrylic
LED Indicators	See User Interface on next page
Connection Types	2 m 300V cable, 4-pin DC micro QD, 5-pin AC mini QD
Supplied Accessories	#129-130 mounting kit
Optional Accessories	Mounting brackets, reflectors, cordsets
Operating Environment	NEMA 3, 4X, 6P, 12, 13 (IP67) 1200 psi washdown
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Operating Temperature [C (F)]	-34...+70° (-29...+158°)
Relative Humidity	5...95%
Certifications	UL Listed, CSA Approved, CE Marked for all applicable directives

Features

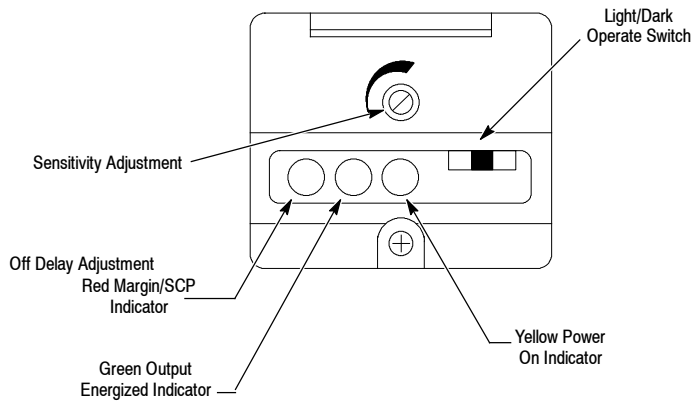
- Reduced light emission for darkroom applications
- Harsh duty 30 mm package
- Wide selection of sensing modes
- Both DC and AC/DC operation
- Fast response time
- Variety of connection types



User Interface

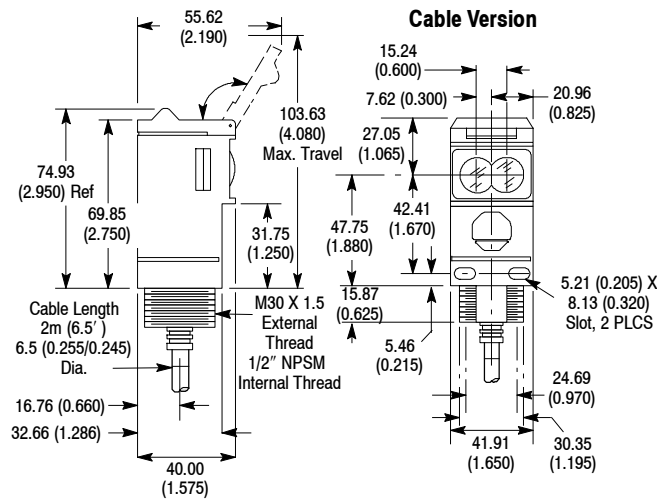
Label	Color	State	Status
Output	Green	OFF	Sensor output de-activated
		ON	Sensor output activated
Margin/SCP	Red	OFF	Margin < 2.5
		ON	Margin > 2.5
		Flashing	Output SCP active
Power	Yellow	OFF	Sensor not powered
		ON	Sensor powered

On/Off Sensors—Top View Detail

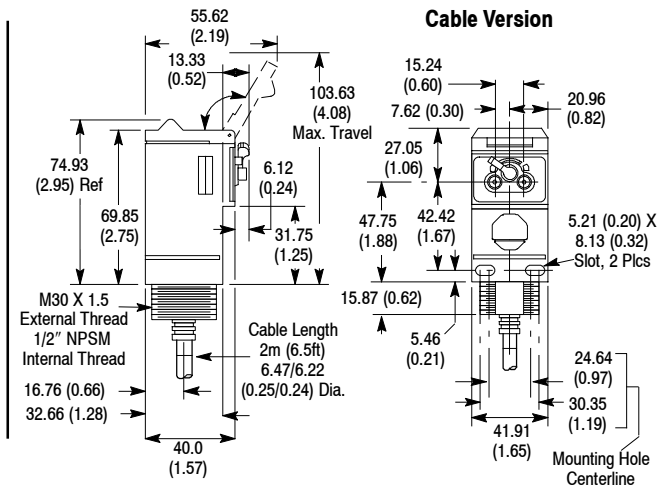


Approximate Dimensions [mm (in.)]

All Versions Except Fiber Optic



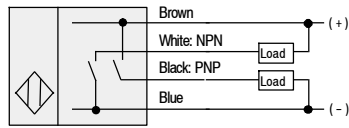
Fiber Optic



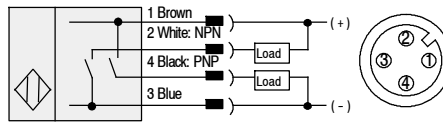
Wiring Diagrams①②

All Models Except Transmitted Beam Source

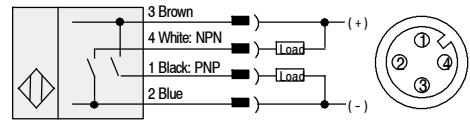
Cable Model: 9__0



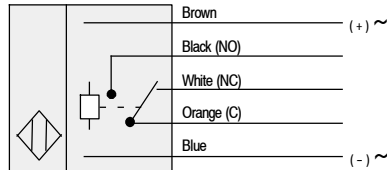
4-pin DC Micro QD Model: 9__0-QD



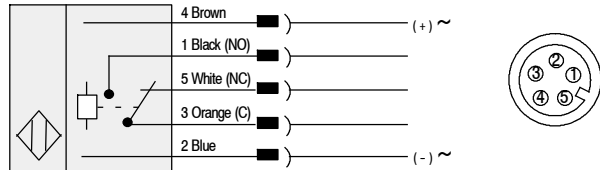
4-pin DC Mini QD Model: 9__0-QD1



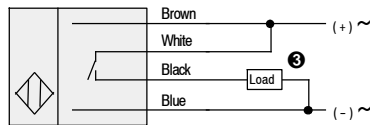
Cable Model: 9__1, 9__2



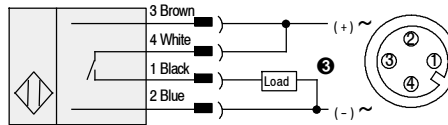
5-pin AC/DC Mini QD Model: 9__1-QD, 9__2-QD



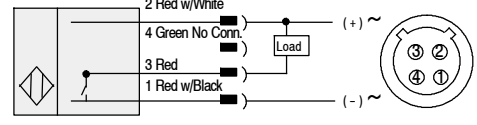
Cable Model: 9__3



AC/DC Mini QD Model: 9__3-QD



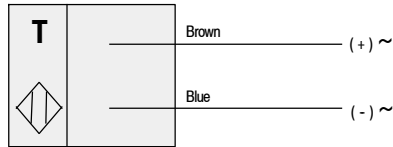
AC/DC Micro QD Model: 9__3-QD1



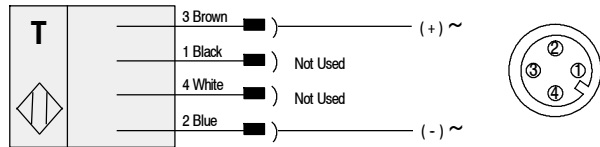
③ Load can be placed on either black or white wire to create sourcing or sinking respectively.

Transmitted Beam Source

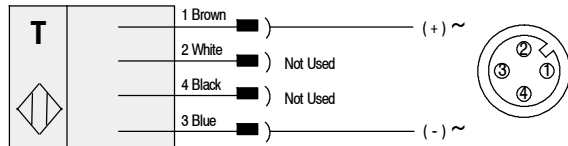
Cable Model: 42GRL-90__



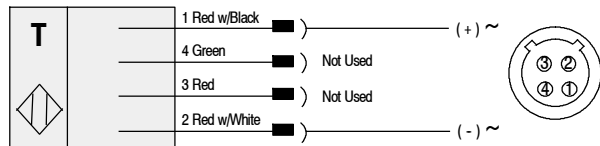
AC/DC Mini QD Model: 42GRL-90_2-QD



DC Micro QD Model: 42GRL-90_0-QD



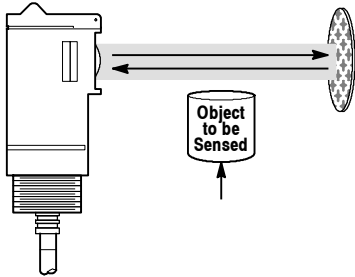
4-pin DC Micro QD Model: 42GRL-90_3-QD1



- ① For Allen-Bradley programmable controller compatible interface, refer to publication 42-2.0.
- ② Quick-disconnect wiring codes shown are valid for Allen-Bradley cables only.
- ③ Load can be placed on either black or white wire to create sourcing or sinking respectively.

Series 9000 Retroreflective

Darkroom



QD Cordsets and Accessories

Description	Cat. No.
1.8 m (6 ft) 5-pin, Mini QD Cordset	889N-F5AF-6F
2 m (6.5 ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2
76 mm (3 in.) Diameter with Center Mount Hole	92-39
32 mm (1.25 in.) Diameter	92-47

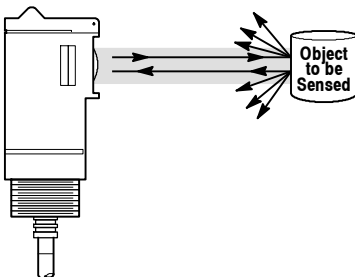
Specifications

Field of View	1.5°
Emitter LED	Infrared 940 nm

Product Selection for Sensors

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Cat. No.
10...40V DC 30 mA	50.8 mm (2 in.) to 4.5 m (15 ft) with 78 mm (3 in.) Reflector	Light/Dark Selectable	NPN/PNP 250 mA 2 ms	10 µA	2 m 300V cable	42KRU-9000
					4-pin DC micro QD	42KRU-9000-QD
70...264V AC/DC 50/60 Hz 15 mA			SPDT EM Relay 2 A/132V AC 1 A/264V AC 1 A/150V DC 15 ms	—	2 m 300V cable	42KRU-9002
					5-pin mini QD	42KRU-9002-QD

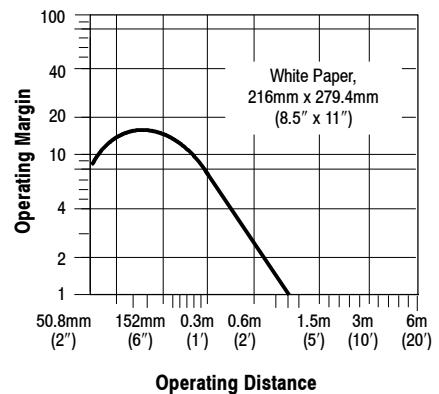
Series 9000 Standard Diffuse



QD Cordsets and Accessories

Description	Cat. No.
1.8 m (6 ft) 5-pin, Mini QD Cordset	889N-F5AF-6F
2 m (6.5 ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2

Typical Response Curve

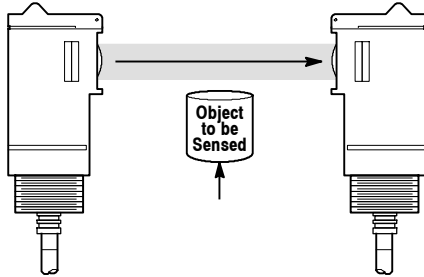


Specifications

Field of View	3.5°
Emitter LED	Infrared 940 nm

Product Selection for Sensors

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Cat. No.
10...40V DC 30 mA	50.8 mm (2 in.)...0.91 m (3 ft) to White Paper	Light/Dark Selectable	NPN/PNP 250 mA 2 ms	10 µA	2 m 300V cable	42KRP-9000
					4-pin DC micro QD	42KRP-9000-QD
70...264V AC/DC 50/60 Hz 15 mA			SPDT EM Relay 2 A/132V AC 1 A/264V AC 1 A/150V DC 15 ms	—	2 m 300V cable	42KRP-9002
					5-pin mini QD	42KRP-9002-QD

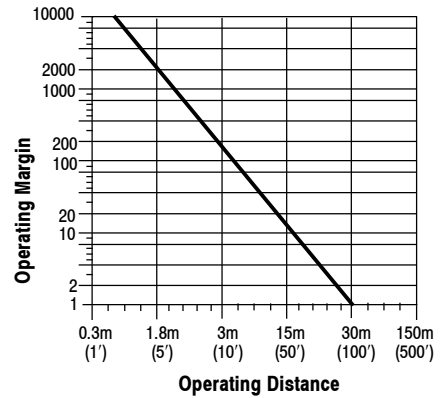


Light Sources and Receivers must be ordered separately. Any Light Source is compatible with any Receiver.

QD Cordsets and Accessories

Description	Cat. No.
1.8 m (6 ft) 4-pin, DC Mini QD Cordset	889N-F4AF-6F
1.8 m (6 ft) 5-pin, AC/DC Mini QD Cordset	889N-F5AF-6F
2 m (6.5 ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2

Typical Response Curve



Specifications

Field of View	1.5°
Emitter LED	Infrared 940 nm

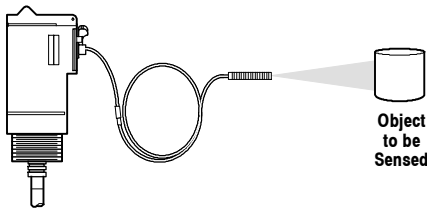
Product Selection for Light Source

Operating Voltage Supply Current	Sensing Distance	Connection Type	Cat. No.
10...264V AC/DC 50/60 Hz 15 mA	25.4 mm (1 in.)... 30 m (100 ft)	2 m 300V cable	42KRL-9000
		4-pin DC micro QD	42KRL-9000-QD
		4-pin mini QD	42KRL-9002-QD

Product Selection for Receivers

Operating Voltage Supply Current	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Cat. No.
10...40V DC 25 mA	Receiver: Light/Dark Selectable	NPN/PNP 250 mA 5 ms	10 µA	2 m 300V cable	42KRR-9000
				4-pin DC micro QD	42KRR-9000-QD
70...264V AC/DC 50/60 Hz 10 mA	Receiver: Light/Dark Selectable	SPDT EM Relay 2 A/132V AC 1 A/264V AC 1 A/150V DC 23 ms	—	2 m 300V cable	42KRR-9002
				5-pin mini QD	42KRR-9002-QD

QD Cordsets and Accessories



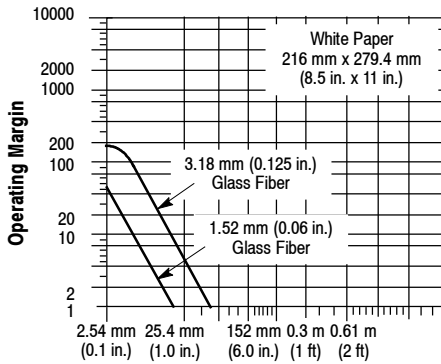
Description	Cat. No.
1.8 m (6 ft) 5-pin, Mini QD Cordset	889N-F5AF-6F
2 m (6.5 ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2
Bifurcated Glass Fiber Optic Cable	99-32-1
Individual Glass Fiber Optic Cable	99-52-1

Specifications

Emitter LED	Infrared 940 nm
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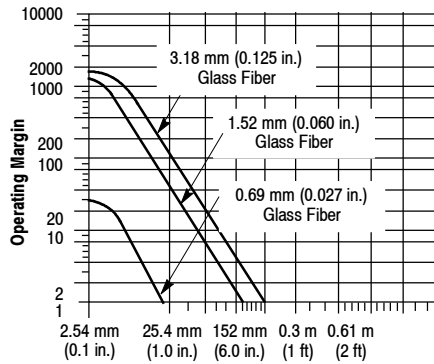
Typical Response Curve

Standard Diffuse



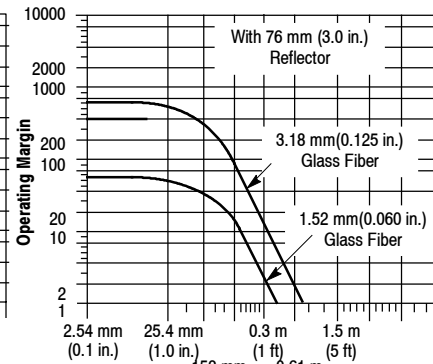
Operating Distance

Transmitted Beam



Operating Distance

Retroreflective



Operating Distance

Product Selection for Sensors

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Cat. No.
10...40V DC 30 mA	Depends on Fiber Optic cable	Light/Dark Selectable	NPN/PNP 250 mA 2 ms	10 μ A	2 m 300V cable	42KRF-9000
					4-pin DC micro QD	42KRF-9000-QD
70...264V AC/DC 50/60 Hz 15 mA	Depends on Fiber Optic cable	Light/Dark Selectable	SPDT EM Relay 2 A/132V AC 1 A/264V AC 1 A/150V DC 15 ms	—	2 m 300V cable	42KRF-9002
					5-pin mini QD	42KRF-9002-QD



Features

- Compact cylindrical package
- Wide selection of sensing modes
- Universal supply voltage models
- Both NPN or PNP outputs (DC)
- Fast response time
- Variety of connection types

Specifications

Environmental	
Certifications	UL Listed, CSA Approved, and CE Marked for all applicable directives
Operating Environment	NEMA 3, 4X, 6, 12, 13; IP67
Operating Temperature [C (F)]	-40...+56° (-40...+150°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...95%
Ambient Light Immunity	Incandescent light 5000 lux
Optical	
Sensing Modes	Retroreflective, polarized retro, diffuse, fixed focus, sharp cutoff, wide angle, transmitted beam
Sensing Range	See Product Selection table on page 1-210
Field of View	See Product Selection table on page 1-210
Light Source	Visible red LED (660 nm), infrared LED (880 nm)
LED Indicators	Red LED for output indication
Adjustments	4-turn sensitivity potentiometer
Electrical	
Voltage	10...30V DC, 20...264V AC/DC
Current Consumption	35 mA max
Sensor Protection	Reverse polarity, false pulse
Outputs	
Response Time	See Product Selection table on page 1-210
Output Type	PNP and NPN (DC models); MOSFET (AC/DC models)
Output Mode	Light or dark operate by cat. no.
Output Current	See Product Selection table on page 1-210
Output Leakage Current	1 µA max
Mechanical	
Housing Material	Noryl
Lens Material	Acrylic
Cover Material	Neoprene
Connection Types	3 m (9.8 ft) cable, 4-pin DC micro (M12) QD, 4-pin AC micro (M12) QD
Supplied Accessories	Mounting kit # 129-106-1 and 129-106-2
Optional Accessories	See mounting brackets on page 1-212

User Interface Panel

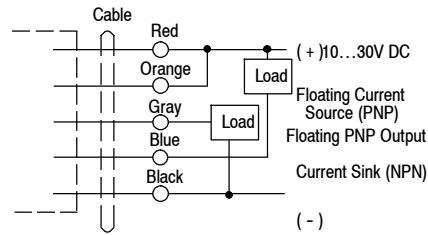
Label	Color	State	Status
Output	Red	OFF	Sensor output de-activated
		ON	Sensor output activated

Wiring Diagrams

DC All Models Except Transmitted Beam Source and High Speed Diffuse

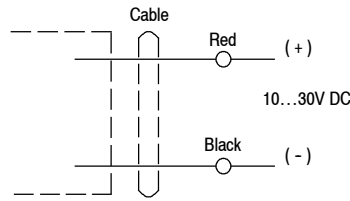
Cable Version

Models: 42SR_-6__2 and 6__3



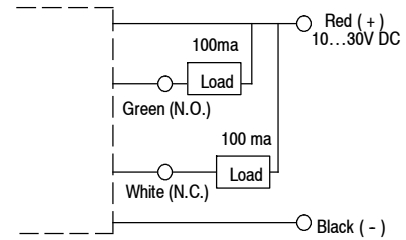
Transmitted Beam Source (42SRL-6000)

Cable Version



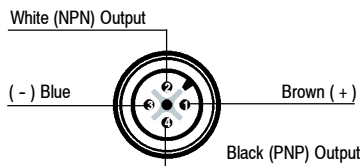
High Speed Diffuse (42SRP-6302)

Cable Version—NPN Outputs

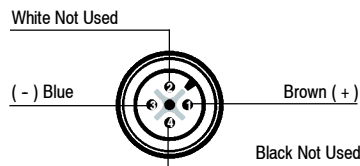


Quick-Disconnect Versions

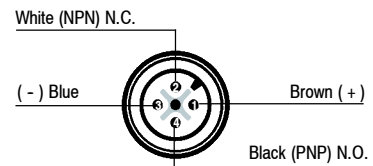
Models: 42SR_-6__2-QD and 6__3-QD



Quick-Disconnect Version



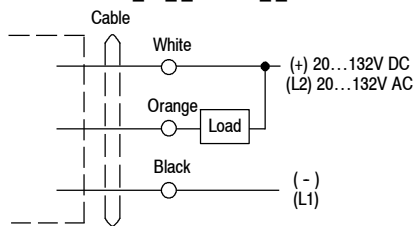
Quick-Disconnect Version



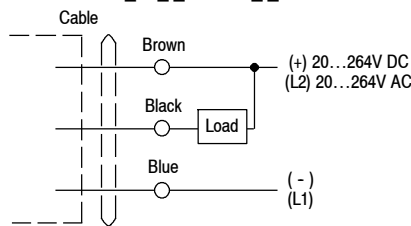
AC/DC All Models Except Transmitted Beam Source

Cable Versions

Models: 42SR_-6__4 and 6__5

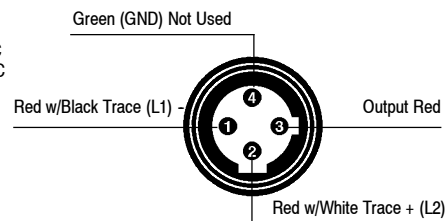


Models: 42SR_-6__6 and 6__7



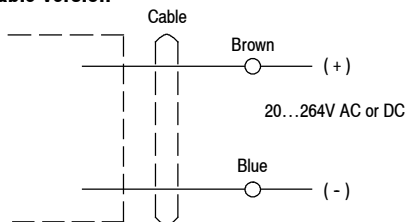
Quick-Disconnect Versions

Models: 42SR_-6__4-QD thru 6__7-QD

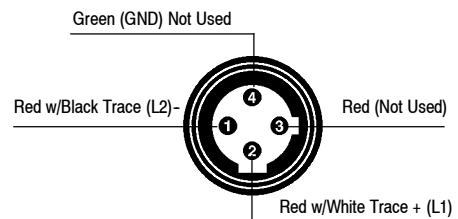


Transmitted Beam Source (42SRL-6006)

Cable Version



Quick-Disconnect Version



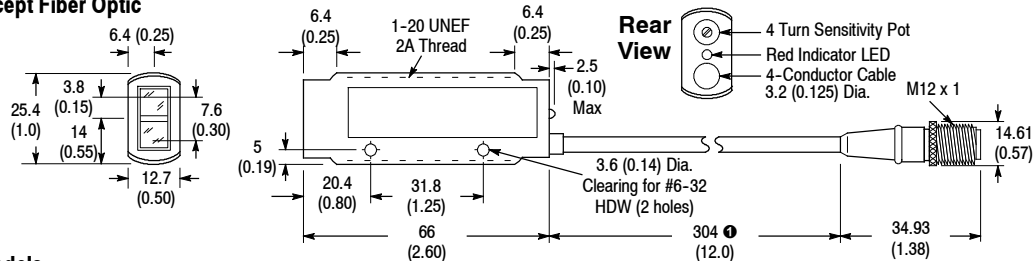
Note: Details regarding connection of Allen-Bradley Series 6000 photoelectric sensors to Allen-Bradley Programmable Controllers can be found in publication 42-2.0.

All wire colors shown refer to Allen-Bradley quick-disconnect cables.

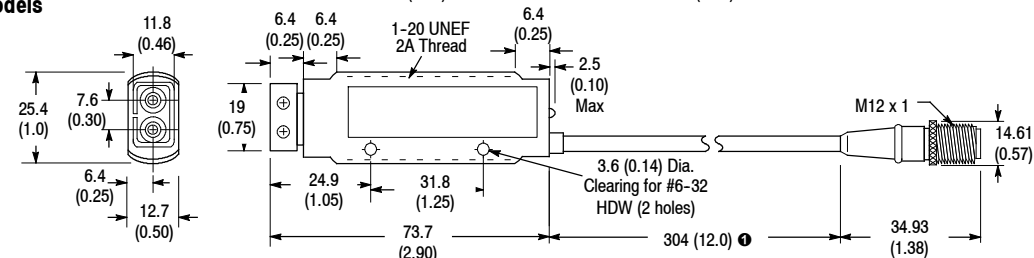
Approximate Dimensions [mm (in.)]

DC Models

All Models Except Fiber Optic

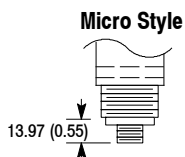


Fiber Optic Models



① Quick-disconnect cable length shown. Cable versions length is 3 m (10 ft).

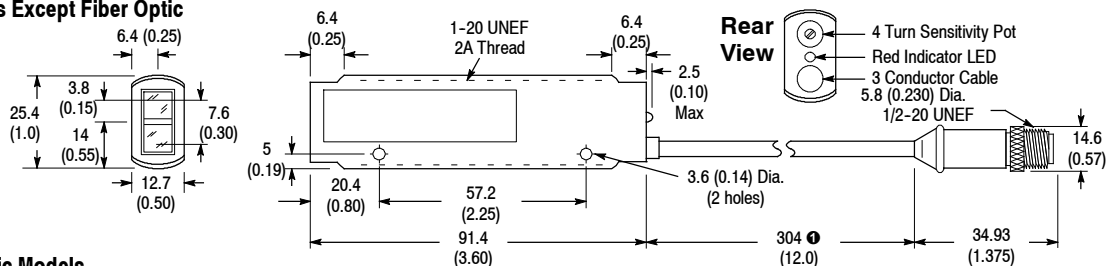
Connector Version



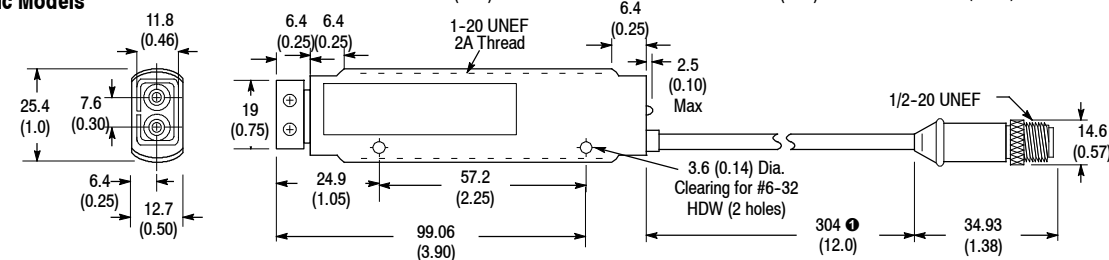
Thread Size

	AC	DC
Micro	1/2-20 UNF 2 Keyways	M12 x 1 1 Keyway

All Models Except Fiber Optic



Fiber Optic Models

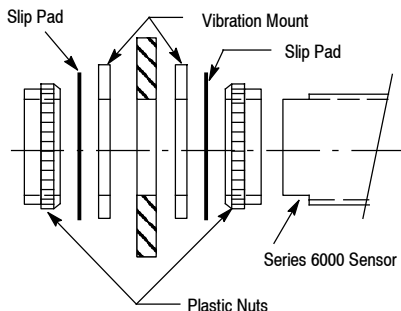


① Quick-disconnect cable length shown. Cable versions length is 3 m (10 ft).

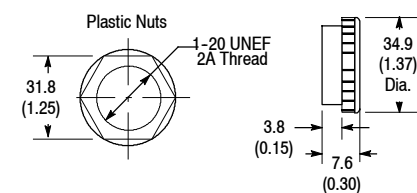
Supplied Accessories

Mounting Kit #129-106-1 contains two plastic nuts, anti-vibration mount, and slip pads.

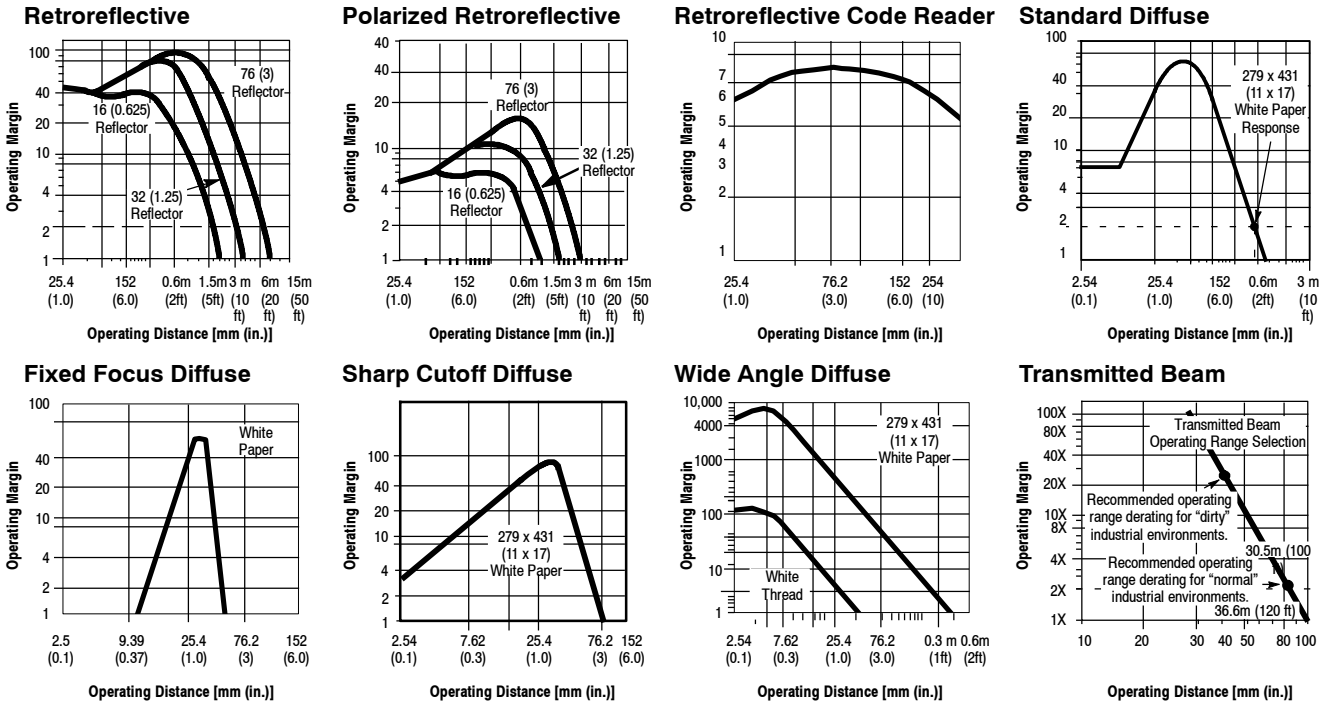
Mounting Kit #129-106-2 contains two plastic nuts, anti-vibration mount, slip pads, and fiber optic mounting hardware.



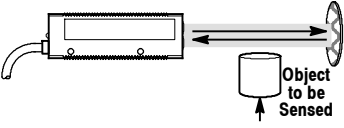
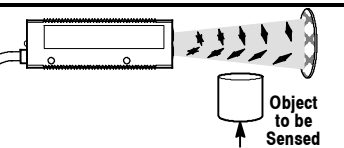
Plastic Nuts



Typical Response Curve

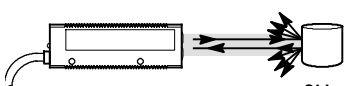
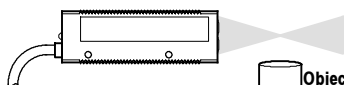
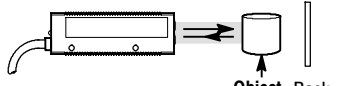
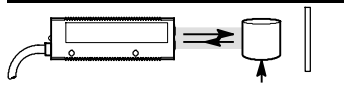
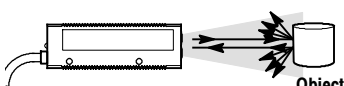


Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance @ 1X Margin	Output Energized	Output Type Response Time	Connection Type	Cat. No.
 <p><i>Retroreflective</i></p> <p>Field of View: 3° Emitter LED: Infrared 880 nm</p>	10...30V DC 35 mA	25.4 mm... 9 m (1 in...30 ft) with 76 mm (3 in.) Reflector	Light	NPN and PNP 200 mA 1 ms	3 m cable	42SRU-6002
			Dark		4-pin DC micro	42SRU-6002-QD
	20...132V AC/DC 50...60 Hz 1.2V A		Light	Power MOSFET 300 mA AC/DC 12 ms AC, 5 ms DC	3 m cable	42SRU-6003
			Dark		4-pin DC micro	42SRU-6003-QD
			Light		3 m cable	42SRU-6004
			Dark		4-pin AC micro	42SRU-6004-QD
 <p><i>Polarized Retroreflective</i></p> <p>Field of View: 3° Minimum Sensing Distance: 50.8 mm (2 in.) Emitter LED: Visible Red 660 nm Indicator LED: Red: Output</p>	10...30V DC 35 mA	50.8 mm... 3 m (2 in...10 ft) with 76 mm (3 in.) Reflector	Light	NPN and PNP 200 mA 1 ms	3 m cable	42SRU-6202
			Dark		4-pin DC micro	42SRU-6202-QD
	20...132V AC/DC 50...60 Hz 1.2V A		Light	Power MOSFET 300 mA AC/DC 12 ms AC, 5 ms DC	3 m cable	42SRU-6203
			Dark		4-pin DC micro	42SRU-6203-QD
			Light		3 m cable	42SRU-6204
			Dark		4-pin AC micro	42SRU-6204-QD
			Light		3 m cable	42SRU-6205
			Dark		4-pin AC micro	42SRU-6205-QD

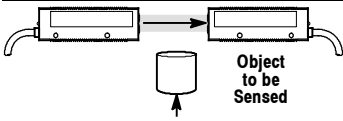
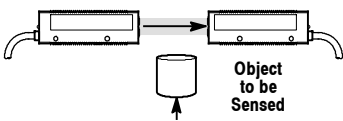
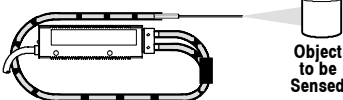
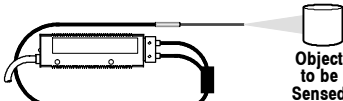
Refer to page 1-212 for cordsets and accessories.

Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance @ 1X Margin	Output Energized	Output Type Response Time	Connection Type	Cat. No.
 <p><i>Standard Diffuse</i> Field of View: 7.5° Emitter LED: Infrared 880 nm</p>	10...30V DC 35 mA	2.54...760 mm (0.1...30 in.) to White Paper	Light	NPN and PNP 200 mA 1 ms	3 m cable	42SRP-6002
			Dark		4-pin DC micro	42SRP-6002-QD
					3 m cable	42SRP-6003
			4-pin DC micro		42SRP-6003-QD	
	20...132V AC/DC 50...60 Hz 1.2V A	2.54...760 mm (0.1...30 in.) to White Paper	Light	Power MOSFET 300 mA AC/DC 12 ms AC, 5 ms DC	3 m cable	42SRP-6004
			Dark		4-pin AC micro	42SRP-6004-QD
					3 m cable	42SRP-6005
			4-pin AC micro		42SRP-6005-QD	
 <p><i>Fixed Focus Diffuse</i> Field of View: 1.52 mm (0.06 in.) square Emitter LED: Visible Red 660 nm</p>	10...30V DC 35 mA	27.9...28 mm (1.098...1.10 in.) to White Paper	Light	NPN and PNP 200 mA 1 ms	3 m cable	42SRP-6022
			Dark		4-pin DC micro	42SRP-6022-QD
					3 m cable	42SRP-6023
			4-pin DC micro		42SRP-6023-QD	
	20...132V AC/DC 50...60 Hz 1.2V A	27.9...28 mm (1.098...1.10 in.) to White Paper	Light	Power MOSFET 300 mA AC/DC 12 ms AC, 5 ms DC	3 m cable	42SRP-6024
			Dark		4-pin AC micro	42SRP-6024-QD
					3 m cable	42SRP-6025
			4-pin AC micro		42SRP-6025-QD	
 <p><i>Sharp Cutoff Diffuse</i> Field of View: 7.5° Emitter LED: Infrared 880 nm</p>	10...30V DC 35 mA	5...76 mm (0.2...3 in.) to White Paper	Light	NPN and PNP 200 mA 1 ms	3 m cable	42SRP-6032
			Dark		4-pin DC micro	42SRP-6032-QD
					3 m cable	42SRP-6033
			4-pin DC micro		42SRP-6033-QD	
	20...132V AC/DC 50...60 Hz 1.2V A	5...76 mm (0.2...3 in.) to White Paper	Light	Power MOSFET 300 mA AC/DC 12 ms AC, 5 ms DC	3 m cable	42SRP-6034
			Dark		4-pin AC micro	42SRP-6034-QD
					3 m cable	42SRP-6035
			4-pin AC micro		42SRP-6035-QD	
 <p><i>Sharp Cutoff Diffuse</i> Field of View: 7.5° Emitter LED: Infrared 880 nm</p>	20...264V AC/DC 50...60 Hz 1.2V A	5...76 mm (0.2...3 in.) to White Paper	Dark	Power MOSFET 150 mA AC/DC 18 ms AC, 10 ms DC	4-pin AC micro	42SRP-6037-QD
 <p><i>Wide Angle Diffuse</i> Field of View: 62° Emitter LED: Infrared 660 nm</p>	10...30V DC 35 mA	2.54...380 mm (0.1...15 in.) to White Paper	Light	NPN and PNP 200 mA 1 ms	3 m cable	42SRP-6012
			Dark		4-pin DC micro	42SRP-6012-QD
					3 m cable	42SRP-6013
			4-pin DC micro		42SRP-6013-QD	
	20...132V AC/DC 50...60 Hz 1.2V A	2.54...380 mm (0.1...15 in.) to White Paper	Light	Power MOSFET 300 mA AC/DC 12 ms AC, 5 ms DC	3 m cable	42SRP-6014
			Dark		4-pin AC micro	42SRP-6014-QD
					3 m cable	42SRP-6015
			4-pin AC micro		42SRP-6015-QD	

Refer to page 1-212 for cordsets and accessories.

Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance @ 1X Margin	Output Energized	Output Type Response Time	Connection Type	Cat. No.
For Light Source						
 <p>Transmitted Beam</p> <p>Object to be Sensed</p> <p>Field of View: 7.5° Emitter LED: Infrared 880 nm</p>	10...30V DC 15 mA	2.54 mm...36.6 m (0.1 in...120 ft)	—	—	3 m cable	42SRL-6000
	10...30V DC 15 mA	2.54 mm...36.6 m (0.1 in...120 ft)	—	—	4-pin DC micro	42SRL-6000-QD
	20...264V AC/DC 50...60 Hz 1V A		—		3 m cable	42SRL-6006
			—		4-pin AC micro	42SRL-6006-QD
For Receiver						
 <p>Transmitted Beam</p> <p>Object to be Sensed</p> <p>Field of View: 7.5° Emitter LED: Infrared 880 nm</p>	10...30V DC 15 mA	—	Light	NPN and PNP 200 mA 5 ms	3 m cable	42SRR-6002
			Dark		4-pin DC micro	42SRR-6002-QD
	20...264V AC/DC 50...60 Hz 1V A	—	Light	Power MOSFET 300 mA AC/DC 18 ms AC, 10 ms DC	3 m cable	42SRR-6003
			Dark		4-pin DC micro	42SRR-6003-QD
			Light		3 m cable	42SRR-6006
			Dark		4-pin AC micro	42SRR-6006-QD
				3 m cable	42SRR-6007	
				4-pin AC micro	42SRR-6007-QD	
 <p>Large Aperture Fiber Optic</p> <p>Object to be Sensed</p> <p>Field of View: Depends on Glass Fiber Optics selected. See Glass Fiber Optic section, page 1-234. Emitter LED: Infrared 880 nm</p>	10...30V DC 35 mA	Depends on Fiber Optic cable selected	Light	NPN and PNP 200 mA 1 ms	4-pin DC micro	42SRF-6002-QD
	20...132V AC/DC 50...60 Hz 1.2V A		Dark		3 m cable	42SRF-6003
			Light	3 m cable	42SRF-6004	
			Dark	4-pin DC micro	42SRF-6003-QD	
			Light	4-pin AC micro	42SRF-6004-QD	
					3 m cable	42SRF-6005
			4-pin AC micro	42SRF-6005-QD		
 <p>Small Aperture Fiber Optic</p> <p>Object to be Sensed</p> <p>Field of View: Depends on Plastic or Glass Fiber Optics selected. See Plastic Fiber optic section, page 1-270 and Glass Fiber Optic section, page 1-234. Emitter LED: Visible 660 nm</p>	10...30V DC 35 mA	Depends on Glass or Plastic Fiber Optics selected	Light	NPN and PNP 200 mA 1 ms	3 m cable	42SRF-6102
	20...132V AC/DC 50...60 Hz 1.2V A		Dark		4-pin DC micro	42SRF-6102-QD
			Light	3 m cable	42SRF-6103	
			Dark	4-pin DC micro	42SRF-6103-QD	
			Light	3 m cable	42SRF-6104	
					4-pin AC micro	42SRF-6104-QD
			3 m cable	42SRF-6105		
			4-pin AC micro	42SRF-6105-QD		

See below for cordsets and accessories.

Cordsets and Accessories

Description	Cat. No.	Description	Cat. No.	Description	Cat. No.
2 m (6.5 ft) 4-pin DC Micro QD Cordset	889D-F4AC-2	Mounting Brackets	60-2618	76 mm (3 in.) Diameter Reflector	92-39
2 m (6.5 ft) 4-pin AC Micro QD Cordset	889R-F4AEA-2	Right Angle Reflector	60-2052	32 mm (1.25 in.) Diameter Reflector	92-47



Features

- Wide selection for increased application flexibility
- Quick-disconnect design reduces down time
 - No disruption of alignment or wiring
- Three power base styles:
 - Terminal base can eliminate need for separate junction box
 - 3 m (10 ft) cable base for lower profile (red and blue line only)
 - Pre-wired mini-style quick-disconnect (green line only)
- False turn-on pulse protection
- Switch selectable light or dark operating mode
- Adjustable sensitivity
- Choice of relay or solid-state outputs
- Highly visible LED output indicator

Specifications

	Red Line	Blue Line	Green Line	Analog Output
Environmental				
Certifications	UL Listed, CSA Approved, and CE Marked for all applicable directives			
Operating Environment	NEMA 3, 4, 12, 13; IP66			
Operating Temperature [C (F)]	-40...+52° (-40...+125°) for TRIAC output -40...+65° (-40...+150°) for all others	-40...+65° (-40...+150°)	-40...+65° (-40...+150°) for EM relay -40...+52° (-40...+125°) for solid state	-40...+65° (-40...+150°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2			
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2			
Relative Humidity	90% max			
Ambient Light Immunity	Incandescent light: 5000 lux			
Optical				
Sensing Modes	Retroreflective, diffuse, long range diffuse, fiber optic, background suppression, transmitted beam (see Product Selection table on page 1-220)			
Sensing Range	See Product Selection table on page 1-220			
Field of View	See Product Selection table on page 1-220			
Light Source	Visible red LED (660 nm), infrared LED (880 nm)			
Electrical				
Voltage	12...30V DC, 120V AC (see Product Selection table on page 1-220)			
Current Consumption	Depends on power base (see Product Selection table on page 1-220)			
Sensor Protection	False pulse	Reverse polarity and false pulse	False pulse	False pulse, short circuit
Outputs				
Response Time	1...8 ms	1 ms	Determined by plug-in module	100 ms
Output Type	PNP and NPN, FET,SPDT relay,TRIAC, analog output (see Product Selection table on page 1-220)			
Output Mode	Light or dark operate selectable, selectable positive or negative slope for analog models (see Product Selection table on page 1-220)			
Output Current	30 mA...2A max	100 mA	Determined by plug-in module	See Product Selection table
Output Leakage Current	1mA max	1 µA	—	10 µA
Mechanical				
Housing Material	Valox®			
Lens Material	Acrylic (glass on polarized models)			
Connection Types	See Product Selection table on page 1-220			
Supplied Accessories	None			
Optional Accessories	See mounting brackets, reflectors, and cordsets on page 1-226			

User Interface Panel

Label	Color	State	Status
Output	Red	OFF	Sensor output de-activated
		ON	Sensor output activated

Series 5000

Modular

Plug-In Output Module (required for green line only)

Output Type Capacity	Max Leakage Current	Output Response Time①	Cat. No.
SPDT EM-Relay 2 A, 120V AC/1 A, 240V AC	—	10 ms On 15 ms Off	8-590
			8-594②
SP-N.O. FET SS Relay 30 mA Cont./0...120V AC/DC	10 mA	1 ms	8-591
SP-N.O. AC Power TRIAC SS Relay 0.75 A Cont. 10 A Inrush/24...240V AC	1 mA	8 ms	8-592
NPN and PNP 100 mA 30V DC	1 µA	1 ms	8-593②

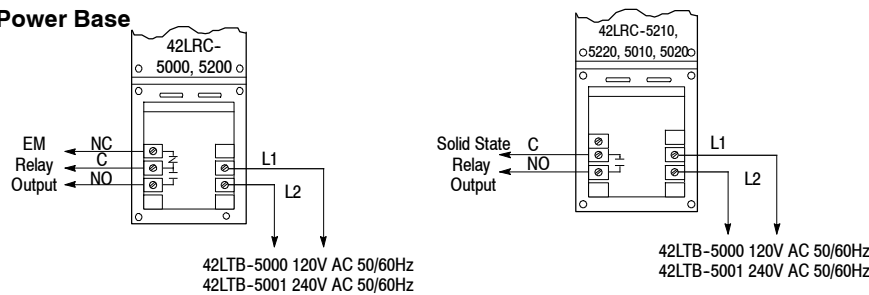
Plug-In Control Function Module (optional for green line only)

Function	Adjustable Time Delay (s)		Adjustable Dwell (s)	Cat. No.
	On	Off		
On and/or Off Delay	0.05...1.0	0.05...1.5	—	60-1790
	0.5...10	0.5...15		60-1791
	2...4.0	2...6.0		60-1798
One-Shot	—	—	0.005...0.5	60-1792
	—	—	0.5...15	60-1793
Motion Detector	—	0.05...1.5	—	60-1796
	—	0.5...15	—	60-1797

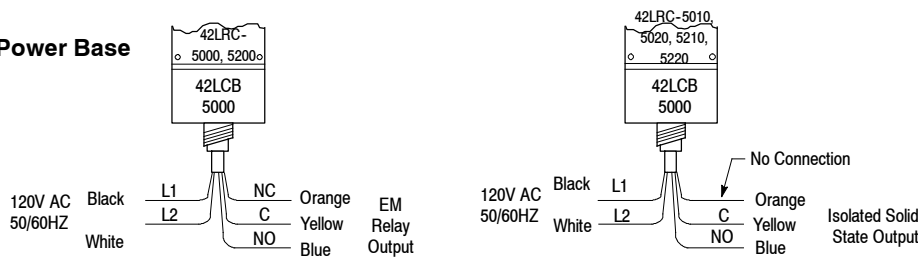
- ① Add sensor and output response time for total response time.
- ② Use with 42MTB-5004 base ONLY. Other output modules will not function with 5004 base.

Red Line Wiring Diagrams

With Terminal Style Power Base



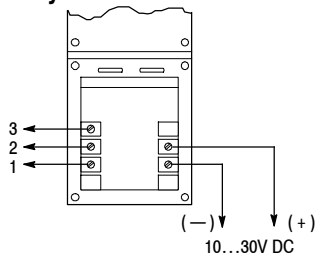
With Cable Style Power Base



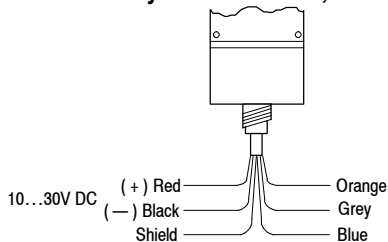
Note: Details of connection of Allen-Bradley Series 5000 photoelectric sensors to Allen-Bradley Programmable Controllers can be found in publication 42-2.0. Refer to www.ab.com/literature for more information.

Blue Line Wiring Diagrams

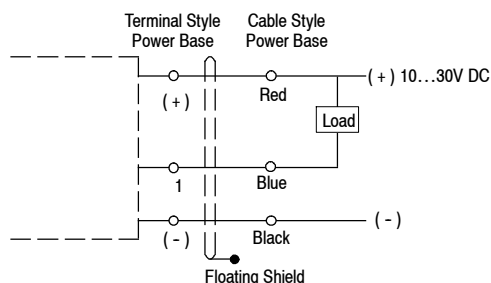
Terminal Style Power Base, DTB-5000



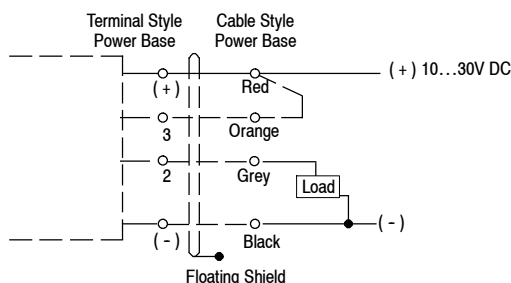
Cable Style Power Base, DCB-5000



NPN Output Connection (Sinking)

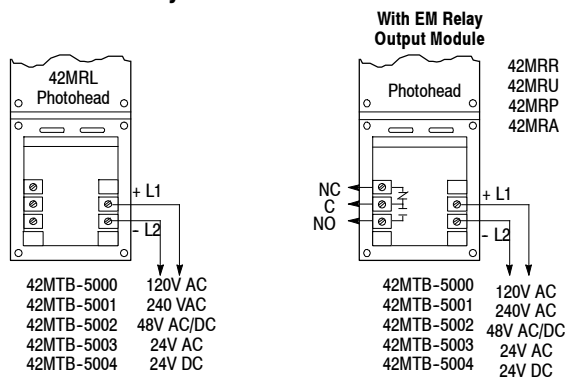


PNP Output Connection (Sourcing)

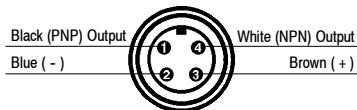


Green Line Wiring Diagrams

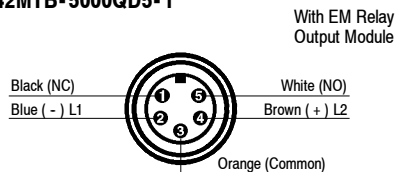
With Terminal Style Power Base



With Mini Quick-Disconnect Style Power Base
42MTB-5004QD4-1



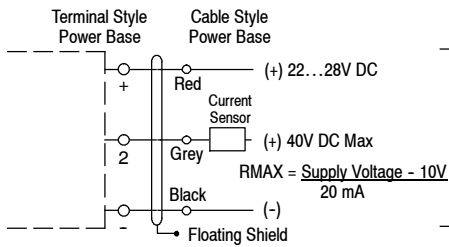
42MTB-5000QD5-1



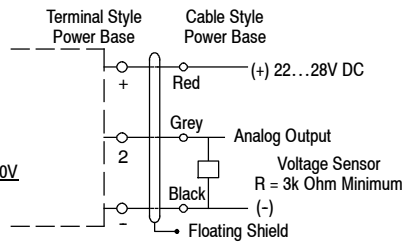
Note: Details of connection of Allen-Bradley Series 5000 photoelectric sensors to Allen-Bradley Programmable Controllers can be found in publication 42-2.0. Wire colors shown refer to Allen-Bradley quick-disconnect cables.

Analog Output Wiring Diagrams

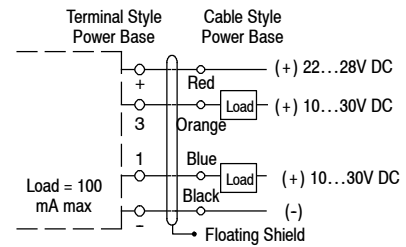
Current Output Connections



Voltage Output Connections



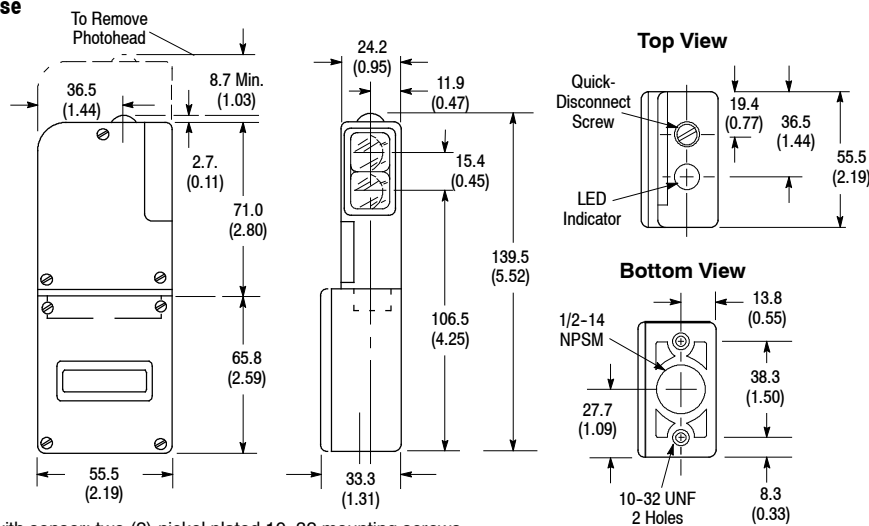
NPN Set Point Output Connections



Note: Details of connection of Allen-Bradley Series 5000 Photoelectric sensors to Allen-Bradley Programmable Controllers can be found in publication 42-2.0.

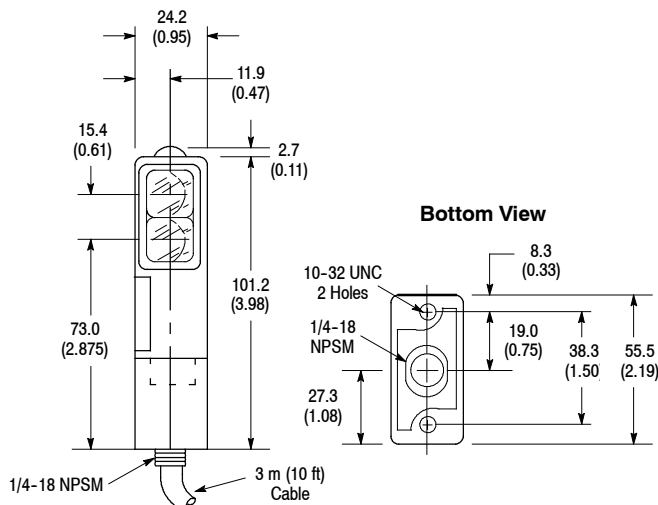
Approximate Dimensions (Applies to all versions) [mm (in.)]

Terminal Style Power Base



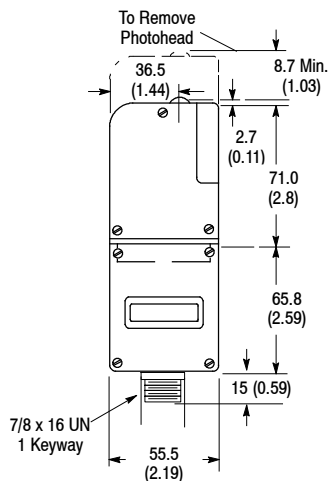
Note: Hardware included with sensor: two (2) nickel plated 10-32 mounting screws.

Cable Style Power Base



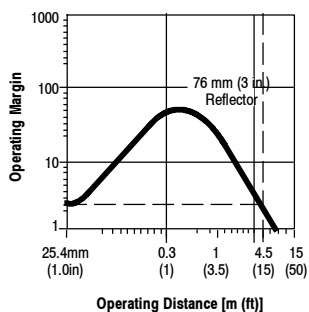
Approximate Dimensions (Applies to all versions) [mm (in.)] (continued)

Quick-Disconnect Style Power Base

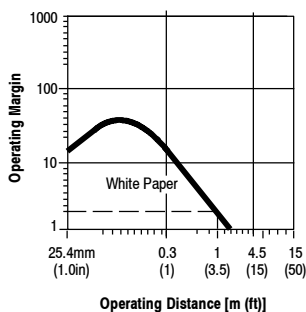


Red Line Typical Response Curve

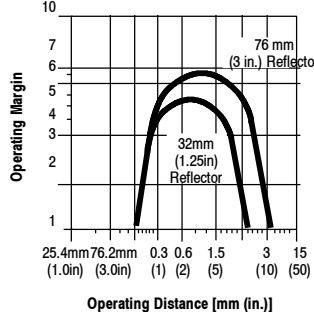
Retroreflective



Standard Diffuse

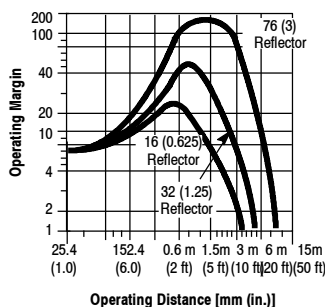


Polarized Retroreflective

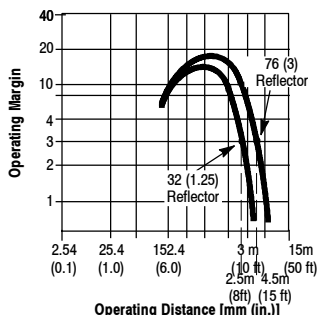


Blue Line Typical Response Curve

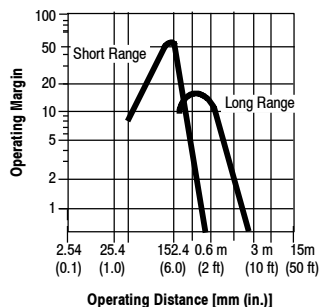
Retroreflective



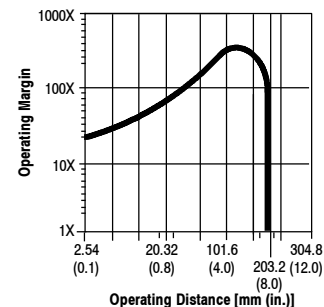
Polarized Retroreflective



Standard Diffuse

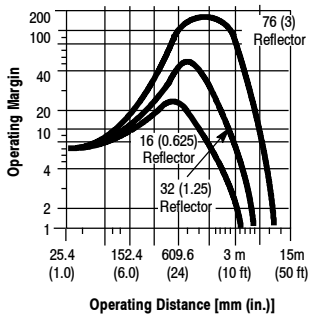


Background Suppression①

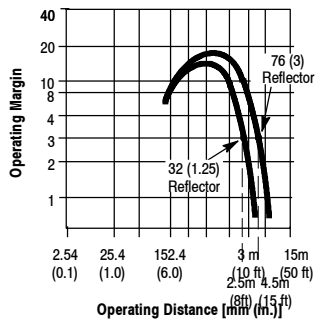


Green Line Typical Response Curve

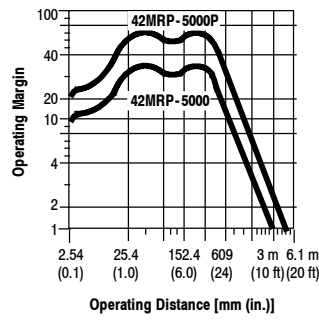
Retroreflective



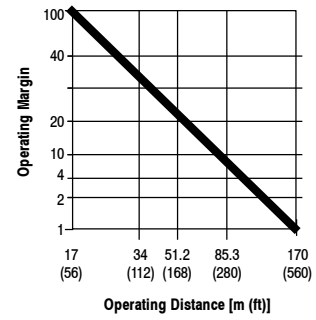
Polarized Retroreflective



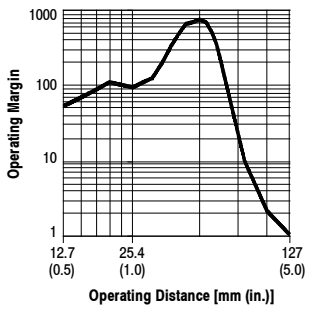
Standard Diffuse



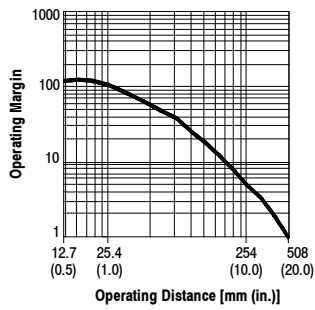
Transmitted Beam



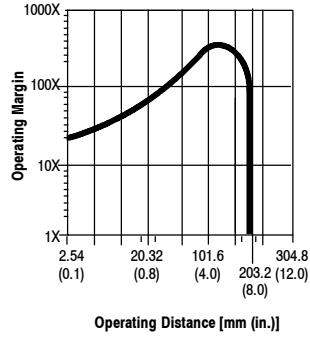
Fixed Focus Lens



Wide Angle Lens



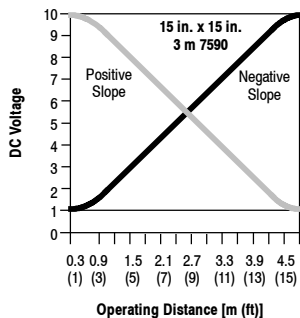
Background Suppression①



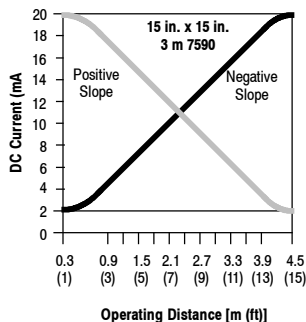
① Example: Operating distance set at 203.2 mm (8 in.).

Analog Output Typical Response Curve

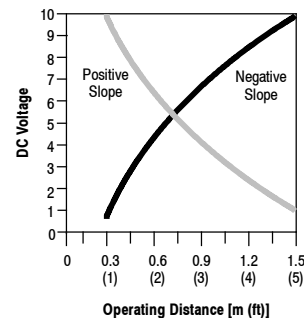
Retroreflective
Voltage Output Slope



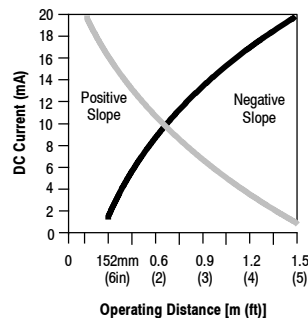
Current Output Slope



Standard Diffuse
Voltage Output

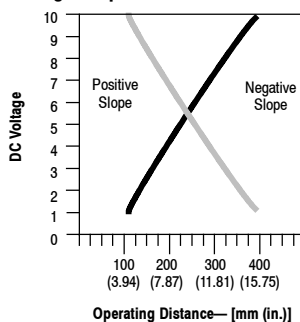


Current Output

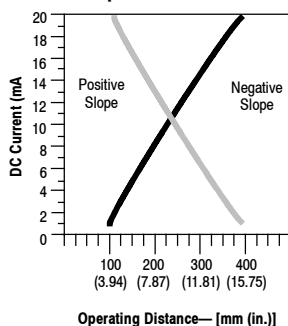


Infrared Glass FO/Fixed Focus/Wide Angle Diffuse

Voltage Output



Current Output



Product Selection Guidelines

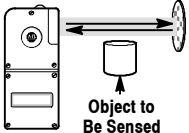
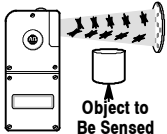
1. Select photohead (see pages 1-220 to 1-225).
2. Select power base (see page 1-226).
3. Select output module for green line models only (see page 1-226).
4. Select plug-in control function optional module on page 1-226 (green models only).

Series 5000

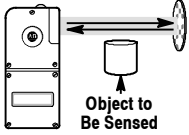
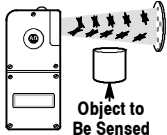
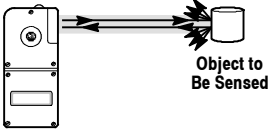
Red Line/Blue Line

Red Line Product Selection [mm (in.)]

1. Select Photohead.

Sensing Mode	Sensing Distance [mm (in.)]	Output Energized	Output Type Capacity	Response Time ^①		Cat. No.
				Sensor	Output	
 <p>Red Line—Retroreflective/Standard Diffuse</p> <p>Field of View: 3° Emitter LED: Infrared 880 nm</p>	50.8 mm...6 m (2 in...20 ft) with 76 (3) Reflector 50.8 mm...1.5 m (2 in...5 ft) with White Paper	Light/Dark Selectable	EM Relay (SPDT) 2.0 A-120V AC 1.0 A-240V AC	5 ms	On 10 ms Off 15 ms	42LRC-5000
			AC/DC Solid State FET (SP-N.O.) 30 mA 0...120V AC/DC		1 ms	42LRC-5010
			AC Solid State TRIAC (SP-N.O.) 0.75 A 240V AC cont.		8 ms	42LRC-5020
 <p>Red Line—Polarized Retroreflective</p> <p>Field of View: 3° Emitter LED: Visible Red 660 nm</p>	50.8 mm...6 m (2 in...20 ft) with 76 (3) Reflector	Light/Dark Selectable	EM-Relay (SPDT) 2.0 A-120V AC 1.0 A-240V AC	5 ms	On 10 ms Off 15 ms	42LRC-5200
			AC/DC Solid State FET (SP-N.O.) 30 mA 0...120V AC/DC		1 ms	42LRC-5210
			AC Solid State TRIAC (SP-N.O.) 0.75 A 240V AC cont.		8 ms	42LRC-5220

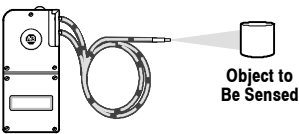
Blue Line Product Selection [mm (in.)]

 <p>Blue Line—Retroreflective</p> <p>Field of View: 2.5° Emitter LED: Infrared 880 nm</p>	50.8 mm...10 m (2 in...33 ft) with 76 (3) Reflector	Light/Dark Selectable	NPN and PNP 100 mA	1 ms	42DRU-5000
 <p>Blue Line—Polarized Retroreflective</p> <p>Field of View: 2.5° Emitter LED: Visible Red 660 nm</p>	50.8 mm...6 m (2 in...20 ft) with 76 (3) Reflector	Light/Dark Selectable	NPN and PNP 100 mA	1 ms	42DRU-5200
 <p>Blue Line—Standard Diffuse</p> <p>Field of View: 3° Emitter LED: Infrared 880 nm</p>	Long Range: 50.8 mm...2.1 m (2 in...7 ft) with White Paper	Light/Dark Selectable	NPN and PNP 100 mA	1 ms	42DRP-5000

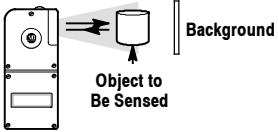
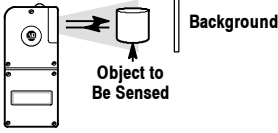
① Add Sensor and Output for total response time.

Refer to page 1-226 for cordsets and accessories.

Blue Line Product Selection [mm (in.)] (continued)

Sensing Mode	Sensing Distance	Output Energized	Output Type Capacity	Response Time	Cat. No.
 <p><i>Blue Line—Large Aperture Fiber Optic</i> Field of View: Depends on fiber optics or lens selected or lens type Emitter LED: Infrared 880 nm</p>	Depends on Fiber Optic selected.	Light/Dark Selectable	NPN and PNP 100 mA	1 ms	42DRA-5000FO

Blue Line Product Selection [mm (in.)] (continued)

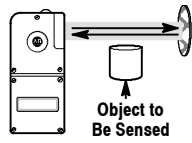
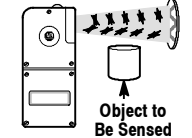
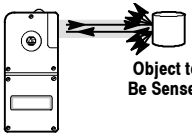
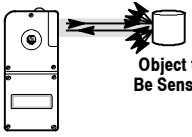
Sensing Mode	Sensing Distance [mm (in.)]	Output Energized	Output	Timing		Response Time	Cat. No.
				Function	Range		
 <p><i>Blue Line—Background Suppression without Timing</i> Field of View: 3° Emitter LED: Infrared 880 nm</p>	Suppression Point Adjustment Range 50.8 (2) to 63.5...304.8 (2.5...12)	Light/Dark Selectable	NPN & PNP	—	—	5 ms	42DBS-5000
 <p><i>Blue Line—Background Suppression with Timing</i> Field of View: 3° Emitter LED: Infrared 880 nm</p>	Suppression Point Adjustment Range 50.8 (2) to 63.5...304.8 (2.5...12)	Light/Dark Selectable	NPN & PNP	Selectable On Delay Off Delay On & Off Delay Delayed One-shot One-shot	0...1.5 s 0...15 s Selectable		42DBS-5100

Refer to page 1-226 for cordsets and accessories.

Series 5000

Green Line

Green Line Product Selection [mm (in.)]

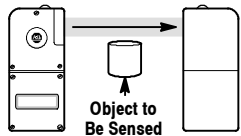
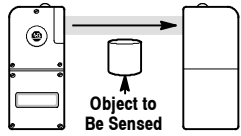
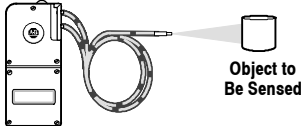
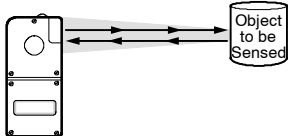
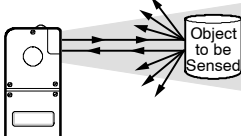
Sensing Mode	Sensing Distance [mm (in.)]	Output Energized	Sensor Response Time ^①	Cat. No.
 <p><i>Green Line—Retroreflective</i> Field of View: 2.5° Emitter LED: Infrared 880 nm</p>	50.8 mm...10 m (2 in...33 ft) with 76 (3) Reflector	Light/Dark Selectable	1 ms	42MRU-5000
 <p><i>Green Line—Polarized Retroreflective</i> Field of View: 2.5° Emitter LED: Visible Red 660 nm</p>	50.8 mm...6 m (2 in...20 ft) with 76 (3) Reflector	Light/Dark Selectable	2.5 ms	42MRU-5200
 <p><i>Green Line—Standard Diffuse</i> Field of View: 3° Emitter LED: Infrared 880 nm</p>	Short Range: 50.8 mm... 3 m (2 in...10 ft) with White Paper	Light/Dark Selectable	2.5 ms	42MRP-5000
 <p><i>Green Line—Long Range Diffuse</i> Field of View: 3° Emitter LED: Infrared 880 nm</p>	Long Range: 50.8 mm... 4.8 m (2 in...16 ft) with White Paper	Light/Dark Selectable	2.5 ms	42MRP-5000P

① Add Sensor and Output for total response time.

Refer to page 1-226 for cordsets and accessories.

Green Line Product Selection [mm (in.)] (continued)

1. Select Photohead (continued).

Sensing Mode	Sensing Distance [mm (in.)]	Output Energized	Sensor Response Time [Ⓢ]	Cat. No.
 <p>Green Line—Transmitted Beam Receiver Field of View: 3° Emitter LED: Infrared 880 nm</p>	25.4 mm...171 m (1 in...560 ft)	Light/Dark Selectable	5 ms	42MRR-5000 Order one receiver and one light source
 <p>Green Line—Transmitted Beam Light Source Field of View: 3° Emitter LED: Infrared 880 nm</p>	25.4 mm...171 m (1 in...560 ft)	—	N/A	42MRL-5000 Order one receiver and one light source
 <p>Green Line—Large Aperture Fiber Optic Field of View: Determined by fiber optics or lens type Emitter LED: Infrared 880 nm</p>	Depends on Fiber Optic selected.	Light/Dark Selectable	2.5 ms	42MRA-5000FO
 <p>Green Line—Fixed Focus Emitter LED: Infrared 880 nm</p>	5.08 mm...172 m (0.2 in...564 ft)	Light/Dark Selectable	2.5 ms	42MRA-5000FF
 <p>Green Line—Wide Angle Diffuse Emitter LED: Infrared 880 nm</p>	5.08 (0.2)...508 (20)	Light/Dark Selectable	2.5 ms	42MRA-5000WA

[Ⓢ] Prewired for use with output 8-593 only.

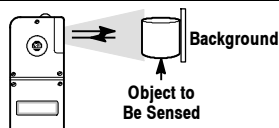
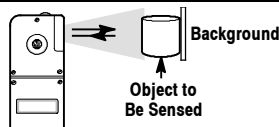
Refer to page 1-226 for cordsets and accessories.

Series 5000

Green Line/Analog Output

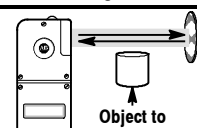
Green Line Product Selection [mm (in.)] (continued)

1. Select Photohead (continued).

Sensing Mode	Sensing Distance [mm (in.)]	Output Energized	Timing		Sensor Response Time ^②	Cat. No.
			Function	Range		
 <p>Green Line—Background Suppression without Timing</p> <p>Field of View: 3° Emitter LED: Infrared 880 nm</p>	Suppression Point Adjustment Range 50.8 (2) to 63.5...304.8 (2.5...12)	Light/Dark Selectable	—	—	5 ms	42MBS-5000
 <p>Green Line—Background Suppression with Timing</p> <p>Field of View: 3° Emitter LED: Infrared 880 nm</p>	Suppression Point Adjustment Range 50.8 (2) to 63.5...304.8 (2.5...12)	Light/Dark Selectable	Selectable On Delay Off Delay On & Off Delay One-shot Delayed One-shot	0...1.5 s 0...15 s Selectable	5 ms	42MBS-5100

Analog Output Product Selection [mm (in.)]

1. Select Photohead.

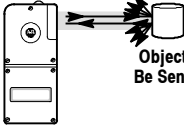
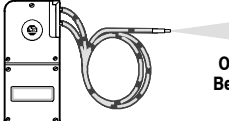
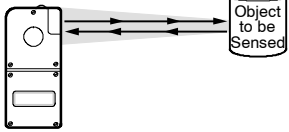
Sensing Mode	Supply Current	Sensing Distance	Analog Output	Output Type Capacity	Response Time ^②	Slope	Cat. No.
 <p>Analog Output—Retroreflective</p> <p>Field of View: 3° Emitter LED: Infrared 880 nm</p>	70 mA	600 mm (2 ft)... Total: 4.6 m (15 ft) Linear 4.0 m (13 ft)	Voltage 1...10V DC Current 1...20 mA	Two Adjustable Set Points NPN 100 mA (30V Max)	100 ms	Selectable Positive or Negative	42DRU-5400

① Prewired for use with output 8-593 only.

② Time needed for full analog swing.

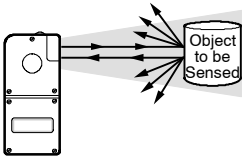
Refer to page 1-226 for cordsets and accessories.

Analog Output Product Selection [mm (in.)] (continued)

Sensing Mode	Sensing Distance [mm (in.)]	Analog Output	Output Type Capacity	Response Time [ⓐ]	Slope	Cat. No.
 <p>Object to Be Sensed</p> <p><i>Analog Output—Standard Diffuse</i> Field of View: 3° Emitter LED: Infrared 880 nm</p>	<p>150 (6) ... Total: 1.5 m (5 ft) Linear: 1.2 m (4 ft)</p>	<p>Voltage 1...10V DC Current 1...20 mA</p>	<p>Two Adjustable Set Points NPN 100 mA (30V max)</p>	<p>100 ms</p>	<p>Selectable Positive or Negative</p>	<p>42DRP-5400</p>
 <p>Object to Be Sensed</p> <p><i>Analog Output—Large Aperture Fiber Optic</i> Field of View: Depends on fiber optics (refer to fiber optic section) or lens type Emitter LED: Infrared 880 nm</p>	<p>Depends on Fiber Optic selected.</p>	<p>Voltage 1...10V DC Current 1...20 mA</p>	<p>Two Adjustable Set Points NPN 100 mA (30V max)</p>	<p>100 ms</p>	<p>Selectable Positive or Negative</p>	<p>42DRA-5400FO</p>
 <p>Object to be Sensed</p> <p><i>Analog Output—Fixed Focus</i> Emitter LED: Infrared 880 nm</p>	<p>5.08...101 (0.2...4)</p>	<p>Voltage 1...10V DC Current 1...20 mA</p>	<p>Two Adjustable Set Points NPN 100 mA (30V max)</p>	<p>100 ms</p>	<p>Selectable Positive or Negative</p>	<p>42DRA-5400FF</p>

Analog Output Product Selection [mm (in.)] (continued)

1. Select Photohead.

Sensing Mode	Sensing Distance	Analog Output	Output Type Capacity	Response Time	Slope	Cat. No.
 <p>Object to be Sensed</p> <p><i>Analog Output—Wide Angle Diffuse</i> Emitter LED: Infrared 880 nm</p>	<p>5.08 (0.2 in.)... 152 mm (6 in.)</p>	<p>Voltage 1...10V DC Current 1...20 mA</p>	<p>Two Adjustable Set Points NPN 100 mA (30V max)</p>	<p>100 ms</p>	<p>Selectable Positive or Negative</p>	<p>42DRA-5400WA</p>

[ⓐ] Time needed for full analog swing.

Refer to page 1-226 for cordsets and accessories.

Series 5000

Power Base

Power Base Product Selection [mm (in.)]

2. Select Power Base.

Style	Operating Voltage	Supply Current	Cat. No.
Red Line			
Terminal	120V AC, 50/60 Hz	2V A	42LTB-5000
	240V AC, 50/60 Hz	4V A	42LTB-5001
Cable	120V AC, 50/60 Hz	2V A	42LCB-5000
Blue Line			
Terminal	10...30V DC	35 mA	42DTB-5000
Cable			42DCB-5000

Operating Voltage	Supply Current	Cat. No.	
		Terminal Style	Mini QD Style
Green Line			
102...132V AC, 50/60 Hz	2V A	42MTB-5000	42MTB-5000QD5-1
204...254V AC, 50/60 Hz	4V A	42MTB-5001	—
40...54V AC/DC, 50/60 Hz	1V A	42MTB-5002	—
20...30V AC, 50/60 Hz		42MTB-5003	—
20...30V DC		42MTB-5004	42MTB-5004QD4-1 ①

	Operating Voltage	Supply Current	Connection Type	Cat. No.
Analog Output Line				
All sensing modes	22...28V DC	70 mA maximum	Screw Terminal	42DTB-5000
		70 mA maximum	3 m 300V Cable	42DCB-5000

3. Select Output module (green line models only) (required).

4. Select plug-in control function optional module (green line models only).

Cordsets and Accessories

Description	Cat./Page No.	Description	Cat. No.	Description	Cat. No.
Terminal Chambers	8-1	Right Angle Bracket	60-1785	76 mm (3 in.) Diameter Reflector	92-39
Screw Terminal	42MTB-5000	Conduit Adaptor 1/2 inch NPT	60-2213	32 mm (1.25 in.) Diameter Reflector	92-47
5-pin DC Mini QD	42MTB-5000-QD5-1	Armored Cable Adaptor	60-1577	Heavy Duty Protective Guard	60-2083
Flexi-mount Mounting Assembly	60-2014	Limit Switch Type Mounting Assembly	60-2230	Heavy Duty Mounting Assembly	60-1748

① Rewired for use with output 8-593 only.



Features

- Harsh duty package
- Screw terminal connections
- Long-range sensing modes
- Plug-in logic and output modules
- Both DC and AC/DC operation
- Selectable light/dark operation

Specifications

Environmental	
Certifications	UL Listed, CSA Approved
Operating Environment	NEMA 3, 4, 12, 13; IP66
Operating Temperature [C (F)]	-40...+57° (-40...+135°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...90%
Optical	
Sensing Modes	Retroreflective, polarized retroreflective, diffuse, transmitted beam
Sensing Range	See Product Selection table on page 1-230
Field of View	See Product Selection table on page 1-230
Light Source	Visible red LED (660 nm), infrared LED (880 nm)
LED Indicators	See User Interface below
Adjustments	Sensitivity adjustment potentiometer
Electrical	
Voltage	See Product Selection table on page 1-230
Current Consumption	See Product Selection table on page 1-230
Sensor Protection	False pulse
Outputs	
Response Time	5 ms plus plug-in module delay
Output Type	EM relay, TRIAC, FET, PNP/NPN
Output Mode	Light or dark operate selectable
Output Current	Determined by plug-in module, see Product Selection table on page 1-230
Output Leakage Current	1 µA max
Mechanical	
Housing Material	Noryl®
Lens Material	Acrylic, glass for polarized sensor
Connection Types	Nickel-plated screw terminal
Supplied Accessories	8-670 DPDT relay module
Optional Accessories	Mounting brackets, reflectors, cordsets

User Interface Panel

Label	Color	State	Status
Power	Yellow	OFF	Sensor not powered
		ON	Sensor powered

PHOTOSWITCH® Photoelectric Sensors

Series 4000B

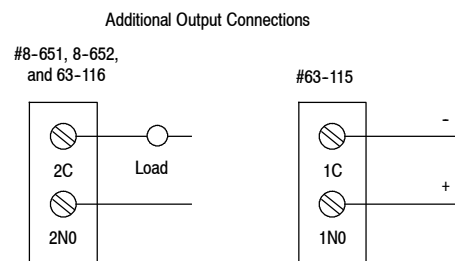
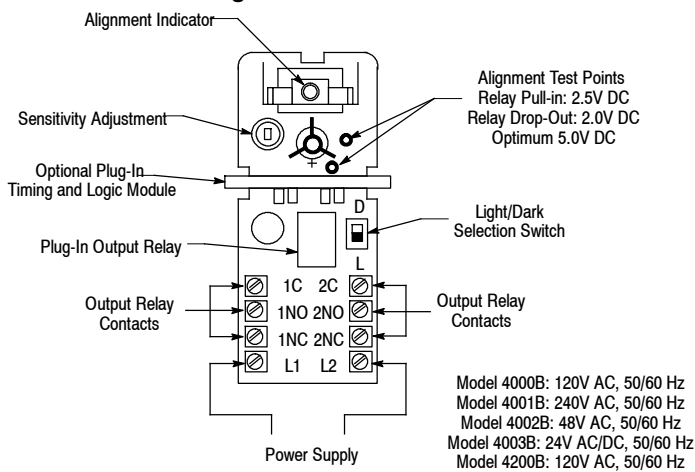
Optional Timing and Logic Modules

These plug-in modules can be added to any series 4000B Photoelectric sensor.

Function	Adjustable Time Delay(s)		Adjustable Dwell (s)	Cat. No.
	On	Off		
One-shot	—	—	0.040...0.250	60-1612-1
	—	—	0.5...15	60-1612-2
On and/or Off Delay	0.05...1.0	0.05...1.5	—	60-1613
	0.5...10	0.5...15		60-1614
Delayed One-shot	0.10...1.5	—	0.040...0.250	60-1625
	1.0...15		0.040...0.250	60-1626
Motion Detector	—	0.05...1.5	—	60-1660
		0.5...15		60-1661
Preset Counter	2...999 Counts		0.040...0.250	60-1716

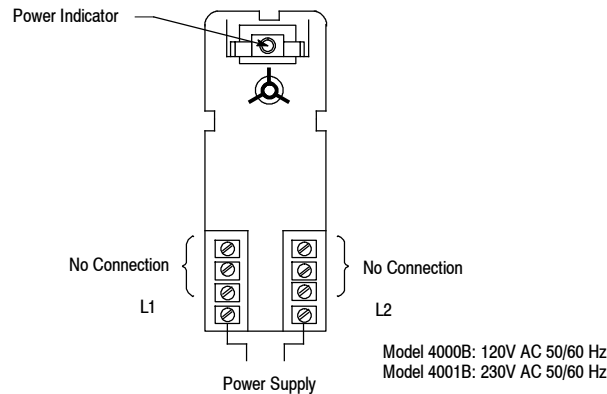
Wiring Diagrams

All Sensing Modes Except Transmitted Beam Light Source

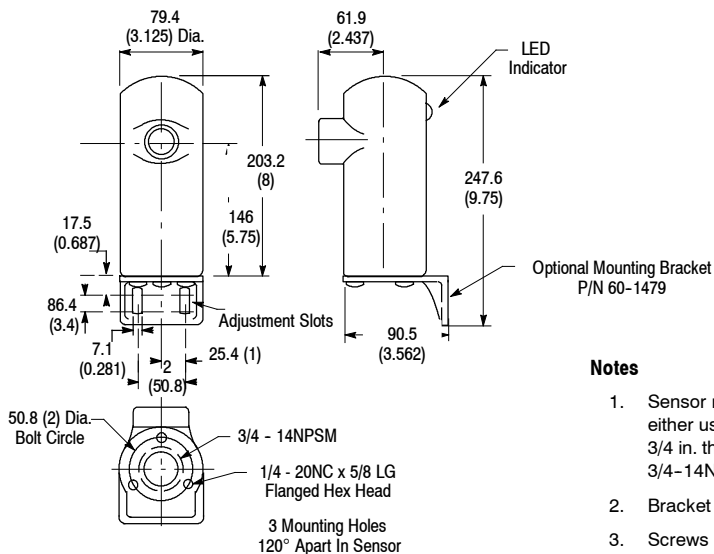


Note: Details regarding connection of Allen-Bradley Series 4000B sensors to Allen-Bradley Programmable Controllers can be found in publication 42-2.0.

Transmitted Beam Light Source



Approximate Dimensions [mm (in.)]



Notes

1. Sensor may be mounted without bracket, either using 3, 1/4-20NC mtg. holes or on a 3/4 in. threaded pipe, thread pitch 3/4-14NPSM.
2. Bracket allows 360° adjustment.
3. Screws included with mounting bracket.

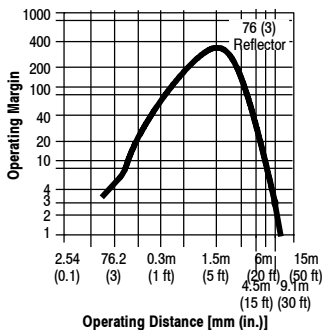
ATTENTION



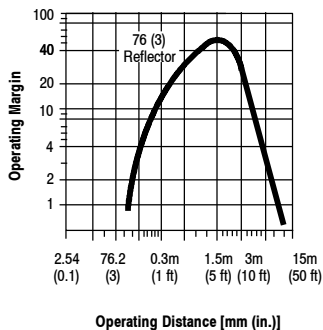
DO NOT use lockwashers with supplied whiz-lock mounting screws.

Typical Response Curve

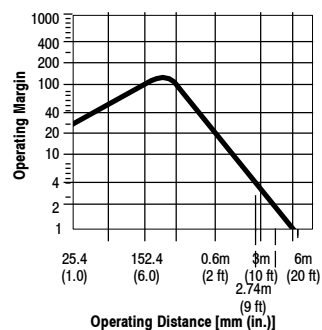
Retroreflective



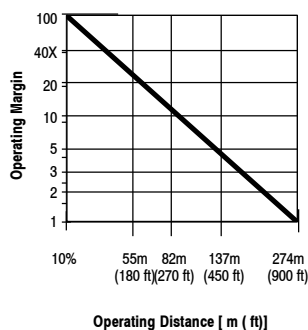
Polarized Retroreflective



Standard Diffuse



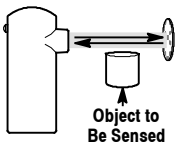
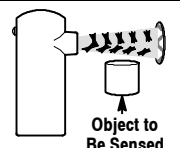
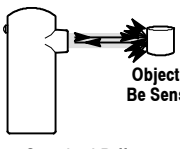
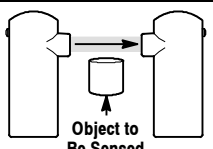
Transmitted Beam



PHOTOSWITCH® Photoelectric Sensors
Series 4000B

Product Selection

1. Select sensor.

Sensing Mode	Operating Voltage/ Power Consumption	Sensing Range [mm (in.)]	Output Energized	Sensor Response Time ❶	Cat. No.
 Retroreflective Field of View: 1.5° Emitter LED: Infrared 940 nm	102...132V AC/ 2V A	50.8 mm...10.6 m (2 in...35 ft)	Light/Dark Selectable	5 ms	42RLU-4000B
	195...253V AC/ 2V A				42RLU-4001B
	40...58V AC/ 2V A				42RLU-4002B
	18...28V AC/DC/2V A 20...32V DC				42RLU-4003B
 Series 4000B Polarized Retroreflective Field of View: 2° Emitter LED: Visible Red 660 nm	102...132V AC/ 2 A	50.8 mm...7 m (2 in...23 ft)	Light/Dark Selectable	5 ms	42RLU-4200B
 Standard Diffuse Field of View: 4° Emitter LED: Infrared 940 nm	102...132V AC/ 2V A	50.8 mm...3.6 m (2 in...12 ft)	Light/Dark Selectable	5 ms	42RLP-4000B
 Transmitted Beam Field of View: 3° Emitter LED: Infrared 940 nm Light sources and receivers must be ordered separately. Any light source is compatible with any receiver.	102...132V AC, 50/60 Hz/ 2V A	50.8 mm...274 m (2 in...900 ft)	Light/Dark Selectable	5 ms	42RLR-4000B

2. Select optional plug-in timing and logic module, page 1-227.

3. Select optional plug-in output module.

Sensing Mode	Type	Max Load Current	Output Response Time❶	Cat. No.
All sensing modes	DPDT EM-Relay (included)	5 A, 120V AC 2.5 A, 240V AC	10 ms On 15 ms Off	8-670❷
	SP-N.O. AC TRIAC	1 A, 265V AC, 20 mA min	8 ms	8-651
	SP-N.O. AC/DC FET	30 mA, 0...120V AC/DC	1 ms	8-652
	Open Collector NPN	250 mA, 30V DC	1 ms	63-115
	DC Voltage Output Adaptor	30 mA, 17V DC		63-116

❶ Add sensor response time and output response time for total response time.

❷ 8-670 relay output module supplied with sensor.



General Specifications

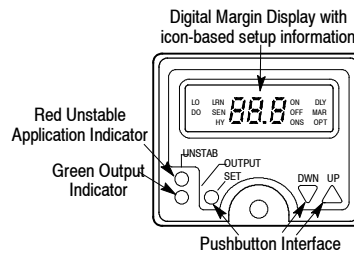
Unit Protection	Overload, short circuit, reverse polarity, false pulse
Supply Voltage	10...30V DC
Current Consumption	70 mA maximum
Output Type	NPN and PNP
Output Mode	Light/dark operate selectable
Output Rating	250 mA @ 30V DC
Max Leakage Current	10 μ A
Response Time	250 μ s...4 ms selectable
Housing Material	Valox®
Lens Material	Acrylic
LED Indicators	See User Interface below
Connection Types	5-pin micro QD, 5-pin mini QD, 2 m PVC 22 AWG cable
Supplied Accessories	#129-130 mounting kit
Optional Accessories	Cordsets, mounting brackets
Operating Environment	NEMA 3, 4X, 6P, 12, 13; IP67 (IEC 529) 1200 psi washdown
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Operating Temperature [C (F)]	-25...+60° (-13...+140°)
Relative Humidity	5...95%
Certifications	UL Listed, CSA Certified, and CE Marked for all applicable directives

Features

- Self-teach operation
- Automatic sensitivity control
- LCD display for easy status indication
- Selectable hysteresis, pulse rates
- Selectable response times
- Selectable ON/OFF, ONE-SHOT timer
- Automatic crosstalk immunity
- Optical program transfer
- Both NPN and PNP outputs

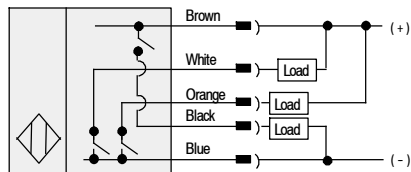
User Interface Panel

Label	Color	State	Status
Unstable	Red	OFF	Margin < 2.5
		ON	Margin > 2.5
Output	Green	OFF	Output not activated
		ON	Output activated

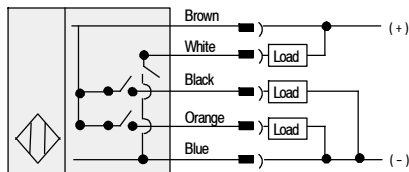


Wiring Diagrams

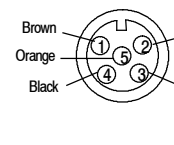
Sensors with NPN Diagnostic Output



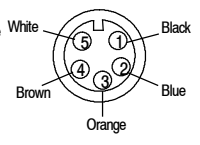
Sensors with PNP Diagnostic Output



Micro QD



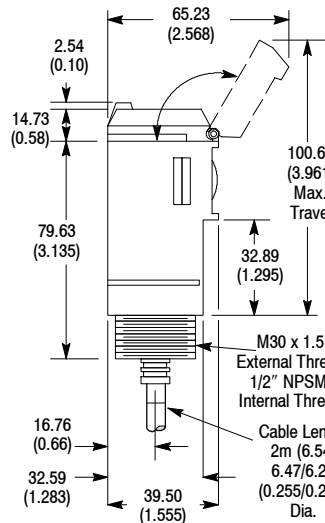
Mini QD



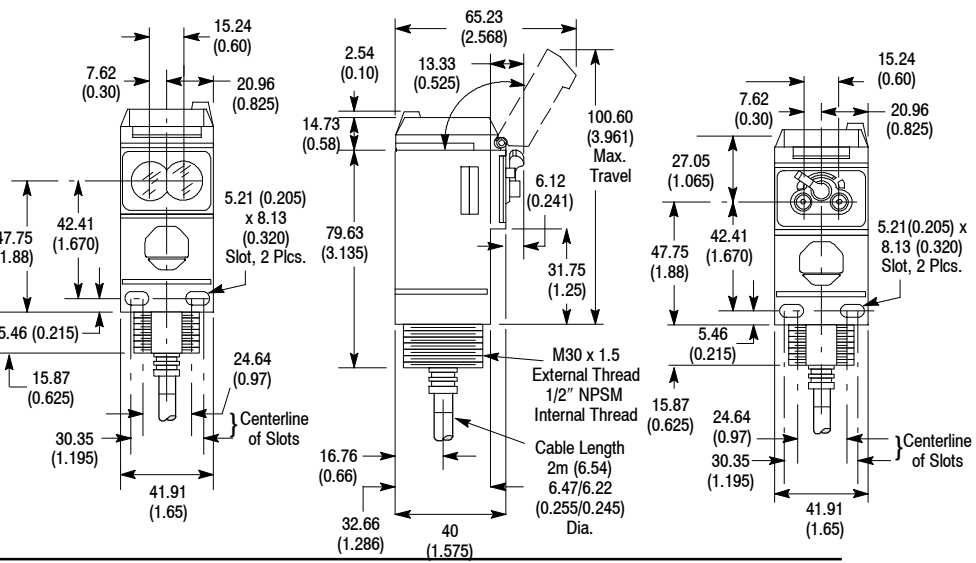
Note: Orange lead is diagnostic output.

Approximate Dimensions [mm (in.)]

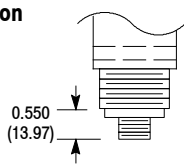
Cable Version



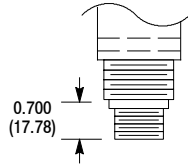
Fiber Optic Version



Connector Version



Micro Style



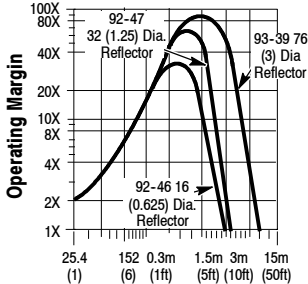
Mini Style

Thread Size

DC Micro	M12 x 1 1 Keyway
Mini	1/2 x 14 NPSM 1 Keyway

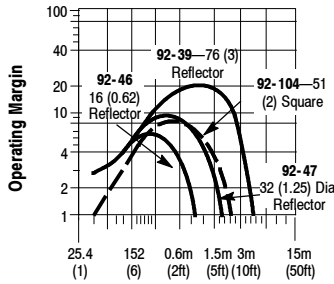
Typical Response Curve

Retroreflective



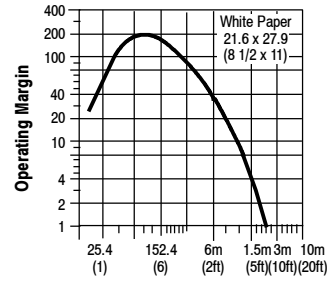
Operating Distance [mm (in.)]

Polarized Retroreflective



Operating Distance [mm (in.)]

Standard Diffuse



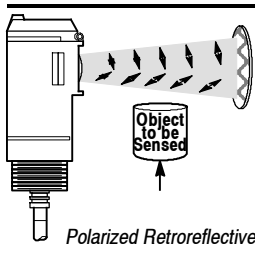
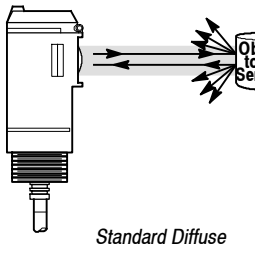
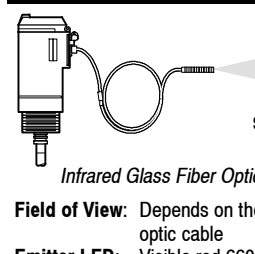
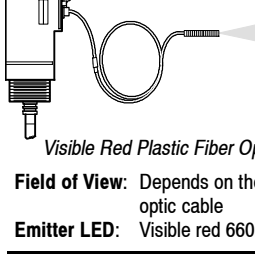
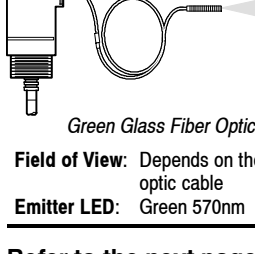
Operating Distance [mm (in.)]

Product Selection

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Diagnostic Output/ Rating	Connection Type	Cat. No.	
<p>Retroreflective</p> <p>Field of View: 1.5°</p> <p>Emitter LED: Visible red 660 nm</p>	10...30V DC 70 mA	51 mm (2 in.)...9.14 m (30 ft)	Light/Dark Selectable	NPN & PNP 250 mA at 30V DC 250 μs...4 ms Selectable	NPN 20 mA at 30V DC	2 m 300V cable	42GTGU-10000-02	
						5-pin DC micro	42GTGU-10000-QD	
						5-pin mini QD	42GTGU-10000-Q1	
						PNP 20 mA at 30V DC	2 m 300V cable	42GTGU-10010-02
							5-pin DC micro	42GTGU-10010-QD
							5-pin mini QD	42GTGU-10010-Q1

Refer to last page for cordsets and accessories.

Product Selection (continued)

Sensing Mode	Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Diagnostic Output/ Rating	Connection Type	Cat. No.	
 <p><i>Polarized Retroreflective</i></p> <p>Field of View: 1.5° Emitter LED: Visible red 660 nm</p>	10...30V DC 70 mA	51 mm (2 in.)...4.6 m (15 ft)	Light/Dark Selectable	NPN & PNP 250 mA at 30V DC 250 μs...4 ms Selectable	NPN 20 mA at 30V DC	2 m 300V cable	42GTGU-10200-02	
						5-pin DC micro	42GTGU-10200-QD	
						5-pin mini	42GTGU-10200-Q1	
						PNP 20 mA at 30V DC	2 m 300V cable	42GTGU-10210-02
							5-pin DC micro	42GTGU-10210-QD
							5-pin mini	42GTGU-10210-Q1
 <p><i>Standard Diffuse</i></p> <p>Field of View: 3.5° Emitter LED: Infrared 880 nm</p>	10...30V DC 70 mA	51 mm (2 in.)...2.7 m (8.86 ft)	Light/Dark Selectable	NPN & PNP 250 mA at 30V DC 250 μs...4 ms Selectable	NPN 20 mA at 30V DC	2 m 300V cable	42GTGP-10000-02	
						5-pin DC micro	42GTGP-10000-QD	
						5-pin mini	42GTGP-10000-Q1	
						PNP 20 mA at 30V DC	2 m 300V cable	42GTGP-10010-02
							5-pin DC micro	42GTGP-10010-QD
							5-pin mini	42GTGP-10010-Q1
 <p><i>Infrared Glass Fiber Optic</i></p> <p>Field of View: Depends on the fiber optic cable Emitter LED: Visible red 660nm</p>	10...30V DC 70 mA	5.08 mm (0.2 in.) to Depends on Fiber Optic selected	Light/Dark Selectable	NPN & PNP 250 mA at 30V DC 250 μs...4 ms Selectable	NPN 20 mA at 30V DC	2 m 300V cable	42GTGF-10000-02	
						5-pin DC micro	42GTGF-10000-QD	
						5-pin mini	42GTGF-10000-QD1	
						PNP 20 mA at 30V DC	2 m 300V cable	42GTGF-10010-02
							5-pin DC micro	42GTGF-10010-QD
							5-pin mini	42GTGF-10010-QD1
 <p><i>Visible Red Plastic Fiber Optic</i></p> <p>Field of View: Depends on the fiber optic cable Emitter LED: Visible red 660nm</p>	10...30V DC 70 mA	5.08 mm (0.2 in.) to Depends on Fiber Optic selected	Light/Dark Selectable	NPN & PNP 250 mA at 30V DC 250 μs...4 ms Selectable	NPN 20 mA at 30V DC	2 m 300V cable	42GTGF-10100-02	
						5-pin DC micro	42GTGF-10100-QD	
						5-pin mini	42GTGF-10100-QD1	
						PNP 20 mA at 30V DC	2 m 300V cable	42GTGF-10110-02
							5-pin DC micro	42GTGF-10110-QD
							5-pin mini	42GTGF-10110-QD1
 <p><i>Green Glass Fiber Optic</i></p> <p>Field of View: Depends on the fiber optic cable Emitter LED: Green 570nm</p>	10...30V DC 70 mA	5.08 mm (0.2 in.)...8 ft (2.7 m)	Light/Dark Selectable	NPN & PNP 250 mA at 30V DC 250 μs...4 ms Selectable	NPN 20 mA at 30V DC	2 m 300V cable	42GTGF-10300-02	
						5-pin DC micro	42GTGF-10300-QD	
						5-pin mini	42GTGF-10300-QD1	
						PNP 20 mA at 30V DC	2 m 300V cable	42GTGF-10310-02
							5-pin DC micro	42GTGF-10310-QD
							5-pin mini	42GTGF-10310-QD1

Refer to the next page for cordsets and accessories.

Series 10,000

Teachable

Infrared Glass Fiber Optic Range (Typical)

Fiber/Core Diameter	Sensing Mode	1.0 ms	500 μ s	250 μ s	100 μ s
43GR-MKS00ML/0.69 mm (0.027 in.)	Diffuse	0.3 in.	0.2 in.	Not Recommended	
	Retroreflective	0.4 in.	Not Recommended		
43GR-FAS25SL/3.18 mm (0.125 in.)	Diffuse	4.0 in.	2.4 in.	0.9 in.	0.9 in.
	Retroreflective	50.0 in.	37.0 in.	21.0 in.	21.0 in.
43GT-FAS25SL/3.18 mm (0.125 in.)	Transmitted Beam	20.0 in.	13.0 in.	5.4 in.	5.4 in.
43GT-MKS00ML/0.69 mm (0.027 in.)	Transmitted Beam	1.5 in.	1.3 in.	0.45 in.	0.40 in.

Visible Red Fiber Optic Range (Typical)

Fiber/Core Diameter	Sensing Mode	1.0 ms	500 μ s	250 μ s	100 μ s
43PR-PJS53VS/0.5 mm (0.02 in.)	Diffuse	0.45 in.	0.22 in.	Not Recommended	
	Retroreflective	12.0 in.	10.0 in.	Not Recommended	
43PR-NESP57ZS/1.0 mm (0.04 in.)	Diffuse	1.75 in.	1.1 in.	0.45 in.	0.45 in.
	Retroreflective	26.0 in.	18.0 in.	10.0 in.	10.0 in.
43PT-PLS2GS/0.5 mm (0.02 in.)	Transmitted Beam	2.6 in.	1.5 in.	0.6 in.	0.45 in.
43PT-NJS56FS/1.0 mm (0.04 in.)	Transmitted Beam	5.0 in.	3.0 in.	1.3 in.	1.3 in.

Visible Green Fiber Optic Range (Typical)

Fiber/Core Diameter	Sensing Mode	1.0ms	500 μ s	250 μ s	100 μ s
43GR-MKS00ML/0.69 mm (0.027 in.)	Diffuse	0.1 in.	Not Recommended		
	Retroreflective		Not Recommended		
43GR-FAS25SL/3.18 mm (0.125 in.)	Diffuse	0.6 in.	0.4 in.	0.1 in.	0.1 in.
	Retroreflective	6.5 in.	5.0 in.	3.0 in.	3.0 in.
43GT-FAS25SL/3.18 mm (0.125 in.)	Transmitted Beam	2.5 in.	1.6 in.	0.7 in.	0.7 in.
43GT-MKS00ML/0.69 mm (0.027 in.)		0.25 in.	0.2 in.	Not Recommended	

Cordsets and Accessories

Description	Cat. No.
2 m (6.5 ft) 5-pin DC Micro QD Cordset	889D-F5AC-2
1.8 m (6 ft) 5-pin Mini QD Cordset	889N-F5AF-6F
Swivel/Tilt Mounting Bracket	60-2439



Fiber optic sensors permit the attachment of “light pipes” called fiber optic cables. Light emitted from the source is sent through transparent fibers in the cables and emerges at the end of the fiber. The transmitted or reflected beam is then carried back to the receiver through different fibers. Ideal for sensing small objects, fiber optic cables can be mounted in locations that would otherwise be inaccessible to photoelectric sensors. Other characteristics/advantages of fiber optic sensors include:

- Some glass fiber optic tips have the ability to withstand high temperatures (up to 482°C (900°F))
- Withstand extreme shock and vibration
- Often have the fastest response times
- Immunity to electrical interference (EMI, RFI).

Fiber Optic Cables—Types

Fiber optic cables can be made of glass or plastic and categorized as either individual (transmitted beam) or bifurcated (diffuse).

Glass fiber optic cables contain multiple strands of very thin glass fiber that are bundled together in a flexible sheath. Typically more durable than their plastic counterparts, glass fiber optic cables will withstand much higher

temperatures; glass fiber optic cables with a stainless steel sheath are rated up to 260°C (500°F). Special glass cables can be obtained with temperature ratings of up to 482°C (900°F). Most glass cables are available with a choice of PVC or flexible stainless steel sheath. While PVC-sheathed cables are typically less expensive, stainless steel sheathing offers greater durability and allows the cables to operate in higher temperatures. Glass fibers can be used with infrared or visible LED light sources.

Light transmission is maximized with a thicker bundle diameter. It is also important to note that attenuation increases as fiber optic cable length increases. For further details, see the Application Recommendations section on page 1-234 .

Plastic fiber optic cables are constructed of a single acrylic monofilament and, since plastic fibers absorb infrared light, they are most efficient when used with visible red LED sources. It is recommended that plastic fiber optic cables are used with visible light sources. Considered less durable than glass cables, plastic fibers are generally less expensive and can be used in applications where continuous flexing of the cable is required. For that reason, coiled plastic cables are also available for such applications.

General Information

Sensor and Sensing Tip Selection page 1-232 and 1-233

Glass Fiber Optic Cables

Application Recommendations page 1-234
 Large Aperture Fibers page 1-235
 Small Aperture Fibers page 1-251
 Custom Fiber Configurator page 1-258
 Sensing Tip Drawings page 1-260
 Standard Bundle Sizes page 1-268
 Accessories page 1-269

Plastic Fiber Optic Cables

Application Recommendations page 1-270
 Small Aperture Fibers page 1-271
 Miniature Aperture Fibers page 1-277
 Special Purpose Fibers page 1-280
 Custom Fiber Configurator page 1-281
 Sensing Tip Drawings page 1-283
 Standard Bundle Sizes page 1-286
 Accessories page 1-287
 Cross Reference page 1-292

Fiber Optic Cables

Introduction

Selection Process

1. Determine the sensing mode

- Transmitted beam (two separate cables required)
 - Greater distance from sensing tip to the object
 - Reflectivity of the object is low
 - Generally darker colors reflect less light.
- Diffuse (one bifurcated cable)
 - Distance from sensing tip to the object is small
 - Reflectivity of the object is high
 - Generally lighter colors reflect more light.

2. Choose between glass or plastic fiber optic cables

- Glass
 - Higher temperature rating (up to 482°C (900°F) possible)
 - Used with infrared or visible red light sources
 - More expensive.
- Plastic
 - Typically used for visible light sources
 - Lower temperature applications (lower than 70°C (158°F))

3. Mechanical considerations

- Glass has a more restrictive bending radius.
- Select sensing tip configuration based on mounting space availability
 - Threaded tip versus ferruled
 - Straight tip versus 45° or 90° bend
 - Straight tip with light exiting at 90°.

4. Select fiber bundle size for the application.

- The smaller the bundle size, the smaller the light spot size for seeing smaller objects.
- The larger the bundle size, the greater the sensing distance

5. Cable length

- Determine distance from sensor to object including required bending radii
- Longer (custom length) cables have shorter sensing distances due to light loss

- Light loss is approximately 6% per foot for glass and 3% for plastic

- Use of extended range lens assemblies significantly increases sensing distance.

Custom Fiber Optic Cables

Rockwell Automation/Allen-Bradley can provide custom glass fiber optic cables to meet nearly any application requirement.

Typical cable modifications include:

- Custom lengths up to 15.2 m (50 ft)
- Custom temperature ratings up to 482°C (900°F) applies to glass fiber optic cables
- Custom configurations including multiple sensing tips
- Custom sensing end tips—nearly any modification is possible
- Reference pages 1-258...1-259 for glass and 1-281...1-282 for plastic.

Note: For more information contact product support at 1.440.646.5800.

ATTENTION



Fiber optic cables are not recommended for explosion-proof applications in hazardous environments. The fiber optic cable can provide a path for explosive fumes to travel from the hazardous area to the safe area.

Sensing Modes

The standard photoelectric sensors, fiber optic sensors are offered in two sensing modes: transmitted beam and diffuse. Reflective sensing can be accomplished in a diffuse mode or retroreflective mode.

Standard **diffuse** sensing with fiber optic cables is similar to sensing with lensed photoelectrics. When adjusted to maximum sensitivity these sensors, using bifurcated fiber optic cables, can detect extremely small targets.

Individual fiber optic cables may be used for more specialized diffuse mode applications. For instance, aiming the two separate sensing tips of the cables at the target can create sharp cutoff, fixed focus and mechanically convergent sensing modes.

Bifurcated Cable (Diffuse/Retroreflective)



Standard **retroreflective** sensing is possible with fiber optics, but polarized retroreflective sensing is not. In some applications, it will be necessary to

reduce the sensitivity of the sensor to prevent diffuse detection of the target.

Transmitted beam sensing, the most reliable sensing mode, requires two

individual fiber optic cables. Targets are detected when they break the light path established between the emitter and receiver cables.

Individual Cable (Transmitted Beam)



Sensing End Tip Selection

One of the most important decisions to be made when selecting fiber optic cables is the sensing end tip configuration. Among the many considerations:

- Size of the object to be sensed
- Rate of travel of the target object

- Distance to the object
- Mounting options
- Environmental conditions
- Moving parts surrounding the object
- Sensing mode

Based on these factors, there are many sensing tips to select from offering

various fiber diameters and arrays, bending radii, threaded and smooth body configurations, etc. The following pages are designed to assist in the selection of the proper sensing end tip for the application. Once a selection has been made, proceed to the fiber optic cables section to select the appropriate fiber optic cable part number.

45FVL/45FSL Light Source Selector Guide for Color Contrast Sensing

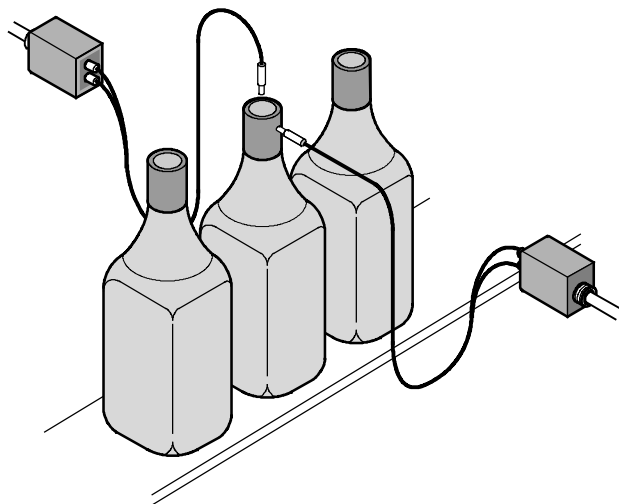
Background	Target						
	White	Yellow	Orange	Red	Green	Blue	Black
White	1	B	B	B	R	R	R
Yellow	B	1	G	G	R	R	R
Orange	B	G	1	G	G	G	R
Red	B	G	G	1	R	B	R
Green	R	R	G	R	1	B	G
Blue	R	R	G	B	B	1	B
Black	R	R	R	R	G	B	1

R = Red; B = Blue; G = Green

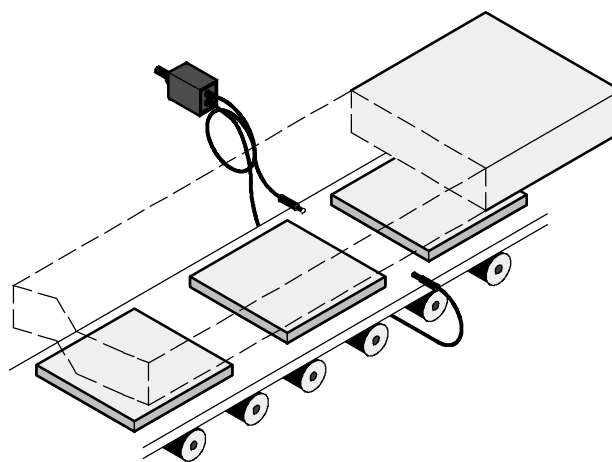
1 45CLR ColorSight sensor suggested for shades of same color.

Note: White LED light source can be used selectively in place of red, blue and green.

Cork Detection with Bifurcated Fiber Optic Cables



Work Piece Detection with Individual Fiber Optic Cables



Glass Fiber Optic Cables

Introduction



Application Recommendations

1. Many glass fiber optic cables are available with different glass fiber bundle diameters.
Larger diameter bundles contain more fibers to carry light between the sensor and application. These cables will generally offer **longer sensing ranges**.
Smaller diameter bundles provide greater resolution and the ability to detect smaller targets.
2. Glass fiber optic cables can be applied in high shock and vibration applications, but secure the cables to prevent excess flexing. Do not use glass cables in applications where they are constantly flexing. **They will break.** Plastic fiber optic cables provide better performance in these applications.
3. Avoid sharp bends. The individual glass fibers in the cable can be broken. Don't exceed the following bend tolerances with PVC sheathed cables:

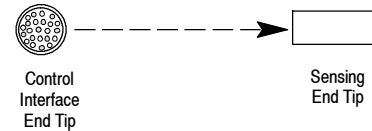
Minimum Cable Bend Radius

Bundle Diameter [mm (in.)]	Minimum Bend Radius [mm (in.)]
0.68 (0.027)	12.7 (0.50)
1.16 (0.046)	12.7 (0.50)
1.6 (0.063)	15.8 (0.625)
2.28 (0.090)	15.8 (0.625)
3.17 (0.125)	19.0 (0.75)
3.96 (0.156)	25.4 (1.0)
4.57 (0.180)	31.7 (1.25)

4. Glass fiber optic cables cannot be cut, spliced or repaired.
5. Glass fiber optic cables tip cannot be bent. Only special plastic fiber optic cable sensing end tips can be bent as specified in the Selection Guide. When using bendable end tips, bend should not be attempted closer than 19 mm (0.75 in.) to the sensing end of the cable.
6. Some applications call for glass fiber optic cables to be used to isolate the sensor from **high voltage**. Custom cables with special nonconductive components must be ordered for these applications.
7. X-RAY or GAMMA radiation will cause glass fibers to eventually become opaque. Custom cables constructed with special optical quartz fibers must be ordered for use in areas with **high radiation**.
8. Use Transmitted Beam sensing in **submerged applications** when possible. Spiral-wound stainless steel sheathing is generally not suitable for wet applications. Fiber optic cables with PVC sheathing should be used for these applications.
9. A glass fiber optic sensor with a **bifurcated** cable can provide **retroreflective** or **diffuse sensing** depending upon the distance to the target and the sensitivity adjustment on the sensor. If the sensor and

cable are to be used for retroreflective sensing, the sensitivity of the sensor must be adjusted low enough to avoid unwanted diffuse response from the targets to be sensed.

10. Glass fiber optic cables have a wide **field of view**, typically 82°. A smaller field of view can be achieved by attaching an Extended Range Lens Assembly to the sensing end of the fiber. These lens assemblies will also increase the available sensing distance. Refer to the Accessories section for more information.
11. Most glass fiber optic cables have round sensing tips with the glass fibers arranged in a circular configuration. Other cables such as 43GT-FIS40SL offer sensing tips with a **rectangular shaped opening** for the glass fibers, referred to as "slotted" cables (see illustration below).



Use these equivalent diameters to determine the approximate performance of slotted cables.

Slot Dimensions [mm (in.)]	Round Sensing Tip Equivalent Diameter [mm (in.)]
2.5 x 0.5 (0.1 x 0.02)	1.2 (0.046)
0.5 x 2.5 (0.02 x 0.1)	1.2 (0.046)
5.1 x 0.25 (2.0 x 0.01)	1.2 (0.046)
9.7 x 0.8 (0.382 x 0.032)	3.1 (0.125)

Formula:
Approximate diameter = 1.128 x $\sqrt{\text{Length} \times \text{Width}}$

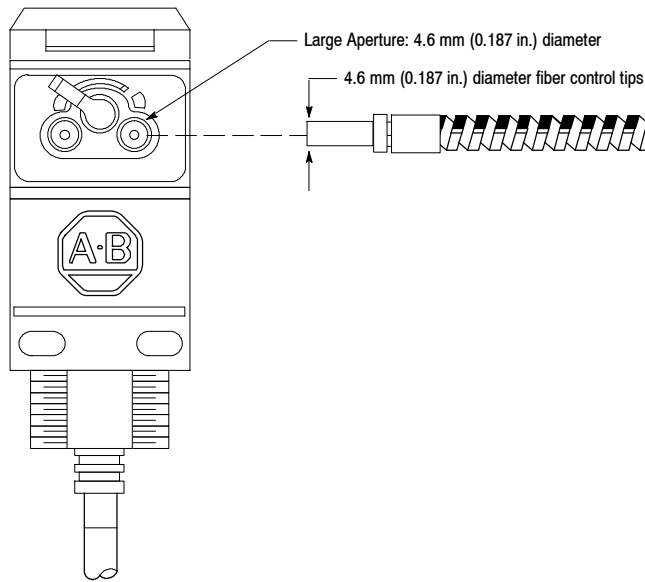
ATTENTION



Fiber optic cables are not recommended for explosion-proof applications in hazardous environments. The fiber optic cable can provide a path for explosive fumes to travel from the hazardous area to the safe area.

Glass Fiber Optic Cables**Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]****Glass Fiber Optic Cables for use with Large Aperture Sensors**

The fiber optic cables on pages 1-236...1-250 are for use with the large aperture sensors shown below.

42GxF-900x**Large Aperture Sensors:**

42SRF-60xx
42SRF-65xx



42GTGF-100x0
42GTGF-103x0



42xRx-5x00FO



42GxF-900x



42EF-G1xxA



42KL-G1xxx

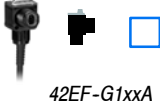
Note: Nominal Sensing Distance

- Due to the variation between fiber optic cables, sensing distance can vary widely
- The sensing distance of bifurcated cables is measured with white paper (90% reflectivity). Other surfaces may be less reflective and therefore would have shorter sensing distances.
- The published numbers are based on extensive testing and are conservative
- The sensing distance of transmitted beam cables is measured from tip to tip
- Application considerations that effect distance
 - Sensor selected
 - Reflectivity of target
 - Environment
 - Accessories such as range extending lenses
 - Length of the cable
- Consult with product support for additional information.

All dimensions indicated are typical. The fiber optic cables on pages 1-236...1-250 are for use with large aperture sensors as seen on the following pages:

43GR Glass Fiber Optic Cables

Threaded Bifurcated Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]



Approximate Metric / Standard Distances

0	50	100	150	200	250	300	mm
0	2	4	6	8	10	12	in.

Approximate Dimensions [mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.	
	Brass	3.2 (0.125)	Stainless Steel		43GR-TBB25SL	
			PVC		43GR-TBB25ML	
		1.6 (0.062)	Stainless Steel		43GR-TBB15SL	
			PVC		43GR-TBB15ML	
		4.0 (0.156)	Stainless Steel		43GR-TBB30SL	
			PVC		43GR-TBB30ML	
	2.5 x 0.5 (0.1 x 0.02) E-W Slot	Stainless Steel		43GR-TBB40SL		
		PVC		43GR-TBB40ML		
		Stainless Steel	1.6 (0.062)	Stainless Steel		43GR-TBS15SL
				PVC		43GR-TBS15ML
		3.2 (0.125)	Stainless Steel		43GR-TBS25SL	
			PVC		43GR-TBS25ML	
	Stainless Steel	2.3 (0.09)	Stainless Steel		43GR-TAS20SL	
			PVC		43GR-TAS20ML	
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GR-TFS10SL	
			PVC		43GR-TFS10ML	
	Brass	4.6 (0.180)	Stainless Steel		43GR-TGB33SL	
			PVC		43GR-TGB33ML	
	Brass	3.2 (0.125)	Stainless Steel		43GR-XDB25SL	
			PVC		43GR-XDB25ML	
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GR-TCS10SL	
			PVC		43GR-TCS10ML	

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GR Glass Fiber Optic Cables

Threaded Bifurcated Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

Approximate Dimensions [mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.
	Brass/ Stainless Steel	3.2 (0.125)	Stainless Steel		43GR-TMC25SL
			PVC		43GR-TMC25ML
	Stainless Steel	1.6 (0.062)	Stainless Steel		43GR-TMC15SL
			PVC		43GR-TMC15ML
	Brass/ Stainless Steel	3.2 (0.125)	Stainless Steel		43GR-TQC25SL
			PVC		43GR-TQC25ML
	Stainless Steel	2.5 x 0.5 (0.1 x 0.02) E-W Slot	Stainless Steel		43GR-TQC40SL
			PVC		43GR-TQC40ML
	Stainless Steel	4.0 (0.156)	Stainless Steel		43GR-TRC30SL
			PVC		43GR-TRC30ML
	Stainless Steel	3.2 (0.125)	Stainless Steel		43GR-TXC25SL
			PVC		43GR-TXC25ML
	Stainless Steel	3.2 (0.125)	Stainless Steel		43GR-THC25SL
			PVC		43GR-THC25ML

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GR Glass Fiber Optic Cables

Threaded Bifurcated Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

Approximate Dimensions [mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.			
	Brass/ Stainless Steel	3.2 (0.125)	Stainless Steel		43GR-TKC25SL			
			PVC		43GR-TKC25ML			
<p>Side View Sensing</p>	Stainless Steel	2.3 (0.09)	Stainless Steel		43GR-TTS20SL			
			PVC		43GR-TTS20ML			
			Stainless Steel		1.2 (0.046)	Stainless Steel		43GR-TTS10SL
						PVC		43GR-TTS10ML
	Stainless Steel	51 x 0.25 (2.0 x 0.01) (N-S)	Stainless Steel	Characterization not available at time of publication	43GR-TUS46SL			
			PVC		43GR-TUS46ML			

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GR Glass Fiber Optic Cables

Ferrule Bifurcated Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

Approximate Dimensions [mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.
	Stainless Steel	3.2 (0.125)	Stainless Steel		43GR-FAS25SL
			PVC		43GR-FAS25ML
	Stainless Steel	3.2 (0.125)	Stainless Steel		43GR-FBS25SL
			PVC		43GR-FBS25ML
	Stainless Steel	0.7 (0.027)	Stainless Steel		43GR-MAS00SL
			PVC		43GR-MAS00ML
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GR-MDS10SL
			PVC		43GR-MDS10ML
	Stainless Steel	1.6 (0.062)	Stainless Steel		43GR-MHS15SL
			PVC		43GR-MHS15ML
	Stainless Steel	0.7 (0.027)	Stainless Steel		43GR-MVS00SL
			PVC		43GR-MVS00ML
	Stainless Steel	3.2 (0.125)	Stainless Steel		43GR-FIS25SL
			PVC		43GR-FIS25ML
	Stainless Steel	4.0 (0.156)	Stainless Steel		43GR-FJS30SL
			PVC		43GR-FJS30ML
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GR-MOS10SL
			PVC		43GR-MOS10ML

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GR Glass Fiber Optic Cables

Ferrule Bifurcated Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

Approximate Dimensions [mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.
	Stainless Steel	1.6 (0.062)	Stainless Steel		43GR-MQS15SL
	Stainless Steel		PVC		43GR-MQS15ML
	Stainless Steel	0.7 (0.027)	Stainless Steel		43GR-MKS00SL
	Stainless Steel		PVC		43GR-MKS00ML
	Stainless Steel	3.2 (0.125)	Stainless Steel		43GR-FGS25SL
	Stainless Steel		PVC		43GR-FGS25ML
	Stainless Steel	2.3 (0.09)	Stainless Steel		43GR-FOS20SL
	Stainless Steel		PVC		43GR-FOS20ML
	Stainless Steel	2.3 (0.09)	Stainless Steel		43GR-FPS20SL
	Stainless Steel		PVC		43GR-FPS20ML
	Stainless Steel	2.5 x 0.5 (0.1 x 0.02) (E-W)	Stainless Steel		43GR-FRS40SL
	Stainless Steel		PVC		43GR-FRS40ML

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

PHOTOSWITCH® Photoelectric Sensors
43GR Glass Fiber Optic Cables

Block Bifurcated Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

Approximate Dimensions [mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheath. Material	Sensing Distance [mm]	Cat. No.
	Aluminum	9.7 x 0.8 (0.382 x 0.032) (E-W)	Stainless Steel	120 mm Nominal	43GR-BAA72SL
			PVC		43GR-BAA72ML
	Aluminum	38.1 x 0.3 (1.5 x 0.01)	Stainless Steel	Characterization not available at time of publication	43GR-BCA73SL
			PVC		43GR-BCA73ML
	Aluminum	25.4 x 0.4 (1.0 x 0.015)	Stainless Steel	Characterization not available at time of publication	43GR-BRA79SL
			PVC		43GR-BRA79ML
	Aluminum	3.9 x 0.5 (0.154 x 0.02)	Stainless Steel	Characterization not available at time of publication	43GR-BTA70SL
			PVC		43GR-BTA70ML

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GT Glass Fiber Optic Cables

Threaded Transmitted Beam Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

Approximate Dimensions [mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.
	Brass	3.2 (0.125)	Stainless Steel		43GT-TBB25SL
			PVC		43GT-TBB25ML
		1.6 (0.062)	Stainless Steel		43GT-TBB15SL
			PVC		43GT-TBB15ML
		4.0 (0.156)	Stainless Steel		43GT-TBB30SL
			PVC		43GT-TBB30ML
		2.5 x 0.5 (0.1 x 0.02) E-W Slot	Stainless Steel		43GT-TBB40SL
			PVC		43GT-TBB40ML
	Stainless Steel	0.7 (0.027)	Stainless Steel		43GT-TFS00SL
			PVC		43GT-TFS00ML
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GT-TFS10SL
			PVC		43GT-TFS10ML
	Stainless Steel	3.2 (0.125)	Stainless Steel		43GT-TYS25SL
			PVC		43GT-TYS25ML
	Stainless Steel	0.7 (0.027)	Stainless Steel		43GT-MRS00SL
			PVC		43GT-MRS00ML
		1.2 (0.046)	Stainless Steel		43GT-MRS10SL
			PVC		43GT-MRS10ML
	Brass/ Stainless Steel	1.6 (0.062)	Stainless Steel		43GT-TMC15SL
			PVC		43GT-TMC15ML
		3.2 (0.125)	Stainless Steel		43GT-TMC25SL
			PVC		43GT-TMC25ML

Note: Two transmitted beam fiber cables required for each sensor.
Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GT Glass Fiber Optic Cables

Threaded Transmitted Beam Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

Approximate Dimensions [mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.
	Stainless Steel	3.2 (0.125)	Stainless Steel		43GT-TMS25SL
			PVC		43GT-TMS25ML
	Stainless Steel	4.0 (0.156)	Stainless Steel		43GT-TOC30SL
			PVC		43GT-TOC30ML
	Stainless Steel	3.2 (0.125)	Stainless Steel		43GT-TQC25SL
			PVC		43GT-TQC25ML
		1.6 (0.062)	Stainless Steel		43GT-TQC15SL
			PVC		43GT-TQC15ML
		2.5 x 0.5 (0.1 x 0.02) E-W Slot	Stainless Steel		43GT-TQC40SL
			PVC		43GT-TQC40ML
	Stainless Steel	3.2 (0.125)	Stainless Steel		43GT-TQS25SL
			PVC		43GT-TQS25ML
	Brass/ Stainless Steel	4.0 (0.156)	Stainless Steel		43GT-TRC30SL
			PVC		43GT-TRC30ML

Note: Two transmitted beam fiber cables required for each sensor.
Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GT Glass Fiber Optic Cables

Threaded Transmitted Beam Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

Approximate Dimensions [mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.
	Stainless Steel	4.0 (0.156)	Stainless Steel		43GT-TRS30SL
			PVC		43GT-TRS30ML
	Stainless Steel	3.2 (0.125)	Stainless Steel		43GT-TWC25SL
			PVC		43GT-TWC25ML
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GT-MUS10SL
			PVC		43GT-MUS10ML
	Stainless Steel	3.2 (0.125)	Stainless Steel		43GT-TXC25SL
			PVC		43GT-TXC25ML
	Stainless Steel	3.2 (0.125)	Stainless Steel		43GT-THC25SL
			PVC		43GT-THC25ML
	Brass/ Stainless Steel	4.0 (0.156)	Stainless Steel		43GT-TJC30SL
			PVC		43GT-TJC30ML
	Brass/ Stainless Steel	3.2 (0.125)	Stainless Steel		43GT-TKC25SL
			PVC		43GT-TKC25ML

Note: Two transmitted beam fiber cables required for each sensor.
Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GT Glass Fiber Optic Cables

Threaded Transmitted Beam Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

Approximate Dimensions [mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.
	Stainless Steel	4.0 (0.156)	Stainless Steel		43GT-TLC30SL
			PVC		43GT-TLC30ML
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GT-MSS10SL
			PVC		43GT-MSS10ML
	Stainless Steel	2.3 (0.090)	Stainless Steel		43GT-TTC20SL
			PVC		43GT-TTC20ML
	Stainless Steel/ Brass	2.5 x 0.5 (0.1 x 0.02) (E-W)	Stainless Steel		43GT-TZC40SL
			PVC		43GT-TZC40ML
	Stainless Steel	51 x 0.25 (2.0 x 0.01) (N-S)	Stainless Steel	130 mm Nominal	43GT-TUS46SL
			PVC		43GT-TUS46ML

Note: Two transmitted beam fiber cables required for each sensor.
Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GT Glass Fiber Optic Cables

Ferrule Transmitted Beam Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

Approximate Dimensions [mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.
	Stainless Steel	3.2 (0.125)	Stainless Steel		43GT-FAS25SL
			PVC		43GT-FAS25ML
		4.0 (0.156)	Stainless Steel		43GT-FAS30SL
			PVC		43GT-FAS30ML
	Stainless Steel	0.7 (0.027)	Stainless Steel		43GT-MBS00SL
			PVC		43GT-MBS00ML
		1.2 (0.046)	Stainless Steel		43GT-MBS10SL
			PVC		43GT-MBS10ML
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GT-MCS10SL
			PVC		43GT-MCS10ML
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GT-MDS10SL
			PVC		43GT-MDS10ML
	Stainless Steel	1.6 (0.062)	Stainless Steel		43GT-MHS15SL
			PVC		43GT-MHS15ML
	Stainless Steel	1.6 (0.062)	Stainless Steel		43GT-MIS15SL
			PVC		43GT-MIS15ML
	Stainless Steel	3.2 (0.125)	Stainless Steel		43GT-FIS25SL
			PVC		43GT-FIS25ML
	Stainless Steel	3.2 (0.125)	Stainless Steel		43GT-FSS25SL
			PVC		43GT-FSS25ML

Note: Two transmitted beam fiber cables required for each sensor.
Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GT Glass Fiber Optic Cables

Ferrule Transmitted Beam Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

Approximate Dimensions [mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GT-MMS10SL
			PVC		43GT-MMS10ML
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GT-MOS10SL
			PVC		43GT-MOS10ML
	Stainless Steel	0.7 (0.027)	Stainless Steel		43GT-MKS00SL
			PVC		43GT-MKS00ML
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GT-FOS10SL
			PVC		43GT-FOS10ML
		2.3 (0.09)	Stainless Steel		43GT-FOS20SL
			PVC		43GT-FOS20ML
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GT-FPS10SL
			PVC		43GT-FPS10ML
		2.3 (0.09)	Stainless Steel		43GT-FPS20SL
			PVC		43GT-FPS20ML
	Stainless Steel	51 x 0.25 (2.0 x 0.01) (N-S)	Stainless Steel	130 mm Nominal	43GT-FQS46SL
			PVC		43GT-FQS46ML
	Stainless Steel	2.5 x 0.5 (0.1 x 0.02)	Stainless Steel		43GT-FRS40SL
			PVC		43GT-FRS40ML

43GT Glass Fiber Optic Cables

Block Transmitted Beam Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

Approximate Dimensions [mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.
	Aluminum	9.7 x 0.8 (0.382 x 0.032) (E-W)	Stainless Steel	500 mm Nominal	43GT-BAA72SL
			PVC		43GT-BAA72ML
	Aluminum	38 x 0.25 (1.5 x 0.01) (E-W)	Stainless Steel	Characterization not available at time of publication	43GT-BCA73SL
			PVC		43GT-BCA73ML
	Aluminum	9.7 x 0.8 (0.382 x 0.032) (E-W)	Stainless Steel	Characterization not available at time of publication	43GT-BEA72SL
			PVC		43GT-BEA72ML

Note: Two transmitted beam fiber cables required for each sensor.
Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GR Glass Fiber Optic Cables

Bifurcated Specialty Cable for Large Aperture Sensors [4.6 mm (0.187 in.)]

Approximate Dimensions [mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.
	Brass	2.8 (0.11)	Stainless Steel	Characterization not available at time of publication	43GR-4TBB22SL
	Stainless Steel	3.2 (0.125)	Stainless Steel	Characterization not available at time of publication	43GR-2FAS25SL

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GT Glass Fiber Optic Cables

Transmitted Beam Specialty for Large Aperture Sensors [4.6 mm (0.187 in.)]

Approximate Dimensions [mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheath Material	Sensing Distance [mm]	Cat. No.
	Brass	1.6 (0.062) (x6)	Stainless Steel	Characterization not available at time of publication	43GT-6TBB15SL
	Stainless Steel	2.3 (0.090) (x2)	Stainless Steel	200 mm Nominal	43GT-2FAS20SL

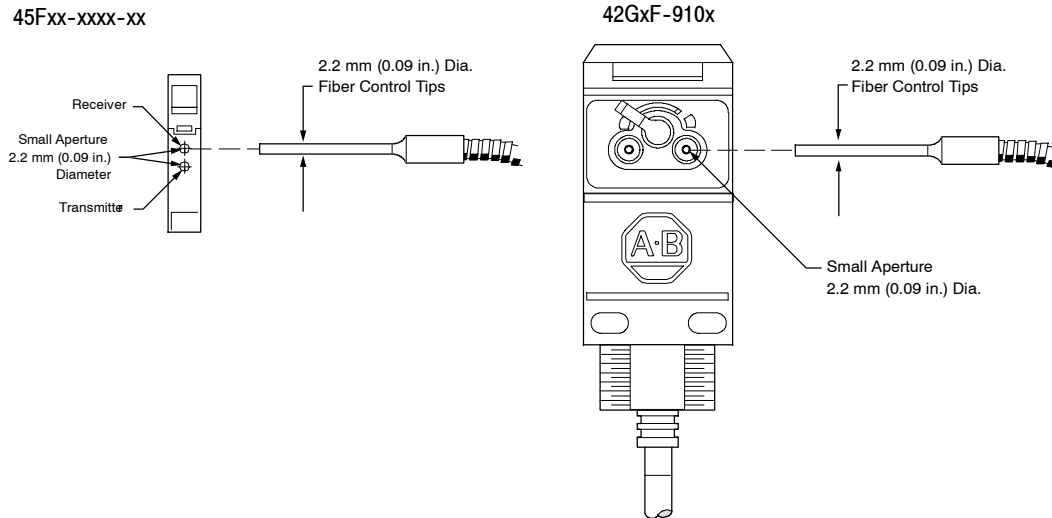
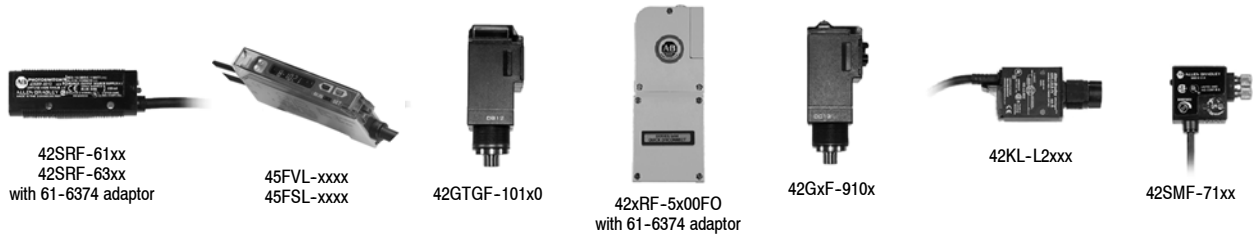
Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

Glass Fiber Optic Cables

Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

Glass Fiber Optic Cables for use with Small Aperture Sensors

The glass fiber optic cables on pages 1-252...1-257 are for use with small aperture sensors.

**Small Aperture Sensors:****Note: Nominal Sensing Distance**

- Due to the variation between fiber optic cables, sensing distance can vary widely
- The published numbers are based on extensive testing and are conservative
- The sensing distance of bifurcated cables is measured with white paper (90% reflectivity). Other surfaces may be less reflective and therefore would have shorter sensing distances.
- The sensing distance of transmitted beam cables is measured from tip to tip
- Application considerations that effect distance
 - Sensor selected
 - Reflectivity of target
 - Environment
 - Accessories such as range extending lenses
- Consult with product support for additional information.

All dimensions indicated are typical.

43GR Glass Fiber Optic Cables

Threaded Bifurcated Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

The fiber optic cables on pages 1-252...1-257 are for use with small aperture sensors including the following:



Approximate Metric / Standard Distances

0	50	100	150	200	250	300	mm
0	2	4	6	8	10	12	in.

Dimensions—[mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.
	Brass	2.2 (0.09)	Stainless Steel		43GR-TAB20SS
			PVC		43GR-TAB20MS
	Stainless Steel	2.2 (0.09)	Stainless Steel		43GR-TAS20SS
			PVC		43GR-TAS20MS
	Stainless Steel	2.2 (0.09)	Stainless Steel		43GR-TBS20SS
			PVC		43GR-TBS20MS
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GR-XAS10SS
			PVC		43GR-XAS10MS
	Stainless Steel	0.7 (0.027)	Stainless Steel		43GR-MRS00SS
			PVC		43GR-MRS00MS
	Stainless Steel	2.2 (0.09)	Stainless Steel		43GR-TMS20SS
			PVC		43GR-TMS20MS

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GR Glass Fiber Optic Cables

Threaded Bifurcated Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

Dimensions—[mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GR-TIS10SS
			PVC		43GR-TIS10MS
	Stainless Steel	2.2 (0.09)	Stainless Steel		43GR-TQS20SS
			PVC		43GR-TQS20MS
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GR-TDS10SS
			PVC		43GR-TDS10MS
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GR-MUS10SS
			PVC		43GR-MUS10MS
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GR-MSS10SS
			PVC		43GR-MSS10MS

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GR Glass Fiber Optic Cables

Ferrule Bifurcated Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

Dimensions—[mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.
	Stainless Steel	0.7 (0.027)	Stainless Steel		43GR-MAS00SS
			PVC		43GR-MAS00MS
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GR-MDS10SS
			PVC		43GR-MDS10MS
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GR-FTS10SS
			PVC		43GR-FTS10MS
	Stainless Steel	0.7 (0.027)	Stainless Steel		43GR-MKS00SS
			PVC		43GR-MKS00MS
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GR-MOS10SS
			PVC		43GR-MOS10MS
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GR-MYS10SS
			PVC		43GR-MYS10MS
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GR-MJS10SS
			PVC		43GR-MJS10MS

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

Threaded Transmitted Beam for Small Aperture Sensors [2.2 mm (0.09 in.)]

Dimensions—[mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.
	Brass	1.6 (0.062)	Stainless Steel		43GT-TAB15SS
			PVC		43GT-TAB15MS
	Stainless Steel	1.6 (0.062)	Stainless Steel		43GT-TAS15SS
			PVC		43GT-TAS15MS
	Stainless Steel	1.6 (0.062)	Stainless Steel		43GT-TBS15SS
			PVC		43GT-TBS15MS
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GT-XAS10SS
			PVC		43GT-XAS10MS
	Stainless Steel	0.7 (0.027)	Stainless Steel		43GT-MRS00SS
			PVC		43GT-MRS00MS
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GT-TIS10SS
			PVC		43GT-TIS10MS
	Stainless Steel	1.6 (0.062)	Stainless Steel		43GT-TMS15SS
			PVC		43GT-TMS15MS
	Stainless Steel	1.6 (0.062)	Stainless Steel		43GT-TQS15SS
			PVC		43GT-TQS15MS

Note: Two transmitted beam fiber cables required for each sensor.
 Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GT Glass Fiber Optic Cables

Threaded Transmitted Beam for Small Aperture Sensors [2.2 mm (0.09 in.)]

Dimensions—[mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GT-TDS10SS
			PVC		43GT-TDS10MS
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GT-MUS10SS
			PVC		43GT-MUS10MS
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GT-MSS10SS
			PVC		43GT-MSS10MS

Note: Two transmitted beam fiber cables required for each sensor.
Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

Ferrule Transmitted Beam for Small Aperture Sensors [2.2 mm (0.09 in.)]

Dimensions—[mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GT-MAS10SS
			PVC		43GT-MAS10MS
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GT-MDS10SS
			PVC		43GT-MDS10MS
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GT-FTS10SS
			PVC		43GT-FTS10MS
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GT-MJS10SS
			PVC		43GT-MJS10MS
	Stainless Steel	1.2 (0.046)	Stainless Steel		43GT-MYS10SS
			PVC		43GT-MYS10MS
	Aluminum	6.35 x 0.3 (0.25 x 0.012)	Stainless Steel	215 mm Nominal	43GT-BSA80SS
			PVC		43GT-BSA80MS

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

Glass Fiber Optic Cables

Additional Cables for Large Aperture Sensors [4.6 mm (0.187 in.) OD Sensor End Tip]

Custom Fiber Optic Cables

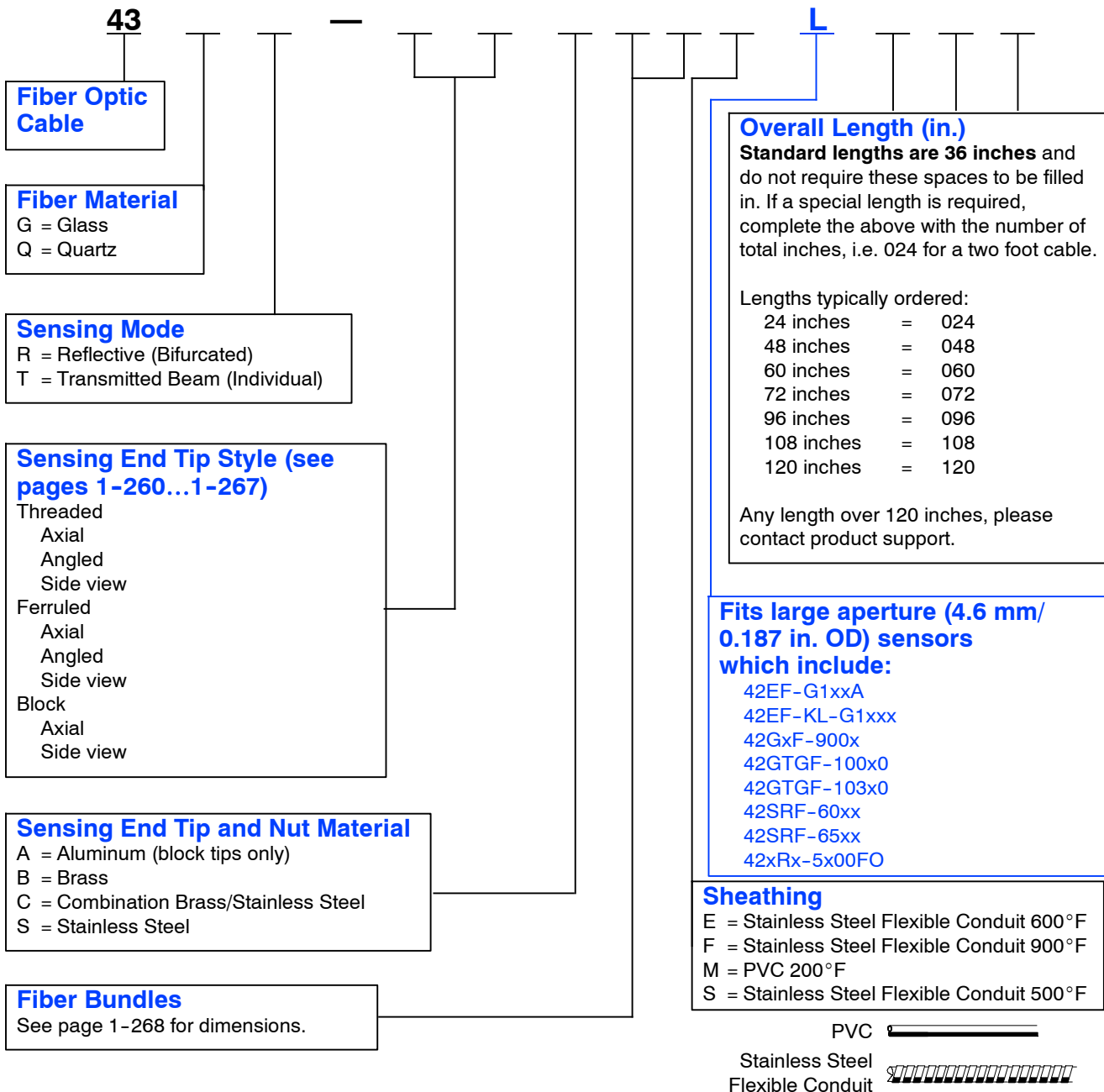
Rockwell Automation/Allen-Bradley can provide custom glass fiber optic cables to meet nearly any application requirement.

Typical cable modifications include:

- Custom lengths up to 15.2 m (50 ft)
- Custom temperature ratings up to 482°C (900°F)
- Custom configurations including multiple sensing tips
- Custom sensing end tips—nearly any modification is possible

For more information contact your local Rockwell Automation sales office or Allen-Bradley distributor.

To Build a Custom Fiber Optic for a Large Aperture Sensor:



Glass Fiber Optic Cables

Additional Cables for Small Aperture Sensors [2.2 mm (0.09 in.) OD Sensor End Tip]

Custom Fiber Optic Cables

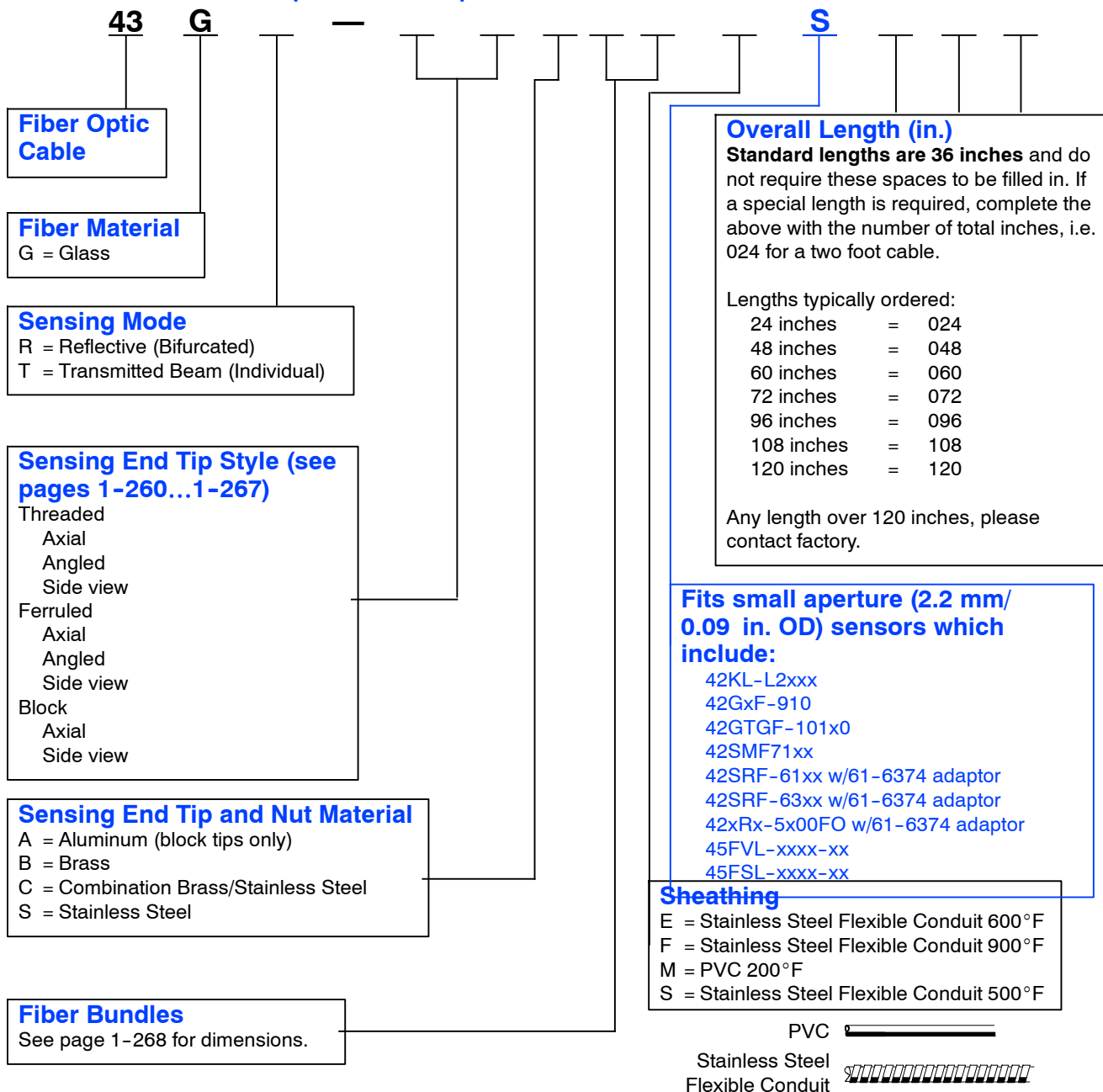
Rockwell Automation/Allen-Bradley can provide custom glass fiber optic cables to meet nearly any application requirement.

Typical cable modifications include:

- Custom lengths up to 15.2 m (50 ft)
- Custom temperature ratings up to 482°C (900°F)
- Custom configurations including multiple sensing tips
- Custom sensing end tips—nearly any modification is possible

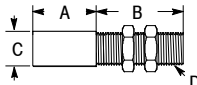
For more information contact your local Rockwell Automation sales office or Allen-Bradley distributor.

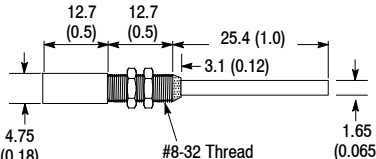
To Build a Custom Fiber Optic for Small Aperture Sensor:

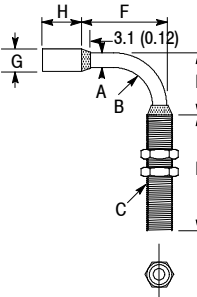


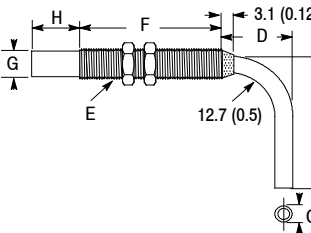
Glass Fiber Optic Cable Tips

Use with Configurators on page 1-258 and 1-259.

Approximate Dimensions [mm (in.)]	Code	[mm (in.)]	Approximate Dimensions [mm (in.)]			
			A	B	C	D
	TA	2.29 (0.09)	10.16 (0.40)	11.18 (0.44)	5.84 (0.23)	M6 x 1 class 6g
	TB	3.2 (0.125)	13.46 (0.53)	38.1 (1.5)	7.92 (0.312)	5/16 x 24 UNF
	TF	3.2 (0.125)	13.46 (0.53)	12.7 (0.5)	4.45 (0.175)	#8-32
	TG	1.2 (0.046)	13.46 (0.53)	38.1 (1.5)	9.53 (0.375)	3/8 x 24 UNF
	TV	4.0 (0.156)	13.46 (0.53)	139.7 (5.5)	7.92 (0.312)	5/16 x 24 UNF
	TY	3.2 (0.125)	13.46 (0.53)	101.6 (4.0)	7.62 (0.3)	5/16 x 24 UNF
	XA	1.2 (0.046)	10.16 (0.40)	12.7 (0.5)	4.75 (0.187)	M4 x 0.7
	XB	1.2 (0.046)	10.16 (0.40)	12.7 (0.5)	4.75 (0.187)	M6 x 0.75
	XD	3.2 (0.125)	13.46 (0.53)	15.24 (0.6)	7.92 (0.312)	5/16 x 24 UNF

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]
	MR	1.2 (0.046)

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]	Approximate Dimensions [mm (in.)]							
			A	B	C	D	E	F	G	H
	TM	3.2 (0.125)	4.75 (0.187)	12.7 (0.5)	5/16 x 24	38.1 (1.5)	20.3 (0.8)	27.9 (1.1)	7.49 (0.295)	15.8 (0.625)
	TO	4.0 (0.156)	5.54 (0.218)	12.7 (0.5)	5/16 x 24	38.1 (1.5)	20.3 (0.8)	27.9 (1.1)	7.49 (0.295)	15.8 (0.625)
	TC	1.2 (0.046)	2.36 (0.093)	6.35 (0.25)	8 - 32	12.7 (0.5)	9.65 (0.38)	15.2 (0.6)	4.45 (0.175)	15.8 (0.625)
	TI	1.2 (0.046)	2.36 (0.093)	3.81 (0.15)	M6 x 0.75	15.2 (0.6)	8.89 (0.35)	12.7 (0.5)	4.75 (0.187)	10.1 (0.40)

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]	Approximate Dimensions [mm (in.)]							
			B	C	D	E	F	G	H	
	TQ	3.2 (0.125)	27.9 (1.1)	4.75 (0.187)	15.75 (0.62)	5/16 x 24	38.1 (1.5)	7.92 (0.312)	13.97 (0.55)	
	TR	3.98 (0.156)	27.9 (1.1)	5.54 (0.218)	18.29 (0.72)	5/16 x 24	38.1 (1.5)	7.92 (0.312)	13.97 (0.55)	
	TW	3.2 (0.125)	40.6 (1.6)	4.75 (0.187)	15.75 (0.62)	5/16 x 24	38.1 (1.5)	7.92 (0.312)	13.97 (0.55)	
	TX	3.2 (0.125)	20.6 (0.81)	4.75 (0.187)	26.9 (1.06)	5/16 x 24	38.1 (1.5)	7.92 (0.312)	13.97 (0.55)	
	TD	1.2 (0.046)	12.7 (0.5)	2.36 (0.093)	8.89 (0.35)	M4 x 0.7	12.7 (0.5)	4.75 (0.187)	10.16 (0.40)	

PHOTOSWITCH® Photoelectric Sensors
Glass Fiber Optic Cable Tips
 Use with Configurators on page 1-258 and 1-259.

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]	Dimensions [mm (in.)]		
			A	B	C
	MT	0.70 (0.027)	1.09 (0.043)	2.29 (0.09)	4.83 (0.19)
	MU	1.2 (0.046)	1.65 (0.065)	3.05 (0.12)	6.35 (0.25)

Approximate Dimensions [mm (in.)]	Code	Standard Bundle—[mm (in.)]	Dimension A [mm (in.)]
	TH	3.2 (0.125)	4.75 (0.187)
	TJ	4.0 (0.156)	5.54 (0.218)

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]	Dimension A [mm (in.)]
	TK	3.2 (0.125)	4.75 (0.187)
	TL	4.0 (0.156)	5.54 (0.218)

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]
	MS	1.2 (0.046)

Glass Fiber Optic Cable Tips

Use with Configurators on page 1-258 and 1-259.

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]	Dimension A [mm (in.)]
	TT	2.29 (0.09)	3.2 (0.125)
	TZ	2.5 x 0.5 (0.1 x 0.02)	3.94 (0.155)

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]
	TU	51 x 0.3 (2.0 x 0.01)

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]	Dimensions [mm (in.)]	
			A	B
	FA	3.2 (0.125)	12.7 (0.5)	12.7 (0.5)
	FB		12.7 (0.5)	26.9 (1.06)
	FC		12.7 (0.5)	31.7 (1.25)
	FD		12.7 (0.5)	50.8 (2.0)
	FE		35.5 (1.4)	76.2 (3.0)

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]	Dimension A [mm (in.)]
	MA	0.70 (0.027)	1.09 (0.043)
	MC	1.2 (0.046)	1.65 (0.065)

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]	Dimensions [mm (in.)]			
			A	B	C	D
	MD	1.2 (0.046)	1.65 (0.065)	12.7 (0.5)	4.06 (0.16)	25.4 (1.0)
	MG	1.2 (0.046)		35.5 (1.4)	7.87 (0.31)	
	MH	1.6 (0.062)	2.36 (0.093)	35.5 (1.4)	7.87 (0.31)	76.2 (3.0)
	MI	1.6 (0.062)		12.7 (0.5)	7.87 (0.31)	25.4 (1.0)

PHOTOSWITCH® Photoelectric Sensors
Glass Fiber Optic Cable Tips
 Use with Configurators on page 1-258 and 1-259.

Approximate Dimensions [mm (in.)]	Code	[mm (in.)]	Dimensions [mm (in.)]	
			A	B
	MB	1.2 (0.046)	1.65 (0.065)	25.4 (1.0)
	MF	1.2 (0.046)	1.65 (0.065)	50.8 (2.0)
	MV	0.70 (0.027)	1.09 (0.043)	12.7 (0.5)

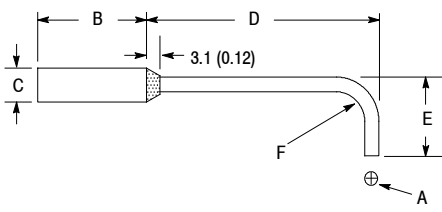
Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]	Dimensions [mm (in.)]				
			A	B	C	D	E
	FI	3.2 (0.125)	27.9 (1.1)	20.3 (0.8)	4.75 (0.187)	7.49 (0.295)	15.8 (0.625)
	FJ	4.0 (0.156)	27.9 (1.1)	25.4 (1.0)	5.54 (0.218)	7.49 (0.295)	15.8 (0.625)
	FK	3.2 (0.125)	27.9 (1.1)	27.9 (1.1)	4.75 (0.187)	7.49 (0.295)	15.8 (0.625)
	FL	3.2 (0.125)	27.9 (1.1)	35.0 (1.38)	4.75 (0.187)	7.49 (0.295)	15.8 (0.625)
	FM	3.2 (0.125)	47.7 (1.88)	47.7 (1.88)	4.75 (0.187)	7.49 (0.295)	15.8 (0.625)
	FT	2.2 (0.09)	12.7 (0.5)	10.16 (0.40)	2.36 (0.093)	4.75 (0.187)	10.4 (0.4)

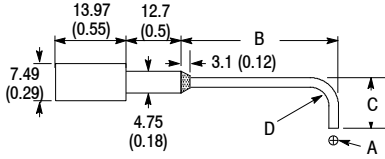
Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]	Dimensions [mm (in.)]		
			A	B	C
	FS	3.2 (0.125)	27.9 (1.1)	20.3 (0.8)	4.75 (0.187)

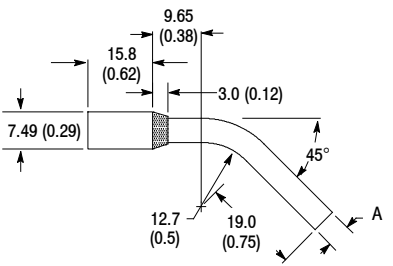
Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]
	ML	1.2 (0.046)

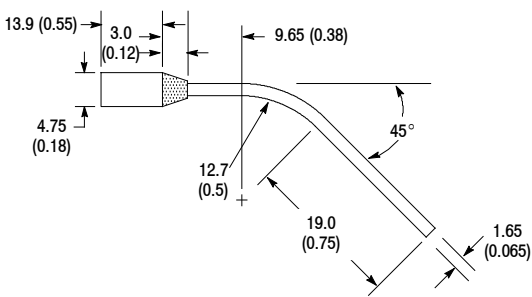
Glass Fiber Optic Cable Tips

Use with Configurators on page 1-258 and 1-259.

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]	Dimensions [mm (in.)]					
			A	B	C	D	E	F
	MM	1.2 (0.046)	1.65 (0.065)	12.7 (0.5)	4.06 (0.16)	25.4 (1.0)	6.35 (0.25)	3.05 (0.12)
	MO	1.2 (0.046)	1.65 (0.065)	35.5 (1.4)	7.87 (0.31)	25.4 (1.0)	6.35 (0.25)	3.05 (0.12)
	MQ	1.6 (0.062)	2.36 (0.083)	35.5 (1.4)	7.87 (0.31)	25.4 (1.0)	6.35 (0.25)	3.05 (0.12)
	MY	1.2 (0.046)	1.57 (0.062)	10.16 (0.40)	4.83 (0.19)	12.7 (0.5)	4.83 (0.19)	3.05 (0.12)

Approximate Dimensions [mm (in.)]	Code	[mm (in.)]	Dimensions [mm (in.)]			
			A	B	C	D
	MK	0.70 (0.027)	1.09 (0.043)	25.4 (1.0)	4.83 (0.19)	2.29 (0.09)
	MN	1.2 (0.046)	1.65 (0.065)	12.7 (0.5)	31.7 (1.25)	19 (0.75)

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]	Dimension A [mm (in.)]
	FG	3.2 (0.125)	4.75 (0.187)
	FH	4.0 (0.156)	5.54 (0.218)

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]
	MJ	1.2 (0.046)

Glass Fiber Optic Cable Tips

Use with Configurators on page 1-258 and 1-259.

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]
	FO	2.29 (0.09)

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]	Dimension A [mm (in.)]
	FP	2.29 (0.09)	3.2 (0.125)
	FR	0.5 x 2.5 (0.2 x 0.01) N-S slot	3.94 (0.155)

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]
	FQ	51 x 0.3 (2.0 x 0.01) N-S slot

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]
	BA	9.7 x 0.8 (0.382 x 0.032) (E-W)

Glass Fiber Optic Cable Tips

Use with Configurators on page 1-258 and 1-259.

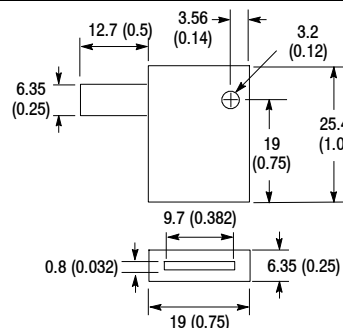
Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]
	BC	38.1 x 0.3 (1.5 x 0.01)

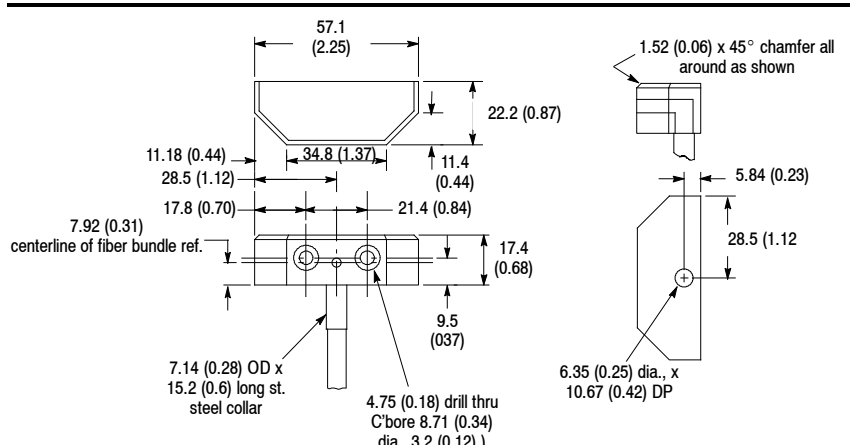
Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]
	BR	25.4 x 0.4 (1.0 x 0.015)

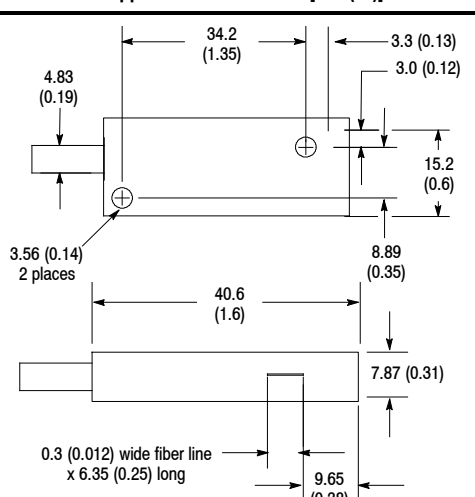
Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]
	BT	3.9 x 0.5 (0.154 x 0.02)

Glass Fiber Optic Cable Tips

Use with Configurators on page 1-258 and 1-259.

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]
	BE	9.7 x 0.8 (0.382 x 0.032) (E-W)

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]
	BP	2.79 x 2.79 (0.11 x 0.11)

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]
	BS	0.3 x 6.35 (0.012 x 0.25) N-S slot

Glass Fiber Optic Cable Tips

Bundle Sizes

These bundle size codes are used with the configurators on page 1-258 and 1-259.

Glass Fiber Bundle with Cylindrical Sensing End Tips

Code	Diameter		Arrangement	2.2 mm Control End Tip		4.6 mm Control End Tip	
	mm	inches		Transmitted Beam	Bifurcated	Transmitted Beam	Bifurcated
00	0.70	0.027	Randomized	X	X	X	X
05	0.81	0.032	Randomized	X	X	X	X
10	1.2	0.046	Randomized	X	X	X	X
15	1.57	0.062	Randomized	X	X	X	X
20	2.29	0.090	Randomized		X	X	X
22	2.79	0.110	Randomized			X	X
25	3.2	0.125	Randomized			X	X
30	4.0	0.156	Randomized			X	X
33	4.57	0.180	Randomized				X
35	5.59	0.220	Randomized				X
40	2.5 x 0.5	0.10 x 0.02	E-W Slot	X	X	X	X
41	0.5 x 2.5	0.02 x 0.10	N-S Slot	X	X	X	X
45	22 x 0.5	0.875 x 0.02	Randomized			X	X
46	51 x 0.3	2.0 x 0.01	N-S Slot			X	X

X = Suitable for use with glass fiber bundle.

Glass Fiber Bundle with Block Sensing End Tips

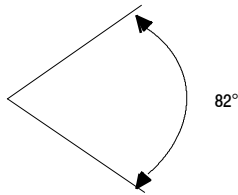
Code	Diameter	
	mm	inches
70	3.9 x 0.5	0.154 x 0.020
72	9.7 x 0.8	0.382 x 0.320
73	38 x 0.25	1.50 x 0.010
74	51 x 0.25	2.00 x 0.010
77	0.4 x 0.25	0.154 x 0.010
78	0.3 x 0.25	0.110 x 0.110
79	25.4 x 0.4	1.00 x 0.015
80	6.4 x 0.3	0.25 x 0.012

Note: Typical fiber optic cable construction is normally randomized. Other options, such as half or shimmed half moon, are available. Please contact your local Rockwell Automation sales office or Allen-Bradley distributor.

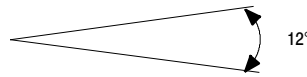
Extended Range Lens Assemblies

Extended range assemblies provide greater sensing range and reduce the field of view for detecting smaller objects at a greater distance. Without the extended range lens assembly the field of view is a divergent beam of 82°, leaving the end of the fiber optic cable tip. With the extended range lens the beam is reduced to 12°, thus permitting the sensing of smaller objects.

Fiber Optic Field of View Standard Fibers (Without Extended Range Lens Assembly)



Fiber Optic Field of View Standard Fibers (With Extended Range Lens Assembly)


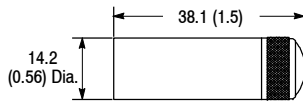

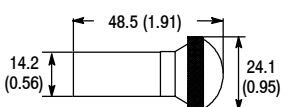

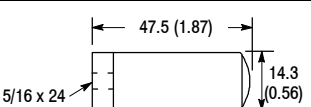
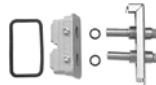
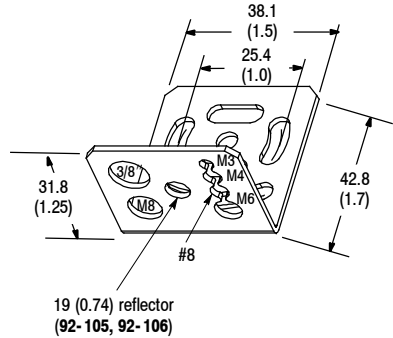
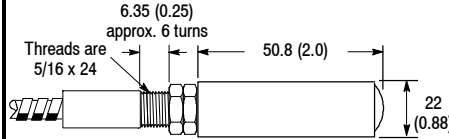


Adjustable Fixed Focus Sensing Lens

Consult your local Rockwell Automation sales office or Allen-Bradley distributor for special applications. All the lens assemblies shown can provide fixed focus sensing with glass fiber optic cables. The distance between the lens and sensing tip can be adjusted, thus varying the focal point and spot size. An example of this using the Cat. No. 60-1844 lens is shown as follows:

[mm (in.)]	Spot Size (Diameter [mm (in.)])	Focus Range [mm (in.)]
0	31.8 (1.25)	127 (5)
2.54 (0.1)	12.7 (0.5)	51...89 (2...3.5)
5.08 (0.2)	7.62 (0.3)	38...51 (1.5...2)
7.62 (0.3)	5.08 (0.2)	33...38 (1.3...1.5)
10.16 (0.4)	3.81 (0.1)	28...33 (1.1...1.3)

It is necessary to reduce the sensitivity of the sensor when using lens assemblies with bifurcated cables to avoid detecting the rear surface of the adaptor lens.

Description	Approximate Dimensions [mm (in.)]	Cat. No.
 Extended Range Lens Assembly—260°C (500°F)		60-1844 (One Cat. No. = One Lens Assembly) Sensing end tips with a 4.74 mm (0.187 in.) diameter
 Extended Range Lens Assembly—260°C (500°F)		60-2559 (One Cat. No. = One Lens Assembly) Sensing tips with 4.74 mm (0.187 in.) diameter
 Extended Range Lens Assembly—260°C (500°F) (Thread mount 5/16 x 24)		60-2323 (One Cat. No. = One Lens Assembly) Sensing end tips with 5/16 x 24 threads
 Adaptor Kit for Series 5000 Green Line Sensors		61-5550 (One Cat. No. = One Lens Assembly)
Glass Fiber Optic Cable Bracket		60-2696
ColorSight Lens Extender		60-2738

Plastic Fiber Optic Cables

Introduction



Application Recommendations

- Many plastic fiber optic cables are available in different core diameters. Larger core diameter cables can carry more light between the sensor and application. These cables will generally offer longer sensing ranges.

Smaller core diameter cables provide greater resolution and the ability to detect smaller targets.
- Note that different sensing distances can be achieved depending upon the cable core diameter. These sensing distances must be de-rated for adverse environments.
Longer custom cables will attenuate the light and reduce the operating range. Light loss is approximately 3% per foot for Plastic Fiber Optic cables. Contact your local Rockwell Automation sales office or Allen-Bradley distributor for application assistance.
- Avoid sharp bends that can permanently deform the cable. Minimum radius bend is listed for each part.
- Some plastic fiber optic cables can be cut to length. A very sharp right angle cut is essential to provide good performance. The supplied cable cutter Cat. No. 57-127, must be used. Each opening in the cutter can be used only once.
- Some sensing tips cannot be bent. **Only special sensing tips can be bent as specified.** Bends should only be attempted in the areas shown in the illustrations. Do not exceed the minimum bend radius for the cable.
- Plastic fiber optic cables are suitable for applications where the sensor must be isolated from high voltage.
- X-RAY or GAMMA radiation will cause plastic fibers to eventually become opaque. Custom cables constructed with special optical quartz fibers must be ordered for use in areas with high radiation.
- Use Transmitted Beam sensing in submerged applications when possible.
- A plastic fiber optic sensor with a duplex cable can provide Retroreflective or Diffuse sensing depending upon the distance to the target and the sensitivity adjustment on the sensor. If the sensor and cable are to be used for Retroreflective sensing, the sensitivity of the sensor must be adjusted low enough to avoid unwanted diffuse response from the targets to be sensed.
- Plastic fiber optic cables have a wide field of view.** A smaller field of view can be achieved by attaching an Extended Range Lens Assembly such as the Cat. No. 63-118 (see page 1-288) to the sensing end of the fiber. These lens assemblies will also increase the available sensing distance.
- Plastic fiber optics cables can be used in applications where constant motion or flexing of the cable is required. Coiled cables (such as 43PR-NES57VS) are particularly well suited for these applications.
- Plastic fiber optic cables can be successfully applied in most industrial environments. However, where abrasion or occasional impact to the cable is a concern, glass fiber optic cables may provide more durability.
- Chemical Resistance: Acid and alkali solvents could damage the Polyethylene Fiber Core. The jacket will offer some washdown protection but long term use in chemical environments could destroy the core material.
- The maximum temperature rating of standard plastic fiber optic cables is 70°C (158°F). Custom cables with temperature ratings of 115°C (239°F) are available.

ATTENTION



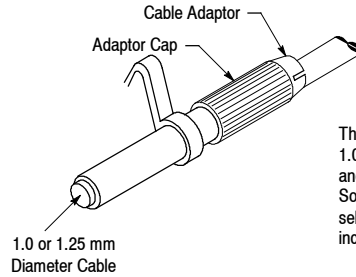
Fiber optic cables are not recommended for explosion-proof applications in hazardous environments. The fiber optic cable can provide a path for explosive fumes to travel from the hazardous area to the safe area.

Plastic Fiber Optic Cables

Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

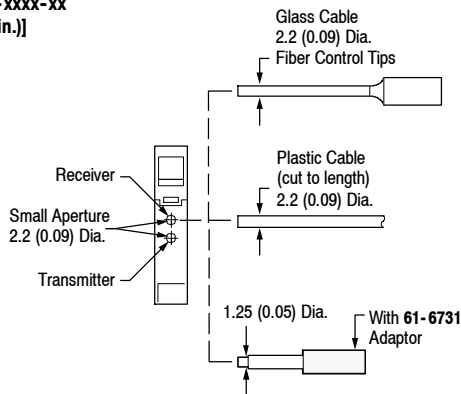
Plastic Fiber Optic Cables for use with Small Aperture Sensors

The plastic fiber optic cables on pages 1-272...1-280 are for use with small aperture sensors. The cables shown on pages 1-277...1-279 require an adaptor (included with the cable).

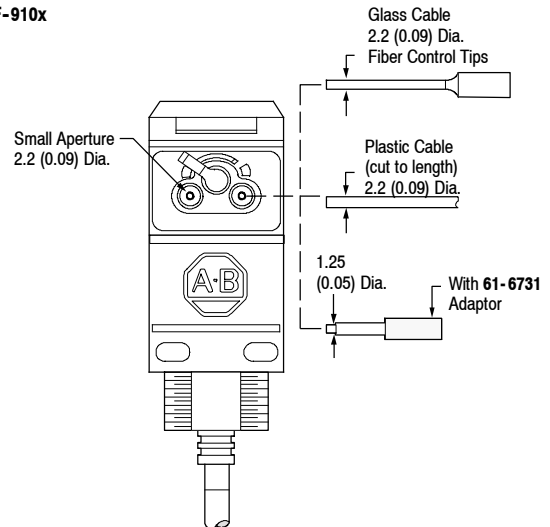


The drawing of the Cat. No. 61-6731 adaptor shows how 1.0/1.25 mm (0.04/0.05 in.) OD fibers (shown on pages 1-277 and 1-279) can be used with most small aperture sensors. Some sensors have adaptors for this purpose included. Product selection pages for each sensor will indicate if an adaptor is included as standard.

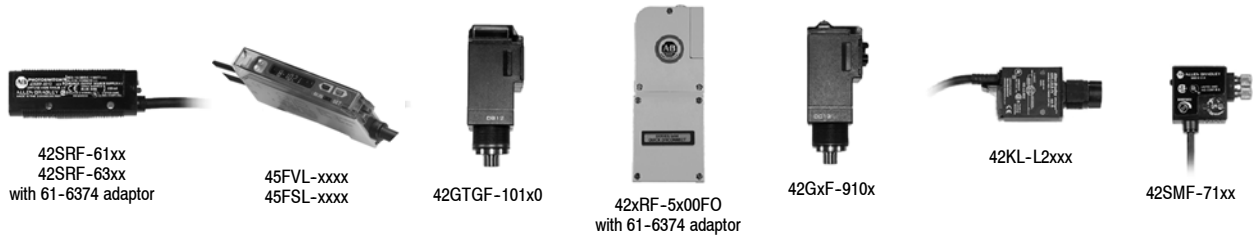
45Fxx-xxxx-xx
[mm (in.)]



42GxF-910x



Small Aperture Sensors:



Note: Sensing Distance

- Due to the variation between fiber optic cables, sensing distance can vary widely
- The sensing distance of bifurcated cables is measured with white paper (90% reflectivity). Other surfaces may be less reflective and therefore would have shorter sensing distances.
- The published numbers are based on extensive testing and are conservative
- The sensing distance of transmitted beam cables is measured from tip to tip
- Application considerations that effect distance
 - Sensor selected
 - Reflectivity of target
 - Environment
 - Accessories such as focusing lens
 - Length of the cable
- The cut of the plastic. Re-cutting the cable with the proper tool (Cat. No. 57-127) will typically give a better surface for the sensor to interface with, allowing a longer sensing distance.
- Bending a bendable tip beyond the minimum bend radius of the cable will reduce sensing distance.
- Consult product support for additional information.

All dimensions indicated are typical. Contact your local Rockwell Automation sales office or Allen-Bradley distributor for exact dimensions.

43PR Plastic Fiber Optic Cables

Threaded Bifurcated Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

The fiber optic cables on pages 1-272...1-279 are for use with small aperture sensors such as follows:



Approximate Metric / Standard Distances

0	50	100	150	200	250	300	mm
0	2	4	6	8	10	12	in.

Approximate Dimensions [mm (in.)]	Bend Radius [mm (in.)]	Fiber Core Diameter	Sheathing Material	Sensing Distance [mm]	Cat. No.
	40 (1.6)	2 x 1.5 (0.06)	Polyethylene		43PR-NDS59FS
	25 (1.0)	2 x 1 (0.04)			43PR-NDS57ZS
	25 (1.0)	2 x 1 (0.04)	Polyethylene		43PR-NES57ZS
	25 (1.0)	2 x 1 (0.04)	Polyethylene		43PR-NES57VS
<p>43PR-NKS61FS has coaxial optics for more precise sensing</p>	25 (1.0)	2 x 1 (0.04)	Polyethylene		43PR-NKS57FS
	20 (0.8)	1 x 0.75 (0.03) 4 x 0.5 (0.02)		Characterization not available at time of publication	43PR-NKS61FS
	2 (0.08)	2 x 0.5 (0.02)	1 R Polyflex	Characterization not available at time of publication	43PR-NKS65YS
	2 (0.08)	2 x 1.0 (0.04)	1 R Polyflex	Characterization not available at time of publication	43PR-NLS65YS

Note: Standard length for plastic fiber optic cables is 2 m (78 in.) tip to tip.

PHOTOSWITCH® Photoelectric Sensors
43PR Plastic Fiber Optic Cables

Threaded Bifurcated Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

Approximate Dimensions [mm (in.)]	Bend Radius [mm (in.)]	Fiber Diameter	Sheathing Material	Sensing Distance [mm]	Cat. No.
	15 (0.6)	2 x 0.5 (0.02)	Polyethylene		43PR-PES53FS
	15 (0.6)	2 x 0.5 (0.02)	Polyethylene		43PR-PFS53FS
	25 (1.0)	2 x 1 (0.04)	Polyethylene		43PR-PIS57ZS
	25 (1.0)	2 x 1 (0.04)	Polyethylene		43PR-PIS57VS
	15 (0.6)	2 x 0.5 (0.02)	Polyethylene		43PR-PJS53ZS
	15 (0.6)	2 x 0.5 (0.02)	Polyethylene		43PR-PJS53VS

Note: Standard length for plastic fiber optic cables is 2 m (78 in.) tip to tip.

43PR Plastic Fiber Optic Cables

Ferrule Bifurcated Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

Approximate Dimensions [mm (in.)]	Bend Radius [mm (in.)]	Fiber Bundle Diameter	Sheathing Material	Sensing Distance	Cat. No.
	25 (1.0)	2 x 1 (0.04)	Polyethylene	Characterization not available at time of publication	43PR-RAS57ZS

Specialty Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

	25 (1.0)	2 x 1 (0.04)	Polyethylene	Characterization not available at time of publication	43PR-SBS57ZS
	25 (1.0)	2 x 1 (0.04)	Polyethylene	Characterization not available at time of publication	43PR-SCS57ZS
	25 (1.0)	1 (0.04)	Polyethylene	The sensing distance is the width of the gap (11.9 mm). The target must cross the optical axis between the two prongs of the fork	43PR-UAA56MS

Note: Standard length for plastic fiber optic cables is 2 m (78 in.) tip to tip.

PHOTOSWITCH® Photoelectric Sensors
43PT Plastic Fiber Optic Cables

Threaded Transmitted Beam Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

Approximate Dimensions [mm (in.)]	Bend Radius [mm (in.)]	Fiber Bundle Diameter	Sheathing Material	Sensing Distance [mm]	Cat. No.
	25 (1.0)	1 (0.04)	Polyethylene		43PT-NJS56FS
	25 (1.0)	1 (0.04)	Polyethylene		43PT-NJS56GS
	40 (1.6)	1.5 (0.06)	Polyethylene		43PT-NAS58FS
	2 (0.08)	1.0 (0.04)	1 R Polylux	Characterization not available at time of publication	43PT-NAS66RS
	15 (0.6)	0.5 (0.02)	Polyethylene		43PT-PAS52FS
	15 (0.6)	0.5 (0.02)	Polyethylene		43PT-PBS52FS

Notes: Standard length for plastic fiber optic cables is 2 m (78 in.) tip to tip.
 Two cables per one plastic transmitted beam cat. no.

43PT Plastic Fiber Optic Cables

Threaded Transmitted Beam Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

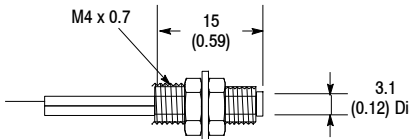
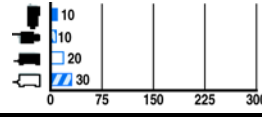
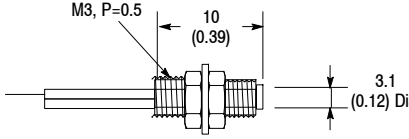
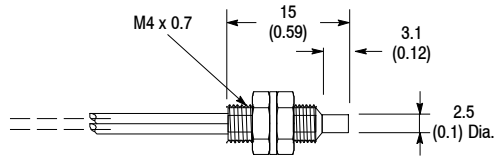
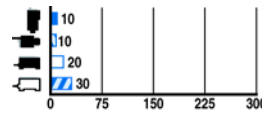
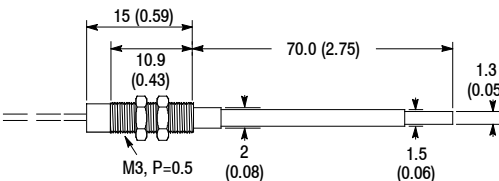
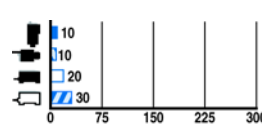
Approximate Dimensions [mm (in.)]	Bend Radius [mm (in.)]	Fiber Bundle Diameter	Sheathing Material	Sensing Distance [mm]	Cat. No.
	25 (1.0)	1 (0.04)	Polyethylene		43PT-PKS56FS
	25 (1.0)	1 (0.04)	Polyethylene		43PT-PKS56GS
	15 (0.6)	0.5 (0.02)	Polyethylene		43PT-PLS52FS
	15 (0.6)	0.5 (0.02)	Polyethylene		43PT-PLS52GS

Ferrule Transmitted Beam for Small Aperture Sensors [2.2 mm (0.09 in.)]

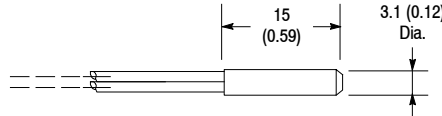
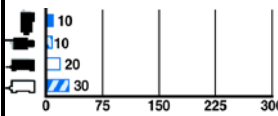
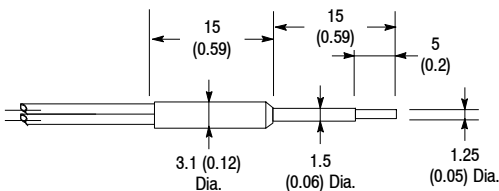
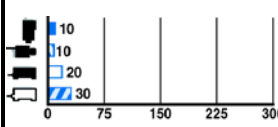
Approximate Dimensions [mm (in.)]	Bend Radius [mm (in.)]	Fiber Bundle Diameter	Sheathing Material	Sensing Distance [mm]	Cat. No.
	25 (1.0)	1 (0.04)	Polyethylene		43PT-CBS56FS
	25 (1.0)	1 (0.04)	Polyethylene	Characterization not available at time of publication	43PT-SAS56FS

Note: Standard length for plastic fiber optic cables is 2 m (78 in.) tip to tip.
Two cables per one plastic transmitted beam Cat. No.

Threaded Bifurcated Miniature Cables for Small Aperture Sensors (adaptor required)

Approximate Dimensions [mm (in.)]	Bend Radius [mm (in.)]	Fiber Bundle Diameter	Sheathing Material	Sensing Distance [mm]	Cat. No.
 <p>43PR-NAS60FM has coaxial optics for more precise sensing</p>	25 (1.0)	2 x 1 (0.04)	Polyethylene		43PR-NAS57ZM
	15 (0.6)	1 x 0.5 (0.02) 4 x 0.25 (0.01)		Characterization not available at time of publication	43PR-NAS60FM
	2 (0.08)	2 x 0.25 (0.01)	1 R Polyflex	Characterization not available at time of publication	43PR-NBS63YM
	15 (0.6)	2 x 0.5 (0.02)	Polyethylene		43PR-NFS53FM
	15 (0.6)	2 x 0.5 (0.02)	Polyethylene		43PR-PHS53ZM

Ferrule Bifurcated Miniature Cables for Small Aperture Sensors (adaptor required) [2.2 mm (0.09 in.)]

Approximate Dimensions [mm (in.)]	Bend Radius [mm (in.)]	Fiber Bundle Diameter	Sheathing Material	Sensing Distance [mm]	Cat. No.5
	15 (0.6)	2 x 0.5 (0.02)	Polyethylene		43PR-CBS53ZM
	15 (0.6)	2 x 0.5 (0.02)	Polyethylene		43PR-AAS53ZM

Note: Standard length for plastic fiber optic cables is 2 m (78 in.) tip to tip.

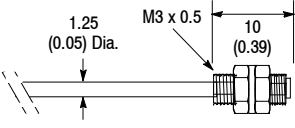
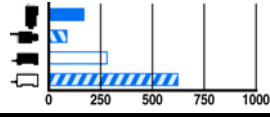
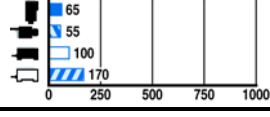
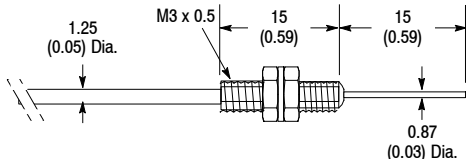
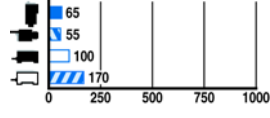
43PR Plastic Fiber Optic Cables

Ferrule Bifurcated Miniature Cables for Small Aperture Sensors (adaptor required)

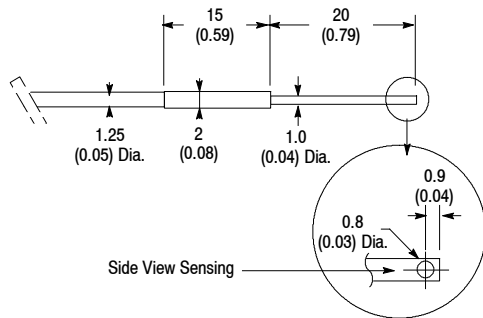
Approximate Dimensions [mm (in.)]	Bend Radius [mm (in.)]	Fiber Bundle Diameter	Sheathing Material	Sensing Distance [mm]	Cat. No.
	15 (0.6)	2 x 0.5 (0.02)	Polyethylene	Characterization not available at time of publication	43PR-VBS53ZM

Note: Standard length for plastic fiber optic cables is 2 m (78 in.) tip to tip.

Threaded Transmitted Beam Miniature Cables for Small Aperture Sensors (adaptor required)

Approximate Dimensions [mm (in.)]	Bend Radius [mm (in.)]	Fiber Bundle Diameter	Sheathing Material	Sensing Distance [mm]	Cat. No.
	25 (1.0)	1 (0.04)	Polyethylene		43PT-NBS56FM
	15 (0.6)	0.5 (0.02)			43PT-NBS52FM
	2 (0.08)		1R Polyflex	Characterization not available at time of publication	43PT-NBS64RM
	15 (0.6)	0.5 (0.02)	Polyethylene		43PT-PCS52FM

Ferrule Transmitted Beam Miniature Cables for Small Aperture Sensors (adaptor required [2.2 mm (0.09 in.)])

Approximate Dimensions [mm (in.)]	Bend Radius [mm (in.)]	Fiber Bundle Diameter	Sheathing Material	Sensing Distance [mm]	Cat. No.
	15 (0.6)	0.5 (0.02)	Polyethylene	Characterization not available at time of publication	43PT-VCS52FM

Note: Standard length for plastic fiber optic cables is 2 m (78 in.) tip to tip.
 Two cables per one plastic transmitted beam Cat. No.

Plastic Fiber Optic Cables

Special Purpose

Approximate Dimensions [mm (in.)]

Sensing Tip Material	Fiber Diameter	Sheathing Material	Nominal Sensing Ref.	Cat. No.
PTFE	1.25 (0.049) x 2	PTFE	NA	99-193-1

PTFE	2.2 (0.090) x 2	PTFE	NA	99-197-1

Plastic Fiber Optic Cables

Additional Cables for Small Aperture Sensors [2.2 mm (0.09 in.) OD Sensor End Tip]

Custom Fiber Optic Cables

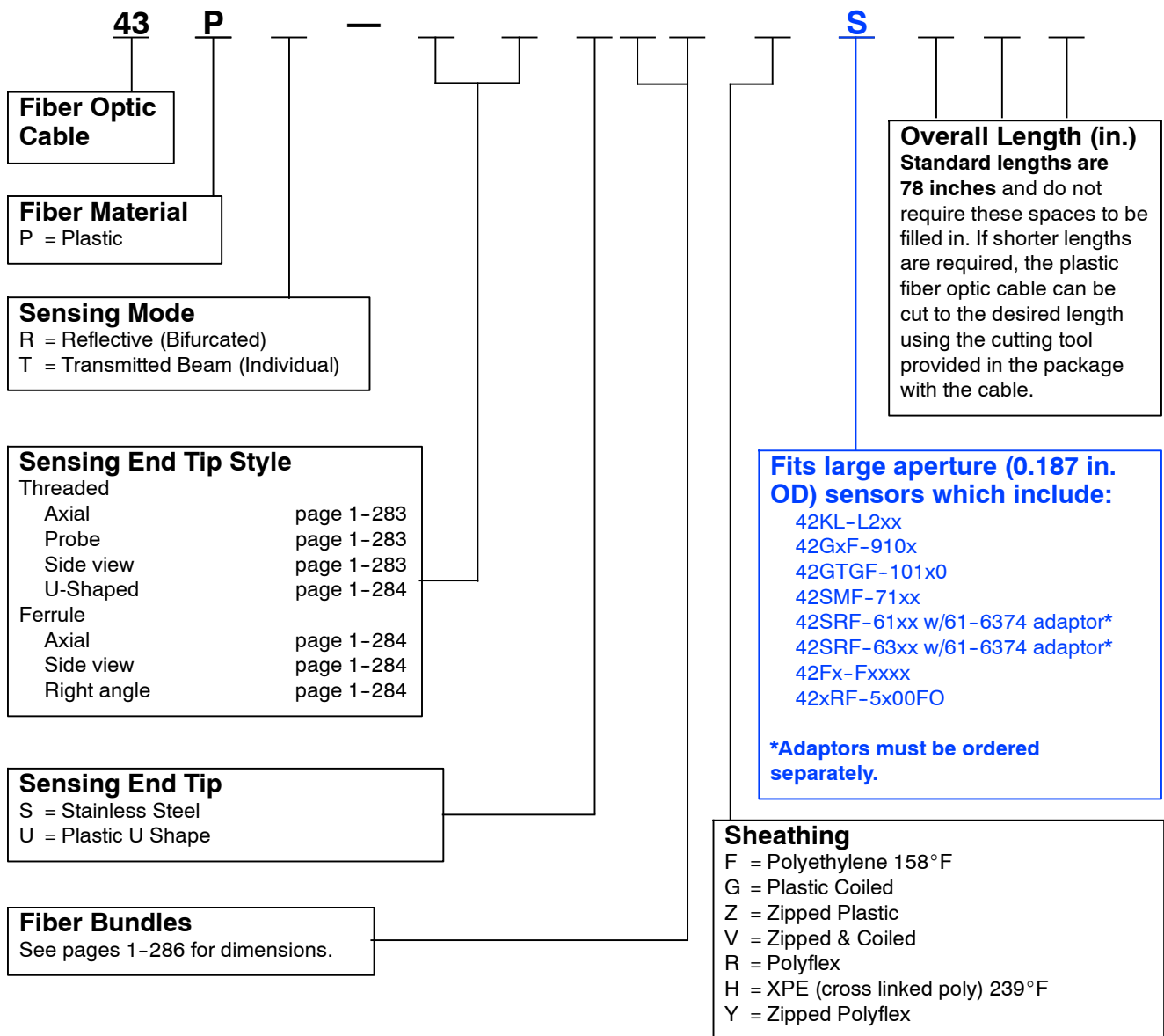
Rockwell Automation/Allen-Bradley can provide custom plastic fiber optic cables to meet nearly any application requirement.

Typical cable modifications include:

- Custom lengths are available
- Custom temperature ratings up to 115°C (239°F)
- Custom configurations including multiple sensing tips
- Custom sensing end tips—nearly any modification is possible

For more information contact your local Rockwell Automation sales office or Allen-Bradley distributor.

To Build a Custom Fiber Optic



Plastic Fiber Optic Cables

Additional Cables for Small Aperture Sensors [1.0/1.25 mm (0.04/0.05 in.) OD Sensor End Tip]

Custom Fiber Optic Cables

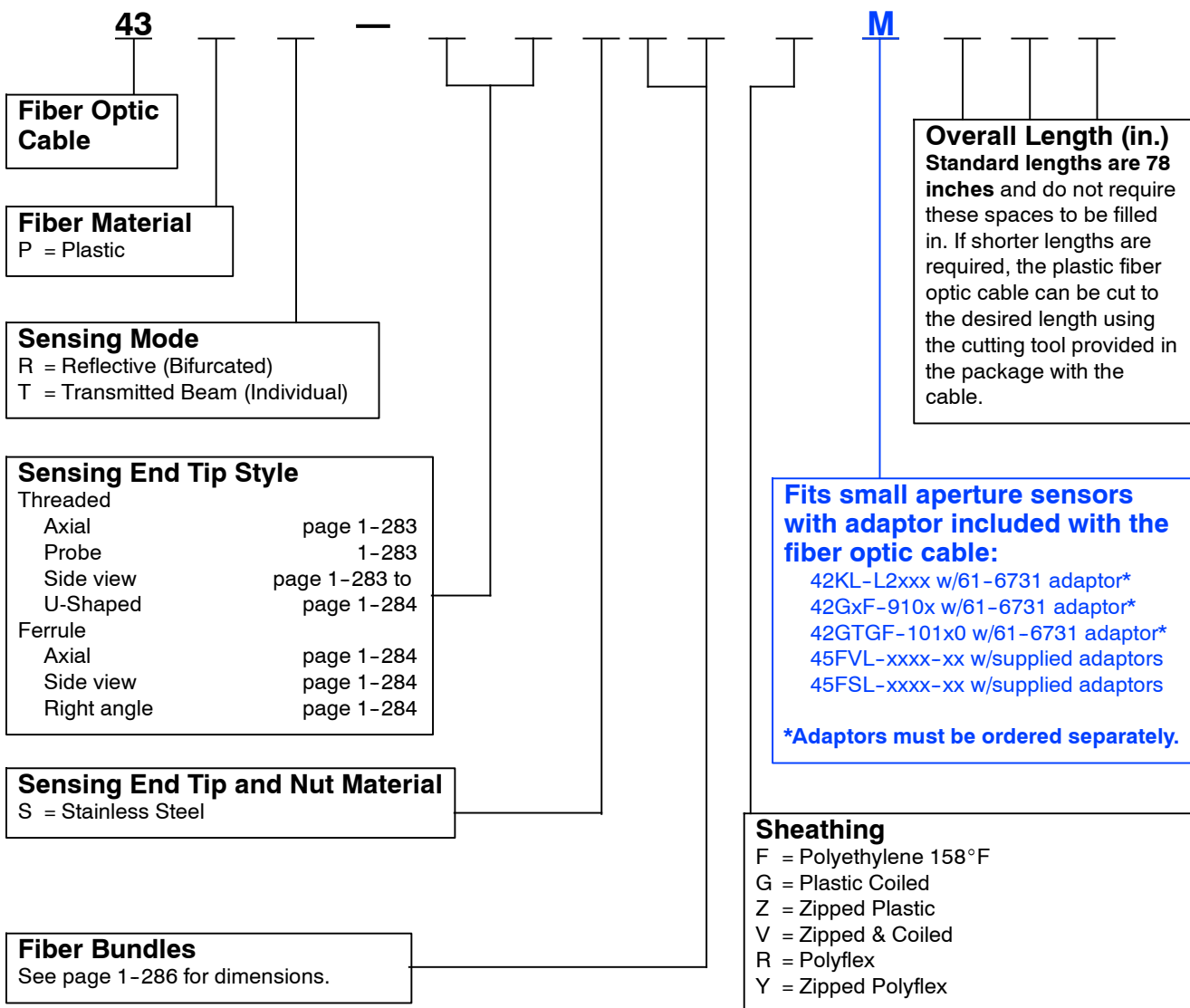
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- Custom configurations including multiple sensing tips
- Custom sensing end tips—nearly any modification is possible

For more information contact your local Rockwell Automation sales office or Allen-Bradley distributor.

To Build a Custom Fiber Optic



PHOTOSWITCH® Photoelectric Sensors
Plastic Fiber Optic Cable Sensing Tips
 Use with Configurators on page 1-281 and 1-282.

Approximate Dimensions	Code	Standard Bundle [mm]	Approximate Dimensions [mm (in.)]					
			A	B	C	D	E	F
	NA	0.5	14.9 (0.59)	—	M4, P=0.7	0.51 (0.02)	3.0 (0.12)	—
	NB	0.5	9.9 (0.39)	—	M3, P=0.5	NA	—	—
	NC	0.25	11.9 (0.47)	—	M4, P=0.7	3.05 (0.12)	1.02 (0.04)	—
	ND	1.5	13.9 (0.55)	23.1 (0.91)	M6, P=1	1.02 (0.04)	4.8 (0.19)	—
	NE	1.0	17.0 (0.67)	—	M6, P=0.75	3.05 (0.12)	4.06 (0.16)	—
	NF	0.5	11.9 (0.47)	—	M4, P=0.7	3.05 (0.12)	2.54 (0.10)	—
	NG	0.75	10.9 (0.43)	14.9 (0.59)	M3, P=0.5	NA	—	3.05 (0.12)
	NJ	1.0	11.9 (0.47)	—	M4, P=0.7	3.05 (0.12)	—	—
	NK	0.5	11.9 (0.47)	—	M6, P=0.75	3.05 (0.12)	2.54 (0.10)	—
	NL	0.5	14.9 (0.59)	23.1 (0.91)	M6, P=1	4.8 (0.19)	6.1 (0.24)	6.1 (0.24)

Approximate Dimensions	Code	Standard Bundle [mm]	Approximate Dimensions [mm (in.)]						
			A	B	C	D	E	F	G
	PA	0.5	14.9 (0.59)	35.0 (1.38)	2.54 (0.1)	1.02 (0.04)	0.76 (0.03)	M4, P=0.7	—
	PB	0.5	14.9 (0.59)	69.8 (2.75)	2.54 (0.1)	1.02 (0.04)	0.76 (0.03)	M4, P=0.7	—
	PD	0.5	9.9 (0.39)	69.8 (2.75)	2.03 (0.08)	1.02 (0.04)	0.76 (0.03)	M3, P=0.5	—
	PE	0.5	14.9 (0.59)	35.0 (1.38)	2.54 (0.1)	1.52 (0.06)	1.27 (0.05)	M6, P=1	23.1 (0.91)
	PF	0.5	14.9 (0.59)	69.8 (2.75)	2.54 (0.1)	1.52 (0.06)	1.27 (0.05)	M6, P=1	23.1 (0.91)
	PG	0.5	14.9 (0.59)	69.8 (2.75)	2.54 (0.1)	1.52 (0.06)	1.27 (0.05)	M4, P=0.7	—
	PH	0.5	10.9 (0.43)	69.8 (2.75)	2.03 (0.08)	1.52 (0.06)	1.27 (0.05)	M3, P=0.5	14.9 (0.59)

Approximate Dimensions	Code	Standard Bundle [mm]	Approximate Dimensions [mm (in.)]			
			A	B	C	D
	PC	0.5	14.9 (0.59)	14.9 (0.59)	0.76 (0.03)	M3, P=0.5
	PI	1.0	17.0 (0.67)	88.9 (3.5)	2.54 (0.1)	M6, P=0.75
	PJ	0.5	11.4 (0.45)	88.9 (3.5)	1.27 (0.05)	M3, P=0.5
	PK	1.0	17.0 (0.67)	88.9 (3.5)	1.27 (0.05)	M6, P=0.75
	PL	0.5	10.9 (0.43)	88.9 (3.5)	0.86 (0.034)	M3, P=0.5

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm]
	SA	1.0

Plastic Fiber Optic Cable Sensing Tips

Use with Configurators on page 1-281 and 1-282.

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm]
<p>Side View Sensing</p>	VC	0.5

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm]
<p>Side View Sensing</p>	SB	1.0

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm]
<p>Side View Sensing</p> <p>M6 x 0.75 thread</p>	SC	1.0

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm]
<p>Side View Sensing</p>	RA	1.0

PHOTOSWITCH® Photoelectric Sensors
Plastic Fiber Optic Cable Sensing Tips
 Use with Configurators on page 1-281 and 1-282.


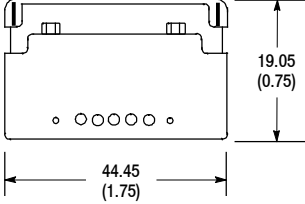

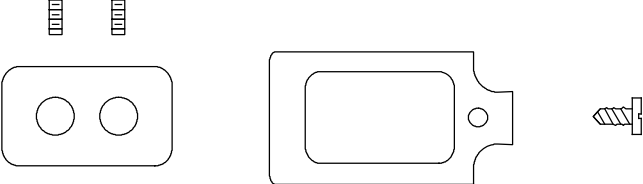

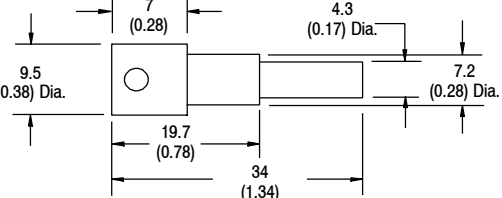
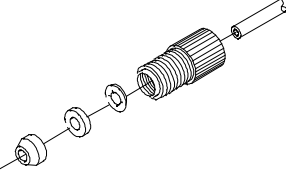
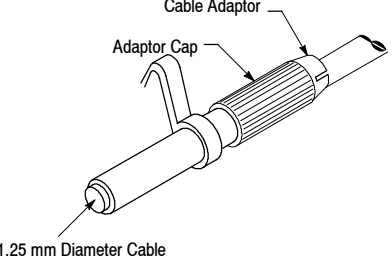
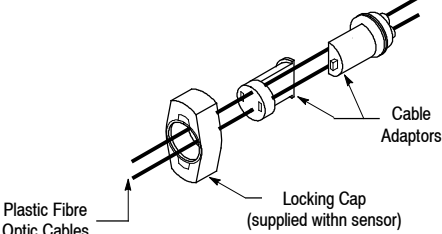
Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm]
	VA	0.5
Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm]
	AA	0.5
Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm]
	CA	1.0

Plastic Fiber Optic Cable Sensing Tips

Use with Configurators on page 1-281 and 1-282.

The bundle size codes are used with the configurators on page 1-281 and 1-282.


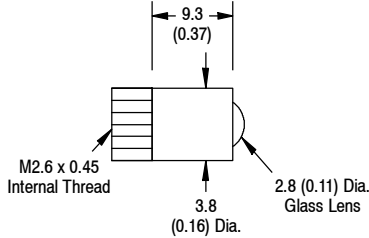
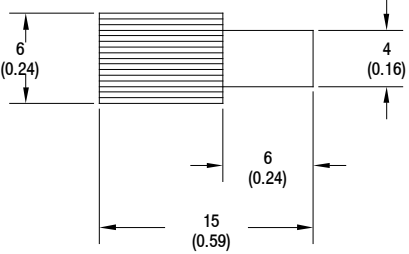
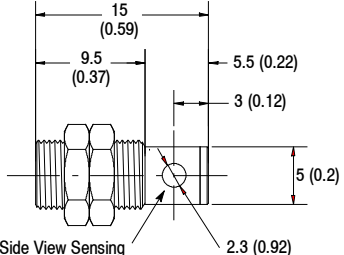
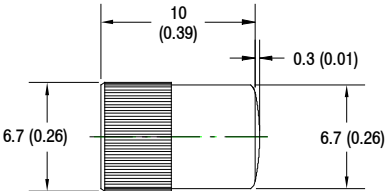
Code	Diameter [mm]	Bend Radius [mm (in.)]	Arrangement
52	0.50	15 (0.6)	Single
53	0.50	15 (0.6)	Pair Zipped
56	1.0	25 (1.0)	Single
57	1.0	25 (1.0)	Pair Zipped
58	1.5	40 (1.6)	Single
59	1.5	40 (1.6)	Pair
60	0.50 x 1 0.25 x 4	15 (0.6)	Coaxial
61	0.75 x 1 0.50 x 4	20 (0.8)	Coaxial
64	0.50	2 (0.08)	Single Flexible
65	0.50	2 (0.08)	Pair Flexible
66	1.0	2 (0.08)	Single Flexible
67	1.0	2 (0.08)	Pair Flexible

Description	Approximate Dimensions [mm (in.)]	Cat. No.
 <p>Cutting Tool for plastic Fiber Optic cable. For use with all cutable cables. One cutter tool is packaged with each fiber optic cable.</p>		<p>57-127</p>
 <p>Molded Fiber Optic Adaptor Kit to be used with Type 42DRF and Type 42MRF Series 5000.</p>		<p>61-6310</p>
 <p>Control End Adaptor Kit for 2.3 mm (0.09 in.) OD Plastic Fiber Optic cable. Use with Series 9000, 10,000, 5000 and 6000.</p>		<p>61-6374 2/package</p>
<p>Control End Adaptor Kit for Series 7000.</p>		<p>129-125-5 2/package</p>
<p>1.25 mm outer jacket adaptor for the 42FA and 42FT (included with sensor) and MiniSight, Series 9100 and 10,000 (adaptor not included)</p>		<p>61-6731</p>
<p>1.0 mm outer jacket adaptor for 45FVL/45FSL</p>		<p>61-6742</p>
<p>2.2 mm outer jacket adaptor for the 42FB (included with sensor)</p>		<p>61-6733</p>

Plastic Fiber Optic Cables

Accessories

Lenses (One per package)

Description	Approximate Dimensions [mm (in.)]	Cat. No.
 <p>Range extender lens adaptor for 1 mm (0.04 in.) dia. transmitted beam plastic cable.</p>	 <p>M2.6 x 0.45 Internal Thread 9.3 (0.37) 3.8 (0.16) Dia. 2.8 (0.11) Dia. Glass Lens</p>	<p>63-118</p>
<p>Fixed focus lens adaptor used with reflective cables with 4 mm (0.16 in.) x 0.7 pitch threaded sensing tips. Plastic housing One Cat. No. = one adaptor</p>	 <p>6 (0.24) 4 (0.16) 6 (0.24) 15 (0.59)</p>	<p>60-2646</p>
<p>Right angle lens adaptor used with transmitted beam cables with 4 mm (0.16 in.) x 0.7 pitch threaded sensing tips. Metal housing One Cat. No. = one adaptor</p>	 <p>15 (0.59) 9.5 (0.37) 5.5 (0.22) 3 (0.12) 5 (0.2) 2.3 (0.92) Side View Sensing</p>	<p>60-2648</p>
<p>Range extender lens adaptor used with transmitted beam cables with 4 mm (0.16 in.) x 0.7 pitch threaded sensing tips. Metal housing One Cat. No. = one adaptor</p>	 <p>10 (0.39) 0.3 (0.01) 6.7 (0.26) 6.7 (0.26)</p>	<p>60-2652</p>

General Specifications

Housing Material	Nickel-plated brass
Operating Temperature [C (F)]	-25...+60° (-13...+140°)
Acceptable Fiber	2.2 mm (0.08 in.) outer diameter
Fiber Optic Cable	Bifurcated = 99-854 Individual = 99-850

Approximate Dimensions [mm (in.)]

Description	Approximate Dimensions [mm (in.)]	Nominal Sensing Distance [mm (in.)]	Cat. No.
Range extending lens for ColorSight 9000		114 (4.5)	60-2738
Lens for diffuse sensing. Accepts 2.2 mm plastic bifurcated fiber optic cable. One Cat. No. = one lens assembly		70 (2.75)	60-2745
Range extending lens for transmitted beam sensing. Accepts 2.2 mm plastic individual fiber optic cable. One Cat. No. = two lens assemblies		200 (7.87)	60-2746
Range extending lens for transmitted beam sensing. Accepts 2.2 mm plastic individual fiber optic cable. One Cat. No. = two lens assemblies		800 (31.49)	60-2747
Range extending lens for transmitted beam sensing. Accepts 2.2 mm plastic individual fiber optic cable. One Cat. No. = two lens assemblies		1200 (47.24)	60-2748

Plastic Fiber Optic Cables

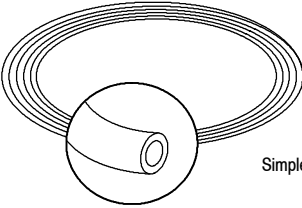
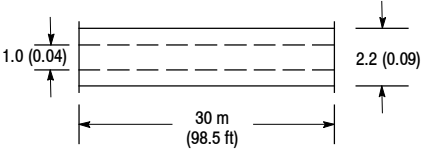
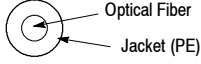
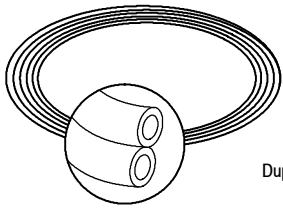
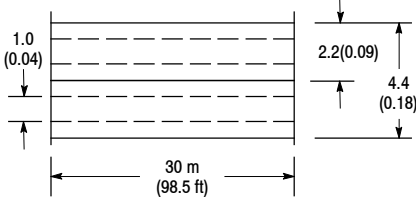
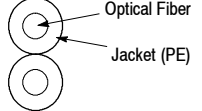
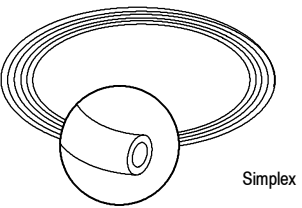
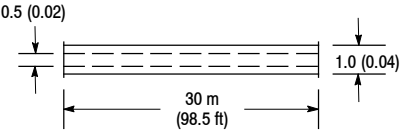
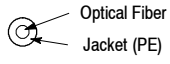
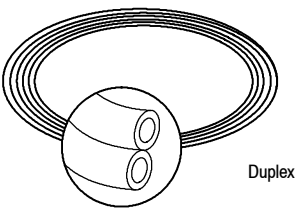
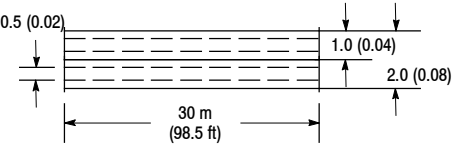
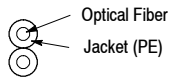
Fiber Optic Lens Assemblies (Field Attachable)

Approximate Dimensions [mm (in.)]

Description	Approximate Dimensions [mm (in.)]	Nominal Sensing Distance [mm (in.)]	Cat. No.
<p>Range extending lens for transmitted beam sensing. Accepts 2.2 mm plastic individual fiber optic cable.</p> <p>One Cat. No. = two lens assemblies</p>		<p>1200 (47.24)</p>	<p>60-2749</p>
<p>Range extending lens for transmitted beam sensing. Accepts 2.2 mm plastic individual fiber optic cable.</p> <p>One Cat. No. = two lens assemblies</p>		<p>4000 (157.48)</p>	<p>60-2750</p>
<p>Splicer for single 2.2 mm plastic fiber optic cable</p> <p>One Cat. No. = two splicers</p>	<p>25% Attenuation</p>	<p>—</p>	<p>60-2751</p>

Note: Nominal sensing reference is included to aid in the selection of fiber optic lens assemblies.

Unterminated Plastic Fiber Optic Cables

Description	Approximate Dimensions [mm (in.)]	Cat. No.
 <p>Simplex</p>	 <p>Single Fiber</p> 	<p>99-850</p>
 <p>Duplex</p>	 <p>Zipped</p> 	<p>99-854</p>
 <p>Simplex</p>	 <p>Single Fiber</p> 	<p>99-852</p>
 <p>Duplex</p>	 <p>Zipped</p> 	<p>99-853</p>

The above cat. nos. are unterminated simplex (individual) and duplex (dual) plastic fibers.

These plastic fiber optic cables can be used with plastic fiber optic sensors and require no control end tip to interface to the sensor.

A cutting tool for these unterminated plastic fiber optic cables is packaged with the fiber cable.

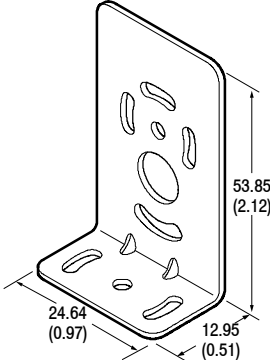
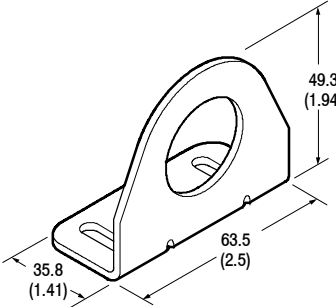
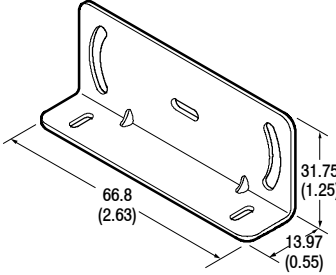
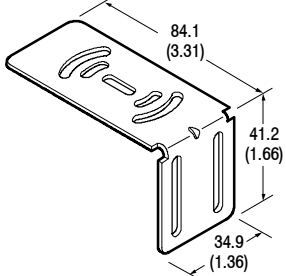
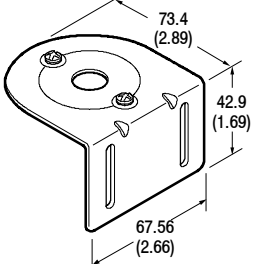
Fiber Optic Cable Cross Reference

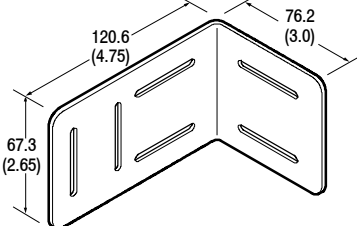
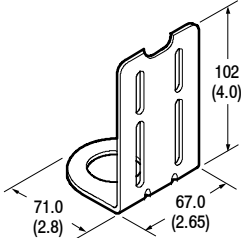
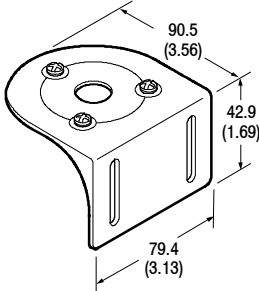
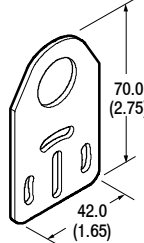
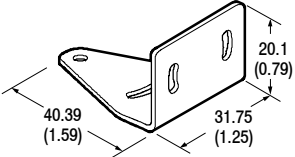
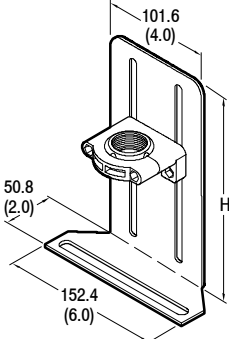
Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
99-1000-1	43GR-TAS20ML	99-461-1	43GT-MMS10ML	99-721-1	43GT-MIS15ML
99-1003-1	43GR-XDB25SL	99-477-1	43GT-TFS00ML	99-722-1	43GT-TMS25ML
99-108	43PT-PLS52FS	99-479-1	43GT-MUS10ML	99-723-1	43GT-TMS15MS
99-109	43PT-PLS52GS	99-487-1	43GT-MRS10ML	99-751-1	43GR-XAS10SS
99-110	43PR-PJS53ZS	99-490-1	43GT-MHS15SL	99-752-1	43GR-TIS10SS
99-116-1	43GT-MIS15SL	99-491-1	43GT-MHS15ML	99-753-1	43GR-FTS10SS
99-161-1	43GR-TAB20SS	99-494-1	43GT-BCA73SL	99-755-1	43GR-TDS10SS
99-181-1	43GT-TWC25SL	99-495-1	43GT-BCA73ML	99-794-1	43GR-BRA79SL
99-184-1	43GT-2FAS20SL	99-500-1	43GT-TBS25SL	99-800	43PR-NDS59FS
99-201-1	43GR-FOS20ML	99-50-1	43GT-FAS25SL	99-801	43PR-NDS57ZS
99-206-1	43GR-FPS20SL	99-501-1	43GT-TBS25ML	99-802	43PR-NAS57ZM
99-214-1	43GR-FJS30SL	99-502-1	43GT-TBB30SL	99-803	43PR-NAS60FM
99-222-1	43GR-TMC25SL	99-504-1	43GT-TQC25SL	99-804	43PR-NKS57ZS
99-224-1	43GR-TMC15SL	99-505-1	43GT-TQC25ML	99-805	43PR-NKS61FS
99-238-1	43GR-FGS25SL	99-508-1	43GT-TRC30SL	99-806	43PR-NFS53FM
99-275-1	43GR-TFS10ML	99-51-1	43GT-FAS25ML	99-808Z	43PR-NGS53ZM
99-279-1	43GR-MUS10ML	99-52-1	43GT-TBB25SL	99-809Z	43PR-NGS55ZM
99-283-1	43GR-MS10ML	99-530-1	43GT-TTC20SL	99-810	43PR-PES53FS
99-290-1	43GR-MHS15SL	99-53-1	43GT-TBB25ML	99-811	43PR-PFS53FS
99-291-1	43GR-MHS15ML	99-54-1	43GT-FIS25SL	99-814	43PR-CBS53ZM
99-294-1	43GR-BCA73SL	99-55-1	43GT-FIS25ML	99-816	43PR-AAS53ZM
99-300-1	43GR-TBS25SL	99-56-1	43GT-BAA72SL	99-818	43PR-VBS53ZM
99-30-1	43GR-FAS25SL	99-57-1	43GT-BAA72ML	99-819	43PT-NAS58FS
99-301-1	43GR-TBS25ML	99-58-1	43GT-MKS00SL	99-820	43PT-NBS56FM
99-302-1	43GR-TBB30SL	99-59-1	43GT-MKS00ML	99-821	43PT-NBS54FM
99-304-1	43GR-TQC25SL	99-614-1	43GR-MQS15SL	99-822	43PT-NBS52FM
99-308-1	43GR-TRC30SL	99-623-1	43GR-2FAS25SL	99-823	43PT-PAS52FS
99-31-1	43GR-FAS25ML	99-626-1	43GT-6TBB15SL	99-825	43PT-PCS52FM
99-315-1	43GR-TKC25ML	99-643-1	43GR-4TBB22SL	99-827	43PT-CBS56FS
99-32-1	43GR-TBB25SL	99-68-1	43GR-MVS00ML	99-828	43PT-SAS56FS
99-330-1	43GR-TTS20SL	99-69-1	43GT-TMC25SL	99-833	43PR-SCS57ZS
99-33-1	43GR-TBB25ML	99-700-1	43GR-TBS20MS	99-838	43PR-SBS57ZS
99-34-1	43GR-FIS25SL	99-701-1	43GR-TBS15ML	99-85-1	43GR-TGB33SL
99-350-1	43GR-FRS40SL	99-702-1	43GR-TAS20MS	99-90	43PT-NJS56FS
99-35-1	43GR-FIS25ML	99-704-1	43GR-TAS20SS	99-900	43PR-RAS57ZS
99-36-1	43GR-BAA72SL	99-705-1	43GR-TMS25ML	99-91	43PT-NJS56GS
99-37-1	43GR-BAA72ML	99-706-1	43GR-TMS20MS	99-92	43PT-PKS56FS
99-39-1	43GR-MKS00ML	99-708-1	43GR-TQS20MS	99-93	43PT-PKS56GS
99-400-1	43GT-FOS20SL	99-710-1	43GT-TBS15MS	99-94	43PR-NES57ZS
99-408-1	43GT-FPS10SL	99-714-1	43GT-TAS15SS	99-95	43PR-NES57VS
99-424-1	43GT-TMC15SL	99-714-1	43GT-TAS15SS	99-951-1	43GT-XAS10SS
99-426-1	43GT-TOC30SL	99-715-1	43GT-TFS10ML	99-952-1	43GT-TIS10SS
99-436-1	43GT-FAS30SL	99-716-1	43GT-TOS30ML	99-953-1	43GT-FTS10SS
99-453-1	43GT-TJC30ML	99-717-1	43GT-TQS25ML	99-955-1	43GT-TDS10SS
99-458-1	43GT-MBS10SL	99-718-1	43GT-TQS15MS	99-96	43PR-PI57ZS
99-46-1	43GR-TXC25SL	99-720-1	43GT-TRS30ML	99-97	43PR-PI57VS

Description	Cat. No.	Used for	Approximate Dimensions [mm (in.)]
Swivel/Tilt bracket allows ± 10° vertical and 360° rotation adjustment.	60-2649	RightSight	
	60-2439	Series 9000 Color Sight LaserSight	
	60-2681	ClearSight 9000	
	60-2619	Series 7000	
	60-2618	Series 6000	
Right angle mounting bracket allows 30° horizontal adjustment.	60-2664	MiniSight 42CA, 42CB	
	60-2657	RightSight MiniSight 42CA, 42CB	
Right angle mounting bracket permits a 360° rotation adjustment. The Cat. No. 60-2513 bracket has mounting hole patterns compatible with the Cat. No. 60-1785.	60-2421 60-2513	Series 9000 ClearSight 9000 ColorSight LaserSight	

Accessories

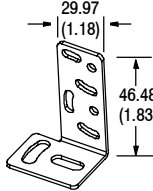
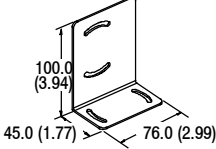
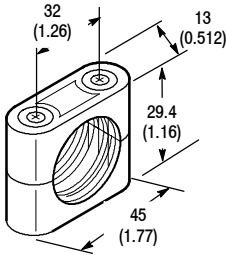
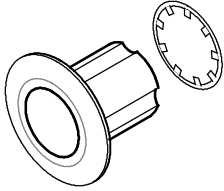
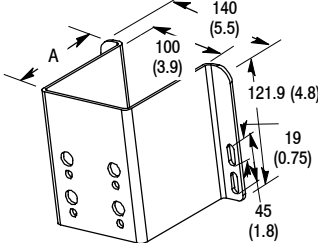
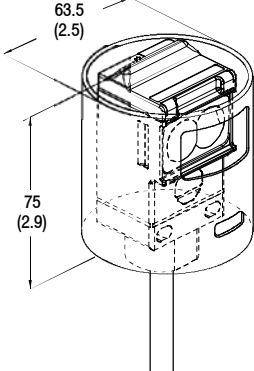
Mounting Brackets


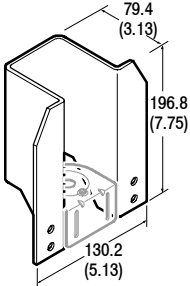

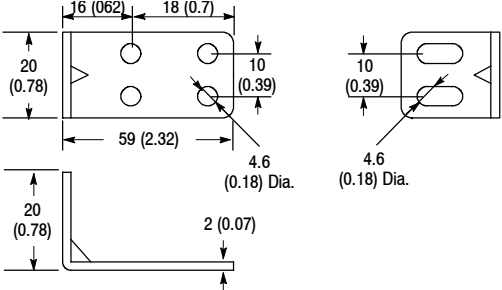
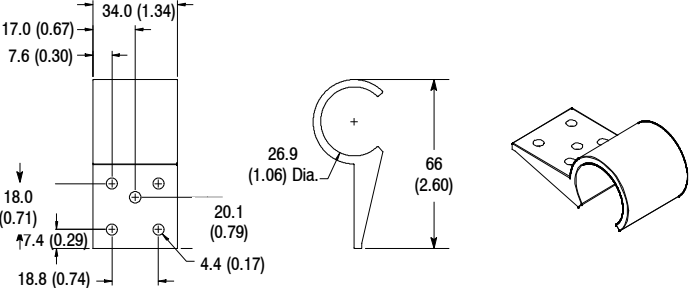
Description	Cat. No.	Used for	Approximate Dimensions [mm (in.)]
<p>Right angle mounting bracket allows 40° horizontal rotation. The Cat. No. 60-2152 permits a 30° horizontal rotation.</p>	<p>60-2151 60-2152</p>	<p>Series 7000</p>	
<p>Right angle mounting bracket with 25.4 mm (1 in.) knockout for Series 6000 sensor.</p>	<p>60-2006</p>	<p>Series 6000</p>	
<p>Tilt mounting bracket provides 30° vertical height adjustment.</p>	<p>60-2007</p>	<p>Series 6000</p>	
<p>Right angle mounting bracket allows for both horizontal and vertical adjustment.</p>	<p>60-2008</p>	<p>Series 6000</p>	
<p>Right angle mounting bracket provides vertical height and 360° rotation.</p>	<p>60-1785</p>	<p>Series 5000</p>	

Description	Cat. No.	Used for	Approximate Dimensions [mm (in.)]
Right angle mounting bracket intended for use with Unistrut™ channel provides many vertical and horizontal adjustments.	60-2014	Series 5000	
Right angle mounting bracket allows 360° rotation and has hole patterns to match standard NEMA style limit switches.	60-2230	Series 5000	
Right angle mounting bracket provides 360° rotation.	60-1479	Series 4000	
Straight mounting bracket provides 30° horizontal rotation.	60-2656	RightSight MiniSight 42CA, 42CB	
Side mounting bracket provides 30° of vertical and 20° of horizontal rotation.	60-2663	MiniSight	
Photoelectric sensor vertical height adjustment bracket slotted for any swivel/tilt bracket.	60-2721 (2 x 4 in.) 60-2722 (2 x 6 in.) 60-2723 (2 x 8 in.) 60-2724 (2 x 10 in.)	RightSight MiniSight Series 9000 ClearSight 9000 ColorSight LaserSight	

Accessories

Mounting Brackets

Description	Cat. No.	Used for	Approximate Dimensions [mm (in.)]
Stainless steel mounting bracket	60-BKTL-SS	44B 42JS VisiSight	
Mounting bracket	60-2677	45MLD	
Clamp style bracket fits any 18 mm sensor.	871A-BP18	RightSight MiniSight 42CA, 42CB	
Flush mount adaptor allows any 18 mm sensor to be mounted flush against panel surface.	60-2590	RightSight MiniSight 42CA, 42CB	
Heavy duty impact bracket of #12 steel can be used with swivel/tilt bracket.	60-2695 A = 76 mm (3 in.)	RightSight MiniSight Series 9000 ColorSight LaserSight	
	60-2702 A = 117 mm (4.6 in.)	ClearSight 9000	
Heavy duty impact bracket of #12 steel can be used with swivel/tilt bracket.	60-2725	Series 9000	

Description	Cat. No.	Used for	Approximate Dimensions [mm (in.)]
Heavy duty mounting bracket designed for use in high vibration applications provides both horizontal and vertical height adjustment.	60-1748	Series 5000	
Heavy duty impact bracket of #12 steel can be used with the Cat. No. 60-1785 mounting bracket.	60-2083	Series 5000	
Heavy duty impact bracket protects sensor and provides 60° horizontal adjustment.	60-1665	Series 4000	
Mounting bracket (included with sensor)	60-2773	45PVA	
Plastic bracket (2 brackets)	60-2779	45PVA	

Accessories

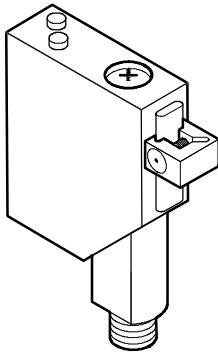
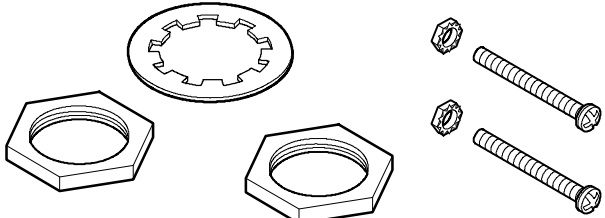
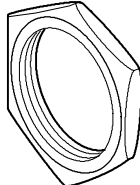
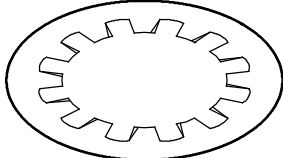
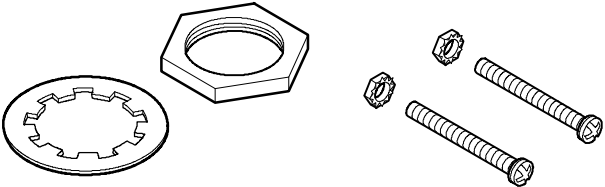
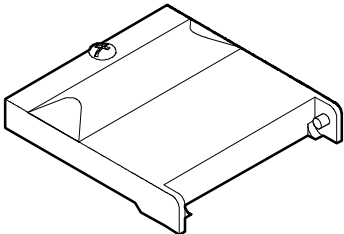
Mounting Brackets

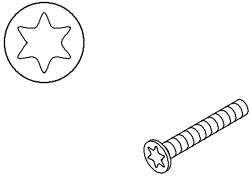
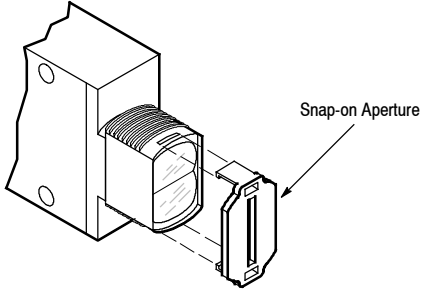
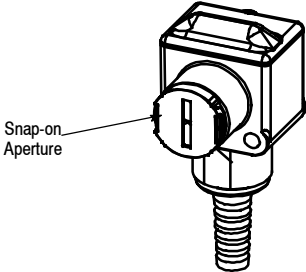
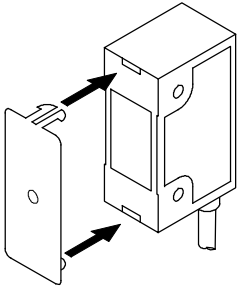
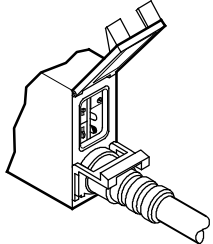
Description	Cat. No.	Used for	Approximate Dimensions [mm (in.)]
Metal brackets (2 brackets)	60-2772	45PVA	
Galvanized steel	60-2775-1	45PVA - 1LEB1-F4	
Galvanized steel	60-2776-1	45PVA - 1LEB2-F4	
Galvanized steel	60-2777-1	45PVA - 1LEB3-F4	
Galvanized steel	60-2778-1	45PVA - 1LEB4-F4	

Description	Cat. No.	Used for	Approximate Dimensions [mm (in.)]
Mounting bracket	60-BJS-L1	42JS VisiSight	
Mounting bracket	60-BJS-L2	42JS VisiSight	
18 mm snap-on adaptor	60-AJS-18	42JS VisiSight	

Accessories

Protective Brackets and Apertures

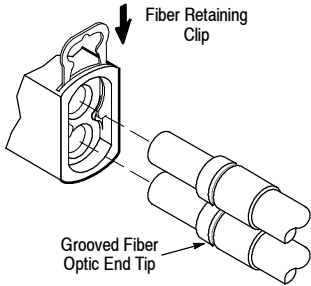
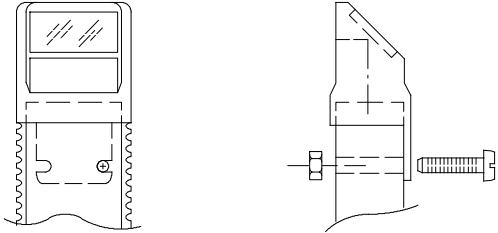
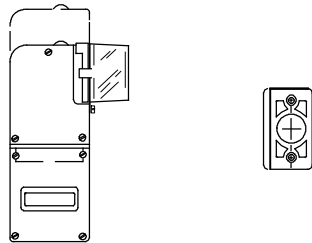
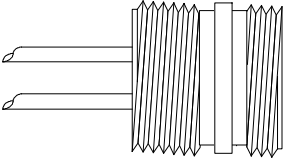
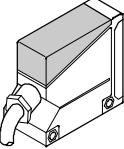
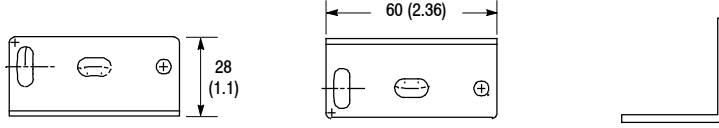
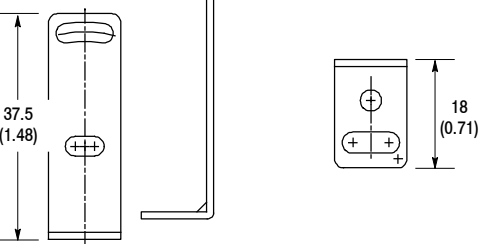
Description	Cat. No.	Used for	Approximate Dimensions [mm (in.)]
Dovetail mounting bracket	44B-BKT	44B 45LSP	
18 mm mounting kit contains lockwasher, nuts, and screws for both body or thru-hole mounting.	60-2716	RightSight	
18 mm mounting nut, plastic (2 each).	871T-N3	RightSight MiniSight 42CA, 42CB	
18 mm mounting nut, stainless steel (2 each).	871T-N4	RightSight MiniSight 42CA, 42CB	
18 mm lockwasher, metal	871A-LWN18	RightSight MiniSight 42CA, 42CB	
30 mm mounting kit contains lockwasher, nuts, and screws for both body or thru-hole mounting.	129-130	Series 9000 ColorSight LaserSight ClearSight 9000	
Replacement user interface cover.	60-2620	Series 9000 ColorSight LaserSight ClearSight 9000	

Description	Cat. No.	Used for	Approximate Dimensions [mm (in.)]
Torx screw set to prevent tampering of sensor settings (set contains 25 pieces). Requires Torx screwdriver 57-144 .	129-135	Series 9000 ColorSight LaserSight ClearSight 9000	
Torx screwdriver	57-144	Series 9000 ColorSight LaserSight ClearSight 9000	
Apertures are used on transmitted beam sensing models to decrease the field of view. This is helpful in applications where small targets must be detected with precision. Note that the sensing range will be reduced by as much as 90% when using apertures. Apertures should be fitted to both the source and receiver models for proper operation. Each kit comes with 20 apertures except as noted.	60-2673 (1 mm) 60-2674 (2 mm) 60-2675 (4 mm) 60-2676 (1, 2, 4 mm)❶	MiniSight	
	60-2660 (1 mm) 60-2661 (2 mm) 60-2662 (4 mm) 60-2659 (1, 2, 4 mm)❶	RightSight	
	61-6726 (1 mm) 61-6727 (2 mm) 61-6728 (3 mm) 61-6729 (1x5 mm)❷	42KB	
Replacement cover and locking clip.	60-2679	MiniSight	

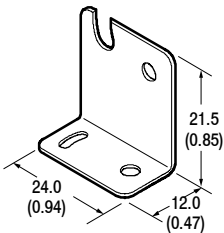
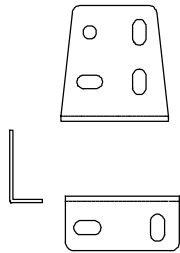
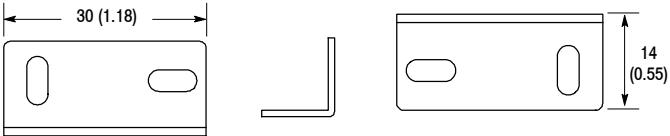
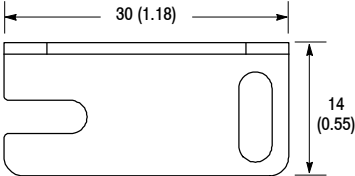
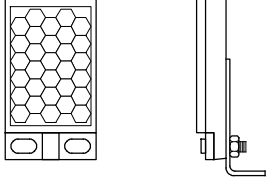
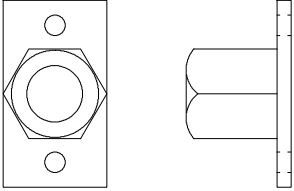
- ❶ 4 each per kit
- ❷ 10 pieces per kit

Accessories

Protective Brackets and Apertures

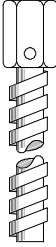
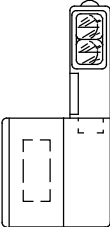
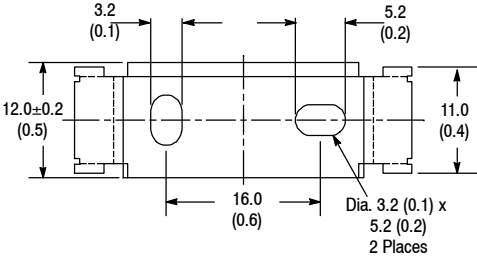
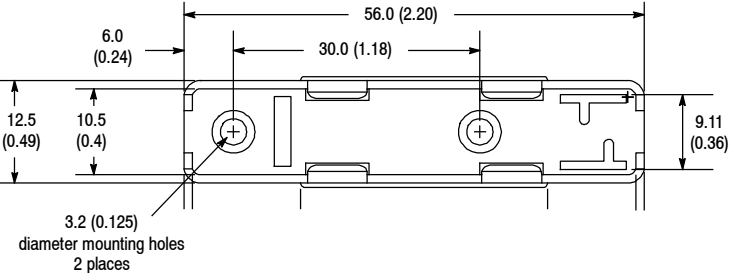
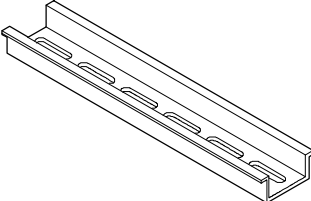
Description	Cat. No.	Used for	Approximate Dimensions [mm (in.)]
Replacement fiber optic retaining clip (set of 5 pieces).	60-2680	MiniSight	 <p>Fiber Retaining Clip</p> <p>Grooved Fiber Optic End Tip</p>
Snap on mirror permits side viewing of targets. Only for retroreflective and transmitted beam sensing models and will reduce sensing range by 30%.	60-2052	Series 6000	
Snap on mirror permits side viewing of targets. Only for retroreflective, diffuse, and transmitted beam sensing models and will reduce sensing range by 30%.	60-1840	Series 5000	
4-pin mini QD receptacle simplifies installation.	60-2668	42BC	
Replacement cover for user interface panel.	60-2669	42BC	
Replacement right angle mounting bracket.	60-2637	42BC	
Replacement mounting bracket side view.	60-2633	42KB	

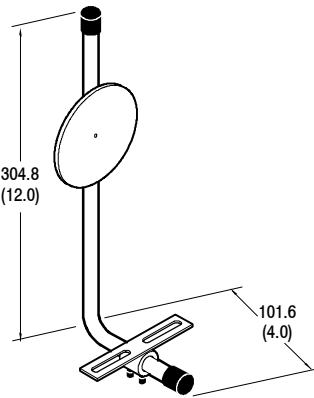
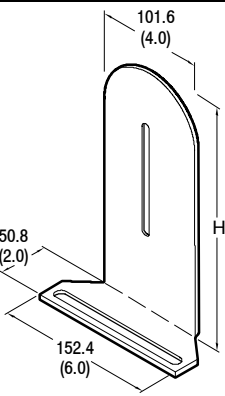
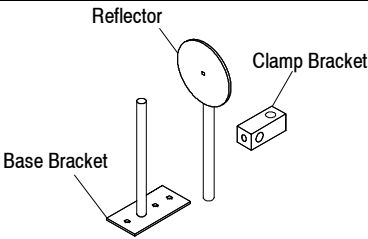
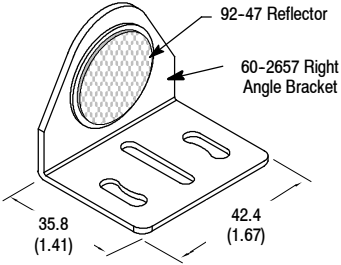
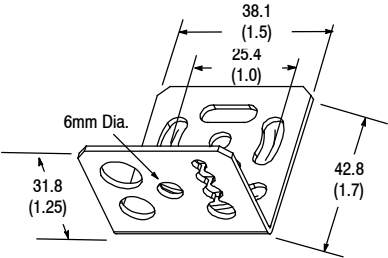
Protective Brackets and Apertures

Description	Cat. No.	Used for	Approximate Dimensions [mm (in.)]
Replacement mounting bracket end view.	60-2632	42KB	
Replacement mounting bracket.	60-2635	42KC	
Replacement mounting bracket end view.	60-2634	42KC	
Replacement right angle mounting bracket.	60-2636	42BA	
Replacement reflector.	92-93	42KB 42KC	
Conduit mounting adaptor permits connection of sensor to 1/2 in. NPT conduit. Gasketed to maintain NEMA 4 rating.	60-2213	Series 5000	

Accessories

Protective Brackets and Apertures

Description	Cat. No.	Used for	Approximate Dimensions [mm (in.)]
<p>Adaptor contains 3 m (10 ft) or armoured cable to protect PVC cable found on Series 5000 cable style bases.</p>	<p>60-1577</p>	<p>Series 5000</p>	
<p>Counter/Totalizer module provides reliable high-speed counting capability and six digit, 5 mm high, LCD display. Battery powered for minimum 5 year life.</p>	<p>60-2072</p>	<p>Series 5000 Green Line</p>	
<p>Replacement adaptor permits mounting of sensor to 35 mm DIN rail.</p>	<p>60-2638</p>	<p>42FT 45FVL 45FSL</p>	
<p>Replacement adaptor permits mounting of sensor to 35 mm DIN rail.</p>	<p>60-2639</p>	<p>42FA</p>	
<p>35 mm DIN rail (1 m) for mounting sensor and other control equipment.</p>	<p>64-134</p>	<p>42FT 45FVL 45FSL</p>	

Description	Cat. No.	Used for	Approximate Dimensions [mm (in.)]
Right angle reflector bracket set for mounting up to 3 in. diameter reflectors.	60-2717	92-39 92-89 92-46 92-47 92-105 92-106	
Reflector vertical height adjustment bracket for mounting up to 3 in. diameter reflectors.	60-2718 (2 x 8 in.) 60-2719 (2 x 10 in.) 60-2720 (2 x 12 in.)	92-39 92-89 92-46 92-47 92-105 92-106	
Reflector bracket provides both vertical and horizontal height adjustment. Bracket comes with 3 in. reflector Cat. No. 92-39.	60-2685	92-39 92-89 92-46 92-47 92-105 92-106	
Mounting bracket with Cat. No. 92-47 reflector mounted at right angle	60-2692	92-47	
Right angle mounting bracket for both reflectors and fiber optic cables	60-2696	92-105 92-106 92-47 92-46	

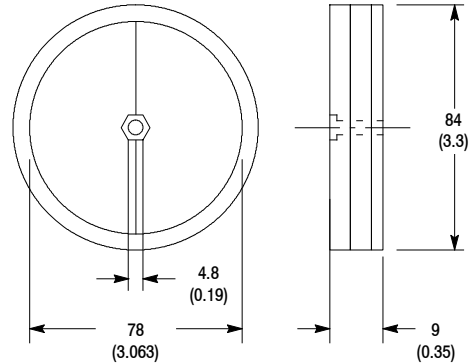
Accessories

Reflectors, Reflective Tape

Specifications

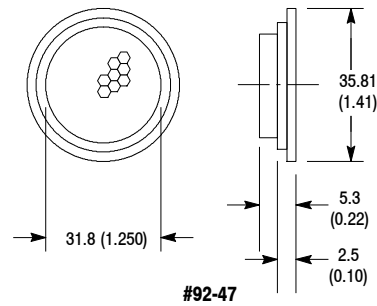
Approximate Dimensions [mm (in.)]

Cat. No.	92-39	92-124
Description	Reflector, 76 mm (3 in.) dia. with center mount hole. (Plastic back) (ABS)	
Suitable for Polarized Sensor	Yes	
Cube Style	Corner cube	
Optimum Range	150 mm (6 in.)...2 m (80 in.)	
Recommended Application	Suitable for general purpose applications up to 65°C (150°F).	

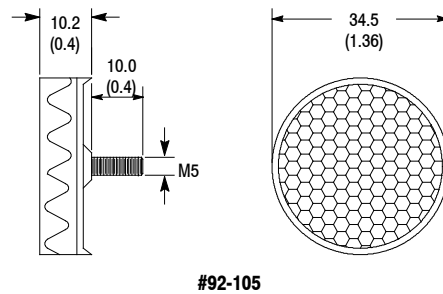


Cat. No.	92-89
Description	Reflector, 76 mm (3 in.) dia. with center mount hole. (Aluminum back)
Suitable for Polarized Sensor	Yes
Cube Style	Corner cube
Optimum Range	150 mm (6 in.)...2 m (80 in.)
Recommended Application	Suitable for general purpose applications up to 65°C (150°F).

Cat. No.	92-47
Description	Reflector, 32 mm (1.25 in.) dia. Requires adhesive backing.
Suitable for Polarized Sensor	Yes
Cube Style	Corner cube
Optimum Range	150 mm (6 in.)...1.5 m (5 ft)
Recommended Application	Suitable for general purpose applications up to 65°C (150°F).



Cat. No.	92-105
Description	Reflector, 32 mm (1.25 in.) dia. with M5 screw
Suitable for Polarized Sensor	Yes
Cube Style	Corner cube
Optimum Range	150 mm (6 in.)...1.5 m (5 ft)
Recommended Application	Suitable for general purpose applications up to 65°C (150°F).

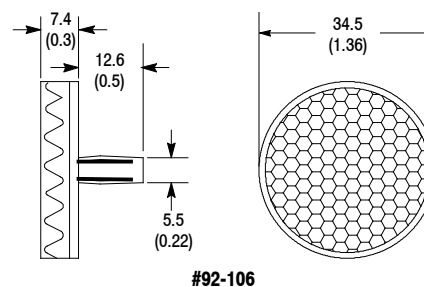


① Optimum range varies with sensor optics. See table on page 1-315 for reflectivity performance.

Specifications

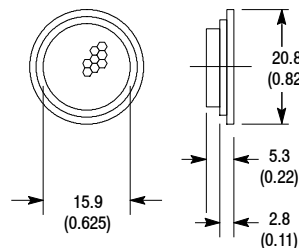
Approximate Dimensions [mm (in.)]

Cat. No.	92-106
Description	Reflector, 32 mm (1.25 in.) dia. with snap fit post
Suitable for Polarized Sensor	Yes
Cube Style	Corner cube
Optimum Range ①	150 mm (6 in.)...1.5 m (5 ft)
Recommended Application	Suitable for general purpose applications up to 65°C (150°F).



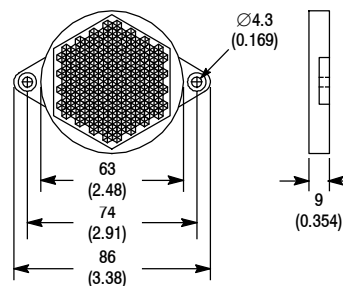
#92-106

Cat. No.	92-46
Description	Reflector, 16 mm (0.625 in.) dia. Requires adhesive backing.
Suitable for Polarized Sensor	Yes
Cube Style	Corner cube
Optimum Range ①	51 mm (2 in.)...150 mm (6 in.)
Recommended Application	Suitable for general purpose applications up to 65°C (150°F).



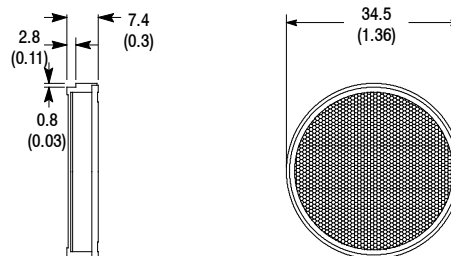
#92-46

Cat. No.	92-90
Description	Reflector, 86 mm (3 in.) dia. with mounting tabs.
Suitable for Polarized Sensor	Yes
Cube Style	Corner cube
Optimum Range ①	51 mm (2 in.)...1.5 m (5 ft)
Recommended Application	Suitable for ClearSight photoelectric sensors and general purpose applications up to 65°C (150°F).



#92-90

Cat. No.	92-114
Description	Reflector, 34 mm (1.35 in.) dia. Requires adhesive backing.
Suitable for Polarized Sensor	Yes
Cube Style	Micro cube
Optimum Range ①	
Recommended Application	Ideal for laser-based photoelectric sensors such as LaserSight as well as general purpose applications up to 65°C (150°F).



#92-114


① Optimum range varies with sensor optics. See table on page 1-315 for reflectivity performance.
 ② Cat. Nos. 92-47 and 92-46 can be mounted with adhesive tape (not included).

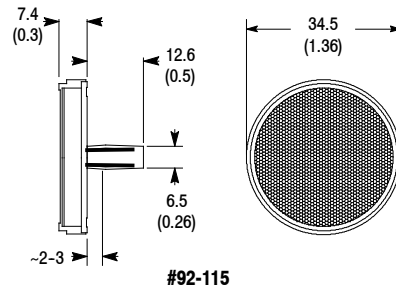
Accessories


Reflectors, Reflective Tape

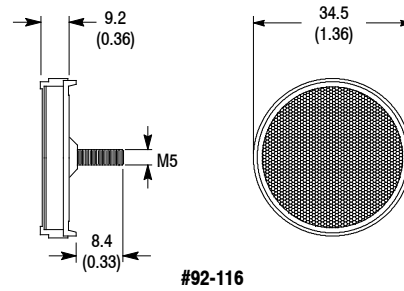
Specifications


Approximate Dimensions [mm (in.)]

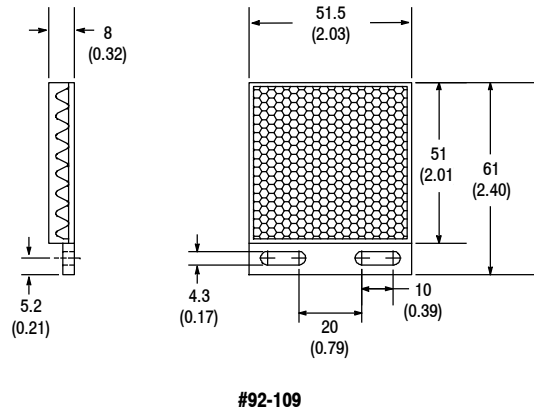
Cat. No.	92-115
Description	Reflector, 34 mm (1.35 in.) dia. with snap fit post.
Suitable for Polarized Sensor	Yes
Cube Style	Micro cube
Optimum Range 	
Recommended Application	Ideal for laser-based photoelectric sensors such as LaserSight as well as general purpose applications up to 65°C (150°F).




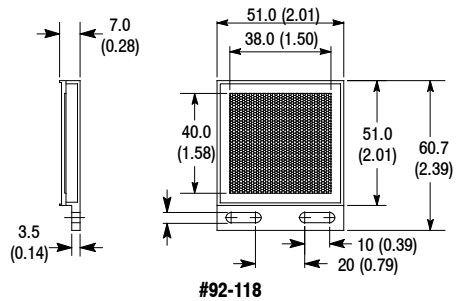
Cat. No.	92-116
Description	Reflector, 34 mm (1.35 in.) dia. with threaded post.
Suitable for Polarized Sensor	Yes
Cube Style	Micro cube
Optimum Range 	
Recommended Application	Ideal for laser-based photoelectric sensors such as LaserSight as well as general purpose applications up to 65°C (150°F).




Cat. No.	92-109
Description	Reflector, 51 x 61 mm (2 x 2.5 in.) rectangular with mounting tabs.
Suitable for Polarized Sensor	Yes
Cube Style	Corner cube
Optimum Range 	51 mm (2 in.)...3.0 m (10 ft)
Recommended Application	Suitable for general purpose applications up to 65°C (150°F).



Cat. No.	92-118
Description	Reflector, 51 x 61 mm (2 x 2.5 in.) rectangular with mounting tabs.
Suitable for Polarized Sensor	Yes
Cube Style	Micro cube
Optimum Range 	
Recommended Application	Suitable for general purpose applications up to 65°C (150°F). The Cat. No. 92-118 is also suitable for laser-based photoelectric sensors such as LaserSight.

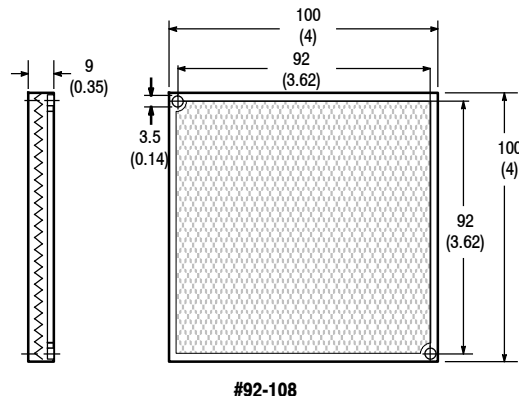


 Optimum range varies with sensor optics. See table on page 1-315 for reflectivity performance.

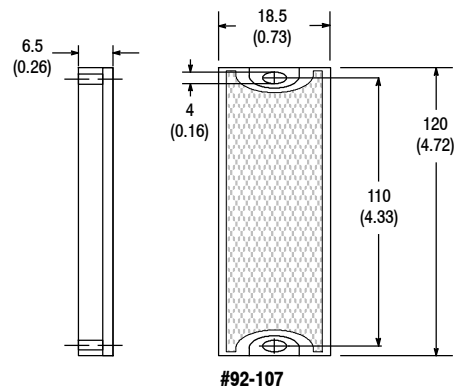
Specifications

Approximate Dimensions [mm (in.)]

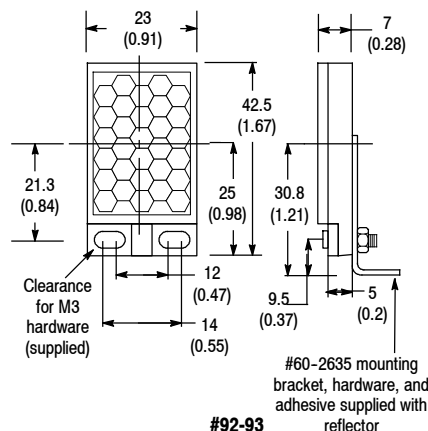
Cat. No.	92-108
Description	Reflector, 100 x 100 mm (4 x 4 in.) square with mounting tabs.
Suitable for Polarized Sensor	Yes
Cube Style	Corner cube
Optimum Range ^①	150 mm (6 in.)...3.0 m (10 ft)
Recommended Application	Suitable for general purpose applications up to 65°C (150°F).



Cat. No.	92-107
Description	Reflector, 18.5 x 120 mm (0.73 x 4.72 in.) rectangular with mounting tabs.
Suitable for Polarized Sensor	Yes
Cube Style	Corner cube
Optimum Range ^①	51 mm (2 in.)...1.5 m (5 ft)
Recommended Application	Suitable for general purpose applications up to 65°C (150°F).



Cat. No.	92-93
Description	Reflector, 23 x 42.5 mm (0.91 x 1.67 in.) rectangular with mounting tabs and bracket. Right angle bracket and adhesive tape.
Suitable for Polarized Sensor	Yes
Cube Style	Corner cube
Optimum Range ^①	51 mm (2 in.)...150 mm (6 in.)
Recommended Application	Suitable for general purpose applications up to 55°C (130°F).



① Optimum range varies with sensor optics. See table on page 1-315 for reflectivity performance.

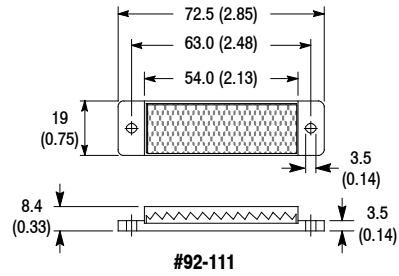
Accessories

Reflectors, Reflective Tape

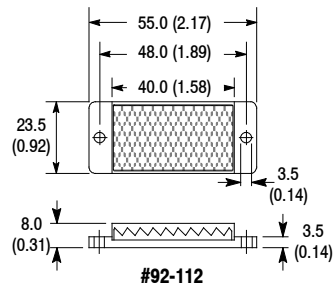
Specifications

Approximate Dimensions [mm (in.)]

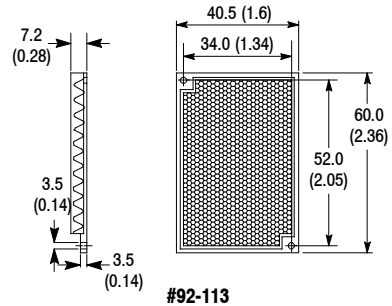
Cat. No.	92-111
Description	Reflector, 19 x 72.5 mm (0.75 x 2.85 in.) rectangular with mounting tabs.
Suitable for Polarized Sensor	Yes
Cube Style	Corner cube
Optimum Range	
Recommended Application	Suitable for general purpose applications up to 55°C (130°F).



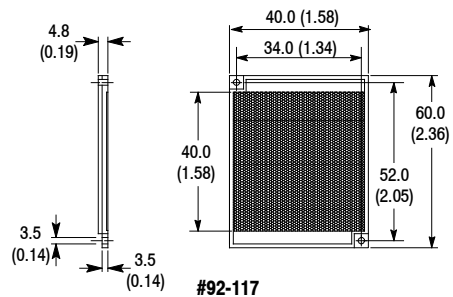
Cat. No.	92-112
Description	Reflector, 23.5 x 55 mm (0.924 x 2.17 in.) rectangular with mounting tabs.
Suitable for Polarized Sensor	Yes
Cube Style	Corner cube
Optimum Range	
Recommended Application	Suitable for general purpose applications up to 55°C (130°F).



Cat. No.	92-113
Description	Reflector, 40.5 x 60 mm (1.6 x 2.36 in.) rectangular with mounting tabs.
Suitable for Polarized Sensor	Yes
Cube Style	Corner cube
Optimum Range	
Recommended Application	Suitable for general purpose applications up to 55°C (130°F).




Cat. No.	92-117
Description	Reflector, 40.5 x 60 mm (1.6 x 2.36 in.) rectangular with mounting tabs.
Suitable for Polarized Sensor	Yes
Cube Style	Micro cube
Optimum Range	
Recommended Application	Suitable for general purpose applications up to 55°C (130°F). The 92-117 is also suited for laser-based photoelectric sensors such as LaserSight.

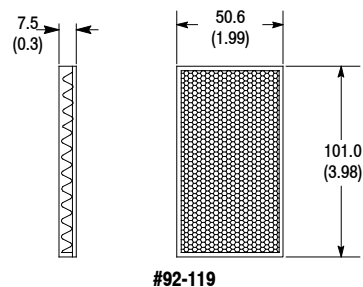



① Optimum range varies with sensor optics. See table on page 1-315 for reflectivity performance.

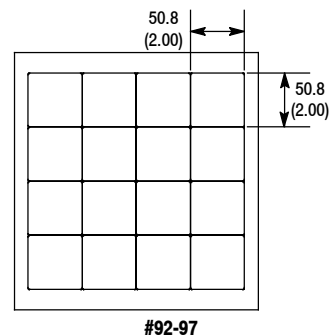
Specifications


Approximate Dimensions [mm (in.)]

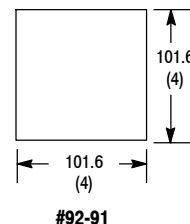
Cat. No.	92-119
Description	Reflector, 51 x 101 mm (2 x 4 in.) rectangular with adhesive backing.
Suitable for Polarized Sensor	Yes
Cube Style	Corner cube
Optimum Range 	
Recommended Application	Suitable for general purpose applications up to 65°C (150°F).




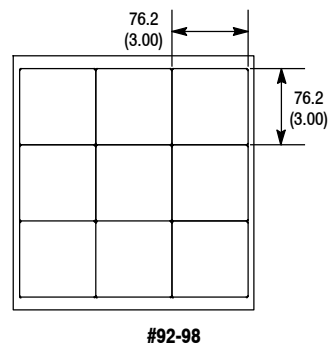
Cat. No.	92-97
Description	Reflective tape, 51 mm (2 in.) square, sheet of 16 pieces with adhesive backing.
Suitable for Polarized Sensor	Yes
Cube Style	Glass bead
Optimum Range 	150 mm (6 in.)...1.5 m (5 ft)
Recommended Application	Suitable for general purpose applications up to 121°C (250°F). Also suitable for polarized retroreflective sensors.




Cat. No.	92-91
Description	Reflective metal, 100 x 100 mm (4 x 4 in.) square.
Suitable for Polarized Sensor	No
Cube Style	Glass bead
Optimum Range 	150 mm (6 in.)...1.5 m (5 ft)
Recommended Application	The Cat. No. 92-91 is intended for use in high temperature applications up to 480°C (900°F) but not with polarized retroreflective sensors.



Cat. No.	92-98
Description	Reflective tape, 76 mm (2.75 in.) square, sheet of 9 pieces with adhesive backing.
Suitable for Polarized Sensor	Yes
Cube Style	Glass bead
Optimum Range 	150 mm (6 in.)...1.5 m (5 ft)




 Optimum range varies with sensor optics. See table on page 1-315 for reflectivity performance.

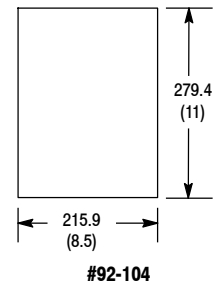
Accessories


Reflectors, Reflective Tape

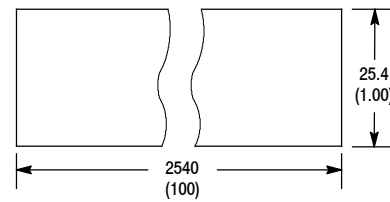
Specifications


Approximate Dimensions [mm (in.)]


Cat. No.	92-104
Description	Reflective tape, 215.9 x 279.4 mm (8.5 x 11 in.) sheet with adhesive backing.
Suitable for Polarized Sensor	Yes
Cube Style	Glass bead
Optimum Range 	200 mm (8 in.)...1.5 m (5 ft)
Recommended Application	Suitable for general purpose applications up to 60°C (140°F) with polarized retroreflective sensors.



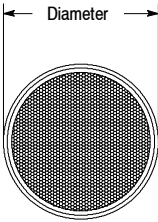
Cat. No.	92-99
Description	Reflective tape, roll of 25 x 2540 mm (1 x 100 in.).
Suitable for Polarized Sensor	Yes
Cube Style	Glass bead
Optimum Range 	150 mm (6 in.)...1.0 m (40 in.)
Recommended Application	Suitable for general purpose applications up to 65°C (150°F).



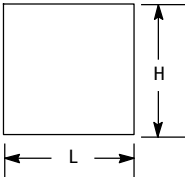
Cat. No.	92-100
Description	Reflective tape, 25 x 2540 mm (1 x 100 in.).
Suitable for Polarized Sensor	No
Cube Style	Glass bead
Optimum Range 	150 mm (6 in.)...1.0 m (40 in.)
Recommended Application	Suitable for general purpose applications up to 79°C (175°F).

 Optimum range varies with sensor optics. See table on page 1-315 for reflectivity performance.

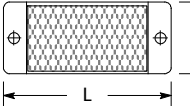
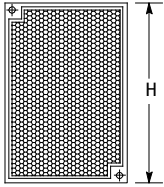
Round Reflectors

Diameter [mm (in.)]	Cube Style	Mounting	Temperature	Approximate Dimensions [mm (in.)]	Cat. No.	
76.2 (3)	Corner Cube	Thru-Hole	≤ 65°C (150°F)		92-39	
76.2 (3)					92-89	
31.75 (1.25)		Adhesive			92-47	
31.75 (1.25)					M5 Screw	92-105
31.75 (1.25)					Snap-Fit	92-106
31.75 (1.25)	Micro Cube	Adhesive			92-114	
31.75 (1.25)		Snap-Fit			92-115	
31.75 (1.25)		M5 Screw			92-116	
19.05 (0.75)	Corner Cube	Adhesive			92-46	
57.15 (2.25)		Thru-Hole x 2			92-90	

Reflective Tape

Length x Height [mm (in.)]	Cube Style	Mounting	Temperature	Approximate Dimensions [mm (in.)]	Cat. No.
50 x 50 (2 x 2) (16 per sheet)	Glass Bead	Adhesive	<121°C (250°F)		92-97
76 x 76 (3 x 3) (9 per sheet)					92-98
100 x 100 (3.94 x 3.94)			<60°C (140°F)		92-104
2510 x 25 (98.8 x 0.98) (1 roll)			<480°C (900°F)		92-91
			≤ 65°C (150°F)		92-99
<79°C (175°F)	92-100				

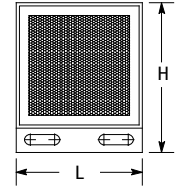
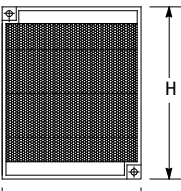
Rectangular Reflectors

Length x Height [mm (in.)]	Cube Style	Mounting	Temperature	Approximate Dimensions [mm (in.)]	Cat. No.
40.5 x 60 (1.59 x 2.36)	Corner Cube	Thru-Hole x 2	<55°C (130°F)		92-113
50.6 x 101 (1.99 x 3.98)		Adhesive	<65°C (150°F)		92-119
18.5 x 120 (0.73 x 4.72)		Thru-Hole x 2		<55°C (130°F)	92-112, 92-111, 92-107
55 x 23.5 (2.17 x 0.93)					92-112
72.5 x 19 (2.85 x 0.75)					92-111
42 x 22 (1.65 x 0.87)					92-93
				92-113, 92-117, 92-119	

Accessories

Reflectors, Reflective Tape

Square Reflectors

Length x Height [mm (in.)]	Cube Style	Mounting	Temperature	Approximate Dimensions [mm (in.)]	Cat. No.
100 x 100 (3.94 x 3.94)	Corner Cube	Thru-Hole x 2	≤ 65°C (150°F)	 <p>92-108, 92-117</p>	92-108
51.5 x 61 (2.08 x 2.40)					92-109
40 x 60 (1.57 x 2.36)					92-117
51 x 60.7 (2.01 x 2.39)	Micro Cube			 <p>92-109, 92-118</p>	92-118

For more detailed dimensions, please refer to www.ab.com/e-tools.

Relative Reflectivity

Reflectivity varies with distance and with sensor optics. The table below is designed to be used as a comparison between reflectors. The numbers represent a reflectivity at a given range

by a class of sensors relative to the standard 92-39 3 in. round reflector.

The two classes of sensors shown represent optic styles. The standard size optic includes the Series 9000,

10,000, 5000, and 4000.

The miniature optics are used in the smaller sensor families: RightSight™, MiniSight™, 5000, 6000, and 7000 Series.





Reflector		Standard Polarized Sensors			Miniature Polarized Sensors			Laser-Based Sensors	
		Series 10,000, 9000, 5000, and 4000			RightSight, MiniSight, Series 6000, 7000, and 42xx			LaserSight	
Cat. No.	Description	3.0 m (10 ft)	1.5 m (5 ft)	0.61 m (2 ft)	450 mm (18 in.)	200 mm (8 in.)	100 mm (4 in.)	15.2 m (50 ft)	3.05 m (10 ft)
92-39, 92-89	Reflector, 3 in. round	100	100	100	100	100	100	100	100
92-46	Reflector, 3/4 in. round	—	—	50	50	40	25	—	100
92-47	Reflector, 1 1/4 in. round	—	40	100	100	80	30	—	90
92-90	Reflector, 2 in. hexagon	70	150	150	350	150	200	130	100
92-91	Reflective tape, high temperature	—	—	—	—	—	—	—	—
92-93	Reflector, 3/4 x 1.5 in. rectangular	—	—	50	50	50	25	—	100
92-97	Reflector, 2 in. ²	—	90	150	200	80	50	—	80
92-98	Reflector, 2 3/4 in. ²	—	100	150	200	80	50	—	70
92-99	Reflective tape, polarized	—	40	70	100	50	30	—	—
92-100	Reflective tape, nonpolarized	—	—	—	—	—	—	—	—
92-104	Reflective tape, 8.5 x 11 in.	25	50	50	70	30	40	—	70
92-105	Reflector, 1 1/4 in. round	—	40	75	100	120	200	70	90
92-106	Reflector, 1 1/4 in. round	—	40	75	100	120	200	70	90
92-107	Reflector, 3/4 x 4 3/4 in. rectangular	—	50	100	100	60	60	—	110
92-108	Reflector, 4 in. ² square	250	150	100	120	90	150	—	100
92-109	Reflector, 2 in. ² square	100	150	100	100	90	150	150	110
92-111	Reflector, 2 x 1, rectangular	20	50	90	100	60	100	—	—
92-112	Reflector, 2.8 x 3/4 in. rectangular	20	60	100	100	60	110	—	100
92-113	Reflector, 1.6 x 2 1/4 in. rectangular	90	115	50	90	50	170	210	110
92-114	Reflector, 1 1/4 in. round	20	70	70	90	20	—	110	110
92-115	Reflector, 1 1/4 in. round	20	70	70	90	20	—	110	110
92-116	Reflector, 1 1/4 in. round	20	70	70	90	20	—	110	110
92-117	Reflector, 1 1/2 x 2 1/4 in. rectangular	30	130	140	200	60	50	30	100
92-118	Reflector, 2 x 2 rectangular	80	70	50	50	30	—	260	90






For more information on the theory of retroreflective sensing, see page 1-22. Some variation may be seen across the reflector. Data was measured with reflector rotating to normalize reflectance.

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	Introduction	page 2-9
	Applications	page 2-16
Tubular	871TM All Stainless Steel	page 2-21
	872C WorldProx™ General Purpose	page 2-47
	871T Stainless Steel Barrel	page 2-85
	871TS Food and Beverage	page 2-93
	871Z Weld Field Immune	page 2-97
	871ZT Weld Field Immune	page 2-103
	871ZC Weld Field Immune	page 2-107
	871C Special Purpose	page 2-113
Rectangular	871P VersaCube™	page 2-129
	871F Flat Pack	page 2-137
	871F Block	page 2-150
	871L & 872L Limit Switch Style	page 2-153
	802PR Limit Switch Style	page 2-159
	871FM Miniature Flat Pack	page 2-173
	871P Can Sensors	page 2-181
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	871D Cylinder Position	page 2-195
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Accessories	Adaptors, Brackets, Covers, Caps, etc.	page 2-207
	Barriers & Isolators	page 12-1
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	Comprehensive Product Index	page 14-1

Inductive Proximity Sensors





Quick Selection Guide





Specifications	 <p>871TM All Stainless Steel</p>	 <p>872C WorldProx General Purpose</p>	 <p>871T Stainless Steel Barrel</p>	 <p>871TS Food and Beverage</p>
Description	Tubular Style • Stainless steel face/ threaded stainless steel barrel	Tubular Style • Plastic face/threaded nickel-plated brass barrel • Plastic face/threaded plastic barrel	Tubular Style • All metal sensing: plastic face/threaded stainless steel barrel • Ferrous selective: stainless steel face/ threaded stainless steel barrel	Tubular Style • PPS plastic face/stainless steel 316L barrel • High pressure washdown rated (IP67, IP68 and IP69K)
Features	<ul style="list-style-type: none"> • Stainless steel face and barrel • Full mechanical seals (all-metal sensing models) • ToughLink™ or PVC cable styles • Mini, micro or EAC micro QD styles • Short-circuit protection • Overload protection • Transient noise protection • False pulse protection • Reverse polarity protection (DC models) • Radio frequency interference protection 	<ul style="list-style-type: none"> • Threaded, nickel-plated brass barrel or plastic barrel • 360° visible LED • Cable or quick-disconnect styles • Short-circuit protection • Overload protection • Transient noise protection • False pulse protection • Reverse polarity protection 	<ul style="list-style-type: none"> • Threaded stainless steel barrel • Cable or QD styles • Short-circuit protection (DC models) • Overload protection (DC models) • Transient noise protection • False pulse protection • Reverse polarity protection (DC models) 	<ul style="list-style-type: none"> • Threaded stainless steel 316L barrel • PPS (FDA Certified) plastic face • Standard and extended sensing range • Short circuit protection • Overload protection • False pulse protection • Reverse polarity protection
Diameter	• 12, 18, 30 mm	• 6.5, 8, 12, 18, 30 mm	• 12, 18 mm	• 12, 18 mm
Available Models	<ul style="list-style-type: none"> • DC 3-Wire 2-22 • DC 3-Wire Extended Sensing 2-25 • DC 3-Wire Ferrous Selective 2-28 • DC 3-Wire Nonferrous Selective 2-28 • DC 3-Wire Submersible 2-31 • DC 2-Wire 2-33 • DC 2-Wire Intrinsically Safe 2-36 • AC/DC 2-Wire 2-41 • AC/DC 2-Wire PLC Interfacer 2-44 • DeviceNet™ Sensors 10-12 	<ul style="list-style-type: none"> • DC 3-Wire 2-48 • DC 3-Wire Short Barrel 2-52 • DC 3-Wire Extended Sensing 2-56 • DC 3-Wire Short Barrel with Extended Sensing 2-60 • DC 3-Wire Plastic Barrel 2-64 • DC 2-Wire 2-67 • DC 2-Wire QuadroPlex 2-70 • DC 4-Wire Complementary Output 2-72 • AC 2-Wire 2-74 • AC 2-Wire Extended Sensing 2-77 • AC/DC 2-Wire 2-80 • AC/DC 2-Wire Relay Output 2-83 	<ul style="list-style-type: none"> • DC 3-Wire 2-86 • AC 2-Wire 2-88 • AC 2-Wire or 4-Wire Ferrous Selective 2-90 	<ul style="list-style-type: none"> • DC 3-Wire 2-93
Connections	<ul style="list-style-type: none"> • PVC Cable • ToughLink™ cable • Mini QD • Micro QD 	<ul style="list-style-type: none"> • Cable (PVC) • Mini Quick-Disconnect • Micro Quick-Disconnect • Pico Quick-Disconnect 	<ul style="list-style-type: none"> • Cable (PVC) • Mini QD 	<ul style="list-style-type: none"> • Micro QD
Enclosure	<ul style="list-style-type: none"> • Stainless steel face and barrel • NEMA 1, 2, 3, 3R, 4, 4X, 6, 6P, 12, 13; IP67 (IEC529) • 1200 psi (8270 kPa) washdown • IP69K (some models) 	<ul style="list-style-type: none"> • NEMA 1, 2, 3, 4, 6P, 12, 13 IP67 (IEC529) • Nickel-plated brass barrel or plastic barrel, plastic face (PBT) 	<ul style="list-style-type: none"> • NEMA 1, 2, 3, 4, 12, 13 IP67 (IEC529) • 303 Stainless steel barrel 	<ul style="list-style-type: none"> • NEMA 1, 2, 3, 3R, 4, 4X, 12, 13 and IP67, IP68 and IP69K
Additional Info	• See page 2-21	• See page 2-47	• See page 2-85	• See page 2-93

 <p style="text-align: center;">871Z Weld Field Immune</p>	 <p style="text-align: center;">871ZT Weld Field Immune Equal Sensing</p>	 <p style="text-align: center;">871ZC Weld Field Immune Copper Housing</p>	 <p style="text-align: center;">871C Special Purpose</p>	 <p style="text-align: center;">871P VersaCube</p>
<p>Tubular Style</p> <ul style="list-style-type: none"> • PTFE face/threaded PTFE-coated brass barrel • Thermoset plastic face/ threaded PTFE-coated brass barrel 	<p>Tubular Style</p> <ul style="list-style-type: none"> • PTFE face/threaded ptf-coated brass barrel 	<p>Tubular Style</p> <ul style="list-style-type: none"> • Thermoset plastic face/threaded copper barrel 	<p>Tubular Style</p> <ul style="list-style-type: none"> • Plastic face/threaded nickel-plated brass barrel • Plastic face/smooth nickel-plated brass barrel • Plastic face/threaded plastic barrel 	<p>Rectangular Style</p> <ul style="list-style-type: none"> • Plastic housing
<ul style="list-style-type: none"> • Cable or QD styles • PTFE-coated brass barrel • Weld field immunity • Short-circuit, false pulse, overload, and transient noise protection 	<ul style="list-style-type: none"> • Weld field immunity • Equal sensing • PTFE-coated brass barrel • Micro QD • Short-circuit, false pulse, overload, and transient noise protection 	<ul style="list-style-type: none"> • Micro and mini QD styles • Copper barrel • Weld field immunity • Short-circuit, false pulse, overload, and transient noise protection 	<ul style="list-style-type: none"> • Cable or QD styles • Short-circuit protection • Overload protection • Transient noise protection • False pulse protection • Reverse polarity protection 	<ul style="list-style-type: none"> • 5-position sensing head • Rugged burn and weld-slag resistant housing on weld-field immune models • Mini and micro QD styles • Weld field immunity (some models) • Equal sensing (some models) • Short-circuit protection • False pulse protection • Overload protection • Transient noise protection • Reverse polarity protection (DC models)
<p>• 12, 18, 30 mm</p>	<p>• 12, 18, 30 mm</p>	<p>• 12, 18, 30 mm</p>	<p>• 3, 4, 5, 12, 18, 30 mm</p>	<p>• 40 x 40 x 69 mm</p>
<ul style="list-style-type: none"> • Weld Field Immune DC 3-Wire 2-98 • Weld Field Immune AC 2-Wire 2-100 	<ul style="list-style-type: none"> • DC 3-Wire Weld Field Immune 2-104 	<ul style="list-style-type: none"> • Weld Field Immune DC 3-Wire 2-108 • Weld Field Immune AC/DC 2-Wire 2-110 	<ul style="list-style-type: none"> • DC 3-Wire Small Diameter 2-114 • DC 3-Wire Extended Temperature Range 2-117 • AC 2-Wire Full-Featured 2-119 • AC 2-Wire Plastic Barrel 2-122 • NAMUR Intrinsically Safe 2-124 • Analog Output 2-127 	<ul style="list-style-type: none"> • DC 3-Wire 2-130 • DC 4-Wire 2-133 • AC/DC 2-Wire 2-134
<ul style="list-style-type: none"> • Cable (ToughLink™) • Mini QD • Micro QD 	<ul style="list-style-type: none"> • Micro QD 	<ul style="list-style-type: none"> • Mini QD • Micro QD 	<ul style="list-style-type: none"> • Cable (PVC or PUR) • Mini Quick-Disconnect • Micro Quick-Disconnect • Pico Quick-Disconnect 	<ul style="list-style-type: none"> • Mini QD • Micro QD
<ul style="list-style-type: none"> • NEMA 1, 2, 3, 3R, 4, 4X, 6, 6P, 12, 13, IP67 (IEC529) PTFE coated housing 		<ul style="list-style-type: none"> • NEMA 1, 2, 3, 4, 12 and 13, IP67 (IEC529) • Copper barrel, thermoset plastic face 	<p>• Varies by product</p>	<ul style="list-style-type: none"> • NEMA 1, 2, 3, 4, 6, 6P, 12 and 13, IP67 (IEC529), 1200 psi (8270 kPa) washdown • IP69K (some models)
<p>• See page 2-97</p>	<p>• See page 2-104</p>	<p>• See page 2-107</p>	<p>• See page 2-113</p>	<p>• See page 2-129</p>

Inductive Proximity Sensors

Quick Selection Guide

Specifications	 <p>871F Flat Pack & Block</p>	 <p>871L & 872L Limit Switch Style</p>	 <p>802PR Limit Switch Style</p>	 <p>871FM Miniature Flat Pack</p>
Description	Flat Pack Style <ul style="list-style-type: none"> Plastic body Block Style <ul style="list-style-type: none"> Aluminum body 	Limit Switch Style <ul style="list-style-type: none"> Plastic body/17-position head 	Limit Switch Style <ul style="list-style-type: none"> Glass-reinforced polyester housing 	Miniature Flat Pack Style <ul style="list-style-type: none"> Plastic body
Features	<ul style="list-style-type: none"> Cable, conduit, or QD styles Short-circuit protection Overload protection Transient noise protection False pulse protection Reverse polarity protection (DC models) 	<ul style="list-style-type: none"> 17 sensing head positions (1 top, 16 side) Conduit or QD styles Short-circuit protection Overload protection Transient noise protection False pulse protection Reverse polarity protection Selectable normally open or normally closed output 	<ul style="list-style-type: none"> Multiple sensing directions Cable, conduit, or QD styles Short-circuit protection (AC/DC models) Overload protection (AC/DC models) Transient noise protection False pulse protection Hazardous location models are available 	<ul style="list-style-type: none"> Cable or QD styles Short-circuit protection (DC models) Overload protection (DC models) Transient noise protection False pulse protection Reverse polarity protection (DC models)
Diameter	Flat Pack Style <ul style="list-style-type: none"> 80 x 80 x 40 mm Block Style <ul style="list-style-type: none"> 50 x 50 x 40 mm 40 x 50 x 100 mm 	<ul style="list-style-type: none"> 40 x 40 x 120 mm 	<ul style="list-style-type: none"> 42 x 41 x 109 mm 	<ul style="list-style-type: none"> 5 x 5 x 15 mm 8 x 8 x 37 mm 28 x 16 x 11 mm 40 x 26 x 12 mm 25 x 50 x 10 mm 31 x 18 x 10 mm
Available Models	<ul style="list-style-type: none"> Complementary Output DC 4-Wire Flat Pack 2-138 DC Weld Field Immune Flat Pack 2-141 2-Wire AC/DC Flat Pack 2-146 Weld Field Immune 2-Wire AC/DC Flat Pack 2-148 DC 3-Wire Block 2-150 	<ul style="list-style-type: none"> DC 3-Wire 2-154 AC 2-Wire 2-156 AC/DC 2-Wire 2-156 	<ul style="list-style-type: none"> AC/DC 2-Wire 2-160 Hazardous Location AC/DC 2-Wire 2-165 AC 2-Wire (High Output) 2-167 Hazardous Location AC 2-Wire (High Output) 2-171 	<ul style="list-style-type: none"> DC 3-Wire 2-176 AC 2-Wire 2-179
Connections	Flat Pack Style <ul style="list-style-type: none"> Cable Mini QD Micro QD Block Style <ul style="list-style-type: none"> Micro QD Cable 	<ul style="list-style-type: none"> Mini QD Micro QD Conduit/Terminal 	<ul style="list-style-type: none"> Cable (STO or ToughLink™) Mini QD Micro QD Conduit/Terminal 	<ul style="list-style-type: none"> Cable (PVC) Pico QD
Enclosure	<ul style="list-style-type: none"> NEMA 1, 2, 3, 4, 6, 6P, 12 and 13, IP67 (IEC529), 1200 psi (8270 kPa) washdown IP69K (some models) 	<ul style="list-style-type: none"> NEMA 3, 4, 6, 12, 13, IP67 (IEC529) Polyloy 	<ul style="list-style-type: none"> NEMA 1, 2, 3, 4, 4X, 12, 13, IP65 (IEC529) Self extinguishing glass-reinforced polyester body 	<ul style="list-style-type: none"> NEMA 4, IP67 (IEC529) Plastic
Additional Info	<ul style="list-style-type: none"> See page 2-137 	<ul style="list-style-type: none"> See page 2-153 	<ul style="list-style-type: none"> See page 2-159 	<ul style="list-style-type: none"> See page 2-173

Specifications	 871P Can Sensors	 871D WorldClamp	 871D Cylinder Position	 871R & 871S Ring & Slot Sensors
Description	Can Sensor Style • Stainless steel housing/plastic face	On-Clamp Cylinder Position Style • Power clamp and gripper style	In-port Cylinder Position Style • Ceramic face/stainless steel probe assembly	Ring and Slot Style • Plastic and metal housing
Features	<ul style="list-style-type: none"> • Short-circuit protection • Overload protection • Transient noise protection • False pulse protection • Reverse polarity protection (DC models) • Stainless steel housing 	<ul style="list-style-type: none"> • Superior LED visibility • Weld-field immune • Shielded construction • Short-circuit protection • Overload protection • Transient noise protection • False pulse protection • Reverse polarity protection (DC models) 	<ul style="list-style-type: none"> • Stainless steel probe with ceramic face • Low profile housing can be rotated 304° after installation without breaking pressure seal • Shielded construction • Weld-field immune • Short-circuit protection • Overload protection • Transient noise protection • False pulse protection • Reverse polarity protection (DC models) 	<ul style="list-style-type: none"> • Cable or micro QD style • Short-circuit protection • Reverse polarity protection
Diameter	• 76 x 38 x 59 mm • 140 x 44.5 x 59 mm	• 47 x 18 x 18 mm • 55 x 35 x 19 mm • 47 x 18 x 24 mm	• 64 x 48 x 37 mm installed	• 12, 20, 50, and 100 mm • 30 mm
Available Models	<ul style="list-style-type: none"> • Short-Range AC 2-Wire Inductive Can . . . 2-182 • Long-Range AC 2-Wire Inductive Can . . . 2-182 • Short-Range DC 4-Wire Inductive Can . . . 2-184 • Long-Range DC 4-Wire Inductive Can . . . 2-184 • Motion DC 4-Wire Inductive Can . . . 2-186 	<ul style="list-style-type: none"> • DC 4-wire 2-190 • AC/DC 5-wire 2-192 	<ul style="list-style-type: none"> • DC 3-wire 2-196 • AC/DC 2-wire 2-198 	<ul style="list-style-type: none"> • 871R DC 3-Wire Ring Style 2-202 • 871S DC 3-Wire Slot Style 2-205
Connections	• Cable (PVC) • Mini QD	• Micro QD	• Mini QD • Micro QD	• Cable (PVC) • Micro QD
Enclosure	• NEMA 1, 3, 4, 4X, 6, 6P, 12, 13, IP67 (IEC529), 1200 psi (8270 kPa) washdown	• IP67	• NEMA 1, 2, 3, 3R, 4, 6, 12, 13, IP67 (IEC529)	• NEMA 4 IP67 (IEC529)
Additional Info	• See page 2-181	• See page 2-189	• See page 2-195	• See page 2-201

Weld Field Immune Proximity Sensors

871ZT Weld Field Immune Tubular page 2-104
871Z Weld Field Immune Tubular page 2-97
871ZC Weld Field Immune Tubular page 2-107
871D WorldClamp™ page 2-192
871D Cylinder Position Sensor page 2-195
871P Weld Field Immune VersaCube page 2-129
871F Weld Field Immune Puck Style page 2-148

Hazardous Location Proximity Sensors

871TM 2-Wire DC Intrinsically Safe page 2-36
871C NAMUR Intrinsically Safe page 2-124
802PR Hazardous Location page 2-159

Ferrous/Nonferrous Selective Proximity Sensors

871TM Ferrous Selective page 2-28
871T Ferrous Selective page 2-90
871TM Nonferrous Selective page 2-28

Extended Temperature Range Proximity Sensors

871C Extended Temperature page 2-117
Other extended temperature range models available as special order items. Contact your local Rockwell Automation sales office or Allen-Bradley distributor for details.

Active Face: Portion of the sensor from which the electromagnetic field or ultrasonic pulse emanates.

Axial Approach: The approach of the target with its center maintained on the reference axis.

Complementary Outputs: (N.O. & N.C.) A proximity sensor that features both normally open and normally closed outputs, which can be used simultaneously.

Correction Factors: Suggested multiplication factors taking into account variations in the target material composition. When figuring actual sensing distance this factor should be multiplied with the nominal sensing distance.

Current Consumption: The current consumed by the proximity switch when the output device is in the off condition.

Damping Material: Material which causes a decrease in the strength of the electromagnetic or electrical field produced by the sensing coil.

Differential Travel (Hysteresis): The distance between the operating point and the release point. See Hysteresis.

Dual Output: Sensor which has two outputs which may be complementary or may be of a single type (i.e. two normally open or two normally closed).

Effective Operating Distance: (Sr) The operating distance of an individual proximity switch measured at stated temperature, voltage, and mounting condition.

False Pulse: An undesired change in the state of the output of the proximity switch that lasts for more than two milliseconds.

Flush Mounting: A shielded proximity sensor which can be flush mounted in metal up to the plane of the active sensing face.

Free Zone: The area around the proximity switch which must be kept free from any damping material.

Hysteresis: The difference, in percentage (%), of the nominal sensing distance between the operate (switch on) and release point (switch off) when the target is moving away from the sensors active face. Without sufficient hysteresis a proximity sensor will "chatter" (continuously switch on and off) when there is significant vibration applied to the target or sensor.

Isolated Output: An output that is optically separated from the input and other output and independent of the other output to a specified level.

Isolation Voltage: Maximum rated voltage between isolated outputs or input and output.

Lateral Approach: The approach of the target perpendicular to the reference axis.

Leakage Current: Current which flows through the output when the output is in an "off" condition or de-energized. This current is necessary to supply power to the electronics of the sensor.

LED (Light Emitting Diode): Semi-conductor that generates monochromatic light when current flows in the conductive direction. An LED is the standard Light Source for most photoelectric sensors.

Maximum Inrush Current: The maximum current level at which the proximity sensor can be operated for a short period of time.

Maximum Load Current: The maximum current level at which the proximity sensor can be continuously operated.

Minimum Load Current: The minimum amount of current required by the sensor to maintain reliable operation.

Nonferrous Metal: Any metal which does not contain iron.

Normally Closed: Output opens when an object is detected in the active switching area.

Normally Open: Output closes when an object is detected in the active switching area.

NPN: The sensor switches the load to the negative terminal. The load should be connected between the sensor output and positive terminal.

Operating Distance, Assured: Between 0 and 81% of the rated operating distance for inductive proximity switches.

Operating Distance, Rated: The operating distance specified by the manufacturer and used as a reference value. Also known as nominal sensing distance.

PNP: The sensor switches the load to the positive terminal. The load should be connected between the sensor output and negative terminal.

Programmable Output: (N.O. or N.C.) Output which can be changed from N.O. to N.C. or N.C. to N.O. by way of a switch or jumper wire. Also known as selectable output.

Repeatability: The variation of the effective operating distance measured at room temperature and constant supply voltage. It is expressed as a percentage of the sensing distance.

Residual Voltage: The voltage across the sensor output while energized and carrying maximum load current.

Response Time: The sum of the time needed for a string of electronic circuits to translate a change in light into a change of output status.

Reverse Polarity Protection: A circuit that uses a diode to avoid damage to the control in case the polarity of the power supply is accidentally reversed.

Ripple: The variance between peak-to-peak values in DC voltage. It is expressed in percentage of rated voltage.

Sensing Distance: The distance at which an approaching target activates (changes state of) the proximity output.

Sensing Range: The sensing range is the distance within which the sensor will detect a target under fluctuations of temperature and voltage.

Shielded: Sensor which can be flush mounted in metal up to the plane of the active sensing face.

Short Circuit Protection: (SCP) Sensor protected from damage when a shorted condition exists for an indefinite or defined period of time.

Sinking: See NPN.

Sourcing: See PNP.

Switching Frequency: The maximum number of times per second the sensor can change state (ON and OFF) usually expressed in Hertz (Hz). As measured in DIN EN 50010.

Target: Object which activates the sensor.

Three-Wire Proximity Switch: An AC or DC proximity sensor with three leads, two of which supply power and a third that switches the load.

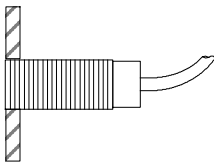
Two-Wire Proximity Switch: A proximity sensor which switches a load connected in series to the power supply. Power for the proximity switch is obtained through the load at all times.

Unshielded: Sensors which have longer sensing distances and a wider magnetic field but are sensitive to surrounding metal.

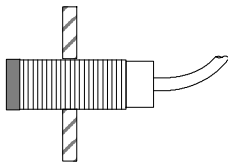
Voltage Drop: The maximum voltage drop across a conducting sensor.

Weld Field Immunity: (WFI) The ability of a sensor not to false trigger in the presence of strong electromagnetic fields.

Shielded



Unshielded



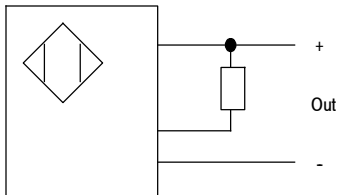
Normally Open



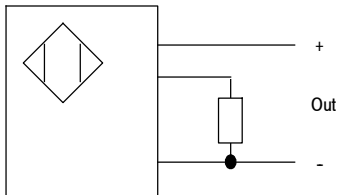
Normally Closed



NPN



PNP



DC ———

AC/DC

AC

Connectors

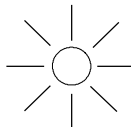
4-Pin Micro



4-Pin Mini



LED



3-Pin Micro

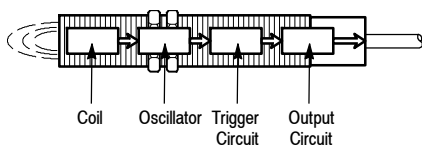


3-Pin Mini

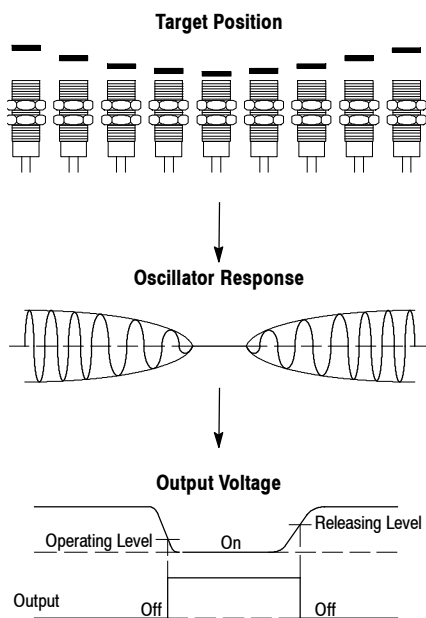


Notes

Principles of Operation for Inductive Proximity Sensors

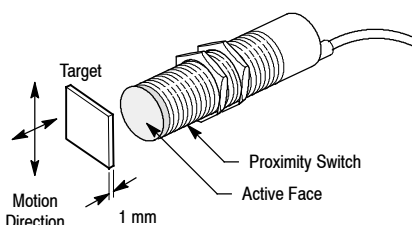


Inductive proximity sensors are designed to operate by generating an electromagnetic field and detecting the eddy current losses generated when ferrous and nonferrous metal target objects enter the field. The sensor consists of a coil on a ferrite core, an oscillator, a trigger-signal level detector and an output circuit. As a metal object advances into the field, eddy currents are induced in the target. The result is a loss of energy and a smaller amplitude of oscillation. The detector circuit then recognizes a specific change in amplitude and generates a signal which will turn the solid-state output "ON" or "OFF."



A metal target approaching an inductive proximity sensor (above) absorbs energy generated by the oscillator. When the target is in close range, the energy drain stops the oscillator and changes the output state.

Standard Target for Inductive Proximity Sensors



The active face of an inductive proximity switch is the surface where a high-frequency electro-magnetic field emerges.

A standard target is a mild steel square, one mm thick, with side lengths equal to the diameter of the active face or three times the nominal switching distance, whichever is greater.

Target Correction Factors for Inductive Proximity Sensors

To determine the sensing distance for materials other than the standard mild steel, a correction factor is used. The composition of the target has a large effect on sensing distance of inductive proximity sensors. If a target constructed from one of the materials listed is used, multiply the nominal sensing distance by the correction factor listed in order to determine the nominal sensing distance for that target. Note that ferrous-selective sensors will not detect brass, aluminum or copper, while nonferrous selective sensors will not detect steel or ferrous-type stainless steels.

The correction factors listed below can be used as a general guideline. Common materials and their specific correction factors are listed on each product specification page.

$$(\text{Nominal Sensing Range}) \times (\text{Correction Factor}) = \text{Sensing Range.}$$

Correction Factors	
Target Material	Approximate Correction Factor
Mild Steel	1.0
Stainless Steel	0.85
Brass	0.50
Aluminum	0.45
Copper	0.40

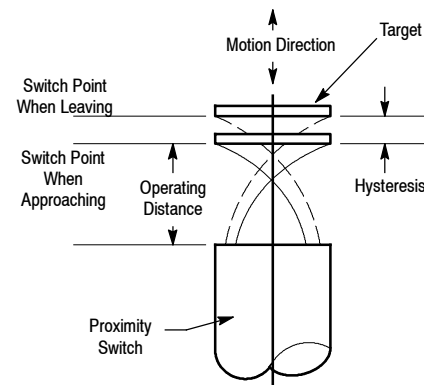
The size and shape of the target may also affect the sensing distance. The following should be used as a general guideline when correcting for the size and shape of a target:

- Flat targets are preferable
- Rounded targets may reduce the sensing distance
- Nonferrous materials usually reduce the sensing distance for all-metal sensing models
- Targets smaller than the sensing face typically reduce the sensing distance
- Targets larger than the sensing face may increase the sensing distance
- Foils may increase the sensing distance

Hysteresis (Differential Travel)

The difference between the operate and the release points is called hysteresis or differential travel. The amount of target travel required for release after operation must be accounted for when selecting target and sensor locations. Hysteresis is needed to help prevent chattering (turning on and off rapidly) when the sensor is subjected to shock and vibration or when the target is stationary at the nominal sensing distance.

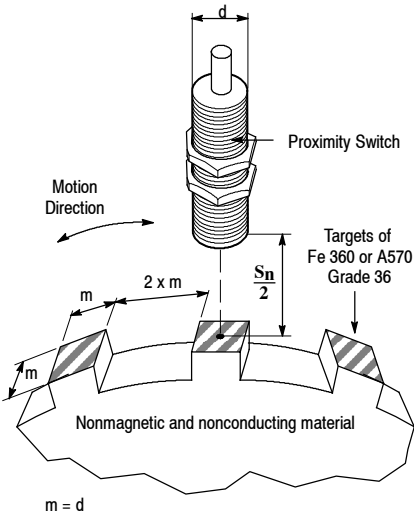
Vibration amplitudes must be smaller than the hysteresis band to avoid chatter.



Introduction

Switching Frequency

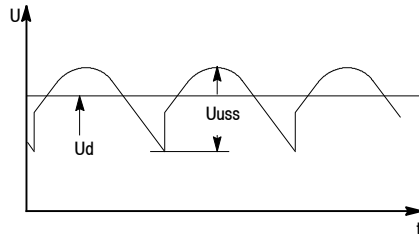
The switching frequency is the maximum speed at which a sensor will deliver discrete individual pulses as the target enters and leaves the sensing field. This value is always dependent on target size, distance from sensing face, speed of target and switch type. This indicates the maximum possible number of switching operations per second. The measuring method for determining switching frequency with standard targets is specified by IEC60947-5-2.



Ripple

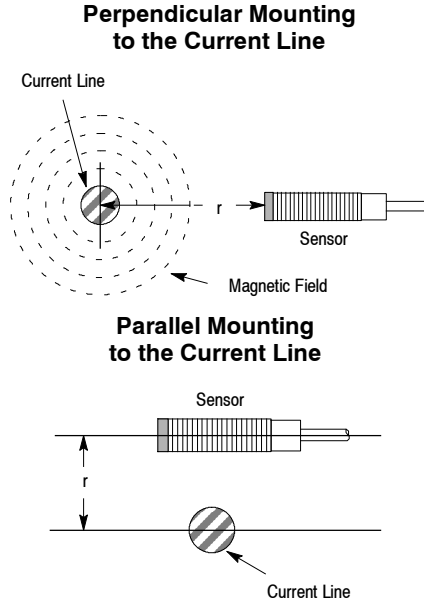
Ripple is the alternating voltage superimposed on the DC voltage (peak to peak) in %.

For the operation of DC voltage switches, a filtered DC voltage with a ripple of 10% maximum is required (according to DIN 41755).



Mounting Considerations for Weld Field Immune Proximities

Reliable operation is dependent on the strength of the magnetic field and the distance between the current line and the sensor.



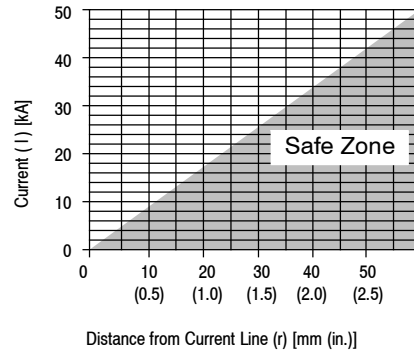
Use the following chart or formulas to determine the spacing requirements between the current line and proximity sensor. Select a distance that falls within the safe zone.

- $H = \frac{I}{2\pi r}$
- $B = \frac{H}{0.796}$
- Gauss = $10 \times B$

where:

- I = welding current (in kA),
- H = field strength (in kA/m),
- B = flux (in mT), and
- r = distance between sensor and current carrying lines (in meters).

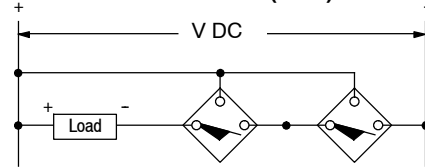
Weld Field Immunity



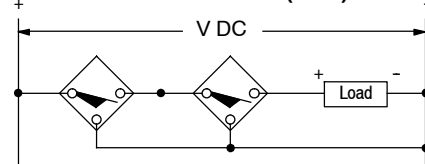
Series Connected Sensors

Sensors can be connected in series with a load. For proper operation, the load voltage must be less than or equal to the minimum supply voltage minus the voltage drops across the series-connected proximity sensors.

Wiring Diagram for Series Connected Current Sink Sensors (NPN)



Wiring Diagram for Series Connected Current Source Sensors (PNP)

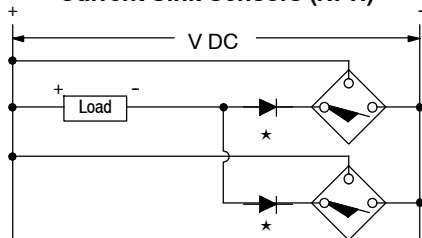


Parallel Connected Sensors

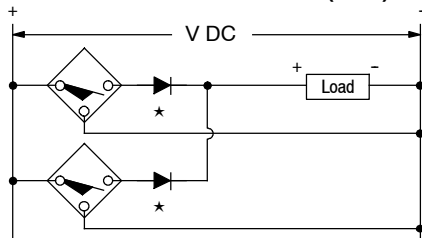
Sensors can be connected in parallel to energize a load. To determine the maximum allowable number of sensors for an application, the sum of the maximum leakage current of the sensors connected in parallel must be less than the maximum OFF-state current of the load device.

Note: Care should be taken when designing parallel proximity circuits. If too much leakage current flows into the load it may cause the solid state input to change state or a small relay not to drop out. Sensors connected in parallel do not provide a higher load current capability.

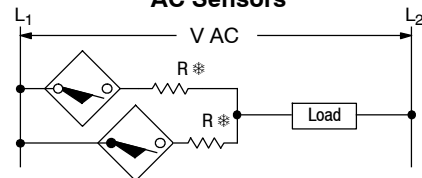
Wiring Diagram for Parallel Connected Current Sink Sensors (NPN)



Wiring Diagram for Parallel Connected Current Source Sensors (PNP)



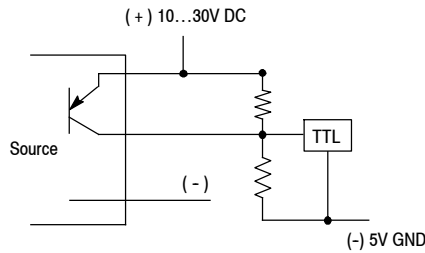
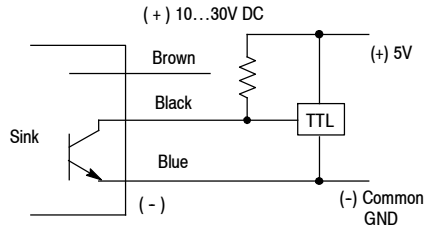
Wiring Diagram for Parallel Connected AC Sensors



★ Add diode as shown to each output to maintain individual output indicator function.

* Add R in series with sensor to maintain minimum voltage when sensor is switching.

TTL Wiring



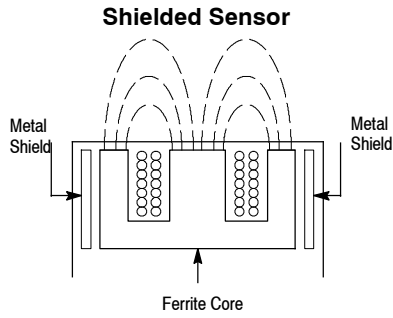
Note: When using sourcing outputs, ground must be floating and cannot be common, or short circuit will result.

PLC Wiring

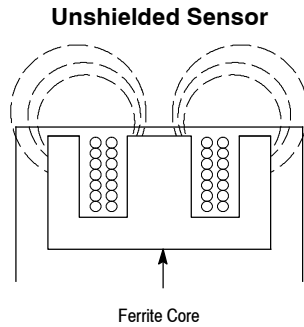
For PLC wiring information for Inductive and Capacitive sensors, refer to publication 871-4.5, June 1996.

Introduction

Shielded vs. Unshielded Inductive Sensors



Shielded construction includes a metal band which surrounds the ferrite core and coil arrangement.



Unshielded sensors do not have this metal band.

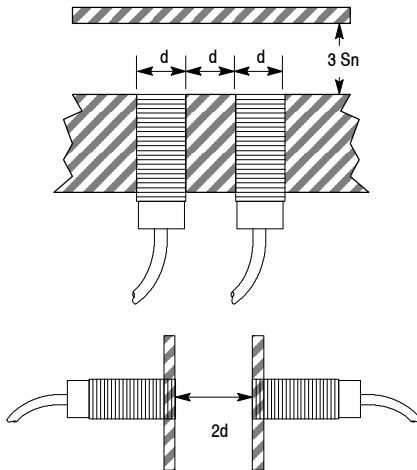
Spacing Between Shielded Sensors (Flush-Mountable) and Nearby Metal Surfaces

Shielded proximity sensors allow the electro-magnetic field to be concentrated to the front of the sensor

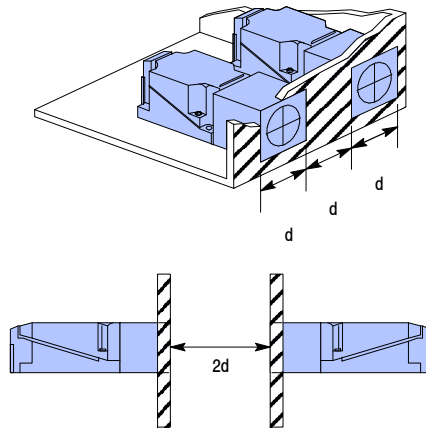
face. Shielded construction allows the proximity to be mounted flush in

surrounding metal without causing a false trigger.

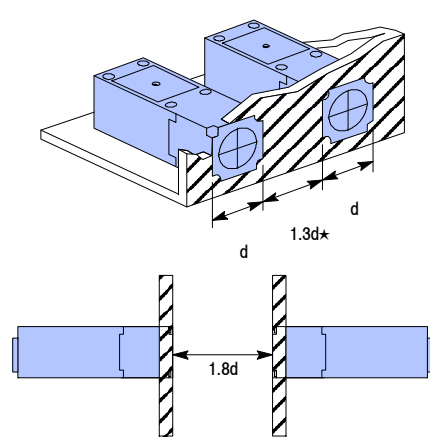
Tubular Style



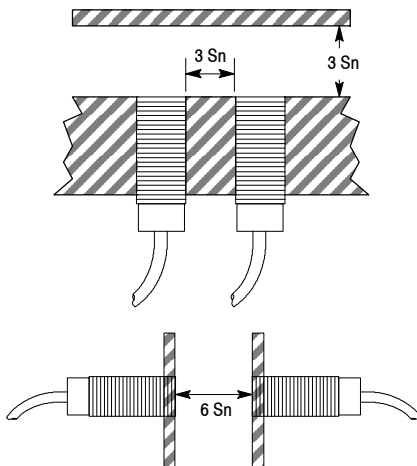
Limit Switch Style (871L and 872L)



Limit Switch Style (802PR)



Tubular Style Extended Sensing (872C)

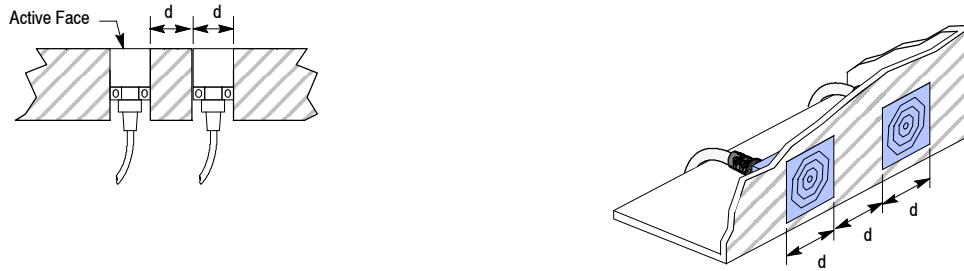


d = diameter or width of active sensing face
 Sn = nominal sensing distance

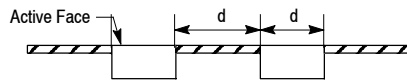
* 802PR-LB or 802PR-XB can be mounted side by side.

Spacing Between Shielded Sensors (Flush-Mountable) and Nearby Metal Surfaces (continued)

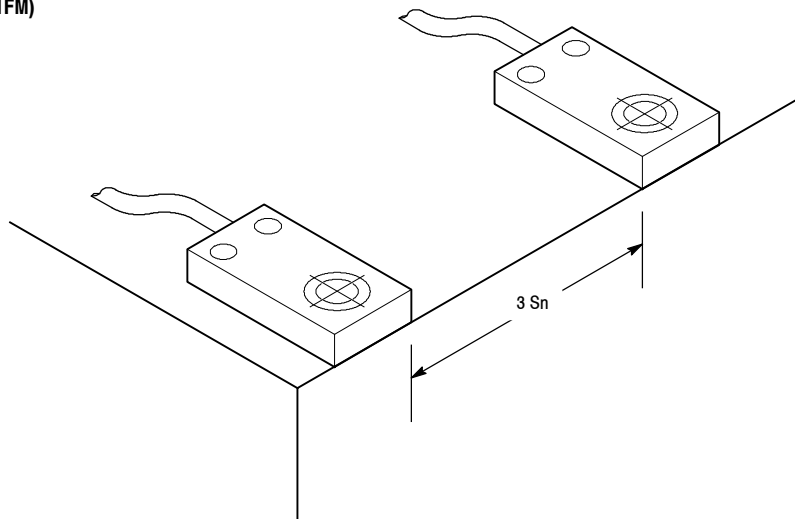
Cube Style (871P VersaCube)



Flat Pack Style (871F)



Miniature Flat Pack Style (871FM)



d = diameter or width of active sensing face
Sn = nominal sensing distance

Introduction

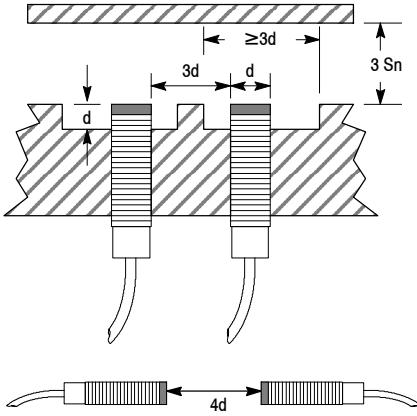
Spacing Between Unshielded Sensors (Nonflush-Mountable) and Nearby Metal Surfaces

Longer sensing distances can be obtained by using an unshielded sensor. Unshielded proximity sensors

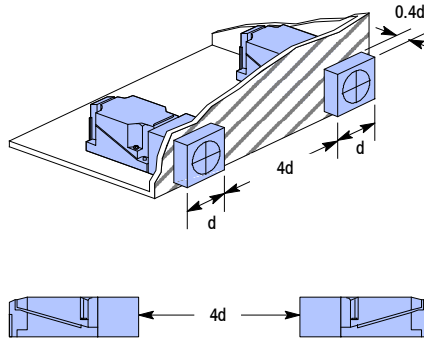
require a metal-free zone around the sensing face. Metal immediately opposite the sensing face should be no

closer than three times the rated nominal sensing distance of the sensor.

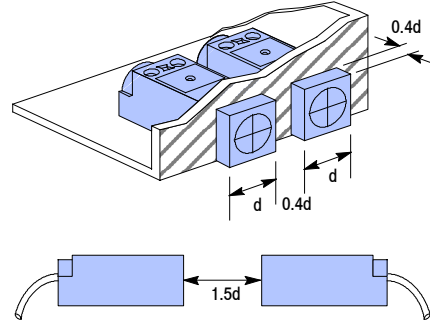
Tubular Style



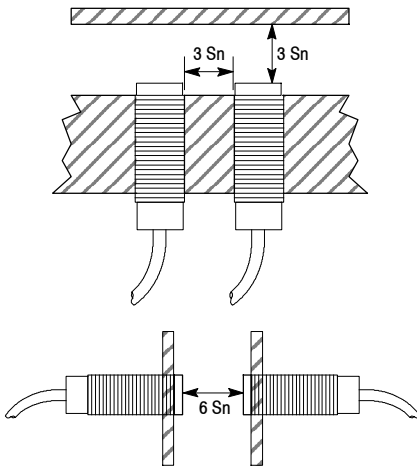
Limit Switch Style (871L and 872L)



Limit Switch Style (802PR)

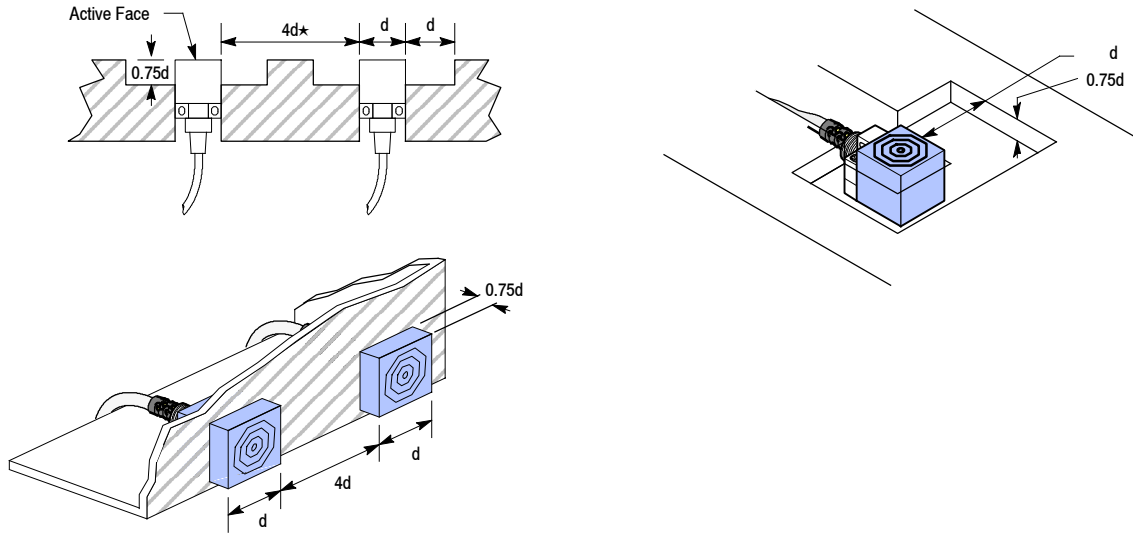


Tubular Style Extended Sensing (872C)

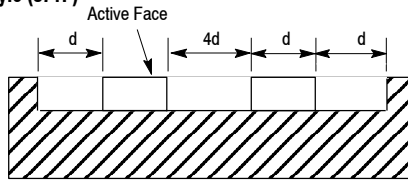


Spacing Between Unshielded Sensors (Nonflush-Mountable) and Nearby Metal Surfaces (continued)

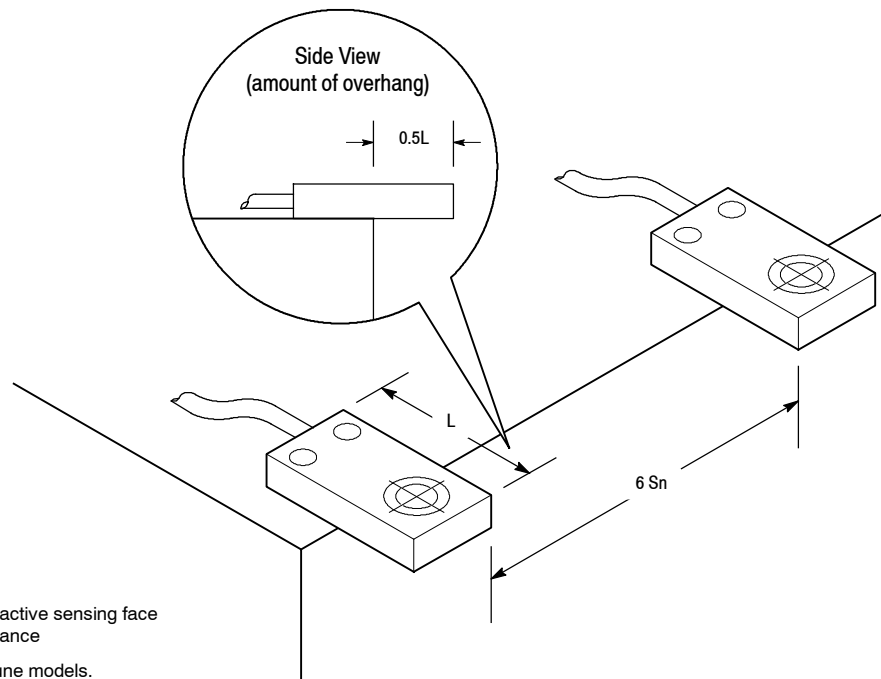
Cube Style (871P VersaCube)



Flat Pack Style (871F)



Miniature Flat Pack Style (871FM)

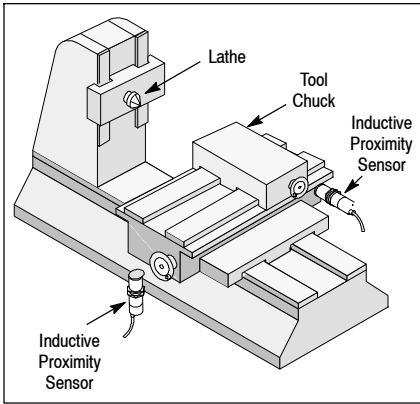


d = diameter or width of active sensing face
 S_n = nominal sensing distance

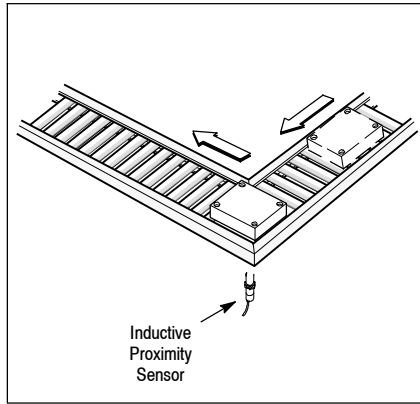
★ $3d$ for Weld Field Immune models.

Applications

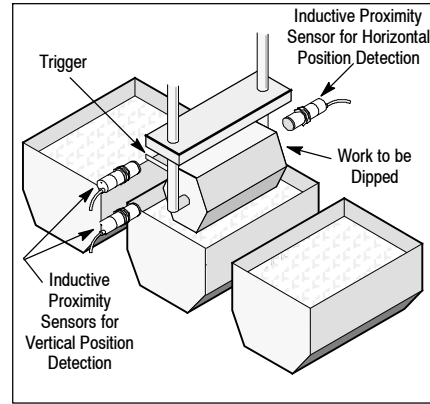
Machine Tools



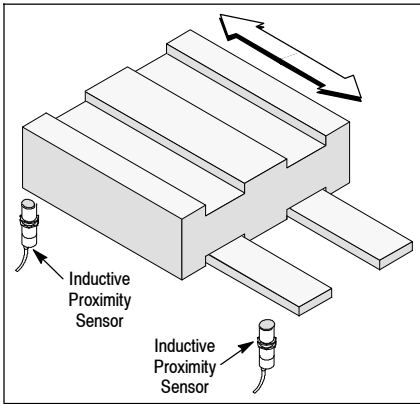
Plating Line



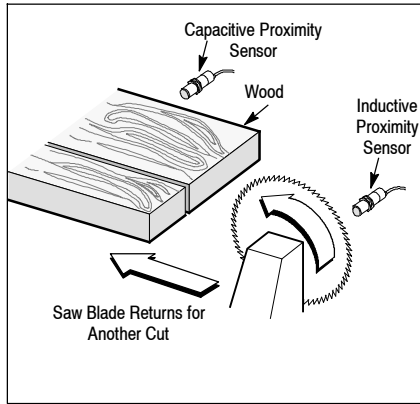
Plating Line



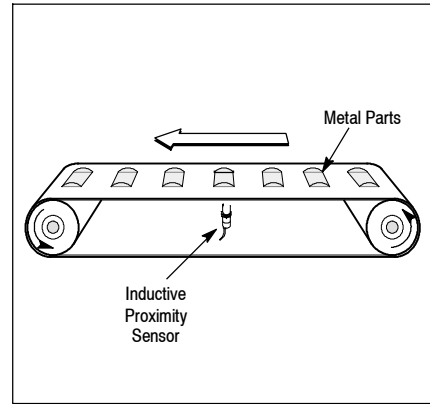
Grinding Machines



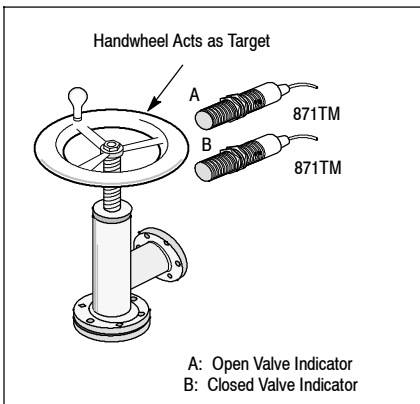
Wood Industry

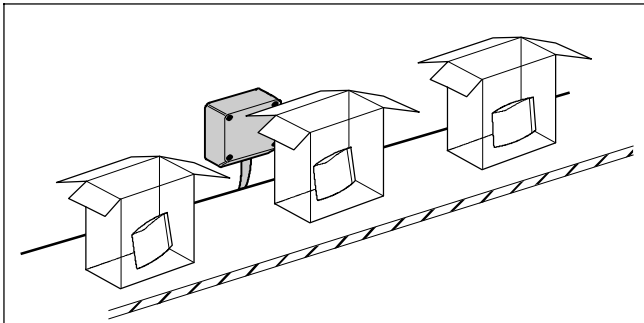


Conveyor Belts

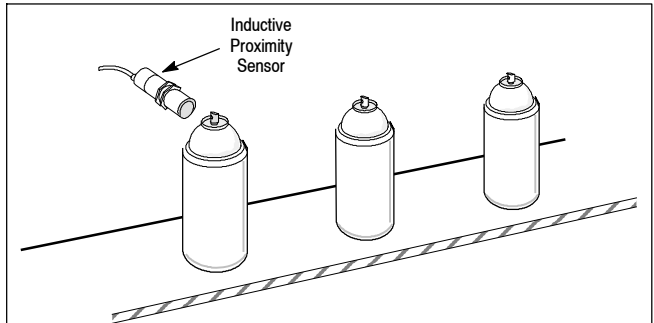


Petroleum Industry— Valve Position



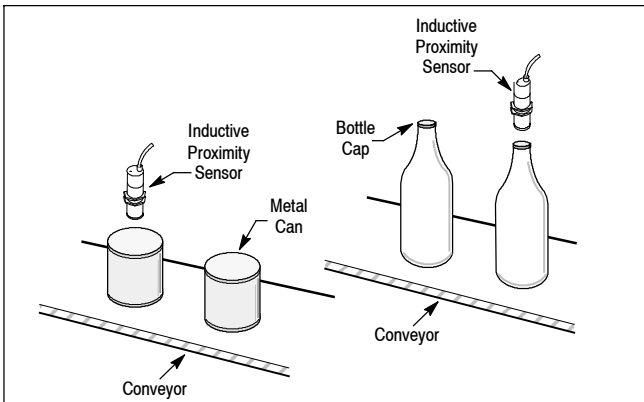


Inductive proximity sensor used to detect a foil seasoning bag inside of a cardboard container.

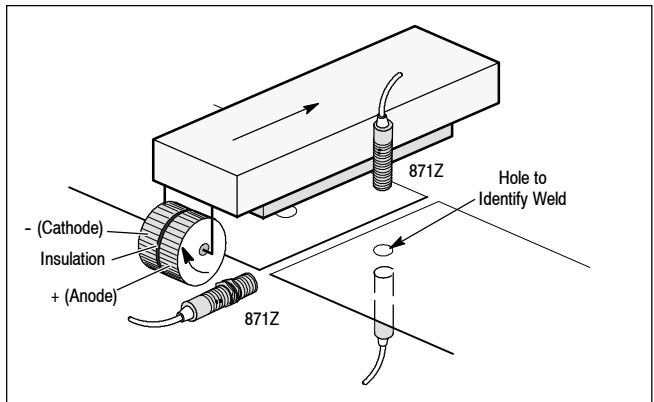


Ferrous selective inductive proximity sensor used to sort ferrous and nonferrous can tops.

Food Industry

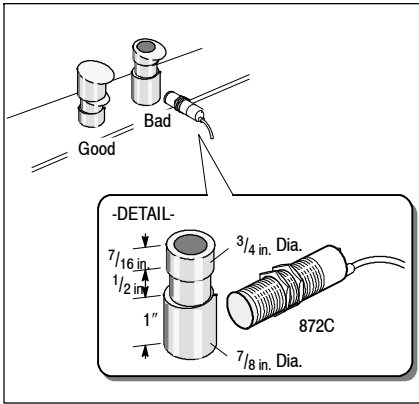


Stainless Steel Sheet Welder

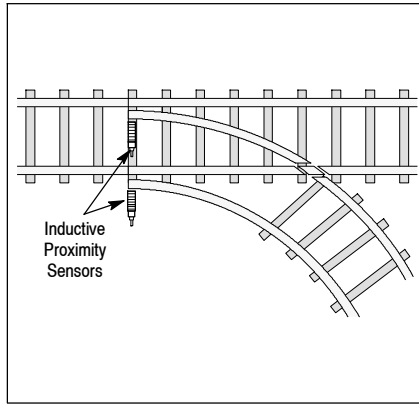


Applications

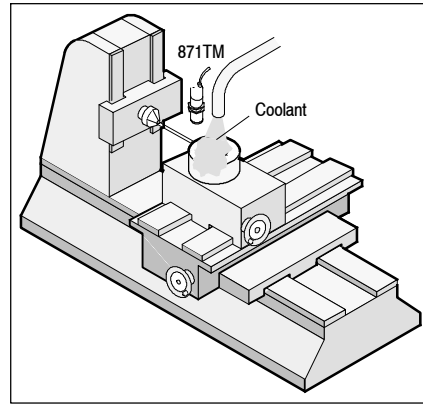
On Line Parts Sorting



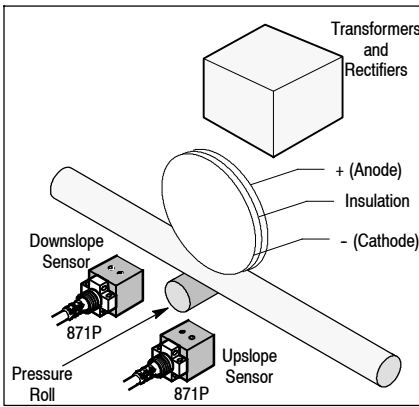
Railroad Yard Position Sensing



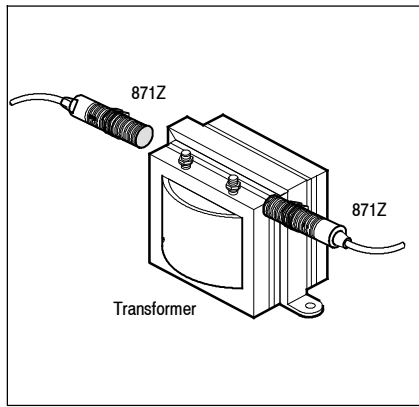
Coolant Resistant Sensing



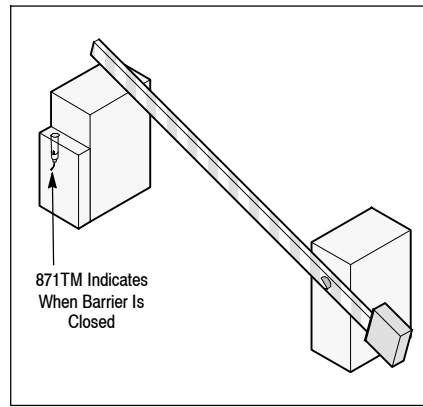
Up and Downslope Control of Continuous Tube Welder



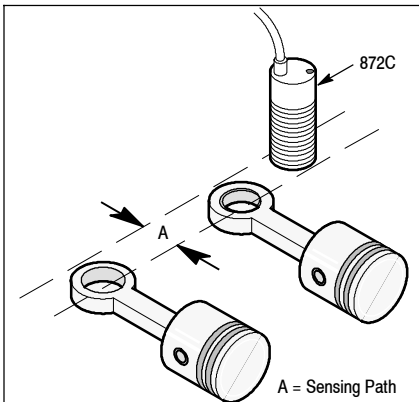
Nut Placement on Transformer



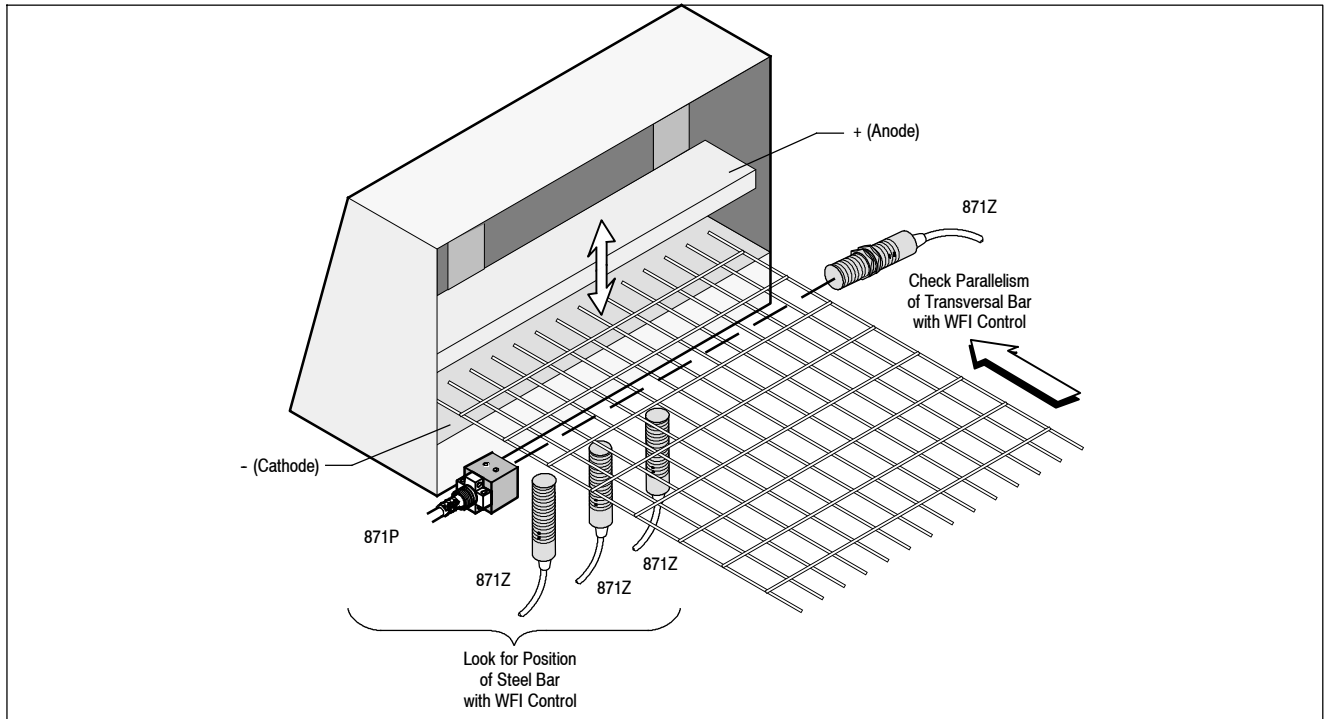
Closed Barrier Indicator



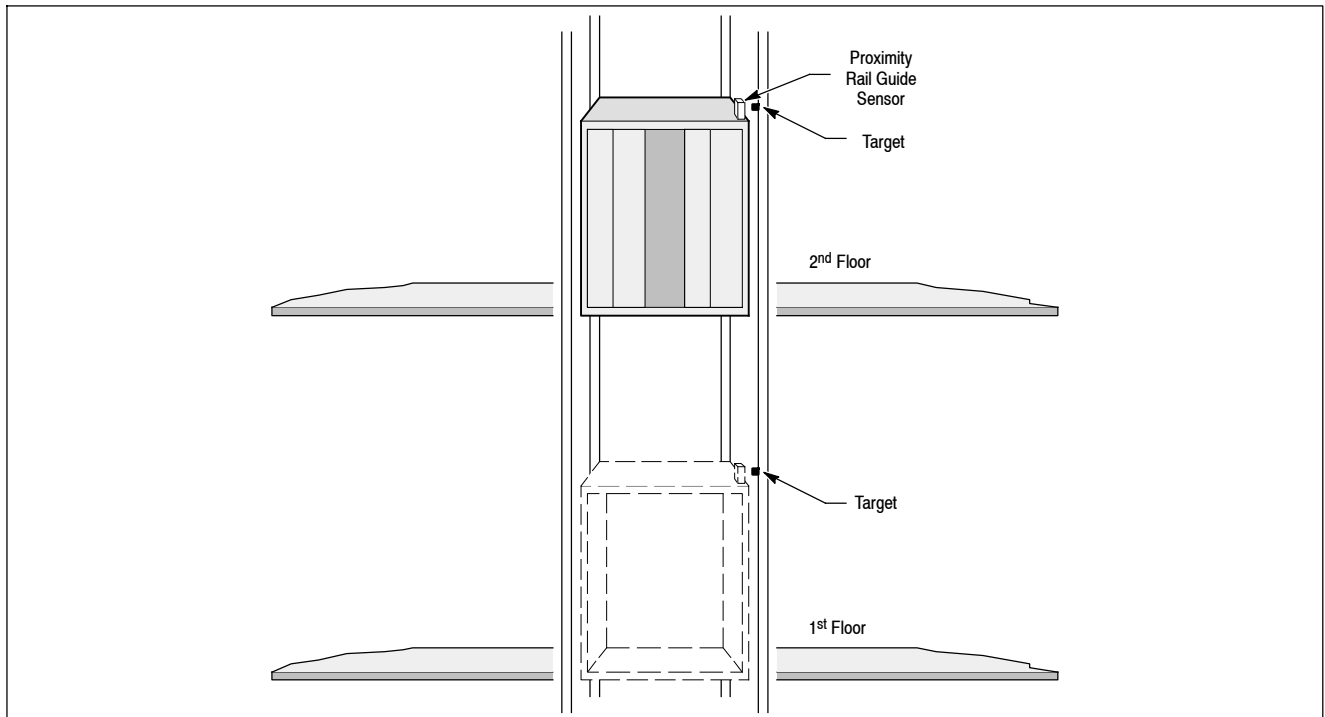
Detect Presence of Bushing in Piston



Control Presence of Mild Steel Bars in Grate Welding



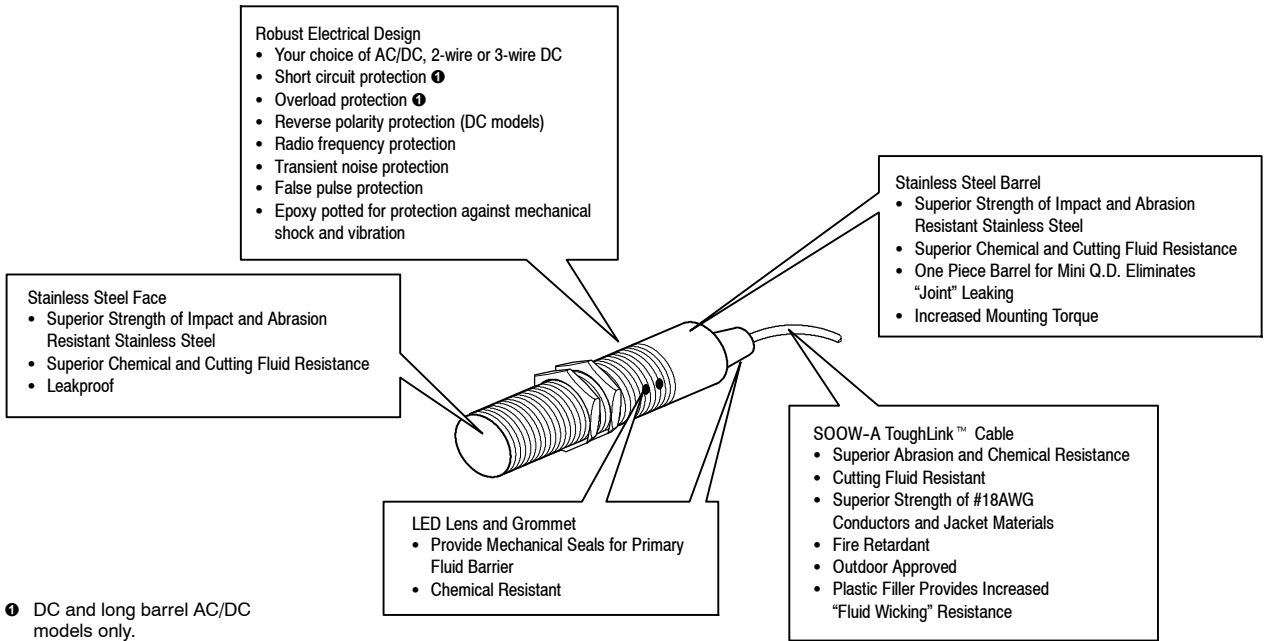
Elevator Positioning



Rockwell Automation produces rail guide inductive proximity sensors for the positioning of elevator cars. These sensors offer increased accuracy and longer life when compared to typical mechanical switches. They are a cost-effective solution for lowering your repair costs and downtime. Contact your local Rockwell Automation sales office or Allen-Bradley distributor for a proximity sensor tailored to your requirements!

Applications

Top 23 Reasons to Use the 871TM



❶ DC and long barrel AC/DC models only.



Description

Designed to reduce your downtime, the Bulletin 871TM is an excellent choice for harsh-environment applications because it stands up to conditions that standard plastic face sensors cannot tolerate. Each sensor is housed by a stainless steel face and barrel which make the front of the sensor leakproof and significantly improve resistance to chemicals, cutting fluid, oils and abrasion. Mechanical seals are provided at all barrel openings. Full epoxy encapsulation provides protection against shock, vibration, and contamination. The electronic circuitry is equipped with transient noise, false pulse, reverse polarity, short-circuit and overload protection.

In addition to standard all-metal sensing models, the 871TM is available in ferrous and nonferrous selective versions that differentiate between iron-based and other metals as well as extended range models for increased sensing distance. For some metals, nonferrous selective sensors can have up to four times the sensing distance of their all-metal sensing equivalents.

Although most carry a NEMA 6P enclosure rating, one style of 871TM is designed particularly for use under temporary submersion and in other extremely wet environments. Its cable grommet is fused directly to the cable jacketing for superior sealing. LEDs have been eliminated to reduce points of possible fluid ingress.

871TM sensors are also available in high- and low-temperature models. Consult your local Rockwell Automation sales office or Allen-Bradley distributor for details.

DeviceNet™ 871TM sensors are also available. These sensors are designed to be connected directly to DeviceNet networks. These models have built-in advanced features and diagnostics such as autobaud, timing options, analog output capability, target too close, target too far, motion detection and teach and learn capabilities.

The Bulletin 871TM is available with Rockwell Automation/Allen-Bradley exclusive ToughLink™ cable, which exceeds SOOW-A ratings and reduces cable failure due to cracking, wearing, melting, or breaking. Other connection options include a PVC cable, mini quick-disconnect, micro quick-disconnect, and EAC micro quick-disconnect.

Features

- Stainless steel face and barrel
- Full mechanical seals (all-metal sensing models)
- ToughLink™ or PVC cable styles
- Mini, micro or EAC micro quick-disconnect styles
- Short circuit protection ❶
- Overload protection ❶
- Transient noise protection
- False pulse protection
- Reverse polarity protection (DC models)
- Radio frequency interference protection
- UL Listed, CSA Certified, and CE Marked for all applicable directives (most models)

Styles

DC 3-Wire	page 2-22
DC 3-Wire Extended Sensing	page 2-25
DC 3-Wire Ferrous Selective	page 2-28
DC 3-Wire Nonferrous Selective	page 2-28
DC 3-Wire Submersible	page 2-31
DC 2-Wire	page 2-33
DC 2-Wire Intrinsically Safe	page 2-36
AC/DC 2-Wire	page 2-41
AC/DC 2-Wire PLC Interfacer	page 2-44
DeviceNet™ Sensors	page 10-12

Accessories

Cordsets	page 8-1
Conduit Adaptors	page 2-209
Mounting Brackets, Spring Return Style	page 2-210
Mounting Brackets, Swivel/Tilt Style	page 2-212
Mounting Brackets, Right Angle Style	page 2-213
Mounting Brackets, Clamp Style	page 2-214
End Caps	page 2-219
Mounting Nuts	page 2-221
Lock Washers	page 2-223

General Information

Torque Chart	page 2-225
Metric/English Conversion Chart	page 14-6

❶ Not available on PLC Interfacer models.

871TM 3-Wire DC

Stainless Steel Face/Threaded Short Stainless Steel Barrel



871TM DC Cable Style
12, 18, 30 mm



871TM DC Mini
Quick-Disconnect Style
12, 18, 30 mm



871TM DC Micro
Quick-Disconnect Style
12, 18, 30 mm

Specifications

Load Current	≤200 mA
Capacitive Load	≤1 μF
Leakage Current	≤10 mA
Operating Voltage	10...30V DC
Voltage Drop	≤1V DC at 200 mA
Repeatability	≤10% at constant temperature
Hysteresis	10% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Reverse Polarity Protection	Incorporated
Short Circuit Protection	Incorporated (trigger at 340 mA typical)
Overload Protection	Incorporated
Certifications	UL Listed, CSA Certified, and CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 3R, 4, 4X, 6, 6P, 12, 13; IP67 (IEC529) all models; 1200 psi (8270 kPa) washdown; stainless steel face and barrel; ToughLink™ and micro connector versions are also rated IP69K (IEC 529)
Connections	Cable: 2 m (6.5 ft) length A2-3-conductor PVC C2-3-conductor #22AWG ToughLink H2-3-conductor #18 AWG ToughLink Quick-Disconnect: 4-pin mini style 4-pin micro style
LED	Red: Output Energized
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.9...1.0
Brass	0.3...0.5
Aluminum	0.1...0.4
Aluminum ≤0.020 Thick	0.9...1.1
Copper	0.4...0.6

Features

- 3-wire operation
- 3-conductor or 4-pin connection
- 10...30V DC
- Short circuit, overload, false pulse, reverse polarity, and transient noise protection
- Normally open or normally closed output
- UL Listed, CSA Certified, and CE Marked for all applicable directives

Product Selection

Barrel Dia.	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration		Switching Frequency [Hz]	Cat. No.			
						PVC Cable	ToughLink™ Cable	Mini QD Style	Micro QD Style
12 mm	2 (0.08)	Y	N.O.	NPN	75	871TM-DH2NN12-A2	871TM-DH2NN12-C2	871TM-DH2NN12-N4	871TM-DH2NN12-D4
				PNP		871TM-DH2NP12-A2	871TM-DH2NP12-C2	871TM-DH2NP12-N4	871TM-DH2NP12-D4
	N	NPN		70	871TM-DH4NN12-A2	871TM-DH4NN12-C2	871TM-DH4NN12-N4	871TM-DH4NN12-D4	
		PNP			871TM-DH4NP12-A2	871TM-DH4NP12-C2	871TM-DH4NP12-N4	871TM-DH4NP12-D4	
	2 (0.08)	Y	N.C.	NPN	75	871TM-DH2CN12-A2	871TM-DH2CN12-C2	871TM-DH2CN12-N4	871TM-DH2CN12-D4
				PNP		871TM-DH2CP12-A2	871TM-DH2CP12-C2	871TM-DH2CP12-N4	871TM-DH2CP12-D4
	4 (0.16)	N		NPN	70	871TM-DH4CN12-A2	871TM-DH4CN12-C2	871TM-DH4CN12-N4	871TM-DH4CN12-D4
				PNP		871TM-DH4CP12-A2	871TM-DH4CP12-C2	871TM-DH4CP12-N4	871TM-DH4CP12-D4
18 mm	5 (0.20)	Y	N.O.	NPN	60	871TM-DH5NN18-A2	871TM-DH5NN18-H2	871TM-DH5NN18-N4	871TM-DH5NN18-D4
				PNP		871TM-DH5NP18-A2	871TM-DH5NP18-H2	871TM-DH5NP18-N4	871TM-DH5NP18-D4
	N	NPN		40	871TM-DH8NN18-A2	871TM-DH8NN18-H2	871TM-DH8NN18-N4	871TM-DH8NN18-D4	
		PNP			871TM-DH8NP18-A2	871TM-DH8NP18-H2	871TM-DH8NP18-N4	871TM-DH8NP18-D4	
	5 (0.20)	Y	N.C.	NPN	60	871TM-DH5CN18-A2	871TM-DH5CN18-H2	871TM-DH5CN18-N4	871TM-DH5CN18-D4
				PNP		871TM-DH5CP18-A2	871TM-DH5CP18-H2	871TM-DH5CP18-N4	871TM-DH5CP18-D4
	8 (0.31)	N		NPN	40	871TM-DH8CN18-A2	871TM-DH8CN18-H2	871TM-DH8CN18-N4	871TM-DH8CN18-D4
				PNP		871TM-DH8CP18-A2	871TM-DH8CP18-H2	871TM-DH8CP18-N4	871TM-DH8CP18-D4
30 mm	10 (0.39)	Y	N.O.	NPN	40	871TM-DH10NN30-A2	871TM-DH10NN30-H2	871TM-DH10NN30-N4	871TM-DH10NN30-D4
				PNP		871TM-DH10NP30-A2	871TM-DH10NP30-H2	871TM-DH10NP30-N4	871TM-DH10NP30-D4
	N	NPN		30	871TM-DH15NN30-A2	871TM-DH15NN30-H2	871TM-DH15NN30-N4	871TM-DH15NN30-D4	
		PNP			871TM-DH15NP30-A2	871TM-DH15NP30-H2	871TM-DH15NP30-N4	871TM-DH15NP30-D4	
	10 (0.39)	Y	N.C.	NPN	40	871TM-DH10CN30-A2	871TM-DH10CN30-H2	871TM-DH10CN30-N4	871TM-DH10CN30-D4
				PNP		871TM-DH10CP30-A2	871TM-DH10CP30-H2	871TM-DH10CP30-N4	871TM-DH10CP30-D4
	15 (0.59)	N		NPN	30	871TM-DH15CN30-A2	871TM-DH15CN30-H2	871TM-DH15CN30-N4	871TM-DH15CN30-D4
				PNP		871TM-DH15CP30-A2	871TM-DH15CP30-H2	871TM-DH15CP30-N4	871TM-DH15CP30-D4
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))								889N-F4AFC-6F	889D-F4AC-2

QD Cordsets and Accessories

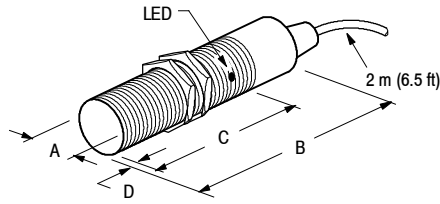
Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-219, 2-220
Mounting Nuts	2-221...2-222

871TM 3-Wire DC

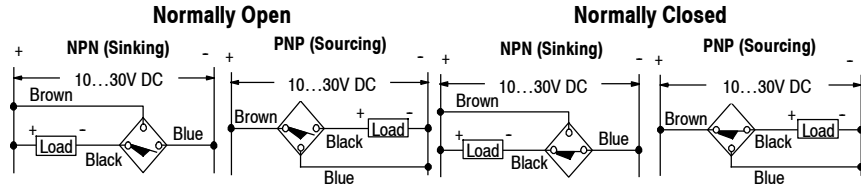
Stainless Steel Face/Threaded Short Stainless Steel Barrel

Approximate Dimensions [mm (in.)]

Cable Style

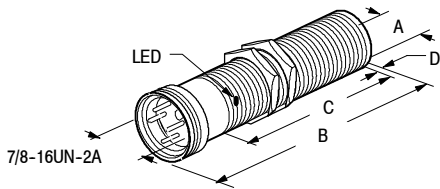


Wiring Diagrams

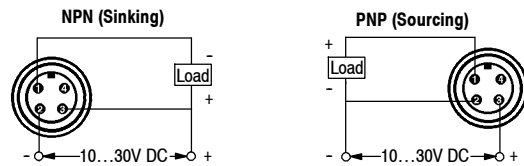


Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	49.8 (1.96)	26.4 (1.04)	2.5 (0.10)
	N			19.5 (0.77)	9.4 (0.37)
M18 X 1	Y	18.0 (0.71)	55.4 (2.18)	41.7 (1.64)	2.5 (0.10)
	N			14.5 (0.57)	14.5 (0.57)
M30 X 1.5	Y	30.0 (1.18)	57.9 (2.28)	41.9 (1.65)	2.5 (0.10)
	N			39.4 (1.55)	18.0 (0.71)

Mini QD Style

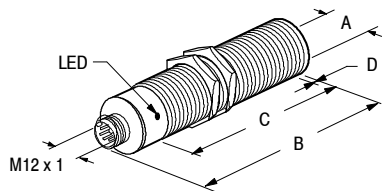


Normally Open or Normally Closed

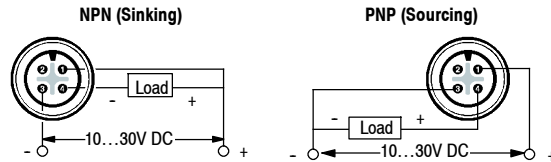


Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	63.5 (2.50)	25.4 (1.00)	2.5 (0.10)
	N			18.5 (0.73)	9.4 (0.37)
M18 X 1	Y	18.0 (0.71)	56.1 (2.21)	35.1 (1.38)	2.5 (0.10)
	N			29.2 (1.15)	14.5 (0.57)
M30 X 1.5	Y	30.0 (1.18)	68.1 (2.68)	41.9 (1.65)	2.5 (0.10)
	N			39.4 (1.55)	18.0 (0.71)

Micro QD Style



Normally Open or Normally Closed



Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	61.0 (2.40)	26.4 (1.04)	2.5 (0.10)
	N			28 (1.10)	9.4 (0.37)
M18 X 1	Y	18.0 (0.71)	65.0 (2.56)	41.7 (1.64)	2.5 (0.10)
	N			14.5 (0.57)	14.5 (0.57)
M30 X 1.5	Y	30.0 (1.18)	66.3 (2.61)	41.9 (1.65)	2.5 (0.10)
	N			39.4 (1.55)	18.0 (0.71)

871TM 3-Wire DC Extended Sensing

Stainless Steel Face/Threaded Stainless Steel Barrel

871TM DC Cable Style
8 mm871TM DC Micro
Quick-Disconnect Style
12 mm871TM DC Micro
Quick-Disconnect Style
18 mm871TM DC Micro
Quick-Disconnect Style
30 mm**Specifications**

Load Current	≤200 mA
Capacitive Load	≤1 μF
Leakage Current	≤0.1 mA
Operating Voltage	10...30V DC
Voltage Drop	≤2.0V DC at 200 mA
Repeatability	≤5% at constant temperature
Hysteresis	10% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Reverse Polarity Protection	Incorporated
Short Circuit Protection	Incorporated (trigger at 340 mA typical)
Overload Protection	Incorporated
Certifications	CE Marked for all applicable directives
Enclosure	IP67
Connections	Cable: 2 m (6.5 ft) length PUR Quick Disconnect: 4-pin micro style 3-pin pico style
LED	Yellow: Output energized/360° LED visibility; flashing LED indicates target located between 80...100% of rated sensing distance
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel (1 mm thick)	0.1
Brass	1.2
Aluminum	1.0
Copper	0.8

Features

- 3-wire operation
- 3-conductor, 4-pin connection
- 10...30V DC
- Short circuit, overload, false pulse, reverse polarity, and transient noise protection
- Normally open or normally closed output
- Equal sensing for both steel and aluminum
- CE Marked for all applicable directives

IMPORTANT

Due to the extended sensing capabilities of these products, special mounting/installation considerations may be necessary, please refer to publication 871TM-UM001A-EN-P.

871TM 3-Wire DC Extended Sensing

Stainless Steel Face/Threaded Stainless Steel Barrel

Product Selection

Barrel Dia.	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration		Max Switching Frequency [Hz]	Cat. No.		
						PUR Cable Style	Micro QD Style	Pico QD Style
8 mm	3 (0.12)	Y	N.O.	NPN	≤ 700	871TM-M3NN8-J2	871TM-M3NN8-D4	871TM-M3NN8-P3
				PNP		871TM-M3NP8-J2	871TM-M3NP8-D4	871TM-M3NP8-P3
	N	NPN		871TM-N6NN8-J2		871TM-N6NN8-D4	871TM-N6NN8-P3	
		PNP		871TM-N6NP8-J2		871TM-N6NP8-D4	871TM-N6NP8-P3	
	6 (0.23)	Y	N.C.	NPN		871TM-M3CN8-J2	871TM-M3CN8-D4	871TM-M3CN8-P3
				PNP		871TM-M3CP8-J2	871TM-M3CP8-D4	871TM-M3CP8-P3
	N	NPN		871TM-N6CN8-J2		871TM-N6CN8-D4	871TM-N6CN8-P3	
		PNP		871TM-N6CP8-J2		871TM-N6CP8-D4	871TM-N6CP8-P3	
Recommended standard QD cordset (-2 = 2 m (6.5 ft) PUR						889D-F4AC-2	889P-F3AB-2	

Barrel Dia.	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration		Max Switching Frequency [Hz]	Cat. No.	
						PUR Cable Style	Micro QD Style
12 mm	6 (0.23)	Y	N.O.	NPN	400	871TM-M6NN12-A2	871TM-M6NN12-D4
				PNP		871TM-M6NP12-A2	871TM-M6NP12-D4
	N	NPN		871TM-N10NN12-A2		871TM-N10NN12-D4	
		PNP		871TM-N10NP12-A2		871TM-N10NP12-D4	
	6 (0.23)	Y	N.C.	NPN		871TM-M6CN12-A2	871TM-M6CN12-D4
				PNP		871TM-M6CP12-A2	871TM-M6CP12-D4
	N	NPN		871TM-N10CN12-A2		871TM-N10CN12-D4	
		PNP		871TM-N10CP12-A2		871TM-N10CP12-D4	
18 mm	10 (0.39)	Y	N.O.	NPN	200	871TM-M10NN18-A2	871TM-M10NN18-D4
				PNP		871TM-M10NP18-A2	871TM-M10NP18-D4
	N	NPN		871TM-N20NN18-A2		871TM-N20NN18-D4	
		PNP		871TM-N20NP18-A2		871TM-N20NP18-D4	
	10 (0.39)	Y	N.C.	NPN		871TM-M10CN18-A2	871TM-M10CN18-D4
				PNP		871TM-M10CP18-A2	871TM-M10CP18-D4
	N	NPN		871TM-N20CN18-A2		871TM-N20CN18-D4	
		PNP		871TM-N20CP18-A2		871TM-N20CP18-D4	
30 mm	20 (0.79)	Y	N.O.	NPN	80	871TM-M20NN30-A2	871TM-M20NN30-D4
				PNP		871TM-M20NP30-A2	871TM-M20NP30-D4
	N	NPN		871TM-N40NN30-A2		871TM-N40NN30-D4	
		PNP		871TM-N40NP30-A2		871TM-N40NP30-D4	
	20 (0.79)	Y	N.C.	NPN		871TM-M20CN30-A2	871TM-M20CN30-D4
				PNP		871TM-M20CP30-A2	871TM-M20CP30-D4
	N	NPN		871TM-N40CN30-A2		871TM-N40CN30-D4	
		PNP		871TM-N40CP30-A2		871TM-N40CP30-D4	
Recommended Standard QD Cordset (-2 = 2 m (6.5 ft))						889D-F4AC-2	

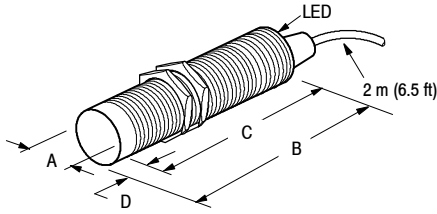
QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-219, 2-220
Mounting Nuts	2-221...2-222

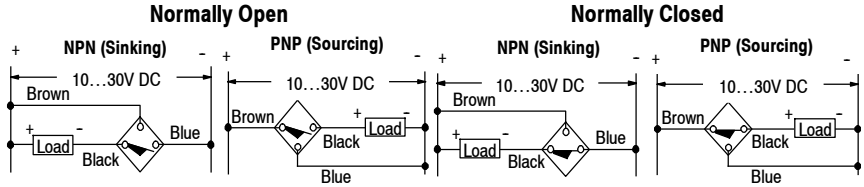
Inductive Proximity Sensors
871TM 3-Wire DC Extended Sensing
 Stainless Steel Face/Threaded Stainless Steel Barrel

Approximate Dimensions [mm (in.)]

Cable Style

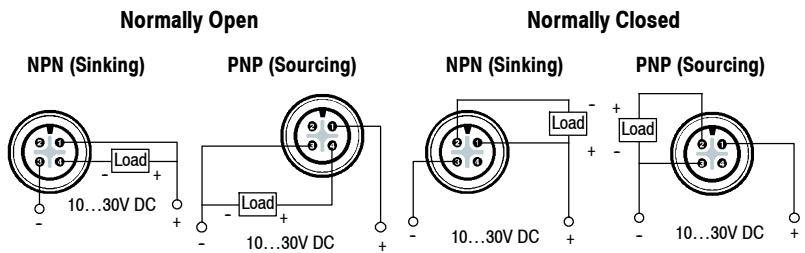
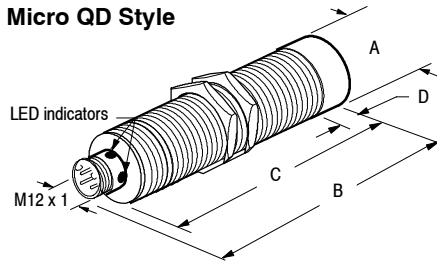


Wiring Diagrams



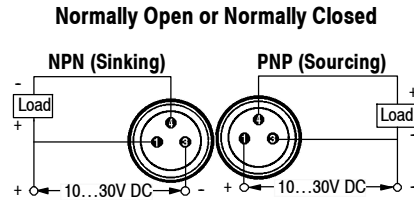
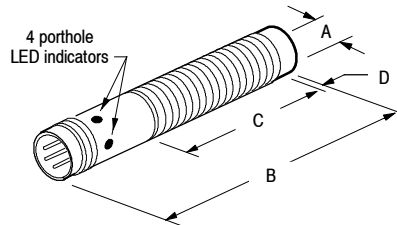
Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M8 X 1	Y	8.0 (0.31)	45 (1.76)	45 (1.76)	—
	N			41 (1.61)	4 (0.16)
M12 X 1	Y	12.0 (0.47)	50 (1.96)	50 (1.96)	—
	N			45 (1.77)	5 (0.19)
M18 X 1	Y	18.0 (0.71)		50 (1.96)	—
	N			43 (1.69)	7 (0.27)
M30 X 1.5	Y	30.0 (1.18)	50 (1.96)	—	
	N		40 (1.57)	10 (0.39)	

Micro QD Style



Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M8 X 1	Y	8.0 (0.31)	66 (2.59)	46 (1.81)	—
	N			42 (1.65)	4 (0.16)
M12 X 1	Y	12.0 (0.47)	60 (2.36)	41 (1.61)	—
	N			36 (1.42)	5 (0.20)
M18 X 1	Y	18.0 (0.71)	63.5 (2.5)	42.5 (1.67)	—
	N			35.5 (1.40)	7 (0.28)
M30 X 1.5	Y	30.0 (1.18)	63.5 (2.5)	42.5 (1.67)	—
	N			32.5 (1.28)	10 (0.39)

Pico QD Style



Thread Size	Smooth Diameter	Shielded	[mm (in.)]			
			A	B (max)	C (min)	D (max)
M8 X 1	—	Y	8.0 (0.31)	60 (2.35)	45.5 (1.79)	—
		N			41.5 (1.63)	4.0 (0.16)

871TM 3-Wire DC Ferrous or Nonferrous Selective

Stainless Steel Face/Threaded Stainless Steel Barrel



871TM DC Cable Style
12, 18, 30 mm



871TM DC Mini
Quick-Disconnect Style
12, 18, 30 mm



871TM DC Micro
Quick-Disconnect Style
12, 18, 30 mm

Specifications

Load Current	≤200 mA
Capacitive Load	≤1 μF
Leakage Current	≤10 mA
Operating Voltage	10...30 V DC
Voltage Drop	≤1V DC at 200 mA
Repeatability	≤10% at constant temperature
Hysteresis	10% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Reverse Polarity Protection	Incorporated
Short Circuit Protection	Incorporated (trigger at 340 mA typical)
Overload Protection	Incorporated
Certifications	UL Listed, CSA Certified, and CE Marked for all applicable directives (May not be available for some special order models.)
Enclosure	NEMA 1, 2, 3, 3R, 4, 4X, 6, 6P, 12, 13 IP67 (IEC529) all models; 1200 psi (8270 kPa) washdown; stainless steel face and barrel; ToughLink™ and micro connector versions are also rated IP69K (IEC 529)
Connections	Cable: 2 m (6.5 ft) length A2-3-conductor PVC C2-3-conductor #22 AWG ToughLink™ H2-3-conductor #18 AWG ToughLink Quick-Disconnect: 4-pin mini style 4-pin micro style
LEDs	Red: Output Energized Green: Power/Short Circuit (flashing)—18 mm models only
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Features

- 3-wire operation
- 3-conductor or 4-pin connection
- 10...30V DC
- Ferrous or nonferrous selective sensing
- Short circuit, overload, false pulse, reverse polarity, and transient noise protection
- Normally open or normally closed output
- UL Listed, CSA Certified, and CE Marked for all applicable directives (may not be available for some special order models)

Note: AC/DC models also available as special order items. Consult your local Rockwell Automation sales office or Allen-Bradley distributor for details.

Correction Factors

Target Material	Correction Factor	
	Ferrous Selective	Nonferrous Selective
Steel	1.0	0.0
Stainless Steel	0...1.0 ^①	0...1.0 ^①
Brass	0.0	1.0
Aluminum	0.0	1.0
Aluminum >0.003 Thick	0.0	1.0
Copper	0.0	1.0

^① Variation due to differences in alloy composition.

Inductive Proximity Sensors

871TM 3-Wire DC Ferrous or Nonferrous Selective
Stainless Steel Face/Threaded Stainless Steel Barrel

Product Selection

Barrel Dia.	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration		Switching Freq. [Hz]	Target Type	Cat. No.			
							PVC Cable	ToughLink Cable	Mini QD Style	Micro QD Style
12 mm	1 (0.04)	Y	N.O.	PNP	25	Ferrous	871TM-DF1NP12-A2	871TM-DF1NP12-C2	871TM-DF1NP12-N4	871TM-DF1NP12-D4
				NPN			871TM-DF1NN12-A2	871TM-DF1NN12-C2	871TM-DF1NN12-N4	871TM-DF1NN12-D4
			N.C.	PNP			871TM-DF1CP12-A2	871TM-DF1CP12-C2	871TM-DF1CP12-N4	871TM-DF1CP12-D4
				NPN			871TM-DF1CN12-A2	871TM-DF1CN12-C2	871TM-DF1CN12-N4	871TM-DF1CN12-D4
	2 (0.08)		N.O.	PNP	20	Nonferrous	—	871TM-DN2NP12-C2	871TM-DN2NP12-N4	871TM-DN2NP12-D4
				NPN			871TM-DN2NN12-C2	871TM-DN2NN12-N4	871TM-DN2NN12-D4	
			N.C.	PNP			871TM-DN2CP12-C2	871TM-DN2CP12-N4	871TM-DN2CP12-D4	
				NPN			871TM-DN2CN12-C2	871TM-DN2CN12-N4	871TM-DN2CN12-D4	
18 mm	3 (0.12)	Y	N.O.	PNP	10	Ferrous	—	871TM-DF3NP18-H2	871TM-DF3NP18-N4	871TM-DF3NP18-D4
				NPN			871TM-DF3NN18-H2	871TM-DF3NN18-N4	871TM-DF3NN18-D4	
			N.C.	PNP			871TM-DF3CP18-H2	871TM-DF3CP18-N4	871TM-DF3CP18-D4	
				NPN			871TM-DF3CN18-H2	871TM-DF3CN18-N4	871TM-DF3CN18-D4	
	5 (0.20)		N.O.	PNP	20	Nonferrous	871TM-DN5NP18-A2	871TM-DN5NP18-H2	871TM-DN5NP18-N4	871TM-DN5NP18-D4
				NPN			871TM-DN5NN18-H2	871TM-DN5NN18-N4	871TM-DN5NN18-D4	
			N.C.	PNP			871TM-DN5CP18-H2	871TM-DN5CP18-N4	871TM-DN5CP18-D4	
				NPN			871TM-DN5CN18-H2	871TM-DN5CN18-N4	871TM-DN5CN18-D4	
30 mm	7.5 (0.30)	Y	N.O.	PNP	15	Ferrous	—	871TM-DF8NP30-H2	871TM-DF8NP30-N4	871TM-DF8NP30-D4
				NPN			871TM-DF8NN30-H2	871TM-DF8NN30-N4	871TM-DF8NN30-D4	
			N.C.	PNP			871TM-DF8CP30-H2	871TM-DF8CP30-N4	871TM-DF8CP30-D4	
				NPN			871TM-DF8CN30-H2	871TM-DF8CN30-N4	871TM-DF8CN30-D4	
	10 (0.39)		N.O.	PNP	15	Nonferrous	871TM-DN10NP30-A2	871TM-DN10NP30-H2	871TM-DN10NP30-N4	871TM-DN10NP30-D4
				NPN			871TM-DN10NN30-H2	871TM-DN10NN30-N4	871TM-DN10NN30-D4	
			N.C.	PNP			871TM-DN10CP30-H2	871TM-DN10CP30-N4	871TM-DN10CP30-D4	
				NPN			871TM-DN10CN30-H2	871TM-DN10CN30-N4	871TM-DN10CN30-D4	
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))								889N-F4AFC-6F	889D-F4AC-2	

Available as a special order item. AC/DC models also available. Specifications and dimensions subject to change. Fifteen piece minimum order required. Consult your local Rockwell Automation sales office or Allen-Bradley distributor for prices and lead times.

QD Cordsets and Accessories

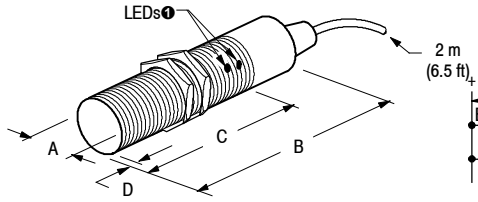
Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-219, 2-220
Mounting Nuts	2-221...2-222

871TM 3-Wire DC Ferrous or Nonferrous Selective

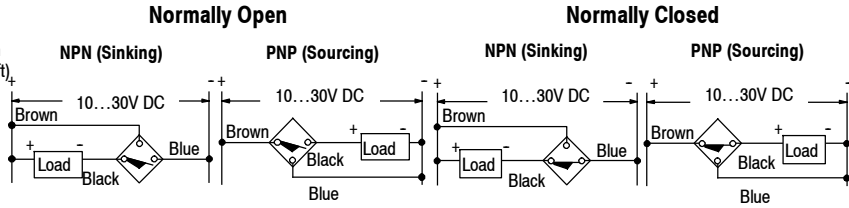
Stainless Steel Face/Threaded Stainless Steel Barrel

Approximate Dimensions [mm (in.)]

Cable Style



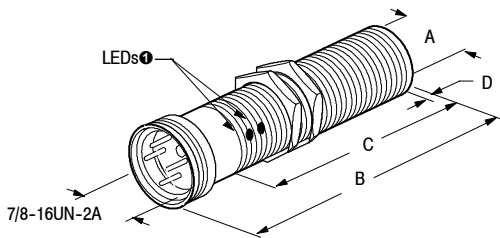
Wiring Diagrams



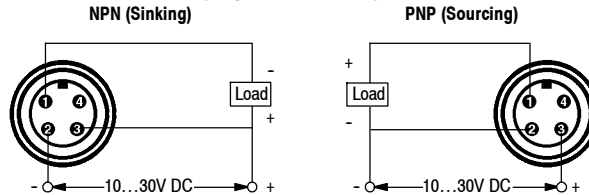
Available for 18 mm models only

Thread Size	Shielded	Target Type	[mm (in.)]			
			A	B	C	D
M12 X 1	Y	Ferrous and Nonferrous	12.0 (0.47)	51.0 (2.01)	27.5 (1.08)	—
M18 X 1		Ferrous	18.0 (0.71)	76.8 (3.02)	65.0 (2.56)	—
		Nonferrous	18.0 (0.71)	74.7 (2.94)	60.0 (2.36)	2.5 (0.10)
M30 X 1.5		Ferrous and Nonferrous	30.0 (1.18)	77.5 (3.05)	63.0 (2.48)	2.5 (0.10)

Mini QD Style

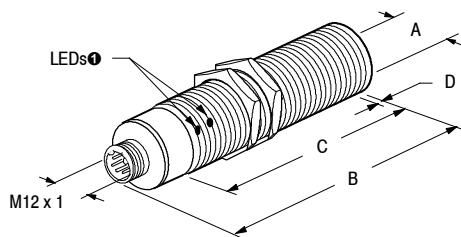


Normally Open or Normally Closed

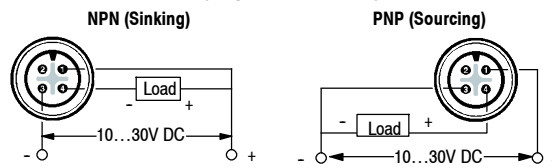


Thread Size	Shielded	Target Type	[mm (in.)]			
			A	B	C	D
M12 X 1	Y	Ferrous and Nonferrous	12.0 (0.47)	61.3 (2.45)	30.4 (1.20)	—
M18 X 1		Ferrous	18.0 (0.71)	78.5 (3.14)	60.0 (2.40)	—
		Nonferrous	18.0 (0.71)	76.6 (3.02)	54.9 (2.16)	2.5 (0.10)
M30 X 1.5		Ferrous and Nonferrous	30.0 (1.18)	86.0 (3.39)	63.5 (2.50)	2.5 (0.10)

Micro QD Style



Normally Open or Normally Closed



Available for 18 mm models only

Thread Size	Shielded	Target Type	[mm (in.)]			
			A	B	C	D
M12 X 1	Y	Ferrous and Nonferrous	12.0 (0.47)	62.3 (2.45)	30.4 (1.20)	0.9 (0.04)
M18 X 1		Ferrous	18.0 (0.71)	85.0 (3.35)	65.5 (2.58)	2.0 (0.08)
		Nonferrous	18.0 (0.71)	84.3 (3.32)	60.0 (2.36)	2.5 (0.10)
M30 X 1.5		Ferrous and Nonferrous	30.0 (1.18)	85.5 (3.37)	63.0 (2.48)	2.5 (0.10)

871TM 3-Wire DC Submersible

Stainless Steel Face/Threaded Short Stainless Steel Barrel



871TM DC Cable Style
18 mm

Features

- 3-wire operation
- 3-conductor or 4-pin connection
- 10...30V DC
- Short circuit, overload, false pulse, reverse polarity and transient noise protection
- Normally open or normally closed output

Specifications

Load Current	≤200 mA
Capacitive Load	≤ 1μF
Leakage Current	≤10 mA
Operating Voltage	10...30V DC
Voltage Drop	≤1V DC at 200 mA
Repeatability	≤1% at constant temperature
Hysteresis	10% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Reverse Polarity Protection	Incorporated
Short Circuit Protection	Incorporated (trigger at 340 mA typical)
Overload Protection	Incorporated
Enclosure	NEMA 1, 2, 3, 3R, 4, 4X, 6, 6P, 12, 13; IP68 (IEC529) and IP69K (IEC 529); 1200 psi (8270 kPa) washdown; stainless steel face and barrel;
Connections	Cable: 5 m (16.4 ft) length 3-conductor #18 AWG ToughLink
LED	None
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.9...1.0
Brass	0.3...0.5
Aluminum	0.1...0.4
Aluminum ≤0.020 Thick	0.9...1.1
Copper	0.4...0.6

Inductive Proximity Sensors

871TM 3-Wire DC Submersible

Stainless Steel Face/Threaded Short Stainless Steel Barrel

Product Selection

Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No. Cable Style		
18 mm	5 (0.20)	Y	N.O.	NPN	60	871TM-DX14	
				PNP		871TM-DX15	
	8 (0.31)	N	N.O.	NPN	40	871TM-DX16	
				PNP		871TM-DX09	
	5 (0.20)	Y	N.C.	NPN	60	871TM-DX17	
				PNP		871TM-DX18	
		8 (0.31)		N	NPN	40	871TM-DX19
					PNP		871TM-DX20

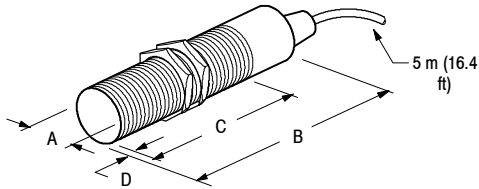
Note: These models are available as special order items. AC/DC and other DC models also available. Consult the factory for details.

QD Cordsets and Accessories

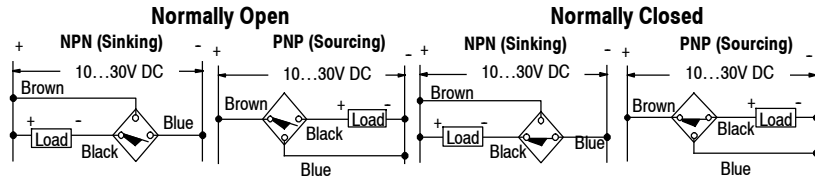
Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-219, 2-220
Mounting Nuts	2-221...2-222

Approximate Dimensions [mm (in.)]

Cable Style



Wiring Diagrams



Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M18 X 1	Y	18.0 (0.71)	55.4 (2.18)	41.7 (1.64)	2.5 (0.10)
	N				14.5 (0.57)



871TM DC Cable Style
12, 18, 30 mm



871TM DC Mini
Quick-Disconnect Style
12, 18, 30 mm



871TM DC Micro
Quick-Disconnect Style
12, 18, 30 mm

Specifications

Load Current	≤25 mA
Minimum Load Current	2 mA
Leakage Current	≤0.9 mA
Operating Voltage	10...30V DC
Voltage Drop	≤8V
Repeatability	10% typical
Hysteresis	10% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Reverse Polarity Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Certifications	UL Listed, CSA Certified and CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 3R, 4, 4X, 6P, 12, 13; IP67 (IEC 529) all models; 1200 psi (8270 kPa) washdown; stainless steel face and barrel; ToughLink™ and micro connector versions are also rated IP69K (IEC 529)
Connections	Cable: 2 m (6.5 ft) length A2—2-conductor #22 AWG PVC C2—2-conductor #22 AWG ToughLink H2—2-conductor #18 AWG ToughLink Quick-Disconnect: 4-pin mini style 4-pin micro style
LED	Red: Output energized
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Features

- 2-wire operation
- 2-conductor or 4-pin connection
- 10...30V DC
- Normally open or normally closed output
- Short circuit, overload, false pulse, reverse polarity, and transient noise protection
- UL Listed, CSA Certified and CE Marked for all applicable directives

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.9...1.0
Brass	0.3...0.5
Aluminum	0.1...0.4
Aluminum ≤0.020 Thick	0.9...1.1
Copper	0.4...0.6

871TM 2-Wire DC

Stainless Steel Face/Threaded Short Stainless Steel Barrel

Product Selection

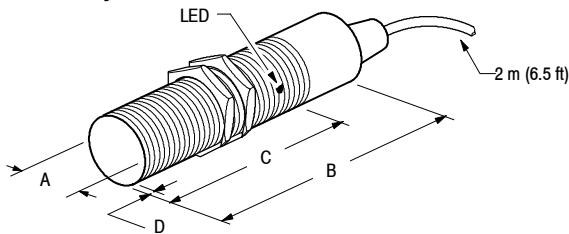
Barrel Dia.	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.			
					PVC Cable	ToughLink™ Cable	Mini QD Style	Micro QD Style
12 mm	2 (0.08)	Y	N.O.	75	871TM-DH2NE12-A2	871TM-DH2NE12-C2	871TM-DH2NE12-N4	871TM-DH2NE12-D4
	4 (0.16)	N			871TM-DH4NE12-A2	871TM-DH4NE12-C2	871TM-DH4NE12-N4	871TM-DH4NE12-D4
	2 (0.08)	Y	N.C.	70	871TM-DH2CE12-A2	871TM-DH2CE12-C2	871TM-DH2CE12-N4	871TM-DH2CE12-D4
	4 (0.16)	N			871TM-DH4CE12-A2	871TM-DH4CE12-C2	871TM-DH4CE12-N4	871TM-DH4CE12-D4
18 mm	5 (0.20)	Y	N.O.	60	871TM-DH5NE18-A2	871TM-DH5NE18-H2	871TM-DH5NE18-N4	871TM-DH5NE18-D4
	8 (0.31)	N			871TM-DH8NE18-A2	871TM-DH8NE18-H2	871TM-DH8NE18-N4	871TM-DH8NE18-D4
	5 (0.20)	Y	N.C.	40	871TM-DH5CE18-A2	871TM-DH5CE18-H2	871TM-DH5CE18-N4	871TM-DH5CE18-D4
	8 (0.31)	N			871TM-DH8CE18-A2	871TM-DH8CE18-H2	871TM-DH8CE18-N4	871TM-DH8CE18-D4
30 mm	10 (0.39)	Y	N.O.	40	871TM-DH10NE30-A2	871TM-DH10NE30-H2	871TM-DH10NE30-N4	871TM-DH10NE30-D4
	15 (0.59)	N			871TM-DH15NE30-A2	871TM-DH15NE30-H2	871TM-DH15NE30-N4	871TM-DH15NE30-D4
	10 (0.39)	Y	N.C.	30	871TM-DH10CE30-A2	871TM-DH10CE30-H2	871TM-DH10CE30-N4	871TM-DH10CE30-D4
	15 (0.59)	N			871TM-DH15CE30-A2	871TM-DH15CE30-H2	871TM-DH15CE30-N4	871TM-DH15CE30-D4
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))							889N-F4AFC-6F	889D-F4AC-2

QD Cordsets and Accessories

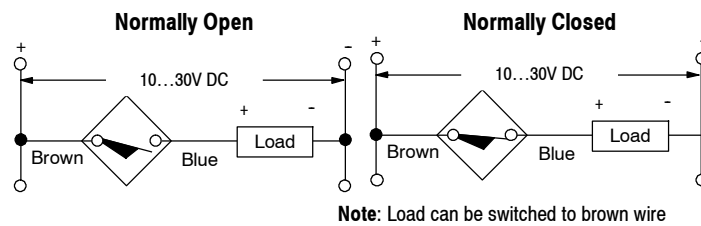
Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-219, 2-220
Mounting Nuts	2-221...2-222

Approximate Dimensions [mm (in.)]

Cable Style



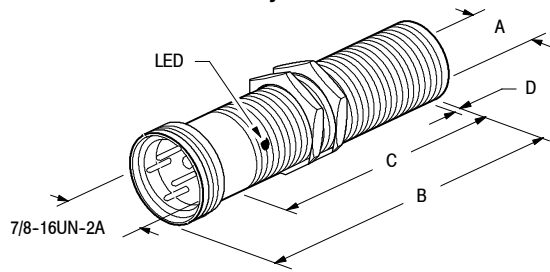
Wiring Diagrams



Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	49.8 (1.96)	26.4 (1.04)	2.5 (0.10)
	N			19.5 (0.77)	9.4 (0.37)
M18 X 1	Y	18.0 (0.71)	55.4 (2.18)	41.7 (1.64)	2.5 (0.10)
	N				14.5 (0.57)
M30 X 1.5	Y	30.0 (1.18)	57.9 (2.28)	41.9 (1.65)	2.5 (0.10)
	N			39.4 (1.55)	18.0 (0.71)

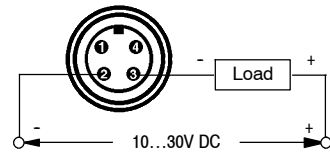
Approximate Dimensions [mm (in.)] (continued)

Mini Quick-Disconnect Style



Wiring Diagrams

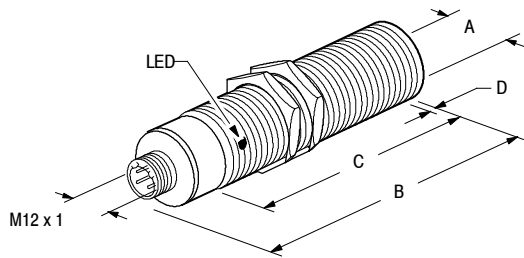
Normally Open or Normally Closed



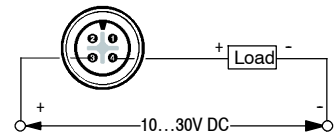
Note: Load can be switched to pin 2.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	63.5 (2.50)	25.4 (1.00)	2.5 (0.10)
	N			18.5 (0.73)	9.4 (0.37)
M18 X 1	Y	18.0 (0.71)	56.1 (2.21)	35.1 (1.38)	2.5 (0.10)
	N			29.2 (1.15)	14.5 (0.57)
M30 X 1.5	Y	30.0 (1.18)	68.1 (2.68)	41.9 (1.65)	2.5 (0.10)
	N			39.4 (1.55)	18.0 (0.71)

Micro Quick-Disconnect Style



Normally Open or Normally Closed



Note: Load can be switched to pin 3.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	61.0 (2.40)	26.4 (1.04)	2.5 (0.10)
	N			19.6 (0.77)	9.4 (0.37)
M18 X 1	Y	18.0 (0.71)	65.0 (2.56)	41.7 (1.64)	2.5 (0.10)
	N				14.5 (0.57)
M30 X 1.5	Y	30.0 (1.18)	66.3 (2.61)	41.9 (1.65)	2.5 (0.10)
	N			39.4 (1.55)	18.0 (0.71)

871TM Intrinsically Safe, 2-Wire DC

Stainless Steel Face and Barrel



871TM Intrinsically Safe
Cable Style



871TM Intrinsically Safe
Micro Quick-Disconnect Style

Description

These special 871TM models are approved as Intrinsically Safe for use in hazardous areas. These special models are designed for use in Division 1, 2; Class I, II, III; Groups A, B, C, D, E, F, G areas when used in conjunction with an appropriate Intrinsically Safe approved zener diode barrier. Recommended barriers are available from Rockwell Automation/Allen-Bradley. These approved units can also be used in Division 2 locations without a barrier.

Features

- 2-wire operation
- 2 conductor or 4 pin connection
- 10...31.5V DC
- Normally open output
- Short circuit, overload, false pulse, transient noise, and reverse polarity protection
- FM and CSA entity approved

Specifications

Outputs	Normally Open
Max. Load Current	25 mA
Min. Load Current	2 mA
Leakage Current	<1.0 mA
Operating Voltage	10...31.5V DC
Voltage Drop	<8V DC
Repeatability	10% typical
Hysteresis	10% typical
Reverse Polarity Protection	Incorporated
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Enclosure	NEMA 1, 2, 3, 3R, 4, 4X, 6, 6P, 12, 13, IP67 (IEC 529) all models; 1200 psi (8270 kPa) washdown; stainless steel face and barrel; ToughLink™ and micro connector versions are also rated IP69K (IEC 529)
Certifications	FM and CSA Approved for - Class I, II, III; Divisions 1, 2; Groups A, B, C, D, E, F, G when used in conjunction with an approved intrinsic safety barrier - Class I, II, III; Division 2; Groups A, B, C, D, E, F, G without intrinsic safety barrier (See control drawing 75001-437 for approval details and wiring diagrams)
Connections	Cable: 2 m (6.5 ft) length A2 - 2 conductor #22AWG PVC C2 - 2 conductor #22AWG ToughLink H2 - 2 conductor #18 AWG ToughLink Quick Disconnect: 4-pin micro style
LED	Red: Output Energized
Operating Temperature [C (F)]	-25...70° (-13...158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.9...1.0
Brass	0.3...0.5
Aluminum	0.1...0.4
Aluminum ≤0.020 Thick	0.9...1.1
Copper	0.4...0.6

Entity Parameters

Sensor			Barrier	
V _{max}	31.5V	≧	V _t	
I _{max}	130 mA	≧	I _t	
P _{max}	1.25 W	≧	P _t	
C _i	0 μF	≦	C _a	
L _i	0 mH	≦	L _a	

ATTENTION



Operating parameters must be adhered to.

Inductive Proximity Sensors
871TM Intrinsically Safe, 2-Wire DC
Stainless Steel Face and Barrel

Product Selection

Barrel Dia.	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.		
					PVC Cable	ToughLink™ Cable	Micro QD Style
12 mm	2 (0.08)	Y	N.O.	75	871TM-DR2NE12-A2	871TM-DR2NE12-C2	871TM-DR2NE12-D4
	4 (0.16)	N			871TM-DR4NE12-A2	871TM-DR4NE12-C2	871TM-DR4NE12-D4
18 mm	5 (0.20)	Y		60	871TM-DR5NE18-A2	871TM-DR5NE18-H2	871TM-DR5NE18-D4
	8 (0.31)	N			871TM-DR8NE18-A2	871TM-DR8NE18-H2	871TM-DR8NE18-D4
30 mm	10 (0.39)	Y		40	871TM-DR10NE30-A2	871TM-DR10NE30-H2	871TM-DR10NE30-D4
	15 (0.59)	N			871TM-DR15NE30-A2	871TM-DR15NE30-H2	871TM-DR15NE30-D4
Recommended Standard QD Cordset (-2 = 2 m (6.5 ft))							889D-F4LC-2 ①

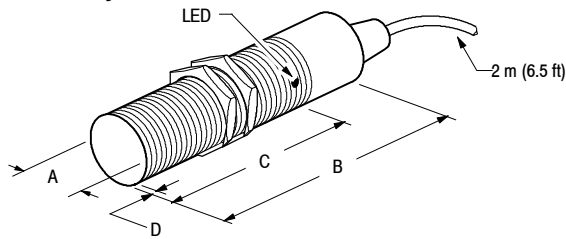
① Intrinsically Safe wiring labels 897H-L1 or 897H-L2 must be applied every 7.6 m (25 ft).

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Zener Diode Barriers	NO TAG
Intrinsically Safe Wiring Labels	12-8

Approximate Dimensions [mm (in.)]

Cable Style



Wiring Diagrams

See pages 2-39 and 2-40.

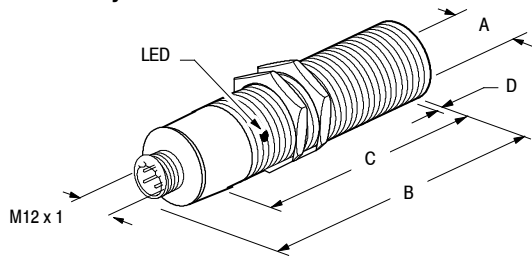
Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 x 1	Y	12.0 (0.47)	72.1 (2.84)	38.4 (1.51)	2.5 (0.10)
	N			31.5 (1.24)	9.4 (0.37)
M18 x 1	Y	18.0 (0.71)	74.7 (2.94)	60.0 (2.36)	2.5 (0.10)
	N			48.2 (1.90)	14.4 (0.56)
M30 x 1.5	Y	30.0 (1.18)	77.2 (3.04)	61.3 (2.41)	2.5 (0.10)
	N			41.6 (1.64)	17.9 (0.70)

871TM Intrinsically Safe, 2-Wire DC

Stainless Steel Face and Barrel

Approximate Dimensions [mm (in.)]

Micro QD Style

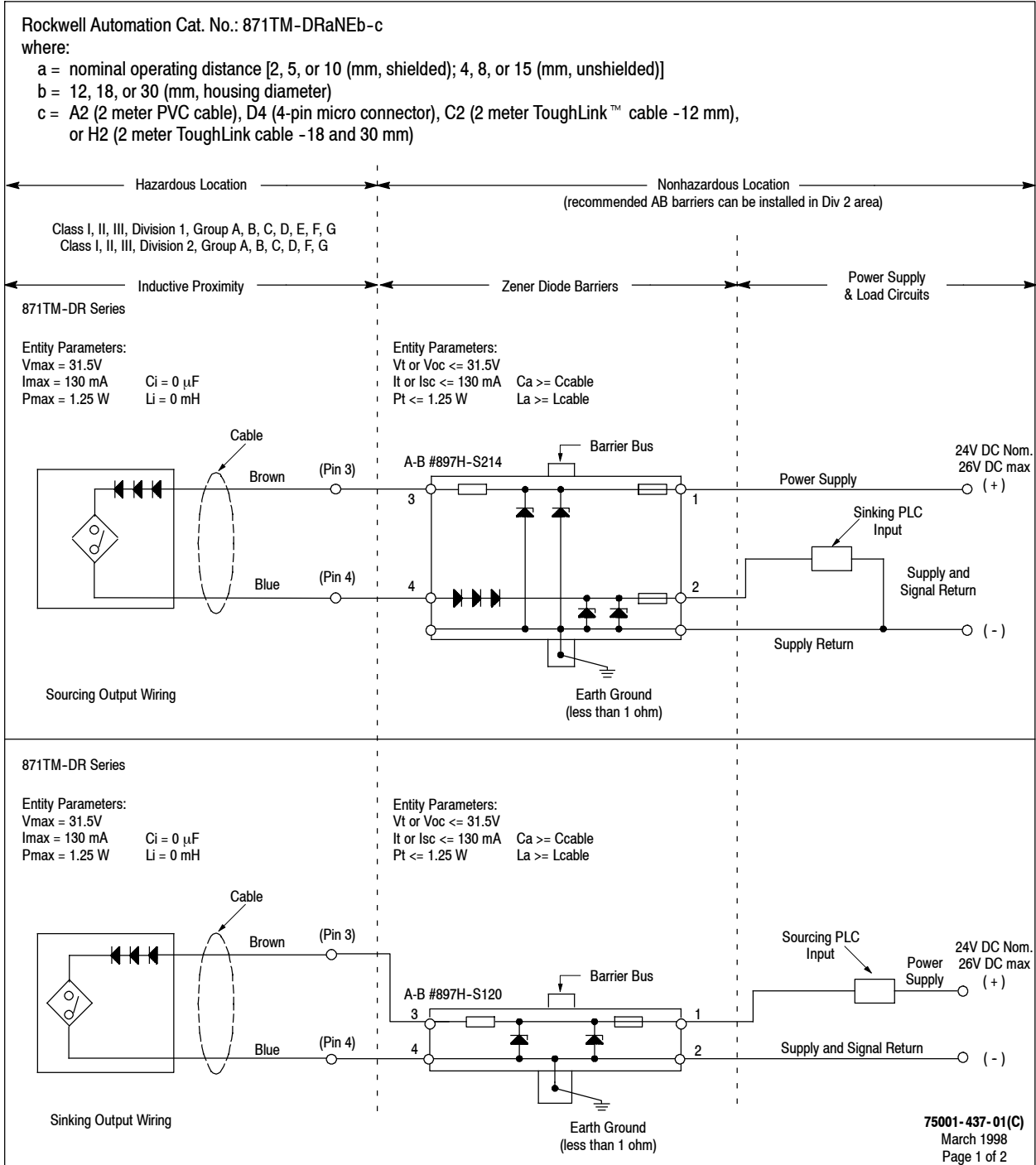


Wiring Diagrams

See pages 2-39 and 2-40.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 x 1	Y	12.0 (0.47)	72.1 (2.84)	38.4 (1.51)	2.5 (0.10)
	N			31.5 (1.24)	9.4 (0.37)
M18 x 1	Y	18.0 (0.71)	74.7 (2.94)	60.0 (2.36)	2.5 (0.10)
	N			48.2 (1.90)	14.4 (0.56)
M30 x 1.5	Y	30.0 (1.18)	77.2 (3.04)	61.3 (2.41)	2.5 (0.10)
	N			41.6 (1.64)	17.9 (0.70)

Inductive Proximity Sensors
Division 1 Installation Wiring Diagrams



ATTENTION



Operating parameters must be adhered to.

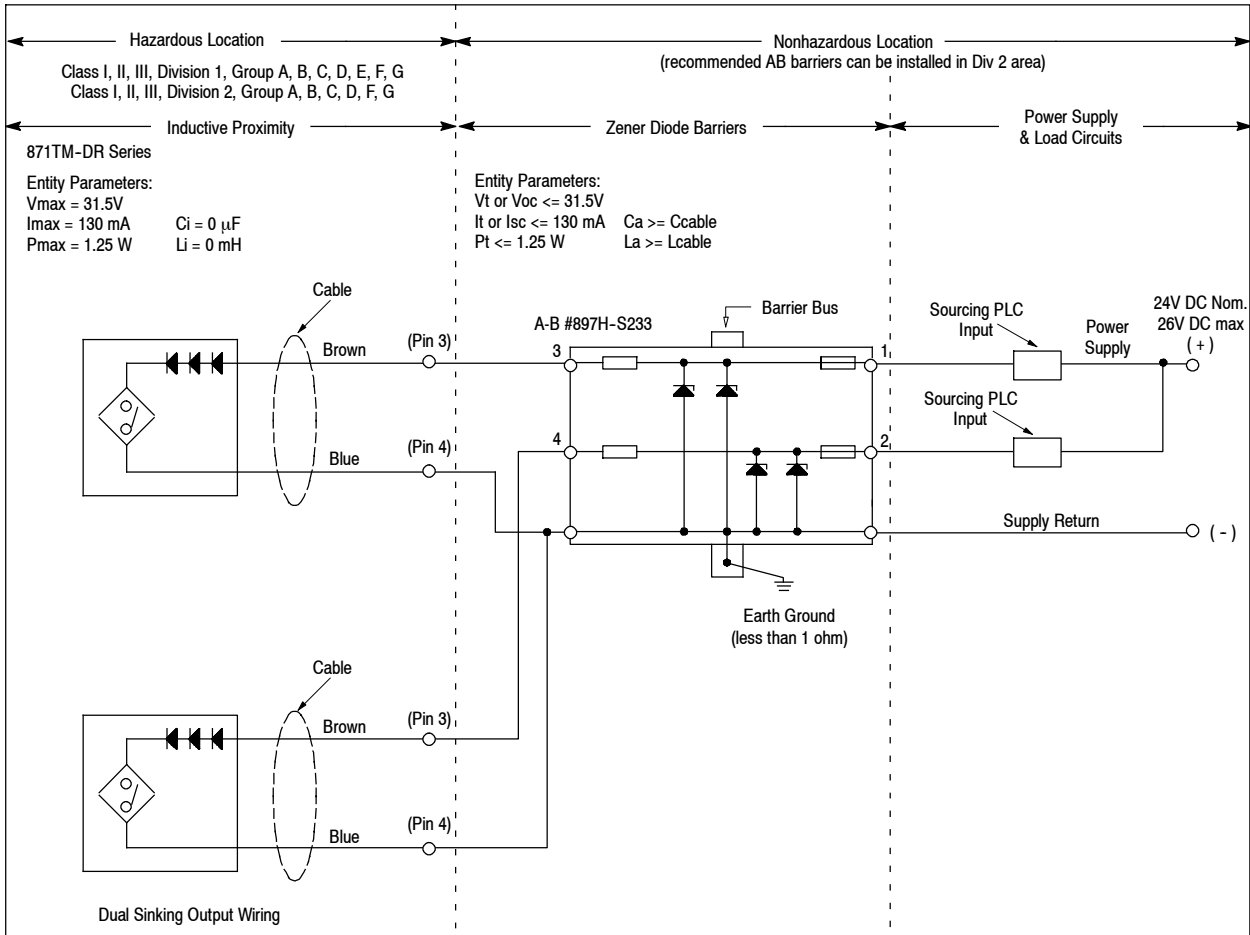
Inductive Proximity Sensors

871TM Intrinsically Safe, 2-Wire DC

Stainless Steel Face and Barrel

Inductive Proximity Sensors

Division 1 Installation Wiring Diagrams (continued)



Factory Mutual Installation Notes:

- 1 Installation must be in accordance with the National Electrical Code® (NFPA 70, Article 504), ANSI/ISA-RP12.6, and the manufacturer's instructions.
- 2 If the electrical parameters of the cable used are unknown, the following values may be used: Capacitance - 60 pF/ft.; Inductance - 0.20 µH/ft.
- 3 The wiring between each Inductive Proximity Sensor and its corresponding channel of the dual-channel barrier is a separate intrinsically safe circuit. Each of the two separate intrinsically safe circuits shall be in separate cables or shall be separated from each other as specified in NEC 504-30. The supply return conductors may be connected at the barrier's grounding terminal.
- 4 The Barrier bus must be insulated from other grounded metal. Use DIN Rail Mounting Kit, Rockwell Automation #64-136.
- 5 The maximum nonhazardous location voltage must not exceed 250V AC or DC.
- 6 Barriers are not required for Division 2 (31.5V DC max.). Division 2 applications must be installed in accordance with the NEC.
- 7 **WARNING:** Substitution of components may impair Intrinsic Safety.
- 8 No revision to drawing without prior FMRC approval.

Canadian Standards Association Installation Notes:

- 1 Installation must be in accordance with the Canadian Electrical Code (Part I), ANSI/ISA-RP12.6, and the manufacturer's instructions.
- 2 If the electrical parameters of the cable used are unknown, the following values may be used: Capacitance - 60 pF/ft.; Inductance - 0.20 µH/ft.
- 3 The wiring between each Inductive Proximity Sensor and its corresponding channel of the dual-channel barrier is a separate intrinsically safe circuit. Each of the two separate intrinsically safe circuits shall be in separate cables or shall be separated from each other as specified in CEC. The supply return conductors may be connected at the barrier's grounding terminal.
- 4 The Barrier bus must be insulated from other grounded metal. Use DIN Rail Mounting Kit, Allen-Bradley #64-136.
- 5 The maximum nonhazardous location voltage must not exceed 250V AC or DC.
- 6 Barriers are not required for Division 2 (31.5V DC max.). Division 2 applications must be installed in accordance with the CEC.
- 7 In Division 2 applications without barriers observe the following warnings:
WARNING: EXPLOSION HAZARD. Do not disconnect equipment unless power has been switched off or the area is known to be nonhazardous.
- 8 **WARNING:** Substitution of components may impair Intrinsic Safety.
- 9 No revision to drawing without prior CSA approval.

75001-437-01(C)
 March 1998
 Page 2 of 2

ATTENTION



These parameters must be adhered to.



871TM AC/DC Cable Style
12, 18, 30 mm



871TM AC/DC Mini
Quick-Disconnect Style
12, 18, 30 mm



871TM AC/DC Micro
Quick-Disconnect Style
12, 18, 30 mm



871TM AC/DC EAC Micro
Quick-Disconnect Style
12 mm

Features

- 2-wire operation
- 2-conductor, 3-conductor, 3-pin or 4-pin connection
- 20...250V AC/DC
- Normally open or normally closed output
- Short-circuit, false pulse, overload, and transient noise protection
- UL Listed, CSA Certified and CE Marked for all applicable directives

Specifications

	12 mm	18 & 30 mm
Load Current	5...200 mA	5...250 mA
Inrush Current (1 cycle)	≤2 A	≤4 A
Leakage Current	≤1.9 mA @ 120V AC	
Operating Voltage	20...250V AC/DC	
Voltage Drop	≤10V @ 5...200 mA	≤10V @ 5...250 mA
Repeatability	≤10% at constant temperature	
Hysteresis	7% typical	
False Pulse Protection	Incorporated	
Transient Noise Protection	Incorporated	
Short-Circuit Protection	Trigger @ 5 A typical	Trigger @ 8 A typical
Overload Protection	Trigger @ 260 mA typical	Trigger @ 320 mA typical
Certifications	UL Listed, CSA Certified and CE Marked for all applicable directives	
Enclosure	NEMA 1, 2, 3, 3R, 4, 4X, 6, 6P, 12, 13 IP67 (IEC 529) all models; 1200 psi (8270 kPa) washdown; stainless steel face and barrel; ToughLink™ and micro connector versions are also rated IP69K (IEC 529)	
Connections	Cable: 2 m (6.5 ft) length A2—2-conductor #22 AWG PVC C2—2-conductor #22 AWG ToughLink H2—3-conductor #18 AWG ToughLink Quick-Disconnect: 3-pin mini style 3-pin micro style 4-pin EAC micro style	
LEDs	Red: Output energized Green: Power Short circuit: Red and green flashing	
Operating Temperature [C (F)]	-25...+70° (-13...+158°)	
Shock	30 g, 11 ms	
Vibration	55 Hz, 1 mm amplitude, 3 planes	

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.9...1.0
Brass	0.3...0.5
Aluminum	0.1...0.4
Aluminum ≤0.020 Thick	0.9...1.1
Copper	0.4...0.6

Inductive Proximity Sensors

871TM 2-Wire AC/DC

Stainless Steel Face/Threaded Stainless Steel Barrel

Product Selection

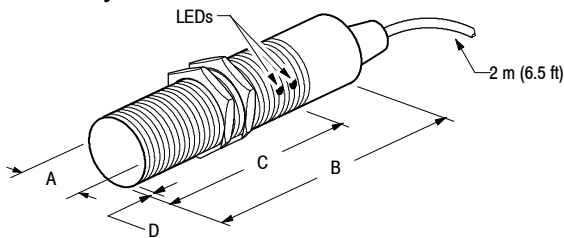
Barrel Dia.	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.				
					PVC Cable	ToughLink™ Cable	Mini QD Style	Micro QD Style	EAC Micro QD Style
12 mm	3 (0.12)	Y	N.O.	35	871TM-B3N12-A2	871TM-B3N12-C2	871TM-B3N12-N3	871TM-B3N12-R3	—
			N.C.	30	871TM-B3C12-A2	871TM-B3C12-C2	871TM-B3C12-N3	871TM-B3C12-R3	—
	4 (0.16)	N	N.O.	20	871TM-B4N12-A2	871TM-B4N12-C2	871TM-B4N12-N3	871TM-B4N12-R3	871TM-B4N12-B4
			N.C.	15	871TM-B4C12-A2	871TM-B4C12-C2	871TM-B4C12-N3	871TM-B4C12-R3	—
18 mm	5 (0.20)	Y	N.O.	20	871TM-B5N18-A2	871TM-B5N18-H2	871TM-B5N18-N3	871TM-B5N18-R3	—
			N.C.	15	871TM-B5C18-A2	871TM-B5C18-H2	871TM-B5C18-N3	871TM-B5C18-R3	—
	8 (0.31)	N	N.O.	15	871TM-B8N18-A2	871TM-B8N18-H2	871TM-B8N18-N3	871TM-B8N18-R3	—
			N.C.	12	871TM-B8C18-A2	871TM-B8C18-H2	871TM-B8C18-N3	871TM-B8C18-R3	—
30 mm	10 (0.39)	Y	N.O.	15	871TM-B10N30-A2	871TM-B10N30-H2	871TM-B10N30-N3	871TM-B10N30-R3	—
			N.C.	12	871TM-B10C30-A2	871TM-B10C30-H2	871TM-B10C30-N3	871TM-B10C30-R3	—
	15 (0.59)	N	N.O.	12	871TM-B15N30-A2	871TM-B15N30-H2	871TM-B15N30-N3	871TM-B15N30-R3	—
			N.C.	10	871TM-B15C30-A2	871TM-B15C30-H2	871TM-B15C30-N3	871TM-B15C30-R3	—
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))							889N-F3AFC-6F	889R-F3ECA-2	889B-F3AC-2

QD Cordsets and Accessories

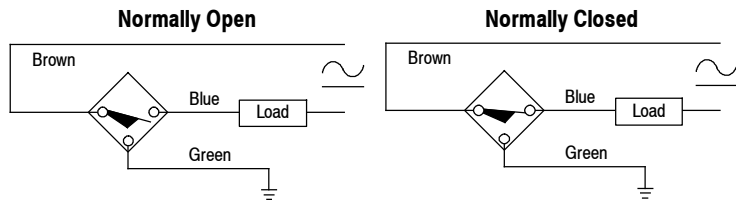
Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-219, 2-220
Mounting Nuts	2-221...2-222

Approximate Dimensions [mm (in.)]

Cable Style



Wiring Diagrams



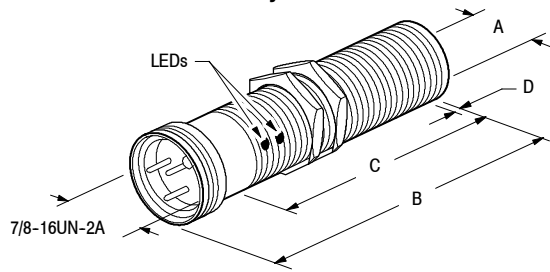
Note 1: No green wire on 12 mm and on sensors with PVC cable (-A2). Attach housing to ground.

Note 2: Load can be switched to brown wire.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 x 1	Y	12.0 (0.47)	72.1 (2.84)	38.4 (1.51)	2.5 (0.10)
	N			31.5 (1.24)	9.4 (0.37)
M18 x 1	Y	18.0 (0.71)	74.7 (2.94)	60.0 (2.36)	2.5 (0.10)
	N			48.2 (1.90)	14.4 (0.56)
M30 x 1.5	Y	30.0 (1.18)	77.2 (3.04)	61.3 (2.41)	2.5 (0.10)
	N			41.6 (1.64)	17.9 (0.70)

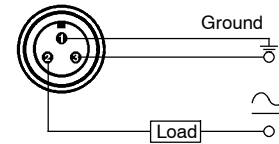
Approximate Dimensions [mm (in.)] (continued)

Mini Quick-Disconnect Style



Wiring Diagrams

Normally Open or Normally Closed

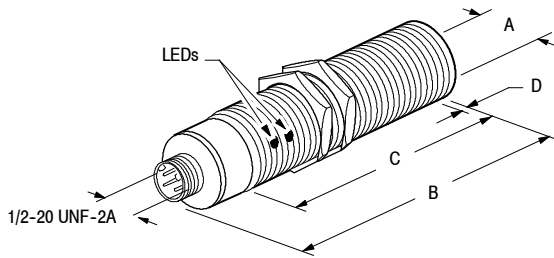


Note 1: No ground pin on 12 mm. Attach housing to ground.

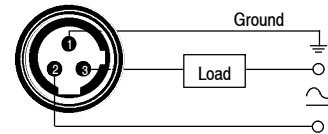
Note 2: Load can be switched to pin 3.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	85.6 (3.37)	37.8 (1.49)	2.5 (0.10)
	N			31.7 (1.25)	9.4 (0.37)
M18 X 1	Y	18.0 (0.71)	76.6 (3.02)	54.9 (2.16)	2.5 (0.10)
	N			43.1 (1.70)	14.4 (0.56)
M30 X 1.5	Y	30.0 (1.18)	86.4 (3.40)	61.3 (2.41)	2.5 (0.10)
	N			41.6 (1.64)	17.9 (0.70)

Micro Quick-Disconnect Style



Normally Open or Normally Closed

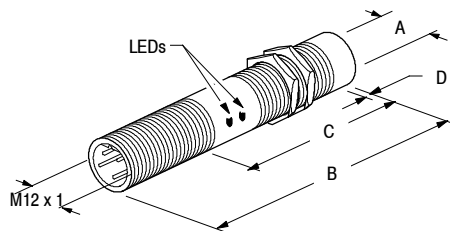


Note 1: No ground pin on 12 mm. Attach housing to ground.

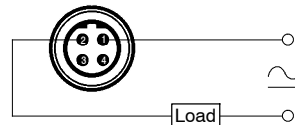
Note 2: Load can be switched to pin 2.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	87.3 (3.44)	38.4 (1.51)	2.5 (0.10)
	N			31.5 (1.24)	9.4 (0.37)
M18 X 1	Y	18.0 (0.71)	84.3 (3.32)	60.0 (2.36)	2.5 (0.10)
	N			48.2 (1.90)	14.4 (0.56)
M30 X 1.5	Y	30.0 (1.18)	85.7 (3.37)	61.3 (2.41)	2.5 (0.10)
	N			46.1 (1.81)	17.9 (0.70)

EAC Micro Quick-Disconnect Style



Normally Open



Note 1: No ground pin. Attach housing to ground.

Note 2: Load can be switched to pin 2.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	N	12.0 (0.47)	83.0 (3.27)	31.7 (1.25)	9.4 (0.37)

871TM 2-Wire AC/DC PLC Interfacer

Stainless Steel Face/Threaded Short Stainless Steel Barrel



871TM AC/DC Cable Style
12, 18, 30 mm



871TM AC/DC Mini
Quick-Disconnect Style
12, 18, 30 mm



871TM AC/DC Micro
Quick-Disconnect Style
12, 18, 30 mm



871TM AC/DC EAC Micro
Quick-Disconnect Style
12 mm

Specifications

Load Current	2...25 mA
Leakage Current	≤0.9 mA at 24V DC ≤1.7 mA at 20...120V AC/DC; ≤2.5 mA at 121...250V AC/DC
Operating Voltage	20...250V AC/DC
Voltage Drop	≤8V at 25 mA DC ≤10V at 25 mA AC
Repeatability	10% typical
Hysteresis	10% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Radio Frequency Protection	10V per meter Frequency range 20...1000MHz
Certifications	UL Listed, CSA Certified and CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 3R, 4, 4X, 6, 6P, 12, 13, IP67 (IEC 529) all models; 1200 psi (8270 kPa) washdown; stainless steel face and barrel; ToughLink™ and micro connector versions are also rated IP69K (IEC 529)
Connections	Cable: 2 m (6.5 ft) length A2—2-conductor #22 AWG PVC C2—2-conductor #22 AWG ToughLink H2—2-conductor #18 AWG ToughLink Quick-Disconnect: 3-pin mini style 3-pin micro style 4-pin EAC micro style
LED	Red: Output energized
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.8...1.0
Brass	0.4...0.7
Aluminum	0.4...0.7
Copper	0.2...0.5

Features

- Designed for low load current PLC, I/O, and PC applications
- 2-wire operation
- 2-conductor, 3-pin or 4-pin connection
- 20...250V AC/DC
- Normally open or normally closed output
- False pulse, transient noise, and radio frequency protection
- UL Listed, CSA Certified, and CE Marked for all applicable directives

871TM 2-Wire AC/DC PLC Interfacer

Stainless Steel Face/Threaded Short Stainless Steel Barrel

Product Selection

Barrel Dia.	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.				
					PVC Cable	ToughLink™ Cable	Mini QD Style	Micro QD Style	EAC Micro QD Style
12 mm	2 (0.08)	Y	N.O.	75	871TM-BH2N12-A2	871TM-BH2N12-C2	871TM-BH2N12-N3	871TM-BH2N12-R3	871TM-BH2N12-B4
	4 (0.16)	N		35	871TM-BH4N12-A2	871TM-BH4N12-C2	871TM-BH4N12-N3	871TM-BH4N12-R3	—
18 mm	5 (0.20)	Y	N.O.	65	871TM-BH5N18-A2	871TM-BH5N18-H2	871TM-BH5N18-N3	871TM-BH5N18-R3	—
	8 (0.31)	N		30	871TM-BH8N18-A2	871TM-BH8N18-H2	871TM-BH8N18-N3	871TM-BH8N18-R3	—
30 mm	10 (0.39)	Y	N.O.	45	871TM-BH10N30-A2	871TM-BH10N30-H2	871TM-BH10N30-N3	871TM-BH10N30-R3	—
	15 (0.59)	N		20	871TM-BH15N30-A2	871TM-BH15N30-H2	871TM-BH15N30-N3	871TM-BH15N30-R3	—
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))							889N-F3AFC-6F	889R-F3ECA-2	889B-F3AC-2

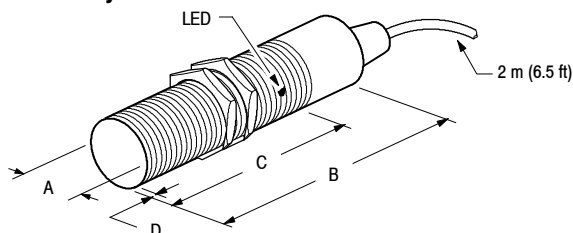
Note: Normally closed models available as special order items. Fifteen piece minimum order required. Consult your local Rockwell Automation sales office or Allen-Bradley distributor for prices and lead times.

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-219, 2-220
Mounting Nuts	2-221...2-222

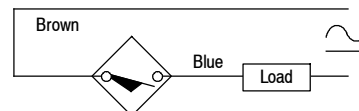
Approximate Dimensions [mm (in.)]

Cable Style



Wiring Diagrams

Normally Open



Note 1: Attach housing to ground.
Note 2: Load can be switched to brown wire.

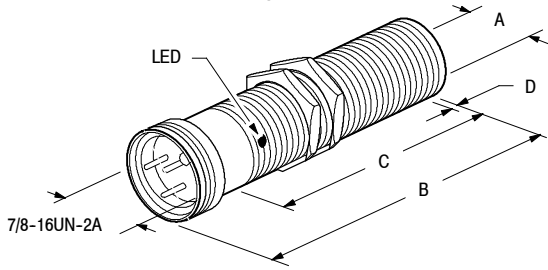
Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	49.8 (1.96)	26.4 (1.04)	2.5 (0.10)
	N			19.5 (0.77)	9.4 (0.37)
M18 X 1	Y	18.0 (0.71)	55.4 (2.18)	41.7 (1.64)	2.5 (0.10)
	N				14.5 (0.57)
M30 X 1.5	Y	30.0 (1.18)	57.9 (2.28)	41.9 (1.65)	2.5 (0.10)
	N			39.4 (1.55)	18.0 (0.71)

871TM 2-Wire AC/DC PLC Interfacer

Stainless Steel Face/Threaded Short Stainless Steel Barrel

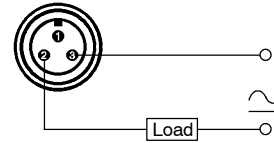
Approximate Dimensions [mm (in.)] (continued)

Mini Quick-Disconnect Style



Wiring Diagrams

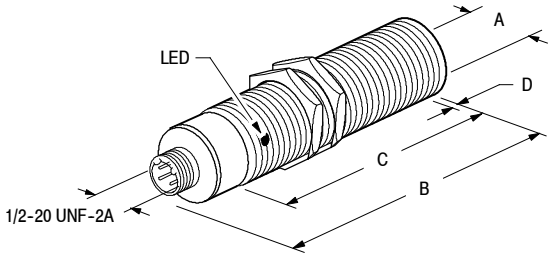
Normally Open



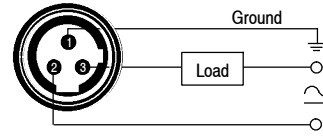
Note 1: Attach housing to ground.
Note 2: Load can be switched to pin 3.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	63.5 (2.50)	25.4 (1.00)	2.5 (0.10)
	N			18.5 (0.73)	9.4 (0.37)
M18 X 1	Y	18.0 (0.71)	56.1 (2.21)	35.1 (1.38)	2.5 (0.10)
	N			29.2 (1.15)	14.5 (0.57)
M30 X 1.5	Y	30.0 (1.18)	68.1 (2.68)	41.9 (1.65)	2.5 (0.10)
	N			39.4 (1.55)	18.0 (0.71)

Micro Quick-Disconnect Style



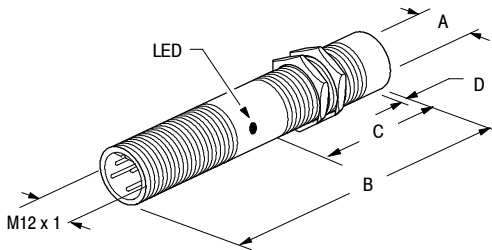
Normally Open



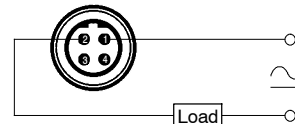
Note 1: Attach housing to ground.
Note 2: Load can be switched to pin 2.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	61.0 (2.40)	26.4 (1.04)	2.5 (0.10)
	N			19.6 (0.77)	9.4 (0.37)
M18 X 1	Y	18.0 (0.71)	65.0 (2.56)	41.7 (1.64)	2.5 (0.10)
	N			39.4 (1.55)	14.5 (0.57)
M30 X 1.5	Y	30.0 (1.18)	66.3 (2.61)	41.9 (1.65)	2.5 (0.10)
	N			39.4 (1.55)	18.0 (0.71)

EAC Micro Quick-Disconnect Style



Normally Open



Note 1: No ground pin. Attach housing to ground.
Note 2: Load can be switched to pin 2.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	61.0 (2.40)	26.4 (1.04)	2.5 (0.10)



Description

Bulletin 872C WorldProx inductive proximity sensors are self-contained, general purpose, solid-state devices designed to sense the presence of ferrous and nonferrous metal objects without touching them.

The switch body consists of a plastic face and a nickel-plated brass barrel. It meets NEMA 1, 2, 3, 4, 6P, 12, 13 and IP67 (IEC529) enclosure standards. The electronic circuitry is fully potted for protection against shock, vibration, and contamination.

All models have a 360° visible LED. Cable models have a translucent end cap which glows when the LED indicator is on, and is visible from almost every angle. Quick-disconnect models have a four porthole LED design for better visibility from most angles. In addition to making installation easier, 360° visibility may facilitate troubleshooting.

These sensors are available in 6.5, 8, 12, 18 and 30 mm diameters. Connection options for 3-wire sensors include PVC or PUR cable jacket and mini, micro, and pico quick-disconnect style. Three-wire DC cable style sensors are available with 2, 5, or 10 m PVC or PUR cables (2 m PVC is standard).

Features

- Threaded, nickel-plated brass barrel
- 360° visible LED
- Cable or quick-disconnect styles
- Short circuit protection
- Overload protection
- Transient noise protection
- False pulse protection
- Reverse polarity protection
- cULus Listed and CE Marked for all applicable directives

Styles

DC 3-Wire	page 2-48
DC 3-Wire Short Barrel	page 2-52
DC 3-Wire Extended Sensing	page 2-56
DC 3-Wire Short Barrel with Extended Sensing	page 2-60
DC 3-Wire Plastic Barrel	page 2-64
DC 2-Wire	page 2-67
DC 2-Wire QuadroPlex	page 2-70
DC 4-Wire Complementary Output	page 2-72
AC 2-Wire	page 2-74
AC 2-Wire Extended Sensing	page 2-77
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AC/DC 2-Wire Relay Output	page 2-83

QD Cordsets and Accessories

Cordsets	page 8-1
Mounting Bracket, Spring Return Style	page 2-210
Mounting Bracket, Swivel/Tilt Style	page 2-212
Mounting Bracket, Right Angle Style	page 2-213
Mounting Bracket, Clamp Style	page 2-214
End Caps	page 2-220
Mounting Nuts	page 2-221
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General Information

Torque Chart	page 2-225
Metric/English Conversion Chart	page 14-6

872C WorldProx™ 3-Wire DC

Plastic Face/Threaded Nickel-Plated Brass Barrel



872C DC Micro Style
6.5, 8, 12, 18, 30 mm



872C Pico Style
6.5, 8, 12, 18 mm



872C DC Mini Style
18, 30 mm



872C DC Cable Style
8, 12, 18, 30 mm

Features

- 3-wire operation
- 3-conductor PVC or PUR cable jacket (PVC standard)
- 3- or 4-pin connection for pico, micro, and mini connectors
- Available in 2, 5, and 10 m cable lengths (2 m standard)
- 10...30V DC
- Normally open or normally closed
- Reverse polarity, short circuit, overload, false pulse, and transient noise protection
- cULus Listed and CE Marked for all applicable directives

Specifications

Load Current	≤200 mA
Leakage Current	≤10 mA
Operating Voltage	10...30V DC
Voltage Drop	≤1.8V all models
Repeatability	≤5%
Hysteresis	10% typical
Reverse Polarity Protection	Incorporated
Transient Noise Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
False Pulse Protection	Incorporated
Certifications	cULus Listed and CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 4, 6P, 12, 13 IP67 (IEC529) Nickel-plated brass barrel, plastic face (PBT)
Connections	Cable: 2 m (6.5 ft), 5 m (16.4 ft), 10 m (32.8 ft) length, 4.4 mm (0.175 in.) diameter 3-conductor #26 AWG PVC or PUR Quick-Disconnect: 4-pin mini style 4-pin micro style 3-pin pico style
LED	Amber: Output energized, 360° visibility
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factors
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.2...0.3

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
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Mounting Brackets	2-210...2-214
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Mounting Nuts	2-221...2-222

Product Selection

Barrel Dia.	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration		Switching Frequency [Hz]	Cat. No.							
						Cable Style	Mini QD Style	Micro QD Style	Pico QD Style				
6.5 mm	2 (0.08)	Y	N.O.	NPN	2000	872C-MM1NN7-E2	—	—	872C-MM1NN7-P3				
				PNP		872C-MM1NP7-E2	—	—	872C-MM1NP7-P3				
			N.C.	NPN		872C-MM1CN7-E2	—	—	872C-MM1CN7-P3				
				PNP		872C-MM1CP7-E2	—	—	872C-MM1CP7-P3				
	3 (0.12)	N	N.O.	NPN		872C-NM3NN7-E2	—	—	872C-NM3NN7-P3				
				PNP		872C-NM3NP7-E2	—	872C-NM3NP7-D4	872C-NM3NP7-P3				
			N.C.	NPN		—	—	—	—				
				PNP		—	—	—	—				
8 mm	2 (0.08)	Y	N.O.	NPN	2500	872C-D2NN8-E2	—	872C-D2NN8-D4	872C-D2NN8-P3				
				PNP		872C-D2NP8-E2	—	872C-D2NP8-D4	872C-D2NP8-P3				
			N.C.	NPN		872C-D2CN8-E2	—	872C-D2CN8-D4	872C-D2CN8-P3				
				PNP		872C-D2CP8-E2	—	872C-D2CP8-D4	872C-D2CP8-P3				
			3 (0.12)	N		N.O.	NPN	872C-D3NN8-E2	—	872C-D3NN8-D4	872C-D3NN8-P3		
							PNP	872C-D3NP8-E2	—	872C-D3NP8-D4	872C-D3NP8-P3		
	N.C.	NPN				872C-D3CN8-E2	—	872C-D3CN8-D4	872C-D3CN8-P3				
		PNP				872C-D3CP8-E2	—	872C-D3CP8-D4	872C-D3CP8-P3				
	12 mm	3 (0.12)				Y	N.O.	NPN	1300	872C-D3NN12-E2	—	872C-D3NN12-D4	872C-D3NN12-P3
								PNP		872C-D3NP12-E2	—	872C-D3NP12-D4	872C-D3NP12-P3
			N.C.	NPN			872C-D3CN12-E2	—		872C-D3CN12-D4	872C-D3CN12-P3		
				PNP			872C-D3CP12-E2	—		872C-D3CP12-D4	872C-D3CP12-P3		
4 (0.16)			N	N.O.	NPN		872C-D4NN12-E2	—		872C-D4NN12-D4	872C-D4NN12-P3		
		PNP			872C-D4NP12-E2	—	872C-D4NP12-D4	872C-D4NP12-P3					
		N.C.		NPN	872C-D4CN12-E2	—	872C-D4CN12-D4	872C-D4CN12-P3					
				PNP	872C-D4CP12-E2	—	872C-D4CP12-D4	872C-D4CP12-P3					
		18 mm		5 (0.20)	Y	N.O.	NPN	1500		872C-D5NN18-E2	872C-D5NN18-N4	872C-D5NN18-D4	872C-D5NN18-P3
PNP			872C-D5NP18-E2				872C-D5NP18-N4			872C-D5NP18-D4	872C-D5NP18-P3		
N.C.	NPN		872C-D5CN18-E2			872C-D5CN18-N4	872C-D5CN18-D4		872C-D5CN18-P3				
	PNP		872C-D5CP18-E2			872C-D5CP18-N4	872C-D5CP18-D4		872C-D5CP18-P3				
8 (0.31)	N		N.O.			NPN	872C-D8NN18-E2		872C-D8NN18-N4	872C-D8NN18-D4	872C-D8NN18-P3		
						PNP	872C-D8NP18-E2		872C-D8NP18-N4	872C-D8NP18-D4	872C-D8NP18-P3		
			N.C.			NPN	872C-D8CN18-E2		872C-D8CN18-N4	872C-D8CN18-D4	872C-D8CN18-P3		
				PNP	872C-D8CP18-E2	872C-D8CP18-N4	872C-D8CP18-D4		872C-D8CP18-P3				
			10 (0.39)	Y	N.O.	NPN	1000		872C-D10NN30-E2	872C-D10NN30-N4	872C-D10NN30-D4	—	
						PNP			872C-D10NP30-E2	872C-D10NP30-N4	872C-D10NP30-D4	—	
					N.C.	NPN			872C-D10CN30-E2	872C-D10CN30-N4	872C-D10CN30-D4	—	
PNP	872C-D10CP30-E2					872C-D10CP30-N4			872C-D10CP30-D4	—			
15 (0.59)	N				N.O.	NPN			872C-D15NN30-E2	872C-D15NN30-N4	872C-D15NN30-D4	—	
						PNP			872C-D15NP30-E2	872C-D15NP30-N4	872C-D15NP30-D4	—	
		N.C.			NPN	872C-D15CN30-E2		872C-D15CN30-N4	872C-D15CN30-D4	—			
			PNP	872C-D15CP30-E2	872C-D15CP30-N4	872C-D15CP30-D4	—						
		Recommended standard QD cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))						889N-F4AFC-6F	889D-F4AC-2	889P-F3AB-2			

Cable Options: replace last two cat. no. characters (8, 12, 18 and 30 mm sensors only)

Cable Length	PVC	PUR
2 m	E2	J2
5 m	E5	J5
10 m	E10	J10

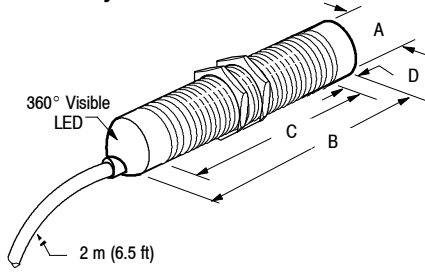
Inductive Proximity Sensors

872C WorldProx™ 3-Wire DC

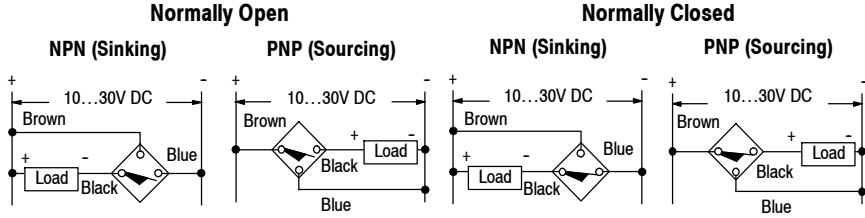
Plastic Face/Threaded Nickel-Plated Brass Barrel

Approximate Dimensions [mm (in.)]

Cable Style



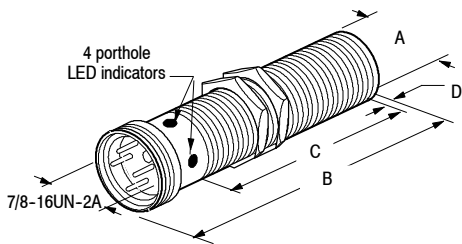
Wiring Diagrams



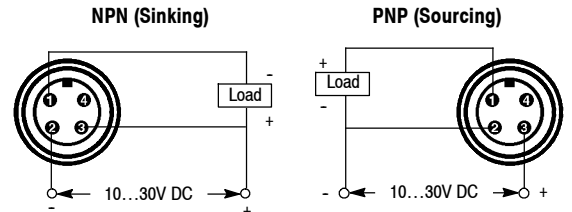
Thread Size	Smooth Diameter	Shielded	[mm (in.)]			
			A	B (max)	C (min)	D (max)
—	6.5	Y	6.5 (0.26)	33 (1.3)	—	—
M8 X 1	—	Y	8.0 (0.31)	32.8 (1.29)	30.2 (1.19)	—
		N		36.8 (1.45)		4.1 (0.16)
M12 X 1	—	Y	12.0 (0.47)	50.8 (2.00)	46.7 (1.84)	—
		N		58.9 (2.32)		8.1 (0.32)
M18 X 1	—	Y	18.0 (0.71)	50.8 (2.00)		—
		N		63.0 (2.48)		12.2 (0.48)
M30 X 1.5	—	Y	30.0 (1.18)	50.8 (2.00)	—	
		N		63.0 (2.48)	12.2 (0.48)	

Mini QD Style

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
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Mounting Nuts	2-221...2-222



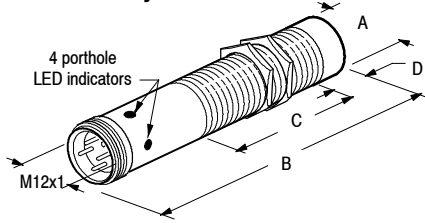
Normally Open or Normally Closed



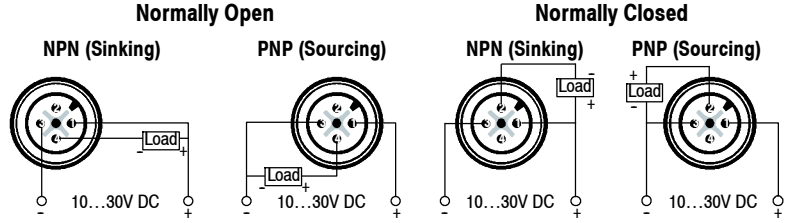
Thread Size	Shielded	[mm (in.)]			
		A	B (max)	C (min)	D (max)
M18 X 1	Y	18.0 (0.71)	63.5 (2.50)	35.1 (1.38)	—
	N		75.7 (2.98)		12.2 (0.48)
M30 X 1.5	Y	30.0 (1.18)	63.5 (2.50)	38.1 (1.50)	—
	N		75.7 (2.98)		12.2 (0.48)

Approximate Dimensions [mm (in.)]

Micro QD Style

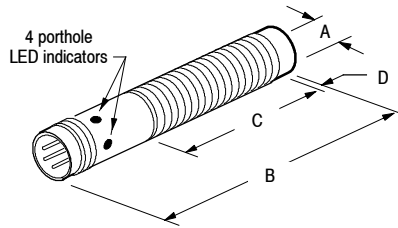


Wiring Diagrams

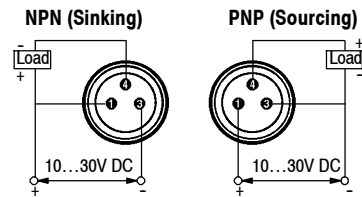


Thread Size	Shielded	[mm (in.)]			
		A	B (max)	C (min)	D (max)
M8 X 1	Y	8.0 (0.31)	58.0 (2.28)	27.7 (1.09)	—
	N		62.0 (2.44)		4.1 (0.16)
M12 X 1	Y	12.0 (0.47)	63.5 (2.50)	38.1 (1.50)	—
	N		71.6 (2.82)		8.1 (0.32)
M18 X 1	Y	18.0 (0.71)	63.5 (2.50)		—
	N		75.7 (2.98)		12.2 (0.48)
M30 X 1.5	Y	30.0 (1.18)	63.5 (2.50)	47.75 (1.88)	—
	N		75.7 (2.98)		12.2 (0.48)

Pico QD Style



Normally Open or Normally Closed



Thread Size	Smooth Diameter	Shielded	[mm (in.)]			
			A	B (max)	C (min)	D (max)
—	6.5	Y	6.5 (0.26)	49 (1.93)	—	—
M8 X 1	—	Y	8.0 (0.31)	49.5 (1.95)	34.0 (1.34)	—
		N		53.6 (2.11)		4.1 (0.16)
M12 X 1	—	Y	12.0 (0.47)	63.5 (2.50)	47.50 (1.87)	—
		N		71.6 (2.82)		8.1 (0.32)
M18 X 1	—	Y	18.0 (0.71)	63.5 (2.50)	47.50 (1.87)	—
		N		75.7 (2.98)		12.2 (0.48)

872C WorldProx™ Short Barrel 3-Wire DC

Plastic Face/Threaded Nickel-Plated Brass Barrel



872C DC Micro Style
8, 12, 18, 30 mm



872C DC Pico Style
8, 12, 18 mm



872C DC Mini Style
18, 30 mm



872C DC Cable Style
8, 12, 18, 30 mm

Specifications

Load Current	≤200 mA
Leakage Current	≤10 mA
Operating Voltage	10...30V DC
Voltage Drop	≤1.8V
Repeatability	≤5%
Hysteresis	≤10% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Reverse Polarity Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Certifications	cULus Listed and CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 4, 6P, 12, 13 IP67 (IEC 529) Nickel plated brass barrel, plastic face (PBT)
Connections	Cable: 2 m (6.5 ft), 5 m (16.4 ft), 10 m (32.8 ft) length, 4.4 mm (0.175 in.) diameter 3-conductor #26 AWG PVC or PUR Quick-Disconnect: 4-pin mini style 4-pin micro style 3-pin pico style
LED	Amber: Output Energized, 360° visibility
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.2...0.3

Features

- 3-wire operation
- 3-conductor PVC or PUR cable jacket (PVC standard)
- 3- or 4-pin connection for pico, micro, and mini connectors
- Available in 2, 5, and 10 m cable lengths (2 m standard)
- 10...30V DC
- Normally open or normally closed
- Reverse polarity, short circuit, overload, false pulse, and transient noise protection
- cULus Listed and CE Marked for all applicable directives

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-220
Mounting Nuts	2-221...2-222

Inductive Proximity Sensors
872C WorldProx™ Short Barrel 3-Wire DC
 Plastic Face/Threaded Nickel-Plated Brass Barrel

Product Selection

Barrel Dia.	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration		Switching Frequency [Hz]	Cat. No.			
						Cable Style	Mini QD Style	Micro QD Style	Pico QD Style
8 mm	2 (0.08)	Y	N.O.	NPN	2500	872C-DH2NN8-E2	—	872C-DH2NN8-D4	872C-DH2NN8-P3
				PNP		872C-DH2NP8-E2	—	872C-DH2NP8-D4	872C-DH2NP8-P3
			N.C.	NPN		872C-DH2CN8-E2	—	872C-DH2CN8-D4	872C-DH2CN8-P3
				PNP		872C-DH2CP8-E2	—	872C-DH2CP8-D4	872C-DH2CP8-P3
	3 (0.12)	N	N.O.	NPN		872C-DH3NN8-E2	—	872C-DH3NN8-D4	872C-DH3NN8-P3
				PNP		872C-DH3NP8-E2	—	872C-DH3NP8-D4	872C-DH3NP8-P3
			N.C.	NPN		872C-DH3CN8-E2	—	872C-DH3CN8-D4	872C-DH3CN8-P3
				PNP		872C-DH3CP8-E2	—	872C-DH3CP8-D4	872C-DH3CP8-P3
12 mm	3 (0.12)	Y	N.O.	NPN	1300	872C-DH3NN12-E2	—	872C-DH3NN12-D4	872C-DH3NN12-P3
				PNP		872C-DH3NP12-E2	—	872C-DH3NP12-D4	872C-DH3NP12-P3
			N.C.	NPN		872C-DH3CN12-E2	—	872C-DH3CN12-D4	872C-DH3CN12-P3
				PNP		872C-DH3CP12-E2	—	872C-DH3CP12-D4	872C-DH3CP12-P3
	4 (0.16)	N	N.O.	NPN		872C-DH4NN12-E2	—	872C-DH4NN12-D4	872C-DH4NN12-P3
				PNP		872C-DH4NP12-E2	—	872C-DH4NP12-D4	872C-DH4NP12-P3
			N.C.	NPN		872C-DH4CN12-E2	—	872C-DH4CN12-D4	872C-DH4CN12-P3
				PNP		872C-DH4CP12-E2	—	872C-DH4CP12-D4	872C-DH4CP12-P3
18 mm	5 (0.20)	Y	N.O.	NPN	1500	872C-DH5NN18-E2	872C-DH5NN18-N4	872C-DH5NN18-D4	872C-DH5NN18-P3
				PNP		872C-DH5NP18-E2	872C-DH5NP18-N4	872C-DH5NP18-D4	872C-DH5NP18-P3
			N.C.	NPN		872C-DH5CN18-E2	872C-DH5CN18-N4	872C-DH5CN18-D4	872C-DH5CN18-P3
				PNP		872C-DH5CP18-E2	872C-DH5CP18-N4	872C-DH5CP18-D4	872C-DH5CP18-P3
	8 (0.31)	N	N.O.	NPN		872C-DH8NN18-E2	872C-DH8NN18-N4	872C-DH8NN18-D4	872C-DH8NN18-P3
				PNP		872C-DH8NP18-E2	872C-DH8NP18-N4	872C-DH8NP18-D4	872C-DH8NP18-P3
			N.C.	NPN		872C-DH8CN18-E2	872C-DH8CN18-N4	872C-DH8CN18-D4	872C-DH8CN18-P3
				PNP		872C-DH8CP18-E2	872C-DH8CP18-N4	872C-DH8CP18-D4	872C-DH8CP18-P3
30 mm	10 (0.39)	Y	N.O.	NPN	1000	872C-DH10NN30-E2	872C-DH10NN30-N4	872C-DH10NN30-D4	—
				PNP		872C-DH10NP30-E2	872C-DH10NP30-N4	872C-DH10NP30-D4	—
			N.C.	NPN		872C-DH10CN30-E2	872C-DH10CN30-N4	872C-DH10CN30-D4	—
				PNP		872C-DH10CP30-E2	872C-DH10CP30-N4	872C-DH10CP30-D4	—
	15 (0.59)	N	N.O.	NPN		872C-DH15NN30-E2	872C-DH15NN30-N4	872C-DH15NN30-D4	—
				PNP		872C-DH15NP30-E2	872C-DH15NP30-N4	872C-DH15NP30-D4	—
			N.C.	NPN		872C-DH15CN30-E2	872C-DH15CN30-N4	872C-DH15CN30-D4	—
				PNP		872C-DH15CP30-E2	872C-DH15CP30-N4	872C-DH15CP30-D4	—
Recommended standard QD cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))						889N-F4AFC-6F	889D-F4AC-2	889P-F3AB-2	

Cable Options: replace last two cat. no. characters

Cable Length	PVC	PUR
2 m	E2	J2
5 m	E5	J5
10 m	E10	J10

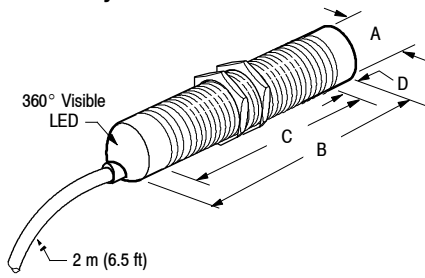
Inductive Proximity Sensors

872C WorldProx™ Short Barrel 3-Wire DC

Plastic Face/Threaded Nickel-Plated Brass Barrel

Approximate Dimensions [mm (in.)]

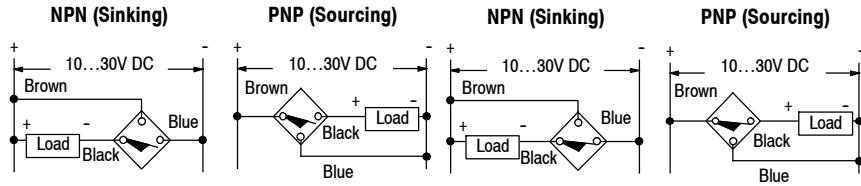
Cable Style



Wiring Diagrams

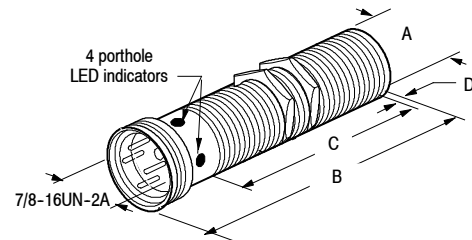
Normally Open

Normally Closed

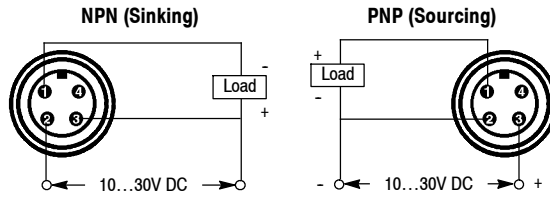


Thread Size	Shielded	[mm (in.)]			
		A	B (max)	C (min)	D (max)
M8 X 1	Y	8.0 (0.31)	26.7 (1.05)	24.1 (0.95)	—
	N		30.7 (1.21)		4.1 (0.16)
M12 X 1	Y	12.0 (0.47)	34.8 (1.37)	31.8 (1.25)	—
	N		42.9 (1.69)		8.1 (0.32)
M18 X 1	Y	18.0 (0.71)	34.8 (1.37)		—
	N		47.0 (1.85)		12.2 (0.48)
M30 X 1.5	Y	30.0 (1.18)	34.8 (1.37)	—	
	N		47.0 (1.85)	12.2 (0.48)	

Mini QD Style



Normally Open or Normally Closed

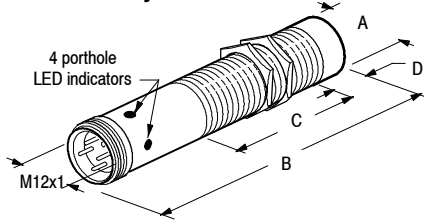


Thread Size	Shielded	[mm (in.)]			
		A	B (max)	C (min)	D (max)
M18 X 1	Y	18.0 (0.71)	47.5 (1.87)	24.2 (0.95)	—
	N		59.7 (2.35)		12.2 (0.48)
M30 X 1.5	Y	30.0 (1.18)	47.5 (1.87)	26.4 (1.04)	—
	N		59.7 (2.35)		12.2 (0.48)

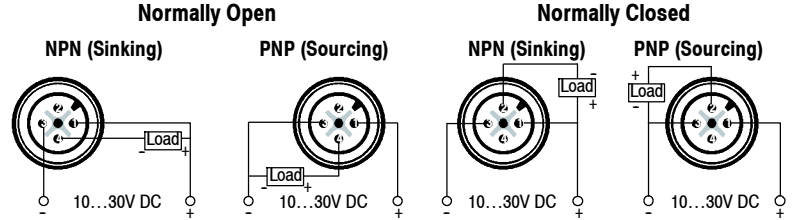
Inductive Proximity Sensors
872C WorldProx™ Short Barrel 3-Wire DC
 Plastic Face/Threaded Nickel-Plated Brass Barrel

Approximate Dimensions [mm (in.)]

Micro QD Style

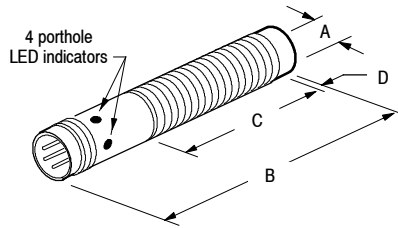


Wiring Diagrams

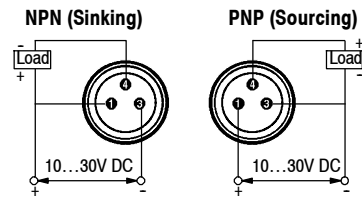


Thread Size	Shielded	[mm (in.)]			
		A	B (max)	C (min)	D (max)
M8 X 1	Y	8.0 (0.31)	44.5 (1.75)	20.1 (0.79)	—
	N		48.5 (1.91)		4.1 (0.16)
M12 X 1	Y	12.0 (0.47)	47.5 (1.87)	27.4 (1.08)	—
	N		55.6 (2.19)		8.1 (0.32)
M18 X 1	Y	18.0 (0.71)	48.8 (1.92)	26.4 (1.04)	—
	N		61.0 (2.40)		12.2 (0.48)
M30 X 1.5	Y	30.0 (1.18)	50.0 (1.97)	31.8 (1.25)	—
	N		62.2 (2.45)		12.2 (0.48)

Pico QD Style



Normally Open or Normally Closed



Thread Size	Shielded	[mm (in.)]			
		A	B (max)	C (min)	D (max)
M8 X 1	Y	8.0 (0.31)	44.5 (1.75)	29.0 (1.14)	—
	N		48.5 (1.91)		4.1 (0.16)
M12 X 1	Y	12.0 (0.47)	45.2 (1.78)	29.2 (1.15)	—
	N		53.3 (2.10)		8.1 (0.32)
M18 X 1	Y	18.0 (0.71)	47.5 (1.87)	31.5 (1.24)	—
	N		59.7 (2.35)		12.2 (0.48)

872C WorldProx™ Extended Sensing 3-Wire DC

Plastic Face/Threaded Nickel-Plated Brass Barrel



872C DC Micro Style
8, 12, 18, 30 mm



872C Pico Style
8, 12, 18 mm



872C DC Mini Style
18, 30 mm



872C DC Cable Style
8, 12, 18, 30 mm

Features

- 3-wire operation
- 3-conductor PVC or PUR cable jacket (PVC standard)
- 3- or 4-pin connection for pico, micro, and mini connectors
- Available in 2, 5, and 10 m cable lengths (2 m standard)
- 10...30V DC
- Normally open or normally closed
- Reverse polarity, short circuit, overload, false pulse, and transient noise protection
- cULus Listed and CE Marked for all applicable directives

Specifications

Load Current	≤200 mA
Leakage Current	≤10 mA
Operating Voltage	10...30V DC
Voltage Drop	≤1.8V
Repeatability	≤5%
Hysteresis	10% typical
Reverse Polarity Protection	Incorporated
Transient Noise Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
False Pulse Protection	Incorporated
Certifications	cULus Listed and CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 4, 6P, 12, 13, IP67 (IEC529) Nickel-plated brass barrel, plastic face (PBT)
Connections	Cable: 2 m (6.5 ft), 5 m (16.4 ft), 10 m (32.8 ft) length, 4.4 mm (0.175 in.) diameter 3-conductor #26 AWG PVC or PUR Quick-Disconnect: 4-pin mini style 4-pin micro style 3-pin pico style
LED	Amber: Output energized, 360° visibility
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factors
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.5...0.6
Aluminum	0.5...0.6
Copper	0.4...0.5

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-220
Mounting Nuts	2-221...2-222

Inductive Proximity Sensors

872C WorldProx™ Extended Sensing 3-Wire DC

Plastic Face/Threaded Nickel-Plated Brass Barrel

Product Selection

Barrel Dia.	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration		Switching Frequency [Hz]	Cat. No.			
						Cable Style	Mini QD Style	Micro QD Style	Pico QD Style
8 mm	3 (0.12)	Y	N.O.	NPN	2500	872C-M3NN8-E2	—	872C-M3NN8-D4	872C-M3NN8-P3
				PNP		872C-M3NP8-E2	—	872C-M3NP8-D4	872C-M3NP8-P3
			N.C.	NPN		872C-M3CN8-E2	—	872C-M3CN8-D4	872C-M3CN8-P3
				PNP		872C-M3CP8-E2	—	872C-M3CP8-D4	872C-M3CP8-P3
	4 (0.16)	N	N.O.	NPN		872C-N4NN8-E2	—	872C-N4NN8-D4	872C-N4NN8-P3
				PNP		872C-N4NP8-E2	—	872C-N4NP8-D4	872C-N4NP8-P3
			N.C.	NPN		872C-N4CN8-E2	—	872C-N4CN8-D4	872C-N4CN8-P3
				PNP		872C-N4CP8-E2	—	872C-N4CP8-D4	872C-N4CP8-P3
12 mm	4 (0.16)	Y	N.O.	NPN	1300	872C-M4NN12-E2	—	872C-M4NN12-D4	872C-M4NN12-P3
				PNP		872C-M4NP12-E2	—	872C-M4NP12-D4	872C-M4NP12-P3
			N.C.	NPN		872C-M4CN12-E2	—	872C-M4CN12-D4	872C-M4CN12-P3
				PNP		872C-M4CP12-E2	—	872C-M4CP12-D4	872C-M4CP12-P3
	8 (0.31)	N	N.O.	NPN		872C-N8NN12-E2	—	872C-N8NN12-D4	872C-N8NN12-P3
				PNP		872C-N8NP12-E2	—	872C-N8NP12-D4	872C-N8NP12-P3
			N.C.	NPN		872C-N8CN12-E2	—	872C-N8CN12-D4	872C-N8CN12-P3
				PNP		872C-N8CP12-E2	—	872C-N8CP12-D4	872C-N8CP12-P3
18 mm	8 (0.31)	Y	N.O.	NPN	1500	872C-M8NN18-E2	872C-M8NN18-N4	872C-M8NN18-D4	872C-M8NN18-P3
				PNP		872C-M8NP18-E2	872C-M8NP18-N4	872C-M8NP18-D4	872C-M8NP18-P3
			N.C.	NPN		872C-M8CN18-E2	872C-M8CN18-N4	872C-M8CN18-D4	872C-M8CN18-P3
				PNP		872C-M8CP18-E2	872C-M8CP18-N4	872C-M8CP18-D4	872C-M8CP18-P3
	12 (0.47)	N	N.O.	NPN		872C-N12NN18-E2	872C-N12NN18-N4	872C-N12NN18-D4	872C-N12NN18-P3
				PNP		872C-N12NP18-E2	872C-N12NP18-N4	872C-N12NP18-D4	872C-N12NP18-P3
			N.C.	NPN		872C-N12CN18-E2	872C-N12CN18-N4	872C-N12CN18-D4	872C-N12CN18-P3
				PNP		872C-N12CP18-E2	872C-N12CP18-N4	872C-N12CP18-D4	872C-N12CP18-P3
30 mm	15 (0.59)	Y	N.O.	NPN	1000	872C-M15NN30-E2	872C-M15NN30-N4	872C-M15NN30-D4	—
				PNP		872C-M15NP30-E2	872C-M15NP30-N4	872C-M15NP30-D4	—
			N.C.	NPN		872C-M15CN30-E2	872C-M15CN30-N4	872C-M15CN30-D4	—
				PNP		872C-M15CP30-E2	872C-M15CP30-N4	872C-M15CP30-D4	—
	20 (0.79)	N	N.O.	NPN		872C-N20NN30-E2	872C-N20NN30-N4	872C-N20NN30-D4	—
				PNP		872C-N20NP30-E2	872C-N20NP30-N4	872C-N20NP30-D4	—
			N.C.	NPN		872C-N20CN30-E2	872C-N20CN30-N4	872C-N20CN30-D4	—
				PNP		872C-N20CP30-E2	872C-N20CP30-N4	872C-N20CP30-D4	—
Recommended standard QD cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))						889N-F4AFC-6F	889D-F4AC-2	889P-F3AB-2	

Cable Options: replace last two cat. no. characters

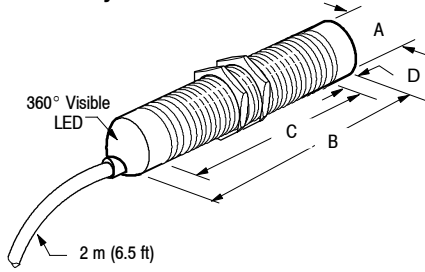
Cable Length	PVC	PUR
2 m	E2	J2
5 m	E5	J5
10 m	E10	J10

872C WorldProx™ Extended Sensing 3-Wire DC

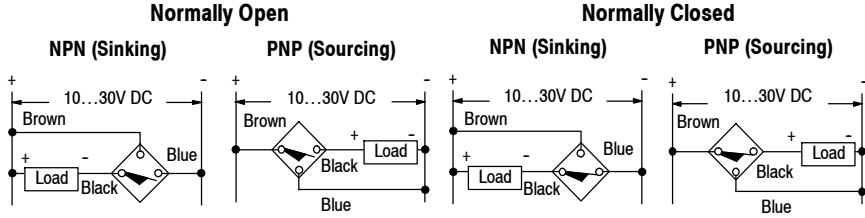
Plastic Face/Threaded Nickel-Plated Brass Barrel

Approximate Dimensions [mm (in.)]

Cable Style

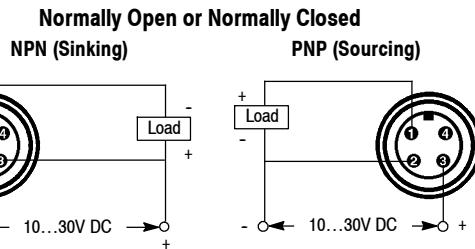
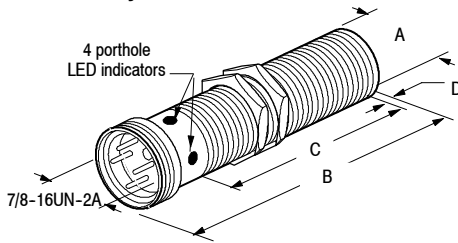


Wiring Diagrams



Thread Size	Smooth Diameter	Shielded	[mm (in.)]				
			A	B (max)	C (min)	D (max)	
M8 X 1	—	Y	8.0 (0.31)	32.8 (1.29)	30.2 (1.19)	—	
		N		36.8 (1.45)		4.1 (0.16)	
M12 X 1	—	Y	12.0 (0.47)	50.8 (2.00)	46.7 (1.84)	—	
		N		58.9 (2.32)		8.1 (0.32)	
M18 X 1	—	Y	18.0 (0.71)	50.8 (2.00)		12.2 (0.48)	—
		N		63.0 (2.48)			—
M30 X 1.5	—	Y	30.0 (1.18)	50.8 (2.00)	47.7 (1.88)	—	
		N		63.0 (2.48)		12.2 (0.48)	

Mini QD Style



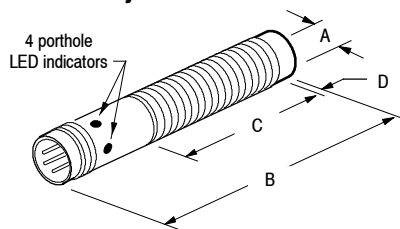
Thread Size	Shielded	[mm (in.)]			
		A	B (max)	C (min)	D (max)
M18 X 1	Y	18.0 (0.71)	63.5 (2.50)	35.1 (1.38)	—
	N		75.7 (2.98)		12.2 (0.48)
M30 X 1.5	Y	30.0 (1.18)	63.5 (2.50)	38.1 (1.50)	—
	N		75.7 (2.98)		12.2 (0.48)

Inductive Proximity Sensors

872C WorldProx™ Extended Sensing 3-Wire DC

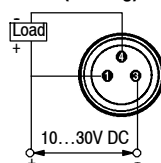
Plastic Face/Threaded Nickel-Plated Brass Barrel

Pico QD Style

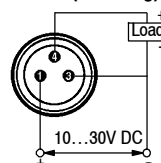


Normally Open or Normally Closed

NPN (Sinking)

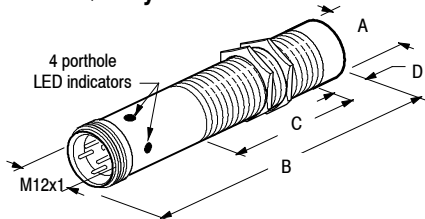


PNP (Sourcing)



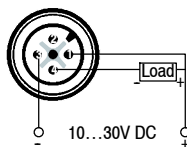
Thread Size	Smooth Diameter	Shielded	[mm (in.)]			
			A	B (max)	C (min)	D (max)
M8 X 1	—	Y	8.0 (0.31)	49.5 (1.95)	34.0 (1.34)	—
		N		53.6 (2.11)		4.1 (0.16)
M12 X 1	—	Y	12.0 (0.47)	63.5 (2.50)	47.5 (1.87)	—
		N		71.6 (2.82)		8.1 (0.32)
M18 X 1	—	Y	18.0 (0.71)	63.5 (2.50)	47.5 (1.87)	—
		N		75.7 (2.98)		12.2 (0.48)

Micro QD Style

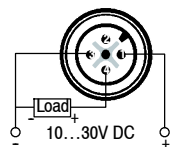


Normally Open

NPN (Sinking)

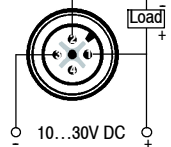


PNP (Sourcing)

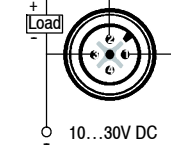


Normally Closed

NPN (Sinking)



PNP (Sourcing)



Thread Size	Shielded	[mm (in.)]			
		A	B (max)	C (min)	D (max)
M8 X 1	Y	8.0 (0.31)	58.0 (2.28)	27.7 (1.09)	—
	N		62.0 (2.44)		4.1 (0.16)
M12 X 1	Y	12.0 (0.47)	63.5 (2.50)	38.1 (1.50)	—
	N		71.6 (2.82)		8.1 (0.32)
M18 X 1	Y	18.0 (0.71)	63.5 (2.50)	38.1 (1.50)	—
	N		75.7 (2.98)		12.2 (0.48)
M30 X 1.5	Y	30.0 (1.18)	63.5 (2.50)	47.7 (1.88)	—
	N		75.7 (2.98)		12.2 (0.48)

872C WorldProx™ Short Barrel Extended Sensing 3-Wire DC

Plastic Face/Threaded Nickel-Plated Brass Barrel



872C DC Micro Style
8, 12, 18, 30 mm



872C DC Pico Style
8, 12, 18 mm



872C DC Mini Style
18, 30 mm



872C DC Cable Style
8, 12, 18, 30 mm

Specifications

Load Current	≤200 mA
Leakage Current	≤10 mA
Operating Voltage	10...30V DC
Voltage Drop	≤1.8V
Repeatability	≤5%
Hysteresis	≤10% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Reverse Polarity Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Certifications	cULus Listed and CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 4, 6P, 12, 13 IP67 (IEC 529) Nickel plated brass barrel, plastic face (PBT)
Connections	Cable: 2 m (6.5 ft), 5 m (16.4 ft), 10 m (32.8 ft) length, 4.4 mm (0.175 in.) diameter 3-conductor #26 AWG PVC or PUR Quick-Disconnect: 4-pin mini style 4-pin micro style 3-pin pico style
LED	Amber: Output Energized, 360° visibility
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.2...0.3

Features

- 3-wire operation
- 3-conductor PVC or PUR cable jacket (PVC standard)
- 3- or 4-pin connection for pico, micro, and mini connectors
- Available in 2, 5, and 10 m cable lengths (2 m standard)
- 10...30V DC
- Normally open or normally closed
- Reverse polarity, short circuit, overload, false pulse, and transient noise protection
- cULus Listed and CE Marked for all applicable directives

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-220
Mounting Nuts	2-221...2-222

872C WorldProx™ Short Barrel Extended Sensing 3-Wire DC

Plastic Face/Threaded Nickel-Plated Brass Barrel

Product Selection

Barrel Dia.	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration		Switching Frequency [Hz]	Cat. No.			
						Cable Style	Mini QD Style	Micro QD Style	Pico QD Style
8 mm	3 (0.12)	Y	N.O.	NPN	2500	872C-MH3NN8-E2	—	872C-MH3NN8-D4	872C-MH3NN8-P3
				PNP		872C-MH3NP8-E2	—	872C-MH3NP8-D4	872C-MH3NP8-P3
			N.C.	NPN		872C-MH3CN8-E2	—	872C-MH3CN8-D4	872C-MH3CN8-P3
				PNP		872C-MH3CP8-E2	—	872C-MH3CP8-D4	872C-MH3CP8-P3
	4 (0.16)	N	N.O.	NPN		872C-NH4NN8-E2	—	872C-NH4NN8-D4	872C-NH4NN8-P3
				PNP		872C-NH4NP8-E2	—	872C-NH4NP8-D4	872C-NH4NP8-P3
			N.C.	NPN		872C-NH4CN8-E2	—	872C-NH4CN8-D4	872C-NH4CN8-P3
				PNP		872C-NH4CP8-E2	—	872C-NH4CP8-D4	872C-NH4CP8-P3
12 mm	4 (0.16)	Y	N.O.	NPN	1300	872C-MH4NN12-E2	—	872C-MH4NN12-D4	872C-MH4NN12-P3
				PNP		872C-MH4NP12-E2	—	872C-MH4NP12-D4	872C-MH4NP12-P3
			N.C.	NPN		872C-MH4CN12-E2	—	872C-MH4CN12-D4	872C-MH4CN12-P3
				PNP		872C-MH4CP12-E2	—	872C-MH4CP12-D4	872C-MH4CP12-P3
	8 (0.31)	N	N.O.	NPN		872C-NH8NN12-E2	—	872C-NH8NN12-D4	872C-NH8NN12-P3
				PNP		872C-NH8NP12-E2	—	872C-NH8NP12-D4	872C-NH8NP12-P3
			N.C.	NPN		872C-NH8CN12-E2	—	872C-NH8CN12-D4	872C-NH8CN12-P3
				PNP		872C-NH8CP12-E2	—	872C-NH8CP12-D4	872C-NH8CP12-P3
18 mm	8 (0.31)	Y	N.O.	NPN	1500	872C-MH8NN18-E2	872C-MH8NN18-N4	872C-MH8NN18-D4	872C-MH8NN18-P3
				PNP		872C-MH8NP18-E2	872C-MH8NP18-N4	872C-MH8NP18-D4	872C-MH8NP18-P3
			N.C.	NPN		872C-MH8CN18-E2	872C-MH8CN18-N4	872C-MH8CN18-D4	872C-MH8CN18-P3
				PNP		872C-MH8CP18-E2	872C-MH8CP18-N4	872C-MH8CP18-D4	872C-MH8CP18-P3
	12 (0.47)	N	N.O.	NPN		872C-NH12NN18-E2	872C-NH12NN18-N4	872C-NH12NN18-D4	872C-NH12NN18-P3
				PNP		872C-NH12NP18-E2	872C-NH12NP18-N4	872C-NH12NP18-D4	872C-NH12NP18-P3
			N.C.	NPN		872C-NH12CN18-E2	872C-NH12CN18-N4	872C-NH12CN18-D4	872C-NH12CN18-P3
				PNP		872C-NH12CP18-E2	872C-NH12CP18-N4	872C-NH12CP18-D4	872C-NH12CP18-P3
30 mm	15 (0.59)	Y	N.O.	NPN	1000	872C-MH15NN30-E2	872C-MH15NN30-N4	872C-MH15NN30-D4	—
				PNP		872C-MH15NP30-E2	872C-MH15NP30-N4	872C-MH15NP30-D4	—
			N.C.	NPN		872C-MH15CN30-E2	872C-MH15CN30-N4	872C-MH15CN30-D4	—
				PNP		872C-MH15CP30-E2	872C-MH15CP30-N4	872C-MH15CP30-D4	—
	20 (0.79)	N	N.O.	NPN		872C-NH20NN30-E2	872C-NH20NN30-N4	872C-NH20NN30-D4	—
				PNP		872C-NH20NP30-E2	872C-NH20NP30-N4	872C-NH20NP30-D4	—
			N.C.	NPN		872C-NH20CN30-E2	872C-NH20CN30-N4	872C-NH20CN30-D4	—
				PNP		872C-NH20CP30-E2	872C-NH20CP30-N4	872C-NH20CP30-D4	—
Recommended standard QD cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))						889N-F4AFC-6F	889D-F4AC-2	889P-F3AB-2	

Cable Options: replace last two cat. no. characters

Cable Length	PVC	PUR
2 m	E2	J2
5 m	E5	J5
10 m	E10	J10

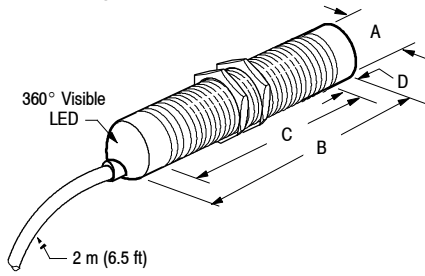
Inductive Proximity Sensors

872C WorldProx™ Short Barrel Extended Sensing 3-Wire DC

Plastic Face/Threaded Nickel-Plated Brass Barrel

Approximate Dimensions [mm (in.)]

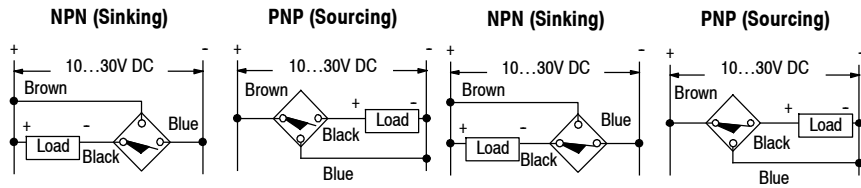
Cable Style



Wiring Diagrams

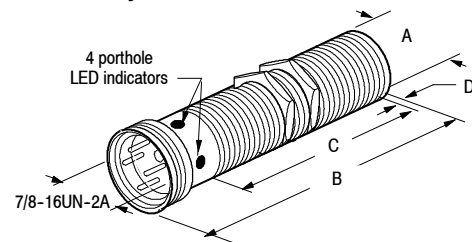
Normally Open

Normally Closed

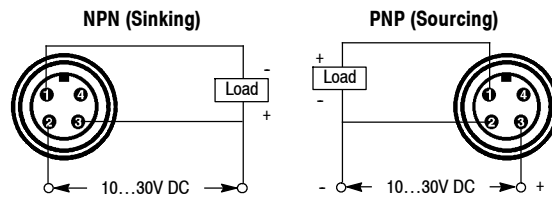


Thread Size	Shielded	[mm (in.)]			
		A	B (max)	C (min)	D (max)
M8 X 1	Y	8.0 (0.31)	26.7 (1.05)	24.1 (0.95)	—
	N		30.7 (1.21)		4.1 (0.16)
M12 X 1	Y	12.0 (0.47)	34.8 (1.37)	31.8 (1.25)	—
	N		42.9 (1.69)		8.1 (0.32)
M18 X 1	Y	18.0 (0.71)	34.8 (1.37)		—
	N		47.0 (1.85)		12.2 (0.48)
M30 X 1.5	Y	30.0 (1.18)	34.8 (1.37)	—	
	N		47.0 (1.85)	12.2 (0.48)	

Mini QD Style



Normally Open or Normally Closed



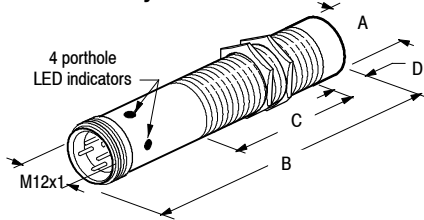
Thread Size	Shielded	[mm (in.)]			
		A	B (max)	C (min)	D (max)
M18 X 1	Y	18.0 (0.71)	47.5 (1.87)	24.2 (0.95)	—
	N		59.7 (2.35)		12.2 (0.48)
M30 X 1.5	Y	30.0 (1.18)	47.5 (1.87)	26.4 (1.04)	—
	N		59.7 (2.35)		12.2 (0.48)

872C WorldProx™ Short Barrel Extended Sensing 3-Wire DC

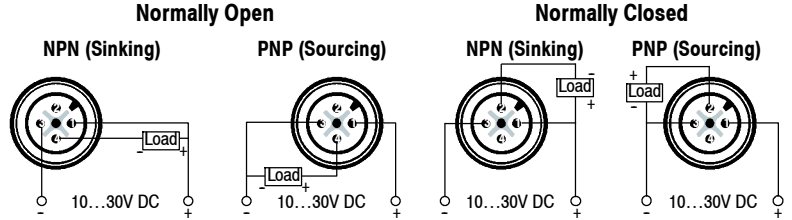
Plastic Face/Threaded Nickel-Plated Brass Barrel

Approximate Dimensions [mm (in.)]

Micro QD Style

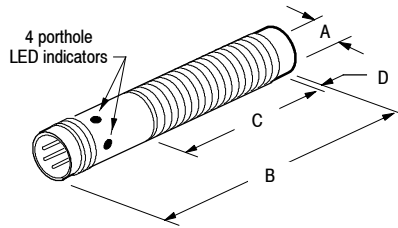


Wiring Diagrams

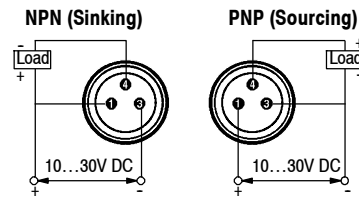


Thread Size	Shielded	[mm (in.)]			
		A	B (max)	C (min)	D (max)
M8 X 1	Y	8.0 (0.31)	44.5 (1.75)	20.1 (0.79)	—
	N		48.5 (1.91)		4.1 (0.16)
M12 X 1	Y	12.0 (0.47)	47.5 (1.87)	27.4 (1.08)	—
	N		55.6 (2.19)		8.1 (0.32)
M18 X 1	Y	18.0 (0.71)	48.8 (1.92)	26.4 (1.04)	—
	N		61.0 (2.40)		12.2 (0.48)
M30 X 1.5	Y	30.0 (1.18)	50.0 (1.97)	31.8 (1.25)	—
	N		62.2 (2.45)		12.2 (0.48)

Pico QD Style



Normally Open or Normally Closed



Thread Size	Shielded	[mm (in.)]			
		A	B (max)	C (min)	D (max)
M8 X 1	Y	8.0 (0.31)	44.5 (1.75)	29.0 (1.14)	—
	N		48.5 (1.91)		4.1 (0.16)
M12 X 1	Y	12.0 (0.47)	45.2 (1.78)	29.2 (1.15)	—
	N		53.3 (2.10)		8.1 (0.32)
M18 X 1	Y	18.0 (0.71)	47.5 (1.87)	31.5 (1.24)	—
	N		59.7 (2.35)		12.2 (0.48)

872CP WorldProx™ 3-Wire DC

Plastic Face/Threaded Plastic Barrel



872CP DC Cable Style
12, 18, 30 mm



872CP DC Micro
Quick-Disconnect Style
12, 18, 30 mm

Features

- 3-wire operation
- 3-conductor connection
- 10...30V DC
- Normally open or normally closed output
- Transient noise, short circuit and reverse polarity protection
- Cable and micro quick-disconnect models
- UL Listed, cUL Certified and CE Marked for all applicable directives

Specifications

Load Current	≤200 mA
Leakage Current	≤10 mA
Operating Voltage	10...30V DC
Voltage Drop	≤1.6V
Repeatability	5%
Hysteresis	≤10% Typical
Transient Noise Protection	Incorporated
Reverse Polarity Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
False Pulse Protection	Incorporated
Certifications	UL Listed, cUL Certified and CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 4, 4X, 6P, 12, 13 IP67 (IEC 529) Plastic barrel
Connection	Cable: 2 m (6.5 ft) length 3-conductor PVC Quick-Disconnect: 4-pin micro style
LED	Red: Output Energized, 360° visibility
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.3...0.4

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-220
Mounting Nuts	2-221...2-222

Inductive Proximity Sensors
872CP WorldProx™ 3-Wire DC
Plastic Face/Threaded Plastic Barrel

Product Selection

Barrel Dia.	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration		Switching Frequency [Hz]	Cat. No.	
						Cable Style	Micro QD
12 mm	3 (0.12)	Y	N.O.	NPN	2000	872CP-M3NN12-E2	872CP-M3NN12-D4
				PNP		872CP-M3NP12-E2	872CP-M3NP12-D4
			N.C.	NPN		872CP-M3CN12-E2	872CP-M3CN12-D4
				PNP		872CP-M3CP12-E2	872CP-M3CP12-D4
	4 (0.16)	N	N.O.	NPN		872CP-N4NN12-E2	872CP-N4NN12-D4
				PNP		872CP-N4NP12-E2	872CP-N4NP12-D4
			N.C.	NPN		872CP-N4CN12-E2	872CP-N4CN12-D4
				PNP		872CP-N4CP12-E2	872CP-N4CP12-D4
18 mm	5 (0.20)	Y	N.O.	NPN	2000	872CP-M5NN18-E2	872CP-M5NN18-D4
				PNP		872CP-M5NP18-E2	872CP-M5NP18-D4
			N.C.	NPN		872CP-M5CN18-E2	872CP-M5CN18-D4
				PNP		872CP-M5CP18-E2	872CP-M5CP18-D4
	8 (0.31)	N	N.O.	NPN		872CP-N8NN18-E2	872CP-N8NN18-D4
				PNP		872CP-N8NP18-E2	872CP-N8NP18-D4
			N.C.	NPN		872CP-N8CN18-E2	872CP-N8CN18-D4
				PNP		872CP-N8CP18-E2	872CP-N8CP18-D4
30 mm	10 (0.39)	Y	N.O.	NPN	2000	872CP-M10NN30-E2	872CP-M10NN30-D4
				PNP		872CP-M10NP30-E2	872CP-M10NP30-D4
			N.C.	NPN		872CP-M10CN30-E2	872CP-M10CN30-D4
				PNP		872CP-M10CP30-E2	872CP-M10CP30-D4
	15 (0.59)	N	N.O.	NPN		872CP-N15NN30-E2	872CP-N15NN30-D4
				PNP		872CP-N15NP30-E2	872CP-N15NP30-D4
			N.C.	NPN		872CP-N15CN30-E2	872CP-N15CN30-D4
				PNP		872CP-N15CP30-E2	872CP-N15CP30-D4
Recommended standard QD cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))						889D-F4AC-2	

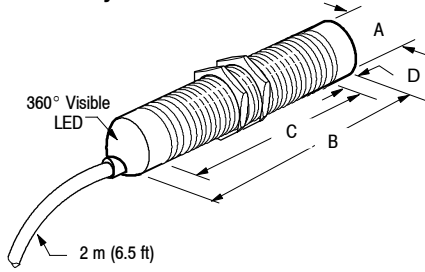
Inductive Proximity Sensors

872CP WorldProx™ 3-Wire DC

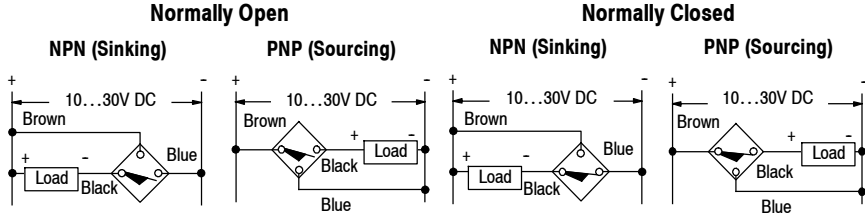
Plastic Face/Threaded Plastic Barrel

Approximate Dimensions [mm (in.)]

Cable Style

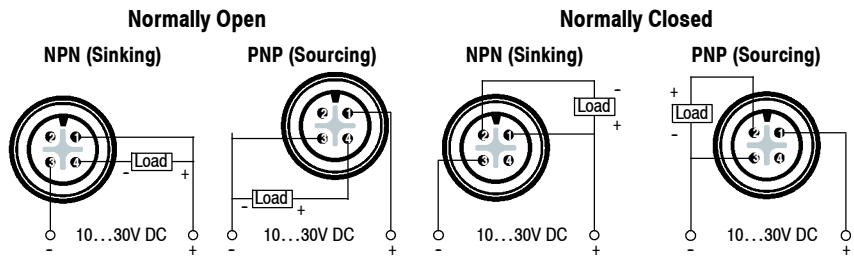
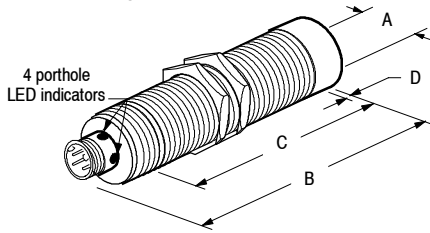


Wiring Diagrams



Thread Size	Shielded	[mm (in.)]			
		A	B (max)	C (min)	D (max)
M12 X 1	Y	12.0 (0.47)	71 (2.80)	60 (2.36)	2 (0.08)
	N				
M18 X 1	Y	18.0 (0.71)	61 (2.40)	57 (2.24)	
	N				
M30 X 1.5	Y	30.0 (1.18)			
	N				

Micro QD Style



Thread Size	Shielded	[mm (in.)]			
		A	B (max)	C (min)	D (max)
M12 X 1	Y	12.0 (0.47)	77 (3.03)	54 (2.13)	2 (0.08)
	N				
M18 X 1	Y	18.0 (0.71)	80 (3.15)	57 (2.24)	
	N				
M30 X 1.5	Y	30.0 (1.18)			
	N				



872C DC Cable Style
12, 18, 30 mm



872C DC Micro
Quick-Disconnect Style
12, 18, 30 mm

Features

- 2-wire operation
- 2-conductor or 4-pin connection
- 10...30V DC
- Normally open or normally closed output
- Reverse polarity, short circuit, overload, false pulse, and transient noise protection
- cULus Listed and CE Marked for all applicable directives

Specifications

Load Current	≤100 mA
Minimum Load Current	5 mA
Leakage Current	≤0.9 mA
Operating Voltage	10...30V DC
Voltage Drop	≤6V
Repeatability	≤2%
Hysteresis	10% typical
Reverse Polarity Protection	Incorporated
Transient Noise Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
False Pulse Protection	Incorporated
Certifications	cULus Listed and CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 4, 6P, 12, 13 IP67 (IEC529) Nickel-plated brass barrel, plastic face (PBT)
Connections	Cable: 2 m (6.5 ft) length, 4.4 mm (0.175 in.) diameter, 2-conductor #26 AWG PVC Quick-Disconnect: 4-pin micro style
LED	Red: Output energized, 360° visibility
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.2...0.3

872C WorldProx™ 2-Wire DC

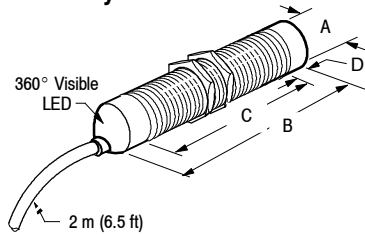
Plastic Face/Threaded Nickel-Plated Brass Barrel

Product Selection

Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.	
					Cable Style	Micro QD Style
12 mm	3 (0.12)	Y	N.O.	2000	872C-D3NE12-A2	872C-D3NE12-D4
			N.C.		872C-D3CE12-A2	872C-D3CE12-D4
	4 (0.16)	N	N.O.		872C-D4NE12-A2	872C-D4NE12-D4
			N.C.		872C-D4CE12-A2	872C-D4CE12-D4
18 mm	5 (0.20)	Y	N.O.	1000	872C-D5NE18-A2	872C-D5NE18-D4
			N.C.		872C-D5CE18-A2	872C-D5CE18-D4
	8 (0.31)	N	N.O.		872C-D8NE18-A2	872C-D8NE18-D4
			N.C.		872C-D8CE18-A2	872C-D8CE18-D4
30 mm	10 (0.39)	Y	N.O.	500	872C-D10NE30-A2	872C-D10NE30-D4
			N.C.		872C-D10CE30-A2	872C-D10CE30-D4
	15 (0.59)	N	N.O.		872C-D15NE30-A2	872C-D15NE30-D4
			N.C.		872C-D15CE30-A2	872C-D15CE30-D4
Recommended standard QD cordset (-2 = 2 m (6.5 ft))						889D-F4AC-2

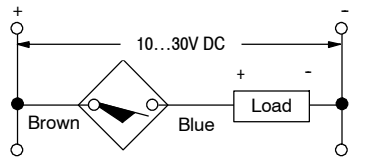
Approximate Dimensions [mm (in.)]

Cable Style

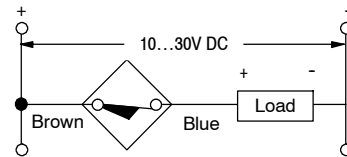


Wiring Diagrams

Normally Open



Normally Closed

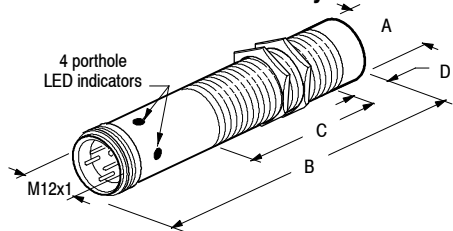


Note: Load can be switched to brown wire.

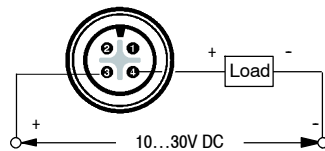
Thread Size	Shielded	[mm (in.)]			
		A	B (max)	C (min)	D (max)
M12 X 1	Y	12 (0.47)	50.8 (2.00)	46.7 (1.84)	—
	N		58.7 (2.31)		7.9 (0.31)
M18 X 1	Y	18 (0.71)	50.8 (2.00)		—
	N		63.0 (2.48)		12.2 (0.48)
M30 X 1.5	Y	30 (1.18)	50.8 (2.00)		—
	N		63.0 (2.48)		12.2 (0.48)

Inductive Proximity Sensors
872C WorldProx™ 2-Wire DC
 Plastic Face/Threaded Nickel-Plated Brass Barrel

Micro Quick-Disconnect Style



Normally Open or Normally Closed



Note: Load can be switched to pin 3.

Thread Size	Shielded	[mm (in.)]			
		A	B (max)	C (min)	D (max)
M12 X 1	Y	12.0 (0.47)	65.0 (2.56)	38.1 (1.50)	—
	N		72.4 (2.85)		7.9 (0.31)
M18 X 1	Y	18.0 (0.71)	65.0 (2.56)		—
	N		76.5 (3.01)		
M30 X 1.5	Y	30.0 (1.18)	65.0 (2.56)	46.7 (1.84)	—
	N		76.5 (3.01)		12.2 (0.48)

872C WorldProx™ QuadroPlex™ 2-Wire DC

Plastic Face/Threaded Nickel-Plated Brass Barrel



872C DC Micro
Quick-Disconnect Style
12, 18, 30 mm

Features

- 2-wire operation
- 4-pin connection
- 10...30V DC
- Normally open or normally closed output
- Short circuit, overload, false pulse, and transient noise protection
- cULus Listed and CE Marked for all applicable directives

Specifications

Barrel Diameter	12 mm	18 mm & 30 mm
Load Current	100 mA	200 mA
Minimum Load Current	5 mA	
Leakage Current	≤1 mA	
Operating Voltage	10...30V DC	
Voltage Drop	≤6V @ 100 mA	≤6.5V @ 200 mA ≤6.0V @ 100 mA
Repeatability	≤10% at constant temperature	
Hysteresis	10% typical	
Transient Noise Protection	Incorporated	
Short Circuit Protection	Incorporated	
Overload Protection	Incorporated	
False Pulse Protection	Incorporated	
Certifications	cULus Listed and CE Marked for all applicable directives	
Enclosure	NEMA 1, 2, 3, 4, 6P, 12, 13 IP67 (IEC529) Nickel-plated brass barrel, plastic face (PBT)	
Connections	Quick-Disconnect: 4-pin micro style	
LED	Red: Output energized, 360° visibility	
Operating Temperature [C (F)]	-25...+70° (-13...+158°)	
Shock	30 g, 11 ms	
Vibration	55 Hz, 1 mm amplitude, 3 planes	

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.2...0.3

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-220
Mounting Nuts	2-221...2-222

Inductive Proximity Sensors
872C WorldProx™ QuadroPlex™ 2-Wire DC
 Plastic Face/Threaded Nickel-Plated Brass Barrel

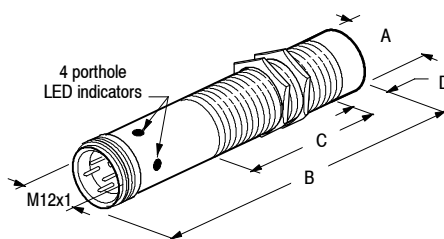
Product Selection

Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.
					Micro QD Style
12 mm	3 (0.12)	Y	N.O. or N.C. ①	2000	872C-M3Q12-D4
	4 (0.16)	N			872C-N4Q12-D4
18 mm	5 (0.20)	Y		1000	872C-M5Q18-D4
	8 (0.31)	N			872C-N8Q18-D4
30 mm	10 (0.39)	Y		500	872C-M10Q30-D4
	15 (0.59)	N			872C-N15Q30-D4
Recommended standard QD cordset (-2 = 2 m (6.5 ft))					889D-F4AC-2

① Depending upon wiring diagram.

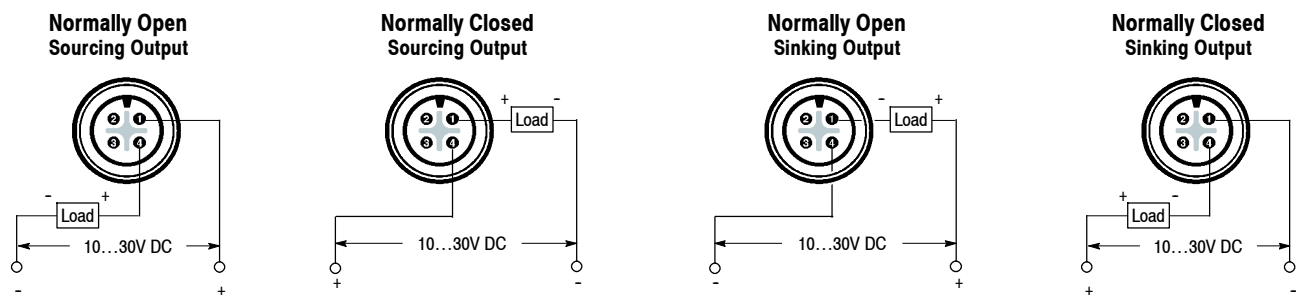
Approximate Dimensions [mm (in.)]

Micro Quick-Disconnect Style



Thread Size	Shielded	[mm (in.)]			
		A	B (max)	C (min)	D (max)
M12 X 1	Y	12.0 (0.47)	65.0 (2.56)	38.1 (1.50)	—
	N		72.4 (2.85)		7.9 (0.31)
M18 X 1	Y	18.0 (0.71)	65.0 (2.56)		12.2 (0.48)
	N		76.5 (3.01)		
M30 X 1.5	Y	30.0 (1.18)	65.0 (2.56)		—
	N		76.5 (3.01)		12.2 (0.48)

Wiring Diagrams



872C WorldProx™ 4-Wire DC Complementary Output

Plastic Face/Threaded Nickel-Plated Brass Barrel



872C DC Cable Style
12, 18, 30 mm



872C DC Micro
Quick-Disconnect Style
12, 18, 30 mm

Features

- 4-wire operation
- 4-conductor or 4-pin connection
- 10...30V DC
- Complementary normally open and normally closed outputs
- Short circuit, false pulse, reverse polarity, overload and transient noise protection
- UL Listed, cUL Certified and CE Marked for all applicable directives

Specifications

Load Current	≤200 mA
Leakage Current	≤10 mA
Operating Voltage	10...30V DC
Voltage Drop	≤1.6V
Repeatability	≤8%
Hysteresis	≤10% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Reverse Polarity Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Certifications	UL Listed, cUL Certified and CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 4, 6P, 12, 13, IP67 (IEC 529); Nickel-plated brass barrel
Connections	Cable: 2 m (6.5 ft) length 4-conductor PVC Quick-Disconnect: 4-pin micro style
LED	Red: Output Energized, 360° visibility
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.2...0.3

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-220
Mounting Nuts	2-221...2-222

Inductive Proximity Sensors

872C WorldProx™ 4-Wire DC Complementary Output

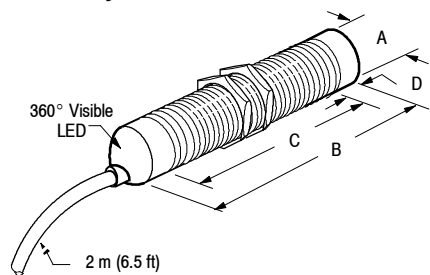
Plastic Face/Threaded Nickel-Plated Brass Barrel

Product Selection

Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration		Switching Frequency [Hz]	Cat. No.		
						Cable Style	Micro QD Style	
12 mm	3 (0.12)	Y	N.O. and N.C.	PNP	2000	872C-D3BP12-E2	872C-D3BP12-D4	
18 mm	5 (0.20)				1000	872C-D5BP18-E2	872C-D5BP18-D4	
30 mm	10 (0.39)				500	872C-D10BP30-E2	872C-D10BP30-D4	
Recommended standard QD cordset (-2 = 2 m (6.5 ft))							889D-F4AC-2	

Approximate Dimensions [mm (in.)]

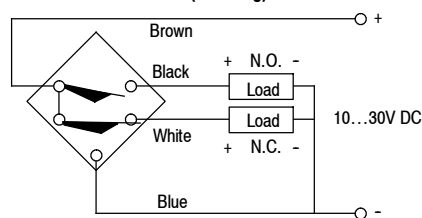
Cable Style



Wiring Diagram

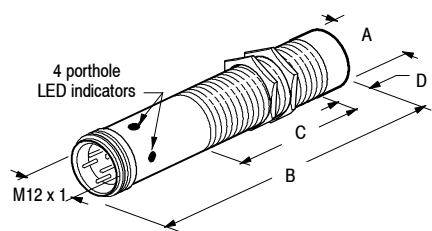
Complementary Normally Open and Normally Closed

PNP (Sourcing)



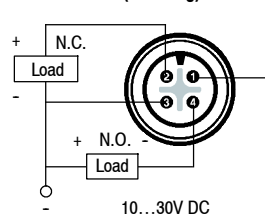
Thread Size	Shielded	[mm (in.)]		
		A	B	C
M12 X 1	Y	12.0 (0.47)	50.8 (2.00)	46.7 (1.84)
M18 X 1	Y	18.0 (0.71)		
M30 X 1.5	Y	30.0 (1.18)		

Micro QD Style



Complementary Normally Open and Normally Closed

PNP (Sourcing)



Thread Size	Shielded	[mm (in.)]		
		A	B	C
M12 X 1	Y	12.0 (0.47)	65.0 (2.56)	38.1 (1.50)
M18 X 1	Y	18.0 (0.71)		48.7 (1.88)
M30 X 1.5	Y	30.0 (1.18)		

872C WorldProx™ 2-Wire AC

Plastic Face/Threaded Nickel-Plated Brass Barrel



872C AC Cable Style
8 mm



872C AC Cable Style
12, 18, 30 mm



872C AC Mini
Quick-Disconnect Style
18, 30 mm



872C AC Micro
Quick-Disconnect Style
12, 18, 30 mm

Features

- 2-wire operation
- 3-conductor or 3-pin connection
- 20...250V AC (20...240V AC for 8 mm)
- Normally open or normally closed output
- False pulse and transient noise protection
- Extended sensing distance on 18 mm unshielded models
- cULus Listed and CE Marked for all applicable directives

Specifications

	8 mm	12, 18, 30 mm
Load Current	100 mA max	≤300 mA
Minimum Load Current	5 mA	
Inrush Current (1 cycle)	≤2 A	
Leakage Current	≤2 mA	
Operating Voltage	20...240V AC	20...250V AC
Voltage Drop	≤5V	
Repeatability	≤5%	
Hysteresis	15%	≤15% typical
False Pulse Protection	Incorporated	
Transient Noise Protection	Incorporated	
Overload Protection	Incorporated	
Certifications	cULus Listed and CE Marked for all applicable directives	
Enclosure	NEMA 1, 2, 3, 4, 12, 13 IP67 (IEC 529) Nickel-plated brass barrel	
Connections	Cable: 2 m (6.5 ft) length 3-conductor PVC Quick-Disconnect: 3-pin micro style 3-pin mini style	
LED	Red: Output Energized, 360° visibility	
Operating Temperature [C (F)]	-25...+70° (-13...+158°)	
Shock	30 g, 11 ms	
Vibration	55 Hz, 1 mm amplitude, 3 planes	

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.9
Brass	0.5
Aluminum	0.45
Copper	0.4

QD Cordsets and Accessories

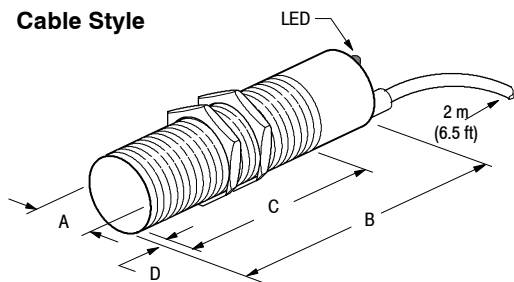
Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-220
Mounting Nuts	2-221...2-222

Product Selection

Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.		
					Cable Style	Mini QD Style	Micro QD Style
8 mm	1.5 (0.06)	Y	N.O.	25	872C-A1N8-A2	—	—
			N.C.		872C-A1C8-A2	—	—
	2 (0.08)	N	N.O.		872C-A2N8-A2	—	—
			N.C.		872C-A2C8-A2	—	—
12 mm	2 (0.08)	Y	N.O.	15	872C-A2N12-A2	—	872C-A2N12-R3
			N.C.		872C-A2C12-A2	—	872C-A2C12-R3
	4 (0.16)	N	N.O.		872C-A4N12-A2	—	872C-A4N12-R3
			N.C.		872C-A4C12-A2	—	872C-A4C12-R3
18 mm	5 (0.20)	Y	N.O.	15	872C-A5N18-A2	872C-A5N18-N3	872C-A5N18-R3
			N.C.		872C-A5C18-A2	872C-A5C18-N3	872C-A5C18-R3
	10 (0.39)	N	N.O.		872C-A10N18-A2	872C-A10N18-N3	872C-A10N18-R3
			N.C.		872C-A10C18-A2	872C-A10C18-N3	872C-A10C18-R3
30 mm	10 (0.39)	Y	N.O.	15	872C-A10N30-A2	872C-A10N30-N3	872C-A10N30-R3
			N.C.		872C-A10C30-A2	872C-A10C30-N3	872C-A10C30-R3
	15 (0.59)	N	N.O.		872C-A15N30-A2	872C-A15N30-N3	872C-A15N30-R3
			N.C.		872C-A15C30-A2	872C-A15C30-N3	872C-A15C30-R3
Recommended standard QD cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))					889N-F3AFC-6F	889R-F3ECA-2	

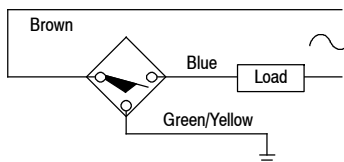
Approximate Dimensions [mm (in.)]

Cable Style

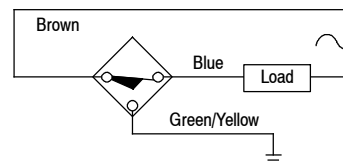


Wiring Diagrams

Normally Open



Normally Closed



NOTE: Load can be switched to brown wire.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M8 X 1	Y	8.0 (0.32)	47.0 (1.85)	36.0 (1.42)	—
	N	6.0 (0.24)	47.0 (1.85)	36.0 (1.42)	6.0 (0.24)
M12 X 1	Y	12.0 (0.47)	70.0 (2.76)	60.0 (2.36)	—
	N			54.0 (2.13)	6.0 (0.24)
M18 X 1	Y	18.0 (0.71)	60.0 (2.36)	50.0 (1.96)	—
	N			42.0 (1.65)	8.0 (0.31)
M30 X 1.5	Y	30.0 (1.18)	60.0 (2.36)	50.0 (1.96)	—
	N			38.0 (1.50)	12.0 (0.47)

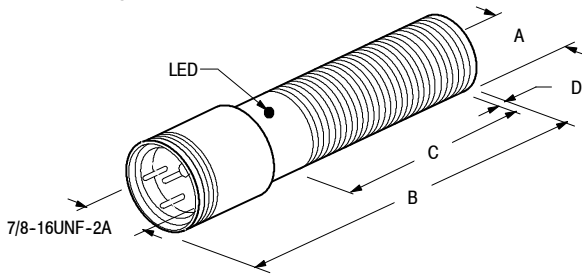
Inductive Proximity Sensors

872C WorldProx™ 2-Wire AC

Plastic Face/Threaded Nickel-Plated Brass Barrel

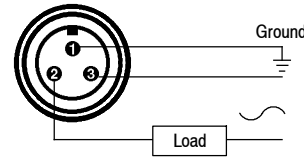
Approximate Dimensions [mm (in.)]

Mini QD Style



Wiring Diagrams

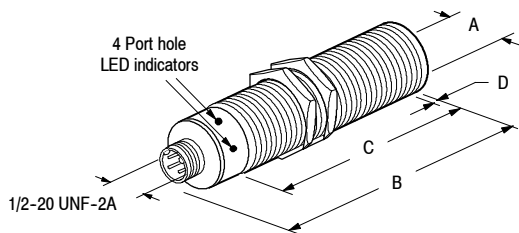
Normally Open or Normally Closed



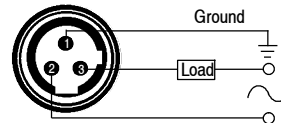
Note: Load can be switched to pin 3.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M18 X 1	Y	18.0 (0.71)	91.0 (3.58)	52.0 (2.05)	—
	N			44.0 (1.73)	8.0 (0.31)
M30 X 1.5	Y	30.0 (1.18)	91.0 (3.58)	52.0 (2.25)	—
	N			40.0 (1.57)	12.0 (0.47)

Micro Quick-Disconnect Style



Normally Open or Normally Closed



Note: Load can be switched to pin 2.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	75.0 (2.95)	45.0 (1.77)	—
	N			40.0 (1.57)	6.0 (0.24)
M18 X 1	Y	18.0 (0.71)	80.0 (3.15)	60.0 (2.36)	—
	N			52.0 (2.05)	8.0 (0.31)
M30 X 1.5	Y	30.0 (1.18)	80.0 (3.15)	50.0 (1.96)	—
	N			38.0 (1.50)	12.0 (0.47)

872C WorldProx™ Extended Sensing 2-Wire AC

Plastic Face/Threaded Nickel-Plated Brass Barrel



872C AC Cable Style
12, 18, 30 mm



872C AC Mini
Quick-Disconnect Style
18, 30 mm



872C AC Micro
Quick-Disconnect Style
12, 18, 30 mm

Features

- 2-wire operation
- 3-conductor or 3-pin connection
- 20...250V AC
- Normally open or normally closed output
- False pulse, transient noise, and overload protection
- CE Marked for all applicable directives

Specifications

Load Current	≤300 mA
Minimum Load Current	2 mA
Inrush Current (1 cycle)	≤2 A
Leakage Current	≤1.7 mA
Operating Voltage	20...250V AC
Voltage Drop	≤11V @ 10 mA, ≤7V @ 300 mA
Repeatability	≤5%
Hysteresis	≤10% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Overload Protection	Incorporated
Certifications	CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 4, 12, 13 IP67 (IEC 529) Nickel-plated brass barrel
Connections	Cable: 2 m (6.5 ft) length 3-conductor PVC Quick-Disconnect: 3-pin micro style 3-pin mini style
LED	Red: Output Energized, 360° visibility
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.9
Brass	0.5
Aluminum	0.45
Copper	0.4

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-220
Mounting Nuts	2-221...2-222

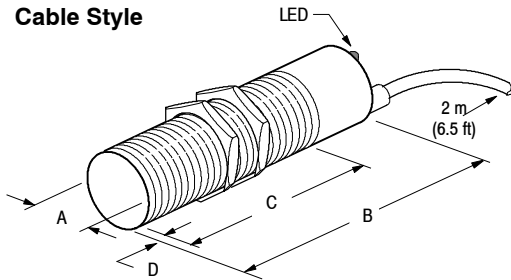
872C WorldProx™ Extended Sensing 2-Wire AC

Plastic Face/Threaded Nickel-Plated Brass Barrel

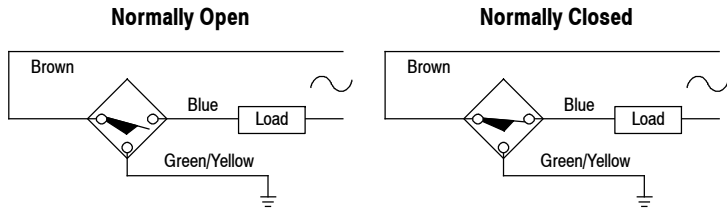
Product Selection

Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.		
					Cable Style	Mini QD Style	Micro QD Style
12 mm	4 (0.16)	Y	N.O.	20	872C-F4N12-A2	—	872C-F4N12-R3
			N.C.		872C-F4C12-A2	—	872C-F4C12-R3
	8 (0.31)	N	N.O.		872C-G8N12-A2	—	872C-G8N12-R3
			N.C.		872C-G8C12-A2	—	872C-G8C12-R3
18 mm	8 (0.31)	Y	N.O.		872C-F8N18-A2	872C-F8N18-N3	872C-F8N18-R3
			N.C.		872C-F8C18-A2	872C-F8C18-N3	872C-F8C18-R3
	12 (0.47)	N	N.O.		872C-G12N18-A2	872C-G12N18-N3	872C-G12N18-R3
			N.C.		872C-G12C18-A2	872C-G12C18-N3	872C-G12C18-R3
30 mm	15 (0.59)	Y	N.O.		872C-F15N30-A2	872C-F15N30-N3	872C-F15N30-R3
			N.C.		872C-F15C30-A2	872C-F15C30-N3	872C-F15C30-R3
	30 (1.18)	N	N.O.		872C-G30N30-A2	872C-G30N30-N3	872C-G30N30-R3
			N.C.		872C-G30C30-A2	872C-G30C30-N3	872C-G30C30-R3
Recommended standard QD cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))					889N-F3AFC-6F	889R-F3ECA-2	

Approximate Dimensions [mm (in.)]



Wiring Diagrams



NOTE: Load can be switched to brown wire.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	70.0 (2.76)	60.0 (2.36)	—
	N			54.0 (2.13)	6.0 (0.24)
M18 X 1	Y	18.0 (0.71)	60.0 (2.36)	50.0 (1.96)	—
	N			42.0 (1.65)	8.0 (0.31)
M30 X 1.5	Y	30.0 (1.18)	60.0 (2.36)	50.0 (1.96)	—
	N			38.0 (1.50)	12.0 (0.47)

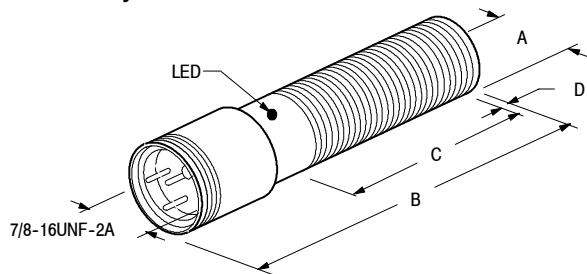
Inductive Proximity Sensors

872C WorldProx™ Extended Sensing 2-Wire AC

Plastic Face/Threaded Nickel-Plated Brass Barrel

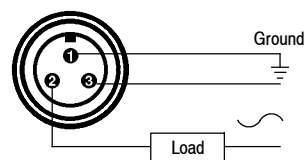
Approximate Dimensions [mm (in.)]

Mini QD Style



Wiring Diagrams

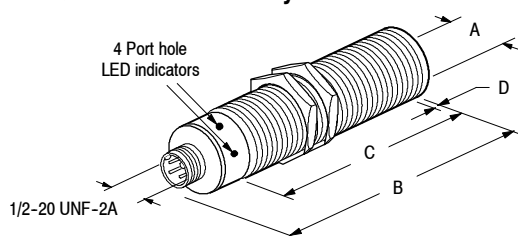
Normally Open or Normally Closed



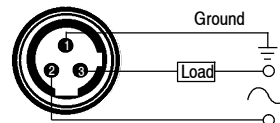
Note: Load can be switched to pin 3.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M18 X 1	Y	18.0 (0.71)	91.0 (3.58)	52.0 (2.05)	—
	N			44.0 (1.73)	8.0 (0.31)
M30 X 1.5	Y	30.0 (1.18)	91.0 (3.58)	52.0 (2.25)	—
	N			40.0 (1.57)	12.0 (0.47)

Micro Quick-Disconnect Style



Normally Open or Normally Closed



Note: Load can be switched to pin 2.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	75.0 (2.95)	45.0 (1.77)	—
	N			40.0 (1.57)	6.0 (0.24)
M18 X 1	Y	18.0 (0.71)	80.0 (3.15)	60.0 (2.36)	—
	N			52.0 (2.05)	8.0 (0.31)
M30 X 1.5	Y	30.0 (1.18)	80.0 (3.15)	50.0 (1.96)	—
	N			38.0 (1.50)	12.0 (0.47)

872C WorldProx™ 2-Wire AC/DC

Plastic Face/Threaded Nickel-Plated Brass Barrel



872C AC/DC Cable Style
12, 18, 30 mm



872C AC/DC Micro
Quick-Disconnect Style
12, 18, 30 mm

Specifications

	12 mm	18 & 30 mm
Load Current	300 mA	350 mA
Minimum Load Current	2 mA	
Inrush Current (1 cycle)	≤2A	
Leakage Current	≤1.7 mA @ 120V and ≤1.9 mA @ 250V	
Operating Voltage	20...250V AC/DC	
Voltage Drop	≤5V	
Repeatability	≤5%	
Hysteresis	≤10% typical	
False Pulse Protection	Incorporated	
Transient Noise Protection	Incorporated	
Short Circuit Protection	Incorporated	
Overload Protection	Incorporated	
Certifications	cULus Listed and CE Marked for all applicable directives	
Enclosure	NEMA 1, 2, 3, 4, 12, 13 IP67 (IEC 529) Nickel-plated brass barrel	
Connections	Cable: 2 m (6.5 ft) length 3-conductor PVC Quick-Disconnect: 3-pin micro style 3-pin mini style	
LED	Red: output energized, 360° visibility	
Operating Temperature [C (F)]	-25...+70° (-13...+158°)	
Shock and Vibration	30 g, 10...55 Hz	

Features

- 2-wire operation
- 3-conductor or 3-pin connection
- 20...250V AC/DC
- Normally open or normally closed output
- False pulse, transient noise, short circuit, and overload protection
- cULus Listed and CE Marked for all applicable directives

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.9
Brass	0.5
Aluminum	0.4
Copper	0.4

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-220
Mounting Nuts	2-221...2-222

Inductive Proximity Sensors
872C WorldProx™ 2-Wire AC/DC
Plastic Face/Threaded Nickel-Plated Brass Barrel

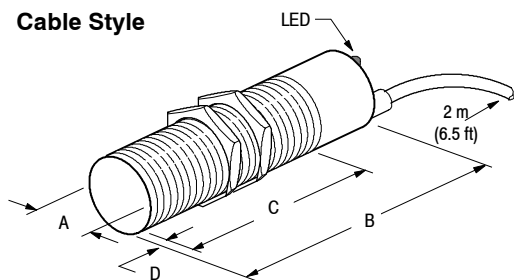
Product Selection

Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.	
					Cable Style	Micro QD Style
12 mm	2 (0.08)	Y	N.O.	30	872C-J2N12-A2	872C-J2N12-R3
	4 (0.16)	N			872C-K4N12-A2	872C-K4N12-R3
18 mm	5 (0.20)	Y			872C-J5N18-A2	872C-J5N18-R3
	8 (0.32)	N			872C-K8N18-A2	872C-K8N18-R3
30 mm	10 (0.39)	Y			872C-J10N30-A2	872C-J10N30-R3
	15 (0.59)	N			872C-K15N30-A2	872C-K15N30-R3
Recommended standard QD cordset (-2 = 2 m (6.5 ft))						889R-F3ECA-2

Note: Normally closed and mini QD units available. Contact your local Rockwell Automation sales office or Allen-Bradley distributor for details.

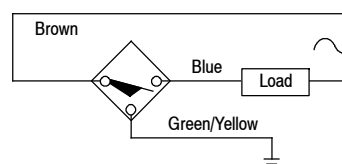
Approximate Dimensions [mm (in.)]

Cable Style



Wiring Diagrams

Normally Open



NOTE: Load can be switched to brown wire.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	70.0 (2.76)	60.0 (2.36)	—
	N			54.0 (2.13)	6.0 (0.24)
M18 X 1	Y	18.0 (0.71)	60.0 (2.36)	50.0 (1.96)	—
	N			42.0 (1.65)	8.0 (0.31)
M30 X 1.5	Y	30.0 (1.18)	60.0 (2.36)	50.0 (1.96)	—
	N			38.0 (1.50)	12.0 (0.47)

Inductive Proximity Sensors

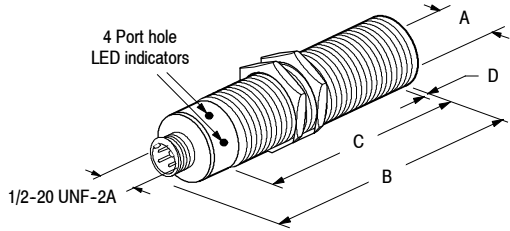
872C WorldProx™ 2-Wire AC/DC

Plastic Face/Threaded Nickel-Plated Brass Barrel

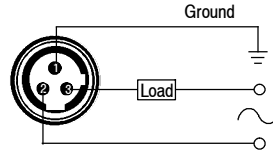
Approximate Dimensions [mm (in.)]

Wiring Diagrams

Micro Quick-Disconnect Style



Normally Open or Normally Closed



Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	75 (2.95)	45.0 (1.77)	—
	N			40.0 (1.57)	6.0 (0.24)
M18 X 1	Y	18.0 (0.71)	80.0 (3.15)	60.0 (2.36)	—
	N			52.0 (2.05)	8.0 (0.31)
M30 X 1.5	Y	30.0 (1.18)	80.0 (3.15)	50.0 (1.96)	—
	N			38.0 (1.50)	12.0 (0.47)

Inductive Proximity Sensors

872C WorldProx™ 2-Wire AC/DC Relay Output

Threaded Nickel-Plated Brass Barrel



872C AC/DC Cable Style
30 mm

Features

- High output current capability—up to 3 A
- N.O. and N.C. contacts in the same unit
- Isolated outputs
- 360° LED
- 30...132V AC/DC supply voltage
- Reverse polarity protection (DC)
- Circuit protected against industrial noise and transients
- UL Listed and CE Marked for all applicable directives

Specifications

Load Current	Switched Power, Max Switched Current, Max Switched Voltage, Max Relay Life	84 W or 900V A 3 amps SPDT 28V DC or 300V AC 20,000,000 operations (no load), 100,000 operations (full load)
Operating Voltage	30...132V AC/DC	
Repeatability	≤10% at constant temperature	
Hysteresis	10% typical	
False Pulse Protection	Incorporated	
Transient Noise Protection	Incorporated	
Reverse Polarity Protection	Incorporated	
Certifications	cULua Listed and CE Marked for all applicable directives	
Enclosure	NEMA 1, 2, 3, 3R 4, 4X, 6, 6P, 12, 13, IP67 (IEC 529); Nickel-plated brass barrel	
Connections	Cable: 2 m (6.5 ft) length 5-conductor 22 AWG PVC cable	
LED	Red: Output Energized, 360° visibility	
Operating Temperature [C (F)]	-25...+70° (-13...+158°)	
Shock	30 g, 11 ms	
Vibration	55 Hz, 1 mm amplitude, 3 planes	

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.2...0.3

Inductive Proximity Sensors

872C WorldProx™ 2-Wire AC/DC Relay Output

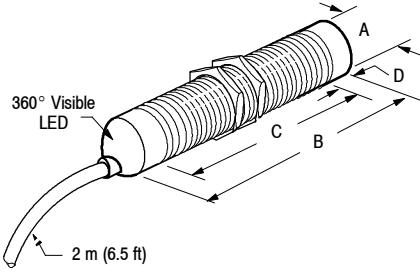
Threaded Nickel-Plated Brass Barrel

Product Selection

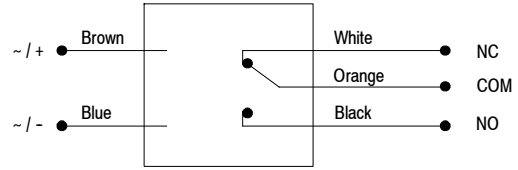
Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.
30 mm	10 (0.39)	Y	SPDT Relay	100	872C-B10BR30-E2
	15 (0.59)	N			872C-B15BR30-E2

Approximate Dimensions [mm (in.)]

Cable Style



Wiring Diagram



Thread Size	Shielded	[mm (in.)]			
		A	B (max)	C (min)	D (max)
M30 X 1.5	Y	30 (1.18)	61.0 (2.40)	57.0 (2.24)	—
	N		73.0 (2.87)		12.2 (0.48)



Description

Bulletin 871T inductive proximity sensors are self-contained, solid-state devices designed to sense the presence of ferrous and nonferrous metal objects without touching them.

The switch body consists of a plastic or stainless steel face and a threaded stainless steel barrel. They meet NEMA 1, 2, 3, 4, 12, 13 and IP67 (IEC529) enclosure standards. The electronic circuitry is potted for protection against shock, vibration, and contamination.

These sensors are available in 12 and 18 mm diameter housings. Connection options include a PVC cable and mini quick-disconnect.

Ferrous Selective Proximity Sensors

The Bulletin 871T ferrous (Fe) selective inductive proximity sensors operate in industrial environments where ferrous metal targets must be sensed without being touched. They are also an excellent replacement for standard inductive proximities that are sensing ferrous metals and subject to harsh environments. The 3 mm nominal sensing distance models are designed to ignore all sizes of nonferrous chips and foils. The 5 mm nominal sensing distance models are designed to replace standard inductive proximities when sensing ferrous metals or ignoring nonferrous chips smaller than 3 mm (0.125 in.).

The Fe-selective proximity sensors have a stainless steel sensing face and body. The stainless steel sensing face provides extra protection in sensor applications where the sensing face is

subjected to abrasion and chemicals. Typical proximity sensors have plastic sensing faces.

These sensors are self-contained, solid state, dual output devices which will energize and de-energize external loads. Each sensor has a normally open (N.O.) and an isolated normally closed (N.C.) output which can be operated up to 500 mA each. As with any sensor each application and target material should be reviewed before installing the sensor. Detailed specifications for these sensors are listed on page 2-90.

Features

- Threaded stainless steel barrel
- Cable or quick-disconnect styles
- Short circuit protection (DC models)
- Overload protection (DC models)
- Transient noise protection
- False pulse protection
- Reverse polarity protection (DC models)
- UL Listed, CSA Certified and CE Marked for all applicable directives

Styles

DC 3-Wire	page 2-86
AC 2-Wire	page 2-88
AC 2-Wire or 4-Wire Ferrous Selective	page 2-90

Accessories

Cordsets	page 8-1
Conduit Adaptor	page 2-209
Mounting Bracket, Spring Return Style	page 2-210
Mounting Bracket, Right Angle Style	page 2-213
Mounting Bracket, Clamp Style	page 2-214
End Caps	page 2-220
Mounting Nuts	page 2-221
Lock Washers	page 2-223

General Information

Torque Chart	page 2-225
Metric/English Conversion Chart	page 14-6

871T 3-Wire DC

Plastic Face/Threaded Stainless Steel Barrel



871T DC Cable Style
12, 18 mm



871T DC Mini
Quick-Disconnect Style
18 mm

Specifications

	12 mm	18 mm
Load Current	≤300 mA	≤400 mA
Leakage Current	≤10 mA	
Operating Voltage	10...30V DC	
Voltage Drop	≤1V	
Repeatability	≤10%	
Hysteresis	≤10% typical	
False Pulse Protection	Incorporated	
Transient Noise Protection	Incorporated	
Reverse Polarity Protection	Incorporated	
Short Circuit Protection	Incorporated	
Overload Protection	Incorporated	
Certifications	UL Listed, CSA Certified and CE Marked for all applicable directives	
Enclosure	NEMA 1, 2, 3, 4, 12 and 13 IP67 (IEC529) 303 Stainless steel barrel	
Connections	Cable: 3 m (10 ft) length 3-conductor PVC Quick-Disconnect: 4-pin mini style	
LED	Red: Output Energized	
Operating Temperature [C (F)]	-40...+70° (-40...+158°)	

Features

- 3-wire operation
- 3-conductor or 4-pin connection
- 10...30V DC
- Normally open output
- Short circuit, overload, false pulse, reverse polarity and transient noise protection
- UL Listed, CSA Certified and CE Marked for all applicable directives

Correction Factors

Target Material	Correction Factors
Steel	1.0
Stainless Steel	0.7...0.9
Brass	0.3...0.5
Aluminum	0.3...0.4
Copper	0.3...0.4

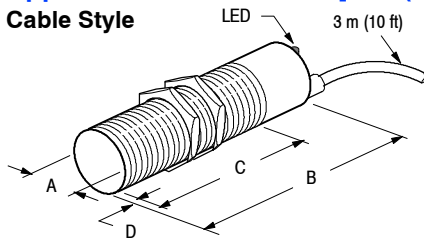
Product Selection

Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.	
					Cable Style	Mini QD Style
12 mm	2 (0.08)	Y	N.O.	2000	871T-R2A12	—
					871T-L2A12	—
	4 (0.16)	N		871T-R4B12	—	
				871T-L4B12	—	
18 mm	5 (0.20)	Y	N.O.	1000	871T-R5 A18	871T-R5J18
					871T-L5 A18	871T-L5J18
	8 (0.31)	N		871T-R8B18	871T-R8K18	
				871T-L8B18	871T-L8K18	
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft))						889N-F4AFC-6F

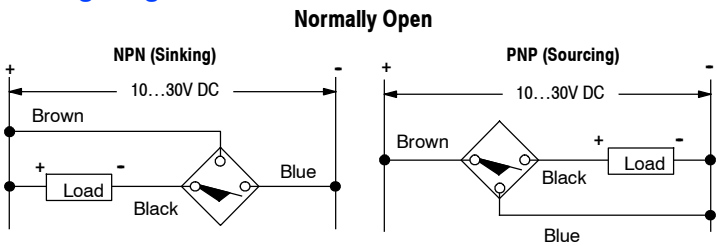
QD Cordsets and Accessories

Description	Page Number	Description	Page Number
Other Cordsets Available	8-2	End Caps	2-220
Terminal Chambers	8-2	Mounting Nuts	2-221...2-222
Mounting Brackets	2-210...2-214	—	—

Approximate Dimensions [mm (in.)]

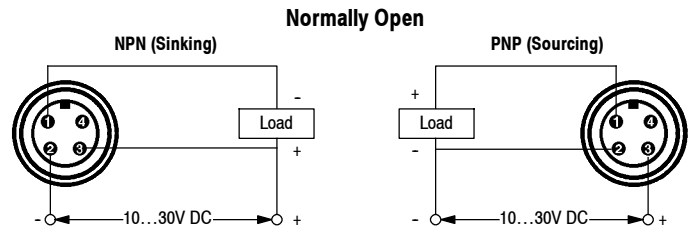
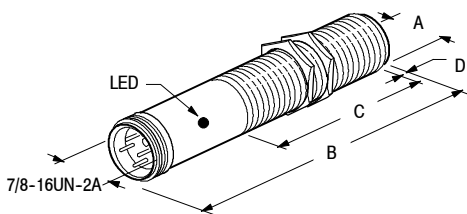


Wiring Diagrams



Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	80.0 (3.15)	53.8 (2.12)	0.8 (0.03)
	N			46.5 (1.83)	8.1 (0.32)
M18 X 1	Y	18.0 (0.71)	81.5 (3.21)	55.6 (2.19)	0.8 (0.03)
	N			81.3 (3.20)	43.7 (1.72)

Mini Quick-Disconnect Style



Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M18 X 1	Y	18.0 (0.71)	96.9 (3.81)	51.9 (2.04)	0.8 (0.03)
	N			40.4 (1.59)	12.3 (0.48)

871T 2-Wire AC

Plastic Face/Threaded Stainless Steel Barrel



871T AC Cable Style
12, 18 mm



871T AC Mini
Quick-Disconnect Style
18 mm

Specifications

	12 mm	18 mm
Load Current	≤300 mA	≤500 mA
Inrush Current (1 cycle)	≤3 A	≤5 A
Leakage Current	≤1.5 mA	
Supply Current (minimum)	5 mA	
Operating Voltage	20...132V AC	
Voltage Drop	6.5V AC at 500 mA, 10V AC at 20 mA (RMS)	
Repeatability	≤10%	
Hysteresis	≤10% typical	
False Pulse Protection	Incorporated	
Transient Noise Protection	Incorporated	
Certifications	UL Listed, CSA Certified and CE Marked for all applicable directives	
Enclosure	NEMA 1, 2, 3, 4, 12 and 13 IP67 (IEC529) 303 Stainless steel barrel	
Connections	Cable: 3 m (10 ft) length 12 mm—2 conductor PVC 18 mm—3 conductor PVC Quick-Disconnect: 3-pin mini style	
LED	Red: Output Energized (none on 871T-G5Q18FT)	
Operating Temperature [C (F)]	-40...+70° (-40...+158°)	
Shock	30 g, 11 ms	
Vibration	55 Hz, 1 mm amplitude, 3 planes	

Features

- 2-wire operation
- 2-conductor, 3-conductor, or 3-pin connection
- 20...132V AC
- False pulse and transient noise protection
- Normally open or normally closed output
- UL Listed, CSA Certified and CE Marked for all applicable directives

Correction Factors

Target Material	Correction Factors
Steel	1.0
Stainless Steel	0.7...0.9
Brass	0.3...0.5
Aluminum	0.3...0.4
Copper	0.3...0.4

Product Selection

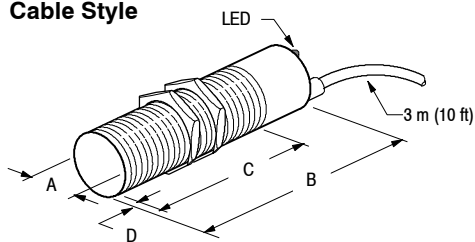
Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.	
					Cable Style	Mini QD Style
12 mm	2 (0.08)	Y	N.O.	50	871T-G2A12	—
	4 (0.16)	N			871T-G4B12	—
	2 (0.08)	Y	871T-H2A12		—	
	4 (0.16)	N	871T-H4B12		—	
18 mm	5 (0.20)	Y	N.O.		871T-G5 A18	871T-G5J18
	8 (0.31)	N			—	871T-G5Q18FT
	5 (0.20)	Y	N.C.		871T-G8B18	871T-G8K18
	8 (0.31)	N			871T-H5 A18	871T-H5J18
				871T-H8B18	871T-H8K18	
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft))						889N-F3AFC-6F

QD Cordsets and Accessories

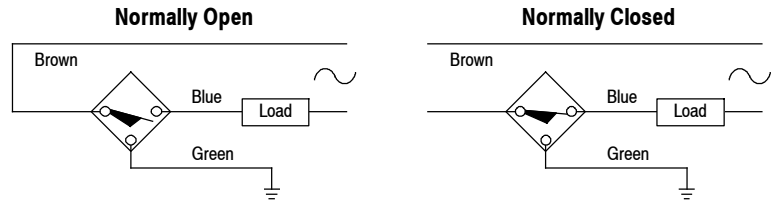
Description	Page Number	Description	Page Number
Other Cordsets Available	8-2	End Caps	2-220
Terminal Chambers	8-2	Mounting Nuts	2-221...2-222
Mounting Brackets	2-210...2-214	—	—

Approximate Dimensions [mm (in.)]

Cable Style



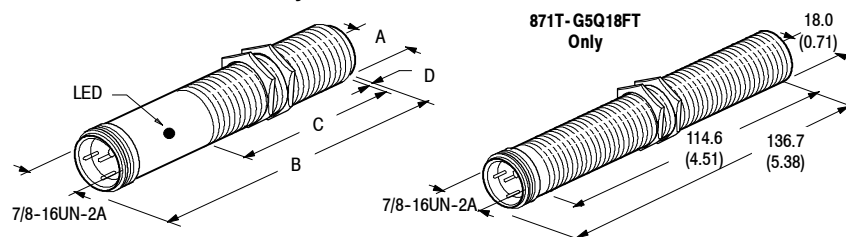
Wiring Diagrams



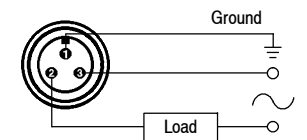
Note 1: No green wire on 12 mm. Attach housing to ground.
Note 2: Load can be switched to brown wire.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	80.0 (3.15)	53.8 (2.12)	0.8 (0.03)
	N			46.5 (1.83)	8.1 (0.32)
M18 X 1	Y	18.0 (0.71)	81.5 (3.21)	55.6 (2.19)	0.8 (0.03)
	N			81.3 (3.20)	43.7 (1.72)

Mini Quick-Disconnect Style



Normally Open or Normally Closed



Note: Load can be switched to pin 3.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M18 X 1	Y	18.0 (0.71)	96.9 (3.81)	51.9 (2.04)	0.8 (0.03)
	N			40.4 (1.59)	12.3 (0.48)

871T 2-Wire or 4-Wire AC Ferrous Selective

Stainless Steel Face/Threaded Stainless Steel Barrel



871T AC Cable Style
18 mm



871T AC Mini
Quick-Disconnect Style
18 mm

Features

- 2-wire or 4-wire operation
- 20...132V AC
- Normally open or complementary (N.O. and N.C.) outputs
- Ferrous selective sensing
- Stainless steel active sensing face
- False pulse and transient noise protection
- CE Marked for all applicable directives

Specifications

Load Current	≤500 mA
Inrush Current (1 cycle)	≤5 A
Supply Current (minimum)	5 mA
Leakage Current	≤1.7 mA
Operating Voltage	20...132V AC
Voltage Drop	N.O. output: 6.5V AC at 500 mA, 10V AC at 20 mA (RMS) N.C. output: 1.7V AC at 500 mA (RMS)
Isolation Voltage	800V AC (output to output); 1500V AC (output to housing)
Repeatability	≤10%
Hysteresis	≤10% typical
False Pulse Protection	Incorporated (Delay on power-up ≤100 ms)
Transient Noise Protection	Incorporated
Certifications	CE Marked for all applicable directives
Enclosure	NEMA 3, 4, 12 and 13, IP67 (IEC529) Stainless steel face and barrel
Connections	Cable: 3.6 m (12 ft) length 5-conductor PVC Quick-Disconnect: 5-pin mini style 3-pin mini style
LEDs	Red: Output Energized Green: Power
Ambient Temperature [C (F)]	-0...+70° (+32...+158°)

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel ^①	0.8...1.1
Brass	0.0
Aluminum	0.0
Copper	0.0

^① Stainless Steel containing carbon

Inductive Proximity Sensors
871T 2-Wire or 4-Wire AC Ferrous Selective
 Stainless Steel Face/Threaded Stainless Steel Barrel

Product Selection

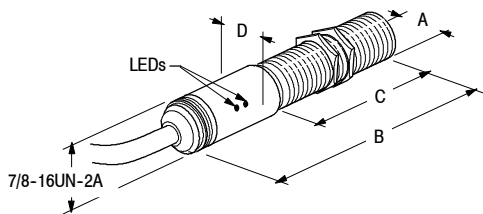
Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.		
					Cable Style	Mini QD 3-pin Style	Mini QD 5-pin Style
18 mm	3 (0.12)	Y	N.O. and N.C.	10	871T-A3 A18FE-12	—	871T-A3J18FE
	5 (0.20)				871T-A5 A18FE-12	—	871T-A5J18FE
	3 (0.12)		N.O.		—	871T-AX01	—
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft))					889N-F3AFC-6F		889N-F5AFC-6F

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-220
Mounting Nuts	2-221...2-222

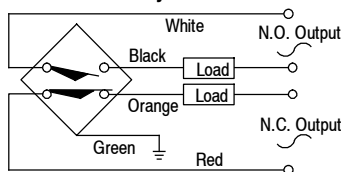
Approximate Dimensions [mm (in.)]

Cable Style



Wiring Diagrams

Complementary Normally Open and Normally Closed

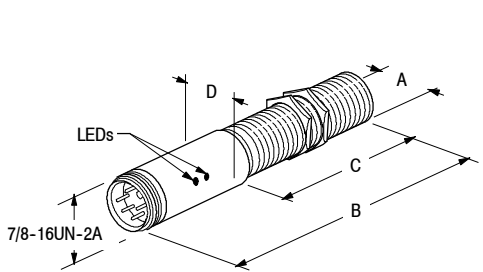


Notes:

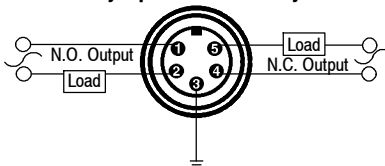
1. N.O. output must be wired for operation. N.C. output is optional.
2. N.O. load can be switched to white wire.
3. N.C. load can be switched to red wire.

Thread Size	[mm (in.)]				Cat. No.
	A	B	C	D	
M18x1	18.0 (0.71)	104.1 (4.10)	53.3 (2.10)	20.3 (0.80)	871T-A3 A18FE-12
		101.6 (4.00)	50.8 (2.00)		871T-A5 A18FE-12

Mini Quick-Disconnect Style



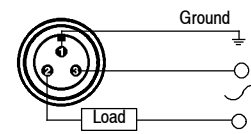
Normally Open and Normally Closed



Notes:

1. N.O. output must be wired for operation. N.C. output is optional.
2. N.O. load can be switched to pin 1.
3. N.C. load can be switched to pin 4.

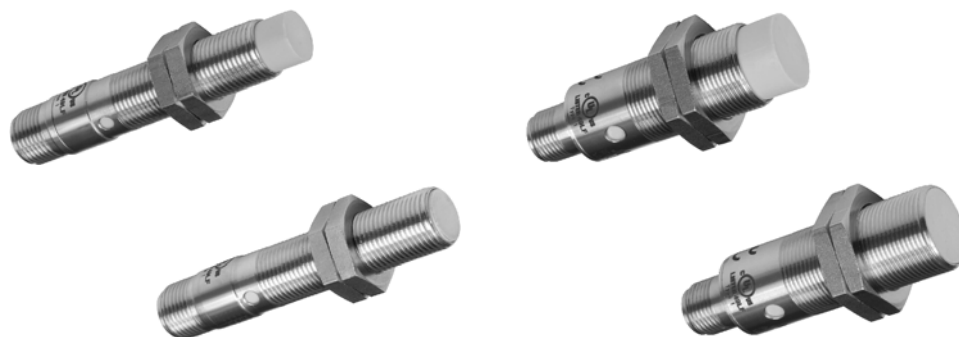
Normally Open



Note: Load can be switched to pin 3.

Thread Size	[mm (in.)]				Cat. No.
	A	B	C	D	
M18x1	18.0 (0.71)	104.1 (4.10)	53.3 (2.10)	20.3 (0.80)	871T-AX01
			50.8 (2.00)		871T-A3J18FE
		871T-A5J18FE			

Notes



Description

Bulletin 871TS inductive proximity sensors are self-contained, solid-state switching devices designed to sense the presence of metals without touching them. These units were designed to withstand high pressure washdown applications in the food and beverage industry. These sensors also offer a high resistance to corrosion caused by cleansing and exposure to disinfecting agents.

The switch body consists of a PPS (FDA Certified) plastic face and threaded stainless steel 316L barrel. These switches meet NEMA 1, 2, 3, 3R, 4, 4X, 6, 6P, 12, 13 and IP67, IP68 and IP69K enclosure standards. The electronic circuitry is potted for protection against shock, vibration, and contamination.

These sensors are available in 12 and 18 mm diameter housings. Connection options are limited to 4-pin (complementary output) DC micro quick-disconnect style.

Features

- 4-wire operation (complementary normally open and normally closed outputs)
- Gold-plated 4-pin micro quick-disconnect
- 10...30V DC
- Standard and extended sensing range versions
- IP67, IP68 and IP69K enclosure ratings
- Stainless steel 316L barrel
- FDA Certified, PPS sensing face
- Extended temperature rating (-40...+80°C (-40...+176°F))
- Short circuit, false pulse, reverse polarity, overload and transient noise protection
- cULus Listed and CE Marked for all applicable directives
- ECOLAB Certified

Styles

DC 3-Wire page 2-94

QD Cordsets and Accessories

Cordsets page 8-1

Mounting Bracket,
Spring Return Style page 2-210

Mounting Bracket,
Swivel/Tilt Style page 2-212

Mounting Bracket,
Right Angle Style page 2-213

Mounting Bracket,
Clamp Style page 2-214

End Caps page 2-220

Mounting Nuts page 2-221

Lock Washers page 2-223

General Information

Torque Chart page 2-225

Metric/English
Conversion Chart page 14-6

871TS Food and Beverage

PPS Plastic Face/Stainless Steel 316L Barrel



871TS DC Micro
Quick-Disconnect Style
12, 18 mm

Features

- 4-wire operation (complementary normally open and normally closed outputs)
- Gold-plated 4-pin micro quick-disconnect
- 10...30V DC
- Standard and extended sensing range versions
- IP67, IP68 and IP69K enclosure ratings
- Stainless steel 316L barrel
- FDA Certified, PPS sensing face
- Extended temperature rating (-40...80°C (-40...176°F))
- Short circuit, false pulse, reverse polarity, overload and transient noise protection
- cULus Listed and CE Marked for all applicable directives
- ECOLAB Certified

Specifications

Load Current	≤200 mA
Leakage Current	≤15 mA
Operating Voltage	10...30V DC
Voltage Drop	≤2.0V
Repeatability	≤5%
Hysteresis	≤10% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Reverse Polarity Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Certifications	cULus Listed and CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 3R, 4, 4X, 6, 6P, 12, 13, IP67, IP68 and IP69K; stainless steel 316L, PPS (FDA Certified) plastic face
Connections	Quick-Disconnect: 4-pin micro style
LED	Yellow: Output Energized
Operating Temperature [C (F)]	-40...+80° (-40...+176°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.2...0.3

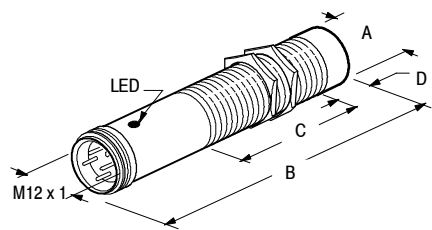
Product Selection

Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.
					Micro QD Style
12 mm	2 (0.08)	Y	N.O. and N.C.	2000	871TS-D2BN12-D4
					871TS-D2BP12-D4
	4 (0.16)	Y		2000	871TS-M4BN12-D4
					871TS-M4BP12-D4
	4 (0.16)	N		2000	871TS-D4BN12-D4
					871TS-D4BP12-D4
	8 (0.31)	N		2000	871TS-N8BN12-D4
					871TS-N8BP12-D4
18 mm	5 (0.20)	Y	N.O. and N.C.	1500	871TS-D5BN18-D4
					871TS-D5BP18-D4
	8 (0.31)	Y		1500	871TS-M8BN18-D4
					871TS-M8BP18-D4
	8 (0.31)	N		1500	871TS-D8BN18-D4
					871TS-D8BP18-D4
	12 (0.47)	N		1500	871TS-N12BN18-D4
					871TS-N12BP18-D4
Recommended standard QD cordset (-2 = 2 m (6.5 ft))					889D-F4AC-2

QD Cordsets and Accessories

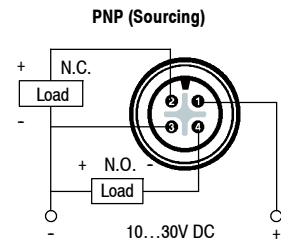
Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-220
Mounting Nuts	2-221...2-222

Approximate Dimensions [mm (in.)]



Wiring Diagram

Complementary Normally Open and Normally Closed



Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	65.0 (2.56)	38.1 (1.50)	—
M12 X 1	N	12.0 (0.47)	65.0 (2.56)	32.5 (1.28)	6.5 (0.26)
M18 X 1	Y	18.0 (0.71)	63.0 (2.48)	34.5 (1.36)	—
M18 X 1	N	18.0 (0.71)	63.0 (2.48)	26.5 (1.04)	8.0 (0.31)



Description

Bulletin 871Z inductive proximity sensors are self-contained, solid state switching devices designed to sense the presence of metal objects (ferrous and nonferrous) without touching them. These special weld-field immune models are ideal for welding environments and other applications where large magnetic fields are present. They are rated for reliable operation at a 25.4 mm (1 in.) distance from a current line carrying 20,000 A.❶

The electronic circuitry is potted for protection against shock, vibration, and contamination and is enclosed in a threaded, PTFE-coated brass housing which meets NEMA 1, 2, 3, 3R, 4, 4X, 6, 6P, 12, 13 and IP67 (IEC529) enclosure standards. The PTFE-coated housing and mounting nuts, Thermoset Plastic plastic face, and fire-retardant cable offer a high degree of weld splatter protection. The heavy #18 AWG SOOW-A cable offers additional abrasion, chemical, and environmental protection.

All units are provided with short circuit, overload, transient noise, and false pulse protection and weld field immunity which exceeds 20,000 A at 25.4 mm (1 in.) from the welding tip. All of these protections mean you can reduce your down time due to improper wiring, shorts, radio frequency interference, line spikes, and many other causes.

❶ This distance varies with current line amperage. See page 2-10 of the Introduction section to determine the minimum distance for your application.

These sensors are available in 12, 18 and 30 mm diameters. Connection options include a 2-meter cable, mini quick-disconnect and micro quick-disconnect.

Features

- Cable or quick-disconnect styles
- PTFE-coated brass barrel
- Weld field immunity
- Short circuit, false pulse, overload, and transient noise protection
- UL Listed, CSA Certified (AC/DC models) and CE Marked for all applicable directives

Styles

DC 3-Wire	page 2-104
AC/DC 2-Wire	page 2-100

Accessories

Cordsets	page 8-1
Mounting Bracket, Spring Return Style	page 2-210
Mounting Bracket, Right Angle Style	page 2-213
Mounting Bracket, Clamp Style	page 2-214
PTFE End Caps	page 2-219
Mounting Nuts	page 2-221
Lock Washers	page 2-223

General Information

Torque Chart	page 2-225
Metric/English Conversion Chart	page 14-6

871Z 3-Wire DC Weld Field Immune

PTFE Face/Threaded PTFE-Coated Brass Barrel



871Z DC Mini
Quick-Disconnect Style
18, 30 mm



871Z DC Micro
Quick-Disconnect Style
12, 18, 30 mm

Specifications

Load Current	≤200 mA
Minimum Load Current	1 mA
Leakage Current	≤10 μA
Operating Voltage	10...30V DC
Voltage Drop	≤2.4V
Repeatability	≤10%
Hysteresis	≤15% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Reverse Polarity Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Weld Field Immunity	20,000 A at 1 inch
Certifications	CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 4, 12 and 13, IP67 (IEC529) PTFE coated brass barrel
Connections	Quick-Disconnect: 4-pin mini style 4-pin micro style
LED	Red: Output Energized
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Features

- 3-wire operation
- 3-conductor or 4-pin connection
- 10...30V DC
- Weld field immunity
- Normally open output
- Reverse polarity, short circuit, overload, false pulse and transient noise protection
- CE Marked for all applicable directives

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.3...0.4

Inductive Proximity Sensors
871Z 3-Wire DC Weld Field Immune
 PTFE Face/Threaded PTFE-Coated Brass Barrel

Product Selection

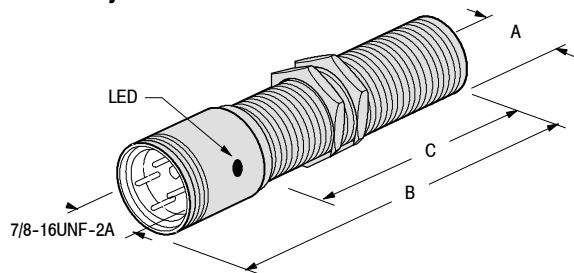
Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration		Switching Frequency [Hz]	Cat. No.	
						Mini QD Style	Micro QD Style
12 mm	2 (0.08)	Y	N.O.	PNP	15	—	871Z-DW2NP12-D4
18 mm	5 (0.20)	Y	N.O.	PNP	15	871Z-DW5NP18-N4	871Z-DW5NP18-D4
30 mm	10 (0.39)	Y	N.O.	PNP	15	871Z-DW10NP30-N4	871Z-DW10NP30-D4
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))						889N-F4AFC-6F	889D-F4WE-2

QD Cordsets and Accessories

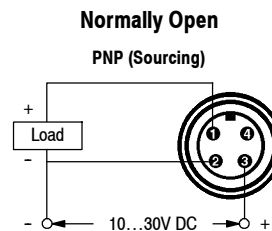
Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
PTFE End Caps	2-219
Mounting Nuts	2-221...2-222

Approximate Dimensions [mm (in.)]

Mini QD Style

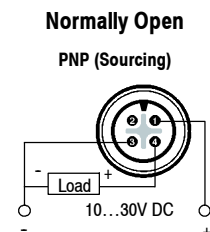
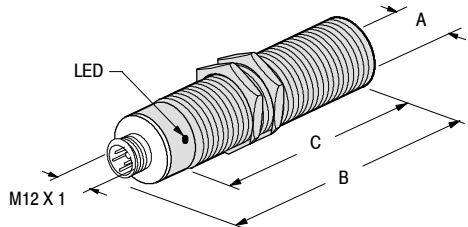


Wiring Diagram



Thread Size	Shielded	[mm (in.)]		
		A	B	C
M18 X 1	Y	18.0 (0.71)	90 (3.54)	53 (2.09)
M30 X 1.5	Y	30.0 (1.18)	90 (3.54)	56 (2.20)

Micro QD Style



Thread Size	Shielded	[mm (in.)]		
		A	B	C
M12 X 1	Y	12.0 (0.47)	70.0 (2.76)	50.0 (1.97)
M18 X 1	Y	18.0 (0.71)	80.0 (3.15)	60.0 (2.36)
M30 X 1.5	Y	30.0 (1.18)	80.0 (3.15)	60.0 (2.36)

871Z 2-Wire AC/DC Weld Field Immune

Thermoset Plastic Face/Threaded PTFE-Coated Brass Barrel



871Z AC/DC Mini
Quick-Disconnect Style
12, 18, 30 mm



871Z AC/DC Micro
Quick-Disconnect Style
12, 18, 30 mm

Features

- 2-wire operation
- 2-conductor, 3-conductor, or 3-pin connection
- 20...250V AC/DC
- Normally open or normally closed output
- Weld field immunity
- Short circuit, false pulse, overload, and transient noise protection
- UL Listed, CSA Certified and CE Marked for all applicable directives

Specifications

	12 mm	18 & 30 mm
Load Current	5...200 mA	5...250 mA
Inrush Current (1 cycle)	≤2 A	≤4 A
Leakage Current	≤1.9 mA @ 120V AC	
Operating Voltage	20...250V AC/DC	
Voltage Drop	≤10V @ 5...200 mA	≤10V @ 5...250 mA
Repeatability	≤10% at constant temperature	
Hysteresis	7% typical	
False Pulse Protection	Incorporated	
Transient Noise Protection	Incorporated	
Short Circuit Protection	Incorporated, trigger @ 5 A typical	Incorporated, trigger @ 8 A typical
Overload Protection	Incorporated, trigger @ 260 mA typical	Incorporated, trigger @ 320 mA typical
Weld Field Immunity	20,000A at 1 inch	
Reverse Polarity Protection (DC output)	Incorporated	
Certifications	UL Listed, CSA Certified and CE Marked for all applicable directives	
Enclosure	NEMA 1, 2, 3, 3R, 4, 4X, 6, 6P, 12, 13, IP67 (IEC529) PTFE coated housing	
Connections	Cable: 2 m (6.5 ft) length C2—2 conductor #22 AWG ToughLink™ H2—3 conductor #18 AWG ToughLink Quick-Disconnect: 3-pin micro style 3-pin mini style	
LEDs	Red: Output energized Green: Power	Red: Flashing short circuit/ overload
Operating Temperature [C (F)]	-25...+70° (-13...+158°)	
Shock	30 g, 11 ms	
Vibration	55 Hz, 1 mm amplitude, 3 planes	

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.3...0.4

871Z 2-Wire AC/DC Weld Field Immune

Thermoset Plastic Face/Threaded PTFE-Coated Brass Barrel

Product Selection

Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.		
					Cable Style ①	Mini QD Style	Micro QD Style
12 mm	2 (0.08)	Y	N.O.	30	—	871Z-BW2N12-N3	871Z-BW2N12-R3
			N.C.	20	—	871Z-BW2C12-N3	871Z-BW2C12-R3
	4 (0.16)	N	N.O.	30	—	871Z-BW4N12-N3	871Z-BW4N12-R3
			N.C.	20	—	871Z-BW4C12-N3	871Z-BW4C12-R3
18 mm	5 (0.20)	Y	N.O.	30	871Z-BW5N18-H2	871Z-BW5N18-N3	871Z-BW5N18-R3
			N.C.	20	871Z-BW5C18-H2	871Z-BW5C18-N3	871Z-BW5C18-R3
	8 (0.31)	N	N.O.	30	—	871Z-BW8N18-N3	871Z-BW8N18-R3
			N.C.	20	—	871Z-BW8C18-N3	871Z-BW8C18-R3
30 mm	10 (0.39)	Y	N.O.	30	871Z-BW10N30-H2	871Z-BW10N30-N3	871Z-BW10N30-R3
			N.C.	20	871Z-BW10C30-H2	871Z-BW10C30-N3	871Z-BW10C30-R3
	15 (0.59)	N	N.O.	30	—	871Z-BW15N30-N3	871Z-BW15N30-R3
			N.C.	20	—	871Z-BW15C30-N3	871Z-BW15C30-R3
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))					889N-F3AFC-6F	889R-F3WEA-2	

① 12 mm models utilize the same outer and inner jacket materials, but are not SOOW-A rated.

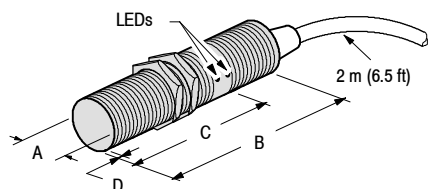
Note: This Allen-Bradley Weld Field Immune proximity sensor is also available with additional weld slag resistant material on the sensing face. Consult your local Rockwell Automation sales office or Allen-Bradley distributor for details.

QD Cordsets and Accessories

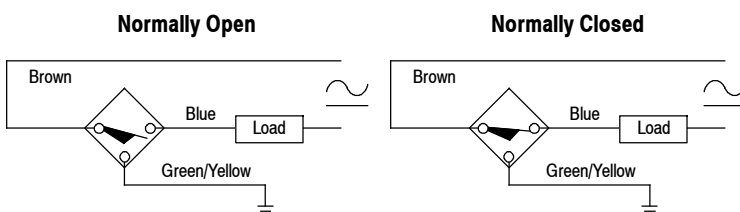
Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
PTFE End Caps	2-219
Mounting Nuts	2-221...2-222

Approximate Dimensions —[mm (in.)]

Cable Style



Wiring Diagram



Note: Rear portion of barrel left uncoated for ground contact on 12 mm models.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M18 X 1	Y	18.0 (0.71)	74.68 (2.94)	61.6 (2.43)	0.8 (0.03)
M30 X 1.5	Y	30.0 (1.18)	77.52 (3.05)	64.3 (2.53)	

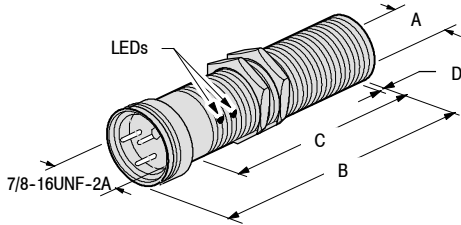
Inductive Proximity Sensors

871Z 2-Wire AC/DC Weld Field Immune

Thermoset Plastic Face/Threaded PTFE-Coated Brass Barrel

Approximate Dimensions [mm (in.)]

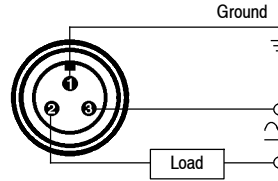
Mini QD Style



Note: Rear portion of barrel left uncoated for ground contact on 12 mm models.

Wiring Diagram

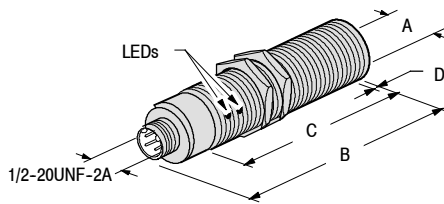
Normally Open or Normally Closed



Note 1: No ground pin on 12 mm. Attach housing to ground.
Note 2: Load can be switched to pin 2.

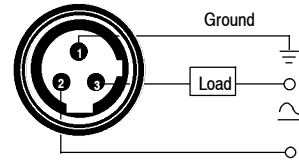
Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	93.45 (3.68)	46.2 (1.82)	0.8 (0.03)
	N			40.7 (1.52)	
M18 X 1	Y	18.0 (0.71)	75.82 (2.99)	57.28 (2.26)	
	N			44.6 (1.76)	
M30 X 1.5	Y	30.0 (1.18)	86.66 (3.41)	64.3 (2.53)	

Micro QD Style



Note: Rear portion of barrel left uncoated for ground contact on 12 mm models.

Normally Open or Normally Closed



Note 1: No ground pin on 12 mm. Attach housing to ground.
Note 2: Load can be switched to pin 2.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	90.1 (3.55)	46.7 (1.85)	0.8 (0.03)
	N			39.7 (1.56)	
M18 X 1	Y	18.0 (0.71)	83.5 (3.29)	61.6 (2.43)	
	N			48.9 (1.93)	
M30 X 1.5	Y	30.0 (1.18)	86.0 (3.38)	64.3 (2.53)	



Description

Bulletin 871ZT inductive proximity sensors are self contained, solid-state switching devices designed to sense the presence of metal objects without touching them. However, unlike most inductive sensors, Bulletin 871ZT sensors are equal sensing inductive proximity sensors; they sense all metals at nearly the same distance. Additionally, these special weld-field immune models are ideal for welding environments and other applications where large magnetic fields are present.

The electronic circuitry is potted for protection against shock, vibration, and contamination and is enclosed in a threaded, PTFE-coated brass housing, which meets IP67 (IEC 529) enclosure standards. The PTFE-coated housing, face and mounting nuts offer a high degree of weld-splatter protection.

All units are provided with short circuit, overload, transient noise, and false pulse protection and weld-field immunity, which exceeds 20,000 A at 25.4 mm (1 in.) from the welding tip. All of these protections mean that you can reduce your downtime due to improper wiring, shorts, radio frequency interference, line spikes, and many other causes.

Features

- Weld field immune
- Weld-slag resistant PTFE-coated brass barrel and face
- Equal sensing for all metals
- Normally open output
- Reverse polarity, short circuit, overload, false pulse and transient noise protection
- CE Marked for all applicable directives

Styles

DC 3-Wire page 2-104

Accessories

Cordsets page 8-1

Conduit Adaptors page 2-209

Mounting Brackets,
Spring Return Style page 2-210

Mounting Brackets,
Swivel/Tilt Style page 2-212

Mounting Brackets,
Right Angle Style page 2-213

Mounting Brackets,
Clamp Style page 2-214

End Caps page 2-220

Mounting Nuts page 2-221

Lock Washers page 2-223

General Information

Torque Chart page 2-225

Metric/English
Conversion Chart page 14-6

871ZT 3-Wire DC Weld Field Immune/Equal Sensing

PTFE Face/Threaded PTFE-Coated Brass Barrel



871ZT DC Micro
Quick-Disconnect Style
12, 18, 30 mm

Features

- 3-wire operation
- 4-pin micro quick-disconnect
- 10...30V DC
- Weld field immunity
- Weld-slag resistant PTFE coated brass barrel and face
- Equal sensing for all metals
- Normally open output
- Reverse polarity, short circuit, overload, false pulse and transient noise protection
- CE Marked for all applicable directives

Specifications

Load Current	≤200 mA
Minimum Load Current	1 mA
Leakage Current	<0.08 mA
Operating Voltage	10...30V DC
Voltage Drop	≤2.5V
Repeatability	≤5% typical
Hysteresis	≤10% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Reverse Polarity Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Weld Field Immunity	Up to 1260 Gauss (M5)
Certifications	CE Marked for all applicable directives
Enclosure	IP67 (IEC 529) PTFE coated brass barrel
Connections	Quick-Disconnect: 4-pin micro style
LED	360° LED visibility; Orange: Target Present
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.9-1.1
Brass	0.9-1.1
Aluminum	0.9-1.1
Copper	0.9-1.1

871ZT 3-Wire DC Weld Field Immune/Equal Sensing

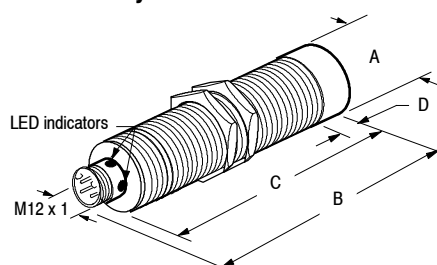
PTFE Face/Threaded PTFE-Coated Brass Barrel

Product Selection

Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Outout Configuration		Switching Frequency [Hz]	Cat. No.
						Micro QD Style
12 mm	3 (0.12)	Y	N.O.	PNP	2000	871ZT-MB3NP12-D4
	8 (0.31)	N			2000	871ZT-NB8NP12-D4
18 mm	5 (0.20)	Y			2500	871ZT-MB5NP18-D4
	12 (0.47)	N			2500	871ZT-NB12NP18-D4
30 mm	10 (0.39)	Y			600	871ZT-MB10NP30-D4
	20 (0.79)	N			1000	871ZT-NB20NP30-D4
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))						889D-F4WE-2

Dimensions [mm (in.)]

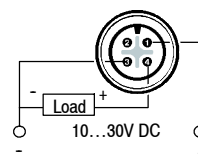
Micro QD Style



Wiring Diagram

Normally Open

PNP (Sourcing)



Thread Size	Shielded	A	B	C	D
M12x1	Y	12 (0.47)	65 (2.56)	50 (1.97)	—
	N	12 (0.47)	65 (2.56)	40 (1.58)	10 (0.39)
M18x1	Y	18 (0.71)	65 (2.56)	50 (1.97)	—
	N	18 (0.71)	65 (2.56)	40.5 (1.59)	10 (0.39)
M30x1	Y	30 (1.18)	65 (2.56)	50.5 (1.99)	—
	N	30 (1.18)	65 (2.56)	37.5 (1.48)	13 (.51)



Description

Bulletin 871ZC inductive proximity sensors are self-contained, solid state switching devices designed to sense the presence of metal objects (ferrous and nonferrous) without touching them. These special weld-field immune models are ideal for welding environments and other applications where large magnetic fields are present. They are rated for reliable operation at 25.4 mm (1 in.) from a current line carrying 20,000 A.❶

The electronic circuitry is potted for protection against shock, vibration, and contamination and is enclosed in a threaded, copper housing, which meets NEMA 1, 2, 3, 3R, 4, 4X, 6, 6P, 12, 13 and IP67 (IEC529) enclosure standards. The copper housing, mounting nuts, and thermoset plastic face offer a high degree of weld splatter protection.

All units are provided with short circuit, overload, transient noise, and false pulse protection and weld field immunity which exceeds 20,000 A at 25.4 mm (1 in.) from the welding tip. All of these protections mean you can reduce your down time due to improper wiring, shorts, radio frequency interference, line spikes, and many other causes.

❶ This distance varies with current line amperage. See page 2-10 of the Introduction section to determine the minimum distance for your application.

❷ Our ToughCoat finish is a proprietary composite material which resists the adhesion and accumulation of weld slag particles, thereby improving and extending sensor performance.

These sensors are available in 12, 18 and 30 mm diameters. Connection options include a mini quick-disconnect and micro quick-disconnect.

Features

- Micro and mini quick-disconnect styles
- Copper barrel
- Weld field immunity
- Short circuit, false pulse, overload, and transient noise protection
- Optional ToughCoat™ finish on sensor face❷
- CE Marked for all applicable directives

Styles

DC 3-Wire
Weld Field Immune page 2-108

AC/DC 2-Wire
Weld Field Immune page 2-110

Accessories

Cordsets page 8-1

Mounting Bracket,
Spring Return Style page 2-210

Mounting Bracket,
Right Angle Style page 2-213

Mounting Bracket,
Clamp Style page 2-214

PTFE End Caps page 2-219

Mounting Nuts page 2-221

Lock Washers page 2-223

General Information

Torque Chart page 2-225

Metric/English
Conversion Chart page 14-6

871ZC 3-Wire DC Weld Field Immune

Thermoset Plastic Face/Threaded Copper Barrel



871ZC DC Micro
Quick-Disconnect Style
12, 18, 30 mm

Features

- 360° LED
- Copper barrel
- Weld field immunity
- 3-wire operation
- 4-pin micro QD connection
- 10...30V DC
- Normally open output
- Reverse polarity, short circuit, overload, false pulse and transient noise protection
- Optional ToughCoat finish on sensor face❶
- UL Listed, cUL Certified and CE Marked for all applicable directives

Specifications

Load Current	≤200 mA
Minimum Load Current	1 mA
Leakage Current	≤10 μA
Operating Voltage	10...30V DC
Voltage Drop	≤2.4V
Repeatability	≤10%
Hysteresis	10% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Reverse Polarity Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Weld Field Immunity	20,000 A at 1 inch
Certifications	UL Listed, cUL Certified and CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 4, 12 and 13, IP67 (IEC529) Copper barrel, thermoset plastic face
Connections	Quick-Disconnect: 4-pin micro style
LED	Red: Target Present
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.3...0.4

❶ Our ToughCoat finish is a proprietary composite material which resists the adhesion and accumulation of weld slag particles, thereby improving and extending sensor performance.

Inductive Proximity Sensors
871ZC 3-Wire DC Weld Field Immune
Thermoset Plastic Face/Threaded Copper Barrel

Product Selection

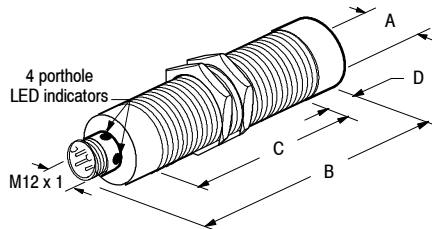
Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	ToughCoat Finish	Output Configuration		Switching Frequency [Hz]	Cat. No.
							Micro QD Style
12 mm	2 (0.07)	Y	Uncoated	N.O.	PNP	15	871ZC-MW2NP12-D4
			Face Only				871ZC-MV2NP12-D4
18 mm	4 (0.15)	N	Uncoated				871ZC-NW4NP12-D4
			Uncoated				871ZC-MW5NP18-D4
	5 (0.19)	Y	Uncoated				871ZC-MV5NP18-D4
			Face Only				871ZC-NW8NP18-D4
8 (0.31)	N	Uncoated	871ZC-NW15NP18-D4				
		Uncoated	871ZC-MW10NP30-D4				
30 mm	10 (0.39)	Y	Uncoated	871ZC-MV10NP30-D4			
			Face Only	871ZC-NW15NP30-D4			
	15 (0.59)	N	Uncoated	871ZC-NW15NP30-D4			
Recommended standard QD cordset (-2 = 2 m (6.5 ft))							889D-F4WE-2

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
PTFE End Caps	2-219
Mounting Nuts	2-221...2-222

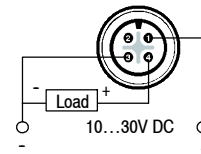
Approximate Dimensions [mm (in.)]

Micro QD Style



Wiring Diagram

**Normally Open
PNP (Sourcing)**



Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	65 (2.56)	37.7 (1.48)	—
	N		70.6 (2.78)	37.7 (1.48)	6.3 (0.25)
M18 X 1	Y	18.0 (0.71)	80.0 (3.15)	52.8 (2.08)	—
	N		88.5 (3.48)	52.8 (2.08)	9.6 (0.38)
M30 X 1	Y	30.0 (1.18)	85.9 (3.38)	68.6 (2.70)	—
	N		99.0 (3.90)	68.6 (2.70)	14.5 (0.57)

871ZC 2-Wire AC/DC Weld Field Immune

Thermoset Plastic Face/Threaded Copper Barrel



871ZC AC/DC Mini
Quick-Disconnect Style
12, 18, 30 mm

Features

- 2-wire operation
- 3-pin connection
- 20...250V AC/DC
- Normally open or normally closed output
- Weld field immunity
- Short circuit, false pulse, overload, and transient noise protection
- UL Listed, CSA Certified and CE Marked for all applicable directives
- Optional ToughCoat™ finish on sensor face❶

Specifications

	12 mm	18 & 30 mm
Load Current	5...200 mA	5...250 mA
Inrush Current (1 cycle)	≤2 A	≤4 A
Leakage Current	≤1.9 mA @ 120V AC	
Operating Voltage	20...250V AC/DC	
Voltage Drop	≤10V @ 5...200 mA	≤10V @ 5...250 mA
Repeatability	≤10% at constant temperature	
Hysteresis	7% typical	
False Pulse Protection	Incorporated	
Transient Noise Protection	Incorporated	
Short Circuit Protection	Incorporated, trigger @ 5 A typical	Incorporated, trigger @ 8 A typical
Overload Protection	Incorporated, trigger @ 260 mA typical	Incorporated, trigger @ 320 mA typical
Weld Field Immunity	20,000A @ 1 inch	
Reverse Polarity Protection (DC output)	Incorporated	
Certifications	UL Listed, CSA Certified and CE Marked for all applicable directives	
Enclosure	NEMA 1, 2, 3, 3R, 4, 4X, 6, 6P, 12, 13, IP67 (IEC529) Copper barrel	
Connections	Quick-Disconnect: 3-pin micro style 3-pin mini style	
LEDs	Red: Output energized/short circuit (flashing) Green: Power	
Operating Temperature [C (F)]	-25...+70° (-13...+158°)	
Shock	30 g, 11 ms	
Vibration	55 Hz, 1 mm amplitude, 3 planes	

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.3...0.4

❶ Our ToughCoat finish is a proprietary composite material which resists the adhesion and accumulation of weld slag particles, thereby improving and extending sensor performance.

Inductive Proximity Sensors
871ZC 2-Wire AC/DC Weld Field Immune
 Thermoset Plastic Face/Threaded Copper Barrel

Product Selection

Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	ToughCoat Finish	Output Configuration	Switching Frequency [Hz]	Cat. No.	
						Mini QD Style	Micro QD Style
12 mm	2 (0.08)	Y	Uncoated	N.O.	30	871ZC-BW2N12-N3	871ZC-BW2N12-R3
			Face Only	N.O.	30	—	871ZC-JV2N12-R3
			Uncoated	N.C.	20	871ZC-BW2C12-N3	871ZC-BW2C12-R3
	4 (0.16)	N	Uncoated	N.O.	30	871ZC-BW4N12-N3	871ZC-BW4N12-R3
			Uncoated	N.C.	20	871ZC-BW4C12-N3	871ZC-BW4C12-R3
			Uncoated	N.O.	30	871ZC-BW5N18-N3	871ZC-BW5N18-R3
18 mm	5 (0.20)	Y	Uncoated	N.O.	30	871ZC-BW5N18-N3	871ZC-BW5N18-R3
			Face Only	N.O.	30	—	871ZC-JV5N18-R3
			Uncoated	N.C.	20	871ZC-BW5C18-N3	871ZC-BW5C18-R3
	8 (0.31)	N	Uncoated	N.O.	30	871ZC-BW8N18-N3	871ZC-BW8N18-R3
			Uncoated	N.C.	20	871ZC-BW8C18-N3	871ZC-BW8C18-R3
			Uncoated	N.O.	30	871ZC-BW10N30-N3	871ZC-BW10N30-R3
30 mm	10 (0.39)	Y	Uncoated	N.O.	30	871ZC-BW10N30-N3	871ZC-BW10N30-R3
			Face Only	N.O.	30	—	871ZC-JV10N30-R3
			Uncoated	N.C.	20	871ZC-BW10C30-N3	871ZC-BW10C30-R3
Recommended standard QD cordset (-6F = 1.8 m (6 ft))						889N-F3AFC-6F	889R-F3WEA-2

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
PTFE End Caps	2-219
Mounting Nuts	2-221...2-222

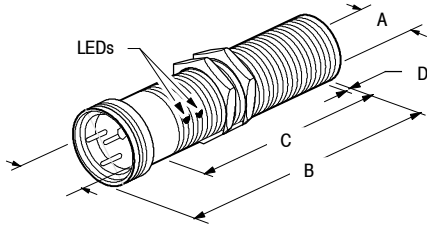
Inductive Proximity Sensors

871ZC 2-Wire AC/DC Weld Field Immune

Thermoset Plastic Face/Threaded Copper Barrel

Approximate Dimensions [mm (in.)]

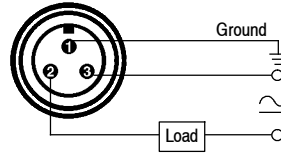
Mini QD Style



7/8-16UNF-2A

Wiring Diagram

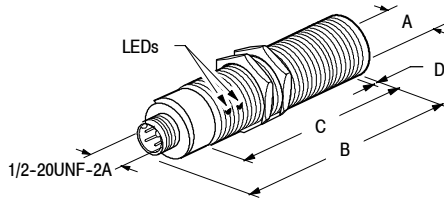
Normally Open or Normally Closed



Note 1: No ground pin on 12 mm. Attach housing to ground.
Note 2: Load can be switched to pin 2.

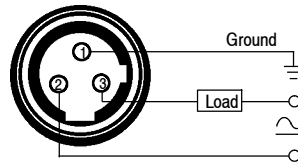
Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	93.5 (3.68)	46.1 (1.81)	0.8 (0.03)
	N			38.7 (1.52)	8.1 (0.32)
M18 X 1	Y	18.0 (0.71)	75.8 (2.99)	57.3 (2.25)	—
	N			44.6 (1.76)	12.7 (0.50)
M30 X 1.5	Y	30.0 (1.18)	86.7 (3.41)	64.3 (2.53)	—

Micro QD Style



1/2-20UNF-2A

Normally Open or Normally Closed



Note 1: No ground pin on 12 mm. Attach housing to ground.
Note 2: Load can be switched to pin 2.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	90.1 (3.55)	47.0 (1.85)	0.8 (0.03)
	N			39.6 (1.56)	8.1 (0.32)
M18 X 1	Y	18.0 (0.71)	83.5 (3.29)	61.6 (2.43)	—
	N			48.9 (1.93)	12.7 (0.50)
M30 X 1.5	Y	30.0 (1.18)	86.0 (3.39)	64.3 (2.53)	—



Description

Bulletin 871C inductive proximity sensors are self-contained, general purpose, solid-state devices designed to sense the presence of ferrous and nonferrous metal objects without touching them.

The switch body consists of a plastic face and either a stainless steel barrel, nickel-plated brass barrel or plastic barrel. The electronic circuitry is potted for protection against shock, vibration, and contamination.

These sensors are available in 3, 4, 5, 8, 12, 18 and 30 mm diameters, with smooth or threaded barrels. Connection options include a 2 m cable, micro quick-disconnect, and pico quick-disconnect.

Features

- Cable or quick-disconnect styles
- Short circuit protection❶
- Overload protection❶
- Transient noise protection
- False pulse protection
- Reverse polarity protection
- CE Marked for all applicable directives (most models)

Styles

DC 3-Wire Small Diameter	page 2-114
DC 3-Wire Extended Temperature Range page 2-117
AC 2-Wire Full-Featured	.. page 2-119
AC 2-Wire Plastic Barrel	.. page 2-122
NAMUR Intrinsically Safe	. page 2-124
Analog Output page 2-127

Accessories

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Conduit Adaptors page 2-209
Mounting Brackets, Spring Return Style page 2-210
Mounting Brackets, Swivel/Tilt Style page 2-212
Mounting Brackets, Right Angle Style page 2-213
Mounting Brackets, Clamp Style page 2-214
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General Information

Torque Chart page 2-225
Metric/English Conversion Chart page 14-6

❶ AC full-featured and DC models only.

871C 3-Wire DC

Plastic Face/Small Threaded or Smooth Nickel-Plated Brass Barrel



871C DC Cable Style
Smooth Barrel
3, 4 mm



871C DC Pico Style 3-Pin 6 inch Lead
Smooth Barrel
4, 5 mm



871C DC Cable Style
Threaded Barrel
4, 5 mm



871C DC Cable Style
Smooth Barrel
4 mm



871C DC Pico Quick-Disconnect
Style Threaded Barrel
5 mm

Specifications

Barrel Diameter	3 mm Smooth Barrel and 4 mm Threaded Barrel	4 mm Smooth Barrel and 5 mm Threaded Barrel
Load Current	≤100 mA	≤200 mA
Leakage Current	≤0.1 mA	
Operating Voltage	10...30V DC	
Voltage Drop	≤2.5V	
Repeatability	≤5%	
Hysteresis	15% typical	
False Pulse Protection	Incorporated	
Transient Noise Protection	Incorporated	
Reverse Polarity Protection	Incorporated	
Short Circuit Protection	Incorporated	
Certifications	CE Marked for all applicable directives	
Enclosure	NEMA 1, 2, 3, 4, 12, 13 IP67 (cable only) IP65 (qd only) (IEC529); Stainless steel barrel	
Connections	Cable: 2 m (6.5 ft) length 3-conductor PUR Quick-Disconnect: 3-pin pico style	Cable: 2 m (6.5 ft) length 3-conductor PVC Quick-Disconnect: 3-pin pico style
LED	Red or Yellow: Output energized	
Operating Temperature [C (F)]	-25...+70° (-13...+158°)	
Shock	30 g, 11 ms	
Vibration	55 Hz, 1 mm amplitude, 3 planes	

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.3...0.4

Features

- 3-wire operation
- 3-conductor, 3-pin pico or 3-pin 6 inch lead
- 10...30V DC
- Normally open
- False pulse, transient noise, reverse polarity and short circuit protections
- CE Marked for all applicable directives (except for 3 mm models)

Product Selection

Barrel Dia.	Barrel Type	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.			
						Cable Style	Pico QD Style	Pico with Lead Style	
3	Smooth	0.6 (0.02)	Y	N.O.	5000	871C-DM1NN3-E2	—	871C-DM1NN3-AP3	
						871C-DM1NP3-E2	—	871C-DM1NP3-AP3	
		1 (0.04)			3000	871C-MM1NN3-E2	—	871C-MM1NN3-AP3	
						871C-MM1NP3-E2	—	871C-MM1NP3-AP3	
4	Threaded	0.8 (0.03)			5000	NPN	871C-D1NN4-E2	—	871C-D1NN4-AP3
						PNP	871C-D1NP4-E2	—	871C-D1NP4-AP3
		1 (0.04)			3000	NPN	871C-M1NN4-E2	—	871C-M1NN4-AP3
						PNP	871C-M1NP4-E2	—	871C-M1NP4-AP3
	Smooth	0.8 (0.03)	5000	NPN	871C-DM1NN4-E2	871C-DM1NN4-P3	—		
				PNP	871C-DM1NP4-E2	871C-DM1NP4-P3	871C-DM1NP4-AP3		
		1.5 (0.06)		3000	NPN	871C-MM2NN4-E2	871C-MM2NN4-P3	—	
					PNP	871C-MM2NP4-E2	871C-MM2NP4-P3	—	
5	Threaded	1 (0.04)		5000	NPN	871C-D1NN5-E2	871C-D1NN5-P3	—	
					PNP	871C-D1NP5-E2	871C-D1NP5-P3	—	
		1.5 (0.06)		3000	NPN	871C-M2NN5-E2	871C-M2NN5-P3	—	
					PNP	871C-M2NP5-E2	871C-M2NP5-P3	—	
Recommended cordset						889P-F3AB-2			

QD Cordsets and Accessories

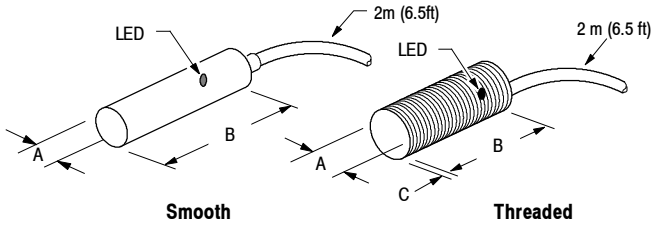
Description	Page Number
Other Cordsets Available	8-2
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871C 3-Wire DC

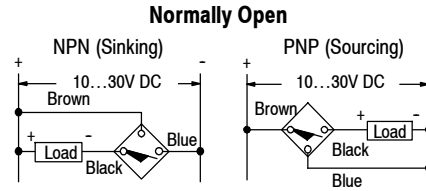
Plastic Face/Small Threaded or Smooth Nickel-Plated Brass Barrel

Approximate Dimensions [mm (in.)]

Cable Style

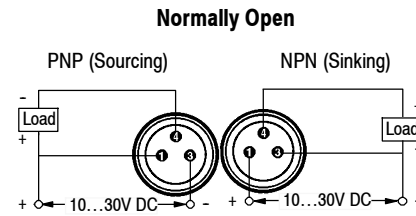
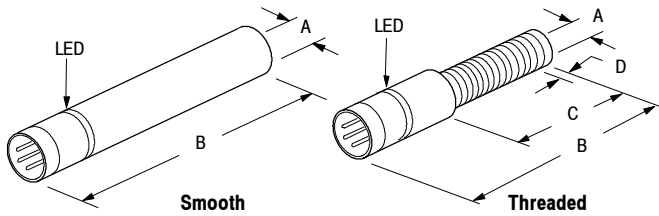


Wiring Diagram



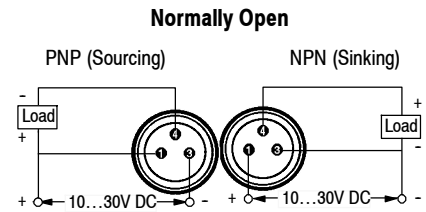
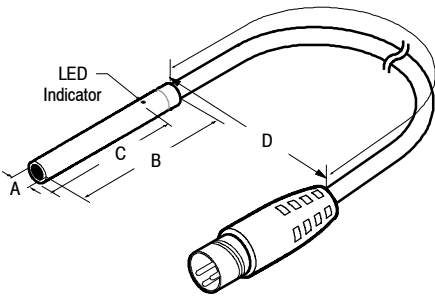
Smooth Diameter	Thread Size	Shielded	[mm (in.)]		
			A	B	C
3.0	—	Y	3.0 (0.12)	22.0 (0.87)	—
4.0	—	Y	4.0 (0.16)	25.0 (0.98)	—
4.0	M4 x 0.5	Y	4.0 (0.16)	22.0 (0.87)	—
5.0	M5 x 0.5	Y	5.0 (0.20)	25.0 (0.98)	—

Pico QD Style



Smooth Diameter	Thread Size	Shielded	[mm (in.)]			
			A	B	C	D
4.0	—	Y	4.0 (0.16)	38.0 (1.50)	19.0 (0.74)	—
5.0	M5 x 0.5	Y	5.0 (0.20)	38.0 (1.50)	23.0 (0.90)	—

Pico with Lead Style



Barrel Diameter	Shielded	[mm (in.)]			
		A	B	C	D
3.0	Y	3.0 (0.12)	22.0 (0.87)	—	150.0 (5.9)
4.0	Y	4.0 (0.16)	22.0 (0.87)	19.0 (0.74)	150.0 (5.9)

871C 3-Wire DC Extended Temperature

Plastic Face/Threaded Nickel-Plated Brass Barrel



871C DC Cable Style
12, 18, 30 mm



871C DC Micro
Quick-Disconnect Style
12, 18, 30 mm

Description

Bulletin 871C inductive proximity sensors are self-contained, solid state devices designed for most industrial applications where it is required to sense the presence of metal objects without touching them. These special extended temperature models are ideal for industrial environments where temperatures can reach as high as 212°F (100°C) or as low as -40°F (-40°C). They are available for current source (PNP) operation with a normally open output.

Each switch has a plastic face and a nickel-plated brass housing which meet NEMA 1, 2, 3, 4, 12, 13 and IP67 (IEC529) enclosure standards. The electronic circuitry is potted for protection against shock, vibration, and contamination.

These sensors are available in 12, 18, and 30 mm diameters. Connection options include: 2 m (6.5 ft) PUR cable or micro quick-disconnect (4 pin, 1 keyway).

Specifications

Load Current	1...200 mA
Leakage Current	≤10 mA
Operating Voltage	10...30V DC
Voltage Drop	≤2.4V
Repeatability	≤10%
Hysteresis	≤15% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Reverse Polarity Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Certifications	CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 4, 12, 13, IP67 (IEC529) Nickel-plated brass barrel
Connections	Cable: 2 m (6.5 ft) length 3-conductor PUR Quick-Disconnect: 4-pin micro style
LED	Orange: Output Energized
Operating Temperature [C (F)]	-40...+100° (-40...+212°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Features

- 3-wire operation
- 3-conductor or 4-pin connection
- 10...30V DC
- Extended temperature range
- Normally open output
- Short circuit, false pulse, reverse polarity, overload and transient noise protection
- CE Marked for all applicable directives

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.9
Brass	0.5
Aluminum	0.45
Copper	0.4

871C 3-Wire DC Extended Temperature

Plastic Face/Threaded Nickel-Plated Brass Barrel

Product Selection

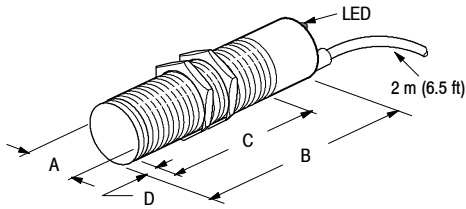
Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration		Switching Frequency [Hz]	Cat. No.		
						Cable Style	Micro QD Style	
12 mm	2 (0.08)	Y	N.O.	PNP	2000	871C-DT2NP12-U2	871C-DT2NP12-D4	
	4 (0.16)	N				871C-DT4NP12-U2	871C-DT4NP12-D4	
18 mm	5 (0.20)	Y	N.O.	PNP	1000	871C-DT5NP18-U2	871C-DT5NP18-D4	
	8 (0.31)	N				871C-DT8NP18-U2	871C-DT8NP18-D4	
30 mm	10 (0.39)	Y	N.O.	PNP	500	871C-DT10NP30-U2	871C-DT10NP30-D4	
	15 (0.59)	N				871C-DT15NP30-U2	871C-DT15NP30-D4	
Recommended standard QD cordset (-2 = 2 m (6.5 ft))							889D-F4AC-2	

QD Cordsets and Accessories

Description	Page Number	Description	Page Number
Other Cordsets Available	8-2	End Caps	2-220
Terminal Chambers	8-2	Mounting Nuts	2-221...2-222
Mounting Brackets	2-210...2-214	—	—

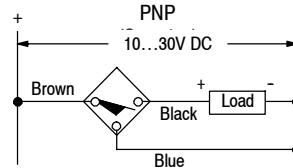
Approximate Dimensions [mm (in.)]

Cable Style



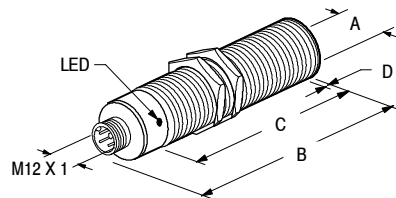
Wiring Diagram

Normally Open



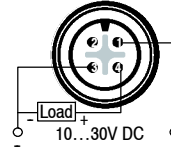
Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	40.0 (1.57)	40.0 (1.57)	—
	N			34.0 (1.34)	6.0 (0.24)
M18 X 1	Y	18.0 (0.71)		40.0 (1.57)	—
	N			32.0 (1.26)	8.0 (0.31)
M30 X 1.5	Y	30.0 (1.18)		40.0 (1.57)	—
	N			28.0 (1.12)	12.0 (0.47)

Micro QD Style



Normally Open

PNP (Sourcing)



Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	60.0 (2.36)	40.0 (1.57)	—
	N			34.0 (1.34)	6.0 (0.24)
M18 X 1	Y	18.0 (0.71)		40.0 (1.57)	—
	N			32.0 (1.26)	8.0 (0.31)
M30 X 1.5	Y	30.0 (1.18)		40.0 (1.57)	—
	N			28.0 (1.10)	12.0 (0.47)

871C 2-Wire AC Full Featured

Plastic Face/Threaded Nickel-Plated Brass Barrel



871C AC Cable Style
18, 30 mm



871C AC Mini
Quick-Disconnect Style
12, 18, 30 mm



871C AC Micro
Quick-Disconnect Style
12, 18, 30 mm

Specifications

Barrel Diameter	12 mm	18 and 30 mm
Load Current	5...200 mA	5...250 mA
Minimum Load Current	5 mA	
Inrush Current (1 cycle)	≤2 A	≤4 A
Leakage Current	≤1.9 mA @ 120V AC	
Operating Voltage	20...250V AC	
Voltage Drop	≤10V @ 5...200 mA,	≤10V @ 5...250 mA
Repeatability	≤10% at constant temperature	
Hysteresis	10% typical	
False Pulse Protection	Incorporated	
Transient Noise Protection	Incorporated	
Short Circuit Protection	Incorporated	
Overload Protection	Incorporated, trigger at 250 mA typical	Incorporated, trigger at 320 mA typical
Certifications	UL Listed, CSA Certified and CE Marked for all applicable directives	
Enclosure	NEMA 1, 2, 3, 3R, 4, 4X, 6, 6P, 12, 13 IP67 (IEC529) Nickel plated brass barrel	
Connections	Cable: 2 m (6.5 ft) length 2-conductor PVC Quick Disconnect: 3-pin micro style 3-pin mini style	
LED	Red: Output energized/Short Circuit (Flashing) Green: Power	
Operating Temperature [C (F)]	-25...+70° (-13...+158°)	
Shock	30 g, 11 ms	
Vibration	55 Hz, 1 mm amplitude, 3 planes	

Features

- 2-wire operation
- 2-conductor or 3-pin connection
- 20...250V AC
- Normally open or normally closed output
- Short circuit, false pulse, overload, and transient noise protection
- UL Listed, CSA Certified, and CE Marked for all applicable directives

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.9
Brass	0.5
Aluminum	0.45
Copper	0.4

Inductive Proximity Sensors

871C 2-Wire AC Full Featured

Plastic Face/Threaded Nickel-Plated Brass Barrel

Product Selection

Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.		
					Cable Style	Mini QD Style	Micro QD Style
12 mm	2 (0.08)	Y	N.O.	30	871C-A2N12-A2	871C-A2N12-N3	871C-A2N12-R3
			N.C.	20	871C-A2C12-A2	871C-A2C12-N3	871C-A2C12-R3
18 mm	5 (0.20)	Y	N.O.	30	871C-A5N18-A2	871C-A5N18-N3	871C-A5N18-R3
			N.C.	20	871C-A5C18-A2	871C-A5C18-N3	871C-A5C18-R3
30 mm	10 (0.39)	Y	N.O.	30	871C-A10N30-A2	871C-A10N30-N3	871C-A10N30-R3
			N.C.	20	871C-A10C30-A2	871C-A10C30-N3	871C-A10C30-R3
Recommended standard QD cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))						889N-F3AFC-6F	889R-F3ECA-2

QD Cordsets and Accessories

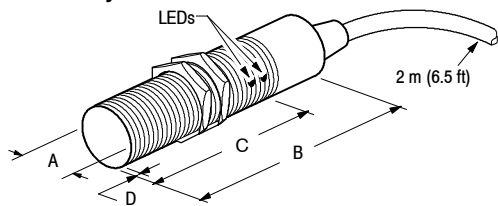
Description	Page Number
Other Cordsets Available	8-2
Mounting Brackets	2-210...2-214
End Caps	2-220
Mounting Nuts	2-221...2-222

871C 2-Wire AC Full Featured

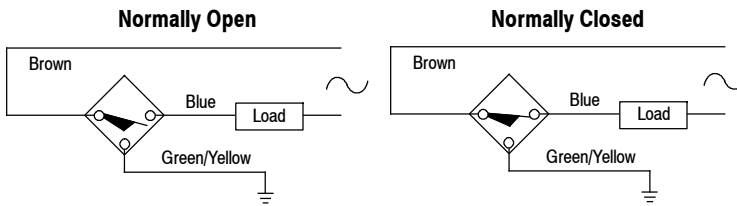
Plastic Face/Threaded Nickel-Plated Brass Barrel

Approximate Dimensions [mm (in.)]

Cable Style



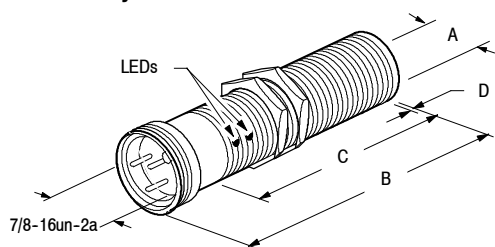
Wiring Diagram



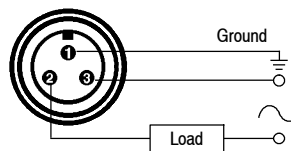
Note: Load can be switched to brown wire.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M12 X 1	Y	12.0 (0.47)	78.99 (3.11)	47.24 (1.86)	0.8 (0.03)
M18 X 1	Y	18.0 (0.71)	74.68 (2.94)	61.6 (2.43)	
M30 X 1.5	Y	30.0 (1.18)	77.52 (3.05)	64.31 (2.53)	

Mini QD Style



Normally Open or Normally Closed

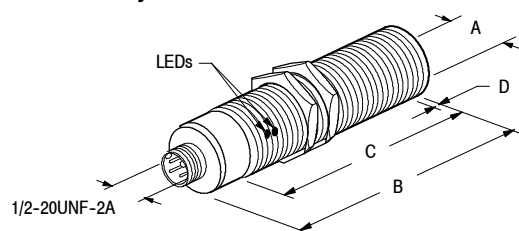


Note 1: No ground wire on 12 mm. Attach housing to ground.

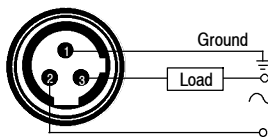
Note 2: Load can be switched to pin 3.

Thread Size	[mm (in.)]			
	A	B	C	D
M12 X 1	12.0 (0.47)	93.45 (3.68)	46.08 (1.81)	—
M18 X 1	18.0 (0.71)	75.82 (2.99)	53.92 (2.12)	
M30 X 1.5	30.0 (1.18)	86.66 (3.41)	64.31 (2.53)	

Micro QD Style



Normally Open or Normally Closed



Note 1: No ground wire on 12 mm. Attach housing to ground.

Note 2: Load can be switched to pin 2.

Thread Size	[mm (in.)]			
	A	B	C	D
M12 X 1	12.0 (0.47)	90.42 (3.56)	46.99 (1.85)	—
M18 X 1	18.0 (0.71)	83.54 (3.29)	61.6 (2.43)	
M30 X 1.5	30.0 (1.18)	86.00 (3.39)	64.31 (2.53)	

871C 2-Wire AC

Plastic Face/Threaded Plastic Barrel



871C AC Cable Style
18, 30 mm

Features

- 2-wire operation
- 2-conductor connection
- 24...250V AC
- Normally open or normally closed output
- Transient noise protection
- CE Marked for all applicable directives

Specifications

Barrel Diameter	18 mm	30 mm
Load Current	≤180 mA	≤300 mA
Inrush Current (1 cycle)	≤1 A	≤3 A
Leakage Current	≤1.7 mA	
Operating Voltage	24...250V AC	
Voltage Drop	≤11V	
Hysteresis	≤20% typical	
Transient Noise Protection	Incorporated	
Certifications	CE Marked for all applicable directives	
Enclosure	NEMA 1, 2, 3, 4, 4X, 12, 13 IP67 (IEC529) Plastic barrel	
Connections	Cable:	2 m (6.5 ft) length 2-conductor PVC
LED	Red: Output energized	
Operating Temperature [C (F)]	-25...+55° (-13...+131°)	
Shock	30 g, 11 ms	
Vibration	55 Hz, 1 mm amplitude, 3 planes	

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.3...0.4

Product Selection

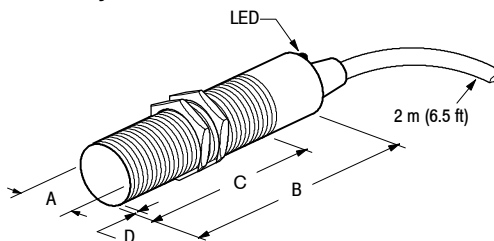
Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.
					Cable Style
18 mm	5 (0.20)	Y	N.O.	8	871C-C5S18
			N.C.		871C-D5S18
	8 (0.31)	N	N.O.		871C-C8R18
			N.C.		871C-D8R18
30 mm	10 (0.39)	Y	N.O.		871C-C10S30
			N.C.		871C-D10S30
	15 (0.59)	N	N.O.		871C-C15R30
			N.C.		871C-D15R30

Accessories

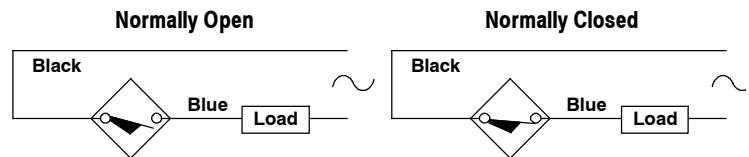
Description	Page Number
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-220
Mounting Nuts	2-221...2-222

Approximate Dimensions [mm (in.)]

Cable Style



Wiring Diagram



Note: Load can be switched to black wire.

Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M18 X 1	Y	18.0 (0.71)	81.0 (3.19)	61.0 (2.40)	2.0 (0.08)
	N 1				
M30 X 1.5	Y	30.0 (1.18)	81.0 (3.19)		
	N 1				

1 Unshielded proximity sensors require a metal-free zone around the sensing face. Any metal immediately opposite the sensing face should be no closer than three times the rated nominal sensing distance of the sensor.

871C 2-Wire NAMUR

Nickel-Plated Brass Barrel, Plastic Face



871C NAMUR
Cable Style
8, 12, 18, 30 mm



871C NAMUR
Micro Quick-Disconnect Style
8, 12, 18, 30 mm

Description

For Allen-Bradley NAMUR style sensors, the sensor input and output conforms to NAMUR specifications (DIN 19 234) allowing these sensors to be used with any approved NAMUR style amplifier/ isolator. Allen-Bradley's NAMUR style sensors are Intrinsically Safe when used with an approved Intrinsically Safe NAMUR style isolator.

The 871C NAMUR style family of sensors can be used in Class I, II, III; Division 1 and 2; Groups A, B, C, D, E, F, and G as well as Zones 0, 1, 2; Groups IIA, IIB, IIC when used with Allen-Bradley's NAMUR style isolators/amplifiers. Installation must be in accordance with the National Electrical Code, ANSI/ISA RP12.6, or per other regulations by authority having jurisdiction over the installation site as appropriate.

Features

- 2-Wire NAMUR operation
- 8, 12, 18, and 30 mm sizes
- Short barrel length
- Shielded and unshielded models
- FM, CSA, and CENELEC (KEMA) Approved and CE Marked for all applicable directives

Specifications

Outputs	NAMUR (conforms to DIN 19 234)
Load Current Target Present	<1 mA
Load Current Target Absent	>3 mA
Operating Voltage	5...15V DC (8.2V DC nom., Ri = 1 kohm, DIN 19 234)
Ripple Voltage	<5%
Repeatability	<10%
Hysteresis	10% typical
Reverse Polarity Protection	Incorporated
False Pulse Protection	Realized in amplifier
Transient Noise Protection	Realized in amplifier
Short Circuit Protection	Realized in amplifier
Overload Protection	Realized in amplifier
Enclosure	NEMA 4, IP67 (IEC529)
Certifications	FM Approved - Class I, II, III; Divisions 1, 2; Groups A, B, C, D, E, F, G - Class I; Zone 0, 1, 2; Groups IIC, IIB, IIA; T6 CSA Approved - Class I, II, III; Divisions 1, 2; Groups A, B, C, D, E, F, G - Class I; Zone 0, 1, 2; Groups IIC, IIB, IIA CENELEC (KEMA) Approved - Groups IIA, IIB, IIC; Zones 0, 1, 2 (EEx ia IIC T6) CE Marked for all applicable directives
Connections	Cable: 2 m (6.5 ft) length 2 conductor #22 AWG PVC Quick-Disconnect: 4-pin micro style
LED	None
Operating Temperature [C (F)]	-25...60° (-13...140°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes
Housing Material	Nickel-plated brass barrel, plastic face

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.2...0.3

Entity Parameters

Sensor			Barrier	
V _{max}	16V	≥	V _t	
I _{max}	60 mA	≥	I _t	
C _i	150 nF	≤	C _a	
L _i	200 μH	≤	L _a	

ATTENTION



Operating parameters must be adhered to.

Inductive Proximity Sensors
871C 2-Wire NAMUR, Cable Style
Nickel-Plated Brass Barrel, Plastic Face

Product Selection

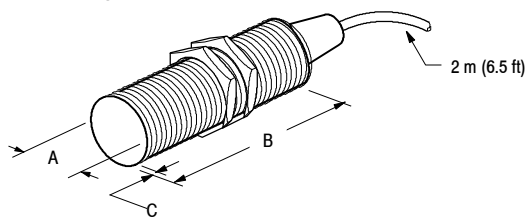
Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.	
					Cable Style	Micro QD Style
8 mm	1 (0.03)	Y	NAMUR DIN 19 234	2000	871C-DH1M8-A2	871C-DH1M8-D4
	2 (0.06)	N		1000	871C-DH2M8-A2	871C-DH2M8-D4
12 mm	2 (0.08)	Y		2000	871C-DH2M12-A2	871C-DH2M12-D4
	4 (0.16)	N		1000	871C-DH4M12-A2	871C-DH4M12-D4
18 mm	5 (0.20)	Y		1000	871C-DH5M18-A2	871C-DH5M18-D4
	8 (0.31)	N		500	871C-DH8M18-A2	871C-DH8M18-D4
30 mm	10 (0.39)	Y		500	871C-DH10M30-A2	871C-DH10M30-D4
	15 (0.59)	N		300	871C-DH15M30-A2	871C-DH15M30-D4
Recommended standard QD cordset (-2 = 2 m (6.5 ft))						889D-F4AC-2 ①

① Intrinsically Safe wiring labels 897H-L1 or 897H-L2 must be applied every 7.6 m (25 ft).

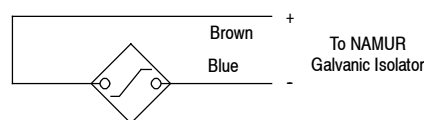
QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Galvanic Isolators	12-5
Intrinsic Safety Wiring Labels	12-8
Mounting Brackets	2-210...2-214
End Caps	2-220
Mounting Nuts	2-221...2-222

Approximate Dimensions [mm (in.)]
Cable Style



Wiring Diagram



Thread Size	Shielded	[mm (in.)]		
		A	B	C
M8 x 1	Y	8.0 (0.31)	30.0 (1.18)	—
	N			5.0 (0.20)
M12 x 1	Y	12.0 (0.47)		—
	N			6.0 (0.24)
M18 x 1	Y	18.0 (0.71)		—
	N			8.0 (0.31)
M30 x 1.5	Y	30.0 (1.18)	40.0 (1.57)	—
	N			12.0 (0.47)

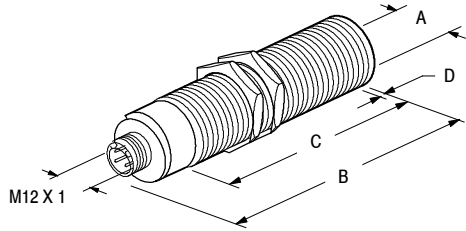
Inductive Proximity Sensors

871C 2-Wire NAMUR

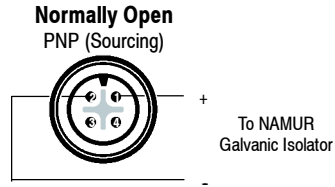
Nickel-Plated Brass Barrel, Plastic Face

Approximate Dimensions [mm (in.)]

Micro QD Style



Wiring Diagram



Thread Size	Shielded	[mm (in.)]			
		A	B	C	D
M8 x 1	Y	8.0 (0.31)	50.0 (1.97)	28.0 (1.10)	—
	N			23.0 (0.91)	5.0 (0.20)
M12 x 1	Y	12.0 (0.47)		30.0 (1.18)	—
	N			24.0 (0.94)	6.0 (0.24)
M18 x 1	Y	18.0 (0.71)		30.0 (1.18)	—
	N			22.0 (0.87)	8.0 (0.31)
M30 x 1.5	Y	30.0 (1.18)	60.0 (2.36)	40.0 (1.57)	—
	N			28.0 (1.10)	12.0 (0.47)

Inductive Proximity Sensors
871C Analog Output, 3-Wire DC
Plastic Face/Nickel-Plated Brass Barrel



871C Cable Style
12, 18, 30 mm

Description

Bulletin 871C inductive proximity sensors are self-contained, solid-state devices designed to sense the presence of metal objects without touching them. This special version provides a 0...10V sourcing analog output proportional to the sensing distance.

This device is enclosed by a plastic face and a nickel-plated brass housing which meets NEMA 1, 2, 3, 4, 12, 13 and IP67 (IEC529) enclosure standards. The electronic circuitry is potted for protection against shock, vibration and contamination.

This sensor is available in 12, 18 and 30 mm diameters with a 2 m (6.5 ft.) PVC cable connection.

Features

- 3-wire operation
- 18...30V DC
- Short circuit, overload, reverse polarity, and transient noise protection
- 0...10V sourcing analog output
- CE Marked for all applicable directives

Specifications

	12 mm	18 mm	30 mm
Analog Output	0...10V Sourcing		
Load Current	5 mA		
Operating Voltage	18...30V DC		
Repeatability	≤ 1%		
Ripple	10%		
Slew Rate	1.0V/ms	0.7V/ms	0.1V/ms
Δ Output / Δ Distance	0.25 mm/V	0.375 mm/V	0.875 mm/V
Linearity Tolerance	6.25%		
Temperature Tolerance	± 0.3V		
Transient Noise Protection	Incorporated		
Reverse Polarity Protection	Incorporated		
Short Circuit Protection	Incorporated		
Overload Protection	Incorporated		
Enclosure	NEMA 1, 2, 3, 4, 12, 13; IP67 (IEC529), Nickel-plated brass barrel, plastic face (PBT)		
Certifications	CE Marked for all applicable directives		
Connections	Cable: 2 m (6.5 ft) length 3 conductor PVC		
LED	None		
Operating Temperature [C (F)]	-25...+70° (-13...+158°)		
Shock	30 g, 11 ms		
Vibration	55 Hz, 1 mm amplitude, 3 planes		

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.2...0.3

Inductive Proximity Sensors

871C Analog Output, 3-Wire DC

Plastic Face/Nickel-Plated Brass Barrel

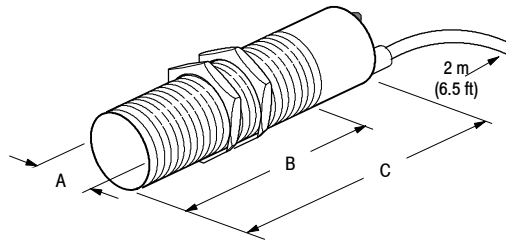
Product Selection

Barrel Diameter	Linear Sensing Distance [mm (in.)]	Shielded	Output Configuration		Switching Frequency [Hz]	Cat. No.
			Analog Voltage	Sourcing		
12 mm	0.5...2.5 (0.02...0.10)	Y	Analog Voltage	Sourcing	100	871C-D3AP12-E2
18 mm	1...4 (0.04...0.16)	Y	Analog Voltage	Sourcing	100	871C-D4AP18-E2
30 mm	7...14 (0.27...0.55)	N	Analog Voltage	Sourcing	30	871C-D14AP30-E2

QD Cordsets and Accessories

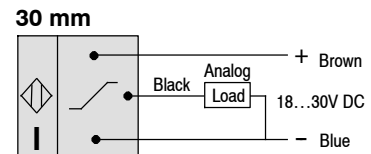
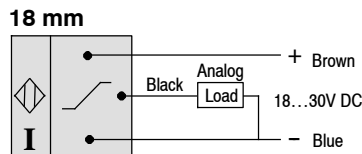
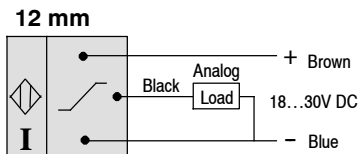
Description	Page Number
Terminal Chambers	8-2
Mounting Brackets	2-210...2-214
End Caps	2-220
Mounting Nuts	2-221...2-222

Approximate Dimensions [mm (in.)]

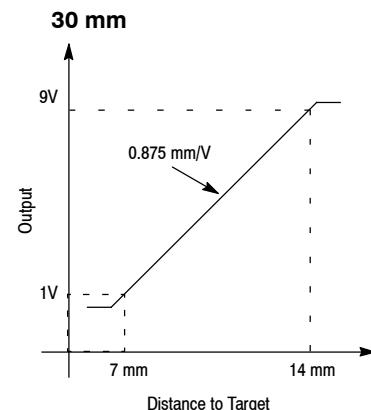
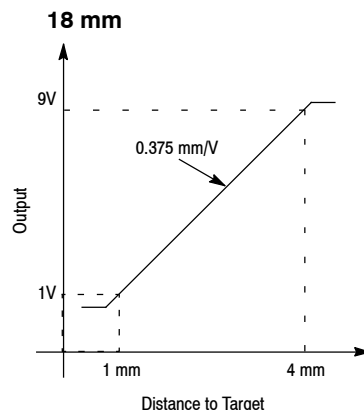
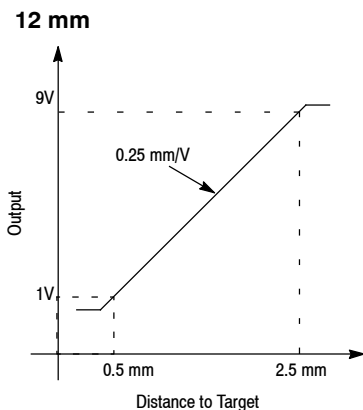


Thread Size	[mm (in.)]		
	A	B	C
12 mm	12 (0.47)	70 (2.75)	80 (3.15)
18 mm	18 (0.71)		
30 mm	30 (1.18)		

Wiring Diagrams



Nominal Output





Description

Bulletin 871P VersaCube inductive proximity sensors are self-contained, solid state devices designed to sense the presence of ferrous and nonferrous metal objects without touching them.

The special weld field immune models are ideal for welding environments and other applications where magnetic fields are present. General Purpose 871P VersaCube models are available for more standard applications where long sensing distance and compact size are required.

The unique VersaCube package is ideal for applications in which space is limited. Their overall size is approximately half that of limit switch style models. The two mounting holes on the VersaCube base align with standard limit switch style mounting holes allowing easy and convenient retrofit capability.

VersaCube models feature two LEDs, one for output and one for power and short-circuit indication. Connection options include mini and micro quick-disconnect.

Features

- 5-position sensing head
- Rugged burn and weld-slag resistant housing on weld-field immune models
- Mini and micro quick-disconnect styles
- Weld field immunity (some models)
- Short circuit protection
- False pulse protection
- Overload protection
- Transient noise protection
- Reverse polarity protection (DC models)
- ToughCoat Finish™ ❶ resists weld-splatter accumulation
- UL Listed, cUL Certified and CE Marked for all applicable directives

❶ 871P VersaCube is now being offered with ToughCoat Finish™ on the sensor face. This is a proprietary epoxy-based material which resists the adhesion and accumulation of weld-slag particles thereby improving and extending sensor performance.

Styles

- DC 3-Wire General Purpose & Weld Field Immune page 2-130
- DC 4-Wire Weld Field Immune page 2-133
- AC/DC 2-Wire General Purpose & Weld Field Immune page 2-134

Accessories

- Cordsets page 8-1
- Mounting Kit page 2-216
- Limit Switch Style Mounting Bracket page 2-217
- PTFE Covers page 2-218

General Information

- Metric/English Conversion Chart page 14-6

871P VersaCube™ 3-Wire DC

General Purpose, Weld Field Immune & ToughCoat Finish™



871P DC
Micro Quick-Disconnect Style



871P DC Mini
Quick-Disconnect Style

Features

- New rugged housing
- Weld field immune models
- ToughCoat Finish[Ⓜ] resists weld-splatter accumulation
- Convenient mounting base
- 3-wire operation
- 4-pin connection
- 10...60V DC
- Normally open or normally closed output
- Short circuit, overload, false pulse, transient noise, and reverse polarity protection
- UL Listed, cUL Certified and CE Marked for all applicable directives

Specifications

	General Purpose	Weld Field Immune
Load Current	≤200 mA	≤200 mA
Leakage Current	≤10 μA	≤10 μA
Operating Voltage	10...60V DC	10...60V DC
Voltage Drop	<2.5V @ 200 mA	<2.5V @ 200 mA
Repeatability	≤5%	≤10% of effective operating distance
Hysteresis	5% typical	12% typical
False Pulse Protection	Incorporated	Incorporated
Transient Noise Protection	Incorporated	Incorporated
Short Circuit Protection	Incorporated	Incorporated
Overload Protection	Incorporated	Incorporated
Reverse Polarity Protection	Incorporated	Incorporated
Weld Field Immunity	N/A	1000 Gauss ^①
Connections	Quick-Disconnect: 4-pin mini style 4-pin micro style	Quick-Disconnect: 4-pin mini style 4-pin micro style
Certifications	UL Listed, cUL Certified and CE Marked for all applicable directives	
Enclosure	NEMA 1, 2, 3, 4, 6, 6P, 12, 13; IP67 (IEC 529), 1200 psi (8270 kPa) washdown; Plastic body, zinc base; micro connector versions also meet IP69K (IEC 529)	
LED	Orange: Output Energized Green: Power	
Operating Temperature [C (F)]	-25...+70° (-13...+158°)	
Shock	30 g, 11 ms	
Vibration	55 Hz, 1 mm amplitude, 3 planes	

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.2...0.3

^① Measured with field perpendicular to face.

[Ⓜ] 871P VersaCube is now being offered with ToughCoat Finish on the sensor face. This is a proprietary epoxy-based material which resists the adhesion and accumulation of weld-slag particles thereby improving and extending sensor performance.

Product Selection

Head Size	Weld Field Immune	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration		Switching Frequency [Hz]	Cat. No.					
							Mini QD Style	Micro QD Style				
40 mm	N	20 (0.79)	Y	N.O.	PNP	100	871P-D20NP40-N4	871P-D20NP40-D4				
					NPN		871P-D20NN40-N4	871P-D20NN40-D4				
				N.C.	PNP		871P-D20CP40-N4	871P-D20CP40-D4				
					NPN		871P-D20CN40-N4	871P-D20CN40-D4				
		40 (1.57)	N	N.O.	PNP		871P-D40NP40-N4 ①	871P-D40NP40-D4 ①				
					NPN		871P-D40NN40-N4 ①	871P-D40NN40-D4 ①				
				N.C.	PNP		871P-D40CP40-N4 ①	871P-D40CP40-D4 ①				
					NPN		871P-D40CN40-N4 ①	871P-D40CN40-D4 ①				
	Y	15 (0.59)	Y	N.O.	PNP	50	871P-DW15NP40-N4	871P-DW15NP40-D4				
					NPN		871P-DW15NN40-N4	871P-DW15NN40-D4				
				N.C.	PNP		871P-DW15CP40-N4	871P-DW15CP40-D4				
					NPN		871P-DW15CN40-N4	871P-DW15CN40-D4				
				N.O.	PNP		—	871P-DW20NP40-D4				
					NPN		871P-DW25NP40-N4	871P-DW25NP40-D4				
		25 (0.79)	N	N.O.	PNP		871P-DW25NN40-N4	871P-DW25NN40-D4				
					NPN		871P-DW25CP40-N4	871P-DW25CP40-D4				
				N.C.	PNP		871P-DW25CN40-N4	871P-DW25CN40-D4				
					NPN		—	871P-DV15NP40-D4				
				Y w/ToughCoat Finish ②	15 (0.59)		Y	N.O.	PNP	50	—	871P-DV20NP40-D4
					20 (0.59)		Y		NPN		—	871P-DV25NP40-D4
	25 (0.79)	N	PNP		—	871P-DV25NP40-D4						
	Recommended Standard QD Cordset (-6F = 1.8m (6ft), -2 = 2m (6.5ft))							889N-F4AFC-6F	889D-F4AC-2			

- ① Assured operating distance for general purpose unshielded models is 0...33 mm.
- ② 871P VersaCube is now being offered with ToughCoat Finish on the sensor face. This is a proprietary epoxy-based material which resists the adhesion and accumulation of weld-slag particles thereby improving and extending sensor performance.

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Kit ③	2-216
Limit Switch Style Mounting Brackets	2-217
PTFE Covers	2-218

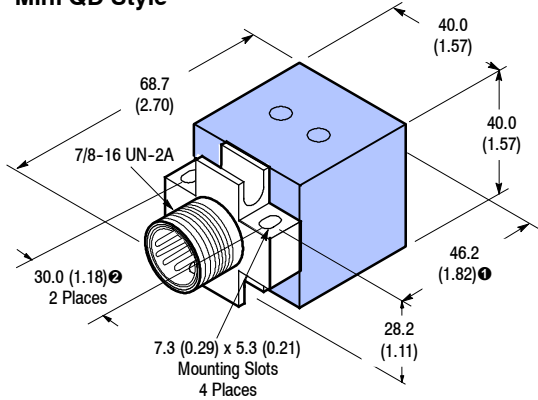
- ③ Each mounting kit includes a ground lug, a ground screw, and an optional adaptor for competitive retrofits.

871P VersaCube™ 3-Wire DC

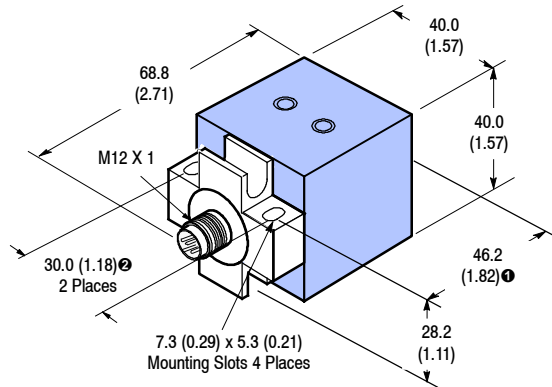
General Purpose, Weld Field Immune & ToughCoat Finish™

Approximate Dimensions [mm (in.)]

Mini QD Style



Micro QD Style



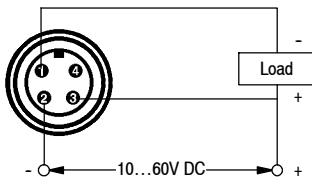
- ❶ With retrofit adaptor, distance from face to mounting holes becomes 60.0 (2.36).
- ❷ With retrofit adaptor, spacing between mounting holes becomes 20.0 (0.79).

Wiring Diagrams

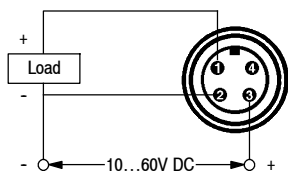
Mini QD Style

Normally Open or Normally Closed

NPN (Sinking)



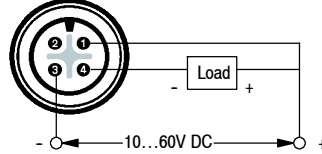
PNP (Sourcing)



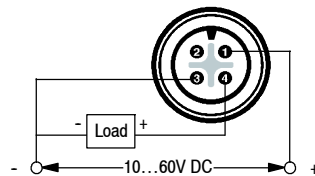
Micro QD Style

Normally Open or Normally Closed

NPN (Sinking)



PNP (Sourcing)



ATTENTION



Unit must be mounted to a grounded metal frame or grounded via field wiring lug per NEC requirements. Recommended grounding lug is available in Allen-Bradley mounting kit 871A-PKIT.



871P DC WFI Micro
Quick-Disconnect Style

Specifications

Load Current	≤200 mA
Inrush Current (1 cycle)	≤2A
Leakage Current	≤80 μA
Operating Voltage	10...30V DC
Voltage Drop	<2.5V
Repeatability	≤5%
Hysteresis	12% typical
Short Circuit Protection	Incorporated
Reverse Polarity Protection	Incorporated
Certifications	cULus Listed and CE Marked for all applicable directives
Enclosure	IP67
Connections	4-pin micro quick-disconnect style
LED	Green: Output energized; Orange: Target present
Operating Temperature [C (F)]	Shielded: -25...+70° (-13...+158°) Unshielded: -10...+70° (14...+158°)
Shock and Vibration	5 g, 30...55 Hz per IEC60947-5-2

Features

- New rugged housing
- ToughCoat Finish¹ on body and face resists weld-splatter accumulation
- Convenient mounting base
- Weld field immune
- Equal sensing capabilities
- Shielded or unshielded models
- 10...30V DC
- Complementary normally open and normally closed outputs

Correction Factors

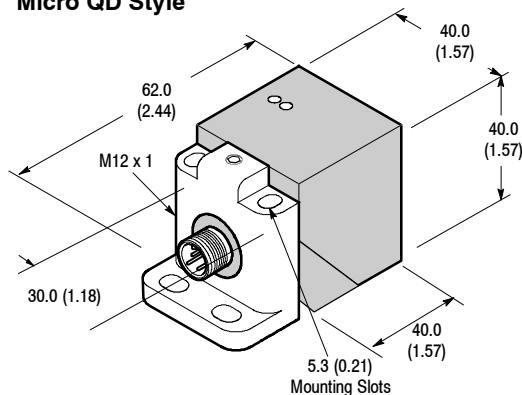
Target Material	Correction Factor
Steel	1.0
Stainless Steel	1.0
Brass	1.0
Aluminum	1.0
Copper	1.0

Product Selection

Head Size	Weld Field Immune	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.
40 mm	Y	15 (0.59)	Y	N.O. and N.C.	400	871P-MW15BP40LD4
		35 (1.37)	N		200	871P-NW35BP40LD4
Recommended Standard QD Cordset (-2 = 2 m (6.5 ft))						889D-F4WE-2

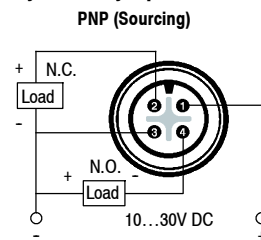
Approximate Dimensions [mm (in.)]

Micro QD Style



Wiring Diagram

Complementary Normally Open and Normally Closed



¹ These special 871P VersaCube are now being offered with ToughCoat Finish on the sensor face and three sides. This is a proprietary epoxy-based material which resists the adhesion and accumulation of weld-slag particles thereby improving and extending sensor performance.



871P AC/DC General Purpose
Micro Quick-Disconnect Style

Features

- New rugged housing
- Burn and weld-slag resistant body on weld field immune models
- Convenient mounting base
- 2-wire operation
- 3-pin connection
- 20...250V AC/DC
- Normally open or normally closed output
- Weld-field immune models
- Short circuit, overload, false pulse, and transient noise protection
- UL Listed, cUL Certified and CE Marked for all applicable directives

Specifications

	General Purpose	Weld Field Immune
Load Current	2...100 mA	2...300 mA
Inrush Current (1 cycle)	≤ 2 A	≤ 2 A
Leakage Current	≤1.5 mA @ 20V ≤1.7 mA @ 120V ≤2.0 mA @ 250V	≤1.5 mA@20V ≤1.7 mA@120V ≤2.0 mA@250V
Operating Voltage	20...250V AC/DC	20-250V AC/DC
Voltage Drop	<10V	<10V
Repeatability	≤10% of effective operating distance	≤10% of effective operating distance
Hysteresis	12% typical	12% typical
False Pulse Protection	Incorporated	Incorporated
Transient Noise Protection	Incorporated	Incorporated
Short Circuit Protection	Incorporated	Incorporated
Overload Protection	Incorporated	Incorporated
Weld-Field Immunity	N/A	1000 Gauss ①
Certifications	UL Listed, cUL Certified and CE Marked for all applicable directives	
Enclosure	NEMA 1, 2, 3, 4, 6, 6P, 12, 13; IP67 (IEC529), 1200 psi (8270 kPa) washdown; Plastic body, zinc base; micro connector versions also meet IP69K (IEC 529)	
Connections	Quick-Disconnect: 3-pin mini style 3-pin micro style	
LED	Red: Output Energized Green: Power (short circuit if flashing)	
Operating Temperature	-25...+70° (-13...+158°)	
Shock	30 g, 11 ms	
Vibration	55 Hz, 1 mm amplitude, 3 planes	

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.2...0.3

① Measured with field perpendicular to sensing face.

Product Selection

Head Size	Weld Field Immune	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.			
						Mini QD Style	Micro QD Style		
40 mm	N	20 (0.79)	Y	N.O.	30	871P-B20N40-N3	871P-B20N40-R3		
				N.C.		871P-B20C40-N3	871P-B20C40-R3		
		40 (1.57)	N	N.O.	20	871P-B40N40-N3 ①	871P-B40N40-R3 ①		
				N.C.		871P-B40C40-N3 ①	871P-B40C40-R3 ①		
	Y	15 (0.59)	Y	N.O.	30	871P-BW15N40-N3	871P-BW15N40-R3		
				N.C.		871P-BW15C40-N3	871P-BW15C40-R3		
		25 (0.98)	N	N.O.	20	871P-BW25N40-N3	871P-BW25N40-R3		
				N.C.		871P-BW25C40-N3	871P-BW25C40-R3		
		Recommended Standard QD Cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))						889N-F3AFC-6F	889R-F3ECA-2

① Assured operating distance for general purpose unshielded models is 0...33 mm (0...1.3 in.).

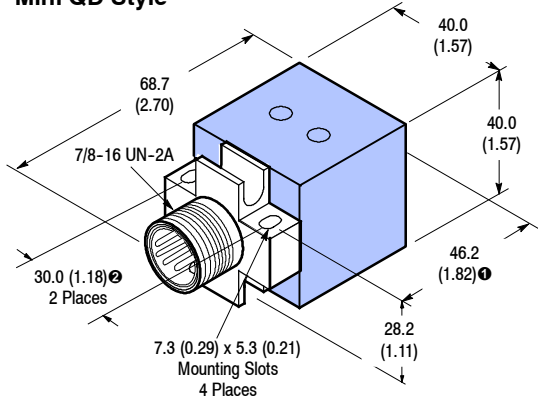
QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Mounting Kit ②	2-216
Limit Switch Style Mounting Brackets	2-217
PTFE Covers	2-218

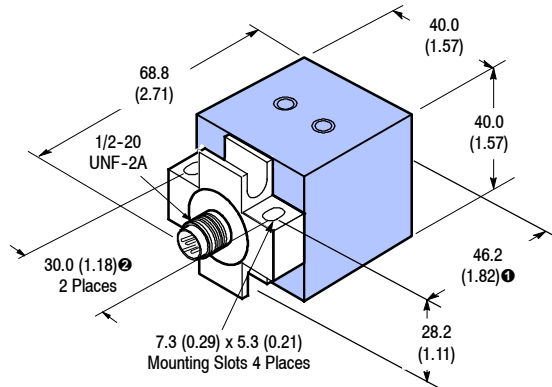
② Each mounting kit includes a ground lug, a ground screw, and an optional adaptor for competitive retrofits.

Approximate Dimensions [mm (in.)]

Mini QD Style



Micro QD Style

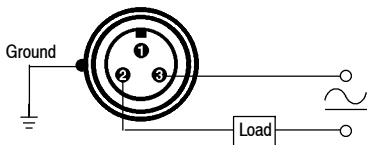


- ❶ With retrofit adaptor, distance from face to mounting holes becomes 60.0 (2.36).
- ❷ With retrofit adaptor, spacing between mounting holes becomes 20.0 (0.79).

Wiring Diagrams

Mini QD Style

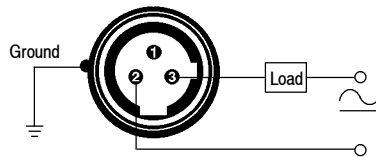
Normally Open or Normally Closed



Note: Load can be switched to pin 3.

Micro QD Style

Normally Open or Normally Closed



Note: Load can be switched to pin 2.

ATTENTION



Unit must be mounted to a grounded metal frame or grounded via field wiring lug per NEC requirements. Recommended grounding lug is available in Allen-Bradley mounting kit **871A-PKIT**. This kit is included with all weld field immune models.



Description

Bulletin 871F inductive flat pack and block style proximity sensors are self-contained, solid state devices. These devices are designed for most applications where it is required to sense the presence of ferrous and nonferrous metal objects without touching them.

The body material is either plastic (flat pack) or aluminum (block) and meets NEMA 1, 2, 3, 4, 6, 6P, 12 and 13, IP67 (IEC529), 1200 psi (8270 kPa) washdown enclosure standards (871F only). The electronic circuitry is potted for protection against shock, vibration, and contamination.

Connection options include a micro and mini quick-disconnect, ToughLink™ and PVC cable models, and both 1/2-14 NPT and PG13.5 conduit opening with screw terminals.

Features

- Cable, conduit, or quick-disconnect styles
- Short circuit protection
- Overload protection
- Transient noise protection
- False pulse protection
- Reverse polarity protection (DC models)
- CE Marked for all applicable directives

Styles

DC 4-Wire Complementary Output Flat Pack	page 2-138
DC Weld Field Immune	page 2-141
AC/DC 2-Wire Flat Pack	page 2-143
AC/DC 2-Wire Flat Pack Weld Field Immune	page 2-146
AC/DC 2-Wire Weld Field Immune	page 2-148
DC 3-Wire Block	page 2-150

Accessories

Cordsets	page 8-1
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General Information

Metric/English Conversion Chart	page 14-6
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871F 4-Wire DC Complementary Output

Flat Pack Style



871F DC Cable Style



871F DC Mini Quick-Disconnect Style



871F DC Micro Quick-Disconnect Style

Specifications

Load Current	≤200 mA
Minimum Load Current	1 mA
Leakage Current	≤10 μA
Operating Voltage	10...30V DC
Voltage Drop	≤2.5V
Repeatability	≤2%
Hysteresis	≤5% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Reverse Polarity Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Certifications	UL Listed, cUL Certified and CE Marked for all applicable all directives
Enclosure	NEMA 1, 2, 3, 4, 6, 6P, 12 and 13, IP67 (IEC529), 1200 psi (8270 kPa) washdown; Housing material: Valox®; micro connector versions also meet IP69K (IEC529)
Connections	Cable: 2 m (6.5 ft) length 4-conductor #22 AWG ToughLink™ Quick Disconnect: 4-pin mini style 4-pin micro style Conduit Opening: 1/2-14 NPT thread, PG13.5 thread
LEDs	Green: Power Orange: Output Energized
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.2...0.3

Features

- 4-wire operation
- 4-pin, 4-conductor or 4-terminal connection
- 10...30V DC
- Complementary normally open and normally closed outputs
- False pulse, transient noise, reverse polarity, short circuit and overload protection
- UL Listed, cUL Certified and CE Marked for all applicable directives
- DIN rail mounting option on quick-disconnect and cable models

Inductive Proximity Sensors

871F 4-Wire DC Complementary Output

Flat Pack Style

Product Selection

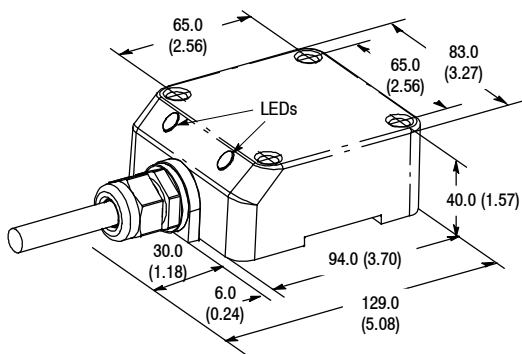
Head Size	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.				
					ToughLink™ Cable	Mini QD Style	Micro QD Style	Conduit 1/2 NPT	Conduit PG13.5
83 (3.27)	50 (1.97) ①	Y	N.O. and N.C.	100	871F-P50BP80-H2	871F-P50BP80-N4	871F-P50BP80-D4	871F-P50BP80-T4	871F-P50BP80-Q4
					871F-P50BN80-H2	871F-P50BN80-N4	871F-P50BN80-D4	871F-P50BN80-T4	871F-P50BN80-Q4
	65 (2.56)	N			871F-N65BP80-H2	871F-N65BP80-N4	871F-N65BP80-D4	871F-N65BP80-T4	871F-N65BP80-Q4
					871F-N65BN80-H2	871F-N65BN80-N4	871F-N65BN80-D4	871F-N65BN80-T4	871F-N65BN80-Q4
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))					889N-F4AFC-6F	889D-F4AC-2	—	—	

① Must be fully embedded in mild steel to achieve maximum sensing distance.

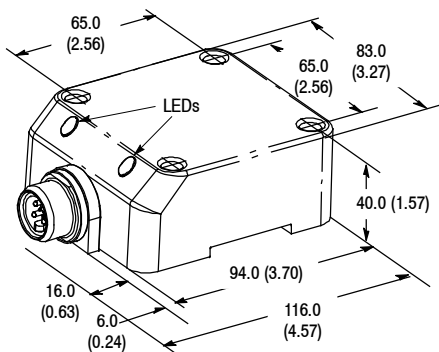


Approximate Dimensions [mm (in.)]

Cable Style

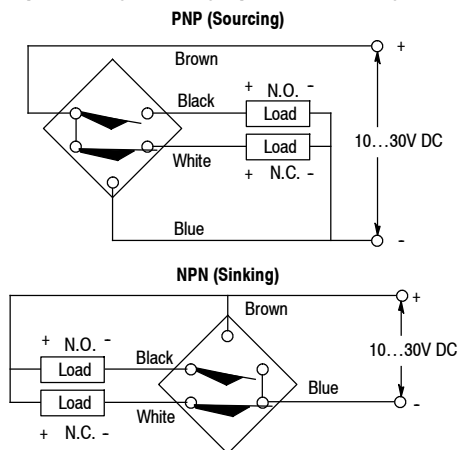


Mini QD Style

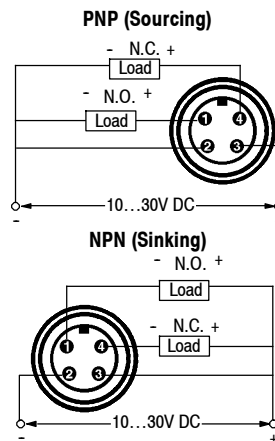


Wiring Diagram

Complementary Normally Open and Normally Closed



Complementary Normally Open and Normally Closed Outputs

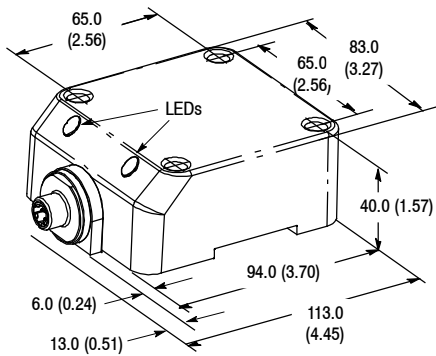


871F 4-Wire DC Complementary Output

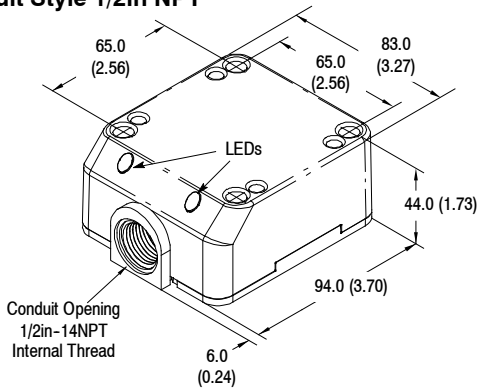
Flat Pack Style

Approximate Dimensions [mm (in.)]

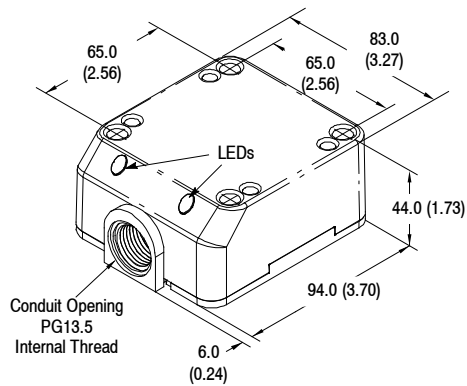
Micro QD Style



Conduit Style 1/2in NPT



Conduit Style PG13.5

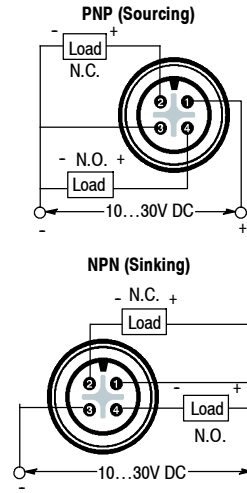


QD Cordsets and Accessories

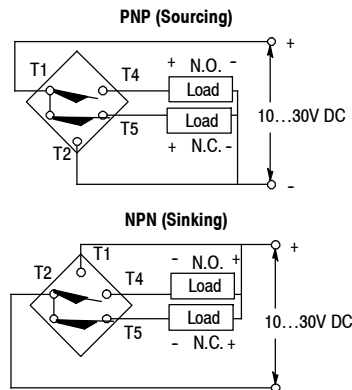
Description	Page Number
Other Cordsets Available	8-2

Wiring Diagram

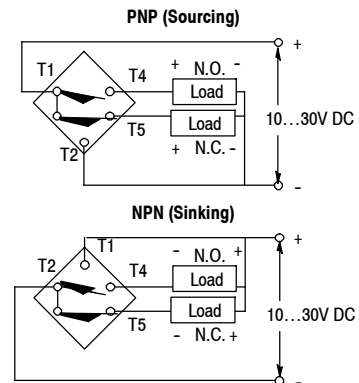
Complementary Normally Open and Normally Closed



Complementary Normally Open and Normally Closed Outputs



Complementary Normally Open and Normally Closed Outputs





*871F DC Mini
Quick-Disconnect Style*



*871F DC Micro
Quick-Disconnect Style*

Specifications

Load Current	≤200 mA
Minimum Load Current	1 mA
Leakage Current	≤10 μA
Operating Voltage	10...30V DC
Voltage Drop	≤2.5V
Repeatability	≤5%
Hysteresis	≤5% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Reverse Polarity Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Weld Field Immunity	1600 Gauss
Certifications	UL Listed, cUL Certified and CE Marked for all applicable all directives
Enclosure	NEMA 1, 2, 3, 4, 6, 6P, 12 and 13, IP67 (IEC529), 1200 psi (8270 kPa) washdown; Housing material: Valox®; micro connector versions also meet IP69K (IEC529)
Connections	Quick Disconnect: 4-pin mini style 4-pin micro style
LEDs	Green: Power Orange: Output Energized
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	5 g
Vibration	55 Hz, 1 mm amplitude, 3 planes

Features

- 4-wire operation
- 4-pin, 4-conductor or 4-terminal connection
- 10...30V DC
- Complementary normally open and normally closed outputs
- False pulse, transient noise, reverse polarity, short circuit and overload protection
- UL Listed, cUL Certified and CE Marked for all applicable directives
- DIN rail mounting option on quick-disconnect
- Weld field immune

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.2...0.3

871F DC Weld Field Immune

Flat Pack Style

Product Selection

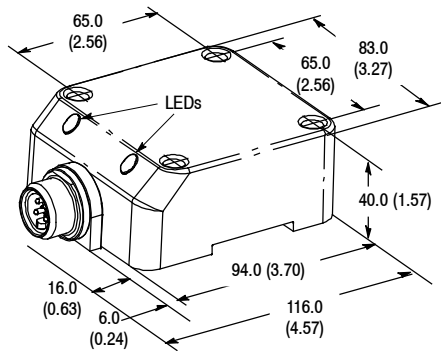
Head Size	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.	
					Mini QD Style	Micro QD Style
83 (3.27)	40 (1.57) *	Y	N.O. and N.C.	15	871F-PW40BP80-N4	871F-PW40BP80-D4
					871F-PW40BN80-N4	871F-PW40BN80-D4
	50 (1.97)	N			871F-NW50BP80-N4	871F-NW50BP80-D4
					871F-NW50BN80-N4	871F-NW50BN80-D4
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))					889N-F4AFC-6F	889D-F4WE-2

❶ Must be fully embedded in mild steel to achieve maximum sensing distance.

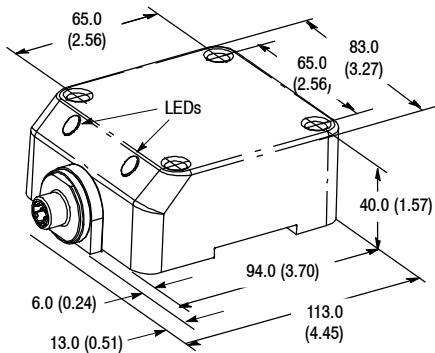


Approximate Dimensions [mm (in.)]

Mini QD Style

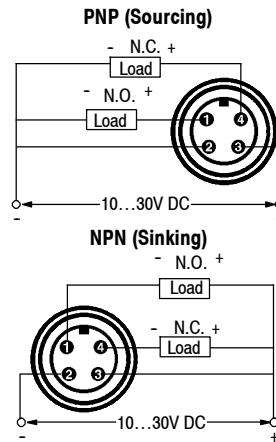


Micro QD Style

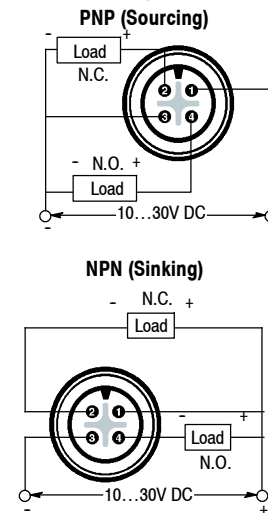


Wiring Diagram

Complementary Normally Open and Normally Closed Outputs



Complementary Normally Open and Normally Closed





871F AC/DC Cable Style

871F AC/DC Mini
Quick-Disconnect Style871F AC/DC Micro
Quick-Disconnect Style

Features

- 2-wire operation
- 2 conductor, 2 terminal, or 3-pin connection
- 20...250V AC/DC
- False pulse, transient noise, short circuit and overload protection
- UL Listed, cUL Certified and CE Marked for all applicable directives
- DIN rail mounting option on quick-disconnect and cable models

Specifications

Load Current	≤100 mA
Minimum Load Current	5 mA
Leakage Current	≤1.7 mA @ 120V; ≤2.0 mA @ 250V
Operating Voltage	20...250V AC/DC
Voltage Drop	≤10V
Repeatability	≤5%
Hysteresis	≤10% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Certifications	UL Listed, cUL Certified and CE Marked for all applicable all directives
Enclosure	NEMA 1, 2, 3, 4, 6, 6P, 12 and 13, IP67 (IEC529), 1200 psi (8270 kPa) washdown; Housing material: Valox®; micro connector versions also meet IP69K (IEC529)
Connections	Quick Disconnect: 3-pin mini style 3-pin micro style Cable: 2 m (6.5 ft) 2 conductor #22 AWG ToughLink™ Conduit Opening: 1/2-14NPT thread, PG 13.5 thread
LEDs	Green: Power Orange: Output Energized
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.2...0.3

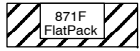
871F 2-Wire AC/DC

Flat Pack Style

Selection Guide

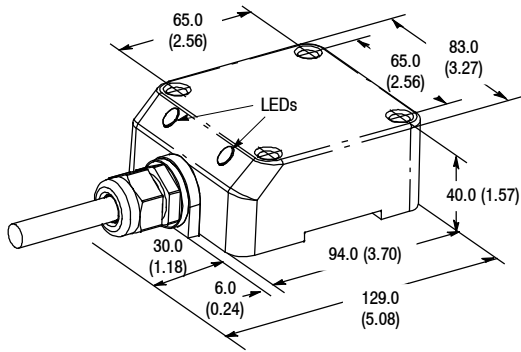
Head Size	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.				
					ToughLink™ Cable	Mini QD Style	Micro QD Style	Conduit 1/2 NPT	Conduit PG13.5
83 (3.27)	50 (1.97) 1	Y	N.O.	10	871F-R50N80-C2	871F-R50N80-N3	871F-R50N80-R3	871F-R50N80-T2	871F-R50N80-Q2
	65 (2.56)	N			871F-K65N80-C2	871F-K65N80-N3	871F-K65N80-R3	871F-K65N80-T2	871F-K65N80-Q2
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))					889N-F3AFC-6F	889R-F3ECA-2	—	—	—

1 50 mm when fully embedded in mild steel as shown

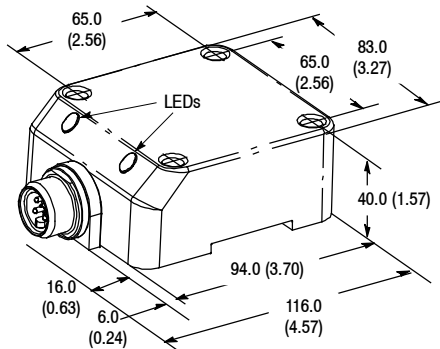


Approximate Dimensions [mm (in.)]

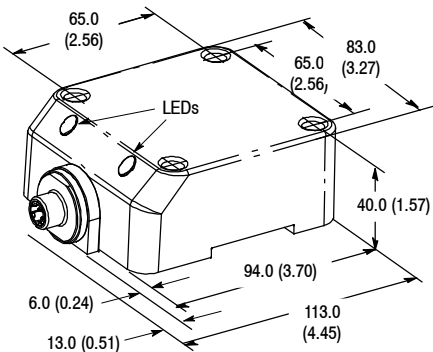
Cable Style



Mini QD Style

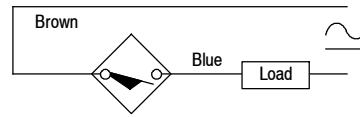


Micro QD Style



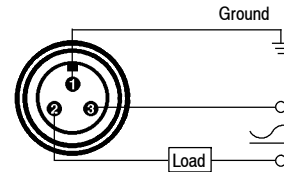
Wiring Diagram

Normally Open



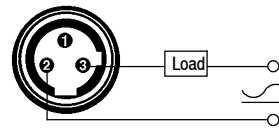
Note: Load can be switched to brown wire.

Normally Open



Note: Load can be switched to pin 3.

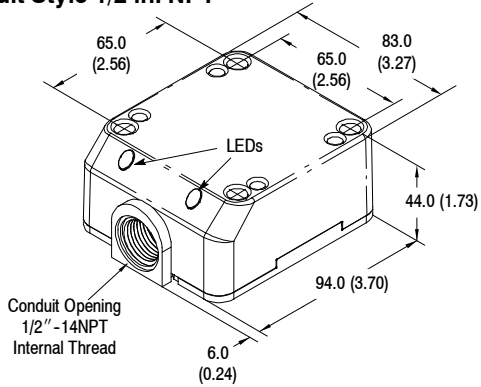
Normally Open



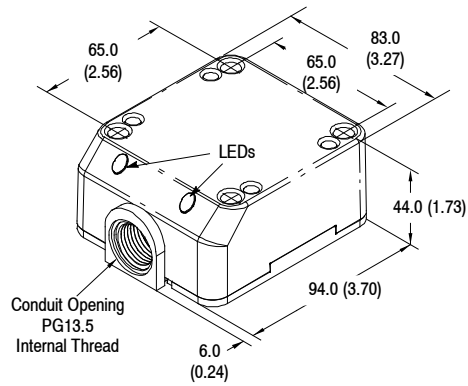
Note: Load can be switched to pin 2.

Approximate Dimensions [mm (in.)]

Conduit Style 1/2 in. NPT

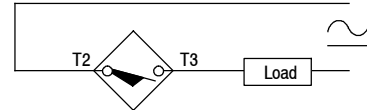


Conduit Style PG13.5



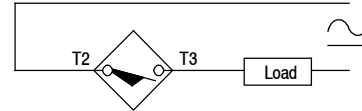
Wiring Diagram

Normally Open



Note: Load can be switched to terminal 2.

Normally Open



Note: Load can be switched to terminal 2.

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2

871F 2-Wire AC/DC Weld Field Immune

Flat Pack Style



871F AC/DC WFI Micro
Quick-Disconnect Style

Features

- Weld Field Immune
- 2-wire operation
- 20...250V AC/DC
- False pulse, transient noise, short circuit and overload protection
- UL Listed, cUL Certified and CE Marked for all applicable directives
- DIN rail mountable option on quick-disconnect and cable models

Specifications

Load Current	≤100 mA
Minimum Load Current	5 mA
Leakage Current	≤1.7 mA @ 120V; ≤2.0 mA @ 250V
Operating Voltage	20...250V AC/DC
Voltage Drop	≤10V
Repeatability	≤5%
Hysteresis	10% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Certifications	UL Listed, cUL Certified and CE Marked for all applicable all directives
Enclosure	NEMA 1, 2, 3, 4, 6, 6P, 12 and 13, IP67 (IEC529), 1200 psi (8270 kPa) washdown; Housing material: Valox®; micro connector versions also meet IP69K (IEC529)
Connections	Quick Disconnect: 3-pin micro style
LEDs	Green: Power Red: Output Energized
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes
Weld Field Immunity	1600 Gauss

Correction Factors

Target Material	Correction Factor	
	Shielded	Unshielded
Steel	1.0	1.0
Stainless Steel	0.7...0.8	0.7...0.8
Brass	0.5...0.6	0.4...0.5
Aluminum	0.4...0.5	0.4...0.5
Copper	0.4...0.5	0.4...0.5

QD Cordsets

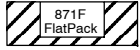
Description	Page Number
Other Cordsets Available	8-2

Inductive Proximity Sensors
871F 2-Wire AC/DC Weld Field Immune
 Flat Pack Style

Product Selection

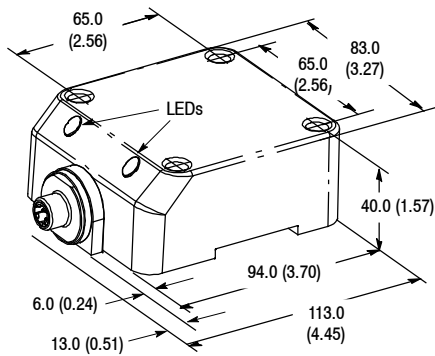
Head Size	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No. Micro QD Style
83 (3.27)	40 (1.57) 1	Y	N.O.	10	871F-JW40N80-R3
	50 (1.97)	N	N.O.	10	871F-KW50N80-R3
Recommended Standard QD Cordset (-2 = 2 m (6.5 ft))					889R-F3WEA-2

1 40 mm when fully embedded in mild steel as shown

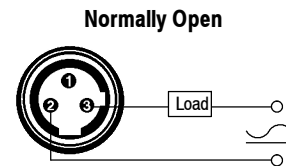


Approximate Dimensions [mm (in.)]

Micro QD Style



Wiring Diagram



Note: Load can be switched to pin 2.

871F 2-Wire AC/DC Weld Field Immune



871F AC/DC Mini and Micro
Quick-Disconnect Style

Description

Bulletin 871F inductive proximity sensors are self-contained, solid-state devices designed to sense the presence of ferrous and nonferrous metal objects without touching them. These special weld-field immune models are ideal for welding environments and other applications where large magnetic fields are present. They are rated for reliable operation at a 1 in distance from a current in line carrying 20,000A. ¹

Each sensor is housed by an aluminum body which meets NEMA 4, 13, and IP67 (IEC529) enclosure standards. It is equipped with a green LED to indicate power and an orange LED which lights when the output is energized.

Features

- 2-wire operation
- 3-pin connection
- 20...250V AC/DC
- Normally open output
- Weld field immune
- Short circuit, false pulse and transient noise protection
- CE Marked for all applicable directives

¹ This distance varies with current line amperage. See page 2-9 of the Introduction section to determine the minimum distance for your application.

Specifications

Load Current	≤400 mA
Minimum Load Current	3 mA
Inrush Current (1 cycle)	≤8 A
Leakage Current	≤1.5 mA
Operating Voltage	20...250V AC/DC
Voltage Drop	≤5V
Repeatability	≤10%
Hysteresis	≤15% typical
Short Circuit Protection	Incorporated
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Weld Field Immunity	20,000A at 1 inch
Certifications	CE Marked for all applicable directives
Enclosure	NEMA 4 and 13, IP67 (IEC529) Aluminum body, PTFE sensing area
Connections	Quick-Disconnect: 3-pin mini style 3-pin micro style
LEDs	Green: Power Orange: Output Energized
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.2...0.3

Product Selection

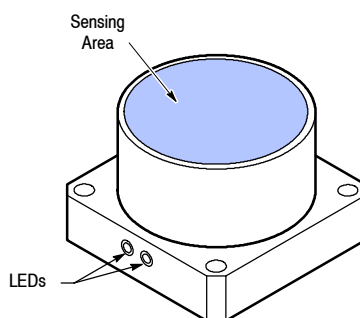
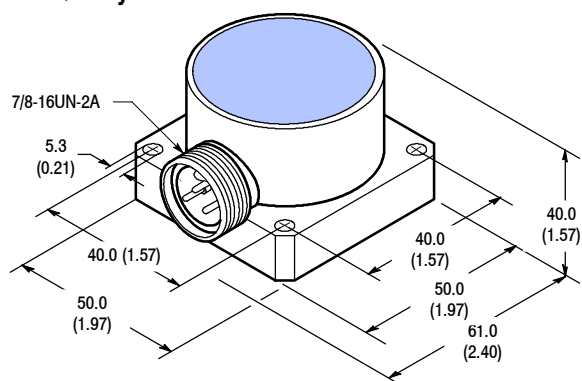
Head Size	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.	
					Mini QD Style	Micro QD Style
50	20 (0.79)	Y	N.O.	15	871F-BW20N50-N3	871F-BW20N50-R3
Recommended Standard QD Cordset (-2 = 2 m (6.5 ft), -6F = 1.8 m (6 ft))					889N-F3AFC-6F	889R-F3WEA-2

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2

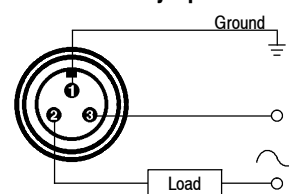
Approximate Dimensions [mm (in.)]

Mini QD Style



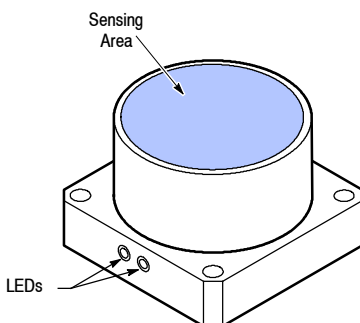
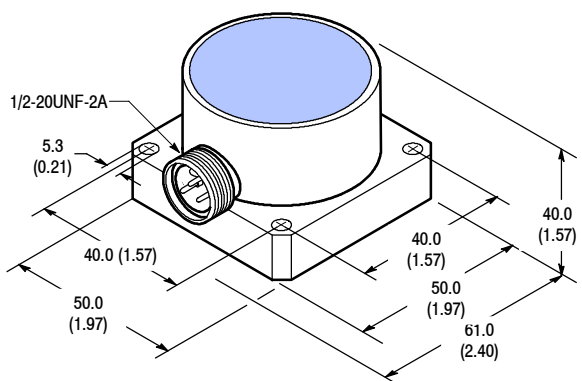
Wiring Diagram

Normally Open

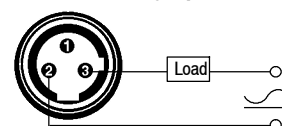


Note: Load can be switched to pin 3.

Micro QD Style



Normally Open



Note: Load can be switched to pin 2.

871F 3-Wire DC

Block Style



871F DC Cable Style



871F DC Micro
Quick-Disconnect Style

Features

- 3-wire operation
- 3-conductor or 4-pin connection
- 10...30V DC
- Normally open output
- False pulse, transient noise, reverse polarity, short circuit and overload protection
- CE Marked for all applicable directives

Specifications

Load Current	≤400 mA
Minimum Load Current	1 mA
Leakage Current	≤10 μA
Operating Voltage	10...30V DC
Voltage Drop	≤2.4V
Repeatability	≤10%
Hysteresis	≤15% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Reverse Polarity Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Certifications	CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 4, 12, 13, IP67 (IEC529) Aluminum Body
Connections	Cable: 2 m (6.5 ft) length 3-conductor PVC Quick-Disconnect: 4-pin micro style
LED	Orange: Output Energized
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.2...0.3

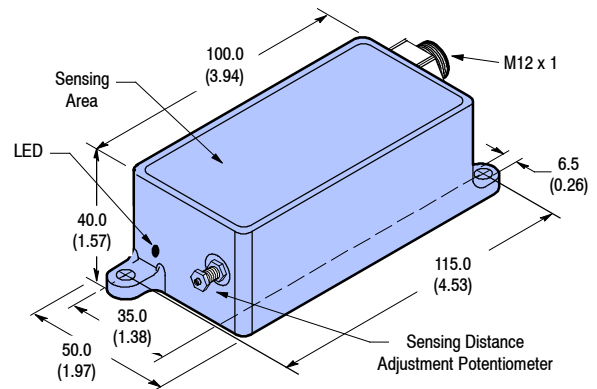
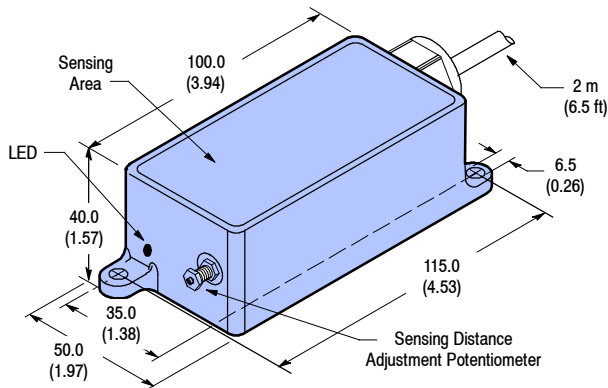
Product Selection

Head Size	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration		Switching Frequency [Hz]	Cat. No.	
						Cable Style	Micro QD Style
50	70 (2.76)	N	N.O.	NPN	300	871F-D70NN50-E2	871F-D70NN50-D4
				PNP		871F-D70NP50-E2	871F-D70NP50-D4
			Recommended Standard QD Cordset (-2 = 2 m (6.5 ft))				

QD Cordsets and Accessories

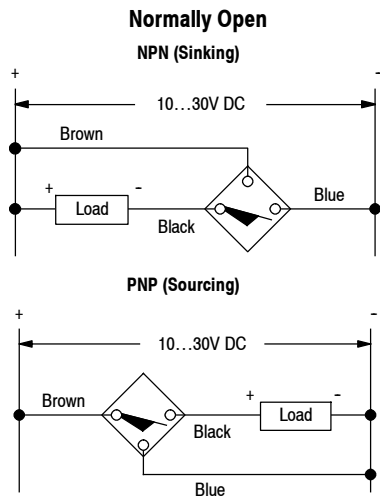
Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2

Approximate Dimensions [mm (in.)]

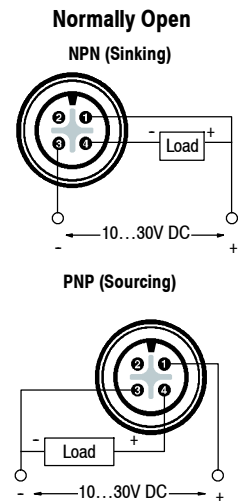


Wiring Diagrams

Cable Style



Micro QD Style



Notes



Description

Bulletin 871L and 872L inductive proximity sensors are self-contained, general purpose, solid state devices designed to sense the presence of metal objects (ferrous and nonferrous) without touching them.

These devices provide mounting interchangeability, easily-wired terminations and rugged construction. The adjustable head can be positioned for top or side sensing. In side-sensing applications, the head can be rotated in 22.5° increments and locked in any of 16 positions.

These sensors are available with a 1/2-14NPT conduit opening, mini quick-disconnect, or micro quick-disconnect.

Features

- 17 sensing head positions (1 top, 16 sides)
- Conduit or quick-disconnect styles
- Short circuit protection (DC only)
- Overload protection
- Transient noise protection
- False pulse protection
- Reverse polarity protection
- Selectable normally open or normally closed output
- CE Marked for all applicable directives

Styles

DC 3-Wire	page 2-154
AC 2-Wire	page 2-156
AC/DC 2-Wire	page 2-156

Accessories

Cordsets	page 8-1
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General Information

Metric/English Conversion Chart	page 14-6
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Inductive Proximity Sensors
871L & 872L 3-Wire DC
Limit Switch Style



871L & 872L DC
Mini Quick-Disconnect Style



871L & 872L DC
Micro Quick-Disconnect Style



871L & 872L DC
Conduit Style

Features

- 3-wire operation
- 3-terminal or 4-pin connection
- 10...60V DC for 871L models
- 10...30V DC for 872L models
- Switch selectable normally open or normally closed output on 871L models
- Normally open or normally closed outputs programmable via jumper on 872L models
- Alignment LED on 871L models
- False pulse, transient noise, reverse polarity, short circuit and overload protection
- cULus and CE Marked for all applicable directives

Specifications

	871L Models	872L Models
Load Current	≤400 mA	≤120 mA
Leakage Current	≤10 μA	≤10 μA
Operating Voltage	10...60V DC	10...30V DC
Voltage Drop	≤2.4V	≤2.5V
Repeatability	≤5%	≤5%
Hysteresis	≤20% typical	≤20% typical
False Pulse Protection	Incorporated	Incorporated
Transient Noise Protection	Incorporated	Incorporated
Reverse Polarity Protection	Incorporated	Incorporated
Short Circuit Protection	Incorporated	Incorporated
Overload Protection	Incorporated	Incorporated
Certifications	cULus and CE Marked for all applicable directives	
Enclosure	NEMA 3, 4, 6, 12, 13, IP67 (IEC 529) Polyloy	
Connections	Quick-Disconnect: 4-pin mini style 4-pin micro style Conduit Opening: 1/2-14 NPT internal thread with screw terminals	
LEDs	Green: Power (Blinks in SCP/Overload) Orange: Output Energized Red: Alignment Indicator	Green: Power (Blinks in SCP/Overload) Orange: Output Energized
Operating Temperature [C (F)]	-25...70° (-13...+158°)	
Shock	30 g, 11 ms	
Vibration	55 Hz, 1 mm amplitude, 3 planes	

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.2...0.3

Product Selection

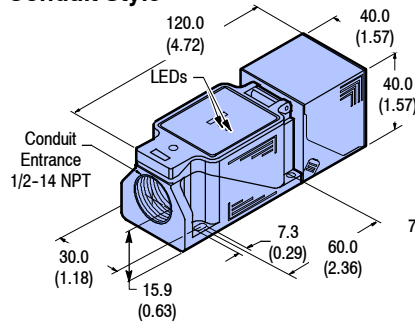
Head Size	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.			
					Conduit Style	Mini QD Style	Micro QD Style	
40	20 (0.79)	Y	Selectable N.O. or N.C.	NPN	150	871L-D20EN40-T3	871L-D20EN40-N4	871L-D20EN40-D4
				PNP		871L-D20EP40-T3	871L-D20EP40-N4	871L-D20EP40-D4
	40 (1.57)	N	Selectable N.O. or N.C.	NPN	70	871L-D40EN40-T3	871L-D40EN40-N4	871L-D40EN40-D4
				PNP		871L-D40EP40-T3	871L-D40EP40-N4	871L-D40EP40-D4
	20 (0.79)	Y	Program-mable N.O. or N.C.	NPN	100	872L-D20EN40-T3	872L-D20EN40-N4	872L-D20EN40-D4
				PNP		872L-D20EP40-T3	872L-D20EP40-N4	872L-D20EP40-D4
	40 (1.57)	N	Program-mable N.O. or N.C.	NPN	50	872L-D40EN40-T3	872L-D40EN40-N4	872L-D40EN40-D4
				PNP		872L-D40EP40-T3	872L-D40EP40-N4	872L-D40EP40-D4
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))							889N-F4AFC-6F	889D-F4AC-2

QD Cordsets and Accessories

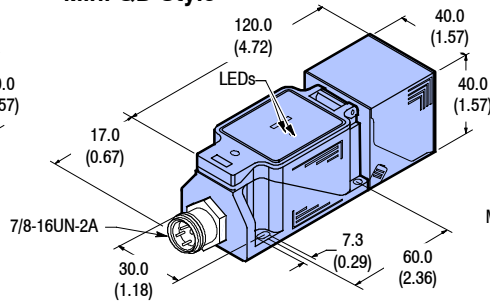
Description	Page Number
Other Cordsets Available	8-2

Approximate Dimensions [mm (in.)]

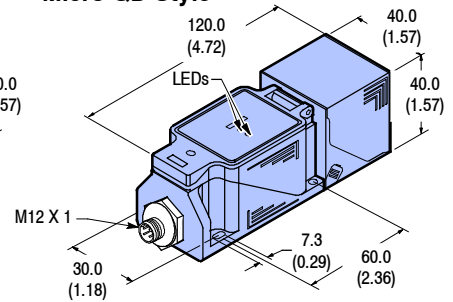
Conduit Style



Mini QD Style



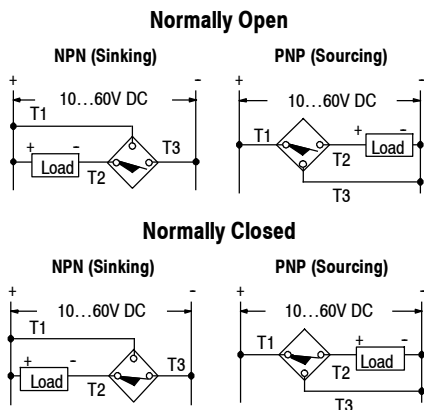
Micro QD Style



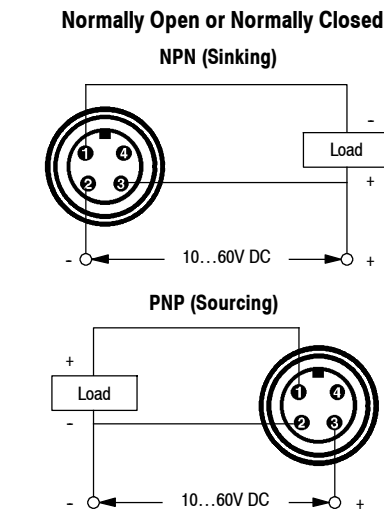
Note: Head can be rotated in 22.5° increments to provide 16 side-sensing positions or rotated for top-sensing.

Wiring Diagram

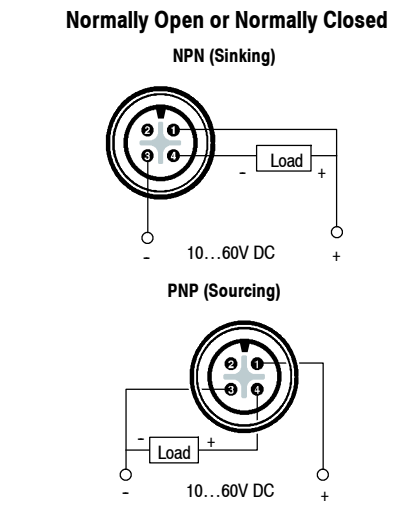
Conduit Style



Mini QD Style



Micro QD Style





871L AC/DC & 872L AC
Mini Quick-Disconnect Style



871L AC/DC & 872L AC
Micro Quick-Disconnect Style



871L AC/DC & 872L AC
Conduit Style

Specifications

	871L Models	872L Models
Load Current	≤400 mA	≤500 mA
Minimum Load Current	2 mA	2 mA
Inrush Current (1 cycle)	≤8 A	≤8 A
Leakage Current	≤2 mA	≤2 mA
Operating Voltage	20...250V AC/DC	20-250V AC
Voltage Drop	≤5V	≤5V
Repeatability	≤5%	≤5%
Hysteresis	≤20%	≤20%
False Pulse Protection	Incorporated	Incorporated
Transient Noise Protection	Incorporated	Incorporated
Certifications	cULus and CE Marked for all applicable directives	
Enclosure	NEMA 3, 4, 6, 12, 13, IP65 (IEC 529) Polyloy	
Connections	Quick Disconnect: 3-pin mini style 3-pin micro style Conduit Opening: 1/2-14 NPT internal thread with screw terminals	
LEDs	Green: Power (Blinks in SCP/Overload) Orange: Output Energized	
Operating Temperature [C (F)]	-25...+70° (-13...+158°)	
Shock	30 g, 11 ms	
Vibration	55 Hz, 1 mm amplitude, 3 planes	

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.7...0.8
Brass	0.4...0.5
Aluminum	0.3...0.4
Copper	0.2...0.3

Features

- 2-wire operation
- 2-terminal or 3-pin connection
- 20...250V AC/DC on 871L models
- 20...250V AC on 872L models
- Switch selectable normally open or normally closed output on 871L models
- Normally open or normally closed output programmable via jumper on 872L models
- False pulse, transient noise, and overload protection
- cULus and CE Marked for all applicable directives

Product Selection

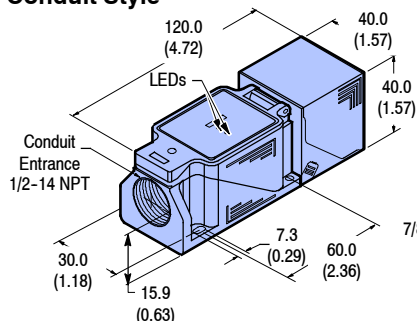
Head Size	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.		
					Conduit Style	Mini QD Style	Micro QD Style
40	20 (0.79)	Y	Selectable N.O. or N.C.	15	871L-B20E40-T2	871L-B20E40-N3	871L-B20E40-R3
	40 (1.57)	N			871L-B40E40-T2	871L-B40E40-N3	871L-B40E40-R3
	20 (0.79)	Y	Programmable N.O. or N.C.		872L-A20E40-T2	872L-A20E40-N3	872L-A20E40-R3
	40 (1.57)	N			872L-A40E40-T2	872L-A40E40-N3	872L-A40E40-R3
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))						889N-F3AFC-6F	889R-F3ECA-2

QD Cordsets and Accessories

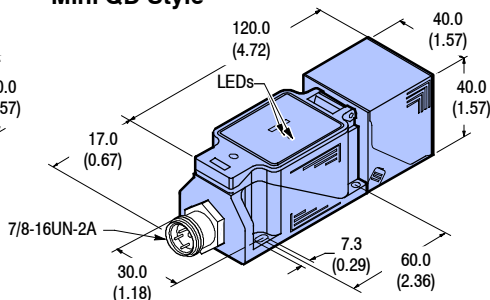
Description	Page Number
Other Cordsets Available	8-2

Approximate Dimensions [mm (in.)]

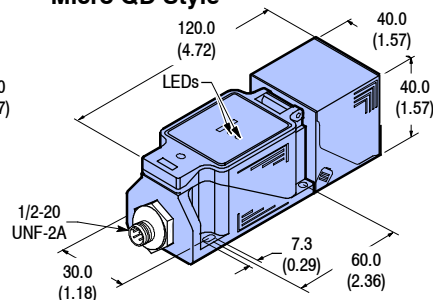
Conduit Style



Mini QD Style



Micro QD Style

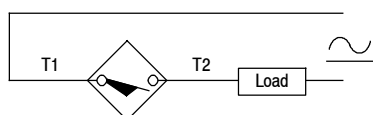


Note: Head can be rotated in 22.5° increments to provide 16 side-sensing positions or rotated for top-sensing.

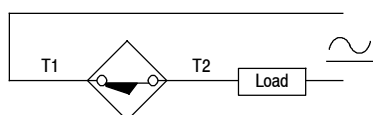
Wiring Diagram

Conduit Style

Normally Open



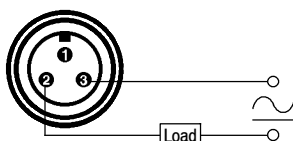
Normally Closed



Note: Load can be switched to Terminal 1.

Mini QD Style

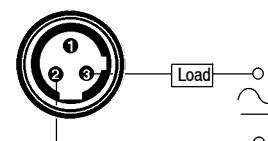
Normally Open or Normally Closed



Note: Load can be switched to pin 3.

Micro QD Style

Normally Open or Normally Closed



Note: Load can be switched to pin 2.

Notes



Description

Bulletin 802PR inductive proximity sensors are self-contained, 2-wire devices designed to detect the presence of ferrous and nonferrous metal objects without touching them. Types LA and XA are high-output AC models designed to switch current loads up to 1 A, while types LB and XB are AC/DC solid-state switches made to interface directly with programmable controllers.

Features

- Multiple sensing directions
- Cable, conduit, or quick-disconnect styles
- Short circuit protection (AC/DC models)
- Overload protection (AC/DC models)
- Transient noise protection
- False pulse protection
- Hazardous location models are available
- UL Listed, CSA Certified and CE Marked for all applicable directives

Styles

AC/DC 2-Wire page 2-160

AC/DC 2-Wire
Hazardous Location page 2-165

AC 2-Wire High-Output page 2-167

AC 2-Wire Hazardous Location
High-Output page 2-171

Accessories

Cordsets page 8-1

General Information

Metric/English
Conversion Chart page 14-6

ATTENTION



High-output models should not be used in solid-state switching, TTL, or programmable controller operations.

Each sensor is housed in a self-extinguishing glass-reinforced polyester body. Special hazardous location models are available which meet Division 2 enclosure standards in Classes I, II, and III (see specifications). Switch constructions include top and side sensing models. The side-sensing head can be rotated in 90° increments to sense in four directions. These devices are available with a threaded conduit opening, conduit coupler, 3-pin mini connector, 3-pin micro connector, or pre-wired cable.



802PR AC/DC
Cable Style



802PR AC/DC Mini
Quick-Disconnect Style



802PR AC/DC Micro
Quick-Disconnect Style



802PR AC/DC
Conduit Style

Specifications

Load Current	AC 4...25 mA; DC 2...25 mA
Leakage Current	≤1.7 mA at 132V, ≤2.5 mA at 250V
Operating Voltage	20...250V AC/DC
Voltage Drop	≤10V
Repeatability	≤10% typical
Hysteresis	≤10% typical
Transient Noise Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
False Pulse Protection	Incorporated
Radio Frequency Protection	10V per meter; frequency range 20...1000 MHz
Certifications	UL Listed, CSA Certified and CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 4, 4X ^① , 12, 13, IP65 (IEC529) Self extinguishing glass-reinforced polyester body
Connections	Cable: 2.4 m (8 ft) length 2-conductor ToughLink™ Quick-Disconnect: 3-pin micro style 3-pin mini style Conduit Opening or Conduit Coupler: Internal thread with screw terminals (use #18-14 AWG wire)
LEDs	Green: Power; Red: Output energized (both on in SCP/Overload)
Operating Temperature [C (F)]	-25...+75° (-13...+167°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

① Corrosion resistant models

Features

- 2-wire operation
- 2-conductor or 3-pin connection
- 20...250V AC/DC (for solid state inputs)
- Normally open output
- Short circuit, overload, false pulse, RFI and transient noise protection
- Corrosion resistant models
- 2 LEDs
- UL Listed, CSA Certified and CE Marked for all applicable directives

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.9
Brass	0.8
Aluminum	0.75
Copper	0.7

Inductive Proximity Sensors

802PR 2-Wire AC/DC, Cable Style

Limit Switch Style

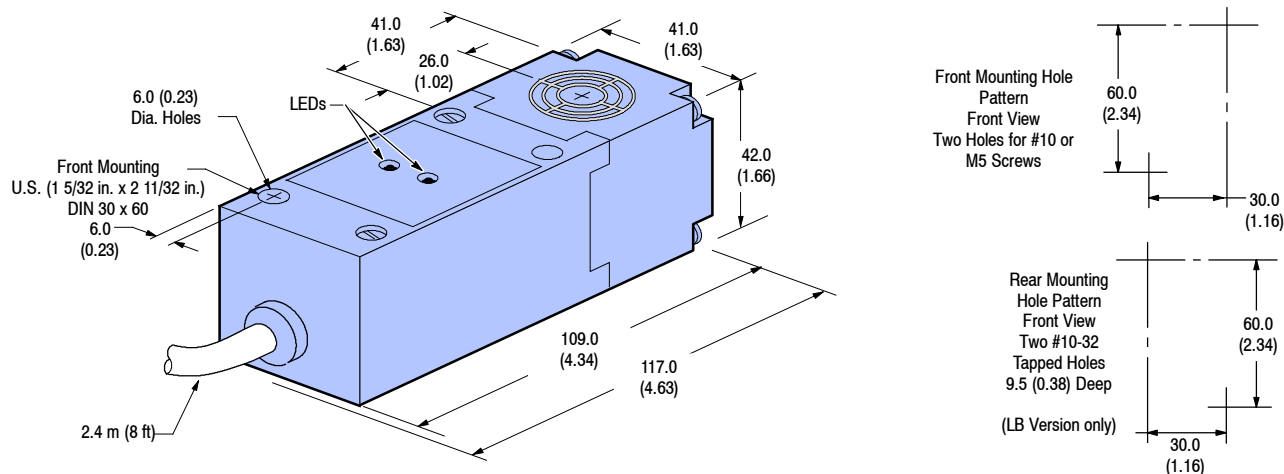
Product Selection

Sensing Direction	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cable Length [m (ft)]	Corrosion Resistant	Cat. No. Cable Style
Side	17 (0.67)	Y	N.O.	20	2.5 (8)	Y	802PR-XBAM1-08
						N	802PR-LBAM1-08
					3.6 (12)	Y	802PR-XBAM1-12
						N	802PR-LBAM1-12
Top	17 (0.67)	Y	N.O.	20	2.5 (8)	Y	802PR-XBAR1-08
						N	802PR-LBAR1-08
					3.6 (12)	Y	802PR-XBAR1-12
						N	802PR-LBAR1-12

Accessories

Description	Page Number
Terminal Chambers	8-2

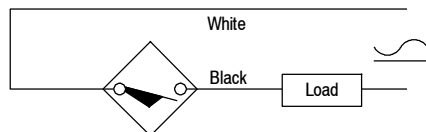
Approximate Dimensions [mm (in.)]



Note: Side sensing model heads can be turned in 90° increments to accommodate 4 side sensing positions.

Wiring Diagram

Normally Open



Note: Load can be switched to white lead.

Inductive Proximity Sensors

802PR 2-Wire AC/DC, Mini Quick-Disconnect Style

Limit Switch Style

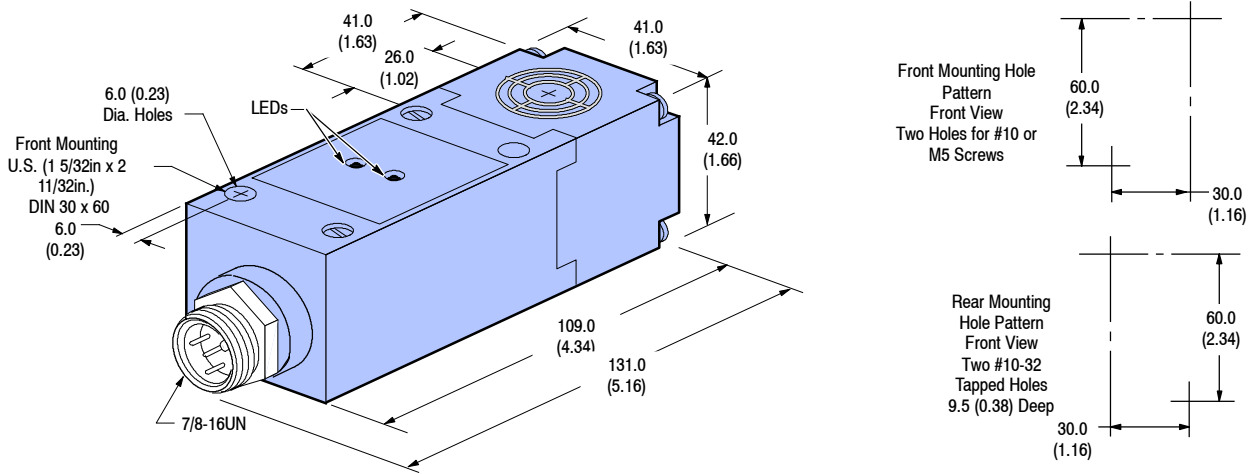
Product Selection

Sensing Direction	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No. Mini QD Style
Side	17 (0.67)	Y	N.O.	20	802PR-LBAE1
Top					802PR-LBAK1
Recommended Standard QD Cordset Required (-6F = 1.8 m (6 ft))					889N-F3AFC-6F

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2

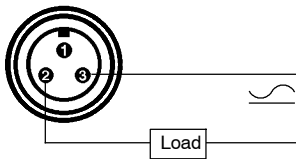
Approximate Dimensions [mm (in.)]



Note: Side sensing model heads can be turned in 90° increments to accommodate 4 side sensing positions.

Wiring Diagram

Normally Open



Note: Load can be switched to Pin 3.

Inductive Proximity Sensors
802PR 2-Wire AC/DC, Micro Quick-Disconnect Style
 Limit Switch Style

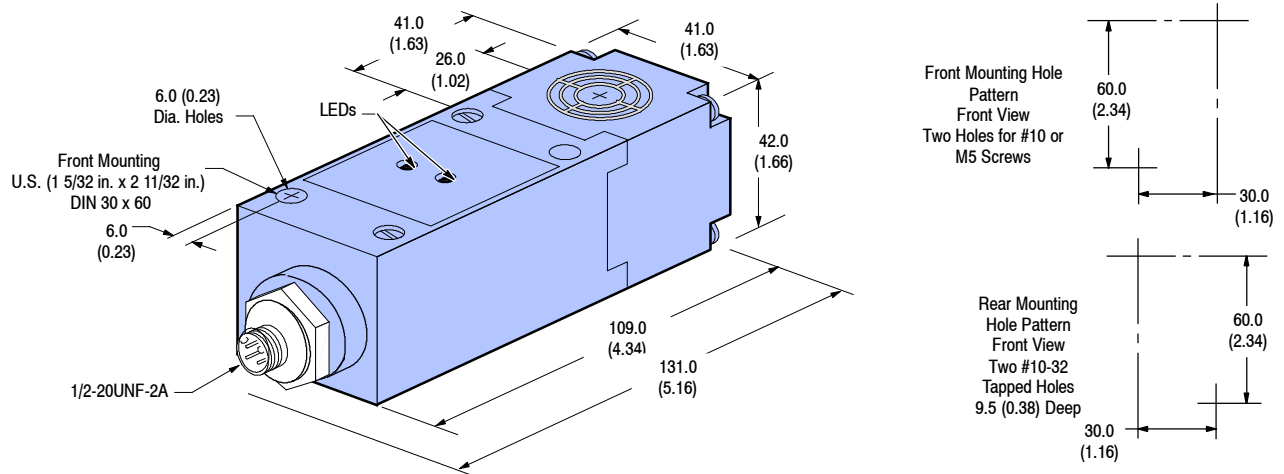
Product Selection

Sensing Direction	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No. Micro QD Style
Side	17 (0.67)	Y	N.O.	20	802PR-LBAC1
Top					802PR-LBAF1
Recommended Standard QD Cordset Required (-2 = 2 m (6.5 ft))					889R-F3ECA-2

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2

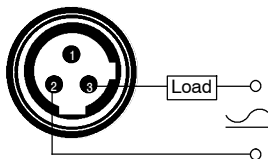
Approximate Dimensions [mm (in.)]



Note: Side sensing model heads can be turned in 90° increments to accommodate 4 side sensing positions.

Wiring Diagram

Normally Open



Note: Load can be switched to pin 2.

Inductive Proximity Sensors

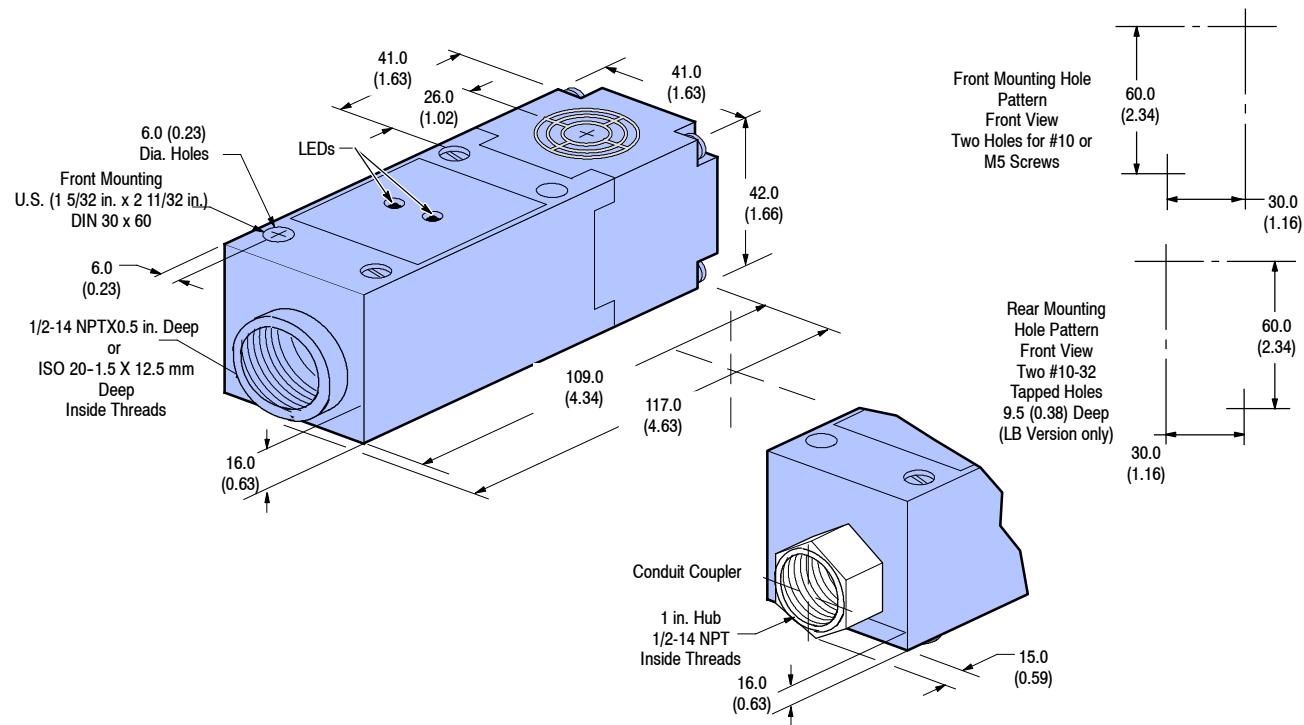
802PR 2-Wire AC/DC, Conduit Style

Limit Switch Style

Product Selection

Sensing Direction	Nominal Sensing Distance mm (inches)	Shielded	Output Configuration	Switching Frequency [Hz]	Corrosion Resistant	Connection Type	Cat. No. Conduit Style
Side	17 (0.67)	Y	N.O.	20	Y	1/2 in.-14NPT	802PR-XBAB1
					N		802PR-LBAB1
					Y	ISO 20-1.5	802PR-XBAB1-S6
					N		802PR-LBAB1-S6
					N	Conduit Coupler	802PR-LBAA1
Top	17 (0.67)	Y	N.O.	20	Y	1/2 in.-14NPT	802PR-XBAH1
					N		802PR-LBAH1
					Y	ISO 20-1.5	802PR-XBAH1-S6
					N		802PR-LBAH1-S6
					N	Conduit Coupler	802PR-LBAJ1

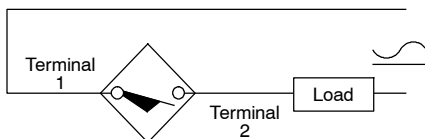
Approximate Dimensions [mm (in.)]



Note: Side sensing model heads can be turned in 90° increments to accommodate 4 side sensing positions.

Wiring Diagram

Normally Open



Note: Load can be switched to Terminal 1.

Inductive Proximity Sensors
802PR 2-Wire AC/DC Hazardous Location
Limit Switch Style



802PR AC/DC
Conduit Style

Features

- 2-wire operation
- 2-terminal connection
- 20...250V AC/DC (for solid state inputs)
- Normally open output
- Short circuit, overload, false pulse, RFI, and transient noise protection
- Hazardous location rating
- 2 LEDs
- UL Listed, CSA Certified and Factory Mutual Approved

Specifications

Load Current	AC: 4...25 mA DC: 2...25 mA
Leakage Current	≤1.7 mA at 132V, ≤2.5 mA at 250V
Operating Voltage	20...250V AC/DC
Voltage Drop	≤10V
Repeatability	≤10% typical
Hysteresis	≤10% typical
Transient Noise Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
False Pulse Protection	Incorporated
Radio Frequency Protection	≤10V per meter Frequency range 20...1000 MHz
Certifications	UL Listed, CSA Certified and Factory Mutual Approved
Enclosure	NEMA 1, 2, 3, 4, 12, 13 IP65 (IEC529) Division 2 Class I: Groups A, B, C & D; Class II: Groups F & G; Class III: All groups Self-extinguishing glass-reinforced polyester body
Connection	Conduit Coupler: 1/2-14 NPT internal thread with screw terminals use (#18-14 AWG wire)
LEDs	Green: Power Red: Output energized (both on in SCP/Overload)
Operating Temperature [C (F)]	-25...+75° (-13...+167°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.9
Brass	0.8
Aluminum	0.75
Copper	0.7

Inductive Proximity Sensors

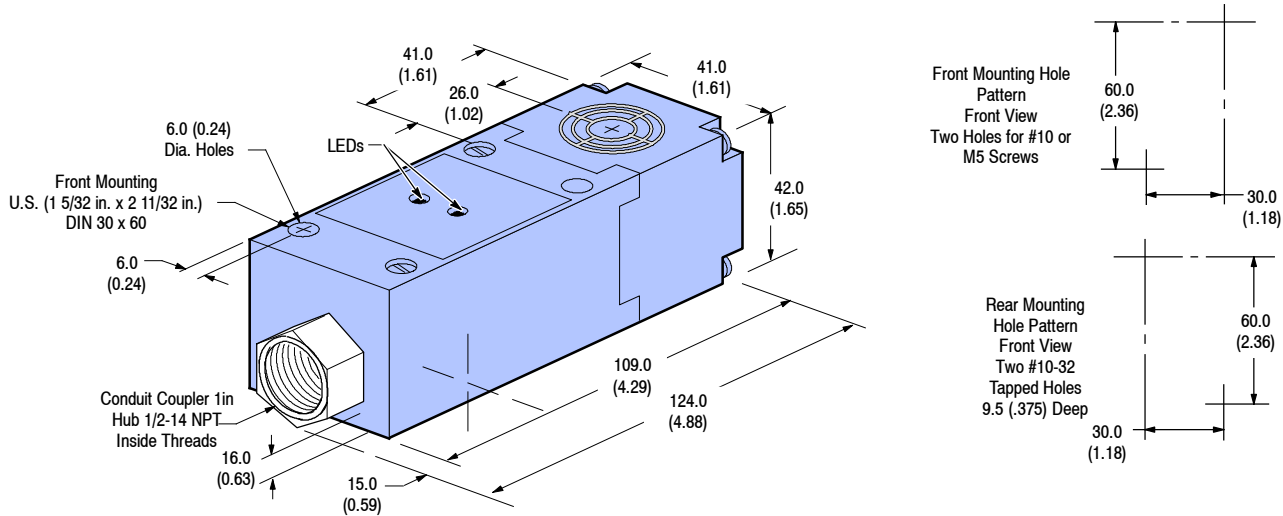
802PR 2-Wire AC/DC Hazardous Location, Conduit Style

Limit Switch Style

Product Selection

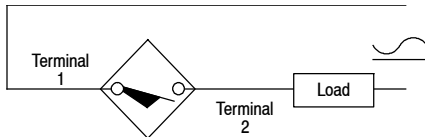
Sensing Direction	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No. Conduit Style
Side	17 (0.67)	Y	N.O.	20	802PR-LBAA3
Top					802PR-LBAJ3

Approximate Dimensions [mm (in.)]



Note: Side-sensing model heads can be turned in 90° increments to accommodate 4 side-sensing positions.

Wiring Diagram



Note: Load can be switched to Terminal 1.



802PR AC
Cable Style



802PR AC Mini
Quick-Disconnect Style



802PR AC
Conduit Style

Specifications

Load Current	≤1 A at +40°C linearly derated to 0.5 A at 75°C
Inrush Current	≤10 A/1 s
Supply Current (minimum)	25 mA
Leakage Current	≤3.5 mA (60...132V AC); ≤6.5 mA (102...132V AC)
Operating Voltage	60...132V AC or 102...132V AC
Voltage Drop	≤8.5V
Repeatability	≤0.025 mm
Hysteresis	15% (max.)
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Certifications	UL Listed, CSA Certified and CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 4, 4X [Ⓢ] , 12, 13, IP65 (IEC529) Self-extinguishing glass-reinforced polyester body
Connections	Cable: 8 ft or 12 ft length 2-conductor 16 AWG STO (oil-resistant thermoplastic) Quick Disconnect: 3-pin mini style Conduit Opening or Conduit Coupler: 1/2-14NPT internal thread with screw terminals (use #18-14 AWG wire)
LED	Red: Output Energized
Operating Temperature [C (F)]	-25...+75° (-13...+167°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

[Ⓢ] Corrosion resistant models

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.80...0.85
Brass	0.50...0.55
Aluminum	0.45...0.50
Copper	0.40...0.45

Features

- 2-wire operation
- 2-conductor, 3-pin, or 2-terminal connection
- 60...132V AC or 102...132V AC
- Normally open or N.O./N.C. selectable output
- High output (1 A)
- Transient noise and false pulse protection
- UL Listed, CSA Certified and CE Marked for all applicable directives

802PR 2-Wire AC High Output, Cable Style

Limit Switch Style

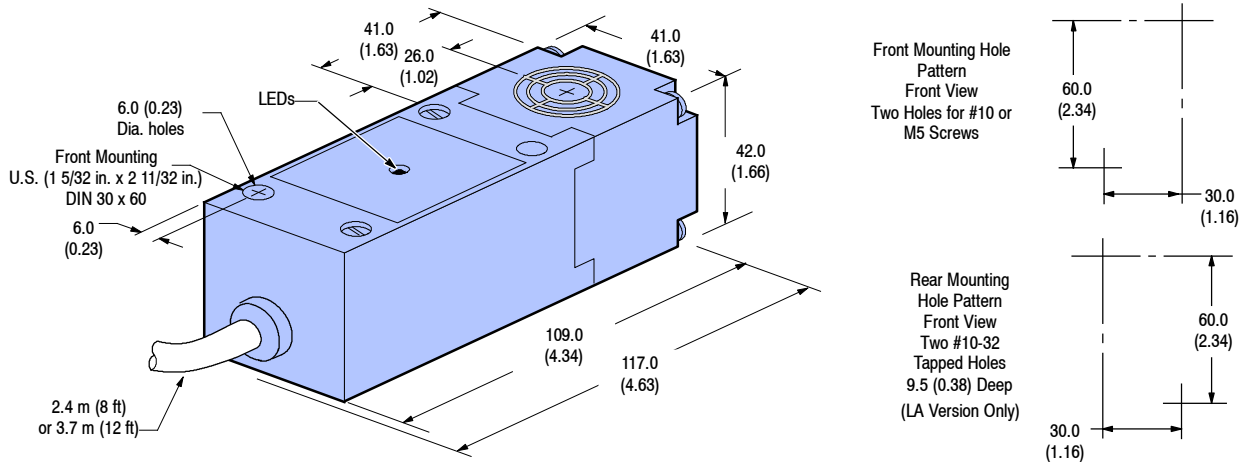
Product Selection

Sensing Direction	Nominal Sensing Distance [mm (in.)]	Shielded	Voltage Range	Output Configuration	Corrosion Resistant	Switching Frequency [Hz]	Cable Length [ft]	Cat. No. Cable Style	
Side	13 (0.51)	Y	60...132V AC	Selectable ^①	N	20	8	802PR-LABM2-08	
							12	802PR-LABM2-12	
Top							8	802PR-LABR2-08	
							12	802PR-LABR2-12	
Side							8	802PR-LACM2-08	
							12	802PR-LACM2-12	
Top			8	802PR-LACR2-08					
			12	802PR-LACR2-12					
Side			102-132V AC	N.O.		N	16	8	802PR-LAAM1-08
								12	802PR-LAAM1-12
Top								8	802PR-LAAR1-08
								12	802PR-LAAR1-12
Side	Y	8			802PR-XAAM1-08				
		12			802PR-XAAM1-12				
Top	8	802PR-XAAR1-08							
	12	802PR-XAAR1-12							

① Preset to N.O. at factory.

② Preset to N.C. at factory.

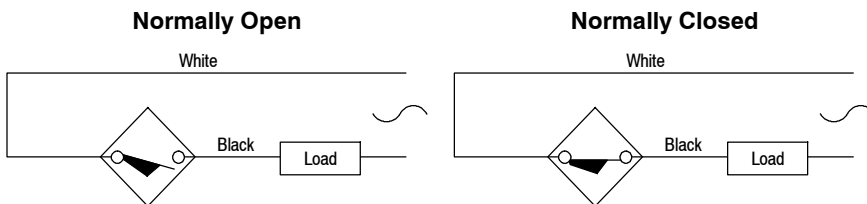
Approximate Dimensions [mm (in.)]



Note 1: Side sensing model heads can be turned in 90° increments to accommodate 4 side sensing positions.

Note 2: Low voltage models have 2 LEDs.

Wiring Diagrams



Note: Load can be switched to white lead.

Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2

802PR 2-Wire AC High Output, Mini Quick-Disconnect Style Limit Switch Style

Product Selection

Sensing Direction	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Voltage Range	Switching Frequency [Hz]	Cat. No. Mini QD Style
Side	13 (0.51)	Y	Selectable❶	60...132V AC	20	802PR-LABE2
Top						802PR-LABK2
Side			Selectable❷			802PR-LACE2
Top						802PR-LACK2
Side			N.O.	102...132V AC	16	802PR-LAAE1
Top						802PR-LAAK1
Recommended Standard QD Cordset Required (-6F = 1.8 m (6 ft))						889N-F3AFC-6F

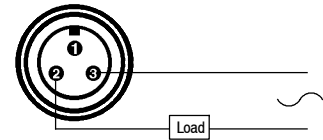
- ❶ Preset to N.O. at factory.
- ❷ Preset to N.C. at factory.

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2

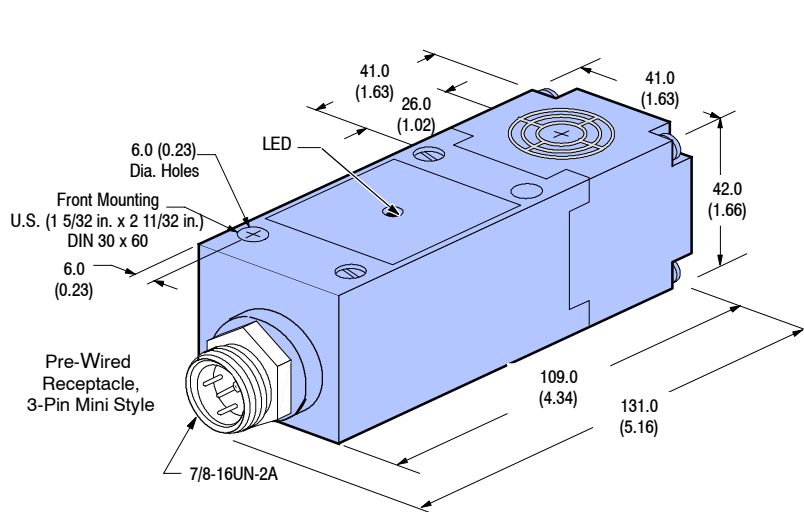
Wiring Diagram

Normally Open or Normally Closed

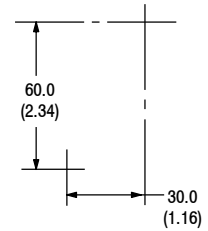


Note: Load can be switched to pin 3.

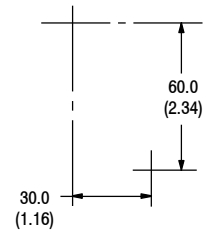
Approximate Dimensions [mm (in.)]



Front Mounting Hole Pattern
Front View
Two Holes for #10 or M5 Screws



Rear Mounting Hole Pattern
Front View
Two #10-32 Tapped Holes
9.5 (0.38) Deep
(LA Version Only)



- Note 1:** Side sensing model heads can be turned in 90° increments to accommodate 4 side sensing positions.
- Note 2:** Low voltage models have 2 LEDs.

802PR 2-Wire AC High Output, Conduit Style

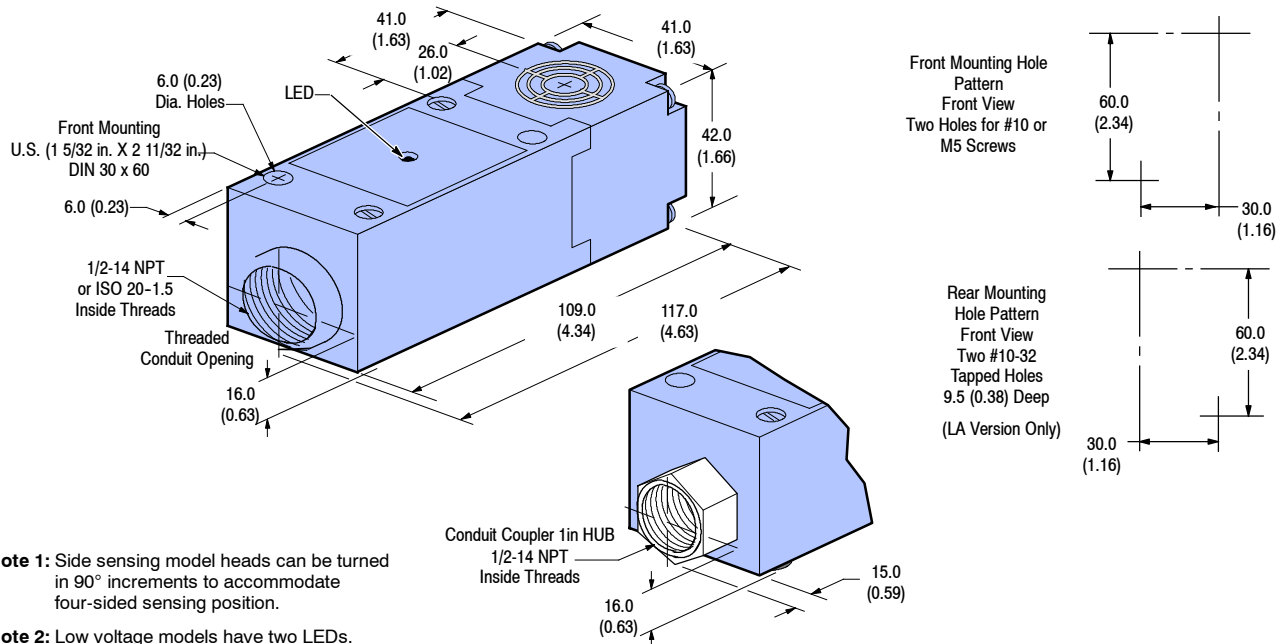
Limit Switch Style

Product Selection

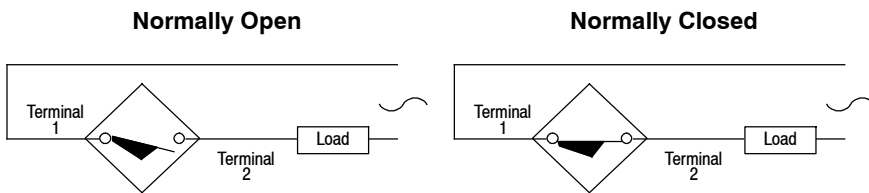
Sensing Direction	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Corrosion Resistant	Voltage Range	Switching Freq. [Hz]	Connection	Cat. No. Conduit Style		
Side	13 (0.51)	Y	Selectable❶	N	60...132V AC	20	Conduit Coupler	802PR-LABA2		
							Threaded 1/2-14 NPT❷	802PR-LABB2		
Top							Conduit Coupler	802PR-LABJ2		
							Threaded 1/2-14 NPT❷	802PR-LABH2		
Side							Selectable❷	Conduit Coupler	802PR-LACA2	
								Threaded 1/2-14 NPT❷	802PR-LACB2	
Top			Conduit Coupler		802PR-LACJ2					
			Threaded 1/2-14 NPT❷		802PR-LACH2					
Side			N.O.		Y	102...132V AC		16	Conduit Coupler	802PR-LAAA1
									Threaded 1/2-14 NPT❷	802PR-LAAB1
Top							Conduit Coupler		802PR-LAAJ1	
							Threaded 1/2-14 NPT❷		802PR-LAAH1	
Side	Threaded 1/2-14 NPT❷	802PR-XAAB1								
Top	Threaded 1/2-14 NPT❷	802PR-XAAH1								

- ❶ Preset to N.O. at factory.
- ❷ Preset to N.C. at factory.
- ❸ To order ISO 20-1.5 add '-S6' to cat. no.

Approximate Dimensions [mm (in.)]



Wiring Diagram



Note: Load can be switched to Terminal 1.

Inductive Proximity Sensors

802PR 2-Wire AC Hazardous Location, High Output Limit Switch Style



802PR AC
Conduit Style

Features

- 2-wire operation
- 2-terminal connection
- 102...132V AC
- Hazardous location rating
- High output (1A)
- Normally open output
- Transient noise and false pulse protection
- UL Listed, CSA Certified and Factory Mutual Approved

Specifications

Load Current	1 A at +40°C linearly derated to 0.5 A at 75°C
Inrush Current	≤10 A/1 s
Supply Current	25 mA min.
Leakage Current	≤6.5 mA
Operating Voltage	102...132V AC
Voltage Drop	≤8.5V
Repeatability	≤.025 mm
Hysteresis	15% maximum
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Certifications	UL Listed, CSA Certified and FM Approved
Enclosure	NEMA 1, 2, 3, 4, 12, 13 IP65 (IEC529) Division 2 Class I: Groups A, B, C & D; Class II: Groups F & G; Class III: All groups Self-extinguishing glass reinforced polyester body
Connection	Conduit Coupler: 1/2-14 NPT internal thread with screw terminals use (#18-14 AWG wire)
LED	Red: Output Energized
Operating Temperature [C (F)]	-25...+75° (-13...+167°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.80...0.85
Brass	0.50...0.55
Aluminum	0.45...0.50
Copper	0.40...0.45

Inductive Proximity Sensors

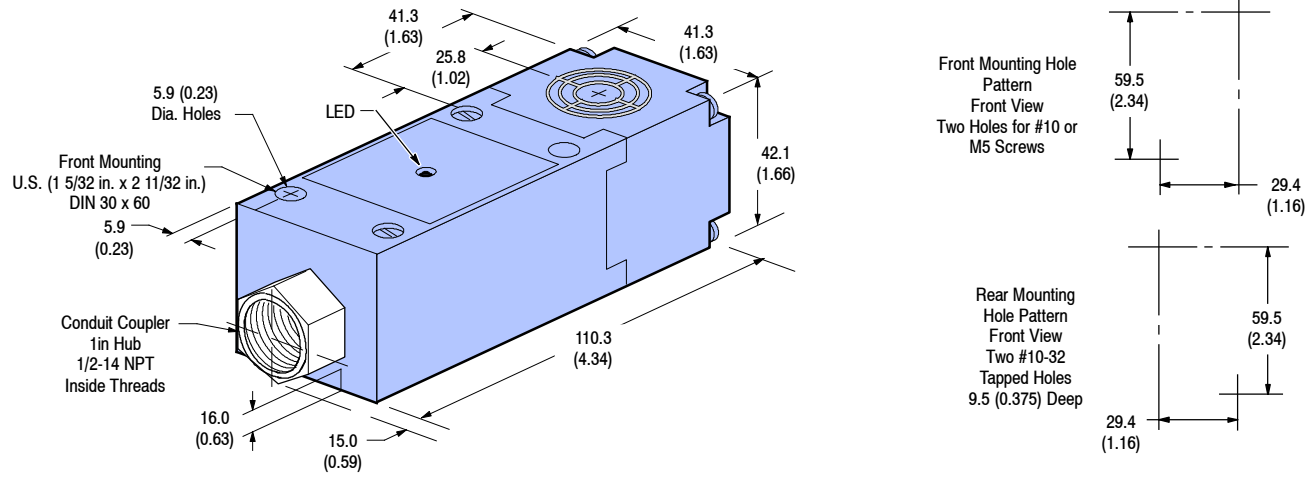
802PR 2-Wire AC Hazardous Location, High Output, Conduit Style

Limit Switch Style

Product Selection

Sensing Direction	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No. Conduit Style
Side	13 (0.51)	Y	N.O.	16	802PR-LAAA3
Top					802PR-LAAJ3

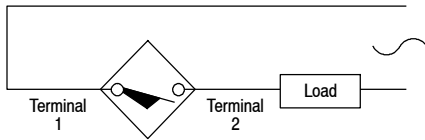
Approximate Dimensions [mm (in.)]



Note: Side sensing model heads can be turned in 90° increments to accommodate 4 side sensing positions.

Wiring Diagram

Normally Open



Note: Load can be switched to Terminal 1.



Description

Bulletin 871FM inductive flat pack proximity sensors are self-contained, general purpose, solid-state devices designed to sense the presence of ferrous and nonferrous metal objects without touching them.

These sensors are ideal for applications in which space is limited. Connection options include 3-conductor PVC cable or pico quick-disconnect.

Features

- Cable or quick-disconnect styles
- Short circuit protection (DC models)
- Overload protection (DC models)
- Transient noise protection
- False pulse protection
- Reverse polarity protection (DC models)
- CE Marked for all applicable directives

Styles

DC 3-wire metal	page 2-176
DC 3-wire plastic	page 2-176
AC 2-wire plastic	page 2-179

Accessories

Cordsets	page 8-1
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General Information

Metric/English	page 14-6
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871FM 3-Wire DC

Miniature Flat Pack Style—Metal Housing



871FM DC Cable
M5 Square



871FM DC Cable
M8 Square

Specifications

Load Current	≤200 mA
Leakage Current	≤1 mA
Operating Voltage	10...30V DC
Voltage Drop	≤2.4V
Repeatability	≤10%
Hysteresis	12% typical
Reverse Polarity Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Certifications	CE Marked for all applicable directives
Enclosure	IP 67, Chrome-plated brass housing, plastic sensing face
Connections	8 mm: PVC cable style/3-pin 6 inch lead or pico QD style 5 mm: PUR cable style/3-pin 6 inch lead or pico QD style
LED	Orange: Output energized
Operating Temperature [C (F)]	-25...+70° (32...+158°)
Shock	EN 60947-5-2; 7.4.1
Vibration	EN 60947-5-2; 7.4.2

Features

- 3-conductor, 3-pin pico or 3-pin 6 inch lead connection
- Convenient flush mounting
- 10...30V DC
- Normally open
- Reverse polarity, short circuit, and overload protection
- Side sensing
- 2 mounting screws included
- CE Marked for all applicable directives

Correction Factors

Target Material	Correction Factors
Steel	1.0
Stainless Steel	0.85
Brass	0.64
Aluminum	0.55
Copper	0.51

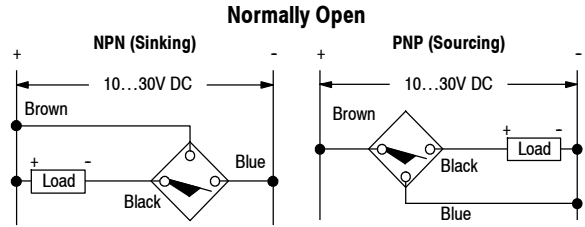
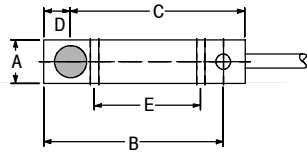
Product Selection

Housing Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.			
					Cable Style	Pico Style	Leaded Pico Style	
5 mm	0.8 (0.03)	Y	N.O.	NPN	5,000	871FM-M1NN5-E2	—	871FM-M1NN5-AP3
	0.8 (0.03)			PNP	5,000	871FM-M1NP5-E2	—	871FM-M1NP5-AP3
	1.5 (0.06)			NPN	3,000	871FM-M2NN5-E2	—	871FM-M2NN5-AP3
	1.5 (0.06)			PNP	3,000	871FM-M2NP5-E2	—	871FM-M2NP5-AP3
8 mm	2.0 (0.08)	N	N.O.	NPN	3,000	871FM-M2NN8-E2	871FM-M2NN8-P3	—
	2.0 (0.08)			PNP	3,000	871FM-M2NP8-E2	871FM-M2NP8-P3	—
	3.0 (.12)			NPN	1,000	871FM-N3NN8-E2	871FM-N3NN8-P3	—
	3.0 (.12)			PNP	1,000	871FM-N3NP8-E2	871FM-N3NP8-P3	—
Recommended standard QD cordset (-2 = 2 m (6.5 ft))							889P-F3AB-2	889P-F3AB-2

Approximate Dimensions [mm (in.)]

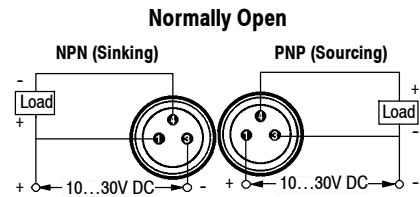
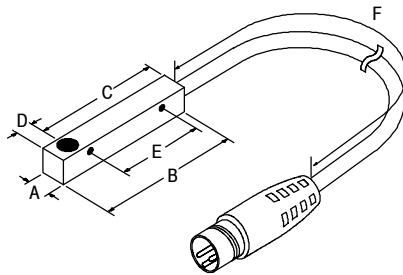
Wiring Diagram

M5 and M8 Square Cable



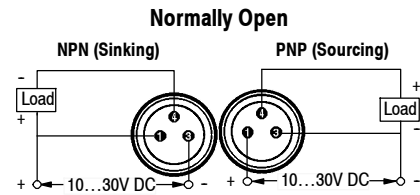
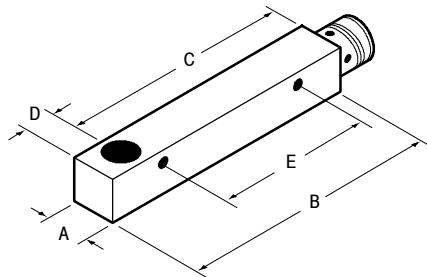
Housing Diameter	mm (inches)				
	A	B	C	D	E
5 mm	5.0 (0.2)	15 (0.59)	22 (0.87)	3 (0.12)	14 (0.55)
8 mm	8.0 (0.31)	37 (1.46)	35 (1.38)	5 (0.2)	20 (0.79)

M5 Square with 6 inch Lead



Housing Diameter	mm (inches)					
	A	B	C	D	E	F
5 mm	5.0 (0.2)	25 (0.98)	22 (0.87)	3 (0.12)	14 (0.55)	150 (6)

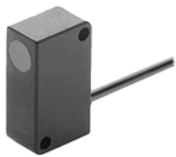
M8 Square 3-Pin Pico



Housing Diameter	mm (inches)				
	A	B	C	D	E
8 mm	8.0 (0.31)	50 (1.97)	45 (1.77)	5 (0.2)	20 (0.79)

871FM 3-Wire DC

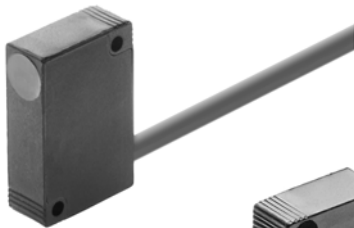
Miniature Flat Pack Style—Plastic Housing



871FM DC Cable Style
28 x 16 x 11 mm



871FM DC Pico
Quick-Disconnect Style
28 x 16 x 11 mm



871FM DC Cable Style
40 x 26 x 12 mm



871FM DC Pico
Quick-Disconnect Style
40 x 26 x 12 mm



871FM DC Cable Style
25 x 50 x 10 mm



871FM DC Pico
Quick-Disconnect Style
30 x 18 x 10 mm

Specifications

	28 x 16 x 11 mm	40 x 26 x 12 mm	25 x 50 x 10 mm	31 x 18 x 10 mm
Supply Current	<11 mA	<11 mA	<8 mA	10 mA
Load Current	≤200 mA	≤200 mA	≤200 mA	50 mA @ 12V DC 100 mA @ 24V DC
Leakage Current	<100 μA	<100 μA	<100 μA	≤100 μA
Operating Voltage	10...30V DC	10...30V DC	10...24V DC	10...30V DC
Voltage Drop	≤1.8V	≤1.8V	≤2.5V	≤1V
Repeatability	≤5%			
Hysteresis	10% typical			
False Pulse Protection	Incorporated			
Transient Noise Protection	Incorporated			
Reverse Polarity Protection	Incorporated			
Short Circuit Protection	Incorporated			
Overload Protection	Incorporated			
Certifications	CE Marked for all applicable directives			
Enclosure	NEMA 4, IP67 (IEC 529) Plastic			
Connections	Cable: 2 m (6.5 ft) length 3-conductor PVC Quick-Disconnect: 3-pin pico style			
LED	Yellow: Output Energized		Red: Output Energized	
Operating Temperature [C (F)]	-25...+70° (-13...+158°)			
Shock	30 g, 11 ms			50 g (Approx)
Vibration	55 Hz, 1 mm amplitude, 3 planes			10...55Hz @ 1...5 mm

Features

- 3-wire operation
- 3-conductor or 3-pin connection
- 10...30V DC
- Normally open or normally closed output
- False pulse, transient noise, reverse polarity, short-circuit and overload protection
- CE Marked for all applicable directives

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.85
Brass	0.55
Aluminum	0.50
Copper	0.45

Product Selection

Sensor Size	Sensing Direction	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration		Switching Frequency [Hz]	Cat. No.	
							Cable Style	Pico QD Style
28 x 16 x 11 mm	Side	2 (0.08)	Y	N.O.	PNP	600	871FM-D2NP11-E2	871FM-D2NP11-P3
				N.C.	PNP		871FM-D2CP11-E2	871FM-D2CP11-P3
2 (0.08)		N.O.		PNP	800	871FM-D2NP12-E2	871FM-D2NP12-P3	
		N.C.		NPN		871FM-D2CN12-E2	—	
40 x 26 x 12 mm	N	4 (0.16)	N.O.	NPN	400	871FM-D4NN12-E2	871FM-D4NN12-P3	
			N.C.	PNP		—	871FM-D4NP12-P3	
	N.O.		PNP	871FM-D4CN12-E2	—			
	N.C.		PNP	—	—			
25 x 50 x 10 mm	Face	5 (0.20)	Y	N.O.	NPN	500	871FM-D5NN25-E2	—
				N.C.	PNP		871FM-D5NP25-E2	871FM-D5NP25-P3
		8 (0.31)		N.O.	NPN	200	871FM-D8NN25-E2	—
				N.C.	PNP		871FM-D8NP25-E2	871FM-D8NP25-P3
31 x 18 x 10mm	N	5 (0.20)	N.O.	PNP	200	871FM-D8CP25-E2	—	
			N.O.	PNP		871FM-D5NP10-E2	—	
Recommended Standard QD Cordset (-2 = 2 m (6.5 ft))								889P-F3AB-2

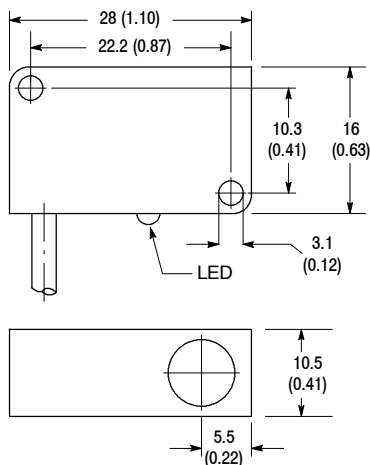
QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2

Approximate Dimensions [mm (inches)]

Cable & Pico QD Style

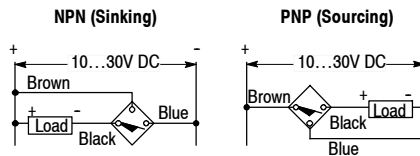
28 x 16 x 11 mm



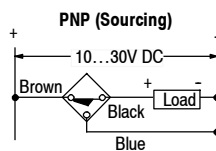
Wiring Diagrams

Cable Style

Normally Open

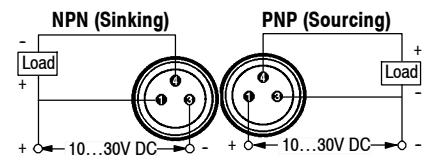


Normally Closed



Pico QD Style

Normally Open or Normally Closed



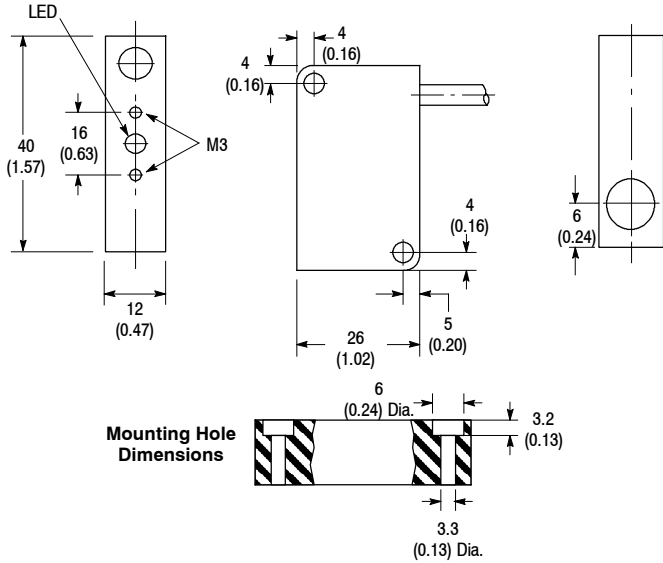
871FM 3-Wire DC

Miniature Flat Pack Style

Approximate Dimensions [mm (inches)]

Cable & Pico QD Style

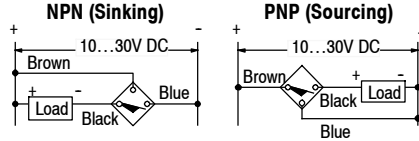
40 x 26 x 12 mm



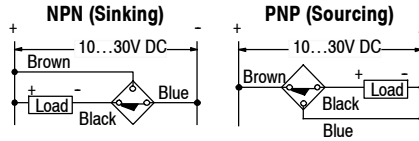
Wiring Diagram

Cable Style

Normally Open

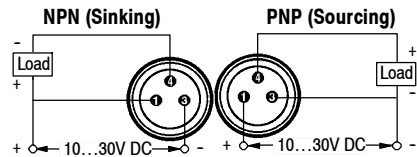


Normally Closed



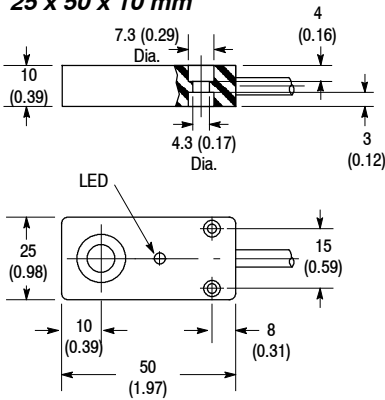
Pico QD Style

Normally Open



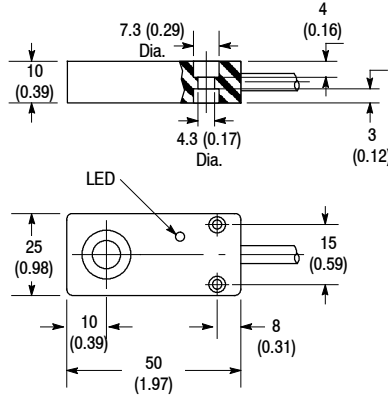
Unshielded Cable & Pico QD & Shielded Pico QD Style

25 x 50 x 10 mm



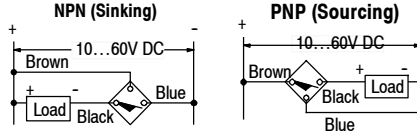
Shielded Cable Style

25 x 50 x 10 mm

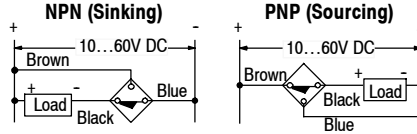


Cable Style

Normally Open

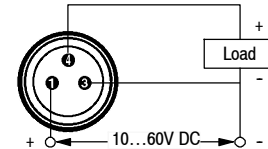


Normally Closed



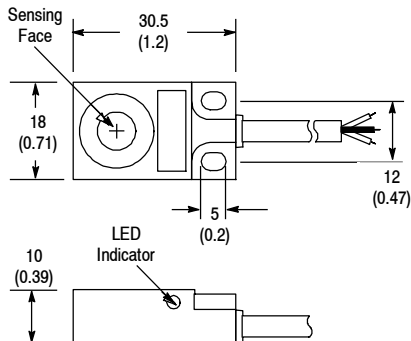
Pico QD Style

PNP (Sourcing)



Cable Style

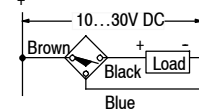
31 x 18 x 10 mm

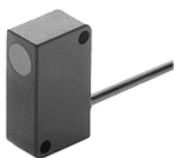


Cable Style

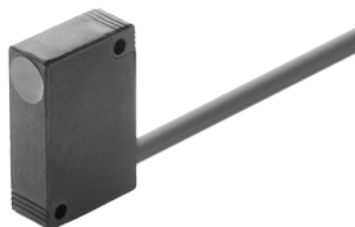
Normally Open

PNP (Sourcing)





871FM AC Cable Style
28 x 16 x 11 mm



871FM AC Cable Style
40 x 26 x 12 mm

Features

- 2-wire operation
- 2-conductor connection
- 90...250V AC
- Normally open or normally closed output
- False pulse and transient noise protection
- CE Marked for all applicable directives

Specifications

	28 x 16 x 11 mm	40 x 26 x 12 mm
Load Current	≤100 mA	≤180 mA
Minimum Load Current	4 mA	
Leakage Current	<2 mA	
Operating Voltage	90...250V AC	
Voltage Drop	≤15V	
Repeatability	≤5%	
Hysteresis	10% typical	
False Pulse Protection	Incorporated	
Transient Noise Protection	Incorporated	
Certifications	CE Marked for all applicable directives	
Enclosure	NEMA 4, IP67 (IEC 529) Plastic	
Connections	Cable: 2 m (6.5 ft) length 2-conductor PVC	
LED	Orange: Output Energized	
Operating Temperature [C (F)]	-25...+70° (-13...+158°)	
Shock	30 g, 11 ms	
Vibration	55 Hz, 1 mm amplitude, 3 planes	

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.85
Brass	0.55
Aluminum	0.50
Copper	0.45

871FM 2-Wire AC

Miniature Flat Pack Style—Plastic Housing

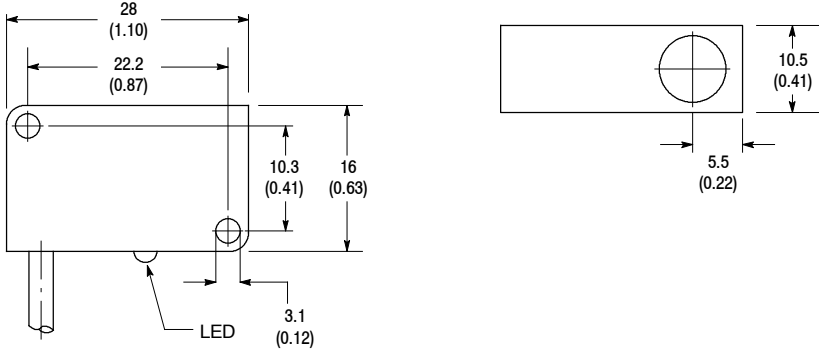
Product Selection

Sensor Size	Sensing Direction	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No. Cable Style
28 x 16 x 11 mm	Side	2 (0.08)	Y	N.O.	10	871FM-A2N11-A2
40 x 26 x 12 mm		4 (0.16)	N	N.O.		871FM-A4N12-A2

Approximate Dimensions [mm (in.)]

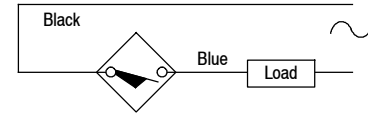
Cable Style

28 x 16 x 11 mm



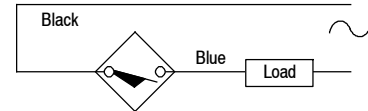
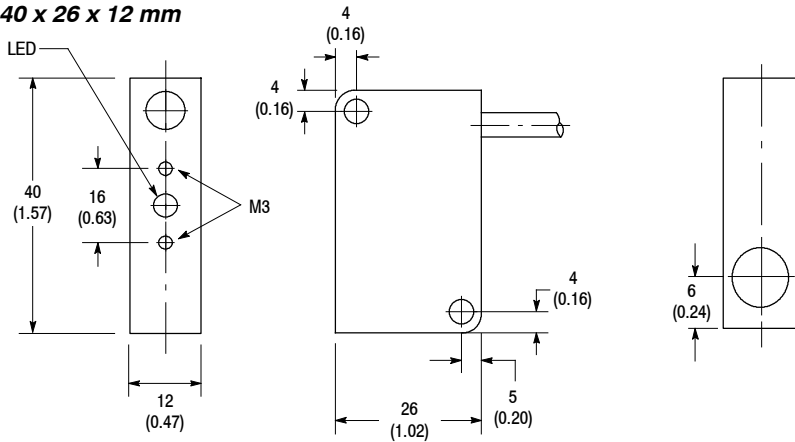
Wiring Diagram

Cable Style

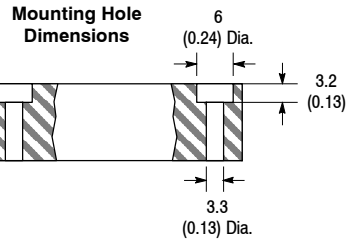


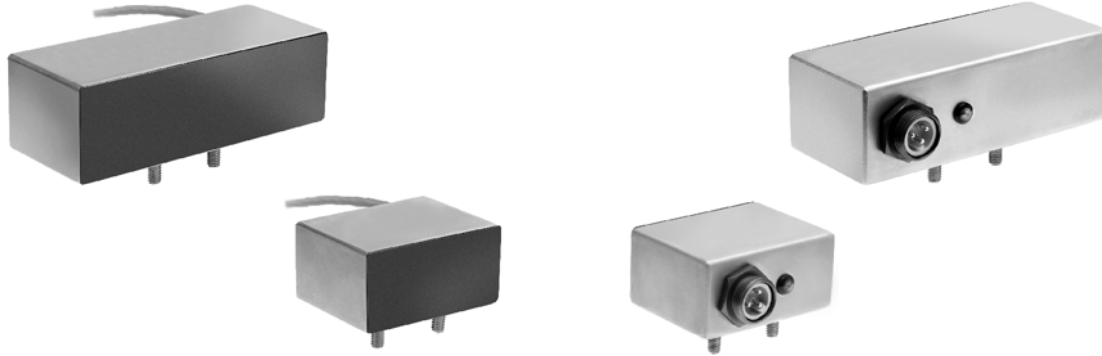
Note: Load can be switched to black wire.

40 x 26 x 12 mm



Note: Load can be switched to black wire.





Description

Bulletin 871P inductive proximity can sensors are self-contained solid state devices, designed specifically for sensing size 202 to 704 metal cans without physical contact. These sensors have been specifically designed for the canning industry in terms of both functionality and environmental ratings.

Short- and long-range can sensor models are available in both AC and DC versions. These sensors contain multiple coils to provide a wide sensing field which allows metal containers to be sensed on canning lines while the gaps between them are ignored. This type of sensor provides a “cans present” or “cans not present” signal and is the standard sensor type used in can line control. Rockwell Automation provides two models for varying can sizes.

A DC powered can motion sensor is also available for applications which require can movement sensing. Designed with the same multiple coils and wide sensing field as the standard can sensor, an extra coil is added as a separate circuit, which can be set to sense the gaps between the cans. The signal from the wide sensing field circuit (which ignores the gaps between the cans) is combined with the signal from the second circuit (which senses the gaps between the cans) to achieve an output indicating true can motion. If cans are present and not moving, the sensor output turns on. If cans are present and moving or if no cans are present, the sensor will remain off.

Depending on the specific canning line setup, Rockwell Automation can motion sensors can help improve line efficiency or address problem areas on canning line conveyor systems by providing control equipment with motion/no motion information.

The 871P can sensor family combines rugged construction and superior sensing capability to provide long lasting durability and performance in hostile manufacturing and filling environments.

Rockwell Automation can sensors are designed to withstand repeated 1200 psi washdowns common in the food and beverage industries and are mountable on industry standard brackets.

Features

- Short circuit protection
- Overload protection
- Transient noise protection
- False pulse protection
- Reverse polarity protection (DC models)
- Stainless steel housing
- NEMA 6P and IP67 enclosure
- 1200 psi (8270 kPa) washdown

Styles

AC 2-Wire Short-Range . . .	page 2-182
AC 2-Wire Long-Range . . .	page 2-182
DC 4-Wire Short-Range . . .	page 2-184
DC 4-Wire Long-Range . . .	page 2-184
DC 4-Wire Motion	page 2-186

Accessories

Cordsets	page 8-1
Mounting Bracket	page 2-215

General Information

Metric/English Conversion Chart	page 14-6
--	-----------

871P Can Sensors 2-Wire AC



871P AC Short-Range
76 x 36 x 58 mm

Features

- 2-wire operation
- 3-conductor connection
- 30...150V AC
- Normally open
- Short- and long-range models
- Stainless steel housing
- 1200 psi (8270 kPa) washdown
- False pulse, transient noise, short circuit, and overload protection

Specifications

Outputs	Normally Open
Load Current	300 mA
Minimum Load Current	15 mA
Leakage Current	<1.5 mA
Inrush Current	<5 A (20 ms)
Operating Voltage	30...150V AC RMS
Line Frequency	40...60 Hz
Voltage Drop	<15V @ 300 mA
Repeatability	≤2%
Hysteresis	10% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Certifications	UL Listed and CE Marked for all applicable directives
Enclosure	NEMA 1, 3, 4, 4X, 6, 6P, 12, 13, IP67 (IEC 529), 1200 psi (8270 kPa) washdown
Connections	3-pin mini style
LEDs	Red: Output Energized
Operating Temperature [C (F)]	-20...+70° (0...+160°)
Housing Material	Stainless steel, plastic face
Mounting	2 stainless steel studs

Product Selection

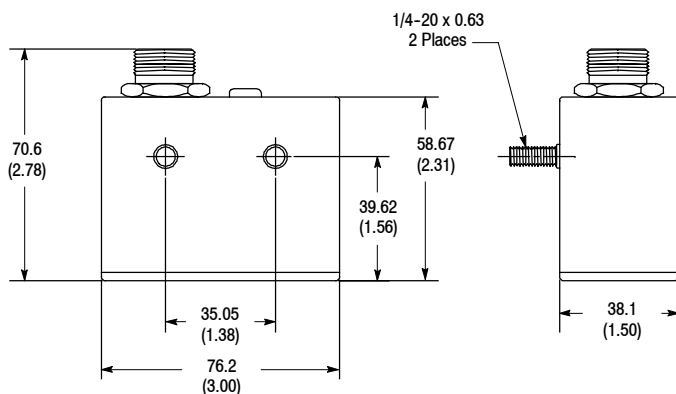
Style	Container Sizes	Nominal Sensing Distance mm (in.)	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No. Mini QD Style
Short	202-401	Steel: 19 mm (0.75 in.) Aluminum: 13 mm (0.50 in.)	Y	N.O.	25	871P-AC19N76-N3
Long	202-704	Steel: 29 mm (1.15 in.) Aluminum: 15 mm (0.60 in.)				871P-AC29N140-N3
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft))						889N-F3AFC-6F

QD Cordsets

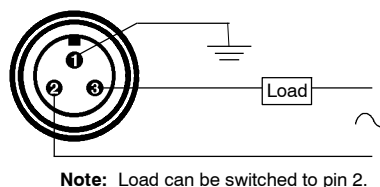
Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2

Approximate Dimensions [mm (in.)]

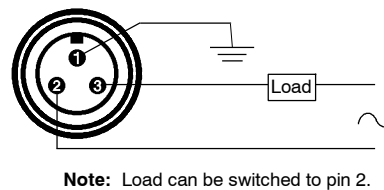
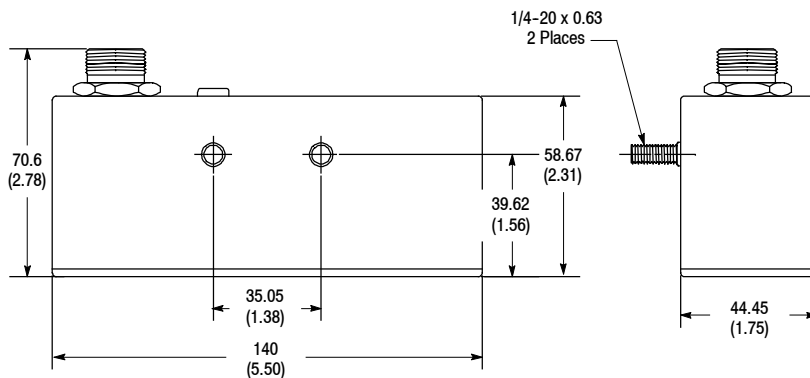
Short-Range Mini QD Style



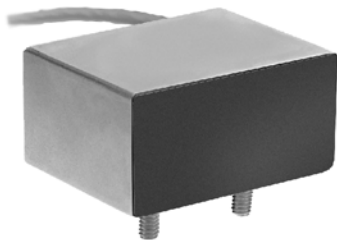
Wiring Diagram



Long-Range Mini QD Style



871P Can Sensors 4-Wire DC



871P DC Short Range
76 x 36 x 58 mm

Features

- 4-conductor plus shield or 4-pin mini connection
- 10...30V DC
- Normally open NPN and PNP outputs
- Short- and long-range models
- Stainless steel housing
- 1200 psi (8270 kPa) washdown
- False pulse, transient noise, reverse polarity, short circuit, and overload protection

Specifications

Outputs	Normally Open NPN and PNP
Load Current	300 mA
Operating Voltage	10...30V DC
Operating Current	25 mA (off), 55 mA (on)
Voltage Drop	≤2.5V
Repeatability	≤2%
Hysteresis	3...15%
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Reverse Polarity Protection	Incorporated
Enclosure	NEMA 1, 3, 4, 4X, 6, 6P, 12, 13, IP67 (IEC 529), 1200 psi (8270 kPa) washdown
Connections	A2: 2 m shielded PVC jacketed cable, 4-wire, #22 AWG, 1/2 in. NPT N4: 4-pin mini quick-disconnect
LEDs	Red: Output energized
Operating Temperature [C (F)]	-20...+70° (0...+160°)
Housing Material	Stainless steel, plastic face
Mounting	2 stainless steel studs

Product Selection

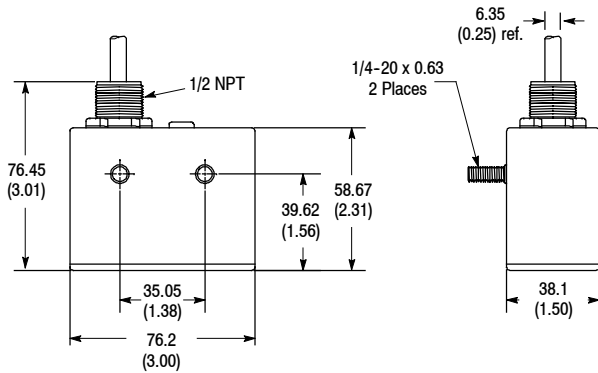
Style	Container Sizes	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.		
						Cable Style	Mini QD Style	
Short	202-401	Steel: 19 (0.75) Aluminum: 13 (0.50)	Y	Normally Open NPN and PNP	35	871P-DC19NB76-A2	871P-DC19NB76-N4	
Long	202-704	Steel: 29 (1.15) Aluminum: 15 (0.60)				871P-DC29NB140-A2	871P-DC29NB140-N4	
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft))							889N-F4AFC-6F	

QD Cordsets

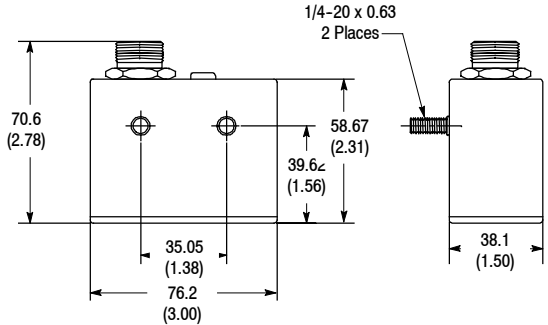
Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2

Approximate Dimensions [mm (inches)]

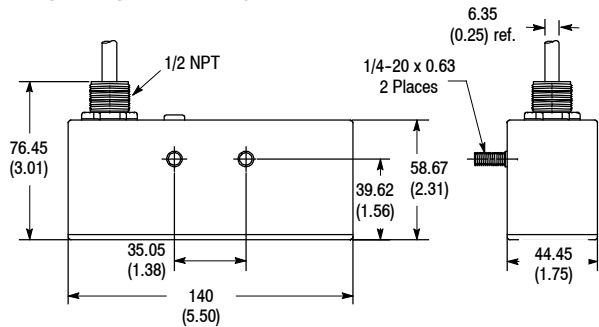
Short-Range Cable Style



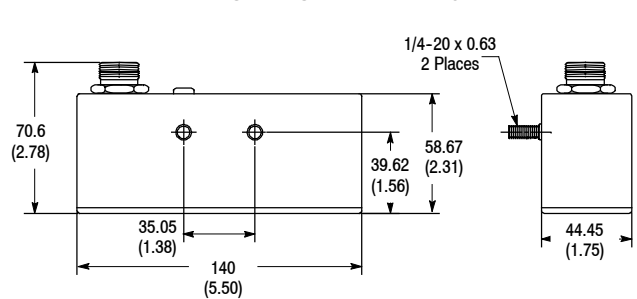
Short-Range Mini QD Style



Long-Range Cable Style

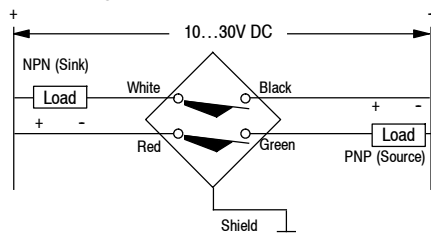


Long-Range Mini QD Style



Wiring Diagram

Cable Style

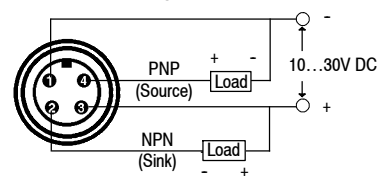


ATTENTION



Red and black wires must be connected for proper operation.

Mini QD Style



871P Can Sensors 4-Wire DC Motion



871P DC Motion Style
140 x 45 x 58 mm

Features

- 4-conductor plus shield or 4-pin mini connection
- 10...30V DC
- Normally open NPN and PNP outputs
- Stainless steel housing
- 1200 psi (8270 kPa) washdown
- Dual function output LED
Dim blink: cans moving
Bright steady: no motion
- Adjustable sensing distance
- False pulse, transient noise, reverse polarity, short circuit, and overload protection

Specifications

Outputs	Normally Open NPN and PNP
Load Current	300 mA
Operating Voltage	10...30V DC
Operating Current	25 mA (off), 55 mA (on)
Voltage Drop	≤2.5V
Repeatability	≤2%
Hysteresis	3...15%
Output Time Delay	0.5 s after motion stops
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Reverse Polarity Protection	Incorporated
Enclosure	NEMA 1, 3, 4, 4X, 6, 6P, 12, 13, IP67 (IEC 529), 1200 psi (8270 kPa) washdown
Connections	A2: 2 m shielded PVC jacketed cable, 4-wire, #22 AWG, 1/2 in. NPT N4: 4-pin mini quick-disconnect
LED	Red: Output Energized Dim Blink: Cans moving Bright Steady: No motion
Potentiometer	Sensing range adjust
Operating Temperature [C (F)]	-20...+70° (0...+160°)
Housing Material	Stainless steel, plastic face
Mounting	2 stainless steel studs

Product Selection

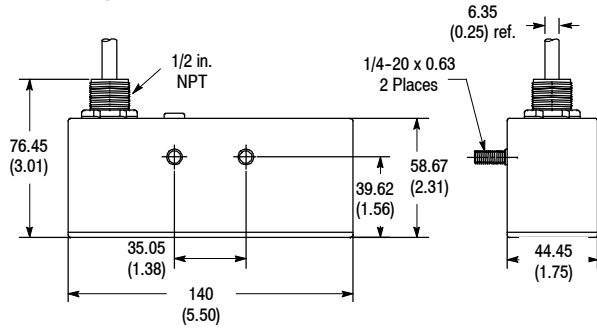
Container Sizes	Nominal Presence Sensing Distance [mm (in.)]	Nominal Motion Sensing Distance [mm (in.)]	Shielded	Output Configuration	Cat. No.	
					Cable Style	Mini QD Style
202-704	Steel: 29 (1.15) Aluminum: 15 (0.60)	Steel: 19 (0.75) Aluminum: 13 (0.50)	Y	Normally Open NPN and PNP	871P-DD29NB140-A2	871P-DD29NB140-N4
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft))						889N-F4AFC-6F

QD Cordsets

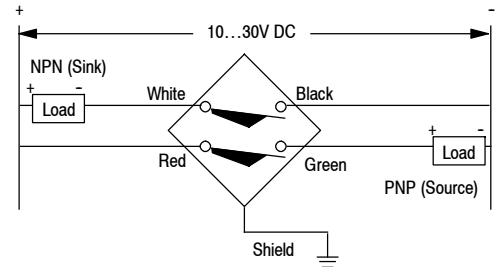
Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2

Approximate Dimensions [mm (in.)]

Cable Style

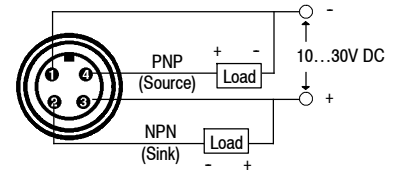
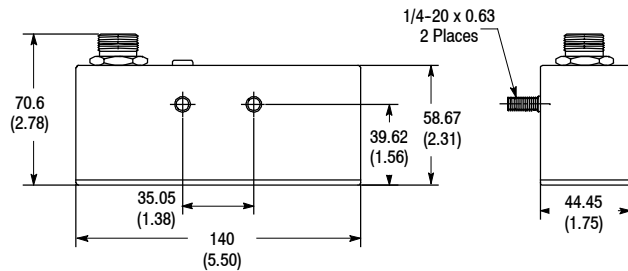


Wiring Diagram

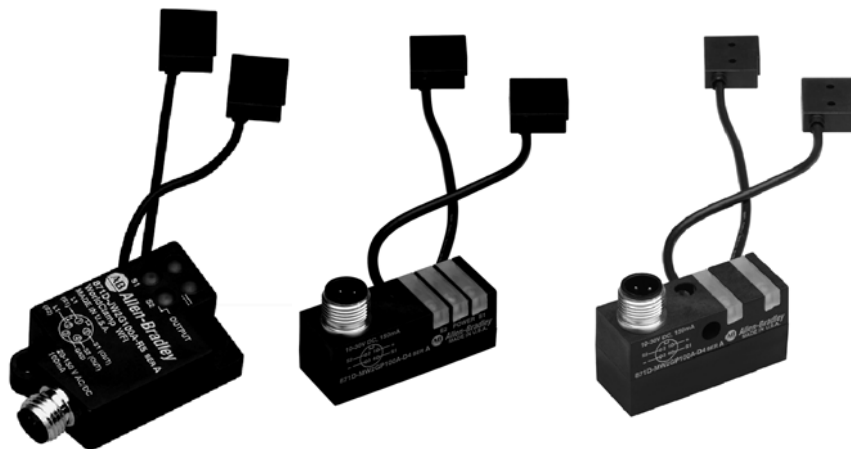


ATTENTION Red and black wires must be connected for proper operation.

Mini QD Style



Notes



Description

Bulletin 871D WorldClamp™ proximity sensors are specifically designed for use in power clamp and gripper applications. These devices incorporate two sensors into one unit, reducing the number of sensors and connection systems required for applications. Each sensor has two sensing coils (chicklets) that are used to detect whether the clamp/gripper is in the open or closed position.

The 871D WorldClamp has a compatible mounting configuration for the cartridges used by the major clamp manufacturers. These models are weld-field immune and have full electrical protections including short circuit, overload, false pulse, reverse polarity (DC models), and transient noise protection. All units meet IEC IP67 enclosure standards and are CE Marked for all applicable directives.

Bulletin 871D WorldClamp™ proximity sensors are available in both 4-wire DC and 5-wire AC/DC micro quick-disconnect styles. Each sensor type is available in 100 mm, 165 mm, and 200 mm lead lengths with either the large or small chicklet size.

Features

- Superior LED visibility
- Weld-field immune
- Shielded construction
- Short circuit protection
- Overload protection
- Transient noise protection
- False pulse protection
- Reverse polarity protection (DC models)
- UL Listed, cUL Certified and CE Marked for all applicable directives

Styles

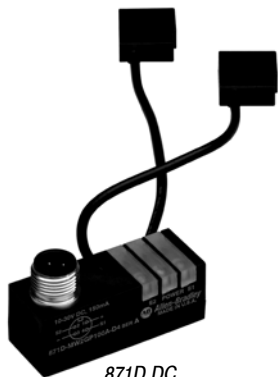
- DC 4-wire page 2-190
- AC/DC 5-wire page 2-192

Accessories

- Cordsets page 8-1

General Information

- Torque Chart page 2-225
- Metric/English Conversion Chart page 14-6



871D DC
100, 165, 200 mm

Features

- 2 normally open outputs
- Superior LED visibility
- 10...30V DC
- Weld field immune
- Short circuit, overload, false pulse, reverse polarity, and transient noise protection
- Standard 100, 165, and 200 mm lead length for chicklets
- Special 40 mm one lead and 100 mm second lead
- Small or large chicklet sizes
- Impact resistant housing
- 4-pin micro quick-disconnect
- UL Listed, cUL Certified and CE Marked for all applicable directives

Specifications

Load Current	150 mA max
Leakage Current	< 10 µA
Operating Voltage	10...30V DC
Voltage Drop	< 2.5V
Repeatability	< 2%
Hysteresis	5% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Weld Field Immunity	1600 Gauss
Certifications	UL Listed, cUL Certified and CE Marked for all applicable directives
Enclosure	IP67
Connections	4-pin micro quick-disconnect
LED	Green: power; orange: S1 output; red: S2 output
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

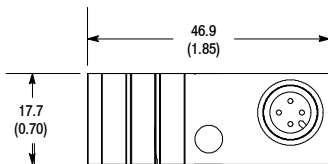
Product Selection

Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Lead Length [mm (in.)]	Chicklet Size	Cat. No.
2 (0.08)	Y	2 N.O. PNP Outputs	15	100 (3.94)	Large	871D-MW2GP100A-D4
					Small	871D-MW2GP100B-D4
					Cylindrical	871D-MW2GP100C-D4
				165 (6.50)	Large	871D-MW2GP165A-D4
					Small	871D-MW2GP165B-D4
				40 (S1)/100 (S2)	Large	871D-MW2GP200A-D4
					Small	871D-MW2GP200B-D4
				40 (S1)/100 (S2)	Large	871D-MW2GP40A-D4❶
Small	871D-MW2GP40B-D4❶					
Recommended standard QD cordset (-2 = 2 m (6.5 ft))						889D-F4AC-2

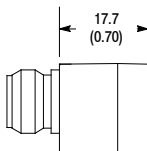
❶ Special length of cable leads, one is 40 mm and the second is 100 mm.

Approximate Dimensions [mm (in.)]

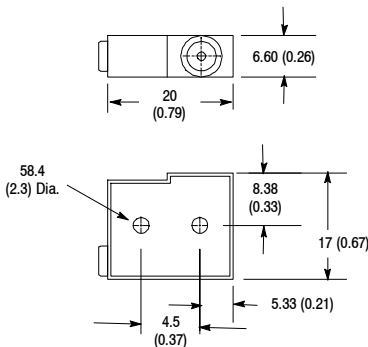
Front View



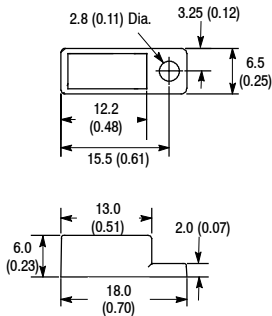
Side View



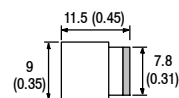
Large Chicklet



Small Chicklet

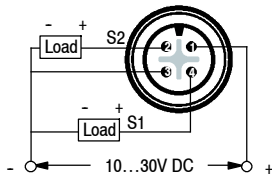


Cylindrical Chicklet



Wiring Diagram

Normally Open Output
PNP (Sourcing)





871D AC/DC
100, 165, 200 mm



871D AC/DC Compact
100, 165, 200 mm

Specifications

Load Current	100 mA max
Inrush Current (1 cycle)	≤ 2 A (1 cycle)
Leakage Current	< 1.7 mA
Operating Voltage	20...150V AC/DC
Voltage Drop	< 10V
Repeatability	< 2%
Hysteresis	5% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Weld Field Immunity	1600 Gauss
Certifications	UL Listed, cUL Certified and CE Marked for all applicable directives
Enclosure	IP67
Connections	5-pin AC micro quick-disconnect
LED	2 green: power S1 and S2; red: S1 output; orange: S2 output
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Features

- 2 normally open outputs
- 20...150V AC/DC
- Weld field immune
- Short circuit, overload, false pulse, and transient noise protection
- Standard 100, 165, and 200 mm lead length for chicklets
- Special 40 mm one lead and 100 mm second lead
- Small or large chicklet sizes
- Impact resistant housing
- 5-pin micro quick-disconnect
- UL Listed, cUL Certified and CE Marked for all applicable directives

Product Selection

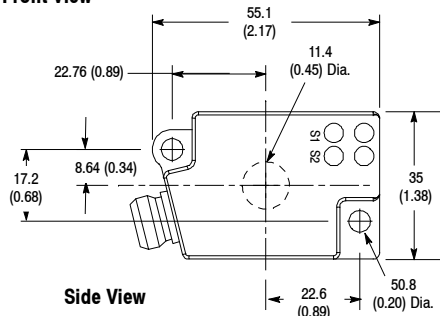
Sensor	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency (Hz)	Lead Length [mm (in.)]	Chicklet Size	Cat. No.
Standard	2 (0.08)	Y	2 N.O. Outputs	20	100 (3.94)	Large	871D-JW2G100A-R5
						Small	871D-JW2G100B-R5
					165 (6.50)	Large	871D-JW2G165A-R5
						Small	871D-JW2G165B-R5
					200 (7.88)	Large	871D-JW2G200A-R5
						Small	871D-JW2G200B-R5
2 (0.08)	Y	2 N.O. Outputs	20	200 (7.88)	Large	871D-JW2G40A-R5❶	
					Small	871D-JW2G40B-R5❶	
Compact	2 (0.08)	Y	2 N.O. Outputs	20	100 (3.94)	Large	871D-JK2G100A-R5
						Small	871D-JK2G100B-R5
					165 (6.50)	Large	871D-JK2G165A-R5
						Small	871D-JK2G165B-R5
					200 (7.88)	Large	871D-JK2G200A-R5
						Small	871D-JK2G200B-R5
Recommended standard QD cordset (-2 = 2 m (6.5 ft))							889R-F5AEA-2

❶ Special length of cable leads, one is 40 mm and the second is 100 mm.

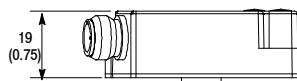
Approximate Dimensions [mm (in.)]

Standard Sensor

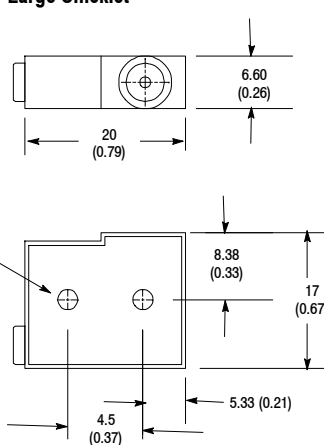
Front View



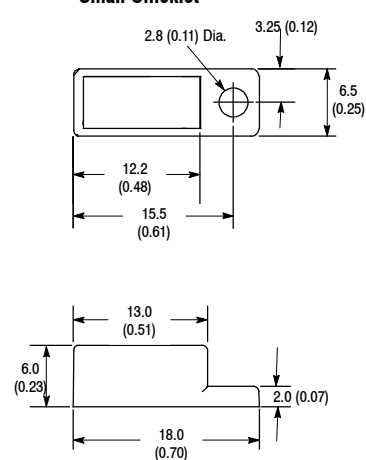
Side View



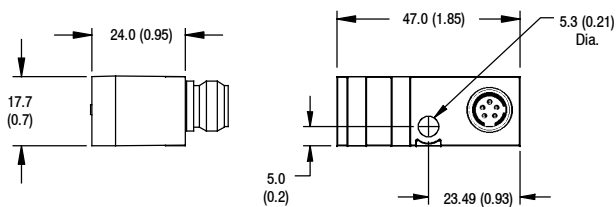
Large Chicklet



Small Chicklet

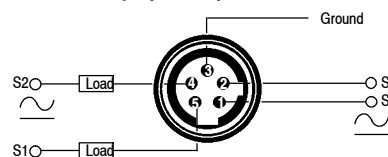


Compact Sensor



Wiring Diagram

Normally Open Outputs



Note: Load can be switched to pin 1 (S1) and pin 2 (S2).

Notes



Description

Bulletin 871D cylinder position inductive proximity sensors are self-contained solid state devices. These devices are designed for sensing metal objects without physical contact. Bulletin 871D cylinder position sensors are specifically designed for end of stroke detection of both hydraulic and pneumatic cylinders.

The innovative design of the 871D product family allows 304° of rotational movement of the sensor body during installation without breaking the seal. The sensor body is locked into place through the use of one set screw on the sensor mounting flange. This system provides simpler and faster sensor installation as well as neat cable runs.

Each 871D sensor mounts into the industry standard in-port cylinder position sensor bolt pattern with two (1/4 inch-20UNC x 3/4 inch) grade 8 screws and is sealed with an O-ring to withstand pressures up to 3000 psi (207 BAR). All models are weld field immune and employ full electrical protections including short circuit, overload, false pulse, reverse polarity (DC models), and transient noise protection. All units meet IEC IP67 enclosure standards and are CE Marked for all applicable directives.

Bulletin 871D sensors are available in both 3-wire DC and 2-wire AC/DC versions with either mini- or micro-style connectors. Each sensor type is available in six industry-standard probe lengths from 26...115.9 mm (1.025...4.560 in.). Special spacers are also available to effectively alter the probe length for specific applications.

Features

- Stainless steel probe with ceramic face
- Low profile housing can be rotated 304° during installation without breaking pressure seal
- Shielded construction
- Weld-field immune
- Short circuit protection
- Overload protection
- Transient noise protection
- False pulse protection
- Reverse polarity protection (DC models)
- UL Listed, cUL Certified and CE Marked for all applicable directives

Styles

- DC 3-wire page 2-196
- AC/DC 2-wire page 2-198

Accessories

- Cordsets page 8-1
- Spacer Kits page 2-224

General Information

- Torque Chart page 2-225
- Metric/English Conversion Chart page 14-6



871D DC Mini
Quick-Disconnect Style
12 mm



871D DC Micro
Quick-Disconnect Style
12 mm

Specifications

Outputs	Normally Open
Max. Load Current	<200 mA
Leakage Current	< 80 μ A
Operating Voltage	10...30VDC
Voltage Drop	< 2.5V DC @ 200 mA
Switching Frequency	10 Hz
Repeatability	5% typical
Hysteresis	15% typical
Reverse Polarity Protection	Incorporated
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Weld Field Immunity	20,000 A at 1 inch
Certifications	UL Listed, cUL Certified for Canada and CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 3R, 4, 6, 12, 13, IP67 (IEC 529)
Connections	Quick Disconnect: 4-pin mini style 4-pin micro style
LED	Green: Power; Orange: Output
Operating Temperature [C (F)]	-25...70° (-13...158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes
Housing Material	Machined aluminum
Probe Material	Stainless steel, ceramic face
Non-activated Current Draw	\leq 10 mA
Activated Current Draw	\leq 18 mA

Features

- Rugged low profile housing
- 3-wire operation
- Housing 304° rotatable during installation without breaking pressure seal
- 10...30V DC
- Normally open output
- Weld-field immune
- Short circuit, overload, false pulse, transient noise, and reverse polarity protection
- UL Listed, cUL Certified for Canada and CE Marked for all applicable directives

Product Selection

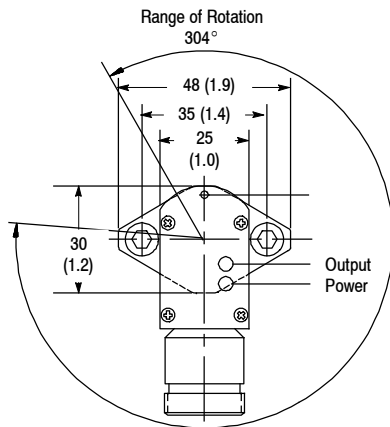
Barrel Dia.	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Probe Length [mm (in.)]	Cat. No.s	
					Mini QD	Micro QD
12 mm	2 (0.08)	Y	N.O.	26.0 (1.025)	871D-DW2NP260-N4	871D-DW2NP260-D4
				31.7 (1.250)	871D-DW2NP317-N4	871D-DW2NP317-D4
				52.4 (2.062)	871D-DW2NP524-N4	871D-DW2NP524-D4
				73.0 (2.875)	871D-DW2NP730-N4	871D-DW2NP730-D4
				95.9 (3.775)	871D-DW2NP959-N4	871D-DW2NP959-D4
				115.9 (4.560)	871D-DW2NP1159-N4	871D-DW2NP1159-D4
Recommended standard QD cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))					889N-F4AFC-6F	889D-F4AC-2

QD Cordsets and Accessories

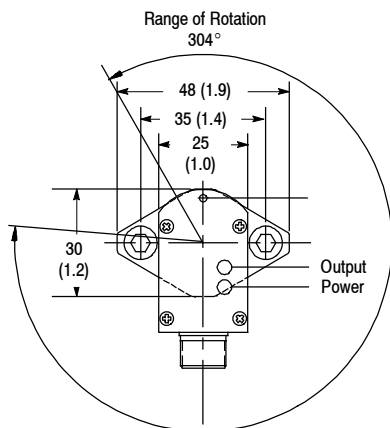
Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Spacer Kits	2-224

Approximate Dimensions [mm (in.)]

Mini Connector Models

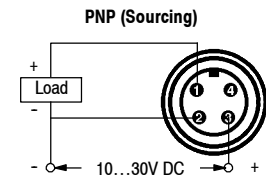
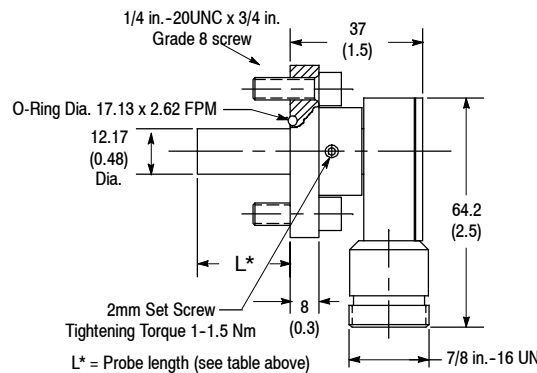


Micro Connector Models

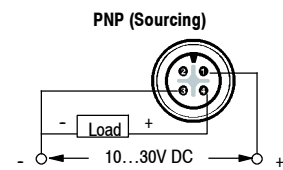
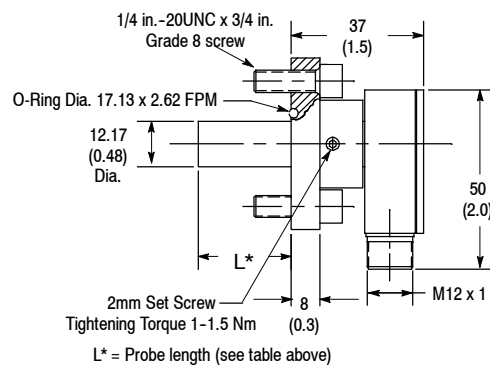


Wiring Diagrams

Mini Quick-Disconnect Style
Normally Open



Micro Quick-Disconnect Style
Normally Open





871D AC/DC Mini
Quick-Disconnect Style



871D AC/DC Micro
Quick-Disconnect Style

Specifications

Outputs	Normally Open
Load Current	5...400 mA
Inrush Current (1 cycle)	< 3 A (t < 20 msec)
Leakage Current	< 1.7 mA @ 120V AC
Operating Voltage	20...250V AC/DC
Voltage Drop	< 6V at 400 mA
Switching Frequency	50 Hz
Repeatability	5% typical
Hysteresis	15% typical
False Pulse Protection	Incorporated
Transient Noise Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Weld Field Immunity	20,000 A at 1 inch
Certifications	UL Listed, cUL Certified for Canada and CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 3R, 4, 6, 12, 13, IP67 (IEC 529)
Connections	Quick Disconnect: 3-pin mini style 3-pin micro style
LED	Green: Power; Orange: Output
Operating Temperature [C (F)]	-25...70° (-13...158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes
Housing Material	Nickel plated brass
Probe Material	Stainless steel, ceramic face

Features

- Rugged low profile housing
- 2-wire operation
- Housing 304° rotatable during installation without breaking pressure seal
- 20...250V AC/DC
- Normally open output
- Weld-field immune
- Short circuit, overload, false pulse, and transient noise protection
- UL Listed, cUL Certified and CE Marked for all applicable directives

Product Selection

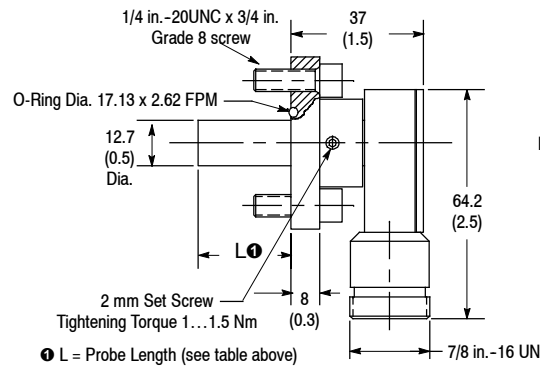
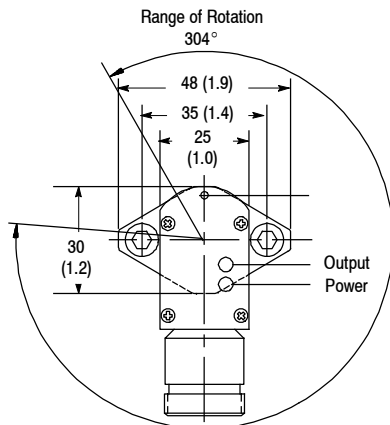
Barrel Dia.	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Probe Length [mm (in.)]	Cat. No.	
					Mini QD	Micro QD
12mm	2 (0.08)	Y	N.O.	26.0 (1.025)	871D-BW2N260-N3	871D-BW2N260-R3
				31.7 (1.250)	871D-BW2N317-N3	871D-BW2N317-R3
				52.4 (2.062)	871D-BW2N524-N3	871D-BW2N524-R3
				73.0 (2.875)	871D-BW2N730-N3	871D-BW2N730-R3
				95.9 (3.775)	871D-BW2N959-N3	871D-BW2N959-R3
				115.9 (4.560)	871D-BW2N1159-N3	871D-BW2N1159-R3
Recommended standard QD cordset (-6F = 1.8m (6ft), -2 = 2 m (6.5 ft))					889N-F3AFC-6F	889R-F3ECA-2

QD Cordsets and Accessories

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2
Spacer Kits	2-224

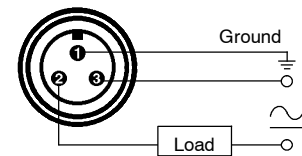
Dimensions—mm (in.)

Mini Connector Models



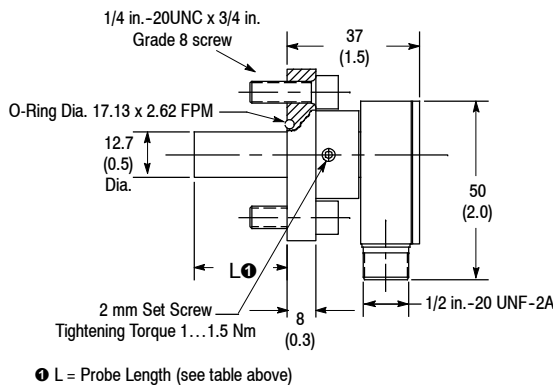
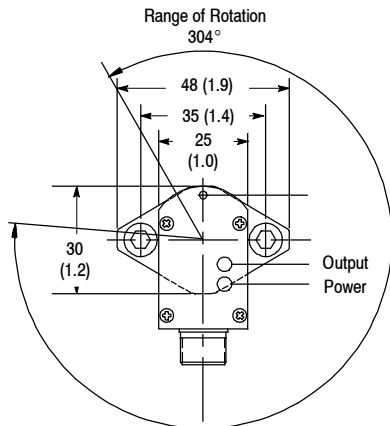
Wiring Diagrams

Mini Quick-Disconnect Style
Normally Open

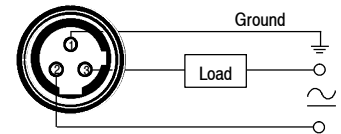


Note 1: Load can be switched to pin 3.

Micro Connector Models



Micro Quick-Disconnect Style
Normally Open or Normally Closed



Note 1: Load can be switched to pin 2.



Description

Bulletin 871R Ring and 871S Slot sensors are self-contained, general purposed, solid-state devices designed to sense the presence of ferrous and nonferrous metal objects that pass through their sensing field.

Ring sensors are available in 12, 20, 50 and 100 mm ring diameter sizes with minimum ball sizes ranging from 2.5...8.0 mm.

Slot sensors are available in 30 mm slot gap. When mounting two slot sensors side by side, it is necessary to use different models with different operating frequencies.

Features

- Cable or micro QD style
- Short circuit protection
- Reverse polarity protection
- CE Marked for all applicable directives

Styles

- 871R DC 3-Wire Ring page 2-202
- 871S DC 3-Wire Slot page 2-205

QD Cordsets

- Cordsets page 8-1

General Information

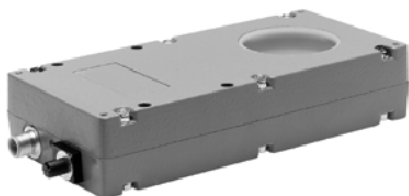
- Torque Chart page 2-225
- Metric/English
- Conversion Chart page 14-6

871R 3-Wire DC

Ring Style



871R DC Cable Style
12, 20 mm



871R DC Micro
Quick-Disconnect Style
50 mm



871R DC Micro
Quick-Disconnect Style
100 mm

Specifications

Load Current	≤200 mA
Leakage Current	≤10 μA
Operating Voltage	10...30V DC
Voltage Drop	≤2.4V
Repeatability	≤2%
Hysteresis	10% typical
Reverse Polarity Protection	Incorporated
Transient Noise Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
False Pulse Protection	Incorporated
Certifications	CE Marked for all applicable directives
Enclosure	NEMA 4 IP67 (IEC 529)
Connections	Cable: 2 m (6.5 ft) length 3-conductor #26 AWG PVC Quick-Disconnect: 4-pin micro style
LED	Red: Output energized
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock and Vibration	5 g, 10...55 Hz

Features

- 3-wire operation
- 3-conductor, 4-pin micro QD style
- 10...30V DC
- Reverse polarity, short circuit, overload, false pulse, and transient noise protection
- CE Marked for all applicable directives

Product Selection

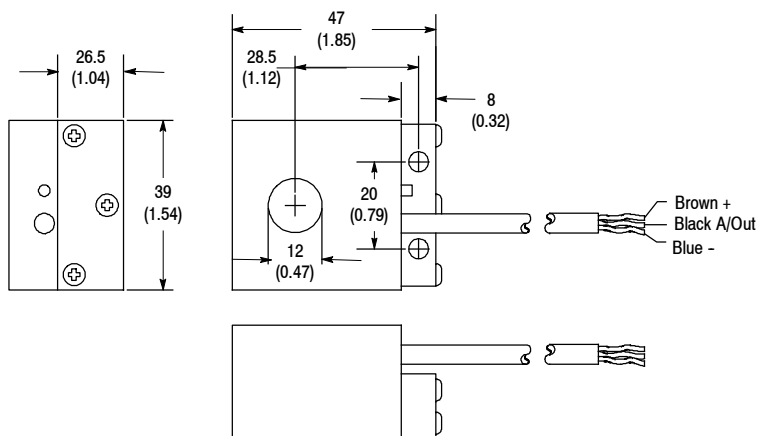
Ring Diameter	Minimum Ball Size [mm (in.)]	Output Configuration		Switching Frequency [Hz]	Cat. No.	
					Cable Style	Micro QD Style
12 mm	2.5 (0.10)	N.O.	PNP	800	871R-D12NP39-E2	—
20 mm	6 (0.24)			1000	871R-D20NP73-E2	—
50 mm	3 (0.12)	N.O. and N.C.	PNP	500	—	871R-D50NP90-D4
100 mm	8 (0.31)		NPN			871R-D50NN90-D4
			PNP			871R-D100NP120-D4
			NPN			871R-D100NN120-D4
Recommended Standard QD Cordset (-6F = 1.8 m (6 ft), -2 = 2 m (6.5 ft))						889D-F4AC-2

QD Cordsets

Description	Page Number
Other Cordsets Available	8-2
Terminal Chambers	8-2

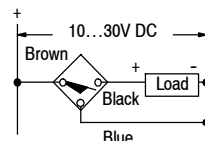
Approximate Dimensions [mm (in.)]

Cable Style (871R-D12NP39-E2)

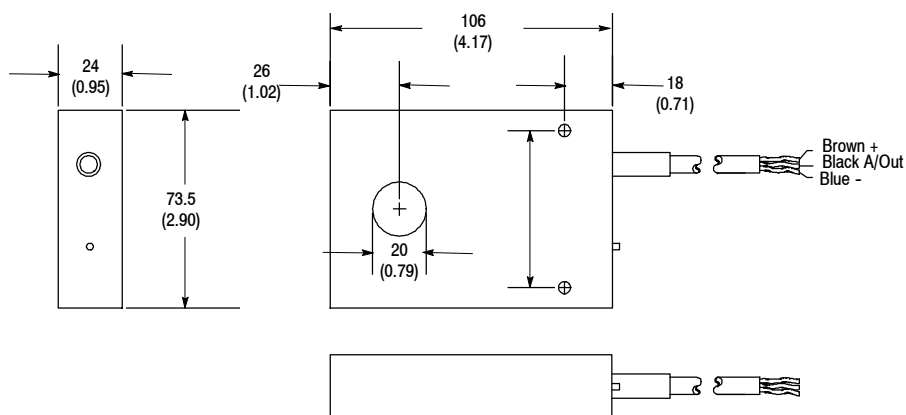


Wiring Diagrams

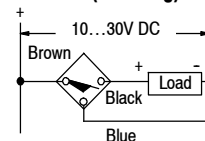
**Normally Open
PNP (Sourcing)**



Cable Style (871R-D20NP73-E2)



**Normally Open
PNP (Sourcing)**

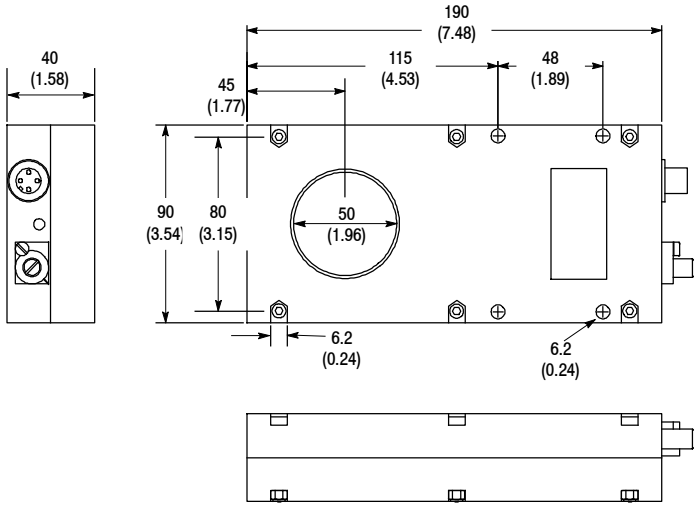


871R 3-Wire DC

Ring Style

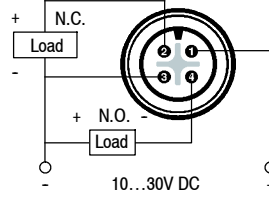
Approximate Dimensions [mm (in.)]

Micro Quick-Disconnect Style (871R-D50NP90-D4 & 871R-D50NN90-D4)

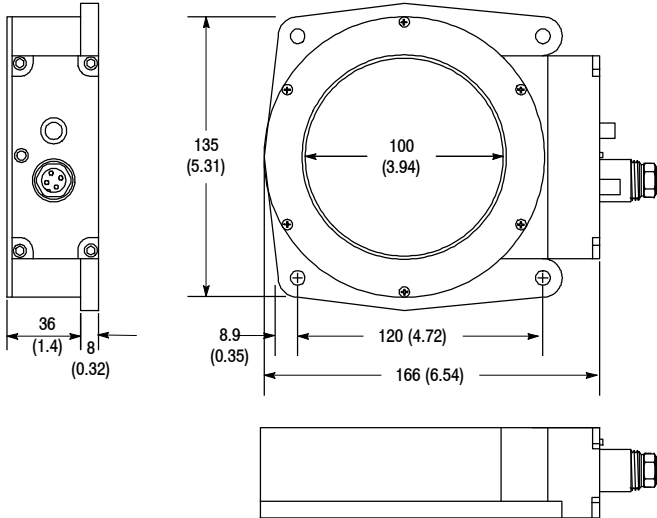


Wiring Diagrams

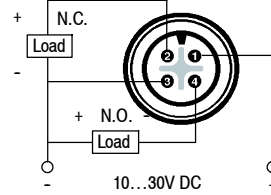
Complementary Normally Open and Normally Closed PNP (Sourcing)



Micro Quick-Disconnect Style (871R-D100NP120-D4 & 871R-D100NN120-D4)



Complementary Normally Open and Normally Closed PNP (Sourcing)





871R DC Cable Style
30 mm Slot Gap

Features

- 3-wire operation
- 3-conductor
- 18...30V DC
- False pulse and transient noise protection
- CE Marked for all applicable directives

Specifications

Load Current	≤200 mA
Leakage Current	≤10 μA
Operating Voltage	18...30V DC
Voltage Drop	≤2.4V
Repeatability	≤2%
Hysteresis	15% typical
Transient Noise Protection	Incorporated
False Pulse Protection	Incorporated
Certifications	CE Marked for all applicable directives
Enclosure	NEMA 4 IP65 (IEC 529)
Connections	Cable: 2 m (6.5 ft) length 3-conductor #26 AWG PVC
LED	None
Operating Temperature [C (F)]	-25...+70° (-13...+158°F)
Shock and Vibration	5 g, 10...55 Hz

Inductive Proximity Sensors

871S 3-Wire DC

Slot Style

Product Selection

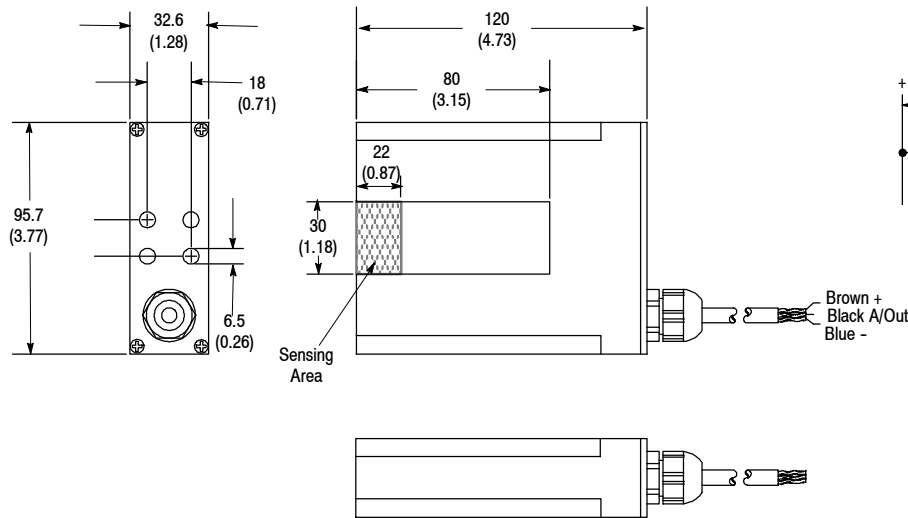
Slot Gap	Output Configuration		Switching Frequency [Hz]	Operating Frequency [KHz]	Cat. No.
					Cable Style
30 mm	N.O.	PNP	500	75	871S-D20NP30-E2
				110	871S-DX20NP30-E2

QD Cordsets

Description	Page Number
Terminal Chambers	8-2

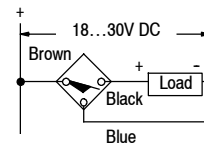
Approximate Dimensions [mm (in.)]

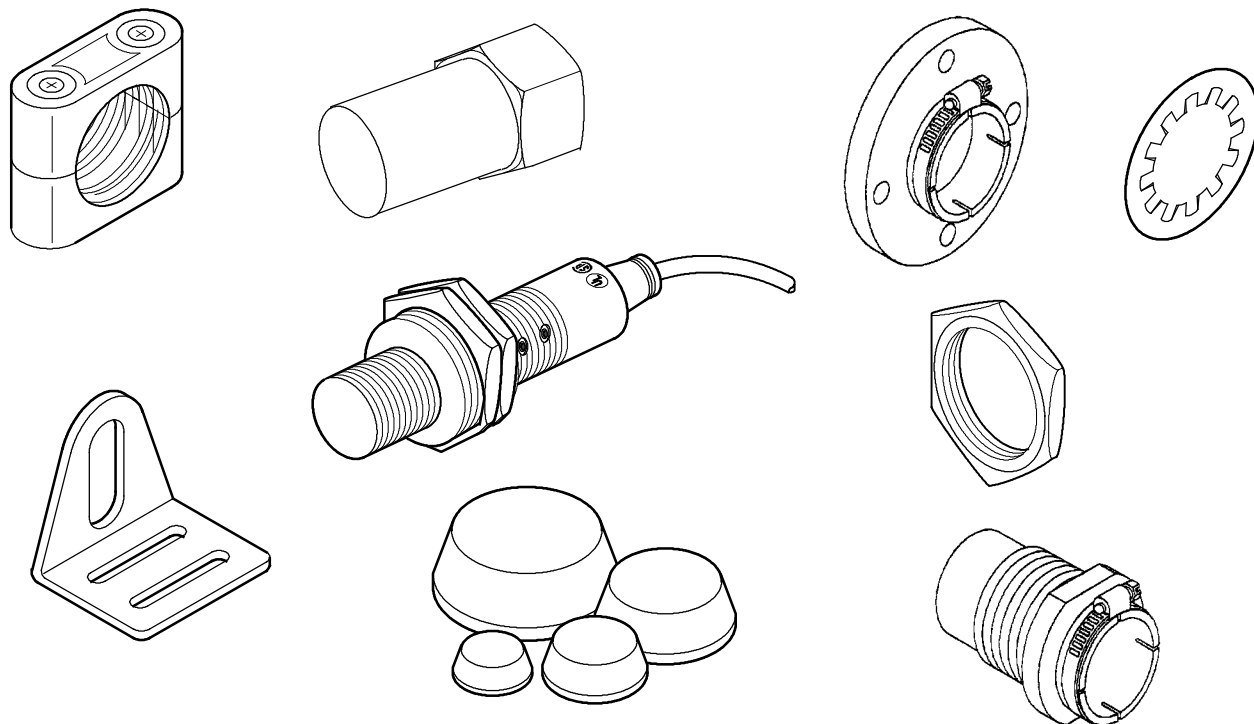
Cable Style



Wiring Diagrams

Normally Open PNP (Sourcing)





Accessories

Banking Screw Adaptors	page 2-208
Conduit Adaptors	page 2-209
Mounting Brackets, Spring Return Style	page 2-210
Mounting Brackets, Quick-Change Style	page 2-211
Mounting Brackets, Snap Clamp Style	page 2-212
Mounting Brackets, Swivel/Tilt Style	page 2-212
Mounting Brackets, Right Angle Style	page 2-213
Mounting Brackets, Clamp Style	page 2-214
Mounting Bracket, Can Sensor Style	page 2-215
Mounting Kit, VersaCube Sensors	page 2-216
Mounting Bracket, Limit Switch Style, VersaCube	page 2-217
PTFE Covers VersaCube	page 2-218
PTFE End Caps	page 2-219
End Caps	page 2-220
Mounting Nuts	page 2-221
Lock Washers	page 2-223
Spacer Kits	page 2-224

General Information

Torque Chart	page 2-225
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Description

A large variety of accessories are available for use with Rockwell Automation/Allen-Bradley products offering convenience in mounting and applying proximity sensors.

Conduit adaptors allow easy connection of most threaded-barrel models to a conduit line. Banking screw adaptors provide a mechanical interface to applications allowing a proximity sensor to be utilized as a mechanical stop switch.

Our clamp, swivel/tilt, and right-angle brackets are designed for convenient mounting and adjustable positioning of tubular-style proximity sensors. Quick-change sensor mounting brackets are designed to allow quick and simple sensor replacement without readjustment. The spring return mounting bracket and end caps help to protect your sensor from damage due to collisions.

VersaCube mounting hardware provides superior mounting stability and convenience when retrofitting rectangular or limit switch style proximity sensors.

Plastic and PTFE end caps and covers provide additional protection to sensors from abrasion corrosion, chemicals, other weld slag and debris.

Sensor wells allow for quick and easy mounting of capacitive sensors in tanks and silos for level detection. Sight-glass mount sensor brackets allow convenient and simple mounting of capacitive sensors to sight tubes for level detection.

All threaded-barrel sensors are shipped with mounting nuts and lock washers. Replacement hardware is available if these become lost or damaged.

Accessories

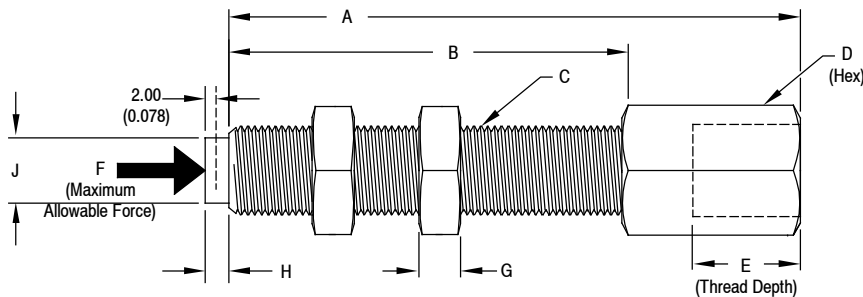
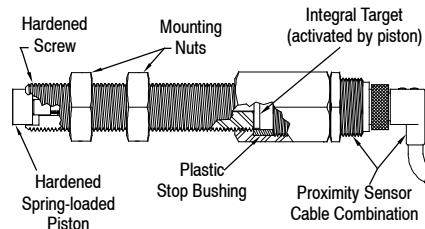
Banking Screw Adaptors

Description

Banking screw adaptors provide the flexibility to utilize inductive proximity sensors as mechanical stop switches. These banking screw adaptors are designed for use only with shielded sensors. Each banking screw adaptor is made of heat treated alloy steel

components and comes complete with two mounting nuts. Standard models require 252 g (9 oz) of force to activate the switch.

NOTE: Models are available requiring more force to activate the switch, contact factory for details.



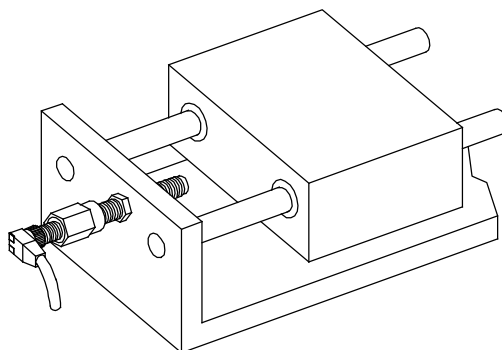
Approximate Dimensions [mm (in.)]

For Use with:	A	B	C	D	E	F	G	H	J	Cat. No.
8 mm Shielded Sensors	57.2 (2.25)	25.0 (1.00)	M8 x 1	11.0 (0.43)	18.4 (0.72)	2,000 N (450 lb)	5.08 (0.20)	2.93 (0.115)	5.84	871A-AK8-25
	82.6 (3.25)	50.0 (2.00)								871A-AK8-50
12 mm Shielded Sensors	57.2 (2.25)	25.0 (1.00)	M12 x 1	15.7 (0.62)	17.4 (0.67)	20,500 N (4,608 lb)	6.35 (0.25)	4.22 (0.166)	9.40	871A-AK12-25
	82.6 (3.25)	50.0 (2.00)								871A-AK12-50
	108 (4.25)	75.0 (3.00)								871A-AK12-75
	133 (5.25)	100 (4.00)								871A-AK12-100
18 mm Shielded Sensors	57.2 (2.25)	25.0 (1.00)	M18 x 1	22.1 (0.87)	22.1 (0.87)	45,000 N (10,115 lb)	6.35 (0.25)	4.22 (0.166)	14.2	871A-AK18-25
	82.6 (3.25)	50.0 (2.00)								871A-AK18-50
	108 (4.25)	75.0 (3.00)								871A-AK18-75
	133 (5.25)	100 (4.00)								871A-AK18-100

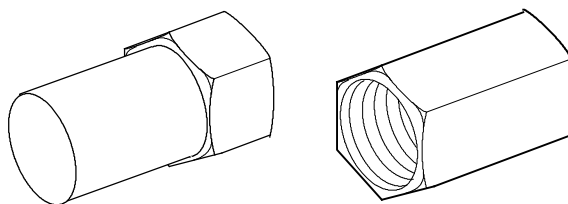
Sensors for use with Banking Screw Adaptors

Sensor Diameter	Sensing Range [mm (in.)]	Specifications	Cat. No.
8 mm	1.5 (0.06)	(10...30V DC, N.O., PNP, Micro QD)	872C-DX15-D4
12 mm	2.0 (0.08)		872C-DX34-D4
18 mm	3.0 (0.12)		872C-DX33-D4
12 mm	1.0 (0.04)	(20...250V AC, N.O., Micro QD)	872C-A2N12-R3
18 mm	4.0 (0.16)		872C-A5N18-R3

Typical Application



Conduit Adaptors for Tubular Proximity Sensors—Nickel-Plated Brass



12, 18, 30 mm

For All Bulletin Numbers Except 871U

Tube Diameter [mm (in.)]	Tube Thread Size	Approximate Dimensions [mm (in.)]	Cat. No.
12 (0.47)	M12 x 1		871C-N13
18 (0.71)	M18 x 1		871C-N19
30 (1.18)	M30 x 1.5		871C-N31
12 (0.47)	M12 x 1		871T-N5
18 (0.71)	M18 x 1		871T-N6
30 (1.18)	M30 x 1.5		871T-N7

Accessories

Mounting Brackets for Tubular Proximity Sensors—Spring Return Style

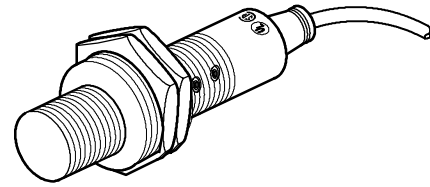
Description

Spring return mounting brackets provide protection for the sensor in the event of a target collision. The bracket is designed to allow the sensor to retract axially when force is applied to its face, then to return to its original position when the force is removed. The bracket is simply threaded onto a

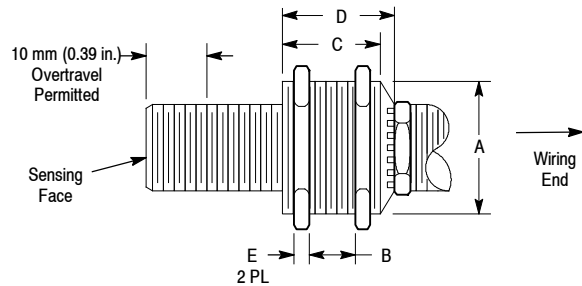
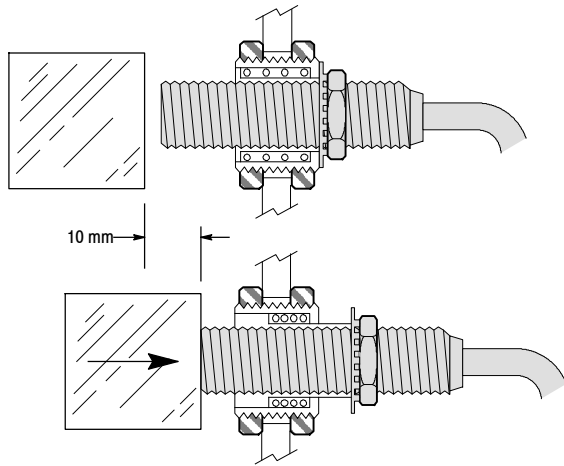
tubular proximity sensor and locked into place by using the mounting nut provided with the sensor.

For protection against lateral collisions, the addition of a plastic deflecting cap is recommended (see page 2-220).

Note: Right angle mounting brackets are available for use with these spring return brackets (see page 2-213).



8, 12, 18, 30 mm



NOTE 1: Any overtravel greater than 10 mm (0.39 in.) or improper installation can damage sensor and/or mount. **Do not exceed** torque specifications listed or distortion of mounting sleeve will result.

NOTE 2: Use a single jam nut, provided with the sensor, to lock the inner sleeve to the sensor body. A bonding agent such as low strength Loctite adhesive is recommended. Tip holes for retaining ring pliers are provided for grasping the inner sleeve.

Approximate Dimensions [mm (in.)]

Sensor Diameter	[mm (in.)]						Cat. No.	
	Clearance Hole Diameter	A	B	C	D	E	Anodized Aluminum	Stainless Steel
8 mm	15.9 (0.63)	M16 X 1.5	11.0 (0.43)	19.0 (0.75)	22.0 (0.87)	3.5 (0.14)	871A-BXN8	871A-BXS8
12 mm	22.2 (0.88)	M22 X 1.5	11.0 (0.43)	19.0 (0.75)	22.0 (0.87)	4.0 (0.16)	871A-BXN12	871A-BXS12
12 mm	17.9 (0.70)	M18 X 1	10.0 (0.40)	19.0 (0.75)	21.2 (0.84)	4.0 (0.16)	—	871A-BXS12-LP
18 mm	31.0 (1.22)	M30 X 1.5	15.0 (0.59)	26.0 (1.02)	30.0 (1.18)	5.0 (0.20)	871A-BXN18	871A-BXS18
30 mm	47.5 (1.87)	M47 X 1.5	25.4 (1.0)	35.0 (1.38)	37.9 (1.49)	5.0 (0.20)	871A-BXN30	871A-BXS30

Note: Each spring return mounting bracket is supplied with two mounting nuts.

Mounting Brackets for Tubular Proximity Sensors—Quick-Change Style

Description

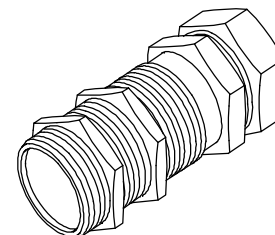
Quick-change sensor brackets provide the ability to install or remove shielded proximity sensors quickly and easily. Quick sensor change-out is achieved with a single collet-style locknut, while maintaining the original sensing distance setup thus eliminating time

consuming readjustments. Each quick-change sensor bracket is made of zinc-plated brass components and comes complete with two mounting nuts.

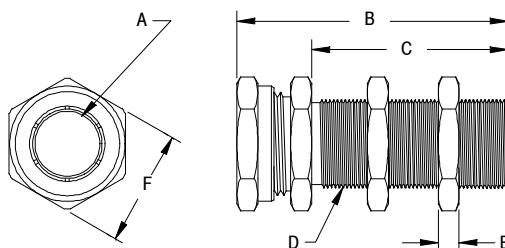
ATTENTION



Not for use with ferrous selective proximity sensors.



8, 12, 18, 30 mm

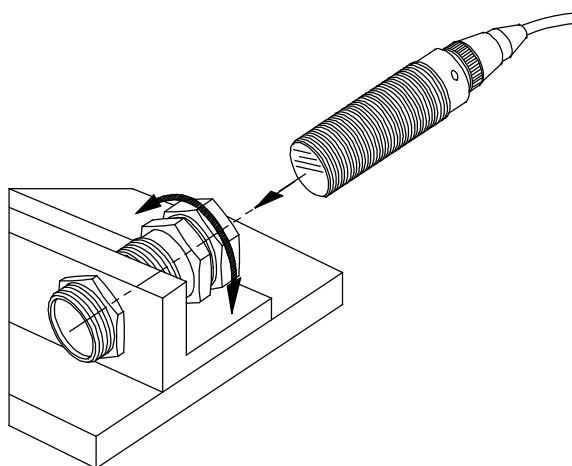


Approximate Dimensions [mm (in.)]

Sensor Diameter	A	B	C	D	E	F	Cat. No.
8 mm	8.10 (0.32)	32.0 (1.25)	18.0 (0.71)	M12 X 1	3.05 (0.12)	17.4 (0.68)	871A-BQN8 ①
		48.0 (1.89)	34.0 (1.34)				871A-BQN8-L ①
12 mm	12.5 (0.50)	34.0 (1.34)	20.0 (0.79)	M16 X 1	3.30 (0.13)	22.2 (0.88)	871A-BQN12 ①
		44.0 (1.73)	30.0 (1.18)				871A-BQN12-L ①
18 mm	18.5 (0.73)	38.0 (1.50)	20.0 (0.79)	M24 X 1.5	5.08 (0.20)	30.2 (1.19)	871A-BQN18 ①
		58.0 (2.28)	40.0 (1.57)				871A-BQN18-L ①
30 mm	31.0 (1.22)	38.0 (1.50)	20.0 (0.79)	M36 X 1.5	5.84 (0.23)	41.3 (1.63)	871A-BQN30 ①
		58.0 (2.28)	40.0 (1.57)				871A-BQN30-L ①

① Versions available for welding environments (Teflon-coated). Add a "W" to the end of the cat. no. (example: 871A-BQN12-LW).

Typical Application

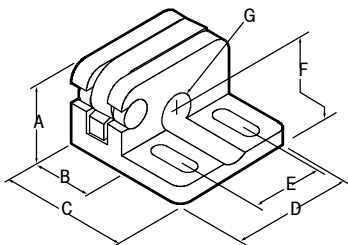


Accessories

Snap-Clamp Style Mounting Bracket for Tubular Proximity Sensors

Description

The snap-clamp style mounting bracket for tubular inductive proximity sensors provides easy, tool-free installation for 12 and 18 mm barrel diameters. This plastic bracket allows fast, simple installation and removal of the sensor, and is ideal for general purpose applications.



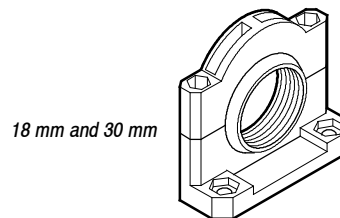
Approximate Dimensions and Product Selection [mm (in.)]

Sensor Diameter	A	B	C	D	E	F	G	Cat. No.
12 mm	25.3 (0.99)	22.1 (0.87)	39.9 (1.57)	35.5 (1.4)	22.0 (0.87)	8.1 (0.32)	12 mm	871A-SCBP12
18 mm	30.5 (1.2)	22.9 (0.9)	42.9 (1.69)	39.6 (1.56)	26.0 (1.02)	11.2 (0.44)	18 mm	871A-SCBP18

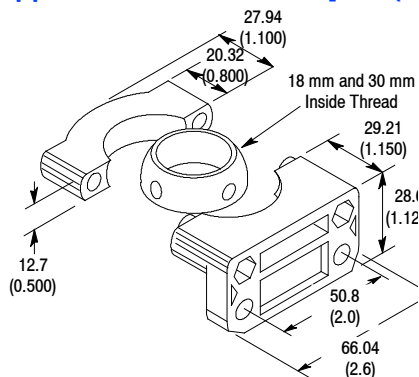
Mounting Brackets for Tubular Proximity Sensors—Swivel/Tilt Style

Description

The swivel/tilt mounting bracket provides both axial and 10° tilt adjustment for our 18 mm and 30 mm tubular-style products. It is ideal for convenient mounting and alignment of 873C ultrasonic sensors.



Approximate Dimensions [mm (in.)]



Description	Cat. No.
30 mm Mounting Bracket	60-2439
18 mm Mounting Bracket	60-2649

Note: Each swivel/tilt mounting bracket is supplied with two screws and two locking nuts.

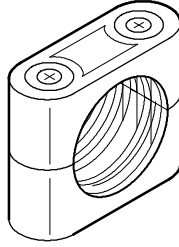
Mounting Brackets for Tubular Proximity Sensors—Right Angle Style

Proximity Tube Diameter [mm (in.)]	Approximate Dimensions [mm (in.)]	Material	Cat. No.
8 (0.31)	<p>Technical drawing of the 8mm diameter mounting bracket. The side view shows a 90-degree bend with a 1.78 (0.07) mm thickness. The top view shows a trapezoidal shape with a top width of 8.74 (0.34) mm, a bottom width of 8.74 (0.31) mm, and a height of 25.4 (1.00) mm. The front view shows two vertical slots with a total width of 31.8 (1.25) mm, a distance between slots of 11.9 (0.46) mm, and a distance from the left edge to the first slot of 7.14 (0.28) mm. The height of the front view is 31.8 (1.25) mm, with a distance from the bottom to the top of the slots of 15.9 (0.625) mm and a distance from the bottom to the center of the slots of 7.92 (0.31) mm. The distance between the centers of the slots is 5.54 (0.21) mm.</p>	Zinc-Plated Steel	871A-BRN8
		Stainless Steel	871A-BRS8
12 (0.047)	<p>Technical drawing of the 12mm diameter mounting bracket. The side view shows a 90-degree bend with a 1.78 (0.07) mm thickness. The top view shows a trapezoidal shape with a top width of 12.7 (0.50) mm, a bottom width of 13.9 (0.55) mm, and a height of 38.1 (1.50) mm. The front view shows two vertical slots with a total width of 34.8 (1.37) mm, a distance between slots of 14.3 (0.56) mm, and a distance from the left edge to the first slot of 7.92 (0.31) mm. The height of the front view is 38.1 (1.50) mm, with a distance from the bottom to the top of the slots of 19.1 (0.75) mm and a distance from the bottom to the center of the slots of 9.53 (0.37) mm. The distance between the centers of the slots is 5.54 (0.21) mm.</p>	Zinc-Plated Steel	871A-BRN12
		Stainless Steel	871A-BRS12
18 (0.071) Also for use with the 871A-BXN8 or 871A-BXS8 Spring Return Brackets	<p>Technical drawing of the 18mm diameter mounting bracket. The side view shows a 90-degree bend with a 1.78 (0.07) mm thickness. The top view shows a trapezoidal shape with a top width of 19.1 (0.75) mm, a bottom width of 19.1 (0.75) mm, and a height of 50.8 (2.00) mm. The front view shows two vertical slots with a total width of 34.8 (1.37) mm, a distance between slots of 14.3 (0.56) mm, and a distance from the left edge to the first slot of 7.92 (0.31) mm. The height of the front view is 44.5 (1.75) mm, with a distance from the bottom to the top of the slots of 25.4 (1.00) mm and a distance from the bottom to the center of the slots of 9.53 (0.37) mm. The distance between the centers of the slots is 5.54 (0.21) mm.</p>	Zinc-Plated Steel	871A-BRN18
		Stainless Steel	871A-BRS18
For use with 871A-BXN12 or 871A-BXS12 Spring Return Brackets	<p>Technical drawing of the 12mm diameter mounting bracket. The side view shows a 90-degree bend with a 1.78 (0.07) mm thickness. The top view shows a trapezoidal shape with a top width of 22.2 (0.87) mm, a bottom width of 17.4 (0.68) mm, and a height of 50.8 (2.00) mm. The front view shows two vertical slots with a total width of 34.8 (1.37) mm, a distance between slots of 14.3 (0.56) mm, and a distance from the left edge to the first slot of 7.92 (0.31) mm. The height of the front view is 44.5 (1.75) mm, with a distance from the bottom to the top of the slots of 25.4 (1.00) mm and a distance from the bottom to the center of the slots of 9.53 (0.37) mm. The distance between the centers of the slots is 5.54 (0.21) mm.</p>	Zinc-Plated Steel	871A-BRN22
		Stainless Steel	871A-BRS22
30 (1.18) Also for use with the 871A-BXN18 or 871A-BXS18 Spring Return Brackets	<p>Technical drawing of the 30mm diameter mounting bracket. The side view shows a 90-degree bend with a 2.16 (0.08) mm thickness. The top view shows a trapezoidal shape with a top width of 30.5 (1.18) mm, a bottom width of 23.0 (0.90) mm, and a height of 63.5 (2.50) mm. The front view shows two vertical slots with a total width of 44.5 (1.75) mm, a distance between slots of 20.6 (0.81) mm, and a distance from the left edge to the first slot of 10.3 (0.40) mm. The height of the front view is 57.2 (2.25) mm, with a distance from the bottom to the top of the slots of 34.8 (1.37) mm and a distance from the bottom to the center of the slots of 11.2 (0.44) mm. The distance between the centers of the slots is 7.14 (0.28) mm.</p>	Zinc-Plated Steel	871A-BRN30
		Stainless Steel	871A-BRS30
For use with 871A-BXN30 or 871A-BXS30 Spring Return Brackets	<p>Technical drawing of the 30mm diameter mounting bracket. The side view shows a 90-degree bend with a 3.05 (0.12) mm thickness. The top view shows a trapezoidal shape with a top width of 47.5 (1.87) mm, a bottom width of 38.1 (1.50) mm, and a height of 88.9 (3.50) mm. The front view shows two vertical slots with a total width of 50.8 (2.00) mm, a distance between slots of 25.4 (1.00) mm, and a distance from the left edge to the first slot of 12.7 (0.50) mm. The height of the front view is 63.5 (2.50) mm, with a distance from the bottom to the top of the slots of 38.1 (1.50) mm and a distance from the bottom to the center of the slots of 12.7 (0.50) mm. The distance between the centers of the slots is 7.14 (0.28) mm.</p>	Zinc-Plated Steel	871A-BRN47
		Stainless Steel	871A-BRS47

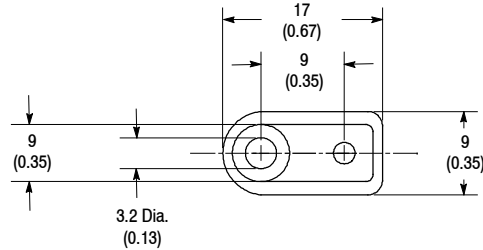
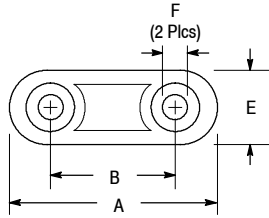
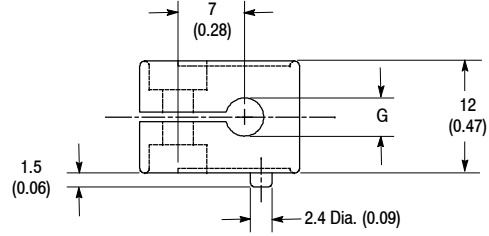
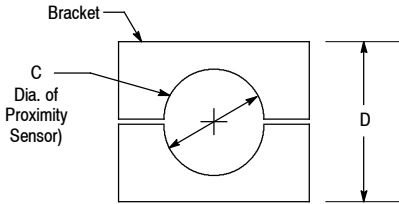
Accessories

Mounting Brackets for Tubular Proximity Sensors—Clamp Style

Stainless Steel Mounting Hardware
and Chemical Resistant Material
for Harsh Environment



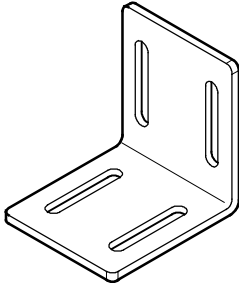
5, 6.5, 8, 12, 18, 30, 34 mm



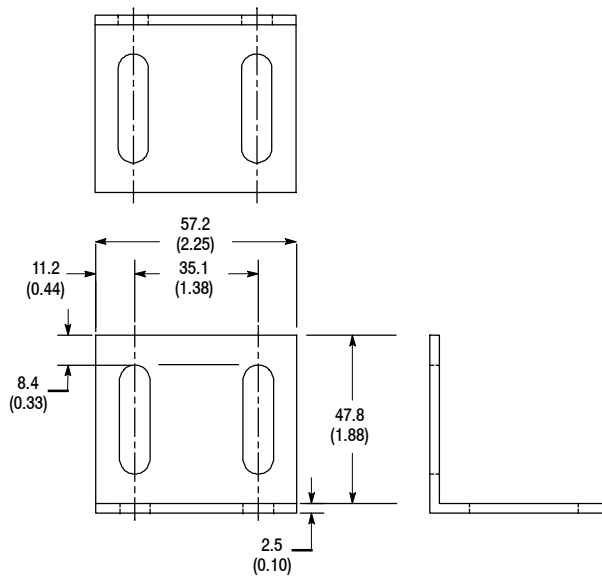
Approximate Dimensions [mm (in.)]

Sensor Diameter	A	B	C	D	E	F	G	Cat. No.
5 mm	—	—	—	—	—	—	5 (0.20)	871A-BP5
6.5 mm	—	—	—	—	—	—	6.5 (0.26)	871A-BP7
8 mm	29.0 (1.14)	18.0 (0.708)	8.0 (0.31)	18.3 (0.72)	11.0 (0.432)	4.4 (0.172)	—	871A-BP8
12 mm	36.0 (1.42)	24.0 (0.944)	12.0 (0.47)		12.0 (0.472)		—	871A-BP12
18 mm	45.0 (1.772)	32.0 (1.26)	18.0 (0.71)	29.4 (1.16)	13.0 (0.512)	5.4 (0.212)	—	871A-BP18
30 mm	60.0 (2.40)	45.0 (1.772)	30.0 (1.18)	48.4 (1.91)	15.8 (0.624)	5.5 (0.218)	—	871A-BP30
34 mm	65.8 (2.59)	50.0 (1.97)	34.0 (1.34)	48.3 (1.90)			—	871A-BP34

Stainless Steel Mounting Bracket Assembly



Approximate Dimensions [mm (in.)]



Description	Cat. No.
Mounting Bracket	871A-BR58

Accessories

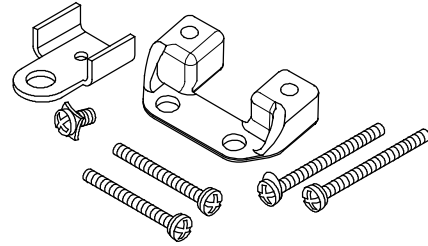
Mounting Bracket for VersaCube™ Proximity Sensors

Description

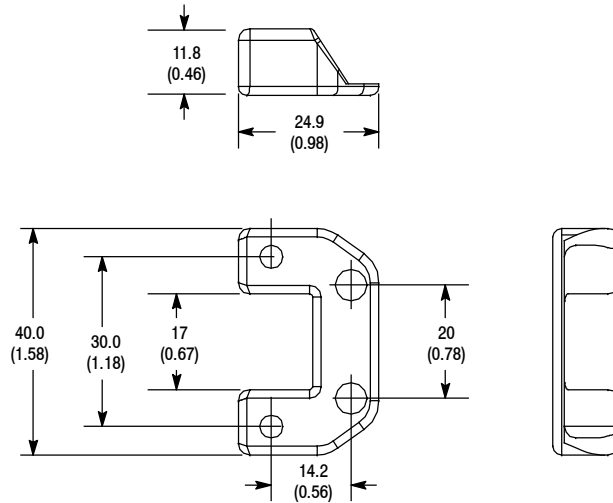
The mounting kit for VersaCube sensors provides additional mounting flexibility to 871P VersaCube style sensors. This kit includes an accessory mounting bracket that allows the VersaCube to bolt in place of existing 871P rectangular and similar competitive sensors. Appropriately sized mounting screws are also supplied. Additionally a ground lug terminal and green color-coded binding screw are provided for grounding the VersaCube sensor in the event that the unit is not mounted to a grounded metal frame.

Kit includes:

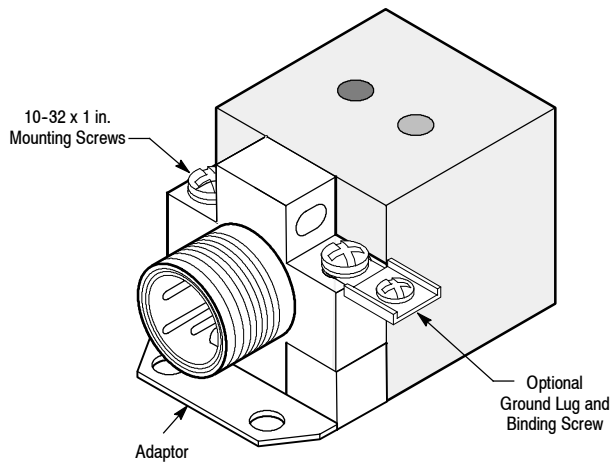
- (1) Threaded mounting bracket
- (1) Through-hole mounting bracket
- (2) 10-32 x 1 in. mounting screw
- (2) 10-32 x 1½ in. mounting screw
- (1) Ground terminal lug
- (1) Green color-coded binding screw



Approximate Dimensions [mm (in.)]



Typical Application



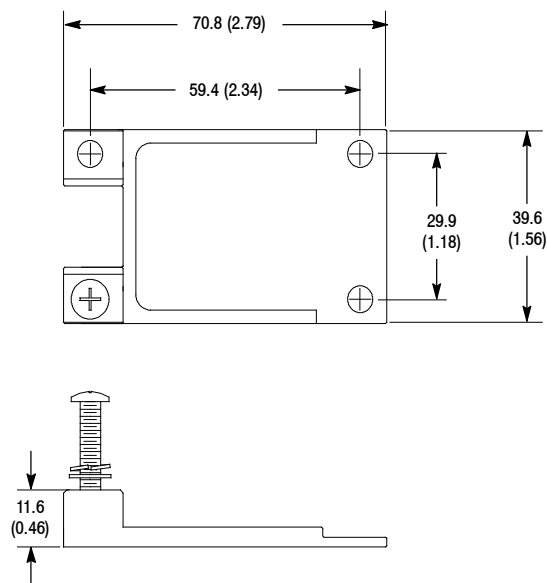
Description	Cat. No.
Mounting Kit	871A-PKIT

Limit Switch Style Mounting Bracket for VersaCube™ Proximity Sensors

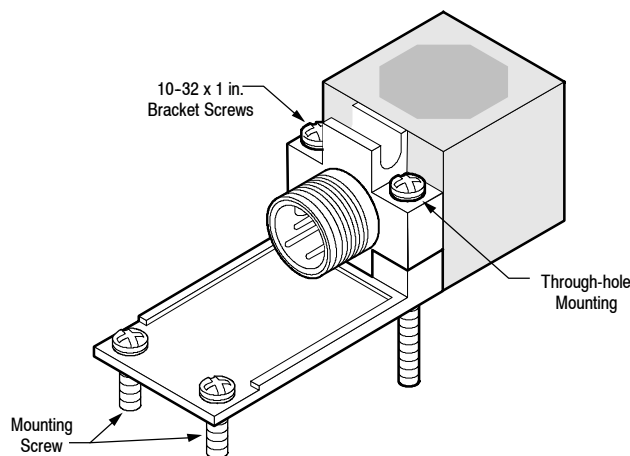
Description

The limit switch style mounting bracket (**871A-PKITLS**) has the same mounting pattern as limit switch style proximity sensors. It provides superior mounting stability and convenience when retrofitting a limit switch style proximity sensor with a VersaCube.

Approximate Dimensions [mm (in.)]



Typical Application



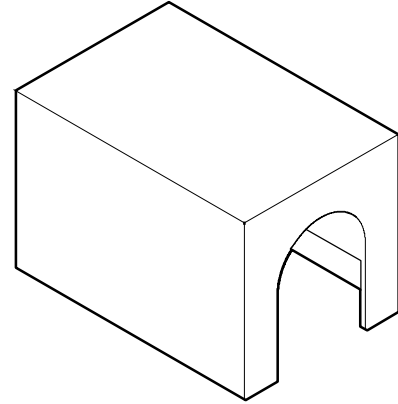
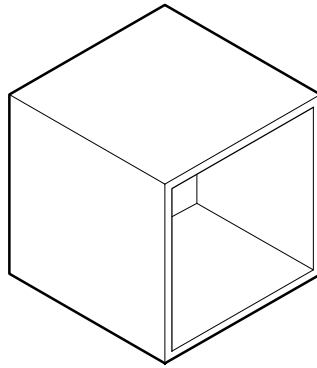
Description	Cat. No.
Mounting Kit	871A-PKITLS

Accessories

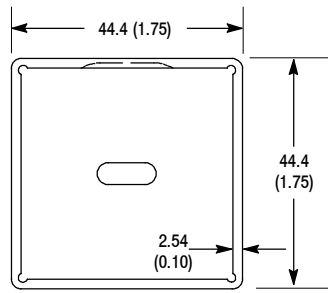
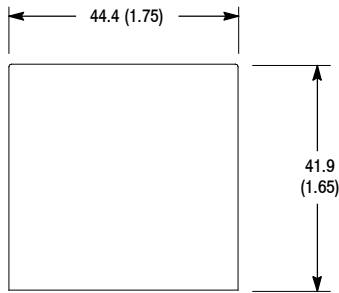
PTFE Cover for VersaCube

Description

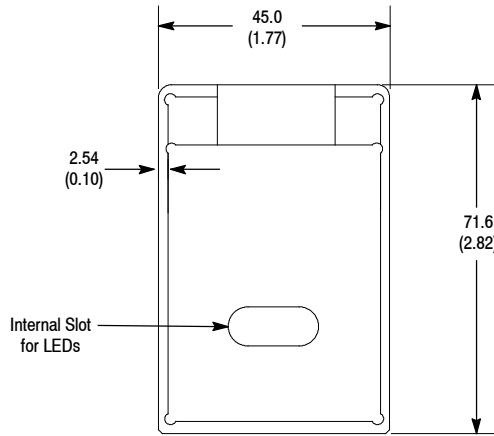
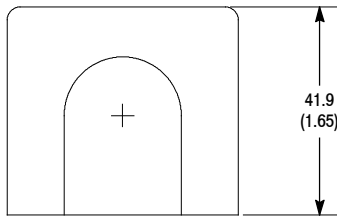
These PTFE covers are designed to protect the VersaCube from weld slag and other debris.



871A-KCT40-F



871A-KCT40-T



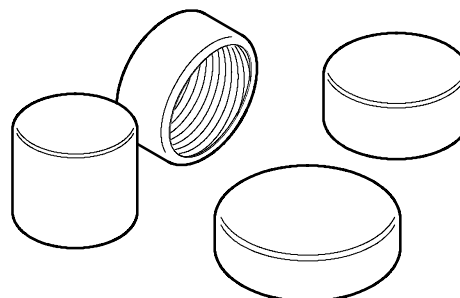
NOTE: Internal slot for LED visibility.

Description	Cat. No.
Short PTFE Cover	871A-KCT40-F
Long PTFE Cover	871A-KCT40-T

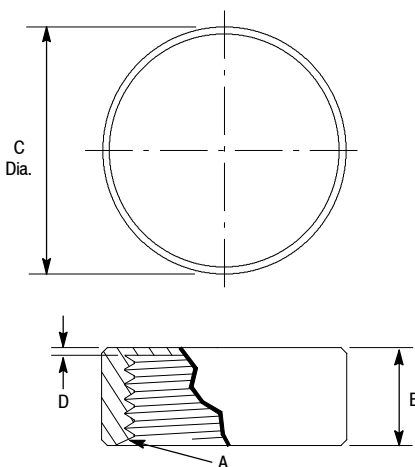
PTFE End Caps for Tubular Proximity Sensors

Description

PTFE end caps protect tubular proximity sensors from abrasion, corrosion, chemical exposure, weld slag, and other debris.



8, 12, 18, 30 mm



Approximate Dimensions [mm (in.)]

Shielded

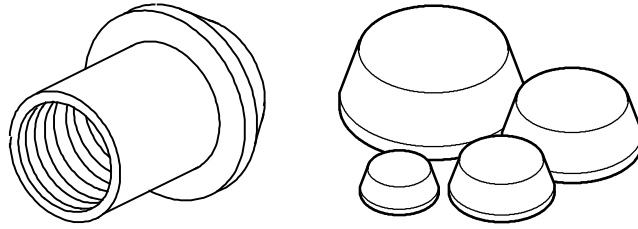
Sensor Diameter	A	B	C	D	Cat. No.
8 mm	M8 x 1	5.0 (0.20)	10.8 (0.43)	0.50 (0.02)	871A-KT8
12 mm	M12 x 1	8.9 (0.35)	14.8 (0.58)	0.89 (0.035)	871A-KT12
18 mm	M18 x 1	8.8 (0.35)	24.4 (0.96)	1.27 (0.05)	871A-KT18
30 mm	M30 x 1.5	10.0 (0.39)	38.1 (1.50)	2.03 (0.08)	871A-KT30

Unshielded

Sensor Diameter	A	B	C	D	Cat. No.
8 mm	M8 x 1	9.6 (0.38)	10.8 (0.43)	0.50 (0.02)	871A-KUT8
12 mm	M12 x 1	15.0 (0.60)	14.8 (0.58)	0.89 (0.035)	871A-KUT12
18 mm	M18 x 1	18.8 (0.70)	24.4 (0.96)	1.27 (0.05)	871A-KUT18
30 mm	M30 x 1.5	23.0 (0.90)	38.1 (1.50)	2.03 (0.08)	871A-KUT30

Accessories

End Caps for Tubular Proximity Sensors



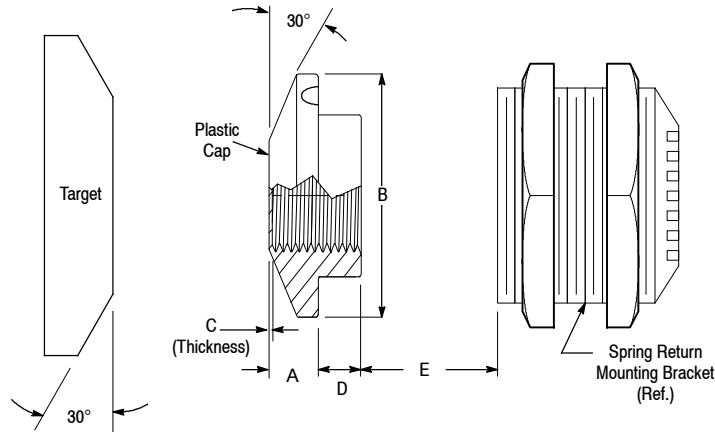
8, 12, 18, 30 mm

Description

Plastic deflecting caps are designed to be utilized with spring return brackets when lateral collisions might occur. The

cap is simply threaded onto the front of the proximity sensor. The 30° slope

allows the sensor and spring bracket to retract when a lateral collision occurs.



Approximate Dimensions [mm (in.)]

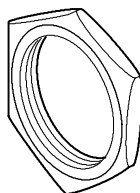
Shielded

Sensor Diameter	A	B	C	D	E	Cat. No.
8 mm	5.1 (0.20)	15.1 (0.59)	0.25 (0.01)	0	10.0 (0.39)	871A-KP8
12 mm	6.4 (0.25)	22.9 (0.90)	0.89 (0.04)			871A-KP12
18 mm	8.0 (0.31)	31.4 (1.34)				871A-KP18
30 mm		44.5 (1.75)	12.7 (0.50)		871A-KP30	

Unshielded

Sensor Diameter	A	B	C	D	E	Cat. No.
8 mm	5.1 (0.20)	15.1 (0.59)	0.25 (0.01)	9.51 (0.37)	10.0 (0.39)	871A-KPU8
12 mm	6.4 (0.25)	22.9 (0.90)	0.89 (0.04)	17.3 (0.68)		871A-KPU12
18 mm	8.0 (0.31)	31.4 (1.34)		20.0 (0.79)		871A-KPU18
30 mm		44.5 (1.75)			12.7 (0.50)	871A-KPU30

Mounting Nuts for Tubular Proximity Sensors—Brass, Stainless Steel, and Plastic



8, 12, 18, 30 mm

Brass

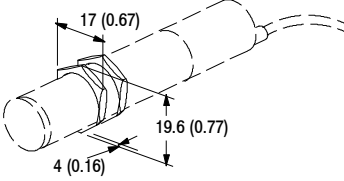
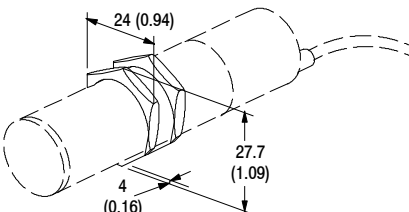
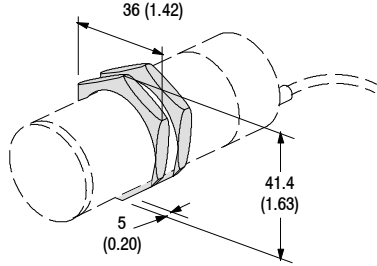
Proximity Tube Diameter [mm (in.)]	Thread Size ISO Metric	Approximate Dimensions [mm (in.)]	Cat. No.
8 (0.31)	M8 x 1		871C-N1 Nickel-Plated 871A-NBT12 PTFE-Coated
12 (0.47)	M12 x 1		871C-N2 Nickel-Plated 871A-NBT12 PTFE-Coated
18 (0.71)	M18 x 1		871C-N3 Nickel-Plated 871A-NBT18 PTFE-Coated
30 (1.18)	M30 x 1.5		871C-N4 Nickel-Plated 871A-NBT30 PTFE-Coated

Note: Each cat. no. includes two mounting nuts.

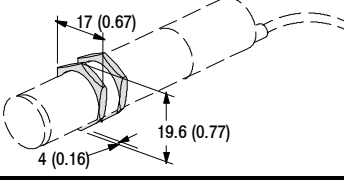
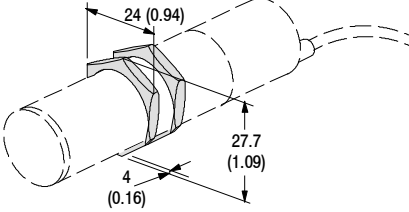
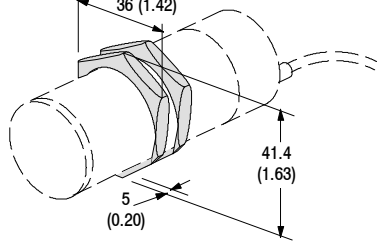
Accessories

Mounting Nuts for Tubular Proximity Sensors—Brass, Stainless Steel, and Plastic

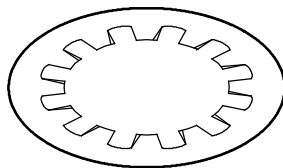
Stainless Steel

Proximity Tube Diameter [mm (in.)]	Thread Size ISO Metric	Approximate Dimensions [mm (in.)]	Cat. No.
12 (0.47)	M12 x 1		871T-N2
18 (0.71)	M18 x 1		871T-N4
30 (1.18)	M30 x 1.5		871T-N8

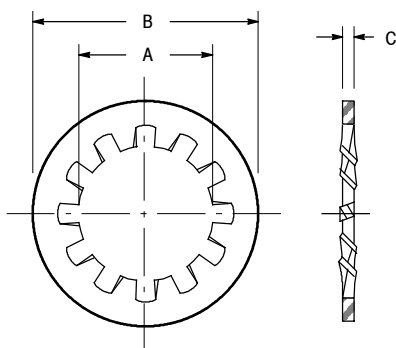
Plastic

Proximity Tube Diameter [mm (in.)]	Thread Size ISO Metric	Approximate Dimensions [mm (in.)]	Cat. No.
12 (0.47)	M12 x 1		871T-N1
18 (0.71)	M18 x 1		871T-N3
30 (1.18)	M30 x 1.5		871C-N5

Note: Each cat. no. includes two mounting nuts.



8, 12, 18, 30 mm



Approximate Dimensions [mm (in.)]

Nominal Washer Size [mm (in.)]	A		B		C		Cat. No.
	Inside Diameter [mm (in.)]		Outside Diameter [mm (in.)]		Material Thickness [mm (in.)]		
8.0 (0.031)	8.5 (0.33)	8.2 (0.32)	15.5 (0.61)	14.75 (0.58)	0.85 (0.03)	0.7 (0.03)	871A-LWN8
12.0 (0.047)	12.7 (0.5)	12.3 (0.48)	20.25 (0.8)	19.5 (0.77)	1.0 (0.04)	0.8 (0.03)	871A-LWN12
18.0 (0.071)	19.1 (0.75)	18.5 (0.73)	29.6 (1.17)	28.6 (1.13)	1.3 (0.051)	1.1 (0.04)	871A-LWN18
30.0 (1.18)	31.4 (1.24)	30.6 (1.2)	46.3 (1.82)	45.1 (1.78)	1.7 (0.07)	1.5 (0.06)	871A-LWN30

Note: Each cat. no. includes two lock washers.

Selection Guide

Spacer kits are available for use with 871D in-port tubular position sensors for nonstandard tubular probe lengths. Example from chart below: Sensor probe length required is 101.6 mm

(4.00 in.). Using sensor 871D-DW2NP1159-D4 and spacer 871A-S1427 results in a probe length of 101.5 mm (3.998 in.). Any difference between desired probe length and

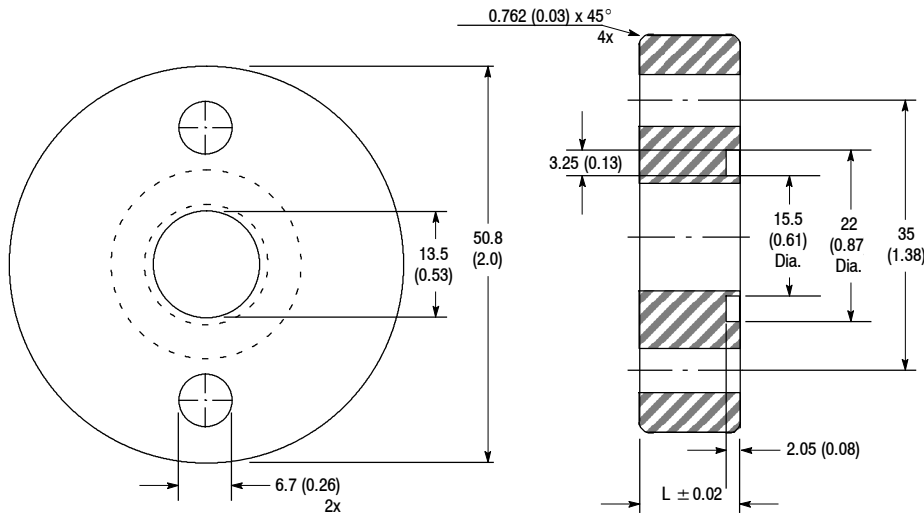
length resulting from sensor and spacer combination should be carefully considered to ensure proper clearance in application.

Spacer Kit Cat. No.	Sensor Cat. No.	871D-xxxxx260-xx	871D-xxxxx317-xx	871D-xxxxx524-xx	871D-xxxxx730-xx	871D-xxxxx959-xx	871D-xxxxx1159-xx
	Probe Length [mm (in.)]						
	Spacer Height [mm (in.)]	26.0 (1.025)	31.7 (1.250)	52.4 (2.062)	73.0 (2.875)	95.9 (3.775)	115.9 (4.560)
871A-S478	4.78 (0.188)	21.26 (0.837)	26.97 (1.062)	47.60 (1.874)	68.25 (2.687)	91.11 (3.587)	111.05 (4.372)
871A-S572	5.72 (0.225)	20.32 (0.800)	26.04 (1.025)	46.66 (1.837)	67.31 (2.650)	90.17 (3.550)	110.11 (4.335)
871A-S780	7.80 (0.307)	18.24 (0.718)	23.95 (0.943)	44.58 (1.755)	65.23 (2.568)	88.09 (3.468)	108.03 (4.253)
871A-S945	9.45 (0.372)	16.59 (0.653)	22.30 (0.878)	42.93 (1.690)	63.58 (2.503)	86.44 (3.403)	106.38 (4.188)
871A-S953	9.53 (0.375)	16.51 (0.650)	22.23 (0.875)	42.85 (1.687)	63.50 (2.500)	86.36 (3.400)	106.30 (4.185)
871A-S1270	12.70 (0.500)	13.34 (0.525)	19.05 (0.750)	39.67 (1.562)	60.33 (2.375)	83.19 (3.275)	103.12 (4.060)
871A-S1382	13.82 (0.544)	12.22 (0.481)	17.93 (0.706)	38.56 (1.518)	59.21 (2.331)	82.07 (3.231)	102.01 (4.016)
871A-S1427	14.27 (0.562)	11.76 (0.463)	17.48 (0.688)	38.10 (1.500)	58.75 (2.313)	81.61 (3.213)	101.55 (3.998)
871A-S1524	15.24 (0.600)	10.80 (0.425)	16.51 (0.650)	37.13 (1.462)	57.79 (2.275)	80.65 (3.175)	100.58 (3.960)
871A-S1737	17.37 (0.684)	8.66 (0.341)	14.38 (0.566)	35.00 (1.378)	55.65 (2.191)	78.51 (3.091)	98.45 (3.876)
871A-S1809	18.09 (0.712)	7.95 (0.313)	13.67 (0.538)	34.29 (1.350)	54.94 (2.163)	77.80 (3.063)	97.74 (3.848)
871A-S2057	20.57 (0.810)	5.46 (0.215)	11.18 (0.440)	31.80 (1.252)	52.45 (2.065)	75.31 (2.965)	95.25 (3.750)
871A-S2380	23.80 (0.937)	2.24 (0.088)	7.95 (0.313)	28.58 (1.125)	49.23 (1.938)	72.09 (2.838)	92.02 (3.623)

Each spacer kit contains:

- (1) Spacer
- (1) O-ring
- (2) Appropriate length mounting bolts

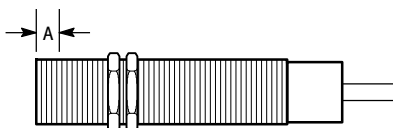
Approximate Dimensions [mm (in.)]



L = Spacer height as indicated in Selection Guide above.

Spring Loaded Brackets

Mounting Nut Torque	Sensor Nut Torque	Cat. No.
8.4 N•m (75 in•lbs)	3.3 N•m (30 in•lbs)	871A-BXN8
15.2 N•m (136 in•lbs)	5.5 N•m (50 in•lbs)	871A-BXN12
22.0 N•m (195 in•lbs)	11.3 N•m (100 in•lbs)	871A-BXN18



Bulletin 871C/872C

Diameter	Shielded	“A” Length			Remainder of Thread Length	
		A [mm (in.)]	Torque N•m (in•lbs)	Turns	Torque N•m (in•lbs)	Turns
8 mm	Y	4.6 (0.18)	1.7 (15)	1 1/2	2.8 (25)	1 1/2
12 mm	Y	11.7 (0.46)	4.0 (35)	1/4	9.6 (85)	1/2
	N	5.6 (0.22)				
18 mm	Y	13.7 (0.54)	11.3 (100)	1/3	19.8 (175)	1/2
	N	5.6 (0.22)				
30 mm	Y/N	-	33.9 (300)	1/8	33.9 (300)	1/8

Bulletin 871T

Diameter	Shielded	“A” Length			Remainder of Thread Length	
		A [mm (in.)]	Torque N•m (in•lbs)	Turns	Torque N•m (in•lbs)	Turns
12 mm	Y	11.7 (0.46)	9.0 (80)	2/3	14.1 (125)	3/4
	N	5.6 (0.22)				
18 mm	Y	13.7 (0.54)	19.8 (175)	1/2	28.3 (250)	2/3
	N	5.6 (0.22)				

Bulletin 871TM

Diameter	Shielded	Torque N•m (in•lbs)	Turns
12 mm	Y	14.1 (125)	3/4
	N		
18 mm	Y	28.3 (250)	2/3
	N		
30 mm	Y	33.9 (300)	1/8
	N		

① For metal housing using supplied hardware.

Torque Chart ①

Bulletin 871Z

Diameter	Shielded	Remainder of Thread Length	
		Torque N•m (in•lbs)	Turns
12 mm	Y	9.6 (85)	1/2
	N		
18 mm	Y	19.8 (175)	1/2
	N		
30 mm	Y	33.9 (300)	1/8
	N		

① For metal housing using supplied hardware.

Bulletin 871ZC

Diameter	Shielded	Remainder of Thread Length	
		Torque N•m (in•lbs)	Turns
12 mm	Y	13.4 (120)	1/2
18 mm		16.8 (150)	
30 mm		19.8 (175)	1/8

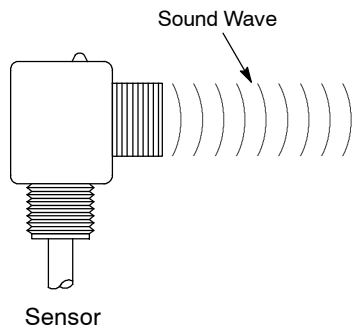
General Information	Quick Selection Guide	page 3-2
	Technical Definitions and Terminology	page 3-3
Products	Bulletin 873P Analog or Discrete Output	page 3-5
	Bulletin 873P Programmable	page 3-8
	Bulletin 873C Proximity Style	page 3-11
	Bulletin 873E RightSound™ Opposed Mode Clear Object Sensing System	page 3-13
	Indexes	Cat. No. Index
	Comprehensive Product Index	page 14-1

Ultrasonic Proximity Sensors

Quick Selection Guide

Specifications	 873P Analog or Discrete Output	 873P Programmable	 873C Analog or Discrete Output	 873E RightSound™ Opposed Mode Clear Object Sensing System
Features	<ul style="list-style-type: none"> Sensing ranges from 100...2500 mm Analog output models (4...20 mA, 0...10V DC) Discrete output models (normally open, PNP) Plastic barrel housing Adjustable sensing distance (discrete models) Short circuit, overload, false pulse, transient noise and reverse polarity protection Hold/Synchronize function to reduce crosstalk cULus Listed and CE Marked for all applicable directives 	<ul style="list-style-type: none"> Sensing ranges from 150...3500 mm Programmable models include 2 discrete and 1 analog output Discrete outputs can be programmed for normally open or normally closed operation Programmable set point adjustment via push button Short circuit, overload, false pulse, transient noise and reverse polarity protection 	<ul style="list-style-type: none"> 3-wire operation 3-conductor connection 18...30V DC Metal, nonmetal solid and liquid sensing capability Short circuit, false pulse, reverse polarity, overload and transient noise protection Adjustable sensing distance (discrete model) Adjustable background suppression (analog model) 	<ul style="list-style-type: none"> Ideal solution for sensing clear objects or materials including glass and plastic bottles. Popular right angle package allows through hole mounting as well as 18 mm threaded mounting hubs on the sensor nose and base. Highly visible 360° indicators conveniently mounted at the top of the sensor. Designed to Rugged Food Industry Standards: enclosure rated for 1200 psi washdown as well as NEMA 4X, 6P, and IP67 water ingress standards. Receivers come with both NPN (sinking) and PNP (sourcing) outputs. Short circuit, overload, reverse polarity, false pulse, and transient noise.
Material	• Plastic Barrel; 18, 30 mm	• Plastic Barrel; 30 mm	• Plastic Face/Threaded Nickel-Plated Brass Barrel	• Plastic
Sensing Range [mm (in.)]	<ul style="list-style-type: none"> 100...600 (3.94...23.62) 200...1500 (7.87...59.06) 300...2500 (11.81...98.43) 	<ul style="list-style-type: none"> 150...1500 (5.98...59.10) 350...3500 (13.78...137.80) 	• 300...1000 (11.81...39.37)	• 50...750 (2...30)
Operating Voltage	• 18...30V DC	• 19...30V DC	• 18...30V DC	• 10.8...30V DC
Output Configuration	<ul style="list-style-type: none"> Discrete (Normally Open—PNP) Analog Current (4...20 mA) Analog Voltage (0...10V DC) 	• Programmable (2—PNP with Analog current or Analog voltage)	<ul style="list-style-type: none"> Analog Voltage (1...10V DC) Discrete (Normally Open—PNP) 	• NPN/PNP
Enclosure Type Rating	• IP67	• IP67	• NEMA 12 and IP65 (IEC529)	• NEMA 4X, 6P, IP67 (IEC529); 1200 psi (8270 kPa) washdown
Connection Type	• Micro QD	• Micro QD	• Cable: 2 m (6.5 ft) length 3-conductor PVC	• Cable: #22 AWG PVC, 2 m (6.5 ft) QD: 4-pin DC micro style male receptacle on pigtail
Additional Info	• See page 3-5	• See page 3-8	• See page 3-11	• See page 3-13

Principles of Operation

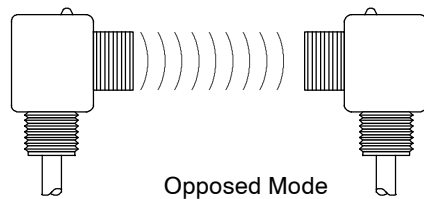


Ultrasonic sensors operate by emitting and receiving high-frequency sound waves. The frequency is usually in the order of 200 kHz, which is too high for the human ear to hear.

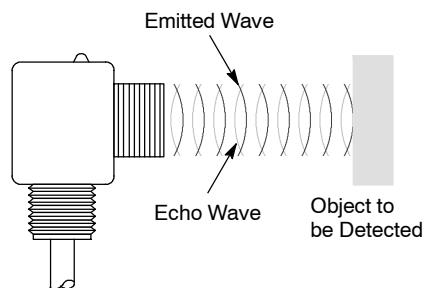
Modes of Operation

There are two basic modes of operation: opposed mode and diffuse (echo) mode.

In opposed mode, one sensor emits the sound wave and another, mounted opposite the emitter, receives the sound wave.

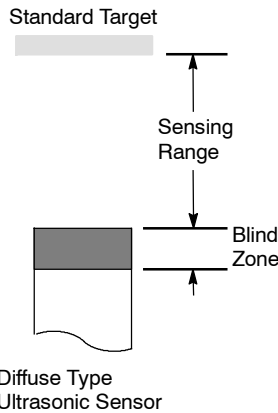


In diffuse mode, the same sensor emits the sound wave and then listens for the echo that bounces off an object.



Sensing Range

The sensing range is the distance within which the ultrasonic sensor will detect a target under fluctuations of temperature and voltage.



Blind Zone

Ultrasonic sensors have an inherent blind zone located at the sensing face. The size of the blind zone depends on the frequency of the transducer. Objects located within the blind spot can not be reliably detected.

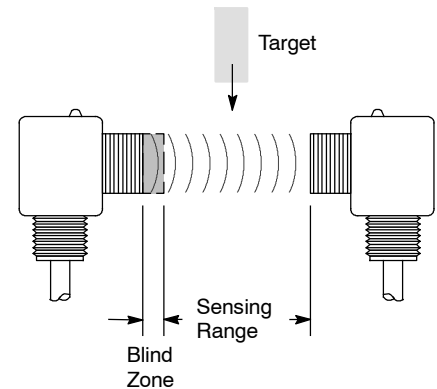
Target Considerations

Certain characteristic of targets must be considered when using ultrasonic sensors. These include target shape, material, temperature, size and positioning.

Soft materials such as fabric or foam rubber are difficult to detect by diffuse ultrasonic technology because they are not sound-reflective.

The standard target for a diffuse type ultrasonic sensor is established by the International Electrotechnical Commission standard IEC 60947-5-2. The standard target is a square shape, having a thickness of 1 mm and made from metal with a rolled finish. The size of the target is dependent upon the sensing range.

For opposed mode ultrasonic sensors, there is no established standard.



Standard targets are used to establish the performance parameters of the sensors. The user must take into consideration differences in performance due to nonstandard targets.

Notes



873P Analog Output
18 mm



873P Discrete Output
30 mm

Description

Bulletin 873P Ultrasonic Sensors are self-contained solid-state devices designed for noncontact sensing of solid and liquid objects. They are available in 18 mm and 30 mm barrel diameters that are constructed from PBT plastic and meet IP67 enclosure standards. The electronic circuitry is potted to protect against shock, vibration, and contamination.

These sensors are available with either analog or discrete output types and three different sensing ranges. Analog model selection includes 4...20 mA or 0...10V DC outputs.

Discrete models have a normally open PNP output and a potentiometer for adjusting the sensing range to ignore background targets. Bulletin 873P ultrasonic sensors have full electrical protections including short circuit, overload, false pulse, transient noise, and reverse polarity.

Specifications

	Discrete	Analog Current	Analog Voltage
Output Configuration	Normally Open, PNP	4...20 mA	0...10V DC
Load Current, Max.	<500 mA		—
Leakage Current	<0.5 mA		—
Current Consumption	< 35 mA		
Operating Voltage	18...30V DC		
Sensor Voltage Drop	< 3.5V DC		—
Repeatability	0.2%		
Hysteresis	2.5% typical		—
Linearity Tolerance	—		±0.3%
Frequency	130, 180, 300 k Hz		
Beam Angle	8°		
Protection Type	Short circuit, overload, false pulse, transient noise, and reverse polarity		
Certifications	cULus Listed and CE Marked for all applicable directives		
Material	Plastic - PBT		
Enclosure Type Rating	IP67		
Connection Type	Micro quick-disconnect (18 mm discrete models have 12 inch pigtail)		
Indicator LED	Yellow		—
Sensitivity Adjustment	Potentiometer		—
Operating Temperature [C (F)]	-15...70° (5...158°)		
Shock	30 g, 11 ms		
Vibration	55 Hz, 1 mm amplitude, 3 planes		

Features

- Sensing ranges from 100...2500 mm
- Analog output models (4...20 mA, 0...10V DC)
- Discrete output models (normally open, PNP)
- Plastic barrel housing
- Adjustable sensing distance (discrete models)
- Short circuit, overload, false pulse, transient noise and reverse polarity protection
- Hold/Synchronize function to reduce crosstalk
- cULus Listed and CE Marked for all applicable directives

QD Cordsets and Accessories

Description	Page Number
Beam Deflectors	3-10
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873P Analog or Discrete Output

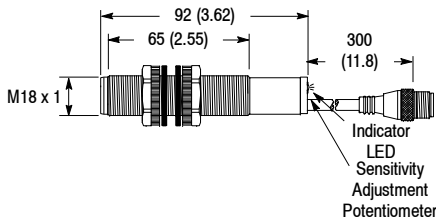
Plastic Barrel

Product Selection

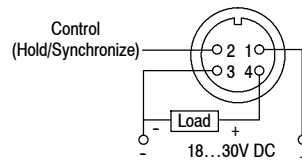
Barrel Diameter [mm]	Sensing Range [mm (in.)]	Output Configuration	Switching Frequency (Hz)	Connection Type	Cat. No.	
18	100...600 (3.94...23.62)	Normally Open PNP	20	Micro QD Pigtail	873P-DBNP1-F4	
	200...1500 (7.87...59.06)		10		873P-DBNP2-F4	
30	300...2500 (11.81...98.43)		5	Micro QD	873P-DCNP1-D5	
18	100...600 (3.94...23.62)	4...20 mA	—		873P-DBAC1-D4	
	200...1500 (7.87...59.06)				873P-DBAC2-D4	
30	300...2500 (11.81...98.43)				873P-DCAC1-D5	
18	100...600 (3.94...23.62)	0...10V DC			—	873P-DBAV1-D4
	200...1500 (7.87...59.06)					873P-DBAV2-D4
30	300...2500 (11.81...98.43)					873P-DCAV1-D5
Recommended standard QD cordset (-2 = 2 m (6.5 ft))						889D-F4AC-2

Approximate Dimensions [mm (in.)]

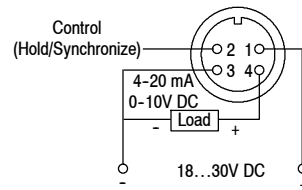
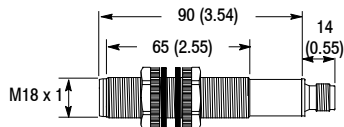
18 mm Discrete



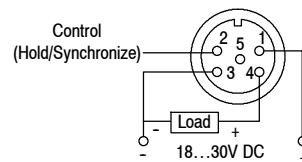
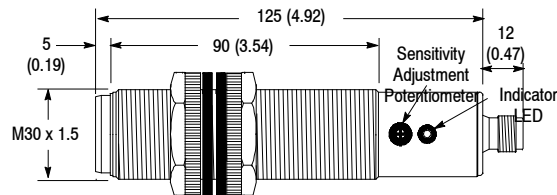
Wiring Diagrams



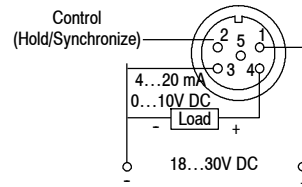
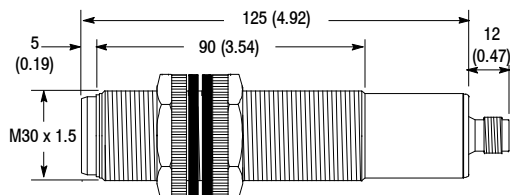
18 mm Analog



30 mm Discrete



30 mm Analog



Control Pin

Normal Operation

For normal operation do not connect the control pin. Hold and synchronize features can be used for special applications.

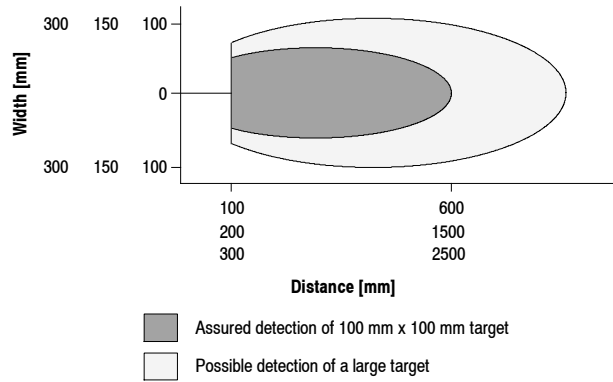
Hold

To inhibit sensor operation and hold the output to its present state connect the control pin (2) to 0V DC. The sensor will not transmit or receive ultrasonic pulses until this voltage is removed from the control pin. Switching output models will be latched and analog output models will hold their value during this period.

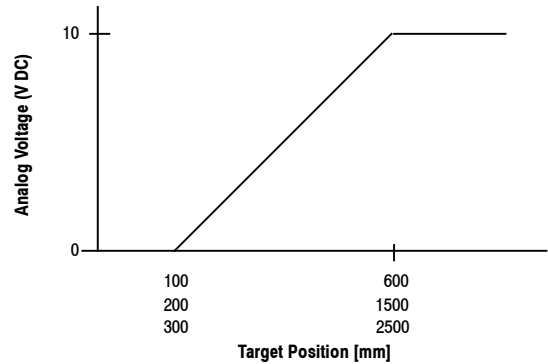
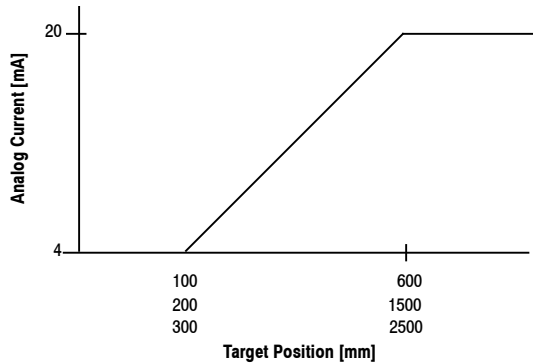
Synchronize

To synchronize the transmission of ultrasonic pulses between several sensors connect the control pins together. This feature reduces the potential for sensor crosstalk between models that are mounted in close proximity to one another.

Beam Pattern



Analog Output



Bulletin 873P Programmable

Plastic Barrel



873P DC Programmable
30 mm

Description

Bulletin 873P Programmable Ultrasonic Sensors are self-contained solid-state devices designed for non-contact sensing of solid and liquid objects. They are available with a 30 mm barrel diameter that is constructed from PBT plastic and meets IP67 enclosure standards. The electronic circuitry is potted to protect against shock, vibration, and contamination.

These sensors have two programmable setpoints with sourcing (PNP) outputs that can be configured for either normally open or normally closed operation. They also feature a 4...20 mA or 0...10V DC analog output. The slope of the analog output is scaled between the limits of the setpoint values. Programming of the setpoints and the output configuration is done using the setup push button on the rear of the housing.

In addition, these devices have full electrical protections including short circuit, overload, false pulse, transient noise and reverse polarity. Bulletin 873P programmable ultrasonic sensors are ideal for applications such as level control, diameter measurement, distance measurement, slope control, and presence detection.

Specifications

Output Configuration	Two discrete PNP (Programmable N.O./N.C.) Analog Current: 4...20 mA Analog Voltage: 0...10V DC
Load Current, Max.	<100 mA (Open collector)
Leakage Current	<0.5 mA
Current Consumption	<45 mA
Operating Voltage	19...30V DC
Sensor Voltage Drop	<5V DC
Repeatability	0.4%
Hysteresis	1% typical
Linearity Tolerance	±0.5%
Frequency	130, 200 kHz
Beam Angle	8°
Protection Type	Short circuit, overload, false pulse, transient noise, reverse polarity
Certifications	cULus Listed and CE Marked for all applicable directives
Material	Plastic - PBT
Enclosure Type Rating	IP67
Connection Type	Micro quick-disconnect
Indicator LED	Yellow: (2) P1, P2 output; Green: Alignment/echo
Programming	Via setup push button
Operating Temperature [C (F)]	-15...70° (5...158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 amplitude, 3 planes

Features

- Sensing ranges from 150...3500 mm
- Programmable models include 2 discrete and 1 analog output
- Discrete outputs can be programmed for normally open or normally closed operation
- Programmable set point adjustment via push button
- Short circuit, overload, false pulse, transient noise, and reverse polarity protection
- cULus Listed and CE Marked for all applicable directives

QD Cordsets and Accessories

Description	Page Number
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Product Selection

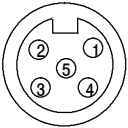
Barrel Diameter [mm]	Sensing Range [mm (in.)]	Output Configuration	Switching Frequency (Hz)	Connection Type	Cat. No.
30 mm	150...1500 (5.91...59.10)	2 PNP (NO or NC) with 4...20 mA	1	Micro QD	873P-DCAC1S-D5
	350...3500 (13.78...137.80)				873P-DCAC2S-D5
	150...1500 (5.91...59.10)	2 PNP (NO or NC) with 0...10V DC			873P-DCAV1S-D5
	350...3500 (13.78...137.80)				873P-DCAV2S-D5
Recommended standard QD cordset (-2 = 2 m (6.5 ft))					889D-F5AC-2

Approximate Dimensions [mm (in.)]

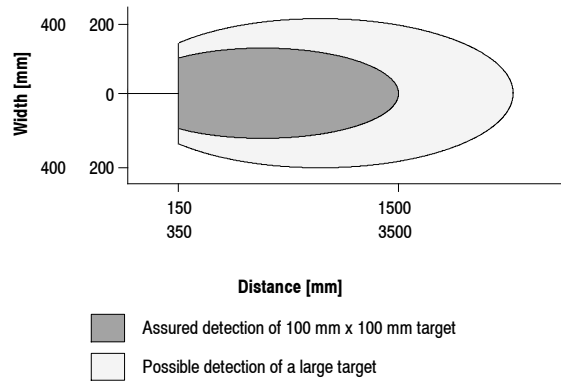
1500 mm

3500 mm

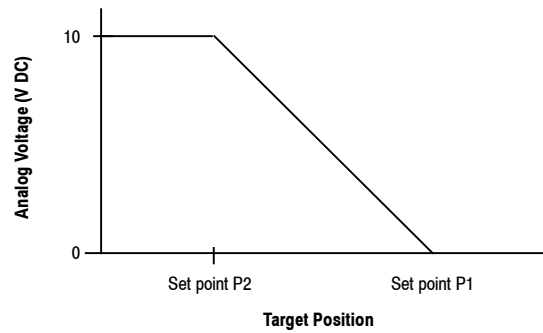
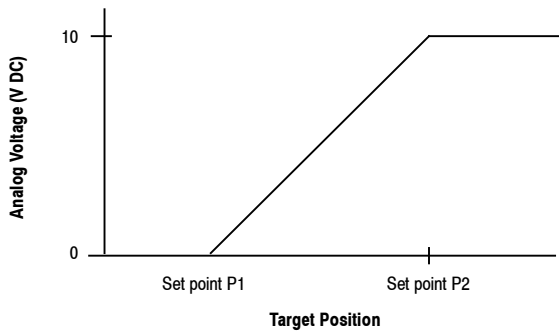
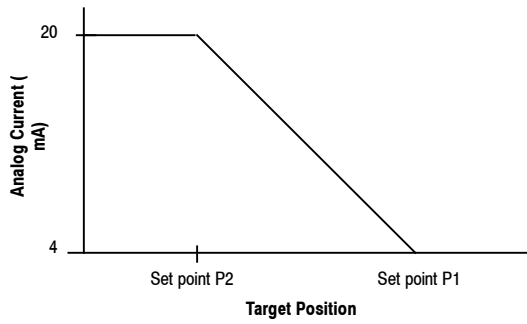
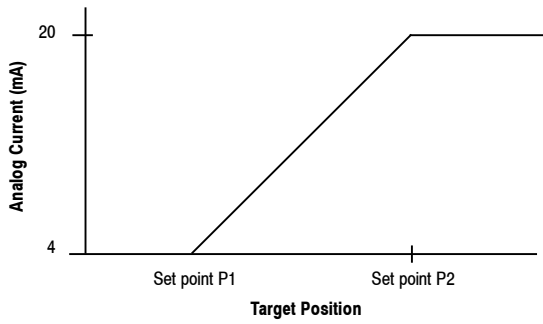
Wiring Diagram

	Pin	Function
	1	19...30V DC Operating Voltage
2	Set point (P2)	
3	0V DC	
4	Set point (P1)	
5	4...20 mA or 0...10V DC (depending on model)	

Beam Pattern



Analog Output

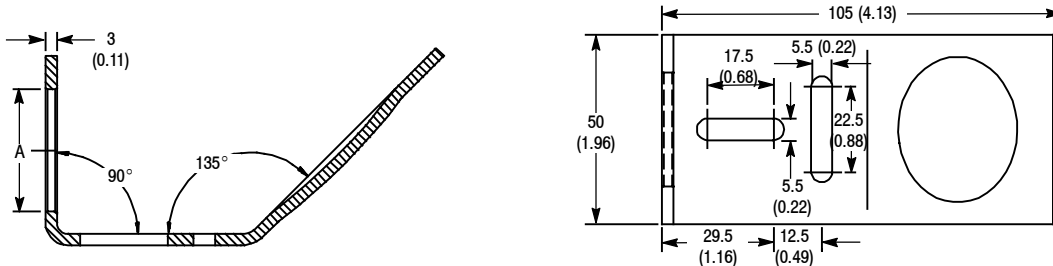


Accessories

Beam Deflectors

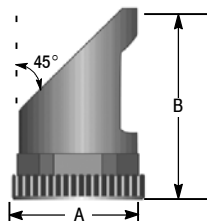
These plastic or stainless steel beam deflectors reduce the mounting profile for space critical applications by deflecting the ultrasonic beam 90°. In addition, stainless steel models provide mounting capability and focus the ultrasonic beam.

Ultrasonic Beam Deflector/Bracket—Stainless Steel [mm (in.)]



Sensor Diameter	A [mm (in.)]	Cat. No.
18 mm	20 (0.79) Dia.	60-2757
30 mm	32 (1.26) Dia.	60-2758

Ultrasonic Beam Deflector—Plastic [mm (in.)]



Sensor Diameter	A [mm (in.)]	B [mm (in.)]	Cat. No.
18 mm	23 (0.91)	35 (1.38)	60-2759
30 mm	35.5 (1.40)	54 (2.13)	60-2760



873C DC Cable Style
30 mm
page 3-12

Description

The Bulletin 873C ultrasonic sensor has the ability to detect solid and liquid targets from a distance of up to 1 m (3.3 ft).

The Bulletin 873C comes in one of two versions: a background suppression unit with analog voltage output or a standard diffuse model with a digital output.

The analog model provides an output voltage that varies linearly with the target distance and an adjustable background suppression feature. For many applications, such as monitoring the level of water in a tank, ultrasonic technology allows a single device to do a job that would otherwise require multiple sensors.

The digital model has a normally open PNP output that can be adjusted between 300 mm (11.8 in.) and 1 m (3.3 ft).

Features

- 3-wire operation
- 3-conductor connection
- 18...30V DC
- Analog or digital (discrete) output
- Metal, nonmetal solid and liquid sensing capability
- Short circuit, false pulse, reverse polarity, overload, and transient noise protection
- Adjustable sensing distance (digital/discrete model)
- Adjustable background suppression (analog model)
- CE Marked for all applicable directives

Specifications

Load Current, Max.	Discrete output: ≤ 400 mA Analog output: ≤ 5 mA
Load Current, Min.	1 mA
Leakage Current	≤ 10 μ A
Operating Voltage	18...30V DC
Sensor Voltage Drop	≤ 2.4 V
Analog Output	1...9V DC
Repeatability	± 5 mm in axial direction
Hysteresis	≤ 15 mm typical
Frequency	200 kHz
Pulse Cone Angle	8° (full angle)
Protection Type	False pulse, transients, reverse polarity, short circuit, overload
Certifications	CE Marked for all applicable directives
Enclosure Type Rating	NEMA 12 and IP65 (IEC529) Nickel-plated brass barrel with plastic face
Connection Type	Cable: 2 m (6.5 ft) length 3-conductor PVC
Indicator LED	Discrete Model: Output Energized Analog Model: Echo Detected
Operating Temperature [C (F)]	-10...+60° (+14...+140°)
Shock	30 g
Vibration	10...55 Hz

Target Considerations

Because ultrasonic sensors depend on a reflected sound wave for proper operation, the shape, material, temperature and positioning of the target are important. These must be selected to return the strongest possible echo.

The ideal target shape is a smooth, flat surface. Rounded or uneven objects can also be detected, but the sensing distances and/or analog output voltages will be reduced.

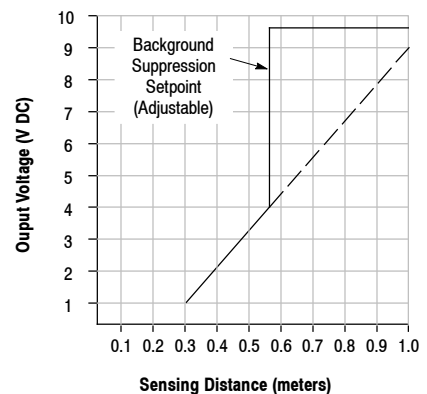
An object must be close to the sensor barrel axis to be detected because the 873C emits ultrasonic pulses in an 8° cone. Targets must be within this cone to reflect the pulses and activate the switch. The object's surface must also face directly toward the sensor to give a proper echo.

The sensor can be positioned accurately using the LED on its end, which glows with an intensity proportional to the strength of the echo. Simply place a target at the desired sensing point, then adjust the position and angle of the sensor to maximize the LEDs brightness.

Soft materials such as fabric or foam rubber are difficult to detect by ultrasonic technology because they are not adequately sound-reflective. This means that non-target objects in the sensing field can be hidden from the sensor by covering them with sound-absorbent material and/or by positioning them so that their echoes are not reflected to the detector.

Target temperatures must be at or below 100°C (212°F) for reliable sensing.

Output Voltage vs. Target Distance (Analog Model)



Ultrasonic Proximity Sensors

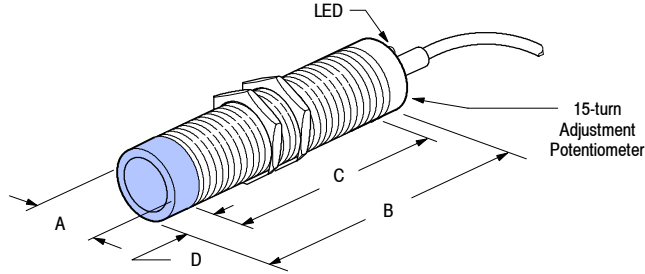
873C 3-Wire DC

Plastic Face/Threaded Nickel-Plated Brass Barrel

Product Selection

Barrel Diameter [mm]	Nominal Sensing Distance [mm (in.)]	Output Configuration		Switching Frequency (Hz)	Cat. No.
		Analog	PNP		
30	300...1000 (11.81...39.37)	N.O.	PNP	5	873C- DDAV1000E2
					873C- DDNP1000E2

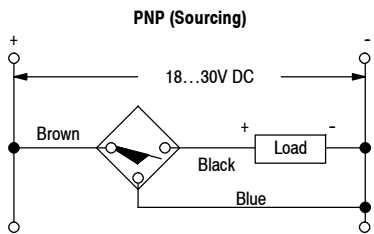
Approximate Dimensions [mm (in.)]



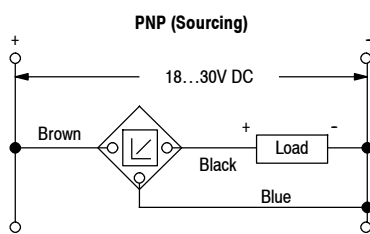
Thread Size	[mm (in.)]			
	A	B	C	D
M30 X 1.5	30.0 (1.18)	117.0 (4.61)	95.0 (3.74)	12.0 (0.47)

Wiring Diagrams

Normally Open Digital (Discrete)



Analog



Accessories

Description	Page Number
Mounting Brackets	2-210...2-214
Extra Mounting Nuts	2-221...2-222

873E RightSound™ Opposed Mode Clear Object Sensing System

18 mm Right Angle Plastic Housing



Opposed Mode
18 mm

Description

RightSound Bulletin 873E sensors are opposed mode ultrasonic sensors consisting of an emitter and a receiver. The receiver is microprocessor based to provide advanced temperature stability and noise immunity. Precise tuning of the receiver to the emitter minimizes interference from ambient noise sources.

The emitter volume control allows the operator to correctly adjust the volume for the sensing distance (distance from the emitter to the receiver) and other variables of a given application (i.e., target speed and spacing, etc.).

The sensing of clear objects, which can be difficult to do reliably with photoelectric controls, is made highly reliable with RightSound ultrasonic sensors. RightSound sensors have been designed for demanding environments, especially those of the Food and Beverage Industry. The NORYL housings are extremely rugged and are rated for 1200 psi washdown and NEMA 4X and 6P standards. The acoustic faces of the emitter and receiver are made of FDA compliant silicone rubber for maximum durability and water ingress protection.

Receivers come with both NPN current sinking and PNP current sourcing outputs rated to 100 mA. The receiver has the ability to operate in either a

Specifications

Emitter	873E-EDZZ0750A2 (2 m (6.5 ft) 300V cable) 873E-EDZZ0750F4 (4-pin DC micro style QD pigtail)
Receiver	873E-RDTT0750A2 (2 m (6.5 ft) 300V cable) 873E-RDTT0750F4 (4-pin DC micro style QD pigtail)
Sensing Mode	Opposed
Sensing Range [mm (in.)]	50...750 (2...30)
Protection Type	False pulse, transient noise, short circuit, overload, reverse polarity
Operating Voltage	10.8...30V DC
Output Type	NPN/PNP
Outputs	Normally Open/Normally Closed
Load Current, Max.	100 mA
Leakage Current	0.1 mA max.
Response Time	<2.5 ms
Power-up Delay	<300 ms
Switching Frequency, Max.	125 Hz
Frequency	200...240 kHz
Pulse Cone Angle	(+/-) 5°
Material	Noryl
Sensing Face Material	FDA compliant silicone rubber
Enclosure Type Rating	NEMA 4X, 6P; IP67 (IEC529); 1200 psi (8270 kPa) washdown
Connection Type	Cable: #22 AWG PVC, 2 m (6.5 ft) QD: 4-pin DC micro style male receptacle on pigtail
Vibration	20 g, 10...55 Hz (non-operational)
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Storage Temperature [C (F)]	-40...+85° (-40...+185°)
Relative Humidity	Not to exceed 95%, noncondensing
Certifications	UL, cUL, and CE Marked for all applicable directives
Standards	IEC60947-5-2, EN60947-5-2

normally open or normally closed mode. Modes are selected by the polarity of receiver supply voltage. When the receiver is in the normally open mode, the output conducts when the receiver hears a RightSound emitter.

When the receiver is in the normally closed mode, the output conducts when the sonic beam from the emitter is blocked or not present.

Features

- Continuously adjustable emitter amplitude with instability indicator allows for simple optimized adjustment over 2...30 inch sensing range.
- Ideal solution for sensing clear objects or materials including glass and plastic bottles.
- Highly immune to ambient sonic and electrical noise.
- Popular right angle package allows through hole mounting as well as 18 mm threaded mounting hubs on the sensor nose and base.
- Highly visible 360° indicators conveniently mounted at the top of the sensor.
- Designed to Rugged Food Industry Standards: enclosure rated for 1200 psi washdown as well as NEMA 4X, 6P and IP67 water ingress standards.
- Receivers come with both NPN (sinking) and PNP (sourcing) outputs; output logic switchable via polarity of receiver power wiring; simplified product selection... Select a 6.5 foot cable or a 6 inch pigtail quick-disconnect and cordset and you're ready to start sensing!
- 10.8...30V DC operation with protections for short circuit, overload, reverse polarity, false pulse and transient noise.

873E RightSound™ Opposed Mode Clear Object Sensing System

18 mm Right Angle Plastic Housing

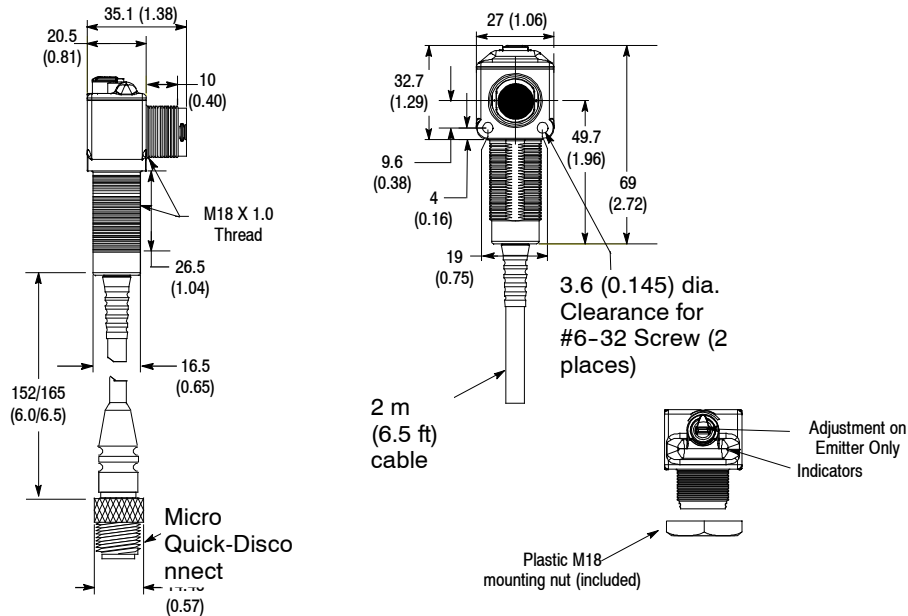
Product Selection

Sensor Type	Termination Type	Operating Voltage/Supply Current	Cat. No.
Emitter	2 m (6.5 ft) Cable 300V	10.8...30V DC 20 mA @ 20°C 100 mA @ -25°C	873E- EDZZ0750A2
Emitter	Micro Style QD		873E- EDZZ0750F4
Receiver	2 m (6.5 ft) Cable 300V	10.8...30V DC 10 mA	873E- RDTT0750A2
Receiver	Micro Style QD		873E- RDTT0750F4
DC Micro QD	Recommended Standard QD Cordset (-2 = 2 m (6.5 ft))		889D- F4AC- 2

LED Indicator Lights

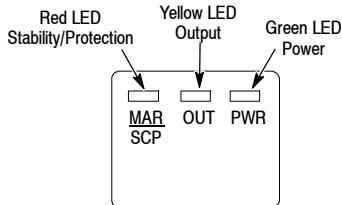
Sensor Type	Label	Color	Status
Emitter	—	Green	Sensor powered
	PWR		Sensor powered
Receiver	OUT	Yellow	Output is conducting
	MAR/SCP	Red	Unreliable sensing condition (On)
			Output in overload or short circuit (Flashing)

Approximate Dimensions [mm (in.)]

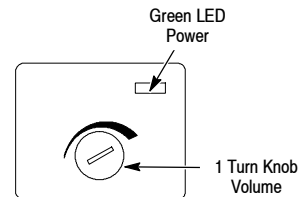


LED and Adjustment Locations

RightSound Ultrasonic Receiver



RightSound Ultrasonic Emitter



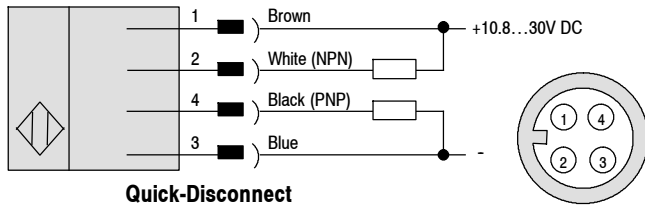
873E RightSound™ Opposed Mode Clear Object Sensing System

18 mm Right Angle Plastic Housing

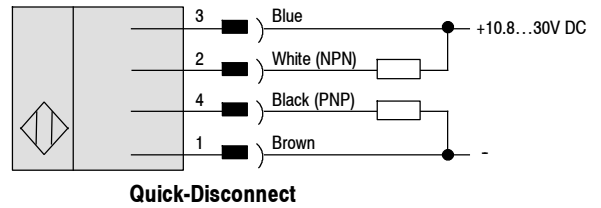
Wiring Diagrams

Receivers with Quick-Disconnect

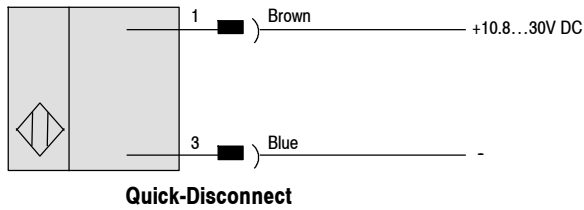
Normally Open Configuration



Normally Closed Configuration

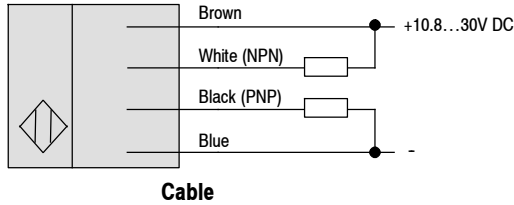


Emitter with Quick-Disconnect

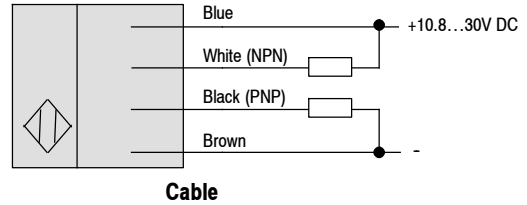


Receivers with Cable

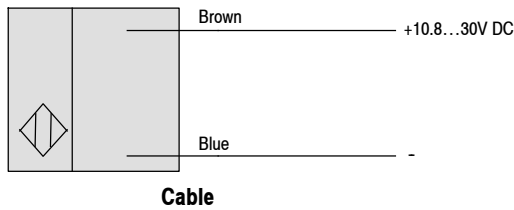
Normally Open Configuration



Normally Closed Configuration



Emitter with Cable



Accessories



Description	Page Number
Terminal Chambers	8-24
Mounting Brackets	2-210...2-214
Mounting Nuts	2-221...2-222

Notes

General Information	Quick Selection Guide	page 4-2
	Technical Definitions and Terminology	page 4-3
	Introduction	page 4-5
Products	875C and 875CP Nickel-Plated and Plastic Barrel	page 4-9
	Accessories	Mounting Brackets, Sight Glass Style
Sensor Wells		page 4-22
Indexes	Cat. No. Index	page 13-1
	Comprehensive Product Index	page 14-1

Capacitive Proximity Sensors

Quick Selection Guide

Specifications	 <p>875C General Purpose Tubular</p>		 <p>875CP Plastic Barrel Tubular</p>	
	Description	<ul style="list-style-type: none"> Nickel-plated brass barrel 		<ul style="list-style-type: none"> Plastic barrel
Features	<ul style="list-style-type: none"> Capacitive technology senses metals and nonmetals, liquid and solids Adjustable sensing distance 3-wire DC and 2-wire AC models DC models have short circuit, overload, transient noise, and reverse polarity protection Cable or quick-disconnect styles 		<ul style="list-style-type: none"> Capacitive technology senses metals and nonmetals, liquid and solids Adjustable sensing distance 3-wire DC and 2-wire AC models DC models have short circuit, overload, transient noise, and reverse polarity protection Cable or quick-disconnect styles 	
Operating Voltage	<ul style="list-style-type: none"> 10...48V DC 	<ul style="list-style-type: none"> 24...240V AC 	<ul style="list-style-type: none"> 10...48V DC 	<ul style="list-style-type: none"> 24...240V AC
Diameter	<ul style="list-style-type: none"> 12, 18, 30 mm 	<ul style="list-style-type: none"> 18, 30 mm 	<ul style="list-style-type: none"> 18, 30, 34 mm 	<ul style="list-style-type: none"> 18, 30, 34 mm
Available Models	<ul style="list-style-type: none"> DC 3-Wire Nickel-Plated Brass Barrel 	<ul style="list-style-type: none"> AC 2-Wire Nickel-Plated Brass Barrel 	<ul style="list-style-type: none"> DC 3-Wire Plastic Barrel 	<ul style="list-style-type: none"> AC 2-Wire Plastic Barrel
Connection	<ul style="list-style-type: none"> PVC Cable Pico QD (18 mm) Micro QD (30 mm) 	<ul style="list-style-type: none"> PVC Cable Micro QD (30 mm) 	<ul style="list-style-type: none"> PVC Cable Pico QD (18 mm) Micro QD (30 & 34 mm) 	<ul style="list-style-type: none"> PVC Cable Micro QD (30 & 34 mm)
Enclosure	<ul style="list-style-type: none"> Nickel-plated brass barrel NEMA 1, 3, 4, 6, 13; IP67 		<ul style="list-style-type: none"> Plastic barrel NEMA 12; IP67 (IEC 529) 	
Additional Info	<ul style="list-style-type: none"> See page 4-10 	<ul style="list-style-type: none"> See page 4-16 	<ul style="list-style-type: none"> See page 4-13 	<ul style="list-style-type: none"> See page 4-18

Axial Approach: The approach of the target with its center maintained on the reference axis.

Complementary Outputs: (N.O. & N.C.) A proximity sensor that features both normally open and normally closed outputs, which can be used simultaneously.

Correction Factors: Suggested multiplication factors taking into account variations in the target material composition. When figuring actual sensing distance this factor should be multiplied with the nominal sensing distance.

Current Consumption: The current consumed by the proximity switch when the output device is in the off condition.

Differential Travel: See Hysteresis.

Dual Output: Sensor which has two outputs which may be complementary or may be of a single type (i.e. two normally open or two normally closed).

Effective Operating Distance: (Sr) The operating distance of an individual proximity switch measured at stated temperature, voltage, and mounting condition.

False Pulse: An undesired change in the state of the output of the proximity switch that lasts for more than two milliseconds.

Flush Mounting: A shielded proximity sensor which can be flush mounted in metal up to the plane of the active sensing face.

Free Zone: The area around the proximity switch which must be kept free from any damping material.

Hysteresis: The difference, in percentage (%), of the nominal sensing distance between the operate (switch on) and release point (switch off) when the target is moving away from the sensors active face. Without sufficient hysteresis a proximity sensor will “chatter” (continuously switch on and off) when there is significant vibration applied to the target or sensor.

Isolation Voltage: Maximum rated voltage between isolated outputs or input and output.

Lateral Approach: The approach of the target perpendicular to the reference axis.

Leakage Current: Current which flows through the output when the output is in an “off” condition or de-energized. This current is necessary to supply power to the electronics of the sensor.

LED: Light Emitting Diode used to indicate sensor status.

Maximum Load Current: The maximum current level at which the proximity sensor can be continuously operated.

Maximum Inrush Current: The maximum current level at which the proximity sensor can be operated for a short period of time.

Minimum Load Current: The minimum amount of current required by the sensor to maintain reliable operation.

Sensing Distance: The distance at which an approaching target activates (changes state of) the proximity output.

Normally Closed: Output opens when an object is detected in the active switching area.

Normally Open: Output closes when an object is detected in the active switching area.

NPN: The sensor switches the load to the negative terminal. The load should be connected between the sensor output and positive terminal.

Operating Distance, Rated: The operating distance specified by the manufacturer and used as a reference value. Also known as nominal sensing distance.

PNP: The sensor switches the load to the positive terminal. The load should be connected between the sensor output and negative terminal.

Programmable Output: (N.O. or N.C.) Output which can be changed from N.O. to N.C. or N.C. to N.O. by way of a switch or jumper wire. Also known as selectable output.

Repeatability: The variation of the effective operating distance measured at room temperature and constant supply voltage. It is expressed as a percentage of the sensing distance.

Residual Voltage: The voltage across the sensor output while energized and carrying maximum load current.

Response Time: See Switching Frequency.

Reverse Polarity Protection: Proximity sensors which are protected against a reversal in voltage polarity.

Ripple: The variance between peak-to-peak values in DC voltage. It is expressed in percentage of rated voltage.

Sensing Range: The rated operating distance.

Shielded: Sensor which can be flush mounted in metal up to the plane of the active sensing face.

Short Circuit Protection: (SCP) Sensor protected from damage when a shorted condition exists for an indefinite or defined period of time.

Sinking: See NPN.

Sourcing: See PNP.

Switching Frequency: The maximum number of times per second the sensor can change state (ON and OFF) usually expressed in Hertz (Hz). As measured in DIN EN 50010.

Target: Object which activates the sensor.

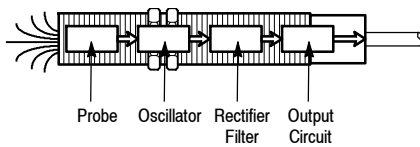
Three-Wire Proximity Switch: An AC or DC proximity sensor with three leads, two of which supply power and a third that switches the load.

Two-Wire Proximity Switch: A proximity sensor which switches a load connected in series to the power supply. Power for the proximity switch is obtained through the load at all times.

Voltage Drop: The maximum voltage drop across a conducting sensor.

Notes

Principles of Operation for Capacitive Proximity Sensors



Capacitive proximity sensors are designed to operate by generating an electrostatic field and detecting changes in this field caused when a target approaches the sensing face. The sensor's internal workings consist of a capacitive probe, an oscillator, a signal rectifier, a filter circuit and an output circuit.

In the absence of a target, the oscillator is inactive. As a target approaches, it raises the capacitance of the probe system. When the capacitance reaches a specified threshold, the oscillator is activated which triggers the output circuit to change between "on" and "off."

The capacitance of the probe system is determined by the target's size, dielectric constant and distance from the probe. The larger the size and dielectric constant of a target, the more it increases capacitance. The shorter the distance between target and probe, the more the target increases capacitance.

Standard Target and Grounding for Capacitive Proximity Sensors

The standard target for capacitive sensors is the same as for inductive proximity sensors. The target is grounded per IEC test standards. However, a target in a typical application does not need to be grounded to achieve reliable sensing.

Shielded vs. Unshielded Capacitive Sensors

Shielded capacitive proximity sensors are best suited for sensing low dielectric constant (difficult to sense) materials due to their highly concentrated electrostatic fields. This allows them to detect targets which unshielded sensors cannot. However, this also makes them more susceptible to false triggers due to the accumulation of dirt or moisture on the sensor face.

The electrostatic field of an unshielded sensor is less concentrated than that of a shielded model. This makes them well suited for detecting high dielectric constant (easy to sense) materials or for differentiating between materials with high and low constants. For the right target materials, unshielded capacitive proximity sensors have longer sensing distances than shielded versions.

Unshielded capacitive sensors are also more suitable than shielded types for use with plastic sensor wells, an accessory designed for liquid level applications. The well is mounted through a hole in a tank and the sensor is slipped into the well's receptacle. The sensor detects the liquid in the tank through the wall of the sensor well. This allows the well to serve both as a plug for the hole and a mount for the sensor.

Target Correction Factors for Capacitive Proximity Sensors

For a given target size, correction factors for capacitive sensors are determined by a property of the target material called the dielectric constant. Materials with higher dielectric constant values are easier to sense than those with lower values. A partial listing of dielectric constants for some typical industrial materials follows. For more information, refer to the *CRC Handbook of Chemistry and Physics (CRC Press)*, the *CRC Handbook of Tables for Applied Engineering Science (CRC Press)*, or other applicable sources.

Dielectric Constants of Common Industrial Materials

Acetone	19.5
Acrylic Resin	2.7-4.5
Air	1.000264
Alcohol	25.8
Ammonia	15-25
Aniline	6.9
Aqueous Solutions	50-80
Bakelite	3.6
Benzene	2.3
Carbon Dioxide	1.000985
Carbon Tetrachloride	2.2
Celluloid	3.0
Cement Powder	4.0
Cereal	3-5
Chlorine Liquid	2.0
Ebonite	2.7-2.9
Epoxy Resin	2.5-6
Ethanol	24
Ethylene Glycol	38.7
Fired Ash	1.5-1.7
Flour	1.5-1.7
Freon R22 & 502 (liquid)	6.11
Gasoline	2.2
Glass	3.7-10
Glycerine	47
Marble	8.0-8.5
Melamine Resin	4.7-10.2
Mica	5.7-6.7
Nitrobenzene	36
Nylon	4-5
Oil Saturated Paper	4.0
Paraffin	1.9-2.5
Paper	1.6-2.6
Perspex	3.2-3.5
Petroleum	2.0-2.2
Phenol Resin	4-12
Polyacetal	3.6-3.7
Polyamide	5.0
Polyester Resin	2.8-8.1
Polyethylene	2.3
Polypropylene	2.0-2.3
Polystyrene	3.0
Polyvinyl Chloride Resin	2.8-3.1
Porcelain	4.4-7
Powdered Milk	3.5-4
Press Board	2-5
Quartz Glass	3.7
Rubber	2.5-35
Salt	6.0
Sand	3-5
Shellac	2.5-4.7
Shell Lime	1.2
Silicon Varnish	2.8-3.3
Soybean Oil	2.9-3.5
Styrene Resin	2.3-3.4
Sugar	3.0
Sulphur	3.4
Teflon	2.0
Toluene	2.3
Transformer Oil	2.2
Turpentine Oil	2.2
Urea Resin	5-8
Vaseline	2.2-2.9
Water	80
Wood, Dry	2-7
Wood, Wet	10-30

Introduction

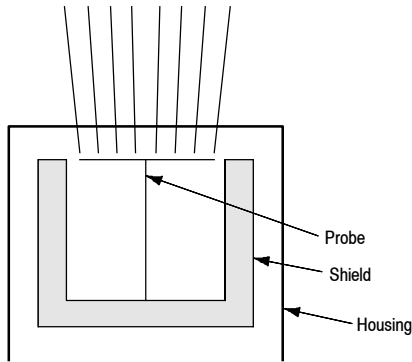
Shielded vs. Unshielded Construction

Each capacitive sensor can be classified as having either a shielded or unshielded construction.

Shielded Probe

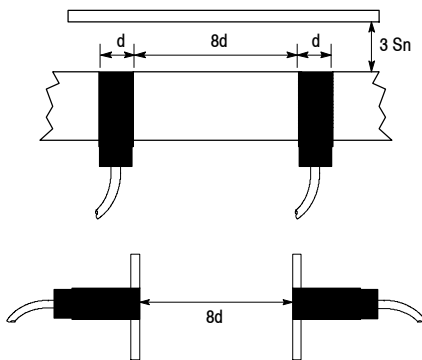
Shielded sensors are constructed with a metal band surrounding the probe. This helps to direct the electrostatic field to the front of the sensor and results in a more concentrated field.

Shielded Probe



Shielded construction allows the sensor to be mounted flush in surrounding material without causing false trigger.

Shielded Sensors Flush Mounted

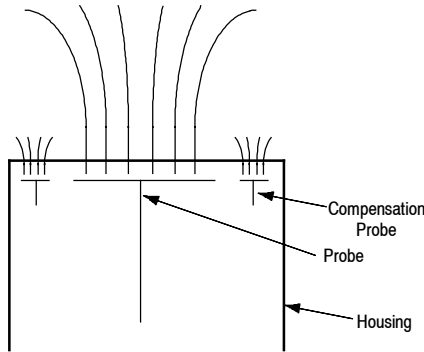


Shielded capacitive proximity sensors are best suited for sensing materials with low dielectric constants (difficult to sense) as a result of their highly concentrated electrostatic fields. This allows them to detect targets that unshielded sensors cannot.

Unshielded Probe

Unshielded sensors do not have a metal band surrounding the probe and hence have a less concentrated electrostatic field. Many unshielded models are equipped with compensation probes, which provide increased stability for the sensor. Compensation probes are discussed later in this section.

Unshielded Probe

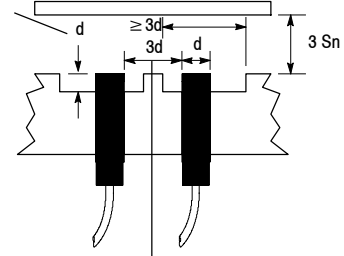


Unshielded capacitive sensors are also more suitable than shielded types for use with plastic sensor wells, an accessory designed for liquid level

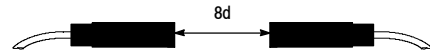
applications. The well is mounted through a hole in a tank and the sensor is slipped into the well's receptacle. The sensor detects the liquid in the tank through the wall of the sensor well.

Unshielded Construction Mounted Above Metal and Mounted in Plastic Sensor Well

d for capacitive sensors if mounted in plastic. $3d$ (12, 18 mm models) or $1.5d$ (30, 34 mm models) if mounted in metal.



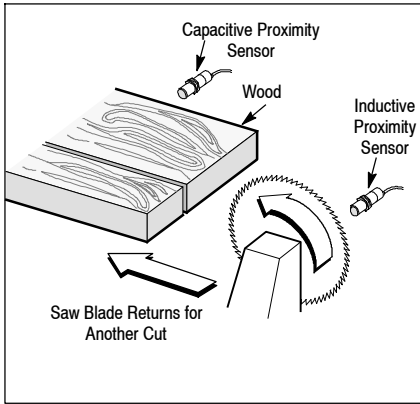
For capacitive sensors, $3d$ at medium sensitivity to $8d$ for maximum sensitivity.



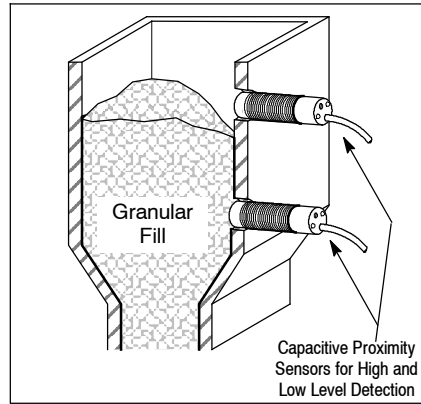
d = diameter or width of active sensing face
 S_n = nominal sensing distance

The electrostatic field of an unshielded sensor is less concentrated than that of a shielded model. This makes them well suited for detecting high dielectric constant (easy to sense) materials or for differentiating between materials with high and low constants. For certain target materials, unshielded capacitive proximity sensors have longer sensing distances than shielded versions.

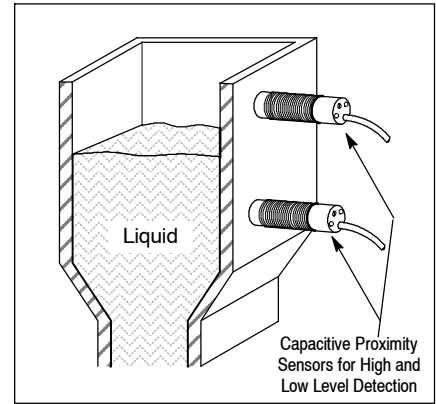
Wood Industry



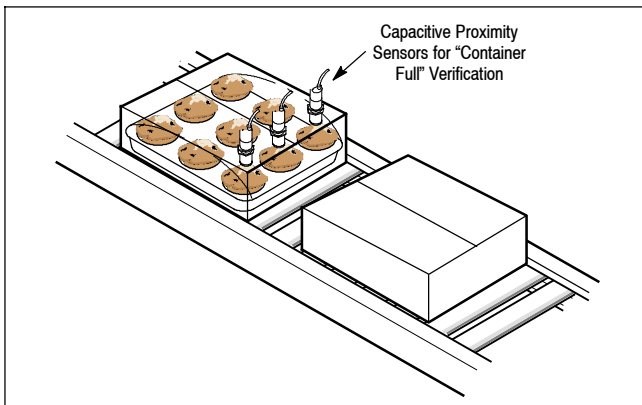
Level Detection



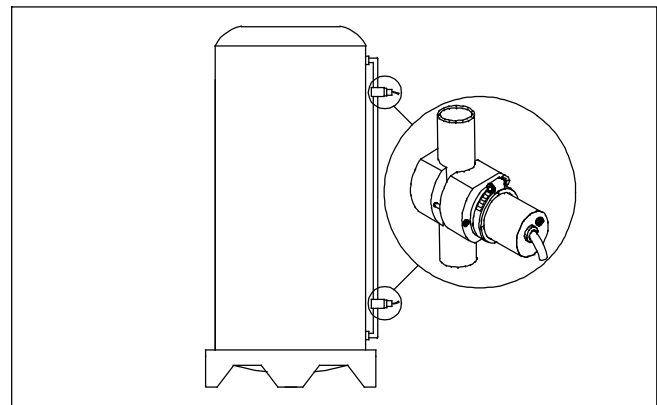
Liquid Level Detection

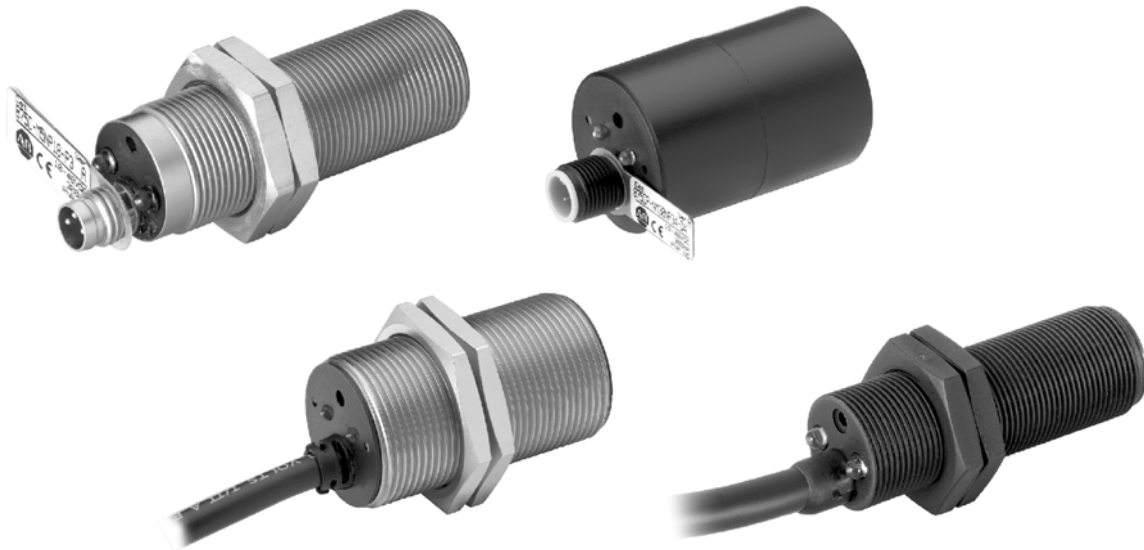


Food Processing



Sight-Tube Level Detection





Description

Bulletin 875C and 875CP capacitive proximity sensors are self-contained solid-state devices designed for noncontact sensing of a wide range of materials.

Unlike inductive proximity sensors, the 875C and 875CP can detect nonmetal solids and liquids in addition to standard metal targets. They can even sense the presence of some targets through certain other materials, making them an ideal choice in some applications where inductive proximity and photoelectric sensors cannot be used.

Each unit has an adjustable sensing distance and is equipped with two LEDs to indicate power and output. They are housed in either a nickel-plated brass barrel (shielded models) or a plastic barrel (unshielded models) which meets NEMA 12 and IP67 (IEC 529) enclosure standards. Connection options include PVC cable as well as micro and pico quick-disconnect.

Features

- Metal, nonmetal solid and liquid sensing capability
- Adjustable sensing distance
- Cable or quick-disconnect styles
- Short circuit^❶, overload^❶, reverse polarity^❶, and transient noise protection
- Plastic models have glass filled nylon housings
- Meets NEMA 12 and IP67 (IEC 529) enclosure standards
- CE Marked for all applicable directives

Styles

DC 3-Wire Nickel-Plated Brass Barrel	page 4-10
DC 3-Wire Plastic Barrel . . .	page 4-13
AC 2-Wire Nickel-Plated Brass Barrel	page 4-16
AC 2-Wire Plastic Barrel . . .	page 4-18

Accessories

Cordsets	page 9-1
Mounting Brackets	
Sight Glass Style	page 4-21
Sensor Wells	page 4-22

^❶ DC models only.

875C 3-Wire DC

Plastic Face/Threaded Nickel-Plated Brass Barrel



875C DC Cable Style
12, 18, 30 mm
page 4-11



875C DC Micro
Quick-Disconnect Style
18 and 30 mm
page 4-12



875C DC Pico
Quick-Disconnect Style
18 mm
page 4-12

Specifications

	12 mm	18 mm	30 mm
Load Current	300 mA	300 mA	300 mA
Leakage Current	0.3 mA	0.1 mA	0.1 mA
Operating Voltage	10...48V DC	10...48V DC	10...48V DC
Voltage Drop	≤ 2V	≤ 2V	≤ 2V
Current Consumption	≤ 10 mA		
Repeatability	≤ 10%		
Hysteresis	≤ 20%		
Transient Noise Protection	Incorporated		
Reverse Polarity Protection	Incorporated		
Short Circuit Protection	Incorporated		
Overload Protection	Incorporated		
Certifications	CE Marked for all applicable directives		
Enclosure	NEMA 1, 3, 4, 6, 13 and IP67; Nickel-plated brass barrel		
Connections	Cable: 2 meter length; 3 conductor PVC Quick-Disconnect: 4-pin micro; 3-pin pico		
LEDs	Green: Power Yellow: Output		
Operating Temperature [C (F)]	-25...+75° (-13...+167°)		
Shock	30 g, 11 ms		
Vibration	55 Hz, 1 mm amplitude, 3 planes		

Correction Factors

Target Material	Correction Factor
Acetone	0.75
Acrylic Resin	0.10...0.25
Air	0.0
Alcohol	0.85
Ammonia	0.70...0.85
Aniline	0.40
Aqueous Solutions	0.98...1.0
Bakelite	0.20
Benzene	0.10
Carbon Dioxide	0.0
Carbon Tetrachloride	0.10
Celluloid	0.15
Cement Powder	0.25
Cereal	0.15...0.30
Chlorine Liquid	0.10
Ebonite	0.15
Epoxy Resin	0.15...0.35
Ethanol	0.85
Ethylene Glycol	0.93
Fired Ash	0.05
Flour	0.05
Freon R22 & 502 (liquid)	0.35
Gasoline	0.10
Glass	0.20...0.55
Glycerine	0.98
Marble	0.50
Melamine Resin	0.25...0.55
Mica	0.35
Nitrobenzine	0.93
Nylon	0.20...0.30
Oil Saturated Paper	0.25
Paraffin	0.10
Paper	0.10

Correction Factors

Target Material	Correction Factor
Perspex	0.15
Petroleum	0.05
Phenol Resin	0.20...0.60
Polyacetal	0.20
Polyamide	0.30
Polyester Resin	0.15...0.50
Polyethylene	0.10
Polypropylene	0.10
Polystyrene	0.15
Polyvinyl Chloride Resin	0.15
Porcelain	0.25...0.40
Powdered Milk	0.20
Press Board	0.10...0.30
Quartz Glass	0.20
Rubber	0.15...0.90
Salt	0.35
Sand	0.15...0.30
Shellac	0.15...0.25
Shell Lime	<0.05
Silicon Varnish	0.15
Soybean Oil	0.15
Styrene Resin	0.15
Sugar	0.15
Sulphur	0.15
PTFE	0.10
Toluene	0.10
Transformer Oil	0.10
Turpentine Oil	0.10
Urea Resin	0.30...0.45
Vaseline	0.10
Water	1.0
Wood, Dry	0.10...0.40
Wood, Wet	0.60...0.85

Features

- Metal, nonmetal solid and liquid sensing capability
- Adjustable sensing distance for 18 mm and 30 mm models
- 3-wire operation
- 3 conductor, 3-pin or 4-pin connection
- Normally open or normally closed output
- Short circuit, overload, reverse polarity, and transient noise protection
- CE Marked for all applicable directives

Product Selection

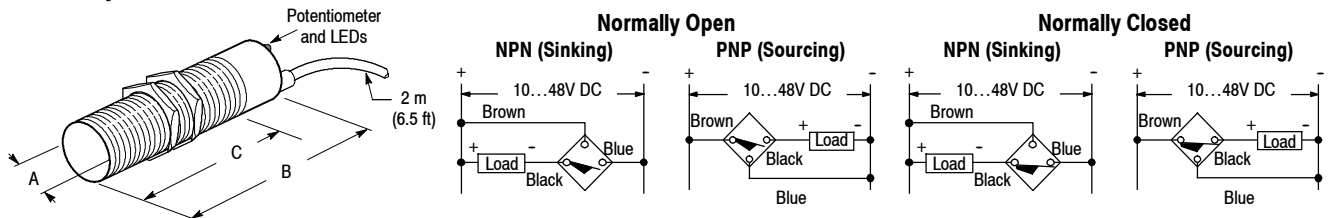
Barrel Dia. & Type	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration		Switching Frequency (Hz)	Cat. No.			
						Cable Style	Micro QD Style	Pico QD Style	
12 mm Threaded	2.5 (0.09)	Y	N.O.	PNP	100	875C-M2NP12-A2	—	—	
18 mm Threaded	1 (0.04)...5 (0.20)			NPN		875C-M5NP18-A2	—	875C-M5NP18-P3	
			N.C.	PNP		875C-M5NN18-A2	—	875C-M5NN18-P3	
				NPN		875C-M5CP18-A2	—	875C-M5CP18-P3	
			30 mm Threaded	2 (0.08)...10 (0.39)		N.O.	PNP	875C-M5CN18-A2	—
NPN	875C-M10NP30-A2						875C-M10NP30-D4	—	
N.C.	PNP					875C-M10NN30-A2	875C-M10NN30-D4	—	
	NPN					875C-M10CP30-A2	875C-M10CP30-D4	—	
						NPN	875C-M10CN30-A2	875C-M10CN30-D4	—
Recommended standard QD cordset (-2 = 2 m (6.5 ft))						889D-F4AC-2	889P-F3AB-2		

QD Cordsets and Accessories

Description	Page Number
Mounting Brackets	2-210...2-214
Mounting Nuts	2-221...2-222
Terminal Chambers	8-1
Other Cordsets Available	8-1

Approximate Dimensions [mm (in.)] Wiring Diagram

Cable Style



Thread Size	mm (inches)		
	A	B	C
M12 x 1	12.0 (0.47)	50.0 (1.96)	42.0 (1.65)
M18 x 1	18.0 (0.71)	52.0 (2.04)	47.4 (1.87)
M30 x 1.5	30.0 (1.18)	53.0 (2.08)	53.0 (2.08)

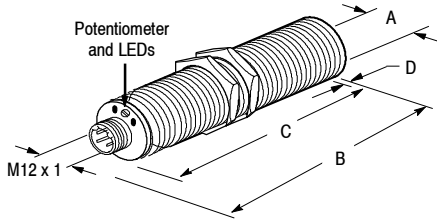
Capacitive Proximity Sensors

875C 3-Wire DC

Plastic Face/Threaded Nickel-Plated Brass Barrel

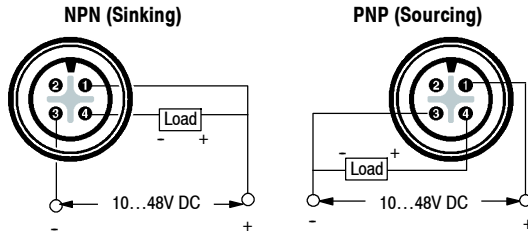
Approximate Dimensions [mm (in.)]

Micro QD Style



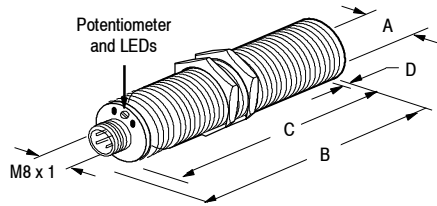
Wiring Diagram

Normally Open or Normally Closed

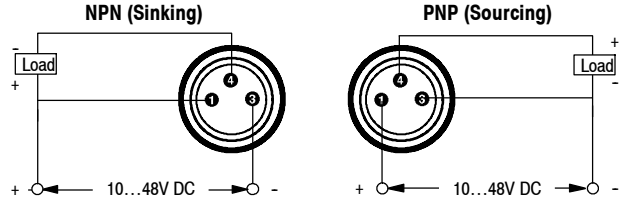


Thread Size	mm (inches)			
	A	B	C	D
M30 x 1.5	30.0 (1.18)	66.0 (2.60)	53.0 (2.08)	1.0 (0.04)

Pico QD Style



Normally Open or Normally Closed



Thread Size	mm (inches)			
	A	B	C	D
M18 x 1	18.0 (0.71)	61.5 (2.42)	52.0 (2.04)	1.0 (0.04)



875CP DC Micro
Quick-Disconnect Style
Smooth Barrel 34 mm
page 4-14



875CP DC Pico
Quick-Disconnect Style
Threaded Barrel 18 mm
page 4-14

Specifications

Load Current	≤ 300 mA
Leakage Current	0.01 mA
Operating Voltage	10...48V DC
Voltage Drop	<2V
Current Consumption	≤ 10 mA
Repeatability	≤ 10%
Hysteresis	≤ 20%
Transient Noise Protection	Incorporated
Reverse Polarity Protection	Incorporated
Short Circuit Protection	Incorporated
Overload Protection	Incorporated
Certifications	CE Marked for all applicable directives
Enclosure	NEMA 12; IP67 (IEC 529) Plastic barrel
Connections	Cable: 2 meter length; 3 conductor PVC Quick-Disconnect: 4-pin micro; 3-pin pico
LEDs	Green: Power Yellow: Output
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Acetone	0.75
Acrylic Resin	0.10...0.25
Air	0.0
Alcohol	0.85
Ammonia	0.70...0.85
Aniline	0.40
Aqueous Solutions	0.98...1.0
Bakelite	0.20
Benzene	0.10
Carbon Dioxide	0.0
Carbon Tetrachloride	0.10
Celluloid	0.15
Cement Powder	0.25
Cereal	0.15...0.30
Chlorine Liquid	0.10
Ebonite	0.15
Epoxy Resin	0.15...0.35
Ethanol	0.85
Ethylene Glycol	0.93
Fired Ash	0.05
Flour	0.05
Freon R22 & 502 (liquid)	0.35
Gasoline	0.10
Glass	0.20...0.55
Glycerine	0.98
Marble	0.50
Melamine Resin	0.25...0.55
Mica	0.35
Nitrobenzine	0.93
Nylon	0.20...0.30
Oil Saturated Paper	0.25
Paraffin	0.10
Paper	0.10

Correction Factors

Target Material	Correction Factor
Perspex	0.15
Petroleum	0.05
Phenol Resin	0.20...0.60
Polyacetal	0.20
Polyamide	0.30
Polyester Resin	0.15...0.50
Polyethylene	0.10
Polypropylene	0.10
Polystyrene	0.15
Polyvinyl Chloride Resin	0.15
Porcelain	0.25...0.40
Powdered Milk	0.20
Press Board	0.10...0.30
Quartz Glass	0.20
Rubber	0.15...0.90
Salt	0.35
Sand	0.15...0.30
Shellac	0.15...0.25
Shell Lime	<0.05
Silicon Varnish	0.15
Soybean Oil	0.15
Styrene Resin	0.15
Sugar	0.15
Sulphur	0.15
PTFE	0.10
Toluene	0.10
Transformer Oil	0.10
Turpentine Oil	0.10
Urea Resin	0.30...0.45
Vaseline	0.10
Water	1.0
Wood, Dry	0.10...0.40
Wood, Wet	0.60...0.85

Features

- Metal, nonmetal solid and liquid sensing capability
- Adjustable sensing distance
- 3-wire operation
- 3 conductor, 3-pin or 4-pin connection
- 10...48V DC
- Normally open or normally closed output
- Short circuit, overload, reverse polarity and transient noise protection
- CE Marked for all applicable directives

Capacitive Proximity Sensors

875CP 3-Wire DC

Plastic Face/Threaded or Smooth Plastic Barrel

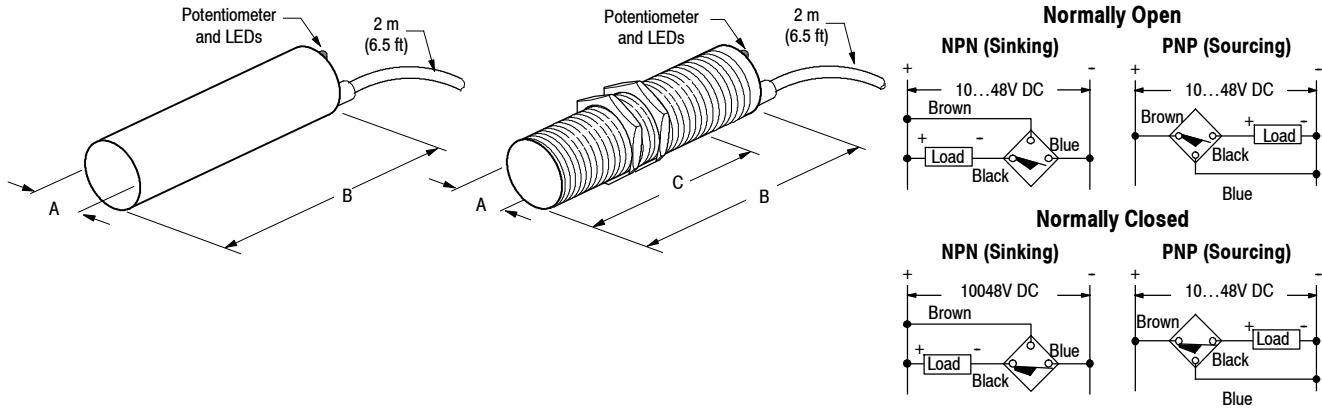
Product Selection

Barrel Dia. & Type	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration		Switching Frequency (Hz)	Cat. No.		
						Cable Style	Micro QD Style	Pico QD Style
18 mm Threaded	2 (0.08)...8 (0.31)		N.O.	PNP	100	875CP-N8NP18-A2	—	875CP-N8NP18-P3
				NPN		875CP-N8NN18-A2	—	875CP-N8NN18-P3
			N.C.	PNP		875CP-N8CP18-A2	—	875CP-N8CP18-P3
				NPN		875CP-N8CN18-A2	—	875CP-N8CN18-P3
30 mm Threaded	5 (0.20)...20 (0.79)	N	N.O.	PNP		875CP-N20NP30-A2	875CP-N20NP30-D4	—
				NPN		875CP-N20NN30-A2	875CP-N20NN30-D4	—
			N.C.	PNP		875CP-N20CP30-A2	875CP-N20CP30-D4	—
				NPN		875CP-N20CN30-A2	875CP-N20CN30-D4	—
34 mm Smooth	7 (0.28)...30 (1.18)		N.O.	PNP	875CP-NM30NP34-A2	875CP-NM30NP34-D4	—	
				NPN	875CP-NM30NN34-A2	875CP-NM30NN34-D4	—	
			N.C.	PNP	875CP-NM30CP34-A2	875CP-NM30CP34-D4	—	
				NPN	875CP-NM30CN34-A2	875CP-NM30CN34-D4	—	
Recommended standard QD cordset (-2 = 2 m (6.5 ft))						889D-F4AC-2	889P-F3AB-2	

QD Cordsets and Accessories

Description	Page Number
Mounting Brackets	2-210...2-214
Mounting Nuts	2-221...2-222
Sensor Wells	4-22
Terminal Chambers	8-1
Other Cordsets Available	8-1

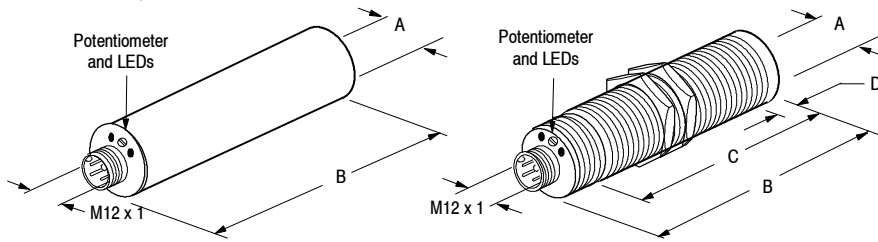
Cable Style



Diameter or Thread Size	mm (inches)		
	A	B	C
M18 x 1	18.0 (0.71)	52.0 (2.04)	52.0 (2.04)
M30 x 1.5	30.0 (1.18)		46.1 (1.81)
Ø34	34.0 (1.34)		N/A

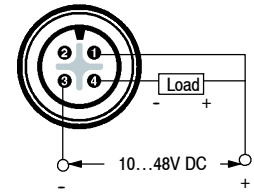
Approximate Dimensions [mm (in.)]

Micro QD Style

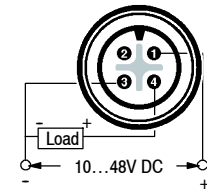


Wiring Diagram

**Normally Open or Normally Closed
NPN (Sinking)**

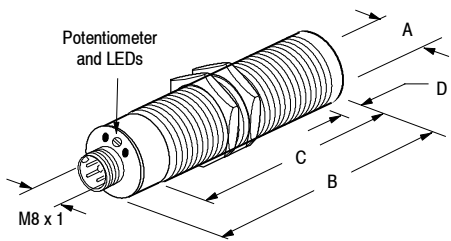


PNP (Sourcing)



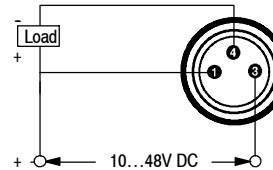
Diameter or Thread Size	mm (inches)			
	A	B	C	D
M30 x 1.5	30.0 (1.18)	65.0 (2.56)	52.0 (2.04)	1.0 (0.04)
∅34	34.0 (1.34)	65.0 (2.56)	N/A	N/A

Pico QD Style

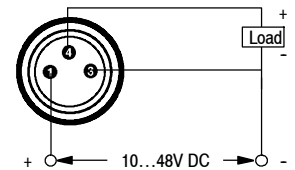


Normally Open or Normally Closed

NPN (Sinking)



PNP (Sourcing)



Diameter or Thread Size	mm (inches)			
	A	B	C	D
M18 x 1	18.0 (0.71)	61.5 (2.42)	52.0 (2.04)	1.0 (0.04)

875C 2-Wire AC

Plastic Face/Threaded Nickel-Plated Brass Barrel



875CP AC Cable Style
Threaded Barrel
18, 30 mm
page 4-17



875CP AC Micro Quick-Disconnect Style
Threaded Barrel
30 mm
page 4-17

Specifications

Load Current	≤ 300 mA
Inrush Current	2A
Leakage Current	<1.5 mA
Operating Voltage	24...240V AC
Voltage Drop	<7.5V AC
Repeatability	≤ 10%
Hysteresis	≤ 20%
Transient Noise Protection	Incorporated
Enclosure	NEMA 1, 3, 4, 6, 13 and IP67
Certifications	CE Marked for all applicable directives
Connections	Cable: 2 meter length; 2 conductor PVC Quick-Disconnect: 3-pin micro
LEDs	Green: Power Yellow: Output
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Acetone	0.75
Acrylic Resin	0.10...0.25
Air	0.0
Alcohol	0.85
Ammonia	0.70...0.85
Aniline	0.40
Aqueous Solutions	0.98...1.0
Bakelite	0.20
Benzene	0.10
Carbon Dioxide	0.0
Carbon Tetrachloride	0.10
Celluloid	0.15
Cement Powder	0.25
Cereal	0.15...0.30
Chlorine Liquid	0.10
Ebonite	0.15
Epoxy Resin	0.15...0.35
Ethanol	0.85
Ethylene Glycol	0.93
Fired Ash	0.05
Flour	0.05
Freon R22 & 502 (liquid)	0.35
Gasoline	0.10
Glass	0.20...0.55
Glycerine	0.98
Marble	0.50
Melamine Resin	0.25...0.55
Mica	0.35
Nitrobenzine	0.93
Nylon	0.20...0.30
Oil Saturated Paper	0.25
Paraffin	0.10
Paper	0.10

Correction Factors

Target Material	Correction Factor
Perspex	0.15
Petroleum	0.05
Phenol Resin	0.20...0.60
Polyacetal	0.20
Polyamide	0.30
Polyester Resin	0.15...0.50
Polyethylene	0.10
Polypropylene	0.10
Polystyrene	0.15
Polyvinyl Chloride Resin	0.15
Porcelain	0.25...0.40
Powdered Milk	0.20
Press Board	0.10...0.30
Quartz Glass	0.20
Rubber	0.15...0.90
Salt	0.35
Sand	0.15...0.30
Shellac	0.15...0.25
Shell Lime	<0.05
Silicon Varnish	0.15
Soybean Oil	0.15
Styrene Resin	0.15
Sugar	0.15
Sulphur	0.15
PTFE	0.10
Toluene	0.10
Transformer Oil	0.10
Turpentine Oil	0.10
Urea Resin	0.30...0.45
Vaseline	0.10
Water	1.0
Wood, Dry	0.10...0.40
Wood, Wet	0.60...0.85

Features

- Metal, nonmetal solid and liquid sensing capability
- Adjustable sensing distance
- 2-wire operation
- 2 conductor or 3-pin connection
- 24...240V AC
- Normally open or normally closed output
- Transient noise protection
- CE Marked for all applicable directives

Product Selection

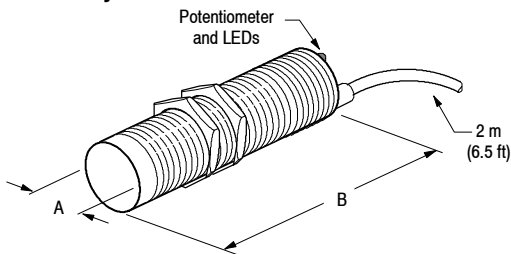
Barrel Diameter and Type	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency (Hz)	Cat. No.	
					Cable Style	Micro QD Style
18 mm Threaded	1 (0.04)...5 (0.20)	Y	N.O.	25	875C-F5N18-A2	—
			N.C.		875C-F5C18-A2	—
30 mm Threaded	2 (0.08)...10 (0.39)		N.O.		875C-F10N30-A2	875C-F10N30-R3
			N.C.		875C-F10C30-A2	875C-F10C30-R3
Recommended standard QD cordset (-2 = 2 m (6.5 ft))					889R-F3ECA-2	

QD Cordsets and Accessories

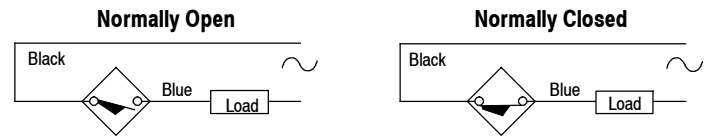
Description	Page Number
Mounting Brackets	2-210...2-214
Mounting Nuts	2-221...2-222
Sensor Wells	4-22
Terminal Chambers	8-1
Other Cordsets Available	8-1

Approximate Dimensions [mm (in.)]

Cable Style



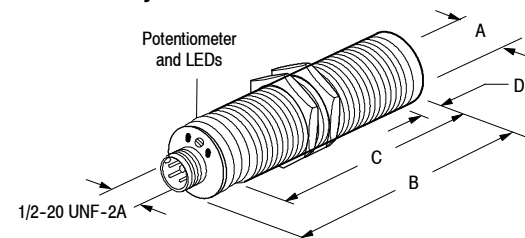
Wiring Diagram



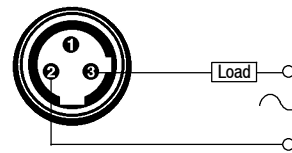
Note: Load can be switched to black wire.

Diameter or Thread Size	mm (inches)	
	A	B
M18 x 1	18.0 (0.71)	52.0 (2.04)
M30 x 1.5	30.0 (1.18)	53.0 (2.08)

Micro QD Style



Normally Open or Normally Closed



Note: Load can be switched to pin 2.

Diameter or Thread Size	mm (inches)			
	A	B	C	D
M30 x 1.5	30.0 (1.18)	66.0 (2.60)	53.0 (2.08)	1.0 (0.04)

875CP 2-Wire AC

Plastic Face/Threaded or Smooth Plastic Barrel



875CP AC Cable Style
Smooth Barrel
34 mm
page 4-19



875CP AC Cable Style
Threaded Barrel
18, 30 mm
page 4-19



875CP AC Micro Quick-Disconnect Style
Smooth Barrel
34 mm
page 4-20



875CP AC Micro Quick-Disconnect Style
Threaded Barrel
30 mm
page 4-20

Features

- Metal, nonmetal solid and liquid sensing capability
- Adjustable sensing distance
- 2-wire operation
- 2 conductor or 3-pin connection
- 24...240V AC
- Normally open or normally closed output
- Transient noise protection
- CE Marked for all applicable directives

Specifications

Load Current	≤ 300 mA
Inrush Current	2A
Leakage Current	<1.5 mA
Operating Voltage	24...240V AC
Voltage Drop	<7.5V AC
Repeatability	≤ 10%
Hysteresis	≤ 20%
Transient Noise Protection	Incorporated
Enclosure	NEMA 1, 3, 4, 6, 13 and IP67
Certifications	CE Marked for all applicable directives
Connections	Cable: 2 meter length; 2 conductor PVC Quick-Disconnect: 3-pin micro
LEDs	Green: Power Yellow: Output
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors		Correction Factors	
Target Material	Correction Factor	Target Material	Correction Factor
Acetone	0.75	Perspex	0.15
Acrylic Resin	0.10...0.25	Petroleum	0.05
Air	0.0	Phenol Resin	0.20...0.60
Alcohol	0.85	Polyacetal	0.20
Ammonia	0.70...0.85	Polyamide	0.30
Aniline	0.40	Polyester Resin	0.15...0.50
Aqueous Solutions	0.98...1.0	Polyethylene	0.10
Bakelite	0.20	Polypropylene	0.10
Benzene	0.10	Polystyrene	0.15
Carbon Dioxide	0.0	Polyvinyl Chloride Resin	0.15
Carbon Tetrachloride	0.10	Porcelain	0.25...0.40
Celluloid	0.15	Powdered Milk	0.20
Cement Powder	0.25	Press Board	0.10...0.30
Cereal	0.15...0.30	Quartz Glass	0.20
Chlorine Liquid	0.10	Rubber	0.15...0.90
Ebonite	0.15	Salt	0.35
Epoxy Resin	0.15...0.35	Sand	0.15...0.30
Ethanol	0.85	Shellac	0.15...0.25
Ethylene Glycol	0.93	Shell Lime	<0.05
Fired Ash	0.05	Silicon Varnish	0.15
Flour	0.05	Soybean Oil	0.15
Freon R22 & 502 (liquid)	0.35	Styrene Resin	0.15
Gasoline	0.10	Sugar	0.15
Glass	0.20...0.55	Sulphur	0.15
Glycerine	0.98	PTFE	0.10
Marble	0.50	Toluene	0.10
Melamine Resin	0.25...0.55	Transformer Oil	0.10
Mica	0.35	Turpentine Oil	0.10
Nitrobenzine	0.93	Urea Resin	0.30...0.45
Nylon	0.20...0.30	Vaseline	0.10
Oil Saturated Paper	0.25	Water	1.0
Paraffin	0.10	Wood, Dry	0.10...0.40
Paper	0.10	Wood, Wet	0.60...0.85

Product Selection

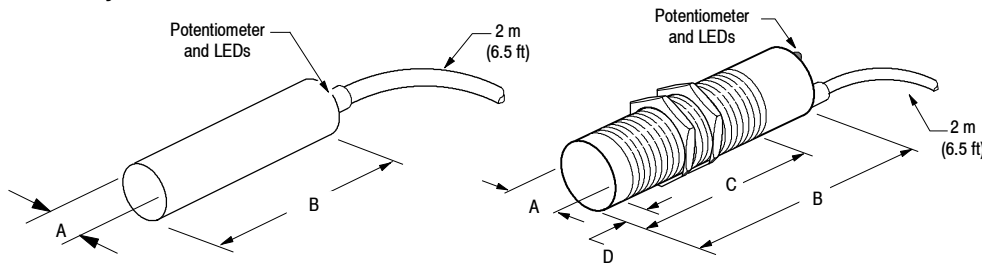
Barrel Diameter and Type	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency (Hz)	Cat. No.	
					Cable Style	Micro QD Style
18 mm Threaded	2 (0.08)...8 (0.31)	N	N.O.	25	875CP-G8N18-A2	—
			N.C.		875CP-G8C18-A2	—
N.O.	875CP-G20N30-A2		875CP-G20N30-R3			
N.C.	875CP-G20C30-A2		875CP-G20C30-R3			
N.O.	875CP-GM30N34-A2		875CP-GM30N34-R3			
N.C.	875CP-GM30C34-A2		875CP-GM30C34-R3			
30 mm Threaded	5 (0.20)...20 (0.79)					
34 mm Smooth	7 (0.28)...30 (1.18)					
Recommended standard QD cordset (-2 = 2 m (6.5 ft))						889R-F3ECA-2

QD Cordsets and Accessories

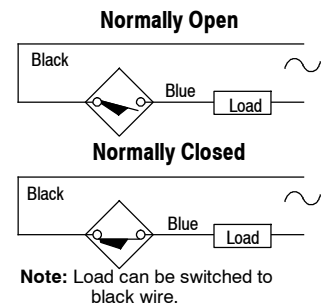
Description	Page Number
Mounting Brackets	2-210...2-214
Mounting Nuts	2-221...2-222
Sensor Wells	4-22
Terminal Chambers	8-1
Other Cordsets Available	8-1

Approximate Dimensions [mm (in.)]

Cable Style



Wiring Diagram



Diameter or Thread Size	mm (inches)			
	A	B	C	D
M18 x 1	18.0 (0.71)	52.0 (2.04)	52.0 (2.04)	1.0 (0.04)
M30 x 1.5	30.0 (1.18)	52.0 (2.04)	46.1 (1.81)	1.0 (0.04)
∅34	34.0 (1.34)	52.0 (2.04)	N/A	N/A

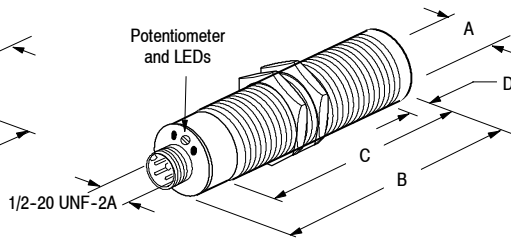
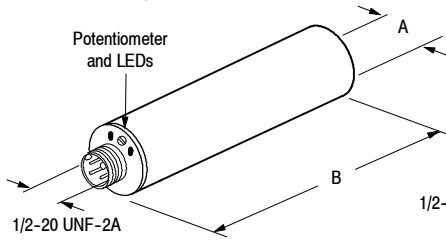
Capacitive Proximity Sensors

875CP 2-Wire AC

Plastic Face/Threaded or Smooth Plastic Barrel

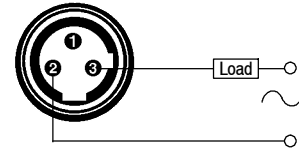
Approximate Dimensions [mm (in.)]

Micro QD Style



Wiring Diagram

Normally Open or Normally Closed



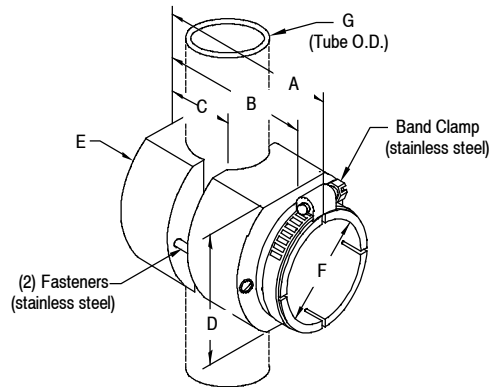
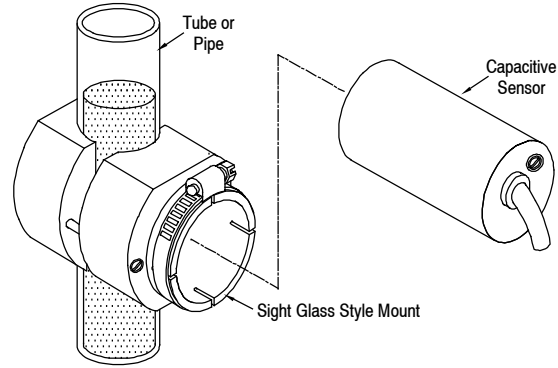
Note: Load can be switched to pin 2.

Diameter or Thread Size	mm (inches)			
	A	B	C	D
M30 x 1.5	30.0 (1.18)	65.0 (2.56)	52.0 (2.04)	1.0 (0.04)
∅34	34.0 (1.34)	65.0 (2.56)	N/A	N/A

Mounting Brackets for Tubular Proximities—Sight Glass Style

Description

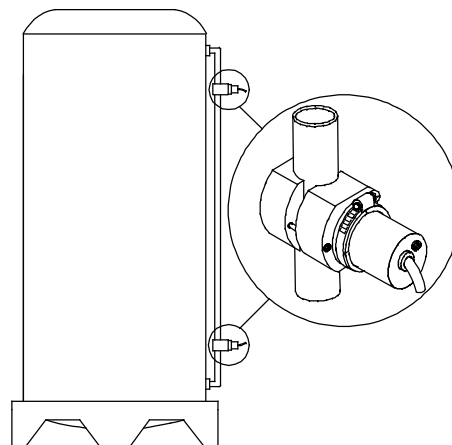
Sight glass style sensor mounts provide simple and convenient mounting of capacitive sensors to sight tubes for high/low level sensing. Sight glass style sensor mounts are available to fit 3/8 inch through 1 3/4 inch diameter plastic or glass tubing. These mounts are designed for use with 12, 18, and 30 mm diameter capacitive sensors. All sight glass style sensor mounts are made of Delrin™ plastic with stainless steel fasteners and band clamp included.



Approximate Dimensions [mm (in.)]

A	B	C	D	E	F- Sensor Diameter	G- Tube O.D.	Cat. No.
44.5 (1.75)	33.0 (1.30)	12.7 (0.50)	25.4 (1.00)	31.8 (1.25)	12 mm (threaded)	9.40...20.6 (0.37...0.81)	871A-BGD12
48.3 (1.90)	36.8 (1.45)	15.2 (0.60)	31.5 (1.24)	37.5 (1.75)	18 mm (threaded)	16.0...28.4 (0.63...1.12)	871A-BGD18
87.6 (3.45)	76.3 (3.00)	31.8 (1.50)	37.5 (1.75)	50.8 (2.00)	30 mm (threaded)	25.4...44.5 (1.00...1.75)	871A-BGD30

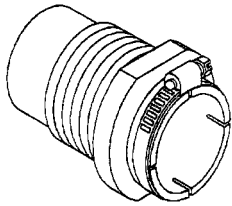
Typical Application



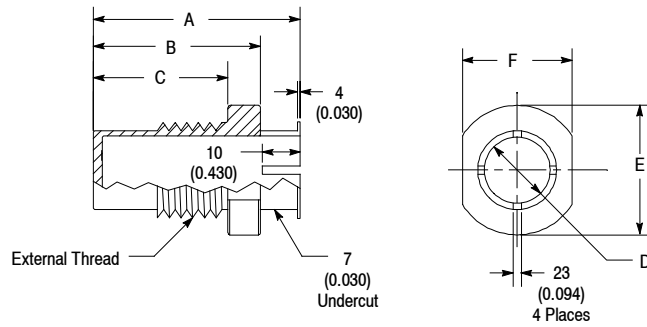
Accessories

Sensor Wells for Capacitive Proximities

Threaded Sensor Well



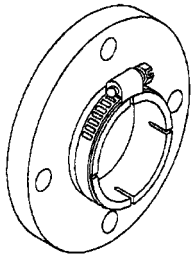
12, 18, 30, 34 mm



Approximate Dimensions [mm (in.)]

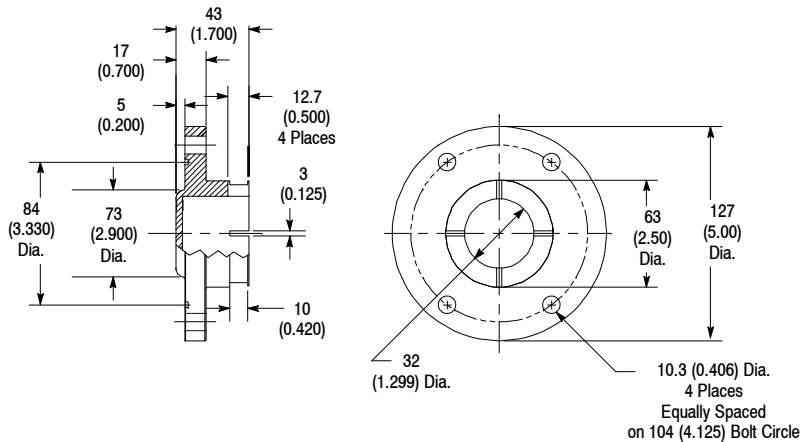
Sensor Diameter	A	B	C	D	E	F	Pressure Rating (psi)	External Thread	Material	Cat. No.			
12 mm	44 (1.750)	33 (1.300)	26 (1.050)	11...12 (0.47...0.48)	31 (1.250)	25 (0.995)	200	1/2-14 NPT	Delrin	871A-WTD12			
									PTFE	871A-WTT12			
18 mm	59 (2.350)	48 (1.900)	38 (1.530)	18 (0.72...0.725)	37 (1.470)	31 (1.245)		3/4-14 NPT	Delrin	871A-WTD18			
											PTFE	871A-WTT18	
30 mm								29...30 (1.18...1.185)	50 (1.970)	44 (1.745)	1-1/4-11.5 NPT	Delrin	871A-WTD30
												PTFE	871A-WTT30
34 mm				34 (1.34...1.345)	69 (2.750)	31 (1.245)		1-1/2-11.5 NPT	Delrin	871A-WTD34			
									PTFE	871A-WTT34			

Bolt-on Sensor Well



30 mm Bolt-on

Material: High Density Polyethylene
Pressure Rating: 150 PSI












Description	Cat. No.
Bolt on sensor well	871A-WSPE30

Note: All 871A Series sensor wells are made of FDA approved materials





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	Technical Definitions and Terminology	page 5-6
	Application Considerations	page 5-8
Products	801 General Purpose	page 5-9
	802DN DeviceNet™ Limit Switches	page 10-15
	802G Gravity Return	page 5-13
	802M/802MC Pre-Wired Factory Sealed	
	Introduction	page 5-15
	802M	page 5-16
	802MC	page 5-30
	802R Sealed Contact	page 5-34
	802T Oiltight	
	Introduction	page 5-40
	Plug-In	page 5-41
	Low Energy	page 5-48
	NonPlug-In	page 5-54
	802X Watertight or Hazardous Location	page 5-74
	802XR Sealed Contact Hazardous Location	page 5-81
	802B Compact, Precision and Small Precision	page 5-87
	802T Safety Limit Switches (DALS)	page 5-109
	440P IEC-Style Safety Limit Switches	
	22mm Compact Metal	page 5-114
	22mm Small Plastic	page 5-116
30mm Large Metal	page 5-122	
15mm Plastic	page 5-128	
Operating Levers	page 5-130	
Indexes	Cat. No. Index	page 13-1
	Comprehensive Product Index	page 14-1






Quick Selection Guide

Specifications	 <p>801 General Purpose</p>	 <p>802G Gravity Return</p>	 <p>802M and 802MC Pre-Wired Factory Sealed</p>	 <p>802R Sealed Contact</p>
Description	<ul style="list-style-type: none"> General purpose limit switch for a wide variety of applications 	<ul style="list-style-type: none"> Plug-in gravity return switch Designed for conveyor-type operations with small or lightweight objects 	<ul style="list-style-type: none"> Compact, prewired switch Factory sealed to meet the requirements of demanding applications, wet or dry 	<ul style="list-style-type: none"> Similar construction to the 802T nonplug-in Glass hermetically sealed reed switch (used as the switching element to provide high contact reliability)
Features	<ul style="list-style-type: none"> Mounting option; surface 	<ul style="list-style-type: none"> Mounting options: surface, manifold 	<ul style="list-style-type: none"> Cable entry and wire strands (epoxy sealed to protect against fluids entering or wicking into the switch) Mounting options: surface. 	<ul style="list-style-type: none"> Enclosure: gasketed, transparent plastic cover Allows inspection of terminals without removing the cover Mounting option: surface
Contact Rating	<ul style="list-style-type: none"> NEMA A600 	<ul style="list-style-type: none"> NEMA B600 	<ul style="list-style-type: none"> 2-circuit: NEMA A600 4-circuit: NEMA B300 	<ul style="list-style-type: none"> NEMA B600
Temperature Rating	<ul style="list-style-type: none"> -0...40°C (32...104°F) 	<ul style="list-style-type: none"> 0...110°C (32...230°F) 	<ul style="list-style-type: none"> 0...80°C (32...176°F) 	<ul style="list-style-type: none"> -29...121°C (-20...250°F)
Actuators	<ul style="list-style-type: none"> Lever, maintained 	<ul style="list-style-type: none"> Three adjustable rod levers 	<ul style="list-style-type: none"> Lever, maintained Top and side push (with or without rollers) 	<ul style="list-style-type: none"> Lever Low operating force Top and side push (with or without rollers) Cat whisker Wobble stick
Enclosure	<ul style="list-style-type: none"> NEMA Type 1, Type 4 or Type 7 and 9 	<ul style="list-style-type: none"> NEMA Type 1 	<ul style="list-style-type: none"> NEMA Types 1, 4, 4X, 6P and 13; IP67 (IEC529) 	<ul style="list-style-type: none"> NEMA Types 13
Additional Info	<ul style="list-style-type: none"> See page 5-9 	<ul style="list-style-type: none"> See page 5-13 	<ul style="list-style-type: none"> See page 5-15 	<ul style="list-style-type: none"> See page 5-34

 <p style="text-align: center;">802T Plug-In Style</p>	 <p style="text-align: center;">802T Low Energy</p>	 <p style="text-align: center;">802T NonPlug-In Style</p>	 <p style="text-align: center;">802X Watertight or Hazardous Location</p>	 <p style="text-align: center;">802XR Sealed Contact Hazardous Location</p>
<ul style="list-style-type: none"> • Plug-in construction provides quick and easy installation • New front-mounting design and method of mode change in head make it easy to apply 	<ul style="list-style-type: none"> • Similar body style to standard 802T plug-in limit switches • Direct connection to PLCs and other low energy circuits 	<ul style="list-style-type: none"> • Ideal for applications which require heavy-duty pilot ratings • High degree of versatility and a rugged, oiltight construction 	<ul style="list-style-type: none"> • NEMA Types 7 and 9 • Designed for hazardous locations only • Class I, Groups B, C, D • Class II, Groups E, F and G, Class III 	<ul style="list-style-type: none"> • Designed for hazardous locations • Contains sealed glass contact switch for greater contact reliability
<ul style="list-style-type: none"> • Circuitry: 4-circuit version (for most types the same size as the 2-circuit switches) • Seals: Viton seals for special applications • Mounting options: surface, manifold 	<ul style="list-style-type: none"> • Conduit and mini receptacle wiring options • Plug-in style for ease of wiring • UL listed, CSA certified and CE marked for all applicable directives. 	<ul style="list-style-type: none"> • Dual, air operated • 2-pole vertical or horizontal lever • Operated time delay • Mounting options: surface, cavity, manifold 	<ul style="list-style-type: none"> • Mounting option: surface 	<ul style="list-style-type: none"> • Mounting option: surface
<ul style="list-style-type: none"> • 2-Circuit: NEMA A600 • 4-Circuit: NEMA A300 	<ul style="list-style-type: none"> • 1 N.O. and 1 N.C. contact • Slow break before make • DC 0.40 VA load per pole max and 0.025 VA load per pole min. 	<ul style="list-style-type: none"> • NEMA A600 	<ul style="list-style-type: none"> • NEMA A600 	<ul style="list-style-type: none"> • NEMA B600
<ul style="list-style-type: none"> • -18...110°C (0...230°F); Optional: -40...110°C (-40...230°F), 	<ul style="list-style-type: none"> • -18...110 (0...230) • -40...110 (-40...230) low temp model 	<ul style="list-style-type: none"> • -18...54°C (0...130°F) • Optional: -29...121°C (-20...250°F) 	<ul style="list-style-type: none"> • -46...121°C (-50...250°F) 	<ul style="list-style-type: none"> • -29...121°C (-20...250°F)
<ul style="list-style-type: none"> • Lever • Maintained • Low operating force • Top and side push (with or without rollers) • Cat whisker • Wobble stick • Neutral position 	<ul style="list-style-type: none"> • Lever • Side push rod • Top push roller • Side push vertical roller 	<ul style="list-style-type: none"> • Lever • Maintained, low operating force • Top and side push (with or without rollers) • Cat whisker • Wobble stick • Neutral position 	<ul style="list-style-type: none"> • Lever • Maintained, top and side push (with or without rollers) • Wobble stick • Neutral position 	<ul style="list-style-type: none"> • Lever • Top and side push (with or without rollers) • Wobble stick
<ul style="list-style-type: none"> • NEMA Types 1, 4, 6P (select side rotary styles), 13 	<ul style="list-style-type: none"> • IP30 	<ul style="list-style-type: none"> • NEMA Types 1, 13 	<ul style="list-style-type: none"> • NEMA Types 7 and 9 • Class I, Groups B, C or D • Class II, Groups E, F or G • Class III 	<ul style="list-style-type: none"> • NEMA Types 7 and 9 • Class I, Groups B, C or D • Class II, Groups E, F or G
<ul style="list-style-type: none"> • See page 5-41 	<ul style="list-style-type: none"> • See page 5-48 	<ul style="list-style-type: none"> • See page 5-54 	<ul style="list-style-type: none"> • See page 5-74 	<ul style="list-style-type: none"> • See page 5-81

Quick Selection Guide

Specifications	 <p>802B Compact</p>	 <p>802B Precision</p>	 <p>802B Small Precision</p>	 <p>802T Safety Limit Switches</p>
Description	<ul style="list-style-type: none"> • Compact metal body • Prewired to maintain enclosure seals • Industry standard mounting for ease of installation. 	<ul style="list-style-type: none"> • Precision style limit switch • Industry standard mounting • Low trip and reset points for more precise sensing 	<ul style="list-style-type: none"> • metal bodied for use in industrial applications • Twelve different styles available for solving multiple applications 	<ul style="list-style-type: none"> • designed for use in control reliable applications and safety applications per ISO 14119
Features	<ul style="list-style-type: none"> • 3 m cable standard • AC or DC LED versions • Low current versions • Booted and panel mount versions • UL/CSA and CE Marked for all applicable directives 	<ul style="list-style-type: none"> • 1/2 in. NPT conduit entry • Grounding screw • Booted models • Side and flange mounting available • UL/CSA and CE Marked for all applicable directives 	<ul style="list-style-type: none"> • 12 different actuators • Screw termination • Small size • Booted and Panel mount versions • UL/CSA and CE marked for all applicable directives 	<ul style="list-style-type: none"> • Direct opening action • Snap acting contacts • Rugged metal construction • Long life and reliability • Plug-in design • NEMA 6P/IP67 sealing
Contact Rating	<ul style="list-style-type: none"> • SPDT Form C • NEMA B300 	<ul style="list-style-type: none"> • SPDT Form C • 15 A @ 125/250/480 V AC 	<ul style="list-style-type: none"> • SPDT Form C • NEMA B300 	<ul style="list-style-type: none"> • 2-circuit: A600/AC-15 Q300/DC-13 • 4-circuit: A300 Q300/DC-13
Temperature Rating	<ul style="list-style-type: none"> • -10...70°C (14...158°F) 	<ul style="list-style-type: none"> • -10...80°C (14...176°F) 	<ul style="list-style-type: none"> • -10...80°C (14...176°F) 	<ul style="list-style-type: none"> • -18C...+110°C (0F...+230°F)
Actuators	<ul style="list-style-type: none"> • Rotary arm • Center rotary arm • Wobble stick • Top push • Top push bevel • Top push roller • Top push cross roller 	<ul style="list-style-type: none"> • Top push • Top push roller • Top push cross roller • Roller lever • One-way roller lever 	<ul style="list-style-type: none"> • Top push • Top push roller • Top push cross roller • Hinge lever • Short hinge lever • Roller lever • Short roller lever • One-way roller lever • Short one-way roller lever 	<ul style="list-style-type: none"> • Lever • Top push roller • Side push vertical roller • Side push horizontal roller
Enclosure	<ul style="list-style-type: none"> • NEMA 1, 3, 4, 6, 12, 13 and IP67 	<ul style="list-style-type: none"> • Nonbooted: NEMA 1 and IP 60 • Booted: NEMA 1, 3, 4 and IP65 	<ul style="list-style-type: none"> • NEMA 1, 3, 4, 6, 13 and IP67 	<ul style="list-style-type: none"> • NEMA 4, 6P, 12, 13 and IP67
Additional Info	<ul style="list-style-type: none"> • See page 5-88 	<ul style="list-style-type: none"> • See page 5-97 	<ul style="list-style-type: none"> • See page 5-105 	<ul style="list-style-type: none"> • See page 5-109

 <p style="text-align: center;">440P-A 22 mm Metal Safety Limit switches</p>	 <p style="text-align: center;">440P-C 22 mm Plastic Safety Limit switches</p>	 <p style="text-align: center;">440P-M 30 mm Metal Safety Limit switches</p>	 <p style="text-align: center;">440P-M 15 mm Plastic Safety Limit switches</p>	 <p style="text-align: center;">Operating Lever</p>
<ul style="list-style-type: none"> • Compact die-cast alloy metal body with prewired 2 m cable exiting bottom or side of switch mounting for ease of installation • Industry standard mounting for ease of installation • Choice of actuator heads 	<ul style="list-style-type: none"> • Conforms to EN50047 (22 mm) • Glass reinforced thermoplastic housing • Most feature direct opening contacts designed to meet IEC 947 • Available in snap-acting, slow make/break with 2 or 3 pole contact arrangement • Heads can be rotated in 90° increments for flexible mounting 	<ul style="list-style-type: none"> • Conforms to EN50041 (30 mm x 60 mm) • Cast aluminum housing • Most feature direct opening contacts designed to meet IEC 947 • Available in snap-acting, slow make/break with 2, 3 or 4 pole contact arrangement. • Heads can be rotated in 90° increments for flexible mounting 	<ul style="list-style-type: none"> • Small size with mounting hole options • Choice of actuator position • UL approved glass filled polyester housing 	<ul style="list-style-type: none"> • To be used with 802T, 802M, 802MC, 802X and 802XR limit switches
<ul style="list-style-type: none"> • Rugged die cast enclosure • Positive operation, forced disconnection of contacts (direct opening action) • Snap-acting contact actuation • Contacts 1 N.C. + 1 N.O. • Prewired 2 meter cable, bottom or side exit • UL Recognized, TÜV and CE Marked for all applicable directives 	<ul style="list-style-type: none"> • Available in 1/2 in. NPT, M20 and QD versions • Cat. 1 device per EN954-1, dual-channel interlocks suitable for Cat. 3 or 4 systems • cULus, TÜV, CCC, and CE Marked for all applicable directives • Mounting options: surface 	<ul style="list-style-type: none"> • Available in 1/2 in. NPT, M20 and QD versions • Cat. 1 device per EN954-1, dual-channel interlocks suitable for Cat. 3 or 4 systems • cULus, TÜV, CCC, and CE Marked for all applicable directives • Mounting options: surface 	<ul style="list-style-type: none"> • Positive operation, forced disconnection of contacts • Contacts, 1 N.C. & 1 N.O. • CSA NRTL/C and CE Marked for all applicable directives 	<ul style="list-style-type: none"> • Various lengths materials and styles to suit specific applications
<ul style="list-style-type: none"> • 1 N.O. and 1 N.C. snap acting contact, AC15/B330, DC 13/Q300 	<ul style="list-style-type: none"> • A600/AC-15 • N600/DC-13 	<ul style="list-style-type: none"> • A600/AC-15 • N600/DC-13 	<ul style="list-style-type: none"> • 1 N.O. and 1 N.C. contact • Slow break before make 	<p style="text-align: center;">—</p>
<ul style="list-style-type: none"> • 2...+70°C (35.6...158°F) 	<ul style="list-style-type: none"> • -25...80°C (-13...176°F) 	<ul style="list-style-type: none"> • -25...80°C (-13...176°F) 	<ul style="list-style-type: none"> • -25...80°C (-113...176°F) 	<p style="text-align: center;">—</p>
<ul style="list-style-type: none"> • Roller plunger • Dome plunger • Cross roller plunger • Lever arm 	<ul style="list-style-type: none"> • Roller plunger • Dome plunger • Hinge lever • Short lever • Offset hinge • Adjustable lever • Large rubber roller 	<ul style="list-style-type: none"> • Roller plunger • Dome plunger • Short lever • Adjustable lever • Rod lever • Spring rod • Telescope arm 	<ul style="list-style-type: none"> • Roller plunger 	<ul style="list-style-type: none"> • Rod levers • Roller levers
<ul style="list-style-type: none"> • NEMA 1, IP66 and IP67 	<ul style="list-style-type: none"> • IP66 	<ul style="list-style-type: none"> • IP66 	<ul style="list-style-type: none"> • IP30 	<p style="text-align: center;">—</p>
<ul style="list-style-type: none"> • See page 5-114 	<ul style="list-style-type: none"> • See page 5-116 	<ul style="list-style-type: none"> • See page 5-122 	<ul style="list-style-type: none"> • See page 5-128 	<ul style="list-style-type: none"> • See page 5-130

Actuator: A switch mechanism that when moved as intended, operates the switch contacts. This mechanism transmits the applied force from the actuating device...the contact block, causing the contacts to operate.

Actuator Free Position: The initial position of the actuator when there is no external force (except gravity) applied to the actuator.

Actuator Operating Position: The position of the actuator when the contacts operate.

Actuator Resetting Position: The position of the actuator at which the contacts move from the operated position to the "normal" position.

Differential Travel (Travel to reset contacts): The angle or distance through which the actuator moves from the contact operating position to the actuator resetting position, or the distance between the operating point and the release point.

Normal Contact Position: The position of the contacts when no operating force is applied.

Operating Contact Position: The position to which the contacts move when the actuator is deflected to or beyond the actuator operating position.

Operating Force: The straight line force in the designed direction applied to the switch actuator to cause the contacts to move to the operated position.

Operating Torque: The torque that must be applied to the actuator to cause the movable contacts to move to the operated contact position.

Overtravel: The movement of the actuator beyond the contact operating position.

Pretravel (Travel to the operate contacts): Travel to operate the contacts from the actuator free position.

Slow Make-Slow Break: A type of contact structure with no overcenter mechanism. Contacts move at a speed directly proportional to the speed of operation of the actuator. Contacts may touch with little contact pressure.

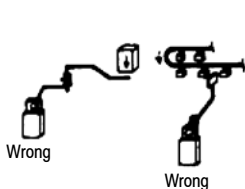
Snap Action: In this type of contact structure, movement of the actuator applies force to an overcenter mechanism, which creates a fast change in contact state once the overcenter position has been exceeded.

Snap Action/IEC Positive Opening Action: This contact structure is very similar to the snap action contact with one addition: continued operation of the operating mechanism beyond the normal snap action position applies force directly to the normally closed (N.C.) contact if it has not opened with the snap action mechanism. This helps to ensure opening of even a welded contact. For example, if a contact has a snap action operating point at 40° rotary movement, the direct opening action point may be at 60° or more. No direct opening action forces are applied to the N.O. contact.

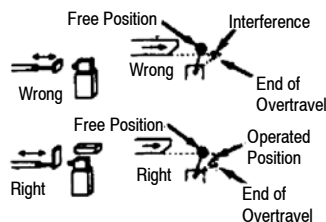
Total or Maximum Travel: The sum of the pretravel and the overtravel.

Application Considerations

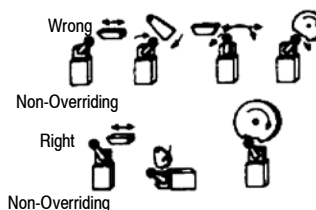
Actuator Consideration



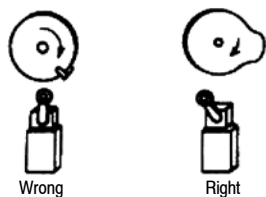
Limit switches are designed for proper performance with the actuators with which they are supplied. Supplementary actuators should not be used unless the limit switches are specifically designed for them.



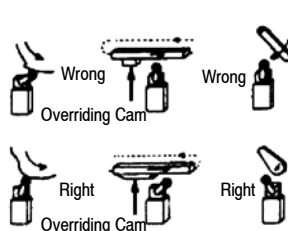
Operating mechanism for limit switches should be so designed that under any operating or emergency conditions the limit switch is not operated beyond its overtravel limit position. A limit switch should not be used as a mechanical stop.



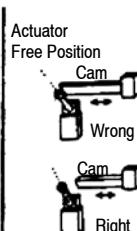
For limit switches with lever actuators, the actuating force should be applied as nearly perpendicular to the lever as practical and perpendicular to the shaft axis about which the lever rotates.



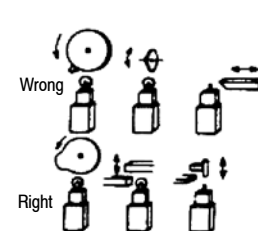
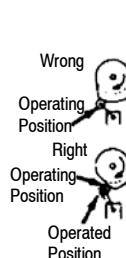
Where relatively fast motions are involved cam arrangements should be such that the actuator does not receive a severe impact. Cams should be designed such that the limit switch will be held operated long enough to operate relays, valves, etc.



Cam or dog arrangements should be such that the actuator is not suddenly released to snap back freely.

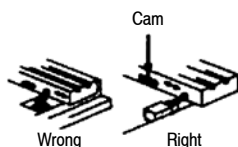


A limit switch actuator must be allowed to move far enough for positive operation of the contacts.

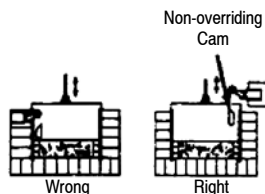


For limit switches with push rod actuators the actuating force should be applied as nearly as possible in line with the push rod axis.

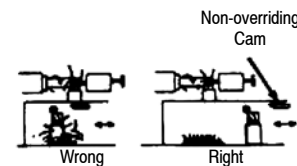
Location and Installation



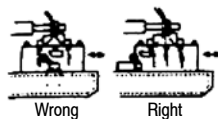
Limit switches should be mounted rigidly and in readily accessible locations with suitable clearances to permit easy service and replacement when necessary. Cover plates should face the maintenance access point.



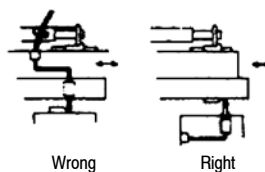
Limit switches should not be used in locations where temperature or atmosphere conditions are beyond those for which they have been specifically designed.



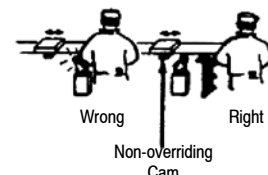
Limit switches should be placed in locations where machining chips do not accumulate under normal operating conditions.



Limit switches should not be submerged in or splashed with oils, coolants or other liquids.



The location of oiltight limit switches and the method of connecting them should be such that condensation in the conduit cannot enter the switch enclosure.



Limit switches should be mounted in locations which will prevent false operation by normal movements of operator or machine components.



801-ASA11



801-ASC17



801-CMC21



801-FSC148



801-ASC1411

Description

The Bulletin 801 line of general purpose limit switches includes many types of switches for use in a wide variety of applications. Many different contact arrangements are available. Slow and snap action contact operating mechanisms are available. Snap action limit switches are designed to provide high snap through force once the mechanism has traveled the required distance. Refer to the table on page 5-12 for limit switch selection.

Figure 1

Lever on right side as illustrated. Clockwise operation only. Lever can be adjusted through 360°.

Figure 2

Contacts are operated in both directions of roller lever. With roller on inside, lever is adjustable through 49° either side of center line. With roller on outside, lever is adjustable through 360°.

Figure 3

Similar to Figure 2 except roller lever is longer for use where more space is necessary between limit switch and its operating device. The total height from base of limit switch to the end of roller is 181.0 mm (7.125 in.).

Figure 4

Same contact operation in either direction, with roller on either inside or outside. Starting position of lever is adjustable 43° either side of center line.

Figure 5

Contact operation is obtained only in direction shown. Lever is free to move in opposite direction, but contacts are not actuated. With roller on inside, starting position of lever can be adjusted through 128° from extreme left position; with roller on outside, the roller lever is adjustable through 360°.

Figure 6

Similar to Figure 5, except that operation is to the left.

Figure 7

For clockwise operation. Ratchet type. When lever is moved to right, contacts are operated. Lever is spring return, but contacts remain in the operated position. Next movement of roller lever to the right returns the contacts to their original position. This completes cycle of operation. Lever is adjustable through 360°.

Figure 8

Similar to Figure 7 except that operation is counterclockwise.

Figure 9

Contacts are operated when fork lever is operated in one direction and are restored to original position when lever is operated in the reverse direction. Rod or Chain/Stroke Type Actuators not shown.

Figure 10

Roller lever on right side. Roller 34.9 mm (1.375 in.) in diameter. Lever travels through 30° arc. Downward travel of roller, 33.3 mm (1.312 in.).

Figure 11

Similar to Figure 10, except roller has a rubber trim, 76.2 mm (3 in.) in diameter. Downward Travel of roller, 42.1 mm (1.656 in.).

Figure 12

Roller lever on right side. Steel roller, 34.9 mm (1.375 in.) in diameter. Lever travel, either direction, 30°.

Figure 13

For clockwise operation. Roller, 1.375 in. (34.9 mm) diameter. Downward linear travel of roller, 50 mm (1.969 in.).

① For NEMA 7 & 9 housing, reduce total height by 1.6 mm (0.063 in.).

Figure 14

Contact operation obtained when fork lever is moved in direction shown and restored to original position when lever is operated in reverse direction.

Figure 15

Contacts operate in the direction shown. Track type limit switch with roller fork lever. Rollers 22.2 mm (0.875 in.) diameter hardened steel.

Figure 16

Contacts operate when the lever is moved in either direction. Should only be used where the link between lever and operating mechanism is short, so that the weight of the connecting mechanism will not offset the force of the spring return. Maximum weight of connecting mechanism: 0.5 lb.

Figure 17

Counterweight holds contacts closed. When the hook reaches the upper limit of its travel, it raises the counterweight and the weighted lever operates the contacts. When the hook is lowered the contacts are reset.

Figure 18

Similar to Figure 1 except lever is on left side.

Figure 19

Similar to Figures 5 and 6 except contacts are arranged for maintained operation. Contacts are actuated when lever is operated in direction shown. Contacts are restored when lever is operated in reverse direction.

Figure 20

Similar to Figures 2 and 3 except contacts are arranged for sequential operation in either direction. Operation is as follows:

Circuit 1 opens at 14°,
Circuit 2 closes at 45°,
Total travel is 55°.

Limit Switches

801

General Purpose

Contact Arrangements and Ratings



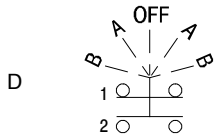
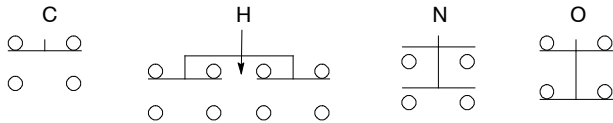
AC

3 A, 120V
1.5 A, 240V
0.75 A, 480V
0.6 A, 600V

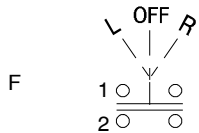
DC

1.1 A, 115V
0.55 A, 230V
0.2 A, 550V

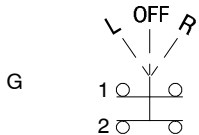
Light Duty



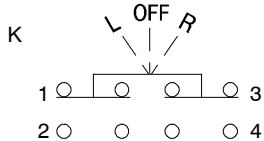
Lever Pos.	Contact Pos.	
	1	2
Off	C	O
A	O	O
B	O	C



Lever Pos.	Contact Pos.	
	1	2
R	C	O
Off	O	O
L	O	C



Lever Pos.	Contact Pos.	
	1	2
R	C	O
Off	C	C
L	O	C



Lever Pos.	Contact Pos.			
	1	2	3	4
R	C	O	O	C
Off	C	O	C	O
L	O	C	C	O

AC

6A, 120V
3A, 240V
1.5A, 480V
1.2A, 600V

DC

2.2A, 115V
1.1A, 230V
0.4A, 550V

Standard Duty

Ambient Temperature Range

0...+40°C (+32...+104°F) minimum temperature based on the absence of freezing moisture or water.

Approximate Dimensions [mm (in.)]

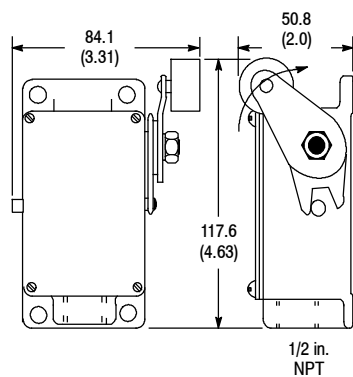


Figure 1, 18

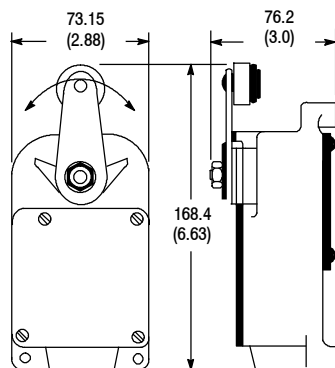


Figure 2, 3, 20

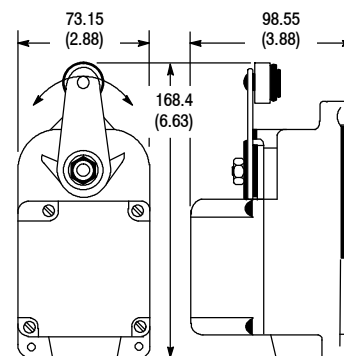


Figure 4

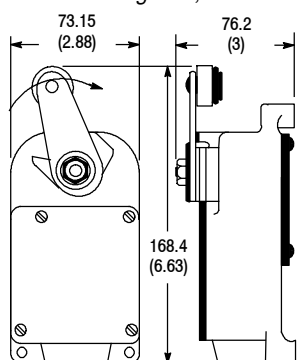


Figure 5, 6, 19

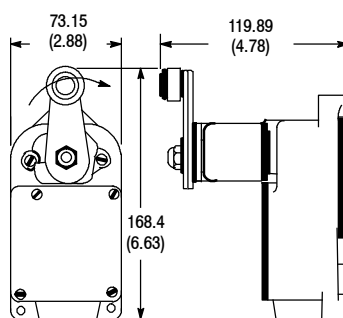


Figure 7, 8

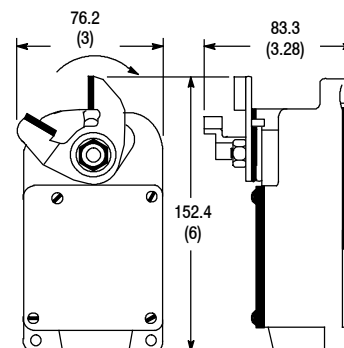


Figure 9

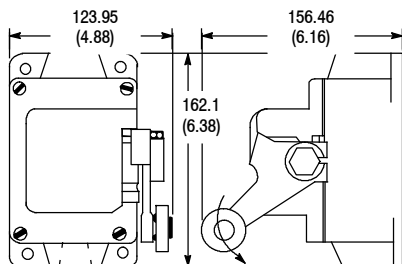


Figure 10, 11

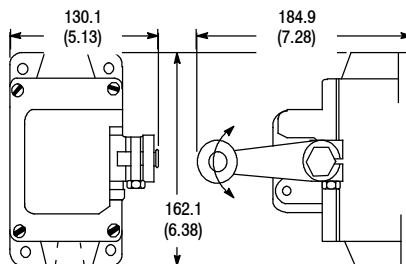


Figure 12

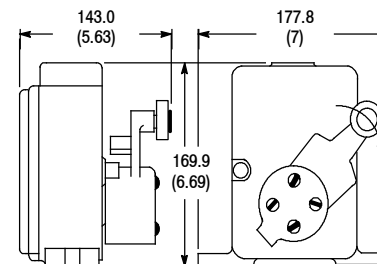


Figure 13

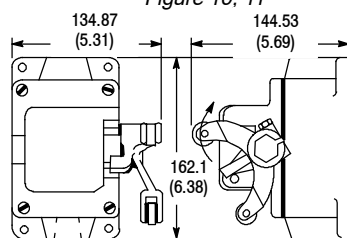


Figure 14

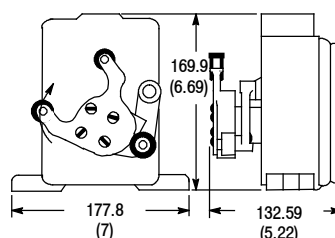


Figure 15

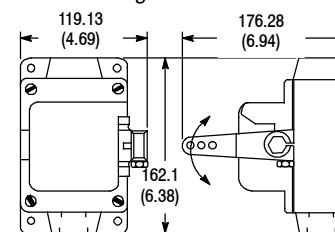


Figure 16

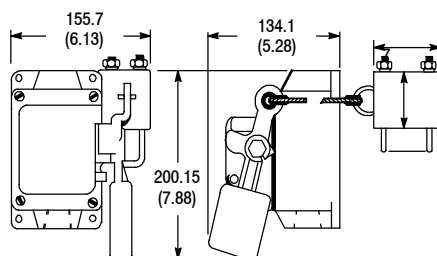


Figure 17

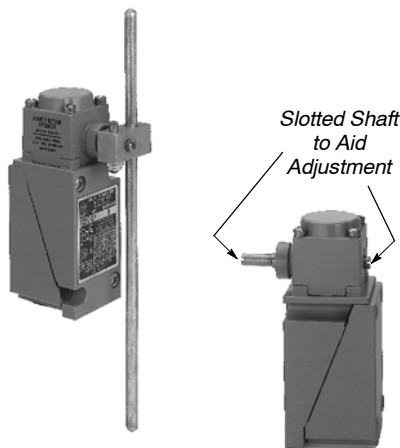
Product Selection

Type of Lever	Contact Operation	Housing Style	Contact Type & Rating ①	Force to Operate (Max.)	Travel to Operate Contacts (Nominal)	Over Travel (Min.)	Cat. No.
NEMA Type 1 Enclosure							
Roller	Slow Action Spring Return	Figure 1	A B	15.58 N (3.5 lb) 15.58 N (3.5 lb)	8° 3°	3° 8°	801-ASA11 801-ASB11
		Figure 18	A	15.58 N (3.5 lb)	8°	3°	801-ASA12
		Figure 2	C	10.0 N (2.25 lb)	30°	25°	801-ASC17
			D	10.0 N (2.25 lb)	See Figure 20 ②	See Figure 20 ②	801-ASD17
			F G	10.0 N (2.25 lb) 10.0 N (2.25 lb)	25° 15°	30° 40°	801-ASF17 801-ASG17
	Snap Action Spring Return	Figure 2	C	22.25 N (5.0 lb)	25°	30°	801-ASC21
			C	37.82 N (8.5 lb)	9°	40°	801-ASC21X
			N	22.25 N (5.0 lb)	25°	30°	801-ASN21
			N	37.82 N (8.5 lb)	9°	40°	801-ASN21X
			O	22.25 N (5.0 lb)	25°	30°	801-ASO21
			O	37.82 N (8.5 lb)	9°	40°	801-ASO21X
		C	10.0 N (2.25 lb)	30°	25°	801-ASC313	
		Figure 4	H	22.25 N (5.0 lb)	30°	20°	801-ASH22
			H	31.15 N (7.0 lb)	10°	43°	801-ASH26X
		Figure 3	C	17.8 N (4.0 lb)	25°	30°	801-ASC25
	C		31.15 N (7.0 lb)	9°	44°	801-ASC25X	
	N		17.8 N (4.0 lb)	25°	30°	801-ASN25	
	Figure 5	N	28.92 N (6.5 lb)	9°	44°	801-ASN25X	
		C	22.25 N (5.0 lb)	25°	15°	801-ASC27	
Figure 6	C	17.8 N (4.0 lb)	25°	15°	801-ASC29		
	Ratchet Type Maintained	Figure 7	C	28.92 N (6.5 lb)	68°	12°	801-ASC218
Figure 8		C	22.25 N (5.0 lb)	68°	12°	801-ASC220	
Snap Action Maintained	Figure 19	C	10.0 N (2.25 lb)	38°	24°	801-AMC211	
Fork	Snap Action Maintained	Figure 9	C	15.58 N (3.5 lb)	20.6 mm (0.81 in.)	—	801-CMC21
Rod or Chain			C	10.0 N (2.25 lb)	20.6 mm (0.81 in.)	20.6mm (0.81 in.)	801-DMC21
Stroke			C	20.0 N (4.5 lb)	14.2 mm (0.56 in.)	—	801-EMC21
NEMA Type 4 Enclosure (For Indoor Use)							
Roller	Slow Action Spring Return	Figure 10	C	27.81 N (6.25 lb)	26°	4°	801-ASC1411
			H	27.81 N (6.25 lb)	26°	4°	801-ASH1411
		Figure 11	C	17.8 N (4.0 lb)	26°	4°	801-ASC1415
		Figure 12	K	17.8 N (4.0 lb)	26°	4°	801-ASK1421
	Snap Action Spring Return	Figure 13	C	17.8 N (4.0 lb)	26.5°	6°	801-ASC2426
Fork	Slow Action Maintained	Figure 14	C	31.15 N (7.0 lb)	31.8 mm (1.25 in.)	—	801-CMC144
	Snap Action Maintained	Figure 15	C	28.92 N (6.5 lb)	38.1 mm (1.5 in.)	—	801-CMC2411
Rod or Chain	Slow Action	Figure 16	K	13.35 N (3.0 lb)	26°	4°	801-DSK145
Weight	Spring Return	Figure 17	C	22.25 N (5.0 lb)	26°	4°	801-FSC148 ③
NEMA Type 7 & 9 Enclosure							
Roller	Slow Action Spring Return	Figure 10	C	27.81 N (6.25 lb)	26°	4°	801-ASC1711
			H	27.81 N (6.25 lb)	26°	4°	801-ASH1711
		Figure 11	C	17.8 N (4.0 lb)	26°	4°	801-ASC1715
		Figure 12	K	17.8 N (4.0 lb)	26°	4°	801-ASK1721
	Snap Action Spring Return	Figure 13	C	17.8 N (4.0 lb)	26.5°	6°	801-ASC2726
Fork	Snap Action Maintained	Figure 15	C	28.92 N (6.5 lb)	38.1 mm (1.5 in.)	—	801-CMC2711

① See table on page 5-10.

② See Figure 20 on page 5-9.

③ The following replacement parts are available: combination lever/weight = B7391, counterweight = Z1997, counterweight cable = B37939.



802G-GP
with Steel
Operating Lever

Specifications

Enclosure Rating	NEMA 1
Certifications	UL Listed, CSA Certified and CE Marked for applicable directives
Ambient Temperature [C (F)]	0...110° (32...230°)

AC Contact Rating (Maximum per Pole, 50 or 60Hz, Same Polarity)

NEMA Rating Designation	Max AC Voltage	A		Continuous Carrying Current	VA	
		Make	Break		Make	Break
B600	120	30	3.00	5 A	3600	360
	240	15	1.50	5 A	3600	360
	480	7.5	0.75	5 A	3600	360
	600	6	0.60	5 A	3600	360

DC Contact Rating (Maximum per Pole, Same Polarity)

Voltage Range	Current Rating
115...125	0.4 A
230...250	0.2 A
550...600	0.1 A

Description

The Bulletin 802G is a plug-in gravity return limit switch designed for conveyor applications with small or lightweight moving objects. It has an extremely low operating torque and uses the action of gravity on the lever arm to reset the contacts. Three unique lever arms are available for the Bulletin 802G in nylon or steel with adjustable lengths.

ATTENTION



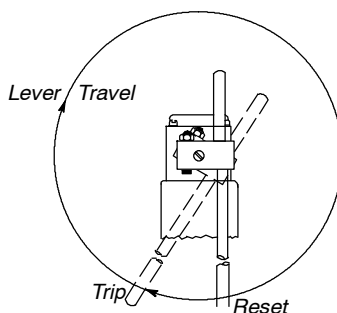
Bulletin 802T or 802MC levers cannot be used on the gravity return limit switch. The gravity return limit switch requires the levers on page 5-14.

Since the switch shaft can be rotated continuously through 360°, the trip point is adjustable to any angle. This adjustment is easily made using the slots provided at both ends to hold the shaft, while rotating the lever arm to the desired angle. A clamping pin is used to maintain this setting, and a set screw to hold the rod length adjustment. The trip angle and lever length must be carefully adjusted to provide proper switch action.

Features

- Light operating torque
- Unique lever arms
- Trip point adjustable to any angle

Example: CW Operation



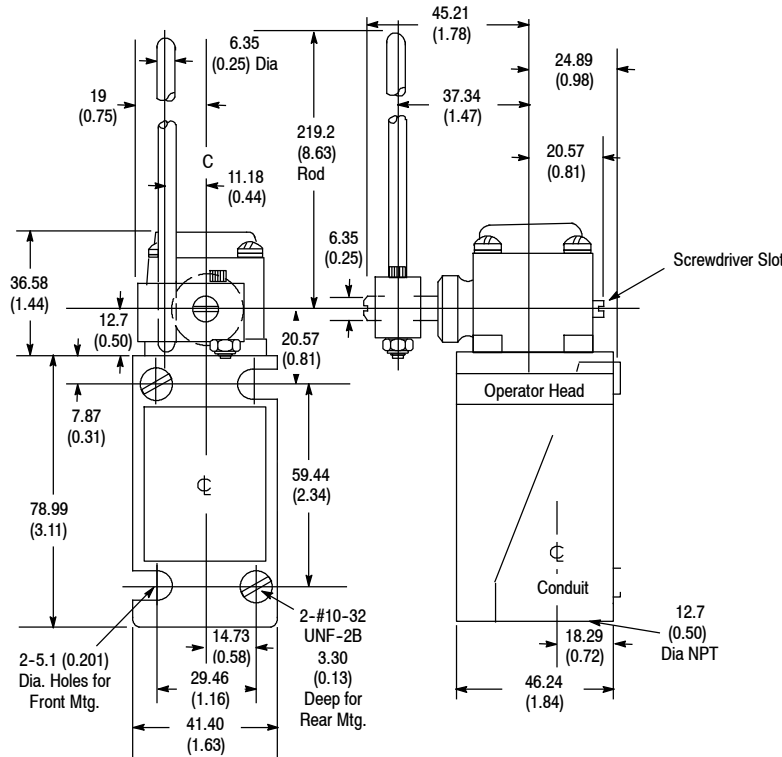
Product Selection

Contact Operation	Torque to Operate (Max)	Travel to Operate Contacts (Max)	Max Travel	Travel to Reset Contacts (Max)	Cat. No.	
					Complete Switch Without Lever	Switch Without Lever and Base
1 N.O. 1 N.C.	0.018 N•m (2.5 oz•in.) (without lever)	Adj. from 10°...180°	360° CW or CCW	10°	802G-GP	802G-GP1

10° opposite trip direction, 180° in trip direction.

Approximate Dimensions [mm (in.)]

Dimensions are not intended to be used for manufacturing purposes.



802G-GP with 802G-W10 Lever
Approximate Shipping Wt. 1.5lbs (680g)

Modification for Neon Indicating Light

The Bulletin 802G gravity return limit switch can be supplied with a neon indicating light. To order, add the letter “N” for 120V AC 50/60 Hz or “N5” for 240V AC 50/60 Hz. **Example:** Catalog number **802G-GP**, becomes catalog number **802G-GPN**.

The indicating light is to be internally connected by the user to two isolated terminals in the base assembly allowing complete flexibility in the connection of the light. Switches with an indicating light have a contact rating of NEMA B300.

Operating Levers

Description	Cat. No.
6.35 mm (0.25 in.) Steel Rod, Adjustable to 219.0 mm (8.625 in.) Length	802G-W10
3.18 mm (0.125 in.) Steel Rod, Adjustable to 219.0 mm (8.625 in.) Length	802G-W10A
6.35 mm (0.25 in.) Nylon Rod, Adjustable to 219.0 mm (8.625 in.) Length	802G-W11



802MC-AY5 with
802MC-W1A Lever

Description

Bulletin 802M compact pre-wired limit switches are factory sealed to meet the demanding requirements for NEMA 1, 4, 6P, 13, and IP67 (IEC529) enclosures. Outstanding features designed into the switch make it ideal for wet environments and washdown applications.

Bulletin 802MC limit switches are also factory sealed against fluid ingress. In addition, they feature a NEMA 4X rating, making the 802MC an ideal solution for washdown applications with harsh chemicals.

A wide variety of operating heads and operating levers are available. Operating heads can be mounted in four positions, 90° apart.

Sealing System

The cable entrance and wire strands are epoxy sealed to protect against liquids entering or wicking into the switch. The interface between the operating head and base is sealed with a chemically resistant O-ring. The

operating shaft for lever type switches is protected by a three-way seal. Push type switches have a special boot to prevent oil and other foreign material from entering the mechanism. A flexible diaphragm seal between the operating head and the switch body helps isolate the switch against the ingress of contaminants. After pre-wiring, the cover is factory installed and epoxy sealed.

Construction

The body and operating head of the Bulletin 802M and 802MC pre-wired limit switch are constructed from a glass filled polymer. This material is characterized by excellent dimensional stability and is resistant to moisture and numerous chemicals.

The Bulletin 802MC switch also capitalizes on the corrosion-resistant properties of the operating shaft and operating head mounting screws, which are made of Type 316 stainless steel.

The basic switching mechanism has double-throw, double-break, snap-action contacts with minimum contact bounce. The switch is pre-wired and factory sealed with "STO" cable. An optional mini-type or micro-type receptacle can also be supplied. Refer to Modifications on page 5-27 and 5-33.

Installation

Although physically smaller, the Bulletin 802M switch can be interchanged with a Bulletin 802T front mounted lever operated switch by using the mounting foot adaptor included (see dimensions on page 5-18). Cam tracking

- STO is a common identification of this cable. The more complete identification of the cable used on the Bulletin 802M is ST00W-A which incorporates an oil resistant jacket and conductor insulation, for indoor and outdoor use.

characteristics from the top mounting hole of the Bulletin 802M and 802MC switch are identical to the Bulletin 802T nonplug-in rotary operated switch line.

Time saving factory pre-wiring makes the switch economical to use. There is no need to purchase a separate cable grip or cable because internal wiring by the installer is eliminated. Merely connect the STO cable to a junction box. Since the switch body is nonmetallic, no ground wire is required for the switch.

Lever Type Switches

These switches are operated by means of a lever which is clamped to a knurled shaft extending from the operating head. These devices can be easily field converted to clockwise, counterclockwise, or both directions of operation without any loose parts. Total travel is 86° in either direction. Operating heads are interchangeable and can be mounted in any of four positions 90° apart for maximum flexibility. The head is interlocked with the base unit to resist accidental shearing.

Lever type switches can be equipped with a variety of operating levers: roller lever, adjustable roller lever, micrometer adjustment roller lever, rod lever, one-way rod or roller lever and fork lever.

Push Type Switches

These switches are actuated by means of a rod or plunger located on the top or side of the operating unit. Pushing the plunger into the head causes the contacts to operate. Two types of plungers are available: rod and roller. Push type switches are supplied in spring return construction.

802M

Pre-Wired—Factory Sealed Switches



Description

The Bulletin 802M compact pre-wired limit switch is factory sealed to meet the demanding requirements for NEMA 1, 4, 6P and 13 enclosures. Outstanding features designed into the switch make it ideal for wet environments and washdown applications.

A wide variety of operating heads and operating levers are available. Operating heads can be mounted in four positions, 90° apart.

Applications

The Bulletin 802M is designed for dry and wet applications. The superior sealing system has been developed to protect against dust, dirt, and fluids normally found in industrial environments. The device has passed harsh environmental testing such as alternately drenching with a liquid and exposing to dust and abrasive grit with the switch operating 250 times per minute.

Specifications

Enclosure Rating	NEMA 1, 4, 6P, 13 and IP67
Pollution Degree	3
Certifications	UL Listed, CSA Certified and CE Marked for applicable directives
Ambient Temperature [C (F)]	0...+80° (+32...+18°) minimum temperature based on the absence of freezing moisture or water.

AC Contact Rating (Maximum per Pole, 50 or 60Hz, 2 Circuits Same Polarity)

NEMA Rating Designation	Max Voltage	A		Continuous Carrying Current	VA	
		Make	Break		Make	Break
A600 AC-15	120	60	6.00	10	7200	720
	240	30	3.00	10	7200	720
	480	15	1.50	10	7200	720
	600	12	1.20	10	7200	720

AC Contact Rating (Maximum per Pole, 50 or 60Hz, 4 Circuits Same Polarity)

NEMA Rating Designation	Max Voltage	A		Continuous Carrying Current	VA	
		Make	Break		Make	Break
B300	120	30	3.00	5	3600	360
	240	15	1.50	5	3600	360

DC Contact Rating (Maximum per Pole, 2 Circuits Same Polarity)

	Nominal Voltage	A	Continuous Carrying Current (A)
		24	1.1

The switch is often used in applications subject to washdowns, streams of coolant, or occasionally submerged in fluids commonly found on machines or in industrial processes. This limit switch is being used successfully in High Water Content Fluid (HWCF) applications. Contact your local Rockwell Automation sales office or Allen-Bradley distributor for applications where potentially corrosive fluids are of a particular concern.

Features

- Pre-wired and factory sealed
- Corrosion-resistant housings
- Corrosion-resistant hardware (802MC)
- Side rotary, adjustable top and top or side push styles with and without rollers
- Double-break fine silver contacts

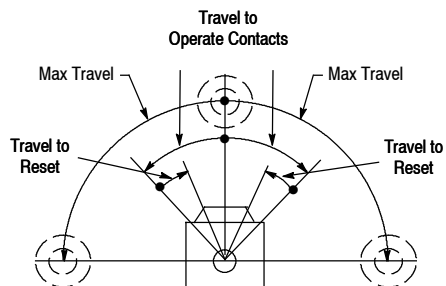
Pre-Wired—Factory Sealed

- Lever Type • Spring Return page 5-17
- Lever Type Neutral page 5-19
- Position • Spring Return
- Lever Type • Maintained . . . page 5-20
- Contact
- Lever Type Sequential • . . . page 5-21
- Spring Return
- Push Type • Spring Return . . . page 5-22
- Wiring Diagrams page 5-24
- Modifications page 5-27
- Accessories page 5-29

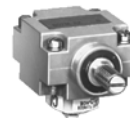
802M Lever Type • Spring Return

Pre-Wired—Factory Sealed Switches

Range of Operation



Complete Switch Without Lever



Operator Head Only



Switch Body Only

Product Selection

No. of Circuits	Lever Movement vs. Contact Operation	Torque to Operate (Max.)	Travel to Operate Contacts (Max.)	Max Travel	Travel to Reset Contacts (Max.)	Cat. No.		
						Complete Switch w/o Lever ❶	Operator Head Only	Switch Body Only ❶
2	Clockwise or Counterclockwise	0.34 N•m (3 lb•in)	15°	86°	6°	802M-AY5	802M-AX	802M-XY5
		0.56 N•m (5 lb•in)	8°		4°	802M-HY5	802M-HX	
	Clockwise	0.34 N•m (3 lb•in)	15°		6°	802M-A1Y5	802M-A1X	
		0.56 N•m (5 lb•in)	8°		4°	802M-H1Y5	802M-H1X	
	Counterclockwise	0.34 N•m (3 lb•in)	15°		6°	802M-A2Y5	802M-A2X	
		0.56 N•m (5 lb•in)	8°		4°	802M-H2Y5	802M-H2X	
4	Clockwise or Counterclockwise	0.34 N•m (3 lb•in)	15°	86°	6°	802M-ATY5	802M-AX	802M-XTY5
		0.56 N•m (5 lb•in)	8°		4°	802M-HTY5	802M-HX	
	Clockwise	0.34 N•m (3 lb•in)	15°		6°	802M-A1TY5	802M-A1X	
		0.56 N•m (5 lb•in)	8°		4°	802M-H1TY5	802M-H1X	
	Counterclockwise	0.34 N•m (3 lb•in)	15°		6°	802M-A2TY5	802M-A2X	
		0.56 N•m (5 lb•in)	8°		4°	802M-H2TY5	802M-H2X	

❶ The standard length of STO cable is 1.52 m (5 ft). For other lengths see Modifications and Accessories.

Levers—See page 5-130 for a complete listing of operating levers.

Wiring Diagrams—See page 5-24.

Modifications and Accessories—See page 5-27.

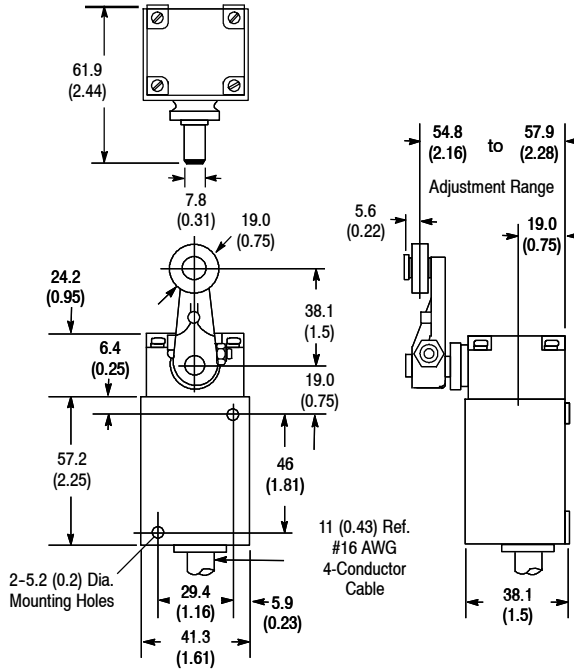
Limit Switches

802M Lever Type • Spring Return

Pre-Wired—Factory Sealed Switches

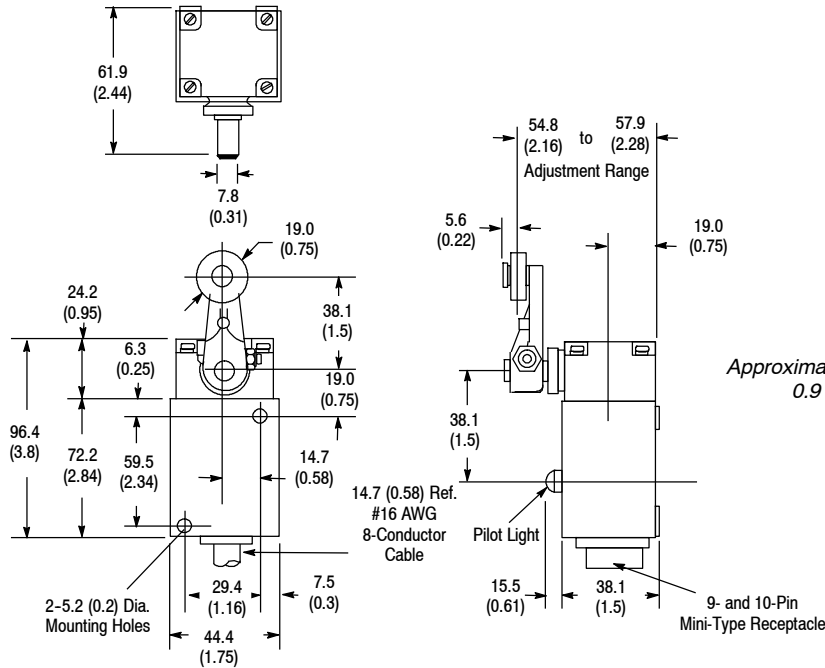
Approximate Dimensions [mm (in.)]

2-Circuit



Shipping Wt.
1lb 0.53 kg (3 oz)

4-Circuit



Approximate Shipping Wt.
0.9 kg (2 lb)

Note: Mounting foot adaptor as shown on page 5-23 is for use with 2-circuit 802M type switches only.

Levers—See page 5-130 for a complete listing of operating levers.

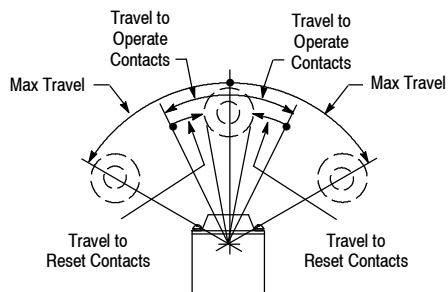
Wiring Diagrams—See page 5-24.

Modifications and Accessories—See page 5-27.

802M Lever Type Neutral Position • Spring Return

Pre-Wired—Factory Sealed Switches

Range of Operation



Complete Switch Without Lever



Operator Head Only



Switch Body Only

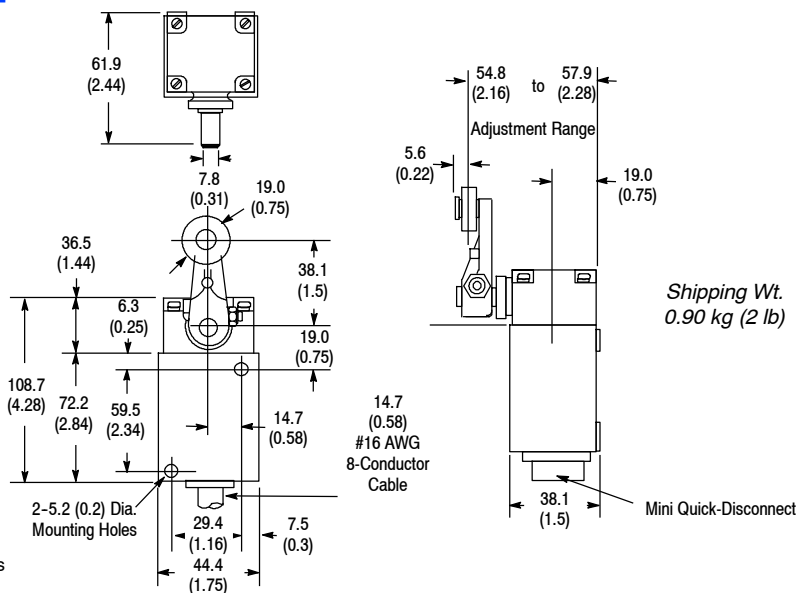
Product Selection

No. of Circuits	Lever Movement vs. Contact Operation	Torque to Operate (Max)		Travel to Operate Contacts (Max)	Max Travel	Travel to Reset Contacts (Max)	Cat. No.		
		CW	CCW				Complete Switch w/o Lever ①②	Operator Head Only ②	Switch Body Only ①
4		7 lb•in (0.79 N•m)	7.5 lb•in (0.85 N•m)	16°	75°	7°	802M-NPY5	802M-NPX	802M-XNPY5

① The standard length of STO cable is 1.52 m (5 ft). For other lengths see Modifications and Accessories.

② Operating lever 802T-W3F should not be used with this switch.

Approximate Dimensions [mm (in.)]



Note: Mounting foot adaptor as shown on page 5-23 is for use with 2-circuit 802M type switches only.

Shipping Wt.
0.90 kg (2 lb)

Levers—See page 5-130 for a complete listing of operating levers.

Wiring Diagrams—See page 5-24

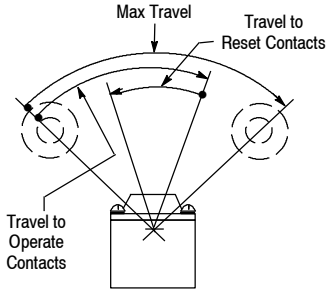
Modifications and Accessories—See page 5-27.

Limit Switches

802M Lever Type • Maintained Contact

Pre-Wired—Factory Sealed Switches

Range of Operation



Complete Switch Without Lever



Operator Head Only



Switch Body Only

Product Selection

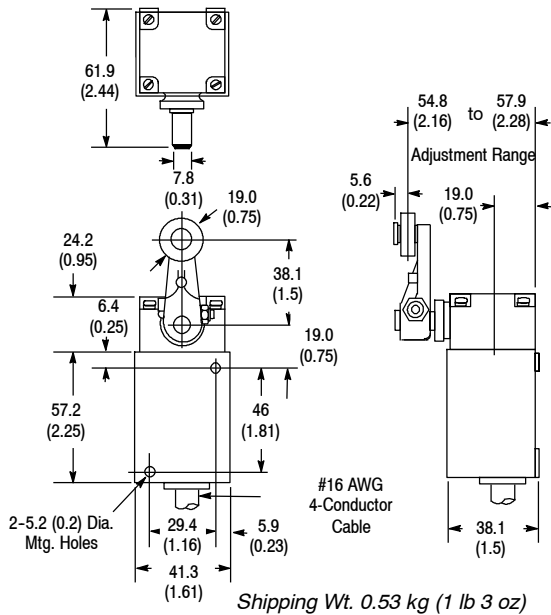
No. of Circuits	Lever Movement vs. Contact Operation	Torque to Operate (Max.)	Travel to Operate Contacts (Max.) [Ⓢ]	Max Travel [Ⓢ]	Travel to Reset Contacts (Max.)	Cat. No.		
						Complete Switch w/o Lever [Ⓢ]	Operator Head Only	Switch Body Only [Ⓢ]
2	Clockwise or Counterclockwise 	0.31 N•m (2.75 lb•in)	75°	87°	35°	802M-AMY5	802M-AMX	802M-XY5
4	Clockwise or Counterclockwise 					802M-AMTY5		802M-XTY5

Ⓢ The standard length of STO cable is 1.52 m (5 ft). For other lengths see Modifications and Accessories.

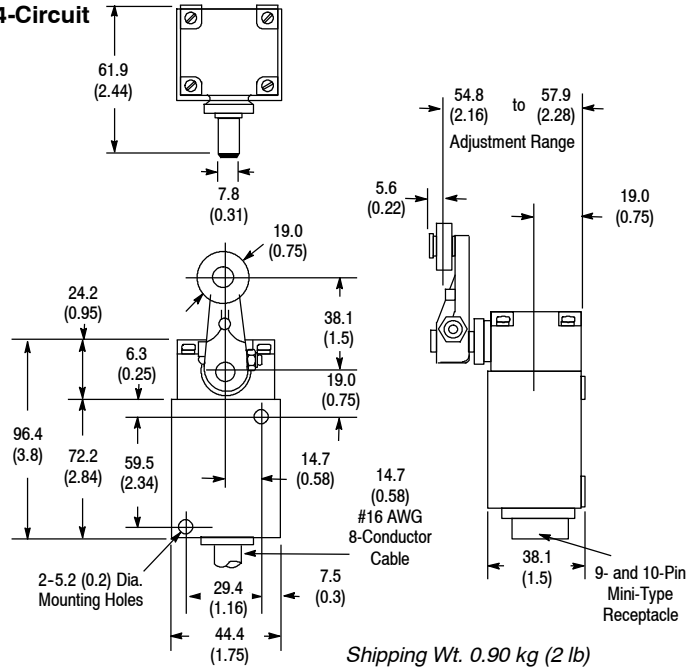
Ⓢ From one maintained position to the other.

Approximate Dimensions [mm (in.)]

2-Circuit



4-Circuit



Levers—See page 5-130 for a complete listing of operating levers.

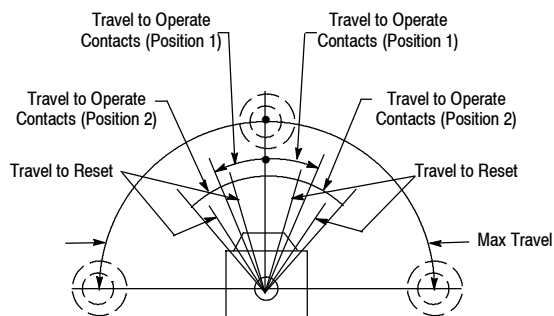
Wiring Diagrams—See page 5-24.

Modifications and Accessories—See page 5-27.

802M Lever Type Sequential • Spring Return

Pre-Wired—Factory Sealed Switches

Range of Operation



Complete Switch Without Lever



Operator Head Only



Switch Body Only

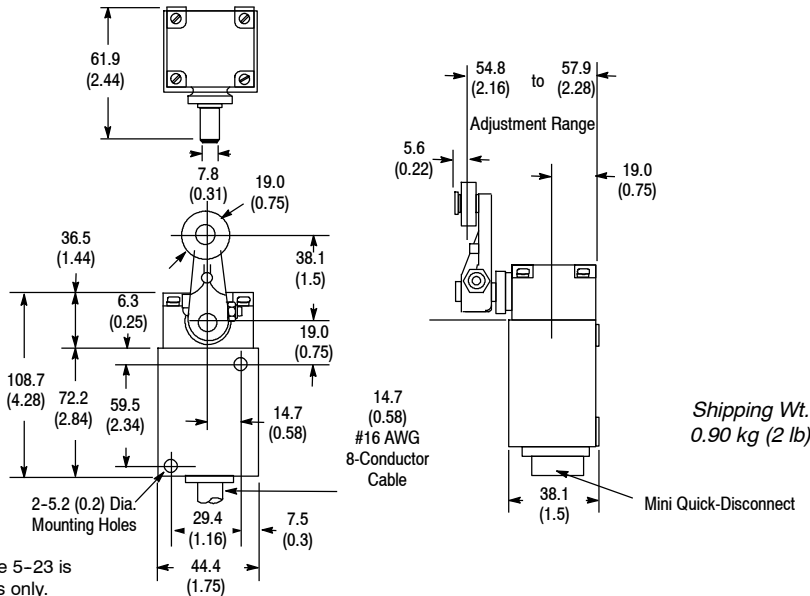
Product Selection — 4-Circuit

Lever Movement vs. Contact Operation	Position 1	Position 2	To Max Travel	Position 1	Position 2	Max Travel	Travel to Reset Contacts (Max.)	Cat. No.		
								Complete Switch w/o Lever ①②	Operator Head Only ②	Switch Body Only ①
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Counterclockwise</p> </div> <div style="text-align: center;"> <p>Clockwise</p> </div> </div>	0.79 N•m (7 lb•in)	0.9 N•m (8 lb•in)		10°± 3°	20°± 3°	88°	4°± 3°	802M-ASY5	802M-ASX	802M-XSY5

① The standard length of STO cable is 1.52 m (5 ft). For other lengths see Modifications and Accessories.

② Operating lever 802T-W3F should not be used with this switch.

Approximate Dimensions [mm (in.)]



Levers—See page 5-130 for a complete listing of operating levers.

Wiring Diagrams—See page 5-24.

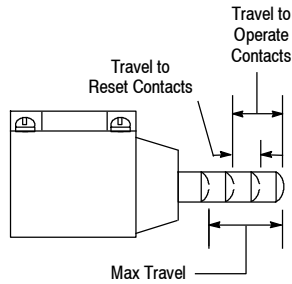
Modifications and Accessories—See page 5-27.

Limit Switches

802M Push Type • Spring Return

Pre-Wired—Factory Sealed Switches

Range of Operation



Product Selection

No. of Circuits	Operator Type	Contact Operation		Force to Operate (Max)	Travel to Operate Contacts (Max)	Max Travel	Travel to Reset Contacts (Max)	Cat. No.		
		Normal	Operated					Complete Switch ❶	Operator Head Only	Switch Body Only ❶
2	Top Push Rod	$\begin{array}{c} 1 \circ \quad \circ 2 \\ 3 \circ \quad \circ 4 \end{array}$	$\begin{array}{c} 1 \circ \quad \circ 2 \\ 3 \circ \quad \circ 4 \end{array}$	13.3 N (3 lb)	1.45 mm (0.057 in.)	5.26 mm (0.207 in.)	0.56 mm (0.022 in.)	802M-BY5	802M-BX	802M-XY5
	Adjustable Top Push Rod							802M-BAY5	802M-BAX	
	Side Push Rod			20 N (4.5 lb)	2.59 mm (0.102 in.)	5.16 mm (0.203 in.)	1.14 mm (0.045 in.)	802M-CY5	802M-CX	
	Top Push Roller			14.7 N (3.3 lb)	1.45 mm (0.057 in.)	5.26 mm (0.207 in.)	0.56 mm (0.022 in.)	802M-DY5	802M-DX	
	Side Push Vertical Roller			20 N (4.5 lb)	2.59 mm (0.102 in.)	5.1 mm (0.203 in.)	1.14 mm (0.045 in.)	802M-KY5	802M-KX	
	Side Push Horizontal Roller							802M-K1Y5	802M-K1X	
	Adjustable Side Push Rod							802M-CAFY5	802M-CAFX	
4	Top Push Rod	$\begin{array}{c} 1 \circ \quad \circ 2 \\ 3 \circ \quad \circ 4 \\ 5 \circ \quad \circ 6 \\ 7 \circ \quad \circ 8 \end{array}$	$\begin{array}{c} 1 \circ \quad \circ 2 \\ 3 \circ \quad \circ 4 \\ 5 \circ \quad \circ 6 \\ 7 \circ \quad \circ 8 \end{array}$	13.3 N (3.5 lb)	1.45 mm (0.057 in.)	5.13 mm (0.202 in.)	0.076 mm (0.030 in.)	802M-BTY5	802M-BX	802M-XTY5
	Adjustable Top Push Rod							802M-BATY5	802M-BAX	
	Side Push Rod			20 N (4.5 lb)	3.18 mm (0.125 in.)	5.54 mm (0.218 in.)	1.14 mm (0.045 in.)	802M-CTY5	802M-CX	
	Top Push Roller			14.7 N (3.5 lb)	1.45 mm (0.057 in.)	5.13 mm (0.202 in.)	0.076 mm (0.030 in.)	802M-DTY5	802M-DX	
	Side Push Vertical Roller			20 N (4.5 lb)	3.18 mm (0.125 in.)	5.54 mm (0.218 in.)	1.14 mm (0.045 in.)	802M-KTY5	802M-KX	
	Side Push Horizontal Roller							802M-K1TY5	802M-K1X	
	Adjustable Side Push Rod							802M-CAFTY5	802M-CAFX	

❶ The standard length of STO cable is 1.52 m (5 ft). For other lengths see Modifications and Accessories.

Wiring Diagrams—See page 5-24.

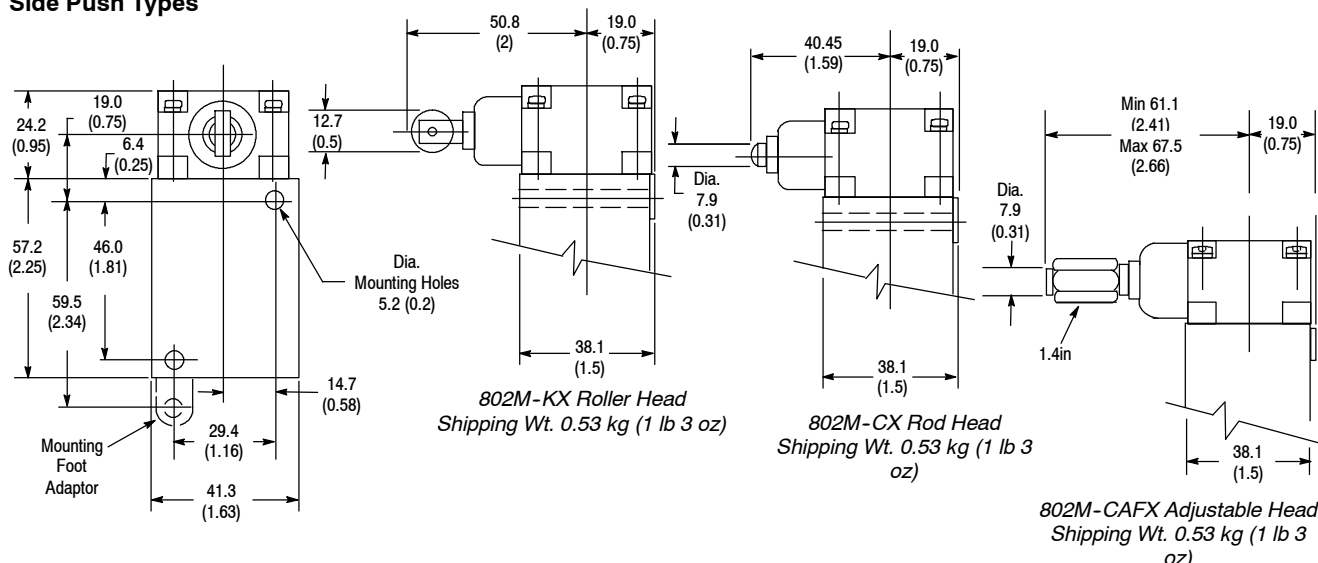
Modifications and Accessories—See page 5-27.

802M Push Type • Spring Return

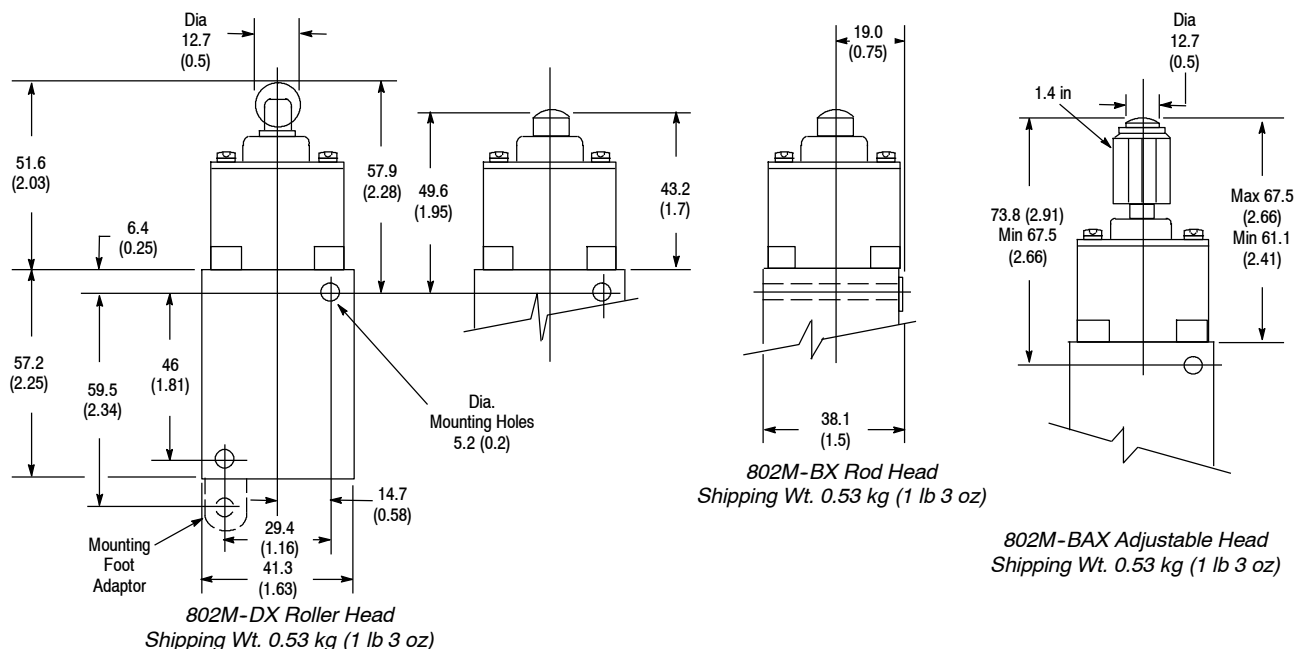
Pre-Wired—Factory Sealed Switches

Approximate Dimensions [mm (in.)]

Side Push Types



Top Push Types



Note: Mounting foot adaptor as shown above is for use with 2-circuit 802M type switches only.

Wiring Diagrams—See page 5-24.

Modifications and Accessories—See page 5-27.

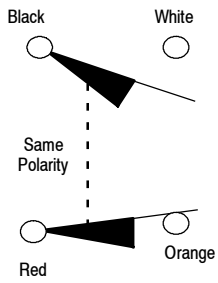
Limit Switches

802M Wiring Diagrams for 2-Circuit Models

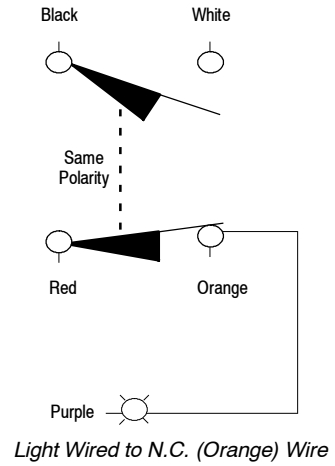
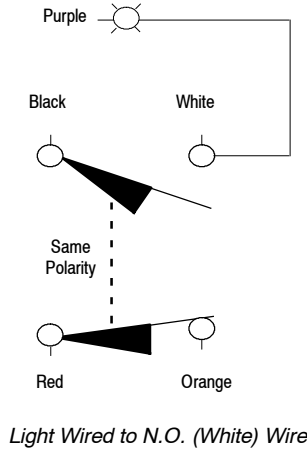
Pre-Wired—Factory Sealed Switches

Cable Models

(See Applicable Codes and Laws)

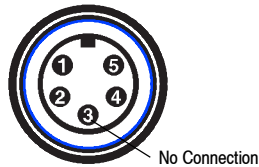
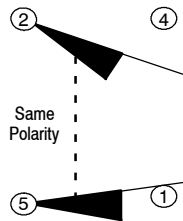


Cable Models with One Indicating Light

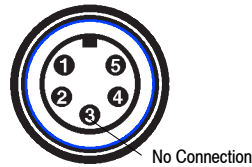
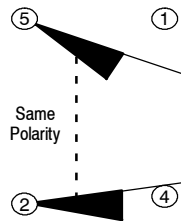


5-Pin Mini-Type Receptacle

“J1” Wiring

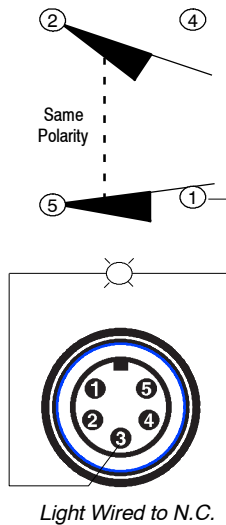
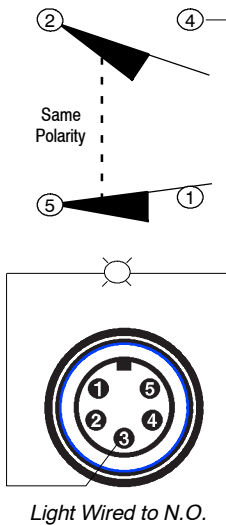


“J9” Wiring

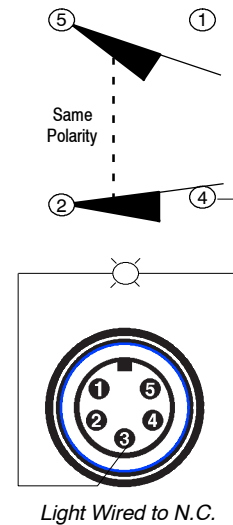
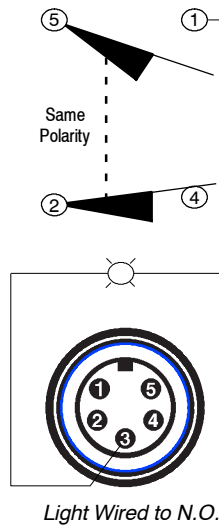


5-Pin Mini-Type Receptacle with One Indicating Light

“J1” Wiring



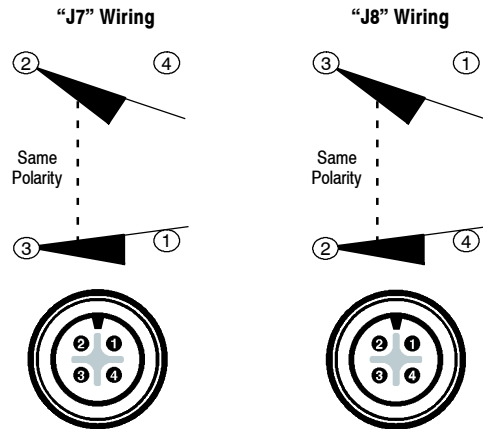
“J9” Wiring



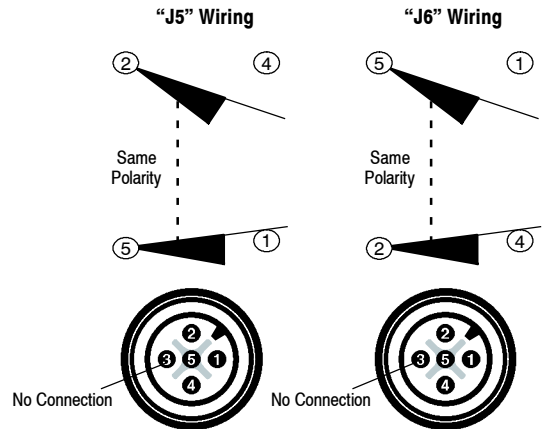
802M Wiring Diagrams for 2-Circuit Models

Pre-Wired—Factory Sealed Switches

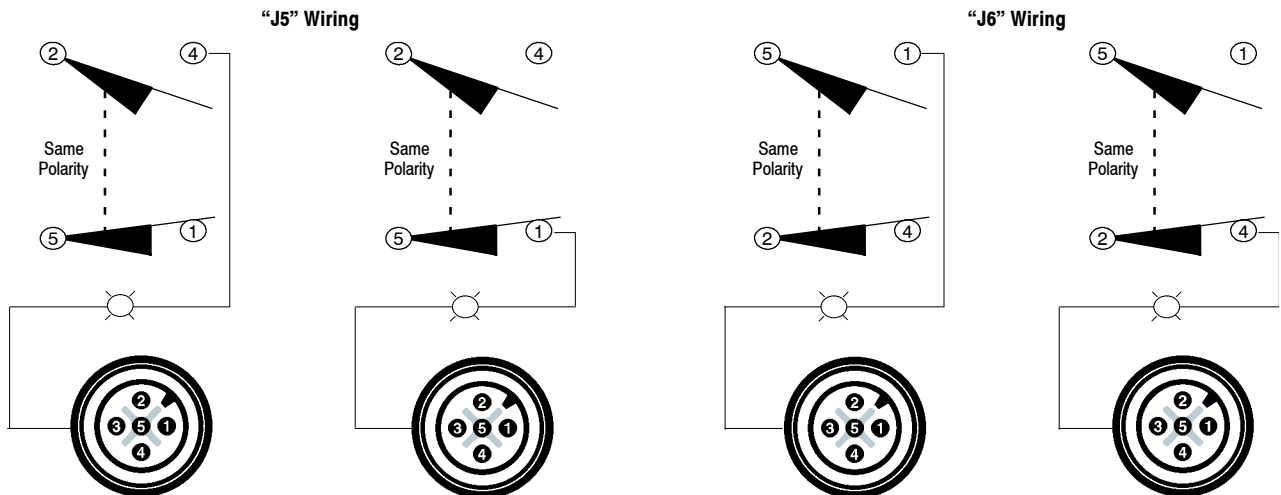
4-Pin Micro-Type Receptacle (DC only)



5-Pin Micro-Type Receptacle (DC only)



5-Pin Micro-Type Receptacle with One Indicating Light (DC only)

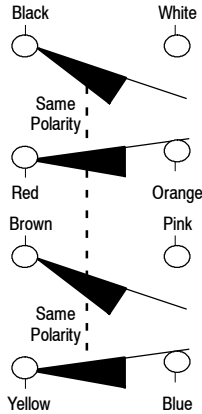


802M Wiring Diagrams for 4-Circuit Models

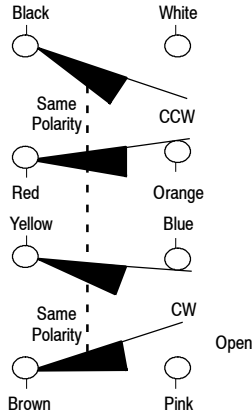
Pre-Wired—Factory Sealed Switches

Cable Models

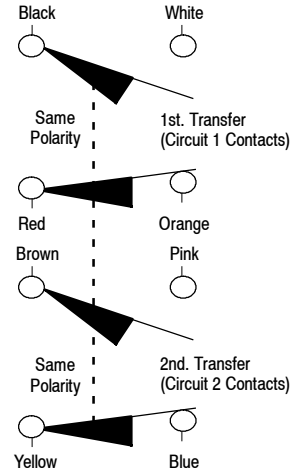
(See Applicable Codes and Laws)



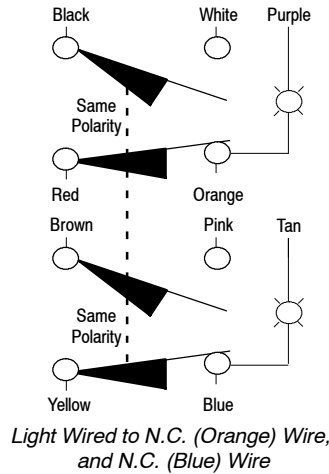
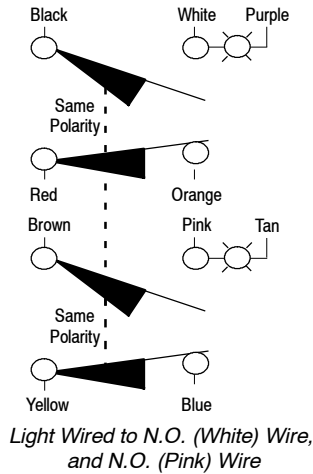
Neutral Position with Cable



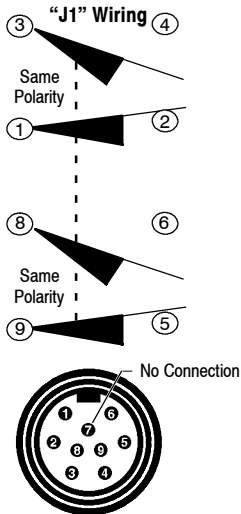
Sequential with Cable



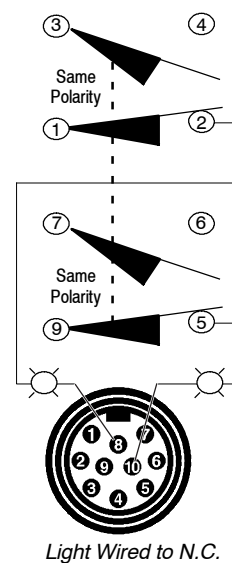
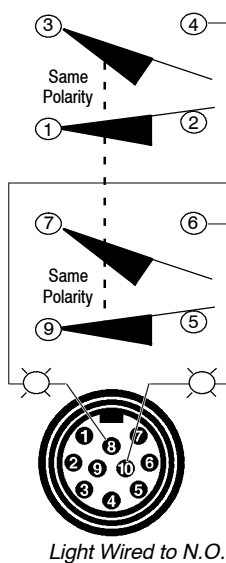
Cable Models with Two Indicating Lights



9-Pin Mini-Type Receptacle



10-Pin Mini-Type Receptacle with Two Indicating Lights



802M Modifications

Pre-Wired—Factory Sealed Switches

24V DC Switches

All two-circuit 802M limit switches are available with silver-nickel contacts rated for 24V DC applications. To order a switch rated for 24V DC use, insert the letter **Z** before the cable or connector designation. Example: 802M-AZY5 is a 24V DC version of the 802M-AY5. The use of the 24V DC micro connector option or 24V DC indicating light option require the switch be rated for 24V DC operation.

Extended Cable Lengths

The factory installed type STO cable is normally supplied in 1.52 m (5 ft) lengths. Extended cable lengths are available in multiples of four feet. To order, replace the suffix **Y5** in the cat. no. with the appropriate suffix from the table below. Example: To order a lever type two-circuit spring return switch with 1.83 m (8 ft) of STO cable the cat. no. would be 802M-AY8.

Additional Cable Length

Modification	Cat. Number Suffix
1.83 m (8 ft) Cable	Y8
3.66 m (12 ft) Cable	Y12
4.78 m (16 ft) Cable	Y16

5-Pin Mini-Type Receptacle^①
(2-Circuit Models Only)

802M with Mini-Type Receptacle
2-Circuit

To order a Bulletin 802M pre-wired limit switch with a 5-pin mini connector in place of the 1.52 m (5 ft) of "STO"^② cable, replace the **Y5** in the cat. no. with the suffix **J1** or **J9** depending upon the wiring configuration required. Maximum voltage rating for this receptacle is 250V AC.

An appropriate female connector with cable (889N-F5AFC-6F) is available on page 8-4 in Connection Systems.

9-Pin Mini-Type Receptacle^①
(4-Circuit Models without Indicator Lights Only)

802M with Mini-Type Receptacle
4-Circuit

To order a Bulletin 802M pre-wired limit switch with a 9-pin mini connector in place of the 1.52 m (5 ft) of STO cable, replace the **Y5** in the cat. no. with the suffix **J1**. Maximum voltage rating for this receptacle is 250V AC.

An appropriate female connector with cable (889N-F9AF-2) is available on page 8-14 in Connection Systems.

10-Pin Mini-Type Receptacle^①
(4-Circuit Models with 2 Indicating Lights Only)

To order a Bulletin 802M pre-wired limit switch with a 10-pin mini connector and two indicating lights, replace the **Y5** in the cat. no. with the suffix **J4**. Maximum voltage rating for this receptacle is 250V AC. Also, specify the indicating lights per the table on page 5-28.

Example: Cat. No. 802M-ATY5 with mini-connector and (2) 120V AC indicating lights wired to one side of each N.O. contact would be Cat. No. 802M-ATJ4L1F.

An appropriate female connector with cable (889N-F10AF-2) is available on page 8-14 in Connection Systems.

4-Pin Micro-Type Receptacle
(2-Circuit 24V DC Models Only)

802M with Micro-Type
Receptacle—2-Circuit

To order a Bulletin 802M pre-wired limit switch with a 4-pin micro connector in place of the 1.52 m (5 ft) of "STO"^② cable, replace the **Y5** in the cat. no. with the suffix **J7** or **J8** depending upon the wiring configuration required. This option requires that the switch is rated 24V DC.

An appropriate female connector with cable (889D-F4AC-2) is available on page 8-16 in Connection Systems.

5-Pin Micro-Type Receptacle
(2-Circuit 24V DC Models Only)

To order a Bulletin 802M pre-wired limit switch with a 5-pin micro connector in place of the 1.52 m (5 ft) of "STO"^② cable, replace the **Y5** in the cat. no. with the suffix **J5** or **J6** depending upon the wiring configuration required. This option requires that the switch is rated 24V DC.

An appropriate female connector with cable (889D-F5AC-2) is available on page 8-16 in Connection Systems.

① A 5-pin, 9-pin or 10-pin plug-in receptacle is supplied to facilitate retrofitting existing installations. The normal ground wire pin is not required and is not connected inside the switch.

② STO is a common identification of this cable. The more complete identification of the cable used on the Bulletin 802M is STOOW-A which incorporates an oil resistant jacket and conductor insulation, for indoor and outdoor use.

802M Modifications

Pre-Wired—Factory Sealed Switches

Indicating Lights



802M with Indicating Light
2-Circuit

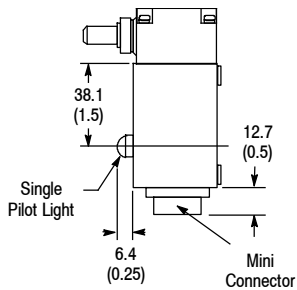


802M with Indicating Lights
4-Circuit

2-Circuit—Bulletin 802M pre-wired limit switches can be supplied with an indicating light which is wired to one side of either the N.O. or N.C. contact. The second lead of the light is available as a fifth conductor for wiring flexibility. See pages 5-24 through 5-25 for wiring diagrams.

To order, add the appropriate suffix listed in the table to the right to the cat. no. Example: Cat. No. 802M-AY5 with a 120V AC LED indicating light wired to one side of the N.O. contact would be Cat. No. 802M-AY5**L1F**.

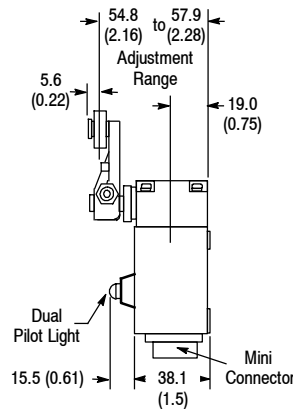
Example: Cat. No. 802M-AY5 with mini-connector and 120V AC indicating light wired to one side of the N.O. contact would be Cat. No. 802M-AJ1**L1F**.



4-Circuit—Bulletin 802M pre-wired limit switches can be supplied with 2 indicating lights wired to one side of each N.O. or N.C. contact of the 4-circuit contact block. Second leads from each light are available as ninth and tenth conductors for wiring flexibility. See page 5-26 for wiring diagram.

To order, add the appropriate suffix listed in the table to the right to the cat. no.

Example: Cat. No. 802M-ATY5 with 120V AC LED indicating lights wired to one side of each N.C. contact would be Cat. No. 802M-ATY5**L1C**.



LED Indicating Lights

Voltage	Wired to ❶	Cat. No. Suffix
24V DC ❷	N.O. Contact	LF
	N.C. Contact	LC
120V AC 50-60Hz	N.O. Contact	L1F
	N.C. Contact	L1C

Neon Indicating Lights

Voltage	Wired to ❶	Cat. No. Suffix
120V AC 50-60Hz	N.O. Contact	NF
	N.C. Contact	NC
240V AC 50-60Hz	N.O. Contact	N5F
	N.C. Contact	N5C

Fitting for Liquid-Tight Flexible Metal Conduit

802M 2-circuit switches can be obtained provided with a fitting for liquid-tight flexible metal conduit (flexible metal conduit not provided) and a pigtail for wiring. Add the following suffix to the cat. no. (dashes indicate pigtail length):

- GS**_ straight-out fitting
- GF**_ front oriented 90° elbow fitting
- GL**_ left oriented 90° elbow fitting
- GB**_ back oriented 90° elbow fitting
- GR**_ right oriented 90° elbow fitting.

Example: GS5=5 foot long pigtail. Additional cable length over 1.5 m (5 ft) is available in multiples of 1.2 m (4 ft).

❶ See wiring diagrams page 5-24...5-26.

❷ Requires the switch to be rated for 24V DC operation.

Adaptor Foot

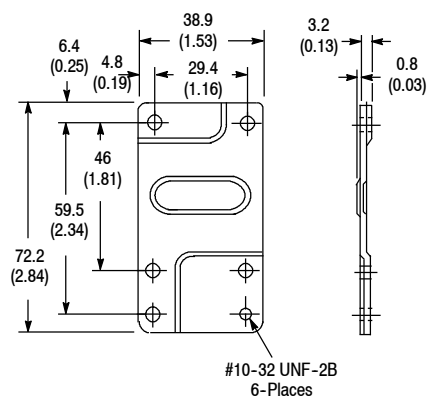
To mount a 2-circuit 802M in the same 1.16 in. x 2.34 in. mounting hole pattern as an 802T, an adaptor foot is required and is included with each 802M as shipped. This accessory is made of steel and is chromate plated to resist corrosion. To obtain replacement adaptor feet, order Cat. No. 40246-008-02.

Rear Mounting Adaptor Kit

For rear mounting of 2-circuit or 4-circuit Bulletin 802M pre-wired limit switch (not suitable for use on Bulletin 802MC).

Kit includes mounting plate and two screws for mounting adaptor plate to switch. To mount to surface from rear use two #10-32 screws. Select proper screw length to pass through adaptor plate without bottoming against back of limit switch.

Order Cat. No. 802M-N1.



Approximate Shipping Wt. 0.2 kg (8 oz)

802MC

Corrosion-Resistant Pre-Wired—Factory Sealed Switches



Description

The Bulletin 802MC is a pre-wired limit switch especially designed to provide additional corrosion protection in wet or dry locations commonly found in industrial process. By using a polymeric enclosure and Type 316 stainless steel for the exposed metal parts, the Bulletin 802MC provides a tougher defense against environmental contaminants to provide the user with more dependable operation and longer lasting performance. In addition, this switch is factory sealed and is particularly effective in applications where it may be subjected to dust, dirt, streams of liquids or occasionally submerged in fluids.

Specifications

Enclosure Rating	NEMA 1, 4X, 6P, 13 and IP66/67 (IEC529)
Pollutions Degree	3
Certifications	UL Listed, CSA Certified and CE Marked for applicable directives
Ambient Temperature [C (F)] ①	0...+80° (+32...+180°)

AC Contact Rating (Maximum per Pole, 50 or 60Hz, 2 Circuits Same Polarity)

NEMA Rating Designation	Voltage	A		Continuous Carrying Current	VA	
		Make	Break		Make	Break
A600 AC-15	120	60	6.00	10	7200	720
	240	30	3.00	10	7200	720
	480	15	1.50	10	7200	720
	600	12	1.20	10	7200	720

DC Contact Rating (Maximum per Pole, 2 Circuits Same Polarity)

Nominal Voltage	A	Continuous Carrying Current	

① Minimum temperature is based on the absence of freezing moisture or water.

Applications

Typical examples of Bulletin 802MC applications are plating facilities, chemical or fertilizer plants, meat packing plants, dairies, breweries and other processing industries, where equipment might be hosed down regularly with cleaning solutions.

Features

- Pre-wired and factory sealed
- Corrosion resistant
- Submersible

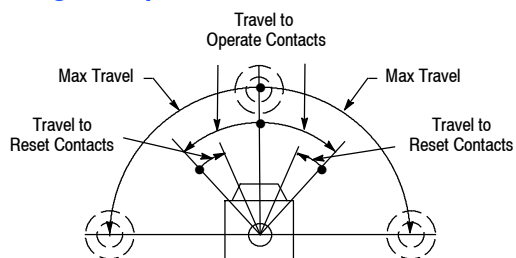
Corrosion-Resistant Pre-Wired

Lever Type • Spring Return page 5-31
 Wiring Diagrams page 5-32
 Modifications and page 5-33
 Accessories

802MC Lever Type • Spring Return

Corrosion-Resistant Pre-Wired—Factory Sealed Switches

Range of Operation



Complete Switch Without Lever



Operator Head Only



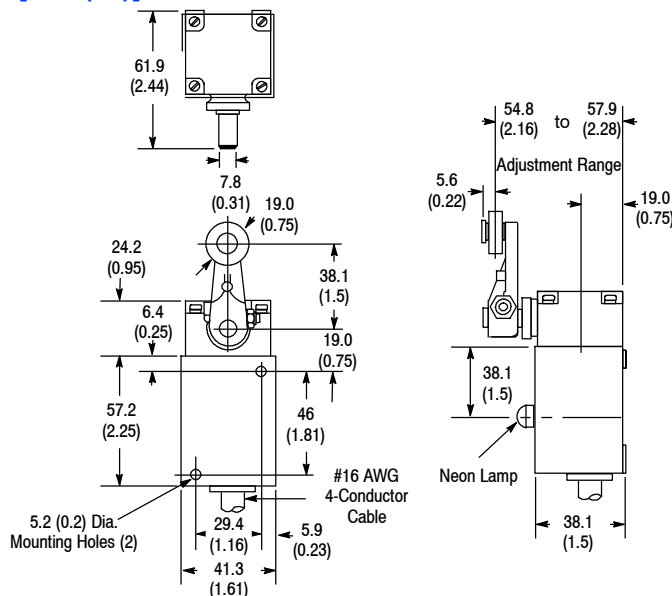
Base Only

Product Selection

No. of Circuits	Lever Movement vs. Contact Operation	Torque to Operate (Max)	Travel to Operate Contacts (Max)	Max Travel	Travel to Reset Contacts (Max)	Cat. No.		
						Complete Switch w/o Lever ①	Operator Head Only	Switch Only ①
2	Clockwise or Counterclockwise	0.34 N•m (3 lb•in)	15°	86°	6°	802MC-AY5	802MC-AX	802MC-XY5
	Clockwise					802MC-A1Y5	802MC-A1X	
	Counterclockwise					802MC-A2Y5	802MC-A2X	

① The standard length of STO cable is 1.52 m (5 ft). For other lengths, see Modifications and Accessories.

Approximate Dimensions [mm (in.)]



Levers—See page 5-130 for a complete listing of operating levers.

Wiring Diagrams—See page 5-32.

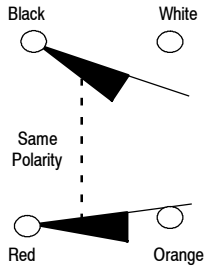
Modifications and Accessories—See page 5-33.

802MC Wiring Diagrams

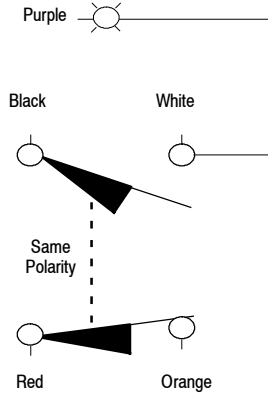
Corrosion-Resistant Pre-Wired—Factory Sealed Switches

Cable Models

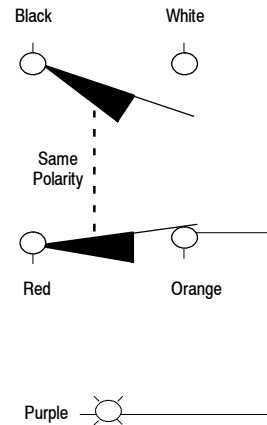
(See Applicable Codes and Laws)



Cable Models with Indicating Light

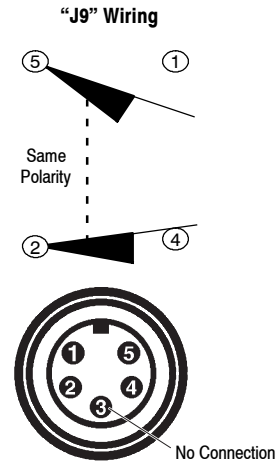
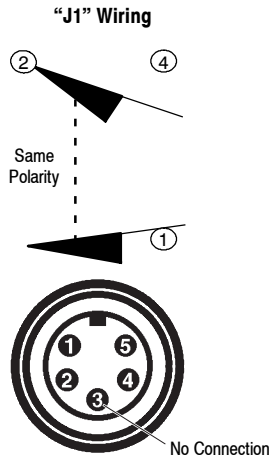


Light Wired to N.O. (White) Wire

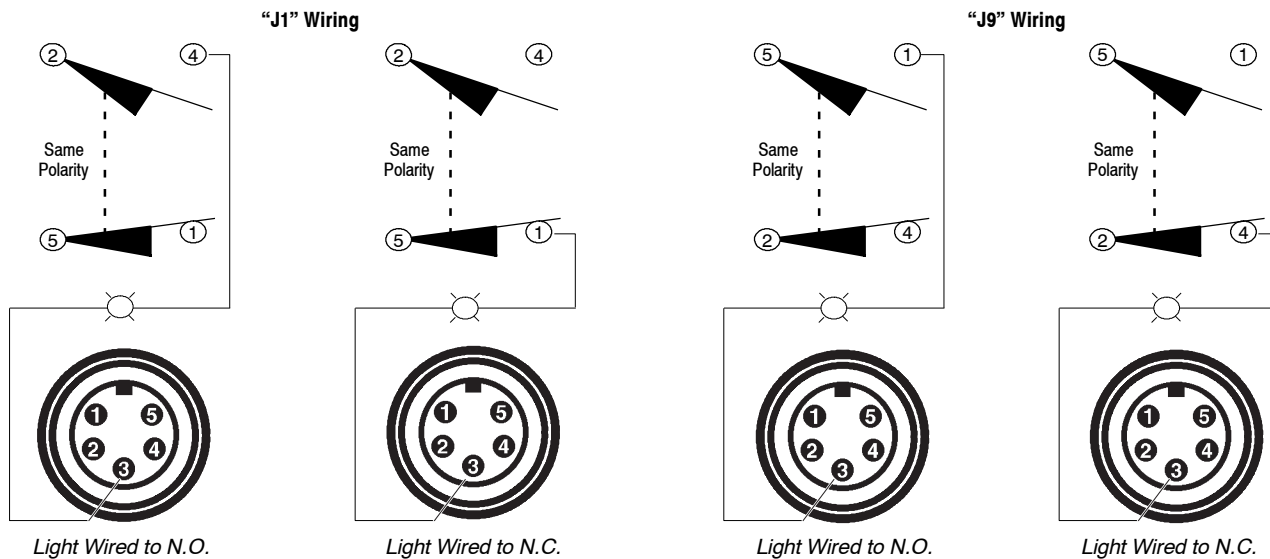


Light Wired to N.C. (Orange) Wire

5-Pin Mini-Type Receptacle



5-Pin Mini-Type Receptacle with Indicating Light



802MC Modifications

Corrosion-Resistant Pre-Wired—Factory Sealed Switches



Neon Indicating Light

Indicating Light

Bulletin 802MC pre-wired limit switches can be supplied with an indicating light wired to one side of either the N.O. or N.C. contact. The second lead of the light is available as a fifth conductor for wiring flexibility.

To order, add the appropriate suffix listed in the table below to the cat. no.. Example: Cat. No. 802MC-AY5 with a 120V AC LED indicating light wired across the N.O. contact would be Cat. No. 802MC-AY5L1F.

LED Indicating Light

Voltage	Wired to	Cat. No. Suffix
24V DC ①	N.O. Contact	LF
	N.C. Contact	LC
120V AC 50-60 Hz	N.O. Contact	L1F
	N.C. Contact	L1C

Neon Indicating Light

Voltage	Wired to	Cat. No. Suffix
120V AC 50-60 Hz	N.O. Contact	NF
	N.C. Contact	NC
240V AC 50-60 Hz	N.O. Contact	N5F
	N.C. Contact	N5C

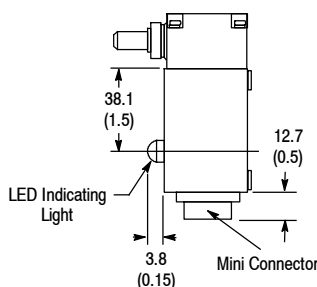


5-Pin Mini-Type Receptacle

5-Pin Mini-Type Receptacle②—2-Circuit Contact Block

To order a Bulletin 802MC pre-wired limit switch with a 5-pin mini connector in place of the 1.52 m (5 ft) of "STO"③ cable, replace the **Y5** in the cat. no. with the suffix **J1** or **J9** depending upon the wiring configuration required. Maximum voltage rating for this receptacle is 250V AC.

An appropriate female connector with cable (889N-F5AFC-6F) is available on page 8-4 in Connection Systems.



Cable Length

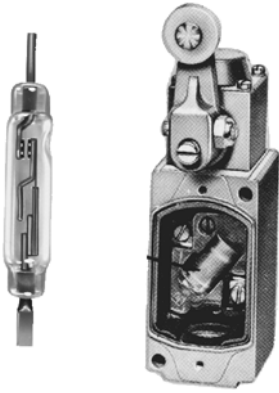
The factory installed pre-wired, type STO cable is normally supplied in 1.52 m (5 ft) lengths. Extended cable lengths are available in multiples of 4 feet. To order, replace the suffix **Y5** in the cat. no. with the appropriate suffix from the table below. Example: To order a lever type spring return switch with 1.83 m (8 ft) of STO cable the cat. no. would be 802MC-AY8.

Modification	Cat. No. Suffix
1.83 m (8 ft) Cable	Y8
3.66 m (12 ft) Cable	Y12
4.78 m (16 ft) Cable	Y16

2-Circuit 24V DC Switches

All 2-circuit 802MC limit switches are available with silver-nickel contacts and rated for 24V DC applications. To order a switch rated for 24V DC use, insert the letter **Z** before the cable or connection designation. Example: 802MC-AZY5 is a 24V DC version of the 802MC-AY5. The use of the 24V DC pilot light option requires the switch be rated for 24V DC operation.

- ① Requires switch to be rated for 24V DC operation.
- ② A 5-pin mini-type receptacle is supplied to facilitate retrofitting existing installations. The normal ground wire pin is not required and is not connected inside the switch.
- ③ STO is a common identification of this cable. The more complete identification of the cable used on the Bulletin 802M is ST00W-A which incorporates an oil resistant jacket and conductor insulation, for indoor and outdoor use.



Sealed
Contact
Switch

802R-AF
(cover removed)
with 802T-W1 Lever

Description

This sealed contact limit switch features a rugged single contact, hermetically sealed in a glass envelope, that has excellent contact reliability even in contaminated atmospheres. The switch is Programmable Controller compatible (24V and above) and is pilot duty rated NEMA B600 for AC and NEMA P300 for DC as shown on page 5-35. The enclosure is NEMA Type 13.

Lever Type Switches

These switches can be equipped with any one of seven different operating levers: roller lever, adjustable roller lever, micrometer adjustment roller lever, rod lever, one-way rod or roller lever and fork lever. These can be used interchangeably on all lever type switches **except the low operating force switch**, which requires the lever identified by Cat. No. 802T-W5.

The micrometer adjustment roller lever, Cat. No. 802T-W6, is designed especially for installations where the position of the roller is a critical factor. This lever has a pivoted roller which can be turned laterally. After clamping the lever to the switch shaft, the position of the roller can be precisely adjusted through an arc of 7.5° on either side of the center or straight-line position.

Push Type Switches

Switches in this category are actuated by means of a rod or plunger located on the top or side of the operating head. Pushing the plunger into the head causes the contacts to operate. Three types of plungers are available: push rod, adjustable push rod and steel push roller.

Wobble Stick and Cat Whisker Type Switches

Both switches are actuated by a rod or wire extending from the top of the operating head. Moving the rod through a specified angle in any direction causes the contacts to operate. All wobble stick and cat whisker switches are supplied with spring return construction only.

Ambient Temperature Range

Bulletin 802R limit switches, except devices with wobble stick or cat whisker operators, have an ambient temperature range of -29...+121°C (-20...+250°F). Wobble stick and cat whisker limit switches are rated from -18...+54°C (0...+130°F).

Note: Temperature ranges below 0°C (+32°F) are based on the absence of freezing moisture or water.

Underwriters' Laboratories, Inc. Listed, CSA Certified

These switches are listed by Underwriters' Laboratories, Inc. for use in **Class 1, Division 2, Groups A, B, C and D hazardous locations** as defined by the National Electrical Code.



802R-AF

Description

This sealed contact limit switch features a rugged single contact, hermetically sealed in a glass envelope, that has excellent contact reliability even in contaminated atmospheres. The switch is Programmable Controller compatible (24 volts and above) and is pilot duty rated NEMA B600 for AC and NEMA P300 for DC as shown to the right. The enclosure is NEMA Type 13.

Specifications

Enclosure Rating	NEMA 13
Approvals	UL Listed and CSA Certified
Ambient Temperature [C (F)]	-29...+121° (-20...+250°) Exception: Wobble stick and cat whisker devices are rated from -18...+54° (0...+130°)

AC Contact Rating (Maximum per Pole, 50 or 60 Hz, Same Polarity)

NEMA Rating Designation	Max Voltage	A		Continuous Carrying Current	VA	
		Make	Break		Make	Break
B600	120	30	3.00	5	3600	360
	240	15	1.50	5	3600	360
	480	7.5	0.75	5	3600	360
	600	6	0.60	5	3600	360

DC Contact Rating (Maximum per Pole, Same Polarity)

NEMA Rating Designation	Voltage Range	Current Rating
P300	115...125	1.1 A
	230...250	0.55 A

Features

- PLC compatible
- High contact reliability in contaminated atmospheres

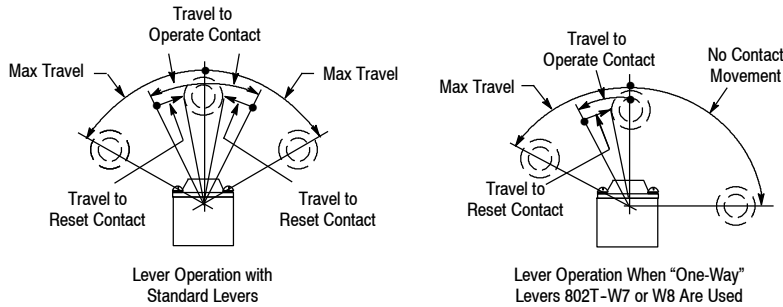
Sealed Contact

Lever Type • Spring Return page 5-36
 Lever Type • Maintained ... page 5-37
 Contact
 Push Type • Spring Return . page 5-38
 Wobble Stick and page 5-39
 Cat Whisker • Spring Return
 Modifications and page 5-39
 Accessories

Limit Switches

802R Lever Type • Spring Return Sealed Contact Switches

Range of Operation



802R-AF Without Lever



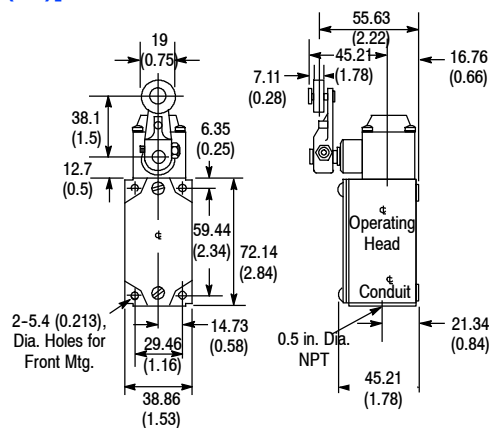
802R-ALFW5

Product Selection—Standard and Low Operating Torque Models

Lever Movement	Torque to Operate (Max.)	Travel to Operate Contact (Max.)	Max Travel	Travel to Reset Contact (Max.)	Contact Type	Cat. No.
Clockwise or Counterclockwise	0.34 N.m (3 lb•in)	16°	42°	9°	N.O.	802R-AF
					N.C.	802R-AC
Clockwise	0.51 N.m (4.5 lb•in)	7°	53°	3.5°	N.O.	802R-HF
					N.C.	802R-HC
					N.O.	802R-H1F
					N.C.	802R-H1C
Counterclockwise	0.51 N.m (4.5 lb•in)	7°	50°	3.5°	N.O.	802R-H2F
					N.C.	802R-H2C
Clockwise Lever cannot move counterclockwise	0.45 N.m (4 lb•in)	20°	91°	11°	N.O.	802R-L1F
					N.C.	802R-L1C
Counterclockwise Lever cannot move clockwise	0.45 N.m (4 lb•in)	20°	91°	11°	N.O.	802R-L2F
					N.C.	802R-L2C
Clockwise or Counterclockwise	0.09 N•m (0.78 lb•in)	22°	43°	12°	N.O.	802R-ALFW5 ①
					N.C.	802R-ALCW5 ①
Clockwise Lever cannot be moved counterclockwise	0.09 N•m (0.78 lb•in)	22°	43°	12°	N.O.	802R-AL1FW5 ①
					N.C.	802R-AL1CW5 ①
Counterclockwise Lever cannot be moved clockwise	0.09 N•m (0.78 lb•in)	22°	43°	12°	N.O.	802R-AL2FW5 ①
					N.C.	802R-AL2CW5 ①

① These low operating force limit switches can only be supplied with the catalog number 802T-W5 rod lever. The rod can easily be formed to meet special application requirements. The contact is restored to its normal position when pressure on the rod is released.

Approximate Dimensions [mm (in.)]



Standard Switch with 802T-W1 Lever
Shipping Wt. 0.35 kg (12.5 oz)

Note: Details regarding wiring Allen-Bradley Limit Switches to Allen-Bradley PLCs can be found in publications 802T-4.0, 4.1, 4.2, and 4.3.

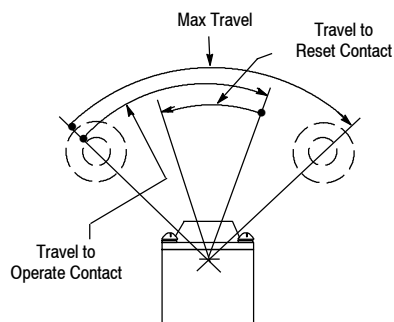
Levers—See page 5-130 for a complete listing of operating levers.

Modifications and Accessories—See page 5-39.

802R Lever Type • Maintained Contact

Sealed Contact Switches

Range of Operation



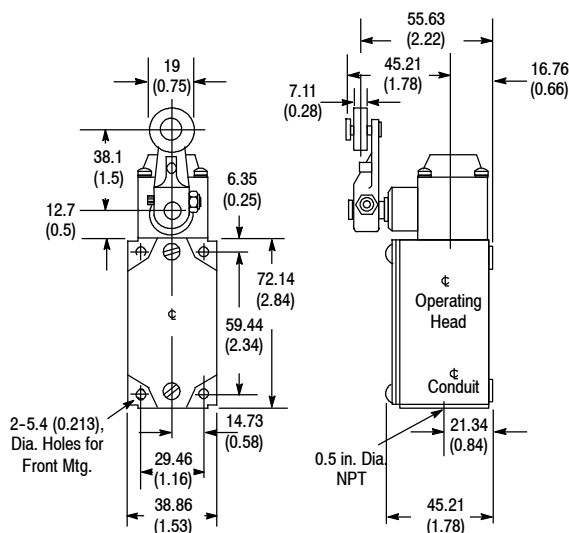
Switch Without Lever

Product Selection

Lever Movement	Torque to Operate (Max)	Travel to Operate Contact (Max)	Max Travel	Travel to Reset Contact (Max)	Contact Type	Cat. No.
Clockwise or Counterclockwise	0.25 N•m (2.25 lb•in)	70° ①	84° ①	35°	N.O.	802R-AMF
					N.C.	802R-AMC

① From one maintained position to the other.

Approximate Dimensions [mm (in.)]



Standard Switch with 802T-W1 Lever
Shipping Wt. 0.35 kg (12.5 oz)

Levers—See page 5-130 for a complete listing of operating levers.

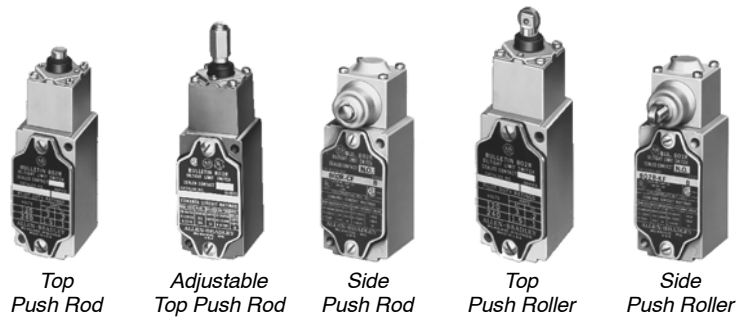
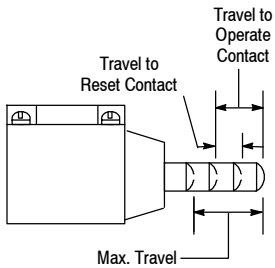
Modifications and Accessories—See page 5-39.

Limit Switches

802R Push Type • Spring Return

Sealed Contact Switches

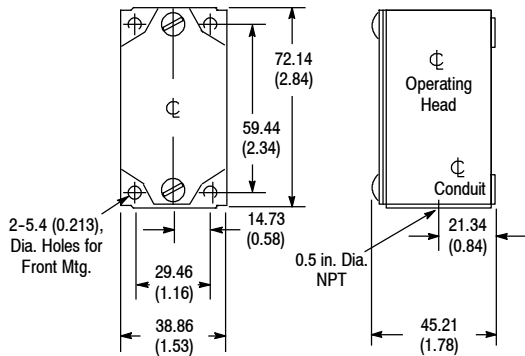
Range of Operation



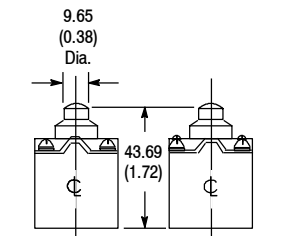
Product Selection

Operator Type	Force to Operate (Max)	Travel to Operate Contact (Max)	Max Travel	Travel to Reset Contact (Max)	Contact Type	Cat. No.
Top Push Rod	15.6 N (3.5 lb)	1.75 mm (0.069 in.)	5.13 mm (0.202 in.)	0.71 mm (0.028 in.)	N.O.	802R-BF
					N.C.	802R-BC
Adjustable Top Push Rod	15.6 N (3.5 lb)	1.75 mm (0.069 in.)	5.13 mm (0.202 in.)	0.71 mm (0.028 in.)	N.O.	802R-BAF
					N.C.	802R-BAC
Side Push Rod	20.0 N (4.5 lb)	3.18 mm (0.125 in.)	5.54 mm (0.218 in.)	1.45 mm (0.057 in.)	N.O.	802R-CF
					N.C.	802R-CC
Top Push Roller	15.6 N (3.5 lb)	1.75 mm (0.069 in.)	5.13 mm (0.202 in.)	0.71 mm (0.028 in.)	N.O.	802R-DF
					N.C.	802R-DC
Side Push Vertical Roller	20.0 N (4.5 lb)	3.18 mm (0.125 in.)	5.54 mm (0.218 in.)	1.45 mm (0.057 in.)	N.O.	802R-KF
					N.C.	802R-KC
Side Push Horizontal Roller	20.0 N (4.5 lb)	3.18 mm (0.125 in.)	5.54 mm (0.218 in.)	1.45 mm (0.057 in.)	N.O.	802R-K1F
					N.C.	802R-K1C

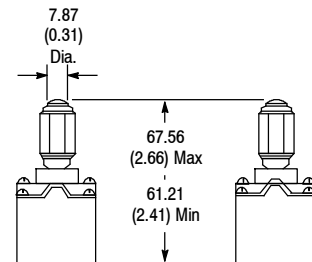
Approximate Dimensions [mm (in.)]



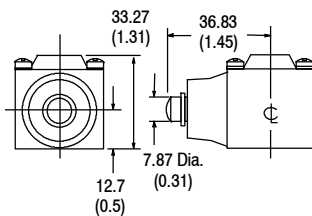
Standard Switch
Shipping Wt. 0.35 kg (12.5 oz)



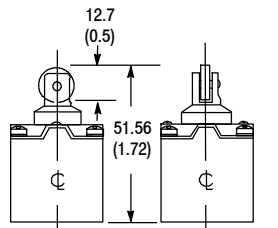
Z-36615
Top Push Rod Head
Shipping Wt. 0.12 kg (4.25 oz)



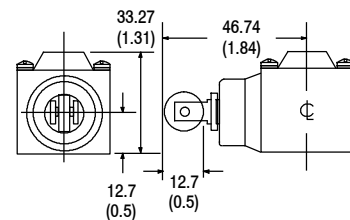
40182-022-52
Adjustable Top
Push Rod Head
Shipping Wt. 0.12 kg (4.25 oz)



Z-36616
Side Push Rod Head
Shipping Wt. 0.12 kg (4.25 oz)



Z-36618
Top Push Roller Head
Shipping Wt. 0.12 kg (4.25 oz)



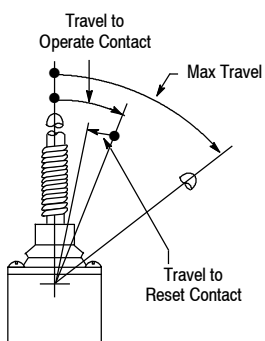
Z-36622
Side Push Vertical Roller Head
Shipping Wt. 0.12 kg (4.25 oz)

Modifications and Accessories—See page 5-39.

802R Wobble Stick and Cat Whisker • Spring Return

Sealed Contact Switches

Range of Operation ①



Wire Wobble Stick



Cat Whisker

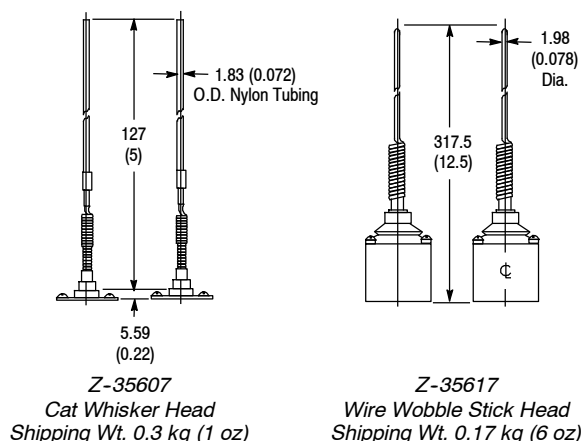
Product Selection

Operator Type	Torque to Operate (Max.)	Travel to Operate Contact (Max.)	Max Travel ①	Travel to Reset Contact (Max.)	Contact Type	Cat. No.
Wire Wobble Stick	0.51 N•m (4.5 lb•in)	11°	11°	5°	N.O.	802R-WS1F ②
					N.C.	802R-WS1C ②
Wire Cat Whisker	0.06 N•m (8 oz•in)	25°	25°	14°	N.O.	802R-CWF ②
					N.C.	802R-CWC ②

① These switches should be mounted in such a way that the wobble or cat whisker will not be deflected beyond the "Maximum Travel" position. This is to avoid excessive backlash, which could cause undesirable repetition of contact action.

② Ambient temperature -18°C...54°C (0°F...130°F).

Approximate Dimensions [mm (in.)]



Modification for Transparent Cover

Switches can be furnished with a gasketed, transparent plastic cover. This modification enables the electrician to inspect terminal wiring without removing the switch cover. To order, add the letter **Z** to the cat. no. of the standard switch. Example: Cat. No. 802R-DF becomes Cat. No. 802R-DFZ.

Conduit Seal Cat. No. 802T-N3

A synthetic rubber conduit seal is available to protect the conduit opening against the ingress of oil into the wiring compartment. Each wire hole in the seal has a thin inner wall which is pierced when a wire is passed through. Thus, any unused opening remains sealed.

Special Conduit Lock Nut Cat. No. 802T-X4

This option, a "Tru-Seal" lock nut with threaded PTFE insert, is a valuable accessory for any Bulletin 802R which is connected by means of conduit.

802T

Introduction



Plug-in Style
802T-AP with
Lever

NonPlug-in Style
802T-A with
Lever

Description

Bulletin 802T limit switches are ideal for applications in which heavy duty pilot ratings, small size, a high degree of versatility and a rugged NEMA Type 4 and 13 oiltight construction are desirable. An important factor in the automation of industry, these limit switches are being applied extensively on conveyor systems, transfer machines, automatic turret lathes, milling and boring machines, radial drills, and many other types of modern, high speed production equipment.

High Degree of Versatility

Bulletin 802T limit switches can be mounted in any position, with operating heads that can be rotated and fastened in any one of four positions 90° apart. Most operating levers are interchangeable and can be rotated and clamped in any position through 360°. Accessories can be added to switches already in the field.

NEMA Type 4, 13 and 6P ① Oiltight Construction

802T limit switches feature NEMA Type 4 and 13 construction with synthetic rubber seals to protect the operating parts against entry of oil, dust, abrasives, water and coolant, within the limits of NEMA-specified tests.

① Plug-in lever type except low-torque models.

Rugged, Dependable Contact Block

The contacts used in Bulletin 802T switches are snap-action type with high snap-through force resulting in minimum contact rebound. Double break, fine silver contacts are electrically independent, but cannot be used on opposite polarities.

Easy Mounting and Wiring

Each switch base has four mounting holes: two “through” holes for front mounting and two tapped holes in the back for rear mounting. The pressure plate type terminals on the contact block face to the front of the switch and have ample wiring space around them. The switch conduit opening is a 1/2-inch threaded pipe tap in the bottom of the housing.

Direct Opening Action Position Interlock Switches

Bulletin 802T Direct Opening Action limit switches have been designed for use in control reliable applications and safety applications per ISO 14119.

Direct Opening Action assures that the normally closed contacts open when the limit switch is actuated. This opening will occur even in the event of a contact weld condition, up to 10 Newtons.

Lever Type Switches

These switches are operated by means of a lever which is clamped to a knurled shaft extending from the operating head.

Lever type switches can be equipped with a variety of operating levers: roller lever, adjustable roller lever, micrometer adjustment roller lever, rod lever, one-way rod or roller lever and fork lever. These can be used interchangeably on all lever type switches except the **low operating force switch**.

Push Type Switches

These switches are actuated by means of a rod or plunger located on the top or side of the operating head. Pushing the plunger into the head causes the contacts to operate. Two types of plungers are available: rod type and steel roller. Side push rod switches can be supplied in spring return or maintained contact constructions. An adjustable length top push rod is also

available. The contacts are snap-acting with high snap-through force resulting in minimum contact rebound.

Wobble Stick and Cat Whisker Type Switches

Both switches are actuated by a rod or wire extending from the top of the operating head. Moving the rod through a specified angle in any direction causes the contacts to operate. All wobble stick and cat whisker switches are supplied with spring return construction only. The contacts are snap-action type with high snap-through force resulting in minimum contact rebound.

Dual Switches

The dual switch is actually two limit switches which function independently but have a common enclosure. These switches are used for installations where two switches would be mounted side by side. There is a saving on installation time and fittings (see page 5-71).

Plug-in Switches

Plug-in style limit switches can reduce costly downtime by eliminating the need for rewiring switches. The head and switch body can be replaced without disturbing the wiring chamber in the base. These units, featuring a castle lock head design, snap-action contacts and reliable plug-in connection are available in 2-circuit or 4-circuit construction. Plug-in style limit switches are listed on page 5-41.

Four-Circuit NonPlug-in Switches

These switches contain two single pole single throw contact blocks (a total of two N.O. and two N.C. contacts) mounted in a common enclosure. The blocks are mounted one above the other in the vertical limit switch construction, or side by side in the horizontal construction. Switch plungers are mechanically coupled in both constructions. When actuated, contacts in both blocks are operated. These switches in both types of construction are listed on page 5-54.

General Information

Plug-in Style page 5-41
NonPlug-in Style page 5-54

Operating Levers

Lever Selection page 5-130



Description

Bulletin 802T limit switches are ideal for applications in which heavy duty pilot ratings, small size, a high degree of versatility and a rugged NEMA Type 4, 13 and 6P¹ construction are desirable. An important factor in the automation of industry, these limit switches are being applied extensively on conveyor systems, transfer machines, automatic turret lathes, milling and boring machines, radial drills, and many other types of modern, high speed production equipment.

A wide variety of operating heads and operating levers are available. Operating heads can be mounted in four positions, 90° apart.

Features

- Front mount for simplified mounting
- Plug-in style for ease of wiring
- Side rotary, wobble stick, cat whisker, adjustable top and top or side push styles with and without rollers
- Quick mode change to clockwise and counterclockwise operation only
- Castle lock head design for high durability

¹ Plug-in lever type except low-torque models.

² Temperature range below 0 °C (+32 °F) is based on the absence of freezing moisture or water. See page 5-53 for low temperature options.

³ Low operating torque-spring return ratings only.

Specifications

Enclosure Rating	NEMA 4, 13, 6P ¹ and IP67
Pollution Degree	3
Certifications	UL Listed, CSA Certified CE Marked for applicable directives
Ambient Temperature [C (F)] ²	-18...+110° (0...+230°) Exception: Wobble stick and cat whisker devices are rated from -18...+54° (0...+130°)

AC Contact Rating (Maximum per Pole, 50 or 60 Hz, 2 Circuits Same Polarity)

NEMA Rating Designation	Max Voltage	A		Continuous Carrying Current	VA	
		Make	Break		Make	Break
A600 AC-15	120	60	6.00	10	7200	720
	240	30	3.00	10	7200	720
	480	15	1.50	10	7200	720
	600	12	1.20	10	7200	720
B600 ³ AC-15	120	30	3.00	5	3600	360
	240	15	1.50	5	3600	360
	480	7.5	0.75	5	3600	360
	600	6	0.60	5	3600	360

AC Contact Rating (Maximum per Pole, 50 or 60 Hz, 4 Circuits Same Polarity)

NEMA Rating Designation	Max Voltage	A		Continuous Carrying Current	VA	
		Make	Break		Make	Break
A300	120	60	6.00	10	7200	720
	240	30	3.00	10	7200	720

DC Contact Rating (Maximum per Pole)

Circuits	Voltage Range	Current Rating
2	115-125	0.4 A
	230-250	0.2 A
	550-600	0.1 A
4	115-125	0.4 A
	230-250	0.2 A

Plug-in Style

Lever Type • Spring Return page 5-42
Standard and Low Operating Torque Models

Lever Type • Maintained . . . page 5-44
Contact and Neutral Position

Push Type • Spring Return . . . page 5-45

Wobble Stick and Cat page 5-47
Whisker • Spring Return

Modifications and page 5-53
Accessories

802T Operating Levers

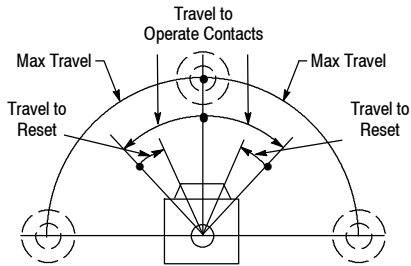
Lever Selection page 5-130

Limit Switches

802T Lever Type • Spring Return

Plug-in Style Oiltight Switches

Range of Operation



Switch Without Lever



Switch Without Lever and Base

Product Selection—Standard and Low Operating Torque Models

No. of Circuits	Lever Movement vs. Contact Operation		Torque to Operate (Max.)	Travel to Operate Contacts (Max.)	Max Travel	Travel to Reset Contacts (Max.)	Cat. No.	
							Switch w/o Lever	Switch w/o Lever and Base
2	Clockwise or Counterclockwise		0.29 N•m (2.6 lb•in) Nominal	13° 18°	90°	7°	802T-AP 802T-A5P ①	802T-AP1 802T-A5P1 ①
							2.5° Nominal	802T-FP
	Clockwise		0.29 N•m (2.6 lb•in) 0.56 N•m (5 lb•in)	13° 18°		7°	802T-A1P 802T-A3P ①	802T-A1P1 802T-A3P1 ①
							3.5°	802T-H1P
	Counterclockwise		0.29 N•m (2.6 lb•in) 0.56 N•m (5 lb•in)	13° 18°		7°	802T-A2P 802T-A4P ①	802T-A2P1 802T-A4P1 ①
							3.5°	802T-H2P
4	Clockwise or Counterclockwise		0.16 N•m (1.5 lb•in)	13°	90°	7°	802T-ALP ②	802T-ALP1 ②
							802T-AL1P ②	802T-AL1P1 ②
							802T-AL2P ②	802T-AL2P1 ②
4	Clockwise or Counterclockwise		0.45 N•m (4 lb•in) 0.79 N•m (7 lb•in)	13° 9°	90°	7°	802T-ATP	802T-ATP1
							3.5°	802T-HTP
	Clockwise		0.45 N•m (4 lb•in) 0.79 N•m (7 lb•in)	13° 9°		7°	802T-A1TP	802T-A1TP1
							3.5°	802T-H1TP
	Counterclockwise		0.45 N•m (4 lb•in) 0.79 N•m (7 lb•in)	13° 9°		7°	802T-A2TP	802T-A2TP1
							3.5°	802T-H2TP

① Fluorinated elastomer shaft seal is supplied with these devices.

② Low operating torque model.

Approximate Dimensions—See page 5-43.

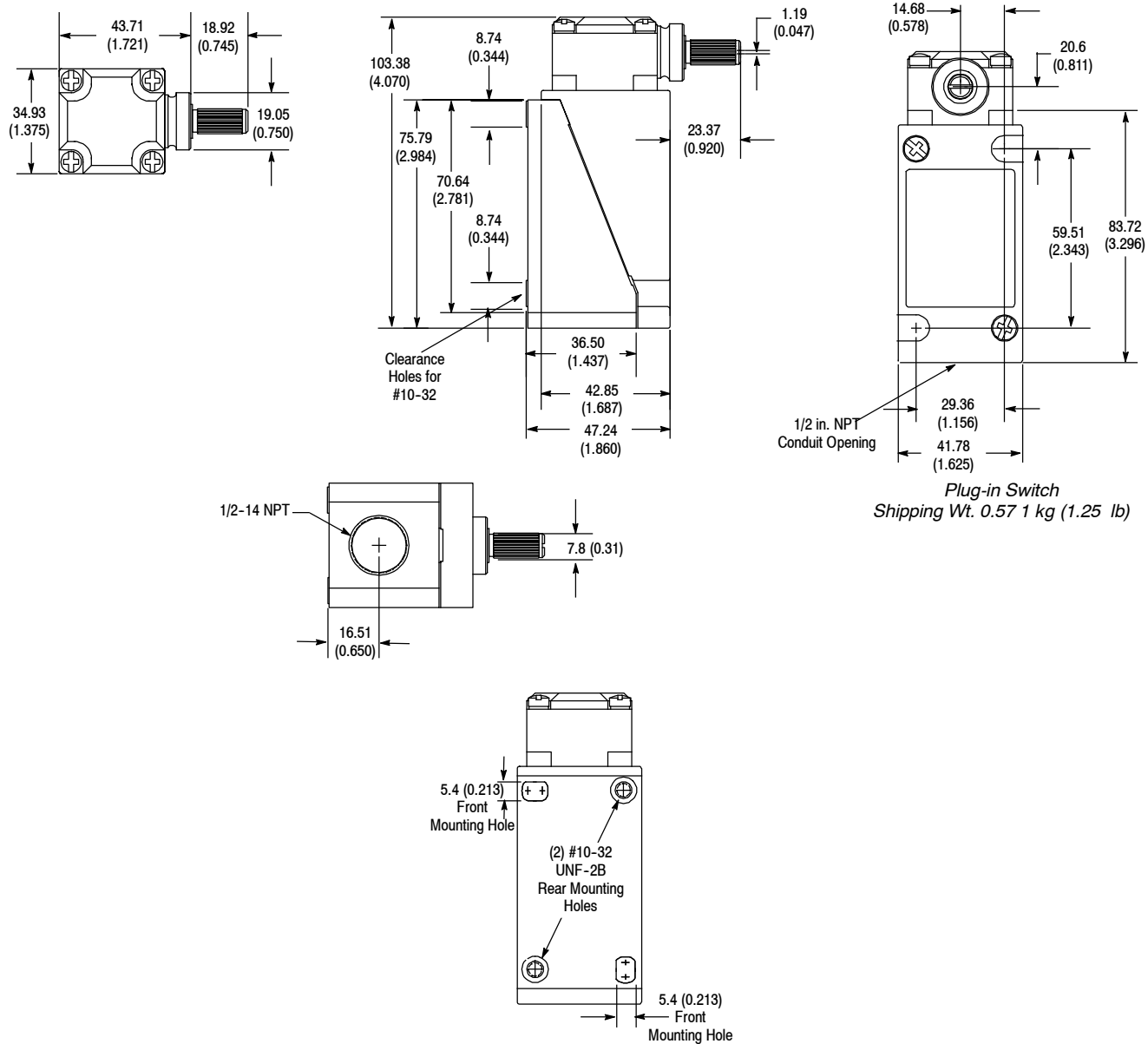
Levers—See page 5-130 for a complete listing of operating levers.

Modifications and Accessories—See page 5-53.

802T Lever Type • Spring Return

Plug-in Style Oiltight Switches

Approximate Dimensions [mm (in.)]

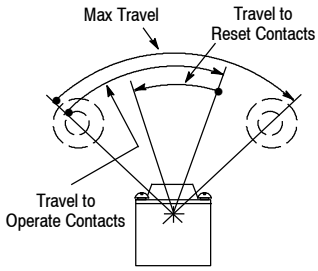


Levers—See page 5-130 for a complete listing of operating levers.

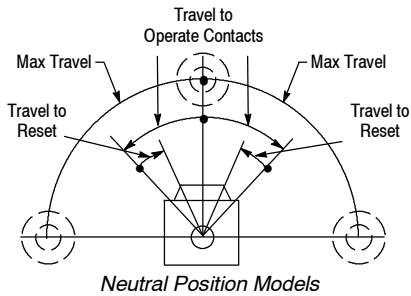
Modifications and Accessories—See page 5-53.

802T Lever Type • Maintained Contact and Neutral Position
Plug-in Style Oiltight Switches

Range of Operation



Maintained Contact Models



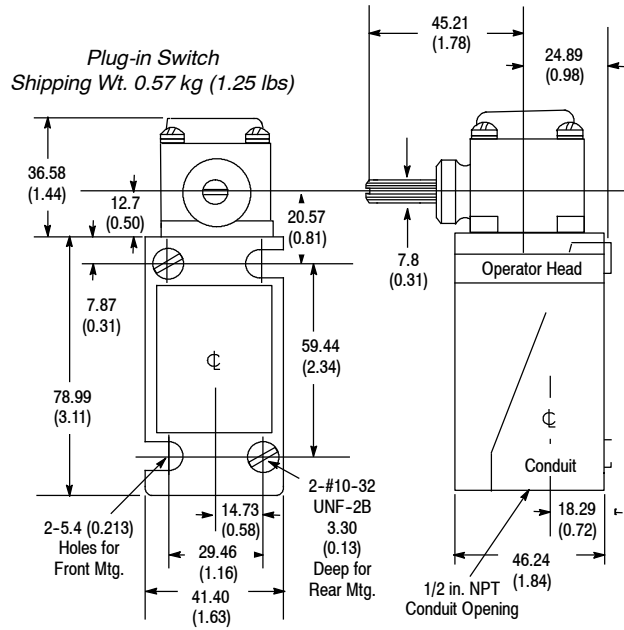
Neutral Position Models



Switch Without Lever

Switch Without Lever and Base

Approximate Dimensions [mm (in.)]



Product Selection—Maintained Contact Models

No. of Circuits	Lever Movement vs. Contact Operation	Torque to Operate (Max.)	Travel to Operate Contacts (Max.)	Max Travel	Travel to Reset Contacts (Max.)	Cat. No.	
						Switch w/o Lever	Switch w/o Lever & Base
2	Clockwise or Counterclockwise 	0.31 N•m (2.75 lb•in)				802T-AMP	802T-AMP1
4	Clockwise or Counterclockwise 	0.32 N•m (2.8 lb•in)	70° ⚙	88° ⚙	32°	802T-AMTP	802T-AMTP1

⚙ From one maintained position to another.

Product Selection—Neutral Position Models

Lever Movement vs. Contact Operation	Torque to Operate (Max.)		Travel to Operate Contacts (Max.)	Max Travel	Travel to Reset Contacts (Max.)	Cat. No.	
	Clockwise	Counter-clockwise				Switch w/o Lever	Switch w/o Lever & Base
	0.28 N•m (2.5 lb•in)	0.47 N•m (4.2 lb•in)	13°	75°	7°	802T-NPTP	802T-NPTP1

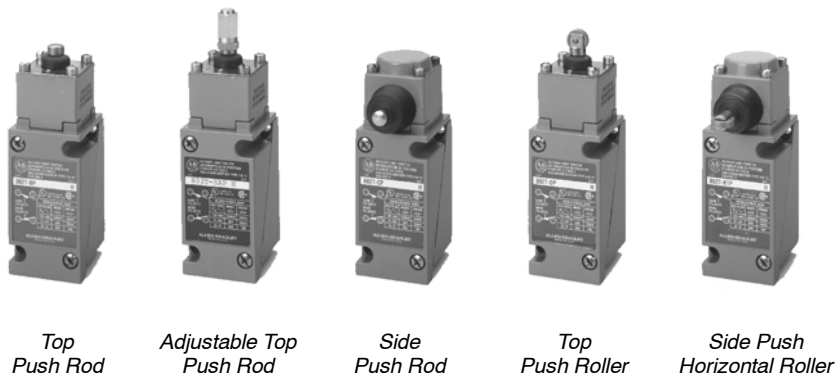
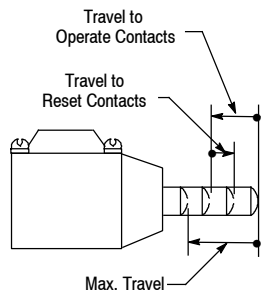
Levers—See page 5-130 for a complete listing of operating levers.

Modifications and Accessories—See page 5-53.

802T Push Type • Spring Return

Plug-in Style Oiltight Switches

Range of Operation



Product Selection

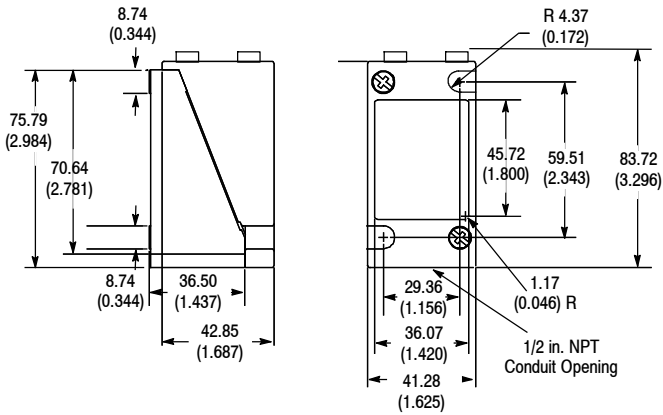
No. of Circuits	Contact Operation		Operator Type	Force to Operate (Max.)	Travel to Operate Contacts (Max.)	Max Travel	Travel to Reset Contacts (Max.)	Cat. No.	
	Normal	Operated						Complete Switch	Switch w/o Base
2	<pre> 1 ○ ○ 2 3 ○ ○ 4 </pre>	<pre> 1 ○ ○ 2 3 ○ ○ 4 </pre>	Top Push Rod	13.8 N (3.1 lb)	1.4 mm (0.057 in.)	6.0 mm (0.236 in.)	0.7 mm (0.028 in.)	802T-BP	802T-BP1
			Adjustable Top Push Rod					802T-BAP	802T-BAP1
			Side Push Rod	16.4 N (3.7 lb)	3.3 mm (0.131 in.)	5.7 mm (0.226 in.)	1.3 mm (0.052 in.)	802T-CP	802T-CP1
			Top Push Roller	13.8 N (3.1 lb)	1.4 mm (0.057 in.)	6.0 mm (0.236 in.)	0.7 mm (0.028 in.)	802T-DP	802T-DP1
			Side Push Vertical Roller	16.4 N (3.7 lb)	3.3 mm (0.131 in.)	5.7 mm (0.226 in.)	1.3 mm (0.052 in.)	802T-KP	802T-KP1
			Side Push Horizontal Roller					802T-K1P	802T-K1P1
4	<pre> 1 ○ ○ 2 3 ○ ○ 4 5 ○ ○ 6 7 ○ ○ 8 </pre>	<pre> 1 ○ ○ 2 3 ○ ○ 4 5 ○ ○ 6 7 ○ ○ 8 </pre>	Top Push Rod	22.2 N (5.0 lb)	1.4 mm (0.057 in.)	6.0 mm (0.236 in.)	0.7 mm (0.028 in.)	802T-BTP	802T-BTP1
			Adjustable Top Push Rod					802T-BATP	802T-BATP1
			Side Push Rod	24.9 N (5.6 lb)	3.3 mm (0.131 in.)	5.7 mm (0.226 in.)	1.3 mm (0.052 in.)	802T-CTP	802T-CTP1
			Top Push Roller	22.2 N (5.0 lb)	1.4 mm (0.057 in.)	6.0 mm (0.236 in.)	0.7 mm (0.028 in.)	802T-DTP	802T-DTP1
			Side Push Vertical Roller	24.9 N (5.6 lb)	3.3 mm (0.131 in.)	5.7 mm (0.226 in.)	1.3 mm (0.052 in.)	802T-KTP	802T-KTP1
			Side Push Horizontal Roller					802T-K1TP	802T-K1TP1

Modifications and Accessories—See page 5-53.

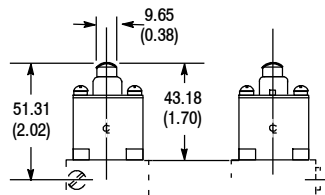
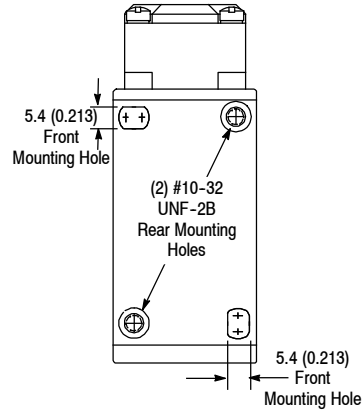
Limit Switches

802T Push Type • Spring Return
Plug-in Style Oiltight Switches

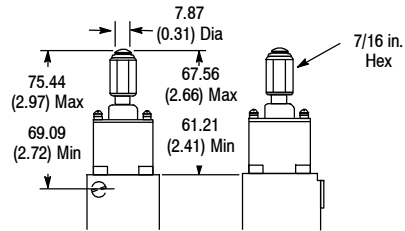
Approximate Dimensions [mm (in.)]



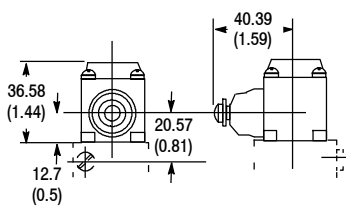
Switch Body



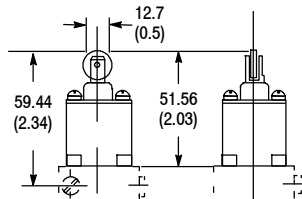
40146-013-59
 Top Push Rod Head
 Shipping Wt. 0.142 kg (5 oz)



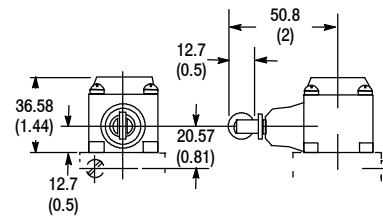
40146-013-65
 Adjustable Top Push Rod Head
 Shipping Wt. 0.142 kg (5 oz)



40146-017-63
 Side Push Rod Head
 Shipping Wt. 0.142 kg (5 oz)



40146-013-60
 Top Push Roller Head
 Shipping Wt. 0.142 kg (5 oz)

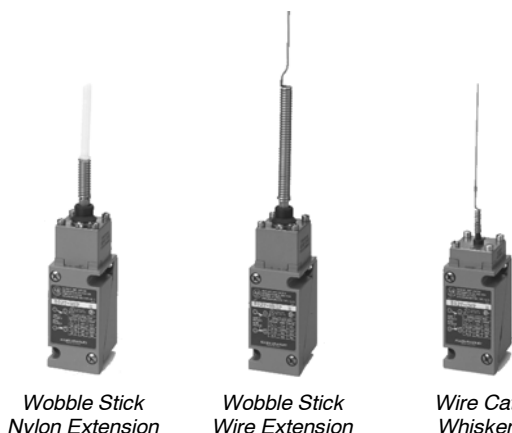
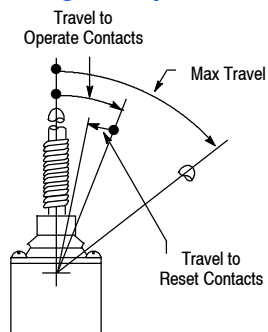


40146-017-64
 Side Push Roller Head
 Shipping Wt. 0.142 kg (5 oz)

Modifications and Accessories—See page 5-53.

802T Wobble Stick and Cat Whisker • Spring Return Plug-in Style Oiltight Switches

Range of Operation

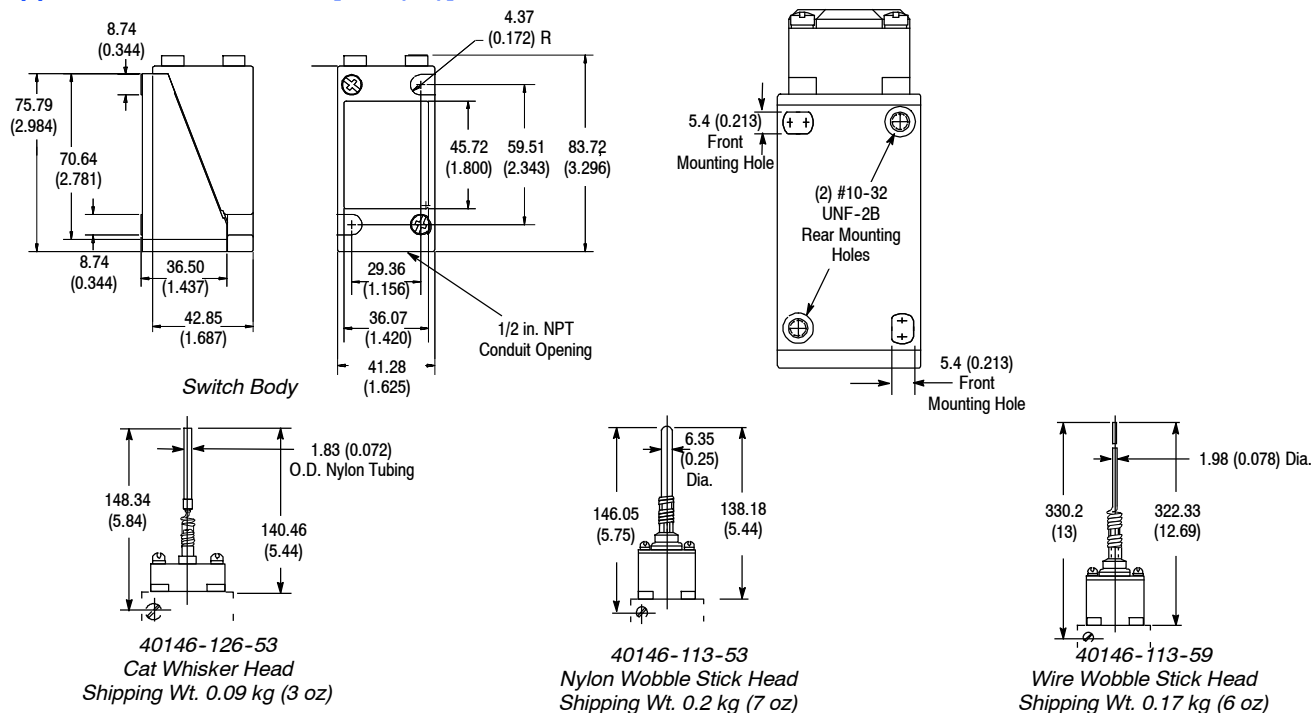


Product Selection

Operator Type	Contact Operation	Torque to Operate (Max.) ②	Travel to Operate Contacts (Max.) ②	Max Travel ①②	Travel to Reset Contacts (Max.) ②	Cat. No.	
						Complete Switch	Switch Without Base
Nylon Wobble Stick		0.51 N•m (4.5 lb•in)	9°	10°	5°	802T-WSP	802T-WSP1
Wire Wobble Stick						802T-WS1P	802T-WS1P1
Wire Cat Whisker		0.06 N•m (8 oz•in)	21°	28°	14°	802T-CWP	802T-CWP1

- ① These switches should be mounted in such a way that the wobble stick or cat whisker will not be deflected beyond the "Maximum Travel" position, as this could cause undesirable repetition of contact action on rebound.
- ② Operating travels and torque are measured at rigid section of stick or cat whisker.

Approximate Dimensions [mm (in.)]



Modifications and Accessories—See page 5-53.



Specifications

Certifications	UL Listed, CSA Certified and CE Marked for all applicable directives
Environmental	
Enclosure Type Rating	NEMA 4, 13, and 6P ^②
Ambient Temperature [C (F)] ^①	-18...+110° (0...+230°) -40...110° (-40...230°) low temp. model
Input Voltage	5...28V DC
DC Contact Rating	0.40V A load per pole max 0.025V A load per pole min

Description

Intended for direct connection to PLCs and other low energy circuits, the components and design of these low energy limit switches are optimized for long life.

The primary concern of low energy switching is contact contamination. Since low energy loads do not arc or burn the contacts clean, contaminants may cause erratic switch behavior. Rockwell Automation’s low energy limit switches are designed with welded gold and silver alloy contacts to provide a protective barrier against surface oxides. A stationary waffle shape contact optimizes contact pressure to stabilize the contact resistance in the region of the micro load. A prism shaped crossbar contact provides high pressure to penetrate foreign particles which could prevent contact closure. These low energy limit switches are suitable for machine connectivity and low voltage facilities. They have a low input voltage of 5...28V DC with contact ratings of 0.025V A min. and 0.40V A max. per pole.

Bulletin 802T low energy limit switches are ideal for applications in which heavy duty pilot ratings, a high degree of versatility and a rugged NEMA Type 4, 13 and 6P rating are required. Similar to our full line of standard 802T plug-in style limit switches, our low energy limit switches exist in lever type spring return and push type spring return. Operating heads can be mounted in four positions, 90° apart.

In today’s age of low energy controls, electromechanical switches are more frequently interfacing directly with low energy circuits. Switching low energy loads presents a unique challenge. Rockwell Automation is perfectly situated to assist you with all your low energy switching needs.

Features

- Welded gold and silver alloy contacts provide a barrier against surface oxides
- Stationary waffle shape contact reduces the impact of contamination build-up
- Prism shaped crossbar contact provides high pressure to penetrate foreign particles which could prevent contact closure
- Snap-acting spanner replicates same reliability performance of our legacy NEMA products
- Lever type and push type operating styles
- Plug-in style for ease of wiring and conduit and mini-receptacle wiring options
- Enclosure rating NEMA 4, 13 and 6P^②
- UL Listed, CSA Certified and CE Marked for applicable directives
- 5...28V DC and 0.025V A min. and 0.40V A max. load per pole

Plug-in Style

Lever Type • Spring Return page 5-49

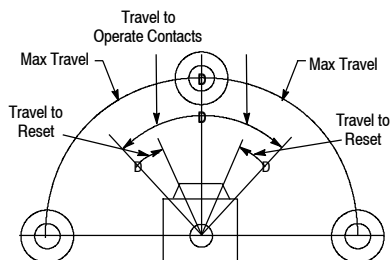
Push Type • Spring Return . page 5-51

^① Temperature range below 0°C (+32°F) is based on the absence of freezing moisture or water.

^② 6P only applies to lever type, except low torque.

802T Low Energy Lever Type • Spring Return Plug-in Style Oiltight Switches

Range of Operation



Switch
without Lever

Product Selection—Standard and Low Operating Torque Models

No. of Circuits	Contact Operation for Clockwise or Counterclockwise Movement	Max. Torque to Operate [N•m (lb•in.)]	Max. Travel to Operate (degrees)	Maximum Travel (degrees)	Max. Travel to Reset (degrees)	Switch Type	Cat. No.
							Switch w/o Lever
2		0.29 (2.6)	13	90	7	Conduit	802T-AGP
All low energy limit switches are designed to operate in an ambient temperature of -18...110°C (0...230°F). This 802T-AGPE limit switch is modified for low temperature operation at -40...110°C (-40...230°F). All other specifications are identical to the 802T-AGP.						Conduit/Low Temp.	802T-AGPE
Identical to 802T-AGP but with pre-wired five-pin mini connector.						Mini Connector	802T-AGPJ1 ¹
2		0.106 (1.3) max.	13	90	7	Conduit/Low Torque	802T-ALGP

¹ Recommended standard cordset is 889N-F5AFC-6F—straight female 5-pin mini to flying leads, 1.8 m (6 ft) long. For additional cable lengths or styles, see page 8-4.

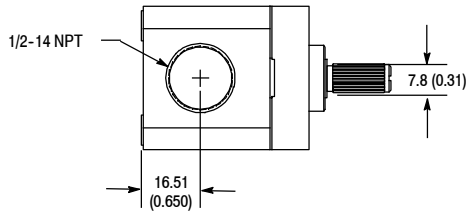
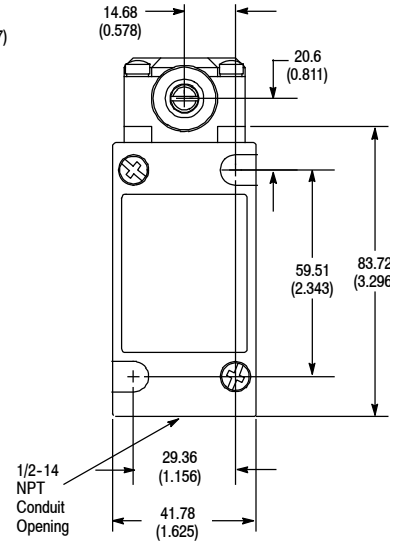
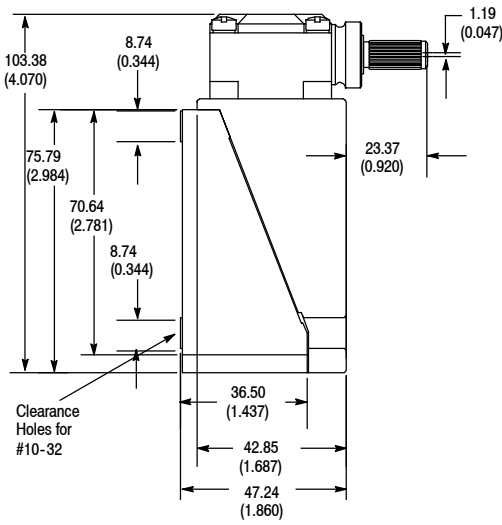
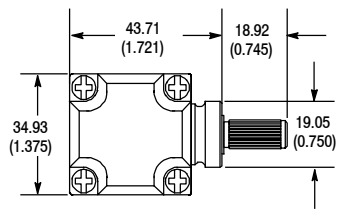
Levers—See page 5-130 for a complete listing of operating levers.

Limit Switches

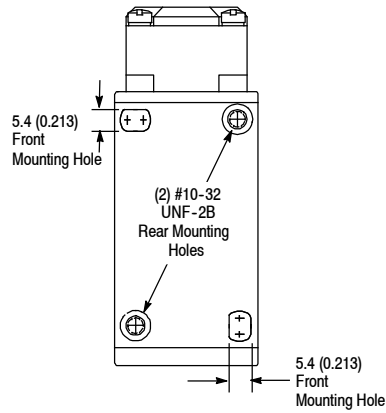
802T Low Energy Lever Type • Spring Return

Plug-in Style Oiltight Switches

Approximate Dimensions [mm (in.)]



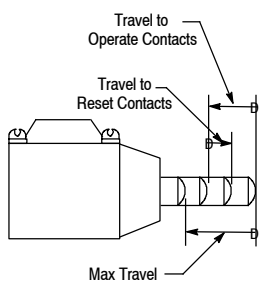
Plug-In Switch
Shipping Wt.
0.571 kg (1.25 lb)



802T Low Energy Push Type • Spring Return

Plug-in Style Oiltight Switches

Range of Operation



Side Push Rod



Top Push Roller



Side Push Vertical Roller

Product Selection

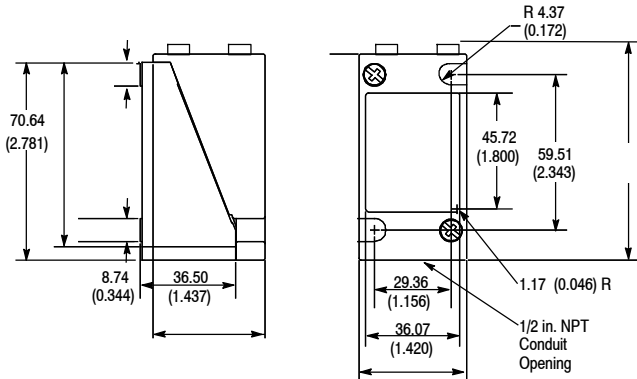
No. of Circuits	Contact Operation		Operator Type	Force to Operate [N•m(lb)]	Travel to Operate [mm (in.)]	Maximum Travel [mm (in.)]	Travel to Reset [mm (in.)]	Cat. No.
	Normal	Operated						
2	<pre> 1 2 3 4 </pre>	<pre> 1 2 3 4 </pre>	Side Push Rod	16.4 (3.68) max.	3.3 (0.131) max.	5.7 (0.226)	1.3 (0.052) max.	802T-CGP
			Top Push Roller	13.8 (3.1) max.	1.4 (0.057) max.	6.0 (0.236)	0.7 (0.028)	802T-DGP
			Side Push Vertical Roller	16.4 (3.68) max.	3.3 (0.131) max.	5.7 (0.226)	1.3 (0.052) max.	802T-KGP

Limit Switches

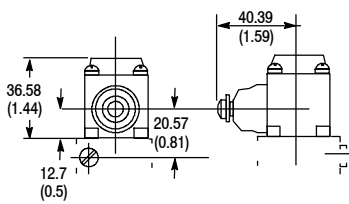
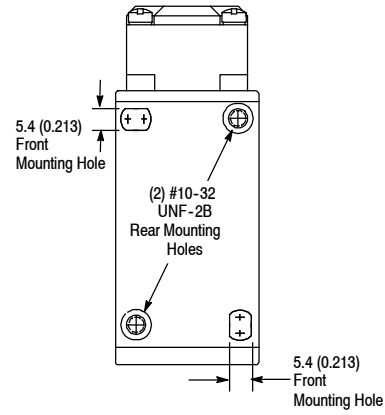
802T Low Energy Push Type • Spring Return

Plug-in Style Oiltight Switches

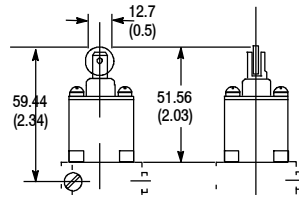
Approximate Dimensions [mm (in.)]



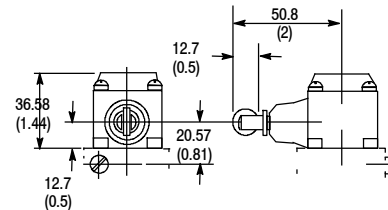
Switch Body



40146-017-63
Side Push Rod Head
Shipping Wt. 0.142kg (5oz)



40146-013-60
Top Push Roller Head
Shipping Wt. 0.142kg (5oz)



40146-017-64
Side Push Roller Head
Shipping Wt. 0.142kg (5oz)

802T Modifications and Accessories

Plug-in Style Oiltight Switches



Manifold Mount

Indicating Light

Manifold Mount

All two-circuit plug-in limit switches can be supplied with a special terminal base which permits mounting the switch manifold style on a machine base, panel or raceway. As shown above, this base is supplied with a wiring hole and gasket on the back.

To order a manifold mount switch, add the letter **U** to the listed cat. no.. Example: Cat. No. 802T-AP becomes Cat. No. 802T-APU.

Indicating Light

Bulletin 802T two-circuit plug-in limit switches (except for the cat whisker, wobble stick, and manifold mount devices) can be supplied with an indicating light. To order add the letter **N** for 120V AC, 50/60 Hz or **N5** for 240V AC 50/60 Hz. Example: Cat. No. 802T-AP becomes Cat. No. 802T-APN.

The indicating light is internally connected to two isolated terminals in the base assembly allowing the user to wire the light to either the N.O. or the N.C. contact. Switches with an indicating light have a contact rating of NEMA A300.

Where an indicator light and a pre-wired 5-pin mini connector are used, the light is pre-wired to the N.C. contact with J1 wiring and to the N.O. contact with J9 wiring. Indicating lights are not available on 4-circuit 802T switches.

Fluorinated Elastomer Seals

To order limit switches with all fluorinated elastomer seals, add the letter **V** to the end of the listed cat. no. Not available on manifold mount, low operating torque, low temperature or limit switches with an indicating light.

To order lever type limit switches with the fluorinated elastomer shaft seal only, add **V1** to the end of the listed cat. no.

Base Assembly

The limit switch base, including the terminal block, is available as a separate unit per the following table.

	Cat. No.
2-Circuit Base	802T-X7
2-Circuit Base with Indicating Light	802T-X7 N
2-Circuit Manifold Mount Base	802T-X7U
4-Circuit Base	802T-X8

Low Temperature Operation

Plug-in limit switches are designed to operate in an ambient temperature range of -18...+110°C (0...+230°F), -18...+54°C (0...+130°F) for wobble stick and cat whisker. Special limit switches modified for low temperature operation at -40...+110°C (-40...+230°F) are available. Temperature ranges below 0°C (+32°F) are based on absence of freezing moisture or water. To order, add the letter **E** to cat. no. **Not available** on wobble stick, cat whisker or pre-wired cable switches; standard on low torque and maintained devices.

Pre-Wired Cable

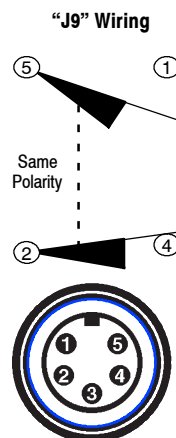
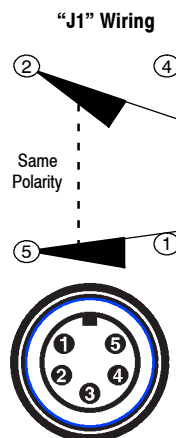
To order factory installed pre-wired type “**STOOW-A**” cable for 2-circuit (5-conductor) and 4-circuit (9-conductor) switches, add the suffix **Y** plus the number of feet required. Example: To order an 802T-AP with 2.4 m (5 ft) of cable the cat. no. would become 802T-APY5.

The standard cable length is 2.4 m (5 ft). Extended cable lengths are available in multiples of 1.22 m (4 ft) only.

Mini-Type Receptacles

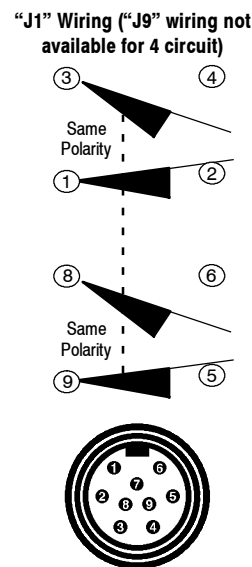
To order a bulletin 802T pre-wired limit switch with a five-pin (2 circuit) or nine pin (4 circuit) mini connector, add the suffix **J1** or **J9** depending on desired wiring (J9 wiring not available for 4-circuit models).

5-Pin Mini-Type Receptacle



An appropriate female connector with cable (889N-F5AFC-6F) is available on page 8-4 in Connection Systems.

9-Pin Mini-Type Receptacle



An appropriate female connector with cable (889N-F9AF-2) is available on page 8-14 in Connection Systems.

802T

NonPlug-in Style Oiltight Switches



Description

Bulletin 802T limit switches are ideal for applications in which heavy duty pilot ratings, small size, a high degree of versatility and a rugged NEMA Type 13 oiltight construction are desirable. An important factor in the automation of industry, these limit switches are being applied extensively on conveyor systems, transfer machines, automatic turret lathes, milling and boring machines, radial drills, and many other types of modern, high speed production equipment.

A wide variety of operating heads and operating levers are available. Operating heads can be mounted in four positions, 90° apart.

Features

- Side rotary, wobble stick, cat whisker, adjustable top and top or side push styles, with or without rollers
- Rugged construction
- Proven reliability

Specifications

Enclosure Rating	NEMA 13, IP54
Pollution Degree	3
Certifications	UL Listed, CSA Certified and CE Marked for applicable directives
Ambient Temperature [C (F)]	Nonplug-in limit switches are designed to operate in an ambient temperature range of -18...+54° (0...+130°).

AC Contact Rating (Maximum per Pole, 50 or 60 Hz, Same Polarity)

NEMA Rating Designation	Max Voltage	A		Continuous Carrying Current	VA	
		Make	Break		Make	Break
A600 AC-15	120	60	6.00	10	7200	720
	240	30	3.00	10	7200	720
	480	15	1.50	10	7200	720
	600	12	1.20	10	7200	720

DC Contact Rating (Maximum per Pole, Same Polarity)

Voltage Range	Current Rating
115-125	0.4 A
230-250	0.2 A
550-600	0.1 A

Temperature range below 0°C (+32°F) is based on the absence of freezing moisture or water. See page 5-73 for Extended Temperature Option.

NonPlug-in Style

2-Circuit

Lever Type • Spring Return page 5-55
Standard and Low Operating Torque Models

Lever Type with DeviceNet page 10-15
Output • Spring Return

Lever Type • Maintained ... page 5-56
Contact and Neutral Position

Lever Type with Time ... page 5-57
Delay • Spring Return (1-Circuit)

Push Type • Spring Return . page 5-59
and Maintained Contact

Wobble Stick and Cat ... page 5-61
Whisker • Spring Return

4-Circuit Vertical Construction

Lever Type • Spring ... page 5-62
Return & Maintained Contact

Push Type • Spring ... page 5-63
Return & Maintained Contact

Wobble Stick and Cat ... page 5-65
Whisker • Spring Return

4-Circuit Horizontal Construction

Lever Type • Spring Return page 5-66

Lever Type • Maintained ... page 5-67

Contact

Push Type • Spring ... page 5-68
Return & Maintained Contact

Wobble Stick & Cat ... page 5-70
Whisker • Spring Return

Dual Switch Lever and ... page 5-71
Push Types • Spring Return

Air-Operated • Spring Return page 5-72
Modifications and ... page 5-73
Accessories

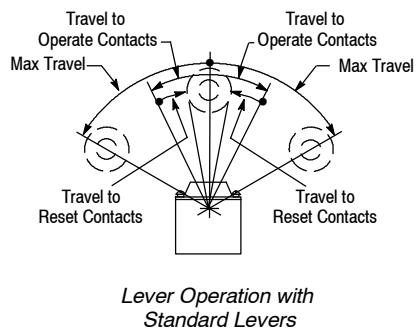
Operating Levers

Lever Selection ... page 5-130

802T 2-Circuit Lever Type • Spring Return

NonPlug-in Style Oiltight Switches

Range of Operation

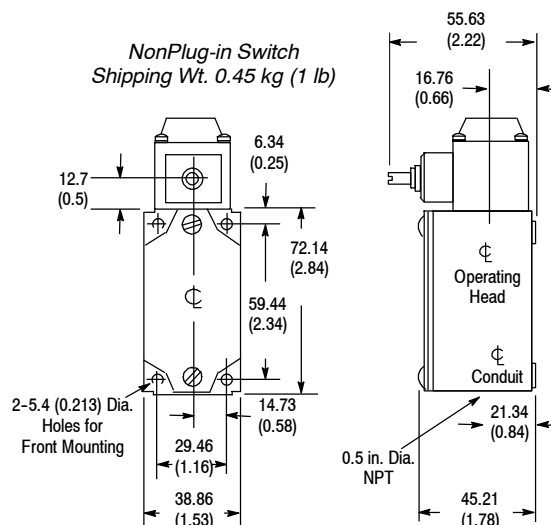


802T-A



802T-ALW5

Approximate Dimensions [mm (in.)]



Product Selection—Standard and Low Operating Torque Models

Lever Movement vs. Contact Operation		Torque to Operate (Max.)	Travel to Operate Contacts (Max.)	Max Travel	Travel to Reset Contacts (Max.)	Cat. No.
Clockwise or Counterclockwise		0.34 N•m (3 lb•in)	16.5°	43°	8°	802T-A
		0.51 N•m (4.5 lb•in)	6°	50°	3°	802T-H
Clockwise		0.40 N•m (3.5 lb•in)	16.5°	43°	8°	802T-A1
		0.51 N•m (4.5 lb•in)	6.5°	50°	3°	802T-H1
Counterclockwise		0.40 N•m (3.5 lb•in)	16.5°	43°	8°	802T-A2
		0.51 N•m (4.5 lb•in)	6.5°	50°	3°	802T-H2
Clockwise Lever cannot move counterclockwise		0.45 N•m (4 lb•in)	20°	91°	11°	802T-L1
Counterclockwise Lever cannot move clockwise						802T-L2
Clockwise or Counterclockwise		0.09 N•m (12.5 oz•in)	22°	43°	12°	802T-ALW5ⓘ
Clockwise						802T-AL1W5ⓘ
Counterclockwise						802T-AL2W5ⓘ

ⓘ These low operating torque limit switches can only be supplied with cat. no. 802T-W5 rod lever. The rod can easily be formed to meet special application requirements.

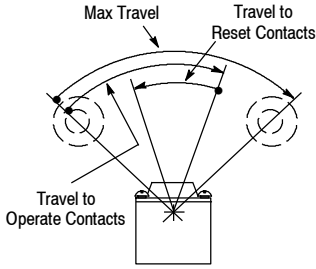
Levers—See page 5-130 for a complete listing of operating levers.

Modifications and Accessories—See page 5-73.

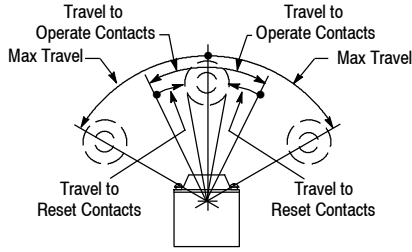
Limit Switches

802T 2-Circuit Lever Type • Maintained Contact and Neutral Position
NonPlug-in Style Oiltight Switches

Range of Operation



Maintained Contact Models



Neutral Position Models



802T-AM



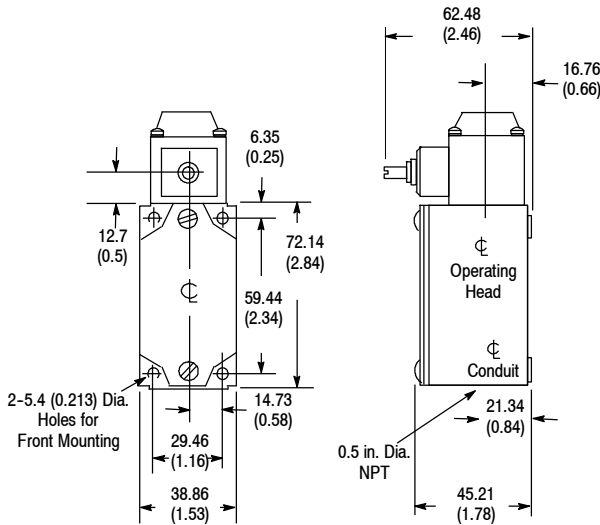
802T-NP

Product Selection

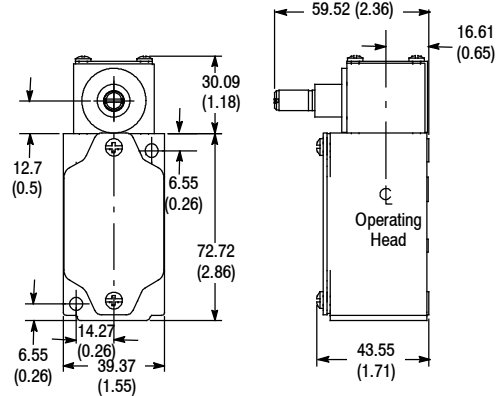
Contact Type	Lever Movement vs. Contact Operation	Torque to Operate (Max.)	Travel to Operate Contacts (Max.)	Max Travel	Travel to Reset Contacts (Max.)	Cat. No.
Maintained		0.25 N•m (2.25 lb•in)	70° ①	84° ①	50°	802T-AM
Neutral Position			12°	53°	6°	802T-NP

① From one maintained position to the other.

Approximate Dimensions [mm (in.)]



NonPlug-in Switch
 Shipping Wt. 0.45 kg (1 lb)
 802T-AM



NonPlug-in Switch
 Shipping Wt. 0.45 kg (1 lb)
 802T-NP

Levers—See page 5-130 for a complete listing of operating levers.

Modifications and Accessories—See page 5-73.

802T 1-Circuit Lever Type with Time Delay • Spring Return

NonPlug-in Style Oiltight Switches



802T-R1TD with 802T-W1 Lever

Product Selection

Lever Movement vs. Contact Operation ^③		Torque to Operate (Max.)	Travel to Operate Contact (Max.)	Overtravel	Max Travel	Cat. No.	
						On-Delay ^{②④⑤}	Off-Delay ^{②⑥}
Clockwise Lever cannot move counterclockwise		0.23 N•m (2 lb•in)	45° ^①	45° ^①	Approx. 90°	802T-R1TD	802T-R7TD
						802T-R3TD	802T-R5TD
Counterclockwise Lever cannot move clockwise						802T-R2TD	802T-R8TD
						802T-R4TD	802T-R6TD

① Required for Timing Accuracy.

② The time delay is adjustable from 0.5...15 seconds ± 25%.

③ Contacts are rated for 3 A, 120V AC maximum.

④ The lever travel must be faster than the timing setting.

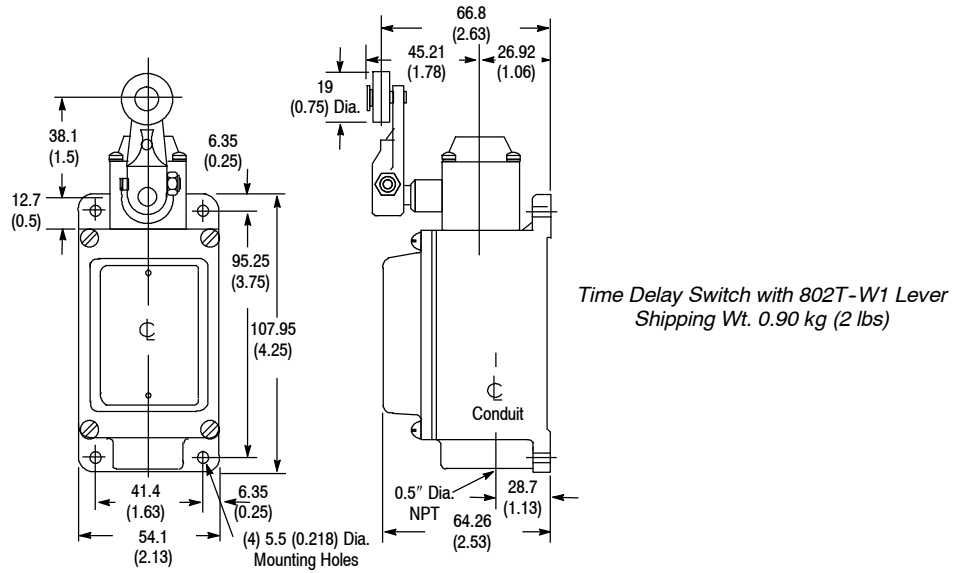
⑤ Time delay occurs after lever is moved to operated position

⑥ Time delay occurs after lever is moved from operated to normal position

802T

NonPlug-in Style Oiltight Switches

Approximate Dimensions [mm (in.)]

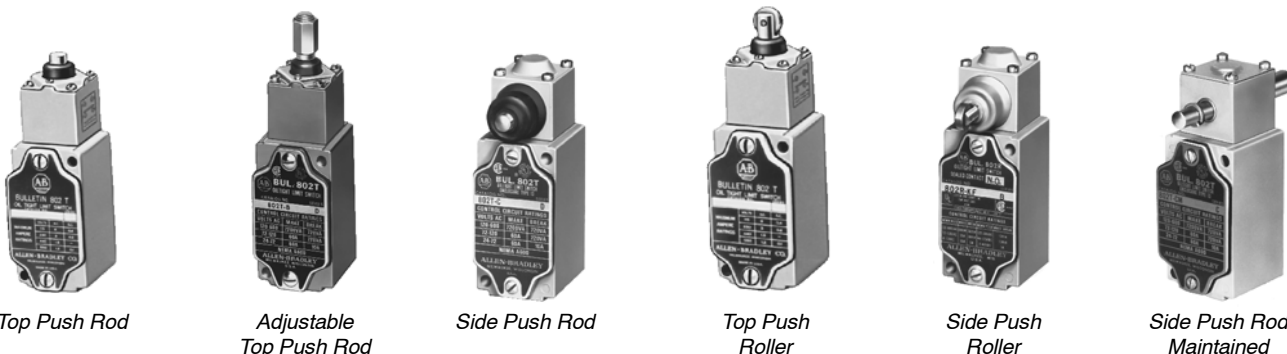


Levers—See page 5-130 for a complete listing of operating levers.

Modifications and Accessories—See page 5-73.

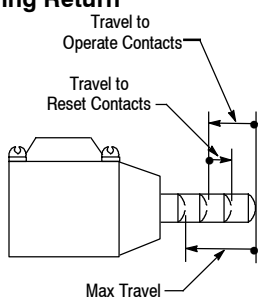
802T 2-Circuit Push Type • Spring Return and Maintained Contact

NonPlug-in Style Oiltight Switches

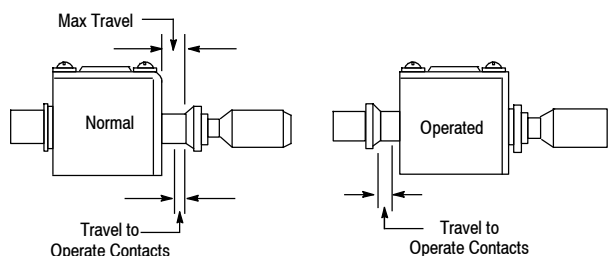


Range of Operation

Spring Return



Maintained



Product Selection

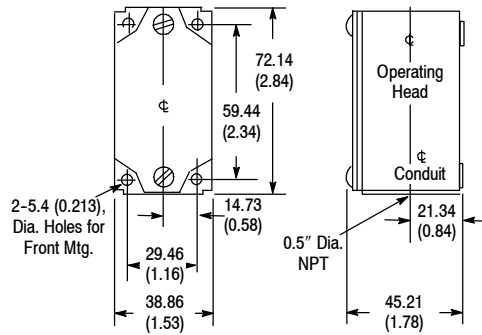
Operator Type	Contact Operation		Force to Operate (Max.)	Travel to Operate Contacts (Max.)	Max Travel	Travel to Reset Contacts (Max.)	Cat. No.
	Normal	Operated					
Top Push Rod			15.6 N (3.5 lb)	1.9 mm (0.075 in.)	5.1 mm (0.202 in.)	0.8 mm (0.030 in.)	802T-B
Adjustable Top Push Rod	1 ○ ○ 2 3 ○ ○ 4	1 ○ ○ 2 3 ○ ○ 4					802T-BA
Top Push Roller							802T-D
Side Push Rod			20.0 N (4.5 lb)	3.2 mm (0.125 in.)	5.5 mm (0.218 in.)	1.5 mm (0.057 in.)	802T-C
Side Push Vertical Roller							802T-K
Side Push Horizontal Roller	1 ○ ○ 2 3 ○ ○ 4	1 ○ ○ 2 3 ○ ○ 4					802T-K1
Maintained Contact Side Push Rod			35.6 N (8 lbs)	4.87 mm (0.192 in.) Nominal	5.96 mm (0.235 in.)	5.30 mm (0.209 in.) Nominal	802T-CM

Modifications and Accessories—See page 5-73.

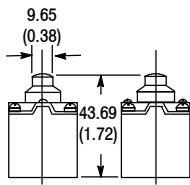
Limit Switches

802T 2-Circuit Push Type • Spring Return and Maintained Contact
NonPlug-in Style Oiltight Switches

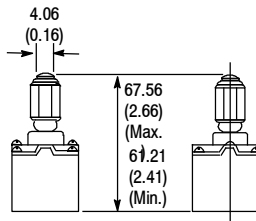
Approximate Dimensions [mm (in.)]



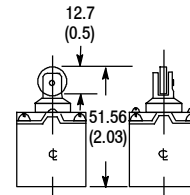
NonPlug-in Switch
Shipping Wt. 0.45 kg (1 lb)



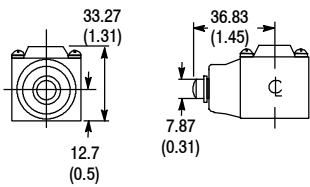
802T-B Top Push Rod Head
Shipping Wt. 0.128 kg (4.5 oz)



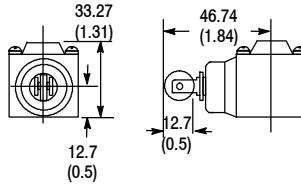
802T-BA Adjustable
Top Push Rod Head
Shipping Wt. 0.128 kg (4.5 oz)



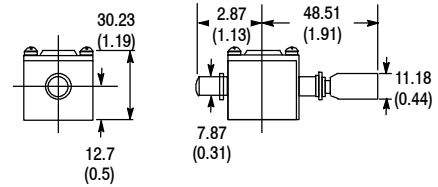
802T-D Top Push Roller Head
Shipping Wt. 0.128 kg (4.5 oz)



802T-C Side Push Rod Head
Shipping Wt. 0.128 kg (4.5 oz)



802T-K Side Push Roller Head
Shipping Wt. 0.128 kg (4.5 oz)

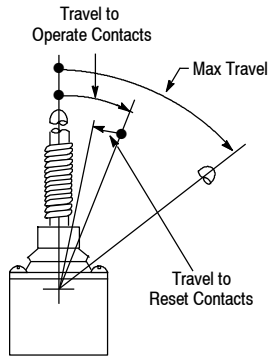


802T-CM Maintained Side Push Rod Head
Shipping Wt. 4.5 oz (0.128 kg)

Modifications and Accessories—See page 5-73.

802T 2-Circuit Wobble Stick and Cat Whisker • Spring Return NonPlug-in Style Oiltight Switches

Range of Operation



Wobble Stick
Nylon Extension



Wobble Stick
Wire Extension



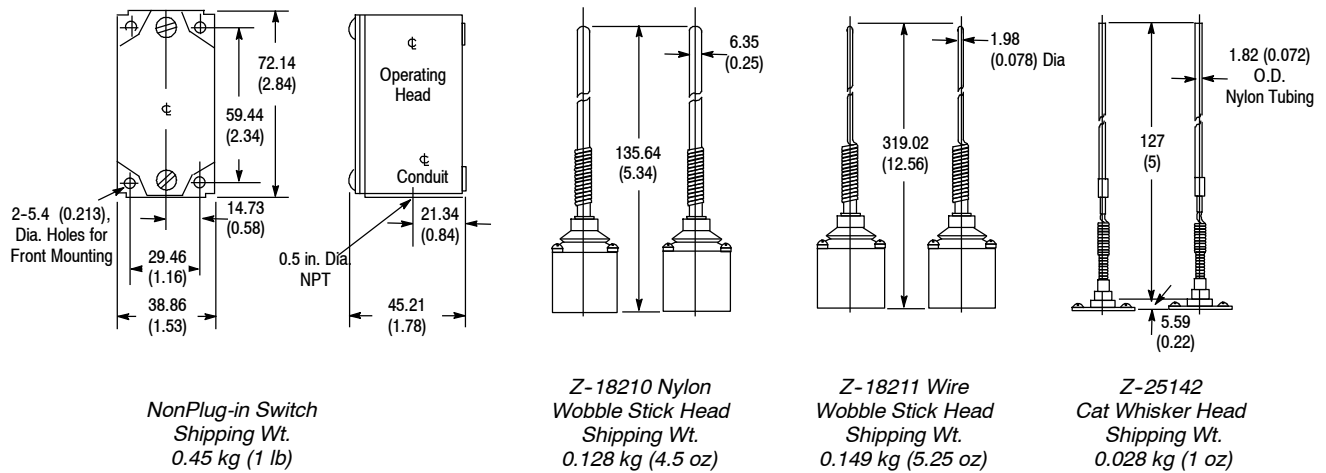
Cat Whisker

Product Selection

Operator Type	Contact Operation	Torque to Operate (Max.) ^①	Travel to Operate Contacts (Max.) ^①	Max Travel ^①	Travel to Reset Contacts (Max.) ^①	Cat. No.
Nylon Wobble Stick		0.51 N•m (4.5 lb•in)	9°	10°	4°	802T-WS
Wire Wobble Stick						802T-WS1
Wire Cat Whisker		0.06 N•m (8 oz•in)	21°	22°	14°	802T-CW

① Operating travels and torque are measured at rigid section of stick or cat whisker.

Approximate Dimensions [mm (in.)]

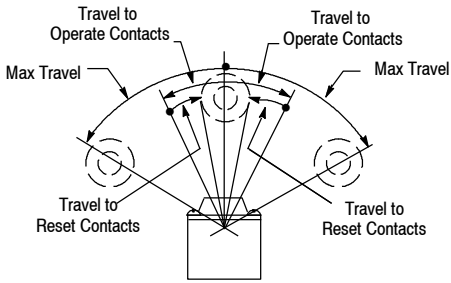


Modifications and Accessories—See page 5-73.

Limit Switches

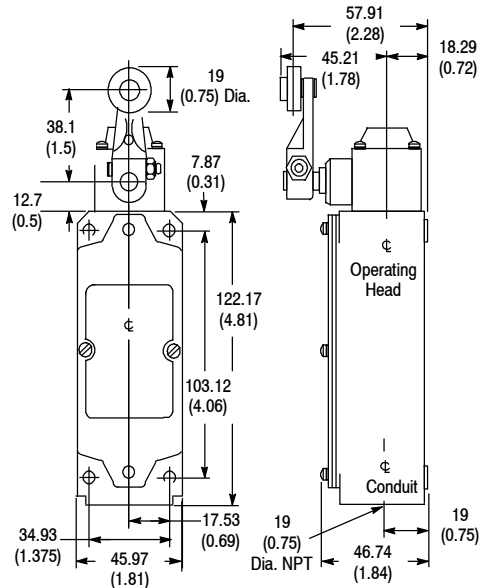
802T Vertical 4-Circuit Push Type • Spring Return & Maintained Contact
NonPlug-in Style Oiltight Switches

Range of Operation



Switch Without Lever

Approximate Dimensions [mm (in.)]



4 Circuit NonPlug-in Switch with 802T-W1 Lever
 Shipping Wt. 0.57 kg (1.25 lb)

Product Selection

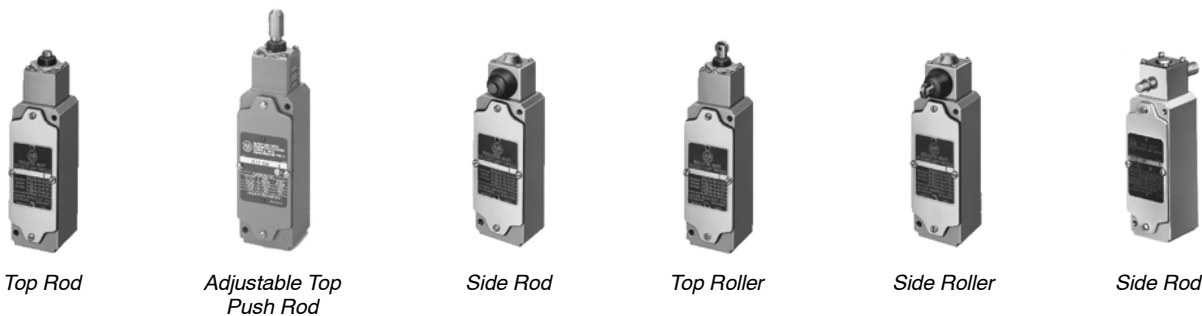
Lever Movement vs. Contact Operation		Torque to Operate (Max.)	Travel to Operate Contacts (Max.)	Max Travel	Travel to Reset Contacts (Max.)	Cat. No.
Clockwise or Counterclockwise		0.34 N•m (3 lb•in)	18°	42°	14°	802T-AT
		0.68 N•m (6 lb•in)	9°	50°	6°	802T-HT
		0.40 N•m (3.5 lb•in)	18°	42°	14°	802T-A1T
		0.68 N•m (6 lb•in)	9°	50°	6°	802T-H1T
Clockwise Lever cannot move counterclockwise		0.40 N•m (3.5 lb•in)	18°	42°	14°	802T-A2T
		0.68 N•m (6 lb•in)	9°	50°	6°	802T-H2T
Clockwise Lever cannot move counterclockwise		0.45 N•m (4 lb•in)	28°	91°	18°	802T-L1T
						802T-L2T
Maintained Contact Clockwise or Counterclockwise		0.34 N•m (3 lb•in)	75°	84° From one maintained position to the other	50°	802T-AMT

Levers—See page 5-130 for a complete listing of operating levers.

Modifications and Accessories—See page 5-73.

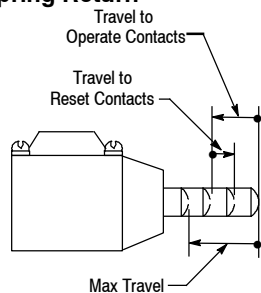
802T Vertical 4-Circuit Push Type • Spring Return & Maintained Contact

NonPlug-in Style Oiltight Switches

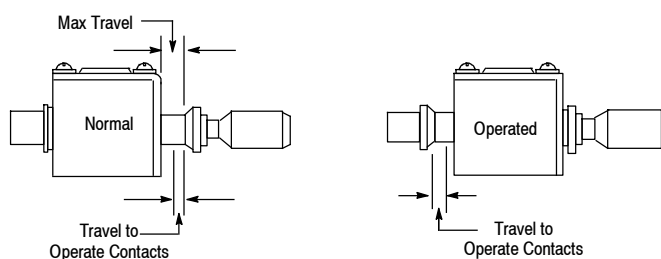


Range of Operation

Spring Return



Maintained



Product Selection

Operator Type	Contact Operation		Force to Operate (Max.)	Travel to Operate Contacts (Max.)	Max Travel	Travel to Reset Contacts (Max.)	Catalog Number ①
	Normal	Operated					
Top Push Rod	1 ○ ○ 2	1 ○ ○ 2	24.4 N (5.5 lb)	3.6 mm (0.140 in.)	6.0 mm (0.234 in.)	1.6 mm (0.062 in.)	802T-BT
Adjustable Top Push Rod	3 ○ ○ 4	3 ○ ○ 4					802T-BAT
Side Push Rod	5 ○ ○ 6	5 ○ ○ 6	28.9 N (6.5 lb)			2.4 mm (0.094 in.)	802T-CT
	7 ○ ○ 8	7 ○ ○ 8					802T-DT
Top Push Roller	1 ○ ○ 2	1 ○ ○ 2	24.4 N (5.5 lb)			1.6 mm (0.062 in.)	802T-DT
Side Push Vertical Roller	3 ○ ○ 4	3 ○ ○ 4					28.9 N (6.5 lb)
Side Push Horizontal Roller	5 ○ ○ 6	5 ○ ○ 6	62.2 N (14 lb)	3.93 mm (0.155 in.) Nominal	5.96 mm (0.235 in.)	802T-K1T	
Maintained Contact Side Push Rod	7 ○ ○ 8	7 ○ ○ 8				5.30 mm (0.180 in.) Nominal	802T-CMT

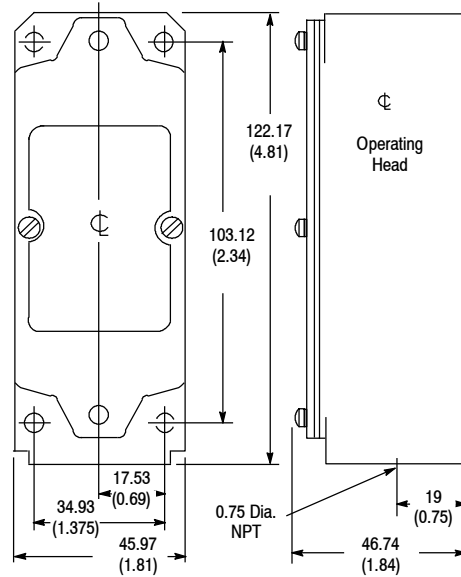
① These devices are not available with fluorinated elastomer seals or neon indicating lights.

Modifications and Accessories—See page 5-73.

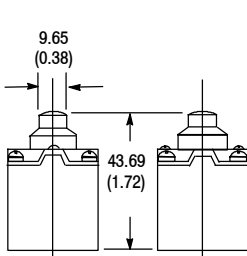
Limit Switches

802T Vertical 4-Circuit Push Type • Spring Return & Maintained Contact
NonPlug-in Style Oiltight Switches

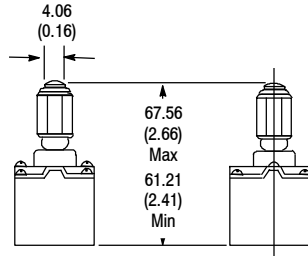
Approximate Dimensions [mm (in.)]



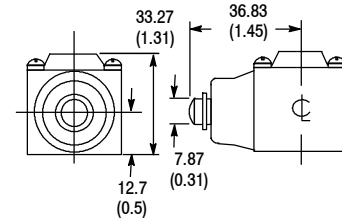
NonPlug-in Switch
 Shipping Wt. 0.57 kg (1.25 lb)



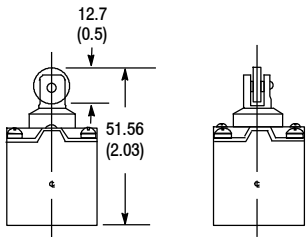
802T-BT
 Top Push Rod Head
 Shipping Wt. 0.128 kg (4.5 oz)



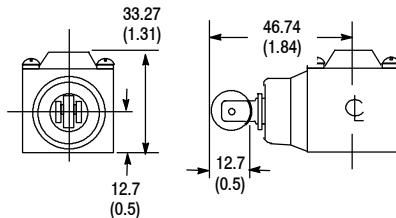
Adjustable Top Push Rod Head
 for 802T-BAT
 Shipping Wt. 0.128 kg (4.5 oz) ❶



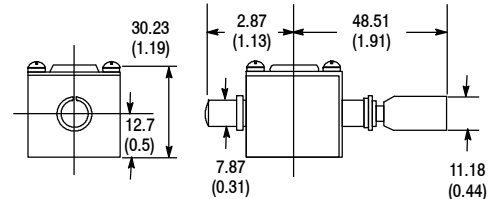
802T-CT
 Side Push Rod Head
 Shipping Wt. 0.128 kg (4.5 oz)



802T-DT
 Top Push Roller Head
 Shipping Wt. 0.128 kg (4.5 oz)



802T-KT
 802T-K1T
 Side Push Roller Head
 Shipping Wt. 0.128 kg (4.5 oz)



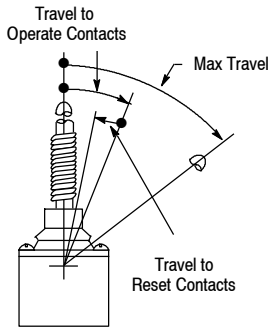
802T-CMT
 Maintained Side Push Rod Head
 Shipping Wt. 0.128 kg (4.5 oz)

❶ Not a saleable item.

Modifications and Accessories—See page 5-73.

802T Vertical 4-Circuit Wobble Stick and Cat Whisker • Spring Return NonPlug-in Style Oiltight Switches

Range of Operation



Travels Are Measured at Rigid Section of Stick or Whisker



Wobble Stick



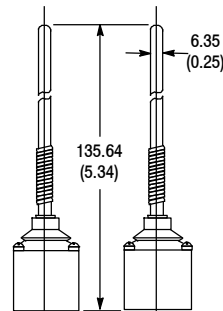
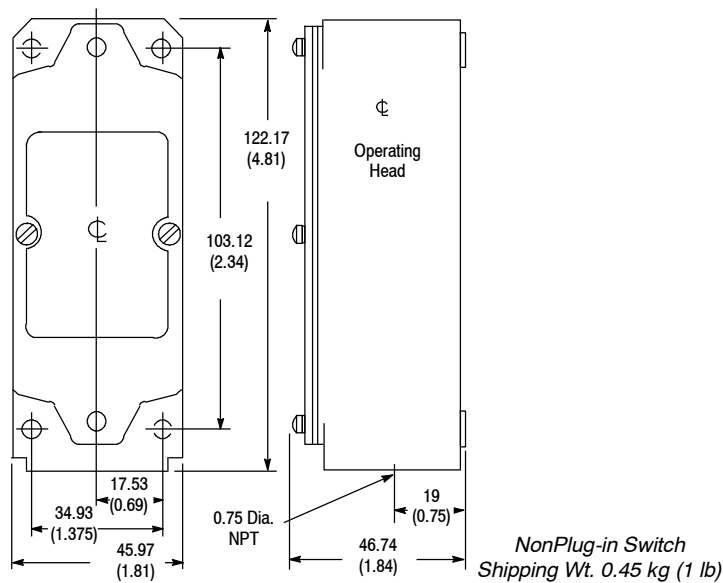
Cat Whisker

Product Selection

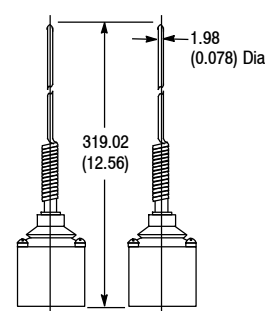
Operator Type	Contact Operation	Torque to Operate (Max.)	Travel to Operate Contacts (Max.)	Max Travel ①	Travel to Reset Contacts (Max.)	Cat. No.
Nylon Wobble Stick		0.79 N•m (7 lb•in)	12°	12°	9°	802T-WST
Wire Cat Whisker						802T-WS1T

① These switches should be mounted in such a way that the wobble stick or cat whisker will not be deflected beyond the "Maximum Travel" position, as this could cause undesirable repetition of contact action on rebound.

Approximate Dimensions [mm (in.)]



Z-18210 Nylon Wobble Stick Head
Shipping Wt. 0.128 kg (4.5 oz)



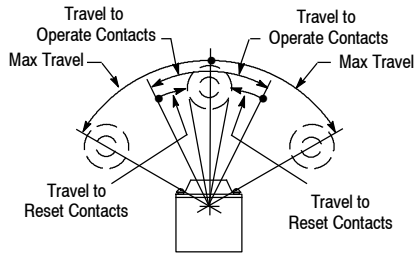
Z-18211 Wire Wobble Stick Head
Shipping Wt. 0.149 kg (5.25 oz)

Modifications and Accessories—See page 5-73.

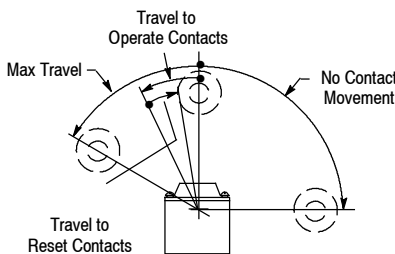
Limit Switches

802T Horizontal 4-Circuit Lever Type • Spring Return NonPlug-in Style Oiltight Switches

Range of Operation



Lever Operation When Standard Levers Are Used



Lever Operation When 802T-W7 and W8 "One-Way" Levers Are Used

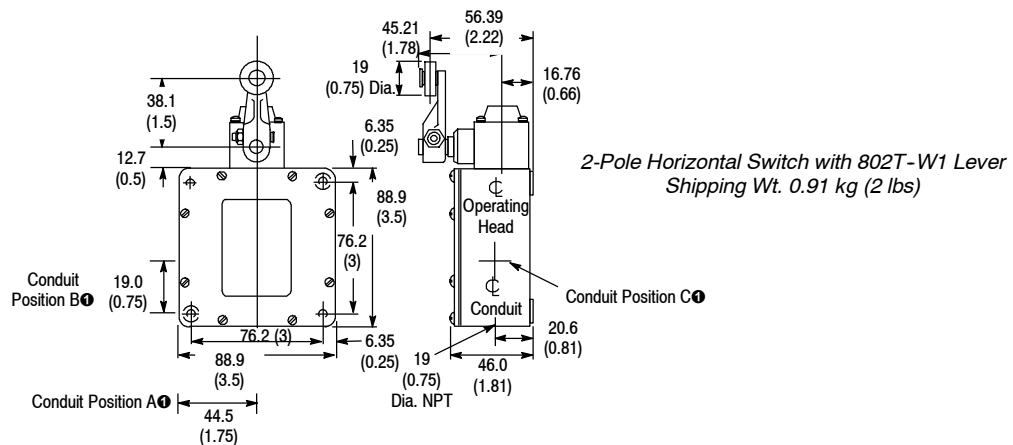


Switch Without Lever

Product Selection

Lever Movement vs. Contact Operation		Torque to Operate (Max.)	Travel to Operate Contacts (Max.)	Max Travel	Travel to Reset Contacts (Max.)	Cat. No.
Clockwise or Counterclockwise		0.34 N•m (3 lb•in)	14°	42°	8°	802T-ATH
		0.68 N•m (6 lb•in)	6°	50°	3°	802T-HTH
		0.39 N•m (3.5 lb•in)	14°	42°	8°	802T-A1TH
Clockwise		0.68 N•m (6 lb•in)	6°	50°	3°	802T-H1TH
		0.39 N•m (3.5 lb•in)	14°	42°	8°	802T-A2TH
Counterclockwise		0.68 N•m (6 lb•in)	6°	50°	3°	802T-H2TH
		0.45 N•m (4 lb•in)	20°	91°	11°	802T-L1TH
Clockwise Lever cannot move counterclockwise		0.45 N•m (4 lb•in)	20°	91°	11°	802T-L1TH
Counterclockwise Lever cannot move clockwise						802T-L2TH

Approximate Dimensions [mm (in.)]



● Conduit positions for modifications S1, S2, S3

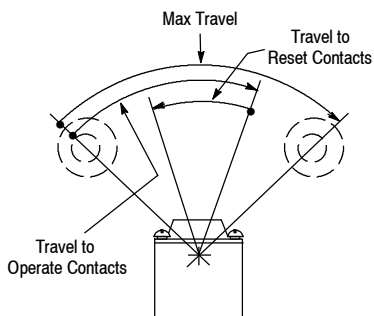
Levers—See page 5-130 for a complete listing of operating levers.

Modifications and Accessories—See page 5-73.

802T Horizontal 4-Circuit Lever Type • Maintained Contact

NonPlug-in Style Oiltight Switches

Range of Operation

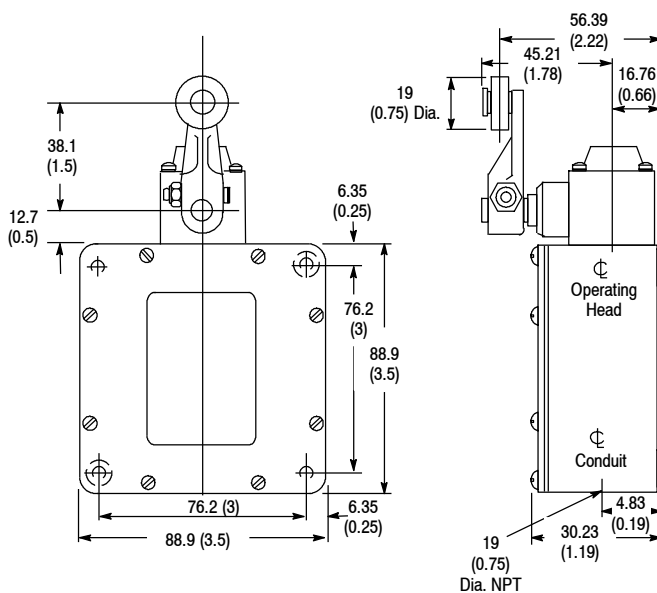


Switch
Without Lever

Product Selection

Lever Movement vs. Contact Operation		Torque to Operate (Max.)	Travel to Operate Contacts (Max.)	Max Travel	Travel to Reset Contacts (Max.)	Cat. No.
Clockwise or Counterclockwise		0.34 N•m (3 lb•in)	70°	84° From one maintained position to the other	35°	802T-AMTH

Approximate Dimensions [mm (in.)]



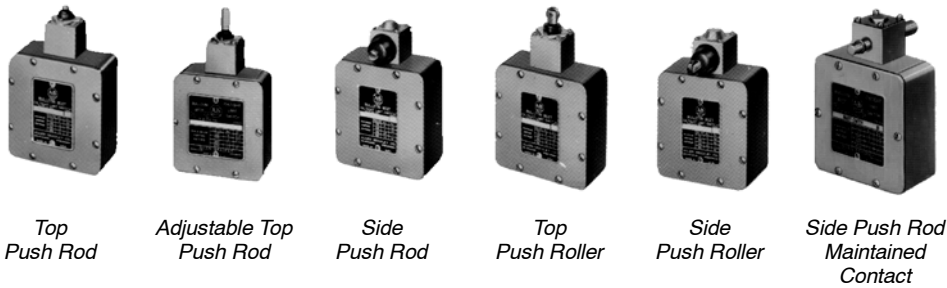
2-Pole Horizontal Switch
with 802T-W1 Lever
Shipping Wt. 0.91 kg (2 lb)

Levers—See page 5-130 for a complete listing of operating levers.

Modifications and Accessories—See page 5-73.

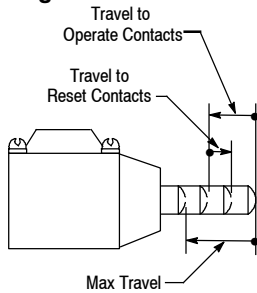
Limit Switches

802T Horizontal 4-Circuit Push Type • Spring Return & Maintained Contact NonPlug-in Style Oiltight Switches

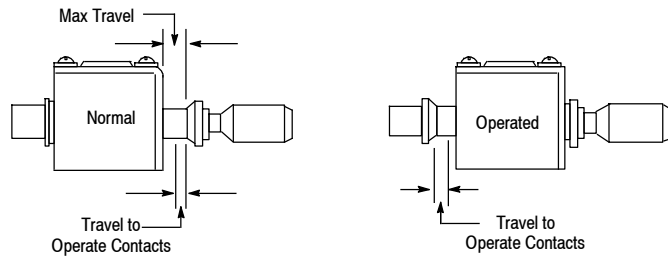


Range of Operation

Spring Return



Maintained



Product Selection

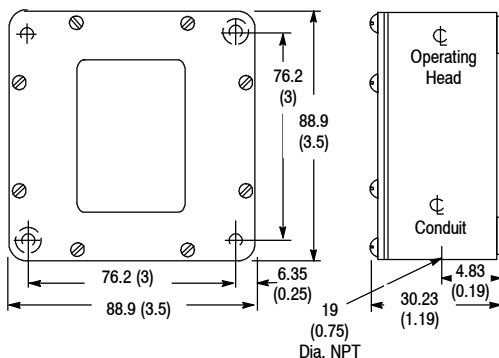
Operator Type	Contact Operation		Force to Operate (Max.)	Travel to Operate Contacts (Max.)	Max Travel	Travel to Reset Contacts (Max.)	Cat. No.
	Normal	Operated					
Top Push Rod			24.4 N (5.5 lbs)	2.4 mm (0.094 in.)	5.9 mm (0.234 in.)	1.2 mm (0.046 in.)	802T-BTH
Adjustable Top Push Rod	1 2 5 6 3 4 7 8	1 2 5 6 3 4 7 8					802T-BATH
Top Push Roller							802T-DTH
Side Push Rod			62.2 N (14 lbs)	2.8 mm (0.109 in.)	5.96 mm (0.235 in.)	1.6 mm (0.062 in.)	802T-CTH
Side Push Vertical Roller							802T-KTH
Side Push Horizontal Roller	1 2 5 6 3 4 7 8	1 2 5 6 3 4 7 8					802T-K1TH
Maintained Contact Side Push Rod				4.87 mm (0.192 in.) Nominal		5.30 mm (0.209 in.) Nominal	802T-CMTH

Modifications and Accessories—See page 5-73.

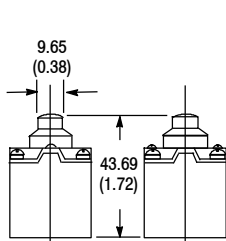
802T Horizontal 4-Circuit Push Type • Spring Return & Maintained Contact

NonPlug-in Style Oiltight Switches

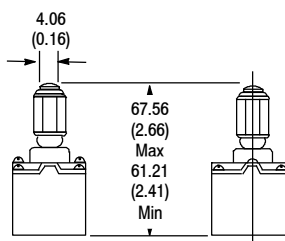
Approximate Dimensions [mm (in.)]



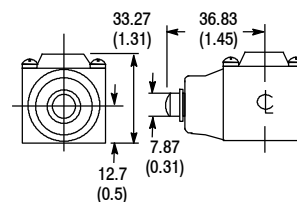
2-Pole Horizontal Switch Base
Shipping Wt. 0.91 kg (2 lb)



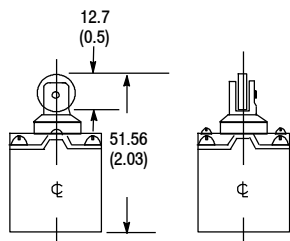
Z-19243
Top Push Rod Head
Shipping Wt. 0.128 kg (4.5 oz)



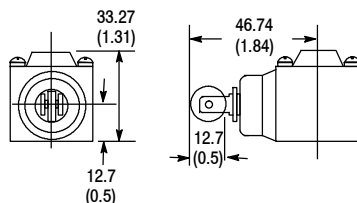
Adjustable Top Push Rod Head
for 802T-KTH
Shipping Wt. 0.128 kg (4.5 oz) **ⓘ**



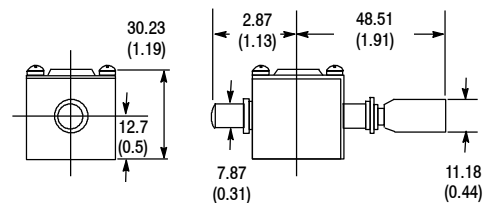
Z-21165
Side Push Rod Head
Shipping Wt. 0.128 kg (4.5 oz)



Z-19241
Top Push Roller Head
Shipping Wt. 0.128 kg (4.5 oz)



Z-21166
Side Push Roller Head
Shipping Wt. 0.128 kg (4.5 oz)



Z-21168
Maintained Side Push Rod Head
Shipping Wt. 0.128 kg (4.5 oz)

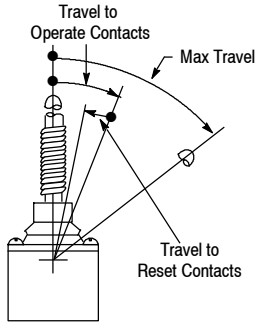
ⓘ Not a saleable item.

Modifications and Accessories—See page 5-73.

Limit Switches

802T Horizontal 4-Circuit Wobble Stick & Cat Whisker • Spring Return NonPlug-in Style Oiltight Switches

Range of Operation ①



Travels Are Measured at Rigid Section of Stick



Wobble Stick



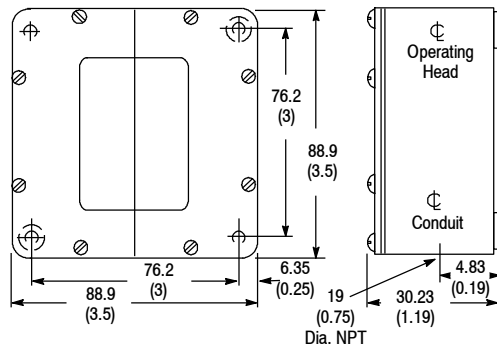
Cat Whisker

Product Selection

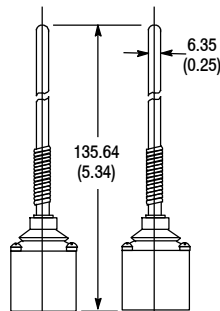
Operator Type	Contact Operation	Torque to Operate (Max.)	Travel to Operate Contacts (Max.)	Max Travel ①	Travel to Reset Contacts (Max.)	Cat. No.
Nylon Wobble Stick		0.79 N•m (7 lb•in)	12°	12°	9°	802T-WSTH
Wire Cat Whisker						802T-WS1TH

① These switches should be mounted in such a way that the wobble stick or cat whisker will not be deflected beyond the "Maximum Travel" position, as this could cause undesirable repetition of contact action on rebound.

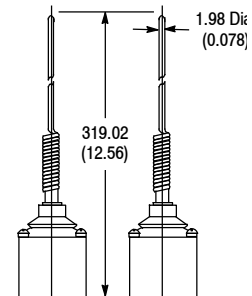
Approximate Dimensions [mm (in.)]



2-Pole Horizontal Switch
Shipping Wt. 0.91 kg (2 lb)



Z-29195 Nylon
Wobble Stick Head
Shipping Wt. 0.128 kg (4.5 oz)



Z-32109 Wire
Wobble Stick Head
Shipping Wt. 0.149 kg (5.25 oz)

Modifications and Accessories—See page 5-73.

802T Dual Switch Lever and Push Types • Spring Return

NonPlug-in Style Oiltight Switches



Dual Switch with
802T-W1 Levers

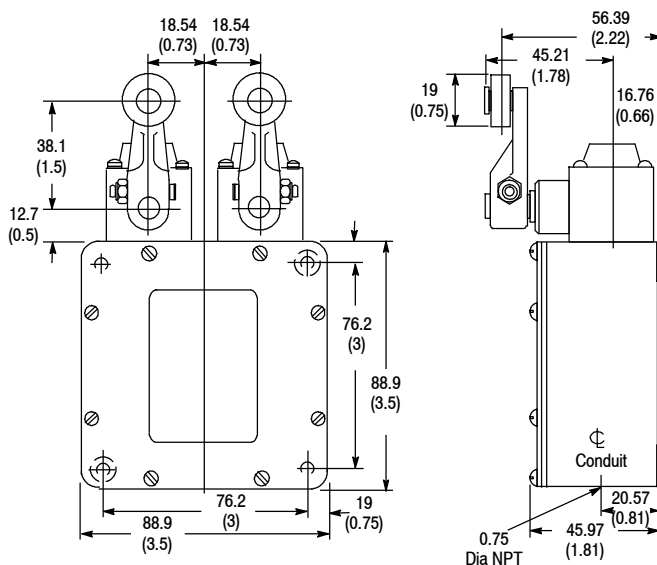
Product Selection

		Right Hand Switch					
		802T-A	802T-H	802T-A1	802T-A2	802T-C	802T-D
Left Hand Switch	802T-A	802T-AD	802T-AHD	802T-AA1D	802T-AA2D	802T-ACD	802T-ADD
	802T-H	802T-HAD	802T-HD	802T-HA1D	802T-HA2D	802T-HCD	802T-HDD
	802T-A1	802T-A1AD	802T-A1HD	802T-A1D	802T-A1A2D	802T-A1CD	802T-A1DD
	802T-A2	802T-A2AD	802T-A2HD	802T-A2A1D	802T-A2D	802T-A2CD	802T-A2DD
	802T-C	802T-CAD	802T-CHD	802T-CA1D	802T-CA2D	802T-CD	802T-CDD
	802T-D	802T-DAD	802T-DHD	802T-DA1D	802T-DA2D	802T-DCD	802T-DD

Ordering Information—Refer to limit switch listings on pages 5-55 and 5-59 determine which units and levers are correct for the desired application. Select left limit switch from left hand vertical column. Select right hand switch from right hand horizontal column. The correct cat. no. is found at the intersecting box.

Most levers listed on page 5-130 can be used. When dual limit switch combinations are desired, consult your local Rockwell Automation sales office or Allen-Bradley Distributor (see page 13-1).

Approximate Dimensions [mm (in.)]



Dual Switch with 802T-W1 Levers
Shipping Wt. 0.91 kg (2 lbs)

Levers—See page 5-130 for a complete listing of operating levers.

Modifications and Accessories—See page 5-73.

Limit Switches

802T Air-Operated • Spring Return NonPlug-in Style Oiltight Switches

Product Selection

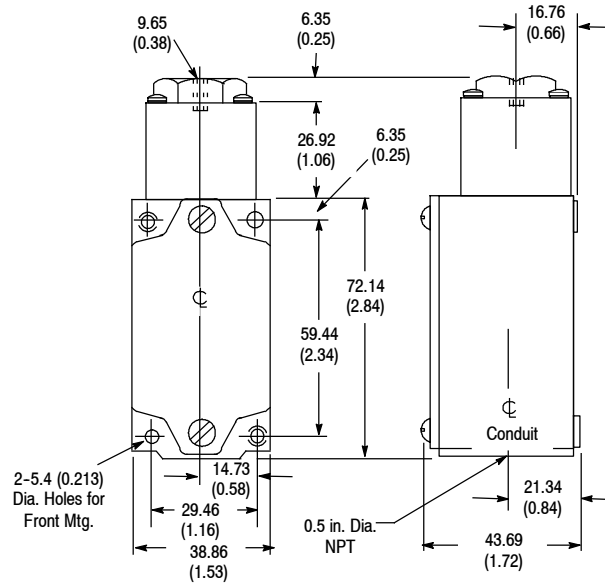
Contact Operation ❶	Cat. No.	
	Single Unit ❷	Double Unit ❸
Will operate when 25 psi (172 kPa) \pm 25% of air pressure is applied, and will reset with a pressure drop of 6...15 psi (41...103 kPa). Maximum allowable pressure is 100 psi (680 kPa).	802T-P	802T-2P

❶ When the switch is in the reset state a small rod protrudes from the top of the die casting. The rod is flush with the surface when the switch trips on higher pressure. The switch can be manually operated by pressing down on the rod.

❷ Contact operation similar to 2-circuit devices.

❸ Contact operation similar to 4-circuit horizontal construction devices.

Approximate Dimensions [mm (in.)]



*Air-Operated Switch
Shipping Wt. 0.34 kg (12 oz)*

Modifications and Accessories—See page 5-73.

802T Modifications and Accessories

NonPlug-in Style Oiltight Switches

Cavity Mounting



Front View



Rear View

802T-AO with 802T-W1A Lever

Manifold Mounting



802T-AMU with 802T-W4A Lever

Cavity Mounting

Except for the types identified by Cat. Nos. 802T-B, 802T-D, 802T-WS, 802T-WS1, and 802T-CW, Bulletin 802T switches can be supplied in a special construction for cavity mounting in a machine base or panel. With this construction, the actuator and contact block are mounted on the back of a gasket steel plate. To order a switch for cavity mounting, add the letter **O** to the cat. no. of the corresponding surface mounted switch. Example: Cat. No. 802T-A becomes cat. no. 802T-AO (shown).

Manifold Mounting

All two-circuit Bulletin 802T switches can be supplied with a special base which permits mounting the switch manifold style on a machine base, panel or raceway. This base is equipped with a wiring hole and synthetic rubber gasket on the back (see illustration).

To order a switch with a manifold mounting base, add the letter **U** to the cat. no. Example: Cat. No. 802T-AM becomes cat. no. 802T-AMU (shown).

Transparent Cover

Switches can be furnished with a gasket, transparent plastic cover. This modification enables the electrician to inspect terminal wiring without removing the switch cover. Not available on cat whisker, time delay or cavity style mounted limit switches.

To order a switch with a transparent cover, add the letter **Z** to the cat. no. of the switch. For example: Cat. No. 802T-D becomes Cat. No. 802T-DZ.

Extended Temperature Operation

Bulletin 802T non-plug-in limit switches are designed to operate in a temperature range of -18...+54°C (0...+130°F). Special limit switches modified for extended temperature operation -29...+121°C (-20...+250°F) are available.

Note: Temperature ranges below 0°C (+32°F) are based on the absence of freezing moisture or water.

To order a Bulletin 802T modified for extended temperature operation, insert the letter **E** after the operating head designation. Example: Cat. No. 802T-A becomes Cat. No. 802T-AE. (Cat. Nos. 802T-WS, WS1, CW, P, 2P and the time delay limit switches are not available for extended temperature operation. Cat. Nos. 802T-A3 and A4 are available for extended temperature operation except with a reduction in damping.)

Special Conduit Positions

Dual operating head switches can be obtained with up to three conduit openings. The location of conduit openings A, B, and C are illustrated in the dimension drawing on page 5-66. The conduit opening in Position A is 3/4 in. NPT, the conduit openings in Position B and C are 1/2 inch NPT. To order a switch with special conduit positioning, add the suffix **S1**, **S2** or **S3** to the cat. no. per the following:

- S1=Position A+B
- S2=Position A+C
- S3=Position B+C

Neon Indicating Lights (2-Circuit Models Only)

Two circuit Bulletin 802T surface mounted limit switches can be supplied with two neon indicating lights—AC 208/240V, 50...60 Hz and 120V, 50...60 Hz. To order, add the letter **N** for 120V or **N5** for 240V before the lever designation. Example: Cat. No. 802T-A1 with indicating lights would be 802T-A1N. Not available on 4-circuit devices.

In addition, indicating light kits as shown in the table below are available for field installation on two circuit devices.

Limit Switch Construction	Light Kit Cat. No.	
	120V AC 50...60 Hz	208/240V AC 50...60 Hz
Surface Mounted	802T-N1	802T-N4
Neutral Position	802T-N2	802T-N10

Conduit Seal

A synthetic rubber conduit seal is available to protect the conduit opening against entry of oil and moisture. The seal can be added easily before switch installation and should be installed so that the 5/8 inch diameter projection (the other projection is 23/32 inch diameter) faces against the shoulder at the bottom of the pipe tap. The seal can accommodate up to four wires of #12 gauge or smaller. Each wire hole in the seal has a thin inner wall which is pierced when a wire is passed through. Thus, any unused opening remains sealed. The seat is designed for single contact block, surface mounted base limit switches having 1/2 inch conduit openings.

Conduit seal Cat. No. **802T-N3**

Special Conduit Lock Nut

This option, a "Tru-Seal" nut with threaded PTFE insert, is a valuable accessory for any Bulletin 802T which is connected by means of conduit.

"Tru-Seal" lock nut for 1/2 inch conduit
Cat. No. **802T-X4**

802X

Watertight or Hazardous Location Switches



Specifications

Enclosure Rating	NEMA 7 and 9/Class I, Groups B, C and D or Class II, Groups E, F and G or Class III; NEMA 4/nonhazardous locations
Certifications	UL Listed and CSA Certified
Ambient Temperature [C (F)] [Ⓢ]	Push type with spring return and all lever types except neutral position: -46...+121° (-50...+250°) Wobble stick and cat whisker devices: -29...+54° (-20...+130°) Side push maintained: -46...+121° (-50...+250°) Neutral position: -18...+121° (0...+250°).

AC Contact Rating (Maximum per Pole, 50 or 60Hz, same polarity)

NEMA Rating Designation	Max Voltage	A		Continuous Carrying Current	VA	
		Make	Break		Make	Break
A600	120	60	6.00	10	7200	720
	240	30	3.00	10	7200	720
	480	15	1.50	10	7200	720
	600	12	1.20	10	7200	720

DC Contact Rating (Maximum per Pole)

NEMA Rating Designation	Max Voltage	A		Continuous Carrying Current	VA	
		Make	Break		Make	Break
P150	125	1.1		5	138	

[Ⓢ] Temperature ranges below 0°C (+32°F) are based on the absence of freezing moisture or water.

Description

Bulletin 802X NEMA Type 7 and 9 limit switches are designed for use in atmospheres and locations defined as Class I, Groups B, C or D, Division 1, Class II, Groups E, F or G, or Class III in the National Electrical Code. Typical applications for this switch include refineries, distilleries, grain elevators and flour mills. For Class I, Division 2 locations, a Bulletin 802R limit switch may also be used (see page 5-34).

Bulletin 802X NEMA Type 4 watertight limit switches are designed for use indoors in locations where their internal parts require protection against seepage of water and splashing, falling or hose-directed water within the limits of the NEMA specified tests for Type 4 watertight enclosures. They are not sleet- (ice-) proof. Typical applications are dairies and food processing plants.

A wide variety of operating heads and operating levers are available. Operating heads can be mounted in four positions, 90° apart. The enclosure base has two through holes for front mounting, two tapped holes for rear mounting and two tapped holes for side mounting.

Features

- Multiple operator styles: side rotary, wobble stick, cat whisker, adjustable top push and top or side push with or without rollers

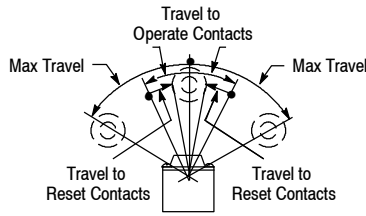
Watertight or Hazardous Location

- Lever Type • Spring Return page 5-75
Standard and Neutral Position Models
- Lever Type • page 5-76
Maintained Contact
- Push Type • Spring Return . page 5-77
- Push Type • page 5-79
Maintained Contact
- Wobble Stick and page 5-80
Cat Whisker • Spring Return

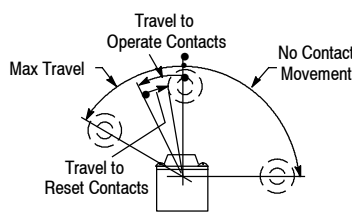
802X Lever Type • Spring Return

Watertight or Hazardous Location Switches

Range of Operation



Lever Operation When Levers Except 802T-W7 and W8 Are Used



Lever Operation When 802T-W7 and W8 "One-Way" Levers Are Used

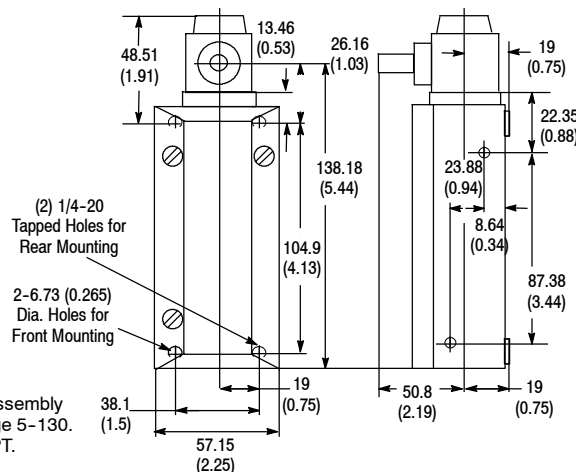


Switch Without Lever

Product Selection—Standard and Neutral Position Models

Lever Movement vs. Contact Operation	Torque to Operate (Max)	Travel to Operate Contacts (Max)	Max Travel	Travel to Reset Contacts (Max)	Cat. No.	
					NEMA 4	NEMA 7 and 9
Clockwise or Counterclockwise 	0.34 N•m (3 lb•in)	16.5°	43°	8°	802X-A4	802X-A7
	0.51 N•m (4.5 lb•in)	6°	50°	3°	—	802X-H7
Clockwise 	0.34 N•m (3.5 lb•in)	16.5°	43°	8°	802X-A14	802X-A17
	0.51 N•m (4.5 lb•in)	6°	50°	3°	—	802X-H17
Counterclockwise 	0.34 N•m (3.5 lb•in)	16.5°	43°	8°	802X-A24	802X-A27
	0.51 N•m (4.5 lb•in)	6°	50°	3°	—	802X-H27
Clockwise 	0.45 N•m (4 lb•in)	20°	91°	11°	802X-L14	802X-L17
					Counterclockwise 	802X-L24
Neutral Position Switch with Normally Open Contacts 	0.25 N•m (2.25 lb•in)	12°	53°	6°	—	802X-NP7

Approximate Dimensions [mm (in.)]



Note: For operating head and lever assembly dimensions not shown, see page 5-130. Conduit pipe opening 1/2 in. NPT.

Approximate Shipping Wt.
0.9 kg (2 lbs)

Mounting Hole Dimensions

2—0.265 Dia. through hole with 0.500 Dia. x 0.25 in. deep C'Bore for front mounting.

2—1/4-20 x 0.56 in. deep Tapped holes for rear mounting.

2—1/4-20 x 0.5 in. deep Tapped holes for side mounting.

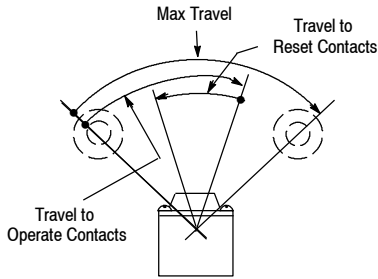
Levers—See page 5-130 for a complete listing of operating levers.

Limit Switches

802X Lever Type • Maintained Contact

Watertight or Hazardous Location Switches

Range of Operation



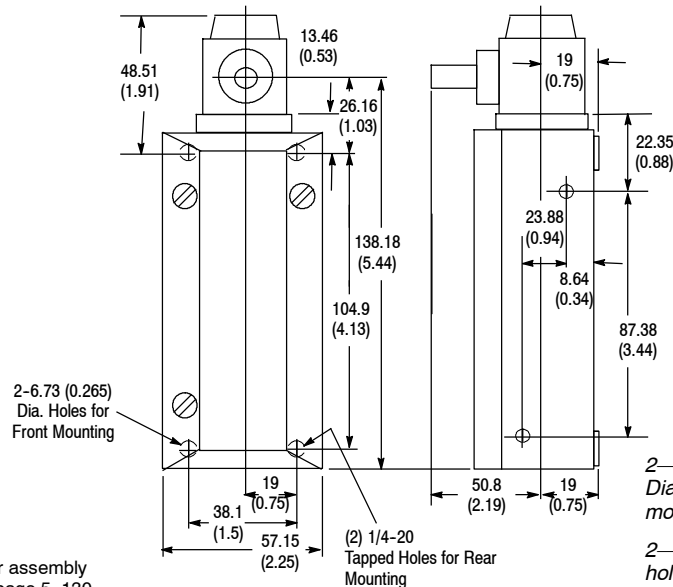
Switch Without Lever

Product Selection

Lever Movement vs. Contact Operation	Torque to Operate (Max)	Travel to Operate Contacts (Max)	Max Travel	Travel to Reset Contacts (Max)	Cat. No.	
					NEMA 4	NEMA 7 & 9
Clockwise or Counterclockwise 	0.25 N•m (2.25 lb•in)	70° ❶	84° ❶	35°	802X-AM4	802X-AM7

❶ From one maintained position to the other.

Approximate Dimensions [mm (in.)]



Approximate Shipping Wt.
0.9 kg (2 lbs)

Mounting Hole Dimensions

2—0.265 Dia. through hole with 0.500 Dia. x 0.25 in. deep C'Bore for front mounting.

2—1/4-20 x 0.56 in. deep Tapped holes for rear mounting.

2—1/4-20 x 0.5 in. deep Tapped holes for side mounting.

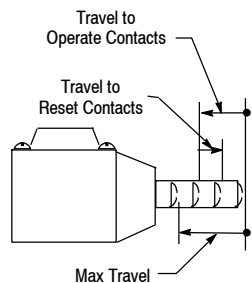
Note: For operating head and lever assembly dimensions not shown, see page 5-130.
Conduit pipe opening 1/2 in. NPT.

Levers—See page 5-130 for a complete listing of operating levers.

802X Push Type • Spring Return

Watertight or Hazardous Location Switches

Range of Operation

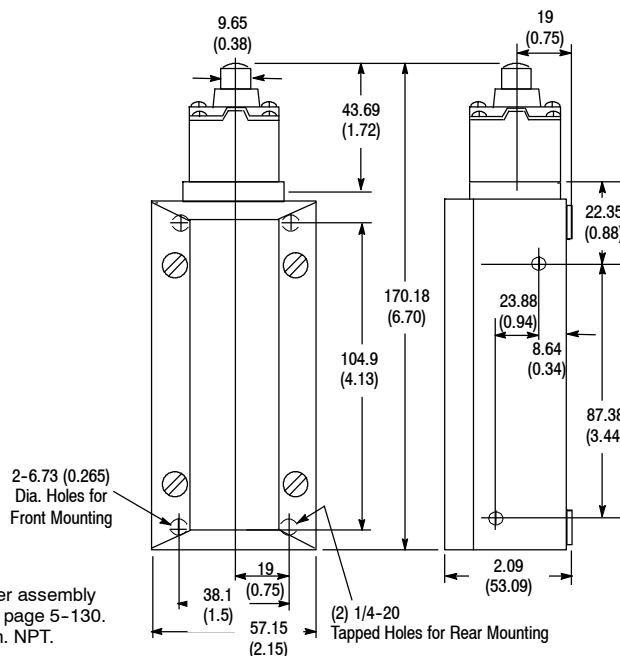


Top Push Rod Adjustable Top Push Rod Side Push Rod Top Push Roller Side Push Roller

Product Selection

Operator Type	Contact Operation		Force to Operate (Max)	Travel to Operate Contacts (Max)	Max Travel	Travel to Reset Contacts (Max)	Cat. No.	
	Normal	Operated					NEMA 4	NEMA 7 and 9
Top Push Rod			15.6 N (3.5 lbs)	1.9 mm (0.075 in.)	5.1 mm (0.202 in.)	0.8 mm (0.030 in.)	802X-B4	802X-B7
Adjustable Top Push Rod			20.0 N (4.5 lbs)	3.2 mm (0.125 in.)	5.5 mm (0.218 in.)	1.5 mm (0.057 in.)	802X-BA4	802X-BA7
Side Push Rod			15.6 N (3.5 lbs)	1.9 mm (0.075 in.)	5.1 mm (0.202 in.)	0.8 mm (0.030 in.)	802X-D4	802X-D7
Top Push Roller			20.0 N (4.5 lbs)	3.2 mm (0.125 in.)	5.5 mm (0.218 in.)	1.5 mm (0.057 in.)	802X-K4	802X-K7
Side Push Vertical Roller			15.6 N (3.5 lbs)	1.9 mm (0.075 in.)	5.1 mm (0.202 in.)	0.8 mm (0.030 in.)	802X-K14	802X-K17
Side Push Horizontal Roller			20.0 N (4.5 lbs)	3.2 mm (0.125 in.)	5.5 mm (0.218 in.)	1.5 mm (0.057 in.)	802X-K14	802X-K17

Approximate Dimensions [mm (in.)]



Approximate Shipping Wt.
0.9 kg (2 lbs)

Mounting Hole Dimensions

2—0.265 Dia. through hole with 0.500 Dia. x 0.25in deep C'Bores for front mounting.

2—1/4-20 x 0.56in deep Tapped holes for rear mounting.

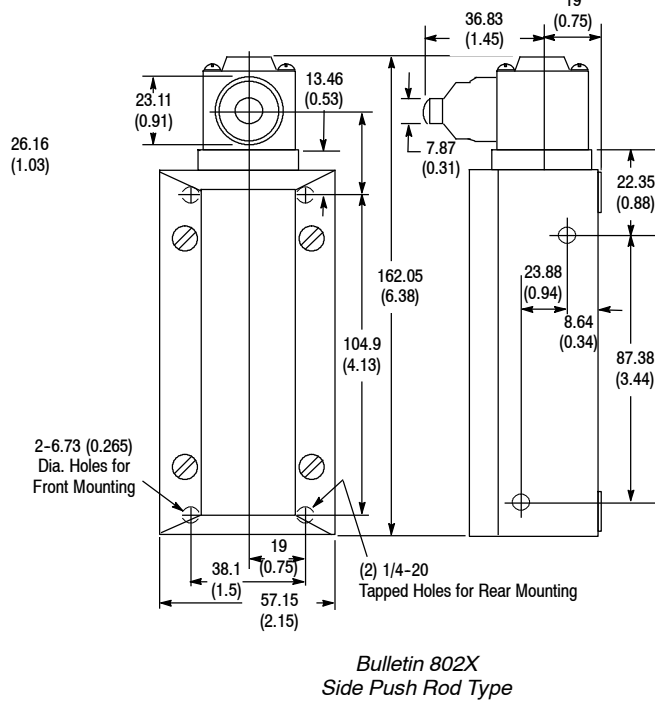
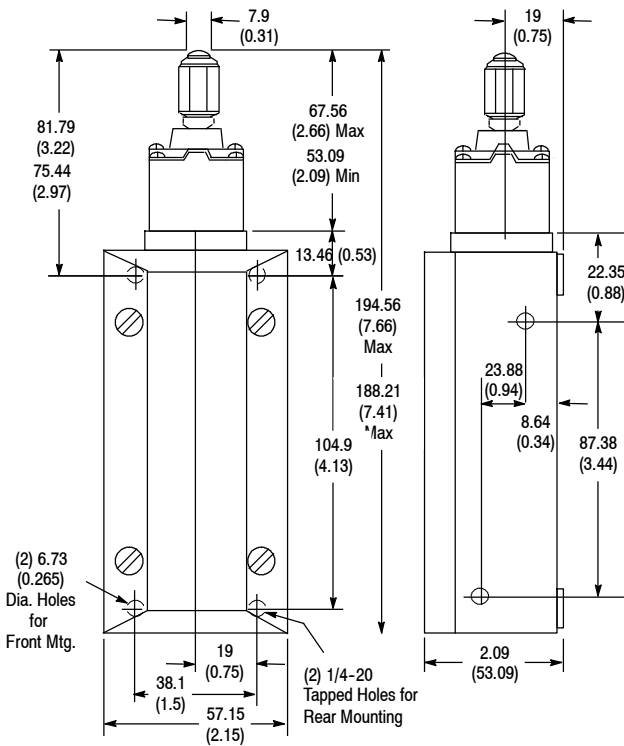
2—1/4-20 x 0.5in deep Tapped holes for side mounting.

Note: For operating head and lever assembly dimensions not shown, see page 5-130. Conduit pipe opening 1/2 in. NPT.

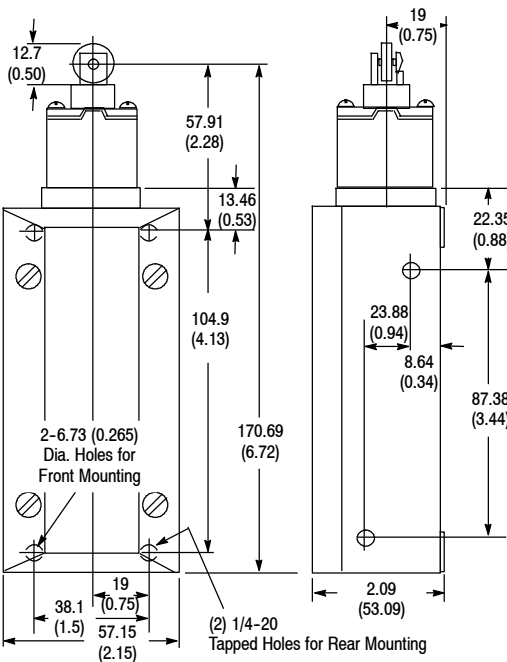
Limit Switches

802X Push Type • Spring Return
Watertight or Hazardous Location Switches

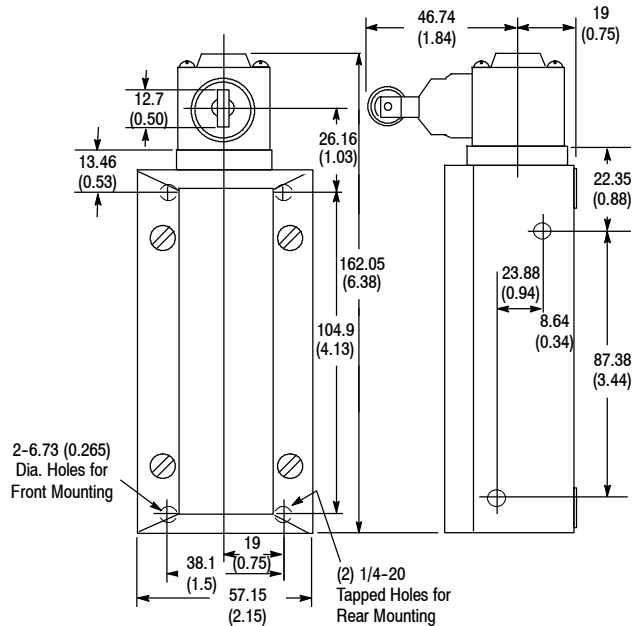
Approximate Dimensions [mm (in.)]



Bulletin 802X
Adjustable Top Push Rod Type



Bulletin 802X
Top Push Roller Type



Bulletin 802X
Side Push Roller Type

Mounting Hole Dimensions

- 2—0.265 Dia. through hole with 0.500 Dia. x 0.25 in. deep C'Bore for front mounting.
- 2—1/4-20 x 0.56 in. deep Tapped holes for rear mounting.
- 2—1/4-20 x 0.5 in. deep Tapped holes for side mounting.

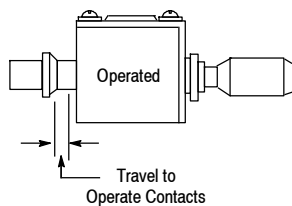
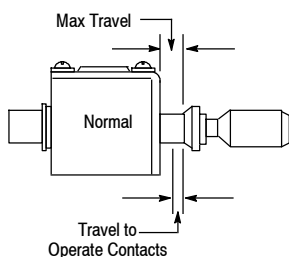
Approximate Shipping Wt. 0.9 kg (2 lbs)

Note: For operating head and lever assembly dimensions not shown, see page 5-130.
 Conduit pipe opening 1/2 in. NPT.

802X Push Type • Maintained Contact

Watertight or Hazardous Location Switches

Range of Operation

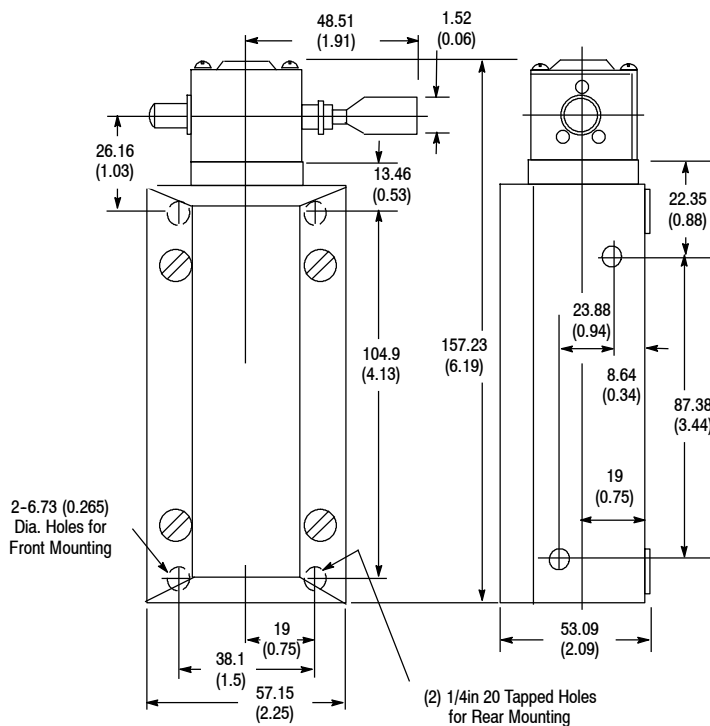


Side Push Rod

Product Selection

Operator Type	Contact Operation		Force to Operate (Max)	Travel to Operate Contacts	Max Travel	Travel to Reset Contacts (Max)	Cat. No.	
	Normal	Operated					NEMA 4	NEMA 7 and 9
Side Push Rod			35.49 N (8 lbs)	4.81 mm (0.192 in.) Nominal	5.96 mm (0.235 in.)	5.30 mm (0.209 in.) Nominal	—	802X-CM7

Approximate Dimensions [mm (in.)]

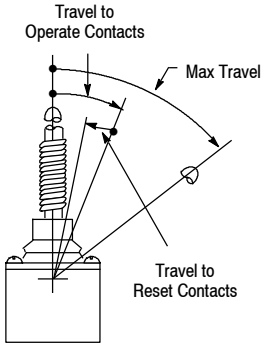


Note: For operating head and lever assembly dimensions not shown, see page 5-130. Conduit pipe opening 1/2 in. NPT.

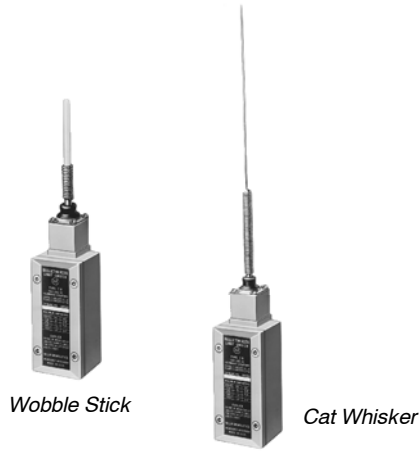
Limit Switches

802X Push Type • Wobble Stick and Cat Whisker • Spring Return Watertight or Hazardous Location Switches

Range of Operation ①



Travels are measured at rigid section of stick or whisker.

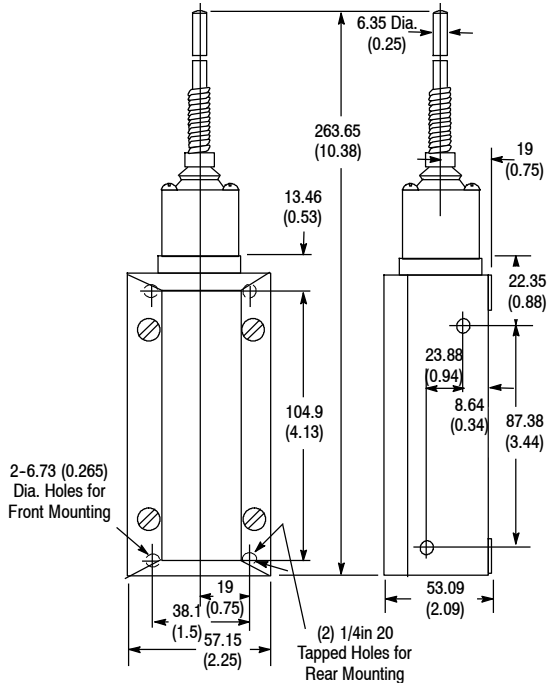


Product Selection

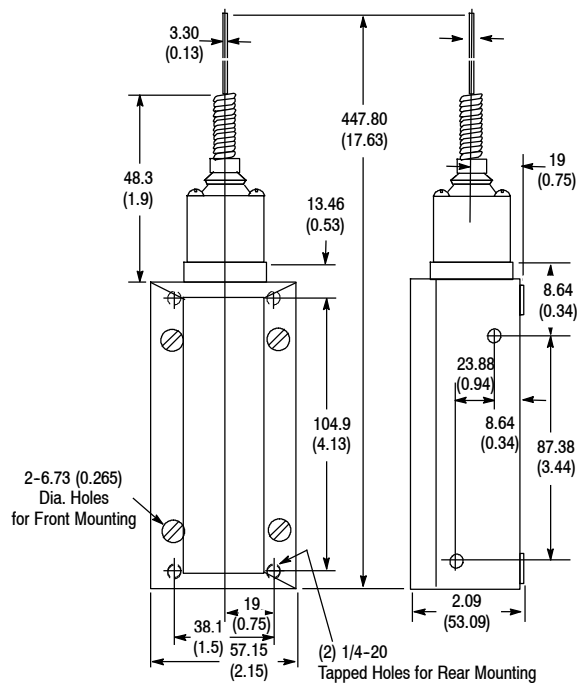
Operator Type	Contact Operation		Torque to Operate (Max)	Travel to Operate Contacts (Max)	Max Travel ①	Travel to Reset Contacts (Max)	Cat. No.	
	Normal	Operated					NEMA 4	NEMA 7 & 9
Nylon Wobble Stick	1 ○ ○ 2	1 ○ ○ 2	0.51N.m (4.5lb in.)	9°	10°	4°	802X-WS4	802X-WS7
Wire Cat Whisker	3 ○ ○ 4	3 ○ ○ 4					802X-WS14	802X-WS17

① These switches should be mounted in such a way that the wobble stick will not be deflected beyond the "Maximum Travel" position, as this could cause undesirable repetition of contact action on rebound.

Approximate Dimensions [mm (in.)]



802X-WS4 and 802X-WS7



Bulletin 802X Wire Wobble Stick Type

Note: For operating head and lever assembly dimensions not shown, see page 5-130. Conduit pipe opening 1/2 in. NPT.



Specifications

Enclosure Rating	NEMA 7 and 9
Certifications	UL Listed and CSA Certified
Ambient Temperature [C (F)] Ⓢ	-29...+121° (-20...+250°) except devices with wobble stick operators. Wobble stick models are rated from -18...+54° (0...+130°)

AC Contact Rating (Maximum per Pole, 50 or 60Hz, Same Polarity)

NEMA Rating Designation	Max Voltage	A		Continuous Carrying Current	VA	
		Make	Break		Make	Break
B600	120	30	3.00	5A	3600	360
	240	15	1.50	5A	3600	360
	480	7.5	0.75	5A	3600	360
	600	6	0.60	5A	3600	360

DC Contact Rating (Maximum per Pole)

NEMA Rating Designation	Voltage Range	Current Rating
P300	115-125	1.1 A
	230-250	0.55 A

Note: Temperature range below 0°C (+32°F) is based on the absence of freezing moisture or water.

Description

Bulletin 802XR NEMA Type 7 and 9 limit switches for hazardous locations are designed to operate in atmospheres and locations defined as Class I, Groups B, C or D or Class II, Groups E, F or G in the National Electrical Code. Typical applications for this switch include refineries, distilleries, grain elevators and flour mills. For Class I, Division 2 locations, a Bulletin 802R limit switch may also be used (see page 5-34).

As an added protection, the contact is hermetically sealed in a glass envelope for excellent contact reliability even in contaminated atmospheres. This switch is Programmable Controller compatible (24V and above) and is pilot duty rated NEMA B600 for AC and NEMA P300 for DC as shown in the specification.

Features

- Class I, Groups B, C, and D or Class II, Groups E, F and G
- Side rotary, wobble stick, adjustable top and top or side push styles with and without rollers

Sealed Contact

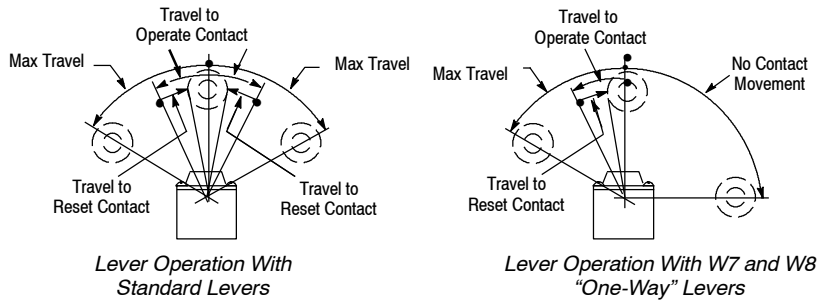
- Lever Type • Spring Return page 5-82
- Lever Type • page 5-83
- Maintained Contact
- Push Type • Spring Return . page 5-84
- Cat Whisker •
- Spring Return page 5-86

Limit Switches

802XR Lever Type • Spring Return

Sealed Contact Hazardous Location Switches

Range of Operation



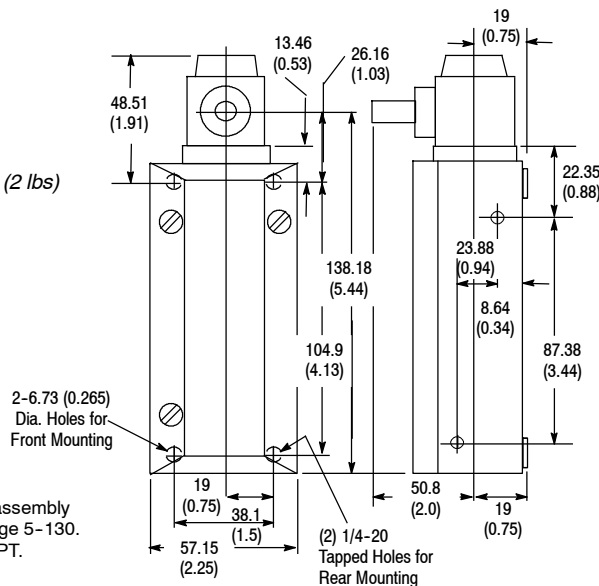
Switch Without Lever

Product Selection

Lever Movement	Torque to Operate (Max)	Travel to Operate Contact (Max)	Max Travel	Travel to Reset Contact (Max)	Contact Type	Cat. No.
Clockwise or Counterclockwise	0.34 N•m (3 lb•in)	16°	42°	9°	N.O.	802XR-AF7
					N.C.	802XR-AC7
	0.51 N•m (4.5 lb•in)	7°	53°	3.5°	N.O.	802XR-HF7
					N.C.	802XR-HC7
Clockwise	0.167 N•m (1.5 lb•in)	17°	42°	10°	N.O.	802XR-A3F7
					N.C.	802XR-A3C7
	0.51 N•m (4.5 lb•in)	7°	50°	3.5°	N.O.	802XR-H1F7
					N.C.	802XR-H1C7
Counterclockwise	0.167 N•m (1.5 lb•in)	17°	42°	10°	N.O.	802XR-A4F7
					N.C.	802XR-A4C7
	0.51 N•m (4.5 lb•in)	7°	50°	3.5°	N.O.	802XR-H2F7
					N.C.	802XR-H2C7
Clockwise Lever cannot move counterclockwise	0.45 N•m (4 lb•in)	20°	91°	11°	N.O.	802XR-L1F7
N.C.					802XR-L1C7	
Counterclockwise Lever cannot move clockwise	0.45 N•m (4 lb•in)	20°	91°	11°	N.O.	802XR-L2F7
N.C.					802XR-L2C7	

Approximate Dimensions [mm (in.)]

Approximate Shipping Wt. 0.9 kg (2 lbs)



Mounting Hole Dimensions

2—0.265 Dia. through hole with 0.500 Dia. C'Bore 0.25 in. deep for front mounting.

2—1/4-20 Tapped holes 0.56 in. deep for rear mounting.

2—1/4-20 Tapped holes 0.5 in. deep for side mounting.

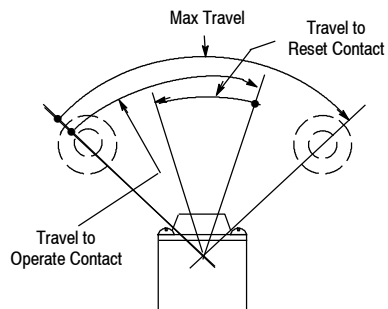
Note: For operating head and lever assembly dimensions not shown, see page 5-130. Conduit pipe opening 1/2 in. NPT.

Levers—See page 5-130 for a complete listing of operating levers.

802XR Lever Type • Maintained Contact

Sealed Contact Hazardous Location Switches

Range of Operation



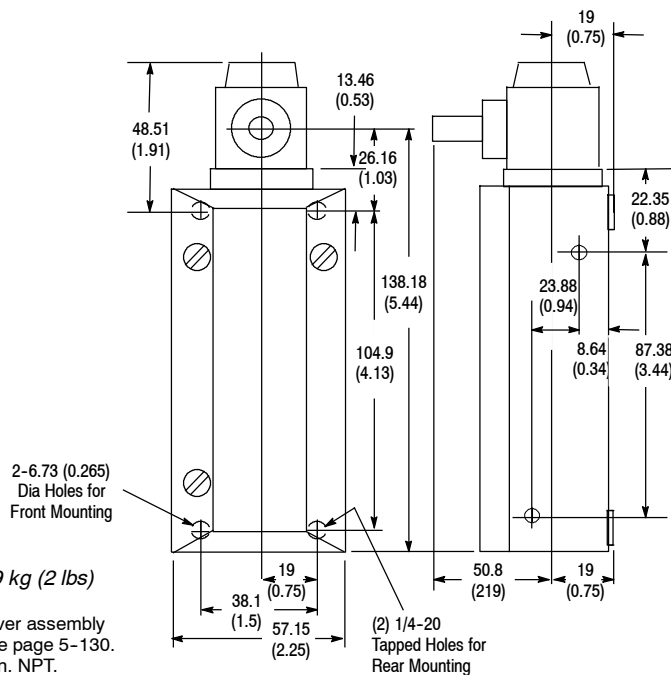
Switch Without Lever

Product Selection

Lever Movement	Torque to Operate (Max)	Travel to Operate Contact (Max)	Max Travel	Travel to Reset Contact (Max)	Contact Type	Cat. No.
Counterclockwise	0.25 N•m (2.25 lb•in)	70° ①	84° ①	35°	N.O.	802XR-AMF7
					N.C.	802XR-AMC7

① From one maintained position to the other.

Approximate Dimensions [mm (in.)]



2-6.73 (0.265) Dia Holes for Front Mounting

Approximate Shipping Wt. 0.9 kg (2 lbs)

Note: For operating head and lever assembly dimensions not shown, see page 5-130. Conduit pipe opening 1/2 in. NPT.

(2) 1/4-20 Tapped Holes for Rear Mounting

Mounting Hole Dimensions

2—0.265 Dia. through hole with 0.500 Dia. C'Bore 0.25 in. deep for front mounting.

2—1/4-20 Tapped holes 0.56 in. deep for rear mounting.

2—1/4-20 Tapped holes 0.5 in. deep for side mounting.

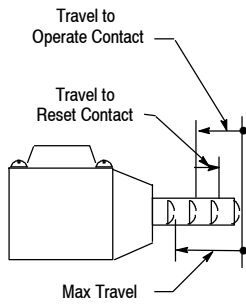
Levers—See page 5-130 for a complete listing of operating levers.

Limit Switches

802XR Push Type • Spring Return

Sealed Contact Hazardous Location Switches

Range of Operation



Top Push Rod



Adjustable Top Push Rod



Side Push Rod



Top Push Roller

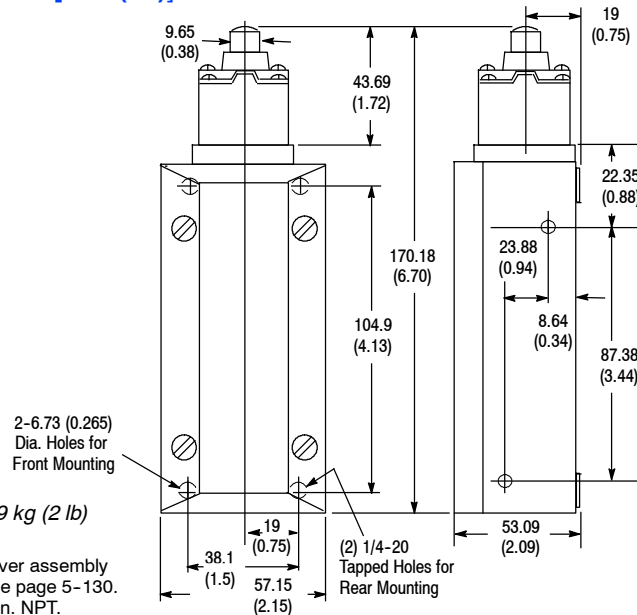


Side Push Roller

Product Selection

Operator Type	Force to Operate (Max)	Travel to Operate Contact (Max)	Max Travel	Travel to Reset Contact (Max)	Contact Type	Cat. No.
Top Push Rod	13.4 N (3 lb)	1.75 mm (0.069 in.)	5.1 mm (0.202 in.)	0.71 mm (0.028 in.)	N.O.	802XR-BF7
					N.C.	802XR-BC7
Adjustable Top Push Rod	15.6 N (3.5 lb)	1.75 mm (0.069 in.)	5.1 mm (0.202 in.)	0.71 mm (0.028 in.)	N.O.	802XR-BAF7
					N.C.	802XR-BAC7
Side Push Rod	20.0 N (4.5 lb)	3.2 mm (0.125 in.)	5.5 mm (0.218 in.)	1.5 mm (0.057 in.)	N.O.	802XR-CF7
					N.C.	802XR-CC7
Top Push Roller	15.6 N (3.5 lb)	1.75 mm (0.069 in.)	5.1 mm (0.202 in.)	0.71 mm (0.028 in.)	N.O.	802XR-DF7
					N.C.	802XR-DC7
Side Push Vertical Roller	20.0 N (4.5 lb)	3.2 mm (0.125 in.)	5.5 mm (0.0218 in.)	1.5 mm (0.057 in.)	N.O.	802XR-KF7
					N.C.	802XR-KC7
Side Push Horizontal Roller	20.0 N (4.5 lb)	3.2 mm (0.125 in.)	5.5 mm (0.0218 in.)	1.5 mm (0.057 in.)	N.O.	802XR-K1F7
					N.C.	802XR-K1C7

Approximate Dimensions [mm (in.)]



Mounting Hole Dimensions

2—0.265 Dia. through hole with 0.500 Dia. C-Bore 0.25 in. deep for front mounting.

2—1/4-20 Tapped holes 0.56 in. deep for rear mounting.

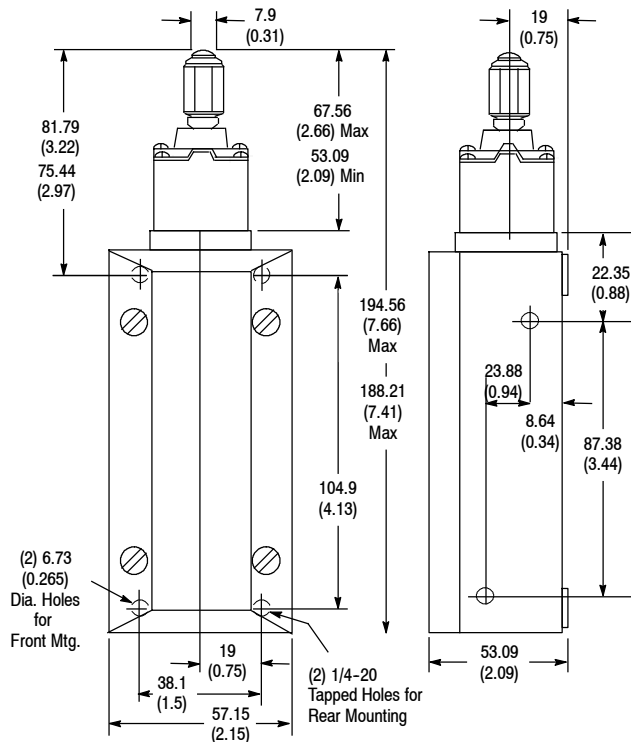
2—1/4-20 Tapped holes 0.5 in. deep for side mounting.

Approximate Shipping Wt. 0.9 kg (2 lb)

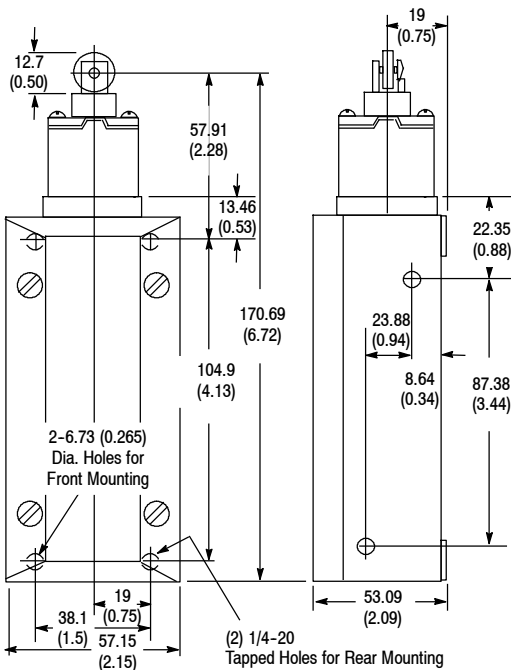
Note: For operating head and lever assembly dimensions not shown, see page 5-130. Conduit pipe opening 1/2 in. NPT.

802XR Push Type • Spring Return
Sealed Contact Hazardous Location Switches

Approximate Dimensions [mm (in.)]



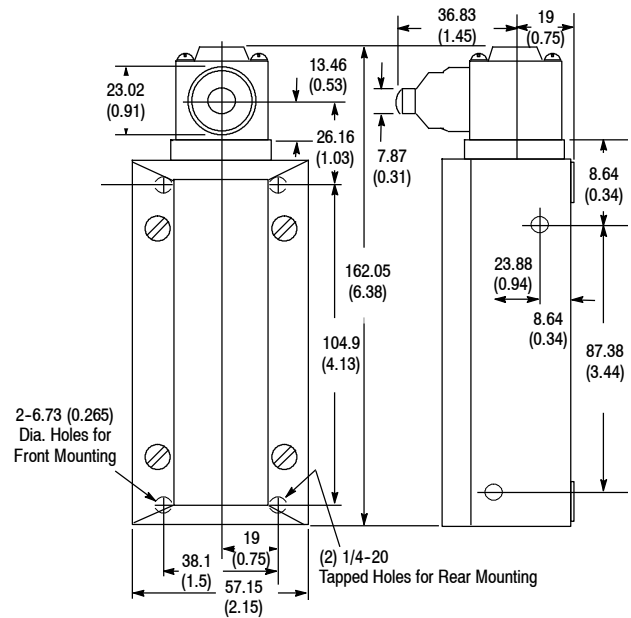
Bulletin 802XR Adjustable Top Push Rod Type



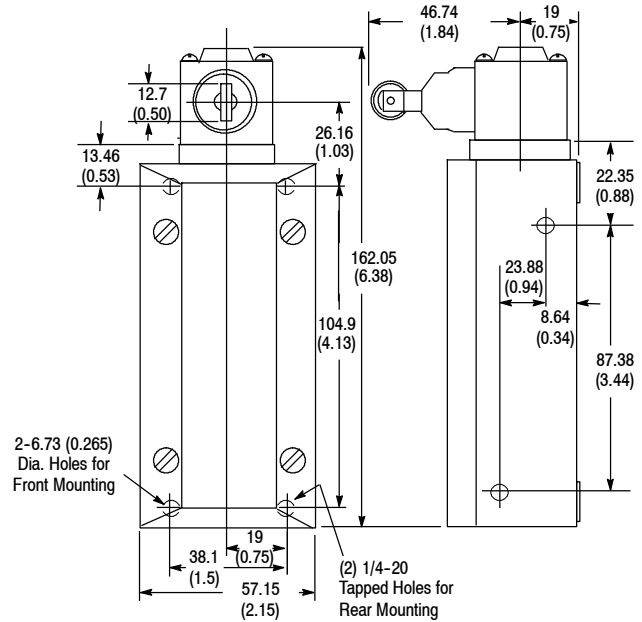
Bulletin 802XR Top Push Roller Type

Approximate Shipping Wt. 0.9 kg (2 lb)

Note: For operating head and lever assembly dimensions not shown, see page 5-130.
 Conduit pipe opening 1/2 in. NPT.



Bulletin 802XR Side Push Rod Type



Bulletin 802XR Side Push Roller Type

Mounting Hole Dimensions

2—0.265 Dia. through hole with 0.500 Dia. C'Bore 0.25 in. deep for front mounting.

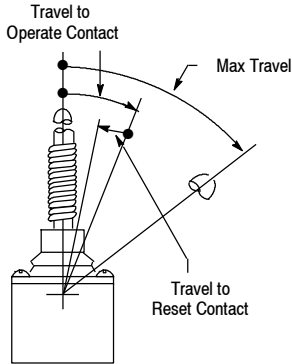
2—1/4-20 Tapped holes 0.56 in. deep for rear mounting.

2—1/4-20 Tapped holes 0.5 in. deep for side mounting.

Limit Switches

802XR Cat Whisker • Spring Return
Sealed Contact Hazardous Location Switches

Range of Operation ①



Travels Are Measured at Rigid Section of Operator

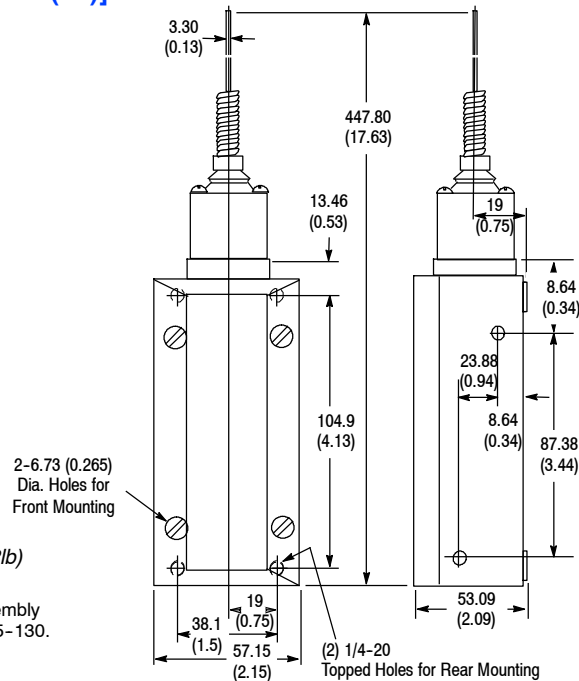


Product Selection

Operator Type	Torque to Operate (Max)	Travel to Operate Contact (Max)	Max Travel ①	Travel to Reset Contact (Max)	Contact Type	Cat. No.
Wire Cat Whisker	0.51 N•m (4.5 lb•ft)	11°	11°	5°	N.O.	802XR-WS1F7
					N.C.	802XR-WS1C7

① These switches should be mounted in such a way that the operator will not be deflected beyond the "Maximum Travel" position, as this could cause undesirable repetition of contact action on rebound.

Approximate Dimensions [mm (in.)]



Approximate Shipping Wt. 0.9 kg (2lb)

Note: For operating head and lever assembly dimensions not shown, see page 5-130. Conduit pipe opening 1/2 in. NPT.

Mounting Hole Dimensions

2—0.265 Dia. through hole with 0.500 Dia. C'Bore 0.25 in. deep for front mounting.

2—1/4-20 Tapped holes 0.56 in. deep for rear mounting.

2—1/4-20 Tapped holes 0.5 in. deep for side mounting.

802B Compact, Precision and Small Precision



Compact



Precision



Small Precision

Description

Bulletin 802B consists of different body styles: compact, precision and small precision. Each style has been designed to withstand the rugged environments that industrial applications demand. Each style utilizes industry standard mounting dimensions and operating characteristics. The 802B family of limit switches can be mounted in areas that traditional NEMA limit switches can not, due to their size and mounting options.

The 802B compact limit switch uses a die-cast housing with a 3m prewired cable. This limit switch is available with 13 unique head configurations. Each head style can be ordered as a standard model, LED indicator model, or as a low current model. The compact limit switch maintains NEMA 6 and IP67 enclosure ratings by utilizing a triple seal construction.

The 802B precision limit switch uses a die-cast housing with 1/2 NPT conduit entry. This limit switch is available with 5 unique head configurations. Each different head is available as standard or with a rubber boot for additional sealing. Two different mounting styles are available. Side mount or flange rubber boot for additional sealing. Two different mounting styles are available: side mount or flange mount.

The 802B small precision limit switch is similar to the 802B Precision limit switch with some additional features. This switch offers an enclosure rating of

NEMA 6 and IP67 which is achieved by a rubber cable gland sealing the control cable entry. This limit switch offers 12 different head configurations, including some that are unique to this product offering.

Specifications

	Compact	Precision	Small Precision
Certifications	UL Listed, CSA Certified and CE Marked for all applicable directives	UL Listed, CSA Certified and CE Marked for all applicable directives	UL Recognized, CSA Certified and CE Marked for all applicable directives
Enclosure Rating	NEMA 1,3,4,6,12,13 and IP67	NonBooted: NEMA 1 and IP60 Booted: NEMA 1,3,4, and IP65	NEMA 1, 3, 4, 6, 13 and IP67
Mechanical Life	Approx. 10,000,000 operations ①	Approx. 10,000,000 operations ①	Approx. 10,000,000 operations ②
Electrical Life	Approx. 200,000 operations (3 A 250 V AC, resistive load) ①	Approx. 500,000 operations (15 A 250 V AC, resistive load) ①	Approx. 500,000 operations (10 A 250 V AC, resistive load) ②
Operating Speed			
Top Push	0.1 mm...0.5 m per second	0.01 mm...0.5 m per second	0.05 mm...0.5 m per second
Side Rotary	1 mm...1 m per second	—	—
Lever Type	—	0.02 mm...0.5 m per second	—
Operating Frequency			
Mechanical	120 operations/minute	120 operations/minute	120 operations/minute
Electrical	30 operations/minute	20 operations/minute	20 operations/minute
Operating Temperature [C (F)]	-10...70° (14...158°) with no icing	-10...80° (14...176°) with no icing	-10...80° (14...176°) with no icing
Short Circuit Protection	Quick blow fuse suitable for rated current is recommended	Quick blow fuse suitable for rated current is recommended	Quick blow fuse suitable for rated current is recommended
Contact Type	SPDT Form C	SPDT Form C	SPDT Form C

① Life expectancy has been calculated at an operating temperature of 5...35°C (41...95°F) and an operating humidity of 40...70%.

② Life expectancy has been calculated at an operating temperature of 20°C (68°F) and an operating humidity of 65%.

Features

- Rugged die-cast housing
- Industry standard dimensions
- Compact size
- Multiple mounting options
- Wide range of operating voltage and current ratings

Style

- Compact page 5-88
- Precision page 5-97
- Small Precision page 5-105

802B Compact, Precision and Small Precision

Specifications Compact

Rated Voltage	Non-Inductive Resistive Load	Inductive Load			Inrush Current			
		Inductive	Motor Load		N/O	N/C		
			N/O	N/C				
Standard Models								
125V AC	5 A	3 A	1.3 A	2.5 A	10 A max	20 A max		
250V AC	5 A	2 A	0.8 A	1.5 A				
8V DC	5 A	5 A	3 A	3 A				
14V DC	5 A	4 A	3 A	3 A				
30V DC	4 A	3 A	3 A	3 A				
125V DC	0.4 A	0.4 A	0.05 A	0.05 A				
250V DC	0.2 A	0.2 A	0.03 A	0.03 A				
AC LED Models								
125V AC	5 A	3 A	1.3 A	2.5 A				
125V DC	0.4 A	0.4 A	0.05 A	0.05 A				
DC LED Models								
30V DC	4 A	3 A	3 A	3 A				
Low Current Models								
125V AC	0.1 A	—						
8V DC	0.1 A							
14V DC	0.1 A							
30V DC	0.1 A							

UL/CSA Approved Ratings

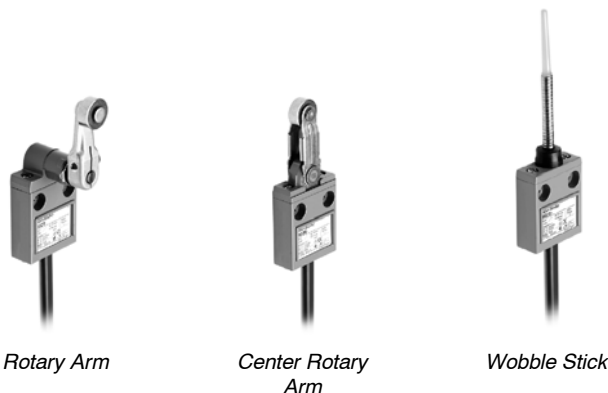
NEMA Rating Designation	Rated Voltage	A		Continuous Current	Volt	Amps
		Make	Break			
B300	120V AC	30	3	5	3,600	360
	240V AC	15	1.5			
AC LED Versions						
B150	120V AC	30	3	5	3,600	360
Leakage Current for LED Models						
	Voltage	Leakage Current		Resistance		
AC LED	125	1.7 mA		68 kΩ		
DC LED	30			15 kΩ		

Precision

Rated Voltage	Non-Inductive Resistive Load	Inductive Load			Inrush Current		UL/CSA Approved Ratings		
		Inductive	Motor Load		N/O	N/C	Rated Voltage	Current	Horsepower
N/O	N/C								
125V AC	15 A	15 A	2.5 A	5 A	15 A max	30 A max	120V AC	15 A	1/8 HP 1/4 HP
250V AC	15 A	2.5 A	1.5 A	3 A					
480V AC	10A	1.5 A	0.75 A	1.5 A					
125V DC	0.5 A	0.5 A	0.05 A				125V DC	0.5 A	
250V DC	0.25 A	0.25 A	0.03 A				250V DC	0.25 A	

Small Precision

Rated Voltage	Non-Inductive Resistive Load	Inductive Load				Inrush Current		NEMA Rating Designation	UL/CSA Approved Ratings					
		Inductive	Motor Load		N/O	N/C	Rated Voltage		A		Continuous Current	Volt	Amps	
			N/O	N/C					Make	Break				
125V AC	10A	10 A	2.5 A	5 A	15 A max	30 A max	A300	120V AC	60	6	10	7,200	720	
250V AC	10A	10 A	1.5 A	3 A				240V AC	30	3				
8V DC	10A	6 A	2.5 A	5 A										
14V DC	10A	6 A	2.5 A	5 A										
30V DC	6A	5 A	2.5 A	5 A										
125V DC	0.5 A	0.05 A	0.05 A											
250V DC	0.25 A	0.03 A	0.03 A											



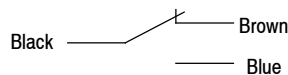
Product Selection

Head Type	Torque to Operate	Travel to Operate	Reference Value		Output Type	Cat. No.	
			Max Travel	Travel to Reset		Pre-leaded	Quick-Disconnect ¹
Rotary Arm	0.216 N•m (2 lb•in.)	25°	70°	3°	Standard	802B-CSAAXSXC3	802B-CSAAXSXD4
					AC LED		802B-CSAAXSLC3
					DC LED	802B-CSDAXSLC3	802B-CSDAXSLD4
					Low Voltage/Current	802B-CSDAXSXC3	—
Center Rotary Arm	0.216 N•m (2 lb•in.)	10 ±3°	65°	4°	Standard	802B-CSAA2XSXC3	—
					AC LED	802B-CSAA2XSLC3	—
					DC LED	802B-CSDA2XSLC3	—
					Low Voltage/Current	802B-CSDA2XSXC3	—
Wobble Stick	0.118 N•m (1.04 lb•in.)	15°	18° (Nominal Value)	11° (Nominal Value)	Standard	802B-CSACXSXC3	802B-CSACXSXD4
					AC LED		802B-CSACXSLC3
					DC LED	802B-CSDCXSLC3	—
					Low Voltage/Current	802B-CSDCXSXC3	—

Wiring

Pre-leaded Models

COM	NO	NC	Ground
Black	Blue	Brown	Green/Yellow



Quick-Disconnect Models

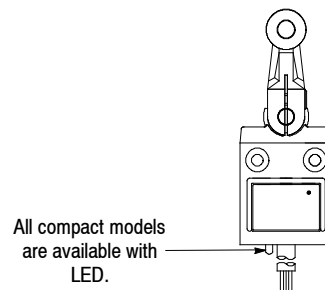
AC QD Pin-out:	DC QD Pin-out:
Pin 1 = Common	Pin 1 = N/O
Pin 2 = N/O	Pin 2 = Common
Pin 3 = N/C	Pin 3 = Grnd.
Pin 4 = Grnd.	Pin 4 = N/C

Male Receptacle

Male Receptacle

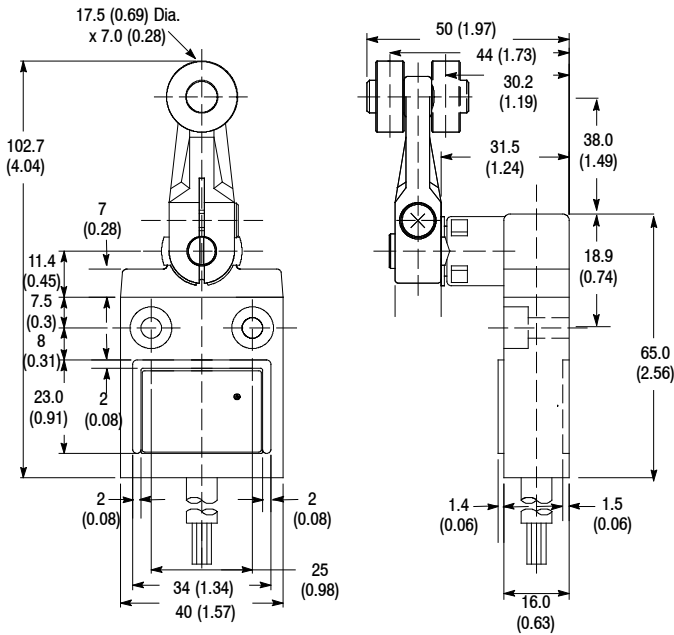
¹ For quick-disconnect versions the last two digits indicate connector type:
 802B-xxxxxxD4 Indicates a 4-pin DC micro style connector
 802B-xxxxxxR4 Indicates a 4-pin AC micro style connector
 QD is on a 6 inch pigtail.

An appropriate female connector with cable is available in Connection Systems.
 4-pin micro DC = (889D-F4AC-2) on page 8-16
 4-pin micro DC = (889R-F4AEA-2) on page 8-28

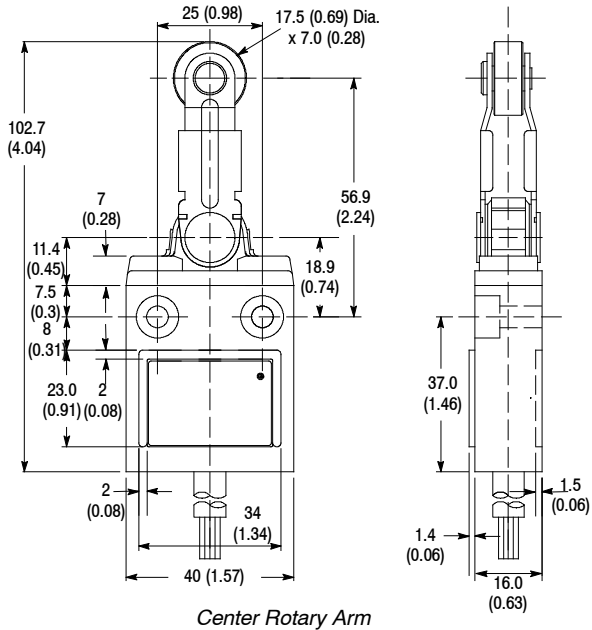


802B Compact
Small Metal Body

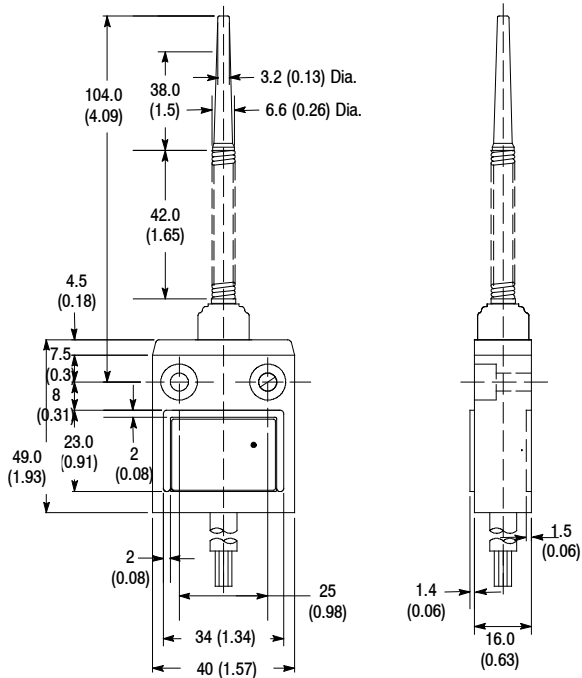
Approximate Dimensions [mm (in.)]



Rotary Arm



Center Rotary Arm



Wobble Stick

Counter Bore = 102. mm Dia
 Mounting Hole = 5.1 mm Dia
 Counter Bore Depth = 5.8 mm
 Mounting Hole Depth = 10.1 mm
 Cable Dia. = 8.5 mm



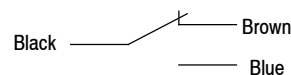
Product Selection

Head Type	Force to Operate	Travel to Operate	Max Travel	Travel to Reset	Output Type	Cat. No.		
						Pre-leaded	Quick-Disconnect ^①	
Top Push	11.77 N (2.65 lb)	1.8 mm (0.071 in.)	5 mm (0.197 in.)	0.2 mm (0.008 in.)	Standard	802B-CSABXSXC3	802B-CSABXSXD4	
					AC LED		802B-CSABXSXC3	802B-CSABXSXR4
					DC LED		802B-CSDBXSXC3	802B-CSDBXSRL4
					Low Voltage/Current		802B-CSDBXSXC3	802B-CSDBXSRL4
Top Push Bevel	11.77 N (2.65 lb)	1.8 mm (0.071 in.)	5 mm (0.197 in.)	0.2 mm (0.008 in.)	Standard	802B-CSAB1XSXC3	—	
					AC LED	802B-CSAB1XSXC3	—	
					DC LED	802B-CSDB1XSXC3	—	
					Low Voltage/Current	802B-CSDB1XSXC3	—	
Top Push Roller	11.77 N (2.65 lb)	1.8 mm (0.071 in.)	5 mm (0.197 in.)	0.2 mm (0.008 in.)	Standard	802B-CSADXXC3	802B-CSADXSD4	
					AC LED		802B-CSADXXC3	802B-CSADXSLR4
					DC LED		802B-CSDDXSXC3	802B-CSDDXSRL4
					Low Voltage/Current		802B-CSDDXSXC3	—
Top Push Cross Roller	11.77 N (2.65 lb)	1.8 mm (0.071 in.)	5 mm (0.197 in.)	0.2 mm (0.008 in.)	Standard	802B-CSAD1XSXC3	802B-CSAD1XSD4	
					AC LED		802B-CSAD1XSXC3	802B-CSAD1XSLR4
					DC LED		802B-CSDD1XSXC3	802B-CSDD1XSLD4
					Low Voltage/Current		802B-CSDD1XSXC3	—

Wiring

Pre-leaded Models

COM	NO	NC	Ground
Black	Blue	Brown	Green/Yellow



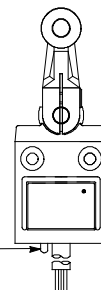
Quick-Disconnect Models

AC QD Pin-out:	DC QD Pin-out:
Pin 1 = Common	Pin 1 = N/O
Pin 2 = N/O	Pin 2 = Common
Pin 3 = N/C	Pin 3 = Grnd.
Pin 4 = Grnd.	Pin 4 = N/C

① For quick-disconnect versions the last two digits indicate connector type:
 802B-xxxxxxD4 Indicates a 4-pin DC micro style connector
 802B-xxxxxxR4 Indicates a 4-pin AC micro style connector
 QD ia on a 6 in. pigtail.

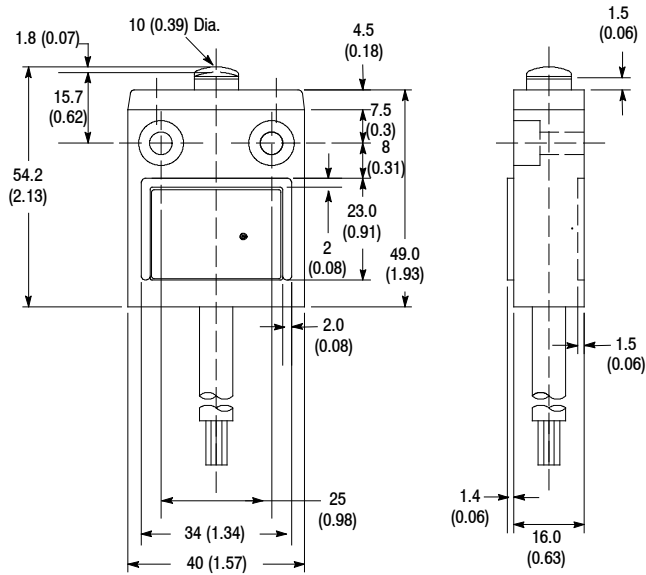
An appropriate female connector with cable is available in Connection Systems.
 4-pin micro DC = (889D-F4AC-2) on page 8-16
 4-pin micro DC = (889R-F4AEA-2) on page 8-28

All compact models are available with LED.

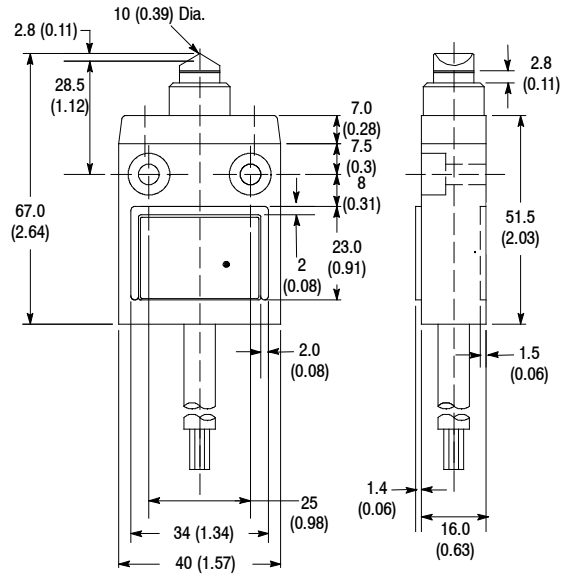


802B Compact
Small Metal Body

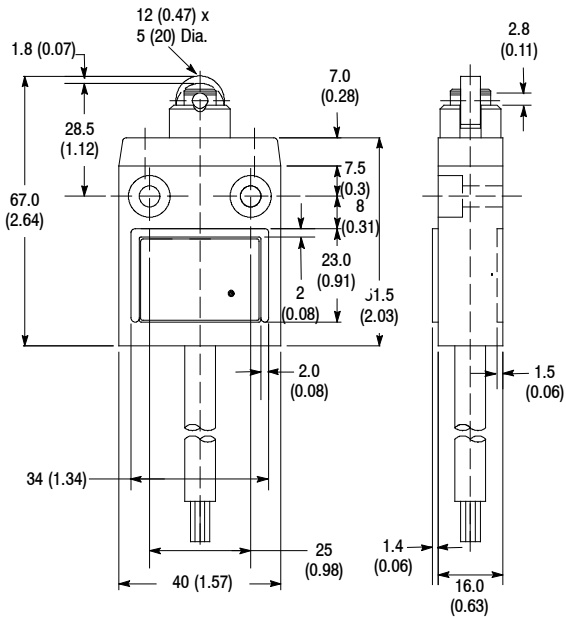
Approximate Dimensions [mm (in.)]



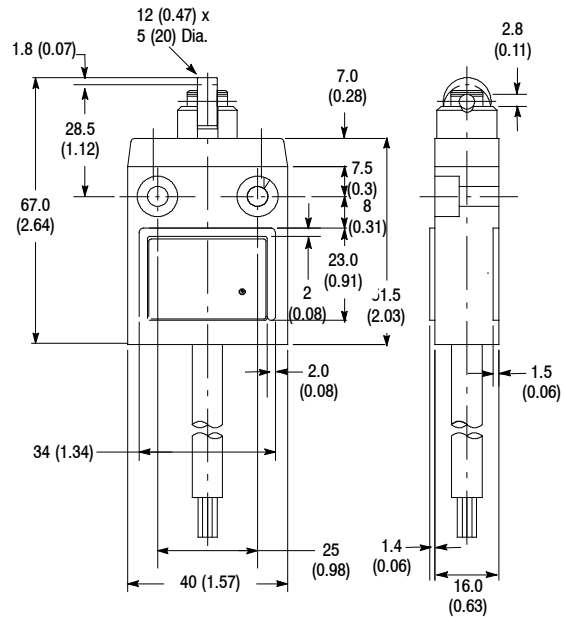
Top Push



Top Push Bevel



Top Push Roller



Top Push Cross Roller



Top Push
Panel Mount



Top Push Roller
Panel Mount



Top Push Cross
Roller Panel Mount

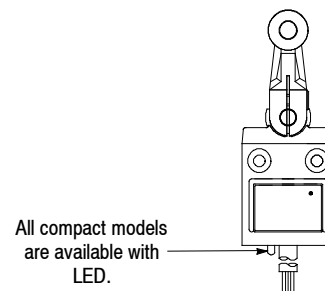
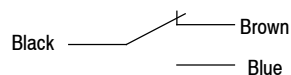
Product Selection

Head Type	Force to Operate	Travel to Operate	Max Travel	Travel to Reset	Output Type	Cat. No.
Top Push Panel Mount	11.77 N (2.65 lb)	1.8 mm (0.071 in.)	5 mm (0.197 in.)	0.2 mm (0.008 in.)	Standard	802B-CPABXSXC3
					AC LED	802B-CPABXSCLC3
					DC LED	802B-CPDBXSCLC3a.
					Low Voltage/Current	802B-CPDBXSXC3
Top Push Roller Panel Mount	11.77 N (2.65 lb)	1.8 mm (0.071 in.)	5 mm (0.197 in.)	0.2 mm (0.008 in.)	Standard	802B-CPADXXC3
					AC LED	802B-CPADXSLC3
					DC LED	802B-CPDDXSCLC3
					Low Voltage/Current	802B-CPDDXSXC3
Top Push Cross Roller Panel Mount	11.77 N (2.65 lb)	1.8 mm (0.071 in.)	5 mm (0.197 in.)	0.2 mm (0.008 in.)	Standard	802B-CPAD1XSXC3
					AC LED	802B-CPAD1XSLC3
					DC LED	802B-CPDD1XSLC3
					Low Voltage/Current	802B-CPDD1XSXC3

Wiring

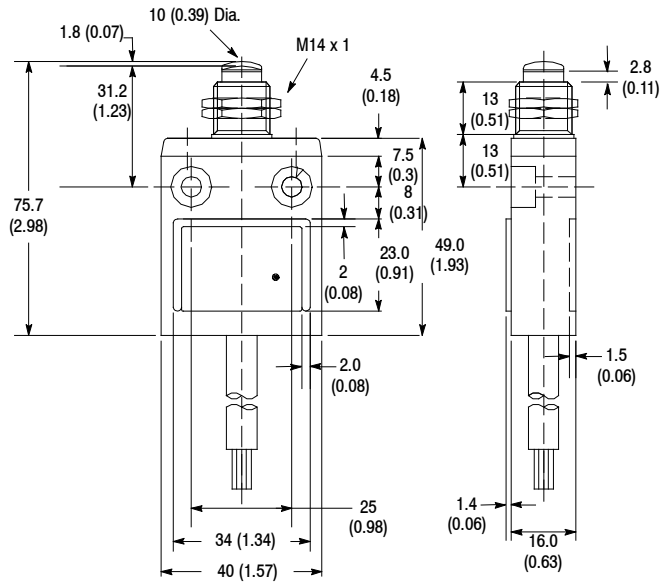
Preleaded Models

COM	NO	NC	Ground
Black	Blue	Brown	Green/Yellow

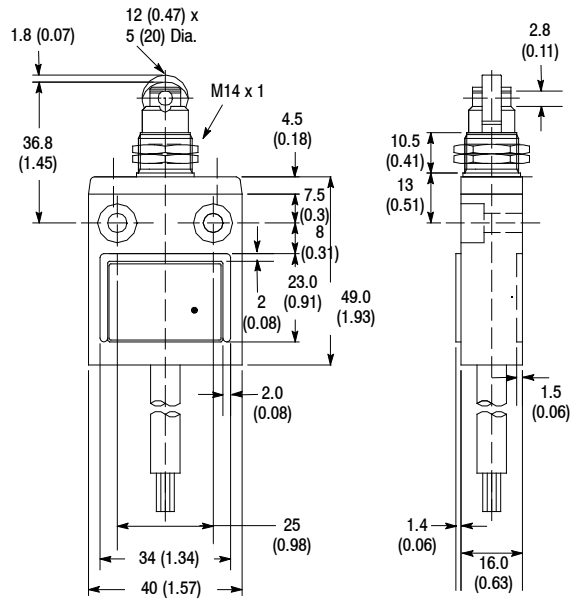


802B Compact
Small Metal Body

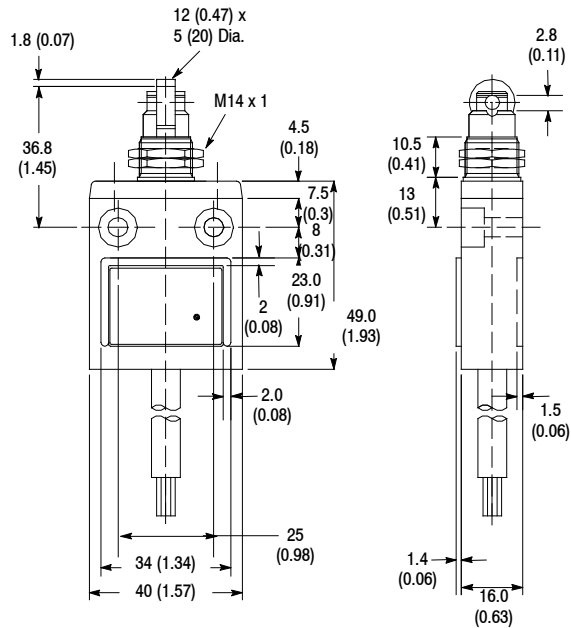
Approximate Dimensions [mm (in.)]



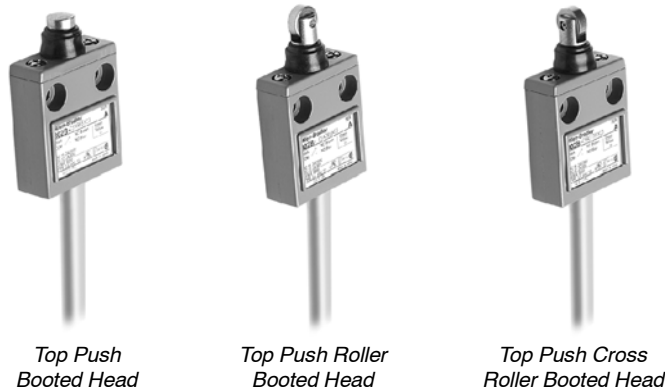
Top Push Panel Mount



Top Push Roller Panel Mount



Top Push Cross Roller Panel Mount



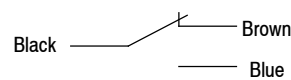
Product Selection

Head Type	Force to Operate	Travel to Operate	Max Travel	Travel to Reset	Output Type	Cat. No.	
						Pre-leaded	Quick-Disconnect ^①
Top Push Booted Head	17.65 N (3.97 lb)	1.8 mm (0.071 in.)	5 mm (0.197 in.)	0.2 mm (0.008 in.)	Standard	802B-CSABBSXC3	802B-CSABBSXD4
					AC LED		802B-CSABBSLR4
					DC LED		802B-CSDBBSLD4
					Low Voltage/Current		—
Top Push Roller Booted Head	17.65 N (3.97 lb)	1.8 mm (0.071 in.)	5 mm (0.197 in.)	0.2 mm (0.008 in.)	Standard	802B-CSADBSXC3	802B-CSADBSXD4
					AC LED		802B-CSADBSLR4
					DC LED		802B-CSDDBSLD4
					Low Voltage/Current		—
Top Push Cross Roller Booted Head	17.65 N (3.97 lb)	1.8 mm (0.071 in.)	5 mm (0.197 in.)	0.2 mm (0.008 in.)	Standard	802B-CSAD1BSXC3	802B-CSAD1BSXD4
					AC LED		802B-CSAD1BSLR4
					DC LED		802B-CSDD1BSLD4
					Low Voltage/Current		—

Wiring

Preleaded Models

COM	NO	NC	Ground
Black	Blue	Brown	Green/Yellow

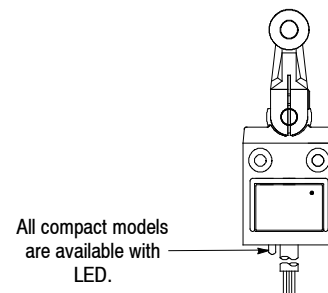


Quick-Disconnect Models

AC QD Pin-out:	DC QD Pin-out:
Pin 1 = Common	Pin 1 = N/O
Pin 2 = N/O	Pin 2 = Common
Pin 3 = N/C	Pin 3 = Grnd.
Pin 4 = Grnd.	Pin 4 = N/C



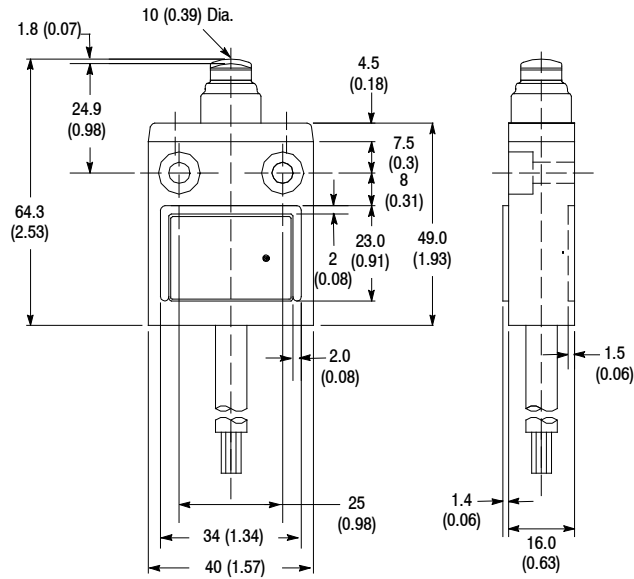
^① For quick-disconnect versions the last two digits indicate connector type:
 802B-xxxxxxD4 Indicates a 4-pin DC micro style connector
 802B-xxxxxxR4 Indicates a 4-pin AC micro style connector
 QD is on a 6 in. pigtail.



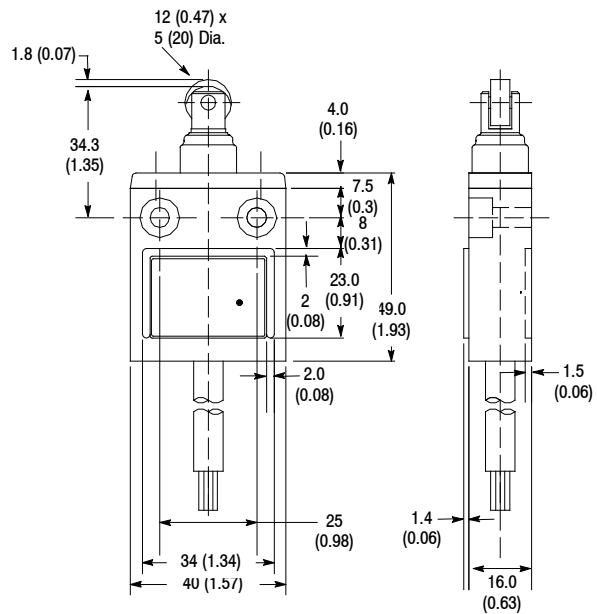
An appropriate female connector with cable is available in Connection Systems.
 4-pin micro DC = (889D-F4AC-2) on page 8-16
 4-pin micro DC = (889R-F4AEA-2) on page 8-28

802B Compact
Small Metal Body

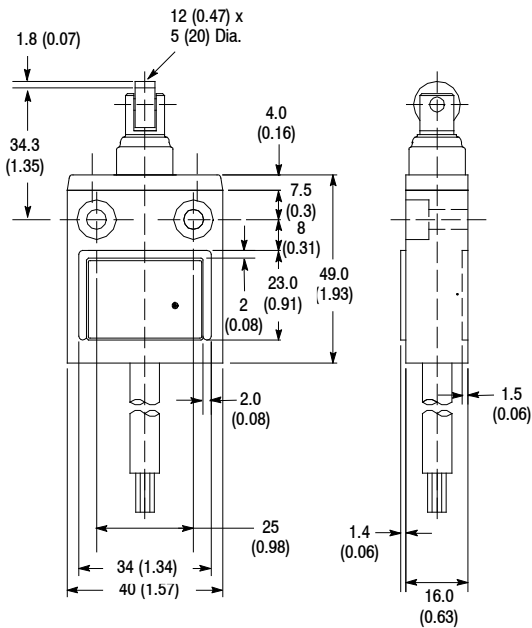
Approximate Dimensions [mm (in.)]



Top Push Sealed Head



Top Push Roller Sealed Head



Top Push Cross Roller Sealed Head



Top Push

Top Push Roller

*Top Push
Cross Roller*

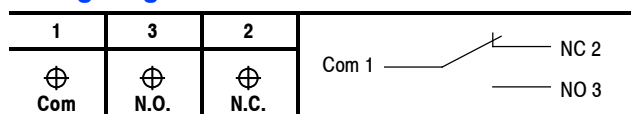
Roller Lever

*One-Way
Roller Lever*

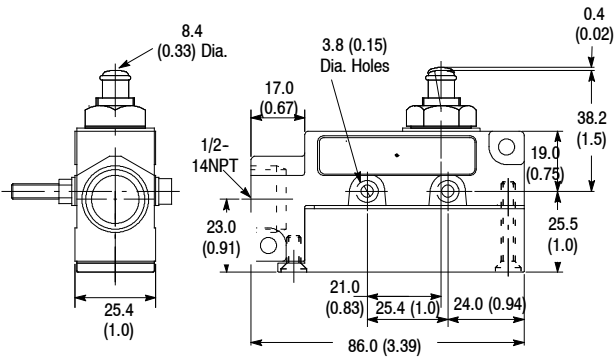
Product Selection

Head Type	Force to Operate	Travel to Operate	Max Travel	Travel to Reset	Mounting Style	Cat. No.
Top Push	2.45...3.43 N (0.55...0.77 lb)	0.4 mm (0.016 in.)	5.9 mm (0.232 in.)	0.05 mm (0.002 in.)	Side	802B-PSABXSX
Top Push Roller		0.5 mm (0.020 in.)	4.1 mm (0.161 in.)			802B-PSADXSX
Top Push Cross Roller						802B-PSAD1XSX
Roller Lever	5.59 N (1.28 lb)	4 mm (0.157 in.)	10 mm (0.394 in.)	0.4 mm (0.016 in.)		802B-PSARXSX
One-Way Roller Lever						802B-PSAR2XSX

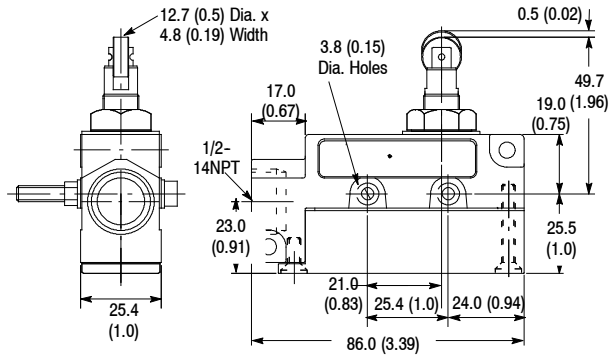
Wiring Diagrams



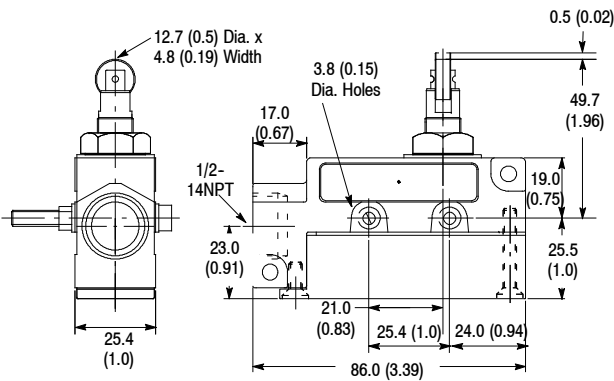
Approximate Dimensions [mm (in.)]



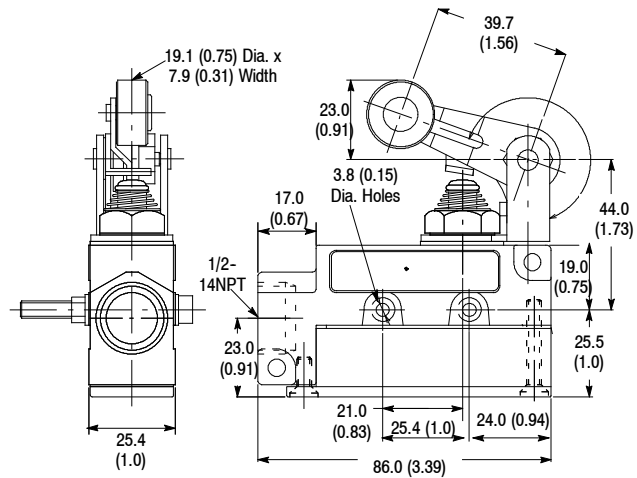
802B-PSABXSX



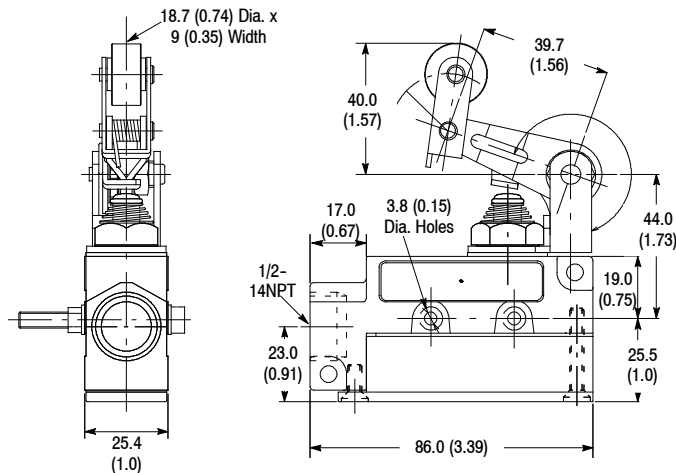
802B-PSADXSX



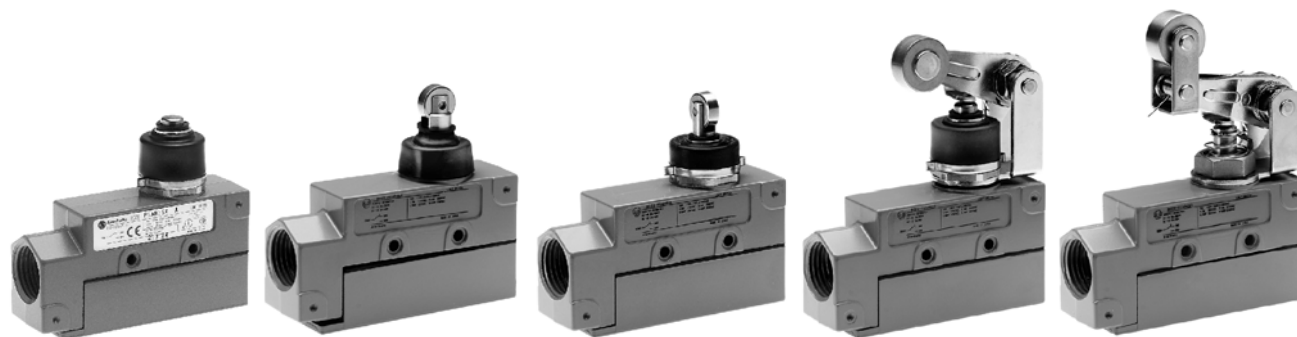
802B-PSD1XSX



802B-PSARXSX



802B-PSAR2XSX



Top Push Booted

*Top Push
Roller Booted*

*Top Push Cross
Roller Booted*

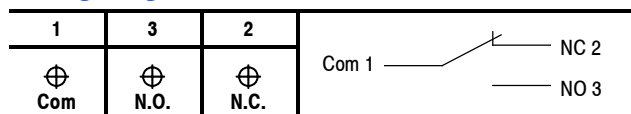
*Roller Lever
Booted*

*One-Way Roller
Lever Booted*

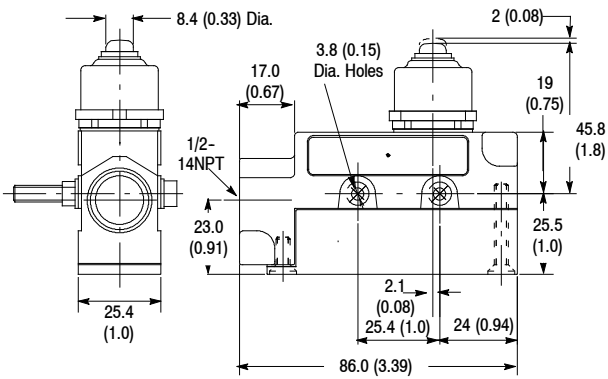
Product Selection

Head Type	Force to Operate	Travel to Operate	Max Travel	Travel to Reset	Mounting Style	Cat. No.
Top Push Booted	7.85 N (1.76 lb)	2 mm (0.079 in.)	7 mm (0.276 in.)	0.1 mm (0.004 in.)	Side	802B-PSABBSX
Top Push Roller Booted	4.9 N (1.09 lb)	1 mm (0.039 in.)	4.5 mm (0.177 in.)	0.12 mm (0.005 in.)		802B-PSADBSX
Top Push Cross Roller Booted						802B-PSAD1BSX
Roller Lever Booted	6.28 N (1.40 lb)	5 mm (0.197 in.)	11 mm (0.433 in.)	0.4 mm (0.016 in.)		802B-PSARBSX
One-Way Roller Lever Booted						802B-PSAR2BSX

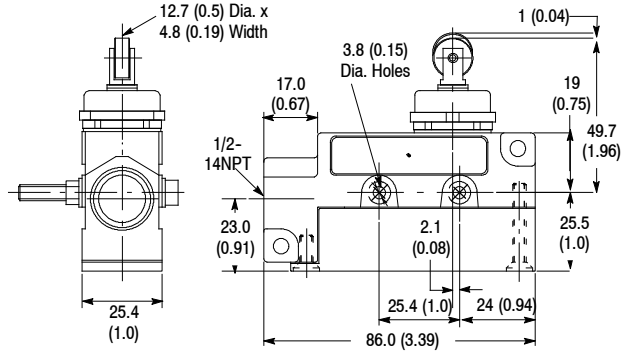
Wiring Diagrams



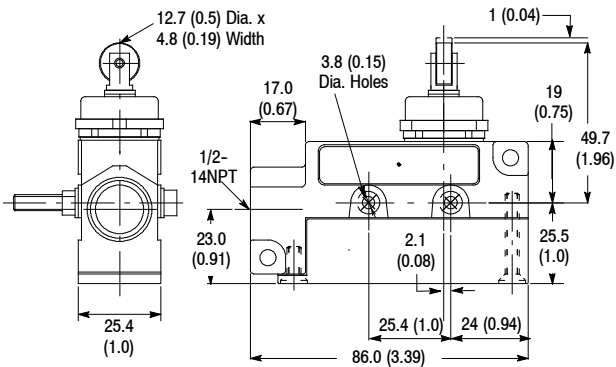
Approximate Dimensions [mm (in.)]



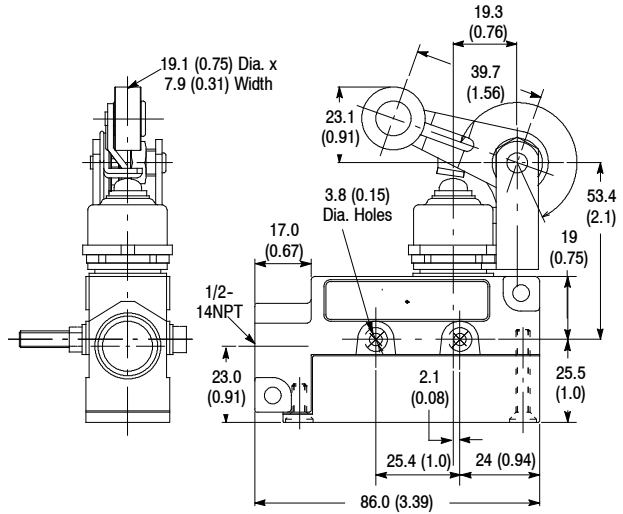
802B-PSABBSX



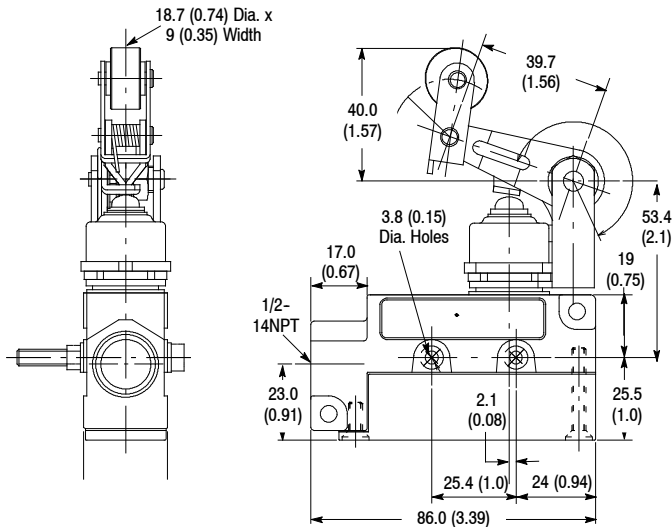
802B-PSADBSX



802B-PSAD1BSX



802B-PSARBSX



802B-PSAR2BSX



Top Push

Top Push Roller

Top Push
Cross Roller

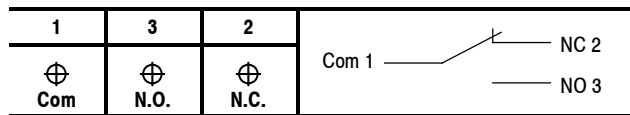
Roller Lever

One-Way
Roller Lever

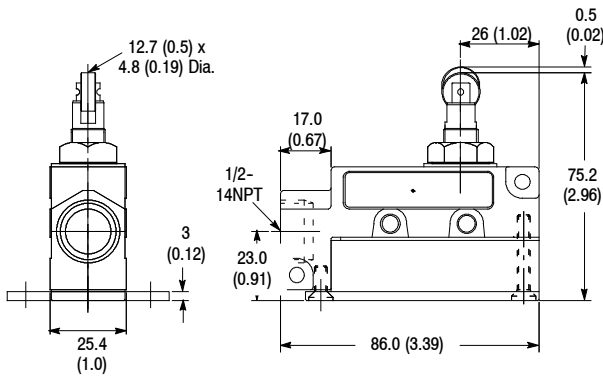
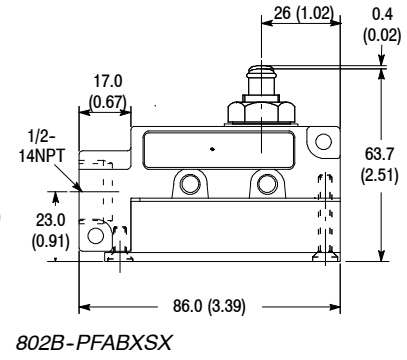
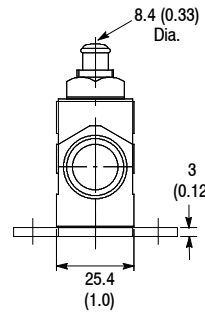
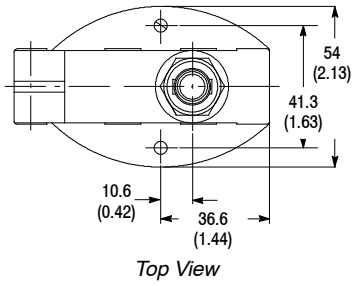
Product Selection

Head Type	Force to Operate	Travel to Operate	Max Travel	Travel to Reset	Mounting Style	Cat. No.
Top Push	2.45...3.43 N (0.55...0.77 lb)	0.4 mm (0.016 in.)	5.9 mm (0.232 in.)	0.05 mm (0.002 in.)	Flange	802B-PFABXSX
Top Push Roller		0.5 mm (0.020 in.)	4.1 mm (0.161 in.)			802B-PFADXSX
Top Push Cross Roller						802B-PFAD1XSX
Roller Lever	5.59 N (1.28 lb)	4 mm (0.157 in.)	10 mm (0.394 in.)	0.4 mm (0.016 in.)		802B-PFARXSX
One-Way Roller Lever						802B-PFAR2XSX

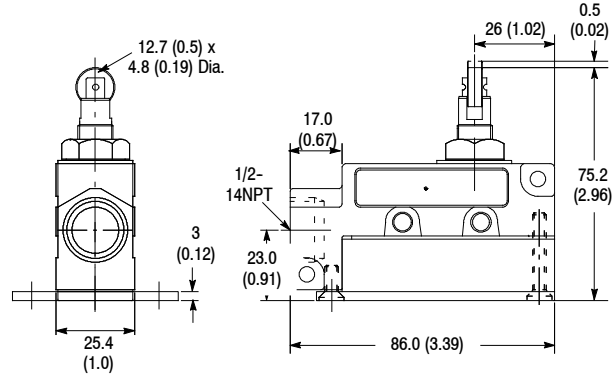
Wiring Diagrams



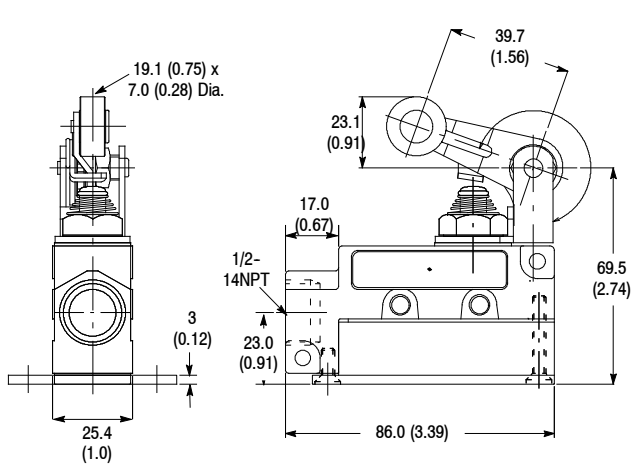
Approximate Dimensions [mm (in.)]



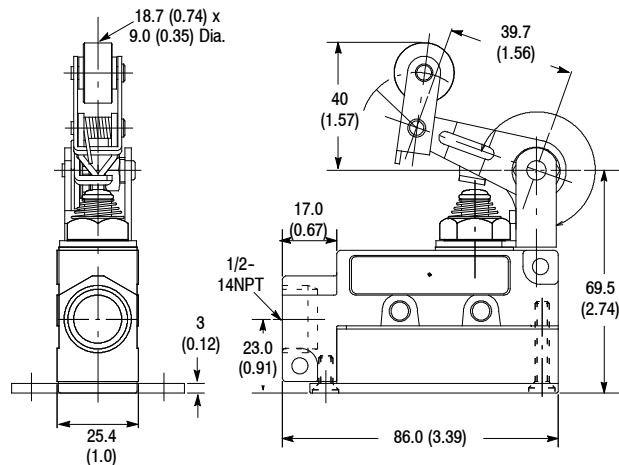
802B-PFADXSX



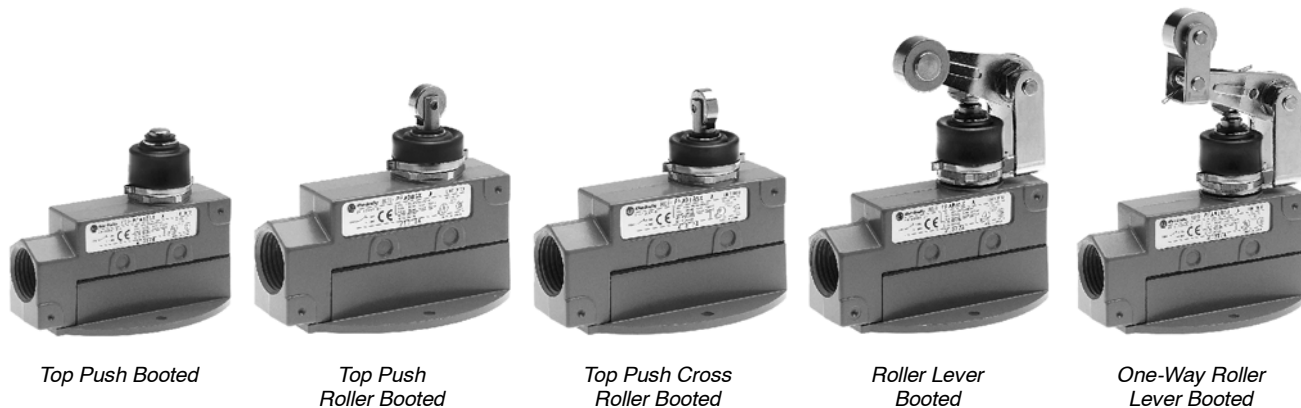
802B-PFAD1XSX



802B-PFARXSX



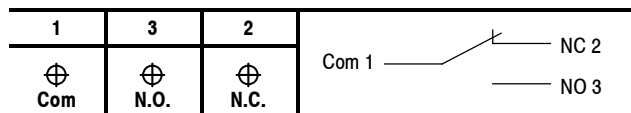
802B-PFAR2XSX



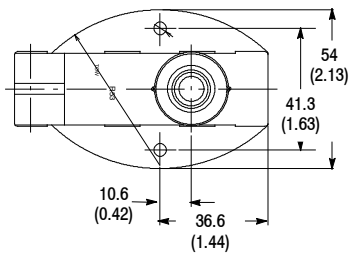
Product Selection

Head Type	Force to Operate	Travel to Operate	Max Travel	Travel to Reset	Mounting Style	Cat. No.
Top Push Booted	7.85 N (1.76 lb)	2 mm (0.079 in.)	7 mm (0.276 in.)	0.1 mm (0.004 in.)	Flange	802B-PFABBSX
Top Push Roller Booted	4.9 N (1.09 lb)	1 mm (0.039 in.)	4.5 mm (0.177 in.)	0.12 mm (0.005 in.)		802B-PFADBSX
Top Push Cross Roller Booted						802B-PFAD1BSX
Roller Lever Booted	6.28 N (1.40 lb)	5 mm (0.197 in.)	11 mm (0.433 in.)	0.4 mm (0.016 in.)		802B-PFARBSX
One-Way Roller Lever Booted						802B-PFAR2BSX

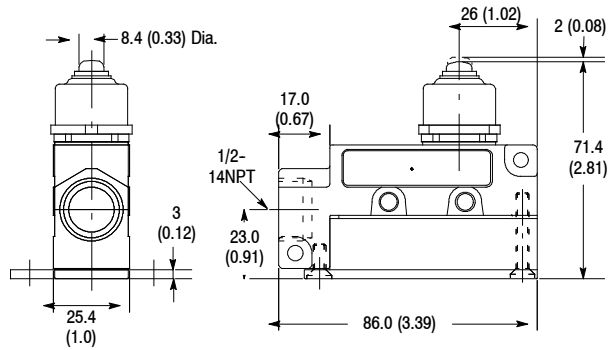
Wiring Diagrams



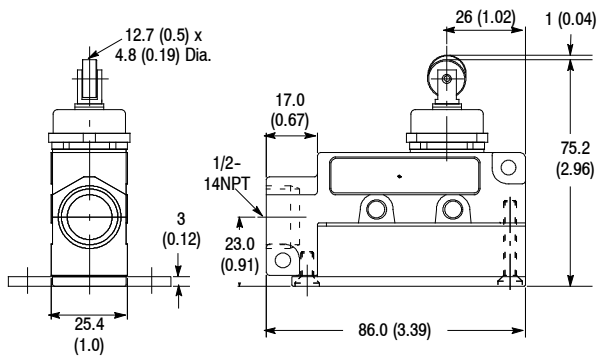
Approximate Dimensions [mm (in.)]



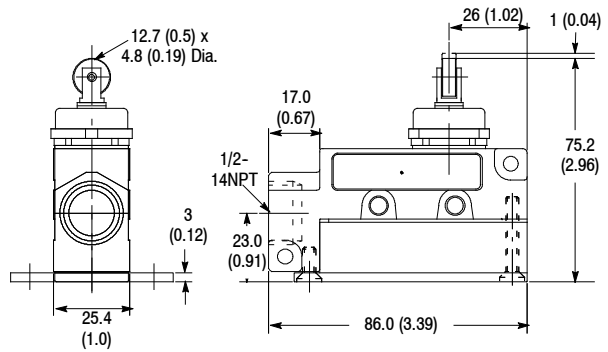
Top View



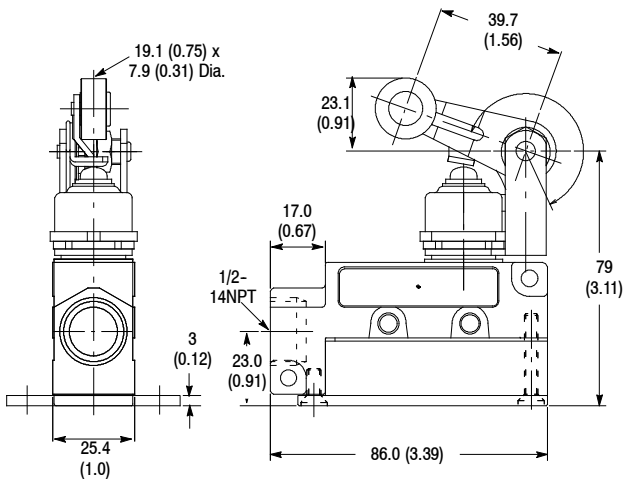
802B-PFABBSX



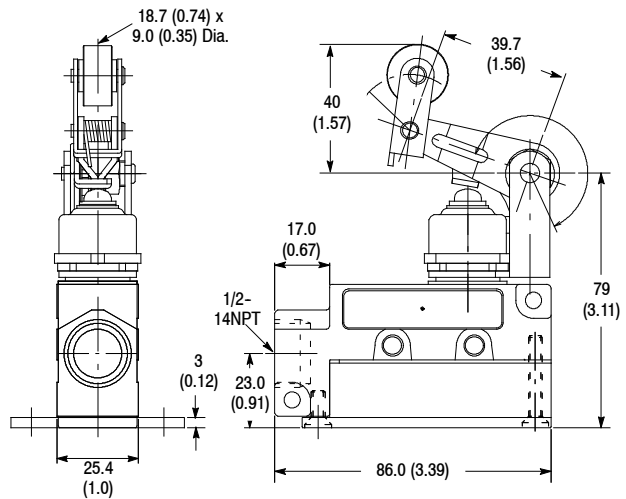
802B-PFADBSX



802B-PFAD1BSX



802B-PFARBSX



802B-PFAR2BSX

Limit Switches
802B Small Precision
 Small Metal Body

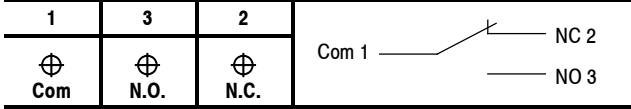


Top Push *Top Push Panel Mount* *Top Roller Panel Mount* *Top Push Cross Roller Panel Mount* *Top Push Roller Booted* *Top Push Cross Roller Booted*

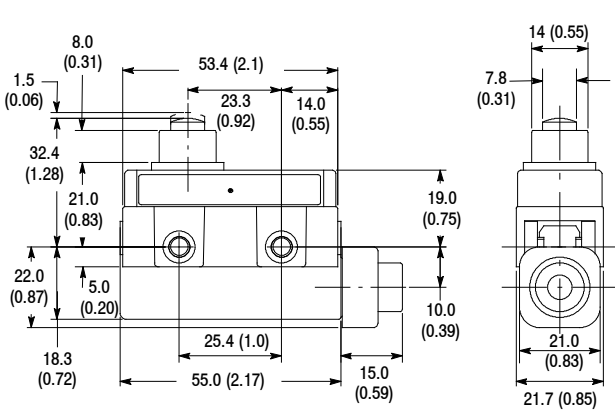
Product Selection

Head Type	Force to Operate	Travel to Operate	Max Travel	Travel to Reset	Mounting Style	Cat. No.
Top Push	11.8 N (2.65 lb)	1.5 mm (0.059 in.)	3.9 mm (0.154 in.)	0.2 mm (0.008 in.)	Side	802B-SSABXSX
Top Push Panel Mount			4.5 mm (0.177 in.)			802B-SPABXSX
Top Push Roller Panel Mount						802B-SPADXSX
Top Push Cross Roller Panel Mount			802B-SPAD1XSX			
Top Push Roller Booted	6.86 N (1.54 lb)	4 mm (0.157 in.)	4 mm (0.157 in.)	802B-SSADBSX		
Top Push Cross Roller Booted				802B-SSAD1BSX		

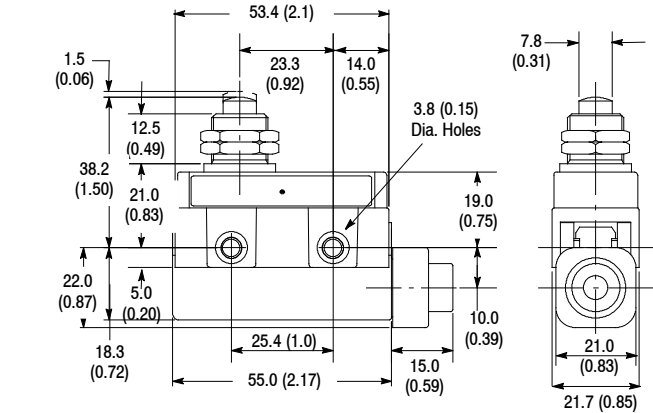
Wiring Diagrams



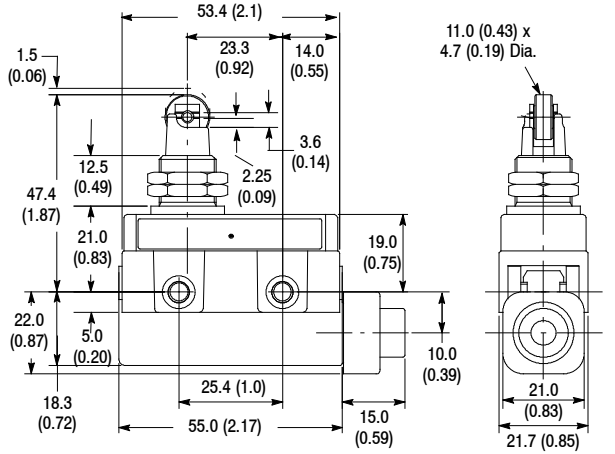
Approximate Dimensions [mm (in.)]



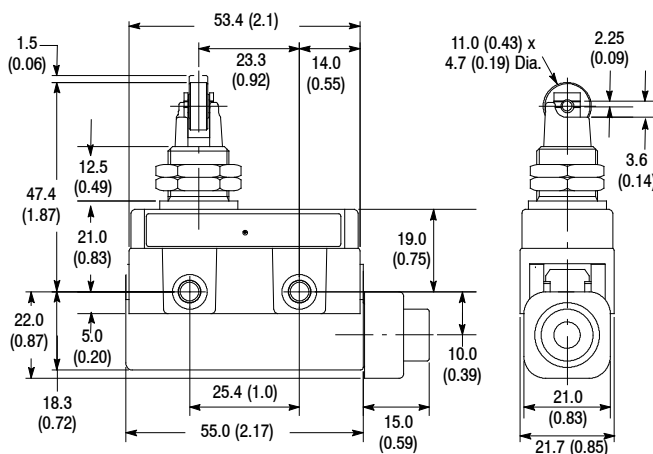
802B-SSABXSX



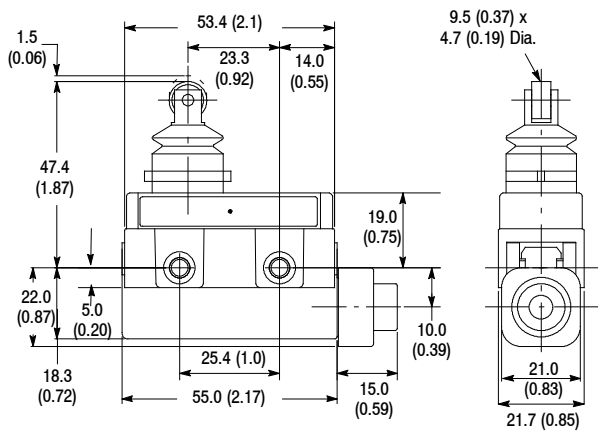
802B-SPABXSX



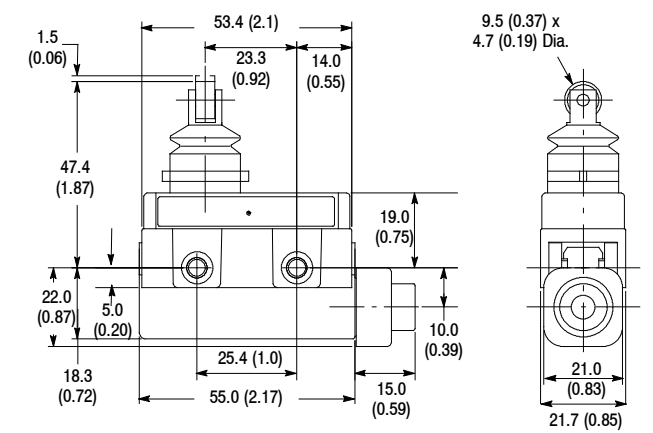
802B-SPADXSX



802B-SPAD1XSX

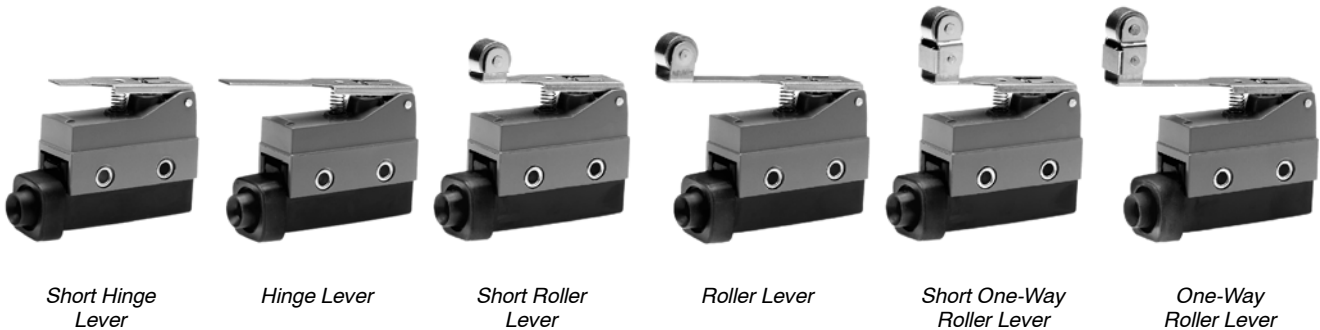


802B-SSADBSX



802B-SSAD1BSX

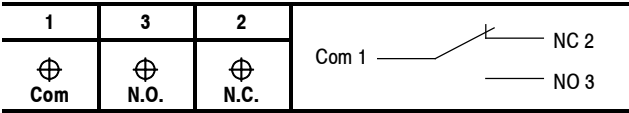
Limit Switches
802B Small Precision
Small Metal Body



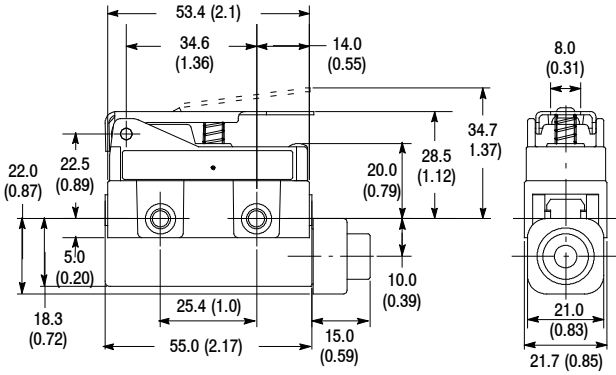
Product Selection

Head Type	Force to Operate	Travel to Operate	Max Travel	Travel to Reset	Mounting Style	Cat. No.
Short Hinge Lever	3.92 N (0.88 lb)	6.2±1.2 mm (0.244 in.)	12.2 mm (0.480 in.)	1 mm (0.04 in.)	Side	802B-SSAH1XSX
Hinge Lever	2.75 N (0.62 in.)	8.2±1.2 mm (0.323 in.)	16.6 mm (0.645 in.)	1.4 mm (0.055 in.)		802B-SSAHXSX
Short Roller Lever	3.92 N (0.88 lb)	6.2±1.2 mm (0.244 in.)	12.2 mm (0.480 in.)	1 mm (0.04 in.)		802B-SSAR1XSX
Roller Lever	2.75 N (0.62 in.)	8.3±1.2 mm (0.327 in.)	16.7 mm (0.657 in.)	1.4 mm (0.055 in.)		802B-SSARXSX
Short One-Way Roller Lever	3.92 N (0.88 lb)	6.2±1.2 mm (0.244 in.)	12.2 mm (0.480 in.)	1 mm (0.04 in.)		802B-SSAR3XSX
One-Way Roller Lever	2.75 N (0.62 in.)	8.2±1.2 mm (0.244 in.)	16.6 mm (0.654 in.)	1.4 mm (0.055 in.)		802B-SSAR2XSX

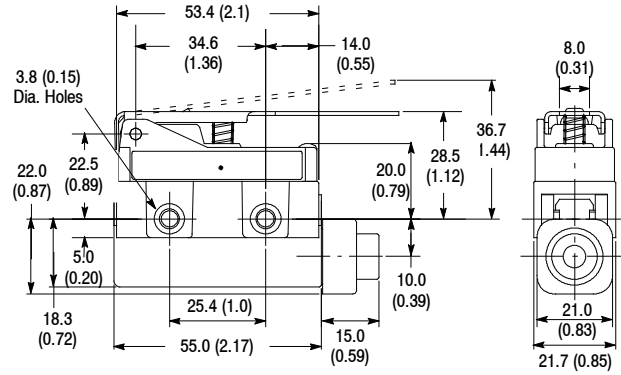
Wiring Diagrams



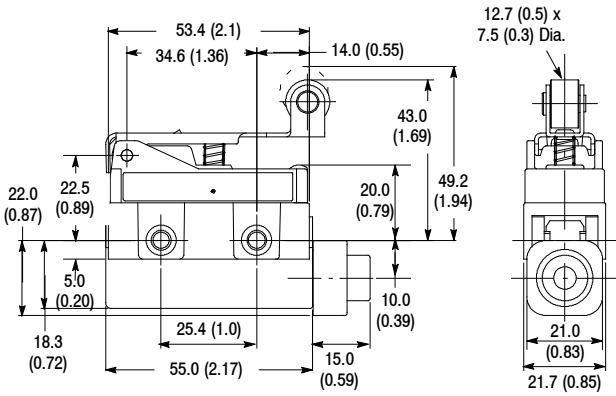
Approximate Dimensions [mm (in.)]



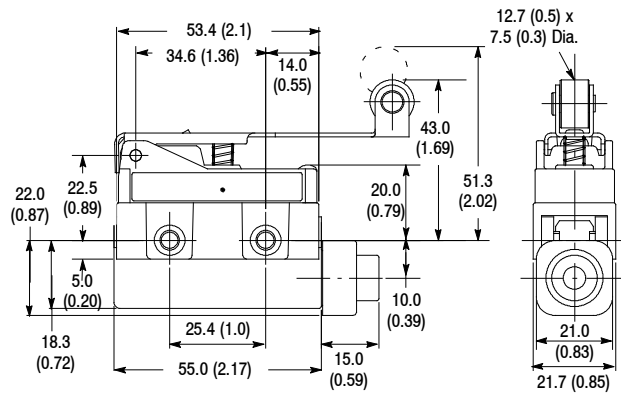
802B-SSAH1XSX



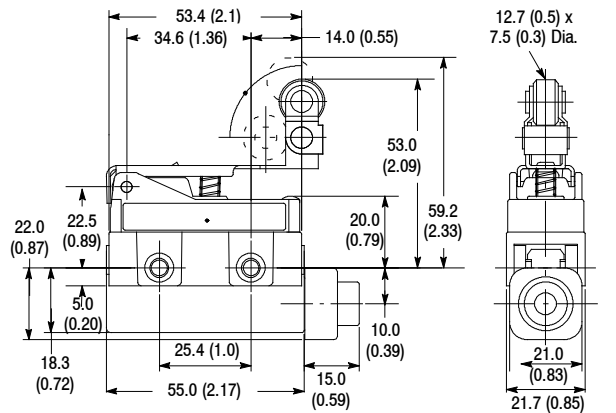
802B-SSAHXSX



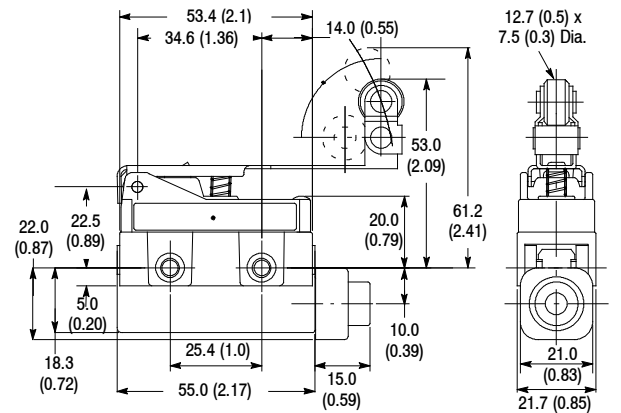
802B-SSAR1XSX



802B-SSARXSX



802B-SSAR3XSX



802B-SSAR2XSX

802T Safety Limit Switches

Direct Opening Action Position Interlock Switches



Specifications

Enclosure Rating	NEMA 4, 6P, 12, 13 and IP67
Pollution Degree	3
Certifications	cULus Listed, TÜV, and CE Marked for all applicable directives
Standards	EN954-1, ISO13849-1, IEC/EN60204-1, NFPA79, EN1088, ISO14119, IEC/EN60947-5-1, ANSI B11.19, AS4024-1
Category	Cat. 1 Device per EN954-1 Dual channel interlocks suitable for Cat. 3 or 4 systems
Operating Temperature [C (F)]	-18...+110° (0...+230°)
Cable Versions Temperature [C (F)]	-18...60° (0...140°)
Storage Temperature [C (F)]	-40...121° (-40...250°)

Description

Bulletin 802T direct opening action limit switches have been designed for use in control reliable applications and safety applications per ISO 14119. These limit switches utilize the same mounting dimensions as other NEMA style limit switches. The rugged metal construction and plug-in body are designed for use in harsh industrial environments.

Direct opening action assures that the normally closed contacts open when the limit switch is actuated. This opening will occur even in the event of a contact weld condition, up to 10 Newtons.

AC Contact Rating (Maximum per Pole, 50 or 60Hz, 2 Circuits)

NEMA Rating Designation	Max Voltage	A		Continuous Carrying Current	VA	
		Make	Break		Make	Break
A600 AC-15	120	60	6.00	10	7200	720
	240	30	3.00	10	7200	720
	480	15	1.50	10	7200	720
	600	12	1.20	10	7200	720

AC Contact Rating (Maximum per Pole, 50 or 60Hz, 4 Circuits)

NEMA Rating Designation	Max Voltage	A		Continuous Carrying Current	VA	
		Make	Break		Make	Break
A300 AC-15	120	60	6.00	10	7200	720
	240	30	3.00	10	7200	720

DC Contact Rating (Maximum per Pole)

NEMA Rating Designation	Max Voltage	A		Continuous Carrying Current	VA	
		Make	Break		Make	Break
Q300 DC 13	250	0.27	0.27	2.5	69	69
	125	0.55	0.55	2.5	69	69

Low Voltage DC

24 V DC @ 1.1 Amps resistive load

Typical Applications

- Machine guards
- Access gates and doors
- Cranes or hoists
- Transfer stations
- Indexing tables
- Robotic cells

Direct Opening Action

- Lever Type • Spring Return page 5-110
- Top Push Roller •
Spring Return page 5-110
- Side Push Vertical Roller •
Spring Return page 5-110
- Side Push Horizontal Roller •
Spring Return page 5-110
- Dimensions page 5-111
- Modifications page 5-112

ATTENTION



To ensure that the normally closed (safety) contacts open, the limit switch actuator must be displaced beyond the point of Direct Opening Action (see specifications).

Features

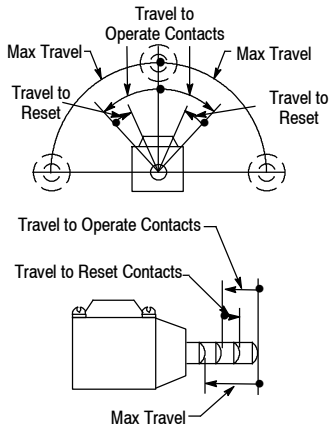
- Direct opening action
- Snap acting contacts
- Rugged metal construction
- Long life and reliability
- Plug-in design
- NEMA 6P/IP67 sealing
- Equal length mounting back base

Limit Switches

802T Safety Limit Switches

Direct Opening Action Position Interlock Switches

Range of Operation



Selection Guide

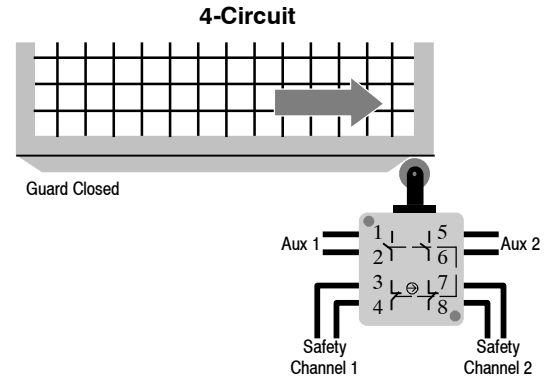
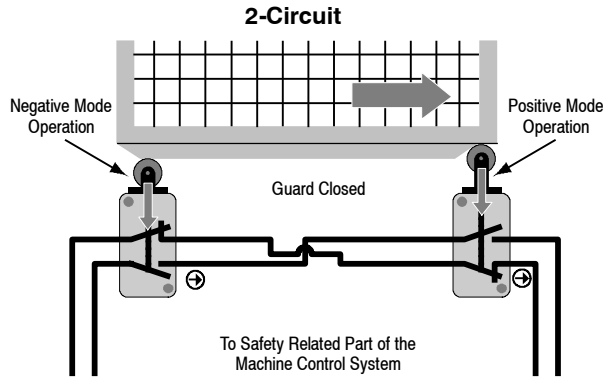
Number of Circuits	Lever Movement vs. Contact Operation	Torque/Force to Operate (Max)	Travel to Operate (Max)	Torque/Force to Operate Direct Opening Action (Min)	Travel to Operate Direct Opening Action (Min)	Max Travel	Travel to Reset Contacts (Max)	Cat. No.
Lever Type • Spring Return								
2	Clockwise or Counter Clockwise		0.45 N•m (4.0 lb•in)	13°	0.90 N•m (8.0 lb•in)	25°	90°	7°
4								Switch w/o Lever 802T-APD
Top Push Roller • Spring Return								
2	Normal	Operated	28.47 N•m (6.4 lb•ft)	1.17 mm (0.046 in.)	66.72 N (15.0 lb•in)	2.29 mm (0.090 in.)	5.99 mm (0.236 in.)	0.64 mm (0.025 in.)
4	Complete Switch 802T-DPD							
Side Push Vertical Roller • Spring Return								
2	Normal	Operated	24.5 N•m (5.5 lb•ft)	2.08 mm (0.082 in.)	53.4 N (12.0 lb•ft)	4.19 mm (0.165 in.)	5.74 mm (0.226 in.)	1.14 mm (0.045 in.)
4	Complete Switch 802T-KPD							
Side Push Horizontal Roller • Spring Return								
2	Normal	Operated	24.5 N•m (5.5 lb•ft)	2.08 mm (0.082 in.)	53.4 N (12.0 lb•ft)	4.19 mm (0.165 in.)	5.74 mm (0.226 in.)	1.14 mm (0.045 in.)
4	Complete Switch 802T-K1PD							

Modifications and Accessories—See page 5-112.

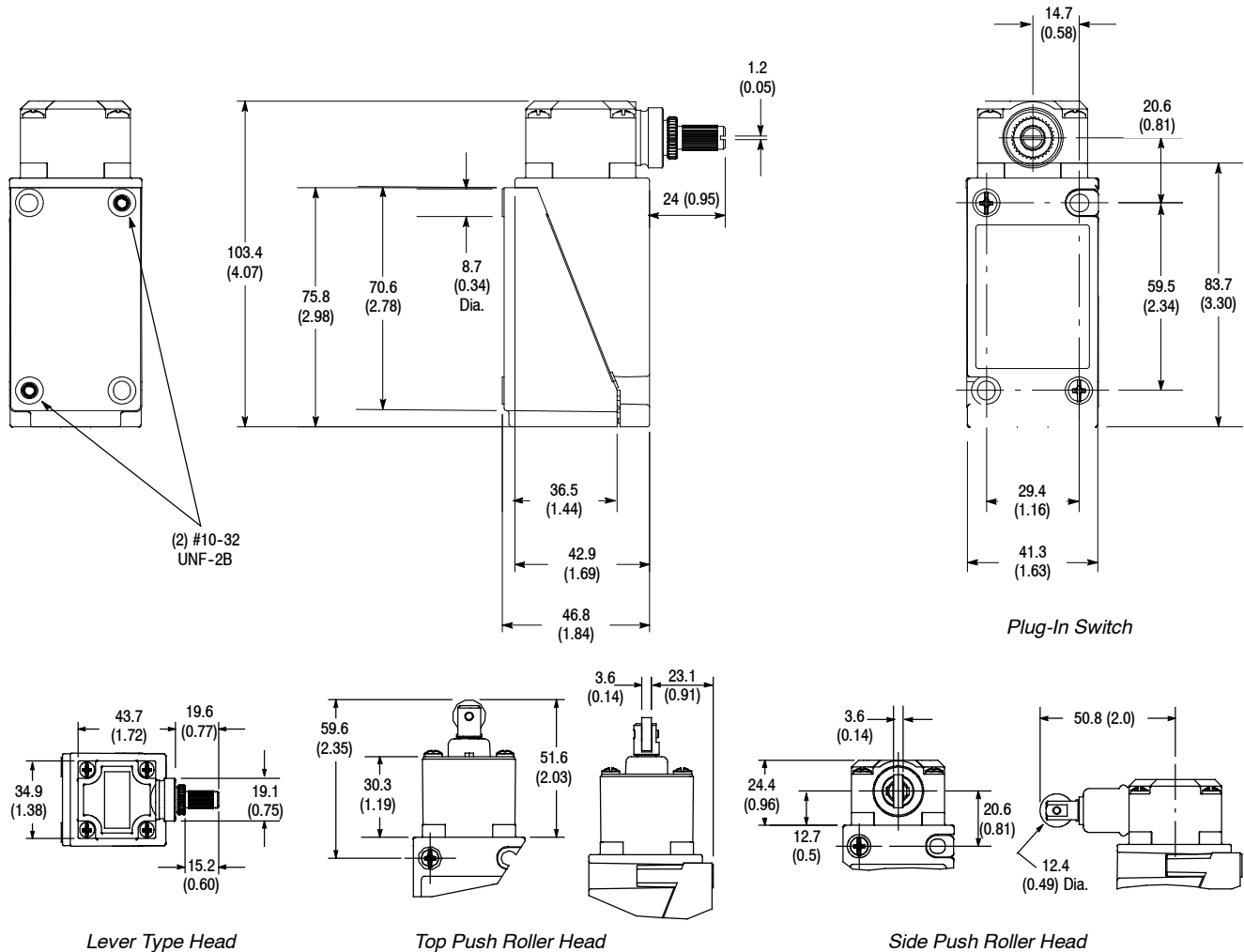
802T Safety Limit Switches

Direct Opening Action Position Interlock Switches

Typical Example of a Dual Channel Safety Application



Approximate Dimensions [mm (in.)]



Limit Switches

802T Safety Limit Switches

Direct Opening Action Position Interlock Switches

Modifications

Metric Conduit Entry

To order a limit switch with a 20 mm conduit entry, add the suffix **S6** to the Cat. No. example: 802T-APDS**6**.

Pre-wired Cable

To order factory installed pre-wired type ST00W-A cable (5 conductor), add the suffix **Y** plus the number of feet required. The standard cable length is 1.52 m (5 ft). Extended cable lengths are available in multiples of 1.22 m (4 ft) only.

Example: To order a limit switch with a factory installed 1.52 m (5 ft) cable, the Cat. No. would become 802T-APD**Y5**.
To order a limit switch with a factory installed 2.44 m (8 ft) cable, the Cat. No. would become 802T-APD**Y8**.

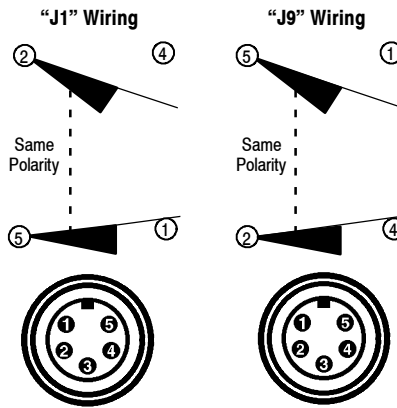
Mini Style Quick-Disconnect

To order a Bulletin 802T pre-wired limit switch with a 5-pin (2 circuit) or 9-pin (4 circuit) mini connector, add the suffix **J1** or **J9** depending on desired wiring (**J9** wiring not available for four-circuit models) to the Cat. No. example: 802T-APD**J1**.

An appropriate female connector with cable is available in Connection Systems.

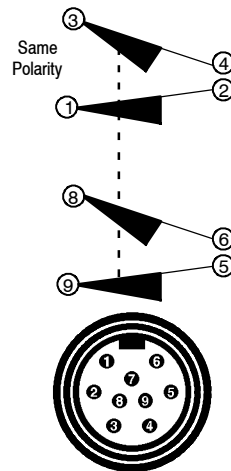
- 5-pin mini = (889N-F5AFC-6F) on page 8-4
- 9-pin mini = (889N-F9AF-2) on page 8-14
- 5-pin mini = (889R-F5AEA-2) on page 8-28
- 5-pin mini = (889D-F5AC-2) on page 8-16

5-Pin Mini-Type Receptacle (2 circuit)



9-Pin Mini-Type Receptacle (4 circuit)

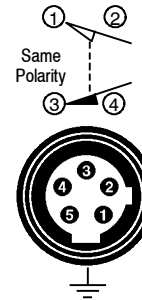
"J1" Wiring ("J9" wiring not available for 4 circuit)



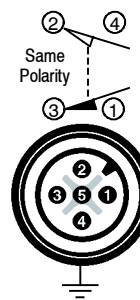
Micro Style Quick-Disconnect

Micro quick-disconnects are available with a 5-pin 2 keyway AC or 5-pin single keyway DC. To order a limit switch with a AC micro quick-disconnect, add the suffix **R5** to the cat. no. To order a limit switch with a DC micro quick-disconnect, add the suffix **D5** to the Cat. No. example: 802T-APDR**5** and 802T-APDD**5**.

AC Micro QD




DC Micro QD



Pin 5 = Ground

Levers

Type	Roller			Cat. No.
	Material	Diameter [mm (in.)]	Width [mm (in.)]	
 Non-Adj. Cast Lever 1.5 in. Radius Roller on Front	Nylon	19 (0.75)	7.11 (0.28)	802T-W1
	Nylon	19 (0.75)	25.4 (1.0)	802T-W1H
	Steel	19 (0.75)	6.35 (0.25)	802T-W1A
	Ball Bearing	19 (0.75)	5.84 (0.23)	802T-W1B

440P Safety Limit Switches**International Style Safety Limit Switches**

22 mm Small Plastic



22 mm Compact Metal



30 mm Large Metal



15 mm Plastic

General Description

The 440P limit switch family offers a full range of international-style solutions for both safety and standard sensing applications. Available in four different body styles—30 mm metal, 22 mm metal and plastic and 15 mm plastic—with a broad selection of operator types, circuit arrangements and connection options, the 440P is ideal for a wide variety of applications. These include material handling, packaging, elevators, escalators, scissor lifts, industrial trucks and tractors, cranes and hoists, overhead door as well as general safety guarding applications.

Mechanical Enclosure

The large metal-body (440P-M) models feature die-cast alloy construction and conform to EN 50041 (30 mm x 60 mm), while the small plastic (440P-C) models are constructed of a glass-filled polymer and conform to EN 50047 (22 mm). Both body types are IP66 rated and available with M20 or 1/2 in. NPT conduit opening or in micro quick-disconnect versions. The 15 mm plastic models (440P-M18001 and 440P-M18002) are constructed of glass-filled polyester and are IP30 rated. The 22 mm metal models (440P-A) have a painted body and are IP65, IP66.

Actuator Types

The 440P international-style limit switches are available with a wide variety of actuators to solve a broad range of applications. All lever-type switches include their respective actuator arm.

The large, metal-body style is available in the following operator types:

- Metal roller plunger
- Metal dome plunger
- Metal short lever
- Metal adjustable lever
- Metal rod lever
- Metal spring rod
- Telescopic arm

The compact metal body style is available in the following operator types:

- Roller plunger
- Dome plunger
- Short lever
- Cross roller plunger

All, except the short lever, are available with panel mount threading.

The small, plastic-body style is available in the following operator types:

- Adjustable roller lever
- Adjustable rubber roller lever
- Short lever
- Hinge lever
- Roller plunger
- Dome plunger
- Offset hinge lever

The 15 mm plastic switch is available with a roller plunger actuator.

Contact Arrangements

All 440P international-style limit switches contain positive opening-action contacts, making them ideal for safety-related applications. The small, plastic models include a choice of snap-acting, slow-break/make with 2- or 3-contacts configurations, while the large-metal switches contain snap-acting, slow-break contacts in 2-, 3-, or 4-contact configurations. The 15 mm plastic versions are slow-break, 2-circuit models. The small metal models are all snap-acting.

440P Safety Limit Switches**22 mm Compact Metal Position Switches****Description**

The 22 mm IEC style metal safety limit switches have been developed to provide a small metal case with a choice of actuator heads.

All units are supplied with an integral two meter cable.

For safety applications it is important that upon actuation, the guard or other moving objects should not pass completely over the switch and allow the plunger or lever to return to its original position.

Features

- Rugged die cast enclosure
- Positive operation, forced disconnection of contacts (direct opening action)
- Snap-acting contact actuation
- Contacts 1 N.C. + 1 N.O.
- Pre-wired two meter cable, bottom or side exit

Specifications

Safety Ratings	
Standards	EN 954-1, ISO 13849-1, IEC/EN 60204-1, NFPA 79, EN 1088, ISO 14119, IEC/EN 60947-5-1, ANSI B11.19, AS 4024.1
Safety Classification	Cat. 1 Device per EN 954-1 Dual channel limit switch suitable for Cat. 3 or 4 systems when ganged together
Certifications	UL Recognized, TÜV and CE Marked for all applicable directives
Outputs	
Safety Contacts ^❶	1 N.C. snap acting
Auxiliary Contacts	1 N.O. snap acting
Thermal Current	10 A
Rated Insulation Voltage	300 V AC

Contact Rating

Maximum AC Contact Rating Per Pole						
NEMA Rating Designation	Max. Voltage	Amperes		Continuous Carrying Current (Amp.)	Volt amperes	
		Make	Break		Make	Break
AC15/B300	120	30	3.0	5	3600	360
AC15/B300	240	15	1.5	5	3600	360
Maximum DC Contact Rating Per Pole						
DC13/Q300	240	0.27	0.27	2.5	69	69

Operating Characteristics

Actuation Speed, Max.	250 mm/s
Actuation Speed, Min.	100 mm/min
Actuation Frequency, Max.	6000 operation per hour
Mechanical Life	1 x 10 ⁷

Environmental

Enclosure Type Rating	NEMA 1, IP66 and IP67
Operating Temperature [C (F)]	2...+70° (35.6...+158°)
Pollution Degree	3

Physical Characteristics

Housing Material	Die-cast alloy
Actuator Material	Various polymers and metals
Mounting	2 x M4, any position
Vibration	IEC 68-2-6 (10...55 Hz, 0.35 mm amplitude)
Shock	IEC 68-2-7 (30 Gn 3 pulses per axis)
Connection	2 m (6.5 ft) cable
Enclosure Color	Red body/black head

- ❶ The safety contacts are described as normally closed (N.C.) i.e., with the guard closed, actuator in place (where relevant) and the machine able to be started.

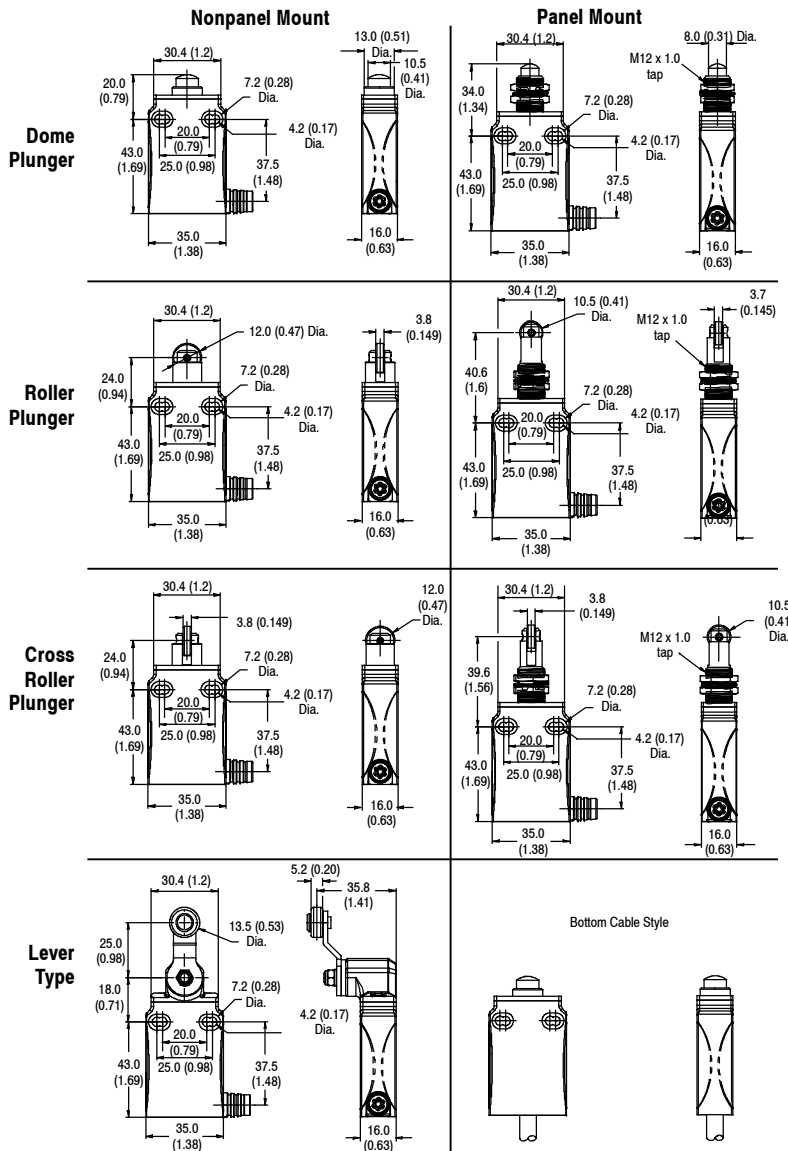
440P Safety Limit Switches

22 mm Metal Position Switches

Product Selection

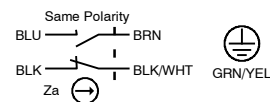
Operator Type	Contact		Contact Opening Characteristics <input type="checkbox"/> Open <input type="checkbox"/> Closed <input checked="" type="checkbox"/> Positive Opening Point	Contact Type	Maximum Force/Torque to Operate	Panel Mount	Cat. No.		
	Safety	Aux.					Bottom Cable Style	Side Cable Style	
Roller Plunger	1 N.C.	1 N.O.		Snap Acting	5.0 kg	No	440P-ARPS11C	440P-ARPS11CS	
	1 N.C.	1 N.O.		Snap Acting	5.0 kg	Yes	440P-ARP1S11C	440P-ARP1S11CS	
Dome Plunger	1 N.C.	1 N.O.		Snap Acting	5.0 kg	No	440P-ADPS11C	440P-ADPS11CS	
	1 N.C.	1 N.O.		Snap Acting	5.0 kg	Yes	440P-ADP1S11C	440P-ADP1S11CS	
Cross Roller Plunger	1 N.C.	1 N.O.		Snap Acting	5.0 kg	No	440P-ACRS11C	440P-ACRS11CS	
	1 N.C.	1 N.O.		Snap Acting	5.0 kg	Yes	440P-ACR1S11C	440P-ACR1S11CS	
Lever	1 N.C.	1 N.O.			Snap Acting	0.20 Nm	NA	440P-ASLS11C	440P-ASLS11CS

Approximate Dimensions [mm (in.)]



- Side cable style shows strain relief only. Units include a 2 m integral cable.
- Bottom cable style units have same dimensions as side cable style.
- Panel mount clearance hole = 13 mm (0.51 in.)

Wiring Diagram



440P Safety Limit Switches

22mm Plastic Position Switches



Description

The 22 mm plastic safety limit switches conform to EN 50047 and have been developed to provide a range of options including metal or plastic cases in various sizes, a choice of snap acting, slow break/make with 2 or 3 contact configurations and a choice of actuator heads. The distance between the mounting holes is 22 mm.

The Senator range offers the option of rotating the head in 90° increments before installation to allow ease of mounting.

Allen-Bradley Guardmaster limit switches can be used in other applications other than guard doors, for example on moving machine beds, crane arms, lifts, elevators, etc.

Operation of these limit switches is achieved by the sliding action of the guard or other moving object deflecting the plunger or lever.

Specifications

Standards	EN954-1, ISO13849-1, IEC/EN60204-1, NFPA79, EN1088, ISO14119, IEC/ EN60947-5-1, ANSI B11.19, AS4024.1			
Category	Cat. 1 Device per EN954-1 Dual channel interlocks suitable for Cat. 3 or 4 systems			
Approvals	cULus, TÜV, CCC and CE Marked for all applicable directives			
Safety Contacts	1 N.C. snap acting, 2 N.C., 3 N.C. or 4 N.C. slow acting			
Auxiliary Contacts	1 N.O. (with 2 N.C.)			
Designation/Utilization Cat.				
A600/AC-15	(Ue)	600 V	500 V	240 V
	(Ie)	1.2 A	1.4 A	3 A
Q600/DC-13	(Ue)	600 V	500 V	250 V
	(Ie)	0.4 A	0.55 A	1.1 A
Min Current	5 V, 5 mA, DC			
Thermal Current (Ith)	10 A			
Rated Insulation Voltage	600 V AC			
Rated Impulse withstand Volt	2500 V			
Travel for Positive Opening	Various (see Product Selection table)			
Max Switching Speed	250 mm/s			
Min Switching Speed	100 mm/min			
Max Switching Frequency	6000 operation per hour			
Case Material	UL approved glass-filled polybutylene terephthalate			
Roller Material	Various polymers			
Enclosure Protection	IP 66			
Operating Temperature	Min -25°C (-18°F) Max 80°C (+176°F)			
Pollution Degree	3			
Mechanical Life Expectancy	1 x 10 ⁷			
Conduit Entry	M20 or 1/2 inch NPT			
Fixing	2 x M4			
Mounting	Any position			
Color	Red			

ATTENTION



For safety applications it is important that upon actuation, the guard or other moving objects should not pass completely over the switch and allow the plunger or lever to return to its original position.

Features

- Large selection of actuator heads
- Positive operation, forced disconnection of contacts
- Snap-acting, slow make before break or slow break before make contact blocks
- Contacts 1 N.C. + 1 N.O., 2 N.C. + 1 N.O. 3 N.C., 2 N.C. + 1 N.O.
- Conforms to EN 50047, EN 1088, EN 60947-5-1, EN 292 and EN 60204-1






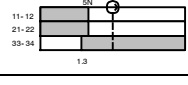


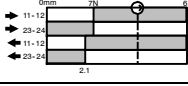
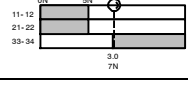
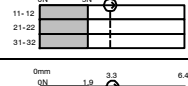
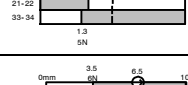


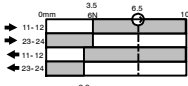
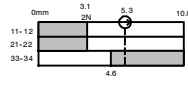
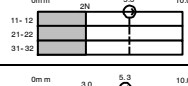
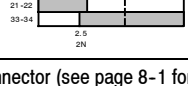
Safety Limit Switches

Product Selection page 5-117
 Wiring page 5-119
 Dimensions page 5-120

440P Safety Limit Switches

22mm Plastic Position Switches

Product Selection

Operator Type	Contact		Contact Type	Typical Force/Torque to Operate	Contact Opening Characteristics □ Open ■ Closed ● Positive Opening Point	Cat. No.		
	Safety	Aux.				1/2 inch NPT Conduit	M20 Conduit	Quick Disconnect ①
 Roller Plunger 	1 N.C.	1 N.O.	Snap Acting	5 N		440P-CRPS11E	440P-CRPS11B	440P-CRPS11D4
	2 N.C.	1 N.O.	BBM	6 N		440P-CRPB12E	440P-CRPB12B	440P-CRPB12R6
	3 N.C.	—	—	5 N		440P-CRPB03E	440P-CRPB03B	440P-CRPB03R6
	2 N.C.	1 N.O.	MBB	6 N		440P-CRPM12E	440P-CRPM12B	440P-CRPM12R6
 Dome Plunger 	1 N.C.	1 N.O.	Snap Acting	5 N		440P-CDPS11E	440P-CDPS11B	440P-CDPS11D4
	2 N.C.	1 N.O.	BBM	6 N		440P-CDPB12E	440P-CDPB12B	440P-CDPB12R6
	3 N.C.	—	—	5 N		440P-CDPB03E	440P-CDPB03B	440P-CDPB03R6
	2 N.C.	1 N.O.	MBB	6 N		440P-CDPM12E	440P-CDPM12B	440P-CDPM12R6
 Hinge Lever 	1 N.C.	1 N.O.	Snap Acting	5 N		440P-CHLS11E	440P-CHLS11B	440P-CHLS11D4
	2 N.C.	1 N.O.	BBM	6 N		440P-CHLB12E	440P-CHLB12B	440P-CHLB12R6
	3 N.C.	—	—	5 N		440P-CHLB03E	440P-CHLB03B	440P-CHLB03R6
	2 N.C.	1 N.O.	MBB	6 N		440P-CHLM12E	440P-CHLM12B	440P-CHLM12R6
Recommended standard cordset, 2 m, 4-pin, DC micro (M12) connector (see page 8-1 for additional lengths).								889D-F4AC-2
Recommended standard cordset, 2 m, 6-pin AC micro connector (see page 8-1 for additional lengths).								889R-F6ECA-2


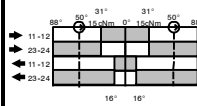
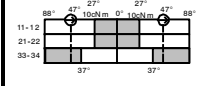
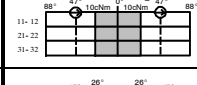
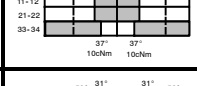

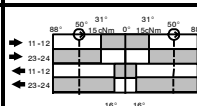
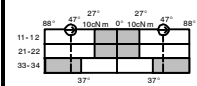
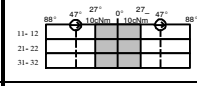
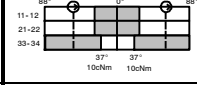

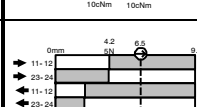
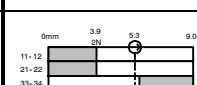
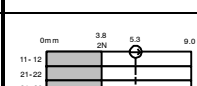
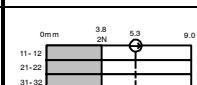
① D4 suffix uses a 4-pin DC micro (M12) connector.
 R6 suffix uses a 6-pin AC micro (dual keyway) connector.

Limit Switches

440P Safety Limit Switches

22mm Plastic Position Switches

Product Selection (continued)



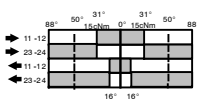
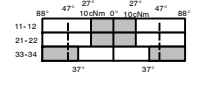
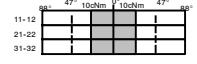
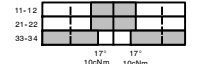


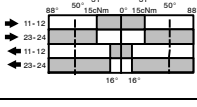
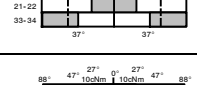
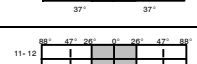
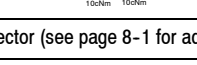
Operator Type	Contact		Contact Type	Typical Force/ Torque to Operate	Contact Opening Characteristics □ Open ■ Closed ⊙ Positive Opening Point	Cat. No.		
	Safety	Aux.				1/2 inch NPT Conduit	M20 Conduit	Quick Disconnect ①
 Short Lever	1 N.C.	1 N.O.	Snap Acting	0.15 N•m		440P-CSLS11E	440P-CSLS11B	440P-CSLS11D4
	2 N.C.	1 N.O.	BBM	0.14 N•m		440P-CSLB12E	440P-CSLB12B	440P-CSLB12R6
	3 N.C.	—	—	0.14 N•m		440P-CSLB03E	440P-CSLB03B	440P-CSLB03R6
	2 N.C.	1 N.O.	MBB	0.14 N•m		440P-CSLM12E	440P-CSLM12B	440P-CSLM12R6
 Short Lever Metal Roller	1 N.C.	1 N.O.	Snap Acting	0.15 N•m		440P-CMHS11E	440P-CMHS11B	440P-CMHS11D4
	2 N.C.	1 N.O.	BBM	0.14 N•m		440P-CMHB12E	440P-CMHB12B	440P-CMHB12R6
	3 N.C.	—	—	0.14 N•m		440P-CMHB03E	440P-CMHB03B	440P-CMHB03R6
	2 N.C.	1 N.O.	MBB	0.14 N•m		440P-CMHM12E	440P-CMHM12B	440P-CMHM12R6
 Offset Hinge	1 N.C.	1 N.O.	Snap Acting	5 N		440P-COHS11E	440P-COHS11B	440P-COHS11D4
	2 N.C.	1 N.O.	BBM	6 N		440P-COHB12E	440P-COHB12B	440P-COHB12R6
	3 N.C.	—	—	5 N		440P-COHB03E	440P-COHB03B	440P-COHB03R6
	2 N.C.	1 N.O.	MBB	6 N		440P-COHM12E	440P-COHM12B	440P-COHM12R6
Recommended standard cordset, 2 m, 4-pin, DC micro (M12) connector (see page 8-1 for additional lengths)								889D-F4AC-2
Recommended standard cordset, 2 m, 6-pin AC micro connector (see page 8-1 for additional lengths)								889R-F6ECA-2

① D4 suffix uses a 4-pin DC micro (M12) connector.
R6 suffix uses a 6-pin AC micro (dual keyway) connector.

440P Safety Limit Switches

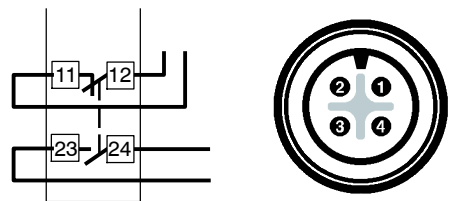
22mm Plastic Position Switches

Product Selection (continued)

Operator Type	Contact		Contact Type	Typical Force/Torque to Operate	Contact Opening Characteristics □ Open ■ Closed ● Positive Opening Point	Cat. No.		
	Safety	Aux.				1/2 inch NPT Conduit	M20 Conduit	Quick Disconnect ①
 Adjustable Lever ② 	1 N.C.	1 N.O.	Snap Acting	0.15 N•m		440P-CALS11E	440P-CALS11B	440P-CALS11D4
	2 N.C.	1 N.O.	BBM	0.14 N•m		440P-CALB12E	440P-CALB12B	440P-CALB12R6
	3 N.C.	—	—	0.14 N•m		440P-CALB03E	440P-CALB03B	440P-CALB03R6
	2 N.C.	1 N.O.	MBB	0.14 N•m		440P-CALM12E	440P-CALM12B	440P-CALM12R6
 Rubber Roller ② 	1 N.C.	1 N.O.	Snap Acting	0.15 N•m		440P-CRRS11E	440P-CRRS11B	440P-CRRS11D4
	2 N.C.	1 N.O.	BBM	0.14 N•m		440P-CRRB12E	440P-CRRB12B	440P-CRRB12R6
	3 N.C.	—	—	0.14 N•m		440P-CRRB03E	440P-CRRB03B	440P-CRRB03R6
	2 N.C.	1 N.O.	MBB	0.14 N•m		440P-CRRM12E	440P-CRRM12B	440P-CRRM12R6
Recommended standard cordset, 2 m, 4-pin, DC micro (M12) connector (see page 8-1 for additional lengths)								889D-F4AC-2
Recommended standard cordset, 2 m, 6-pin AC micro connector (see page 8-1 for additional lengths)								889R-F6ECA-2

Typical Wiring Diagrams ③

Two-Circuit Type D4 4-Pin Micro Connector

Connector Pinout	1 N.C. + 1 N.O.		
	Terminal	Contact	
	1	11	
	3	12	N.C.
	2	23	N.O.
	4	24	

- ① D4 suffix uses a 4-pin DC Micro (M12) connector.
R6 suffix uses a 6-pin AC Micro (dual keyway) connector.
- ② Not positive opening
- ③ See Product Selection tables for positive opening points.

Limit Switches

440P Safety Limit Switches

22mm Plastic Position Switches

Typical Wiring Diagrams (continued) ①

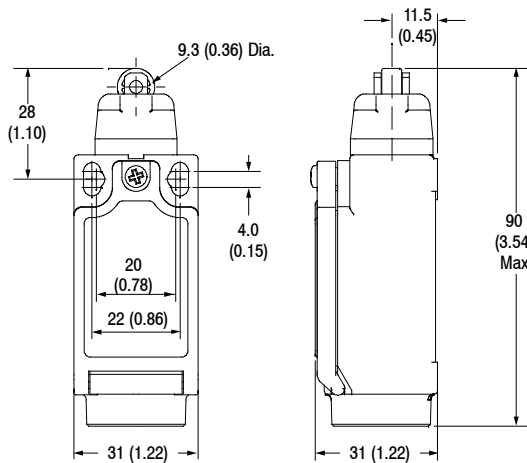
Three-Circuit Type R6 6-Pin Micro Connector

Same Polarity	Connector Pinout		2 N.C. + 1 N.O.		3 N.C.	
			Terminal	Contact	Terminal	Contact
		1	11	N.C.	11	N.C.
		5	12	N.C.	12	N.C.
		2	21	N.C.	21	N.C.
		6	22	N.C.	22	N.C.
		3	33	N.O.	31	N.C.
		4	34	N.O.	32	N.C.

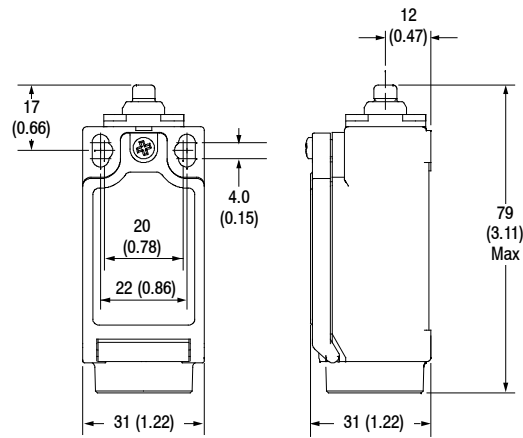
① See Product Selection tables for positive opening points.

Approximate Dimensions [mm (in.)]

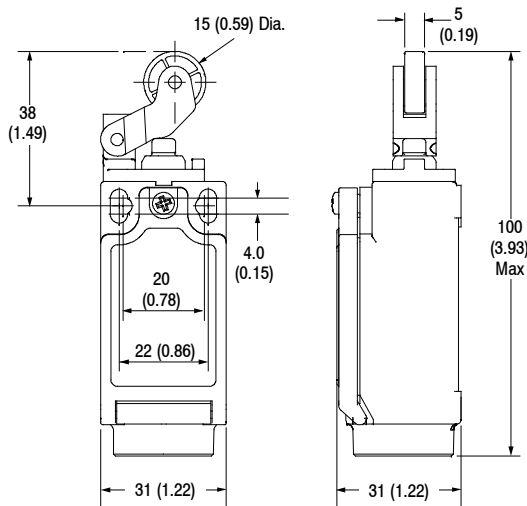
Dimensions are not intended to be used for installation purposes.



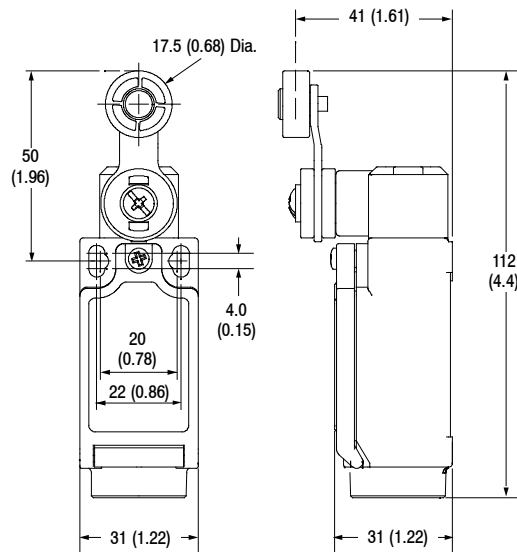
Roller Plunger



Dome Plunger



Hinge Lever



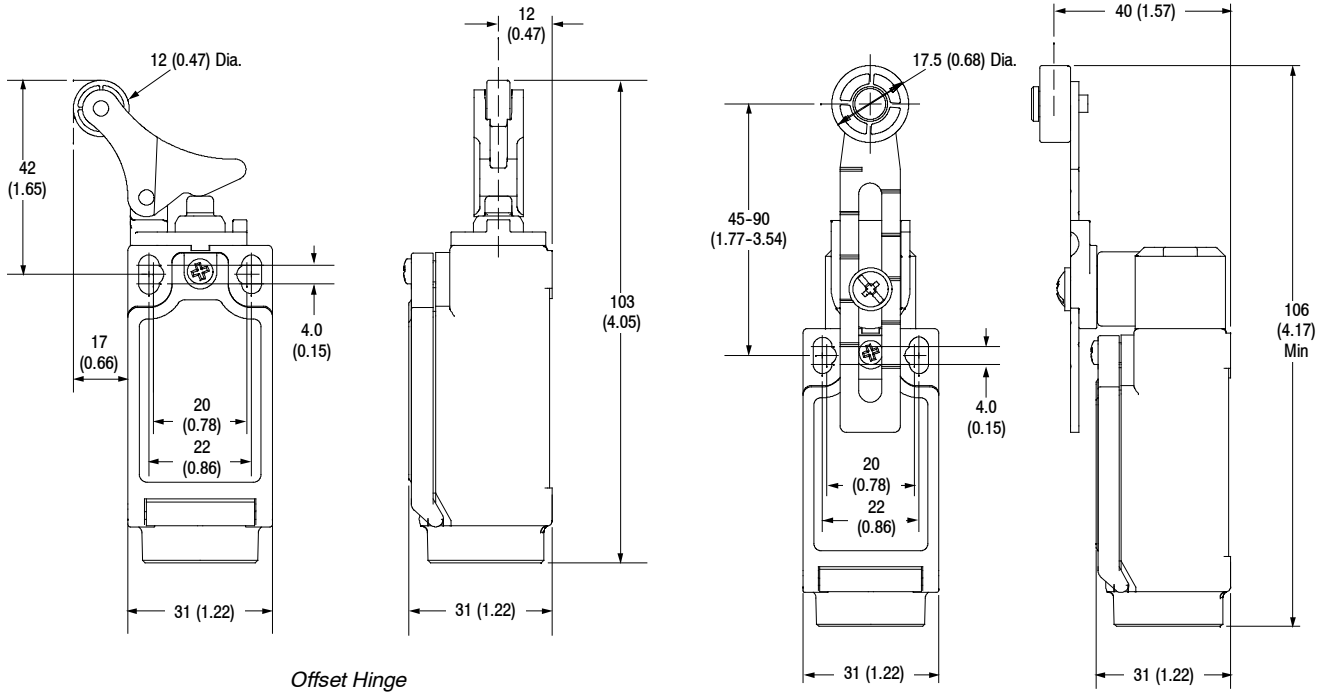
Short Lever
(Metal & Plastic Roller)

440P Safety Limit Switches

22mm Plastic Position Switches

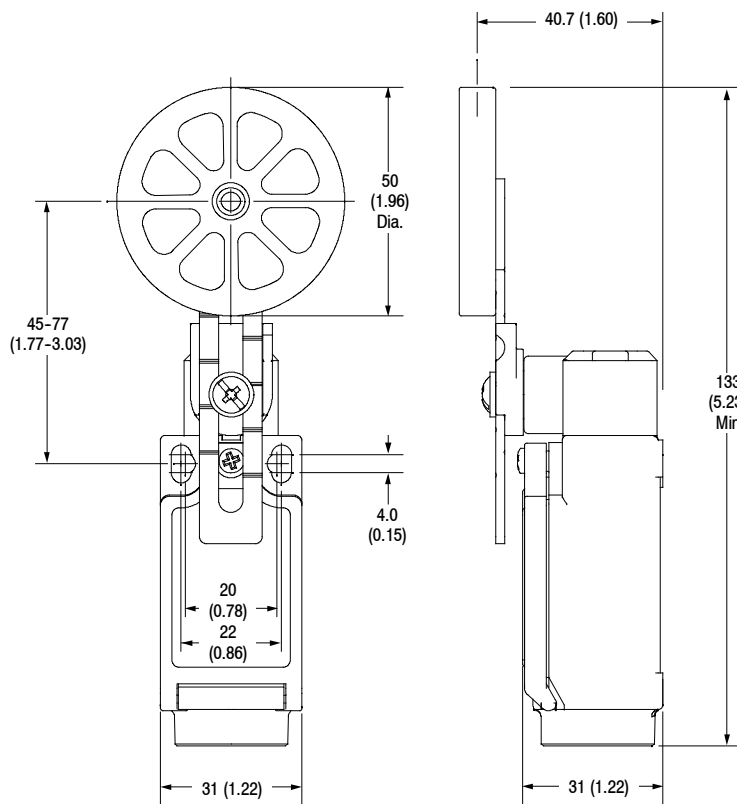
Approximate Dimensions [mm (in.)]

Dimensions are not intended to be used for installation purposes.



Offset Hinge

Adjustable Lever



Rubber Roller

440P Safety Limit Switches

30mm Metal Position Switches



The 30mm metal safety limit switches conform to EN 50041 and have been developed to provide a range of options including metal or plastic cases in various sizes, a choice of snap acting, slow break/make with 2, 3 or 4 contact configurations and a choice of actuator heads. The distance between the horizontal mounting holes is 30 mm.

The Senator range offers the option of rotating the head in 90° increments before installation to allow ease of mounting.

Allen-Bradley/Guardmaster limit switches can be used in other applications other than guard doors, for example on moving machine beds, crane arms, lifts, elevators, etc.

Operation of these limit switches is achieved by the sliding action of the guard or other moving object deflecting the plunger or lever.

ATTENTION



For safety applications it is important that upon actuation, the guard or other moving objects should not pass completely over the switch and allow the plunger or lever to return to its original position.

Specifications

Standards	EN954-1, ISO13849-1, IEC/EN60204-1, NFPA79, EN1088, ISO14119, IEC/ EN60947-5-1, ANSI B11.19, AS4024.1			
Category	Cat. 1 Device per EN954-1 Dual channel interlocks suitable for Cat. 3 or 4 systems			
Approvals	cULus, TÜV, CE and CCC Marked for all applicable directives			
Safety Contacts	1 N.C. snap acting, 2 N.C., 3 N.C. or 4 N.C. slow acting			
Auxiliary Contacts	1 N.O. (with 2 N.C.)			
Designation/Utilization Cat.				
A600/AC-15	(Ue)	600 V	500 V	240 V
	(Ie)	1.2 A	1.4 A	3 A
Q600/DC-13	(Ue)	600 V	500 V	250 V
	(Ie)	0.1 A	0.13 A	0.27 A
				09.55 A
Min Current	5 V, 5 mA, DC			
Thermal Current (Ith)	8 A			
Rated Insulation Voltage	600 V AC			
Rated Impulse withstand Volt	2500 V			
Travel for Positive Opening	Various (see Product Selection table)			
Max Switching Speed	250 mm/s			
Min Switching Speed	100 mm/min			
Max Switching Frequency	6000 operation per hour			
Case Material	Die cast alloy			
Actuator Material	See Product Selection table			
Enclosure Protection	IP66			
Operating Temperature	Min -25°C (-18°F) Max 80°C (+176°F)			
Pollution Degree	3			
Mechanical Life Expectancy	1 x 10 ⁷			
Conduit Entry	M20 or 1/2 inch NPT			
Fixing	2 x M5			
Mounting	Any position			
Color	Red			

Conductive pollution occurs, or dry, nonconductive pollution occurs which becomes conductive due to condensation.

Features

- Large selection of actuator heads
- Positive operation, forced disconnection of contacts
- Snap-acting, slow make before break or slow break before make contact blocks
- Contacts 1 N.C. + 1 N.O., 2 N.C. + 1 N.O. 3 N.C., 2 N.C. + 2 N.O., 3 N.C. + 1 N.O., or 4 N.C.
- Conforms to EN 50041, EN 1088, EN 60947-5-1, EN 292 and EN 60204-1


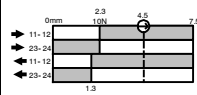
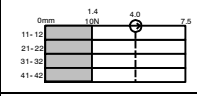
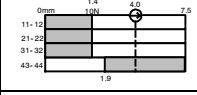
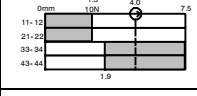

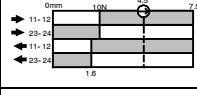


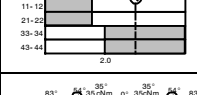

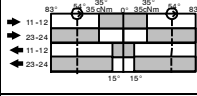
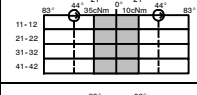
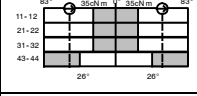
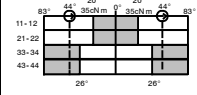
Safety Limit Switches

- Product Selection page 5-123
- Wiring page 5-126
- Dimensions page 5-126

440P Safety Limit Switches

30mm Metal Position Switches

Product Selection

Operator Type	Contacts		Contact Type	Typical Force/Torque to Operate	Contact Opening Characteristics □ Open ■ Closed ⊙ Positive Opening Point	Cat. No.		
	Safety	Aux.				1/2 inch NPT Conduit	M20 Conduit	Quick Disconnect ①
	1 N.C.	1 N.O.	Snap Acting	13 N		440P-MRPS11E	440P-MRPS11B	440P-MRPS11N5
	4 N.C.	—	—	11 N		440P-MRPB04E	440P-MRPB04B	440P-MRPB04M9
	3 N.C.	1 N.O.	BBM	11 N		440P-MRPB13E	440P-MRPB13B	440P-MRPB13M9
	2 N.C.	2 N.O.	BBM	11 N		440P-MRPB22E	440P-MRPB22B	440P-MRPB22M9
	1 N.C.	1 N.O.	Snap Acting	13 N		440P-MDPS11E	440P-MDPS11B	440P-MDPS11N5
	4 N.C.	—	—	11 N		440P-MDPB04E	440P-MDPB04B	440P-MDPB04M9
	3 N.C.	1 N.O.	BBM	11 N		440P-MDPB13E	440P-MDPB13B	440P-MDPB13M9
	2 N.C.	2 N.O.	BBM	11 N		440P-MDPB22E	440P-MDPB22B	440P-MDPB22M9
	1 N.C.	1 N.O.	Snap Acting	0.34 N•m		440P-MSLS11E	440P-MSLS11B	440P-MSLS11N5
	4 N.C.	—	—	0.20 N•m		440P-MSLB04E	440P-MSLB04B	440P-MSLB04M9
	3 N.C.	1 N.O.	BBM	0.34 N•m		440P-MSLB13E	440P-MSLB13B	440P-MSLB13M9
	2 N.C.	2 N.O.	BBM	0.34 N•m		440P-MSLB22E	440P-MSLB22B	440P-MSLB22M9
Recommended standard cordset, 2 m, 5-pin mini connector (see page 8-1 for additional lengths).						889N-F5AE-6F		
Recommended standard cordset, 2 m, 12-pin 9 wire (see page 8-1 for additional lengths).						889M-F12X9AE-2		


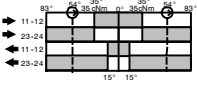
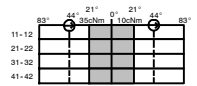

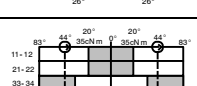

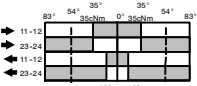
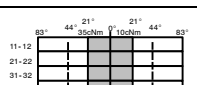
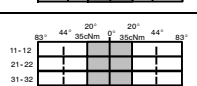
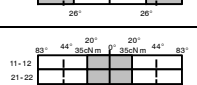

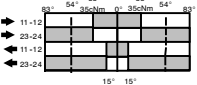
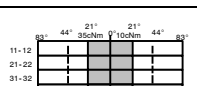
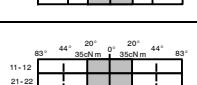
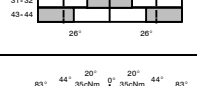
① N5 = 5-pin mini connector.
M9 = 12-pin M23 connector (use 9 wire).

Limit Switches

440P Safety Limit Switches

30mm Metal Position Switches


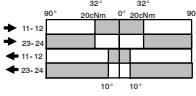
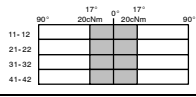
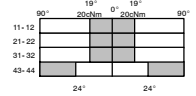
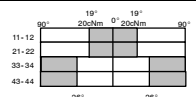

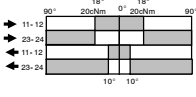
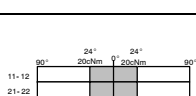
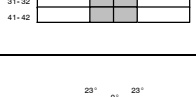
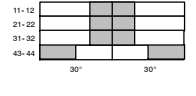
Product Selection (continued)

Operator Type	Contacts		Contact Type	Typical Force/ Torque to Operate	Contact Opening Characteristics □ Open ■ Closed ⊙ Positive Opening Point	Cat. No.		
	Safety	Aux.				1/2 inch NPT Conduit	M20 Conduit	Quick Disconnect ①
 Metal Short Lever, Metal Roller	1 N.C.	1 N.O.	Snap Acting	0.34 N•m		440P-MMHS11E	440P-MMHS11B	440P-MMHS11N5
	4 N.C.	—	—	0.20 N•m		440P-MMHB04E	440P-MMHB04B	440P-MMHB04M9
	3 N.C.	1 N.O.	BBM	0.34 N•m		440P-MMHB13E	440P-MMHB13B	440P-MMHB13M9
	2 N.C.	2 N.O.	BBM	0.34 N•m		440P-MMHB22E	440P-MMHB22B	440P-MMHB22M9
 Metal Adjustable Lever ②	1 N.C.	1 N.O.	Snap Acting	0.34 N•m		440P-MALS11E	440P-MALS11B	440P-MALS11N5
	4 N.C.	—	—	0.20 N•m		440P-MALB04E	440P-MALB04B	440P-MALB04M9
	3 N.C.	1 N.O.	BBM	0.34 N•m		440P-MALB13E	440P-MALB13B	440P-MALB13M9
	2 N.C.	2 N.O.	BBM	0.34 N•m		440P-MALB22E	440P-MALB22B	440P-MALB22M9
 Metal Rod Lever ②	1 N.C.	1 N.O.	Snap Acting	0.34 N•m		440P-MARS11E	440P-MARS11B	440P-MARS11N5
	4 N.C.	—	—	0.20 N•m		440P-MARB04E	440P-MARB04B	440P-MARB04M9
	3 N.C.	1 N.O.	BBM	0.34 N•m		440P-MARB13E	440P-MARB13B	440P-MARB13M9
	2 N.C.	2 N.O.	BBM	0.34 N•m		440P-MARB22E	440P-MARB22B	440P-MARB22M9
Recommended standard cordset, 2 m, 5-pin mini connector (see page 8-1 for additional lengths).						889N-F5AE-6F		
Recommended standard cordset, 2 m, 12-pin 9 wire (see page 8-1 for additional lengths).						889M-F12X9AE-2		

① N5 = 5-pin mini connector.
 M9 = 12-pin M23 connector (use 9 wire).
 ② Not positive opening

Limit Switches
440P Safety Limit Switches
 30mm Metal Position Switches

Product Selection (continued)

Operator Type	Contacts		Contact Type	Typical Force/ Torque to Operate	Contact Opening Characteristics <input type="checkbox"/> Open <input type="checkbox"/> Closed ⊕ Positive Opening Point	Cat. No.		
	Safety	Aux.				1/2 inch NPT Conduit	M20 Conduit	Quick Disconnect [Ⓢ]
 Metal Spring Rod [Ⓢ]	1 N.C.	1 N.O.	Snap Acting	0.20 N•m		440P-MSRS11E	440P-MSRS11B	440P-MSRS11N5
	4 N.C.	—	—	0.20 N•m		440P-MSRB04E	440P-MSRB04B	440P-MSRB04M9
	3 N.C.	1 N.O.	BBM	0.20 N•m		440P-MSRB13E	440P-MSRB13B	440P-MSRB13M9
	2 N.C.	2 N.O.	BBM	0.20 N•m		440P-MSRB22E	440P-MSRB22B	440P-MSRB22M9
 Telescope Arm [Ⓢ]	1 N.C.	1 N.O.	Snap Acting	0.20 N•m		440P-MTAS11E	440P-MTAS11B	440P-MTAS11N5
	4 N.C.	—	—	0.20 N•m		440P-MTAB04E	440P-MTAB04B	440P-MTAB04M9
	3 N.C.	1 N.O.	BBM	0.20 N•m		440P-MTAB13E	440P-MTAB13B	440P-MTAB13M9
	2 N.C.	2 N.O.	BBM	0.20 N•m		440P-MTAB22E	440P-MTAB22B	440P-MTAB22M9
Recommended standard cordset, 2 m, 5-pin mini connector (see page 8-1 for additional lengths).						889N-F5AE-6F		
Recommended standard cordset, 2 m, 12-pin 9 wire (see page 8-1 for additional lengths).						889M-F12X9AE-2		

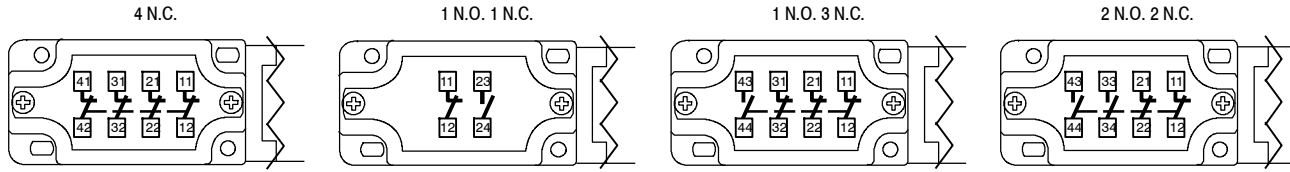
- Ⓢ N5 = 5-pin mini connector.
- M9 = 12-pin M23 connector (use 9 wire).
- ⊕ Not positive opening

Limit Switches

440P Safety Limit Switches

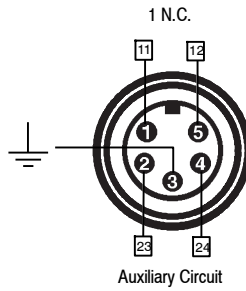
30mm Metal Position Switches

Typical Wiring Diagram



Same Polarity

N5 Connector 2 Circuit 5-Pin Mini Connector

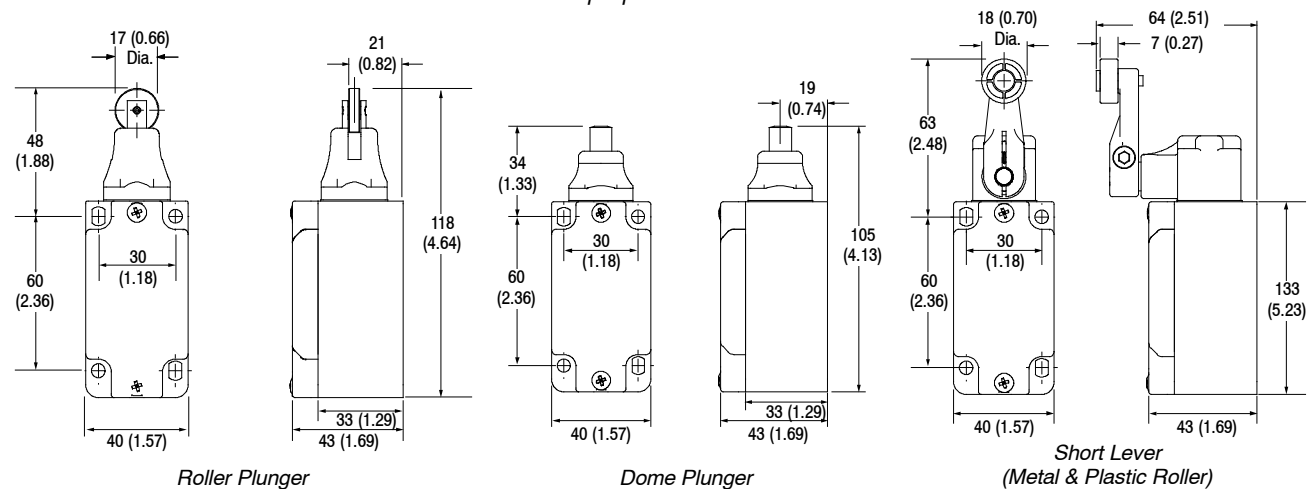


M9 12-Pin M23 Connector

Connector Pinout	4 N.C.		3 N.C. 1 N.O.		2 N.C. 2 N.O.	
	Terminal	Contact	Terminal	Contact	Terminal	Contact
1	11	N.C.	11	N.C.	11	N.C.
3	12	N.C.	12	N.C.	12	N.C.
4	21	N.C.	21	N.C.	21	N.C.
6	22	N.C.	22	N.C.	22	N.C.
7	31	N.C.	31	N.C.	33	N.O.
8	32	N.C.	32	N.C.	34	N.O.
9	41	N.C.	43	N.O.	43	N.O.
10	42	N.C.	44	N.O.	44	N.O.
12	Ground					

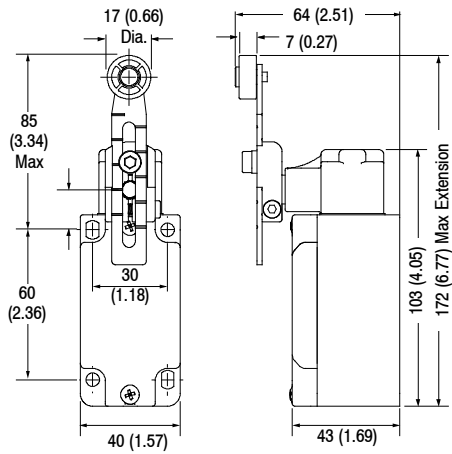
Approximate Dimensions [mm (in.)]

Dimensions are not intended to be used for installation purposes.

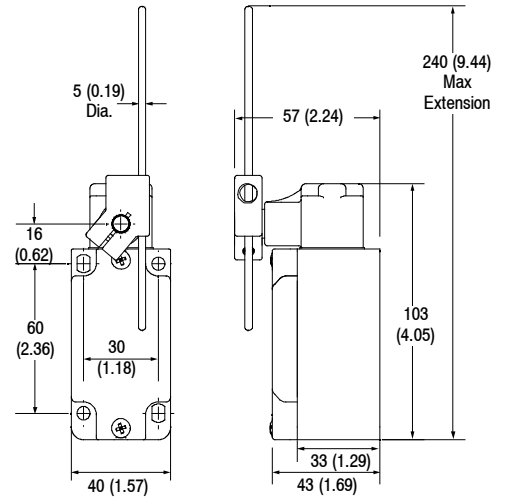


Approximate Dimensions [mm (in.)]

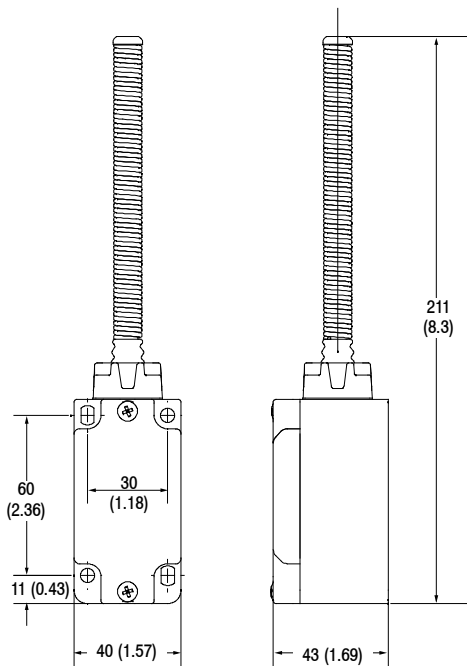
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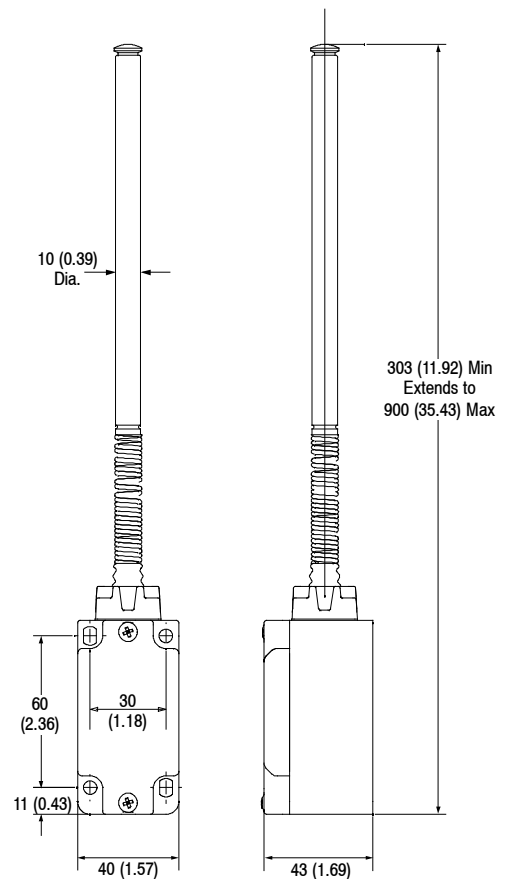
Adjustable Lever



Rod Lever



Spring Rod



Telescopic Arm

Limit Switches

440P Safety Limit Switches

15mm Plastic Position Interlock Switches



Imp 1



Imp 2

Description

The Imp offers safety switch performance of bigger units in the most compact case available. Designed with two mounting hole options and a choice of actuator positions, the Imp will fit in the most confined spaces.

Features

- Positive operation, forced disconnection of contacts
- Contacts, 1 N.C. & 1 N.O.

Specifications

Standards	EN60947-5-1, EN292-1, EN60204-1, EN1088
Certifications	CE Marked for all applicable directives and CSA NRTL/C
Safety Contacts	1 N.C. positive break
Utilization Category	AC 15
AC (Ue)	500 V 250 V 100 V
(Ie)	1 A 2 A 5 A
DC	250 V 0.5 A, 24 V 2 A
Max. Switched Current/Voltage/Load	500 V/500 VA
Thermal Current (Ith)	10 A
Minimum Current	5 V 5 mA DC
Safety Contact Gap	>2 x 2 mm (0.079 in.)
Rated Insulation Voltage	(Ui) 500 V
Rated Impulse Withstand Voltage	(Uimp) 2500 V
Auxiliary Contacts	1 N.O.
Pollution Degree	3
Actuator Travel for Positive Opening	2.5 mm (0.098 in.)
Break Contact Min. Force	10 N (2.25 lb)
Maximum Actuator Travel	5 mm (0.197 in.)
Maximum Actuation Speed	160 mm (6.29 in.) per sec
Maximum Actuation Frequency	2 Cycle per sec
Case Material	UL approved glass filled polyester
Actuator Material	Acetal
Protection	IP30
Conduit Entry	3x breakouts
Operating Temperature [C (F)]	-25...+80° (-13...+176°)
Mounting	2 x M3 front or 2 x M4 top
Mechanical Life	10,000,000 operations
Electrical Life	1,000,000 operations
Color	Red

Position Interlock Switch

Selection Guide	page 5-129
Dimensions	page 5-129
Wiring Diagram	page 5-129
Operating Levers	page 5-130

440P Safety Limit Switches

15mm Plastic Position Interlock Switches

Range of Operation



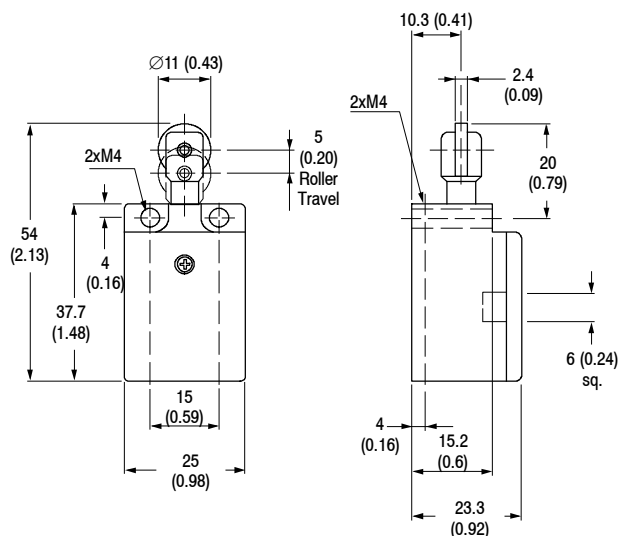
Imp 1

Imp 2

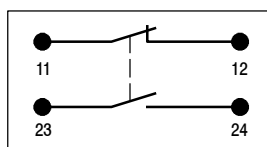
Selection Guide

Contact Action	Conduit	Contact	Type	Operator Type	Cat. No.	
<input type="checkbox"/> Contact Open <input type="checkbox"/> Contact Closed 	3x breakouts	Slow break before make	1 N.O. & 1 N.C.	Imp 1 (roller parallel to switch front)	Top Push Roller	440P-M18001
Imp 2 (roller perpendicular to switch front)				Top Push Cross Roller	440P-M18002	

Approximate Dimensions [mm (in.)]



Wiring Diagram






1 N.O. & 1 N.C.







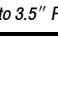
Operating Levers

For use with 802T, 802M, 802MC, 802X, 802XR

Roller Levers






Type	Roller			Cat. No.
	Material	Dia.	Width	
 Non-Adj. Cast Lever 0.75" Radius	Metal	0.75"	0.27"	802T-W9A
 Non-Adj. Cast Lever 1.5" Radius Roller on Front	Nylon	0.75"	0.28"	802T-W1
	Nylon	0.75"	1"	802T-W1H
	Dual Nylon	0.75"	1" each	802T-W1HH
	Steel	0.75"	0.25"	802T-W1A
	Steel	0.75"	0.75"	802T-W1N
	Ball Bearing	0.75"	0.23"	802T-W1B
	Beryllium Copper (Nonsparking)	0.75"	0.28"	802T-W1J
 Non-Adj. Cast Lever 1.5" Radius Roller on Rear	Nylon	0.75"	0.28"	802T-W1E
	Nylon	0.75"	1"	802T-W1D
	Nylon	1.5"	0.28"	802T-W1G
	Steel	0.75"	0.25"	802T-W1F
	Steel	0.75"	0.75"	802T-W1C
	Nylon	0.75"	0.75"	802T-W1M
	 Non-Adj. Steel Lever 2.0" Radius Roller on Front	Nylon	0.75"	0.28"
Nylon		0.75"	1"	802T-W20D
Steel		0.75"	0.25"	802T-W20A
Steel		0.75"	0.75"	802T-W20B
Ball Bearing		0.75"	0.23"	802T-W20C
Beryllium Copper		0.75"	0.28"	802T-W20E
 Non-Adj. Steel Lever 2.0" Radius Roller on Rear		Nylon	0.75"	0.28"
	Nylon	0.75"	1"	802T-W20K
	Steel	0.75"	0.25"	802T-W20L
	Steel	0.75"	0.75"	802T-W20M
	Ball Bearing	0.75"	0.23"	802T-W20N
 Non-Adj. Steel Lever 2 1/8" Radius Roller on Front	Beryllium Copper	0.75"	0.28"	802T-W20P
	Nylon	0.75"	0.75"	802T-W18
 Non-Adj. Steel Lever 2 1/8" Radius Roller on Front	Nylon	0.75"	1"	802T-W18A

Approximate Dimensions—See page 5-133.

Type	Roller			Cat. No.
	Material	Dia.	Width	
 Non-Adj. Steel Lever 2.5" Radius Roller on Front	Nylon	0.75"	0.28"	802T-W25
	Nylon	0.75"	1"	802T-W25D
	Steel	0.75"	0.25"	802T-W25A
	Steel	0.75"	0.75"	802T-W25B
	Ball Bearing	0.75"	0.23"	802T-W25C
 Non-Adj. Steel Lever 2.5" Radius Roller on Rear	Beryllium Copper	0.75"	0.28"	802T-W25E
	Nylon	0.75"	0.28"	802T-W25J
	Nylon	0.75"	1"	802T-W25K
	Steel	0.75"	0.25"	802T-W25L
	Steel	0.75"	0.75"	802T-W25M
	Ball Bearing	0.75"	0.23"	802T-W25N
	Beryllium Copper	0.75"	0.28"	802T-W25P
 Non-Adj. Steel Lever 3.0" Radius Roller on Front	Nylon	0.75"	0.28"	802T-W30
	Nylon	0.75"	1"	802T-W30D
	Steel	0.75"	0.25"	802T-W30A
	Steel	0.75"	0.75"	802T-W30B
	Ball Bearing	0.75"	0.23"	802T-W30C
 Non-Adj. Steel Lever 3.0" Radius Roller on Rear	Beryllium Copper	0.75"	0.28"	802T-W30E
	Nylon	0.75"	0.28"	802T-W30J
	Nylon	0.75"	1"	802T-W30K
	Steel	0.75"	0.25"	802T-W30L
 Non-Adj. Steel Lever 3.0" Radius Roller on Rear	Steel	0.75"	0.75"	802T-W30M
	Ball Bearing	0.75"	0.23"	802T-W30N
	Beryllium Copper	0.75"	0.28"	802T-W30P
	 Adjustable Lever 1.19" to 3" Radius	Nylon	0.75"	0.28"
Nylon		0.75"	1"	802T-W2D
Nylon		1.5"	0.28"	802T-W2A
Steel		0.75"	0.25"	802T-W2B
Ball Bearing		0.75"	0.23"	802T-W2C
Steel		1.4"	0.27"	802T-W2E
Rubber		1.5"	0.5"	802T-W2R
Beryllium Copper		0.75"	0.28"	802T-NX94
 Adjustable Lever 1.19" to 3.5" Radius		Nylon	0.75"	0.28"
	Metal	802T-W17B		
	Nylon	1.5"	802T-W17A	

For use with 802T, 802M, 802MC, 802X, 802XR

Roller Levers (continued)

Type	Roller			Cat. No.
	Material	Dia.	Width	
 <i>Fork Lever 1.5" Radius</i>	Nylon; L.H. Roller on Front; R.H. Roller on Back	0.75"	0.28"	802T-W4
	Steel; L.H. Roller on Front; R.H. Roller on Back	0.75"	0.25"	802T-W4B
	Nylon; Both Rollers on Front	0.75"	0.28"	802T-W4A
	Nylon; Both Rollers on Rear	0.75"	0.28"	802T-NX115
	Nylon; Both Rollers on Front	0.75"	1"	802T-W4F
	Steel; Both Rollers on Front	0.75"	0.25"	802T-W4C
	Nylon; L.H. Roller on Back; R.H. Roller on Front	0.75"	0.28"	802T-W4D
 <i>Micrometer Adjustment Lever 1.5" Radius</i>	Nylon R.H. Adj.	0.75"	0.28"	802T-W6
	Steel R.H. Adj.	0.75"	0.25"	802T-W6A
	Ball Bearing R.H. Adj.	0.75"	0.23"	802T-W6B
	Nylon L.H. Adj.	0.75"	0.28"	802T-W6C
	Steel L.H. Adj.	0.75"	0.25"	802T-W6D
	Ball Bearing L.H. Adj.	0.75"	0.23"	802T-W6E
	Nylon R.H. Adj.	0.75"	1"	802T-W6F
 <i>Non-Adj. One-Way Lever 1.5" Radius</i>	Nylon	0.75"	0.28"	802T-W7①
	Steel	0.75"	0.25"	802T-W7A①
	Ball Bearing	0.75"	0.23"	802T-W7B①
 <i>Non-Adj. Offset Lever 1.44" Radius Roller on Front</i>	Nylon	0.75"	0.28"	802T-W12②
	Steel	0.75"	0.25"	802T-W12A②
	Bearing Roller	0.75"	0.23"	802T-W12B
 <i>Non-Adj. Offset Lever 1.44" Radius Roller on Rear</i>	Nylon	0.75"	0.28"	802T-W12E
	Steel	0.75"	0.25"	802T-W12F

Roller Levers—Corrosion-Resistant

Type	Material	Roller		Cat. No.
		Dia.	Width	
 <i>1.5" Radius Roller on Front</i>	Type 316 stainless steel roller, roller pin and clamp pin One-piece cast aluminum arm is protected with TUFRAM®③	0.75"	0.25"	802MC-W1A
 <i>1.5" Radius Roller on Rear</i>	Nylon Roller One-piece cast aluminum arm is protected with TUFRAM®③	1.5"	0.28"	802MC-W1G
 <i>Non-Adj. Offset Lever 1.44" Radius Roller on Front</i>	Nylon Roller One-piece cast aluminum arm is protected with TUFRAM®③	0.75"	0.28"	802MC-W12
 <i>Adjustable 1.19"-1.3" Radius</i>	Type 316 stainless steel roller, roller pin, clamp pin and adjustable lever arm Block is cast aluminum protected with TUFRAM®③	0.75"	0.25"	802MC-W2B

Approximate Dimensions—See page 5-133.







- ① Do not use on maintained contact limit switches.
- ② When mounted on Plug-In devices, the offset lever provides equivalent cam tracking to the NonPlug-In devices using catalog number 802T-W1 levers.
- ③ TUFRAM is a synergistic coating which combines the advantages of anodizing with a controlled infusion of PTFE for added corrosion resistance.
- ④ The micrometer adjustment roller lever is designed especially for installations where the position of the roller is a critical factor. This lever has a pivoted roller which can be turned laterally. After clamping the lever to the switch shaft, the position of the roller can be precisely adjusted through an arc of 7.5° on either side of the center or straight-line position.

Limit Switches

Operating Levers

For use with 802T, 802M, 802MC, 802X, 802XR





Rod Levers

Type	Material	Dia.	Cat. No.
	Stainless Steel Rod 5" Long	0.13"	802T-W3②
	Stainless Steel Rod 8.5" Long	0.13"	802T-W3B②
	Stainless Steel Rod 12" Long	0.13"	802T-NX50
	Stainless Steel Rod 11.5" Long	0.13"	802T-W3A
	Stainless Steel Rod 14" Long	0.08"	802T-W3F②
	Nylon Rod 12" Long	0.25"	802T-W3C 802T-NX142 ⑤
	Stainless Steel Rod 5" Long	0.06"	802T-W5②
	Stainless Steel Rod 5" Long One-Way	0.06"	802T-W8①
	Nylatron Looped Rod 6" Long 2" Wide Loop	0.18"	802T-W14
	Nylatron Looped Rod 9" Long 2" Wide Loop	0.18"	802T-NX119
	Steel Rod 9" Long	0.25"	802T-W16
	Nylon Rod 9" Long	0.25"	802T-W16A

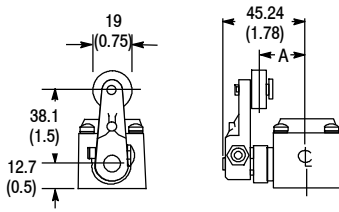
Approximate Dimensions—See page 5-133.

- ① Do not use on maintained contact limit switches.
- ② Recommended for use with low operating torque switches.
- ③ Not for use with 802M-NPY5 or 802M-ASY5 type switches.
- ④ TUFGRAM® is a synergistic coating which combines the advantages of anodizing with a controlled infusion of PTFE for added corrosion resistance.
- ⑤ Recommended for high impact applications.

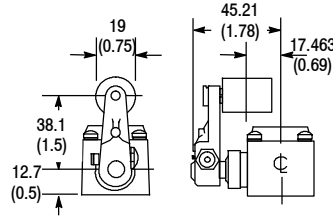
Rod Levers—Corrosion-Resistant

Type	Material	Dia.	Cat. No.
	Type 316 stainless steel rod 5" long Block is cast aluminum protected with TUFGRAM®④	0.13"	802MC-W3
	Type 316 stainless steel rod 11.5" long Block is cast aluminum protected with TUFGRAM®④	0.08"	802MC-W3A
	Nylon Rod 12" long Block is cast aluminum protected with TUFGRAM®④	0.25"	802MC-W3C
	Nylon Rod Only	0.25"	WF25507

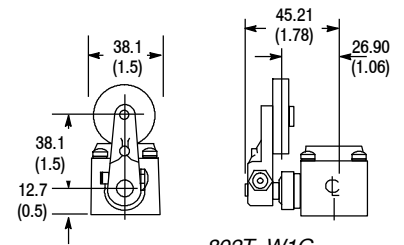
Approximate Dimensions [mm (in.)]



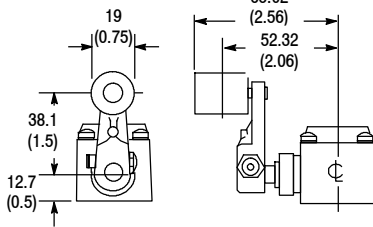
802T-W1C (Dim. A = 0.81");
802T-W1E and 802T-W1F (Dim. A = 1.03")
Shipping Wt. 57g (2oz). (W1C), 1 oz. (W1E),
43g (1.5oz) (W1F)



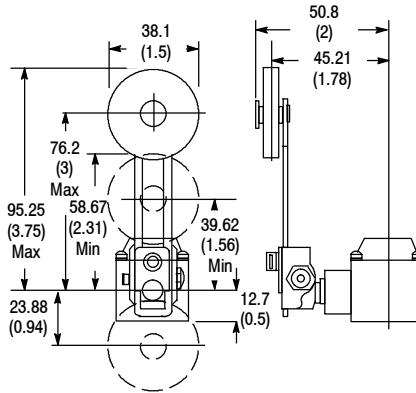
802T-W1D
Shipping Wt. 43g (1.5oz)



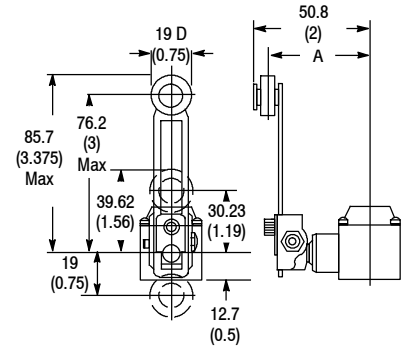
802T-W1G
Shipping Wt. 28g (1oz)



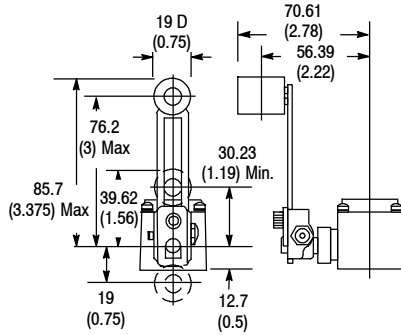
802T-W1H
Shipping Wt. 43g (1.5oz)



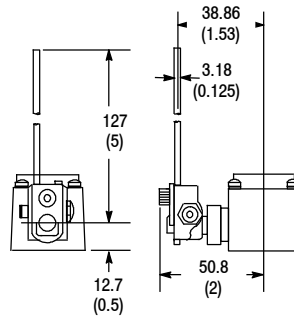
802T-W2A
Shipping Wt. 57g (2oz)



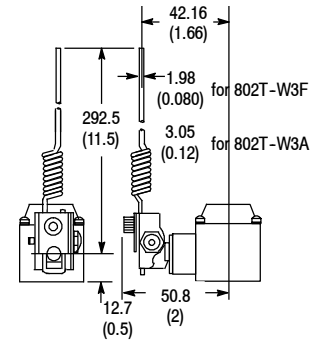
802T-W2 & 802T-W2B (Dim. A = 1.78");
802T-W2C (Dim. A = 1.81")
Shipping Wt. 57g (2oz)



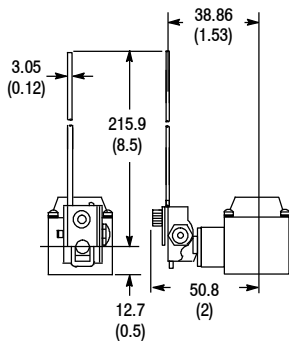
802T-W2D
Shipping Wt. 57g (2oz)



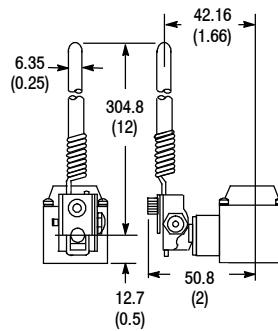
802T-W3
Shipping Wt. 43g (1.5oz)



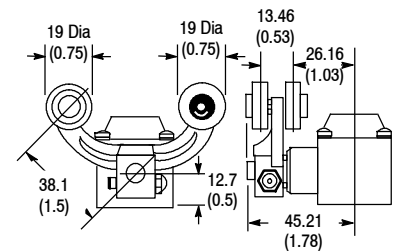
802T-W3A and 802T-W3F
Shipping Wt. 57g (2oz)



802T-W3B and 802T-W3F
Shipping Wt. 43g (1.5oz)

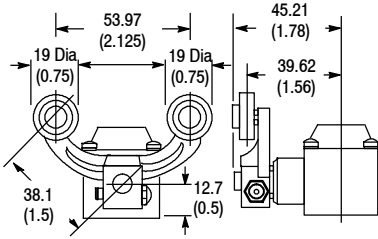


802T-W3C
Shipping Wt. 57g (2oz)

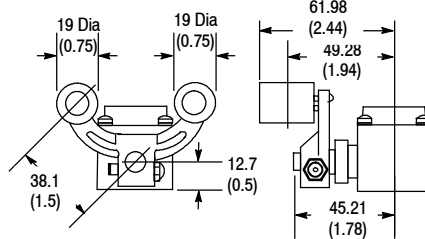


802T-W4 and 802T-W4D
Shipping Wt. 43g (1.5oz) 802T-W4B
Shipping Wt. 57g (2oz)

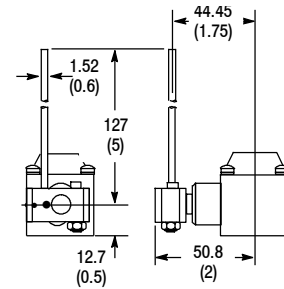
Approximate Dimensions [mm (in.)] (continued)



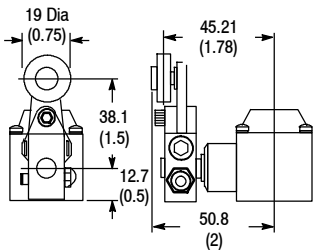
802T-W4A and 802T-W4C
Shipping Wt. 57g (2oz)



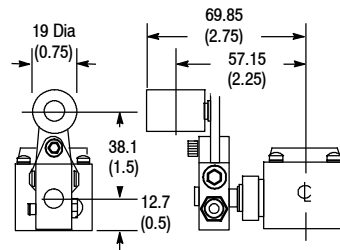
802T-W4F
Shipping Wt. 57g (2oz)



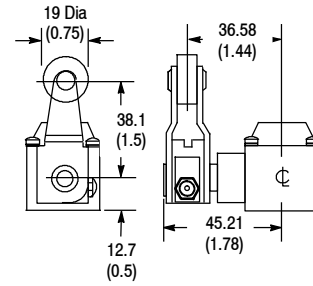
802T-W5
Shipping Wt. 28g (1oz)



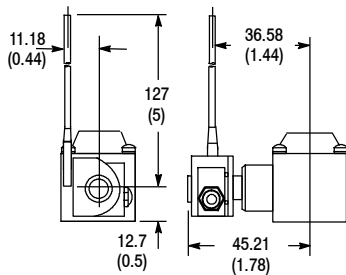
802T-W6, 802T-W6A,
802T-W6B, 802T-W6E
Shipping Wt. 57g (2oz)



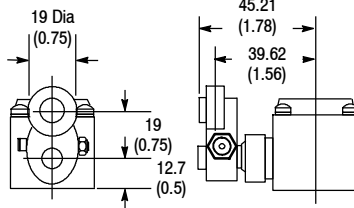
802T-W6F
Shipping Wt. 57g (2oz)



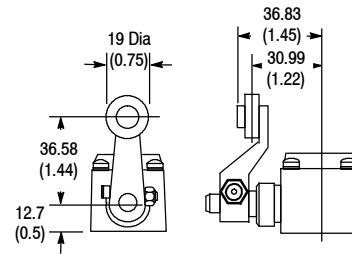
802T-W7, 802T-W7A
and 802T-W7B
Shipping Wt. 57g (2oz)



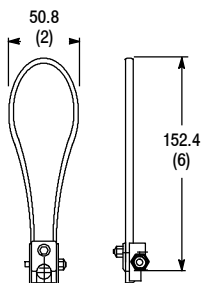
802T-W8
Shipping Wt. 43g (1.5oz)



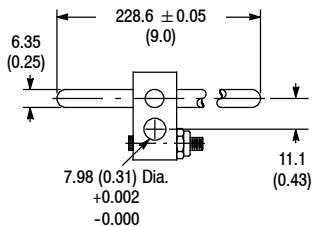
802T-W9
Shipping Wt. 28g (1oz)



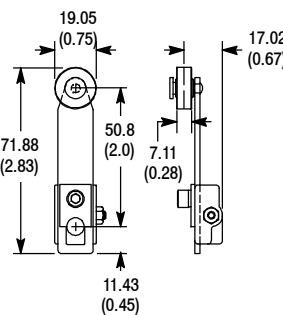
802T-W12 Shipping Wt. 1 oz. and
802T-W12A 802T-W6B, 802T-W6E
Shipping Wt. 43g (1.5oz)



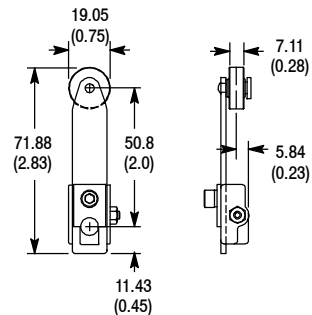
802T-W14
Shipping Wt. 43g (1.5oz)



802T-W16
802T-W16A




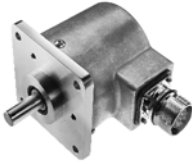



802T-W20
Shipping Wt. 57g (2oz)





802T-W20J
Shipping Wt. 57g (2oz)





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Absolute Encoders	Bulletin 842A Multi-Turn Magnetic	page 6-7
	Bulletin 842D DeviceNet™ Magnetic	page 10-16
	Bulletin 842HR Sine Cosine/Serial	page 6-10
	Bulletin 845D Single-Turn	page 6-14
	Bulletin 845G Single-Turn	page 6-18
	Bulletin 845GM Single-Turn	page 6-23
Incremental Optical Encoders	Bulletin 844A & 844B Hollow Shaft	page 6-28
	Bulletin 844D Hollow Shaft	page 6-31
	Bulletin 845F with Integral Coupler	page 6-34
	Bulletin 845H Size 25	page 6-37
	Bulletin 845T Size 20	page 6-41
Digital Tachometer	Bulletin 845PY (5PY Mounting)	page 6-44
Accessories	Serial Parallel Adaptor	page 6-46
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	Flexible Couplings	page 6-47
	Measuring Wheels	page 6-48
	Servo Clamps	page 6-48
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	Mounting Plates	page 6-52
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Quick Selection Guide

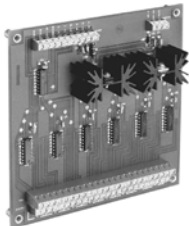
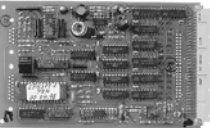

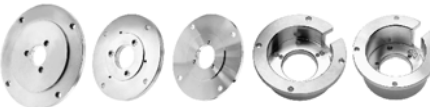
Specifications	 842A Multi-Turn Magnetic Absolute	 842HR Sine Cosine/Serial	 844A & 844B Hollow Shaft Incremental	 844D Hollow Shaft Incremental	 845D Single-Turn Absolute
Resolution	• 24 bits (2048...8192 CPR & 256...8192 revolutions)	• 1024 PPR	• 10...2500 PPR	• 360...16,384 PPR	• 8...12 bits (256...1000 CPR)
Power Supply	• 10...30V DC	• 5-12V DC, or 7...12C DC	• 5V DC, 12V DC, or 8...24V DC	• 5V DC, 10...30V DC, or 5...26V DC	• 5V DC or 8...24V DC
Outputs	• Synchronous Serial Interface (SSI)	• Analog differential • Digital RS-485 • Hiperface® compatible	• Differential line driver • NPN open collector	• Differential line driver • Push-Pull	• 5V TTL • Open collector
Housing Size (Dia.)	• 60 mm (2.36 in.)	• 64 mm (2.5 in.)	• 51 mm (2.0 in.)	• 90 mm (3.5 in.)	• 64 mm (2.5 in.)
Frequency Response or Data Rate	• Up to 500 kHz	• 200 kHz	• 100 kHz	• 200, 300, or 600 kHz	• 16 K words/sec
Shaft Speed	• 6000 RPM	• 6000 RPM	• 3000 RPM	• 3000 RPM	• 5000 RPM
Mounting	• Metric servo with 36 or 50 mm pilot	• Square flange • Hub Shaft	• Integral flex mount	• Three tether options & anti-rotation pin	• Square flange • English servo
Connections	• Radial connector	• Radial connector	• 18in (457mm) integral cable	• Radial connector • Radial cable • Terminal block	• Axial connector • Radial connector
Protection	• IP66 (IEC 529)	• IP66	• IP40 (IEC 529)	• NEMA 4, 13; IP66	• NEMA 4, 13; IP66
Additional Info	• See page 6-7	• See page 6-10	• See page 6-28	• See page 6-31	• See page 6-14

Specifications	 845F Incremental with Integral Coupler	 845G Single-Turn Absolute	 845GM Single-Turn Absolute	 845H Size 25 Incremental	 845K Size 25 Incremental
Resolution	• 1...5000 PPR	• 8...15 bits (256-32,768 CPR)	• 8...15 bits (256-32,768 CPR)	• 1...5000 PPR	• Up to 5000 PPR
Power Supply	• 5V DC or 8...24V DC	• 5V DC, 10...30V DC, or 8...24V DC	• 5V DC, 10...30V DC, or 8...24V DC	• 5V DC or 8...24V DC	• 5V DC or 8...24V DC
Outputs	• Source • Sink w/pullup • Differential line driver • Open collector	• 5V TTL • Open collector • Push-Pull • SSI	• 5V TTL • Open collector • Push-Pull • SSI	• Source • Sink w/pullup • Differential line driver • Open collector	• Source • Sink • Differential line driver • Open collector
Housing Size (Dia.)	• 64 mm (2.5 in.)	• 64 mm (2.5 in.)	• 51 mm (2.0 in.)	• 64 mm (2.5 in.)	• 64 mm (2.5 in.)
Frequency Response or Data Rate	• 200 kHz	• 16 Kwords/sec	• 16 Kwords/sec	• 200 kHz	• 210 kHz
Shaft Speed	• 6000 RPM	• 5000 RPM	• 5000 RPM	• 6000 RPM	• 6000RPM
Mounting	• Standard coupler • High performance coupler	• Square flange • English servo	• Square flange • English servo	• Square flange • English servo	• Square flange • English servo
Connections	• Axial connector • Radial connector • Axial cable • Radial cable	• Axial connector • Radial connector	• Radial connector	• Axial connector • Radial connector • Axial cable • Radial cable	• 24in pigtail cable termination
Protection	• NEMA 4, 13; IP66	• NEMA 4, 13; IP66	• NEMA 4, 13; IP66	• NEMA 4, 13; IP66	• NEMA 1
Additional Info	• See page 6-34	• See page 6-18	• See page 6-23	• See page 6-37	• www.ab.com/catalogs

Quick Selection Guide

Specifications	 845P Size 15 Incremental	 845PY Digital Tachometer (5PY Mounting)	 845S IGBT Drive Incremental	 845T Size 20 Incremental
Resolution	• 500 or 1000 PPR	• 1...3000 PPR	• Up to 5000 PPR	• 1...3000 PPR
Power Supply	• 5V DC	• 5V DC, 11...20V DC or 24V DC	• 5V DC and 8...24V DC	• 5V DC, 11...20V DC or 24V DC
Outputs	• Differential line driver	• Differential line driver	• Differential line driver	• Push-Pull • Differential line driver
Housing Size (Dia.)	• 40 mm (1.59 in.)	• 51 mm (2.0 in.)	• 64 mm (2.5 in.)	• 51 mm (2.0 in.)
Frequency Response or Data Rate	• 100 kHz	• 100 kHz	• 100 kHz	• 100 kHz
Shaft Speed	• 5000 RPM	• 15000 RPM	• 6000RPM	• 15000 RPM
Mounting	• English servo	• 5PY	• Square flange • English Servo	• Square flange • English servo
Connections	• 18 in. (457 mm) integral cable	• Radial connector • Radial cable	• Axial connector & cable • Radial connector & cable	• Radial connector • Radial cable
Protection	• NEMA 1	• NEMA 4, 13; IP66	• NEMA 4, 13; IP66	• NEMA 4, 13; IP66
Additional Info	• www.ab.com/catalogs	• See page 6-41	• www.ab.com/catalogs	• See page 6-41

Accessories	 Flexible Couplings	 Measuring Wheels	 Servo Clamps	 Cable Assemblies	 Mating Connectors
Additional Info	• See page 6-47	• See page 6-48	• See page 6-48	• See page 6-49	• See page 6-52

Accessories	 Buffer Board	 Serial Parallel Adaptor	 Servo Clamps	 Mounting Plates
Additional Info	• See page 6-55	• See page 6-46	• See page 6-46	• See page 6-52

I/O to Encoder Selection Guide

Accessories

To use this selection guide, scan down the column of the input card or device being used, then look in the column to the right for typical encoders that could

be used in the application. The asterisk (*) is used to represent one character in the catalog number. Complete the encoder catalog number by referring to

the appropriate pages in the catalog. Some absolute encoders typically require an output module to send a latching signal.

Incremental Encoders		Absolute Encoders		
If you have one of these Input Devices:	Select one of these Encoders:	If you have one of these Input Devices:	Select one of these Encoders:	And select one of these Output Modules if necessary:
1395 DC Drive 1746-HSCE 1746-HSTP1 1756-M02AE 1756-HSC 1771-IJ 1771-QC 1771-VHSC 8200 CNC 8400 CNC 8600 CNC 9 SERIES CNC IMC 110, 120 IMC 121, 123 IMC S-CLASS MAX CONTROL	845F-SJ*Z*4**Y** 845H-SJ***4**Y** 845K-SA*Z*4**Y3 845M-***5LD****	1746-IG16 1771-IG 1771-IGD	845D-SJ***4BD*** 845D-SJ***4BN*** 845G-*3**HT**** 845GM-*3**HT****	1771-OG / OGD 1746-OG16
	845P-SHC14-**3 845PY-**-*_* 845T-**13E**_* 845T-**43E**_* 845T-**53E**_* 844D-****1** 844D-****4** 844A-**05D**** 844B-**05D****	1746-IG16 1771-IG 1771-IGD	845D-SJ***4AG*** 845G-*3G*HT**** 845GM-*3G*HT**** 842A with 842-SPA	None Required
		1746-ITV16 1746-IV8,16,32 1771-IQ, IQ16 1771-IV, IVN 1756-IV16 1794-IV16	845D-SJ**25AG*** 845G-*3G8HC**** 845GM-*3G8HC**** 842A with 842-SPA	None Required
1771-IK	845F-SJ*Z26**Y** ❶ 845H-SJ**26**Y** ❶ 845K-SA*Z25**Y3 845T-**3***_*C 844A-**12C**** 844B-**12C**** 844D-****5**	1746-ITV16 1746-IV8,16,32 1771-IQ, IQ16 1771-IV, IVN 1756-IV16 1794-IV16	845D-SJ**25BD*** 845D-SJ**25BN*** 845G-*3B8HC**** 845G-*3D8HC**** 845GM-*3B8HC**** 845GM-*3D8HC****	1771-OV 1746-OV 1756-OV16E 1794-OV16
1336 PLUS 1336 FORCE 1336 IMPACT	845S-****	1771-DE	845D-SJ***4A**** 845G-*3**HT**** 845GM-*3**HT****	None Required
MICROLOGIX 1000, 1200, 1500	845T-**33A**_* 845TK-****_* 844D-****5** 844A-**12C**** 844B-**12C****	1771-DL	845D-SJ***5AGCW* 845G-*3G8HC0256* 845GM-*3G8HC0256*	None Required
1794-VHSC 1394	845H-SJ**24 845T-**53 844D-****4** 844A-**05D**** 844B-**05D****	4100-AEC AMCI 7561	842A-**** 845G-*3*AHS**** 845GM-*3*AHS****	None Required
		1756-IBI16	845G-*3G8LC**** 845GM-*3G8LC**** 845D-SJ**25AG	None Required
1794-ID2 1746-HSCE2 1756HSC 1397	845H-SJ**26 845T-**63 844D-****2** 844A-**24D**** 844B-**24D****	1756-PLS	846-SJDA1CG-R3C	None Required
1747-L**C 1747-L**D 1747L**E	845T-**31**	1746-ITB16 1746-IB8, IB16, IB32 1771-IQ, IQ16 1771-IB, IBN 1794-IB16 1756-IB16 MicroLogix 1000, 1200, 1500	845G-*3*8HP**** 845GM-*3*8HP****	1771-OV 1746-OV 1756-OV16E 1794-OV16
845-BB-	845F-SJ**14 845H-SJ**14 845K-SA**14 845P-SHC14-** 845T-**13 844D-****1** 844A-**05D**** (5V DC Supply)			
	844B-**05D**** 845F-**24 845H-SS**24 845K-SA**24 845T-**43 844D-****4** (12V DC Supply)			

❶ Wire Single Ended Only (no complements)

Technical Definitions and Terminology

5PY: A type of analog DC tachometer with a specific bolt pattern.

Angular Acceleration: The rate of change of angular velocity usually expressed in radians per second squared.

Angular Misalignment: The maximum amount of angle between the coupled shafts.

Axial: The direction parallel to the encoder shaft.

Axial Compliance: The maximum amount of machine shaft end play.

Axial Load: The maximum amount of force that may be applied to an encoder shaft in a direction parallel to the shaft.

Blind Shaft: A hollow shaft encoder which is covered on one end so that the accepted shaft cannot exceed a maximum length. See also "Hollow Shaft" and "Through Shaft."

Binary: A number system using 2 as its base (1,2,4,8,16,32,...).

Binary Coded Decimal (BCD): A number system where decimal numbers 0 through 9 are represented by 4 binary bits (8,4,2,1).

Bit: An abbreviation for binary digit.

Channel: An incremental encoder output signal. A dual channel encoder has two outputs.

Counts Per Turn: Sometimes referred to as Pulses Per Revolution (PPR), the total number of positions in 360 degrees of shaft rotation.

Current Sinking: An output type where signal current flows from the load into the encoder.

Current Sourcing: An output type where signal current flows from the encoder into the load.

Data: Factual measurement information transmitted by an encoder either in parallel or serial form.

Decades: In BCD a decade is comprised of 4 bits (1, 2, 4, 8) representing one decimal place (units, tens, hundreds, etc.).

Differential: In digital logic terms a pair of outputs exactly opposite 0, 1, or 180 degrees out of phase.

Differential Line Driver: A type of output driver using two signal lines per encoder channel. When used with a differential line receiver, longer cable lengths and higher noise immunity can be provided.

Duty Cycle: The ratio of the logic "1" level to the total period of one cycle.

End Play: The amount of axial shaft movement with a specified amount of axial load applied.

Flange: A square mounting configuration for rotary encoders and resolvers.

Frequency Response: The maximum frequency at which all parameters are still in specification.

Gray Code: A binary code in which only one bit of the binary word changes for each sequential number or position.

Heavy Duty: Encoders with higher shaft loading characteristics are considered heavy duty.

High Performance: Encoders with high frequency response and resolution are considered high performance.

Hollow Shaft: A shaftless encoder design which mounts on the shaft of a connected device such as a motor. See also "Blind Shaft" and "Through Shaft."

Impedances: Impedances, expressed in ohms, are usually specified in rectangular form as $R + jX$ where R is the sum of the DC and AC resistive components and X is the reactive component.

Index: An output signal, also known as a zero marker, which is produced once per revolution. It is used to identify a home position or a reset point.

Input Current: The current required to power the internal circuitry of the encoder.

IP66 (IEC 529): Provides a degree of protection against dust, and water projected in powerful jets from any direction.

Load: A term used to describe the device to which encoder signals are applied.

Maximum Working Temperature: A maximum temperature allowed for operation for most applications. Some specifications may not be met. Also see "Operating Temperature."

Maximum Working Speed: A maximum speed allowed for operation for most applications. Shaft loading must be minimized. Some specifications may not be met. See also "Operating Speed."

Moment of Inertia: The sum of the products formed by multiplying the mass of each element of a figure by the square of its distance from an axis.

NEMA Type 1: Type 1 enclosures are intended to provide protection against incidental contact with dirt, dust, lint, fibers, and other nonliquid contaminants.

NEMA Type 4: Type 4 enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water and hose directed water. They are not intended to provide protection against conditions such as internal condensation or internal icing.

Nosepiece: The housing that holds the shaft, bearings, and shaft seal.

Null Voltage: The residual voltage remaining when the in-phase component of the output voltage is zero.

Operating Speed: The maximum shaft RPM allowed at which all specifications are met. See also "Maximum Working Speed."

Operating Temperature: The maximum temperature allowed at which all specifications are met.

Parallel Misalignment: The maximum amount of distance between the center lines of the coupled shafts.

Technical Definitions and Terminology

Pulses Per Revolution (PPR): See counts per turn.

Push-Pull: A type of single-ended output driver capable of sinking and sourcing current. Also known as Totem-Pole.

Quadrature: Separation in phase by 90°. Used on incremental encoders to denote the direction of motion.

Radial: The direction perpendicular to the encoder shaft.

Radial Load: The maximum amount of force that may be applied to an encoder shaft in a perpendicular direction.

Radial Play: The amount of shaft radial movement with specified radial load.

Radian: An arc in any circle, equal in length to the radius of the same circle.

Resolution: The measure of the smallest change of input that the encoder can detect.

Running Torque: The torque required to keep a shaft rotating at constant velocity, typically measured in inch-ounces.

Sensitivity: The output voltage expressed as a function of the shaft angle in millivolts/degree.

Servo: A circular mounting configuration that allows for rotation of the encoder for purposes of alignment. Also a common term for a small electric motor.

Shaft Loading: The maximum amount of force that may be applied to an encoder shaft typically expressed in pounds (Newtons).

Shaft Runout: The amount of radial movement when spinning.

Shock: A transient motion which is capable of exciting mechanical resonances.

Single-Ended: An output referenced to common which uses only one signal line for data transmission.

Size 15: Encoders with a nominal diameter of 1.5 inches (1.625 inch encoders are also classified as size 15).

Size 20: Encoders with a nominal diameter of 2.0 inches.

Size 25: Encoders with a nominal diameter of 2.5 inches.

Slew Speed: The maximum velocity an encoder may be operated without physical damage to the unit.

Starting Torque: The torque required to start a shaft rotating, typically measured in inch-ounces.

Symmetry: The ratio of the logic "1" level to the total period of one cycle.

Synchronous Serial Interface or SSI: A serial communication protocol often used to translate parallel absolute encoder data. Advantages of SSI over parallel wiring include reduced wire count and better noise immunity.

Through Shaft: A hollow shaft encoder which is open on both ends so that the accepted shaft length is unlimited. For example, a through shaft encoder allows a motor shaft to protrude through it. See also "Blind Shaft" and "Hollow Shaft."

Transformation Ratio: The ratio of the output voltage to the input voltage when the output is at maximum coupling.

Vibration: The periodic change in displacement with respect to a fixed reference.

Zero Reference: An output signal which is produced once per revolution. It is used to identify a home position or a reset point.

Bulletin 842A Absolute Multi-Turn Magnetic Encoders

Synchronous Serial Interface



Description

Bulletin 842A is a 25-bit absolute multi-turn shaft encoder. It can provide up to maximum of 8192 pulses per turn or a maximum of 8192 turns. It has SSI outputs to reduce cable costs.

The 842A can be interfaced in several ways:

- 1734-SSI Synchronous Serial Interface Absolute Encoder Module
- 842-SPA and 842-CH which converts SSI to parallel data
- 4100-AEC which converts SSI to A quad B data to interface with 1394 GMC/GMC Turbo and S Class Compact motion controllers (see publication 4100-AEC-1.1)
- SLC input module AMCI 7561 which inputs SSI data directly into the module (see Encompass partner AMCI).
- PLC—AMCI 7761H

Synchronous Serial Interface or SSI provides many advantages over traditional parallel wiring. SSI provides 25 bit resolution over 5 wires rather than the usual 24 wires. The use of SSI technology in the Bulletin 842A provides the following customer benefits:

- Greatly reduced wiring cost and complexity
- Greatly improved noise immunity achieved via differential communication format
- Simplified start up
- Choice of gray code or natural binary formats

Specifications

Certifications	CE Marked for all applicable directives.
----------------	--

Electrical

Code Format	Gray or Natural Binary
Code Direction	CW or CCW
Symmetry	40...60%
Operating Voltage	10...30V DC
Power Supply	30 mA @ 24V
No. of Steps, Max.	8192
No. of Revolutions, Max.	8192
SSI Position Forming Time	0.15 msec
Power-Up Delay	1050 msec
Clock +, Clock -, Data +, Data -	Synchronous Serial Interface (SSI)
CW/CCW	"L" active (L = 0-1.5V, H = 3.0 - V _s)
Reset	Via covered rear button or reset pin

Mechanical

Angular Acceleration	5 x 10 ⁵ radians/sec ²
Moment of Inertia	35 gcm ² (5.0 x 10 ⁻⁴ oz-in-sec ²)
Shaft Operating Speed, Max. (RPM)	6000 RPM at max shaft loading
Starting Torque	2.5 Ncm (3.5 oz-in)
Shaft Loading	Axial 11 lb (50 N) Radial 67 lb (300 N)

Environmental

Material	Aluminum housing
Operating Temperature [C (F)]	-20...85° (-4...+185°)
Storage Temperature [C (F)]	-40...100° (-40...+212°)
Relative Humidity	98% noncondensing
Enclosure Type Rating	NEMA Type 4, 13; IP67 (IEC 529): Static Shaft
Shock	100 g/6 msec
Vibration	20 g/10...2000 Hz
Weight [g (oz)]	0.5 (18)

Typical Applications

- Steel mills
- Overhead cranes
- Punch press
- Transfer lines
- Oil rigs
- Wind mills
- Machine Tools
- Packaging

Accessories

Description	Page Number
Serial Parallel Adaptor Board	6-46
Flexible Couplings	6-47
Measuring Wheels	6-48
Servo Clamps	6-48
Pre-Wired Cables	6-49
Mating Connectors	6-52
Mounting Plates	6-52

Bulletin 842A Absolute Multi-Turn Magnetic Encoders

Synchronous Serial Interface

Product Selection

842A — **31** **G** **B**
a *b* *c*

a

Mounting Configuration	
Code	Description
31	Servo Mount 10 mm Shaft 36 mm Pilot
56	Servo Mount 6 mm Shaft 50 mm Pilot

b

Code Type	
Code	Description
G	Gray Code
N	Natural Binary

c

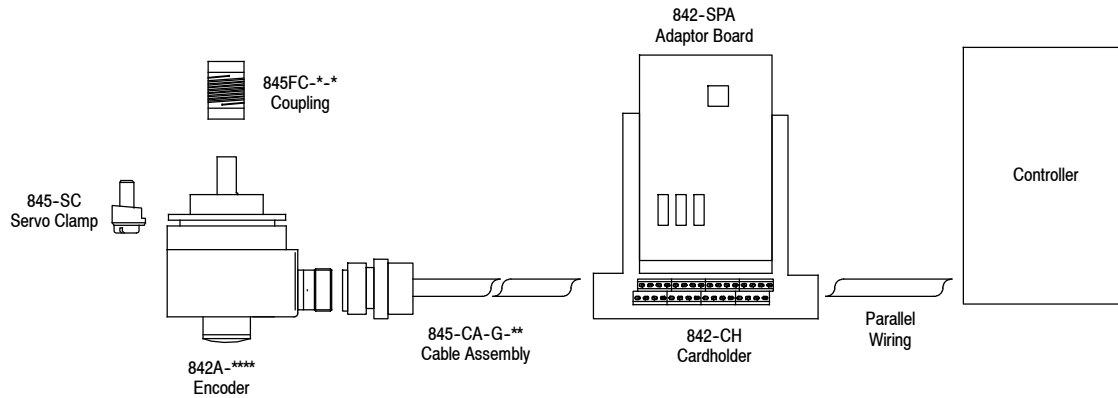
Resolution		
Code	Pulses per Revolution	Number of Revolutions
A	8192	2048
B	4096	4096
C	2048	8192
D	4096	512
E	4096	256

Electrical Connections

The 842A comes with an M23 connector. Order the mating connector separately.

Function	Pin Number
DC Return	1
Data +	2
Clock +	3
DC+ Input	8
Data -	10
Clock -	11
CW/CCW	12
Reset	9

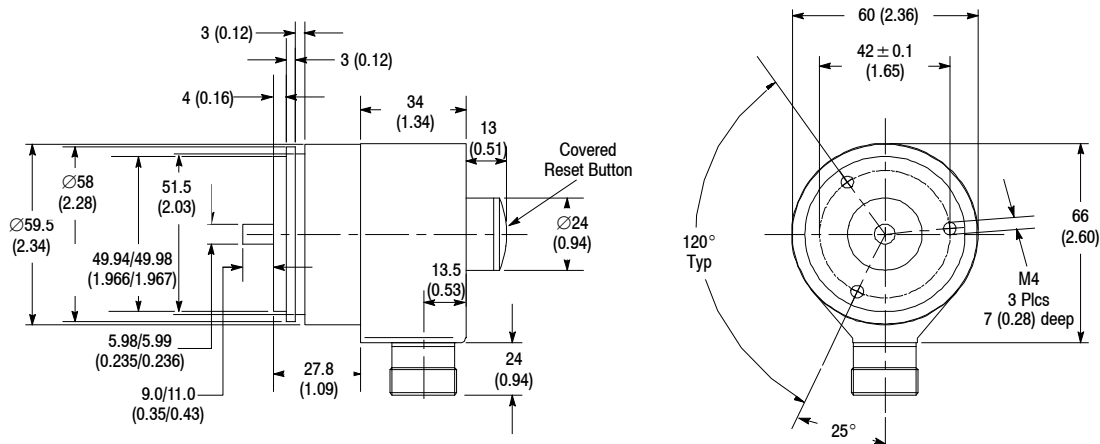
Typical Application



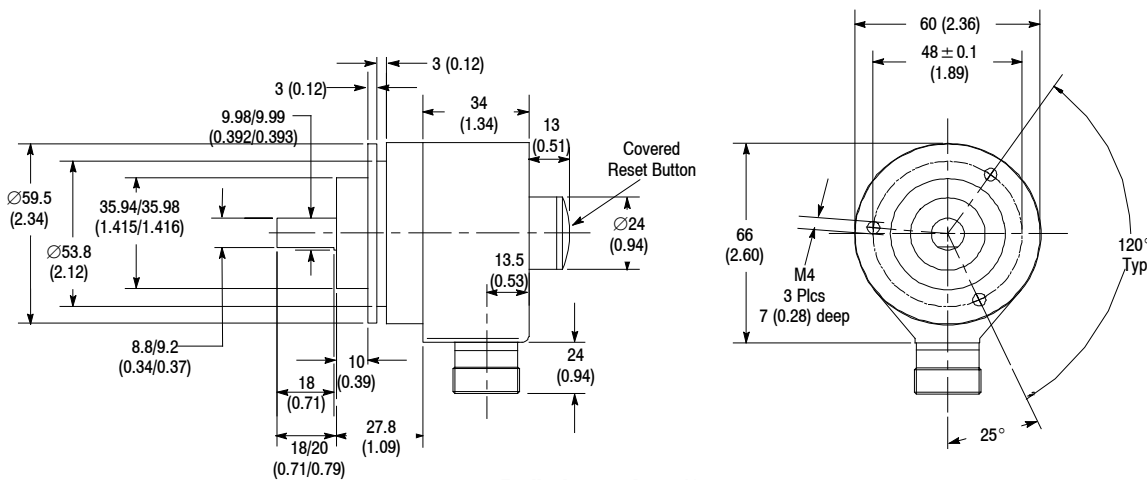
Bulletin 842A Absolute Multi-Turn Magnetic Encoders

Synchronous Serial Interface

Approximate Dimensions [mm (in.)]



Bulletin 842A-56**



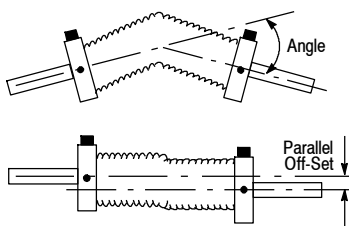
Bulletin 842A-31**

ATTENTION



Activating the zero reset results in a change of position reading. This can cause unexpected motion which could result in damage to the product, equipment, or personal injury.

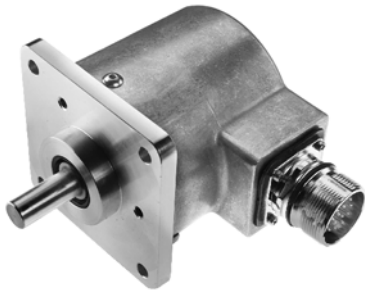
Flexible Shaft Couplings



ATTENTION



Rigidly coupling the encoder shaft to the machine shaft will cause a failure in either the bearings of the encoder or the bearings of the machine shaft.

Bulletin 842HR Sine Cosine/Serial Encoders**Size 25, High Resolution Auxiliary Servo Feedback****Description**

Bulletin 842HR is a 15-bit serial/sine cosine encoder. Targeted for high performance digital servo drive systems that require absolute feedback for position control and high resolution incremental feedback for speed control.

Rockwell Automation sine cosine high performance encoders provide commutation, speed regulation and position control all in one device. Absolute position values of up to 15 bit combined with incremental resolution up to 2 million counts per turn.

Features

- Absolute feedback for position control
- High resolution Incremental feedback for speed control
- Commutation
- Sine cosine differential interface
- Digital bidirectional RS-485 interface
- Compatible with Hiperface[®] interface
- Internal diagnostic functions

Typical Applications

Compatible with a variety of motor control products including Kinetix[®] drives and the Allen-Bradley Guardmaster[™] MSR 57 safe speed monitoring relay, the 842HR is a flexible solution for a wide range of industrial applications.

- Packing machines
- Robotics
- Printing machines
- Rotary table positioning

Specifications

Certifications	CE Marked for all applicable directives
Electrical	
# of sine/cosine cycles per revolution	1,024
Code format for absolute position value	Binary
Code direction with clockwise rotation viewed from shaft end	Increasing
# of steps per revolution (Single 842HR-S)	32,768
# of revolutions (Multi 842HR-M)	4,096
Error limits for the digital absolute value via RS 485	±90 angular seconds
Error limits in evaluating the 1,024 signals, integral non-linearity	±45 singular seconds
Non-linearity within a sine/cosine period, differential non-linearity	±7 angular seconds
Output frequency for sine/cosine signals	0...200 kHz
Operating Voltage Range	7...12V, 5...12V
Max. Operating Current, no load	
5...12 V Supply ❶	180 mA
7...12 V Supply	80 mA
Available Memory on EEPROM ❷	128 bytes
Interface Signals	
Process data channel = SIN, REFSIN, COS, REFCOS	Analog, differential
Parameter channel = RS 485	Digital
Mechanical	
Angular Acceleration, Max.	5 x 10 ⁵ rad/sec ²
Shaft Operating Speed, Max. (RPM)	6,000
Torque to Operate [N•m (lb•in)]	0.024 (0.212) max.
Starting Torque, Max.	0.035 N•m (0.309 lb•in)
Shaft Loading	Radial 35 lb, Axial 40 lb
Life of Ball Bearings	3.6 x 10 ⁹ rotations
Environmental	
Material	Aluminum housing
Operating Temperature [C (F)]	-20...85° (-4...+185°)
Storage Temperature [C (F)]	-30...+90° (-22...+194°)
Relative Humidity ❸	90%
Shock ❹	30 g/11 ms
Vibration ❺	20 g/10...2 kHz
Enclosure Type Rating ❻	IP66 (IEC60529)
Weight [g (oz)]	481 g (17 oz)
EMC	DIN EN61000-6-2 DIN 61000-6-3

❶ Inrush current with 5...12V supply can be as high as 1 Amp

❷ If applying the electronic type label, in connection with numeric controllers, attention should be paid to Patent EP 425 912 B 2. Application of the electronic type label in connection with speed regulation is exempt.

❸ Condensation not permissible

❹ To DIN EN 60068-2-27

❺ To DIN EN 60068-2-6

❻ With mating connector inserted

Bulletin 842HR Sine Cosine/Serial Encoders

Size 25, High Resolution Auxiliary Servo Feedback

Product Selection

842HR — **S** **J** **DZ** **1** **15FWY** **2**

a *b* *c* *d*

a

No. of Turns	
Code	Description
S	Single-turn (1 turn)
M	Multi-turn (4096 turns)

b

Mounting Configuration (Note)	
Code	Description
DZ	Square Flange, 3/8 in. solid shaft
DN	Square Flange, 3/8 in. solid shaft with flat
A1	Hub shaft, 15 mm blind hollow shaft
A2	Hub shaft, 1/2 in. blind hollow shaft
A3	Hub shaft, 12 mm blind hollow shaft
A4	Hub shaft, 10 mm blind hollow shaft
A5	Hub shaft, 3/8 in. blind hollow shaft
A6	Hub shaft, 8 mm blind hollow shaft
A7	Hub shaft, 1/4 in. blind hollow shaft
A8	Hub shaft, 6 mm blind hollow shaft

C

Power Supply	
Code	Description
1	5...12V DC
2	7...12V DC

d

Connection Options	
Code	Description
2	MS 10-pin
D	M23 17-pin

Note: Hub shaft units are supplied with 15 mm blind hollowshaft. For shaft bores smaller than 15 mm, a shaft insert is supplied having the correct ID.

Output Termination: M23 17-Pin

Pin No.	Function	Explanation	Wire Color
1	SINE	Process Data Channel	Black
2	REFSINE	Process Data Channel	White/Black
3	COSINE	Process Data Channel	Red
4	REFCOSINE	Process Data Channel	White/Red
5	Data +	RS-485 parameter channel	Green
6	Data -	RS-485 parameter channel	White/Green
9	DC + Input	5V Supply Voltage	Grey
10	DC Return	Ground Connection	White/Grey ①
11	DC + Input	9V Supply Voltage	Orange
13	N.C.		
14	N.C.		
15	N.C.		
16	N.C.		
17	N.C.		
7	CASE	Case Ground	Brown
8	N.C.		
12	DC Return	Ground Connection	①

① Pin 12 internally tied to pin 10

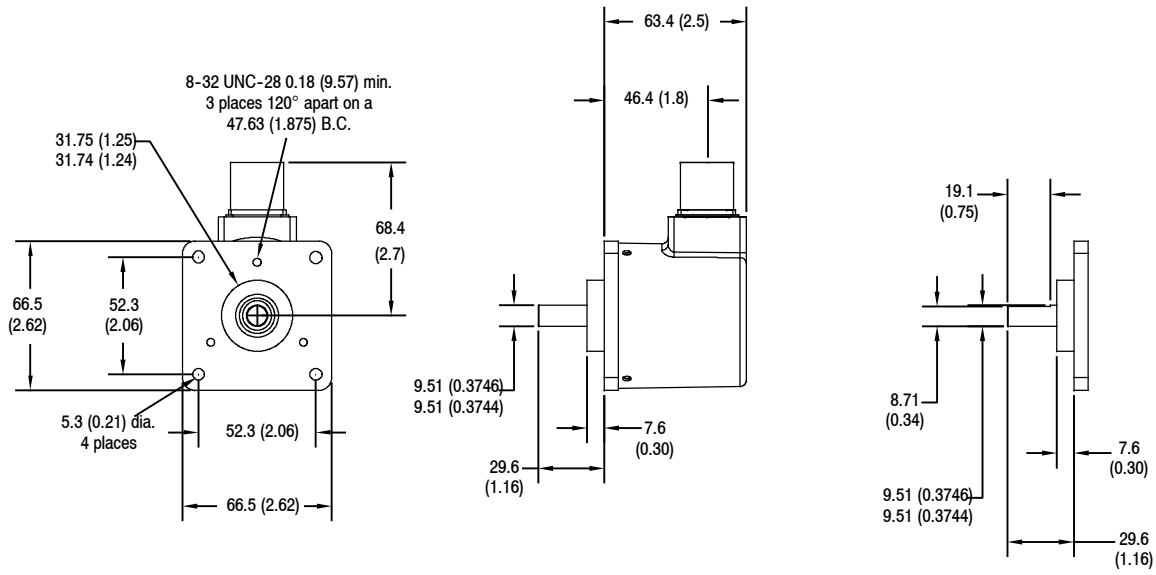
Output Termination: MS 10-Pin

Pin No.	Function	Wire Color
A	+VS	Red
B	Common	Blue
C	Ref SIN	Brown
D	Ref COS	Black
E	Data +	Grey
F	Data -	Green
G	SIN	White
H	COS	Pink
I	Not Used	
J	Case	Case

Bulletin 842HR Sine Cosine/Serial Encoders

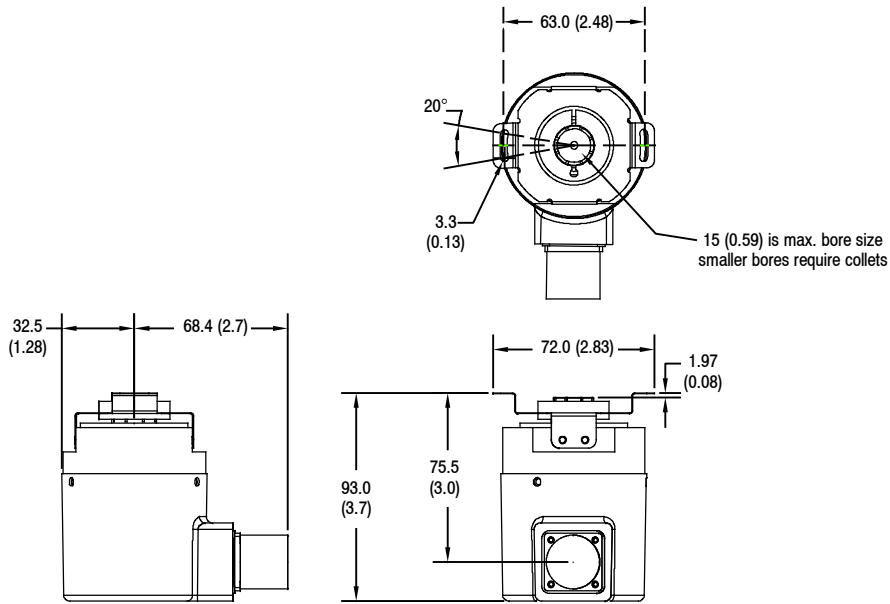
Size 25, High Resolution Auxiliary Servo Feedback

Approximate Dimensions [mm (in.)]



Square Flange, Solid Shaft

Solid Shaft with Flat



Hub Shaft

Bulletin 842HR Sine Cosine/Serial Encoders

Size 25, High Resolution Auxiliary Servo Feedback

Accessories

Description	Cat. No.
M23 17-Pin Cables	2090-XXNFMF-Sxx
MS 10-Pin Cables	842HR-CA-2-yy
Flexible Coupling	845-FC-x-x

2090-XXNFMF-Sxx

Pre-wired cable to a M23 DIN 17-pin connector for the encoder. The other end of the cable is flying leads.

xx = Cable Length	
01	1 m
02	2 m
03	3 m
04	4 m
05	5 m
07	7 m
09	9 m
12	12 m
15	15 m
20	20 m
25	25 m
30	30 m

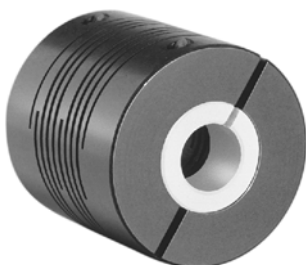
Note: Consult manufacturer's drive manual for maximum recommended cable length.

842HR-CA-2-yy

Pre-wired cable to a MS 10-pin connector for the encoder. The other end of the cable is flying leads.

yy = Cable Length	
01	1 m
03	3 m
05	5 m
10	10 m
20	20 m
30	30 m

Flexible Couplings



Description

High performance flexible couplings are used to connect two shafts, and help to reduce the effects of misalignment between the shafts. Flexible couplings are offered in the high performance version, with nonconductive inserts. They are of the flexible curved beam helical type with clamping screw at both ends.

Specifications

Parallel Offset	0.51 mm (0.02 in.) max.
Angular Offset	10° max.
Axial Compliance	1.58 mm (0.06 in.) max.
Construction	Aluminum with a fiberglass insert

Available cat. nos. for this encoder:

- 845-FC-B-B
- 845-FC-B-C
- 845-FC-B-R
- 845-FC-B-T
- 845-FC-A-B
- 845-FC-R-B

Product Selection

845 — FC — $\frac{B}{a}$ — $\frac{B}{b}$

a

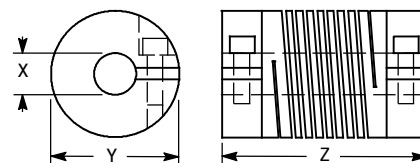
Smallest Bore Diameter	
Code	Description
A	1/4 inch
B	3/8 inch
R	6 mm
T	10 mm

b

Largest Bore Diameter	
Code	Description
A	1/4 inch
B	3/8 inch
C	1/2 inch
R	6 mm
T	10 mm

Approximate Dimensions [mm (in.)]

High Performance Flexible Coupling



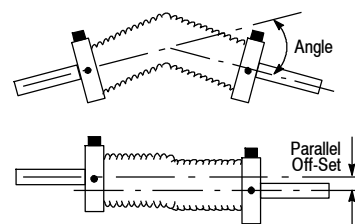
Dimension Code	Bore Size Code Letter				
	A	B	C	R	T
X	6.4 (0.25)	9.5 (0.375)	12.7 (0.50)	6	10
Y	30.56 (1.20) Dia.				
Z	32 (1.25) Long				

ATTENTION



The shielded cables, output devices, and power supplies must be properly grounded. All National Electric Code and applicable local codes and ordinances must be observed when wiring the system.

Flexible Shaft Couplings



ATTENTION



Rigidly coupling the encoder shaft to the machine shaft **will cause a failure** in either the bearings of the encoder or the bearings of the machine shaft.

Bulletin 845D Absolute Encoders

Single-Turn, Size 25



English Servo Mount
845D-SJHZ14BDCK2

Description

The Bulletin 845D is a heavy duty, NEMA Type 4 single-turn absolute position encoder that digitizes shaft angle position into one of a number of absolute code formats. The absolute encoder has a unique digital output for each shaft position. The use of absolute encoders assures that true position is always available, regardless of power interruptions to the system.

The Bulletin 845D provides improved accuracy, increased operating speed and high noise immunity over competitive units. The 845D is housed in a size 25 NEMA Type 4 enclosure to meet the demands of today's industrial environment.

Features

- Absolute Gray Code, Natural Binary or BCD output
- Optional latch command input for discrete I/O
- Optional 5V or 8...24V DC power requirements
- 85°C (185°F) operating temperature
- Electronic zero set pin
- Field-selectable direction control
- CE Marked for all applicable directives

Specifications

Electrical	
Code Format	Binary Coded Decimal (BCD) Gray Code Natural Binary
Resolution	(Gray and Natural Binary): 256 CPR (8 bit); 512 CPR (9 bit) 1024 CPR (10 bit) (BCD): 360 CPR (10 bit); 1000 CPR (12 bit)
Accuracy	±1 bit
Response Frequency	16 K words/sec
Power Supply	Determined by Cat. No.: 5V DC ±5% @ 400 mA max. 8...24V DC @ 400 mA max.
Output Drives	NPN current sink = 16 mA
Output Logic	Parallel BCD, GRAY, or NAT BIN: Logic "0" = 0.0...0.6V DC Logic "1" = 3.5...5.0V DC (TTL) Logic "1" = 24V DC maximum (Open collector)
Latch Command	Optional with BCD and NAT BIN only: Logic "0" = outputs active (DC common) Logic "1" = outputs latched (+DC or open)
Code Direction	Field selectable for increasing counts (CW or CCW)
Reset	Reset position value to zero (Natural Binary and BCD) or max. (Gray Code). Only with shaft stationary.
Mechanical	
Starting Torque	2.5 Ncm typical [3.5 in.-oz]
Running Torque	2.5 Ncm typical [3.5 in.-oz]
Shaft Loading	Axial 89 N [20 lbs]; Radial 178 N [40 lbs]
Shaft Size	6 mm, 10 mm, 1/4 in., 3/8 in. diameter
Moment of Inertia	54 g-cm ² (0.3 oz-in. ²)
Slew Speed	5000 RPM
Environmental	
Housing	NEMA Type 4, IP66 (IEC 529); NEMA Type 4X on selected models
Operating Temperature [C (F)]	0...+85° (+32...+185°)
Storage Temperature [C (F)]	-25...+90° (-13...+194°)
Humidity	98%, noncondensing
Shock	50 g (11 ms duration)
Vibration	20 g (58...150 Hz), 1.5 mm displacement (10...58 Hz)
Weight [kg (lbs)]	0.91 (2)

Accessories

Description	Page Number
Flexible Couplings	6-47
Measuring Wheels	6-48
Servo Clamps	6-48
Pre-Wired Cables	6-49
Mating Connectors	6-52
Mounting Plates	6-52

Product Selection

845D — S J D Z 1 4 B D CK 4
 a b c d e f g h i

a

NEMA Rating	
Code	Description
J	NEMA 4
X	NEMA 4X ①

d

Power Supply Options	
Code	Description
1	5V DC ±5%
2	8...24V DC Unregulated

h

Resolution		
Code	Description	
CW	256 ②	Gray Code or Natural Binary
DW	512 ②	
FW	1024 ②	
CK	360 ④	Binary Coded Decimal
CN	1000 ④	

b

Mounting Configuration	
Code	Description
D	Square Flange
E	70 mm Diameter Flange
F	90 mm Diameter Flange
G	Metric Servo 48 mm B.C.
H	English Servo
J	Metric Servo 42 mm B.C.

e

Output Configuration	
Code	Description
4	5V DC TTL Compatible
5	NPN Open Collector 24V DC Max.

i

Connector Options	
Code	Description
1	Axial Connector (End) without Mate
2	Radial Connector (Side) without Mate
4	Axial Connector (End) with Mate
5	Radial Connector (Side) with Mate

c

Shaft Options	
Code	Description
A	6 mm Diameter
B	10 mm Diameter
C	1/4 in. Diameter
Z	3/8 in. Diameter
K	6 mm w/Flat
L	10 mm w/Flat
M	1/4 in. w/Flat
N	3/8 in. w/Flat

f

Latch Options	
Code	Description
A	No Latch
B	Latch (Sink Output Module Compatible)

g

Output Code Type	
Code	Description
D	Binary Coded Decimal
G	Gray Code ②
N	Natural Binary

- ① Available with square flange mounting configuration only.
- ② This option not available with Latch Options code: "B."
- ③ These options not available with Output Code Type code: "D."
- ④ These options not available with Output Code Type code: "G" & "N."

Electrical Connections

Pin	Function		
	Gray Code	Natural Binary	BCD (8421)
A	G(0)	2 ⁰	1
B	G(1)	2 ¹	2
C	G(2)	2 ²	4
D	G(3)	2 ³	8
E	G(4)	2 ⁴	10
F	G(5)	2 ⁵	20
G	G(6)	2 ⁶	40
H	G(7)	2 ⁷	80
J	G(8)	2 ⁸	100
K	G(9)	2 ⁹	200
L	MSB Complement	Not Used	400
M	Not Used	Not Used	800
N	Not Used	Not Used	Not Used
P	Not Used	Not Used	Not Used
R	Not Used	Direction Control	Direction Control
S	Reset	Reset	Reset
T	DC Return	DC Return	DC Return
U	Not Used	Latch Control	Latch Control
V	DC+ Input	DC+ Input	DC+ Input

Direction Pin

The Direction Pin can change function with code type. In parallel type Gray Code encoders, its function is Most Significant Bit Complement or MSBC for short. In Natural Binary and Binary Coded Decimal encoders, its function is Direction Control.

Direction Control 

Natural Binary and BCD

A logic "1" (+DC or open) on the direction control pin will produce increasing counts with a counterclockwise rotation of the shaft. A logic "0" (DC common) on the direction control pin will produce increasing counts with a clockwise rotation of the shaft.

Gray Code (parallel only)

Counterclockwise rotation of the shaft will produce increasing counts. For increasing counts with a clockwise rotation, use the Most Significant Bit Complement Pin instead of the Most Significant Bit Pin. See Electrical Connection table for pin designation.

ATTENTION



For parallel gray code: connecting the MSB or MSBC to +DC will result in permanent damage to the encoder.

Reset Pin

The shaft must be stationary before using the reset function. Connecting the Reset Pin to +DC will reset Natural

Binary and BCD position value to zero. Connecting the Reset Pin to +DC will reset Gray Code position value to maximum (e.g., 255, 511, 1023, etc.) if MSBC is used, to zero if MSB is used. The reset function requires a connection to +DC for 0.1 seconds or longer.

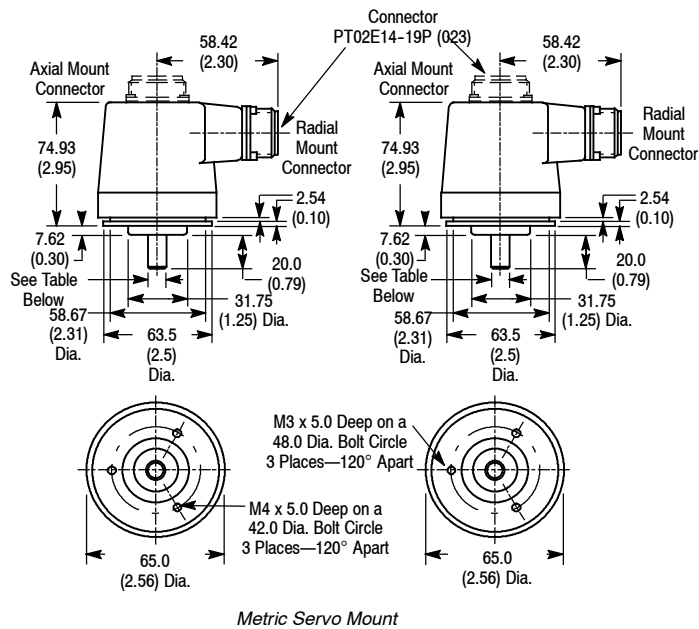
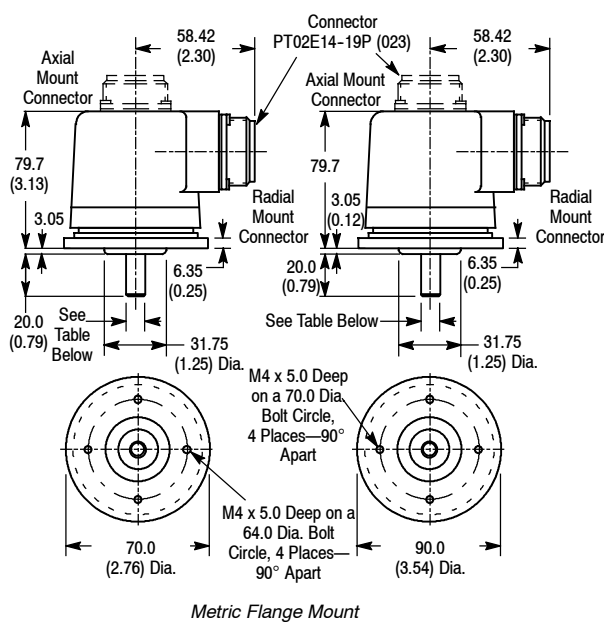
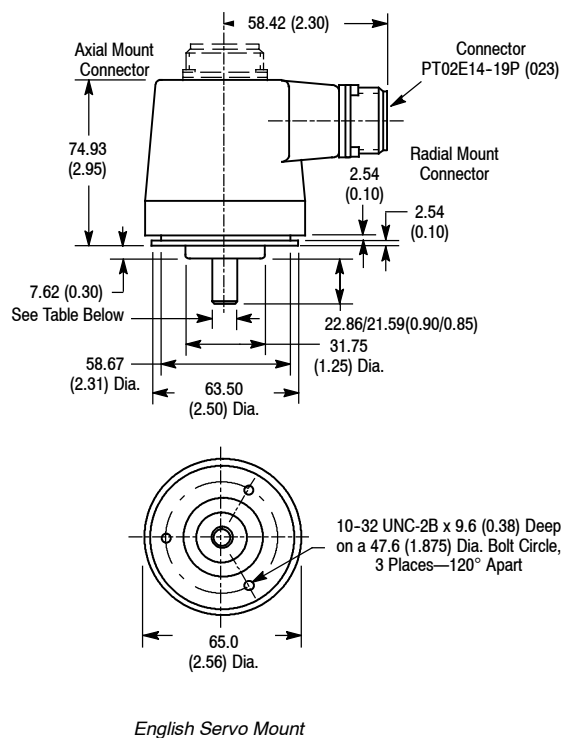
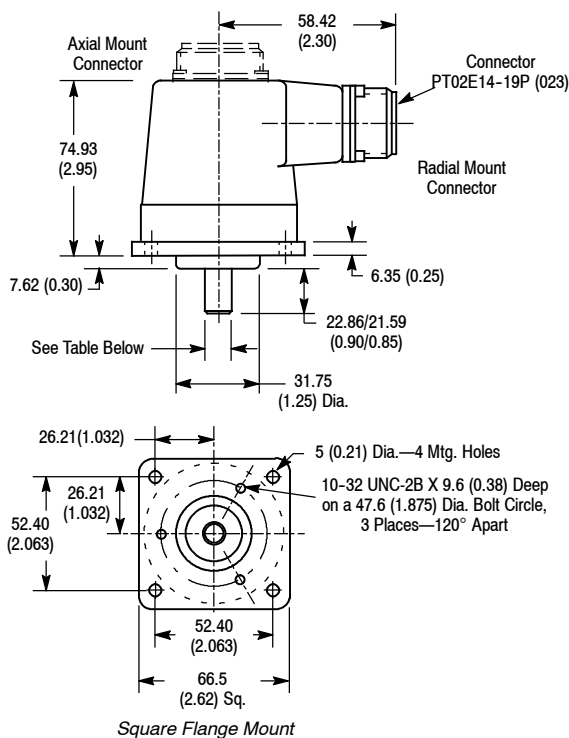
ATTENTION



Activating the Reset Pin results in a change of position reading. This can cause unexpected motion which could result in damage to the product, equipment, or personal injury.

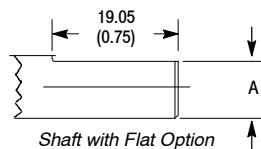
 Rotation is viewed from the end of the encoder shaft.

Approximate Dimensions [mm (in.)]



Shaft Diameter Options

Code	Shaft Diameter
A or K	6 mm +0.00 mm, -0.013 mm
B or L	10 mm +0.00 mm, -0.013 mm
C or M	6.35(0.2499) +0.0000, -0.0005
Z or N	9.52 (0.3749) +0.0000, -0.0005



Flat Dimensions

Code	Dimension "A"
K	5.3 mm (0.21 in.)
L	9.1 mm (0.36 in.)
M	5.5 mm (0.22 in.)
N	8.6 mm (0.34 in.)

Bulletin 845G Absolute Encoders

Single-Turn, Size 25



English Servo Mount
845G-S3G5HC1024R

Description

Bulletin 845G is a heavy duty NEMA Type 4 and 13 single-turn absolute encoder that digitizes shaft position. The absolute encoder has a unique digital output for each shaft position. The use of absolute encoders assures that true position is available, regardless of power interruptions.

Features

- Absolute grey code, natural binary or binary coded decimal (BCD)
- 8-...15-bit resolution (256...32,768)
- Open collector, TTL, push-pull or SSI outputs
- Low or high true output optional
- NEMA Type 4 and 13
- Reverse polarity protection
- 85°C operating temperature
- CE Marked for all applicable directives

Specifications

Electrical	
Code Format	Binary Coded Decimal (parallel only) Grey code or natural binary (parallel or SSI)
Resolution	Counts per Rev. (CPR) 256 CPR (8 bit) 2048 CPR (11 bit) 360 CPR (9 or 10 bit) 4096 CPR (12 bit) 512 CPR (9 bit) 8192 CPR (13 bit) 1000 CPR (12 bit BCD) 16384 CPR (14 bit) 1024 CPR (10 bit) 32768 CPR (15 bit)
Accuracy	±1 bit
Response Frequency	16 K words/sec
Power Supply	Determined by Cat. No: 5V DC ±5% @ 150 mA max. 8...24V DC @ 150 mA max. 10...30V DC @ 150 mA max.
Output Drives	16 mA
Output Logic	Parallel Grey, natural binary or binary coded decimal (BCD) Logic "0" = 0.0...0.6V DC Logic "1" = 3.5...5V DC (TTL) Logic "1" = 24V DC maximum (Open Collector) SSI RS-422 compatible
Latch Command	Standard with natural binary and BCD Logic "0" = outputs active (DC common) Logic "1" = outputs latched (+DC or open)
Code Direction	Field selectable for increasing counts (CW or CCW)
Reset	Reset position value to zero (natural binary and BCD) or max. (grey code). Only with shaft stationary.
Mechanical	
Starting Torque	0.025 N·m [3.5 in.-oz.]Typical
Running Torque	0.025 N·m [3.5 in.-oz.]Typical
Shaft Loading	Axial 89 N [20 lbs]; Radial 178 N [40 lbs]
Shaft Dimensions	9.517 mm [3/8 inch] diameter w/flat
Moment of Inertia	0.08 oz.-in. ² max.
Slew Speed	5000 RPM
Environmental	
Enclosure Type Rating	NEMA Type 4, 13, IP66 (IEC 529)
Operating Temperature [C (F)]	0...+85° (+32°...+185°)
Storage Temperature [C (F)]	-40...+100° (-40...+212°)
Working Temperature [C (F)]	-20...+85° (-4...+185°), max.
Relative Humidity	98%, noncondensing
Shock	50 g (11 ms duration)
Vibration	20 g (58...150 Hz), 1.5 mm displacement (10...58 Hz)
Weight [kg (lbs)]	0.91 (2)

Accessories

Description	Cat. No.	No. of Pins	Mating Connector	Pre-Wired Cable
High Performance Flexible Coupling	845-FC- 1-1	12	845-12P	845-CA-G- 1
Measuring Wheels	845-MW-A- 1	17	845-17P	845-CA-H- 1
Servo Clamps	845-SC	19	845-SCD	845-CA-D- 1

1 For additional information, see the Accessories section on pages 6-46...6-55.

Product Selection

845G — **F** **3** **G** **8** **H** **C** **1024** **R**

a *b* *c* *d* *e* *f* *g*

a

Mounting Configuration	
Code	Description
F	Square Flange
S	English Servo

b

Output Code Type ❶	
Code	Description
B	Natural Binary
D	Binary Coded Decimal ❷
G	Grey Code

c

Power Supply	
Code	Description
5	5V DC ±5%
8	8...24V DC
A	10...30V DC ❸

d

Output Logic	
Code	Description
H	High True
L	Low True ❹

e

Output Configuration	
Code	Description
C	NPN Open Collector 24V DC Max
P	Push-Pull (7272) ❺
S	SSI Output ❻❻❻
T	5V DC TTL NPN

f

Resolution	
Code	Description
0256	8 bit/0...255
0360	9 or 10 bit/0...359 ❻❻
0512	9 bit/0...511
1000	12 bit/0...999 BCD only
1024	10 bit/0...1023
2048	11 bit/0...2047
4096	12 bit/0...4095
8192	13 bit/0...8191
016K	14 bit/0...16,383
032K	15 bit/0...32,767

g

Connector Options	
Code	Description
A	Axial 19-Pin
R	Radial 19-Pin
S	Axial 17-pin
T	Axial 12-Pin ❹
U	Radial 12-Pin ❹

- ❶ Latch control available with natural binary and binary coded decimal (BCD) only.
- ❷ BCD output available in 0360 and 1000 resolutions only. Not available with SSI output.
- ❸ 10...30V DC power supply may only be ordered together with either push-pull or SSI output.
- ❹ Not available with push-pull output. Output logic inverted.
- ❺ Not available with BCD. Latch not available.
- ❻ Excess 76 used for 9 bit grey code. BCD is 10 bit.
- ❼ Only available with SSI output.
- ❽ SSI available with grey code output only.
- ❾ Not available with SSI.

Bulletin 845G Absolute Encoders

Single-Turn, Size 25

Electrical Connections—17 Pin Connector (All code types)

Pin	845-CA-H- Wire Color	8192 (13 Bit)	1000 BCD or 4096 (12 Bit)	2048 (11 Bit)	360 BCD or 1024 (10 Bit)	512 (9 Bit)	360 (9 Bit)	0256 (8 Bit)
A	White/Orange	G(0) or 2 ⁰	G(0) or 2 ⁰	G(0) or 2 ⁰	G(0) or 2 ⁰	G(0) or 2 ⁰	G(0) or 2 ⁰	G(0) or 2 ⁰
B	White	G(1) or 2 ¹	G(1) or 2 ¹	G(1) or 2 ¹	G(1) or 2 ¹	G(1) or 2 ¹	G(1) or 2 ¹	G(1) or 2 ¹
C	Grey	G(2) or 2 ²	G(2) or 2 ²	G(2) or 2 ²	G(2) or 2 ²	G(2) or 2 ²	G(2) or 2 ²	G(2) or 2 ²
D	Violet	G(3) or 2 ³	G(3) or 2 ³	G(3) or 2 ³	G(3) or 2 ³	G(3) or 2 ³	G(3) or 2 ³	G(3) or 2 ³
E	Blue	G(4) or 2 ⁴	G(4) or 2 ⁴	G(4) or 2 ⁴	G(4) or 2 ⁴	G(4) or 2 ⁴	G(4) or 2 ⁴	G(4) or 2 ⁴
F	Yellow	G(5) or 2 ⁵	G(5) or 2 ⁵	G(5) or 2 ⁵	G(5) or 2 ⁵	G(5) or 2 ⁵	G(5) or 2 ⁵	G(5) or 2 ⁵
G	Orange	G(6) or 2 ⁶	G(6) or 2 ⁶	G(6) or 2 ⁶	G(6) or 2 ⁶	G(6) or 2 ⁶	G(6) or 2 ⁶	G(6) or 2 ⁶
H	Brown	G(7) or 2 ⁷	G(7) or 2 ⁷	G(7) or 2 ⁷	G(7) or 2 ⁷	G(7) or 2 ⁷	G(7) or 2 ⁷	G(7) or 2 ⁷
J	White/Violet	G(8) or 2 ⁸	G(8) or 2 ⁸	G(8) or 2 ⁸	G(8) or 2 ⁸	G(8) or 2 ⁸	G(8) or 2 ⁸	N/C
K	White/Brown	G(9) or 2 ⁹	G(9) or 2 ⁹	G(9) or 2 ⁹	G(9) or 2 ⁹	N/C	N/C	N/C
L	White/Green	G(10) or 2 ¹⁰	G(10) or 2 ¹⁰	G(10) or 2 ¹⁰	N/C	N/C	N/C	Reset
M	White/Yellow	G(11) or 2 ¹¹	G(11) or 2 ¹¹	N/C	N/C	N/C	N/C	Direction ②
N	White/Red	G(12) or 2 ¹²	Reset	Reset	Reset	Reset	Reset	Latch Control ①
P	White/Blue	Latch Control ①	Latch Control ①	Latch Control ①	Latch Control ①	Latch Control ①	Latch Control ①	N/C
R	Black	DC Common	DC Common	DC Common	DC Common	DC Common	DC Common	DC Common
S	Red	+DC	+DC	+DC	+DC	+DC	+DC	+DC
T	Green	Direction ②	Direction ②	Direction ②	Direction ②	Direction ②	Direction ②	Case Ground

Electrical Connections—19 Pin Connector (Grey code or natural binary)

Pin	845-CA-D- Wire Color	32768 (15 Bit)	16384 (14 Bit)	8192 (13 Bit)	4096 (12 Bit)	2048 (11 Bit)	1024 (10 Bit)	360 and 512 (9 Bit)	0256 (8 Bit)
A	Brown	G(0) or 2 ⁰	G(0) or 2 ⁰	G(0) or 2 ⁰	N/C	N/C	G(0) or 2 ⁰	G(0) or 2 ⁰	G(0) or 2 ⁰
B	Orange	G(1) or 2 ¹	G(1) or 2 ¹	G(1) or 2 ¹	G(0) or 2 ⁰	N/C	G(1) or 2 ¹	G(1) or 2 ¹	G(1) or 2 ¹
C	Yellow	G(2) or 2 ²	G(2) or 2 ²	G(2) or 2 ²	G(1) or 2 ¹	G(0) or 2 ⁰	G(2) or 2 ²	G(2) or 2 ²	G(2) or 2 ²
D	Green	G(3) or 2 ³	G(3) or 2 ³	G(3) or 2 ³	G(2) or 2 ²	G(1) or 2 ¹	G(3) or 2 ³	G(3) or 2 ³	G(3) or 2 ³
E	Blue	G(4) or 2 ⁴	G(4) or 2 ⁴	G(4) or 2 ⁴	G(3) or 2 ³	G(2) or 2 ²	G(4) or 2 ⁴	G(4) or 2 ⁴	G(4) or 2 ⁴
F	Violet	G(5) or 2 ⁵	G(5) or 2 ⁵	G(5) or 2 ⁵	G(4) or 2 ⁴	G(3) or 2 ³	G(5) or 2 ⁵	G(5) or 2 ⁵	G(5) or 2 ⁵
G	Grey	G(6) or 2 ⁶	G(6) or 2 ⁶	G(6) or 2 ⁶	G(5) or 2 ⁵	G(4) or 2 ⁴	G(6) or 2 ⁶	G(6) or 2 ⁶	G(6) or 2 ⁶
H	White	G(7) or 2 ⁷	G(7) or 2 ⁷	G(7) or 2 ⁷	G(6) or 2 ⁶	G(5) or 2 ⁵	G(7) or 2 ⁷	G(7) or 2 ⁷	G(7) or 2 ⁷
J	White/Orange	G(8) or 2 ⁸	G(8) or 2 ⁸	G(8) or 2 ⁸	G(7) or 2 ⁷	G(6) or 2 ⁶	G(8) or 2 ⁸	G(8) or 2 ⁸	N/C
K	White/Brown	G(9) or 2 ⁹	G(9) or 2 ⁹	G(9) or 2 ⁹	G(8) or 2 ⁸	G(7) or 2 ⁷	G(9) or 2 ⁹	N/C	N/C
L	White/Red	G(10) or 2 ¹⁰	G(10) or 2 ¹⁰	G(10) or 2 ¹⁰	G(9) or 2 ⁹	G(8) or 2 ⁸	Direction ②	Direction ②	Direction ②
M	White/Yellow	G(11) or 2 ¹¹	G(11) or 2 ¹¹	G(11) or 2 ¹¹	G(10) or 2 ¹⁰	G(9) or 2 ⁹	N/C	N/C	N/C
N	White/Green	G(12) or 2 ¹²	G(12) or 2 ¹²	G(12) or 2 ¹²	G(11) or 2 ¹¹	G(10) or 2 ¹⁰	N/C	N/C	N/C
P	White/Blue	G(13) or 2 ¹³	G(13) or 2 ¹³	N/C	Direction ②	Direction ②	N/C	N/C	N/C
R	White/Black	G(14) or 2 ¹⁴	Reset	Reset	Reset	Reset	Reset	Reset	Reset
S	White/Violet	Direction ②	Direction ②	Direction ②	N/C	N/C	N/C	N/C	N/C
T	Black	DC Common	DC Common	DC Common	DC Common	DC Common	DC Common	DC Common	DC Common
U	White/Grey	Latch Control ①	Latch Control ①	Latch Control ①	Latch Control ①	Latch Control ①	Latch Control ①	Latch Control ①	Latch Control ①
V	Red	+DC	+DC	+DC	+DC	+DC	+DC	+DC	+DC

① Latch control not available with grey code or SSI output. On grey code encoders this pin is not connected (N/C).

② The Direction pin function is either Direction Control or MSBC. See next page for further detail.

Electrical Connections—19 Pin Connector (Binary Coded Decimal)

Pin	845-CA-D-__ Wire Color	1000 BCD (12 Bit)	360 BCD (10 Bit)
V	Red	+DC	+DC
A	Brown	1	1
B	Orange	2	2
C	Yellow	4	4
D	Green	8	8
E	Blue	10	10
F	Violet	20	20
G	Grey	40	40
H	White	80	80
J	White/Orange	100	100
K	White/Brown	200	200
L	White/Red	400	N/C
M	White/Yellow	800	N/C
N	White/Green	N/C	N/C
P	White/Blue	N/C	N/C
R	White/Black	Direction Control	Direction Control
S	White/Violet	Reset	Reset
T	Black	DC Common	DC Common
U	White/Grey	Latch Control	Latch Control

Electrical Connections for SSI Output—12 Pin Connector

Cat. No.	Wire Pair	Wire Color	Function	Pin
845-CA-G-__ (With 12 pin connector)	Red/Black/Shield	Red	+DC Input	8
		Black	DC Common	1
	White/Black/Shield	White	Clock +	3
		Black	Clock -	11
	Blue/Black/Shield	Blue	Data +	2
		Black	Data -	10
	Green/Black/Shield	Green	CW/CCW	12
		Black	Reset	9

Direction Pin

The Direction Pin can change function with code type. In parallel type grey code encoders, its function is Most Significant Bit Complement or MSBC for short. In Natural Binary, Binary Coded Decimal and grey code SSI encoders, its function is Direction Control.

Direction Control ①

Natural Binary and BCD

A logic “1” (+DC or open) on the direction control pin will produce increasing counts with a counterclockwise rotation of the shaft. A logic “0” (DC common) on the direction control pin will produce increasing counts with a clockwise rotation of the shaft.

① Rotation is viewed from the end of the encoder shaft.

Grey Code (SSI)

A logic “1” (+DC or open) on the direction control pin will produce increasing counts with a clockwise rotation of the shaft. A logic “0” (DC common) on the direction control pin will produce increasing counts with a counterclockwise rotation of the shaft.

Grey Code (parallel)

Counterclockwise rotation of the shaft will produce increasing counts. For increasing counts with a clockwise rotation, use the Most Significant Bit Complement Pin instead of the Most Significant Bit Pin. See Electrical Connection table for pin designation.

ATTENTION



For parallel grey code: connecting the MSB or MSBC to +DC will result in permanent damage to the encoder.

Reset Pin

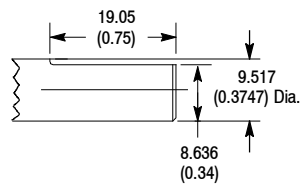
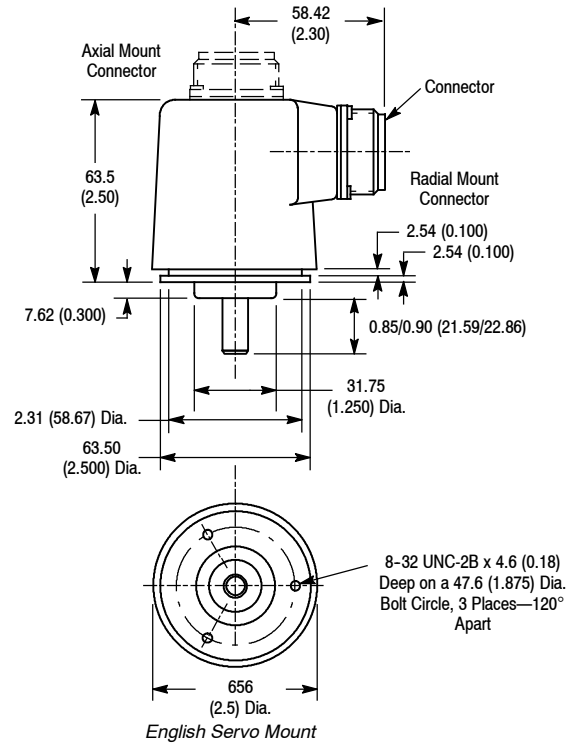
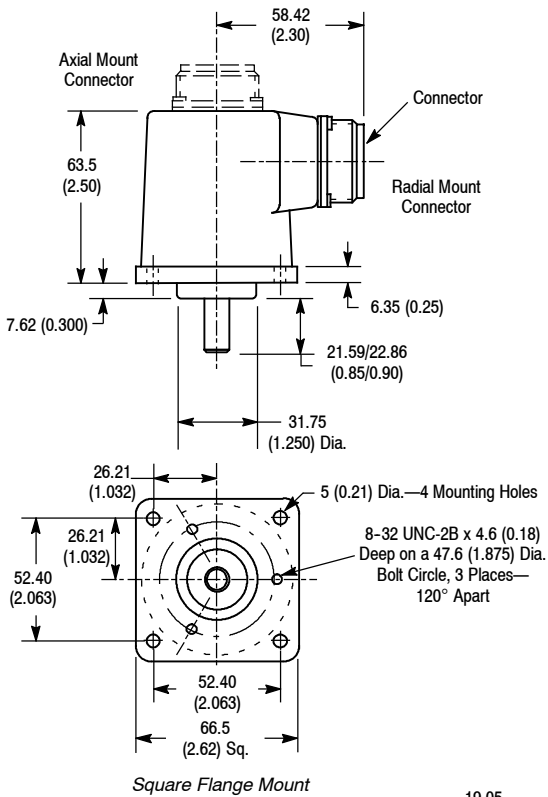
The shaft must be stationary before using the reset function. Connecting the Reset Pin to +DC will reset Natural Binary and BCD position value to zero. Connecting the Reset Pin to +DC will reset grey code position value to maximum (e.g., 255, 511, 1023, etc.) if MSBC is used, to zero if MSB is used. The reset function requires a connection to +DC for 0.1 seconds or longer.

ATTENTION



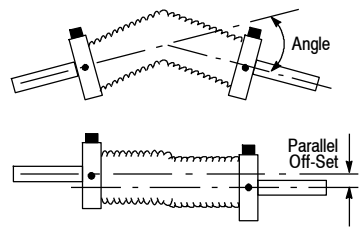
Activating the reset pin results in a change of position reading. This can cause unexpected motion which could result in damage to the product, equipment, or personal injury.


Approximate Dimensions [mm (in.)]



Shaft Dimensions

Flexible Shaft Couplings



ATTENTION  Rigidly coupling the encoder shaft to the machine shaft **will cause a failure** in either the bearings of the encoder or the bearings of the machine shaft.



845GM-S3G8HC0360R

Description

Bulletin 845GM is a single-turn absolute encoder that provides a unique digital output for each shaft position. These size 20 encoders are available with resolution ranging from 256...32,768 CPR (counts per revolution). The electronic zero-set feature facilitates synchronization of electrical and mechanical zero positions.

Features

- Absolute grey code, natural binary or binary coded decimal (BCD)
- 8-...15-bit resolution (256...32,768)
- Open collector, TTL, push-pull or SSI outputs
- Electronic zero-set pin
- Low or high true output optional
- NEMA Type 4 and 13
- Reverse polarity protection
- 85°C operating temperature
- CE Marked for all applicable directives

Specifications

Electrical	
Code Format	Parallel: grey code, natural binary, binary coded decimal (BCD) SSI: grey code
Resolution	Counts per Rev. (CPR) 256 CPR (8 bit) 2048 CPR (11 bit) 360 CPR (9 or 10 bit) 4096 CPR (12 bit) 512 CPR (9 bit) 8192 CPR (13 bit) 1000 CPR (12 bit BCD) 16384 CPR (14 bit) 1024 CPR (10 bit) 32768 CPR (15 bit)
Accuracy	±1 bit
Response Frequency	16 K words/sec
Power Supply.	Determined by Cat. No.: 5V DC ±5% @ 150 mA max. 8...24V DC @ 150 mA max. 10...30V DC @ 150 mA max.
Output Drives	16 mA
Output Logic	Parallel: grey, natural binary or (BCD) Logic "0" = 0.0...0.6V DC Logic "1" = 3.5...5V DC (TTL) Logic "1" = 24V DC maximum (Open Collector) Logic "1" = 0.7 x Vs (Push-Pull) SSI RS-422 compatible
Latch Command	Standard with natural binary and BCD Logic "0" = outputs active (DC common) Logic "1" = outputs latched (+DC or open)
Code Direction	Field selectable for increasing counts (CW or CCW)
Reset	Reset position value to zero (see the Reset Pin section on page 6-26). Only with shaft stationary.
Mechanical	
Starting Torque	0.025 N·m (3.5 in-oz) typical
Running Torque	0.025 N·m (3.5 in-oz) typical
Shaft Loading	Axial 178 N (40 lbs); radial 178 N (40 lbs)
Shaft Dimensions	6 mm, 10 mm, 9.517 mm (3/8 in.), 9.517 mm (3/8 in.) w/flat
Moment of Inertia	54 gcm ² (0.30 oz-in ²) max.
Slew Speed	5000 RPM
Environmental	
Enclosure Type Rating	NEMA Type 4, 13; IP65
Operating Temperature [C (F)]	0...+85° (+32...+185°)
Storage Temperature [C (F)]	-40...+100° (-40...+212°)
Working Temperature [C (F)]	-20...+85° (-4...+185°), max.
Relative Humidity	90%, noncondensing
Shock	50 g (11 ms duration)
Vibration	20 g (58...150 Hz), 1.5 mm displacement (10...58Hz)
Weight [kg (lbs)]	0.45 (1)

Accessories

Description	Cat. No.	No. of Pins	Mating Connector	Pre-Wired Cable
High Performance Flexible Coupling	845-FC- 1 - 1	12	845-12P	845-CA-G- 1
Measuring Wheels	845-MW-A- 1	19	845-SCD	845-CA-D- 1
Servo Clamps	845-SC			

1 For additional information, see the Accessories section on pages 6-46...6-55.

Bulletin 845GM Absolute Encoders

Single-Turn, Size 20

Product Selection

845GM — **F** **3** **G** **8** **H** **C** **1024** **R**
a b c d e f g h

a

Mounting Configuration	
Code	Description
F	Square Flange
S	English Servo

b

Shaft Options	
Code	Description
1	6 mm
2	10 mm
3	3/8 in. w/flat
4	3/8 in.

c

Output Code Type ❶	
Code	Description
B	Natural Binary
D	Binary Coded Decimal
G	Grey Code

d

Power Supply	
Code	Description
5	5V DC ±5%
8	8...24V DC
A	10...30V DC ❶

e

Output Logic	
Code	Description
H	High True
L	Low True ❷

f

Output Configuration	
Code	Description
C	NPN Open Collector 24V DC Max
P	Push-Pull (7272) ❶
S	SSI Output ❶❸❹
T	5V DC TTL NPN

g

Resolution	
Code	Description
0256	8 bit/0...255
0360	9 or 10 bit/0...359 ❸❹
0512	9 bit/0...511
1000	12 bit/0...999 BCD only
1024	10 bit/0...1023
2048	11 bit/0...2047
4096	12 bit/0...4095
8192	13 bit/0...8191
016K	14 bit/0...16,383
032K	15 bit/0...32,767

h

Connector Options	
Code	Description
R	Radial 19-Pin
U	Radial 12-Pin ❺

- ❶ Push-Pull or SSI output can only be ordered with 10...30V DC power supply.
- ❷ Not available with push-pull and SSI output. Output logic inverted.
- ❸ SSI available with grey code output only.
- ❹ SSI only available with 12-pin connector.
- ❺ Excess 76 used for 9 bit 360 grey code. BCD is 10 bit.
- ❻ Not available with SSI.

Electrical Connections—19 Pin Connector (Grey code or natural binary)

Pin	845-CA-D- Wire Color	32768 (15 Bit)	16384 (14 Bit)	8192 (13 Bit)	4096 (12 Bit)	2048 (11 Bit)	1024 (10 Bit)	360 and 512 (9 Bit)	0256 (8 Bit)
A	Brown	G(0) or 2 ⁰	G(0) or 2 ⁰	G(0) or 2 ⁰	N/C	N/C	G(0) or 2 ⁰	G(0) or 2 ⁰	G(0) or 2 ⁰
B	Orange	G(1) or 2 ¹	G(1) or 2 ¹	G(1) or 2 ¹	G(0) or 2 ⁰	N/C	G(1) or 2 ¹	G(1) or 2 ¹	G(1) or 2 ¹
C	Yellow	G(2) or 2 ²	G(2) or 2 ²	G(2) or 2 ²	G(1) or 2 ¹	G(0) or 2 ⁰	G(2) or 2 ²	G(2) or 2 ²	G(2) or 2 ²
D	Green	G(3) or 2 ³	G(3) or 2 ³	G(3) or 2 ³	G(2) or 2 ²	G(1) or 2 ¹	G(3) or 2 ³	G(3) or 2 ³	G(3) or 2 ³
E	Blue	G(4) or 2 ⁴	G(4) or 2 ⁴	G(4) or 2 ⁴	G(3) or 2 ³	G(2) or 2 ²	G(4) or 2 ⁴	G(4) or 2 ⁴	G(4) or 2 ⁴
F	Violet	G(5) or 2 ⁵	G(5) or 2 ⁵	G(5) or 2 ⁵	G(4) or 2 ⁴	G(3) or 2 ³	G(5) or 2 ⁵	G(5) or 2 ⁵	G(5) or 2 ⁵
G	Grey	G(6) or 2 ⁶	G(6) or 2 ⁶	G(6) or 2 ⁶	G(5) or 2 ⁵	G(4) or 2 ⁴	G(6) or 2 ⁶	G(6) or 2 ⁶	G(6) or 2 ⁶
H	White	G(7) or 2 ⁷	G(7) or 2 ⁷	G(7) or 2 ⁷	G(6) or 2 ⁶	G(5) or 2 ⁵	G(7) or 2 ⁷	G(7) or 2 ⁷	G(7) or 2 ⁷
J	White/Orange	G(8) or 2 ⁸	G(8) or 2 ⁸	G(8) or 2 ⁸	G(7) or 2 ⁷	G(6) or 2 ⁶	G(8) or 2 ⁸	G(8) or 2 ⁸	N/C
K	White/Brown	G(9) or 2 ⁹	G(9) or 2 ⁹	G(9) or 2 ⁹	G(8) or 2 ⁸	G(7) or 2 ⁷	G(9) or 2 ⁹	N/C	N/C
L	White/Red	G(10) or 2 ¹⁰	G(10) or 2 ¹⁰	G(10) or 2 ¹⁰	G(9) or 2 ⁹	G(8) or 2 ⁸	Direction Ⓢ	Direction Ⓢ	Direction Ⓢ
M	White/Yellow	G(11) or 2 ¹¹	G(11) or 2 ¹¹	G(11) or 2 ¹¹	G(10) or 2 ¹⁰	G(9) or 2 ⁹	N/C	N/C	N/C
N	White/Green	G(12) or 2 ¹²	G(12) or 2 ¹²	G(12) or 2 ¹²	G(11) or 2 ¹¹	G(10) or 2 ¹⁰	N/C	N/C	N/C
P	White/Blue	G(13) or 2 ¹³	G(13) or 2 ¹³	N/C	Direction Ⓢ	Direction Ⓢ	N/C	N/C	N/C
R	White/Black	G(14) or 2 ¹⁴	Reset	Reset	Reset	Reset	Reset	Reset	Reset
S	White/Violet	Direction Ⓢ	Direction Ⓢ	Direction Ⓢ	N/C	N/C	N/C	N/C	N/C
T	Black	DC Common	DC Common	DC Common	DC Common	DC Common	DC Common	DC Common	DC Common
U	White/Grey	Latch Control Ⓢ	Latch Control Ⓢ	Latch Control Ⓢ	Latch Control Ⓢ	Latch Control Ⓢ	Latch Control Ⓢ	Latch Control Ⓢ	Latch Control Ⓢ
V	Red	+DC	+DC	+DC	+DC	+DC	+DC	+DC	+DC

Ⓢ Latch control not available with grey code or SSI output. On grey code encoders this pin is not connected (N/C).

Ⓢ **Important**—The Direction pin function provides Direction Control for Binary Coded Decimal and Natural Binary or MSBC for parallel grey code. See next page for further detail.

Bulletin 845GM Absolute Encoders

Single-Turn, Size 20

Electrical Connections—19 Pin Connector (Binary Coded Decimal)

Pin	845-CA-D-___ Wire Color	1000 BCD (12 Bit)	360 BCD (10 Bit)
V	Red	+DC	+DC
A	Brown	1	1
B	Orange	2	2
C	Yellow	4	4
D	Green	8	8
E	Blue	10	10
F	Violet	20	20
G	Grey	40	40
H	White	80	80
J	White/Orange	100	100
K	White/Brown	200	200
L	White/Red	400	N/C
M	White/Yellow	800	N/C
N	White/Green	N/C	N/C
P	White/Blue	N/C	N/C
R	White/Black	Direction Control	Direction Control
S	White/Violet	Reset	Reset
T	Black	DC Common	DC Common
U	White/Grey	Latch Control	Latch Control

Electrical Connections for SSI Output—12 Pin Connector

Cat. No.	Wire Pair	Wire Color	Function	Pin
845-CA-G-___ (With 12 pin connector)	Red/Black/Shield	Red	+DC Input	8
		Black	DC Common	1
	White/Black/Shield	White	Clock +	3
		Black	Clock -	11
	Blue/Black/Shield	Blue	Data +	2
		Black	Data -	10
	Green/Black/Shield	Green	Direction Control	12
		Black	Reset	9

Direction Pin

The Direction Pin can change function with code type. In parallel type grey code encoders, its function is Most Significant Bit Complement or MSBC for short. In Natural Binary, Binary Coded Decimal and grey code SSI encoders, its function is Direction Control.

Direction Control ⓘ

Natural Binary and BCD

A logic "1" (+DC or open) on the direction control pin will produce increasing counts with a counterclockwise rotation of the shaft. A logic "0" (DC common) on the direction control pin will produce increasing counts with a clockwise rotation of the shaft.

ⓘ Rotation is viewed from the end of the encoder shaft.

Grey Code (SSI)

A logic "1" (+DC or open) on the direction control pin will produce increasing counts with a clockwise rotation of the shaft. A logic "0" (DC common) on the direction control pin will produce increasing counts with a counterclockwise rotation of the shaft.

Grey Code (parallel)

Counterclockwise rotation of the shaft will produce increasing counts. For increasing counts with a clockwise rotation, use the Most Significant Bit Complement Pin instead of the Most Significant Bit Pin. See Electrical Connection table for pin designation.

ATTENTION



For parallel grey code: connecting the MSB or MSBC to +DC will result in permanent damage to the encoder.

Reset Pin

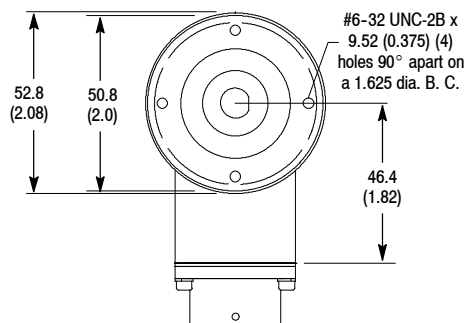
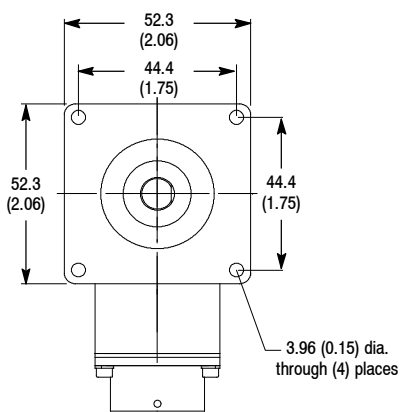
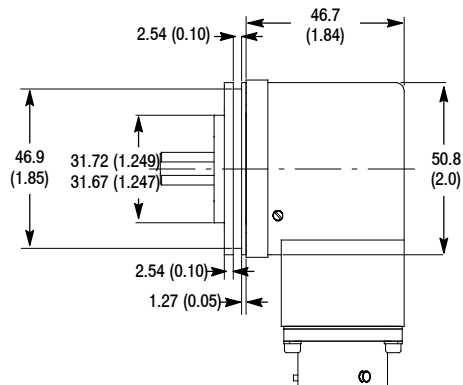
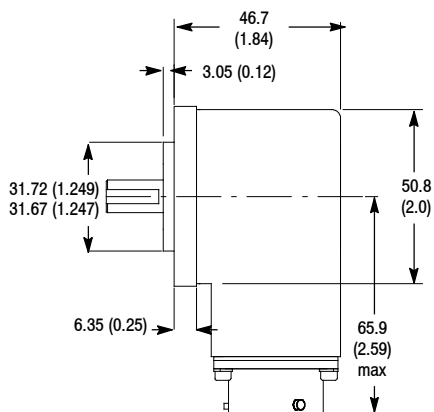
The shaft must be stationary before using the reset function. Connecting the Reset Pin to +DC will reset Natural Binary and BCD position value to zero. Connecting the Reset Pin to +DC will reset grey code position value to maximum (e.g., 255, 511, 1023, etc.) if MSBC is used, to zero if MSB is used. The reset function requires a connection to +DC for 0.1 seconds or longer.

ATTENTION



Activating the Reset Pin results in a change of position reading. This can cause unexpected motion which could result in damage to the product, equipment, or personal injury.

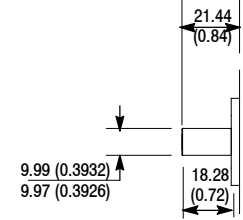
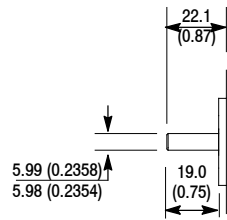
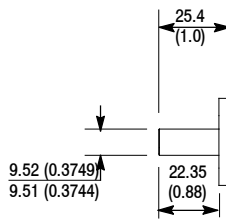
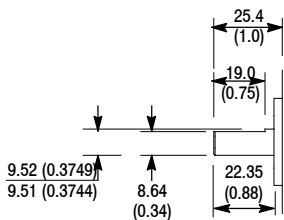
Approximate Dimensions [mm (in.)]



Square Flange Mount

English Servo Mount

Shaft Options—Square Flange Mount



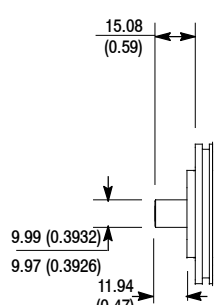
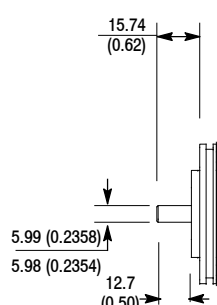
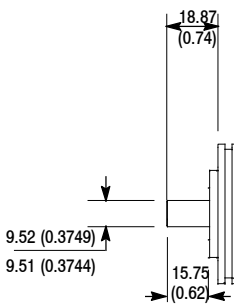
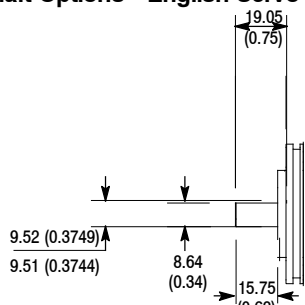
3/8 in. w/flat

3/8 in.

6 mm

10 mm

Shaft Options—English Servo Mount



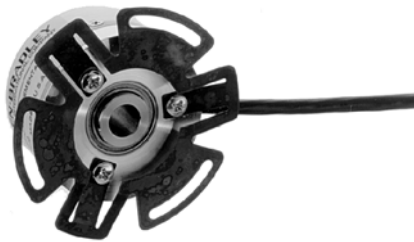
3/8 in. w/flat

3/8 in.

6 mm

10 mm

Bulletin 844A & 844B Hollow Shaft Incremental Encoders



Description

Bulletin 844A blind-shaft and 844B through-shaft incremental encoders are used to electronically monitor the position or speed of a rotating shaft. Shaft position is converted to digital pulses in an A quad B format.

- Blind or through-shaft designs
- Integral flex mount
- 10...2500 PPR
- 2 inch diameter housing

Bulletin 844A and 844B encoders offer a built-in flexible coupling which reduces installation cost and mounting space requirements. Additionally, the Bulletin 844B Encoder is a through-shaft design allowing additional accessories to be mounted to the same shaft. Both families come standard with channels A, B and Z and differential line driver (DLD) outputs. Single-ended outputs are also supported at no additional charge. All support shaft sizes up to 1/2 inch in diameter. Bulletin 844A and 844B Encoders offer 42 resolution options.

Specifications

Electrical	
Code Format	2 channels with zero index
Quadrature	90° ±22° channel A leads B CW
Symmetry	40...60%
Power Supply	120 mA (no load)
Output Frequency, Max.	100 kHz
Resolution	Up to 2500 pulses per revolution
Cable Diameter [mm (in.)]	457 (18)
Output Drivers	RS422 Line driver—3487 Open collector—7406 8-24V Line driver—7272

Mechanical	
Angular Acceleration	50,000 radians/sec ²
Moment of Inertia	19.4 gcm ² (2.75 x 10 ⁻⁴ oz-in-sec ²)
Operating Speed, Max. (RPM)	3000 at max shaft loading
Permissible Shaft Movement	Radial 0.13 mm (0.005 in.); Axial ±0.76 mm (±0.030 in.)
Shaft Loading	Axial 0.45 kg (1 lb); Radial 1.36 kg (3 lb)
Shaft Dimensions	3/8 inch or 1/2 inch

Environmental	
Material	Aluminum Housing
Operating Temperature [C (F)]	0...70° (+32...+158°)
Storage Temperature [C (F)]	-20...85° (-4...+185°)
Relative Humidity	95% noncondensing
Enclosure Type Rating	IP40 (IEC529)
Shock	20 g/11 ms
Vibration	5 g/10...150 Hz
Weight [kg (oz)]	0.12 (4)

Bulletin 844A & 844B Hollow Shaft Incremental Encoders

Product Selection

844 **A** — **Z3** **05C** **2500**
a *b* *c* *d*

a

Coupling Options	
Code	Description
A	Front (Blind-Shaft)
B	Rear (Through-Shaft)

b

Shaft Options	
Code	Description
Z3	3/8 inch
Z4	1/2 inch

c

Power Supply & Output ^①	
Code	Description
05D	5V DC In, 5V DC DLD RS-422 Out
05C	5V DC In, NPN Open Collector Out
12C	12V DC In, NPN Open Collector Out
24D	8...24V DC In, 8...24V DC DLD Out

① DLD = Differential Line Driver

d

Resolution (PPR)	
Code	Description
0010	10
0020	20
0030	30
0050	50
0060	60
0100	100
0128	128
0150	150
0180	180
0200	200
0240	240
0250	250
0256	256
0300	300
0336	336
0360	360
0400	400
0500	500
0512	512
0600	600
0720	720
0800	800
0900	900
0960	960
1000	1000
1024	1024
1140	1140
1152	1152
1200	1200
1230	1230
1250	1250
1260	1260
1270	1270
1386	1386
1500	1500
1512	1512
1800	1800
1888	1888
2000	2000
2048	2048
2400	2400
2500	2500

Accessories

Description	Page Number
Differential Encoder Buffer Board	6-55

Bulletin 844A & 844B Hollow Shaft Incremental Encoders

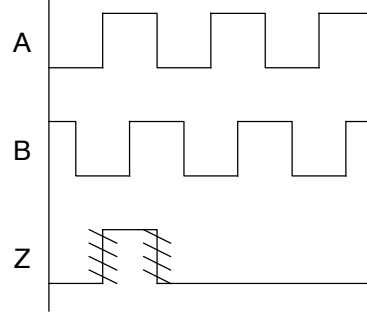
Electrical Connections

Function	Line Driver Wire Color	Open Collector Wire Color
V DC	Red	Red
Common	Black	Black
A Output	White	White
B Output	Green	Green
Z Output	White/Black	White/Black
\bar{A} Output	Blue	NC
\bar{B} Output	Orange	NC
\bar{Z} Output	Red/Black	NC
Shield	Drain Wire	Drain Wire

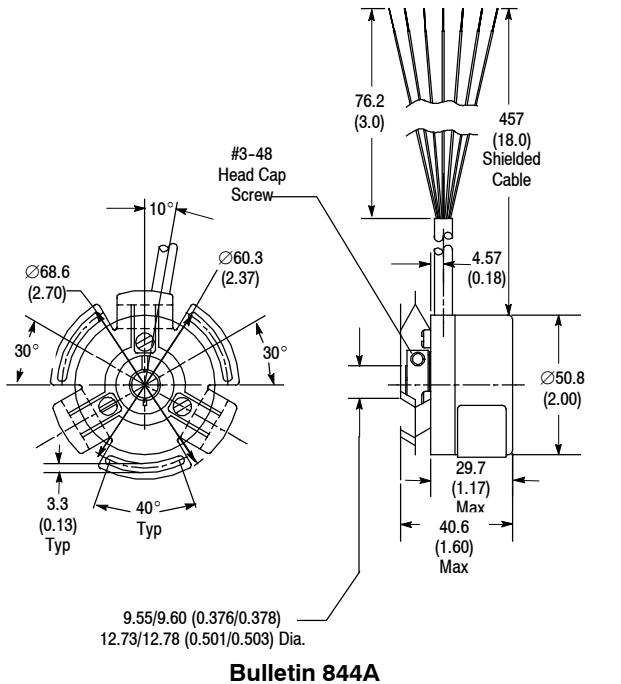
Output Waveforms

1. Channel A leads Channel B for clockwise rotation when viewed from face of the encoder.
2. Complementary signals (A, B, and Z) are supplied only on units with line drivers.
3. Marker Pulse is nongated and is approximately centered on the positive-going edge of Channel B for clockwise rotation and is $180^\circ \pm 90^\circ$ wide.

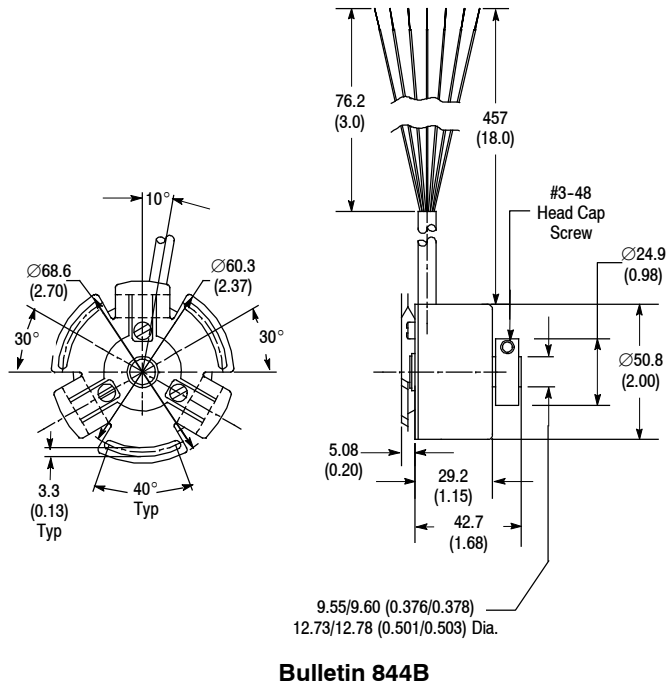
Channel



Approximate Dimensions [mm (in.)]



Bulletin 844A



Bulletin 844B

844A Mating Shaft Tolerance [mm (in.)]

Bore	Diameter	Length
3/8 in.	9.50/9.55 (0.374/0.376)	10.7/31 (0.42/1.22)
1/2 in.	12.67/12.73 (0.499/0.501)	10.7/31 (0.42/1.22)

844B Mating Shaft Tolerance [mm (in.)]

Bore	Diameter	Length (minimum)
3/8 in.	9.50/9.55 (0.374/0.376)	41 (1.6)
1/2 in.	12.67/12.73 (0.499/0.501)	

Bulletin 844D Hollow Shaft Incremental Encoders

HS35 Style



Description

Bulletin 844D blind-shaft and through-shaft incremental encoders are used to electronically monitor the position or speed of a rotating shaft. Shaft position is converted to digital pulses in an A quad B format. A Zero Index Channel is also included with all models.

Features

- Blind-shaft and through-shaft front coupled models
- Flexible coupler not required
- Adaptor plate not required
- 120...16,384 PPR
- 3.5 in. diameter housing
- Supports 1/2...1 1/8 inch shafts
- Cable, connector or terminal block connection options
- CE Marked for all applicable directives

Specifications

Electrical	
Code Format	2 channels with zero index
Power Supply	120 mA (no load)
Output Frequency, Max.	200 kHz Push-Pull (120...8192 PPR) 300 kHz all other drivers (120...8192 PPR) 600 kHz (above 8192 PPR)
Resolution	Up to 16,384 pulses per revolution
Output Drives	3487 Line driver = ± 40 mA 4469 Line driver = ± 200 mA 7272 Line driver = ± 40 mA Push-Pull Single Ended Driver = ± 70 mA
Mechanical	
Angular Acceleration	100,000 radians/sec ²
Starting Torque	9.3 Ncm (13 in-oz) @ 25°C (77°F)
Running Torque	5 Ncm (7 in-oz) @ 25°C (77°F)
Moment of Inertia	490 gcm ² (6.9 x 10 ⁻³ oz-in-sec ²)
Slew Speed	3000 rpm maximum
Shaft Loading	120...2500 PPR: Axial 67 N (15 lbs); Radial 133 N (30 lbs) 4096...16,384 PPR: Axial 44 N (10 lbs); Radial 67 N (15 lbs)
Permissible Shaft	Radial Movement: Static ±0.5 mm (0.02 in.); Dynamic ±0.1 mm (0.004 in.) Axial Movement: Static ±0.5 mm (0.02 in.); Dynamic ±0.5 mm (0.02 in.)
Bore Size	Supports 1/2...1 1/8 in. and 30 mm shafts
Environmental	
Enclosure Type Rating	NEMA Type 4, 13; IP66 (IEC 529) except terminal block connection type rated IP40 (IEC 529) only
Material	Aluminum Housing
Operating Temperature [C (F)]	-20...85° (-4...+185°)
Storage Temperature [C (F)]	-30...85° (-22...+185°)
Relative Humidity	90% noncondensing
Shock	50 g for 11 ms
Vibration	20 g from 5...2000 Hz
Weight [kg (lbs)]	0.91 (2)

Accessories

Description	Page Number
Pre-Wired Cables	6-49
Mating Connectors	6-52
Differential Encoder Buffer Board	6-55

Product Selection

844D — **A** **5** **A** **C** **1** **CR**
a b c d e f

a

Shaft Design	
Code	Description
A	Blind-Shaft
B	Through-Shaft

b

Shaft Size ①	
Code	Description
4	1/2 inch
5	5/8 inch
6	3/4 inch
7	7/8 inch
8	1.0 inch
9	1 1/8 inch
M	30 mm

- ① Shaft sizes below 1 inch include an insulating insert.
- ② Terminal block unit is not rated for fluid ingress protection (IP40 (IEC 529) only).
- ③ DLD = Differential Line Driver
- ④ 7272 line driver has a voltage drop of 1.9V.
- ⑤ Available with power supply and output options 1, 2, 3, and 4.

c

Mounting Configuration	
Code	Description
A	Tether, 1/2 inch bolt on a 7.25 inch dia. B.C. (to fit 8 1/2 inch NEMA C face)
B	Tether, 3/8 inch bolt on a 5.88 inch dia. B.C. (to fit 4 1/2 inch NEMA C face)
C	Tether, 3/8 inch bolt on a 2.5...4.0 inch dia. radius
D	Anti-rotation pin

d

Connection Type	
Code	Description
C	10 pin connector
T	Terminal block ②
1	1 m (3.28 ft) cable

e

Power Supply & Output⑤	
Code	Description
1	5V DC in, 5V DC DLD out (3487)
2	5...26V DC in, 5...26V DC DLD out (7272) ④
3	5...15V DC in, 5...15V DC DLD out (4469)
4	8...26V DC in, 5V DC DLD out (3487)
5	10...30V DC in, 10...30V DC Push-Pull out

f

Resolution	
Code	Description (PPR)
DB	120
CK	360
FW	1024
CS	2048
CR	2500
DS	4096
DR	5000
FS	8192
CV	10000 ⑥
LS	16384 ⑥

Electrical Connections

Table A: Differential Line Driver Outputs

Function	10-Pin Connector	Shielded Cable	Terminal
Channel A Output	A	White	1
Channel B Output	B	Pink	2
Channel Z Output	C	Violet	7
DC+ Input	D	Red	3
DC Return	F	Blue	4
Case Ground	G	Green	—
Channel A' Output	H	Brown	5
Channel B' Output	I	Black	6
Channel Z' Output	J	Yellow	8

Table B: Push-Pull Outputs

Function	10-Pin Connector	Shielded Cable	Terminal
Channel A Output	A	White	1
Channel B Output	B	Pink	2
Channel Z Output	C	Violet	7
DC+ Input	D	Red	3
DC Return	F	Blue	4
Case Ground	G	Green	—
Not connected	—	Brown	—
Not connected	—	Black	—
Not connected	—	Yellow	—

Note: 10-pin connector type MS3102R18-1P

Bulletin 844D Hollow Shaft Incremental Encoders

HS35 Style

844D Blind-Shaft Tolerance

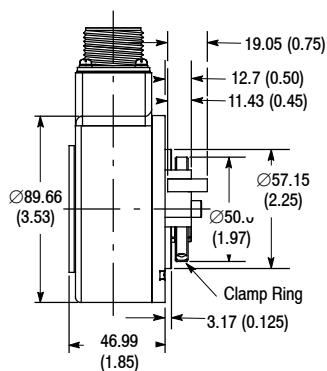
Shaft Size	Bore	Mating Shaft	Length
1/2 inch	0.500/0.501 inch	0.500/0.499 inch	0.70/2.00 inch
5/8 inch	0.625/0.626 inch	0.625/0.624 inch	0.70/2.00 inch
3/4 inch	0.750/0.751 inch	0.750/0.749 inch	0.70/2.00 inch
7/8 inch	0.875/0.876 inch	0.875/0.874 inch	0.70/2.00 inch
1.0 inch	1.000/1.001 inch	1.000/0.999 inch	0.70/2.00 inch
1 1/8 inch	1.125/1.126 inch	1.125/1.124 inch	0.70/2.00 inch
30 mm	30.000/30.025 mm	30.000/29.975 mm	18/50 mm

844D Through-Shaft Tolerance

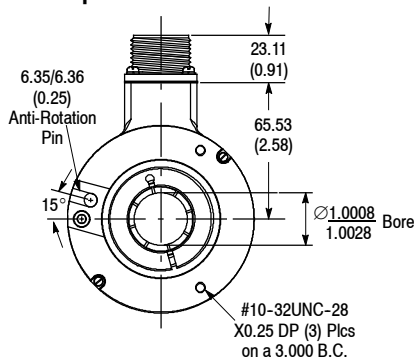
Shaft Size	Bore	Mating Shaft	Length—min.
1/2 inch	0.500/0.501 inch	0.500/0.499 inch	0.70 inch
5/8 inch	0.625/0.626 inch	0.625/0.624 inch	0.70 inch
3/4 inch	0.750/0.751 inch	0.750/0.749 inch	0.70 inch
7/8 inch	0.875/0.876 inch	0.875/0.874 inch	0.70 inch
1.0 inch	1.000/1.001 inch	1.000/0.999 inch	0.70 inch
1 1/8 inch	1.125/1.126 inch	1.125/1.124 inch	0.70 inch
30 mm	29.980/29.959 mm	30.000/29.975 mm	18 mm

Approximate Dimensions [mm (in.)]

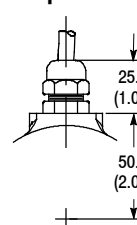
Blind-Shaft ❶



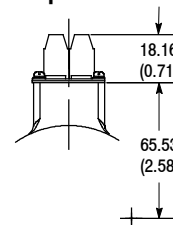
Connector Option



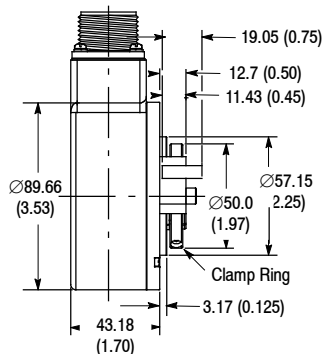
Cable Option



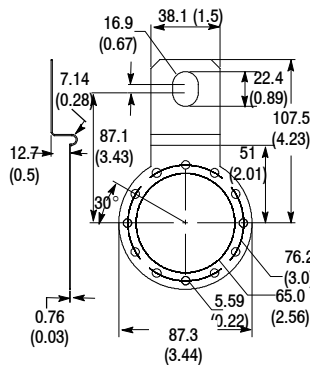
Terminal Option



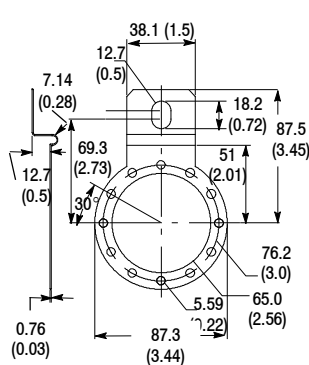
Through-Shaft ❷



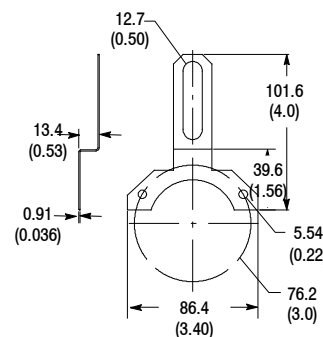
Tether Option "A"



Tether Option "B"



Tether Option "C"



❶ Shown with optional anti-rotation pin.

Bulletin 845F Incremental Encoders

Size 25, High Performance with Integral Shaft Coupling



High Performance Coupling
845F-SJGZ14FWY2

Description

The Bulletin 845F is an optical incremental encoder that provides digital feedback corresponding to the position of a rotating shaft. This feedback is compatible with Programmable Controllers, Numerical Controllers, Motion Controllers, and other positioning systems.

The 845F provides code disk resolution up to 5000 pulses per revolution, frequency response of 210 kHz, and high immunity to electromagnetic interference. Housed in a rugged, size 25, NEMA Type 4 and 13, IP66 (IEC 529), aluminum enclosure, the 845F has a flange mount with integral coupling for ease of installation in harsh industrial environments.

Features

- Code disk resolution up to 5000 PPR
- Optional sink, source, open collector or differential line driver output configurations
- 210 kHz operating frequency
- Input reverse polarity protection
- CE Marked for all applicable directives

Specifications

Electrical	
Code Format	Incremental, 2 channels with zero index
Quadrature	90° ±22°; Channel A leads B CCW
Symmetry	50% ±10%
Zero Index Channel	1/2 cycle, gated to channel B̄
Power Supply	Determined by cat. no.: 5V DC ±5% @ 150 mA max. 8...24V DC @ 150 mA max.
Response Frequency	Data: 210 kHz Zero index: 125 kHz
Operating Speed (Data)	(210 kHz x 60)/pulses per rev. = RPM or 6000 RPM, whichever is lower
Resolution	Up to 5000 PPR on code disk
Output Drives	PNP current source = 20 mA; NPN current sink = 20 mA; Differential line driver = ±20 mA; NPN open collector = 20 mA
Mechanical	
Starting Torque	2.5 Ncm typical [3.5 in-oz]
Running Torque	2.5 Ncm typical [3.5 in-oz]
Moment of Inertia	27 gcm ² (3.9 x 10 ⁻⁴ oz-in-sec ²)
Slew Speed	6000 RPM
Shaft Misalignment	Angular: 5° standard, 10° high performance; Parallel: 0.010 in. standard, 0.020 in. high performance
Coupling Axial Compliance	±0.030 in. standard, ±0.060 in. high performance
Bore Size	9.517 mm (3/8 in.) or 6.4 mm (1/4 in.) dia.
Environmental	
Enclosure Type Rating	NEMA Type 4,13; IP66 (IEC 529)
Operating Temperature [C (F)]	0...+60° (+32...+140°)
Storage Temperature [C (F)]	-25...+90° (-13...+194°)
Relative Humidity	98%, noncondensing
Shock	50 g (11 ms duration)
Vibration	20 g (5...2000 Hz)
Weight [kg (lbs)]	0.91 (2)

Accessories

Description	Page Number
Pre-Wired Cables	6-49
Mating Connectors	6-52
Differential Encoder Buffer Board	6-55

Bulletin 845F Incremental Encoders

Size 25, High Performance with Integral Shaft Coupling

Electrical Connections

7-Pin Connector (ACS02E16S-1P (023))

Current Source, Current Sink,
Open Collector Outputs

Pin	Function	Pin	Function
A	Channel A Output	E	—
B	Channel B Output	F	DC Return
C	Channel Z Output	G	Case Ground
D	DC+ Input	—	—

10-Pin Connector (ACS02E18-1P (023))

Differential Line-Driver Outputs

Pin	Function	Pin	Function
A	Channel A Output	F	DC Return
B	Channel B Output	G	Case Ground
C	Channel Z Output	H	Channel \bar{A} Output
D	DC+ Input	I	Channel \bar{B} Output
E	—	J	Channel \bar{Z} Output

⦿ Pins D and E internally connected

Cable

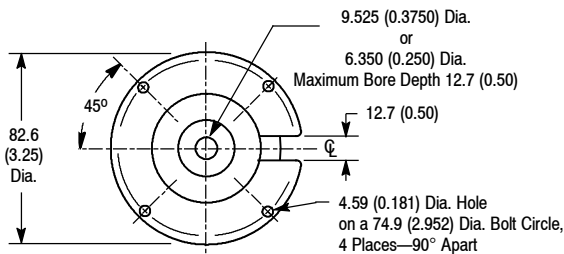
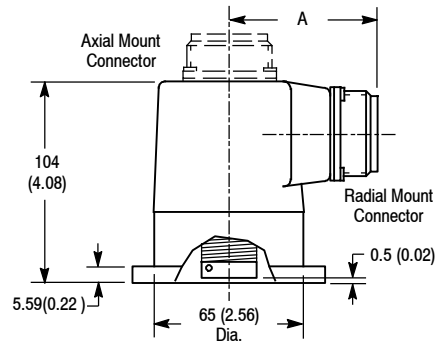
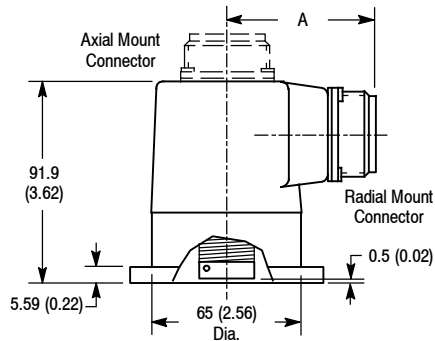
Current Source, Current Sink,
Open Collector Outputs

Wire Pair	Wire Color	Function
Red/Black	Red	DC+ Input
	Black	DC Return
White/Black	White	Channel A Output
	Black	Not Connected
Blue/Black	Blue	Channel B Output
	Black	Not Connected
Green/Black	Green	Channel Z Output
	Black	Not Connected

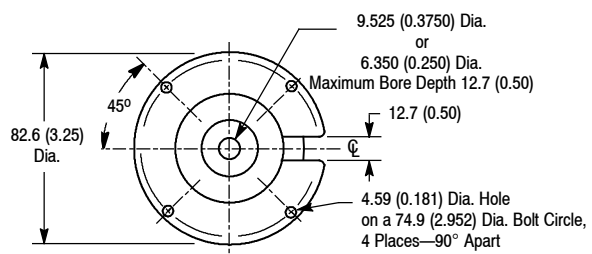
Differential Line Driver Outputs

Wire Pair	Wire Color	Function
Red/Black	Red	DC+ Input
	Black	DC Return
White/Black	White	Channel A Output
	Black	Channel \bar{A} Output
Blue/Black	Blue	Channel B Output
	Black	Channel \bar{B} Output
Green/Black	Green	Channel Z Output
	Black	Channel \bar{Z} Output

Approximate Dimensions [mm (in.)]



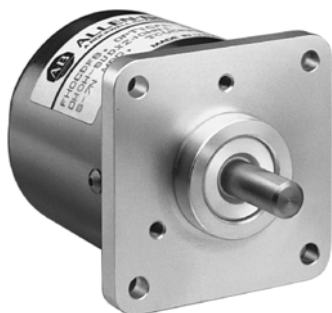
Standard Coupling



High Performance Coupling

Connector Type [mm (in.)]

Output Code	Output Type	Connector Type	Number of Pins	Dimension "A"
2	Current Source	ACS02E16S-1P (023)	7	63 (2.48)
3	Current Sink	ACS02E16S-1P (023)	7	63 (2.48)
4	Diff. Line Driver	ACS02E18-1P (023)	10	73.9 (2.91)
5	Open Collector	ACS02E16S-1P (023)	7	63 (2.48)



Square Flange Mount
845H-SJDZ14CRY2

Description

The Bulletin 845H optical incremental encoders electronically digitize shaft motion of a rotating element by converting mechanical motion to an electronic digital format. Incremental square waves are accumulated in a counter as position feedback. The encoder provides code disk resolutions up to 5000 pulses per revolution at a signal frequency response of 210 kHz.

The Bulletin 845H encoder is housed in a size 25, NEMA Type 4 and 13, IP66 (IEC 529), enclosure making it suitable for many of today's industrial environments.

Features

- Code disk resolution up to 5000 PPR
- Optional sink, source, open collector or differential line driver output configurations
- English and metric options
- Input reverse polarity protection
- CE Marked for all applicable directives

Specifications

Electrical	
Code Format	Incremental, 2 channels with zero index
Quadrature	90° ±22°; Channel A leads B CCW
Symmetry	50% ±10%
Zero Index Channel	1/2 cycle, gated to channel B
Power Supply	Determined by cat. no.: 5V DC ±5% @ 150 mA max. 8...24V DC @ 150mA max.
Response Frequency	Data: 210 kHz Zero index: 125 kHz
Shaft Operating Speed, Max. (RPM)	(210 kHz x 60)/pulses per rev. = RPM or 6000 RPM, whichever is lower
Resolution	Up to 5000 PPR on code disk
Output Drives	PNP current source = 20 mA; NPN current sink = 20 mA; Differential line driver = ±20 mA; NPN open collector = 20 mA
Mechanical	
Starting Torque	2.5 Ncm typical [3.5 in-oz]
Running Torque	2.5 Ncm typical [3.5 in-oz]
Moment of Inertia	15 gcm (2.1 x 10 ⁻⁴ oz-in-sec ²)
Slew Speed	6000 RPM
Shaft Loading	3/8 in. and 10 mm Dia.: Axial 89 N (20 lbs) (10 lbs 5000 PPR); Radial 178 N (40 lbs) (20 lbs 5000 PPR)
Shaft Diameter	6 mm, 10 mm, 6.4 mm (1/4 in.) 9.517 mm (3/8 in.) diameter
Environmental	
Enclosure Type Rating	NEMA Type 4, 13; IP66 (IEC 529)
Operating Temperature [C (F)]	0...+60° (+32...+140°)
Storage Temperature [C (F)]	-25...+90° (-13...+194°)
Relative Humidity	98%, noncondensing
Shock	50 g (11 ms duration)
Vibration	20 g (4...2000 Hz)
Weight [kg (lbs)]	0.91 (2)

Accessories

Description	Page Number
Flexible Couplings	6-47
Measuring Wheels	6-48
Servo Clamps	6-48
Pre-Wired Cables	6-49
Mating Connectors	6-52
Mounting Plates	6-52
Differential Encoder Buffer Board	6-55

Bulletin 845H Incremental Encoders

Size 25, High Performance

Selection Guide

845H — **S** **J** **H** **Z** **1** **4** **CR** **Y** **2** **C**

a b c d e f g

a

Mounting Configuration ❶	
Code	Description
D	Square Flange
E	70 mm Diameter Flange
F	90 mm Diameter Flange
G	Metric Servo 48 mm B.C.
H	English Servo
J	Metric Servo 42 mm B.C.

b

Shaft Options ❶	
Code	Description
A	6 mm Diameter
B	10 mm Diameter
C	1/4 in. Diameter
Z	3/8 in. Diameter
K	6 mm w/Flat
L	10 mm w/Flat
M	1/4 in. w/Flat
N	3/8 in. w/Flat
P	3/8 in. w/Double Flat

❶ Standard cat. nos. consist of either English Mounting Configurations with English Shaft Options or Metric Mounting Configurations with Metric Shaft Options.

c

Power Supply	
Code	Description
1	5V DC ±5%
2	8...24V DC Unregulated

d

Output Configuration ❷	
Code	Description
2	PNP Current Source
3	NPN Current Sink
4	DLD 5V DC RS-422
5	NPN Open Collector 24V DC Max ❸
6	DLD 8...24V DC ❹

❷ DLD = Differential Line Driver

❸ External pull-up resistor required

❹ Can not be ordered with 5V DC power supply (code 1 above)

e

Resolution	Resolution
Code	Description (PPR)
AG	1
AM	5
BG	10
CA	50
CB	60
CE	64
CF	80
CG	100
DB	120
DF	150
EB	180
CH	200
CJ	250
CC	254
CW	256
EG	300
CK	360
CL	400
CM	500
DW	512
EH	600
DG	720
DL	800
LG	900
CN	1000
FW	1024
EL	1200
CD	1250
RF	1280
CU	1472
EM	1500
FL	1600
CP	1800
DN	2000
CS	2048
HL	2400
CR	2500
CY	2540
LJ	2750
EN	3000
CT	3600
DR	5000

f

Connection Type	
Code	Description
1	Axial Connector (End)
2	Radial Connector (Side)
A	Axial Cable (End)
R	Radial Cable (Side)

g

Connection Options	
Code	Description
Blank	Without Mating Connector ❺
C	With Mating Connector ❺
1	1 m (3.28 ft) Cable Length ❻
5	5 m (16.4 ft) Cable Length ❻
9	9 m (29.52 ft) Cable Length ❻

❺ These options not available with Connection Options code: "A" & "R."

❻ These options not available with Connection Options code: "1" & "2."

Electrical Connections

7-Pin Connector (ACS02E16S-1P (023))

Current Source, Current Sink,
Open Collector Outputs

Pin	Function	Pin	Function
A	Channel A Output	E	—
B	Channel B Output	F	DC Return
C	Channel Z Output	G	Case Ground
D	DC+ Input	—	—

10-Pin Connector (ACS02E18-1P (023))

Differential Line-Driver Outputs

Pin	Function	Pin	Function
A	Channel A Output	F	DC Return
B	Channel B Output	G	Case Ground
C	Channel Z Output	H	Channel \bar{A} Output
D	DC+ Input	I	Channel \bar{B} Output
E	—	J	Channel \bar{Z} Output

ⓘ Pins D and E internally connected

Cable

Current Source, Current Sink,
Open Collector Outputs

Wire Pair	Wire Color	Function
Red/Black	Red	DC+ Input
	Black	DC Return
White/Black	White	Channel A Output
	Black	Not Connected
Blue/Black	Blue	Channel B Output
	Black	Not Connected
Green/Black	Green	Channel Z Output
	Black	Not Connected

Cable

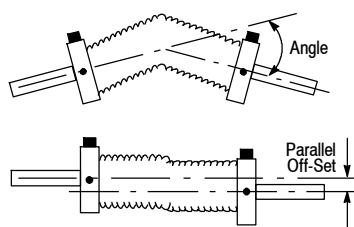
Differential Line Driver Outputs

Wire Pair	Wire Color	Function
Red/Black	Red	DC+ Input
	Black	DC Return
White/Black	White	Channel A Output
	Black	Channel \bar{A} Output
Blue/Black	Blue	Channel B Output
	Black	Channel \bar{B} Output
Green/Black	Green	Channel Z Output
	Black	Channel \bar{Z} Output

Connector Type

Output Code	Output Type	Connector Type	Number of Pins	Dimension "B"
2	Current Source	ACS02E16S-1P (023)	7	63 (2.48)
3	Current Sink	ACS02E16S-1P (023)	7	63 (2.48)
4.6	Diff. Line Driver	ACS02E18-1P (023)	10	73.9 (2.91)
5	Open Collector	ACS02E16S-1P (023)	7	63 (2.48)

Flexible Shaft Couplings

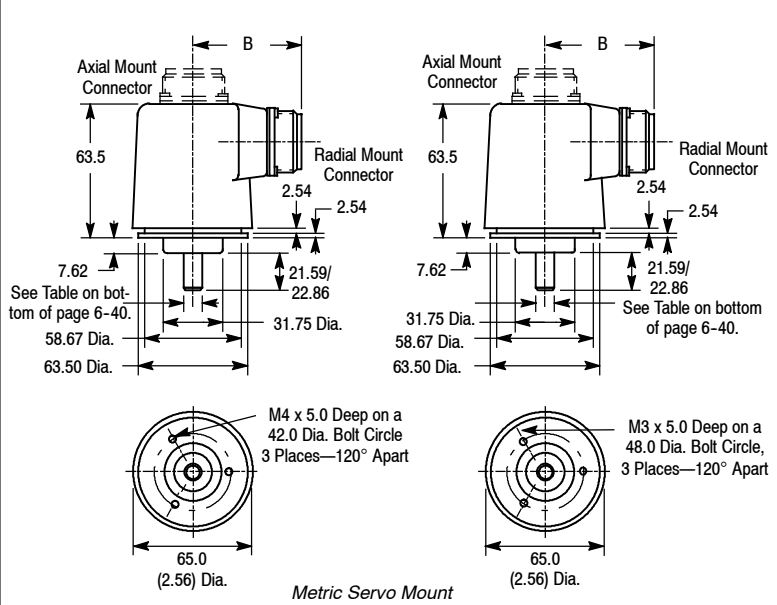
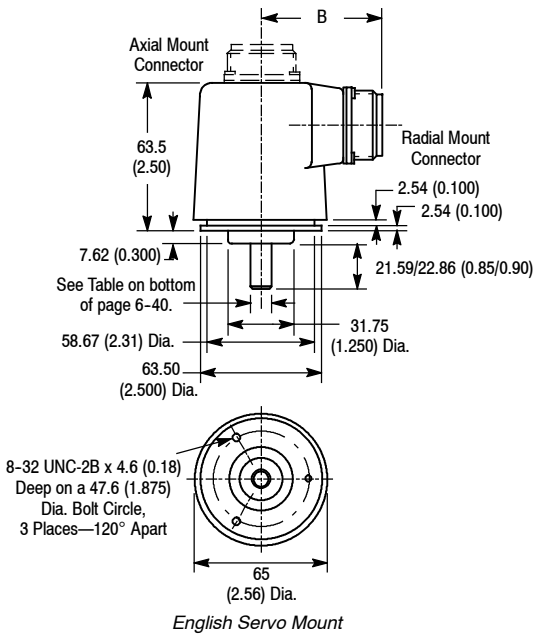
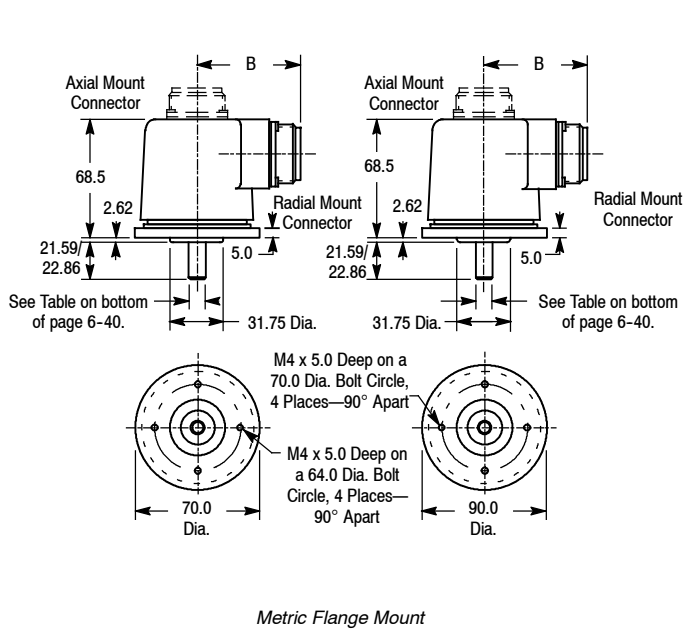
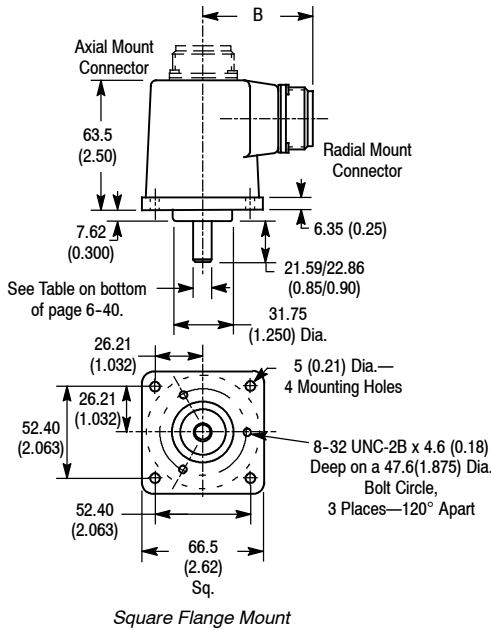


ATTENTION



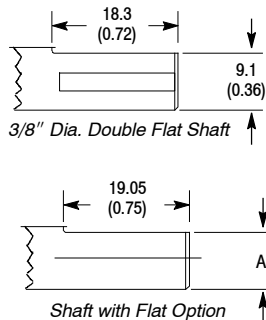
Rigidly coupling the encoder shaft to the machine shaft **will cause a failure** in either the bearings of the encoder or the bearings of the machine shaft.

Approximate Dimensions [mm (in.)]



Shaft Diameter Options

Code	Shaft Diameter [mm (in.)]
A or K	6 +0.00, -0.013
B or L	10 +0.00, -0.013
C or M	6.35 (0.2499) +0.0000, -0.0005
Z or N	9.52 (0.3749) +0.0000, -0.0005



Flat Dimensions

Code	Dimension "A" [mm (in.)]
K	5.3 (0.21)
L	9.1 (0.36)
M	5.5 (0.22)
N	8.6 (0.34)

Bulletin 845T Incremental Encoders

Size 20, Heavy Duty



Square Flange Mount
845T-DZ13ECR

Description

Bulletin 845T optical incremental encoders are used to electronically monitor the position of a rotating shaft. Shaft motion is converted to digital pulses which are accumulated and evaluated by various electronic controllers. The 845T provides code disk resolutions of up to 3000 pulses per revolution, and a frequency response of up to 100 kHz.

The Bulletin 845T encoder is a heavy duty, NEMA Type 4, and IP66 (IEC 529) rated optical incremental shaft encoder that is housed in a two inch diameter enclosure. Typical applications for the 845T include machine tools, packaging machinery, motion controls, and robotics. The heavy duty bearing assembly, rugged construction and high shaft loading capabilities make the 845T suitable for many of today's harsh industrial environments.

Features

- Code disk resolution up to 3000 PPR
- Input reverse polarity protection
- CE Marked for all applicable directives

Specifications

Electrical	
Code Format	Incremental (A, AB or ABZ channels)
Quadrature	90° ±22°; Channel A leads B CCW
Symmetry	50% ±10%
Zero Index Channel	1/2 cycle, gated to channel B̄
Power Supply	Determined by cat. no.: 5V DC ±5% @ 150 mA max. 11...20V DC @ 150 mA max. 24V DC @ 150 mA max.
Response Frequency	Data: 100 kHz Zero index: 100 kHz
Operating Speed	100 kHz x 60/pulses per revolution = RPM or 15,000 RPM, whichever is lower
Resolution	Up to 3000 PPR on code disk
Output Drives	Push-Pull Single Ended Driver = ±20 mA Differential line driver = ±20 mA
Mechanical	
Starting Torque	2.5 Ncm (3.5 in-oz) typical
Running Torque	2.5 Ncm (3.5 in-oz) typical
Slew Speed	15,000 RPM
Shaft Loading	Axial: 359 N (80lbs); Radial: 359 N (80 lbs) (10 mm, 3/8 in. shafts) 180 N (40 lbs) (6 mm, 1/4 in. shafts)
Shaft Dimensions	6 mm, 10 mm, 6.4 mm (1/4 in.), 9.517 mm (3/8 in.) diameter
Environmental	
Enclosure Type Rating	NEMA Type 4; IP66 (IEC 529)
Operating Temperature [C (F)]	0...+60° (+32...+140°)
Storage Temperature [C (F)]	-25...+90° (-13...+194°)
Relative Humidity	98%, noncondensing
Shock	50 g (11 ms duration)
Vibration	20 g (5...2000 Hz)
Weight [kg (oz)]	0.44 (14)

Accessories

Description	Page Number
Flexible Couplings	6-47
Measuring Wheels	6-48
Servo Clamps	6-48
Pre-Wired Cables	6-49
Mating Connectors	6-52
Mounting Plates	6-52
Differential Encoder Buffer Board	6-55

Bulletin 845T Incremental Encoders

Size 20, Heavy Duty

Product Selection

845T — **D** **Z** **1** **3** **E** **CR** — **C**
a b c d e f g

a

Mounting Configuration	
Code	Description
D	Square Flange
H	Servo with Face Mount Holes
L	Servo without Face Mount Holes

b

Shaft Options	
Code	Description
A	6 mm Diameter
B	10 mm Diameter
C	1/4 in. Diameter
Z	3/8 in. Diameter
K	6 mm w/Flat
L	10 mm w/Flat
M	1/4 in. w/Flat
N	3/8 in. w/Flat

c

Electrical Options ①	
Code	Description
1	5V DC in, 5V DC DLD Out
2	5V DC in, 5V DC P-P Out
3	11...24V DC in, 11...24V DC P-P Out
4	11...20V DC in, 5V DC DLD Out
5	24V DC in, 5V DC DLD Out
6	11...24V DC in, 11...24V DC DLD out

① DLD = Differential Line Driver
 P-P = Push-Pull Single Ended Driver

d

Signal Options	
Code	Description
1	Channel A Only
2	Channel A and B
3	Channel A, B, and Z

e

Connection Options	
Code	Description
A	6 Pin Connector ②
B	7 Pin Connector ②
E	10 Pin Connector
P	Pigtail Cable

② This option not available with Electrical Option codes: "1," "4," "5" or "6."

f

Resolution	
Code	Description (PPR)
AG	1
AM	5
BG	10
CA	50
CB	60
CE	64
CF	80
CG	100
DB	120
DF	150
EB	180
CH	200
CJ	250
CC	254
CW	256
EG	300
CK	360
CL	400
CM	500
DW	512
EH	600
DG	720
DL	800
LG	900
CN	1000
FW	1024
EL	1200
CD	1250
RF	1280
CU	1472
EM	1500
FL	1600
CP	1800
DN	2000
CS	2048
HL	2400
CR	2500
CY	2540
LJ	2750
EN	3000

g

Mating Connector/Cable Length	
Code	Description
Blank	Without Mating Connector ③
C	With Mating Connector ③
1	1 m (3.28 ft) Cable Length ④
5	5 m (16.4 ft) Cable Length ④
9	9 m (29.52 ft) Cable Length ④

③ These options not available with Connection Options code: "P."

④ These options not available with Connection Options code: "A," "B," & "E."

Cable

Push-Pull Outputs

Wire Pair	Wire Color	Function
Red/Black	Red	DC+ Input
	Black	DC Return
White/Black	White	Channel A Output
	Black	Not Connected
Blue/Black	Blue	Channel B Output
	Black	Not Connected
Green/Black	Green	Channel Z Output
	Black	Not Connected

Differential Line Driver Outputs

Wire Pair	Wire Color	Function
Red/Black	Red	DC+ Input
	Black	DC Return
White/Black	White	Channel A Output
	Black	Channel \bar{A} Output
Blue/Black	Blue	Channel B Output
	Black	Channel \bar{B} Output
Green/Black	Green	Channel Z Output
	Black	Channel \bar{Z} Output

Electrical Connections

6-Pin Connector
(ACS02E14S-6P (023))

Push-Pull Outputs

Pin	Function	Pin	Function
A	DC Return	D	Channel B Output
B	DC+ Input	E	Channel A Output
C	Channel Z Output	F	No Connection

7-Pin Connector
(ACS02E16S-1P (023))

Push-Pull Outputs

Pin	Function	Pin	Function
A	Channel A Output	E	No Connection
B	Channel B Output	F	DC Return
C	Channel Z Output	G	No Connection
D	DC+ Input	—	No Connection

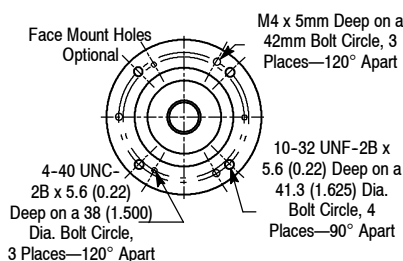
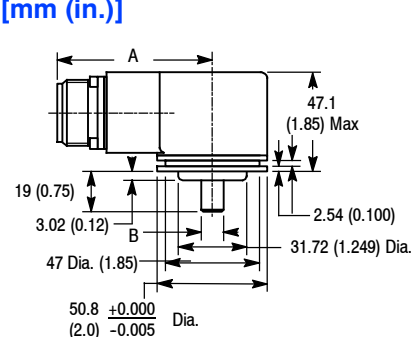
10-Pin Connector
(ACS02E18-1P (023))

Push-Pull, Differential Line Driver Outputs

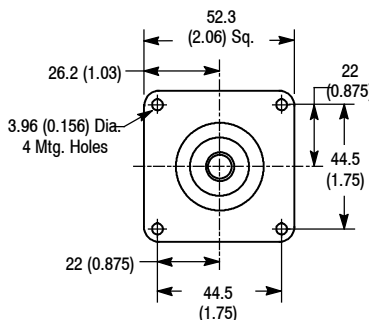
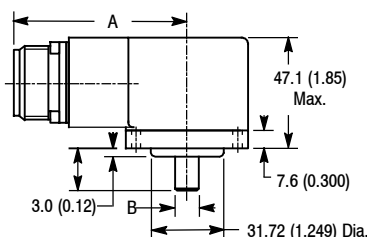
Pin	Function	Pin	Function
A	Channel A Output	F	DC Return
B	Channel B Output	G	No Connection
C	Channel Z Output	H	Channel \bar{A} Output
D	DC+ Input	I	Channel \bar{B} Output
E	No Connection	J	Channel \bar{Z} Output

⦿ Not included with push-pull outputs

Approximate Dimensions
[mm (in.)]



Servo Mount



Square Flange Mount

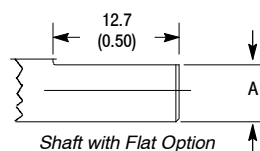
Connector Dimensions

Dimension Code	Radial Connector Options	Length mm (inches)
A	ACS02E14S-6P (023)	57.7 (2.272)
	ACS02E16S-1P (023)	62.5 (2.460)
	ACS02E18-1P (023)	68.9 (2.691)

Shaft Diameter Options
Dimension "B"

Code	Shaft Diameter [mm (in.)]
A or K	6 ± 0.00 , -0.013
B or L	10 ± 0.00 , -0.013
C or M	6.35 (0.2499) ± 0.0000 , -0.0005
Z or N	9.52 (0.3749) ± 0.0000 , -0.0005

Option H Mounting Configuration includes all 3 sets of mounting holes.



Shaft with Flat Option

Flat Dimensions

Code	Dimension "A" [mm (in.)]
K	5.3 (0.21)
L	9.1 (0.36)
M	5.5 (0.22)
N	8.6 (0.34)

Bulletin 845PY Digital Tachometer

Size 20, 5PY Mounting



5PY Mount
845PY-FW-2

Description

Bulletin 845PY digital tachometer is an optical encoder that determines the angular velocity of a rotating shaft and is a direct digital replacement for the standard 5PY analog tachometer. The Bulletin 845PY will mount on the same bolt hole pattern and use the same flexible coupling.

The Bulletin 845PY digital tachometer is a heavy duty, NEMA Type 4, and IP66 (IEC 529) rated optical incremental shaft encoder that is housed in a two-inch diameter enclosure. Typical applications for the 845PY include velocity feedback to a variety of DC drives, and machine tools.

Features

- Digital replacement for the 5PY Analog Tachometer
- Direct 1395 digital DC drive interface
- Code disk resolution up to 3000 PPR
- Input reverse polarity protection
- CE Marked for all applicable directives

Specifications

Electrical	
Code Format	Incremental, 2 channels
Quadrature	90° ±22°; Channel A leads B CCW
Symmetry	50% ±10%
Power Supply	Determined by cat. no.: 5V DC ±5% @ 150 mA max. 11...20V DC @ 150 mA max. 24V DC @ 150 mA max.
Response Frequency	100 kHz
Operating Speed	(100 kHz x 60)/pulses per revolution = RPM or 15,000 RPM, whichever is lower
Resolution	Up to 3000 PPR on code disk
Output Drives	Differential line driver = ±20 mA @ 5V DC
Mechanical	
Starting Torque	2.5 Ncm (3.5 in-oz) typical
Running Torque	2.5 Ncm (3.5 in-oz) typical
Slew Speed	15,000 RPM
Shaft Loading	Axial: 359 N (80 lbs); Radial: 222 N (50 lbs)
Shaft Dimensions	7.94 mm (5/16 in.) diameter
Environmental	
Enclosure Type Rating	NEMA Type 4; IP66 (IEC 529)
Operating Temperature [C (F)]	0...+60° (+32...+140°)
Storage Temperature [C (F)]	-25...+90° (-13...+194°)
Relative Humidity	98%, noncondensing
Shock	50 g (11 ms duration)
Vibration	20 g (5...2000 Hz)
Weight [kg (oz)]	0.56 (20)

Accessories

Description	Page Number
Pre-Wired Cables	6-49
Mating Connectors	6-52
Differential Encoder Buffer Board	6-55

Product Selection

845PY — **FW** — **2** — **C**
 a *b* *c*

a

Resolution	
Code	Description (PPR)
AG	1
AM	5
BG	10
CA	50
CB	60
CE	64
CF	80
CG	100
DB	120
DF	150
EB	180
CH	200
CJ	250
CC	254
CW	256
EG	300
CK	360
CL	400
CM	500
DW	512
EH	600
DG	720
DL	800
LG	900
CN	1000
FW	1024
EL	1200
CD	1250
RF	1280
CU	1472
EM	1500
FL	1600
CP	1800
DN	2000
CS	2048
HL	2400
CR	2500
CY	2540
LJ	2750
EN	3000

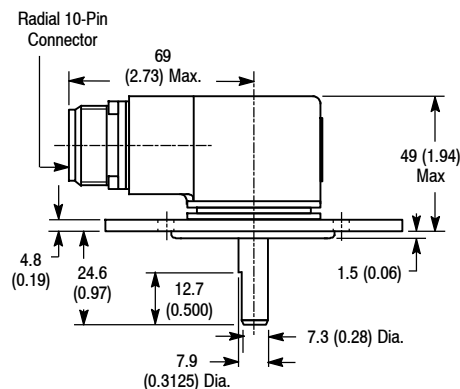
b

Power Supply Option	
Code	Description
1	5V DC ±5%
2	11...20V DC
3	24V DC ±10%

c

Mating Connector	
Code	Description
Blank	Without Mating Connector
C	With Mating Connector

Approximate Dimensions [mm (in.)]

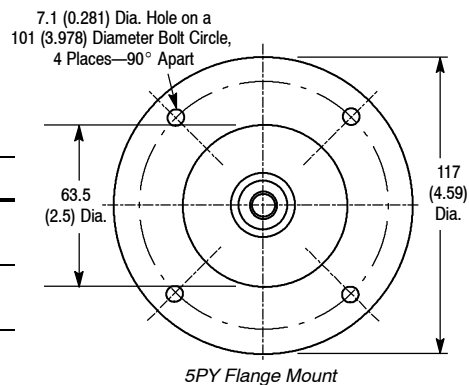


Electrical Connections

10-Pin Connector (ACS02E18-1P (023))

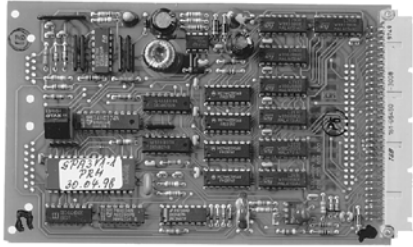
Differential Line Driver Outputs

Pin	Function	Pin	Function
A	Channel A Output	F	DC Return
B	Channel B Output	G	No Connection
C	No Connection	H	Channel A Output
D	DC+ Input	I	Channel B Output
E	No Connection	J	No Connection



Bulletin 842 Encoder Accessories

Serial Parallel Adaptor/SPA Card Holder



Serial Parallel Adaptor
842-SPA

Product Selection

842 — SPA

Size	10.3 x 165 mm (4 x 6.5 in.)
Voltage Supply	11...32V DC
Power Requirements	250 mA
Operating Temperature [C (F)]	0...50° (32...122°)
Output Driver (parallel)	Push-pull, 5...32V, 20 mA (max)
Input	RS422 (SSI)

Description

The 842-SPA, Serial Parallel Adaptor, converts Synchronous Serial Interface (SSI) signals to parallel data format. The 842-SPA is used with 842A, 845G, and 845GM absolute encoders.

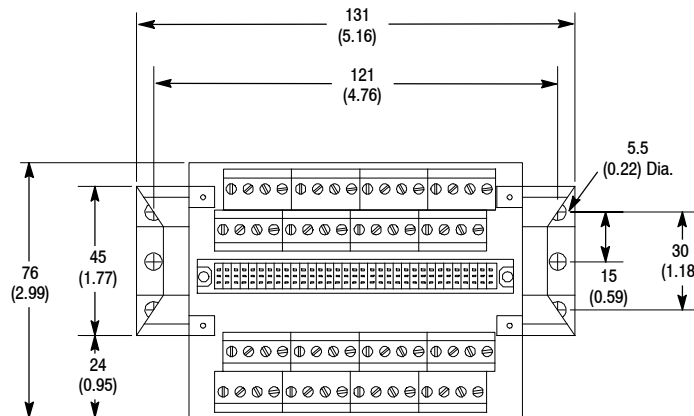
Typically, one each of the 842-SPA and 842-CH are ordered for each application.



SPA Card Holder
842-CH

Product Selection

842 — CH

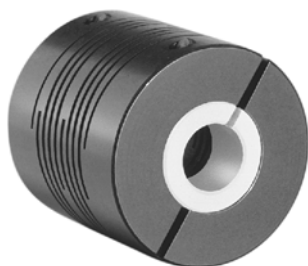


Description

The 842-CH is the card holder for the 842-SPA. It is designed to be mounted in an enclosure provided by the user. The card holder should be mounted as close as possible to the controller or input card.

Typically, one each of the 842-SPA and 842-CH are ordered for each application.

The 842-CH can accommodate wire sizes from #26...16 AWG.



High Performance Flexible Coupling
845-FC-B-B

Product Selection—
High Performance

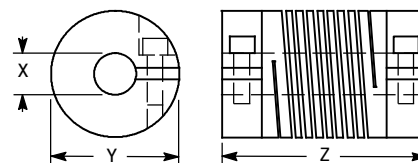
845 — FC — $\frac{B}{a}$ — $\frac{B}{b}$

Smallest Bore Diameter	
Code	Description
A	1/4 in.
B	3/8 in.
R	6 mm
T	10 mm

Largest Bore Diameter	
Code	Description
A	1/4 in.
B	3/8 in.
C	1/2 in.
R	6 mm
T	10 mm

Approximate Dimensions
[mm (in.)]

High Performance Flexible Coupling



Dimension Code	Bore Size Code Letter				
	A	B	C	R	T
X	6.4 (0.25)	9.5 (0.375)	12.7 (0.50)	6	10
Y	30.56 (1.20) Dia.				
Z	32 (1.25) Long				

Description

High performance flexible couplings are used to connect two shafts, and help to reduce the effects of misalignment between the shafts. Flexible couplings are offered in the high performance version, with nonconductive inserts. They are of the flexible curved beam helical type with clamping screw at both ends.

Specifications

Parallel Offset	0.51 mm (0.020 in.) max.
Angular Offset	10.0° max.
Axial Compliance	1.58 mm (0.060 in.) max.
Construction	Aluminum with a fiberglass insert



Miniature Style
Flexible Coupling
845-FC-1

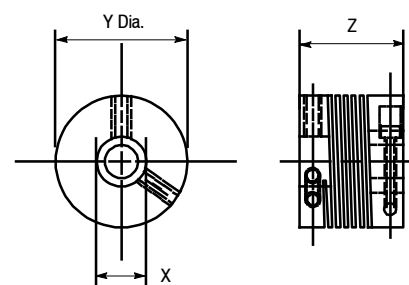
Product Selection—
Miniature Style

845 — FC — $\frac{1}{a}$

Bore Diameter	
Code	Description
1	3/8...3/8 in.
2	1/4...3/8 in.

Approximate Dimensions
[mm (in.)]

Miniature Style Flexible Coupling



Dimension Code	Bore Size Code Letter	
	1	2
X	9.5 (0.375)	6.4 (0.25)
Y	25.40 (1.0) Dia.	
Z	19 (0.750) Long	

Specifications

Parallel Offset	0.25 mm (0.010 in.) max
Angular Offset	5.0° max
Axial Compliance	0.76 mm (0.030 in.) max
Construction	Aluminum with a fiberglass insert

Bulletin 845 Encoder Accessories

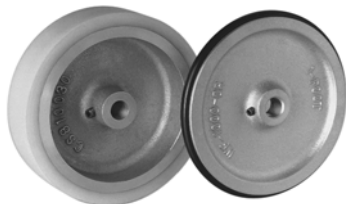
Measuring Wheels/Servo Clamps

Product Selection

845 — M W — A — $\frac{1}{a}$

Approximate Dimensions [mm (in.)]

Measuring Wheels



Polyurethane
845-MW-A-2

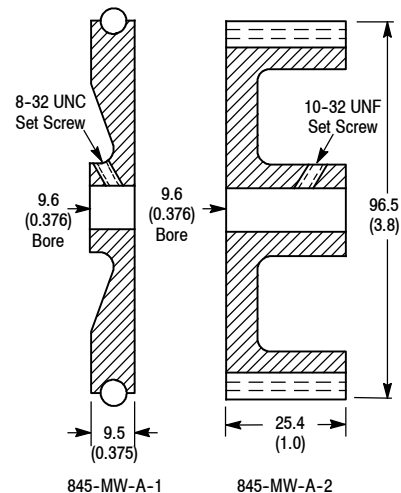
Rubber O-Ring
845-MW-A-1

a

Contact Material	
Code	Description
1	Rubber O-Ring
2	Polyurethane

Specifications

Circumference	304.8 mm (12.00 in.)
Bore Hole Diameter	9.6 mm (0.376 in.)
Durometer	70 Shore D
Material	Cast Aluminum



Description

Measuring wheels are used to convert a fixed amount of linear motion to a corresponding amount of rotary motion. Rubber O-Ring type contact material is used on metal, paper, foil, film and hard plastics. Polyurethane type contact material is used on soft smooth materials, such as soft paper, cardboard and fine weave textiles.

Product Selection

845 — SC

Approximate Dimensions [mm (in.)]

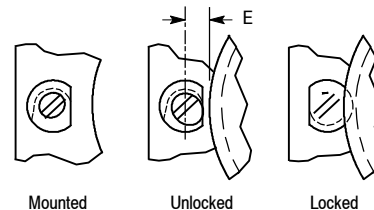
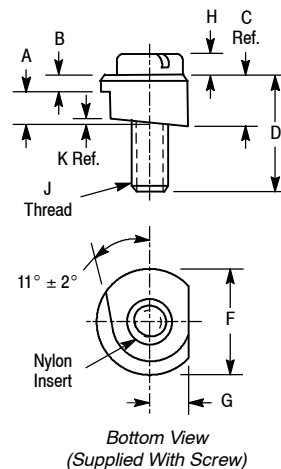
Servo Clamps



Servo Clamps
845-SC

Dimension Code	Approximate Dimension
A	2.38 ± 0.003 (0.093)
B	1.02 ± 0.003 (0.040)
C	3.38 (0.133)
D	9.5 + 0.000, - 0.032 (0.375)
E	3.43 (0.135)
F	9.90 (0.390)
G	3.18 (0.125)
H	1.73 (0.068) max.
J	#4...40
K	0.25 (0.010)

Material: Stainless Steel 316



Description

Servo clamps are used for the mounting of all encoders with the servo type mounting option. For the size 15 device, 3 clamps are arrayed on a 48.1 mm (1.895 in.) diameter bolt circle. For the size 20 device, 3 or 4 clamps are arrayed on a 57.7 mm (2.27 in.) diameter bolt circle. For 60 mm encoders (i.e., the 842A), 3 or 4 clamps are arrayed on a 66.3 mm (2.61 in.) diameter bolt circle. For the size 25 device, 3 or 4 clamps are arrayed on a 70.4 mm (2.77 in.) diameter bolt circle. Servo clamps are sold as a kit (set of 4 clamps).

Product Selection



6 Pin Connector
845-CA-A-50

845 — CA — $\frac{C}{a}$ — $\frac{25}{b}$

a

b

Connector		
Code	Description	Cable Type
A	6 Pin (845T)	Alpha 6054C or equivalent
B	7 Pin (845F, H, T)	
C	10 Pin (845F, H, T, 844D)	
D	19 Pin (845D, G, GM)	Alpha 5199/20C or equivalent
G	12 Pin (842A, 845G, GM)	Alpha 6054C or equivalent
H	17 Pin (845G)	Alpha 5199/20C or equivalent
K	10 Pin (845F, H, T)	Alpha 6318 or equivalent ②
PY	10 Pin (845PY)	Alpha 6054C or equivalent

Cable Length ①	
Code	Description
10	10 ft
25	25 ft
50	50 ft ②
100	100 ft ②

① See table on page 6-51 for other available lengths.

② Not recommended for 5V DC powered encoders.

③ Low capacitance cable for long cable runs.

Description

The following pre-wired cable assemblies are available for use with Allen-Bradley encoder products. The cables are wired to the appropriate mating connector for the encoder with which they will be used. The other end of the cable will be a stripped and tinned pigtail. Connector catalog numbers shown below from Amphenol Corporation.

Cat. No.	Wire Pair	Wire Color	Function	Pin
845-CA-A- (With 6 pin ACS06E14S-6S (023) connector)	Red/Black/Shield	Red	+DC Input	B
		Black	DC Common	A
	White/Black/Shield	White	CH A	E
		Black	N/C	—
	Blue/Black/Shield	Blue	CH B	D
		Black	N/C	—
Green/Black/Shield	Green	CH Z	C	
	Black	N/C	—	

Cat. No.	Wire Pair	Wire Color	Function	Pin
845-CA-B- (With 7 pin ACS06E16S-1S (023) connector)	Red/Black/Shield	Red	+DC Input	D
		Black	DC Common	F
	White/Black/Shield	White	CH A	A
		Black	N/C	—
	Blue/Black/Shield	Blue	CH B	B
		Black	N/C	—
Green/Black/Shield	Green	CH Z	C	
	Black	N/C	—	

Cat. No.	Wire Pair	Wire Color	Function	Pin
845-CA-C- (With 10 pin ACS06E18-1S (023) connector)	Red/Black/Shield	Red	+DC Input	D
		Black	DC Common	F
	White/Black/Shield	White	CH A	A
		Black	CH \bar{A}	H
	Blue/Black/Shield	Blue	CH B	B
		Black	CH \bar{B}	I
	Green/Black/Shield	Green	CH Z	C
		Black	CH \bar{Z}	J

Bulletin 845 Encoder Accessories**Pre-Wired Cable Assemblies**

Cat. No.	Wire Color	Pin	Wire Color	Pin
845-CA-D- (With 19 pin PT06E14-19S connector)	Brown	A	White/Red	L
	Orange	B	White/Yellow	M
	Yellow	C	White/Green	N
	Green	D	White/Blue	P
	Blue	E	White/Black	R
	Violet	F	White/Violet	S
	Grey	G	Black	T
	White	H	White/Grey	U
	White/Orange	J	Red	V
	White/Brown	K	White/Black/Brown	—
			Shield	Shield

Cat. No.	Wire Pair	Wire Color	Function	Pin
845-CA-G- (With 12 pin connector)	Red/Black/Shield	Red	+DC Input	8
		Black	DC Common	1
	White/Black/Shield	White	Clock +	3
		Black	Clock -	11
	Blue/Black/Shield	Blue	Data +	2
		Black	Data -	10
	Green/Black/Shield	Green	CW/CCW	12
		Black	Reset	9

Cat. No.	Wire Color	Pin	Wire Pair	Pin
845-CA-H- (With 17 pin MS3106E20-29S connector)	White/Orange	A	White/Green	L
	White	B	White/Yellow	M
	Grey	C	White/Red	N
	Violet	D	White/Blue	P
	Blue	E	Black	R
	Yellow	F	Red	S
	Orange	G	Green	T
	Brown	H		
	White/Violet	J		
	White/Brown	K		
				Shield

Bulletin 845 Encoder Accessories

Pre-Wired Cable Assemblies

Cat. No.	Wire Pair	Wire Color	Function	Pin
845-CA-K- (With 10 pin ACS06E18-1S (023) connector)	Red/Black/Shield	Red	+DC Input	D
		Black	DC Common	F
	White/Black/Shield	White	CH A	A
		Black	CH \bar{A}	H
	Blue/Black/Shield	Blue	CH B	B
		Black	CH \bar{B}	I
	Green/Black/Shield	Green	CH Z	C
		Black	CH \bar{Z}	J
All Shields	—	Shield	G	

Cat. No.	Wire Pair	Wire Color	Function	Pin
845-CA-PY- (With 10 pin ACS06E18-1S (023) connector)	Red/Black/Shield	Red	+DC Input	D
		Black	DC Common	F
	White/Black/Shield	White	CH A	A
		Black	CH \bar{A}	H
	Green/Black/Shield	Green	CH B	B
		Black	CH \bar{B}	I

Cat. No.	Description	Cat. No.	Description
845-CA-A-10	6 Pin Connector for 845T—3 m (10 ft)		
845-CA-A-25	6 Pin Connector for 845T—7.6 m (25 ft)		
845-CA-A-50	6 Pin Connector for 845T—15.2 m (50 ft)		
845-CA-A-100	6 Pin Connector for 845T—30.4 m (100 ft)		
845-CA-B-10	7 Pin Connector for 845F, H, T—3 m (10 ft)	845-CA-G-10	12 Pin Connector for 842A, 845G ^① , GM ^② —3 m (10 ft)
845-CA-B-25	7 Pin Connector for 845F, H, T—7.6 m (25 ft)	845-CA-G-25	12 Pin Connector for 842A, 845G ^① , GM ^② —7.6 m (25 ft)
845-CA-B-50	7 Pin Connector for 845F, H, T—15.2 m (50 ft)	845-CA-G-50	12 Pin Connector for 842A, 845G ^① , GM ^② —15.2 m (50 ft)
845-CA-B-100	7 Pin Connector for 845F, H, T—30.4 m (100 ft)	845-CA-G-100	12 Pin Connector for 842A, 845G ^① , GM ^② —30.4 m (100 ft)
845-CA-C-10	10 Pin Connector for 845F, H, T, 844D—3 m (10 ft)	845-CA-H-10	17 Pin Connector for 845G—3 m (10 ft)
845-CA-C-25	10 Pin Connector for 845F, H, T, 844D—7.6 m (25 ft)	845-CA-H-25	17 Pin Connector for 845G—7.6 m (25 ft)
845-CA-C-50	10 Pin Connector for 845F, H, T, 844D—15.2 m (50 ft)	845-CA-H-50	17 Pin Connector for 845G—15.2 m (50 ft)
845-CA-C-100	10 Pin Connector for 845F, H, T, 844D—30.4 m (100 ft)	845-CA-H-100	17 Pin Connector for 845G—30.4 m (100 ft)
845-CA-C-200	10 Pin Connector for 845F, H, T, 844D—60.9 m (200 ft)	845-CA-K-10	10 Pin Connector ^② —3 m (10 ft)
845-CA-C-330	10 Pin Connector for 845F, H, T, 844D—100.5 m (330 ft)	845-CA-K-25	10 Pin Connector ^② —7.6 m (25 ft)
845-CA-D-10	19 Pin Connector for 845D, G, GM—3 m (10 ft)	845-CA-K-50	10 Pin Connector ^② —15.2 m (50 ft)
845-CA-D-25	19 Pin Connector for 845D, G, GM—7.6 m (25 ft)	845-CA-K-100	10 Pin Connector ^② —30.4 m (100 ft)
845-CA-D-50	19 Pin Connector for 845D, G, GM—15.2 m (50 ft)	845-CA-K-200	10 Pin Connector ^② —60.9 m (200 ft)
845-CA-D-100	19 Pin Connector for 845D, G, GM—30.4 m (100 ft)	845-CA-K-300	10 Pin Connector ^② —91.4 m (300 ft)
845-CA-D-150	19 Pin Connector for 845D, G, GM—45.7 m (150 ft)	845-CA-K-400	10 Pin Connector ^② —121.9 m (400 ft)
845-CA-D-200	19 Pin Connector for 845D, G, GM—60.9 m (200 ft)	845-CA-PY-10	10 Pin Connector for 845PY—3 m (10 ft)
		845-CA-PY-25	10 Pin Connector for 845PY—7.6 m (25 ft)
		845-CA-PY-50	10 Pin Connector for 845PY—15.2 m (50 ft)
		845-CA-PY-100	10 Pin Connector for 845PY—30.4 m (100 ft)

Cables 50 ft and longer not recommended for 5V DC powered encoders.

① 845-CA-G-** for 845G and 845GM SSI models.

② Low capacitance cable.

Bulletin 845 Encoder Accessories

Mating Connectors/Mounting Plates

Product Selection

845 — 10P
a



Mating Connectors

Description

Mating connectors listed are either included with, or available as standard options for all encoder products.

<i>a</i>	
Connector	
Code	Description
6P	6 Pin (845T)
7P	7 Pin (845F, H, T)
7P-RT	7 Pin, Right Angle (845F, H, T)
10P	10 Pin (845F, H, T, PY, 844D)
10P-RT	10 Pin, Right Angle (845F, H, T, PY, 844D)
12P	12 Pin (842A, G, GM)
SCD	19 Pin, KPT06F-14-19S (845D, G, GM)
17P	17 Pin, MS3106E20-29S (845G)

Description

Mounting plates are used to physically mount the encoder or resolver to the rotating member that is to be monitored.

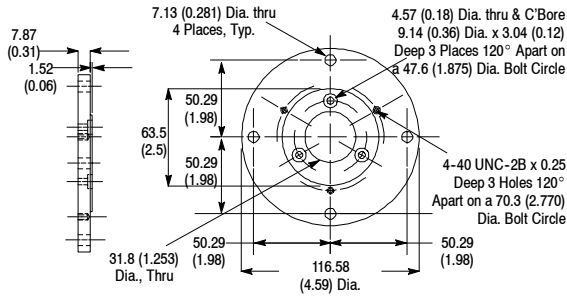
Product Selection

845 — MB — 1
a

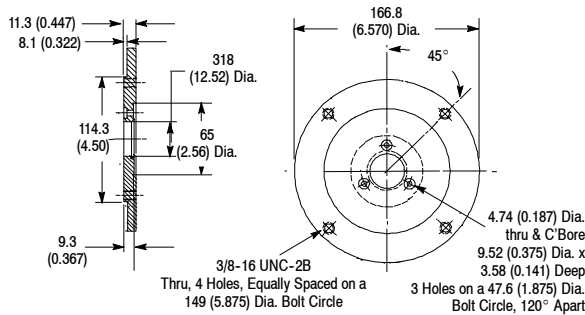
Approximate Dimensions [mm (in.)]



845-MB-1



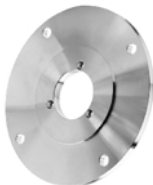
845-MB-2



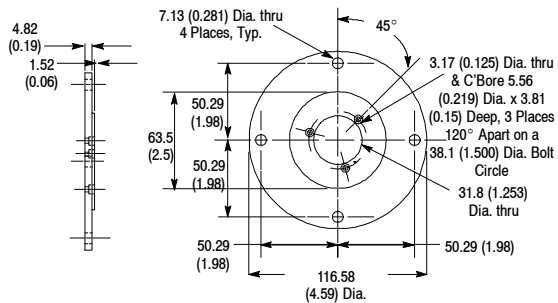
<i>a</i>	
Plate	
Code	Description
1	5PY Mounting Plate for Size 25 Face or Servo Mount (845H, K, G, D)
2	BC42 Mounting Plate for Size 25 Face Mount (845H, K, G, D)
3	5PY Mounting Plate for Size 20 Face Mount (845T)
4	Integral Coupling Flange, Miniature Style (845D, G, H, K, T) ❶
5	Integral Coupling Flange, High Performance (845D, G, H, K, T) ❶
6	BC48 Servo to Square (842A) ❷
7	0.1875 Servo to Square (845H, K) ❷
8	NEMA 180 C-Face Mount (845H, K) ❸
9	Low Profile Coupling Flange Miniature Style (845D, G, H, K, T)

- ❶ For size 20/25 face mount
- ❷ Square flange adaptor
- ❸ Face or servo mount

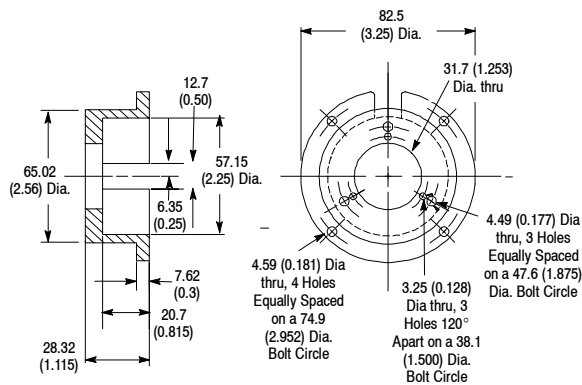
Approximate Dimensions [mm (in.)] (continued)



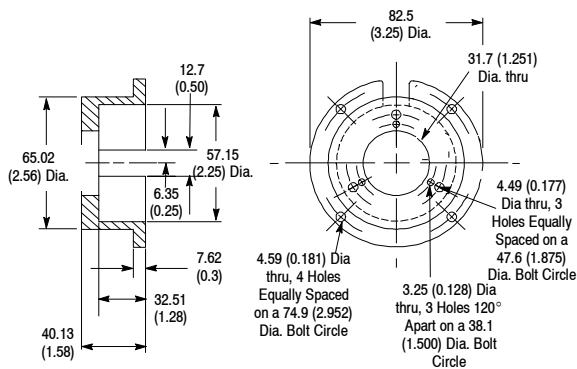
845-MB-3



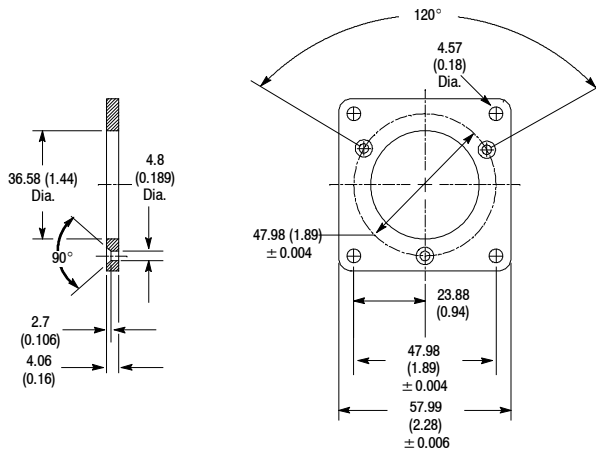
845-MB-4



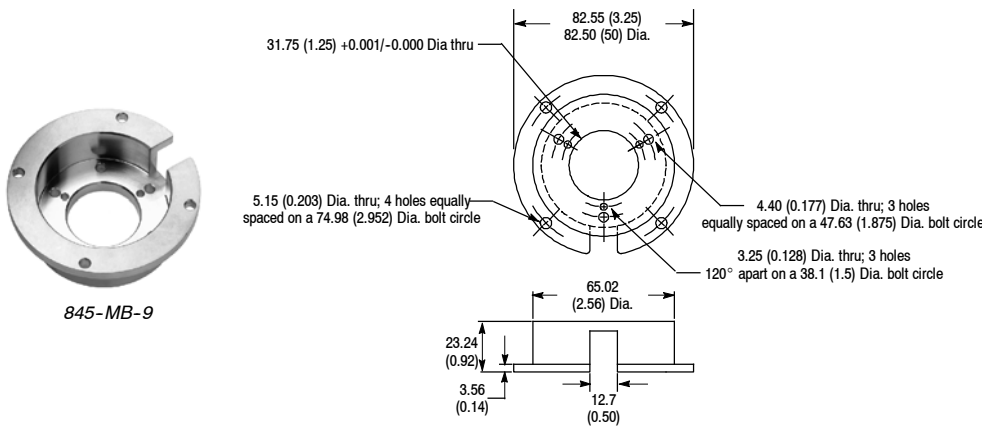
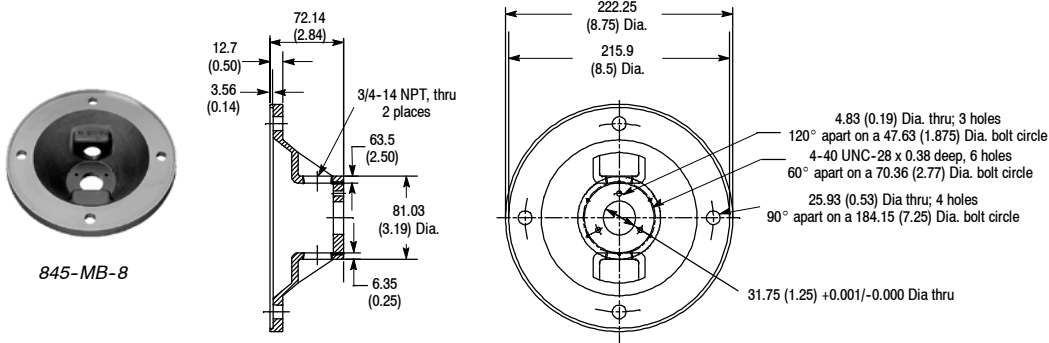
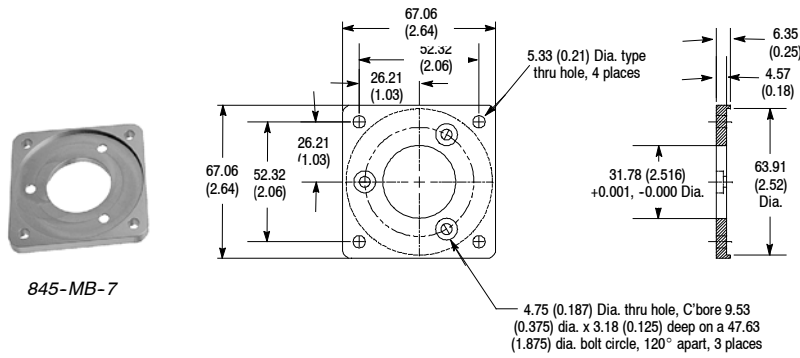
845-MB-5



845-MB-6



Approximate Dimensions [mm (in.)] (continued)

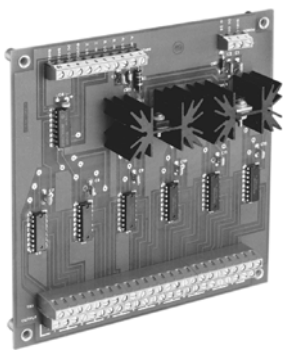


Encoder Mounting Plate Options

Mounting Plate	Option 1	Option 2	845D #1	845D #2	845G	845K	845T
845-MB-1	845H-SJD*	845H-SJH*	845D-S*D*	845-S*H*	845G-*	845K-*	
845-MB-2							
845-MB-3							
845-MB-4	845H-SJD*	845H-SJH*	845D-S*D*	845D-S*H*	845G-*	845K-*	845T-H*
845-MB-5							
845-MB-6	842A-31*						
845-MB-7	845H-SJH*			845D-S*H*	845G-S*	845K-SAH*	
845-MB-8	845H-SJD*	845H-SJH*	845D-S*D*	845D-S*H*	845G-*	845K-*	
845-MB-9							

Bulletin 845 Encoder Accessories

Differential Encoder Buffer Board



Buffer Board
845-BB

Selection Guide

845 — BB

Specifications

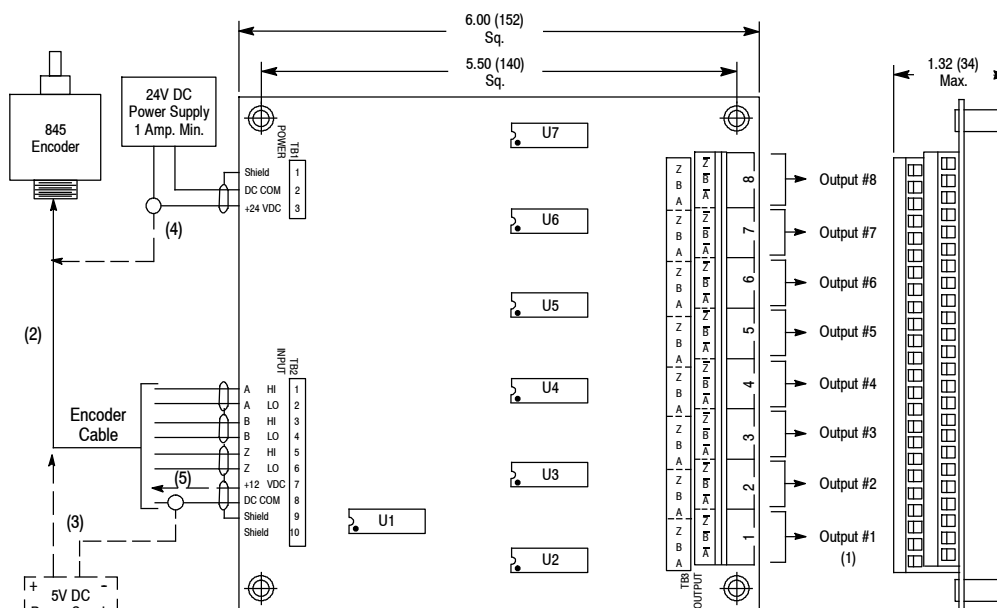
Electrical	
Power Requirements	24V DC ±10% filtered @ 1 A maximum
Input Code Format	Incremental differential line driver dual channel with zero index
Input Signal	5V DC RS-422 differential line driver
Available Encoder Power	12V DC ±10% @ 220 mA maximum
Frequency Response	250 kHz maximum
Outputs	Eight (8) sets of ABZ channel 5V DC RS-422 differential line driver signals
Output Drive Capability	±20 mA per channel
Mechanical	
Dimensions	152 mm (6 in.) x 152 mm (6 in.) x 34 mm (1.32 in.) maximum
Mounting	Thru-hole standoffs on circuit board four (4) holes on a 140 mm (5.5 in.) square
Enclosure	None (non-enclosed circuit board)
Environmental	
Operating Temperature	0...+50°C (+32...+122°F)
Storage Temperature	-25...+90°C (-13...+194°F)
Humidity	98%, Noncondensing
Approximate Ship Weight	0.23kg (0.5lbs)

Description

The 845-BB buffer board is an encoder interface designed to allow a single differential line driver type encoder to be wired to eight sets of differential inputs. The inputs may be programmable controllers, numerical controllers, motion controllers, and other positioning systems that require differential encoder input signals.

The 845-BB buffer board should be mounted in the I/O cabinet and will provide a degree of immunity to electrical noise. The buffer board is powered with 24V DC, 1 A maximum. Internal voltage regulator circuits make available 12V DC as encoder power. All connections are made via terminal strips mounted on the buffer board.

Approximate Dimensions [mm (in.)]








Notes:

- (1) Output cable is (Alpha 6053C) or (Belden 9329) or equivalent.
- (2) Encoder cable is (Alpha 6054C) or (Belden 9330) or equivalent.
- (3) For 5V DC Encoders, connect 5V common to DC common (max cable length = 30 feet).
- (4) Connect for 24V DC Encoders.
- (5) Connect for 12V DC Encoders.

- General Information** Quick Selection Guide page 7-2
- Products**
 - 836E Pressure Switches page 7-4
 - 836E Nondisplay Pressure Switches page 7-7
 - 837E Temperature Switches page 7-10
 - 837E Nondisplay Temperature Switches page 7-13
 - 839E Flow Switches page 7-15
- Accessories** Adaptors page 7-6
- Indexes**
 - Cat. No. Index page 13-1
 - Comprehensive Product Index page 14-1

Quick Selection Guide

	 836E Pressure Switches	 836E Nondisplay Pressure Switches
Features	<ul style="list-style-type: none"> • Microprocessor based with no moving parts for longer life and reduced downtime • Rugged, corrosion-resistant 316L stainless steel housing features an IP66 enclosure rating to withstand harsh industrial conditions • Operating pressures from -15...6000 psi (gauge) • Industry-leading four-digit 14-segment digital display • Independently programmable dual PNP N.O./N.C. outputs or 4...20 mA analog output • Stainless steel sensing element 	<ul style="list-style-type: none"> • Microprocessor based with no moving parts for longer life and reduced downtime • Rugged, corrosion-resistant 304L stainless steel housing features an IP65 enclosure rating to withstand harsh industrial conditions • Operating pressures from 0...6000 psi (gauge) • 4...20 mA analog output • Stainless steel sensing element
Applications	<ul style="list-style-type: none"> • Automotive industry • Machine tool • Injection molding machines • Hydraulics • Pneumatics 	<ul style="list-style-type: none"> • Automotive industry • Machine tool • Injection molding machines • Hydraulics • Pneumatics
Supply Voltage	12...30V DC	12...30V DC
Output	Dual PNP N.O./N.C. or 4...20 mA analog with single PNP N.O./N.C. programmable outputs	4...20 mA analog
Supply Current	<60 mA	<30 mA
Load Current	250 mA (each output)	250 mA (each output)
Certifications	<ul style="list-style-type: none"> • cULus • CE Marked for all applicable directives 	<ul style="list-style-type: none"> • CE Marked for all applicable directives
Additional Info	• See page 7-4	• See page 7-7

 837E Temperature Switches	 837E Nondisplay Temperature Switches	 839E Flow Switches
<ul style="list-style-type: none"> • Microprocessor based with no moving parts for longer life and reduced downtime • Rugged, corrosion-resistant 316L stainless steel housing features an IP66 enclosure rating to withstand harsh industrial conditions • Media temperature range from -50...150°C (-58...302°F) • Industry-leading four-digit 14-segment digital display • Independently programmable dual PNP N.O./N.C. outputs or 4...20 mA analog output • 316L Stainless steel probe 	<ul style="list-style-type: none"> • Microprocessor based with no moving parts for longer life and reduced downtime • Rugged, corrosion-resistant 316L stainless steel housing features an IP66 enclosure rating to withstand harsh industrial conditions • Media temperature range from -50...150°C (-58...302°F) • 4...20 mA analog output PC programmable via the M12 connector • 316L Stainless steel probe 	<ul style="list-style-type: none"> • Microprocessor based with no moving parts for longer life and reduced downtime • Rugged, corrosion-resistant 316 stainless steel housing features an IP66 enclosure rating to withstand harsh industrial conditions • Flow range from 0.03...3 m/s (0.1...9.84 ft/s) • Industry-leading four-digit 14-segment digital display • Independently programmable dual PNP N.O./N.C. outputs or 4...20 mA analog output • 316L Stainless steel probe
<ul style="list-style-type: none"> • Automotive industry • Machine tool • Hydraulics • Batch temperature control 	<ul style="list-style-type: none"> • Automotive industry • Machine tool • Hydraulics • Batch temperature control 	<ul style="list-style-type: none"> • Food and beverage • Pharmaceuticals • Water/wastewater • Hydraulics
12...30V DC	10...35V DC	18...30V DC
Dual PNP N.O./N.C. or 4...20 mA analog with single PNP N.O./N.C. programmable outputs	4...20 mA analog	Dual PNP N.O./N.C. or 4...20 mA analog with single PNP N.O./N.C. programmable outputs
<60 mA	<23 mA	<100 mA
250 mA (each output)	250 mA (each output)	250 mA (each output)
<ul style="list-style-type: none"> • cULus • CE Marked for all applicable directives 	<ul style="list-style-type: none"> • cULus • CE Marked for all applicable directives 	<ul style="list-style-type: none"> • cULus • CE Marked for all applicable directives
• See page 7-10	• See page 7-13	• See page 7-15

836E Pressure Switches



Features

- Microprocessor based with no moving parts for longer life and reduced downtime
- Rugged, corrosion-resistant 316L stainless steel housing features an IP66 enclosure rating to withstand harsh industrial conditions
- Operating pressures from -15...6000 psi (gauge)
- Industry-leading four-digit 14-segment digital display
- Independently programmable dual PNP NO/NC outputs or 4...20 mA analog output with single PNP NO/NC output
- Stainless steel sensing element

Applications

- Automotive industry
- Machine tool
- Injection molding machines
- Hydraulics
- Pneumatics
- Food and beverage
- Pharmaceuticals

Specifications

Certifications	cULus, CE Marked for all applicable directives, and 3 A authorized only with sanitary adaptor
Supply Voltage	12...30V DC
Output	Dual PNP N.O./N.C. or 4...20 mA analog with single PNP N.O./N.C.
Supply Current	<60 mA (no load)
Load Current, Max.	250 mA (per PNP output)
Analog Output Impedance	Max (Vsupply - 6.5V)/0.22 A
Accuracy	<0.5% of upper pressure range limit Analog Nonlinearity: <0.2% (as per limit point method)
Repeatability	<0.2% of upper pressure range limit
Long Term Drift	<0.15% per year
Media Temperature [C (F)]	-40...100° (-40...212°)
Operating Temperature [C (F)]	-40...85° (-40...185°)
Housing Material	316L Stainless Steel
Wetted Parts	316L Stainless Steel
Enclosure Type Rating	IP66 ❶
Switch Cycles, Min.	>10,000,000
Over Pressure Limit (psi) ❷	1.5 times MWP
Burst Pressure Limit	3 times MWP
Response Time	Switch Output: ≤20 ms; Analog Output: Rise Time: T ₉₀ ≤200 ms; Analog Output: Settling Time: T ₉₉ ≤500 ms

❶ Pressure sensors up to 60 psi are rated IP60.

❷ Maximum working pressure (MWP) is the maximum pressure that switches can tolerate for an indefinite period of time. Over pressure limit is the maximum pressure that switches can tolerate for a short period of time without sustaining permanent damage. Burst pressure limit is the maximum pressure that switches can tolerate without sustaining permanent damage or leakage.

Solid-State Condition Sensing Switches

836E Pressure Switches

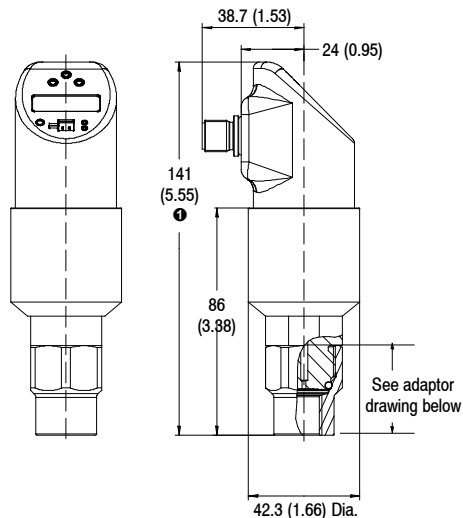
Product Selection

Process Connection	Pressure Range [psi]	Set Point Range [psi]	Reset Point Range [psi]	Max. Working Pressure [psi]Ⓐ	Cat. No.	
					Dual PNP Output	420 mA Analog Output w/Single PNP OutputⒷ
1/4 inch NPT (female)	-15...15	-14.92+15	-15.00...14.92	40.5	836E-DA1CC1D4	836E-DC1CC1D4
	0...60	0.30...60	0...59.70	160.5	836E-DA1EL1D4	836E-DC1EL1D4
	0...150	0.75...150	0...149.25	400.5	836E-DA1EN1D4	836E-DC1EN1D4
	0...600	3.00...600	0...597.00	1600.5	836E-DA1EQ1D4	836E-DC1EQ1D4
	0...1,500	7.50...1,500	0...1,492.50	1600.5	836E-DA1ER1D4	836E-DC1ER1D4
	0...6,000	0.30...6000	0...5,970.00	6,000	836E-DA1EU1D4	836E-DC1EU1D4
SAE 7/16-20 UNF (female)	-15...15	-14.92...+15	-15.00...14.92	40.5	836E-DA1CC2D4	836E-DC1CC2D4
	0...60	0.30...60	0...59.70	160.5	836E-DA1EL2D4	836E-DC1EL2D4
	0...150	0.75...150	0...149.25	400.5	836E-DA1EN2D4	836E-DC1EN2D4
	0...600	3.00...600	0...597.00	1600.5	836E-DA1EQ2D4	836E-DC1EQ2D4
	0...1,500	7.50...1,500	0...1,492.50	1600.5	836E-DA1ER2D4	836E-DC1ER2D4
	0...6,000	0.30...6000	0...5,970.00	6,000	836E-DA1EU2D4	836E-DC1EU2D4
G1/4 BSPP (female)	-1...1 (bar)	-1.0...+1.03 (bar)	-1.03...1 (bar)	2.7 (bar)	836E-DA1CC3D4	836E-DC1CC3D4
	0...4 (bar)	0.02...4.14 (bar)	0...4 (bar)	10.7 (bar)	836E-DA1EL3D4	836E-DC1EL3D4
	0...10 (bar)	0.05...10.30 (bar)	0...10 (bar)	26.7 (bar)	836E-DA1EN3D4	836E-DC1EN3D4
	0...40 (bar)	0.21...41.38 (bar)	0...40 (bar)	106.7 (bar)	836E-DA1EQ3D4	836E-DC1EQ3D4
	0...100 (bar)	0.52...103.45 (bar)	0...100 (bar)	106.7 (bar)	836E-DA1ER3D4	836E-DC1ER3D4
	0...400 (bar)	2.07...413.79 (bar)	0...400 (bar)	400 (bar)	836E-DA1EU3D4	836E-DC1EU3D4
Sanitary Connection						
1...1.5 inch Clamp	0...150	0.75...150	0...149.25	400.5	836E-DA1ENBD4	836E-DC1ENBD4
	0...600	3.00...600	0...597.00	600	836E-DA1EQBD4	836E-DC1EQBD4
2 inch Clamp	0...150	0.75...150	0...149.25	400.5	836E-DA1ENC4D4	836E-DC1ENC4D4
	0...600	3.00...600	0...597.00	600	836E-DA1EQCD4	836E-DC1EQCD4
Base Switch (No Adaptor)	0...150	0.75...150	0...149.25	400.5	836E-DA1EN7D4	836E-DC1EN7D4
	0...600	3.00...600	0...597.00	600	836E-DA1EQ7D4	836E-DC1EQ7D4
Recommended cordset: 2 m (6.5 ft) 4-pin DC micro (straight) Ⓒ					889D-F4AC-2	
Recommended cordset: 2 m (6.5 ft) 4-pin DC micro (right angle) Ⓒ					889D-R4AC-2	

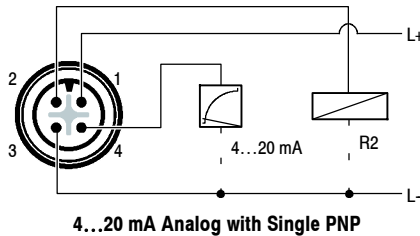
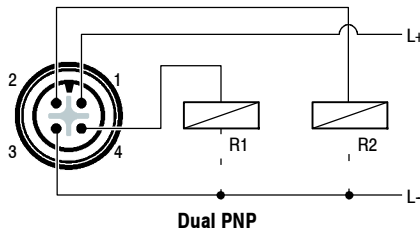
- Ⓐ Maximum working pressure (MWP) is the maximum pressure that switches can tolerate for an indefinite period of time. Over pressure limit is the maximum pressure that switches can tolerate for a short period of time without sustaining permanent damage. Burst pressure limit is the maximum pressure that switches can tolerate without sustaining permanent damage or leakage.
- Ⓑ Analog output version may be set up to output dual PNP NO/NC.
- Ⓒ Additional cable lengths are available. Shielded cables may be used to protect analog signal quality in an electrically noisy environment—refer to the On-Machine Connectivity catalog for options.

836E Pressure Switches

Approximate Dimensions [mm (in.)]



Wiring Diagram



Note: Output 2 operates as diagnostic/break contact in DESINA mode.

① 145.2 (5.71) for 6000psi switch.

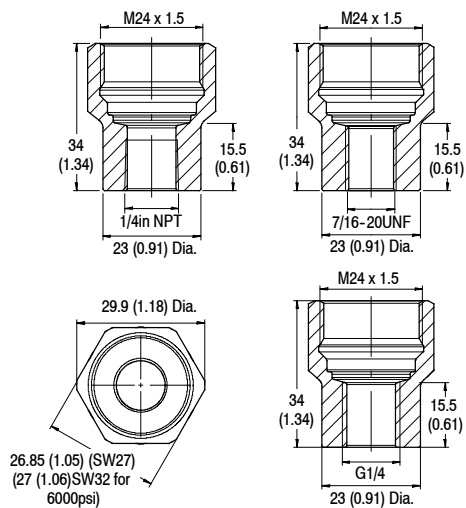
Accessories

Description	Cat. No.
Configuration kit (includes converter cable and ReadWin 2000 software)	836E-NSR
1/4 in. NPT (female) adaptor	836E-NP71
7/16-20 UNF (female) adaptor	836E-NP72
G1/4 BSPP (female) adaptor	836E-NP73
1/4 in. NPT (male) adaptor	836E-NP74

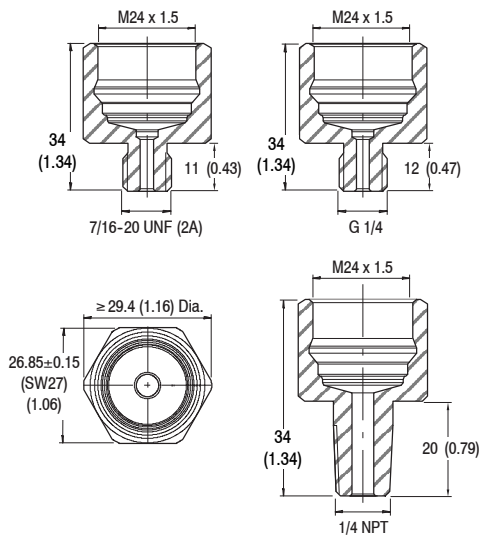
Description	Cat. No.
7/16-20 UNF (male) adaptor	836E-NP75
G1/4 BSPP (male) adaptor	836E-NP76
1...1.5 inch sanitary clamp	836E-NH7B
2 inch sanitary clamp	836E-NH7C
O-ring (EPDM)	836E-NV1
O-ring (fluorinated elastomer seal)	836E-NV2

Note: Maximum female adaptor pressure range = 1,450psi (100 bar).
Maximum male adaptor pressure range = 580psi (40 bar).

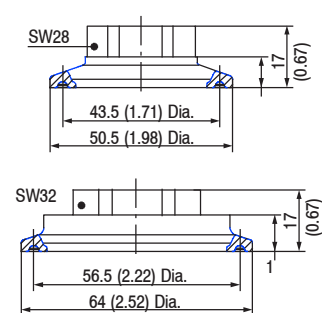
Female Adaptors



Male Adaptors



Sanitary Connectors





Features

- Microprocessor based with no moving parts for longer life and reduced downtime
- Rugged, corrosion-resistant 304 stainless steel housing features an IP65 enclosure rating to withstand harsh industrial conditions
- Operating pressures from 0...6000 psi (gauge)
- 4...20 mA analog output
- 316L stainless steel sensing element

Applications

- Automotive industry
- Machine tool
- Injection molding machines
- Hydraulics
- Pneumatics

Specifications

Certifications	CE Marked for all applicable directives
Supply Voltage	12...30V DC
Output	4...20 mA analog
Supply Current	<30 mA
Analog Output Impedance	Max. (V _{supply} - 12V)/0.02 A
Accuracy	<0.5% of upper pressure range limit analog nonlinearity
Repeatability	< 0.2% of upper pressure range limit
Long Term Drift	<0.15% per year
Media Temperature [C (F)]	-25...70° (-13...158°)
Operating Temperature [C (F)]	-25...70° (-13...158°) [ambient]
Storage Temperature [C (F)]	-40...85° (-40...185°)
Housing Material	304 stainless steel
Sensor Diaphragm	316L stainless steel
Enclosure Type Rating	IP65/NEMA 4X
Over Pressure Limit (psi)*	1.5 times MWP
Response Time	2...5 ms

* Maximum working pressure (MWP) is the maximum pressure that switches can tolerate for an indefinite period of time. Over pressure limit is the maximum pressure that switches can tolerate for a short period of time without permanent damage.

Solid-State Condition Sensing Switches

836E Nondisplay Pressure Switches

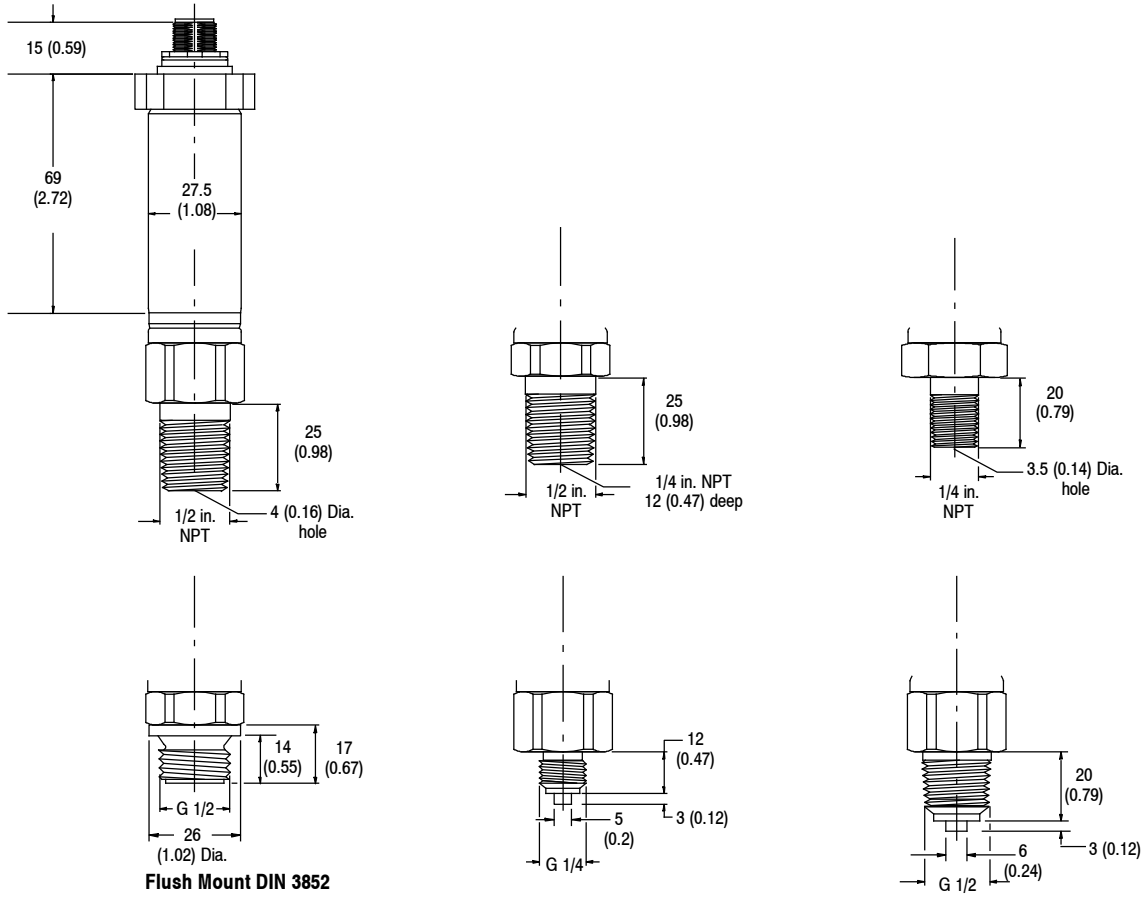
Product Selection

Process Connection	Pressure Range [psi]	Max. Working Pressure [psi] ❶	Cat. No.
1/2 inch NPT (male)	0...15	40	836E-TD1CC8-D4
	0...50	160	836E-TD1EL8-D4
	0...150	400	836E-TD1EN8-D4
	0...500	1,000	836E-TD1EQ8-D4
	0...1,500	1,500	836E-TD1ER8-D4
	0...6,000	6,000	836E-TD1EU8-D4
1/4 inch NPT (male)	0...15	40	836E-TD1CC4-D4
	0...50	160	836E-TD1EL4-D4
	0...150	400	836E-TD1EN4-D4
	0...500	1,000	836E-TD1EQ4-D4
	0...1,500	1,500	836E-TD1ER4-D4
	0...6,000	6,000	836E-TD1EU4-D4
1/2 inch NPT (male) 1/4 inch NPT (female)	0...15	40	836E-TD1CC9-D4
	0...50	160	836E-TD1EL9-D4
	0...150	400	836E-TD1EN9-D4
	0...500	1,000	836E-TD1EQ9-D4
	0...1,500	1,500	836E-TD1ER9-D4
	0...6,000	6,000	836E-TD1EU9-D4
G1/2 (flush mount)	0...15	40	836E-TD1CC62-D4
	0...50	160	836E-TD1EL62-D4
	0...150	400	836E-TD1EN62-D4
	0...500	1,000	836E-TD1EQ62-D4
	0...1,500	1,500	836E-TD1ER62-D4
	0...6,000	6,000	836E-TD1EU62-D4
G1/4 (male)	0...15	40	836E-TD1CC6-D4
	0...50	160	836E-TD1EL6-D4
	0...150	400	836E-TD1EN6-D4
	0...500	1,000	836E-TD1EQ6-D4
	0...1,500	1,500	836E-TD1ER6-D4
	0...6,000	6,000	836E-TD1EU6-D4
Recommended cordset: 2 m (6.5 ft) 4-pin DC micro (straight) ❷			889D-F4AC-2
Recommended cordset: 2 m (6.5 ft) 4-pin DC micro (right angle) ❷			889D-R4AC-2

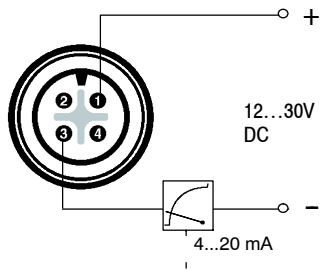
❶ Maximum working pressure (MWP) is the maximum pressure that switches can tolerate for an indefinite period of time. Over pressure limit is the maximum pressure that switches can tolerate for a short period of time without sustaining permanent damage.

❷ Additional cable lengths are available. Shielded cables may be used to protect analog signal quality in an electrically noisy environment—refer to the *On-Machine Connectivity* catalog for options.

Approximate Dimensions [mm (in.)]



Wiring Diagram



837E Temperature Switches



Features

- Microprocessor based with no moving parts for longer life and reduced downtime
- Rugged, corrosion-resistant 316L stainless steel housing features an IP66 enclosure rating to withstand harsh industrial conditions
- Media temperature range from -50...150°C (-58...302°F)
- Operating temperatures from -40...85°C (-40...185°F)
- Industry-leading four-digit 14-segment digital display
- Independently programmable dual PNP N.O./N.C. outputs or 4...20 mA analog output with single PNP N.O./N.C. output
- Stainless steel probe

Applications

- Automotive industry
- Machine tool
- Hydraulics
- Batch temperature control
- Food and beverage
- Pharmaceuticals

Specifications

Certifications	cULus, CE Marked for all applicable directives, and 3 A authorized only with sanitary adaptor
Supply Voltage	12...30V DC
Output	Dual PNP N.O./N.C. or 4...20 mA analog output with single PNP N.O./N.C.
Supply Current	<60 mA (no load)
Load Current, Max.	250 mA (per PNP output)
Analog Output Impedance	Max. $(V_{supply} - 6.5V)/0.22 A$
Accuracy	<0.2°C
Repeatability	<0.1°C
Temperature Drift	<0.1°C per year
Media Temperature [C (F)]	-50...150° (-58...302°)
Operating Temperature [C (F)]	-40...85° (-40...185°)
Housing Material	316 stainless steel
Wetted Parts	316L stainless steel
Enclosure Type Rating	IP66
Switch Cycles, Min.	>10,000,000
Response Time	Switch Output: ≤ 20 ms Analog Output: Rise Time: $T_{90} \leq 200$ ms Analog Output: Settling Time: $T_{99} \leq 500$ ms

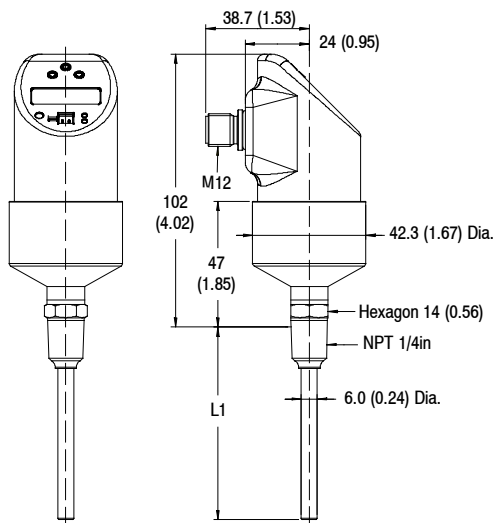
Product Selection

Process Connection	Set Point Range [C (F)]	Reset Point Range [C (F)]	Probe Length	Cat. No.	
				Dual PNP Output	4...20 mA Analog Output w/Single PNP Output [ⓐ]
1/4 inch NPT (Male)	-49...150° (-57...302°)	-50...149.5° (-58...301°)	50 (1.96 in.)	837E-DA1BN1A1D4	837E-DC1BN1A1D4
	-49...150° (-57...302°)	-50...149.5° (-58...301°)	100 (3.93 in.)	837E-DA1BN1A2D4	837E-DC1BN1A2D4
	-49...150° (-57...302°)	-50...149.5° (-58...301°)	200 (7.87 in.)	837E-DA1BN1A4D4	837E-DC1BN1A4D4
1/2 inch NPT (Male)	-49...150° (-56.2...302°)	-50...149.5° (-58...301.1°)	50 (1.96 in.)	837E-DA1BN2A1D4	837E-DC1BN2A1D4
	-49...150° (-57...302°)	-50...149.5° (-58...301.1°)	100 (3.93 in.)	837E-DA1BN2A2D4	837E-DC1BN2A2D4
	-49...150° (-57...302°)	-50...149.5° (-58...301°)	200 (7.87 in.)	837E-DA1BN2A4D4	837E-DC1BN2A4D4
G1/4 BSPP	-49...150° (-57...302°)	-50...149.5° (-58...301°)	50 (1.96 in.)	837E-DA1BN3A1D4	837E-DC1BN3A1D4
	-49...150° (-57...302°)	-50...149.5° (-58...301°)	100 (3.93 in.)	837E-DA1BN3A2D4	837E-DC1BN3A2D4
	-49...150° (-57...302°)	-50...149.5° (-58...301°)	200 (7.87 in.)	837E-DA1BN3A4D4	837E-DC1BN3A4D4
G1/2 BSPP	-49...150° (-57...302°)	-50...149.5° (-58...301°)	50 (1.96 in.)	837E-DA1BN4A1D4	837E-DC1BN4A1D4
	-49...150° (-57...302°)	-50...149.5° (-58...301°)	100 (3.93 in.)	837E-DA1BN4A2D4	837E-DC1BN4A2D4
	-49...150° (-57...302°)	-50...149.5° (-58...301°)	200 (7.87 in.)	837E-DA1BN4A4D4	837E-DC1BN4A4D4
Sanitary Connection					
1...1.5 inch Clamp	-49...150° (-57...302°)	-50...149.5° (-58...301°)	50 mm (1.96 in.)	837E-DA1BNBA1D4	837E-DC1BNBA1D4
	-49...150° (-57...302°)	-50...149.5° (-58...301°)	100 mm (3.93 in.)	837E-DA1BNBA2D4	837E-DC1BNBA2D4
	-49...150° (-57...302°)	-50...149.5° (-58...301°)	200 mm (7.87 in.)	837E-DA1BNBA4D4	837E-DC1BNBA4D4
2 inch Clamp	-49...150° (-57...302°)	-50...149.5° (-58...301°)	50 mm (1.96 in.)	837E-DA1BNCA1D4	837E-DC1BNCA1D4
	-49...150° (-57...302°)	-50...149.5° (-58...301°)	100 mm (3.93 in.)	837E-DA1BNCA2D4	837E-DC1BNCA2D4
	-49...150° (-57...302°)	-50...149.5° (-58...301°)	200 mm (7.87 in.)	837E-DA1BNCA4D4	837E-DC1BNCA4D4
Base Switch	-49...150° (-57...302°)	-50...149.5° (-58...301°)	50 mm (1.96 in.)	837E-DA1BN7A1D4	837E-DC1BN7A1D4
	-49...150° (-57...302°)	-50...149.5° (-58...301°)	100 mm (3.93 in.)	837E-DA1BN7A2D4	837E-DC1BN7A2D4
	-49...150° (-57...302°)	-50...149.5° (-58...301°)	200 mm (7.87 in.)	837E-DA1BN7A4D4	837E-DC1BN7A4D4
Recommended cordset: 2 m (6.5 ft) 4-pin DC micro (straight) [ⓑ]					889D-F4AC-2
Recommended cordset: 2 m (6.5 ft) 4-pin DC micro (right angle) [ⓑ]					889D-R4AC-2

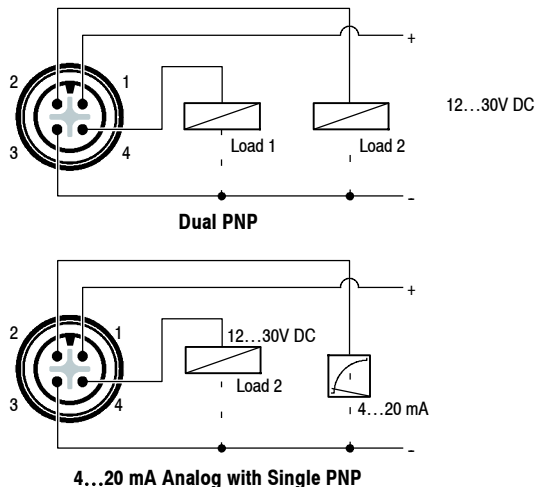
[ⓐ] Analog output version may be set up to output dual PNP N.O./N.C.

[ⓑ] Additional cable lengths are available. Shielded cables may be used to protect analog signal quality in an electrically noisy environment—refer to the *On-Machine™ Connectivity* catalog for options.

Approximate Dimensions [mm (in.)]



Wiring Diagram



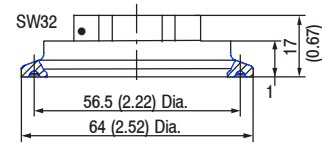
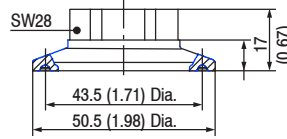
Note: Output 2 operates as diagnostic/break contact in DESINA mode.

837E Temperature Switches

Accessories

Description	Cat. No.
Configuration kit (includes converter cable and ReadWin 2000 software)	836E-NSR
1...1.5 inch sanitary clamp	836E-NH7B
2 inch sanitary clamp	836E-NH7C

Sanitary Connectors





Features

- Microprocessor based with no moving parts for longer life and reduced downtime
- Rugged, corrosion-resistant 316L stainless steel housing features an IP67 enclosure rating to withstand harsh industrial conditions
- Media temperature range from -50...150°C (-58...302°F)
- Operating temperatures from -40...85°C (-40...185°F)
- 4...20 mA analog output PC programmable via the M12 connector
- Stainless steel probe

Applications

- Automotive industry
- Machine tool
- Hydraulics
- Batch temperature control
- Food and beverage
- Pharmaceuticals

Specifications

Certifications	cULus, CE Marked for all applicable directives, and 3 A authorized only with sanitary adaptor
Supply Voltage	10...35V DC
Output	4...20 mA analog
Supply Current	<23 mA (no load)
Analog Output Impedance	Max. $(V_{\text{supply}} - 10V)/0.23 \text{ A}$
Accuracy	<0.2°C
Repeatability	<0.1°C
Temperature Drift	<0.1°C per year
Media Temperature [C (F)]	-50...150° (-58...302°)
Operating Temperature [C (F)]	-40...85° (-40...185°)
Housing Material	316 stainless steel
Wetted Parts	316L stainless steel
Enclosure Type Rating	IP67
Switch Cycles, Min.	>10,000,000
Response Time	< 3s

Solid-State Condition Sensing Switches

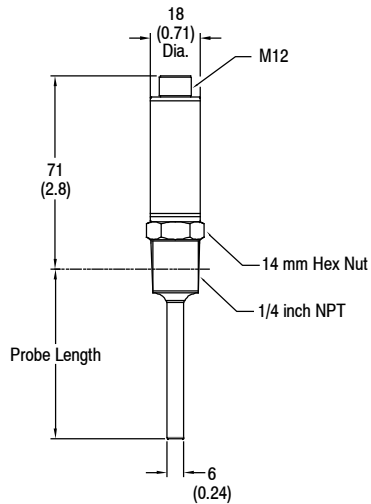
837E Nondisplay Temperature Switches

Product Selection

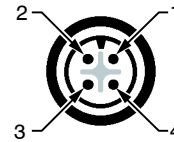
Process Connection	Media Temperature [C (F)]	Probe Length	Cat. No.
			4...20 mA Analog Output
1/4 inch NPT (Male)	-50...150° (-58...302°)	50 mm (1.96 in.)	837E-TD1BN1A1-D4
	-50...150° (-58...302°)	100 mm (3.93 in.)	837E-TD1BN1A2-D4
	-50...150° (-58...302°)	200 mm (7.87 in.)	837E-TD1BN1A4-D4
1/2 inch NPT (Male)	-50...150° (-58...302°)	50 mm (1.96 in.)	837E-TD1BN2A1-D4
	-50...150° (-58...302°)	100 mm (3.93 in.)	837E-TD1BN2A2-D4
	-50...150° (-58...302°)	200 mm (7.87 in.)	837E-TD1BN2A4-D4
G1/4 BSPP	-50...150° (-58...302°)	50 mm (1.96 in.)	837E-TD1BN3A1-D4
	-50...150° (-58...302°)	100 mm (3.93 in.)	837E-TD1BN3A2-D4
	-50...150° (-58...302°)	200 mm (7.87 in.)	837E-TD1BN3A4-D4
Sanitary Connection			
1...1.5 inch Clamp	-50...150° (-58...302°)	50 mm (1.96 in.)	837E-TD1BNBA1-D4
	-50...150° (-58...302°)	100 mm (3.93 in.)	837E-TD1BNBA2-D4
	-50...150° (-58...302°)	200 mm (7.87 in.)	837E-TD1BNBA4-D4
2 inch Clamp	-50...150° (-58...302°)	50 mm (1.96 in.)	837E-TD1BNCA1-D4
	-50...150° (-58...302°)	100 mm (3.93 in.)	837E-TD1BNCA2-D4
	-50...150° (-58...302°)	200 mm (7.87 in.)	837E-TD1BNCA4-D4
Recommended cordset: 2 m (6.5 ft) 4-pin DC Micro (straight) ①			889D-F4AC-2
Recommended cordset: 2 m (6.5 ft) 4-pin DC Micro (right angle) ①			889D-R4AC-2

① Additional cable lengths are available. Shielded cables may be used to protect analog signal quality in an electrically noisy environment—refer to the *On-Machine Connectivity* catalog for options.

Approximate Dimensions [mm (in.)]



Wiring Diagram

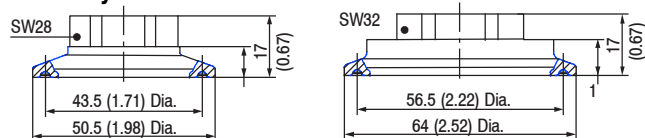


Pin No.	Description	Wire Color
1	Power supply 10 35V DC, current output 4 20 mA	Brown
2	Connection of PC configuration cable, shortened pin	White
3	Power supply 0V DC, current output 4 20 mA	Blue
4	Connection of PC configuration cable, shortened pin	Black

Accessories

Description	Cat. No.
Configuration kit (includes converter cable and ReadWin 2000 software)	836E-NSR
Cable adaptor, PC programming	836E-NSRT
1...1.5 inch sanitary clamp	836E-NH7B
2 inch sanitary clamp	836E-NH7C

Sanitary Connectors





Features

- Microprocessor based with no moving parts for longer life and reduced downtime
- Rugged, corrosion-resistant 316 stainless steel housing features an IP66 enclosure rating to withstand harsh industrial conditions
- Flow rates of liquid media (calorimetric measuring principle) in the range from 0.03...3 m/s (0.1...9.84 ft/s)
- Industry leading four-digit 14-segment digital display
- Dual N.O./N.C. programmable PNP outputs or 4...20 mA analog output with single PNP output
- Stainless steel probe

Applications

- Food and beverage
- Pharmaceuticals
- Water/Wastewater
- Hydraulics

Specifications

Certifications	cULus, CE Marked for all applicable directives, and 3 A authorized only with sanitary adaptor			
Supply Voltage	18...30V DC			
Output	Dual PNP N.O./N.C. or 4...20 mA analog output with single PNP N.O./N.C.			
Supply Current	<100 mA			
Load Current, Min.	250 mA			
Temperature Accuracy	2 K (3.6 F)			
Temperature Repeatability	1 K (1.8 F)			
Operating Range	Liquids from 0.03...3 m/s (0.1... 9.84 ft/s) Mass flow as a relative value between 0 and 100%			
Media Temperature [C (F)]	-20...85° (-4...185°)			
Housing Material	316 stainless steel			
Enclosure Type Rating	IP66			
Switch Cycles, Min.	>10,000,000			
Flow Accuracy	Measuring Range— m/s (f/s)	Repeatability	Influence of Medium Temperature❶	Influence of Ambient Temperature
	0.03...0.5 (0.1...1.6)	2%	0.05%/K	0.04%/K
	0.03...1 (0.1...3.28)	3%	0.10%/K	0.05%/K
	0.03...2 (0.1...6.56)	5%	0.15%/K	0.10%/K
	0.03...3 (0.1...9.84)	10%	0.25%/K	0.30%/K

❶ The values indicated only apply to the device itself without taking the temperature-dependent change of the thermo-physical properties of the medium into account. For this reason, we recommend you commission the device at the process temperature and set the switch points (learn function).

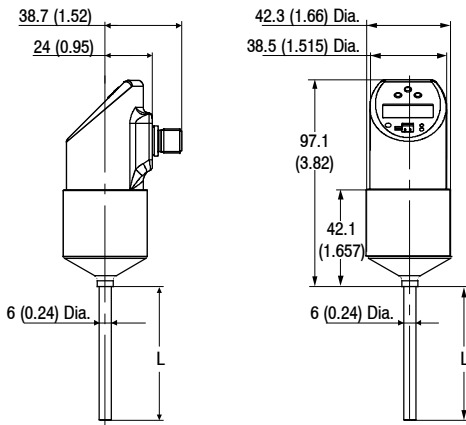
839E Flow Switches

Product Selection

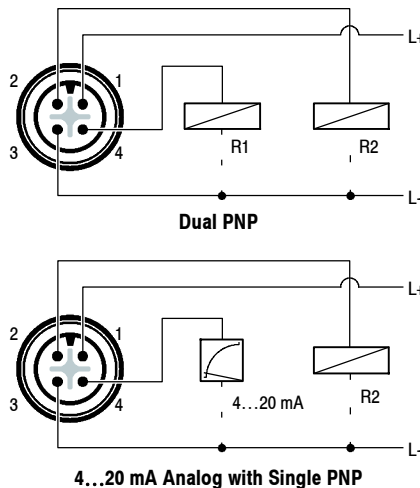
Process Connection	Measuring Range	Response Time	Probe Length	Cat. No.			
				Dual PNP Output	4...20 mA Analog Output with Single PNP Output ^①		
1/4 inch NPT (Male)	Liquids from 0.03...3 m/s (0.1... 9.84 ft/s) Mass flow as a relative value between 0 and 100%	6...12 seconds	30 mm (1.18 in)	839E-DA1BA1A3-D4	839E-DC1BA1A3D4		
			100 mm (3.93 in)	839E-DA1BA1A2-D4	839E-DC1BA1A2D4		
1/2 inch NPT (Male)			30 mm (1.18 in)	839E-DA1BA2A3D4	839E-DC1BA2A3D4		
			100 mm (3.96 in)	839E-DA1BA2A2D4	839E-DC1BA2A2D4		
G1/4 BSPP			30 mm (1.18 in)	839E-DA1BA3A3D4	839E-DC1BA3A3D4		
			100 mm (3.96 in)	839E-DA1BA3A2D4	839E-DC1BA3A2D4		
G1/2 BSPP			30 mm (1.18 in)	839E-DA1BA4A3D4	839E-DC1BA4A3D4		
			100 mm (3.96 in)	839E-DA1BA4A2D4	839E-DC1BA4A2D4		
Sanitary Connection							
1...1.5 inch Clamp			Liquids from 0.03...3 m/s (0.1... 9.84 ft/s) Mass flow as a relative value between 0 and 100%	6...12 seconds	30 mm (1.18 in)	839E-DA1BABA3D4	839E-DC1BABA3D4
	100 mm (3.96 in)	839E-DA1BABA2D4			839E-DC1BABA2D4		
2 inch Clamp	30 mm (1.18 in)	839E-DA1BACA3D4			839E-DC1BACA3D4		
	100 mm (3.96 in)	839E-DA1BACA2D4			839E-DC1BACA2D4		
Base Switch	30 mm (1.18 in)	839E-DA1BA7A3D4			839E-DC1BA7A3D4		
	100 mm (3.96 in)	839E-DA1BA7A2D4			839E-DC1BA7A2D4		
Recommended cordset: 2 m (6.5 ft) 4-pin DC micro (straight)					889D-F4AC-2		
Recommended cordset: 2 m (6.5 ft) 4-pin DC micro (right angle)					889D-R4AC-2		

① Analog output version may be set up to output dual PNP N.O./N.C.

Approximate Dimensions [mm (in.)]



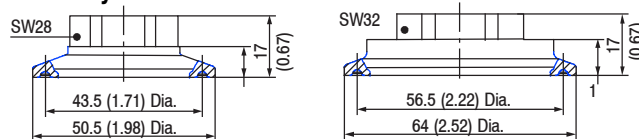
Wiring Diagram



Accessories




Description	Cat. No.
Configuration kit (includes converter cable and ReadWin 2000 software)	836E-NSR
1...1.5 in. sanitary clamp	836E-NH7B
2 in. sanitary clamp	836E-NH7C



Sanitary Connectors



General Information	Quick Selection Guide page 8-2
	Overview page 8-3
Mini Quick-Disconnect Style	Cordsets & Patchcords
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	Terminal Chambers
	Screw Type, Field Attachable Connector page 8-12
Mini-Plus Quick-Disconnect Style	Cordsets & Patchcords
	16 or 18/22 AWG page 8-14
DC Micro Quick-Disconnect Style	Cordsets & Patchcords
	18 and 22 AWG, Yellow, Black, or Blue PVC page 8-16
	22 AWG, Yellow, Black, or Blue PVC page 8-18
	18 and 22 AWG, PUR, TPE, or TPR page 8-20
	18 and 22 AWG, ToughLink or ToughWeld page 8-22
	Terminal Chambers
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AC Micro Quick-Disconnect Style	Cordsets & Patchcords
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	18 AWG, ToughLink or ToughWeld page 8-30
	Terminal Chambers
	Screw Type, Field Attachable Connector page 8-32
Pico Quick-Disconnect Style	Cordsets & Patchcords
	24 AWG, PVC, PUR, TPE, or Shielded, Screw-On and Snap-On page 8-34
	Terminal Chambers
	Screw Terminal, Field Attachable Connector page 8-36
	Insulation Displacement Connector page 8-38
Combination Connector Style	Cordsets & Patchcords
	18...22 AWG, Yellow PVC, Micro to Mini page 8-40
	24 AWG, PVC, PUR, or TPE, Screw-On and Snap-On, Pico to Micro page 8-42
M23 Quick-Disconnect Style	Cordsets & Patchcords
	18 or 18/22 AWG, Black or Yellow PVC page 8-44
Accessories	Sealing Caps page 12-1
Indexes	Cat. No. Index page 13-1
	Comprehensive Product Index page 14-1

Quick Selection Guide

			
	Female Cordsets	Male Cordsets	Patchcords
Description	<ul style="list-style-type: none"> • Cable with integral female connector on one end 	<ul style="list-style-type: none"> • Cable with integral male connector on one end 	<ul style="list-style-type: none"> • Cable with integral connector on each end
Features	<ul style="list-style-type: none"> • Straight or right angle • Multiple standard lengths • Braided and unbraided • Standard and LED versions • Female connector provides direct interface to sensors and other field devices 	<ul style="list-style-type: none"> • Straight or right angle • Multiple standard lengths • Male connector provides interface to distribution boxes or DC micro ArmorBlock DeviceNet I/O 	<ul style="list-style-type: none"> • Straight or right angle • Multiple standard lengths • Direct connection between field devices and distribution boxes or Allen-Bradley ArmorBlock DeviceNet I/O
Available Models	<ul style="list-style-type: none"> • Mini 8-4 • Mini-Plus 8-14 • DC Micro 8-16 • AC Micro 8-28 • Pico 8-34 	<ul style="list-style-type: none"> • Mini 8-4 • DC Micro 8-16 • AC Micro 8-28 	<ul style="list-style-type: none"> • Mini to Mini 8-4 • Mini-Plus 8-14 • DC Micro 8-16 • AC Micro 8-28 • Pico 8-34 • M23 8-44

		
	Field Attachable Connectors	Accessories
Description	<ul style="list-style-type: none"> • Terminal Chambers and Insulation Displacement Connectors (IDC) 	<ul style="list-style-type: none"> • Sealing caps, coupling adaptors, and other connection systems accessories
Features	<ul style="list-style-type: none"> • Screw, solder or insulation displacement connector styles • Straight or right angle • Multiple sizes for varying cable jacket diameters 	<ul style="list-style-type: none"> • Rugged durable construction • Versions to interface with male or female connectors • Multiple sizes for various connector types
Available Models	<ul style="list-style-type: none"> • Mini 8-12 • DC Micro 8-24 • AC Micro 8-32 • Pico 8-36 • M23 8-44 	<ul style="list-style-type: none"> • Sealing caps 12-1

For information on additional On-Machine™ Connectivity Products, see the *On-Machine Connectivity* catalog or visit www.ab.com/catalogs.



Description

Rockwell Automation offers a wide variety of connection products for interfacing field devices to I/O, junction boxes, PLCs, etc. Connection systems products are made of durable materials and are designed to handle rough industrial environments.

Featuring industry standard 2-, 3-, 4-, 5-, or 6-pin overmolded connectors, Rockwell Automation quick-disconnect cables provide secure connection for proximity sensors, limit switches and photoelectric sensors. Connectors can be straight or right-angled and are

physically keyed to reduce wiring mishaps. Rockwell Automation cabling options include:

- Cordsets: Cable with integral male or female connector at one end and flying leads at the other
- Patchcords: Cable with integral connector at each end (one male, one female)

Available in a variety of cable jackets, lengths, and connector styles, Rockwell Automation cordsets can be configured to fit the needed application.

Cordsets & Patchcords:

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Mini-Plus Style	page 8-14
DC Micro Style	page 8-16
AC Micro Style	page 8-28
Pico Style	page 8-34
M23 Style	page 8-44

Terminal Chambers

Mini	page 8-12
DC Micro	page 8-24
AC Micro	page 8-32
Pico	page 8-36

Combination Connectors

Mini to Micro Patchcords	page 8-40
Pico to Micro Patchcords	page 8-42

Accessories

Sealing Caps	page 12-10
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Mini Style



4-Pin Straight Mini Cordset

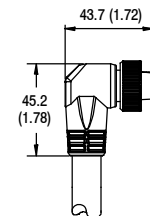
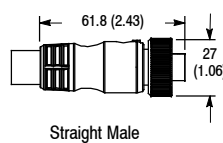
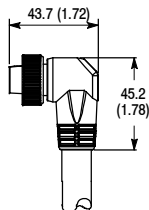
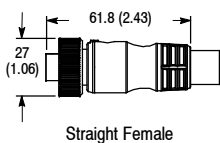
Features

- Heavy duty STOOW-A 16 AWG cable
- PVC jacket offers good oil and chemical resistance
- 2-, 3-, 4-, 5-, and 6-pin configurations
- Ratcheting coupling nut for vibration resistance

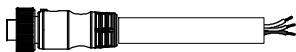
Specifications

Certifications	UL Recognized and CSA Certified
Mechanical	
Coupling Nut	Epoxy-coated zinc
Housing	Molded oil-resistant TPE
Contacts	Gold-plated brass
Cable	Oil-resistant yellow PVC jacket, 16 AWG stranded copper, 600V; UL Recognized and CSA Certified, STOOW-A
Bend Radius	10x diameter, min.
Cable Diameter	2/c = 10 mm (0.40 in.) 3/c = 10 mm (0.40 in.) 4/c = 11 mm (0.43 in.) 5/c = 13 mm (0.51 in.) 6/c = 14 mm (0.55 in.)
Electrical	
Cable Rating	UL STOOW VW-1 105C 600V, CSA ST 105C 600V FT2, UV oil and water resistant
Assembly Rating	2-pin = 600V, 13 A 3-pin = 600V, 13 A 4-pin = 600V, 10 A 5-pin = 600V, 8 A 6-pin = 600V, 8 A
Environmental	
Enclosure Type Rating	NEMA 4, 6P, 12, 13; IP67
Operating Temperature [C (F)]	-20...+105° (-4...+221°)

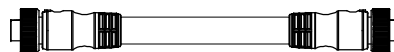
Approximate Dimensions [mm (in.)]



Dimensions are approximate. Illustrations are not drawn to scale.



Example of Cordset



Example of Patchcord

Mating Components & Accessories

Description	Cat. No.	Page
Coupling Adaptors	889A-NADPT	12-11

Pinout and Color Code

Color Code	Face View Pinout									
	2-Pin		3-Pin		4-Pin		5-Pin		6-Pin	
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
A (US)	1 White 2 Black		1 Green 2 Black 3 White		1 Black 2 White	3 Red 4 Green	1 White 2 Red 3 Green	4 Orange 5 Black	1 White 2 Red 3 Green	4 Orange 5 Black 6 Blue
B (Auto)	—		1 Green 2 Red/Black Tr 3 Red/White Tr		1 Red/Black Tr 2 Red/White Tr	3 Red 4 Green	1 Red/White Tr 2 Red 3 Green 4 Red/Yellow Tr 5 Red/Black Tr			—
C (IEC)	—		—		1 Black 2 Blue	3 Brown 4 White	1 Black 2 Blue 3 Orange	4 Brown 5 White	1 Blue 2 Orange 3 Red	4 White 5 Brown 6 Black

Product Selection

Cordsets 

Pin Count	Assembly Rating	Color Code	Cat. No.			
			Straight Female	Right Angle Female	Straight Male	Right Angle Male
2-Pin	600V 13 A	A	889N-F2AFC- 0 F	889N-R2AFC- 0 F	889N-U2AFC- 0 F	889N-V2AFC- 0 F
3-Pin		A	889N-F3AFC-0 F	889N-R3AFC-0 F	889N-U3AFC-0 F	889N-V3AFC- 0 F
		B	889N-F3AFA- 0 F	889N-R3AFA- 0 F	889N-U3AFA-F	889N-V3AFA- 0 F
4-Pin	600V 10 A	A	889N-F4AFC-0 F	889N-R4AFC-0 F	889N-U4AFC- 0 F	889N-V4AFC- 0 F
		B	889N-F4AFA- 0 F	889N-R4AFA- 0 F	889N-U4AFA- 0 F	889N-V4AFA- 0 F
		C	889N-F4AF-0 F	889N-R4AF-0 F	889N-U4AF- 0 F	889N-V4AF- 0 F
5-Pin	600V 8 A	A	889N-F5AFC-0 F	889N-R5AFC- 0 F	889N-U5AFC- 0 F	889N-V5AFC- 0 F
		B	889N-F5AFA- 0 F	889N-R5AFA- 0 F	889N-U5AFA- 0 F	889N-V5AFA- 0 F
		C	889N-F5AF-0 F	889N-R5AF-0 F	889N-U5AF- 0 F	889N-V5AF- 0 F
6-Pin		C	889N-F6AFC- 0 F	889N-R6AFC- 0 F	889N-U6AFC- 0 F	889N-V6AFC- 0 F
		A	889N-F6AF- 0 F	889N-R6AF- 0 F	889N-U6AF- 0 F	889N-V6AF- 0 F

Patchcords 

Pin Count	Assembly Rating	Cat. No.			
		Straight Female Straight Male	Straight Female Right Angle Male	Right Angle Female Straight Male	Right Angle Female Right Angle Male
2-Pin	16 AWG 600V 13 A	889N-F2AFNU- 0 F	889N-F2AFNV- 0 F	889N-R2AFNU- 0 F	889N-R2AFNV- 0 F
3-Pin		889N-F3AFNU-0 F	889N-F3AFNV- 0 F	889N-R3AFNU- 0 F	889N-R3AFNV- 0 F
4-Pin	16 AWG 600V 10 A	889N-F4AFNU-0 F	889N-F4AFNV- 0 F	889N-R4AFNU- 0 F	889N-R4AFNV- 0 F
5-Pin	16 AWG 600V 8 A	889N-F5AFNU-0 F	889N-F5AFNV- 0 F	889N-R5AFNU- 0 F	889N-R5AFNV- 0 F
6-Pin		889N-F6AFNU- 0 F	889N-F6AFNV- 0 F	889N-R6AFNU- 0 F	889N-R6AFNV- 0 F

- ① Replace symbol with 6 (6 ft), 12 (12 ft), or 20 (20 ft) for standard cable lengths.
- ② Replace symbol with 3 (3 ft), 6 (6 ft), 12 (12 ft), or 20 (20 ft) for standard cable lengths.

Note: Stainless steel connector versions may be ordered by adding an "S" to the cat. no., e.g., 889NS-F3AFC-**0**F.

Cordsets & Patchcords, Mini Style

18 AWG, PVC

Mini Style



4-Pin Straight Mini Cordset

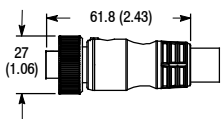
Features

- General purpose 18 AWG cable
- Highly visible yellow PVC jacket offers good oil and chemical resistance
- 2-, 3-, 4-, 5-, and 6-pin configurations
- Ratcheting coupling nut for vibration resistance

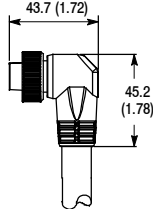
Specifications

Certifications	UL Recognized and CSA Certified
Mechanical	
Coupling Nut	Epoxy-coated zinc
Housing	Molded oil-resistant TPE
Contacts	Gold-plated brass
Cable	Oil-resistant yellow PVC jacket, 18 AWG stranded copper, 300V; UL Recognized and CSA Certified, ST00W-A
Bend Radius	10x diameter, min.
Cable Diameter	2/c = 6 mm (0.24 in.); 3/c = 6 mm (0.25 in.); 4/c = 7 mm (0.27 in.); 5/c = 8 mm (0.31 in.); 6/c = 8 mm (0.32 in.)
Electrical	
Cable Rating	UL AWM style 2661 VW-1 105C 300V, CSA AWM A/B I/II 80C 300V FT1, UV oil and water resistant
Assembly Rating	2-pin = 300V, 10 A 3-pin = 300V, 10 A 4-pin = 300V, 7 A 5-pin = 300V, 5.6 A 6-pin = 300V, 5.6 A
Environmental	
Enclosure Type Rating	NEMA 4, 6P, 12, 13; IP67; 1200 psi washdown
Operating Temperature [C (F)]	-20...+105° (-4...+221°)

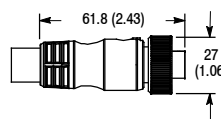
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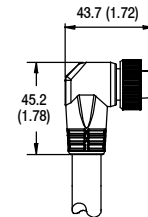
Straight Female



Right Angle Female

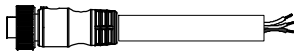


Straight Male

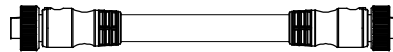


Right Angle Male

Dimensions are approximate. Illustrations are not drawn to scale.



Example of Cordset



Example of Patchcord

Mating Components & Accessories

Description	Cat. No.	Page
Coupling Adaptor	889A-NADPT	12-11

Pinout and Color Code

Color Code	Face View Pinout									
	2-Pin		3-Pin		4-Pin		5-Pin		6-Pin	
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
A (US)	1 White 2 Black		1 Green 2 Black 3 White		1 Black 2 White	3 Red 4 Green	1 White 2 Red 3 Green	4 Orange 5 Black	1 White 2 Red 3 Green	4 Orange 5 Black 6 Blue
B (Auto)	—		1 Green 2 Red/Black Tr 3 Red/White Tr		1 Red/Black Tr 2 Red/White Tr	3 Red 4 Green	1 Red/White Tr 2 Red 3 Green 4 Red/Yellow Tr 5 Red/Black Tr			—
C (IEC)	—		—		1 Black 2 Blue	3 Brown 4 White	1 Black 2 Blue 3 Grey	4 Brown 5 White		—

Product Selection

Cordsets 

Pin Count	Assembly Rating	Color Code	Cat. No.			
			Straight Female	Right Angle Female	Straight Male	Right Angle Male
2-Pin	300V, 10 A	A	889N-F2AEC- 0 F	889N-R2AEC- 0 F	889N-U2AEC- 0 F	889N-V2AEC- 0 F
3-Pin		A	889N-F3AEC- 0 F	889N-R3AEC- 0 F	889N-U3AEC- 0 F	889N-V3AEC- 0 F
		B	889N-F3AEA-0 F	889N-R3AEA- 0 F	889N-U3AEA- 0 F	889N-V3AEA- 0 F
4-Pin	300V, 7 A	A	889N-F4AEC- 0 F	889N-R4AEC- 0 F	889N-U4AEC- 0 F	889N-V4AEC- 0 F
		B	889N-F4AEA- 0 F	889N-R4AEA- 0 F	889N-U4AEA- 0 F	889N-V4AEA- 0 F
		C	889N-F4AE-0 F	889N-R4AE-0 F	889N-U4AE- 0 F	889N-V4AE- 0 F
5-Pin	300V, 5.6 A	A	889N-F5AEC-0 F	889N-R5AEC- 0 F	889N-U5AEC- 0 F	889N-V5AEC- 0 F
		B	889N-F5AEA- 0 F	889N-R5AEA- 0 F	889N-U5AEA- 0 F	889N-V5AEA- 0 F
		C	889N-F5AE-0 F	889N-R5AE-0 F	889N-U5AE- 0 F	889N-V5AE- 0 F
6-Pin		A	889N-F6AE- 0 F	889N-R6AE- 0 F	889N-U6AE- 0 F	889N-V6AE- 0 F

Patchcords 

Pin Count	Assembly Rating	Cat. No.			
		Straight Female Straight Male	Straight Female Right Angle Male	Right Angle Female Straight Male	Right Angle Female Right Angle Male
2-Pin	300V, 10 A	889N-F2AENU- 0 F	889N-F2AENV- 0 F	889N-R2AENU- 0 F	889N-R2AENV- 0 F
3-Pin		889N-F3AENU- 0 F	889N-F3AENV- 0 F	889N-R3AENU- 0 F	889N-R3AENV- 0 F
4-Pin	300V, 7 A	889N-F4AENU- 0 F	889N-F4AENV- 0 F	889N-R4AENU- 0 F	889N-R4AENV- 0 F
5-Pin	300V, 5.6 A	889N-F5AENU- 0 F	889N-F5AENV- 0 F	889N-R5AENU- 0 F	889N-R5AENV- 0 F
6-Pin		889N-F6AENU- 0 F	889N-F6AENV- 0 F	889N-R6AENU- 0 F	889N-R6AENV- 0 F

- ① Replace symbol with 6 (6 ft), 12 (12 ft), or 20 (20 ft) for standard cable lengths.
- ② Replace symbol with 3 (3 ft), 6 (6 ft), 12 (12 ft), or 20 (20 ft) for standard cable lengths.

Note: Stainless steel connector versions may be ordered by adding an "S" to the cat. no., e.g., 889NS-F3AEC-**0**F.

Mini Style



4-Pin Straight Mini Cordset

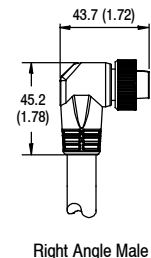
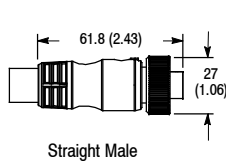
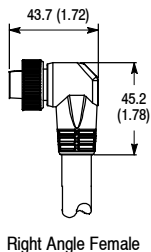
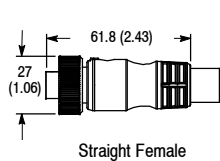
Features

- Heavy duty 16 AWG cable
- Highly visible yellow ToughLink jacket offers excellent oil and chemical resistance
- ToughWeld jacket offers good oil and chemical resistance and excellent resistance to weld slag
- 3-, 4-, and 5-pin configurations
- Ratcheting coupling nut for vibration resistance

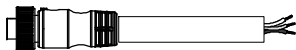
Specifications

Certifications	UL Recognized and CSA Certified
Mechanical	
Coupling Nut	Epoxy-coated zinc
Housing	Molded oil-resistant TPE
Contacts	Gold-plated brass
Cable	ToughLink: Oil-resistant yellow TPE jacket, 16 AWG stranded copper, 600V; UL Recognized and CSA Certified, SE00W ToughWeld: Oil-resistant yellow CPE thermoset jacket, 16 AWG stranded copper, 600V; UL Recognized and CSA Certified, SO0W
Bend Radius	10x diameter, min.
Cable Diameter	3/c = 10 mm (0.41 in.); 4/c = 11 mm (0.44 in.); 5/c = 13 mm (0.52 in.)
Electrical	
Cable Rating	ToughLink: UL SE00W VW-1 105C -50C 600V water resistant, CSA ST00 FT-1 600V; ToughWeld: UL SO0W 105C 600V water resistant, CSA -50C FT-1 600V
Assembly Rating	3-pin = 600V, 13A; 4-pin = 600V, 10 A; 5-pin = 600V, 8 A
Environmental	
Enclosure Type Rating	NEMA 4, 6P, 12, 13; IP67; 1200 psi washdown
Operating Temperature [C (F)]	ToughLink: -20...+105° (-4...+221°); ToughWeld: -20...+90° (-4...+194°)

Approximate Dimensions [mm (in.)]



Dimensions are approximate. Illustrations are not drawn to scale.



Example of Cordset



Example of Patchcord

Mating Components & Accessories

Description	Cat. No.	Page
Coupling Adaptor	889A-NADPT	12-11

Pinout and Color Code

Color Code	Face View Pinout					
	3-Pin		4-Pin		5-Pin	
	Female	Male	Female	Male	Female	Male
A (US)	1 Green 2 Black 3 White	1 Black 2 White	3 Red 4 Green	1 White 2 Red 3 Green	4 Orange 5 Black	

Product Selection

Cordsets 

Pin Count	Material	Assembly Rating	Color Code	Cat. No.			
				Straight Female	Right Angle Female	Straight Male	Right Angle Male
3-Pin	ToughLink (TPE)	600V 13 A	A	889N-F3HFC- 0 F	889N-R3HFC- 0 F	889N-U3HFC- 0 F	889N-V3HFC- 0 F
4-Pin		600V 10 A		889N-F4HFC- 0 F	889N-R4HFC- 0 F	889N-U4HFC- 0 F	889N-V4HFC- 0 F
5-Pin		600V 8 A		889N-F5HFC- 0 F	889N-R5HFC- 0 F	889N-U5HFC- 0 F	889N-V5HFC- 0 F
3-Pin	ToughWeld (CPE)	600V 13 A		889N-F3WFC- 0 F	889N-R3WFC- 0 F	889N-U3WFC- 0 F	889N-V3WFC- 0 F
4-Pin		600V 10 A		889N-F4WFC- 0 F	889N-R4WFC- 0 F	889N-U4WFC- 0 F	889N-V4WFC- 0 F
5-Pin		600V 8 A		889N-F5WFC- 0 F	889N-R5WFC- 0 F	889N-U5WFC- 0 F	889N-V5WFC- 0 F

Patchcords 

Pin Count	Material	Assembly Rating	Cat. No.			
			Straight Female Straight Male	Straight Female Right Angle Male	Right Angle Female Straight Male	Right Angle Female Right Angle Male
3-Pin	ToughLink (TPE)	600V 13A	889N-F3HFNU- 0 F	889N-F3HFNV- 0 F	889N-R3HFNU- 0 F	889N-R3HFNV- 0 F
4-Pin		600V 10 A	889N-F4HFNU- 0 F	889N-F4HFNV- 0 F	889N-R4HFNU- 0 F	889N-R4HFNV- 0 F
5-Pin		600V 8 A	889N-F5HFNU- 0 F	889N-F5HFNV- 0 F	889N-R5HFNU- 0 F	889N-R5HFNV- 0 F
3-Pin	ToughWeld (CPE)	600V 13 A	889N-F3WFNU- 0 F	889N-F3WFNV- 0 F	889N-R3WFNU- 0 F	889N-R3WFNV- 0 F
4-Pin		600V 10 A	889N-F4WFNU- 0 F	889N-F4WFNV- 0 F	889N-R4WFNU- 0 F	889N-R4WFNV- 0 F
5-Pin		600V 8 A	889N-F5WFNU- 0 F	889N-F5WFNV- 0 F	889N-R5WFNU- 0 F	889N-R5WFNV- 0 F

- ❶ Replace symbol with 6 (6 ft), 12 (12 ft), or 20 (20 ft) for standard cable lengths.
- ❷ Replace symbol with 3 (3 ft), 6 (6 ft), 12 (12 ft), or 20 (20 ft) for standard cable lengths.

Note: Stainless steel connector versions may be ordered by adding an "S" to the cat. no., e.g., 889NS-F3HFC-**0**F.

Mini Style



4-Pin Straight Mini Cordset

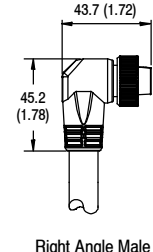
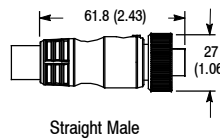
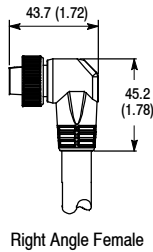
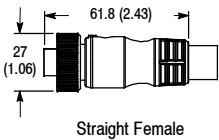
Features

- General purpose 18 AWG cable
- Highly visible yellow ToughLink jacket offers excellent oil and chemical resistance
- ToughWeld jacket offers good oil and chemical resistance and excellent resistance to weld slag
- 3-, 4-, and 5-pin configurations
- Ratcheting coupling nut for vibration resistance

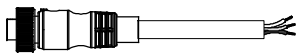
Specifications

Certifications	UL Recognized and CSA Certified	
Mechanical		
Coupling Nut	Epoxy-coated zinc	
Housing	Molded oil-resistant TPE	
Contacts	Gold-plated brass	
Cable	Oil-resistant yellow TPE or CPE jacket, 18 AWG stranded copper, 300V; UL Recognized and CSA Certified, ST00W-A	
Bend Radius	10x diameter, min.	
Cable Diameter	TPE 3/c = 6 mm (0.25 in.); 4/c = 7 mm (0.27 in.); 5/c = 8 mm (0.32 in.);	ToughWeld 3/c = 8 mm (0.32 in.); 4/c = 9 mm (0.36 in.); 5/c = 10 mm (0.38 in.)
Electrical		
Cable Rating	TPE: UL AWM style 20327 VW-1 105C 300V, CSA AWM A/B I/II 105C 300V FT1, UV oil and water resistant ToughWeld: UL SJOOW 105C 300V water resistant, CSA -50C FT-1 300V	
Assembly Rating	3-pin = 300V, 10 A 4-pin = 300V, 7 A 5-pin = 300V, 5.6 A	
Environmental		
Enclosure Type Rating	NEMA 4, 6P, 12, 13; IP67; 1200 psi washdown	
Operating Temperature [C (F)]	-20...+105° (-4...+221°)	

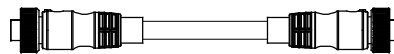
Approximate Dimensions [mm (in.)]



Dimensions are approximate. Illustrations are not drawn to scale.



Example of Cordset



Example of Patchcord

Mating Components & Accessories

Description	Cat. No.	Page
Coupling Adaptor	889A-NADPT	12-11

Pinout and Color Code

Color Code	Face View Pinout					
	3-Pin		4-Pin		5-Pin	
	Female	Male	Female	Male	Female	Male
A (US)	1 Green 2 Black 3 White		1 Black 2 White	3 Red 4 Green	1 White 2 Red 3 Green	4 Orange 5 Black
B (Auto)	1 Green 2 Red/Black Tr 3 Red/White Tr		1 Red/Black Tr 2 Red/White Tr	3 Red 4 Green	1 Red/White Tr 2 Red 3 Green	4 Red/Yellow Tr 5 Red/Black Tr

Product Selection

Cordsets 

Pin Count	Material	Assembly Rating	Color Code	Cat. No.			
				Straight Female	Right Angle Female	Straight Male	Right Angle Male
3-Pin	TPE	300V, 10 A	B	889N-F3HJA- 0 F	889N-R3HJA- 0 F	889N-U3HJA- 0 F	889N-V3HJA- 0 F
4-Pin		300V, 7 A		889N-F4HJA- 0 F	889N-R4HJA- 0 F	889N-U4HJA- 0 F	889N-V4HJA- 0 F
5-Pin		300V, 5.6 A		889N-F5HJA- 0 F	889N-R5HJA- 0 F	889N-U5HJA- 0 F	889N-V5HJA- 0 F
3-Pin	Tough-Weld (CPE)	300V, 10 A	A	889N-F3WEC- 0 F	889N-R3WEC- 0 F	889N-U3WEC- 0 F	889N-V3WEC- 0 F
4-Pin		300V, 7 A		889N-F4WEC- 0 F	889N-R4WEC- 0 F	889N-U4WEC- 0 F	889N-V4WEC- 0 F
5-Pin		300V, 5.6 A		889N-F5WEC- 0 F	889N-R5WEC- 0 F	889N-U5WEC- 0 F	889N-V5WEC- 0 F

Patchcords 

Pin Count	Material	Assembly Rating	Cat. No.			
			Straight Female Straight Male	Straight Female Right Angle Male	Right Angle Female Straight Male	Right Angle Female Right Angle Male
3-Pin	TPE	300V, 10 A	889N-F3HJNU- 0 F	889N-F3HJNV- 0 F	889N-R3HJNU- 0 F	889N-R3HJNV- 0 F
4-Pin		300V, 7 A	889N-F4HJNU- 0 F	889N-F4HJNV- 0 F	889N-R4HJNU- 0 F	889N-R4HJNV- 0 F
5-Pin		300V, 5.6 A	889N-F5HJNU- 0 F	889N-F5HJNV- 0 F	889N-R5HJNU- 0 F	889N-R5HJNV- 0 F
3-Pin	ToughWeld (CPE)	300V, 10 A	889N-F3WENU- 0 F	889N-F3WENV- 0 F	889N-R3WENU- 0 F	889N-R3WENV- 0 F
4-Pin		300V, 7 A	889N-F4WENU- 0 F	889N-F4WENV- 0 F	889N-R4WENU- 0 F	889N-R4WENV- 0 F
5-Pin		300V, 5.6 A	889N-F5WENU- 0 F	889N-F5WENV- 0 F	889N-R5WENU- 0 F	889N-R5WENV- 0 F

- ❶ Replace symbol with 6 (6 ft), 12 (12 ft), or 20 (20 ft) for standard cable lengths.
- ❷ Replace symbol with 3 (3 ft), 6 (6 ft), 12 (12 ft), or 20 (20 ft) for standard cable lengths.

Note: Stainless steel connector versions may be ordered by adding an "S" to the cat. no., e.g., 889NS-F3HJA-**0**F.

Terminal Chambers, Mini Style
Screw Type, Field Attachable Connector

Mini Style



3-Pin Mini Female Terminal Chamber

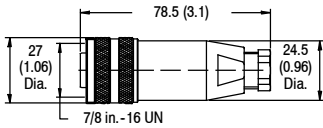
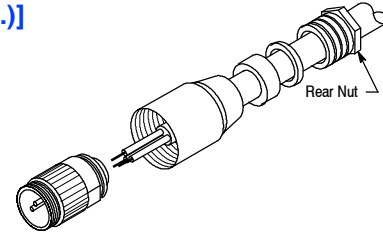
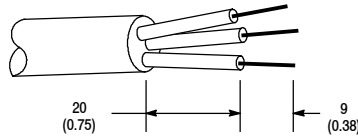
Specifications

Mechanical	
Coupling Nut	Black anodized aluminum
Connector Shell Material	PBT
Contacts	Gold-plated brass
Wire Size, Max.	16 AWG (1.5 mm ²)
Environmental	
Enclosure Type Rating	IP67
Operating Temperature [C (F)]	-40...+85° (-40...+185°)

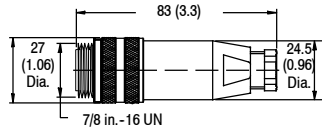
Features

- Field installable
- Screw terminals provide simple and secure installation
- Allows easy modification of existing cable installations

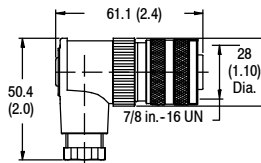
Approximate Dimensions [mm (in.)]



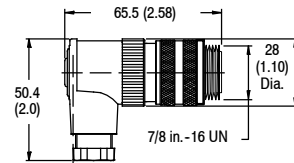
Straight
Internal Thread



Straight
External Thread



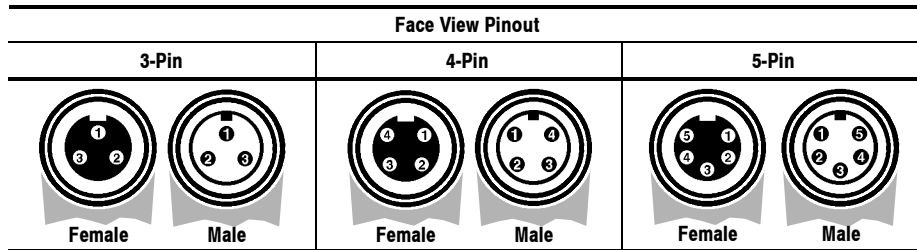
Right Angle Internal
Thread



Right Angle External
Thread

Dimensions are approximate. Illustrations are not drawn to scale.

Pinout



Product Selection

Terminal Chambers

Pin Count	Cable Jacket Diameter [mm (in.)]	Assembly Rating	Rear Nut Thread Size	Cat. No.		
				Straight Female Internal Threads	Straight Male Internal Threads	Straight Male External Threads
3-Pin	6.0...8.0 (0.24...0.32)	250V, 12 A	PG9	871A-TS3-N2 ①	871A-TS3-NU2 ①	871A-TS3-NM2 ①
	10.0...12.0 (0.39...0.47)		PG13.5	871A-TS3-N1	871A-TS3-NU1	871A-TS3-NM1
4-Pin	6.0...8.0 (0.24...0.32)	250V, 9 A	PG9	871A-TS4-N1 ①	871A-TS4-NU1 ①	871A-TS4-NM1 ①
	10.0...12.0 (0.39...0.47)		PG13.5	871A-TS4-N2	871A-TS4-NU2	871A-TS4-NM2
	12.0...14.0 (0.47...0.55)		PG16	871A-TS4-N3	871A-TS4-NU3	871A-TS4-NM3
5-Pin	6.0...8.0 (0.24...0.32)	250V, 9 A	PG9	871A-TS5-N1 ①	871A-TS5-NU1 ①	871A-TS5-NM1 ①
	10.0...12.0 (0.39...0.47)		PG13.5	871A-TS5-N2	871A-TS5-NU2	871A-TS5-NM2
	12.0...14.0 (0.47...0.55)		PG16	871A-TS5-N3	871A-TS5-NU3	871A-TS5-NM3

① Available in Right Angle. Replace "S" with "R" (i.e. 871A-TR3-N2).

Note: Stainless steel coupling nuts available. Add "S" to cat. no. (i.e. 871AS-TS3-N2).

Connection Systems
Cordsets & Patchcords, Mini-Plus Style

16 or 18/22 AWG

Mini-Plus Style



10-Pin Mini-Plus Cordset

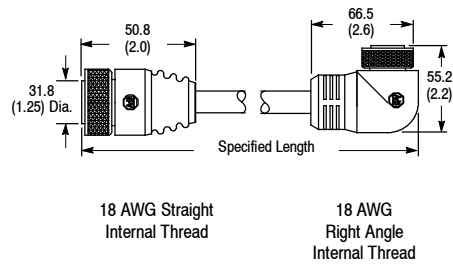
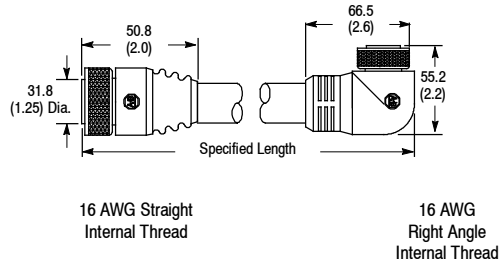
Features

- Heavy duty STOOW 16 AWG cable
- Highly visible yellow PVC jacket offers good oil and chemical resistance
- One-piece molded body design

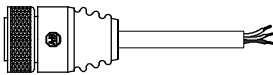
Specifications

Certifications	UL Recognized and CSA Certified
Mechanical	
Coupling Nut	Anodized aluminum with clear sealant
Material	Molded oil-resistant PVC
Contacts	Gold-plated machined brass
Cable	Oil-resistant yellow PVC jacket, 16 AWG stranded copper, 600V; UL Recognized and CSA Certified, STOOW
Bend Radius	10x diameter, min.
Cable Diameter	16 AWG 9/c = 17 mm (0.67 in.) 16 AWG 10/c = 17 mm (0.67 in.) 16 AWG 12/c = 18 mm (0.71 in.) 18/22 AWG 12/c = 9 mm (0.36 in.)
Electrical	
Cable Rating	16 AWG: UL STOOW 105C 600V, CSA ST 105C FT2 18/22 AWG: UL AWM style 2661 VW-1 105C 300V, CSA AWM A/B I/II 105C 300V FT4
Assembly Rating	16 AWG: 600V, 7 A; 18/22 AWG: 300V, 3 A
Environmental	
Enclosure Type Rating	NEMA 4, 6P, 12, 13; IP67; 1200 psi washdown
Operating Temperature [C (F)]	-40...+105° (-40...+221°)

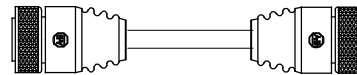
Approximate Dimensions [mm (in.)]



Dimensions are approximate. Illustrations are not drawn to scale.



Example of Cordset



Example of Patchcord

Mating Components & Accessories

Description	Cat. No.	Page
Coupling Adaptor	889A-N3ADPT	12-11

Pinout and Color Code

Color Code	Face View Pinout					
	9-Pin		10-Pin		12-Pin	
	Female	Male	Female	Male	Female	Male
A	 1 Orange 2 Blue 3 Red/Black Tr 4 Green/Black Tr 5 White	 6 Red 7 Green 8 White/Black Tr 9 Black	 1 Orange 2 Blue 3 White/Black Tr 4 Red/Black Tr 5 Green/Black Tr	 6 Orange/Black Tr 7 Red 8 Green 9 Black 10 White	 1 Orange 2 Blue 3 White/Black Tr 4 Red/Black Tr 5 Green/Black Tr 6 Orange/Black Tr	 7 Blue/Black Tr 8 Black/White Tr 9 Green 10 Red 11 White 12 Black
B	—		—		1 White 2 Green 3 Yellow 4 Grey 5 Rose 6 Red	7 Black 8 Violet 9 Green/Yellow ① 10 Orange 11 Blue ① 12 Brown ①

Product Selection

Cordsets

Pin Count	Assembly Rating	Color Code	Cat. No.	
			Straight Female	Straight Male
9-Pin	16 AWG, 600V, 7 A	A	889N-F9AF-②	889N-U9AF-②
10-Pin	16 AWG, 600V, 7 A		889N-F10AF-②	889N-U10AF-②
12-Pin	16 AWG, 600V, 7 A		889N-F12AF-②	889N-U12AF-②
	(3) 18 AWG/(9) 22 AWG, 300V, 3 A	B	889N-F12AC-②	—

Patchcords

Pin Count	Assembly Rating	Cat. No.	
		Straight Female Straight Male	Straight Female Right Angle Male
9-Pin	16 AWG, 600V, 7 A	889N-F9AFNU-③	—
10-Pin	16 AWG, 600V, 7 A	889N-F10AFNU-③	889N-F10AFNV-③
10-Pin	(3) 18 AWG/(9) 22 AWG, 300V, 3 A	889N-F10ACNU-③	889N-F10ACNV-③
12-Pin	16 AWG, 600V, 7 A	889N-F12AFNU-③	889N-F12AFNV-③
12-Pin	(3) 18 AWG/(9) 22 AWG, 300V, 3 A	889N-F12ACNU-③	889N-F12ACNV-③
Thread adaptor to couple standard internally threaded ends.		889A-N3ADPT	889A-N3ADPT

- ① 18 AWG conductors
- ② Replace symbol with 2 (2 m (6.5 ft)), 5 (5 m (16.4 ft)), or 10 (10 m (32.8 ft)) for standard cable lengths.
- ③ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.

DC Micro Style



4-Pin DC Micro Cordset

Features

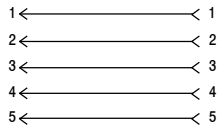
- Ratcheting coupling nut
- Subtle black or highly visible yellow PVC jacket offers good oil and chemical resistance
- Blue jacket models for intrinsically safe applications
- “-V” models allow wiring of devices using pin 2 for output into standard single-point distribution boxes and IP 67 I/O

Specifications

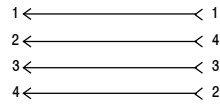
Certifications	UL Recognized and CSA Certified
Mechanical	
Coupling Nut	Epoxy-coated zinc
Material	Molded oil-resistant PUR
Contacts	Gold-plated brass
Cable	Oil-resistant PVC jacket, 18 AWG or 22 AWG conductors, 300V, UL Recognized and CSA Certified
Bend Radius	10x diameter, min.
Cable Diameter	2/c = 5 mm (0.21 in.) 3/c = 5 mm (0.21 in.) 4/c = 5 mm (0.21 in.) 5/c = 6.5 mm (0.25 in.) 4/c (18AWG) = 6.5 mm (0.25 in.)
Electrical	
Cable Rating	UL AWM style 2661 VW-1 105C 300V, CSA AWM A/B I/II 80C 300V FT1, UV oil and water resistant
Assembly Rating	250V, 4 A
Environmental	
Enclosure Type Rating	IP 67, NEMA 6P, 1200 psi (8270 kPa) washdown
Operating Temperature [C (F)]	-20...+105 ° (-4...+221 °)

Wiring Diagrams

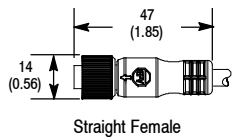
Standard Models



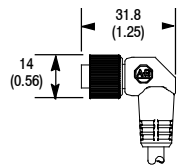
889D-*4ACD*-V* Models



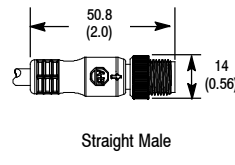
Approximate Dimensions [mm (in.)]



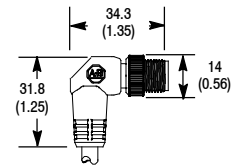
Straight Female



Right Angle Female

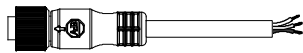


Straight Male

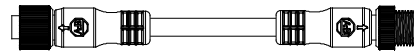


Right Angle Male

Dimensions are approximate. Illustrations are not drawn to scale.

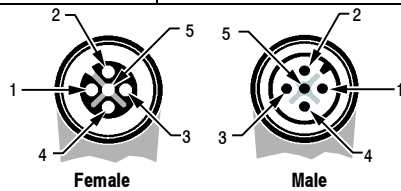


Example of Cordset



Example of Patchcord

Pinout and Color Code

Color Code	Face View Pinout							
	2-Pin		3-Pin		4-Pin		5-Pin	
								
A	1 NA 2 NA 3 Brown	4 Blue 5 NA	1 Brown 2 NA 3 Blue	4 Black 5 NA	1 Brown 2 White 3 Blue	4 Black 5 NA	1 Brown 2 White 3 Blue	4 Black 5 Grey

Product Selection

Cordsets 

Pin Count	Color Code	Jacket Color	Wire Gauge	Cat. No.			
				Straight Female	Right Angle Female	Straight Male	Right Angle Male
2-Pin	A	Yellow	22 AWG	889D-F2AC-❶	889D-R2AC-❶	889D-M2AC-❶	889D-E2AC-❶
3-Pin	A	Yellow		889D-F3AC-❶	889D-R3AC-❶	889D-M3AC-❶	889D-E3AC-❶
4-Pin	A	Yellow	18 AWG	889D-F4AC-❶	889D-R4AC-❶	889D-M4AC-❶	889D-E4AC-❶
	A	Yellow	22 AWG	889D-F4AE-❶	889D-R4AE-❶	889D-M4AE-❶	889D-E4AE-❶
	A	Black		889D-F4BC-❶	889D-R4BC-❶	889D-M4BC-❶	889D-E4BC-❶
	A	Blue	889D-F4LC-❶	889D-R4LC-❶	889D-M4LC-❶	889D-E4LC-❶	
5-Pin	A	Yellow	22 AWG	889D-F5AC-❶	889D-R5AC-❶	889D-M5AC-❶	889D-E5AC-❶
	A	Black		889D-F5BC-❶	889D-R5BC-❶	889D-M5BC-❶	889D-E5BC-❶

Patchcords 

Pin Count	Color Code	Jacket Color	Wire Gauge	Cat. No.			
				Straight Female Straight Male	Straight Female Right Angle Male	Right Angle Female Straight Male	Right Angle Female Right Angle Male
2-Pin	A	Yellow	22 AWG	889D-F2ACDM-❷	889D-F2ACDE-❷	889D-R2ACDM-❷	889D-R2ACDE-❷
3-Pin	A	Yellow	22 AWG	889D-F3ACDM-❷	889D-F3ACDE-❷	889D-R3ACDM-❷	889D-R3ACDE-❷
4-Pin	A	Yellow	22 AWG	889D-F4ACDM-❷	889D-F4ACDE-❷	889D-R4ACDM-❷	889D-R4ACDE-❷
	A❸	Yellow	22 AWG	889D-F4ACDM-V❷	889D-F4ACDE-V❷	889D-R4ACDM-V❷	889D-R4ACDE-V❷
	A	Yellow	18 AWG	889D-F4AEDM-❷	889D-F4AEDE-❷	889D-R4AEDM-❷	889D-R4AEDE-❷
	A	Black	22 AWG	889D-F4BCDM-❷	889D-F4BCDE-❷	889D-R4BCDM-❷	889D-R4BCDE-❷
	A	Blue	22 AWG	889D-F4LCDM-❷	889D-F4LCDE-❷	889D-R4LCDM-❷	889D-R4LCDE-❷
5-Pin	A	Yellow	22 AWG	889D-F5ACDM-❷	889D-F5ACDE-❷	889D-R5ACDM-❷	889D-R5ACDE-❷
	A	Yellow	22 AWG	889D-F5BCDM-❷	889D-F5BCDE-❷	889D-R5BCDM-❷	889D-R5BCDE-❷

- ❶ Replace symbol with 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.
- ❷ Replace symbol with 0M3 (1 ft), 1 (1 m), 2 (2 m), 5 (5 m) or 10 (10 m) for standard lengths.
- ❸ See Wiring Diagrams.

Note: Stainless steel connectors may be ordered by adding an "S" to the cat. no. (e.g. 889DS-F4AC-2).

DC Micro Style



4-Pin DC Micro Cordset

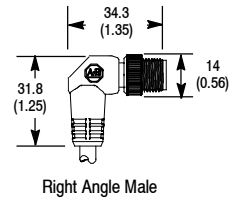
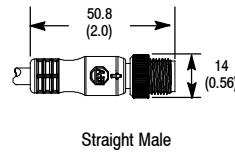
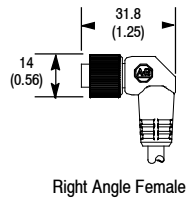
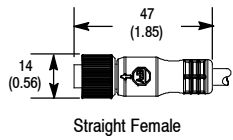
Features

- Ratcheting coupling nut
- Q models specifically wired for QuadroPlex applications
- N models specifically wired for NAMUR applications
- E models specifically wired for Photo Emitter applications
- K models specifically wired for KwikLink Auxiliary Power applications
- Blue Jacket models for intrinsically safe applications

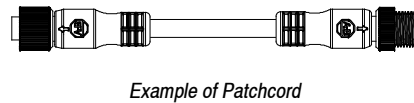
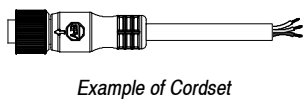
Specifications

Certifications	UL Recognized and CSA Certified
Mechanical	
Coupling Nut	Epoxy-coated zinc
Material	Molded oil-resistant PUR
Contacts	Gold-plated brass
Cable	Unshielded, oil-, water- and UV-resistant, UL Recognized and CSA Certified
Cable Diameter	2/c = 5 mm (0.21 in.) 3/c = 5 mm (0.21 in.) 4/c = 5 mm (0.21 in.) 5/c = 6.5 mm (0.25 in.) 4/c (18 AWG) = 6.5 mm (0.25 in.)
Bend Radius	10x diameter, min.
Electrical	
Cable Rating	UL AWM style 2661 VW-1 105C 300V, CSA AWM A/B I/II 80C 300V FT1, UV oil and water resistant
Assembly Rating	250V, 4 A
Environmental	
Enclosure Type Rating	IP67, NEMA 6P, 1200 psi (8270 kPa) washdown
Operating Temperature [C (F)]	-20...+105 ° (-4...+221 °)

Approximate Dimensions [mm (in.)]



Dimensions are approximate. Illustrations are not drawn to scale.



Pinout and Color Code

Face View Pinout					
4-Pin/2 Conductor					
Color Code	A	B	C	D	F
	Photo Emitter	NAMUR	QuadroPlex	KwikLink Aux Power	2-Wire
	1 Brown 2 NA 3 Blue 4 NA	1 Brown 2 Blue 3 NA 4 NA	1 Brown 2 NA 3 NA 4 Blue	1 NA 2 Brown 3 Blue 4 NA	1 NA 2 NA 3 Brown 4 Blue

Product Selection

Cordsets

No. of Pins	Color Code	Wire Type	Jacket Material	Wire Size, AWG	Cat. No.			
					Straight Female	Right Angle Female	Straight Male	Right Angle Male
2-Pin	B	NAMUR	Blue PVC	22 AWG	889D-F2LC-N ^①	889D-R2LC-N ^①	889D-M2LC-N ^①	889D-E2LC-N ^①
	F	Intrinsically Safe	Blue PVC	22 AWG	889D-F2LC- ^①	889D-R2LC- ^①	889D-M2LC- ^①	889D-E2LC- ^①
	C	QuadroPlex	Yellow PVC	22 AWG	889D-F2AC-Q ^①	889D-R2AC-Q ^①	889D-M2AC-Q ^①	889D-E2AC-Q ^①
	A	Photo Emitter	Yellow PVC	22 AWG	889D-F2AC-E ^①	889D-R2AC-E ^①	889D-M2AC-E ^①	889D-E2AC-E ^①
	D	KwikLink Aux Pwr	Yellow PVC	18 AWG	889D-F2AE-K ^①	889D-R2AE-K ^①	889D-M2AE-K ^①	889D-E2AE-K ^①

Patchcords

No. of Pins	Color Code	Wire Type	Jacket Material	Wire Size AWG	Cat. No.			
					Straight Female... Straight Male	Straight Female... Right Angle Male	Right Angle Female...Straight Male	Right Angle Female...Right Angle Male
2-Pin	B	NAMUR	Blue PVC	22	889D-F2LCDM-N ^①	889D-R2LCDE-N ^①	889D-F2LCDM-N ^①	889D-R2LCDE-N ^①
	F	Intrinsically Safe	Blue PVC	22	889D-F2LCDM- ^①	889D-R2LCDE- ^①	889D-F2LCDM- ^①	889D-R2LCDE- ^①
	C	QuadroPlex	Yellow PVC	22	889D-F2ACDM-Q ^①	889D-R2ACDE-Q	889D-F2ACDM-Q ^①	889D-R2ACDE-Q ^①
	A	Photo Emitter	Yellow PVC	22	889D-F2ACDM-E ^①	889D-R2ACDE-E	889D-F2ACDM-E ^①	889D-R2ACDE-E ^①
	D	KwikLink Aux Pwr	Yellow PVC	18	889D-F2AEDM-K ^①	889D-R2AEDE-K	889D-F2AEDM-K ^①	889D-R2AEDE-K ^①

^① Replace symbol with 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.

Note: Stainless steel connectors may be ordered by adding an "S" to the cat. no. (e.g. 889DS-F2LN-N2).

Notes: QuadroPlex models are used with 872C Proximity products.
NAMUR models are used with 871C Proximity products.
Photo Emitter models are used with Photoelectric light source/emitter/models.

DC Micro Style



4-Pin DC Micro Cordset

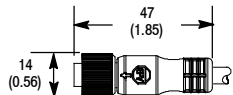
Features

- PUR jacket provides good oil and chemical resistance
- TPE jacket material for good oil, chemical, and weld slag resistance
- 8-pin/7-wire configuration for Sipha safety switches and other applications
- Ratcheting coupling nuts for vibration resistance

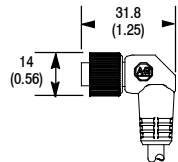
Specifications

Certifications	UL Recognized and CSA Certified
Mechanical	
Coupling Nut	Epoxy-Coated Zinc
Material	Molded oil-resistant PUR
Contacts	Gold-plated brass
Cable	PUR or TPE jacket, 18 & 22 AWG or 24 AWG conductors, 300V; UL Recognized and CSA Certified
Bend Radius	10x diameter, min.
Cable Diameter	4/c (PUR): 5 mm (0.21 in.) 4/c (18 AWG TPE): 7 mm (0.28 in.) 4/c (22 AWG TPE): 4.9 mm (0.19 in.) 5/c: 6.5 mm (0.25 in.) 7/c: 7.4 mm (0.29 in.) 8/c: 7.4 mm (0.29 in.)
Electrical	
Cable Rating	4 & 5/c (PUR): UL AWM style 20866 VW-1 80C 300V, CSA AWM A/B I/II 80C 300V FT1, UV oil and water resistant 8/c (PUR): UL AWM style 20866 90C 300V, CSA II A 90C 300V TPE: UL AWM style 20327 VW-1 105C 300V, CSA AWM A/B I/II 105C 300V FT1, UV oil and water resistant
Assembly Rating	4- or 5-pin: 250V, 4 A; 8-pin: 300V AC/36V DC, 1.5 A
Environmental	
Enclosure Type Rating	IP 67, NEMA 6P, 1200 psi (8270 kPa) washdown
Operating Temperature—C (F)	PUR models: -20...+80 ° (-4...+176 °) TPE models: -20...+105 ° (-4...+221 °) TPR models: -25...+125 ° (-13...+256 °)

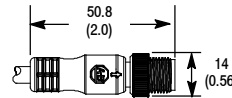
Approximate Dimensions [mm (in.)]



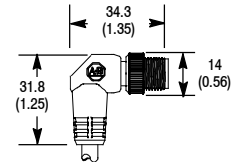
Straight Female



Right Angle Female

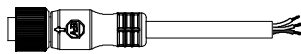


Straight Male

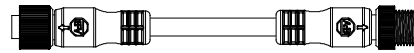


Right Angle Male

Dimensions are approximate. Illustrations are not drawn to scale.



Example of Cordset



Example of Patchcord

Pinout and Color Code

Color Code	Face View Pinout												
	3-Pin		4-Pin		5-Pin		8-Pin						
A	1 Brown 2 NA 3 Blue 4 Black 5 NA	1 Brown 2 White 3 Blue	4 Black 5 NA	1 Brown 2 White 3 Blue	4 Black 5 Grey	1 Red 2 Blue 3 Green 4 Yellow	5 Black 6 White 7 N.C. 8 Grey	B	—	—	—	1 White 2 Brown 3 Green 4 Yellow	5 Grey 6 Pink 7 Blue 8 Red

Product Selection

Cordsets

Pin Count	Cable Type	Assembly Rating	Color Code	Cat. No.			
				Straight Female	Right Angle Female	Straight Male	Right Angle Male
3-Pin	PUR	18 AWG, 300V, 4 A	A	889D-F3UE- 1	889D-R3UE- 1	889D-M3UE- 1	889D-E3UE- 1
4-Pin	TPE	18 AWG, 250V, 4 A	A	889D-F4HJ-1	889D-R4HJ- 1	889D-M4HJ- 1	889D-E4HJ- 1
4-Pin	TPE	22 AWG, 250V, 4 A	A	889D-F4HL-1	889D-R4HL- 1	889D-M4HL- 1	889D-E4HL- 1
	PUR		A	889D-F4UC-1	889D-R4UC-1	889D-M4UC- 1	889D-E4UC- 1
4-Pin	PUR	18 AWG, 300V, 4 A	A	889D-F4UE- 1	889D-R4UE- 1	889D-M4UE- 1	889D-E4UE- 1
5-Pin	PUR	22 AWG, 250V, 4 A	A	889D-F5UC- 1	889D-R5UC- 1	889D-M5UC- 1	889D-E5UC- 1
8-Pin	TPR	24 AWG 30V AC/ 36V DC 1.5 A	A	889D-F8AC-1	—	—	—
	PUR		B	889D-F8AB-1	889D-R8AB-1	889D-M8AB- 1	—

Patchcords

Pin Count	Cable Type	Assembly Rating	Color Code	Cat. No.			
				Straight Female Straight Male	Straight Female Right Angle Male	Right Angle Female Straight Male	Right Angle Female Right-Angle Male
3-Pin	PUR	18 AWG, 300V, 4 A	A	889D-F3UEDM- 2	889D-F3UEDE- 2	889D-R3UEDM- 2	889D-R3UEDE- 2
4-Pin	TPE	18 AWG, 250V, 4 A	A	889D-F4HJDM- 2	889D-F4HJDE- 2	889D-R4HJDM- 2	889D-R4HJDE- 2
			A	889D-F4HLDM-2	889D-F4HLDE- 2	889D-R4HLDM- 2	889D-R4HLDE- 2
4-Pin	PUR	22 AWG, 250V, 4 A	A	889D-F4UCDM- 2	889D-F4UCDE- 2	889D-R4UCDM- 2	889D-R4UCDE- 2
4-Pin	PUR	18 AWG, 300V, 4 A	A	889D-F4UEDM- 2	889D-F4UEDE- 2	889D-R4UEDM- 2	889D-R4UEDE- 2
5-Pin	PUR	22 AWG, 250V, 4 A	A	889D-F5UCDM- 2	889D-F5UCDE- 2	889D-R5UCDM- 2	889D-R5UCDE- 2
8-Pin		24 AWG, 30V AC/ 36V DC 1.5 A	A	889D-F8ABDM- 2	—	—	—

- 1 Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
- 2 Replace symbol with 0M3 (1 ft), 1 (1 m), 2 (2 m), 5 (5 m) or 10 (10 m) for standard lengths.

Note: Stainless steel connectors may be ordered by adding an "S" to the cat. no. (e.g. 889DS-F4HJ-2).

DC Micro Style



4-Pin DC Micro Cordset

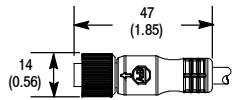
Specifications

Certifications	UL Recognized and CSA Certified
Mechanical	
Coupling Nut	Epoxy-coated zinc
Material	Molded oil-resistant PUR
Contacts	Gold-plated brass
Cable	Allen-Bradley ToughLink TPE or ToughWeld CPE yellow jacket, 18 AWG or 22 AWG conductors, 300V; UL Recognized and CSA Certified
Bend Radius	10x diameter, min.
Cable Diameter	ToughLink: 9 mm (0.35 in.); ToughWeld: 9 mm (0.35 in.)
Electrical	
Cable Rating	ToughLink: UL AWM style 20328 600V VW-1 -50...+105°C water resistant, CSA AWM I/II A/B 105C 600V FT1 ToughWeld: UL -50°C SJOOW 90°C dry and 60°C water resistant, CSA -50°C SJOOW 90°C FT1, P-123-103, MSHA 300V
Assembly Rating	250V, 4 A
Environmental	
Enclosure Type Rating	IP67, NEMA 6P, 1200 psi (8270 kPa) washdown
Operating Temperature [C (F)]	ToughLink: -50...+105° (-58...+221°) ToughWeld: -50...90° (-58...+194°)

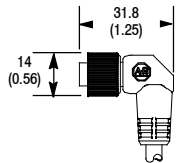
Features

- Ratcheting coupling nut for vibrating resistance
- ToughLink TPE yellow jacket offers excellent oil and chemical resistance
- ToughWeld CPE yellow jacket provides excellent resistance to weld slag
- Heavy duty construction for rugged environments

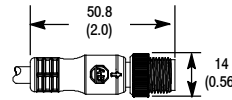
Approximate Dimensions [mm (in.)]



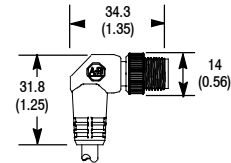
Straight Female



Right Angle Female

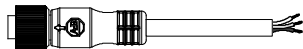


Straight Male

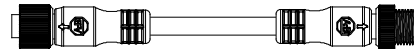


Right Angle Male

Dimensions are approximate. Illustrations are not drawn to scale.



Example of Cordset



Example of Patchcord

Pinout and Color Code

Face View Pinout			
4-Pin			
<p style="text-align: center;">Female</p>	<p style="text-align: center;">Male</p>		
Color Code	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">1 Brown 2 White</td> <td style="width: 50%; border: none;">3 Blue 4 Black</td> </tr> </table>	1 Brown 2 White	3 Blue 4 Black
1 Brown 2 White	3 Blue 4 Black		
A			

Product Selection

Cordsets

Pin Count	Material	Assembly Rating	Color Code	Cat. No.			
				Straight Female	Right Angle Female	Straight Male	Right Angle Male
4-Pin	ToughLink (TPE)	22 AWG 250V 4 A	A	889D-F4HC-①	889D-R4HC-①	889D-M4HC-①	889D-E4HC-①
	ToughWeld (CPE)	18 AWG 250V 4 A	A	889D-F4WE-①	889D-R4WE-①	889D-M4WE-①	889D-E4WE-①
	ToughLink (TPE)	18 AWG 250V 4 A	A	889D-F4HE-①	889D-R4HE-①	889D-M4HE-①	889D-E4HE-①

Patchcords

Pin Count	Material	Assembly Rating	Cat. No.			
			Straight Female Straight Male	Straight Female Right Angle Male	Right Angle Female Straight Male	Right Angle Female Right Angle Male
4-Pin	ToughLink (TPE)	22 AWG 250V 4 A	889D-F4HCDM-②	889D-F4HCDE-②	889D-R4HCDM-②	889D-R4HCDE-②
	ToughWeld (CPE)	18 AWG 250V 4 A	889D-F4WEDM-②	889D-F4WEDE-②	889D-R4WEDM-②	889D-R4WEDE-②
	ToughLink (TPE)	18 AWG 250V 4 A	889D-F4HEDM-②	889D-F4HEDE-②	889D-R4HEDM-②	889D-R4HEDE-②

- ① Replace symbol with 1 (1 m), 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
- ② Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 4 (4 m), 5 (5 m) or 6 (6 m) for standard lengths.

Note: Stainless steel connectors may be ordered by adding an "S" to the cat. no. (e.g. 889DS-F4HC-2).

DC Micro Style



DC Micro Female

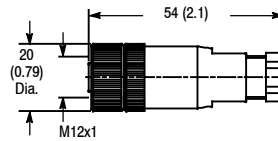
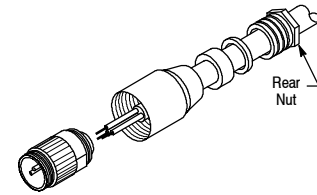
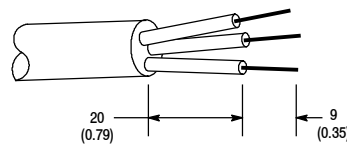
Specifications

Mechanical	
Coupling Nut	Nickel-plated brass
Connector Shell Material	PBT, except embedded thermistor models: Nylon
Contacts	Gold-plated palladium nickel
Cable	18 AWG (0.75 mm ²) max.
Electrical	
Assembly Rating	4- or 5-pin: 250V, 4 A; 8-pin: 60V, 2 A
Environmental	
Enclosure Type Rating	IP67
Operating Temperature [C (F)]	-40...+88° (-40...+185°)

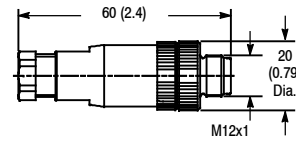
Features

- Field installable
- 4- or 5-pin DC micro style
- Straight or right angle
- Single cable or dual cable models
- Screw terminals provide simple and secure installation
- Allows easy modification of existing cable installations

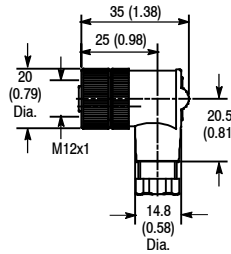
Approximate Dimensions [mm (in.)]



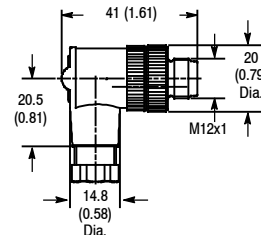
Straight Female



Straight Male



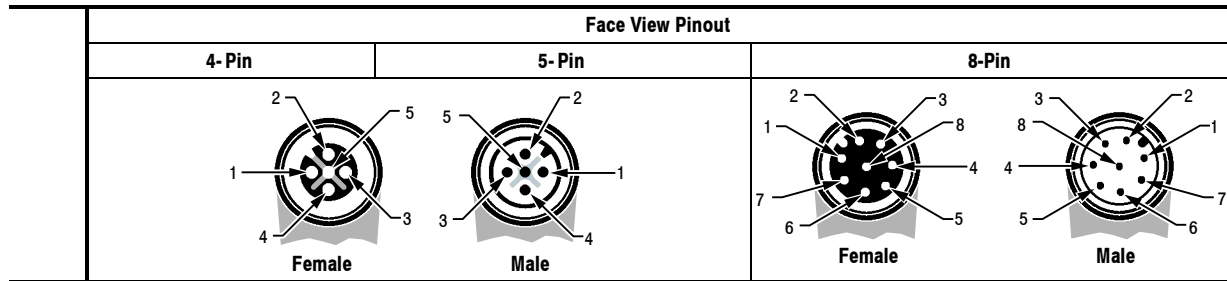
Right Angle Female



Right Angle Male

Dimensions are approximate. Illustrations are not drawn to scale.

Pinout



Product Selection

Single-Cable Model Terminal Chambers 

Pin Count	Cable Jacket Diameter [mm (in.)]	Assembly Rating	Rear Nut Thread Size	Cat. No.			
				Straight Female	Right Angle Female	Straight Male	Right Angle Male
4-Pin	4.0...6.0 (0.16...0.24)	250V, 4 A	PG 7	871A-TS4-D	871A-TR4-D	871A-TS4-DM	871A-TR4-DM
	6.0...8.0 (0.24...0.32)		PG 9	871A-TS4-D1	871A-TR4-D1	871A-TS4-DM1	871A-TR4-DM1
5-Pin	4.0...6.0 (0.16...0.24)		PG 7	871A-TS5-D	871A-TR5-D	871A-TS5-DM	871A-TR5-DM
	6.0...8.0 (0.24...0.32)		PG 9	871A-TS5-D1	871A-TR5-D1	871A-TS5-DM1	871A-TR5-DM1
8-Pin	6.0...8.0 (0.24...0.32)	60V, 2 A	PG 9	871A-TS8-D1	—	871A-TS8-DM1	—

Dual-Cable Model Terminal Chambers 

Pin Count	Cable Jacket Diameter [mm (in.)]	Assembly Rating	Rear Nut Thread Size	Cat. No.	
				Straight Male	Right Angle Male
4-Pin	Two cables 2.1...3.0 (0.08...0.12)	250V, 4 A	PG 9	871A-VS4-DM	871A-VR4-DM
5-Pin	or 3.5...5.2 (0.14...0.21)			871A-VS5-DM	871A-VR5-DM

Note: Stainless steel coupling nuts available, add an "S" to the cat. no. (e.g. 871AS-TS4-DM).

DC Micro Style



DC Micro Male

Specifications

Mechanical	
Coupling Nut	Zinc die-cast
Connector Shell Material	Zinc die-cast or polyamide
Contacts	Gold-plated palladium nickel
Maximum IDC Installations	10
Conductor Outside Diameter	26-22 AWG-20 AWG: 1.0...1.6 mm (0.039...0.063 in.) 24-22 AWG, 22-18 AWG: 1.6...2.0 mm (0.063...0.079 in.)
Electrical	
Assembly Rating	32V, 4 A; 50V, 6 A
Environmental	
Enclosure Type Rating	IP67
Operating Temperature [C (F)]	-25...85° (-13...185°)
Installation Temperature [C (F)]	-5...50° (23...185°)

Features

- Field installable with no hand tools needed
- 4-pin DC micro style
- Straight or right angle, male or female
- Allows easy modification of existing cable installations
- Insulation displacement technology for secure and reliable installation
- Metal body unit excellent in shielding applications

Approximate Dimensions [mm (in.)]

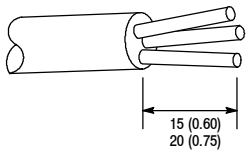


Figure A

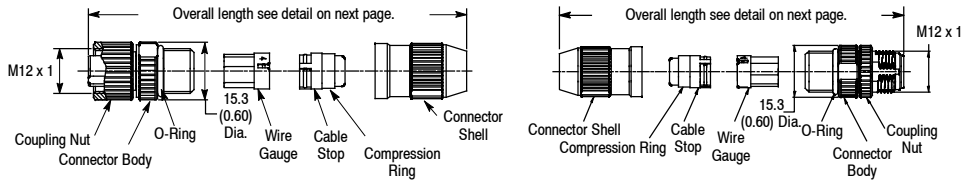


Figure B

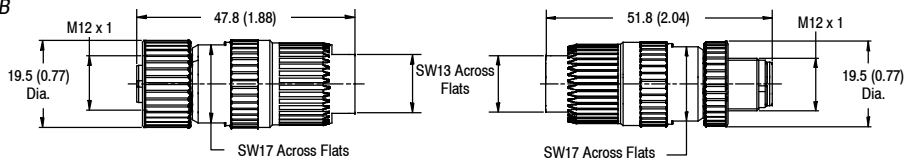


Figure C

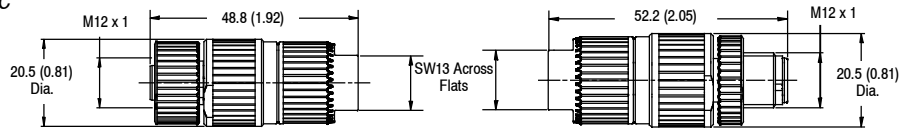
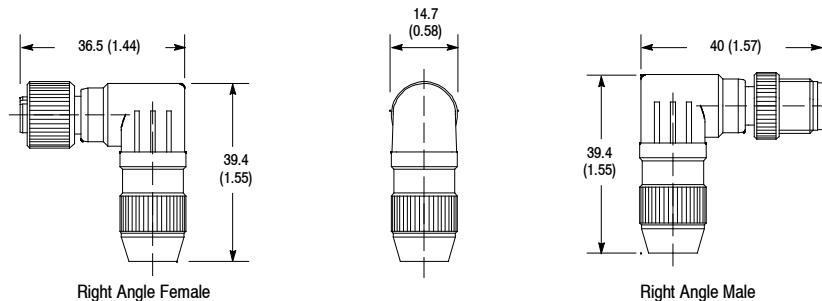
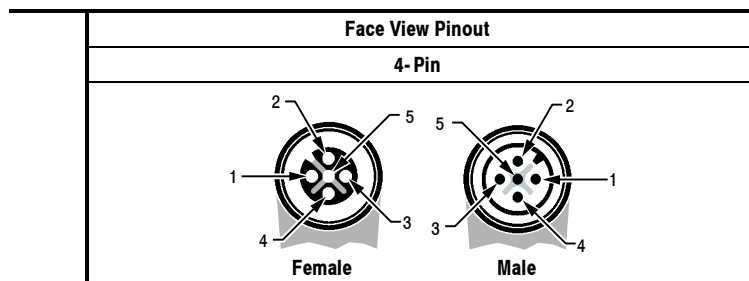


Figure D



Dimensions are approximate. Illustrations are not drawn to scale.

Pinout



Product Selection

IDC Field Attachables

Pin Count	Connector Body	Dimensions	Cable Jacket Diameter [mm (in.)]	Wire Size	Assembly Rating	Cat. No.			
						Straight Female	Straight Male	Right Angle Female	Right Angle Male
4-Pin	Polyamide Small body unshielded	Figure A & D	4.0...5.1 (0.16...0.20)	26...22 AWG	32V 4 A	889D-F4DC-H	889D-M4DC-H	889D-R4DC-H	889D-E4DC-H
	Zinc die-cast Large body shielded	Figure B	7.0...8.8 (0.28...0.35)	24...22 AWG	32V 4 A	889D-F4DC-SH	889D-M4DC-SH	—	—
	Polyamide Large body unshielded	Figure C	5.5...8.0 (0.22...0.31)	22...18 AWG	50V 6 A	889D-F4CE-H	889D-M4CE-H	—	—

Cordsets & Patchcords, AC Micro Style

18 or 22 AWG, PVC

AC Micro Style



3-Pin AC Micro Cordset

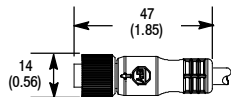
Features

- Highly visible yellow PVC jacket offers good oil and chemical resistance
- Heavy-duty re-inforcing braiding can be used as a grounded shield to reduce noise
- Ratcheting coupling nut for vibration resistance

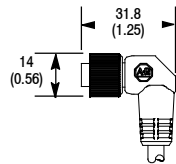
Specifications

Certifications	UL Recognized and CSA Certified
Mechanical	
Coupling Nut	Epoxy-coated zinc
Connector	Molded oil-resistant polyurethane
Contacts	Gold-plated brass
Cable	Oil-resistant yellow PVC jacket, 18 or 22 AWG conductors, 300V; UL Recognized and CSA Certified
Bend Radius	10 x diameter, min.
Cable Diameter	3/c (22 AWG) = 6.7 mm (0.26 in.) 3/c (18 AWG) = 6.7 mm (0.26 in.) 4/c (18 AWG) = 6.7 mm (0.26 in.) 5/c (18 AWG) = 6.7 mm (0.26 in.) 6/c (22 AWG) = 6.7 mm (0.26 in.)
Braiding	Shield aluminum mylar stranding 26 x #36 (AWG) (Braided cable models only)
Cable Rating	UL AWM style 2661 VW-1 105C 300V, CSA AWM A/B I/II 80C 300V FT1, UV oil and water resistant
Assembly Rating	250V, 4 A
Environmental	
Enclosure Type Rating	IP67, NEMA 6P, 1200 psi (8270 kPa) washdown
Operating Temperature [C (F)]	-20...+105 ° (-4...+221 °)

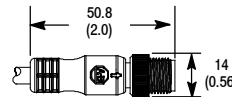
Approximate Dimensions [mm (in.)]



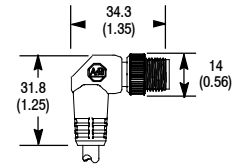
Straight Female



Right Angle Female

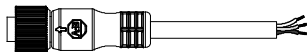


Straight Male

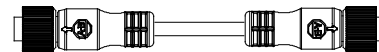


Right Angle Male

Dimensions are approximate. Illustrations are not drawn to scale.



Example of Cordset



Example of Patchcord

Pinout and Color Code

Color Code	Face View Pinout								
	3-Pin		4-Pin		5-Pin		6-Pin		
	Female	Male	Female	Male	Female	Male	Female	Male	
A	1 Green (GND) 2 Red/Black Tr. 3 Red/White Tr.	1 Green (GND) 2 Red/Black Tr. 3 Red/White Tr.	1 Red/Black Tr. 3 Red 2 Red/White Tr. 4 Green (GND)	1 Red/Black Tr. 3 Red 2 Red/White Tr. 4 Green (GND)	1 Red/White Tr. 4 Red/Yellow Tr. 2 Red 5 Red/Black Tr. 3 Green	1 Red/White Tr. 4 Red/Yellow Tr. 2 Red 5 Red/Black Tr. 3 Green	1 Red/White Tr. 4 Red/Yellow Tr. 2 Red 5 Red/Black Tr. 3 Green	1 Red/White Tr. 4 Red/Yellow Tr. 2 Red 5 Red/Black Tr. 3 Green	1 Red/White Tr. 4 Red/Yellow Tr. 2 Red 5 Red/Black Tr. 3 Green

Product Selection

Cordsets 

Pin Count	Assembly Rating	Color Code	Cat. No.			
			Straight Female	Right Angle Female	Straight Male	Right Angle Male
3-Pin	Braided 22 AWG, 250V, 4 A	A	889R-F3ECA-①	889R-R3ECA-①	889R-M3ECA-①	889R-E3ECA-①
	18 AWG, 250V, 4 A		889R-F3AEA-①	889R-R3AEA-①	889R-M3AEA-①	889R-E3AEA-①
4-Pin	Braided 22 AWG, 250V, 4 A		889R-F4ECA-①	889R-R4ECA-①	889R-M4ECA-①	889R-E4ECA-①
	18 AWG, 250V, 4 A		889R-F4AEA-①	889R-R4AEA-①	889R-M4AEA-①	889R-E4AEA-①
5-Pin	Braided 22 AWG, 250V, 4 A		889R-F5ECA-①	889R-R5ECA-①	889R-M5ECA-①	889R-E5ECA-①
	18 AWG, 250V, 4 A		889R-F5AEA-①	889R-R5AEA-①	889R-M5AEA-①	889R-E5AEA-①
6-Pin	Braided 22 AWG, 250V, 4 A		889R-F6ECA-①	889R-R6ECA-①	889R-M6ECA-①	889R-E6ECA-①

Patchcords 

Pin Count	Assembly Rating	Color Code	Cat. No.			
			Straight Female Straight Male	Straight Female Right Angle Male	Right Angle Female Straight Male	Right Angle Female Right Angle Male
3-Pin	Braided 22 AWG, 250V, 4 A	A	889R-F3ECRM-②	889R-F3ECRE-②	889R-R3ECRM-②	889R-R3ECRE-②
	18 AWG, 250V, 4 A		889R-F3AERM-②	889R-F3AERE-②	889R-R3AERM-②	889R-R3AERE-②
4-Pin	Braided 22 AWG, 250V, 4 A		889R-F4ECRM-②	889R-F4ECRE-②	889R-R4ECRM-②	889R-R4ECRE-②
	18 AWG, 250V, 4 A		889R-F4AERM-②	889R-F4AERE-②	889R-R4AERM-②	889R-R4AERE-②
5-Pin	Braided 22 AWG, 250V, 4 A		889R-F5ECRM-②	889R-F5ECRE-②	889R-R5ECRM-②	889R-R5ECRE-②
	18 AWG, 300V, 4 A		889R-F5AERM-②	889R-F5AERE-②	889R-R5AERM-②	889R-R5AERE-②
6-Pin	Braided 22 AWG, 250V, 4 A		889R-F6ECRM-②	889R-F6ECRE-②	889R-R6ECRM-②	889R-R6ECRE-②

- ① Replace symbol with 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.
- ② Replace symbol with 0M3 (0.3 m), 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m) or 10 (10 m) for standard lengths.

Note: Stainless steel connectors may be ordered by adding an "S" to the cat. no. (e.g. 889RS-F6ECA-2).

Cordsets & Patchcords, AC Micro Style

18 AWG, ToughLink™ or ToughWeld™

AC Micro Style



3-Pin AC Micro Cordset

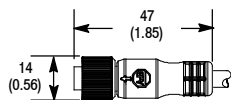
Features

- ToughLink TPE jacket offers excellent oil, chemical, and abrasion resistance
- ToughWeld neoprene rubber jacket offers excellent weld slag resistance
- Ratcheting coupling nuts for vibration resistance

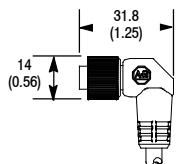
Specifications

	ToughLink	ToughWeld
Certifications	UL Recognized and CSA Certified	
Mechanical		
Coupling Nut	Epoxy-coated zinc	
Connector	Molded oil-resistant polyurethane	
Contacts	Gold-plated brass	
Cable	Yellow TPE jacket, 18 AWG stranded copper, 300V	Yellow CPE jacket, 18 AWG stranded copper, 300V
Bend Radius	10 x diameter, min.	
Cable Diameter	3-pin: 8.64 mm (0.34 in.) 4-pin: 9.40 mm (0.37 in.) 5-pin: 10.16 mm (0.40 in.)	7.87 mm (0.31 in.) 8.64 mm (0.34 in.) 9.14 mm (0.36 in.)
Electrical		
Cable Rating	UL AWM style 20328, 600V, VW-1, CSA AWM A/B I/II 600V FT1	UL SJOOW style CSA FT1, P-123-103, MSHA-300V
Assembly Rating	250V, 4 A	
Environmental		
Enclosure Type Rating	IP67, NEMA 6P, 1200 psi (8270 kPa) washdown	
Operating Temperature [C (F)]	-50...+105 ° (-58...+221 °)	

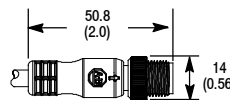
Approximate Dimensions [mm (in.)]



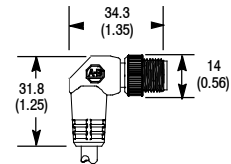
Straight Female



Right Angle Female

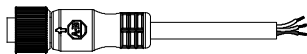


Straight Male

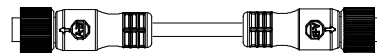


Right Angle Male

Dimensions are approximate. Illustrations are not drawn to scale.



Example of Cordset



Example of Patchcord

Pinout and Color Code

Color Code	Face View Pinout					
	3-Pin		4-Pin		5-Pin	
	Female	Male	Female	Male	Female	Male
A	1 Green 2 Red/Black Tr 3 Red/White Tr	1 Red/Black Tr 2 Red/White Tr 3 Red 4 Green	1 Red/White Tr 2 Red 3 Green 4 Red/Yellow Tr 5 Red/Black Tr			
B	1 Green 2 Black 3 White	1 Black 2 White 3 Red 4 Green	1 White 2 Red 3 Green 4 Orange 5 Black			

Product Selection

Cordsets 

Pin Count	Material	Assembly Rating	Color Code	Cat. No.			
				Straight Female	Right Angle Female	Straight Male	Right Angle Male
3-Pin	ToughWeld	18 AWG, 300V, 4 A	B	889R-F3WEC-①	889R-R3WEC-①	889R-M3WEC-①	889R-E3WEC-①
4-Pin	ToughWeld	18 AWG, 300V, 4 A	B	889R-F4WEC-①	889R-R4WEC-①	889R-M4WEC-①	889R-E4WEC-①
5-Pin	ToughWeld	18 AWG, 300V, 4 A	B	889R-F5WEC-①	889R-R5WEC-①	889R-M5WEC-①	889R-E5WEC-①
3-Pin	ToughLink	18 AWG, 300V, 4 A	A	889R-F3HEA-①	889R-R3HEA-①	889R-M3HEA-①	889R-E3HEA-①
4-Pin	ToughLink	18 AWG, 300V, 4 A	A	889R-F4HEA-①	889R-R4HEA-①	889R-M4HEA-①	889R-E4HEA-①
5-Pin	ToughLink	18 AWG, 300V, 4 A	A	889R-F5HEA-①	889R-R5HEA-①	889R-M5HEA-①	889R-E5HEA-①

Patchcords 

Pin Count	Material	Assembly Rating	Cat. No.			
			Straight Female... Straight Male	Straight Female... Right Angle Male	Right Angle Female... Straight Male	Right Angle Female... Right Angle Male
3-Pin	ToughWeld	18 AWG, 300V, 4 A	889R-F3WERM-②	889R-F3WERE-②	889R-R3WERM-②	889R-R3WERE-②
4-Pin	ToughWeld	18 AWG, 300V, 4 A	889R-F4WERM-②	889R-F4WERE-②	889R-R4WERM-②	889R-R4WERE-②
5-Pin	ToughWeld	18 AWG, 300V, 4 A	889R-F5WERM-②	889R-F5WERE-②	889R-R5WERM-②	889R-R5WERE-②
3-Pin	ToughLink	18 AWG, 300V, 4 A	889R-F3HERM-②	889R-F3HERE-②	889R-R3HERM-②	889R-R3HERE-②
4-Pin	ToughLink	18 AWG, 300V, 4 A	889R-F4HERM-②	889R-F4HERE-②	889R-R4HERM-②	889R-R4HERE-②
5-Pin	ToughLink	18 AWG, 300V, 4 A	889R-F5HERM-②	889R-F5HERE-②	889R-R5HERM-②	889R-R5HERE-②

- ① Replace symbol with 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.
- ② Replace symbol with 0M3 (0.3 m), 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard lengths.

Terminal Chambers, AC Micro Style

Screw Type, Field Attachable Connector

AC Micro Style



AC Micro Male Receptacle

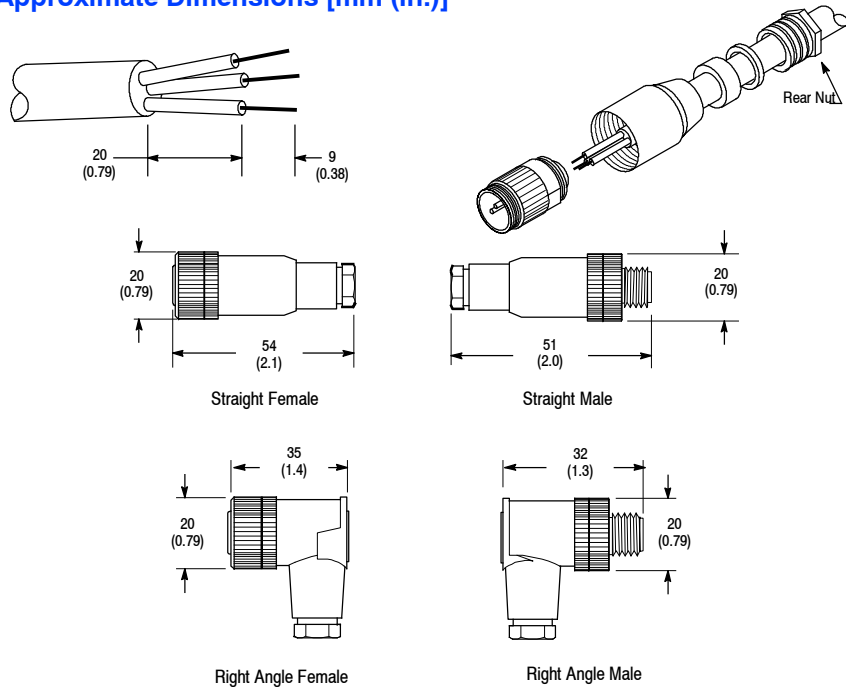
Specifications

Mechanical	
Coupling Nut	Nickel-plated brass
Connector Insert Material	Nylon
Contacts	Gold-plated palladium/nickel
Wire Size, Max.	18 AWG (0.75 mm ²)
Environmental	
Enclosure Type Rating	IP67 (IEC 529); NEMA 6P
Operating Temperature [C (F)]	-40...+90° (-40...+194°)

Features


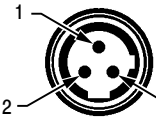
- Field installable
- 3-pin AC micro style
- Straight or right angle
- Screw terminals provide simple and secure installation
- Allows easy modification of existing cable installations

Approximate Dimensions [mm (in.)]



Dimensions are approximate. Illustrations are not drawn to scale.

Pinout and Color Code

Face View Pinout	
3-Pin	
 <p style="text-align: center;">Female</p>	 <p style="text-align: center;">Male</p>
Color Code	<p>1 Green 2 Red/Black Tr 3 Red/White Tr</p>
A	

Product Selection

Terminal Chambers 

Style	Cable Jacket Diameter [mm (in.)]	Wire Size, Max.	Cat. No.	
			Female	Male
Straight	4.0...6.0 (0.16...0.24)	18 AWG (0.75 mm ²)	871A-TS3-R	871A-TS3-RM
Right Angle			871A-TR3-R	871A-TR3-RM
Straight	6.0...8.0 (0.24...0.32)	18 AWG (0.75 mm ²)	871A-TS3-R1	871A-TS3-RM1
Right Angle			871A-TR3-R1	871A-TR3-RM1

Note: Stainless steel coupling nuts available, add "S" to cat. no. (e.g., 871AS-TS3-R).

Cordsets & Patchcords, Pico Style

24 AWG, PVC, PUR, TPE, or Shielded, Screw-On and Snap-On

Pico Style



Pico Screw-On Style

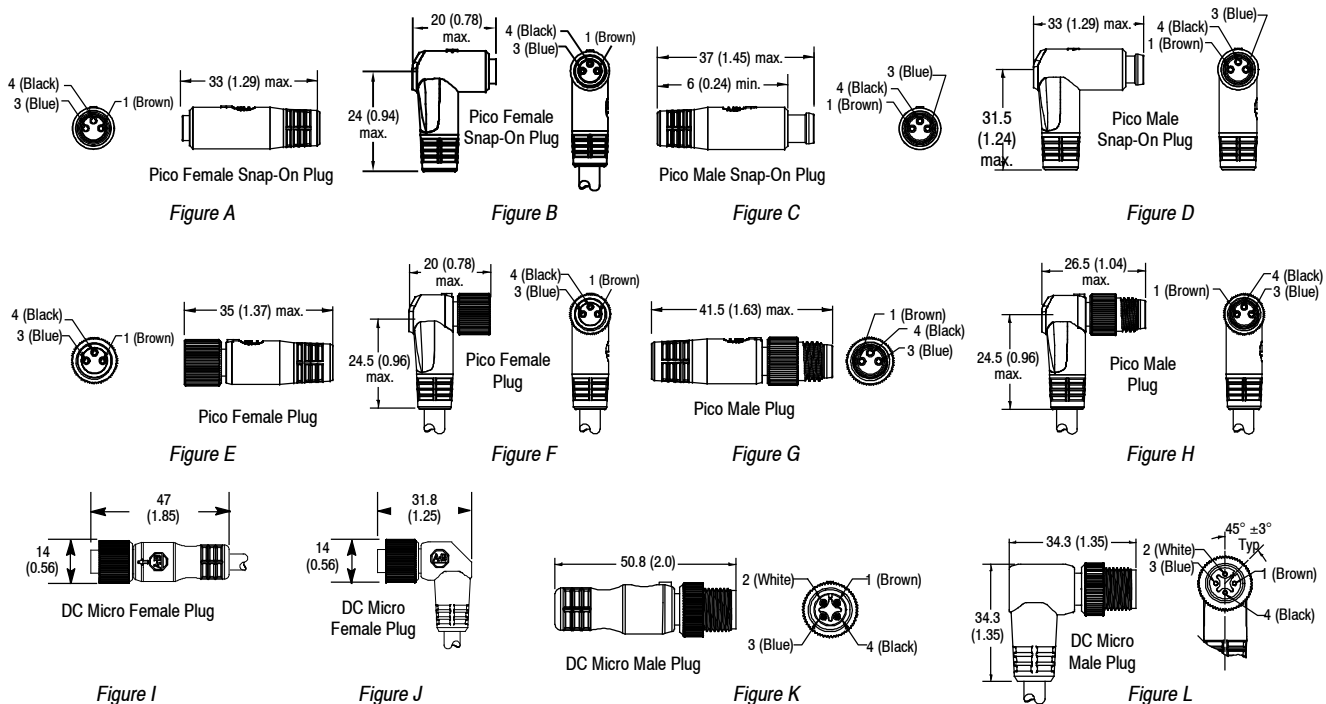
Features

- Highly visible yellow PVC jacket offers good oil and chemical resistance
- LED versions provide power and output indication for either PNP or NPN devices
- Snap-on coupling style for quick and simple connection

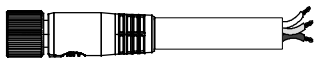
Specifications

Certifications	UL Recognized and CSA Certified
Mechanical	
Coupling Nut Material	Nickel-plated brass
Connector Material	Molded, oil-resistant, PUR
Contacts	Gold-plated brass
Cable	Oil-, water-, and UV-resistant, 24 AWG conductors, 300V, 4 A, AWM
Cable Diameter	3/c PVC = 4.6 mm (0.18 in.) 3/c Foil Shield = 4.8 mm (0.189 in.) 3/c TPE or PUR = 4.3 mm (0.17 in.) 4/c PVC = 4.75 mm (0.18 in.) 4/c Foil Shield = 5.0 mm (0.197 in.) 4/c PUR or TPE = 4.6 mm (0.18 in.)
Bend Radius	10x diameter, min.
Electrical	
Cable Rating	PVC: UL AWM style 2661 VW-1 105°C 300V, CSA AWM A/B I/II 105°C 300V FT1 PUR: UL AWM style 20233, 21198 or 10493 80°C 300V FT2 TPE: UL AWM style 20327 VW-1 105°C 300V FT1
Assembly Rating	60V AC/75V DC, 4 A
Environmental	
Enclosure Type Rating	Screw-type: IP67, 1200 psi (8270 kPa) washdown Snap-on type: IP65
Operating Temperature [C (F)]	-20...+105° (-4...+221°)

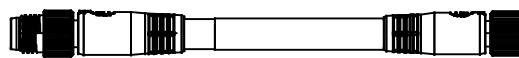
Approximate Dimensions [mm (in.)]



Dimensions are approximate. Illustrations are not drawn to scale.



Example of Cordset



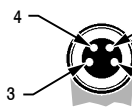



Example of Patchcord

Cordsets & Patchcords, Pico Style

24 AWG, PVC, PUR, TPE, or Shielded, Screw-On and Snap-On

Pinout and Color Code

Face View Pinout			
3-Pin		4-Pin	
			
Female	Male	Female	Male
1 Brown 2 NA 3 Blue 4 Black		1 Brown 2 White 3 Blue 4 Black	

Product Selection

Snap-On Cordsets

Pin Count	Jacket Material ①	Cat. No.		Cat. No.	
		Straight Female ②	Right Angle Female ②	Straight Male ②	Right Angle Male ②
3-Pin	Yellow PUR Flex ①	889P-S3UB-④	889P-Z3UB-④	889P-G3UB-④	889P-H3UB-④
4-Pin		889P-S4UB-④	889P-Z4UB-④	889P-G4UB-④	889P-H4UB-④

Screw-On Cordsets

Pin Count	Jacket Material ②	Cat. No.		Cat. No.	
		Straight Female ②	Right Angle Female ②	Straight Male ②	Right Angle Male ②
3-Pin	Yellow PVC ②	889P-F3AB-④	889P-R3AB-④	889P-M3AB-④	889P-E3AB-④
4-Pin		889P-F4AB-④	889P-R4AB-④	889P-M4AB-④	889P-E4AB-④

Screw-On Patchcords

Pin Count	Jacket Material	Cat. No.		Cat. No.	
		Straight Female... Straight Male ⑤	Straight Female... Right Angle Male ⑤	Right Angle Female... Straight Male ⑤	Right Angle Female... Right Angle Male ⑤
Male: Pico 3-Pin Female: Pico 3-Pin	Yellow AB PVC ⑤	889P-F3ABPM-⑥	889P-F3ABPE-⑥	889P-R3ABPM-⑥	889P-R3ABPE-⑥
Male: Pico 3-Pin Female: Pico 4-Pin		889P-F4ABP3M-⑥	889P-F4ABP3E-⑥	889P-R4ABP3M-⑥	889P-R4ABP3E-⑥
Male: Pico 4-Pin Female: Pico 4-Pin		889P-F4ABPM-⑥	889P-F4ABPE-⑥	889P-R4ABPM-⑥	889P-R4ABPE-⑥

- ① Replace **UB** with **JB** for black Halogen free PUR.
- ② Replace **AB** with **BB** for black PVC, **FB** for yellow PVC/foil shield and drain; **UB** for yellow PUR, flex cable, **JB** for black Halogen-free PUR, **HB** for yellow TPE flex.
- ③ Replace **AB** with **BB** for black PVC, **UB** for yellow PUR, flex cable, **JB** for black Halogen-free PUR, **HB** for yellow TPE flex cable.
- ④ Replace symbol with 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.
- ⑤ Replace symbol with 0M3 (0.3 m), 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m) or 10 (10 m) for standard cable lengths.

Pico Style



3-Pin Pico Female

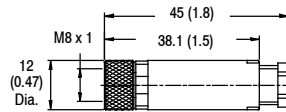
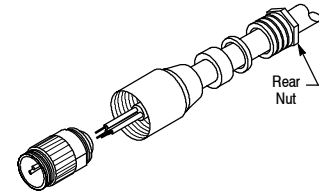
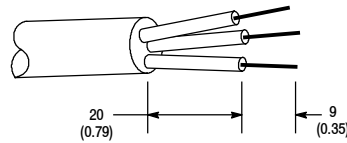
Features

- Field installable
- 3- or 4-pin DC micro style
- Straight connectors
- Screw terminals provide simple and secure installation
- Allows easy modification of existing cable installations

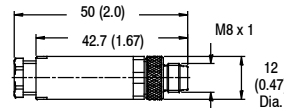
Specifications

Certifications	UL Recognized and CSA Certified
Mechanical	
Coupling Nut	Nickel-plated brass
Connector Shell Material	PBT
Contacts	Gold-plated palladium nickel
Cable	20 AWG (0.5 mm ²) max.
Electrical	
Assembly Rating	3- or 4-pin: 60V, 4 A
Environmental	
Enclosure Type Rating	IP67
Operating Temperature [C (F)]	-40...+88° (-40...+185°)

Approximate Dimensions [mm (in.)]



Right Angle Female



Right Angle Male

Dimensions are approximate. Illustrations are not drawn to scale.

Pinout and Color Code

Color Code	Face View Pinout			
	4- Pin		5- Pin	
A	1 Brown 3 Blue	4 Black	1 Brown 2 White 3 Blue 4 Black	

Product Selection

Terminal Chambers

Pin Count	Cable Jacket Diameter [mm (in.)]	Assembly Rating	Rear Nut Thread Size	Cat. No.	
				Straight Female	Straight Male
3-Pin	3.5...5.0 (0.14...0.20)	60V, 4 A	PG 7	871A-TS3-P	871A-TS3-PM
4-Pin				871A-TS4-P	871A-TS4-PM

Pico Style



Pico Style Male

Features

- Field installable with no hand tools needed
- 3- or 4-pin pico style
- Straight, male or female
- Allows easy modification of existing cable installations
- Insulation displacement technology for secure and reliable installation

Specifications

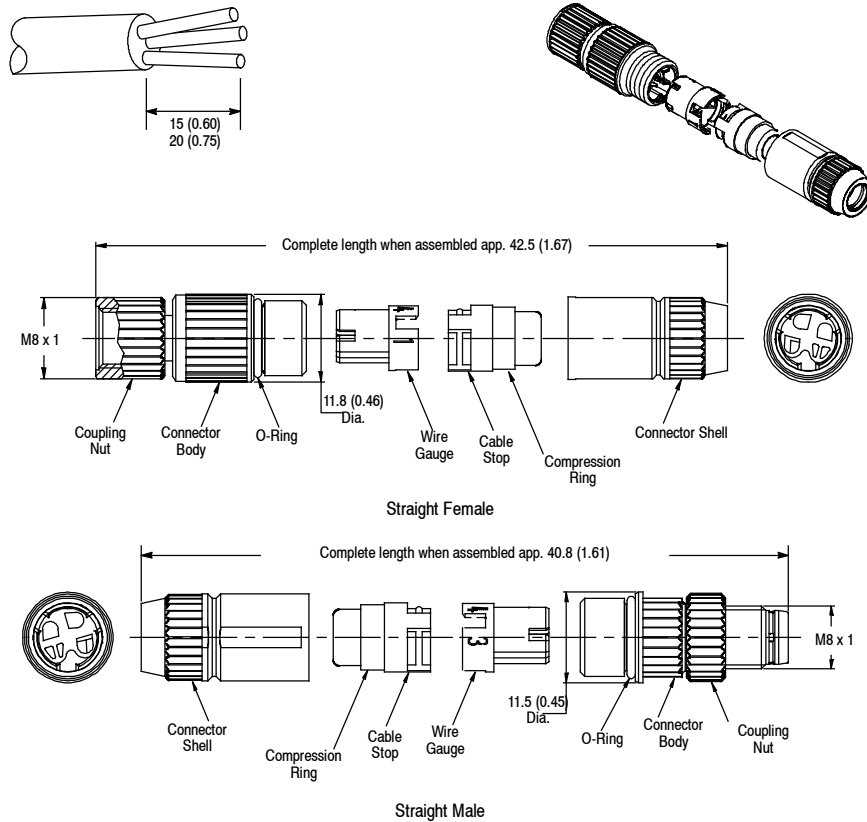
Mechanical

Coupling Nut	Nickel-plated brass
Connector Shell Material	Nickel-plated brass
Connector Body Material	Hytel Htr 8068
Field Contacts	Gold-plated palladium nickel
IDC Installations, Max.	10
Outside Diameter Conductor	1.0...1.6 mm (0.04...0.063 in.)
Wire Size	22 AWG...26 AWG (min. individual strand size = 38 AWG)

Environmental

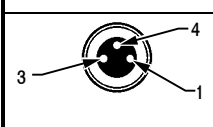
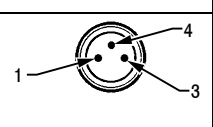
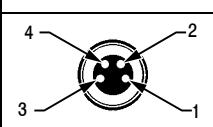
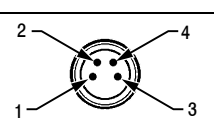
Enclosure Type Rating	IP67; NEMA 6P
Operating Temperature [C (F)]	-25...+85° (-13...+185°)
Installation Temperature [C (F)]	-5...+50° (23...+122°)

Approximate Dimensions [mm (in.)]



Dimensions are approximate. Illustrations are not drawn to scale.

Pinout and Color Code

Face View Pinout				
Color Code	3-Pin		4-Pin	
	Female	Male	Female	Male
A				
	1 Brown 3 Blue	4 Black	1 Brown 2 White	3 Blue 4 Black

Product Selection

Terminal Chambers 

Style	Cable Jacket Diameter [mm (in.)]	Rating	Cat. No.	
			Female	Male
Straight	4.0...5.1 (0.16...0.20)	32V 3 A	889P-F3DC-H	889P-M3DC-H
			889P-F4DC-H	889P-M4DC-H

Patchcords



Patchcords, Multiple Style Connectors

Features

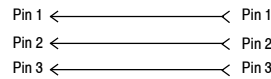
- Convenient connection from AC micro to mini and AC micro to DC micro
- Highly visible yellow PVC jacket offers good oil- and chemical-resistance

Specifications 759

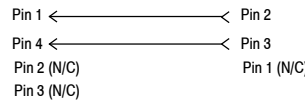
Certifications	UL Recognized and CSA Certified
Mechanical	
Coupling Nut	Epoxy-coated zinc
Material	Molded oil-resistant Micro end: PUR Mini end: TPE
Contacts	Gold-plated brass
Cable	Oil resistant PVC jacket, 18 AWG or 22 AWG conductors, 300V UL Recognized and CSA Certified
Bend Radius	10x diameter, min.
Cable Diameter	6.7 mm (0.26 in.)
Electrical	
Cable Rating	UL AWM style 2661 VW-1 105°C 300V, CSA AWM A/B I/II 80°C 300V FT1, UV oil and water resistant
Assembly Rating	250V, 4 A
Environmental	
Enclosure Type Rating	IP67, NEMA 6P, 1200 psi (8270 kPa) washdown
Operating Temperature [C (F)]	-20...+105° (-4...+221°)

Wiring Diagrams

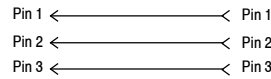
AC Micro Male ← Mini Female



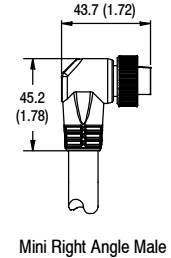
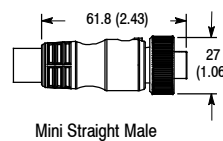
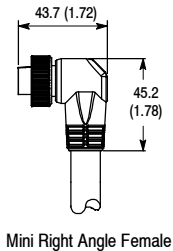
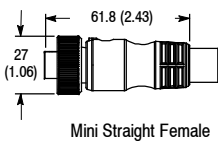
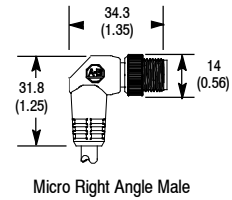
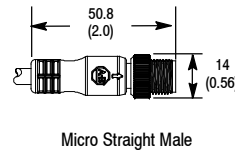
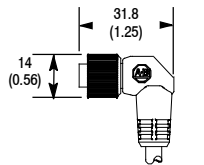
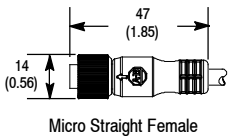
DC Micro Male ← AC Micro Female



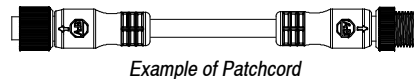
Mini Male ← AC Micro Female



Approximate Dimensions [mm (in.)]



Dimensions are approximate. Illustrations are not drawn to scale.



Pinout and Color Code

No. of Pins	Face View Pinout					
	3-Pin Mini Female to 3-Pin AC Micro Male		3-Pin AC Micro Female to 3-Pin Mini Male		3-Pin AC Micro Female to 4-Pin DC Micro Male	
	Female	Male	Female	Male	Female	Male
Pinout	A		B		C	

Product Selection

Patchcords

Pinout	Connector Style	Wire Size, AWG	Cat. No.			
			Straight Female... Straight Male	Straight Female... Right Angle Male	Right Angle Female... Straight Male	Right Angle Female... Right Angle Male
A	3-Pin Mini Female to 3-Pin AC Micro Male	18	889N-F3AERM-①	889N-F3AERE-①	889N-R3AERM-①	889N-R3AERE-①
B	3-Pin AC Micro Female to 3-Pin Mini Male	18	889R-F3AENM-①	889R-F3AENE-①	889R-R3AENM-①	889R-R3AENE-①
C	3-Pin AC Micro Female to 4-Pin DC Micro Male	18	889R-F3AEDM-①	889R-F3AEDE-①	889R-R3AEDM-①	889R-R3AEDE-①
C	3-Pin AC Micro Female to 4-Pin DC Micro Male	22	889R-F3ACDM-①	889R-F3ACDE-①	889R-R3ACDM-①	889R-R3ACDE-①

① Replace symbol with 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.

Cordsets & Patchcords, Combination Connectors

24 AWG, PVC, PUR, or TPE, Screw-On and Snap-On, Pico to Micro

Pico Style



Pico to Micro Screw-On Style

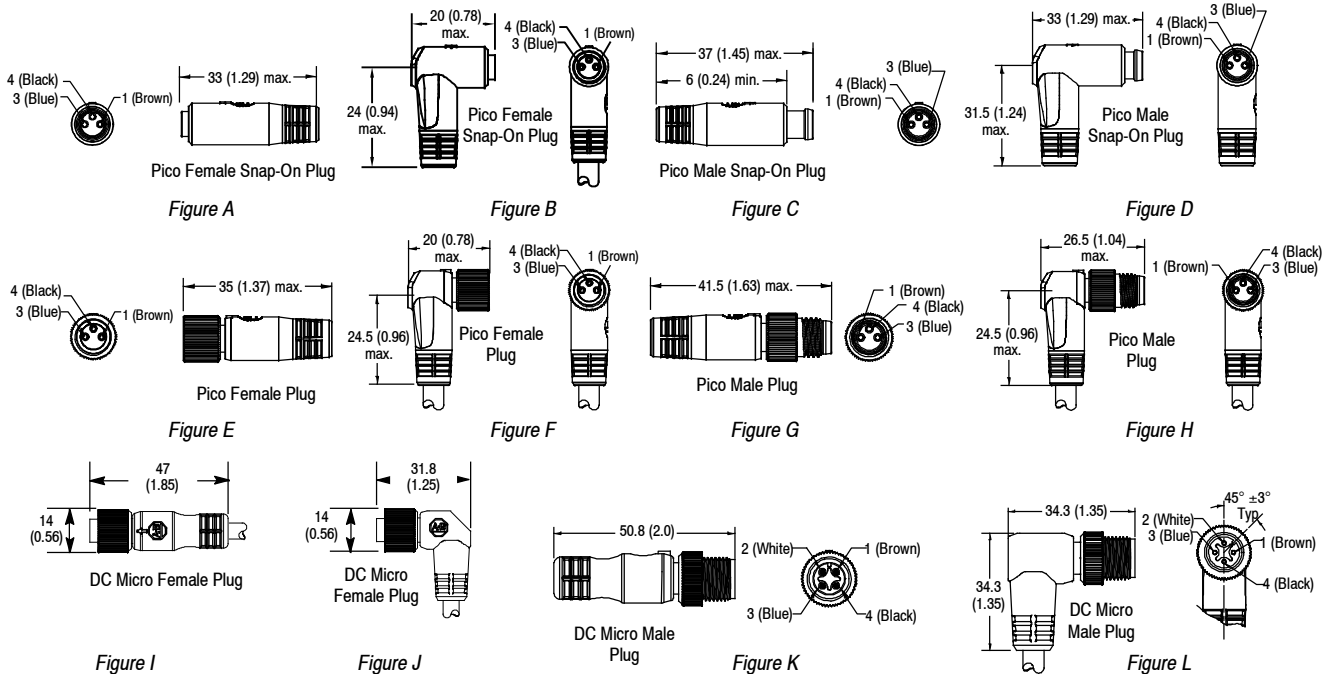
Features

- Highly visible yellow PVC jacket offers good oil and chemical resistance
- LED versions provide power and output indication for either PNP or NPN devices
- Snap-on coupling style for quick and simple connection
- “-V” models allow wiring of devices using pin 2 for output into standard single-point distribution boxes and IP67 I/O

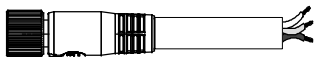
Specifications760

Certifications	UL Recognized and CSA Certified
Mechanical	
Coupling Nut Material	Nickel-plated brass
Connector Material	Molded, oil-resistant, PUR
Contacts	Gold-plated brass
Cable	Oil-, water-, and UV-resistant, 24 AWG conductors, 300V, 4 A, AWM
Cable Diameter	3/c PVC = 4.6 mm (0.18 in.) 3/c Foil Shield = 4.8 mm (0.189 in.) 3/c TPE or PUR = 4.3 mm (0.17 in.) 4/c PVC = 5.0 mm (0.197 in.) 4/c PUR or TPE = 4.6 mm (0.18 in.)
Bend Radius	10x diameter, min.
Electrical	
Cable Rating	PVC: UL AWM style 2661 VW-1 105°C 300V, CSA AWM A/B I/II 105°C 300V FT1 PUR: UL AWM style 20233, 21198 or 10493 80°C 300V FT2 TPE: UL AWM style 20327 VW-1 105°C 300V FT1
Assembly Rating	60V AC/75V DC, 4 A
Environmental	
Enclosure Type Rating	Screw-type: IP67, 1200 psi (8270 kPa) washdown Snap-on type: IP65
Operating Temperature [C (F)]	-20...+105° (-4...+221°)

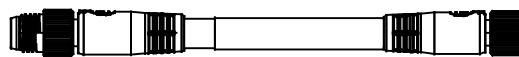
Approximate Dimensions [mm (in.)]



Dimensions are approximate. Illustrations are not drawn to scale.



Example of Cordset


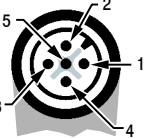

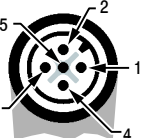




Example of Patchcord

Cordsets & Patchcords, Combination Connectors

24 AWG, Yellow PVC, PUR, or TPE, Screw-On and Snap-On, Pico to Micro

Pinout and Color Code

Face View Pinout								
3-Pin Female Pico to 4-Pin Male DC Micro			4-Pin Female Pico to 4-Pin Male DC Micro			4-Pin Female DC Micro to 3-Pin Male Pico		
								
Female	Male		Female	Male		Female	Male	

Product Selection

Snap-On Pico to Threaded Micro Cordsets

Pin Count	Jacket Material	Cat. No.		Cat. No.	
		Straight Female to Straight Male ^①	Straight Female to Right Angle Male ^②	Right Angle Female to Straight Male ^①	Right Angle Female to Right Angle Male ^②
Male: Micro 4-Pin Female: Pico 3-Pin	Yellow PUR Flex ^①	889P-S3UBD4M- ^③	889P-S3UBD4E- ^④	889P-Z3UBD4M- ^③	889P-Z3UBD4E- ^④
Male: Micro 4-Pin Female: Pico 4-Pin		889P-S4UBDM- ^③	889P-S4UBDE- ^④	889P-Z4UBDM- ^③	889P-Z4UBDE- ^④
Male: Micro 4-Pin Female: Pico 4-Pin		889P-S4UBDM-V ^⑤	889P-S4UBDE-V ^⑤	889P-Z4UBDM-V ^⑤	889P-Z4UBDE-V ^⑤
Male: Pico 3-Pin Female: Micro 4-Pin		889D-F4UBP3G- ^③	889D-F4UBP3H- ^④	889D-R4UBP3G- ^③	889D-R4UBP3H- ^④
Male: Pico 3-Pin Female: Micro 4-Pin		889D-F4UBP3G-V ^⑤	889D-F4UBP3H-V ^⑤	889D-R4UBP3G-V ^⑤	889D-R4UBP3H-V ^⑤
Male: Micro 4-Pin Female: Pico 4-Pin		889D-F4UBPG- ^③	889D-F4UBPH- ^④	889D-R4UBPG- ^③	889D-R4UBPH- ^④

Threaded Pico to Threaded Micro Patchcords

Pin Count	Jacket Material	Cat. No.		Cat. No.	
		Straight Female to Straight Male ^②	Straight Female to Right Angle Male ^②	Right Angle Female to Straight Male ^②	Right Angle Female to Right Angle Male ^②
Male: Micro 4-Pin Female: Pico 3-Pin	Yellow PVC ^②	889P-F3ABD4M-^④	889P-F3ABD4E- ^④	889P-R3D4M- ^④	889P-R3ABD4E- ^④
Male: Micro 4-Pin Female: Pico 4-Pin		889P-F4ABDM- ^④	889P-F4ABDE- ^④	889P-R4ABDM- ^④	889P-R4ABDE- ^④
Male: Micro 4-Pin Female: Pico 4-Pin		889P-F4ABDM-V ^⑤	889P-F4ABDE-V ^⑤	889P-R4ABDM-V ^⑤	889P-R4ABDE-V ^⑤
Male: Pico 3-Pin Female: Micro 4-Pin		889D-F4ABP3M- ^④	889D-F4ABP3E- ^④	889D-R4ABP3M- ^④	889D-R4ABP3E- ^④
Male: Pico 3-Pin Female: Micro 4-Pin		889D-F4ABP3M-V ^⑤	889D-F4ABP3E-V ^⑤	889D-R4ABP3M-V ^⑤	889D-R4ABP3E-V ^⑤
Male: Pico 4-Pin Female: Micro 4-Pin		889D-F4ABPM- ^④	889D-F4ABPE- ^④	889D-R4ABPM- ^④	889D-R4ABPE- ^④

- ① Replace **UB** with **JB** for black Halogen free PUR.
- ② Replace **AB** with **BB** for black PVC, **UB** for yellow PUR, flex cable, **JB** for black Halogen-free PUR, **HB** for yellow TPE flex cable.
- ③ Replace symbol with 2 (2 m), (5 m) or 10 (10 m) for standard cable lengths.
- ④ Replace symbol with 0M3 (0.3 m), 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m) or 10 (10 m) for standard cable lengths.

Cordsets & Patchcords, M23 Style

18 or 18/22 AWG, Black or Yellow PVC

M23 Style



12-Pin M23 Cordset

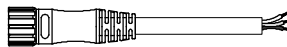
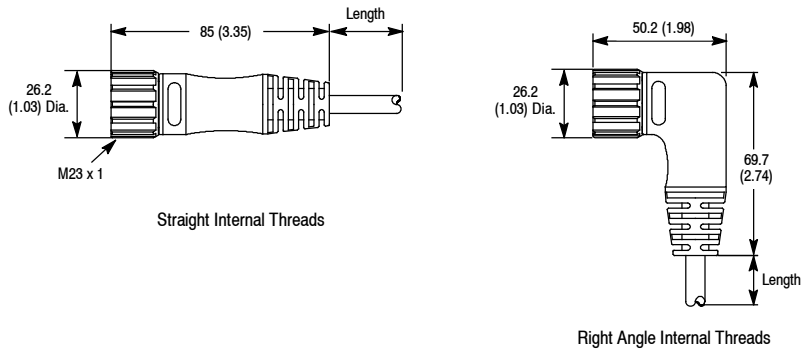
Features

- 12-pin configuration for SafeShield light curtains and other applications
- 12-pin/11-conductor on 19-pin for passive distribution and other box applications
- Subtle black or highly visible yellow PVC jacket offers good oil and chemical resistance

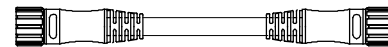
Specifications

Mechanical	
Coupling Nut	Nickel-plated brass
Connector	Molded oil-resistant PUR
Contacts	Gold over nickel-plated brass
Cable	Oil resistant yellow PVC jacket, 18 AWG conductors, 60V UL Recognized and CSA Certified
Bend Radius	10 x diameter, min.
Cable Diameter	10 mm (0.41 in.)
Electrical	
Cable Rating	300V
Assembly Rating	9- & 12-pin: 300V, 4 A 11-pin: 63V, 6 A; 19-pin: 63V, 12 A
Environmental	
Enclosure Type Rating	IP67, NEMA 6P, 1200 psi (8270 kPa) washdown
Operating Temperature [C (F)]	-20...+80° (-4...+176°)

Approximate Dimensions [mm (in.)]



Example of Cordset



Example of Patchcord

Dimensions are approximate. Illustrations are not drawn to scale.

Pinout and Color Code

Color Code	Face View Pinout					
	9-, 11-, or 12-Pin			19-Pin		
	Female		Male	Female		Male
A	9-Pin					
	1 Brown	5 NA	9 Pink	1 Violet	7 Grey/Pink	13 Yellow/Brown
	2 NA	6 Green	10 Red	2 Red	8 White/Green	14 Brown/Green
B	11-Pin					
	3 Blue	7 Yellow	11 NA	3 Grey	9 White/Yellow	15 White
	4 White	8 Grey	12 Green/Yellow	4 Red/Blue	10 White/Grey	16 Yellow
C	12-Pin					
	5 Green			5 Green	11 Black	17 Pink
	6 Blue			6 Blue	12 Green/Yellow	18 Grey/Brown

Product Selection

Cordsets 

Pin Count	Color Code	Jacket Color	Assembly Rating	Cat. No.			
				Straight Female	Right Angle Female	Straight Male	Right Angle Male
9-Pin	A	Yellow	18 AWG	889M-F12X9AE-①	889M-R12X9AE-①	—	—
11-Pin	B	Black	3/18 & 8/22 AWG	889M-F11RM-①	889M-R11RM-①	889M-U11RM-①	889M-V11RM-①
12-Pin	C	Yellow	18 AWG	889M-F12AH-①	889M-R12AH-①	—	—
19-Pin	A	Black	3/18 & 16/22 AWG	889M-F19RM-①	889M-R19RM-①	889M-U19RM-①	889M-V19RM-①






Patchcords 

Pin Count	Jacket Color	Assembly Rating	Cat. No.			
			Straight Female Straight Male	Straight Female Right Angle Male	Right Angle Female Straight Male	Right Angle Female Right Angle Male
11-Pin	Black	3/18 & 8/22 AWG	889M-F11RMMU-②	889M-F11RMMV-②	889M-R11RMMU-②	889M-R11RMMV-②
12-Pin	Yellow	18 AWG	889M-F12AHMU-③	—	—	—
19-Pin	Black	3/18 & 16/22 AWG	889M-F19RMMU-②	889M-F19RMMV-②	889M-R19RMMU-②	889M-R19RMMV-②

- ① Replace symbol with 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.
- ② Replace symbol with OM3 (0.3 m), 1 (1 m), 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
- ③ Replace symbol with OM3 (0.3 m), OM6 (0.6 m), 1 (1 m), 2 (2 m) or 3 (3 m) for standard cable lengths.

General Information	Quick Selection Guide	page 9-2
	Introduction	page 9-3
Ethernet Media	Cordsets & Patchcords	
	Cable Spools	page 9-4
	Cordsets & Patchcords	page 9-5
	Field Attachable RJ45 Connectors	page 9-9
	IDC M12 D-Code Connectors	page 9-11
	M12 to RJ45 Bulkhead Connectors	page 9-13
Indexes	Cat. No. Index	page 13-1
	Comprehensive Product Index	page 14-1

Quick Selection Guide

					
	Cable Spools	Cordsets & Patchcords	Field Attachable RJ45 Connectors	IDC M12 D-Code Connectors	M12 to RJ45 Bulkhead Connector
Description	<ul style="list-style-type: none"> Unshielded raw ethernet cable spools 	<ul style="list-style-type: none"> Cable with connector on one end or both ends 	<ul style="list-style-type: none"> Insulation Displacement Connectors (IDC) 	<ul style="list-style-type: none"> Insulation Displacement Connector (IDC) 	<ul style="list-style-type: none"> M12 to RJ45 bulkhead adaptor
Features	<ul style="list-style-type: none"> Cable spools for custom applications 	<ul style="list-style-type: none"> 2 pair and 4 pair cables Riser PVC, high flex, Plenum PVC 	<ul style="list-style-type: none"> Easy to assemble 	<ul style="list-style-type: none"> Easy to assemble 	<ul style="list-style-type: none"> Easy transition from inside the cabinet (IP20) to On-Machine (IP67)
Available Models	<ul style="list-style-type: none"> Riser PVC, 4 pair High Flex, 2 pair High Flex, 4 pair Plenum PVC, 4 pair 	<ul style="list-style-type: none"> M12 D-code to M12 D code M12 D-code to flying leads RJ45 to RJ45 RJ45 to flying leads M12 to RJ45 	<ul style="list-style-type: none"> RJ45 IDC connector RJ45 crimp connector with boot Crimp tool kit 	<ul style="list-style-type: none"> M12 IDC female shielded M12 IDC male shielded and unshielded 	<ul style="list-style-type: none"> M12 to RJ45 bulkhead adaptor, female M12 to female RJ45
Additional Info	<ul style="list-style-type: none"> See page 9-4 	<ul style="list-style-type: none"> See page 9-5 	<ul style="list-style-type: none"> See page 9-9 	<ul style="list-style-type: none"> See page 9-11 	<ul style="list-style-type: none"> See page 9-13



Description

As ethernet becomes increasingly utilized in industrial control, survival of physical media in rugged or harsh environments is becoming a necessity. The high speed of network protocol allows it to be used in applications where other networks fall short. EtherNet/IP™ uses both standard ethernet and TCP/IP technologies and an open application layer protocol called the Control and Information Protocol (CIP). This is the same application layer used in DeviceNet™ and ControlNet™ networks.

Rockwell Automation Cat5e ethernet cables are designed to supply a reliable network connection in harsh surroundings. By optimizing the balance of twisted pair conductors inside a robust Thermoplastic Elastomer (TPE)

jacket, data is protected from noise, chemicals and mechanical issues to M₃I₃C₃E₃ environmental protection levels. The cable is available in RJ45 patchcords for IP20 applications or in four-pin D-coded M12 patchcords for IP67 applications where high vibration, fluids and other contaminants can threaten the reliability of a network.

M12 D-code field attachable insulation displacement connectors (IDC) are available in both shielded and unshielded housings with male or female connectors. Male eight-pin RJ45 connectors are available in both a crimp termination and a toolless IDC connector for custom cabling.

Rockwell Automation M12 to RJ45 bulkhead connectors provide an

elegant transition for network architecture from an IP20 setting to an IP67 environment. The adaptor can be used to connect remote junction boxes or implement an On-Machine™ solution with Armor™ I/O products.

The Rockwell Automation ethernet media portfolio provides reliable connectivity to maintain network integrity and prevent costly downtime from troubleshooting.

M12 patchcords can be used with the following sensing products:

- 48 MS MultiSight™ vision sensors
- 54RF, 55RF, and 56RF RFID ethernet control interfaces



Specifications

Certifications	UL Listed and CEC
Cable Type	Unshielded 2- and 4-pair, Cat 5e
Operating Temperature [C (F)]	-40...+75° (-40...+167°)
Conductor Material	Tinned copper stranded
Bend Radius	Ten million cycles at 20 x dia., min. (TPE cable)
Data Rate	Up to 1 Gb/s

Description

Rockwell Automation Cat5e unshielded cables are designed to supply a reliable network connection in harsh surroundings. The high speed data rate provides more data to be transferred within a shorter period of time. By optimizing balance of twisted pair conductors inside a robust thermoplastic elastomer (TPE) jacket, data is protected from noise, chemicals, and mechanical issues to M₃L₃C₃E₃ environmental protection levels. Two and four pair TPE robotic flex cable is available for flex applications, reaching 10 million cycles, as well as a riser PVC cable for standard applications and a plenum PVC cable for air duct applications. All ethernet media components are designed to perform at TIA 568-B.2 and ODVA ethernet standards. Bulletin 1585 ethernet cables are optimized UTP cables, which can be used in place of STP for many applications. Therefore, ground potential differences, which may cause problems in shielded cabling systems, are eliminated.

Cable and Color Code

Two-Pair	Four-Pair												
<table border="1"> <tr><td>White/Orange</td></tr> <tr><td>White/Green</td></tr> <tr><td>Orange</td></tr> <tr><td>Green</td></tr> </table>	White/Orange	White/Green	Orange	Green	<table border="1"> <tr><td>White/Orange</td></tr> <tr><td>Orange</td></tr> <tr><td>White/Green</td></tr> <tr><td>Blue</td></tr> <tr><td>White/Blue</td></tr> <tr><td>Green</td></tr> <tr><td>White/Brown</td></tr> <tr><td>Brown</td></tr> </table>	White/Orange	Orange	White/Green	Blue	White/Blue	Green	White/Brown	Brown
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White/Green													
Orange													
Green													
White/Orange													
Orange													
White/Green													
Blue													
White/Blue													
Green													
White/Brown													
Brown													

Features

- Four- and eight-conductor styles
- Unshielded cable types, Cat 5e
- 24 AWG conductors
- Twisted pairs maintain signal balance through cable to provide high noise immunity
- Designed to ODVA EtherNet/IP specifications and ISO IEC 24702
- Suitable for high noise environments M₃L₃C₃E₃
- Riser PVC cables used for general purpose environments
- TPE robotic cable used for flex applications, transmission-tested to 10 million cycles
- Plenum PVC cable used for air duct applications
- TPE cable meets channel transmission performance to 10 million flexes

Product Selection

Jacket Material	No. of Conductors	Nominal Outer Diameter [mm (in.)]	Jacket Color	Color Code	Cable Rating	Cat. No.
Robotic TPE	4	5.6 (0.22)	Teal	White/Orange, Orange, White/Green, Green	Weld splatter, sunlight and oil resistant; UL CM; cUL CM; Standard TIA 568-B, high flex rated	1585-C4TB-S
	8	5.84 (0.23)	Teal	White/Orange, Orange, White/Green, Green, White/Blue, Blue, White/Brown, Brown		1585-C8TB-S
			Red			1585-C8VB-S
Plenum	8	5.84 (0.23)	Red	White/Orange, Orange, White/Green, Green, White/Blue, Blue, White/Brown, Brown	UL CMP; cUL CMP; Standard TIA 568-B	1585-C8MB-S
Riser PVC	8	5.84 (0.23)	Teal	White/Orange, Orange, White/Green, Green, White/Blue, Blue, White/Brown, Brown	UL CMR; CMG; cUL CMG; Standard TIA 568-B	1585-C8PB-S

① Replace symbol with 100 (100 m), 300 (300 m), or 600 (600 m) for standard cable lengths.



4-Pin M12 D Code Cordset

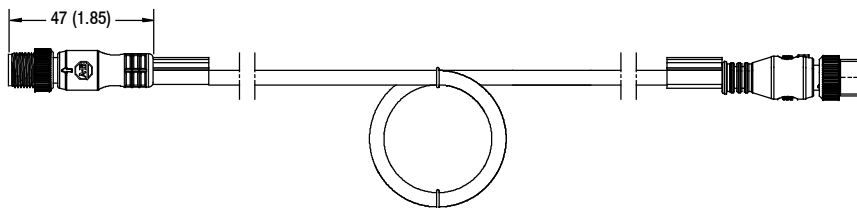
Features

- Over molded housing suitable for IP67 applications and harsh industrial environments where extreme vibration, shock, chemicals and temperature are found.
- Flex-rated cable (cable must be tied down and not flexed within six inches of the connector)
- Single-ended cordsets can be custom terminated with one of several field attachable connectors
- Designed to ODVA EtherNet/IP™ specifications and ISO IEC 24702, IEC 61918
- Twisted pairs maintain signal balance through cable to provide high noise immunity and return loss
- Suitable for noise environments M₃I₃C₃E₃

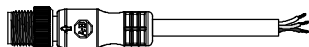
Specifications

Mechanical	
Coupling Nut Material	Nickel-plated brass
Housing Material	Polyurethane (PUR)
Contact Material	Gold-plated brass
Cable Type	Unshielded teal TPE, 4-conductor, stranded tinned wire, Industrial Cat5e, UL Listed, weld splatter, sunlight and oil-resistant
Cable Diameter [mm (in.)]	5.84 (0.23)
Bend Radius	10x diameter, min.
Electrical	
Cable Rating	Standard TIA 568-B, flex rated, 24 AWG: UL, CM, cULus and CM
Environmental	
Enclosure Type Rating	IP67
Operating Temperature [C (F)]	-40...+75° (-40...+167°)

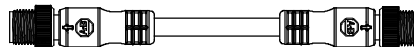
Approximate Dimensions [mm (in.)]



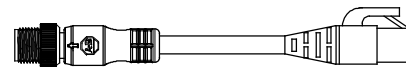
Dimensions are approximate. Illustrations are not drawn to scale.



Example of Cordset



Example of M12 to M12 Patchcord

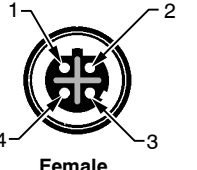
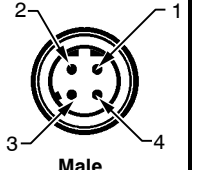
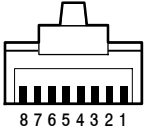


Example of M12 to RJ45 Patchcord

Ethernet M12 D-Code Media

Cordsets & Patchcords

Pinout

Color Code	Face View Pinout		Face View RJ45 Pinout	
	4-Pin		8-Pin	
	 <p>Female</p>	 <p>Male</p>		
A	1 White-Orange 2 White-Green	3 Orange 4 Green	1 White/Orange 2 Orange 3 White/Green 4 Blue 5 White/Blue 6 Green 7 White/Brown 8 Brown	TxData + TxData - Recv Data + Unused Unused Recv Data - Unused Unused

Product Selection

M12 Cordset

First End Connector	Second End Connector	Cable	Cat. No.
Male M12 D-Code, Straight	Flying Leads	4-Conductor, Teal TPE, Flex Rated	1585D-M4TB- ①

M12 Patchcord

First End Connector	Second End Connector	Cable	Cat. No.
Male M12 D-Code, Straight	Male M12 D-Code, Straight	4-Conductor, Teal TPE, Flex Rated	1585D-M4TBDM- ①
Male M12 D-Code, Right Angle	Male M12 D-Code, Right Angle	4-Conductor, Teal TPE, Flex Rated	1585D-E4TBEM- ①
Male M12 D-Code, Straight	Male M12 D-Code, Right Angle	4-Conductor, Teal TPE, Flex Rated	1585D-M4TBEM- ①
Male M12 D-Code, Straight	Female M12 D-Code, Straight	4-Conductor, Teal TPE, Flex Rated	1585D-M4TBFM- ①

M12 to RJ45 Patchcord

First End Connector	Second End Connector	Cable	Cat. No.
Male M12 D-Code	RJ45	4-Conductor, Teal TPE, Flex Rated	1585D-M4TBJM- ①

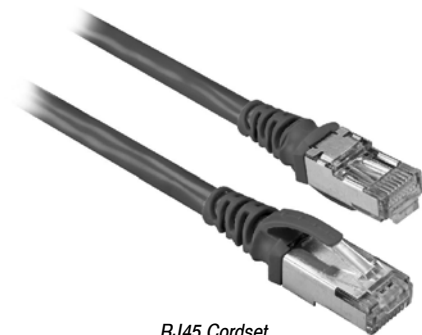
Accessories

Description	Channel Bandwidth	Cat. No.
RJ45 Insulation Displacement Connector (IDC)	Cat. 6	1585J-M8CC-H ②
RJ45 Crimp Connector with Boot	Cat. 5e	1585J-M8CC-C ③

① Replace symbol with 1 (1 m), 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.

② Qty. = 1 piece.

③ Qty. = 50 pieces.



RJ45 Cordset

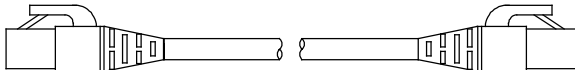
Specifications

Certifications	UL Listed
Connectors	RJ45 male to RJ45 male, Cat 6
Cable Type	Unshielded 4- and 8-conductor, 24 AWG, Industrial Cat5e
Bend Radius	10x diameter, min.
Enclosure Type Rating	IP20
Nominal Outer Diameter [mm (in.)]	5.84 (0.23)
Operating Temperature [C (F)]	-20...+60° (-4...+140°)

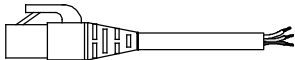
Features

- Flex rated TPE, PVC, and Plenum cables for various applications
- Teal or red cable jacket
- Rugged strain relief and hitch mechanism to maintain network integrity
- Suitable for noise environments
M₃l₃C₃E₃

Approximate Dimensions [mm (in.)]



Dimensions are approximate. Illustrations are not drawn to scale.



Example of Cordset

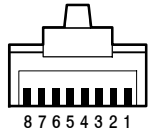


Example of Patchcord

Ethernet RJ45 Media

Cordsets & Patchcords

Pinout

Face View RJ45 Pinout	
8-Pin	
	
1 White/Orange	TxData +
2 Orange	TxData -
3 White/Green	Recv Data +
4 Blue	Unused
5 White/Blue	Unused
6 Green	Recv Data -
7 White/Brown	Unused
8 Brown	Unused

Product Selection

Cordset

Cable Type	Cable Rating	Cat. No.
4-conductor, teal robotic TPE	UL CM; cULus CM; Standard TIA 568-B	1585J-M4TB- 1

1 Replace symbol with 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.

Patchcords

Cable Type	Cable Rating	Cat. No.
8-conductor, teal riser PVC	UL CMR, CMG; cULus CMG; Standard TIA 568-B	1585J-M8PBJM-1
8-conductor, teal flex-rated robotic TPE	Weld splatter, sunlight and oil resistant; UL CM; cULus CM; Standard TIA 568-B, flex rated	1585J-M8TBJM- 1
4-conductor, teal flex-rated robotic TPE		1585J-M4TBJM- 1
8-conductor, red flex-rated robotic TPE		1585J-M8VBJM- 1
8-conductor, red plenum	UL CMP; cULus CMP; Standard TIA 568-B	1585J-M8MBJM- 1

1 Replace symbol with 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.

Crossover Patchcords

Cable Type	Cable Rating	Cat. No.
8-conductor, teal riser PVC	UL CMR, CMG; cULus CMG; Standard TIA 568-B	1585J-M8PBJM- 1X

1 Replace symbol with 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.

Accessories

Description	Cat. No.
RJ45 Insulation Displacement Connector (IDC)	1585J-M8CC-H
RJ45 Crimp Connector with Boot	1585J-M8CC-C 2

2 Qty. = 50 pieces.



RJ45 Insulation Displacement Connector (IDC)



RJ45 Crimp

Specifications

Certifications	UL Listed
Connectors	RJ45 male
Enclosure Type Rating	IP20
Operating Temperature [C (F)]	-20...+60° (-4...+140°)

Features

IDC Connector

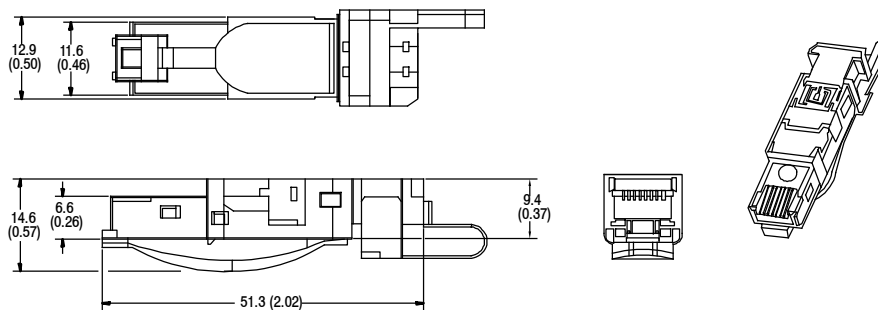
- Up to 8 conductors
- 26...22 AWG conductors
- 360° shielding
- Re-use IDC connector up to five times
- No tools or conductor stripping required
- Cat. 6

Crimp Connector

- Up to 8 conductors
- 26...24 AWG
- Standard crimp connector with rugged boot
- Cat. 5e

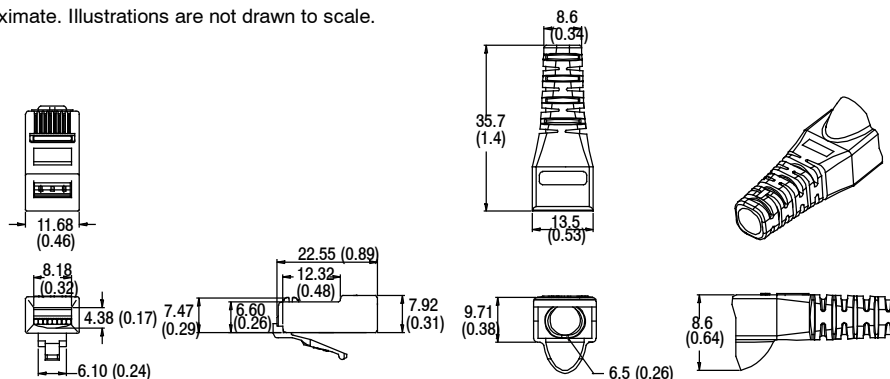
Approximate Dimensions [mm (in.)]

RJ45 Insulation Displacement Connector (IDC)



RJ45 Crimp Connector

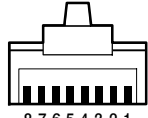
Dimensions are approximate. Illustrations are not drawn to scale.



Ethernet RJ45 Media Accessories

Field Attachable RJ45 Connectors

Pinout

Face View RJ45 Pinout	
8-Pin	
	
1 White/Orange	TxData +
2 Orange	TxData -
3 White/Green	Recv Data +
4 Blue	Unused
5 White/Blue	Unused
6 Green	Recv Data -
7 White/Brown	Unused
8 Brown	Unused

Product Selection

Description	Electrical Connection	Housing Material	Insulation Material	Contact Material	Channel Bandwidth	Cat. No.
RJ45 Insulation Displacement Connector (IDC)	—	Diecast Zinc	Plastic	Gold-plated copper alloy	Cat. 6	1585J-M8CC-H^①
RJ45 crimp connector with boot	150V, 1.5 A	Clear Polycarbonate			Cat. 5e	1585J-M8CC-C ^②
Crimp tool kit (crimper, cable stripper, cutter, conductor separator)						1585A-JCRIMP

- ① Qty. = 1 pieces.
- ② Qty. = 50 piece.



Field Attachable

Specifications

Mechanical	
Coupling Nut	Zinc die-cast
Connector Shell Material	Zinc die-cast or polyamide
Contacts	Gold-plated brass
Maximum IDC Installation	10 times
Conductor Outside Diameter	Unshielded: 26 AWG-22 AWG: 1.0...1.6 mm (0.04...0.063 in.); Shielded 24 AWG-22 AWG: 1.2...1.6 mm (0.04...0.063 in.)
Electrical	
Assembly Rating	32V, 4 A
Environmental	
Enclosure Type Rating	IP67
Operating Temperature [C (F)]	-25...85° (-13...185°)
Installation Temperature [C (F)]	-5...50° (23...185°)

Features

- Field installable with no hand tools needed
- Straight male or female shielded versions
- Allows easy modification of existing cable installations
- Insulation displacement technology for secure and reliable installation
- Metal body unit excellent in shielding applications

Approximate Dimensions [mm (in.)]

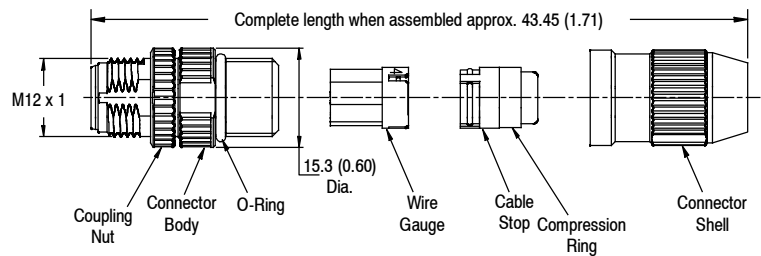
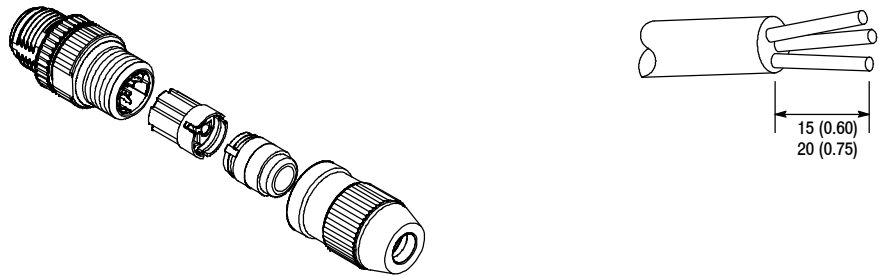


Figure A

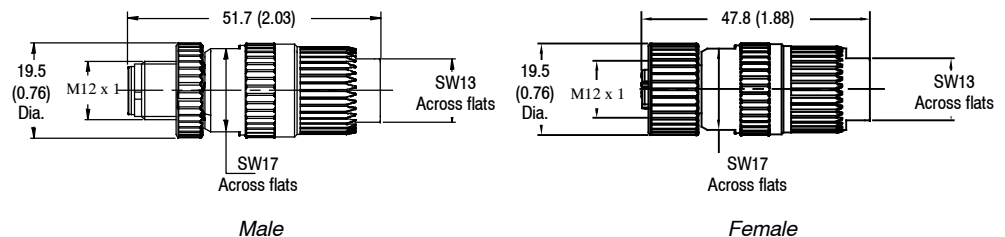

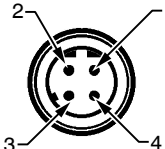


Figure B

Network Media
Ethernet M12 Media
 Insulation Displacement Connectors

Pinout and Color Code

Face View M12 Pinout		
4-Pin		
Color Code	 <p>Female</p>	 <p>Male</p>
	A	1 White-Orange 2 White-Green 3 Orange 4 Green

Product Selection

Pin Count	Connector Body	Cable Jacket Diameter [mm (in.)]	Wire Size	Assembly Rating	Dimensions	Cat. No.	
						Straight Female	Straight Male
4-Pin	Polyamide Small body unshielded	4.0...5.1 (0.16...0.20)	26...22 AWG	32V 4 A	Figure A	—	1585D-M4DC-H
	Zinc die-cast Large body shielded	5.5...7.2 (0.22...0.28)	24...22 AWG		Figure B	1585D-F4DC-SH	1585D-M4DC-SH



EtherNet M12 to RJ45 Adaptor

Specifications

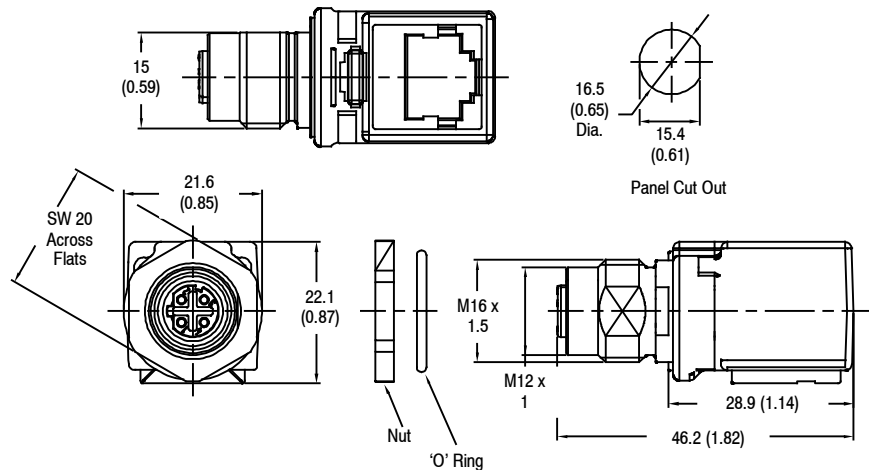
Electrical Ratings	32V 4 A
Receptacle Shell	Nickel-plated brass
Contacts	Brass with nickel plating
Wire Insulation	Oil-resistant PVC, 22 AWG stranded copper, 300V, UL Recognized
Enclosure Type Rating	IP67, 1200 psi (8270 kPa) washdown
Operating Temperature [C (F)]	-20...+85° (-4...+185°)
Certifications	UL Recognized for Canada and USA

Features

- M12 to RJ45 bulkhead
- Fluoroelastomer o-ring
- Convenient transition from IP67 ethernet to IP20

Approximate Dimensions [mm (in.)]

Ethernet Adaptor M12 Female to RJ45 Female Right Angle



Product Selection

Description	Connector Body	Panel Mount Threads	Assembly Rating	Cat. No.
Female M12 Receptacle to RJ45 Female Adaptor Right Angle	Polyamide and Brass with Nickel Plating	PG 9	22 AWG 32V 4 A	1585A-DD4JD

General Information Quick Selection Guide page 10-2

DeviceNet Sensors RightSight™ DeviceNet page 10-4

SmartSight™ 9000 DeviceNet page 10-8

Inductive Proximity
DeviceNet page 10-12




Limit Switch DeviceNet page 10-14



Encoder DeviceNet page 10-16

Indexes Cat. No. Index page 13-1

Comprehensive Product Index page 14-1

Quick Selection Guide

<p>Specifications</p>	 <p>RightSight™ Photoelectric Sensor</p>	 <p>SmartSight™ 9000 Photoelectric Sensor</p>	 <p>871TM Inductive Proximity Sensor</p>
<p>Features</p>	<ul style="list-style-type: none"> • DeviceNet Network compatibility • Patented 18 mm housing design with 1200 psi washdown rating • Selectable COS/Strobe • Advanced diagnostics, counter, and timers 	<ul style="list-style-type: none"> • DeviceNet Network compatibility • Harsh duty 30 mm housing • 1200 psi washdown • Advanced features such as teach, selectable COS/Strobe, counter, timers and diagnostics 	<ul style="list-style-type: none"> • DeviceNet Network compatibility, stainless steel face and barrel, 1200 psi washdown rated, standard mounting, discrete or analog output, timing options, advanced diagnostics
<p>Output Type</p>	<ul style="list-style-type: none"> • DeviceNet 	<ul style="list-style-type: none"> • DeviceNet 	<ul style="list-style-type: none"> • DeviceNet
<p>Connections</p>	<ul style="list-style-type: none"> • 5-pin DC micro QD 	<ul style="list-style-type: none"> • 5-pin DC micro QD • 5-pin mini QD • 2 m cable 	<ul style="list-style-type: none"> • 5-pin DC micro QD • 5-pin mini QD • 2 m CPE cable
<p>Available Models</p>	<ul style="list-style-type: none"> • Polarized Retroreflective 10-6 • Standard Diffuse 10-6 • Sharp Cutoff Diffuse 10-6 • Background Suppression 10-6 • Infrared Fiber Optic 10-7 • Transmitted Beam 10-7 	<ul style="list-style-type: none"> • Retroreflective page 10-10 • Polarized Retroreflective page 10-10 • ClearSight™ page 10-10 • Standard Diffuse page 10-11 • Infrared Glass Fiber Optic page 10-11 • Visible Red Glass Fiber Optic page 10-11 • Transmitted Beam page 10-11 	<ul style="list-style-type: none"> • 18 mm shielded 10-12 • 18 mm unshielded 10-12 • 30 mm shielded 10-12 • 30 mm unshielded 10-12
<p>Additional Info</p>	<ul style="list-style-type: none"> • See page 10-4 	<ul style="list-style-type: none"> • See page 10-8 	<ul style="list-style-type: none"> • See page 10-12

<p>Specifications</p>	 <p>802DN Limit Switch</p>	 <p>842D Encoder</p>
<p>Features</p>		<ul style="list-style-type: none"> • DeviceNet Network compatibility, advanced diagnostics
<p>Output Type</p>	<ul style="list-style-type: none"> • DeviceNet 	<ul style="list-style-type: none"> • DeviceNet
<p>Connections</p>	<ul style="list-style-type: none"> • 5-pin DC micro QD • 5-pin mini QD • 2 m CPE cable 	<ul style="list-style-type: none"> • 5-pin DC micro QD
<p>Available Models</p>	<ul style="list-style-type: none"> • Limit Switch without lever 10-14 • Limit Switch with wide belt roller 10-14 	<ul style="list-style-type: none"> • 26-bit absolute multi-turn 10-16
<p>Additional Info</p>	<ul style="list-style-type: none"> • See page 10-14 	<ul style="list-style-type: none"> • See page 10-16



Description

Rockwell Automation/Allen-Bradley DeviceNet sensors interface directly to this industry-standard plant floor network without the need for additional I/O blocks or adaptors. In addition to the standard On/Off indication, DeviceNet compatible sensors provide advanced logic and diagnostic functions not available in competitive DeviceNet models. Logic functions include counters, timers and motion detection; the diagnostics warn of unstable application characteristics. For example, the 871™ DeviceNet proximity sensor will produce a diagnostic output when the target is too close to the sensor face or at the outside edge of the sensing range. Further, Allen-Bradley DeviceNet sensors may be configured for either strobing or change-of-state (COS) operating modes, normally open or normally closed outputs (light operate or dark operate for photoelectric sensors) and discrete or analog output. This flexibility allows a single sensor to be configured for a variety of applications.

DeviceNet sensors may be assigned any node address between 0 and 63. While a sensor's baud rate is determined automatically as it is added to the network (autobaud), it may also be manually programmed to 125, 250, or 500 kb/s. Configuration of all network and sensor parameters can be done over the network with

Rockwell Software's RSNetWorx™ package and for field configuration or diagnostics, the DeviceView™ Hand-Held Configurator (2707-DNC) is available.

Features

- Direct interface to DeviceNet network
- Strobing and COS protocols
- Autobaud detect
- Operating parameters configurable over the network
- Advanced diagnostics
- Integral timing and counting functions
- Mini, micro, or cable connection options

DeviceNet Sensors

RightSight™ DeviceNet	page 10-4
SmartSight™ 9000	page 10-8
Inductive Proximity DeviceNet	page 10-12
Limit Switch DeviceNet	page 10-14
Encoder DeviceNet	page 10-16



DeviceNet RightSight

Description

RightSight DeviceNet photoelectric sensors interface directly to this industry standard plant floor network without the need for additional I/O blocks or adaptors.

Features

- Compact RightSight housing
- 1200 psi (8270 kPa) washdown rating
- Direct interface to DeviceNet network
- Strobing and COS protocols
- On Delay and Off Delay/One-Shot timers
- Adjustable counter with output
- Adjustable motion detection
- Dual margin threshold diagnostics
- Autobaud

Specifications

Environmental	
Certifications	UL Listed, CSA Certified, and CE Marked for all applicable directives
Operating Environment	NEMA 4X, 6P; IP67 (IEC 529) 1200 psi (8270 kPa) washdown, IP69K
Operating Temperature [C (F)]	-25...+70° (-13...+158°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...95% (noncondensing)
Ambient Light Immunity	Incandescent light 5000 lux
Optical	
Sensing Modes	Polarized retro, diffuse, sharp cutoff diffuse, background suppression, fiber optic, transmitted beam
Sensing Range	See Product Selection table
Field of View	
Light Source	Visible red (660 nm), infrared (880 nm)
Operation Mode	Selectable light or dark operate
LED Indicator	See User Interface
Adjustments	Potentiometer for diffuse, sharp cutoff and fiber optic models only
Electrical	
Voltage	11...25V DC
Current Consumption	65 mA max
Sensor Protection	Miswire, hot insertion
Communications	
Response Time	3 ms (11 ms for transmitted beam models)
Network Interface Type	DeviceNet
Messaging Type	Selectable change-of-state (COS) and strobing
Autobaud Detect	Selectable on/off
Communication Rate	Selectable 125 kb/s, 250 kb/s, 500 kb/s or autobaud
Node Address	Selectable 0...63
Diagnostic Type	Selectable static or dynamic with dual thresholds (0.7...1.5 and 0.7...2.0)
Mechanical	
Housing Material	Mindel
Lens Material	Acrylic
Cover Material	Udel
Connection Types	5-pin micro (M12) QD
Supplied Accessories	18 mm mounting nut
Optional Accessories	Reflectors, cordsets, Rockwell Software RSNetworkx for configuration

User Interface

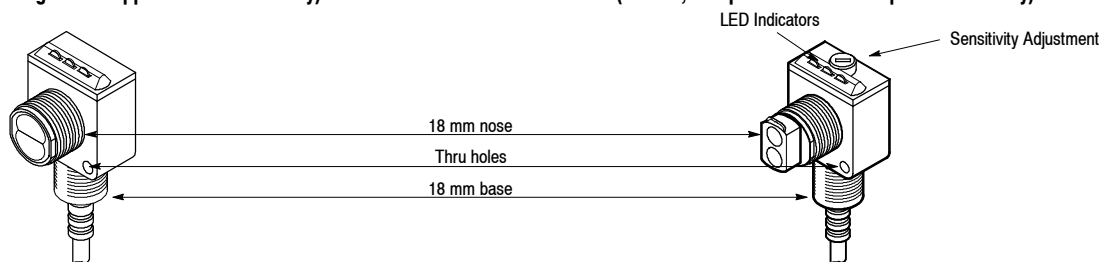
Label	Color	State	Status
Output	Yellow	On	Target detected
Margin	Orange	Off	Margin < 2.0
		On	Margin > 2.0
Status	Red/Green	Off	Sensor not powered
		Green On Steady	Sensor active and allocated by a Master
		Green Flashing	Sensor active but not allocated by a Master
		Red Flashing	Minor correctable fault (baud rate)
		Red On Steady	Major fault (possible duplicate address)

I/O Data Byte 1

	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
	Sensor Output	Diagnostic	Diagnostic Margin 2x	Diagnostic Margin 3x	Motion Output	Counter Output	Not Used	Not Used
0	OFF	OK	OK	OK	Motion	Less Than Preset		
1	ON	ALARM	Margin Unstable	Margin Unstable	No Motion	Preset Reached		

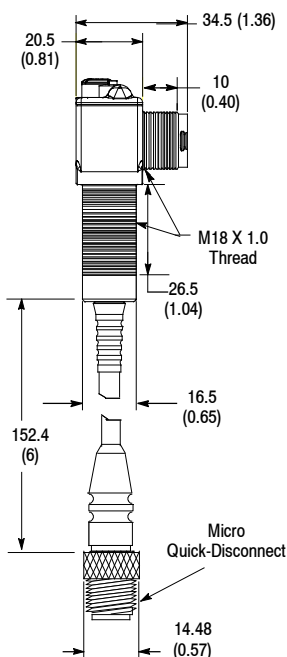
RightSight Nonadjustable Sensor
 (Polarized retro and background suppression models only)

RightSight Adjustable Sensor
 (Diffuse, sharp cutoff and fiber optic models only)

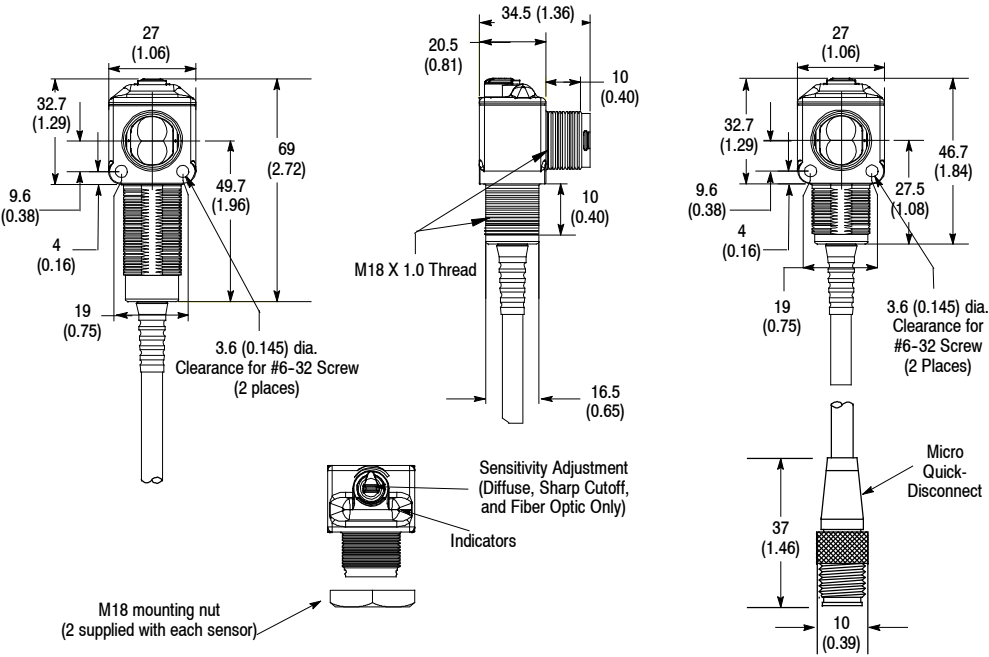


Approximate Dimensions [mm (in.)]

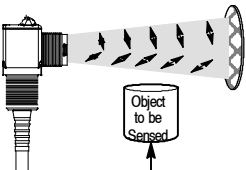
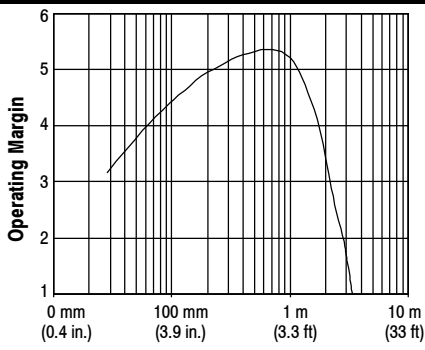
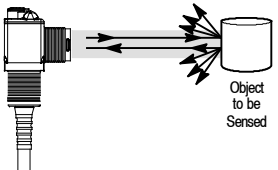
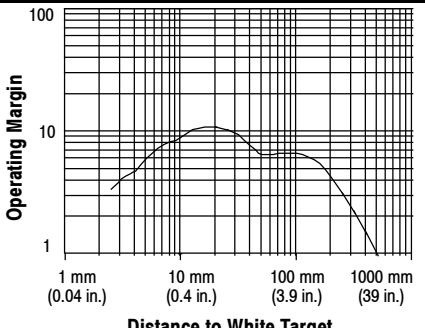
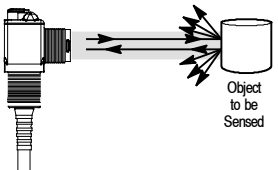
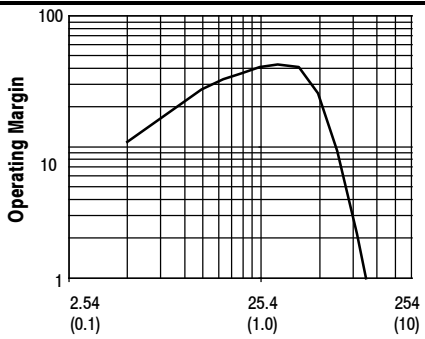
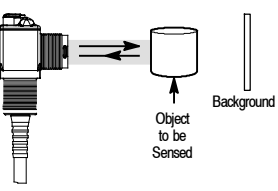
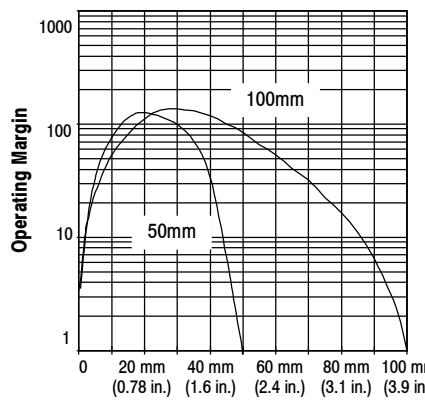
DeviceNet Models



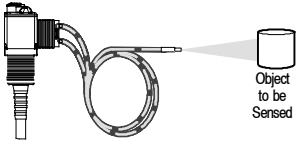
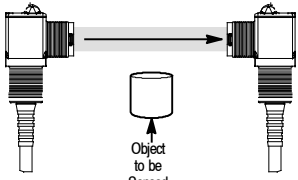
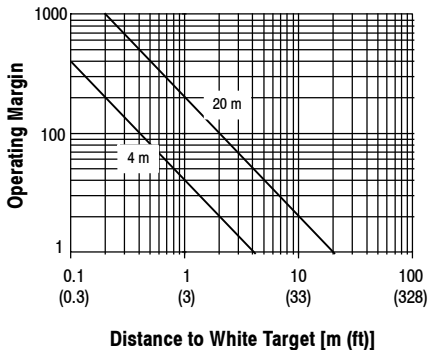
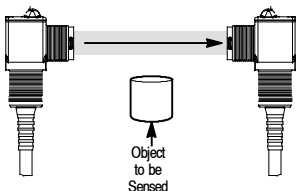
DC Light Source Models



Product Selection

Sensing Mode	Min/Max Sensing Distance	Connection Type	Cat. No.	Typical Response Curve
 <p><i>Polarized Retroreflective</i> Field of View: 1.5° Light Source: Visible red 660 nm</p>	25 mm (1.0 in.)/ 3 m (9.8 ft)	5-pin DC micro QD	42EF-P2LDB-F5	 <p>Distance to 76 mm Reflector—92-39</p>
 <p><i>Standard Diffuse</i> Field of View: 5° Light Source: Infrared 880 nm</p>	3 mm (0.12 in.)/ 500 mm (20 in.)		42EF-D1LDAK-F5	 <p>Distance to White Target</p>
 <p><i>Sharp Cutoff Diffuse</i> Field of View: 7° Light Source: Infrared 880 nm</p>	<130 mm (5 in.) 40 mm (1.5 in.) @ 30x margin		42EF-S1LDA-F5	 <p>Distance to White Target [mm (in.)]</p>
 <p><i>Background Suppression</i> Field of View: 20° (50 mm models) 8° (100 mm models) Light Source: Infrared 880 nm</p>	3 mm (0.12 in.)/ 50 mm (2 in.)		42EF-B1LDBC-F5	 <p>Distance to White Target</p>
	3 mm (0.12 in.)/ 100 mm (4 in.)	42EF-B1LDBE-F5		

Product Selection (continued)

Sensing Mode	Min/Max Sensing Distance	Connection Type	Cat. No.	Typical Response Curve
 <p><i>Large Aperture Glass Fiber Optic</i> Light Source: Infrared 880 nm</p>	Depends on fiber optic cable selected	5-pin DC micro QD	42EF-G1LDA-F5	Depends on fiber optic cable selected. See page 1-235 for fiber optic cable selection.
 <p><i>Transmitted Beam</i> Light Source: Infrared 880 nm</p>	See receiver models below	5-pin DC micro QD	42EF-E1EDZB-F5	 <p>Operating Margin</p> <p>Distance to White Target [m (ft)]</p>
		4-pin DC micro QD	42EF-E1EZB-F4	
		2m 300V cable	42EF-E1EZB-A2	
 <p><i>Transmitter Beam Receiver</i> Field of View: 7°</p>	25 mm (1 in.)/ 4 m (13 ft)	5-pin DC micro QD	42EF-R9LDBV-F5	
	25 mm (1 in.)/ 20 m (60 ft)		42EF-R9LDB-F5	

Accessories

Description	Cat. No.
Reflector, 76 mm (3 in.) diameter with center mount hole	92-39
Reflector, 32 mm (1.25 in.) diameter	92-47
Mounting bracket swivel/tilt	60-2649
2 m (6.5 ft) micro QD cordset	1485R-P2R5-C
2 m (6.5 ft) micro QD patchcord	1485R-P2R5-F5

For additional mounting brackets and accessories, see page 1-293.

Refer to www.rockwellautomation.com/resources/eds for EDS files.



Description

SmartSight photoelectric sensors interface directly to this industry standard plant floor network without the need for additional I/O blocks or adaptors. They combine the benefits of the Series 9000 mechanical and optical package with the DeviceNet bus system.

Features

- Local and remote self-teach operation
- 1200 psi washdown rating
- Selectable strobing and COS
- Low margin diagnostics
- Adjustable motion detect
- On delay and off delay one-shot
- Adjustable counter with output

General Specifications

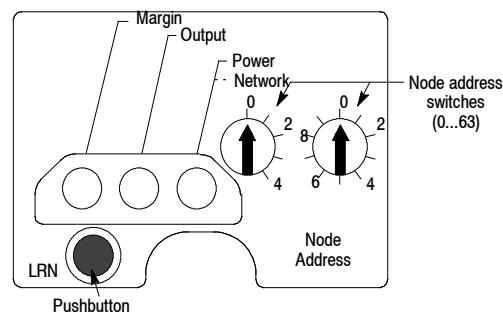
Environmental	
Certifications (Ordinary Locations)	cULus Listed and CE Marked for all applicable directives
Operating Environment	NEMA 3, 4X, 6P, 12, 13; IP67 (IEC 529) 1200 psi (8270 kPa) washdown, IP69K
Operating Temperature [C(F)]	-25...+70° (-13...+158°)
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Relative Humidity	5...95% (noncondensing)
Ambient Light Immunity	Incandescent light 5000 lux
Optical	
Sensing Modes	Retroreflective, polarized retro, diffuse, clear object, transmitted beam
Sensing Range	See Product Selection table
Field of View	See Product Selection table
Light Source	Visible red (660 nm), infrared (880 nm)
Operation Mode	Selectable light operate or dark operate
LED Indicator	See table on page 10-9
Adjustments	Push button for sensitivity adjustments
Electrical	
Voltage	11...25V DC
Current Consumption	75 mA max
Sensor Protection	Miswire, hot insertion
Communications	
Response Time	3.5 ms
Network Interface Type	DeviceNet
Messaging Type	Selectable change-of-state (COS) and strobing
Autobaud Detect	Selectable on/off
Communication Rate	Selectable 125 kb/s, 250 kb/s, 500 kb/s or autobaud
Node Address	Selectable 0...63—via network or local switch
Diagnostic Type	Selectable static or dynamic with dual thresholds (0.7...1.5 and 0.7...2.0)
Mechanical	
Housing Material	Valox®
Lens Material	Acrylic
Cover Material	Neoprene
Connection Types	5-pin DC micro QD, 5-pin DC mini QD, 2 m (6.5 ft) drop cable
Supplied Accessories	129-130 mounting kit
Optional Accessories	Reflectors, cordsets, Rockwell Software RSNetWorx for configuration

I/O Data

	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
	Sensor Output	Diagnostic	Diagnostic Margin 2X	Diagnostic Margin 3X	Motion Output	Counter Output	Not Used	Not Used
0	OFF	OK	OK	OK	Motion	Less Than Preset		
1	ON	ALARM	Margin Unstable	Margin Unstable	No Motion	Preset Reached		

Indicators (refer to illustration)

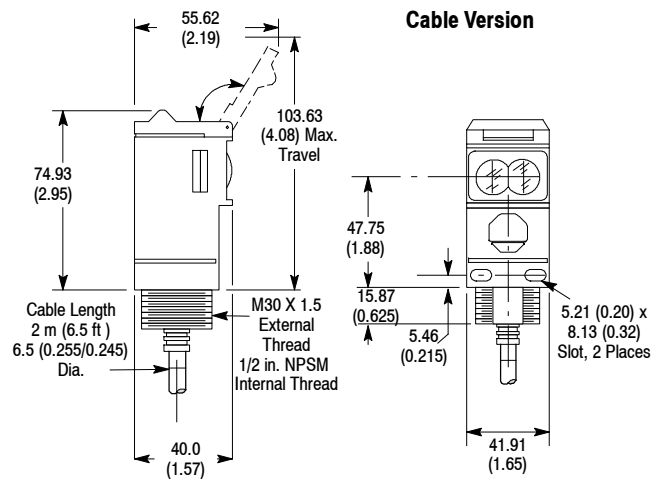
Label	Color	State	Status
Output	Yellow	ON	Target detected
Margin	Orange	OFF	Margin < 2.0
		ON	Margin ≥ 2.0
Status	Red/Green	OFF	Sensor not powered or auto baud
		Green ON Steady	Sensor active and allocated by master
		Green Flashing	Sensor active but not allocated by master
		Red Flashing	Minor correctable fault (baud rate)
		Red ON Steady	Major fault (possible duplicate address)



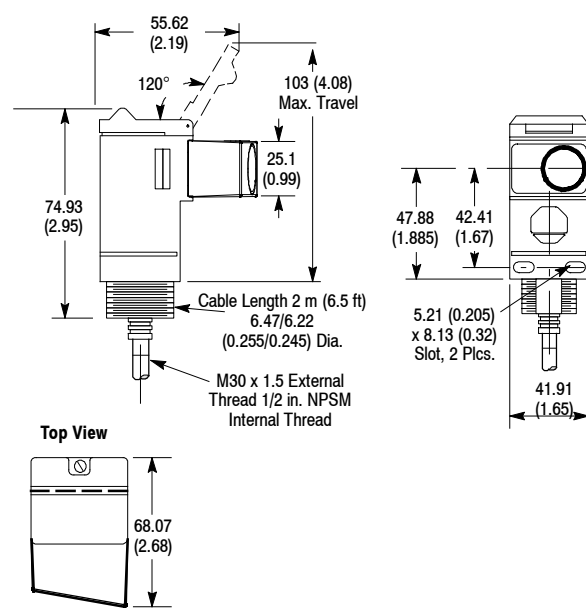
NOTE: LED indicators are used during the *Self-Teach* operation of the sensor. Refer to publication 1000002281 for complete instructions on using this feature.

Approximate Dimensions [mm (inches)]

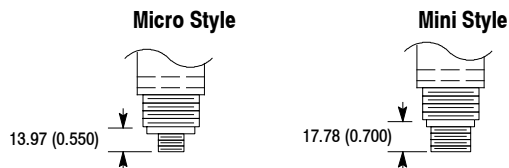
All Models Except ClearSight



ClearSight Models



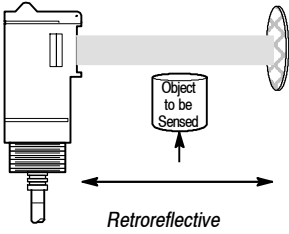
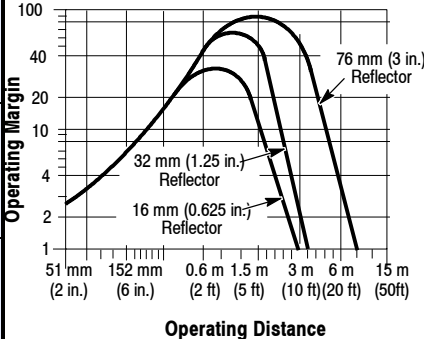
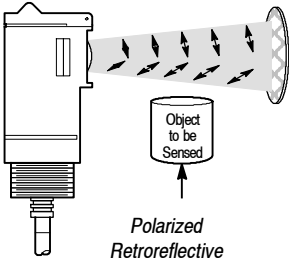
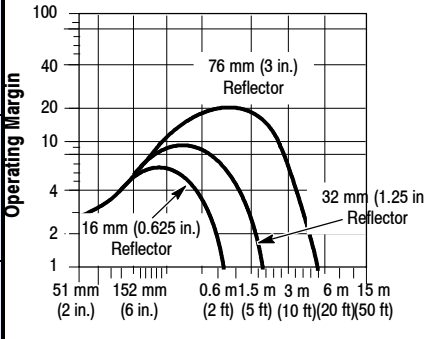
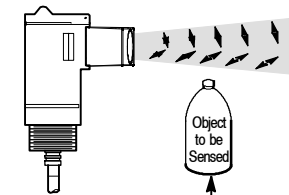
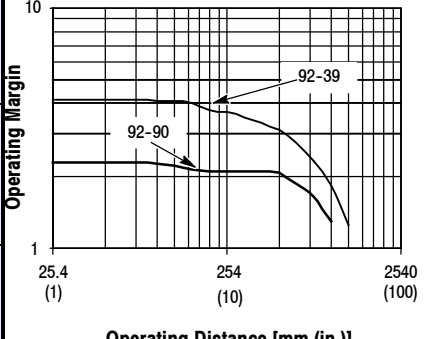
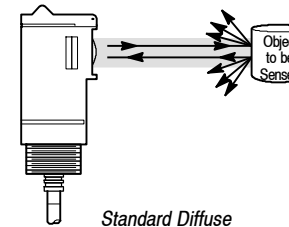
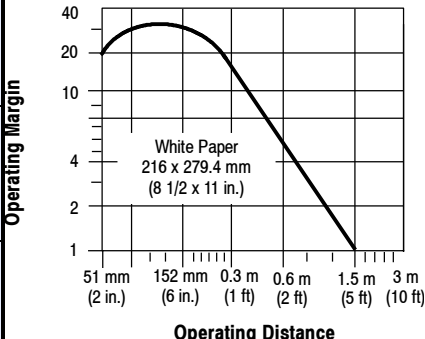
Connector Version



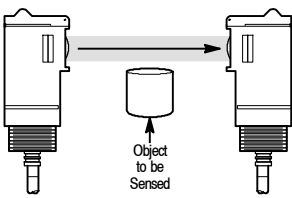
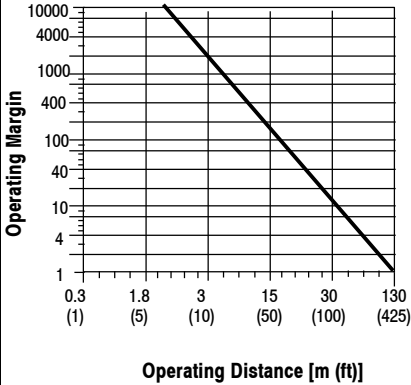
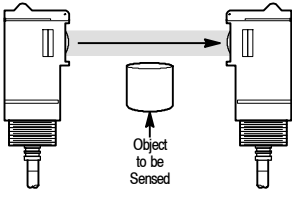
Thread Size

Micro Style	M12 x 1 1 Keyway
Mini Style	7/8-16 UN 1 Keyway

Product Selection

Sensing Mode	Min/Max Sensing Distance	Connection Type	Cat. No.	Typical Response Curve
 <p>Retroreflective</p> <p>Field of View: 1.5° Light Source: Visible red 660 nm</p>	51 mm (2 in.) 9.14 m (30 ft) with 76 mm (3 in.) Reflector	2 m CPE cable	42GNU-9020	
		5-pin DC micro QD	42GNU-9020-QD	
		5-pin mini QD	42GNU-9020-QD1	
 <p>Polarized Retroreflective</p> <p>Field of View: 1.5° Light Source: Visible red 660 nm</p>	51 mm (2 in.) 4.87 m (16 ft) with 76 mm (3 in.) Reflector	2 m CPE cable	42GNU-9220	
		5-pin DC micro QD	42GNU-9220-QD	
		5-pin mini QD	42GNU-9220-QD1	
 <p>ClearSight™</p> <p>Field of View: 1.5° Light Source: Visible red 660 nm</p>	0...1200 mm (0...48 in.)	2 m CPE cable	42GNC-9220	
		5-pin DC micro QD	42GNC-9220-QD	
		5-pin mini QD	42GNC-9220-QD1	
 <p>Standard Diffuse</p> <p>Field of View: 3.5° Light Source: Infrared 880 nm</p>	50.8 mm (2 in.) 1.52 m (5 ft) to White Paper	2 m CPE cable	42GNP-9020	
		5-pin DC micro QD	42GNP-9020-QD	
		5-pin mini QD	42GNP-9020-QD1	

Product Selection (continued)

Sensing Mode	Min/Max Sensing Distance	Connection Type	Cat. No.	Typical Response Curve
 <p><i>Transmitted Beam</i> Field of View: 1.5° Light Source: Infrared 880 nm</p>	130 m (425 ft)	5-pin DC micro QD	42GNL-9040-QD	
		5-pin DC mini QD	42GNL-9040-QD1	
 <p><i>Transmitted Beam Receiver</i></p>	130 m (425 ft)	2 m CPE cable	42GNR-9020	
		5-pin DC micro QD	42GNR-9020-QD	
		5-pin mini QD	42GNR-9020-QD1	

Accessories

Description	Cat. No.	Description	Cat. No.
Reflector, 76 mm (3 in.) Diameter with Center Mount Hole	92-39	Mounting Bracket Swivel/Tilt (nonClearSight models)	60-2439
Reflector, 32 mm (1.25 in.) Diameter	92-47	Mounting Bracket Swivel/Tilt (ClearSight models)	60-2681

Refer to www.rockwellautomation.com/resources/eds for EDS files.

871TM DeviceNet Sensors

Inductive Proximity Sensors



871TM DeviceNet Cable Style
18, 30 mm
page 10-13



871TM DeviceNet Mini Quick-Disconnect Style
18, 30 mm
page 10-13



871TM DeviceNet Micro Quick-Disconnect Style
18, 30 mm
page 10-13

Specifications

Current Drain	≤60 mA
Operating Voltage	11...25V DC
Repeatability	≤1% at constant temperature
Hysteresis	10% typical
Approvals	UL Listed, cUL Certified, and CE Marked for all applicable directives
Enclosure	NEMA 1, 2, 3, 3R, 4, 4X, 6, 6P, 12, 13; IP67 (IEC 529), 1200 psi (8270 kPa) washdown Stainless steel face and barrel
Connections	Cable: 2 m (6.5 ft) length Quick-Disconnect: 5-pin mini style 5-pin micro style
LEDs	Bicolor Red/Green: DeviceNet Network/Status Amber: Output energized
Operating Temperature [mm (in.)]	-25...+70° (-13...+158°)
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm amplitude, 3 planes

Correction Factors

Target Material	Correction Factor
Steel	1.0
Stainless Steel	0.9...1.0
Brass	0.3...0.5
Aluminum	0.1...0.4
Aluminum ≤0.020 Thick	0.9...1.1
Copper	0.4...0.6

Indicators (refer to illustration)

Label	Color	State	Status
Output	Yellow	On	Target detected
Status	Red/Green	Off	Sensor not powered
		Green On Steady	Sensor active and allocated by a Master
		Green Flashing	Sensor active but not allocated by a Master
		Red Flashing	Minor correctable fault (baud rate)
		Red On Steady	Major fault (possible duplicate address)

Features

- Connects directly to DeviceNet networks
- Autobaud
- Discrete and analog output
- Diagnostic capabilities available
 - Object too close
 - Sensor operational
 - Object too far
- Timing functions: On, Off, and One-Shot Delay configuration
- Configurable normally open/normally closed
- Motion detection
- Teach/learn target capabilities
- UL Listed, cUL Certified, and CE Marked for all applicable directives

I/O Data

Strobe and Change-of-State Output:

Byte 1	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
Sensor Output	Diagnostic	Coil Operational	Too Close	Too Far	Always In	Motion Detect	Counter Output	
Byte 2	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
Analog Output (Strobe Only)								

Product Selection

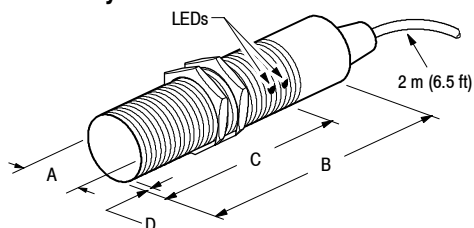
Barrel Dia.	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Cat. No.		
				Cable Style	Mini QD Style	Micro QD Style
18 mm	5 (0.20)	Y	Programmable N.O./N.C.	871TM-D5ED18-S2	871TM-D5ED18-N5	871TM-D5ED18-D5
	8 (0.31)	N		871TM-D8ED18-S2	871TM-D8ED18-N5	871TM-D8ED18-D5
30 mm	10 (0.39)	Y		871TM-D10ED30-S2	871TM-D10ED30-N5	871TM-D10ED30-D5
	15 (0.59)	N		871TM-D15ED30-S2	871TM-D15ED30-N5	871TM-D15ED30-D5

Accessories

Description	Page Number
Terminal Chambers	8-1
Mounting Brackets	2-210...2-214
End Caps	2-219, 2-220
Mounting Nuts	2-221...2-222

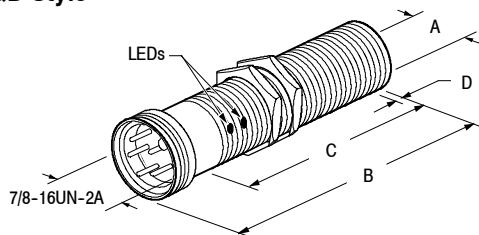
Approximate Dimensions [mm (in.)]

Cable Style

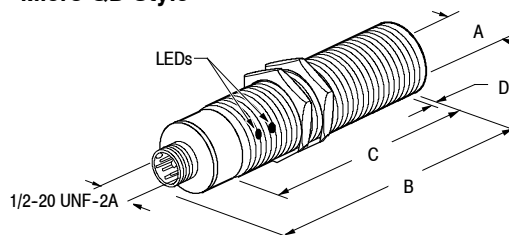


		Cable Style			
Thread Size	Shielded	mm (inches)			
		A	B	C	D
M18 x 1	Y	18.0 (0.71)	74.7 (2.94)	60.0 (2.36)	2.5 (0.10)
	N			48.2 (1.90)	14.4 (0.56)
M30 x 1.5	Y	30.0 (1.18)	77.2 (3.04)	61.3 (2.41)	2.5 (0.10)
	N			41.6 (1.64)	17.9 (0.70)

Mini QD Style



Micro QD Style



Mini QD Style						Micro QD Style					
Thread Size	Shielded	mm (inches)				Thread Size	Shielded	mm (inches)			
		A	B	C	D			A	B	C	D
M18 X 1	Y	18.0 (0.71)	76.6 (3.02)	54.9 (2.16)	2.5 (0.10)	M18 X 1	Y	18.0 (0.71)	84.3 (3.32)	60.0 (2.36)	2.5 (0.10)
	N			43.1 (1.70)	14.4 (0.56)		N			48.2 (1.90)	14.4 (0.56)
M30 X 1.5	Y	30.0 (1.18)	86.4 (3.40)	61.3 (2.41)	2.5 (0.10)	M30 X 1.5	Y	30.0 (1.18)	85.7 (3.37)	61.3 (2.41)	2.5 (0.10)
	N			41.6 (1.64)	17.9 (0.70)		N			46.1 (1.81)	17.9 (0.70)

802DN Lever Type with DeviceNet Output • Spring Return

NonPlug-In Style Oiltight Limit Switches



NonPlug-In Style
802DN-AD5 without
Lever

Description

Bulletin 802DN DeviceNet limit switches have been designed with the same rugged features of our 802T NEMA limit switches with the features and benefits of DeviceNet built in. These limit switches utilize DeviceNet technology to address the primary customer needs. The three most common needs are increased information flow, an inexpensive way to connect limit switches to a DeviceNet network, and reduction of down time by using the advanced diagnostic capabilities only available through DeviceNet. 802DN limit switches are configured using RSNetWorx for DeviceNet. Online configuration help is available using the parameter help feature.

Features

- Direct connection to DeviceNet network
- Autobaud
- Dual outputs with distinct programmable angles to operate
- Teach and learn angle
- Each output programmable to N.O. or N.C.
- Programmable travel to reset (hysteresis)
- Configurable counters with resets on each output

Specifications

Enclosure Rating	NEMA 1, 4, 6P, 13; IP67 (IEC 529)
Certifications	UL Listed, CSA Certified, and CE Marked for applicable directives
Ambient Temperature [C (F)]	NonPlug-In limit switches are designed to operate in an ambient temperature range of -18...+54° (0...+130°)

Features (continued)

- Multiple timing functions
 - Programmable in 1 ms increments
 - On delay timer
 - Off delay timer
 - One shot timer
- User-selectable discrete or analog output
- Multiple maintenance warnings
 - Overtravel alarm
 - Motion detection
 - Slow lever return alarm
 - Jam detect
- User defined counter preset used for Tracking total operations and maintenance alarming
- Supports change-of-state (COS) or strobing protocol

High Degree of Versatility

Bulletin 802DN limit switches can be mounted in any position, with operating heads that can be rotated and fastened in any one of four positions 90° apart. Most operating levers are interchangeable and can be rotated and clamped in any position through 360°.

NEMA Type 13 Construction

802DN limit switches feature NEMA Type 13 construction with synthetic rubber seals to protect the operating parts against entry of oil, dust, abrasives, water and coolant, within the limits of NEMA-specified tests.

Easy Mounting and Wiring

Each switch base has four mounting holes: two “through” holes for front mounting and two tapped holes in the back for rear mounting. Three different wiring styles are available for ease of installation. Each of the models is available for order with one of the following: a five-pin micro quick-disconnect, a five-pin mini quick-disconnect, or a prewired two meter cable.

Lever Type Switches

These switches are operated by means of a lever that is clamped to a knurled shaft extending from the operating head.

Lever type switches can be equipped with a variety of operating levers: roller lever, adjustable roller lever, micrometer adjustment roller lever, rod lever, one-way rod or roller lever and fork lever. These can be used interchangeably on all lever type switches.

The micrometer adjustment roller lever, Cat. No. **802T-W6**, is designed especially for installations where the exact position of the roller is critical. This lever has a pivoted roller which can be turned laterally. After clamping the lever to the switch shaft, the position of the roller can be precisely adjusted through an arc of 7.5° on either side of the center or straight-line position.

Wide Belt Roller

The **802DN-WBR-XX** limit switches come packaged with a special lever arm. This limit switch has been specifically designed for precise position detection of conveyor belts. By using the advanced features of DeviceNet, this limit switch is ideal for this application.

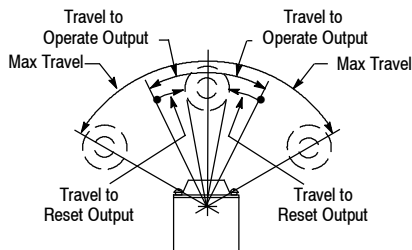
Operating Levers

See pages 6-91...6-96.

802DN Lever Type with DeviceNet Output • Spring Return

NonPlug-In Style Oiltight Limit Switches

Range of Operation



Switch
Without Lever

Product Selection

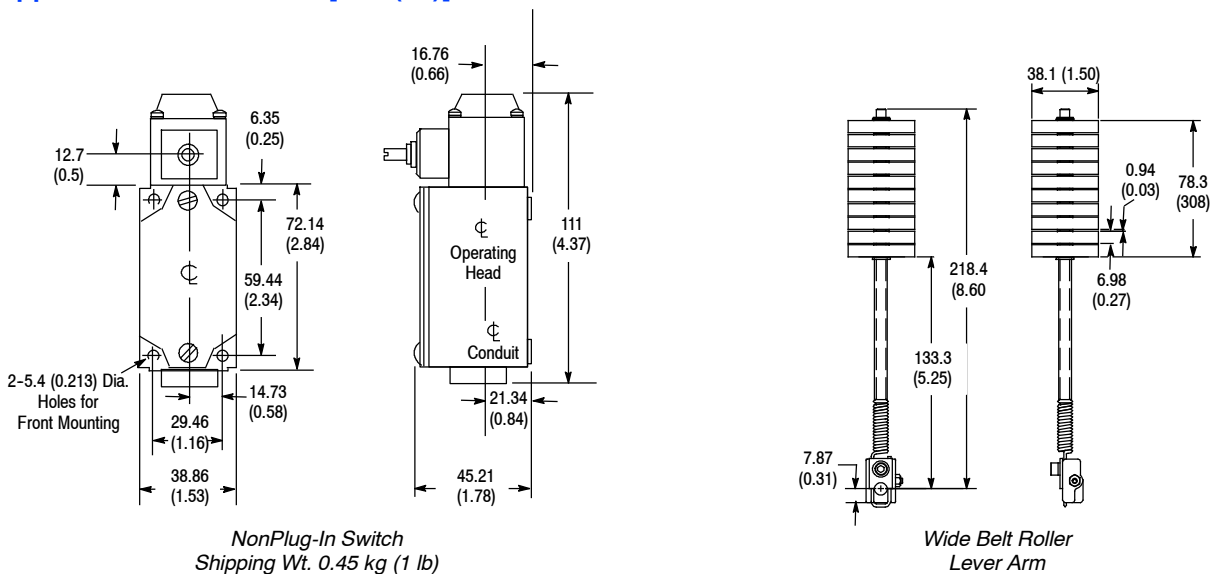
Lever Movement	Torque to Operate (Max)	Travel to Operate Output #1	Travel to Operate Output #2	Max Travel	Travel to Reset	Lever	Connection Type	Cat. No.
Clockwise or Counterclockwise	0.34 N•m (3 lb•in.)	Programmable	Programmable	54°	Programmable (5° min)	None	2 m cable	802DN-AS2
							5-pin mini	802DN-AN5
							5-pin micro	802DN-AD5
						Wide belt roller	2 m cable	802DN-WBRS2
							5-pin mini	802DN-WBRN5
5-pin micro	802DN-WBRD5							

I/O Data

Byte 1								Byte 2							
Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
Output 1	Output 2	Maintenance Diagnostic	Over Travel	Slow Return	Counter 1 Output	Counter 2 Output	Not Used	Analog Output (Strobe Only)							

Outputs 1 and 2 are programmable N.O./N.C.
See electronic data sheet for programming instructions.

Approximate Dimensions [mm (in.)]



Bulletin 842D DeviceNet Absolute Multi-Turn Magnetic Encoder



DeviceNet Encoder

Description

The Bulletin 842D offers direct connection to DeviceNet for advanced functionality with reduced wiring cost. The following is a partial feature list:

Features

- Magnetic design withstands 100 g shock and temperature extremes
- 26 bit multi-turn absolute encoder retains position data if power is lost
- Up to 8192 PPR & 8192 turns
- Connects via 5-pin micro QD
- Slotted rear cover allows address and baud rate selection
- Position reset button
- NEMA 4/IP66 housing

Programmable Features

- Current position (0 to 67,108,864)
- Counts per revolution (1 to 8192)
- Revolutions (1 to 8192)
- Eight programmable cams with high/low limits & hysteresis
- Position change required for COS communication
- Counting direction (cw/ccw)

Diagnostic Features

- Red and green LEDs
- Cumulative operating time
- Min./max. acceleration & velocity
- Maximum velocity warning flag
- Current velocity (RPM, RPS or STEPS/SEC)

Specifications

Electrical	
Code Format	Natural binary
Code Direction	CW or CCW (programmable)
Electrical Interface	DeviceNet specification release 2.0
Operating Voltage	11...25V DC (24V DC recommended)
Power Requirements	1.8 W
Max # of Steps/Revolution	8192
Max # of Revolutions	8192
Position Forming Time	0.3 ms
Delay on Power Up	1050 ms
Preset Position	Via covered rear button or DeviceNet
Mechanical	
Angular Acceleration	$5 \times 10^5 \text{ rad/s}^2$
Moment of Inertia	$35 \text{ gcm}^2 (5.0 \times 10^{-4} \text{ oz}\cdot\text{in}\cdot\text{s}^2)$
Operating Speed	6000 RPM at max shaft loading
Starting Torque	$2.5 \text{ N}\cdot\text{cm} (3.5 \text{ oz}\cdot\text{in})$
Shaft Loading	Axial 11 lb (50 N) Radial 67 lb (300 N)
Environmental	
Housing	Aluminum
Operating Temperature [C (F)]	-20...85° (-4...+185°)
Storage Temperature [C (F)]	-40...125° (-40...+257°)
Humidity	98% noncondensing
Enclosure Type Rating	NEMA Type 4, 13, IP66 (IEC 529)
Shock	100 g/6 ms
Vibration	20g/10...2000 Hz
Approximate Weight [kg (lbs)]	0.91 (2)

Accessories

Description	Page Number
Flexible Couplings	6-47
Servo Clamps	6-48
Mating Connectors	8-24 ①
Mounting Plates	6-52

Indicators

LED	Status
Off	Not connected not on-line
Green Blinking	Active but not allocated by master
Green Steady	Active and allocated by master
Red Blinking	Minor fault and/or connection interrupt
Red Steady	Critical communication fault

① Also see DeviceNet round media cable in the Network Media section of the *On-Machine™ Connectivity* catalog.

Bulletin 842D DeviceNet Absolute Multi-Turn Magnetic Encoder

Product Selection

Electrical Connection	Cat. No.
One 5-pin male micro QD	842D-60131331BDA
Two 5-pin micro QDs (one male & one female)	842D-60131331BXA

Approximate Dimensions [mm (in.)]

ATTENTION



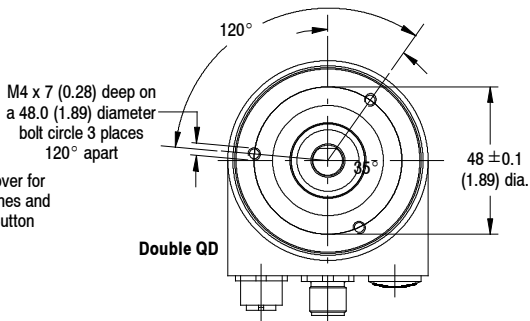
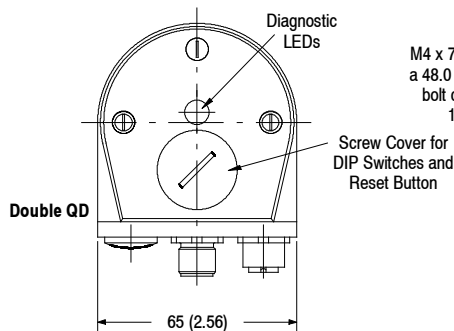
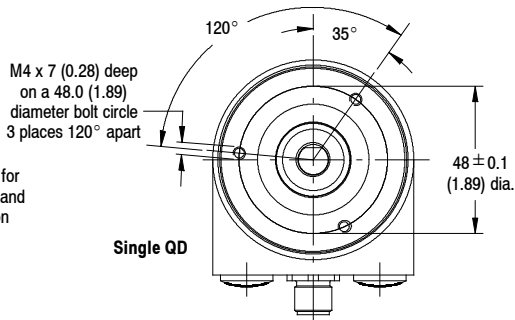
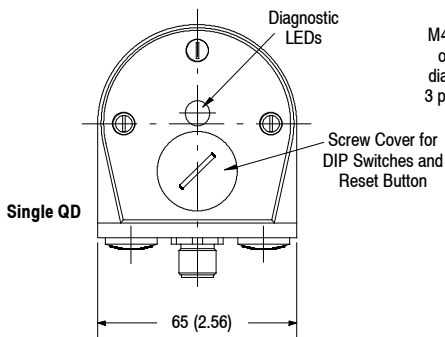
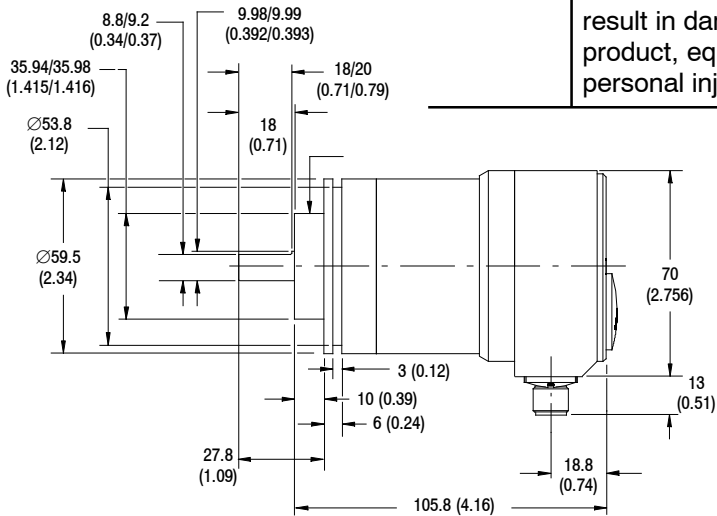
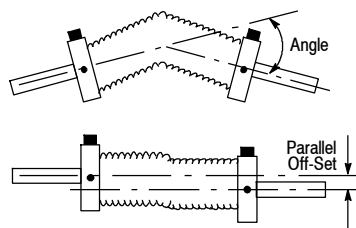
Rigidly coupling the encoder shaft to the machine shaft **will cause a failure** in either the bearings of the encoder or the bearings of the machine shaft.

WARNING



Pressing the preset position button results in a change of position reading. This can cause unexpected motion which could result in damage to the product, equipment, or personal injury.

Flexible Shaft Couplings







Notes

General Information	Quick Selection Guide	page 11-2
Products	54RF Tags, Transceivers & Interfaces	page 11-3
	55RF Tags, Transceivers & Interfaces	page 11-4
	56RF Tags, Transceivers & Interfaces	page 11-5
	57RF Handheld Interfaces and Spacers	page 11-6
	57RF Cables	page 11-7
Indexes	Cat. No. Index	page 13-1
	Comprehensive Product Index	page 14-1



Quick Selection Guide

Specifications	 54RF Tags, Transceivers & Interfaces	 55RF Tags, Transceivers & Interfaces	 56RF Tags, Transceivers & Interfaces	 57RF Handhelds, Cables & Accessories
Description	• General purpose RFID solution	• High performance RFID solution	• High-frequency RFID solution	• Portable RFID communication and cable solutions
Features	<ul style="list-style-type: none"> • Interfaces available for EtherNet/IP™, ControlNet™ and DeviceNet™, as well as MicroLogix™ (DF1) and 1746 backplanes • Three rugged transceiver styles designed for industrial locations • 1.5 MHz low frequency technology for enhanced immunity to EMI, interference from metallic reflective surfaces, oil, water, and other potentially disruptive materials • Seven character read-only or 2Kbyte read/write tags • Read and write speeds up to 200 characters per second (cps) • Five tag styles with sensing distances of 100 mm (3.94 in.) • Reusable Rislan® tags assure long life and reliable performance in harsh environments 	<ul style="list-style-type: none"> • Interfaces available for EtherNet/IP, ControlNet and DeviceNet, as well as MicroLogix (DF1) and 1746 backplanes • Three rugged transceiver styles designed for industrial locations • 1.5 MHz low frequency technology for enhanced immunity to EMI, interference from metallic reflective surfaces, oil, water, and other potentially disruptive materials • 8 Kbyte and 32 Kbyte read/write tags allow complete build instructions and quality test data to be kept with the product • Read speeds up to 2,500 characters per second (cps) and write speeds up to 2,500 cps • Reusable Rislan tags assure long life and reliable performance in harsh environments • Sensing distances up to 70 mm (2.76 in.) 	<ul style="list-style-type: none"> • Interfaces available for EtherNet/IP, ControlNet and DeviceNet, as well as MicroLogix (DF1) and 1746 backplanes • Two transceiver styles • 13.56 MHz high frequency technology ideal for light industrial applications • 2 Kbyte read/write tags • No special tag orientation required • Read speeds up to 2,500 characters per second (cps) • Write speeds up to 2,500 characters per second (cps) • Four styles of reusable tags • Sensing distances up to 68 mm (2.68 in.) 	<ul style="list-style-type: none"> • Handheld units are portable and light weight • Handheld units have LCD or color display • Interface to transceiver cables come various lengths and in four different styles: <ul style="list-style-type: none"> • 57RF-DF 5-pin DC straight micro female to flying leads • 57RF-DR 5-pin DC right angle micro female to flying leads • 57RF-DFDM 5-pin DC straight micro male to 5-pin DC straight micro female • 57RF-DRDM 5-pin DC right angle micro female to 5-pin DC straight micro male • Cables are made of oil resistant polyurethane and meets NEMA 1, 3, 4, 13 and IEC IP67
Operating Voltage	• 24V DC	• 24V DC	• 24V DC	• N/A
Tag Size (LxWxH)	• 40 x 40 x 17 • 75 x 50 x 15	• 75 x 50 x 15	• 40 x 40 x 17 • 75 x 50 x 15 • 28...50 mm x 0.89 mm	• N/A
Memory Range	• 7 bytes...2k bytes	• 8...32k bytes	• 2k bytes	• N/A
Temperature Range [C (F)]	• -25...85° (-13...185°)	• -25...70° (-13...158°)	• -25...85° (-13...185°)	• Dependant on interface
Sensing Range	• 20...100mm	• 20...70 mm	• 20...68 mm	• 20...80 mm
Additional Info	• See page 11-3	• See page 11-4	• See page 11-5	• See page 11-6 and 11-7

Tags



The 54RF family of industrial RFID tags are available in seven byte (character) read-only and two Kbyte read/write memory configurations. Designed for billions of read/write cycles, these reusable tags feature a rugged, urethane-filled Rislam-housing to ensure long life and reliable operation in the most demanding industrial environments. The 54RF tags are available in five tag styles for sensing distances up to 100 mm (3.94 in.). Data can be read from or transferred to the tags at speeds up to 200 bytes (characters) per second, allowing for use in high-speed applications.

Transceiver-Tag Max. Sensing Distance [mm (in.)]			Tag Memory [byte]	Tag Function	Tag Cat. No.
54RF-TR-ERC	54RF-TR-ERD	54RF-TR-ERE			
25 (0.98)	55 (2.17)	80 (3.15)	7	Read Only	54RF-TG-FFA
25 (0.98)	N/A	100 (3.94)	7	Read Only	54RF-TG-FFB
25 (0.98)	N/A	100 (3.94)	7	Field Programmable	54RF-TG-FFB7FP
20 (0.79)	55 (2.17)	N/A	2K	Read/Write	54RF-TG-GGA2K
25 (0.98)	80 (3.15)	100 (3.94)	2K	Read/Write	54RF-TG-GGB2K

Transceivers



The 54RF family of industrial RFID transceivers are available in three different physical shapes allowing for optimal read distance and mounting in locations where tags are being read or written. Plus, most of the 54RF family of transceivers can be mounted up to 304.8 m (1000 ft) (except for the ERC, which can be mounted up to 45.7 m (150 ft)) from the network or I/O interface modules, allowing for extreme flexibility in system design and layout. Transceivers are connected to a network or Allen-Bradley I/O interface modules via 57RF family cables with M12 quick connectors for additional modularity and ease of use.

Max. Sensing Distance [mm (in.)]	Transceiver Cat. No.
20...25 (0.79...0.98) depending on tag style used	54RF-TR-ERC
55...80 (2.17...3.15) depending on tag style used	54RF-TR-ERD
80...100 (3.15...3.94) depending on tag style used	54RF-TR-ERE

Interfaces



The 54RF family of industrial RFID interfaces provide integration of the transceivers used for reading and writing to tags with EtherNet/IP, ControlNet and DeviceNet networks or the SLC and MicroLogix (DF1) backplanes. Integration into an Allen-Bradley Logix System is easily accomplished with Logix Profiles, sample code and other developer tools. The 54RF family RFID interfaces are available in a variety styles and are specified for the network or backplane required as shown below.

Network or Backplane	Interface Cat. No.
SLC Backplane Control Interface for FF style tags	54RF-IN-46F
SLC Backplane Control Interface for GG style tags	54RF-IN-46G
MicroLogix DF1 Control Interface for FF style tags	54RF-IN-DF1F
MicroLogix DF1 Control Interface for GG style tags	54RF-IN-DF1G
ControlNet Control Interface for FF style tags	54RF-IN-CNF
ControlNet Control Interface for GG style tags	54RF-IN-CNG
DeviceNet Control Interface for FF style tags	54RF-IN-DNF
DeviceNet Control Interface for GG style tags	54RF-IN-DNG
EtherNet/IP Control Interface for FF style tags	54RF-IN-IPF
EtherNet/IP Control Interface for GG style tags	54RF-IN-IPG

55RF

Tags, Transceivers and Interfaces

Tags



The 55RF family of industrial RFID tags are available with 8 Kbyte and 32 Kbyte read/write memory for extensive manufacturing or quality record data. Designed for billions of read/write cycles, these reusable tags feature a rugged, urethane-filled Rislun-housing to ensure long life and reliable operation in the most demanding industrial environments. The 55RF tags are available in two different shapes and styles for sensing distances up to 70 mm (2.76 in.). Information can be read from these tags at 2,500 bytes (characters) per second and written at up to 2,500 bytes per second across distances up to 70 mm (2.76 in.).

Transceiver-Tag Max. Sensing Distance [mm (in.)]			Tag Memory [byte]	Tag Cat. No.
55RF- TR- ECB	55RF- TR- ECC	55RF- TR- ECD		
22 (0.87)	40 (1.57)	70 (2.76)	8K	55RF-TG- OXA8K
22 (0.87)	40 (1.57)	70 (2.76)	32K	55RF-TG- OXA32K

Transceivers



The 55RF family of industrial RFID transceivers are available in three different physical shapes allowing for optimal read distance and mounting in locations where tags are being read or written. Plus, 55RF family transceivers can be mounted up to 150 feet from the network or I/O interface modules, allowing for extreme flexibility in system design and layout.

Transceivers are connected to network or Allen-Bradley I/O interface modules via 57RF family cables with M12 quick connectors for additional modularity and ease of use.

Max. Sensing Distance [mm (in.)]	Transceiver Cat. No.
22 (0.87) with 8K or 32K tag styles	55RF-TR- ECB
40 (1.57) with 8K or 32K tag styles	55RF-TR- ECC
70 (2.76) with 8K or 32K tag styles	55RF-TR- ECD

Interfaces



The 55RF family of industrial RFID interfaces provide integration of the transceivers used for reading and writing to tags with EtherNet/IP, ControlNet and DeviceNet networks or the SLC and MicroLogix (DF1) backplanes. Integration into an Allen-Bradley Logix System is easily accomplished with Logix Profiles, sample code and other developer tools. The 55RF family of RFID interfaces are available in a variety of styles and are specified for the network or backplane required as shown in the table below.

Network or Backplane	Interface Cat. No.
SLC Backplane Control Interface	55RF-IN-46
MicroLogix DF1 Control Interface	55RF-IN-DF1
ControlNet Control Interface	55RF-IN-CN
DeviceNet Control Interface	55RF-IN-DN
EtherNet Control Interface	55RF-IN-IP

Tags



The 56RF family of industrial RFID tags have a 2 Kbyte read/write memory size. Designed for billions of read/write cycles, these reusable tags are available in multiple styles, including disc style tags in 28 mm and 50 mm diameters, allowing for sensing distances up to 68 mm (2.68 in.). Information can be read from 56RF tags at 2,500 bytes (characters) per second and written at 2,500 bytes per second.

When mounting disc style tags to a metal surface, a minimum distance between the tag and mounting surface is required. Spacers are available that ensure this minimum distance is maintained—refer to installation instructions for details.

Transceiver-Tag Max. Sensing Distance [mm (in.)]		Tag Memory [byte]	Tag Cat. No.
56RF-TR-EFE	56RF-TR-EFF		
30 (1.18)	53 (2.09)	2K	56RF-TG-OTA2K
45 (1.77)	68 (2.68)		56RF-TG-OTB2K
28 (1.10)	50 (1.97)		56RF-TG-OTC2K
45 (1.77)	68 (2.68)		56RF-TG-OTD2K

Transceivers



The 56RF family of industrial RFID transceivers are available in two different physical shapes allowing for mounting in locations where tags are being read or written. Transceivers are connected to network or Allen Bradley I/O interface modules via 57RF family cables with M12 modular connectors. The 56RF family transceivers can be mounted up to 150 feet from the network or I/O interface modules.

Max. Sensing Distance [mm (in.)]	Transceiver Cat. No.
28...45 (1.10...1.77) depending on tag style used	56RF-TR-EFE
50...68 (1.97...2.68) depending on tag style used	56RF-TR-EFF

Interfaces



The 56RF family of industrial RFID interfaces provide integration of the transceivers used for reading and writing to tags with EtherNet/IP, ControlNet and DeviceNet networks or the SLC and MicroLogix (DF1) backplanes. Integration into an Allen-Bradley Logix System is easily accomplished with Logix Profiles, sample code and other developer tools.

The 56RF family RFID interfaces are available in a variety styles and are specified for the network or backplane required as shown in the table below.

Network or Backplane	Interface Cat. No.
SLC Backplane Control Interface	56RF-IN-46
MicroLogix DF1 Control Interface	56RF-IN-DF1
ControlNet Control Interface	56RF-IN-CN
DeviceNet Control Interface	56RF-IN-DN
EtherNet Control Interface	56RF-IN-IP

Handheld Interfaces



Description	Cat. No.
RFID handheld interface for 54RF-FF tags	57RF-HH-54FF❶
Programming cable for 57RF-HH-54FF to program 54RF-TG-FFB7FP	57RF-HH-54FFPC
RFID handheld interface for 54RF-GG and 55RF tags	57RF-HH-54GG55
Charger base for 57RF-HH-54GG55 handheld	57RF-HH-54GG55CB
Remote read/write head for 57RF-HH-54GG55 handheld	57RF-HH-54GG55RH
RFID handheld interface for 56RF tags	57RF-HH-56
Rechargeable battery pack and wall charger for 57RF-HH-56 handheld	57RF-HH-56RBP
Synchronizing cable for 57RF-HH-56 handheld	57RF-HH-56SC

❶ Please note, the 57RF-HH-54FF is a read-only handheld, but it can be used to program the 54RF-TG-FFB7FP tags as long as you have the programming cable accessory.

Spacers



Allen-Bradley's RFID tag spacers provide the minimum distance required between read/write RFID tags and metal mounting surfaces.

Features

- 57RF-SP30Q100: disc size 30.5 mm x 6.4 mm
- 57RF-SP50Q100: disc size 50.5 mm x 6.4 mm

Tag Environment

- Tags 56RF-TG-OTC2K and 56-TG-OTD2K can be mounted on metal surfaces using spacers.
- Spacers provide proper distance between the tag and metal mounting surface for accurate reads and writes. Use spacer 57RF-SP30Q100 with tag 56RF-TG-OTC2K and spacer 57RF-SP50Q100 with tag 56RF-TG-OTD2K.

Transceiver Cable Selection

- Shielding designed specifically for transceiver to interface communications
- Single ended cordsets for use with chassis-based and MicroLogix interfaces
- Double ended patchcords in straight or right angle configurations for transceiver to network interfaces
- PUR jacketing for improved oil and abrasion resistance
- Available in lengths up to 1000 feet for 54RF family use and 150 feet for 55RF and 56RF family systems.

57RF-DF Series

Single-End Female Transceiver Cable	Cat. No.
1000 feet	57RF-DF1000F
600 feet	57RF-DF600F
500 feet	57RF-DF500F
300 feet	57RF-DF300F
250 feet	57RF-DF250F
225 feet	57RF-DF225F
200 feet	57RF-DF200F
175 feet	57RF-DF175F
150 feet	57RF-DF150F
125 feet	57RF-DF125F
100 feet	57RF-DF100F
75 feet	57RF-DF75F
50 feet	57RF-DF50F
25 feet	57RF-DF25F
5 meter	57RF-DF5
2 meter	57RF-DF2

57RF-DR Series

Single-End Right Angle Female Transceiver Cable	Cat. No.
1000 feet	57RF-DR1000F
100 feet	57RF-DR100F
75 feet	57RF-DR75F
50 feet	57RF-DR50F
25 feet	57RF-DR25F
5 meter	57RF-DR5
2 meter	57RF-DR2

57RF-DFDM Series

Male to Female Transceiver Cable	Cat. No.
150 meter	57RF-DFDMJ150
100 meter	57RF-DFDMJ100
75 meter	57RF-DFDMJ75
50 meter	57RF-DFDMJ50
25 meter	57RF-DFDMJ25
20 meter	57RF-DFDMJ20
15 meter	57RF-DFDMJ15
10 meter	57RF-DFDMJ10
5 meter	57RF-DFDMJ5
2 meter	57RF-DFDMJ2

57RF-DRDM Series

Male to Right Angle Female Transceiver Cable	Cat. No.
40 meter	57RF-DRDMJ40
30 meter	57RF-DRDMJ30
15 meter	57RF-DRDMJ15
10 meter	57RF-DRDMJ10
5 meter	57RF-DRDMJ5
2 meter	57RF-DRDMJ2

M12 to RJ45 Patchcord

- Overmolded housing suitable for IP67 applications and harsh industrial environments where extreme vibration, shock, chemicals and temperature are found.
- Flex-rated cable (cable must be tied down and not flexed within six inches of the connector)
- Single-end cordsets can be custom terminated with one of several field attachable connectors
- Designed to ODVA EtherNet/IP specifications and ISO IEC 24702, IEC 61918
- Twisted pairs maintain signal balance through cable to provide high noise immunity and reduce return loss
- Suitable for noise environments M₃I₃C₃E₃

RJ45 to M12, 4-Pin Male Ethernet Cable	Cat. No.
50 meter	1585D-M4TBJM-50
10 meter	1585D-M4TBJM-10
5 meter	1585D-M4TBJM-5
3 meter	1585D-M4TBJM-3
1 meter	1585D-M4TBJM-1

① Refer to Network Media, page 9-6.

Accessories	Barriers and Isolators	page 12-2
	Intrinsically Safe Zener Diode Barriers	page 12-3
	Intrinsically Safe Galvanic Isolators	page 12-5
	Intrinsically Safe Wiring Labels	page 12-8
	DIN Mounting Rail	page 12-8
	Sealing Caps	page 12-10
	Coupling Adaptors	page 12-11
	Mounting Accessories	page 12-11
	Power Supplies	page 12-11
Indexes	Cat. No. Index	page 13-1
	Comprehensive Product Index	page 14-1

The Accessories in this section may be used across multiple product lines. Accessories specific to a product line can be found at the end of the respective section.

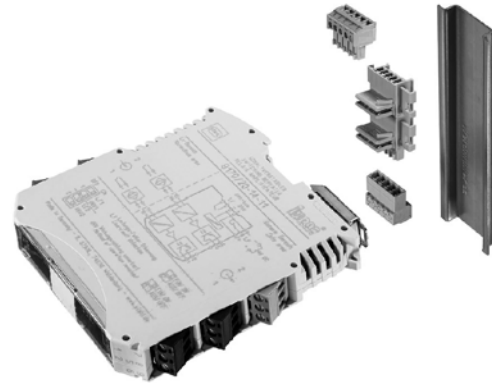
Barriers and Isolators



Intrinsically Safe Zener Diode Barriers



Intrinsically Safe Galvanic Isolators



Description

For applications involving sensor use in hazardous locations, Rockwell Automation offers a line of Intrinsic Safety Zener Diode Barriers and Galvanic Isolators. Both are economical solutions for instrumentation and control systems in hazardous locations as defined by NEC article 500 and CEC Part I, Section 18.

Zener diode barriers are *passive* protective interface assemblies that limit the amount of energy (voltage and current) that enters a hazardous area in the event of a fault (i.e., overvoltage, shorted field wiring). The energy is limited to an amount that would not be sufficient to ignite the potentially explosive atmosphere. Designed in a slim 1/2 inch wide housing, each barrier contains zener diodes that limit the voltage while a resistor prevents excessive current from being transferred to the hazardous area. In the barriers offered by

Rockwell Automation, a replaceable fuse is used to protect the barrier from miswiring and transients.

The principle of a keyed fuse assembly has been employed. In case of a fault due to overvoltage, polarity misconnection or transients, only the protective keyed fuse assembly needs to be replaced.

The replacement of the fuse assembly can be done by the user at the job site. The barriers do not have to be returned to the manufacturer for replacement.

Intrinsically Safe or Galvanic Isolators are *active* protective interface assemblies that limit the amount of energy allowed to enter a hazardous area under fault conditions. Sometimes called Transformer Isolated Barriers, they separate intrinsically safe wiring from non-intrinsically safe wiring through the use of the same isolation coils found in power transformers. Galvanic isolators, unlike zener diode

barriers, do not require grounding—therefore they may reduce ground loop problems as well as installation and maintenance costs. The slim 3/4 inch wide housing on DC models also conserves valuable mounting space. DIP switches provide convenient programming of output and diagnostic functions while multiple LEDs provide visual indication of module and circuit status.

Rockwell Automation zener diode barriers and galvanic isolators are DIN Rail mountable and designed primarily for use with intrinsically safe proximity sensors and photoelectrics. All Rockwell Automation barriers and isolators are UL Listed, FM Certified, CSA and CE Marked for all applicable directives.

Intrinsically Safe Zener Diode Barriers



Features

- Replaceable fuse
- Low internal resistance
- Short-circuit protected
- Reverse polarity protection
- Slim 1/2 inch wide housing
- UL Listed, FM, CSA and PTB Certified, and CE Marked for all applicable Directives

Specifications

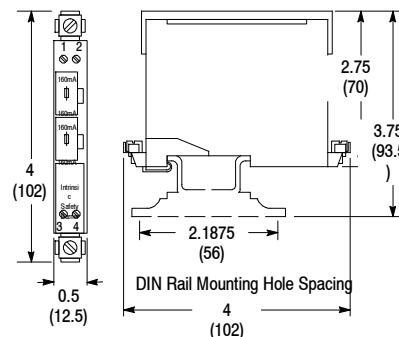
Environmental	
Certifications	UL, FM, CSA PTB, and CE Marked for all applicable directives
Operating Temperature [C (F)]	+20...+60° (-4...+140°)
Vibration	55 Hz (1.5 mm amplitude)
Shock	20 g
Relative Humidity	0...95% (noncondensation)
Electrical	
Leakage Current	≤1 μA
Protection Type	Reverse polarity (protected by replaceable fuse), over-voltage (protected by replaceable fuse), and short-circuit (incorporated)
Replaceable Fuse Rating	160 A
Operating Frequency	≤100 kHz @ I _{sc} > 50 mA; ≤50 kHz @ I _{sc} ≤0.50 mA
Short Circuit Protection	Incorporated
Mechanical	
Material	Polyamide
Mounting Location	Nonhazardous or Class 1, Division 2 or Zone 2/Zone 22 locations
I.S. Connections for	Class I, II, III; Div 1 and 2; Groups A-G and Zones 0, 1, 2, 20, 21, 22; Group IIC and IIB
Enclosure Rating	IP40 (IEC529)

Compatible Sensors

Photoelectrics

Sensor Style	Sensing Mode	Connection Type	Cat. No.	
			Sensor	Barriers Used†
9000 Through Beam Photoelectric	Emitter	2 m Cable	42GRL-9540	897H-S120
		4-Pin Micro	42GRL-9540-QD	
		4-Pin Mini	42GRL-9540-QD1	
	Receiver	2 m Cable	42GRR-9500	897H-S214 or 897H-S150
		4-Pin Micro	42GRR-9500-QD	
		4-Pin Mini	42GRR-9500-QD1	
5000 Photoelectric	Retroreflective	Screw Terminals	42DRU-5500	897H-S120 or 897H-S140 or 897H-S150
	Polarized Retroreflective		42DRU-5700	
	Standard Diffuse		42DRP-5500	
	Fiber Optic		42DRA-5500	

Approximate Dimensions [mm (in.)]



Proximities

Sensor Style	Barrel Diameter	Shielding	Cat. No.	
			Sensor	Barriers Used†
Stainless Steel Face and Barrel Proximity Sensor	12 mm	Shielded	871TM-DR2ENE12-⊗	897H-S214 or 897H-S120
		Unshielded	871TM-DR4ENE12-⊗	
	18 mm	Shielded	871TM-DR2ENE18-⊗	
		Unshielded	871TM-DR4ENE18-⊗	
	30 mm	Shielded	871TM-DR2ENE30-⊗	
		Unshielded	871TM-DR4ENE30-⊗	

⊗ Replace symbol with desired termination. A2 for 2 meter PVC cable and D4 for 4-pin micro QD.

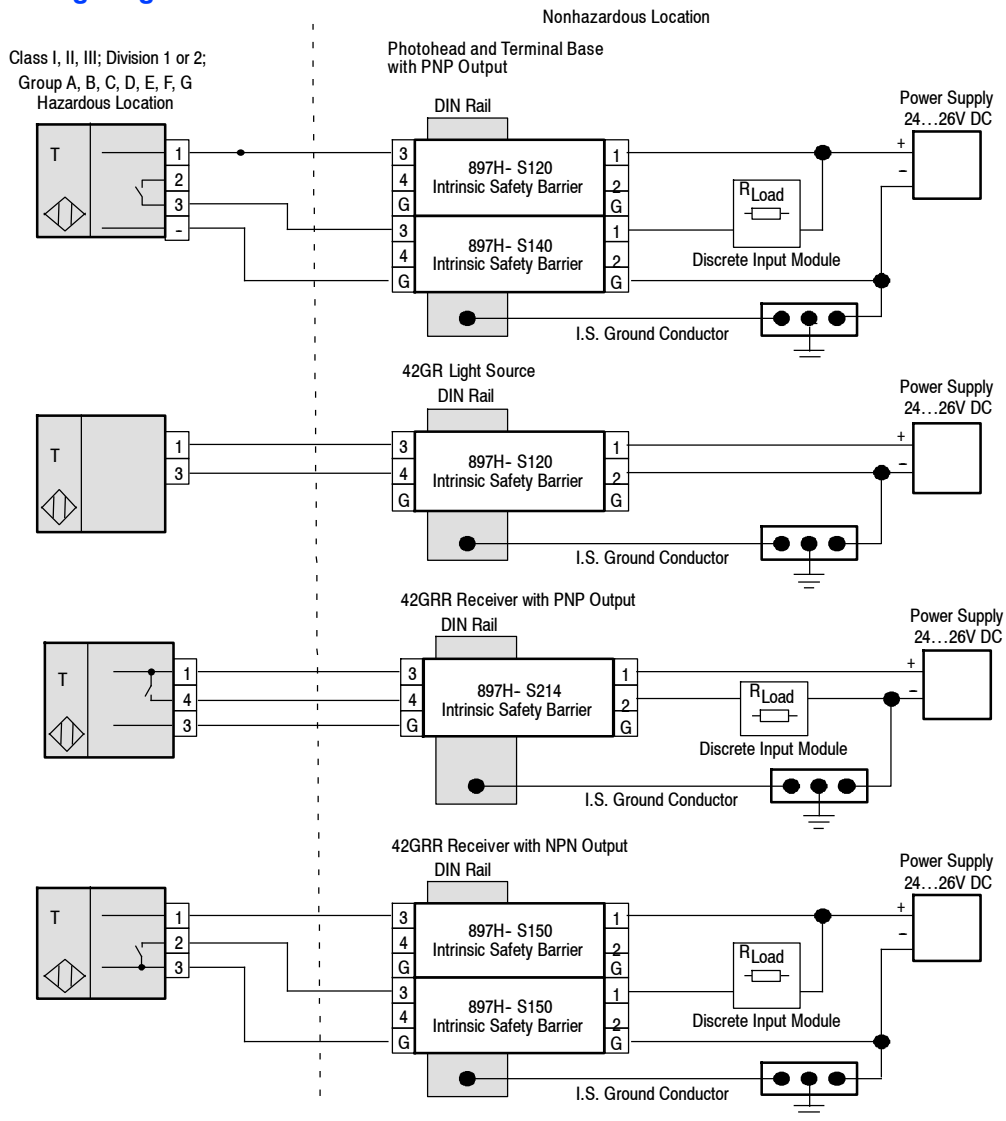
Intrinsically Safe Zener Diode Barriers

Product Selection

Rated Voltage	Internal Resistance	Classification	FM Entity Parameters					ATEX Certified Stahl Part No.	Cat. No.			
			Supply Voltage, Max.	Current, Max.	Power, Max.	Permissible External Capacity	Permissible External Inductance, Max.					
24V DC	286...319 ohms	A, B, E	28V	100 mA	700 Mw	0.083 μ F	1.6 mH	9001/01-280-100-101	897H-S120			
		D, F, G				0.65 μ F	11 mH					
	0 ohms	A, B, E				0.083 μ F	1.6 mH	9001/03-280-000-101	897H-S140			
		D, F, G				0.65 μ F	230 mH					
	599...666 ohms	A, B, E				0.083 μ F	1.6 mH	9001/01-280-050-101	897H-S150			
		D, F, G				0.65 μ F	230 mH					
	269...290 ohms	A, B, E				0.083 μ F	1.6 mH	9002/13-280-110-001	897H-S214			
		D, F, G				0.65 μ F	230 mH					
	321...356 ohms	A, B				0.083 μ F	1.6 mH	9002/11-280-186-001	897H-S233			
		D, F, G				0.65 μ F	230 mH					
	Replacement Fuse Assembly								897H-F160			

Note: Safety Parameters stated above are per input.

Typical Wiring Diagram



Intrinsically Safe Galvanic Isolators



Features

- DIN Rail mounting with power bus option
- Removable field connection terminals
- Single- and two-input versions
- Variety of output types
- Certified to worldwide standards
- SIL 2 and 3 rated
- Intrinsically safe connections for Class I, II, III, Div 1; Groups A-G; Zones 1, 2, 21, and 22; [Ex Ia], IIC/IIB

Specifications

Environmental	
Certifications	FM, CSA, UL, PTB and CE Marked for all applicable directives
Operating Temperature [C (F)]	-20...+65° (-4...+149°)
Relative Humidity	<95% RH
Enclosure Type Rating	IP30
Electrical	
Number of Inputs	2
Switching Current @ Voltage, Max.	8V @ 8.2 mA (to EN 60947-5-6 NAMUR)
Input Current	On > 2.1 mA; Off < 1.2 mA
Input Resistance	1000 Ω
Switching Frequency (Hz)	< 15 Hz
Switch Delay	On to Off: 15 ms; Off to On: 15 ms
Status Indicators	Green = Power; Yellow = Output Closed; Red = Wire Break/Short
Mechanical	
Material	Polyamide 6GF
Mounting	35 mm DIN Rail
Conductor Size, Max.	0.2...2.5 mm ² (24-14 AWG)
Weight [g (lbs)]	160 (0.35)

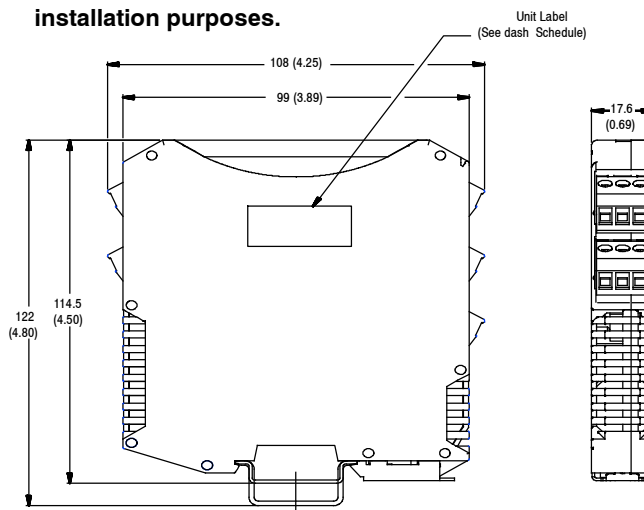
Compatible Sensors

NAMUR Style

Sensor Style	Sensing Mode	Connection Type	Cat. No.
Nickel-Plated Brass Barrel, Plastic Face Proximity Sensor	8 mm	Shielded	871C-DH1M8-①
		Unshielded	871C-DH2M8-①
	12 mm	Shielded	871C-DH1M12-①
		Unshielded	871C-DH2M12-①
	18mm	Shielded	871C-DH1M18-①
		Unshielded	871C-DH2M18-①
	30 mm	Shielded	871C-DH1M30-①
		Unshielded	871C-DH2M30-①

Approximate Dimensions [mm (in.)]

Dimensions are not intended to be used for installation purposes.



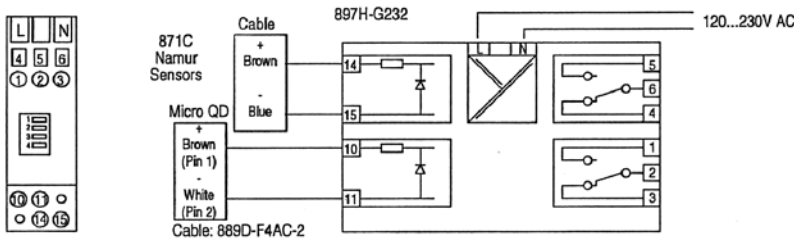
① Replace symbol with desired termination. A2 for 2 meter PVC cable and D4 for 4-pin micro QD.

Intrinsically Safe Galvanic Isolators

Product Selection

Power Supply	Input Type	Output Type/ Output Rating/ Response Time	Classi- fication	FM Entity Parameter					ATEX Certified Stahl Cat. No.	Cat. No.
				Voltage, Max.	Current, Max.	Power, Max.	Max. Permiss. External Capacity	Max. Permiss. External Inductance		
120...230 V AC	(2) NAMUR Sensors or Dry- Contacts	SPDT Relay/250V AC @ 4 A/ 10 ms	A, B, E	10.6V	24 mA	64 mW	2.32 μ F	63 mH	9170/20-12-21s	897H-G232
			D, F, G				16.2 μ F	230 mH		
24V DC			A, B, E				2.32 μ F	63 mH	9170/20-12-11s	897H-G231
			D, F, G				16.2 μ F	230 mH		
24V DC	(2) NAMUR Sensors or Dry- Contacts	Transistor, Open Collector/ 35V DC @ 50 mA/ 30 μ s	A, B, E	10.6V	24 mA	64 mW	2.32 μ F	63 mH	9170/20-14-11s	897H-G211
			D, F, G				16.2 μ F	230 mH		

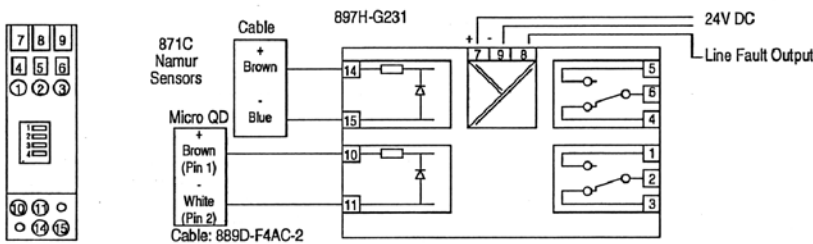
Typical Wiring Diagrams



Dip Switch Settings

1	2	3	4
1	1	1	1
1	2	3	4
1	0	3	0

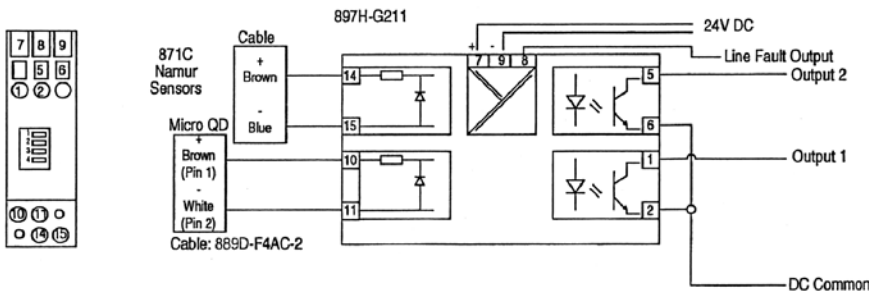
Switch 1, 2 Channel 1 (2 Config N.O./N.C.)
Switch 3, 4 Channel 2 (4 Config N.O./N.C.)
Turn Switch 1 & 3 "On" to configure
short ckt/open wire detection. Use a
22K Ohm in parallel for open wire
detection, or a 2.7K Ohm in series for
short ckt detection.



Dip Switch Settings

1	2	3	4
1	1	1	1
1	2	3	4
1	0	3	0

Switch 1, 2 Channel 1 (2 Config N.O./N.C.)
Switch 3, 4 Channel 2 (4 Config N.O./N.C.)
Turn Switch 1 & 3 "On" to configure
short ckt/open wire detection. Use a
22K Ohm in parallel for open wire
detection, or a 2.7K Ohm in series for
short ckt detection.

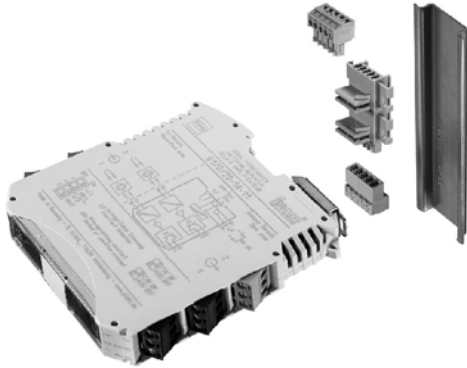


Dip Switch Settings

1	2	3	4
1	1	1	1
1	2	3	4
1	0	3	0

Switch 1, 2 Channel 1 (2 Config N.O./N.C.)
Switch 3, 4 Channel 2 (4 Config N.O./N.C.)
Turn Switch 1 & 3 "On" to configure
short ckt/open wire detection. Use a
22K Ohm in parallel for open wire
detection, or a 2.7K Ohm in series for
short ckt detection.

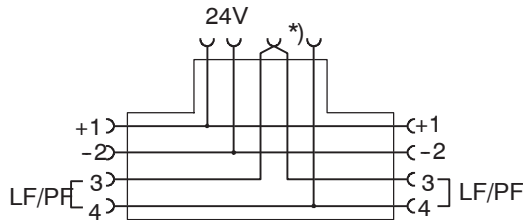
It is recommended that wiring for intrinsically safe systems be identified as such through the use of light blue jacketing and/or through appropriate labels. Such labels are required by NEC Article 504 and ANSI/ISA RP-12.8 to be placed at no more than 25 foot intervals. When installing intrinsically safe equipment the user should refer to all relevant national standards and/or those standards set forth by the "authority having jurisdiction" at the installation site.



Description

Rockwell Automation Galvanic Isolators can be daisy chained together via power bus connectors. The snap-on connectors save time and simplify wiring for power distribution and error identification on a series of modules. Each end on a string of bussed isolators is terminated with a screw terminal connector. The line fault and power supply failure line are bridged on these connectors to close the current.

Wiring Diagram



Approximate Dimensions [mm (in.)]

Accessory Connectors

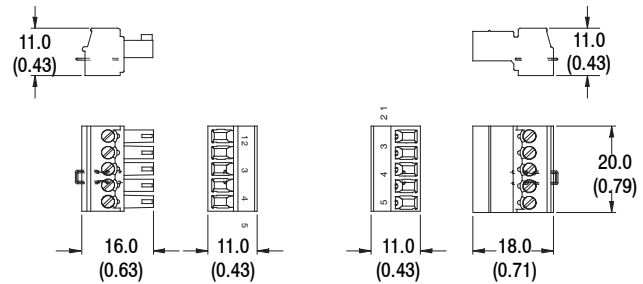


Figure 1

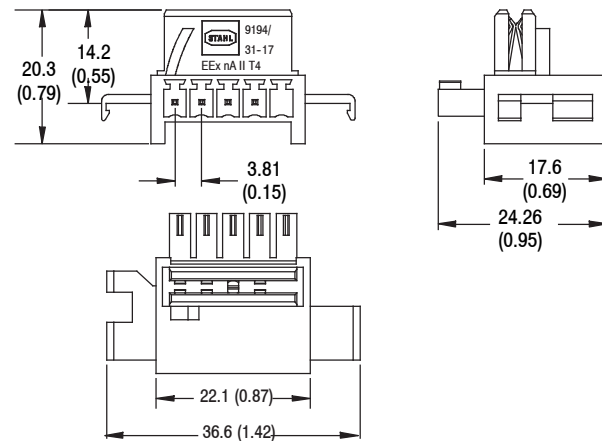


Figure 2

Dimensions are not intended to be used for installation purposes.

Product Selection

Description	Approximate Dimensions [mm (in.)]	Cat. No.
Power Bus Screw Terminal Connector	See Figure 1	897H-GDRC
Power Bus T-Connector	See Figure 2	897H-GDRCT

Intrinsically Safe Wiring Labels/DIN Mounting Rail

Description

It is recommended that wiring for intrinsically safe systems be identified as such through the use of light blue jacketing and/or through appropriate labels. Such labels are required by

NEC Article 504 and ANSI/ISA RP-12.6 to be placed at no more than 25 foot intervals. When installing intrinsically safe equipment the user should refer to

all relevant national standards and/or those standards set forth by the “authority having jurisdiction” at the installation site.

Intrinsically Safe Wiring Labels



Figure 1

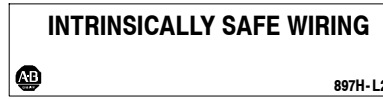


Figure 2

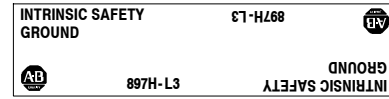


Figure 3

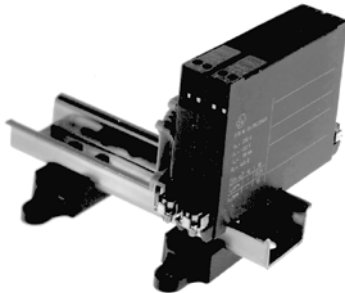
Quantity	Description	Figure	Cat. No.
25	Intrinsically Safe Wiring	1	897H-L1-25
100	Intrinsically Safe Wiring		897H-L1-100
25	Intrinsically Safe Wiring	2	897H-L2-25
100	Intrinsically Safe Wiring		897H-L2-100
25	Intrinsic Safety Ground	3	897H-L3-25

Description

DIN Rail provides convenient and simple mounting of barriers, isolators, and other control equipment. DIN Rail is available from Rockwell Automation/

Allen-Bradley in one meter sections (Cat. No. **64-134**) or as part of a mounting kit (Cat. No. **64-136**). By isolating the DIN Rail from the mounting

surface, the mounting kit allows 897H-series shunt diode barriers to be grounded directly to the rail.



#64-136 TS35 DIN Mounting Rail Kit
(Barriers not included)



#64-134 TS35 DIN Mounting Rail


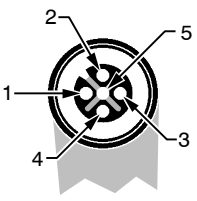
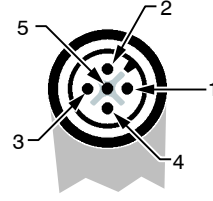
Mounting Accessories

Description	Cat. No.
1 m (3.3 ft) prepunched zinc-plated and chromated steel mounting rail per EN50022/DIN46277 (TS35)	64-134
DIN Rail mounting kit includes 12 inch DIN Rail, two insulated standoffs, and two grounding terminals	64-136

Intrinsically Safe Wiring

DC Micro Style, 22 AWG Blue BVC Cordsets and Patchcords

Pinout and Color Code

	Face View Pinout	
	4-Pin	
		
	Female	Male
Color Code	1-Brown 2-White 3-Blue 4-Black 5-NA	

Description

As defined in the National Electric Code (NEC), intrinsically safe wiring must be identified by color coding with light blue jacketed cable or by labeling at regular 25 foot or less intervals. When installing intrinsically safe equipment, the user should refer to all relevant national

standards and/or those standards set forth by the “authority having jurisdiction” at the installation site. Rockwell Automation cordsets and patchcords with blue PVC jacketing provide a cost effective solution for easy identification of intrinsically safe wiring.

Unlike tags, that may fall off or become unreadable, this rugged cable maintains its visibility, even in harsh environments. No labor time is required for labeling the cable while it is being installed or during maintenance.

Product Selection

Cordsets

Pin Count	Color Code	Jacket Color	Wire Gauge	Cat. No.			
				Straight Female	Right Angle Female	Straight Male	Right Angle Male
4-Pin	A	Blue	22 AWG	889D-F4LC-❶	889D-R4LC-❶	889D-M4LC-❶	889D-E4LC-❶

Patchcords

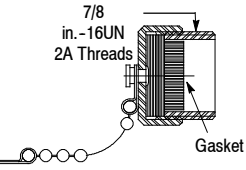
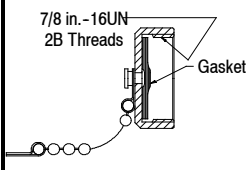
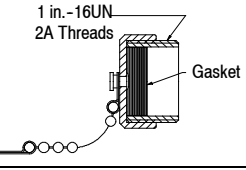
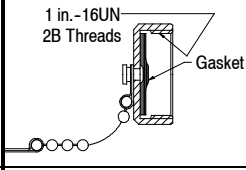
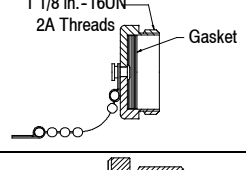
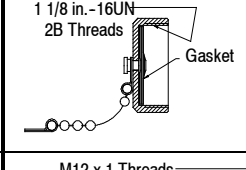
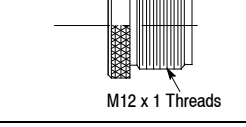
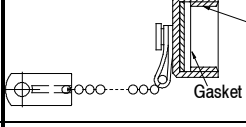
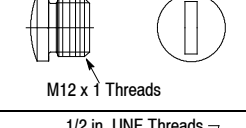
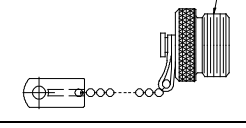
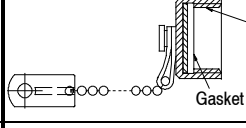
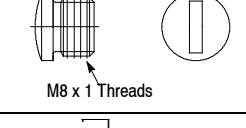
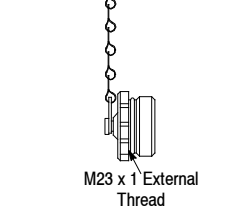
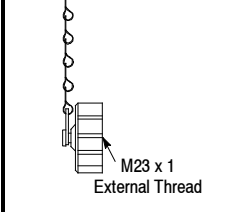
Pin Count	Color Code	Jacket Color	Wire Gauge	Cat. No.			
				Straight Female Straight Male	Straight Female Right Angle Male	Right Angle Female Straight Male	Right Angle Female Right Angle Male
4-Pin	A	Blue	22 AWG	889D-F4LCDM-❷	889D-F4LCDE-❷	889D-R4LCDM-❷	889D-R4LCDE-❷

- ❶ Replace symbol with 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.
- ❷ Replace symbol with 0M3 (1 ft), 1 (1 m), 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.

Note: See DC Micro Style Cordsets and Patchcords for complete specifications (page 8-1).


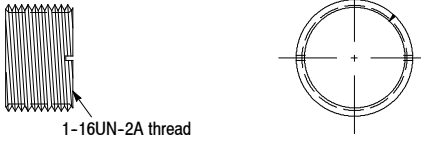
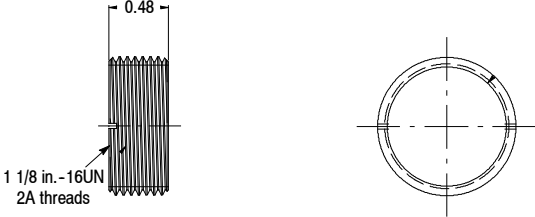
Accessories
Sealing Caps

Product Selection

Connector Style	Material	Thread Config.	Approximate Dimensions [mm (in.)]	Cat. No.	Thread Config.	Approximate Dimensions [mm (in.)]	Cat. No.
Mini	Aluminum	External		1485A-C1	Internal		889A-NCAP
Mini-Plus (7 and 8 pin)	Aluminum	External		889A-NM2CAP	Internal		889A-N2CAP
Mini-Plus (9, 10, and 12 pin)	Aluminum	External		889A-NM3CAP	Internal		889A-N3CAP
DC Micro	Aluminum	External		1485A-C3	Internal		889A-DCAP
	Plastic	External		1485A-M12	—	—	—
AC Micro	Aluminum	External		889A-RMCAP	Internal		889A-RCAP
Pico	Plastic	External		889A-PMCAP	—	—	—
M23	Nickel-plated Brass	External		889A-MMCAP	Internal		889A-MCAP

Coupling Adaptors/Mounting Accessories/Power Supplies

Coupling Adaptors

Connector Style	Material	Approximate Dimensions [mm (in)]	Cat. No.
Mini	Aluminum		889A-NADPT
Mini-Plus (7 and 8 pin)			889A-N2ADPT
Mini-Plus (9, 10, and 12 pin)			889A-N3ADPT

Mounting Accessories

Description	Cat. No.
Mounting nuts for 1/2-14 NPT threaded receptacles are available in bags of 10 pieces	889A-U1NUT-10
Flat, sealing washers for 1/2-14 NPT threaded receptacles are available in bags of 10 pieces	889A-U1FSL-10

Bulletin 1606 Power Supplies



Product Selection

	Output Power	Output Voltage	Output Current	Special Feature(s)	Stocked Item	Parallel Operation (Selectable)	Meets EN 61000-3-2 (PFC)	Cat. No.
1606-XLP Compact								
Compact Single Phase	30 W	DC 10...12V	3 A	NEC Class 2	X	—	N/A	1606-XLP30B
		DC 24...28V	1.3 A	NEC Class 2	X	—	N/A	1606-XLP30E
	50 W	DC 12...15V	4.2 A	Output Voltage Adjustable NEC Class 2	X	—	N/A	1606-XLP50B
		DC 24...28V	2.1 A	NEC Class 2	X	—	N/A	1606-XLP50E
		DC 24...28V	3 A	NEC Class 2	X	—	N/A	1606-XLP72E
1606-XL Standard Single Phase								
Standard Single Phase	60 W	DC 24V	2.5 A	NEC Class 2	X	—	N/A	1606-XL60D
	120 W		5 A	—	X	—	Yes	1606-XL120D
	240 W	DC 24...28V	10 A	FM Class 1 Div. 2 T3A	X	—	Yes	1606-XL240EP

Other power supplies are located at www.ab.com/catalogs—select *Industrial Control - English - Power Supplies*.

1485A-C1	12-10	42CF-D1LPA2-A2	1-64	42DRP-5400	1-225
1485A-C3	12-10	42CF-D1LPA2-D4	1-64	42DRP-5500	1-190, 12-3
1485A-M12	12-10	42CF-E1EZB-A2	1-64	42DRU-5000	1-220
1585A-DD4JD	9-13	42CF-E1EZB-D4	1-64	42DRU-5200	1-220
1585D-F4DC-SH	9-12	42CF-P2LNA1-A2	1-64	42DRU-5400	1-224
1585D-M4DC-H	9-12	42CF-P2LNA1-D4	1-64	42DRU-5500	1-189, 12-3
1585D-M4DC-SH	9-12	42CF-P2LPA1-A2	1-64	42DRU-5700	1-189, 12-3
1585D-M4TBJM-1	11-7	42CF-P2LPA1-D4	1-64	42DTB-5000	1-226
1585D-M4TBJM-10	11-7	42CF-R1LNB1-A2	1-64	42DTB-5500	1-190
1585D-M4TBJM-3	11-7	42CF-R1LNB1-D4	1-64	42EF-B1JBBC-A2	1-36
1585D-M4TBJM-5	11-7	42CF-R1LPB1-A2	1-64	42EF-B1JBBC-F4	1-36
1585D-M4TBJM-50	11-7	42CF-R1LPB1-D4	1-64	42EF-B1JBBE-A2	1-36
1606-XL120D	12-11	42CM-B2LNBC-A2	1-60	42EF-B1JBBE-F4	1-36
1606-XL240EP	12-11	42CM-B2LNBC-D4	1-60	42EF-B1KBBC-A2	1-36
1606-XL60D	12-11	42CM-B2LNBE-A2	1-60	42EF-B1KBBC-F4	1-36
1606-XLP30B	12-11	42CM-B2LNBE-D4	1-60	42EF-B1KBBE-A2	1-36
1606-XLP30E	12-11	42CM-B2LPBC-A2	1-60	42EF-B1KBBE-F4	1-36
1606-XLP50B	12-11	42CM-B2LPBC-D4	1-60	42EF-B1LDBC-F5	10-6
1606-XLP50E	12-11	42CM-B2LPBE-A2	1-60	42EF-B1LDBE-F5	10-6
1606-XLP72E	12-11	42CM-B2LPBE-D4	1-60	42EF-B1MNBC-A2	1-36
22ZC-223	1-183	42CM-D1MNAL-A2	1-60	42EF-B1MNBC-F4	1-36
22ZC-343	1-183	42CM-D1MNAL-D4	1-60	42EF-B1MNBC-Y4	1-36
22ZC-413	1-183	42CM-D1MPAL-A2	1-60	42EF-B1MNBE-A2	1-36
22ZC-PWR	1-183	42CM-D1MPAL-D4	1-60	42EF-B1MNBE-F4	1-36
42BA-S1LNAG-A2	1-83	42CM-D2MNAE-A2	1-60	42EF-B1MNBE-Y4	1-36
42BA-S1LPAG-A2	1-83	42CM-D2MNAE-D4	1-60	42EF-B1MPBC-A2	1-36
42BA-S2LNAA-A2	1-83	42CM-D2MPAE-A2	1-60	42EF-B1MPBC-F4	1-36
42BA-S2LNAC-A2	1-83	42CM-D2MPAE-D4	1-60	42EF-B1MPBC-Y4	1-36
42BA-S2LNAE-A2	1-83	42CM-D8MNA-A2	1-118	42EF-B1MPBE-A2	1-36
42BA-S2LPAA-A2	1-83	42CM-D8MNA-D4	1-118	42EF-B1MPBE-F4	1-36
42BA-S2LPAC-A2	1-83	42CM-D8MPA-A2	1-118	42EF-B1MPBE-Y4	1-36
42BA-S2LPAE-A2	1-83	42CM-D8MPA-D4	1-118	42EF-B1RCBC-A2	1-36
42BC-B1CRAL-T4	1-80	42CM-E1EZB-A2	1-61	42EF-B1RCBC-G4	1-36
42BC-B1CRAN-T4	1-80	42CM-E1EZB-D4	1-61	42EF-B1RCBE-A2	1-36
42BC-B1LBAL-T4	1-80	42CM-E8EZB-A2	1-118	42EF-B1RCBE-G4	1-36
42BC-B1LBAN-T4	1-80	42CM-E8EZB-D4	1-118	42EF-B1RFBC-A2	1-36
42BT-B1LBSN-A2	1-77	42CM-P2MNB-A2	1-60	42EF-B1RFBC-G4	1-36
42BT-B1LBSN-F4	1-77	42CM-P2MNB-D4	1-60	42EF-B1RFBE-A2	1-36
42BT-B1LBSN-Y4	1-77	42CM-P2MPB-A2	1-60	42EF-B1RFBE-G4	1-36
42BT-B2LBSL-A2	1-77	42CM-P2MPB-D4	1-60	42EF-B1SCBC-A2	1-36
42BT-B2LBSL-F4	1-77	42CM-P8MNB-A2	1-118	42EF-B1SCBC-G4	1-36
42BT-B2LBSL-Y4	1-77	42CM-P8MNB-D4	1-118	42EF-B1SCBE-A2	1-36
42CA-B2LNBC-D4	1-56	42CM-P8MPB-A2	1-118	42EF-B1SCBE-G4	1-36
42CA-B2LNBE-D4	1-56	42CM-P8MPB-D4	1-118	42EF-B1SFBC-A2	1-36
42CA-B2LPBC-D4	1-56	42CM-R1MNB-A2	1-61	42EF-B1SFBC-G4	1-36
42CA-B2LPBE-D4	1-56	42CM-R1MNB-D4	1-61	42EF-B1SFBE-A2	1-36
42CA-D1MNAE-D4	1-55	42CM-R1MPB-A2	1-61	42EF-B1SFBE-G4	1-36
42CA-D1MNAJ-D4	1-55	42CM-R1MPB-D4	1-61	42EF-C2KBA-A2	1-149
42CA-D1MNAL-D4	1-55	42CM-R8MNB-A2	1-118	42EF-C2KBA-F4	1-149
42CA-D1MPAE-D4	1-55	42CM-R8MNB-D4	1-118	42EF-C2SCA-A2	1-149
42CA-D1MPAJ-D4	1-55	42CM-R8MPB-A2	1-118	42EF-C2SCA-G4	1-149
42CA-D1MPAL-D4	1-55	42CM-R8MPB-D4	1-118	42EF-D1JBAK-A2	1-35
42CA-E1EZB1-D4	1-56	42CM-U1MNB-A2	1-60	42EF-D1JBAK-F4	1-35
42CA-P2MNB-D4	1-55	42CM-U1MNB-D4	1-60	42EF-D1JBCK-A2	1-35
42CA-P2MPB-D4	1-55	42CM-U1MPB-A2	1-60	42EF-D1JBCK-F4	1-35
42CA-R1MNA1-D4	1-56	42CM-U1MPB-D4	1-60	42EF-D1KBAK-A2	1-35
42CA-R1MPA1-D4	1-56	42CRC-4000	1-129	42EF-D1KBAK-F4	1-35
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Solid-State Condition Sensing Switches

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† Indicates obsolete product. For information on these products, please visit our web site at www.ab.com/catalogs and select Sensors.

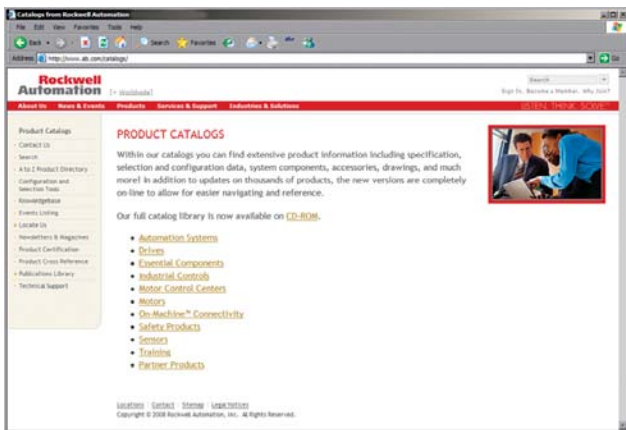
Metric Conversion Factors

From	To	Multiply by
Length		
Inches (in.)	Millimeters (mm)	25.4
Inches (in.)	Centimeters (cm)	2.54
Feet (ft)	Meters (m)	0.305
Yards (yds)	Meters (m)	0.914
Millimeters (mm)	Inches (in.)	0.0393
Centimeters (cm)	Inches (in.)	0.394
Meters (m)	Feet (ft)	3.28
Meters (m)	Yards (yds)	1.09
Area		
Square inches (sq in.)	Square millimeters (mm ²)	645
Square inches (sq in.)	Square centimeters (cm ²)	6.45
Square feet (sq ft)	Square meters (m ²)	0.0929
Square yards (sq yds)	Square meters (m ²)	0.836
Square millimeters (mm ²)	Square inches (sq in.)	0.00155
Square centimeters (cm ²)	Square inches (sq in.)	0.155
Square meters (m ²)	Square feet (sq ft)	10.8
Square meters (m ²)	Square yards (sq yds)	1.20
Weight		
Ounces (oz)	Grams (g)	28.3
Pounds (lb)	Kilograms (kg)	0.454
Grams (g)	Ounces (oz)	0.0353
Kilograms (kg)	Pounds (lb)	2.20
Volume		
Cubic inches (cu in)	Cubic centimeters (cm ³)	16.4
Cubic feet (cu ft)	Cubic meters (m ³)	0.0283
Cubic inches (cu in)	Liters (l)	0.0164
Cubic feet (cu ft)	Liters (l)	28.3
Gallons (Imp)	Liters (l)	4.55
Gallons (US)	Liters (l)	3.79
Cubic centimeters (cm ³)	Cubic inches (cu in)	0.061
Cubic meters (m ³)	Cubic feet (cu ft)	35.3
Liters (l)	Cubic inches (cu in)	61.0
Liters (l)	Cubic feet (cu ft)	0.0353
Liters (l)	Gallons (Imp)	0.220
Liters (l)	Gallons (US)	0.264
Pressure		
Pounds/square inch (psi)	kiloPascals (kPa)	6.89
Pounds/square inch (psi)	Bars (Bar)	0.0689
kiloPascals (kPa)	Pounds/square inch (psi)	0.145
Bars (Bar)	Pounds/square inch (psi)	14.5
Torque		
Pound inch (lb•in.)	Newton meters (N•m)	0.113
Newton meters (N•m)	Pound inch (lb•in.)	8.85
Temperature		
Degrees Fahrenheit (°F)	Degrees Celsius (°C)	①
Degrees Celsius (°C)	Degrees Fahrenheit (°F)	②

① Conversion Formula: $5/9 (°F - 32°F) = °C$

② Conversion Formula: $9/5 (°C + 32°F) = °F$

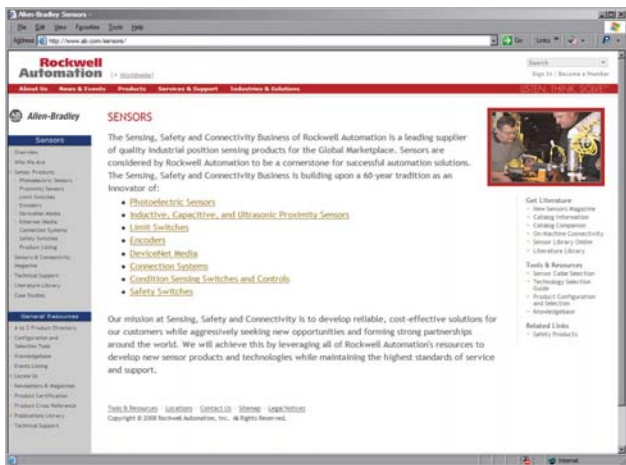
On-Line Resources



Sensors Catalog www.ab.com/catalogs

For the most current version of this *Sensors* catalog, visit the Allen-Bradley catalog web site at www.ab.com/catalogs. With our on-line catalog, you can search for information by product type or by part number.

On-line catalogs are updated regularly, so come back often to find the latest information!



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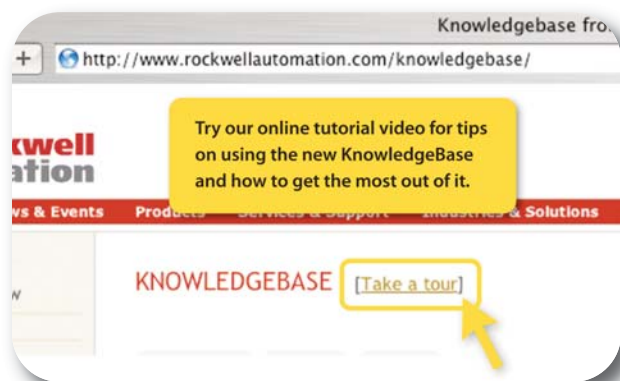
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