Kinetix 350 to Kinetix 5300 Servo Drive Migration Guide

Catalog Numbers 2198-C1004-ERS, 2198-C1007-ERS, 2198-C1015-ERS, 2198-C1020-ERS, 2198-C2030-ERS, 2198-C2055-ERS, 2198-C2075-ERS, 2198-C4004-ERS, 2198-C4007-ERS, 2198-C4015-ERS, 2198-C4020-ERS, 2198-C4030-ERS, 2198-C4055-ERS, 2198-C4075-ERS

Allen-Bradley
by ROCKWELL AUTOMATION

Reference Manual

Original Instructions

Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.

IMPORTANT Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.

SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.

BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.

ARC FLASH HAZARD: Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

System Architecture

Chapter 4

Appendix A

The purpose of this guide is to provide you with the essential information to determine necessary changes when migrating from a system containing Kinetix® 350 servo drives to one containing Kinetix 5300 servo drives.

Migrating from a motion control system that uses Kinetix 350 drives to a system that uses Kinetix 5300 drives requires a comprehensive design review of the motion control system. As a result, this migration guide is not an all-inclusive document. It does not describe all redesign steps required, nor contain the detailed product information necessary to finalize the redesign. The generalities of the replacement process are covered, and the decision-making steps likely to be encountered in a typical replacement scenario are described.

This manual is intended for engineers and technicians that are directly involved in the installation and wiring of the Kinetix 5300 drives, and programmers who are directly involved in the operation, field maintenance, and integration of these drives. You must have previous experience with, and a basic understanding of, electrical terminology, programming procedures, networking (and required equipment and software), and safety precautions.

Product compatibility information and release notes are available online within the Product Compatibility and Download Center at rok.auto/pcdc.

Migration Options

This migration guide provides you with the essential information to determine hardware design changes that can be necessary when migrating from a motion system that contains Kinetix 350 servo drives to one that contains Kinetix 5300 servo drives.

Potential Design Changes

The design changes required for converting to the Kinetix 5300 drives depend on the original/replacement drive combination and the specifics of the application. The objective is to determine which areas of a design must be changed. This publication provides you with knowledge about the type and extent of work required to change successfully from a Kinetix 350 system to a Kinetix 5300 system.

Due to the flexibility of drive installation and usage, it is not feasible to cover all possibilities. In addition to the items described in this publication, pay attention to unique features and functions of the Kinetix 350 system when considering replacement with a Kinetix 5300 system.

See Appendix A for a comparison of features. See the Kinetix Servo Drives Specifications Technical Data, publication KNX-TD003 for complete specifications.

Application Conversion

Studio 5000 Logix Designer application is used to configure and program both the Kinetix 350 and Kinetix 5300 drives.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
Kinetix Rotary Motion Specifications Technical Data, publication KNX-TD001	Product specifications for Kinetix VP, Kinetix MP, Kinetix TL and TLY, Kinetix RDB, Kinetix TLP, and Kinetix HPK rotary motors.
Kinetix Servo Drives Specifications Technical Data, publication KNX-TD003	Product specifications for Kinetix Integrated Motion over the EtherNet/IP network, Integrated Motion over Sercos interface, EtherNet/IP networking, and component servo drive families.
Kinetix 5300 Drive Systems Design Guide, publication KNX-RM012	System design guide to select the required (drive specific) drive module, power accessory, feedback connector kit, and motor cable catalog numbers for your Kinetix 5300 drive and Kinetix motion control system.
Ethernet Reference Manual, publication ENET-RM002	Provides information on how to design Ethernet and EtherNet/IP networks.
Kinetix Motion Control Selection Guide, publication KNX-SG001	Overview of Kinetix servo drives, motors, actuators, and motion accessories that are designed to help make initial decisions for the motion control products best suited for your system requirements.
Kinetix 300 and Kinetix 350 Drive Systems Design Guide, publication KNX-RM004	Provides information to help identify the drive system components and accessory items you need for your Kinetix 300/350 drive and motor/actuator combination.
Kinetix 5300 Single-axis EtherNet/IP Servo Drives User Manual, publication 2198-UM005	Provides installation instructions to mount, wire, and troubleshoot your Kinetix 5300 drive; and system integration for your drive/motor combination with a Logix controller.
Kinetix 350 EtherNet/IP Indexing Servo Drives User Manual, publication 2097-UM002	Provides installation instructions to mount, wire, and troubleshoot your Kinetix 350 drive; and system integration for your drive/motor combination with a Logix controller.
Kinetix 350 Single-axis EtherNet/IP Servo Drive Installation Instructions, publication 2097-IN008	Provides information on how to install your Kinetix 350 drive system.
Bulletin 2097 Shunt Resistor Installation Instructions, publication 2097-IN002	Provides information on how to install and wire the Kinetix 350 drive shunt resistors.
Bulletin 2097 AC Line Filter Installation Instructions, publication 2097-IN003	Provides information on how to install and wire the Kinetix 350 drive AC line filter.
Bulletin 2097 I/O Terminal Expansion Block Installation Instructions, publication 2097-IN005	Provides information on how to install and wire the Kinetix 350 drive I/O terminal expansion block.
Servo Drive Installation Best Practices Application Technique, publication MOTION-AT004	Best practice examples to help reduce the number of potential noise or electromagnetic interference (EMI) sources in your system and to make sure that the noise sensitive components are not affected by the remaining noise.
System Design for Control of Electrical Noise Reference Manual, publication GMC-RM001	Information, examples, and techniques designed to minimize system failures caused by electrical noise.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines to install a Rockwell Automation industrial system.
Product Certifications website: rok.auto/certifications	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at rok.auto/literature.

Replacement Considerations

Replacing a Kinetix® 350 drive with a Kinetix 5300 drive can require some system design changes:

- Review the hardware and software design of the existing Kinetix 350 system.
- Compare these designs to the hardware and software specifications for the Kinetix 5300 drives.

WARNING: 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 make sure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes, and standards. In no event will Rockwell Automation be responsible or liable for indirect or consequential damage resulting from the use or application of these products.

This publication highlights the major differences between the Kinetix 350 servo drives and the Kinetix 5300 servo drives. Additional differences can also impact your application. Review this publication to evaluate your needs.

Design considerations:

- Upload and save any network files and programmable logic controller (PLC) programs that you can use for the new system.
- See the System Design for Control of Electrical Noise Reference Manual, publication GMC-RM001 and Servo Drive Installation Best Practices Application Technique, publication MOTION-AT004 for information on the concept of high-frequency (HF) bonding, the Ground Plane principle, and electrical noise reduction.
- Verify that your current motor is compatible.
- Verify that the drive size is compatible.
- Verify that the drive dimensions are compatible with your available installation space.
- Verify that the drive connections and connector wires are all labeled prior to disconnecting the old connectors.

Catalog Number Explanation

Kinetix 5300 drive catalog numbers and performance descriptions.

Table 1 - Kinetix 5300 Servo Drives

Cat. No.	Frame Size	Input Voltage	Continuous Output Power kW	Continuous Output Current A (rms)	Peak Output Current A (rms)
2198-C1004-ERS	1	85...132V rms single-phase 170...253V rms single-phase 170...253V rms three-phase	0.22 0.46 0.72	2.8 2.8 2.8	6.6 9.5 9.5
2198-C1007-ERS	1		0.36 0.76 1.18	4.6 4.6 4.6	9.7 15.5 15.5
2198-C1015-ERS	2		0.67 1.41 2.18	8.5 8.5 8.5	12.2 20.5 29.2
2198-C1020-ERS	2		0.97 2.02 3.13	12.2 12.2 12.2	25.0 40.6 40.6
2198-C2030-ERS	2	170...253V rms three-phase	5.02	19.6	61.0
2198-C2055-ERS	3		10.30	40.2	108.0
2198-C2075-ERS	3		12.22	47.7	127.5
2198-C4004-ERS	1	342...528V rms three-phase	0.86	1.6	5.3
2198-C4007-ERS	1		1.55	2.9	9.3
2198-C4015-ERS	2		2.78	5.2	18.0
2198-C4020-ERS	2		3.90	7.3	23.8
2198-C4030-ERS	2		6.25	11.7	34.1
2198-C4055-ERS	3		12.08	22.6	58.5
2198-C4075-ERS	3		14.70	27.5	73.5

Select a Replacement Drive

There are a number of different factors that affect the selection of a replacement servo drive and the system redesign effort. Drive sizing is the primary factor in selecting a replacement servo drive. To identify the correct replacement drive size, compare the continuous and peak output current ratings.

Kinetix 350 drives can be replaced with a Kinetix 5300 drive of similar, or in some cases, greater output current capability.

The Kinetix 5300 drives with similar current ratings require a similar physical space compared to the Kinetix 350 drives.

Factors that affect the redesign effort include these considerations:

- Drive sizing (ratings and physical)
- Dimension comparison
- Drive interconnects and cabling
- Accessories

Drive Replacement

This section lists the Kinetix 350 servo drives and the suggested Kinetix 5300 replacement servo drives, along with the output ratings and dimension differences of the drives. Information in this migration guide is based on the drive combinations that are shown in Table 2 and Table 3.

Nominal Voltage and Output Current Comparison

Table 2 compares the Output Current of the Kinetix 350 and Kinetix 5300 drives. Review Table 2 to ensure that the replacement drive can deliver the required level of peak and continuous current to the motor.

Table 2 - Suggested Kinetix 5300 Replacement Drives by Output Current

Kinetix 350 Drive				Kinetix 5300 Drive			
Cat. No.	**Voltage Range**	**Continuous Output Current** A rms (0-pk)	**Peak Output Current** A rms (0-pk)	**Cat. No.**	**Voltage Range**	**Continuous Output Current** A rms (0-pk)	**Peak Output Current** A rms (0-pk)
2097-V33PR1-LM	80...132V, single-phase (120V nom)	2 (2.8)	6.0 (8.5)	2198-C1004-ERS	85...132V, single-phase (110V nom)	2.8 (4.0)	6.6 (13.4)
2097-V33PR3-LM		4 (5.7)	12.0 (17.0)	2198-C1007-ERS		4.6 (6.5)	9.7 (21.9)
2097-V33PR5-LM		8 (11.3)	24.0 (33.9)	2198-C1015-ERS		8.5 (11.7)	12.2 (41.3)
2097-V33PR6-LM		12 (17.0)	36.0 (50.9)	2198-C1020-ERS		12.2 (17.3)	25.0 (57.4)
2097-V31PR0-LM	80...264V, single-phase (240V nom)	2 (2.8)	6.0 (8.5)	2198-C1004-ERS	170...253V, single-phase (230V nom)	2.8 (4.0)	9.5 (13.4)
2097-V31PR2-LM		4 (5.7)	12.0 (17.0)	2198-C1007-ERS		4.6 (6.5)	15.5 (21.9)
2097-V32PR0-LM		2 (2.8)	6.0 (8.5)	2198-C1004-ERS		2.8 (4.0)	9.5 (13.4)
2097-V32PR2-LM		4 (5.7)	12.0 (17.0)	2198-C1007-ERS		4.6 (6.5)	15.5 (21.9)
2097-V32PR4-LM		8 (11.3)	24.0 (33.9)	2198-C1015-ERS		8.5 (12.0)	20.5 (41.3)
2097-V33PR1-LM		2 (2.8)	6.0 (8.5)	2198-C1004-ERS		2.8 (4.0)	9.5 (13.4)
2097-V33PR3-LM		4 (5.7)	12.0 (17.0)	2198-C1007-ERS		4.6 (6.5)	15.5 (21.9)
2097-V33PR5-LM		8 (11.3)	24.0 (33.9)	2198-C1015-ERS		8.5 (12.0)	20.5 (41.3)
2097-V33PR6-LM		12 (17.0)	36.0 (50.9)	2198-C1020-ERS		12.2 (17.3)	40.6 (57.4)
2097-V33PR1-LM	80...264V, three-phase (240V nom)	2 (2.8)	6.0 (8.5)	2198-C1004-ERS	170...253V, three-phase (230V nom)	2.8 (4.0)	9.5 (13.4)
2097-V33PR3-LM		4 (5.7)	12.0 (17.0)	2198-C1007-ERS		4.6 (6.5)	15.5 (21.9)
2097-V33PR5-LM		8 (11.3)	24.0 (33.9)	2198-C1015-ERS		8.5 (12.0)	29.2 (41.3)
2097-V33PR6-LM		12 (17.0)	36.0 (50.9)	2198-C1020-ERS		12.2 (17.3)	40.6 (57.4)
2097-V34PR3-LM	320...528V, three-phase (480V nom)	2.0 (2.8)	6.0 (8.5)	2198-C4007-ERS	342...528V, three-phase (480V nom)	2.9 (4.1)	9.3 (13.2)
2097-V34PR5-LM		4.0 (5.7)	12.0 (17.0)	2198-C4015-ERS		5.2 (7.4)	18.0 (25.5)
2097-V34PR6-LM		6.0 (8.5)	18.0 (25.5)	2198-C4020-ERS		7.3 (10.3)	23.8 (33.7)

Table 3 - Additional Kinetix 5300 Drives by Output Current

Kinetix 5300 drive			
Cat. No.	**Voltage Range**	**Continuous Output Current** A rms (0-pk)	**Peak Output Current** A rms (0-pk)
2198-C2030-ERS	170...253V, three-phase, (230V nom)	19.6 (27.7)	60.1 (86.3)
2198-C2055-ERS		40.2 (56.9)	108.0 (152.7)
2198-C2075-ERS		47.7 (67.5)	127.5 (180.3)
2198-C4004-ERS	342...528V, three-phase, (480V nom)	1.6 (2.3)	5.3 (7.5)
2198-C4030-ERS		11.7 (16.5)	34.1 (48.3)
2198-C4055-ERS		22.6 (32.0)	58.5 (82.7)
2198-C4075-ERS		27.5 (38.9)	73.5 (103.9)

Dimension Comparison

Table 4 compares the dimensions of the Kinetix 350 and Kinetix 5300 drives.

Table 4 - Suggested Kinetix 5300 Replacement Drives by Dimensions

Kinetix 350 drive				Kinetix 5300			
Cat. No.	**Height** mm (in.) (1)	**Width** mm (in.)	**Depth** mm (in.)	**Cat. No.**	**Height** mm (in.)(1)	**Width** mm (in.)	**Depth** mm (in.)
2097-V31PR0-LM	238 (9.37)	68.0 (2.68)	185 (7.28)	2198-C1004-ERS	215 (8.46)	50 (1.97)	200 (7.87)
2097-V31PR2-LM	238 (9.37)	69.0 (2.72)	185 (7.28)	2198-C1007-ERS	215 (8.46)	50 (1.97)	200 (7.87)
2097-V32PR0-LM	238 (9.37)	68.0 (2.68)	230 (9.06)	2198-C1004-ERS	215 (8.46)	50 (1.97)	200 (7.87)
2097-V32PR2-LM	238 (9.37)	69.0 (2.72)	230 (9.06)	2198-C1007-ERS	215 (8.46)	50 (1.97)	200 (7.87)
2097-V32PR4-LM	238 (9.37)	87.0 (3.43)	230 (9.06)	2198-C1015-ERS	265 (10.43)	55 (2.16)	200 (7.87)
2097-V33PR1-LM	238 (9.37)	68.0 (2.68)	185 (7.28)	2198-C1004-ERS	215 (8.46)	50 (1.97)	200 (7.87)
2097-V33PR3-LM	238 (9.37)	69.0 (2.72)	185 (7.28)	2198-C1007-ERS	215 (8.46)	50 (1.97)	200 (7.87)
2097-V33PR5-LM	238 (9.37)	94.0 (3.70)	185 (7.28)	2198-C1015-ERS	265 (10.43)	55 (2.16)	200 (7.87)
2097-V33PR6-LM	238 (9.37)	68.0 (2.68)	230 (9.06)	2198-C1020-ERS	265 (10.43)	55 (2.16)	200 (7.87)
2097-V34PR3-LM	238 (9.37)	69.0 (2.72)	185 (7.28)	2198-C4007-ERS	215 (8.46)	50 (1.97)	200 (7.87)
2097-V34PR5-LM	238 (9.37)	94.0 (3.70)	185 (7.28)	2198-C4015-ERS	265 (10.43)	55 (2.16)	200 (7.87)
2097-V34PR6-LM	238 (9.37)	68.0 (2.68)	230 (9.06)	2198-C4020-ERS	265 (10.43)	55 (2.16)	200 (7.87)

(1) Height includes connectors.

Refer to Dimensions, Cables, and Wiring for additional information on dimensions.

AC Input Power Cable Length and Fuse Protection

This section provides information to assist in the determination of power cable lengths and fuse protection for the drives.

AC Input Power Configuration

The Kinetix 350 drive supports multiple types of AC input power: center grounded wye secondary, and corner grounded delta secondary.

The Kinetix 5300 drives only support AC input power with center grounded wye secondary.

Input Power Cable Length and Fuse Protection

Determine the wire length for the AC line input after the drive location and cable routing are finalized.

In general, the recommended drive replacement should not require changes in wiring length; however, the routing may need to change as the input power (Mains IPD) and motor power (MP) connections on the Kinetix 350 drives and Kinetix 5300 could be in different physical locations with different terminations. Table 5 gives an overview of the connection placement for Kinetix 5300 drives. See Connectors for a comparison of the Kinetix 350 and Kinetix 5300 drive connectors.

Table 5 - Input and Motor Power Connection Placement for Kinetix 350 and Kinetix 5300 Drives

Series	Input Power Location	Motor Power Location
Kinetix 350	Top	Front
Kinetix 5300	Top	Bottom

Circuit Breaker and Fuse Considerations

Review the fusing requirements when you change a drive.

Table 6 - Kinetix 350 Drive Fuse and Circuit Breaker (CB) Specifications

Drive Cat. No.	Drive Voltage	Phase	UL Applications			IEC (non-UL) Applications		
			Fuses (Bussmann)	Miniature CB Cat. No.	Motor Protection CB Cat. No.	DIN gG Fuses Amps (max)	Miniature CB Cat. No.	Motor Protection CB Cat. No.
2097-V31PR0-LM	120/240V	Single-phase	KTK-R-10 (10 A)	1489-M1C100	140M-C2E-C10	10	1492-SPM1D100	140M-C2E-C10
2097-V31PR2-LM	120/240V	Single-phase	KTK-R-20 (20 A)	1489-M1C200	140M-D8E-C20	20	1492-SPM1D200	140M-D8E-C20
2097-V32PR0-LM	240V	Single-phase	KTK-R-15 (15 A)	1489-M1C150	140M-D8E-C16	16	1492-SPM1D150	140M-D8E-C16
2097-V32PR2-LM	240V	Single-phase	KTK-R-20 (20 A)	1489-M1C200	140M-D8E-C20	20	1492-SPM1D200	140M-D8E-C20
2097-V32PR4-LM	240V	Single-phase	KTK-R-30 (30 A)	1489-M1C300	140M-F8E-C32	32	1492-SPM1D320	140M-F8E-C32
2097-V33PR1-LM	120/240V	Single-phase	KTK-R-20 (20 A)	1489-M1C200	140M-D8E-C20	20	1492-SPM1D200	140M-D8E-C20
	240V	Three-phase	KTK-R-15 (15 A)	1489-M3C150	140M-D8E-C16	16	1492-SPM3D150	140M-D8E-C16
2097-V33PR3-LM	120/240V	Single-phase	KTK-R-20 (20 A)	1489-M1C200	140M-D8E-C20	20	1492-SPM1D200	140M-D8E-C20
	240V	Three-phase	KTK-R-15 (15 A)	1489-M3C150	140M-D8E-C16	16	1492-SPM3D150	140M-D8E-C16
2097-V33PR5-LM	120/240V	Single-phase	KTK-R-30 (30 A)	1489-M1C300	140M-F8E-C32	32	1492-SPM1D300	140M-F8E-C32
	240V	Three-phase	KTK-R-20 (20 A)	1489-M3C200	140M-D8E-C20	20	1492-SPM3D200	140M-D8E-C20
2097-V33PR6-LM	120/240V	Single-phase	LPJ-40SP	—	140M-F8E-C32	40	—	140M-F8E-C32
	240V	Three-phase	KTK-R-30 (30 A)	1489-M3C300	140M-F8E-C32	32	1492-SPM3D300	140M-F8E-C32

Table 7 - Kinetix 5300 Drive Fuse and Circuit Breaker (CB) Specifications

Kinetix 5300 Drives			UL Applications		IEC (non-UL) Applications		
Drive Cat. No.	Drive Voltage	Phase	Fuses (Bussmann)	Molded Case CB Cat. No.	DIN gG Fuses Amps (max)	Miniature CB Cat. No.	Molded Case CB Cat. No.
2198-C1004-ERS	110V	Single-phase	KTK-R-6	140U-D6D2-B40	6	1489-M2C060	140U-D6D2-B40
	230V	Single-phase	KTK-R-6				
		Three-phase	KTK-R-6	140U-D6D3-B40		1489-M3C060	140U-D6D3-B40
2198-C1007-ERS	110V	Single-phase	KTK-R-10	140U-D6D2-B80	10	1489-M2C100	140U-D6D2-B80
	230V	Single-phase	KTK-R-10				
		Three-phase	KTK-R-10	140U-D6D3-B80		1489-M3C100	140U-D6D3-B80
2198-C1015-ERS	110V	Single-phase	KTK-R-15	140U-D6D2-C12	16	1489-M2C160	140U-D6D2-C12
	230V	Single-phase	KTK-R-15				
		Three-phase	KTK-R-15	140U-D6D3-C12		1489-M3C160	140U-D6D3-C12
2198-C1020-ERS	110V	Single-phase	KTK-R-25	140U-D6D2-C20	25	1489-M2C250	140U-D6D2-C20
	230V	Single-phase	KTK-R-25				
		Three-phase	KTK-R-25	140U-D6D3-C20		1489-M3C250	140U-D6D3-C20
2198-C2030-ERS	230V	Three-phase	KTK-R-30	140U-D6D3-C30	32	1489-M3C400	140U-D6D3-C30
2198-C2055-ERS	230V	Three-phase	LPJ-50SP	140G-G6C3-C50	40	–	140G-G6C3-C50
2198-C2075-ERS	230V	Three-phase	LPJ-60SP	140G-G6C3-C60	50	–	140G-G6C3-C60
2198-C4004-ERS	480V	Three-phase	KTK-R-3	140U-D6D3-B20	2	1489-M3C030	140U-D6D3-B20
2198-C4007-ERS	480V	Three-phase	KTK-R-6	140U-D6D3-B40	6	1489-M3C060	140U-D6D3-B40
2198-C4015-ERS	480V	Three-phase	KTK-R-12	140U-D6D3-B80	12	1489-M3C100	140U-D6D3-B80
2198-C4020-ERS	480V	Three-phase	KTK-R-15	140U-D6D3-C12	16	1489-M3C130	140U-D6D3-C12
2198-C4030-ERS	480V	Three-phase	KTK-R-25	140U-D6D3-C15	25	1489-M3C200	140U-D6D3-C15
2198-C4055-ERS	480V	Three-phase	LPJ-30SP	140U-D6D3-C30	32	1489-M3C350	140U-D6D3-C30
2198-C4075-ERS	480V	Three-phase	LPJ-35SP	140U-D6D3-C30	32	1489-M3C400	140U-D6D3-C30

Power Specifications

This section provides the power specifications for the Kinetix 350 and Kinetix 5300 servo drives.

Table 8 ...Table 10 list the power specifications and requirements for the Kinetix 350 servo drives.

Table 8 - Kinetix 350 Drives (Single-phase) Power Specifications

Attribute	2097-V31PR0-LM	2097-V31PR2-LM	2097-V32PR0-LM	2097-V32PR2-LM	2097-V32PR4-LM
AC input voltage	70...132V rms single-phase (120V nom) voltage-doubler mode 80...264V rms single-phase (240V nom)		80...264V rms single-phase (240V nom)		
AC input frequency	48...62 Hz				
Main AC input current (1) Rms (nom) 120V input (voltage-doubler) Inrush (0-pk) Max 120V input Rms (nom) 120/240V input Inrush (0-pk) max 240V input	 9.70 A 1.15 A 5.0 A 1.1 A	 15.0 A 1.15 A 8.6 A 1.1	 5.0 A 136 A	 8.6 A 2.3 A	 15.0 A 2.3 A
Integrated AC line filter	No	No	Yes	Yes	Yes
Continuous output current (rms)	2.0 A	4.0 A	2.0 A	4.0 A	8.0 A
Continuous output current (0-pk)	2.8 A	5.7 A	2.8 A	5.7 A	11.3 A
Peak output current (rms) (2)	6.0 A	12.0 A	6.0 A	12.0 A	24.0 A
Peak output current (0-pk)	8.5 A	17.0 A	8.5 A	17.0 A	39.9 A
Continuous power output @ 240V nom or 120V (voltage-doubler mode) (3)	0.40 kW	0.80 kW	0.40 kW	0.80 kW	1.70 kW
Shunt On	390V DC				
Shunt Off	375V DC				
Overvoltage	430V DC				
Short-circuit current rating	100,000 A (rms) symmetrical				

(1) Kinetix 350 drive modules are limited to 1 AC main power cycling per every 2 minutes.
(2) Peak RMS current allowed for up to 2 seconds with a 50% duty cycle.
(3) Nominal continuous power output (kW) applies to 240V AC drives. Value is approximately one-half of this kW rating when using 120V AC.

Table 9 - Kinetix 350 Drives (single-phase and three-phase) Power Specifications

Attribute	2097-V33PR1-LM	2097-V33PR3-LM	2097-V33PR5-LM	2097-V33PR6-LM
AC input voltage	80...132V rms single-phase (120V nom) 80...264V rms single-phase (240V nom) 80...264V rms three-phase (240V nom)			
AC input frequency	48...62 Hz			
Main AC input current (1) Rms (nom) 120V input (voltage doubler) Inrush (0-pk) max 120V input Rms (nom) 120/240V input Inrush (0-pk) max 240V input	 5.0 A 68.0 A 3.0 A 136 A	 8.6 A 1.15 A 5.0 A 2.3 A	 15.0 A 1.15 A 8.7 A 2.3 A	 24.0 A 5.65 A 13.9 A 11.3 A
Integrated AC line filter	No	No	No	No
Continuous output current (rms)	2.0 A	4.0 A	8.0 A	12.0 A
Continuous output current (0-pk)	2.8 A	5.7 A	11.3 A	17.0 A
Peak output current (rms) (2)	6.0 A	12.0 A	24.0 A	36.0 A
Peak output current (0-pk)	8.5 A	17.0 A	33.9 A	50.9 A
Continuous power output @ 240V nom or 120V (voltage-doubler mode) (3)	0.50 kW	1.00 kW	2.00 kW	3.00 kW
Shunt On	390V DC			
Shunt Off	375V DC			
Overvoltage threshold	430V DC			
Short-circuit current rating	100,000 A (rms) symmetrical			

(1) Kinetix 350 drive modules are limited to 1 AC main power cycling per every 2 minutes.
(2) Peak RMS current allowed for up to 2 seconds with a 50% duty cycle.
(3) Nominal continuous power output (kW) applies to 240V AC drives. Value is approximately one-half of this kW rating when using 120V AC.

Table 10 - Kinetix 350 Drive (three-phase) Power Specifications

Attribute	2097-V34PR3-LM	2097-V34PR5-LM	2097-V34PR6-LM
AC input voltage	320…528V rms three-phase (480V nom)		
AC input frequency	48…62 Hz		
Main AC input current [1] Nom (rms) Max inrush (0-pk)	 2.7 A 4.5 A	 5.5 A 4.5 A	 7.9 A 22.6 A
Integrated AC line filter	No	No	No
Continuous output current (rms)	2.0 A	4.0 A	6.0 A
Continuous output current (0-pk)	2.8 A	5.7 A	8.5 A
Peak output current (rms) [2]	6.0 A	12.0 A	18.0 A
Peak output current (0-pk)	8.5 A	17.0 A	25.5 A
Continuous power output @ 480V nom	1.00 kW	2.00 kW	3.00 kW
Shunt on	780V DC		
Shunt off	750V DC		
Overvoltage	850V DC		
Short-circuit current rating	100,000 A (rms) symmetrical		

(1) Kinetix 350 drive modules are limited to 1 AC mains power cycling per every 2 minutes.
(2) Peak RMS current allowed for up to 2 seconds with a 50% duty cycle.

Table 11 … Table 14 list power specifications and requirements for the Kinetix 5300 drives.

Table 11 - Kinetix 5300 (110V and 230V, single-phase and three-phase) Power Specifications

Attribute	2198-C1004-ERS	2198-C1007-ERS	2198-C1015-ERS	2198-C1020-ERS
AC input voltage	85…132V rms, single-phase (110V nom) 170…253V rms, single-phase (230V nom) 170…253V rms, three-phase (230V nom)			
AC input frequency	47…63 Hz			
Main AC input current (rms) [1]	2.17 A	3.56 A	6.58 A	9.45 A
Max inrush current (0-pk) Nom 110V input (single-phase) Nom 230V input (single-phase) Nom 230V input (three-phase)	 6.0 A 11.5 A 7.4 A	 6.0 A 11.5 A 7.4 A	 6.0 A 11.5 A 7.4 A	 6.0 A 11.5 A 7.4 A
Peak AC input current (rms)	6.99 A	10.48 A	19.75 A	27.46 A
Control power input voltage [2]	21.6…26.4V DC 24V DC nom			
Control power input current [1] [3] (non-brake motors)	0.4 A $_{DC}$	0.4 A $_{DC}$	0.9 A $_{DC}$	0.9 A $_{DC}$
Continuous output current (rms) Nom 110V input (single-phase) Nom 230V input (single-phase) Nom 230V input (three-phase)	 2.8 A	 4.6 A	 8.5 A	 12.2 A
Continuous output current (0-pk) Nom 110V input (single-phase) Nom 230V input (single-phase) Nom 230V input (three-phase)	 4.0 A	 6.5 A	 12.0 A	 17.3 A
Peak output current (rms) [4] Nom 110V input (single-phase) Nom 230V input (single-phase) Nom 230V input (three-phase)	 6.6 A 9.5 A 9.5 A	 9.7 A 15.5 A 15.5 A	 12.2 A 20.5 A 29.2 A	 25.0 A 40.6 A 40.6 A
Peak output current (0-pk) Nom 110V input (single-phase) Nom 230V input (single-phase) Nom 230V input (three-phase)	 9.3 A 13.4 A 13.4 A	 13.7 A 21.9 A 21.9 A	 17.3 A 29.0 A 41.3 A	 35.4 A 57.4 A 57.4 A
Line loss ride through	20 ms			

Table 11 - Kinetix 5300 (110V and 230V, single-phase and three-phase) Power Specifications (continued)

Attribute	2198-C1004-ERS	2198-C1007-ERS	2198-C1015-ERS	2198-C1020-ERS
Continuous output power @ 110V nom single-phase @ 230V nom single-phase @ 230V nom three-phase	 0.22 kW 0.46 kW 0.72 kW	 0.36 kW 0.76 kW 1.18 kW	 0.67 kW 1.41 kW 2.18 kW	 0.97 kW 2.02 kW 3.13 kW
Internal shunt on	387.5V			
Internal shunt off	377.5V			
Internal shunt resistor	100 Ω	100 Ω	60 Ω	60 Ω
Internal shunt power	30 W	30 W	50 W	50 W
Bus undervoltage limit	72V @110V AC input 144V @230V AC input			
Bus overvoltage limit	405V			
Bus capacitance	330 µF	560 µF	660 µF	1120 µF
Capacitive energy absorption @ 110V nom AC input @ 230V nom AC input	 21.31 J 5.94 J	 36.17 J 10.08 J	 42.63 J 11.88 J	 72.34 J 20.16 J
Efficiency	91% @110V (single-phase) AC input 95% @230V (single-phase) AC input 97% @230V (three-phase) AC input			
Short-circuit current rating (5)	200,000 A (rms) symmetrical			

(1) Drives are limited to one power cycle per minute.
(2) The cooling fan runs as part of the control power startup routine, when the inverter is enabled, and if the inverter temperature exceeds preset threshold.
(3) For current values when motors include a holding brake, refer to Kinetix Servo Drive Specifications Technical Data, publication KNX-TD003.
(4) Peak RMS current allowed for up to 1.0 seconds.
(5) This rating is only valid if UL specified fuses are used.

Table 12 - Kinetix 5300 (230V, three-phase) Input Power Specifications

Attribute	2198-C2030-ERS	2198-C2055-ERS	2198-C2075-ERS
AC input voltage	170…253V rms, three-phase (230V nom)		
AC input frequency	47…63 Hz		
Main AC input current (rms) (1)	15.18 A	31.13 A	36.93 A
Max inrush current (0-pk)	7.4 A	14.8 A	14.8 A
Peak AC input current (rms)	41.26 A	73.06 A	86.25 A
Control power input voltage (2)	21.6…26.4V DC 24V DC nom		
Control power input current (1) (3) (non-brake motors)	0.9 A_{DC}	1.7 A_{DC}	1.7 A_{DC}
Continuous output current (rms)	19.6 A	40.2 A	47.7 A
Continuous output current (0-pk)	27.7 A	56.9 A	67.5 A
Peak output current (rms) (4)	61.0 A	108.0 A	127.5 A
Peak output current (0-pk)	86.3 A	152.7 A	180.3 A
Line loss ride through	20 ms		
Continuous output power	5.02 kW	10.30 kW	12.22 kW
Internal shunt on	387.5V		
Internal shunt off	377.5V		
Internal shunt resistor	60 Ω	40 Ω	
Internal shunt power	50 W	75 W	
Bus undervoltage limit	144V		
Bus overvoltage limit	405V		
Bus capacitance	1680 µF	2460 µF	3280 µF
Capacitive energy absorption	30.25 J	44.29 J	59.05 J
Efficiency	97%		
Short-circuit current rating (5)	200,000 A (rms) symmetrical		

(1) Drives are limited to one power cycle per minute.
(2) The cooling fan runs as part of the control power startup routine, when the inverter is enabled, and if the inverter temperature exceeds preset threshold.
(3) For current values when motors include a holding brake, refer to Kinetix Servo Drive Specifications Technical Data, publication KNX-TD003.
(4) Peak RMS current allowed for up to 1.0 seconds.
(5) This rating is only valid if UL specified fuses are used.

Table 13 - Kinetix 5300 (480V, three-phase) Input Power Specifications

Attribute	2198-C4004-ERS	2198-C4007-ERS	2198-C4015-ERS	2198-C4020-ERS
AC input voltage	342…528V rms, three-phase (480V nom)			
AC input frequency	47…63 Hz			
Main AC input current (rms) (1)	1.24 A	2.25 A	4.03 A	5.65 A
Max inrush current (0-pk)	15.5 A	15.5 A	15.5 A	15.5 A
Peak AC input current (rms)	3.59 A	6.29 A	12.18 A	16.10 A
Control power input voltage (2)	21.6…26.4V DC 24V DC nom			
Control power input current (1) (3) (non-brake motors)	0.4 A_{DC}	0.4 A_{DC}	0.9 A_{DC}	0.9 A_{DC}
Continuous output current (rms)	1.6 A	2.9 A	5.2 A	7.3 A
Continuous output current (0-pk)	2.3 A	4.1 A	7.4 A	10.3 A
Peak output current (rms) (4)	5.3 A	9.3 A	18.0 A	23.8 A
Peak output current (0-pk)	7.5 A	13.2 A	25.5 A	33.7 A
Line loss ride through	20 ms			
Continuous output power	0.86 kW	1.55 kW	2.78 kW	3.90 kW
Internal shunt on	775V			
Internal shunt off	765V			
Internal shunt resistor	100 Ω	100 Ω	60 Ω	60 Ω
Internal shunt power	30 W	30 W	50 W	50 W
Bus undervoltage limit	275V			
Bus overvoltage limit	810V			
Bus capacitance	165 µF	165 µF	280 µF	330 µF
Capacitive energy absorption	8.13 J		13.79 J	16.26 J
Efficiency	97%			
Short-circuit current rating (5)	200,000 A (rms) symmetrical			

(1) Drives are limited to one power cycle per minute.
(2) The cooling fan runs as part of the control power startup routine, when the inverter is enabled, and if the inverter temperature exceeds preset threshold.
(3) For current values when motors include a holding brake, refer to Kinetix Servo Drive Specifications Technical Data, publication KNX-TD003.
(4) Peak RMS current allowed for up to 1.0 seconds.
(5) This rating is only valid if UL specified fuses are used.

Table 14 - Kinetix 5300 (480V, three-phase) Input Power Specifications

Attribute	2198-C4030-ERS	2198-C4055-ERS	2198-C4075-ERS
AC input voltage	342…528V rms, three-phase (480V nom)		
AC input frequency	47…63 Hz		
Main AC input current (rms) (1)	9.06 A	17.50 A	21.29 A
Max inrush current (0-pk)	30.9 A	30.9 A	46.4 A
Peak AC input current (rms)	23.07 A	39.57 A	49.72 A
Control power input voltage (2)	21.6…26.4V DC 24V DC nom		
Control power input current (1) (3) (non-brake motors)	0.9 A $_{DC}$	1.7 A $_{DC}$	1.7 A $_{DC}$
Continuous output current (rms)	11.7 A	22.6 A	27.5 A
Continuous output current (0-pk)	16.5 A	32.0 A	38.9 A
Peak output current (rms) (4)	34.1 A	58.5 A	73.5 A
Peak output current (0-pk)	48.3 A	82.7 A	103.9 A
Line loss ride through	20 ms		
Continuous output power	6.25 kW	12.08 kW	14.70 kW
Internal shunt on	775V		
Internal shunt off	765V		
Internal shunt resistor	60 Ω	40 Ω	
Internal shunt power	50 W	75 W	
Bus undervoltage limit	275V		
Bus overvoltage limit	810V		
Bus capacitance	560 µF	820 µF	1230 µF
Capacitive energy absorption	27.59 J	40.40 J	60.60 J
Efficiency	97%		
Short-circuit current rating (5)	200,000 A (rms) symmetrical		

(1) Drives are limited to one power cycle per minute.
(2) The cooling fan runs as part of the control power startup routine, when the inverter is enabled, and if the inverter temperature exceeds preset threshold.
(3) For current values when motors include a holding brake, refer to Kinetix Servo Drive Specifications Technical Data, publication KNX-TD003.
(4) Peak RMS current allowed for up to 1.0 seconds.
(5) This rating is only valid if UL specified fuses are used.

I/O Availability and Specifications

All Kinetix 350 and Kinetix 5300 servo drives have a set of digital I/O. Use the specifications that follow to verify if the operation between the drives will be consistent.

Digital Inputs

This section describes digital inputs for Kinetix 350 and Kinetix 5300 servo drives. Table 15 compares the digital inputs of the two drive families.

Table 15 - Kinetix Drives Digital Input Specification Comparison

Attribute	Kinetix 350 Values	Kinetix 5300 Value
Input functions	Dedicated functions: Enable, Home, Positive Overtravel, Negative Overtravel, Registration	Configurable functions: Enable, Home, Positive Overtravel, Negative Overtravel, Registration 1, Registration 2
Input current (with 24V applied)	9 mA, max	2.5 mA, typical
Input ON voltage range (typical)	4.2…24V @ 2…9 mA total	15…26.4V DC
Input OFF voltage, max	0…2.5V	5V DC
Pulse reject filtering (registration functions)	120 ns, nom	–
Pulse reject filtering (home input function) debounce filter	1.0 ms, nom	–
Propagation delay (registration functions)	5 µs	–
Registration accuracy	–	±3 µs
Registration repeatability	200 ns	1.0 µs
Input reaction time (Disable)	2 ms, max	–
Input reaction time (Enable, Positive Overtravel inputs)	2 ms, max	–
Input protection	–	Optically isolated, reverse voltage protected
Digital input type according to IEC 61131-2	–	24V DC Type 1

Kinetix 350 Drives

The Kinetix 350 drive has five digital inputs. The five digital inputs (IOD-27…IOD-30 and IOD-39) have fixed pin assignments. See Table 16 for input assignments. Each input can be assigned an individual debounce time via the Studio 5000 Logix Designer® application.

The inputs are separated into three groups: A, B, and C. Each group has four inputs and share one common: IN_A_COM, IN_B_COM, and IN_C_COM, respectively. Travel limit switches, the inhibit/enable input, and registration input have dedicated inputs.

Table 16 - Kinetix 350 Drives Fixed Digital Input Assignments

IOD Pin	Signal	Description	Capture Time	Edge/ Level Sensitive
IOD-29	ENABLE	Optically isolated, single-ended active high signal. Current loading is nominally 9 mA. A 24V DC input is applied to this terminal to enable the axis.	0.5 ms	Level
IOD-30	HOME	Optically isolated, single-ended active high signal. Current loading is nominally 9 mA. Home switch (normally open contact) inputs axis require 24V DC (nominal).	0.5 ms	Edge
IOD-39	REG	Optically isolated, single-ended active high signal. Current loading is nominally 9 mA. A 24V DC input is applied or removed from this terminal to trigger registration event. Fast registration inputs are required to ensure the motor interface can capture the positional information with less than 5 µs uncertainty.	5 µs	Edge
IOD-27 IOD-28	NEG_OT POS_OT	Overtravel detection is available as an optically isolated, single-ended active high signal. Current loading is nominally 9 mA per input. The positive/negative limit switch (normally closed contact) inputs for axis require 24V DC (nominal).	1 ms	Level

The digital inputs are optically isolated and sink up to 24V DC. You can configure the inputs for PNP sourcing or NPN sinking.

Figure 1 - Sourcing of Digital Inputs

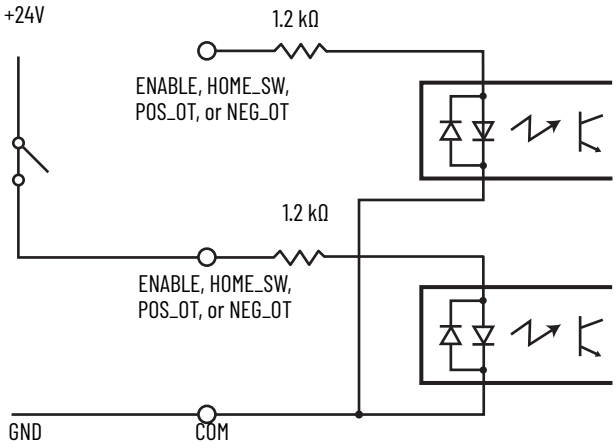


Figure 2 - Sinking of Digital Inputs

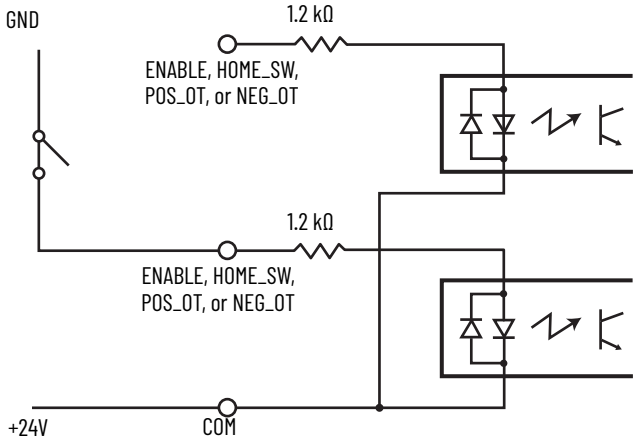


Figure 3 - Sourcing of Registration Digital Input

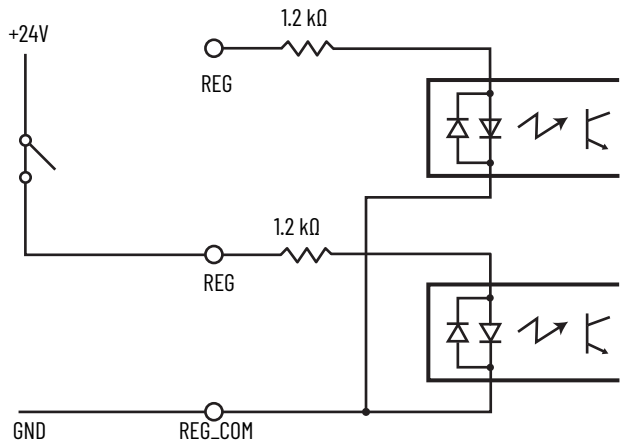
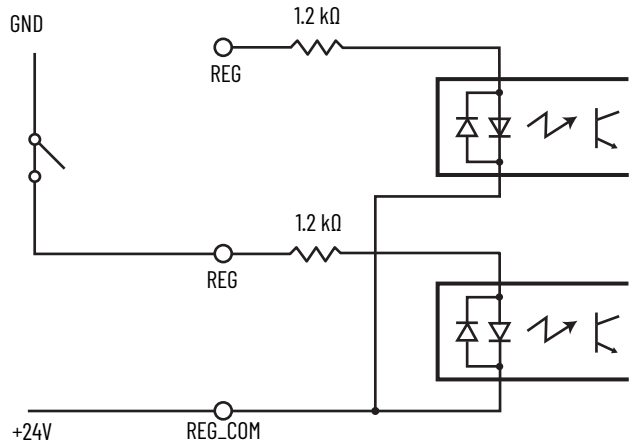


Figure 4 - Sinking of Registration Digital Input



Kinetix 5300 Drives

The Kinetix 5300 drive has four configurable digital inputs and six configurable functions to choose from in the Logix Designer application. Digital inputs require a 24V DC @ 15 mA supply. These are sinking inputs that require a sourcing device. A common and cable shield connection is provided on the connector for digital inputs.

IMPORTANT To improve registration input EMC performance, refer to the System Design for Control of Electrical Noise Reference Manual, publication GMC-RM001.

Although any input can be configured as a registration input, only two can be registration inputs at any one time

Table 17 - Understand Digital Input Functions

Function	Description
Enable	A 24V DC input is applied to this terminal to move the AxisCipDrive from Start-Inhibited to Stopped State.
Home	An active state indicates to a homing sequence that the referencing sensor has been seen. Typically, a transition of this signal is used to establish a reference position for the machine axis.
Registration 1	An inactive-to-active transition (also known as a positive transition) or active-to-inactive transition (also known as a negative transition) is used to latch position values for use in registration moves.
Registration 2	
Positive overtravel Negative overtravel	The positive/negative limit switch (normally closed contact) inputs for each axis require 24V DC (nominal).

Motor Brake Output

The Kinetix 350 and 5300 drives both have an optional motor brake output. The brake option is a spring-set holding brake that releases when voltage is applied to the brake coil in the motor. The customer-supplied 24V power supply drives the brake output through a solid-state relay.

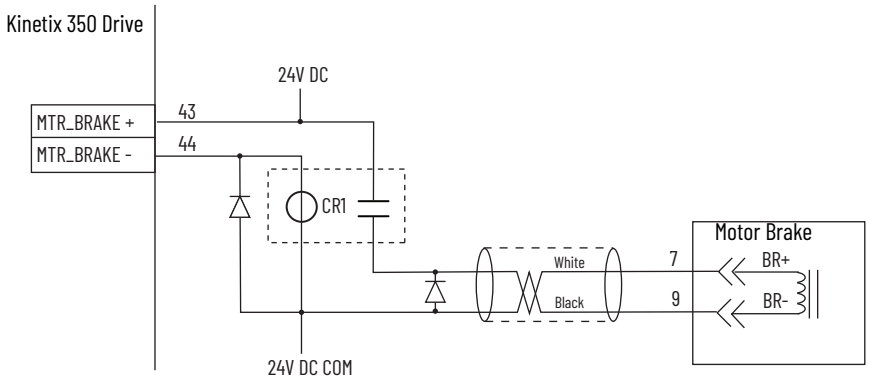
Kinetix 350 Motor Brake Output

The two digital outputs (IOD-43 and IOD-44) have fixed pin assignments for motor brake function.

Attribute	Value
Circuit type	Optically isolated open collector/emitter
Voltage, max	30V DC
Current, max	100 mA

The following schematic shows a typical wiring configuration for the motor brake circuit with a Kinetix 350 drive.

Figure 5 - Brake Wiring Schematic

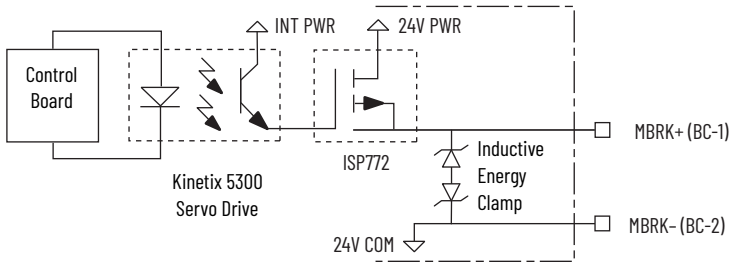


Kinetix 5300 Motor Brake Output

Two connections (MBRK+ and MBRK-) are required for the motor brake output. Connections are rated for 2.25 A @ +24V (refer to Figure 6).

When replacing a Kinetix 350 with a Kinetix 5300, do not wire a customer supplied power supply to the motor brake circuit of the Kinetix 5300 drive. Instead, either wire the motor brake circuit directly to the motor brake, or use the 24V supplied by the Kinetix 5300 motor brake connector to drive an interposing relay. In many cases the external relay circuit can be removed, because the Kinetix 5300 can drive 2.25 A motor brakes directly, which is sufficient for most applications.

Figure 6 - Motor Brake Circuit



IMPORTANT Motor parking-brake switching frequency must not exceed 15 cycles/min.

Control of the solid-state relay to release the motor brake is configurable in the Logix Designer application Refer to Kinetix 5300 Single-axis EtherNet/IP Servo Drives User Manual, publication 2198-UM005.

An active signal releases the motor brake. Turn-on and turn-off delays are specified by the MechanicalBrakeEngageDelay and MechanicalBrakeReleaseDelay settings.

IMPORTANT Holding brakes that are available on Allen-Bradley® rotary motors are designed to hold a motor shaft at 0 rpm for up to the rated brake-holding torque, not to stop the rotation of the motor shaft, or be used as a safety device.

You must command the servo drive to 0 rpm and engage the brake only after verifying that the motor shaft is at 0 rpm.

Control and Auxiliary Power Specifications

The Kinetix 350 drives use a 24V DC logic power source for all drives (referred to as control power). Table 18 shows the control power specifications for the drives.

Table 18 - Kinetix Drive Control Power Specification Comparison

Attribute	Kinetix 350 Drives	Kinetix 5300 Drive(2)		
		Frame 1	Frame 2	Frame 3
Control power input voltage	20...26V DC	21.6...26.4V DC 24V DC nom		
Control power input current Nominal @24V DC (1) Inrush max (0-pk)	 500 mA 30 A	 400 mA 1.8 A	 900 mA 2.4 A	 1.7 A 3.0 A

(1) For the Kinetix 5300 only: Plus BC connector (MBRK+) current.

(2) The cooling fan runs as part of the control power startup routine, when the inverter is enabled, and if the inverter temperature exceeds preset threshold.

The Kinetix 5300 drives also require 24V DC input power for control circuitry.

IMPORTANT PELV rated power supplies must be used to energize external safety devices connected to the Kinetix 5300 safety inputs.

The National Electrical Code and local electrical codes take precedence over the values and methods provided. Implementation of these codes is the responsibility of the machine builder.

Kinetix Motor and Actuator Compatibility

Compatible Kinetix motor and actuators for the Kinetix 350 and Kinetix 5300 servo drives are listed in Table 19.

Table 19 - Motor Compatibility

Motor/Actuator Cat. No.	Kinetix 350	Kinetix 5300
MPL-A/B15*xxx*-V/Ex7xAA, MPL-A/B2*xxx*-V/Ex7xAA MPL-A/B3*xxx*-S/Mx7xAA, MPL-A/B4*xxx*-S/Mx7xAA MPL-A/B45*xxx*-S/Mx7xAA, MPL-A/B5*xxx*-S/Mx7xAA MPL-B6*xxx*-S/Mx7xAA, MPL-B8*xxx*-S/Mx7xAA MPL-B9*xxx*-S/Mx7xAA, MPL-A/B15*xxx*-Hx7xAA MPL-A/B2*xxx*-Hx7xAA, MPL-A/B3*xxx*-Hx7xAA MPL-A/B4*xxx*-Hx7xAA, MPL-A/B45*xxx*-Hx7xAA	Yes	Yes
MPM-A/B*xxxx*-S/M MPF-A/B*xxxx*-S/M MPS-A/B*xxxx*-S/M	Yes	Yes
MPAR-A/B1*xxxx*-V and MPAR-A/B2*xxxx*-V (series B) MPAR-A/B3*xxxx*-M MPAI-A/B*xxxxx*M3	Yes	Yes
MPAS-A/B*xxxx*1-V05SxA (ballscrew) MPAS-A/B*xxxx*2-V20SxA (ballscrew)	Yes	Yes
MPAS-A/B*xxxx*-ALMx2C (direct drive)	No	Yes
LDAT-S*xxxxxx*-xDx, LDAT-S*xxxxxx*-xBx	No	Yes
LDC-C*xxxxxx*-xH LDL-*xxxxxxx*-xH	No	Yes
TLP-A046-*xxx*, TLP-A070-*xxx*, TLP-A090-*xxx*, TLP-A100-*xxx*, TLP-A115-*xxx*, TLP-A145-*xxx*, TLP-A200-*xxx*, TLP-B070-*xxx*, TLP-B090-*xxx*, TLP-B115-*xxx*, TLP-B145-*xxx*, TLP-B200-*xxx*	No	Yes
TLY-A*xxxx*-B, TLY-A*xxxx*-H	Yes	Yes
TL-A*xxxx*-B	No	Yes

Feedback Devices

For more information on the compatible feedback types see the Kinetix 5300 Single-axis Ethernet/IP Servo Drives User Manual, publication 2198-UM005 and the Kinetix 350 EtherNet/IP Indexing Servo Drives User Manual, publication 2097-UM002.

Kinetix 350 Motor Feedback Devices

The Kinetix 350 drives support multiple types of feedback devices by using the 15-pin (MF) motor feedback connector and shared connector pins in many cases. The drive accepts motor feedback signals from encoders with these general specifications.

Table 20 - Motor Feedback General Specifications

Attribute	Value
Feedback device support	• Hiperface • Generic TTL Incremental • Tamagawa 17-bit Serial
Power supply (EPWR5V)	5.13…5.67V, 400 mA, max
Power supply (EPWR9V)	8.3…9.9V, 275 mA, max
Thermostat	Single-ended, under 500 Ω = no fault, over 10 kΩ = fault

Kinetix 5300 Motor Feedback Devices

The Kinetix 5300 drives accept motor feedback of various types on the MFB feedback connector and auxiliary feedback signals from TTL incremental encoders on the digital inputs and auxiliary feedback connector.

IMPORTANT Auto-configuration in the Logix Designer application of intelligent absolute, high-resolution encoders, and incremental encoders is possible with only Allen-Bradley motors.

Motor feedback and auxiliary feedback can be used in these applications:

- Motor feedback
- Auxiliary feedback and feedback-only axis
- Load feedback (dual-loop control) and master feedback applications

Table 21 - Feedback General Specifications

Attribute	Motor Feedback	Auxiliary Feedback
Feedback device support	• Hiperface • Tamagawa (17-bit) serial (Kinetix TL and TLY motors) • Nikon (24-bit) serial (Kinetix TLP motors) • Generic TTL Incremental • Generic Sine/Cosine Incremental	Generic TTL Incremental
Power supply voltage (MTR_EPWR5V) Power supply current (MTR_EPWR5V)	5.10…5.40V 300 mA, max	
Power supply voltage (MTR_EPWR9V) Power supply current (MTR_EPWR9V)	8.10…9.90V 150 mA, max	
Thermostat	Single-ended, under 500 Ω = no fault, over 10 kΩ = fault	

Accessories

You can reuse motor power and feedback cables between Kinetix MP motors and Kinetix 350 drives in Kinetix 5300 applications.

See Dimensions, Cables, and Wiring for more details.

In some instances, existing shunt resistors used with Kinetix 350 drives can be reused with Kinetix 5300 drives.

Required Accessories

See Kinetix 300 and Kinetix 350 Drive Systems Design Guide, publication KNX-RM004 for detailed descriptions and specifications of the servo drive accessories. See Kinetix 5300 Drive Systems Design Guide, publication KNX-RM012 for detailed descriptions and specifications of the servo drive accessories.

Table 22 - Kinetix 350 Required Drive Accessories

Drive Accessory	Cat. No.(4)	Description
Ethernet Cable (1)	1585J-M8CBJM-*x*	Double-ended, non-flex, shielded
	1585J-M8UBJM-*x*	Double-ended, high-flex, shielded
Low-profile connector kits (3) (required for flying-lead cables) (2)	2090-K2CK-D15M	Incremental feedback from any compatible motor/ actuator to Kinetix 350 drives
Terminal block for I/O connections (1)	2097-TB1	Provides termination points for 50-pin IOD connector
Backup battery (required to maintain absolute position reference) (2)	2090-DA-BAT2	Installs in the 2090-K2CK-D15M low-profile connector kit and applies to drive systems that include TLY-Axxxx-B rotary motors
Motor power and feedback cables (2)	–	Refer to the specific drive/motor combination for the motor cables required for your system
External Shunt Resistor (3)		External passive shunts are available to provide additional shunt capacity for applications where the internal shunt capacity is exceeded
AC Line Filters (3)	2097-F4, 2097-F5, or 2097-F6	These recommended line filters are required to meet CE requirements

(1) Refer to the Kinetix Motion Accessories Specifications Technical Data, publication KNX-TD004, for detailed descriptions and specifications of these drive accessories.
(2) Refer to the Kinetix Servo Drives Specifications Technical Data, publication KNX-TD003, for detailed descriptions and specifications of these drive accessories.
(3) This is an optional accessory.
(4) Where *x* equals the cable length in meters.

Table 23 - Kinetix 5300 Drive Accessories

Accessory (1)	Cat. No.	Description
Low-profile Feedback Connector kit (required for flying-lead cables)	2198-K53CK-D15M	Motor feedback connector kit with 15-pin connector plug and battery backup is required for absolute position. Supports Kinetix MP, TL, TLP, TLY, and LDAT-Series rotary motors and linear actuators
Motor Power and Feedback Cables	–	Refer to the specific drive/motor combination for the motor cables required for your system
Ethernet Cables (2)	1585J-M8CBJM-*x*	Ethernet cables are available in standard lengths; Shielded cable is recommended
24V DC Shared-bus Connector Kits (zero-stack tab / cutout) (3)	2198-H040-*x*-*x*	Input wiring connectors and DC bus T-connector for frame 1 and 2 servo drives
	2198-H070-*x*-*x*	Input wiring connectors and DC bus T-connector for frame 3 servo drives
External Shunt Resistor (3)	2097-R*x* and 2198-R*xxx*	External passive shunts are available to provide additional shunt capacity for applications where the internal shunt capacity is exceeded
AC Line Filters (3)	2198-DB08-F 2198-DBR*xx*-F	These recommended line filters are required to meet CE requirements

(1) Refer to the Kinetix Servo Drives Specifications Technical Data, publication KNX-TD003, for detailed descriptions and specifications of these drive accessories.
(2) Where *x* equals the cable length in meters.
(3) This is an optional accessory.

The Kinetix 5300 drives include an internal shunt that is wired to the shunt resistor connector at the factory.

Optional Drive Accessories

Both the Kinetix 350 and Kinetix 5300 servo drives have a variety of optional drive accessories. For details on which accessories are available with each drive, refer to the Kinetix Motion Accessories Specifications Technical Data, publication KNX-TD004.

External Shunt Resistor

The Kinetix 5300 has optional external shunt resistors (Bulletin 2198-R*xxx* or 2097-R*x* shunt resistors) that can be used to provide additional shunt capacity for applications when the internal shunt capacity of the drive is exceeded. Catalog numbers 2198-R014 and 2198-R031 are is composed of resistor coils that are housed inside an enclosure. Catalog numbers 2097-R6, 2097-R7, and 2198-R001, 2198-R002, 2198-R004 are shunt resistors without an enclosure.

Communication

Configuration, programming, and diagnostics of the Kinetix 350 and Kinetix 5300 drives are performed over the standard 10/100 Mbps Ethernet communication port by using the Studio 5000 Logix Designer application.

- The Kinetix 350 drives have a single RJ45 10/100Mbit Ethernet connector (PORT1). Natively, the Kinetix 350 drives only support Ethernet star topology. Some configurations have been modified to use an ETAP or similar device to create a ring or linear topology.
- The Kinetix 5300 drives have two RJ45 10/100Mbit Ethernet connectors (PORT1 and PORT2) which support any Ethernet topology including linear, ring, and star.

IMPORTANT When using an external Ethernet switch for routing traffic between the controller and the drive, switches with IEEE-1588 time synchronization capabilities (boundary or transparent clock) must be used to make sure switch delays are compensated.

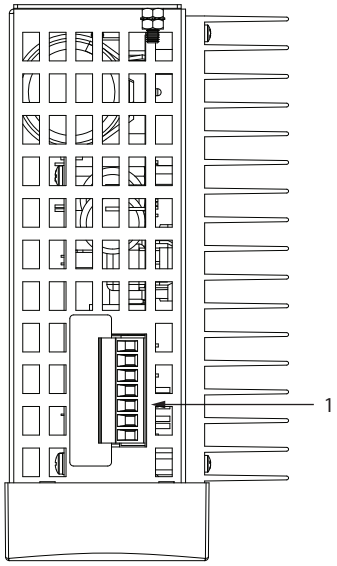
Connectors

Connectors on the Kinetix® 350 servo drives and on the Kinetix 5300 servo drives are of different types in different locations. Make sure that your cables are long enough to compensate for the differences.

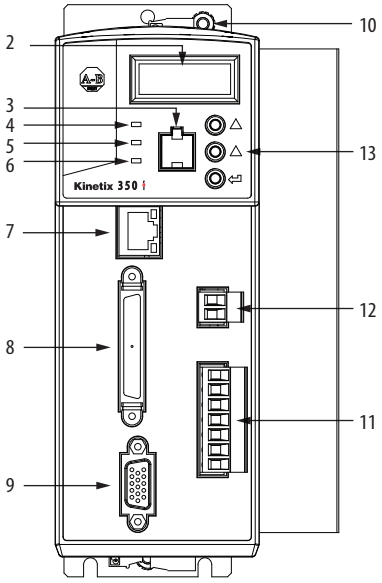
Kinetix 350 Servo Drive Connector Locations

The connectors of the Kinetix 350 servo drives are show in Figure 7. Although the physical size of the Kinetix 350 drives vary, the location of the connectors and indicators is identical.

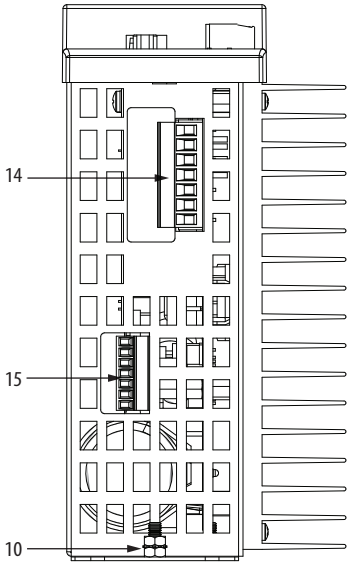
Figure 7 - Kinetix 350 Connector Locations



Kinetix 350 Drive, Top View
(2097-V33PR5-LM drive is shown)



Kinetix® 350 Drive, Front View
(2097-V33PR5-LM drive is shown)



Kinetix 350 Drive, Bottom View
(2097-V33PR5-LM drive is shown)

Table 24 - Kinetix 350 Drive Connectors

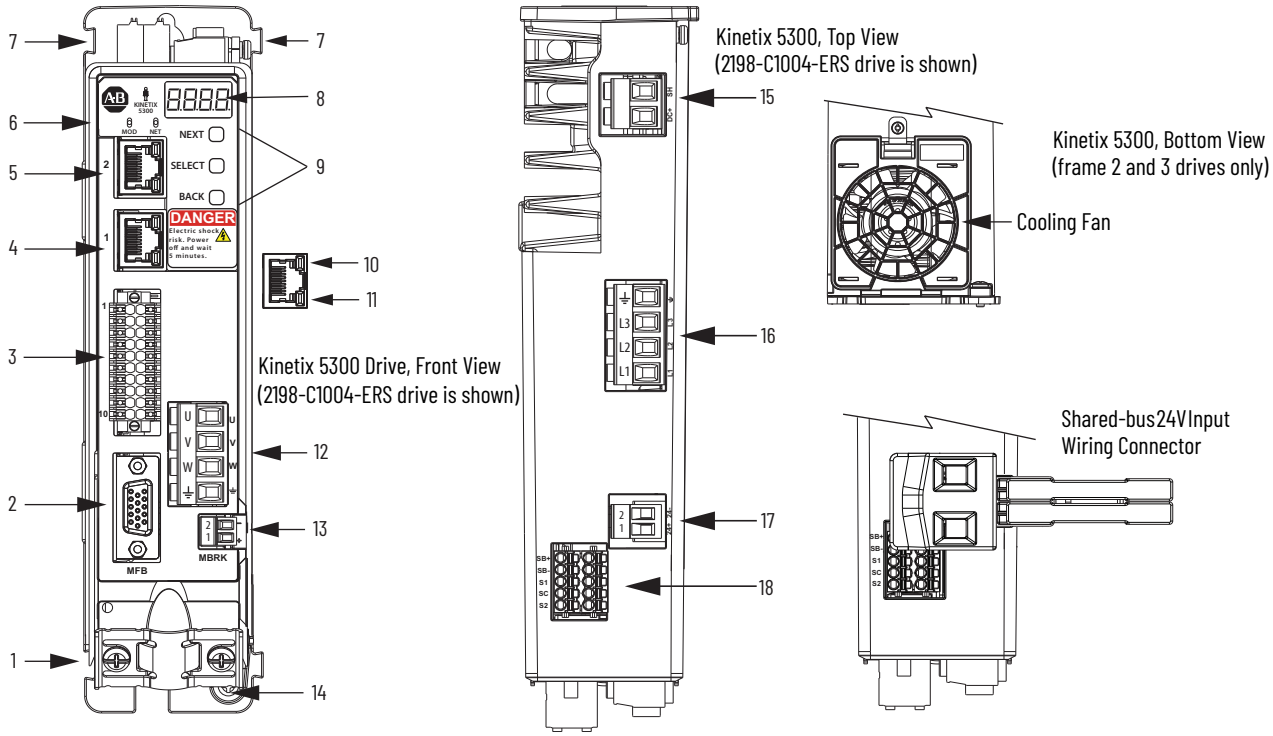
Item	Description
1	Mains (IPD) connector
2	Data status indicator and diagnostic display
3	Memory module socket
4	Network status indicator
5	Module status indicator
6	Axis status indicator
7	Ethernet communication port (Port 1)
8	I/O (IOD) connector

Item	Description
9	Motor feedback (MF) connector
10	Ground lug
11	Shunt resistor and DC bus (BC) connector
12	Back-up power (BP) connector
13	Display control push buttons (3)
14	Motor power (MP) connector
15	Safe torque-off (STO) connector

Kinetix 5300 Servo Drive Connector Locations

The connectors of the Kinetix 5300 servo drive are shown in Figure 8.

Figure 8 - Kinetix 5300 Connector Locations



Item	Description
1	Motor cable shield clamp
2	Motor feedback (MFB) connector
3	Digital inputs and auxiliary feedback connector
4	Ethernet (PORT1) RJ45 connector
5	Ethernet (PORT2) RJ45 connector
6	Module and Network status indicators

Item	Description
7	Zero-stack mounting tab/cutout
8	Four-character status display
9	Navigation pushbuttons
10	Link speed status indicators
11	Link/Activity status indicators
12	Motor power connector

Item	Description
13	Motor brake connector
14	Ground terminal
15	Shunt resistor connector
16	AC mains input power connector
17	24V control input power connector
18	Safe Torque Off (STO) connector

I/O Connector and Auxiliary Feedback Pinouts

This section describes the I/O and Auxiliary Feedback Connector pin assignments for the Kinetix 350 servo drive and the Kinetix 5300 servo drive. See Figure 7 for locations of connectors on your Kinetix 350 drive. See Figure 8 for locations of connectors on your Kinetix 5300 drive.

There is no separate auxiliary feedback connector used with the Kinetix 350 or Kinetix 5300 drives. The auxiliary encoder signal is wired using the I/O connector.

Table 25 ... Table 28 describes the I/O and auxiliary feedback connector pin assignments for the Kinetix 350 (IOD connector) and Kinetix 5300 (I/O connector) servo drives.

Table 25 - I/O and Auxiliary Feedback Connector Assignment for Kinetix 350 Drives

IOD Pin	Description	Signal
1...25	Reserved	Reserved
26	+/- Overtravel, enable, and home common	COM
27	Negative hardware overtravel	NEG_OT
28	Positive hardware overtravel	POS_OT
29	Drive enable	ENABLE
30	Home switch	HOME_SW
31...35	Reserved	–
36	Registration common	REG_COM
37...38	Reserved	–
39	Registration input	REG
40...42	Reserved	–
43	Motor brake release positive	MTR_BRAKE+
44	Motor brake release negative	MTR_BRAKE-
44...50	Reserved	–

Five fixed inputs are available for the machine interface on the Kinetix 350 drive. The five digital inputs (IOD-27...IOD-30 and IOD-39) have fixed pin assignments.

Table 26 - Kinetix 350 Drive Digital Inputs

IOD Pin	Signal	Description	Capture Time	Edge/Level Sensitive
IOD-29	ENABLE	Optically isolated, single-ended active high signal. Current loading is nominally 9 mA. A 24V DC input is applied to this terminal to enable the axis.	0.5 ms	Level
IOD-30	HOME	Optically isolated, single-ended active high signal. Current loading is nominally 9 mA. Home switch (normally open contact) inputs axis require 24V DC (nominal).	0.5 ms	Edge
IOD-39	REG	Optically isolated, single-ended active high signal. Current loading is nominally 9 mA. A 24V DC input is applied or removed from this terminal to trigger registration event. Fast registration inputs are required to ensure the motor interface can capture the positional information with less than 5 µs uncertainty.	5 µs	Edge
IOD-27 IOD-28	NEG_OT POS_OT	Overtravel detection is available as an optically isolated, single-ended active high signal. Current loading is nominally 9 mA per input. The positive/negative limit switch (normally closed contact) inputs for axis require 24V DC (nominal).	1 ms	Level

The Kinetix 5300 drive has four configurable digital inputs and six configurable functions to choose from in the Studio 5000 Logix Designer® application.

Table 27 - Kinetix 5300 Drive I/O and Auxiliary Feedback Connector Assignment

Pin	Description	Signal	Pin	Description	Signal
1	24V current-sinking fast input #1	IN1	11	24V current-sinking fast input #3	IN3
2	I/O common for customer-supplied 24V supply	COM	12	I/O common for customer-supplied 24V supply	COM
3	24V current-sinking fast input #2	IN2	13	24V current-sinking fast input #4	IN4
4	I/O common for customer-supplied 24V supply	COM	14	I/O common for customer-supplied 24V supply	COM
5	I/O cable shield termination point	SHLD	15	I/O cable shield termination point	SHLD
6	Channel AM Differential Input +	AM+	16	Channel AM Differential Input –	AM-
7	Channel BM Differential Input +	BM+	17	Channel BM Differential Input –	BM-
8	Channel IM Differential Input +	IM+	18	Channel IM Differential Input –	IM-
9	Encoder 5V power output	AUX_EPWR_5V	19	Auxiliary common	AUX_COM
10	I/O cable shield termination point	SHLD	20	I/O cable shield termination point	SHLD

Table 28 - Kinetix 5300 Drive Configurable Functions

Default Configuration	Description
Digital input1= Enable Digital input2 = Home Digital input3 = Registration 1 Digital input4 = Registration 2	0 = Unassigned
	1 = Enable
	2 = Home
	3 = Registration 1
	4 = Registration 2
	5 = Positive overtravel
	6 = Negative overtravel

Motor Feedback

The Table 29 compares the motor feedback connector pinouts for the Kinetix 350 (motor feedback connector) and Kinetix 5300 servo drives (MFB connector).

Refer to the Kinetix 350 Single-axis EtherNet/IP Servo Drives User Manual, publication 2097-UM002 and the Kinetix 5300 Single-axis EtherNet/IP Servo Drives User Manual, publication 2198-UM005 for additional information on supported feedback types.

Figure 9 - 15 Pin Motor Feedback Connector Pin Assignment

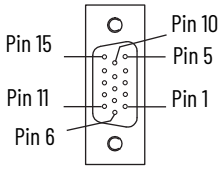


Table 29 - Kinetix Drives Motor Feedback Connectors Assignment Comparison

Kinetix 350			Kinetix 5300		
Pin	**Description**	**Signal**	**Pin**	**Description**	**Signal**
1	Sine differential input+ AM+ differential input+	SIN+ AM+	1	Sine differential input + AM differential input +	MTR_SIN+ MTR_AM+
2	Sine differential input- AM- differential input-	SIN- AM-	2	Sine differential input– AM differential input–	MTR_SIN– MTR_AM–
3	Cosine differential input+ BM+ differential input+	COS+ BM+	3	Cosine differential input + BM differential input +	MTR_COS+ MTR_BM+
4	Cosine differential input- BM- differential input-	COS- BM-	4	Cosine differential input – BM differential input –	MTR_COS– MTR_BM–
5	Data differential input + Index pulse+	DATA+ IM+	5	Data differential input/output + IM differential input +	MTR_DATA+ MTR_IM+
6	Common	ECOM	6	Encoder common	MTR_ECOM
7	Encoder power (+9V) (1)	EPWR_9V	7	Encoder 9V power output (3)	MTR_EPWR9V
8	Single-ended 5V Hall effect commutation	S3	8	Hall commutation S3 input	MTR_S3
9	Reserved	—	9	Reserved	–
10	Data differential input - Index pulse-	DATA- IM-	10	Data differential input/output – IM differential input –	MTR_DATA- MTR_IM–
11	Motor thermal switch (normally closed) (2)	TS	11	Motor thermostat (normally closed) (2)	MTR_TS
12	Single-ended 5V Hall effect commutation	S1	12	Hall commutation S1 input	MTR_S1
13	Single-ended 5V Hall effect commutation	S2	13	Hall commutation S2 input	MTR_S2
14	Encoder power (+5V) (1)	EPWR_5V	14	Encoder 5V power output (2)	MTR_EPWR5V
15	Reserved	—	15	Reserved	–

(1) Encoder power supply uses either 5V or 9V DC based on encoder/motor used.
(2) Not applicable unless motor has integrated thermal protection.
(3) Determine which power supply your encoder requires and connect to only the specified supply. Do not make connections to both supplies.

Safe Torque Off Connector

Both the Kinetix 350 and Kinetix 5300 drives have a Safe Torque Off (STO) connector. The STO pinouts are different between the two drives. See Figure 10 for a comparison of the two connectors. See the Kinetix 350 Single-axis EtherNet/IP Servo Drive User Manual, publication 2097-UM002 for information on STO with the Kinetix 350 drive. See the Kinetix 5300 Single-axis EtherNet/IP Servo Drives User Manual, publication 2198-UM005 for information on STO with the Kinetix 5300 drive.

The Kinetix 350 drive ships with the 6-pin wiring-plug that connects your safety circuit to the Kinetix 350 drive safe torque-off (STO) connector.

The Kinetix 5300 10-pin connector consists of two parallel 5-pin rows for cascading safety connections from drive-to-drive when drives are joined by the zero-stack feature.

Figure 10 - STO Connector Assignment Comparison

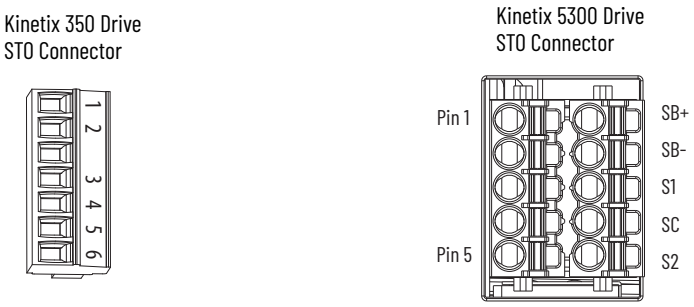


Table 30 - Kinetix 350 STO Connector Assignment

STO Pin	Description	Signal
1	+24V DC output from the drive	+24V DC control
2	+24V DC output common	Control COM
3	Safety status	Safety Status
4	Safety input 1 (+24V DC to enable)	Safety Input 1
5	Safety common	Safety COM
6	Safety input 2 (+24V DC to enable)	Safety Input 2

Table 31 - Kinetix 5300 STO Connector Assignment

STO Pins	Description	Signal
1 and 6	Safety bypass plus signal. Connect to both safety inputs to disable the STO function	SB+
2 and 7	Safety bypass minus signal. Connect to safety common to disable the STO function	SB-
3 and 8	STO input 1 (SS_IN_CH0)	S1
4 and 9	STO input common (SCOM)	SC
5 and 10	STO input 2 (SS_IN_CH1)	S2

Dimensions, Cables, and Wiring

This chapter provides dimensions of the drives to help you determine the space that is needed to install the drives.

Dimension Drawings

The dimensions for Kinetix® 350 drives are shown in Figure 11 and Table 32.

Figure 11 - Kinetix 350 Dimensions in mm (in.)

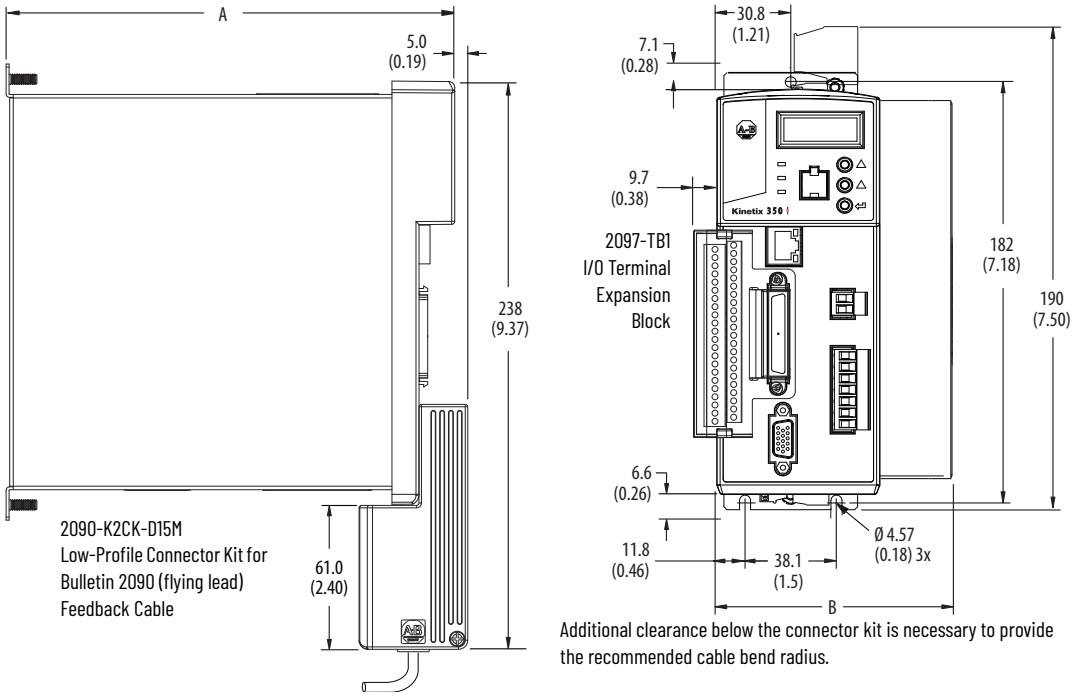


Table 32 - Kinetix 350 Dimensions

Cat. No.	**Dimensions** mm (in.)	
	A	**B**
2097-V31PR0-LM	185 (7.29)	68.0 (2.68)
2097-V31PR2-LM	185 (7.29)	69.0 (2.70)
2097-V32PR0-LM	230 (9.04)	68.0 (2.68)
2097-V32PR2-LM	230 (9.04)	69.0 (2.70)
2097-V32PR4-LM	230 (9.04)	87.0 (3.42)
2097-V33PR1-LM	185 (7.29)	68.0 (2.68)
2097-V33PR3-LM	185 (7.29)	69.0 (2.70)
2097-V33PR5-LM	185 (7.29)	94.0 (3.72)
2097-V33PR6-LM	230 (9.04)	68.0 (2.68)

The dimensions for Kinetix 5300 are shown in Figure 12 and Table 33.

Figure 12 - Kinetix 5300 Drives with 2198-K53CK-D15M Connector Kit

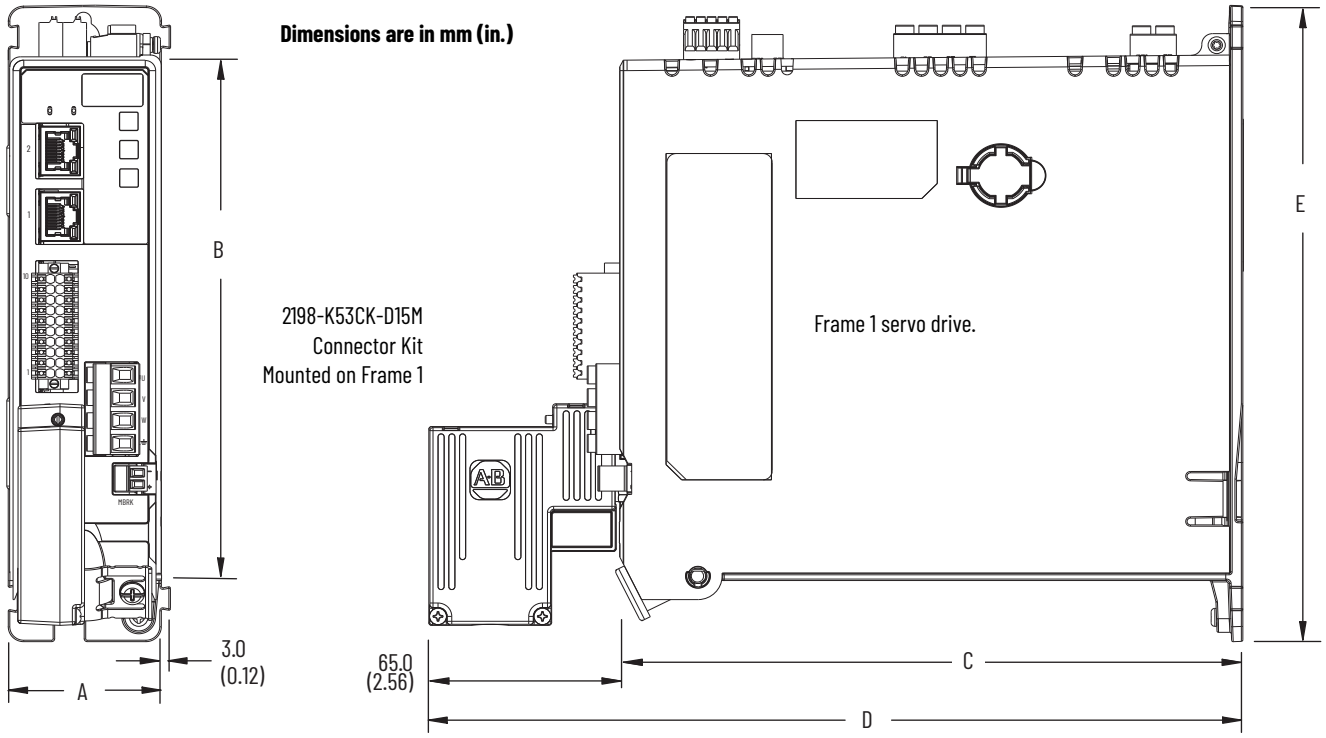


Table 33 - Kinetix 5300 Dimensions

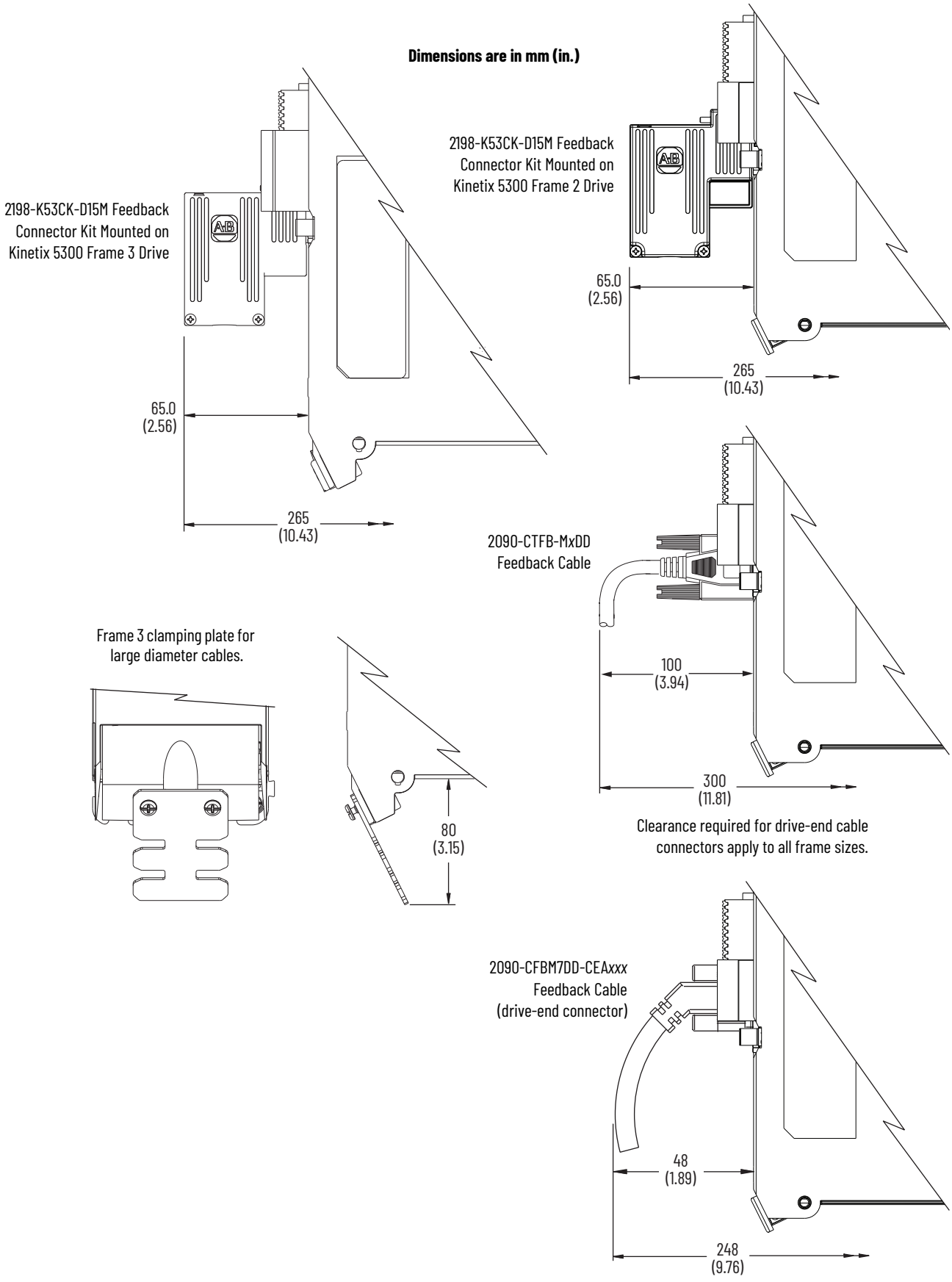
200V-class Drives Cat. No.	400V-class Drives Cat. No.	Frame Size	A mm (in.)	B mm (in.)	C mm (in.)	D mm (in.)	E mm (in.)
2198-C1004-ERS	2198-C4004-ERS	Frame 1	50.0 (1.97)	170 (6.69)	200 (7.87)	265 (10.43)	215 (8.46)
2198-C1007-ERS	2198-C4007-ERS						
2198-C1015-ERS	2198-C4015-ERS	Frame 2	55.0 (2.16)	225 (8.86)			265 (10.43)
2198-C1020-ERS	2198-C4020-ERS						
2198-C2030-ERS	2198-C4030-ERS						
2198-C2055-ERS	2198-C4055-ERS	Frame 3	85.2 (3.35)	250 (9.84)			294 (11.57)
2198-C2075-ERS	2198-C4075-ERS						

The 2198-K53CK-D15M feedback connector kit is available for Kinetix 5300 servo drives when flying-lead cable are used.

Refer to Kinetix 5300 Feedback Connector Kit Installation Instructions, publication 2198-IN023 for more information.

Figure 13 - Kinetix 5300 Drives with Connector Kit Accessories (Frames 2 and 3)

Dimensions are in mm (in.)



Cables

This section provides information to help you determine interconnects and cable requirements of the drives.

Motor and Feedback Cables

When migrating your Kinetix 350 servo drive system, do not exceed the maximum cable lengths for the Kinetix 5300 servo drives. The length of the power and feedback cables for the Kinetix 5300 drives cannot exceed 50 m (164 ft), although in some cases maximum cable length is less, refer to Table 34. Performance was tested at this length and meets CE requirements.

The maximum drive-to-motor power and feedback cable length depends on the AC input power and feedback type.

Table 34 - Maximum Cable Lengths for Kinetix 5300 Drives

Compatible Motor and Actuator Cat. No.	Feedback Type	Cable Length, max m (ft)	
		≤400V AC Input	480V AC Input
TLP-A/B*xxx*-*xxx*-D	Nikon (24-bit) absolute high-resolution, multi-turn and single-turn	50 (164)	
MPL-A/B15*xxx*-V/E*x*7xAA MPL-A/B2*xxx*-V/E*x*7xAA	Hiperface, absolute high-resolution, multi-turn and single-turn	50 (164)	20 (65.6)
MPL-A/B3*xxx*-S/M*x*7xAA MPL-A/B4*xxx*-S/M*x*7xAA MPL-A/B45*xxx*-S/M*x*7xAA MPL-A/B5*xxx*-S/M*x*7xAA MPL-B6*xxx*-S/M*x*7xAA MPL-B8*xxx*-S/M*x*7xAA MPL-B9*xxx*-S/M*x*7xAA		50 (164)	
MPM-A/B*xxxx*-S/M MPF-A/B*xxxx*-S/M MPS-A/B*xxxx*-S/M			
MPAR-A/B3*xxxx*-M			
MPAS-A/B*xxxx*1-V05SxA (ballscrew) MPAS-A/B*xxxx*2-V20SxA (ballscrew) MPAR-A/B1*xxxx*-V and MPAR-A/B2*xxxx*-V (series B) MPAI-A/B*xxxxx*M3	Absolute high-resolution, multi-turn	50 (164)	20 (65.6)
MPL-A/B15*xxx*-H*x*7xAA MPL-A/B2*xxx*-H*x*7xAA	Incremental encoder	30 (98.4)	20 (65.6)
MPL-A/B3*xxx*-H*x*7xAA MPL-A/B4*xxx*-H*x*7xAA MPL-A/B45*xxx*-H*x*7xAA		30 (98.4)	
MPAS-A/B*xxxx*-ALM*x*2C (direct drive)	Incremental, magnetic linear		
TLY-A*xxxx*-B	Tamagawa (17-bit) absolute high-resolution, multi-turn		
TL-A*xxxx*-B			
TLY-A*xxxx*-H	Incremental encoder		
LDAT-S*xxxxxx*-xD*x*	Hiperface, absolute, magnetic scale	10 (33.1)	
LDAT-S*xxxxxx*-xB*x*	Incremental, magnetic scale		
LDC-C*xxxxxx*-xH, LDL-*xxxxxxx*-xH	Sin/Cos or TTL encoder		

The existing motor power cables can be used for the Kinetix MP motors since they are supported by both the Kinetix 350 drives and the Kinetix 5300 drives.

The existing motor feedback cables can be used for the Kinetix MP motors since they are supported by both the Kinetix 350 drives and the Kinetix 5300 drives. However, if flying lead cables were used on the Kinetix 350 drive, the feedback connector kit will need to be replaced by 2198-K53CK-D15M feedback connector kit, as it is required for Kinetix 5300 drives.

Factory-made motor power and feedback cables with premolded connectors are designed to minimize electromagnetic interference (EMI). Rockwell Automation recommends factory-made cables to achieve the expected system performance.

For details and drawings of recommended cables see the Kinetix Motion Accessories Specifications Technical Data, publication KNX-TD004, the bill of materials (BOM) configuration tool within Motion Analyzer, or ProposalWorks™ from Rockwell Automation.

Power Wiring

Use these power wiring examples to assist you in comparing the power wiring for the Kinetix 350 servo drives and the Kinetix 5300 servo drives.

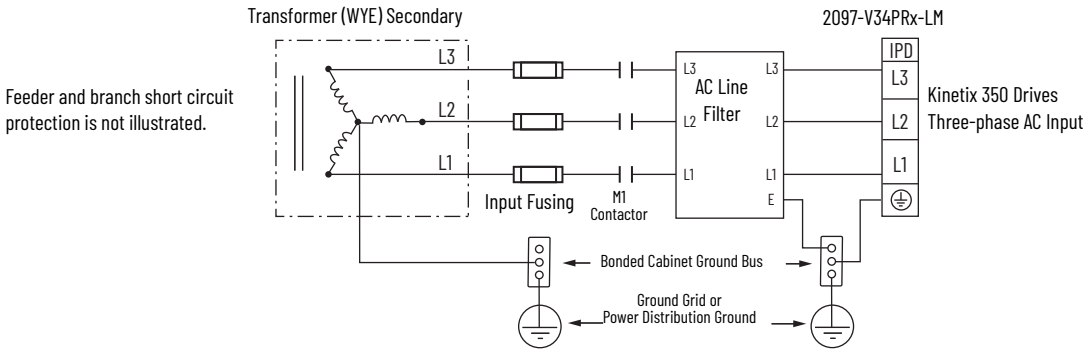
Kinetix 350 Power Wiring Diagrams

This section contains examples of typical single-phase and three-phase facility input power that is wired to single-phase and three-phase Kinetix 350 drives. The grounded power configuration lets you ground your single-phase or three-phase power at a neutral point.

Three-phase Power Wired to Three-phase Drives

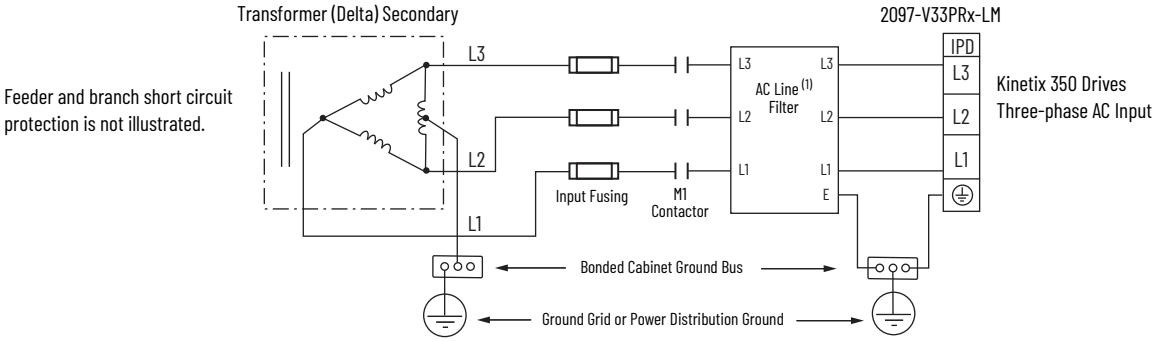
These examples illustrate grounded three-phase power that is wired to three-phase Kinetix 350 drives when phase-to-phase voltage is within drive specifications.

Figure 14 - Three-phase (400/480V) Power Configuration (WYE Secondary)



ATTENTION: For the 480V Kinetix 350 drives to meet proper voltage creepage and clearance requirements, each phase voltage to ground must be less than or equal to 300V AC rms. This requirement means that the power system must use a center grounded wye secondary configuration for 400/480V AC mains. Refer to Kinetix 350 EtherNet/IP Indexing Servo Drives User Manual, publication 2097-UM002 for leakage currents.

Figure 15 - Three-phase (240V) Power Configuration (Delta Secondary)



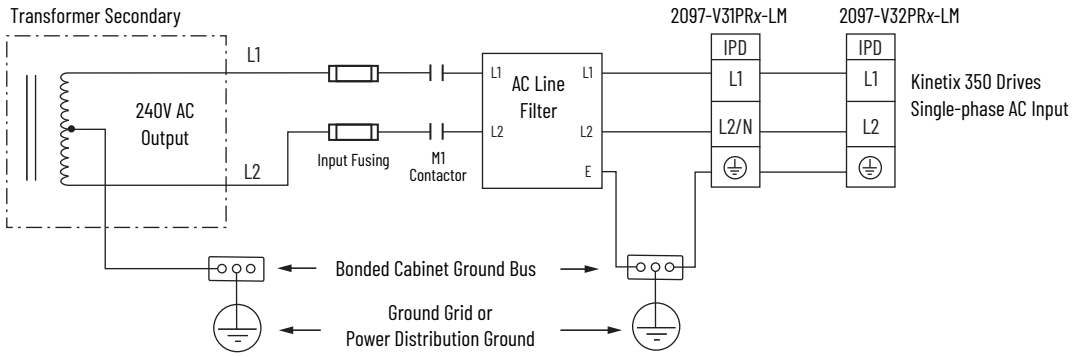
(1) Leakage current from the line filter, in this configuration, typically is higher than a balanced (center ground) configuration.

Single-phase Power Wired to Single-phase Drives

These examples illustrate grounded single-phase power that is wired to single-phase Kinetix 350 drives when phase-to-phase voltage is within drive specifications.

IMPORTANT The 2097-V32PRx-LM models have integrated AC line filters and do not require the AC line filter that is shown in this diagram.

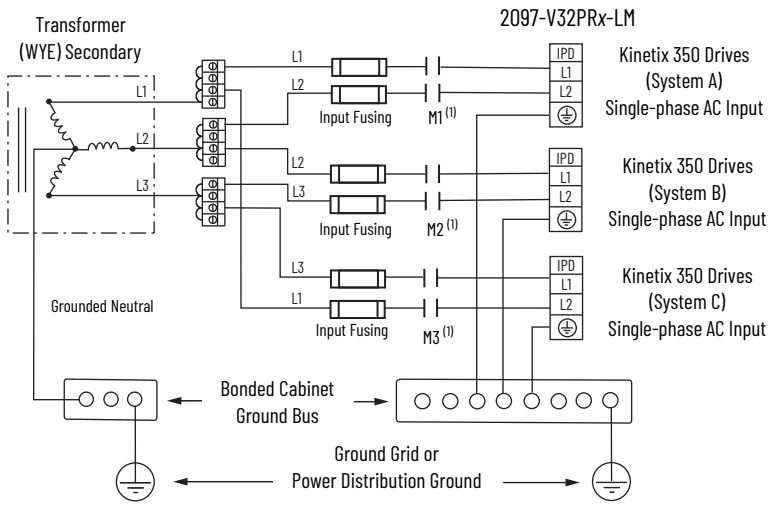
Figure 16 - Single-phase Grounded Power Configurations



Three-phase Power Wired to Single-phase Drives

This example illustrates grounded three-phase power that is wired to single-phase Kinetix 350 drives when phase-to-phase voltage is within drive specifications.

Figure 17 - Single-phase Amplifiers on Three-phase Power (WYE)



(1) Contactors (MI, M2, and M3) can be optional. Implementation of control circuits and risk assessment is the responsibility of the machine builder. Reference international standards IEC 62061 and ISO 13849-1 estimation and safety performance categories. AC line filter is optional, but is required for CE compliance.

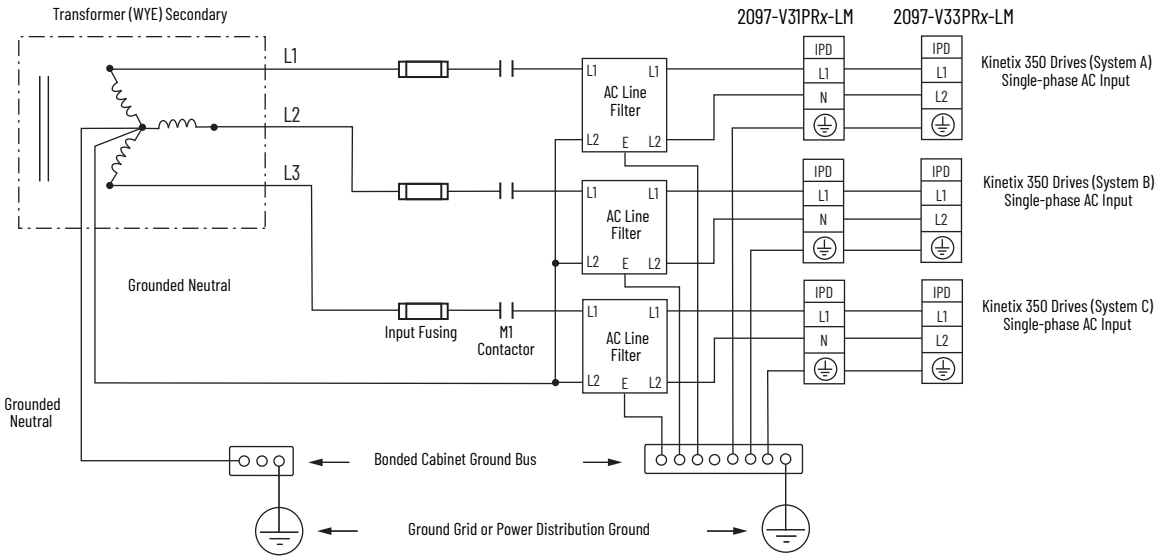
Feeder short circuit protection is not illustrated.

This example illustrates grounded three-phase power that is wired to single-phase Kinetix 350 drives when phase-to-phase voltage exceeds drive specifications.

A neutral must be connected when single-phase drives are attached to a three-phase isolating transformer secondary. It is not necessary that all three-phases be loaded with drives, but each drive must have its power return via the neutral connection.

ATTENTION: Failure to connect the neutral can result in supply voltage swings at the individual drives. This condition occurs when the neutral point moves vectorially as a result of load variations that individual drives experience. The supply voltage swing can cause undervoltage and overvoltage trips on the drives, and the drive can be damaged if the overvoltage limit is exceeded.

Figure 18 - Single-phase Amplifiers (One AC Line Filter Per Drive)



Feeder and branch short circuit protection is not illustrated.

IMPORTANT An AC line filter for each drive is the preferred configuration and required for CE compliance.

Kinetix 5300 Power Wiring Diagrams

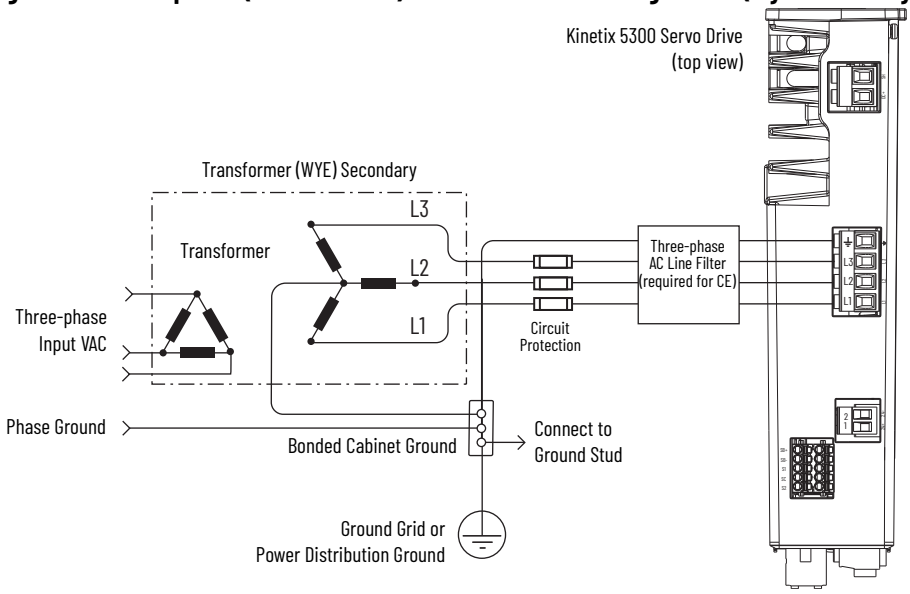
For Kinetix 5300 drive power specifications, see Kinetix Servo Drives Specifications Technical Data, publication KNX-TD003. For Kinetix 5300 drive interconnect diagrams, see Kinetix 5300 Single-axis EtherNet/IP Servo Drives, publication 2198-UM005.

Three-phase Input Power

This example illustrates grounded three-phase power that is wired to three-phase Kinetix 5300 drives when phase-to-phase voltage is within drive specifications.

IMPORTANT For three-phase operation, Kinetix 5300 drives must use center-grounded wye secondary input power configurations.

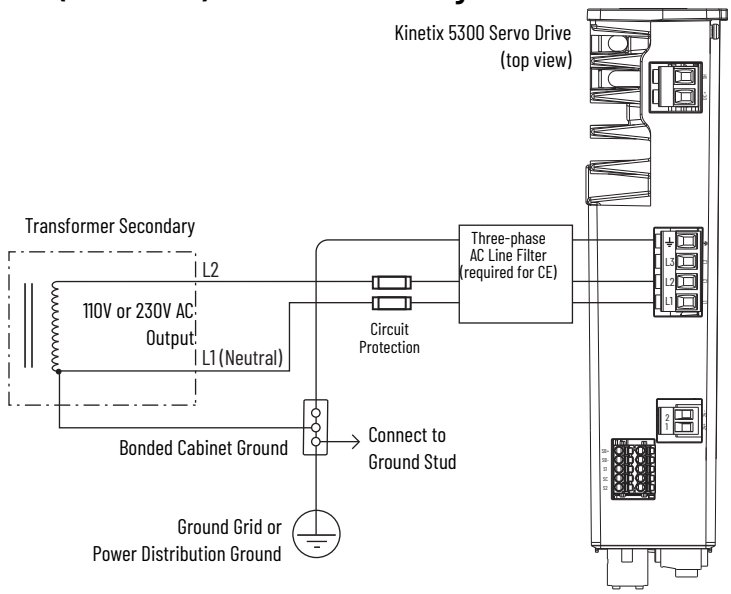
Figure 19 - Three-phase (230V or 480V) Grounded Power Configuration (wye secondary)



Single-phase Input Power

These examples illustrate grounded single-phase power that is wired to single-phase Kinetix 5300 drives.

Figure 20 - Single-phase (110V or 230V) Grounded Power Configuration



ATTENTION: Ungrounded systems do not reference each phase potential to a power distribution ground. This can result in an unknown potential to earth ground.

Notes:

System Architecture

The Kinetix® 350 single-axis EtherNet/IP servo drive is designed to provide a solution for applications with output power requirements between 0.4...3.0 kW (2...12 A rms).

Drive System Overview

This section lists the typical system components and compares some configurations of Kinetix 350 and Kinetix 5300 drives. The Kinetix 5300 drives are flexible to provide integration into your existing application or can be designed to meet your new application requirements.

Table 35 - Kinetix 350 Drive System Overview

Kinetix 350 System Component	Cat. No.	Description
Kinetix 350 Integrated Motion on EtherNet/IP Servo Drive	2097-V3*x*PR*x*-LM	Kinetix 350 integrated motion on EtherNet/IP drives with safe torque-off feature are available with 120/240V or 480V AC input power.
AC Line Filters	2090 2097-F*x*	Bulletin 2090 and Bulletin 2097-F*x* AC line filters are required to meet CE with Kinetix 350 drives without an integrated line filter. Bulletin 2097 filters are available in foot mount and side mount.
Shunt Module	2097-R*x*	Bulletin 2097 shunt resistors connect to the drive and provides shunt capability in regenerative applications.
Terminal block for I/O connector	2097-TB1	50-pin terminal block. Use with IOD connector for control interface connections.
Stratix® 2000 Ethernet Switch	1783-US05T	An Ethernet switch divides an Ethernet network into segments and directs network traffic efficiently.
Logix PAC® Controller Platforms	Bulletin 5069 Bulletin 1768 and 1769	EtherNet/IP networking with CompactLogix™ 5370 and CompactLogix 5380 controllers with embedded dual-port. 1769-L3*x* controllers with embedded single port. 1768-L4*x* controller and 1768-L4xS safety controller with 1768-ENBT EtherNet/IP communication module.
	1756-EN2T, 1756-EN2TR, and 1756-EN3TR module	EtherNet/IP network communication modules for use with ControlLogix® 5570 and ControlLogix 5580 controllers.
Studio 5000® Environment or RSLogix 5000® Software	—	RSLogix® 5000 software (version 20 or earlier) and the Studio 5000 Logix Designer® application (version 21 or later) are used to program, commission, and maintain the Logix family of controllers.
Encoder Output Module (1)	2198-ABQE	The Allen-Bradley® encoder output module is a DIN-rail mounted EtherNet/IP network-based standalone module capable of outputting encoder pulses to a customer-supplied peripheral device (cameras, for example, used in line-scan vision systems).
Rotary Servo Motors	Kinetix MP, Kinetix TL	Compatible rotary motors include the Kinetix MP (Kinetix MPL, MPM, MPF, and MPS) and Kinetix TL/TLY motors.
Linear Stages	Kinetix MP (Ballscrew)	Compatible stages include Kinetix MP (Kinetix MPAS) Integrated Linear Stages.
Electric Cylinders	Kinetix MP, Kinetix TL	Compatible electric cylinders include Kinetix MP and Kinetix TL (Kinetix MPAR, TLAR, and MPAI) Electric Cylinders.
Encoder	842E-CM	Integrated Motion Encoder on EtherNet/IP network.
Cables	Motor/brake and feedback cables	Motor power/brake and feedback cables include SpeedTec and threaded DIN connectors at the motor. Power/brake cables have flying leads on the drive end and straight connectors that connect to servo motors. Feedback cables have flying leads that wire to low-profile connector kits on the drive end and straight connectors on the motor end.
	Communication cables	1585J-M8CBJM-*x* (shielded) or 1585J-M8UBJM-x (high-flex shielded) Ethernet cable.
Feedback Connector Kit	2090-K2CK-D15M	Low-profile connector kit for motor feedback signals.

(1) See Encoder Output Module Installation Instructions, publication 2198-UM003. For information to help you install and wire the 2198-ABQE Encoder Output Module.

The Kinetix 5300 servo drives are designed to provide a Kinetix Integrated Motion solution for your drive and motor/actuator application.

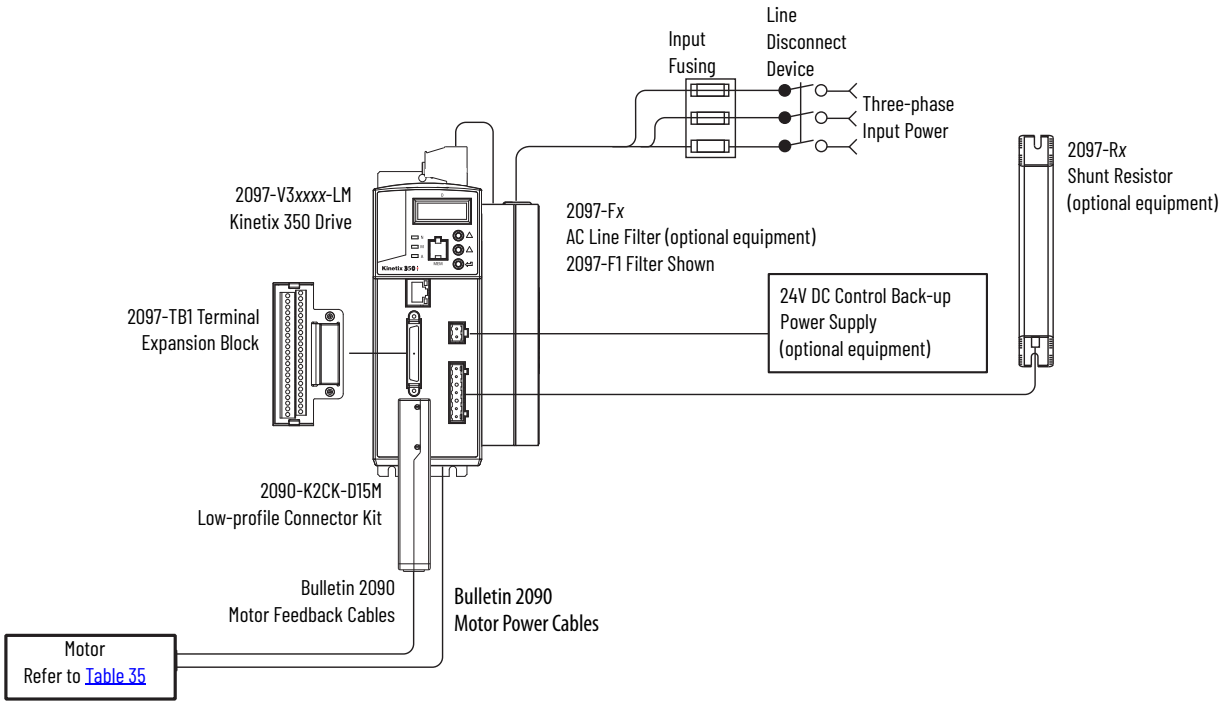
Table 36 - Kinetix 5300 Drive System Overview

Drive System Component	Cat. No.	Description
Kinetix 5300 Servo Drives	2198-C*xxxx*-ERS	200V-class (single-phase or three-phase) and 400V-class (three-phase) drives operate in standalone configurations. Modules can be zero-stacked from drive-to-drive and are compatible with the 24V DC shared-bus connection system to extend control power to multiple drives. Drives feature Safe Torque Off via the hardwired (STO) connector.
Shared-bus Connector Kits	2198-TCON-24VDCIN36	Control power input connector.
	2198-H040-*x*-*x*	Control power T-connector and bus-bar connectors, 55 mm, for Frame 1 and 2 drives.
	2198-H070-*x*-*x*	Control power T-connector and bus-bar connectors, 85 mm, for Frame 3 drives.
Feedback Connector Kit	2198-K53CK-D15M	Motor feedback connector kit with 15-pin connector plug for compatible motors and actuators. Kit features battery backup for Kinetix TLP, TL, and TLY multi-turn encoders.
Connector Sets	2198-CONKIT-PWR20	Connector set included with the Frame 1 and 2 drives (except 2198-C2030 drives). Replacement sets are also available.
	2198-CONKIT-PWR30	Connector set included with 2198-C2030 drives. Replacement sets are also available.
	2198-CONKIT-PWR75	Connector set included with Frame 3 drives. Replacement sets are also available.
Logix 5000™ Controller Platform	Bulletin 1769 Bulletin 5069	Integrated Motion on the EtherNet/IP network in CompactLogix 5370, CompactLogix 5380, and CompactLogix 5480 controllers and Integrated Safety in Compact GuardLogix® 5370 controllers. Linear, device-level ring (DLR), and star topology is supported.
	1756-EN2T module 1756-EN2TR module 1756-EN3TR module	EtherNet/IP network communication modules for use with ControlLogix® 5570, ControlLogix 5580, GuardLogix® 5570, and GuardLogix 5580 controllers. Linear, device-level ring (DLR), and star topology is supported.
Studio 5000 Environment	—	Studio 5000 Logix Designer application, version 33.00 or later, provides support for programming, commissioning, and maintaining the CompactLogix and ControlLogix controller families.
Rotary Servo Motors	Kinetix MP	Compatible rotary motors include 200V and 400V-class Kinetix MPL, MPM, MPF, and MPS servo motors.
	Kinetix TLP	Compatible rotary motors include 200V and 400V-class Kinetix TLP servo motors.
	Kinetix TL and TLY	Compatible rotary motors include 200V-class Kinetix TL and TLY servo motors.
Linear Actuators	Kinetix MP and LDAT-Series	Compatible linear actuators include 200V and 400V-class Kinetix MPAS and MPMA linear stages, Kinetix MPAR and MPAI linear actuators, and LDAT-Series linear thrusters.
Linear Motors	LDC-Series and LDL-Series	Compatible motors include LDC-Series™ iron-core and LDL-Series™ ironless linear motors.
Induction Motors	—	Induction motors with open-loop frequency control and closed-loop control are supported.
2090-Series Cables	2090-CTFB-MxDx-*xxxxx*	Motor feedback cables for Kinetix TLP motors.
	2090-CTPx-MxDx-*xxxxx*	Motor power/brake cables for Kinetix TLP motors.
	2090-CFBM6Dx-CxAA*xx*	Motor feedback cables for Kinetix TLY servo motors.
	2090-CPxM6DF-16AA*xx*	Motor power/brake cables for Kinetix TLY servo motors.
	2090-DANFCT-S*xx*	Motor feedback cables for Kinetix TL servo motors.
	2090-DANPT-16S*xx*	Motor power cables for Kinetix TL servo motors.
	2090-DANBT-18S*xx*	Motor brake cables for Kinetix TL servo motors.
	2090-CFBM7DF-CEA*xxx*	Motor feedback cables for Kinetix MP motors/actuators, LDAT-Series linear thrusters, and LDC/LDL-Series linear motors.
	2090-CPxM7DF-*xx*A*xxx*	Motor power/brake cables for Kinetix MP motors/actuators, LDAT-Series linear thrusters, and LDC/LDL-Series linear motors.
	2090-XXNFMF-S*xx* 2090-CFBM7DF-CDAF*xx*	Standard and continuous-flex feedback cables that include additional conductors for use with incremental encoders.
Ethernet Cables	1585J-M8CBJM-*x*	Ethernet cables are available in standard lengths. Shielded cable is required to meet EMC specifications.
AC Line Filters	2198-DB08-F 2198-DBR20-F 2198-DBR40-F	Bulletin 2198 three-phase AC line filters are required to meet CE and are available for use in all Kinetix 5300 drive systems.
24V DC Power Supply	1606-XL*xxx*	Bulletin 1606 24V DC power supply for control circuitry, digital inputs, and safety inputs.
External Shunt Resistors	2097-R6 and 2097-R7	Bulletin 2097 and 2198 external passive shunt resistors are available for when the internal shunt capability of the drive is exceeded.
	2198-R001, 2198-R002, 2198-R004, 2198-R014, 2198-R031	

Kinetix 350 Servo Drive System Architecture

Figure 21 is an example of a typical Kinetix 350 Servo Drive system, in this case a Kinetix 350 controlled through EtherNet/IP external reference. This illustrates how the required drive modules and accessories are used in a typical Kinetix 350 servo drive system.

Figure 21 - Typical Kinetix 350 Drive Installation

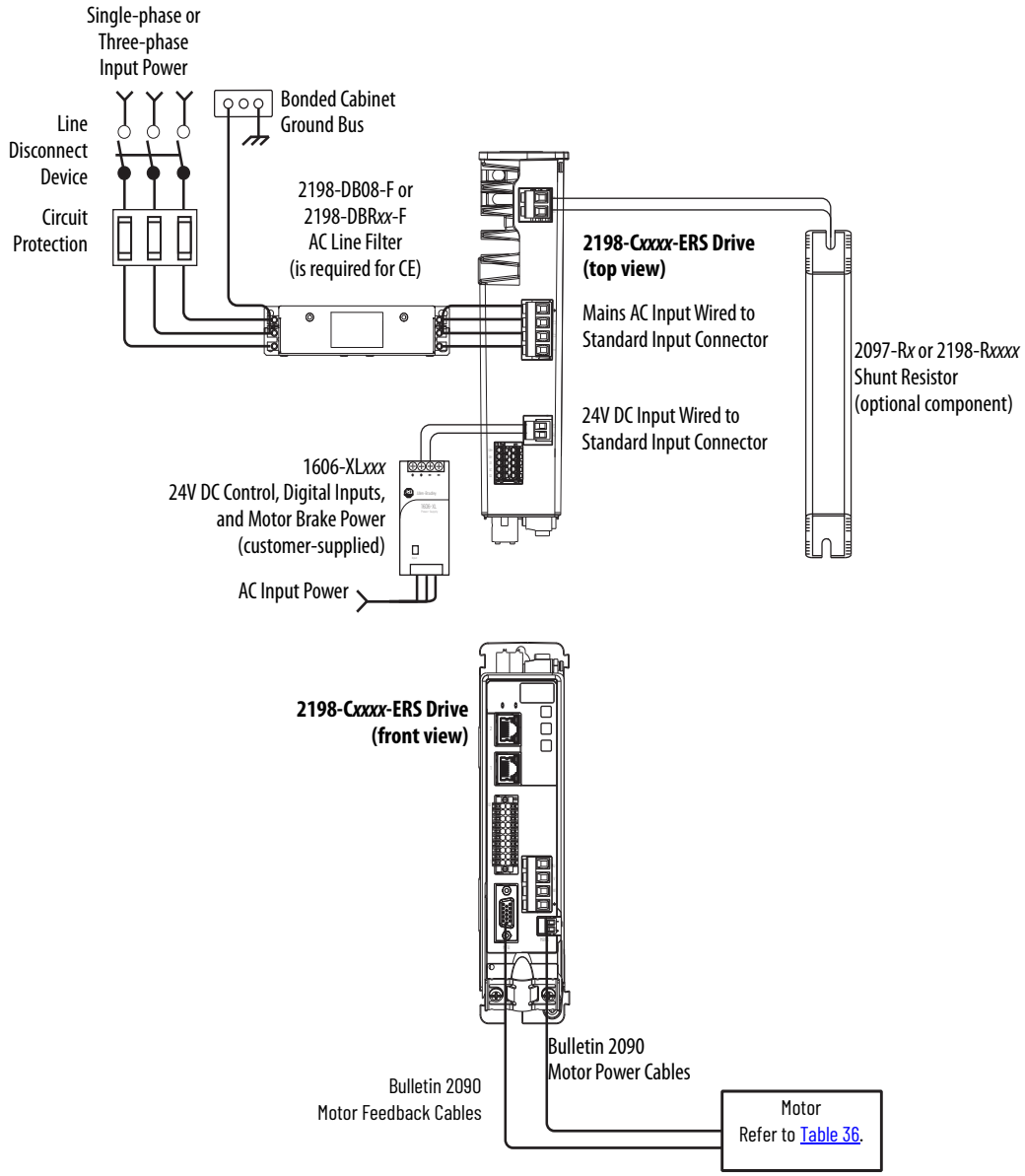


Kinetix 5300 Drive Hardware and Input Power Configurations

Typical Kinetix 5300 systems include single-phase and three-phase standalone configurations.

In this example, a single drive is shown with input power to the standard AC and 24V DC input connectors.

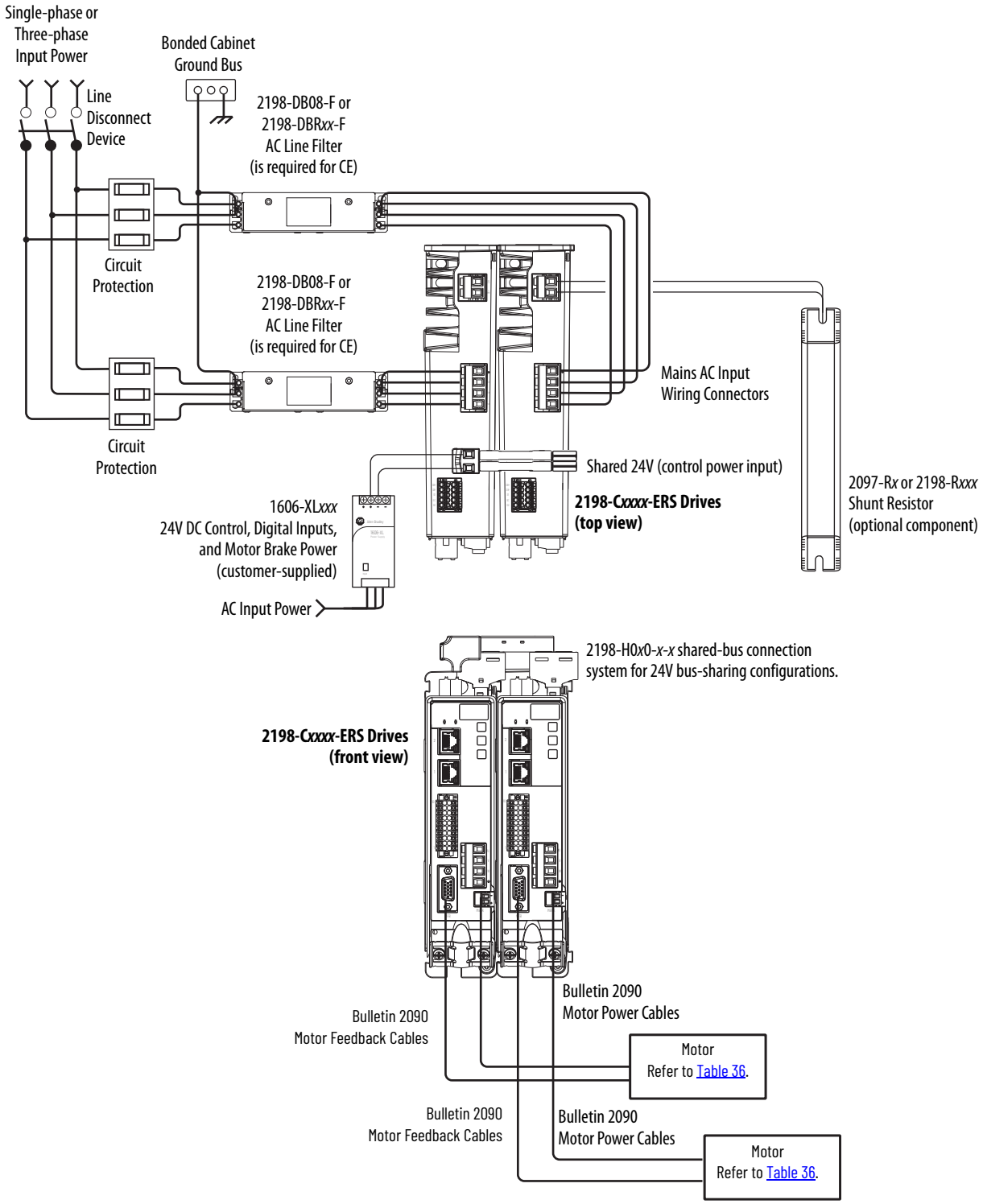
Figure 22 - Typical Kinetix 5300 Standalone Installation



In this example, two drives are shown with input power to the standard input connectors and control power input by using 24V shared-bus connectors.

With two or more drives in the drive configuration, each drive requires AC input power and a line filter.

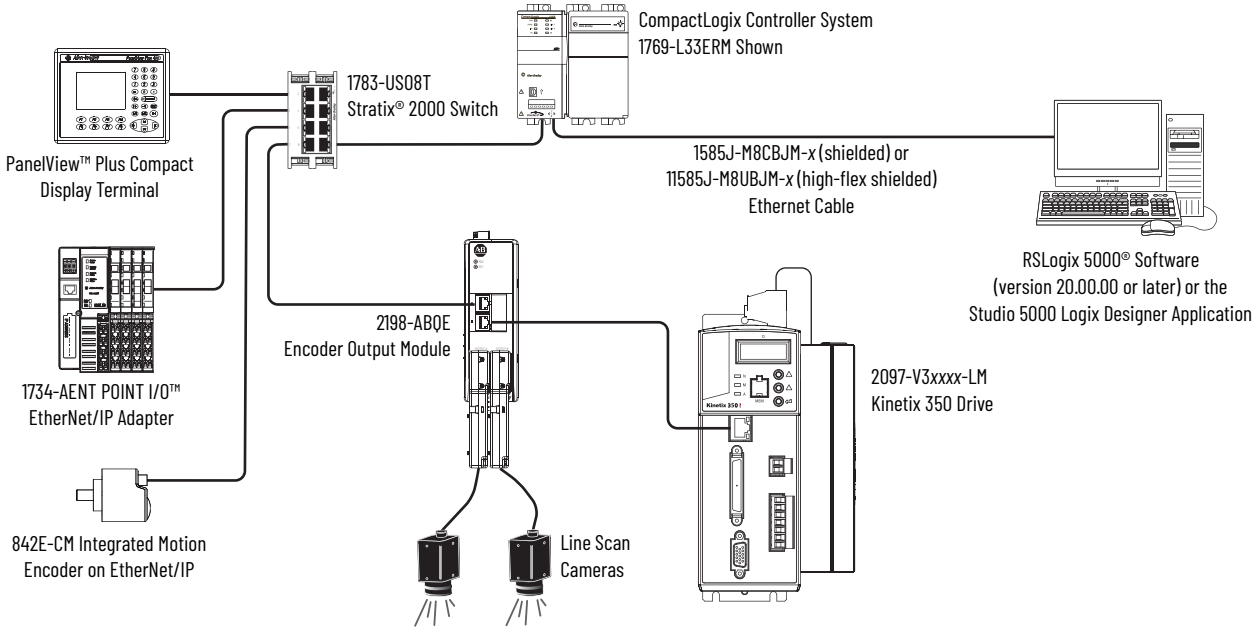
Figure 23 - Typical Kinetix 5300 Installation with 24V Shared-bus Connectors



Typical Communication Configurations

Natively, the Kinetix 350 drives only support Ethernet star topology. Some configurations have been modified to use an ETAP or similar device to create a ring or linear topology. The Kinetix 5300 drives natively support Ethernet topologies which include linear, ring, and star by using ControlLogix or CompactLogix controllers.

Figure 24 - Typical Kinetix 350 Communication Configuration



The Kinetix 5300 examples feature the CompactLogix 5380 programmable automation controllers (Bulletin 5069) that are part of the Logix 5000 family of controllers. The applications range from standalone systems to more complex systems with devices that are connected to the controller via an EtherNet/IP network.

Refer to CompactLogix 5380, Compact GuardLogix 5380, and CompactLogix 5480 Controller Specifications Technical Data, publication 5069-TD002, for more information on CompactLogix 5380 controllers.

Figure 25 - Kinetix 5300 Linear Communication Installation

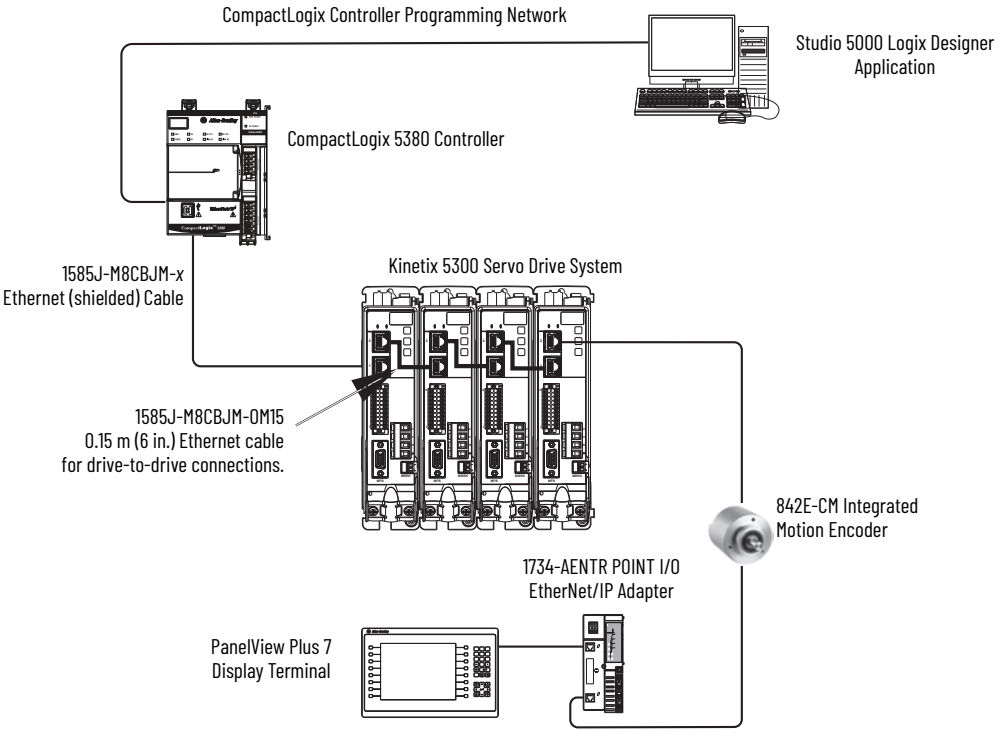


Figure 26 - Kinetix 5300 Ring Communication Installation

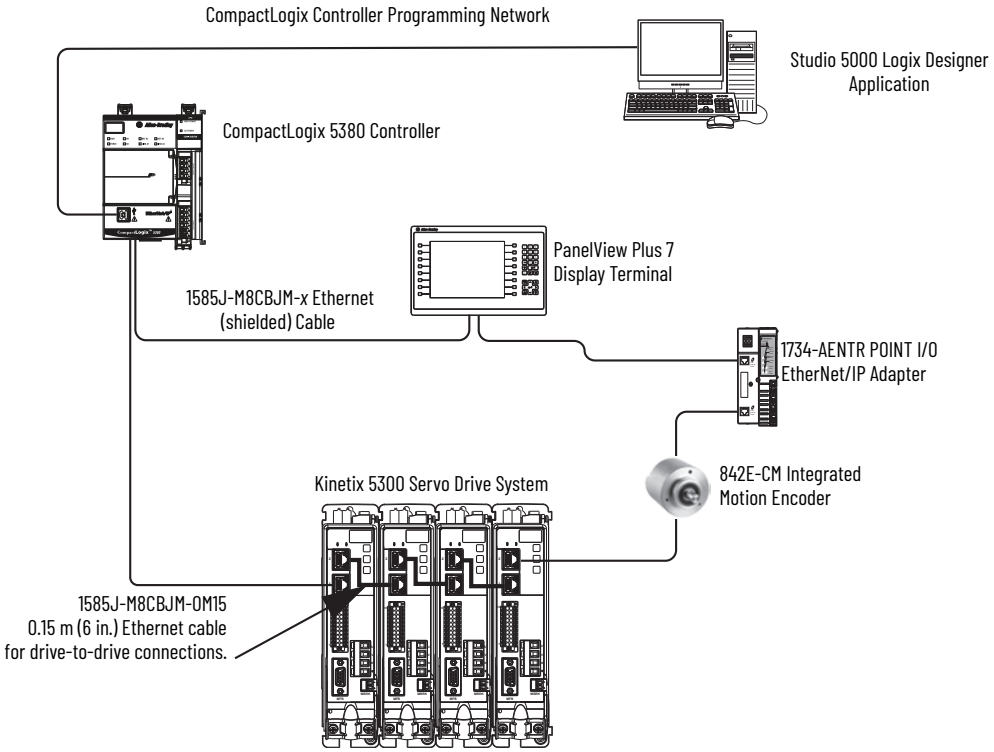
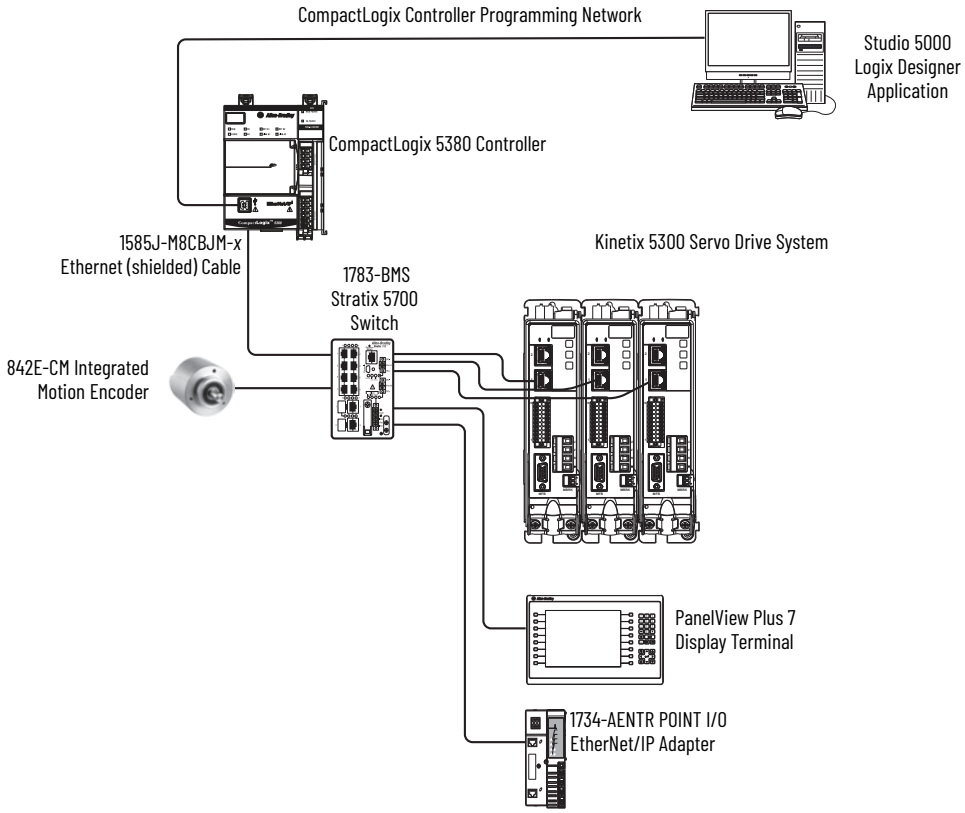


Figure 27 - Kinetix 5300 Star Communication Installation



See Kinetix 5300 Single-axis EtherNet/IP Servo Drives, publication 2198-UM005 for additional motor and auxiliary feedback connection and communication topology configurations.

Feature Comparison

The following table compares the hardware and features of the Kinetix® 350 drives and the Kinetix 5300 drives.

Table 37 - Feature Comparison Chart

Features	Kinetix 350 Drives	Kinetix 5300 Drives
Controller required	Yes	Yes
110/120V...240V operation	Yes	Yes
Internal shunt resistor available	Yes	Yes
Supports Sourcing I/O (1)	Yes	No
Supports Sinking I/O (1)	Yes	Yes
Hardwired Safe Torque Off	Yes	Yes
Dedicated Auxiliary feedback encoder connector	No	Yes
Hardware overtravel limits	Yes	Yes
Multiple assignments for inputs	No	Yes
Registration latch (capture position)	No	Yes
Holding brake support	Yes (2)	Yes (3)
Dual Loop Control	No	Yes
Dual-port Ethernet with DLR support	No	Yes

(1) Refer to Replacement Considerations: Figure 1...Figure 4 for more information.
(2) Only via interposing relay.
(3) Directly drive up to, 2.25A or via interposing relay.

Notes:

Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, and product notification updates.	rok.auto/support
Knowledgebase	Access Knowledgebase articles.	rok.auto/knowledgebase
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes.	rok.auto/pcdc

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Waste Electrical and Electronic Equipment (WEEE)

At the end of life, this equipment should be collected separately from any unsorted municipal waste.

Rockwell Automation maintains current product environmental information on its website at rok.auto/pec.

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