

Ultra3000 Digital Servo Drives to Kinetix 5500 Servo Drives



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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).

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Overview

The purpose of this migration guide is to provide you with the essential information to determine what hardware design changes may be necessary when migrating from a motion system containing Ultra™ 3000 servo drives to one containing Kinetix 5500 servo drives.

IMPORTANT Migrating from a motion control system that uses Ultra3000 servo drives to a system that uses Kinetix 5500 servo drives requires a comprehensive design review of the entire motion control system. There are multiple drive replacement combinations, multiple configurations for how the drives can be installed, and how software is applied. In addition there are system wide changes required because of the communication protocol employed.

As a result, this migration guide is not an all-inclusive document. It does not describe all the redesign steps that may be required, nor does it 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.

You will need to review additional product literature (see [Additional Resources on page 10](#)) to understand the technical similarities and differences between the Ultra3000 servo drive and a Kinetix 5500 servo drive, and to help you determine the proper solution for your migration.

This migration guide contains these chapters and appendices.

Chapter 1: Servo Drive and System Considerations	Describes some of the primary differences and system design considerations between the drive families.
Chapter 2: Servo Drive and System Comparisons	Provides information on drive sizing, dimension comparison, input wiring / fusing, motor power, cabling, and system layout.
Appendix A: Connectors and Field Connections	Provides information on connector locations, and comparisons for encoder wiring, control wiring, and mains power wiring.
Appendix B: About the Servo Drive System	Provides cut-sheet information about both drive families.
Appendix C: Specifications	Provides comparisons of the power specifications, cable lengths, environmental specifications, and certifications.
Appendix D: Interconnect Diagrams	Provides interconnect diagrams to assist in comparing power wiring and drive connections for both drive families.
Appendix E: Communication Configurations	Provides communication topologies for Kinetix 5500 servo drives.

Kinetix 5500 Servo Drives

The Kinetix 5500 servo drives and Kinetix VP low-inertia servo motors provide a cost-effective motion solution that delivers high performance and scalability with motor windings matched to drive ratings for optimized system sizing.

Enhancing the current midrange architecture portfolio, this motion system is designed to connect and operate with the new family of CompactLogix 5370 controllers by using the Studio 5000 environment and supporting Integrated Motion on the EtherNet/IP network. With the benefits of this motion system, you can now run motion applications on a single control platform by using a single network—simplifying the design, operation, and maintenance of equipment.



Kinetix 5500 Servo Drive Features

The Kinetix 5500 servo drive provides the following features:

- High performance in a smaller footprint and optimized power density
- Single motor cable that includes power, feedback, and brake conductors with SpeedTec connector
- Single-axis operation for low-cost simplicity
- Flexible power connectivity in multi-axis bus-sharing configurations
 - Shared AC
 - Shared DC
 - Shared AC/DC and hybrid configurations
- Integrated motion on the EtherNet/IP network (includes dual-port Ethernet)
- Provides disturbance observer that allows up to 80-1 inertia mismatch
- Safe torque-off control, ISO-13849-1 certified, PLd, category 3
- Each catalog number supports 200V and 400V class applications
- Bulletin VPL winding options that match the drive ratings for optimized system sizing
 - 0.2...14.6 kW continuous output power
 - 1.4...32.5 A 0-pk, continuous output current (inverter)
- Bulletin 2198 capacitor module and Bulletin 2097 shunt resistor for energy absorption management
- Digital (DSL) feedback device provides real-time motor performance information to the control circuitry
 - High-resolution absolute, multi-turn, and single-turn encoder feedback
- Capability to run servo and induction motors

Kinetix 5500 Servo Drive Components

Kinetix 5500 servo drive systems consist of these required components:

- One 2198-H0xx-ERSx servo drive
- One Kinetix VP servo motor, induction motor, or MP-Series rotary motor or linear actuator
 - MP-Series compatibility requires 2198-H2DCK converter kit
- One 2090-CSxM1DF-xxAAxx motor cable for power, feedback, and brake connections
- One 1606-XLxxx 24V power supply for control and motor brake power
- 1585J-M8CBJM-x (shielded) Ethernet cable

Kinetix 5500 servo drive systems can also include any of these optional components:

- One 2198-CAPMOD-1300 capacitor module
- One 2198-DBxx-F AC line filter
- One 2097-Rx shunt resistor
- Bulletin 2198 shared-bus connection system

For detailed Kinetix 5500 servo drive system requirements, see the Kinetix 5500 Servo Drive Systems Design Guide, publication [GMC-RM009](#).

Kinetix 5500 Servo Drive Selection

Kinetix 5500 Servo Drive Cat. No.	Frame Size	Input Voltage	Continuous Output Power kW	Continuous Output Current A 0-pk
2198-H003-ERSx	1	195...264V rms, single-phase 195...264V rms, three-phase 324...528V rms, three-phase	0.2 kW 0.3 kW 0.6 kW	1.4 A
2198-H008-ERSx			0.5 kW 0.8 kW 1.6 kW	3.5 A
2198-H015-ERSx	2		1.0 kW 1.5 kW 3.2 kW	7.1 A
2198-H025-ERSx			2.4 kW 5.1 kW	11.3 A
2198-H040-ERSx			4.0 kW 8.3 kW	18.4 A
2198-H070-ERSx	3		7.0 kW 14.6 kW	32.5 A

For Kinetix 5500 servo drive module specifications not included in this publication, see the Kinetix Servo Drives Technical Data, publication [GMC-TD003](#).

Pre-migration

Motion Analyzer software – is a comprehensive motion-application sizing tool used for analysis, optimization, selection, and validation of your Kinetix motion control system. This software facilitates the machine design process, letting you quickly design and validate new machine concepts without purchasing or installing physical equipment.

The performance capabilities of any replacement drive should be reviewed to be sure that the replacement drive is capable of delivering the required level of peak and continuous current to the motor and the Motion Analyzer software can assist in the correct drive selection.

Download is available at <http://ab.rockwellautomation.com/motion-control/motion-analyzer-software>.

Controller Files – Upload and save any network files and programmable logic controller (PLC) programs.

Electrical Noise Reduction – See the System Design for Control of Electrical Noise Reference Manual, publication [GMC-RM001](#), for information on the concept of high-frequency (HF) bonding, the ground plane principle, and electrical noise reduction.

Additional Resources

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

Resource	Description
Integrated Motion on SERCOS and EtherNet/IP Systems - Analysis and Comparison, publication MOTION-WP001	Compare and contrast Integrated Motion systems using SERCOS and EtherNet/IP with a ControlLogix® Programmable Automation Controller (PAC).
Ethernet Design Considerations Reference Manual, publication ENET-RM002	Provides information for designing ethernet and EtherNet/IP networks.
Kinetix 5500 Servo Drives User Manual, publication 2198-UM001	Information on installing, configuring, startup, troubleshooting, and applications for your Kinetix servo drive system.
Kinetix 5500 Drive Systems Design Guide, publication GMC-RM009	System design guide to select the required (drive specific) drive module, power accessory, feedback connector kit, and motor cable catalog numbers for your Kinetix 5500 drive and Kinetix VP motor motion control system.
Logix 5000 Control Systems: Connect Kinetix 5500 Drives over an EtherNet/IP Network, publication IASIMP-QS035	Provides examples and procedures for integrating a Kinetix 5500 servo drive into any Logix 5000™ control system over an EtherNet/IP network.
Kinetix 5500 Servo Drives Installation Instructions, publication 2198-IN001	Information on mounting and wiring the Kinetix 5500 servo drive.
Kinetix 5500 Feedback Connector Kit Installation Instructions, publication 2198-IN002	Information on installing and wiring the Kinetix 5500 motor feedback connector kit.
Kinetix 5500 AC Line Filter Installation Instructions, publication 2198-IN003	Information on installing and wiring the Kinetix 5500 servo drive AC line filters.
Kinetix 5500 Capacitor Module Installation Instructions, publication 2198-IN004	Information on installing and wiring the Kinetix 5500 servo drive capacitor module.
Kinetix 5500 Shared-bus Connector Kit Installation Instructions, publication 2198-IN005	Information on installing the Kinetix 5500 servo drive shared-bus connector kits.
Kinetix 300 Shunt Resistor Installation Instructions, publication 2097-IN002	Information on installing and wiring Kinetix 300 shunt resistors.
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.
EMC Noise Management DVD, publication GMC-SP004	
Kinetix Motion Control Selection Guide, publication GMC-SG001	Overview of Kinetix servo drives, motors, actuators, and motion accessories designed to help make initial decisions for the motion control products best suited for your system requirements.

Resource	Description
Kinetix Rotary Motion Specifications Technical Data, publication GMC-TD001	Product specifications for Kinetix VP (Bulletin VPL), MP-Series™ (Bulletin MPL, MPM, MPF, MPS), Kinetix 6000M (Bulletin MDF), TL-Series™, RDD-Series™, and HPK-Series™ rotary motors.
Kinetix Servo Drives Specifications Technical Data, publication GMC-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.
Ultra3000 Drive Systems Design Guide, publication GMC-RM008	Reference material used to design an Ultra3000 servo system.
Ultra3000 Digital Servo Drives Installation Manual, publication 2098-IN003	Mounting, wiring, and connecting procedures for the Ultra3000 Digital Servo Drive.
Ultra3000 Servo Drives Integration Manual, publication 2098-IN005	Power-up procedures, system integration, and troubleshooting tables for the Ultra3000 Digital Servo Drive.

You can view or download publications at <http://www.rockwellautomation.com/literature>. To order paper copies of technical documentation, contact your local Allen-Bradley® distributor or Rockwell Automation sales representative.

To find your local Rockwell Automation distributor or sales representative, visit <http://www.rockwellautomation.com/locations>.

Notes:

Servo Drive and System Considerations

Replacing an Ultra3000 servo drive with a Kinetix 5500 servo drive will require some system design changes as well as drive hardware changes. This chapter describes some of the primary differences and considerations. Additional chapters will provide in-depth drive comparisons.

Engineering Effort and Product Liability

Thoroughly review this document before you begin to evaluate the design changes required to successfully migrate your Ultra3000 servo drive to a Kinetix 5500 servo drive.



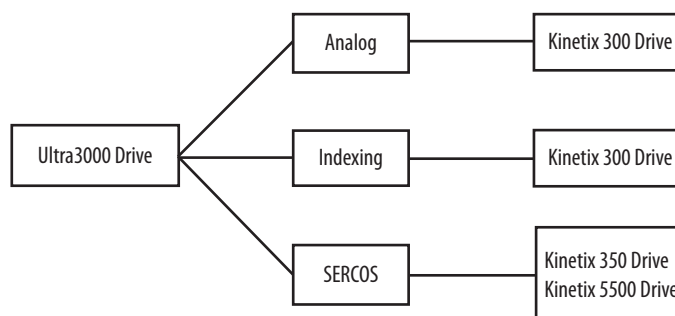
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The following sections highlight the major and minor differences between Ultra3000 servo drives and Kinetix 5500 servo drives. There may be more differences beyond these that can impact your application. Read this entire document before proceeding to qualify the Kinetix 5500 servo drive for your needs.

Migration Options

This document covers the migration of the Ultra3000 SERCOS servo drive only, though it is possible to migrate from the other Ultra3000 servo drive types. For additional migration options, see Ultra3000 Digital Servo Drives to Kinetix 300 and Kinetix 350 Servo Drives, publication [2098-AP001](#).

Figure 1 - Suggested Migration Options



Communications

The Ultra3000 servo drives use the SERCOS network for communications. A SERCOS interface module serves as a link between the ControlLogix/CompactLogix platform and the Ultra3000 servo drive system.

The communication link uses the IEC 61491 Serial Real-time COmmunication System (SERCOS) protocol over a fiber-optic media.

The Kinetix 5500 servo drives use the EtherNet/IP network for communicating to either a ControlLogix or CompactLogix programmable automation controller. All Kinetix 5500 servo drives include dual-port EtherNet/IP connectivity.

Supported Ethernet topologies include linear, ring, and star.

For more information on Ethernet design considerations, see these publications:

- Scalability - The Best Approach to Change, publication [IA-WP002](#)
- EtherNet/IP Design, Commissioning, and Troubleshooting Quick Reference, publication [IASIMP-QR023](#)
- Integrated Motion on EtherNet/IP Configuration Drawing with Notes, publication [IASIMP-QR019](#)

See [Appendix E](#) for communication configurations.

Controller, Ethernet Cards, and Switches

The following table lists the compatible hardware for Integrated Motion on EtherNet/IP systems.

Hardware	Description
Controllers	ControlLogix® 1756 L7x and L6x models CompactLogix® 5370 L3y, L2y, and L1y models
Ethernet Communication	1756-EN2T, 1756-EN2TR, and 1756-EN3TR
Ethernet Switches	Stratix 8300™ Layer 3 Modular Managed Ethernet Switches Stratix 8000™ Modular Managed Ethernet Switches Stratix 6000™ Fixed Managed Ethernet Switches Stratix 5700™ Managed Industrial Ethernet Switches Stratix 2000™ Unmanaged Ethernet Switches

Motors

Verify that your existing motor is compatible with the Kinetix 5500 servo drive family. Kinetix 5500 servo drives are compatible with the following motors:

- Kinetix VP-Series servo motor
- Induction motors
- MP-Series rotary motors
- MP-Series linear actuators

Note: MP-Series compatibility requires a 2198-H2DCK converter kit, and also requires drive firmware revision 2.001 or later, and the Kinetix 5500 servo drive

AOP (Add-On Profile) for Studio 5000 Logix Designer™ application, version 21.00.00 or later.

For more information, see Hiperface-to-DSL Feedback Converter Kit Installation Instructions, publication [2198-IN006](#).

For Kinetix 5500 Hiperface-to-DSL Feedback Converter Kit pin-out, see [page 39](#).

In most cases Encompass Partner motors will work with the converter kit. Check with your local Rockwell sales person or distributor to evaluate compatibility.

Cable Lengths

Verify that the feedback cable length in your current Ultra3000 servo drive system does not exceed the maximum cable lengths for the Kinetix 5500 servo drives. The maximum cable lengths for the Kinetix 5500 servo drives are:

- Combined motor power cable length for all axes on the same DC bus must not exceed 250 m (820 ft). Drive-to-motor cables must not exceed 50 m (164 ft), however use of continuous-flex cable limits the maximum length. See the Kinetix 5500 Servo Drives User Manual, publication [2198-UM001](#), Table 5 for specifications by frame size.
- Ethernet cable lengths connecting drive-to-drive, drive-to-controller, or drive-to-switch must not exceed 100 m (328 ft). Complete a careful evaluation of your Ethernet media when using a CIP motion solution. For more information, see Guidance for Selecting Cables for EtherNet/IP Networks, publication [ENET-WP007](#).
- Registration and digital input cables greater than 30 m (98.4 ft) must be shielded.

See [Drive Interconnects and Cabling on page 35](#) for more information.

Physical Dimensions

The physical size of the drive families are different (see [Dimension Comparison on page 21](#)). In most cases, the Kinetix 5500 servo drives are smaller and will fit into the existing space of the compatible Ultra3000 drives; however, you should verify the physical size of the Kinetix 5500 servo drive.

Control and Auxiliary Power

The control and auxiliary power feature lets the drive maintain logic power when main power is removed. This allows communication between the controller and the drive to continue and to maintain position feedback (aside from absolute feedback).

The Ultra3000 servo drives (2098-DSD-005, -010, and -020) require an external +5V power supply in applications where it is necessary to maintain logic power

when the AC line voltage is removed. The +24V I/O supply (IOPWR) allows use of the drive-mounted breakout board with 24V to 5V DC converter (2090-U3CBB-DM12). All other Ultra3000 servo drives have other auxiliary power requirements. See Appendix C, Control and Auxiliary Specifications, for more information.

The Kinetix 5500 servo drive requires 24V DC input power for control circuitry. You need to review your control power scheme including 24V power supply requirements. See [Appendix C](#) for more information on control power specifications.

Circuit Protection

Sizing for protective devices, such as fuses and circuit breakers, may be different between Ultra3000 servo drives and Kinetix 5500 servo drives. Verify that you have chosen the correct sizes when selecting and installing a Kinetix 5500 servo drive. For more information, see [Appendix C](#).

Control Signals

Digital Inputs – The Ultra3000 servo drive includes six digital inputs. They are Enable, Home, Reg1, Reg2, OT+, and OT-. All Ultra3000 drives require an isolated external 12-24V power supply for proper operation of the digital I/O.

The Kinetix 5500 servo drive includes two digital inputs. They are Reg1 and Reg2. The Reg1 input is capable of dual functionality. It can also be used as the Home input.

Digital Outputs – The Ultra3000 servo drive includes one digital output (Drive Ready) and one relay output (brake).

Dual Position Loop / Aux Feedback Port – The Kinetix 5500 servo drive does not have the ability to accept an auxiliary encoder input for dual-loop operation or to be used as a Master Input for encoder feedback.

If a Master Encoder input is required, other options are available such as using a Bulletin 842E-CM Integrated Motion on EtherNet/IP™ Absolute Encoder that provides a CIP Motion-capable Master Encoder that can be used with the Kinetix 5500 servo drive or investigate using a Kinetix 6200 or 6500 drive.

Motor Brake – The Ultra3000 servo drive includes a relay output dedicated as a Brake output, where closed contacts release a motor brake.

The Kinetix 5500 servo drive requires a customer-supplied 24V power supply to drive the motor parking-brake output through a solid-state relay.

Safe Torque-off Safety Features

Kinetix 5500 servo drives have the capability to safely turn off the inverter power transistors in response to a monitored digital input, according to Category 0 Stop behavior. These drives support parallel input terminals for cascading to adjacent drives over duplex wiring.

For applications that do not require the safety function, you must install jumper wires to bypass the safe torque-off feature.

For the Safe Torque-off connector pinout, installation, and wiring information, see the related chapter in the Kinetix 5500 Servo Drives User Manual, publication [2198-UM001](#).

Accessories

Ultra3000 servo drive accessories include the drive-mounted breakout boards, panel-mounted breakout boards, 2090 AC line filters, 2090 shunt modules, resistive brake module (RBM), and external auxiliary encoder.

Kinetix 5500 servo drive accessories include the Bulletin 2198 capacitor module, AC line filters, and the shared-bus connection system. Kinetix 5500 servo drives are also compatible with Bulletin 2097 external shunt resistors. See [Accessories on page 45](#).

Notes:

Servo Drive and System Comparisons

There are a number of different factors that affect the selection of a replacement servo drive and the system redesign effort. They include the following:

- Drive Sizing
- Dimension Comparison
- AC Input Power Wiring and Fusing
- Interconnects and Cabling
- Typical System Layout
- Accessories

This chapter provides a side-by-side comparison of both servo drive families to help in the evaluation and selection of the correct components in the migration process.

Drive Sizing

This section lists the Ultra3000 servo drives and the suggested Kinetix 5500 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 shown in [Table 1](#) and [Table 2](#).

Output Current Comparison

IMPORTANT The performance capabilities of the replacement drive should be reviewed to be sure that the replacement drive is capable of delivering the required level of peak and continuous current to the motor.

Table 1 - Suggested Kinetix 5500 Replacement Drives by Output Current

Ultra3000 Servo Drives				Kinetix 5500 Servo Drives			
Model	Voltage Range (V)	Nominal Voltage Range (V)	Output Current Rating (0-pk) A ⁽¹⁾	Recommended Kinetix 5500 Replacement Drive	Voltage Range (V)	Nominal Voltage Range (V)	Output Current Rating (0-pk) A ⁽¹⁾
N/A	N/A	N/A	N/A	2198-H003-ERSx	195...264, 1-phase 195...264, 3-phase 324...528, 3-phase	240, 1-phase 240, 3-phase 480, 3-phase	1.4
2098-DSD-005	88...265, 1-phase	100...240, 1-phase	2.5	2198-H008-ERSx	195...264, 1-phase 195...264, 3-phase 324...528, 3-phase	240, 1-phase 240, 3-phase 480, 3-phase	3.5
2098-DSD-010	88...265, 1-phase	100...240, 1-phase	5.0	2198-H015-ERSx	195...264, 1-phase 195...264, 3-phase 324...528, 3-phase	240, 1-phase 240, 3-phase 480, 3-phase	7.1
2098-DSD-020	88...265, 1-phase	100...240, 1-phase	10.0	N/A	N/A	N/A	N/A
2098-DSD-030	88...265, 1-phase	100...240, 1-phase	15.0	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	2198-H025-ERSx	195...264, 3-phase 324...528, 3-phase	240, 3-phase 480, 3-phase	11.3
N/A	N/A	N/A	N/A	2198-H040-ERSx	195...264, 3-phase 324...528, 3-phase	240, 3-phase 480, 3-phase	18.4
2098-DSD-075	88...265, 3-phase	100...240, 3-phase	35	2198-H070-ERSx	195...264, 3-phase 324...528, 3-phase	240, 3-phase 480, 3-phase	32.5
2098-DSD-150	88...265, 3-phase	100...240, 3-phase	65	N/A	N/A	N/A	N/A
2098-DSD-HV030	207...528, 3-phase	230...480, 3-phase	7.0	2198-H015-ERSx	195...264, 1-phase 195...264, 3-phase 324...528, 3-phase	240, 1-phase 240, 3-phase 480, 3-phase	7.1
2098-DSD-HV050	207...528, 3-phase	230...480, 3-phase	11.0	2198-H025-ERSx	195...264, 3-phase 324...528, 3-phase	240, 3-phase 480, 3-phase	11.3
2098-DSD-HV100	207...528, 3-phase	230...480, 3-phase	23.0	2198-H070-ERSx	195...264, 3-phase 324...528, 3-phase	240, 3-phase 480, 3-phase	32.5
2098-DSD-HV150	207...528, 3-phase	230...480, 3-phase	34.0				
2098-DSD-HV220	207...528, 3-phase	230...480, 3-phase	47.0	N/A	N/A	N/A	N/A

(1) Continuous output current ratings are used.

Dimension Comparison

The following table provides a comparison of the dimensions of the drives.

Table 2 - Suggested Kinetix 5500 Replacement Drives by Dimensions

Ultra3000 Servo Drive ⁽¹⁾				Kinetix 5500 Servo Drive				Dimension Differences		
Model	Height mm (in)	Width mm (in)	Depth mm (in)	Model	Height mm (in)	Width mm (in)	Depth mm (in)	Height ⁽²⁾ mm (in)	Width ⁽²⁾ mm (in)	Depth ⁽²⁾ mm (in)
N/A	N/A	N/A	N/A	2198-H003-ERSx	215 (8.46)	50 (1.97)	226 (8.90)	N/A	N/A	N/A
2098-DSD-005	198.12 (7.8)	95.5 (3.76)	144.27 (5.68)	2198-H008-ERSx	215 (8.46)	50 (1.97)	226 (8.90)	16.88 (0.66)	-45.5 (-1.79)	81.73 (3.22)
2098-DSD-010	198.12 (7.8)	121.54 (4.79)	144.27 (5.68)	2198-H015-ERSx	265 (10.43)	55 (2.16)	226 (8.90)	66.88 (2.63)	-66.54 (-2.63)	81.73 (3.22)
2098-DSD-HV030	360.7 (14.2)	138.7 (5.46)	242.2 (9.54)					-95.7 (-3.77)	-83.7 (-3.3)	-16.2 (-0.64)
2098-DSD-HV050	360.7 (14.2)	138.7 (5.46)	242.2 (9.54)	2198-H025-ERSx	265 (10.43)	55 (2.16)	226 (8.90)	-95.7 (-3.77)	-83.7 (-3.3)	-16.2 (-0.64)
N/A	N/A	N/A	N/A	2198-H040-ERSx	265 (10.43)	55 (2.16)	226 (8.90)	N/A	N/A	N/A
2098-DSD-075	360.7 (14.2)	138.68 (5.41)	247.14 (9.73)	2198-H070-ERSx	294 (11.57)	8.52 (3.35)	226 (8.90)	-66.7 (-2.63)	-53.48 (-2.06)	-21.14 (-.083)
2098-DSD-HV100	360.7 (14.2)	151.6 (5.97)	242.2 (9.54)					-66.7 (-2.63)	-66.4 (-2.62)	-16.2 (-0.64)
2098-DSD-HV150	360.7 (14.2)	151.6 (5.97)	242.2 (9.54)					-66.7 (-2.63)	-66.4 (-2.62)	-16.2 (-0.64)

(1) Dimensions are for Ultra3000 drives -SE.

(2) A minus sign denotes that the height, width, or depth of the Kinetix 5500 servo drive is shorter, narrower, or shallower than the comparable Ultra3000 servo drive.

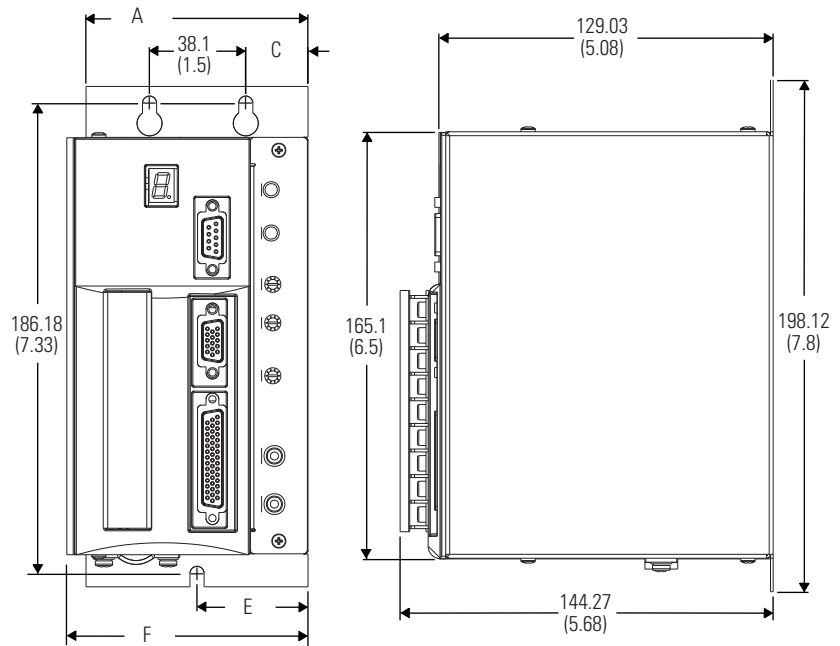
Dimension Drawings

This section provides dimensions of the drives to assist you in determining the space needed to install the drives.

Ultra3000 (230V) Drive Dimensions

In [Figure 2](#), -xxx is replaced by -005, -010, or -020 to represent the Ultra3000 500 W, 1 kW, and 2 kW drives respectively.

Figure 2 - Ultra3000 (230V) Dimensions (catalog numbers 2098-DSD-xxx, 2098-DSD-xxxX, 2098-DSD-xxx-SE, 2098-DSD-xxx-DN, and 2098-DSD-xxxX-DN)



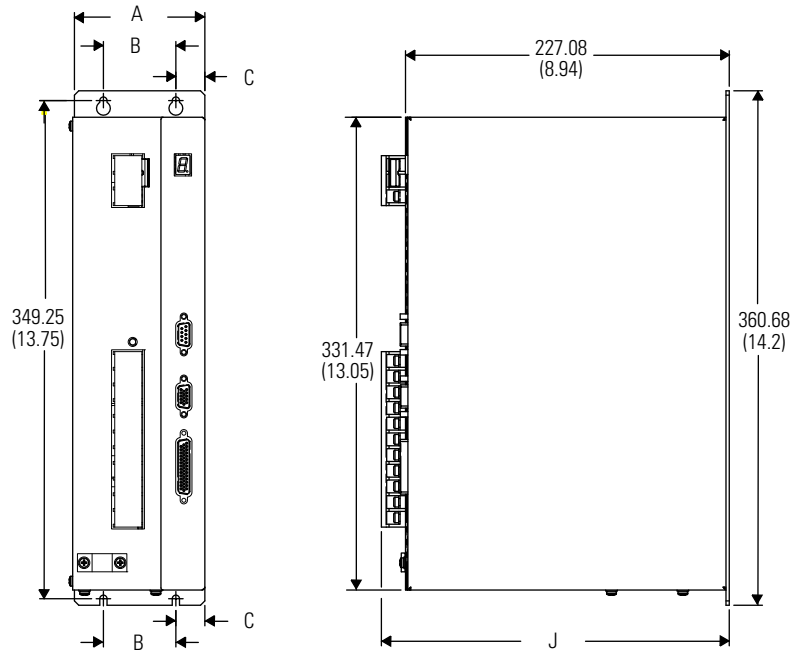
Dimensions are in mm (in.)

Unit shown is the 2098-DSD-005-SE drive.

Ultra3000 Servo Drive Cat. No.	A mm (in.)	C mm (in.)	E mm (in.)	F mm (in.)
2098-DSD-005 2098-DSD-005X	65.02 (2.56)	13.26 (0.52)	32.77 (1.29)	72.64 (2.86)
2098-DSD-010 2098-DSD-010X 2098-DSD-020 2098-DSD-020X				98.1 (3.89)
2098-DSD-005-SE 2098-DSD-005-DN 2098-DSD-005X-DN				95.5 (3.76)
2098-DSD-010-SE 2098-DSD-010-DN 2098-DSD-010X-DN 2098-DSD-020-SE 2098-DSD-020-DN 2098-DSD-020X-DN	87.88 (3.46)	24.64 (0.97)	43.94 (1.73)	121.54 (4.79)

In [Figure 3](#), -xxx is replaced by -030, -075, or -150 to represent the Ultra3000 3 kW, 7.5 kW, and 15 kW drives respectively.

Figure 3 - Ultra3000 (230V) Dimensions (catalog numbers 2098-DSD-xxx, 2098-DSD-xxxX, 2098-DSD-xxx-SE, 2098-DSD-xxx-DN, and 2098-DSD-xxxX-DN)



Dimensions are in mm (in.)

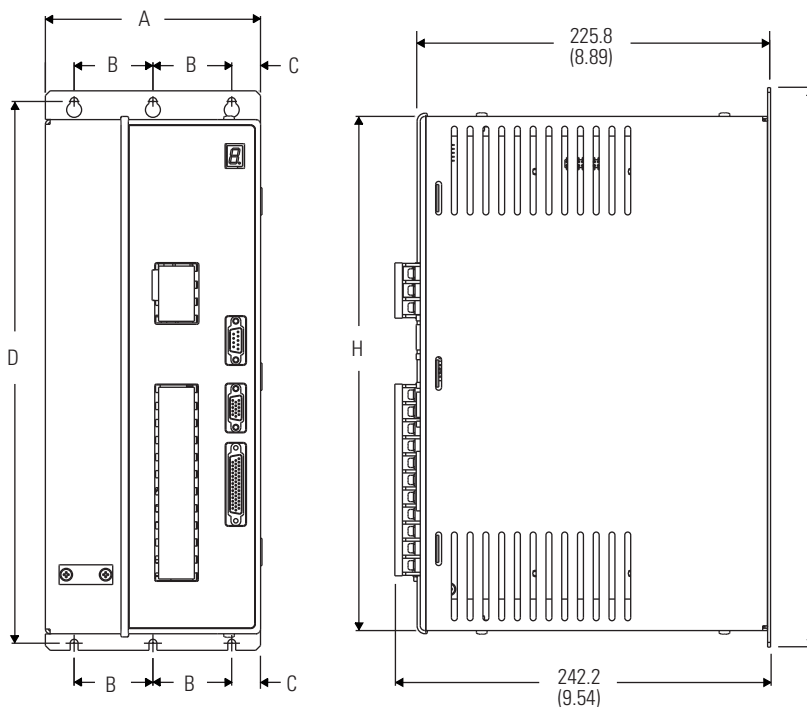
Unit shown is the 2098-DSD-030 drive.

Ultra3000 Servo Drive Cat. No.	A mm (in.)	B mm (in.)	C mm (in.)	J mm (in.)
2098-DSD-030 2098-DSD-030X 2098-DSD-030-SE 2098-DSD-030-DN 2098-DSD-030X-DN	91.44 (3.6)	50.8 (2.0)	20.32 (0.8)	243.84 (9.6)
2098-DSD-075 2098-DSD-075X 2098-DSD-075-SE 2098-DSD-075-DN 2098-DSD-075X-DN	138.68 (5.41)	88.9 (3.5)	24.89 (0.96)	247.14 (9.73)
2098-DSD-150 2098-DSD-150X 2098-DSD-150-SE 2098-DSD-150-DN 2098-DSD-150X-DN	188.97 (7.44)	139.7 (5.5)	24.6 (0.97)	241.05 (9.49)

Ultra3000 (460V) Drive Dimensions

In Figure 4, xxx is replaced by 030, 050, 100, 150, or 220 to represent the Ultra3000 3 kW, 5 kW, 10 kW, 15 kW, and 22 kW drives respectively.

Figure 4 - Ultra3000 (460V) Dimensions (catalog numbers 2098-DSD-HVxxx, 2098-DSD-HVxxxX, 2098-DSD-HVxxx-SE, 2098-DSD-HVxxx-DN, and 2098-DSD-HVxxxX-DN)



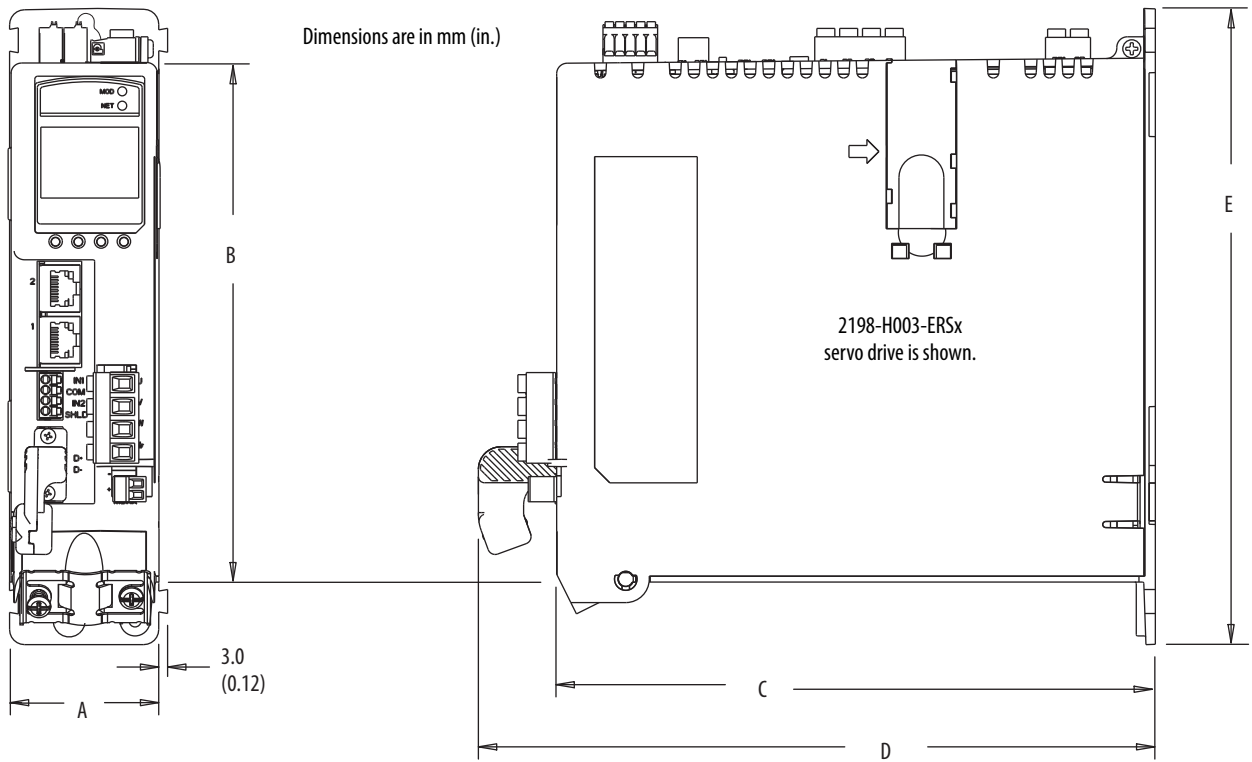
Dimensions are in mm (in.)

Unit shown is the 2098-DSD-HV030 drive.

Ultra3000 Servo Drive Cat. No. ⁽¹⁾	A mm (in.)	C mm (in.)	B mm (in.)	D mm (in.)	H mm (in.)	I mm (in.)
2098-DSD-HV030x 2098-DSD-HV030-xx 2098-DSD-HV050x 2098-DSD-HV050-xx	138.7 (5.46)	18.5 (0.73)	50.8 (2.0)	349.3 (13.75)	331.5 (13.05)	360.7 (14.2)
2098-DSD-HV100x 2098-DSD-HV100-xx 2098-DSD-HV150x 2098-DSD-HV150-xx	151.6 (5.97)	25 (0.99)				
2098-DSD-HV220x 2098-DSD-HV220-xx	203.2 (8.0)	25.4 (1.0)	76.2 (3.0)	380.4 (14.98)	362.6 (14.26)	391.8 (15.43)

(1) The x represents the indexing (X) option. The -xx represents the SERCOS interface (SE) or DeviceNet (DN) option. SERCOS interface is not available with the DeviceNet option.

Kinetix 5500 Servo Drive Dimensions



Kinetix 5500 Servo Drive Cat. No.	A mm (in.)	B mm (in.)	C mm (in.)	D mm (in.)	E mm (in.)
2198-H003-ERSx	50 (1.97)	170 (6.69)	200 (7.87)	226 (8.90)	215 (8.46)
2198-H008-ERSx					
2198-H015-ERSx	55 (2.16)	225 (8.86)			265 (10.43)
2198-H025-ERSx					
2198-H040-ERSx					
2198-H070-ERSx	85.2 (3.35)	250 (9.84)			294 (11.57)

AC Input Power Wiring and Fusing

This section provides information to assist you in determining the wiring and fusing requirements of the drives.

AC Input Power Wiring

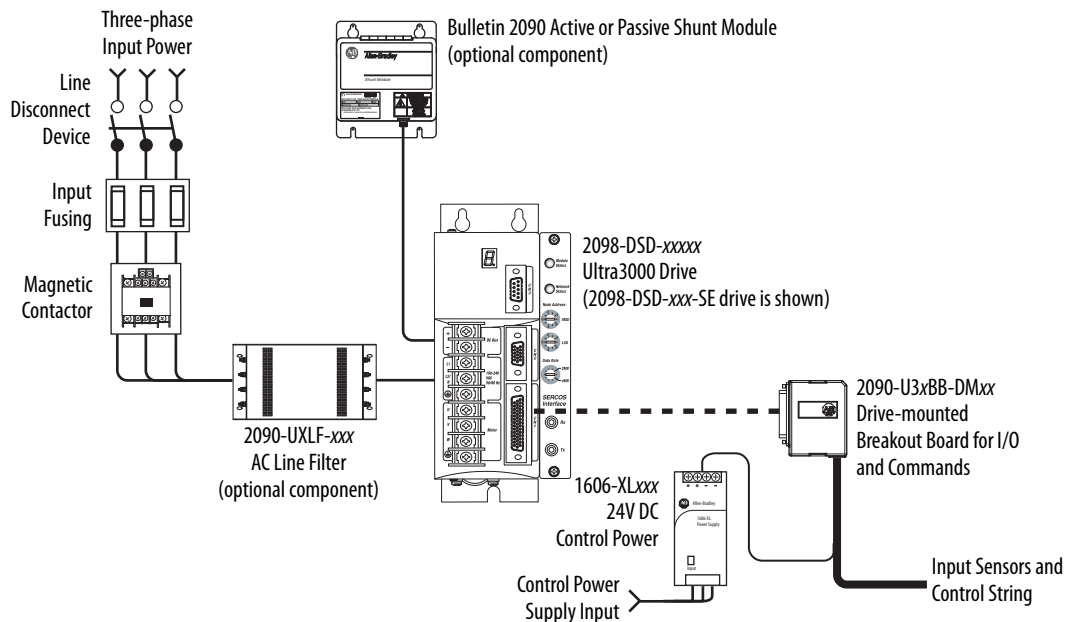
In general, the recommended drive replacement should not require changes in wiring length. However, the routing may need to change as the input power on the Kinetix 5500 servo drive is located on the top of the drive, while the same connection is located on the front of the Ultra3000 servo drive.

See [Appendix A](#), Connectors and Field Connections for a comparison of the Ultra3000 servo drive and Kinetix 5500 servo drive terminals.

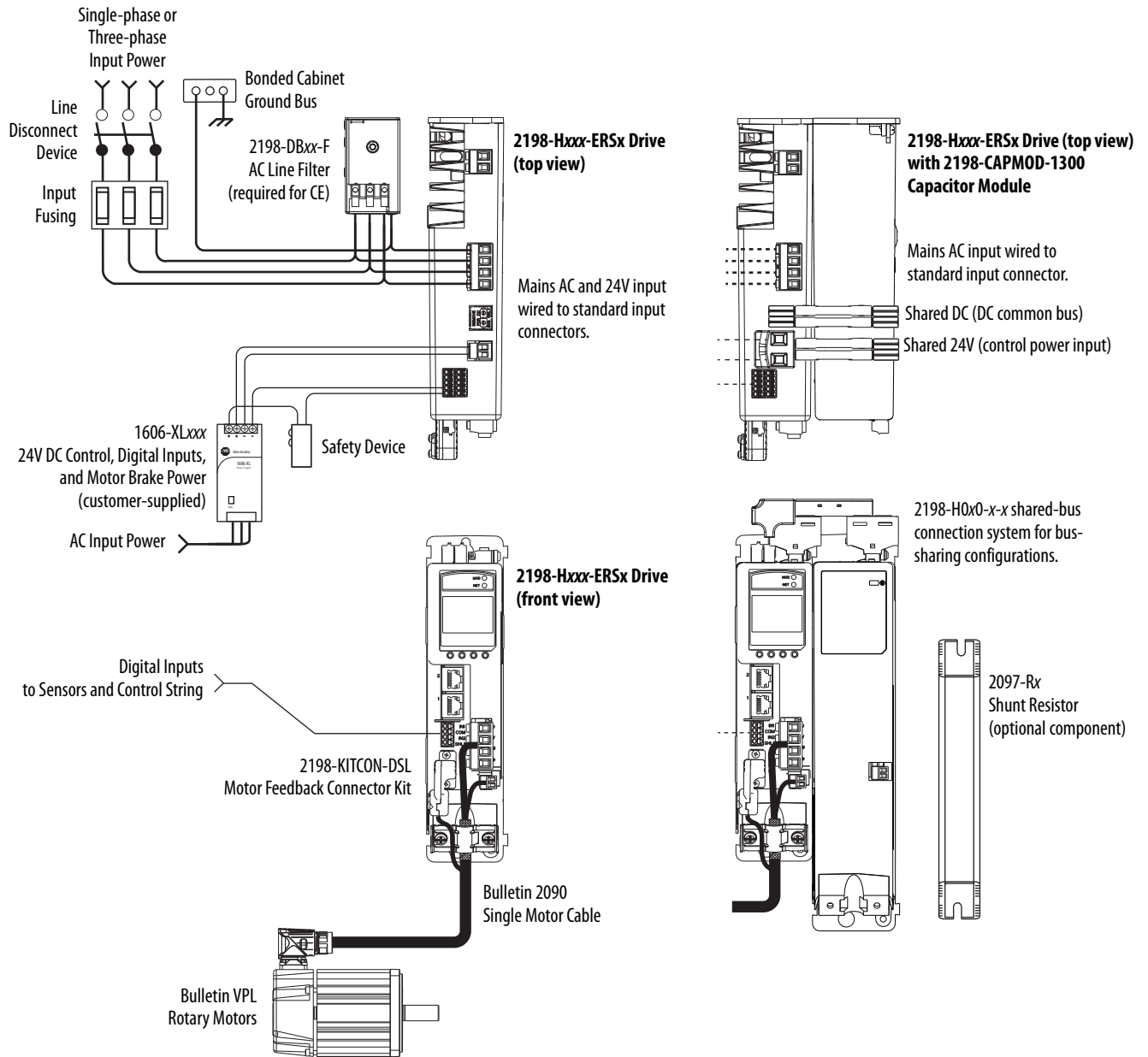
In addition, the Kinetix 5500 servo drives are designed for multiple power topologies, and your system may benefit from these additional wiring configurations. It can be wired independently (single axis) or in multi-axis configurations, including:

- Standalone
- AC/DC Supply Sharing
- DC Bus Sharing
- Hybrid Configuration (consisting of shared AC/DC supply with DC bus)

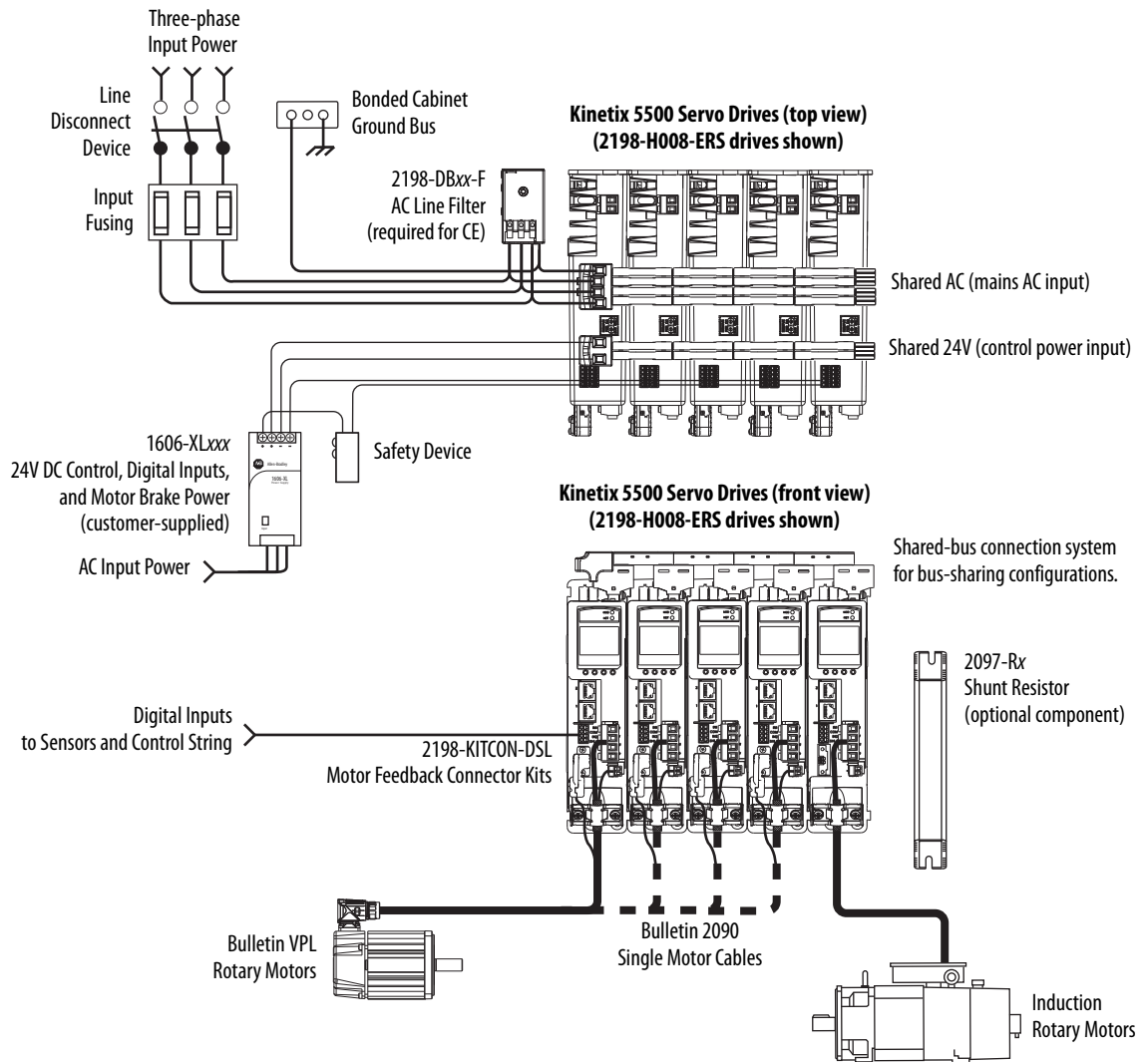
Ultra3000 Servo Drive Input Power Example



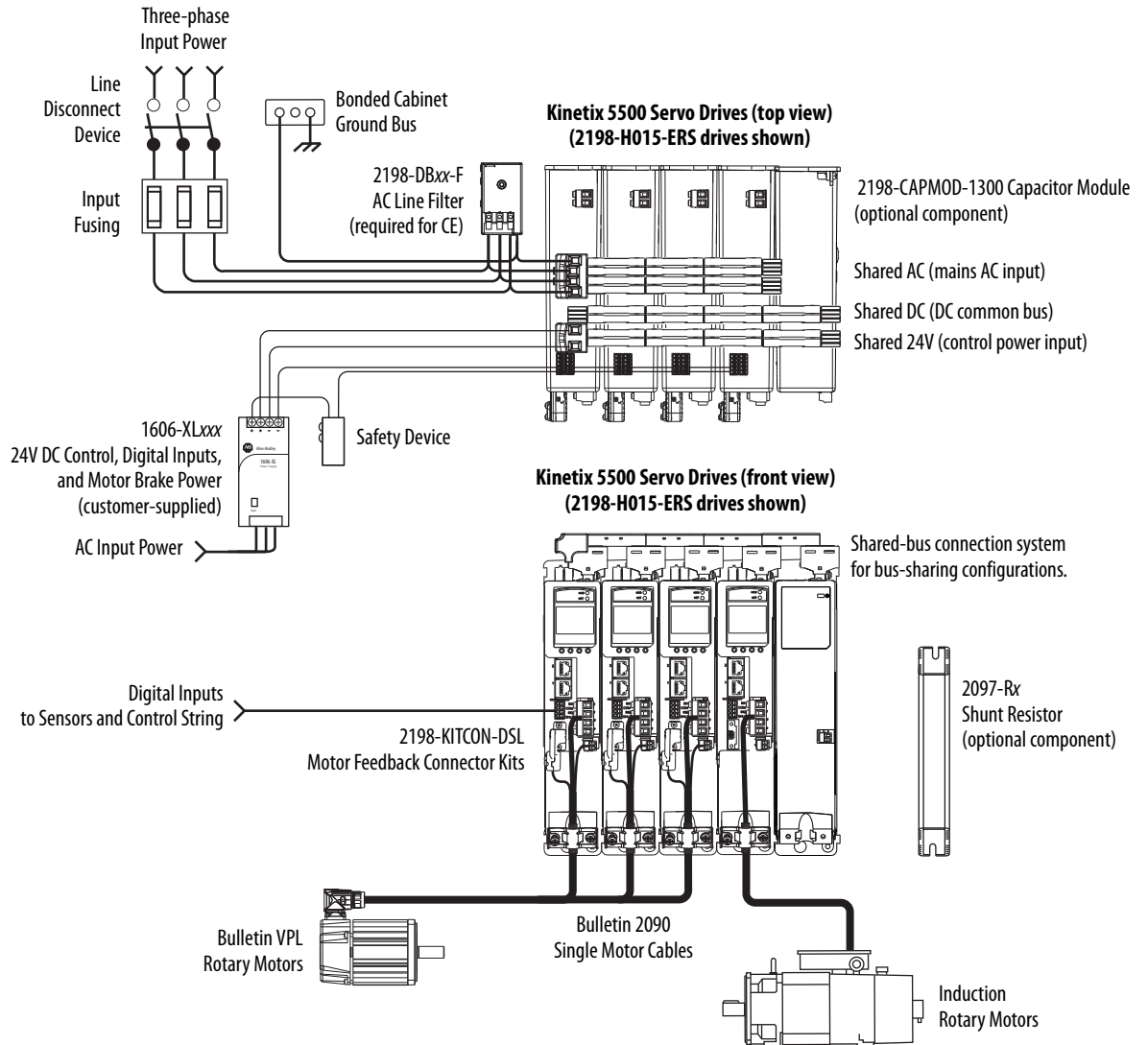
Kinetix 5500 Servo Drive Input Power Example (Standalone)



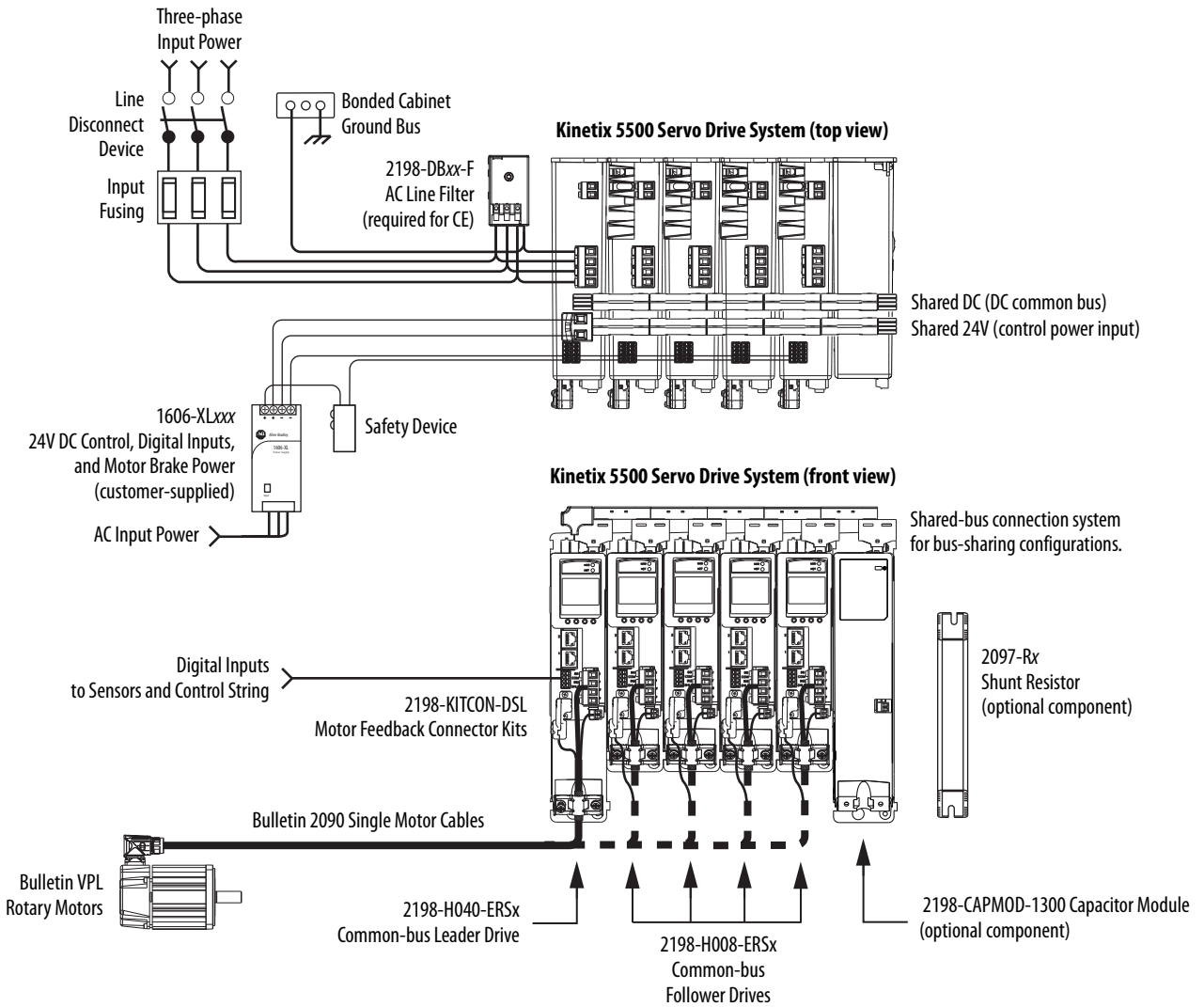
Kinetix 5500 Servo Drive Input Power Example (Shared AC)



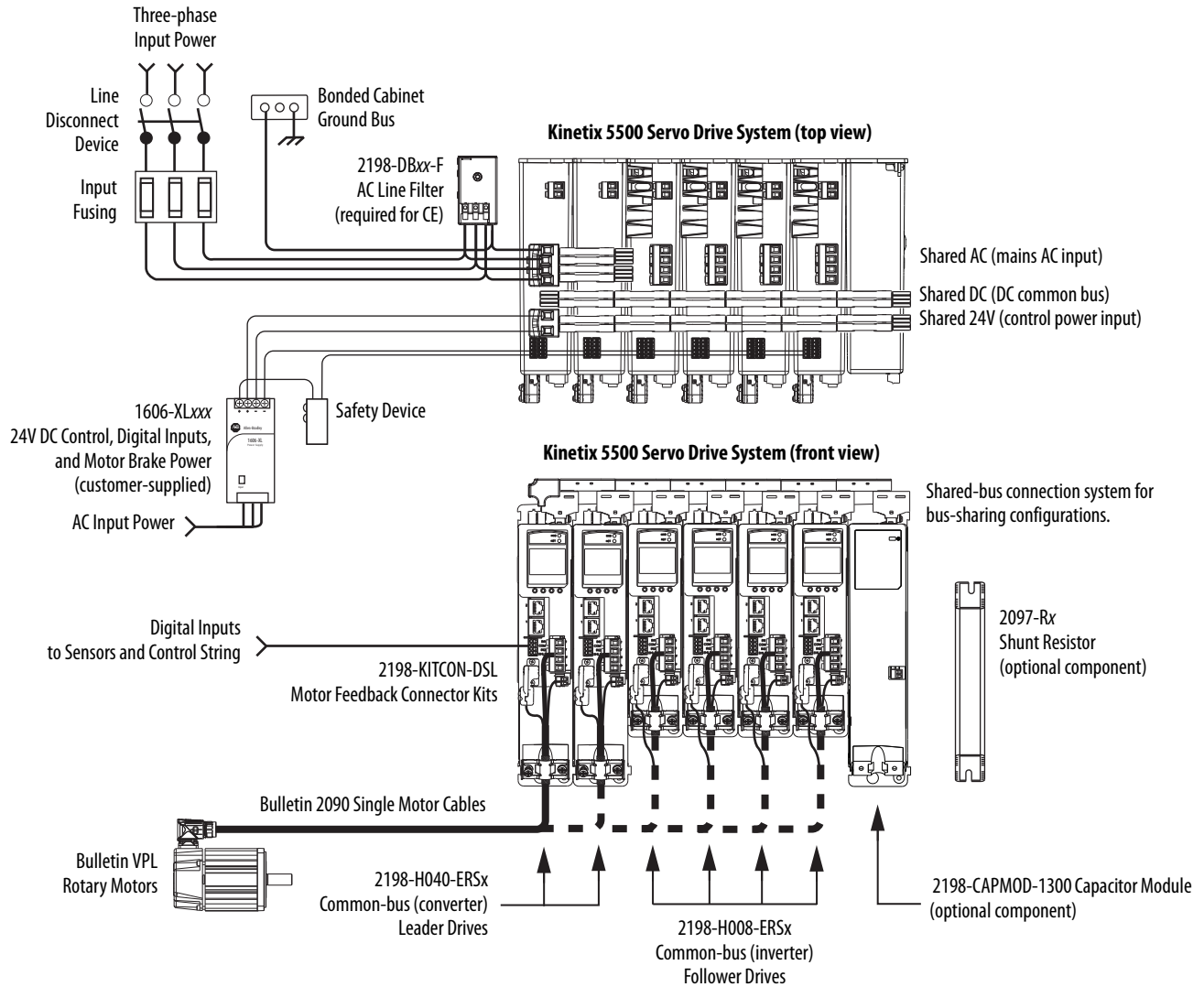
Kinetix 5500 Servo Drive Input Power Example (Shared AC/DC)



Kinetix 5500 Servo Drive Input Power Example (Common-bus)



Kinetix 5500 Servo Drive Input Power Example (Shared AC/DC Bus Hybrid)



Circuit Breaker and Fuse Considerations

Review the fusing requirements when changing drives.

A Ultra3000 servo drive system needs to be protected by a device having a short circuit interrupt current rating of the service capacity provided or a maximum of 100,000 A.

The Kinetix 5500 servo drives use internal solid-state motor short-circuit protection and, when protected by suitable branch circuit protection, are rated for use on a circuit capable of delivering up to 150,000 A.

While circuit breakers offer some convenience, there are limitations for their use. Circuit breakers do not handle high current inrush as well as fuses.

IMPORTANT UL has not approved circuit breakers for use as branch circuit protection for Kinetix 5500 servo drive systems.

Make sure the selected components are properly coordinated and meet acceptable codes including any requirements for branch circuit protection. Evaluation of the short-circuit available current is critical and must be kept below the short-circuit current rating of the circuit breaker.

Ultra3000 Servo Drive Main Input Power Fuse and Circuit Breaker Specifications

Use class CC, G, J, L, R, or T class fuses, with current ratings as indicated in the table below. This table lists fuse examples recommended for use with the Ultra3000 (230V and 460V) drives.

Ultra3000 Servo Drive Cat. No.	Input Voltage	Voltage Type	Recommended Fuse	
			Class CC ⁽¹⁾	Class J ⁽¹⁾
2098-DSD-005x-xx	230V	Input Power	FNQ-R-6	LPJ-6SP
2098-DSD-010x-xx			FNQ-R-10	LPJ-10SP
2098-DSD-020x-xx			FNQ-R-20	LPJ-20SP
2098-DSD-030x-xx			FNQ-R-30	LPJ-30SP
2098-DSD-075x-xx			FNQ-R-30	LPJ-30SP
2098-DSD-150x-xx			N/A	LPJ-60SP
2098-DSD-xxxx-xx		Auxiliary Input Power	FNQ-R-10	LPJ-10SP
2098-DSD-HV030x-xx	460V	Input Power	KTK-R-5	LPJ-5SP
2098-DSD-HV050x-xx			KTK-R-8	LPJ-8SP
2098-DSD-HV100x-xx			KTK-R-20	LPJ-17-1/2SP
2098-DSD-HV150x-xx			KTK-R-30	LPJ-30SP
2098-DSD-HV220x-xx			N/A	LPJ-35SP
2098-DSD-HVxxx-xx		Auxiliary Input Power	FNQ-R-10	LPJ-10SP

(1) Bussmann® Fuse

The table below lists circuit breaker examples recommended for use with the Ultra3000 (460V) drives.

Ultra3000 Servo Drive Cat. No.	Input Voltage	Circuit Breaker
2098-DSD-HV030x-xx	460V	140M-F8E-C16
2098-DSD-HV050x-xx		140M-F8E-C20
2098-DSD-HV100x-xx		140M-F8E-C32
2098-DSD-HV150x-xx		140M-F8E-C45
2098-DSD-HV220x-xx		N/A

Kinetix 5500 Servo Drive Main Input Power Fuse and Circuit Breaker Specifications

The Kinetix 5500 servo drive fuse and circuit breaker selection are dependent on input power configurations.

Table 3 - Standalone Drive Systems Fuse Selection (Bussmann Part No.)

Kinetix 5500 Servo Drive Cat. No.	Three-phase	Single-phase
2198-H003-ERSx	KTK-R-3	KTK-R-2
2198-H008-ERSx	KTK-R-7	KTK-R-5
2198-H015-ERSx	KTK-R-15	KTK-R-10
2198-H025-ERSx	KTK-R-20	N/A
2198-H040-ERSx	KTK-R-25	
2198-H070-ERSx	LPJ-35SP	

Table 4 - Standalone Drive Systems Circuit Breaker Selection (Allen-Bradley Cat. No.)

Kinetix 5500 Servo Drive Cat. No.	Three-phase ⁽¹⁾	Single-phase ⁽¹⁾
2198-H003-ERSx	140U-D6D3-B20	140U-D6D2-B10
2198-H008-ERSx	140U-D6D3-B60	140U-D6D2-B20
2198-H015-ERSx	140U-D6D3-C12	140U-D6D2-B80
2198-H025-ERSx	140U-D6D3-C20	N/A
2198-H040-ERSx	140U-D6D3-C25	
2198-H070-ERSx	N/A	

(1) UL has not approved circuit breakers for use as branch circuit protection for Kinetix 5500 servo drive systems.

Table 5 - Shared DC (Common-bus) Drive Systems Fuse Selection (Bussmann Part No.)

Kinetix 5500 Servo Drive Cat. No.	Three-phase
2198-H003-ERSx	KTK-R-10
2198-H008-ERSx	
2198-H015-ERSx	KTK-R-15
2198-H025-ERSx	KTK-R-20
2198-H040-ERSx	KTK-R-25
2198-H070-ERSx	LPJ-35SP

Table 6 - Shared DC (Common-bus) Drive Systems Circuit Breaker Selection (Allen-Bradley Cat. No.)

Kinetix 5500 Servo Drive Cat. No.	Three-phase ⁽¹⁾
2198-H003-ERSx	N/A
2198-H008-ERSx	
2198-H015-ERSx	140U-D6D3-C15
2198-H025-ERSx	140U-D6D3-C20
2198-H040-ERSx	140U-D6D3-C25
2198-H070-ERSx	N/A

(1) UL has not approved circuit breakers for use as branch circuit protection for Kinetix 5500 servo drive systems.

Table 7 - Shared AC Drive Systems Fuse Selection (Bussmann Part No.)

Kinetix 5500 Servo Drive Cat. No.	2 Axes	3 Axes	4 Axes	5 Axes
2198-H003-ERSx	KTK-R-15			
2198-H008-ERSx	KTK-R-15			
2198-H015-ERSx	KTK-R-20	KTK-R-25	N/A	
2198-H025-ERSx	KTK-R-30		N/A	
2198-H040-ERSx	LPJ-35SP	LPJ-45SP	N/A	
2198-H070-ERSx	LPJ-60SP	N/A		

Table 8 - Shared AC Drive Systems Circuit Breaker Selection (Allen-Bradley Cat. No.)

Kinetix 5500 Servo Drive Cat. No.	2 Axes ⁽¹⁾	3 Axes ⁽¹⁾	4 Axes ⁽¹⁾	5 Axes ⁽¹⁾
2198-H003-ERSx	N/A			
2198-H008-ERSx				
2198-H015-ERSx	140U-D6D3-C15	140U-D6D3-C20	N/A	
2198-H025-ERSx	140U-D6D3-C25	140U-D6D3-C30	N/A	
2198-H040-ERSx	N/A			
2198-H070-ERSxxx	N/A			

(1) UL has not approved circuit breakers for use as branch circuit protection for Kinetix 5500 servo drive systems.

Table 9 - Shared AC/DC and Hybrid Systems Fuse Selection (Bussmann Part No.)

Kinetix 5500 Servo Drive Cat. No.	2 Axes	3 Axes	4 Axes	5 Axes	6 Axes	7 Axes	8 Axes
2198-H003-ERSx	KTK-R-10					KTK-R-15	
2198-H008-ERSx	KTK-R-15				KTK-R-20		
2198-H015-ERSx	KTK-R-20			N/A			
2198-H025-ERSx	KTK-R-30			N/A			
2198-H040-ERSx	KTK-R-30	LPJ-45SP	LPJ-50SP	N/A			
2198-H070-ERSx	LPJ-50SP	N/A					

Table 10 - Shared AC/DC and Hybrid Systems Circuit Breaker Selection (Allen-Bradley Cat. No.)

Kinetix 5500 Servo Drive Cat. No.	2 Axes ⁽¹⁾	3 Axes ⁽¹⁾	4 Axes ⁽¹⁾	5 Axes ⁽¹⁾	6 Axes ⁽¹⁾	7 Axes ⁽¹⁾	8 Axes ⁽¹⁾
2198-H003-ERSx	N/A						
2198-H008-ERSx	N/A						
2198-H015-ERSx	140U-D6D3-C15	140U-D6D3-C20		N/A			
2198-H025-ERSx	140U-D6D3-C20	140U-D6D3-C30		N/A			
2198-H040-ERSx	140U-D6D3-C30	N/A					
2198-H070-ERSx	N/A						

(1) UL has not approved circuit breakers for use as branch circuit protection for Kinetix 5500 servo drive systems.

Drive Interconnects and Cabling

This section provides information to assist you in determining the interconnects and cabling requirements of the drives.

Motor Power and Feedback

The Kinetix 5500 servo drive incorporates a single cable design, which includes both motor power and motor feedback when using a compatible VP-Series motor. The Kinetix 5500 servo drive can also be matched with MP-Series motors and the 2090-xxxx motor power cables can connect directly to the Kinetix 5500 servo drive.

IMPORTANT If you are planning on using an existing MP-Series motor, verify that the existing motor power cable is capable of handling the current delivered to the motor.

For motor feedback the Kinetix 5500 servo drive can be matched with MP-Series motors, but requires the Hiperface-to-DSL Feedback Converter Kit (catalog no. 2198-H2DCK). For more information, see Hiperface-to-DSL Feedback Converter Kit Installation Instructions, publication [2198-IN006](#).

Ultra3000 Servo Drives Motor Power

See the table below for the catalog number of the motor power cable for your Ultra3000 servo drive.

Motor	Available Universal Cable	When Universal Cable not Available, Use this Motor Power Cable
MP-Series (Low Inertia and Integrated Gear) (230V or 460V systems)	2090-XXNPMP-16Sxx 2090-XXNPMP-14Sxx 2090-XXNPMP-10Sxx	N/A
1326AB-Series (M2L/S2L)	2090-XXNPMP-8Sxx	
MP-Series (Food Grade)	2090-XXNPMF-16Sxx 2090-XXNPMF-14Sxx 2090-XXNPMF-10Sxx	
F-Series	2090-XXNPHF-16Sxx 2090-XXNPHF-14Sxx	2090-UXNPAHF-10Sxx 2090-UXNPAHF-8Sxx
H-Series	2090-XXNPH-16Sxx 2090-XXNPHF-14Sxx	2090-UXNPAHF-10Sxx 2090-UXNPAHF-8Sxx 2090-UXNPAH-6Sxx
N-Series	2090-XXNPN-16Sxx	N/A
Y-Series	2090-XXNPY-16Sxx	N/A

Ultra3000 Servo Drive Feedback Connector

Factory-made cables with premolded connectors are designed to minimize EMI and are recommended over hand-built cables to improve system performance. However, other options are available for building your own feedback and I/O cables. See the table below for the available options.

Drive Connector	Connector Option	Option Cat. No.	
CN1 I/O Connector	44-pin drive-mounted breakout board with 24V to 5V auxiliary power converter	2090-U3CBB-DM44	
	12-pin drive-mounted breakout board with 24V to 5V auxiliary power converter for SERCOS interface applications	2090-U3CBB-DM12	
	44-pin panel-mounted breakout board kit	2090-U3BK-D44xx	
	44-pin, drive-mounted breakout board	2090-U3BB2-DM44	
	44-pin (high-density D-shell) drive connector kit	2090-U3CK-D44	
	Single-axis flying lead to 1756-M02AE module or 1784-PM02AE PCI card	2090-U3CC-D44xx	
	Two-axis pre-wired to 1756-M02AE module	2090-U3AE-D44xx	
CN2 Feedback Connector	Premolded cable at drive and motor end	2090-UXNFBxx-Sxx	
	Flying lead cable at drive end (2090-XXNFxx-Sxx)	15-pin drive-mounted breakout board	2090-UXBB-DM15
		15-pin panel-mounted breakout board kit	2090-UXBK-DM15xx
		15-pin (high-density D-shell) drive connector kit	2090-UXCK-D15
CN3 Serial Connector	PC serial connector to premolded drive connector	2090-UXPC-DM09	
	9-pin drive-mounted breakout board	2090-UXBB-DM09	
	9-pin (high-density D-shell) drive connector kit	2090-UXCK-D09	

See the table below for motor feedback cable catalog numbers available for specific motor/feedback combinations.

Motor Series	Using this Type of Motor Feedback	Use this Feedback Cable	
		Premolded	Flying Lead ⁽¹⁾
MPL-Axxxx or MPG-Axxx-xxx	High-resolution encoder	2090-UXNFBMP-Sxx	2090-XXNFMP-Sxx
MPL-Axxxx	Incremental encoder		
MPL-Bxxxx or MPG-Bxxx-xxx	High-resolution encoder		
1326AB	M2L/S2L High-resolution encoder		
MPF-Axxxx or MPF-Bxxxx	High-resolution encoder	N/A	2090-XXNFMF-Sxx
F-Series	Incremental encoder	2090-UXNFBHF-Sxx	2090-XXNFHF-Sxx
H-Series		2090-UXNFBN-Sxx	2090-XXNFN-Sxx
N-Series			
Y-Series			

(1) Requires 2090-UXBB-DM15 drive-mounted breakout board, 2090-UXBK-D15xx breakout board kit, or 2090-UXCK-D15 mating connector kit.

Kinetix 5500 (200V-class operation) Servo Drives with Kinetix VP Low Inertia Motors

This section provides system combination information for the Kinetix 5500 servo drives (with 240V, nominal input) when matched with Kinetix VP (200V-class) low-inertia motors.

IMPORTANT Combined motor power cable length for all axes on the same DC bus must not exceed 250 m (820 ft). Drive-to-motor cables must not exceed 50 m (164 ft), however use of continuous-flex cable limits the maximum length. See the Kinetix 5500 Servo Drives User Manual, publication [2198-UM001](#), Table 5 on page 24 for specifications by frame size.

Table 11 - Bulletin VPL Motor Cable Combinations

Motor Cat. No. (200V-class)	Feedback Type	Single Cable Cat. No. ⁽¹⁾
VPL-A063xx	Multi-turn or Single-turn Digital Encoder Feedback	2090-CSBM1DF-18AAxx or 2090-CSWM1DF-18AAxx (standard, non-flex) 2090-CSBM1DF-18AFxx (continuous-flex)
VPL-A0751E, VPL-A0752C, VPL-A0753C		
VPL-A0752E, VPL-A0753E		2090-CSBM1DF-14AAxx or 2090-CSWM1DF-14AAxx (standard, non-flex) 2090-CSBM1DF-14AFxx (continuous-flex)
VPL-A1001C		2090-CSBM1DF-18AAxx or 2090-CSWM1DF-18AAxx (standard, non-flex) 2090-CSBM1DF-18AFxx (continuous-flex)
VPL-A1001M, VPL-A1002x, VPL-A1003x		2090-CSBM1DF-14AAxx or 2090-CSWM1DF-14AAxx (standard, non-flex) 2090-CSBM1DF-14AFxx (continuous-flex)
VPL-A1152x, VPL-A1153x		
VPL-A1303x, VPL-A1304x, VPL-A1306x		

(1) Cable length xx is in meters, 01 (3.3) . . . 50 (164) in 1.0 m (3.3 ft) increments. See the Kinetix Motion Accessories Technical Data, publication [GMC-TD004](#), for cable specifications.

Kinetix 5500 (400V-class operation) Servo Drives with Kinetix VP Low Inertia Motors

This section provides system combination information for the Kinetix 5500 servo drives (with 480V, nominal input) when matched with Kinetix VP (400V-class) low-inertia motors.

IMPORTANT Combined motor power cable length for all axes on the same DC bus must not exceed 250 m (820 ft). Drive-to-motor cables must not exceed 50 m (164 ft), however use of continuous-flex cable limits the maximum length. See the Kinetix 5500 Servo Drives User Manual, publication [2198-UM001](#), Table 5 on page 24 for specifications by frame size.

Table 12 - Bulletin VPL Motor Cable Combinations

Motor Cat. No. (400V-class)	Feedback Type	Single Cable Cat. No. ⁽¹⁾
VPL-B063xx	Multi-turn or Single-turn Digital Encoder Feedback	2090-CSBM1DF-18AAxx or 2090-CSWM1DF-18AAxx (standard, non-flex) 2090-CSBM1DF-18AFxx (continuous-flex)
VPL-B0751M, VPL-B0752E, VPL-B0752F, VPL-B0753E, VPL-B0753F		
VPL-B1001M, VPL-B1002E, VPL-B1003C		
VPL-B0752M, VPL-B0753M		2090-CSBM1DF-14AAxx or 2090-CSWM1DF-14AAxx (standard, non-flex) 2090-CSBM1DF-14AFxx (continuous-flex)
VPL-B1002M, VPL-B1003F, VPL-B1003T		2090-CSBM1DF-18AAxx or 2090-CSWM1DF-18AAxx (standard, non-flex) 2090-CSBM1DF-18AFxx (continuous-flex)
VPL-B1152C		2090-CSBM1DF-14AAxx or 2090-CSWM1DF-14AAxx (standard, non-flex) 2090-CSBM1DF-14AFxx (continuous-flex)
VPL-B1152F, VPL-B1152T, VPL-B1153E, VPL-B1153F		2090-CSBM1DF-18AAxx or 2090-CSWM1DF-18AAxx (standard, non-flex) 2090-CSBM1DF-18AFxx (continuous-flex)
VPL-B1303x, VPL-B1304x, VPL-B1306x		2090-CSBM1DF-14AAxx or 2090-CSWM1DF-14AAxx (standard, non-flex) 2090-CSBM1DF-14AFxx (continuous-flex)
VPL-B1651C, VPL-B1651F, VPL-B1652C, VPL-B1653C, VPL-B1654B		

(1) Cable length xx is in meters, 01 (3.3) . . . 50 (164) in 1.0 m (3.3 ft) increments. See the Kinetix Motion Accessories Technical Data, publication [GMC-TD004](#), for cable specifications.

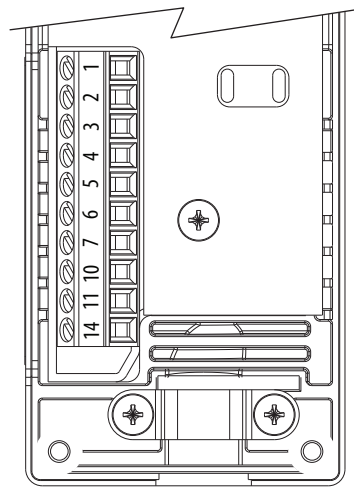
Kinetix 5500 Servo Drive Hiperface-to-DSL Feedback Converter Kit

This kit is designed for use with Allen-Bradley® 2090-Series motor feedback cables and provides wire terminations for Hiperface encoder signals to the motor feedback (MF) connector on Kinetix 5500 servo drives with firmware revision 2.001 or later. If needed, the Add-On Profile (AOP) for Kinetix 5500 servo drives is available for download at the Custom Downloads Add-On Profiles website:

<https://download.rockwellautomation.com/esd/download.aspx?downloadid=addonprofiles>

For more information, see Hiperface-to-DSL Feedback Converter Kit Installation Instructions, publication [2198-IN006](#).

Connector Data



Converter Kit Pinout

Terminal	Signal	Wire Color
1	SIN+	Black
2	SIN-	White/Black
3	COS+	Red
4	COS-	White/Red
5	DATA+	Green
6	ECOM ⁽¹⁾	White/Gray
7	EPWR_9V ⁽²⁾	Orange
10	DATA-	White/Green
11	TS+	White/Orange
14	EPWR_5V ⁽²⁾	Gray

(1) The ECOM and TS- connections are tied together and connect to the cable shield.

(2) The converter kit generates 5V and 9V from a 12V supply coming from the drive. The 5V supply is used by 5V encoders in 230V motors. The 9V supply is used by 9V encoders in 460V motors.

For more information on installing this kit, preparing the cables, and attaching the cable clamps, see the Kinetix 5500 Servo Drive User Manual, publication [2198-UM001](#).

Digital I/O

This section describes digital inputs for Ultra3000 and Kinetix 5500 servo drives.

Ultra3000 Servo Drive Digital Inputs

The digital inputs on the Ultra3000 servo drive have the following characteristics and specifications.

All digital inputs on Ultra3000 drives have the same physical characteristics as shown in the tables below.

Table 13 - Ultra3000 Drives Digital Input Characteristics

Specification	Description
I/O response	100 μ s
Digital I/O firmware scan period	1 ms

Table 14 - Ultra3000 Drives Digital Input Parameters

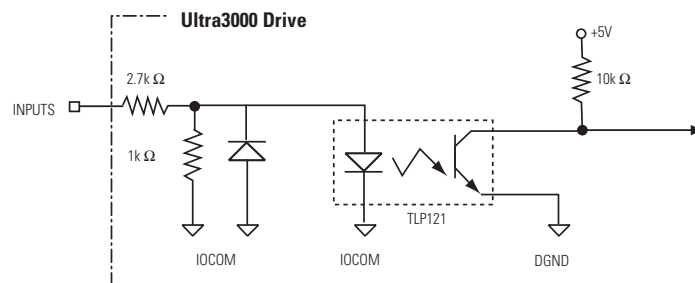
Parameter	Description	Min	Max
ON state voltage	Voltage applied to the input, with respect to IOCOM, to guarantee an ON state.	10.8V	26.4V
ON state current	Current flow to guarantee an ON State.	3.0 mA	12.0 mA
OFF state voltage	Voltage applied to the input, with respect to IOCOM, to guarantee an OFF state.	-1.0V	2.0V

Table 15 - Ultra3000 SERCOS Drives Dedicated Functionality Inputs

Pin	Signal	Description
CN1-31	ENABLE	Drive Enable Input, an active state enables the power electronics to control the motor.
CN1-32	HOME	Home Sensor, an active state indicates to a homing sequence that the sensor has been seen.
CN1-33 CN1-34	REG1 REG2	Registration Sensor, a transition is used to record position values.
CN1-37 CN1-38	OT_POS OT_NEG	Overtravel Input, an inactive state indicates that a position limit has been exceeded. An active state occurs when 24V is removed from the input.

For the Ultra3000 drives, there are eight optically isolated digital inputs. All digital inputs have the same configuration, as shown in the following figure.

Figure 5 - Ultra3000 Drive Digital Input Circuit



Ultra3000 Servo Drive Outputs

The digital output and relay output on the Ultra3000 servo drive have the following characteristics and specifications.

Table 16 - Ultra3000 Drives Digital Outputs

Parameter	Description	Min	Max
ON state current	Current flow when the output transistor is ON	—	50 mA
OFF state current	Current flow when the output transistor is OFF	—	0.1 mA
ON state voltage	Voltage across the output transistor when ON	—	1.5V
OFF state voltage	Voltage across the output transistor when OFF	—	50V

Figure 6 - Transistor Output Hardware Configuration

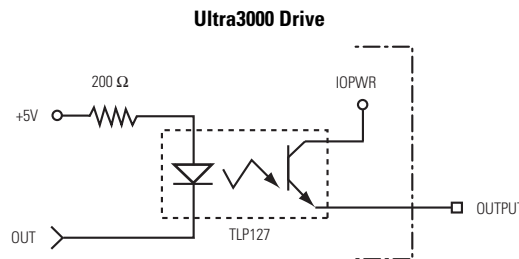
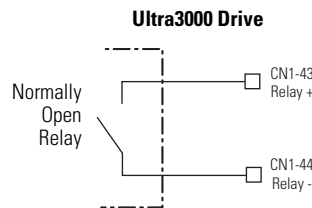


Table 17 - Relay Output Specifications

Parameter	Description	Min	Max
ON state current	Current flow when the relay is closed	—	1A
ON state resistance	Contact resistance when the relay is closed	—	1 Ω
OFF state voltage	Voltage across the contacts when the relay is open	—	30V

Figure 7 - Relay Output Configuration



Kinetix 5500 Servo Drive Digital Inputs

Two digital inputs are available for the machine interface on the IOD connector. 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 IOD connector for digital inputs.

The Registration 1 input is capable of dual functionality. You can also use this as the Home input. Configuration for dual functionality is not needed.

IMPORTANT To improve registration input EMC performance, see the System Design for Control of Electrical Noise Reference Manual, publication [GMC-RM001](#).

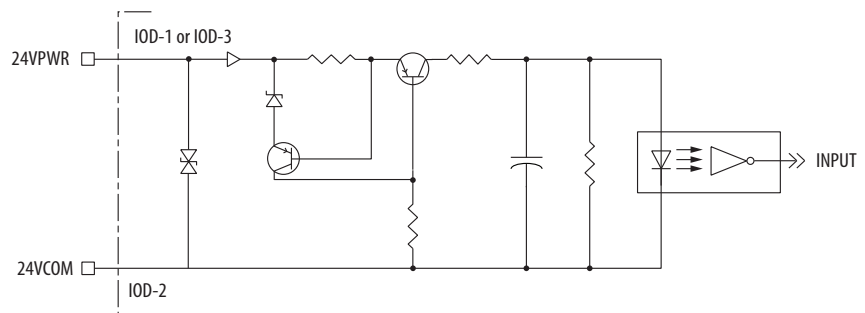
Understanding Digital Input Functions

Function	Description	Default Behavior
Home/Reg1	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.	The function is always inactive. You can enable in the Logix Designer application.
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		

Digital Input Specifications

Attribute	Value
Type	Active high, single-ended, current sinking (EN 61131-2 Type 1)
Dedicated functions	Registration 1, Home, Registration 2
Input current (with 24V applied)	12 mA, typical
On-state input voltage	15...30V @ 15 mA, max
Off-state input voltage	-1.0...5.0V
Pulse reject filtering (registration functions)	12.0 μs
Pulse reject filtering (home input function) debounce filter	20 ms, nom
Propagation delay (registration functions)	0 (delay compensated)
Registration repeatability	700 ns
Windowed registration invalid-to-valid event delay	125 μs, min

Figure 8 - Kinetix 5500 Servo Drive Digital Input Circuitry

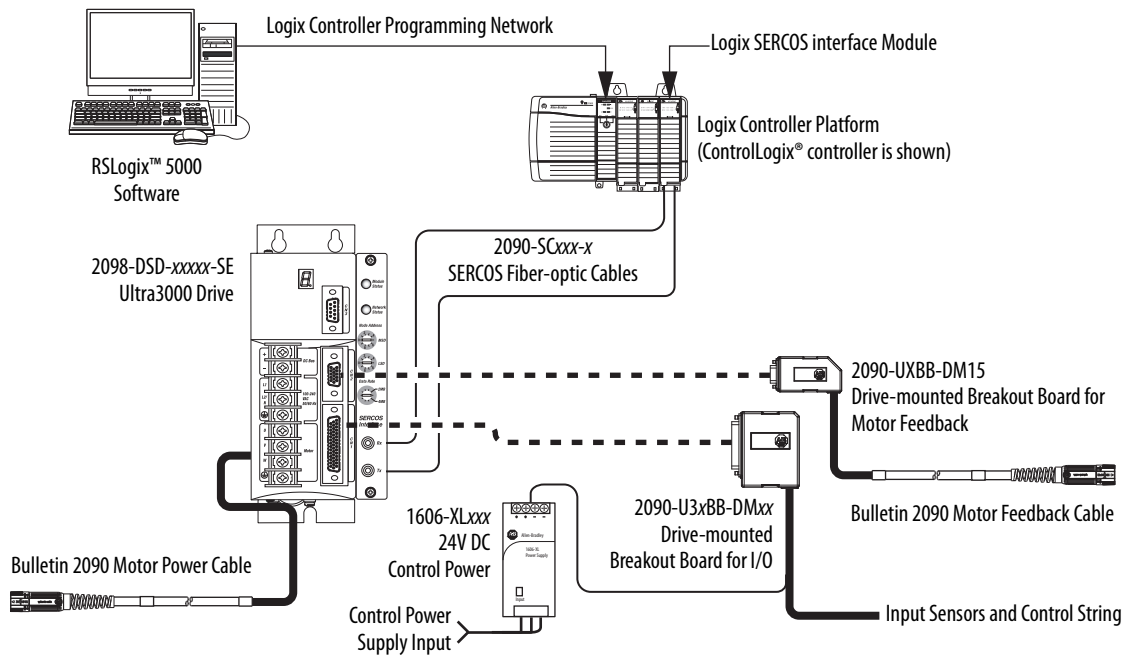


Typical System Layout

This section provides system examples for Ultra3000 and Kinetix 5500 servo drives.

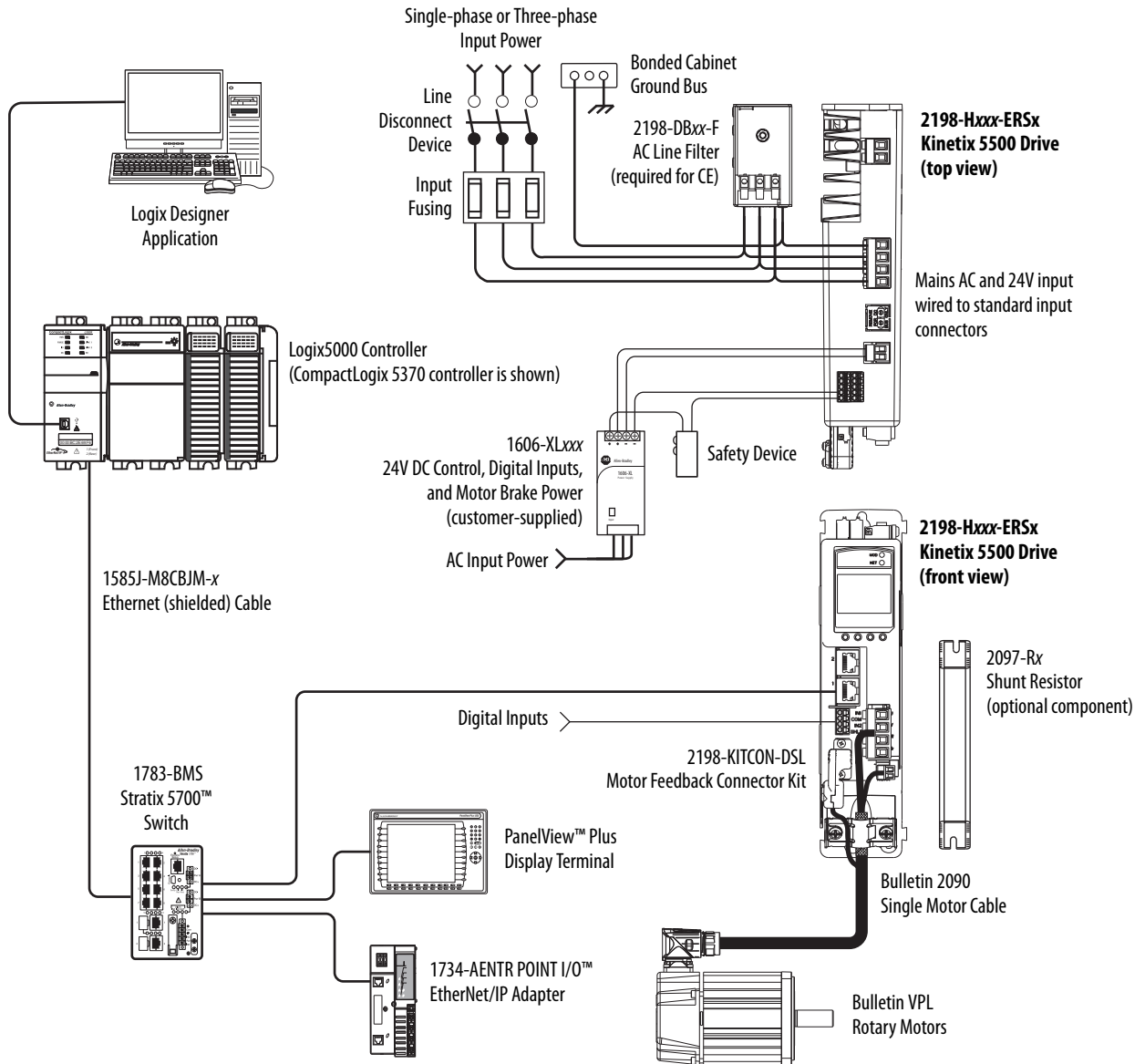
Ultra3000 Servo Drive System Example

This system example illustrates how the required drive modules and accessories are used in a typical system.



Kinetix 5500 Servo Drive System Example

This example control system uses a Kinetix 5500 standalone servo drive.



See [Appendix E](#) for additional communication configurations.

Accessories

This section describes required and optional accessories for Ultra3000 and Kinetix 5500 servo drives.

Ultra3000 Servo Drive Accessories

Table 18 - Required Drive Accessories

Drive Accessory	Description	Cat. No.
24V power supply	12. . . 24V DC for control power and motor brakes.	1606-XLxxx
Drive-mounted breakout boards (required for flying-lead cables)	Motor feedback (CN2) connections.	2090-UXBB-DM15
	Serial interface (CN3) connections.	2090-UXBB-DM09
	I/O (CN1) connections. These kits apply to all Ultra3000 drives (catalog numbers 2098-DSD-005, 2098-DSD-010, and 2098-DSD-020) in applications where 5V DC control power (if required) is user-supplied.	2090-U3BB-DM12 ⁽¹⁾
		2090-U3BB2-DM44
	I/O (CN1) connections. These kits apply to only 2098-DSD-005, 2098-DSD-010, and 2098-DSD-020 drives in applications where a 24. . . 5V DC converter for control power is required.	2090-U3CBB-DM12 ⁽¹⁾
2090-U3CBB-DM44		
SERCOS fiber-optic cables (required as needed for SERCOS applications)	Plastic, in-cabinet duty.	2090-SCEPx-x
	Plastic, on-machine duty.	2090-SCNPx-x
	Plastic, outdoor and conduit duty.	2090-SCVPx-x
	Glass, outdoor and conduit duty.	2090-SCVGx-x
Serial interface cable (required for non-SERCOS applications)	Ultra3000 serial interface to personal computer.	2090-UXPC-D09xx
Motor power and feedback cables	See the specific drive/motor combination for the motor cables required for your system.	

(1) The 12-pin board is intended for use with SERCOS drives, but may be used in non-SERCOS applications with minimal I/O requirements.

See the Kinetix Motion Accessories Technical Data, publication [GMC-TD004](#), for detailed descriptions and specifications of these servo drive accessories.

Table 19 - Optional Drive Accessories

Drive Accessory	Description	Cat. No.
Drive to 1756-M02AE module interface cable	Single-axis (CN1) flying-lead drive to Logix module cable.	2090-U3CC-D44xx
	Two-axis (CN1) pre-wired drive to Logix module cable.	2090-U3AE-D44xx
Drive-mounted breakout board for serial interface (applies to flying-lead cables as an alternative to serial interface cable)	9-pin (CN3) breakout board for serial interface.	2090-UXBB-DM09
Panel-mounted breakout boards (applies to flying-lead cables as an alternative to drive-mounted breakout boards)	DIN rail mounted terminal block and cable for 15-pin (CN2) motor feedback connections.	2090-UXBK-D15xx
	DIN rail mounted terminal block and cable for 44-pin (CN1) I/O connections.	2090-U3BK-D44xx
2090 AC line filters	AC line conditioning for EMC. Applies to 200V-class drives.	2090-UXLF-xxx
	AC line conditioning for EMC. Applies to 400V-class drives.	2090-UXLF-HVxxx
2090 shunt modules	Applies to 2098-DSD-HV030, 2098-DSD-HV050, and 2098-DSD-HV100 drives. ⁽¹⁾	2090-SRxxx-xx
	Applies to 2098-DSD-075 and 2098-DSD-150 drives.	2090-UCSR-P900
	Applies to 2098-DSD-030 drives.	9101-1183
	Applies to 2098-DSD-005, 2098-DSD-010, and 2098-DSD-020 drives.	2090-UCSR-A300

Drive Accessory	Description	Cat. No.
Resistive brake module (RBM)	Physically and electrically separate the drive power output from its corresponding motor.	2090-XBxxx-xx
RBM interface cables	Motor power, RBM to drive.	2090-UXNRB-10F1P3
		2090-UXNRB-8F1P4
		2090-UXNRB-6F1P5
External auxiliary encoder	Allen-Bradley® sine/cosine and incremental external encoders.	Bulletin 842A, 844D, 845H, and 845T

(1) See Rockwell Automation Encompass™ partners for 2098-DSD-HV150 and 2098-DSD-HV220 passive shunt solutions.

Kinetix 5500 Servo Drive Accessories

Table 20 - Required Drive Accessories

Drive Accessory	Description	Cat. No.
24V power supply	24V DC for control power and motor brakes	1606-XLxxx
Ethernet network cables	Double-ended, non-flex, shielded	1585J-M8CBJM-x
	Double-ended, high-flex, shielded	1585J-M8UBJM-x
Motor cables	Refer to the specific drive/motor combination for the motor cable required for your system	2090-CSxM1DF-xxAxxx

TIP The Kinetix 5500 feedback connector kit is included with the drive. Replacement kits are also available.

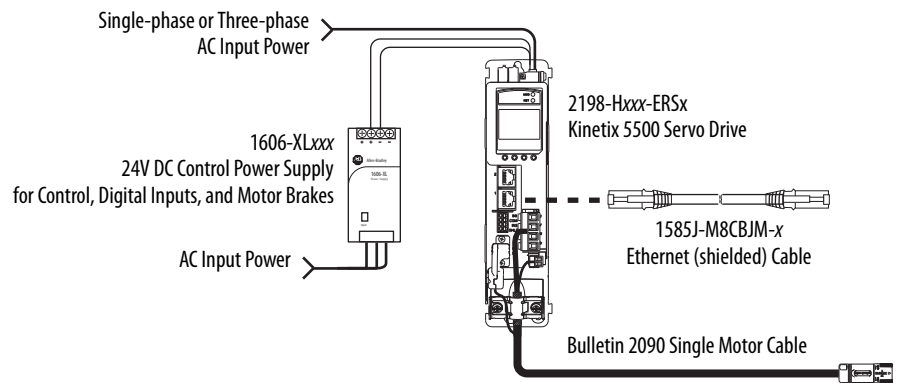
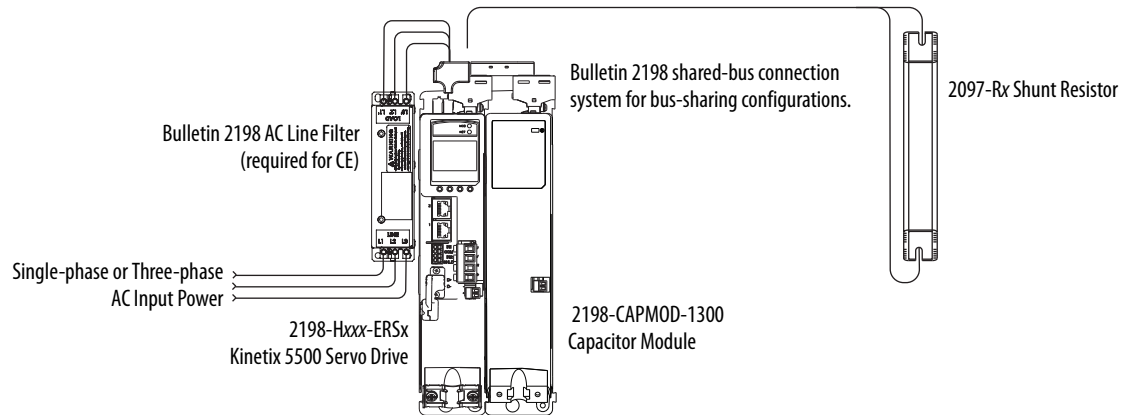


Table 21 - Optional Drive Accessories

Drive Accessory	Description	Cat. No.
Capacitor module	Capacitor bank for energy storage and/or to improve performance in applications that produce regenerative energy and require shorter duty cycles (1360 µf).	2198-CAPMOD-1300
AC line filters	AC line conditioning for EMC.	2198-DBxx-F
Bulletin 2097 shunt resistor	Panel-mount shunt resistor.	2097-Rx
Shared-bus connection system	Input wiring connectors and DC bus T connectors for use between frame 1, 2, and 3 servo drives (frame 3:2, frame 2:1, frame 1:1, and frame 2:2).	2198-H040-x-x
	Input wiring connectors and DC bus T connectors for use between frame 3 servo drives (frame 3:3).	2198-H070-x-x



See the Kinetix Servo Drives Specifications Technical Data, publication [GMC-TD003](#), for detailed descriptions and specifications of these drive accessories.

Notes:

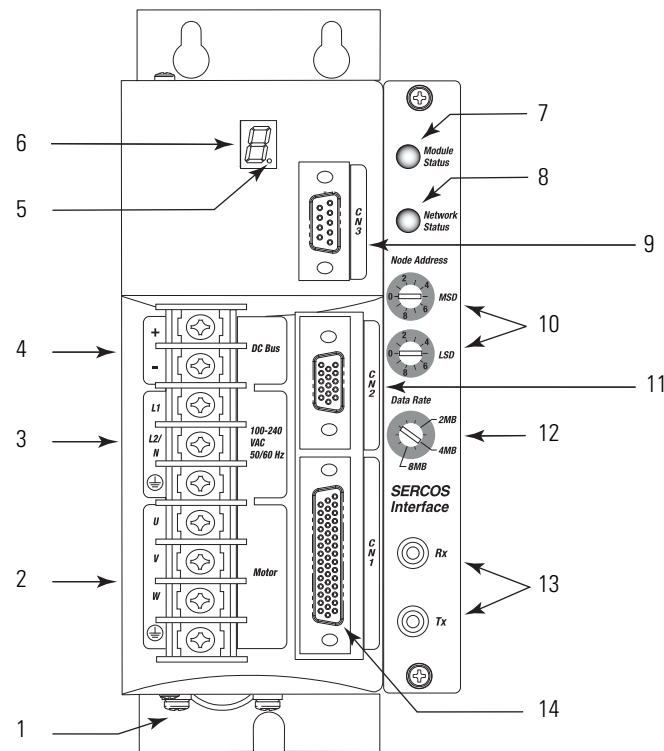
Connectors and Field Connections

Connector Locations

Use these illustrations to identify the connectors and indicators for the Ultra3000 and Kinetix 5500 servo drives.

Ultra3000 Servo Drive Connector Data

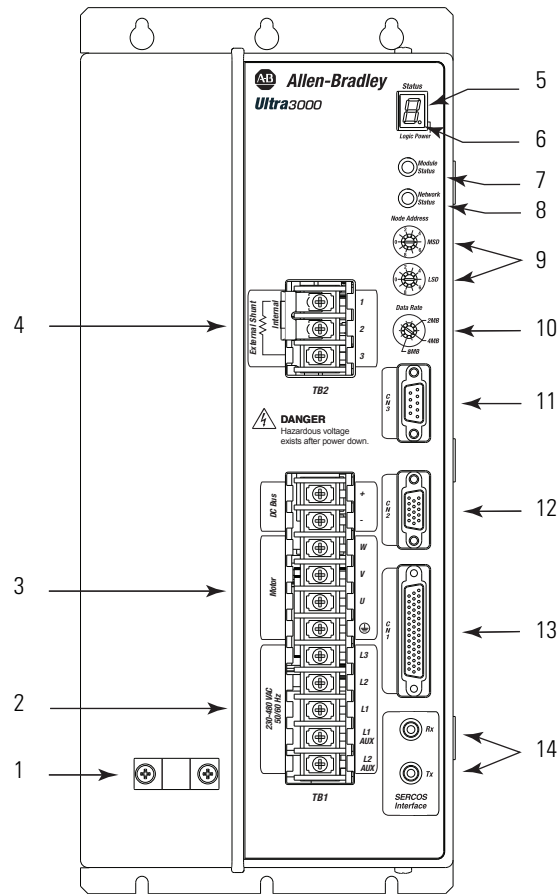
Figure 9 - Ultra3000 Servo Drive Front Panel Connections for Cat. No. 2098-DSD-005-SE, -010-SE, and -020-SE



Item	Description
1	Motor Power Cable Shield Clamp
2	Motor Power Connections
3	AC Input Power Connections
4	DC Bus Connections for Active Shunt Resistor Kit
5	Logic Power LED
6	Seven Segment Status LED

Item	Description
7	Module Status LED
8	Network Status LED
9	CN3 9-pin Serial Port Connector
10	Node Address Switches
11	CN2 15-pin Motor Feedback Connector
12	Data Rate Switch
13	SERCOS Interface Receive (Rx) and Transmit (Tx) Connectors
14	CN1 44-pin User I/O Connector

Figure 10 - Ultra3000 Servo Drive Front Panel Connections for Cat. No. 2098-DSD-HVxxx-SE

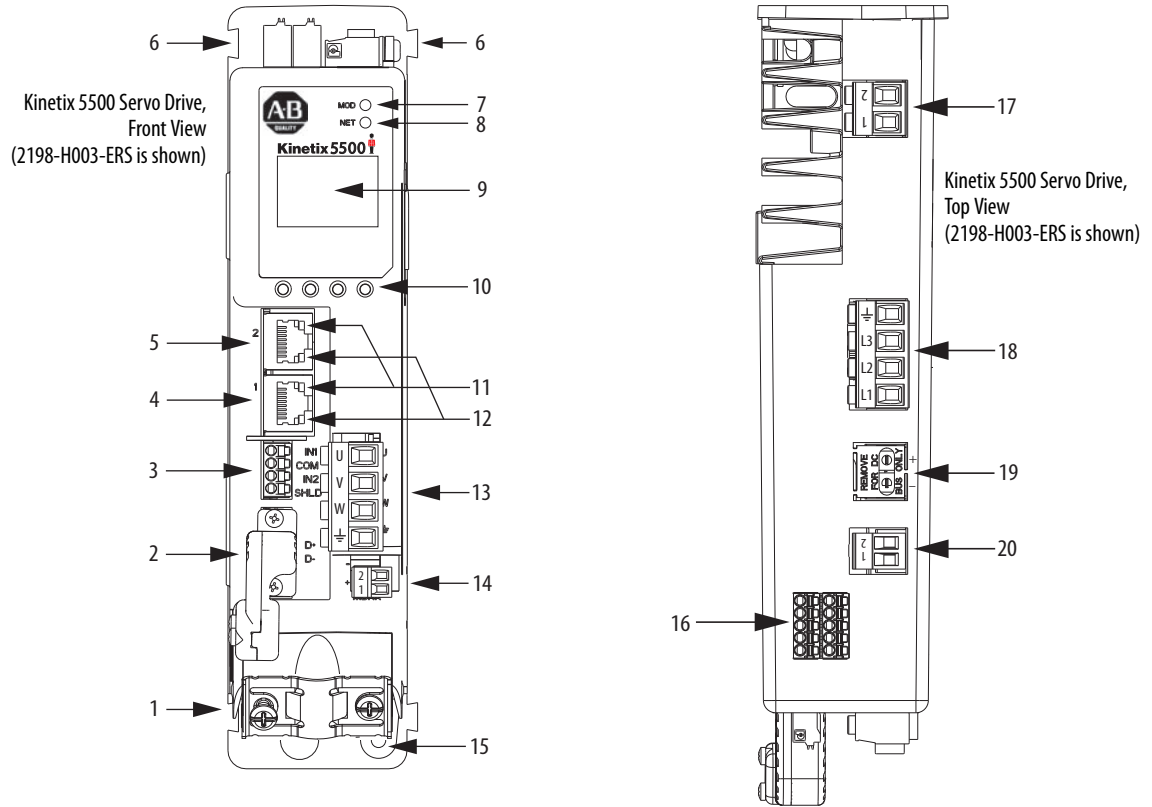


Item	Description
1	Motor Power Cable Shield Clamp
2	AC Input Power Connections
3	Motor Power Connections
4	Passive Shunt Resistor Connections
5	Seven Segment Status LED
6	Logic Power LED
7	Module Status LED

Item	Description
8	Network Status LED
9	Node Address Switches
10	Data Rate Switch
11	CN3 9-pin Serial Port Connector
12	CN2 15-pin Motor Feedback Connector
13	CN1 44-pin User I/O Connector
14	SERCOS Interface Receive (Rx) and Transmit (Tx) Connectors

Kinetix 5500 Servo Drive Connector Data

Figure 11 - Drive Features and Indicators



Item	Description
1	Motor cable clamp
2	Motor feedback (MF) connector
3	Digital inputs (IOD) connector
4	Ethernet (PORT1) RJ45 connector
5	Ethernet (PORT2) RJ45 connector
6	Zero-stack mounting tab/cutout
7	Module status indicator
8	Network status indicator
9	LCD display
10	Navigation pushbuttons

Item	Description
11	Link speed status indicators
12	Link/Activity status indicators
13	Motor power (MP) connector
14	Motor brake (BC) connector
15	Ground terminal
16	Safe torque-off (STO) connector
17	Shunt resistor (RC) connector
18	AC mains input power (IPD) connector
19	DC bus (DC) connector (under cover) ⁽¹⁾
20	24V control input power (CP) connector

(1) The DC bus connector ships with a protective knock-out cover that can be removed for use in shared-bus configurations.

Input and Motor Power Connector Pinouts

The table below compares the input power, control/auxiliary power, motor power, and shunt resistor connector pinouts for the Ultra3000 and Kinetix 5500 servo drives:

- Ultra3000 servo drive TB1 and TB2 connectors
- Kinetix 5500 servo drive IPD, DC, MP, CP, and RC connectors

Description	Ultra3000 Servo Drives (Cat. No. 2098-DSD-005, -010, and -020)		Kinetix 5500 Servo Drives		
	Signal	Terminal	Connector	Signal	Terminal
DC Bus Connections	DC+	+	DC	DC-	1
	DC-	-		DC+	2
Single-phase Input Power	L1	L1	IPD	L1	L1
	L2/N	L2/N		L2	L2
	—	—		L3	L3
	Ground	⊥		Ground	Ground
Motor	U	U	MP	U	U
	V	V		V	V
	W	W		W	W
	Chassis Ground	⊥		Chassis Ground	Chassis Ground
Control Power	—	—	CP	24V	24V+
	—	—		24V Com	24-
Shunt Resistor	—	—	RC	SH ⁽¹⁾	1
	—	—		DC+ ⁽¹⁾	2

(1) Shunt connections (Frame 1).

Description	Ultra3000 Servo Drives (Cat. No. 2098-DSD-075, -150, and 2098-DSD-HVxxx)			Kinetix 5500 Servo Drives		
	Connector	Signal	Terminal	Connector	Signal	Terminal
Motor	TB1	U	U	MP	U	U
		V	V		V	V
		W	W		W	W
		Chassis Ground	⊥		Chassis Ground	Chassis Ground
DC Bus Connections	TB1	DC+	+	DC	DC-	1
		DC-	-		DC+	2
Three-phase Input Power	TB1	L1	L1	IPD	L1	L1
		L2	L2		L2	L2
		L3	L3		L3	L3
		Ground	⊥		Ground	Ground
Control/Auxiliary Power	TB1	L1 Aux	L1 Aux	CP	24V	24V+
		L2 Aux	L2 Aux		24V Com	24-

Description	Ultra3000 Servo Drives (Cat. No. 2098-DSD-075, -150, and 2098-DSD-HVxxx)			Kinetix 5500 Servo Drives		
	Connector	Signal	Terminal	Connector	Signal	Terminal
Shunt Resistor	TB2	Internal/External	1	RC	DC+ ⁽¹⁾	1
		Internal	2		SH ⁽¹⁾	2
		External	3			

(1) Shunt connections (Frames 2 and 3).

Encoder Connector Pinouts

The table below compares the feedback connector pinouts for the Ultra3000 and Kinetix 5500 servo drives:

- Ultra3000 servo drive CN2 connector
- Kinetix 5500 servo drive MF connector

Ultra3000 Servo Drives ⁽¹⁾			Kinetix 5500 Servo Drives ⁽²⁾		
MF Pin	Description	Signal	Signal	Description	MF Pin
1	Channel A+ / sine differential input+	AM+	—	—	—
2	Channel A- / sine differential input-	AM-	—	—	—
3	Channel B+ / cosine differential input+	BM+	—	—	—
4	Channel B- / cosine differential input-	BM-	—	—	—
5	Channel I+ / Index pulse+	IM+	—	—	—
6	Common	ECOM	—	—	—
7	N/C / Encoder power (+9V) ⁽¹⁾	EPWR +9V	—	—	—
8	Commutation channel S3	S3	—	—	—
9	Positive overtravel limit	+LIMIT	—	—	—
10	Channel I- / Index pulse-	IM-	—	—	—
11	Thermostat	TS	—	—	—
12	Commutation channel S1	S1	—	—	—
13	Commutation channel S2	S2	—	—	—
14	Encoder power (+5V)	EPWR_5V	—	—	—
15	Negative overtravel limit	-LIMIT	—	—	—
—	—	—	D+	Bidirectional data and power for digital encoder interface ⁽³⁾	1
—	—	—	D-		2
—	—	—	SHIELD		SHIELD

(1) +9V encoder capability only available on standard size Ultra3000 drive (catalog number 2098-DSD-030 or larger).

(2) Connections shown for VPL motor encoder.

(3) Kinetix 5500 servo drive-to-motor power cables must not exceed 50 m (164 ft). System performance was tested at this cable length. These limitations also apply when meeting CE requirements.

I/O Connector Pinouts

The table below compares the I/O connector pinouts for the Ultra3000 and Kinetix 5500 servo drives:

- Ultra3000 CN1 connector
- Kinetix 5500 servo drive IOD connector

Ultra3000 Servo Drives			Kinetix 5500 Servo Drives		
CN1 Pin	Description	Signal	Signal	Description	IOD Pin
1	Auxiliary Encoder Power Out (+5V)	EPWR			
2	Common	ECOM			
3	Auxiliary Logic Power In (+5V)	AUXPWR			
4	Auxiliary Encoder Ch A+	AX+			
5	Auxiliary Encoder Ch A-	AX-			
6	Auxiliary Encoder Ch B+	BX+			
7	Auxiliary Encoder Ch B-	BX-			
8	Auxiliary Encoder Ch I+	IX+			
9	Auxiliary Encoder Ch I-	IX-			
10	Unbuffered Motor Encoder Ch A+	AM+			
11	Unbuffered Motor Encoder Ch A-	AM-			
12	Unbuffered Motor Encoder Ch B+	BM+			
13	Unbuffered Motor Encoder Ch B-	BM-			
14	Unbuffered Motor Encoder Ch I+	IM+			
15	Unbuffered Motor Encoder Ch I-	IM-			
16	Buffered Motor Encoder Ch A+	AMOUT+			
17	Buffered Motor Encoder Ch A-	AMOUT-			
18	Buffered Motor Encoder Ch B+	BMOUT+			
19	Buffered Motor Encoder Ch B-	BMOUT-			
20	Buffered Motor Encoder Ch I+	IMOUT+			
21	Buffered Motor Encoder Ch I-	IMOUT-			
22	Common	ACOM			
23	Reserved	—			
24	Analog Current Limit Input	ILIMIT			
25	Reserved	—			
26	Reserved	—			
27	I/O Common	IOCOM	COM	I/O common for customer-supplied 24V supply.	2
28	I/O Common	IOCOM			
29	I/O Power	IOPWR			
30	I/O Power	IOPWR			
31	Drive Enable Input	ENABLE			
32	Home Sensor Input	HOME	IN1 ⁽¹⁾	High speed registration /home position input. A low/high or high/low transition triggers a registration event. This is a dual-function input.	1

Ultra3000 Servo Drives			Kinetix 5500 Servo Drives		
CN1 Pin	Description	Signal	Signal	Description	IOD Pin
33	Registration Sensor 1 Input	REG1	IN1 ⁽¹⁾	High speed registration/home position input. A low/high or high/low transition triggers a registration event. This is a dual-function input.	1
34	Registration Sensor 2 Input	REG2	IN2	High speed registration input. A low/high or high/low transition triggers a registration event.	3
35	Reserved	—			
36	Reserved	—			
37	Positive Overtravel Input	OT_POS			
38	Negative Overtravel Input	OT_NEG			
39	Drive Ready	READY ⁽²⁾			
40	Reserved	—			
41	Reserved	—			
42	Reserved	—			
43	Brake Relay Output+	BRAKE+			
44	Brake Relay Output-	BRAKE-			

(1) This signal has dual-functionality. You can use IN1 (IOD-1) as registration or Home input.

(2) READY signal only available with firmware version 1.29 (or above). Requires use of drive-mounted breakout board (2090-U3BB2-DM44).

Notes:

About the Servo Drive System

About the Ultra3000 Servo Drive System

The Ultra3000 servo drive is designed to provide a Kinetix Integrated Motion solution for applications with output power requirements between 0.5...22 kW (1.8...32.2 A).

Table 22 - Ultra3000 Servo Drive System Overview

Ultra3000 Servo Drive System Component	Cat. No.	Description
Axis Module	2098-DSD-xxxx-xx (200V class) 2098-DSD-HVxxxx-xx (400V class)	Individual Axis Module
2090 Shunt Modules	2090-SRxxx-xx 2090-UCSR-P900 9101-1183 2090-UCSR-A300	Shunt Module (SM); This module provides additional shunting capability in regenerative applications.
Resistive Brake Module (RBM)	2093-XBxxx-xx	Physically and electrically separate the drive power output from its corresponding motor.
24V Power Supply	1606-XLxxx	12...24V DC for control power and motor brakes.
Logix Controller Platform	1756-L60M03SE, 1756-MxxSE, and 1768-M04SE modules, and the 1784-PM16SE PCI card	SERCOS interface module/PCI card serves as a link between the ControlLogix/CompactLogix/SoftLogix platform and Ultra3000 drive system. The communication link uses the IEC 61491 Serial Real-time Communication System (SERCOS) protocol over a fiber-optic cable.
SERCOS Fiber-optic Cables	2090-SCxxx-x	Plastic or glass; in cabinet or on-machine duty.
RSLogix 5000 Software	9324-RLD300ENE	RSLogix 5000 software provides support for programming, commissioning, and maintaining the Logix family of controllers.
Servo Motors	MP-Series, TL-Series, LDC-series, and LDL-Series	Compatible servo motors.
Cables	Motor Power, Feedback, and Brake cables	Refer to the specific drive and motor combination for the motor cables required for the system.
Drive-mounted Breakout Boards	2090-UXBB-DM15	Motor feedback (CN2) connections.
	2090-UXBB-DM09	Serial interface (CN3) connections.
	2090-U3BB-DM12	I/O (CN1) connections. These kits apply to all Ultra300 drives (and drive catalog numbers 2098-DSD-005, 2098-DSD-010, and 2098-DSD-020 in applications where 5V DC control power, if required, is user-supplied).
	2090-U3CBB-DM12	I/O (CN1) connections. These kits apply to only Ultra300 drive catalog numbers 2098-DSD-005, 2098-DSD-010, and 2098-DSD-020 in applications where a 24...5V DC converter for control power is required.
2090 AC Line Filters	2090-UXLF-xxx	AC line conditioning for EMC. Applies to 200V-class drives.
	2090-UXLF-HVxxx	AC line conditioning for EMC. Applies to 400V-class drives.

About the Kinetix 5500 Servo Drive System

The Kinetix 5500 servo drives are designed to provide a Kinetix Integrated Motion solution for your drive/motor application.

Table 23 - Kinetix 5500 Servo Drive System Overview

Kinetix 5500 Servo Drive System Component	Cat. No.	Description
Kinetix 5500 Servo Drives	2198-Hxxx-ERSx	200V-class (single-phase or three-phase) and 400V-class (three-phase) drives operate in standalone and multi-axis shared AC, shared DC, shared AC/DC, and shared AC/DC hybrid configurations. Modules are zero-stacked from drive-to-drive and use the shared-bus connection system to extend power in multi-axis configurations.
Kinetix 5500 Capacitor Module	2198-CAPMOD-1300	Used for energy storage and/or to improve performance in applications producing regenerative energy and requiring shorter duty cycles (1360 µf). Modules are zero-stacked side-by-side with servo drives and use the shared-bus connection system to extend power.
Shared-bus Connector Kits	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.
Feedback Connector Kit	2198-KITCON-DSL	Replacement feedback connector kit with 2-pin connector plug and grounding plate inside the connector housing.
I/O Connector Kits	2198-KITCON-IOSP	Replacement I/O connector kit (spring clamp) for I/O (IOD) connector.
	2198-KITCON-IOSC	Replacement I/O connector kit (screw terminal) for I/O (IOD) connector.
Connector Sets	2198-KITCON-PWR40	Replacement connector set, 40 A, for frame 1 and frame 2 drives.
	2198-KITCON-PWR70	Replacement connector set, 70 A, for frame 3 drives.
	2198-KITCON-CAP1300	Replacement connector set, 40 A, for capacitor module.
Logix5000 Controller Platform	1769-L18ERM 1769-L27ERM 1769-L30ERM 1769-L33ERM 1769-L36ERM	CompactLogix 5370 controllers with Integrated Motion on the EtherNet/IP network. Linear, ring, and star topology is supported.
	1756-EN2T module 1756-EN2TR module 1756-EN3TR module	ControlLogix 1756-L7x controllers with Integrated Motion on EtherNet/IP networks. Linear, device-level ring (DLR), and star topology is supported.
Studio 5000	N/A	Studio 5000 Logix Designer application, version 21.00 or later, provides support for programming, commissioning, and maintaining the CompactLogix and ControlLogix controller families.
Compatible Motors	VPL-Axxxx VPL-Bxxxx	Compatible rotary motors include 200V and 400V-class Kinetix VP (Bulletin VPL) servo motors.
	N/A	Induction motors with open loop volts/hertz frequency control are also supported.
Cables	2090-CSxM1DF-xxAAxx	Bulletin 2090 single-cable for motor power, feedback, and 24V DC brake power.
	1585J-M8CBJM-x	Ethernet cables are available in standard lengths. Shielded cable is recommended.
AC Line Filters	2198-DB08-F 2198-DB20-F 2198-DB42-F	Bulletin 2198 three-phase AC line filters are required to meet CE and available for use in all Kinetix 5500 servo drive systems.
24V DC Power Supply	1606-XLxxx	Bulletin 1606 24V DC power supply for control circuitry, digital inputs, safety, and motor brake.
External Shunt Resistors	2097-R6 and 2097-R7	Bulletin 2097 external passive shunt resistors for when the drive's internal shunt capability is exceeded.

Specifications

Power Specifications

This section provides the power specifications for the Ultra3000 and Kinetix 5500 servo drives.

Ultra3000 (230V) Servo Drive Power Specifications

The table below lists power specifications and requirements for the Ultra3000 230V drives (2098-DSD-005x-xx, -010x-xx, and -020x-xx).

Attribute	2098-DSD-005	2098-DSD-010	2098-DSD-020
AC input voltage ⁽¹⁾	100...240V rms, single-phase		
AC input frequency	47...63 Hz		
AC input current ^{(2) (3)}			
Nom (rms)	5 A	9 A	18 A
230V AC (0-pk) max inrush ⁽⁴⁾	100 A - Series A or B 20 A - Series C	100 A - Series A or B 20 A - Series C	100 A - Series A or B 20 A - Series C
Continuous output current (rms)	1.8 A	3.5 A	7.1 A
Continuous output current (0-pk)	2.5 A	5.0 A	10 A
Peak output current (rms)	5.3 A	10.6 A	21.2 A
Peak output current (0-pk)	7.5 A	15 A	30 A
Bus capacitance	1410 μ F	1880 μ F	1880 μ F
Internal shunt resistance	N/A	N/A	N/A
Shunt on	N/A	N/A	N/A
Shunt off	N/A	N/A	N/A
Bus overvoltage	400V DC	400V DC	400V DC
Energy absorption capability			
115V AC input	93 J	125 J	
230V AC input	38 J	51 J	
Continuous power output			
115V AC input	0.25 kW	0.5 kW	1.0 kW
230V AC input	0.5 kW	1.0 kW	2.0 kW

(1) Specification is for nominal voltage. The absolute limits are $\pm 10\%$, or 88...265V rms.

(2) The 2098-DSD-005x-xx, 2098-DSD-010x-xx, and 2098-DSD-020x-xx (200V-class) drives are limited to:
Series A or B - one contactor cycle every two minutes.

Series C - one contactor cycle every 10 s for up to two minutes, not to exceed 12 cycles in five minutes.

(3) Power initialization requires a short period of inrush current. Dual element time delay (slow blow) fuses are recommended.

(4) In-rush current limiting circuitry is enabled within 3 s after removal of AC line power.

The table below lists power specifications and requirements for the Ultra3000 230V drives (2098-DSD-030x-xx, -075x-xx, and -150x-xx).

Attribute	2098-DSD-030	2098-DSD-075	2098-DSD-150
AC input voltage ⁽¹⁾	100...240V rms, single-phase	100...240V rms, three-phase	
AC input frequency	47...63 Hz		
Main AC input current ⁽²⁾ ⁽³⁾			
Nom (rms)	28 A	30 A	46 A
230V AC (0-pk) max inrush	50 A	50 A	68 A
Auxiliary AC input current			
115V AC (rms) nom	1.0 A	1.0 A	1.0 A
230V AC (rms) nom	0.5 A	0.5 A	0.5 A
115V AC (0-pk) max inrush ⁽⁴⁾	47 A	47 A	47 A
230V AC (0-pk) max inrush ⁽⁴⁾	95 A	95 A	95 A
Continuous output current (rms)	10.6 A	24.7 A	45.9 A
Continuous output current (0-pk)	15 A	35 A	65 A
Peak output current (rms)	21.2 A	53 A	106 A
Peak output current (0-pk)	30 A	75 A	150 A
Bus capacitance	2820 μ F	4290 μ F	7520 μ F
Internal shunt resistance	35 Ω	16.5 Ω	9.1 Ω
Shunt on	420V DC	420V DC	420V DC
Shunt off	402V DC	402V DC	402V DC
Bus overvoltage	452V DC	452V DC	452V DC
Internal shunt			
Continuous power	50 W	50 W	180 W
Peak power	4.5 kW	10 kW	18 kW
External shunt			
Resistance	30 Ω (-0/+5%)	16.5 Ω (-0/+5%)	9 Ω (-0/+5%)
Continuous power	2.4 kW	4 kW	8 kW
Peak power	6 kW	10 kW	19 kW
Energy absorption capability			
115V AC input	251 J	381 J	669 J
230V AC input	139 J	211 J	370 J
Continuous power output			
115V AC input	1.5 kW	N/A	N/A
230V AC input	3 kW	7.5 kW	15 kW

- (1) Specification is for nominal voltage. The absolute limits are $\pm 10\%$, or 88...265V rms.
- (2) The 2098-DSD-030x-xx, 2098-DSD-075x-xx, and 2098-DSD-150x-xx (200V-class) drives are limited to one contactor cycle per two minutes.
- (3) Power initialization requires a short period of inrush current. Dual element time delay (slow blow) fuses are recommended.
- (4) 400 μ s half wave sine.

Ultra3000 (460V) Servo Drive Power Specifications

The table below lists power specifications and requirements for the Ultra3000 460V drives (2098-DSD-HV030x-xx, -HV050x-xx, -HV100-x-xx, -HV150x-xx, and -HV220x-xx).

Attribute	2098-DSD-HV030	2098-DSD-HV050	2098-DSD-HV100	2098-DSD-HV150	2098-DSD-HV220
AC input voltage ^{(1) (2)}	230...480V rms, three-phase				
AC input Frequency	47...63 Hz				
Main AC input current ^{(3) (4)}					
460V AC (rms) nom	4 A	7 A	14 A	20 A	28 A
460V AC (rms) max inrush	6 A	6 A	6 A	6 A	6 A
Auxiliary AC input current					
230V AC (rms) nom	0.55 A				
360V AC (rms) nom	0.35 A				
480V AC (rms) nom	0.25 A				
230V AC (0-pk) max inrush ⁽⁵⁾	47 A				
480V AC (0-pk) max inrush ⁽⁵⁾	68 A				
Continuous output current (rms)	5.0 A	7.8 A	16.3 A	24.0 A	33.2 A
Continuous output current (0-pk)	7.0 A	11 A	23 A	34 A	47 A
Peak output current (rms)	9.9 A	15.6 A	32.5 A	48.1 A	66.5 A
Peak output current (0-pk)	14 A	22 A	46 A	68 A	94 A
Bus capacitance	470 µF		705 µF	940 µF	1880 µF
Internal shunt resistance	120 Ω		40 Ω	25 Ω	20 Ω
Shunt on					
230V AC input	400V DC				
480V AC input	800V DC				
Shunt off					
230V AC input	375V DC				
480V AC input	750V DC				
Bus overvoltage					
230V AC input	410V DC				
480V AC input	810V DC				
Internal shunt					
Continuous power	100 W		200 W	200 W	400 W
Peak power	5.3 kW		16 kW	25.6 kW	32 kW
External shunt					
Resistance (-0/+5%)	120 Ω		40 Ω	25 Ω	20 Ω
Continuous power	3 kW		10 kW	15 kW	22 kW
Peak power	5.3 kW		16 kW	25.6 kW	32 kW
Energy absorption capability					
230V AC input with 230V motor	15 J		22 J	29 J	59 J
230V AC input with 460V motor	129 J		194 J	259 J	517 J
480V AC input	55 J		82 J	109 J	219 J
Continuous power output					
230V AC input	1.5 kW		2.5 kW	5.0 kW	7.5 kW
480V AC input	3.0 kW		5.0 kW	10 kW	15 kW

(1) Specification is for nominal voltage. The absolute limits are $\pm 10\%$, or 207...264V rms and 324...528V rms.

(2) The 2098-DSD-HVxxx-xx drives can be powered with 230V rms and used with motors designed for 230V operation. In such cases, the voltage levels used for shunting and DC bus overvoltage limits are adjusted to be compatible with the voltage limit of the motor.

The 2098-DSD-HVxxx-xx drives can be powered with 480V rms and used with motors designed for 480V operation. In such cases, the voltage levels used for shunting and DC bus overvoltage limits are adjusted to be compatible with the voltage limit of the motor.

(3) The 2098-DSD-HVxxx-xx (400V-class) drives are limited to three contactor cycles per minute.

(4) Power initialization requires a short period of inrush current (processor controlled via soft start circuitry). Dual element time delay (slow blow) fuses are recommended.

(5) 400 µs half wave sine.

Kinetix 5500 Servo Drive Input Power Specifications

The table below lists input power specifications and requirements for the Kinetix 5500 servo drives.

Attribute	2198-H003-ERSx	2198-H008-ERSx	2198-H015-ERSx	2198-H025-ERSx	2198-H040-ERSx	2198-H070-ERSx
AC input voltage	195...264V rms, single-phase (240V nom) 195...264V rms, three-phase (240V nom) 324...528V rms, three-phase (480V nom)			195...264V rms, three-phase (240V nom) 324...528V rms, three-phase (480V nom)		
AC input frequency	47...63 Hz					
Main AC input current ⁽¹⁾ Nom (rms) three-phase Nom (rms) single-phase	1.0 A 0.7 A	2.60 A 1.70 A	5.20 A 3.40 A	8.30 A N/A	13.4 A N/A	23.7 A N/A
Max inrush (0-pk)	15.0 A			30.0 A		60.0 A
Peak AC input current Nom (rms) three-phase Nom (rms) single-phase	3.0 A 2.1 A	7.8 A 5.1 A	15.6 A 10.2 A	24.9 A N/A	40.2 A N/A	71.1 A N/A
Line loss ride through	20 ms					
Control power DC input voltage	24V DC ±10%					
Control power DC input current ^{(1) (2)} (non-brake motors)	0.4 A _{DC}		0.8 A _{DC}			1.3 A _{DC}
Nominal bus output voltage	276...747V DC					
Continuous output current to bus Three-phase Single-phase	1.0 A _{DC} 0.67 A _{DC}	2.40 A _{DC} 1.60 A _{DC}	4.90 A _{DC} 3.27 A _{DC}	7.80 A _{DC} N/A	12.7 A _{DC} N/A	22.50 A _{DC} N/A
Peak output current to bus ⁽³⁾ Three-phase Single-phase	3.0 A _{DC} 2.0 A _{DC}	7.2 A _{DC} 4.8 A _{DC}	14.7 A _{DC} 9.8 A _{DC}	23.4 A _{DC} N/A	38.1 A _{DC} N/A	67.5 A _{DC} N/A
Continuous output power to bus 195...264V rms, single-phase 195...264V rms, three-phase 324...528V rms, three-phase	0.2 kW 0.3 kW 0.6 kW	0.5 kW 0.8 kW 1.6 kW	1.0 kW 1.6 kW 3.2 kW	N/A 2.5 kW 5.2 kW	N/A 4.0 kW 8.4 kW	N/A 7.2 kW 14.9 kW
Peak output power to bus 195...264V rms, single-phase 195...264V rms, three-phase 324...528V rms, three-phase	0.6 kW 1.0 kW 1.9 kW	1.6 kW 2.4 kW 4.9 kW	3.2 kW 4.9 kW 9.7kW	N/A 7.8 kW 15.6 kW	N/A 12.7 kW 25.3 kW	N/A 22.4 kW 44.8 kW
DC input voltage (common bus follower)	276...747V DC					
DC input current (common bus follower)	1.0 A _{DC}	2.4 A _{DC}	4.9 A _{DC}	7.8 A _{DC}	12.7 A _{DC}	22.5 A _{DC}
Bus overvoltage	240V, nom AC input	440V DC				
	480V, nom AC input	810V DC				
Bus undervoltage	240V, nom AC input	138V DC				
	480V, nom AC input	275V DC				
Efficiency	97%					
Capacitive energy absorption	11.54 J		19.58 J	39.15 J	58.73 J	104.87 J
Short-circuit current rating	150,000 A (rms) symmetrical					

(1) All drives are limited to 1 power cycle per minute.

(2) For current values when motors include a holding brake and additional information, see [Control and Auxiliary Power Specifications on page 64](#).

(3) Peak output current duration equals 1.0 second.

Kinetix 5500 Servo Drive Output Power Specifications

The table below lists output power specifications and requirements for the Kinetix 5500 servo drives.

Attribute	2198-H003-ERSx	2198-H008-ERSx	2198-H015-ERSx	2198-H025-ERSx	2198-H040-ERSx	2198-H070-ERSx
Bandwidth ⁽¹⁾ Velocity loop, max Current loop	300 Hz 1000 Hz					
Continuous output current (rms)	1.0 A	2.5 A	5.0 A	8.0 A	13.0 A	23.0 A
Continuous output current (0-pk)	1.4 A	3.5 A	7.1 A	11.3 A	18.4 A	32.5 A
Peak output current (rms) ⁽²⁾	2.5 A	6.25 A	12.5 A	20.0 A	32.5 A	57.5 A
Peak output current (0-pk) ⁽²⁾	3.5 A	8.8 A	17.7 A	28.3 A	45.9 A	81.3 A
Continuous power out (nom) 195...264V rms, single-phase 195...264V rms, three-phase 324...528V rms, three-phase	0.2 kW 0.3 kW 0.6 kW	0.5 kW 0.8 kW 1.6 kW	1.0 kW 1.5 kW 3.2 kW	N/A 2.4 kW 5.1 kW	N/A 4.0 kW 8.3 kW	N/A 7.0 kW 14.6 kW
Internal shunt resistance	100 Ω		60 Ω			40 Ω
Internal shunt power	30 W		50 W			75 W
Shunt on	775V plus 30V x bus regulator capacity/utilization ⁽³⁾					
Shunt off	765V plus 30V x bus regulator capacity/utilization ⁽³⁾					

(1) Bandwidth values vary based on tuning parameters and mechanical components.

(2) Peak current duration (T_{PKmax}) equals 1.0 second.

(3) The shunt on and shunt off voltages increase during periods of shunting activity to promote sharing of shunt power in multi-axis configurations. Shunt utilization is equivalent to the BusRegulatorCapacity tag in the Logix Designer application.

Control and Auxiliary Power Specifications

This section provides the control and auxiliary power specifications for the Ultra3000 and Kinetix 5500 servo drives.

Ultra3000 Servo Drive Auxiliary Power Specifications

Table 24 - Ultra3000 Drives +24V Power Supply Requirements for Logic Power

Parameter	Description	Min	Max
Input voltage range	Input voltage range of the external power supply for drive-mounted breakout boards with 24V to 5V converter.	18V	30V
Input current	Input current draw from the external power supply for the drive-mounted breakout boards with 24V to 5V converter.	—	400 mA

IMPORTANT A single 24V power supply can be used to power the digital I/O and supply 24V to the drive-mounted breakout boards (catalog numbers 2090-U3CBB-DMxx) provided the cumulative minimum current requirements are met.

Table 25 - Ultra3000 Drives 5V Supply Specifications

Parameter	Description	Min	Max
Voltage	Voltage tolerance of the external logic supply.	5.1V	5.25V
Current	Current output capability of the external +5V DC power supply.	1.5A	—

IMPORTANT Using the drive-mounted breakout board with 24V to 5V auxiliary power converter is preferred to using an external +5V DC power supply.

Table 26 - Ultra3000 Drive Auxiliary Power Specification (230V)

Specification	2098-DSD-030	2098-DSD-075	2098-DSD-150
Auxiliary AC input current			
115V AC (rms) nom	1.0 A	1.0 A	1.0 A
230V AC (rms) nom	0.5 A	0.5 A	0.5 A
115V AC (0-pk) max inrush	47 A	47 A	47 A
230V AC (0-pk) max inrush	95 A	95 A	95 A

Table 27 - Ultra3000 Drive Auxiliary Power Specification (460V)

Attribute	2098-DSD-HV030	2098-DSD-HV050	2098-DSD-HV100	2098-DSD-HV150	2098-DSD-HV220
Auxiliary AC input current					
230V AC (rms) nom	0.55 A				
360V AC (rms) nom	0.35 A				
480V AC (rms) nom	0.25 A				
230V AC (0-pk) max inrush	47 A				
480V AC (0-pk) max inrush	68 A				

Kinetix 5500 Servo Drive Control Power Specifications

Table 28 - Control Power Current Specifications

Cat. No.	24V Current (non-brake motor)	24V Current (2 A brake motor)	24V Inrush Current ⁽¹⁾
2198-H003-ERSx	0.4 A DC	2.4 A DC	2.0 A
2198-H008-ERSx			
2198-H015-ERSx	0.8 A DC	2.8 A DC	3.0
2198-H025-ERSx			
2198-H040-ERSx			
2198-H070-ERSx	1.3 A DC	3.3 A DC	
2198-CAPMOD-1300	0.3 A DC	N/A	2.0

(1) Inrush current duration is less than 30 ms.

Power Dissipation Specifications

This section provides the power dissipation specifications for the Ultra3000 and Kinetix 5500 servo drives.

Ultra3000 Servo Drive Power Dissipation Specifications

Use the following table to size an enclosure and calculate required ventilation for a Ultra3000 servo drive system. Typical heat losses run approximately one-half maximum power losses. The maximum power losses are shown below.

Ultra3000 Servo Drive Cat. No.	Maximum Loss, watts	Ultra3000 Servo Drive Cat. No.	Maximum Loss, watts
2098-DSD-005x-xx	48	2098-DSD-HV030x-xx	175 + dissipative shunt
2098-DSD-010x-xx	48	2098-DSD-HV050x-xx	175 + dissipative shunt
2098-DSD-020x-xx	50	2098-DSD-HV100x-xx	350 + dissipative shunt
2098-DSD-030x-xx	150 + dissipative shunt	2098-DSD-HV150x-xx	350 + dissipative shunt
2098-DSD-075x-xx	300 + dissipative shunt	2098-DSD-HV220x-xx	600 + dissipative shunt
2098-DSD-150x-xx	500 + dissipative shunt		

Kinetix 5500 Servo Drive Power Dissipation Specifications

Use this table to size an enclosure and calculate required ventilation for a Kinetix 5500 drive system.

Kinetix 5500 Servo Drive Cat. No.	Usage as % of Rated Power Output (Watts)				
	20%	40%	60%	80%	100%
2198-H003-ERSx	12	25	37	50	62
2198-H008-ERSx					
2198-H015-ERSx	40	80	120	160	200
2198-H025-ERSx					
2198-H040-ERSx					
2198-H070-ERSx	64	128	192	256	320

Cable Lengths

This section provides the feedback cable lengths for the Ultra3000 and Kinetix 5500 servo drives.

Ultra3000 Servo Drive Motor Feedback Cable Lengths

Although motor feedback cables are available in standard lengths up to 90 m (295.3 ft), the drive/motor/feedback combination can limit the maximum cable length, as shown in the table below. This table assumes using cables recommended in the Motion Control Selection Guide, publication GMC-SG001.

The maximum cable lengths for Ultra3000 drives with MP-Series (low inertia and integrated gear) motors are given in the table below.

MPL-A (230V) Motors		MPL-B (460V) Motors	
Absolute High-Res ⁽¹⁾ m (ft)	Incremental ⁽²⁾ m (ft)	Absolute High-Res ⁽¹⁾ m (ft)	Incremental ⁽²⁾ m (ft)
90 (295.3)	45 (147.6)	90 (295.3)	45 (147.6)

(1) Refers to MPL-A/BxxxxS/M (single-turn or multi-turn) low inertia motors with absolute high-resolution feedback.

(2) Refers to MPL-A/BxxxxH low inertia motors with 2000-line incremental feedback.

Kinetix 5500 Servo Drive Single Motor Cable Lengths

Although single motor cables are available in standard lengths up to 50 m (164 ft), use of continuous-flex cables limits the maximum cable length. This table assumes the use of 2090-Series single motor cables. See the Kinetix Motion Accessories Technical Data, publication [GMC-TD004](#), for cable specifications.

Kinetix 5500 Servo Drive Cat. No.	Standard (non-flex) Cables Cat. No. 2090-CSxM1DF-xxAAxx	Continuous-flex Cables Cat. No. 2090-CSBM1DF-xxAFxx
2198-H003-ERSx 2198-H008-ERSx	50 m (164 ft)	30 m (98.4 ft)
2198-H015-ERS x 2198-H025-ERS x 2198-H040-ERSx	50 m (164 ft)	
2198-H070-ERSx	50 m (164 ft)	

Combined cable length for all axes on the same DC bus must not exceed 250 m (820 ft). Drive-to-motor cables must not exceed 50 m (164 ft).

IMPORTANT System performance was tested at these cable length specifications. These limitations also apply when meeting CE requirements.

Environmental Specifications This section provides the environmental specifications for the Ultra3000 and Kinetix 5500 servo drives.

Ultra3000 Servo Drive Environmental Specifications

Specification	Operational Range	Storage Range (non-operating)
Ambient Temperature	0 °C...55 °C (32 °F...131 °F)	-40 °C...70 °C (-40 °F...158 °F)
Relative Humidity	5...95% non-condensing	5...95% non-condensing
Altitude	1500 m (4921.5 ft) - Derate 3% per 300 m (984.3 ft) above 1500 m (4,921.5 ft)	
Vibration	5-2000 Hz @ 2.5g peak, 0.0006 mm (0.015 in.) maximum displacement	
Shock	15g, 11 ms half-sine pulse	

Kinetix 5500 Servo Drive Environmental Specifications

Specification	Operational Range	Storage Range (non-operating)
Ambient temperature	0...50 °C (32...122 °F)	-40...70 °C (-40...158 °F)
Relative humidity	5...95% non-condensing	5...95% non-condensing
Altitude	1000 m (3281 ft)	3000 m (9843 ft) during transport
Vibration	5...55 Hz @ 0.35 mm (0.014 in.) double amplitude, continuous displacement; 55...500 Hz @ 2.0 g peak constant acceleration	
Shock	15 g, 11 ms half-sine pulse (3 pulses in each direction of 3 mutually perpendicular directions)	

Certifications

This section lists the certifications for the Ultra3000 and Kinetix 5500 servo drives.

Ultra3000 Servo Drive Certifications

Agency Certification ⁽¹⁾ (when product is marked)	Standards
c-UL-us	UL Listed to U.S. and Canadian safety standards (UL 508 C File E145959).
CE	European Union 89/336/EEC EMC Directive compliant with EN 61800-3:2004: Adjustable Speed Electrical Power Drive Systems - Part 3; EMC Product Standard including specific test methods. European Union 73/23/EEC Low Voltage Directive compliant with: <ul style="list-style-type: none"> EN 60204-1:1997 - Safety of Machinery - Electrical Equipment of Machines. EN 50178:1997 - Electronic Equipment for use in Power Installations.
Functional Safety	<ul style="list-style-type: none"> EN 60204-1:1997 - Safety of Machinery - Electrical Equipment of Machines. IEC 61508: Part 1-7:2000 - Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems. EN954-1:1996 - Safety of machinery. Safety related parts of control systems. Part 1: General principles for design.

(1) See <http://www.rockwellautomation.com/products/certification> for Declarations of Conformity Certificates.

Kinetix 5500 Servo Drive Certifications

Agency Certification ⁽¹⁾	Standards
c-UL-us ⁽²⁾	UL Listed to U.S. and Canadian safety standards (UL 508C File E59272). Solid-state motor overload protection provides dynamic fold-back of motor current when 110% of the motor rating is reached with a peak current limit based on the peak rating of the motor as investigated by UL to comply with UL 508C (UL File E59272).
CE	European Union 2004/108/EC EMC Directive compliant with EN 61800-3:2004: Adjustable Speed Electrical Power Drive Systems - Part 3; EMC Product Standard including specific test methods. European Union 2006/95/EC Low Voltage Directive compliant with EN 61800-5-1:2007 - Adjustable speed electrical power drive systems.
Functional Safety	TÜV Certified for Functional Safety: up to SIL CL2, according to EN 61800-5-2, EN 61508, and EN 62061; up to Performance Level PLd and Category 3, according to EN ISO 13849-1; when used as described in the Kinetix 5500 Servo Drives User Manual, publication 2198-UM001 .
C-Tick	Australian Radio Communications Act, compliant with: <ul style="list-style-type: none"> Radio Communications Act: 1992 Radio Communications (Electromagnetic Compatibility) Standard: 1998 Radio Communications (Compliance Labelling - Incidental Emissions) Notice: 1998 AS/NZS CISPR 11: 2002 (Group 1, Class A)
KC	Korean Registration of Broadcasting and Communications Equipment, compliant with: <ul style="list-style-type: none"> Article 58-2 of Radio Waves Act, Clause 3 Registration number: KCC-REM-RAA-2198
ODVA	EtherNet/IP conformance tested.
OSHA	Maximum audible noise from the servo drive system complies with OSHA standard 3074, Hearing Conservation (<85 dBA).

(1) When product is marked, see <http://www.ab.com> for Declarations of Conformity Certificates.

(2) UL has not evaluated the safe-off, safe torque-off, or safe speed-monitoring options in these products.

Notes:

Interconnect Diagrams

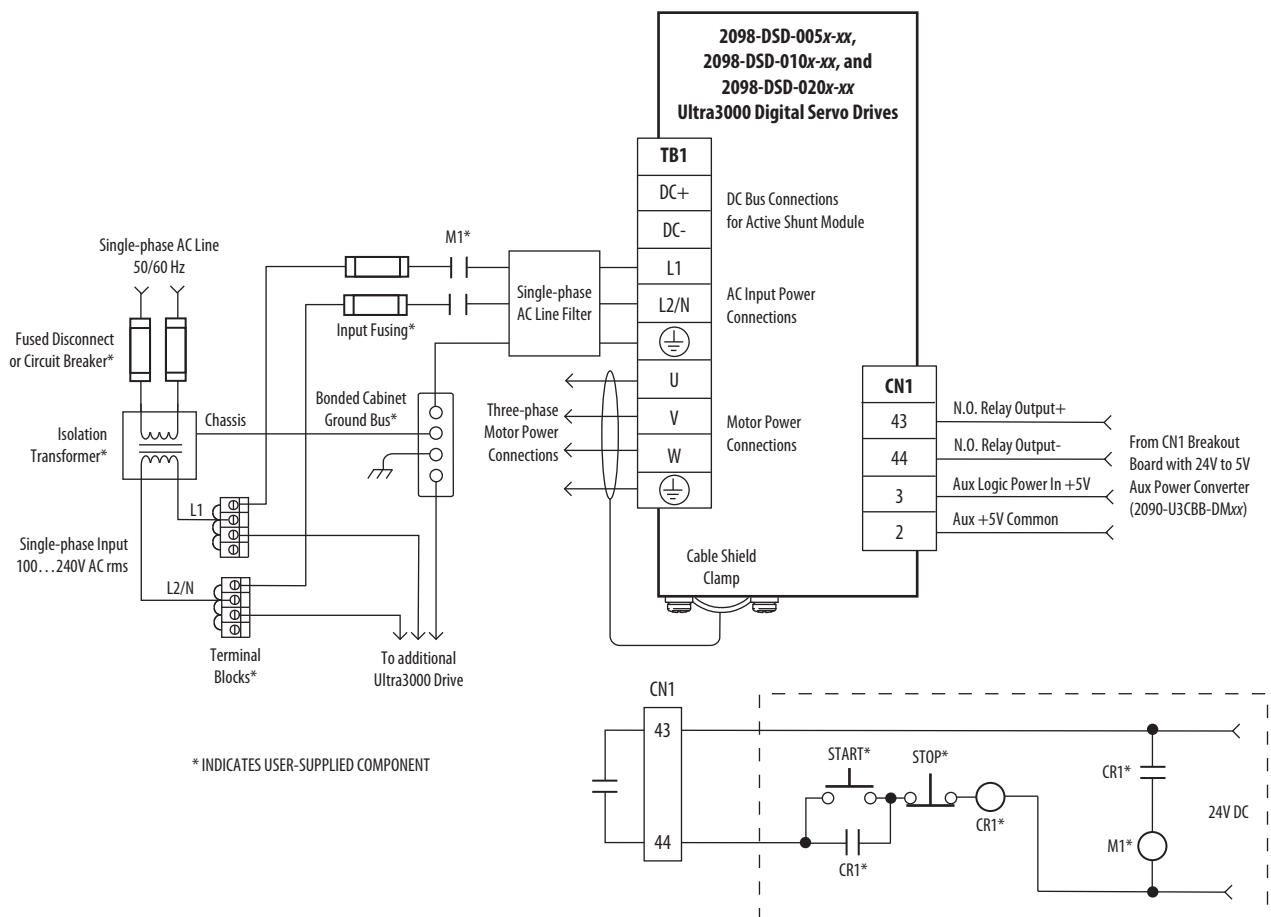
This appendix provides power wiring examples to assist you in comparing the power wiring for the Ultra3000 servo drive and the Kinetix 5500 drive systems.

Ultra3000 Servo Drive Power Wiring Examples

This is the power wiring diagram with 24V DC control string for 2098-DSD-005x-xx, 2098-DSD-010x-xx, and 2098-DSD-020x-xx Ultra3000 drives (non-SERCOS drives only). To avoid a separate 5V DC auxiliary logic power supply, the 24V to 5V converter breakout board (catalog number 2090-U3CBB-DMxx) is used to wire the control interface (CN1) connector.

For SERCOS drives, input line contactor is part of the PLC program and output control.

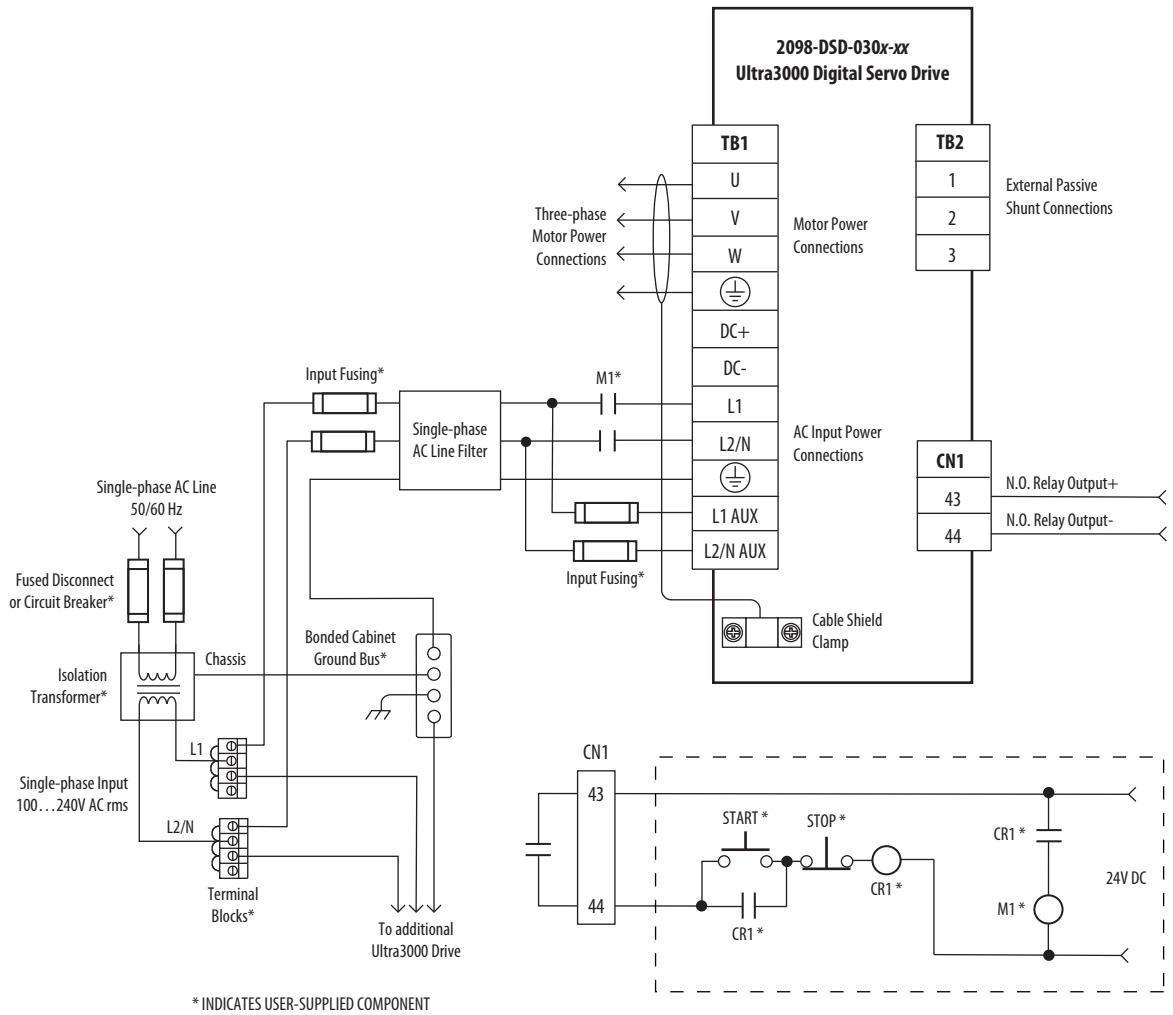
Figure 12 - Typical Power Wiring on Ultra3000 (230V) System



This is the power wiring diagram with 24V DC control string for the 2098-DSD-030x-xx drive (non-SERCOS drives only).

For SERCOS drives, input line contactor is part of the PLC program and output control.

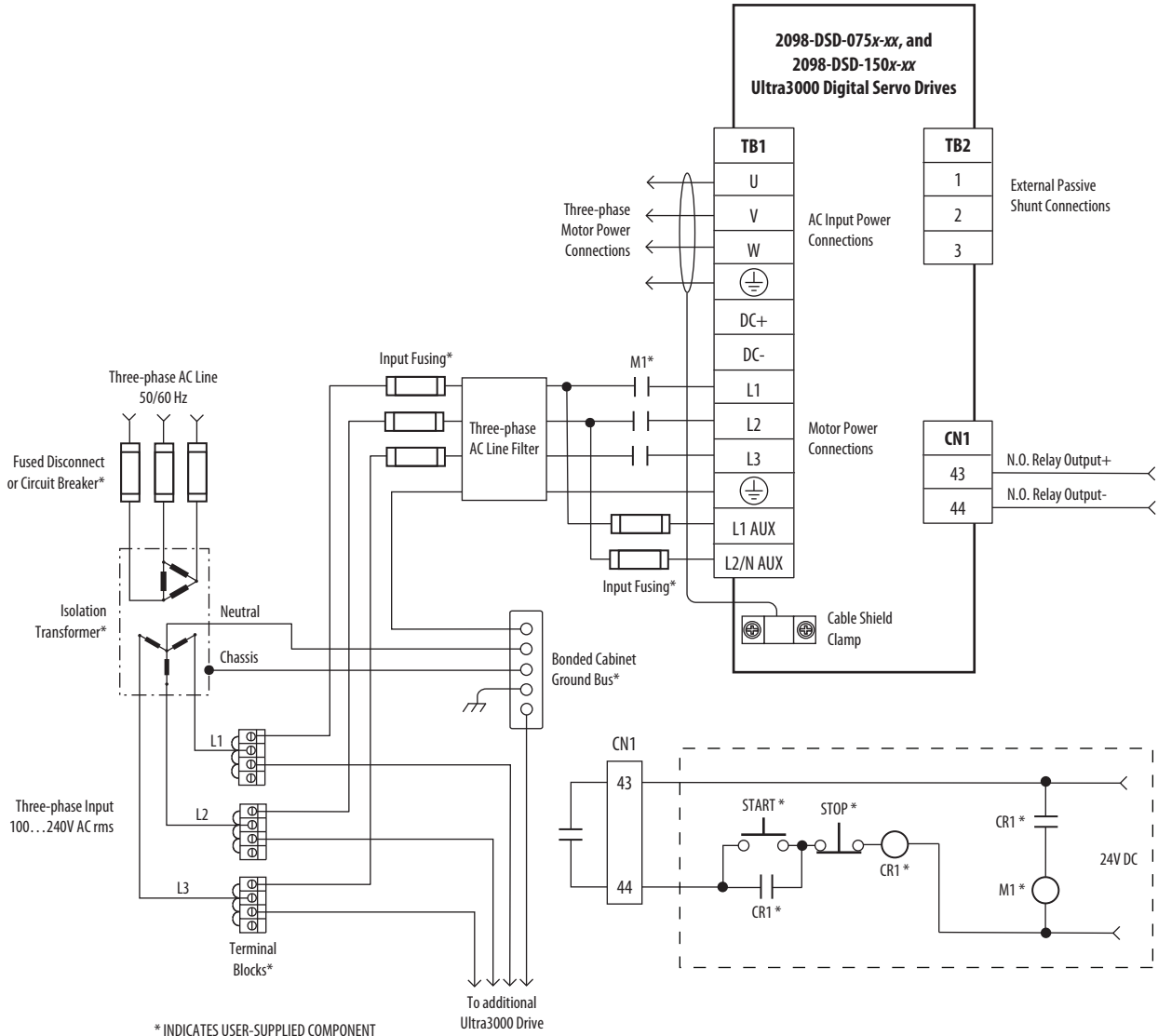
Table 29 - Typical Power Wiring on Ultra3000 (230V) System



This is the power wiring diagram with 24V DC control string for 2098-DSD-075x-xx and 2098-DSD-150x-xx Ultra3000 drives (non-SERCOS drives only).

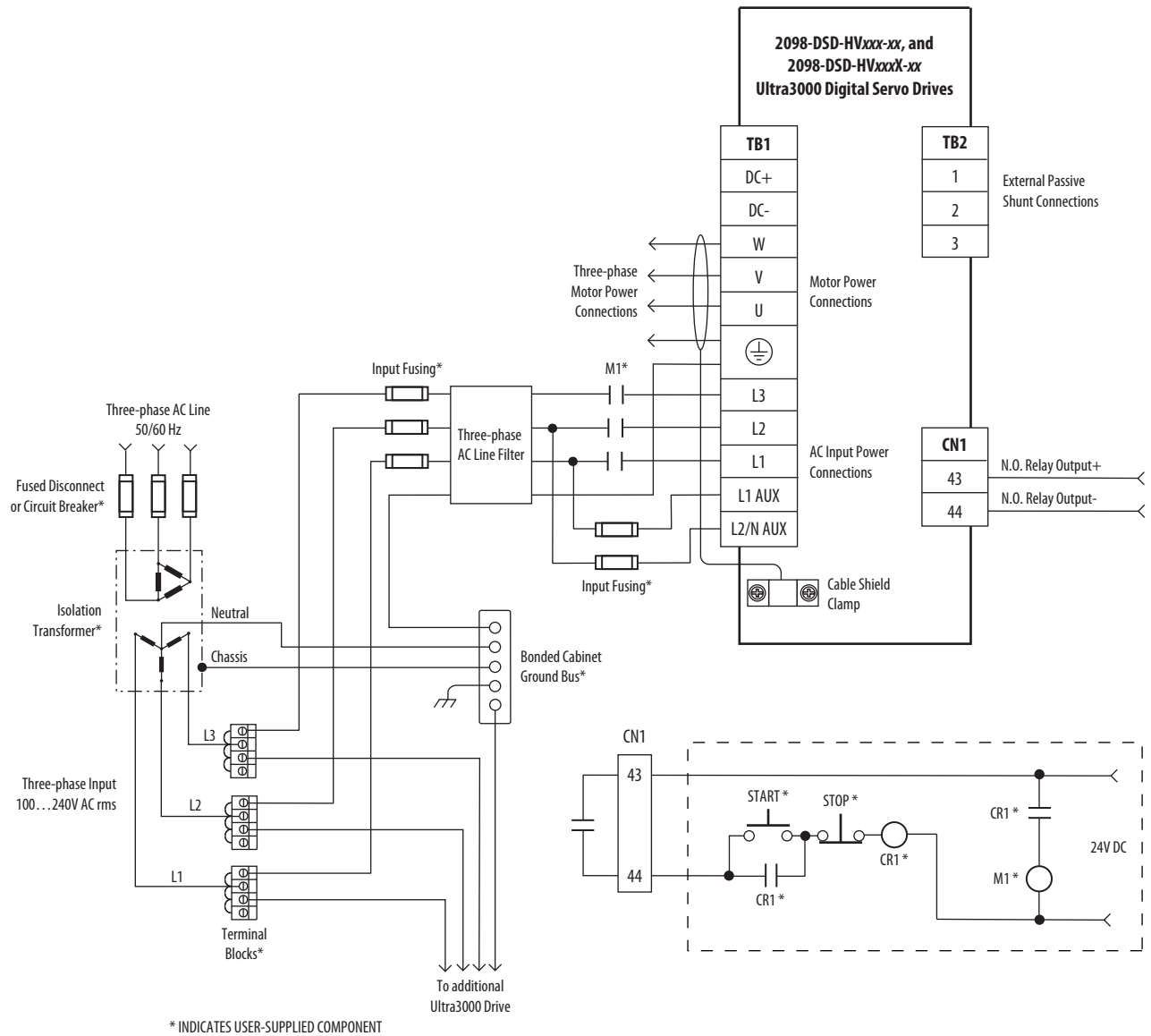
For SERCOS drives, input line contactor is part of the PLC program and output control.

Table 30 - Typical Power Wiring on Ultra3000 (230V) System



This is the power wiring diagram with 24V DC control string for 2098-DSD-HVxxx-xx and 2098-DSD-HVxxxX-xx Ultra3000 drives.

Figure 13 - Typical Power Wiring on Ultra3000 (460V) System



Kinetix 5500 Servo Drive Power Wiring Examples

This section provides wiring examples to assist you in wiring the Kinetix 5500 servo drive system.

You must supply input power components. The single-phase and three-phase line filters are wired downstream of the input fusing.

Single-axis Drive Wiring Examples

Figure 14 - Kinetix 5500 Servo Drives Power Wiring (three-phase operation)

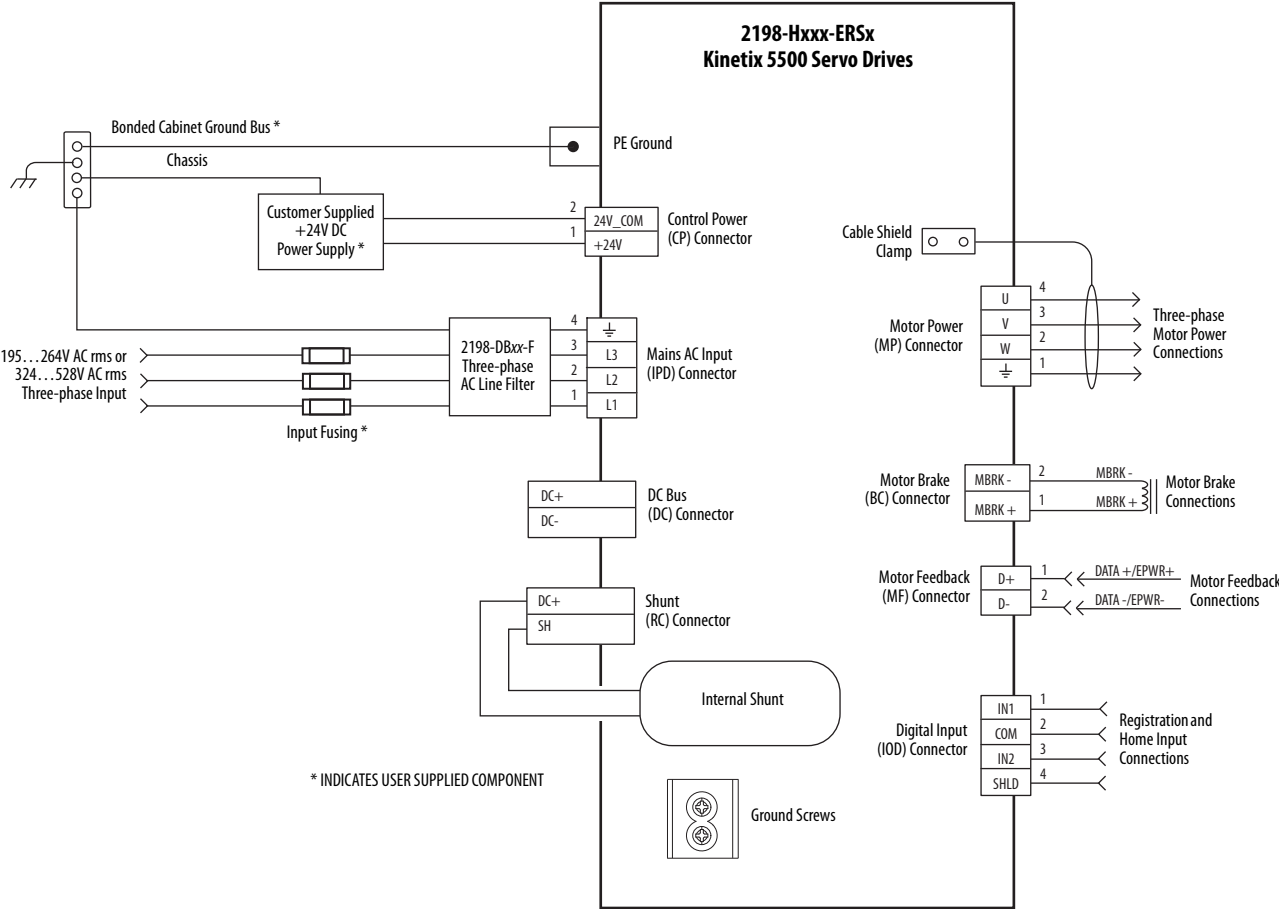
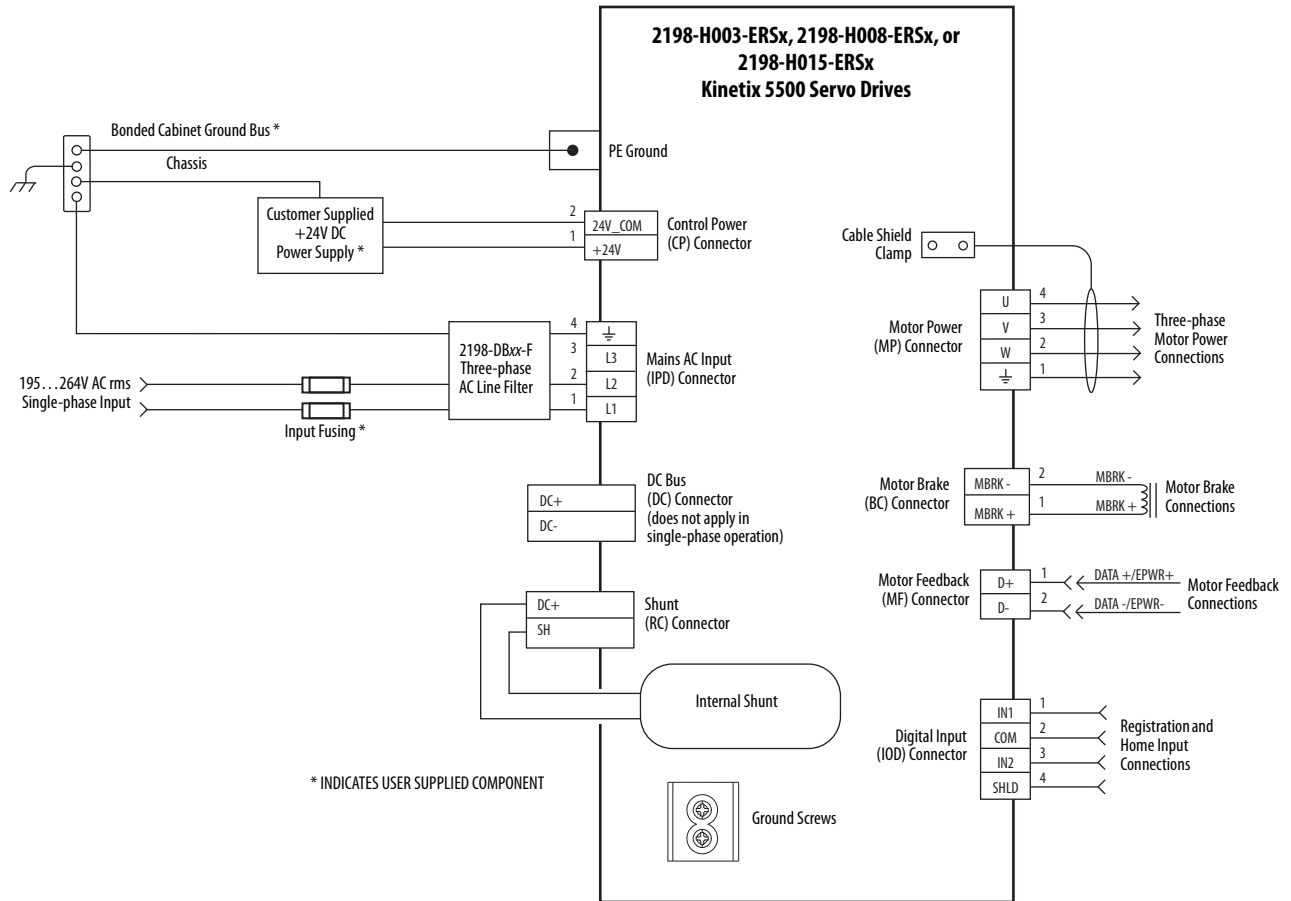


Figure 15 - Kinetix 5500 Servo Drives Power Wiring (single-phase operation)



Bus-sharing Wiring Examples

For bus-sharing configurations, use the 2198-H0x0-xx-x shared-bus connection system to extend power from drive to drive.

Figure 16 - Kinetix 5500 Servo Drives with Shared AC Bus

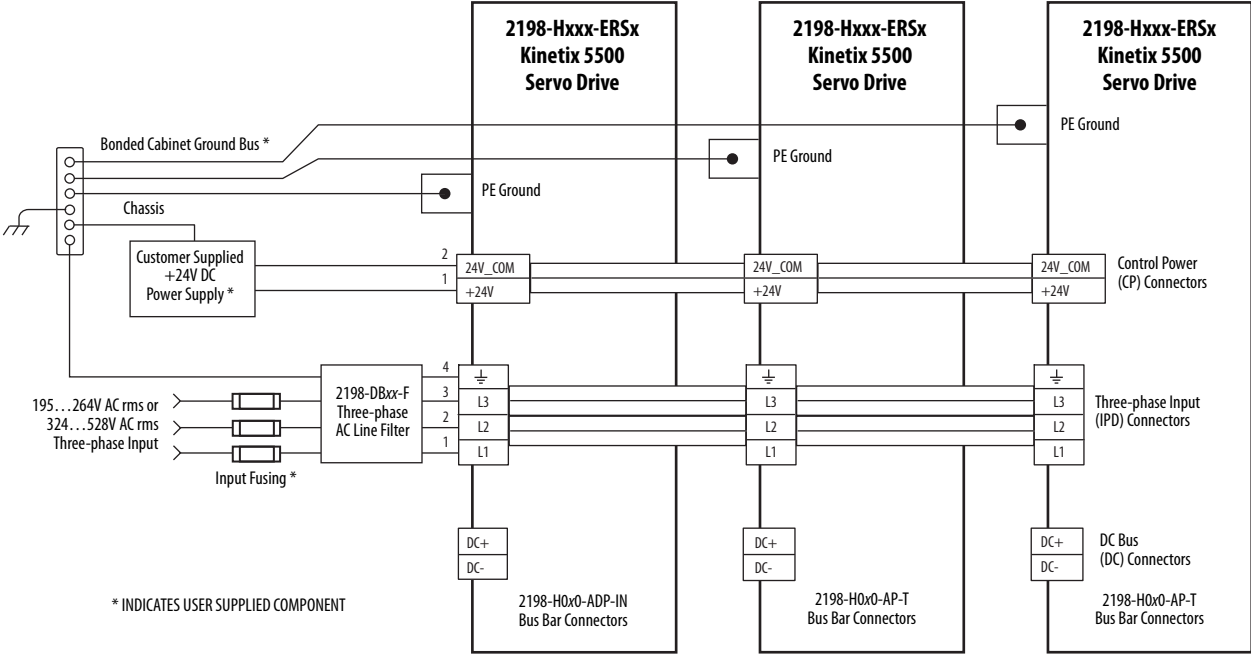


Figure 17 - Kinetix 5500 Servo Drives with Shared AC/DC Bus

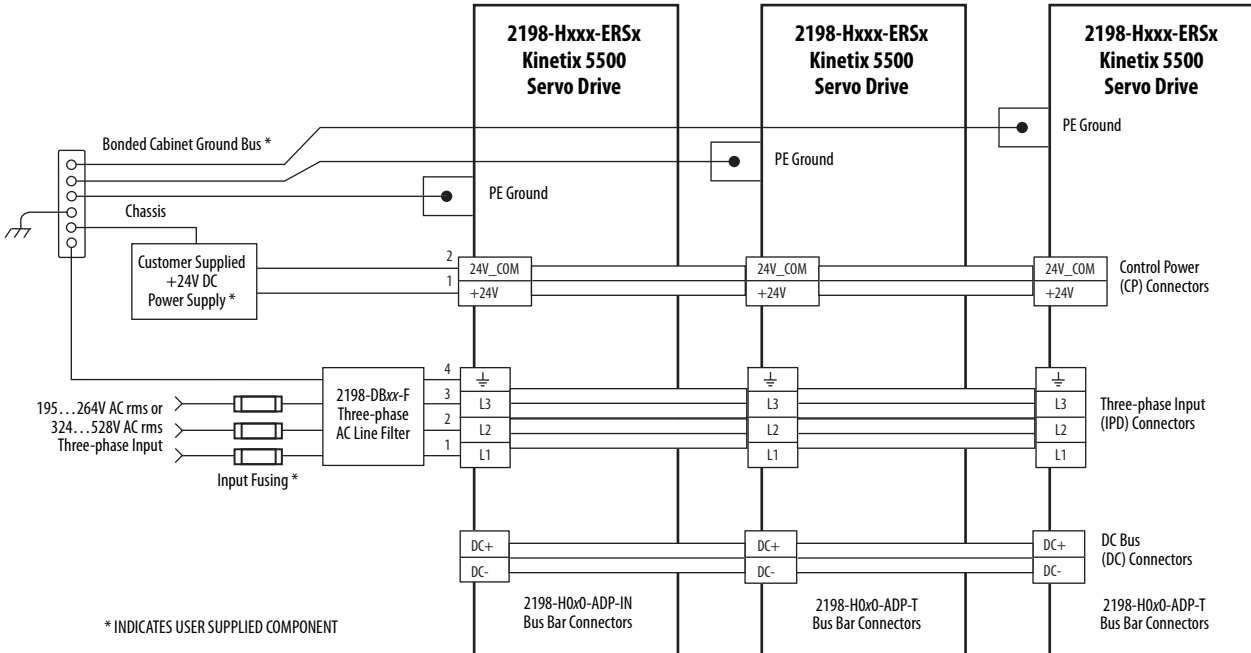


Figure 18 - Kinetix 5500 Servo Drives with Shared DC (common bus)

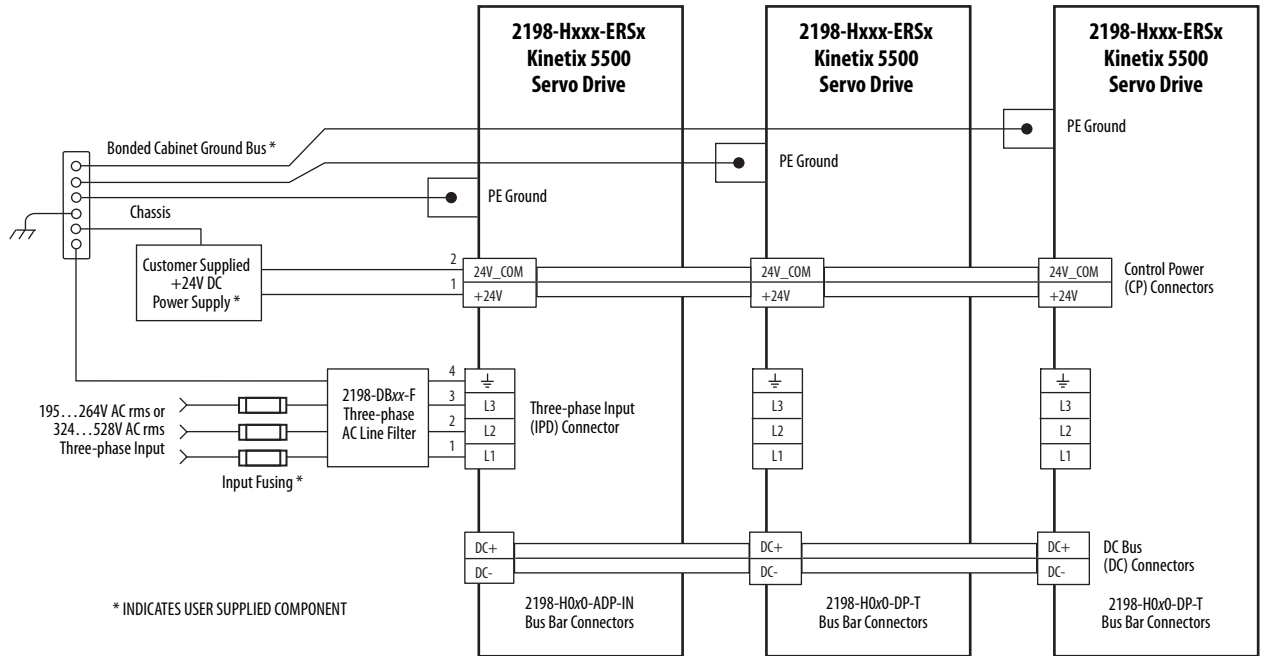
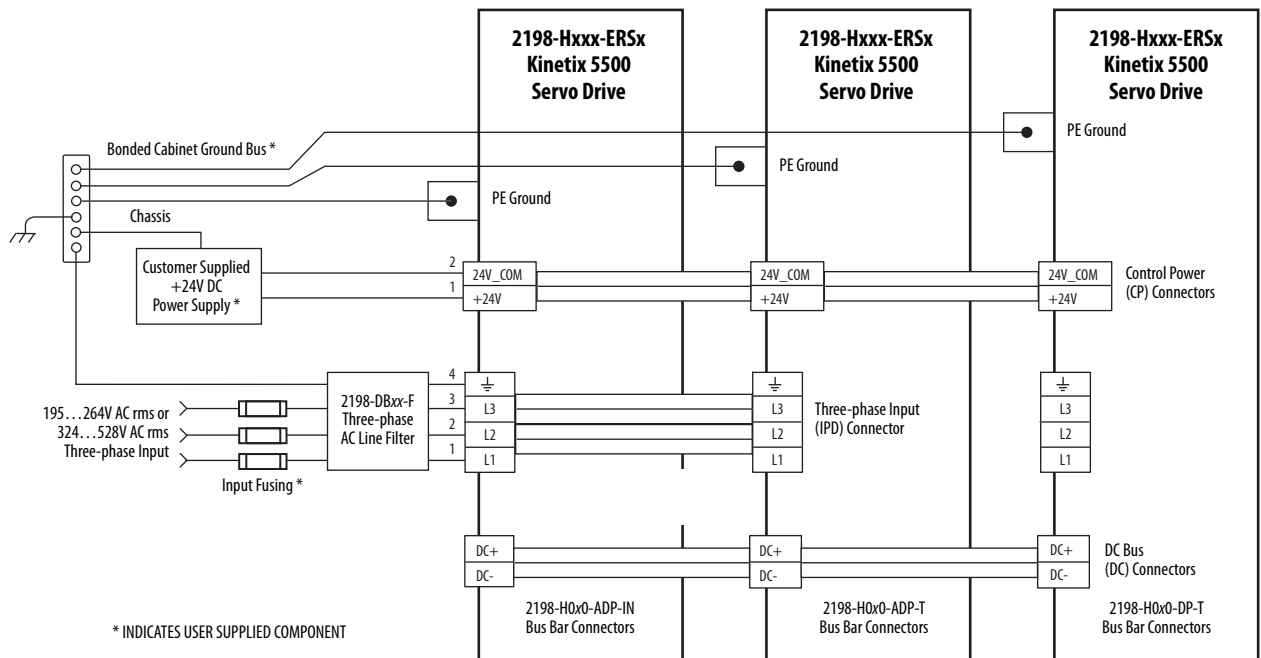


Figure 19 - Kinetix 5500 Servo Drives with Shared AC/DC Hybrid Bus



Communication Configurations

The Kinetix 5500 servo drives support any Ethernet topology including linear, ring, and star.

These examples feature the CompactLogix 5370 programmable automation controllers (catalog number 1769-L36ERM) with support for Integrated Motion over the EtherNet/IP network. Controller features include the following:

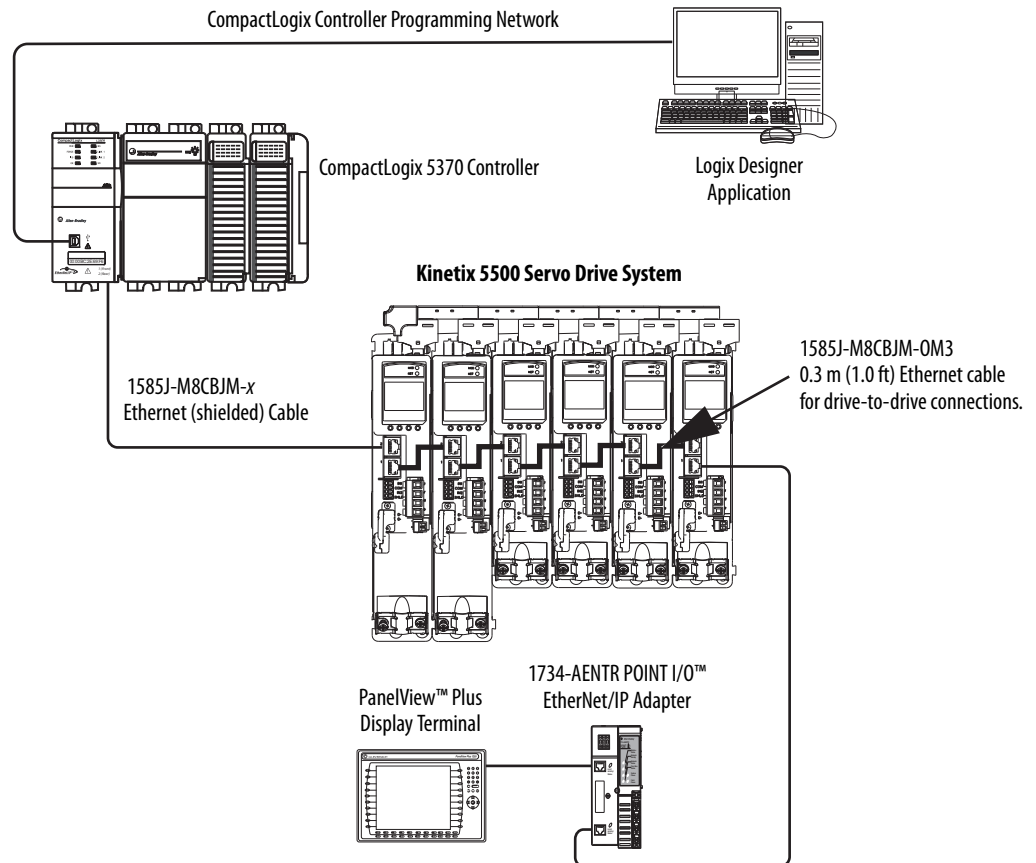
- Supports up to 16 axes
- Supports up to 48 devices in linear configurations
- Dual-port connectivity to support device-level ring (DLR) topology

See the CompactLogix Controllers Specifications Technical Data, publication [1769-TD005](#), for more information on CompactLogix 5370 L1, L2, and L3 controllers.

Kinetix 5500 Servo Drive Linear Topology

In this example, all devices are connected in linear topology. The Kinetix 5500 servo drives include dual-port connectivity, however, if any device becomes disconnected, all devices downstream of that device lose communication. Devices without dual ports must include the 1783-ETAP module or be connected at the end of the line.

Figure 20 - Kinetix 5500 Servo Drive Linear Communication Installation

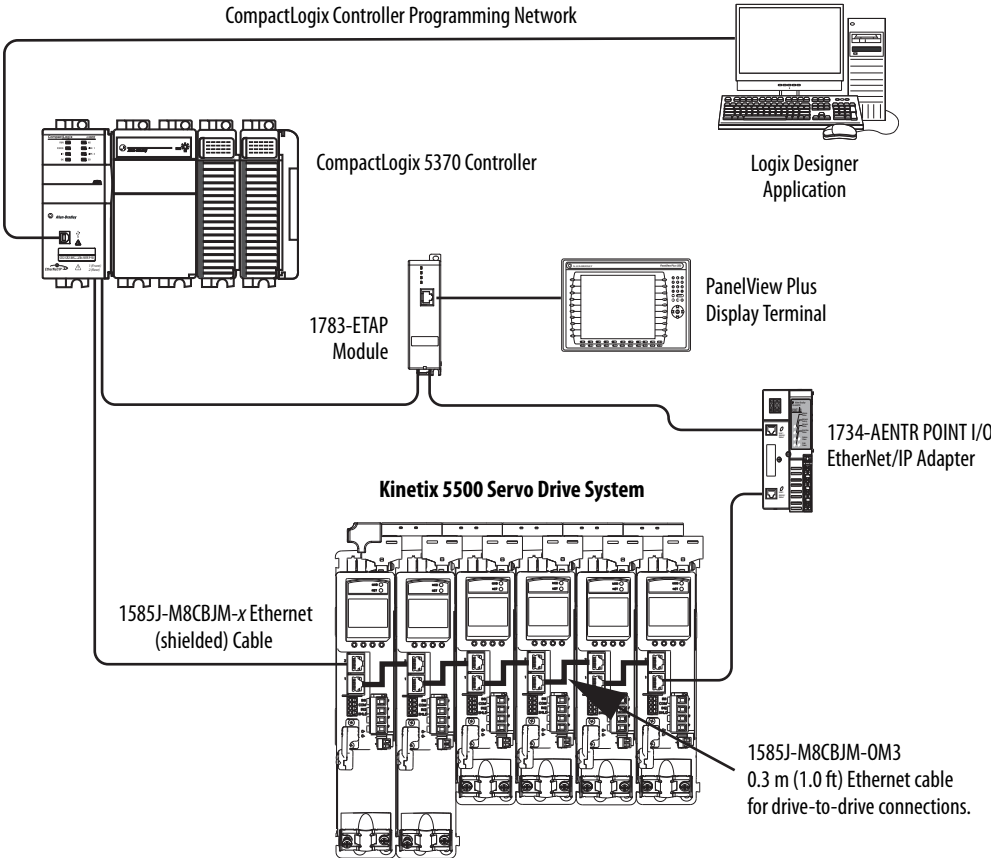


Kinetix 5500 Servo Drive Ring Topology

In this example, the devices are connected by using ring topology. If only one device in the ring is disconnected, the rest of the devices continue to communicate. For ring topology to work correctly, a device level ring (DLR) supervisor is required (for example, the Bulletin 1783 ETAP device). DLR is an ODVA standard. For more information, see the EtherNet/IP Embedded Switch Technology Application Guide, publication [ENET-AP005](#).

Devices without dual ports require a DLR supervisor, for example the 1783-ETAP module, to complete the network ring.

Figure 21 - Kinetix 5500 Servo Drive Ring Communication Installation

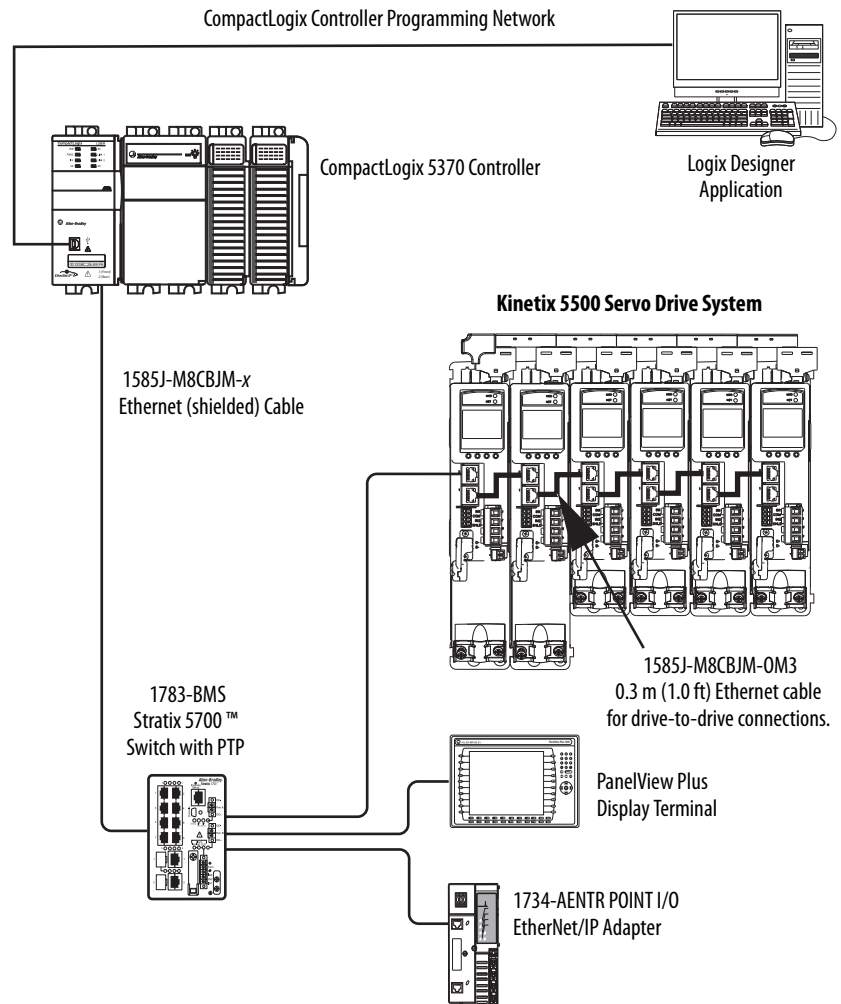


Kinetix 5500 Servo Drive Star Topology

In this example, the devices are connected by using star topology. Each device is connected directly to the switch.

Kinetix 5500 servo drives have dual ports, so linear topology is maintained from drive-to-drive, but Kinetix 5500 servo drives and other devices operate independently. The loss of one device does not impact the operation of other devices.

Figure 22 - Kinetix 5500 Servo Drive Star Communication Installation



Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products.

At <http://www.rockwellautomation.com/support> you can find technical and application notes, sample code, and links to software service packs. You can also visit our Support Center at <https://rockwellautomation.custhelp.com/> for software updates, support chats and forums, technical information, FAQs, and to sign up for product notification updates.

In addition, we offer multiple support programs for installation, configuration, and troubleshooting. For more information, contact your local distributor or Rockwell Automation representative, or visit <http://www.rockwellautomation.com/services/online-phone>.

Installation Assistance

If you experience a problem within the first 24 hours of installation, review the information that is contained in this manual. You can contact Customer Support for initial help in getting your product up and running.

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/rockwellautomation/support/overview.page , or contact your local Rockwell Automation representative.

New Product Satisfaction Return

Rockwell Automation tests all of its products to help ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

United States	Contact your distributor. You must provide a Customer Support case number (call the phone number above to obtain one) to your distributor to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

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