Reference Manual

Original Instructions

Allen-Bradley

Migration Guidelines: Kinetix 6000 Servo Drives to Kinetix 5700 Servo Drives

Allen-Bradley • Rockwell Software

Rockwell Automation

Important User Information

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

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

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

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

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

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

	**WARNING:** Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
	**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

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

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

Chapter 3

System Replacement Examples

This manual provides migration guidelines for replacing Kinetix® 6000 servo drive systems with Kinetix 5700 servo drive systems.

Migrating from Kinetix 6000 servo drives to a motion system that uses Kinetix 5700 servo drives requires a comprehensive design review of the motion control system. There are replacement drives and potentially new motor combinations, and changes in the Studio 5000 Logix Designer® application. In addition, there are system changes that are required because of the communication protocol changes.

To compare motion systems that use Sercos interface and EtherNet/IP™ networks with a LOGIX 5000™ programmable automation controller (PAC), see Integrated Motion on SERCOS and EtherNet/IP Network - Analysis and Comparison, publication MOTION-AT006.

This manual is intended for engineers and technicians that are directly involved in the installation and wiring of the Kinetix 5700 drive modules, and programmers who are directly involved in the operation, field maintenance, and integration of these modules with the EtherNet/IP communication module or controller.

Product compatibility information and release notes are available online within the Product Compatibility and Download Center at: http://compatibility.rockwellautomation.com/Pages/home.aspx

These replacement guidelines contain the following chapters.

Topic	Description
Chapter 1 - System Replacement Considerations	Includes a Kinetix 6000 migration checklist, a comprehensive table that compares system components, and background information on Kinetix 5700 drive system features.
Chapter 2 - Servo Drive and System Comparison	Includes tables and drive system diagrams that compare axis module output current, dimensions, AC input power, circuit protection, and cables.
Chapter 3 - System Replacement Examples	Includes two system migration examples with common tasks for both systems and specific replacements for drive modules, input power components, and accessory items.

Conventions Used in This Manual

These conventions are used throughout this manual:

- Bulleted lists such as this one provide information, not procedural steps
- Numbered lists provide sequential steps or hierarchical information

Before You Begin

Before you begin review these online tools and publications.

IMPORTANT This publication applies to replacing only 400V-class Kinetix 6000 drive applications with Kinetix 5700 drive systems.

When replacing 200V-class Kinetix 6000 drive applications, see the Kinetix 5500 Servo Drives User Manual, publication 2198-UM001.

Motion Analyzer

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

The Torque/Speed tool in Motion Analyzer gives you quick access to torque-speed performance curves for any compatible combination of motors/actuators and drives. Review the performance capabilities of your replacement drive to make sure that the replacement drive is capable of delivering the required level of peak and continuous current to the motor.

Create a user account at https://motionanalyzer.rockwellautomation.com.

IMPORTANT Not all third-party motors are supported by Kinetix 5700 drives. Check with your Rockwell Automation representative to see if your third-party motor is compatible with the Kinetix 5700 drives.

Controller Files

If an updated copy of the controller program is not available, use the Studio 5000 Logix Designer application to upload and save the programmable automation controller (PAC) program that contains Kinetix 6000 drive system configuration. Upload and save any network files.

To compare motion systems that use Sercos interface and EtherNet/IP networks with a LOGIX 5000 PAC, see Integrated Motion on SERCOS and EtherNet/IP Network - Analysis and Comparison, publication MOTION-AT006.

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.

Kinetix 5700 Servo Drives

The Kinetix 5700 drive family helps expand the value of integrated motion and safety on the EtherNet/IP network to large custom machine-builder applications.

The innovative zero-stack shared-bus system simplifies assembly and installation, thus reducing cabinet space requirements. DSL feedback ports support single-cable technology and Kinetix VP motors, which reduces wiring for your motion system by 60%. The Kinetix 5700 drives incorporate Load Observer real-time tuning technology that yields high-performance control and nearly eliminates the need to tune most axes, thus reducing your commissioning time.

Kinetix 5700 servo drives are designed for machines with high axis-counts and high-power requirements. Single and dual-axis inverters are available with integrated and hardwired safe torque-off functionality.

Kinetix 5700 Drive System Features

- Designed for machines with high axis-counts, high-power requirements, and high-performance motion applications
- AC input voltage range: 324...528V rms, three-phase
- DC-bus power supply (converter), 480V three-phase operation
  - Multi-axis, DC-bus sharing
  - Extended DC-bus sharing
- Single-axis and dual-axis inverters
  - 1.7...60.1 kW continuous output power
  - 3.5...120.2 A 0-pk, continuous output current
  - Accepts Hiperface DSL encoder feedback from Kinetix VP servo motor family
  - Accepts Hiperface multi-turn and single-turn encoder feedback from compatible Allen-Bradley® motors and actuators
  - Accepts EnDat sine/cosine and EnDat digital encoder feedback
  - Accepts digital AqB, digital AqB with UVW, sine/cosine, and sine/cosine with UVW master feedback types
- TÜV Rheinland certified safe torque-off (STO) control, category 3, SIL CL3, PLe
  - Hardwired STO with connections to safety inputs
  - Integrated STO with connections to safety controller
- Single cable technology, for Kinetix VP motors, includes DSL connector kit (drive-end) and SpeedTec connector (motor-end)
- Bulletin 2198 capacitor module, extension module, and passive-shunt resistors for energy absorption management
- Support for permanent-magnet servo motors and actuators
- Support for induction motors with open-loop frequency control or closed-loop control
- Integrated motion and integrated safety on the EtherNet/IP network

Kinetix 5700 Drive Module Components

Kinetix 5700 servo drive systems consist of these required components:

- 2198-P*xxx* DC-bus power supplies (up to three modules that are wired in parallel are possible)
- Single-axis and dual-axis inverters
  - Extended drive systems are possible with Bulletin 2198 capacitor modules
- Kinetix VP (400V-class) servo motors
  - Use 2090-CS*x*M1DE cables (includes 2198-KITCON-DSL feedback connector kit)
  - Use 2090-CS*x*M1DG flying-lead cables (order 2198-KITCON-DSL connector kit separately)
- MP-Series™ (400V-class) servo motors and actuators, LDAT-Series linear thrusters, LDC-Series™ linear motors, or HPK-Series™ asynchronous rotary motors
  - Use 2090-CP*x*M7DF power/brake cables
  - Use 2090-CFBM7DF feedback cables and many legacy-motor feedback cables with 2198-K57CK-D15M universal feedback connector kits
- Support for induction motors with basic volts/hertz, fan/pump V/Hz, and sensorless-vector open-loop frequency control methods or closed-loop motor feedback options
- 1606-XL*xxx* 24V power supplies for control and motor brake power
- 1585J-M8CBJM-*x* (shielded) Ethernet cable

Kinetix 5700 servo drive systems can also include any of these optional components:

- 2198-CAPMOD-2240 capacitor modules
- 2198-CAPMOD-DCBUS-IO extension modules
- 2198-ABQE encoder output module
- One 2198-DB*xx*-F AC line filter
- 2198-R*xxx* external passive-shunt resistors
- Bulletin 1321 line reactors
  (required with two or three 2198-P208 DC-bus power supplies)
- Bulletin 2198 24V DC input power shared-bus connection system

For detailed Kinetix 5700 drive system requirements, refer to the Kinetix 5700 Drive Systems Design Guide, publication KNX-RM010.

Catalog Number Explanation

Kinetix 5700 Drive Modules	Module Cat. No.	Module Width mm	Input Voltage	Continuous Output Power kW	Continuous Output Current to Bus A_{DC} rms	Continuous Output Current A 0-pk
DC-bus Power Supply	2198-P031 2198-P070	55	324…528V AC rms, three-phase	7 17	10.5 25.5	–
	2198-P141 2198-P208	85		31 46	46.9 69.2	
Dual-axis Inverters	2198-D006-ERS3 2198-D012-ERS3 2198-D020-ERS3 2198-D032-ERS3	55	–	1.7 3.4 5.5 8.9	–	3.5 7.0 11.3 18.3
	2198-D057-ERS3	85		15.9		32.5
Single-axis Inverters	2198-S086-ERS3 2198-S130-ERS3	85	–	29.7 44.9		60.8 91.9
	2198-S160-ERS3	100		60.1		120.2

Integrated Architecture Tools and Resources

Integrated Architecture® tools can help you plan and configure a system, and migrate system architectures. For more information, go to: http://www.rockwellautomation.com/global/support/integrated-architecture-tools/overview.page?

Migration Services

Throughout the product lifecycle, as products mature, Rockwell Automation is there to help you get the most out of your current equipment, to help you determine your next steps, and to help you lay out a plan for the transition to newer technology.

Whether you choose to migrate all at once or use our unique, phased approach to help minimize the costs, risks, and complexities that are involved with legacy products and systems, Rockwell Automation has the tools and the experience to guide you through the transition.

For more information, see the Migration Solutions Brochure, publication MIGRAT-BR002.

Additional Resources

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

Resource	Description
Kinetix Rotary Motion Specifications Technical Data, publication KNX-TD001	Product specifications for Kinetix VP (Bulletin VPL, VPC, VPF, and VPS), MP-Series (Bulletin MPL, MPM, MPF, and MPS), and HPK-Series rotary motors.
Kinetix Linear Motion Specifications Technical Data, publication KNX-TD002	Product specifications for Bulletin MPAS and MPMA linear stages, Bulletin MPAR and MPAI electric cylinders, LDAT-Series linear thrusters, and LDC-Series linear motors.
Kinetix Servo Drives Specifications Technical Data, publication KNX-TD003	Product specifications for Kinetix Integrated Motion over the EtherNet/IP network, Integrated Motion over Sercos interface, EtherNet/IP networking, and component servo drive families.
Kinetix Motion Accessories Specifications Technical Data, publication KNX-TD004	Product specifications for Bulletin 2090 motor and interface cables, low-profile connector kits, drive power components, and other servo drive accessory items.
Kinetix 5700 Servo Drives User Manual, publication 2198-UM002	Provides information to install, configure, startup, troubleshoot, and apply your Kinetix servo drive system.
Kinetix 6000 Mulit-axis Servo Drives User Manual, publication 2094-UM001	
Kinetix 6000 and Kinetix 6200/6500 Drive Systems Design Guide, publication KNX-RM003	System design guide to select the required (drive specific) drive module, power accessory, feedback connector kit, and motor cable catalog numbers for your Kinetix drive system.
Kinetix 5700 Drive Systems Design Guide, publication KNX-RM010	
System Design for Control of Electrical Noise Reference Manual, publication GMC-RM001	Information, examples, and techniques that are designed to minimize system failures that are caused by electrical noise.
Kinetix Motion Control Selection Guide, publication KNX-SG001	Overview of Kinetix servo drives, motors, actuators, and motion accessories that are designed to help make initial decisions for the motion control products that are best suited for your system requirements.
Rockwell Automation® Product Selection website http://www.rockwellautomation.com/global/support/selection.page	Online product selection and system configuration tools, including AutoCAD (DXF) drawings.
Motion Analyzer website https://motionanalyzer.rockwellautomation.com/	Comprehensive motion application sizing tool that is used for analysis, optimization, selection, and validation of your Kinetix Motion Control system.
Product Certifications website, http://www.rockwellautomation.com/global/certification/overview.page	Provides declarations of conformity, certificates, and other certification details.
Ethernet Design Considerations Reference Manual, publication ENET-RM002	Provides information for designing Ethernet and EtherNet/IP networks.
Switched Mode Power Supply Specifications Technical Data, publication 1606-TD002	Provides specifications for 24V power supplies that can be used for control logic, I/O, and holding brakes.
Integrated Motion on SERCOS and EtherNet/IP Network - Analysis and Comparison, publication MOTION-AT006	Compare and contrast Motion systems that use Serial Real-time Communications System (Sercos) and EtherNet/IP with a ControlLogix® programmable automation controller (PAC).
Integrated Motion on the EtherNet/IP Network Reference Manual, publication MOTION-RM003	Information on the AXIS_CIP_DRIVE attributes and the Studio 5000 Logix Designer application Control Modes and Methods.
Motion System Tuning Application Techniques, publication MOTION-AT005	Information on tuning a Kinetix drive system.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.

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

To find your local Rockwell Automation sales representative, visit http://www.rockwellautomation.com/global/distributor-locator/sales-locator.page

To find your local Rockwell Automation authorized distributor, visit http://www.rockwellautomation.com/global/distributor-locator/distributor-locator.page

System Replacement Considerations

Replacing a Kinetix® 6000 servo drive with a Kinetix 5700 servo drive requires some system design changes and drive hardware changes. This chapter describes the primary differences and considerations.

To review servo drive specifications for all Kinetix drive families, see Kinetix Servo Drives Specifications Technical Data, publication KNX-TD003.

Checklist for Kinetix 6000 Servo Drive System Migration

For each Kinetix 6000 drive control feature, there is a suitable solution with the Kinetix 5700 servo drives, LOGIX 5000™ controller platforms, and the Studio 5000 Logix Designer® application. Use the following table as a checklist of common considerations when migrating from Kinetix 6000 drives to Kinetix 5700 drives.

Table 1 - Migration Checklist

Feature/Function	Kinetix 6000 Drive Features	Page	Kinetix 5700 Drive Replacement Features	Complete?
Rotary Motor Compatibility	The Kinetix 6000 servo drives support 1326AB, MP-Series™ (Bulletin MPL, MPM, MPF, MPS), and RDD-Series™ rotary servo motors.	19	You can continue to use the existing compatible motors/actuators with the Kinetix 5700 servo drives, however, feedback compatibility restrictions apply.	
Linear Motor/Actuator Compatibility	The Kinetix 6000 servo drives support LDC-Series™ linear motors, MP-Series (Bulletin MPAS, MPMA, MPAR, MPAI) linear actuators, and LDAT-Series linear actuators.			
Customer-supplied External 24V DC Power Supply for Motor Brakes	The Kinetix 6000 IAM and AM (inverter) modules require an external customer-supplied 24V DC input for motor brakes. The Motor Brake (BC) connector on each IAM and AM module provides programmable motor-brake relay outputs and supply an MOV device for arc suppression.	22	The Kinetix 5700 drive modules require an external customer-supplied 24V DC power supply for control power, digital inputs, and motor brake power. The Motor Brake (BC) connector on each inverter provides programmable motor-brake relay outputs and supply an MOV device for arc suppression.	
Digital Input and Registration Input Power Supplies	The Kinetix 6000 has an internal 24V DC power supply on each IAM/AM module that is dedicated for use by the enable, home, and overtravel digital inputs, and two registration inputs.	23	The Kinetix 5700 drive modules require an external customer-supplied 24V DC power supply for control power, digital inputs, and motor brake power.	
I/O Terminations	The Kinetix 6000 IAM and AM modules each have their own dedicated I/O (IOD) connector for terminating the individual I/O points for each axis. Each IOD connector requires a low-profile connector kit (catalog number 2090-K6CK-D26M).	23	The Kinetix 5700 single-axis and dual-axis inverters have four configurable digital inputs with fast response times and ten I/O functions to choose from in the Logix Designer application. Digital inputs connect directly to the IOD connector.	
Hardware Enable Inputs	The Kinetix 6000 IAM and AM modules each have their own Hardware Enable input on the I/O (IOD) connector. Each IOD connector requires a low-profile connector kit (catalog number 2090-K6CK-D26M).	23	The Enable input is one of ten I/O functions that you can assign to one of four configurable inputs that require 24V DC. Digital inputs connect directly to the IOD connector. See Switched Mode Power Supply Specifications Technical Data, publication 1606-TD002.	
Safe Torque-off (STO)	The Kinetix 6000 servo drives offer a 9-pin hardwired safe torque-off (STO) connector for wiring single and multiple safe torque-off drive configurations. A jumper lets you defeat (not use) the safe torque-off function.	24	The Kinetix 5700 dual-axis and single-axis inverters are equipped for hardwired safe torque-off (STO) and integrated STO over the EtherNet/IP™ network. Jumper wires that are inserted in the STO connector let you defeat (not use) the safe torque-off function. GuardLogix® 5570 or GuardLogix 5580 controllers are required for safety configuration.	
Typical Input Power Components	• 324…528V AC, 50/60 Hz, 3-phase input • 95…264V AC, single-phase control power supply • Disconnect, fuse block, main contactor • 24V DC power supply for motor brakes and motor thermal contacts	31	The Kinetix 5700 input power requirements are similar to the Kinetix 6000 drives, except Kinetix 5700 systems require an external 24V DC supply for control power, digital inputs, and motor brake power. Consider reusing some of your Kinetix 6000 input power components.	
Relay Outputs to Help Protect Drive Electronics (precharge circuit)	The Kinetix 6000 IAM module provides a Contactor Enable (CED) connector for the same purpose. Wiring the contactor enable relay into your control string is required.	34	The Kinetix 5700 DC-bus supply provides the Contactor Enable (CED) connector to help protect the drive system if overloads or other fault conditions occur. An AC three-phase mains contactor must be wired in series between the branch circuit protection and the DC-bus power supply.	
DC Common-bus Capability	Configure the Kinetix 6000 IAM module in RSLogix 5000® software or the Studio 5000 Logix Designer application as a common-bus leader or common-bus follower drive, based on system needs for regeneration or configuration requirements. When planning your panel layout, the common-bus leader must be configured to include the common-bus follower capacitance, because it controls system precharge and shunt control.	49	The Kinetix 5700 servo drive system is based on DC-bus sharing. The axis inverters (single and dual-axis inverters) require a DC-bus supply that is configured in the Studio 5000 Logix Designer application (formally RSLogix 5000). We recommend using Motion Analyzer to size and select the appropriate DC-bus supply for your Kinetix 5700 system.	

Compare Drive Family System Components

The following table lists the Kinetix 5700 drive components and the comparable component that is used in Kinetix 6000 drive systems. A dash is present when the other drive family has nothing comparable for that component.

ATTENTION: Because of the variety of uses for the products that are described in this publication, the individuals responsible for the application and use of these products must satisfy themselves that all necessary steps have been taken to make sure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes, and standards. In no event will Rockwell Automation be responsible or liable for indirect or consequential damage that results from the use or application of these products.

Table 2 - Kinetix 6000 and Kinetix 5700 Drive System Comparison

Kinetix 6000 System Components	Cat. No.	Description	Kinetix 5700 System Components	Cat. No.	Description
Integrated Axis Module	2094-BC*xx*-M*xx*-S	Integrated axis modules (IAM) with 400V-class (three-phase) AC input power. Contains converter and an inverter section.	DC-bus Power Supply	2198-P*xxx*	Converter power supply with 400V-class (three-phase) AC input power. Typical systems consist of 1…3 modules. Additional modules increase power output to Bulletin 2198 single-axis and dual-axis inverters.
Axis Module	2094-BM*xx*-S	Axis modules (AM) are shared DC-bus inverters, are rated for 400V-class (three-phase) operation, and feature TÜV Rheinland certified hardwired safe torque-off function. The AM module must be used with an IAM module.	Single-axis Inverters	2198-S*xxx*-ERS3	Single-axis inverters with current ratings up to 85 A rms. Drives feature TÜV Rheinland certified safe torque-off function with hardwired and integrated safety connection options, PLe and SIL CL3 safety ratings, and support DSL and Hiperface encoder feedback.
			Dual-axis Inverters	2198-D*xxx*-ERS3	Dual-axis inverters with current ratings up to 23 A rms. Drives feature TÜV Rheinland certified safe torque-off function with hardwired and integrated safety connection options, PLe and SIL CL3 safety ratings, and support DSL and Hiperface encoder feedback.
Shunt Module	2094-BSP2	The Bulletin 2094 shunt module contains a shunt resistor and capacitors. The module mounts to the power rail and provides additional shunting in regenerative applications.	Capacitor Module	2198-CAPMOD-2240	Use for energy storage and to extend the DC-bus voltage to another inverter cluster. Modules are zero-stacked with servo drives and use the shared-bus connection system to extend the external DC-bus in applications up to 100 A.
			Extension Module	2198-CAPMOD-DCBUS-IO	The extension module, which is paired with a capacitor module, is used to extend the DC-bus voltage to another inverter cluster in the Kinetix 5700 drive system.

Table 2 - Kinetix 6000 and Kinetix 5700 Drive System Comparison (continued)

Kinetix 6000 System Components	Cat. No.	Description	Kinetix 5700 System Components	Cat. No.	Description
Power Rail	2094-PRS*x* 2094-PR*x*	The Bulletin 2094 power rail consists of copper bus bars and a circuit board with connectors for each module. The power rail provides power and control signals from the converter section to adjacent inverters. The IAM and AM power modules, shunt module, slot-filler modules mount on the power rail.	Zero-stack Tab and Cutout	The Kinetix 5700 drive modules are zero-stacked and use the shared-bus connection system to extend power from one drive module to another without a power rail. Engaging the zero-stack tab and cutout makes efficient use of panel space, especially for high axis-count installations.	
			Shared-bus Connector Kits	2198-TCON-24VDCIN36 2198-*xxxx*-P-T 2198-BARCON-*xx*DCAC100	24V input wiring connector, T-connectors, and bus-bars for the Kinetix 5700 drive system 24V shared-bus connection system (optional).
				2198-BARCON-*xx*DC200 2198-KITCON-ENDCAP200	DC-bus links (55, 85, and 100 mm) and end caps for the DC-bus shared-bus connection system (required and included with each respective drive module).
Slot-filler Module	2094-PRF	The Bulletin 2094 slot-filler module is used when one or more slots on the power rail are empty after all other power rail modules are installed. One slot-filler module is required for each empty slot.	Bulletin 2094 slot-filler module is not supported.		
LOGIX 5000 Communication Modules	1756-M*xx*SE modules	The Sercos interface module serves as a link between the ControlLogix® controllers and the Kinetix 6000 drive system. The communication link uses Sercos interface protocol over a fiber-optic cable.	CompactLogix Controllers (with embedded Ethernet port)	Bulletin 1769 Bulletin 5069	Integrated motion on the EtherNet/IP network in CompactLogix™ 5370 and CompactLogix 5380 controllers and Integrated Safety in Compact GuardLogix 5370 controllers. Linear, Device Level Ring (DLR), and star topology is supported.
	1768-M04SE module	The Sercos interface module serves as a link between the CompactLogix controllers and the Kinetix 6000 drive system. The communication link uses Sercos interface protocol over a fiber-optic cable.	ControlLogix Communication Modules	1756-EN2T module 1756-EN2TR module 1756-EN3TR module	EtherNet/IP network communication modules for use with ControlLogix 5570, ControlLogix 5580, and GuardLogix 5570 controllers. Linear, Device Level Ring (DLR), and star topology is supported.
	1784-PM16SE PCI card	The Sercos interface PCI card serves as a link between the SoftLogix™ controller and the Kinetix 6000 drive system. The communication link uses Sercos interface protocol over a fiber-optic cable.			
Bulletin 2198 encoder output module is not supported.			Encoder Output Module	2198-ABQE	The Allen-Bradley® encoder output module is a DIN-rail-mounted EtherNet/IP network-based standalone module capable of outputting encoder pulses to a customer-supplied peripheral device (cameras, for example, used in line-scan vision systems).
Studio 5000® Environment	9324-RLD300*xx*E	The Studio 5000 Logix Designer application, version 21.00 or later, provides support for programming, commissioning, and maintaining the LOGIX 5000 family of controllers.	Studio 5000 Environment	9324-RLD300*xx*E	Studio 5000 Logix Designer application, version 26.00 or later, provides support for programming, commissioning, and maintaining the LOGIX 5000 family of controllers.

Table 2 - Kinetix 6000 and Kinetix 5700 Drive System Comparison (continued)

Kinetix 6000 System Components	Cat. No.	Description	Kinetix 5700 System Components	Cat. No.	Description
Rotary Servo Motors	1326AB	Compatible rotary motors include 1326AB (M2L/S2L) and 1326AB (resolver) motors.	Rotary Servo Motors	1326AB	Use Vega resolver converter kit (model 2792503) and custom motor file from Encompass™ partner Elwood Corporation. See your local Rockwell Automation authorized distributor for details on the Kinetix 5700 drives with Bulletin 1326AB motors migration path.
	MP-Series	Compatible motors include 400V-class Bulletin MPL, MPM, MPF, and MPS servo motors.		MP-Series	Compatible motors include 400V-class Bulletin MPL, MPM, MPF, and MPS servo motors.
	RDD-Series	Compatible motors include 400V-class Bulletin RDB direct-drive motors.		RDD-Series	Compatible motors include 400V-class Bulletin RDB direct-drive motors.
	HPK-Series™ and Kinetix VP motors are not supported.			HPK-Series	Compatible motors include 460V and 400V-class HPK-Series asynchronous servo motors.
				Kinetix VP	Compatible motors include 400V-class Bulletin VPL, VPC, VPF, and VPS servo motors.
Linear Motors	LDC-Series	Compatible motors include LDC-Series iron core (400V-class) linear motors.	Linear Motors	LDC-Series	Compatible motors include LDC-Series iron-core (400V-class) linear motors.
Linear Actuators	MP-Series	Compatible actuators include 400V-class Bulletin MPAS, MPAR, MPAI linear actuators.	Linear Actuators	MP-Series	Compatible actuators include 400V-class Bulletin MPAS, MPAR, MPAI linear actuators.
	LDAT-Series	LDAT-Series integrated linear actuators are compatible with 400V-class drive systems.		LDAT-Series	LDAT-Series integrated linear actuators are compatible with 400V-class drive systems.
2090-Series single cables are not supported.			2090-Series Single Cables	2090-CS*x*M1DE-*xx*A*xxx*	Bulletin 2090 single cable for motor power, feedback, and 24V DC brake power with Kinetix VP motors. Feedback conductors are wired to the 2198-KITCON-DSL feedback connector kit.
				2090-CS*x*M1DG-*xx*A*xxx*	Bulletin 2090 single cable for motor power, feedback, and 24V DC brake power with Kinetix VP motors. 2090-CS*x*M1DG cables have flying-lead feedback conductors for connection to a customer-supplied 2198-KITCON-DSL feedback connector kit.
2090-Series Power and Feedback Cables	2090-CFBM7DF-CEA*xxx*	Bulletin 2090 motor feedback cables for MP-Series motors and actuators with Stegmann Hiperface encoders.	2090-Series Power and Feedback Cables	2090-CFBM7DF-CEA*xxx*	Bulletin 2090 motor feedback cables for MP-Series motors and actuators with Stegmann Hiperface encoders.
	2090-CP*x*M7DF-*xx*A*xxx*	Bulletin 2090 motor power/brake cables for MP-Series motors and actuators.		2090-CP*x*M7DF-*xx*A*xxx*	Bulletin 2090 motor power/brake cables for MP-Series motors and actuators.
	2090-XXNFMF-S*xx* 2090-CFBM7DF-CDAF*xx*	Bulletin 2090 standard and continuous-flex feedback cables that include additional conductors for use with incremental and EnDat encoders.		2090-XXNFMF-S*xx* 2090-CFBM7DF-CDAF*xx*	Bulletin 2090 standard and continuous-flex feedback cables that include additional conductors for use with incremental and EnDat encoders.
Communication Cables	2090-SC*x*P*x*-*x* 2090-SCVG*x*-*x*	Bulletin 2090 Sercos fiber-optic cables are available as enclosure only, PVC, nylon, and glass with connectors at both ends.	Communication Cables	1585J-M8CBJM-*x* 1585J-M8UBJM-*x* 1585J-M8CB-*x*	Ethernet cables are available in standard lengths. Shielded cable is required to meet EMC specifications.

Table 2 - Kinetix 6000 and Kinetix 5700 Drive System Comparison (continued)

Kinetix 6000 System Components	Cat. No.	Description	Kinetix 5700 System Components	Cat. No.	Description
Low-profile Connector Kits	2090-K6CK-D15M	Low-profile connector kit for motor feedback (15-pin, male, D-sub). Use with compatible motors for incremental or high-resolution feedback.	Universal Feedback Connector Kit	2198-K57CK-D15M	Universal feedback connector kit for motor and auxiliary feedback connections with the 15-pin connector plug and grounding plate inside the connector housing. Supports 400V-class MP-Series and HPK-Series rotary motors, MP-Series linear actuators, LDAT-Series linear thrusters, and LDC-Series linear motors.
	2090-K6CK-D15F	Low-profile connector kit for auxiliary feedback (15-pin, female, D-sub).			
	2090-K6CK-KENDAT module	Low-profile feedback module (15-pin, male, D-sub) used to enable operation of drives with EnDat feedback.			Use the 2198-K57CK-D15M universal feedback kit for EnDat feedback.
	2090-K6CK-D26M	Low-profile connector kit for I/O (26-pin, male, D-sub).	No connector kit needed.		For I/O connections, wire directly to the IOD connector on the front of the drive.
Bulletin 2198 DSL motor feedback is not supported.			DSL Feedback Connector Kit	2198-KITCON-DSL	Replacement DSL motor feedback connector kit with 2-pin connector plug and grounding plate inside the connector housing. Supports 400V-class Kinetix VP rotary motors. Included with 2090-CS*x*M1DE motor cables. Must be purchased separately when used with 2090-CS*x*M1DG motor cables.
			Hiperface-to-DSL Feedback Converter Kit	2198-H2DCK	Provides Hiperface-to-DSL feedback conversion for use with compatible 400V-class motors and actuators.
Panel-mounted Breakout Board	2090-UXBB-D15	Panel-mounted breakout board for motor feedback. Use with compatible motors for incremental or high-resolution feedback.	Bulletin 2090 panel-mounted breakout board option is not supported.		
AC Line Filters	2090-XXLF-*xxxx*	Bulletin 2090-XXLF-*xxxx* three-phase AC line filters are required to meet CE in all 400V-class drive systems.	AC Line Filters	2198-DB20-F 2198-DB42-F 2198-DB80-F 2198-DB290-F	Bulletin 2198 three-phase AC line filters are required to meet CE and available for use in all Kinetix 5700 drive systems.
External Shunt Modules	1394-SR*xxxx*	You can use Bulletin 1394 external passive shunt modules when the IAM/AM module internal shunt and power rail mounted 2094-BSP2 shunt module capability is exceeded.	External Passive Shunt Resistors	2198-R014 2198-R031 2198-R127 2198-R004	Bulletin 2198 external passive shunt resistors for use when the DC-bus power supply internal shunt capability is exceeded. These shunt resistors are wired directly to the DC-bus power supply, so additional modules are not required.
			External Active Shunt Modules		External active shunts from Encompass partner Powerohm Resistors, Inc. are available for connecting to Bulletin 2198 DC-bus power supplies.

Table 2 - Kinetix 6000 and Kinetix 5700 Drive System Comparison (continued)

Kinetix 6000 System Components	Cat. No.	Description	Kinetix 5700 System Components	Cat. No.	Description
Internal Shunt Resistors and Capacitance	2094-BC*xx*-M*xx*-S 2094-BM*xx*-S	The Kinetix 6000 drives include internal shunt and common-bus capacitance ratings for its axis modules and integrated axis modules. See the Kinetix Servo Drives Specifications Technical Data, publication KNX-TD003, for values.	Internal Shunt Resistors	2198-P031 2198-P070 2198-P141 2198-P208	For the Kinetix 5700 drives, an internal shunt is included in only the DC-bus supply modules. See the Kinetix Servo Drives Specifications Technical Data, publication KNX-TD003, for values.
			Internal Capacitance	2198-P*xxx* 2198-S*xxx*-ERS3 2198-Dxxx-ERS3	Internal capacitance is available on the DC-bus power supply and axis inverter modules. See the Kinetix Servo Drives Specifications Technical Data, publication KNX-TD003, for internal capacitance performance.
Line Interface Modules	2094-*x*L*xx* 2094-*x*L*xx*S 2094-XL75S-C*x*	Line interface modules (LIM) include the circuit breakers, AC line filter (catalog numbers 2094-AL09 and 2094-BL02 only), power supplies, and safety contactor required for Kinetix 5700 operation.	Bulletin 2094 line interface module option is not supported.		
Resistive Brake Module	2090-XB*xx-xx*	Resistive Brake Modules (RBM) include a safety contactor for use in a control circuit. Contactors and resistors reside in this module such that the motor leads can be disconnected from the drive with a permanent magnet motor that is brought to an immediate stop.	Resistive Brake Module	See Encompass partner Powerohm Resistors at https:/www/powerohm.com/.	

Communication

Kinetix 6000 servo drives use Sercos interface for communication. A Sercos interface module serves as the link between the ControlLogix or CompactLogix controller and the Kinetix 6000 servo drive system. The communication link uses the IEC 61491 Serial Real-time Communication System (SERCOS) protocol over a fiber-optic media.

Kinetix 5700 servo drives use the EtherNet/IP network for communicating to either a ControlLogix or CompactLogix programmable automation controller. All Kinetix 5700 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:

- Integrated Motion on SERCOS and EtherNet/IP Network - Analysis and Comparison, publication MOTION-AT006
- Industrial Ethernet Media Brochure, publication 1585-BR001
- Guidance for Selecting Cables for EtherNet/IP Networks, publication ENET-WP007

Controller Platforms, Ethernet Modules, and Stratix Switches

Although the controller platform used in your Kinetix 6000 drive system can be compatible with the Kinetix 5700 drive system, the communication module and network switch must support the EtherNet/IP network.

Table 3 - Compatible Hardware for Integrated Motion on EtherNet/IP Networks

Hardware	Controller/Module/Switch Family	Publication Number
Integrated Motion	ControlLogix 5570 and ControlLogix 5580 controllers	1756 ControlLogix Controllers Technical Data, publication 1756-TD001
	CompactLogix 5370 controllers	CompactLogix Controllers Specifications Technical Data, publication 1769-TD005
	CompactLogix 5380 controllers	CompactLogix 5380 Controllers Specifications Technical Data, publication 5069-TD002
Integrated Safety	GuardLogix 5570 controllers	1756 ControlLogix Controllers Technical Data, publication 1756-TD001
	Compact GuardLogix 5370 controllers	CompactLogix Controllers Specifications Technical Data, publication 1769-TD005
ControlLogix EtherNet/IP Communication Modules	1756-EN2T (1), 1756-EN2TR, and 1756-EN3TR communication modules	Ethernet Design Considerations Reference Manual, publication ENET-RM002
Ethernet Switches	Stratix® 5700 switches.	Stratix 5700 Switch Configuration Quick Start, publication IASIMP-QS040

(1) Firmware revision 4.00 or later.

Rotary and Linear Motion

Verify that your existing motor/actuator is compatible with the Kinetix 5700 servo drive family.

Kinetix 5700 Rotary Motor Support

- Kinetix VP servo motors (Bulletin VPL, VPC, VPF, and VPS)
- Induction motor (open-loop) frequency control
  - Basic volts/hertz
  - Fan/pump volts/hertz
  - Sensorless-vector
- Induction motor (closed-loop) control
- MP-Series rotary motors (Bulletin MPL, MPM, MPF, and MPS)
- HPK-Series Asynchronous servo motors
- RDD-Series Direct Drive motors

Kinetix 5700 Linear Motor/Actuator Support

- MP-Series linear actuators (Bulletin MPAS, MPAR, and MPAI)
- LDAT-Series Integrated Linear Thrusters
- LDC-Series Iron-core Linear motors

2198-K57CK-D15M Universal Feedback Kit

The 2198-K57CK-D15M universal feedback kit passes feedback signals straight through from the encoder to the universal feedback (UFB) connector on the drive. The following encoder feedback types are accepted:

- Hiperface high-resolution absolute (multi-turn and single-turn)
- Heidenhain EnDat high-resolution absolute (sine/cosine and digital)
  - EnDat sine/cosine encoders support only RDD-Series direct-drive motors (Bulletin RDB)
  - EnDat digital encoders support only third-party motors
- Digital AqB (TTL) and Digital AqB (TTL) with UVW (incremental)
- Sine/Cosine and Sine/Cosine with UVW (incremental)
- Feedback-only, master feedback, or load feedback (absolute single-turn/multi-turn Hiperface)
- Feedback-only, master feedback, or load feedback (incremental)
- Feedback-only, master feedback, or load feedback (generic sine/cosine)

Use the universal feedback connector kit in the following types of installations:

- New installations with Kinetix 5700 servo drives and the compatible motors and actuators
- Existing motor/actuator installations when upgrading with Kinetix 5700 servo drives

2198-H2DCK Hiperface-to-DSL Feedback Converter Kit

The 2198-H2DCK Hiperface-to-DSL feedback kit converts 15-pin Hiperface encoder feedback signals to 2-pin DSL feedback signals on the motor feedback (MF) connector. The following feedback types are accepted:

- Hiperface high-resolution absolute multi-turn and single-turn encoders
- Feedback-only, master feedback, or load feedback (absolute single-turn/ multi-turn Hiperface)

Use the converter kit for Hiperface auxiliary-encoder feedback in applications that require dual-loop or load feedback when the 15-pin universal feedback (UFB) connector is already in use for another compatible feedback type.

In most cases, Encompass partner motors are compatible with the converter kit. Check with your local Allen-Bradley distributor or Rockwell Automation sales representative to evaluate compatibility.

Cable Lengths

Verify that the cable lengths that are used in your current Kinetix 6000 drive system do not exceed the maximum cable lengths for the Kinetix 5700 servo drives.

- 2090-CPBM7DF power cables and 2090-CFBM7DF feedback cables support MP-Series motors and actuators and are used with Kinetix 6000 and Kinetix 5700 drive systems
- 2090-CSBM1D*x* single cables support Kinetix VP motors and are not compatible with Kinetix 6000 drives, but are compatible with Kinetix 5700 drive systems

Motor Power and Feedback Cables

Combined 2090-CPBM7DF power cable lengths for all axes on the same DC-bus must not exceed 400 m (1312 ft). Drive-to-motor 2090-CFBM7DF feedback cables up to 90 m (295 ft) can be used, depending on the feedback type. See the Kinetix Motion Accessories Technical Data, publication KNX-TD004, for cable specifications.

Table 4 - Drive-to-Motor Feedback Cable Length

Feedback Type	Cable Length, max m (ft)
Single-turn or multi-turn absolute	90 (295) (1)
Incremental	30 (98)
Heidenhain EnDat	75 (246)

(1) Maximum feedback cable length for Bulletin VPL-B063*xx* and VPL-B075*xx* motors is 50 m (164 ft).

Single Cables

Combined 2090-CSBM1D*x* cable lengths for all axes on the same DC-bus must not exceed 400 m (1312 ft). Drive-to-motor cables up to 90 m (295 ft) can be used, for linear actuators, linear motors, induction motors, and most rotary servo motors except for Bulletin VPL and Bulletin VPF motors.

IMPORTANT Kinetix VP (Bulletin VPL and VPF) servo motors are not compatible with Kinetix 6000 drives.

Table 5 - Single Cable Length Specifications

Motor Cat. No.	2090-CSBM1D*x-xx*AA*xx* Standard Non-flex Cable, max m (ft)		2090-CSBM1D*x-xx*AF*xx* Continuous-flex Cable, max m (ft)	
	Kinetix 6000 Drives	Kinetix 5700 Drives	Kinetix 6000 Drives	Kinetix 5700 Drives
VPL-A/B063*xxx* VPF-A/B063*xxx*	Not compatible	50 (164)	Not compatible	50 (164)
VPL-A/B075*xxx* VPF-A/B075*xxx*	Not compatible	50 (164)	Not compatible	50 (164)
All other Bulletin VPL/VPF Motors	Not compatible	90 (295)	Not compatible	90 (295)

Ethernet Cable Lengths

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 an integrated motion over the EtherNet/IP network solution. For more information, see Guidance for Selecting Cables for EtherNet/IP Networks, publication ENET-WP007.

IMPORTANT Shielded Ethernet cable (catalog number 1585J-M8CBJM-*x*) is required for all integrated motion over the EtherNet/IP network applications and to meet EMC specifications.

Control Power

The control and auxiliary power feature lets the drive maintain logic power when mains (three-phase) input power is removed. Communication between the controller and the drive continues and position feedback (aside from absolute feedback) is maintained.

- The Kinetix 6000 servo drives require AC input power for control circuitry. The control power input requires an AC (EMC) line filter for CE certification. See the Kinetix 6000 Multi-axis Servo Drives User Manual, publication 2094-UM001, for more information.
- The Kinetix 5700 servo drives require a (customer supplied) 24V DC input power supply for control circuitry. See the Switched Mode Power Supply Specifications Technical Data, publication 1606-TD002.
- Review your control power scheme including 24V power supply requirements. See the Kinetix 5700 Servo Drives User Manual (Appendix C), publication 2198-UM002, regarding control power current demand.

Physical Dimensions

In most cases, the Kinetix 5700 servo drives require less panel space and fit into the existing space of the compatible Kinetix 6000 drives. See Dimension Comparison on page 29 for more information.

To review servo drive specifications for all Kinetix drive families, see Kinetix Servo Drives Specifications Technical Data, publication KNX-TD003.

Circuit Protection

Sizing for protective devices, such as fuses and circuit breakers, can be different between Kinetix 6000 servo drives and Kinetix 5700 servo drives. Verify that you have chosen the correct sizes when selecting and installing Kinetix 5700 servo drives. See Circuit Breaker and Fuse Considerations on page 35 for more information.

Control Signals

Digital I/O, auxiliary feedback, and motor brake control circuitry is available with Kinetix 5700 servo drives.

Digital Inputs/Outputs

The Kinetix 6000 servo drives include six dedicated digital inputs. The IAM and AM modules provide 24V DC at 250 mA power for digital input operation.

The Kinetix 5700 single-axis and dual-axis inverters have four configurable digital inputs with fast response times and ten configurable functions to choose from in the Logix Designer application. With a 24V DC power supply, the input current is 12 mA per input.

The Kinetix 5700 DC-bus power supply has two configurable digital inputs and four configurable functions to choose from. These are sinking inputs that require a sourcing device.

IMPORTANT Registration and digital input cables greater than 30 m (98.4 ft) must be shielded.

Table 6 - Digital Inputs Comparison

Kinetix 6000 IAM and AM Module Dedicated Digital Inputs
ENABLE
HOME
REG1
REG2
OT+
OT-

Kinetix 5700 Inverter Digital Inputs	
Default Digital Inputs	**Description**
Digital input1= Enable Digital input2 = Home Digital input3 = Registration 1 Digital input4 = Registration 2	Unassigned
	Enable
	Home
	Registration 1 (REG1)
	Registration 2 (REG2)
	Positive overtravel (OT+)
	Negative overtravel (OT-)
	Regeneration OK
	Bus capacitor OK
	Shunt thermal switch OK

Kinetix 5700 DC-bus Power Supply Digital Inputs	
Default Digital Inputs	**Description**
Digital input1= Enable Digital input2 = Unassigned	Unassigned
	Enable
	Bus capacitor OK
	Shunt thermal switch OK

Dual Position Loop/Auxiliary Feedback

The Kinetix 5700 servo drives offer dual feedback control. A combination of the 2198-K57CK-D15M connector kit and the 2198-H2DCK converter kit can be required for the inverters to accept an auxiliary encoder input for dual-loop operation or to be used as a master input for encoder feedback.

Motor Brake

The brake option is a spring-set holding brake that releases when voltage is applied to the brake coil in the motor.

- The customer-supplied 24V supply drives the brake output through a solid-state relay in Kinetix 5700 drives and Kinetix 6000 series C drives
- Kinetix 6000 series A and B drives have dry-contact relays
- Kinetix 5700 dual-axis inverters have separate brake circuits for each axis.

The solid-state brake driver circuit provides the following protection:

- Brake current-overload protection
- Brake overvoltage protection

Safe Torque-off Safety Features

The Kinetix 6000 servo drives use Sercos interface with hardwired safe torque-off (STO) connections. Engineers commissioning hardwired safety often had to use smaller systems or minimize their performance requirements because it was difficult to hardwire interlocks and relay-based safety logic into a complete automation system.

The Kinetix 5700 servo drives include hardwired STO (advanced compared to Kinetix 6000 drives) and integrated STO, the ability to safely remove torque by using an EtherNet/IP network connection. This network connection can provide diagnostics on the same wires that provide the standard control and greatly reduces wiring. Integrated Safety over an EtherNet/IP network is also known as CIP Safety™ technology based on the ODVA standard.

IMPORTANT	For applications that do not require the safety function, you must install jumper wires to bypass the hardwired safe torque-off feature. For applications that use the safe torque-off (STO) function, consider using a LOGIX 5000 safety controller to control the STO functionality and to reduce wiring.

For the safe torque-off connector pinout, installation, and wiring information, see the related chapter in the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002.

Important Safety Considerations

It is good practice to review:

- Validation of any sensors or actuators that are connected to the system
- Completing a machine-level risk assessment
- Certification of the machine to the desired ISO 13849-1 Performance Level or IEC 62061 SIL level
- Project management and proof testing

See the Kinetix 6000 and Kinetix 5700 drive family feature-comparison table on page 42.

Table 7 - Comparing Functional Safety Features

Topics	Kinetix 6000 Servo Drives	Kinetix 5700 Servo Drives
Safety rating	SIL 3 PLe safe torque-off (STO)	• SIL 3, PLe rated integrated STO (CIP Safety) • SIL 3, PLe rated hardwired STO
Drive Cat. No.	Hardwired STO: • 2094-BC*xx*-M*xx*-S • 2094-BM*xx*-S	Hardwired STO/ Integrated STO: • 2198-S*xxx*-ERS3 • 2198-D*xxx*-ERS3
Additional resources	• Kinetix Safe Torque-off Feature Safety Reference manual, publication GMC-RM002 • Kinetix 6000 Drive Systems Design Guide, publication KNX-RM003	• Kinetix 5700 Servo Drives User Manual, publication 2198-UM002 • Kinetix 5700 Drive Systems Design Guide, publication KNX-RM010 • Stop Cat. 0 or 1 via a Kinetix Drive with Integrated Safe Torque Off on EtherNet/IP publication SAFETY-AT135

Accessories

The only drive accessory that is shared between Kinetix 6000 drives and Kinetix 5700 drives are 2090-C*x*BM7DF motor cables. Other drive accessories are similar (line filters and feedback connector kits, for example), but have different catalog numbers, even though they fulfill the same function. Some drive accessories are unique to one family or the other (shared-bus connector kits and line interface modules, for example). To compare all drive accessories see Table 2 beginning on page 13.

Table 8 - Kinetix 5700 Drive Accessories

Accessory	Cat. No.	Description
Shared-bus Connector Kits	2198-TCON-24VDCIN36 2198-*xxxx*-P-T 2198-BARCON-*xx*DCAC100	24V input wiring connectors, T-connectors, and bus-bars for the Kinetix 5700 drive system 24V shared-bus connection system (optional).
	2198-BARCON-*xx*DC200 2198-KITCON-ENDCAP200	DC-bus links (55, 85, and 100 mm) and end caps for the DC-bus shared-bus connection system (required and included with each respective drive module).
Capacitor Module	2198-CAPMOD-2240	Use for energy storage and to extend the DC-bus voltage to another inverter cluster. Modules are zero-stacked with servo drives and use the shared-bus connection system to extend the external DC-bus in applications up to 100 A.
Extension Module	2198-CAPMOD-DCBUS-IO	The extension module, which is paired with a capacitor module, is used to extend the DC-bus voltage to another inverter cluster in the Kinetix 5700 drive system.
2090-Series Power and Feedback Cables	2090-CFBM7DF-CEA*xxx*	Bulletin 2090 motor feedback cables for MP-Series motors and actuators with Stegmann Hiperface encoders.
	2090-CP*x*M7DF-*xx*A*xxx*	Bulletin 2090 motor power/brake cables for MP-Series motors and actuators.
	2090-XXNFMF-S*xx* 2090-CFBM7DF-CDAF*xx*	Bulletin 2090 standard and continuous-flex feedback cables that include additional conductors for use with incremental and EnDat encoders.
2090-Series Single Cables	2090-CS*x*M1DE-*xx*A*xxx*	Bulletin 2090 single cable for motor power, feedback, and 24V DC brake power with Kinetix VP motors. Feedback conductors are wired to the 2198-KITCON-DSL feedback connector kit.
	2090-CS*x*M1DG-*xx*A*xxx*	Bulletin 2090 single cable for motor power, feedback, and 24V DC brake power with Kinetix VP motors. 2090-CS*x*M1DG cables have flying-lead feedback conductors for connection to a customer-supplied 2198-KITCON-DSL feedback connector kit.
Communication Cables	1585J-M8CBJM-*x* 1585J-M8UBJM-*x* 1585J-M8CB-*x*	Ethernet cables are available in standard lengths. Shielded cable is required to meet EMC specifications.

Servo Drive and System Comparison

This chapter provides side-by-side examples comparing Kinetix® 6000 and Kinetix 5700 servo drive families. Use these examples to help in the evaluation and selection of the correct components in the migration process.

The following factors affect the selection process when replacing servo drives and the drive system redesign.

- Drive Sizing
- Panel Space
- AC Input Power and Circuit Protection
- System Layouts and Cables

To compare Kinetix 5700 and Kinetix 6000 drive family features, see Compare Drive Family Features on page 42.

Drive Sizing

Cost is a significant factor when designing a machine, however we know that there are other factors to consider such as the efficiency of the system, its expected life, and overall performance. These factors impact your machine and when properly sized at design, most machines provide a return on investment in total cost of operation and life expectancy.

With Motion Analyzer, you have access to Rockwell Automation® motors and drives, and an array of Encompass™ partner products to choose from. The goal is to make the sizing and selection process easier and to help you build a better machine.

Access Motion Analyzer at: https://motionanalyzer.rockwellautomation.com.

In this section, the Kinetix 6000 servo drives are paired with Kinetix 5700 replacement drives. In addition, the output ratings and dimension differences of the drives are included.

Output Current Comparison

IMPORTANT Review the performance capabilities of the replacement drive to make sure that the replacement drive can deliver the required level of continuous and peak current to the motor.

Table 9 - Kinetix 5700 Replacement Drives by Output Current

Kinetix 6000 Servo Drives					Kinetix 5700 Servo Drives (replacement drives) (1)				
Servo Drive Cat. No.	**Input Voltage Range**	**Nominal Voltage Range**	**Continuous Current A (rms)**	**Peak Current A (rms)**	**Servo Drive Cat. No.**	**Input Voltage Range**	**Nominal Voltage Range**	**Continuous Current (2) A (rms)**	**Peak Current (2) A (rms)**
N/A					2198-D006-ERS3	324…528V (three-phase)	480V (three-phase)	2.5	6.3
2094-BMP5-S (2094-BC01-MP5-S)	324…528V (three-phase)	360…480V (three-phase)	2.8	7.0	2198-D012-ERS3			5.0	12.5
2094-BM01-S (2094-BC01-M01-S)			6.1	15.3	2198-D020-ERS3			8.0	20.0
2094-BM02-S (2094-BC02-M02-S)			10.3	25.8	2198-D032-ERS3			13.0	32.5
2094-BM03-S (2094-BC04-M03-S)			21.2	53.0	2198-D057-ERS3			23.0	57.5
2094-BM05-S (2094-BC07-M05-S)			34.6	69.2	2198-S086-ERS3			43.0	86.0
N/A					2198-S130-ERS3			65.0	130.0
					2198-S160-ERS3			85.0	160.0

(1) In this example, the 2198-D006-ERS3, 2198-S130-ERS3, and 2198-S160-ERS3 inverters are not used.

(2) These Kinetix 5700 replacement (inverter) drives require a properly sized DC-bus power supply (converter) to deliver the required level of peak and continuous current to the motor.

IMPORTANT We recommend Motion Analyzer, the Rockwell Automation online system sizing tool, to select the Kinetix 5700 replacement drives for your Kinetix 6000 drive system. Use Motion Analyzer to verify compatibility and make sure that your replacement drive is capable of delivering the required level of peak and continuous current to the motor. Create a user account and access the tool and at: https://motionanalyzer.rockwellautomation.com/.

Dimension Comparison

The following table provides overall drive dimensions (height, width, and depth) and the differences between the two drive families.

Table 10 - Kinetix 5700 Replacement Drives Dimensions

Kinetix 6000 Servo Drives (series B and C)				Kinetix 5700 Servo Drives (replacement drives)				Dimension Differences		
Servo Drive Cat. No.	**Height** mm (in.)	**Width** mm (in.)	**Depth** mm (in.)	**Servo Drive Cat. No.**	**Height** mm (in.)	**Width** mm (in.)	**Depth** mm (in.)	**Height** (2) mm (in.)	**Width** (2) mm (in.)	**Depth** (2) mm (in.)
N/A				2198-D006-ERS3	358 (14.09)	55 (2.17)	252 (9.92)	71 (2.80)	-15 (0.59)	3.0 (0.12)
2094-BMP5-S	287 (11.3)	70 (2.76)	249 (9.8)	2198-D012-ERS3					-70 (2.76)	
2094-BC01-MP5-S		125 (4.9)								
2094-BMP5-S		70 (2.76)		2198-D020-ERS3					-15 (0.59)	
2094-BC01-M01-S		125 (4.9)							-70 (2.76)	
2094-BM02-S		70 (2.76)		2198-D032-ERS3					-15 (0.59)	
2094-BC02-M02-S		125 (4.9)							-70 (2.76)	
2094-BM03-S (2094-BC04-M03-S)	375 (14.7)	196 (7.7)		2198-D057-ERS3	433 (17.0)	85 (3.35)		58 (2.28)	-111 (4.37)	
2094-BM05-S (2094-BC07-M05-S)	375 (14.7) (1)			2198-S086-ERS3						
N/A				2198-S130-ERS3						
				2198-S160-ERS3	478 (18.82)	100 (3.94)		103 (4.06)	-96 (3.78)	

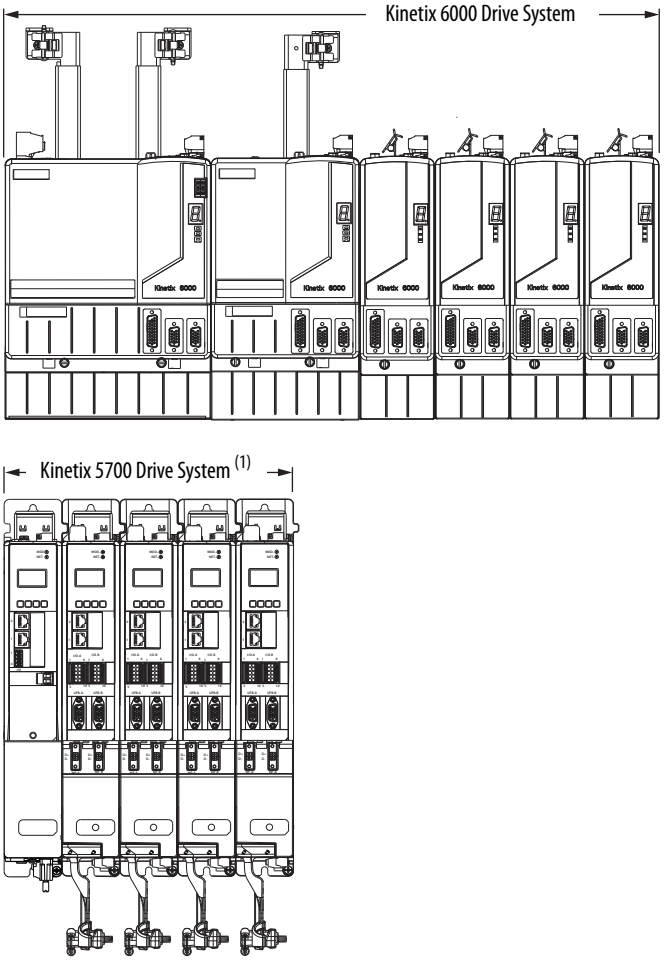
(1) Height dimension for series A drives is 436 mm (17.2 in.).

(2) A negative value (-) indicates that the height, width, or depth of the Kinetix 5700 servo drive is shorter, narrower, or shallower than the comparable Kinetix 6000 servo drive.

When planning your panel layout, see the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002, for clearance requirements.

In this example, the Kinetix 5700 drives use far less panel space than the comparable Kinetix 6000 fully populated 8-axis power rail.

Figure 1 - Panel Space Comparison



(1) For alternate mounting options, refer to your local Rockwell Automation authorized distributor.

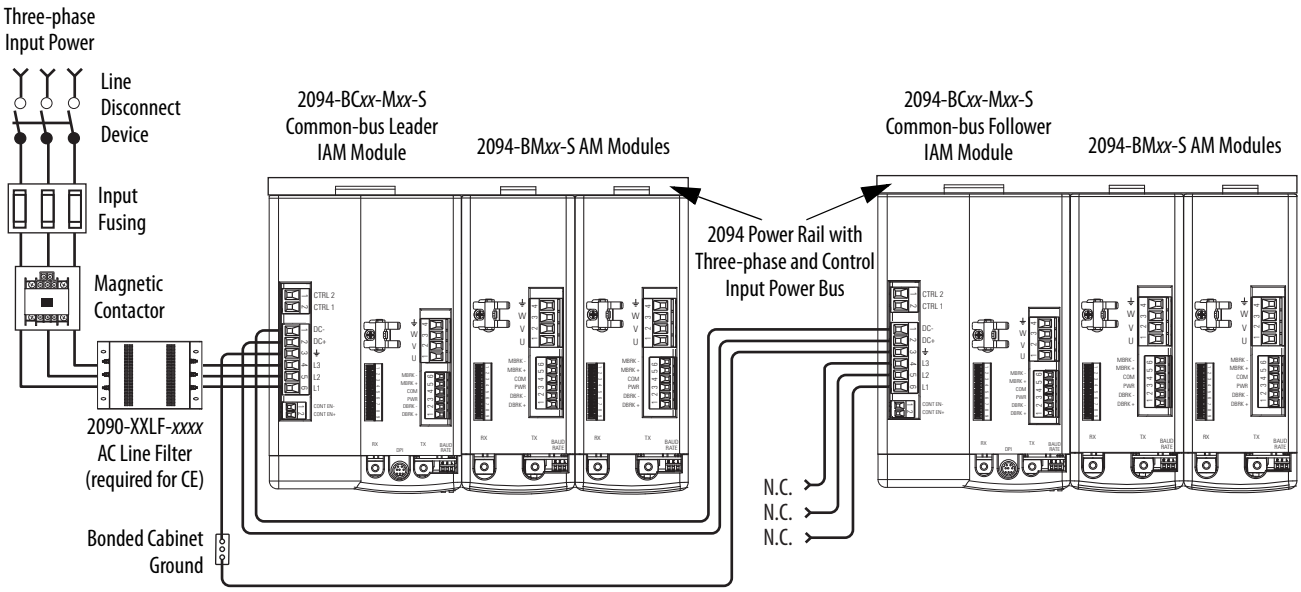
AC Input Power Wiring

This section provides information to help you determine the drive system wiring requirements.

DC Common-bus Configurations

When two Kinetix 6000 servo-drive systems are used in a DC common-bus configuration, one IAM module is known as the leader IAM and the other as the follower IAM module. The leader IAM and any non-common bus IAM have identical three-phase AC input power connections. Follower IAM modules do not have three-phase input power connections, but instead have DC-bus power connections from a leader IAM module.

Figure 2 - Typical Kinetix 6000 Common-bus Configuration

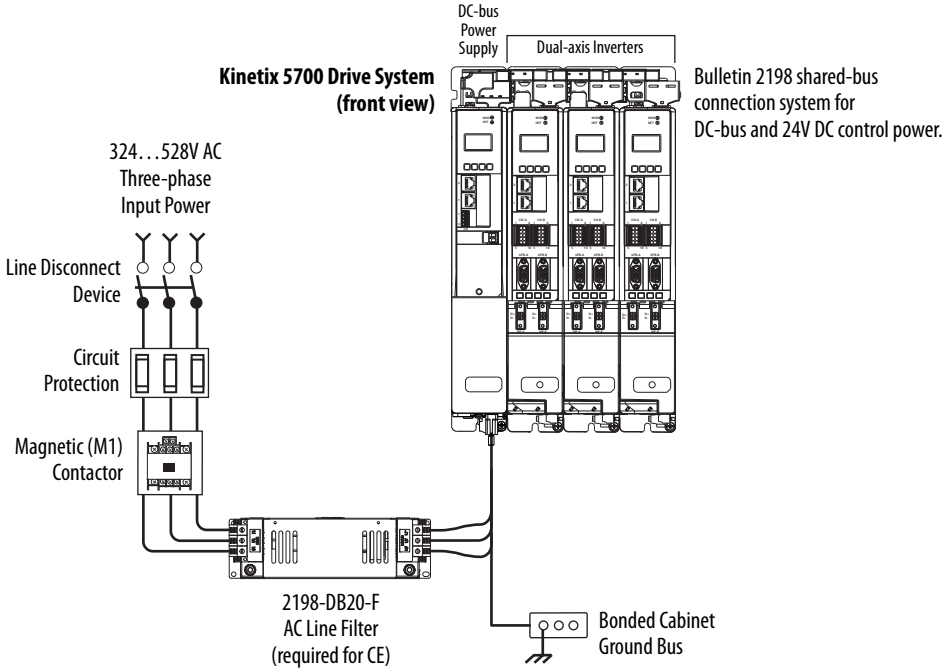


To compare input wiring and terminal pinouts, refer to these user manuals for pinout tables and interconnect diagrams.

- Kinetix 6000 Servo Drives User Manual, publication 2094-UM001
- Kinetix 5700 Servo Drives User Manual, publication 2198-UM002

Kinetix 5700 servo drive systems have three-phase input power that is supplied by a DC-bus (converter) power supply.

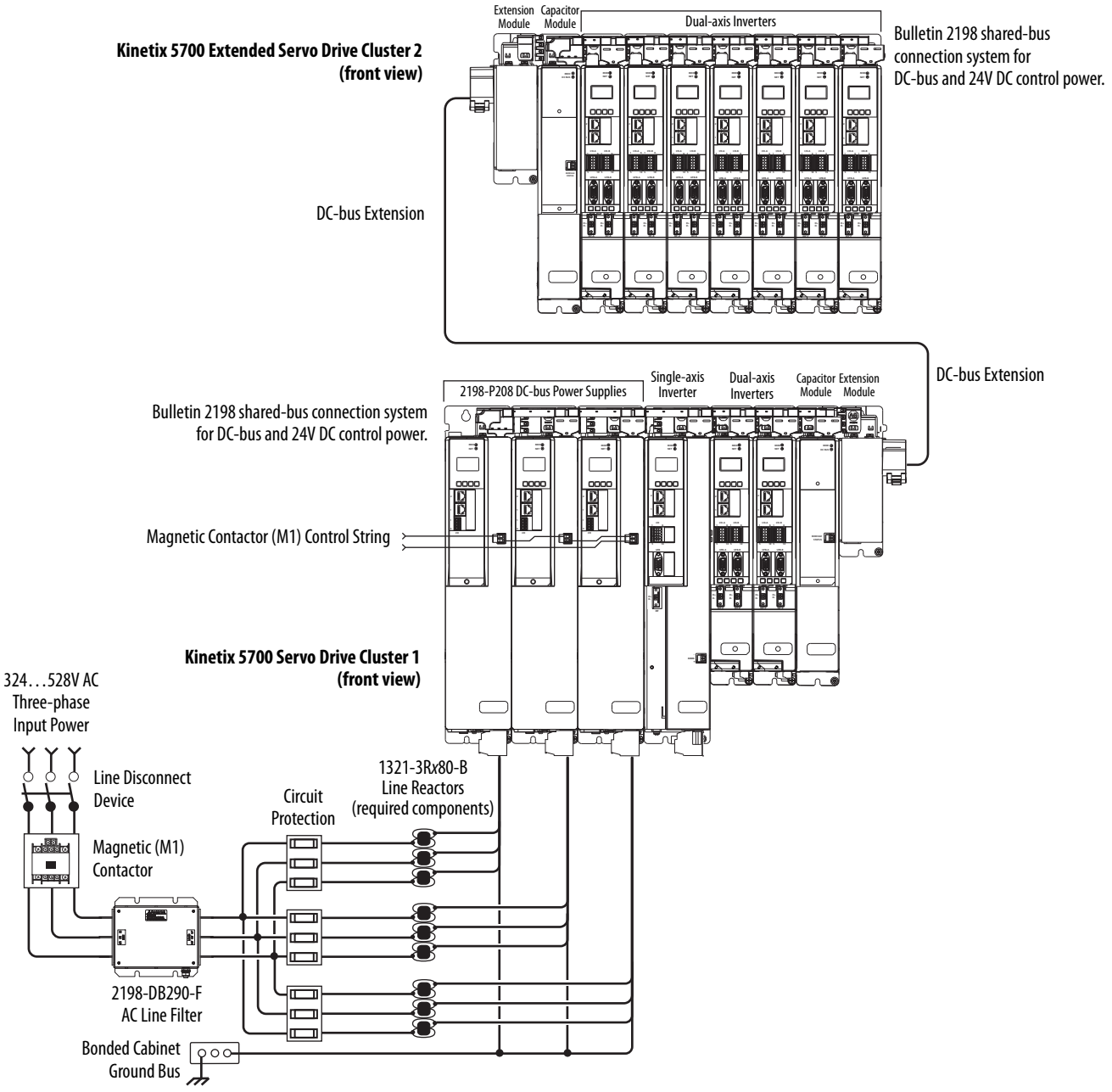
Figure 3 - Kinetix 5700 Configuration



IMPORTANT Axis motoring and regeneration power requirement determines the size of the DC-bus power supply, and the shunt and capacitance requirement. See Motion Analyzer for sizing your Kinetix 5700 application.

For additional system capacitance and DC-bus current capability, two or three DC-bus power supplies can be used, but they must be catalog number 2198-P208. For additional output power (kW), you can extend the DC-bus to another inverter cluster with capacitor modules.

Figure 4 - Extended DC-bus Configuration



IMPORTANT When two or three DC-bus power supplies are wired together in the same drive cluster, they must all be catalog number 2198-P208.

Contactor Enable Relay

In Kinetix 5700 drive systems, the contactor-enable circuitry includes a relay-driven contact within the 2198-P*xxx* DC-bus power supply. In Kinetix 6000 drive systems, the contactor enable relay resides in the IAM module. The relay helps protect the drive system if overloads or other fault conditions occur.

An AC three-phase mains contactor must be wired in series between the branch circuit protection and the DC-bus power supply. In addition, the AC three-phase contactor control string must be wired in series with the contactor-enable relay at the contactor-enable (CED) connector.

ATTENTION: Wiring the contactor-enable relay is required. To avoid personal injury or damage to the drive, wire the contactor-enable relay into your control string. By using the contactor-enable relay:

- Three-phase power is removed, which helps protect the DC-bus power supply under various fault conditions
- Three-phase power is never applied to the drive system before control power is applied

Shunt Modules

Kinetix 6000 drive systems use the 2094-BSP2 shunt module when the IAM/AM module internal shunt-resistor capacity is exceeded. If additional shunting capacity is needed, the 2094-BSP2 shunt module can be coupled with a 1394-SR*xxx* external passive shunt module.

For the Kinetix 5700 replacement system, we recommend Motion Analyzer to determine if the 2094-BSP2 shunt module and if an external shunt module are required. Observe the following guidelines when mounting your 2198-R*xxx* external passive shunt module:

- Mount the shunt module outside of the drive system enclosure. Only the 2198-R004 shunt resistor can be mounted inside the enclosure.
- Mount the shunt module so that wiring routes in the very dirty zone (inside the drive system enclosure)
- Keep unshielded wiring as short as possible, not to exceed 3 m (9.8 ft) and keep shunt wiring as flat to the cabinet as possible
- Separate shunt power cables from other sensitive low-voltage signal cables

Circuit Breaker and Fuse Considerations

The Kinetix 6000 IAM module uses 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 200,000 A (fuses) and 65,000 A (circuit breakers).

The Kinetix 5700 DC-bus power supplies also 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 200,000 A (fuses) and 65,000 A (circuit breakers). 24V DC control power is sourced from the customer-supplied 1606-XL*xxx* power supply.

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

Make sure that 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.

Table 11 - Kinetix 6000 Control and DC-bus Circuit Protection Specifications

IAM Module Cat. No.	Control Input Power		DC-bus Power		
	Bussmann Fuse (1)	Allen-Bradley® Circuit (2)non-UL)	Bussmann Fuse	Mersen Fuse (3)	
2094-BC01-MP5-S	FNQ-R-10 (10 A) or FNQ-R-7.5 (7.5 A)	1492-SPM2D060 or 1492-SPM1D150	FWJ-20A14F	DCT20-2	HSJ20
2094-BC01-M01-S					
2094-BC02-M02-S			FWJ-40A	A70QS40-4	HSJ40
2094-BC04-M03-S			FWJ-70A	A70QS70-4	HSJ70
2094-BC07-M05-S			FWJ-125A	A70QS125-4	HSJ125

(1) Use FNQ-R-7.5 circuit breaker for higher single -cycle inrush current capability. This is recommended when the continuous control-power current exceeds 3.0 A.

(2) Use 1492-SPM1D150 circuit breaker for higher single -cycle inrush current capability. This is recommended when the continuous control-power current exceeds 3.0 A.

(3) Mersen fuses were formerly known as Ferraz-Shawmut.

Table 12 - Kinetix 6000 Input-power Circuit-protection Specifications

Kinetix 6000 Drives		UL Applications				IEC (non-UL) Applications			
IAM Module Cat. No.	Drive Voltage (three-phase) nom	Fuses (Bussmann) Cat. No.	Miniature CB Cat. No.	Motor Protection CB, Self-protected CMC Cat. No.	Molded Case CB Cat. No.	Miniature CB Cat. No.		Motor Protection CB Cat. No.	Molded Case CB Cat. No.
2094-BC01-MP5-S	360…480V AC	KTK-R-20 (20 A) Class CC	1489-M3D300	140M-F8E-C32	–	1492-SPM3D300	1489-M3D300	140M-F8E-C32	–
2094-BC01-M01-S	360…480V AC	KTK-R-20 (20 A) Class CC		140M-F8E-C32				140M-F8E-C32	
2094-BC02-M02-S	360…480V AC	KTK-R-30 (30 A) Class CC	1489-M3D400	140M-F8E-C45		1492-SPM3D400	1489-M3D400	140M-F8E-C45	
2094-BC04-M03-S	360…480V AC	LPJ-45SP (45 A) Class J	–	–	140G-G6C3-C50	–	–	–	140G-G6C3-C50
2094-BC07-M05-S	360…480V AC	LPJ-80SP (80 A) Class J			140G-G6C3-C90				140G-G6C3-C90

Table 13 - Kinetix 5700 Input Power UL/CSA Circuit-protection Specifications

DC-bus Power Supply (1) Cat. No.	Drive Voltage (three-phase) nom	Bussmann Fuses Cat. No.	Miniature CB Cat. No.	Motor Protection CB, Self Protected CMC Cat. No.	Molded Case CB Cat. No.
2198-P031	324…528V AC	LPJ-15SP (15 A)	1489-M3D250	140M-D8E-C25	140G-G6C3-C25
2198-P070		LPJ-40SP (40 A)	1489-M3D400	140M-F8E-C45	140G-G6C3-C50
2198-P141		LPJ-70SP (70 A)	1489-M3D630	–	140G-G6C3-C90
2198-P208		LPJ-100SP (100 A)	–	–	140G-G6C3-D12

(1) For applications that require CSA certification, fuses (Bussmann catalog number 170M1760) must be added to the DC link between the two drive clusters when circuit breakers are used for branch circuit protection. The DC-bus fuses are not required when AC line fuses are used for branch circuit protection.

Table 14 - Kinetix 5700 Input Power IEC (non-UL/CSA) Circuit-protection Specifications

DC-bus Power Supply Cat. No.	Drive Voltage (three-phase) nom	DIN gG Fuses Amps, max	Miniature CB Cat. No.		Motor Protection CB Cat. No.	Molded Case CB Cat. No.
2198-P031	324…528V AC	16	1489-M3D250	–	140M-D8E-C25	140G-G6C3-C25
2198-P070		40	–	1492-SPM3D400	140M-F8E-C45	140G-G6C3-C50
2198-P141		75	–	1492-SPM3D630	140MG-H8E-C60	140G-G6C3-C90
2198-P208		110	–	–	140MG-H8E-D10	140G-G6C3-D12

System Layouts and Cables

This section provides system layout examples and cable requirements for connecting your motors and drives.

Motor Power and Feedback Cables

Bulletin 2090-CP*x*M7DF power/brake cables are matched to MP-Series™ motors and actuators according to the motor/actuator current rating. The flying-lead drive-end cable connections are compatible with both Kinetix 6000 and Kinetix 5700 drives, however, the power and brake conductors/shields will likely require preparation before the overall cable shield fits into the Kinetix 5700 cable clamp and the conductors reach the connector terminals.

IMPORTANT If you are planning to use an existing MP-Series motor/actuator with the existing motor cable, refer to the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002, for more information on cable shield and conductor preparation.

Table 15 - Motor Power and Feedback Cables

Motor Cable	Motor Power Cables (1)		Motor Feedback Cables (1) (2)	
	Cable Cat. No.	Description	Cable Cat. No.	Description
Standard (non-flex)	2090-CPBM7DF-*xx*AA*xx*	Brake	2090-CFBM7DF-CEAA*xx*	SIN/COS high-resolution or resolver feedback to drive-end flying leads.
	2090-CPWM7DF-*xx*AA*xx*	Non-brake	2090-CFBM7DD-CEAA*xx*	SIN/COS high-resolution or resolver feedback to drive-end D-sub connector.
Continuous-flex	2090-CPBM7DF-*xx*AF*xx*	Brake	2090-CFBM7DF-CEAF*xx*	SIN/COS high-resolution or resolver feedback to drive-end flying leads.
	2090-CPWM7DF-*xx*AF*xx*	Non-brake	2090-CFBM7DD-CEAF*xx*	SIN/COS high-resolution or resolver feedback to drive-end D-sub connector.
			2090-CFBM7DF-CDAF*xx*	SIN/COS high-resolution or incremental feedback to drive-end flying leads.

(1) Refer to the Kinetix Motion Control Accessories Technical Data, publication KNX-TD004, for cable specifications.
(2) All 2090-CFBM7D*x* cables have SpeedTec DIN connectors.

Table 16 - Legacy Motor Power and Feedback Cables

Motor Cable	Legacy Motor Power Cables (1)		Legacy Motor Feedback Cables (1)	
	Cable Cat. No.	Description	Cable Cat. No.	Description
Standard	2090-XXNPMF-*xx*S*xx*	Power/brake, threaded connector	2090-XXNFMF-S*xx* 2090-UXNFBMF-S*xx*	Encoder feedback, threaded connector
	2090-XXNPMP-*xx*S*xx*	Power-only, bayonet connector	2090-UXNFBMP-S*xx* 2090-XXNFMP-S*xx*	Encoder feedback, bayonet connector
Continuous-flex	2090-CPBM4DF-*xx*AF*xx*	Power/brake, threaded connector	2090-XXTFMP-S*xx*	Encoder feedback, bayonet connector
	2090-CPWM4DF-*xx*AF*xx*	Power-only, threaded connector	2090-CFBM4DF-CDAF*xx*	Encoder feedback, threaded connector
	2090-XXTPMP-*xx*S*xx*	Power-only, bayonet connector		

(1) Refer to the Kinetix Motion Control Accessories Technical Data, publication KNX-TD004, for cable specifications.

Single Cables

Kinetix 5700 servo drives are also compatible with 2090-CSBM1D*x* single cable technology, which includes motor power, brake, and feedback conductors in a single cable when using Kinetix VP motors.

Table 17 - Single Motor Cables

Motor Cable	Description	Cable Cat. No. (1) (2)
Standard	Brake	2090-CSBM1D*x*-*xx*AA*xx*
	Non-brake	2090-CSWM1D*x*-*xx*AA*xx*
Continuous-flex	Brake	2090-CSBM1D*x*-*xx*AF*xx*
	Non-brake	2090-CSWM1D*x*-*xx*AF*xx*

(1) 2090-CS*x*M1DE single cables are designed specifically for Kinetix 5700 drives and include the 2198-KITCON-DSL connector kit. 2090-CS*x*M1DG single cables have flying-lead feedback conductors on the drive end that are designed to fit Kinetix 5700 drives.
(2) Refer to the Kinetix Motion Control Accessories Technical Data, publication KNX-TD004, for cable specifications.

Feedback Connector Kits

Motor feedback from MP-Series servo motors/actuators are supported on Kinetix 5700 drives by the 15-pin universal feedback connector, for Hiperface and EnDat feedback types, and by the 2-pin DSL feedback connector for Hiperface DSL feedback.

Hiperface-to-DSL feedback conversion requires the 2198-H2DCK feedback converter kit. Refer to the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002, for more information on wiring your feedback cable to the Bulletin 2198 converter kit.

Table 18 - Feedback Connector Kits

Connector Kit (1) Cat. No.	Description
2198-K57CK-D15M	Universal feedback connector kit for motor and auxiliary feedback connections with the 15-pin connector plug and grounding plate inside the connector housing. Supports 400V-class MP-Series and HPK-Series™ rotary motors, MP-Series linear actuators, LDAT-Series linear thrusters, and LDC-Series™ linear motors.
2198-KITCON-DSL	Replacement DSL motor feedback connector kit with 2-pin connector plug and grounding plate inside the connector housing. Supports 400V-class Kinetix VP rotary motors. Included with 2090-CS*x*M1DE motor cables. Must be purchased separately when used with 2090-CS*x*M1DG motor cables.
2198-H2DCK	Provides Hiperface-to-DSL feedback conversion for use with compatible 400V-class motors and actuators.

(1) Refer to the Kinetix Servo Drives Specifications Technical Data, publication KNX-TD003, for kit specifications.

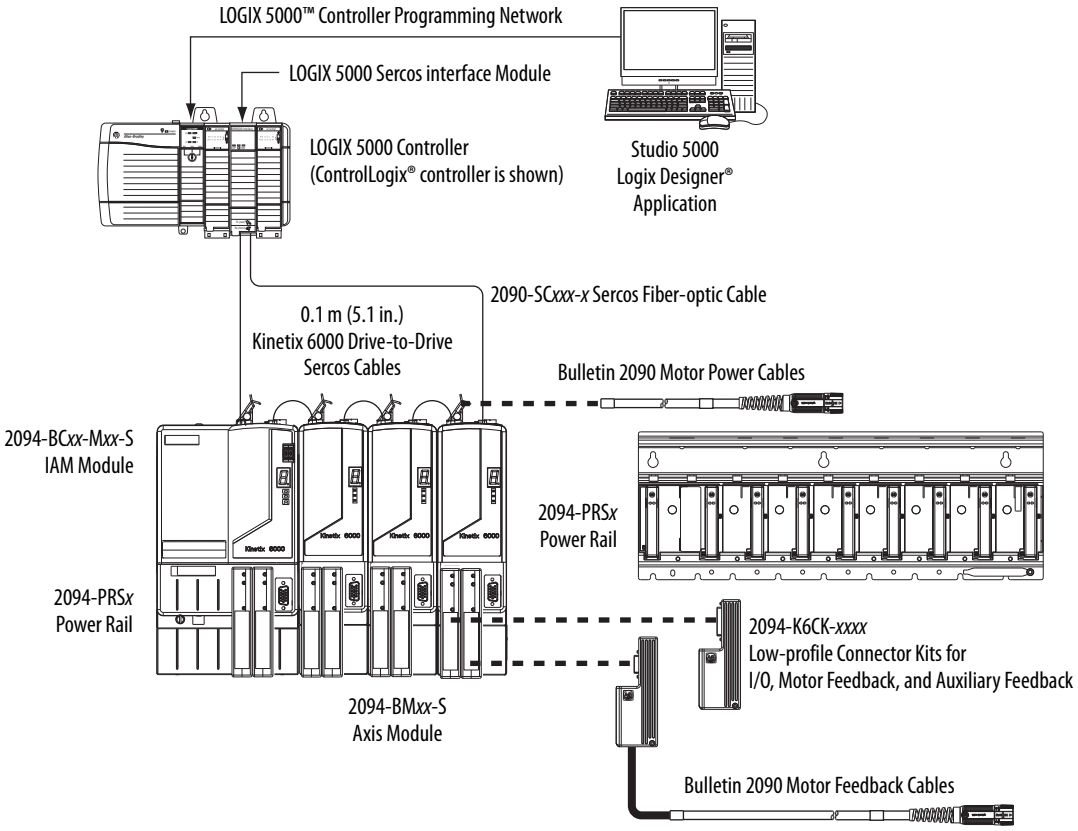
Typical System Layouts

This section provides system examples for the Kinetix 6000 and Kinetix 5700 drive families.

Kinetix 6000 Servo Drive System Example

This system example illustrates how the required Kinetix 6000 drive modules and accessories are used in a typical system.

Figure 5 - Kinetix 6000 Drive System Example (Sercos interface)

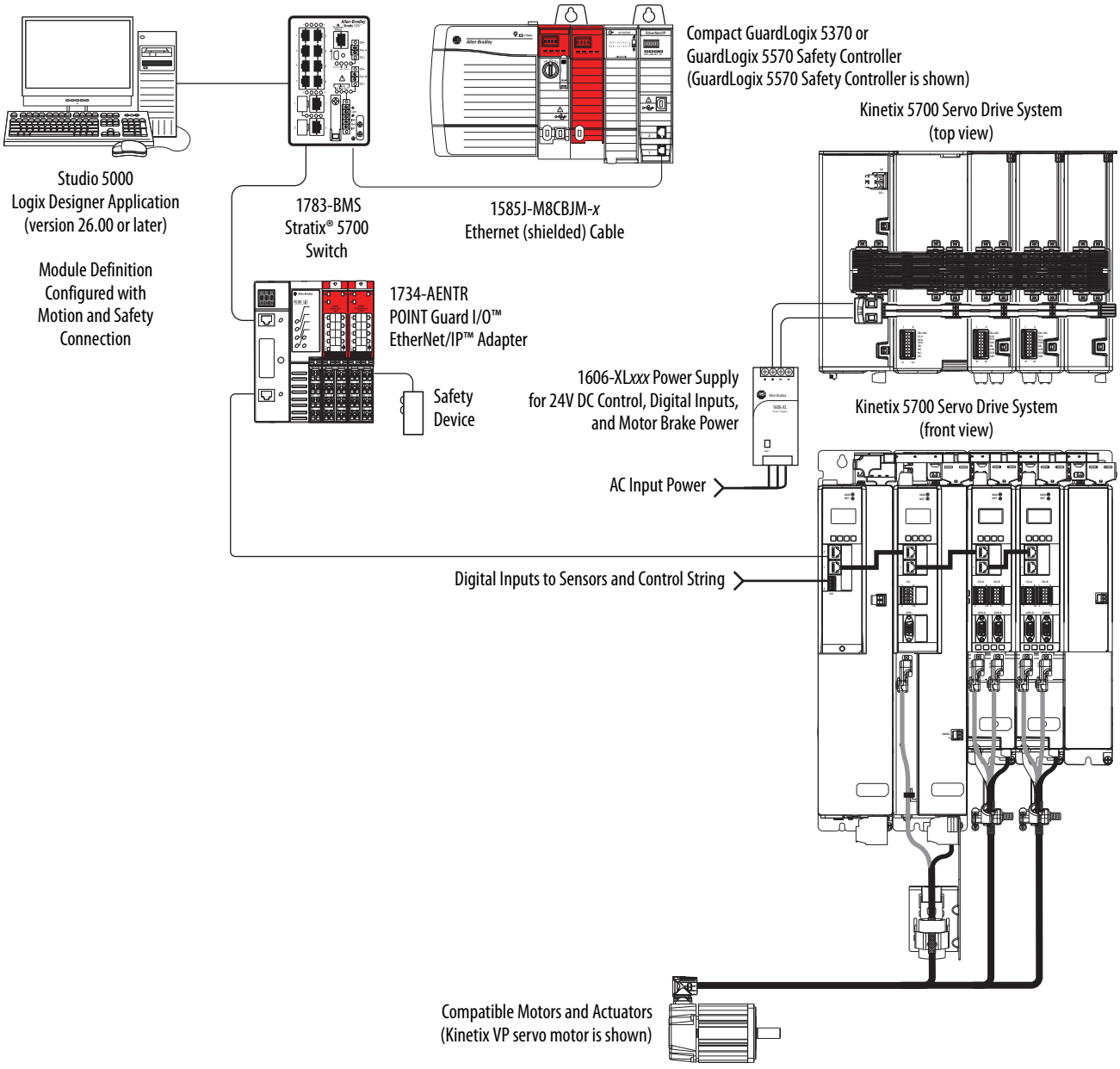


Kinetix 5700 Servo Drive System Example

This example control system uses a single GuardLogix® 5570 safety controller, and a DC common-bus configuration of the Kinetix 5700 drive system with Motion and Safety connections.

IMPORTANT Other configuration options are available that do not require a safety controller.

Figure 6 - Motion and Safety Configuration (single controller)



Compare Drive Family Features

This table compares features between the Kinetix 6000 and Kinetix 5700 drive families.

Drive Features	Kinetix 6000	Kinetix 5700
Main characteristics	• Multi-axis • Common bus • Enhanced peak performance • Motor power and feedback cables, SpeedTec connectors, with flying-leads at the drive end	• Designed for machines with high axis-counts, high-power requirements, and high-performance needs • 200 A DC-bus sharing with DC-bus connector links • Single motor cable, SpeedTec connector, with DSL connector kit at the drive end • Digital (DSL) feedback device and 15-pin (sine/cosine) Hiperface feedback • Capability to run servo and induction motors
Communication	Integrated motion on Sercos interface	• Integrated motion on the EtherNet/IP network • Integrated safety on the EtherNet/IP network
Functional safety	• Safe torque-off (STO) control, TÜV Rheinland certified • Hardwired STO, PLe, Cat 3; SIL CL3	• Safe torque-off (STO) control, TÜV Rheinland certified • Hardwired STO, PLe, Cat 3; SIL CL3 • Integrated STO, PLe, Cat 3; SIL CL3
Drive configuration	1…8 Axes on Bulletin 2094 power rail	• Multi-axis bus-sharing configurations • DC-bus and extended DC-bus sharing
Input voltage	324…528V AC, three-phase (400V-class)	324…528V AC, three-phase
Common-bus follower input voltage	458…747V DC (400V-class)	458…747V DC
Continuous output power (inverter)	1.8…22 kW (400V-class)	1.7…60.1 kW
Continuous output current (inverter)	2.8…34.6 A rms (400V-class)	2.5…85.0 A rms
Drive digital inputs	• Dedicated inputs • Enable, home, overtravel ± • High-speed registration (2/axis)	• DC-bus power supply: Two configurable inputs (four functions) • Single and dual-axis inverters: 4 configurable inputs (10 functions) • Enable, home, overtravel ± • High-speed registration (2/axis) • Regeneration OK, shunt thermal switch OK, bus capacitor OK
Drive digital outputs	Motor brake relay output (with suppression)	Motor brake relay output (with suppression)
DPI™ connector	DriveExplorer™ software or DPI HIM module	–
Programming	• RSLogix 5000® software, Version 11.00.00 or later or • Studio 5000 Logix Designer, Version 21.00.00 or later	Studio 5000 Logix Designer, Version 26.00.00 or later
	Ladder logic, structured text, and sequential function charts	Ladder logic, structured text, and sequential function charts
LOGIX 5000 controller module compatibility	• 1756-M03SE, 1756-M08SE, 1756-M16SE ControlLogix communication modules • 1768-M04SE CompactLogix™ communication module	• 1756-EN2T (1), 1756-EN2TR, 1756-EN3TR EtherNet/IP modules with ControlLogix 5570 and ControlLogix 5580 controllers or GuardLogix 5570 safety controllers • CompactLogix 5370 and CompactLogix 5380 controllers or Compact GuardLogix 5370 safety controllers
I/O control	Fiber-optic Sercos interface	EtherNet/IP network
Feedback	• High-resolution absolute multi-turn and single-turn encoder • Incremental encoder • EnDat 2.1 and 2.2 encoder support with 2090-K6CK-KENDAT module • Resolver	• DSL high-resolution absolute, multi-turn, and single-turn encoder feedback • Hiperface and EnDat (sin/cos and digital) support with 2198-K57CK-D15M connector kit • Generic (TTL and sin/cos) incremental encoder with 2198-K57CK-D15M connector kit • Feedback-only, master feedback, and load feedback support options
	Feedback-only Auxiliary Axis	Feedback-only axis with Bulletin 842HR, 844D, 847H, or 847T encoders
Rotary motors compatibility	• MP-Series (Bulletin MPL/MPM/MPF/MPS) • RDD-Series™ (Bulletin RDB) • 1326AB	• Kinetix VP (Bulletin VPL/VPC/VPF/VPS) • MP-Series (Bulletin MPL/MPM/MPF/MPS) • HPK-Series • RDD-Series (Bulletin RDB)
Linear motors compatibility	LDC-Series Iron Core	LDC-Series Iron Core
Linear actuator compatibility	• LDAT-S*xxxxxx*-*xBx* Integrated Linear Thrusters • MP-Series Electric Cylinders (Bulletin MPAR/MPAI) • MP-Series Linear Stages (Bulletin MPAS and MPMA)	• LDAT-S*xxxxxx*-*xDx* and -*xBx* Integrated Linear Thrusters • MP-Series Electric Cylinders (Bulletin MPAR/MPAI) • MP-Series Linear Stages (Bulletin MPAS and MPMA)
Induction motor support	–	• Basic volts/hertz, fan/pump V/Hz, and sensorless-vector open-loop frequency control • Closed-loop control
Accessory compatibility	• 2094 Line Interface Modules (LIM) • 2090 Resistive Brake Modules (RBM) • 1394 external passive-shunt resistors • 2090 AC (EMC) line filters	• 2198-CAPMOD-2240 capacitor module • 2198-CAPMOD-DCBUS-IO extension module • 2198 AC (EMC) line filters • 2198 encoder output module • 2198 shared-bus connector kits • 2198 external passive-shunt resistors • 1321 line reactors

(1) Module firmware 4.00 or later.

System Replacement Examples

This chapter provides side-by-side examples replacing Kinetix® 6000 drives with Kinetix 5700 servo drives. Use these examples to help in the evaluation and selection of the correct components in the migration process.

Common Replacement Tasks

Many of the replacement tasks are common to all Kinetix 6000 to Kinetix 5700 system migrations. In this section we'll review sizing, mounting order, accessories, network topology, Studio 5000 Logix Designer® configuration, fault codes, and tuning.

Drive Sizing Example

The sizing for Replacement Example #1 was done by using the Kinetix 6000 drive system that is listed on page 28 and matching those drives to Kinetix 5700 drives with comparable output current.

With Motion Analyzer online, you can enter the motion profile of your axis and mechanical details to find the appropriate compatible Kinetix 5700 servo drive and size the 2198-P*xxx* DC-bus power supply. Motion Analyzer also provides information on motoring versus regenerative power and whether a shunt module, shunt resistor, and/or capacitor module is needed.

Access Motion Analyzer at: https://motionanalyzer.rockwellautomation.com.

These figures show a Kinetix 6000 axis configuration and a Kinetix 5700 axis configuration with the same motor, and a side-by-side system performance comparison. Use Motion Analyzer to properly size your motion system.

Figure 7 - Kinetix 6000 Axis as Configured in Motion Analyzer

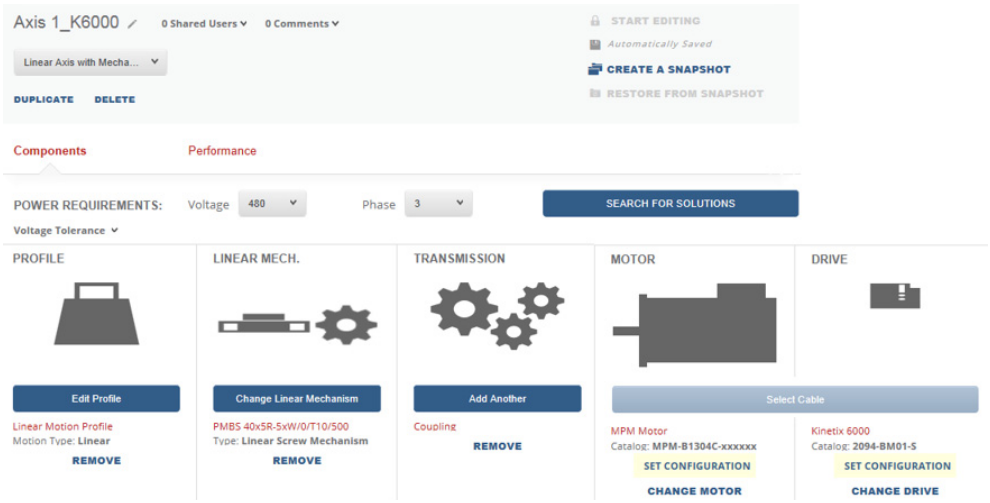


Figure 8 - Kinetix 5700 Axis as Configured in Motion Analyzer

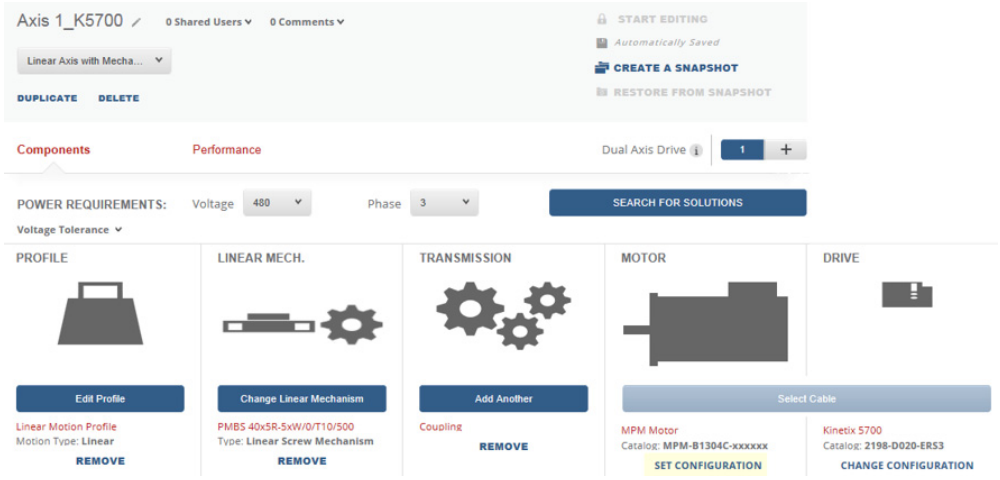
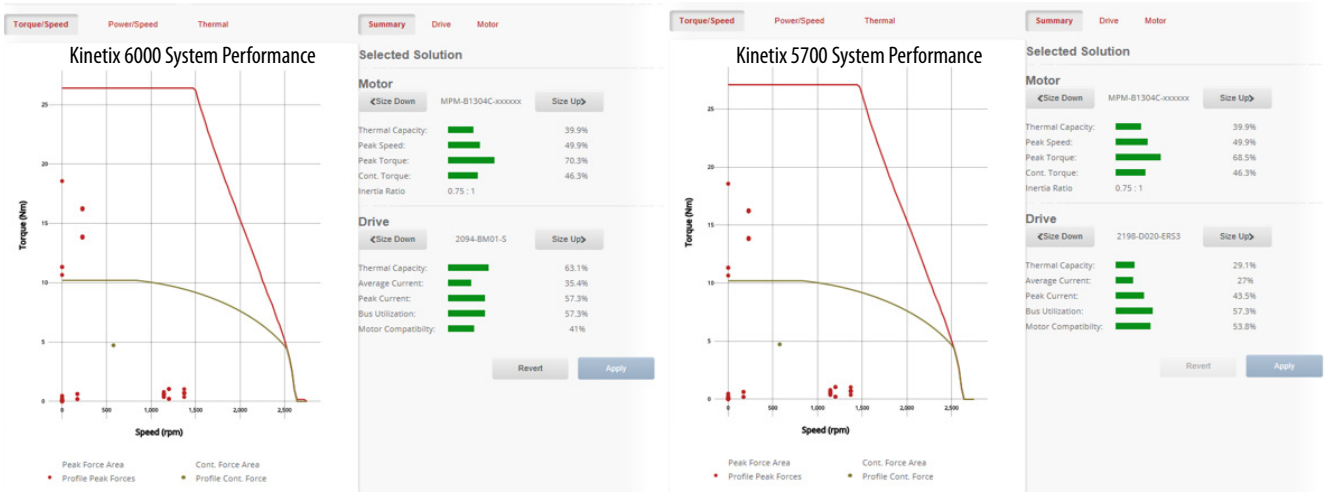


Figure 9 - Compare Kinetix 6000 and Kinetix 5700 Axes Configured in Motion Analyzer



Module Mounting Order

Kinetix 6000 drive modules (IAM, AM, shunt, and slot-filler) are mounted according to power utilization (highest to lowest) from left to right starting with the highest power utilization.

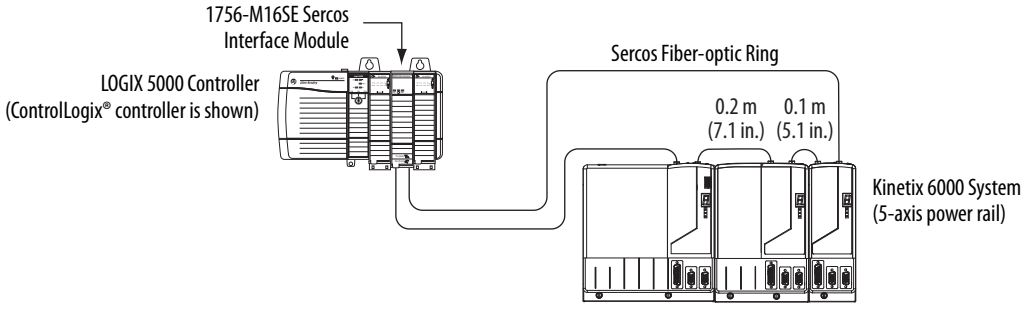
The Kinetix 5700 axis inverters are mounted according to power utilization from left to right starting with the DC-bus power supply followed by the axis inverter with the highest power utilization.

Power utilization is the average power (kW) consumed by a servo axis. If Motion Analyzer was used to size the axis, the calculated axis power that is required can be used for the power utilization value. If Motion Analyzer was not used, you can use the continuous power value (kW) for each module to determine mounting order.

Kinetix 6000 Network Topology

The Kinetix 6000 servo drives use Sercos interface to communicate with the LOGIX 5000™ controller and must be configured in ring topology. Sercos fiber-optic cables connect between the drive and controller receive (Rx) and transmit (Tx) connectors to form a Sercos fiber-optic ring.

Figure 10 - Sercos Fiber-optic Ring - LOGIX 5000 Controller with Double-wide Drive Modules



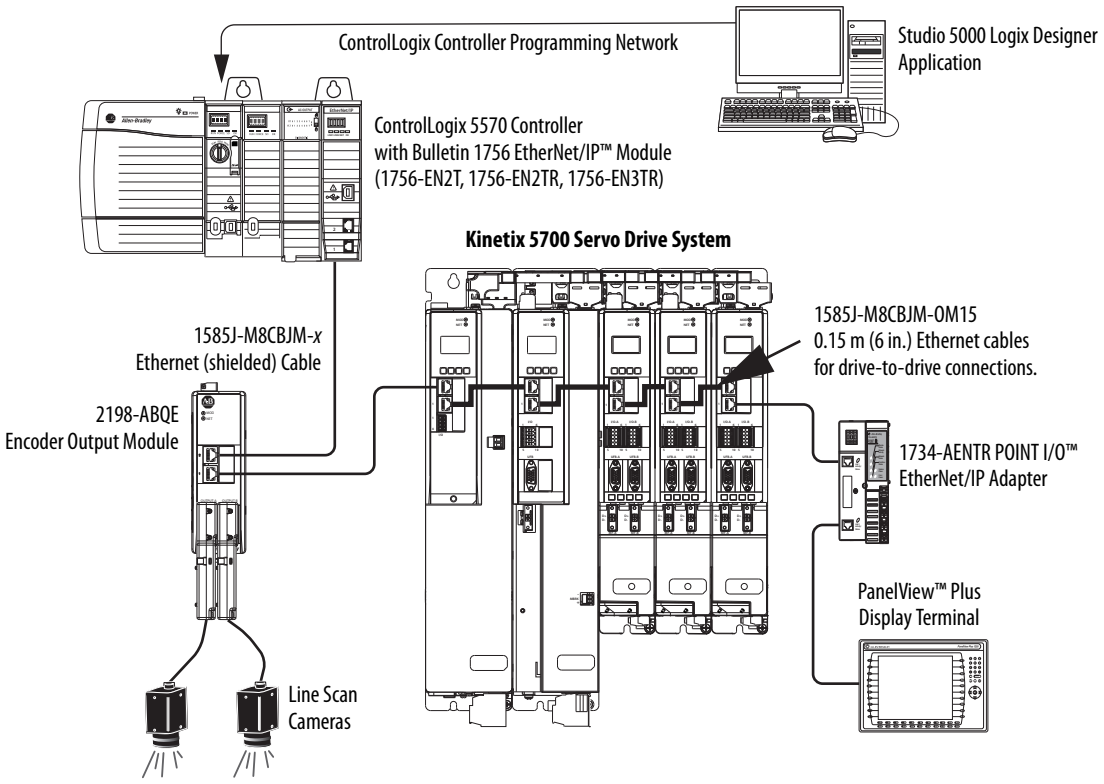
Kinetix 5700 Ethernet Topology

The Kinetix 5700 drives support any Ethernet topology including linear, ring, and star by using ControlLogix, GuardLogix®, or CompactLogix™ controllers.

Linear Topology

The Kinetix 5700 drive modules 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 11 - Kinetix 5700 Linear Communication Installation

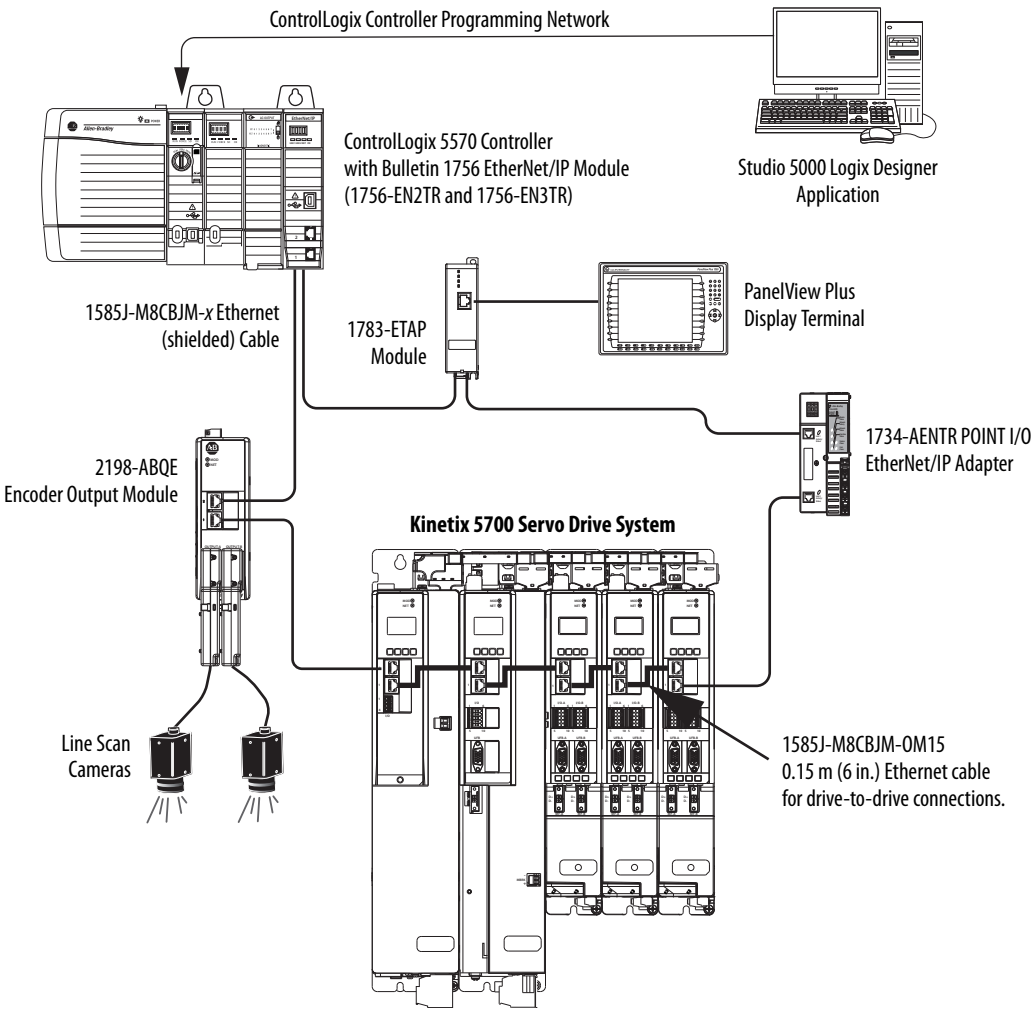


Ring Topology

For a Kinetix 5700 servo system in 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, for example the display terminal, require a 1783-ETAP module to complete the network ring.

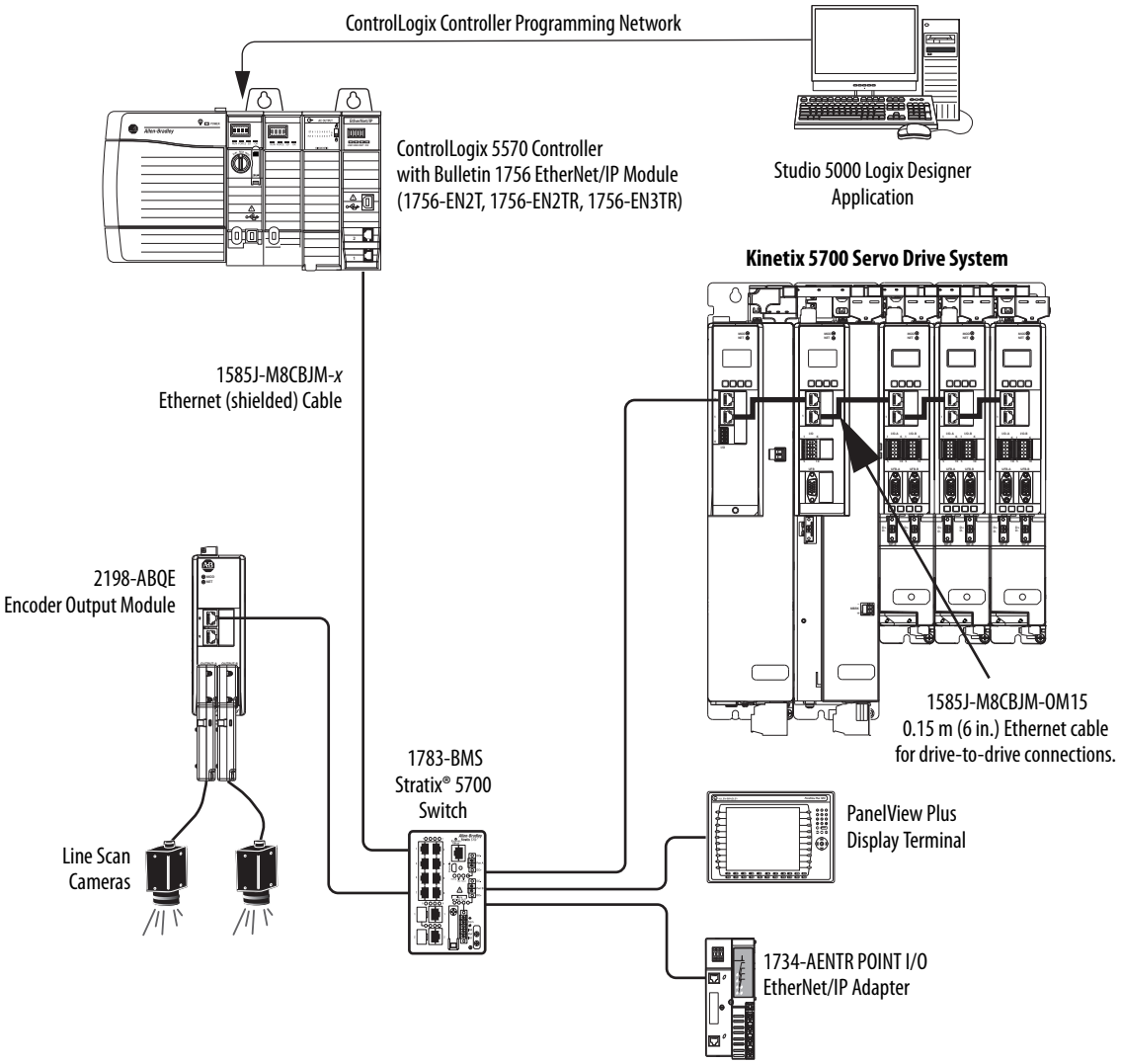
Figure 12 - Kinetix 5700 Ring Communication Installation



Star Topology

The Kinetix 5700 drive modules have dual ports, so linear topology is maintained from one module to another, but the Kinetix 5700 system and other devices operate independently. The loss of one device does not impact the operation of other devices.

Figure 13 - Kinetix 5700 Star Communication Installation



Axis Configuration in Studio 5000 Logix Designer

For DC-bus power supply and axis configuration/startup, refer to Chapter 6 of the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002.

IMPORTANT When configuring the Kinetix 5700 drive system, you must add the DC-bus power supply to the Studio 5000 Logix Designer I/O Configuration folder. The Kinetix 5700 DC-bus power supplies are EtherNet/IP network enabled modules that require configuration in the Logix Designer application program.

Sercos to EtherNet/IP Network Guidelines

For a side-by-side comparison of axis configuration (Kinetix 6000 drives to Kinetix 5700 drives), see the Integrated Motion on Sercos and EtherNet/IP Network - Analysis and Comparison Application Technique, publication MOTION-AT006.

Fault Structure

For the Kinetix 6000 drives, when a fault is detected, the seven-segment status indicator displays an E followed by the flashing of the two-digit error code, one digit at a time. This is repeated until the error code is cleared.

Review the Kinetix 6000 Multi-axis Servo Drives User Manual, publication 2094-UM001, for more information on the seven-segment status indicator error codes.

For the Kinetix 5700, the fault code tables are designed to help you determine the source of the fault or exception. When a fault condition is detected, the drive module performs the appropriate fault action, the fault is displayed, and the fault is added to a persistent fault log (along with diagnostics data). The earlier faults have priority to be displayed. See the Kinetix 5700 Fault Code Summary on page 50 for a list of fault code types.

Review the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002, for troubleshooting tables to identify faults, potential causes, and the appropriate actions to resolve the fault.

Review the Integrated Motion on the EtherNet/IP Network Reference Manual, publication MOTION-RM003, for understanding all the CIP Motion™ protocol exceptions.

Table 19 - Kinetix 5700 Fault Code Summary

Fault Code Type (1) (2)	Description
FLT S*xx*	Standard runtime axis exceptions. The exception can apply to an individual axis or to all axes.
FLT M*xx*	Manufacturer-specific runtime axis exception. The exception can apply to an individual axis or to all axes.
INIT FLT S*xx*	Exceptions that help prevent normal operation and occur during the initialization process.
INIT FLT M*xx*	
NODE FLT*xx*	Exceptions that help prevent normal operation of the drive module and apply to the entire module and affect all axes.
NODE ALARM *xx*	Exceptions that help prevent normal operation of the drive module, but do not result in any action other than reporting the alarm to the controller.
INHIBIT S*xx*	Conditions that help prevent normal operation and indicate that the drive module is prevented from being enabled.
INHIBIT M*xx*	
ALARM S*xx*	An underlying exception condition that does not result in any action other than reporting the alarm to the controller.
ALARM M*xx*	
SAFE FLT*xx*	Exception that is generated by a fault condition that is detected in the safety function.

(1) S*xx* refers to Standard exceptions.

(2) M*xx* refers to Manufacturer-specific exceptions.

Tuning

Closed-loop servo systems require settings for the control-loop gain and filter values to make sure that the load accurately follows the desired input-command signal. The process of adjusting and refining the gain and filter configuration is called tuning.

Tuningless features help you reduce commissioning time, maintain product quality, sustain operation with lower downtime, and improve machine performance.

For help tuning your axes, see the Tuningless Features for the Kinetix 5000 Servo Drive Family Quick Start, publication MOTION-QS001.

Table 20 - Motion System Tuning

Tuning Methods	Kinetix 6000 Drives	Kinetix 5700 Drives
Load Observer	• Operates in real-time • Estimates and compensate for mechanical load inertia on motor • Controls motor as if unloaded • Compensates for mechanical variations in system such as changing loads, compliance, and machine wear over time	
	Configure Kinetix 6000 drives via message instructions	Configure Kinetix 5700 drives in Logix Designer>Axis Properties via Add-on Profile
Adaptive Tuning with Tracking Notch Filter	Adaptive tuning feature is not supported.	• Operates in real-time • Measures mechanical resonances and dynamically sets the notch filter frequency to mitigate the resonances
Adaptive Tuning with Gain Stabilization	Adaptive tuning feature is not supported.	• Enables and tunes the low-pass filter to suppress resonances if any are identified above the low-frequency limit (when there are more resonances in the system than notch filters in the drive). • Adjusts the torque low-pass filter, the control loop gains, and the load observer bandwidth from the current values until the identified HF resonances are suppressed or until a LF resonance or instability is attenuated enough to make the system stable.

Replacement Example #1

In this example, a six-axis Kinetix 6000 drive system is replaced by Kinetix 5700 servo drives. The Kinetix 6000 drive system uses an 8-axis power rail with an integrated axis module (IAM) supplying DC-bus power to the IAM axis and five axis modules (AM).

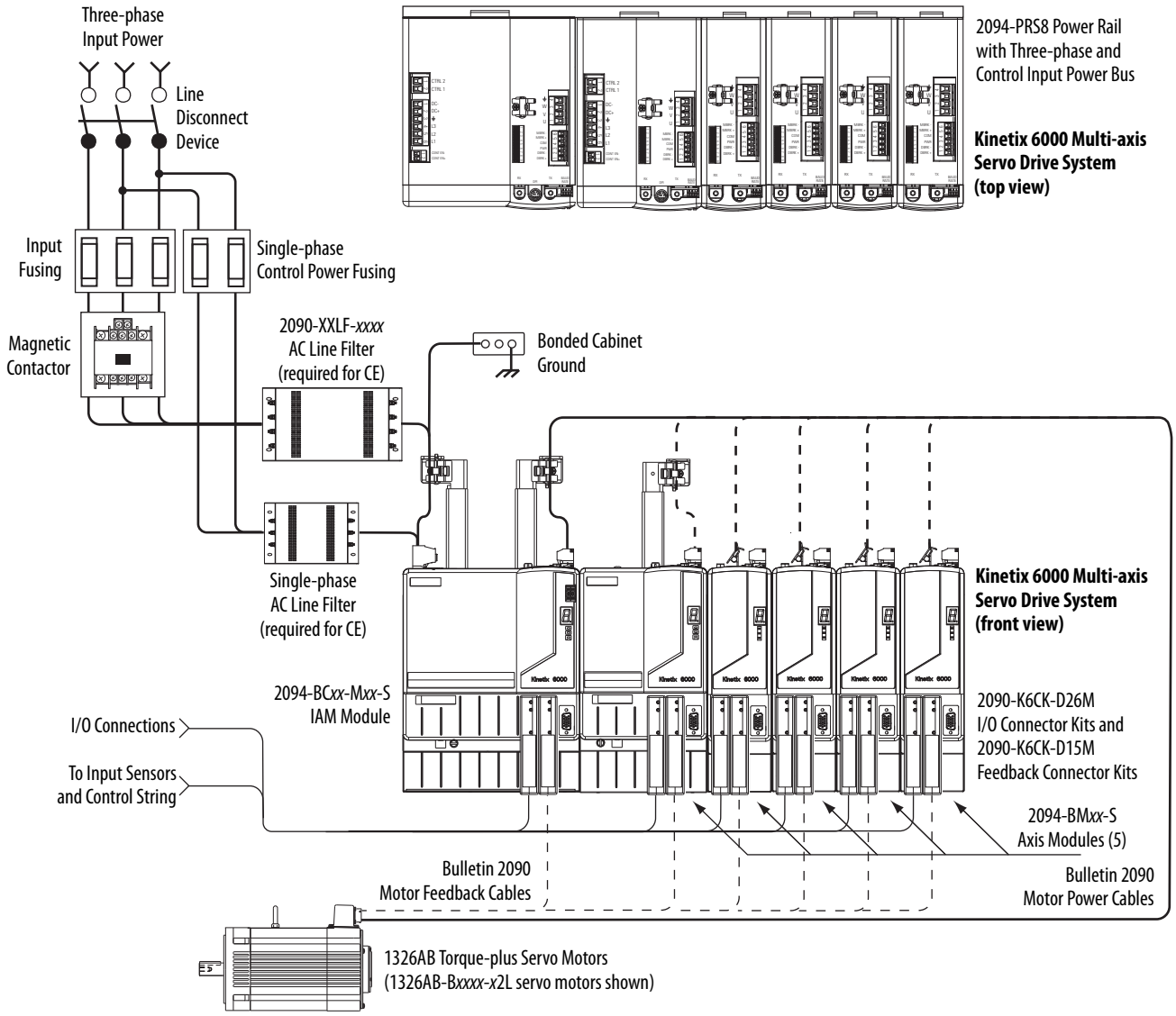
Kinetix 6000 System Without a Line Interface Module

In this example, the Kinetix 6000 8-axis power rail (with 6 axes) consists of the following drive modules:

- 2094-BC07-M05-S (double-wide) IAM
- 2094-BM03-S (double-wide) AM
- 2094-BM02-S AM
- 2094-BM01-S AM
- 2094-BMP5-S AM(2x)

Three-phase AC input power components consist of a line disconnect device, fuses/circuit breakers, and contactor.

Figure 14 - Typical Kinetix 6000 Drive System (without LIM)

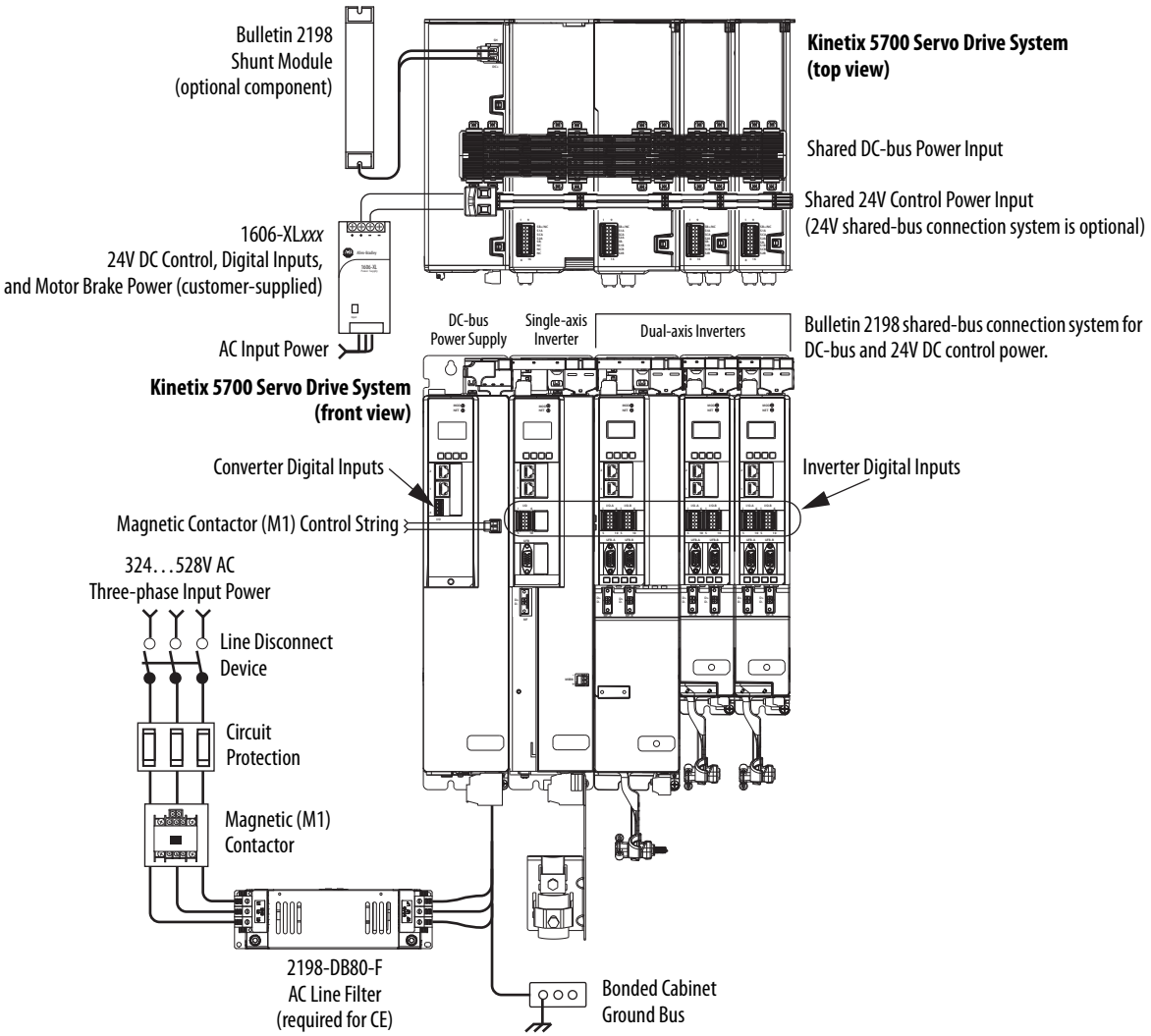


Kinetix 5700 Drive System

The Kinetix 6000 fully-populated 8-axis power rail (with 6 axes) are replaced by a single cluster of Kinetix 5700 servo drives. In this example, the replacement system consists of the following drive modules:

- 2198-P141 DC-bus power supply
- 2198-S086 single-axis inverter
- 2198-D057 dual-axis inverter
- 2198-D020 dual-axis inverter
- 2198-D012 dual-axis inverter

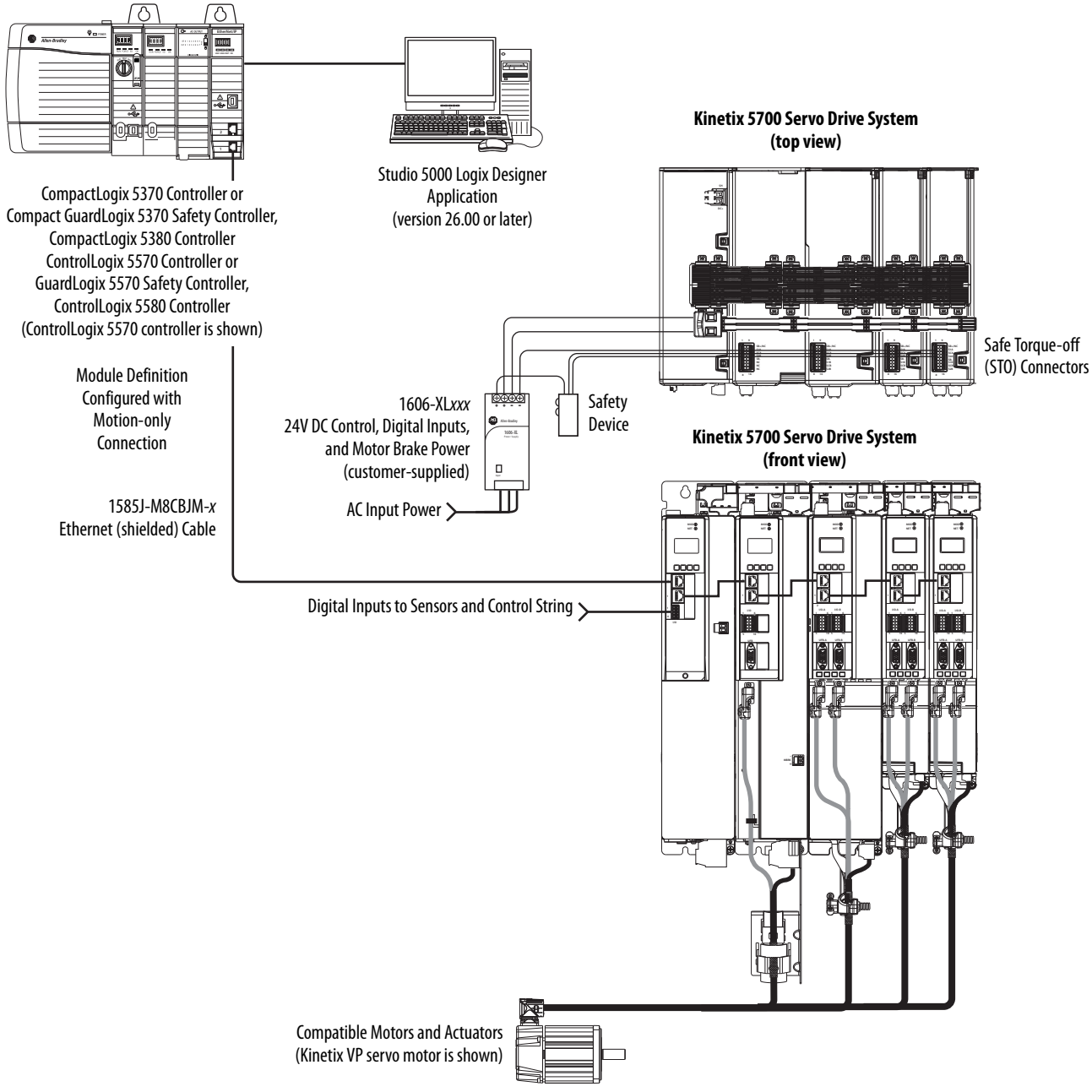
Figure 15 - Typical Kinetix 5700 Shared DC-Bus Drive System



Hardwired Safe Torque-off Configuration

In this example, Kinetix 5700 servo drives use the safe torque-off (STO) connector for wiring external safety-devices and cascading hardwired safety-connections from one drive to another.

Figure 16 - Safe Torque-off (hardwired) Configuration



Circuit Protection

For this example application, the following fuse and circuit breaker options apply when the motion system is a UL/CSA application.

Refer to Circuit Breaker and Fuse Considerations on page 35 for fuse and circuit breaker recommendations for all Kinetix 6000 IAM modules and Kinetix 5700 DC-bus power supplies.

Table 21 - Control and DC-Bus Circuit Protection Specifications

Drive Cat. No.	Control Input Power	DC-bus Power			
	Bussmann Fuse (1)	Bussmann Fuse	Mersen Fuse (2)	Miniature CB (3)	Molded Case CB
2094-BC07-M05-S	FNQ-R-10 (10 A) or FNQ-R-7.5 (7.5 A)	FWJ-125A	A70QS125-4 or HSJ125	–	140G-G6C3-C90
2198-P141	–	LPJ-70SP (70A)	–	1489-M3D630	140G-G6C3-C90

(1) Use FNQ-R-7.5 circuit breaker for higher single-cycle inrush current capability. This is recommended when the continuous control-power current exceeds 3.0 A.
(2) Mersen fuses were formerly known as Ferraz-Shawmut.
(3) Use 1492-SPM1D150 circuit breaker for higher single -cycle inrush current capability. This is recommended when the continuous control-power current exceeds 3.0 A.

Contactor Specifications

The DC-bus power supply contactor enable relay (CED connector) is rated at 24V DC or 110/220V AC at 1.0 A, max.

Table 22 - Contactor Specifications

Drive Cat. No.	Contactor	Intermediate Relay
2094-BC07-M05-S	FNQ-R-10 (10 A) or FNQ-R-7.5 (7.5 A)	FWJ-125A
2198-P141	100-C72DJ10	700-HB32Z24 (relay) 700-HN153 (socket)

AC Line Filter Specifications

These AC line filters are available for your servo drive input power.

Table 23 - AC Line Filter Specifications

Drive Cat. No.	AC Line Filter Cat. No.
2094-BC07-M05-S	2090-XXLF-3100
2198-P141	2198-DB80-F

Transformer Specifications

Follow these voltage requirements for sizing a system transformer.

Table 24 - Transformer Specifications

Drive Cat. No.	Specifications (1)
2094-BC07-M05-S	45 kW continuous x 1.5 = 67.5 KVA
2198-P141	31 kW continuous x 1.5 = 46.5 KVA

(1) An isolation transformer for three-phase input power is not required for the Kinetix 6000 IAM or Kinetix 5700 DC-bus supply.

Shared-bus Connections

Use the following shared-bus connector kits with your Kinetix 5700 drive system.

Table 25 - Shared-bus Connector Kits

Shared-bus Connector Kit Cat. No.	Drive Module Cat. No.	Application	Description
2198-TCON-24VDCIN36 2198-BARCON-*xx*DCAC100	2198-P141	24V DC input power to control bus	24V input wiring connectors and bus-bars for the Kinetix 5700 drive system 24V shared-bus connection system (optional).
2198-H040-P-T	2198-D012-ERS3 2198-D020-ERS3	Control power sharing	Control power T-connector with bus bars, 55 mm
2198-H070-P-T	2198-D057-ERS3 2198-S086-ERS3	Control power sharing	Control power T-connector with bus bars, 85 mm
2198-BARCON-*xx*DC200 2198-KITCON-ENDCAP200	2198-D*xxx*-ERS3 2198-S*xxx*-ERS3	Shared-bus connector kits	DC-bus links (55, 85, and 100 mm) and end caps for the DC-bus shared-bus connection system (required and included with each respective drive module).

Cable Accessories

In this example, the Kinetix 6000 system includes 1326AB motors with resolver interface. You can continue to use the 1326AB motors or replace them. These are your options:

- Keep the Bulletin 1326AB motors and use the Vega resolver converter kit (model 2792503) and custom motor file from Encompass™ partner Elwood Corporation. See your local Rockwell Automation authorized distributor for details on the Kinetix 5700 drives with Bulletin 1326AB motors migration path.
- Replace the Bulletin 1326AB motors with MP-Series™ (Bulletin MPM) motors. Table 26 shows drive and motor combinations along with the corresponding replacement MP-Series (Bulletin MPM) motor.

Table 26 - 1326AB Motor Migration

Kinetix 6000 Drive Cat. No.	1326AB Motor Cat. No.	Bulletin MPM (replacement) Motor Cat. No.
2094-BC07-M05-S	1326AB-B730E	MPM-B2153F
2094-BM03-S	1326AB-B515G	MPM-B1651F
2094-BM02-S	1326AB-B515G	MPM-B1651F
2094-BM01-S	1326AB-B430E	MPM-B1153E
2094-BMP5-S (2x)	1326AB-B410G (2x)	MPM-B1151F (2x)

The Kinetix 5700 drives are paired with these Bulletin MPM motors and require the following cable and connector kit accessory items.

Table 27 - Cable and Connector Kit Accessories

Bulletin MPM (replacement) Motor Cat. No.	Kinetix 5700 (replacement) Drive Cat. No.	Description	Accessory Cat. No.	
MPM-B2153F	2198-S086-ERS3	Single-axis inverter	• 1557J-M8CBJM-*x* (4x) • 2090-CPxM7DF (6x) • 2090-CFBM7DF-CE (6x) • 2198-K57CK-D15M (6x)	Ethernet cable (1 per module) Bulletin 2090 Power/brake cable (1 per axis) Bulletin 2090 Feedback cable (1 per axis) Universal feedback connector kit (1 per axis)
MPM-B1651F (2x)	2198-D057-ERS3	Dual-axis inverter		
MPM-B1153E	2198-D020-ERS3	Dual-axis inverter (1 axis)		
MPM-B1151F (2x)	2198-D012-ERS3	Dual-axis inverter		
–	2198-P141	DC-bus power supply	1557J-M8CBJM-*x*	Ethernet cable

See the Rockwell Automation Knowledgebase document 473510 for details on the Bulletin 1326AB to Bulletin MPM motor migration path.

Replacement Example #2

In this example, a typical DC common-bus configuration with a leader IAM and follower IAM module is shown. The leader IAM module is responsible for discharging the DC-bus and for providing common-bus follower drives with DC-bus precharge, bus regulation, phase-loss detection, and ground fault detection. Follower IAM modules do not have three-phase input power connections, but have DC bus connections from a leader IAM module.

Kinetix 6000 System With a Line Interface Module

The Kinetix 6000 drive system has the following modules:

Rack 1 is an 8-axis power rail with the following drive modules:

- One (IAM module) catalog number 2094-BC07-M05-S
- Three (AM modules) catalog number 2094-BM02-S
- Three (AM modules) catalog number 2094-BM01-S

Rack 2 is an 8-axis power rail with the following drive modules:

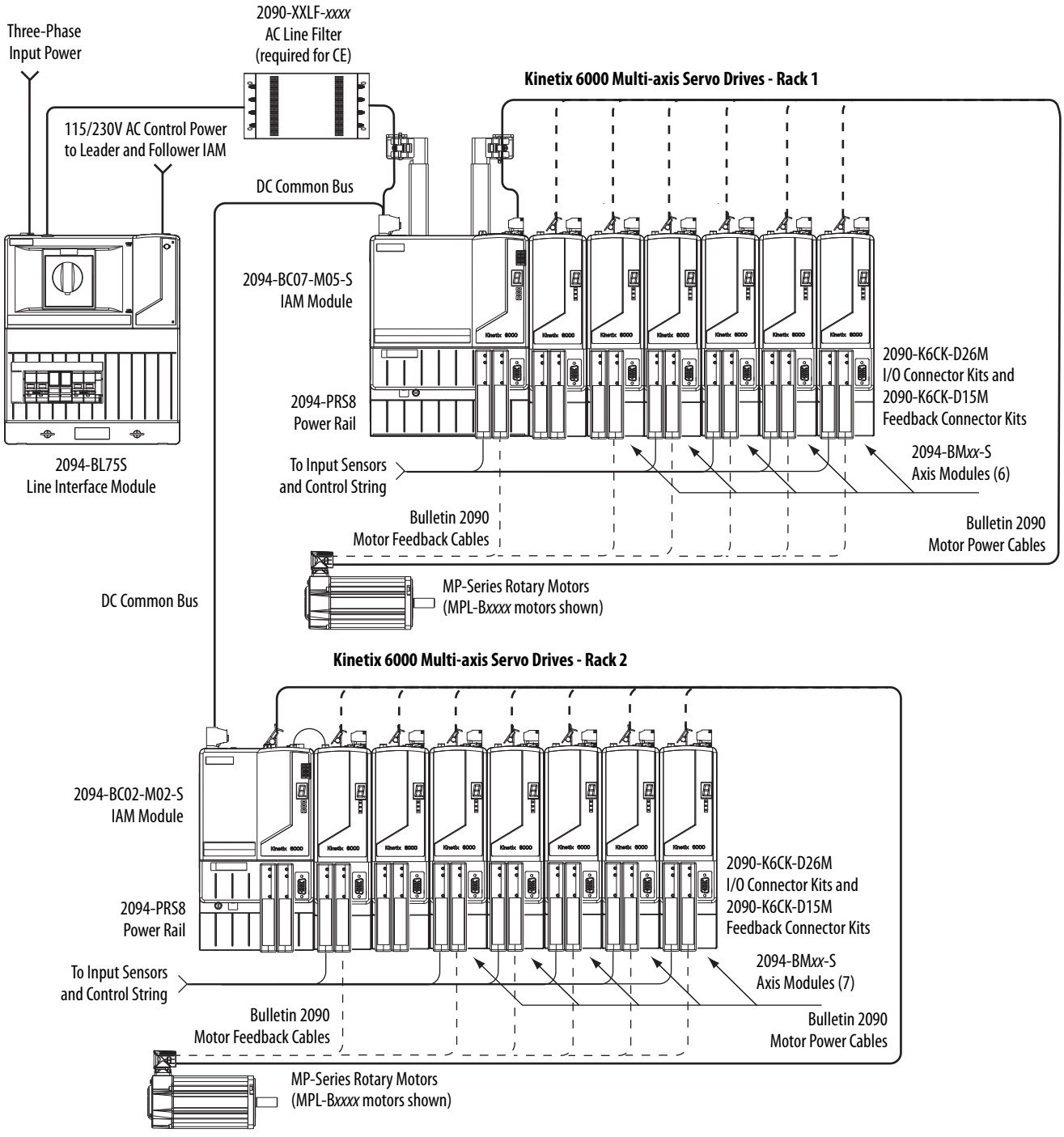
- One (IAM module) catalog number 2094-BC02-M02-S
- One (AM modules) catalog number 2094-BM02-S
- Two (AM modules) catalog number 2094-BM01-S
- Four (AM modules) catalog number 2094-BMP5-S

The Line Interface Module (LIM) is catalog number 2094-BL75S with:

- Configurable branch circuit protection
- 75 A AC output current
- External AC line filter
- 24V DC @ 20 A

Three-phase AC input power, control power, and 24V motor brake power is provided by the Line Interface Module (LIM).

Figure 17 - Kinetix 6000 Drive System (with LIM, front view)



Kinetix 5700 Drive System

The Kinetix 6000 fully-populated 8-axis power rails (with 15 axes) are replaced by two clusters of Kinetix 5700 servo drives. In this example, the replacement clusters consist of the following drive modules.

Cluster 1

- 2198-P208 DC-bus power supply
- 2198-S086 single-axis inverter
- 2198-D032 dual-axis inverter
- 2198-D032 dual-axis inverter
- 2198-D020 dual-axis inverter

Cluster 2

- 2198-D032 dual-axis inverter
- 2198-D020 dual-axis inverter
- 2198-D012 dual-axis inverter
- 2198-D012 dual-axis inverter

To extend the DC-bus input voltage to the second cluster, use an extension module that is paired with a capacitor module on each cluster:

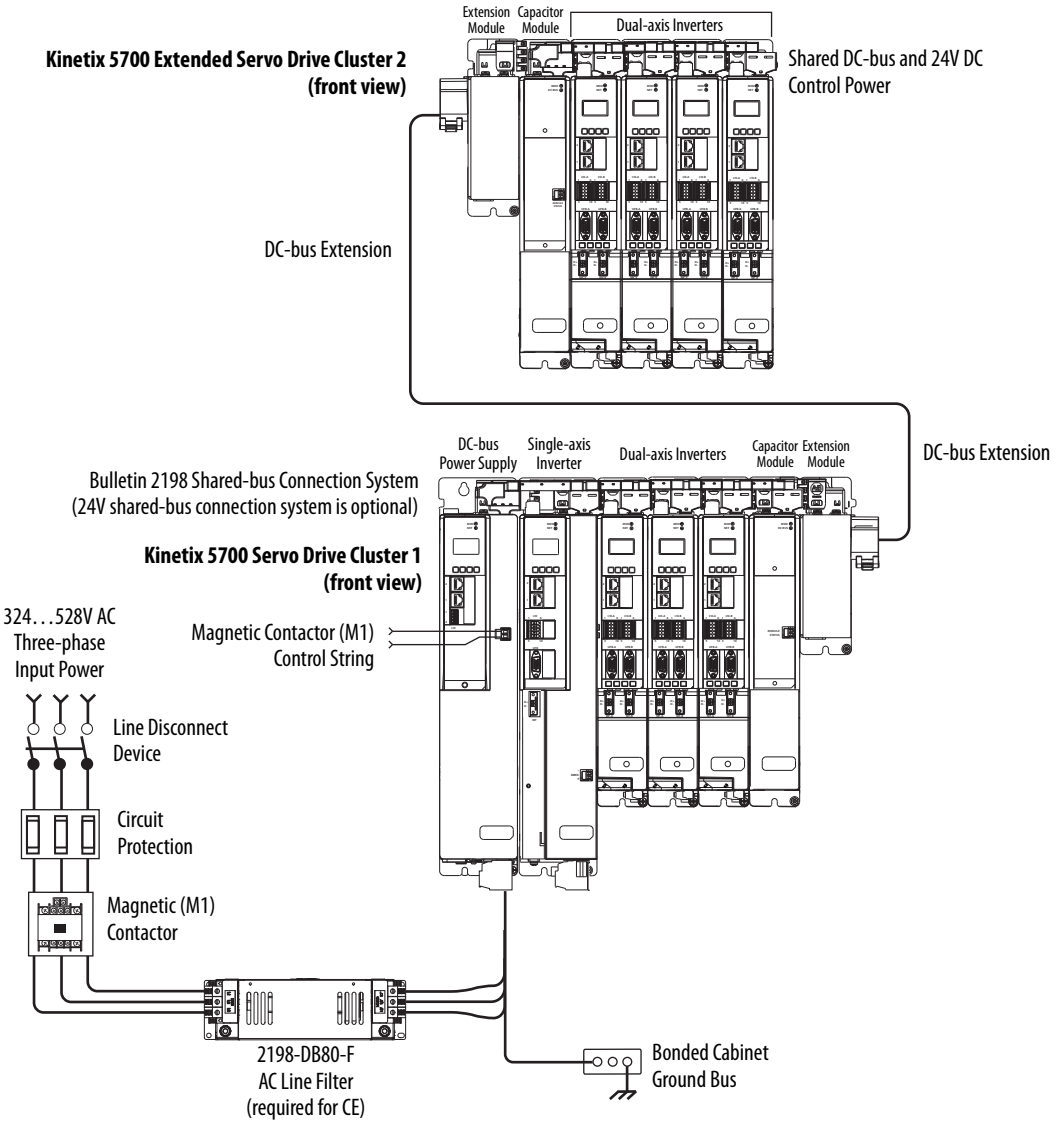
- 2198-CAPMOD-1300 capacitor module (1 per cluster)
- 2198-CAPMOD-DCBUS-IO extension module (1 per cluster)

IMPORTANT You are limited to a 200 A DC-Bus on your overall Kinetix 5700 servo drives system.

In this example, 2 drive clusters define the DC-bus group and are possible by extending the DC-bus. You also have to stay within the general sizing guidelines:

- Maximum motor-power cable length: 400 m (1312 ft)
- Maximum supported capacitance: 13,000 μF
- Maximum 24V DC control power current: 32 A
- Maximum DC-bus current: 200 A

Figure 18 - Kinetix 5700 Extended DC-bus Installation

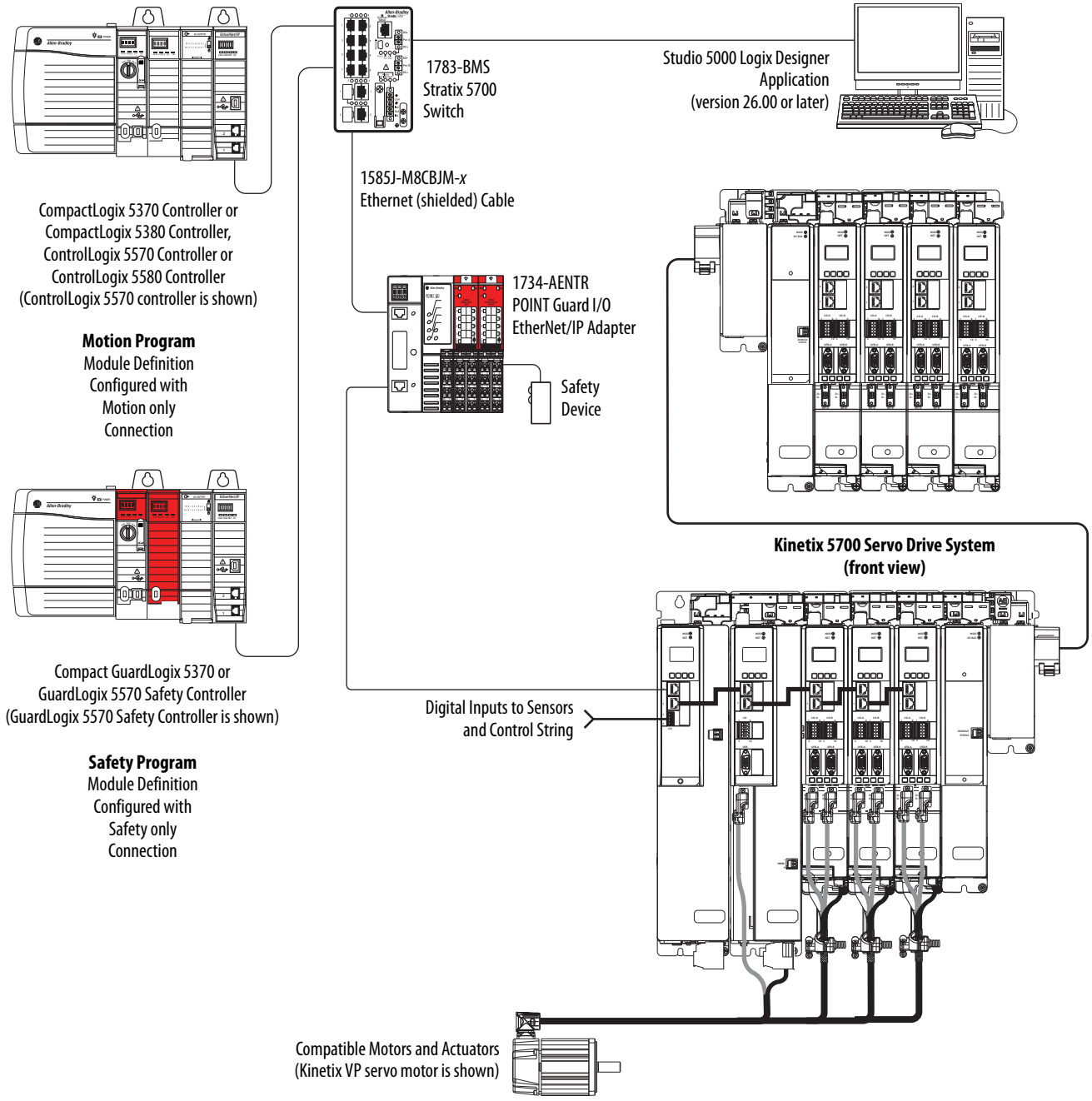


Integrated Safe Torque-off Configuration

In this example, a non-safety controller makes the Motion-only connection and a separate GuardLogix 5570 safety controller makes the Safety-only connection.

IMPORTANT If two controllers are used in an application with Motion-only and Safety-only connections, the Safety-only connection must be a GuardLogix 5570 or Compact GuardLogix 5370 safety controller and the Motion-only connection must be a ControlLogix 5570 or CompactLogix 5370 controller.

Figure 19 - Motion and Safety Configuration (multi-controller)



Circuit Protection

For this example application, the following fuse and circuit breaker options apply when the motion system is a UL/CSA application.

Refer to Circuit Breaker and Fuse Considerations on page 35 for fuse and circuit breaker recommendations for all Kinetix 6000 IAM modules and Kinetix 5700 DC-bus power supplies.

Table 28 - Control and DC-Bus Circuit Protection Specifications

Drive Cat. No.	Control Input Power	DC-bus Power			
	Bussmann Fuse (1)	Bussmann Fuse	Mersen Fuse (2)	Miniature CB	Molded Case CB
2094-BC07-M05-S	FNQ-R-10 (10 A) or FNQ-R-7.5 (7.5 A)	FWJ-125A	A70QS125-4 or HSJ125	–	140G-G6C3-C90
2198-P208	–	LPJ-100SP (100A)	–	–	140G-G6C3-D12

(1) Use FNQ-R-7.5 circuit breaker for higher single-cycle inrush current capability. This is recommended when the continuous control-power current exceeds 3.0 A.

(2) Mersen fuses were formerly known as Ferraz-Shawmut.

Contactor Specifications

The DC-bus power supply contactor enable relay (CED connector) is rated at 24V DC or 110/220V AC at 1.0 A, max.

Table 29 - Contactor Specifications

Drive Cat. No.	Contactor	Intermediate Relay
2094-BC07-M05-S	FNQ-R-10 (10 A) or FNQ-R-7.5 (7.5 A)	FWJ-125A
2198-P208	100-C97DJ10	700-HB32Z24 (relay) 700-HN153 (socket)

AC Line Filter Specifications

These AC line filters are available for your servo drive input power.

Table 30 - AC Line Filter Specifications

Drive Cat. No.	AC Line Filter Cat. No.
2094-BC07-M05-S	2090-XXLF-3100
2198-P208	2198-DB80-F

Transformer Specifications

Follow these voltage requirements for sizing a system transformer.

Table 31 - Transformer Specifications

Drive Cat. No.	Specifications (1)
2094-BC07-M05-S	45 kW continuous x 1.5 = 67.5 KVA
2198-P208	46 kW continuous x 1.5 = 69.0 KVA

(1) An isolation transformer for three-phase input power is not required for the Kinetix 6000 IAM or Kinetix 5700 DC-bus supply.

Shared-bus Connector Kits

Use the following shared-bus connector kits with your Kinetix 5700 drive system.

Shared-bus Connector Kits Cat. No.	Drive Module Cat. No.	Application	Description
2198-TCON-24VDCIN36 2198-BARCON-*xx*DCAC100	2198-P208 (1x) 2198-CAPMOD-2240 (2x)	24V DC input power to control bus	24V input wiring connectors and bus-bars for the Kinetix 5700 drive system 24V shared-bus connection system (optional).
2198-H040-P-T	2198-D012-ERS3 (2x) 2198-D020-ERS3 (2x) 2198-D032-ERS3 (3x) 2198-CAPMOD-2240 (2x)	Control power sharing	Control power T-connector with bus bars, 55 mm
2198-H070-P-T	2198-S086-ERS3	Control power sharing	Control power T-connector with bus bars, 85 mm
2198-BARCON-*xx*DC200 2198-KITCON-ENDCAP200	2198-D*xxx*-ERS3 2198-S*xxx*-ERS3	Shared-bus connector kits	DC-bus links (55, 85, and 100 mm) and end caps for the DC-bus shared-bus connection system (required and included with each respective drive module).

Cable Accessories

In this example, the Kinetix 6000 system includes 1326AB motors with resolver interface, Bulletin MPM motors, RDD-Series™ direct-drive motors, and LDC-Series linear motors. Some of the existing motors are expected to remain in service, but paired with a replacement Kinetix 5700 drive and the appropriate cables and feedback connector kit.

Table 32 - Kinetix 5700 Drive Migration

Kinetix 6000 Drive Cat. No.	Existing Allen-Bradley® Motor Cat. No.	Kinetix 5700 (replacement) Drive Cat. No.	Description
2094-BC07-M05-S	–	2198-P208	DC-bus power supply
	RDB-B41035-*x*B72AA	2198-S086-ERS3	Single-axis inverter
2094-BC02-M02-S	RDB-B2151C-*x*B72AA	2198-D032-ERS3 (1 axis)	Dual-axis inverters
2094-BM02-S (2x)	1326AB-B410G (2x)	2198-D032-ERS3	
2094-BM01-S (2x)	1326AB-B515G (2x)	2198-D020-ERS3	
2094-BM02-S (2x)	MPM-B1153E (2x)	2198-D032-ERS3	
2094-BM01-S (3x)	MPM-B1651F (3x)	2198-D020-ERS3 2198-D032-ERS3 (1 axis)	
2094-BMP5-S (4x)	LDC-C030100-DHT*xx* (4x)	2198-D012-ERS3 2198-D012-ERS3	

The Kinetix 5700 drives are paired with these Allen-Bradley motors and require the following cable and connector kit accessory items.

Table 33 - Cable and Connector Kit Accessories

Existing Motor Cat. No.	Kinetix 5700 (replacement) Drive Cat. No.	Accessory Cat. No.	
1326AB-B410G (2x) (1) 1326AB-B515G (2x) (1)	2198-D032-ERS3 2198-D020-ERS3	1557J-M8CBJM-*x* (2x)	Ethernet cable (1 per axis module)
		1326-CP*x*1T-L-*xxx* (4x)	Bulletin 1326 Power cable (1 per axis)
		1326-CCUT-L-*xxx* (4x)	Bulletin 1326 Feedback cable (1 per axis)
		Model 2792503 (4x)	Vega resolver converter kit (1 per axis)
RDB-B41035-*x*B72AA (2) RDB-B2151C-*x*B72AA (2)	2198-S086-ERS3 2198-D032-ERS3 (1 axis) (3)	1557J-M8CBJM-*x* (2x)	Ethernet cable (1 per axis module)
		2090-CP*x*M7DF (2x)	Bulletin 2090 Power/brake cable (1 per axis)
		2090-XXNFMF or 2090-CFBM7DF-CD (2x)	Bulletin 2090 Feedback cable (1 per axis)
		2198-K57CK-D15M (2x)	Universal feedback connector kit (1 per axis)
MPM-B1153E (2x) MPM-B1651F (3x)	2198-D032-ERS3 2198-D020-ERS3 2198-D032-ERS3 (1 axis) (3)	1557J-M8CBJM-*x* (2x)	Ethernet cable (1 per axis module)
		2090-CP*x*M7DF (5x)	Bulletin 2090 Power/brake cable (1 per axis)
		2090-CFBM7DF-CE (5x)	Bulletin 2090 Feedback cable (1 per axis)
		2198-K57CK-D15M (5x)	Universal feedback connector kit (1 per axis)
LDC-C030100-DHT*xx* (4x)	2198-D012-ERS3 2198-D012-ERS3	1557J-M8CBJM-*x* (2x)	Ethernet cable (1 per axis module)
		2090-CP*x*M7DF (4x)	Bulletin 2090 Power/brake cable (1 per axis)
		2090-XXNFMF or 2090-CFBM7DF-CD (4x)	Bulletin 2090 Feedback cable (1 per axis)
		2198-K57CK-D15M or 2198-H2DCK (4x)	Universal feedback connector kit (1 per axis) or Hiperface to DSL converter kit (1 per axis)
–	2198-P208	1557J-M8CBJM-*x*	Ethernet cable

(1) Use Vega resolver converter kit (model 2792503) and custom motor file from Encompass partner Elwood Corporation. See your local Rockwell Automation authorized distributor for details on the Kinetix 5700 drives with Bulletin 1326AB motors migration path.

(2) Requires Kinetix 5700 drive firmware 5.002 or later.

(3) This is one axis of the 2198-D032-ERS3 dual-axis inverter that provides power to the Bulletin RDB and Bulletin MPM motor.

Numerics

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Notes:

Rockwell Automation Support

Use the following resources to access support information.

Technical Support Center	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	https://rockwellautomation.custhelp.com/
Local Technical Support Phone Numbers	Locate the phone number for your country.	http://www.rockwellautomation.com/global/support/get-support-now.page
Direct Dial Codes	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	http://www.rockwellautomation.com/global/support/direct-dial.page
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	http://www.rockwellautomation.com/global/literature-library/overview.page
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	http://www.rockwellautomation.com/global/support/pcdc.page

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