Installation Instructions

Original Instructions

Kinetix 5700 Regenerative Bus Supply

Catalog Numbers 2198-RP088, 2198-RP200, 2198-RP263, 2198-RP312

About the Regenerative Bus Supply

The Kinetix® 5700 regenerative bus supply with 400V-class three-phase AC input provides continuous output power and current to servo drives for applications with requirements in the range of 24...140 kW and 35...207 A, respectively.

See the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002, for detailed information on wiring, applying power, troubleshooting, and integration with ControlLogix® 5580 controllers with EtherNet/IP communication modules or CompactLogix™ 5380 controllers with embedded EtherNet/IP network connections.

Catalog Number Explanation

This publication applies to the following Kinetix 5700 regenerative bus supplies.

Regenerative Bus Supply Catalog Numbers

Regenerative Bus Supply Cat. No.	Module Width mm	Input Voltage (1)	Continuous Output Power kW	Continuous Output Current A_{DC} rms
2198-RP088	165	324…506V AC rms, three-phase	24	35
2198-RP200	275		67	100
2198-RP263	440		119	176
2198-RP312			140	207

(1) Applies when DC-bus voltage regulation is enabled. If DC-bus voltage regulation is not enabled, then the input voltage range is 324…528V AC. For more information on these two modes of operation, see the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002.

Before You Begin

Prepare all equipment and hardware that is used to lift the regenerative bus supply before you unpack and lift the module out of the shipping container.

Parts List

The Kinetix 5700 regenerative bus supplies include the following accessory items:

- DC-bus end caps
- Wiring plug connector set for mains input power (IPD), 24V control input power (CP), digital inputs (IOD), shunt power (RC), and contactor enable (CED)
- Wiring plug connector for shunt power (RC) connections installed on the module

  TIP Replacement connector sets (catalog numbers 2198-KITCON-RP088, 2198-KITCON-RP200, and 2198-KITCON-RP312) are also available. See the Kinetix Servo Drives Specifications Technical Data, publication KNX-TD003, for more information.

- These installation instructions, publication 2198-IN014

Unpack and Inspect the Module

Upon delivery, follow these steps to unpack, and inspect the module.

IMPORTANT Delivery of equipment from Rockwell Automation to the carrier is considered delivery to the buyer. The carrier becomes liable for any damage that occurs during transit. It is the responsibility of the buyer to notify the proper party if damage is found. The buyer can forfeit any right to recovery for loss or damages by failing to comply with these steps.

1. Inspect the shipping container for any damage that occurred during transit.
2. Remove the cover of the shipping container.
3. Remove the protective packing materials.
4. Inspect the module for any damage.
5. If damage to the module exists, contact the carrier that delivered the shipment and your Rockwell Automation sales representative to schedule an inspection.
6. Retain all product packaging for review by the carrier.
7. Remove the fasteners that secure the module to the pallet, if applicable.
8. After unpacking, check the item nameplate catalog number against the purchase order.

Lifting Instructions

A hoist, straps, and J-hooks with a lockable clasp capable of supporting the maximum module weight are recommended. See Specifications on page 18 for weight specifications.

These lifting instructions apply to catalog numbers 2198-RP200, 2198-RP263, and 2198-RP312.

Read the Lifting Precautions

Read these precautions before attempting to lift the regenerative bus supply.

ATTENTION: All equipment and hardware that is used to lift the module must be properly sized and rated to lift and hold the weight of the module safely. To guard against possible personal injury or equipment damage:

- Inspect all hardware for proper attachment before a module is lifted.
- Do not let any part of the module or lift equipment to contact electrically charged conductors or components.
- Do not subject the module to high rates of acceleration or deceleration during a lift or transportation.
- Do not allow personnel or their limbs directly beneath the module during a lift.

Lift the Module

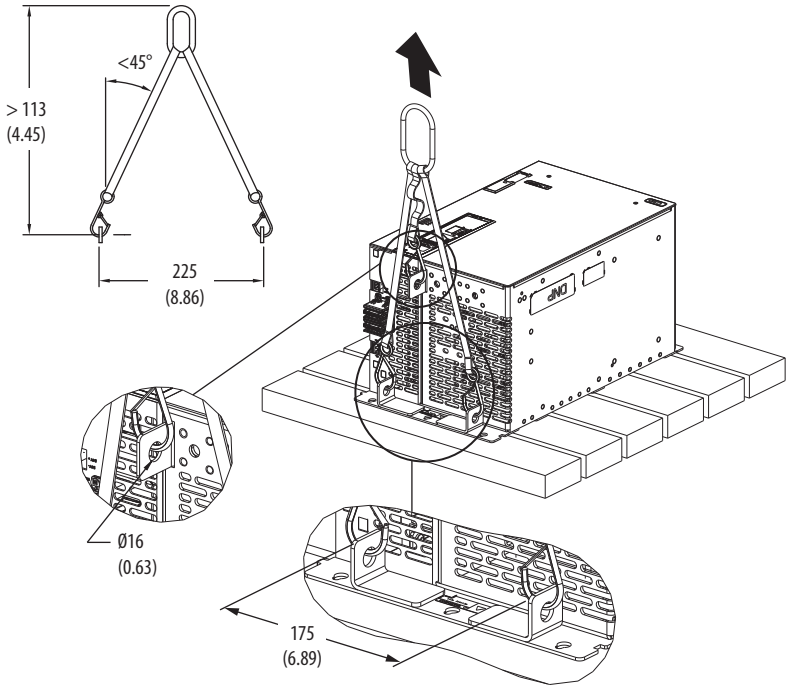
Follow theses steps to lift the regenerative bus supply.

1. Insert and secure the appropriate hardware in the designated lift points (as identified in the illustrations).

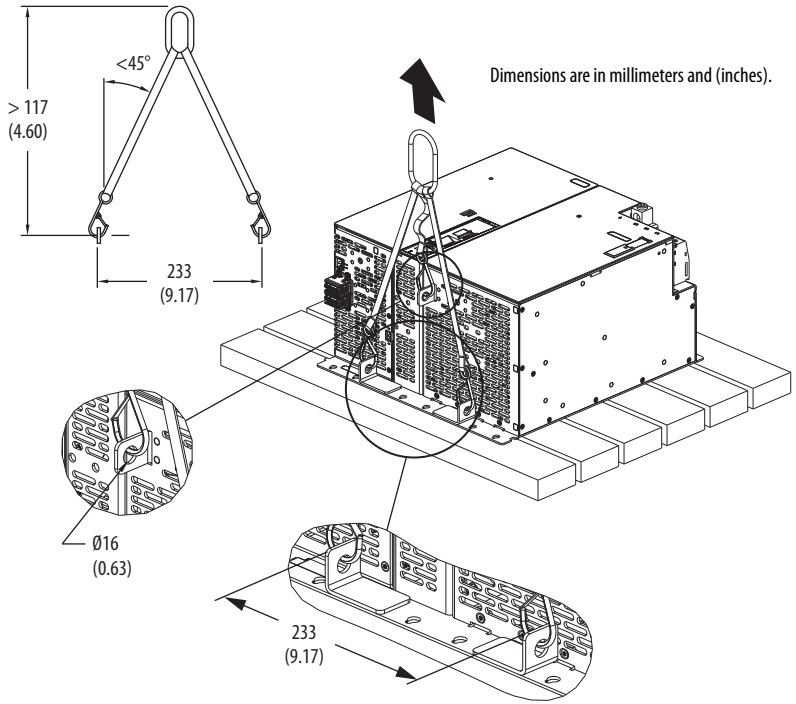
ATTENTION: To guard against equipment damage, verify that the hardware is securely connected to the correct lift points on the module as shown.
Use all **three** attachment points to lift.

Catalog Number 2198-RP200

Dimensions are in millimeters and (inches).



Catalog Numbers 2198-RP263 and 2198-RP312



IMPORTANT When approaching the full upright (vertical) position, the weight can shift and cause the module to swing unexpectedly. Control the movement of the module as it is lifted from the shipping container.

2. Slowly lift the module to an upright position and carefully transport the module to the installation location.

Ground Jumper Settings

The regenerative bus supply includes a ground jumper that is installed at the factory. Keep the ground jumper installed when input power has a grounded-wye configuration. Remove the ground jumper when using impedance-grounded power configurations. Refer to the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002, for configuration diagrams.

IMPORTANT If you have grounded-wye power distribution in your facility, do not remove the ground jumper from the regenerative bus supply. For all other power distribution configurations, refer to the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002, to determine the ground jumper setting.

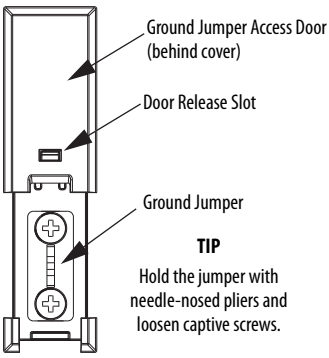
ATTENTION: Risk of equipment damage exists. The input-power ground configuration must be accurately determined. When the ground jumper is installed with impedance-grounded power distribution or when the ground jumper is not installed with grounded-wye power distribution, damage to equipment can result.

ATTENTION: Risk of equipment damage exists. If you are using the 2198-RP*xxx* regenerative bus supply, always remove the ground jumper in 2198-D*xxx*-ERS*x* and 2198-S*xxx*-ERS*x* inverters.

ATTENTION: To avoid personal injury, the ground jumper access door must be kept closed when power is applied. If power was present and then removed, wait at least 5 minutes for the DC-bus voltage to dissipate, and verify that no DC-bus voltage exists before accessing the ground jumper.

The ground-jumper access door is located on the front of the regenerative bus supply. To access the ground jumper, insert a small screw driver or probe into the door release slot and push the door up behind the cover.

Remove the Ground Jumper



Ground Jumper Setting for Regenerative Bus Supply

Ground Configuration [1]	Regenerative Bus Supply Ground Jumper Setting
Grounded (wye)	Ground jumper installed (default setting)
Impedance grounded	Remove ground jumper

(1) Refer to the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002, for configuration diagrams.

Install the Regenerative Bus Supply

These procedures assume that you have prepared your panel and understand how to bond your system. For installation instructions regarding equipment and accessories not included here, refer to the instructions that came with those products.

SHOCK HAZARD: To avoid hazard of electrical shock, perform all mounting and wiring of the Kinetix 5700 drive system prior to applying power. Once power is applied, connector terminals can have voltage present even when not in use.

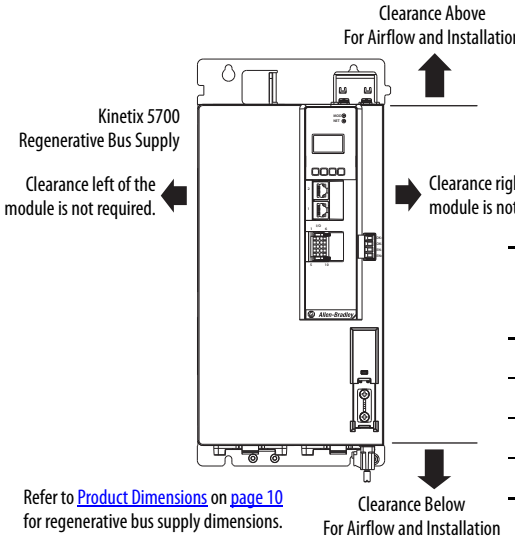
ATTENTION: Plan the installation of your system so that you can perform all cutting, drilling, tapping, and welding with the system removed from the enclosure. Because the system is of the open type construction, be careful to keep any metal debris from falling into it. Metal debris or other foreign matter can become lodged in the circuitry and result in damage to components.

Mount the Regenerative Bus Supply

Observe these clearance requirements when mounting the regenerative bus supply:

- Additional clearance is required for cables and wires or the shared-bus connection system connected to the top of the module.
- Additional clearance is required if other devices are installed above and/or below the module and have clearance requirements of their own.
- Additional clearance left and right of the module is required when mounted adjacent to noise sensitive equipment or clean wire ways.
- The recommended minimum cabinet depth is 300 mm (11.81 in.).

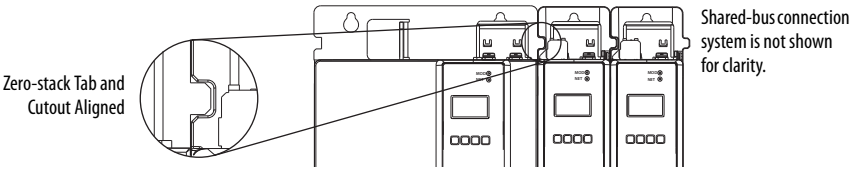
Minimum Clearance Requirements



Bus Supply Cat. No.	Clearance Above mm (in.)	Clearance Below mm (in.)
2198-RP088	40 (1.57)	100 (3.94)
2198-RP200		150 (5.91)
2198-RP263	80 (3.15)	200 (7.87)
2198-RP312		

IMPORTANT Mount the regenerative bus supply in an upright position as shown. Do not mount the unit on its side.

The Kinetix 5700 drive system must be spaced by aligning the zero-stack tab and cutout. To mount, size, and configure shared-bus configurations, refer to the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002.



Mount the Kinetix 5700 regenerative bus supply to the cabinet subpanel with M5 (#10-32) steel bolts torqued to 4.0 N•m (35.4 lb•in), max.

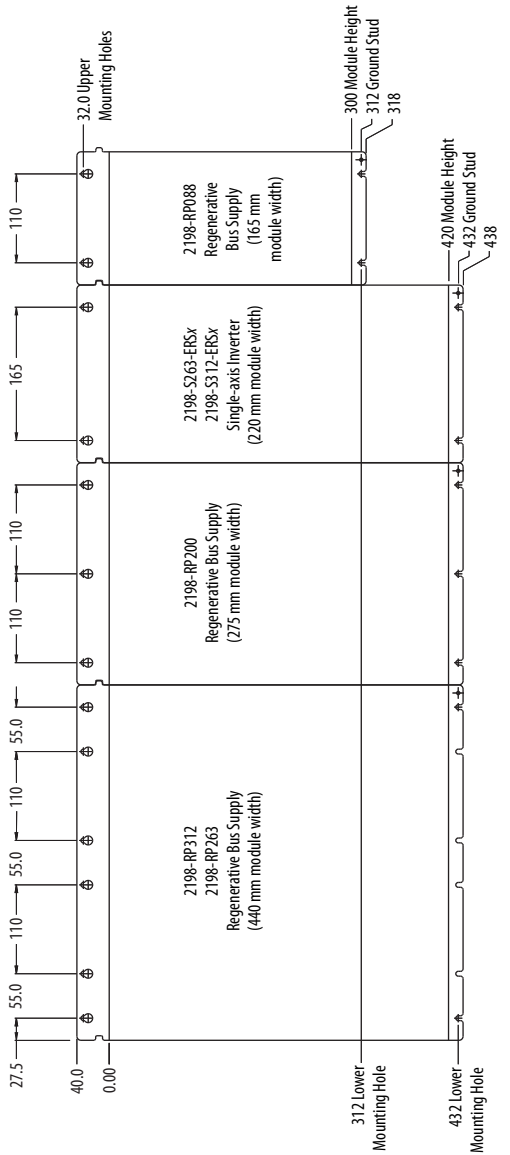
Mounting Hole Patterns

This section provides mounting hole patterns for Kinetix 5700 regenerative bus supplies that are mounted in zero-stack (shared-bus) configurations. The regenerative bus supply can be mounted on the far right, far left, or anywhere in between. However, the far left position is preferred to accommodate the 24V shared bus.

Mounting holes for the Kinetix 5700 regenerative bus supply modules are based on 55 mm spacing, however, only the holes specified for each module are required.

Regenerative Bus Supply Mounting Hole Patterns

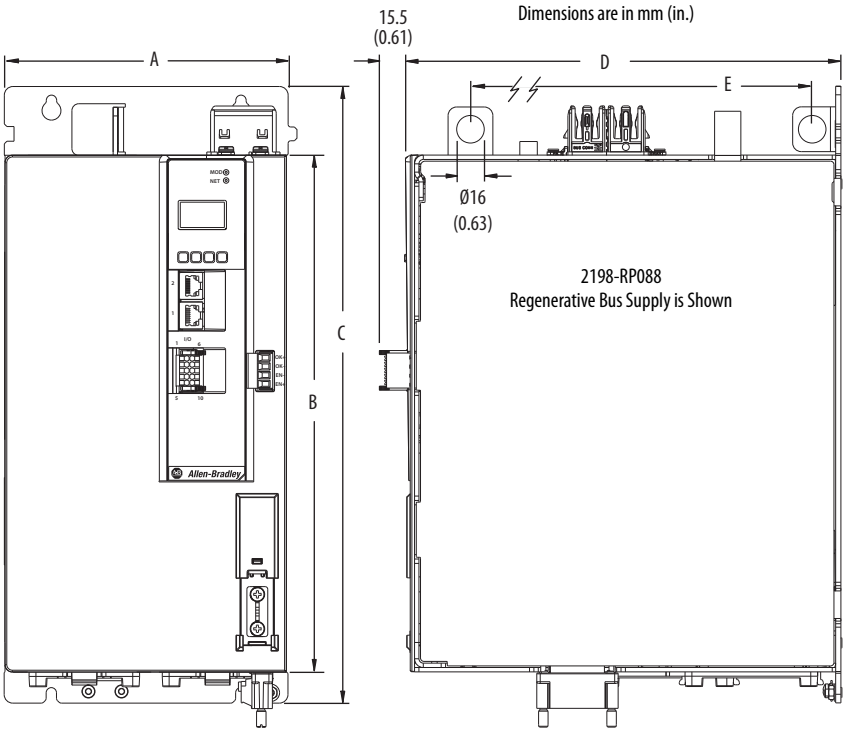
IMPORTANT Hole spacing is measured in millimeters and not converted to inches to avoid errors due to rounding.



Also available to assist you with mounting holes is the Kinetix 5700 System Mounting Toolkit, catalog number 2198-K5700-MOUNTKIT.

Product Dimensions

Refer to the Kinetix Servo Drives Technical Data, publication KNX-TD003, for product dimensions of all Kinetix 5700 drive modules.

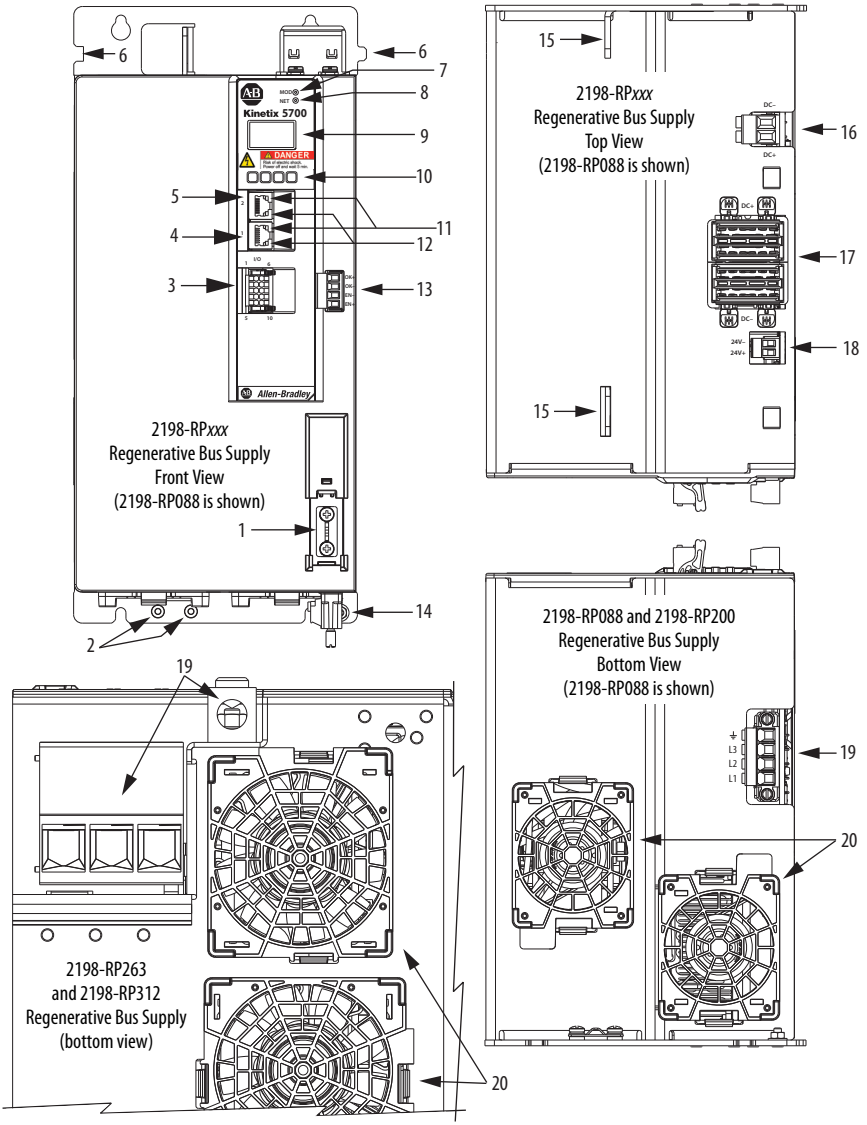


Regenerative Bus Supply Cat. No.	A mm (in.)	B mm (in.)	C mm (in.)	D mm (in.)	E (1) mm (in.)
2198-RP088	165 (6.50)	300 (11.8)	358 (14.1)	252 (9.92)	198 (7.80)
2198-RP200	275 (10.83)	420 (16.54)	478 (18.82)		225 (8.86), max
2198-RP263	440 (17.32)				233 (9.17), max
2198-RP312					

(1) Maximum distance between lift points.

Connector Data

Use this illustration to identify the regenerative-bus supply features and indicators.



For feature descriptions, by item number, see Regenerative Bus Supply Features and Indicators on page 12.

Regenerative Bus Supply Features and Indicators

Item	Description
1	Ground jumper in operation
2	Ground jumper in storage
3	Digital inputs (IOD) connector
4	Ethernet (PORT1) RJ45 connector
5	Ethernet (PORT2) RJ45 connector
6	Zero-stack mounting tab/cutout
7	Module status indicator
8	Network status indicator
9	LCD display
10	Navigation push buttons

Item	Description
11	Link speed status indicators
12	Link/Activity status indicators
13	Contactor enable (CED) connector
14	Ground lug
15	Lifting points
16	Active shunt (RC) connector
17	DC bus (DC) connector
18	24V control input power (CP) connector
19	AC Input power (IPD) connector (1)
20	Cooling fans

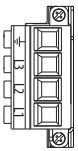
(1) Connector plug orientation applies to 2198-RP088 and 2198-RP200 modules (2198-RP200 connector size is larger). See adjacent figure for 2198-RP263 and 2198-RP312 connector plug size and orientation.

Regenerative Bus Supply Connectors

Designator	Description	Connector
IPD	AC mains input power	4-position plug, terminal screws
DC	DC common-bus power	DC-bus links and end caps
CP	24V control input power	2-position plug, terminal screws
RC	Active shunt power	2-position plug, terminal screws
IOD	Digital inputs	10-position plug, spring terminals
CED	Contactor enable	4-position plug, terminal screws
PORT1, PORT2	Ethernet communication ports	RJ45 Ethernet

Mains Input Power (IPD) Connector Pinout

IPD Pin	Description	Signal
⏚	Chassis ground	⏚
L3	Three-phase input power	L3
L2		L2
L1		L1

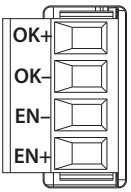


Shunt Power (RC) Connector Pinout

RC Pin	Description	Signal
2	Active shunt connections	DC+
1		DC–

Contactor Enable (CED) Connector Pinout

CED Pin	Description	Signal
OK+	Relay-driven contact that provides a signal to inverters indicating that they can draw power from the regenerative power supply.	CONV OK+
OK–		CONV OK–
EN–	Relay-driven contact that is used in the control string for a three-phase power contactor.	CONT EN–
EN+		CONT EN+



The contactor-enable circuitry includes a relay-driven contact within the 2198-RP*xxx* regenerative bus supply. The relay protects the Kinetix 5700 drive system in the event of overloads or other fault conditions.

An AC three-phase mains contactor must be wired in series between the branch circuit protection and the regenerative bus 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. Refer to the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002, for wiring examples.

ATTENTION: Wiring the contactor-enable relay is required. To avoid personal injury or damage to the Kinetix 5700 drive system, wire the contactor-enable relay into your control string so that:

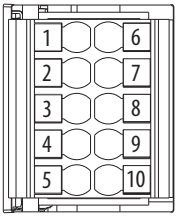
- three-phase power is removed and the regenerative bus supply is protected under various fault conditions.
- three-phase power is never applied to the Kinetix 5700 drive system before control power is applied.

Control Input Power (CP) Connector Pinout

CP Pin	Description	Signal
2	24V common	24V-
1	24V power supply, customer-supplied	24V+

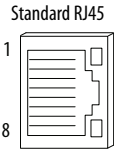
Digital Inputs (IOD) Connector Pinout

IOD Pin	Description	Signal
1	24V current sinking fast input #1	IN1
2	I/O common for customer-supplied 24V supply	COM
3	24V current sinking fast input #2	IN2
4	I/O common for customer-supplied 24V supply	COM
5	Chassis ground	SHLD
6	24V current sinking fast input #3	IN3
7	I/O common for customer-supplied 24V supply	COM
8	24V current sinking fast input #4	IN4
9	I/O common for customer-supplied 24V supply	COM
10	Chassis ground	SHLD



Ethernet Communication PORT1 and PORT2 Pinout

Port Pin	Description	Signal
1	Transmit port (+) data terminal	+ TX
2	Transmit port (-) data terminal	- TX
3	Receive port (+) data terminal	+ RX
4	–	–
5	–	–
6	Receive port (-) data terminal	- RX
7	–	–
8	–	–



Wiring Requirements

Wire must be copper with 75 °C (167 °F) minimum rating. Phasing of mains AC power is arbitrary and earth ground connection is required for safe and proper operation.

IMPORTANT The National Electrical Code and local electrical codes take precedence over the values and methods provided.

Regenerative Bus Supply Wiring Requirements

Regen Bus Supply Cat. No.	Description	Connects to Terminals		Wire Size mm ^{2} (AWG)	Strip Length mm (in.)	Torque Value N•m (lb•in)
		Pin	Signal			
2198-RP088	Mains input power	⏚ L3 L2 L1	⏚ L3 L2 L1	6…10 (10…8)	10.0 (0.39)	0.5…0.8 (4.4…7.1)
2198-RP200				10…35 (8…2)	20.0 (0.79)	2.5…4.5 (22…40)
2198-RP263 2198-RP312				21.1…120 (4…250 kcmil)	27.0 (1.06)	15…20 (132…177)
2198-RP*xxx*	PELV/SELV 24V power (connector plug)	CP-1 CP-2	24V+ 24V–	0.5…2.5 (20…14)	7.0 (0.28)	0.22…0.25 (1.9…2.2)
	DC Bus power	Bus bar	DC– DC+	N/A (1)	N/A (1)	N/A (1)
	Contactor enable	OK+ OK– EN– EN+	CONV OK+ CONV OK– CONT EN– CONT EN+	0.14…2.5 (26…12)	7.0 (0.28)	0.4…0.5 (3.5…4.4)
	Active shunt	RC-2 RC-1	DC+ DC–	1.5…6 (16…10)	12.0 (0.47)	0.5…0.6 (4.5…5.3)
	Digital inputs	IOD-1 IOD-2 IOD-3 IOD-4 IOD-5 IOD-6 IOD-7 IOD-8 IOD-9 IOD-10	IN1 COM IN2 COM SHLD IN3 COM IN4 COM SHLD	0.14…1.5 (26…16)	10.0 (0.39)	N/A (2)

(1) Shared DC-bus power connections are always made from drive to drive over the bus-bar connection system. These terminals do not receive discrete wires.

(2) This connector uses spring tension to hold wires in place.

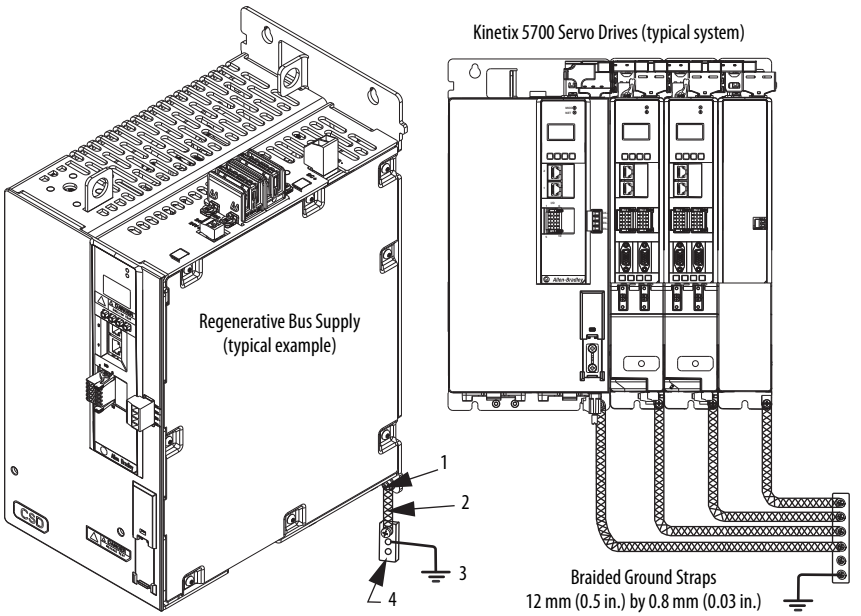
ATTENTION: To avoid personal injury and/or equipment damage, observe the following:

- Make sure that installation complies with specifications regarding wire types, conductor sizes, branch circuit protection, and disconnect devices. The National Electrical Code (NEC) and local codes outline provisions for safely installing electrical equipment.
- Ground shielded power cables to prevent potentially high voltages on the shield.

Ground Your Regenerative Bus Supply to the Subpanel

Ground the Kinetix 5700 regenerative bus-supply, servo drives, capacitor modules, and DC-bus conditioner modules to a bonded-cabinet ground bus with a braided ground strap. Keep the braided ground strap as short as possible for optimum bonding.

Connect the Braided Ground Strap



Item	Description
1	Ground screw (green) 2.0 N•m (17.5 lb•in), max
2	Braided ground strap (customer supplied)
3	Ground grid or power distribution ground
4	Bonded-cabinet ground bus (customer supplied)

Circuit Breaker/Fuse Specifications

The Kinetix 5700 regenerative bus supplies use internal solid-state motor short-circuit protection and, when protected by suitable branch circuit protection, are rated for use on a circuit that can deliver up to 200,000 A (fuses) and 65,000 A (circuit breakers). 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, which includes 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.

Input Power UL/CSA Circuit-protection Specifications

Kinetix 5700 Regenerative Bus Supply		UL/CSA Applications [2]				
Cat. No.	**Input Voltage [1] (three-phase) nom**	**Bussmann Fuses Cat. No.**	**Mersen Fuses Cat. No.**	**Miniature CB Cat. No.**	**Motor Protection CB, Self Protected CMC Cat. No.**	**Molded Case CB Cat. No.**
2198-RP088	324…506V AC rms	LPJ-45SP (45A)	AJT45 (45A)	–	–	140G-G6C3-C60
2198-RP200		LPJ-125SP (125A)	AJT125 (125A)	–	–	140G-J6F3-D15
2198-RP263		LPJ-200SP (200A)	AJT200 (200A)	–	–	140G-K6F3-D30
2198-RP312		LPJ-250SP (250A)	AJT250 (250A)	–	–	140G-K6F3-D40

(1) Applies when DC-bus voltage regulation is enabled. If DC-bus voltage regulation is not enabled, then the input voltage range is 324….528V AC. For more information on these two modes of operation, see the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002.

(2) For applications requiring 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.

Input Power IEC (non-UL/CSA) Circuit-protection Specifications

Kinetix 5700 Regenerative Bus Supply		IEC (non-UL/CSA) Applications				
Cat. No.	**Input Voltage [1] (three-phase) nom**	**DIN gG Fuses** Amps, max	**Miniature CB Cat. No.**		**Motor Protection CB Cat. No.**	**Molded Case CB Cat. No.**
2198-RP088	324…506V AC rms	50	1489-M3C600	1492-SPM3C630	140MG-H8E-C60	140G-G6C3-C60
2198-RP200		125	–	–	140MG-J8E-D15	140G-J6F3-D15
2198-RP263		200	–	–	–	140G-K6F3-D30
2198-RP312		250	–	–	–	140G-K6F3-D40

(1) Applies when DC-bus voltage regulation is enabled. If DC-bus voltage regulation is not enabled, then the input voltage range is 324….528V AC. For more information on these two modes of operation, see the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002.

Specifications

Attribute	2198-RP088	2198-RP200	2198-RP263	2198-RP312
Surrounding air temperature Operating Storage	0…50 °C (32…122 °F) -40…70 °C (-40…158 °F)			
Weight, kg (lb) approx	13.6 (30)	38.6 (85)	61.2 (135)	61.2 (135)
Short-circuit current rating	200,000 A rms symmetrical			
Branch-circuit short-circuit protection	Integral solid-state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electric Code (NEC) and any additional local codes.			
Leakage current	• Kinetix 5700 drives produce leakage current in the protective-earthing conductor that exceeds 3.5 mA AC and/or 10 mA DC. The minimum size of the protective-earthing (grounding) conductor used in the application must comply with local safety regulations for high-protective-earthing conductor current equipment. • Kinetix 5700 drives produce DC current in the protective-earthing conductor and can reduce the ability of a residual current device (RCD) or residual current monitor (RCM) of type A or AC to provide protection for the drive module and other equipment in the installation.			

Additional Resources

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

Resource	Description
Kinetix 5700 Servo Drives User Manual, publication 2198-UM002	Provides information to install, configure, start, and troubleshoot your Kinetix 5700 servo drive system.
Kinetix Servo Drives Specifications Technical Data, publication KNX-TD003	Provides product specifications for the 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	Provides product specifications for Bulletin 2090 motor and interface cables, low-profile connector kits, drive power components, and other servo drive accessory items.
Kinetix 5000 AC Line Filter Installation Instructions, publication 2198-IN003	Provides information to install and wire Kinetix 5500 and Kinetix 5700 AC line filters.
Kinetix 5700 DC-bus Conditioner Modules Installation Instructions, publication 2198-IN016	Provides information to install and wire Kinetix 5700 DC-bus conditioner modules.
Kinetix 5700 Capacitor Modules Installation Instructions, publication 2198-IN008	Provides information to install and wire Kinetix 5700 capacitor modules.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, rok.auto/certifications	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at 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.

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

Documentation Feedback

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

Rockwell Automation maintains current product environmental information on its website at http://www.rockwellautomation.com/rockwellautomation/about-us/sustainability-ethics/product-environmental-compliance.page.

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