

Kinetix 5700 Capacitor Module and Extension Module

Catalog Numbers 2198-CAPMOD-2240, 2198-CAPMOD-DCBUS-10

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Summary of Changes

This manual contains new and updated information as indicated in the following table.

Topic	Page
Updated the mounting and installation information consistent with the Bulletin 2198 DC-bus conditioner module and introduced all three modules as accessory modules.	Throughout
Updated the external DC-bus current values as 104 A systems and 208 A systems, maximum.	
Replaced the extension module in the extended (208 A) system example with a DC-bus conditioner module. Also, updated the descriptive text explaining when the accessory modules are required.	4
Replaced the extension module in the 8720MC-RPS system example with a DC-bus conditioner module. Also, updated the descriptive text explaining when the accessory modules are required.	5
Added dimensions to the M8 DC-bus stud connections on accessory modules to help size lugs, if required.	6
Updated the module status pinout information.	9
Updated the compatible active shunt specifications information.	11
Added information to make clear how to obtain flexible bus-bars.	2, 12

About the Capacitor Module and Extension Module

The 2198-CAPMOD-2240 capacitor module, 2198-CAPMOD-DCBUS-IO extension module, and 2198-DCBUSCOND-RP312 DC-bus conditioner module are also referred to as Kinetix® 5700 accessory modules.

Accessory modules can be used in any Kinetix 5700 drive system configurations with DC-bus power supplies, regenerative bus supplies, and 8720MC-RPS power supplies.

Accessory Module Cat. No.	Description
2198-CAPMOD-2240 capacitor modules are used:	<ul style="list-style-type: none"> For energy storage and to extend the DC-bus voltage to another inverter cluster. As connection points for an external active shunt module. In systems with external DC-bus current of up to 104 A, however, can parallel with itself or with another accessory module for up to 208 A.
2198-CAPMOD-DCBUS-IO extension modules are used:	<ul style="list-style-type: none"> With another accessory module when the external DC-bus current is > 104 A, up to a maximum of 208 A. To extend the DC-bus voltage to another inverter cluster.

See the Kinetix 5700 Servo Drives User Manual, publication [2198-UM002](#), for help selecting accessory modules for your application.

Before You Begin

Remove all packing material, wedges, and braces from within and around the components. After unpacking, check the item nameplate catalog number against the purchase order.

The Kinetix 5700 accessory modules include the following accessory items.

Item	2198-CAPMOD-2240	2198-CAPMOD-DCBUS-IO
Parts kit containing stud/lug cover with wires ⁽¹⁾ , lug-cover bottom plate, hex nuts and spacers for M8 studs, and 55 mm DC-bus link	X	X
Wiring plug for the module status (MS) connector	X	—
Wiring plug for the 24V DC input power (CP) connector	X	—
Flexible bus-bars, 2 each ⁽²⁾	—	X

(1) Stud cover for systems without wires attached is installed on each module.

(2) Flexible bus-bars are included with only the 2198-CAPMOD-DCBUS-IO extension module. So, if you have two capacitor modules, two DC-bus conditioner modules, or a capacitor module and DC-bus conditioner module mounted side by side, you must order the 2198-KITCON-CAPMOD2240 or 2198-KITCON-DCBUSCOND connector set separately.

Install the Capacitor Module and Extension Module

These procedures assume that you have prepared your panel, mounted your Kinetix 5700 servo drives, 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 the hazard of electrical shock, perform all mounting and wiring of the Kinetix 5700 drive modules prior to applying power. Once power is applied, and then removed, you must wait 5 minutes and verify that the DC-bus voltage has discharged before servicing.

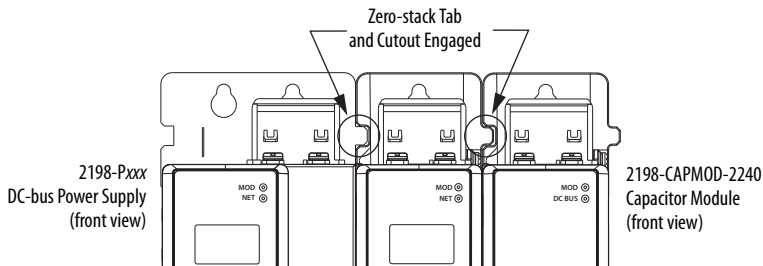


ATTENTION: Plan the installation of your system so that you can perform all cutting, drilling, tapping, and welding with the system removed from the enclosure. Because the system is of open type construction, be careful to keep any metal debris from falling into it. Metal debris or other foreign matter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

Zero-stack Tab and Cutout

Engaging the zero-stack tab and cutout from module-to-module is required for shared-bus drive systems and includes the Kinetix 5700 accessory modules. This is done to make sure that the module connectors are spaced properly to accept the shared-bus connection system.

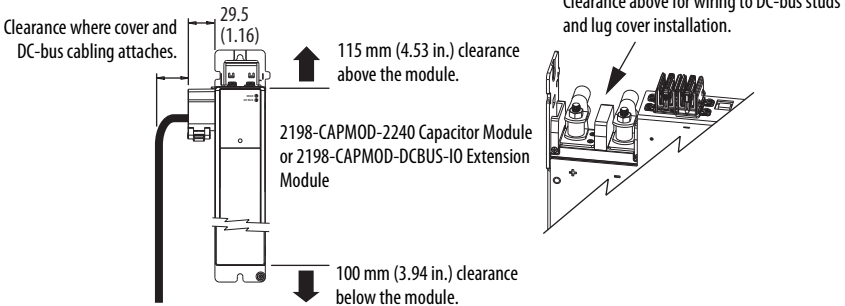
Zero-stack Tab and Cutout Example



Clearance Requirements

The capacitor module and extension module require clearance above the module for access to the DC-bus studs and side-to-side for the DC-bus wiring that attaches to the studs. Refer to the Kinetix 5700 Servo Drives User Manual, publication [2198-UM002](#), for system clearance information.

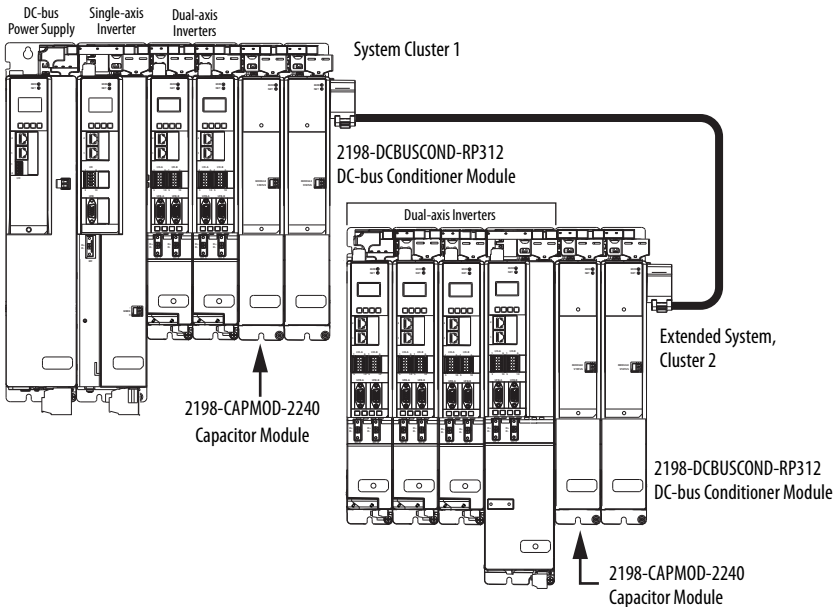
Minimum Clearance Requirements



Mount the Capacitor Module and Extension Module

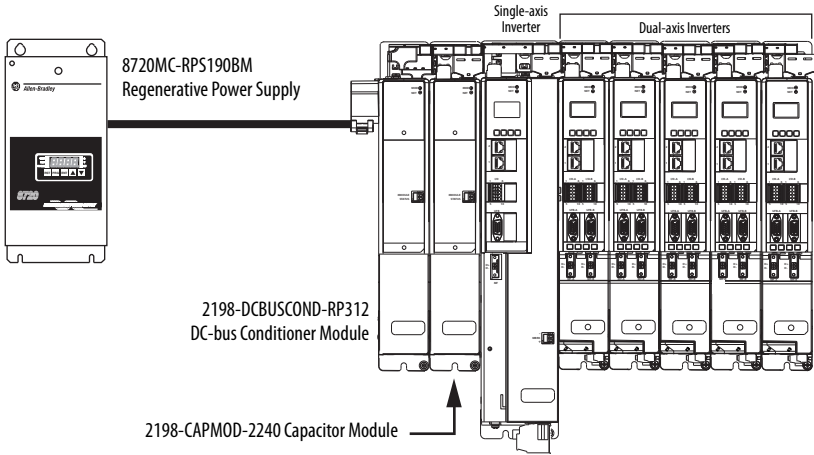
For extended 104 A drive systems, the 2198-DCBUSCOND-RP312 DC-bus conditioner modules can be removed from Cluster 1 and Cluster 2 if they are not required to help protect system components.

Kinetix 5700 Drive System Example with Extended (208 A) Drive Cluster



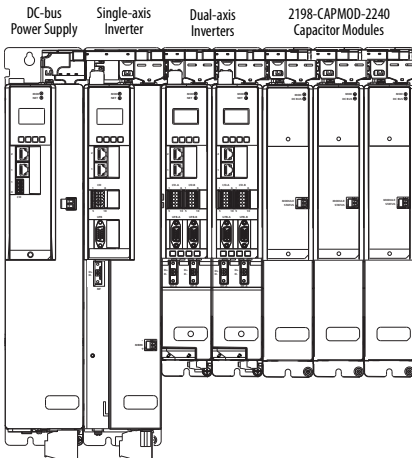
In this example, the capacitor module and DC-bus conditioner module are positioned on the far right in both clusters. Other configurations are possible, as long as the inverters with the highest power ratings (in each cluster) are positioned closest to the DC-bus power supply and in decreasing order leading away from the supply. Two accessory modules are required at each cluster, because this is a 208 A system. However, DC-bus conditioner modules are required (in each cluster) if the total motor-power cable length of each cluster exceeds 400 m (1312 ft).

Kinetix 5700 Drive System Example with 8720MC-RPS Unit (208 A) Drive System



In this example, the 8720MC-RPS unit, capacitor module, and DC-bus conditioner module are positioned on the far left, with the DC-bus supply feeding into the inverter with the highest power rating. To move the DC-bus input voltage to the far right, you must also reverse the order of the inverters. Two accessory modules are required because this is a 208 A system. The DC-bus conditioner is also required if the total motor-power cable lengths exceed 400 m (1312 ft).

Kinetix 5700 Drive System Example with Multiple Capacitor Modules



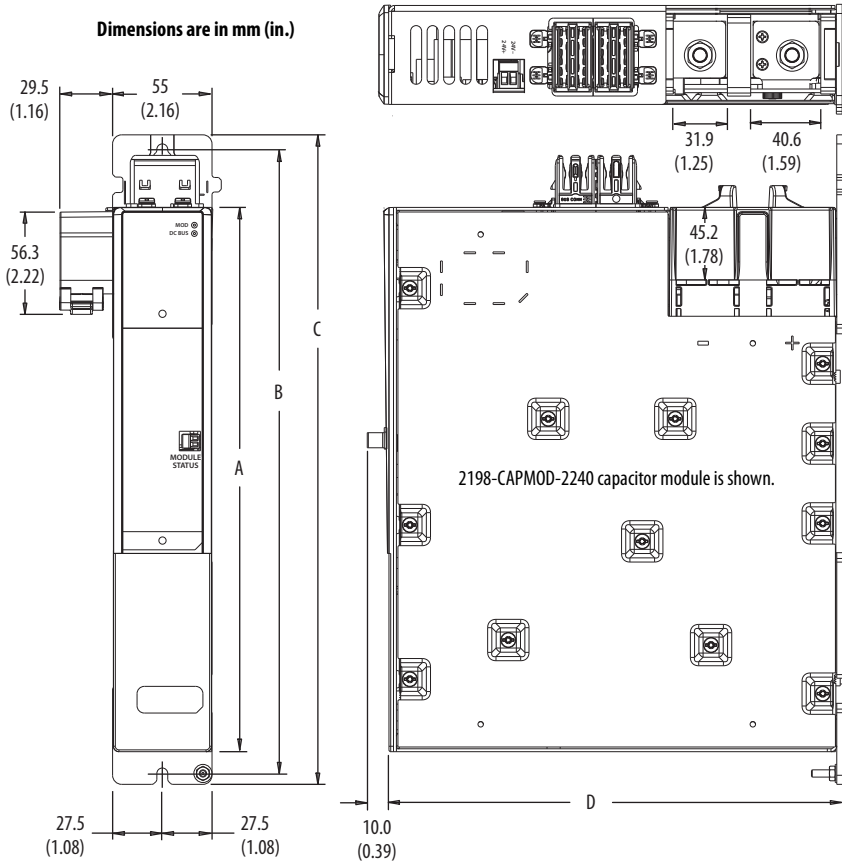
In this example, the bank of three capacitor modules are positioned on the far right. However, they can all be moved to the far left to optimize panel space.

Each 2198-CAPMOD-2240 capacitor module adds to the total system capacitance and increased energy storage. The only limit to the number of capacitor modules in a system is the amount of total capacitance of the system. See the Kinetix 5700 Servo Drives User Manual, publication [2198-UM002](#), to determine the maximum system capacitance for your selected DC-bus power supply or regenerative bus supply.

Product Dimensions

Refer to the Kinetix 5700 Servo Drives User Manual, publication [2198-UM002](#), for system-wide drill hole specifications.

Capacitor Module and Extension Module Dimensions



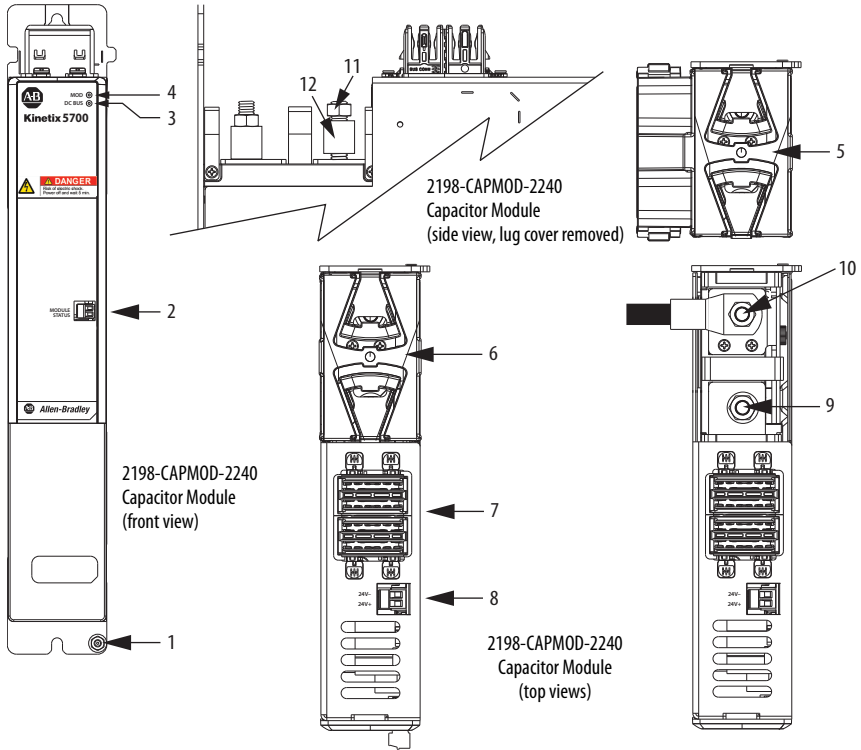
Module Cat. No.	A	B ⁽¹⁾	C	D
2198-CAPMOD-2240	300 (11.81)	345 (13.58)	358 (14.09)	253 (10.0)
2198-CAPMOD-DCBUS-IO	131 (5.16)	176 (6.93)	189 (7.44)	248 (9.76)

(1) The recommended mounting hardware is M5 (#10-32) steel bolts. Apply 4.0 N·m (35.4 lb-in) maximum torque to each fastener.

Connector Data

Lug spacers are needed only when wiring both external DC-bus and active shunt connections to the lug studs. Two types of lug covers are provided, one for systems with external DC-bus or active shunt wires attached and one without.

Capacitor Module Features and Indicators

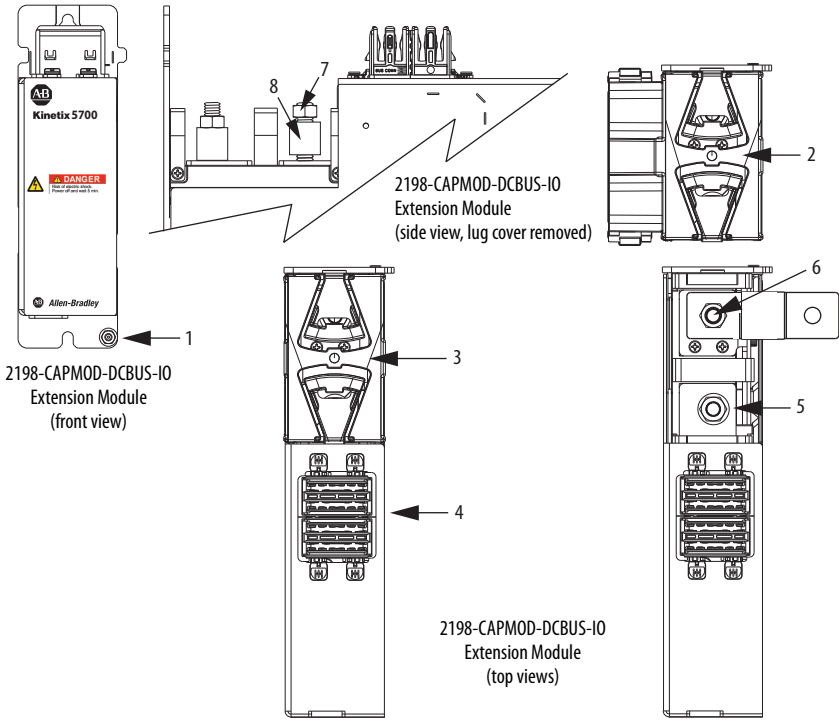


Item	Description
1	Ground stud
2	Module status (MS) connector
3	DC-bus status indicator
4	Module status indicator
5	Stud/lug cover with wires ⁽¹⁾
6	Stud cover without wires

Item	Description
7	DC-bus (DC) connector
8	24V control input power (CP) connector
9	DC- M8 stud (external DC-bus)
10	DC+ M8 stud (external DC-bus), shown with wire lug
11	M8 hex nut
12	Lug spacer

(1) This example shows the lug cover oriented for wires exiting to the left (capacitor module is on the far left of the drive configuration). Rotate lug cover 180° when wires exit to the right (capacitor module is on the far right of the drive configuration).

Extension Module Features and Indicators



Item	Description
1	Ground lug
2	Stud/lug cover with wires ⁽¹⁾
3	Stud cover without wires
4	DC-bus (DC) connector

Item	Description
5	DC- M8 stud (external DC-bus)
6	DC+ M8 stud (external DC-bus), shown with flexible bus-bar
7	M8 hex nut
8	Lug spacer

(1) This example shows the lug cover oriented for wires exiting to the left (extension module is on the far left of drive configuration). Rotate lug cover 180° when wires exit to the right (extension module is on the far right of drive configuration).

DC Bus (DC) Connector Pinout

DC Pin	Description	Signal
Bus link	DC bus connections	DC-
		DC+

Control Input Power (CP) Connector Pinout

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

Module Status (MS) Connector Pinout

MS Pin	Description	Signal
1	Module status output	MS
2		MS

Wiring Requirements

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

Capacitor Module and Extension Module Wiring Requirements

Connector Description	Pin	Signal	Recommended Wire Size mm ² (AWG)	Strip Length mm (in.)	Torque Value N·m (lb·in)
Module Status	MS-1 MS-2	MS MS	0.14...1.5 (28...16)	7.0 (0.28)	0.22...0.25 (1.9...2.2)
PELV/SELV 24V power (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⁾
DC-bus studs	Bus-bar		N/A	N/A	18 (156)
	Lugs		53.5 (1/0 AWG) 104 A 152 (300 kcmil) 208 A	N/A ⁽²⁾	

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

(2) Strip length for the DC-bus studs depend on the customer-supplied lugs.



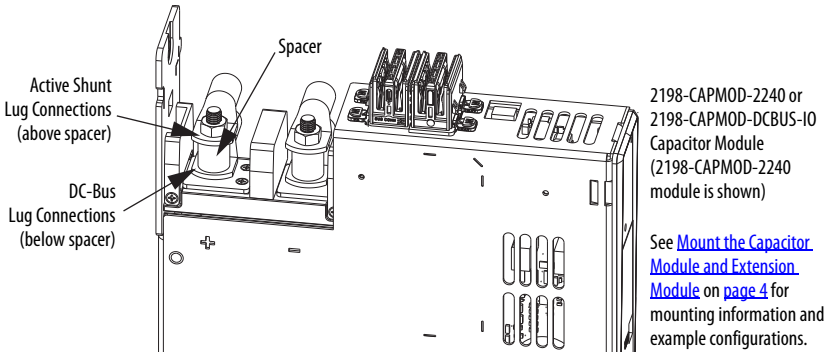
ATTENTION: To avoid personal injury and/or equipment damage, observe the following:

- Make sure that the 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.
- Use power connectors for connection purposes only. Do not use them to turn the unit on and off.

Wire an External Active Shunt

Active shunts wire to the DC-bus studs. The capacitor module and extension module are equipped with spacers that slide onto the M8 studs. When the system configuration includes external DC-bus and active shunt connections, external DC-bus connections are made below the spacer and active shunt connections are made above the spacer.

Active Shunt Connections



Active shunts are available from the Rockwell Automation Encompass™ partner Powerohm Resistors, Inc. See <http://www.powerohm.com> for more information on Powerohm active shunts.

IMPORTANT Powerohm Bulletin PKBxxx active shunt modules use built-in internal brake resistors. Bulletin PWBxxx active shunt modules require appropriately sized external brake resistors.



ATTENTION: Do not use Powerohm active-shunt modules at input line voltages that exceed 528V AC. Active-shunt thermal-overload shutdown can occur if input line voltage exceeds 528V AC.

Compatible Active Shunt Specifications (internal brake resistor)

Kinetix 5700 Power Supply	Powerohm Resistors Cat. No. (1)	Input Voltage, nom	Turn-on Bus Voltage	Continuous Power kW	Resistance (internal) Ω	Resistance (minimum) Ω	Continuous Current Amps	Peak Current Amps
2198-Pxxx DC-bus power supply or 2198-RPxxx regenerative bus supply when DC-bus regulation is not enabled.	PKB005	480V AC	750V DC	1.50	108	-	2.00	6.9
	PKB010			2.06	52.7	-	2.75	14.2
	PKB050			7.00	10.5	-	9.30	71.4
2198-RPxxx regenerative bus supply when DC-bus regulation is enabled.	PKB005-800	800V DC	800V DC	1.50	108	-	1.88	7.4
	PKB010-800			2.06	52.7	-	2.58	15.2
	PKB050-800			7.00	10.5	-	8.72	76.2

(1) To connect Powerohm PKBxxx shunts to the 2198-Pxxx DC-bus power supply and 2198-RPxxx regenerative bus supply, see the Kinetix 5700 Servo Drives User Manual, publication [2198-UM002](#).

Compatible Active Shunt Specifications (no internal brake resistor)

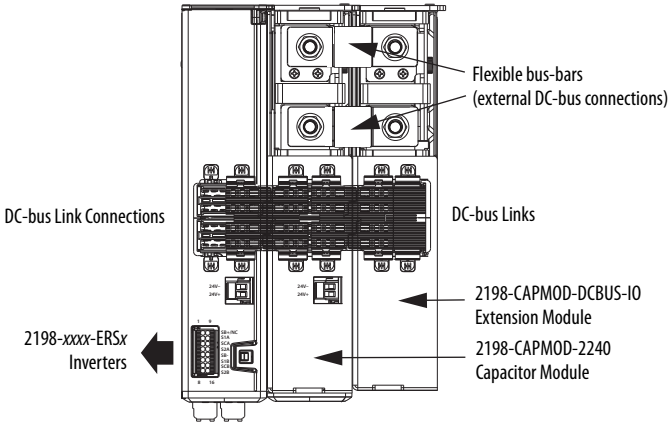
Kinetix 5700 Power Supply	Powerohm Resistors Cat. No. (1)	Input Voltage, nom	Turn-on Bus Voltage	Continuous Power kW	Resistance (internal) Ω	Resistance (minimum) Ω	Continuous Current Amps	Peak Current Amps
2198-Pxxx DC-bus power supply or 2198-RPxxx regenerative bus supply when DC-bus regulation is not enabled.	PWB035	480V AC	750V DC	26.25	-	7.5	35	100
	PWB110			82.5	-	2.5	110	300
	PWB035-800			26.25	-	8.0	35	100
2198-RPxxx regenerative bus supply when DC-bus regulation is enabled.	PWB110-800	800V DC	800V DC	82.5	-	2.7	110	300

(1) To connect Powerohm PWBxxx shunts to the 2198-Pxxx DC-bus power supply and 2198-RPxxx regenerative bus supply, see the Kinetix 5700 Servo Drives User Manual, publication [2198-UM002](#).

Connect Modules with Flexible Bus-bars

When the 2198-CAPMOD-DCBUS-IO extension module is used, two flexible bus-bars make the external DC-bus lug connections to the 2198-CAPMOD-2240 capacitor module. The DC-bus links must also be installed.

Flexible Bus-bar Example



ATTENTION: To avoid damage to components on 208 A systems, the DC-bus links and the flexible bus-bars must be installed.

Flexible bus-bars are included with only the 2198-CAPMOD-DCBUS-IO extension module. So, if you have two capacitor modules, two DC-bus conditioner modules, or a capacitor module and DC-bus conditioner module mounted side by side, you must order the 2198-KITCON-CAPMOD2240 or 2198-KITCON-DCBUSCOND connector set separately.

Accessory Module Cat. No.	Module	Flexible Bus-bars Included
2198-CAPMOD-2240	Capacitor module	No ⁽¹⁾
2198-CAPMOD-DCBUS-IO	Extension module	Yes
2198-DCBUSCOND-RP312	DC-bus conditioner module	No ⁽¹⁾

(1) For flexible bus-bars, order either 2198-KITCON-CAPMOD2240 or 2198-KITCON-DCBUSCOND connector set.

See the Kinetix 5700 Servo Drives User Manual, publication [2198-UM002](#), for detailed information on wiring, applying power, and troubleshooting accessory modules.

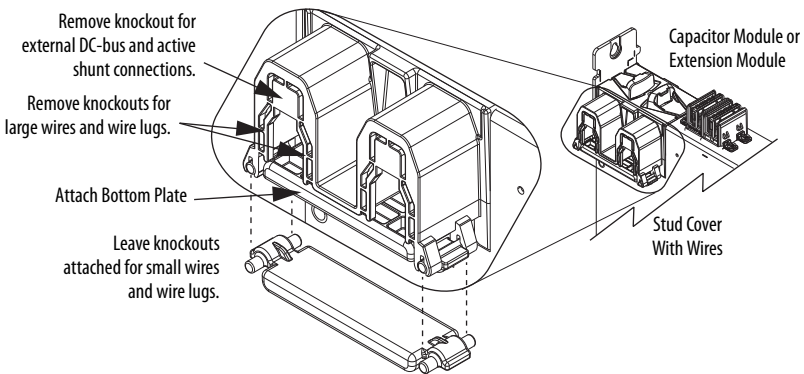
Apply Stud/Lug Covers

Covers are included with the capacitor module and extension module and are used to protect you from the electrical hazard that is present on the DC-bus studs, lugs/wires, and flexible bus-bars that are attached to accessory modules. Insert the appropriate cover over the external DC-bus connections. You can rotate the covers 180° to accommodate lugs, wires, or flexible bus-bars exiting from either the left or right.



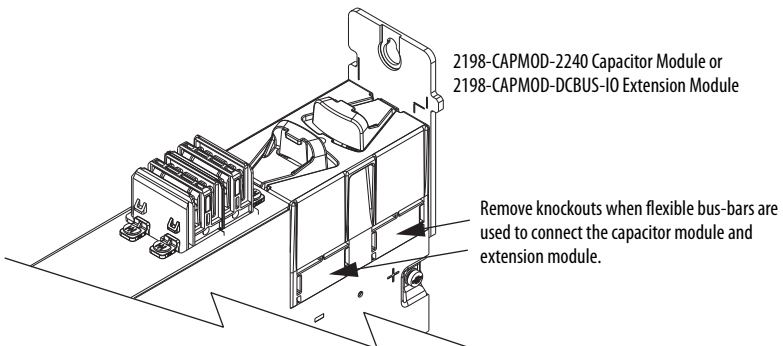
ATTENTION: To avoid personal injury, make sure that the appropriate cover is inserted over the DC-bus studs, lugs/wires, or flexible bus-bars when installing 2198-CAPMOD-2240 capacitor modules and 2198-CAPMOD-DCBUS-IO extension modules. Covers with wires also require a hinged bottom plate to prevent access from below.

Stud/Lug Cover With Wires



ATTENTION: To avoid unintentional damage to the lug cover, we recommend cutting the knockout to remove it from the cover.

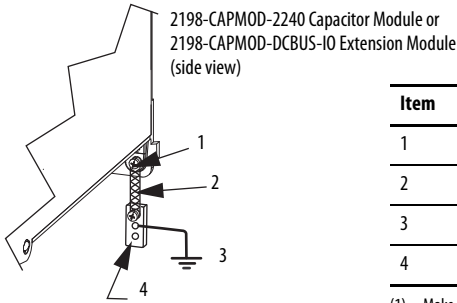
Stud Cover With Flexible Bus-bars



Ground Drive Modules to the Subpanel

Ground Bulletin 2198 drive modules, capacitor modules, and extension modules to a bonded cabinet ground-bus with a braided ground strap.

Connecting 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) ⁽¹⁾
3	Ground grid or power distribution ground
4	Bonded cabinet ground-bus (customer supplied)

(1) Make braided ground straps 12 mm (0.5 in.) by 0.8 mm (0.03 in.). Keep straps as short as possible.

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 on installing, configuring, starting, and troubleshooting your Kinetix 5700 servo drive system.
Kinetix 5700 DC-bus Conditioner Modules Installation Instructions, publication 2198-IN016	Provides information on installing and wiring the Kinetix 5700 DC-bus conditioner module.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://ab.rockwellautomation.com	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>.

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

Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete the How Are We Doing? form at http://literature.rockwellautomation.com/idc/groups/literature/documents/du/ra-du002_-en-e.pdf.



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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