MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

ALLEN-BRADLEY

2198-P141

DC-BUS POWER SUPPLY

Used with the applicable Kinetix 5700 DC-bus power supply configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Rockwell Automation 2198-IN009E-EN-P, Kinetix 5700 DC-bus Power Supply Installation Instructions

Installation Instructions

Original Instructions

Kinetix 5700 DC-bus Power Supply

Catalog Numbers 2198-P031, 2198-P070, 2198-P141, 2198-P208

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Summary of Changes

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Updated Kinetix 5700 Servo Drive Circuit Breaker/Fuse specifications to include 140MT Motor Protection Circuit Breakers for power supply Cat. No. 2198-P070.	13

About the DC-bus Power Supply

The Kinetix® 5700 DC-bus (converter) power 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 7…46 kW and 10.5…69.2 A, respectively. For additional output power (kW) you can install two or three 2198-P208 DC-bus power supplies. You can also extend the DC-bus to additional inverter clusters via accessory modules.

See the Kinetix 5700 DC-bus Power Supply Servo Drives User Manual, publication 2198-UM002, for detailed information on wiring, applying power, troubleshooting, and integration with ControlLogix® EtherNet/IP communication modules or CompactLogix™ 5370 controllers.

Catalog Number Explanation

This publication applies to the following Kinetix 5700 DC-bus Power Supply DC-bus power supplies.

DC-bus Power Supply Catalog Numbers

DC-bus Power Supply Cat. No.	Module Width mm	Input Voltage	Continuous Output Power kW	Continuous Output Current A_{DC} rms
2198-P031	55	195…528V rms, three-phase	7	10.5
2198-P070			17	25.5
2198-P141	85		31	46.9
2198-P208			46	69.2

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.

Parts List

The DC-bus power supplies ship with the following:

- 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 drive
- These installation instructions, publication 2198-IN009

Replacement connector sets are also available. See the Kinetix 5700, 5500, 5300, 5100 Servo Drives Specifications Technical Data, publication KNX-TD003, for more information.

Remove the Ground Screw in Select Power Configurations

Remove the ground screw when using ungrounded, corner-grounded, and impedance-grounded power configurations.

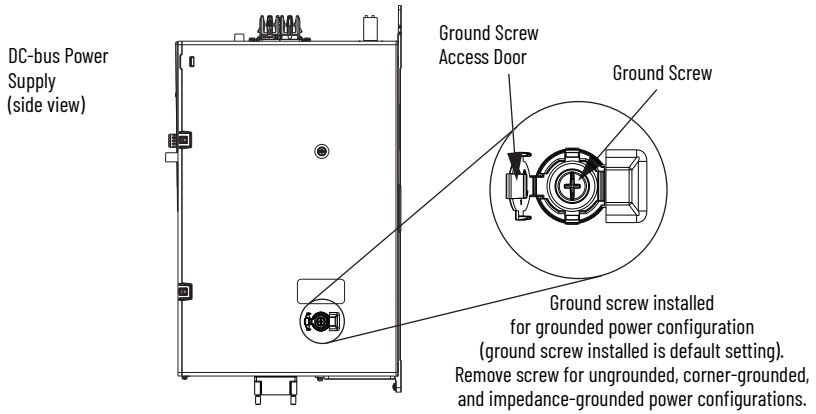
IMPORTANT If you have grounded-wye power distribution, you do not need to remove the screw. Go to Install the DC-bus Power Supply on page 3.
EMC performance can be affected if you remove the ground screw.

We recommend that you remove the ground screw before mounting the power supply to the panel. Place the power supply on its side, on a solid surface equipped as a grounded static-safe workstation.

ATTENTION: To avoid personal injury, the ground-screw 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 screw.

To access the ground screw, open the small plastic door on the right side of the module.

Remove the Ground Screw



ATTENTION: Risk of equipment damage exists. The drive-module ground configuration must be accurately determined. Leave the ground screw installed for grounded power configurations (default). Remove the screw for ungrounded, corner-grounded, and impedance-grounded power.

Ground Screw Settings

Ground Configuration (1)	2198-P*xxx* DC-bus Power Supply
Grounded (wye)	Ground screw installed (default setting) (2)
• AC-fed ungrounded • Corner grounded • Impedance grounded	Remove ground screw

(1) Refer to the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002, for example configurations.
(2) Ground screw is factory installed.

Install the DC-bus Power 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 DC-bus Power Supply drive prior to applying power. Once power is applied, connector terminals can have voltage present even when not in use.

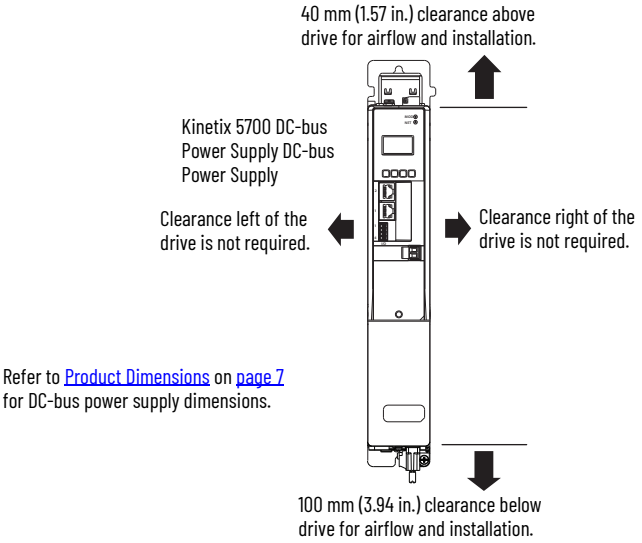
ATTENTION: Plan the installation of your system so that you can perform all cutting, drilling, tapping, and welding with the system removed from the enclosure. Because the system is of the open type construction, be careful to keep any metal debris from falling into it. Metal debris or other foreign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

Mount the DC-bus Power Supply

Observe these clearance requirements when mounting the DC-bus power supply:

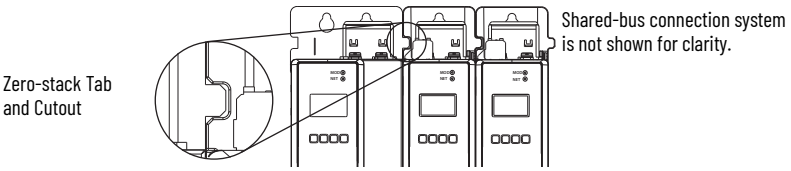
- Additional clearance is required for cables and wires or the shared-bus connection system connected to the top of the drive module.
- Additional clearance is required if other devices are installed above and/or below the drive and have clearance requirements of their own.
- Additional clearance left and right of the drive 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



IMPORTANT Mount the drive module in an upright position as shown. Do not mount the drive module on its side.

The Kinetix 5700 drive system must be spaced by aligning the zero-stack tab and cutout. For mounting, sizing, and configuring shared-bus configurations, refer to the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002.



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

Drill Hole Patterns

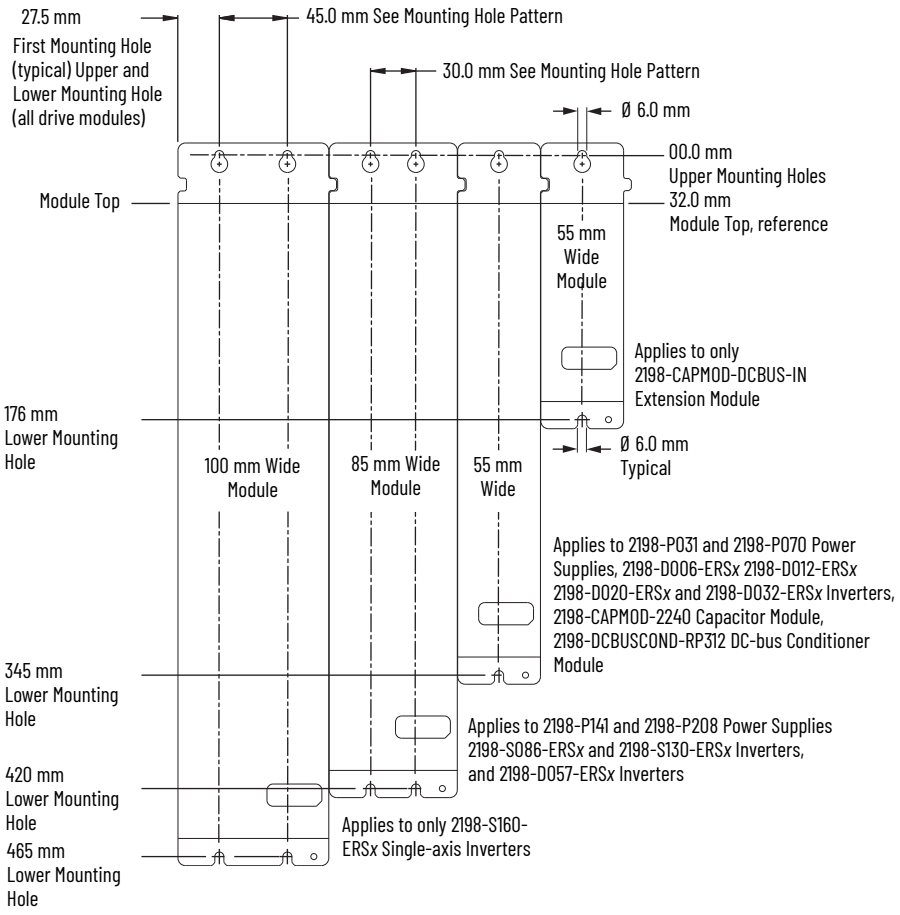
This section provides hole patterns for Kinetix 5700 drive modules that are mounted in zero-stack (shared-bus) configurations:

- Mount the DC-bus power supply anywhere within the cluster, whatever makes the best use of panel space. If multiple 2198-P208 power supplies are mounted within the same cluster, mount them adjacent to each other anywhere within the cluster.
- Mount the inverter modules according to power rating (highest to lowest) from left to right or right to left, depending on where the power supply is mounted, with the highest rated inverter adjacent to the power supply.

Calculate the left-to-right hole pattern for any Kinetix 5700 drive module configuration by following these steps.

1. The first hole location is zero.
2. The second hole location is module width minus 55 mm.
3. The next hole location is 55 mm.
4. Repeat step 2 and step 3 for the remaining holes.

Kinetix 5700 Mounting Hole Patterns



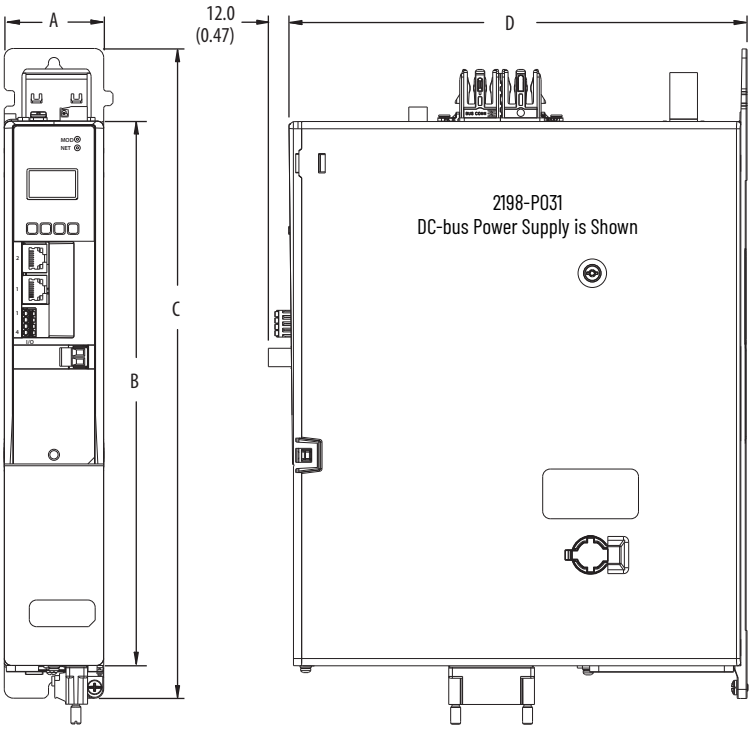
When your Kinetix 5700 system configuration includes 2198-S263-ERSx or 2198-S312-ERSx single-axis inverters, see the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002, for those mounting hole patterns.

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 5700, 5500, 5300, 5100 Servo Drives Specifications Technical Data, publication KNX-TD003, for product dimensions of all Kinetix 5700 drive modules.

Dimensions are in mm (in.)

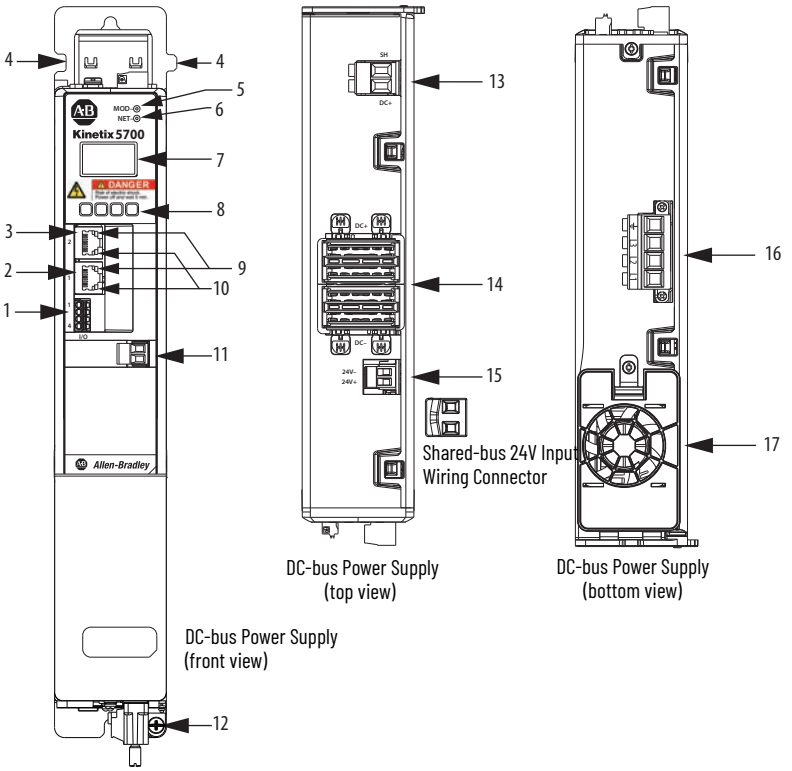


DC-bus Power Supply Cat. No.	A mm (in.)	B mm (in.)	C mm (in.)	D mm (in.)
2198-P031	55 (2.17)	300 (11.8)	358 (14.1)	252 (9.9)
2198-P070				
2198-P141	85 (3.35)	375 (14.8)	433 (17.0)	
2198-P208				

Connector Data

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

DC-bus Power Supply Features and Indicators (2198-P031 power supply is shown)



Item	Description
1	Digital inputs (IOD) connector
2	Ethernet (PORT1) RJ45 connector
3	Ethernet (PORT2) RJ45 connector
4	Zero-stack mounting tab/ cutout
5	Module status indicator
6	Network status indicator

Item	Description
7	LCD display
8	Navigation push buttons
9	Link speed status indicators
10	Link/Activity status indicators
11	Contactor enable (CED) connector
12	Ground terminal

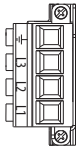
Item	Description
13	Shunt resistor (RC) connector
14	DC bus (DC) connector
15	24V control input power (CP) connector
16	AC Input power (IPD) connector
17	Cooling fan

DC-bus Power 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	Shunt power	2-position plug, terminal screws
IOD	Digital inputs	4-position plug, spring terminals
CED	Contactor enable	2-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
1	Shunt connections	SH
2		DC+



Contactor Enable (CED) Connector Pinout

CED Pin	Description	Signal
EN–	Contactor-enable connections	CONT EN–
EN+		CONT EN+



The contactor-enable circuitry includes a relay-driven contact within the 2198-P*xxx* DC-bus power 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 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. 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 DC-bus power supply is protected under various fault conditions.
- three-phase power is never applied to the Kinetix 5700 drive system before control power is applied.

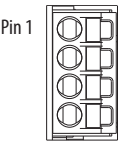
Control Input Power (CP) Connector Pinout

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



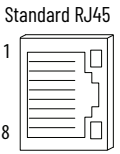
Digital Inputs (IOD) Connector Pinout

IOD Pin	Description	Signal
1	Digital input #1	IN1
2	I/O common for customer-supplied 24V supply.	COM
3	Digital input #2	IN2
4	I/O cable shield termination point.	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.

DC-bus Power Supply Wiring Requirements

DC-bus Power 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-P031	Mains input power	⏚ L3 L2 L1	⏚ L3 L2 L1	6…10 (1) (10…8)	10.0 (0.39)	0.5…0.8 (4.4…7.1)
2198-P070				6…10 (2) (10…8)		
2198-P141 2198-P208				10…35 (8…2)	20.0 (0.79)	2.5…4.5 (22…40)

DC-bus Power Supply Wiring Requirements

DC-bus Power 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-P*xxx*	PELV/SELV 24V power (connector plug)	CP-1 CP-2	24V+ 24V–	0.5…4 (20…12)	7.0 (0.28)	0.22…0.25 (1.9…2.2)
	DC Bus power	Bus bar	DC– DC+	N/A (3)	N/A (3)	N/A (3)
	Contactor enable	EN– EN+	CONT EN– CONT EN+	0.14…2.5 (26…12)	7.0 (0.28)	0.4…0.5 (3.5…4.4)
	Shunt resistor	RC-1 RC-2	SH 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	IN1 COM IN2 SHLD	0.14…1.5 (26…16)	10.0 (0.39)	N/A (4)

(1) Applies to solid wire. If using stranded wire, the maximum wire size is 6 mm^2 (10 AWG).

(2) Applies to solid wire. If using stranded wire, the maximum wire size is 6 mm^2 (10 AWG). To meet CE requirements above 45 °C (113 °F) for 6 mm^2 stranded wires, single-core copper conductors must be used with 90 °C minimum rating.

(3) 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.

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



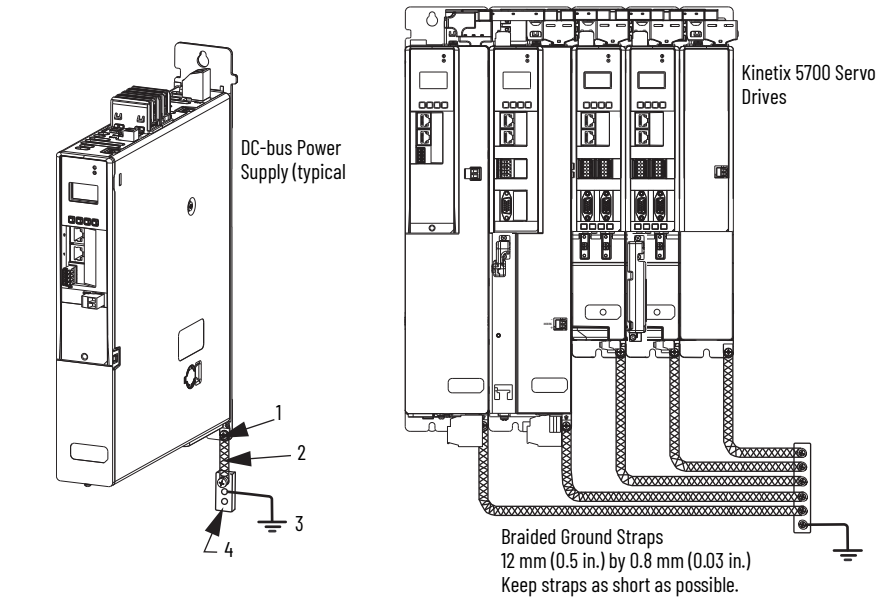
ATTENTION: To avoid personal injury and/or equipment damage, observe the following:

- 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.
- Use motor power connectors only for connection purposes. Do not use them to turn the unit on and off.
- Ground shielded power cables to prevent potentially high voltages on the shield.

Ground Your DC-bus Power Supply to the Subpanel

Ground Kinetix 5700 DC-bus Power Supply drives and Bulletin 2198 capacitor 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 power 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.

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

DC-bus Power Supply Cat. No.	Input 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	195…528V AC rms	16	1489-M3D250	–	140M-D8E-C25 140MT-D9E-C25	140G-G6C3-C25
2198-P070		40	–	1492-SPM3D400	140M-F8E-C45 140MT-F9E-C45	140G-G6C3-C50
2198-P141		75	–	1492-SPM3D630	140MG-H8E-C60	140G-G6C3-C90
2198-P208		110	–	–	140MG-H8E-D10	140G-G6C3-D12

UL/CSA Circuit-protection Specifications

DC-bus Power Supply Cat. No.	Input Voltage (three-phase) nom	Bussmann Fuses (1) Cat. No.	Miniature CB (2) Cat. No.	Motor Protection CB, (2) Self Protected CMC Cat. No.	Molded Case CB Cat. No.
2198-P031	195…528V AC rms	LPJ-15SP (15A)	1489-M3D250	140M-D8E-C25 140MT-D9E-C25	140G-G6C3-C25
2198-P070		LPJ-40SP (40A)	–	140M-F8E-C45 140MT-F9E-C45	140G-G6C3-C50
2198-P141		LPJ-70SP (70A)	–	–	140G-G6C3-C90
2198-P208		LPJ-100SP (100A)	–	–	140G-G6C3-D12

(1) 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.

(2) These Bulletin 140M/MT Motor Protection Circuit Breakers, when used as self-protected (Type E) devices, and Bulletin 1489 circuit breakers can be used on only WYE power systems (480Y/277V).

Specifications

Attribute	2198-P031	2198-P070	2198-P141	2198-P208
Surrounding air temperature Operating Storage	0…50 °C (32…122 °F) -40…+70 °C (-40…+158 °F)			
Weight, kg (lb) approx	4.33 (9.55)	4.42 (9.74)	6.91 (15.2)	7.04 (15.5)
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 Nation al 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 (ground) 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, 5500, 5300, 5100 Servo Drives Specifications, publication KNX-TD003	Provides product specifications for Kinetix Integrated Motion over the EtherNet/IP network and EtherNet/IP networking servo drive families.
Kinetix Rotary and Linear Motion Cable Specifications Technical Data, publication KNX-TD004	Product specifications for Kinetix 2090 motor and interface cables.
Kinetix 3, 300, 350, 2000, 6000, 6200, 6500, 7000 Servo Drives Specifications, publication KNX-TD005	Provides product specifications for Kinetix Integrated Motion over the EtherNet/IP network (Kinetix 6500 and Kinetix 350), Integrated Motion over Sercos interface (Kinetix 6200, Kinetix 6000, Kinetix 2000, and Kinetix 7000), and component (Kinetix 3) servo drive families.
Kinetix 5700 Servo Drives User Manual, publication 2198-UM002	Provides information on how to install, configure, startup, and troubleshoot your Kinetix 5700 servo drive system.
AC Line Filter Installation Instructions, publication 2198-IN003	Provides information on how to install and wire the AC line filter for Kinetix 5500 and Kinetix 5700 servo drives.
Kinetix 5700 Passive Shunt Modules Installation Instructions, publication 2198-IN011	Provides information on how to install and wire Kinetix 5700 external passive shunt modules.
Product Certifications website, rok.auto/certifications	Provides declarations of conformity, certificates, and other certification details.
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 rok.auto/literature.