User Manual

Original Instructions

Allen-Bradley

8720MC Regenerative Power Supply

Catalog Numbers 8720MC-RPS065, 8720MC-RPS190, 8720MC-LR, 8720MC-HF-B2, 8720MC-VA-B, 8720MC-RFI80, 8720MC-EF190-VB

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 6

8720MC-RPS Startup and Operation

Chapter 7

Configure Parameters

Chapter 8

Troubleshoot the 8720MC-RPS Unit

Appendix A

Specifications

Notes:

This publication provides detailed installation instructions for mounting and wiring your 8720MC-RPS regenerative power supply, line reactor, harmonic filter, varistor, and EMC line filter. Also provided are startup and programming procedures for your 8720MC-RPS regenerative power supply installation.

This manual is intended for engineers or technicians directly involved in the installation, wiring, startup, and programming of the 8720MC-RPS power supply and accessories.

If you do not have a basic understanding of 8720MC-RPS regenerative power supply, contact your local Rockwell Automation sales representative for information on available training courses.

Summary of Changes

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

Topic	Page
Combined the features of series # and series B units into a single manual.	Throughout
Added 8720MC-RPS Series Change.	9
Added Electrical Noise Reduction.	19
Updated EMC Directive. and Low Voltage Directive.	66

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
- Throughout this publication the Bulletin 8720MC regenerative power supply is also referred to as the 8720MC-RPS unit

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.
System Design for Control of Electrical Noise Reference Manual, publication GMC-RM001	Information, examples, and techniques designed to minimize system failures caused by electrical noise.
Kinetix Motion Control Selection Guide, publication KNX-SG001	Overview of Kinetix servo drives, motors, actuators, and motion accessories designed to help make initial decisions for the motion control products best suited for your system requirements.
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 System Sizing and Selection Tool website https://motionanalyzer.rockwellautomation.com/	Comprehensive motion application sizing tool used for analysis, optimization, selection, and validation of your Kinetix Motion Control system.
Product Certifications website, rok.auto/certifications	Provides declarations of conformity, certificates, and other certification details.
Vertical Load and Holding Brake Management Application Technique, publication MOTION-AT003	Information on vertical loads and how the servo motor holding-brake option can be used to help keep a load from falling.
Motion System Tuning Application Technique, publication MOTION-AT005	Information on tuning a Kinetix drive system.
Rockwell Automation Industrial Automation Glossary, publication AG-7.1	A glossary of industrial automation terms and abbreviations.
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.

8720MC-RPS Regenerative Power Supply Overview

Use this chapter to become familiar with the design and installation requirements of the 8720MC-RPS regenerative power supply.

8720MC-RPS Series Change

The initial 8720MC-RPS units have no series designation on the nameplate. In this publication, those units are referred as series #. The following changes apply to series B units.

- Catalog numbers 8720MC-RPS065B*x* and 8720MC-RPS090B*x* (series B) units are RoHS compliant. Because of internal timing and switching functions, series B units cannot replace series # units in configurations with two or three parallel units.

  IMPORTANT In parallel configurations of two or three units, all parallel units must be series # or series B units. They cannot be mixed.

- Catalog numbers 8720MC-RPS190B*x* (series B) units have main AC input and DC-bus terminations that run perpendicular (turned 90°) to the front cover, compared with series # units, that run parallel to the front cover.

  IMPORTANT Due to a change in the bus-bar orientation, the 8720MC-RPS190B*x* (series B) AC input wiring and DC-bus wiring is routed differently, compared to series # units.

- Mounting dimensions for the 8720MC-RPS190 (series B) unit changed slightly, but are still within the tolerance needed for series B units to reuse the same mounting holes intended for series # units.
- The internal capacitance of 8720MC-RPS065 units increased from 1900 µF (series #) to 1960 µF for series B units.
- A second precharge resistor was added to 8720MC-RPS190 (series B) units to improve precharge capacity.

About the 8720MC-RPS Power Supply

The 8720MC-RPS power supplies and the following accessories provide DC-bus power to servo drive systems. 8720MC-RPS power supplies can be configured to provide full-line regeneration, regenerative braking, DC common-bus power, and leader/follower modes for multiple units operating in parallel.

System Component	Cat. No.	Description
Regenerative Power Supply	8720MC-RPS*xxx*	Sinusoidal PWM converter that can control the increase of DC-bus voltage and perform continuous power generation for one or more servo drives in multi-axis DC common-bus configurations.
Line Reactors	8720MC-LR*xx*	Bulletin 8720MC line reactors help keep equipment running longer by absorbing many of the power line disturbances that can shut down your power supply.
EMC Line Filters	8720MC-RFI80	This EMC line filter (required for CE) is used in full-line regeneration configurations with 8720MC-RPS065 units. The harmonic filter and varistor can be purchased separately, but are included with 8720MC-RPS065BM-HV2 units.
	8720MC-EF190-VB	This EMC line filter is used in full-line regeneration configurations with 8720MC-RPS190 units and includes an AC line filter (required for CE), magnetic contactor, harmonic filter, and varistor.
Harmonic Filter	8720MC-HF-B2	This harmonic filter can be purchased separately, but is included with 8720MC-RPS065BM-HV2 units.
Varistor	8720MC-VA-B	This varistor can be purchased separately, but is included with 8720MC-RPS065BM-HV2 units.
24V DC Power Supply	1606-XL*xxx*	Bulletin 1606 24V DC power supply for control circuitry, digital inputs, safety, and motor brake.

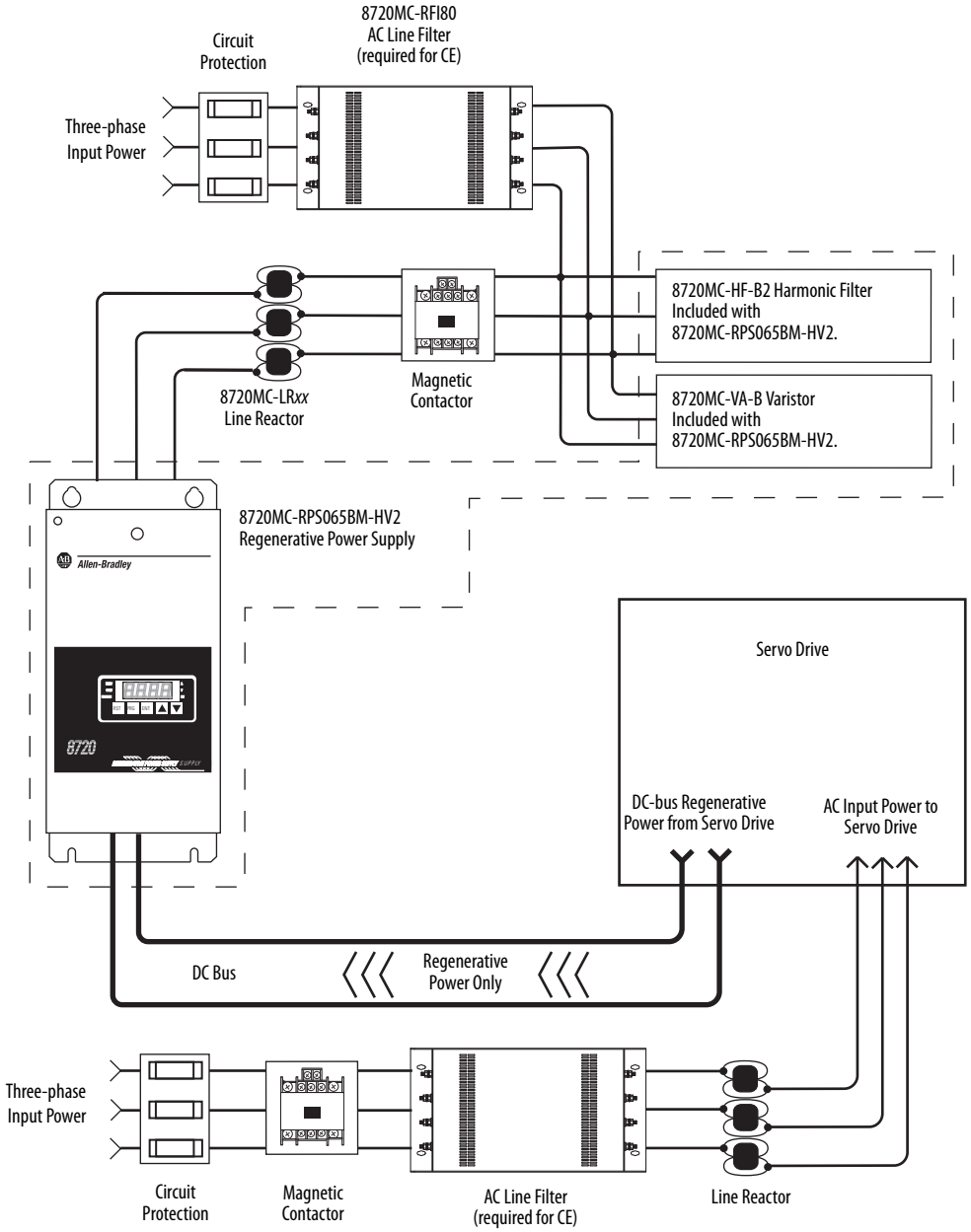
Input Power Configurations

These 8720MC regenerative power supply (RPS) examples in common-bus configurations show DC-bus regenerative power and full-line power.

AC Input and Regenerative Power Configuration

In this configuration the servo drive provides motoring power and the RPS unit receives regenerative power.

Figure 1 - 8720MC-RPS065 Unit with AC Input and Regenerative Power Supply

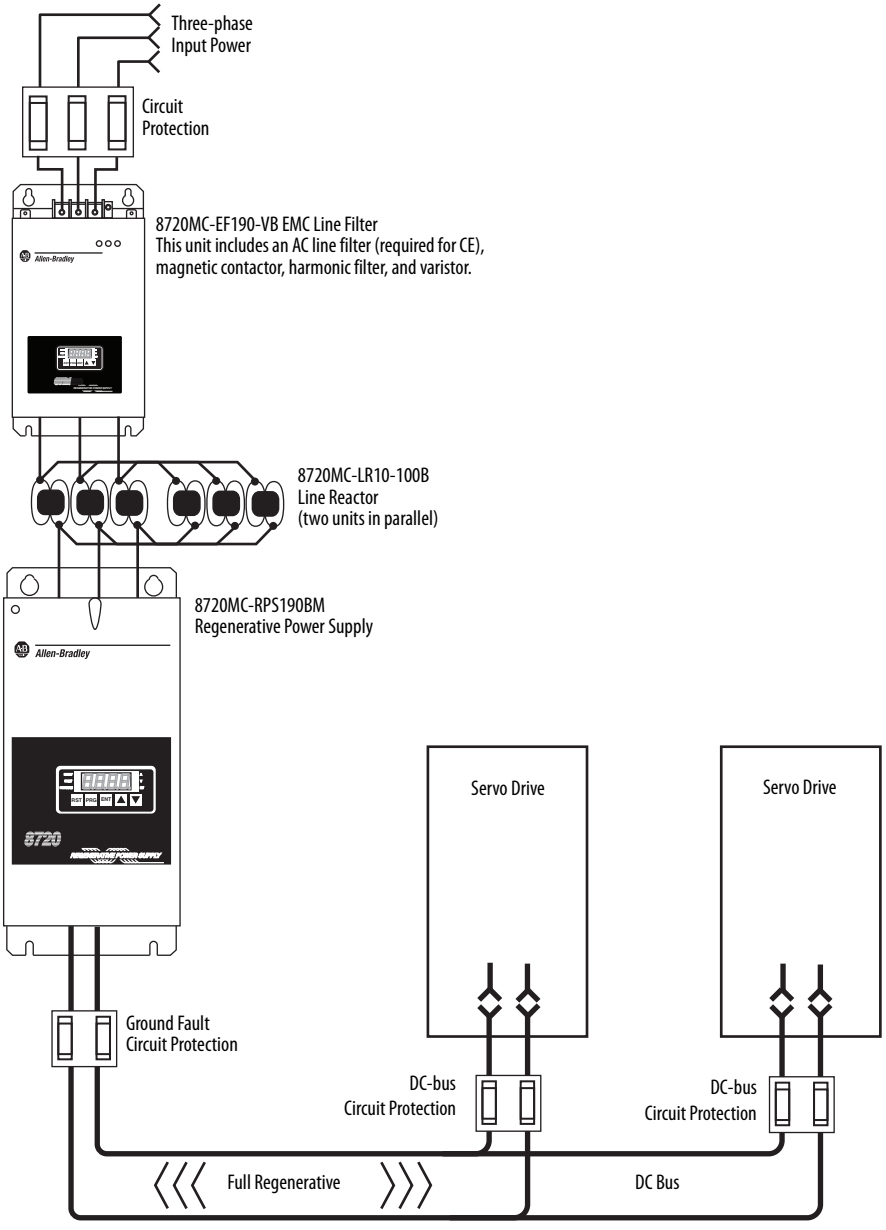


Full-line Regeneration Configurations

In this DC common-bus full-line regeneration example the 8720MC-RPS190 unit provides motoring and regenerative power.

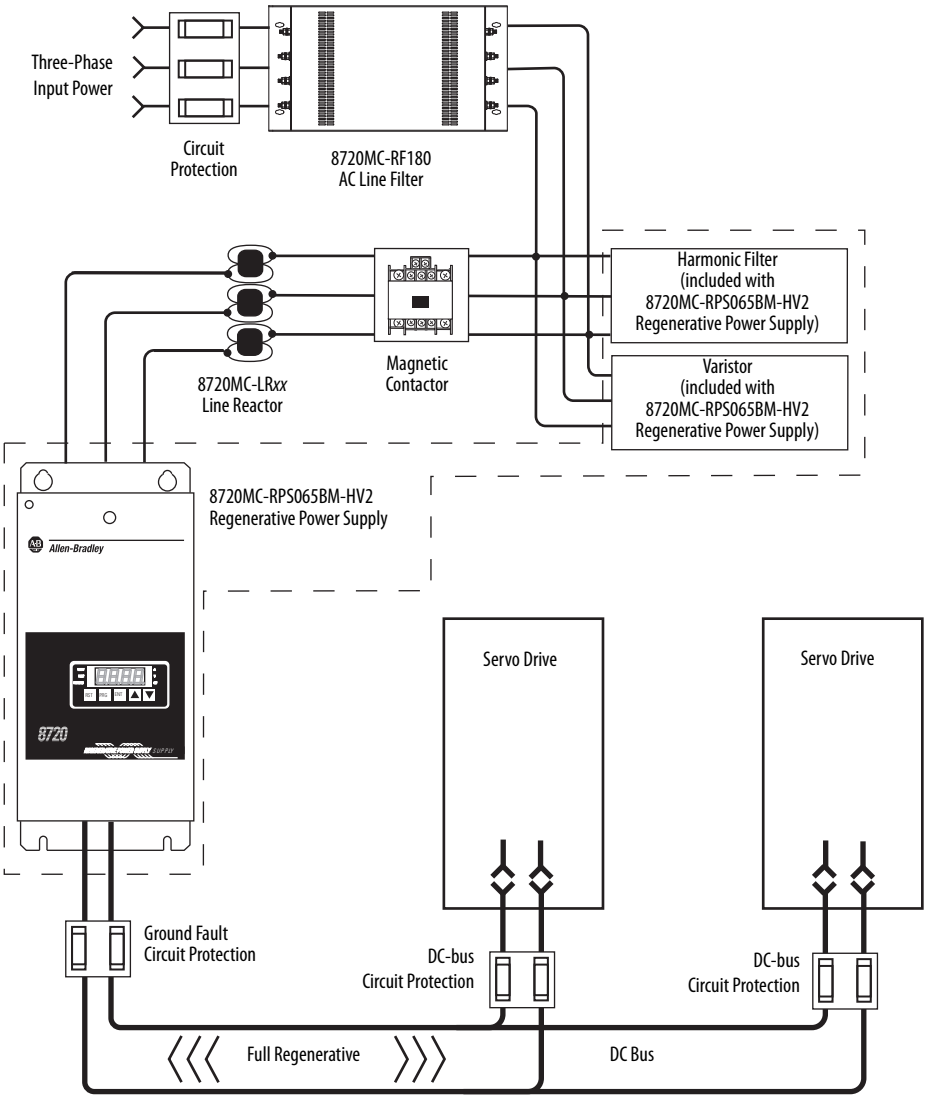
IMPORTANT The 8720MC-EF190-VB line filter unit and two 8720MC-LR10-100B line reactors are required when using the 8720MC-RPS190 regenerative power supply.

Figure 2 - 8720MC-RPS190 Unit with AC Input and Full-line Regeneration



In this full-line regeneration example, the 8720MC-RPS065 unit provides motoring and regenerative power. The harmonic filter and varistor are available separately, but are included with the 8720MC-RPS065BM-HV2 RPS unit. In full-line regenerative mode the 8720MC-RPS065BM-HV2 unit provides motoring power and regenerative power.

Figure 3 - 8720MC-RPS065 Unit with AC Input and Full-line Regeneration



Catalog Number Explanation

8720MC-RPS units can be in parallel configurations with up to three units, however, the units must be of the same size (catalog number) and series.

Table 1 - 8720MC-RPS Unit Catalog Numbers

8720MC-RPS Cat. No.	Units	Input Voltage	Power Rating (single unit)	Power Rating (1) (2 parallel units)	Power Rating (1) (3 parallel units)	8720MC-RPS Accessory Options
8720MC-RPS065BM	Leader	324…506V AC rms Three-phase	37 kW	75 kW	110 kW	Includes 8720MC-RPS065 unit only.
8720MC-RPS065BM-HV2						Includes 8720MC-RPS065 unit plus: • 8720MC-HF-B2 harmonic filter • 8720MC-VA-B varistor
8720MC-RPS065BS	Follower	N/A	N/A			N/A
8720MC-RPS190BM	Leader	324…506V AC rms Three-phase	125 kW	250 kW	375 kW	Required accessories: • 8720MC-EF190-VB line filter • Two 8720MC-LR10-100B line reactors
8720MC-RPS190BS	Follower	N/A	N/A			N/A

(1) Leader and follower units in the same configuration must be of the same size and series. You cannot mix units of catalog number 8720MC-RPS065 with 8720MC-RPS190 and you cannot mix units of series # with series B.

Table 2 - 8720MC-RPS Accessory Catalog Numbers

Accessory Cat. No.	Accessory	Use in Applications With
8720MC-EF190-VB	EMC line filter (required for CE) Includes: • AC line filter • Magnetic contactor • Harmonic filter • Varistor	8720MC-RPS190BM
8720MC-RFI80	EMC line filter (required for CE)	8720MC-RPS065BM
8720MC-LR03-032B	Line reactor	8720MC-RPS065BM
8720MC-LR05-48B		
8720MC-LR10-62B		
8720MC-LR14-70B		
8720MC-LR10-100B (1)		8720MC-RPS190BM
8720MC-HF-B2	Harmonic filter	8720MC-RPS065BM
8720MC-VA-B	Varistor	

(1) Order two 8720MC-LR10-100B line reactors and wire in parallel for 200 A rating when used with the 8720MC-RPS190BM units.

Plan and Mount the 8720MC-RPS Installation

This chapter describes system installation guidelines and mounting specifications for your 8720MC-RPS unit.

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 metal debris from falling into it. Metal debris or other foreign matter can become lodged in the circuitry and result in damage to the components.

System Design Guidelines

Use the information in this section when designing your enclosure and planning to mount your 8720MC-RPS unit and accessories on the panel.

For on-line product selection and system configuration tools, including AutoCAD (DXF) drawings of the product, refer to https://www.rockwellautomation.com/global/support/selection.page.

System Mounting Requirements

- To comply with UL and CE requirements, the drive system powered by the 8720MC-RPS unit must be mounted in a grounded conductive enclosure offering protection as defined in standard IEC 60529 to IP20 such that they are not accessible to an operator or unskilled person.

  To maintain the functional safety rating of the Kinetix® drive system, this enclosure must be appropriate for the environmental conditions of the industrial location and provide a protection class of IP54 or higher.
- The panel you install inside the enclosure for mounting your system components must be on a flat, rigid, vertical surface that won't be subjected to shock, vibration, moisture, oil mist, dust, or corrosive vapors in accordance with pollution degree 2 (EN 61800-5-1) because the product is rated to protection class IP20 (EN 60529).
- Size the system enclosure so as not to exceed the maximum ambient temperature rating. Consider heat dissipation specifications for all system components.
- Segregate input power wiring from control wiring and motor cables.
- Use high-frequency (HF) bonding techniques to connect the modules, enclosure, machine frame, and motor housing, and to provide a low-impedance return path for high-frequency (HF) energy and reduce electrical noise.

  Bond the 8720MC-RPS unit and accessory grounding screws by using a braided ground strap as shown in Figure 20 on page 44.

Refer to the System Design for Control of Electrical Noise Reference Manual, publication GMC-RM001, to better understand the concept of electrical noise reduction.

Circuit Breaker/Fuse Selection

The 8720MC-RPS unit does not contain a circuit breaker. Install an adequate circuit breaker on the AC input power line. When an earth leakage breaker is used, select a breaker equipped with harmonic suppressor.

Provide the required quantity of circuit breakers with supplemental contact (CB) for all units connected in parallel. Because supplemental contact of this circuit breaker does not conform with a load of 5 mA, use a relay with less than 5 mA for connection when a supplemental contact is connected with sequence input PWR.

Table 3 - Circuit Protection Specifications

8720MC-RPS Cat. No.	Input Voltage (three-phase) nom	Amp Rating	Input Power Protection		DC-bus Protection
			Fuji Electric Circuit (1) Breaker (or equivalent)	Mersen Fuse	Mersen Fuse
8720MC-RPS065BM	324…506V AC	100 A	BW100EAGU-3P100	A070UD30KI100	A130UD70LI100
8720MC-RPS065BS					
8720MC-RPS190BM		350 A	BW400SAGU-3P350	A070UD30KI0315	A130UD71LLI0350
8720MC-RPS190BS					

(1) Because the supplemental contact of this circuit breaker does not conform with load of 5mA, a relay with less than 5mA should be used for connection when a supplemental contact is connected with sequence input PWR.

Contactor Specifications

To help prevent electrical noise, peripherals of the 8720MC-RPS065 unit such as magnetic contactors and relays must be provided with adequate surge suppressor. Use CR filter for AC circuit and inverse-parallel diodes for DC operation circuit.

The 8720MC-EF190-VB EMC filters, when used with 8720MC-RPS190 units provides the magnetic contactor.

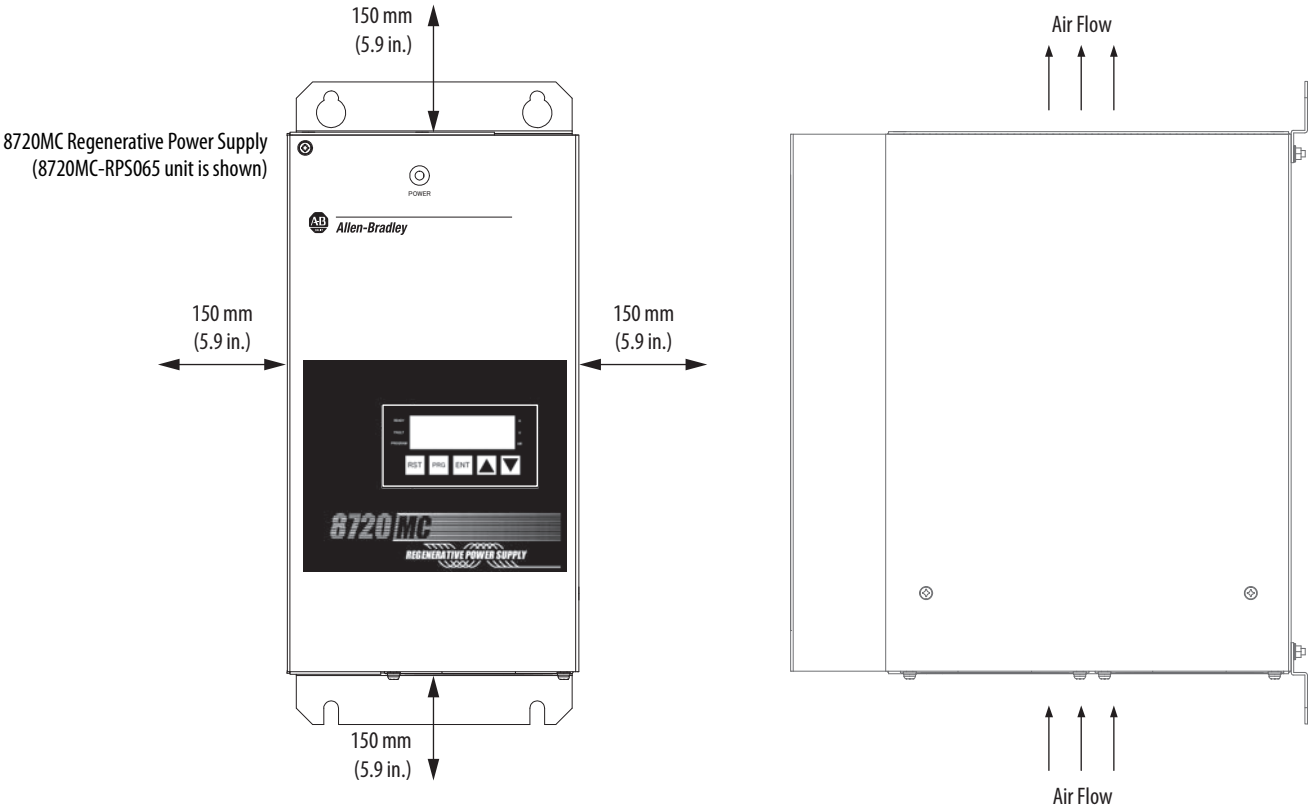
Table 4 - Input Power Contactor Specifications

8720MC-RPS Cat. No.	Allen-Bradley® Contactor (1) Cat. No.	Fugi Electric Contactor (1) Cat. No.
8720MC-RPS065BM	100-C43x10 (2)(CE marked)	SC-N2S (UL listed component)
8720MC-RPS065BS		
8720MC-RPS190BM	Included with 8720MC-EF190-VB EMC filter units.	
8720MC-RPS190BS		

(1) Select an adequate operating coil for the magnetic contactor within the range of 100…230V AC depending on the applied voltage.

(2) Where x is the voltage suffix code of the operating coil.

Minimum Clearance Requirements



IMPORTANT Mount the 8720MC-RPS unit in an upright position as shown. Do not mount the module on its side.

Refer to Product Dimensions on page 111 for 8720MC-RPS mounting dimensions.

ATTENTION: The temperature inside the cabinet must be kept below 50 °C (122 °F). Because the 8720MC-RPS unit dissipates large amounts of heat, exercise special caution for exhausting air. Take into account heat dissipation for all units when sizing the enclosure and providing ventilation.

Electrical Noise Reduction

This section outlines best practices that minimize the possibility of noise-related failures as they apply specifically to 8720MC-RPS system installations. For more information on the concept of high-frequency (HF) bonding, the ground plane principle, and electrical noise reduction, refer to the System Design for Control of Electrical Noise Reference Manual, publication GMC-RM001.

Bonding Modules

Bonding is the practice of connecting metal chassis, assemblies, frames, shields, and enclosures to reduce the effects of electromagnetic interference (EMI).

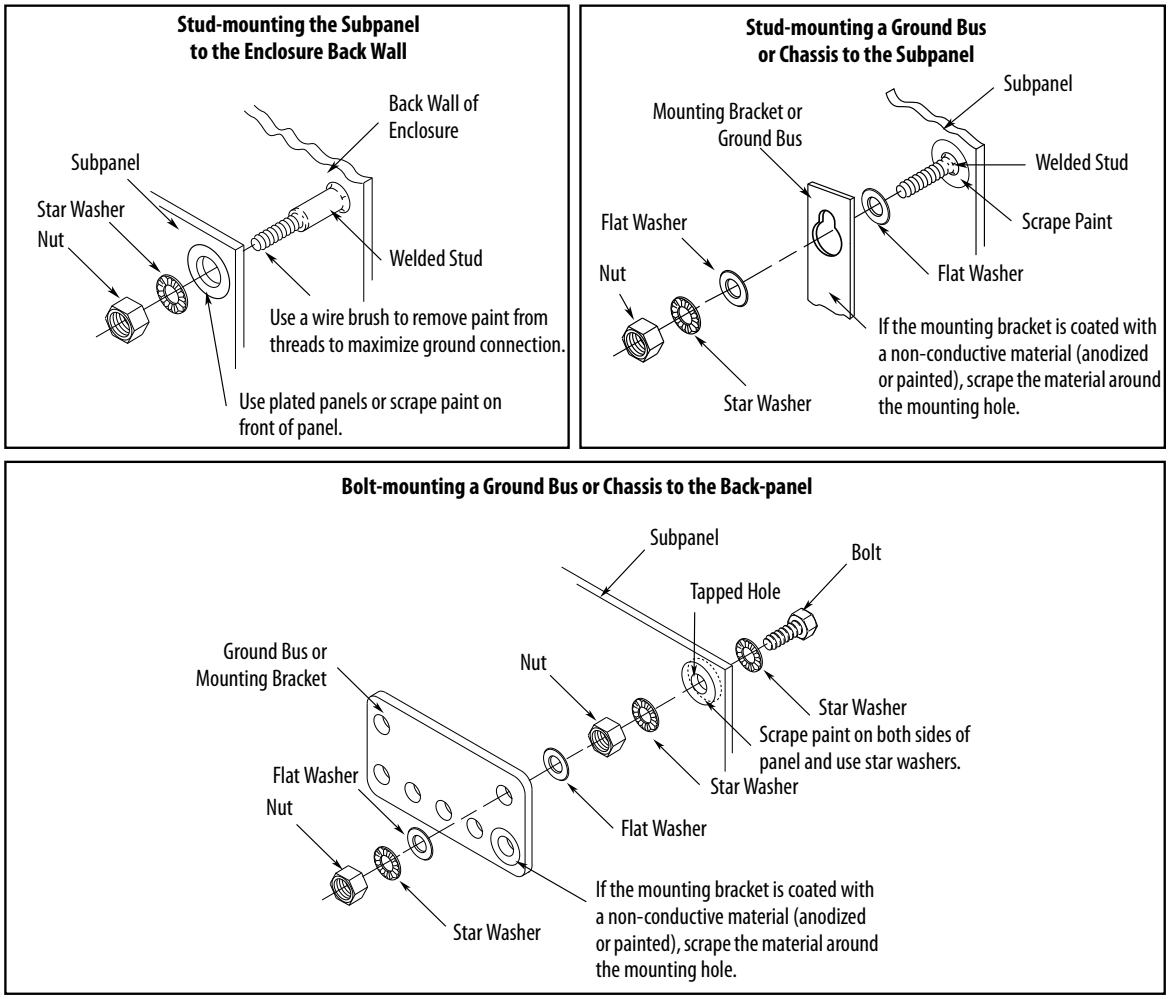
Unless specified, most paints are not conductive and act as insulators. To achieve a good bond between the drive module and subpanel, surfaces need to be paint-free or plated. Bonding metal surfaces creates a low-impedance return path for high-frequency energy.

IMPORTANT To improve the bond between the drive module and subpanel, construct your subpanel out of zinc plated (paint-free) steel.

Improper bonding of metal surfaces blocks the direct return path and allows high-frequency energy to travel elsewhere in the cabinet. Excessive high-frequency energy can effect the operation of other microprocessor controlled equipment.

These illustrations show details of recommended bonding practices for painted panels, enclosures, and mounting brackets.

Figure 4 - Recommended Bonding Practices for Painted Panels

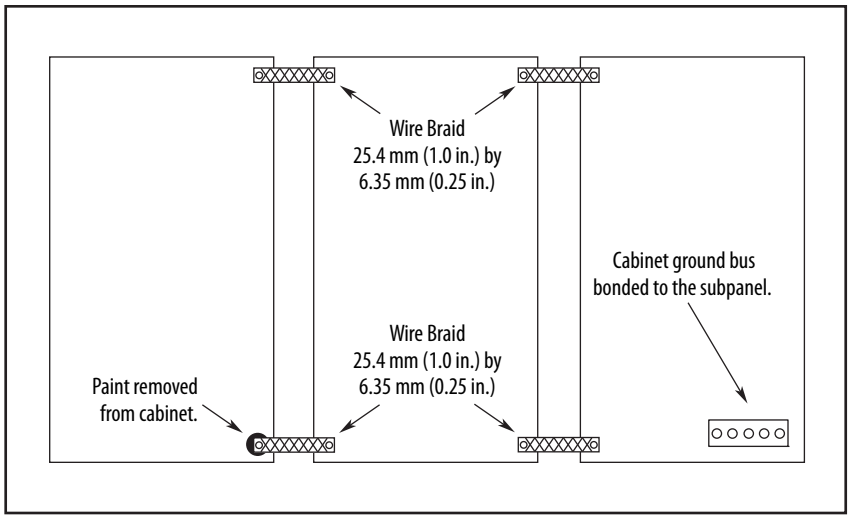


Bonding Multiple Subpanels

Bonding multiple subpanels creates a common low impedance exit path for the high frequency energy inside the cabinet. Subpanels that are not bonded together do not necessarily share a common low impedance path. This difference in impedance can affect networks and other devices that span multiple panels:

- Bond the top and bottom of each subpanel to the cabinet by using 25.4 mm (1.0 in.) by 6.35 mm (0.25 in.) wire braid. As a rule, the wider and shorter the braid is, the better the bond.
- Scrape the paint from around each fastener to maximize metal-to-metal contact.

Figure 5 - Multiple Subpanels and Cabinet Recommendations



Notes:

Mount the 8720MC-RPS Unit

This chapter provides the system installation procedures for mounting your 8720MC-RPS unit to the system panel.

This procedure assumes 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 the hazard of electrical shock, perform all mounting and wiring of the 8720MC-RPS unit before 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 metal debris from falling into it. Metal debris or other foreign matter can become lodged in the circuitry and result in damage to the components.

Mounting Guidelines

Observe the following guidelines when mounting 8720MC-RPS units in parallel configurations:

- In configurations where one or two follower units are present, mount the leader unit to the far right of the follower units
- Leader and follower units in the same configuration must be of the same size and series. You cannot mix units of catalog number 8720MC-RPS065 with 8720MC-RPS190 and you cannot mix units of series # with series B
- Mount 8720MC-RPS units according to the specified maximum distance. This is required so that the connecting cables between 8720MC-RPS units reach from one unit to another

Figure 6 - 8720MC-RPS065 Leader and Follower Units

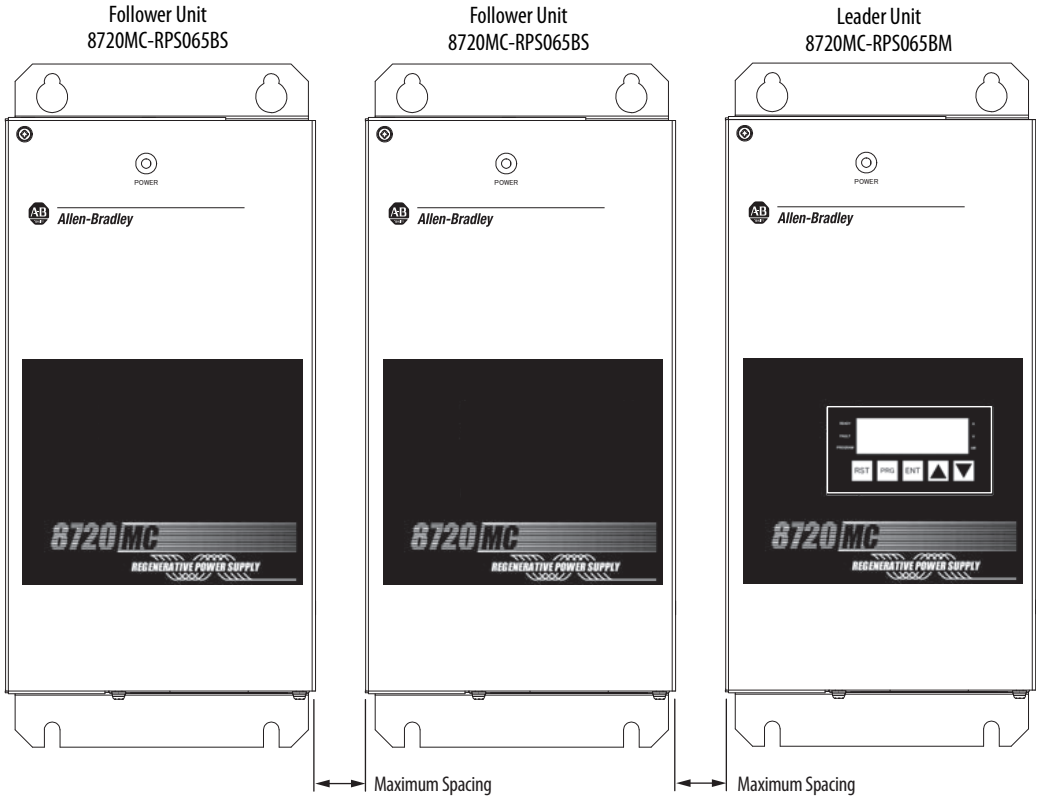


Table 5 - Maximum Unit Spacing Specifications

8720MC-RPS Cat. No.	**8720MC-RPS (series #)** mm (in.)	**8720MC-RPS (series B)** mm (in.)
8720MC-RPS065BM	250 (9.8	200 (7.9)
8720MC-RPS065BS		

ATTENTION: Leader and follower units in the same configuration must be of the same size and series. You cannot mix units of catalog number 8720MC-RPS065 with 8720MC-RPS190 and you cannot mix units of series # with series B. Failure to comply can result in damage to equipment.

Figure 7 - 8720MC-RPS190 Leader and Follower Units

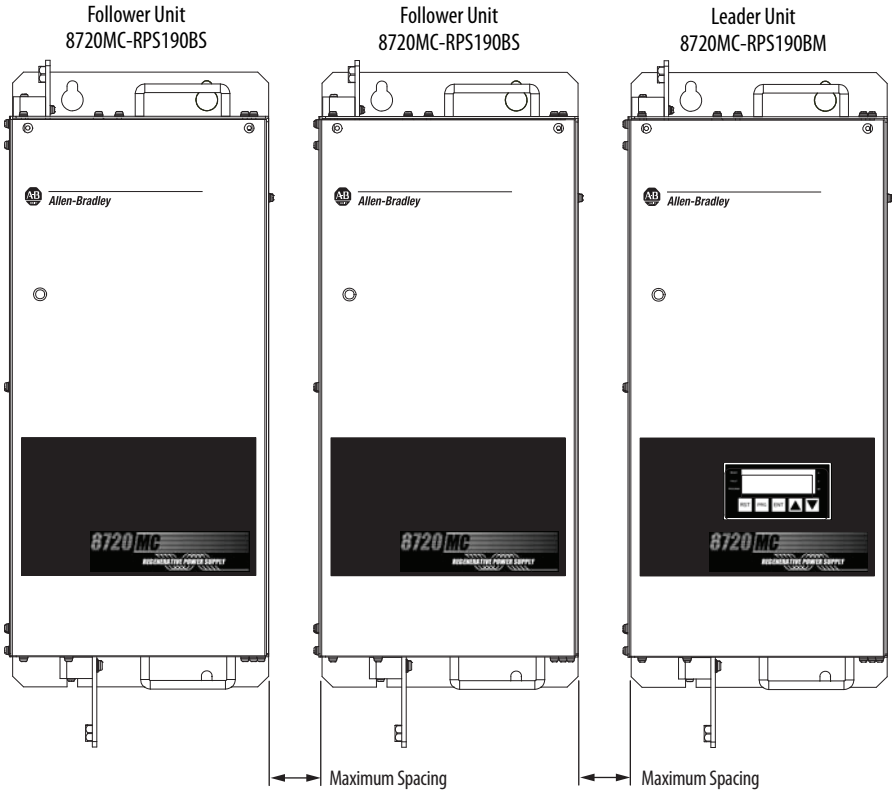


Table 6 - Maximum Unit Spacing Specifications

8720MC-RPS Cat. No.	**8720MC-RPS (series #)** mm (in.)	**8720MC-RPS (series B)** mm (in.)
8720MC-RPS190BM	620 (24.5)	500 (20.0
8720MC-RPS190BS		

ATTENTION: Leader and follower units in the same configuration must be of the same size and series. You cannot mix units of catalog number 8720MC-RPS065 with 8720MC-RPS190 and you cannot mix units of series # with series B. Failure to comply can result in damage to equipment.

Mount Your 8720MC-RPS Regenerative Power Supply

This procedure assumes that you have prepared your panel and understand how to bond your system. For installation instructions regarding other equipment and accessories, refer to the instructions that came with those products.

Follow these steps to mount your 8720MC-RPS units to the panel.

1. Lay out the placement for each system component in the enclosure.

   See System Design Guidelines beginning on page 16 for panel layout recommendations.

   IMPORTANT To improve the bond between the drive modules and subpanel, construct your subpanel out of zinc plated (paint-free) steel.

   For multiple 8720MC-RPS unit installations, see Mounting Guidelines beginning on page 24.

2. Drill holes in the panel for mounting your drive system.

   Refer to Product Dimensions beginning on page 111.

3. Loosely attach the mounting hardware to the panel.

   We recommend mounting hardware for 8720MC-RPS units as follows:
   - 8720MC-RPS065 units: M5 (#10-32) steel bolts.
   - 8720MC-RPS190 units: M8 (5/16-24-32) steel bolts.

   Observe bonding techniques as described in Bonding Modules on page 19.

4. Tighten all mounting fasteners.
   - 8720MC-RPS065 units: 2.0 N•m (17.7 lb•in) maximum torque
   - 8720MC-RPS190 units: 5.5 N•m (48.7 lb•in) maximum torque

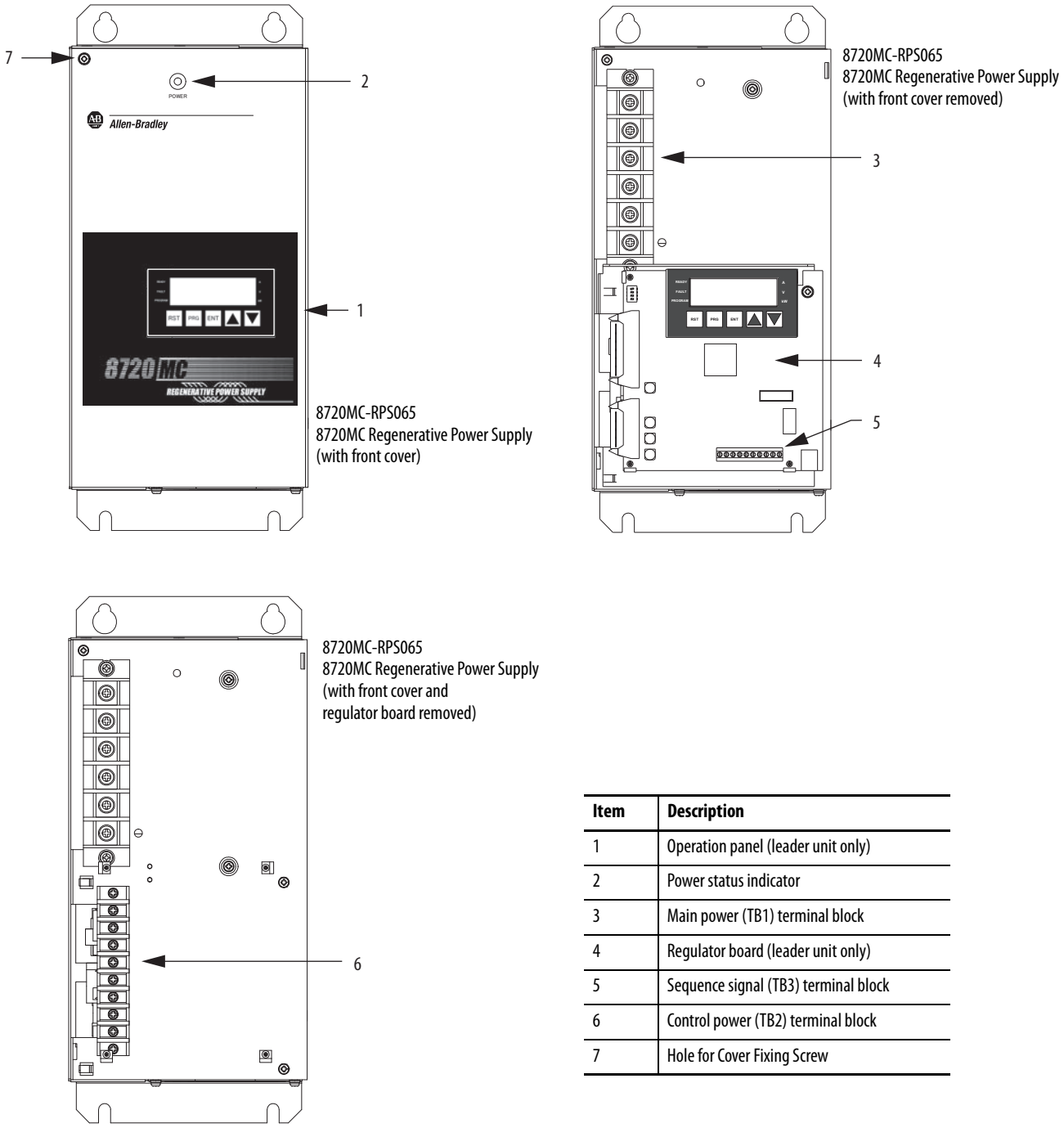
Connector Data and Feature Descriptions

This chapter illustrates connectors and indicators for the 8720MC-RPS065 and 8720MC-RPS190 units. Also included in this chapter are 8720MC-RPS connector pinouts and descriptions.

8720MC Regenerative Power Supply Connector Data

Use these illustrations to identify the terminal blocks and other features of the 8720MC-RPS units.

Figure 8 - 8720MC-RPS065 Unit

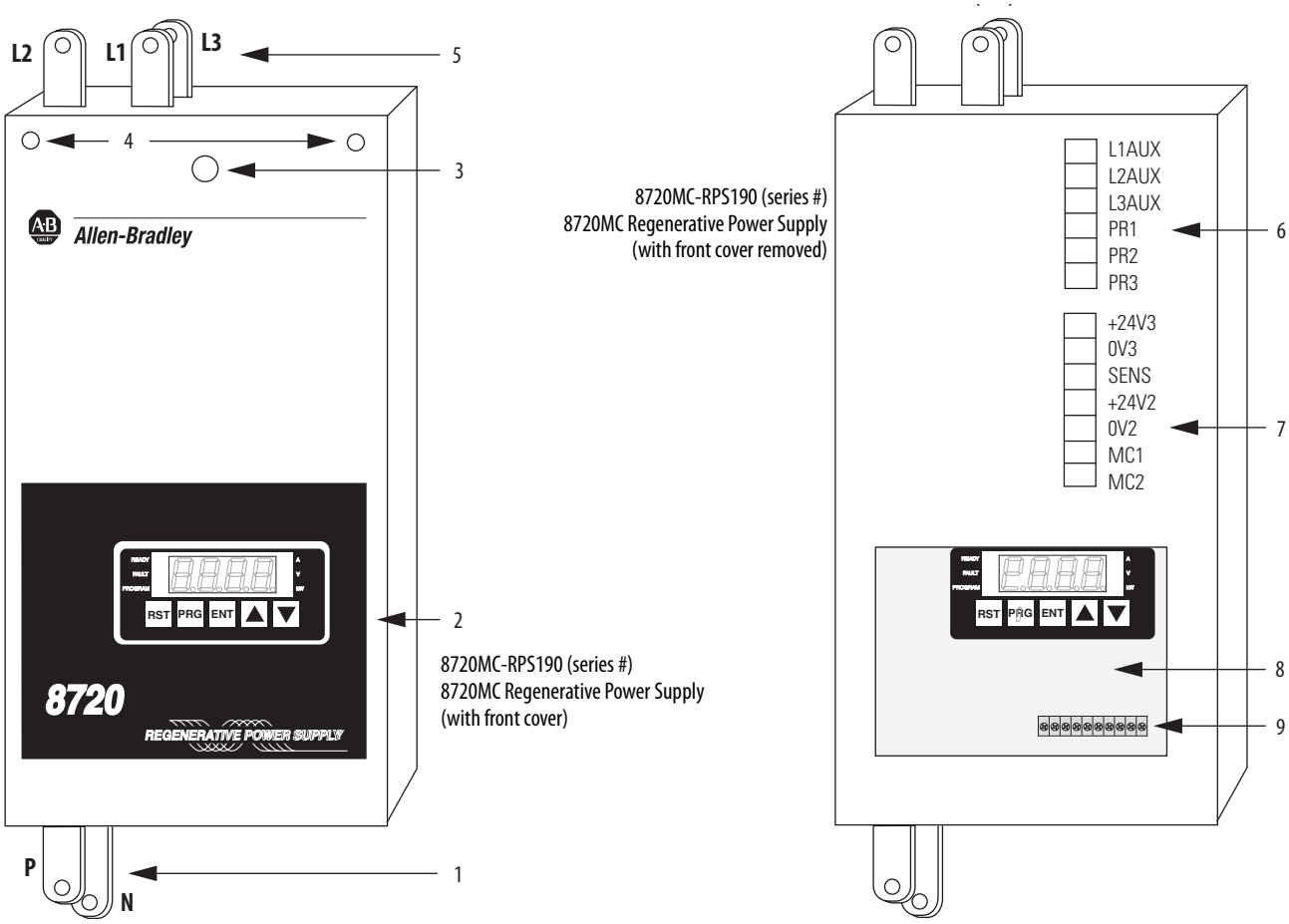


Item	Description
1	Operation panel (leader unit only)
2	Power status indicator
3	Main power (TB1) terminal block
4	Regulator board (leader unit only)
5	Sequence signal (TB3) terminal block
6	Control power (TB2) terminal block
7	Hole for Cover Fixing Screw

For access to the terminal blocks and regulator board:

- Remove the cover screw (item 7) to remove the front cover.
- The regulator board has two ribbon cables on the left side and two screws on the right side. Remove the two screws and the board swings open, hinged by the ribbon cables.

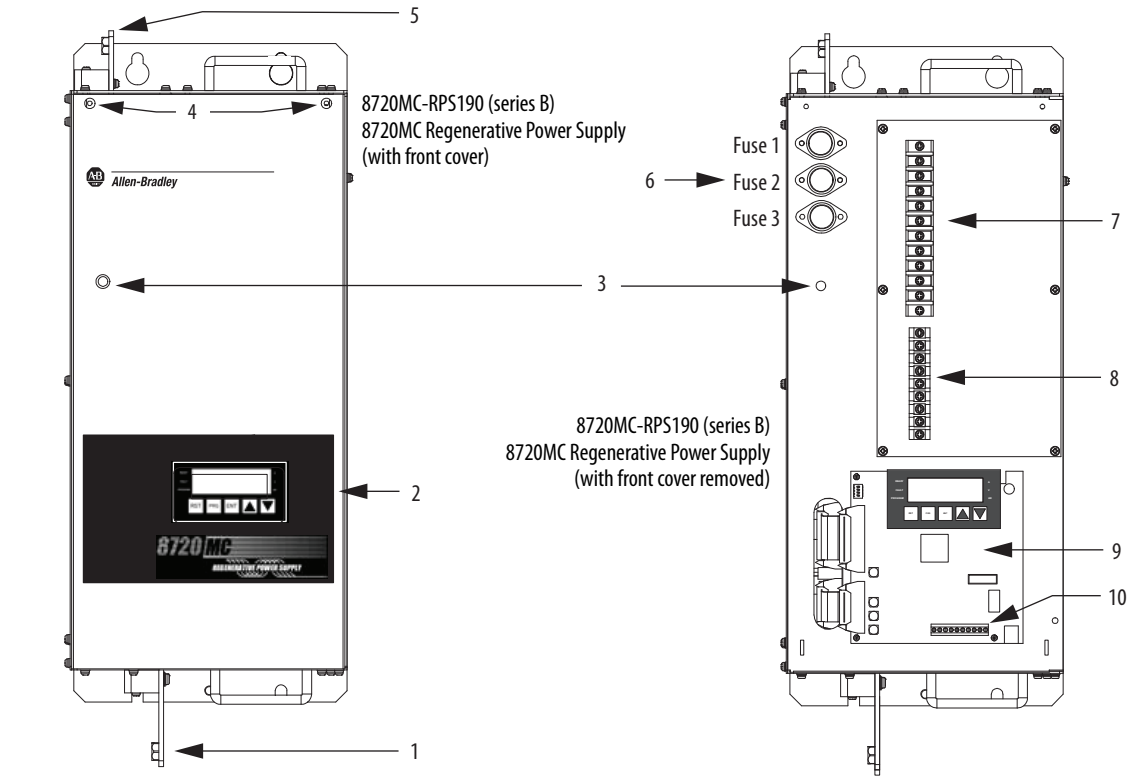
Figure 9 - 8720MC-RPS190 Unit (series #)

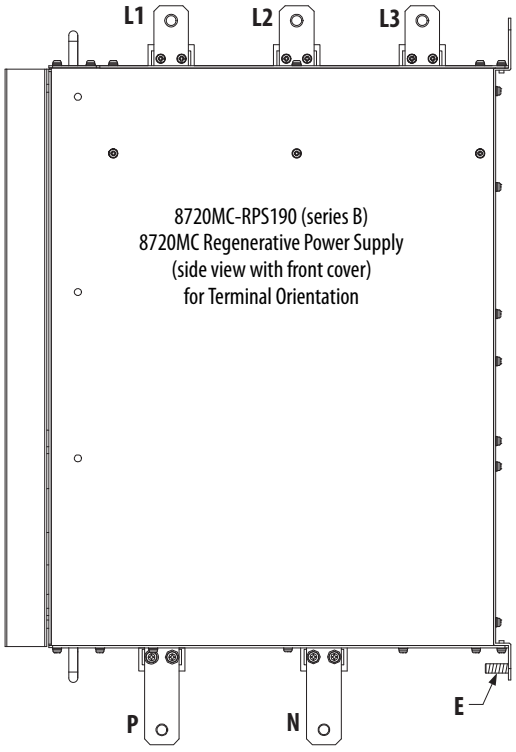


Item	Description
1	DC-bus output terminals
2	Operation panel (leader unit only)
3	Power status indicator
4	Holes for cover fixing screws
5	Mains power terminals
6	Control power (TB2) terminal block
7	Control power (TB4) terminal block
8	Regulator board (leader unit only)
9	Sequence signal (TB3) terminal block

For access to the terminal blocks, remove the cover screws (item 4) to remove the front cover.

Figure 10 - 8720MC-RPS190 Unit (series B)





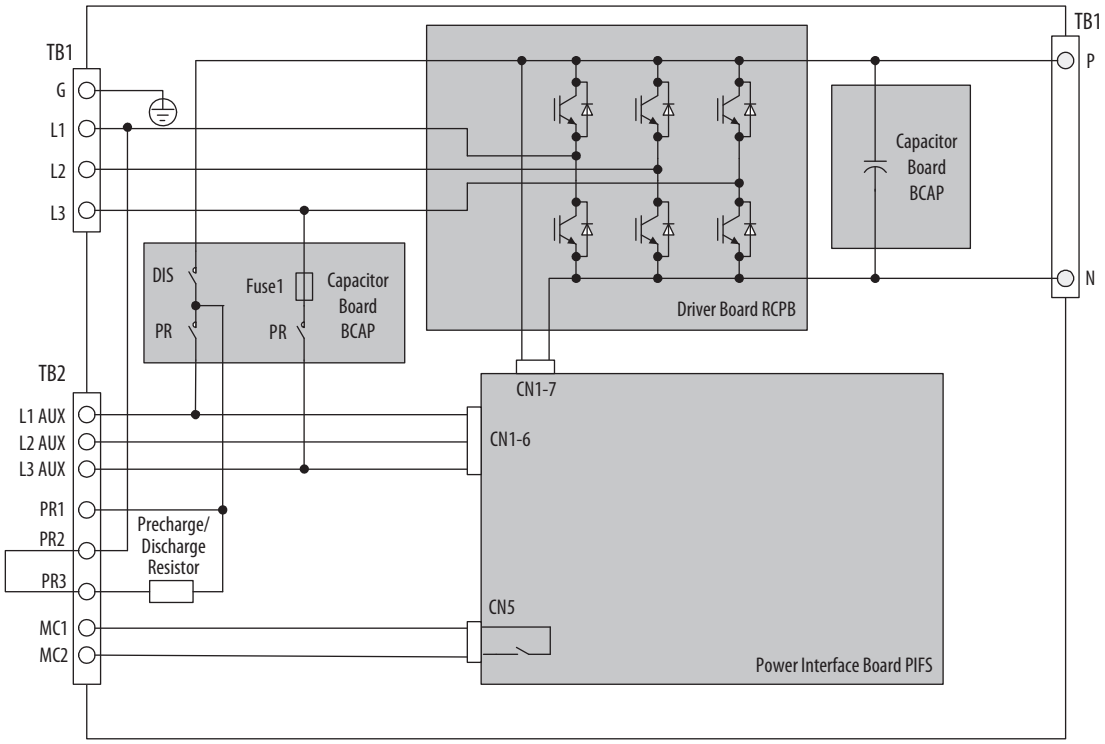
Item	Description
1	DC-bus output terminals
2	Operation panel (leader unit only)
3	Power status indicator
4	Holes for cover fixing screws
5	Mains power terminals
6	Circuit protection
7	Control power (TB2) terminal block
8	Control power (TB4) terminal block
9	Regulator board (leader unit only)
10	Sequence signal (TB3) terminal block

For access to the terminal blocks, remove the cover screws (item 4) to remove the front cover.

Input Circuit Block Diagrams

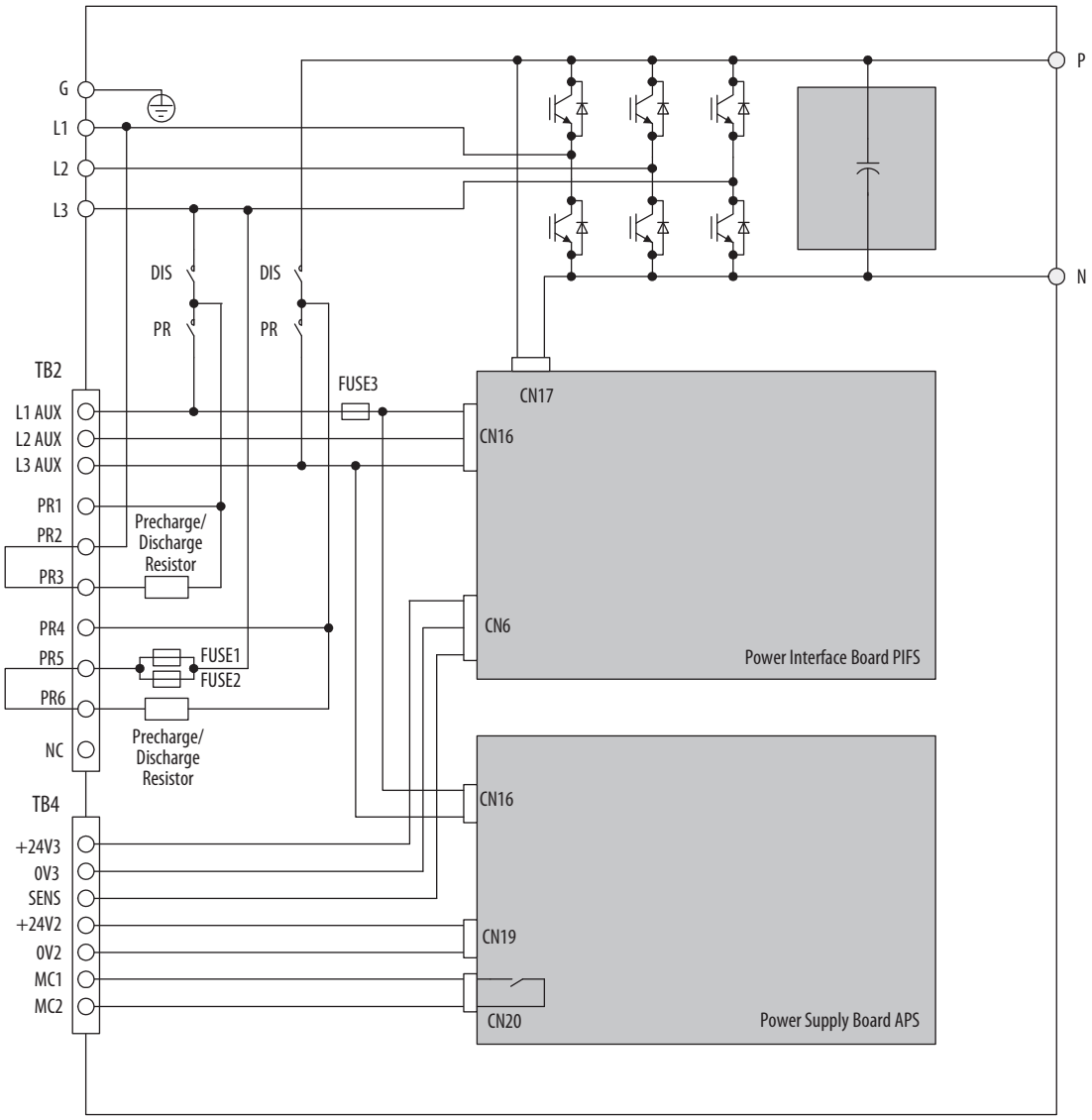
This mains (TB1) and control power (TB2) block diagram applies to the 8720MC-RPS065 units.

Figure 11 - 8720MC-RPS065 Block Diagram



This mains and control power (TB2 and TB4) block diagram applies to the 8720MC-RPS190 units.

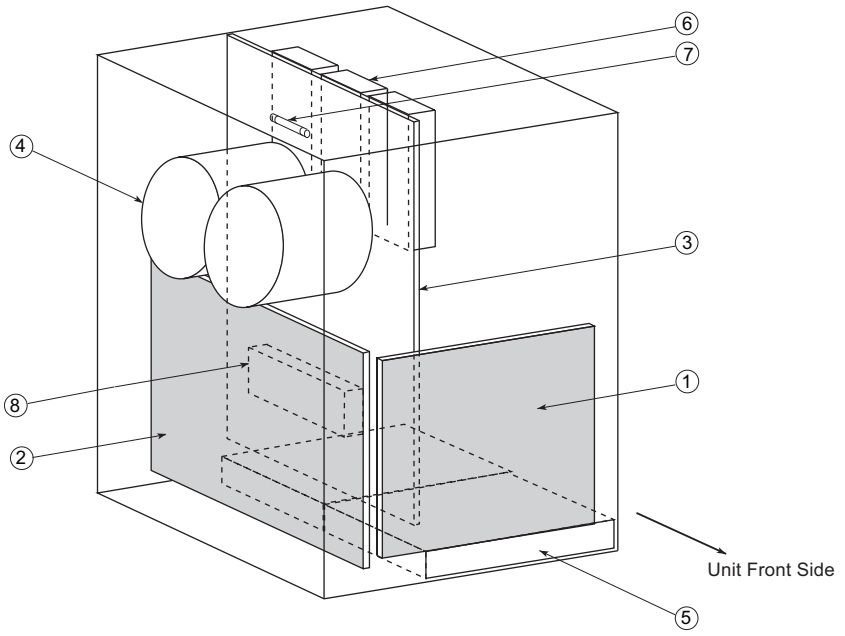
Figure 12 - 8720MC-RPS190 Block Diagram



Internal Component Layout

There are references throughout this publication to the circuit boards and other features identified in these drawings.

Figure 13 - 8720MC-RPS065 Internal Components

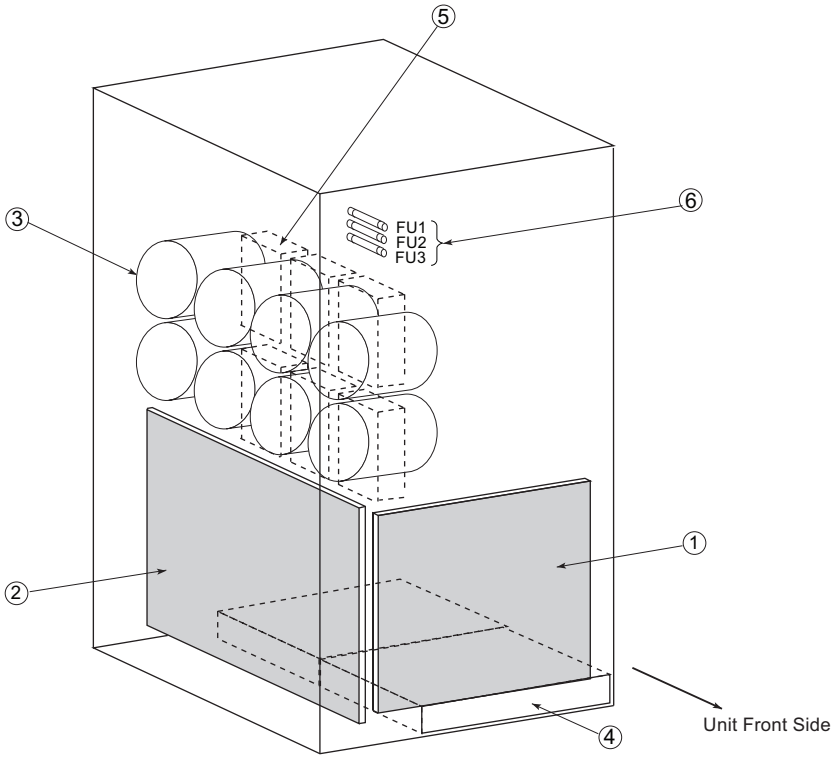


Item	Internal Component
1	Regulator board (BDSR) (1)
2	Power interface board (PIFS)
3	Driver board (RCPB)
4	Bus capacitors
5	Cooling fan
6	Power modules
7	Fuse - 1
8	Precharge/discharge resistor

(1) Applies to only the leader unit.

Figure 13 represents 8720MC-RPS065 (series #) unit, but the location of the series B unit components is similar. Ribbon cables exist between the regulator board (item 1) and the power interface board (item 2).

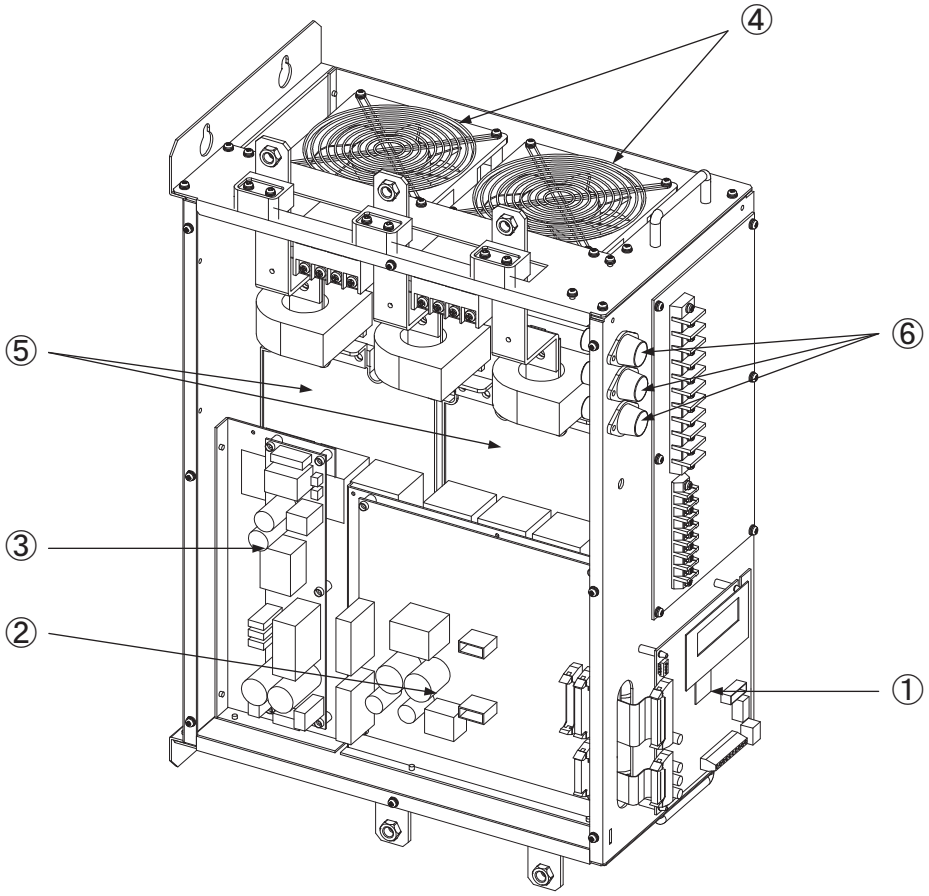
Figure 14 - 8720MC-RPS190 (series #) Internal Components



Item	Internal Component
1	Regulator board (BDSR) (1)
2	Power interface board (PIFS)
3	Bus capacitors
4	Cooling fan
5	Power modules
6	Fuses - 1, 2, 3

(1) Applies to only the leader unit.

Figure 15 - 8720MC-RPS190 (series B) Internal Components



Item	Internal Component
1	Regulator board (BDSR) (1)
2	Power interface board (PIFS)
3	Power supply board (APS)
4	Cooling fan
5	Power modules
6	Fuses - 1, 2, 3

(1) Applies to only the leader unit.

Terminal Block Pinouts

The 8720MC-RPS units have terminal blocks for making mains and control power connections.

Terminal Block Pinouts for 8720MC-RPS065 Units

The 8720MC-RPS065 unit has two terminal blocks for mains and control power connections.

Table 7 - Mains Power Terminal Connections

TB1	Description	Signal
G	Chassis ground	⏚
L1	Three-phase input power	L1
L2		L2
L3		L3
N	DC bus connections to load equipment	DC–
P		DC+

Table 8 - Control Power Terminal Connections

TB2	Description	Terminals
L1 AUX	Three-phase AC input power to the control circuit.	Control Power
L2 AUX		
L3 AUX		
PR1	Precharge/discharge jumper: • For internal resistor, apply jumper between PR2 and PR3 • For external resistor, apply jumper between PR1 and PR2 • For power regeneration mode only, remove jumper	Precharge/Discharge Resistor
PR2		
PR3		
MC1	Mains magnetic contactor (rated for 250V AC/1 Amp or 30V DC/1 Amp).	Mains Magnetic Contactor
MC2		

Terminal Block Pinouts for 8720MC-RPS190 Units

The 8720MC-RPS190 has two terminal blocks for control power connections.

Table 9 - Control Power Terminal Connections

TB2	Description	Terminals
L1 AUX	Three-phase AC input power to the control circuit.	Control Power
L2 AUX		
L3 AUX		
PR1	Precharge/discharge jumper: • For internal resistor, apply jumper between PR2-PR3 and PR5-PR6 • For external resistor, apply jumper between PR1-PR2 and PR4-PR5 • For power regeneration mode only, remove jumper	Precharge/Discharge Resistor
PR2		
PR3		
PR4		
PR5		
PR6		
MC1	Mains magnetic contactor (rated for 250V AC/1 Amp or 30V DC/1 Amp).	Mains Magnetic Contactor
MC2		

Table 10 - Control Terminal Connections

TB4	Description	Terminals
+24V3	AC power to fan for the AC reactor unit through the EM4000 EMC filter unit.	AC Reactor Fan Power
0V3		
SENS	To enter fault signal of the fan for the AC reactor unit.	Fan Fault
+24V2	Power to the main magnetic contactor and the fan for the cabinet fan through the 8720MC-EF190 EMC filter unit.	Main Magnetic Contactor (MC) and Optional Fan
0V2		
MC1	Mains magnetic contactor (rated for 250V AC/1 Amp or 30V DC/1 Amp).	Mains Magnetic Contactor
MC2		

Regulator Board Features and Components

The regulator board is present only on the 8720MC-RPS (leader) unit. Follower units, used in parallel configurations, have no regulator board and are controlled by the regulator board on the leader unit.

The 8720MC-RPS regenerative power supply regulation is performed by a microprocessor on the regulator board. Figure 16 identifies the main features and components of the regulator board. The operation of the 8720MC-RPS regenerative power supply is adjusted by the parameters set on the keypad.

Figure 16 - Regulator Board Features

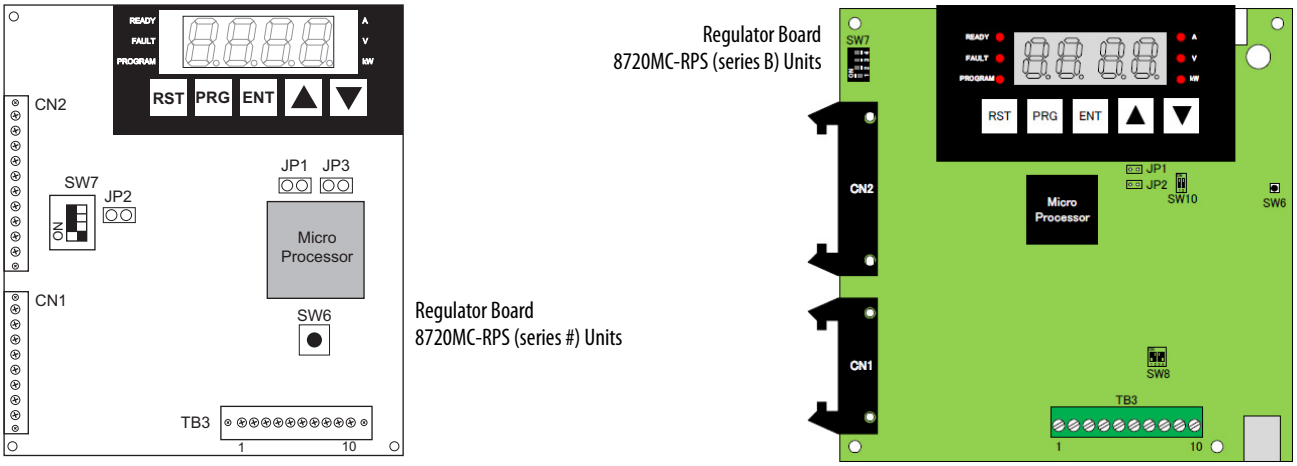


Table 11 - Regulator Board Operation

Regulator Board Attributes	Description
PWM gating signals	Based on the output of the current/voltage control loop, the regulator board sends PWM gating signals through the power interface board to the power modules (transistors), producing a pulse-width-modulated (PWM) waveform.
Sequence output signals	Sequence output signals are provided from the sequence signal terminal block (TB3) of the regulator board to indicate the unit status.
Four-character display and six status indicators	A four-character seven-segment status indicator is used to monitor values, parameter numbers, parameter values, and error codes. Six status indicators show the display mode of the operation panel and the units of the monitored values.

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should set jumpers and switches. Read and understand this manual in its entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: Do not press SW6 during operation. Also, do not alter the setting of any jumpers and switches during operation. Failure to observe this precaution could result in destruction of the equipment, severe bodily injury or loss of life.

ATTENTION: Do not alter the settings of any jumpers not described in this manual. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

Jumpers JP1/JP2 and switch SW7 are set to these default settings at the factory.

Table 12 - Jumper and Switch Default Settings

Jumper	Function	Description
JP1	Enable Operation	Short this jumper to start the switching operation of transistors when the RUN sequence input is enabled. Keep this jumper closed.
JP2	Enable Inspection Mode	Keep this jumper open.
SW6	Reset	Pressing this switch resets the CPU.

IMPORTANT Do not press the reset switch SW6 during operation.

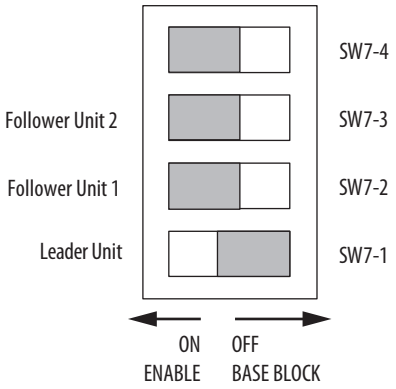
Switch SW7 Settings

SW7 settings depend on the configuration of leader and follower units in your application. This switch is used to stop the switching of transistors that produces the PWM waveform by interrupting the base signal from the power modules. To interrupt the base signal, turn the switch to the OFF position.

Switch SW7 consists of four switches:

- SW7-1, SW7-2, and SW7-3 are allocated to the leader unit and follower units 1 and 2. In the case of a leader with paralleled follower units, it is possible to interrupt the base signal of each unit by turning the corresponding switch to the OFF position.
- Keep SW7-4 in the OFF position.
- When two units are connected in parallel, turn SW7-1 and SW7-2 to the ON position
- When three units are connected in parallel, turn SW7-1, SW7-2, and SW7-3 to the ON position.

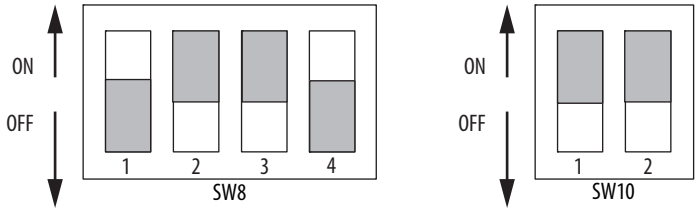
Figure 17 - Switch SW7 Positions



Switch SW8 and SW10 Settings

SW8 and SW10 are present on only the 8720MC-RPS (series B) units. These default switch settings are made at the factory and do not require changes regardless of the operating mode or application.

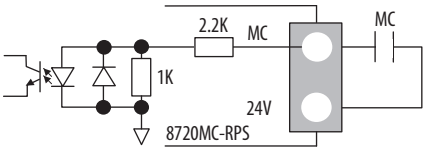
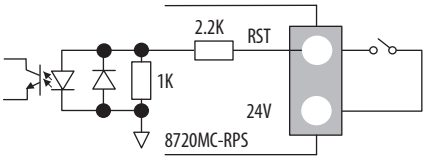
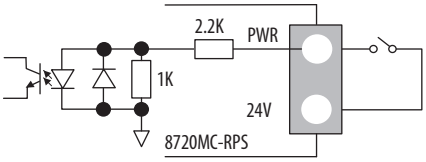
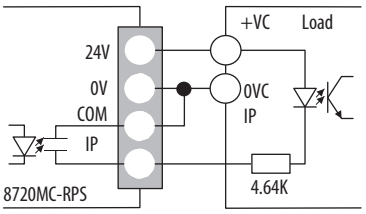
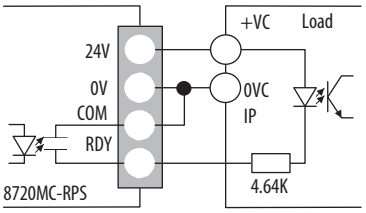
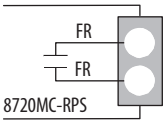
Figure 18 - Switch SW8 and SW10 Default Positions



Sequence Signal Terminal Block

The following table provides information on each of the TB3 terminals.

Table 13 - Sequence Signal Terminal Block (TB3) Descriptions

Function	Signal	Description
Sequence Input Signals	MC	Enter the supplemental contact signal (normally open contact) of the main magnetic contactor.(1) 
	RST	The reset signal (+24 VDC) is used to reset faults. Close the reset signal as required. (1) 
	PWR	Enter the RUN signal (+24 VDC). (1) 
Power for Sequence Signals	0V	0 V of +24V DC power
	24V	+24V DC power (rating: 24V DC/0.2 Amps)
Sequence Output Signals	COM	Common for IP and RDY signals.
	IP	This is a contact signal that is turned ON during instantaneous power loss (contact rating: 30V DC/ 50 mA). 
	RDY	This is a contact signal that is turned ON when the unit is ready for operation (contact rating: 30V DC/ 50 mA). 
	FR, FR	This is a contact signal that opens when the fault occurs (contact rating: 250V AC/1 Amp or 30V DC/ 1 Amp). 

(1) Because the driving current of sequence input signals is ≤5 mA, use a contact with a minimum applicable load is ≤5 mA.

Connect the 8720MC-RPS Unit

This chapter provides procedures for wiring your 8720MC-RPS units and accessory items.

Basic Wiring Requirements

This section contains basic wiring information for the 8720MC-RPS units and accessories.

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 metal debris from falling into it. Metal debris or other foreign matter can become lodged in the circuitry and result in damage to components.

SHOCK HAZARD: To avoid hazard of electrical shock, perform all mounting and wiring of the Bulletin 2198 drive modules prior to applying power. Once power is applied, connector terminals can have voltage present even when not in use.

IMPORTANT This section contains common PWM servo system wiring configurations, size, and practices that can be used in a majority of applications. National Electrical Code, local electrical codes, special operating temperatures, duty cycles, or system configurations take precedence over the values and methods provided.

Routing the Power and Signal Cables

Be aware that when you route power and signal wiring on a machine or system, radiated noise from nearby relays, transformers, and other electronic devices can be induced into I/O communication, or other sensitive low voltage signals. This can cause system faults and communication anomalies.

- The Bulletin 2090 single motor cable contains the power, brake, and feedback wires, but is properly shielded to protect the noise-sensitive feedback signals.
- Separate the sequence control signal wiring from the power wiring, and do not put both into a same duct. Also, do not route both wires in parallel.

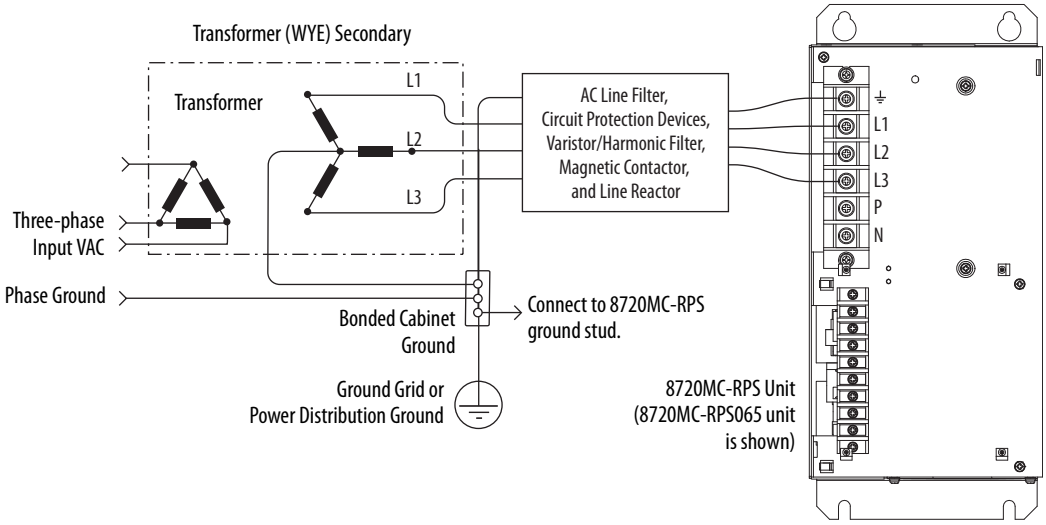
Refer to Electrical Noise Reduction on page 19 for examples of routing high and low voltage cables in wireways. Refer to the System Design for Control of Electrical Noise Reference Manual, publication GMC-RM001, for more information.

Input Power Configuration

The 8720MC-RPS units are designed to operate in grounded WYE environments.

The grounded (WYE) power configuration lets you ground your three-phase power at a neutral point. This type of grounded power configuration is required.

Figure 19 - Grounded Power Configuration (WYE Secondary)



ATTENTION: Ungrounded systems do not reference each phase potential to a power distribution ground. This can result in an unknown potential to earth ground.

Refer to Typical Input Power Diagrams beginning on page 49 for input power interconnect diagrams.

Ground the Drive System

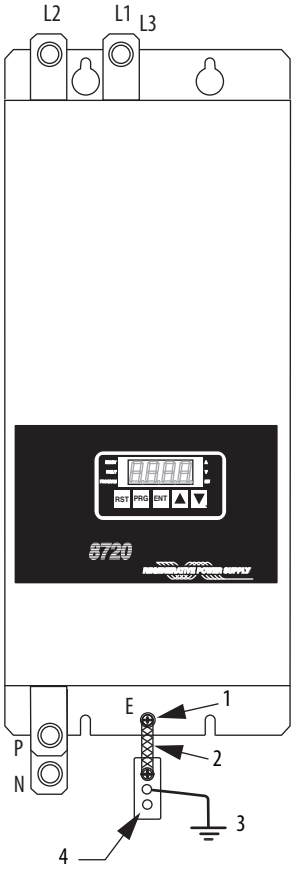
All equipment and components of a machine or process system must have a common earth-ground point that is connected to chassis. A grounded system provides a ground path for protection against electrical shock. Grounding your modules and panels minimize the shock hazard to personnel and damage to equipment caused by short circuits, transient overvoltages, and accidental connection of energized conductors to the equipment chassis.

ATTENTION: The National Electrical Code contains grounding requirements, conventions, and definitions. Follow all applicable local codes and regulations to safely ground your system.
For CE grounding requirements, refer to EMC Compliance on page 65.

Ground the System Subpanel

Ground 8720MC-RPS units to a bonded cabinet ground bus with a braided ground strap. Keep the braided ground strap as short as possible for optimum bonding.

Figure 20 - Connect the Ground Terminal



8720MC Regenerative Power Supply
(8720MC-RPS190 is shown)

Braided Ground Straps
12 mm (0.5 in.) by 0.8 mm (0.03 in.).
Keep straps as short as possible.

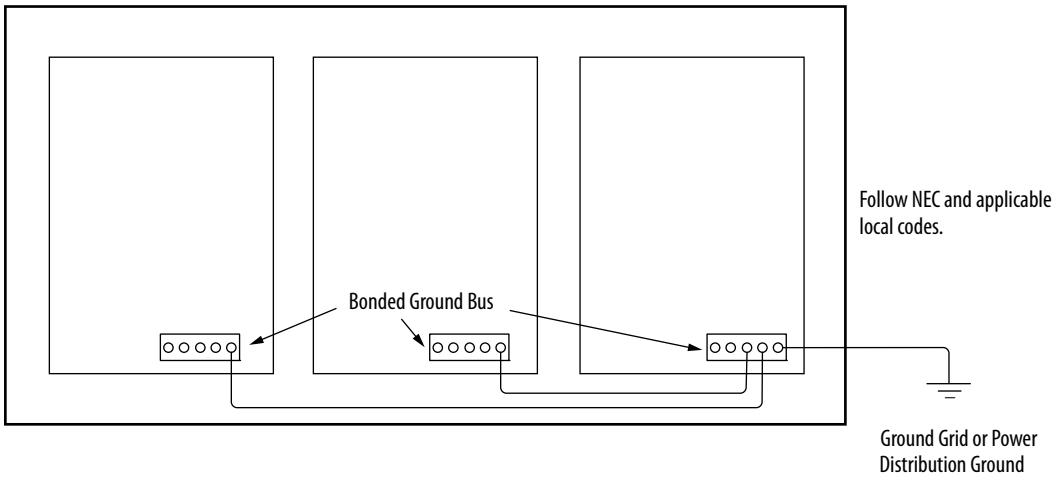
Item	Description
1	Ground screw (green) 2.0 N•m (17.7 lb•in), max
2	Braided ground strap (customer supplied)
3	Ground grid or power distribution ground
4	Bonded cabinet ground bus (customer supplied)

Refer to the System Design for Control of Electrical Noise Reference Manual, publication GMC-RM001, for more information.

Ground Multiple Subpanels

In this figure, the chassis ground is extended to multiple subpanels.

Figure 21 - Subpanels Connected to a Single Ground Point



High-frequency (HF) bonding is not illustrated. For HF bonding information, refer to Bonding Multiple Subpanels on page 21.

Wiring Requirements

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

Refer to Power Wiring Examples on page 121 for interconnect diagrams.

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

Table 14 - 8720MC-RPS065 Wiring Requirements

Terminals	Connects to Terminals	Screw Size	Wire Size mm ^{2} (AWG)	Pressure Terminal (1)	Torque Value N•m (lb•in)
Mains input power	L1, L2, L3	M6	22 (4)	JST 22-S6 or R22-6	2.9 (26)
DC Bus power	P, N				
Ground Stud	G				
Control terminal (TB2)	L1_AUX L2_AUX L3_AUX PR1, PR2, PR3 MC1, MC2	M4	2 (14)	JST 2-M4 or R2-4	1.2…1.4 (11…12)

(1) Terminal must be UL Listed. JST = Japan Solderless Terminal Co.

Table 15 - 8720MC-RPS190 Wiring Requirements

Terminals	Connects to Terminals	Screw Size	Wire Size mm ^{2} (AWG)	Pressure Terminal (1)	Torque Value N•m (lb•in)
Mains input power	L1, L2, L3	M10	38 (2) (two parallel wires)	JST R38-10 (x6)	10…12 (89…106)
DC Bus power	P, N			JST R38-10 (x4)	
Ground Stud	G	M8	38 (2)	JST R38-10 (x1)	5.5…6.6 (48…57)
Control terminal (TB2)	L1_AUX L2_AUX L3_AUX PR1, PR2, PR3 PR4, PR5, PR6	M4	3.5 (12)	JST 3.5-R4	1.2…1.4 (11…12)
Control terminal (TB4)	+24V3, 0V3, SENS, +24V2, 0V2, MC1, MC2	M4	2 (14)	JST 2-M4	1.2…1.4 (11…12)

(1) Terminal must be UL Listed. JST = Japan Solderless Terminal Co.

AC Input Power Diagrams

This section provides input wiring diagrams for 8720MC-RPS065 and 8720MC-RPS190 units in all possible configurations.

ATTENTION: The 8720MC-RPS units use high-speed switching elements that generate noise during switching. To avoid influence of such noise, use ground wire that is as thick and short as possible. Refer to the System Design for Control of Electrical Noise Reference Manual, publication GMC-RM001.

ATTENTION: It is required to install a power disconnecting device, a main magnetic contactor, and a line reactor in the AC input power line. In addition, an EMC line filter is required to meet CE requirements. Failure to observe these precautions could result in damage to equipment.

ATTENTION: When a thyristor or similar equipment is connected to the AC input power line, large distortion can be produced in the AC input power voltage and the 8720MC-RPS unit may not operate normally. Remove such large distortion from the AC input power voltage.

The capacity (rating) of the 8720MC-RPS unit depends on the number of units connected in parallel (for example, single unit, two paralleled units, or three paralleled units). The relation between the number of paralleled units and the unit capacity is shown in the Technical Specifications table on page 110.

ATTENTION: The phases of AC input power to the main power supply terminals (L1, L2 and L3), the control power terminals (L1_AUX, L2_AUX, and L3_AUX), and the polarity of DC-bus output (P and N) of all the connected units must be the same. For paralleled units, the phases of control power L1_AUX, L2_AUX, and L3_AUX for the follower units must be the same as those for the leader unit. Failure to observe this precaution could result in equipment damage or personal injury.

8720MC-RPS Input Power Diagrams

The notes in the following table apply to all 8720MC-RPS065 and 8720MC-RPS190 input power diagrams.

Table 16 - 8720MC-RPS Input Power Diagram Notes

Note	Information
1	The three-phase AC input power to terminals L1, L2, and L3 must branch off to control power terminals L1AUX, L2AUX, and L3AUX respectively. In parallel configurations, the control power phases L1AUX, L2AUX, and L3AUX for the master unit must branch off to terminals L1AUX, L2AUX, and L3AUX of the follower units respectively.
2	We recommend that you install the DC-bus circuit protection on both lines connected to terminals P and N to help prevent ground faults when more than one servo drive is connected to the 8720MC-RPS unit.
3	Turn ON switches SW7-1 and SW7-2 on the Regulator Board.
4	Circuit breakers and fuses (both) following the three-phase AC line filter are not required. Check your local code to determine if fuses should be used instead of circuit breakers.
5	The follower circuit breaker must be provided with an auxiliary contact as a safety interlock to the leader. Use fuses with a slightly higher current rating if your local code requires them.
6	When the 8720MC-RPS unit must comply with CE requirements, install a line filter in the three-phase AC input power line and a single-phase line filter in the power supply line to the main magnetic contactor.
7	The maximum length for DC-bus wiring is 2.0 m (6.6 ft). Use twisted, shielded, cable.
8	The maximum length for DC-bus wiring is 2.0 m (6.6 ft). We recommend that you use Bus bar for the common bus 1.75 times the total continuous current output of the 8720MC-RPS units.
9	Route wires and cables in the cabinet as short as possible.
10	Make the ground connection from the harmonic filter (terminal E) to ground terminal (G) as short as possible.
11	The physical order of the harmonic filter and varistor relative to the contactor and line reactor in the AC input power line must be installed as shown.
12	Driving current of the sequence input signals is ≤5 mA. So, make sure to use a contact with a minimum applicable load of ≤5 mA.
13	Use the line reactor in maximum surrounding air temperature of 55 degree C (131 degree F) and below.
14	 Leader and follower units in the same configuration must be of the same size and series. You cannot mix units of catalog number 8720MC-RPS065 with 8720MC-RPS190 and you cannot mix units of series # with series B. Failure to comply can result in damage to equipment.
15	This connection diagram is only available for AC input drives.
16	When the fan is connected to an external power supply, make sure that the power supply is designated by NEC Class 2 (power supply limited to ≤100 VA and ≤8 A in the event of a failure). For fan wiring inside the line reactor, see the figure (lower left) and Figure 53 on page 115.

Typical Input Power Diagrams

These example diagrams include single unit, two parallel unit, and three parallel unit diagrams for 8720MC-RPS065 and 8720MC-RPS190 regenerative power supplies.

Figure 22 - 8720MC-RPS065 (single unit) Input Power Wiring

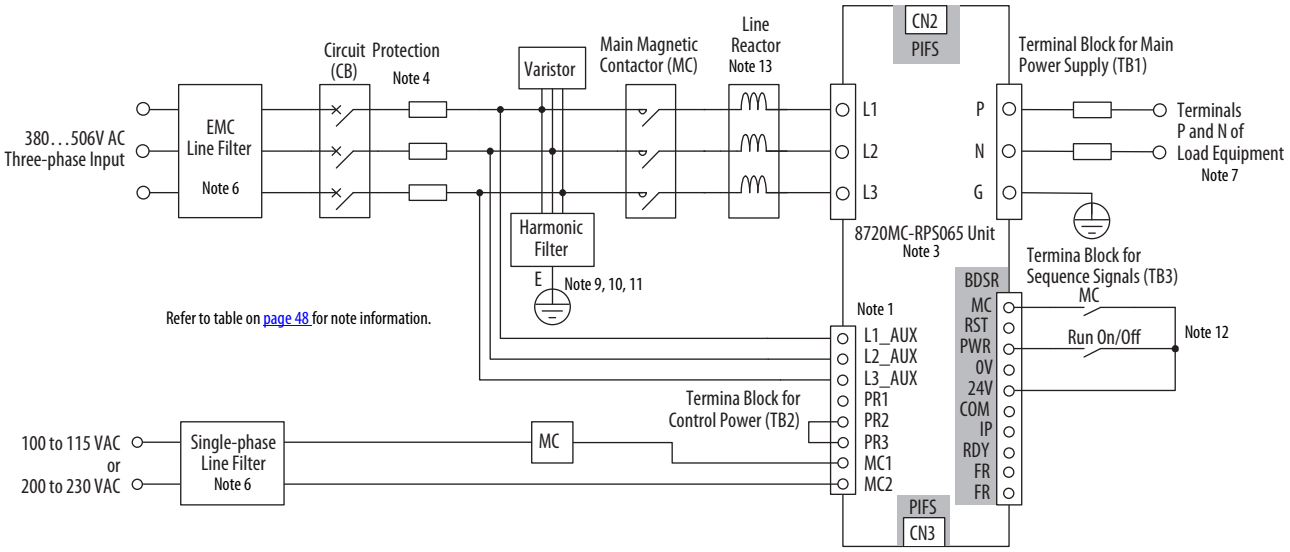


Figure 23 - 8720MC-RPS065 (two parallel units) Input Power Wiring

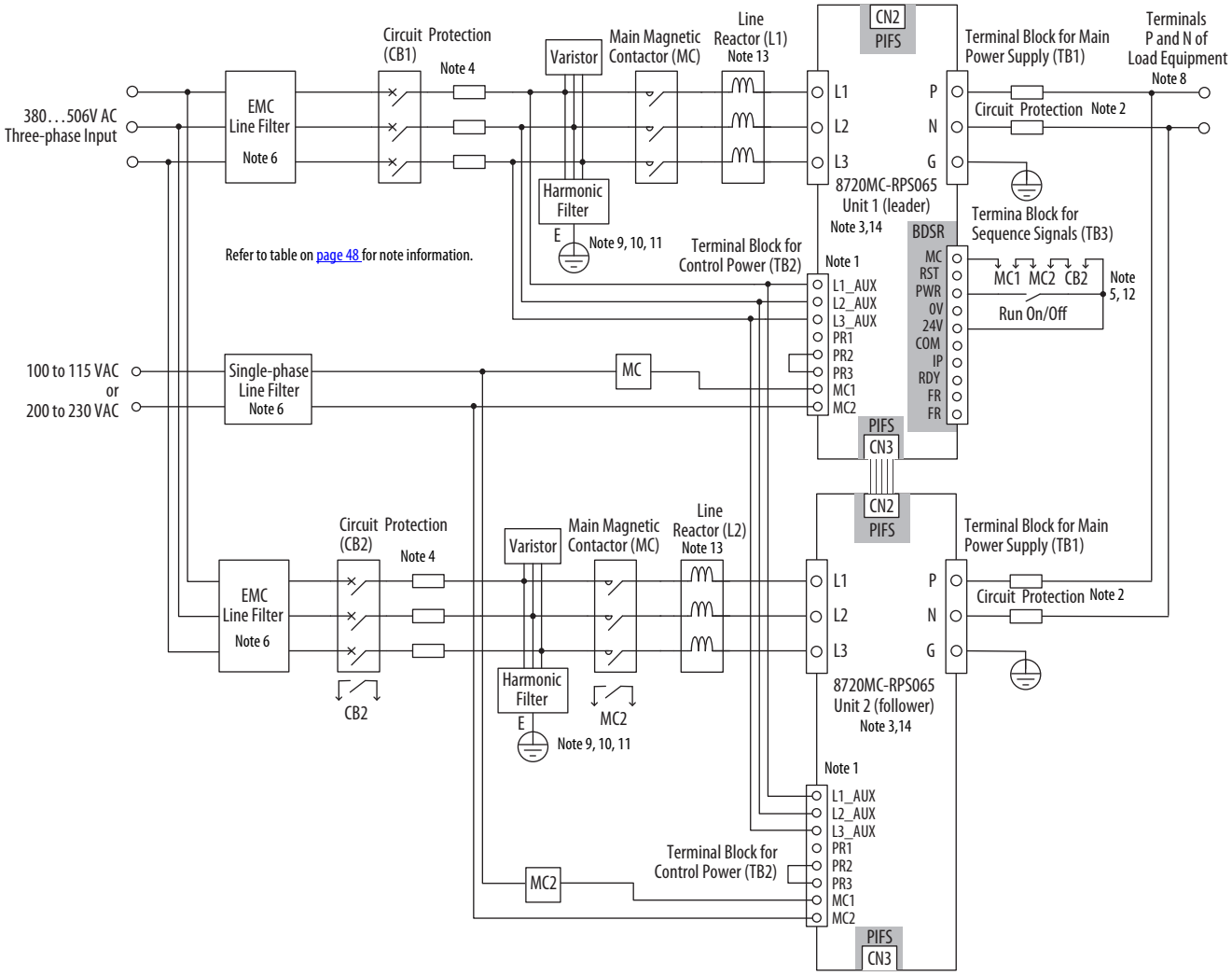


Figure 24 - 8720MC-RPS065 (three parallel units) Input Power Wiring

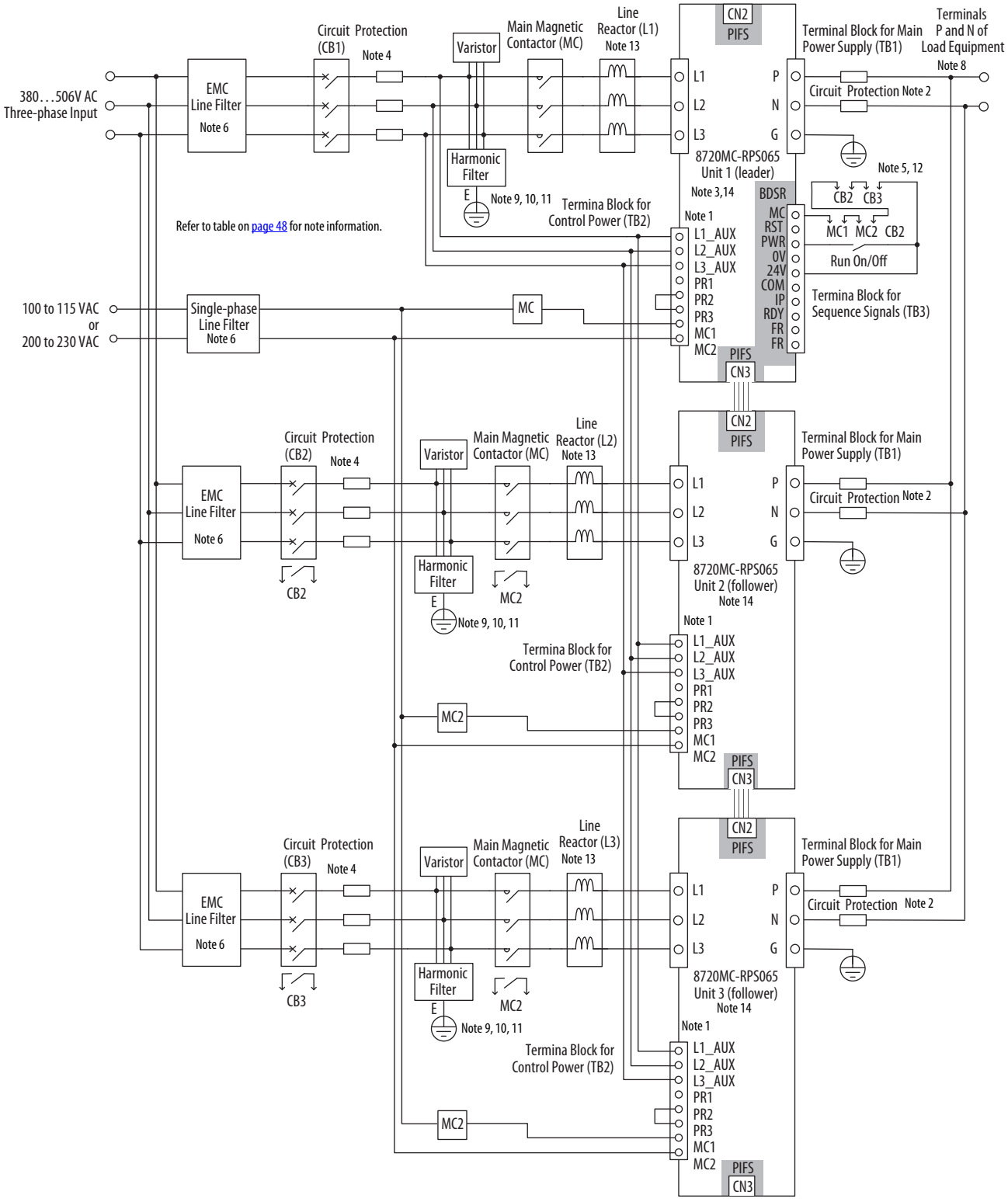


Figure 25 - 8720MC-RPS190 (single unit) Input Power Wiring

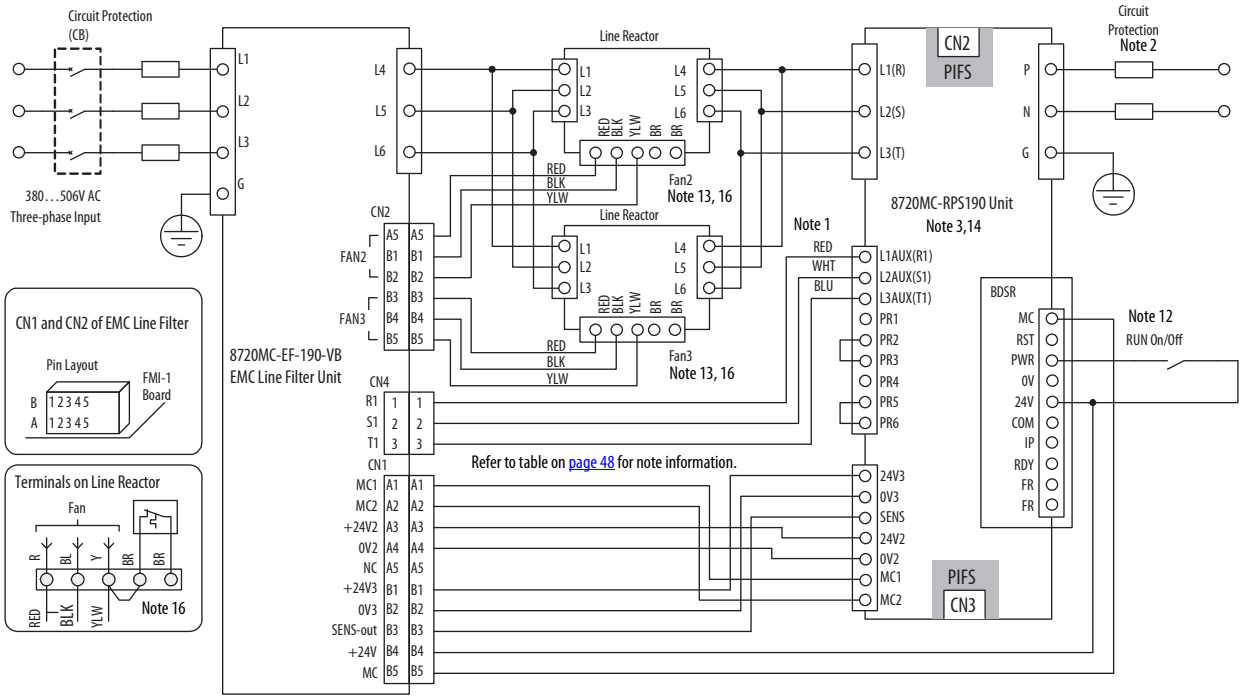


Figure 26 - 8720MC-RPS190 (two parallel units) Input Power Wiring

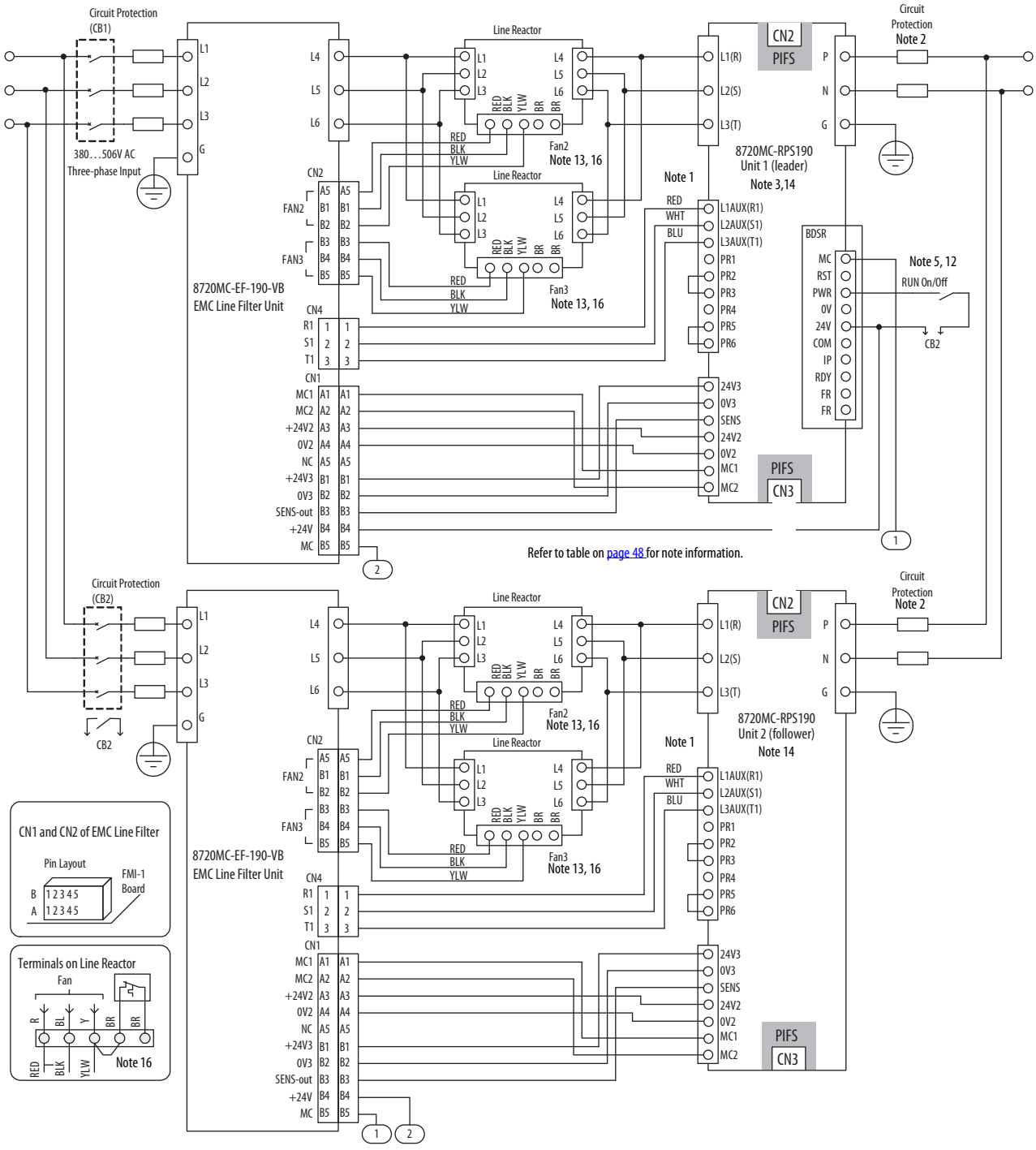
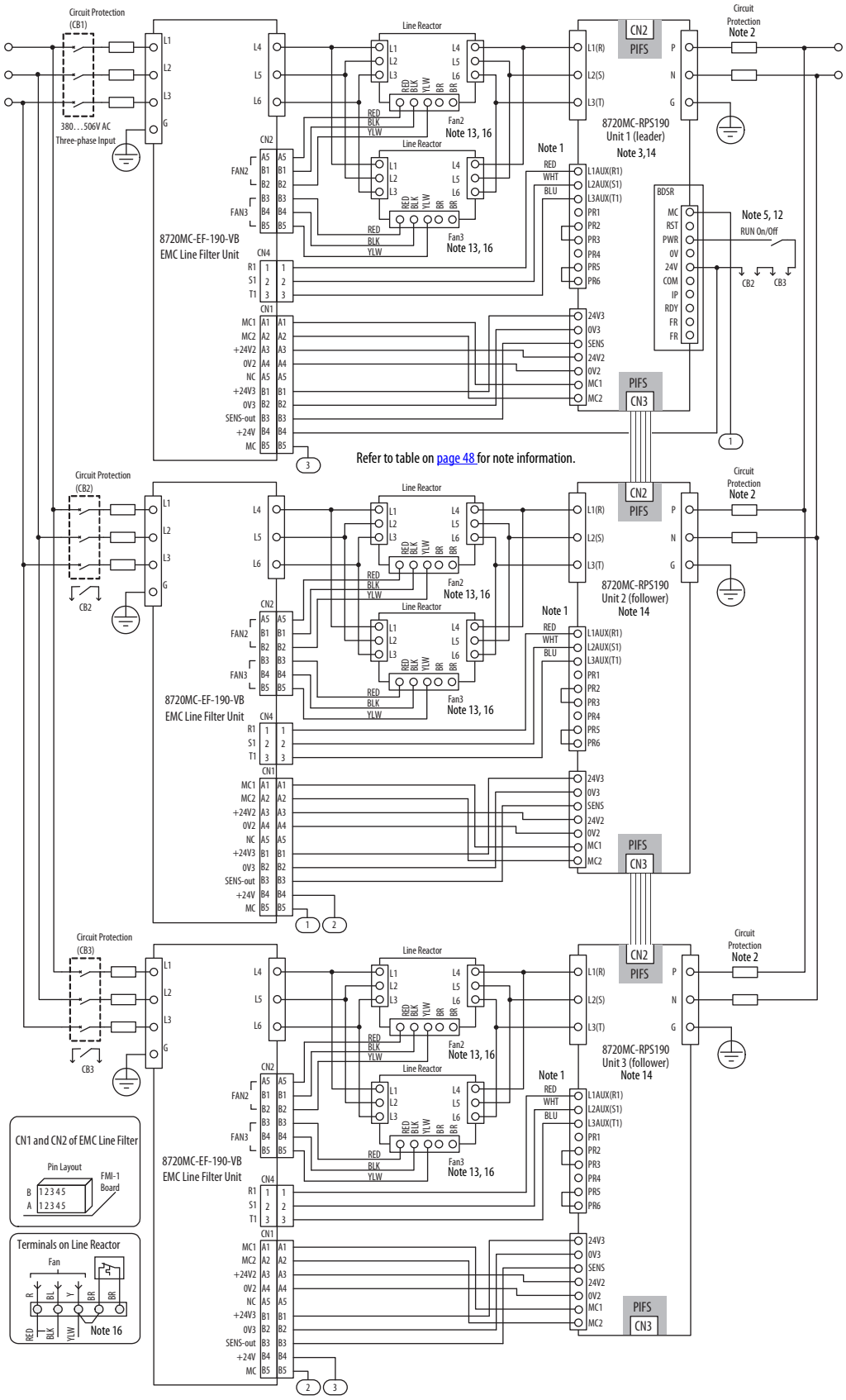


Figure 27 - 8720MC-RPS190 (three parallel units) Input Power Wiring



Regenerative Mode Input Power Diagrams

It is possible to select the 8720MC-RPS units based on regenerative power when only regenerated power of the unit integrating converter and inverter is used. See the figures on page 56 and page 57 for example diagrams. In these examples, the 8720MC-RPS unit is used as a converter for regenerative mode power only.

Observe the following Regenerative mode installation best practices:

- Rating of regenerative power of the 8720MC-RPS is less than rated power in the instantaneous rating and continuous rating.
- When the rectifier portion of the inverter is composed of a thyristor, the CR snubber circuit between anode and cathode of thyristor can become overloaded. Therefore, treating time for regenerative power must be within five seconds for three minutes. Because the current ICR flowing through the CR snubber circuit in the power regeneration mode is represented by the following formula, verify the specifications of CR snubber circuit.

$$I_{CR}[A] = (8–0.03 \cdot R\,[\Omega]) \cdot \sqrt{C\,[\mu F]}$$

- Connect the line reactor (ACL) unit of 3% impedance toward inverter rating with the AC input line of inverter. Without the line reactor unit, excessive circulating current flows between the 8720MC-RPS units.
- Even during the power running, current is supplied from the 8720MC-RPS unit to DC-bus proportionally to the impedance ratio of both reactors at the 8720MC-RPS unit and inverter. This current must not exceed the rating of the 8720MC-RPS unit.
- Set the parameter of the FWD Current Limit (U.001) to zero (0).
- Set the parameter of the Discharging Function Enable (F.017) to zero (OFF).
- Set the DC-bus voltage to start power regeneration to the parameter of the DC-bus voltage reference (U.000).
- Open the PR1, PR2, and PR3 terminals for connecting the precharge/discharge resistor. Because these terminals are open, the unit does not perform precharge/discharge operations. Precharge/discharge must be performed on the inverter side.
- Connect the READY signal of the inverter to PWR.

Table 17 - 8720MC-RPS Regeneration Mode Diagram Notes

Note	Information
1	The three-phase AC input power to terminals L1, L2, and L3 must branch off to control power terminals L1AUX, L2AUX, and L3AUX respectively. In parallel configurations, the control power phases L1AUX, L2AUX, and L3AUX for the master unit must branch off to terminals L1AUX, L2AUX, and L3AUX of the follower units respectively.
2	We recommend that you install the DC-bus circuit protection on both lines connected to terminals P and N to help prevent ground faults when more than one servo drive is connected to the 8720MC-RPS unit.
3	Turn ON switches SW7-1 and SW7-2 on the Regulator Board.
4	Route wires and cables in the cabinet as short as possible.
5	Make the ground connection from the harmonic filter (terminal E) to ground terminal (G) as short as possible.
6	This connection diagram is only available for AC input drives.
7	The physical order of the harmonic filter and varistor relative to the contactor and line reactor in the AC input power line must be installed as shown.
8	Use the line reactor in maximum surrounding air temperature of 55 degree C (131 degree F) and below.
9	Driving current of the sequence input signals is ≤5 mA. So, make sure to use a contact with a minimum applicable load of ≤5 mA.
10	When the fan is connected to an external power supply, make sure that the power supply is designated by NEC Class 2 (power supply limited to ≤100 VA and ≤8 A in the event of a failure). For fan wiring inside the line reactor, see the figure (lower left) and Figure 53 on page 115.

Figure 28 - 8720MC-RPS065 (regenerative mode only) Input Power Wiring

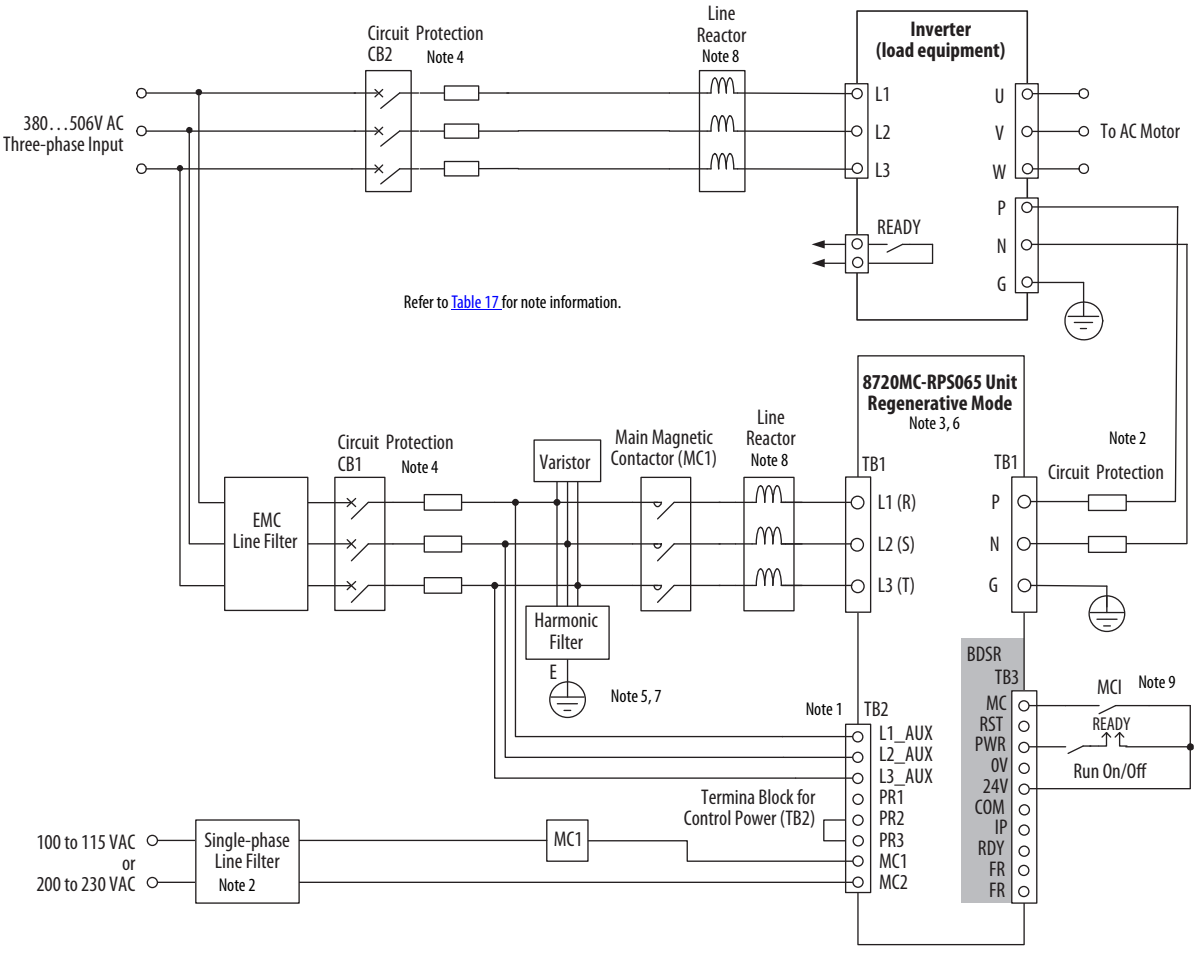
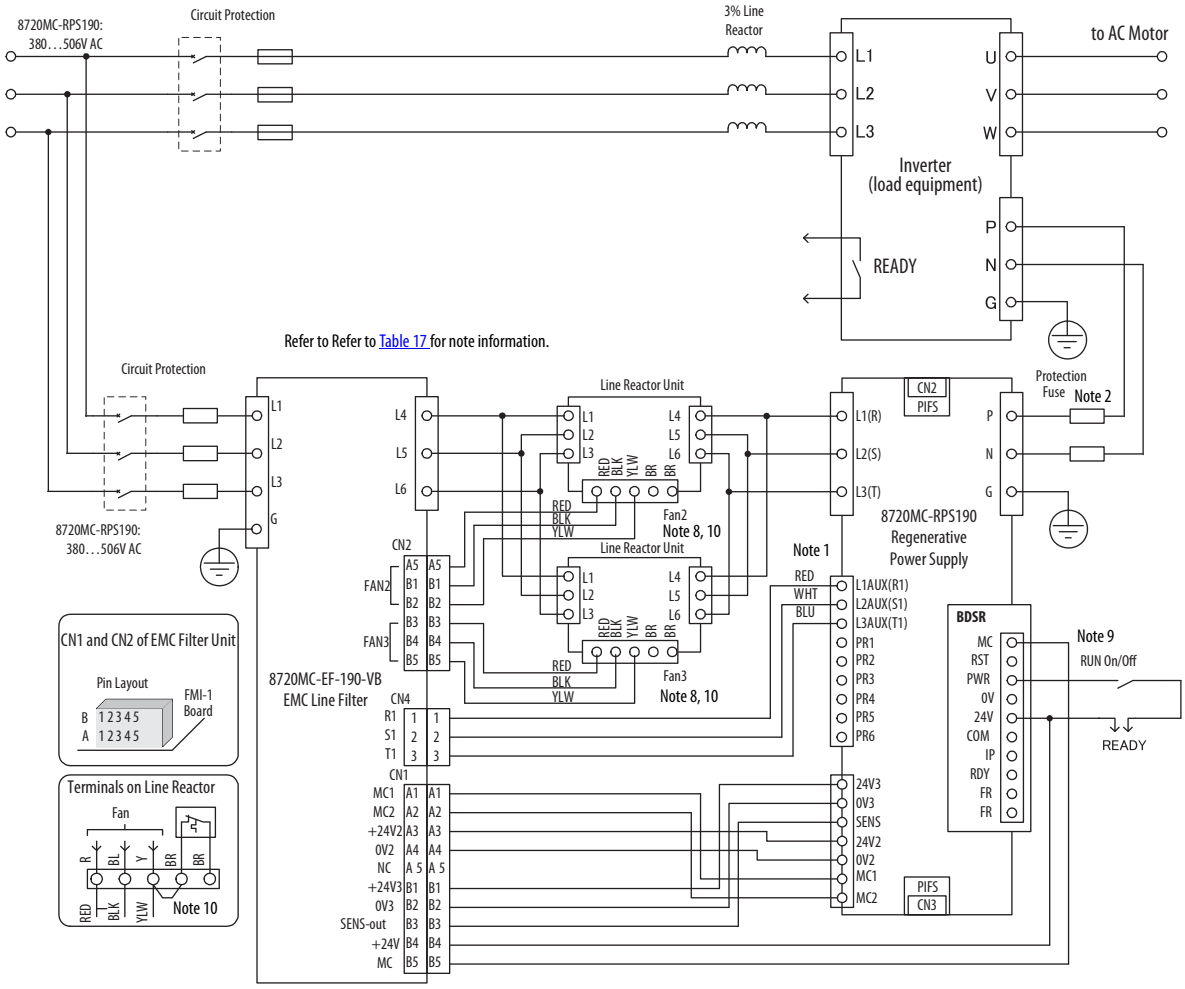


Figure 29 - 8720MC-RPS190 (regenerative mode only) Input Power Wiring



8720MC-RPS Unit Adapted to Large Capacity Capacitors

8720MC-RPS units charge to capacitors with a single-phase, full-wave rectification circuit through the built-in precharge/discharge resistor. When the load capacitors have large capacitance, it takes more time for charging, and the wattage of the internal resistor becomes insufficient. When the load capacitance is large, disable the built-in precharge/discharge resistor and connect an external resistor or external circuit for precharging/discharging.

TIP The minimum precharging/discharging cycle is three minutes.

Calculate the rated wattage of the external precharge/discharge resistor to be connected to the outside in accordance with the following formula, depending on the total capacitance of all the capacitors including the built-in capacitor.

Rated wattage [W] = 17,000 • C[F]
Assumes surge resistivity of J[J] = 28,000 • C[F] is provided

When an external precharge/discharge resistor is connected between PR1 and PR2, change the set value of the following parameters, if necessary.

- Precharge/discharge time (F.014)
- Wattage of precharge/discharge resistor (F.015)

Table 18 - Maximum Applicable Capacitance Value and Minimum Resistance Value

Attribute	8720MC-RPS065 Value	8720MC-RPS190 Value
Capacitance of the built-in capacitor	1960 µF	5600 µF
Built-in resistor (resistance value/wattage)	7000 µF (22 Ω/120 W)	25,000 µF (10 Ω/400 W)
External resistor (minimum resistance value) connected to PR1 and PR2	110,000 µF (20 Ω)	165,000 µF (10 Ω)
External resistor (minimum resistance value) See Figure 30 and Figure 31 for example diagrams.	220,000 µF (4.7 Ω)	495,000 µF (1.5 Ω)

External Resistor Case

Most applications are successfully integrated using the internal precharge resistor provided in the 8720MC-RPS unit. For instances where there is a large amount of load capacitance, caused by connecting several drives to a single 8720MC-RPS unit, use an external precharge resistor. To determine the total capacitance C[F], add the capacitance for the applicable 8720MC-RPS unit, as determined from row 1 of Table 18 to the sum of the drive capacitance.

- For the 8720MC-RPS065 unit, if the total capacitance is above 7,000 µF, but less than 110,000 µF, an external resistor connected to PR1 and PR2 is required. Table 18 provides the minimum resistance value for the external precharge resistor (20 ohms for the 8720MC-RPS065 unit).
- For the 8720MC-RPS190 unit, if the total capacitance is above 25,000 µF, but less than 165,000 µF, an external resistor connected to PR1 and PR2 is required. Table 18 provides the minimum resistance value for the external precharge resistor (10 ohms for the 8720MC-RPS190 unit).

The wattage [W] is determined by the equation presented on page 58. Connect the external precharge resistor to terminals PR1 and PR2 on terminal block TB2. Leave terminal PR3 open (see Table 18 on page 58). The precharge/discharge time (F.014) can require a larger value to accommodate the increased precharge time. The wattage of precharge/discharge resistor (F.015) can also be increased to the external precharge resistor wattage.

External Circuit Case

The notes in the following table are referenced from the 8720MC-RPS precharge/discharge circuit diagrams of the 8720MC-RPS065 units configured with an external circuit.

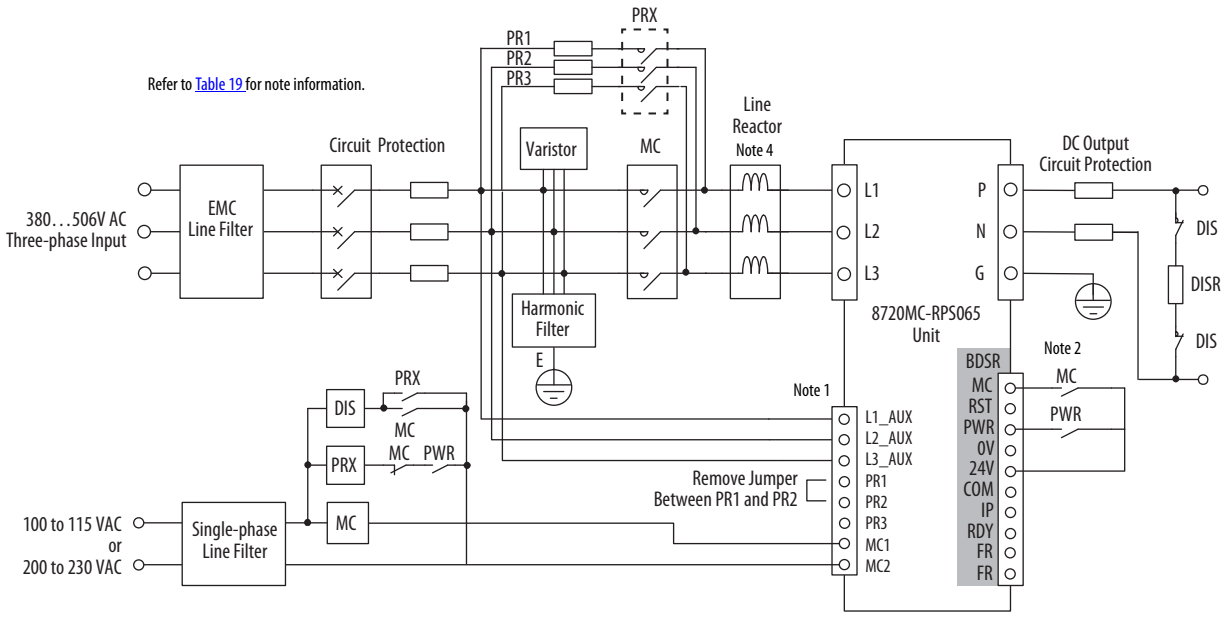
Table 19 - 8720MC-RPS Regeneration Mode Diagram Notes

Note	Information
1	Remove the jumper between PR2 and PR3.
2	Driving current of the sequence input signals is ≤5 mA. So, make sure to use a contact with a minimum applicable load of ≤5 mA. Wait at least 10 seconds after applying control power for the contactor power supply to become activated.
3	When the fan is connected to an external power supply, make sure that the power supply is designated by NEC Class 2 (power supply limited to ≤100 VA and ≤8 A in the event of a failure). For fan wiring inside the line reactor, see the figure (lower left) and Figure 53 on page 115.
4	Use the line reactor in maximum surrounding air temperature of 55 degree C (131 degree F) and below.

For the 8720MC-RPS065 unit, if the total capacitance is above 110,000 µF, but less than 220,000 µF, if an external resistor connected as shown in Figure 30 must be provided.

Table 18 on page 58 provides the minimum resistance value for the external precharge resistor (4.7 ohms for the 8720MC-RPS065 unit). The wattage [W] is determined by the equation presented earlier.

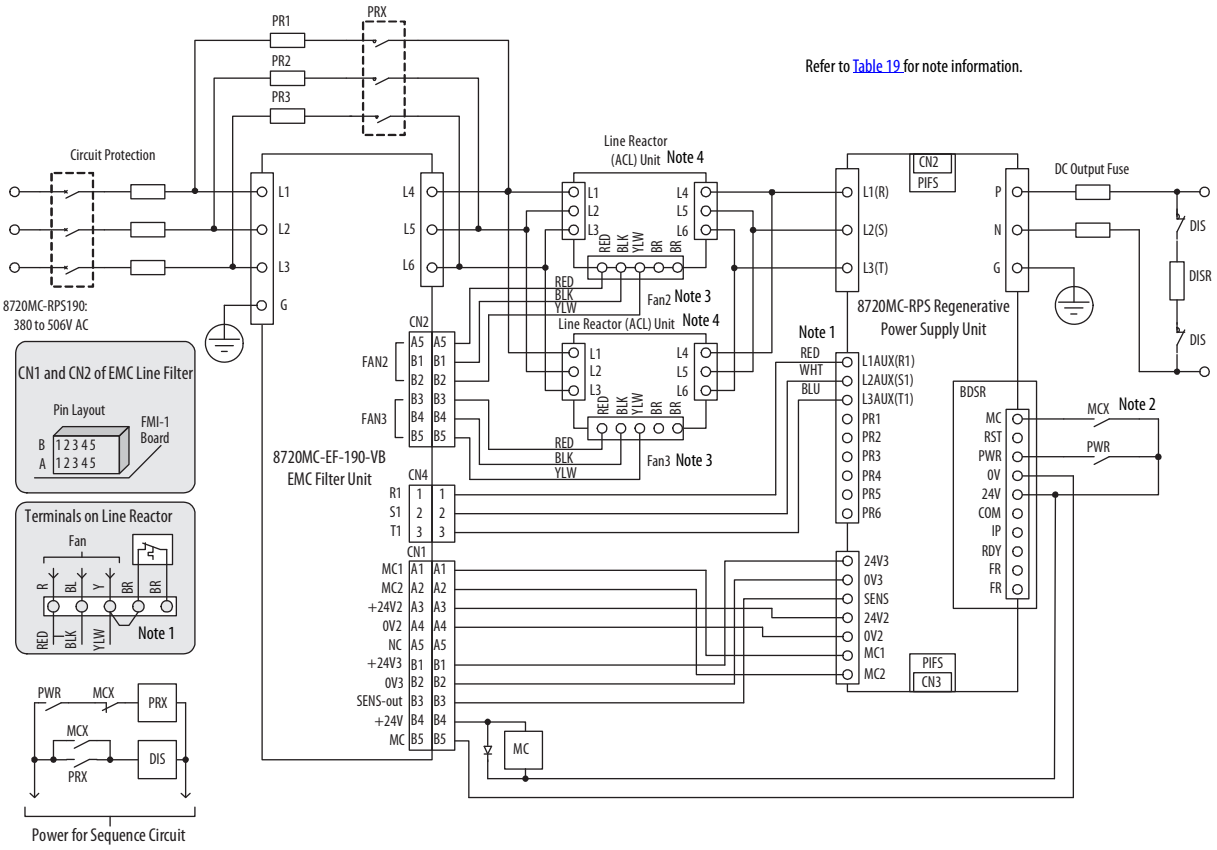
Figure 30 - 8720MC-RPS065 Precharge/Discharge Circuit with and External Circuit



For the 8720MC-RPS190 unit, if the total capacitance is above 165,000 µF, but less than 495,000 µF, if an external resistor connected as shown in Figure 31 must be provided.

Table 18 on page 58 provides the minimum resistance value for the external precharge resistor (1.5 ohms for the 8720MC-RPS190 unit). The wattage [W] is determined by the equation presented earlier.

Figure 31 - 8720MC-RPS190 Precharge/Discharge Circuit with and External Circuit



If a totally external resistor network is used as shown in Figure 31, the calculated wattage, [W] = 17,000 • C farads, is divided in half to size the precharge and discharge resistors. Parameter F.015 should be set to the sum of the wattage for both resistors.

Install the Circuit Breaker/Fuse Circuit Protection

To protect the AC input power for single and parallel unit configurations, install a circuit breaker with supplemental contact (CB) or fuses in the AC input power line. Refer to Circuit Breaker/Fuse Selection on page 17 for recommended circuit protection devices.

Install the Main Magnetic Contactors

The 8720MC-RPS unit uses a magnetic contactor for turning the main power supply ON and OFF. This applies to single units and units connected in parallel. After the RUN sequence signal is entered and the precharge operation is completed, the main magnetic contactor turns ON.

Conversely, when the RUN sequence signal is turned OFF, or when a fault occurs, the main magnetic contactor turns OFF, and the discharge operation begins. Refer to Contactor Specifications on page 17 for recommended magnetic contactors.

Install Line Reactors

The 8720MC-RPS unit boosts up and controls the DC-bus voltage by utilizing the magnetic characteristics of a line reactor.

ATTENTION: Due to the high operating temperature of the line reactor, make sure the unit has adequate ventilation inside the enclosure.

BURN HAZARD: During operation of the 8720MC-RPS unit the line reactor becomes extremely hot. Do not touch the line reactor during operation or immediately after the unit has been turned OFF. Failure to observe this precaution could result in bodily injury.

Install a single-phase type line reactor to each of L1-phase, L2-phase, and L3-phase. Do not use three-phase AC line reactors, because this causes unwanted coupling between the phases.

The following inductance of the line reactor must be maintained in a high frequency as 10 to 20 kHz. The use of a line reactor for commercial power supply does not maintain the required inductance, resulting in increased heat generation or saturation due to iron loss.

When multiple units are connected in parallel, a current unbalance between the units is produced due to variation of reactor inductance. To make the current difference between the connected units as small as possible, use line reactors having a variation of no more than ±2.5%.

These line reactors are integrated for three phases consisting of three single-phase reactors. When selected reactors are installed, set their capacity to the parameter F.013.

Table 20 - 8720MC Line Reactors for 8720MC-RPS065 Units

Line Reactors (1) Cat. No.	Continuous Current, max A	Inductance uH	Capacity of Motor, max kW
8720MC-LR03-032B	32	850	15
8720MC-LR05-048B	48	800	22
8720MC-LR10-062B	62	1100	30
8720MC-LR14-070B	70	1200	37

(1) Provide the required quantity of reactors for all units connected in parallel (refer to Figure 23 and Figure 24).

Table 21 - 8720MC Line Reactors for 8720MC-RPS190 Units

Line Reactors (1) Cat. No.	Quantity	Continuous Current, max A	Inductance uH	Capacity of Motor, max kW
8720MC-LR10-100B	1	100	800	65
	2	190		125

(1) Cooling fan and thermo switch are mounted on the line reactor unit. The thermo switch opens at about 150 °C (302 °F) and produces a reactor-fan fault signal.

Table 22 - Wire Ratings for 8720MC Line Reactors

Line Reactors Cat. No.	Continuous Current, max	Wire Temperature
8720MC-LR03-032B	≤60 A	105 °C (221 °F) or higher
8720MC-LR05-048B		
8720MC-LR10-062B		
8720MC-LR14-070B		
8720MC-LR14-070B	60…80 A	130 °C (266 °F) or higher
8720MC-LR10-100B	–	105 °C (221 °F) or higher

The operating ambient temperature for the 8720MC line reactors is 50 °C (122 °F), maximum. Derate current 1% for every 1 °C above 50 °C.

Install the Varistor (8720MC-RPS065 units only)

Install a varistor to absorb surge voltage between AC input power wires. The 8720MC-VA-B varistor is the designated varistor for 8720MC-RPS065BM and 8720MC-RPS065BS units.

IMPORTANT Provide the required quantity of varistors for all units connected in parallel and connect the varistor on the incoming AC line-side of the AC contactor.

Install the Harmonic Filter (8720MC-RPS065 units only)

Install the 8720MC-HF-B2 harmonic filter to remove high-order harmonics generated by the switching operation of the AC input power modules. Wire size for the 8720MC-HF-B2 harmonic filter is 3.5 mm^2 (12 AWG).

IMPORTANT Connect the harmonic filter on the incoming AC line-side of the AC contactor.

Install the EMC Line Filter (8720MC-RPS065 units only)

An AC (EMC) line filter is required for meeting the requirements of CE. Install a line filter for three-phase AC input power and single-phase AC power for the main magnetic contactors. Line filters are used in power supply and power regeneration configurations.

Table 23 - Line Filters for 8720MC-RPS065 Units

8720MC-RPS Cat. No.	Three-phase AC Power for AC Input Power Line		Single-phase AC Power for Main Magnetic Contactor	
	Allen-Bradley® Cat. No.	Soshin Electric PN	Schaffner PN	Soshin Electric PN
8720MC-RPS065BM	8720MC-RFI80	HF3080C-TOA	FN2010-6-06	NF2005A-YX
8720MC-RPS065BS				

Install the Line Filter (8720MC-RPS190 units only)

The 8720MC-EF190-VB (EMC) line filter unit contains line filter, magnetic contactor, varistor, harmonic filter, and is used with the 8720MC-RPS190BM and 8720MC-RPS190BS regenerative power supplies.

Because the 8720MC-EF190-VB unit is completely assembled, the wiring can be simplified in combination with 8720MC-LR10-100B reactors. For wiring the 8720MC-EF190-VB unit, refer to Figure 25, Figure 26, and Figure 27.

Table 24 - Recommended Power Wire Sizes

Terminal Block	Terminals	Screw Size	Wire Size	Attached Lug (1)	Torque
Mains (input)	L1, L2, L3	M8	Larger than 38 mm^2-2 in parallel (2-2 AWG in parallel)	JST, R38-8 (M8) (6 pieces)	5.5…6.6 N•m (48…57 lb•in)
Mains (output)	L4, L5, L6	M10		JST, R38-10 (M10) (6 pieces)	10…12 N•m (89…106 lb•in)
Ground (earth)	G	M8	Larger than 38 mm^2 (2 AWG)	JST, R38-8 (M8) (1 piece)	5.5…6.6 N•m (48…57 lb•in)

(1) UL-Listed wires must be lugged by attached lugs. JST is Japan Solderless Terminal Co.

Install DC-bus Power Output Wiring

The DC-bus output terminals on the main power terminal block (TB1) or the DC-bus terminal bars of the 8720MC-RPS unit are used for connecting to load equipment (inverters). Use the recommended wire sizes shown in Table 14 and Table 15 for wiring between the 8720MC-RPS unit and the load equipment. Connect terminal P on the main power terminal block (TB1) or terminal bar P of the 8720MC-RPS unit to the positive (plus) DC-bus terminal of the load equipment. Connect terminal N on the terminal block TB1 or the terminal bar N to the negative (minus) DC-bus terminal of the load equipment.

ATTENTION: When connecting the DC-bus to multiple external loads and fuses are not provided in the load equipment, you are responsible for installing fuses to protect the DC-bus from shorting. Failure to observe this precaution could result in damage to the equipment.

ATTENTION: Terminal P on the 8720MC-RPS unit must be connected to terminal P on the load (inverter). Likewise, Terminal N on the 8720MC-RPS unit must be connected to terminal N on the load (inverter). Failure to observe this precaution could result in damage to the 8720MC-RPS unit and the connected load equipment.

When multiple drives are connected to the 8720MC-RPS unit, always install input fuses before each drive to protect the wiring and the drive. Refer to Circuit Protection Specifications on page 17 for recommended devices.

Ground the 8720MC-RPS Unit

Connect an equipment ground conductor to the ground terminal of load equipment, remote control station (if used), input transformer (if used), and ground terminal of the 8720MC-RPS unit. Run earth conductor to earth ground after confirming that the conductors are unbroken. Refer to the recommended wire size for ground terminals in Table 14 and Table 15.

This system is operated by switching the DC-bus line from + (plus) bus voltage to – (minus) bus voltage with reference to ground potential for the 8720MC-RPS operation. For this reason, plus and minus voltages are always added on a circuit if the equipment has a circuit between the bus line of the equipment to be connected and the ground (earth). Even if no direct circuit exists between the bus line and the ground, pulse current will flow through the stray capacity of the equipment by bus voltage switching. When the 8720MC-RPS unit and the equipment connected to the 8720MC-RPS unit are not securely grounded, this current will flow through the circuit and may cause malfunction of them. If ground is not made properly, it can cause a malfunction in another system on the same line.

Install an insulating transformer to the input line of the 8720MC-RPS if unbalanced current flows and earth leakage breaker malfunctions due to the power supply conditions.

EMC Compliance

To declare conformity with the requirements of the CE mark, the 8720MC-RPS unit must comply with the EMC directive and low voltage directive.

ATTENTION: Meeting CE requires a grounded system, and the method of grounding the AC line filter and 8720MC-RPS unit must match. Failure to do this renders the filter ineffective and can cause damage to the filter. For the grounding example, refer to Input Power Configuration on page 43.

For more information on electrical noise reduction, refer to the System Design for Control of Electrical Noise Reference Manual, publication GMC-RM001.

IMPORTANT The 8720MC-RPS unit is not subject to the Machine Directive. However, when the 8720MC-RPS unit is combined with other equipment, control cabinet and machine, it becomes necessary to declare compliance with the Machine Directive. The noise level can vary depending on the installation and wiring of the 8720MC-RPS unit, and other equipment in the control cabinet. It has been already confirmed that the 8720MC-RPS unit complies with EMC standards, but only when the 8720MC-RPS unit is composed of the component parts designated by Rockwell Automation.

For you to declare conformity with the requirements of the CE Mark, you must confirm that the unit complies with EMC standards on the final conditions after completion of installation and wiring.

To meet CE requirements, these requirements apply:

- Use a control cabinet made of metal for installing the 8720MC-RPS unit.
- Install a line filter designated by Rockwell Automation to the power input line of the 8720MC-RPS units. Wiring to the line filter must be as short as possible.
- Because current leaks to the earth when a line filter is installed, connection to earth ground must be secured. Due to leaked current, the earth leakage breaker can malfunction. Select a proper breaker complying with leaked current (rated current 100...500 mA and operating time within 0.1...2.0 seconds).
- The control cabinet must be grounded. Wiring to the ground terminal of the control cabinet must be as thick and short as possible.
- The input and output line of the 8720MC-RPS units must be separated from the output line of the inverter unit as far as possible.
- Wiring of the control signal must be terminated within the control cabinet. Should the control cable be needed to extend out of the control cabinet, it is recommended to use shielded cables. When ferrite cores are used, install them to the side of the 8720MC-RPS units. The following are recommended ferrite cores for use with control cables:
  - ZCAT2032-0930 (inside diameter 9 ±1 mm): TDK
  - ZCAT2035-1330 (inside diameter 13 ±1 mm): TDK
- For help on wiring to the other equipment and motors connected to the 8720MC-RPS unit, refer to the manuals of relevant equipment.

EMC Directive

This unit is tested to meet Council Directive 2004/108/EC Electromagnetic Compatibility (EMC) by using these standards, in whole or in part:

> EN 61800-3 - Adjustable Speed Electrical Power Drive Systems, Part 3 - EMC Product Standard including specific test methods

The product described in this manual is intended for use in an industrial environment.

CE Declarations of Conformity are available online at http://www.rockwellautomation.com/rockwellautomation/certification/overview.page.

Low Voltage Directive

These units are tested to meet Council Directive 2006/95/EC Low Voltage Directive. The EN 60204-1 Safety of Machinery-Electrical Equipment of Machines, Part 1-Specification for General Requirements standard applies in whole or in part. Additionally, the standard EN 61800-5-1 Electronic Equipment for use in Power Installations apply in whole or in part.

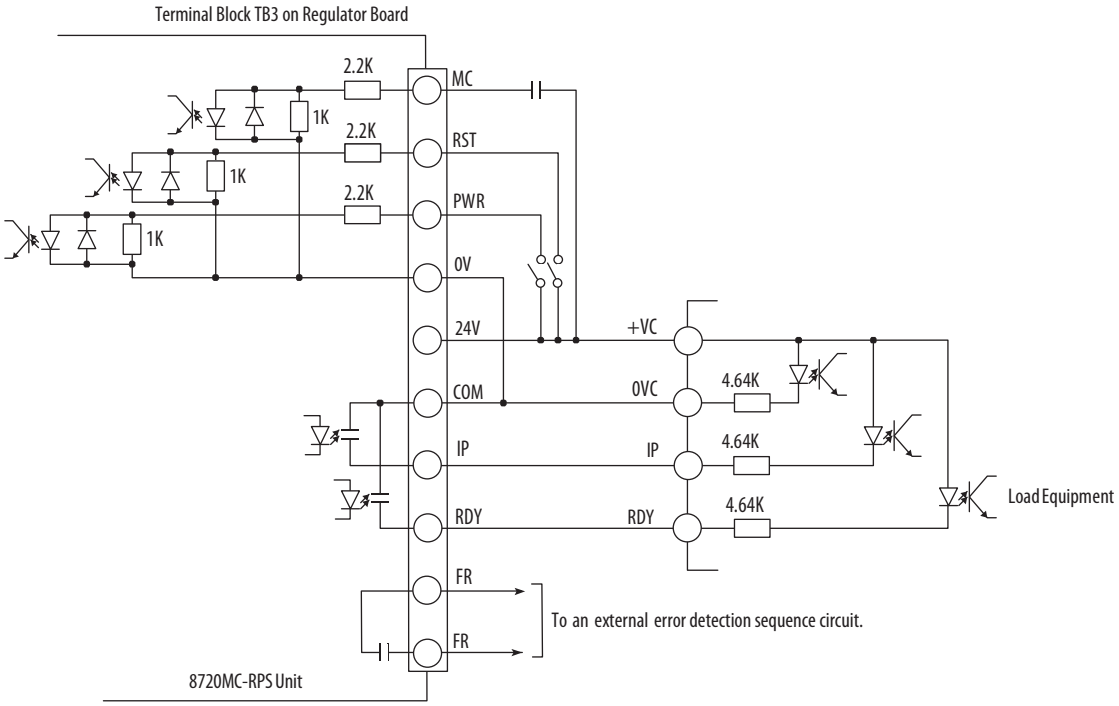
Sequence Signal Wiring

Sequence output signals are provided from the sequence signal terminal block (TB3) of the regulator board to indicate the unit status.

Follow these guidelines when installing sequence signal wiring:

- Use twisted pair cable of 0.2...0.5 mm^2 (22...20 AWG) for the signal line.
- Separate the sequence signal wiring from the power wiring (main power supply wiring, control power wiring, and DC-bus power wiring). Failure to observe this precaution could result in damage to the 8720MC-RPS unit.
- Use a separate (dedicated) wireway for the sequence signal wiring.
- Do not route the sequence signal wiring near any equipment that produces electromagnetic interference.

Figure 32 - Typical Sequence Control Signal Connections



Operation Timing of Sequence Control Signals

The following timing diagrams describe the sequence of operations for precharge, discharge, error detection, error resetting, and power loss.

Figure 33 - Sequence Operation of Precharging

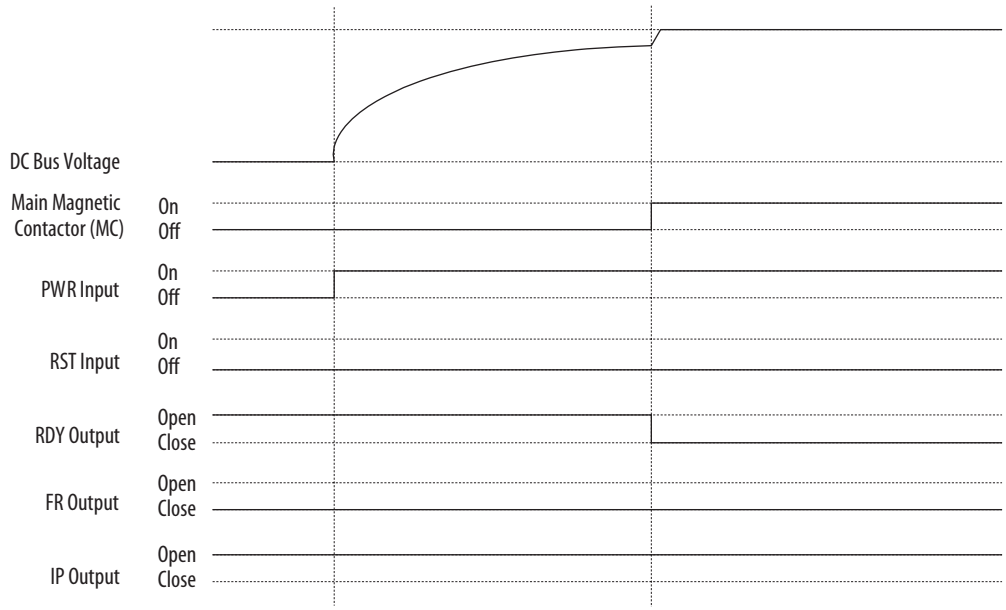


Figure 34 - Sequence Operation of Discharging

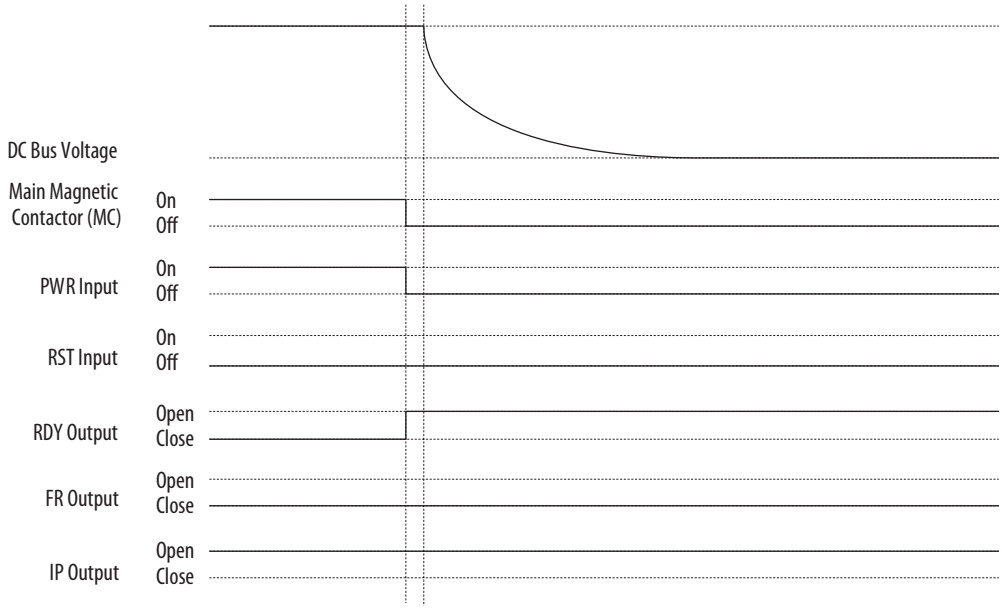


Figure 35 - Sequence Operation of Error Detection

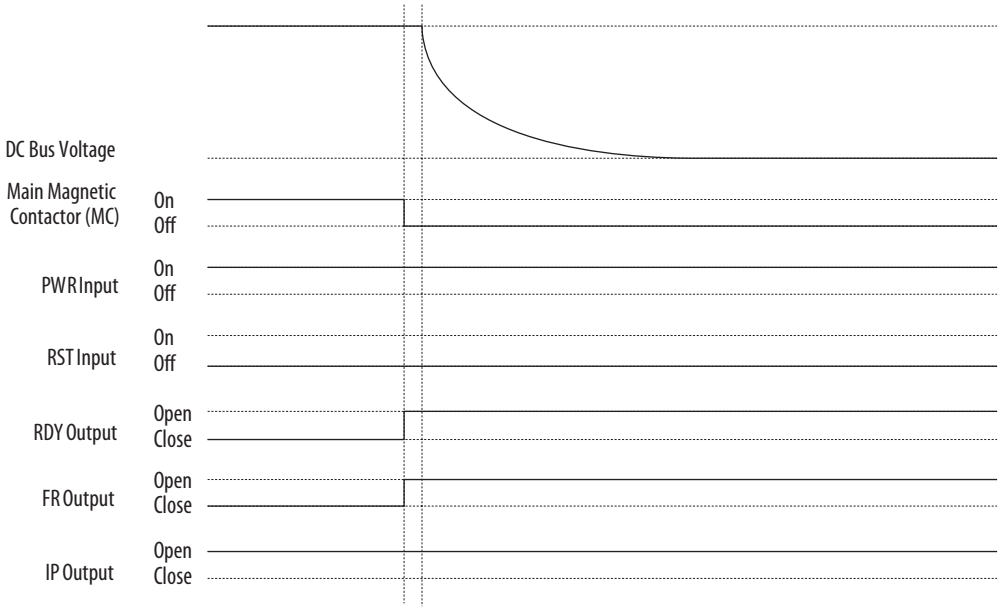


Figure 36 - Sequence Operation of Error Reset

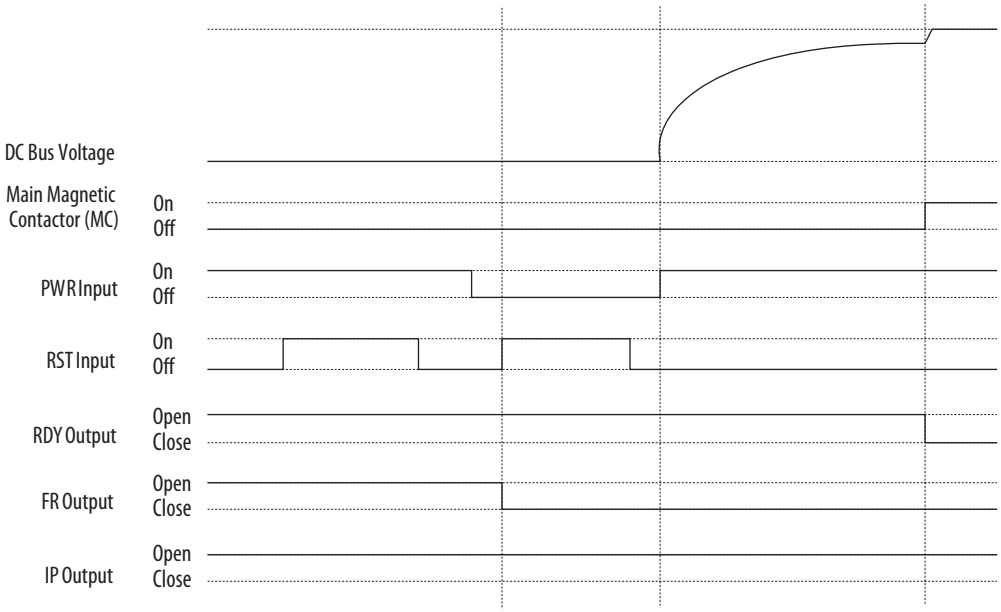


Figure 37 - Sequence Operation of Detecting Instantaneous Power Loss (magnetic contactor power is not off)

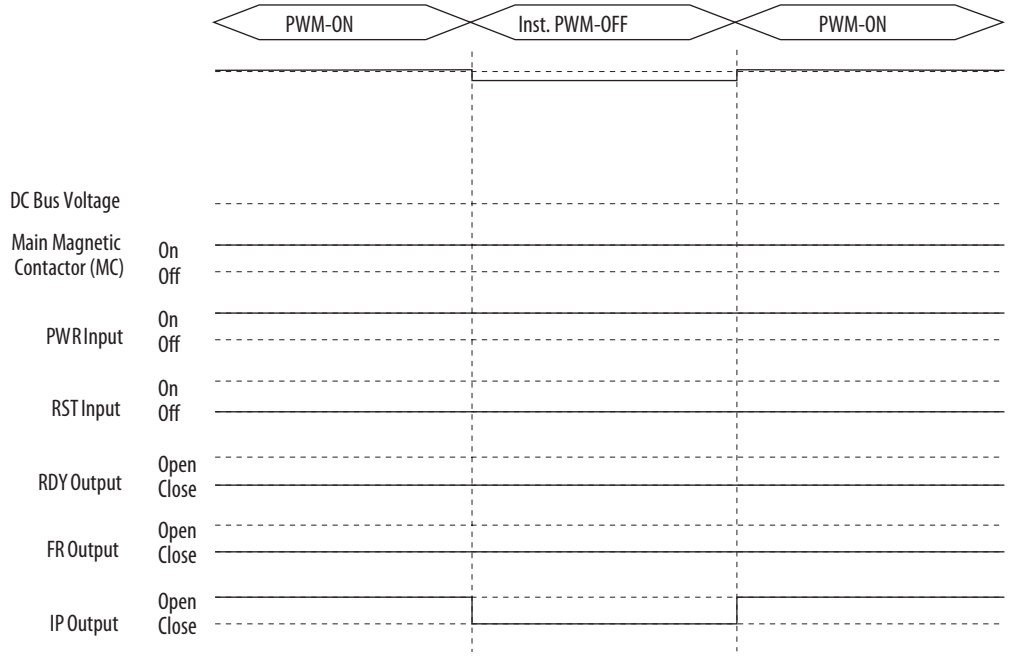
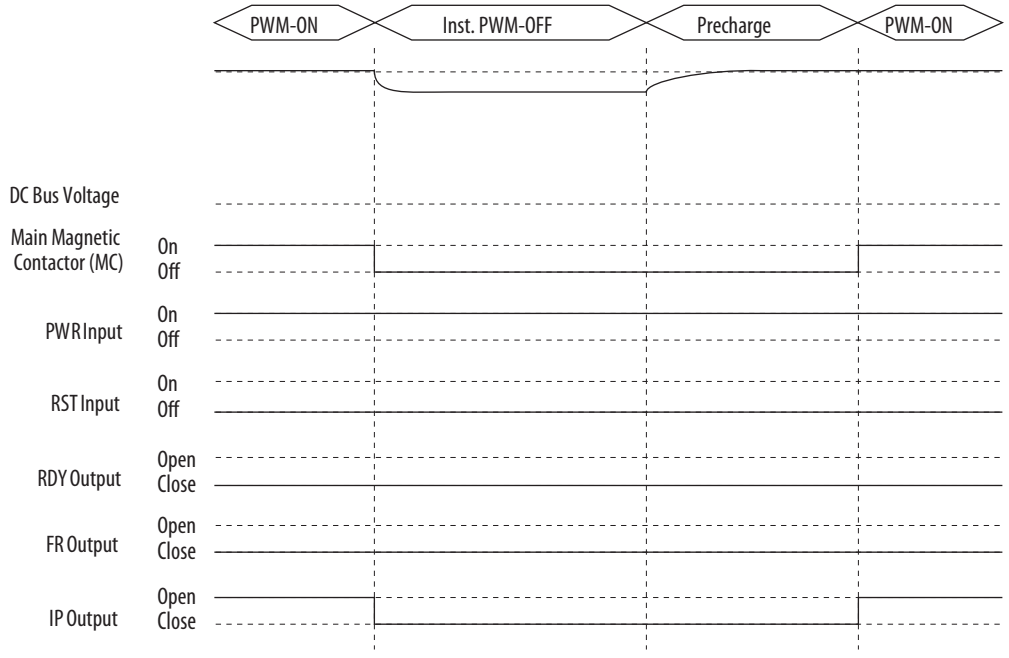


Figure 38 - Sequence Operation of Detecting Instantaneous Power Loss (magnetic contactor power is off)



Install Ribbon Cables

For a single units or for leader unit when multiple units are connected in parallel, the regulator board is connected to the power interface board (PIFS) with a ribbon cable. Also, ribbon cable is used for connecting between the power interface boards of the leader unit and the follower unit and between the power interface boards of the follower units.

- Ribbon cable connects between the regulator board (BDSR) and power interface board (PIFS)
- Ribbon cable connects between power interface boards (PIFS).

Figure 39 - Connecting Ribbon Cables (series #)

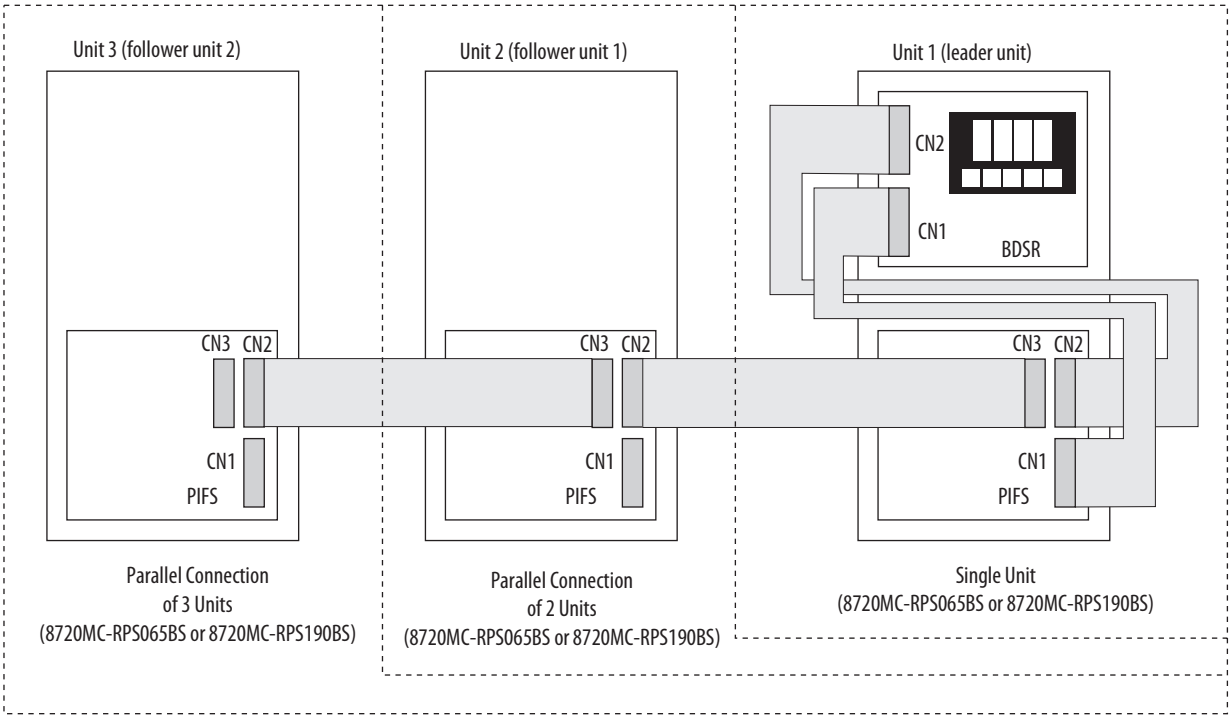


Figure 40 - Connecting Ribbon Cables (series B)

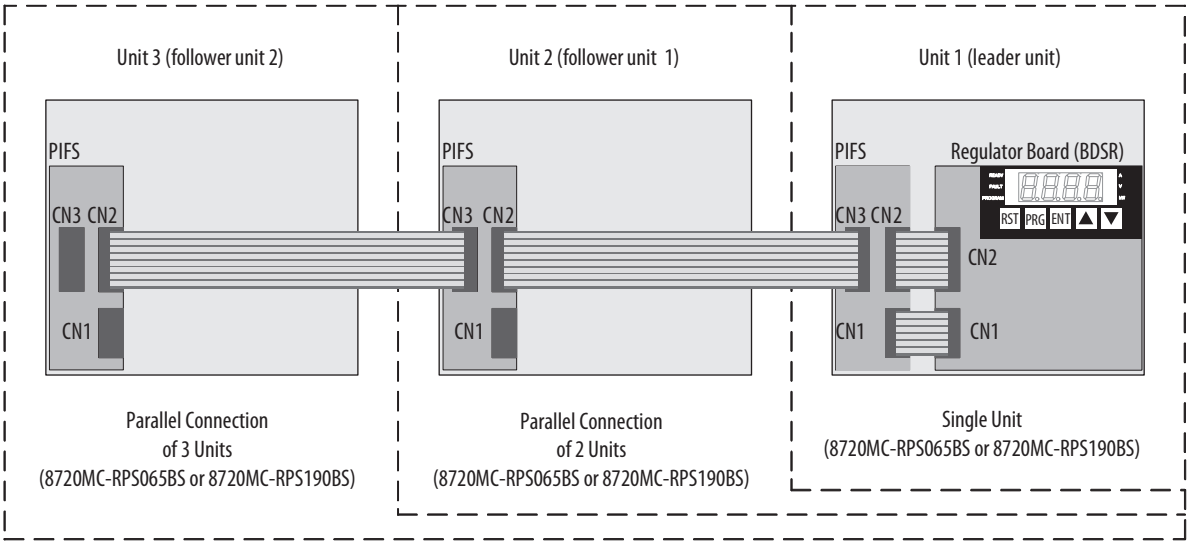
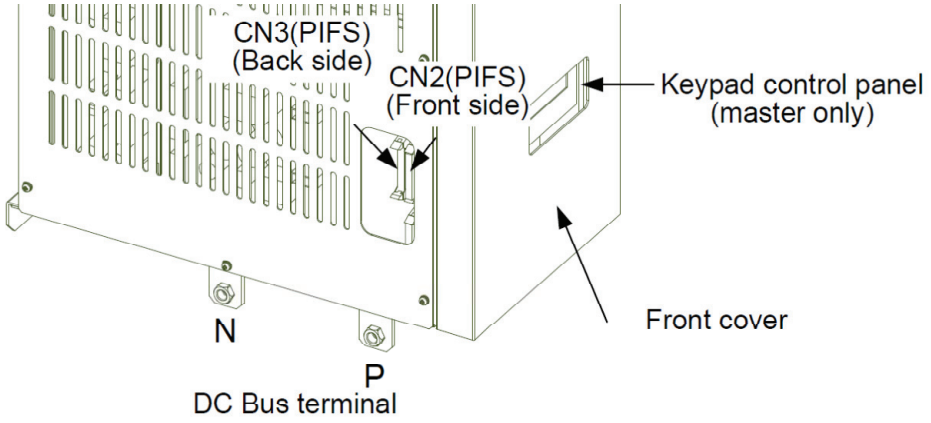


Figure 41 - Ribbon Cable Locations (series B)



Ribbon Cable Wiring in Parallel Operation

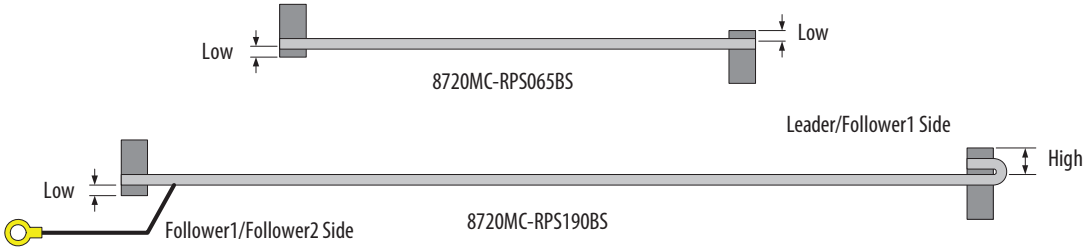
For 8720MC-RPS065BS units, the low height lock is used for both ends of the ribbon cable in parallel operation. The cable connector is not keyed, so be careful not to insert the CN2 and CN3 connectors backwards.

For 8720MC-RPS190BS units, high and low height locks are used on ribbon cables in parallel operation. If the cable is inserted backwards, the locks will not function properly.

IMPORTANT Make sure cables are inserted properly. If aligned properly, excessive force is not required. Cables inserted backwards or misaligned with the mating connector can result in a power module failure or damage to the connectors.

See the labels placed on the ribbon cables. As shown below, apply the higher lock to the leader/follower 1 side, and the lower lock to the follower 1 / follower 2 side.

Figure 42 - Ribbon Cable for Follower Units (series B)



8720MC-RPS Startup and Operation

This chapter provides a description of the operation panel and how to power-up and operate the 8720MC-RPS regenerative power supply.

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, or service this equipment. Read and understand this manual in its entirety before proceeding. Failure to observe this precaution could result in damage to equipment, severe bodily injury, or loss of life.

ATTENTION: DC-bus capacitors retain hazardous voltages after input power has been disconnected. After disconnecting power, wait five minutes for the DC-bus capacitors to discharge and then check the voltage with a voltmeter to make sure the DC-bus capacitors are discharged before touching any internal components. Failure to observe this precaution could result in severe bodily injury or loss of life.

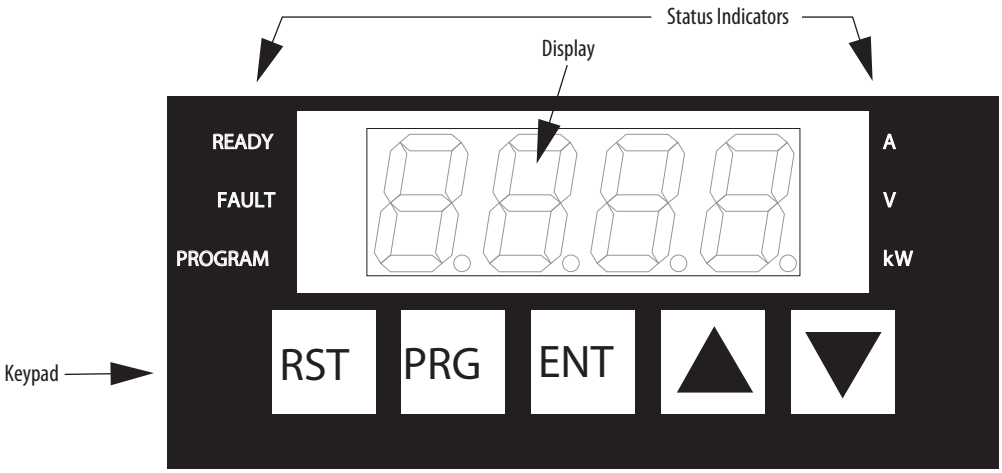
ATTENTION: Make sure that the input disconnect (breaker) is in the correct position either ON or OFF depending on the work to be performed. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: A back up technician must be in line of sight when this work is being performed, to assist in case of emergency. Failure to observe this precaution could result in severe bodily injury or loss of life.

Operation Panel Features

The operation panel is used for setting parameters, monitoring operating conditions, and resetting faults.

Figure 43 - Operation Panel Features



The operation panel has three main areas:

- There are five pushbutton switches that are used for selecting monitoring information, setting parameters, and resetting faults
- The display consists of four seven-segment LEDs that display monitored values, parameter numbers, parameter values, and error codes.
- Six status indicators that are used to display the operation status and the units of the monitored values.

Display

When power is applied, the four-character seven-segment LED displays SELF as the 8720MC-RPS unit performs the power-up self-diagnostics. When the diagnostics are completed, the display indicates various monitor values, parameter numbers, parameter values, and error codes.

Keypad

The keypad has five push-button switches that are used to select monitoring items, to set parameters, and to reset faults.

Press ▲ or ▼ to perform the following tasks:

- Select monitoring items in Monitor mode
- Select parameters and move through the error log in Program mode
- Increase or decrease a numeric value when a parameter value is displayed
- Hold down ▲ or ▼ to increase the scroll speed.

Press ENT to perform the following tasks:

- Display a selected parameter value and the contents of the error log in Program mode
- Save a parameter value when the parameter value is displayed

Press PRG to perform the following tasks:

- Toggle between Program and Monitor modes. The PROGRAM status indicator is OFF when operation panel is in Monitor mode and ON when operation panel is in Program mode
- Return to the display of parameter number without saving a parameter value when a parameter value is displayed

Press RST to reset a fault when the fault occurred and the display shows the error code.

IMPORTANT Before resetting faults, remove the problem that caused the fault. When the RUN sequence signal has been entered, the fault cannot be reset.

Interpret Status Indicators

The operation panel contains six status indicators as defined in the following table.

Table 25 - Status Indicator Legend

Status Indicators		Description
READY	ON	PWM switching is being performed.
	OFF	PWM switching is not being performed.
FAULT	ON	Fault occurred or the error log is being displayed.
	OFF	Normal operation
PROGRAM	ON	The operation panel is in Program mode.
	OFF	The operation panel is in Monitor mode.
A	ON	The rms value (in Amps) of the monitored input current is displayed.
V	ON	• AC input voltage (rms) value is displayed • DC-bus voltage value is displayed
kW	ON	Monitored power-running (kW) value is displayed.
	Flashing	Monitored power (regenerated) (kW) value is displayed
A, V, kW	OFF	The load ratio(1) is a ratio of the input current to the rated current. Load ratio (in %) is displayed when A, V, and kW are all OFF in Monitor mode.

(1) The displayed value of input current is only an approximate value and no accuracy can be guaranteed. If you need an accurate value, measure it by using a dedicated measuring device.

Operation Modes

The operation panel operates in the two modes:

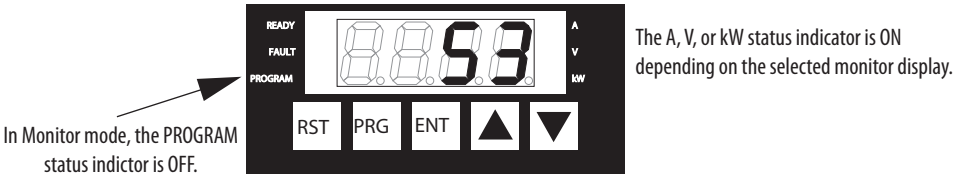
- In Monitor mode, you can monitor various operating conditions including input current of the 8720MC-RPS unit and DC-bus voltage, for example.
- In Program mode, you can view and change parameter values, and examine the error log.

Monitor Mode

To select a value to monitor, press ▲ or ▼ until the desired value is displayed. Pressing ▲ or ▼ increments you through the each of the displays.

In Monitor mode, the PROGRAM status indicator is OFF, indicating that the operation panel is not in Program mode. When any fault occurs, the operation panel cannot be changed to Monitor mode.

Figure 44 - Monitor Mode Example



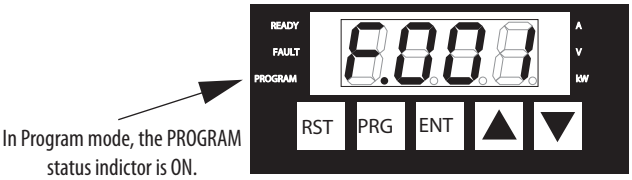
Program Mode

In Program mode you can display and modify parameter values, and display the error log. The following can be displayed in program mode:

- Types of parameters
- Parameter numbers
- Parameter values
- Selection of error log
- Error log number
- Error codes

In Program mode, the PROGRAM status indicator is ON, indicating that the operation panel is in Program mode.

Figure 45 - Program Mode Example



8720MC-RPS Powerup Sequence

Follow these steps to apply power to the 8720MC-RPS unit.

1. Turn the RUN sequence signal OFF.
2. Turn the input power circuit breaker to the ON position.
3. Apply power to the 8720MC-RPS unit (see page 79).
4. Verify that the unit powers up properly without incident such as abnormal sound or odor.
5. Verify that there is no input power voltage drop or short circuit.
6. Verify that the rating of the 8720MC-RPS unit matches the parameter setting of the Unit Selection (F.001).

   For more information on parameter F.001, refer to F.001 Unit Selection on page 89.

8720MC-RPS Operation

This start-up procedure describes the minimum set of parameters. Your application may require programming other parameters in addition to those described in this start-up procedure. Refer to Configure Parameters beginning on page 85 for a description of all parameters to verify whether you need to program additional parameters.

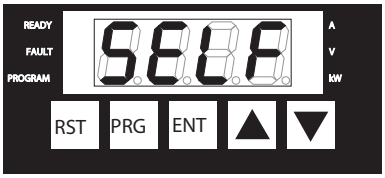
In this publication, there are references to parameter names and the numbers that identify them for the 8720MC-RPS unit. This publication uses the same format shown on the display to refer to parameters:

U.nnn
F.nnn

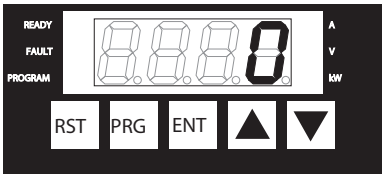
where: nnn is a number
U designates User parameters
F designates Factory parameters

Apply Power to the 8720MC-RPS Unit

Apply power to the 8720MC-RPS unit.



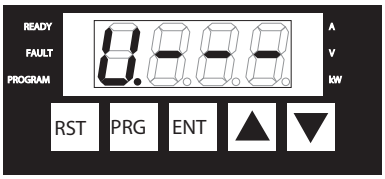
The initial display shows SELF, with all six status indicators ON, which indicates that the unit is performing power-up self-diagnostics.



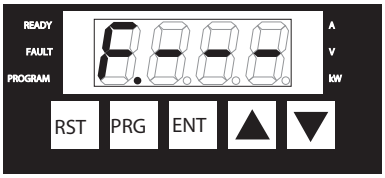
After the diagnostics are complete (approx. 0.5 seconds), the operation panel is in Monitor mode. The display shows the input current value, and the A status indicator turns ON. This display shows that the input current is 0 Amp.

Verify the Parameter of the Unit Selection

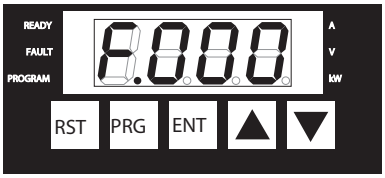
1. Press PRG.
   The operation panel changes to Program mode and the PROGRAM status indicator turns ON. The display shows U.–––, which indicates that you can access the user parameters.



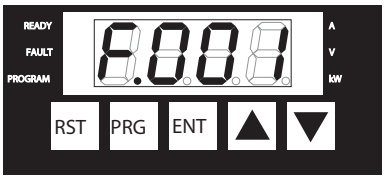
2. Press ▼.
   The display shows F.–––, which indicates that you can access the Factory parameters.



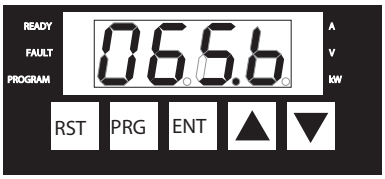
3. Press ENT.
   The display shows the first Factory parameter (F.000).



4. Press ▼.
   The display shows the second Factory parameter (F.001).

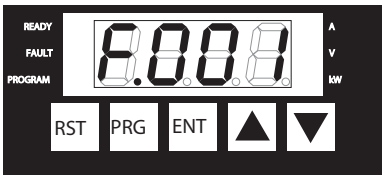


5. Press ENT.



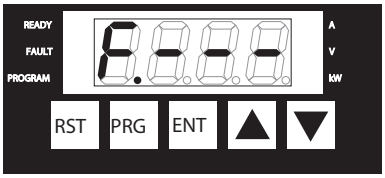
   The display shows that 37 kW (65 A) unit for 460V is selected. If the display does not match the actual unit rating, first set the password (F.000), and then set again the Unit Selection conforming to the unit rating (refer to Factory Parameters on page 89).

6. Press PRG.



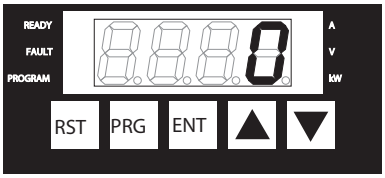
   The display shows the second Factory parameter (F.001).

7. Press PRG.



   The display shows F.–––, which indicates that you can access the Factory parameters.

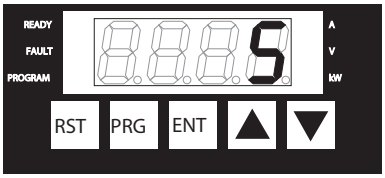
8. Press PRG.



   The operation panel returns to Monitor mode. The display indicates that the input current and the A status indicator turns ON. This display shows the input current is 0 A.

Precharge

Turn the RUN sequence signal ON.



The precharge sequence starts. When the precharge operation is completed, the main magnetic contactor is turned ON and the PWM switching starts. When the precharge operation is finished, the DC-bus voltage increases to the reference value. This displays the input current is 5 A.

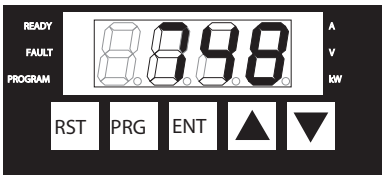
Verify the DC-bus Voltage

1. Press ▼.

   The display shows AC input power voltage, with the V status indicator turned ON. This display indicates that the input power voltage is 412V.

2. Press ▼.

   The display indicates that the DC-bus voltage and the V status indicator turns ON. This display shows that the DC-bus voltage is 748V.

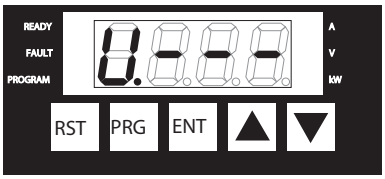


Change the DC-bus Voltage Reference Value

The default value of the DC Bus Voltage Reference (U.000) is 750V. The examples are intended as reference only and do not indicate the actual value.

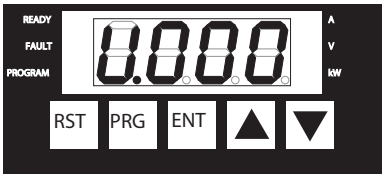
1. Press PRG.

   The operation panel changes to Program mode and the PROGRAM status indicator turns ON. The display shows U.–––, which indicates that you can access the user parameters.



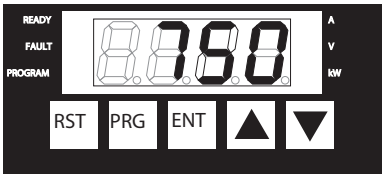
2. Press ENT.

   The display shows the first User parameter (U.000).

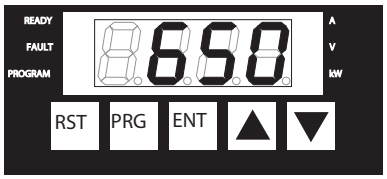


3. Press ENT.

   The display indicates the value of the DC bus Voltage Reference (U.000). The default value is 750V.

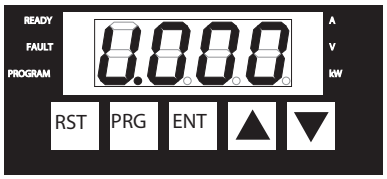


4. Press ▼ until the value becomes 650.



   Pressing ▼ decrements the value on the display. Holding down the key increases the scroll speed. If you wish to increase the set value, press the ▲ key.

5. Press ENT.

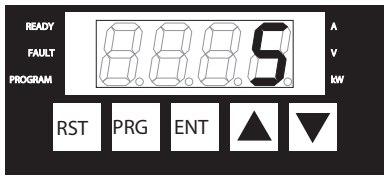


   The set value is decided and is written to the EEPROM. After pressing the ENT key, the display returns to the first User parameter (U.000), indicating that the set value has been decided.

6. Press PRG.

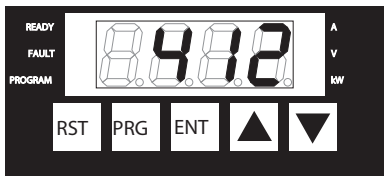
   The display shows U.–––, which indicates that you can access the user parameters.

7. Press PRG.



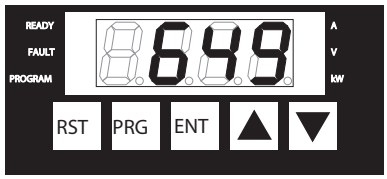
   The operation panel returns to Monitor mode, and the display indicates the input current, with the A status indicator turned ON. This display shows that the input current is 5 A.

8. Press ▼.



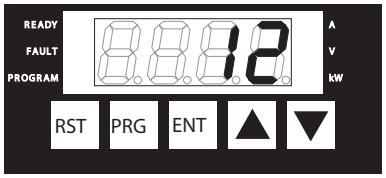
   The display shows the AC input power voltage and the V status indicator turns ON. This display shows that the input power voltage is 412V.

9. Press ▼.



   The display indicates the DC-bus voltage and the V status indicator turns ON. Verify that the DC-bus voltage is almost the same as the reference value (U.000).

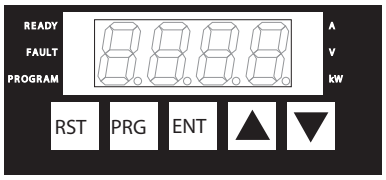
Discharge



Turn the RUN sequence control signal OFF.

The discharge operation starts and the PWM switching stops. Turn the main magnetic contactor OFF. When the discharge operation is completed, the DC-bus voltage drops to 50V or lower. The display shows the DC-bus voltage is 12V.

Disconnect Power



Disconnect input power.

Power to the regulator board, display and status indicators is turned OFF. But, when you touch the internal portion of the 8720MC-RPS unit, DC-bus voltage can still be present.

Notes:

Configure Parameters

Parameters are used to define characteristics of the 8720MC-RPS unit. To program the unit for a specific application, you display the appropriate parameter and make adjustments as required. This chapter provides information on parameter types, detailed descriptions of each parameter, and describes how to access, display, and modify parameters.

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should adjust and operate this equipment. Read and understand this manual in its entirety before proceeding. Failure to observe this precaution could result in destruction of the equipment, severe bodily injury or loss of life.

About Parameters

Parameters break down into two types that can be used in the operation of the 8720MC-RPS unit.

Parameter Types

There are two types of parameters:

- User Parameters - These parameters can be adjusted or modified at any time
- Factory Parameters - These parameters are initially set at the factory and usually are not required to be adjusted or modified in the field

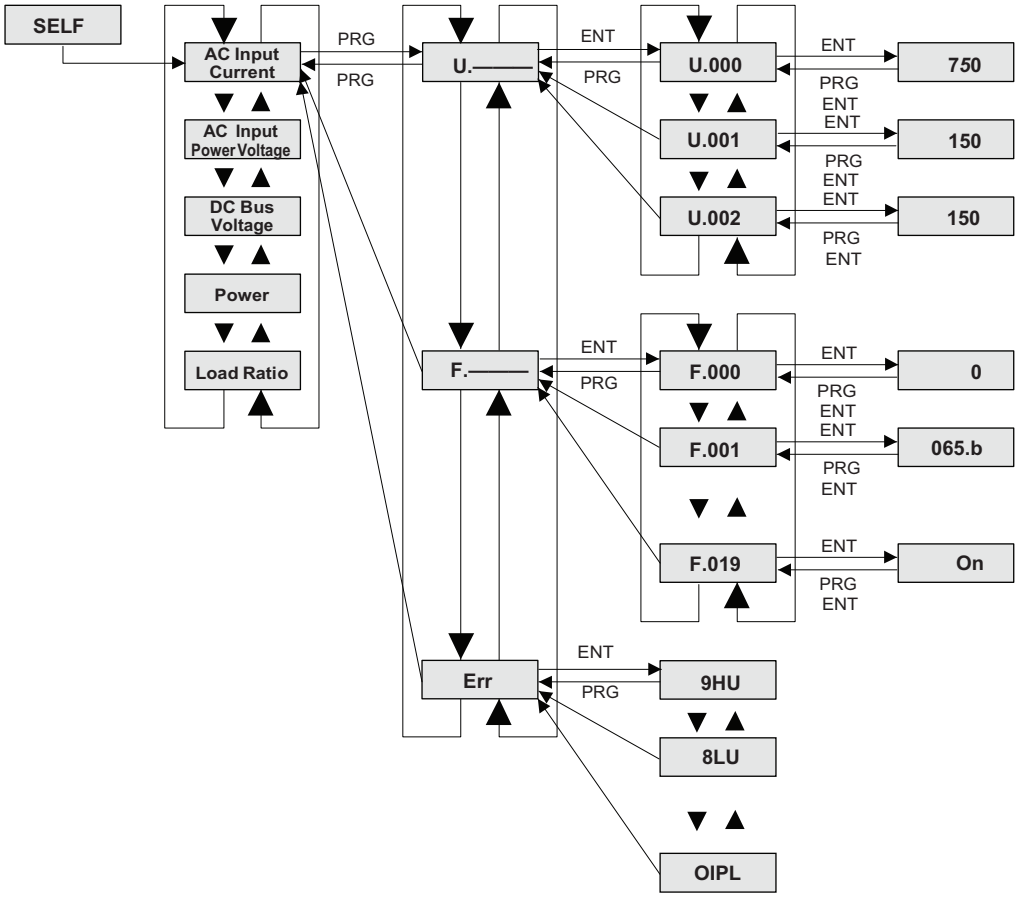
The factory parameters are protected by a password and the password must be set to access these parameters. However, some parameters cannot be modified during operation even though the password has been set.

Table 26 - Parameter Information

Attribute	Description
Parameter number	A unique number is assigned to each parameter. The number is preceded by either U or F to identify it as a User or Factory parameter, respectively. The parameter number is shown on the display of the operation panel.
Parameter name	A name is assigned to each parameter. The parameter name is not displayed when programming the 8720MC-RPS unit.
Parameter description	This is a description of the parameter's function.
Parameter range	This shows the predefined upper and lower limits of the parameter value.
Default setting	Parameters are initially set at the factory, and that is the default setting.
Parameter type	The parameter type identifies whether the parameter can be modified at any time, is protected by password, or cannot be modified during operation.
Refer also to Parameters	This shows a list of associated parameters that can provide additional or related information.

The parameter structure is shown in the following figure.

Figure 46 - Parameter Structure



Protect Parameters with a Password

Factory parameter values are password protected using Parameter F.000 (setting password). But, even after the password has been set, some factory parameters cannot be modified. Such parameters must be set after operation has stopped.

Parameter F.018 (version information) is a read-only parameter, and therefore, cannot be modified.

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should change the factory parameters. Read and understand this instruction manual in its entirety before proceeding. Failure to change parameter values correctly could result in destruction of the equipment, severe bodily injury or loss of life.

Display and Change Parameter Values

To display or change parameter values, the operation panel must be in Program mode. Use the procedure described in the following sections to change parameters in Program mode. For calling out the error log and resetting faults, refer to Troubleshoot the 8720MC-RPS Unit beginning on page 99.

The user parameters are basic parameters that you can modify depending on the application. Follow these steps to modify the user parameters.

1. Press PRG until the PROGRAM status indicator turns ON and the display shows U.---. You can access the User parameters. If U.--- is not shown on the display, press the key or the key until U.--- appears on the display.
2. Press ENT. The first User parameter number (U.000) is displayed.
3. Press ▲ or ▼ to move through the User parameters.
4. When the desired parameter appears, press ENT. The parameter is called out and the parameter value is displayed.
5. Use ▲ to increment the value and ▼ to decrement the value.
6. Press ENT to save the changed value. Pressing ENT displays the same parameter number again, indicating that the value was saved.
   - The value is not written to the memory until ENT has been pressed
   - Pressing PRG returns you to the same parameter number, without saving the value
   - Parameter values are retained through a line dip or power shutdown

User Parameters

User parameters can be adjusted or modified at any time.

U.000 DC Bus Voltage Reference		
This parameter sets the DC-bus voltage reference value. The 8720MC-RPS unit controls to maintain the DC-bus voltage at the set value.	Parameter Range	275…750V
	Default Setting	750V
	Parameter Type	Configurable only when the unit is normal.
	Refer also to Parameters	U.001 FWD Current Limit U.002 REV Current Limit F.005 Voltage Control Proportional Gain F.7 Bus Overvoltage Detection Level F.8 Bus Low Voltage Detection Level
	Set the desired DC-bus voltage (V) to this parameter. When the actual DC-bus voltage is lower than the set value, current flows to the direction of power running, resulting in an increase of voltage. On the contrary, if the actual DC-bus voltage is higher than the set value, current flows to the regenerative direction, and the voltage drops. But, when the current limit values (U.001 and U.002) are set too low, the DC-bus voltage might fluctuate because the current to be used for controlling the DC-bus voltage is limited. When the DC-bus voltage is set too low, control becomes impossible and the DC-bus voltage swings widely. Set the DC-bus voltage to a value equal to or higher than the peak value of AC input power voltage plus 30V. When regenerated power enters rapidly due to rapid deceleration of load equipment or other reasons, the DC-bus voltage can rise instantaneously. To help prevent such rapid change of the DC-bus voltage, adjust the Voltage Control Proportional Gain (F.005). If the difference between the set values of the DC-bus Voltage Reference and the Bus Overvoltage Detection Level (F.007) is small, bus overvoltage fault can occur. When a fault occurs, the DC-bus Voltage Reference cannot be set until the fault has been reset.	

U.001 FWD Current Limit		
This parameter limits current flowing from the AC input power to the 8720MC-RPS unit during operation.	Parameter Range	0…150%
	Default Setting	150%
	Parameter Type	Configurable only when the unit is normal.
	Refer also to Parameters	U.000 DC-bus Voltage Reference U.002 REV Current Limit F.002 Rated Current
	Set the FWD current value (flowing in the direction to power running) to be limited as a ratio (%) of the Rated Current (F.002). What is to be limited is the current value flowing by the PWM switching. It is impossible to limit the current flowing through diodes. When the set value of the FWD Current Limit is too small, the DC bus voltage might not go up to the set value of the DC-bus Voltage Reference (U.000). If the 8720MC-RPS unit operates in the Power Regeneration mode only, set this parameter to 0%. The DC-bus voltage to start power regeneration is the set value of the DC-bus Voltage Reference (U.000). When an error occurs, the FWD Current Limit cannot be set until the error has been reset.	

U.002 REV Current Limit		
This parameter limits current flowing from the 8720MC-RPS unit to the AC input power during operation.	Parameter Range	0…150%
	Default Setting	150%
	Parameter Type	Configurable only when the unit is normal.
	Refer also to Parameters	U.000 DC-bus Voltage Reference U.001 FWD Current Limit F.002 Rated Current
	Set the REV current value (flowing in the direction to power regeneration) to be limited as a ratio (%) of the Rated Current (F.002). What is to be limited is the current value flowing by the PWM switching. When the set value of the REV Current Limit is too small, the DC-bus voltage might not decrease to the set value of the DC-bus Voltage Reference (U.000), and DC-bus overvoltage error might be detected. When an error occurs, the FWD Current Limit cannot be set until the error has been reset.	

Factory Parameters

Factory parameters are initially set at the factory and usually do not require adjustment or modification in the field.

F.000 Password

A password must be set to this parameter to change the Factory parameters.

Parameter Range	0…999
Default Setting	0
Parameter Type	Configurable
Refer also to Parameters	F.001 Unit Selection

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should change the Factory Parameters. Read and understand this instruction manual in its entirety before proceeding. Failure to change parameter values could result in destruction of the equipment, severe bodily injury or loss of life.

Once a password is set, it is retained until power to the 8720MC-RPS unit is removed. Therefore, once a password is set to this parameter, the Factory parameters can be changed at any time until power to the unit is removed.
Even though a password has been set to this parameter, the password can be cancelled by setting other value than the password to this parameter.
Password can be set at any time while the 8720MC-RPS unit is operating or stopping, or fault occurred.
Use the following procedure to set a password:
1. Press PRG. U.--- is displayed, and the PROGRAM status indicator turns ON.
2. Press ▲ or ▼ until F.--- is displayed.
3. Press ENT. F.000 is displayed.
4. Press ENT. 0 is displayed.
5. Press ▲ until 55 is displayed (hold down ▲ to increase the scroll speed).
6. Press ENT to enter the value.

F.001 Unit Selection

As the type of the 8720MC-RPS unit, this parameter sets a character code representing the input power supply voltage and the unit capacity. For most applications, we recommend that this parameter not be adjusted.
IMPORTANT: This parameter is available from software version 3.00 or later (to be shown on the parameter F.018).
IMPORTANT: The parameters reset to factory settings if the ENT key is pressed, even though the unit type selection remains intact.

Parameter Range	065.b 37 kW, 65 A unit for 460V, single 37 kW unit 130.b 75 kW, 130 A unit for 460V, 2 paralleled 37 kW units 195.b 110 kW, 195 A unit for 460V, 3 paralleled 37 kW units 190.b 125 kW, 190 A unit for 460V, single 125 kW unit 380.b 250 kW, 380 A unit for 460V, 2 paralleled 125 kW units 570.b 375 kW, 570 A unit for 460V, 3 paralleled 125 kW units
Default Setting	Unit-dependent
Parameter Type	Requiring the password, configurable only while the unit stops.
Refer also to Parameters	F.002 Rated Current

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should change the Factory Parameters. Read and understand this instruction manual in its entirety before proceeding. Failure to change parameter values could result in destruction of the equipment, severe bodily injury or loss of life.

- The unit type (065: 65A, for example) is represented by the AC input current value.
- .b is the AC input power voltage value (380…460V AC).
- Setting a unit type to this parameter resets all the parameters to factory default settings, and cancels the password.
- When the password is not set, or during operation even though the password has been set, the unit capacity cannot be changed.

IMPORTANT: 065.b, 130.b, 190.b, 195.b, 380.b, and 570.b are the only valid parameter settings.

F.002 Rated Current

This parameter sets the rated input current of the 8720MC-RPS unit. In case of multiple units connected in parallel, the total current of the connected units must be set.
For most applications, we recommend that this parameter not be adjusted.
IMPORTANT: This parameter is available from software version 3.00 or later (to be shown on the parameter F.018).

Parameter Range	10…0 A, 37 kW unit (single 37 kW unit) 20…140 A, 75 kW unit (2 paralleled 37 kW units) 30…210 A, 110 kW unit (3 paralleled 37 kW units) 30…215 A, 125 kW unit (single 125 kW unit) 60…430 A, 250 kW unit (2 paralleled 125 kW units) 90…645 A, 375 kW unit (3 paralleled 125 kW units)
Default Setting	65 A, 37 kW unit (single 37 kW unit) 130 A, 75 kW unit (2 paralleled 37 kW units) 195 A, 110 kW unit (3 paralleled 37 kW units) 190 A, 125 kW unit (single 125 kW unit) 380 A, 250 kW unit (2 paralleled 125 kW units) 570 A, 375 kW unit (3 paralleled 125 kW units)
Parameter Type	Requiring the password, configurable only while the unit stops.
Refer also to Parameters	U.001 FWD Current Limit U.002 REV Current Limit F.001 Unit Selection

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should change the Factory Parameters. Read and understand this instruction manual in its entirety before proceeding. Failure to change parameter values could result in destruction of the equipment, severe bodily injury or loss of life.

This parameter sets the rated input current in units of amperes. The set value affects the FWD and REV Current Limits (U.001 and U.002), overload detection, for example.
For paralleled units, the total current value of the connected units must be set to this parameter. When pressing ▲ or ▼, the displayed value changes 1 Amp per stroke in case of single unit, 2 Amps per stroke in case of two paralleled units, and 3 Amps per stroke in case of three paralleled units.

F.003 Current Control Proportional Gain

This parameter determines the response of the current control.
For most applications, we recommend that this parameter not be adjusted.

Parameter Range	0.01…10.00 times
Default Setting	1.00 times
Parameter Type	Requiring the password, configurable only when the unit is normal.
Refer also to Parameters	F.004 Current Control Integral Gain

Larger values of the Current Control Proportional Gain set in this parameter result in faster response of the current control loop. However, if the gain value is set too large, the unit becomes more susceptible to overcurrent detection and unstable by starting vibration of input current. Decreasing the gain value helps increase stability, but result in less responsiveness.

F.004 Current Control Integral Gain

This parameter determines the dynamic characteristics of the current control.
For most applications, we recommend that this parameter not be adjusted.

Parameter Range	1…3,000 rad/s
Default Setting	64 rad/s
Parameter Type	Requiring the password, configurable only when the unit is normal.
Refer also to Parameters	F.003 Current Control Proportional Gain

Larger values of the Current Control Integral Gain set in this parameter result in shorter arrival time to the reference current value. If the gain is set too large, the current vibrates and becomes unstable. Decreasing the gain helps increase stability, but the arrival time to the reference current value becomes longer to a change of input current.

F.005 Voltage Control Proportional Gain		
This parameter determines the response of the voltage control.	Parameter Range	0.01…30.00 times
	Default Setting	5 times
	Parameter Type	Requiring the password, configurable only when the unit is normal.
	Refer also to Parameters	F.006 Voltage Control Integral Gain
	Larger values of the Voltage Control Proportional Gain set in this parameter result in faster response to change of DC-bus voltage. But, If the gain is set too large, the unit becomes unstable. Decreasing the gain value helps increase stability, but can result in less responsiveness to a change of DC-bus voltage. If capacity of load equipment capacitors is large, increase the set value of the Voltage Control Proportional Gain.	

F.006 Voltage Control Integral Gain		
This parameter determines the dynamic characteristics of the voltage control. For most applications, we recommend that this parameter not be adjusted.	Parameter Range	1…3,000 rad/s
	Default Setting	128 rad/s
	Parameter Type	Requiring the password, configurable only when the unit is normal.
	Refer also to Parameters	F.005 Voltage Control Proportional Gain
	Larger values of the Voltage Control Integral Gain set in this parameter result in shorter arrival time to the set value. But, if the gain is set too large, the voltage vibrates and becomes unstable. Decreasing the gain helps increase stability, but the arrival time to the set value becomes longer to a change of DC bus voltage. When capacity of load equipment capacitors is large, increase the set value of the Voltage Control Integral Gain.	

F.007 Bus Overvoltage Detection Level		
This parameter sets the voltage level to detect the DC-bus overvoltage error.	Parameter Range	325…900V
	Default Setting	800V
	Parameter Type	Requiring the password, configurable only while the unit stops.
	Refer also to Parameters	U.000 DC-bus Voltage Reference F.001 Unit Selection F.008 Bus Low Voltage Detection Level

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should change the Factory Parameters. Read and understand this instruction manual in its entirety before proceeding. Failure to change parameter values could result in destruction of the equipment, severe bodily injury or loss of life.

When the DC-bus voltage reaches the set value of the Bus Overvoltage Detection Level, the DC-bus overvoltage error is detected. When the error is detected, the PWM switching stops, the discharge operation starts, and operation stops.
When load changes largely due to rapid deceleration of load equipment or other reasons, the DC-bus voltage might be increased instantaneously. If the voltage difference between the set values of the DC-bus Voltage Reference (U.000) and the Bus Overvoltage Detection Level is not large enough, the bus overvoltage error might be detected.
Set the Bus Overvoltage Detection Level to the same value as the detection level of the load equipment.

F.008 Bus Low Voltage Detection Level

This parameter sets the voltage level to detect the DC-bus low voltage error.
IMPORTANT: This maximum Parameter Range (600V. . .700V) is available from software version 3.14 or later (to be shown on parameter F.018).

Parameter Range	200. . .700V
Default Setting	400V
Parameter Type	Requiring the password, configurable only while the unit stops.
Refer also to Parameters	U.000 DC-bus Voltage Reference F.001 Unit Selection F.007 Bus Overvoltage Detection Level

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should change the Factory Parameters. Read and understand this instruction manual in its entirety before proceeding. Failure to change parameter values could result in destruction of the equipment, severe bodily injury or loss of life.

When the DC-bus voltage reaches the set value of the Bus Low Voltage Detection Level, the DC-bus low voltage error is detected. Detection of the error stops PWM switching, starts the discharge operation, and stops operation.

F.009 AC Overvoltage Detection Level

This parameter sets the voltage level to detect the AC input power overvoltage error.

Parameter Range	200. . .550V
Default Setting	550V
Parameter Type	Requiring the password, configurable only while the unit stops.
Refer also to Parameters	F.001 Unit Selection

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should change the Factory Parameters. Read and understand this instruction manual in its entirety before proceeding. Failure to change parameter values could result in destruction of the equipment, severe bodily injury or loss of life.

When the AC input power voltage reaches the set value of the AC Overvoltage Detection Level, the AC overvoltage error is detected. Detection of the error stops PWM switching, starts the discharge operation, and stops operation.
When the AC Overvoltage Detection Level is carelessly set lower than the AC input power voltage, the AC overvoltage error cannot be reset. In such a case, use the following steps to reset the AC overvoltage error.
1. Press PRG while the AC error is shown on the display. The operation panel is in Program mode, and the display shows U.---.
2. Press ▲ or ▼ until F.--- is displayed.
3. Press ENT. F.000 is displayed.
4. Press ENT. 0 is displayed.
5. Set the password (55), and press ENT. The display shows F.000.
6. Press ▲ or ▼ until F.009 is displayed.
7. Press ENT. The display shows the AC Overvoltage Detection Level.
8. Press ▲ to increment the set value to an adequate value.
9. Press ENT to decide the set value. The display shows F.009.
10. Press PRG. The display shows AC.
11. Press RST or enter the RST sequence signal. Resetting AC returns to monitor mode.

F.010 Carrier Frequency

This parameter sets the carrier frequency of the PWM switching.
IMPORTANT: This parameter is available from software version 3.00 or later (to be shown on the parameter F.018).

Parameter Range	5 kHz, 10 kHz, or 15 kHz
Default Setting	• 10 kHz: For catalog number 8720MC-RPS065 • 5 kHz: For catalog number 8720MC-RPS190
Parameter Type	Requiring the password, configurable only while the unit stops.
Refer also to Parameters	F.002 Rated Current

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should change the Factory Parameters. Read and understand this instruction manual in its entirety before proceeding. Failure to change parameter values could result in destruction of the equipment, severe bodily injury or loss of life.

The carrier frequency is largely concerned with heat generation of the 8720MC-RPS unit and line reactor. When the carrier frequency is increased from 10 kHz to 15 kHz, use the unit by derating the Rated Current (F.002) by 20%.

F.011 Deadtime

This parameter sets the deadtime of PWM.
For most applications, we recommend that this parameter not be adjusted.

Parameter Range	1.5…15.0 µs
Default Setting	6.0 µs
Parameter Type	Requiring the password, configurable only while the unit is normal and stops.
Refer also to Parameters	–

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should change the Factory Parameters. Read and understand this instruction manual in its entirety before proceeding. Failure to change parameter values could result in destruction of the equipment, severe bodily injury or loss of life.

Deadtime is the time provided for protecting the power modules from shorting. The set value depends on the transistor modules that are used for the power modules. The Deadtime value is critical to proper operation. If you need to change the setting of this parameter, contact your local Rockwell Automation sales representative.

F.012 Allowable Time for Instantaneous Power Loss

This parameter sets the time period within which that the 8720MC-RPS unit can return to operation automatically, when the input power voltage drops below 200V AC (for 460V units) instantaneously, or when instantaneous phase loss occurred.
When the power dip or phase loss continued longer than the set value, a phase loss error occurs.

Parameter Range	0.05…3.00 seconds
Default Setting	0.50 seconds
Parameter Type	Requiring the password, configurable only while the unit is normal and stops.
Refer also to Parameters	–

If an instantaneous power loss or phase loss is detected, the PWM switching stops. When the unit returns from the instantaneous power loss or phase loss, the PWM switching restarts.
When the power to the main magnetic contactor was turned OFF due to an instantaneous power loss or phase loss and the main power supply was turned OFF, returning from the instantaneous power loss or phase loss starts precharge operation. After the precharge operation is completed, the PWM switching restarts.
When an instantaneous power loss or phase loss continued longer than the value set to this parameter, it is considered as a power loss, and a phase loss error occurs. Detecting a phase loss error starts discharge operation.

F.013 AC Reactor Capacity		
This parameter sets the capacity of the AC reactor installed in the main power wiring. **IMPORTANT:** This parameter is available from software version 3.00 or later (to be shown on the parameter F.018).	Parameter Range	100…8,000 µH
	Default Setting	• 1200 µH: For catalog numbers 8720MC-RPS065 • 400 µH: For catalog numbers 8720MC-RPS190
	Parameter Type	Requiring the password, configurable only while the unit is normal and stops.
	Refer also to Parameters	F.003 Current Control Proportional Gain F.004 Current Control Integral Gain F.010 Carrier Frequency
	This parameter sets the capacity of the AC reactor in the unit of micro-henry (µH). The AC reactor capacity set to the parameter is not the total capacity for three phases but the capacity for one phase only. This is also applicable to multiple units connected in parallel.	

F.014 Precharge/Discharge Time		
This parameter sets the precharge/discharge time. If the DC-bus voltage did not increase in precharge, even if the set time period has elapsed, a precharge error occurs. In case of discharge, the discharge operation continues for the time period set to this parameter. **IMPORTANT:** This parameter must be set to 15.0 seconds when the 8720MCRPS190 unit is used. **IMPORTANT:** This maximum Parameter Range (from 15.0…30.0 s) is available from software version 3.00 or later (to be shown on the parameter F.018).	Parameter Range	0.5…30.0 seconds
	Default Setting	3.0 seconds
	Parameter Type	Requiring the password, configurable only while the unit is normal and stops.
	Refer also to Parameters	F.015 Wattage of Precharge/Discharge Resistor
	Larger capacity of capacitors connected to the DC-bus requires a longer precharge time. In such a case, set a large value to this parameter. When the DC-bus voltage does not reach the precharge voltage, even if the time period set to this parameter has already elapsed, a precharge error occurs. Set a larger value. The precharge voltage is 90% of the peak value of the AC input power voltage. In case of precharge, the precharge operation is finished when the DC-bus voltage arrives at a certain value, even though the set Precharge/Discharge Time has not elapsed yet. But in case of discharge, the discharge operation continues for the set value of this parameter, regardless of the DC bus voltage. When an external resistor for precharge/discharge or an external circuit is used, set the Precharge/Discharge Time again, if necessary. For connection of the external resistor for precharge/discharge or the external circuit, refer to External Resistor Case on page 58 and External Circuit Case on page 59.	

F.015 Wattage of Precharge/Discharge Resistor

This parameter sets the rated wattage of the precharge/discharge resistor.
IMPORTANT: This parameter is available from software version 3.00 or later (to be shown on the parameter F.018).

Parameter Range	50 to 2,000 W
Default Setting	• 120 W: For catalog numbers 8720MC-RPS065 • 400 W: For catalog numbers 8720MC-RPS190
Parameter Type	Requiring the password, configurable only while the unit is normal and stops.
Refer also to Parameters	F.014 Precharge/Discharge Time

When an external resistor for precharge/discharge or an external circuit is used, set again the Precharge/Discharge Time, if necessary. For connection of the external resistor for precharge/discharge or the external circuit, refer to External Resistor Case on page 58 and External Circuit Case on page 59.
The 8720MC-RPS unit has an overload protection function for precharge/discharge resistor. When the resistor becomes overload condition as a result of repeated precharge and discharge, an overload error of the precharge/discharge resistor occurs.
The standard indication of overload of the precharge/discharge resistor is as follows:
Temperature increase of resistor:
- **Temp**. Increase of Resistor (degree C) = 500 x Precharge/Discharge Time (F.014)
- Wattage of Precharge/Discharge Resistor
- **Temp**. of Resistor to Detect Overload = 120 °C (248 °F)

When the temperature of the precharge/discharge resistor reaches 120 °C (248 °F), an overload error of the resistor occurs. But if precharge/discharge operation is not performed for 10 minutes, the integrated values are cleared.

F.016 DC-bus Voltage Feedback Coefficient

This parameter is used to compensate error of monitored DC-bus voltage from actual value, by multiplying the feedback of DC-bus voltage by coefficient.
IMPORTANT: This parameter is available from software version 2.00 or later (to be shown on the parameter F.018).
IMPORTANT: If the Unit type selection (F.001) is changed, F.016 returns to the factory default setting (1,000). It needs to be set again.

Parameter Range	0.900…1.100
Default Setting	1.000
Parameter Type	Requiring the password, configurable only while the unit is normal.
Refer also to Parameters	U.000 DC-bus Voltage Reference

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should change the Factory Parameters. Read and understand this instruction manual in its entirety before proceeding. Failure to change parameter values could result in destruction of the equipment, severe bodily injury or loss of life.

An error of monitored value of DC-bus voltage shown on the display (usually almost same as the set value of the DC-bus Voltage Reference (U.000) from actually measured DC-bus voltage can be compensated by setting an adequate value to this parameter.
The value to be set to the DC-bus Voltage Offset (F.016) is determined by using the following formula:
DC-bus Voltage Offset (F.016) = Measured DC Bus Voltage (1) / DC-bus Voltage Reference (U.000)
After setting this parameter, confirm that the error was reduced.

(1) Measured DC-bus Voltage is value actually measured by a voltmeter.

F.017 Discharging Function Enable

This parameter selects whether the discharging function of DC-bus voltage is performed or not, when the 8720MC-RPS unit is stopped or aborted. When ON is selected, DC-bus voltage is discharged when the unit stops. When OFF is selected, DC-bus voltage does not discharge.
IMPORTANT: This parameter is available from software version 2.00 or later (to be shown on the parameter F.018).

Parameter Range	OFF, ON
Default Setting	ON
Parameter Type	Requiring the password, configurable only while the unit is normal.
Refer also to Parameters	–

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should change the Factory Parameters. Read and understand this instruction manual in its entirety before proceeding. Failure to change parameter values could result in destruction of the equipment, severe bodily injury or loss of life.

ATTENTION: DC-bus capacitors retain hazardous voltages after input power has been disconnected. After disconnecting power, wait five minutes for the DC-bus capacitors to discharge and verify that the DC-bus capacitors are discharged before touching any internal components. Failure to observe this precaution could result in severe bodily injury or loss of life.

Setting this parameter to OFF does not discharge the DC-bus voltage when the 8720MC-RPS unit is stopped or aborted. This results in retaining an identical voltage in the DC-bus capacitors as the set value of the DC-bus Voltage Reference (U.000).
When the 8720MC-RPS unit is used in Power Regeneration mode (refer to Figure 28 on page 56 and Figure 29 on page 57), set this parameter to OFF, and perform discharging on the inverter unit side. In this case, the discharging time is determined by the inverter unit to be connected.

F.018 Version Information

This parameter displays the software version number.

Parameter Range	–
Default Setting	–
Parameter Type	Read only
Refer also to Parameters	–

F.019 Selection of Wiring Error (LE) Detecting Function

This parameter selects whether detecting function of wiring error (LE) during operation is used or not. When ON is selected, wiring errors are detected when operation is started. When OFF is selected, wiring error detection is not performed.
IMPORTANT: This parameter is available from software version 3.00 or later (to be shown on the parameter F.018).
IMPORTANT: If other failures occur, and the main contactor turns off, an LE error might be displayed. Set the parameter to OFF, to mask the LE error.

Parameter Range	OFF, ON
Default Setting	ON
Parameter Type	Requiring the password, configurable only while the unit is normal.
Refer also to Parameters	–

Default Parameter Settings

Default parameter settings depend on the model and number of units connected in parallel.

Table 27 - Default Parameter Settings

Parameter Number	Parameter Name	Units	8720MC-RPS065			8720MC-RPS190		
			Single Unit	Two Units in Parallel	Three Units in Parallel	Single Unit	Two Units in Parallel	Three Units in Parallel
F.001	Unit Selection	–	065.b	130.b	195.b	190.b	380.b	570.b
F.002	Rated Current	Amps	65	130	195	190	380	570
F.013	AC Reactor Capacity	µH	1200			400		
F.015	Wattage of Precharge/Discharge Resistor	W	120			400		

Table 28 - Default Settings of All Parameters

Parameter Number	Parameter Number	Parameter Name	Setting Range	Default Value	User Setting	
					Setting	Date
User Parameters	U.000	Unit Selection	275…750V	750V		
	U.001	FWD Current Limit	0…150%	150%		
	U.002	REV Current Limit	0…150%	150%		
Factory Parameters	F.000	Password	0…999	0		
	F.001	Unit Selection	• 065.b • 130.b • 190.b • 195.b • 380.b • 570.b	• 65 Amps • 130 Amps • 190 Amps • 195 Amps • 380 Amps • 570 Amps		
	F.002	Rated Current	• 065.b: 10…70A • 130.b: 20…140A • 190.b: 30…210A • 195.b: 30…215A • 380.b: 60…430A • 570.b: 90…645A	• 065.b: 65 Amps • 130.b: 130 Amps • 190.b: 190 Amps • 195.b: 195 Amps • 380.b: 380 Amps • 570.b: 570 Amps		
	F.003	Current Control Proportional Gain	0.01…10.0 times	1.00 times		
	F.004	Current Control Integral Gain	1.0…3000 rad/s	64 rad/s		
	F.005	Voltage Control Proportional Gain	0.01…30.0 times	5.00 times		
	F.006	Voltage Control Integral Gain	1.0…3000 rad/s	128 rad/s		
	F.007	Bus Overvoltage Detection Level	325…900V	800V		
	F.008	Bus Low Voltage Detection Level	200…700V	400V		
	F.009	AC Overvoltage Detection Level	200…550V	550V		
	F.010	Carrier Frequency	5, 10, and 15 kHz	• 10 kHz: 8720MC-RPS065 • 5 kHz: 8720MC-RPS190		
	F.011	Deadtime	1.5…15.0 µs	6.0 µs		
	F.012	Allowable Time for Instantaneous Power Loss	0.05…3.00 s	0.50 s		
	F.013	AC Reactor Capacity	100…8,000 µH	See previous section		
	F.014	Precharge/Discharge Time	0.5…30.0 s	3.0 s (3)		
	F.015	Wattage of Precharge/Discharge Resistor	50…2,000 W	See previous section		
	F.016	DC Bus Voltage Offset (1)	0.900…1.100	1.000		
	F.017	Discharge Function Enable (1)	OFF, ON	ON		
	F.018	Version Information	–	–		
	F.019	Selecting of Wiring Error (LE) Detecting Function (2)	OFF, ON	ON		

(1) These parameters are available from only software version 2.00 or later.

(2) This parameter is available only from software version 3.00 or later.

(3) This parameter must be set to 15.0 seconds for the 8720MC-RPS190 unit.

Troubleshoot the 8720MC-RPS Unit

This chapter provides troubleshooting tables and related information for your 8720MC-RPS regenerative power supply.

Safety Precautions

Observe the following safety precautions when troubleshooting the 8720MC-RPS regenerative power supply.

ATTENTION: Capacitors on the DC bus can retain hazardous voltages after input power has been removed. Before working on the 8720MC-RPS unit, measure the DC-bus voltage to verify it has reached a safe level or wait five minutes for the DC bus to discharge completely. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: Do not attempt to defeat or override the module fault circuits. You must determine the cause of a fault and correct it before you attempt to operate the system. Failure to correct the fault could result in personal injury and/or damage to equipment as a result of uncontrolled machine operation.

ATTENTION: Provide an earth ground for test equipment (oscilloscope) used in troubleshooting. Failure to ground the test equipment could result in personal injury.

About Error Codes

When an error occurs in the 8720MC-RPS unit, an error code corresponding to the error is shown on the display. The error codes are two or three letter codes flashing on the display.

When an error occurs while the unit is stopped, the precharge operation and the PWM switching cannot be started by entering the RUN sequence signal, and thus, operation cannot be started until the error code is reset.

When an error occurs during operation, the PWM switching stops, the discharge operation starts, and the unit stops. Once again, the unit cannot be started until the error code is reset.

To reset an error code, remove the RUN signal and press RST or enter the RESET sequence signal after removing the cause of the error.

If multiple errors occurred at a time, the corresponding error codes scroll flashing one after another.

It is possible to view all the parameters while an error is present and the error code is being displayed. However, before changing any parameter, errors must be reset. To view a parameter, press PRG while an error code is displayed. Pressing PRG displays U.---, indicating the operation panel is changed to Program mode.

A maximum of ten error codes can be stored in the error log. The last error that occurred is the first one to appear on the display when accessing the error log. The last error code is identified by the highest number (up to 9).

The first error that occurred appears as the last one in the error log. The first error code is identified by the number 0.

When viewing the error log, press ▲ or ▼ to scroll through the error codes.

The error log is retained even if power to the unit is lost. If the error log is full, more entries can be added by clearing older entries. If you desire to clear the error log, press RST while the error log is displayed.

Error Codes

The error codes are shown in the following tables.

Table 29 - Troubleshooting Tables

Error Code Descriptions	Page
Common to all units regardless of single unit connection or parallel connection of multiple units.	101
Caused by leader unit regardless of single unit connection or parallel connection of multiple units.	102
Caused by follower unit 1 (follower unit connected adjacent to the leader unit) in the case of parallel connection of multiple units.	103
Caused by follower unit 2 (follower unit connected adjacent to the follower unit 1) in the case of parallel connection of multiple units.	103

To reset error codes, first remove the causes of the errors and then press RST or enter the RESET sequence signal. In either case, resetting cannot be performed when the RUN sequence signal has been entered.

Table 30 - Error Codes Common to All 8720MC-RPS Units

Error Code	Error Description	Error Cause	Corrective Action
PrC	Precharge Error	The DC-bus voltage did not reach a certain level in precharge even if the precharge/discharge time has elapsed.	Check that the set value of the Precharge/ Discharge Time (F.014) is correct. If no other problem is found, increase the set value.
			Precharge/discharge resistor or its wiring is faulty. Check the resistor and wiring, and remove the cause. If Fuse 1 the precharge fuse is blown, replace the fuse. Check that the recommended line reactor has been selected.
CHr	Precharge/Discharge Overload Error	The precharge/discharge resistor is in overload condition.	Do not perform precharge and discharge for a while.
			Replace the precharge/discharge resistor with one having a larger wattage, and set again the Wattage of Precharge/Discharge Resistor (F.015).
oL	Overload Error	Output current is excessive.	Check that the power rating of the unit is adequate for the input of the load.
			Decrease the input of the load.
AC	AC Input Frequency or High Voltage Error	The AC input power frequency exceeds the base frequency (50 Hz or 60 Hz) by +/-3% or more.	Check the AC input power supply.
		There is large distortion (notches) in AC input power voltage.	
		The AC input power is too high.	Check that the set value of the AC Overvoltage Detection Level (F.009) is adequate. If no other problem is found, increase the set value.
HU	High Bus-voltage Error	The DC-bus voltage is too high.	Check the AC input power voltage.
			Check that the set value of the Voltage Control Proportional Gain (F.005) is adequate.
			Check that the set value of the Bus Overvoltage Detection Level (F.007) is adequate. If no other problem is found, increase the set value.
			The capacity of the AC reactor is too large. Replace it with a reactor having a smaller capacity.
			The load change is too fast. Reduce the load change speed.
LU	Low Bus-voltage Error	The DC-bus voltage is too low.	Check the AC input power voltage and the line fuse.
			Check that the set value of the Allowable Time for Instantaneous Power Loss (F.012) is adequate. If no other problem is found, increase the set value.
IPL	Input Phase Loss Error	Phase loss occurred for the AC input power.	Check the AC input power voltage and the line fuse.
		Power loss occurred (The allowable time for instantaneous power loss was exceeded.)	Check that the set value of the Allowable Time for Instantaneous Power Loss (F.012) is adequate. If no other problem is found, increase the set value.
Con	Magnetic Contactor Error	No answer-back signal was received from the main magnetic contactor.	Check the operation of the main magnetic contactor.
			Verify that the answer-back signal of the main magnetic contactor is correctly wired to the sequence input signal terminal.
Fr	Faulty Relay Signal	An error was issued from the Power Interface Board (PIFS). Detailed descriptions of error factors cannot be read out.	Verify that the Regulator Board and the Power Interface Board are inserted correctly.

Table 31 - Error Codes Relating to Leader Units

Error Code	Error Description	Error Cause	Corrective Action
P.U1	Small unit - Power Module Phase L1 Error	Over current, overheat, or voltage drop of gate power supply occurs in the L1 phase power modules of the leader unit.	Check the wiring of the AC input power.
			Check the ambient temperature, the cooling fan, and the clearances around the unit.
			If the error occurs intermittently, contact your Rockwell Automation sales representative or replace the unit. Check that the harmonic filter is located on the primary side of the line reactor and the secondary side of the line reactor is connected to the unit.
	Large unit - Power Module Over Current	Overcurrent or short circuit occurs in power modules of the leader unit.	Make sure that an overload or overcurrent failure or short circuit has not occurred in the external equipment such as motors and inverters.
PU.1	Small unit - Power Module Phase L2 Error	The phase L2 power module of the leader unit is faulty.	Check the wiring of the AC input power.
			Check the ambient temperature, the cooling fan, and the clearances around the unit.
			If the error occurs intermittently, contact your Rockwell Automation sales representative or replace the unit. Check that the harmonic filter is located on the primary side of the line reactor and the secondary side of the line reactor is connected to the unit.
	Large unit	Large unit is not used.	–
PU1.	Small unit - Power Module Phase L3 Error	The phase L3 power module of the leader unit is faulty.	Check the wiring of the AC input power.
			Check the ambient temperature, the cooling fan, and the clearances around the unit.
			If the error occurs intermittently, contact your Rockwell Automation sales representative or replace the unit. Check that the harmonic filter is located on the primary side of the line reactor and the secondary side of the line reactor is connected to the unit.
	Large unit - Module Overheating Error	Power modules of the leader unit has been overheated.	Make sure that the unit is not running in an overload condition.
			Check the ambient temperature, cooling fan, and available space around the unit.
FA1	Fan Error	Small unit - Cooling fan of the leader unit failed.	Check the cooling fan and wiring of the cooling fan.
		Large unit- The leader unit or cooling fan of the line reactor failed. The line reactor is overheated. Fuse for the control power supply (FU3) of the leader unit is blown. Power supply board (APS) failed.	Check the ambient temperature.
			Check the fuse for the control power supply (FU3).
			Check the voltage of TB4 (between 24V2 and 0V2).
LE1	Line Connect Error	The phases (L1, L2, and L3) of the AC input power of the leader unit do not match with those of the control power.	Make the phases (L1, L2, and L3) of the AC main power same as those of the control power.
PS1	Power Supply Board Error	The Power Interface Board (PIFS) of the leader unit is faulty.	If the error occurs intermittently, contact your Rockwell Automation sales representative or replace the Power Interface Board (PIFS).

Table 32 - Error Codes Relating to Follower Units 1

Error Code	Error Description	Error Cause	Corrective Action
P.U2	Small unit - Power Module Phase L1 Error	Over current, overheat, or voltage drop of gate power supply occurs in the L1 phase power modules of the follower1 unit.	Same as P.U1.
	Large unit - Power Module Over Current	Overcurrent or short circuit occurs in power modules of the follower1 unit.	
PU.2	Small unit - Power Module Phase L2 Error	The phase L2 power module of the follower1 unit is faulty.	Same as PU.1.
	Large unit	Large unit is not used.	
PU2.	Small unit - Power Module Phase L3 Error	The phase L3 power module of the follower1 unit is faulty.	Same as PU1.
	Large unit - Module Overheating Error	Power modules of the follower1 unit has been overheated.	
FA2	Fan Error	Small unit - Cooling fan of the follower1 unit failed.	Same as FA1.
		Large unit- The follower1 unit or cooling fan of the line reactor failed. The line reactor is overheated. Fuse for the control power supply (FU3) of the follower1 unit is blown. Power supply board (APS) failed.	
LE2	Line Connect Error	The phases (L1, L2, and L3) of the AC input power of the follower1 unit do not match with those of the control power.	Same as LE1.
PS2	Power Supply Board Error	The Power Interface Board (PIFS) of the follower1 unit is faulty.	Same as PS1.

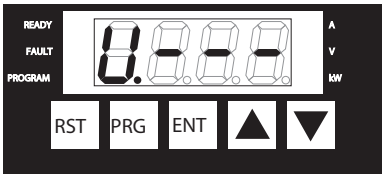
Table 33 - Error Codes Relating to Follower Units 2

Error Code	Error Description	Error Cause	Corrective Action
P.U3	Small unit - Power Module Phase L1 Error	Over current, overheat, or voltage drop of gate power supply occurs in the L1 phase power modules of the follower2 unit.	Same as P.U1.
	Large unit - Power Module Over Current	Overcurrent or short circuit occurs in power modules of the follower2 unit.	
PU.3	Small unit - Power Module Phase L2 Error	The phase L2 power module of the follower2 unit is faulty.	Same as PU.1.
	Large unit	Large unit is not used.	
PU3.	Small unit - Power Module Phase L3 Error	The phase L3 power module of the follower2 unit is faulty.	Same as PU1.
	Large unit - Module Overheating Error	Power modules of the follower2 unit has been overheated.	
FA3	Fan Error	Small unit - Cooling fan of the follower2 unit failed.	Same as FA1.
		Large unit- The follower2 unit or cooling fan of the line reactor failed. The line reactor is overheated. Fuse for the control power supply (FU3) of the follower2 unit is blown. Power supply board (APS) failed.	
LE3	Line Connect Error	The phases (L1, L2, and L3) of the AC input power of the follower2 unit do not match with those of the control power.	Same as LE1.
PS3	Power Supply Board Error	The Power Interface Board (PIFS) of the follower2 unit is faulty.	Same as PS1.

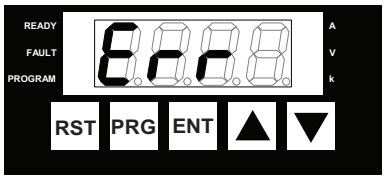
Access and Clear the Error Log

The following procedure shows how to access and clear the error log. Note that you cannot clear a single entry from the error log. The entire log will be cleared simultaneously by using this procedure.

1. Press PRG.
   The operation panel is in Program mode, the user parameter is displayed, and the PROGRAM status indicator tuns ON.

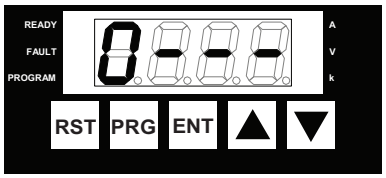


2. Press ▼ until Err is displayed.

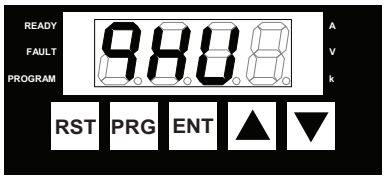


3. Press ENT.

   With no errors present, 0--- is displayed.

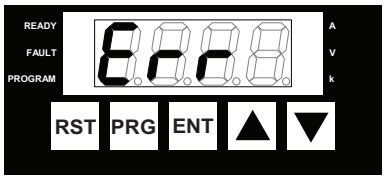


   With errors present, the last error that occurred is displayed.



4. Press RST.

   Pressing RST while the error log is displayed clears the error log and Err is displayed again, indicating that the error log is empty.



Recover From Fatal Errors

Fatal error codes generally indicate a malfunction of the regulator board. If cycling input power does not remove the error, replace the 8720MC-RPS unit.

Table 34 - Fatal Error Codes

Error Code	Error Description	Error Cause	Corrective Action
SCx	Self Check Error	Error was detected during self-diagnostics. 'x' in the error code represents an integer value of 1…7.	Contact your local Rockwell Automation sales representative or replace the Regulator Board.
CHS	Checksum Error	Writing parameter value to EEPROM was not successful.	Set again the Unit Selection (F.001), and restore all the parameters to the default values.
			If this error occurs intermittently, contact your local Rockwell Automation sales representative or replace the Regulator Board.
CPU	CPU Error	Unexpected error occurred during CPU internal calculation.	Contact your local Rockwell Automation sales representative or replace the Regulator Board.
SYS	System Error	Unexpected error occurred.	Contact your local Rockwell Automation sales representative or replace the Regulator Board.

Troubleshoot the 8720MC-RPS Unit

Follow these preliminary system checks and flow charts to track the 8720MC-RPS unit powerup sequencing.

Preliminary System Checks

Follow these steps to verify that the 8720MC-RPS unit was installed correctly.

1. Turn OFF input power to the 8720MC-RPS unit and wait until POWER status indicator is OFF.
2. Verify that the DC-bus voltage is zero and that the DC-bus capacitors are completely discharged.
3. Make the following checks:
   - Connectors not seated properly
   - Loose wire terminations to connectors
   - Input power voltage within tolerance
   - Verify that all sources of electrical noise (relays, solenoid-valves, and magnetic brakes, for example) are provided with surge suppressors.
   - Installation instructions were followed correctly

Operation Flow Charts

These flow charts track the 8720MC-RPS unit power-up sequencing to make sure that the unit has power applied and that the DC-bus is at an acceptable voltage level.

Figure 47 - 8720MC-RPS Unit Fails to Power Up

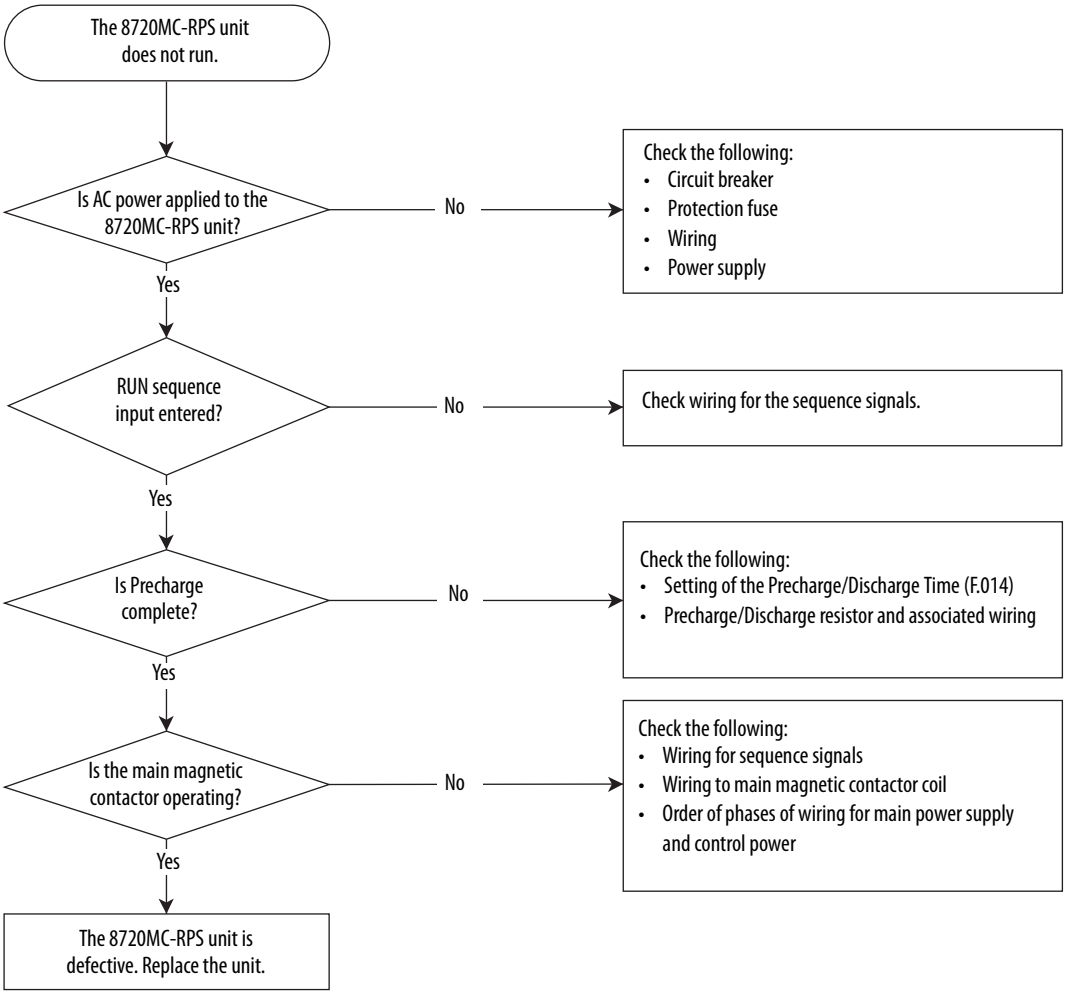
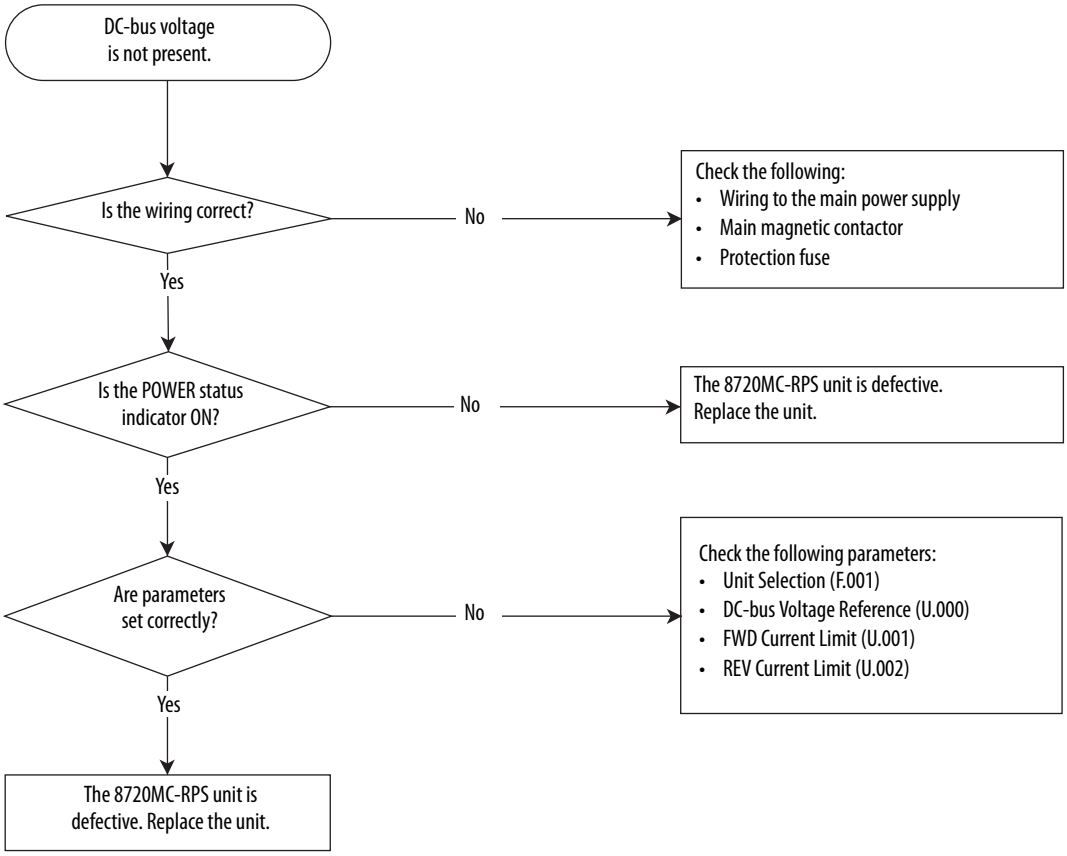


Figure 48 - DC-bus Fails to Energize



Notes:

Specifications

This appendix provides specifications for the 8720MC-RPS units and accessory items.

Technical Specifications

The following table contains technical specifications for the 8720MC-RPS units.

Attributes			8720MC-RPS065			8720MC-RPS190		
Number of Units Connected in Parallel (1)			Single Unit	Two Units in Parallel	Three Units in Parallel	Single Unit	Two Units in Parallel	Three Units in Parallel
Capacity of Motor to be Applied (kW)			37	75	110	125	250	375
Input	Rated capacity of the power supply (kVA)		45	90	135	152	304	457
	Input power factor (2)		0.95 or higher					
	Power supply (3)		324 to 506V AC +10/-15%, 50/60 Hz +/-5%					
	Rated current, nom (A_{rms})		65	130	195	190	380	570
	Current, max 1.0 min (A_{rms})		98	196	294	285	570	855
	PWM carrier frequency (kHz)		5, 10 (standard), and 15			5, 10 (standard), and 15		
Output	Rated output capacity (kVA)		45	90	135	133	266	399
	Voltage		750V (standard)					
	Continuous output current (A_{DC})		64	128	192	190	380	570
	Current, max 1.0 min (A)		96	192	288	285	570	855
	Bus capacitor (µF)		1960	1960 x 2	1960 x 3	5600	5600 x 2	5600 x 3
Protection functions			Overcurrent, overload, overvoltage, low voltage, and phase loss.					
Output signals			RDY signal, FR signal, instantaneous power loss signal, and main magnetic contactor reference contact.					
Monitor display (with four-character seven-segment status indicator			Input current, input power supply voltage, DC bus voltage, power and load ratio.					
Input signals			RUN signal, RESET signal, and answer-back signal of the main magnetic contactor.					
Environmental	Place of installation		In a control cabinet (kept away from corrosive and dangerous gas).					
	Ambient	Operating	-10…50 °C (14…122 °F)					
		Storage	-40…65 °C (-40…149 °F)					
	Heat dissipation (kW)		1.1	1.1 x 2	1.1 x 3	4.0	4.0 x 2	4.0 x 3
	Relative humidity		5 to 95% (non-condensing)					
	Elevation		• Up to 1,000 m (3,300 ft) without derating output power • For every 300 m (1,000 ft) above 1,000 m (3,300 ft), derate the output power 4% • Above 1,500 m (5,000 ft), contact Rockwell Automation					
	Vibration		Less than 1G (25 Hz)					
	Shock		Less than 2G					
Weight kg (lb)			13.5 (29.7)	13.5 (29.7) x 2	13.5 (29.7) x 3	39 (86.8)	39 (86.8) x 2	39 (86.8) x 3

(1) For units connected in parallel, derating is required proportionally to the fluctuation (dispersion) of inductances of AC line reactors connected to phases.

(2) At the rated current of the 8720MC-RPS units.

(3) Applies to 400V rms AC (or 200V rms AC). If you use the unit continuously at a voltage lower than stated, derating is required.

Product Dimensions

The following dimension diagrams apply to the 8720MC-RPS units and accessory items.

8720MC-RPS Regenerative Power Supplies

Figure 49 - Catalog Number 8720MC-RPS065

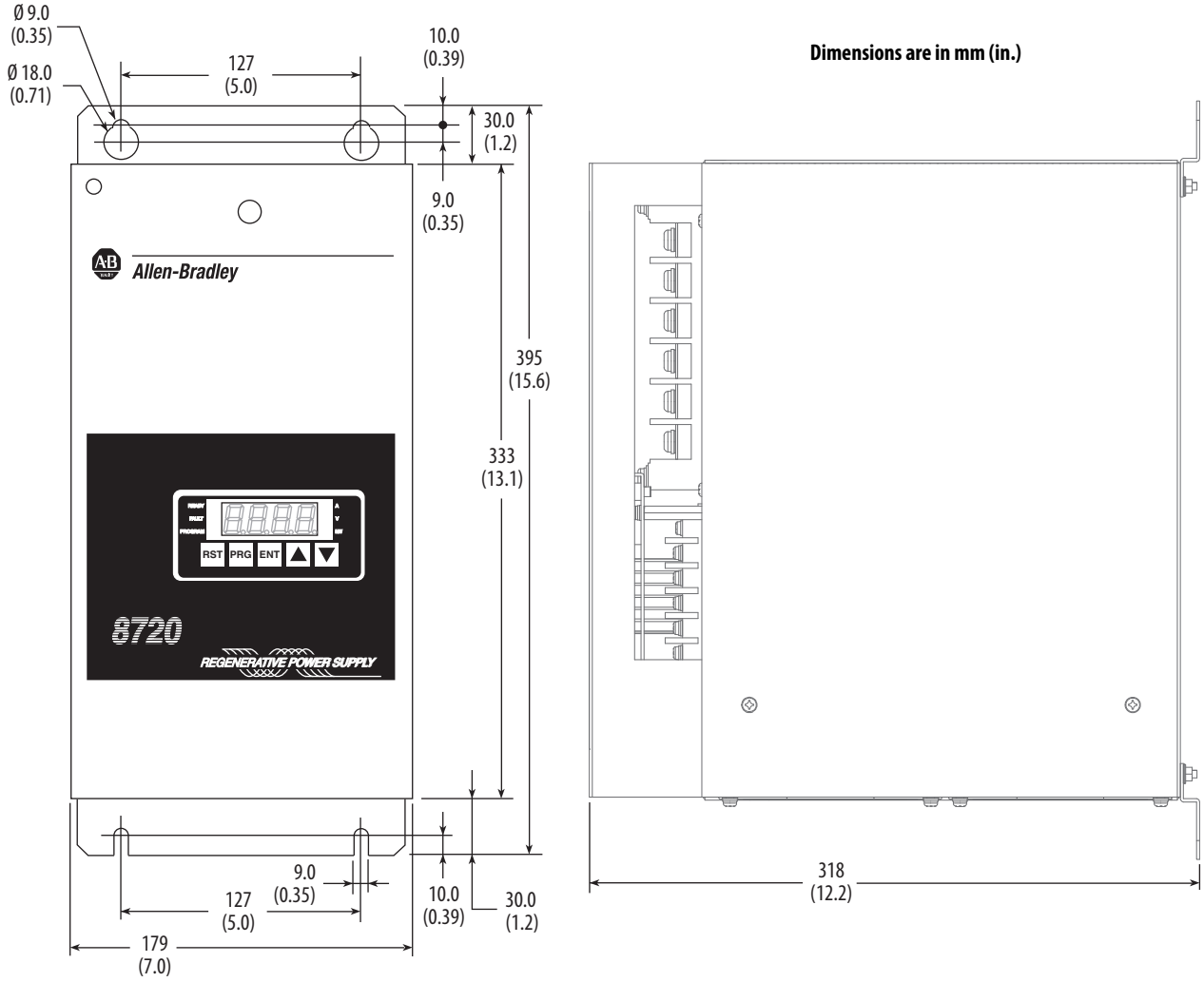


Figure 50 - Catalog Number 8720MC-RPS190 (series #)

Dimensions are in mm (in.)

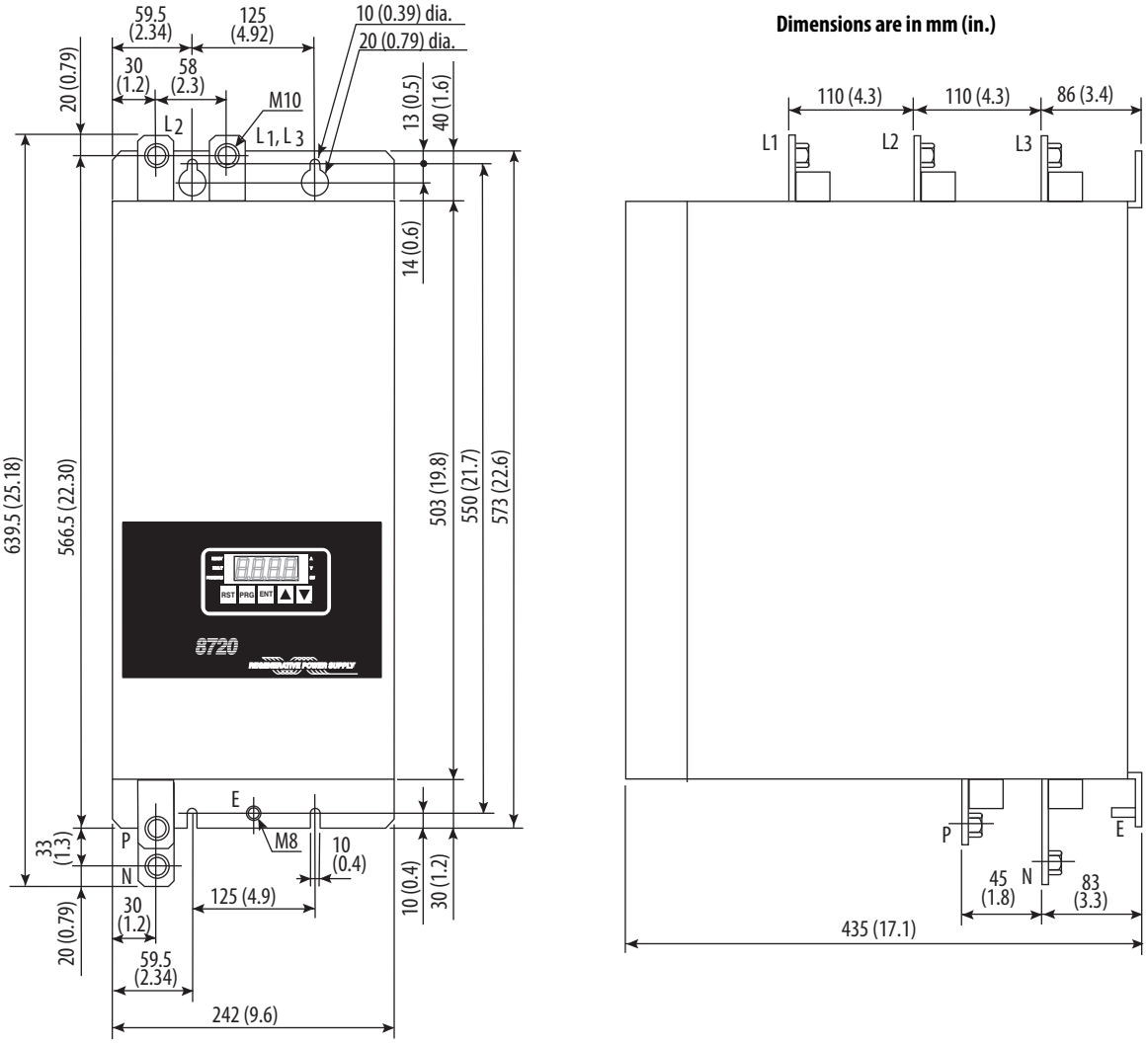
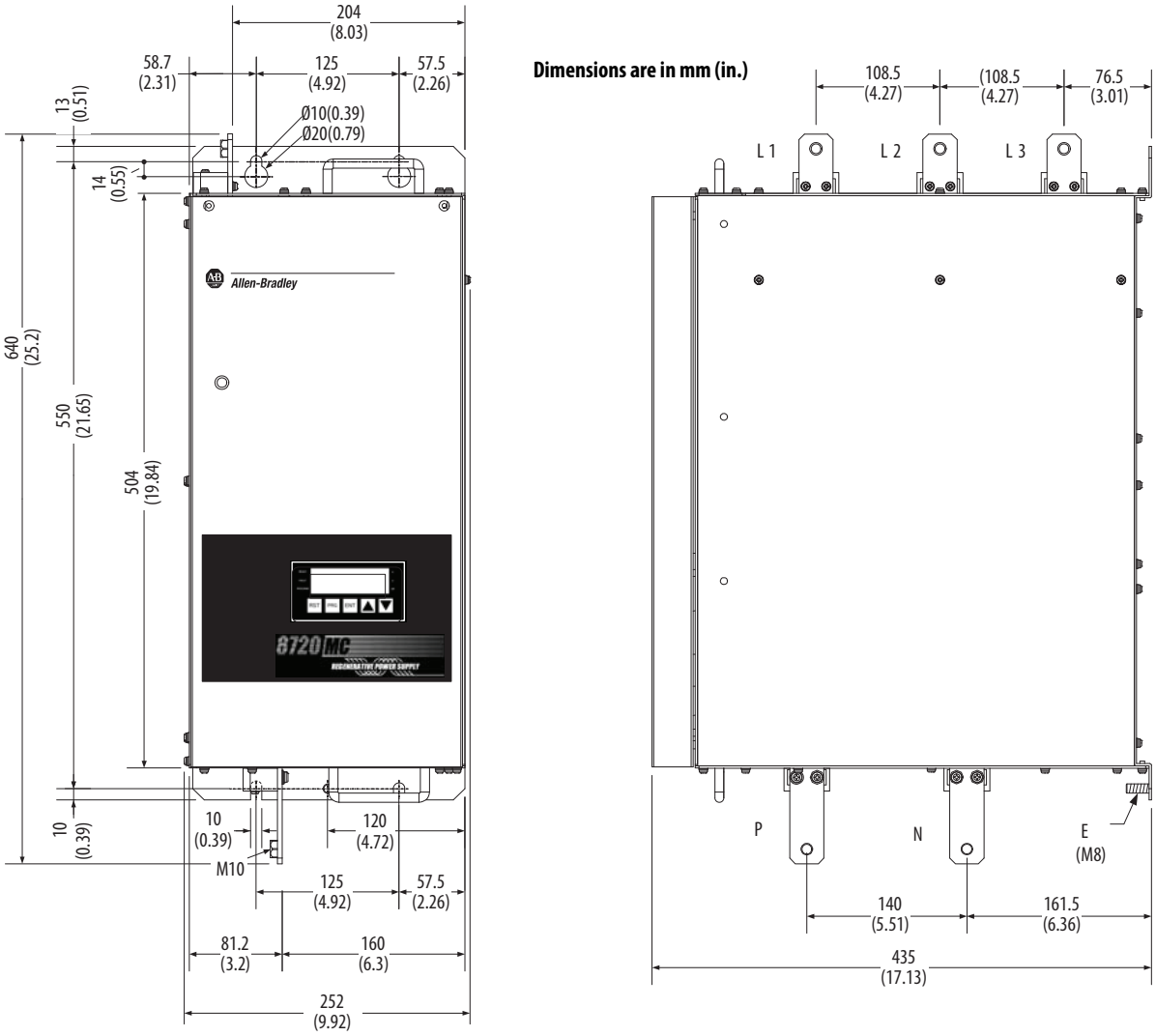


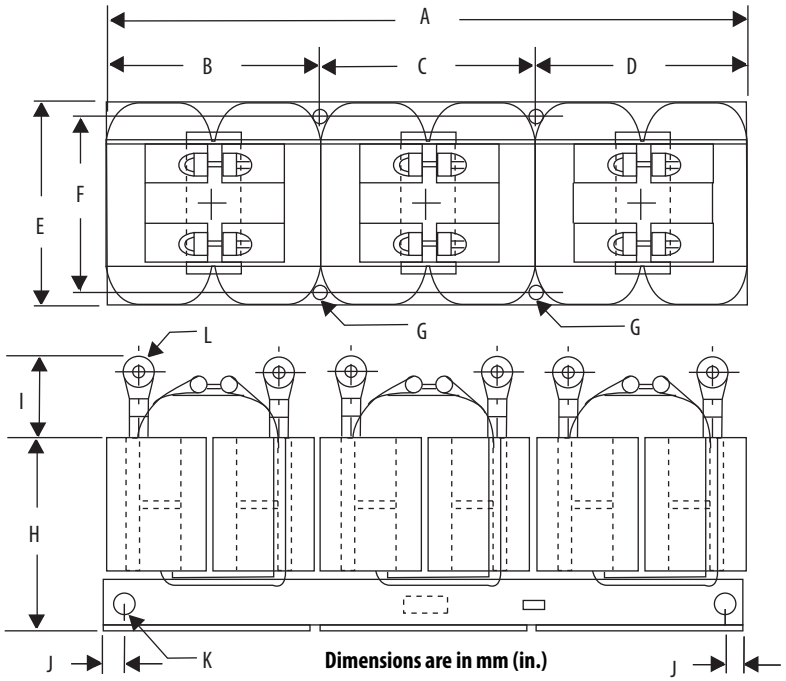
Figure 51 - Catalog Number 8720MC-RPS190 (series B)



Line Reactors

These line reactors apply to 8720MC-RPS065 and 8720MC-RPS190 units.

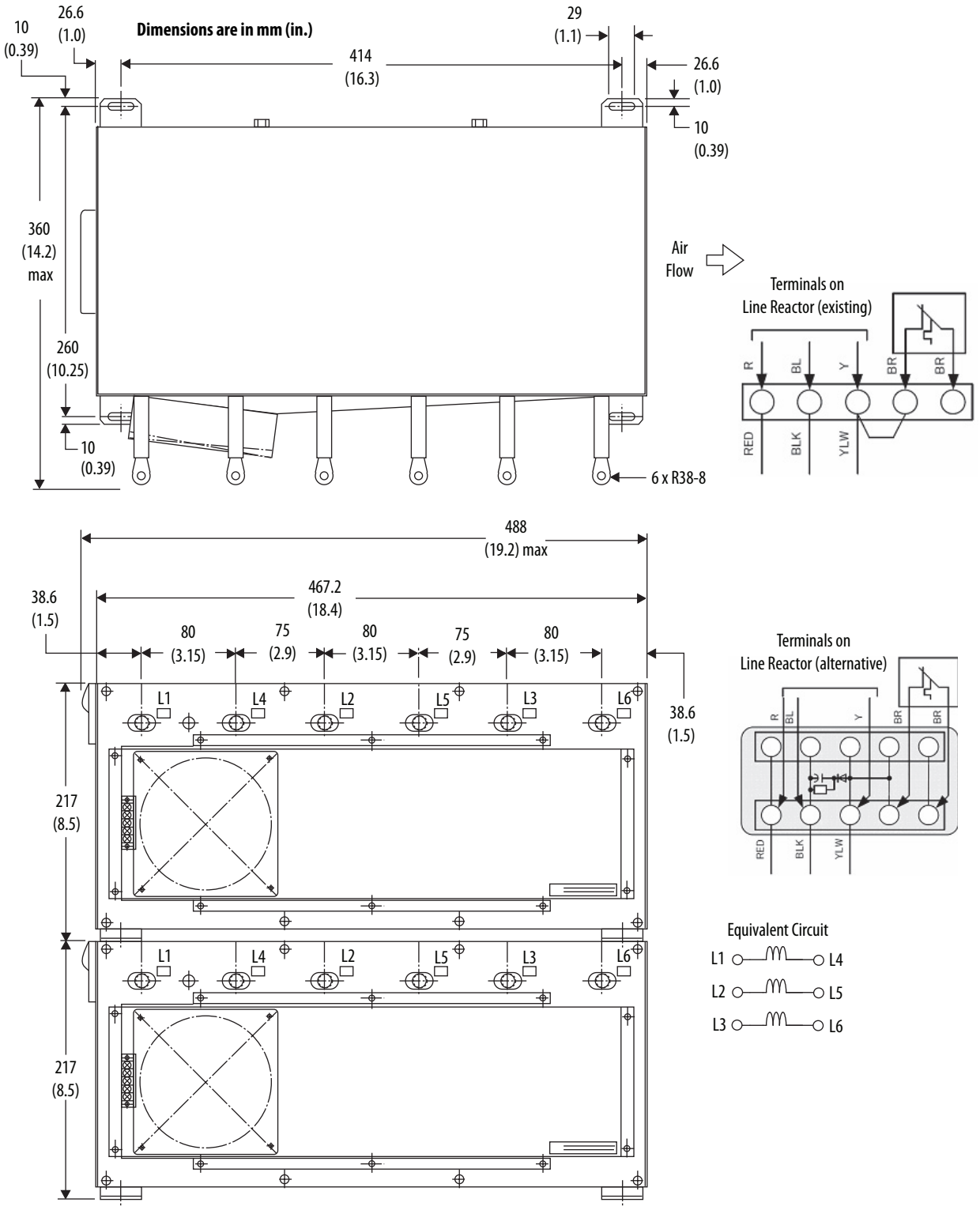
Figure 52 - Catalog Numbers 8720MC-LR03-032B, 8720MC-LR048B, 8720MC-LR062B, and 8720MC-LR070B



Line Reactors Cat. No.	A (1) mm (in.)	B mm (in.)	C (2) mm (in.)	D mm (in.)	E mm (in.)	F (3) mm (in.)	G mm (in.)	H (4) mm (in.)	I (5) mm (in.)	J mm (in.)	K mm (in.)	Pressure Terminal mm (in.)
8720MC-LR03-032B	345 (13.58)	112.5 (4.43)	120 (4.72)	112.5 (4.43)	140 (5.51)	100 (3.94)	4…7 (0.15…0.27)	127 (5.0)	80 (3.14)	15 (0.59)	4…15 (0.15…0.59)	6-(R22-6) (0.23)
8720MC-LR05-048B	400 (15.74)	132.5 (5.21)	135 (5.31)	132.5 (5.21)	155 (6.10)	105 (4.13)		125 (4.92)				
8720MC-LR10-062B	440 (17.32)	145 (5.70)	150 (5.90)	145 (5.70)	160 (6.29)	110 (4.33)	4…9.5 (0.15…0.37)	125 (4.92)				
8720MC-LR14-070B	460 (18.11)	155 (6.10)	150 (5.90)	155 (6.10)	180 (7.08)	125 (4.92)		140 (5.51)				

(1) The tolerance is ±2 mm (0.07 in.).
(2) The tolerance is ±1 mm (0.03 in.).
(3) The tolerance is +1 mm, -5 mm (+0.03 in. -0.19 in.).
(4) The tolerance is ±5 mm (0.19 in.).
(5) The tolerance is ±10 mm (0.39 in.).

Figure 53 - Catalog Number 8720MC-LR10-100B

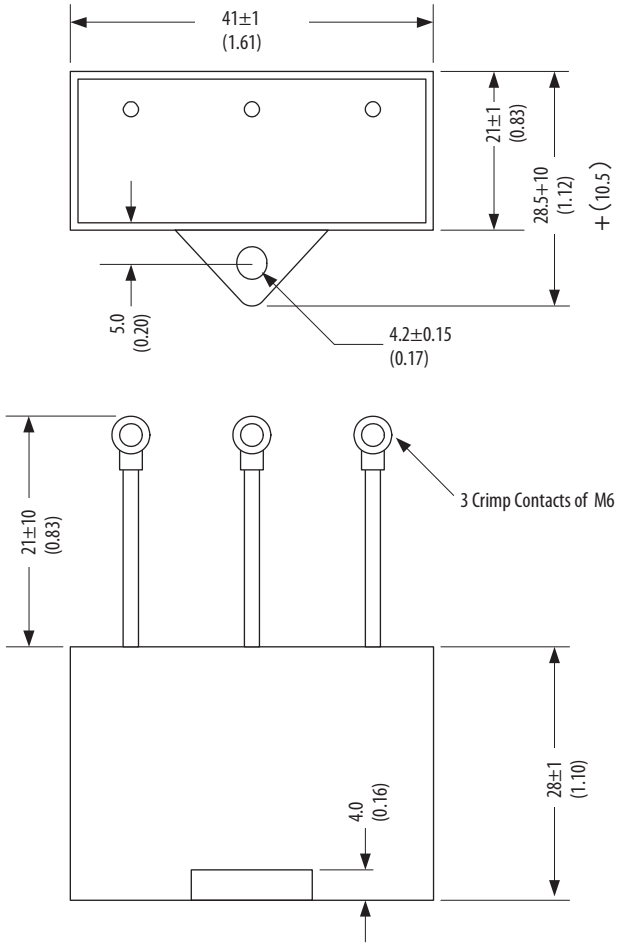


Shown are two 8720MC-LR10-100B units in a typical configuration for use with the 8720MC-RPS190 unit.

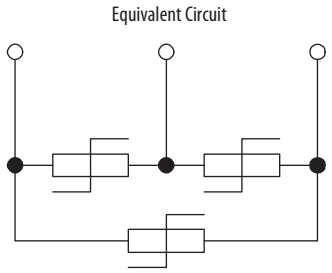
Varistor

The 8720-VA-B varistor applies to 8720MC-RPS065 units.

Figure 54 - Catalog Number 8720MC-VA-B



Dimensions are in mm (in.)



Harmonic Filter

These harmonic filters apply to 8720MC-RPS065 units.

Figure 55 - Catalog Number 8720MC-HF-B2

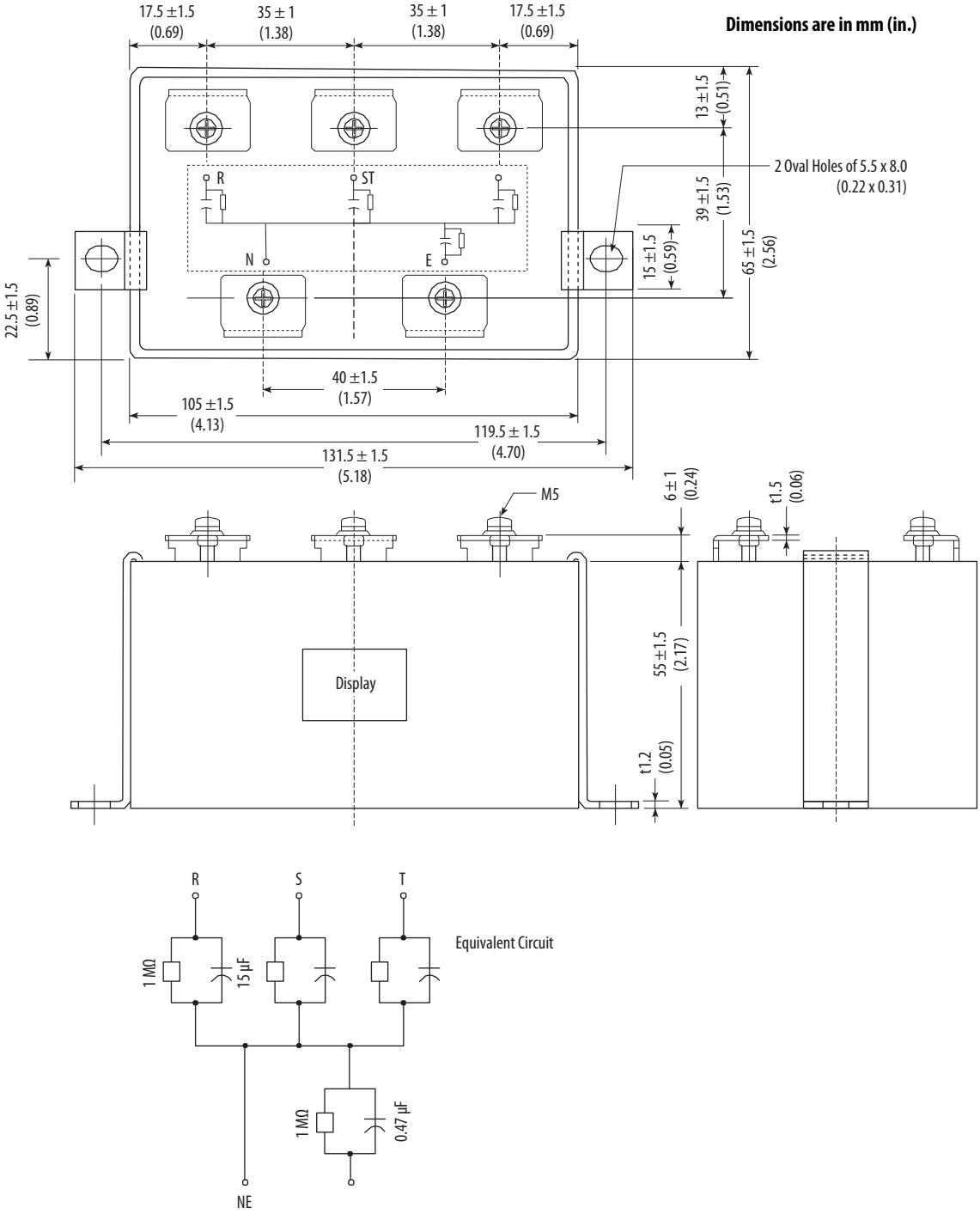
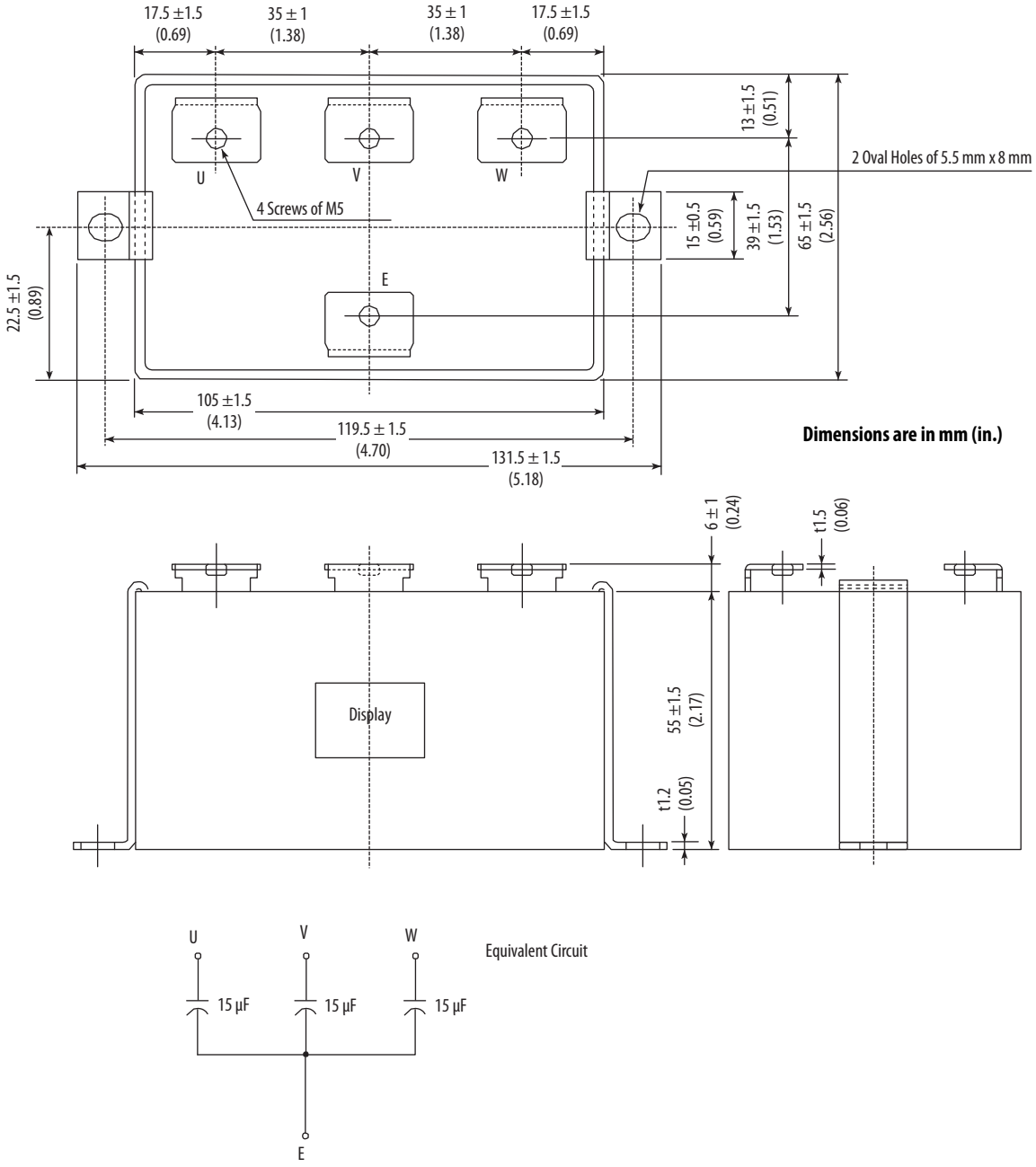


Figure 56 - Catalog Number 8720MC-HF-B



EMC Line Filters

EMC Line filters (Figure 57 and Figure 58) apply to 8720MC-RPS065 units.

Figure 57 - Catalog Number 8720MC-RFI80

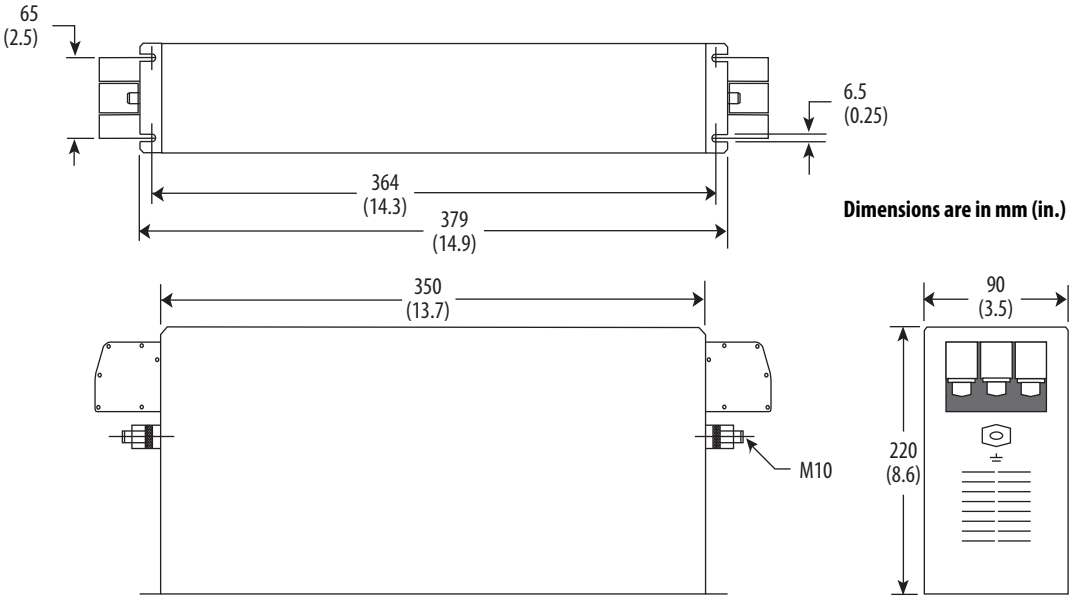
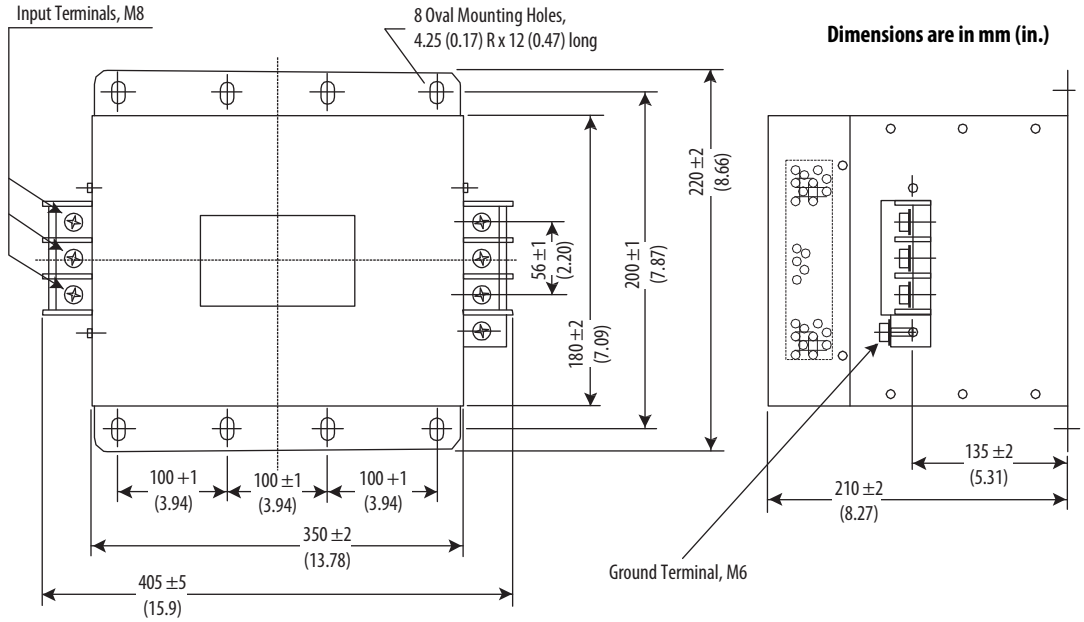


Figure 58 - Soshin Electric (PN-HF3080C-TOA)



Line filter (Figure 59) applies to 8720MC-RPS190 units.

Figure 59 - Catalog Number 8720MC-EF190-VB

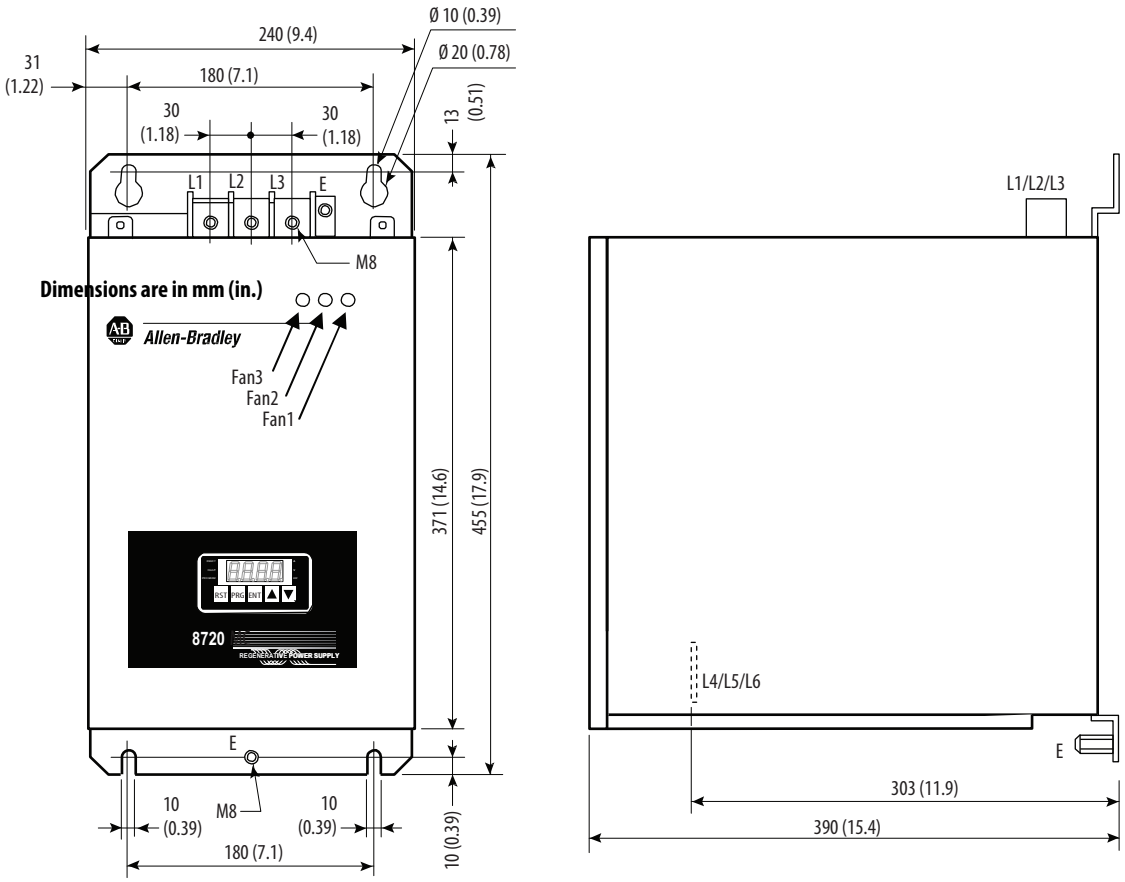
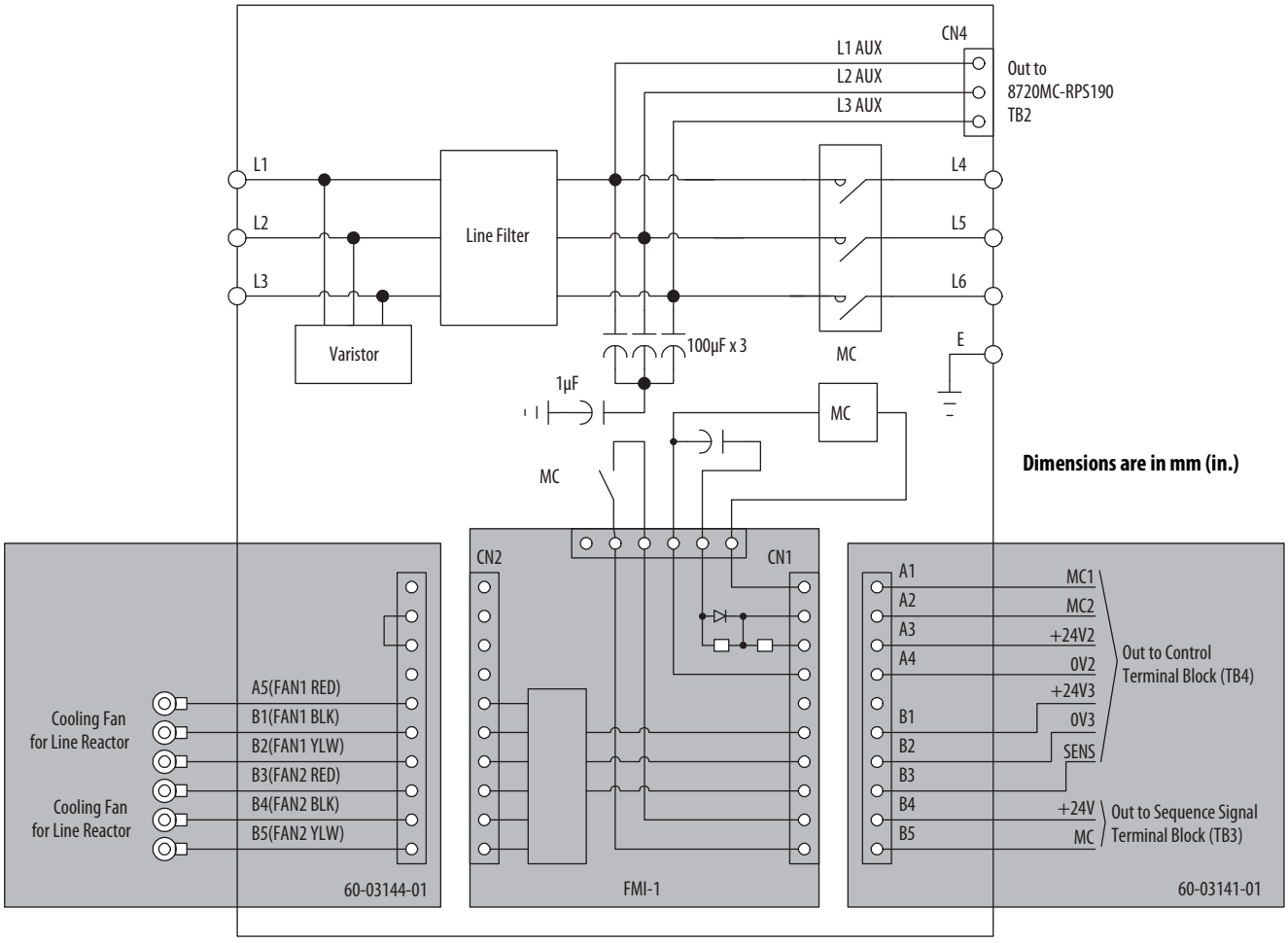
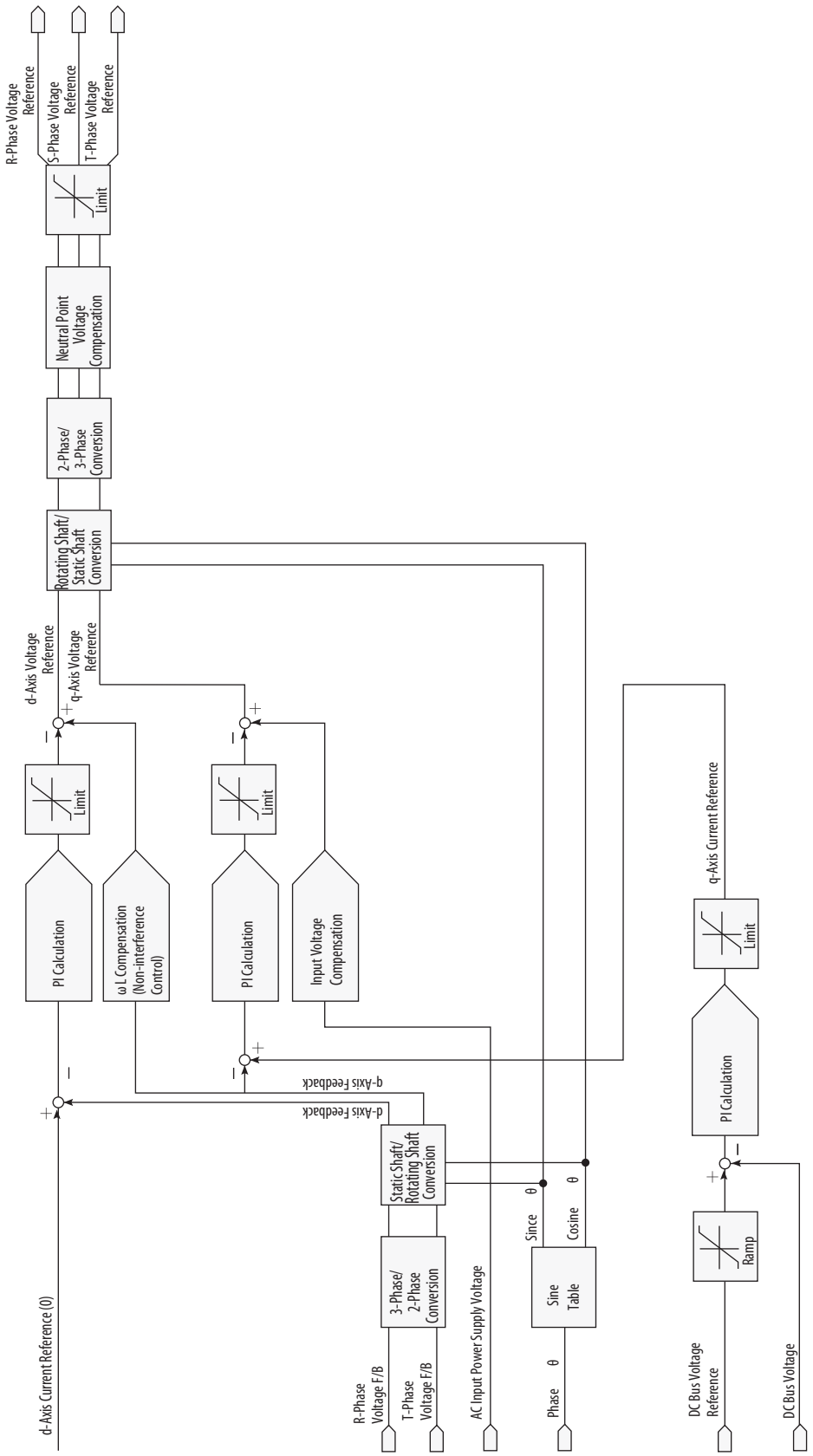


Figure 60 - 8720MC-EF190-VB Connection Diagram



Control Block Diagram

Shown is the 8720MC-RPS unit control block diagram.



Numerics

A

B

C

D

E

F

G

H

I

L

W

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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