



PowerFlex SCR Bus Supply

Firmware Version 1.xxx



Allen-Bradley

by ROCKWELL AUTOMATION

User Manual

Original Instructions

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.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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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.

These 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).

The following icon may appear in the text of this document.



Identifies information that is useful and can help to make a process easier to do or easier to understand.



Rockwell Automation recognizes that some of the terms that are currently used in our industry and in this publication are not in alignment with the movement toward inclusive language in technology. We are proactively collaborating with industry peers to find alternatives to such terms and making changes to our products and content. Please excuse the use of such terms in our content while we implement these changes.

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The purpose of this manual is to provide you with the basic information needed to install, start up, and troubleshoot the PowerFlex[®] SCR Bus Supply. This manual is intended for personnel that are qualified to install, program, and operate adjustable frequency drives and their use in common DC bus systems.



Rockwell Automation recognizes that some of the terms that are currently used in our industry and in this publication are not in alignment with the movement toward inclusive language in technology. We are proactively collaborating with industry peers to find alternatives to such terms and making changes to our products and content. Please excuse the use of such terms in our content while we implement these changes.

Summary of Changes

This publication contains the following new or updated information. This list includes substantive updates only and is not intended to reflect all changes.

Topic	Page
Removed mini tables of contents	Throughout
Removed Rockwell Support information from Preface	5
Updated certification information.	26

Conventions Used in This Manual

- In this manual we may see the PowerFlex SCR Bus Supply as SCR Bus Supply or Bus Supply.
- The firmware release is displayed as FRN X.xxx. The “FRN” signifies Firmware Release Number. The “X” is the major release number. The “xxx” is the minor update number.
- The following words may be used throughout the manual to describe an action:

Word	Meaning
Can	Possible, able to do something
Cannot	Not possible, not able to do something
May	Permitted, allowed
Must	Unavoidable, you must do this
Shall	Required and necessary
Should	Recommended
Should Not	Not Recommended

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation. You can view or download publications at rok.auto/literature.

General Drive Information

Title	Publication
Wiring and Grounding Guidelines for PWM AC Drives	DRIVES-IN001
AC Drives in Common Bus Configurations	DRIVES-AT002
Preventive Maintenance of Industrial Control and Drive System Equipment	DRIVES-TD001
Safety Guidelines for the Application, Installation and Maintenance of Solid State Control	SGI-1.1
A Global Reference Guide for Reading Schematic Diagrams	0100-2.10
Guarding Against Electrostatic Damage	8000-4.5.2
1321 Power Conditioning Products Technical Data	1321-TD001

Specific Drive Information

For detailed drive information, including specifications, see the following PowerFlex 70, PowerFlex 700, PowerFlex 700H, PowerFlex 700S, and PowerFlex 750-Series drive publications.

For:	See:	Publication
PowerFlex 70/70EC Drive	PowerFlex 70 User Manual PowerFlex 70/700 Reference Manual PowerFlex 70EC/700VC Reference Manual	20A-UM001 PFLEX-RM001 PFLEX-RM004
PowerFlex 700/700VC Series A Drive PowerFlex 700VC Series B Drive	PowerFlex 700 Series A User Manual PowerFlex 700 Series B User Manual PowerFlex 70/700 Reference Manual PowerFlex 70EC/700VC Reference Manual	20B-UM001 20B-UM002 PFLEX-RM001 PFLEX-RM004
PowerFlex 700H Drive	PowerFlex 700H Installation Instructions PowerFlex 700H Programming Manual	PFLEX-IN006 20C-PM001
PowerFlex 700S Drive	PowerFlex 700S with Phase I Control Installation Manual (Frames 1...6) PowerFlex 700S with Phase I Control Installation Manual (Frames 9 and 10) PowerFlex 700S with Phase I Control User Manual (All Frame Sizes) PowerFlex 700S with Phase I Control Reference Manual PowerFlex 700S with Phase II Control Installation Manual (Frames 1...6) PowerFlex 700S with Phase II Control Installation Manual (Frames 9...14) PowerFlex 700S with Phase II Control Programming Manual (All Frame Sizes) PowerFlex 700S with Phase II Control Reference Manual	20D-IN024 PFLEX-IN006 20D-UM001 PFLEX-RM002 20D-IN024 PFLEX-IN006 20D-PM006 PFLEX-RM003
PowerFlex 750-Series AC Drive	PowerFlex 750-Series Drive Installation Instructions PowerFlex 750-Series Drive Programming Manual PowerFlex 750-Series Reference Manual	750-IN001 750-PM001 750-RM002

General Precautions



ATTENTION: This Bus Supply contains ESD (Electrostatic Discharge) sensitive parts and assemblies. Static control precautions are required when installing, testing, servicing or repairing this assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with static control procedures, see Allen-Bradley publication [8000-4.5.2](#), "Guarding Against Electrostatic Damage" or any other applicable ESD protection handbook.



ATTENTION: An incorrectly applied or installed Bus Supply can result in component damage or a reduction in product life. Wiring or application errors, such as incorrect or inadequate AC supply, or excessive ambient temperatures may result in malfunction of the system.



ATTENTION: Only qualified personnel familiar with adjustable frequency AC drives and associated machinery should plan or implement the installation, start-up and subsequent maintenance of the system. Failure to comply may result in personal injury and/or equipment damage.



ATTENTION: Connect products with or without precharge circuitry to the SCR Bus Supply common bus output terminals within the minimum and maximum capacitance and load rating guidelines.



ATTENTION: To avoid an electric shock hazard, verify that the voltage on the DC bus terminals (which are connected to the DC bus capacitors of the Inverter) has discharged before performing any work on the Bus Supply. Measure the DC bus voltage at the +DC and -DC output terminals. The voltage must be zero.



ATTENTION: A second source of power for the cooling blower is present. To avoid an electric shock hazard or moving blades, verify that the AC power supply has been removed prior to performing any maintenance or repairs.



ATTENTION: National Codes and standards (NEC, VDE, BSI, etc.) and local codes outline provisions for safely installing electrical equipment. Installation must comply with specifications regarding wire types, conductor sizes, branch circuit protection, and disconnect devices. Failure to do so may result in personal injury and/or equipment damage.

Catalog Number Explanation

Position Number					
1...3	4	5...7	8	9	10
20S	D	400	N	E	N
a	b	c	d	e	f
a					
Product					
Code			Type		
20S			PowerFlex SCR Bus Supply		
b					
Voltage Rating					
Code	Input Voltage	Phase	DC Output		
D	400/480V AC	3	540...650V DC		
F	600/690V AC	3	675...930V DC		

c

Current Rating	
Code	Output
400	400 A, 400/480V
600	600 A, 400/480V
1k0	1000 A, 400/480/600/690V

d

Enclosure		
Code	Rating	Conformal Coating
N	Open / IP00	No

e

Documentation and Shipping Carton		
Code	User Manual	Carton
E	English	Yes

f

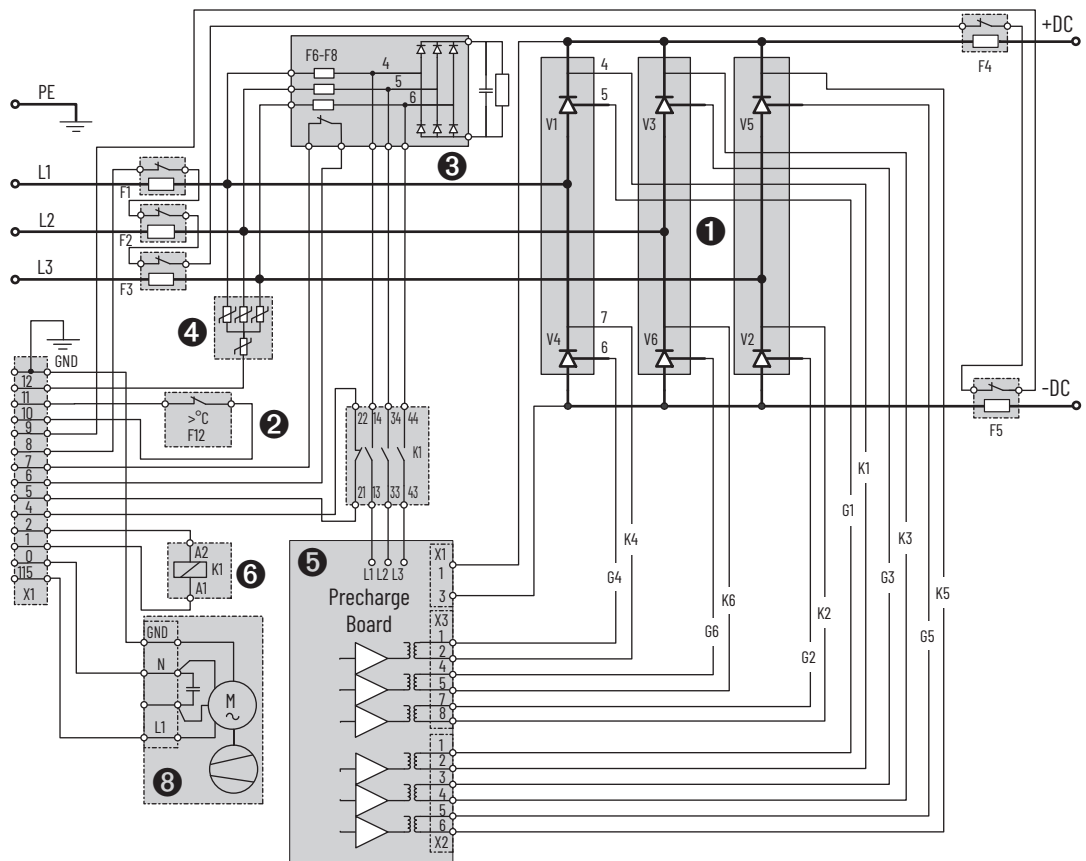
Configuration	
Code	Type
N	Stand Alone
M	Master (1000 A only)
S	Slave (1000 A only)

IMPORTANT PowerFlex SCR Bus Supply 1000 A units with Master or Slave configuration are available for 400/480 and 600/690 Volts.

Descriptions and Schematic Diagrams

The SCR Bus Supply is a single-direction power converter for the front end of common DC bus drive systems. It converts the incoming 3-phase AC line voltage to a common DC bus voltage.

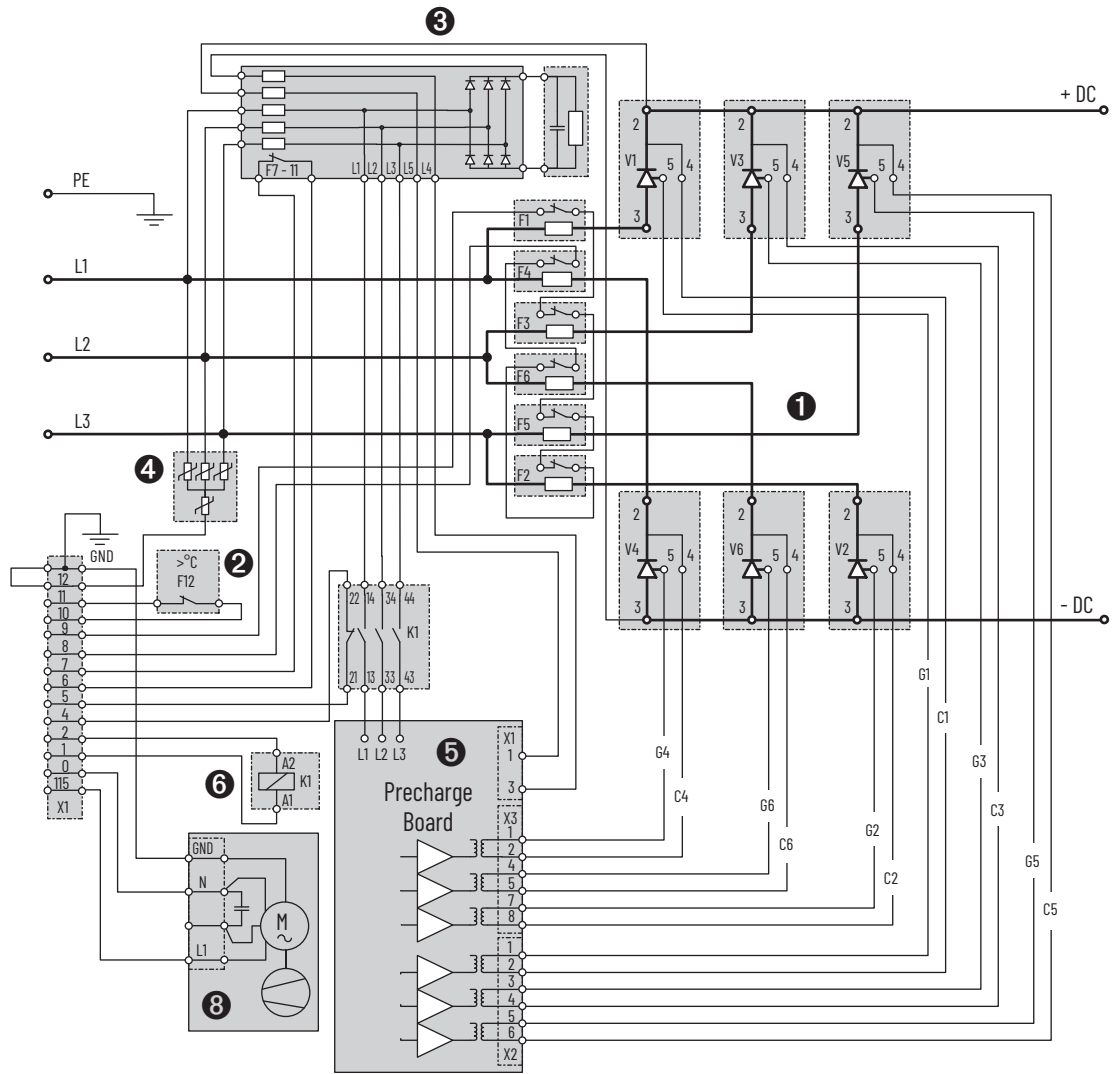
Figure 1 - 400 A and 600 A SCR Bus Supply Schematic Diagram



The primary electrical components for the 400 A and 600 A SCR Bus Supply are:

Item	Description
①	Six-Pulse, Full-Wave, 3-Phase SCR Bridge Rectifier Unit connected to the line input and DC Bus output terminals through semi-conductor protection fuses with trip indicator switches.
②	Bus Supply Overtemperature Sensor located on the heat sink for thermal protection of the SCR bridge rectifier.
③	RC snubber circuit routed to the three input phases through semi-conductor protection fuses with trip indicator switches.
④	MOV snubber circuit routed to the three input phases.
⑤	Precharge Board
⑥	Enable Contactor (K1) for the precharge board.
⑧	Cooling Blower connected to a customer-supplied 115V AC Power Supply. The customer's controls must, at a minimum, command the blower to run whenever contactor K1 is enabled.

Figure 2 - 1000 A SCR Bus Supply Single Unit Schematic Diagram

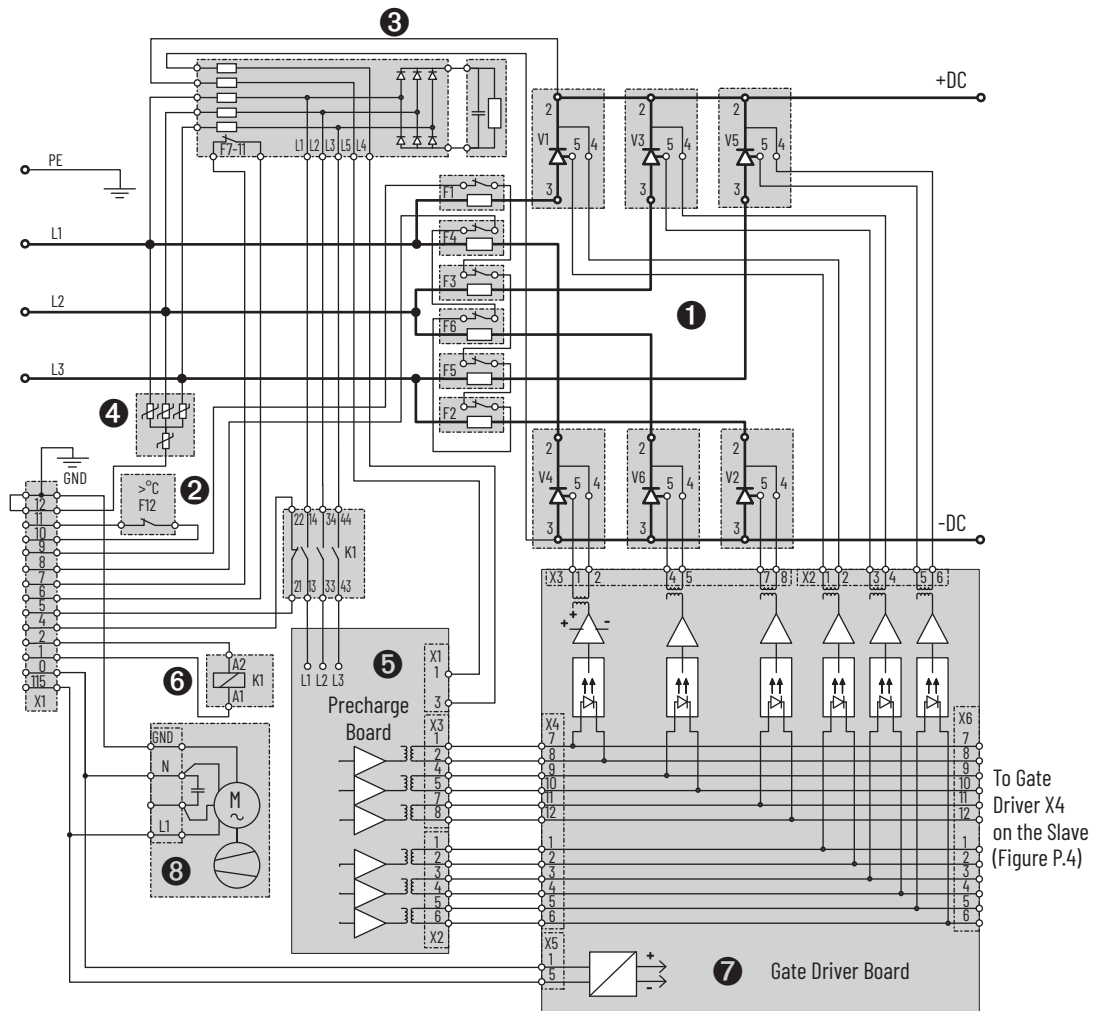


The primary electrical components for the 1000 A SCR Bus Supply Single Unit are:

Item	Description
①	Six-Pulse, Full-Wave, 3-Phase SCR Bridge Rectifier Unit connected to the line input and DC Bus output terminals through semi-conductor protection fuses with trip indicator switches.
②	Bus Supply Overtemperature Sensor located on the heat sink for thermal protection of the SCR bridge rectifier.
③	RC snubber circuit routed to the three input phases through semi-conductor protection fuses with trip indicator switches.
④	MOV snubber circuit routed to the three input phases.
⑤	Precharge Board
⑥	Enable Contactor (K1) for the precharge board.
⑧	Cooling Blower connected to a customer-supplied 115V AC Power Supply. The customer's controls must, at a minimum, command the blower to run whenever contactor K1 is enabled.

NOTE: There is no DC output fuse protection in the 1000 A SCR unit.

Figure 3 - 1000 A SCR Bus Supply Master Unit Schematic Diagram

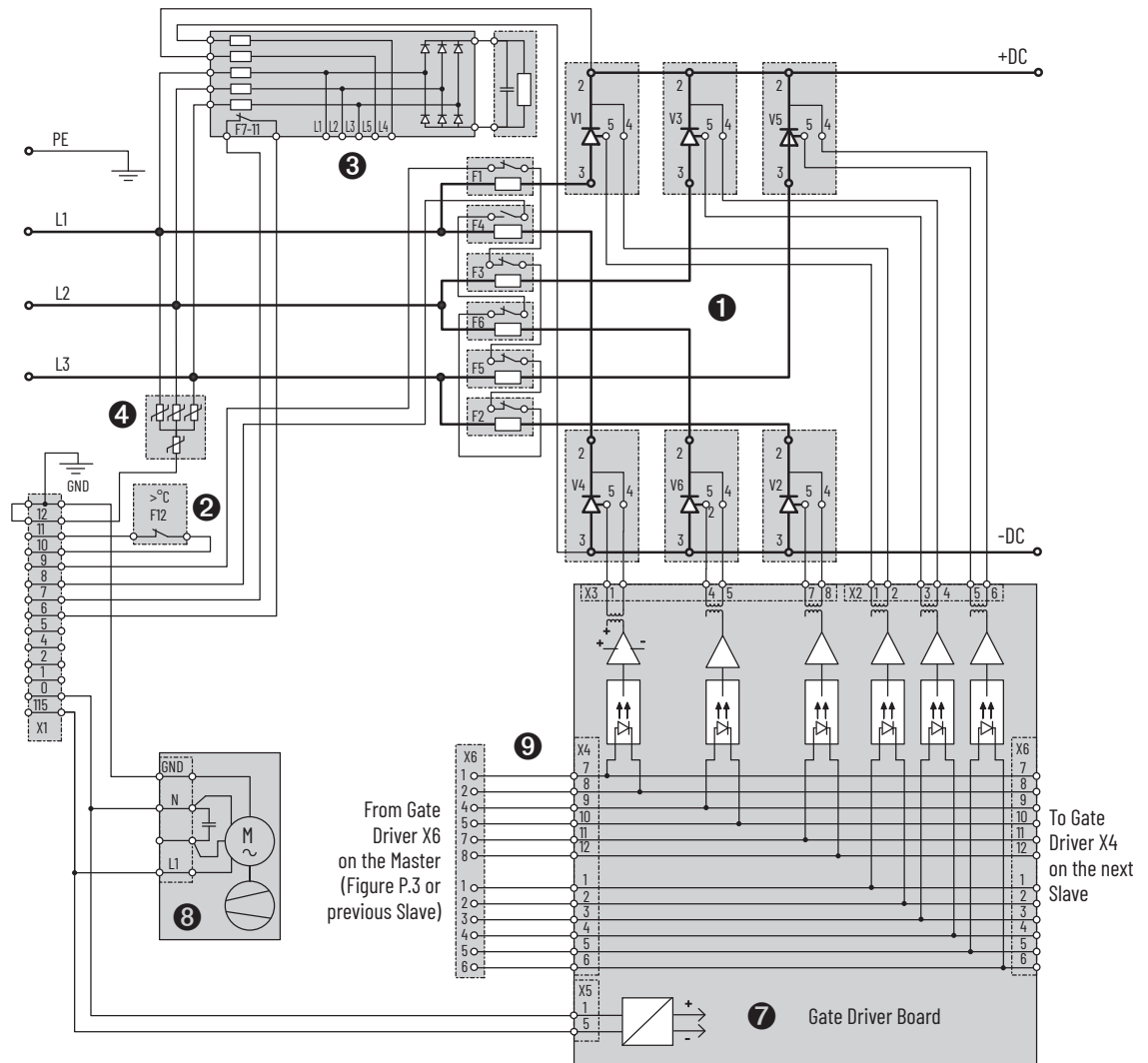


The primary electrical components for the 1000 A SCR Bus Supply Master Unit are:

Item	Description
①	Six-Pulse, Full-Wave, 3-Phase SCR Bridge Rectifier Unit connected to the line input and DC Bus output terminals through semi-conductor protection fuses with trip indicator switches.
②	Bus Supply Overtemperature Sensor located on the heat sink for thermal protection of the SCR bridge rectifier.
③	RC snubber circuit routed to the three input phases through semi-conductor protection fuses with trip indicator switches.
④	MOV snubber circuit routed to the three input phases.
⑤	Precharge Board
⑥	Enable Contactor (K1) for the precharge board.
⑦	Gate Driver Board. The DC power supply is connected to a customer-supplied 115V AC Power Supply.
⑧	Cooling Blower connected to a customer-supplied 115V AC Power Supply. The customer's controls must, at a minimum, command the blower to run whenever contactor K1 is enabled.

NOTE: There is no DC output fuse protection in the 1000 A SCR unit.

Figure 4 - 1000 A SCR Bus Supply Slave Unit Schematic Diagram



The primary electrical components for the 1000 A SCR Bus Supply Slave Unit are:

Item	Description
①	Six-Pulse, Full-Wave, 3-Phase SCR Bridge Rectifier Unit connected to the line input and DC Bus output terminals through semi-conductor protection fuses with trip indicator switches.
②	Bus Supply Over-temperature Sensor located on the heat sink for thermal protection of the SCR bridge rectifier.
③	RC snubber circuit routed to the three input phases through semi-conductor protection fuses with trip indicator switches.
④	MOV snubber circuit routed to the three input phases.
⑦	Gate Driver Board. The DC power supply is connected to the customer-supplied 115V AC Power Supply.
⑧	Cooling Blower connected to a customer-supplied 115V AC Power Supply. The customer's controls must, at a minimum, command the blower to run whenever contactor K1 is enabled.
⑨	Connection Cable (1 m) connects the gate firing pulses from the Master to the first Slave or between any two Slaves (maximum 4).

NOTE: There is no DC output fuse protection in the 1000 A SCR Unit.

Installation/Wiring

This chapter provides information on the installation and wiring of the PowerFlex[®] SCR Bus Supply.

Most start-up difficulties are the result of incorrect wiring. Every precaution must be taken to assure that the wiring is done as instructed. All items must be read and understood before the actual installation begins.

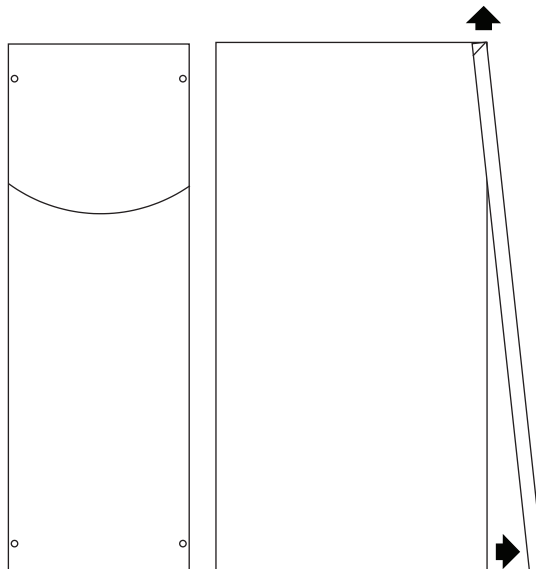


ATTENTION: The following information is merely a guide for proper installation. Rockwell Automation, Inc. cannot assume responsibility for the compliance or the noncompliance to any code, national, local or otherwise for the proper installation of this product or associated equipment. A hazard of personal injury and/or equipment damage exists if codes are ignored during installation.

Opening the Cover

1. Remove the four fastening screws. (The steel sheet cover will stay in place, even in the vertical position.)
2. Hold the cover with both hands at the bottom, and lift it upward about 2 cm (0.8 in.) and away from the enclosure ([Figure 5](#)).

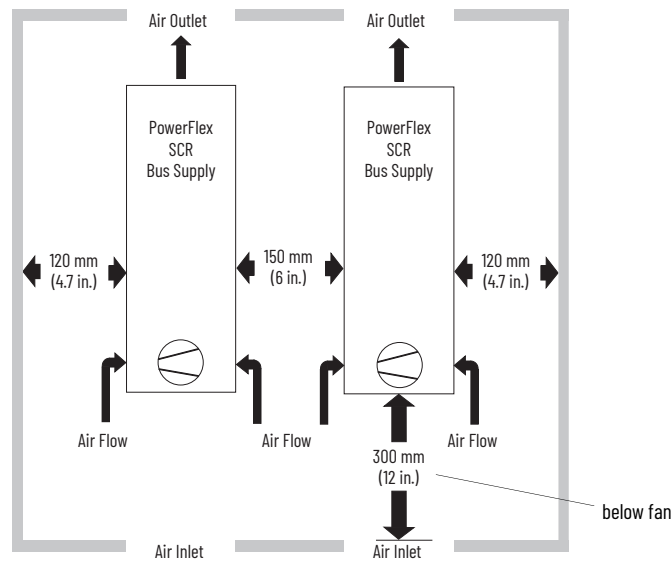
Figure 5 - Opening the Cover



Minimum Mounting Clearances

The cabinet air inlet and outlet areas for each SCR Bus Supply must be a minimum of 200 cm² (31 in.²). The length-to-width ratio must not exceed 4:1.

Figure 6 - Mounting Clearances



See [Appendix A](#) for detailed dimension information.

Ambient Operating Temperatures

The PowerFlex SCR Bus Supply is designed to operate at 0...40 °C (32...104 °F) ambient without derating. For operation in ambients above 40 °C up to 50 °C (104 °F up to 122 °F), the PowerFlex SCR Bus Supply output Amps must be derated by 1.2% per 1 °C for 400 A unit, and by 1.0% per 1 °C for 600 A and 1000 A units.

Ensure that proper cooling is provided to the SCR Bus Supply to maintain the 40 °C rated specification. If the ambient temperature is exceeded, apply the proper derate factors. Add exhaust fans to the front or top of the enclosure bay and provide a filtered opening at the bottom of the cabinet bay.

The SCR Bus Supply watt losses (from specification section) are 1200 W at 400 A, 1600 W at 600 A, 2700 W at 480V 1000 A, and 2800 W at 690V 1000 A. The three-phase AC line reactor watt losses are listed in the 1321 Power Conditioning Products Technical Data, publication [1321-TD001](#).

Because of the internal design of the SCR Bus Supply, it is NOT recommended to rely on an air dam surrounding the SCR Bus Supply.

It is recommended that the system integrator completes a thermal evaluation to ensure adequate cooling to maintain proper operating conditions for each cabinet or bay. A minimum air exchange of 725 CFM per SCR Bus Supply is recommended.

AC Supply Source Considerations

The PowerFlex SCR Bus Supply is suitable for use on a circuit capable of delivering a short circuit rating up to a maximum of 85,000 rms symmetrical amperes.

If a Residual Current Detector (RCD) is used as a system ground fault monitor, only Type B (adjustable) devices should be used to avoid nuisance tripping.

Line Reactors

A minimum 3% rated three-phase AC line reactor must be installed for minimum voltage drop unless the closest supply transformer is matched to the kVA rating of the PowerFlex SCR Bus Supply. For recommended line reactors, see [Line Reactors on page A-7](#).

Install one three-phase AC line reactor for each SCR Bus Supply module. It is recommended to maintain cable length symmetry between the three-phase AC line reactors and the SCR Bus Supply connections. One method is to mount the three-phase AC line reactors on the cabinet floor under the SCR Bus Supply.

IMPORTANT It is recommended to keep all wired or bus bar connections identical in size and length. This includes the AC line connection to the three-phase AC line reactors and from the three-phase AC line reactors to the SCR Bus Supply.

Unbalanced or Non-Solid Grounded Distribution Systems

Where the potential exists for abnormally high phase-to-ground voltages (in excess of 125% of nominal), or the supply system is non-solid grounded, see the Wiring and Grounding Guidelines for Pulse Width Modulated (PWM) AC Drives, publication [DRIVES-IN001](#).



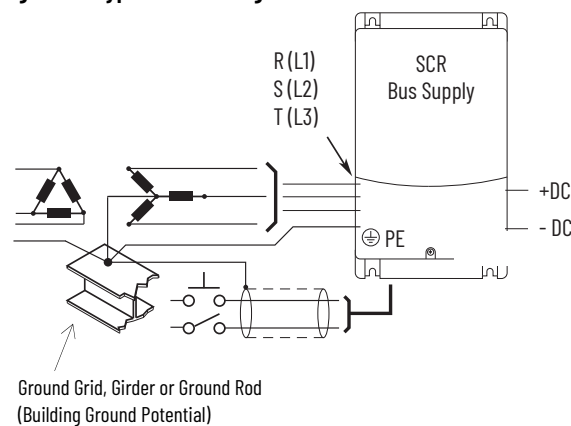
ATTENTION: The PowerFlex SCR Bus Supply contains protective MOVs that are referenced to ground. The MOVs should be disconnected from ground if the SCR Bus Supply is installed on any non-solid grounded power distribution system (IT-network). For jumper location, see [Figure 11 on page 21](#).

General Grounding Requirements

The Safety Ground terminal (PE) must be connected to the building grounding scheme. Ground impedance must conform to the requirements of national and local industrial safety regulations and/or electrical codes. The integrity of all ground connections should be periodically checked.

For installations within a cabinet, a single safety ground point or ground bus bar connected directly to building steel should be used. All circuits including the AC input ground conductor should be grounded independently and directly to this point/bar.

Figure 7 - Typical Grounding



Safety Ground Terminal - PE

The Bus Supply safety ground (PE) must be connected to the customer grounding scheme or earth ground. This is the safety ground for the Bus Supply that is required by code. This point must be connected to adjacent building steel (girder, joist), a floor ground rod, bus bar or building ground grid. Grounding points must comply with national and local industrial safety regulations and/or electrical codes.

RFI Filter Grounding

Using an external RFI filter may result in relatively high ground leakage currents. Therefore, the **filter must only be used in installations with grounded AC supply systems and be permanently installed and solidly grounded** (bonded) to the building power distribution

ground. Ensure that the incoming supply neutral is solidly connected (bonded) to the same building power distribution ground. Grounding must not rely on flexible cables and should not include any form of plug or socket that would permit inadvertent disconnection. Some local codes may require redundant ground connections. The integrity of all connections should be periodically checked. See the instructions supplied with the filter.

Minimum Capacitance

In order to commission and test the SCR Bus Supply, a minimum capacitance is required. The design of the final installation must assure that the minimum capacitance is connected whenever the bus supply is to be enabled. If this minimum capacitance is not present, the bus supply internal fault detection circuit will interpret the condition as a DC bus short and stop pulse firing. The minimum capacitance (110 µF per SCR bus supply) may be provided by an external capacitor bank (recommended) or a drive (as long as the drive remains connected to the DC bus).

NOTE: A capacitance of 110 µF is typical of a 5 Hp or 3.7 kW drive. To find DC bus capacitances for specific PowerFlex drives, see Appendix A tables in the PowerFlex AC Drives in Common Bus Configurations Application Guidelines, publication [DRIVES-AT002](#).

Maximum Loading

To avoid overloading the Bus Supply, the following requirement applies:

The DC Input current sum (Normal Duty rating at 40 °C/104 °F) of the connected drive(s) must not exceed the Bus Supply continuous DC Bus output current rating.

For the DC Input Current values of the drives, see tables in the respective drive documentation.

[Table 1](#) and [Table 2](#) provide guidance on the nominal operation of the SCR Bus Supply. No overload capability is built into the tables.

IMPORTANT See Output Ratings in Appendix A for overload capability.

When an overload is being utilized in connected drives or products, that overload current must be accounted for in the calculation to properly size the SCR Bus Supply.

Table 1 - Normal Duty ND (110%, 1 minute; 150%, 3 seconds)

Drive Rating		Drive Output Current		Drive DC Input Current		SCR Bus Supply ⁽¹⁾	
DC Voltage	ND Power	ND Output Currents	ND Output Current Sum	ND DC Input Currents	ND DC Input Current Sum	Maximum DC Output Amps	AC Input Voltage
540V	3 x 110 kW 1 x 45 kW	3 x 205 = 615A 1 x 85 = 85A	700 A	3 x 226 = 678A 1 x 95 = 95A	773A	1000 A	400V
650V	3 x 60 Hp 1 x 30 Hp	3 x 77 = 231A 1 x 40 = 40 A	271A	3 x 84.5 = 253.5A 1 x 42.9 = 42.9A	297A	400 A	480V

(1) No overload capability.

Table 2 - Heavy Duty HD (150%, 1 minute; 200%, 3 seconds)

Drive Rating		Drive Output Current		Drive DC Input Current		SCR Bus Supply ⁽¹⁾	
DC Voltage	HD Power	HD Output Currents	HD Output Current Sum	HD DC Input Currents	HD DC Input Current Sum	Maximum DC Output Amps	AC Input Voltage
540V	3 x 90 kW	3 x 170 = 510 A	510 A	3 x 192.3 = 577A	577A	600 A	400V

(1) No overload capability.

Fusing

The 400 A and 600 A PowerFlex SCR Bus Supplies have built-in AC line and DC bus fuses. The 1000 A unit has six in-path fuses which simultaneously protect AC and DC paths. All units are equipped with fuse trip indicator switches. For a list of recommended replacement fuses, see these pages.

SCR Bus Supply	See Page...
400 A	42
600 A	44
1000 A	46

Power Wiring



ATTENTION: National Codes and standards (NEC, VDE, BSI, etc.) and local codes outline provisions for safely installing electrical equipment. Installation must comply with specifications regarding wire types, conductor sizes, and disconnect devices. Failure to do so may result in personal injury and/or equipment damage.

To maintain balanced impedance, and thus balance current in the SCR Bus Supply, it is recommended to keep all wired or bus bar connections identical in size and length. This includes the AC line connection to three-phase AC line reactors and from the three-phase AC line reactors to the SCR Bus Supply.

EMC Compliance

See [CE Conformity on page 26](#) for details.

Cable Trays and Conduit

If cable trays or large conduits are to be used, see guidelines in the Wiring and Grounding Guidelines for Pulse Width Modulated (PWM) AC Drives, publication [DRIVES-IN001](#).



ATTENTION: To avoid a possible shock hazard caused by induced voltages, unused wires in the conduit must be grounded at both ends. For the same reason, if a drive sharing a conduit is being serviced or installed, all drives using this conduit should be disabled. This will help minimize the possible shock hazard from “cross coupled” motor leads.

DC Bus Wiring Guidelines

For DC Bus wiring guidelines, see AC Drives in Common Bus Configurations, publication [DRIVES-AT002](#).

Power Connection Bus Bars and Terminals

Figure 8 - 400 A Unit Bus Bar and Terminal Locations for Customer Wiring

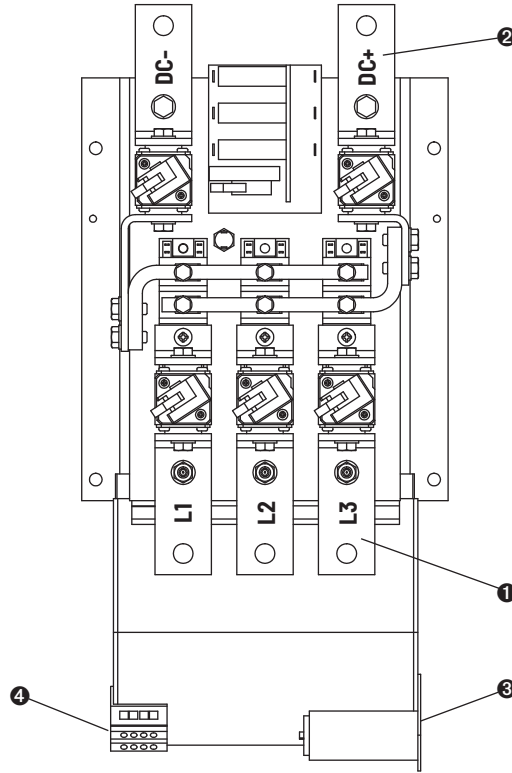


Table 3 - 400 A Unit Power Connection Specifications

Item	Description	Copper Bus Bars ⁽¹⁾	Recommended Minimum Size	
			Bus Bar	Wire
①	AC Line Input L1, L2, L3	40 x 5 mm (1.57 x 0.2 in.) with single 14 mm (0.55 in.) diameter hole for customer terminal	40 x 5 mm	120 mm ² (or 2 x 50 mm ²)
②	DC Bus DC+, DC-	40 x 5 mm (1.57 x 0.2 in.) with single 14 mm (0.55 in.) diameter hole for customer terminal	40 x 5 mm	150 mm ² (or 2 x 70 mm ²)
③	Protective Earth PE	M8 x 25 mm (0.98 in.) stud; torque to 6 N•m (54 lb•in)	Size per NEC or local code	
④	Control Terminal Block	See Table 6		

(1) Input/output power bus bar connections require the use of either lug type connectors to terminate field-installed conductors or bus bars.

Figure 9 - 600 A Unit Bus Bar and Terminal Locations for Customer Wiring

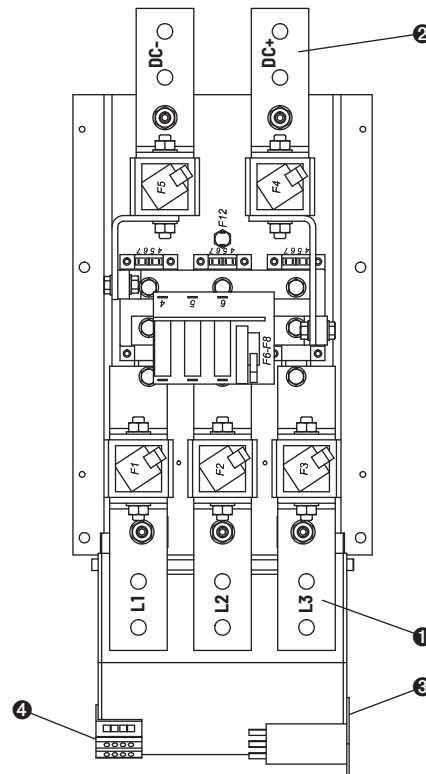


Table 4 - 600 A Unit Power Connection Specifications

Item	Description	Copper Bus Bars ⁽¹⁾	Recommended Minimum Size	
			Bus Bar	Wire
①	AC Line Input L1, L2, L3	50 x 5 mm (1.97 x 0.2 in.) with two 14 mm (0.55 in.) diameter holes for customer terminal	50 x 5 mm	240 mm ² (or 2 x 95 mm ²)
②	DC Bus DC+, DC-	50 x 5 mm (1.97 x 0.2 in.) with two 14 mm (0.55 in.) diameter holes for customer terminal	60 x 5 mm	300 mm ² (or 2 x 120 mm ²)
③	Protective Earth PE	M12 x 25 mm (0.98 in.) stud; torque to 15 N•m (133 lb•in)	Size per NEC or local code	
④	Control Terminal Block	See Table 6		

(1) Input/output power bus bar connections require the use of either lug type connectors to terminate field-installed conductors or bus bars.

Figure 10 - 1000 A Unit Bus Bar and Terminal Locations for Customer Wiring

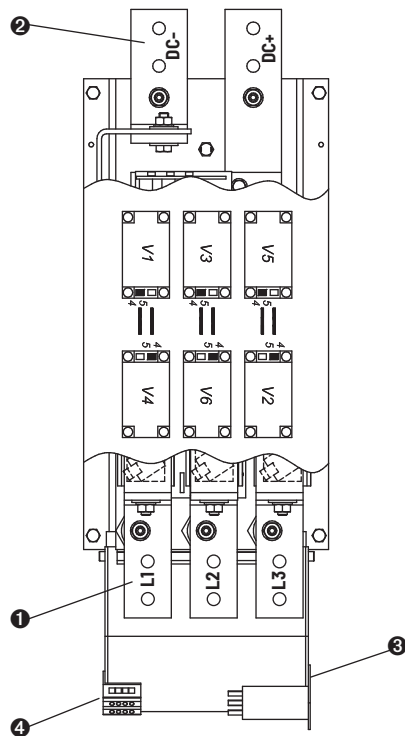


Table 5 - 1000 A Unit Power Connection Specifications

Item	Description	Copper Bus Bars ⁽¹⁾	Recommended Minimum Size	
			Bus Bar	Wire
1	AC Line Input L1, L2, L3	50 x 10 mm (1.97 x 0.39 in.) with two 14 mm (0.55 in.) diameter holes for customer terminal	50 x 10 mm (or 80 x 5 mm)	2 x 240 mm ²
2	DC Bus DC+, DC-	60 x 10 mm (2.36 x 0.39 in.) with two 14 mm (0.55 in.) diameter holes for customer terminal	60 x 10 mm (or 100 x 5 mm)	2 x 300 mm ²
3	Protective Earth PE	M12 x 25 mm (0.98 in.) stud; torque to 15 N•m (133 lb•in)	Size per NEC or local code	
4	Control Terminal Block	See Table 6		

(1) Input/output power bus bar connections require the use of either lug type connectors to terminate field-installed conductors or bus bars.

Control Wiring

Important points to remember about control wiring:

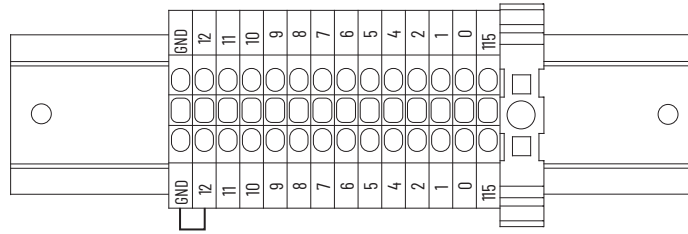
- Use Copper wire only. Wire gauge requirements and recommendations are based on 75 °C (168 °F). Do not reduce wire gauge when using higher temperature wire.
- Wire with an insulation rating of 600V or greater is recommended.
- Control wires outside the cabinet should be separated from power wires by at least 0.3 meters (1 foot).

Table 6 - Control Terminal Specifications

Item	Name	Wire Size Range ⁽¹⁾		Torque
		Maximum	Minimum	
4	Control Terminals	2.5 mm ² (14 AWG)	0.25 mm ² (22 AWG)	0.8 N•m (7 lb•in)

(1) Maximum/minimum sizes that the terminals will accept - these are not recommendations.

Figure 11 - Control Terminal Arrangement



Terminal	Bus Supply	Description	Notes
115 and 0	All units	115V AC Supply Input	For cooling blower (and power supply on the Gate Driver Board - on Master and Slave Units)
1 and 2	(1)	Contactor Coil 115V AC	Contactor must be energized to enable the controller
4 and 5	(1)	NC Contact Output (2)	Opens if the Enable Contactor is energized
6 and 7	400 A and 600 A units	NC Contact Output (2)	Opens if any of the snubber circuit fuses (F6...F8) trip
	1000 A units		Opens if any of the snubber circuit fuses or DC bus feedback fuses (F7...F11) trip
8 and 9	400 A and 600 A units	NC Contact Output (2)	Opens if any of the line input or DC bus branch circuit fuses (F1...F5) trip
	1000 A units		Opens if any of the line input branch circuit fuses (F1...F6) trip
10 and 11	All units	NC Contact Output (2)	Opens at power stack heat sink overtemperature
12 and GND	All units	Jumper MOVs to Ground	Disconnects MOVs from ground by removing this jumper. See Disconnecting MOVs on page 23 for details.

(1) Not used on Slave Units.

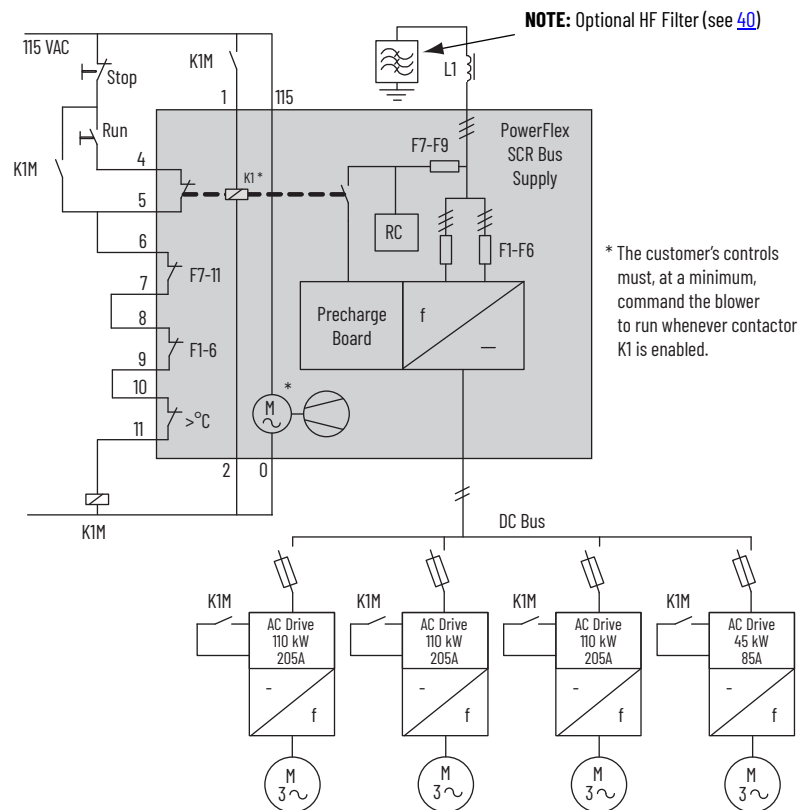
(2) See [Appendix A](#) for contact rating.

Drive Run Interlock

To protect the Bus Supply from overtemperature, the normally closed contacts (Bus Supply Overtemperature - terminals 10 and 11) should be wired to either the AC line input contactor for the Bus Supply or the Run interlock circuit (enable input) of each connected drive. This ensures that the drives are stopped in case of Bus Supply Overtemperature.

Control Wiring Example

Figure 12 - Example of SCR Bus Supply, 1000 A Single with Multiple Drives Using Drive Run Interlocks, Running Simultaneous



Jumper Settings

The PowerFlex SCR Bus Supply precharge board has three jumpers. See [Figure 13](#) for jumper locations and positions.

- **LINE TYPE Jumper:** Always set to the "3-ph" default right-side position (towards the board edge).
- **SPARE 1 Jumper:** For board firmware version 1.21 (or earlier), this jumper is non-functional. For firmware version 1.22 (or later), the SCR Bus Supply is shipped with this jumper in the right (default) inactive state position. When the jumper is placed in the left (RGU/AFE) or active position, the firmware is active for SCR and RGU/AFE parallel operation on common bus systems, where the SCR is in parallel with an active front end that is used only as a regenerative brake unit. The PowerFlex SCR Bus Supply will then deliver the required motoring power and the RGU/AFE will provide the possibility to feed the regenerative energy back to the AC power line. The auto-voltage limitation (allowing the SCRs to phase back) associated with high AC line will be disabled. The left (RGU/AFE) jumper position provides the best protection for parallel SCR and RGU/AFE operation.
- **SPARE 2 Jumper:** For board firmware version 1.21 (or earlier), this jumper is non-functional. For firmware version 1.22 (or later), this jumper is used for slow ramp-up, which slows the DC bus voltage charge up time (from 0.2 to 1.3 seconds). Slow ramp-up should be used when the connected DC bus capacitance is greater than the values shown in the following table.

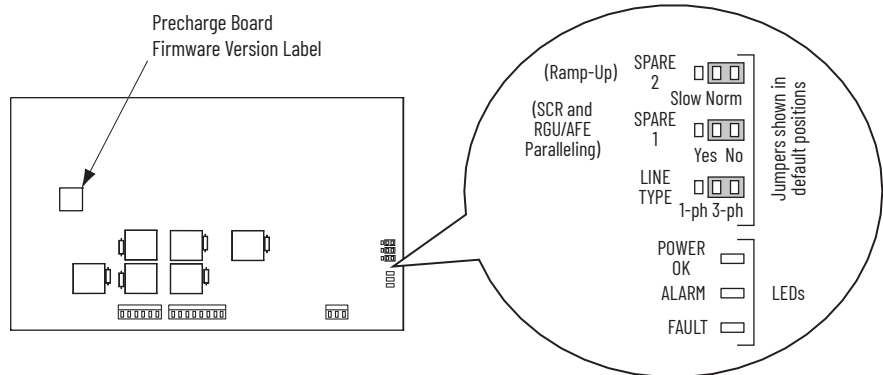
To operate the SCR Bus Supply with a slow ramp-up, set the SPARE 2 jumper to the left (SLOW) position.

SCR Bus Supply	Max. Bus Capacitance ⁽¹⁾ with Normal Ramp	Max. Bus Capacitance ⁽¹⁾ with Slow Ramp
400 A	40,000 µF	200,000 µF
600 A	60,000 µF	300,000 µF
1000 A @ 480V	100,000 µF	500,000 µF
1000 A @ 690V	50,000 µF	250,000 µF

(1) It is recommended to derate the capacitance value by 20% in master/slave configurations.

For standard applications where only the PowerFlex SCR Bus Supply provides the required common DC power, make sure the SPARE 1 and SPARE 2 jumpers are in their default settings (right side—towards the board edge) shown in [Figure 13](#).

Figure 13 - Location of LED Indicators and Jumpers on the Precharge Board



To identify the firmware version, remove the SCR Bus Supply cover and check the firmware version label on the Precharge Board ([Figure 13](#)).

Disconnecting MOVs

The PowerFlex SCR Bus Supply contains protective MOVs that are referenced to ground. To prevent damage, the MOVs should be **disconnected from ground if the Bus Supply is installed on any non-solid grounded distribution system** where the line-to-ground voltages on any phase could exceed 125% of the nominal line-to-line voltage. To disconnect the MOVs from ground, remove the jumper (12-GND) on the control terminal block shown in [Figure 11](#). Solid and non-solid grounded systems are defined in [Table 7](#).

Table 7 - Recommended MOV Configurations

Power Source Type ⁽¹⁾	MOV/Input Filter Capacitors ⁽²⁾	Benefits of Correct Power Source Type Configuration
Solid Grounded <ul style="list-style-type: none"> AC fed, solidly grounded DC fed from passive rectifier which has an AC source and solid ground 	Connected	<ul style="list-style-type: none"> UL compliance Reduced electrical noise Most stable operation EMC compliance Reduced voltage stress on components and motor bearings
Non-Solid Grounded <ul style="list-style-type: none"> AC fed ungrounded Impedance grounded High resistive ground B phase ground Regenerative unit (common DC bus supply and brake) DC fed from an active converter 	Disconnected	<ul style="list-style-type: none"> Helps avoid severe equipment damage when ground fault occurs

(1) It is highly recommended to accurately determine the power source type and then configure appropriately.

(2) When MOVs are disconnected, the power system must have its own transient protection to ensure known and controlled voltages.

For more information on non-solid grounded system installation, see Wiring and Grounding Guidelines for Pulse Width Modulated (PWM) AC Drives, publication [DRIVES-UM001](#).



ATTENTION: To avoid an electric shock hazard, verify that the voltage on the bus capacitors has discharged before removing the jumper. Measure the DC bus voltage at the +DC and -DC output terminals. The voltage must be zero.

Table 8 - Jumper Removal

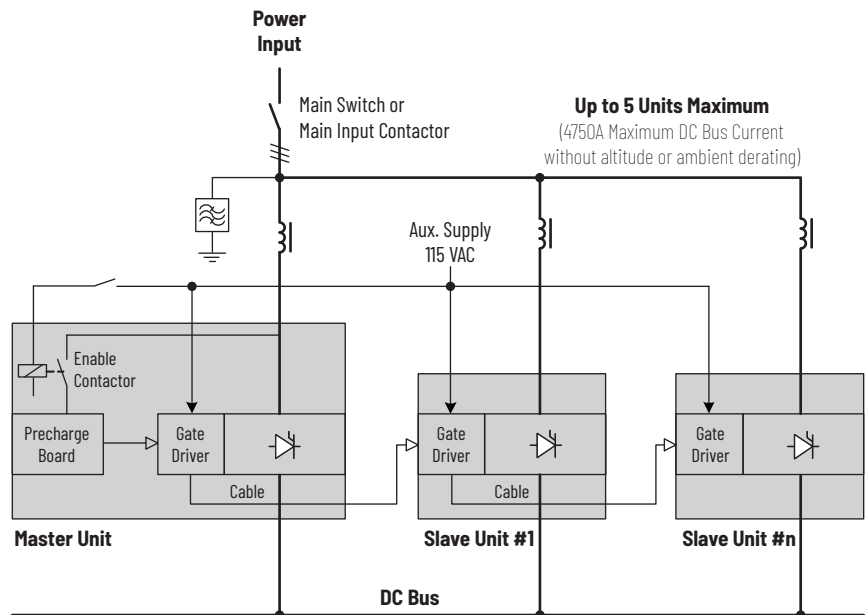
Item	Jumper	Jumper Location	Removes...
1	12 and GND	Control Terminals ⁽¹⁾	MOVs from Ground

(1) For control terminal location, see [Figure 8](#), [Figure 9](#) or [Figure 10](#).

Parallel Connection of Slave Units

Up to four 1000 A PowerFlex SCR Bus Supply Slave units may be connected in parallel with one 1000 A Master. The derate for each additional slave is 5% plus 5% for the master. Thus, the maximum possible output rating without altitude or ambient derating is 4750 Amps (0.95 x 5 x 1000 amps) at 40 °C.

Figure 14 - Example for Master-Slave Configuration (shown without circuit protection for clarity)



1000 A SCR Bus Supply Flexibility

The 1000 A SCR Bus Supply can be converted in the following ways.

1000 A SCR Bus Supply	Convert to...		
	Standalone	Master	Slave
Convert from: Standalone		No	No
Master	Yes		Yes
Slave	No	No	

Because of numerous internal changes (components, cables, and hardware) the following conversions are not allowed:

- Standalone to master
- Standalone to slave
- Slave to standalone
- Slave to master

NOTE: See [Figure 29 on page 47](#) for circuit board location.

Converting Master Unit to Standalone Unit

No changes are required to run a master (without slave units) as a standalone SCR Bus Supply.

Converting Master Unit to Slave Unit

It is possible to reconfigure a master SCR Bus Supply to run as a slave SCR Bus Supply. To convert a master unit to a slave, perform these steps.

1. Remove the cables between the precharge board connectors (X2 and X3) and the gate driver printed circuit board connector X4 (see [Figure 3 on page 11](#)).
2. Connect a cable from the gate driver printed circuit board connector (X4) to the new master SCR Bus Supply or another slave SCR Bus Supply gate connector (X6, see [Figure 4 on page 12](#)). Note that the precharge board does not need to be removed from the converted SCR Bus Supply.
3. Ensure that the precharge relay is not energized (terminal block...terminal 1 and 2, see [Control Wiring on page 20](#)).
4. Place a label near the data nameplate stating that the SCR bus supply has been converted to catalog # 20Sx1KONES, where x is the voltage class of the unit.

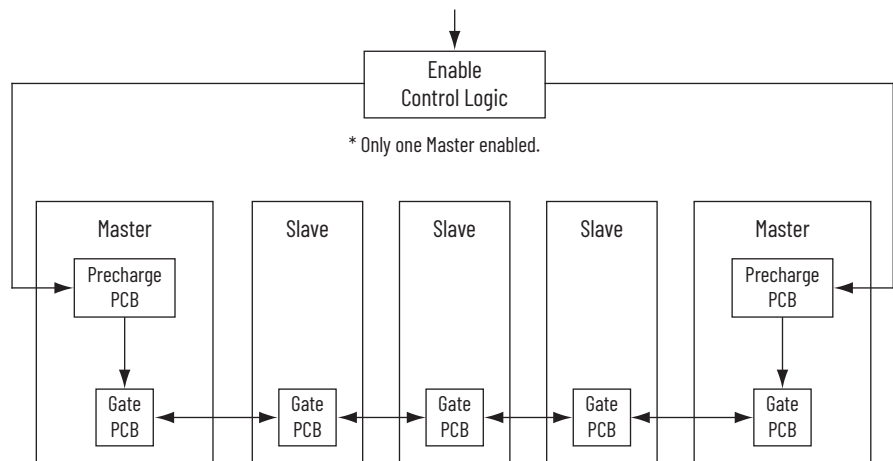
1000 A SCR Bus Supply Redundancy

It is not recommended to install parallel master SCR Bus Supplies. The reason is that there is nothing to synchronize the SCR gate firing between the precharge printed circuit boards in separate SCR Bus Supplies. Each precharge board has circuitry designed to energize the DC bus, which has little to no impedance to limit the inrush current. This DC bus charging synchronization could lead to power device failure.

If redundancy of the SCR Bus Supply master is required by the application, there are two options.

- A microcontroller or other electronically or manually-controlled switch or contact network can be used to reconfigure the wire harnesses between the redundant master SCR Bus Supplies. Basically, one SCR Bus Supply becomes the master and the other becomes the slave by the logic selection of the controlling or steering network. One example of numerous possible configurations is shown in [Figure 15](#).

Figure 15 - Basic Master/Slave Redundancy System Configuration



- Although not recommended, synchronization differences might be minimized by using the slower ramp time available in precharge printed circuit boards with firmware version 1.22 (or later). The standard ramp time is for the rise of DC bus to phase full on in approximately 0.2 seconds, while the slower ramp time will take approximately 1.3 seconds. This will help to limit the inrush current in the system.

For additional recommendations about SCR Bus Supply redundancy, contact Rockwell Automation Technical Support.

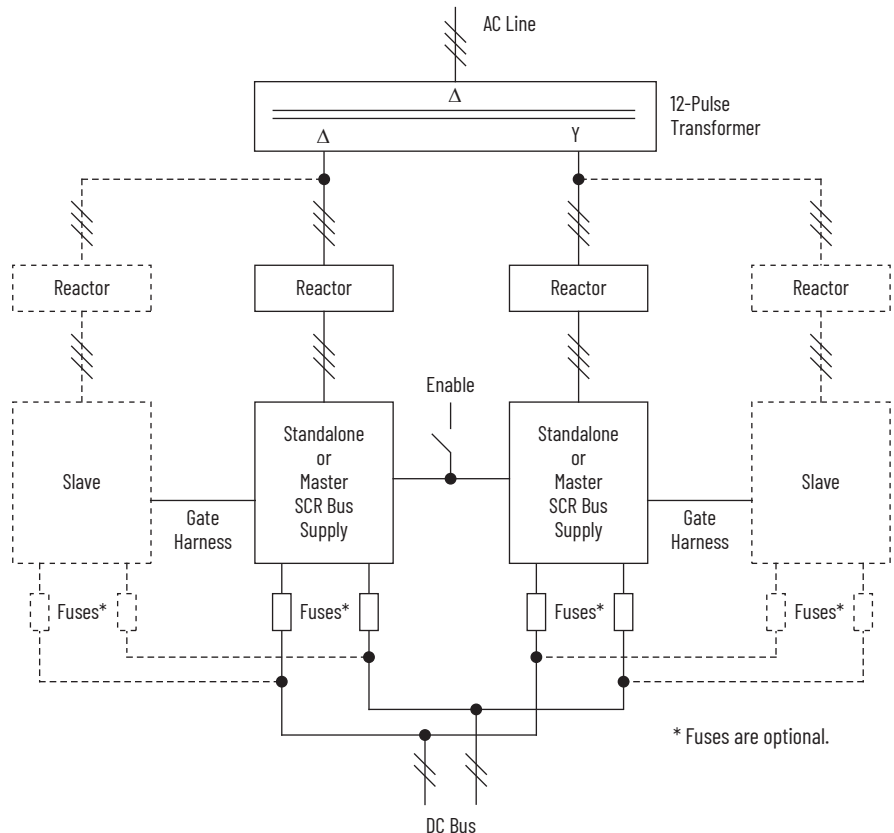
SCR Bus Supply 12-Pulse Configuration

Standalone or master/slave SCR Bus Supplies can be used on applications that use a 12-pulse transformer to minimize power line harmonics.

IMPORTANT Be sure to select the slow ramp time (see Jumper Settings on [Jumper Settings on page 22](#)).

[Figure 16](#) shows a recommended 12-pulse system configuration with optional slave SCR Bus Supplies.

Figure 16 - 12-Pulse System Configuration



For additional recommendations about SCR Bus Supply 12-pulse configurations, contact Rockwell Automation Technical Support.

CE Conformity

Conformity with the Low Voltage (LV) Directive and Electromagnetic Compatibility (EMC) Directive has been demonstrated using harmonized European Norm (EN) standards published in the Official Journal of the European Communities. The PowerFlex SCR Bus Supply complies with the EN standards listed below when installed according to the User Manual.

CE Declarations of Conformity are available online at: rok.auto/certifications

Low Voltage Directive

- EN 61800-5-1 Adjustable speed electrical power drive systems –Part 5-1: Safety requirements – Electrical, thermal and energy.

EMC Directive

- EN61800-3 Adjustable speed electrical power drive systems Part 3: EMC product standard including specific test methods.

Harmonic Emissions

Electronic converters such as the Bus Supply can cause conducted low frequency disturbances (harmonic emissions) to the supply network. The mandatory three-phase AC line reactors will substantially reduce harmonic currents produced by the Bus Supply. However, the magnitude of the harmonic currents and resulting harmonic voltages depends upon the network impedance at the point where the unit is connected to the network. Currently there are no mandatory harmonic emission limits related to CE compliance for equipment connected to private power networks. Upon request, Rockwell Automation can provide information regarding harmonic emissions from the SCR Bus Supply.

General Notes

- The DC bus cable to the inverter(s) should be kept as short as possible to avoid electromagnetic emission and capacitive currents. Therefore the inverter(s) should be located in the same cabinet as the Bus Supply or next to the cabinet with the Bus Supply. If the connection leads between DC bus and inverter(s) are leaving the cabinet, shielded cables must be used.
- Use of line filters in non-solid grounded systems is not recommended.
- The PowerFlex SCR Bus Supply with external Line Reactor and HF filter satisfies CE EMC emission limits for the industrial environment. If used in a residential or domestic environment it may cause radio interference. The user is required to take measures to prevent interference, in addition to the essential requirements for CE compliance listed below, if necessary.
- Conformity of the drive with CE EMC requirements does not guarantee an entire machine installation complies with CE EMC requirements. Many factors can influence total machine/installation compliance.

Essential Requirements for CE Compliance

Conditions 1...5 listed below **must be** satisfied for the PowerFlex SCR Bus Supply to meet the requirements of **EN61800-3**.

1. Bus Supply and inverter must be PowerFlex type and CE compatible.
2. Externally mounted Line Reactor and HF filter (specified in [Appendix A](#)) must be connected to the line input as shown in [Figure 12](#).
3. Review important precaution/attention statements throughout this document before installing the drive(s).
4. Grounding as described in [General Grounding Requirements on page 15](#).
5. Control wiring and DC bus wiring leaving the cabinet must be braided, shielded cable with a coverage of 75% or better, metal conduit or equivalent attenuation.

For additional conditions, see the respective drive manual listed in [Additional Resources on page 6](#).

Notes:

Startup/Troubleshooting

This chapter provides the necessary information for the start up and troubleshooting of the PowerFlex[®] SCR Bus Supply.



ATTENTION: Power must be applied to the SCR Bus Supply and the Inverter to perform the following start-up procedure. Some of the voltages present are at incoming line potential. To avoid electric shock hazard or damage to equipment, only qualified service personnel should perform the following procedure. Thoroughly read and understand the procedure before beginning. If an event does not occur while performing this procedure, **do not proceed. Remove power** including user-supplied control voltages. User-supplied voltages may exist even when main AC power is not applied to the Bus Supply. Correct the malfunction before continuing.



ATTENTION: When operating the SCR Bus Supply, a minimum of one 7.5 kW (10 Hp) PowerFlex 700/700S Inverter must be connected to the DC bus—otherwise the internal fault detection circuit will interpret the condition as an *Output Voltage Loss* and stop pulse firing. This is indicated on the Precharge Board by the Alarm LED (7 flashes) and after 30 seconds by the Fault LED (2 flashes). See [Table 9](#) and [Table 10](#).



ATTENTION: Second source of power for cooling blower is present. To avoid an electric shock hazard or moving blades, verify the AC power supply has been removed prior to performing any maintenance or repairs.

Start-Up

Before Applying Power to the Bus Supply

- 1. Verify that the minimum of one Inverter is connected to the DC bus.
- 2. Confirm that all inputs are connected to the correct terminals and are properly torqued.
- 3. Using an ohmmeter or other continuity testing device, verify that shorts do not exist between Source 1 and Source 2:

Source 1	Source 2	Checkmark Below if No Short Exists
L1	L2	
L1	L3	
L2	L3	
L1	PE	
L2	PE	
L3	PE	
L1	DC+ Bus	
L2	DC+ Bus	
L3	DC+ Bus	
L1	DC- Bus	
L2	DC- Bus	
L3	DC- Bus	
DC+ Bus	DC- Bus	
DC+ Bus	PE	
DC Bus	PE	

- 4. Verify that AC line power at the disconnect device is within the rated value of the Bus Supply. See [Appendix A](#).
- 5. Verify that control power voltage is correct.
- 6. Verify that the enable contactor coil K1 (not used on *Slave* units) is correctly wired.
- 7. Verify that these four outputs are correctly wired:
 - Bus Supply Overtemperature
 - Rectifier Fuse Trip
 - Snubber/DC feedback Fuse Trip
 - Enable Contactor Feedback (not used on *Slave* units)

These normally closed contact outputs are used to set alarms and to stop the drive(s). Verify that they have been wired correctly according to the user's specification. See the control wiring example shown in [Figure 12 on page 22](#).
- 8. Verify that the "Line Type" jumper on the Precharge Board shown in [Figure 17](#) is set to the "3-ph" position (default).
- 9. Verify that the SPARE 1 and SPARE 2 jumpers on the Precharge Board shown in [Figure 17](#) are set to appropriate positions for the application. (See [Jumper Settings on page 22](#) and [Figure 13 on page 23](#) for more information).
- 10. Verify that the jumper between control terminals 12 and GND ([Figure 11 on page 21](#)) is present on grounded supply lines (default) or is removed on non-solid grounded supply lines. (See [Disconnecting MOVs on page 23](#) for more information).

Applying AC Power to the Bus Supply

- 1. Apply AC power and control voltage (115V AC) to the Bus Supply.
The green POWER OK LED on the Precharge Board should be on if power is applied to terminals L1 (R), L2 (S), L3 (T) and the enable contactor for the precharge board (not used on *Slave* units) is energized.
- 2. If the green POWER OK LED is off at this point, see [Table 10](#).

Precharge Board LED Indicators

The three LEDs on the Precharge Board are visible through a small slot in the SCR Bus Supply cover. The 400 A unit cover has one slot. The 600 A unit cover has two slots but only the lower slot is used to view the LEDs. Since the Precharge Board for the 1000 A unit is mounted either on the lower carrier plate (on *Single Units*) or on the upper carrier plate (on *Master Units*), the corresponding lower or upper slot is used to view the LEDs. For slot locations, see [Figure 19 on page 35](#).



ATTENTION: The SCR Bus Supply LEDs are only operational when the unit is energized. Servicing energized equipment can be hazardous. Severe injury or death can result from electrical shock, burn, or unintended actuation of the controlled equipment. Follow safety-related practices of NFPA 70E, Electrical Safety For Employee Workplaces. DO NOT work alone on energized equipment!

Figure 17 - Location of LED Indicators and Jumpers on the Precharge Board

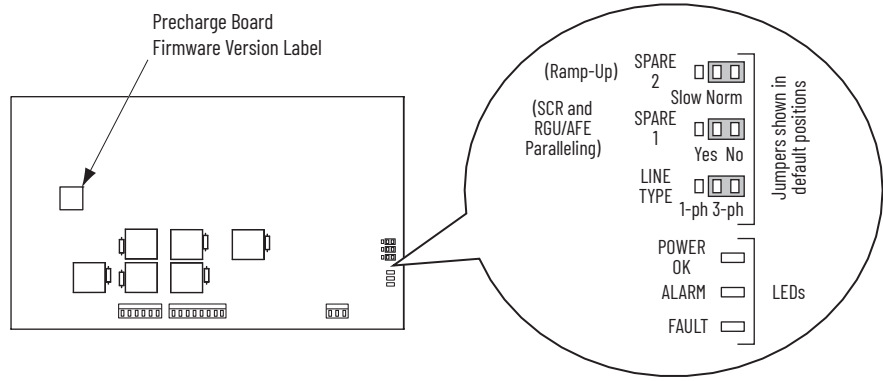


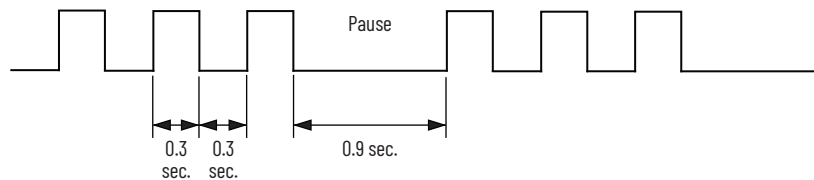
Table 9 - Precharge Board LED Indicators

Name	Color	State	Description
POWER OK	Green	Steady	Illuminates when precharge board power supply is operational.
ALARM	Yellow	Flashing	The number [n] of flashes (see flashing pattern in Figure 18) indicates one of the following alarms ⁽¹⁾ : [1] Low Line Voltage (< 90%) Low Line Voltage (< 65%) for SCR and RGU/AFE paralleling mode Very Low Line Voltage (< 50%) [2] Low Phase (One phase < 80% of line voltage), or [3] Low Phase Voltage (One phase < 56% of line voltage) for SCR and RGU/AFE paralleling mode Freq. out of range or asymmetry (Line synchronization failed) [4] Low DC Bus Voltage (triggers ride-through operation) [5] Input Frequency momentarily out of range (40...65 Hz) [6] DC Bus Short Circuit testing active (repetitive for appr. 120 s) or no inverter connected to the bus [7]
FAULT	Red	Flashing	The number [n] of flashes (see flashing pattern in Figure 18) indicates one of the following faults ⁽²⁾ : [2] DC Bus Short (Udc < 2% after 20ms) [4] Line Synchronization failed or Low Line (Uac < 50% Unom) [5] Jumper setting wrong

(1) The ALARM indicator LED will continue the flashing pattern as long as the alarm condition exists. An alarm might trigger internal actions which may stop SCR gate firing.

(2) If a fault occurs, the FAULT indicator LED will continue the flashing pattern, even if the fault condition no longer exists. Power must be cycled to clear the fault.

Figure 18 - Flashing Pattern for ALARM and FAULT LEDs



Example: Flashing pattern for ALARM LED showing a Low Phase alarm (where n = 3 flashes)

Troubleshooting

Table 10 - Possible Faults and Corrective Actions

Fault	Cause	Corrective Action
Heat sink Overtemperature	Heat sink temperature exceeds maximum rating	<ol style="list-style-type: none"> 1. Verify that maximum ambient temperature has not been exceeded. 2. Check Overtemperature Switch (N.C. contacts) at control terminals 10 and 11. 3. Check 115V AC supply input voltage at control terminals 0 and 115. 4. Check blower for correct operation. 5. Check for excess load on the bus supply. 6. Check for minimum mounting clearance around the bus supply. 7. Contact your local RA sales office.
DC Output Voltage Loss	DC bus: - Short CircuitFAULT [2] or - Low Line FAULT [4] or - No Load ALARM [7] See Table 9 .	<ol style="list-style-type: none"> 1. Check 3-phase AC incoming power for undervoltage or phase loss. 2. Check all Bus Supply fuse trip indicator switches. 3. Verify the Inverter is connected. 4. Verify the power of the connected Inverter(s) is minimum 7.5 kW (10 Hp). See the 2nd Attention statement on page 29. 5. Contact your local RA sales office.
	Loss of 115V AC power	<ol style="list-style-type: none"> 1. Check 115V AC supply input voltage at control terminals 0 and 115. 2. Check Enable Contactor function. 3. Contact your local RA sales office.
Jumper setting wrong	Wrong jumper settings: Single phase (1-ph) line type and one or both of the SPARE 1 or SPARE 2 jumpers set to their respective left positions.	<ol style="list-style-type: none"> 1. Check the jumper setting(s). 2. Set the jumper(s) correctly.

IMPORTANT Complete the tests listed in without power applied to the SCR Bus Supply.

Table 11 - Control Terminal Block Continuity Test Conditions

Test Condition	Possible Cause	Corrective Action
N.C. contact on control terminals 6 and 7 is open	400 A and 600 A Unit: Open snubber fuse (F6...F8). 1000 A Unit: Open snubber fuse or open DC bus fuse (F7...F11).	<ol style="list-style-type: none"> 1. Check for evidence of power module failure (see Step 3 in Start-Up on page 29). 2. Check for evidence of failure in snubber circuit. Check the snubber pcb diodes and snubber resistor and capacitor. 3. Replace entire SCR Bus Supply if any device has failed. 4. If there is no evidence of a failure, check for open fuse and replace.
N.C. contact on control terminals 8 and 9 is open	400 A and 600 A Unit: Open AC line fuse or open DC bus fuse (F1...F5). 1000 A Unit: Open AC line fuse (F1...F6).	<ol style="list-style-type: none"> 1. Check for evidence of power module failure (see Step 3 in Start-Up on page 29). 2. Replace entire SCR Bus Supply if any device has failed. 3. If there is no evidence of power module failure, check for open fuse and replace.
N.C. contact on control terminals 10 and 11 is open	Open heat sink Overtemperature Switch	<ol style="list-style-type: none"> 1. Verify that maximum ambient temperature is not exceeded. 2. Replace the Overtemperature Switch.

Specifications

This appendix provides electrical, environmental, functional and physical specifications for the PowerFlex[®] SCR Bus Supply, and selection tables for AC input devices.

PowerFlex SCR Bus Supply

Specifications Dependent on Power and Voltage

Category	Specification	SCR Bus Supply Catalog Number			
		20SD400...	20SD600...	20SD1K0...	20SF1K0...
Input Ratings	Nominal AC Input Voltage:	400/480V			600/690V
	Frequency:	47...63 Hz			47...63 Hz
	Operational AC Input Voltage Range:	187...528V			528...759V
	Input Current (Max. Continuous rms):	355	521	843	843
	Input kVA at Max. Continuous rms Amps:	246/295	361/433	584/700	876/1007
Output Ratings	DC Bus Amps	Normal Duty/Heavy Duty			
	Continuous:	300/240	500/400	800/720	800/720
	1 minute:	330/360	550/600	880/1080	880/1080
	3 Sec. every minute:	450/480	750/800	1200/1440	1200/1440
	Max. Continuous DC Bus Amps without Overload:	400	600	1000	1000
Power Dissipation ⁽¹⁾ – Watts at Maximum Continuous Amps:	1200	1600	2700	2800	

(1) Includes appropriate AC line reactor.



The derate for each additional slave is 5% plus 5% for the master. See [Parallel Connection of Slave Units on page 24](#).

Specifications Dependent on Voltage

AC Input Voltage	DC Bus Voltage	
	Nominal	Maximum
400V	540V	750V
480V	650V	750V
600V	810V	1080V
690V	930V	1080V

Specifications Common to All SCR Bus Supplies

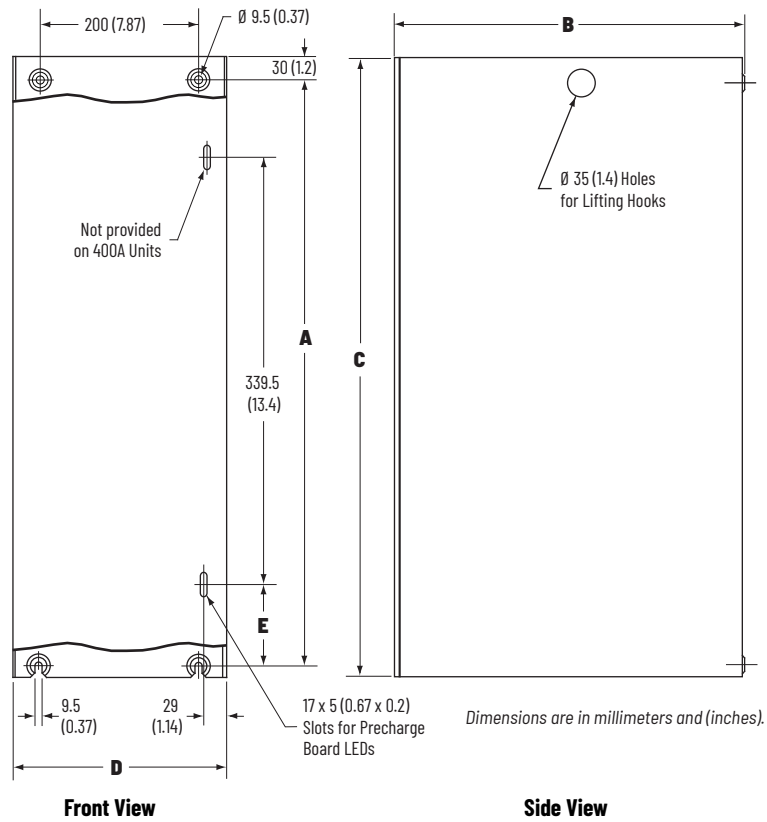
Category	Specification	
Input/Output Ratings	Voltage Tolerance:	-10% of minimum, +10% of maximum
	Frequency Tolerance:	47...63 Hz.
	Displacement Power Factor:	0.92 lagging (entire load range)
	Efficiency:	99.5% at rated amps, nominal line volts
	Line Transients:	Up to 6000 volts peak per IEEE C62.41-1991
	Max. Short Circuit Current Rating:	85 kA
	Cooling	Forced ventilation cooled by tangential blower below heat sink
	Blower Power Consumption: Cooling Air:	200VA 600 m ³ /hr.

Category	Specification	
Control Input	Enable Contactor Coil:	Single Phase 115V AC, 30VA (pick-up), 4.5VA (hold)
	Blower Current Consumption:	Single Phase 115V AC, 50/60 Hz, 1 A
Control Output	Heat Sink Temperature Sensor:	The temperature sensor trips if heat sink temperature exceeds maximum temperature.
	NC Contact Output Rating (Max.):	Resistive Rating: 15A at 125V AC, 10 A at 250V AC, 7A at 24V DC Inductive Rating: 10 A at 125V AC, 6A at 250V AC
	Fuse Trip Indication Microswitches F1...F5 (400 A and 600 A) Microswitches F1...F6 (1000 A) NC Contact Output Rating (Max.):	Resistive Rating: 10 A at 30...250V AC, 8A at 30V DC Inductive Rating: L/R = 25 ms, 10 A at 30...250V AC
	Fuse Trip Indication Microswitches F6...F8 (400 A and 600 A) Microswitches F7...F11 (1000 A) NC Contact Output Rating (Max.):	Resistive Rating: 10 A at 30...250V AC, 8A at 30V DC Inductive Rating: L/R = 25 ms, 10 A at 30...250V AC
	Enable Contactor K1, NC Contact Output Rating (Max.):	Resistive Rating: 10 A at 24...230V AC, 3A at 30V DC Inductive Rating: 2. 2A at 24...230V AC
Approvals and Standards Compliance	NFPA 70- US National Electrical Code NEMA ICS 3.1- Safety standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems. NEMA 250- Enclosures for Electrical Equipment IEC 146- International Electrical Code.	
		UL and cUL Listed to UL508C and CAN/CSA-C22.2
For current product certification information, visit rok.automation.com/certifications .		Marked for all applicable European Directives: <ul style="list-style-type: none"> EMC Directive (2014/30/EU) Emissions: EN 61800-3 Adjustable Speed electrical power drive systems Part 3 Immunity: EN 61800-3 Second Environment, Restricted Distribution Low Voltage Directive (2014/35/EU) EN 61800-5-1 Adjustable speed electrical power drive systems
Environment	Altitude:	1000 m (3300 ft.) max. without derating. Above 1000 m, the derating for the output current is 1% per 100 m (330 ft.).
	Ambient Operating Temperature without Derating - Open Type / IP00:	0...40 °C (32...104 °F); above 40 °C up to 50 °C (122 °F) maximum temperature, the output Amps must be derated by: 1.2% per °C (2.2% per °F) for 400 A unit 1.0% per °C (1.8% per °F) for 600 A unit 1.0% per °C (1.8% per °F) for 1000 A unit
	Storage Temperature (all const.):	-40...70 °C (-40...158 °F)
	Relative Humidity:	5...95% non-condensing
Environment (continued)	Shock:	15G peak for 11 ms duration (± 1.0 ms)
	Vibration:	0.152 mm (0.006 in.) displacement, 1G peak
	Atmosphere:	Important: The bus supply must not be installed in an area where the ambient atmosphere contains volatile or corrosive gas, vapors or dust. If the bus supply is not going to be installed for a period of time, it must be stored in an area where it will not be exposed to a corrosive atmosphere.
	Surrounding Environment:	The fan has a L10 rated life of 74,000 hours in a clean environment. Excessive dust and heat will degrade fan life.
Permitted Maximum Capacitance	Maximum Capacitance for Connection to the DC Bus Supply	This is the total DC Bus capacitance sum of the permitted drives to connect. See Minimum Capacitance on page 16 and Jumper Settings on page 22 .

Bus Supply Dimensions

The overall dimensions and mounting holes of the PowerFlex SCR Bus Supply are shown in [Figure 19](#). Connection Bus Bar dimensions are shown in [Figure 20](#), [Figure 21](#), and [Figure 22](#).

Figure 19 - Bus Supply Mounting Dimensions



SCR Bus Supply	Dimensions					Weight
	A	B	C	D	E	
400 A	535 (21.1)	404 (15.9)	580 (22.8)	276 (10.9)	138.5 (5.5)	30 kg (66 lb.)
600 A	740 (29.1)	490 (19.3)	785 (30.9)	276 (10.9)	104.5 (4.1)	43 kg (95 lb.)
1000 A	740 (29.1)	490 (19.3)	785 (30.9)	276 (10.9)	104.5 (4.1)	67 kg (147 lb.)

Figure 20 - 400 A Unit Bus Bar Customer Connection Point Dimensions/Locations

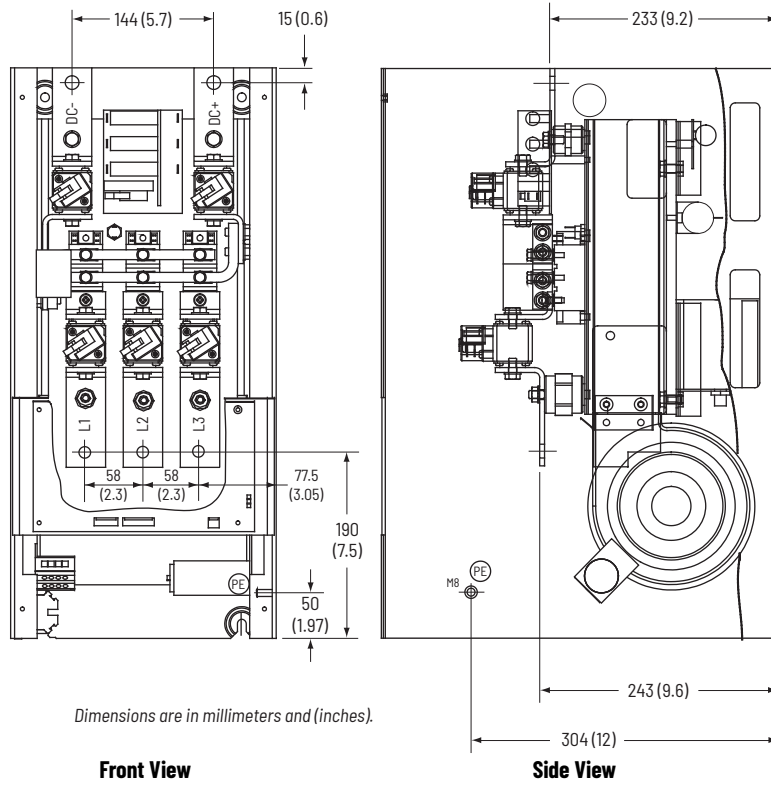


Figure 21 - 600 A Unit Bus Bar Customer Connection Point Dimensions/Locations

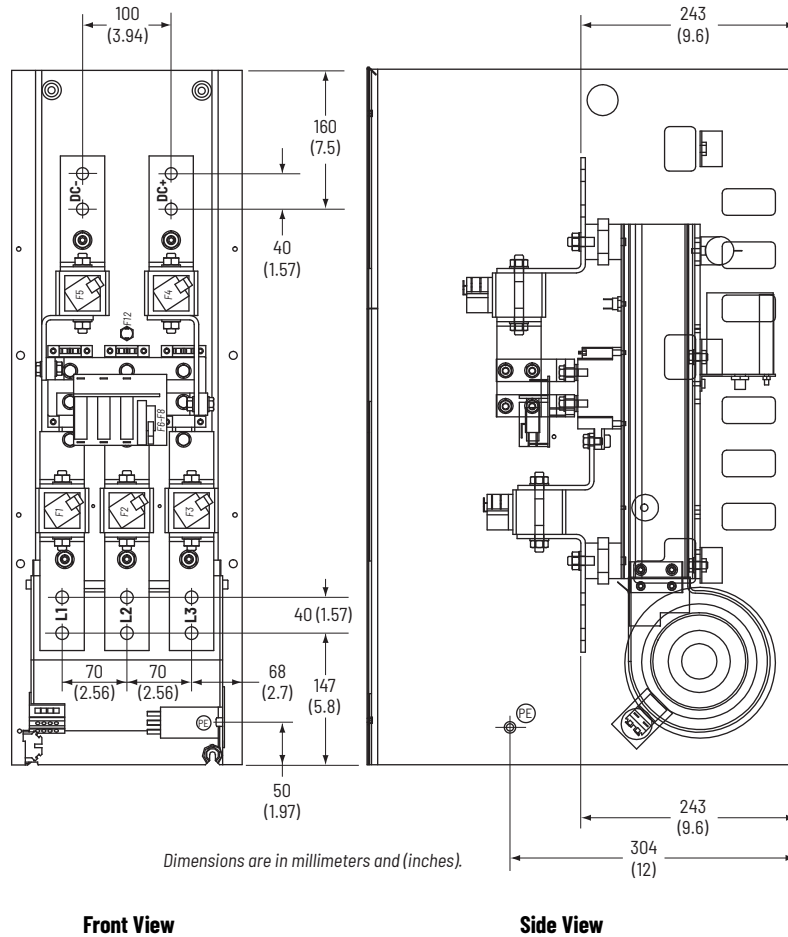
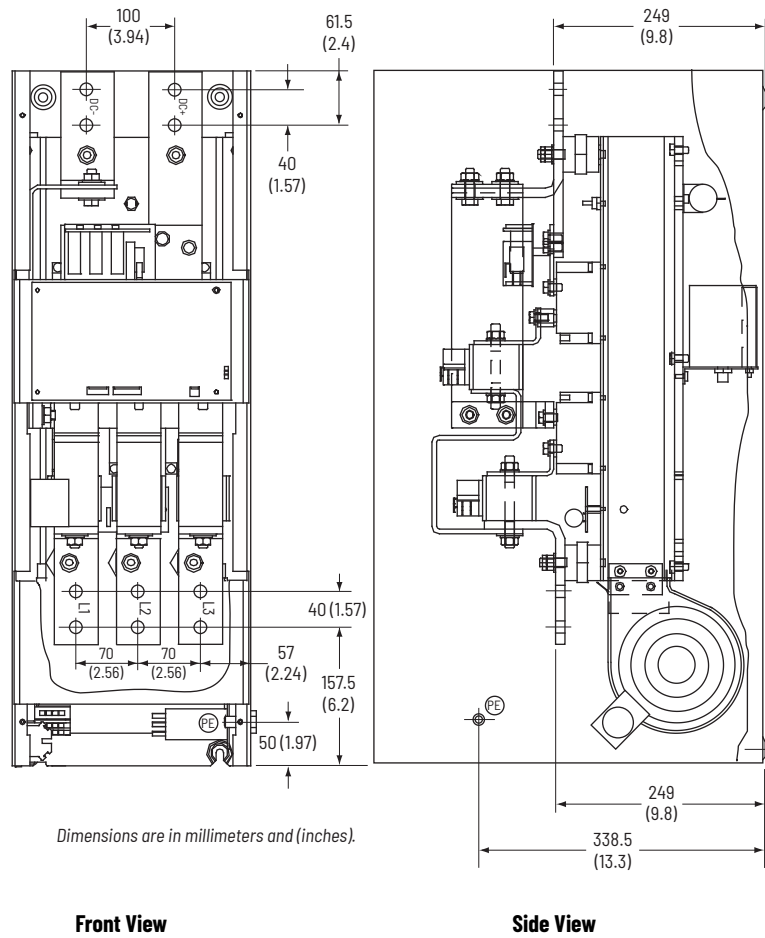


Figure 22 - 1000 A Unit Bus Bar Customer Connection Point Dimensions/Locations



Accessories

Line Reactors

A minimum reactance is required to limit peak currents in the AC line and the bridge circuit. This can be accomplished either by a matched supply transformer or by adding line reactors to ensure the requested minimum voltage drop over the total line impedance. The preferred method is to install a minimum 3% line reactor, which will also reduce line harmonics.

Use [Table 12...Table 15](#) to select a line reactor based on the sum of the drive's connected DC Amps and the supply transformer rating.

For more details on the 1321-Series line reactors, see the 1321 Power Conditioning Products Technical Data, publication [1321-TD001](#).

Table 12 - 400V, 50Hz Line Reactor Selection

Drives	Ranges of Drives DC Amp Sum for Typical Supply Transformers ⁽¹⁾							Line Reactor
Sum of DC Amps	630 kVA 5% 43 μH	800 kVA 5% 35 μH	1000 kVA 5.5% 31 μH	1250 kVA 6% 27 μH	1600 kVA 6% 22 μH	2500 kVA 6.5% 16 μH	3000 kVA 6.5% 13 μH	Catalog No. 1321-... ⁽²⁾
up to 203	120...150	120...154	120...160	120...165	120...168	120...173	120...176	3R160-C
	151...203	155...203	161...203	166...203	169...203	174...203	177...203	3R160-B
								3R160-A
204...255	—	—	—	204...206	204...209	204...219	204...224	3R200-C
	204...255	204...255	204...255	207...255	210...255	220...255	225...255	3R200-B
								3R200-A

Table 12 - 400V, 50Hz Line Reactor Selection (Continued)

256...319	—	—	—	—	—	256...260	256...275	3RB250-C
	256...319	256...319	256...319	256...319	256...319	261...319	276...319	3RB250-B
	—	—	—	—	—	—	—	3RB250-A
320...407	—	—	—	—	—	—	—	3RB320-C
	320...335	320...370	320...390	320...407	320...407	320...407	320...407	3RB320-B
	336...407	371...407	391...407	—	—	—	—	3RB320-A
408...509	—	—	—	—	—	—	—	3RB400-C
	—	408...425	408...450	408...480	408...509	408...509	408...509	3RB400-B
	408...509	426...509	451...509	481...509	—	—	—	3RB400-A
510...635	—	—	—	510...538	510...590	510...635	510...635	3R500-B
	510...540	510...580	510...635	539...635	591...635	—	—	3R500-A
636...763	—	—	—	—	636...660	636...763	636...763	3R600-B
	—	636...763	636...763	636...763	661...763	—	—	3R600-A
764...938	—	—	—	—	—	764...900	764...938	3R750-B
	—	764...800	764...870	764...900	764...938	901...938	—	3R750-A
939...1K0	—	—	—	—	—	939...1K0	939...1K0	3R850-B
	—	—	—	—	939...1K0	—	—	3R850-A

(1) The inductance value of the supply transformers includes 2.5 µH for 10 m feeder cable.
 (2) The number in the catalog string represents the fundamental AC current rating of the reactor.

Table 13 - 480V, 60Hz Line Reactor Selection

Drives	Ranges of Drives DC Amp Sum for Typical Supply Transformers ⁽¹⁾							Line Reactor
Sum of DC Amps	630 kVA 5% 51 µH	800 kVA 5% 41 µH	1000 kVA 5.5% 36 µH	1250 kVA 6% 32 µH	1600 kVA 6% 26 µH	2500 kVA 6.5% 19 µH	3000 kVA 6.5% 16 µH	Catalog No. 1321-... ⁽²⁾
up to 203	120...140	120...144	120...150	120...155	120...160	120...165	120...170	3R160-C
	141...203	145...203	151...203	156...203	161...203	166...203	171...203	3R160-B
204...255	—	—	—	—	204...209	204...214	204...218	3R200-C
	204...255	204...255	204...255	204...255	210...255	215...255	219...255	3R200-B
	—	—	—	—	—	—	—	3R200-A
256...319	—	—	—	—	—	—	256...260	3RB250-C
	256...290	256...319	256...319	256...319	256...319	256...319	261...319	3RB250-B
	291...319	—	—	—	—	—	—	3RB250-A
320...407	—	320...340	320...360	320...380	320...407	320...407	320...407	3RB320-B
	320...407	341...407	361...407	381...407	—	—	—	3RB320-A
408...509	—	—	408...420	408...450	408...490	408...509	408...509	3RB400-B
	408...440	408...509	421...509	451...509	491...509	—	—	3RB400-A
510...635	—	—	—	—	510...540	510...620	510...635	3R500-B
	510...560	510...585	510...600	510...635	541...635	621...635	—	3R500-A
636...763	—	—	—	—	—	636...700	636...763	3R600-B
	—	636...680	636...763	636...763	636...763	701...763	—	3R600-A
764...938	—	—	—	—	—	764...840	764...938	3R750-B
	—	—	—	764...938	764...938	841...938	—	3R750-A
939...1K0	—	—	—	—	—	939...1K0	939...1K0	3R850-B
	—	—	—	—	939...1K0	—	—	3R850-A

(1) The inductance value of the supply transformers includes 2.5 µH for 10 m feeder cable.
 (2) The number in the catalog string represents the fundamental AC current rating of the reactor.

Table 14 - 600V, 60Hz Line Reactor Selection

Drives	Ranges of Drives DC Amp Sum for Typical Supply Transformers ⁽¹⁾							Line Reactor
	630 kVA 5% 78 µH	800 kVA 5% 62 µH	1000 kVA 5.5% 55 µH	1250 kVA 6% 48 µH	1600 kVA 6% 38 µH	2500 kVA 6.5% 27 µH	3000 kVA 6.5% 21 µH	
Sum of DC Amps								Catalog No. 1321-... ⁽²⁾
up to 203	120...155	120...164	120...175	130...180	130...190	130...199	140...203	3R160-C
	156...203	165...203	176...203	181...203	191...203	200...203	—	3R160-B
								3R160-A
204...255	—	—	204...209	204...230	204...230	204...255	204...255	3R200-C
	204...255	204...255	210...255	231...255	231...255	—	—	3R200-B
								3R200-A
256...319	—	—	—	—	256...270	256...295	256...319	3RB250-C
	256...280	256...319	256...319	256...319	271...319	296...319	—	3RB250-B
	281...319	—	—	—	—	—	—	3RB250-A
320...407	—	320...340	320...360	320...390	320...407	320...407	320...407	3RB320-B
	320...407	341...407	361...407	391...407	—	—	—	3RB320-A
408...509	—	—	—	—	—	—	408...425	3RB400-C
	—	—	—	408...440	408...509	408...509	426...509	3RB400-B
	408...450	408...509	408...509	441...509	—	—	—	3RB400-A
510...635	—	—	—	—	510...545	510...635	510...635	3R500-B
	—	510...560	510...600	510...635	546...635	—	—	3R500-A
636...763	—	—	—	—	—	636...740	636...763	3R600-B
	—	—	—	636...750	636...763	741...763	—	3R600-A
764...938	—	—	—	—	—	764...840	764...938	3R750-B
	—	—	—	—	764...938	841...938	—	3R750-A
939...1K0	—	—	—	—	—	939...1K0	939...1K0	3R850-B
	—	—	—	—	939...1K0	—	—	3R850-A

(1) The inductance value of the supply transformer includes 2.5 µH for 10 m feeder cable.

(2) The number in the catalog string represents the fundamental AC current rating of the reactor.

Table 15 - 690V, 50Hz Line Reactor Selection

Drives	Ranges of Drives DC Amp Sum for Typical Supply Transformers ⁽¹⁾							Line Reactor
	630 kVA 5% 123 µH	800 kVA 5% 95 µH	1000 kVA 5.5% 86 µH	1250 kVA 6% 75 µH	1600 kVA 6% 59 µH	2500 kVA 6.5% 42 µH	3000 kVA 6.5% 33 µH	
Sum of DC Amps								Catalog No. 1321-... ⁽²⁾
up to 203	—	130...150	130...157	130...162	130...170	140...180	150...185	3R160-B ⁽³⁾
	130...175	151...190	158...203	163...203	171...203	181...203	186...203	3R160-C
	176...203	191...203	—	—	—	—	—	3R160-B
								3R160-A
204...255	—	—	—	—	—	204...210	204...220	3R200-B ⁽³⁾
	204...206	204...230	204...245	204...255	204...255	211...255	221...255	3R200-C
	207...255	231...255	246...255	—	—	—	—	3R200-B
								3R200-A
256...319	—	—	—	—	—	—	256...260	3RB250-B ⁽³⁾
	—	256...260	256...270	256...290	256...319	256...319	261...319	3RB250-C
	256...280	261...319	271...319	291...319	—	—	—	3RB250-B
	281...319	—	—	—	—	—	—	3RB250-A
320...407	—	—	—	—	320...360	320...407	320...407	3RB320-C
	—	320...360	320...380	320...407	361...407	—	—	3RB320-B
	320...407	361...407	381...407	—	—	—	—	3RB320-A
408...509	—	—	—	—	—	408...465	408...509	3RB400-C
	—	—	408...414	408...450	408...509	466...509	—	3RB400-B
	—	408...500	415...509	451...509	—	—	—	3RB400-A

Table 15 - 690V, 50Hz Line Reactor Selection (Continued)

510...635	—	—	—	—	—	510...520	510...580	3R500-C
	—	—	—	510...538	510...570	521...635	581...635	3R500-B
	—	—	510...540	539...635	571...635	—	—	3R500-A
636...763	—	—	—	—	—	—	636...650	3R600-C
	—	—	—	—	—	636...763	651...763	3R600-B
	—	—	—	—	661...763	—	—	3R600-A
764...938	—	—	—	—	—	—	764...780	3R750-C
	—	—	—	—	—	764...850	781...938	3R750-B
	—	—	—	—	—	851...938	—	3R750-A
939...1K0	—	—	—	—	—	—	—	3R850-C
	—	—	—	—	—	939...1K0	939...1K0	3R850-B
	—	—	—	—	—	—	—	3R850-A

- (1) The inductance value of the supply transformers includes 2.5 µH for 10 m feeder cable.
- (2) The number in the catalog string represents the fundamental AC current of the reactor.
- (3) Connect two reactors in series.

HF Filter

It is recommended to install one HF filter (Catalog No. 20S-RFC) in every system. When this filter is used, the HF emission limits for class A, group 2* (EN 55011) in the 2nd environment (industrial supply network) according to the product standard EN 61800-3 are met and the Bus Supply fulfills CE conformity.

The HF filter is connected in front of the AC line reactor between the three AC line input phases and the protection earth conductor PE (Figure 23).

Figure 23 - HF Filter Wiring Diagram

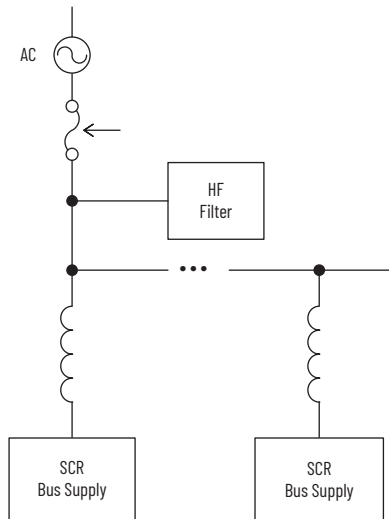
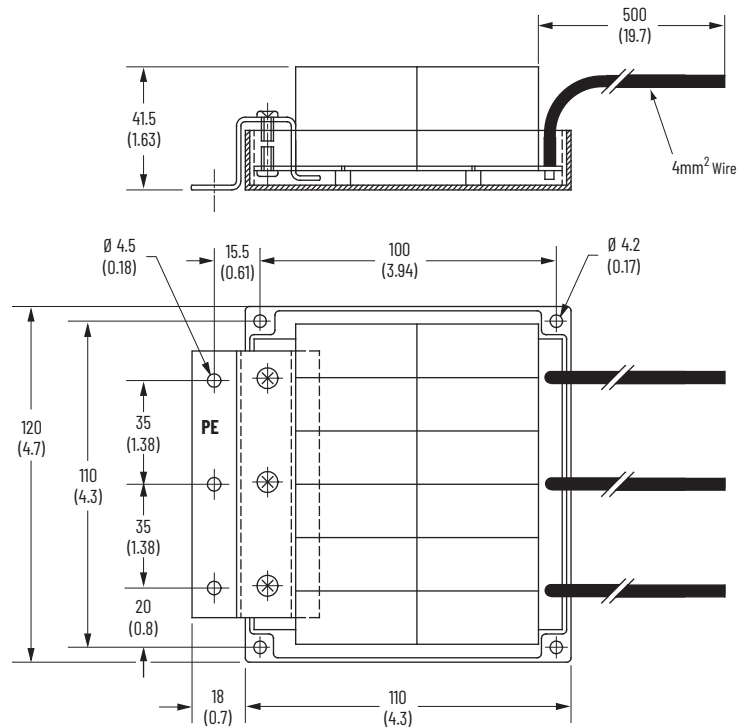


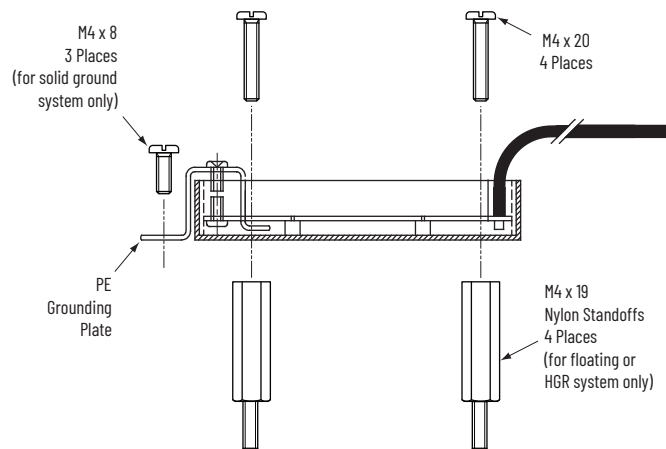
Figure 24 - 20S-RFC Filter Dimensions



Solid Ground Systems

Using the hole location dimensions from [Figure 24](#), install the HF filter using the four (4) M4 x 20 screws through the four holes in the plastic body of the HF filter ([Figure 25](#)). Then install the three (3) M4 x 8 screws through the PE grounding plate. Do NOT use the nylon standoffs.

Figure 25 - Mounting the HF Filter



Non-Solid Ground Systems

The HF filter may be installed with floating or HRG ground systems for line-to-line transient protection. In this type of installation, the PE grounding plate should NOT be connected to ground, but remain isolated from ground.

IMPORTANT

The HF filter PE grounding plate will be floating with potential high voltage with respect to earth ground when AC line power is applied.

Using the hole location dimensions from [Figure 24](#), install the HF filter using the four (4) M4 x 19 nylon standoffs and four (4) M4 x 20 screws through the four holes in the plastic body of the HF filter ([Figure 25](#)). Finger tighten the nylon standoffs. Do NOT install the three (3) M4 x 8 screws through the PE grounding plate.

Install the High Voltage Warning label onto the PE grounding plate when the HF filter is installed with a floating or HRG ground system.

Spare Parts

400 A SCR Bus Supply

IMPORTANT SCR Bus Supplies are NOT designed to be field repaired, but can be field maintained.

Figure 26 - 400 A Unit Spare Part Locations

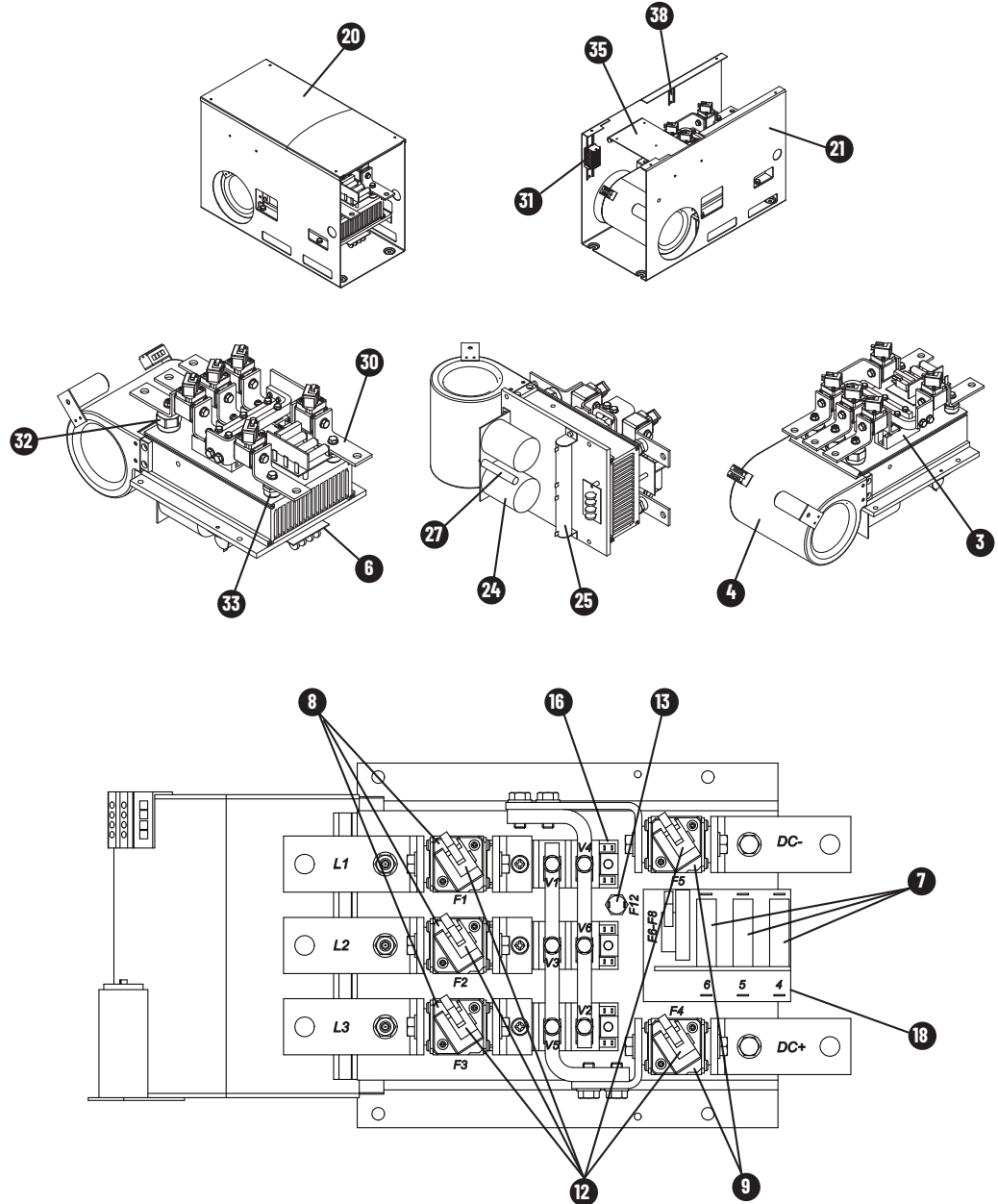


Table 16 - 400 A Unit Spare Part Numbers/Descriptions

Item	Availability ⁽¹⁾	Description	Rockwell Catalog No.	Qty.
3	—	400 A SCR Set	SK-20S-MCC162-18101	3
4	Yes	Fan Assembly ⁽²⁾	SK-D9-FAN2	1
6	—	400 A and 600 A MOV Assembly	SK-20S-VBKSDK041	1
7	Yes	40 A Fuse (Precharge fuses F6...F8) ⁽³⁾	SK-20S-F070B040S or Westcode Type F070B040S or Ferraz Shawmut Type 6.921CPgRC14.51 40	3
8	Yes	400 A, 700V Fuse (AC fuses F1...F3) Torque to 13 N•m (115 lb•in).	SK-20S-069UROS0400B or Westcode Type 069UROS0400B or Ferraz Shawmut Type 6.9URD30TTF0400	3
9	Yes	450 A, 700V Fuse (DC fuses F4 and F5) Torque to 13 N•m (115 lb•in).	SK-20S-069UROS0450B or Westcode Type 069UROS0450B or Ferraz Shawmut Type 6.9URD30TTF0450	2
12	Yes	Fuse Monitoring Switch	SK-20S-MS3V1-5	5
13	—	85 °C Thermostat	SK-20S-SWT85KSDKRW	1
16	—	400 A SCR Wire Harness	SK-20S-ZY041-400	1
18	Yes	400 and 600 A Snubber Circuit Board	SK-20S-PR-GR3	1
20	—	400 A Cover	SK-20S-RW9582300-B	1
21	—	400 A Enclosure	SK-20S-RW-U-SCR400	1
24	—	10 µF, 1200V Capacitor	SK-20S-E62K85103D1W	2
25	—	5.6K Ohm, 90 W Resistor	SK-20S-RW35FST5K6K	2
27	—	4.7 Ohm, 45 W Resistor	SK-20S-RW33FST4R7K	1
30	—	400 A Bus Bar Set	SK-20S-BBKSDK041	1
31	—	Terminal Block Assembly	SK-20S-TBKSDKRW	1
32	—	40 mm tall x 40 mm O.D. Insulator with M10 Thread	SK-20S-IN551520	3
33	—	30 mm tall x 26 mm O.D. Insulator with M8 Thread	SK-20S-IN551450	2
35	Yes	480V SCR Precharge Circuit Board ⁽⁴⁾	SK-D9-SCRPRE1-D	1
38	Yes	Precharge Relay	SK-20S-CA2KN31F7	1

(1) **Important:** SCR Bus Supplies are designed to be field maintained only. Normal maintenance components (fan, fuses, fuse monitor switch, printed circuit boards (precharge, gate, and snubber), and precharge relay are available. Additional catalog numbers are provided for troubleshooting and technical support information only.

(2) Extensive disassembly is required to replace the fan assembly. Please consider using Rockwell Automation Remanufacturing Services.

(3) When replacing these fuses, always properly position them so that their fuse trip indicators (plungers) point toward the fuse trip detection board.

(4) This is an ESD sensitive component.

600 A SCR Bus Supply

IMPORTANT SCR Bus Supplies are NOT designed to be field repaired, but can be field maintained.

Figure 27 - 600 A Unit Spare Part Locations

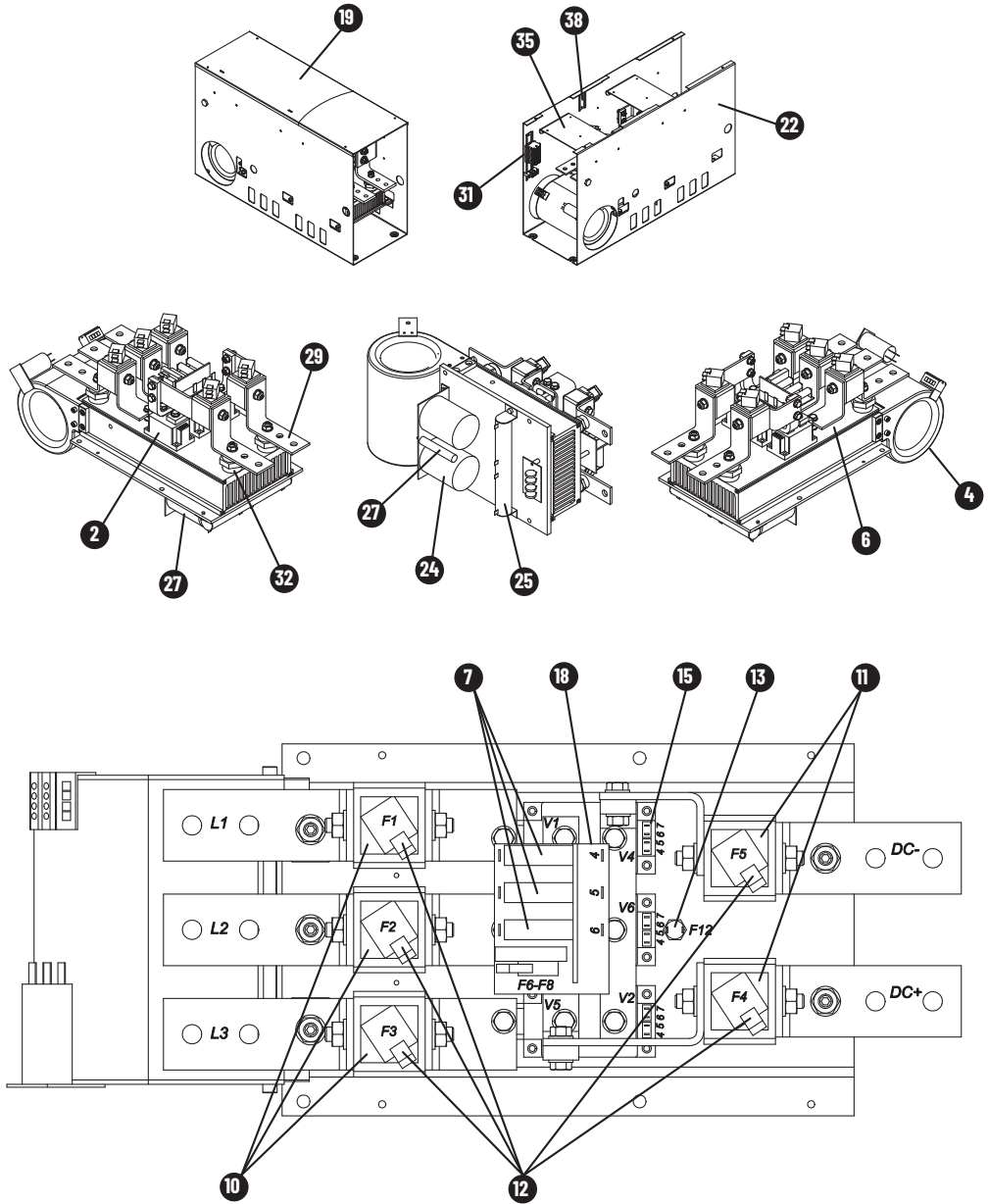


Table 17 - 600 A Unit Spare Part Numbers/Descriptions

Item	Availability ⁽¹⁾	Description	Rockwell Catalog No.	Qty.
2	—	600 A SCR Set	SK-20S-MCC312-18101	3
4	Yes	Fan Assembly ⁽²⁾	SK-D9-FAN2	1
6	—	400 A and 600 A MOV Assembly	SK-20S-VBKSDK041	1
7	Yes	40 A Fuse (Precharge fuses F6...F8) ⁽³⁾	SK-20S-F070B040S or Westcode Type F070B040S or Ferraz Shawmut Type 6.921CPgRC14.51 40	3

Table 17 - 600 A Unit Spare Part Numbers/Descriptions (Continued)

Item	Availability ⁽¹⁾	Description	Rockwell Catalog No.	Qty.
10	Yes	630 A, 700V Fuse (AC fuses F1...F3) Torque to 25 N•m (221 lb•in).	SK-20S-069UR5S0630B or Westcode Type 069UR2S0630B or Ferraz Shawmut Type 6.9URD32TTF0630	3
11	Yes	1000 A, 700V Fuse (DC fuses F4 and F5) Torque to 25 N•m (221 lb•in).	SK-20S-069UR2S1000B or Westcode Type 069UR2S1000B or Ferraz Shawmut Type 6.9URD32TTF1000	2
12	Yes	Fuse Monitoring Switch	SK-20S-MS3V1-5	5
13	—	85 °C Thermostat	SK-20S-SWT85KSDKRW	1
15	—	600 A SCR Wire Harness	SK-20S-ZY065-600	1
18	Yes	400 and 600 A Snubber Circuit Board	SK-20S-PR-GR3	1
19	—	600 A and 1000 A Cover	SK-20S-RW9582300-A	1
22	—	600 A and 1000 A Enclosure	SK-20S-RWU600-1000	1
24	—	10 µF, 1200V Capacitor	SK-20S-E62K85103D1W	2
25	—	5.6K Ohm, 90 W Resistor	SK-20S-RW35FST5K6K	2
27	—	4.7 Ohm, 45 W Resistor	SK-20S-RW33FST4R7K	1
29	—	600 A Bus Bar Set	SK-20S-BBKSDK065	1
31	—	Terminal Block Assembly	SK-20S-TBKSDKRW	1
32	—	40 mm tall x 40 mm O.D. Insulator with M10 Thread	SK-20S-IN551520	5
35	Yes	480V SCR Precharge Circuit Board ⁽⁴⁾	SK-D9-SCRPRE1-D	1
38	Yes	Precharge Relay	SK-20S-CA2KN31F7	1

(1) **Important:** SCR Bus Supplies are designed to be field maintained only. Normal maintenance components (fan, fuses, fuse monitor switch, printed circuit boards (precharge, gate, and snubber), and precharge relay are available. Additional catalog numbers are provided for troubleshooting and technical support information only.

(2) Extensive disassembly is required to replace the fan assembly. Please consider using Rockwell Automation Remanufacturing Services.

(3) When replacing these fuses, always properly position them so that their fuse trip indicators (plungers) point toward the fuse trip detection board.

(4) This is an ESD sensitive component.

1000 A SCR Bus Supply

IMPORTANT SCR Bus Supplies are NOT designed to be field repaired, but can be field maintained.

Figure 28 - 1000 A Unit Spare Part Locations

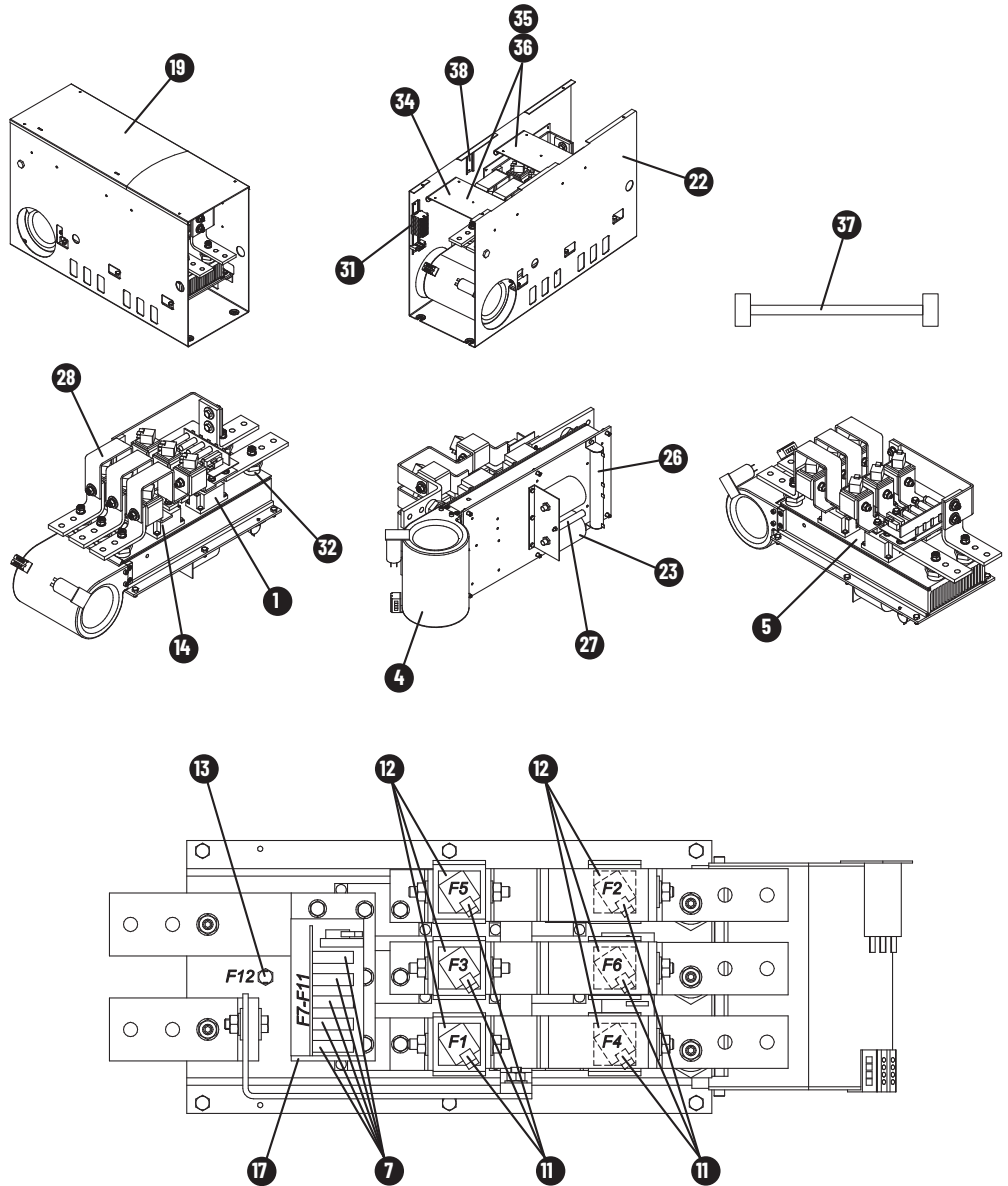


Table 18 - 1000 A Unit Spare Part Numbers/Descriptions

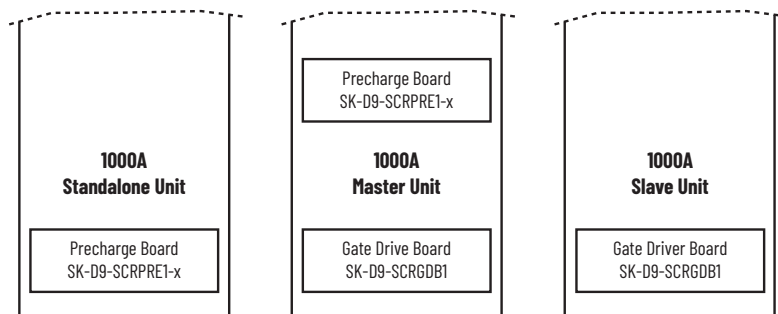
Item	Availability ⁽¹⁾	Description	Rockwell Catalog No.	Qty.
1	—	1000 A SCR Set	SK-20S-MC0600-22I01	6
4	Yes	Fan Assembly ⁽²⁾	SK-D9-FAN2	1
5	—	1000 A MOV Assembly	SK-20S-VBKSDK110	1
7	Yes	40 A Fuse (Precharge fuses F7...F1) ⁽³⁾	SK-20S-F070B040S or Westcode Type F070B040S or Ferraz Shawmut Type 6.921CPgRC14.51 40	5
11	Yes	1000 A, 700V Fuse (AC fuses F1...F6) Torque to 25 N•m (221 lb•in).	SK-20S-069UR2S1000B or Westcode Type 069UR2S1000B or Ferraz Shawmut Type 6.9URD32TF1000	6
12	Yes	Fuse Monitoring Switch	SK-20S-MS3V1-5	6

Table 18 - 1000 A Unit Spare Part Numbers/Descriptions (Continued)

Item	Availability ⁽¹⁾	Description	Rockwell Catalog No.	Qty.
13	—	85 °C Thermostat	SK-20S-SWT85KSDKRW	1
14	—	1000 A SCR Wire Harness	SK-20S-ZY110-1000	1
17	Yes	1000 A Snubber Circuit Board	SK-20S-PR-GR3-5	1
19	—	600 A and 1000 A Cover	SK-20S-RW9582300-A	1
22	—	600 A and 1000 A Enclosure	SK-20S-RWU600-1000	1
23	—	15 µF, 1000V Capacitor	SK-20S-E62K85153D1W	2
26	—	4.7K Ohm, 130 W Resistor	SK-20S-RW36FST4K7K	2
27	—	4.7 Ohm, 45 W Resistor	SK-20S-RW33FST4R7K	1
28	—	1000 A Bus Bar Set	SK-20S-BBKSDK110	1
31	—	Terminal Block Assembly	SK-20S-TBKSDKRW	1
32	—	40 mm tall x 40 mm O.D. Insulator with M10 Thread	SK-20S-IN551520	5
34	Yes	Gate Driver Circuit Board ⁽⁴⁾⁽⁵⁾	SK-D9-SCRGDB1	1
35	Yes	480V SCR Precharge Circuit Board ⁽⁴⁾⁽⁶⁾	SK-D9-SCRPRE1-D	1
36	Yes	690V SCR Precharge Circuit Board ⁽⁴⁾⁽⁶⁾	SK-D9-SCRPRE1-F	1
37	Yes	Master/Slave or Slave/Slave Wire Harness ⁽⁷⁾	SK-20S-D9-CBL1-DF	1
38	Yes	Precharge Relay	SK-20S-CA2KN31F7	1

- (1) **Important:** SCR Bus Supplies are designed to be field maintained only. Normal maintenance components (fan, fuses, fuse monitor switch, printed circuit boards (precharge, gate, and snubber), and precharge relay are available. Additional catalog numbers are provided for troubleshooting and technical support information only.
- (2) Extensive disassembly is required to replace the fan assembly. Please consider using Rockwell Automation Remanufacturing Services.
- (3) When replacing these fuses, always properly position them so that their fuse trip indicators (plungers) point toward the fuse trip detection board.
- (4) This is an ESD sensitive component.
- (5) Not required for 1000 amps Standalone unit, but required for 1000 amps Master unit or 1000 amps Slave unit (both mounted in lower location).
- (6) Not required for 1000 amps Slave unit, but required for 1000 amps Standalone unit (mounted in lower location) or 1000 amps Master unit (mounted in upper location).
- (7) Not required for a 1000 amps Standalone unit, but required to connect an existing 1000 amps Master or Slave unit to another 1000 amps Slave unit (gate driver circuit board mounted in lower location).

Figure 29 - 1000 A Unit Printed Circuit Board Locations (top view)



Notes:

History of Changes

This appendix contains the new or updated information for each revision of this publication. These lists include substantive updates only and are not intended to reflect all changes.

20S-UM001H-EN-P, October 2023

Change

In Appendix A removed 1321 line reactor specifications and replaced with a link to the 1321 Power Conditioning Products Technical Data, publication [1321-TD001](#).

20S-UM001G-EN-P, March 2012

Change

In Chapter 1 in the "1000 A SCR Bus Supply Flexibility" section:

- Added information and a table at the beginning to show which conversions are possible and which are not possible.
- In the "Converting Master Unit to Slave Unit" subsection, added new steps 3 and 4.
- Deleted subsection "Converting Slave Unit to Master Unit" subsection.

In Appendix A in the "Accessories" section:

- Changed Table A.A cat. numbers for rows 256...509, and added new row for 939...1K0.
- Changed Table A.B cat. numbers for rows 256...509, and added new row for 939...1K0.
- Changed Table A.C cat. numbers for rows 256...509, and added new row for 939...1K0.
- Changed Table A.D cat. numbers for rows 256...509, and added new row for 939...1K0.

In Appendix A in the "HF Filter" section:

- Added new HF Filter Wiring Diagram Figure A.5.
- Added new subsection "Solid Ground Systems."
- Added new subsection "Non-Solid Ground Systems."

In Appendix A in the "Spare Parts" section:

- Added Important statement above Figure A.8.
- Added new "Availability" column to Table A.E
- Added Important statement above Figure A.9.
- Added new "Availability" column to Table A.F
- Added Important statement above Figure A.10.
- Added new "Availability" column and new footnote 1 to Table A.G
- Added new Figure A.11 to show locations of precharge and gate drive boards for 1000 A unit.

In Appendix A, revised Input Ratings "Operational AC Input Voltage Range" for catalog number 20SF1K0... from "269...759V" to "528...759V."

Added new Appendix B.

20S-UM001F-EN-P, March 2011

Change

Reformatted document from half size (5.5 x 8.5 in.) to full size (8.5 x 11 in.).

Removed reactors by DC Bus outputs on 12-Pulse System Configuration drawing.

Added Atmosphere specification to the Environmental section.

Added Surrounding Environment specification to the Environment section.

Revised 400 A, 600 A, and 1000 A Bus Supply spare part drawings and related tables.

Added index to User Manual.

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Publication 20S-UM001I-EN-P - February 2024

Supersedes Publication 20S-UM001H-EN-P - October 2023

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