Model 6

Motor Control Centers

Instruction Bulletin

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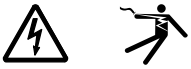
Safety Information

Read these instructions carefully and examine the equipment to become familiar with the device before attempting to install, operate, service, or maintain it. The following special messages may appear throughout this user guide or on the equipment to warn of hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

NOTE: Provides additional information to clarify or simplify a procedure.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

Electrical equipment should be transported, stored, installed, and operated only in the environment for which it is designed.

About the Model 6 Motor Control Center

Motor control centers (MCCs) provide the most suitable method for grouping electrical motor control and other related devices in a compact, economical, and free-standing installation. A motor control center is made of standardized vertical sections consisting of totally enclosed, dead front, free-standing structures bolted together. These sections support and house control units, a common bus bar for distributing power to the control units, and a network of wireways and conductor entrance areas to accommodate outgoing load and control wires.

The control units consist of components such as combination motor starters, branch feeder devices, and lighting panelboards. Each is mounted in an individual, isolated compartment having its own cover. When front-of-board unit arrangement is selected, all units are mounted on the front side of the MCC. A 15 in. (381 mm) or 20 in. (508 mm) deep section is provided for front-of-board mounting. The standard MCC width is 20 in. (508 mm) with a 4 in. (102 mm) wide vertical wireway.

An optional 25 in. (635 mm) wide section with a 9 in. (229 mm) wide wireway is also available. Larger sections are available for mounting larger equipment. When a back-to-back arrangement is selected, the units are mounted on both the front and rear of 31 in. (787 mm) or 41 in. (1041 mm) deep structures. There is approximately 1 in. (25 mm) of space between back-to-back sections. The standard height of all MCC structures is 91.5 in. (2324 mm) without the three in. (76.2 mm) lifting angle.

> **NOTE:** Model 6 MCCs may be equipped with top-located pull boxes that can add up to 18 in. of height to the section. MCCs with the ArcBlok™ 1200 Top Entry options have an 18 in. pull box as standard.

Model 6 MCCs are available with an arc-rated option that provides an arc containment rating tested per ANSI C37.20.7-2007 guidelines. Additional reinforcement and pressure relief features are added to the Model 6 MCC to meet the arc containment rating. Refer to ANSI C37.20.7-2007 for the specific test requirements to which the arc-rated Model 6 MCC has been subjected.

The arc-rated Model 6 MCC can provide enhanced arc containment in case of an arcing fault inside the MCC. This is a valuable feature along with other arc flash enhancements available with Model 6 MCCs. Contact your local Schneider Electric™ representative for more information on Model 6 MCC arc flash options.

A Model 6 MCC with the arc-rated option includes a label (see Model 6 MCC 100 ms Arc-Rated Option Label and Typical Location on Enclosure, page 9) that states the performance and requirements necessary to maintain the rating. The arc containment rating is applicable to the front, sides, and rear of the MCC (defined as Type 2 in ANSI C37.20.7-2007).

This instruction bulletin contains specific instructions on maintaining, modifying, and expanding an arc-rated Model 6 MCC. These instructions must be followed to maintain the arc containment rating of the MCC. To achieve the labeled arc containment rating, the additional 100 Millisecond, Arc-rated MCC, Upstream Over-current Protection Device (OCPD) Requirements, page 11 must be met.

> **NOTE:** Application of the arc-rated option in Model 6 MCCs meeting the requirements of ANSI C37.20.7-2007 does not eliminate the requirements for use of personal protection equipment (PPE).

Figure 1 - Model 6 MCC 100 ms Arc-Rated Option Label and Typical Location on Enclosure

Arc Rating Information

This Motor Control Center has been tested and meets the requirements of ANSI C37.20.7-2007 to the following level:

- Type 2 accessibility
- Protection from an internal arcing event is DEVICE LIMITED
- The maximum clearing time for the protective device shall be 50 milliseconds
- Maximum short circuit current is 65,000 amperes RMS symmetrical
- Arc duration of 100 milliseconds

Attention

The above ratings apply when all the following conditions are met:

- All factory-supplied installation, operational and maintenance instructions are followed
- Equipment shall be electrically coordinated and protected by a circuit breaker or fuses as described in document 80459-641-01
- All units mounted in the Motor Control Center are labeled as “Arc Rated Unit”
- If spliced to another section, it must be a Model 6 Motor Control Center that has been certified to meet the requirements of ANSI C37.20.7-2007
- All doors are closed and all provided hardware is engaged
- All exterior covers and panels are secured using all the hardware provided
- All internal barriers are installed and secured using all the hardware provided
- Voltage does not exceed the rating indicated on the nameplate
- No modifications have been made to the factory-supplied power circuit or unit/section structural components
- For any damage to this equipment, please contact Schneider Electric Services to arrange for repair of the equipment

For further information, refer to instruction bulletin 80459-641-01.

= Arc-rated Label
= MCC Section Nameplate

100 Millisecond, Arc-rated MCC, Upstream Over-current Protection Device (OCPD) Requirements

The OCPD external to and upstream of the MCC must meet the following criteria:

- The current rating of the upstream OCPD must be equal to or less than the main device and main bus rating of the MCC.
- The voltage rating of the upstream OCPD must be equal to or greater than the voltage rating of the MCC. The maximum voltage is 600 V.
- The interrupting rating of the upstream OCPD must be equal to or greater than the available short-circuit current. The maximum available short-circuit current is 65,000 A.
- The instantaneous trip setting (if available) of the upstream OCPD must NOT be turned off and must be set to trip at or below 35,000 A.
- The short-time delay trip setting (if available) of the upstream OCPD MUST be set to the **OFF** position; no intentional delay is allowed.
- Approved circuit breakers that can be used as the upstream OCPD:
  - 15–125 A, PowerPacT™ B-frame circuit breakers manufactured by Schneider Electric
  - 15–150 A, PowerPacT H-frame circuit breakers manufactured by Schneider Electric
  - 175–250 A, PowerPacT J-frame circuit breakers manufactured by Schneider Electric
  - 300–600 A, PowerPacT L-frame circuit breakers equipped with MicroLogic™ trip units, manufactured by Schneider Electric
  - 700–1200 A, PowerPacT PJ- or PL-frame circuit breakers equipped with MicroLogic trip units, manufactured by Schneider Electric
  - 1200–2500 A, PowerPacT R-frame circuit breakers equipped with MicroLogic trip units, manufactured by Schneider Electric
  - 800–1200 A, MasterPacT™ NT and MTZ1 circuit breakers equipped with MicroLogic trip units, manufactured by Schneider Electric
  - 1600–2500 A, MasterPacT NW and MTZ2 circuit breakers equipped with MicroLogic trip units, manufactured by Schneider Electric
- Approved fuses that can be used as the upstream OCPD:
  - 15–600 A, UL® Listed, Class RK1 from any manufacturer
  - 15–600 A, UL Listed, Class RK5 from any manufacturer
  - 15–600 A, UL Listed, Class J from any manufacturer
  - 700–2500 A, UL Listed, Class L from any manufacturer

Schneider Electric Literature Lists

The following Schneider Electric publications may be useful in the maintenance and regular operation of your Model 6 MCC. Your local Schneider Electric representative can provide them upon your request or you can download these documents at www.schneider-electric.us/en/download.

Table 1 - MCC-related Literature

Title	Publication No.
Schneider Electric Digest	0100CT2401 (EN)
Motor Control Centers (Model 6 Catalog, Class 8998)	8998CT9701 (EN)
Model 6 Arc-Rated Motor Control Centers	80459–654–01 (EN, ES, FR)
Closed Door Racking (CDR) Unit for Square D™ Model 6 Low Voltage Motor Control Centers (LVMCCs)	80459-655-01 (EN, ES, FR)
1600 A Splice Instructions	80459-656-01 (EN, ES, FR)
Location Restrictions for Installing a Three-Inch-High Unit into a Model 6 Motor Control Center (MCC) Instructions	80445-750-01 (EN, ES, FR)
Installing a Pull Box Kit into the Square D Model 6 Arc Rated (AR) Motor Control Center (MCC)	80466-258-01 (EN, ES, FR)
Altistart™ 48 Soft Start Units in Motor Control Centers	80438-069-02 (EN, ES, FR)
Altistart 48 Y-Range Soft Start Controllers Installation Guide	S1A37491 (EN); S1A37491 (ES); S1A37491 (FR)
ATS48 User's Manual	1494409 (EN, ES, FR)
Altistart 48 Soft Starts Maintenance and Repair Guide	30072-451-28 (EN)
Altivar™ Soft Starter ATS480 User Manual	NNZ85515 (EN); NNZ85515 (ES); NNZ85515 (FR)
Altistart 22 Soft Starters in Motor Control Centers	80459-652-01 (EN)
ATS22 User Manual	BBV51330 (EN); BBV51330 (ES); BBV51330 (FR)
ATS22–Quick Start Guide	S1A10388 (EN); S1A10388 (ES); S1A10388 (FR)
PowerPacT B-Frame 15 to 125 A Circuit Breakers Catalog	0611CT1603 (EN)
PowerPacT B-Frame Circuit Breakers and Automatic Switches–User Guide	DOCA0095EN (EN); DOCA0095ES (ES); DOCA0095FR (FR)
LC and LI Circuit Breakers	48040-732-04 (EN, ES, FR)
LA, LAMC, LH, LHMC, SLA and Q4 Circuit Breakers	48049-034-04 (EN, ES, FR)
Motor Circuit Protector (MCP) Settings for PowerPacT H- and J-Frame Motor Circuit Protectors	48940-260-01 (EN, ES, FR)
PowerPacT H- and J-Frame ET Circuit Breakers User Guide	48940-313-01 (EN)
PowerPacT H-, J- and L-Frame Circuit Breaker Catalog	0611CT1001 (EN)

Table 1 - MCC-related Literature (Continued)

Title	Publication No.
PowerPacT H- and J-Frame Circuit Breaker and Switches–Installation	JYT65471 (EN, ES, FR)
MicroLogic 5 and 6 Electronic Trip Units	48940-312-01 (EN, ES, FR)
PowerPacT H-, J-, and L-Frame Circuit Breakers with MicroLogic™ Trip Units	48940-313-01 (EN, ES, FR)
PowerPacT L-Frame Electronic Trip Circuit Breaker Installation Instructions	JYT65477 (EN, ES, FR)
PowerPacT M-, P-, and R-Frame and NS Circuit Breakers	0612CT0101 (EN)
PowerPacT M-Frame Circuit Breakers	48049-251-01 (EN, ES, FR)
PowerPacT M-Frame Circuit Breaker Data Sheet	0612DB1701 (EN)
PowerPacT P-Frame and NS630b–NS1600 Circuit Breakers	48049-148-05 (EN, ES, FR)
PowerPacT P-Frame Circuit Breaker Data	0612DB1702 (EN)
PowerPacT R-Frame Circuit Breaker Data Sheets	0612DB1703 (EN)
PowerPacT R-Frame and NS1600b-NS3200 Circuit Breakers Installation and User Guide	48049-243-04 (EN, ES, FR)
MasterPacT MTZ MicroLogic X Control Unit User Guide	DOCA0102EN (EN); DOCA0102ES (ES); DOCA0102FR (FR)
MasterPacT MTZ1 UL Rated/ANSI Certified 800 to 1600 A Circuit Breakers and Switches	0614IB1702 (EN); 0614IB1702ES (ES); 0614IB1702FR (FR)
MasterPacT MTZ2/MTZ3 UL Rated/ANSI Certified 800 to 6000 A Circuit Breakers and Switches	0614IB1701EN (EN); 0614IB1701ES (ES); 0614IB1701FR (FR)
MasterPacT MTZ2/MTZ3 Drawout Circuit Breaker or Switch-Disconnector Instruction Sheet	NVE35470 (EN, ES, FR)
MasterPacT MTZ1 Drawout Circuit Breaker or Switch	QGH70065 (EN, ES, FR)
MasterPacT MTZ2/MTZ2 Drawout Circuit Breaker or Switch	QGH69563 (EN, ES, FR)
Maintenance and Field Testing Guide for MasterPacT NT and NW Circuit Breakers	0613IB1202 (EN, ES, FR)
MasterPacT NT and NW Universal Power Circuit Breakers	0613CT0001 (EN)
Field Testing and Maintenance Guide for Thermal-Magnetic and MicroLogic Electronic-Trip Circuit Breakers	0600IB1201 (EN); 0600IB1201 (ES); 0600IB1201 (FR)
Energy Reduction Maintenance Setting (ERMS) System Installation and User Guide	NHA67346 (EN, ES, FR)
ULP System for MasterPacT and PowerPacT–User Guide	0602IB1503 (EN); 0602IB1504 (ES); 0602IB1505 (FR)
ULP (Universal Logic Plug) System–User Guide	48940-329-01 (EN, ES, FR)
PowerPacT H-, J-, and L-Frame Circuit Breakers–Modbus Communication Guide	0611IB1302 (EN); 0611IB1303 (ES); 0611IB1304 (FR)
MasterPacT NT/NW and PowerPacT P- and R-Frame–Modbus Communication Guide	0613IB1313 (EN); 0613IB1314 (ES); 0613IB1315 (FR)

Table 1 - MCC-related Literature (Continued)

Title	Publication No.
IFE Ethernet Interface for LV circuit breaker–Instruction Sheet	HRB49218 (EN, ES, FR)
Modbus Interface Module (IFM)	48940-326-01 (EN)
IO module–Input/Output interface for LV circuit breaker–Instruction sheet	HRB49217 (EN, ES, FR)
TeSys T LTMCU / LTMCUF Control Operator Unit	1639581EN (EN); 1639581ES (ES); 1639581FR (FR)
Enerlin'X EIFE Embedded Ethernet Interface for One MasterPacT MTZ Drawout Circuit Breaker User Guide	DOCA0106EN (EN); DOCA0106ES (ES); DOCA0106FR (FR)
Enerlin'X IFE Ethernet Interface for One UL Circuit Breaker User Guide	0602IB1801EN (EN); 0602IB1801ES (ES); 0602IB1801FR (FR)
MotorLogic Plus™ Network Communication Module, Class 9999 Type MB11 and Type MB22 Programming Guide	30072-013-102 (EN, ES, FR)
AC Magnetic Contactors and Starters, Size 00	30072-013-52 (EN, ES, FR)
AC Magnetic Contactors and Starters, Size 0	30072-013-22 (EN, ES, FR)
AC Magnetic Contactors and Starters, Size 1	30072-013-23 (EN, ES, FR)
AC Magnetic Contactors and Starters, Size 2	30072-013-24 (EN, ES, FR)
AC Magnetic Contactors and Starters, Size 3	30072-013-25 (EN, ES, FR)
AC Magnetic Contactors and Starters, Size 4	30072-013-26 (EN, ES, FR)
AC Magnetic Contactors and Starters, Size 5	30072-013-47 (EN, ES, FR)
AC Magnetic Contactors and Starters, Size 6	30072-013-60 (EN, ES, FR)
Full Voltage Contactors and Starters	8502CT9701 (EN)
Reduced Voltage Starters Type S	8600CT9601 (EN)
MotorLogic™ Solid-State Overload Relay	30072-013-29 (EN, ES, FR)
TeSys™ T LTM R EtherNet/IP with a Third-Party PLC–Quick Start Guide	DOCA0119EN (EN); DOCA0119EN (ES); DOCA0119EN (FR)
TeSys T LTMR Motor Management Controller User Guide	DOCA0127EN (EN); DOCA0127ES (ES); DOCA0127FR (FR)
TeSys T LTMR Motor Management Controller Installation Guide	DOCA0128EN (EN); DOCA0128ES (ES); DOCA0128FR (FR)
TeSys T LTMR Motor Management Controller Modbus Communication Guide	DOCA0130EN (EN); DOCA0130ES (ES); DOCA0130FR (FR)

Table 1 - MCC-related Literature (Continued)

Title	Publication No.
TeSys T LTMR Motor Management Controller PROFIBUS DP Communication Guide	DOCA0131EN (EN); DOCA0131ES (ES); DOCA0131FR (FR)
TeSys T LTMR Motor Management Controller CANopen Communication Guide	DOCA0132EN (EN); DOCA0132ES (ES); DOCA0132FR (FR)
TeSys T LTMR Motor Management Controller DeviceNet Communication Guide	DOCA0133EN (EN); DOCA0133ES (ES); DOCA0133FR (FR)
TeSys Tera Motor Management Controller–LTMTCU Control Operator Unit User Guide	DOCA0228EN
TeSys Tera Motor Management Controller–User Guide	DOCA0253EN
TeSys Tera Motor Management Controller Installation Guide	DOCA0254EN
TeSys Tera Motor Management Controller–Modbus RTU Communication Guide	DOCA0255EN
TeSys Tera Motor Management Controller–PROFIBUS DP Guide	DOCA0256EN
TeSys Tera Motor Management Controller–Ethernet Communication Guide	DOCA0258EN
TeSys Tera Motor Management Controller–Substitution Guide	DOCA0278EN
Harmony™ 9001K/SK/KX 30 mm Push Buttons	9001CT1103 (EN)
Harmony XB4 Metal pushbuttons, switches and pilot lights	DIA5ED2121212EN (EN); DIA5ED2121212FR (FR)
Harmony XB5 Plastic pushbuttons, switches and pilot lights	DIA5ED2121213EN (EN); DIA5ED2121213FR (FR)
Harmony™ XB7 Monolithic 22 mm Push Buttons	DIA5ED2120503EN (EN); DIA5ED2120503EN (ES); DIA5ED2120503FR (FR)
PowerLogic™ Circuit Monitor Series 2000 Reference Manual	3020IM9806 (EN)
Altivar Process Variable Speed Drives ATV930, ATV950 Installation Manual	NHA80932 (EN); NHA80935 (ES); NHA80933 (FR)
Altivar Process Variable Speed Drives ATV930, ATV950, ATV960, ATV980 Programming Manual	NHA80757 (EN); NHA80760 (ES); NHA80758 (FR)
Altivar Process Variable Speed Drives ATV630, ATV650 Installation Manual	EAV64301 (EN); EAV64307 (ES); EAV64302 (FR)
Altivar Process Variable Speed Drives ATV630, ATV650, ATV660 Programming Manual	EAV64318 (EN); EAV64322 (ES); EAV64320 (FR)

Table 1 - MCC-related Literature (Continued)

Title	Publication No.
PowerLogic PM5500 Series User Manual	HRB1684301 (EN); HRB1684303 (ES); HRB1684302 (FR)
PowerLogic PM8000 Series User Manual	7EN02-0336 (EN); 7ES02-0336 (ES); 7FR02-0336 (FR)
PowerLogic ION9000 Series Installation Guide	NVE78642 (EN, ES, FR)
PowerLogic ION9000 Series User Manual	7EN02-0390 (EN); 7ES02-0390 (ES); 7FR02-0390 (FR)
PowerLogic RD192 Display Installation Guide	QGH42230 (EN, ES, FR)
Altivar Machine ATV320 Variable Speed Drives for Asynchronous and Synchronous Motors Installation Manual	NVE41289 (EN); NVE41292 (ES); NVE41290 (FR)
Altivar Machine ATV320 Variable Speed Drives for Asynchronous and Synchronous Motors Programming Manual	NVE41295 (EN); NVE41298 (ES); NVE41296 (FR)
ATV320 Modbus® Manual	NVE41308 (EN)
ATV320 CANopen Manual–VW3A3608, VW3A618, VW3A628	NVE41309 (EN)
ATV320 PROFIBUS® DP Manual–VW3A3607	NVE41310 (EN)
ATV320 PROFINET® Manual–VW3A3627	NVE41311 (EN)
ATV320 Modbus TCP-EtherNet IP Manual: VW3A3616	NVE41313 (EN)
ATV320 DeviceNet Manual: VW3A3609	NVE41314 (EN)
MasterPacT MTZ Unpacking Instruction Sheet	PHA53377 (EN, ES, FR)
Thermal Monitoring Dongle Kit Instruction Bulletin	MFR21149 (EN, ES, FR)
Square D Wiring Diagrams for Contactors, Starters, Relays, and Controllers	0140CT9201 (EN)
MasterPacT MTZ–Modbus Communication Guide	DOCA0105EN (EN); DOCA0105ES (ES); DOCA0105FR (FR)

Table 2 - iMCC-related Literature

Title	Publication No.
LTM CU–Instruction Sheet	AAV6665701 (EN, ES, FR)
ATS48 Modbus Manual	1623736 (EN, ES, FR)
TeSys T LTM R Modbus Motor Management Controller User's Manual	DOCA0130EN (EN); DOCA0130ES (ES); DOCA0130FR (FR)
TeSys T LTMR PROFIBUS Motor Management Controller User's Manual	DOCA0131EN (EN); DOCA0131ES (ES); DOCA0131FR (FR)
TeSys T LTMR CANopen Motor Management Controller User's Manual	DOCA0132EN (EN); DOCA0132ES (ES); DOCA0132FR (FR)
TeSys T LTM R DeviceNet™ Motor Management Controller User's Manual	DOCA0133EN (EN); DOCA0133ES (ES); DOCA0133FR (FR)
TeSys T LTMR Motor Management Controller Ethernet Communication Guide	DOCA0129EN (EN); DOCA0129ES (ES); DOCA0129FR (FR)
TeSys T LTMR Motor Management Controller Modbus Communication Guide	DOCA0130EN (EN); DOCA0130ES (ES); DOCA0130FR (FR)
TeSys T LTM R PROFIBUS-DP® Motor Management Controller Quick Start Guide	1639573US (EN); 1639573 (ES); 1639573 (FR)
TeSys T LTM R CANopen Motor Management Controller Quick Start Guide	1639574 (EN); 1639574ES (ES); 1639574FR (FR)
TeSys T LTM R DeviceNet Motor Management Controller Quick Start Guide	1639575EN (EN); 1639575ES (ES); 1639575FR (FR)
TeSys T LTM R Modbus/TCP Motor Management Controller Quick Start Guide	1639576EN (EN); 1639576ES (ES); 1639576FR (FR)
TeSys T LTM CU Control Operator Unit User's Manual	1639581EN (EN); 1639581 (ES); 1639581 (FR)
LTM R–Instruction Sheet	AAV7709901 (EN, ES, FR)
LTM E–Instruction Sheet	AAV7950501 (EN, ES, FR)
PowerTag™ System–Design and Commissioning Guide	DOCA0194EN (EN); DOCA0194FR (FR)
Altivar Process Variable Speed Drives ATV630, ATV650, ATV660 Programming Manual	EAV64318 (EN)
Altivar Process ATV600 Variable Speed Drives for Asynchronous and Synchronous Motors Embedded Ethernet Manual	EAV64327 (EN)
Altivar Process ATV600 Variable Speed Drives for Asynchronous and Synchronous Motors EthernetIP Modbus TCP Manual–VW3A3720	EAV64328 (EN)
Altivar Process 600 PROFIBUS DP Manual–VW3A3607	EAV64329 (EN)

Table 2 - iMCC-related Literature (Continued)

Title	Publication No.
Altivar Process 600 Variable Speed Drives for Asynchronous and Synchronous Motors DeviceNet Manual–VW3A3609	EAV64330 (EN)
Altivar Process ATV600 Variable Speed Drive for Asynchronous and Synchronous Motors CANopen Manual–VW3A3608, 618, 628	EAV64333 (EN)
Altivar Process Variable Speed Drives ATV930, ATV950, ATV960, ATV980 Programming Manual	NHA80757 (EN); NHA80760 (ES); NHA80758 (FR)
Altivar Process 900 Ethernet Manual–Embedded	NHA80940 (EN)
Altivar Process 900 PROFIBUS DP Manual–VW3A3607	NHA80941 (EN)
Altivar Process 900 Variable Speed Drives for Asynchronous and Synchronous Motors DeviceNet Manual–VW3A3609	NHA80942 (EN)
Altivar Process 900 CANopen Manual–VW3A3608, 618, 628	NHA80945 (EN)
Altivar Process 900 Variable Speed Drives EtherCAT Manual–VW3A3601	NHA80946 (EN)
ATS480 Embedded Modbus Manual	NNZ85539 (EN)
ATS480 Ethernet IP Modbus TCP Manual–VW3A3720	NNZ85540 (EN)
ATS480 Profibus DP Manual–VW3A3607	NNZ85542 (EN)
ATS480 CANopen Manual–VW3A3608, VW3A3618, VW3A3628	NNZ85543 (EN)
ATS480 Communication Parameter Addresses	NNZ85544 (EN)
TeSys Tera Motor Management Controller–LTMTCU Control Operator Unit User Guide	DOCA0228EN
TeSys Tera Motor Management Controller–User Guide	DOCA0253EN
TeSys Tera Motor Management Controller Installation Guide	DOCA0254EN
TeSys Tera Motor Management Controller–Modbus RTU Communication Guide	DOCA0255EN
TeSys Tera Motor Management Controller–PROFIBUS DP Guide	DOCA0256EN
TeSys Tera Motor Management Controller–Ethernet Communication Guide	DOCA0258EN
TeSys Tera Motor Management Controller–Substitution Guide	DOCA0278EN

Safety Precautions

Carefully read and follow the safety precautions before attempting to lift, move, install, use, or maintain Model 6 MCCs and their components.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462 or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Qualified electrical personnel must perform work in accordance with all applicable national and local electrical codes.
- Perform such work only after reading and understanding all the instructions contained in this bulletin.
- Turn off all power supplying this equipment before working on or inside equipment.
- Assume that all circuits are live until they have been completely deenergized, tested, locked out, and/or tagged out. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

⚠WARNING

HAZARD OF COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

- Change default passwords to help prevent unauthorized access to device settings and information.
- Disable unused ports/services and default accounts, where possible, to minimize pathways for malicious attacks.
- Place networked devices behind multiple layers of cyber defenses (such as firewalls, network segmentation, and network intrusion detection and protection).
- Use cybersecurity best practices (for example: least privilege, separation of duties) to help prevent unauthorized exposure, loss, modification of data and logs, interruption of services, or unintended operation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ **WARNING:** This product can expose you to chemicals including Nickel compounds, which are known to the State of California to cause cancer, and Bisphenol A (BPA), which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Moisture Contamination Avoidance and Mitigation

This bulletin provides supplemental instructions for moisture contamination avoidance and mitigation. Please read and follow the instructions in this addendum before performing the instructions in the product manual.

Safety Precautions

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Store the equipment in a clean, dry (including no condensation), well-ventilated area with an ambient temperature of approximately 70°F (21°C).
- If heaters are furnished in the assembly, energize them from an external source. When energizing heaters from an external source, remove the primary and secondary overcurrent protective devices from the control power transformer.
- If heaters are not installed in the assembly, and the area is cold and damp, use a temporary heating source within the assembly. A range of 200–250 watts of heat per section is recommended.
- Avoid greasy, smoky heaters that can deposit carbon on insulation, which could lead to tracking and insulation breakdown.
- If moisture, condensation, or chemical ingress is observed, do not energize the equipment. If the equipment is already energized, de-energize it immediately.

Failure to follow these instructions will result in death or serious injury.

⚠WARNING

FIRE HAZARD

Remove all flammable material in the vicinity of the heaters, such as packaging, accessories in boxes, and documentation, before energizing the heaters.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Shipping, Receiving, and Storage Requirements

This equipment does not achieve its ratings until it is installed per record/as-built drawings, installed per the instructions contained in this document, and has operational environmental controls with appropriate settings to help mitigate environmental influences. This equipment can also be stored in a climate controlled area that uses both heating and cooling to maintain acceptable environmental conditions. Indoor and outdoor rated equipment is not suitable for outdoor storage.

- The equipment should be treated as if it is in storage until it is installed and operational. The storage area should be clean, dry (75% or less relative humidity), and climate controlled with proper ventilation.

- To keep the equipment dry, the use of heaters is required in some cases (for example, during seasonal or low periods of electrical loading and equipment de-energization).
  - Consult the Engineer of Record for the appropriate environmental control settings or means to mitigate environmental influences.
  - If so equipped, ensure that the thermostats and/or humidistats are set to mitigate condensation. A minimum of 200 watts of heat per section is suggested.
  - If heaters are being used with the equipment that were not included in the equipment by Schneider Electric, they must be clean and free of debris and grease. Greasy and/or smoky heaters can contaminate electrical insulation and lead to dielectric breakdown and/or tracking.
- Shipping packaging is not suitable for and cannot be used by itself for equipment storage unless otherwise indicated on the shipping packaging labeling.
- When receiving equipment, the equipment may be at a lower temperature than the ambient air temperature. Allow time for the equipment temperature, including the temperature of internal components, to rise to the ambient air temperature before making openings in or otherwise disturbing the packaging. Condensation can occur on and inside the equipment if warm air contacts cold surfaces of the equipment. Moisture damage can occur, destroying the dielectric capabilities of the equipment and rendering it unusable.
- The factory shipping wrap around the equipment on shipping pallets is not suitable for non-enclosed over-the-road transportation that risks exposing the equipment to the elements. The factory shipping wrap around the equipment should remain on the equipment until the equipment is ready to be inspected and stored or inspected and installed. After receiving the equipment and allowing it to acclimate to the environment, remove the packaging and inspect the equipment for damage that may have occurred in transit. If damage is found or suspected, immediately file a claim with the carrier and notify a Schneider Electric representative.
- Follow these guidelines every time the equipment is moved to a new storage location or to its final destination.

Installation, Operation, and Maintenance Requirements

This equipment does not achieve its ratings until it is installed per record/as-built drawings, installed per the instructions contained in this document, and has operational environmental controls with appropriate settings to help mitigate environmental influences. This equipment can also be operated in a climate controlled area that uses both heating and cooling to maintain acceptable environmental conditions. Indoor and outdoor rated equipment is not suitable for outdoor storage.

In some cases (such as seasonal electrical loading, de-energized equipment, and standby/alternate power sources), the heat generated by equipment loading is insufficient to prevent condensation and alternate heat sources are required. If environmental controls such as a thermostat or humidistat are used, ensure their settings are sufficient to mitigate condensation and remain operational at all times. Consult the Engineer of Record for the appropriate environmental control settings.

Exposure to Moisture, Chemicals, and Condensation

If liquids such as moisture, chemicals, and condensation contact the electronics, circuit breaker, fuses, bussing, or other electrical components, do not attempt to clean or repair the equipment as this may lead to unrepairable damage. If the equipment is energized, de-energize it. If equipment is not energized, do not energize it. Contact the Schneider Electric Customer Care Center at 888-778-2733.

Receiving, Handling, and Storing the MCC

For ease of use during transportation and installation, MCCs are constructed in shipping blocks of up to three vertical sections. The main horizontal bus of all shipping blocks is spliced together at the job site with the use of captive horizontal splice bars.

Before shipment from the factory, the MCC is inspected visually, electrically, and mechanically by professional quality control analysts. Certification of quality control testing is available upon request.

After leaving Quality Control, each shipping block is carefully packaged and attached to a skid (see Motor Control Center Packaged in Sideways Position (Typical for Most Sections), page 22 and Motor Control Center Packaged in Upright Position (Typical for Extra Heavy Sections such as 18-Pulse Drives or as Customer Option), page 22).

Figure 2 - Motor Control Center Packaged in Sideways Position (Typical for Most Sections)

Figure 3 - Motor Control Center Packaged in Upright Position (Typical for Extra Heavy Sections such as 18-Pulse Drives or as Customer Option)

Receiving the MCC

See requirements for Moisture Contamination Avoidance and Mitigation, page 20 for additional information on receiving, inspecting and storage of electrical equipment. Inspect the MCC for damage as soon as it is received. Delivery of the equipment to a carrier at any of the Schneider Electric plants or other shipping point constitutes delivery to the purchaser. Title and all risk of loss or damage in transit shall pass to the purchaser at that time. Refer to the Schneider Electric Conditions of Sale for more details. All claims for loss and damage must be made by the purchaser to the carrier.

If the packaging material is removed, replace it for protection until the MCC is installed.

Handling the MCC

⚠WARNING

TIP OVER HAZARD

- Before installing or uninstalling this product, read and follow the product instructions for handling.
- This product has a high center of gravity. Use properly rated lifting equipment to move the product and prevent tipping.
- During the installation, secure the product to the mounting surface. Follow instructions in Securing Structures to the Floor.
- This product must be handled and installed only by qualified personnel.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Equipment Needed

Adequate equipment, such as a fork truck, crane, or rods and pipe rollers, must be available for handling MCCs. Approximate MCC Shipping Weights, page 23 lists the approximate shipping weights of sections equipped with **typical** units. If you need more exact shipping weights for your set-up, contact the MCC Technical Assistance Group at 800-634-2003.

Table 3 - Approximate MCC Shipping Weights

Enclosure Type		Depth in. (mm)	One Section lb. (kg)	Two Sections lb. (kg)	Three Sections lb. (kg)
1, 1 A, 12		15 (381)	600 (272)	1200 (544)	1800 (816)
3R Non-Walk-In		15 (381) (26.6/676 overall)	900 (408)	1800 (816)	2700 (1225)
1, 1 A, 12		20 in. (508)	750 (340)	1500 (680)	2250 (1021)
3R Non-Walk-In		20 (508) (31.6/803 overall)	1050 (476)	2100 (953)	3150 (1429)
18-Pulse Drive	50 wide (1270)	20 (508)	—	2107 (956)	—
	65 wide (1651)			2816 (1277)	

Moving the MCC

As shown in Approximate MCC Shipping Weights, page 23, weights vary by enclosure type and depth.

⚠WARNING

TIP OVER HAZARD

While moving the MCC:

- Follow all manufacturer-specified instructions and precautions when moving heavy equipment.
- Verify that the moving equipment is rated to handle the weight.
- Fork trucks, when available, provide a convenient method of moving MCCs (see Moving the MCC withf a Fork Truck). Use extended forks when lifting 42 in. (1067 mm), minimum.
- Secure the load to the lifting equipment before moving.
- When removing an MCC from a shipping pallet, carefully balance and secure it using a properly rated strap.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: Standard sections are packaged and shipped in a sideways position, as shown in Motor Control Center Packaged in Sideways Position (Typical for Most Sections), page 22 and Moving the MCC with a Fork Truck, page 24. Extra heavy sections, such as 18–pulse drives, are packaged and shipped in an upright position, as shown in Motor Control Center Packaged in Upright Position (Typical for Extra Heavy Sections such as 18-Pulse Drives or as Customer Option), page 22. MCC sections can also be packaged and shipped in an upright position at the customer's request.

Figure 4 - Moving the MCC with a Fork Truck

Each shipping block has lifting angles for handling the MCC with overhead cranes.

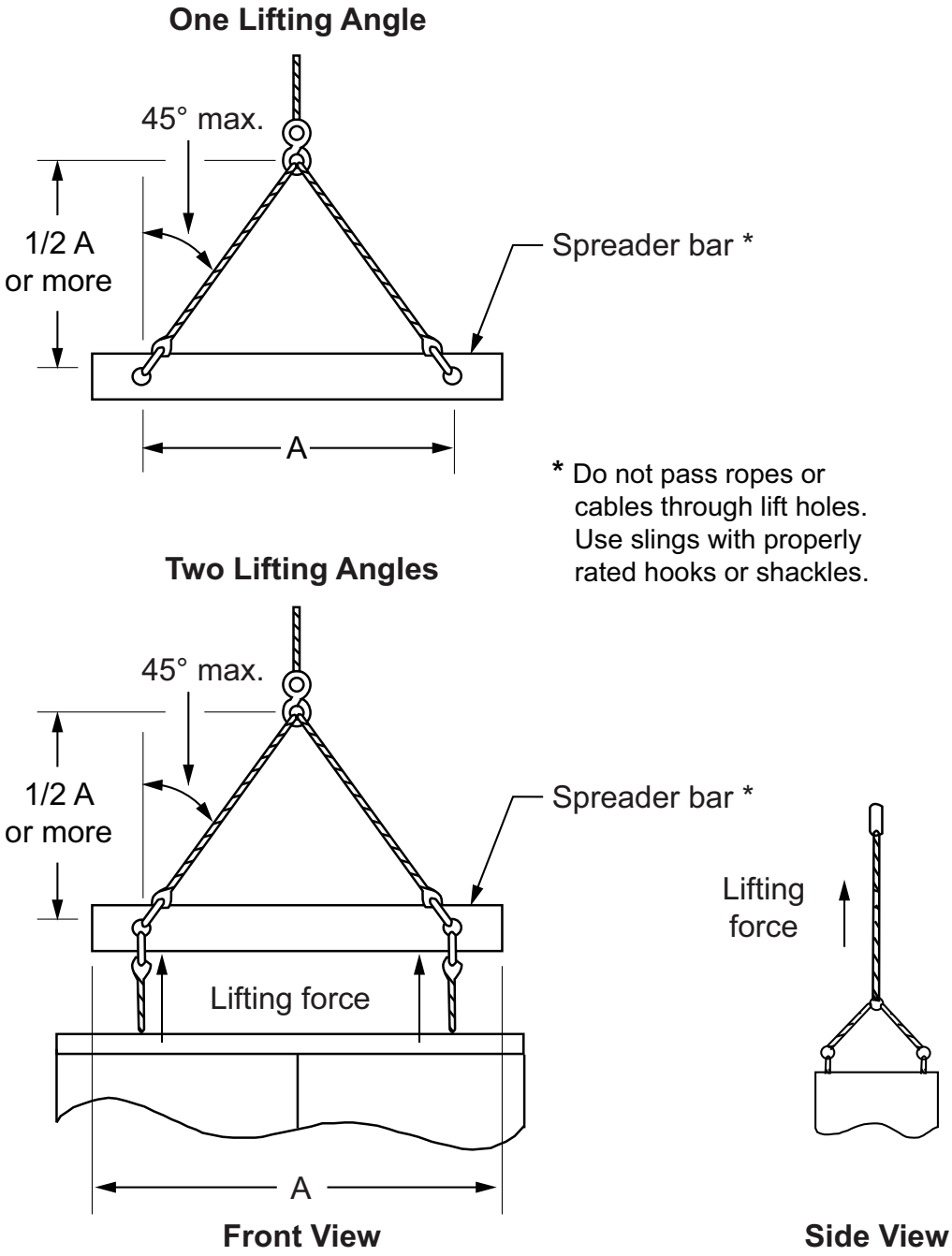
⚠WARNING

HANDLING AND LIFTING HAZARD

- Product must only be lifted by qualified personnel.
- Keep area below equipment clear of any personnel or property.
- Inspect lifting angle for any damage. Do not lift if damage is found.
- Select rigging lengths to compensate for unequal weight distribution.
- Limit sling angle to less than 45° maximum angle between the vertical and lifting cables (see Proper Use of Sling to Lift MCCs).
- Do not pass ropes, cables or slings through lifting angle holes. Use properly rated hooks or shackles.
- Use only properly rated lifting equipment to lift product.
- Lift from upright position only. Keep lifting force vertical.
- Do not attempt to lift or attach lifting means to sections equipped with pull boxes.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Figure 5 - Proper Use of Sling to Lift MCCs



After the shipping section is in place, its lifting angle(s) may be removed and discarded. To help prevent the entrance of foreign materials, replace all hardware that secured the lifting angle(s).

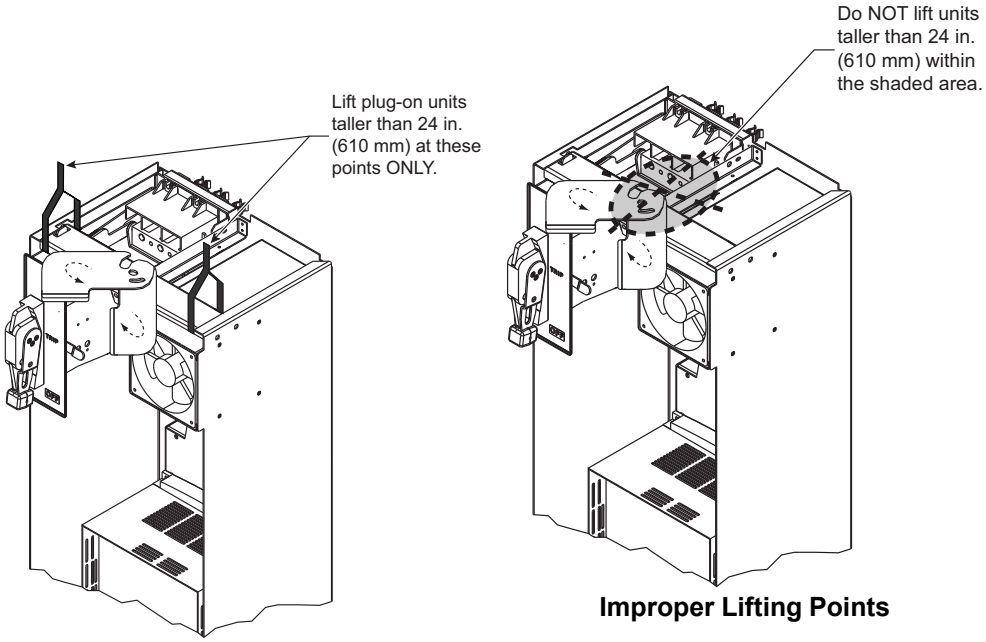
Model 6 MCCs with the arc-rated option must have the lifting angle removed to maintain the arc rating and allow the proper operation of the arc-rated vent flaps. Retain the hardware from the lifting angle for installing the top-plate assembly.

Model 6 MCCs with the ArcBlok option must have the lifting angle removed and discarded. Then move the vented hood to the vent location. To help prevent the entrance of foreign materials, replace all hardware that secured the lifting angle.

Plug-in Units

Some MCC units can weigh up to 200 lb. (90.7 kg) and require two or more persons or special handling equipment. Lift only by supporting bottom and/or side panels of the unit (see Proper/Improper Lifting Points for Plug-in Units Taller Than 24 in. (610 mm), page 27).

Figure 6 - Proper/Improper Lifting Points for Plug-in Units Taller Than 24 in. (610 mm)



Proper Lifting Points

Improper Lifting Points

Dimensions: in. (mm)

Before installing any MCC control units, locate and retighten or re-torque any connections that may have loosened during shipment and handling. Refer to the procedures in Installing Additional MCC Units, page 181.

Storing the MCC

NOTICE
HAZARD OF MOISTURE INGRESS AND CORROSION Never store MCCs outdoors. Outdoor storage is inadequate, even with the protection of a tarpaulin. **Failure to follow these instructions can result in equipment damage.**

If the MCC cannot be placed into service upon receipt, store it in a clean, dry, ventilated building free from temperature extremes. See requirements for Moisture Contamination Avoidance and Mitigation, page 20 for additional information on storage of electrical equipment.

Installing the MCC

This section explains how to locate, install, and join Model 6 MCC enclosures, and how to splice power and the ground bus. Refer to MCC front elevation drawings supplied by Schneider Electric for location/placement of shipping splits/sections within each MCC line-up. For information related to removing and installing existing and new units, see Expansion, page 178, or the information included with the shipment of the new device.

Locating the MCC

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.
- When moving MCC sections, follow the instructions in Handling the MCC. The MCC has a high center of gravity, which may cause it to tip over.
- MCC structures must be secured to the mounting surface. Follow instructions in Securing Structures to the Floor.

Failure to follow these instructions will result in death or serious injury.

MCCs are designed for use in non-hazardous locations. Choose a location for installation that is well ventilated and free from excess humidity, dust, and dirt. The temperature of the area must be no less than 0°C (32°F) and no greater than 40°C (104°F). Protect the MCC from the entrance of water or any moisture. If necessary, protect the MCC from condensation by ordering internal space heaters.

Space Requirements

Install MCCs in an area with a minimum of 3 ft. (0.9 m) of free space in front of front-of-board construction. An additional 3 ft. (0.9 m) is necessary in the rear of back-to-back construction. This free space provides adequate room to remove and install units. (More space may be required for some applications; refer to applicable local and national installation codes.) Provide at least 0.5 in. (13 mm) of space between the back of front-of-board MCCs and a wall. For damp locations, provide at least 6 in. (152 mm).

When selecting a location for the installation of an MCC, carefully consider accessibility, overhead clearances, and future expansions. Considering these factors minimizes many difficulties during this and future MCC installations.

NOTE: Model 6 MCCs with the arc-rated option have pressure-relief roof flaps for top venting of arc fault gases. These MCCs require a minimum of 28.5 in. (724 mm) from the top plate of the MCC to the nearest obstruction (minimum ceiling height of 10 ft. (3 m) including base channel). See Required Obstruction-Free Area, page 29 concerning the required clearance above the equipment.

⚠⚠DANGER

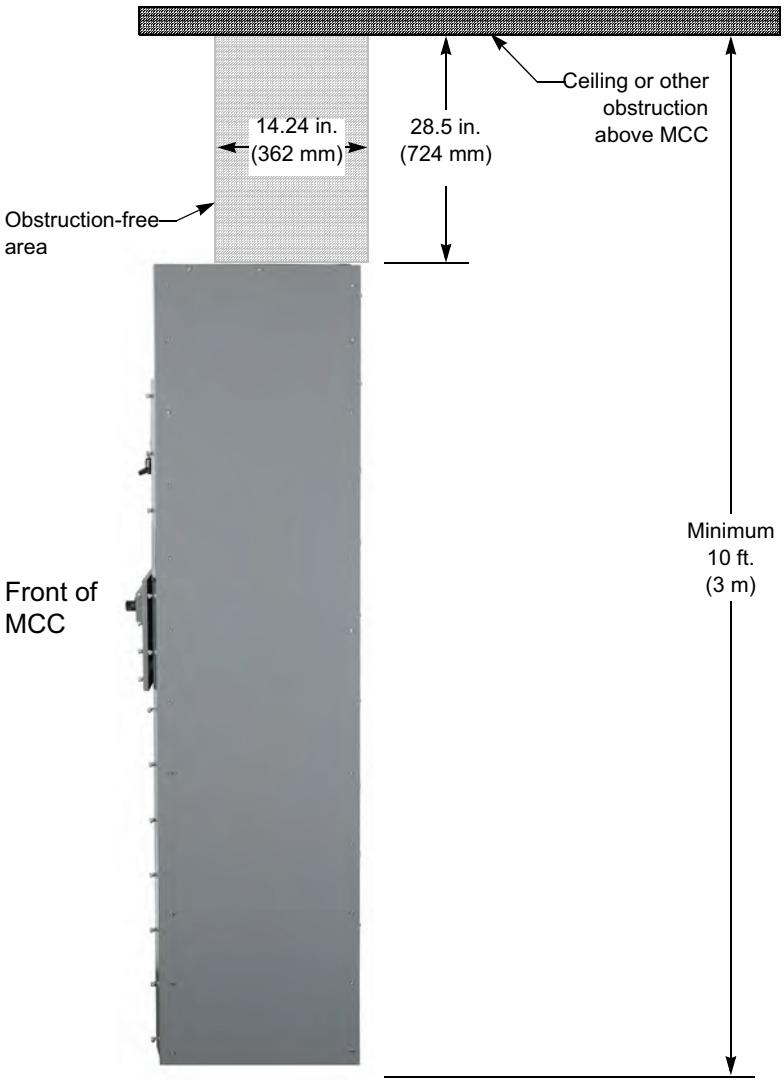
BURN HAZARD FROM HOT GASES

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- Keep the area directly above the equipment clear and unobstructed for 28.5 in. (724 mm) from the roof.

Failure to follow these instructions will result in death or serious injury.

The shaded area (see Required Obstruction-Free Area, page 29) above the arc-rated MCC must be free from obstructions.

Figure 7 - Required Obstruction-Free Area



Aligning the MCC

Provide a smooth, level surface for installation. An uneven foundation may cause misalignment of shipping blocks, units, and doors. The surface under an MCC must be of a non-combustible material unless bottom plates are installed in each vertical section.

Joining Type 1, Type 1 Gasketed, and Type 12 Sections

Before positioning the MCC sections (see Motor Control Center Views), check for damaged bus bars and insulators. If the bus is bent or insulators are broken, do not install the MCC. Report any damage to the carrier.

NOTE:

- A joining hardware kit is bagged and tied to the right front corner channel of each shipping split. Captive splice bars are preassembled on the horizontal bus on the left side of each shipping split.
- For gasket installation instructions, see Splice Gaskets for Type 1 Gasketed, Type 1 Sprinkler-resistant, and Type 12 Enclosures, page 45 before joining sections.

Positioning the MCC

To mount and splice a new MCC section to an existing Model 6 section, or to join factory shipping splits:

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.

2. Remove the upper and lower horizontal wireway covers in all sections, providing access to each section's front splicing bolts (see Motor Control Center Views, page 31, View B).

Figure 8 - Motor Control Center Views

View A: All Covers in Place

View B: Horizontal Wireway Covers Removed

View C: Two-piece Bus Barriers Removed (splice connection made)

3. Gain access to each section's bus splicing provisions buy sliding the panels of the two-piece bus barriers (see Motor Control Center Views, page 31, View C) in the sections adjacent to a splice connection (the left and right sections).
4. Make provisions for fastening the structure(s) to the floor and wall. See Securing Structures to the Floor, page 34, Seismic Certification of Model 6 MCCs, page 35, Responsibility for Mitigation of Seismic Damage, page 35, Securing Structures to Floor—Seismic Hazard Designated Locations, page 37, and Securing Structures to Wall—Seismic Hazard Designated Locations, page 43 for fastener locations.
5. Supporting the MCC by its base channels and/or lifting angles, lift it into place. The front edges of the base channels must align to form a continuous front in a straight line. Use a chalk line, string, or other method to align the front base channels in a straight line.
6. Using the notches in the base channels, carefully move the sections in to alignment with a crowbar (see Base Channel Notches, page 32).

   NOTE: Follow all manufacturer-specified instructions and precautions when moving heavy equipment. See Handling the MCC, page 23 before moving the MCC.

Figure 9 - Base Channel Notches

Joining Corner Channels

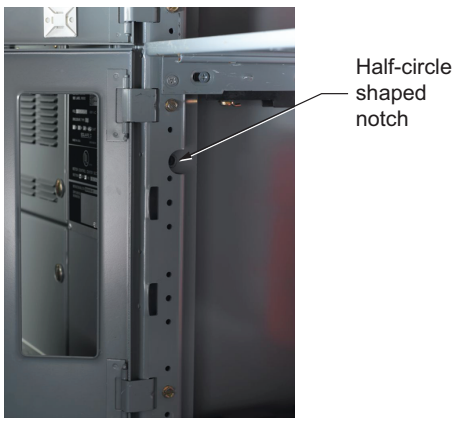
Figure 10 - Hardware Kit

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. The hardware kit for joining sections (see Hardware Kit) is bagged and tied to the right front corner channel of each shipping split.
3. Locate the four half-circle shaped notches on the inside surface of the corner channels (see Bolting Sections Together: Joining Corner Channels, page 32, View A).
4. Using four of the 3/4 in. x 1/4-20 hex head thread-forming screws supplied in the hardware kit, join the **front** vertical corner channels by inserting the screws through the clearance holes located within the half-circle shaped notches and into the mating thread-forming hole (see Bolting Sections Together: Joining Corner Channels, page 32, View B).

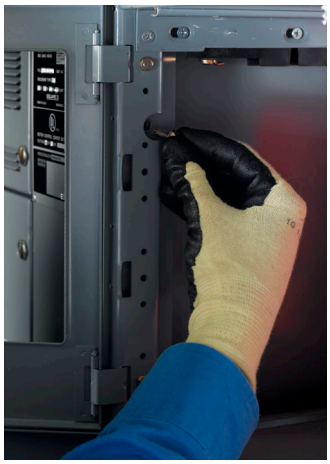
   NOTE: Insert the screws from whichever side provides the easiest access to the holes; either side allows proper joining of the channels.
5. Tighten the screws (see Bolting Sections Together: Joining Corner Channels, page 32, View C).
6. Repeat steps 3–5 to connect the **rear** corner channels.

NOTE: In some instances, holes in the rear channels are only accessible from the rear of the MCC with the MCC back plates removed. If the MCC is not rear accessible, install as many screws as possible from the front of the MCC (typically via the vertical wireway).

Figure 11 - Bolting Sections Together: Joining Corner Channels



View A



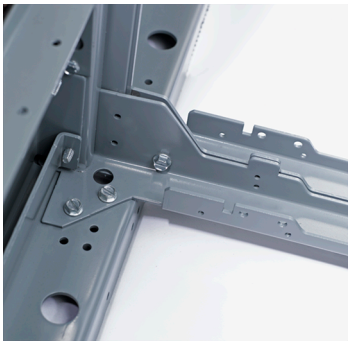
View B

View C

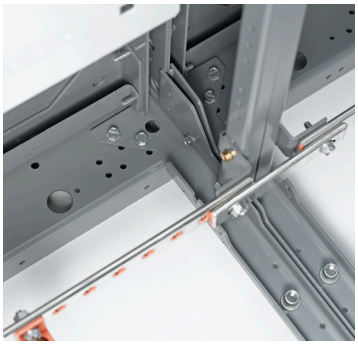
Joining Section Side Channels

1. Locate two clearance holes for 1/4-20 hardware on the inside surface of the bottom section side channels (see Bolting Sections Together: Joining Corner Channels, page 33, Views A and B). These are accessible after removal of the bottom wireway cover.

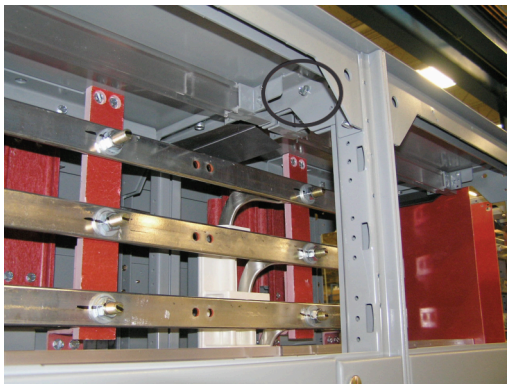
Figure 12 - Bolting Sections Together: Joining Corner Channels



View A: Front Bottom Side Channel Connection



View B: Rear Bottom Side Channel Connection



View C: Top Front Side Channel Connection

View D: Top Rear Side Channel Connection (Shown with MCC back plates removed.)

2. Use two of the four 1-1/4 in. x 1/4-20 hex head thread-forming screws supplied in the hardware kit to join the bottom section side channels. The screw installed at the front is installed from the right-hand section (see Bolting Sections Together: Joining Corner Channels, page 33, View A).
3. The screw installed at the rear is installed from the left-hand section (see Bolting Sections Together: Joining Corner Channels, page 33, View B).
4. Locate two clearance holes for 1/4-20 hardware on the inside surface of the top section side channels. The front clearance hole is in the left section and is accessible after removal of the top wireway cover (see Bolting Sections Together: Joining Corner Channels, page 33, View C).
5. The rear clearance hole is in the right section. In most cases, it is necessary to remove the section back plate or the top plate to gain access to the rear clearance hole and install the screw (see Bolting Sections Together: Joining Corner Channels, page 33, View D).

Securing Structures to the Floor

Non-seismic Applications

NOTE: See page Securing Structures to Floor—Seismic Hazard Designated Locations, page 37 for Seismic Applications.

Fasten each section to the floor (see Standard Base Channel Mounting, page 34) using 1/2 in. or 3/4 in., grade 5 or higher, bolts, and flat washers (furnished by customer).

0.88 in. (22 mm) diameter base channel mounting holes provide clearance for bolt expansion anchors for 1/2 in. bolts.

NOTE: Although sections are free-standing, floor fastening helps to prevent movement, thereby preventing conduit connection damage.

Figure 13 - Standard Base Channel Mounting

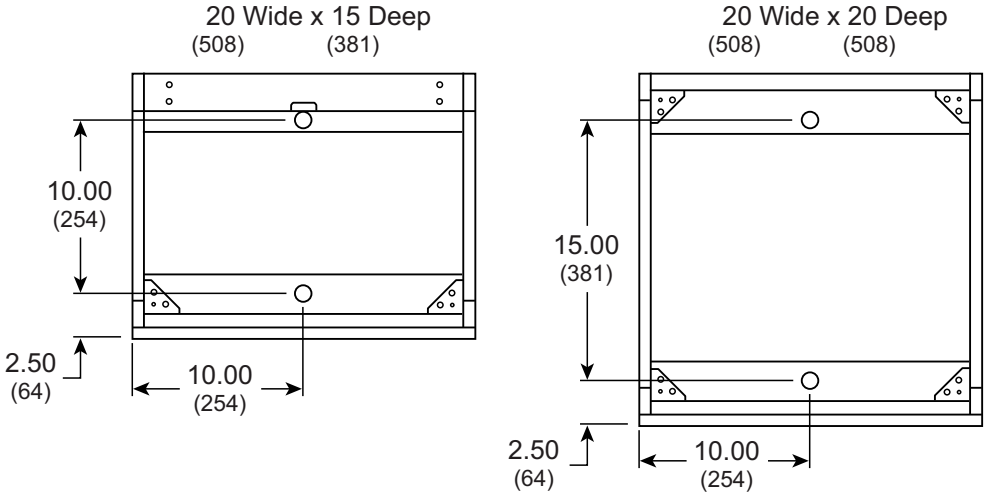
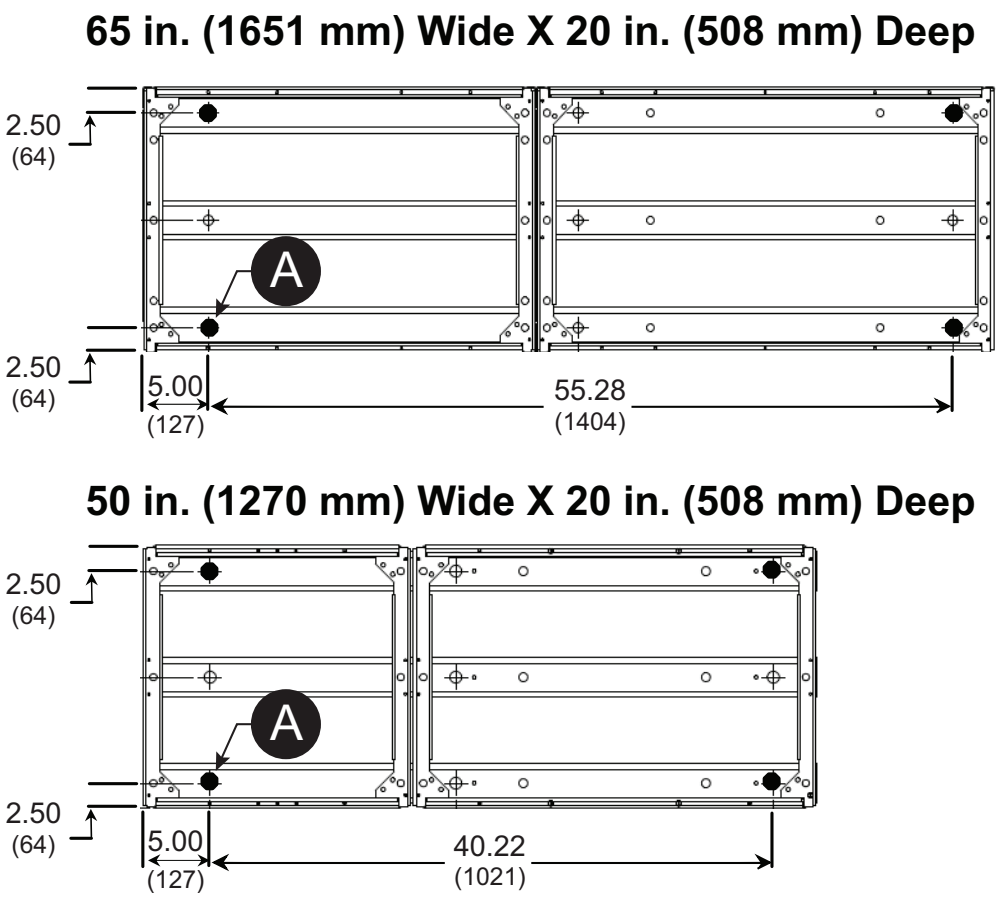


Figure 14 - Base Channel Mounting For 18-Pulse AC Drive MCC Sections



A	Structure anchoring locations (typical of four)

Seismic Certification of Model 6 MCCs

Introduction

Model 6 Motor Control Centers that are seismically certified have been certified to the seismic requirements of the listed regional building codes and/or seismic design standards per the manufacturer's certificate of compliance (CoC). Equipment labels and CoCs are provided with all seismically certified Model 6 Motor Control Centers. Refer to the equipment CoC for certification details and applicable seismic parameters. To maintain the validity of this certification, the installation instructions provided in this section must be followed.

Responsibility for Mitigation of Seismic Damage

Model 6 MCCs are considered nonstructural building components, as defined by regional building codes and seismic design standards. Equipment capacity was determined from tri-axial seismic shake table test results in accordance with the International Code Counsel Evaluation Service (ICC ES) Acceptance Criteria for Seismic Certification by Shake-TableTesting of Nonstructural Components (AC156).

An equipment importance factor, I_p, that is greater than one ($I_p > 1.0$) is assumed and indicates that equipment functionality is required after a seismic event and after

seismic simulation testing. This importance factor is applicable for designated seismic systems, for example, special certification, servicing critical infrastructure where post-earthquake equipment functionality is a requirement.

Incoming and outgoing bus, cable, and conduit must also be considered as related, but independent, systems. These distribution systems must be designed and restrained to withstand the forces generated by the seismic event without increasing the load transferred to the equipment. For applications where seismic hazard exists, it is preferable for bus, cable, and conduit to enter and exit the bottom of the equipment enclosure.

Seismic qualification of nonstructural components and equipment by Schneider Electric is just one link in the total chain of responsibility required to maximize the probability that the equipment is intact and functional after a seismic event. During a seismic event, the equipment must be able to transfer the inertial loads that are created and reacted through the equipment's force resisting system and anchorage to the load-bearing path of the building structural system or foundation.

Anchorage of equipment, for example, nonstructural supports and attachments, to the primary building structure or foundation is required to validate seismic conformance. The construction site structural engineer or registered design professional or engineer of record (EOR) is responsible for detailing the equipment anchorage requirements for the given installation. The installer and manufacturers of the anchorage system are responsible for assuring the mounting requirements are met. Schneider Electric is not responsible for the specification and performance of anchorage systems.

Tie-Down Points for Rigid, Floor-Mounted Equipment

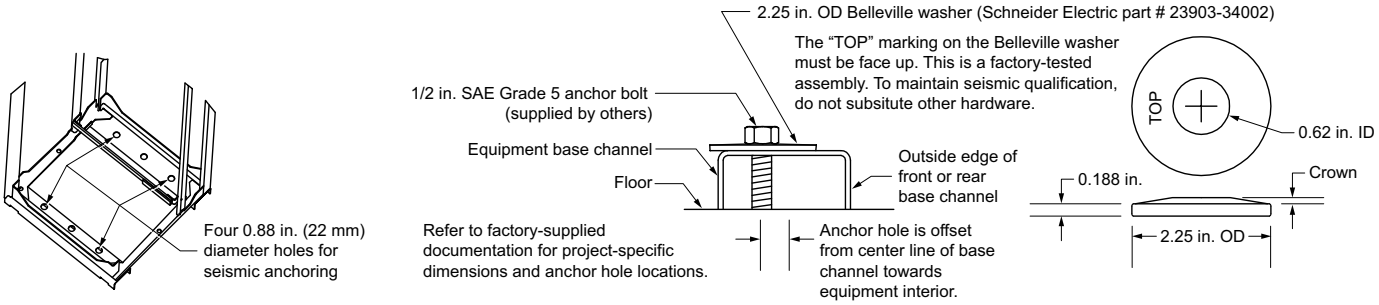
The equipment enclosure provides anchorage tie-down points to accept anchor attachments to the building structure or foundation. Model 6 MCC indoor enclosures provide enclosure base frame clearance holes for bolted anchorage attachments, as shown in Type 1, Type 1 Gasketed, Type 1 Sprinkler Resistant, and Type 12 Seismic Tie Down Locations, page 38 and Seismic Tie-Down Locations for 18-Pulse AC Drive MCC Sections, page 39. Model 6 MCC outdoor enclosures provide enclosure base frame clearance holes for bolted anchorage attachments, as shown in Type 3R Seismic Tie-Down Locations, page 40.

MCC sections must be anchored using all enclosure tie-down points, as shown in the previous referenced topics, for indoor and outdoor applications.

Anchorage Assembly Instructions

The bolted anchor assembly view depicted in Bolted Anchor Assembly, page 37 illustrates the equipment's as-tested attachment to a seismic shake-table test fixture. The equipment seismic capacity, as stated on the Schneider Electric CoC, was achieved with the identified size and grade attachment hardware. For bolted attachments, the use of factory-supplied Belleville conical spring washers at specified locations is required to maintain seismic conformance. Field installed equipment attachment and support detailing must be in accordance with the anchorage system requirements as defined by the construction site structural engineer, registered design professional, or engineer of record.

Figure 15 - Bolted Anchor Assembly



Welded Anchorage

Equipment installations using welded supports and attachments in lieu of bolted supports and attachments must ensure the weld locations are distributed similarly to the locations of enclosure anchorage clearance holes. Welded supports and attachments must be properly sized to ensure the weldment withstand capacity exceeds the earthquake demand at the equipment installation location. Precautions must be taken to properly vent and shield the equipment enclosure during the field welding process. Paint must be removed from the equipment weld locations before welding, and then replaced after welding is complete to inhibit corrosion.

Securing Structures to Floor-Seismic Hazard(1) Designated Locations

Each section must be anchored per detail supplied by engineer of record to the load bearing path of the building structural system. For floor mounting locations, see Type 1, Type 1 Gasketed, Type 1 Sprinkler Resistant, and Type 12 Seismic Tie Down Locations, page 38 or Seismic Tie-Down Locations for 18-Pulse AC Drive MCC Sections, page 39. Use anchorage designed by and supplied by others. Seismic test units were anchored with 1/2-13 SAE Grade 5 hardware and Belleville conical washers. 1/2 in. and 3/4 in. Belleville washers are supplied with equipment for use with the seismic anchorage.

Seismic Tie-down Access for ArcBlok 1200 with Bottom-feed, Line-side, Isolation Cable Vault

The front cover and rear panel assembly of each ArcBlok bottomfeed cable vault are removable to allow access to seismic tie-down points. Refer to Front Cover and Rear Panel of Cable Vault, page 38, Type 1, Type 1 Gasketed, Type 1 Sprinkler Resistant, and Type 12 Seismic Tie Down Locations, page 38, Seismic Tie-Down Locations for 18-Pulse AC Drive MCC Sections, page 39, and Type 3R Seismic Tie-Down Locations, page 40.

(1) Seismic hazard for site specific locations as defined by the current edition of the International Building Code or NFPA 5000 or relevant local building code or consulting engineer of record.

Figure 16 - Front Cover and Rear Panel of Cable Vault

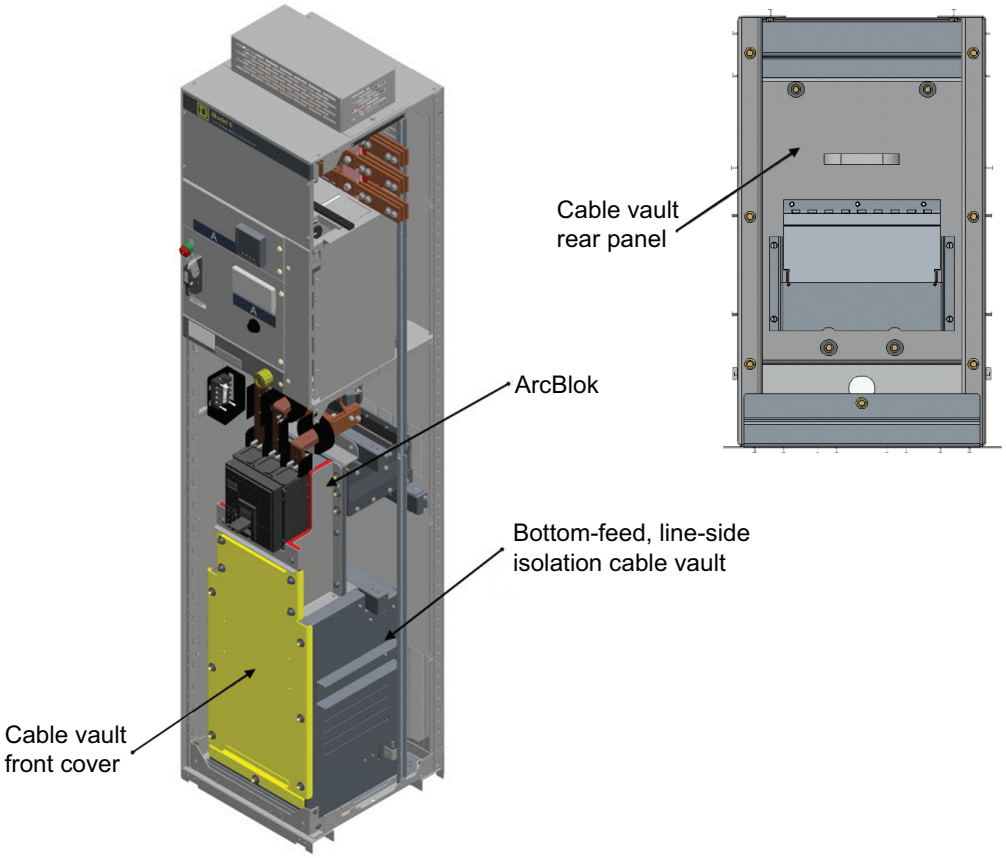
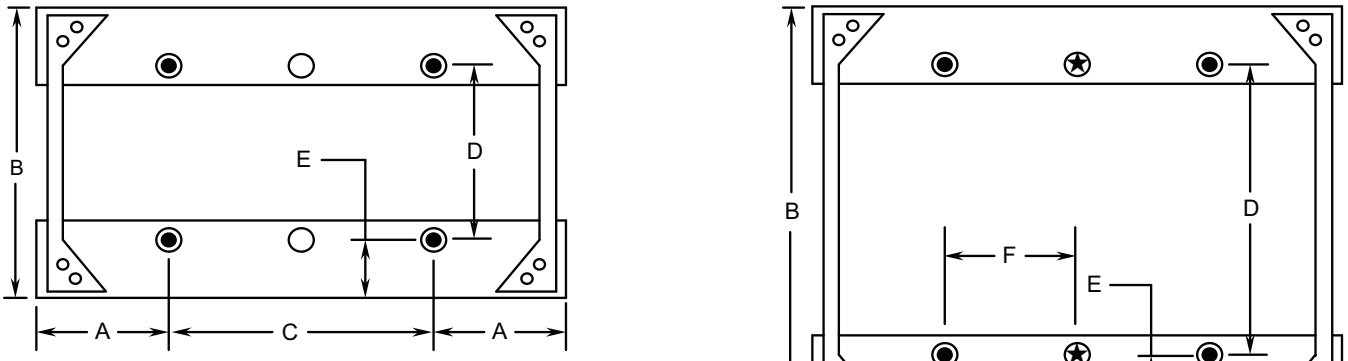


Figure 17 - Type 1, Type 1 Gasketed, Type 1 Sprinkler Resistant, and Type 12 Seismic Tie Down Locations



● = Seismic tie-down locations
★ = Additional seismic tie-down locations for 44 in. wide NW main.

Table 4 - 15 (381) Section Dimensions in. (mm)

Letter	Section Width	Dimension
A	N/A	5.00 (127)
B	N/A	15.00 (381)
C	20.00 (508)	10.00 (254)
	25.00 (635)	15.00 (381)

Table 5 - 20 (508) Section Dimensions in. (mm)

Letter	Section Width	Dimension
A	N/A	5.00 (127)
B	N/A	20.00 (508)
C	20.00 (508)	10.00 (254)
	25.00 (635)	15.00 (381)

Table 4 - 15 (381) Section Dimensions in. (mm) (Continued)

Letter	Section Width	Dimension
	30.00 (762)	20.00 (508)
	35.00 (889)	25.00 (635)
D	N/A	9.98 (253)
E	N/A	2.50 (64)

N/A = Not applicable

Table 5 - 20 (508) Section Dimensions in. (mm) (Continued)

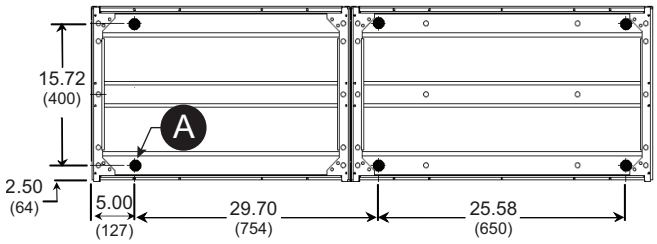
Letter	Section Width	Dimension
	30.00 (762)	20.00 (508)
	35.00 (889)	25.00 (635)
	44.00 (1118)	34.00 (864)
D	N/A	14.98 (380)
E	N/A	2.50 (64)
F	44.00 (1118)	17.00 (432)

N/A = Not applicable

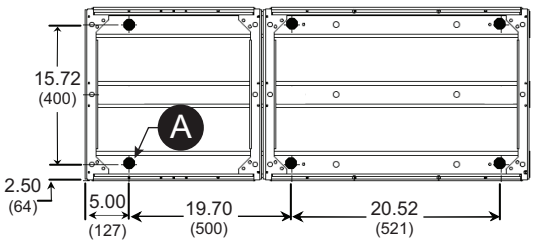
NOTE: The dimensions shown are tie-down locations within individual MCC sections. Refer to factory supplied drawings to determine appropriate anchor locations for the equipment pad.

Figure 18 - Seismic Tie-Down Locations for 18-Pulse AC Drive MCC Sections

65 in. (1651 mm) Wide X 20 in. (508 mm) Deep

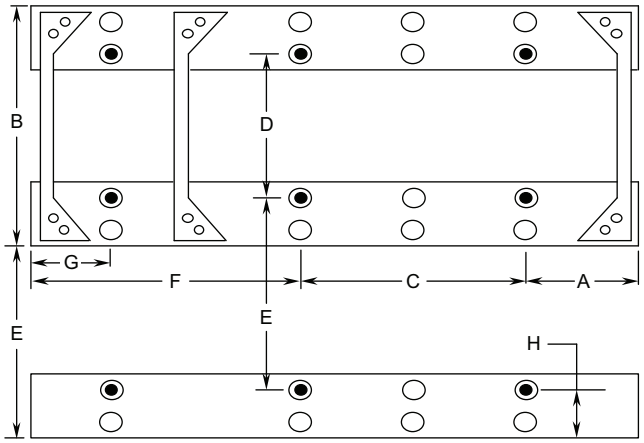


50 in. (1270 mm) Wide X 20 in. (508 mm) Deep



A	Structure anchoring locations (typical of 4)

Figure 19 - Type 3R Seismic Tie-Down Locations



● = Seismic Tie-Down Locations

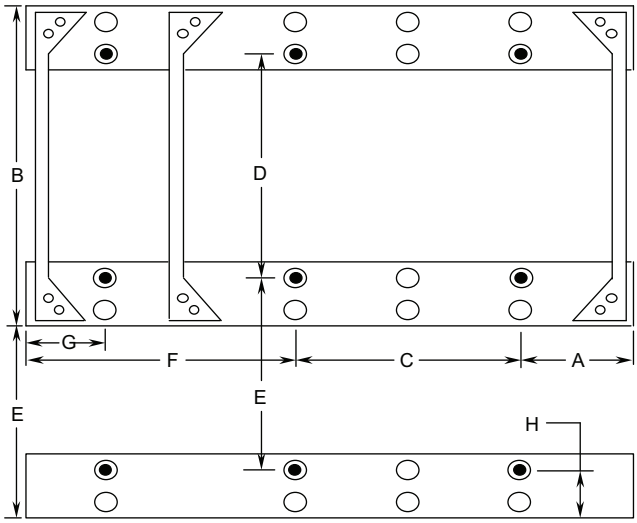


Table 6 - 15 (381) Section Dimensions in. (mm)

Letter	Section Width	Dimension
A	N/A	5.00 (127)
B	N/A	15.00 (381)
C	20.00 (508)	10.00 (254)
	25.00 (635)	15.00 (381)
	30.00 (762)	20.00 (508)
	35.00 (889)	25.00 (635)
D	N/A	9.98 (253)
E	N/A	11.60 (295)
F	N/A	12.50 (318)
G	N/A	5.00 (127)
H	N/A	3.60 (91)

N/A = Not applicable

Table 7 - 20 (508) Section Dimensions in. (mm)

Letter	Section Width	Dimension
A	N/A	5.00 (127)
B	N/A	20.00 (508)
C	20.00 (508)	10.00 (254)
	25.00 (635)	15.00 (381)
	30.00 (762)	20.00 (508)
	35.00 (889)	25.00 (635)
D	N/A	14.98 (380)
E	N/A	11.60 (295)
F	N/A	12.50 (318)
G	N/A	5.00 (127)
H	N/A	3.60 (91)

N/A = Not applicable

NOTE: The dimensions shown are tie-down locations within individual MCC sections. Refer to factory supplied drawings to determine appropriate anchor locations for the equipment pad.

1. Remove and retain the 3/8-16 Keps™ nuts securing the cable vault front cover.
2. Remove the cable vault front cover.
3. Remove and retain the 3/8-16 Keps nuts securing the cable vault rear panel.
4. Remove the rear panel from the inside of the cable vault.
5. Install the seismic hardware.
6. Reinstall the rear panel and front cover using the 3/8-16 Keps nuts retained in steps 1 and 3.

Seismic Tie-Down Access for ArcBlok 2500 with Bottom-feed, Line-side, Isolation Cable Vault

Anchor Point Access for ArcBlok 2500 with Bottom-Feed, Line-Side, Isolation Cable Vault

The front cover and rear access panel of each ArcBlok bottom-feed cable vault are removable to allow access to section anchor points.

1. Unplug the terminal block of ArcBlok Event Indicator and put it on the right side of the cable vault. Do not unplug any wires of the terminal block.
2. Remove and retain the 1/4-20 hardware securing the cable vault front cover.
3. Remove and retain the cable vault front cover.
4. Remove and retain the 1/4-20 hardware securing the cable vault rear access panel.
5. Remove and retain the rear access panel from the inside of the cable vault.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

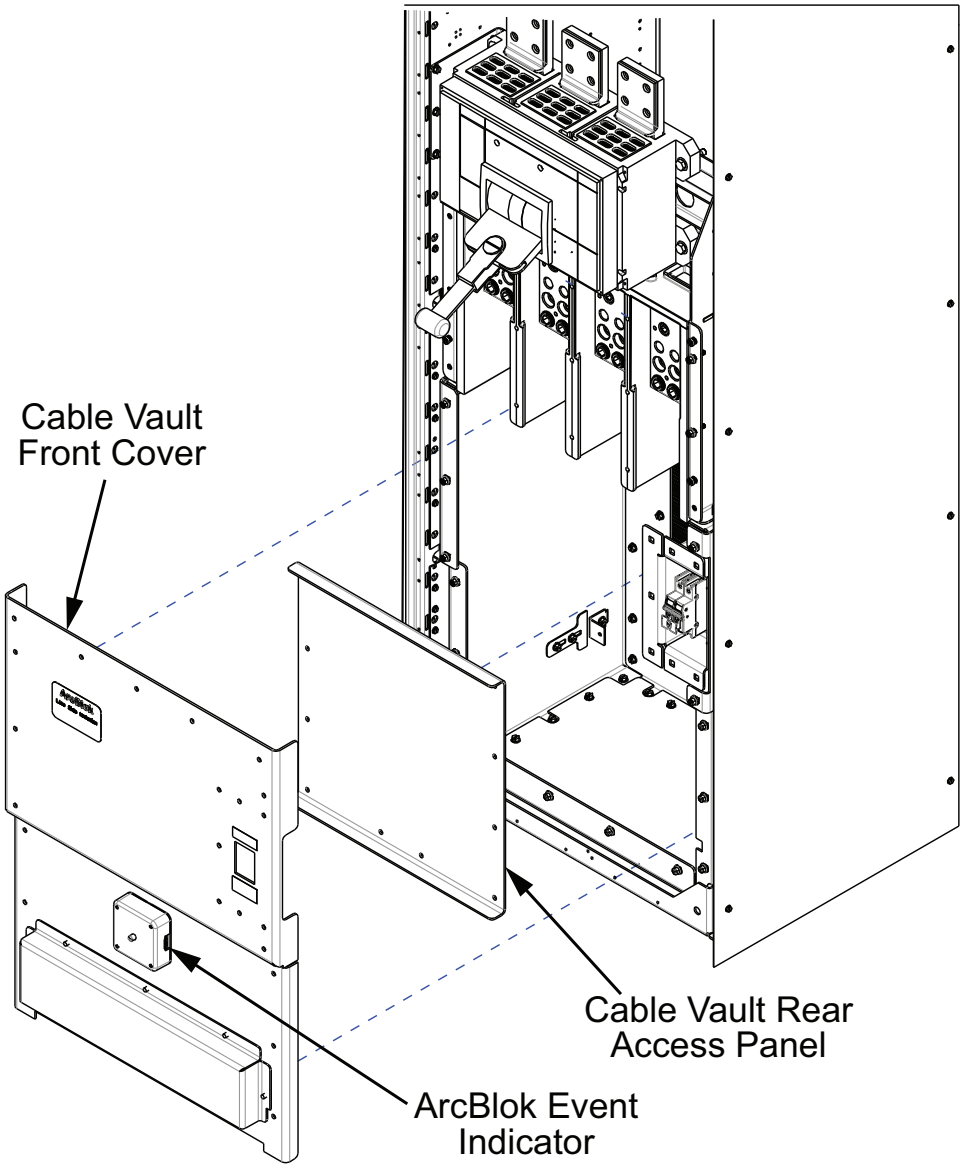
- Replace this cover after section is anchored.
- Do not turn on power if this cover is uninstalled.
- Torque cover hardware to 95–105 lb-in. (10.7–11.9 N•m).

Failure to follow these instructions will result in death or serious injury.

6. Install the anchor hardware.
7. Reinstall the rear access panel using 1/4-20 hardware retained in step 4. Torque hardware to 95–105 lb-in. (10.7–11.9 N•m).
8. Reinstall the cable vault front cover using 1/4-20 hardware retained in step 2 and 3.

9. Re-plug the terminal block of ArcBlok Event Indicator removed in step 1.

Figure 20 - Cable Vault Rear Access Panel



Securing Structures to Wall—Seismic Hazard(2) Designated Locations

When specified or required for the application (all seismic hazard areas with S_s in excess of 2.67g), each section must be laterally braced at the top (bracing supplied by others) and connected to the load-bearing path of the building system per detail supplied by engineer of record. Refer to the current International Building Code or NFPA 5000 for location specific values of S_s.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Turn off power supplying equipment before installing lateral bracing.
- Bolts must not penetrate top plate by more than 0.50 in. (12.7 mm).

Failure to follow these instructions will result in death or serious injury.

Remove the lifting angle and fasten each section to the lateral restraint system (supplied by others) using the same attachment points used to secure the lifting angle. Re-use bolts and lock washer supplied with the lifting angle or hardware supplied by others as appropriate. Pay particular attention to the limitation on the depth the bolt can penetrate below the surface of the top plate. The bolts must not penetrate the top plate of the enclosure by more than 0.50 in.

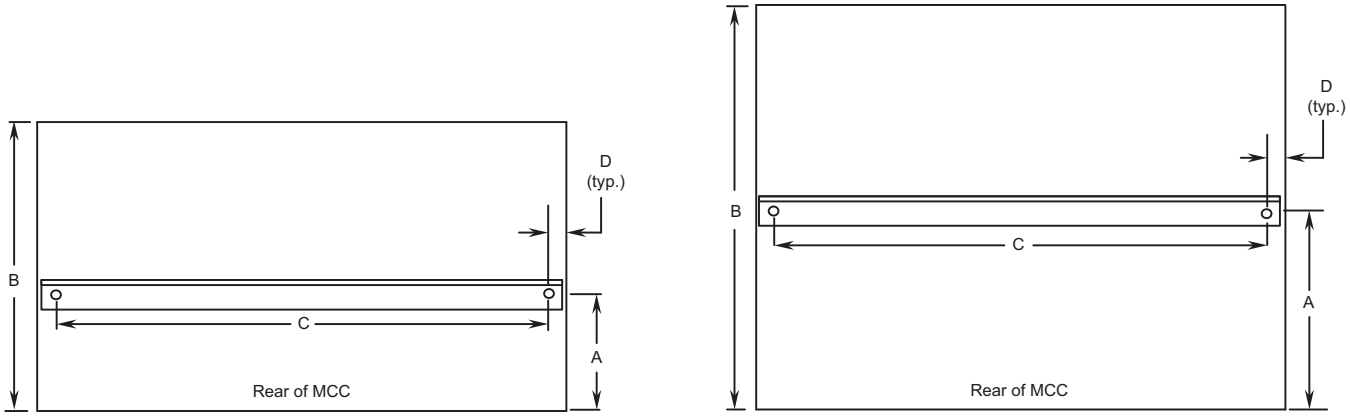
Each section must also be anchored at the base. See the instruction label located on the inside of the bottom horizontal wireway cover.

NOTE: On arc-rated MCCs, do not block roof flaps with lateral restraint components.

(2) Seismic hazard for site specific locations as defined by the current edition of the International Building Code or NFPA 5000 or relevant local building code or consulting engineer of record.

Figure 21 - Attachment Locations for Top Lateral Bracing

NOTE: The dimensions shown are for locating top lateral bracing locations within individual MCC sections. Refer to factory supplied drawings to determine appropriate anchor locations for the top lateral brace support system.



Dimensions: in. (mm)

Table 8 - 15 (381) Section Dimensions

Letter	Section Width	Dimension
A	N/A	5.25 (133)
B	N/A	15.00 (381)
C	20.00 (508)	18.40 (467)
	25.00 (635)	23.40 (594)
	30.00 (762)	28.40 (721)
	35.00 (889)	33.40 (848)
D	N/A	0.80 (20)

N/A = Not applicable

Table 9 - 20 (508) Section Dimensions

Letter	Section Width	Dimension
A (single lifting angle)	N/A	10.25 (260)
A (two lifting angles)	N/A	1.91 (48)
B	N/A	20.00 (508)
C	20.00 (508)	18.40 (467)
	25.00 (635)	23.40 (594)
	30.00 (762)	28.40 (721)
	35.00 (889)	33.40 (848)
D	N/A	0.80 (20)

N/A = Not applicable

Splice Gaskets for Type 1 Gasketed, Type 1 Sprinkler-resistant, and Type 12 Enclosures

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

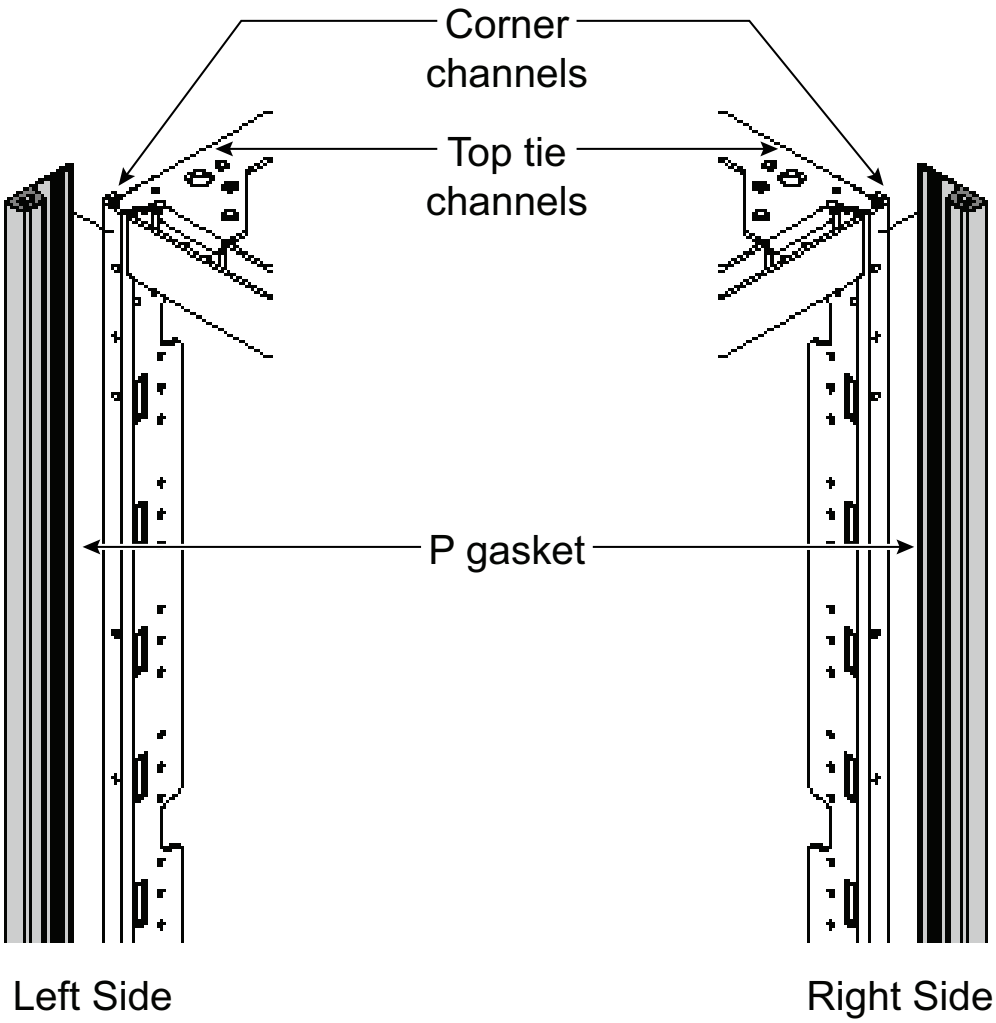
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying the equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.
- When moving MCC sections, follow the instructions in Handling the MCC. The MCC has a high center of gravity, which may cause it to tilt.

Failure to follow these instructions will result in death or serious injury.

Model 6 MCC, Type 12 sections manufactured between 1992 and 2005 included "P" shaped gaskets. When splicing to an existing MCC, refer to P Gasketing, page 46. If a P gasket is:

- Not installed, follow the instructions in Splicing Without P Gasketing, page 46.
- Installed, follow the instructions in Splicing With P Gasketing, page 47.

Figure 22 - P Gasketing



Splicing Without P Gasketing

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. If splicing to an existing MCC, remove the end plate and any gasketing from the existing MCC.
3. Remove the white paper backing from the new gaskets (supplied by Schneider Electric) to expose the adhesive. This adhesive temporarily holds the gaskets in place while the sections are being positioned.
4. Apply flat gaskets to the outside of the front and rear vertical corner channels. The gaskets must not extend above the top of the corner channels.
5. Apply flat gaskets to the outside of the top and bottom tie channels. The gaskets must not extend above the top of the tie channels.
6. Applying thumb pressure, firmly press the gaskets in place from top to bottom. Verify that the gaskets are flat along the entire length.
7. Join sections together following the appropriate steps in Joining Type 1, Type 1 Gasketed, and Type 12 Sections, page 30 or Joining Type 1 Sprinkler-resistant Sections, page 56.

Splicing With P Gasketing

Determine the location of the existing P gasket before splicing. If the P gasket is on the left (see P Gasketing, page 46), follow the instructions Splice to Existing Left, page 47. If the P gasket is on the right (see P Gasketing, page 46), follow the instructions Splice to Existing Right, page 47.

Splice to Existing Left

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Remove the end plate and all flat gaskets from the existing MCC. Leave the P gasket on the existing front corner channel in place.
3. Remove the factory installed flat gasket from the front corner channel of the new vertical section.
4. Join sections together following the appropriate steps in Joining Type 1, Type 1 Gasketed, and Type 12 Sections, page 30 or Joining Type 1 Sprinkler-resistant Sections, page 56.

Splice to Existing Right

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Remove the end plate and all flat gaskets from the existing MCC. Leave the P gasket on the existing front corner channel in place.
3. Remove the white paper backing from the new gaskets (supplied by Schneider Electric) to expose the adhesive. This adhesive temporarily holds the gasket in place while the sections are being positioned.
4. Apply a flat gasket to the outside of the rear vertical corner channel of the existing section. The gasket must not extend above the top of the corner channel.
5. Apply flat gaskets to the outside of the top and bottom side channels. The gaskets must not extend above the top of the side channels.
6. Applying thumb pressure, firmly press the gasket in place from top to bottom. The gasket must be flat along the entire length.
7. Join sections together following the appropriate steps in Joining Type 1, Type 1 Gasketed, and Type 12 Sections, page 30 or Joining Type 1 Sprinkler-resistant Sections, page 56.

Joining New Style Type 3R Enclosures to Old Style Type 3R Enclosures

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

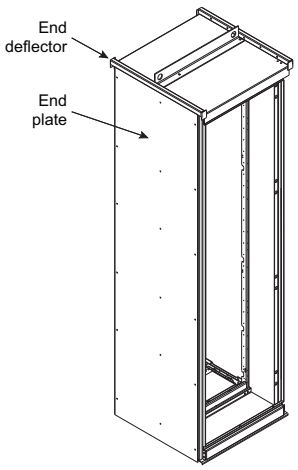
This section provides instructions for joining new style Type 3R enclosures manufactured after February 1998 to old style Type 3R enclosures manufactured before February 1998 (the new MCC enclosure is 3 in. (76 mm) shorter than the existing MCC). Instructions for joining to the left or right of an existing MCC enclosure (as viewed from the front) are provided.

For all MCCs in Type 3R enclosures, the parts required for joining the enclosures are included in a kit. This kit is shipped with the MCC order and contains all the parts necessary to join the enclosures.

NOTE: All Type 3R sections manufactured after February 1998 measure approximately 93 in. (2362 mm) from the bottom of the section to the top of the deflector.

Joining to the Left Side of an Existing Type 3R MCC Enclosure

Figure 23 - Removing the End Deflector

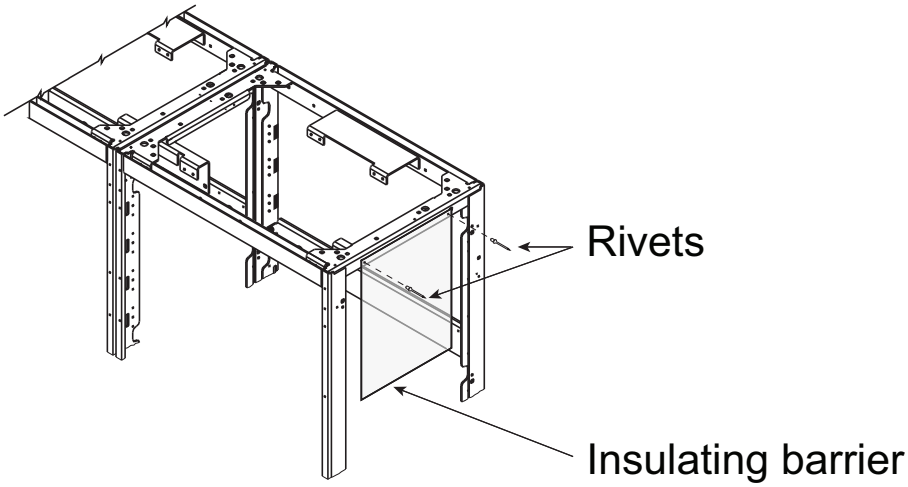


1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Remove the end deflector (see Removing the End Deflector, page 48) from the leftmost section of the existing MCC and the end deflector, if supplied, from the rightmost section of the MCC being added. Discard both end deflectors. Retain the hardware for installation of new parts.
3. Remove the back plate from the leftmost section of the existing MCC and from the rightmost section of the MCC being added. Retain the back plates and mounting hardware for re-installation.
4. Remove the end plate (see Removing the End Deflector, page 48) from the leftmost section of the existing MCC and the end plate, if supplied, from the rightmost section of the MCC being added. Discard both end plates. Retain the hardware for installation of new parts.

5. Remove the insulating barrier (see Removing the Insulating Barrier, page 49) from the leftmost section of the existing MCC by punching out the rivets that are holding the barrier in place. Repeat this procedure for the barrier, if supplied, in the rightmost section of the MCC being added. Discard both barriers.

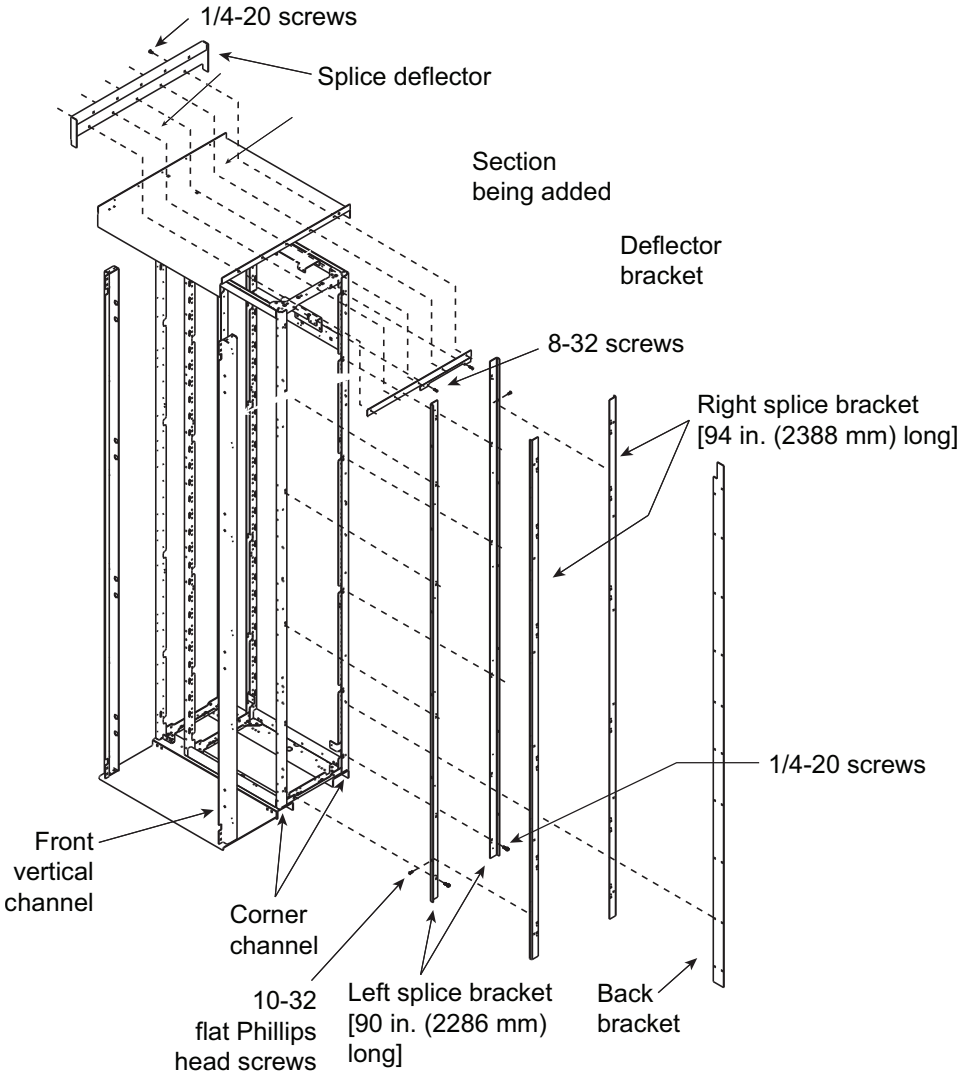
   NOTE: Ensure that rivet parts do not fall into the MCC.

Figure 24 - Removing the Insulating Barrier



6. Install the deflector bracket (see Installing the Deflector Bracket, page 50) on the right most section of the MCC being added using two 8-32 Phillips head screws included in the kit. The same holes from which the rivets were removed are used to mount the deflector bracket. The top holes of the bracket must align with the holes in the top plate of the enclosure.

Figure 25 - Installing the Deflector Bracket

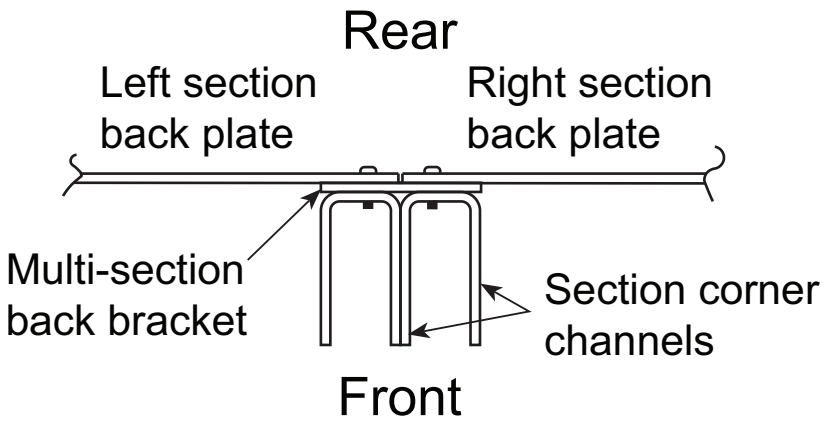


7. Attach a left splice bracket (see Installing the Deflector Bracket, page 50), 90 in. (2286 mm) long, to the front corner channel of the right most section of the MCC being added using six
1/4–20 screws contained in the kit. The short flange must be flush with the front of the corner channel and that the holes in the bracket line up with the holes in the corner channel.
8. Install a left splice bracket (see Installing the Deflector Bracket, page 50), 90 in. (2286 mm) long, to the rear corner channel of the right most section of the MCC being added using six
1/4–20 screws contained in the kit. The short flange must be flush with the back of the corner channel and that the holes in the bracket line up with the holes in the corner channel.
9. Attach a right splice bracket (see Installing the Deflector Bracket, page 50), 94 in. (2388 mm) long, to the left splice bracket installed in step 7 using six 10–32 flat Phillips head screws contained in the kit. The short flange must be behind the flange of the left splice bracket. The right splice bracket extends below the left splice bracket by approximately one in. (25 mm) when properly installed.

10. Install a right splice bracket (see Installing the Deflector Bracket, page 50), 94 in. (2388 mm) long, to the left splice bracket installed in step 8 using six 10–32 flat Phillips head screws contained in the kit. The short flange must be in front of the flange of the left splice bracket. The right splice bracket extends below the left splice bracket by approximately one in. (25 mm) when properly installed.
11. Position the structures that are to be spliced. Check that the fronts are flush to ensure proper alignment of all components.
12. Splice sections using the instructions in the Model 5 Instruction Bulletin (8998IM9101) if joining to a Model 5 MCC, or the instructions in Splice Gaskets for Type 1 Gasketed, Type 1 Sprinkler-resistant, and Type 12 Enclosures, page 45 if joining to a Model 6 MCC.

    NOTE: When splicing the horizontal bus between the new and existing MCC sections, remove the splice bars contained in the leftmost section of the existing MCC. Discard the splice bars. Install the horizontal bus splice assembly provided in this kit using the instructions beginning in Splicing Power Bus for Type 1 and Type 12 Enclosures, page 59. Use the remaining six 1/4–20 hex head screws provided in the kit to splice the corner channels of the existing MCC to the right splice brackets installed in steps 9 and 10.

Figure 26 - Re-attaching the Back Plates



13. Using the 10–32 hex head screws removed in step 3, re-attach the back plate (see Re-attaching the Back Plates, page 51) to the rightmost section of the new MCC. Install the back bracket (see Installing the Deflector Bracket, page 50) under the back plate using the left side holes of the back bracket. The notch at the top of the back bracket must be installed toward the new MCC section.
14. Using the 10–32 screws removed in step 3, re-attach the back plate (see Re-attaching the Back Plates, page 51) to the right section.
15. Install the splice deflector (see Installing the Deflector Bracket, page 50) to the rightmost section of the MCC being added. Use the five 1/4–20 screws supplied in the kit. Both the top plate flanges must be covered.
16. Install five of the 1/4–20 screws removed in step 2 through the splice deflector and into the top plate of the leftmost section of the existing MCC.
17. Using the six 10–32 screws supplied in the kit, secure the right front vertical channel of the new Type 3R enclosure to the left front vertical channel of the existing Type 3R enclosure.

    NOTE: Install the screws through the clearance holes in the left front vertical channel of the existing MCC into the right front vertical channel of the new MCC.

18. Before energizing the equipment, replace all covers and barriers.

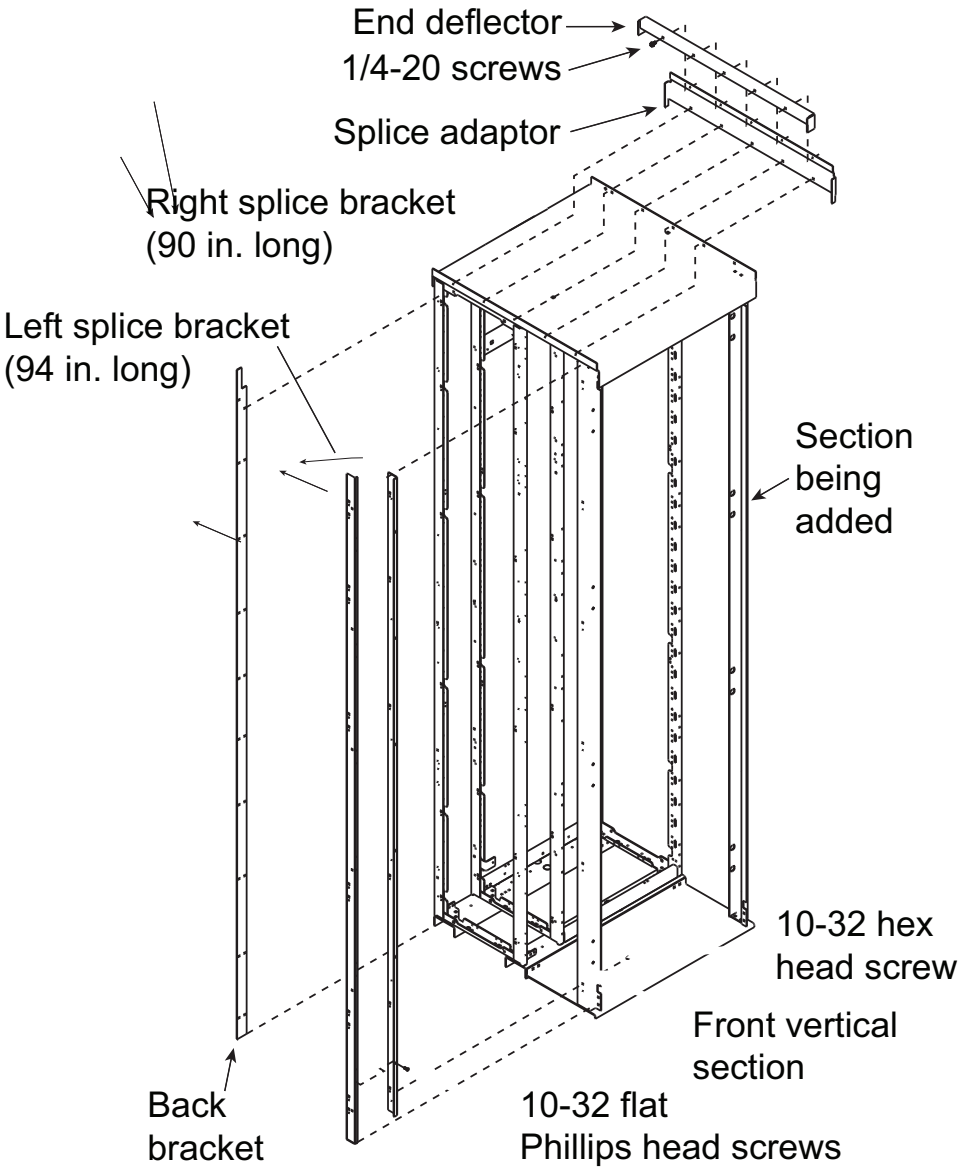
Joining to the Right Side of an Existing Type 3R MCC Enclosure

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Remove the end deflector (see Removing the End Deflector, page 48) from the rightmost section of the existing MCC and the end deflector, if supplied, from the leftmost section of the MCC being added. Retain hardware for use in step 12. Discard both end deflectors.
3. Remove the back plate from the rightmost section of the existing MCC and from the leftmost section of the MCC being added. Retain the back plates and mounting hardware for re-installation.
4. Remove the end plate (see Removing the End Deflector, page 48) from the rightmost section of the existing MCC and the end plate, if supplied, from the leftmost section of the MCC being added. Discard both end plates.
5. Remove the insulating barrier (see Removing the Insulating Barrier, page 49) from the rightmost section of the existing MCC by punching out the rivets that are holding the barrier in place. Repeat this procedure for the barrier, if provided, located in the leftmost section of the MCC being added. Discard both barriers.

   NOTE: Ensure that rivet parts do not fall into the MCC.

6. Install the left splice bracket (see Installing the Splice Deflector, page 53), 94 in. (2388 mm) long, to the right front vertical channel of the existing MCC. Use six 10–32 hex head screws provided in the kit. The long flange of the splice channel mounts to the side of the vertical channel with the short flange near the front of the vertical channel. When properly installed, the bottom of the left splice bracket is flush with the bottom of the vertical channel.

Figure 27 - Installing the Splice Deflector



7. Install the right splice bracket (see Installing the Splice Deflector, page 53), 90 in. (2286 mm) long, to the left splice bracket installed in step 6 using six 10–32 flat Phillips head screws provided in the kit. The short flange of the right splice bracket must be in front of the flange of the left splice bracket. When properly installed, the left splice bracket extends approximately one in. (25 mm) below the right splice bracket.
8. Position the structures that are to be spliced together. Make sure that the fronts are flush. This ensures proper alignment of all components.
9. Splice sections using the instructions in the Model 5 Instruction Bulletin (8998IM9101) if joining to a Model 5 MCC, or the instructions in Splice Gaskets for Type 1 Gasketed, Type 1 Sprinkler-resistant, and Type 12 Enclosures, page 45 if joining to a Model 6 MCC. Use the 12 1/4–20 hex head screws provided in the kit to splice the corner channels of the existing MCC to the corner channels of the new MCC.

10. Re-attach the back plate (see Re-attaching the Back Plates, page 51) to the leftmost section of the MCC being added by using the 10–32 hex head screws removed in step 4. Install the back bracket (see Installing the Splice Deflector, page 53) under the back plate using the right side holes of the back bracket. The notch at the top of the back bracket must be installed toward the new MCC section.
11. Using the hardware removed in step 3, re-attach the back plate (see Re-attaching the Back Plates, page 51) to the rightmost section of the existing MCC.
12. Install the splice adaptor (see Installing the Splice Deflector, page 53) to the leftmost section of the MCC being added by using five 1/4–20 screws provided in the kit.
13. Position the end deflector, provided in the kit, over the top plate flanges of both sections (see Installing the Splice Deflector, page 53) and install with five 1/4–20 screws removed in step 2.
14. Using six 10–32 hex head screws, provided in the kit, secure the right front vertical channel of the MCC being added to the right splice bracket installed in step 7 (see Installing the Splice Deflector, page 53).
15. Before energizing the equipment, replace all covers and barriers.

Joining Type 3R Sections

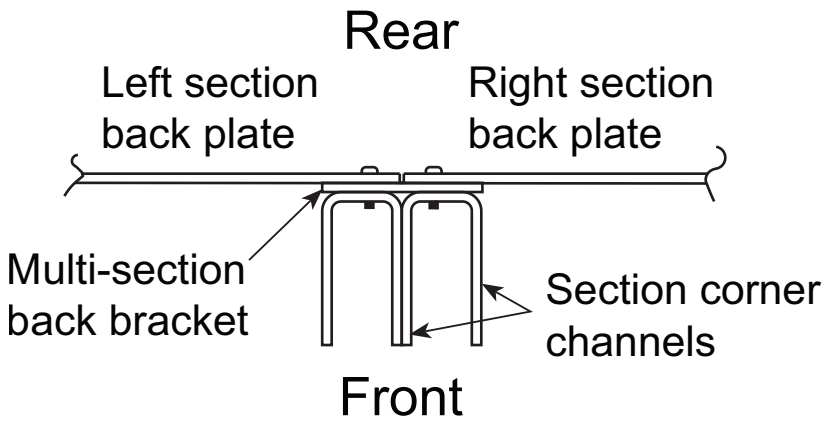
This section provides instructions for joining Type 3R MCC sections (manufactured after February 1998).

NOTE: All Type 3R sections manufactured after February 1998 are approximately 93 in. (2362 mm) from the bottom of the section to the top of the deflector.

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Remove the right section back plate (see Attach the Multi-Section Bracket, page 54).

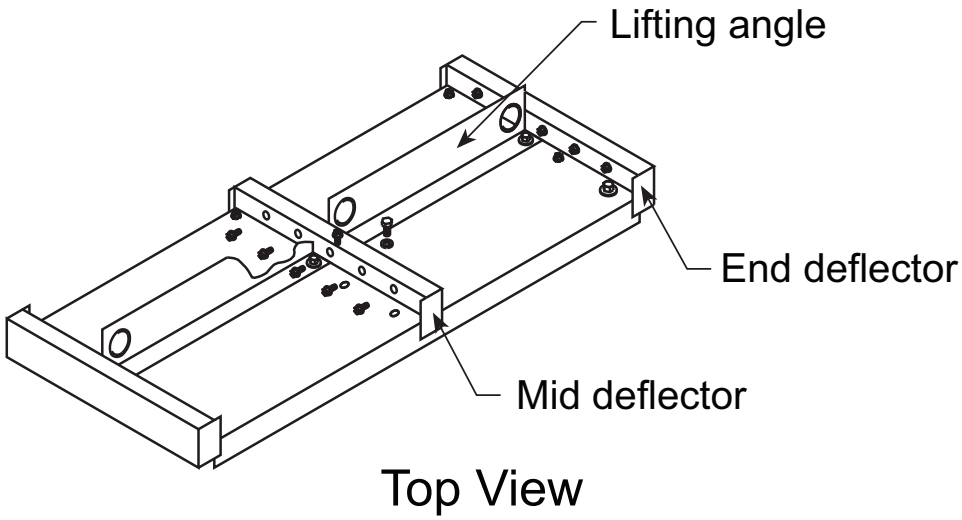
   NOTE: Steps 3 and 4 apply only if a new section is being added to an existing MCC line-up. If installing a new line-up, skip to step 5.

Figure 28 - Attach the Multi-Section Bracket



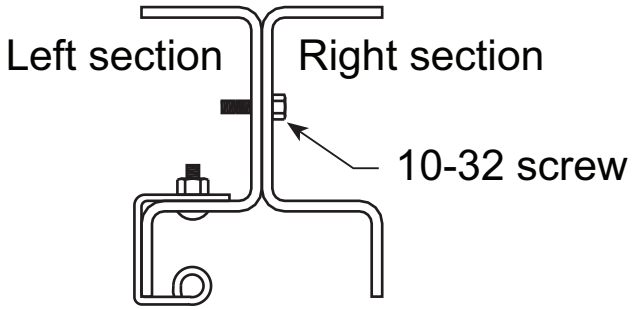
3. Remove the end deflector cap from the right side of the existing Type 3R section (seeRemove Mid and End-deflector Caps from the Top of the MCC, page 55). Also, remove the mid-deflector cap from the section being added to the right.

Figure 29 - Remove Mid and End-deflector Caps from the Top of the MCC



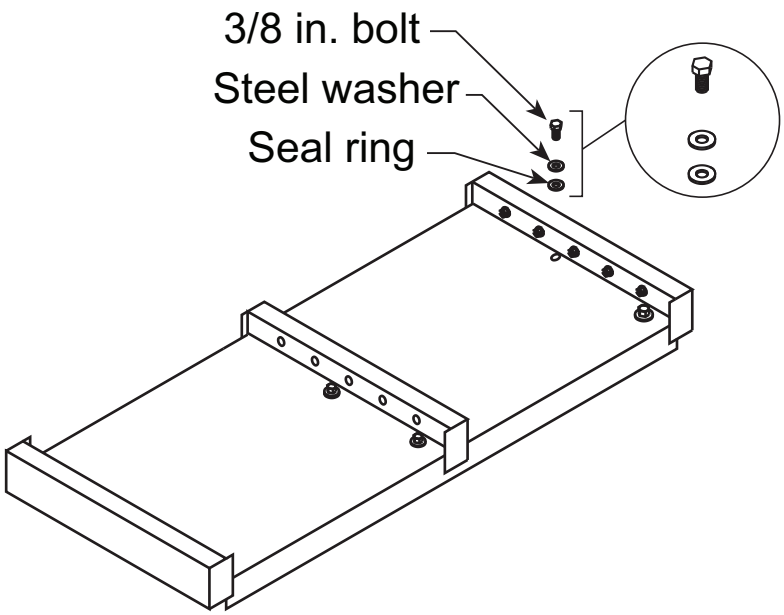
4. Remove the end closing plate from the right side of the existing section.
5. After placing the structures side-by-side, join them as described in Joining Type 1, Type 1 Gasketed, and Type 12 Sections, page 30.
6. Re-attach the back plate (removed in step 2) to the right section using the additional hardware supplied. Attach the right side to the multi-section bracket (see Attach the Multi-Section Bracket, page 54).
7. Install the mid deflector, ensuring both top plate flanges are covered (see Remove Mid and End-deflector Caps from the Top of the MCC, page 55).
8. Using the six 10-32 screws supplied, secure the left front vertical channel of the Type 3R extension to the right front vertical channel of the Type 3R extension (see Secure the Vertical Channels, page 55).

Figure 30 - Secure the Vertical Channels



9. If the lifting angle is to be removed from the sections after installation, replace all hardware in the order shown (see Replace Lifting Angle Hardware, page 56).

Figure 31 - Replace Lifting Angle Hardware



Joining Type 1 Sprinkler-resistant Sections

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

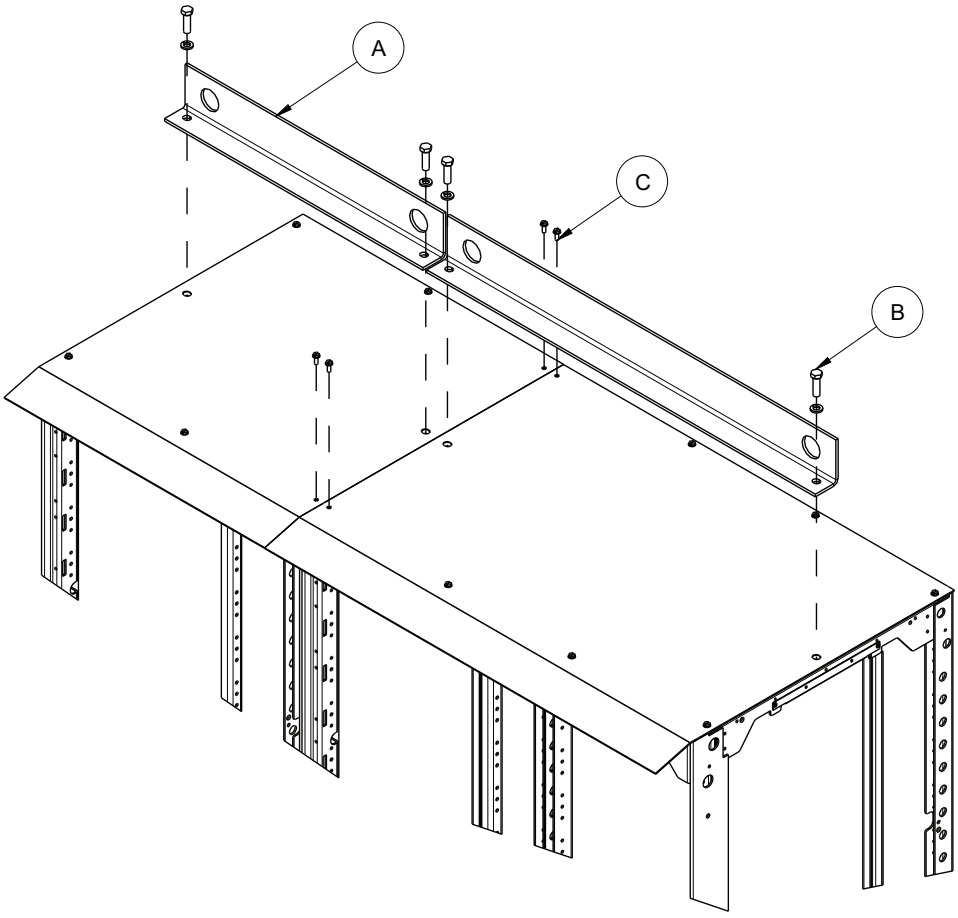
Failure to follow these instructions will result in death or serious injury.

This section contains instruction for joining MCC sections provided with a sprinkler-resistant enclosure.

1. Join sections together as described in Joining Type 1, Type 1 Gasketed, and Type 12 Sections, page 30.

   See **Removing the Lifting Angles and Hardware**, page 57 for steps 2 and 3.

Figure 32 - Removing the Lifting Angles and Hardware

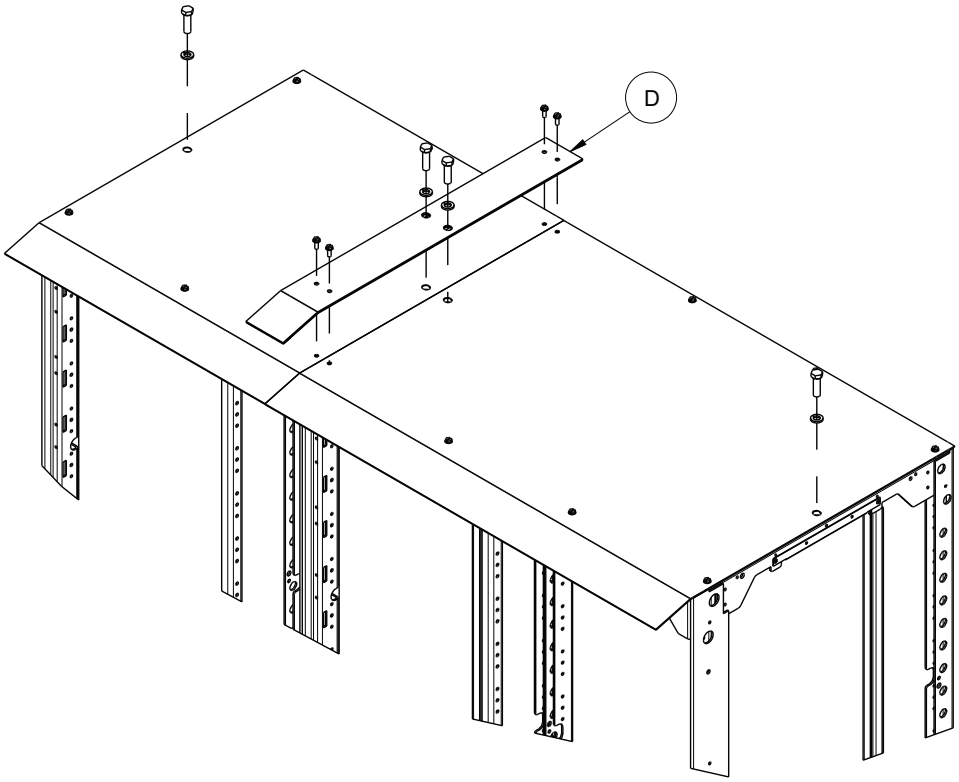


2. Uninstall and discard the lifting angles (A) by removing the 3/8-in bolts and washers (B) securing them.

3. Remove the 10-32 screws (C) on top of the MCC section closest to the sides of the MCC sections on which the drip hood splice plate will be installed.

   See **Installing the Drip Hood Splice Plate**, page 58 for steps 4 and 5.

Figure 33 - Installing the Drip Hood Splice Plate



4. Install the drip hood splice plate (D) by reusing the hardware removed in steps 2 and 3.
5. Install the rest of the hardware removed in step 2.

Splicing Power Bus for Type 1 and Type 12 Enclosures

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

To splice the power bus:

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Remove the horizontal wireway covers and slide the horizontal bus barriers to gain access to the captive splice connectors (see Horizontal Wireway Covers and Bus Barriers Removed, page 59). See Appendix A–Removal and Installation of Horizontal Bus Barrier Panels, page 208 for the steps for removing horizontal bus barriers.

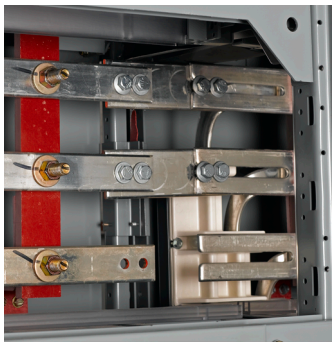
Figure 34 - Horizontal Wireway Covers and Bus Barriers Removed

Power Bus Splicing MCCs with Single Bar/Phase Splice Kit (600 A and 800 A, Copper Horizontal Bus, 65,000 A Short Circuit or Less, Shipped after August 2012)

NOTE: The integral splice kit used on shipments September 2012 and later, containing 600/800 A, copper, horizontal bus with a short circuit withstand current rating 65,000 A RMS consists of a single bar per phase and does not use a fork type bus (see Correct Application of Splice (shown installed) for 600/800 A, Non-fork Bus, page 60). DO NOT use the single bar per phase splice on the fork end of the fork type bus (see Incorrect Application of Single-Bar Splice on Fork-type Bus, page 60 for incorrect application). Two splice bars must be used on the fork end of the fork type bus (see Power Bus Splicing MCCs with Multiple Bar/Phase Splice Kit, page 62). Contact your local Schneider Electric representative if the necessary two-bar splice is not provided with your equipment.

Figure 35 - Correct Application of Splice (shown installed) for 600/800 A, Non-fork Bus

Figure 36 - Incorrect Application of Single-Bar Splice on Fork-type Bus



1. Remove all four bolts from the integral splice bar (see Remove Bolts from Single-splice Bar, page 60).

Figure 37 - Remove Bolts from Single-splice Bar

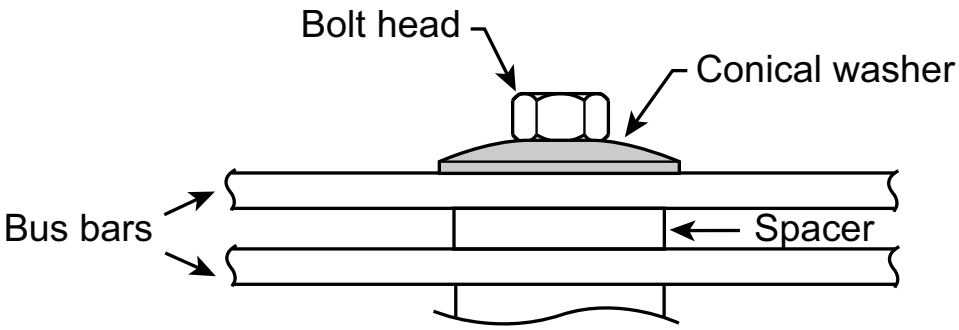
2. Move the single splice bar to the left and align the two left holes in the splice bar with the corresponding holes in the horizontal bus on the left section (see Move and Align the Splice Bar to the Bus Holes, page 61).

Figure 38 - Move and Align the Splice Bar to the Bus Holes

3. Reinstall the four bolts into the horizontal bus on the left and right sections (see Insert Splice Bolts in the Left and Right Sections, page 61). Make sure the original conical washers are reinstalled with the concave side facing the horizontal bus (see Place a Conical Washer Under the Bolt Head, page 61).

Figure 39 - Insert Splice Bolts in the Left and Right Sections

Figure 40 - Place a Conical Washer Under the Bolt Head



4. Torque all bolts on both ends to 31–32 lb-ft. (41.87–43.22 N•m). (See Torquing the Bolts, page 61).

Figure 41 - Torquing the Bolts

5. Return to step 2 in Splicing Power Bus for Type 1 and Type 12 Enclosures, page 59 for all phases and for the neutral bus (if supplied). When all splices are complete, go to step 6.
6. Before energizing the equipment, slide the horizontal bus barriers into the closed position and replace all covers.

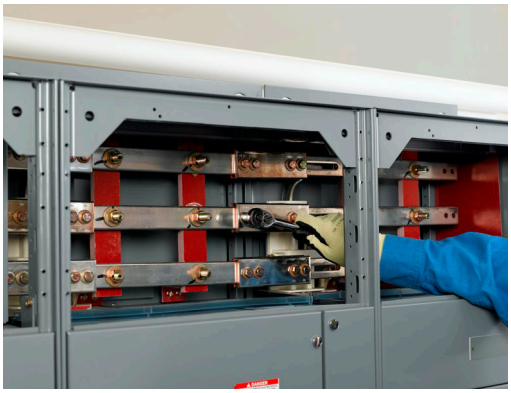
Power Bus Splicing MCCs with Multiple Bar/Phase Splice Kit

NOTE: On the integral splice bar assembly, located on the left side of each phase bus, the number of splice bars used on each phase is one greater than the number of main horizontal bus bars. The rear-most splice bar includes captive nuts.

1. Remove the two left bolts. Loosen, but do not remove, the two right bolts on the splice assembly (see Remove the Left Bolts and Loosen the Right Bolts on the Splice Assembly, page 62).

   NOTE: Do not remove the two right bolts from the splice assemblies. Doing so permits spacers to fall from the splice assembly. If this occurs, re-assemble the splice bars and spacers (if applicable) in the proper order before continuing.

Figure 42 - Remove the Left Bolts and Loosen the Right Bolts on the Splice Assembly



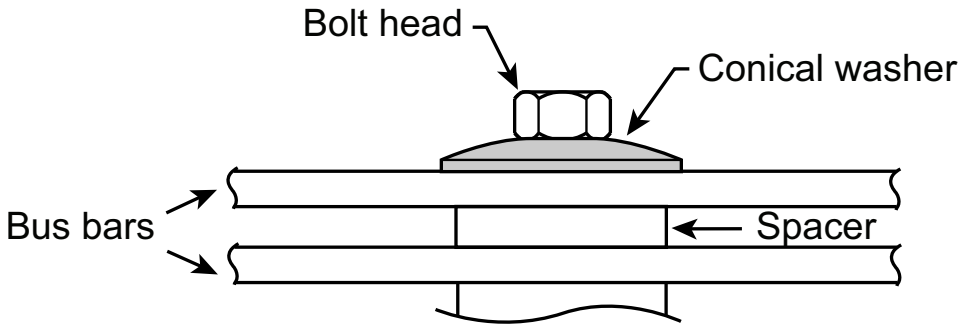
2. Slide the splice assembly to the left until the two left holes are in line with the corresponding holes in the horizontal bus on the left section (see Align the Splice and Bus Holes, page 62).

Figure 43 - Align the Splice and Bus Holes

3. Reinstall the two left bolts through the splice bars and into the horizontal bus (see Insert the Splice Bolts, page 63); make sure the original conical washers are reinstalled with the concave side facing the splice bus (see Place a Conical Washer Under the Bolt Head, page 63).

Figure 44 - Insert the Splice Bolts

Figure 45 - Place a Conical Washer Under the Bolt Head



4. Torque all bolts on both ends to 31–32 lb-ft. (41.87–43.22 N•m) (see Torque the Bolts, page 63).

Figure 46 - Torque the Bolts

5. Return to step 2 in Power Bus Splicing MCCs with Multiple Bar/Phase Splice Kit, page 62 for all phases and for the neutral bus (if supplied). When all splices are complete, go to step 6.
6. Before energizing the equipment, slide the horizontal bus barriers into the closed position and replace all covers.

Splicing Power Bus in Type 3R Enclosures

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

This section describes how to splice the power bus of a Type 3R enclosure (manufactured after February 1998) to the power bus of another Type 3R section. Bus splicing material is not captive if the section is equipped with offset bus. Refer to Splice Offset Horizontal Bus, page 71 for instructions for splicing offset power bus in Type 3R enclosures.

To splice power bus:

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Remove the horizontal wireway covers and slide the horizontal bus barriers to gain access to the captive splice connectors (see Wireway Covers Removed and Horizontal Bus Barriers Open, page 64 for the steps for removing horizontal bus barriers.

   NOTE: On the integral splice bar assembly, located on the left side of each phase bus, the number of splice bars used on each phase is one greater than the number of main horizontal bus bars. The rear-most splice bar includes captive nuts.

Figure 47 - Wireway Covers Removed and Horizontal Bus Barriers Open

3. Remove the two left bolts from each splice assembly. Then loosen, but do not remove, the two right bolts of each splice assembly (see Loosen Bolts, page 65). If the bus has optional 85,000 A bus bracing supplied (see 85,000 A Bracing Option, page 65), also loosen the center nut of each splice assembly.

   NOTE: Do not remove the two right bolts or the center bolt (if applicable) from the splice assemblies. Doing so permits spacers to fall from the splice assemblies. If this occurs, re-assemble the splice bars and spacers (if applicable) in the proper order before continuing.

Figure 48 - Loosen Bolts

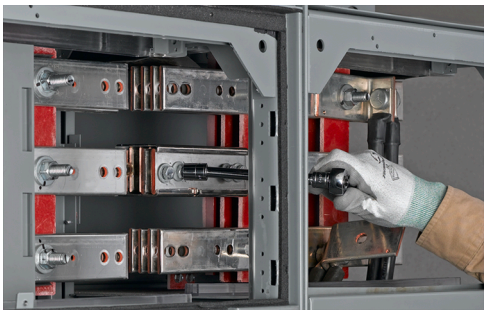
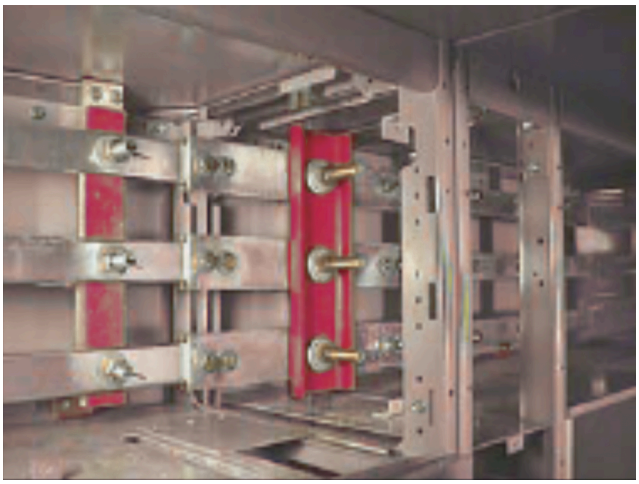


Figure 49 - 85,000 A Bracing Option



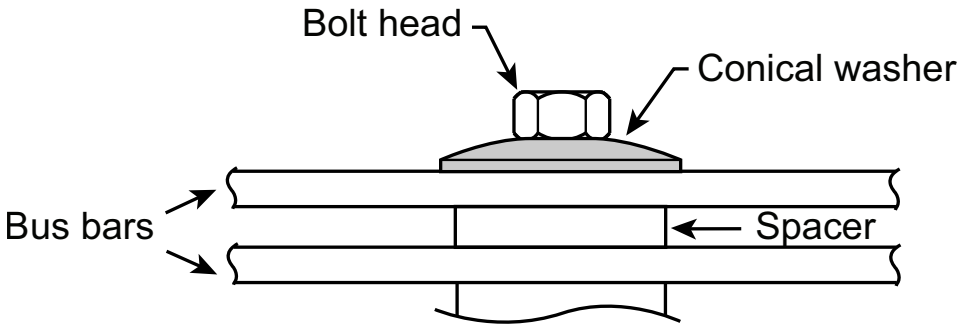
4. Slide the splice assembly to the left until the two left holes are in line with the corresponding holes in the horizontal bus in the left section (see Slide the Splice Assembly to the Left, page 65).

Figure 50 - Slide the Splice Assembly to the Left

5. Re-install the two left bolts through the splice assembly and into the horizontal bus (see Insert the Splice Bolts, page 66). Make sure the original conical washers are reinstalled with the concave side facing the splice bus (see Place a Conical Washer Under the Bolt Head, page 66).

Figure 51 - Insert the Splice Bolts

Figure 52 - Place a Conical Washer Under the Bolt Head



6. Torque the splice connection bolts at horizontal bus connections to 31–32 lb-ft. (41.87–43.22 N•m). Torque 85 kA support nuts (if applicable) to 68–72 lb-ft. (92.2–97.6 N•m) (see Torque All Bolts, page 66).

Figure 53 - Torque All Bolts

7. Repeat steps 2–6 for all phases and the neutral bus (if supplied).
8. Before energizing the equipment, replace all covers and barriers.

Power Bus Splicing of 2500 A Bus with 100,000 A Short Circuit Rating

This section provides instructions for splicing the power bus of one section with 2500 A bus braced for 100,000 A to the power bus of another section of the same type. Splicing material is captive on the integral splice assembly unless the section is equipped with an offset bus.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

To splice the power bus:

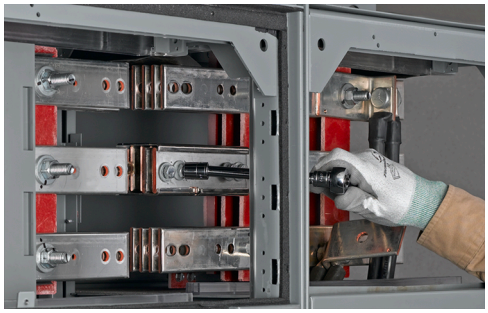
1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Remove the horizontal wireway covers and slide the horizontal bus barriers to gain access to the captive splice connectors (see Wireway Covers Removed and Horizontal Bus Barriers Open, page 67). See Appendix A–Removal and Installation of Horizontal Bus Barrier Panels, page 208 for the steps for removing horizontal bus barriers.

   NOTE: On the integral splice bar assembly, located on the left side of each phase bus, the number of splice bars used on each phase is one greater than the number of main horizontal bus bars. Splice bars are held captive on the horizontal bus by a splice bar carrier assembly. The rear of the carrier assembly includes captive nuts (see Wireway Covers Removed and Horizontal Bus Barriers Open, page 67).

Figure 54 - Wireway Covers Removed and Horizontal Bus Barriers Open

3. Remove all four bolts from each splice assembly (see Remove the Bolts from the Splice Assembly, page 68).

Figure 55 - Remove the Bolts from the Splice Assembly



4. Slide the splice assembly to the left until the two left holes are in line with the corresponding holes in the horizontal bus on the left section (see Align the Splice and Bus Holes, page 68).

Figure 56 - Align the Splice and Bus Holes

5. Reinstall all four bolts through the splice assembly and into the horizontal bus (see Insert the Splice Bolts, page 69). Make sure the original conical washers are reinstalled with the concave side facing the splice bus (see Place a Conical Washer Under the Bolt Head, page 69).

Figure 57 - Insert the Splice Bolts

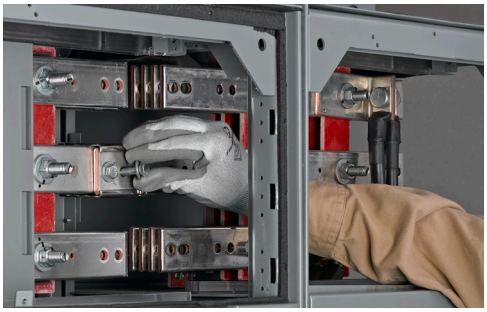
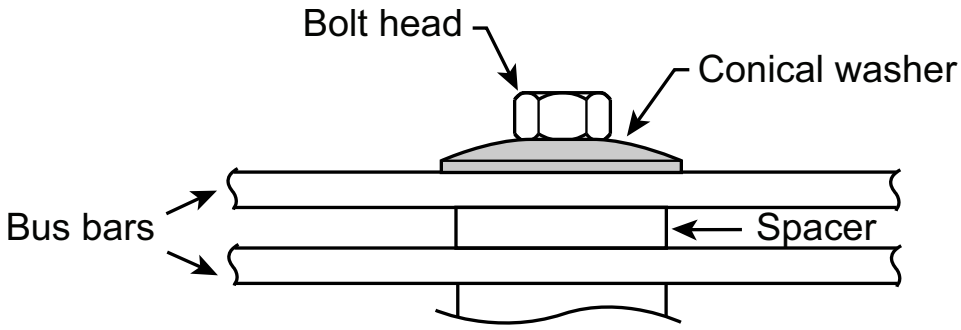
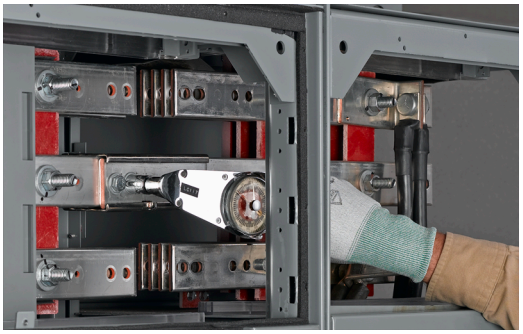


Figure 58 - Place a Conical Washer Under the Bolt Head



6. Torque all bolts on both ends to 31–32 lb-ft. (41.87–43.22 N•m) (see Torque All Bolts, page 69).

Figure 59 - Torque All Bolts



7. Repeat steps 2–6 for all phases and the neutral bus (if supplied).
8. Before energizing the equipment, replace all covers and barriers.

Splicing Offset for 3000/3200 A Horizontal Bus (Left Side of Structure Only)

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

NOTE:

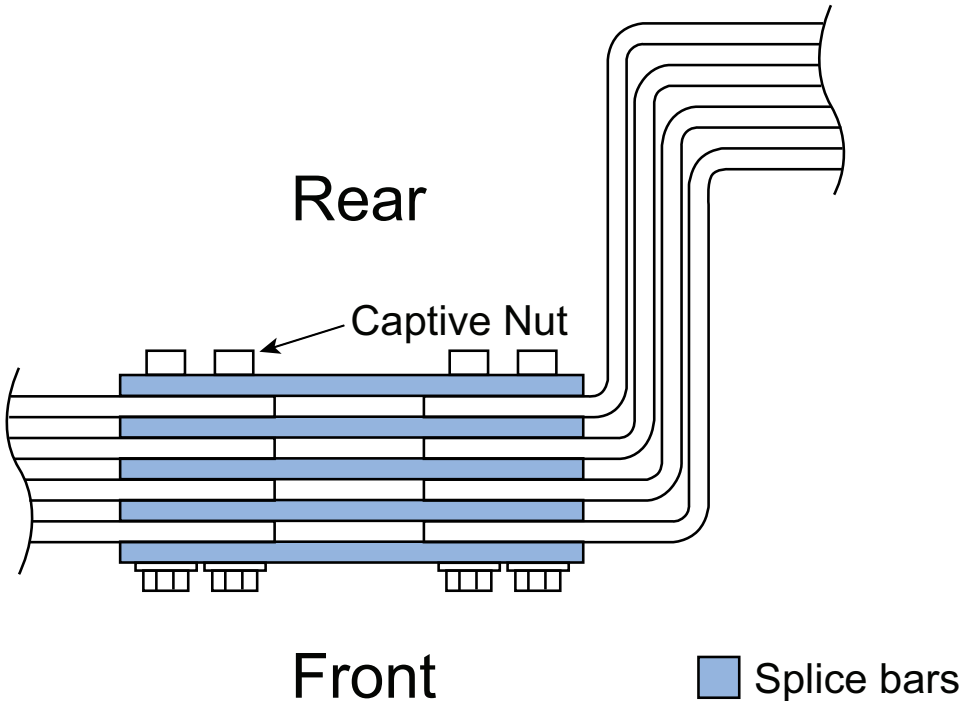
- In all structures with an offset or 3000/3200 A horizontal bus, splice bars are provided as a kit. This kit is packaged in a carton and shipped inside the structure. The kit contains all splice bars and mounting hardware necessary for horizontal bus splicing.
- Use the splice kit only if splicing is to be done on the left (while facing the structure). If the splice is not on the left, remove the kit before energizing and retain it for future expansion. If a structure is to be spliced to another structure on the right, follow splicing instructions provided for that structure application.
- On the integral splice bar assembly, located on the left side of each phase bus, the number of splice bars used on each phase is one greater than the number of main horizontal bus bars. The rear-most splice bar includes captive nuts.

To splice a horizontal bus on the left side of the structure:

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Join sections together following the appropriate steps beginning at Locating the MCC, page 28 and continuing through Joining Type 3R Sections, page 54. This provides proper alignment of the horizontal bus.

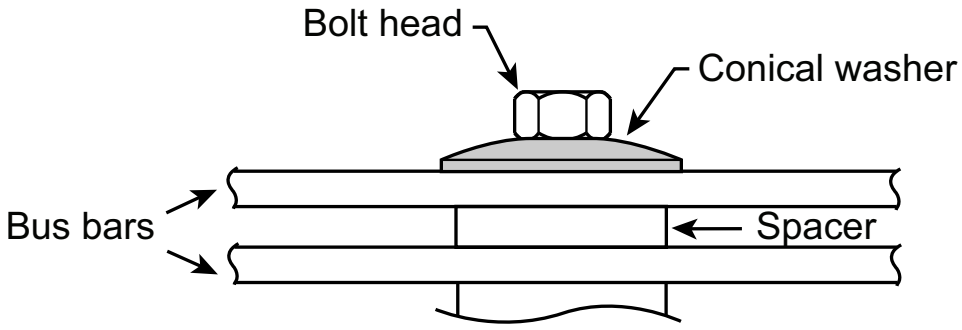
3. Position the rear splice bar (the bar with captive nuts (see Splice Offset Horizontal Bus, page 71) against the back face of the rear horizontal bus bar.

Figure 60 - Splice Offset Horizontal Bus



4. Install a plain splice bar between each lamination of horizontal bus; install the last bar against the front face of the horizontal bus (see Splice Offset Horizontal Bus, page 71).
5. Align the four mounting holes in the splice bus and the horizontal bus.
6. Re-install the two left bolts through the splice assembly and into the horizontal bus. Make sure the original conical washers are re-installed with the concave side facing the splice bus (see Place a Conical Washer Under the Bolt Head, page 71).

Figure 61 - Place a Conical Washer Under the Bolt Head



7. For 600–2500 A main bus splices, torque the bolts to 31-32 lb-ft. (41.87-43.22 N•m). For 3000/3200 A main bus splices, torque the bolts to 70 lb-ft. (94.92 N•m). Torque the center nut on 85 kA braced, 3R splice bar assemblies to 70 lb-ft. (94.92 N•m).
8. Repeat steps 2–6 for each of the three horizontal bus phases.
9. Before energizing the equipment, replace all covers and barriers.

Ground Bus Splicing for Type 1, Type 12, and Type 3R

NOTE: The MCC horizontal ground bus is located at the bottom of each MCC structure. It can be accessed by removing the bottom horizontal wireway cover or other bottom located cover on the structure. The ground bus splice plate is located on the right end of the ground bus in each shipping split.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

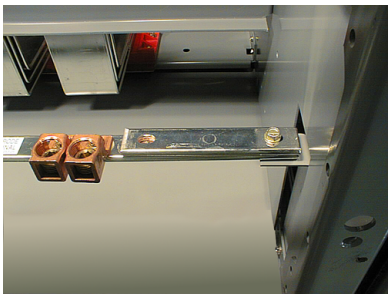
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

To splice the ground bus:

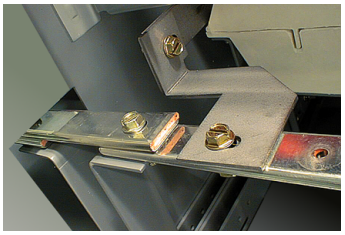
1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Remove ground bar bolts from the right and left sections (see Ground Splice Bar as Shipped, page 72).

Figure 62 - Ground Splice Bar as Shipped



3. Slide the ground splice bar into the right section, aligning the mounting holes (see Ground Bar Bolt Replaced, page 72).

Figure 63 - Ground Bar Bolt Replaced



4. Replace the ground bar bolts (see Ground Bar Bolt Replaced, page 72) in the right and left sections. Torque both bolts to 60–75 lb-in. (6.75–8.44 N•m).
5. Replace all covers and barriers and close all doors.

Ground Bus Splicing for Bottom-feed ArcBlok 1200 Main Sections

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

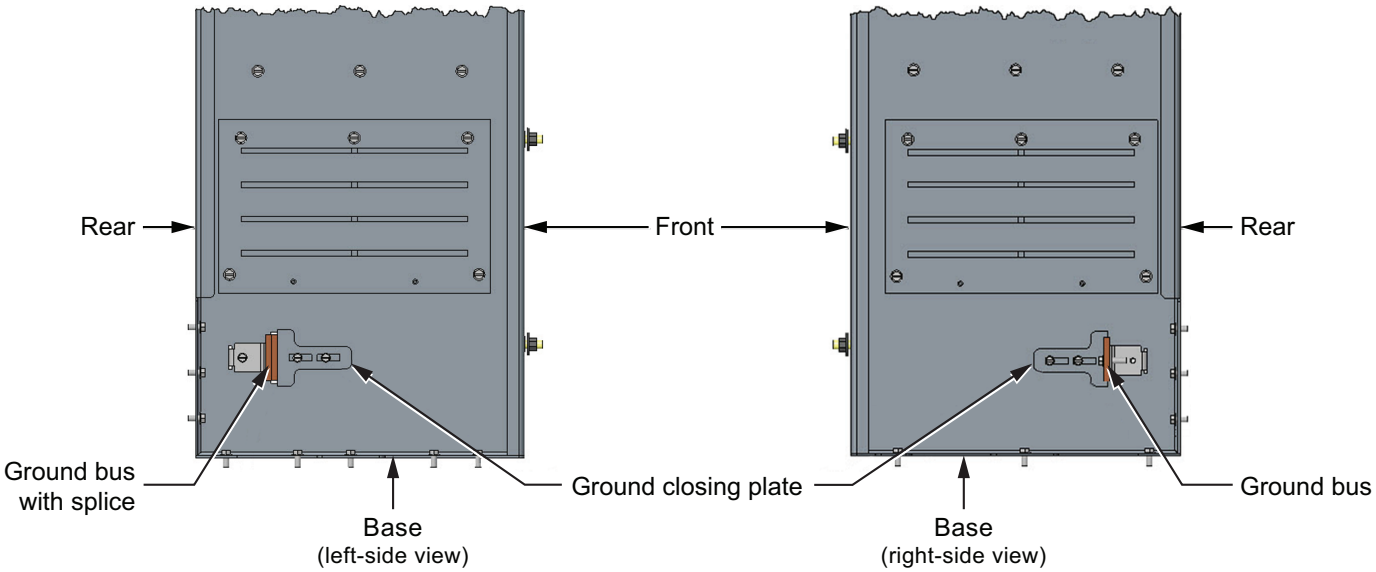
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment and follow your organization's lockout/tagout procedures.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

To splice the ground bus:

1. Remove the cable vault front cover to access the ground bus assembly.
2. Remove the ground bar bolts in the cable vault and in the adjacent MCC section.
3. Slide the ground splice bar into the right section, aligning the mounting holes.
4. Replace the ground bar bolts (see Ground Bar Bolt Replaced, page 72) in the right and left sections.
5. Torque the ground bar bolts to 60–75 lb-in. (6.75–8.44 N•m).
6. Place the ground closing plates into position to seal the cable vault (see Location of Ground Closing Plates, page 73).
   a. Slide the left ground closing plate against the splice bus bar.
   b. Slide the right ground closing plate to completely close the splice opening on the cable vault panel.

Figure 64 - Location of Ground Closing Plates

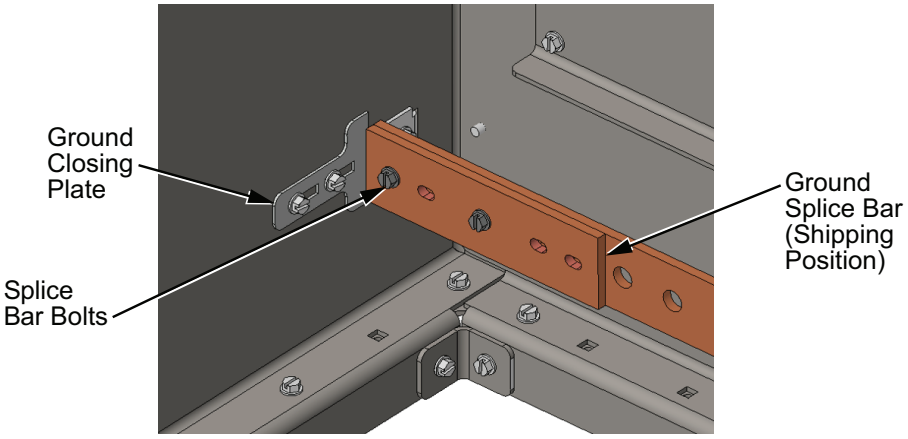


7. Replace all covers and barriers and close all doors.

Ground Bus Splicing for Bottom-feed ArcBlok 2500 Main Sections

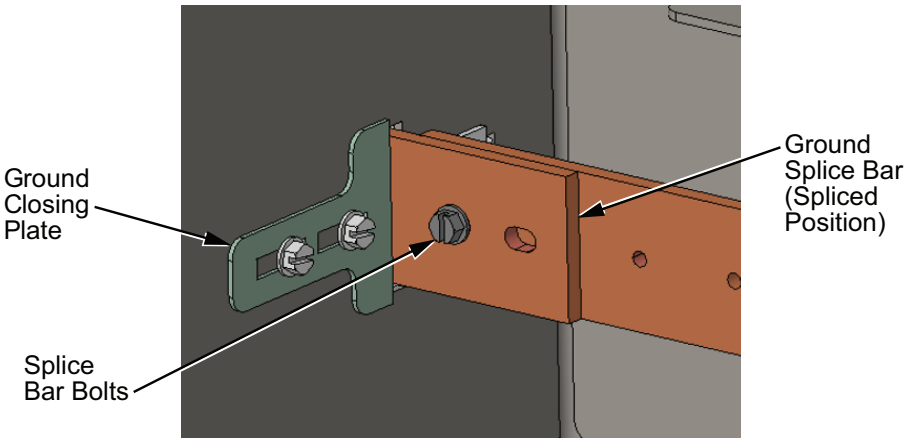
1. Remove the cable vault front cover to access the ground bus assembly.
2. For splicing to left adjacent section (if applicable):
   - Remove the bolts for the ground splice bar located on the left-side of the cable vault and the ground splice bar located on the right-side of the left adjacent section. (see Removing Bolts for Ground Splice Bar, page 74).

Figure 65 - Removing Bolts for Ground Splice Bar



   - Discard the ground splice bar on the right side of the left adjacent section.
   - Loosen the ground closing plate hardware on the left side of the cable vault and slide the closing plate forward to reveal open slot in cable vault.
   - Slide the ground splice bar located inside the cable vault to the left so that it aligns with the mounting hole of the ground bus in the left adjacent section.
   - Re-install one ground splice bar bolt in both sections, (see Re-install Ground Splice Bar Bolt, page 74).

Figure 66 - Re-install Ground Splice Bar Bolt



   - Torque the ground splice bar bolts to 60–75 lb-in. (6.75–8.44 N•m).
   - Slide the closing plate against the ground splice bar and tighten the ground closing plate hardware.

3. For splicing to right adjacent section (if applicable):
   - Remove the bolts for the ground splice bar located on the right-side of the cable vault.
   - If applicable, remove the bolts for the ground splice bar located on the left-side of the right adjacent section and discard the ground splice bar.
   - Loosen the ground closing plate hardware on the right side of the cable vault and slide the closing plate forward to reveal open slot in cable vault.
   - Slide the ground splice bar located inside the cable vault to the right so that it aligns with the mounting hole of the ground bus in the right adjacent section.
   - Re-install one ground splice bar bolt in both sections.
   - Torque the ground splice bar bolts to 60–75 lb-in. (6.75–8.44 N•m).
   - Slide the closing plate against the ground splice bar and tighten the ground closing plate hardware.
4. Replace all covers and barriers and close all doors.

Conductor Entry

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Conduit entry space is provided at the top and bottom of the MCC structure. The top plates (and closing plates in bottom, if present) are removable for convenience in wiring and cutting conduit openings). A hinged door or cover allows access to the main lug, main circuit breaker, or main switch compartment. In some cases, the horizontal wireway cover must be removed.

Determine the conduit requirements per local electrical codes to protect connections on top of the MCC. For Type 1 Sprinkler-Resistant, Type 12, and Type 3R enclosures, protect the top of the MCC from the ingress of water.

NOTE: Do not use the top of the MCC to support the weight of the conduit. Support the conduit independently. When conduit is installed, make sure no areas of the roof are bowed downward. This helps prevent pooling of water.

Pull boxes are available if additional wiring space is required.

Cable connection torque values are listed in Connection Torque Values for Main Lug Compartments, page 110 and Connection Torque Values for Main and Branch Feeders, page 111.

Conductor Entry for Line-side Isolation Cable Vaults with ArcBlok 1200

Conduit entry into main breaker sections equipped with ArcBlok and line-side Isolation cable vaults requires:

- Use of an 18 in. pull box for top-feed entry with a removable top plate.
- Line-side isolation cable vaults require removal of enclosure covers and barriers prior to removing the cable vault front cover and ArcBlok lug cover.

Figure 67 - Line-side Isolation Cable Vault and ArcBlok Top-feed Main Breaker Access

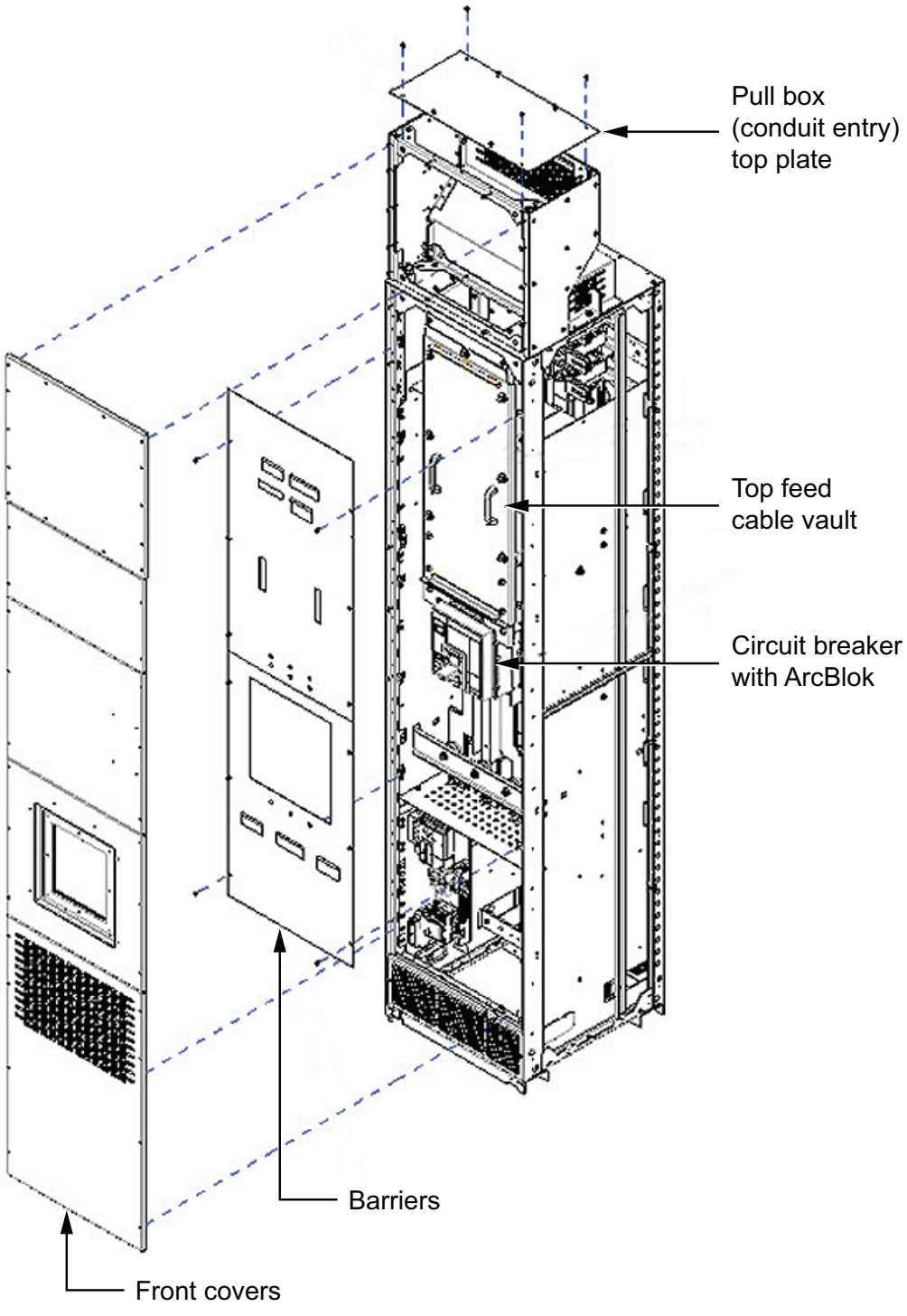


Figure 68 - Line-side Isolation Cable Vault and ArcBlok Top-feed Main Lug Breaker Access

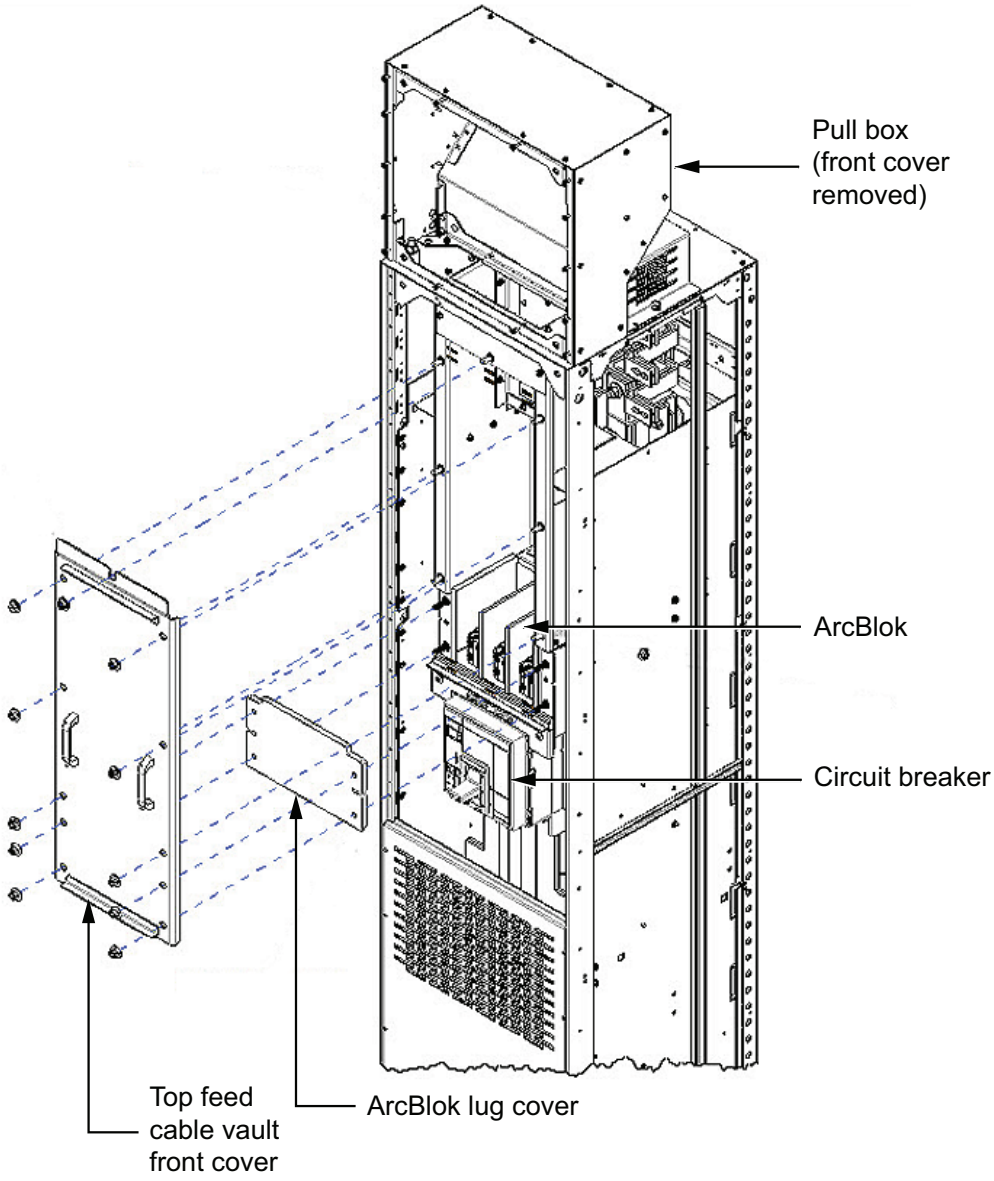


Figure 69 - Line-side Isolation Cable Vault and ArcBlok Bottom-feed Main Breaker Access

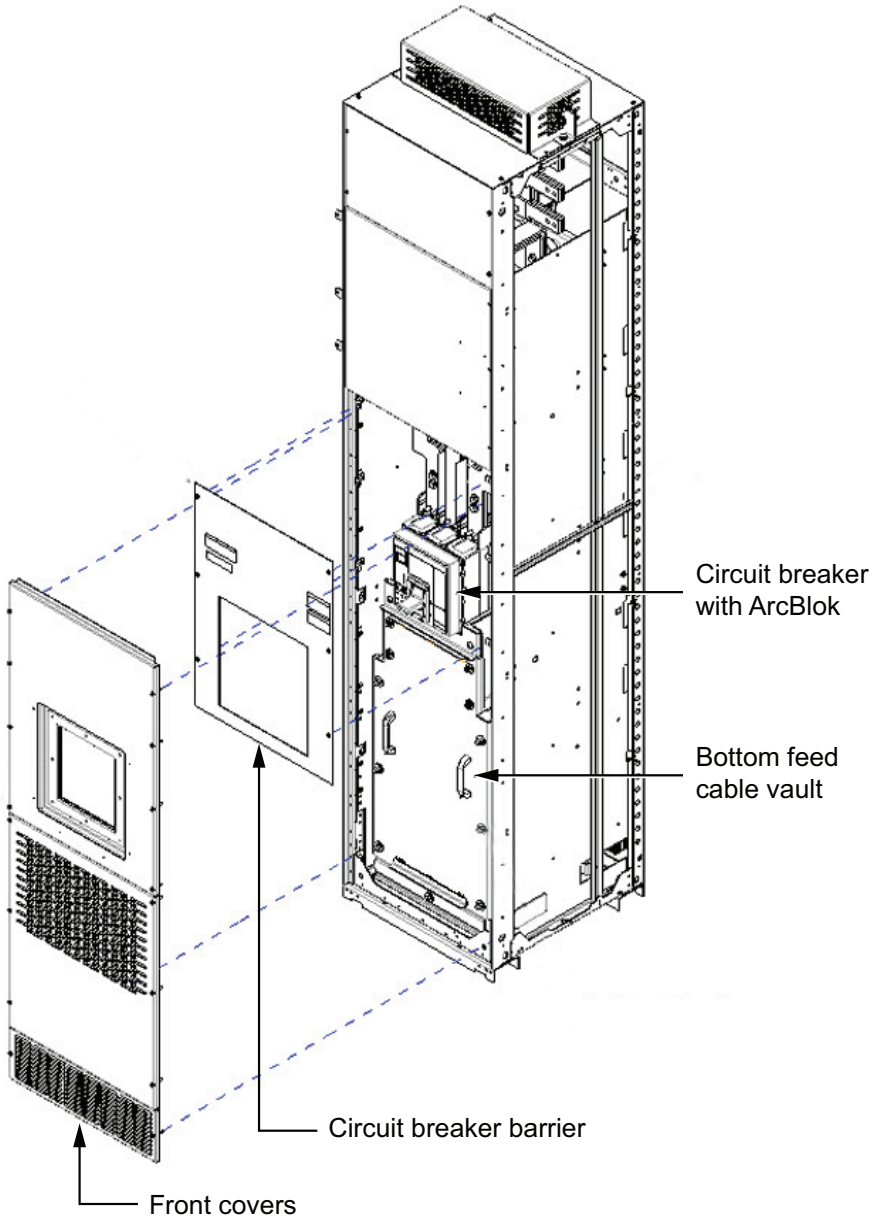
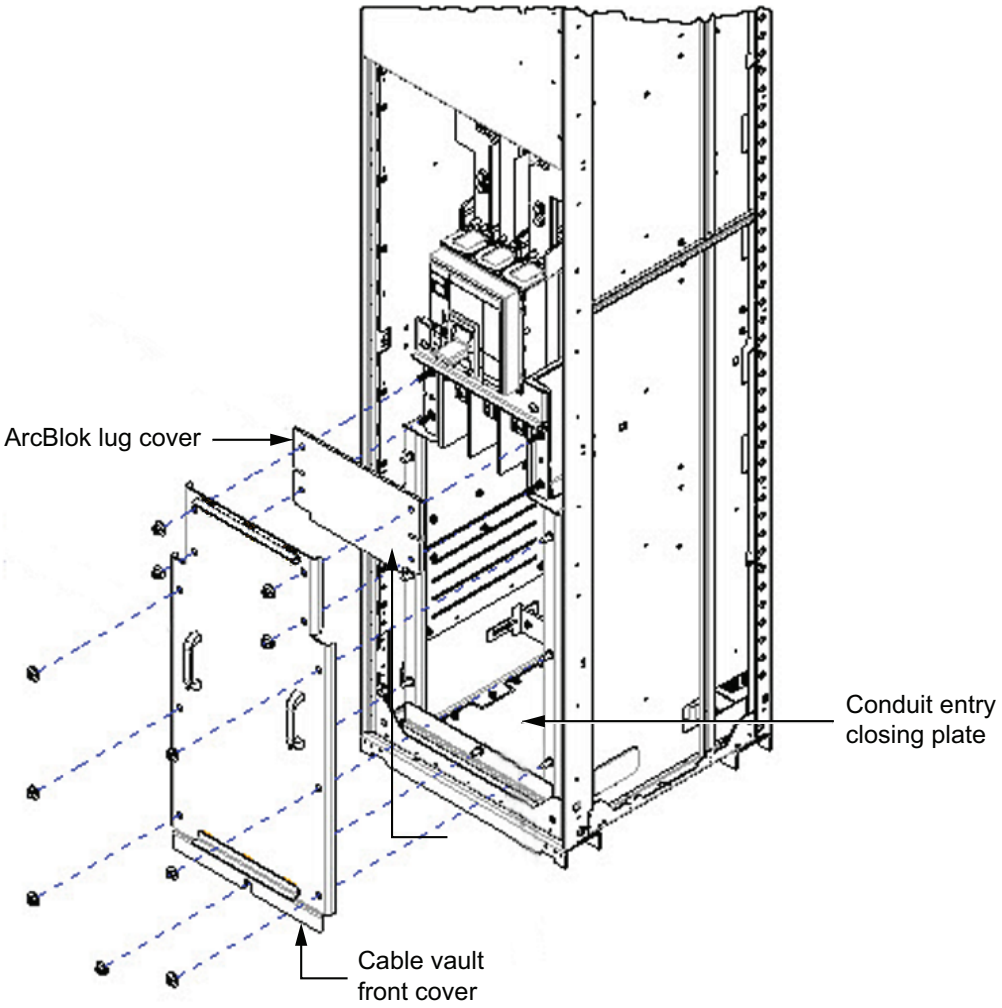
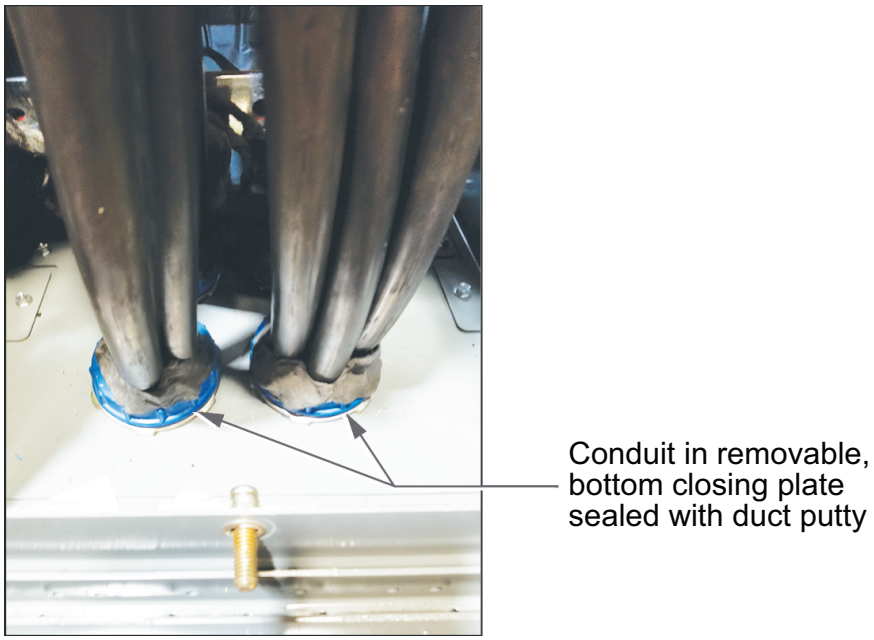


Figure 70 - Line-side Isolation Cable Vault and ArcBlok Bottom-feed Main Lug Breaker Access



NOTE: Cable entry into line-side isolation cable vaults must use conduit connection means installed on the closing plate (in bottom-feed applications) or the pull box top closing plate (in top-feed applications). Conduits must be sealed using duct seal putty.

Figure 71 - Line-side Isolation Cable Vault Conduit Installation and Sealing



Conductor Entry for Line-Side Isolation Cable Vaults with ArcBlok 2500

- Arcblok 2500 is only available in bottom-feed MCC units.

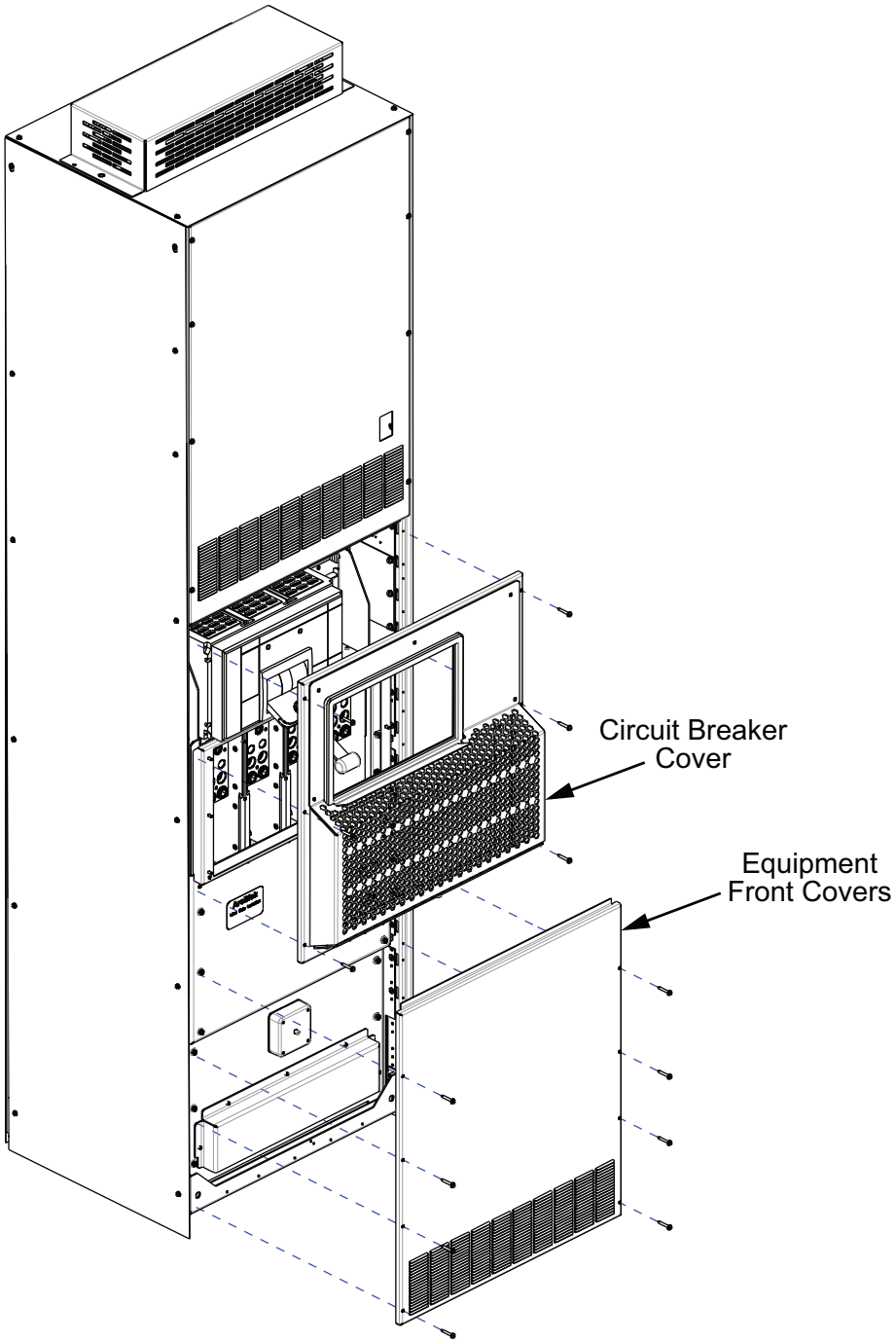
Wire Connections with ArcBlok 2500

- Locate and terminate all conduit in the MCC enclosure in the “available conduit area” designated on the equipment drawing.

- The conduit area is available towards the front of the section inside the cable vault.

1. Remove and retain the 10–32 size hardware securing the equipment breaker cover.
2. Remove and retain the breaker cover.

Figure 72 - Removing Equipment Front Covers

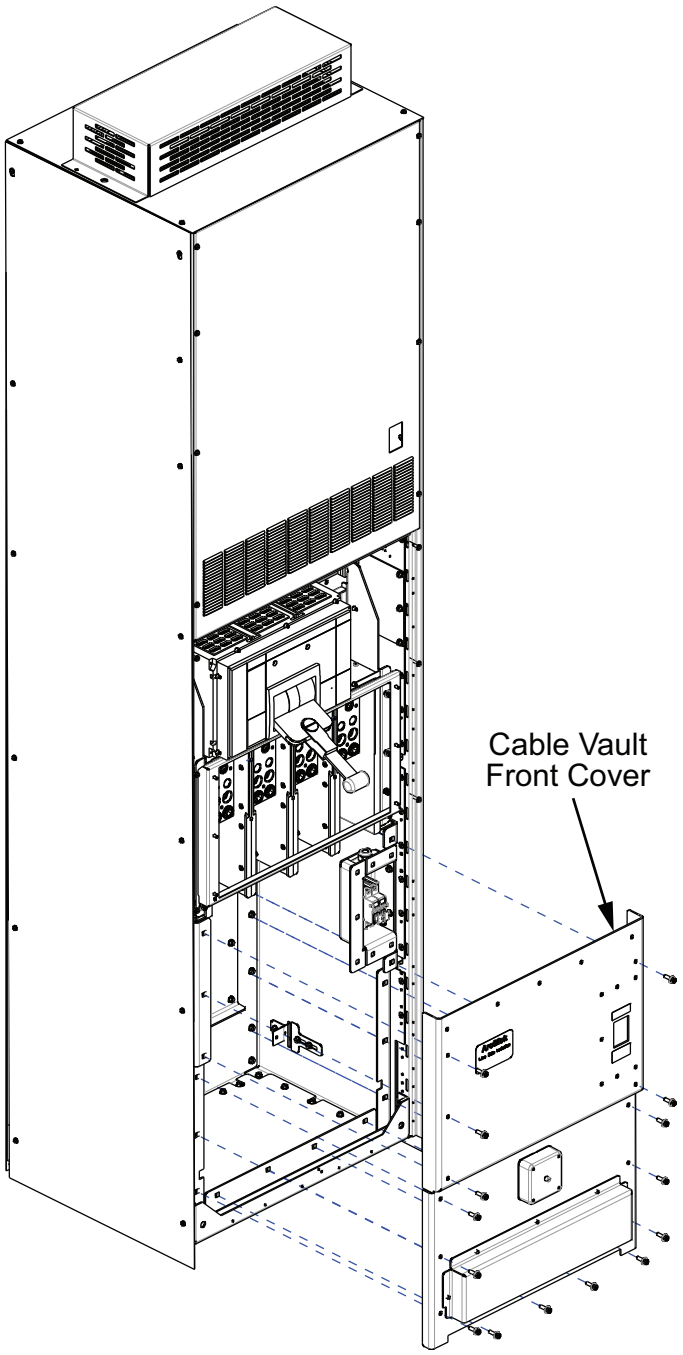


3. Remove and retain 10–32 size hardware securing the equipment lower front cover.
4. Remove and retain the equipment lower front cover.
5. Unplug the terminal block of the ArcBlok Event Indicator and put it on the right side of the cable vault. Do not disconnect wires from the terminal block.
6. Remove and retain 1/4–20 size hardware securing the cable vault front cover.

7. Remove and retain the cable vault front cover.

NOTICE
DAMAGE TO EVENT INDICATOR Do not damage ArcBlok event indicator while installing or uninstalling the cable vault front cover. Call Schneider Electric Services if the event indicator is damaged. **Failure to follow these instructions can result in equipment damage.**

Figure 73 - Removing Cable Vault Front Cover



⚠⚠DANGER

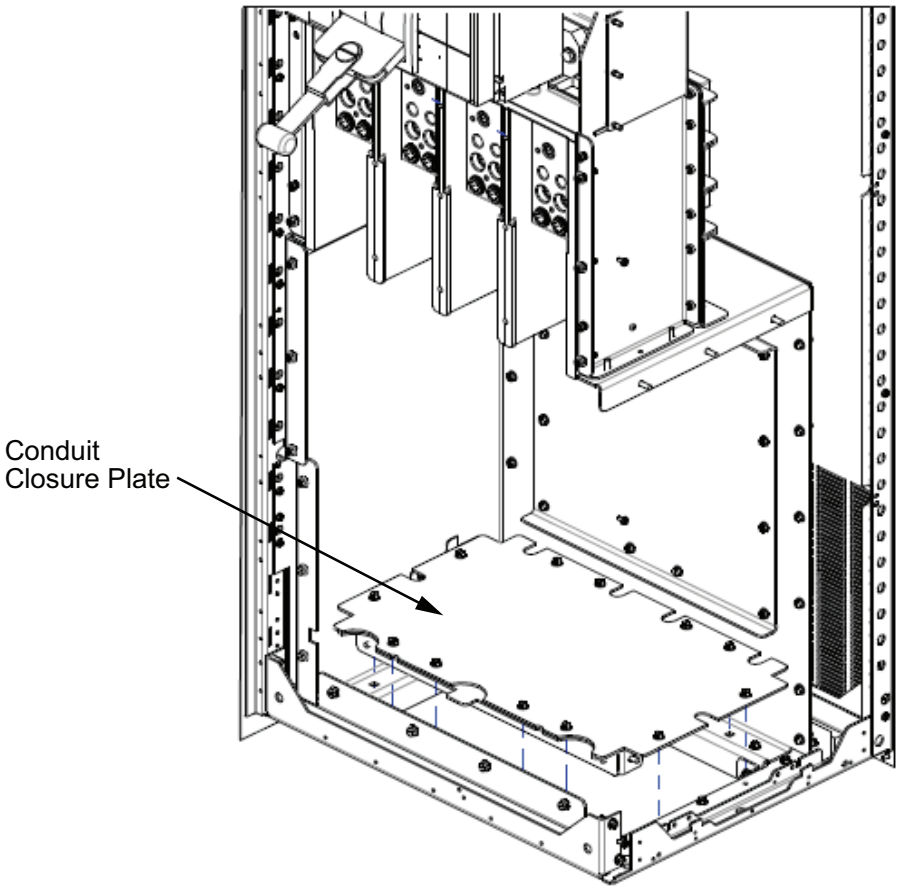
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Replace conduit closure plate after creating the conduit holes.
- Do not turn on power if conduit closure plate is not installed.

Failure to follow these instructions will result in death or serious injury.

◦ Remove and retain the conduit closure plate for reuse. The customer must create any holes necessary for conduit entering the bottom of the MCC. After creating the holes, reinstall the conduit closure plate (see Bottom-fed ArcBlok Main Bottom Conduit Closure Plate, page 83).

Figure 74 - Bottom-fed ArcBlok Main Bottom Conduit Closure Plate



8. Pull the cables inside the cable vault and terminate them on the ArcBlok lugs shown in Lug Cross Section Showing Hole Placement, page 84. Torque all wire-binding screws to 842 lb–in. (95 N•m).

NOTICE

DAMAGE TO PHASE BARRIERS

Do not apply excessive force to the phase barriers during cable installation. Damage to the phase barriers can occur. Call Schneider Electric Services if the phase barriers are damaged.

Failure to follow these instructions can result in equipment damage.

a. Use a proper insulation stripping tool to strip a length of insulation from the end of the cable sufficient to fit into the full length of the lug barrel. Be careful not to nick or ring the strands.

b. Thoroughly clean aluminum cable contact surfaces with a wire brush, or scrub them with an abrasive cloth to remove oxides and foreign matter.

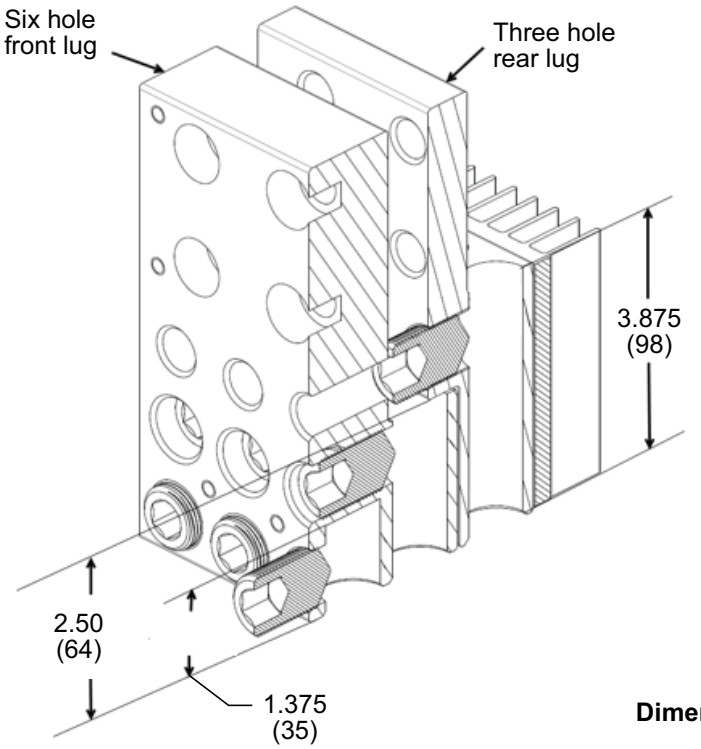
c. Immediately apply an acceptable joint compound to the bare aluminum surfaces.

d. Install the rear cables into the rear three-hole lug. Wire strip length: 3.875 in. (98 mm).

e. Install the cables into the front six-hole lug. Wire strip length: 2.50 in. (64mm) for the rear three holes. Wire strip length: 1.375 in. (35 mm) for the front three holes.

f. Screw any unused wire binding screws in completely. Screw in all wire binding screws without cables installed so they are not in the way of the Thermal Interface Module (TIM) (see TIM Sleeve, page 85).

Figure 75 - Lug Cross Section Showing Hole Placement



9. Cable entry into the cable vault must use conduit connections installed on the conduit closure plate. The conduits must be sealed using duct seal putty.

10. Install the Thermal Interface Module (TIM):

a. Verify TIM mating surfaces and lugs are clean and undamaged. Clean with a dry, lint-free rag.

b. Install one TIM per phase and neutral using 1/4-20 size captive screws as shown in TIM Sleeve, page 85. Slide the plastic sleeve around each TIM against the top of the phase barriers. Sleeve must be flush with the top of the phase barriers. Torque all six TIM screws in a star pattern to 60 lb-in. (6.8 Nm).

NOTE: The TIM mounting screws are not completely removable.

Figure 76 - Thermal Interface Module (TIM) Installation

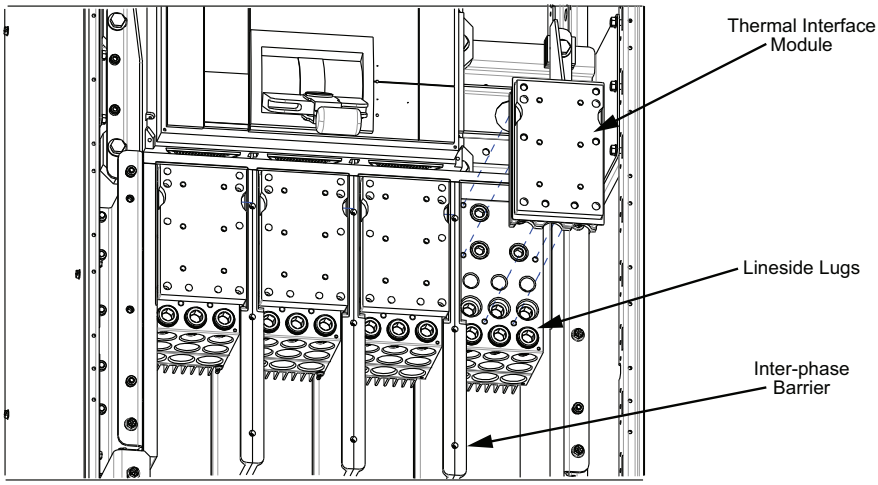
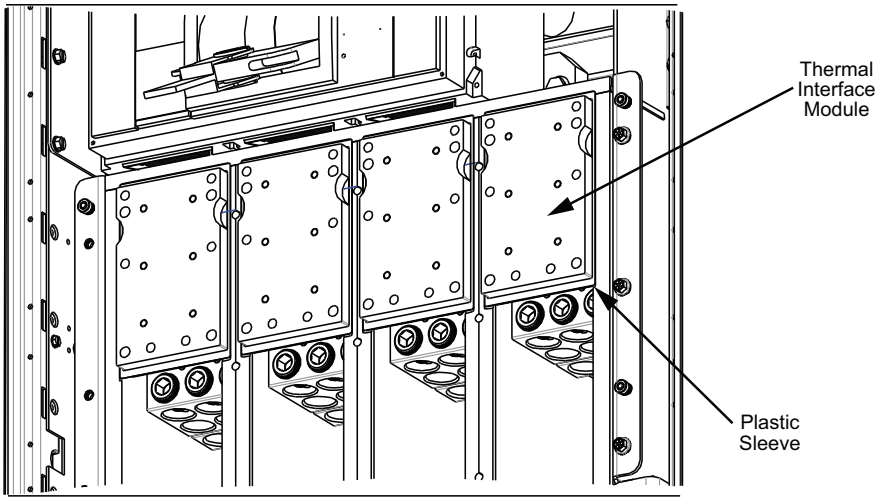
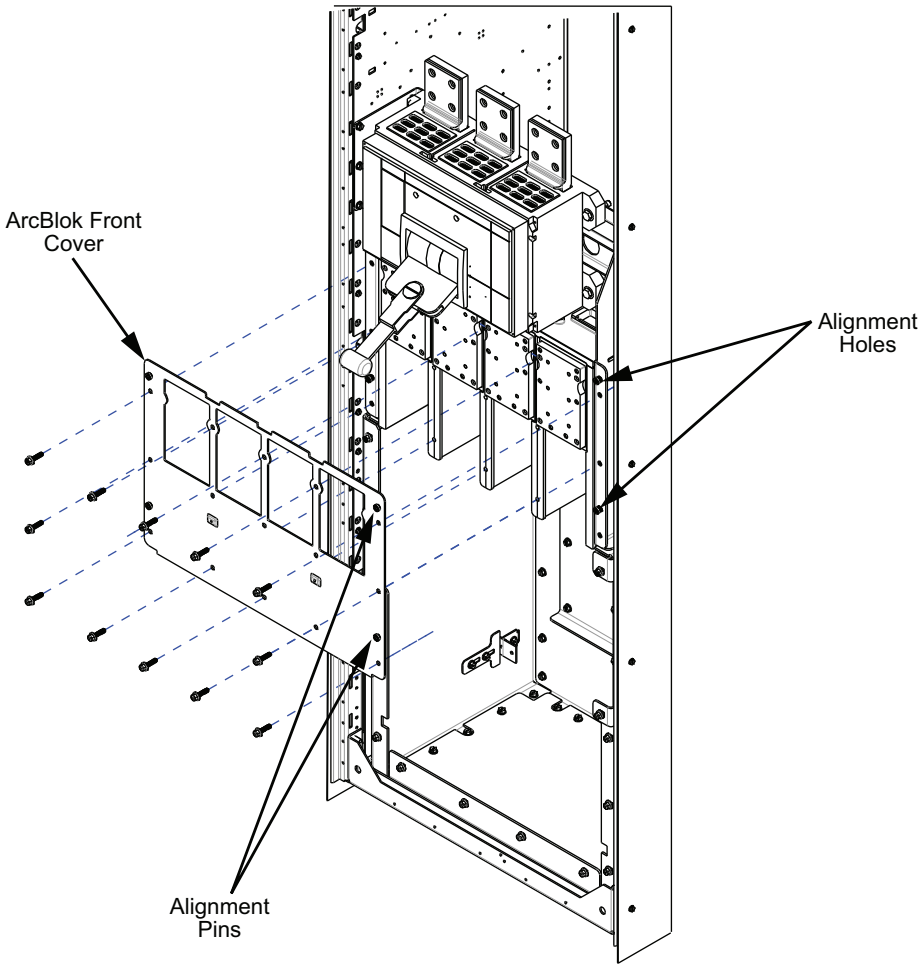


Figure 77 - TIM Sleeve



11. Install the ArcBlok module front cover assembly to enclose the ArcBlok module using 1/4-20 size screws provided as shown in ArcBlok Front Cover Installation, page 86. Install the cover by aligning the four alignment pins in the cover with the holes in the module side plates. Fasten five screws on the top row and another five in the middle row of the front cover. Use the remaining five screws for the bottom row while installing the cable vault front cover as mentioned in step 13. Torque all ten screws on the front cover to 60 lb-in. (6.8 Nm).

Figure 78 - ArcBlok Front Cover Installation



NOTICE

DAMAGE TO TAPE ON THERMAL INTERFACE MODULE (TIM)

Do not damage the tape on the TIM during installation of the ArcBlok front cover during this step. Call Schneider Electric Services if cover assembly is damaged.

Failure to follow these instructions can result in equipment damage.

NOTICE

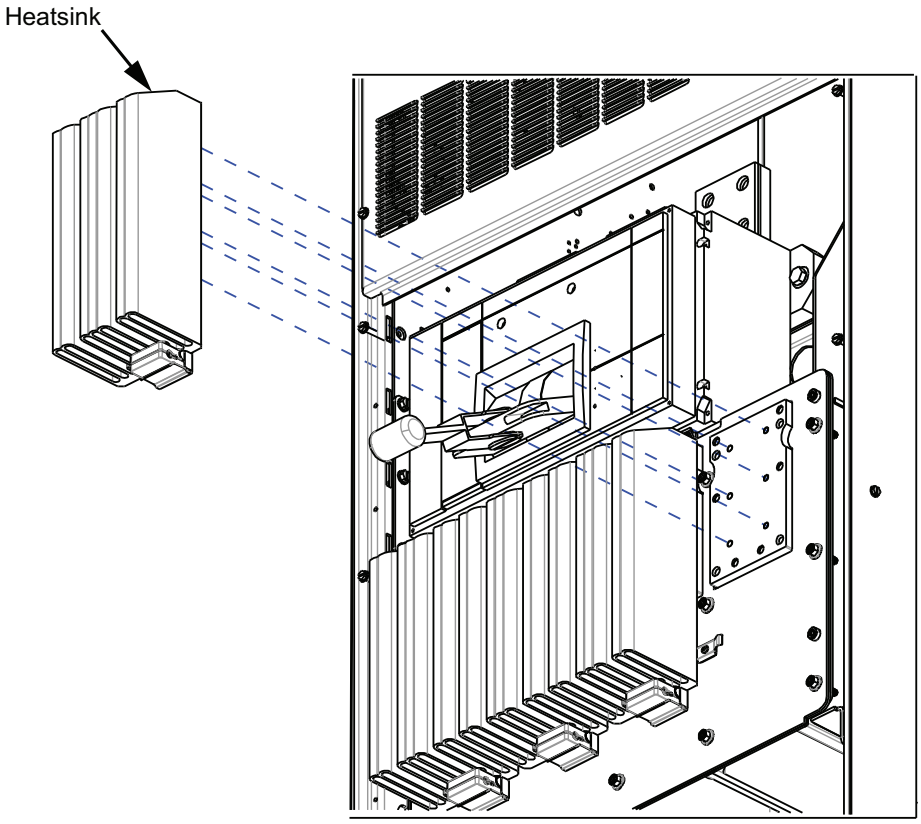
DAMAGE TO ARCBLOK MODULE FRONT COVER ASSEMBLY

Do not apply excessive force to the ArcBlok module front cover assembly during installation. Call Schneider Electric Services if cover assembly is damaged.

Failure to follow these instructions can result in equipment damage.

12. Install one heatsink per phase and neutral on the front surface of the TIM using 1/4-20 size captive screws as shown in ArcBlok Heat Sink Installation, page 87. Torque all six screws on the heatsink in a star pattern to 60 lb-in. (6.8 N•m).

Figure 79 - ArcBlok Heat Sink Installation



⚠CAUTION

RISK OF BURNS FROM HOT SURFACES OR HEATSINKS

Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices when working near heatsinks. See NFPA 70E, NOM-029-STPS or CSA Z462 or local equivalent.

Failure to follow these instructions can result in injury or equipment damage.

13. Install the thermal sensor (if used) as labeled per phase in the thermal sensor mounting clip available underneath the heatsink with the temperature probe towards the base of the heat sink as shown in Thermal Sensor Installation, page 88.

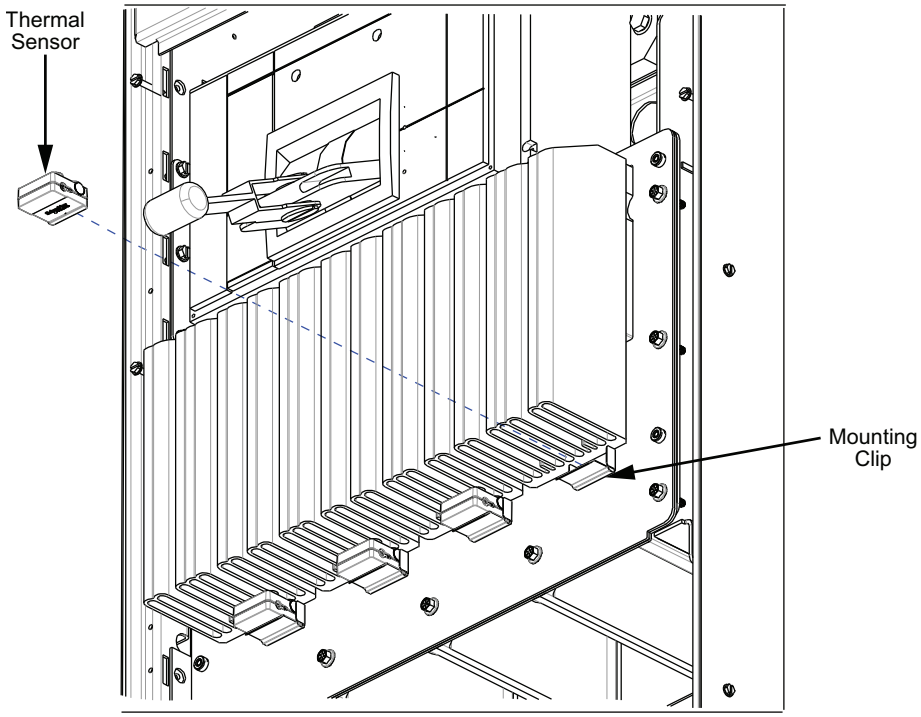
NOTICE

DAMAGE TO SENSOR SPRING LOADED PROBE

Do not damage or let the sensor spring loaded probe tip out of place during the installation to avoid temperature data discrepancy. Call Schneider Electric Services if the sensor is damaged.

Failure to follow these instructions can result in equipment damage.

Figure 80 - Thermal Sensor Installation



14. Perform substeps:
    a. Reinstall the cable vault front cover using (15) 1/4-20 size screws retained in step 5 (see Reinstall Cable Vault Front Cover, page 89).
    b. Locate (5) 1/4-20, x 1 in. long screws from ArcBlok Module kit and install at the top edge of the cable vault front cover to fasten the ArcBlok front cover. Torque all screws on cable vault front cover to 60 lb-in. (6•8 Nm) (see Reinstall Cable Vault Front Cover, page 89).

Figure 81 - Reinstall Cable Vault Front Cover

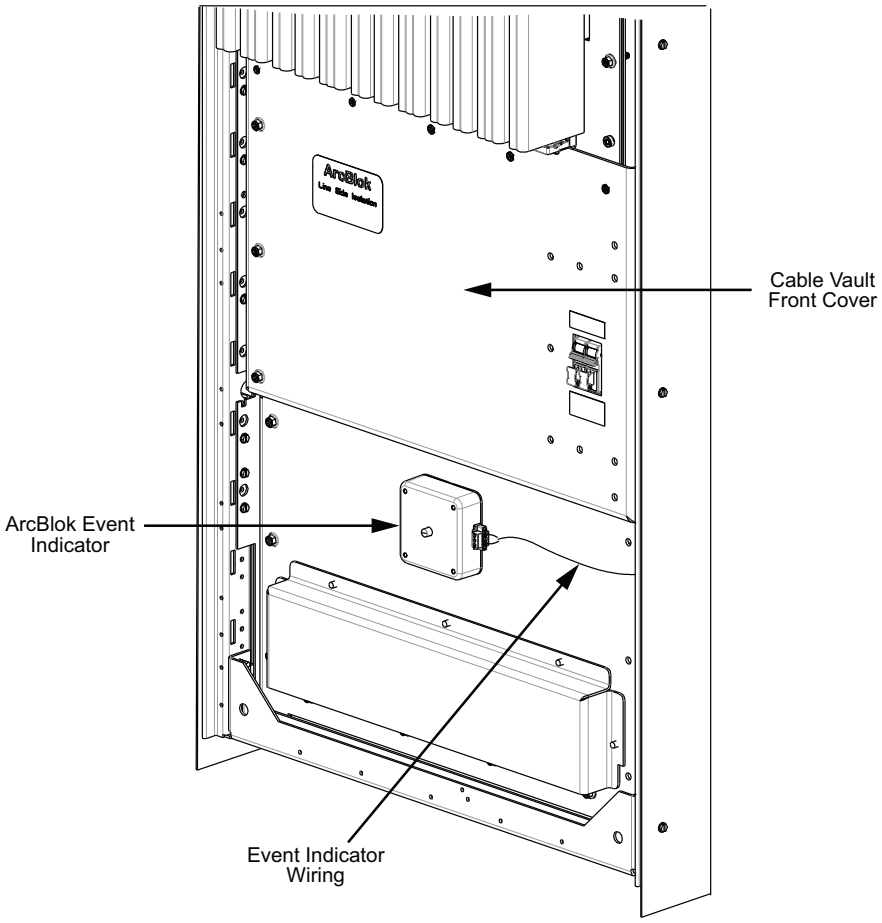
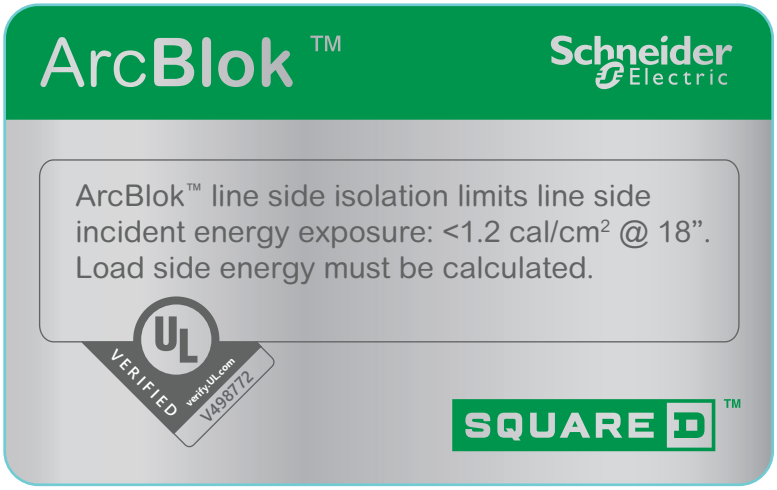


Figure 82 - Cable Vault Front Cover Labels



⚠⚠DANGER

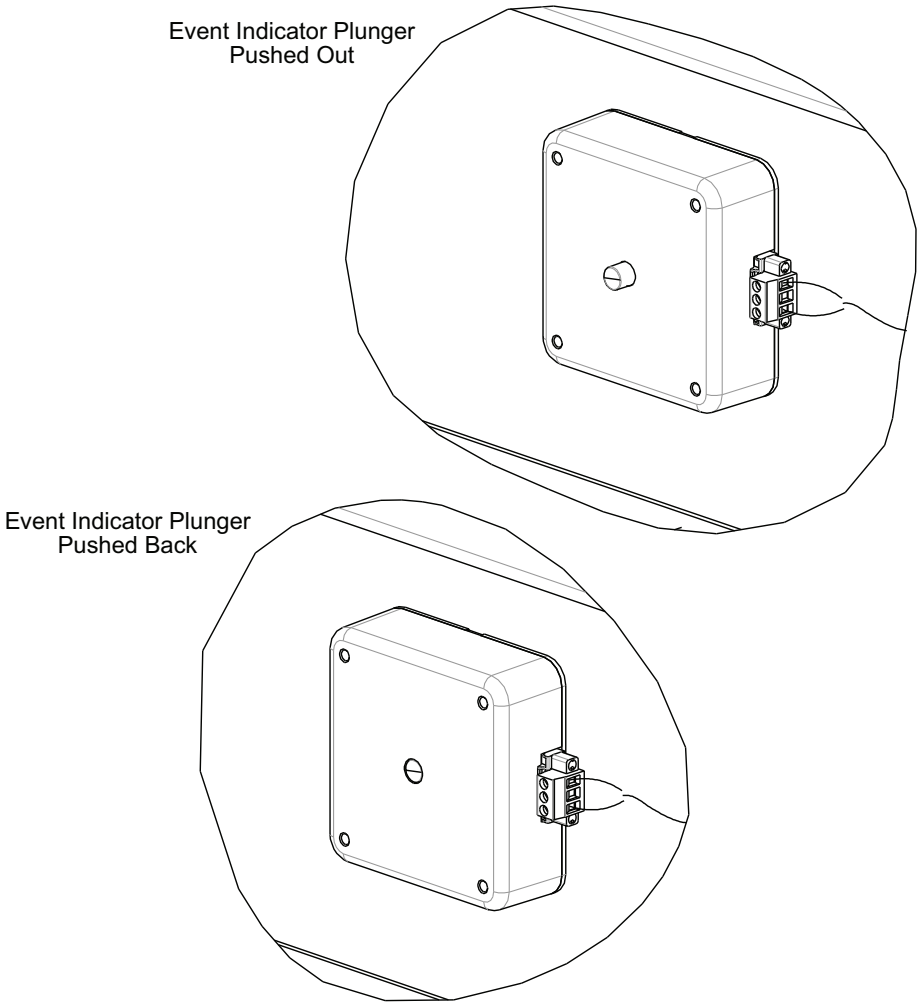
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSAZ462.
- This equipment must be installed and serviced by qualified electrical personnel.
- Read instruction bulletin and become familiar with the equipment before installing, operating, servicing, or troubleshooting the equipment.
- Turn off all power supplying this equipment before working inside this cable vault.
- Always use a properly rated voltage sensing device to confirm power is off.
- Do not turn on power without this cover installed. Incident Energy levels greater than 1.2 cal/cm^2 are present if cover is uninstalled.
- Replace all devices, doors, and covers before turning on power to this equipment.
- Apply torque to cable vault hardware to 60 lb-in. (6.8 N•m).

Failure to follow these instructions will result in death or serious injury.

15. Re-plug the terminal block of the ArcBlok Event Indicator removed in step 4.
16. Make sure the ArcBlok Event Indicator plunger is pushed back as shown in ArcBlok Event Indicator, page 91.

Figure 83 - ArcBlok Event Indicator



17. Reinstall the equipment front covers and breaker cover using 1/4–20 size hardware retained in steps 1 and 2.

Incoming Cable Lacing Instructions–ArcBlok 1200 Line-side Isolation Cable Vault

All cables must be laced and secured prior to installing the cable vault front cover.

⚠⚠DANGER

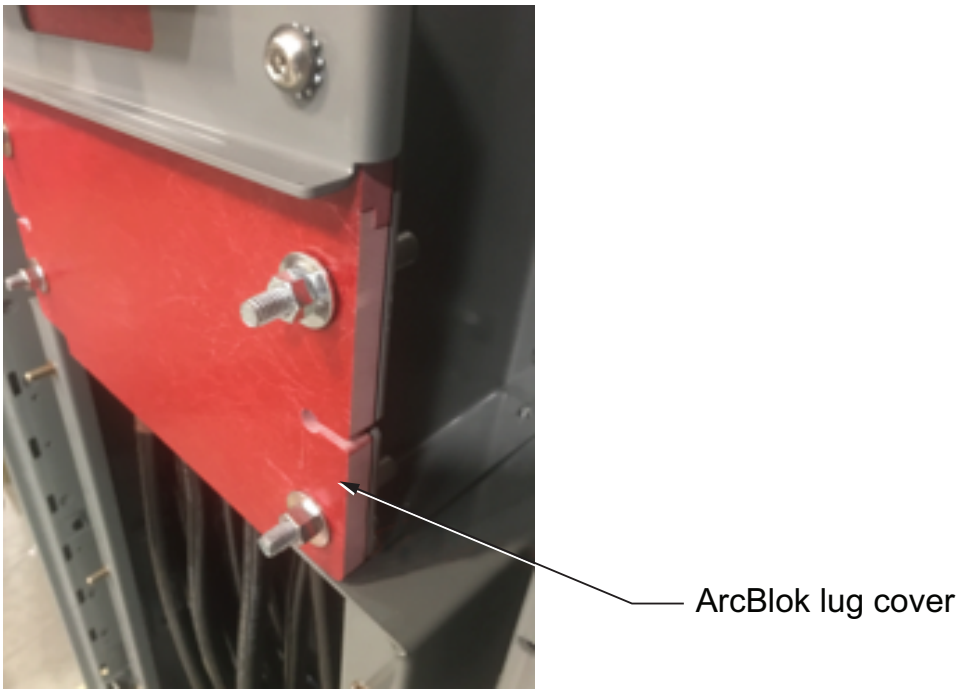
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

1. For lacing material, select a sisal or hemp rope with a minimum of 2500 pounds of pull strength (625 pounds working load). Apply tape to any frayed end of the rope before lacing cables.
2. Lace the cables from all phases together in one bundle with a continuous length of rope. The ArcBlok lug cover must be in place and bolted down prior to lacing (ArcBlok Lug Cover in Place Prior to Lacing, page 92). Make sure interphase barriers are inserted in the grooves of the ArcBlok lug cover.

Figure 84 - ArcBlok Lug Cover in Place Prior to Lacing

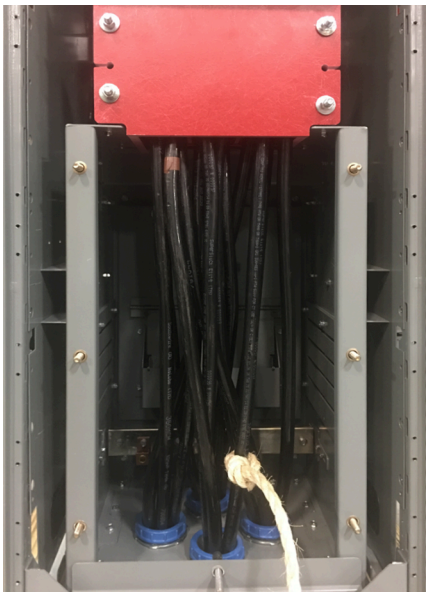


Lacing requires two sets of looping groups: an entry loop set and a second looping group nearer to the ArcBlok.

3. Attach one end of the rope to the cable bundle.

4. After attaching the rope to the cables, make a loop in the rope and pull the loop around the cable bundle from behind. Pull the loose end of the rope through the loop (see First Cable Lacing Loop, page 93).

Figure 85 - First Cable Lacing Loop

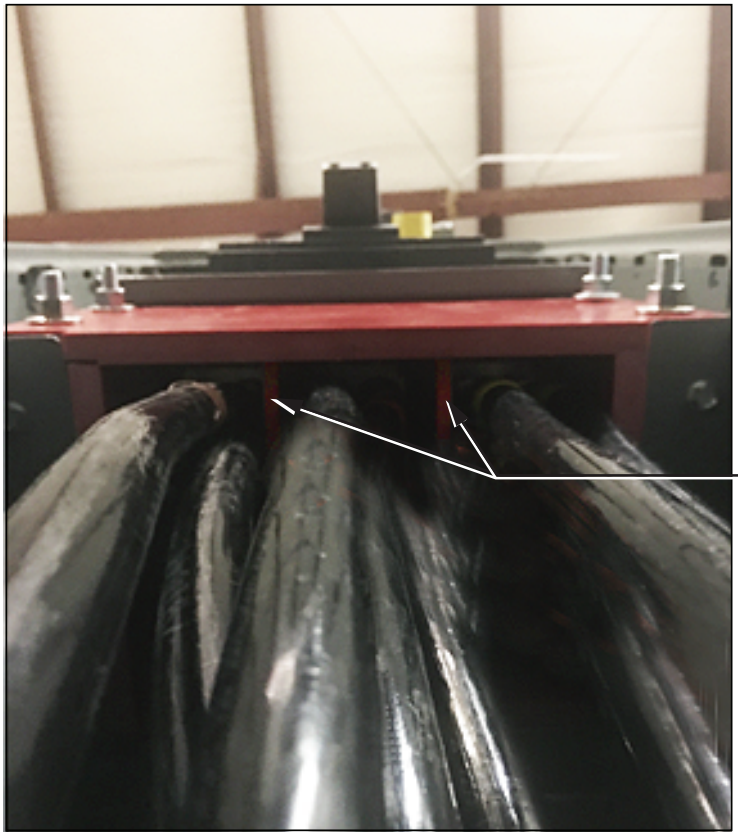


5. Continue to pull the rope through the loop until the rope is tight. Continue to make a loop group of no more than two loops, wrapping the cable bundle four times.
6. Create the second loop group by pulling the rope around the cable bundle. Make a loop by pulling the loose end under the rope. Continue to pull the rope through the loop until it is tight around the cable bundle. Repeat the procedure until the cable bundle has no more than two loops, wrapping the cable bundle four times. The spacing between the upper and lower loop groups should be no less than four in. (102 mm) (see Upper and Lower Cable Lacing Groups, page 93).

Figure 86 - Upper and Lower Cable Lacing Groups

7. Make sure the cable bundles do not disengage the interphase barriers from the grooves of the ArcBlok lug cover (see ArcBlok Interphase Barriers, page 94 and ArcBlok Interphase Barriers and Lug Cover Grooves, page 95).

Figure 87 - ArcBlok Interphase Barriers

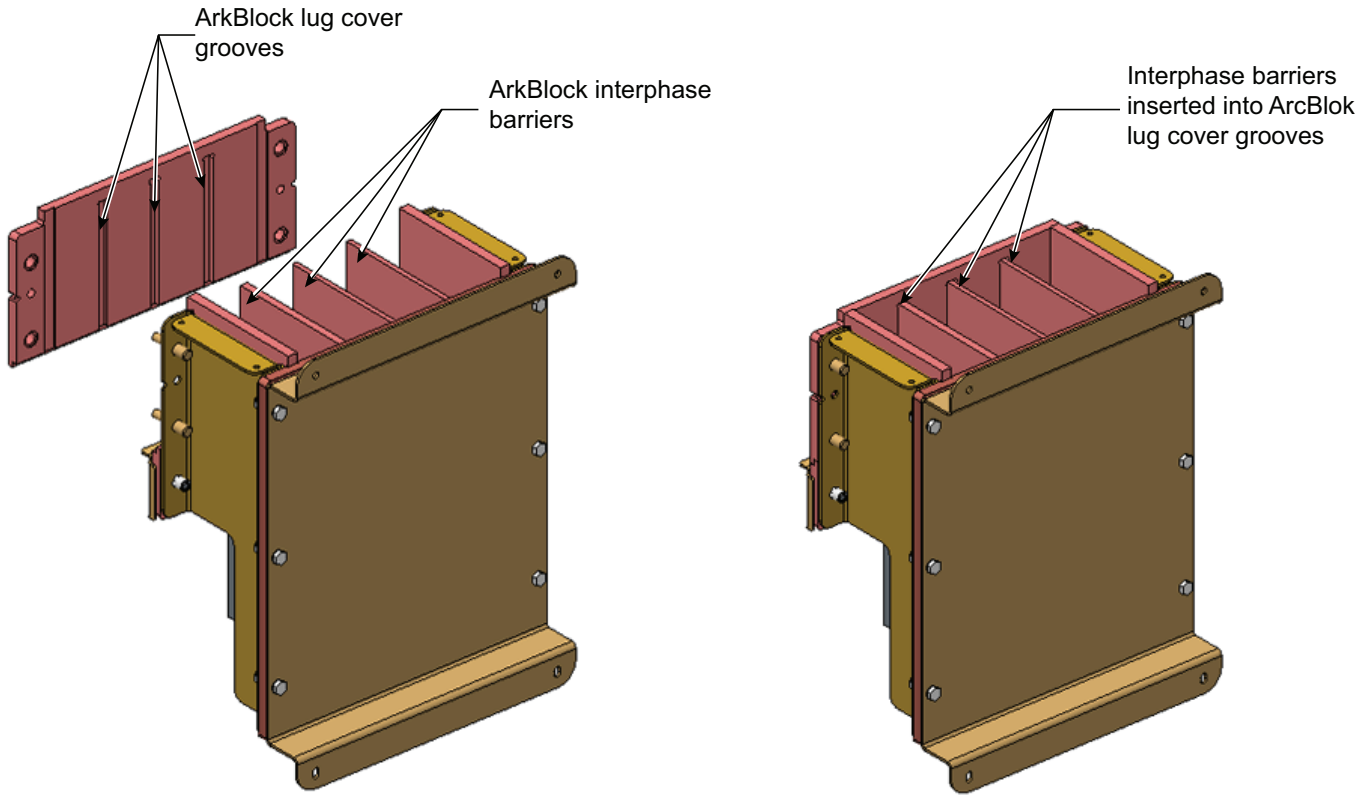


8. After the entire cable bundle has been laced, tie the ends of the ropes securely to the looping groups, then cut and tape the ends to help prevent fraying. Make sure the rope ends are not obstructing the cable vault front cover, overlapping seals, or rear panel damper. After the entire cable bundle has been laced, tie the ends of the ropes securely to the looping groups, then cut and tape the ends to help prevent fraying. Make sure the rope ends are not obstructing the cable vault front cover, overlapping seals, or rear panel damper.

9. While keeping the ArcBlok lug cover in place, remove all cover hardware.

   NOTE: Make sure the interphase barriers remain inserted into the grooves of the ArcBlok lug cover (see ArcBlok Interphase Barriers and Lug Cover Grooves, page 95).

Figure 88 - ArcBlok Interphase Barriers and Lug Cover Grooves



10. Place the cable vault front cover on top of the ArcBlok lug cover.
11. Install 3/8–16 Keps nuts and torque them to 20–23 lb-ft. (27–31 N•m).

Incoming Cable Lacing Instructions–ArcBlok 2500 Line-side Isolation Cable Vault

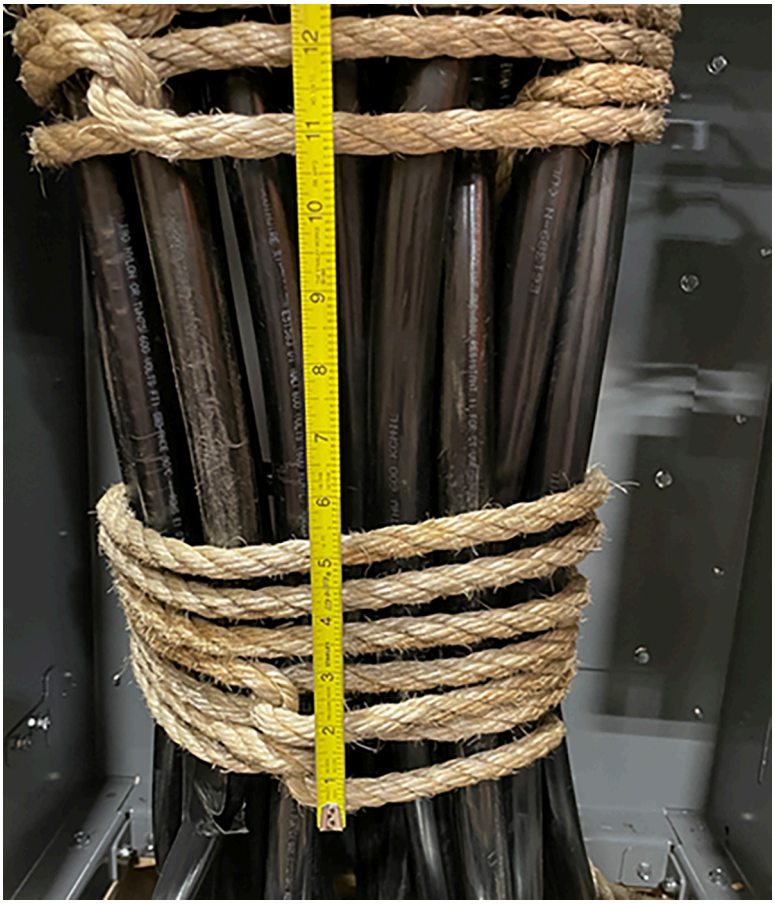
NOTICE
RISK OF LOOSE CABLES Lace and secure all cables. Cable restraint is required on the line-side of the ArcBlok section. **Failure to follow these instructions can result in equipment damage.**

Cable restraint is required on the line-side of the ArcBlok section. All cables must be laced and secured prior to installing the cable vault front cover.

1. Wrap cables using 1/2 in. (13 mm) diameter sisal rope or equivalent.
2. Lace the cables from all phases together in one bundle with a continuous length of rope.
3. Lacing requires two sets of looping groups: an entry loop group and a second loop group nearer to the ArcBlok.

4. Attach one end of the rope to on of the cables about 10 in. (254 mm) from the floor.
5. After attaching the rope, make a loop in it and pull the loop around the entire cable bundle from behind. Pull the loose end of the rope through the loop and continue to pull it until the rope is tight.
6. Make a second loop and pass behind the cables using the same procedure. Put the loose end of the rope through the loop and pull the loop tight. Repeat this step one additional time.
7. Start the second (upper) loop group by first pulling the rope around the cable bundle, then repeat the procedure described in step 6 for the upper loop group. The spacing between the upper and lower loop groups must be no more than 5 1/2 in. (139 mm). See Upper and Lower Loop Group Spacing, page 96.

Figure 89 - Upper and Lower Loop Group Spacing



8. After the entire cable bundle has been laced, tie the end of the rope securely to the looping groups, then cut and tape the end to prevent fraying. Make sure the rope is not obstructing the cable vault front cover, fuse disconnect switch wiring, or ArcBlok Event Indicator plunger.

Vent Hood Installation

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.
- Do not drill or cut in the top area of the motor control center.
- Avoid contaminating the motor control center with dust or debris.
- DO NOT lift the cabinet by the vent hood or by attaching lifting angles to the vent hood.

Failure to follow these instructions will result in death or serious injury.

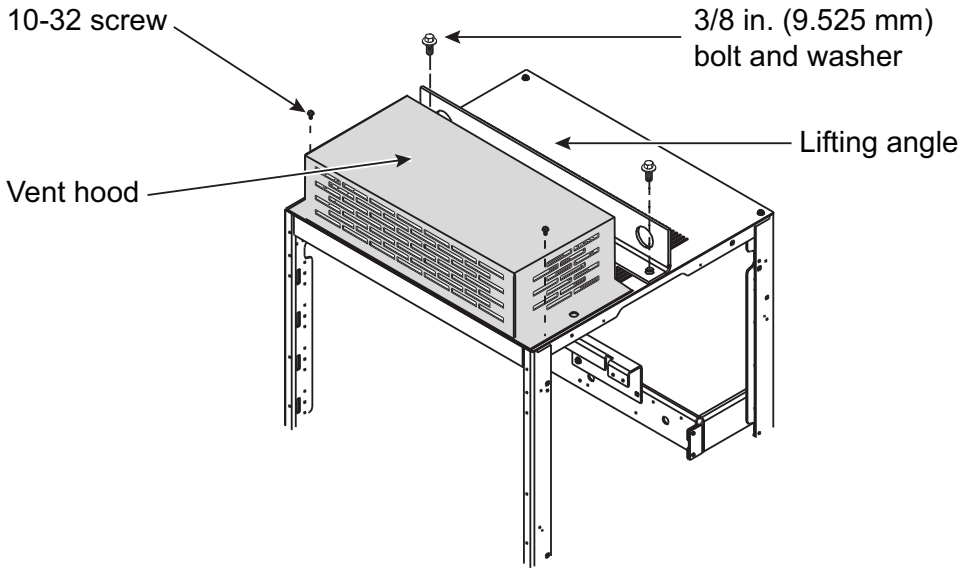
This section contains instructions for installing a vent hood over the top plate vents on an MCC.

NOTE:

- Do not install the vent hood until the MCC is in its final location.
- Retain all hardware.

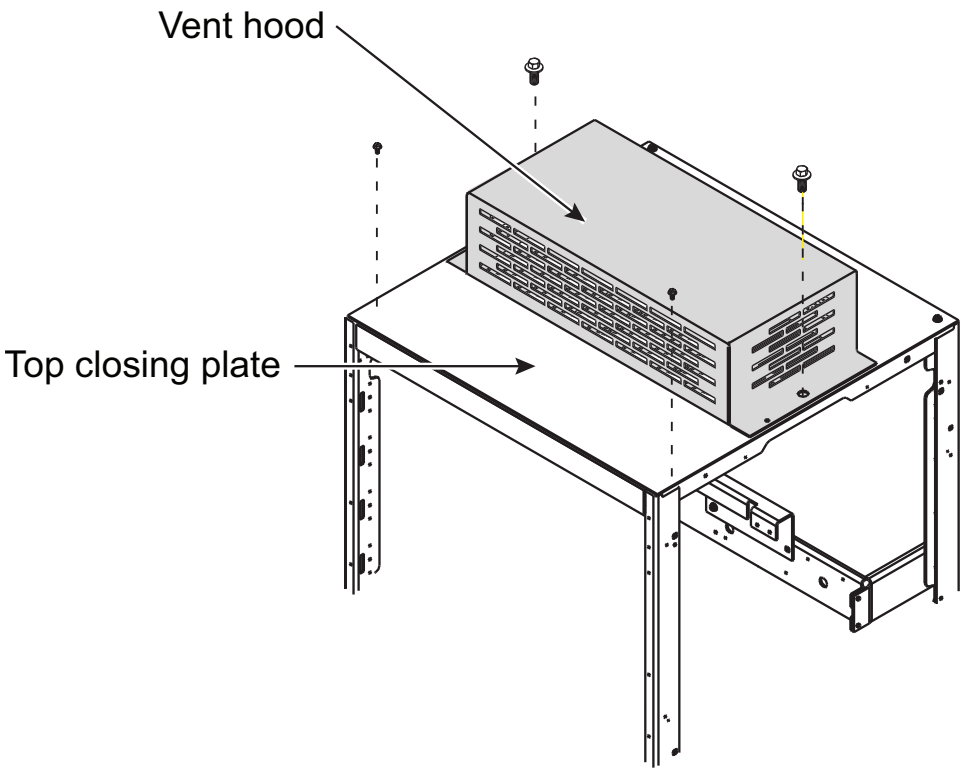
1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Remove the 3/8 in. (9.525 mm) bolts, washers, and the lifting angle (see Remove the Hardware, page 97).

Figure 90 - Remove the Hardware



3. Remove the two 10-32 screws that secure the vent hood and closing plate to the top of the cabinet (see Reposition and Attach the Vent Hood, page 98).

Figure 91 - Reposition and Attach the Vent Hood



4. Once the vent hood is removed, secure the top closing plate by reinstalling the 10-32 screws removed in step 3 (see Reposition and Attach the Vent Hood, page 98).
5. Position the vent hood on the top of the cabinet as shown.
6. Secure the vent hood in place using the two 3/8 in. (9.525 mm) bolts and washers removed in step 2. Torque the bolts to 28–33 lb-in. (3.164–3.729 N•m).

Pull Box Installation

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside it.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.
- Do not drill or cut in the top area of the motor control center.
- Avoid contaminating the motor control center with dust or debris.
- DO NOT lift the cabinet by the pull box or by attaching lifting angles to the pull box.

Failure to follow these instructions will result in death or serious injury.

This section contains instructions for installing pull boxes on low voltage MCCs. Pull boxes are either 12 or 18 in. (304.8 or 457.2 mm) high and mount on the top of the MCC.

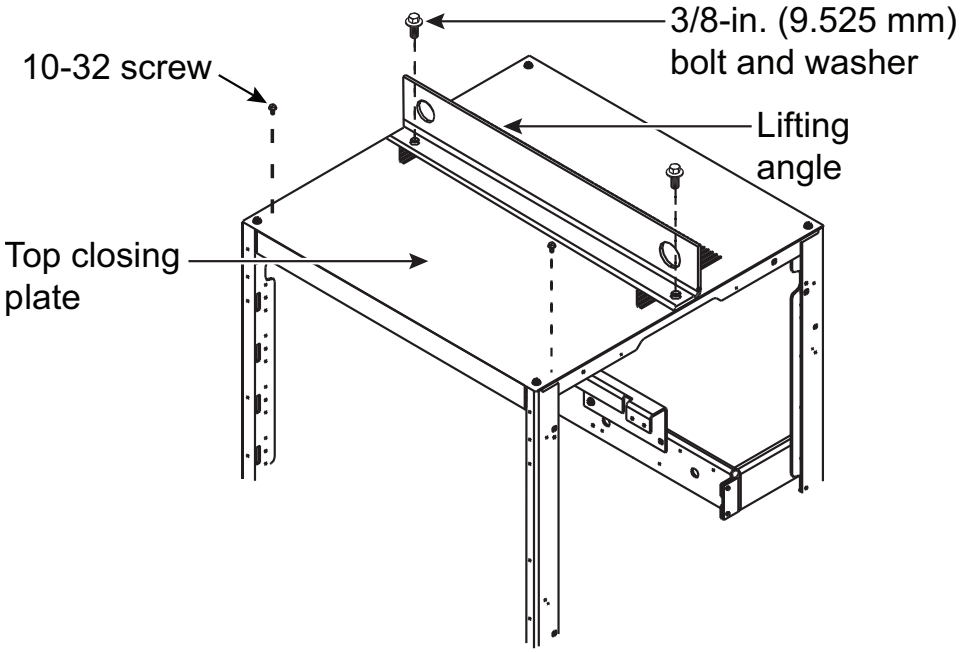
NOTE:

- Do not install the pull box until the MCC is in its final location.
- Retain all hardware.

Standard Low Voltage MCC Pull Box

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm power is off.
2. Remove the 3/8 in. (9.525 mm) bolts, washers, and the lifting angle (see Remove the Hardware, page 100).

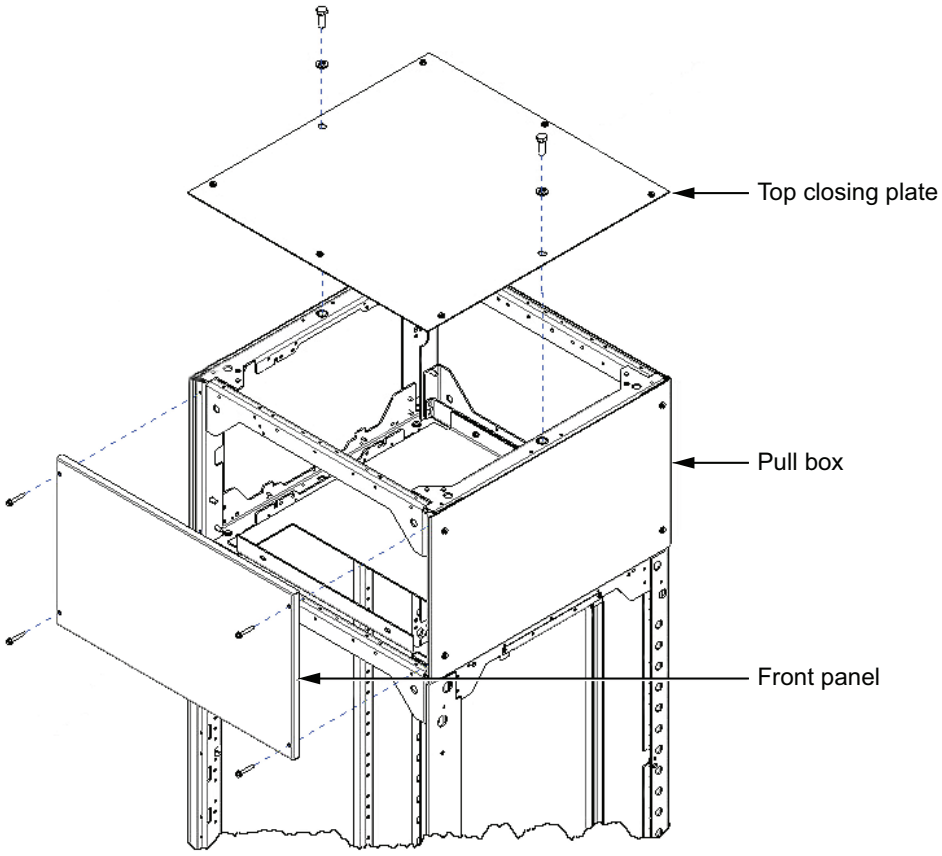
Figure 92 - Remove the Hardware



3. Remove the 10-32 screws that secure the top closing plate to the top of the cabinet (see Remove the Hardware, page 100).
4. Remove the top closing plate from the structure.

5. Remove the front panel from the pull box. Position the pull box on top of the cabinet as shown in Install the Pull Box, page 101.

Figure 93 - Install the Pull Box

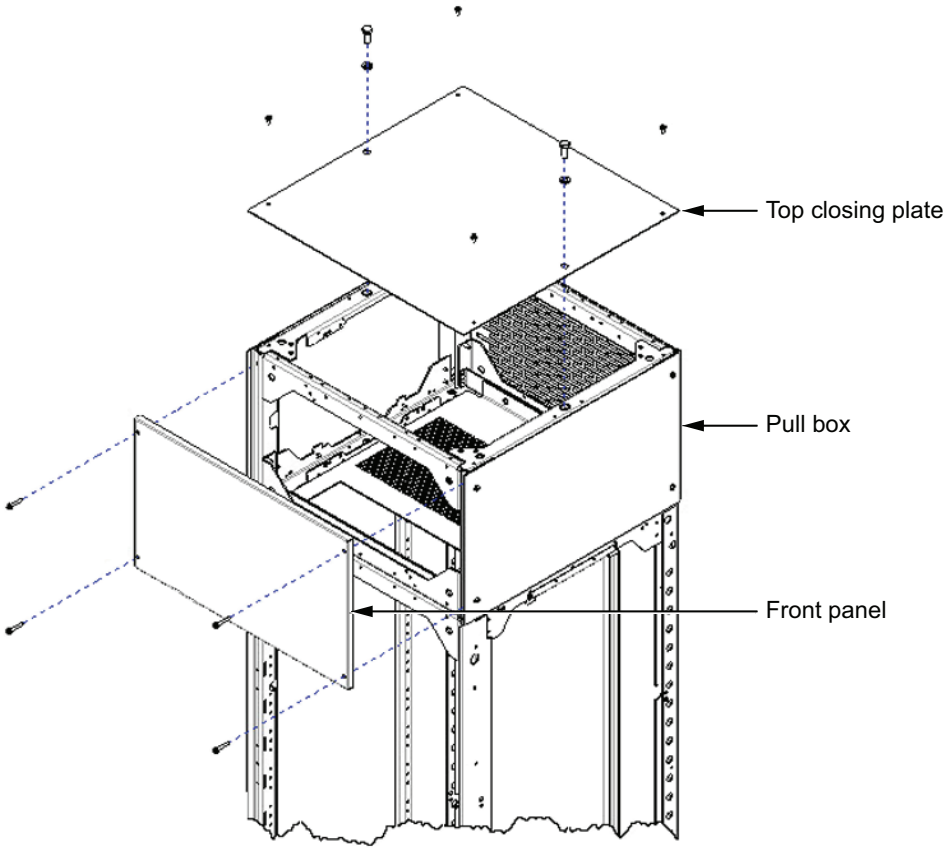


6. Install the two 3/8 in. (9.525 mm) bolts and washers that were removed in step 2. Place them through the pull box lower side channels and into the top of the cabinet. Torque the bolts to 28–33 lb-in. (3.164–3.729 N•m).
7. Re-install the pull box front panel removed in step 5 and the top closing plate removed in step 4 (see Install the Pull Box, page 101).

Vented Low Voltage MCC Pull Box

1. Follow the same instructions for standard pull box installation (see Standard Low Voltage MCC Pull Box, page 100), except remove and discard the top closing plate from the MCC section. The vented pull box comes with a solid top plate.

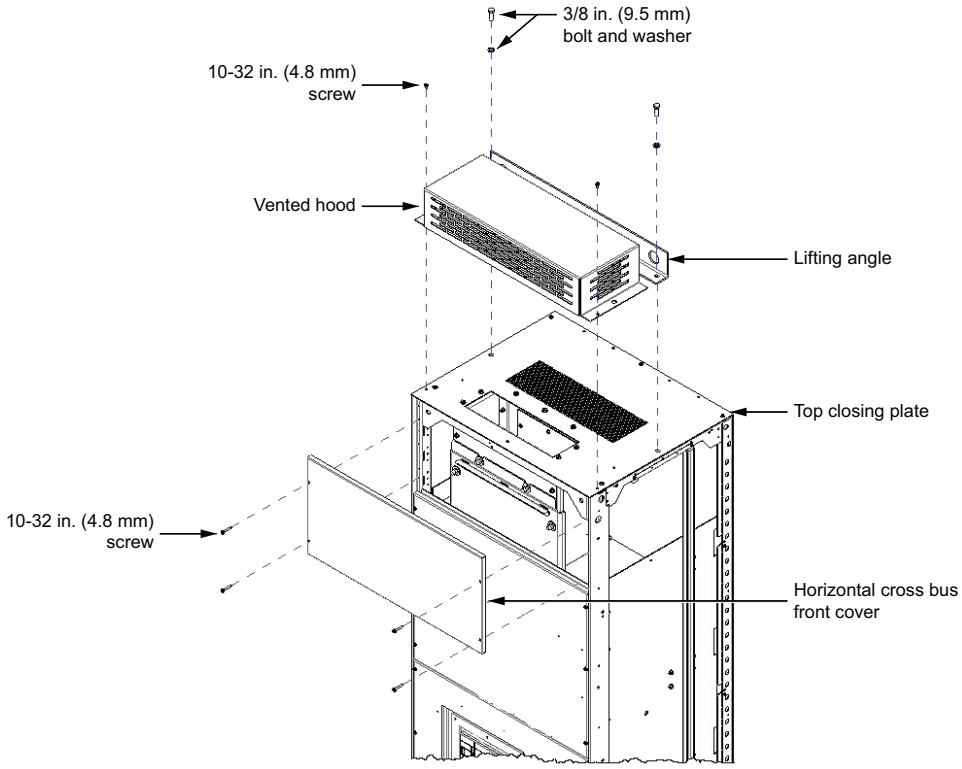
Figure 94 - Install the Pull Box



Line-side Isolation, Low Voltage MCC Pull Box

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm power is off.
2. Remove the 3/8 in. (9.5 mm) bolts, washers, and the lifting angle (see Remove the Hardware, page 103).

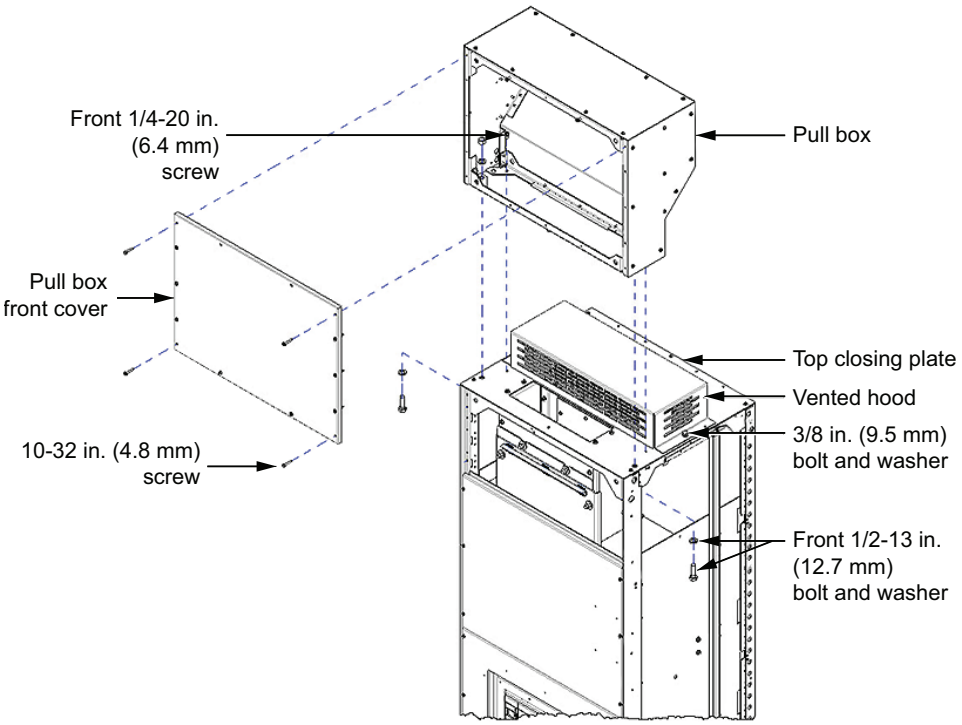
Figure 95 - Remove the Hardware



3. Remove the 10–32 in. (4.8 mm) screws and vented hood (see Remove the Hardware, page 103).
4. Remove the 10–32 in (4.8 mm) screws and horizontal cross bus front cover (see Remove the Hardware, page 103).

5. Remove the pull box front cover for installation access (see Install the Pull Box, page 104).

Figure 96 - Install the Pull Box

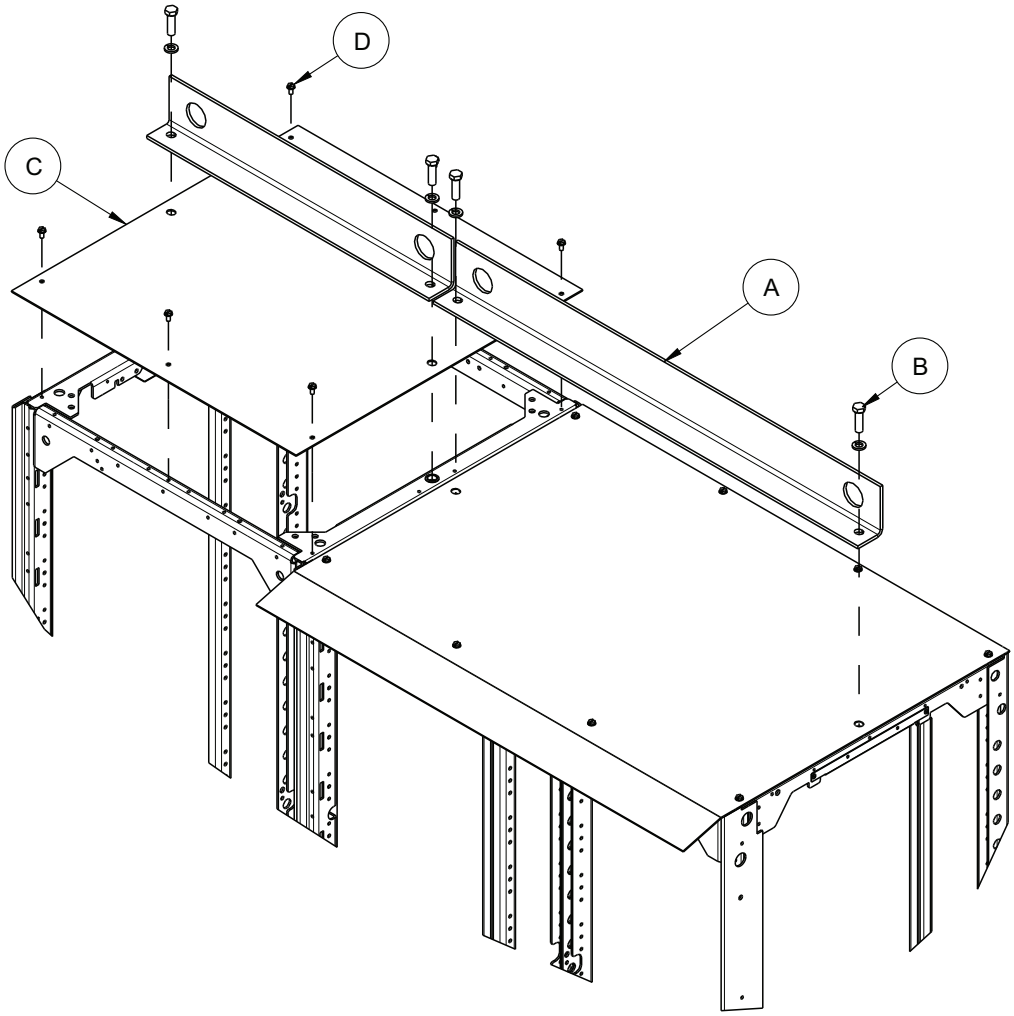


6. Install 1/2 in. (12.7 mm) bolts and washers from inside the cabinet through the top closing plate and to the front pull box channel. Complete the connection with a washer and nut on the inside of the pull box.
7. Install two 1 /4 in (6.4 mm) screws on the pull box rear channel and to the top closing plate.
8. Install the two 3/8 in. (9.5 mm) bolts and washers that were removed in step 2. Place them through the lower side flanges of the vented hood, and into the top of the cabinet. Torque the bolts to 28–33 lb-in. (3.164–3.729 N•m).
9. Re-install the pull box front cover removed in step 5 (see Install the Pull Box, page 104) and the top horizontal wireway cover removed in step 4.

Sprinkler-resistant Low Voltage MCC Pull Box

Refer to Removing the Lifting Angles and Hardware, page 105 for the following steps.

Figure 97 - Removing the Lifting Angles and Hardware



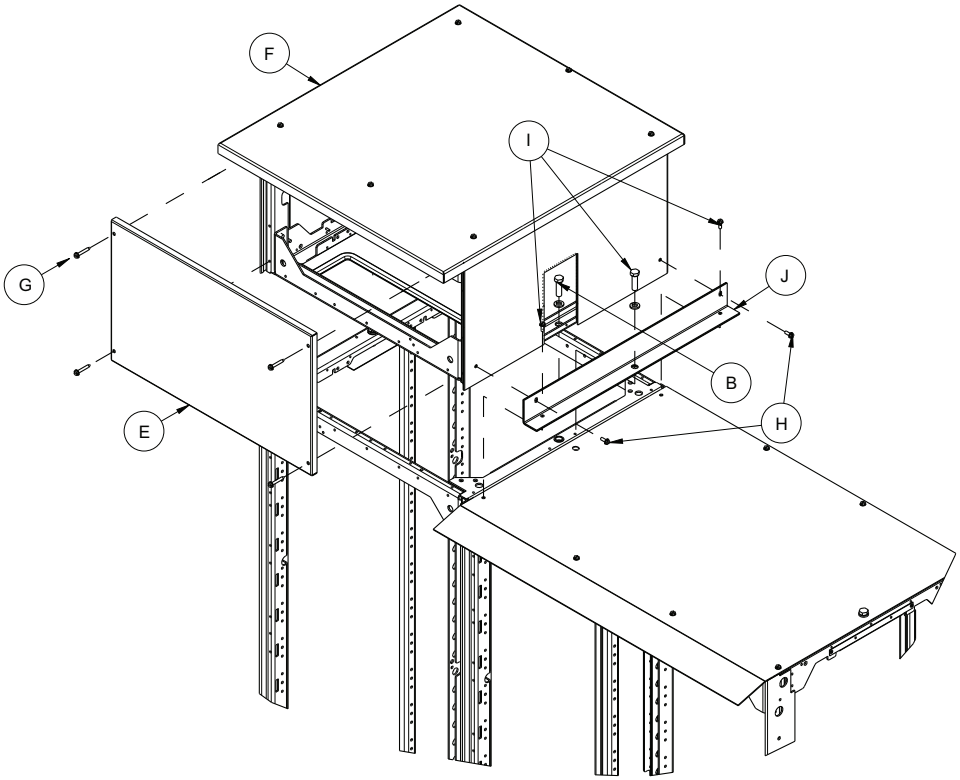
1. Uninstall and discard the lifting angles (A) by removing the 3/8 in. bolts and washers (B) securing them.

2. Remove and discard the top closing plate (C) from the MCC section by removing the 10-32 screws (D) securing it.

   NOTE: For main sections with ArcBlok 1200 technology, do not remove the top closing plate (C) since the pull box is installed over it. Remove only the 10-32 screws (D).

   Refer to **Installing the Pull Box**, page 106.

Figure 98 - Installing the Pull Box



3. Remove the front panel (E) from the pull box (F) by removing the 10-32 screws (G) securing it.
4. Position the pull box on top of the MCC section frame (for standard sections) or on top of the closing plate (for main sections with ArcBlok 1200 technology).

   NOTE: The overhang located at the top of the pull box must be facing the front of the MCC section.

5. Install the two 3/8 in. bolts and washers (B) removed in step 1. Place them through the pull box lower side channels and into the top of the MCC section.
6. Re-install the pull box front panel removed in step 3.
7. Remove the two 10-32 screws (H) located on the side of the pull box near the bottom.
8. Remove the two 10-32 screws, 3/8 in. bolt, and washer located on the top closing plate of the adjacent MCC section (I).
9. Install the pull box splice angle (J) re-using the hardware removed in steps 7 and 8.

NOTE: If the drip hood pull box will be installed on top of a MCC section located in the middle of two other MCC sections, a pair of pull box splice angles will be provided, one per side. For this configuration, repeat steps 7–9 to install the splice angles on both sides.

Load and Control Wiring

The top and bottom horizontal wireways and the vertical wireway are convenient areas to run incoming line, load, and control wires (see Wiring in the Top Horizontal Wireway, page 107). Openings between sections permit wire to pass from one section into the next for interwiring.

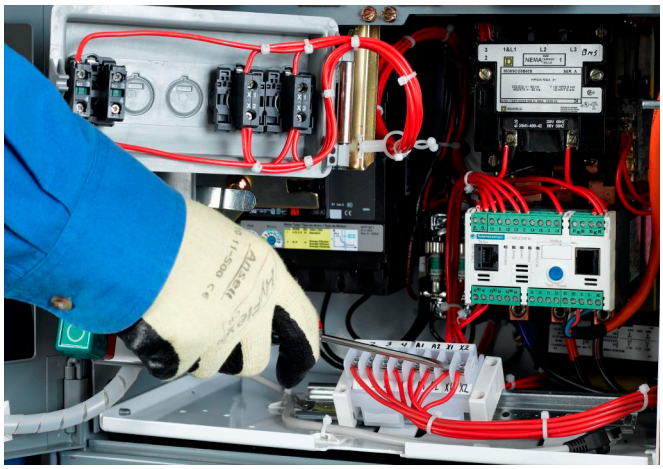
Figure 99 - Wiring in the Top Horizontal Wireway

Control and power wires are routed to each unit via the vertical wireway. When supplied, grommeted wire ports must be opened to route wire to the unit. The H-shaped cut pattern is pre-scored for easy opening. Using a small knife, cut through the center tabs and complete the H-shaped slice (see Vertical Wireway Grommet, page 107). When cutting, be sure not to damage the wires located near the grommet.

Figure 100 - Vertical Wireway Grommet

Pull-apart control terminals (see Pull-apart Type Terminal Blocks, page 108) are mounted on a 35 mm DIN rail located adjacent to the wiring ports toward the front of the unit. Terminate field control wiring on the removable portion of the block.

Figure 101 - Pull-apart Type Terminal Blocks



Crimp Lug Cable Assembly for Cabled Disconnect Unit Installation

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

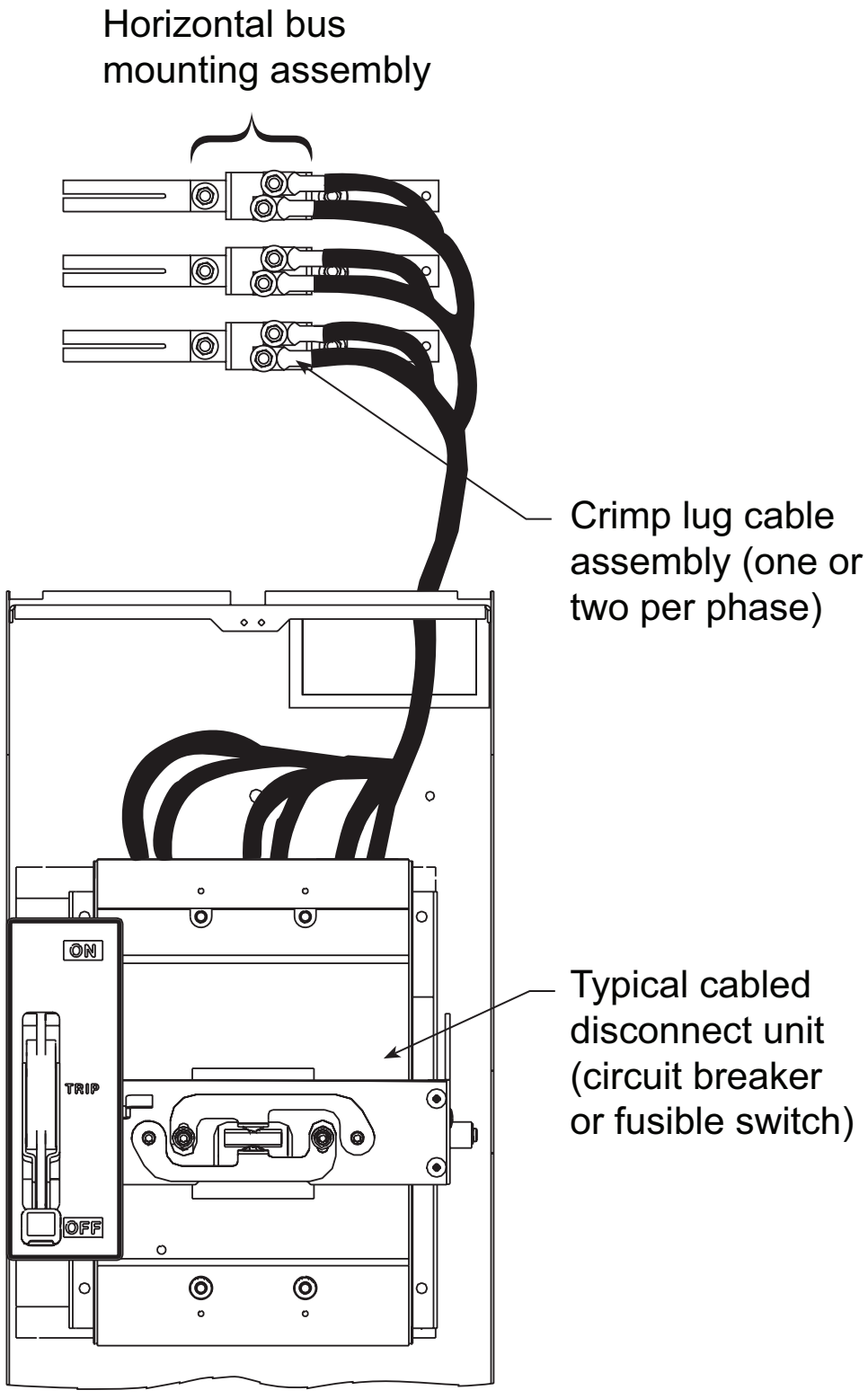
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.

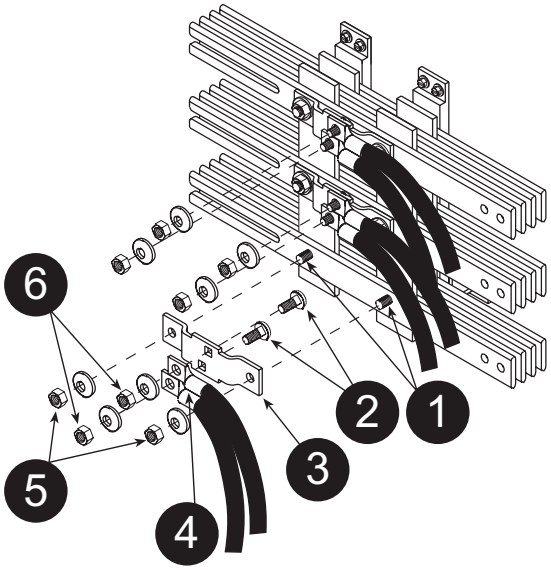
2. Access the horizontal bus in the motor control center (see Typical Cabled Disconnect Unit, page 109).

Figure 102 - Typical Cabled Disconnect Unit



3. Remove the horizontal bus mounting nuts and washers (item E) from the horizontal bus assembly (see Typical Horizontal Bus Assembly, page 110).

Figure 103 - Typical Horizontal Bus Assembly

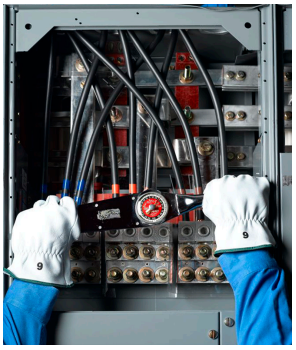


A	Horizontal bus mounting bolts
B	Loom bolts
C	Lug pad
D	Crimp lug cable assembly
E	Horizontal bus mounting nuts and washers
F	Lug pad nuts and washers

4. Insert the loom bolts (item B) through the rear of the lug pad (item C).
5. Using the mounting nuts and washers from step 3, attach the lug pad to the horizontal bus mounting bolts (item A).
6. Torque the horizontal bus mounting nuts to 820–840 lb-in. (93–95 N•m).
7. Route the cable to the circuit breaker or fuse disconnect unit (see Typical Cabled Disconnect Unit, page 109); trim cable length as required.
8. Using the lug pad nuts and washers (item F), attach the crimp lug cable assembly (item D) to the loom bolts on the lug pad.
9. Torque the lug pad nuts to 820–840 lb-in. (93–95 N•m).

Cable Connection Torque Values

Figure 104 - Main Lug Compartment Torque Connection



Connection Torque Values for Main Lug Compartments and Connection Torque Values for Main and Branch Feeders provide main disconnect and branch feeder torque values, which apply to both aluminum and copper conductors.

Table 10 - Connection Torque Values for Main Lug Compartments(3)

Socket Size Across Flat	Torque
3/8 in.	375 lb-in. (42.4 N•m)
1/2 in.	500 lb-in. (55.6 N•m) for 800–1200 A, bottom main lug compartments
	600 lb-in. (67.8 N•m) for all others

(3) See Main Lug Compartment Torque Connection, page 110.

Table 11 - Connection Torque Values for Main and Branch Feeders

Frame Size	Ampere Rating	Torque
B	15–125 A	44 lb-in (5.0 N•m) for #14 - #8Q80 lb-in. (9.0 N•m) for #6 - #3/0
H	15–30 A	50 lb-in. (5.6 N•m)
	35–150 A	120 lb-in. (13.6 N•m)
J	150–250 A	225 lb-in. (25.4 N•m)
FA	15–30 A	35 lb-in. (3.9 N•m)
	35–100 A	80 lb-in. (9.0 N•m)
FC	20–30 A	35 lb-in. (4.0 N•m)
	40–100 A	65 lb-in. (7.3 N•m)
KA	70–250 A	250 lb-in. (28.2 N•m)
KC	110–250 A	250 lb-in. (28.2 N•m)
LA/LH	125–400 A	200 lb-in. (22.6 N•m)
LC/LI/LE/LX/LXI	300–600 A	300 lb-in. (33.9 N•m)
LG/LH/LL/LR	300–600 A	442 lb-in. (50 N•m)
MA/MH/ME/MX	200–400 A	300 lb-in. (33.9 N•m)
	450–1000 A	300 lb-in. (33.9 N•m)
NT	400–1200 A	600 lb-in. (67.8 N•m)
NW	400–3200 A	600 lb-in. (67.8 N•m)
PA/PH/PE/PX	800–2000 A	600 lb-in. (67.8 N•m)
MJ/MG	300–800 A	450 lb-in. (50.8 N•m)
PJ/PK/PG/PL	250–1200 A	450 lb-in. (50.8 N•m)
RJ/RK/RG/RL	600–2500 A	500 lb-in. (56.5 N•m)

Component Instructional Information

Component manuals for devices such as adjustable frequency drive controllers, solid state reduced voltage starters, and programmable logic controllers are available from your local Schneider Electric representative, or can be downloaded from the Schneider Electric Download Center: se.com/us/en/download/ . See the Schneider Electric Literature Lists, page 12.

Modifying Fuse Clip Locations

⚠⚠DANGER

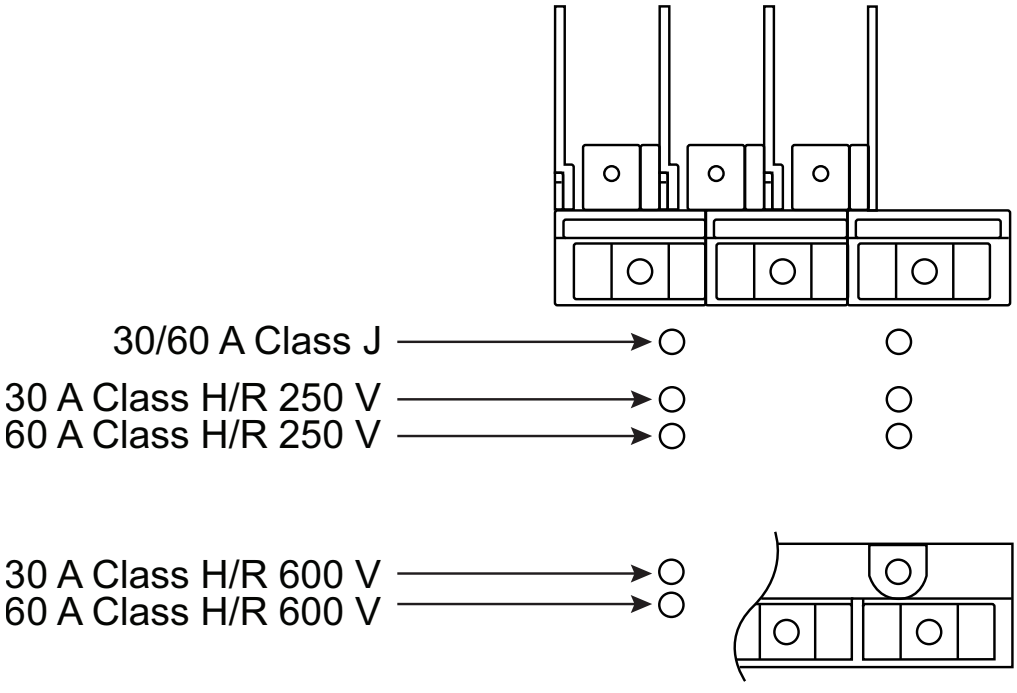
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized switch with door open.
- Turn off switch before removing or installing fuses or making load side connections.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm switch is off.
- Turn off all power supplying switch before doing any other work on or inside switch.
- Do not use renewable link fuses in fused switches.

Failure to follow these instructions will result in death or serious injury.

Install 30 and 60 A fuse bases for the proper fuse size and class and maximum voltage in Size 1 and 2 starter units. The base pan of the disconnect switch has five sets of mounting holes for this purpose. The lower fuse base is installed in the proper mounting holes at the factory (see Size 1 and 2 Fuse Clip Locations, page 112). Additional clips and bases may be required if changing fuse class.

Figure 105 - Size 1 and 2 Fuse Clip Locations



Turn off all power supplying this equipment and follow lockout/tagout procedures before working on or inside equipment. Always use a properly rated voltage sensing device to confirm the power is off.

NOTE: For Form II Class C fuse spacing, contact your Schneider Electric Canada representative.

Operation

Included in this section are the pre-operation checklist and energizing procedures.

Pre-operation Checklist

To help ensure proper operation of the MCC, check the items listed below before energizing the MCC:

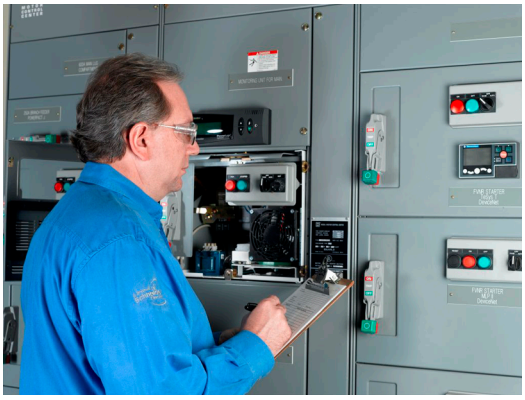
1. Complete the maintenance procedures beginning in Maintaining the MCC, page 116 and continuing up to Insulation Test, page 135. This initial maintenance is necessary to detect any shipping damage or loose connections. Do not energize the MCC until initial maintenance is complete.

   NOTE:

   The following maintenance procedures are not necessary before energizing the MCC for the first time: Stab Assemblies, Starter Contacts, and Barriers/ Insulators.

2. Perform an insulation test on the MCC (see Insulation Test, page 135).
3. If the MCC is equipped with ground fault protection, properly adjust and test, the ground fault protective device before energizing.

Figure 106 - Pre-operation Check



4. Remove all blocks or other temporary holding means from the electrical devices.
5. Remove any secondary shunt bars from the current transformers. Do not operate a current transformer with its secondary open-circuited.
6. Manually exercise all switches, circuit breakers, and other operator mechanisms to help ensure that they are properly aligned and operate freely.
7. Electrically exercise all electrically-operated switches, circuit breakers and other mechanisms (but not under load) to help ensure that the devices operate properly. An auxiliary source of control power may be required.
8. Verify proper interval and contact operation of the timers.
9. Verify that proper overload units are installed by checking the overload selection tables against motor full load current. MotorLogic, TeSys T, TeSys Tera and IEC overload relays (if supplied) do not require thermal units but are set at the lowest setting at the factory.
10. Verify that all load and remote-control connections have been made and that they agree with the wiring diagrams provided.
11. Verify that all ground connections are made properly.

12. Install the covers and close the doors; verify all fasteners are properly tightened; verify all mechanism interlocks function.

For arc-rated applications:

1. Verify that lifting angles have been removed from all sections in the lineup.
2. Verify that the proper top plate assembly has been installed per the provided instructions.
3. Verify that over-current protection device (OCPD) settings meet the requirements outlined in this document before applying power.
4. Verify that the required clearances from obstructions above and around the equipment have been met per the requirements outlined in this document.

For ArcBlok 1200 mains:

1. Verify all incoming power cables are properly installed and secured:
   a. Cable lacing is complete per instructions starting on Incoming Cable Lacing Instructions–ArcBlok 1200 Line-side Isolation Cable Vault, page 91.
   b. The damper and two springs on the cable vault rear panel are installed and functioning properly.
   c. Closing plates are installed with conduit.
   d. The space between conductors and conduit is sealed with duct seal putty.
2. Verify all ArcBlok 1200 and cable vault covers are replaced and secured correctly.

For ArcBlok 2500 mains:

1. Verify all incoming power cables are properly installed and secured:
   a. Cable lacing is complete per instructions starting on Incoming Cable Lacing Instructions–ArcBlok 2500 Line-side Isolation Cable Vault, page 95.
   b. Closing plates are installed with conduit.
   c. The space between conductors and conduit is sealed with duct seal putty.
2. Verify all ArcBlok 2500 and cable vault covers are replaced and secured correctly.

Energizing the MCC

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.
- Review the Pre-operation Checklist, ensuring that all items check out.

Failure to follow these instructions will result in death or serious injury.

NOTE: If an electrical fault is experienced, do not attempt to re-energize the MCC. Please refer to Maintenance After an Electrical System Event Has Occurred, page 136.

To energize the MCC:

1. Review the Pre-operation Checklist, page 113 before energizing.
2. Turn off all downstream loads, including distribution equipment and other devices that are remote from the MCC.
3. Verify that all barriers, doors, and covers are closed before energizing the equipment.
4. Energize the equipment in sequence, starting with the main, the feeder units next, and then the motor starter units.
5. With all barriers in place and all unit doors closed and latched, turn on the units with a firm, positive motion.
6. After all disconnects are closed, loads such as lighting circuits, starters, contactors, heaters, and motors may be energized.

Maintaining the MCC

Initial Maintenance: Before energizing any new MCC equipment, perform the maintenance procedures described in this section.

Future Periodic Maintenance: Record the installation, initial maintenance, and commissioning date(s) for the MCC. Future periodic maintenance consists of inspection and maintenance actions as described in the following sections. Perform inspection and maintenance at least annually, or more frequently if indicated by service conditions or your established maintenance policy.

Inspecting the Enclosure

Perform inspection, cleaning, and any required repair activities as part of the initial maintenance of the MCC and at periodic inspection and maintenance intervals.

1. Inspect the interior and exterior of the MCC for moisture, oil, or other foreign material. Eliminate all foreign material and clean the MCC.
2. Clean the interior and exterior of the MCC with a vacuum cleaner. (Do not use compressed air; it redistributes contaminants to other surfaces.) Check the enclosure for damage that might reduce electrical clearances.
3. Examine the finish of the enclosure. Touch up the paint if necessary. Replace any badly corroded or damaged enclosure parts.
4. Check the MCC interior carefully for moisture, condensation build-up, or signs of previous wetness. Moisture can compromise electrical insulation systems and cause rapid oxidation of current-carrying parts. Inspect all conduit entrances and cracks between the enclosure panels for dripping leaks. Condensation in conduits can be a source of moisture and must not be allowed to drip onto live parts or insulating material. Take the necessary steps to eliminate moisture and seal off leaks.

Bus Bars and Incoming Line Compartments

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

NOTE: If a three-inch VeriSafe Absence of Voltage Tester (AVT) unit is being used to confirm that power is off, refer to the one-line diagram for the MCC to determine which parts of the MCC bus system the AVT monitors. The line side of the circuit breaker main supplying power to MCC lineup or other portions of the MCC bus system might still be powered.

NOTICE

HAZARD OF IMPROPER CLEANING

- Never brush or use sandpaper on the bus; doing so will remove plating and cause oxidation. Use a cleaning fluid approved for such use. Do not use cleaning fluid on insulators.
- Do not attempt to clean bus bars or connectors that are damaged in any way. Replace them with new parts.

Failure to follow these instructions can result in equipment damage.

Initial Maintenance

Follow the steps below at the time of installation to locate and tighten any connections that may have loosened during shipment and handling:

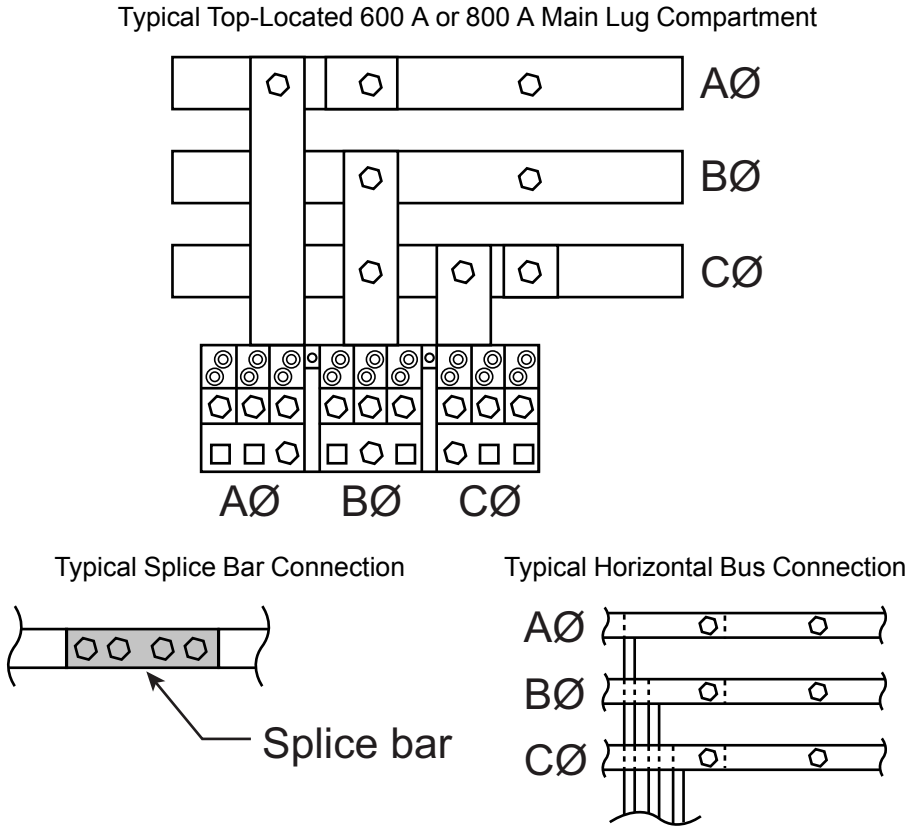
1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm power is off.
2. Remove the top and bottom horizontal wireway covers in each section.
3. Expose the bus and bus connections by removing the two-piece bus barrier in each section.
4. Examine all bus bars and connectors. Replace any parts that are badly discolored, corroded, pitted, or otherwise damaged.

5. Verify that all bolts at the bus connection points indicated by a hexagon in Typical Bus Connection Points, page 118 are in place and properly tightened. Although one specific type of compartment or bus is shown in Typical Bus Connection Points-Top-Feed ArcBlok Main Access, page 119, perform this maintenance on all bolted connections. See Bus Connection Torque Values, page 118 for torque values.

Table 12 - Bus Connection Torque Values

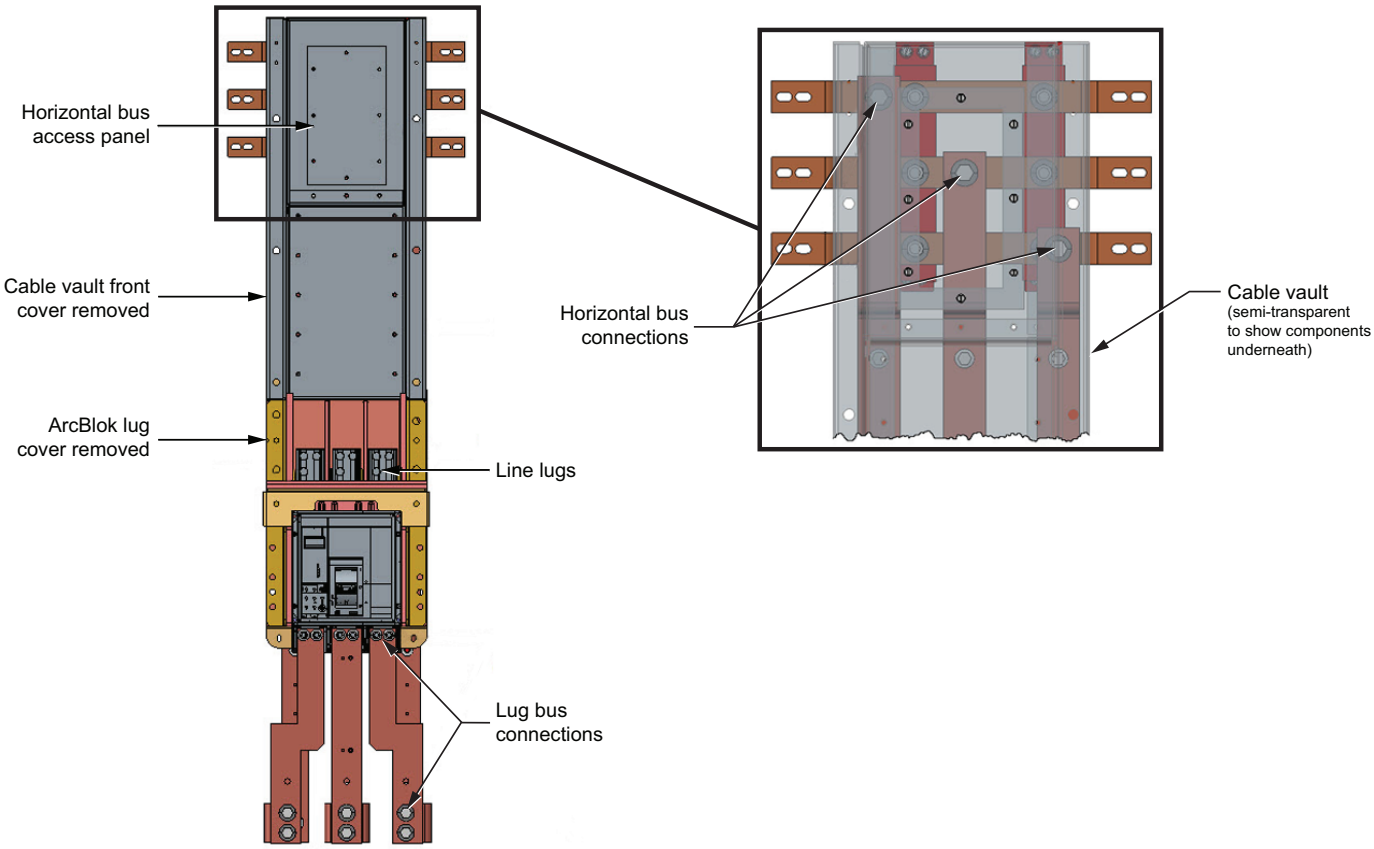
Bolted Connection Location	Torque Range
Horizontal bus (all locations)	68–70 lb-ft. (92.29–94.54 N•m)
Horizontal ground bus (all locations)	5–6 lb-ft. (6.75–8.44 N•m)
Splice bars–0.375 in. diameter bolts	31–32 lb-ft. (41.64–43.33 N•m)
Splice bars–0.5 in. diameter bolts	68–70 lb-ft. (92.29–94.54 N•m)

Figure 107 - Typical Bus Connection Points



6. Access to load-side connections for top-feed ArcBlok main sections are restricted by the cable vault, so an access panel in the cable vault provides access to B phase bus connections. Bus connections for A and C phases are located at the outer edges of the cable vault (See Typical Bus Connection Points-Top-Feed ArcBlok Main Access, page 119).

Figure 108 - Typical Bus Connection Points-Top-Feed ArcBlok Main Access



7. Verify that all main lug, circuit breaker, or fusible switch set screws holding incoming conductors in main lugs are in place and properly tightened (see Main Lug Compartment Torque Connection, page 119). Use a torque wrench and a 3/8 in. Allen bit to torque the lug set screws to the appropriate value (see Cable Connection Torque Values, page 110).

Figure 109 - Main Lug Compartment Torque Connection

8. Inspect all insulators, braces, and barriers; replace any that show signs of arcing damage, tracking, excessive heat, or cracking.

Periodic Inspection and Maintenance

Perform periodic inspection and maintenance of bus and incoming line lug connections at least annually or more frequently if indicated by service conditions and your established maintenance policy.

1. Inspect the bus and line compartment connections for any signs of overheating. Discoloration and flaking of insulation or metal parts are indications of overheating.

   NOTE: If overheating occurs, be sure all conditions that caused the overheating have been identified and corrected. Loose or contaminated connections can cause overheating.

2. Replace bus bars and terminal lugs that display pitting, corrosion, or discoloration resulting from high temperatures or having been subjected to short circuit conditions.
3. Tighten any loose connections found. See Initial Maintenance, page 117 for information on bus and incoming line compartment connections.

   NOTE: Bus bar and other joints that were tightened during initial maintenance and do not display signs of overheating or other signs of loosening do not need to be retightened.

4. Inspect all insulating materials. Before re-energizing the MCC, replace insulators showing any visible damage (such as cracks).

Maintaining the Control Unit

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

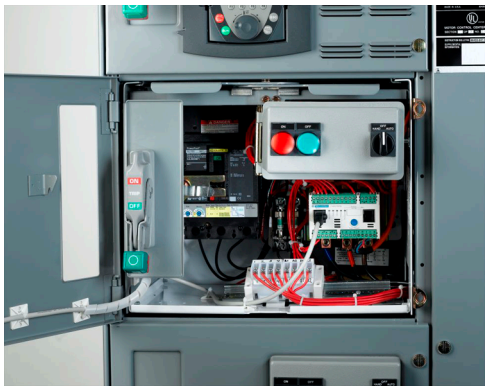
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

NOTE: If a three-inch VeriSafe Absence of Voltage Tester (AVT) unit is being used to confirm that power is off, refer to the one-line diagram for the MCC to determine which parts of the MCC bus system the AVT monitors. The line side of the circuit breaker main supplying power to MCC lineup or other portions of the MCC bus system might still be powered.

Perform maintenance on control units at least annually, or more frequently if indicated by service conditions and your established maintenance policy. During installation, locate and tighten any connections that have become loose during shipment and handling, using the following procedures. If the control unit (see Control Unit, page 121) is being removed from the MCC for maintenance, start with Removing the Control Unit, page 122. If maintenance is performed with the control unit installed, start with Circuit Breaker or Disconnect Switch.

Figure 110 - Control Unit



Removing the Control Unit

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Do not attempt to remove the unit from the structure with the disconnect in the **ON** position.
- The control unit is interlocked with the MCC structure to help prevent the unit from being withdrawn while the disconnect is in the **ON** position. Do not attempt to override the mechanism-to-structure interlock.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

The Model 6 MCC is designed for convenient and quick control unit removal and replacement. To remove control units:

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.

   NOTE: If a three-inch VeriSafe Absence of Voltage Tester (AVT) unit is being used to confirm that power is off, refer to the one-line diagram for the MCC to determine which parts of the MCC bus system the AVT monitors. The line side of the circuit breaker main supplying power to MCC lineup or other portions of the MCC bus system might still be powered.

2. Move the operator mechanism to the OFF position (see Operator Mechanism in the OFF Position, page 122).

Figure 111 - Operator Mechanism in the OFF Position

3. Loosen the captive fasteners (see Loosening Captive Fasteners, page 123) on the door and open it. Use a properly rated voltmeter to check for live circuits. De-energize any voltage sources.

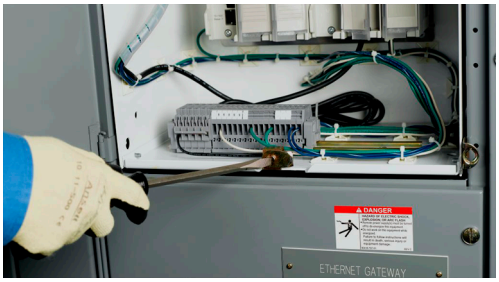
Figure 112 - Loosening Captive Fasteners

NOTE: Arc-rated units have additional fasteners at the top-middle and bottom-middle of the door that must be loosened to open the door (see Arc-Rated MCC Door Latches, page 123).

Figure 113 - Arc-Rated MCC Door Latches

4. Release the lock-in device located at the bottom front of the unit (when supplied) by turning the screw on the front of the device until the locking pawl is parallel to the bottom of the unit (see Releasing the Lock-in Device (when supplied), page 123).

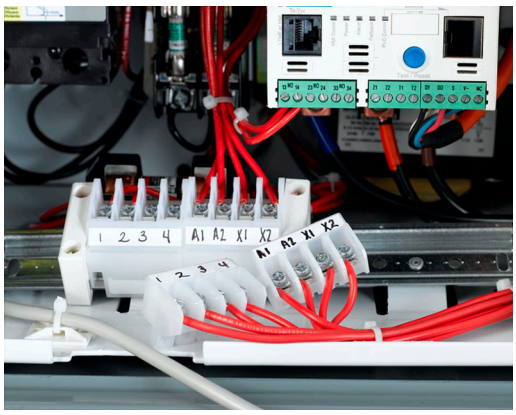
Figure 114 - Releasing the Lock-in Device (when supplied)



5. Disconnect the power wiring from the starter terminals or, if provided, the power terminal blocks. Tag the terminations for re-installation (see Disconnected Terminal Blocks, page 124).

   Remove the top portion of the pull-apart control terminal blocks to which field wiring is connected.

Figure 115 - Disconnected Terminal Blocks

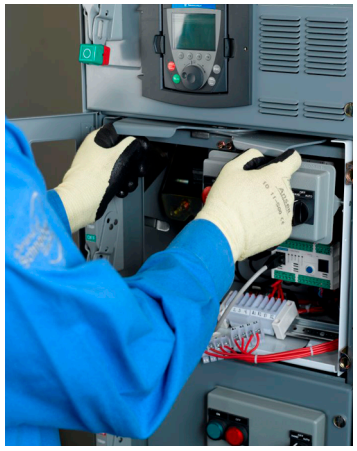


6. Push the power leads and the top portion of the control pull-apart terminal blocks through the wiring port and into the vertical wireway (see Power Leads and Top of Terminal Blocks Fed Through Wiring Port, page 124).

Figure 116 - Power Leads and Top of Terminal Blocks Fed Through Wiring Port

7. Pull forward on the twin handle cam mechanism located at the top front of the unit to rack the unit partially out of the structure (see Pulling the Twin Handle Cam Mechanism Forward, page 125). This action disconnects the power stabs from the vertical bus. Continue pulling forward until the handles are fully extended.

Figure 117 - Pulling the Twin Handle Cam Mechanism Forward



8. The operator mechanism-to-structure interlock helps prevent the control unit from being withdrawn or inserted with the handle in the **ON** position (see Operating the Mechanism-to-Structure Interlock, page 125).

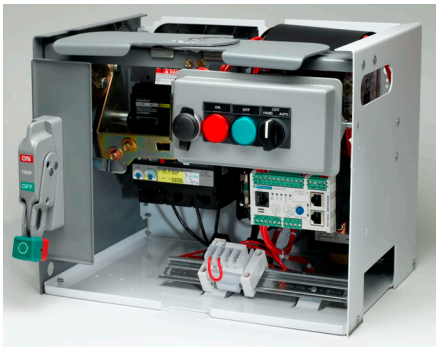
Figure 118 - Operating the Mechanism-to-Structure Interlock

9. If the withdrawn unit is left in the structure, use appropriate lock-out procedures to avoid re-loading by non-authorized personnel (see Locked Out Device, page 125).

Figure 119 - Locked Out Device

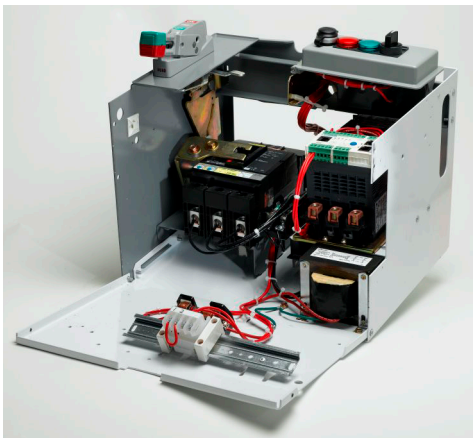
10. Remove the control unit from the structure for servicing (see Control Unit Removed, page 126). In units with a full bottom plate, additional accessibility to the components and wiring can be achieved by folding the bottom plate down. To do so, lean the unit on its back, remove the two front screws, and fold the bottom plate down (see Control Unit with Bottom Plate Folded Down, page 126).

Figure 120 - Control Unit Removed



NOTE: Some MCC units can weigh up to 200 pounds (90.1 kg) and require two or more persons or special handling equipment. Lift only by supporting the bottom and/or the side panels of the unit. Refer to Proper/Improper Lifting Points for Plug-in Units Taller Than 24 in. (610 mm), page 27.

Figure 121 - Control Unit with Bottom Plate Folded Down



11. If necessary, the door can be taken off its hinges without removing the unit. To do so, drive the hinge pins out of the hinge collars, using a small flat-bladed screwdriver or small punch (see Driving Out Hinge Pin, page 127). Remove the bottom hinge pin first.

Figure 122 - Driving Out Hinge Pin

12. When reinstalling a hinge pin, make certain that the hooked end is fully engaged into the hinge collar.

Removing the Compac™ 6 Control Unit

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

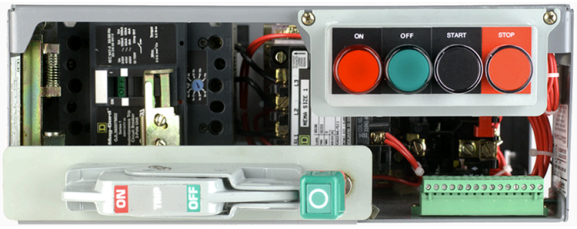
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside it.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm power is off.

2. Move the operator handle to the **OFF** position (see Operator Handle in the OFF Position, page 128).

Figure 123 - Operator Handle in the OFF Position



3. Loosen the captive fasteners (see Loosening Captive Fasteners, page 128) on the door and open it.

   NOTE: Arc-rated units have additional fasteners at the top-middle and bottom-middle of the door that must be loosened to open the door (see Arc-Rated MCC Door Latches, page 123).

Figure 124 - Loosening Captive Fasteners

4. Check for live circuits using a properly rated voltage sensing device. De-energize any voltage sources.

   NOTE: Removal of the control station plate may be necessary to perform steps 5 and 6. To remove the control station plate:

   a. Loosen the captive mounting screws holding the plate to the front of the unit.

   b. Remove the plate from the unit (see Control Station Plate Removed, page 129).

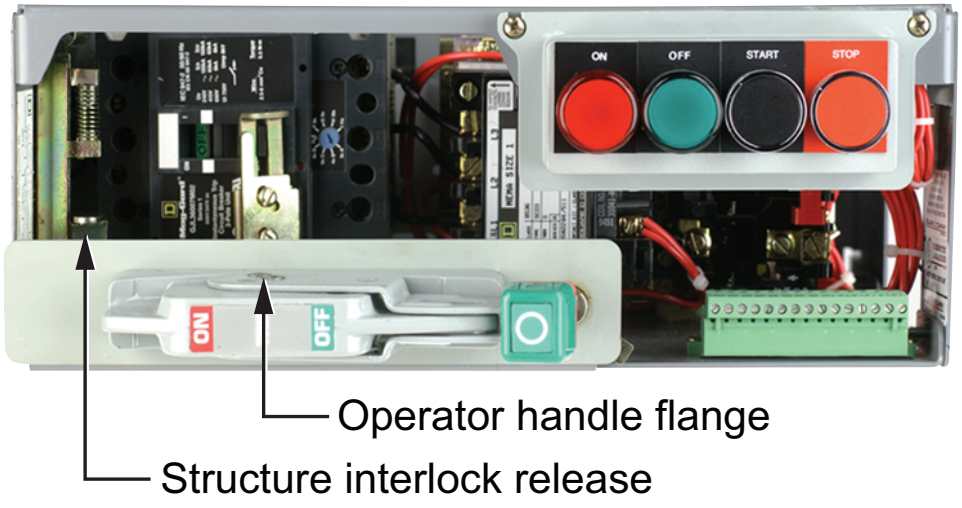
   c. Re-attach the plate after disconnecting the load wires and control terminal block.

      NOTE: Do not disconnect the wires to the control station plate.

Figure 125 - Control Station Plate Removed

5. Disconnect the power wiring from the starter terminals. Tag the terminations for re-installation.
6. Remove the top portion of the pull-apart control terminal block to which field wiring is connected.
7. Push the power leads and the top portion of the control pull-apart terminal blocks through the wiring port and into the vertical wireway.
8. Grasp the operator handle flange and press down on the structure interlock release (see Operator Handle and Interlock Release, page 129).

Figure 126 - Operator Handle and Interlock Release



9. Firmly pull the unit forward to disengage the power stabs from the vertical bus. The unit should now slide freely from the MCC structure.
10. The operator mechanism-to-structure interlock helps prevent the control unit from being inserted or withdrawn with the handle in the **ON** position.
11. If the withdrawn unit is left in the structure, use appropriate lock-out/tag-out procedures to avoid re-loading by non-authorized personnel.

12. Remove the control unit from the structure and place it on a flat surface for servicing.

    NOTE: Partial disassembly of the unit may be necessary to gain access to various electrical connections for servicing.

Tests and Maintenance Performed with the Control Unit Removed

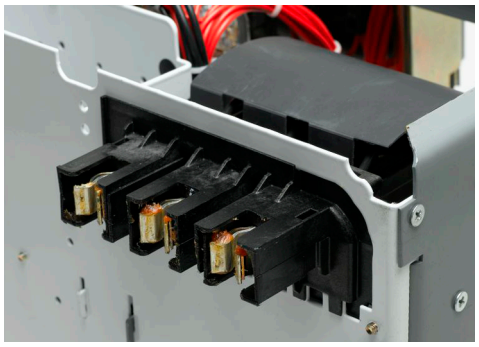
NOTICE
HAZARD OF IMPROPER LUBRICATION • Do not remove the protective lubricant from the stabs. • If additional lubricant is required, order electrical joint compound (Schneider Electric PN PJC-7201). **Failure to follow these instructions can result in equipment damage.**

Once the control unit is removed, perform the following tests and maintenance:

Stab Assemblies: Inspect the stab assemblies (see Stab Assembly, page 130) for signs of arcing or overheating. Replace the disconnect assembly (FA/KA type circuit breakers) or the jaw connector assembly (B-, H-, J-, or L-frame circuit breakers) immediately if overheating has occurred. For replacement disconnect assemblies, see Circuit Breaker and Fusible Switch Replacement, page 205.

NOTE: If the stab assembly is badly pitted, the vertical bus may also need to be replaced.

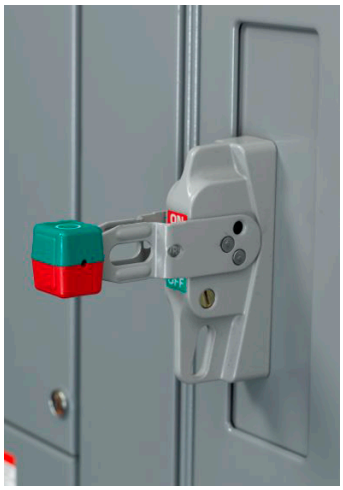
Figure 127 - Stab Assembly



Circuit Breaker or Disconnect Switch: Verify proper operation of the circuit breaker or disconnect switch. Inspect switch blades; if evidence of arcing or excessive heat is present, replace the switch assembly. Exercise the push-to-trip feature on the circuit breakers.

Operator Mechanism: Verify proper operation of the operator mechanism (see Operator Mechanism in the Tripped Position, page 131).

Figure 128 - Operator Mechanism in the Tripped Position

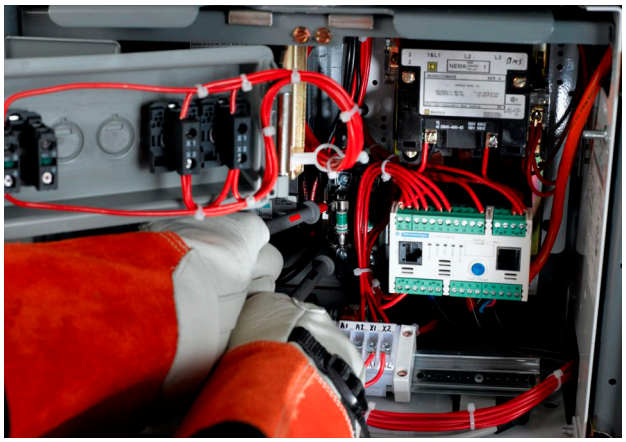


Test for proper **ON**, **TRIP**, **OFF**, and **RESET** positions (F-, K-, and L-frame circuit breakers) or **ON**, **TRIP**, and **OFF** positions (B-, H-, J-, M-, or P-frame circuit breakers). Verify proper door interlock operation.

> **NOTE:** Fusible switch operator mechanisms do not have **TRIP** or **RESET** positions.

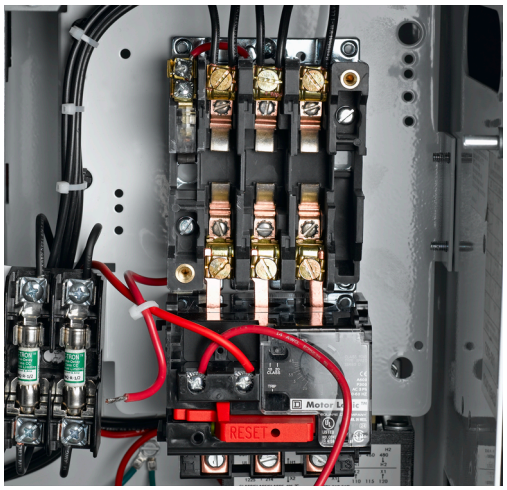
Fuses: Inspect all fuses and fuse clips (see Inspecting Fuses, page 131). Replace any parts showing signs of overheating or arcing.

Figure 129 - Inspecting Fuses



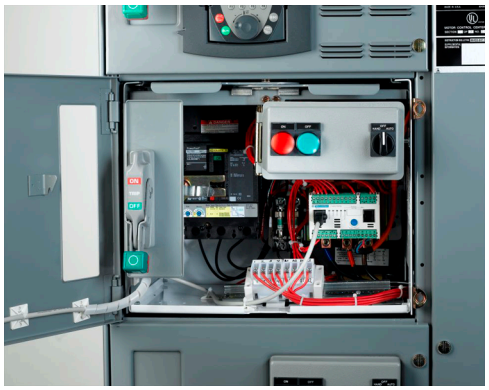
Starter Contacts: Check the starter contacts (see Starter Contacts, page 132). Replace any that are badly worn or pitted. (See the Schneider Electric Literature Lists, page 12 for the appropriate instruction bulletin.)

Figure 130 - Starter Contacts



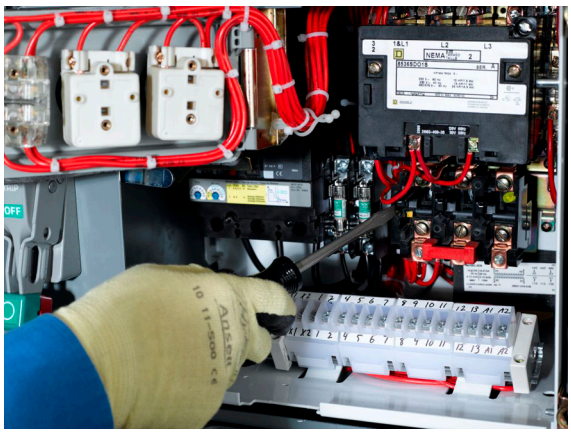
Control Devices—Check for proper operation of starters, relays, timers, and other control devices (see Control Devices).

Figure 131 - Control Devices



Overload Relay: Manually trip the overload relay to help ensure proper operation (see Tripping the Overload Relay, page 132). Verify that the thermal unit is the proper size for the application. Refer to the thermal unit selection tables (Thermal Overload Unit Selection, page 196).

Figure 132 - Tripping the Overload Relay

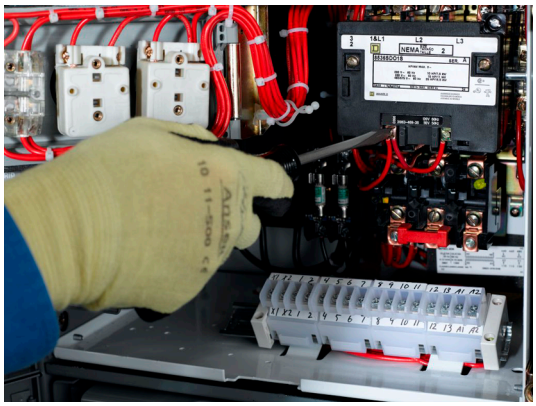


Wiring and Electrical Connections: Verify that all electrical connections are correct; tighten them if necessary (see Tightening Electrical Connections, page 133). For any inaccessible electrical connections, contact Schneider Electric Services. Also inspect

all power and control wiring, replacing any wire that has worn insulation or shows signs of overheating or cracking.

Verify that all network connections are secured and all cable insulation is in good condition. Replace if cable shows signs of stress, particularly on cable bends and connecting plugs.

Figure 133 - Tightening Electrical Connections



Starter Interlocks: Check the mechanical interlocks on reversing, multispeed, or reduced voltage starters.

Barriers/Insulators: Inspect all insulators, braces, and barriers (see Manual and Automatic Bus Shutters, page 134); replace any that show signs of arcing damage, tracking, excessive heat, or cracking.

Figure 134 - Manual and Automatic Bus Shutters

Manual Bus Shutter

Automatic Bus Shutter

Special Units: Follow the manufacturer's recommended maintenance procedures for special units (for example: drives, soft starts, and automatic transfer switches).

Reassembly

To reassemble the MCC after testing and maintenance:

1. Reinstall Compac 6 units by reversing removal steps 1–12 in Removing the Compac™ 6 Control Unit, page 127. Reinstall all other units by reversing removal steps 1–12 in Removing the Control Unit, page 122.
2. Confirm the cam mechanism is in the open position; position the mounting slides of the control unit onto the slots of the mid-shelf. Slide the unit inward to engage the cam mechanism.

   For Compac 6 units, position the mounting slides of the control unit onto the slots of the mid-shelf. Slide the unit inward until the unit is halfway in, then move it inward with a quick push. This movement easily overcomes the compression of the stabs as they engage the vertical bus.
3. Replace all barriers and cover plates and close and fasten all doors.

Insulation Test

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

NOTICE

HAZARD OF OVERVOLTAGE

- Do not use a megohmmeter on: adjustable speed drives, solid state soft starters, surge protection devices (SPDs), AccuSine™ active harmonic filter units, PowerLogic solid state meters, capacitor units or any devices not designed to withstand megohmmeter voltage.
- Disconnect all solid-state devices such as SPDs, drives, soft starts, capacitors, filters, and circuit monitors before performing megohmmeter tests on the MCC.

Failure to follow these instructions can result in equipment damage.

Before an MCC is energized, take resistance measurements. Use an insulation tester (megohmmeter) with a potential of 500–1000 V. Take readings between each phase and from each phase to ground, with the branch disconnects **off**. Make sure the main disconnect is **off** during all insulation tests.

Readings from a megohmmeter with all disconnects **off** are typically 5–20 megohms or higher. Do not energize the MCC if readings below one megohm are found. Contact your local Schneider Electric representative. Record all megohmmeter readings for future reference. Any sudden change in resistance values (even within the acceptable range) may indicate a potentially damaged insulation system. Early detection and replacement of a potentially damaged insulation system helps avoid equipment damage.

Maintenance After an Electrical System Event Has Occurred

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

NOTE: After an unusual electrical system event such as a ground fault, short circuit, or protective device trip has occurred, arc-rated MCCs must be inspected, repaired, and re-qualified by Schneider Electric Services personnel to maintain the arc containment ratings.

Excessive currents occurring during a short circuit or arcing event may result in structure, component, bus, or conductor damage. This damage is caused by mechanical distortion, thermal damage, metal deposits, or smoke from the event. Locate and correct the cause of the event. Inspect all equipment and make any necessary repairs or replacements before putting the equipment into service again. Make sure all replacement parts are rated properly and are suitable for the application. If in doubt, consult your Schneider Electric field sales representative.

After any unusual electrical system event, perform all maintenance procedures, starting in Maintaining the MCC, page 116 and continuing to Insulation Test, page 135. Also perform the following procedures after an event:

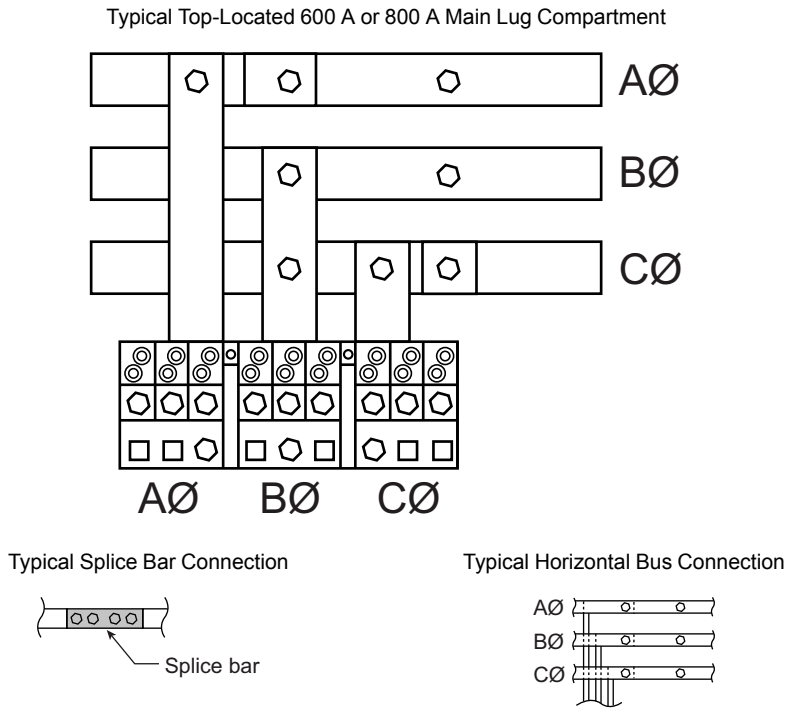
1. If the event occurred downstream from the MCC, perform appropriate maintenance on all equipment involved.
2. Examine the enclosure. External evidence of enclosure damage usually indicates damage within. Extensive damage requires replacement of the enclosure parts and the enclosed equipment.
3. Replace any parts that are damaged or deformed. Pay particular attention to door hinges and door closing hardware. Inspect the area around any damaged units (both inside and out) for displaced parts from the damaged unit. See Inspecting the Enclosure, page 116.

4. Examine bus bars and incoming line compartments; tighten all electrical connections to their proper torques (Bus Connection Torque Values, page 137 and Typical Bus Connection Points, page 137 show typical bus connection points and torque values.) Replace any deformed bus bars or connectors, as well as any showing signs of arcing damage. Inspect all insulators for cracks or burn marks; replace any displaying these characteristics.

Table 13 - Bus Connection Torque Values

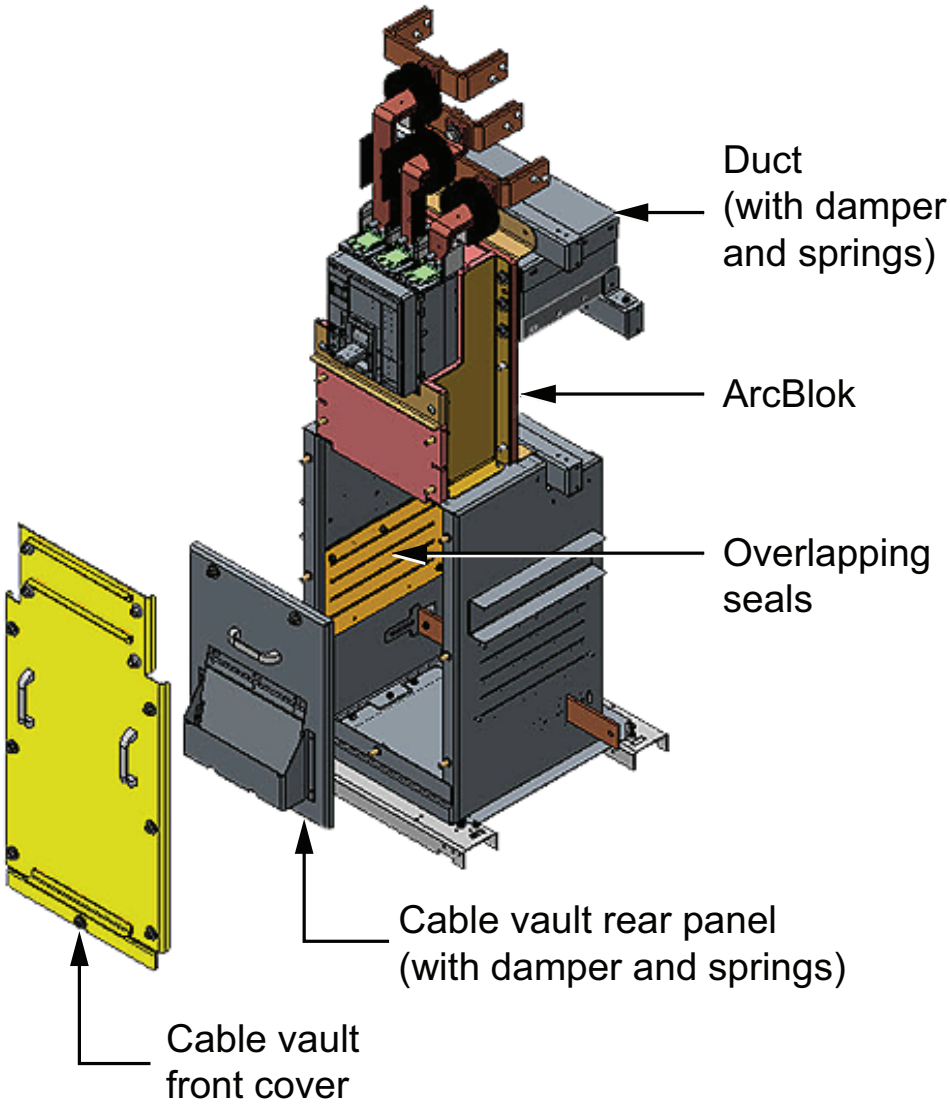
Bolted Connection Location	Torque Range
Horizontal bus (all locations)	68–70 lb-ft. (92.29–94.54 N•m)
Horizontal ground bus (all locations)	5–6 lb-ft. (6.75–8.44 N•m)
Splice bars–0.375 in. diameter bolts	31–32 lb-ft. (41.64–43.33 N•m)
Splice bars–0.5 in. diameter bolts	68–70 lb-ft. (92.29–94.54 N•m)

Figure 135 - Typical Bus Connection Points



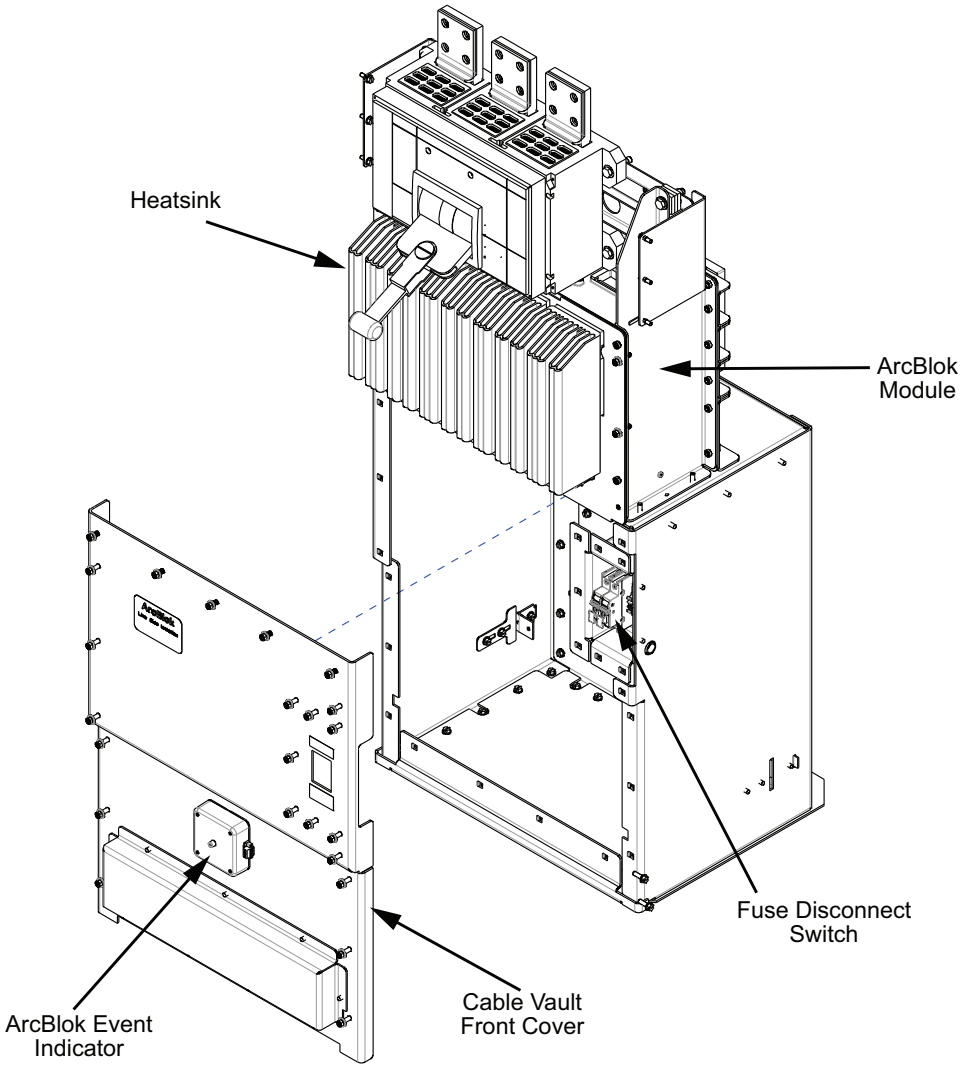
5. If the event occurred between an upstream protection device and the section containing an ArcBlok 1200 main device, inspect line-side connections within the ArcBlok and the line-side isolation cable vault. Inspect the interior, looking for evidence of an event, including burn marks and damaged parts. Inspect the front covers, overlapping seals, dampers, springs, and gasket material in and around the vault (see Inspection Points After an Event, page 138). Replace any parts that are damaged or deformed. If there is evidence of damage in ArcBlok components such as the interphase barriers or phase-line lug connectors, contact Schneider Electric Services before returning the equipment to service.

Figure 136 - Inspection Points After an Event



6. If an internal arc interruption occurs on incoming power of ArcBlok Main device, refer to Return to Service Protocol—R Frame ArcBlok Instruction Bulletin—PKR25993. In addition, inspect the Fuse Disconnect Switch and its wiring inside the cable vault for damage of discoloration. See Inspection Point After an Event, page 139. Contact Schneider Electric Services if any damage or discoloration is found. Refer to deployment guide 7EN42-0247-00 for the ArcBlok Event Indicator and CL110 thermal sensors commissioning procedure.

Figure 137 - Inspection Point After an Event



7. Follow maintenance procedures for control units. Begin with Maintaining the Control Unit, page 121, and continue to Insulation Test, page 135. Also, perform the steps listed below:
   a. Examine the disconnect means for evidence of damage. Make sure that the operator mechanism properly turns the disconnect **on** and **off**. Exercise the push-to-trip feature on circuit breakers. Make sure that the operator mechanism properly resets the circuit breaker.
   b. Check that the door interlock keeps the unit door from opening while the disconnect is in the **on** position.

      NOTE: If the unit door must be opened while the unit is energized, only authorized personnel may operate an interlock defeat mechanism (see Operating Door Interlock Defeat Mechanism, page 140).

      Figure 138 - Operating Door Interlock Defeat Mechanism

   c. Inspect the motor starters for damage. Replace contacts and contact springs if the contacts are welded or show heat damage. If deterioration extends beyond the contacts, replace the entire contactor or starter.
   d. Replace the complete overload relay if the thermal units are burned out, or if any indications of arcing or burning are present on the relay.
   e. Inspect all fuses and fuse clips. Replace all fuses in a set, even if only one or two are open-circuited.
   f. Check all conductors and other devices within the units for signs of damage.
8. Complete an insulation test (see Insulation Test, page 135) before placing the MCC back into service.
9. Complete the Pre-operation Checklist, page 113.
10. Re-energize the equipment. See Energizing the MCC, page 114.

Maintenance for Type 1 Sprinkler-resistant Enclosures

Water-Soaked MCCs

Do not clean or repair an MCC that has been exposed to large volumes of water or submerged at any time. Current-carrying parts, insulation systems, and electrical components may be damaged beyond repair. **Do not energize the MCC.** Contact Schneider Electric Services at 1-888-778-2733 (US), 55-5804-5000 (Mexico), or 1-800-565-6699 (Canada).

Water-sprayed or Splashed MCC (Clean Water Only)

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

If the MCC has been sprayed or splashed with small amounts of clean water, make a thorough inspection of the entire system, and verify that no damage to conductors or insulation has occurred. Do not open sealed devices such as molded case circuit breakers or fuses. Replace these devices if they are damaged. Refer to the appropriate instruction bulletin listed in MCC-related Literature, page 12.

Inspection and Cleanup of Clean Water Sprayed or Splashed MCC

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Follow steps 1–4 only if:

- No signs of physical damage to the equipment are present.
- The MCC has not been submerged or exposed to water for long periods of time.
- The water that has been in contact with the MCC has not been contaminated with sewage, chemicals, or other substances that can negatively affect the integrity of the electrical equipment.

If any one or more of these conditions have not been met, **do not energize the MCC**. Contact Schneider Electric Services at 1-888-778-2733 (US), 55-5804-5000 (Mexico), or 1-800-565-6699 (Canada).

Failure to follow these instructions will result in death or serious injury.

If **ALL**of the conditions listed have been met, proceed as follows:

1. Test the MCC for insulation resistance as described in Insulation Test, page 135.
2. Record resistance values. Refer to the chart in Insulation Resistance, page 195.
3. If resistance measurements are:
   - Less than one megohm, **do not energize the MCC** and contact Schneider Electric Services at 1-888-778-2733 (US), 55-5804-5000 (Mexico), or 1-800-565-6699 (Canada).
   - Greater than one megohm, the equipment can be energized using the procedures listed in Energizing the MCC, page 114.

MotorLogic Solid-state Overload Relay (SSOLR)

The following describes 600 V rated MCC starter units equipped with the MotorLogic solid-state overload relay. Read and understand the Safety Precautions, page 19 before you install, adjust, or perform maintenance on these units. For full details about MCC installation, refer to Installing the MCC, page 28.

Figure 139 - MotorLogic SSOLR

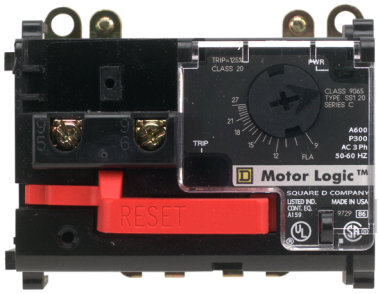


Figure 140 - NEMA Rated Compac 6 Unit

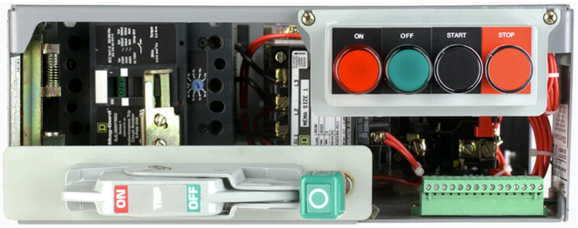
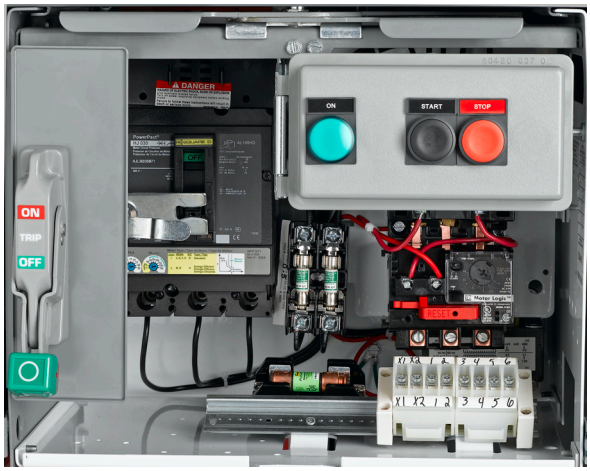


Figure 141 - NEMA Rated Standard Unit



MotorLogic Retrofit Applications

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

NOTICE

INCORRECT OPERATION

- **Lug Kits:** Use only 9999 LBO and 9999 LLO purchased after 5/1/95 for Size 0, 00B, 00C, and Size 1 units.
- **Z Element:** Do not use the 9999Z3, 9999Z2, or 9999Z1 developed for open and general enclosed starters.

Failure to follow these instructions can result in equipment damage.

Remove the starter from the unit to replace the overload (melting alloy/bi-metallic). See Removing the Control Unit, page 122.

Use Terminal blocks (OEKTTBML) for applications requiring multiple passes to achieve the proper adjustment range.

Restrain looped load cabling between the overload and the terminal block with wire ties or the equivalent when terminal kits are used.

On Size 3 and 4 starter units, the overload reset button is 1-5/8 in. (41 mm) further from the unit door and may require an alternative reset assembly (80420-862-51).

Retrofitting NEMA rated Compac 6, six in. (52 mm) units is not recommended. The MotorLogic overload relay is available factory installed in Compac 6.

On 600 V Size 1 applications, add a third wire tie between the circuit breaker and contactor near the contactor line lugs. Refer to instruction bulletin 30072-013-29 for additional information.

NOTE: For retrofit applications, contact your Schneider Electric field sales representative for assistance. Schneider Electric assumes no responsibility for the design or implementation of retrofits unless contracted to perform them.

Use copper wire only on device power and control terminals. Conductors must be sized for 60°C (140°F) or 75°C (167°F) National Electrical Code® (NEC®) ratings.

Pressure wire terminals are suitable for wire sizes #16–12 AWG, solid or stranded. Terminal instruction labels are located adjacent to the terminal block or on the wireway door.

Box lugs (on interposing power terminal blocks supplied with selected units) are suitable for wire sizes #14–8 AWG, solid or stranded. Terminal instruction labels are located adjacent to the terminal block. Lug Types and Wire Sizes, page 144 provides additional termination data.

Table 14 - Lug Types and Wire Sizes

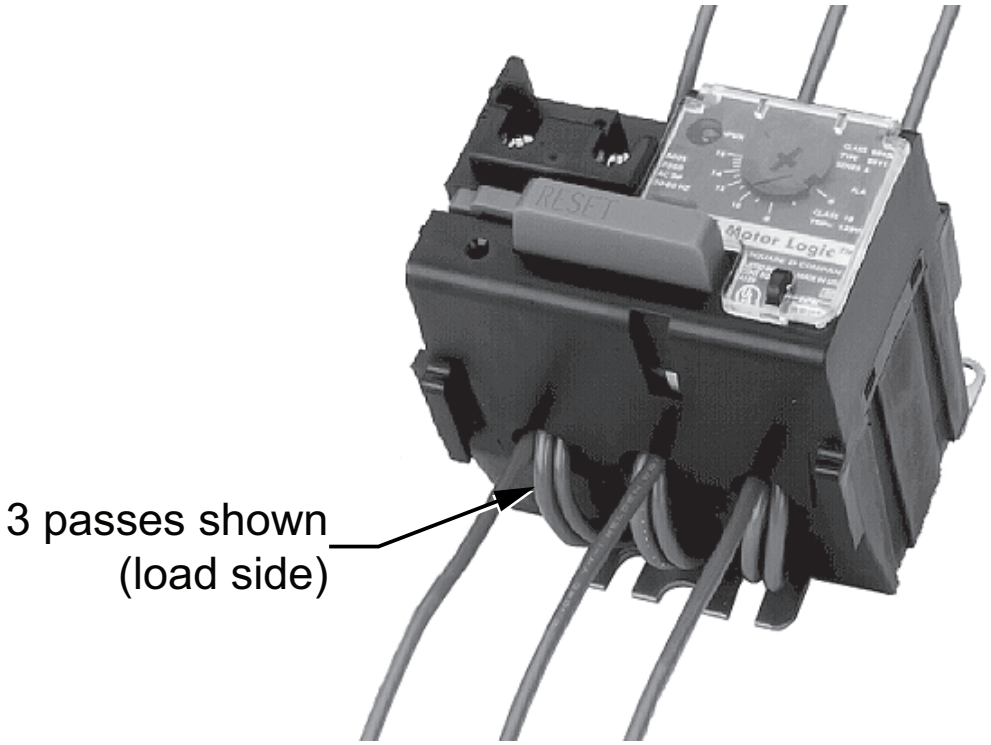
Class 9065 MotorLogic Overload Relay Size[4]	Rating	Lug Type	Wire Size[5]	Torque Values[6]
00B	1.5–4.5 A	Pressure Wire[7]	14–8 AWG (2.5–6 mm²)	25 lb-in. (2.8 N•m)
00C	3–9 A	Pressure Wire[7]	14–8 AWG (2.5–6 mm²)	25 lb-in. (2.8 N•m)
0	6–18 A	Box Lug	14–4 AWG (2.5–16 mm²)	50 lb-in. (5.6 N•m)
1	9–27 A	Box Lug	14–4 AWG (2.5–16 mm²)	50 lb-in. (5.6 N•m)
3	30–90 A	Box Lug	14–1/0 AWG (2.5–50 mm²)	100 lb-in. (11.3 N•m)
4	45–135 A	Box Lug	8–250 MCM (6–120 mm²)	200 lb-in. (22.6 N•m)
5	90–270 A	Box Lug	250–500 MCM (120–240 mm²)	250 lb-in. (28.2 N•m)
6	180–540 A	Clamp Lug	250–500 MCM (120–240 mm²)	375 lb-in. (42.4 N•m)

Size 00B, 00C, 0, and 1 relays have conductor (CT) windows through which the motor leads must pass before being connected to the load terminals on the contactor (T1, T2, and T3). By allowing multiple passes (turns) of the load leads through these CT windows, overload protection can be provided for motors with a full-load current lower than the specified operating range.

Two passes of the load leads through each window effectively increases (by a multiple of two) the current that the overload relay senses. Three passes effectively increases the current by a multiple of three. All three conductor windows must have the same number of passes, looped in the same direction, for the overload relay to operate properly (see Looping Passes, page 145).

(4) Refer to the overload relay label next to the adjustment dial.
(5) Solid or stranded copper wire, 140 or 167°F (60 or 75°C), except 45 to 135 A overload relay, which is 67°F (75°C) wire only.
(6) Does not apply to Compac 6 units.
(7) Box lug kit may be supplied, suitable for 14 to 4 AWG wire, 50 lb-in. (5.6 N•m) tightening torque.

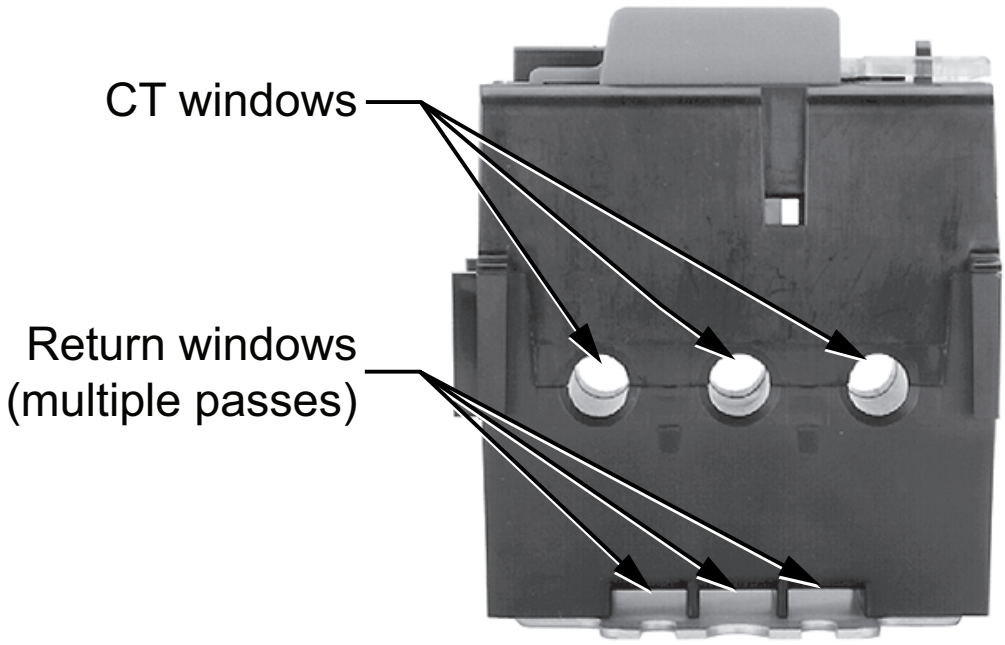
Figure 142 - Looping Passes



Passes begin from the load side of the overload through the CT window and return via the windows provided between the baseplate and overload (see MotorLogic Overload (Bottom View), page 145). The final pass terminates on the load side of the contactor.

MCC units requiring multiple passes are factory supplied prelooped with #14 AWG wire and interposing terminal blocks. Refer to MotorLogic Retrofit Applications for information concerning retrofit.

Figure 143 - MotorLogic Overload (Bottom View)



Adjustment

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.

Overload adjustment information is located on a label inside the unit door (see Unit Adjustment Label, page 147) of starter units equipped with the MotorLogic overload relay.

Figure 144 - Unit Adjustment Label

DANGER

HAZARD OF ELECTRIC SHOCK, BURN OR EXPLOSION

- Turn off power supplying equipment before working inside.
- For fusible switch starter units, power fuses must be selected in accordance with Article 430 of the NEC. Class RK5 fuses are recommended for NEMA rated applications.
- Use only Class J fuses for Compac™ 6 units.

Failure to follow these instructions will result in death, serious injury or equipment damage.

OPERATING INSTRUCTIONS;
For continuous-rated motors with service factors of 1.0, multiply the motor full-load current (MFLC) by the number of passes through the overload relay's windows (1,2 or 3) and set the overload relay's current adjustment dial to 90% of this value. For continuous-rated motors with service factors of 1.15 to 1.25, multiply the MFLC by the number of passes through the overload relay's windows (1,2 or 3) and set the overload current adjustment dial to this value.

SOLID - STATE OVERLOAD RELAY

CURRENT RANGE:

SIZE 00B	1.5 - 4.5A	0.75 - 2.25A (2 PASSES)	0.5 - 1.5A (3 PASSES)
SIZE 00C	3 - 9A	1.5 - 4.5A (2 PASSES)	1 - 3A (3 PASSES)
SIZE 0	6 - 18A	3 - 9A (2 PASSES)	2 - 6A (3 PASSES)
SIZE 1	9 - 27A	4.5 -13.5A (2 PASSES)	3 - 9A (3 PASSES)
SIZE 2	15 - 45A	MULTIPLE PASSES NOT AVAILABLE	
SIZE 3	30 - 90A	MULTIPLE PASSES NOT AVAILABLE	
SIZE 4	45 - 135A	MULTIPLE PASSES NOT AVAILABLE	

*** Passes refer to multiple looping through overload windows.**

Trip current rating is 1.25 times the overload relay's current adjustment dial setting. Instructions above assume the motor is applied at its rated ambient temperature. For other conditions, consult the motor manufacturers for current capacity. NOTE: For part winding and multi-speed applications, use the MFLC of each motor winding as a basis for overload adjustment. Trip and alarm contact ratings: NEMA A600 and NEMA P300.

80438-651-01 **REV G**

Mag-Gard™, PowerPacT, and TeSys Motor Circuit Protector and Circuit Breaker Settings

The National Electrical Code® (NEC®) and Canadian Electrical Code (CEC) require that magnetic starters, used in combination with adjustable magnetic trip-only circuit breakers, have an overload relay in each conductor. MagGard, PowerPacT, or TeSys BV4 Motor Circuit Protectors are the standard motor circuit protectors used in Model 6 MCCs.

Some Model 6 MCC motor control units are provided with PowerPacT M or P frame circuit breakers. The circuit breaker trip units are set to the required amperage setting for the motor control unit in the factory. The circuit breaker instantaneous trip settings may need to be adjusted to permit motor starting in some cases.

Adjusting Mag-Gard, PowerPacT, or TeSys Magnetic Trip Setting

The adjustable magnetic trip setting is factory-set at Lo for Mag-Gard Motor Circuit Protectors. For PowerPacT H- and J-frame, and TeSys BV4 Motor Circuit Protectors, where applicable, the Full Load Amp Setting (FLA) is factory set to the lowest setting. The instantaneous trip setting (Im) is factory set to the Auto 1 or the lowest instantaneous trip setting. For PowerPacT P-frame Motor Circuit Protectors (ET1.0M electronic trip unit), the adjustable instantaneous trip setting is factory set to its lowest position. These settings may have to be adjusted for proper motor start-up. For Mag-Gard, PowerPacT, and TeSys BV4 Motor Circuit Protectors, refer to the magnetic trip set-point limits outlined in the applicable national installation codes. For PowerPacT H- and J-frame Motor Circuit Protectors, refer also to instruction bulletin 48940–260–01 , Motor Circuit Protector (MCP) Settings For PowerPacT H- and J-frame Motor Circuit Protectors.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

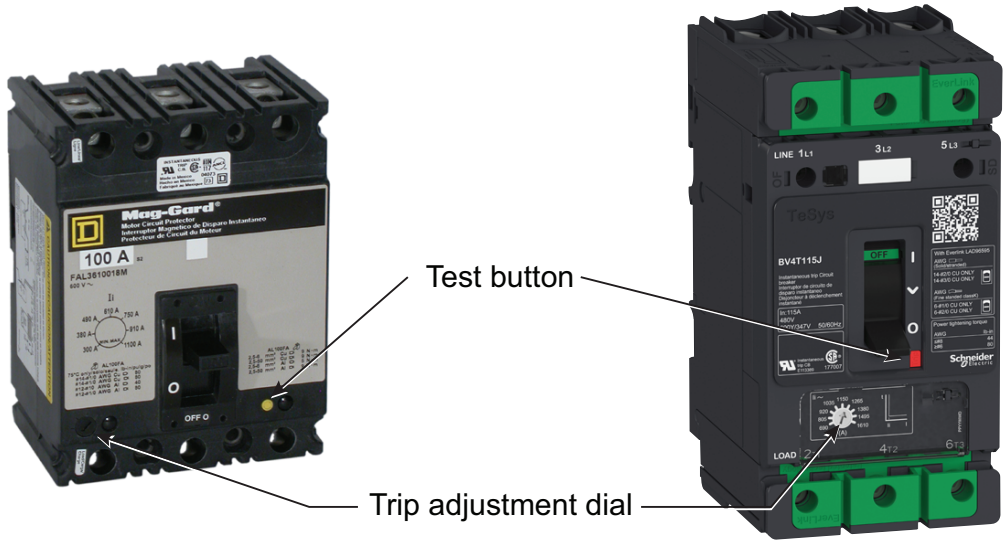
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

To access the MagGard trip or TeSys BV4 adjustment dial:

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Place the unit handle in the **OFF** position and open the door.
3. While pushing the door interlock lever forward, trip the circuit breaker by pressing the test button (see Mag-Gard and TeSys BV4 Magnetic Trip Adjustment, page 149). The disconnect handle automatically moves up, allowing access to the adjustment dial.

Figure 145 - Mag-Gard and TeSys BV4 Magnetic Trip Adjustment

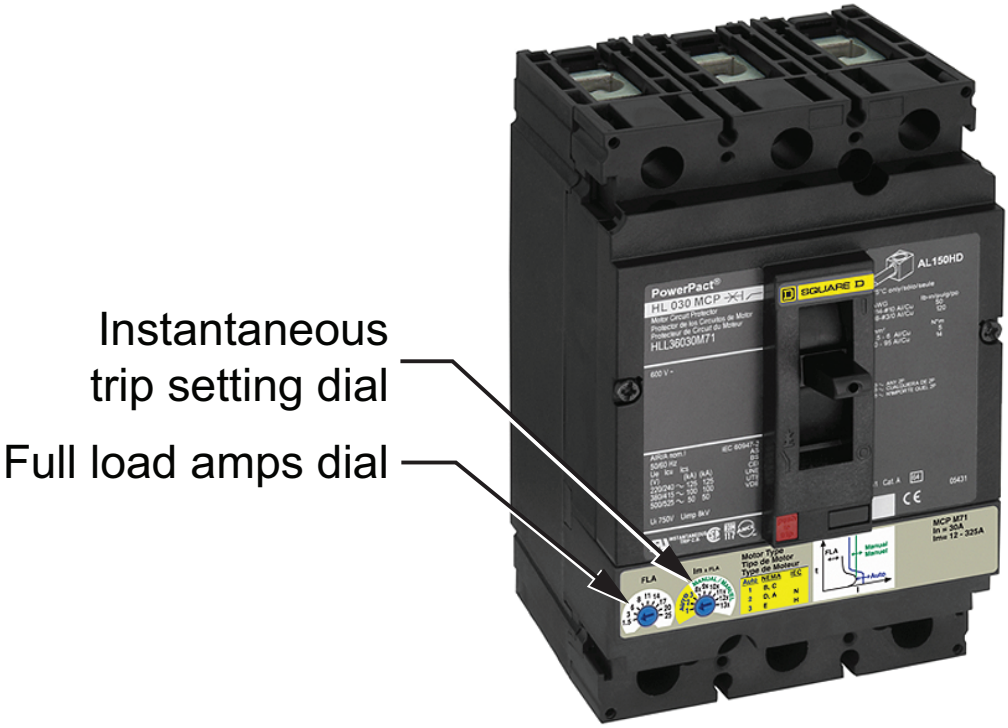


After obtaining the motor full load current from the motor nameplate, select an adjustable trip setpoint to test start the motor. Further adjustments may be required because of motor load characteristics. Refer to applicable national installation codes for permissible setpoints.

After adjusting the trip setting, reset the circuit breaker by moving the disconnect handle to the **ON** position and then to the **OFF** position.

To access the PowerPacT H- and J-frame Full Load Amps (FLA) and Instantaneous Trip setting (Im) dials:

Figure 146 - PowerPacT H- and J-frame Magnetic Trip Adjustment



1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Place the unit handle in the **OFF** position and open the door.

3. To set the FLA and Im dials, refer to instruction bulletin 48940–260–01, Motor Circuit Protector (MCP) Settings For PowerPacT H- and J-frame Motor Circuit Protectors.

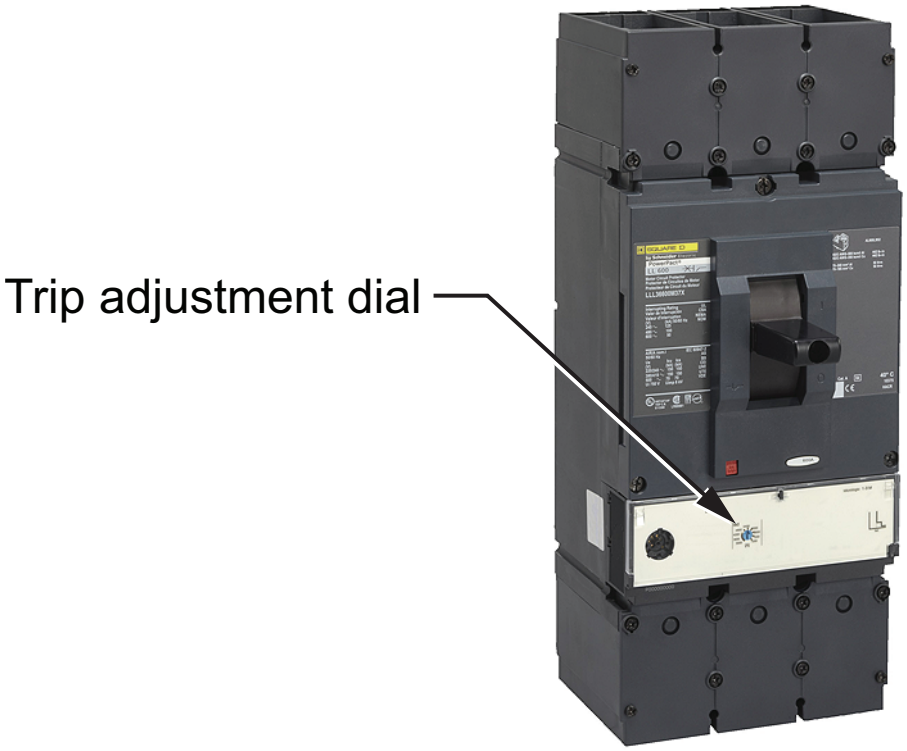
   NOTE:

   - Select replacement MagGard, PowerPacT, or TeSys BV4 Motor Circuit Protectors for MCCs using the voltage and current ratings listed in the Model 6 MCC Catalog (8998CT9701) in addition to the Mag-Gard, PowerPacT, or TeSys selection tables in the Schneider Electric Digest.
   - These circuit breakers are suitable for motors with locked-rotor indicating code letters based on applicable national codes and standards. For other motors, consult your local Schneider Electric field sales representative.

To access the PowerPacT L-frame trip adjustment dial (Isd):

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Place the unit handle in the **OFF** position and open the door.
3. Set the overcurrent trip setting by adjusting the switch labeled "Isd" as shown in PowerPacT L-frame Instantaneous Trip Adjustment, page 150Figure 130. The dial is labeled in amperes. Refer to instruction bulletin 48940–310-01, MicroLogic™ 0, 1, 2, and 3 Trip Units—User Guide, for more information on trip settings.

Figure 147 - PowerPacT L-frame Instantaneous Trip Adjustment



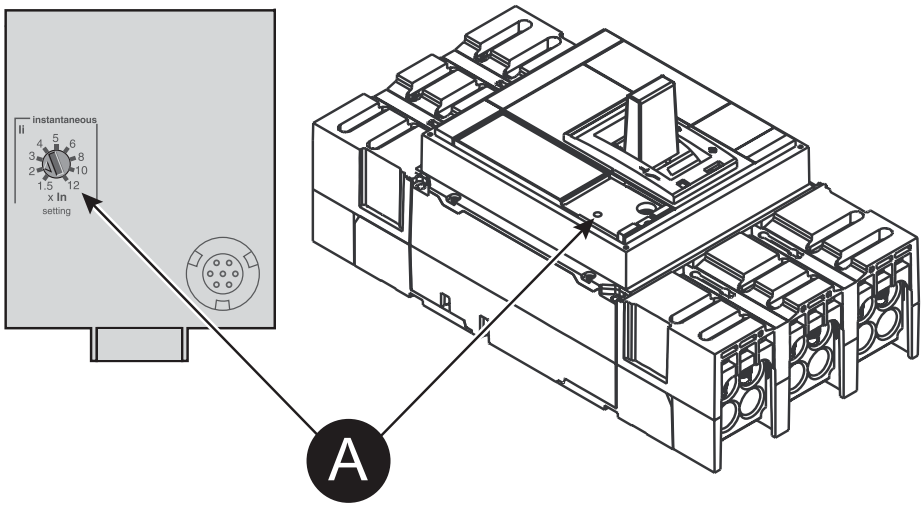
After obtaining the motor full load current from the motor nameplate, select an adjustable trip set-point to test start the motor. Further adjustments may be required because of motor load characteristics. Refer to applicable national installation codes for permissible set-points.

To access the PowerPacT P-frame Instantaneous Trip setting (Im) dial:

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.

2. Place the unit handle in the **OFF** position and open the door.
3. Adjust as follows:
   a. For ET1.0I and ET1.0M electronic trip units, adjust instantaneous trip (Ii) by adjusting switch A (see PowerPacT P-frame Instantaneous Trip Adjustment, page 151). Switch settings are multiples of the frame rating.

Figure 148 - PowerPacT P-frame Instantaneous Trip Adjustment



   b. For P-frame MCPs with other Micrologic electronic trip units, see instruction bulletin 48049-148-05, PowerPacT P-Frame and NS630b–NS1600 Circuit Breakers.

After obtaining the motor full load current from the motor nameplate, select an adjustable trip set-point to test start the motor. Further adjustments may be required because of motor load characteristics. Refer to applicable national installation codes for permissible set-points.

Adjusting PowerPacT M- and P-Frame Circuit Breakers in Motor Control Center Motor Starter Units

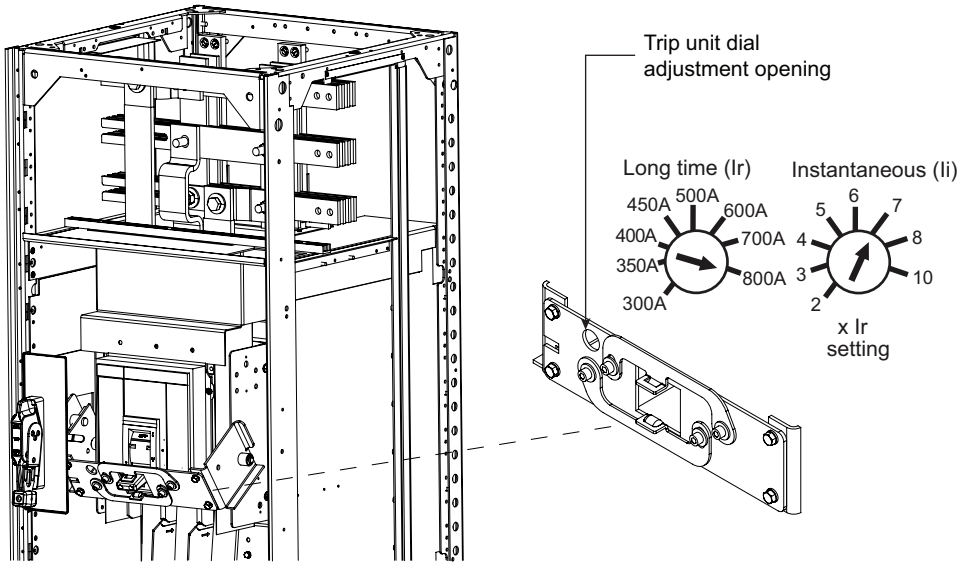
The following describes procedures for adjusting the trip units in PowerPacT M- and P-frame circuit breakers that have flange-mounted operator mechanisms. Circuit breaker instantaneous trip setting is factory-set to the minimum setting. It may need to be adjusted to permit motor starting in some cases. Circuit breaker trip setting dials are located behind the bail arm of the circuit breaker operator mechanism.

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Place the unit handle in the **OFF** position and open the door.

3. Insert a small, flat-head screwdriver through the opening in the mechanism bail arm and into the slot of the adjustment dial being changed (see Detailed View of Mechanism Bail Arm and Typical Adjustment Dials, page 152). Turn the adjustment dial to the desired position. If one or more dials cannot be accessed through the bail arm opening, go to step 4. Otherwise, skip to step 9.

   NOTE: For adjustable amperage M- or P-Frame circuit breakers, the amperage dial (or Ir long time) is factory-set to the required value associated with the horsepower/voltage application. Do not change this setting. If the dial setting appears to be incorrect, consult the order drawings to verify the correct required setting and, if necessary, adjust the setting to match the drawing value.

Figure 149 - Detailed View of Mechanism Bail Arm and Typical Adjustment Dials



⚠⚠DANGER

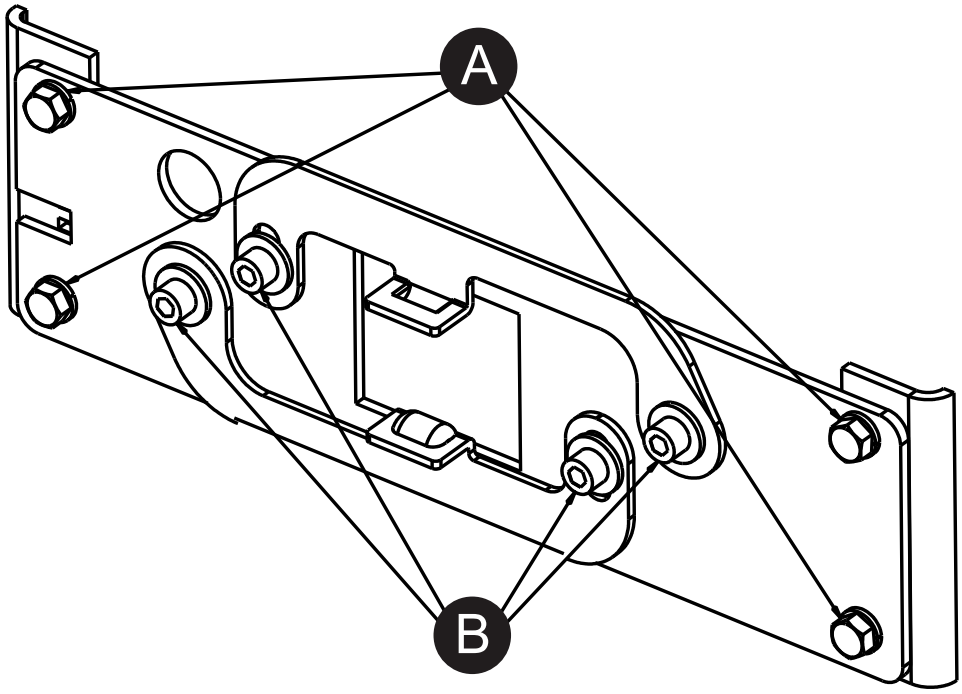
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

To avoid the possibility of a short circuit, do not drop screws into components below the bail arm assembly.

Failure to follow these instructions will result in death or serious injury.

4. Disassemble the bail arm by removing the four 1/4-20 x 3/8 in. mounting screws (see Bail Arm Disassembly, page 153). Retain the screws for re-assembly. Do not attempt to remove or loosen the four 1/4-20 x 1/2 in. toggle plates adjustment screws.

Figure 150 - Bail Arm Disassembly



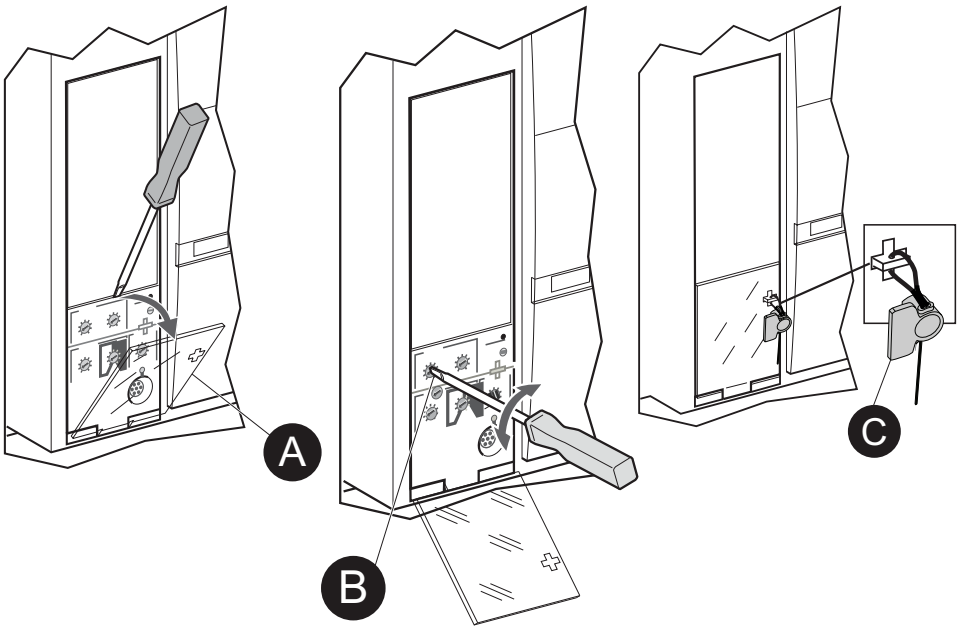
A	Bail arm mounting screws
B	Toggle plates adjustment screws

Refer to Circuit Breaker Trip Unit Adjustment, page 154 for the following steps.

5. If the circuit breaker trip unit is provided with a door, use the screwdriver to open it (A).
6. Insert the screwdriver into the slot of the adjustment dial being changed. Turn the adjustment dial to the desired position. Repeat as necessary for other dials (B).

7. Close the trip unit door. Use a MicroLogic Trip Unit Tamper Evident Seal, (MICROTUSEAL, not provided), if necessary, to provide tamper evidence (C).

Figure 151 - Circuit Breaker Trip Unit Adjustment



8. After making the necessary adjustments, re-assemble the bail arm using the four screws removed in step 4. Torque each screw to 70 lb-in.
9. Close and latch the unit door.
10. Test the operation of the circuit breaker mechanism by closing and opening the circuit breaker using the operator handle.
11. If the circuit breaker mechanism does not operate properly, contact your local Schneider Electric representative.

iMCC

This section includes instructions for the Model 6 Intelligent MCC (iMCC).

iMCC Overview

Model 6 iMCCs feature the same overall structure and unit features as Model 6 Motor Control Centers with additional “intelligent” capabilities. Two popular methods for configuring Model 6 iMCCs to customize your application are:

- iMCC-Hardwired I/O: PLC Interwiring
- iMCC-Network: Network Cabling

iMCC-Hardwired I/O: PLC Interwiring

This method offers a hardwired I/O system in the Model 6 MCC that provides basic information and control capabilities. With the I/O mounted in the MCC, the starters are wired to the I/O at the Schneider Electric manufacturing plant, and the system is tested prior to shipment.

iMCC-Network: Network Cabling

A key feature of our iMCC-Network solution is the integration of intelligent devices and device level networks for control and automation that delivers improved performance. Popular network protocols such as CANopen, DeviceNet™, Ethernet, Modbus, and PROFIBUS communicate directly to every unit of the iMCC for an effective method of connecting centralized control to widely distributed I/O.

Networking allows for easy monitoring of critical data of each motor or load connected to the iMCC, enabling precise process control. With this information, your staff can respond to potential problems proactively. Real-time access to information and records of last events allows for simplified diagnostics and reduced downtime.

The network cabling consists of a solution that is appropriate for your selected communication network. Our industry-leading, full-depth wireway effectively separates network cabling from high voltage cabling. Additionally, our standard wireway barrier isolates the communication cabling from the load cabling routed in the vertical wireway.

Networks/Communications Overview

iMCCs contain Schneider Electric devices with communication ports. Each device has a unique internal register map. These devices may be linked together to a single point.

The Schneider Electric publications listed in iMCC-related Literature, page 17 may be useful in the setup, maintenance, and regular operation of your Model 6 iMCC. Upon request, your Schneider Electric field sales representative can provide them to you in print. Or, you can download these documents from the Schneider Electric Download Center: se.com/us/en/download/ .

Connecting the iMCC Cabling System

Units within iMCCs are connected at the factory. The cable used varies with the network type. The pin outs for the various networks are shown in Pin Outs for iMCC Networks, page 156.

Ethernet Networks use a Cat 5e RJ45 cable for connected devices.

NOTICE

LOSS OF COMMUNICATIONS

- Do not use excessive force when making iMCC cabling connections.
- Connections are keyed so that that pins are properly aligned.

Failure to follow these instructions can result in equipment damage.

Table 15 - Pin Outs for iMCC Networks

Network	Cable Color				
	Blue	White	Red	Black	Bare
Modbus (two-wire RS-485)	Signal +	Signal -	Not used		Shield
PROFIBUS	A (Neg)	B (Pos)			
DeviceNet	CAN_L	CAN_H	V +	V -	
CANopen					

Network Cabling

Factory supplied network cabling is installed in accordance with UL 845 procedures and practices and routed in the bottom horizontal wireway.

To make direct connections to Class 2 or Class CM systems, install Class 2 or Class CM wiring so that it is separated from power conductors either by a barrier or a minimum space of 0.25 in. (6 mm). Route power conductors in the top horizontal wireway for maximum separation.

External network cabling must comply with Class 2 or Class CM practices under the provisions of NEC Articles 725 and 800.

Cables Between Shipping Splits

Connect the trunk line cables between shipping splits by aligning the keyways and plugging the pin end of the trunk cable to the socket end of the next trunk cable. Screw the coupling ring until it is hand-tight. Repeat this process until all shipping splits are connected.

Load Cables

It is recommended to route all load cables in the top horizontal wireway to keep them isolated from the communications cabling. If you route the load cables in the bottom horizontal wireway, make sure to maintain a 0.25 in. (6 mm) distance between the communications cabling and all other cabling.

Communication Networks

There are three primary ways to connect communication networks: via bridges/repeaters, programmable logic controllers (PLCs), or a direct cable connection. Follow the applicable instructions below to make the cabling connections for your Model 6 iMCC.

Bridges/Repeaters

If the PLC is not in the local area of the MCC, you typically need to use a bridge/repeater to connect the communication network.

Terminating Resistors

For the communication network to operate properly, terminating resistors are required on each end of the network. If your iMCC is shipped with a bridge, repeater, and/or PLC, external terminal blocks (MCT485) are included with shipment.

Direct Cable Connection

To connect a cable directly to the network via the iMCC network cable:

1. Determine which end (pin or socket) of the iMCC network you will attach to your cable.
2. Strip back the communication cabling insulation.
3. Based on the network, use the pin outs given in Network Connection Pin Outs, page 157.

Table 16 - Network Connection Pin Outs

Field Connection Termination	Five-pin Socket/Pin	
	Modbus and PROFIBUS	DeviceNet and CANopen
Pin # 1	Shield	Shield
Pin # 2	Unused	Red
Pin # 3	Unused	Black
Pin # 4	White	White
Pin # 5	Blue	Blue

Figure 152 - Typical Cabling Scheme for Modbus Two-wire

Orderable Item in. (mm)	Part Number
Cap for unused pin end or tap	3463512-1
Cap for unused socket end or tap	3463512-3
Mini socket field attachable connector	5000129-287
Mini pin field attachable connector	5000129-292
20 (508) trunk extension	5000129-76
25 (635) trunk extension	5000129-78
30 (762) trunk extension	5000129-79
35 (889 trunk extension	5000129-80
25 (10.7) cable extension	5000129-81

NOTE: Shield must be grounded at one end only.

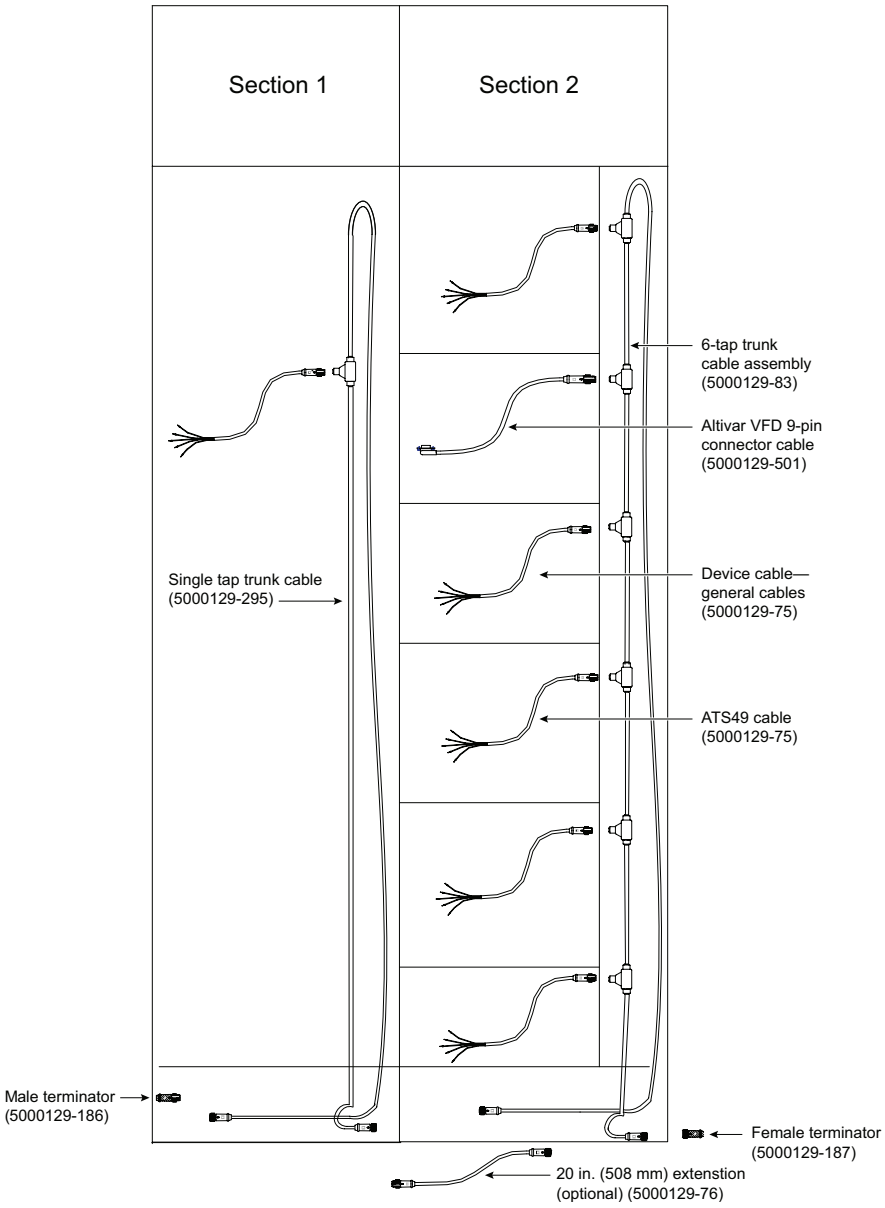


Figure 153 - Typical Cabling Scheme for DeviceNet and CANopen (8A cable)

Orderable Item in. (mm)	Part Number
Mini socket field attachable connector	1A5000-34DN
Mini pin field attachable connector	1A5006-34DN
25 (635) trunk cable	80420-919-01
30 (762) trunk cable	80420-920-01
35 (889) trunk cable	80420-921-01

NOTE: Shield must be grounded at one end only.

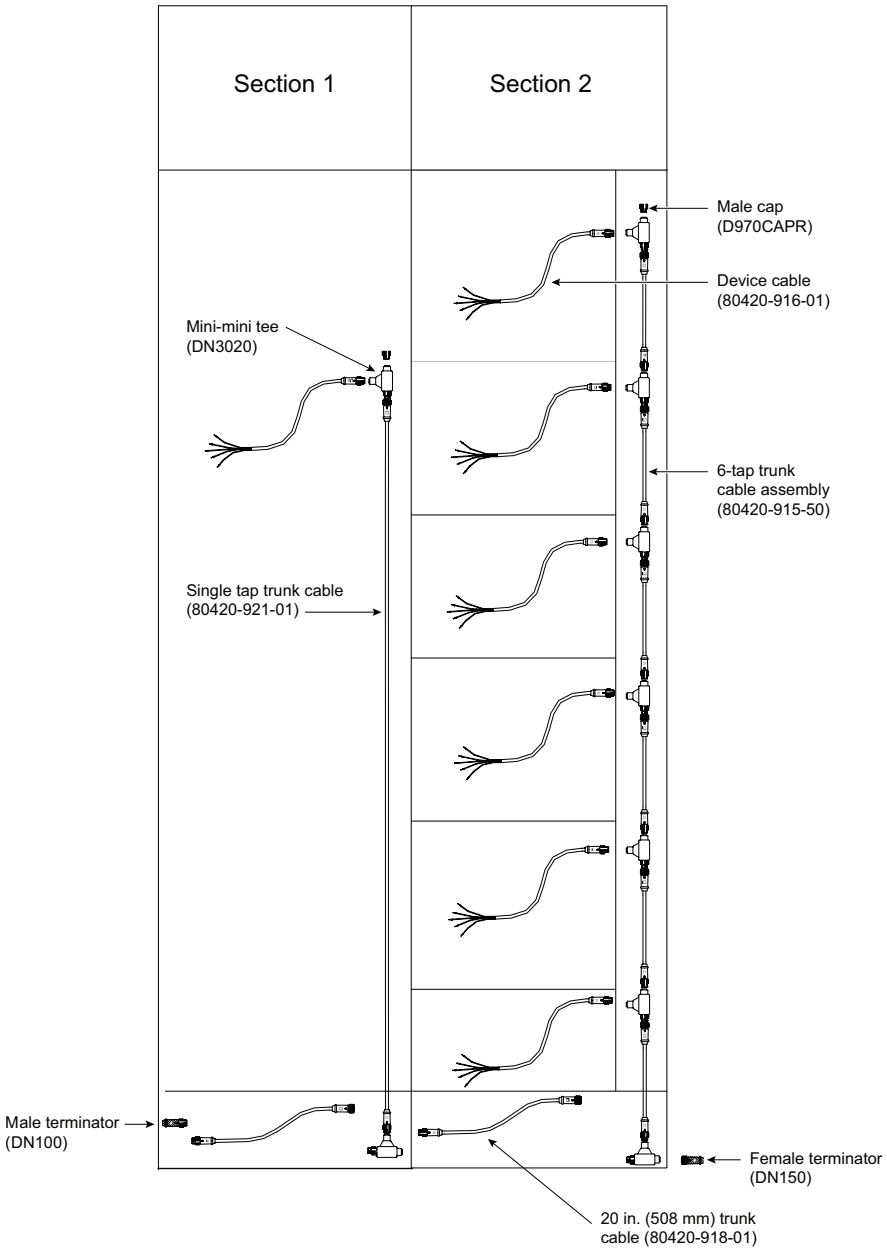
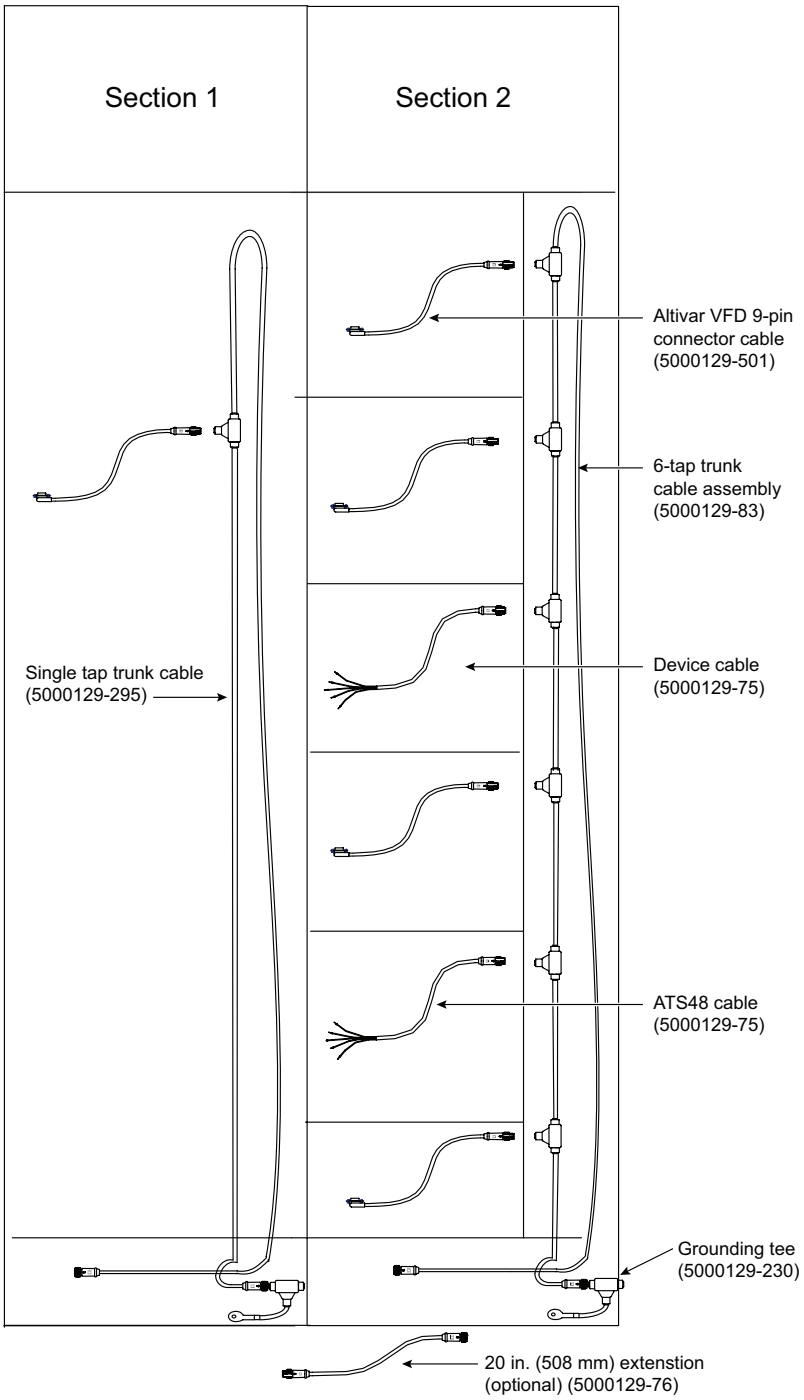


Figure 154 - Typical Cabling Scheme for PROFIBUS



Orderable Item in. (mm)	Part Number
Cap for unused pin end or tap	3463512-1
Cap for unused socket end or tap	3463512-3
20 (508) trunk extension	5000129-76
25 (635) trunk extension	5000129-78
30 (762) trunk extension	5000129-79
35 (889) trunk extension	5000129-80
25 (10.7) cable extension	5000129-81

NOTE: Shield must be grounded in all sections.

Operation

This section contains pre-operation checklists, energizing procedures, and remote and local programming procedures for TeSys T, TeSys Tera, and MotorLogic Plus motor protection relays, PowerLogic ION Meter, PowerLogic Power Meter, PowerLogic Circuit Monitor, Altivar drives, and Altistart soft starts.

Pre-operation Checklists

To verify that the iMCC is operating properly, complete both of the following checklists before energizing the equipment:

MCC Structure

1. Complete the maintenance procedures beginning in Maintaining the MCC, page 116 and continuing up to Insulation Test, page 135. This initial maintenance is necessary to detect any shipping damage or loose connections. Do not energize the MCC until initial maintenance is complete.

   NOTE: The following maintenance procedures are not necessary before energizing the MCC for the first time: Control Unit Removal, Stab Assemblies, Starter Contacts and Barriers/Insulators.
2. Perform an insulation test on the MCC (see Insulation Test, page 135).
3. If the MCC is equipped with ground fault protection, properly adjust, and test the ground fault protective device before energizing.
4. Remove all blocks or other temporary holding means from the electrical devices.
5. Remove any secondary shunt bars from the current transformers. Do not operate a current transformer with its secondary shunt bars open circuited.
6. Manually exercise all switches, circuit breakers, and other operator mechanisms to help ensure that they are properly aligned and operate freely.
7. Electrically exercise all electrically-operated switches, circuit breakers, and other mechanisms (but not under load) to help ensure that the devices operate properly. This may require an auxiliary source of control power.
8. Verify proper interval and contact operation of the timers.
9. Verify that overload relay FLA is set to proper application setting prior to operation.
10. Verify that all load and remote-control connections have been made and that they agree with the wiring diagrams provided.
11. Verify that all ground connections are made properly.
12. Install the covers and close the doors; verify that they are all properly tightened.

iMCC Communications

NOTICE
LOSS OF COMMUNICATIONS • Do not use excessive force when making cabling connections. • Connections are keyed to help ensure that pins are properly aligned. **Failure to follow these instructions can result in equipment damage.**

Before energizing the equipment, check the items below to verify that the iMCC networking and cabling are set up and connected properly:

- Cabling Connections
- Verify that the network length without a repeater is less than 1500 ft. (457 m).
- Verify that the MCC cables are connected between shipping splits. See Cables Between Shipping Splits, page 156 for instructions.

- Verify that each device tap cable is properly connected to the main trunk line.
- Verify that all network connections are secure.
- Verify that terminating resistors are installed as required per network protocol.

Communications Setup

- Verify that all devices have been assigned correct addresses; see Device Addressing, page 176 for specific addressing parameters.

Energizing the MCC

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.
- Review the Pre-operation Checklists, and verify that all items check out.

Failure to follow these instructions will result in death or serious injury.

To energize the MCC:

1. Review the Pre-operation Checklists, page 161 before energizing.
2. Turn off all downstream loads, including distribution equipment and other devices that are remote from the MCC.
3. Verify that all barriers, doors, and covers are closed before energizing the equipment.
4. Energize the equipment in sequence, starting with the main, the feeder units next, and then the motor starter units.
5. With all barriers in place and all unit doors closed and latched, turn on the units with a firm, positive motion.
6. After all disconnect devices are closed, you may energize loads such as lighting circuits, starters, contactors, heaters, and motors.

MotorLogic Plus Local Programming

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

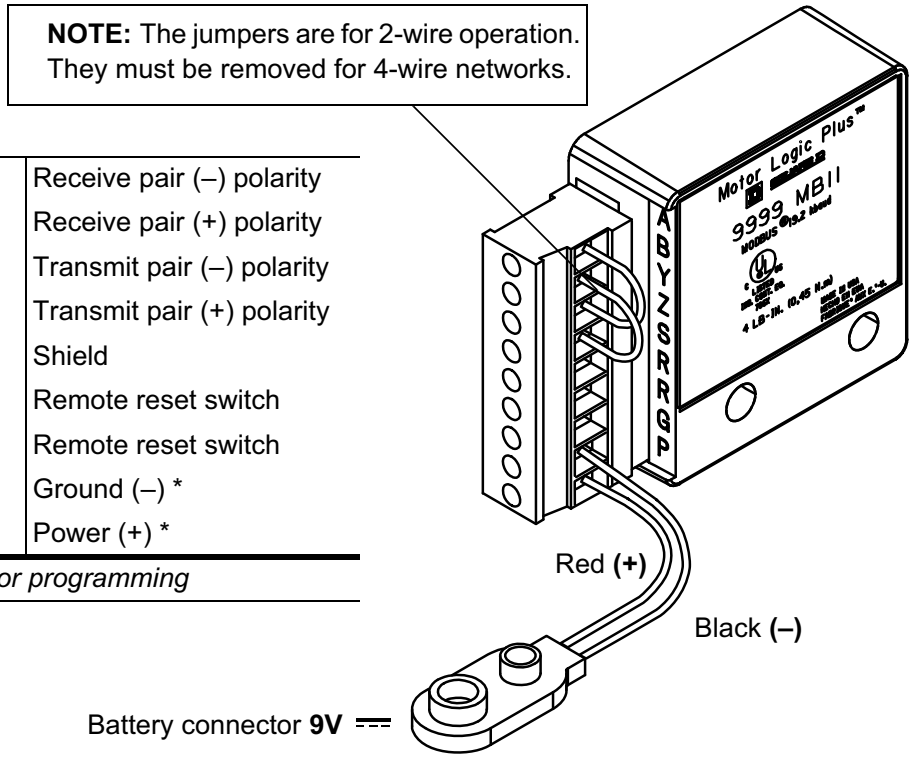
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- Turn off all power supplying this equipment before working on or inside the Motor Control Center.
- Use a properly rated voltage sensing device to confirm that all power is off. Control units must be de-energized before performing maintenance on the MCC.
- The unit disconnect switch must be locked in the **off** position before working on equipment.

Failure to follow these instructions will result in death or serious injury.

Local programming can be used for MotorLogic Plus setpoint programming and detected error readout purposes:

1. Verify that the display is unlocked (the default setting) and disconnect all power.
2. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
3. Connect a nine V supply to the “P” and “G” terminals using the supplied connector, Schneider Electric PN 80445-519-50 (see MotorLogic Plus Communication Module Terminals, page 163).

Figure 155 - MotorLogic Plus Communication Module Terminals



4. Turn the “Mode Select” switch to the parameter you are programming. Refer to Schneider Electric instruction bulletin 30072-013-98 (see iMCC-related Literature, page 17) for a list of parameters.

5. Press and hold the “Reset/Program” button.

   NOTE: The display does not illuminate for local programming if the “Mode Select” switch is in the “Run” position.

6. Turn the “Display/Program” dial to the desired setting as shown on the LED display.
7. Release the “Reset/Program” button.
8. Turn the “Mode Select” switch back to the “Run” position.
9. Disconnect the nine V supply and its connector.

Messages are displayed on the three-digit LED display when harmful conditions are detected. Local Message Display, page 164 contains a list of the message codes and their definitions.

Table 17 - Local Message Display

Displayed Message	Meaning
oc	Tripped on over current
SP	Tripped on single phasing
ub	Tripped on voltage or current unbalance
uC	Tripped on under current
cF	Tripped on contactor misoperation
GrF	Tripped on ground fault
HI	Tripped on over-voltage
Lo	Tripped on under-voltage
rP	Incoming phases have been reversed
oFF	A stop command was issued from a remote source

MotorLogic Plus Remote Programming

Remote programming can be used for setpoint programming and data acquisition purposes. Follow the steps below to remotely configure the MotorLogic Plus overload. (See Command Line Codes for a description of the command line codes referenced in the steps.)

1. Stop the overload by sending code “02H” to the command register (C6H).
2. If network programming has not been enabled, send code “05H” to the command register.
3. Program the appropriate parameter. See MotorLogic Plus Address Descriptions (Read only, all registers are 16-bit words), page 165 for a register map with a list of parameters. For more detailed information, refer to Schneider Electric instruction bulletin 30072-013-102. See Read-Only Registers, page 167 and Read/Write Registers, page 168 to determine the location and addressing of parameters within the MotorLogic Plus register map.
4. Restart the overload by using code “01H.”

Table 18 - Command Line Codes

Code	Command
01H	Start/reset
02H	Stop
03H	Display lock

Table 18 - Command Line Codes (Continued)

Code	Command
04H	Display unlock
05H	Network program enable
06H	Network program disable
07H	Network watchdog enable(8)
08H	Network watchdog disable(9)

Table 19 - MotorLogic Plus Address Descriptions (Read only, all registers are 16-bit words)

Address		Code	Description	Notes
RAM	Relative(10)			
A0	1A0	VOLTAV	Average voltage L–L	V~
A2	1A1	IAVE	Raw average current	A (x100, x10, x1), multiplied by scale factor
A4	1A2	VUB	Voltage unbalance	0–100%
A6	1A3	IUB	Current unbalance	0–100%
A8	1A4	PFANGLE	Power factor angle	Degrees
AA	1A5	CAPTY	Thermal capacity remaining	0–100%
AC	1A6	GFC	Ground fault current	A (x100, x10, x1), multiplied by scale factor
AE	1A7	ERCODE/TRIPRN	Real time event (RTE) and trip indicator (TI)	8-bit nibble-coded RTE; 8-bit coded TI
B0	1A8	FH	Event history	Event order: 4th, 3rd, 2nd, Last
B2	1A9	PID	Manufacture year/model and scale	8-bit year; 8-bit ID and scale
B4	1AA	VA-C	Line voltage A–C	V~
B6	1AB	VB-C	Line voltage B–C	V~
B8	1AC	VA-B	Line voltage A–B	V~
BA	1AD	IC	Raw current phase C	A (x100, x10, x1), multiplied by scale factor
BC	1AE	IB	Raw current phase B	A (x100, x10, x1), multiplied by scale factor
BE	1AF	IA	Raw current phase A	A (x100, x10, x1), multiplied by scale factor
C0	1Bo	RD1	Remaining restart delay RD1	
C2	1B1	RD2	Remaining restart delay RD2	
C4	1B2	RD3	Remaining restart delay RD3	
C6	1B3	COMLINE	Command line code (address C6H)	See Bus Connection Torque Values, page 118 12 (write only)
C8	1B4	Scale	PowerLogic scale parameter (read only)	0, 1, 2; 16-bit signed word (2's complement, read only)
CA	1B5	LV	Under-voltage threshold	170 V~ to HV (600 V~ model; 450 V~ to HV)
CC	1B6	HV	Over-voltage threshold	LV to 528 V~ (600 V~ model; LV to 660 V~)
CE	1B7	VUB	Voltage unbalance threshold	2–15%, or 999 (off)
D0	1B8	MULT	Effective turns ratio	Determined by model
D2	1B9	OC	Overcurrent threshold	Current range of SSOLR
D4	1BA	UC	Undercurrent threshold	0.5 x OC Min. to OC Max., Off
D6	1BB	CUB	Current unbalance threshold	2–25%, or 999 (off)
D8	1BC	TC	Overcurrent trip class	5, J5, 10, J10, 15, J15, 20, J20, 30, J30 (J = Jam protection is enabled)

(8) The network watchdog feature disables the MotorLogic Plus SSOLR when the device does not receive a valid communication within a 10 s period.
(9) The network watchdog feature disables the MotorLogic Plus SSOLR when the device does not receive a valid communication within a 10 s period.
(10) Required for PowerLogic software.

Table 19 - MotorLogic Plus Address Descriptions (Read only, all registers are 16-bit words) (Continued)

Address		Code	Description	Notes
RAM	Relative[11]			
DA	1BD	RD1	Rapid cycle timer	2–500 s
DC	1BE	RD2	Restart delay RD2	2–500 min.
DE	1BF	RD3	Restart delay RD3	2–500 min.
E0	1C0	#RU	Restarts after UC	0, 1, 2, 3, 4, A
E2	1C1	#RF	Number of restarts	0, 1, oc1, 2, oc2, 3, oc3, 4, oc4, A, ocA (0 = manual, A = continuous, oc = automatic restart after RD2 expires)
E4	1C2	UCTD	Undercurrent trip delay	2–60 s
E6	1C3	GF	Ground fault threshold	0.15 x OC Min. to 0.2 x OC Max., Off
E8	1C4	ADDR	RS-485 secondary address	01–99

(11) Required for PowerLogic software.

Table 20 - Read-Only Registers

RAM Address	Relative Address(12)	Code	Description	Notes		
A0	1A0	VOLTAV	Average voltage L-L	Volts		
A2	1A1	IAVE	Raw average current	A (x100, x10, x1), multiplied by scale factor		
A4	1A2	VUB(13)	Voltage unbalance	0–100%		
A6	1A3	IUB(13)	Current unbalance	0–100%		
A8	1A4	PFANGLE(13)	Power factor angle	Degrees		
AA	1A5	CAPTY(13)	Thermal capacity remaining	0–100%		
AC	1A6	GFC(13)	Ground fault current	A (x100, x10, x1), multiplied by scale factor		
AE	1A7	ERCODE/ TRIPRN	Bit-real time messages and trip indicator	**Bit #**	**TRIPRN**	**ERCODE**
				0	Event lockout	Under-voltage
				1	Remote stop	Over-voltage
				2	Contactor event	Unbalance voltage
				3	Under current	Under current
				4	Over current	Phase reversal
				5	Ground fault	Unbalance current
				6	Current unbalance	Single phase voltage > 25%
				7	Current single phase > 50% unbalance	Single phase current > 50%
B0	1A8	FH(13)	NIBBLE_CODED -4 event history	The four-event history is based on the following scheme: 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1, where bits 1–4 = Last event, bits 5–8 = 2nd last event, bits 9–12 = 3rd last event, and bits 13–16 = 4th last event. These four bits indicate a hex value that corresponds to the following events:		
				1		Over-voltage
				2		Under-voltage
				3		N/A
				4		Contactor misoperation
				5		Phase reversal
				6		Single phase
				7		Ground fault
				8		Current unbalance
				9		Remote off command
				10		Overcurrent
				11		Undercurrent
B2	1A9	PID(13)	Manufacture year, month, product type/scale	8-bit year, 4-bit month, 4-bit I/O and scale		
B4	1AA	VA-C	Line voltage A–C	Volts		
B6	1AB	VB-C	Line voltage B–C	Volts		
B8	1AC	VA-B	Line voltage A–B	Volts		
BA	1AD	IC	Raw current phase C	A (x100, x10, x1), multiplied by scale factor		
BC	1AE	IB	Raw current phase B	A (x100, x10, x1), multiplied by scale factor		
BE	1AF	IA	Raw current phase A	A (x100, x10, x1), multiplied by scale factor		
C0	1B0	RD1(13)	Remaining restart delay RD1	Seconds		
C2	1B1	RD2(13)	Remaining restart delay RD2	Seconds		
C4	1B2	RD3(13)	Remaining restart delay RD3	Seconds		

(12) Must be used with PowerLogic software.
(13) Can only be viewed via network.

Table 21 - Read/Write Registers

RAM Address	Relative Address	Code	Description	Range	Default	
C6	1B3	COM-LINE	Command Line(14)	Reset/run/stop, display lock, network configuration enable	**MotorLogic Plus Command Register (C6 hex)**	
					01H	Start/reset
					02H	Stop
					03H	Display lock
					04H	Display unlock
					05H	Network program enable
					06H	Network program disable
C8	1B4	Scale	PowerLogic scale parameter	0, 1, 1–2; 16-bit signed word (2s complement, read only)	Model dependent	
CA	1B5	LV	Low voltage threshold	170 V (450 V(14)) - HV setting	435	
CC	1B6	HV	Over-voltage threshold	LV setting - 528 V (660 V (14))	500	
CE	1B7	VUB	Voltage unbalance threshold	2–15% or 999%	5%	
D0	1B8	MULT	CT/turns effective ratio	1 or 10–200	1	
D2	1B9	OC	Overcurrent threshold	OL current range	Min. rating	
D4	1BA	UC	Undercurrent threshold	0.5 x OC Min. to OC Max., Off	0.8 x OC Min.	
D6	1BB	CUB	Current unbalance threshold	2–25% or 999%	6%	
D8	1BC	TC	Overcurrent trip class	5, J5, 10, J10, 15, J15, 20, J20, 30, J30 (J = Jam protection is enabled)	5	5 decimal
					J5	133 decimal
					10	10 decimal
					J10	138 decimal
					15	15 decimal
					J15	143 decimal
					20	20 decimal
					J20	148 decimal
					30	30 decimal
					J30	158 decimal
DA	1BD	RD1	Rapid cycle timer	2–500 seconds	10	
DC	1BE	RD2	Restart delay all events except undercurrent	2–500 minutes	8	
DE	1BF	RD3	Restart delay after undercurrent	2–500 minutes	20	
E0	1C0	#RU	# Restarts after undercurrent	0, 1, 2, 3, 4, A (Automatic)	**RU Values**	
					8.1	0–4 in decimal
					8.2	A = 255 decimal

(14) Can only be viewed via network.

Table 21 - Read/Write Registers (Continued)

RAM Address	Relative Address	Code	Description	Range	Default	
E2	1C1	#RF	# Restarts all events except undercurrent	0, 1, oc1, 2, oc2, 3, oc3, 4, oc4, A, ocA (0 = manual, A = continuous, oc = automatic restart after RD2 expires)	**RF Values**	
					0	1 decimal
					1	2 decimal
					oc1	3 decimal
					2	4 decimal
					oc2	5 decimal
					3	6 decimal
					oc3	7 decimal
					4	8 decimal
					oc4	9 decimal
					A	10 decimal
					ocA	11 decimal
E4	1C2	UCTD	Undercurrent trip delay	2–60 seconds	5	
E6	1C3	GF	Ground fault current threshold	(0.4) AOL current range or Off	0.15 x Min.	
E8	1C4	ADDR	RS-485 secondary address	01–99	1	

TeSys T Motor Management Controller

The following describes MCC starter units equipped with the TeSys T Motor Management Controller. Read and understand the Safety Precautions, page 19 before you install, adjust, or perform maintenance on these units. For full details about MCC installation, refer to Installing the MCC, page 28.

Figure 156 - NEMA Rated Control Unit (TeSys T Modbus)

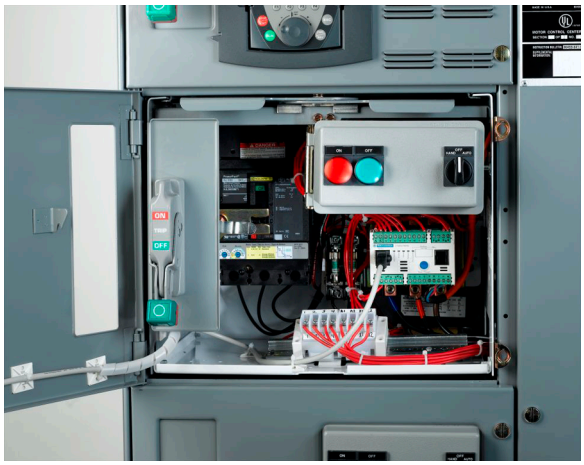


Figure 157 - TeSys T Controllers

Modbus

DeviceNet

PROFIBUS

Ethernet

CANopen

TeSys T Retrofit Applications

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

NOTE: For retrofit applications, contact your local Schneider Electric representative for assistance. Schneider Electric assumes no responsibility for the design or implementation of retrofits unless contracted to perform them. See Schneider Electric data bulletin 8998DB1004 for upgrade of the MotorLogic Plus or MotorLogic Plus II solid state overload relay to the TeSys T motor management system.

Remove the starter from the unit to replace the overload (melting alloy/bi-metallic). See Removing the Control Unit, page 122.

Use terminal blocks (OEKTTBML) for two-speed applications requiring multiple passes to achieve the proper adjustment range.

Restrain looped load cabling between the TeSys T controller and the terminal block with wire ties (or the equivalent) when terminal kits are used.

On 600 V Size 1 applications, add a third wire tie between the circuit breaker and contactor near the contactor line lugs. Refer to instruction bulletin 30072-013-29 for additional information.

Use copper wire only on device power and control terminals. Conductors must be sized for 60°C (140°F) or 75°C (167°F) National Electrical Code® (NEC®) ratings.

Pressure wire terminals are suitable for single conductor wire sizes #24–14, solid or stranded. Two conductor wire size is #24–18. Terminal instruction labels are located adjacent to the terminal block or on the wireway door.

Applications Requiring Turns

There are some applications that require more than one wiring turn through the TeSys T controller:

- All NEMA Size 4 applications require three passes through separately mounted current transformers (CTs) rated 300:5.
- Certain two-speed constant or variable torque applications require two passes through the TeSys T conductor (CT) windows through which the motor leads must pass before being connected to the load terminals on the contactor (T1, T2, and T3). These two-speed constant or variable torque applications are for NEMA Size 1 (3/4 HP, 480 V) and all NEMA Size 2. By allowing multiple passes (turns) of the load leads through these CT windows, protection can be provided for motors with a full-load current lower than the specified operating range. Two passes of the load leads through each window effectively increase (by a multiple of two) the current that the TeSys T senses.
- All three conductor windows must have the same number of passes, looped in the same direction, for the TeSys T to operate properly.
- Begin passes from the load side of the TeSys T through the CT window, and return via the windows provided between the baseplate and the TeSys T. The final pass terminates on the load side of the contactor.
- MCC units requiring multiple passes are factory supplied pre-looped with #14 wire and interposing terminal blocks.

TeSys T Local Programming

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462 or local equivalent.
- Turn off all power supplying this equipment before working on or inside the Motor Control Center.
- Always use a properly rated voltage sensing device to confirm that all power is off. Control units must be de-energized before performing maintenance on the MCC.
- The unit disconnect switch must be locked in the “off” position before working on equipment.

Failure to follow these instructions will result in death or serious injury.

Use Local Programming for set point programming and detected error readout purposes. Configure the TeSys T by using SoMove™ software, or an HMI (display) to set the parameters.

The Parameter Settings Sheet (included with MCC order drawings) lists all the parameters that are by the factory specific to each device application. Any settings not shown on the Parameter Settings Sheet are retained at device default values. To return the TesSys T controller to its default settings, press and hold the Test / Reset button down for 16–20 seconds.

NOTE: The TeSys T requires power for configuration.

Configuring with HMI

The HMI may be supplied either as a unit-mounted option, or as a separate, handheld programming kit containing one HMI and one 3.3 ft. (1 m) connection cable.

1. Connect the HMI to the TeSys T unit:
   a. If supplied as a unit-mounted option, the connection is made at the factory.

      or

   b. Connect the programming kit via the standard, unit-mounted RJ-45 port.
2. Input Full Load Current (FLC):
   a. Using the HMI, go to Menu>Protection Settings>Thermal>Thermal Overload>FLC1

      NOTE: For additional details, refer to the TeSys T LTMCUF Control Operator Unit User Manual and the TeSys T LTMR Motor Management Controller User Guide specific to your network communication protocol. (See iMCC-related Literature, page 17 for the document numbers.)

Configuring with SoMove Software

For details about the SoMove software, refer to the TeSys T LTMR Motor Management Control User Manual specific to your network communication protocol (See iMCC-related Literature, page 17 for the document numbers.).

TeSys Tera Motor Management Controller

The following describes MCC starter units equipped with the TeSys Tera Motor Management Controller. Read and understand the Safety Precautions, page 19 before you install, adjust, or perform maintenance on these units. For full details about MCC installation, refer to Installing the MCC, page 28.

Figure 158 - TeSys Tera Controllers

Modbus

ProfiNet™

PROFIBUS

Ethernet

IEC61850

Applications Requiring Turns

There are some applications that require more than one wiring turn through the TeSys Tera controller:

- All NEMA Size 4 applications require one pass through the 3 amp Tera Sensor Module from the external current transformer (CT) secondary. CTs are rated 300:5.
- All NEMA Size 5 applications require two passes through the 25 amp Tera Sensor Module from the external current transformer (CT) secondary. CTs are rated 300:5.
  - MCC units requiring secondary passes using an external CT are factory supplied pre-looped with #14 wire and interposing terminal blocks.
- Certain two-speed constant or variable torque applications require two passes through the TeSys Tera conductor (CT) windows through which the motor leads must pass before being connected to the load terminals on the contactor (T1, T2, and T3). Two passes of the load leads through each window effectively increase (by a multiple of two) the current that the TeSys Tera senses. Verify that the low speed and high speed Full Load Amperages fall within Tera current sensing range.
- All three conductor windows must have the same number of passes, looped in the same direction, for the TeSys Tera to operate properly.
- Passes should begin from the load side of the TeSys Tera through the CT window. The final pass terminates on the load side of the contactor.

TeSys Tera Local Programming

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- Turn off all power supplying this equipment before working on or inside the Motor Control Center.
- Use a properly rated voltage sensing device to confirm that all power is off. Control units must be de-energized before performing maintenance on the MCC.
- The unit disconnect switch must be locked in the “off” position before working on equipment.

Failure to follow these instructions will result in death or serious injury.

Local Programming can be used for set point programming and detected error readout purposes. Configure the Tesys Tera by using SoMove software, or an HMI (display) to set the parameters.

The Parameter Settings Sheet (included with the final MCC order documentation) lists all the parameters that are by the factory specific to each device application. Any settings not shown on the Parameter Settings Sheet are retained at device default values. To return the TeSys Tera controller to its default settings, press and hold the Test / Reset button down for 16–20 seconds.

NOTE: The TeSys Tera requires power for configuration.

Configuring with HMI

The HMI may be supplied either as a unit-mounted option, or as a separate, handheld programming kit containing one HMI and one 3.3 ft. (1 m) connection cable.

1. Connect the HMI to the TeSys Tera unit:
   a. If supplied as a unit-mounted option, the connection is made at the factory.

      or

   b. Connect the programming kit via the standard, unit mounted RJ-45 port.
2. Input Full Load Current (FLC):
   a. Using the HMI, Log into "Admin" Mode: MENU > FIRST SETUP > SYSTEM SETTING > IFLC1.

      NOTE: For additional details, refer to the TeSys Tera Motor Management Controller User Guide and the TeSys Tera LTMTCUF Control Operator Unit User Manual specific to your network communication protocol. (See iMCC-related Literature, page 17 for the document numbers.)

Configuring with SoMove Software

For details about the SoMove software, refer to the TeSys Tera Motor Management Controller User Guide specific to your network communication protocol (See iMCC-related Literature, page 17 for the document numbers).

PowerLogic ION Meter

Instructions for programming the PowerLogic ION 9000 Series meters are contained in Schneider Electric instruction bulletin 7EN02-0390.

PowerLogic Power Meter Series 800, 5500, 8000

Instructions for performing local and remote programming for the Power Meter Series 800 are contained in Schneider Electric instruction bulletins 63230500-200 and 63230500-224 (see iMCC-related Literature, page 17).

Instructions for performing local and remote programing for the Power Meter Series 5500 are contained in Schneider Electric instruction bulletin HRB1684301.

Instructions for performing local and remote programing for the Power Meter Series 8000 are contained in Schneider Electric instruction bulletin 7EN02-0336.

PowerLogic Circuit Monitor

Instructions for performing local and remote programming for the Circuit Monitor 3000 or Circuit Monitor 4000 series are contained in Schneider Electric instruction bulletin 63230-400-204 or 63230-300-209, respectively (see iMCC-related Literature, page 17).

Altivar 61/71

Instructions for performing local setpoint programming are contained in Schneider Electric instruction bulletin atv71_Programming_Manual_en (see iMCC-related Literature, page 17).

Instructions for performing remote setpoint programming are contained in Schneider Electric instruction bulletin atv71_Parameters_en (see iMCC-related Literature, page 17).

Altivar 630/930

Instructions for performing local or remote programming for the Altivar 630 drive are contained in Schneider Electric instruction bulletin EAV64318 (see iMCC-related Literature, page 17).

Instructions for performing local or remote programming for the Altivar 930 drive are contained in Schneider Electric instruction bulletin NHA80757 (see iMCC-related Literature, page 17).

Altistart 48

Instructions for performing local or remote programming for the Altistart 48 soft starter are contained in Schneider Electric instruction bulletin 1623736, (see iMCC-related Literature, page 17).

Altivar 480

Instructions for performing local or remote programming for the Altivar 480 soft starter are contained in the Schneider Electric ATS480 communication instruction bulletins (see iMCC-related Literature, page 17).

PowerPacT Circuit Breakers with MicroLogic Trip Units

Instructions for performing local or remote programming of the MicroLogic trip unit parameters can be found in Schneider Electric instruction bulletin 48940-313-01,

Device Addressing

Ethernet-based networks use classless IPv4 addressing. Unless specified otherwise, MCC devices are assigned addresses in the 10.10.10.0/24 subnet starting from 10.10.10.2.

Serial-based networks follow the specific addressing rules of the protocol used. Details of these addressing rules can be found in Serial Device Addressing, page 177. Unless specified otherwise, MCC devices are assigned addresses starting from 2.

Table 22 - Serial Device Addressing

Protocol	Maximum Number of Addressable Nodes	Address Range	Address to Avoid
Modbus	31	2–247	127
PROFIBUS	126	2–125	126
DeviceNet	64	2–62	63
CANopen	127	2–126	127

Software

Configurable software-such as PowerLogic System Manager Software, Ecoreach, or SoMove is available for communication with your intelligent Model 6 iMCC components. For setup, operating, and maintenance instructions, consult the user manual included with your software package.

Network Security

⚠WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

- Change default passwords to help prevent unauthorized access to device settings and information.
- Disable unused ports/services and default accounts, where possible, to minimize pathways for malicious attacks.
- Place networked devices behind multiple layers of cyber defenses (such as firewalls, network segmentation, and network intrusion detection and protection).
- Use cybersecurity best practices (for example: least privilege, separation of duties) to help prevent unauthorized exposure, loss, modification of data and logs, interruption of services, or unintended operation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Expansion

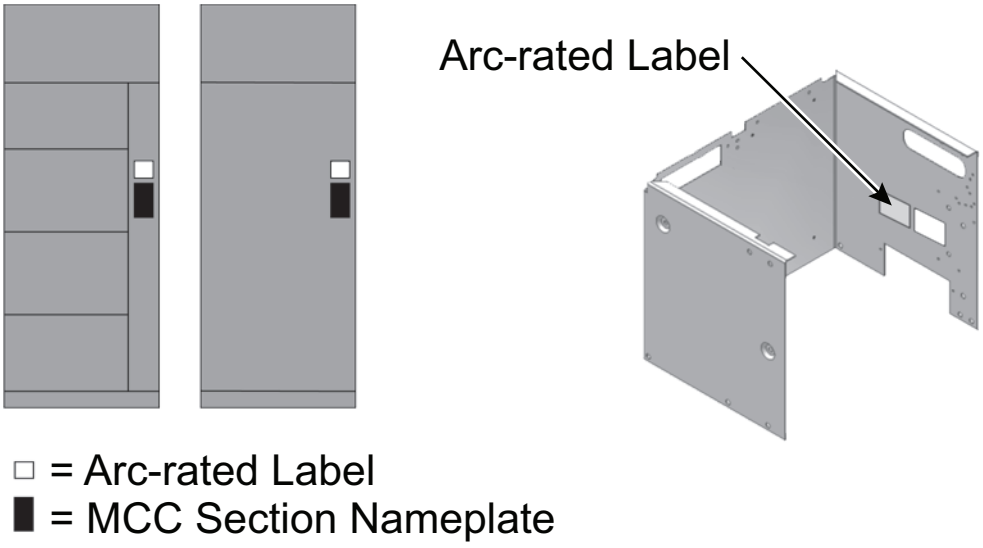
The MCC's modular design permits easy expansion to keep pace with an expanding electrical system. When space is available in the existing MCC, starter units can easily be added. Units can be rearranged where necessary. Additional MCC sections can be added to an MCC when space is available. In some cases, units can be replaced with higher-rated units of the same physical size, for example, a 12 in. (305 mm) high, NEMA size one starter unit can be replaced with a 12 in. (305 mm) high, size two starter unit.

Ordering Information

NOTE: Arc-rated MCCs must only be expanded or added onto with arc-rated units/sections to maintain the arc containment ratings. Arc-rated units and sections have special labels identifying them as AR (arc-rated), typically in the locations shown in Typical Arc-rated Label Locations on Sections and Units, page 178. Customers must provide the previous arc-rated MCC factory order number when ordering additional arc-rated MCC equipment from the factory.

NOTE: Prepared spaces or unused spaces in arc-rated MCCs must be filled with arc-rated empty units. Arc-rated empty units can be ordered for use when rearranging units in an arc-rated MCC.

Figure 159 - Typical Arc-rated Label Locations on Sections and Units



When ordering additional MCC equipment, include the following information:

- Type of equipment supplied
- Supply voltage, frequency, system type
- Enclosure type
- Enclosure finish
- Control circuit voltage and frequency
- Optional control circuit components required (control transformers, push buttons, pilot lights, selector switches. other items.)
- Special features
- The factory order number of the original MCC (the number is stamped into the structure nameplate on the vertical wireway door; the unit label inside each control unit also contains the factory order number)

When ordering new vertical sections, also provide the following information:

- Horizontal and vertical bus capacity, material, and plating
- Bus bracing (or available fault current)
- Enclosure type and dimensions

Modifying MCC Units

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Most MCC units are designed for easy removal from the MCC structure. Some units are not removable due primarily to the physical size of the unit.

De-energizing Equipment and Identifying Unit Type

Identify whether the unit intended for modification is a removable style or a fixed position unit. All removable units have stab connections to the vertical bus as shown on the electrical schematics and one-line diagrams provided with the MCC. Most removable units also have a twin handle cam mechanism (see Pulling the Twin Handle Cam Mechanism Forward, page 125). One notable exception is the Compac 6 control unit (see Operator Handle in the OFF Position, page 128), which is removable but does not have the twin handle cam mechanism.

> **NOTE:** Modifications to arc-rated MCC units or structures can adversely affect the arc containment features and/or performance. Modifications to control circuit wiring are allowed. Modifications specifically covered in this instruction bulletin are allowed. However, additional components, changes to the power circuit, or mechanical modifications to the unit saddle or MCC exteriors must be approved by Schneider Electric. Contact your local Schneider Electric representative for more information.

If the unit is removable, follow the instructions below. If the unit is a fixed position unit, follow the instructions for Modifying Fixed Units, page 180.

Modifying Removable Units

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.

2. Remove the MCC unit from the structure. See the procedure for Maintaining the Control Unit, page 121.
3. Perform the required modifications. Use thread-forming screws to mount devices. Do not use bolts and nuts, as they could loosen over time and cause property damage or personal injury. The hardware must not extend beyond the back of the MCC unit saddle more than 0.25 in. (6 mm) or beyond the sides and bottom pan by more than 0.125 in. (3 mm).
4. Maintain proper electrical spacings(15) in the unit.
5. Use a vacuum cleaner to remove all debris left in the unit due to the modifications. Do not use compressed air to blow out the unit, because all debris may not be fully removed.
6. Perform the recommended maintenance procedures beginning in Maintaining the Control Unit, page 121.
7. Make sure that vertical bus closing plugs are in place (except for one plug where the MCC unit stabs on the vertical bus). If other vertical bus closing plugs are not in the proper position, make sure that all power is removed from the vertical bus and reinstall the vertical bus closing plugs.
8. Use a megohmmeter to perform an insulation test as outlined in Insulation Test, page 135.
9. Look for and clear any obstructions that does not permit proper energizing of the MCC unit.
10. Reinstall the MCC unit and follow the procedures for Energizing the MCC, page 162.

Modifying Fixed Units

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. If drilling holes in the back of the MCC unit saddle is required, do not drill through the back of the saddle more than 0.1875 in. (5 mm). Use a drill stop device for this procedure.
3. Perform the required modifications. Use thread-forming screws to mount devices. Do not use bolts and nuts, as they could loosen over time and cause property damage or personal injury. The hardware must not extend beyond the back of the MCC unit saddle more than 0.25 in. (6 mm) or beyond the sides and bottom pan by more than 0.125 in. (3 mm).
4. Maintain proper electrical spacings (16) in the unit.
5. Use a vacuum cleaner to remove all debris left in the unit due to the modifications. Do not use compressed air to blow out the unit, because all debris may not be fully removed.

(15) The following minimum spacing requirements are based on Tables 18 and 19 of UL 845, Motor Control Centers (Fifth Edition, October 31, 2018).

- Through air between live parts (301–600 V)-In motor control units: 0.375 in. (9.5 mm); in other MCC units: 1.0 in. (25.4 mm).
- Over (insulation) surface between live parts (301–600 V)-In motor control units: 0.5 in., (12.7 mm); in other MCC units: 2.0 in. (50.8 mm).
- Between live parts and grounded metal (0–600 V)-in motor control units: 0.5 in. (12.7 mm); in other MCC units: 1.0 in. (25.4 mm).

Spacing values above can also be used at lower voltages. For conditions other than those noted, contact Schneider Electric.

(16) The following minimum spacing requirements are based on Tables 18 and 19 of UL 845, *Motor Control Centers* (Fifth Edition, October 31, 2018).

- Through air between live parts (301–600 V)-In motor control units: 0.375 in. (9.5 mm); in other MCC units: 1.0 in. (25.4 mm).
- Over (insulation) surface between live parts (301–600 V)-In motor control units: 0.5 in., (12.7 mm); in other MCC units: 2.0 in. (50.8 mm).
- Between live parts and grounded metal (0–600 V)-in motor control units: 0.5 in. (12.7 mm); in other MCC units: 1.0 in. (25.4 mm).

Spacing values above can also be used at lower voltages. For conditions other than those noted, contact Schneider Electric.

6. Perform the recommended maintenance procedures beginning in Maintaining the Control Unit, page 121.
7. Use a megohmmeter to perform an insulation test as outlined in Insulation Test, page 135.
8. Follow the procedures for Energizing the MCC, page 162.

Installing Additional MCC Units

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.

2. Position the midshelf (see Shelf and Door Installation, page 182, A) in the appropriate area of the structure.

   NOTE: Arc-rated MCCs have a midshelf specifically designed for arc-rated MCCs (see Shelf and Door Installation, page 182). This midshelf includes arc pressure relief flaps and must be used when installing arc-rated MCC units to maintain the arc containment ratings.

Figure 160 - Shelf and Door Installation

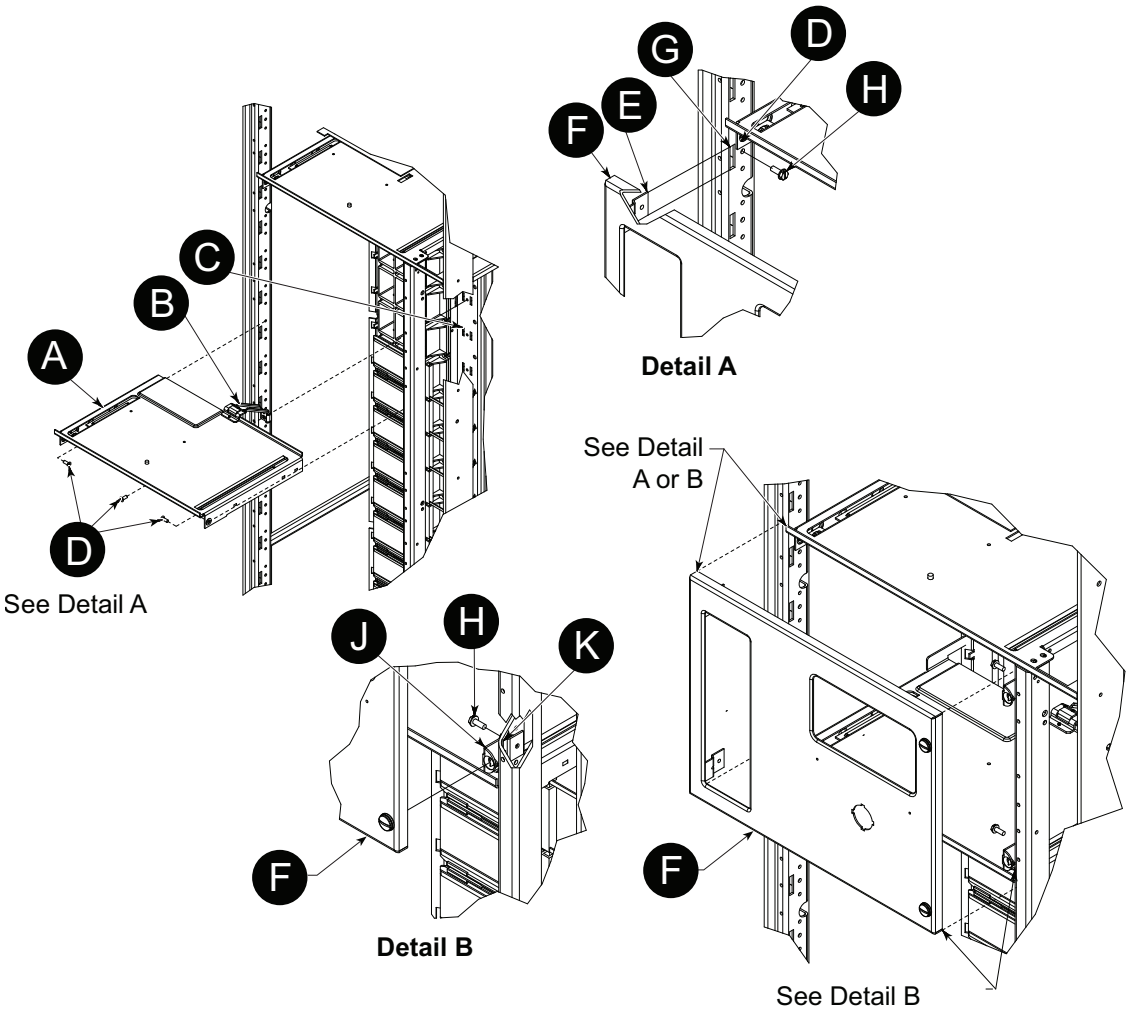


Table 23 - Shelf Installation Kit Parts

Item	Description	Qty	Assemble per
A	Shelf	2(17)	Steps 2 and 3
D	Flat head screws	4	Step 3
F	Unit door	1	Step 4
H	Round head Torx® screws	4(18)	Steps 4 and 5
J	Quarter turn fastener receptacle	2(18)	Step 5

(17) Shelves are furnished with order. Structure may already have shelf mounted in position.
(18) All necessary hardware for typical shelf installation is included. Door installation may require additional hardware.

Figure 161 - Midshelf for Arc-Rated MCCs

3. Place the mounting foot (see Shelf and Door Installation, page 182, B) of the shelf into the mounting pan slots (see Shelf and Door Installation, page 182, C). Secure the shelf at the mounting foot end, the left side, and the right side with flat head screws (see Shelf and Door Installation, page 182, Detail A, D).
4. Install the hinge leaves of the door (see Shelf and Door Installation, page 182, Detail A, E) into the hinge slots (Item G), which are on the structure corner channel. Fasten the hinge leaves to the structure corner channel using Torx head screws (see Shelf and Door Installation, page 182, H).
5. Install fastener receptacles (see Shelf and Door Installation, page 182 Detail B, J) into the bracket slots (see Shelf and Door Installation, page 182, K) and fasten with Torx head screws (see Shelf and Door Installation, page 182, H).
6. If a grommeted wireway barrier is supplied, locate the vertical wireway grommet (see Cutting the Vertical Wireway Grommet, page 183) nearest the bottom of the control unit. Cut the grommet following the instructions on the grommet. See the second paragraph under Load and Control Wiring, page 107.

Figure 162 - Cutting the Vertical Wireway Grommet (when supplied)

7. Remove the manual bus shutter(s) (see Removing the Manual Bus Shutter, page 184) to allow insertion of the new control unit; slide out the top bus shutter.

   NOTE: Do not remove the tether.

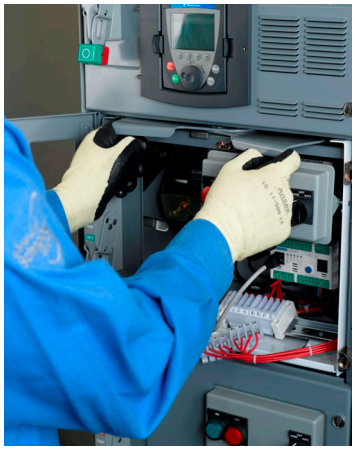
Figure 163 - Removing the Manual Bus Shutter

8. Insert unit into MCC as follows:

   All Units Except Compac 6 (six in. high) Units

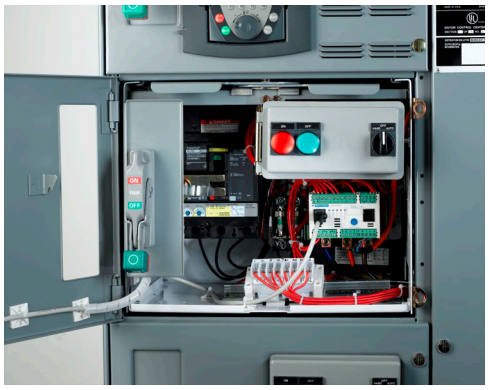
   a. Confirm the cam mechanism is in the open position and the disconnect handle is in the off position; position the mounting slides of the control unit onto the slots of the midshelf. Slide the unit inward to engage the cam mechanism (see Engaging the Cam Mechanism, page 185).

   Figure 164 - Engaging the Cam Mechanism



   b. Press the handles inward until they are flush with the face of the MCC (see Handles Flush with the Front of the MCC, page 185).

   Figure 165 - Handles Flush with the Front of the MCC



   c. Turn the screw on the control unit lock-in panel (when supplied) located at the bottom front of the control unit (see Tightening the Control Unit Lock-in Panel, page 185), until the lock-in pawl is latched to the support shelf below the control unit.

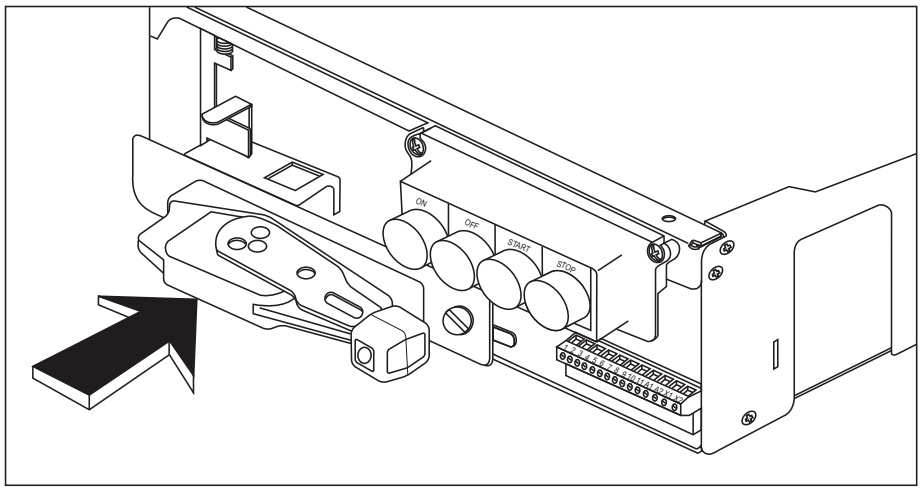
   Figure 166 - Tightening the Control Unit Lock-in Panel (when supplied)

Compac 6 (six in. high) Units

a. Position the mounting slides of the control unit onto the slots of the midshelf. Slide the unit inward until the unit is halfway in, then move it inward with a quick push. This movement easily overcomes the compression of the stabs as they engage the vertical bus (see Reinstalling the Compac 6 Control Unit, page 186).

NOTE: The interlock is spring loaded and engages automatically when the control unit is inserted with a firm push to the operator handle. Pressing the structure interlock release is not necessary.

Figure 167 - Reinstalling the Compac 6 Control Unit



9. Pull the power leads from the vertical wireway through the grommet and into the control unit.

All Units Except Compac 6 (six in. high) Units

a. Connect the power leads to the power terminals in the control unit (see Power Leads Connected to Power Terminals, page 187).

NOTE: To provide additional working clearance, grasp the control station plate on the right side and pull gently, allowing it to hinge open (see Connecting Control Leads to the Terminal Blocks, page 187).

Figure 168 - Power Leads Connected to Power Terminals

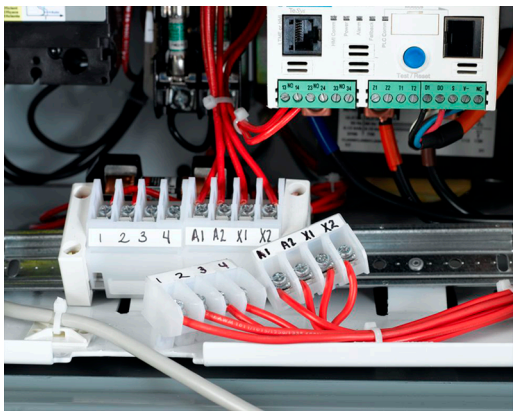
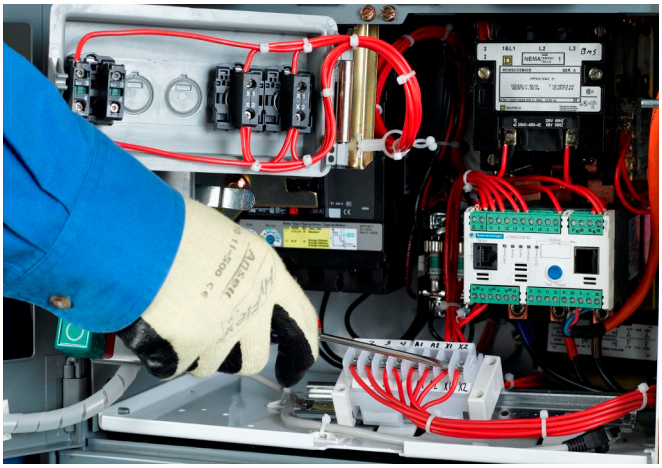


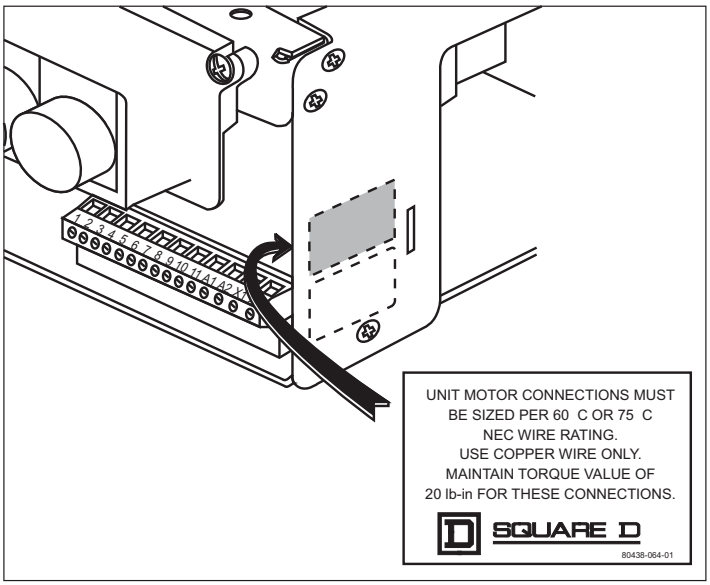
Figure 169 - Connecting Control Leads to the Terminal Blocks



Compac 6 (six in. high) Units

a. Connect the power leads to the power terminals on the starter. Refer to the torque label on the right inside wall of the unit for load terminal wire and torque requirements (see Typical Unit Torque Label, page 188).

Figure 170 - Typical Unit Torque Label



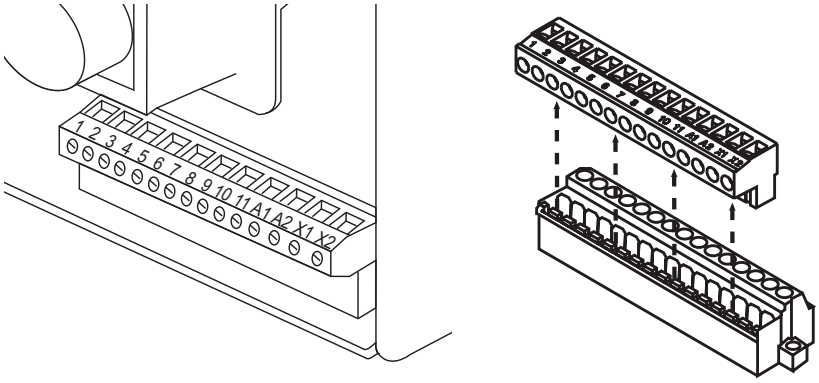
NOTE: Removal of the control station plate may be necessary to install power and control wiring. For detailed steps, refer to step 4 in Removing the Compac™ 6 Control Unit, page 127.

10. Pull the control leads from the vertical wireway through the grommet and connect them to the terminals of the top (removable) portion of the control pull-apart terminal blocks (see Connecting Control Leads to the Terminal Blocks, page 187 and Pull-apart Terminals, page 188).

    All Units Except Compac 6 (six in. high) Units

    Compac 6 (six in.) Units

    Figure 171 - Pull-apart Terminals



    10 A Control Wire Terminal Block

    - To separate or remove the top portion of the terminal block from its base, grasp the top half and pull apart as shown.
    - Each terminal is rated for one 16-12 AWG wire or two 16 AWG wires.
    - Torque terminal screws to 5 lb-in. (0.5 N•m).

    NOTE: If removal of the control station plate was necessary, reinstall the plate by reversing the steps used to remove the plate (step 4 in Removing the Compac™ 6 Control Unit, page 127).

11. Close the unit door and secure the fasteners.

Troubleshooting

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Motor Control Center Troubleshooting Chart, page 190 lists problems encountered with MCCs, their causes, and remedies. This table is of a general nature and covers only the main causes of problems.

Misapplication of a device can result in serious problems; however, rather than list this cause repeatedly below, note that misapplication is a major cause of motor control problems and must always be questioned when a device is not functioning properly.

Actual physical damage or broken parts can usually be quickly located and replaced.

NOTE: Damage caused by water ingress or flood conditions requires replacement of the equipment.

NOTE: Damaged, arc-rated MCCs must be inspected, repaired, and requalified by Schneider Electric Services personnel to maintain the arc containment ratings.

Contact the Schneider Electric Customer Care Center for repair services, replacement parts, or equipment replacement:se.com/us/en/work/support/ , or by calling 888-SQUARED (888-778-2733), Monday–Friday, 8:00 a.m. to 8:00 p.m. ET.

Table 24 - Motor Control Center Troubleshooting Chart

Part	Problem	Cause	Remedy
Contacts	Contact Chatter (also see Noisy Magnet)	1. Poor contact in the control circuit. 2. Low voltage.	1. Replace the contact device or use a holding circuit interlock (three-wire control). 2. Check the coil terminal voltage and voltage dips during starting.
	Welding or Freezing	1. Abnormal inrush of current. 2. Rapid jogging. 3. Insufficient tip pressure. 4. Low voltage which prevents the magnet from sealing. 5. Foreign matter prevents the contacts from closing. 6. Short circuit or ground fault.	1. Check for grounds, shorts, or excessive motor load current, or use larger contactor. 2. Install a larger device rated for jogging service. 3. Replace contacts and springs. Check contact carrier for deformation or damage. 4. Check the coil terminal voltage and voltage dips during starting. 5. Clean the contacts with an environmentally safe (CFC-free) contact cleaner. 6. Remove the cause of the event. make sure that the fuse and circuit breaker sizes are correct.
	Short Trip Life or Overheating or Trips	1. Filing or dressing. 2. Interrupting excessively high currents. 3. Excessive jogging. 4. Weak tip pressure. 5. Dirt or foreign matter on the contact surface 6. Short circuit or ground fault. 7. Loose connection in the power circuit. 8. Sustained overload.	1. Do not file the silver tips; rough spots or discoloration do not harm tips or impair their efficiency. 2. Install a larger device or check for grounds, shorts, or excessive motor currents. 3. Install a larger device rated for jogging service. 4. Replace contacts and springs; check the contact carrier for deformation or damage. 5. Clean contacts with a CFC-free contact cleaner. Reduce the entry of foreign matter into the enclosure. 6. Remove the cause of the event; ensure that the fuse and circuit breaker sizes are correct. 7. Clear and tighten the connection. 8. Check for excessive motor load current or install a larger device.
Coils	Open Circuit	Mechanical damage.	Replace the coil; handle and store replacement coils carefully.
	Overheated Coil	1. Overvoltage or high ambient temperature. 2. Incorrect coil. 3. Shorted turns caused by mechanical damage or corrosion. 4. Undervoltage; magnet will not seal in. 5. Dirt or rust on the pole faces. 6. Mechanical obstruction.	1. Check the coil terminal voltage. It should not exceed 110% of the coil rating. 2. Install the correct coil. 3. Replace the coil. 4. Check the coil terminal voltage. It should be at least 85% of the coil rating. 5. Clean the pole faces. 6. With power off, check for free movement of the contact and armature assembly.
Thermal Overload Relays	Tripping	1. Sustained overload. 2. Loose or corroded connection in the power circuit. 3. Incorrect thermal units. 4. Excessive coil voltage.	1. Check for excessive motor currents or current unbalance; correct cause. 2. Clean and tighten the connection. 3. Replace the thermal units with the correct size for the application. 4. Voltage should not exceed 110% of the coil rating.
	Not Tripping	1. Incorrect thermal units. 2. Mechanical binding, dirt, or corrosion. 3. Relay previously damaged by a short circuit. 4. Relay contact welded or not in series with the contactor coil.	1. Check the thermal unit selection table. Install the proper thermal units. 2. Replace the relay and thermal units. 3. Replace the relay and thermal units. 4. Check circuit for the cause of the event and correct the condition. Replace the contact or the entire relay as necessary.

Table 24 - Motor Control Center Troubleshooting Chart (Continued)

Part	Problem	Cause	Remedy
MotorLogic Overload Relays	Overload relay trips on start-up (after more than three seconds).	1. Load is too heavy for motor horsepower. 2. Wrong overload trip class selected for application. 3. Incorrect overload FLA setting. 4. Use of electronic DC injection brake.	1. Remove excessive motor load or resize motor. 2. Use Trip Class 20 overload relay instead of Trip Class 10. 3. Set FLA adjustment according to motor full-load current. 4. Do not use electronic DC injection brakes with solid-state overload relay.
	Overload relay trips on start-up (in less than three seconds).	1. Motor branch circuit fuse blown. 2. Loose motor branch circuit. 3. Motor circuit is not three-phase. 4. Voltage unbalance on feeder. 5. Motor winding damage in one or more windings. 6. Phase loss in primary of wye-delta or delta-wye transformer. 7. One or more load lead(s) is not routed through relay window or is routed in opposite direction. 8. Number of load lead passes are different.	1. Replace blown motor branch circuit fuse(s). 2. Tighten motor branch circuit connection. 3. Select different type of overload relay for non three-phase applications. 4. Correct voltage unbalance in feeder. 5. Check motor winding impedance. Rewind if necessary. 6. Replace blown fuses or tighten connections. 7. Pass each load lead through its respective window in the same direction. 8. Each load lead must be looped the same number of passes.
	Overload relay trips while running normally.	1. Load is too heavy for motor horsepower. 2. Incorrect overload FLA setting. 3. Use of electronic DC injection brake. 4. Incorrect overload FLA setting. (Multiple pass applications.)	1. Remove excessive motor load or resize motor. 2. Set FLA adjustment according to motor full-load current. 3. Do not use electronic DC injection brakes with solid-state overload relay. 4. Recalculate FLA adjustment and set according to motor full-load current and number of looped passes.
TeSy T Motor Controller	Minor internal detected errors	Invalid configuration	Indicates either a bad checksum or good checksum but bad data (Invalid configuration). Both caused by hardware misoperation. Take the following steps: 1. Cycle power and wait 30 s. 2. Reset the configuration settings to factory settings. 3. If the condition persists, replace the TeSys T motor controller.
		Configuration checksum (EEROM) incorrect	
		Loss of internal network communications	These messages indicate a hardware misoperation. Take the following steps: 1. Cycle power and wait 30 s. 2. If the condition persists, replace the TeSys T motor controller.
		A/D out of range	
	Diagnostic	Start command check	Check the following: • Relay outputs. • All wiring, including: ◦ Control wiring circuit, including all electromechanical devices. ◦ Power wiring circuit, including all components. ◦ Load CT wiring. After all checks are complete: 1. Perform a reset. 2. If the condition persists, cycle power and wait 30 s. 3. If the condition persists, replace the TeSys T motor controller.
		Stop command check	
		Stop check back	
		Run check back	
	Wiring/configuration	CT reversal	Correct the polarity of the CTs. Be sure that: • All external CTs face the same direction. • All load CT wiring passes through windows in the same direction. After all checks are complete: 1. Perform a reset. 2. If the condition persists, cycle power and wait 30 s. 3. If the condition persists, replace the TeSys T motor controller.

Table 24 - Motor Control Center Troubleshooting Chart (Continued)

Part	Problem	Cause	Remedy
TeSys T Motor Controller	Wiring/configuration errors	Current/voltage phase reversal Phase configuration incorrect	Check: • L1, L2 and L3 wiring connection to be sure wires are not crossed. • Motor Phases Sequence parameter setting (ABC versus ACB). After all checks are complete: 1. Perform a reset. 2. If the condition persists, cycle power and wait 30 s. 3. If the condition persists, replace the TeSys T motor controller.
		PTC connection	Check for: • Short circuit or open circuit in the motor temp sensor wiring. • Wrong type of motor temp sensing device. • Improper configuration of parameters for selected device. After all checks are complete: 1. Perform a reset. 2. If the condition persists, cycle power and wait 30 s. 3. If the condition persists, replace the TeSys T motor controller.
		Voltage phase loss	Check for: • Improper wiring, such as loose terminations. • Blown fuse. • Cut wire. • Single-phase motor configured for three-phase operation. • Single-phase motor not wired through both A and C load CT windows. • Loss of power source (for example, utility power outage). After all checks are complete: 1. Perform a reset. 2. If the condition persists, cycle power and wait 30 s. 3. If the condition persists, replace the TeSys T motor controller.
TeSys Tera Overload Relays	Diagnostics	Start Command Check Stop Command Check Stop Check Back Run Check Back	Check for: • Relay output • All wiring, including: ◦ Control wiring circuit, including all electromechanical devices ◦ Power wiring circuit, including all components ◦ Load CT wiring After all checks are completed: 1. Perform a reset. 2. If condition persists, cycle power and wait 30 seconds. 3. If the condition still persists, replace the TeSys Tera motor controller.

Table 24 - Motor Control Center Troubleshooting Chart (Continued)

Part	Problem	Cause	Remedy
TeSys Tera Overload Relays	Wiring/ Configuration Errors	CT Reversal	Correct the polarity of the CTs. Be sure that: • All external CTs face the same direction • All load CT wiring passes through the windows in the same direction After all checks are completed: 1. Perform a reset. 2. If the condition persists, cycle power and wait 30 seconds. 3. If the condition still persists, replace the TeSys Tera motor controller.
		Current/Voltage Phase Reversal Phase Configuration Incorrect	Check for: • L1, L2 and L3 wiring connection to be sure wires are not crossed • Motor Phases Sequence parameter setting (ABC versus ACB) After all checks are completed: 1. Perform a reset 2. If the condition persists, cycle power and wait 30 s. 3. If the condition still persists, replace the TeSys Tera motor controller.
		PTC Connection	Check for: • Short circuit or open circuit in the motor temp sensor wiring • Wrong type of motor temp sensing device • Improper configuration of parameters for selected device After all checks are completed: 1. Perform a reset. 2. If the condition persists, cycle power and wait 30 seconds. 3. If the condition still persists, replace the TeSys Tera motor controller.
		Voltage Phase Loss	Check for: • Improper wiring, such as loose terminations • Blown fuse • Cut wire • Single-phase motor configured for 3-phase operation • Single phase motor not wired though both A and C load CT windows • Lose of power source (for example, utility power outage) After all checks are completed: 1. Perform a reset. 2. If the condition persists, cycle power and wait 30 seconds. 3. If the condition still persists, replace the TeSys Tera motor controller.

Table 24 - Motor Control Center Troubleshooting Chart (Continued)

Part	Problem	Cause	Remedy
TeSys Tera Overload Relays	Major Internal Malfunctions	Sensor Module Communication Error Detected	1. Check the RJ11 LTMT9RJ105 is connected properly between LTMT main unit and Sensor module. 2. Replace RJ11 LTMT9RJ105 and check. 3. Replace Sensor module and check. 4. Replace LTMT main unit.
		LTMT Expansion Module Communication Error Detected	1. Check device configuration setting for LTMT expansion module. Check detected LTMT epxansion lmodule on DTM 'my device' tab. 2. Check if the RJ45 cable is connected properly between LTMT main unit and Expansion module. 3. Replace RJ45 cable and check. 4. Replace LTMT expansion module and check. 5. Replace LTMT main unit.
		Configuration Error Detected	1. Check device configuration setting for LTMT expansion module. 2. Check detected LTMT expansion module on DTM 'my device' tab. 3. Check LTMTCT…UT/LTMTCTVT…UT and LTMTZCT22.. are not configured together. 4. Make correct configuration and check.
		Internal Temperature is High	Replace LTMT main unit.
	Minor Internal Malfunctions	—	Contact Schneider support team.
Magnetic and Mechanical Parts	Noisy Magnet	1. Broken shading coil. 2. Dirt or rust on magnet faces. 3. Low voltage.	1. Replace the magnet and armature. 2. Clean the magnet with a clean, dry cloth. 3. Check the coil terminal voltage and voltage dips during starting.
	Does Not Pick Up and Seal	1. No control voltage. 2. Low voltage. 3. Mechanical obstruction. 4. Open or overheated coil. 5. Wrong coil.	1. Check the control circuit wiring for a loose connection or poor contact continuity. 2. Check for the proper coil terminal voltage and voltage dips during starting. 3. With the power off, check for free movement of the contact and armature assembly. 4. Replace the coil. 5. Replace the coil.
	Does Not Drop Out	1. Gummy substance on the pole faces. 2. Voltage not removed. 3. Worn or corroded parts causing binding. 4. Residual magnetism due to the lack of an air gap in the magnet path. 5. Welded contacts.	1. Clean the pole faces with a clean, dry cloth. 2. Check the coil terminal voltage and the control circuit. 3. Replace the parts. 4. Replace the magnet and armature. 5. See Contacts—Welding or Freezing.
Pneumatic Timers	Erratic Timing	Foreign matter in the valve.	Replace the complete timing head or return the timer to the factory for repair and adjustment.
	Contacts Do Not Operate	1. Maladjustment of the actuating screw. 2. Worn or broken parts in the snap switch.	1. Adjust according to the instructions in the service bulletin. 2. Replace the snap switch.
Limit Switches	Broken Parts	Over-travel of the actuator.	Use a resilient actuator or operate within the tolerance of the device.
Manual Starters	Does Not Reset	Latching mechanism worn or broken.	Replace the starter.

Insulation Resistance

NOTE: Disconnect all solid state devices such as SPDs, drives, soft starts, capacitors, filters, power meters, and circuit monitors before performing megohmmeter tests on the MCC.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.
- Follow the instructions in Insulation Test.

Failure to follow these instructions will result in death or serious injury.

Date	Phase-to-Phase			Phase-to-Ground		
	All Disconnects Open					
	A-B	B-C	C-A	A-Ground	B-Ground	C-Ground
Date	All Disconnects Closed					
	A-B	B-C	C-A	A-Ground	B-Ground	C-Ground

Thermal Overload Unit Selection

This section identifies the thermal overload units needed for the starters specified in an order. Tables are based on motor full-load amps and provide the catalog number for the appropriate thermal units for use at that current rating.

Table 25 - Melting Alloy Overload Selection Tables for Combination Starter Units

Size 1

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
0.56–0.63	B 0.81	4.12–4.70	B 6.90
0.64–0.68	B 0.92	4.71–5.21	B 7.70
0.69–0.77	B 1.03	5.22–5.53	B 8.20
0.78–0.85	B 1.16	5.54–6.17	B 9.10
0.86–0.97	B 1.30	6.18–7.02	B 10.2
0.98–1.09	B 1.45	7.03–7.92	B 11.5
1.10–1.21	B 1.67	7.93–8.61	B 12.8
1.22–1.33	B 1.88	8.62–9.17	B 14
1.34–1.53	B 2.10	9.18–10.0	B 15.5
1.54–1.73	B 2.40	10.1–11.0	B 17.5
1.74–1.89	B 2.65	11.1–11.8	B 19.5
1.90–2.17	B 3.00	11.9–13.5	B 22
2.18–2.53	B 3.30	13.6–15.3	B 25
2.54–2.87	B 3.70	15.4–17.4	B 28
2.88–3.22	B 4.15	17.5–19.4	B 32
3.23–3.49	B 4.85	19.5–22.2	B 36
3.50–3.85	B 5.50	22.3–25.1	B 40
3.86–4.11	B 6.25	25.2–27.0	B 45

Size 2

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
3.94–4.45	B 6.90	14.0–15.8	B 25
4.46–4.97	B 7.70	15.9–17.9	B 28
4.98–5.28	B 8.20	18.0–19.9	B 32
5.29–5.97	B 9.10	20.0–22.8	B 36
5.98–6.89	B 10.2	22.9–25.4	B 40
6.90–7.92	B 11.5	25.5–28.9	B 45
7.93–8.71	B 12.8	29.0–30.8	B 50
8.72–9.27	B 14.0	30.9–32.5	B 56
9.28–10.2	B 15.5	32.6–34.9	B 62
10.3–11.4	B 17.5	35.0–39.7	B 70
11.5–12.3	B 19.5	39.8–44.7	B 79
12.4–13.9	B 22		

Size 3

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
14.0–14.9	CC 20.9	36.9–39.8	CC 59.4
15.0–16.2	CC 22.8	39.9–42.3	CC 64.3
16.3–17.2	CC 24.6	42.4–45.7	CC 68.5
17.3–18.7	CC 26.3	45.8–49.2	CC 74.6
18.8–20.2	CC 28.8	49.3–52.8	CC 81.5
20.3–21.7	CC 31.0	52.9–56.8	CC 87.7
21.8–23.3	CC 33.3	56.9–61.2	CC 94.0
23.4–25.2	CC 36.4	61.3–66.1	CC 103
25.3–27.1	CC 39.6	66.2–71.2	CC 112
27.2–29.4	CC 42.7	71.3–76.7	CC 121
29.5–31.6	CC 46.6	76.8–82.9	CC 132
31.7–34.0	CC 50.1	83.0–90.0	CC 143
34.1–36.8	CC 54.5		

Size 4

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
44.0–46.8	CC 64.3	73.0–78.1	CC 112
46.9–50.6	CC 68.5	78.2–83.9	CC 121
50.7–54.5	CC 74.6	84.0–91.1	CC 132
54.6–58.4	CC 81.5	91.2–97.5	CC 143
58.5–62.9	CC 87.7	97.6–104	CC 156
63.0–67.7	CC 94.0	105–113	CC 167
67.8–72.9	CC 103	114–133	CC 180

Size 5 without CT Type Overloads

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
88.2–95.1	DD 112	171–180	DD 220
95.2–101	DD 121	181–197	DD 240
102–111	DD 128	198–204	DD 250
112–119	DD 140	205–213	DD 265
120–131	DD 150	214–237	DD 280
132–149	DD 160	238–243	DD 300
150–170	DD 185	244–266	DD 320

Size 5 with CT Type Overloads and Circuit Breakers

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
40.8–45.5	B 1.03	115–128	B 3.00
45.6–49.9	B 1.16	129–140	B 3.30
51.0–57.5	B 1.30	141–160	B 3.70
57.6–65.9	B 1.45	161–193	B 4.15

Size 5 with CT Type Overloads and Circuit Breakers

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
66.0–73.1	B 1.67	194–209	B 4.85
73.2–81.5	B 1.88	210–232	B 5.50
81.6–92.3	B 2.10	233–248	B 6.25
92.4–104	B 2.40	249–266	B 6.90
105–114	B 2.65		

Size 5 with CT Type Overloads and Fusible Switch Disconnects

Motor Full-Load Current (A)	Thermal Unit Number	Max. Fuse Rating (A)	Motor Full-Load Current (A)	Thermal Unit Number	Max. Fuse Rating (A)
40.8–45.5	B 1.03	90	115–128	B 3.00	250
45.6–49.9	B 1.16	100	129–140	B 3.30	250
51.0–57.5	B 1.30	110	141–160	B 3.70	300
57.6-65.9	B 1.45	125	161–193	B 4.15	350
66.0–73.1	B 1.67	125	194–209	B 4.85	400
73.2–81.5	B 1.88	150	210–232	B 5.50	400
84.6–92.3	B 2.10	175	233–248	B 6.25	400
92.4–104	B 2.40	200	249–266	B 6.90	400
105–114	B 2.65	225			

Size 6

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
133–148	B 1.30	272–308	B 2.65
149–174	B 1.45	309–348	B 3.00
175–195	B 1.67	349–397	B 3.30
196–219	B 1.88	398–429	B 3.70
220–239	B 2.10	430–495	B 4.15
240–271	B 2.40	496–520	B 4.85

Table 26 - Melting Alloy Overload Selection Tables for Part Winding Combination Starter Units

Size 1

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
1.12–1.27	B 0.81	8.24–9.41	B 6.90
1.28–1.37	B 0.92	9.42–10.43	B 7.70
1.38–1.55	B 1.30	10.44–11.07	B 8.20
1.56–1.71	B 1.16	11.08–12.35	B 9.10
1.72–1.95	B 1.30	12.36–14.05	B 10.2
1.96–2.19	B 1.45	14.06–15.85	B 11.5
2.20–2.43	B 1.67	15.86–17.23	B 12.8
2.44–2.67	B 1.88	17.24–18.35	B 14
2.68–3.07	B 2.10	18.36–20.1	B 15.5

Table 26 - Melting Alloy Overload Selection Tables for Part Winding Combination Starter Units (Continued)

Size 1

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
3.08–3.47	B 2.40	20.2–22.1	B 17.5
3.48–3.79	B 2.65	22.2–23.7	B 19.5
3.80–4.35	B 3.00	23.8–27.1	B 22
4.36–5.07	B 3.30	27.2–30.7	B 25
5.08–5.75	B 3.70	30.8–34.9	B 28
5.76–6.45	B 4.15	35.0–38.9	B 32
6.46–6.99	B 4.85	39.0–44.5	B 36
7.00–7.71	B 5.50	44.6–50.3	B 40
7.72–8.23	B 6.25	50.4–54.0	B 45

Size 2

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
7.88–8.91	B 6.90	24.8–27.9	B 22
8.92–9.95	B 7.70	28.0–31.7	B 25
9.96–10.57	B 8.20	31.8–35.9	B 28
10.58–11.95	B 9.10	36.0–39.9	B 32
11.96–13.79	B 10.2	40.0–45.7	B 36
13.80–15.85	B 11.5	45.8–50.9	B 40
15.86–17.43	B 12.8	51.0–61.7	B 45
17.44–18.55	B 14.0	61.8–65.1	B 50
18.56–20.5	B 15.5	65.2–69.9	B 56
20.6–22.9	B 17.5	70.0–79.5	B 62
23.0–24.7	B 19.5	79.6–89.4	B 70

Size 3

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
28.0–29.9	CC 20.9	73.8–79.7	CC 59.4
30.0–32.5	CC 22.8	79.8–84.7	CC 64.3
32.6–34.5	CC 24.6	84.8–91.5	CC 68.5
34.6–37.5	CC 26.3	91.6–98.5	CC 74.6
37.6–40.5	CC 28.8	98.6–105.7	CC 81.5
40.6–43.5	CC 31.0	105.8–113.7	CC 87.7
43.6–46.7	CC 33.3	113.8–122.5	CC 94.0
46.8–50.5	CC 36.4	122.6–132.3	CC 103
50.6–54.3	CC 39.6	132.4–142.5	CC 112
54.4–58.9	CC 42.7	142.6–153.5	CC 121
59.0–63.3	CC 46.6	153.6–165.9	CC 132
63.4–68.1	CC 50.1	166.0–180.0	CC 143
68.2–73.7	CC 54.5		

Size 4

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
105–112	CC 74.6	170–181	CC 132
113–122	CC 81.5	182–195	CC 143
123–131	CC 87.7	196–209	CC 156
132–142	CC 94.0	210–227	CC 167
143–153	CC 103	228–247	CC 180
154–157	CC 112	248–266	CC 196
158–169	CC 121		

Size 5 without CT Type Overloads

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
176–190	DD 112	342–361	DD 220
191–203	DD 121	362–395	DD 240
204–223	DD 128	396–409	DD 250
224–239	DD 140	410–427	DD 265
240–253	DD 150	428–475	DD 289
254–299	DD 160	476–487	DD 300
300–341	DD 185	488–532	DD 320

Size 5 with CT Type Overloads and Circuit Breakers

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
81.6–91.1	B 1.03	230–257	B 3.00
91.2–101	B 1.16	258-281	B 3.30
102–115	B 1.30	282–321	B 3.70
116–131	B 1.45	322–387	B 4.15
132–146	B 1.67	388–419	B 4.35
147–163	B 1.84	420–465	B 5.60
164–184	B 2.10	466–497	B 6.25
185–209	B 2.40	496–532	B 6.90
210–229	B 2.65		

Size 5 with CT Type Overloads and Fusible Switch Disconnects

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
81.6–91.1	B 1.03	230–257	B 3.00
91.2–101	B 1.16	258–281	B 3.30
102–115	B 1.30	282–321	B 3.70
116–131	B 1.45	322–387	B 4.15
132–146	B 1.67	388–419	B 4.35
147–163	B 1.88	420–465	B 5.60
164–184	B 2.10	466–497	B 6.25

Size 5 with CT Type Overloads and Fusible Switch Disconnects

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
185–209	B 2.40	498–532	B 6.90
210–229	B 2.65		

Table 27 - Ambient-compensated Bimetallic Overload Selection Tables for Combination Starter Units

Size 1

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
0.57–0.60	AR 1.05	3.46–3.81	AR 5.8
0.61–0.66	AR 1.15	3.82–4.20	AR 6.4
0.67–0.73	AR 1.26	4.21–4.65	AR 7.0
0.74–0.81	AR 1.39	4.66–5.29	AR 7.7
0.82–0.90	AR 1.53	5.30–5.84	AR 8.5
0.91–1.05	AR 1.68	5.85–6.27	AR 9.3
1.06–1.15	AR 1.85	6.28–6.97	AR 10.2
1.16–1.25	AR 2.04	6.98–7.59	AR 11.2
1.26–1.35	AR 2.24	7.60–7.89	AR 12.4
1.36–1.47	AR 2.46	7.90–8.95	AR 13.6
1.48–1.58	AR 2.71	8.96–10.3	AR 15.4
1.59–1.74	AR 2.98	10.4–11.7	AR 17.6
1.75–1.94	AR 3.28	11.8–13.3	AR 20.5
1.95–2.20	AR 3.62	13.4–15.2	AR 23
2.21–2.47	AR 3.98	15.3–17.2	AR 27
2.48–2.76	AR 4.37	17.3–19.7	AR 30
2.77–3.07	AR 4.80	19.8–22.4	AR 35
3.08–3.45	AR 5.3	22.5–26.0	AR 40

Size 2

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
4.24–4.62	AR 8.5	16.5–18.9	AR 35
4.63–5.05	AR 9.3	19.0–21.6	AR 40
5.06–5.54	AR 10.2	21.7–23.3	AR 44
5.55–6.13	AR 11.2	23.4–24.9	AR 47
6.14–6.44	AR 12.4	25.0–26.9	AR 51
6.45–7.48	AR 13.6	27.0–29.1	AR 55
7.49–8.55	AR 15.4	29.2–31.3	AR 60
8.56–9.74	AR 17.6	31.4–33.5	AR 66
9.75–11.1	AR 20.5	33.6–36.9	AR 72
11.2–12.7	AR 23	37.0–39.1	AR 79
12.8–14.4	AR 27	39.2–40.9	AR 86
14.5–16.4	AR 30	41.0–45.0	AR 94

Size 3

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
27.1–30.0	E 67	47.0–51.5	E 74
30.1–33.2	E 69	51.6–57.0	E 76
33.3–35.7	E 70	57.1–62.8	E 77
35.8–39.4	E 71	62.9–69.1	E 78
39.5–43.4	E 72	69.2–75.0	E 79
43.5–46.9	E 73	75.1–83.3	E 80

Size 4

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
50–55.9	E 88	82–86.9	E 96
56–60.9	E 89	87–92.9	E 97
61–65.9	E 91	93–97.9	E 98
66–69.9	E 92	98–107.9	E 99
70–75.9	E 93	108–113.9	E 101
76–81.9	E 94	114–125.9	E 102

Size 5

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
105–116	AR 3.28	166–184	AR 4.80
117–132	AR 3.62	185–207	AR 5.3
133–148	AR 3.98	208–229	AR 5.8
149–165	AR 4.37	230–266	AR 6.4

Size 6

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
146–169	AR 1.68	280–311	AR 3.28
170–185	AR 1.85	312–353	AR 3.62
186–201	AR 2.04	354–396	AR 3.98
202–217	AR 2.24	397–442	AR 4.37
218–236	AR 2.46	443–492	AR 4.80
237–253	AR 2.71	493–520	AR 5.3
254–279	AR 2.98		

Table 28 - Ambient-compensated Bimetallic Overload Selection Tables for Part Winding Combination Starter Units

Size 1

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
1.14–1.21	AR 1.05	6.92–7.63	AR 5.8
1.22–1.33	AR 1.15	7.64–8.41	AR 6.4
1.34–1.47	AR 1.26	8.42–9.31	AR 7.0
1.48–1.63	AR 1.39	9.32–10.59	AR 7.7
1.64–1.81	AR 1.53	10.60–11.69	AR 8.5
1.82–2.11	AR 1.68	11.70–12.55	AR 9.3
2.12–2.31	AR 1.85	12.56–13.95	AR 10.2
2.32–2.51	AR 2.04	13.96–15.19	AR 11.2
2.52–2.71	AR 2.24	15.20–15.79	AR 12.4
2.72–2.95	AR 2.46	15.80–17.91	AR 13.6
2.96–3.17	AR 2.71	17.92–20.7	AR 15.4
3.18–3.49	AR 2.98	20.8–23.5	AR 17.6
3.50–3.89	AR 3.28	23.6–26.7	AR 20.5
3.90–4.41	AR 3.62	26.8–30.5	AR 23
4.42–4.95	AR 3.98	30.6–34.5	AR 27
4.96–5.53	AR 4.37	34.6–39.5	AR 30
5.54–6.15	AR 4.80	39.6–44.9	AR 35
6.16–6.91	AR 5.30	45.0–52.0	AR 40

Size 2

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
8.48–9.25	AR 8.5	33.0–37.9	AR 35
9.26–10.11	AR 9.3	38.0–43.3	AR 40
10.12–11.09	AR 10.2	43.4–46.7	AR 44
11.10–12.27	AR 11.2	46.8–49.9	AR 47
12.28–12.89	AR 12.4	50.0–53.9	AR 51
12.90–14.97	AR 13.6	54.0–58.3	AR 55
14.98–17.11	AR 15.4	58.4–62.7	AR 60
17.12–19.49	AR 17.6	62.8–67.1	AR 66
19.50–22.3	AR 20.5	67.2–73.8	AR 72
22.4–25.5	AR 23	74.0–78.3	AR 79
25.6–28.9	AR 27	78.4–81.9	AR 86
29.0–32.9	AR 30	82.0–90.0	AR 94

Size 3

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
54.2–60.1	E 67	94.0–103.1	E 74
60.2–66.5	E 69	103.2–114.1	E 76
66.6–71.5	E 70	114.2–125.7	E 77
71.6–78.9	E 71	125.8–138.3	E 78
79.0–86.9	E 72	138.4–150.1	E 79
87.0–93.9	E 73	150.2–166.6	E 80

Size 4

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
100–111.9	E 88	164–173.9	E 96
112–121.9	E 89	174–185.9	E 97
122–131.9	E 91	186–195.9	E 98
132–139.9	E 92	196–215.9	E 99
140–151.9	E 93	216–227.9	E 101
152–163.9	E 94	228–251.9	E 102

Size 5

Motor Full-Load Current (A)	Thermal Unit Number	Motor Full-Load Current (A)	Thermal Unit Number
210–233	AR 3.28	332–369	AR 4.8
234–265	AR 3.62	370–415	AR 5.3
266–297	AR 3.98	416–459	AR 5.8
298–331	AR 4.37	460–532	AR 6.4

Circuit Breaker and Fusible Switch Replacement

NOTE: On Closed Door Racking (CDR) Units, Schneider Electric does not recommend field replacement of the circuit breaker by the customer due to the complexity of the CDR unit construction. Contact Schneider Electric Services to replace the circuit breaker in a CDR unit.

For 100/200 A fusible switches, Schneider Electric recommends replacing the entire disconnect assembly. The disconnect assembly includes the operator mechanism and the appropriate switch.

Replacing the entire disconnect assembly requires the removal of three screws (two from the left side of the assembly and one inside the back of the assembly). This procedure is much simpler and quicker than replacing an individual circuit breaker or switch.

See Schneider Electric bulletin 80439-666-01 Disconnect Assembly Replacement Instructions for disconnect assembly installation instructions.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

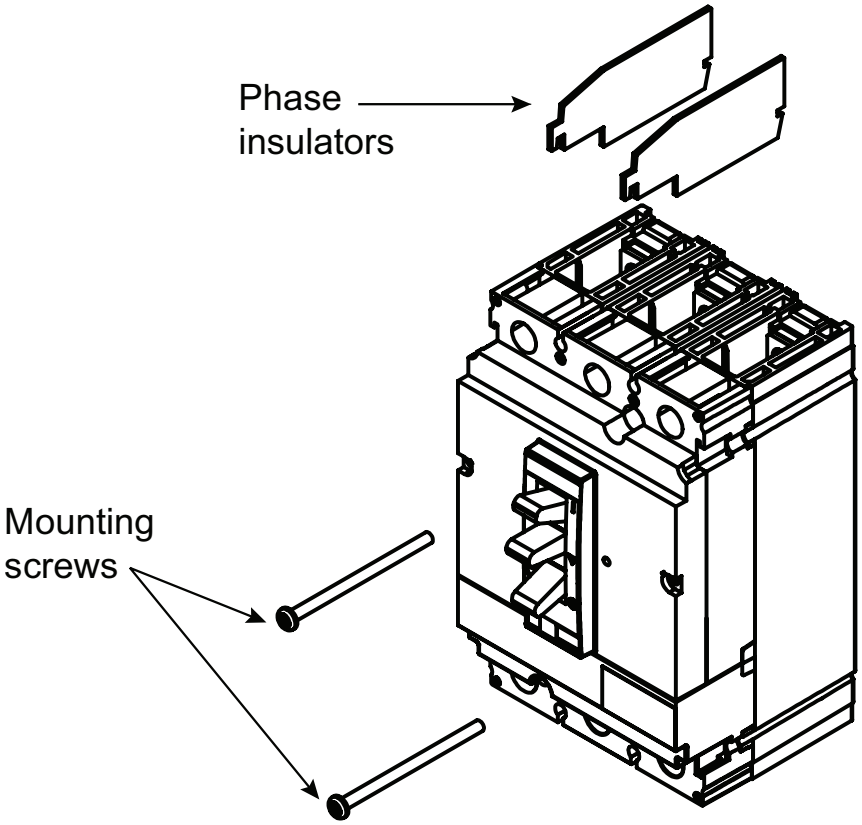
Failure to follow these instructions will result in death or serious injury.

For PowerPacT H-, J-, and B-frame and TeSys BV4 circuit breakers, order a replacement circuit breaker only. The following instructions use the PowerPacT H-Frame circuit breaker for illustration. Other breaker frames noted have similar replacement procedures. To replace the circuit breaker:

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm power is off.
2. Remove the control unit from the MCC. See Removing the Control Unit, page 122.
3. Open the line insulator tabs.
4. Loosen the set screws in the line and load side lugs. Detach the line and load-side wires.

5. Remove circuit breaker mounting screws (see Circuit Breaker Replacement, page 206).

Figure 172 - Circuit Breaker Replacement



6. Remove the circuit breaker from the unit.
7. Remove the phase insulators from the breaker (see Circuit Breaker Replacement, page 206).

   NOTE: Step 7 does not apply to PowerPacT B-frame and TeSys BV4 circuit breakers.
8. Unpack the new circuit breaker.
9. Reinstall the circuit breaker phase insulators in the slots provided on the circuit breaker.

   NOTE: Step 9 does not apply to PowerPacT B-frame and TeSys BV4 circuit breakers.
10. Place the circuit breaker in the mounting pan, making sure that the line insulator is in position under the circuit breaker. Secure the circuit breaker with the two mounting screws provided.
11. Insert the line and load wires into the circuit breaker lugs. Tighten the lug set screws to the torque value indicated on the circuit breaker.
12. Close the line insulator tabs.
13. Reinstall the control unit in the MCC. Close and fasten the door.

Always use replacement devices of the same type and rating as the device being removed. Using a different type of disconnect or one with a different rating may alter the short circuit ratings of the motor control center.

Contact the MCC Technical Assistance Group (TAG) before installing a circuit breaker with a different rating. See Appendix E–Technical Support, page 236 for the MCC TAG technical support number.

Installation and Maintenance Log

Table 29 - Installation and Maintenance Log

Date	Job Description	Name/Initials

Appendix A–Removal and Installation of Horizontal Bus Barrier Panels

This appendix contains installation and removal instructions for the horizontal bus barrier panels in 15 in. (381 mm) and 20 in. (508 mm) deep Model 6 Motor Control Centers manufactured by Schneider Electric.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

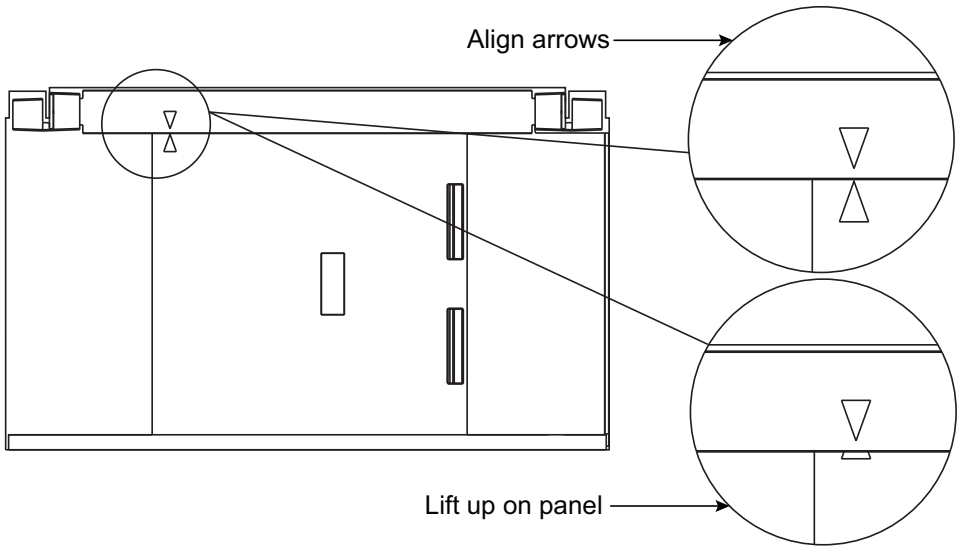
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Removal

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. With one hand, slide the left panel to the right until it unsnaps from the right panel.
3. Align the arrows on the left panel and top track as shown in Aligning the Arrows on the Panels, page 208. Lift the panel out of the bottom track and remove the panel.

Figure 173 - Aligning the Arrows on the Panels

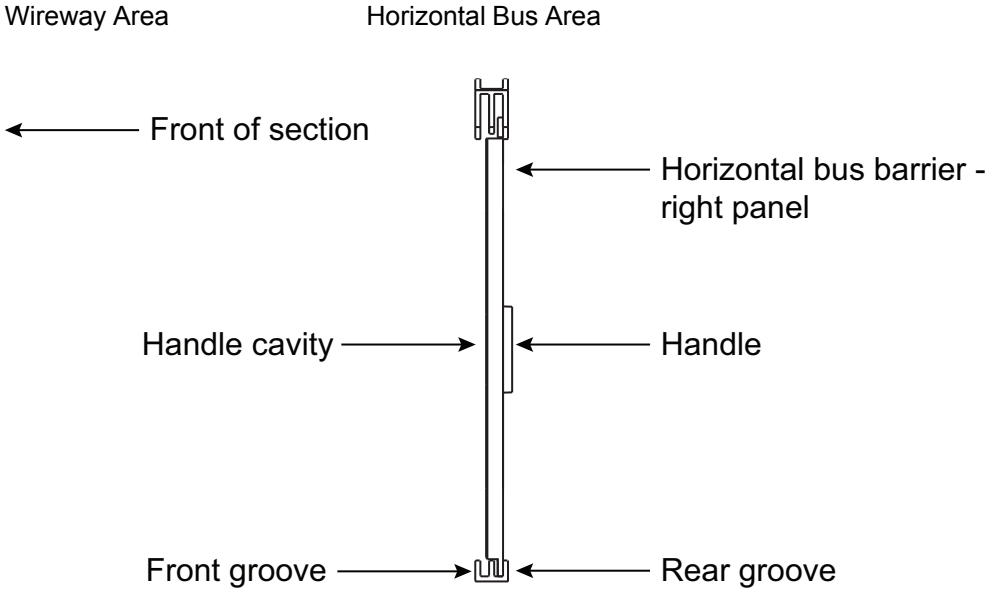


4. Align the arrows on the right panel and top track as shown in Aligning the Arrows on the Panels, page 208. Lift the panel out of the bottom track and remove the panel.

Installation

NOTE: The horizontal bus barrier contains two identical panels with arrows at the top. The “handle” on the left panel faces the front of the MCC section. The “handle cavity” on the right panel faces the front of the MCC section (see Right Panel (Side View), page 209).

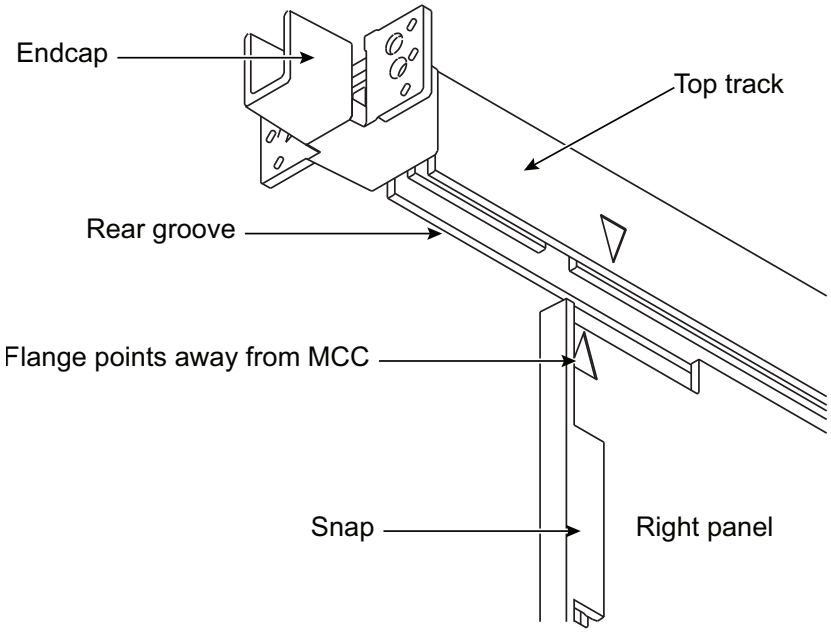
Figure 174 - Right Panel (Side View)



1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.

2. Align the arrows on the right panel and top track as shown in Installing the Right Panel into the Rear Groove, page 210.

Figure 175 - Installing the Right Panel into the Rear Groove



3. Lift the panel up into the rear groove of the top track.
4. Lower the panel into the rear groove of the bottom track.
5. Slide the panel to the far right.
6. Align the arrows on the left panel and top track.
7. Repeat steps 3 and 4 using the left panel and front groove.
8. Slide the panel to the left until it locks (snaps) into place.
9. Verify that the barrier is completely closed by making sure that the wiring compartment is isolated from the bus compartment.

Fixed Barrier

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Removal

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. A captive rivet at the bottom of each bus barrier panel secures the panels to mounting brackets on the MCC (see Fixed Horizontal Bus Barrier, page 211, Horizontal Bus Barrier Installation and Removal, page 211 and Barrier Installed and Removed, page 212).

Figure 176 - Fixed Horizontal Bus Barrier

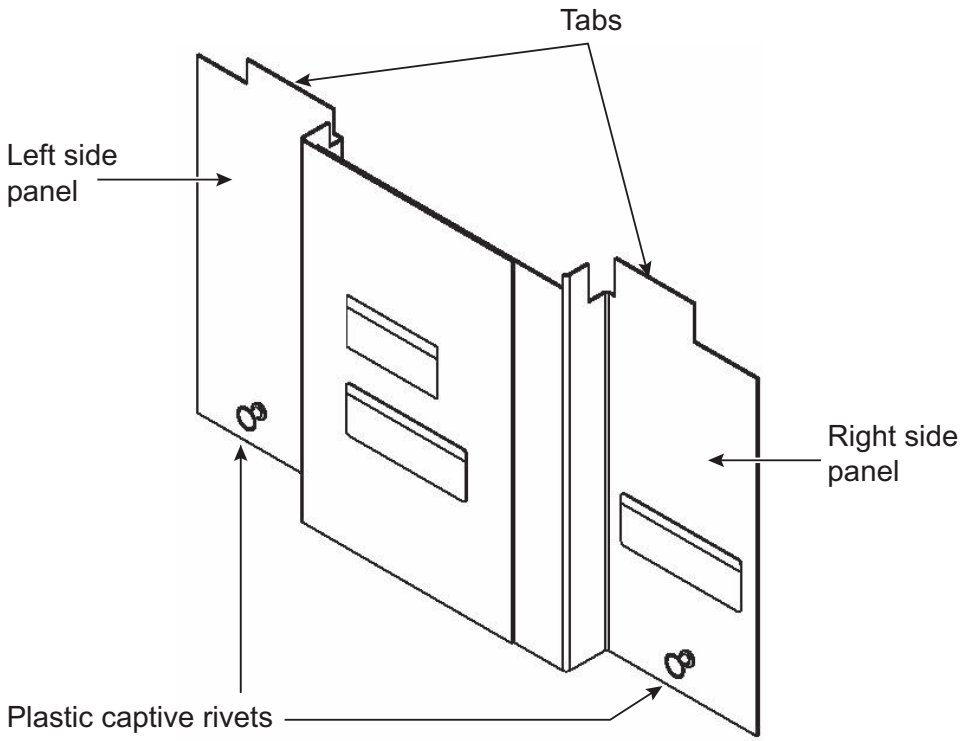
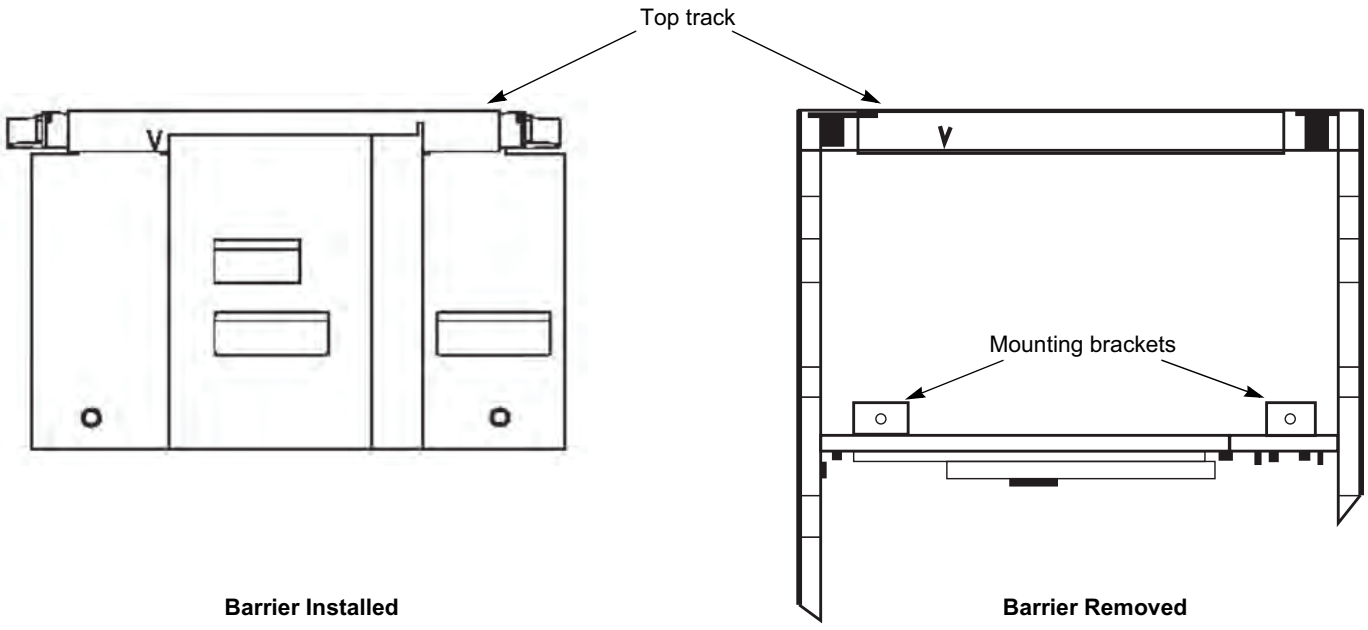


Figure 177 - Horizontal Bus Barrier Installation and Removal



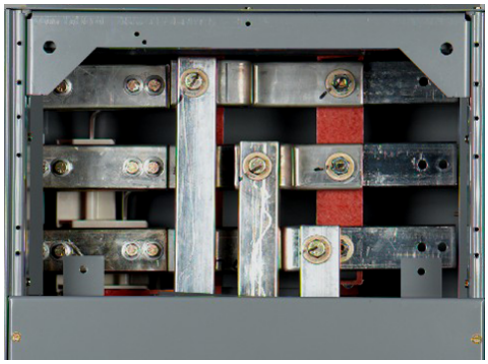
3. Firmly grasp the head of the left side rivet and pull until the rivet releases from the mounting bracket.
4. Pull out on the bottom of the left side panel until the tab at the top of the panel is clear of the top track (see Horizontal Bus Barrier Installation and Removal, page 211).
5. Remove the panel from the MCC.
6. Repeat steps 3–5 for the right-side panel.

Installation

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Insert the tab on the right side panel into the top track on the right side of the MCC and set it into place (see Fixed Horizontal Bus Barrier, page 211 and Horizontal Bus Barrier Installation and Removal).
3. Secure the right-side panel by pushing the rivet firmly into the hole of the mounting bracket.
4. Repeat steps 2 and 3 for the left side panel.

Figure 178 - Barrier Installed and Removed

Installed



Removed

Appendix B–Non-Conductive Horizontal Bus Barrier Retrofit Kit

This appendix contains installation instructions for non-conductive horizontal bus barrier retrofit kits manufactured by Schneider Electric. These kits are for use in 15 in. (381 mm) and 20 in. (508 mm) deep Models 5 and 6 Motor Control Centers.

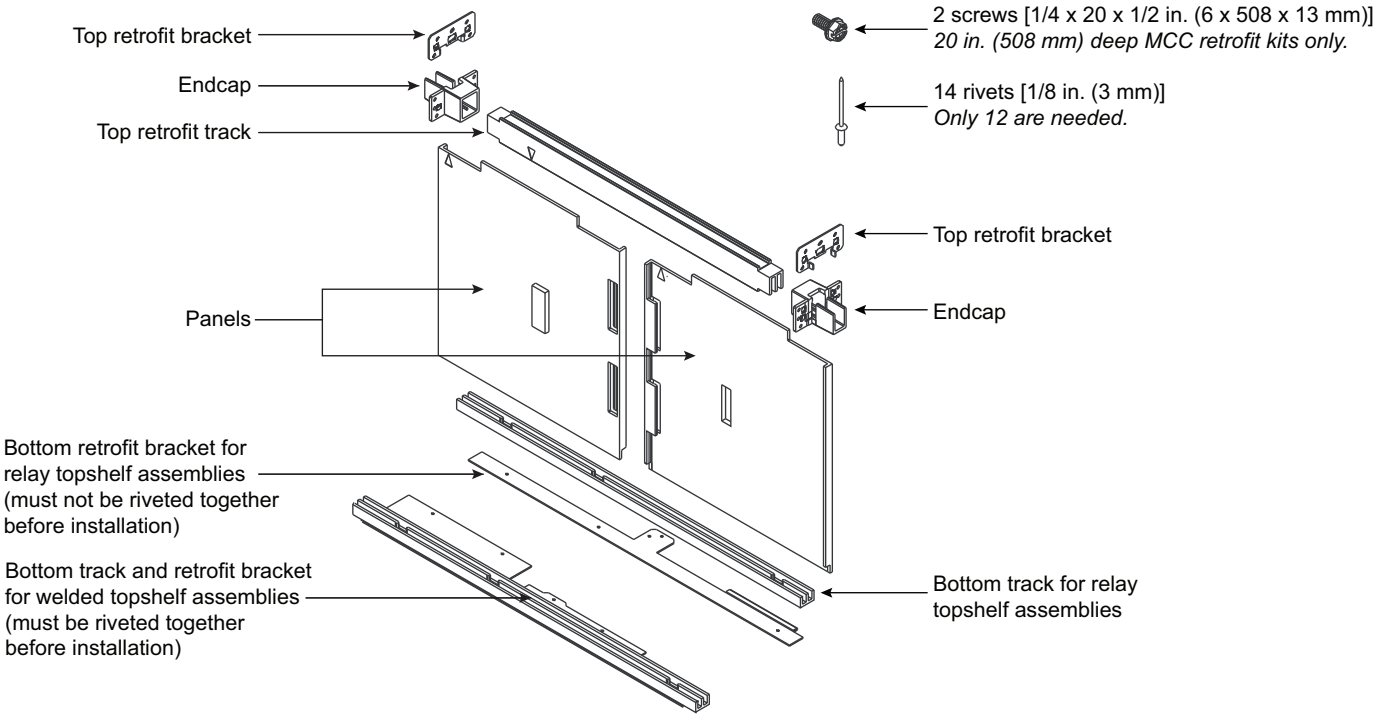
⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- After removing rivets and screws, verify that the compartment is free of loose particles.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Figure 179 - Retrofit Kit Components



Remove Existing Components

Follow these instructions to remove the existing top horizontal wireway cover, bus barriers, units below the topshelf, and brackets (15 in. (381 mm) deep MCC):

Horizontal Wireway Cover

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm power is off.
2. Remove the screws that secure the top horizontal wireway cover to the structure, and then remove the cover.

Horizontal Bus Barriers

1. Remove the screw located at the top of the two-piece bus barriers.
2. Remove the screw located at the bottom of the two-piece bus barriers.
3. Pull the two metal barriers out of the MCC and discard them.

Units Below the Topshelf

If applicable, remove the plug-in unit below the topshelf (see Remove Existing Brackets on the 15 in. (381 mm) Deep MCC, page 215).

Refer to either the Model 5 MCC Installation and Maintenance Manual (8998IM9101) or Removing the Control Unit, page 122for unit removal instructions. If necessary, contact your local Schneider Electric field sales representative to obtain this bulletin.

Existing Brackets: 15 in. (381 mm) Deep MCC Only

If the MCC is 15 in. (381 mm) deep, use a 1/8 in. (3 mm) drill bit to remove the rivets that hold the right and left horizontal bus barrier brackets in place (see Remove Existing Brackets on the 15 in. (381 mm) Deep MCC, page 215). Discard the brackets after removal.

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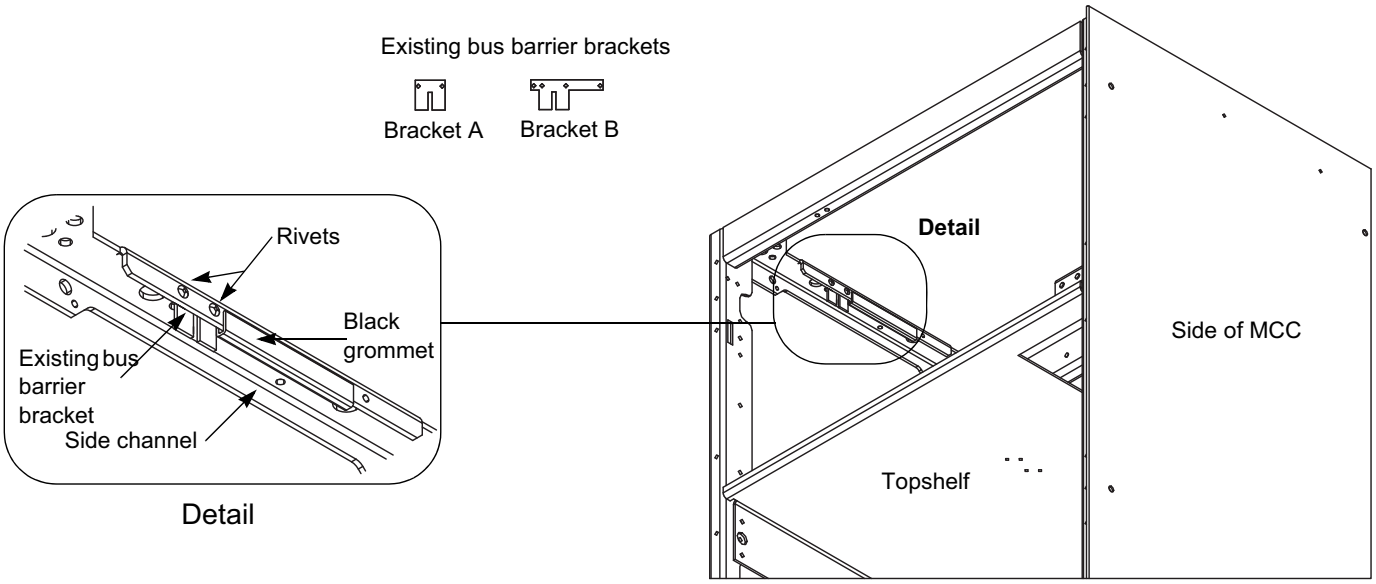
- Drilling increases the chance of loose particles in the MCC.
- Confirm that the compartment is free of loose particles before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Figure 180 - Remove Existing Brackets on the 15 in. (381 mm) Deep MCC



NOTE: Discard all retrofit brackets if the existing bus barrier bracket “B” (see Remove Existing Brackets on the 15 in. (381 mm) Deep MCC, page 215) is present on the 15 in. (381 mm) deep MCC. All holes are already present for direct mounting of the horizontal bus barrier.

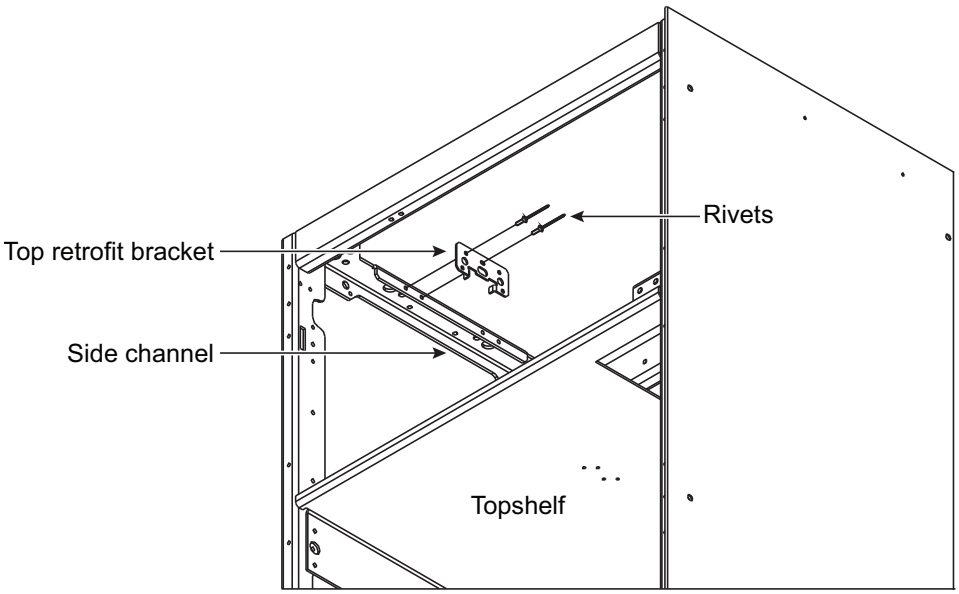
Install the Retrofit Kit

Retrofit Brackets and Endcaps

Follow the applicable instructions below to install retrofit brackets into 15 in. (381 mm) or 20 in. (508 mm) deep MCCs. The top retrofit bracket must sit flush against the side channel. Slide the black grommets toward the back of the MCC.

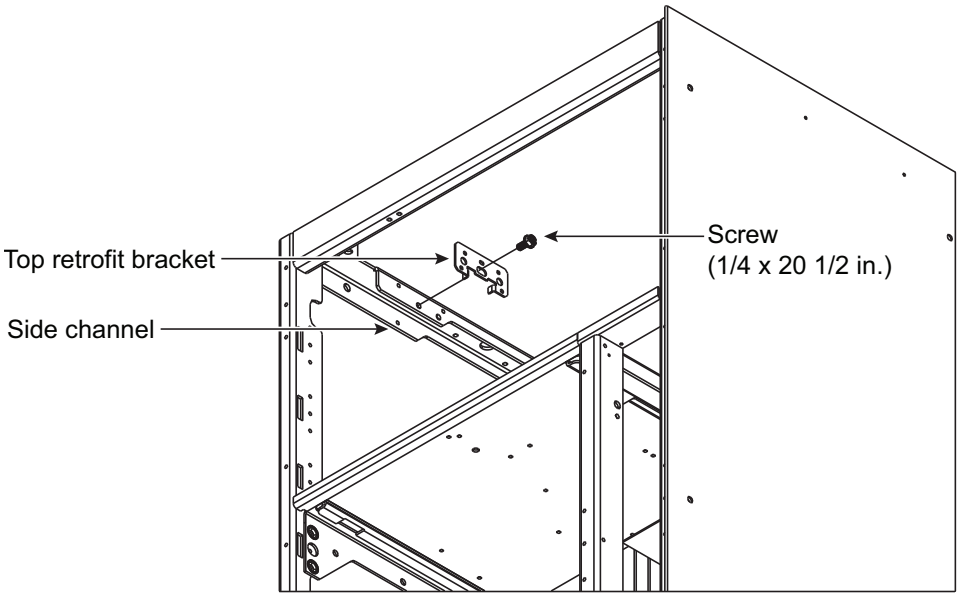
- 15 in. (381 mm) deep MCC: Use a rivet gun and two rivets in the retrofit kit to attach the retrofit brackets to the left and right-side channels (see 15 in. (381 mm) Deep MCC Retrofit Bracket, page 216).

Figure 181 - 15 in. (381 mm) Deep MCC Retrofit Bracket



- 20 in. (508 mm) deep MCC: Use the screws provided in the retrofit kit to attach the retrofit brackets to the left and right-side channels. Align the holes in the bracket and side channel as shown in 20 in. (508 mm) Deep MCC Retrofit Bracket, page 216.

Figure 182 - 20 in. (508 mm) Deep MCC Retrofit Bracket

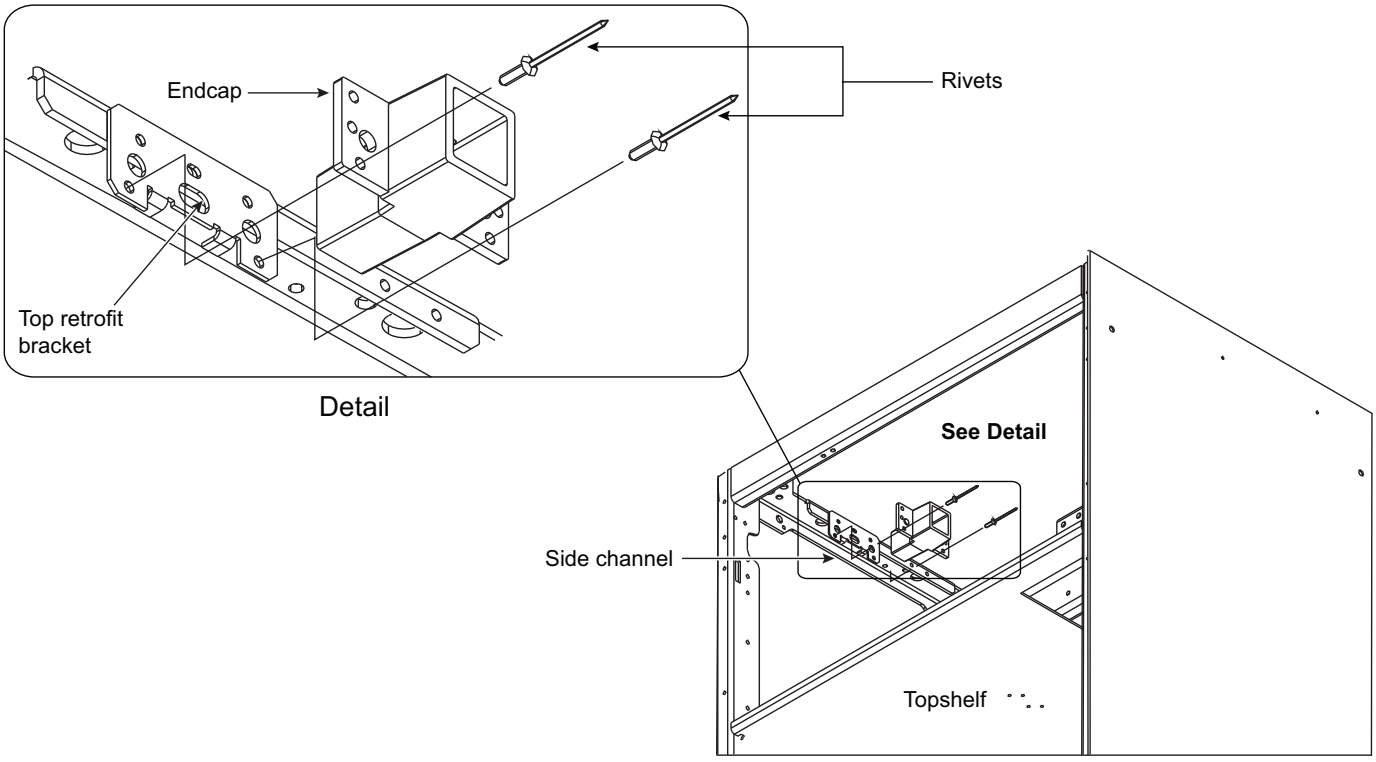


NOTE:

- Even if the holes are present for a direct mounting of the endcap to the side channels, use the top retrofit bracket on 20 in. (508 mm) deep MCCs.
- Before tightening the screws, push the bracket away from you so that the rear bracket hole is properly aligned with the side channel hole.

Follow the steps below to install the endcaps (see Endcap Placement, page 217).

Figure 183 - Endcap Placement

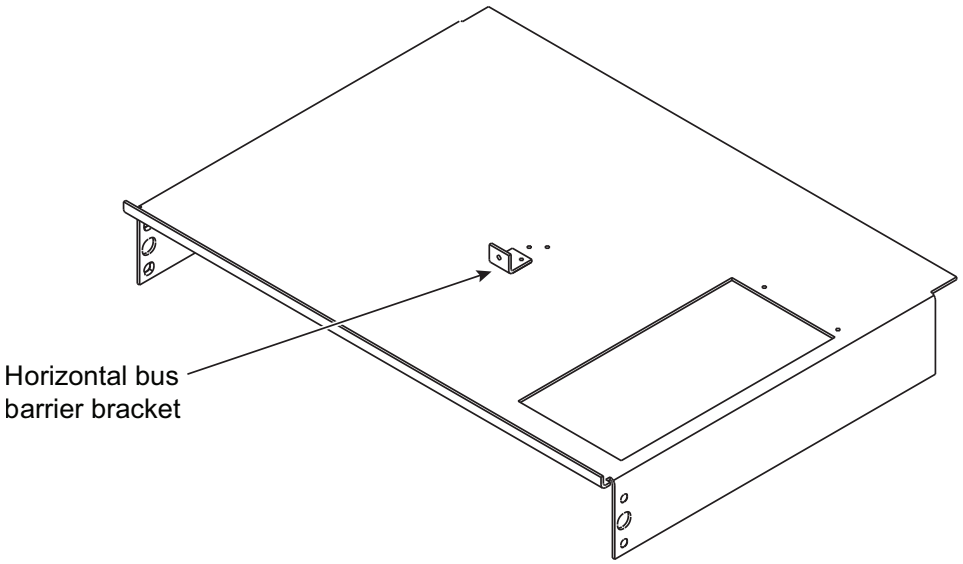


1. Rivet one endcap into place on the retrofit bracket or the side channel, either to the right or left side of the structure.
2. Insert one end of the top track into the attached endcap.
3. Place the other endcap on the opposite end of the top track and slide the top track into place.
4. Rivet the second endcap to the retrofit bracket.

Bottom Track and Bottom Retrofit Bracket

1. Using a 1/8 in. (3 mm) drill bit, drill out both rivets on the horizontal bus barrier bracket (the L-shaped bracket located on the topshelf (see Horizontal Bus Barrier (L-shaped) Bracket, page 218). Remove the bracket and discard it.

Figure 184 - Horizontal Bus Barrier (L-shaped) Bracket

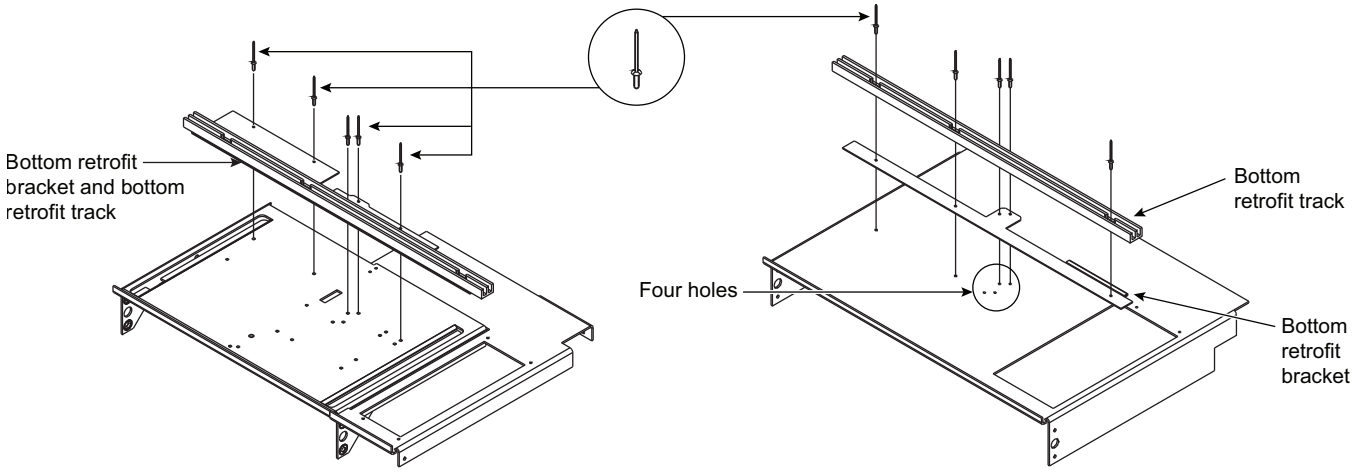


2. Install the bottom retrofit track (see Welded and Relay Topshelf Assemblies, page 219).
   - **Welded topshelf**: Align the holes of the shelf with those on the bottom track (see Welded and Relay Topshelf Assemblies, page 219). Rivet the track and the retrofit bracket to the topshelf.

     NOTE: If the bus contains four laminations, access the rivet holes from underneath the topshelf.
   - **Relay topshelf**: Align the two holes on the relay shelf with the bottom retrofit bracket holes (see Welded and Relay Topshelf Assemblies, page 219). Mark the places where you will drill other holes to secure the bottom track to the shelf. Drill the holes using a drill bit ranging from 0.136.–0.147 in. (3–4 mm) in diameter. Rivet the track and retrofit bracket to the topshelf.

     NOTE: The bottom retrofit track can be riveted directly onto the relay topshelf only if the relay assembly topshelf has two holes instead of four.

Figure 185 - Welded and Relay Topshelf Assemblies

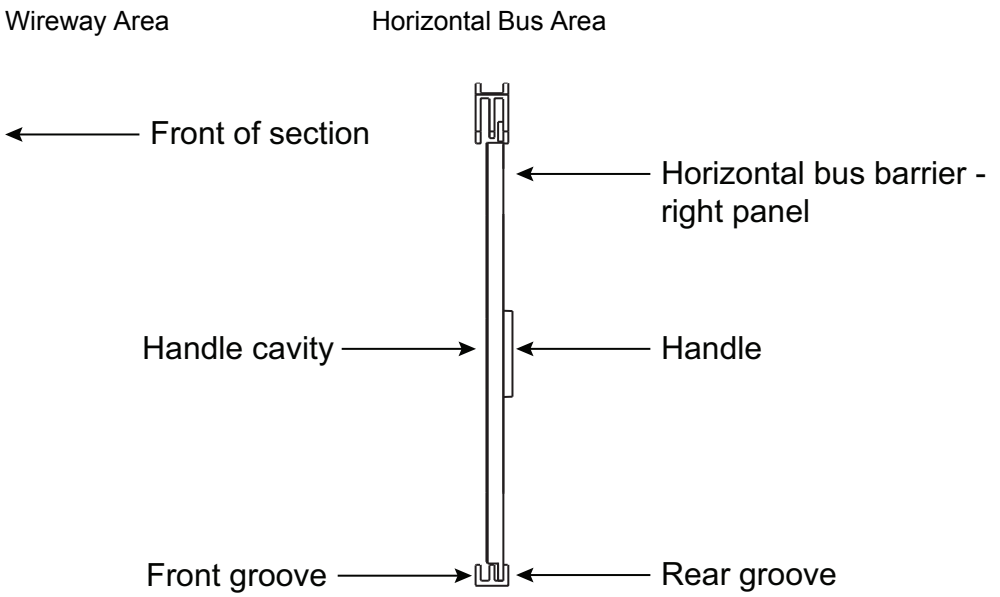


Left and Right Panels

Installation

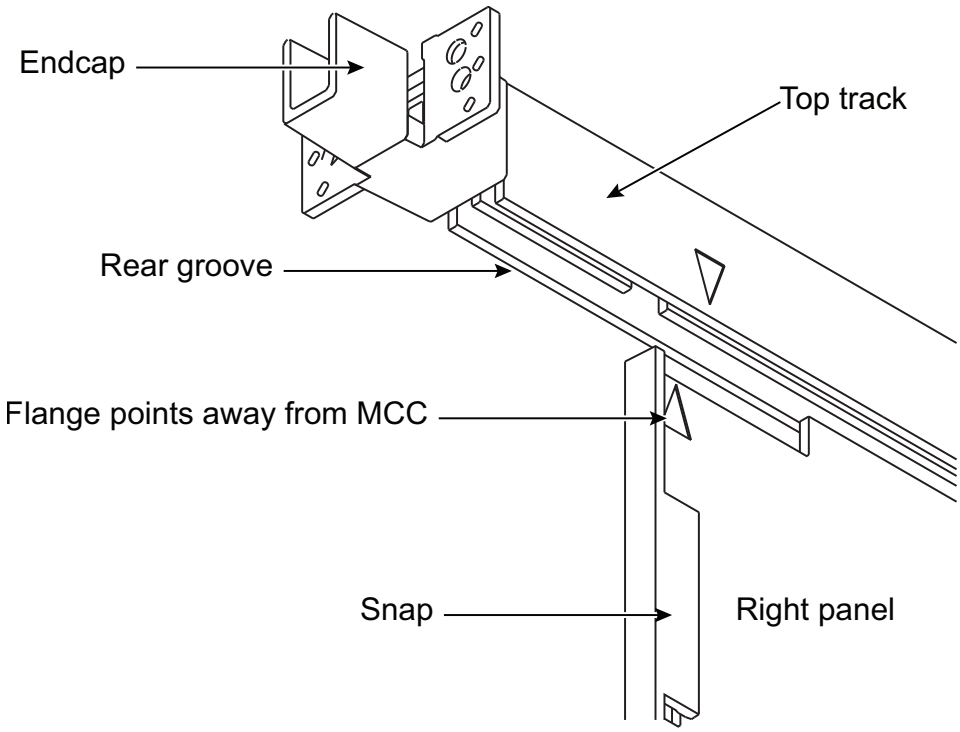
NOTE: The horizontal bus barrier contains two identical panels with arrows at the top. The “handle” on the left panel faces the front of the MCC section. The “handle cavity” on the right panel faces the front of the MCC section (see Right Panel (Side View), page 220).

Figure 186 - Right Panel (Side View)



1. Align the arrows on the right panel and top track as shown in Installing the Right Panel into the Rear Groove, page 220.

Figure 187 - Installing the Right Panel into the Rear Groove



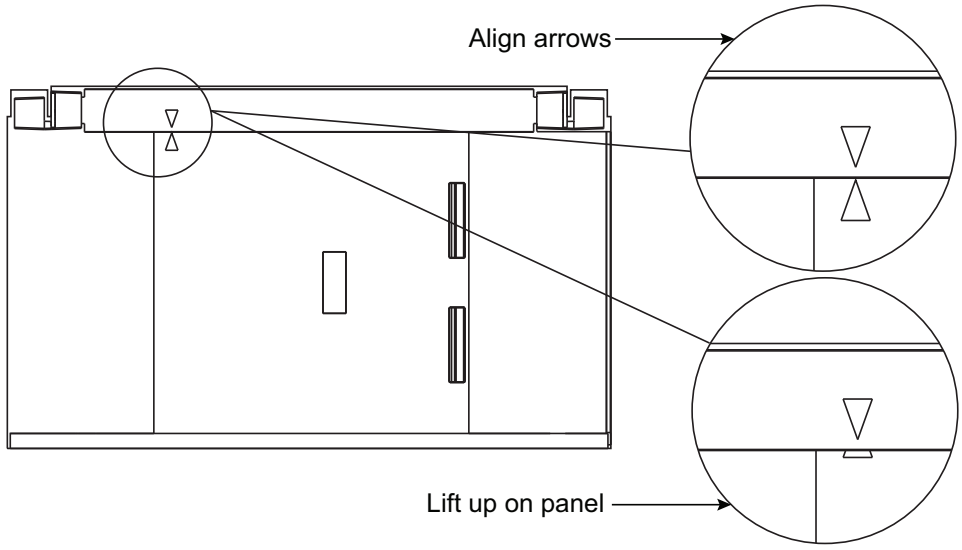
2. Lift the panel up into the rear groove of the top track.
3. Lower the panel into the rear groove of the bottom track.
4. Slide the panel to the far right.
5. Align the arrows on the left panel and top track.
6. Repeat steps 2 and 3 using the left panel and front groove.
7. Slide the panel to the left until it locks (snaps) into place.

8. Verify that the barrier is completely closed by making sure that the wiring compartment is isolated from the bus compartment.

Removal (when required)

1. With one hand, slide the left panel to the right until it unsnaps from the right panel.
2. Align the arrows on the left panel and top track as shown in Aligning the Arrows on the Panels, page 221. Lift the panel out of the bottom track and remove the panel.

Figure 188 - Aligning the Arrows on the Panels



3. Align the arrows on the right panel and top track as shown in Installing the Right Panel into the Rear Groove, page 220. Lift the panel out of the bottom track and remove the panel.

Replace Components

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

To replace the components of the MCC:

1. Install the unit you removed in the section, Units Below the Topshelf, page 214. Refer to either the Model 5 MCC Installation and Maintenance Manual (8998IM9101) or Removing the Control Unit, page 122 for instructions on installing units in an MCC.
2. Replace the top horizontal wireway cover.
3. Replace or close all other covers or doors before turning on the power to the MCC.

Appendix C–Automatic Vertical Bus Shutter

Introduction

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

The automatic vertical bus shutter is an optional feature for the Model 6 motor control center (MCC) vertical bus. The shutters are pre-assembled and installed as part of the MCC line-up.

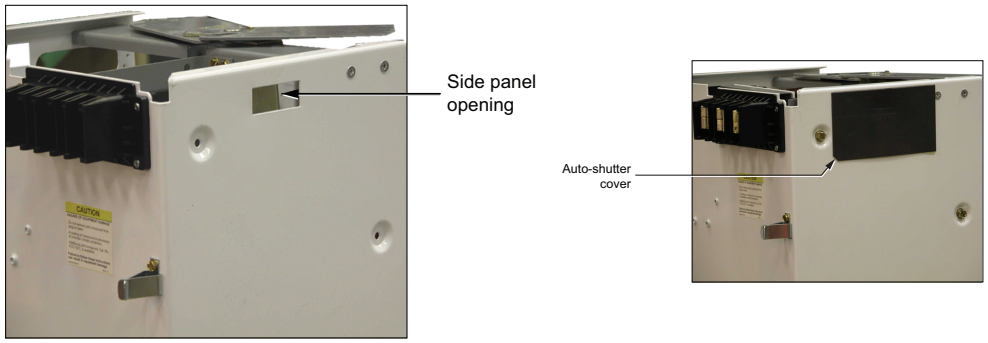
Automatic bus shutters open and close the vertical bus connection point when units are inserted and removed from the structure. The shutters can be located throughout the MCC and placed in 6 in. (152 mm) increments. They mount to the left edge of each midshelf.

The automatic shutter assembly requires an updated midshelf to allow clearance for the shutter above the plug-in unit.

NOTE:

- MCC structures shipped before January 2003 cannot use the top 3 in. (76 mm) space with the automatic vertical bus shutter option. A 3 in. (76 mm) cover plate is required to cover the opening.
- Compac 6 control units shipped before January 2003 cannot be used with the automatic vertical bus shutter option.
- Variable frequency drive and soft starter units 45 in. (1143 mm) or taller that shipped before July 2003 with a side-panel opening, as shown in Location of Auto-Shutter Cover for Side-Panel Opening, page 224, View A, require an auto-shutter cover (Square D Seneca PN 80451765-01). The auto-shutter cover aligns with the back edge of the center-most flat head screw, as shown in Location of Auto-Shutter Cover for Side-Panel Opening, page 224, View B.

Figure 189 - Location of Auto-Shutter Cover for Side-Panel Opening

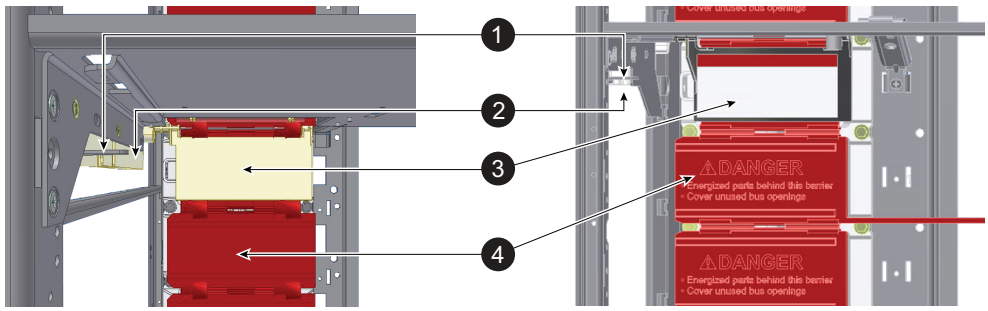


View A View B

There are four main components of the automatic vertical bus shutter (see Figure Automatic Vertical Bus Shutter in an MCC (front view), page 224):

1. **Operator Mechanism**: Operates the vertical bus shutter, allowing the plug-in unit to engage the vertical bus.
2. **Mechanism Housing** : Protects the mechanism from incidental foreign material that could obstruct the intended operation.
3. **Vertical Bus Door and Clip**: Provides a barrier against incidental contact with the MCC vertical bus.
4. **Manual Shutter**: Helps prevent access to the unused vertical bus openings. The manual shutter is held in place by a built-in locking feature that holds the shutter in the closed position during shipping, set-up, and daily operations.

Figure 190 - Automatic Vertical Bus Shutter in an MCC (front view)



Style 1 Style 2

Compare the field-installed midshelf to the two designs above. If the field-installed midshelf matches Style 1, follow the installation and removal instructions starting below. If the field-installed midshelf matches Style 2, follow the instructions starting in Installation-style 2, page 229.

NOTE: Arc-rated MCCs have a midshelf specifically designed for arc-rated MCCs (Schneider Electric PN. 80466-007-50; see Midshelf for Arc-Rated MCCs, page 183). This midshelf includes arc pressure relief flaps and must be used when installing arc-rated MCC units to maintain the arc containment ratings.

Installation-style 1

Follow these instructions to install the automatic vertical bus shutter assembly to an existing Style 1 midshelf. See Shelf Installation—Style 1, page 226 and Automatic Vertical Bus Shutter Installation—Style 1, page 226.

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HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.

2. Position the midshelf (see Shelf Installation—Style 1, page 226, A) in the appropriate area of the structure.

Figure 191 - Shelf Installation—Style 1

Description	Quantity	Item
Midshelf	1(19)	A
Flat head screws	2	D
Unit door	1	F
Round head Torx® screws	4(20)	H
Quarter turn fastener receptacle	2(20)	J

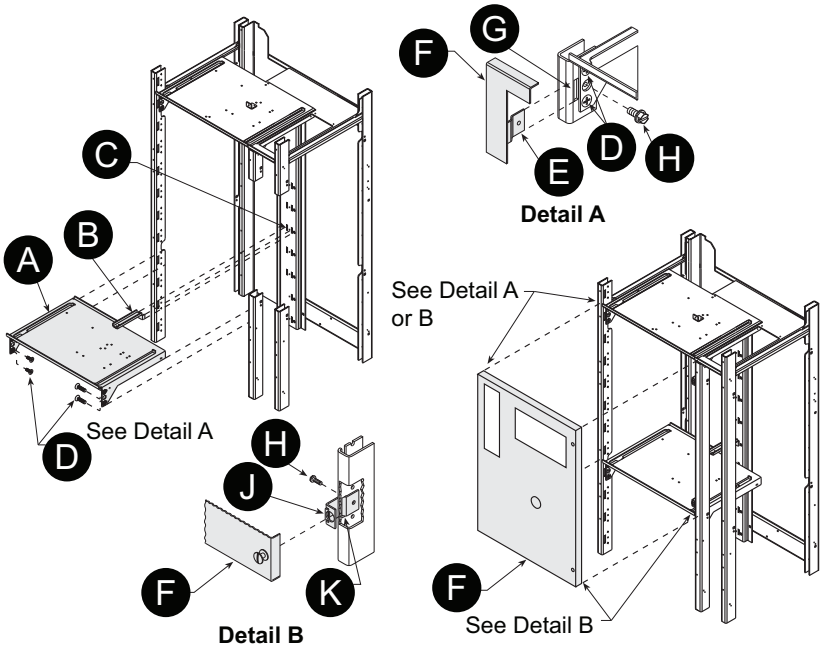
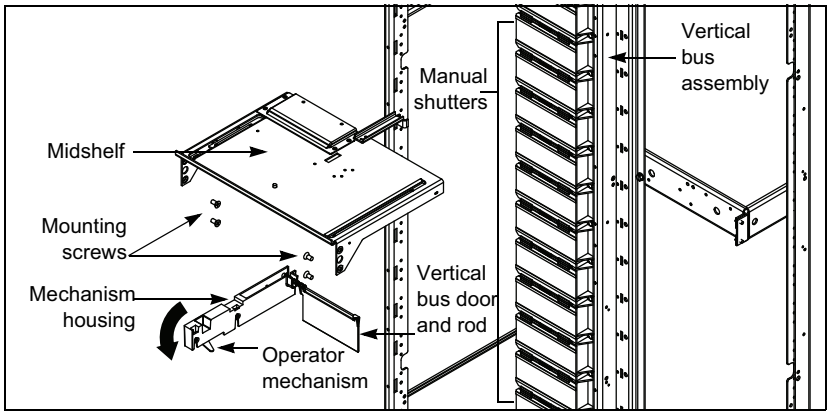


Figure 192 - Automatic Vertical Bus Shutter Installation—Style 1



3. Place the mounting foot (see Shelf Installation—Style 1, page 226, B) of the shelf into the mounting pan slots (see Shelf Installation—Style 1, page 226, C). Secure the shelf on the left and right with flat head screws (see Shelf Installation—Style 1, page 226, Detail A, D).
4. Install the hinge leaves (see Shelf Installation—Style 1, page 226, Detail A, E) and the door (see Shelf Installation—Style 1, page 226, F) into the hinge slots (see Shelf Installation—Style 1, page 226, G), which are on the structure corner channel. Fasten the hinge leaves to the structure corner channel using Torx head screws (see Shelf Installation—Style 1, page 226, H).

(19) Shelf is furnished with order and may already be mounted in position.
(20) All necessary hardware for typical shelf installation is included. Door installation may require additional hardware.

5. Install the fastener receptacles (see Shelf Installation—Style 1, page 226, Detail B, J) into the bracket slots (see Shelf Installation—Style 1, page 226, K) and fasten with Torx head screws (see Shelf Installation—Style 1, page 226, H).
6. Install the automatic bus shutter assembly by rotating the mechanism housing upward to clear the front corner channel of the structure.
7. Slide the automatic shutter assembly upward so that it fits snugly to the left edge of the midshelf.
8. Loosely insert the two 10-32 x 3/8 in. mounting screws through the inner left edge of the midshelf and into the square nuts in the housing.
9. Remove the manual shutter from the vertical bus assembly. Allow the manual shutter to hang next to the vertical bus assembly.
10. Snap the automatic shutter rod onto the vertical bus clip located on the front of the vertical bus assembly.
11. Tighten the two 10-32 x 3/8 in. mounting screws inserted in step 8.
12. Push the operator mechanism to the rear, ensuring the shutter rotates upward into the pocket of the midshelf above the unit.
13. Insert the unit into the MCC. Follow the procedures in Installing the MCC, page 28.
14. Replace all devices, doors, and covers before turning on the power to the equipment.

Removal-style 1

Follow these instructions to remove the automatic vertical bus shutter assembly from an existing Style 1 midshelf (see Automatic Vertical Bus Shutter Removal—Style 1, page 228).

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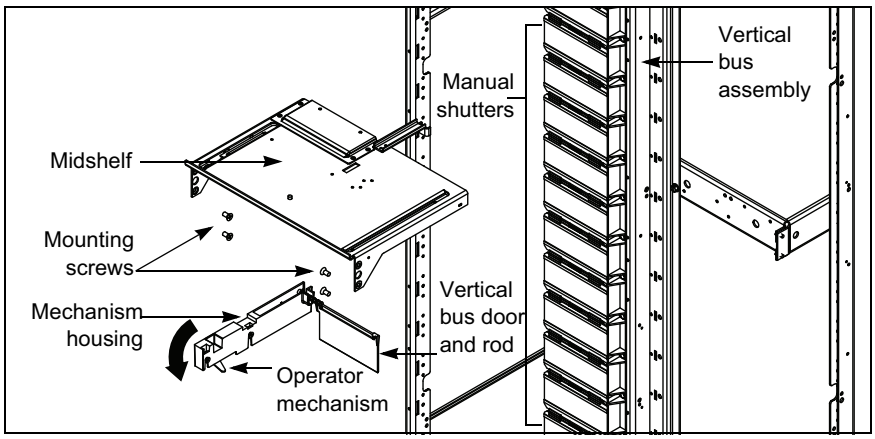
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Figure 193 - Automatic Vertical Bus Shutter Removal—Style 1



1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Remove the unit from the MCC structure. Follow the procedures in Installing the MCC, page 28.
3. Remove the automatic vertical bus shutter rod from the vertical bus clip located on the front of the vertical bus assembly.
4. Insert the manual shutter into the vertical bus assembly.
5. Remove the two 10-32 x 3/8 in. mounting screws located on the inner left edge of the midshelf.
6. Slide the automatic shutter assembly downward, clearing the midshelf.
7. Rotate the assembly downward to clear the front corner channel of the structure.
8. Remove the automatic shutter assembly.
9. Replace all devices, doors, and covers before turning on the power to the equipment.

Installation-style 2

Follow these instructions to install the automatic vertical bus shutter assembly to an existing Style 2 midshelf (see Shelf Installation—Style 2, page 229 and Automatic Vertical Bus Shutter Installation—Style 2, page 229.

Figure 194 - Shelf Installation—Style 2

Description	Quantity	Item
Midshelf	2(21)	A
Flat head screws	3	D
Unit door	1	F
Round head Torx screws	4(22)	H
Quarter turn fastener receptacle	2(22)	J

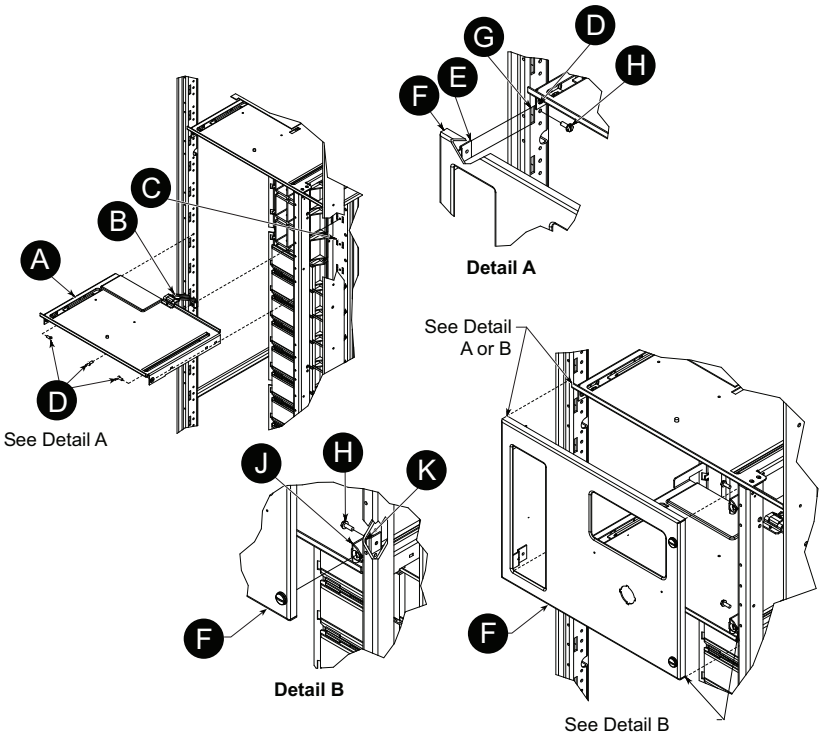
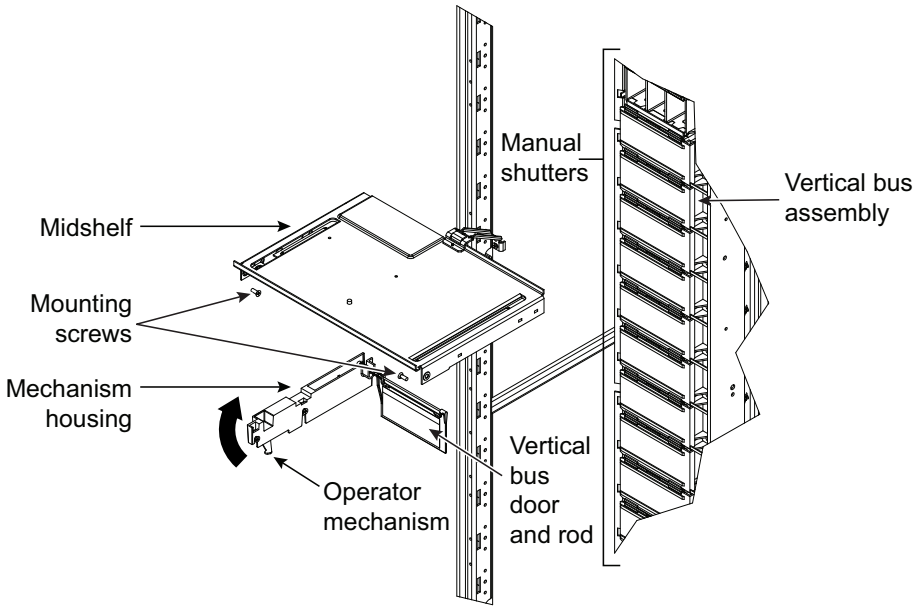


Figure 195 - Automatic Vertical Bus Shutter Installation—Style 2



(21) Shelves are furnished with order. Structure may already have shelf mounted in position.
(22) All necessary hardware for typical shelf installation is included. Door installation may require additional hardware.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

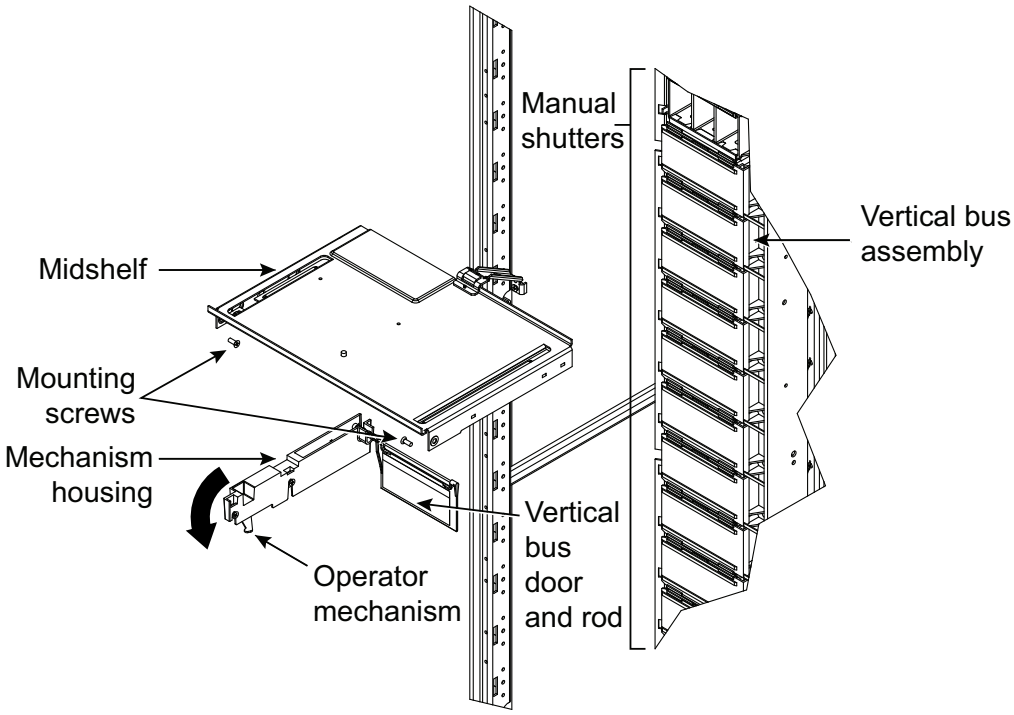
Failure to follow these instructions will result in death or serious injury.

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Position the midshelf (see Shelf Installation—Style 2, page 229, A) in the appropriate area of the structure.
3. Place the mounting foot (see Shelf Installation—Style 2, page 229, B) of the shelf into the mounting pan slots (see Shelf Installation—Style 2, page 229, C). Secure the shelf at the mounting foot end, the left side, and the right side with flat head screws (see Shelf Installation—Style 2, page 229, Detail A, D).
4. Install the hinge leaves of the door (see Shelf Installation—Style 2, page 229, Detail A, E) into the hinge slots (see Shelf Installation—Style 2, page 229, G), which are on the structure corner channel. Fasten the hinge leaves to the structure corner channel using Torx head screws (see Shelf Installation—Style 2, page 229, H).
5. Install fastener receptacles (see Shelf Installation—Style 2, page 229, Detail B, J) into the bracket slots (see Shelf Installation—Style 2, page 229, K) and fasten with Torx head screws (see Shelf Installation—Style 2, page 229, H).
6. Install the automatic bus shutter assembly by rotating the mechanism housing upward to clear the front corner channel of the structure.
7. Slide the automatic shutter assembly upward so that it fits snugly to the left edge of the midshelf.
8. Loosely insert a 10-32 x 3/8 in. mounting screw through the inner left edge of the midshelf and into the square nuts in the housing.
9. Remove the manual shutter from the vertical bus assembly. Allow the manual shutter to hang next to the vertical bus assembly.
10. Snap the automatic shutter rod onto the vertical bus clip located on the front of the vertical bus assembly.
11. Tighten the 10-32 x 3/8 in. mounting screw inserted in step 8.
12. Push the operator mechanism to the rear, ensuring the shutter rotates upward into the pocket of the midshelf above the unit.
13. Insert the unit into the MCC. Follow the procedures in Installing the MCC, page 28.
14. Replace all devices, doors, and covers before turning on the power to the equipment.

Removal-style 2

Follow these instructions to remove the automatic vertical bus shutter assembly from an existing Style 2 midshelf (see Automatic Vertical Bus Shutter Removal—Style 2, page 231).

Figure 196 - Automatic Vertical Bus Shutter Removal—Style 2



⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS, CSA Z462, or local equivalent.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

1. Turn off all power supplying this equipment before working on or inside the equipment and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Remove the unit from the MCC structure. Follow the procedures contained in Installing the MCC, page 28.
3. Remove the automatic vertical bus shutter rod from the vertical bus clip located on the front of the vertical bus assembly.
4. Insert the manual shutter into the vertical bus assembly.
5. Remove the 10-32 x 3/8 in. mounting screw from the inner left edge of the midshelf.

6. Slide the automatic shutter assembly downward, clearing the midshelf.
7. Rotate the assembly downward to clear the front corner channel of the structure.
8. Remove the automatic shutter assembly.
9. Replace all devices, doors, and covers before turning on the power to the equipment.

Operation-styles 1 and 2

Inserting a Unit

When a unit is inserted into the Model 6 MCC structure, the operator mechanism opens the automatic bus shutter, allowing the unit stabs to connect with the vertical bus.

Removing a Unit

The automatic shutter closes when a unit is removed from the structure. The shutter door provides a barrier against incidental contact with the MCC vertical bus.

Appendix D–Key Interlock Systems on Model 6 Main and Feeder Circuit Breaker Units

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029–STPS-2011, or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

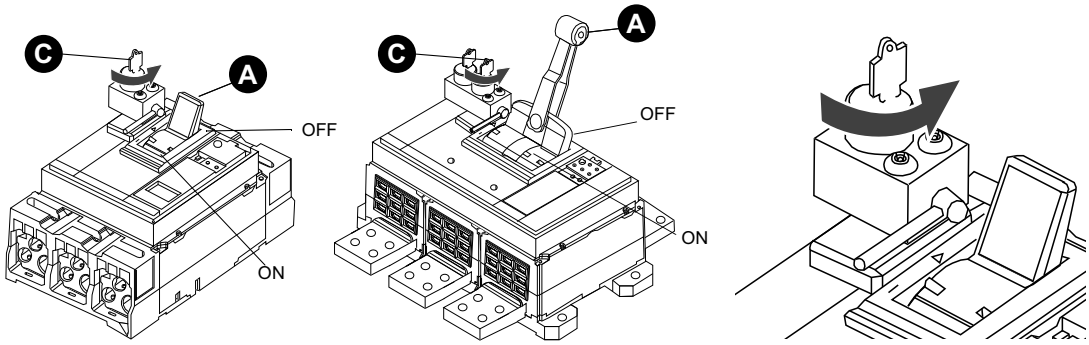
Failure to follow these instructions will result in death or serious injury.

Model 6 motor control center main and feeder circuit breaker units may be equipped with optional key interlock systems. Two types of key interlock systems are provided. The type of key interlock system installed depends on the type of main or feeder circuit breaker unit.

Circuit Breaker Mounted Key Interlock

Key interlocks for PowerPacT M, P, and R frame manually operated circuit breaker main or feeder units are installed directly on the circuit breaker. Locks are equipped with a roll pin installed perpendicular to the lock shaft.

Figure 197 - Key Interlocks Directly Installed on the Circuit Breaker



Verify key lock operation.

1. Place circuit breaker in the ON position.
2. Turn the key in counter-clockwise direction. The roll pin arm must bump into the handle.
3. The key cannot be turned to the engaged (locked) position or removed.

If key lock does not meet these conditions, contact the local field office.

Off Position Key Interlocking Operation

1. Move circuit breaker handle (A) to the OFF (O) position.
2. Turn the key (C) counter-clockwise to the fully engaged (locked) position.

3. Remove the interlock key. The circuit breaker is locked in the OFF position.

If key lock does not meet these conditions, contact the local field office.

Plug-in Unit Mounted Key Interlock

⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- This unit contains a key interlock system. Do not modify or relocate this unit.
- Replace this unit only with an identical unit equipped with a key interlock.
- Only operate the disconnect operator handle with the key in the vertical position.
- Only operate the key interlock with the disconnect operator handle in the OFF position.
- Do not force the disconnect handle or interlock key to operate if resistance is encountered.

Failure to follow these instructions will result in death or serious injury.

Key interlocks are available on plug-in main and feeder circuit breaker units containing PowerPacT H, J, and L frame circuit breakers. These types of units include an exterior operating handle to operate the circuit breaker inside the unit. The key for the key interlock system is accessible with the unit door closed.

Unit OFF, with key removed

Unit ON, with key not removable

Operating the Unit with Key Interlock

NOTE: To avoid damage to the key interlock system:

- The interlock key must be in the vertical position when moving the unit operating handle to the ON or OFF position.
- ONLY turn the key when the unit operating handle is in the OFF position.
- If resistance is encountered, do not force the unit operating handle or the key.
- If indications of incorrect operation are found contact Schneider Electric to request repair. See Appendix E–Technical Support, page 236 of this document.

NOTE: The key can be turned one half turn (180 degrees) from the fully locked to the fully unlocked position. The key must remain in the vertical position (see Unit OFF, with key removed, page 234 and Unit ON with key not removable, page 234) before the exterior circuit breaker operating handle is moved to the ON or OFF position.

1. Turning the unit on.
   a. Insert the key into the key interlock.
   b. When the key is initially inserted into the lock it will be in the vertical position and the unit operator handle will be locked.
   c. If the key is already in the lock, verify it is in the correct position by trying to turn it counter-clockwise. Do not force the key. If the key is in the vertical position and will not turn counter-clockwise, it is in the correct position.
   d. Turn the key clockwise one half turn (180 degrees) to the vertical position to unlock the operating handle.
   e. Move the unit operator handle to the ON position.
2. Turning the unit off.
   a. Verify the key is in the correct position by trying to turn it clockwise. Do not force the key. If the key is in the vertical position and will not turn clockwise, it is in the correct position for operation.
   b. Move the unit operator handle to the OFF position.
   c. Turn the key counter-clockwise one half turn (180 degrees) until it stops in the vertical position. The unit operating handle is now locked in the off position.
   d. Remove the key from the key interlock.

Appendix E–Technical Support

Technical support is available Monday–Friday, 8:00 a.m. to 8:00 p.m. ET, by calling 888-SQUARED (888-778-2733).

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As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

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