Model 6 Motor Control Centers
Class 8998

ENGLISH

Instruction Bulletin

80459-641-01E
10/2012

Retain for future use.

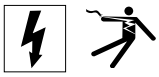
SQUARE D™

by Schneider Electric

ENGLISH

Hazard Categories and Special Symbols

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential 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 potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

NOTICE is used to address practices not related to physical injury. The safety alert symbol is not used with this signal word.

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.

Systems Integration Disclaimer

Unless systems integration is performed by Schneider Electric, Schneider Electric claims no liability for any systems integration work. Schneider Electric assumes no responsibility for application software and control systems designs supplied by a third party.

ENGLISH

Table of Contents

ENGLISH

ENGLISH

ENGLISH

List of Figures

ENGLISH

ENGLISH

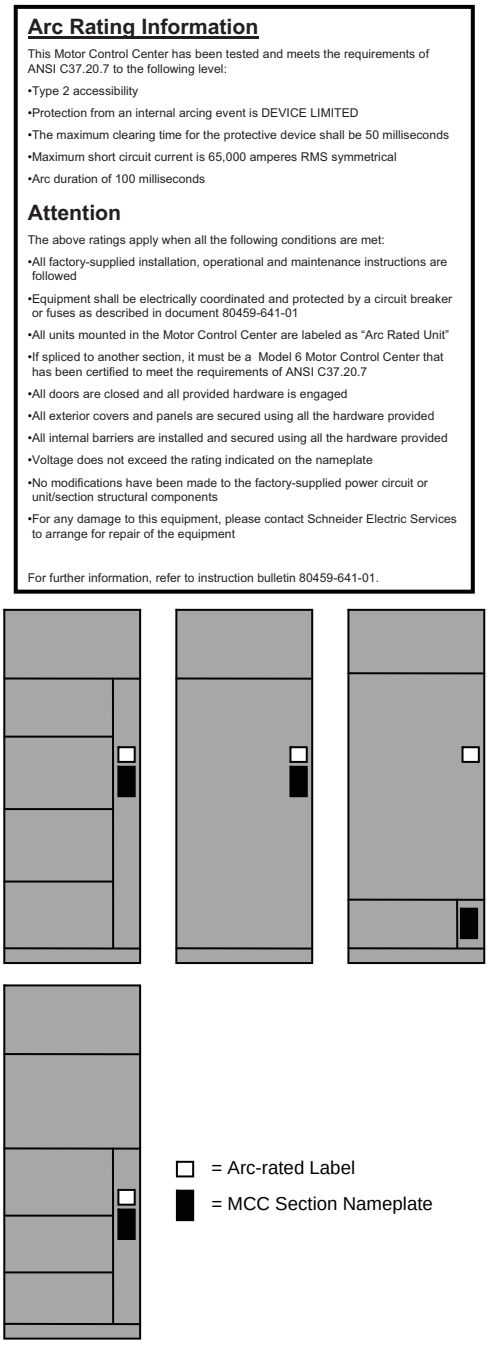
List of Tables

ENGLISH

Section 1—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 wire trough and conductor entrance areas to accommodate outgoing load and control wires.

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



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. Approximately 1 in. (25 mm) of space is between back-to-back sections. The standard height of all MCC structures is 91.5 in. (2324 mm) without the 3 in. (76.2 mm) lifting angle.

Model 6 MCCs are available with an arc-rated option that provides an arc containment rating tested per ANSI C37.20.7 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 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 (Figure 1) which 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).

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" on Page 11 must be met.

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

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:

1. The current rating of the upstream OCPD must be equal to or less than the main device and main bus rating of the MCC.
2. 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.
3. 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.
4. 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.
5. The short time delay trip setting (if available) of the upstream OCPD MUST be set to the OFF position; no intentional delay is allowed.
6. Approved circuit breakers that can be used as the upstream OCPD:
   - — 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 circuit breakers equipped with Micrologic trip units, manufactured by Schneider Electric
   - — 1600–2500 A, Masterpact NW circuit breakers equipped with Micrologic trip units, manufactured by Schneider Electric
7. 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 List

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 from the Technical Library at www.schneider-electric.us.

Table 1: MCC-Related Literature

Publication No.	Title
8998CT9701	Motor Control Centers (Model 6 Catalog, Class 8998)
80444-233-01	Altivar™ 61/71 Adjustable Speed Drive Controllers in Motor Control Centers
80438-069-02	Altistart™ 48 Soft Start Units in Motor Control Centers
80459-652-01	Altistart 22 Soft Starters in Motor Control Centers
S1A10942	Quick Start Guide — ATV312
30072-013-29	Motor Logic™ Solid-State Overload Relay

Publication No.	Title
30072-013-24	AC Magnetic Contactors and Starters, Size 2
30072-013-25	AC Magnetic Contactors and Starters, Size 3
30072-013-26	AC Magnetic Contactors and Starters, Size 4
30072-013-47	AC Magnetic Contactors and Starters, Size 5
30072-013-60	AC Magnetic Contactors and Starters, Size 6
3020IM9503	PowerLogic™ Power Meter

ENGLISH

Table 1: MCC-Related Literature *(continued)*

Publication No.	Title
30072-013-98	Motor Logic Plus™ Programmable Solid-State Overload Relay
30072-013-99	Motor Logic Plus Solutions Software
30072-013-101	Motor Logic Plus Lug-Lug Kit
30072-013-102	Motor Logic Plus Network Communication Module
30072-013-52	AC Magnetic Contactors and Starters, Size 00
30072-013-22	AC Magnetic Contactors and Starters, Size 0
30072-013-23	AC Magnetic Contactors and Starters, Size 1

Publication No.	Title
3020IM9806	PowerLogic Circuit Monitor Series 2000 Reference Manual
63230-400-207	PowerLogic Circuit Monitor Series 3000 Reference Manual
63230-300-213	PowerLogic Circuit Monitor Series 4000 Reference Manual
0100PL1201	Schneider Electric Digest 176
63230-500-224	PM820, PM850, PM870 Installation
63230-500-225	PM820, PM850, PM870 Reference Manual

Table 2: iMCC-Related Literature

Publication No.	Title
atv71_parameters_en	Altivar® 71 Communication Parameters User's Manual
atv71_programming_manual_en	Altivar 71 Programming Manual
atv71_Modbus_EN	Altivar 71 Modbus®/Uni-Telway™ Card—Modbus protocol
atv71_Uni-Telway_EN	Altivar 71 Modbus/Uni-Telway card—UniTelway protocol
BBV46391	Altivar 312 AC Drive Installation Manual
BBV46385	Altivar 312 AC Drive Programming Manual
890USE10300	Modicon Modbus Plus™ Network BM85 Bridge Multiplexer User's Guide
Modicon TSX Quantum Automation Series	www.modicon.com/specguide98/
PI-MBUS-300	Modicon – Modbus Protocol Reference Guide
30072-013-98	Motor Logic Plus™ Programmable Solid-State Overload Relay
30072-013-99	Solutions Software for Motor Logic Plus SSOL
30072-013-101	Motor Logic Plus Lug-Lug Kit
30072-013-102	Motor Logic Plus Network Communication Module
30072-450-61	Altistart™ 48 Y-Range Soft Start Controllers
1639501	TeSys™ T LTM R Modbus Motor Management Controller User's Manual
1639502	TeSys T LTM R PROFIBUS Motor Management Controller User's Manual
1639503	TeSys T LTM R CANopen Motor Management Controller User's Manual
1639504	TeSys T LTM R DeviceNet™ Motor Management Controller User's Manual
1639505	TeSys T LTM R Modbus/TCP Motor Management Controller User's Manual
1639572	TeSys T LTM R Modbus Motor Management Controller Quick Start Guide
1639573	TeSys T LTM R PROFIBUS-DP® Motor Management Controller Quick Start Guide
1639574	TeSys T LTM R CANopen Motor Management Controller Quick Start Guide
1639575	TeSys T LTM R DeviceNet Motor Management Controller Quick Start Guide

Publication No.	Title
1639576	TeSys T LTM R Modbus/TCP Motor Management Controller Quick Start Guide
1639581	TeSys T LTM CU Control Operator Unit User's Manual
1639508_01a55	LTM R - Instruction Sheet
1639509_01a55	LTM E - Instruction Sheet
1639582_01a55	LTM CU - Instruction Sheet
840USE10000	Modicon™ TSX Quantum Automation Series
840USE11300	Modicon XMIT Function Block
840USE11600	Quantum NOE 771 X0 Ethernet Modules User Guide
870USE00200	TSX Momentum™ I/0 Base User Guide
870USE10100	Modicon TSX Momentum M1 Processor Adapter and Option Adapter User Manual
870USE11400	Ethernet Communications Adapter
890USE10000	Modicon Modbus Plus Network Planning/Installation Guide
3000DB0001	PowerLogic™ System Architecture and Application Guide
3020IB9818	PowerLogic Ethernet Communication Module, Models ECM-2000 and ECM-RM
63230-500-200	PowerLogic Series 800 Power Meter Installation Manual—PM810
63230-500-224	PowerLogic Series 800 Power Meter Installation Manual—PM820, PM850, PM870
63230-400-204	PowerLogic Circuit Monitor Series 3000 Installation Manual
63230-300-209	PowerLogic Circuit Monitor Series 4000 Installation Manual
3050IM9601	PowerLogic Ethernet Gateway
3080HO9601	System Manager™ Software SMS-3000
3080IB9803	PL, PowerLogic System Manager 3000
3080IM9603	Ethernet Driver for System Manager

ENGLISH

Section 2—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 or CSA Z462.
- 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 of the instructions contained in this bulletin.
- Follow all safety procedures defined in NFPA 70E, CSA Z462, and OSHA 1910.331-35, as well as those established by your specific location.
- Turn off all power supplying this equipment before working on or inside equipment.
- Assume that all circuits are live until they have been completely de-energized, tested, locked out, and/or tagged out (per OSHA 1910.147). 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 this instruction will result in death or serious injury.

ENGLISH

Section 3—Receiving, Handling, and Storing the MCC

MCCs are constructed in shipping blocks of up to three vertical sections. This allows for ease of handling during transportation and installation. The main horizontal bus of all shipping blocks will be 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 Figure 2 or Figure 3).

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

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

HAZARD OF BODILY INJURY OR EQUIPMENT DAMAGE

- Use extreme caution when moving sections. The MCC has a high center of gravity, which may cause it to tilt.
- Do not attempt to lift or attach lifting means to sections equipped with pull boxes.

Failure to follow this instruction can result in death or serious injury.

Equipment Needed

Adequate equipment, such as a fork truck, crane, or rods and pipe rollers, must be available for handling MCCs. Table 3 lists the approximate shipping weights of sections equipped with typical units.

Table 3: Approximate MCC Shipping Weights

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

Moving the MCC

As shown in Table 2, weights vary by enclosure type and depth. To minimize the risk of injury and equipment damage while moving the MCC, follow these guidelines:

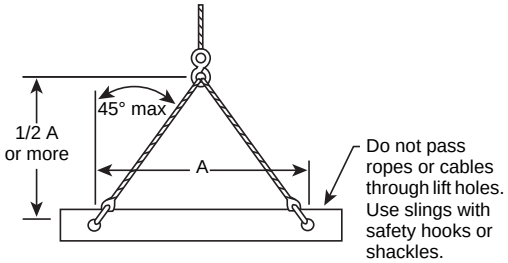
- Use caution when moving heavy equipment.
- Verify that the moving equipment is rated to handle the weight.
- Fork trucks, when available, provide a convenient method of moving MCCs (see Figure 4 on page 16). When removing an MCC from a shipping pallet, carefully balance and secure it using a safety strap.

NOTE: Standard sections are packaged and shipped in a sideways position, as shown in Figure 2 on page 14 and Figure 4 on page 16. Extra heavy sections, such as 18-pulse drives, are packaged and shipped in an upright position, as shown in Figure 3 on page 14. MCC sections can also be packaged and shipped in an upright position at the customer's request.

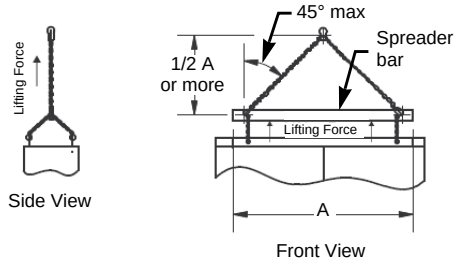
ENGLISH

Figure 4: Moving the MCC with a Fork Truck

Figure 5: Proper Use of Sling to Lift MCCs



Single Lifting Angle



Two Lifting Angles

Each shipping block has lifting angles for handling the MCC with overhead cranes. Take the following precautions when using a crane:

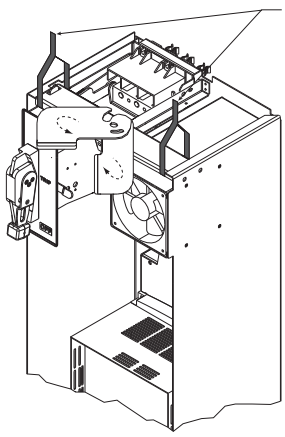
- Handle MCCs in the upright position only.
- Select rigging lengths to compensate for any unequal weight distribution.
- Do not exceed the 45° maximum angle between the vertical and lifting cables (see Figure 5).
- Use only slings with safety hooks or shackles. Do not pass ropes or cables through the holes in the lifting angle(s).

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

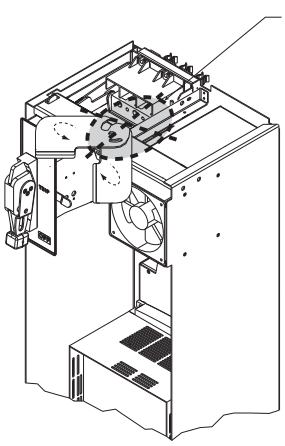
Model 6 MCCs with the arc-rated option must have the lifting angle removed to maintain the arc rating and allow the proper operation of the arc-rated vent flaps. Retain the hardware from the lifting angle for installing the top-plate assembly (shipped separately for arc-rated MCCs).

NOTE: Do not attempt to lift or attach lifting means to sections equipped with pull boxes.

Figure 6: Proper/Improper Lifting Points for Plug-in Units Taller Than 24 in.



Proper Lifting Points



Improper Lifting Points

Observe the following precautions for MCC units shipped to the site as a plug-on unit.

- Lifting plug-on units taller than 24 in. (610 mm) require two or more persons using special handling precautions and lifting devices.
- If lifting devices are used, refer to Figure 6 for proper lifting points.

Before installing any MCC control units, locate and retighten or retorque any connections that may have loosened during shipment and handling. Refer to the procedures in “Installing Additional MCC Units” on page 95 of this instruction bulletin.

Storing the MCC

NOTICE

EQUIPMENT DAMAGE HAZARD

Never store MCCs outdoors. Outdoor storage is inadequate, even with the protection of a tarpaulin.

Failure to follow this instruction 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. Acceptable storage temperatures are from 0 °C (32 °F) to 40 °C (104 °F). Acceptable humidity levels are 0–95%, non-condensing.

If the storage area is cool and/or damp, provide enough heat to prevent condensation inside the MCC. Contact your Schneider Electric field sales representative for specific requirements.

ENGLISH

Section 4—Installing the MCC

This section explains how to locate, install, and join Model 6 MCC enclosures, and how to splice power and 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 “Section 10—Expansion” on page 92, 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 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.
- When moving MCC sections, follow the instructions in “Handling the MCC” on page 15. The MCC has a high center of gravity, which may cause it to tilt.

Failure to follow this instruction 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 should be no less than 0 °C (32 °F) and no greater than 40 °C (104 °F). Protect the enclosure from the entrance of water or any moisture.

Space Requirements

Install MCCs in an area with a minimum of 3 ft. (914 mm) of free space in front of front-of-board construction. An additional 3 ft. (914 mm) 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 will eliminate 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 120 in. (3048 mm) including base channel). See the special hazard statement on page 19 concerning the required clearance above the equipment.

⚠ DANGER

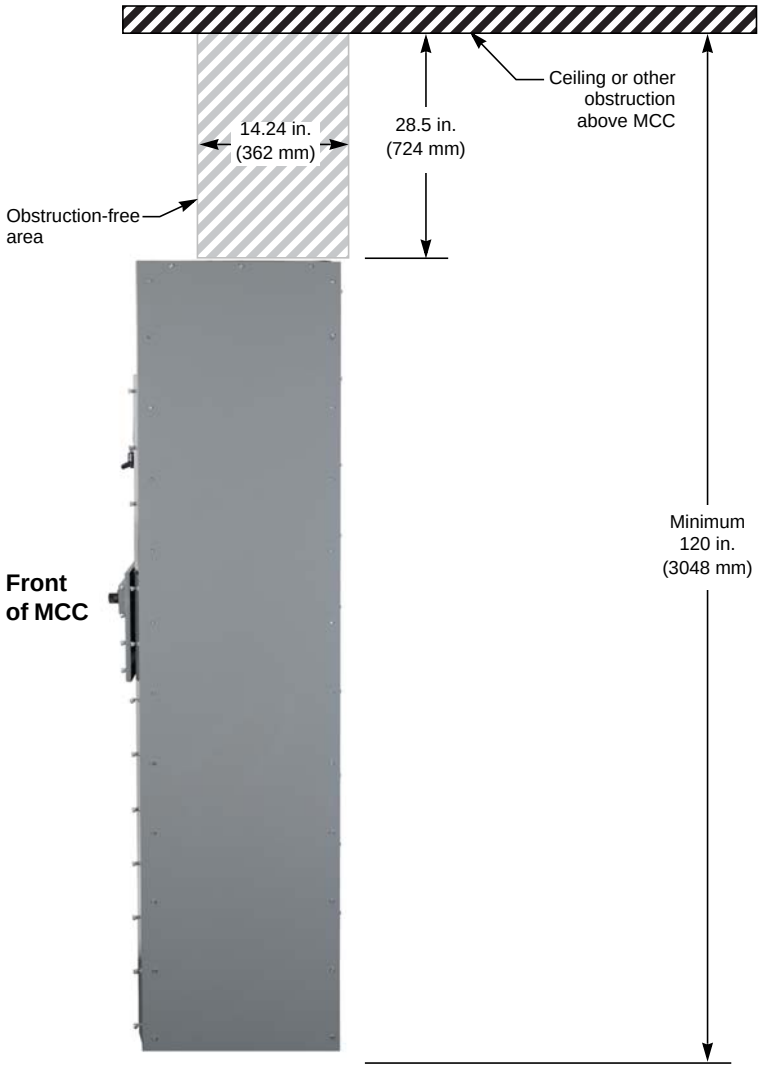
BURN HAZARD FROM HOT GASES

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

Failure to follow this instruction will result in death or serious injury.

See figure 7 for the required area above the arc-rated MCC that must be free from obstructions.

Figure 7: Required Obstruction-Free Area



Aligning the MCC

MCCs are assembled in the factory on a smooth, level surface to ensure proper alignment of all sections. A similar smooth, level surface should be provided 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.

ENGLISH

Joining NEMA Type 1 / NEMA Type 1 Gasketed / NEMA Type 12 Sections

Before positioning the MCC sections (see Figure 8), 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.

NOTES:
- A joining hardware kit is bagged and tied to the right front corner channel of each shipping split. Captive splice bars are pre-assembled on the horizontal bus on the left side of each shipping split.
- For gasket installation instructions, see “Splice Gaskets for NEMA Type 1 Gasketed and Type 12 Enclosures” on page 28 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, follow these steps:

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 wire trough covers in all sections, providing access to each section’s front splicing bolts (see Figure 8B).

Figure 8: Motor Control Center Views

Figure 8A: All Covers in Place

Figure 8B: Horizontal Wire Trough Covers Removed

Figure 8C: Two-piece Bus Barriers Removed (splice connection made)

3. To gain access to each section’s bus splicing provisions, slide the panels of the two-piece bus barriers (see Figure 8C) 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 pages 23–27 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 be aligned 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 Figure 9).

   NOTE: Use caution when moving MCC sections, as they are top heavy. See “Handling the MCC” on page 15 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 Figure 10) 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 Figure 11A).
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 Figure 11B).

   NOTE: Insert the screws from whichever side provides the easiest access to the holes; either side will allow proper joining of the channels.
5. Tighten the screws (see Figure 11C).
6. Repeat steps 3–5 to connect the **rear** corner channels.

NOTE: In some instances, holes in the rear channels will only be 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).

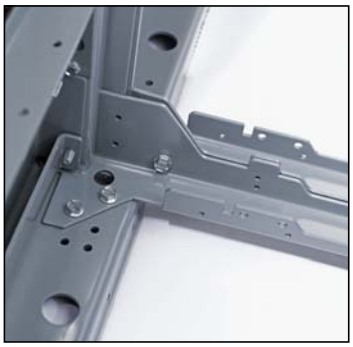
ENGLISH

Figure 11: Bolting Sections Together

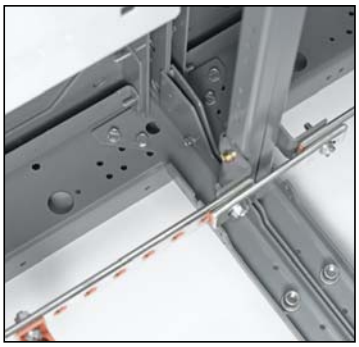
11A

11B

11C



11D: Front Bottom Side Channel Connection



11E: Rear Bottom Side Channel Connection

11F: Top Front Side Channel Connection

11G: Top Rear Side Channel Connection
(Shown with MCC back plates removed.)

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 Figures 11D and 11E). These can be accessed after removal of the bottom wireway cover.
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 Figure 11D).
3. The screw installed at the rear is installed from the left-hand section (see Figure 11E).

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 Figure 11F on page 22).
5. The rear clearance hole is in the right section. In most cases, it will be necessary to remove the section back plate or the top plate to gain access to the rear clearance hole and install the screw (see Figure 11G).

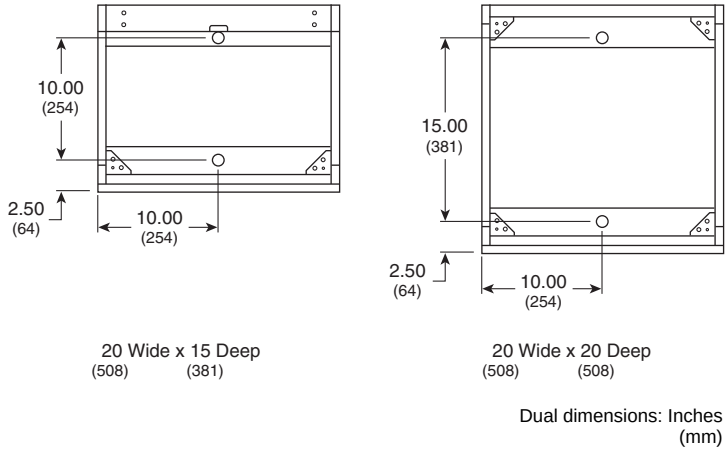
Securing Structures to the Floor

(Non-Seismic Applications, see page 25 for Seismic Applications)

Fasten each section to the floor (see Figure 12) 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.

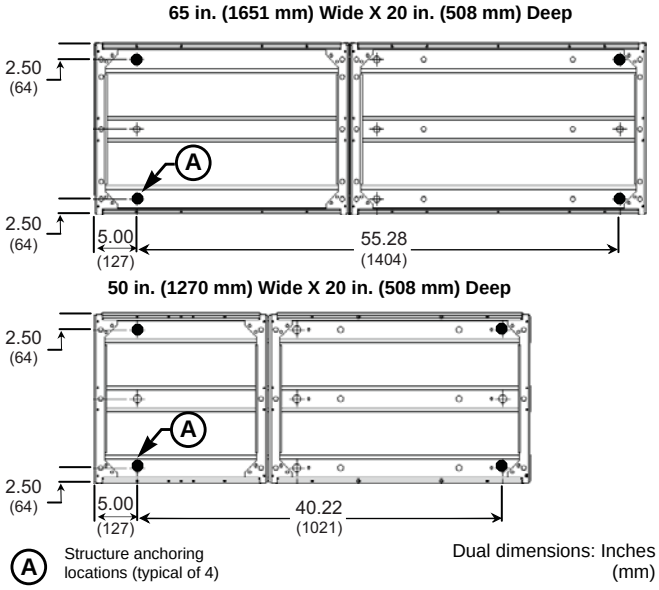
NOTE: Although sections are free-standing, floor fastening prevents movement, thereby preventing conduit connection damage.

Figure 12: Standard Base Channel Mounting



Dual dimensions: Inches
(mm)

Figure 13: Base Channel Mounting For 18-Pulse AC Drive MCC Sections



Dual dimensions: Inches
(mm)

ENGLISH

Seismic Certification of Model 6 MCCs

Model 6 Motor Control Centers that are seismically certified have been qualified to the site-specific seismic requirements of the listed model building codes and/or standards. Optional construction features may be required, depending on the location of the installation and the particular code and/or standard of interest. Seismic certificates of compliance and equipment labels are provided with all seismically certified MCCs. To maintain the validity of this certification, the installation instructions provided in this section must be followed.

Responsibility for Mitigation of Seismic Damage

For the purposes of the model building codes, Model 6 Motor Control Centers are considered nonstructural building components. Equipment capacity was determined from tri-axial seismic shake table test results as defined in the International Code Counsel Evaluation Service (ICC ES) Acceptance Criteria for Seismic Qualification Testing of Nonstructural Components (AC156).

Unless otherwise indicated, an equipment importance factor of 1.5 ($I_P = 1.5$) was used, indicating that equipment functionality was verified before and after shaker table seismic simulation testing. This importance factor is indicative of critical facilities where maximizing the probability of post event functionality is a priority.

AC156 is published by the ICC ES and has been recognized by the Building Seismic Safety Council (BSSC) as an appropriate methodology in the 2003 National Earthquake Hazard Reduction Program (NEHRP) commentary. The National Institute of Building Sciences established the BSSC in1979 to develop and promote regulatory provisions for earthquake risk mitigation at the national level.

Incoming and outgoing cable and conduit must also be considered as related but independent systems. They 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, bottom entry and/or exit of cable and conduit is preferred.

If the spectral acceleration value (S_s as defined by the International Building Code or NFPA 5000) is in excess of 2.67g (such as the New Madrid seismic area), then the equipment must also be braced at the top using a lateral restraint system. A lateral restraint system is also required in situations where horizontal motion at the top of the MCC is not be desirable (such as applications where top entry and/or exit of conduit are used). This system must be capable of transferring the loads created to the load-bearing path of the building structural system.

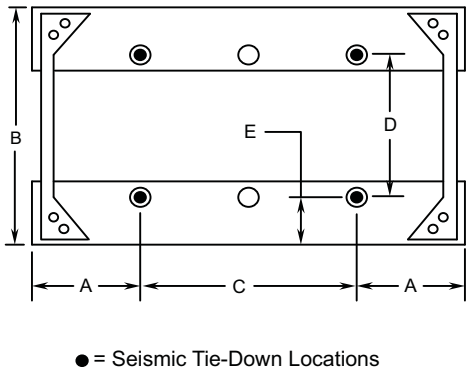
Seismic qualification of nonstructural components by Schneider Electric is just one link in the total chain of responsibility required to maximize the probability that the equipment will be intact and functional after a seismic event. During a seismic event, the equipment must be able to transfer the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

The structural civil engineer or design engineer of record is responsible for detailing the equipment connection and anchorage requirements (including the lateral restraint system if appropriate) for the given installation. The installer and manufacturers of the anchorage and lateral restraint system are responsible for assuring that the mounting requirements are met. Schneider Electric is not responsible for the specification and performance of these systems.

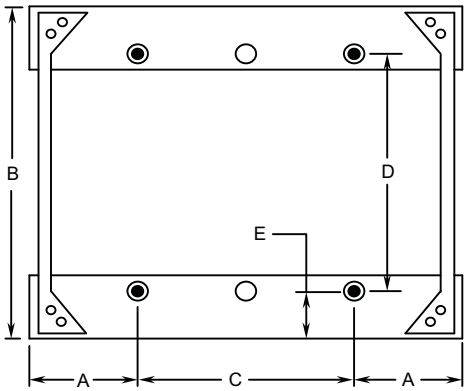
Securing Structures to Floor—Seismic Hazard[1] Designated Locations

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 Figure 14 (NEMA Type 1, Type 1 Gasketed, and Type 12 enclosures) or Figure 16 on page 26 (NEMA Type 3R enclosures). Use 0.50 in. or 0.75 in. grade 5 or higher bolts and Belleville washers. Torque bolts to the value specified by the manufacturer of the anchor.

Figure 14: NEMA Type 1, Type 1 Gasketed, and Type 12 Seismic Tie-Down Locations



● = Seismic Tie-Down Locations



15 in. (381 mm) Section Dimensions

Letter	Section Width	Dimension
A	N/A	5.00 in. (127 mm)
B	N/A	15.00 in. (381 mm)
C	20.00 in. (508 mm)	10.00 in. (254 mm)
	25.00 in. (635 mm)	15.00 in. (381 mm)
	30.00 in. (762 mm)	20.00 in. (508 mm)
	35.00 in. (889 mm)	25.00 in. (635 mm)
D	N/A	9.98 in. (253 mm)
E	N/A	2.50 in. (64 mm)

N/A = Not applicable

20 in. (508 mm) Section Dimensions

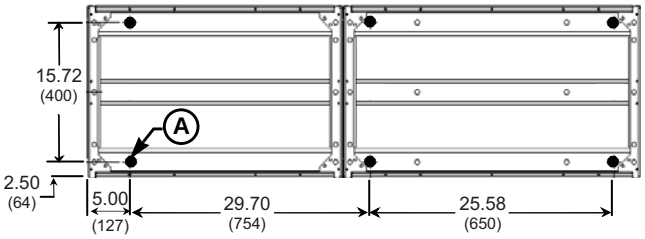
Letter	Section Width	Dimension
A	N/A	5.00 in. (127 mm)
B	N/A	20.00 in. (508 mm)
C	20.00 in. (508 mm)	10.00 in. (254 mm)
	25.00 in. (635 mm)	15.00 in. (381 mm)
	30.00 in. (762 mm)	20.00 in. (508 mm)
	35.00 in. (889 mm)	25.00 in. (635 mm)
D	N/A	14.98 in. (380 mm)
E	N/A	2.50 in. (64 mm)

N/A = Not applicable

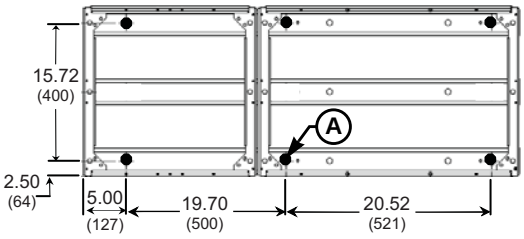
NOTE: The dimensions shown are tie-down locations within individual MCC sections. Refer to factory supplied drawings to determine appropriate anchor locations for the equipment pad.

Figure 15: 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



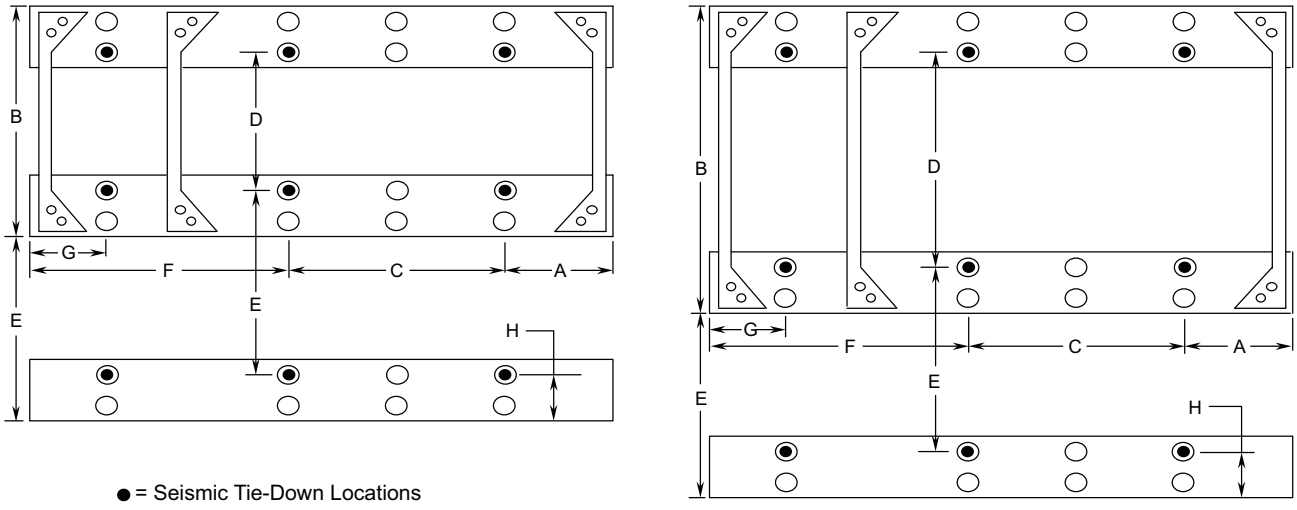
Ⓐ Structure anchoring locations (typical of 9)

Dual dimensions: Inches (mm)

[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.

ENGLISH

Figure 16: NEMA Type 3R Seismic Tie-Down Locations



15 in. (381 mm) Section Dimensions

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

N/A = Not applicable

20 in. (508 mm) Section Dimensions

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

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.

Securing Structures to Wall—Seismic Hazard[1] 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

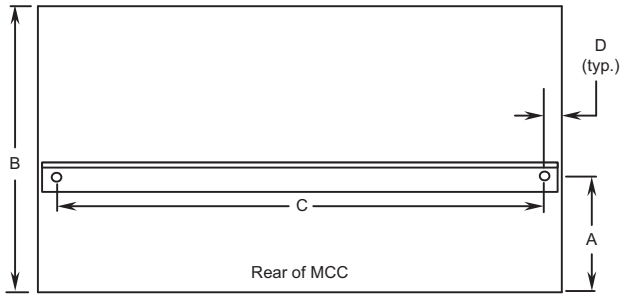
- Turn off power supplying equipment before installing lateral bracing.
- Bolts must not penetrate top plate by more than 0.50 in.

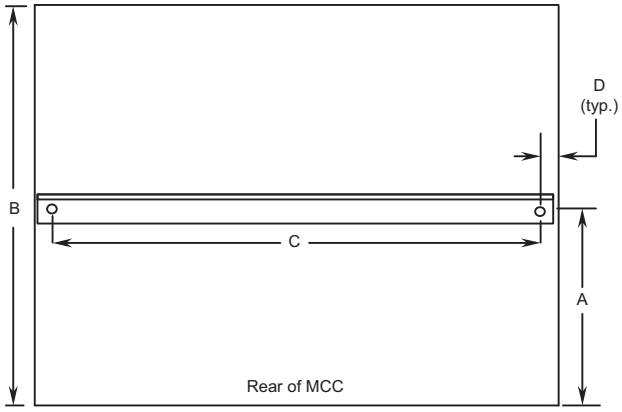
Failure to follow this instruction will result in death or serious injury.

Remove the lifting angle and fasten each section to the lateral restraint system using the same attachment points used to secure the lifting angle. Re-use bolts [3/8 (.375 in.) by 7/8 (.875 in.) long #16 thread] and lock washer (.094 in. thick) 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.

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

Figure 17: Attachment Locations for Top Lateral Bracing





15 in. (381 mm) Section Dimensions

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

N/A = Not applicable

20 in. (508 mm) Section Dimensions

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

N/A = Not applicable

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.

[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.

ENGLISH

Splice Gaskets for NEMA Type 1 Gasketed and Type 12 Enclosures

⚠ DANGER

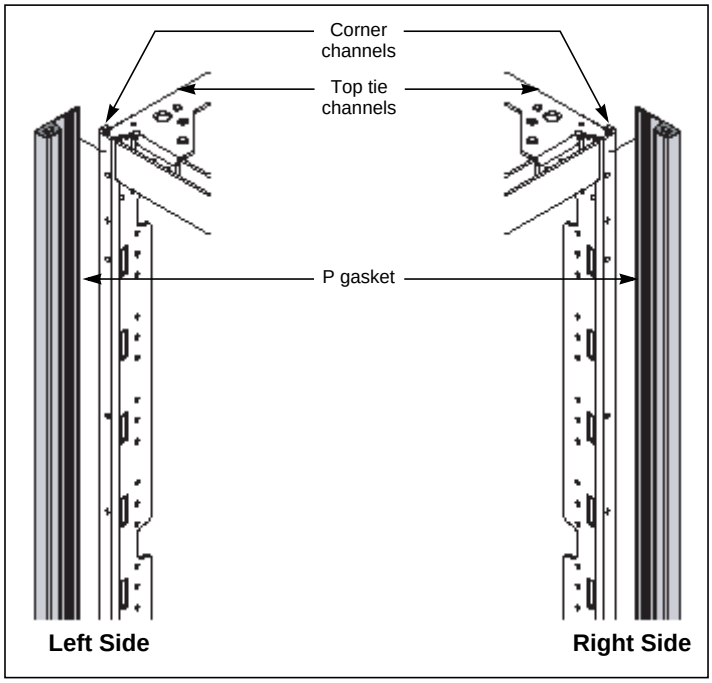
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- 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” on page 15. The MCC has a high center of gravity, which may cause it to tilt.

Failure to follow this instruction will result in death or serious injury.

When splicing to an existing MCC, refer to Figure 18. If P gasket is not installed, follow the instructions in “Splicing With No P Gasketing” on page 29. If P gasket is installed, follow the instructions in “Splicing With P Gasketing” on page 29.

Figure 18: P Gasketing



Splicing With No 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 P gaskets to the outside of the front and rear vertical corner channels (see Figure 18 on page 28). The gaskets should 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 should 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 NEMA Type 1 / NEMA Type 1 Gasketed / NEMA Type 12 Sections” on page 20.

   NOTE: When new sections will be added to left side of existing line-up, follow Steps 1, 2, and 7 only.

Splicing With P Gasketing

Determine the location of the existing P gasket before splicing. If the P gasket is on the left (see Figure 18 on page 28), follow the instructions “Splice to Existing Left”. If the P gasket is on the right (see Figure 18 on page 28), follow the instructions “Splice to Existing Right”.

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 NEMA Type 1 / NEMA Type 1 Gasketed / NEMA Type 12 Sections” on page 20.

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. The P gasket on the existing front corner channel should be left 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 P gasket to the outside of the rear vertical corner channel (see Figure 18 on page 28). The gasket should not extend above the top of the corner channel. Retain the extra P gasket for future use.
5. Apply flat gaskets to the outside of the top and bottom tie channels. The gaskets should not extend above the top of the tie channels.
6. Applying thumb pressure, firmly press the gasket in place from top to bottom. Ensure that the gasket is flat along the entire length.
7. Join sections together following the appropriate steps in “Joining NEMA Type 1 / NEMA Type 1 Gasketed / NEMA Type 12 Sections” on page 20.

ENGLISH

Joining New Style NEMA Type 3R Enclosures to Old Style NEMA 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 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 this instruction will result in death or serious injury.

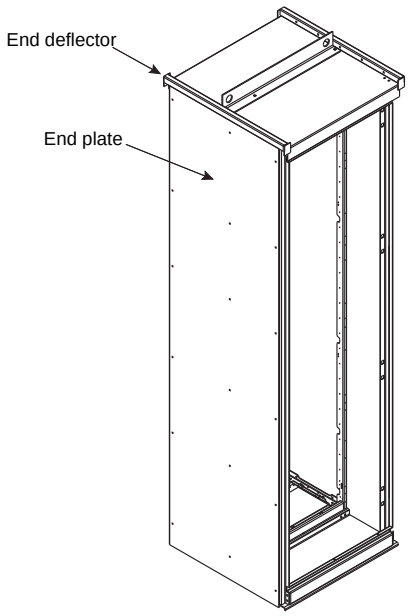
This section provides instructions for joining new style NEMA Type 3R enclosures manufactured after February 1998 to old style NEMA Type 3R enclosures manufactured before February 1998 (the new MCC enclosure is 3 in. (76 mm) shorter than the existing MCC). Instructions for joining to the left or right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

For all MCCs in NEMA 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 NEMA 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 NEMA Type 3R MCC Enclosure.

Figure 19: Removing the End Deflector

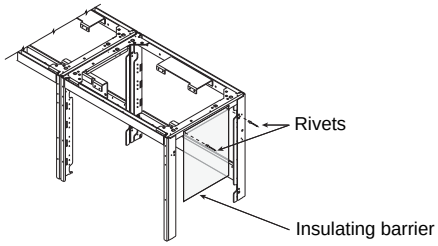


1. Turn off all power supplying this equipment before working on or inside the equipment, and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Remove the end deflector (see Figure 19) from the leftmost section of the existing MCC and 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 also 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 Figure 19) 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 Figure 20 on page 31) 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.

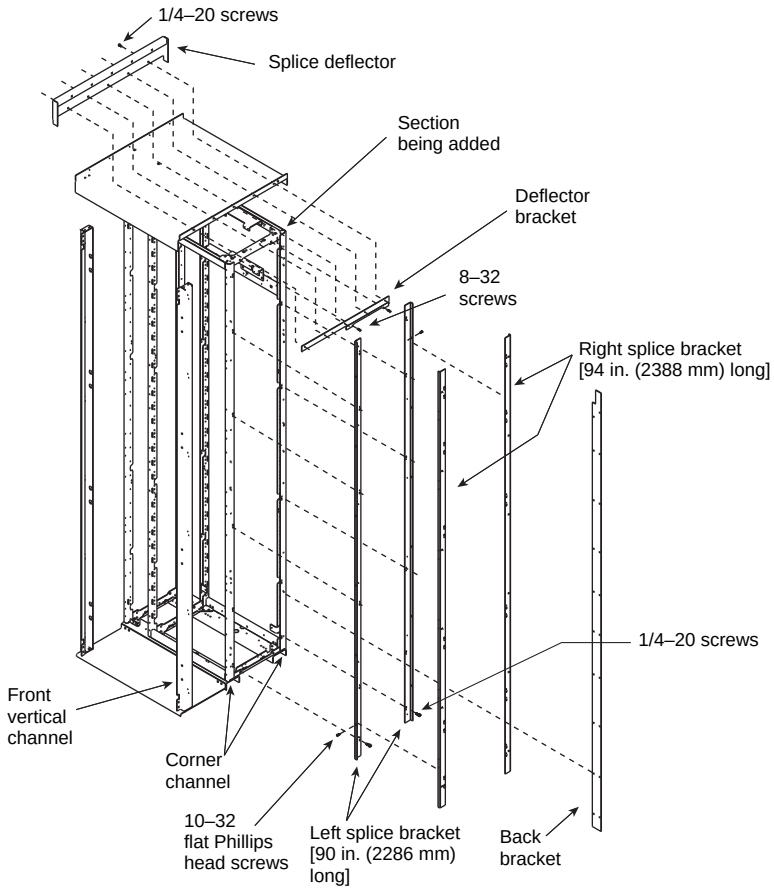
ENGLISH

Figure 20: Removing the Insulating Barrier



6. Install the deflector bracket (see Figure 21) on the rightmost 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 will be used to mount the deflector bracket. Ensure that the top holes of the bracket align with the holes in the top plate of the enclosure.

Figure 21: Installing the Deflector Bracket



7. Attach a left splice bracket (see Figure 21), 90 in. (2286 mm) long, to the front corner channel of the rightmost section of the MCC being added using six 1/4–20 screws contained in the kit. Ensure that the short flange is 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 Figure 21 on page 31), 90 in. (2286 mm) long, to the rear corner channel of the rightmost section of the MCC being added using six 1/4–20 screws contained in the kit. Ensure that

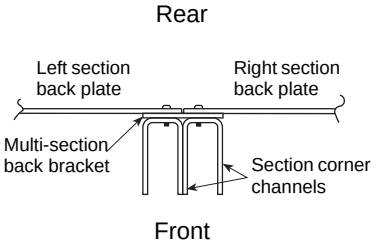
ENGLISH

the short flange is 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 Figure 21), 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. Ensure that the short flange is behind the flange of the left splice bracket. The right splice bracket will extend below the left splice bracket by approximately 1 in. (25 mm) when properly installed.
10. Install a right splice bracket (see Figure 21), 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. Ensure that the short flange is in front of the flange of the left splice bracket. The right splice bracket will extend below the left splice bracket by approximately 1 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 (8998IM9101R5/92) if joining to a Model 5 MCC, or the instructions on 28 of this instruction bulletin 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 on 35 of this bulletin. 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 22: Re-attaching the Back Plates



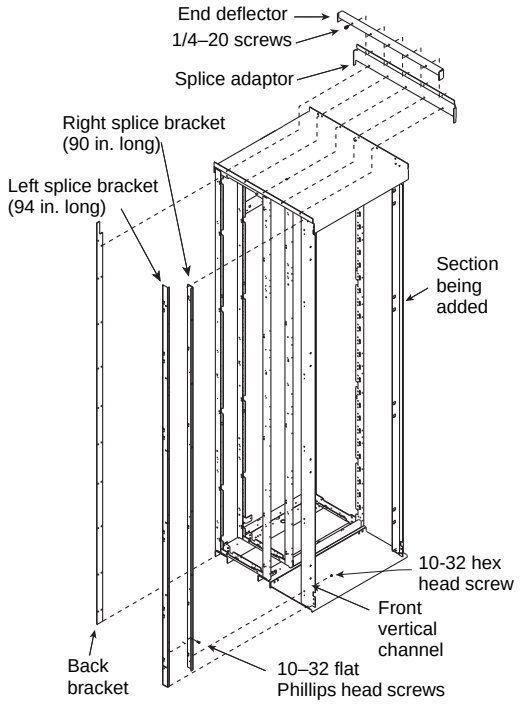
13. Using the 10–32 hex head screws removed in Step 3, re-attach the back plate (see Figure 22) to the rightmost section of the new MCC. Install the back bracket (see Figure 21 on page 31) under the back plate using the left side holes of the back bracket. Ensure that the notch at the top of the back bracket is installed toward the new MCC section.
14. Using the 10–32 screws removed in Step 3, re-attach the back plate (see Figure 22) to the right section.
15. Install the splice deflector (see Figure 21 on page 31) to the rightmost section of the MCC being added. Use the five 1/4–20 screws supplied in the kit. Ensure that both top plate flanges are 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 NEMA Type 3R enclosure to the left front vertical channel of the existing NEMA 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 NEMA Type 3R MCC Enclosure

Figure 23: Installing the Splice 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 Figure 19 on page 30) 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 also 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 Figure 19 on page 30) 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 Figure 20 on page 31) 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 Figure 23), 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 will mount 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 will be flush with the bottom of the vertical channel.
7. Install the right splice bracket (see Figure 23), 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. Ensure that the short flange of the right splice bracket is in front of the flange of the left splice bracket. When properly installed, the left splice bracket will extend approximately 1 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 on 28 of this instruction bulletin 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 Figure 22 on page 32) 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 Figure 23) under the back plate using the right side holes of the back bracket. Ensure that the notch at the top of the back bracket is installed toward the new MCC section.
11. Using the hardware removed in Step 3, re-attach the back plate (see Figure 22 on page 32) to the rightmost section of the existing MCC.
12. Install the splice adaptor (see Figure 23) to the leftmost section of the MCC being added by using five 1/4–20 screws provided in the kit.
13. Next, position the end deflector, provided in the kit, over the top plate flanges of both sections (see Figure 23) 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 Figure 23).
15. Before energizing the equipment, replace all covers and barriers.

ENGLISH

Joining NEMA Type 3R Sections

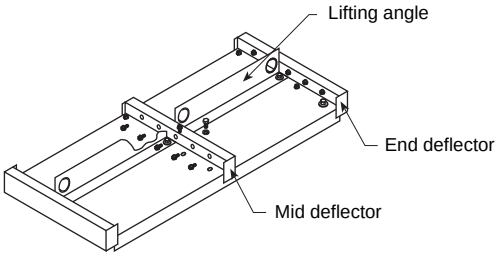
This section provides instructions for joining NEMA Type 3R MCC sections (manufactured after February 1998).

NOTE: All NEMA 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 (see Figure 25) back plate.

   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.
3. Remove the end deflector cap from the right side of the existing NEMA Type 3R section (see Figure 24). Also, remove the mid deflector cap from the section being added to the right.
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 NEMA Type 1 / NEMA Type 1 Gasketed / NEMA Type 12 Sections” on page 20.
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 Figure 25).
7. Install the mid deflector, ensuring both top plate flanges are covered (see Figure 24).
8. Using the six 10-32 screws supplied, secure the left front vertical channel of the NEMA Type 3R extension to the right front vertical channel of the NEMA Type 3R extension (see Figure 26).
9. If the lifting angle is to be removed from the sections after installation, replace all hardware in the order shown (see Figure 27).

Figure 24: Remove Mid and End Deflector Caps from the Top of the MCC



Top View

Figure 25: Attach the Multi-section Bracket

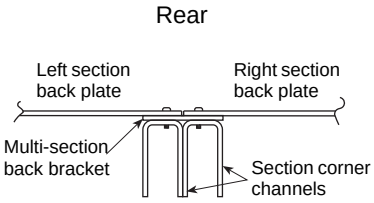


Figure 26: Secure the Vertical Channels

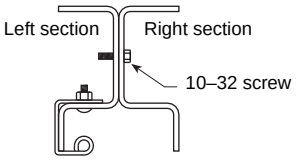
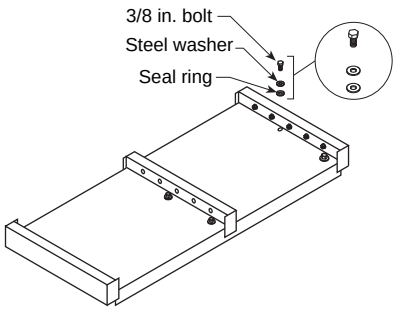


Figure 27: Replace Lifting Angle Hardware



Splicing Power Bus for NEMA 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 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 this instruction will result in death or serious injury.

To splice the power bus, follow these steps:

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 Figure 28). See Appendix A—Removal and Installation of Horizontal Bus Barrier Panels for the steps for removing horizontal bus barriers.

Figure 28: Horizontal Wireway Covers and Bus Barriers Removed

ENGLISH

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 Figure 29). DO NOT use the single bar per phase splice on the fork end of the fork type bus (see Figure 30 for incorrect application). Two splice bars must be used on the fork end of the fork type bus (see instructions beginning on page 38). Contact your local Schneider Electric representative if the necessary two-bar splice is not provided with your equipment.

Figure 29: Correct Application of Splice (shown installed) for 600/800 A, Non-Fork Bus

Figure 30: Incorrect Application of Single-Bar Splice on Fork-Type Bus

1. Remove all four bolts from the integral splice bar (see Figure 31).

Figure 31: Removing Bolts from Single-Splice Bar

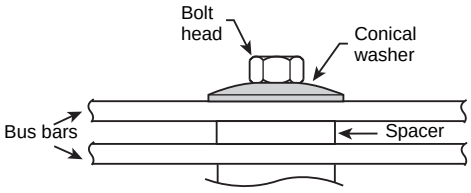
2. Move the single splice bar to the left and align the two left holes in the splice bar with the corresponding holes in the horizontal bus on the left section (see Figure 32).

Figure 32: Moving and Aligning the Splice Bar to the Bus Holes

3. Reinstall the four bolts into the horizontal bus on the left and right sections (see Figure 33). Make sure the original conical washers are reinstalled with the concave side facing the horizontal bus (see Figure 34).

Figure 33: Inserting Splice Bolts in the Left and Right Sections

Figure 34: Placing 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 Figure 35.)

Figure 35: Torquing the Bolts

5. Return to Step 2 on page 35 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.

ENGLISH

Power Bus Splicing MCCs with Multiple Bar/Phase Splice Kit

NOTE: On the integral splice assembly, located on the left side of each phase bus, the number of bus links is one greater than the number of horizontal bus bars. This creates a sandwich splice. The rear-most splice link contains the captive nuts.

1. Remove the two left bolts. Loosen, but do not remove, the two right bolts on the splice assembly (see Figure 36).

   NOTE: Do not remove the two right bolts from the splice assemblies. Doing so will permit 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 36: Removing the Left Bolts and Loosening 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 Figure 37).

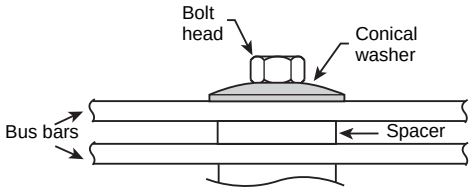
Figure 37: Aligning the Splice and Bus Holes

ENGLISH

Figure 38: Inserting the Splice Bolts

3. Reinstall the two left bolts through the splice links and into the horizontal bus (see Figure 38); make sure the original conical washers are reinstalled with the concave side facing the splice bus (see Figure 39).

Figure 39: Placing 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 Figure 40).

Figure 40: Torquing the Bolts

5. Return to Step 2 on page 35 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.

ENGLISH

Splicing Power Bus in NEMA Type 3R Enclosures

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

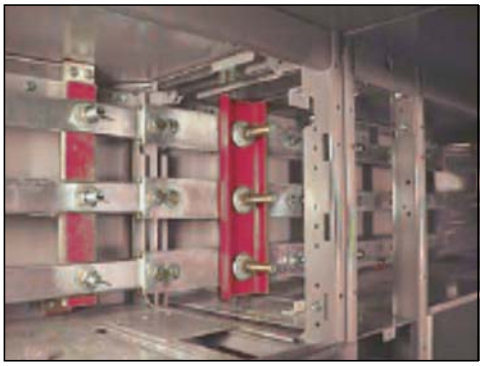
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always 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 this instruction will result in death or serious injury.

Figure 41: Wireway Covers Removed and Horizontal Bus Barriers Open

Figure 42: Loosen Bolts

Figure 43: 85,000 A Bracing Option



This section describes how to splice the power bus of a NEMA Type 3R enclosure (manufactured after February 1998) to the power bus of another NEMA Type 3R section. Bus splicing material is not captive if the section is equipped with offset bus. Refer to “Splicing Offset Horizontal Bus” on page 45 for instructions for splicing offset power bus in NEMA Type 3R enclosures.

To splice power bus, follow these steps.

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 Figure 41). See Appendix A—Removal and Installation of Horizontal Bus Barrier Panels for the steps for removing horizontal bus barriers.

   NOTE: On the integral splice assembly, located on the left side of each phase bus, the number of bus links is one greater than the number of horizontal bus bars. This creates a sandwich splice. The rear-most splice link contains the captive nuts.

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 Figure 42). If the bus has optional 85,000 A bus bracing supplied (see Figure 43), 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 will permit 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.

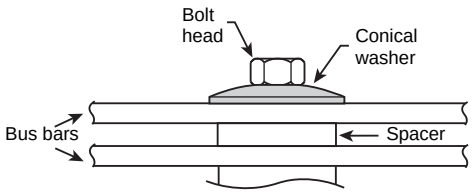
4. Slide the splice assembly to the left until the two left holes are in line with the corresponding holes in the horizontal bus in the left section (see Figure 44).

Figure 44: Slide the Splice Assembly to the Left

Figure 45: Inserting the Splice Bolts

5. Re-install the two left bolts through the splice assembly and into the horizontal bus (see Figure 38 on page 39). Make sure the original conical washers are re-installed with the concave side facing the splice bus (see Figure 46).

Figure 46: Place a Conical Washer Under the Bolt Head



6. Torque the bolts to 31–32 lb-ft (41.87–43.22 N•m). See Figure 47.

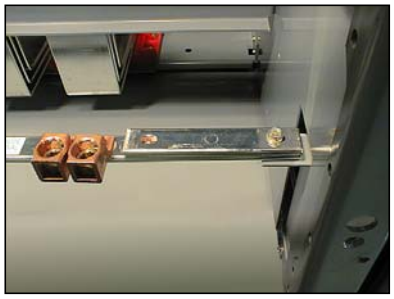
Figure 47: Torque All Bolts

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

ENGLISH

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

Figure 48: Ground Splice Bar as Shipped



⚠ 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 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 this instruction will result in death or serious injury.

To splice the ground bus, follow these steps:

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 Figure 48).
3. Slide the ground splice bar into the right section, aligning the mounting holes (see Figure 49).
4. Replace the ground bar bolts (see Figure 49) 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.

Figure 49: Ground Bar Bolt Replaced

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 NEMA Type 1 or Type 12 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 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 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 this instruction will result in death or serious injury.

To splice the power bus, follow these steps:

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 Figure 50). See Appendix A for the steps for removing horizontal bus barriers.

   NOTE: On the integral splice assembly, located on the left side of each phase bus, the number of bus links is one greater than the number of horizontal bus bars. This creates a sandwich splice. The rear-most splice link contains the captive nuts.

Figure 50: Wireway Covers Removed and Horizontal Bus Barriers Open

Figure 51: Removing the Bolts from the Splice Assembly

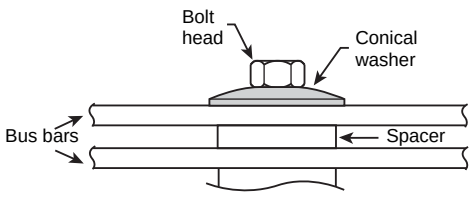
3. Remove all four bolts from each splice assembly (see Figure 51).
4. Slide the splice assembly to the left until the two left holes are in line with the corresponding holes in the horizontal bus on the left section (see Figure 52).

Figure 52: Aligning the Splice and Bus Holes

Figure 53: Inserting the Splice Bolts

5. Reinstall all four bolts through the splice assembly and into the horizontal bus (see Figure 53); make sure the original conical washers are reinstalled with the concave side facing the splice bus (see Figure 54).

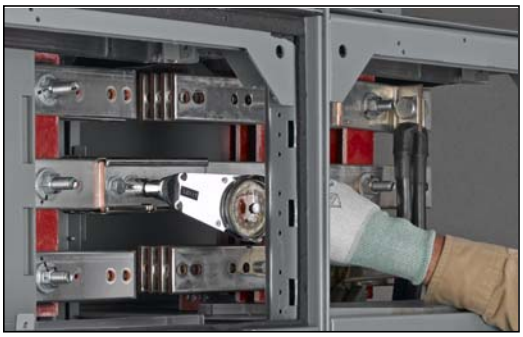
Figure 54: Place a Conical Washer Under the Bolt Head



ENGLISH

6. Torque all bolts on both ends to 31–32 lb-ft (41.87–43.22 N•m). See Figure 55.

Figure 55: 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 Horizontal Bus (Left Side of Structure Only)

⚠ DANGER

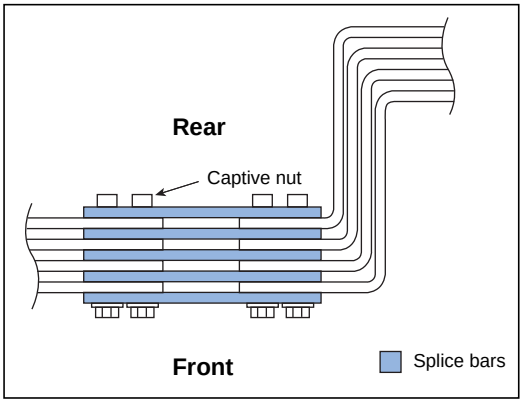
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E 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 this instruction will result in death or serious injury.

NOTES:
- In all structures with an offset 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.
- All splice connections have one more splice bar than the number of horizontal bus bars. The rear-most splice bar contains captive nuts.

Figure 56: Splicing Offset Horizontal Bus



To splice a horizontal bus on the left side of the structure, follow these steps:

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” on page 18 and continuing through page 34. This provides proper alignment of the horizontal bus.
3. Position the rear splice bar (bar with captive nuts; see Figure 56) against the back face of the rear horizontal bus bar.
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 Figure 56).
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 Figure 39 on page 39). Torque these bolts to 31–32 lb-ft (41.87–43.22 N•m) (see Figure 56). If the optional 85,000 A bus bracing is supplied, torque the center nut to 70 lb-ft (94.92 N•m).
7. Repeat Steps 2–6 for each of the three horizontal bus phases.
8. Before energizing the equipment, replace all covers and barriers.

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 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 this instruction 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 allows access to the main lug, main circuit breaker, or main switch compartment. In some cases, the horizontal wire trough cover must be removed.

Pull boxes are available if additional wiring space is required.

Cable connection torque values are listed in Table 4 and Table 5 on page 51.

ENGLISH

Vent Hood Installation for MCCs with 2500 A Horizontal 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 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.
- 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.

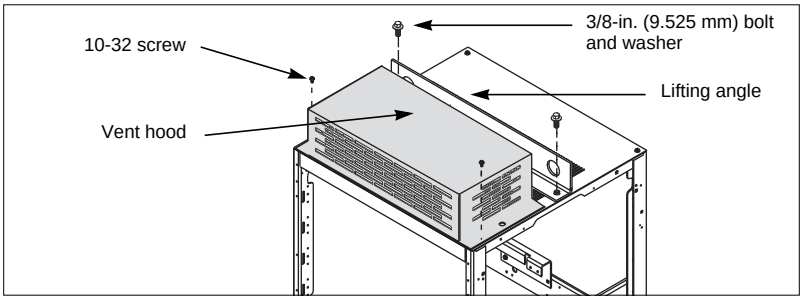
Failure to follow this instruction will result in death or serious injury.

This section contains instructions for installing a vent hood over the top plate vents on a motor control center (MCC) with 2500 A horizontal bus.

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

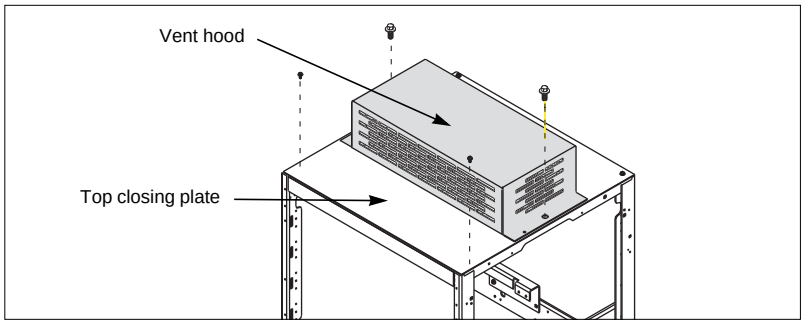
1. Turn off all power supplying this equipment before working on or inside the equipment, and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Remove the 3/8-in. (9.525 mm) bolts, washers, and the lifting angle (see Figure 57).

Figure 57: 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 Figure 58).
4. Once the vent hood is removed, secure the top closing plate by reinstalling the 10-32 screws removed in Step 3 (see Figure 58).

Figure 58: Reposition and Attach the Vent Hood



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).

ENGLISH

Vented Pull Box Installation for MCCs with 2500 A Horizontal 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 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 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 vent hood or by attaching lifting angles to the vent hood.

Failure to follow this instruction will result in death or serious injury.

This section contains instructions for installing a vented pull box on a motor control center with 2500 A horizontal bus. Pull boxes are either 12 or 18 in. (304.8 or 457.2 mm) high and mount on the top of the MCC.

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

Figure 59: Remove the Hardware

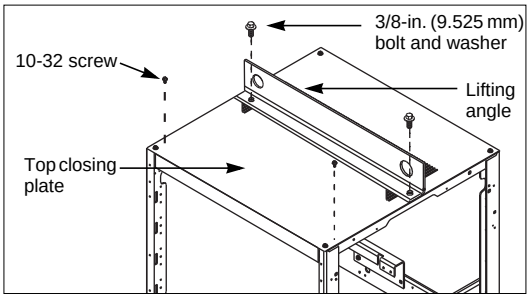
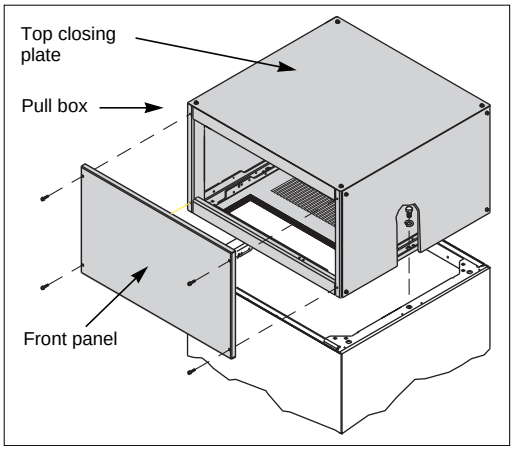


Figure 60: Install the Pull Box



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 Figure 59).
3. Remove the two 10-32 screws that secure the top closing plate to the top of the cabinet (see Figure 59).
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 Figure 60.
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 Figure 60).

Load and Control Wiring

The top and bottom horizontal wire troughs and the vertical wire trough are convenient areas to run incoming line, load, and control wires (see Figure 61). Openings between sections permit wire to pass from one section into the next for interwiring.

Figure 61: Wiring in the Top Horizontal Wire Trough

Control and power wires are routed to each unit via the vertical wire trough. 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 Figure 62). When cutting, be sure not to damage the wires located near the grommet.

Figure 62: Vertical Wire Trough Grommet

Pull-apart control terminals (see Figure 63) 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 63: Pull-apart Type Terminal Blocks

ENGLISH

Crimp Lug Cable Assembly for Cabled Disconnect Unit Installation

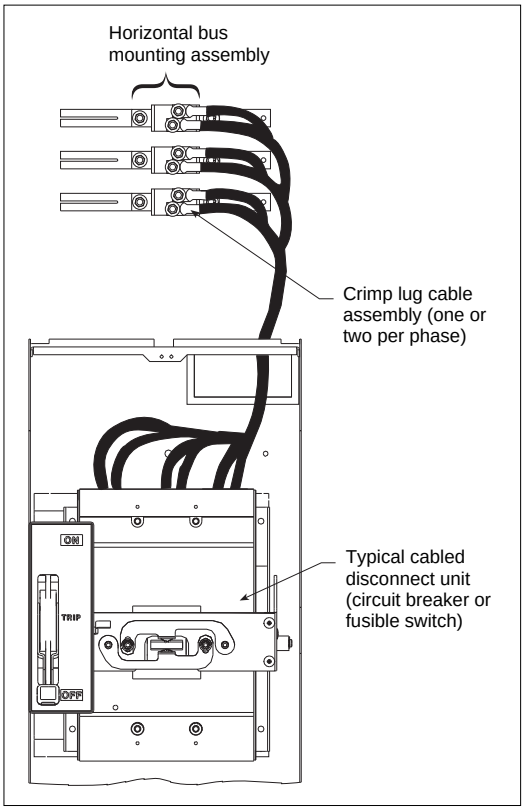
⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E 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.

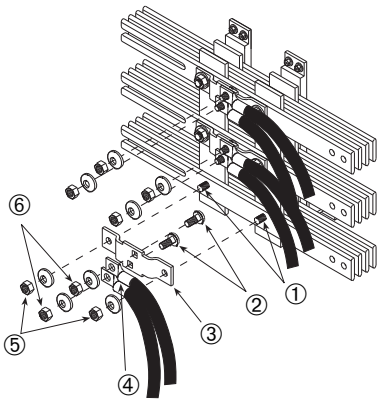
Failure to follow this instruction will result in death or serious injury.

Figure 64: Typical Cabled Disconnect Unit



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.
3. Remove the horizontal bus mounting nuts and washers (item ⑤) from the horizontal bus assembly.
4. Insert the loom bolts (item ②) through the rear of the lug pad (item ③).
5. Using the mounting nuts and washers from Step 3, attach the lug pad to the horizontal bus mounting bolts (item ①).
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 Figure 64); trim cable length as required.
8. Using the lug pad nuts and washers (item ⑥), attach the crimp lug cable assembly (item ④) to the loom bolts on the lug pad.
9. Torque the lug pad nuts to 820–840 lb-in (93–95 N•m).

Figure 65: Typical Horizontal Bus Assembly



① Horizontal bus mounting bolts	④ Crimp lug cable assembly
② Loom bolts	⑤Horizontal bus mounting nuts and washers
③ Lug pad	⑥ Lug pad nuts and washers

Cable Connection Torque Values

The following tables provide main disconnect and branch feeder torque values, which apply to both aluminum and copper conductors.

Figure 66: Main Lug Compartment Torque Connection

Table 4: Connection Torque Values for Main Lug Compartments [1]

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

[1] See Figure 66.

Table 5: Connection Torque Values for Main and Branch Feeders

Frame Size	Ampere Rating	Torque
H	15–30 A 35–150 A	50 lb-in (5.6 N•m) 120 lb-in (13.6 N•m)
J	150–250 A	225 lb-in (25.4 N•m)
FA	15–30 A 35–100 A	35 lb-in (3.9 N•m) 80 lb-in (9.0 N•m)
FC	20–30 A 40–100 A	35 lb-in (4.0 N•m) 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 450–1000 A	300 lb-in (33.9 N•m) 300 lb-in (33.9 N•m)
NT	400–1200 A	600 lb-in (67.8 N•m)
NW (top entry)	400–2500 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 included with the MCC instruction information packet.

Thermal overload selection data is listed on the inside of the vertical wire trough door of each section. This information is also listed in this bulletin; see “Thermal Overload Unit Selection” beginning on page 105. Select proper thermal overloads from the applicable starter size tables.

ENGLISH

Modifying Fuse Clip Locations

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

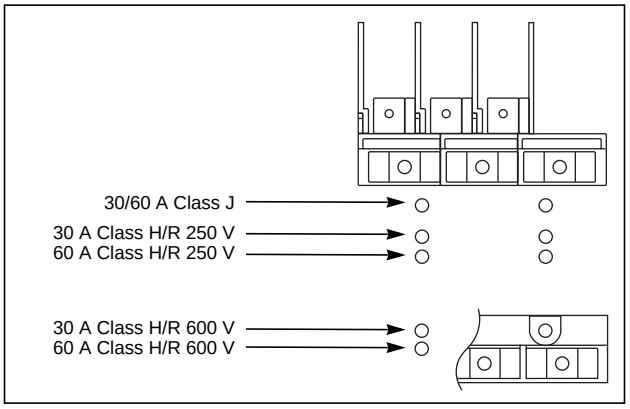
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized switch with door open.
- Turn off switch before removing or installing 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 this instruction 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 Figure 67). Additional clips and bases may be required if changing fuse class.

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.

Figure 67: Size 1 and 2 Fuse Clip Locations



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

ENGLISH

Section 5—Operation

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

Pre-operation Checklist

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

- ❏ Complete the maintenance procedures beginning on page 55 and continuing up to “Insulation Test” on page 66. 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.
- ❏ Perform an insulation test on the MCC (see “Insulation Test” on page 66).
- ❏ If the MCC is equipped with ground fault protection, properly adjust and test the ground fault protective device before energizing.
- ❏ Remove all blocks or other temporary holding means from the electrical devices.
- ❏ Remove any secondary shunt bars from the current transformers. Do not operate a current transformer with its secondary open-circuited.
- ❏ Manually exercise all switches, circuit breakers, and other operator mechanisms to ensure that they are properly aligned and operate freely.
- ❏ Electrically exercise all electrically-operated switches, circuit breakers and other mechanisms (but not under load) to ensure that the devices operate properly. An auxiliary source of control power may be required.
- ❏ Verify proper interval and contact operation of the timers.
- ❏ Verify that proper overload units are installed by checking the overload selection tables against motor full load current. Motor Logic, TeSys™ T, and IEC overload relays (if supplied) do not require thermal units, but are set at the lowest setting at the factory.
- ❏ Verify that all load and remote control connections have been made and that they agree with the wiring diagrams provided.
- ❏ Verify that all ground connections are made properly.
- ❏ Install the covers and close the doors; ensure that all fasteners are properly tightened; verify that all mechanism interlocks function.

For arc-rated applications:

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

Figure 68: Pre-operation Check

ENGLISH

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 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.
- Review the "Pre-operation Checklist" on page 53, ensuring that all items check out.

Failure to follow this instruction will result in death or serious injury.

To energize the MCC:

1. Review the "Pre-operation Checklist" on page 53 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 devices, the feeder devices next, and then the motor starter devices.
5. With all barriers in place and all unit doors closed and latched, turn on the devices with a firm, positive motion.
6. After all disconnect devices are closed, loads such as lighting circuits, starters, contactors, heaters, and motors may be energized.

ENGLISH

Section 6—Maintaining the MCC

Before energizing any new MCC equipment, perform the maintenance described in this section. Perform regular maintenance at least annually, or more frequently if indicated by service conditions and your established maintenance policy. Also perform maintenance following any service interruption, electrical fault, or unusual occurrence.

Examining the Enclosure

Examine the interior and exterior of the MCC for moisture, oil, or other foreign material. Eliminate all foreign material and clean the MCC.

Clean the interior and exterior of the MCC with a vacuum cleaner. (Do not use compressed air; it will redistribute contaminants to other surfaces.) Check the enclosure for damage that might reduce electrical clearances.

Examine the finish of the enclosure. Touch up the paint if necessary. Replace any badly corroded or damaged enclosure parts.

Maintaining 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 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 this instruction will result in death or serious injury.

NOTICE

HAZARD OF EQUIPMENT DAMAGE

- 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 this instruction can result in equipment damage.

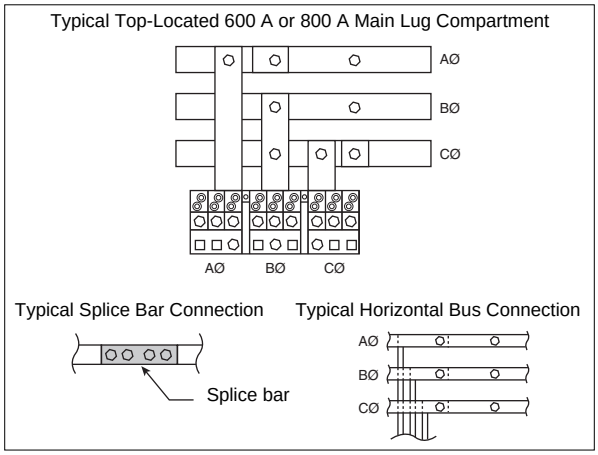
Perform maintenance of bus and incoming line lug connections at least annually, or more frequently if indicated by service conditions and your established maintenance policy. Follow the steps below at the time of installation to locate and tighten any connections that may have loosened during shipment 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 wire trough 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, or pitted. Also replace parts subjected to excessive temperatures.
5. Verify that all bolts at the bus connection points indicated by a hexagon in Figure 69 are in place and properly tightened. Although one specific type of compartment or bus is shown in Figure 69, perform this maintenance on all bolted connections. See Table 6 for torque values.

Table 6: Bus Connection Torque Values

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

Figure 69: Typical Bus Connection Points



ENGLISH

Figure 70: Main Lug Compartment Torque Connection

6. 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 Figure 70). 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” on 51).
7. Inspect all insulators, braces, and barriers; replace any that show signs of arcing damage, tracking, excessive heat, or cracking.

Maintaining the Control Unit

Figure 71: 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 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 this instruction will result in death or serious injury.

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 Figure 71) is being removed from the MCC for maintenance, start with “Removing the Control Unit” beginning on page 57. If maintenance is performed with the control unit installed, start with “Circuit Breaker or Disconnect Switch” on page 63.

Removing the Control Unit

Figure 72: Operator Mechanism in the OFF Position

Figure 73: Loosening Captive Fasteners

⚠ 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 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.
- 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 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 this instruction will result in death or serious injury

The Model 6 MCC is designed for convenient and quick control unit removal and replacement. Follow these steps 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.
2. Move the operator mechanism to the OFF position (see Figure 72).
3. Loosen the captive fasteners (see Figure 73) on the door and open it. Use a properly rated voltmeter to check for live circuits. De-energize any voltage sources.

   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 Figure 74).

Figure 74: 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 Figure 75).

ENGLISH

Figure 75: 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 Figure 76).

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

Figure 76: Disconnected Terminal Blocks

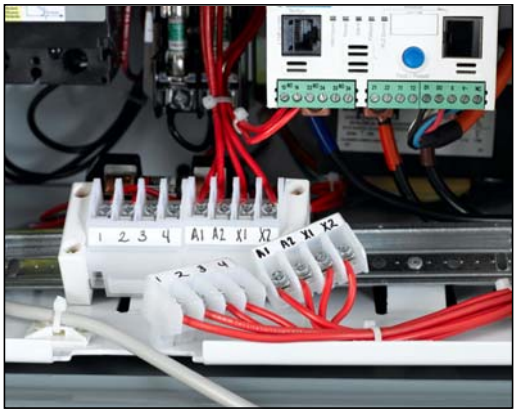


Figure 77: Power Leads and Top of Terminal Blocks Fed Through Wiring Port

6. Push the power leads and the top portion of the control pull-apart terminal blocks through the wiring port and into the vertical wire trough (see Figure 77).
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 Figure 78). This action disconnects the power stabs from the vertical bus. Continue pulling forward until the handles are fully extended.

Figure 78: Pulling the Twin Handle Cam Mechanism Forward

Figure 79: Operating the Mechanism-to-Structure Interlock

8. The operator mechanism-to-structure interlock prevents the control unit from being withdrawn or inserted with the handle in the ON position (see Figure 79).
9. If the withdrawn unit is left in the structure, use appropriate lock-out procedures to avoid re-loading by non-authorized personnel (see Figure 80).

Figure 80: Locked Out Device

Figure 81: Control Unit Removed

10. Remove the control unit from the structure for servicing (see Figure 81). 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 Figure 82).

    NOTE: Lifting plug-on units taller than 24 in. (610 mm) requires two or more persons using special handling precautions. If lifting devices are used, see Figure 6 on page 17 for the proper lifting points. Figure 6 also shows a lifting point that is NOT recommended when lifting larger units.

Figure 82: Control Unit with Bottom Plate Folded Down

ENGLISH

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 Figure 83). Remove the bottom hinge pin first.

    As an alternative to removing the hinge pins, the hinge mounting screws can be removed from the structure through the access holes provided.

Figure 83: 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

The following information is specific to Compac 6, six-inch (52 mm) units. For more information regarding Compac 6 units, refer to “Compac™ 6 Units” beginning on page 97, or the information included with the shipment of the new device.

⚠ 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 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 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 this instruction 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 Figure 84 on page 61).

ENGLISH

Figure 84: Operator Handle in the OFF Position

Figure 85: Loosening Captive Fasteners

3. Loosen the captive fasteners (see Figure 85) 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 Figure 74 on page 57).

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, follow these steps:

   a. Loosen the captive mounting screws holding the plate to the front of the unit.
   b. Remove the plate from the unit (see Figure 86).
   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.

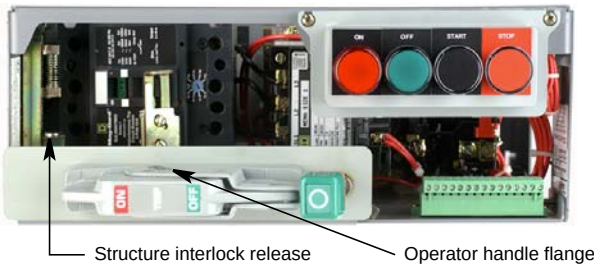
Figure 86: Control Station Plate Removed

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 wire trough.

ENGLISH

8. Grasp the operator handle flange and press down on the structure interlock release (see Figure 87).

Figure 87: 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 prevents 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 EQUIPMENT DAMAGE

Do not remove the protective lubricant from the stabs. If additional lubricant is required, order Schneider Electric electrical joint compound #PJC-7201.

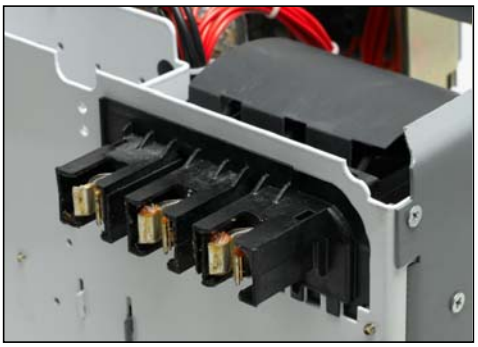
Failure to follow this instruction can result in equipment damage.

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

Stab Assemblies—Inspect the stab assemblies (see Figure 88) for signs of arcing or overheating. **Replace the disconnect assembly (FA/KA type circuit breakers) or the jaw connector assembly (H- or J-frame circuit breakers) immediately if overheating has occurred.** For replacement disconnect assemblies, see “Section 13—Circuit Breaker and Fusible Switch Replacement” beginning on page 111.

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

Figure 88: 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 Figure 89). Test for proper ON, TRIP, OFF, and RESET positions (F-, K-, and L-frame circuit breakers) or ON, TRIP, and OFF positions (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.

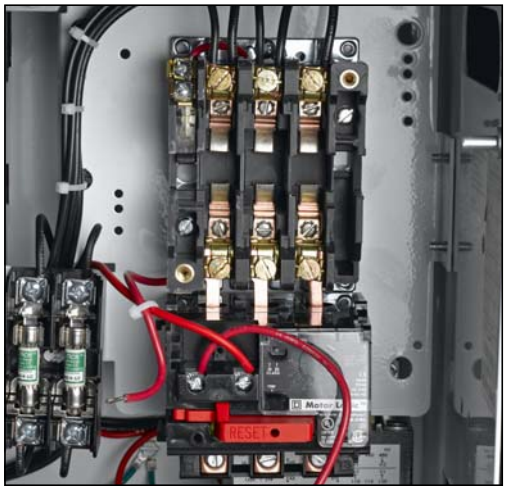
Fuses—Inspect all fuses and fuse clips (see Figure 90). Replace any parts showing signs of overheating or arcing.

Figure 89: Operator Mechanism in the Tripped Position

Figure 90: Inspecting Fuses

Starter Contacts—Check the starter contacts (see Figure 91). Replace any that are badly worn or pitted. (See the contactor instruction bulletin included with the original shipment.)

Figure 91: Starter Contacts



ENGLISH

Figure 92: Control Devices

Control Devices—Check for proper operation of starters, relays, timers, and other control devices (see Figure 92).

Overload Relay—Manually trip the overload relay to ensure proper operation (see Figure 93). Verify that the thermal unit is the proper size for the application. Refer to the thermal unit selection tables on the inside of the vertical wire trough doors.

Figure 93: Tripping the Overload Relay

Wiring and Electrical Connections—Verify that all electrical connections are correct; tighten them if necessary (see Figure 94). Also inspect all power and control wiring, replacing any wire that has worn insulation or shows signs of overheating or cracking.

Figure 94: Tightening Electrical Connections

Starter Interlocks—Check the mechanical interlocks on reversing, multi-speed, or reduced voltage starters.

Barriers/Insulators—Inspect all insulators, braces, and barriers (see Figure 95); replace any that show signs of arcing damage, tracking, excessive heat, or cracking.

Figure 95: 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, follow the steps below:

1. Reinstall all units by reversing Steps 1–12 in "Removing the Control Unit" beginning on page 57.
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.

ENGLISH

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 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 this instruction will result in death or serious injury.

NOTICE

HAZARD OF EQUIPMENT DAMAGE

- Do not use a megohmmeter on:
  - adjustable speed drives
  - solid state soft starters
  - surge protection devices (SPDs)
  - AccuSine™ active harmonic filter units
  - PowerLogic™ Circuit Monitor units
  - PowerLogic Power Meter units
  - capacitor units
  - 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 this instruction can result in equipment damage.

Before an MCC is re-energized (after installation or regular maintenance), 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* and *on*. Make sure the main disconnect is *off* during all insulation tests.

Readings from a megohmmeter with all disconnects *off* will typically be 5–20 megohms. On new equipment that has been stored in a damp area, lower readings may occur during start-up. If the readings are below one megohm, a few branch units may be energized to help dry out the MCC. If additional readings are above one megohm, additional units may be energized. After the equipment has been in operation for 48 hours, readings should be in the 5–20 megohm range.

When megohmmeter readings are taken with the disconnects *on* (except for the main), disconnect all devices completing circuits between phases or between phases and neutral (for example, control transformers). Although readings may be slightly different, observe the one megohm lower limit during start-up.

Record all megohmmeter readings on the insulation resistance chart on 104. Any sudden change in resistance values (even within the acceptable range) may indicate potential insulation failure. Early detection and replacement of faulty insulating components helps avoid equipment damage.

If megohmmeter readings are below 5 megohms (one megohm during start-up) consult your Schneider Electric field sales representative.

Re-energize the equipment in sequence, starting with the main devices, the feeder devices next, and then the motor starter devices. (See “Energizing the MCC” beginning on page 54).

Maintenance After a Fault 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 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 this instruction will result in death or serious injury.

NOTE: After a fault 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 fault may result in structure, component, bus or conductor damage. This damage is caused by mechanical distortion, thermal damage, metal deposits, or smoke from fault currents. After a fault, locate and correct the cause of the fault. 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 fault, perform all maintenance procedures, starting on page 55 and continuing to “Insulation Test” beginning on page 66. Also perform the following procedures after a fault:

1. If the fault 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 “Examining the Enclosure” on 55.

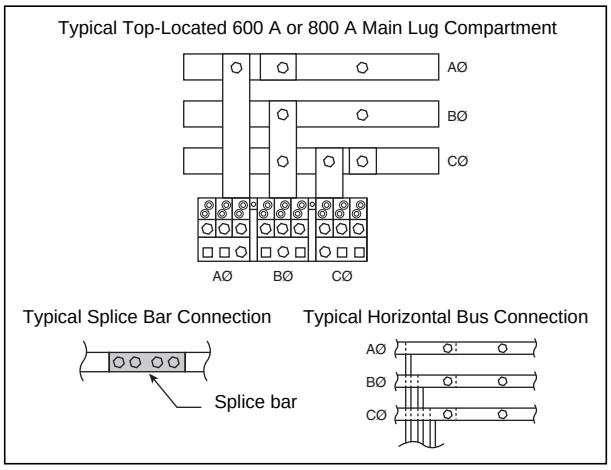
ENGLISH

Table 7: Bus Connection Torque Values

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

4. Examine bus bars and incoming line compartments; tighten all electrical connections to their proper torques. (Table 7 and Figure 96 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.

Figure 96: Typical Bus Connection Points



5. Follow maintenance procedures for control units. Begin with “Maintaining the Control Unit” beginning on page 56, and continue to “Insulation Test” beginning on page 66. Also perform the steps listed below:

   a. Examine the disconnect means for evidence of possible damage. Ensure 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 Figure 97).

   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.

6. Complete an insulation test (see “Insulation Test” beginning on page 66) before placing the MCC back into service.
7. Complete the “Pre-operation Checklist” beginning on page 53.
8. Re-energize the equipment. See“Energizing the MCC” beginning on page 54.

Figure 97: Operating Door Interlock Defeat Mechanism

ENGLISH

Section 7—Motor Logic™ Solid-State Overload Relay (SSOLR)

The following describes 600 V rated MCC starter units equipped with the Motor Logic solid-state overload relay. Read and understand the safety precautions at the beginning of this bulletin before you install, adjust, or perform maintenance on these units. For full details about MCC installation, refer to “Section 4—Installing the MCC” on page 18.

Figure 98: Motor Logic SSOLR

Figure 99: NEMA Rated Compac™ 6 Unit

Figure 100: NEMA Rated Standard Unit

ENGLISH

Motor Logic 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 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 this instruction will result in death or serious injury.

NOTICE

HAZARD OF EQUIPMENT DAMAGE

- **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 this instruction can result in equipment damage.

Remove the starter from the unit to replace the overload (melting alloy/bi-metallic). See “Removing the Control Unit” on page 57.

Terminal blocks (OEKTTBML) should be used 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-inch (52 mm) units is not recommended. The Motor Logic 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 or 75 °C 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. Table 8 provides additional termination data.

Table 8: Lug Types and Wire Sizes

Class 9065 Motor Logic Overload Relay Size①	Rating	Lug Type	Wire Size②	Torque Values④
00B	1.5–4.5 A	Pressure Wire③	14–8 AWG (2.5–6 mm^2)	25 lb-in (2.8 N•m)
00C	3–9 A	Pressure Wire③	14–8 AWG (2.5–6 mm^2)	25 lb-in (2.8 N•m)
0	6–18 A	Box Lug	14–4 AWG (2.5–16 mm^2)	50 lb-in (5.6 N•m)
1	9–27 A	Box Lug	14–4 AWG (2.5–16 mm^2)	50 lb-in (5.6 N•m)
3	30–90 A	Box Lug	14–1/0 AWG (2.5–50 mm^2)	100 lb-in (11.3 N•m)
4	45–135 A	Box Lug	8–250 MCM (6–120 mm^2)	200 lb-in (22.6 N•m)
5	90–270 A	Box Lug	250–500 MCM (120–240 mm^2)	250 lb-in (28.2 N•m)
6	180–540 A	Clamp Lug	250–500 MCM (120–240 mm^2)	375 lb-in (42.4 N•m)

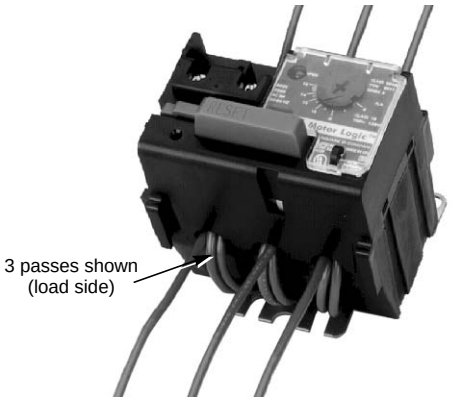
① Refer to the overload relay label next to the adjustment dial.

② 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.

③ Box lug kit may be supplied, suitable for 14 to 4 AWG wire, 50 lb-in (5.6 N•m) tightening torque.

④ Does not apply to Compac 6 units.

Figure 101: Looping Passes

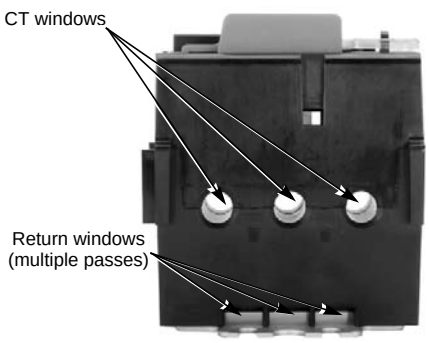


Size 00B, 00C, 0, and 1 relays have conductor (CT) windows through which the motor leads must pass before being connected to the load terminals on the contactor (T1, T2, and T3). By allowing multiple passes (turns) of the load leads through these CT windows, overload protection can be provided for motors with a full-load current lower than the specified operating range. Two passes of the load leads through each window effectively increase (by a multiple of two) the current that the overload relay senses. Three passes effectively increase 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 Figure 101).

Passes should begin from the load side of the overload through the CT window and return via the windows provided between the baseplate and overload (see Figure 102). 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 “Motor Logic Retrofit Applications” on page 70 for information concerning retrofit.

Figure 102: Motor Logic Overload (Bottom View)



ENGLISH

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 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 this instruction 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 (Figure 103) of starter units equipped with the Motor Logic overload relay.

Figure 103: 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

ENGLISH

Section 8—Mag-Gard™ and PowerPact™ Motor Circuit Protector 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. Mag-Gard or PowerPact Motor Circuit Protectors are the standard motor circuit protectors used in Model 6 MCCs.

Adjusting Mag-Gard or PowerPact 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 Motor Circuit Protectors, the Full Load Amp Setting (FLA) is factory set to the lowest position and the instantaneous trip setting (Im) is factory set to the Auto 1 position. 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 both Mag-Gard and PowerPact 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 the *PowerPact Motor Circuit Protector Settings* instruction bulletin (48940-260-01) shipped with the equipment.

⚠ 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 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 this instruction will result in death or serious injury.

Figure 104: Mag-Gard Magnetic Trip Adjustment

To access the Mag-Gard trip adjustment dial:

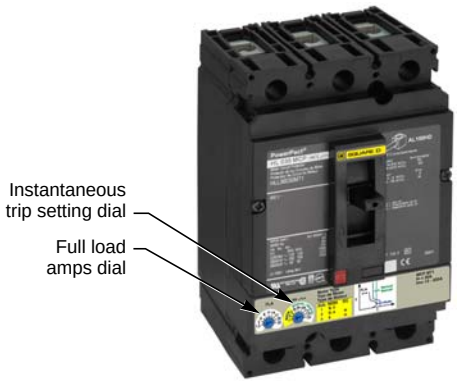
1. Turn off all power supplying this equipment before working on or inside the equipment, and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm the power is off.
2. Place the unit handle in the OFF position and open the door.
3. While pushing the door interlock lever forward, trip the circuit breaker by pressing the yellow test button (see Figure 104). The disconnect handle will automatically move up, allowing access to the adjustment dial.

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.

ENGLISH

Figure 105: PowerPact H- and J-frame Magnetic Trip Adjustment



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

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 the PowerPact Motor Circuit Protector Settings instruction bulletin (48940-260-01) shipped with the equipment.

NOTES:
- Select replacement Mag-Gard or PowerPact 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 or PowerPact selection tables in the Square D 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.

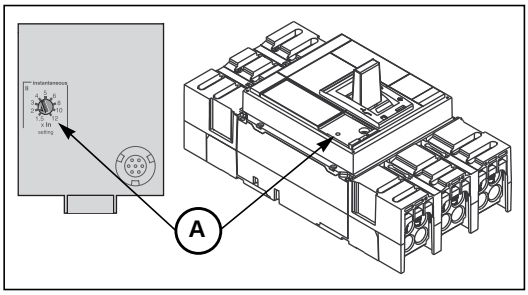
Figure 106: PowerPact L-frame Instantaneous Trip Adjustment

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 Figure 106. 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. This instruction bulletin is shipped with the equipment.

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.

Figure 107: PowerPact P-frame Instantaneous Trip Adjustment



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. Make adjustments as follows:
   a. For ET1.0I and ET1.0M electronic trip units, adjust instantaneous trip (Ii) by adjusting switch A (see Figure 107). Switch settings are multiples of the frame rating.
   b. For Micrologic electronic trip units, see the instruction bulletin shipped with the circuit breaker.

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.

Section 9—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 at all times. With this information, your staff can respond to potential problems proactively. Real-time access to information and records of last faults 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 Table 2 on page 12 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 Technical Library at www.schneider-electric.us.

ENGLISH

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 Table 9:

Table 9: Pin Outs for iMCC Networks

Network	Cable Color				
	Blue	White	Red	Black	Bare
Modbus (2-wire RS-485)	Signal +	Signal -	Not used		Shield
PROFIBUS	A (Neg)	B (Pos)			
DeviceNet	CAN_L	CAN_H	V +	V -	
CANopen					

NOTICE

HAZARD OF EQUIPMENT DAMAGE

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

Failure to follow this instruction can result in equipment damage.

Network Cabling

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

In order 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 male end of the trunk cable to the female 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 will typically need to use a bridge/repeater to connect the communication network.

Terminating Resistors

In order 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

Table 10: Network Connection Pin Outs

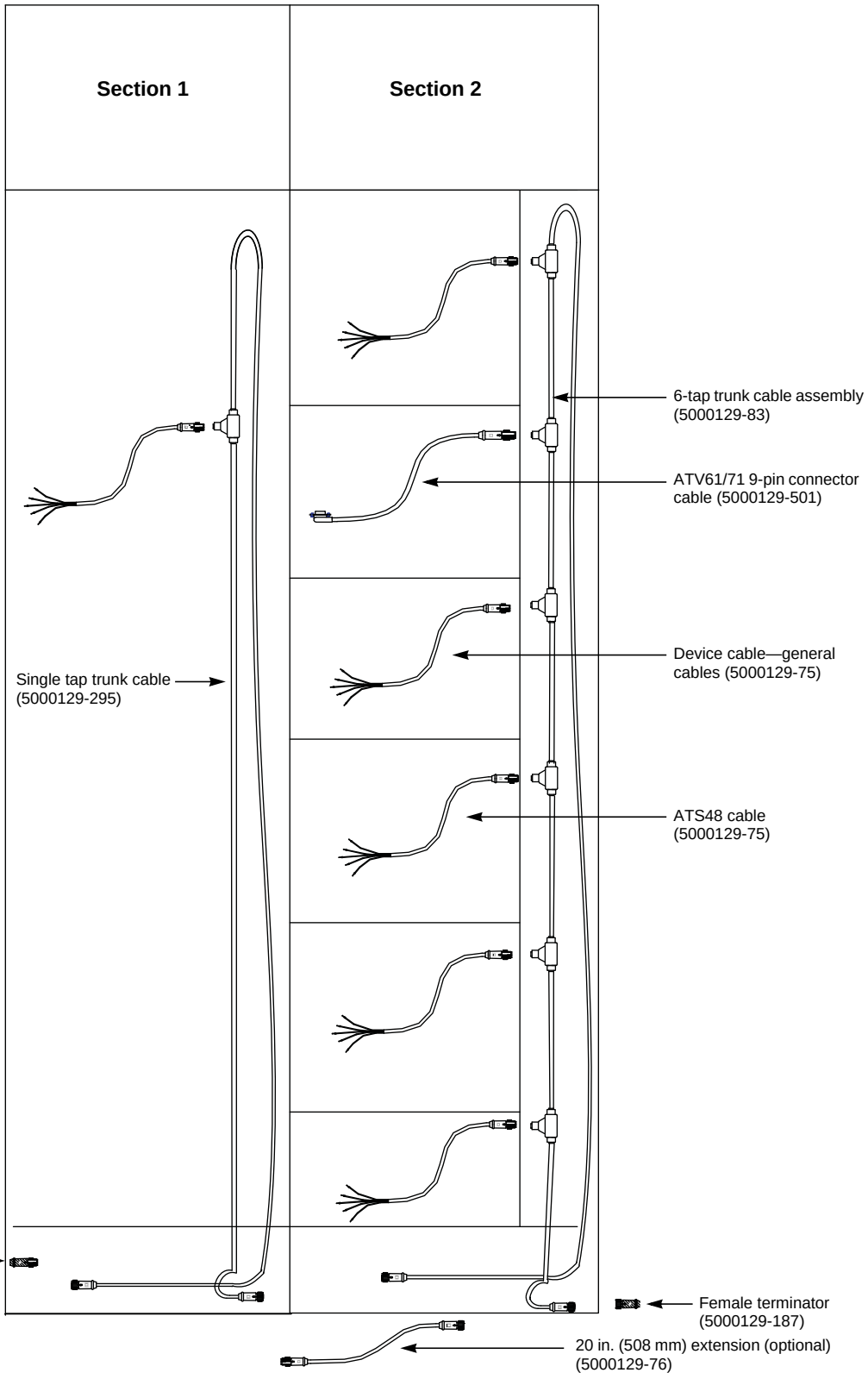
Field Connection Termination	5-Pin Female/Male	
	Modbus and PROFIBUS	DeviceNet and CANopen
Pin # 1	Shield	Shield
Pin # 2	Unused	Red
Pin # 3	Unused	Black
Pin # 4	White	White
Pin # 5	Blue	Blue

Follow the steps below to connect a cable directly to the network via the iMCC network cable.

1. Determine which end (male or female) 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 the table at left.

ENGLISH

Figure 108: Typical Cabling Scheme for Modbus® Two-Wire

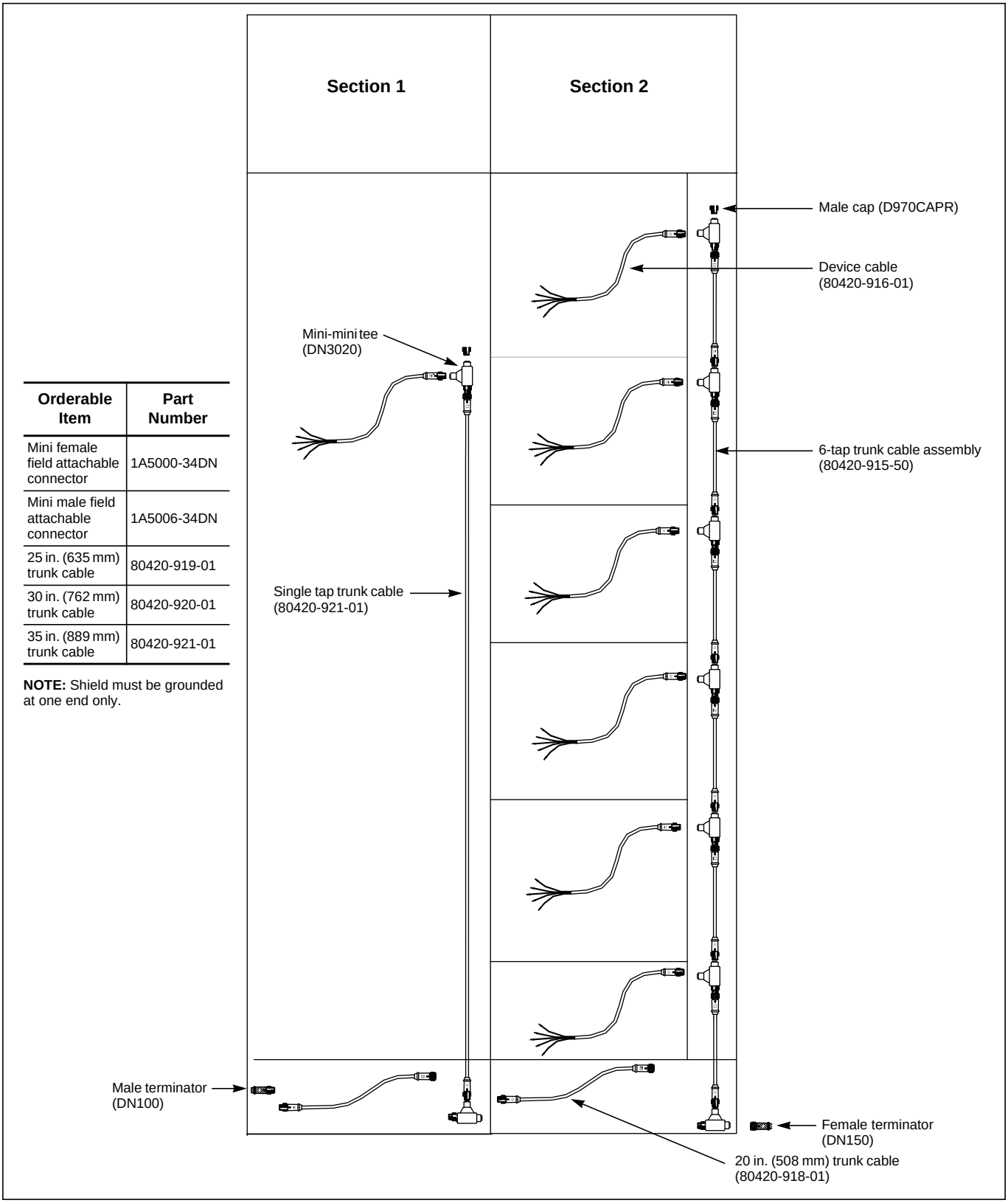


Orderable Item	Part Number
Cap for unused male end or tap	3463512-1
Cap for unused female end or tap	3463512-3
Mini female field attachable connector	5000129-287
Mini male field attachable connector	5000129-292
20 in. (508 mm) trunk extension	5000129-76
25 in. (635 mm) trunk extension	5000129-78
30 in.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

NOTE: Shield must be grounded at one end only.

ENGLISH

Figure 109: Typical Cabling Scheme for DeviceNet™ and CANopen (8A cable)

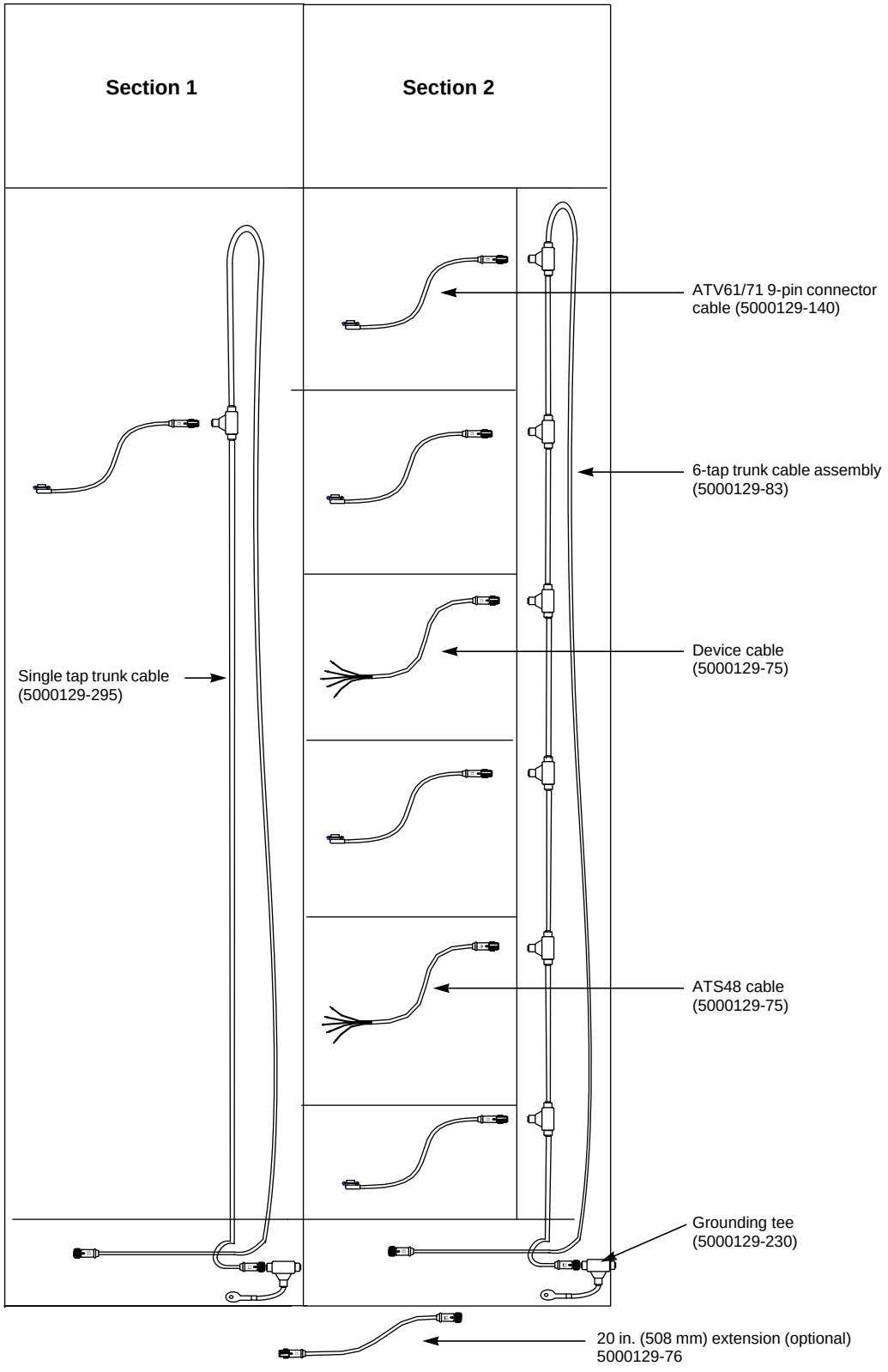


Orderable Item	Part Number
Mini female field attachable connector	1A5000-34DN
Mini male field attachable connector	1A5006-34DN
25 in. (635 mm) trunk cable	80420-919-01
30 in. (762 mm) trunk cable	80420-920-01
35 in. (889 mm) trunk cable	80420-921-01

NOTE: Shield must be grounded at one end only.

ENGLISH

Figure 110: Typical Cabling Scheme for PROFIBUS



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

NOTE: Shield must be grounded in all sections.

NOTE: The network is terminated in a Termination Unit.

ENGLISH

Operation

This section contains pre-operation checklists, energizing procedures, and remote and local programming procedures for TeSys™ T and Motor Logic Plus™ motor protection relays, 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

- ❑ Complete the maintenance procedures beginning on page 55 and continuing up to “Insulation Test” on page 66. 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.
- ❑ Perform an insulation test on the MCC (see “Insulation Test” on page 66).
- ❑ If the MCC is equipped with ground fault protection, properly adjust and test the ground fault protective device before energizing.
- ❑ Remove all blocks or other temporary holding means from the electrical devices.
- ❑ Remove any secondary shunt bars from the current transformers. Do not operate a current transformer with its secondary shunt bars open-circuited.
- ❑ Manually exercise all switches, circuit breakers, and other operator mechanisms to ensure that they are properly aligned and operate freely.
- ❑ Electrically exercise all electrically-operated switches, circuit breakers, and other mechanisms (but not under load) to ensure that the devices operate properly. This may require an auxiliary source of control power.
- ❑ Verify proper interval and contact operation of the timers.
- ❑ Set the Motor Logic Plus overcurrent setting to the maximum service factor amperage of the motor to ensure that the proper overload protection is provided. The Motor Logic Plus overcurrent threshold is set at the lowest setting at the factory. Verify that all other settings are optimized for the application.
- ❑ The Parameter Settings Sheet lists all the parameters that have been changed from the original, default settings. Any settings not shown on this sheet will retain their original, default values.
- ❑ Verify that all load and remote control connections have been made and that they agree with the wiring diagrams provided.
- ❑ Verify that all ground connections are made properly.
- ❑ Install the covers and close the doors; verify that they are all properly tightened.

iMCC Communications

NOTICE

HAZARD OF EQUIPMENT DAMAGE

Do not use excessive force when making cabling connections. Connections are keyed to ensure that pins are properly aligned.

Failure to follow this instruction 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 feet (457 m).
- Verify that the MCC cables are connected between shipping splits. See “Cables Between Shipping Splits” on page 76 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” on page 91 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 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.
- Review the “Pre-operation Checklists” beginning on page 80, and verify that all items check out.

Failure to follow this instruction will result in death or serious injury.

To energize the MCC:

1. Review the “Pre-operation Checklists” on page 80 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 devices, the feeder devices next, and then the motor starter devices.
5. With all barriers in place and all unit doors closed and latched, turn on the devices 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.

ENGLISH

Motor Logic Plus Local Programming

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

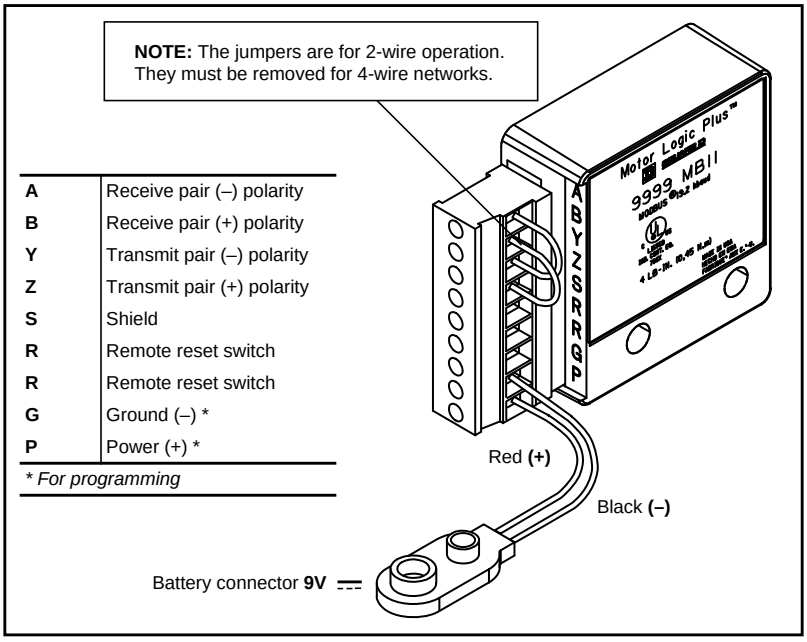
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- Turn off all power supplying this equipment before working on or inside the Motor Control Center.
- Use a properly rated voltage sensing device to confirm that all power is off. 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 this instruction will result in death or serious injury.

Local programming can be used for Motor Logic Plus setpoint programming and error readout purposes. Verify that the display is unlocked (the default setting), and disconnect all power before performing the steps below to accomplish local programming:

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. Connect a 9 V supply to the “P” and “G” terminals using the supplied connector, part # 80445-519-50 (see Figure 111).

Figure 111: Motor Logic Plus Communication Module Terminals



3. Turn the “Mode Select” switch to the parameter you are programming. Refer to bulletin # 30072-013-98_ (see “iMCC-Related Literature” on page 12) for a list of parameters.
4. Press and hold the “Reset/Program” button.

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

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

Error messages are displayed on the 3-digit LED display when harmful conditions are detected. Table 11 contains a list of the error message codes and their definitions.

Table 11: Local Error 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 failure
GrF	Tripped on ground fault
HI	Tripped on high voltage
Lo	Tripped on low voltage
rP	Incoming phases have been reversed
oFF	A stop command was issued from a remote source

Motor Logic Plus Remote Programming

Remote programming can be used for setpoint programming and data acquisition purposes. Follow the steps below to remotely configure the Motor Logic Plus overload. (See Table 12 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 Table 13 on page 84 for a register map with a list of parameters. For more detailed information, refer to bulletin # 30072-013-102_. See Table 14 on page 85 and Table 15 on page 86 to determine the location and addressing of parameters within the Motor Logic Plus register map.
4. Restart the overload by using code “01H.”

Table 12: Command Line Codes

Code	Command
01H	Start/reset
02H	Stop
03H	Display lock
04H	Display unlock
05H	Network program enable
06H	Network program disable
07H	Network watchdog enable★
08H	Network watchdog disable★

★ The network watchdog feature disables the Motor Logic Plus SSOLR when the device does not receive a valid communication within a 10 s period.

ENGLISH

Table 13: Motor Logic Plus Address Descriptions

Operation	Address		Code	Description	Notes
	RAM	Relative★			
Read only (all registers are 16-bit words)	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 error (RTE) and trip indicator (TI)	8-bit nibble-coded RTE; 8-bit coded TI
	B0	1A8	FH	Fault history	Fault 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 Table 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	Low voltage threshold	170 V~ to HV (600 V~ model; 450 V~ to HV)
	CC	1B6	HV	High voltage threshold	LV to 528 V~ (600 V~ model; LV to 660 V~)
Read only (all registers are 16-bit words)	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)*
	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 slave address	01–99

★ Required for PowerLogic software.

ENGLISH

Table 14: Read-Only Registers

RAM Address	Relative Address★	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★★	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/TRIP RN	Bit-real time errors and trip indicator	**Bit #**	**TRIPRN**	**ERCODE**
				0	Fault lockout	Low voltage
				1	Remote stop	High voltage
				2	Contactor failure	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★★	NIBBLE_CODED -4 fault history	The four-fault 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 fault, bits 5–8 = 2nd last fault, bits 9–12 = 3rd last fault, and bits 13–16 = 4th last fault. These four bits indicate a hex value that corresponds to the following faults:		
				01		High voltage
				02		Low voltage
				03		N/A
				04		Contactor failure
				05		Phase reversal
				06		Single phase
				07		Ground fault
				08		Current unbalance
				09		Remote off command
				10		Overcurrent
				11		Undercurrent
B2	1A9	PID★★	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★★	Remaining restart delay RD1	Seconds		
C2	1B1	RD2★★	Remaining restart delay RD2	Seconds		
C4	1B2	RD3★★	Remaining restart delay RD3	Seconds		

★ Must be used with PowerLogic software
★★ Can only be viewed via network

ENGLISH

Table 15: Read/Write Registers

RAM Address	Relative Address	Code	Description	Range	Default	
C6	1B3	COM-LINE	Command Line★	Reset/run/stop, display lock, network configuration enable	**Motor Logic 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★) - HV setting	435	
CC	1B6	HV	High voltage threshold	LV setting - 528 V (660 V★)	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 faults 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
E2	1C1	#RF	# Restarts all faults 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 slave address	01–99	1	

★ Can only be viewed via network

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 at the beginning of this bulletin before you install, adjust, or perform maintenance on these units. For full details about MCC installation, refer to “Section 4—Installing the MCC” on page 18.

Figure 112: TeSys T Controllers

Modbus®

DeviceNet™

PROFIBUS

Ethernet

CANopen

Figure 113: NEMA Rated Control Unit (TeSys T Modbus)

ENGLISH

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 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 this instruction 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 no. 8998DB1004 for upgrade of the Motor Logic™ Plus or Motor Logic 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” on page 57.

Terminal blocks (OEKTTBML) should be used 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 or 75 °C 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.

- Passes should begin 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. Refer to “TeSys T Retrofit Applications” on page 88 for information concerning retrofit.

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 or CSA Z462.
- 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 this instruction will result in death or serious injury.

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

The Parameter Settings Sheet lists all the parameters that have been set by the factory specific to each device application. Any settings not shown on the Parameter Settings Sheet will be retained at device default values. To return the Tesys 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:
   - — If supplied as a unit-mounted option, the connection will be made at the factory.

     or
   - — Connect the programming kit directly to the ‘LTME or HMI’ port on the front of theTesys T controller.

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

   NOTE: For additional details, refer to the *TeSys T LTM CU Control Operator Unit User’s Manual* and the *TeSys T LTM R Motor Management Controller User's Manual* specific to your network communication protocol. (See “iMCC-Related Literature” on page 12 for the document numbers.)

ENGLISH

Configuring with PowerSuite™ Software

The PowerSuite Software kit contains one PowerSuite CD, one USB-to-RS-485 converter, and one 10 ft. (3 m) cable.

1. Install the PowerSuite software on your PC.
2. Set the top switch on the converter to 0-TER MULT.
3. Set the Polarization switch on the side of the converter to OFF.
4. Connect one end of the cable to the RJ-45 port on the converter.
5. Connect the other end of the cable to the TeSys T controller.
6. Connect the USB connector on the converter to a USB port on your PC. (The converter uses the UniTelway/Modbus driver that is included with PowerSuite.)
7. Set the full load current (FLC)
   - — Go to Settings -> Thermal -> FLC1 (OC1)
   - — Enter FLC1 as a % of FLCmax.
8. Convert the amperes to FLC Settings
   - — FLC values are stored as a percentage of FLCmax in the TeSys T:

     FLC (in %) = FLC (in A) / FLCmax

NOTES: For details about the PowerSuite software, refer to the *TeSys T LTM R Motor Management Controller User's Manual* specific to your network communication protocol.

Verify the proper configuration of the TeSys T controller per your application.

PowerLogic™ Power Meter Series 800

Instructions for performing local and remote programming for the Power Meter Series 800 are contained in Schneider Electric instruction bulletins # 63230-500-200 and 63230-500-224 (see the “iMCC-Related Literature” table on 12).

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 the “iMCC-Related Literature” table on 12).

Altivar™ 61/71

To perform local setpoint programming, please refer to Schneider Electric bulletin *atv71_Programming_Manual_en* (see the “iMCC-Related Literature” table on page 12).

To perform remote setpoint programming, please refer to Schneider Electric bulletin *atv71_Parameters_en* (see the “iMCC-Related Literature” table on page 12).

Altistart™ 48

The Altistart 48 is factory set to operate without adjustment along with many applications. The Altistart 48 is set up with the following parameters:

Protocol	Address	Speed	Format	Parity
Modbus RTU	Customer defined	19,200 baud	8 data bits, 1 stop bit	Even

Two switches on the back of the keypad provide three levels of access to the parameters. Each can be set to avoid adjustment of the parameters, as is the case when shipped from the factory. The parameters are locked at the factory to avoid accidental modification. To adjust parameters, you must first remove the communications module from the front of the unit door, and then change the DIP switch settings.

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, *PowerPact™ H-, J-, and L-Frame Circuit Breakers with Micrologic™ Trip Units—User Guide*.

Device Addressing

Unless specified otherwise, MCC devices are assigned addresses starting from 2.

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, PowerSuite, or Motor Logic Plus Solutions—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.

ENGLISH

Section 10—Expansion

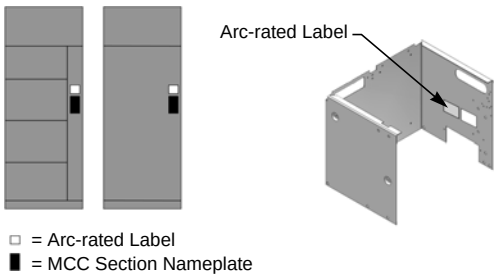
The modular design of MCCs permits easy expansion to keep pace with an expanding electrical system. When space is available in the existing MCC, starter units can easily be added. When no more starter unit mounting space is available, vertical sections can be added to provide additional space. All prepared spaces or leftover spaces must be filled with arc-rated empty units on arc-rated Model 6 MCCs.

Starter units may be rearranged or replaced with larger units. In most cases, a Size 2 starter unit can replace a Size 1 unit with no change in mounting space.

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 Figure 114. Customer must provide the previous arc-rated MCC factory order number when ordering additional arc-rated MCC equipment from factory.

Figure 114: Typical Arc-Rated Label Locations on Sections and Units



When ordering additional MCC equipment, include the following information:

- Type of equipment being supplied
- Supply voltage, frequency, system type
- NEMA/EEMAC enclosure type
- Enclosure finish
- Control circuit voltage and frequency
- Optional control circuit components required (control transformers, push buttons, pilot lights, selector switches, etc.)
- Special features
- The factory order number of the original MCC (the number is stamped into the structure nameplate on the vertical wire trough 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 dimensions

⚠ 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 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 this instruction will result in death or serious injury.

Modifying MCC Units

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 Figure 78 on page 58). One notable exception is the Compac™ 6 control unit (see Figure 84 on page 61), 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” below.

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” on page 56 of this manual.
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. Make sure that proper electrical spacing[1] between uninsulated live parts of opposite polarity and an exposed or uninsulated dead metal part is maintained.
5. Use a vacuum cleaner to remove all debris left in the unit as a result of 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 on 56 of this manual.
7. Ensure that vertical bus closing plugs are in place (with the exception of one plug where the MCC unit will stab on the vertical bus). If other vertical bus closing plugs are not in the proper position, ensure 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 on 66.
9. Look for and clear any obstructions that would not permit proper energizing of the MCC unit.
10. Reinstall the MCC unit and follow the procedures for “Energizing the MCC” on page 54 of this manual.

[1] Electrical spacings are specified in UL 845, Tables 18 and 19. Electrical spacing in a control or metering circuit or within a motor control unit (251–600 V) is 0.375 in. (10 mm) through air and 0.50 in. (13 mm) over surface; for power circuits of main and feeder units, it is 1 in. (25 mm) through air and 2 in. (51 mm) over surface.

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. Make sure that proper electrical spacing[1] between uninsulated live parts of opposite polarity and an exposed or uninsulated dead metal part is maintained.
5. Use a vacuum cleaner to remove all debris left in the unit as a result of 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 on 56 of this manual.
7. Use a megohmmeter to perform an insulation test as outlined on 66.
8. Follow the procedures for “Energizing the MCC” on page 54.

Installing Additional MCC 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. Position the midshelf (Figure 115, Item A) in the appropriate area of the structure.

   NOTE: Arc-rated MCCs have a midshelf specifically designed for arc-rated MCCs (Schneider Electric part no. 80466-007-50; see Figure 116 on page 95). This midshelf includes arc pressure relief flaps and must be used when installing arc-rated MCC units to maintain the arc containment ratings.

Figure 115: Shelf and Door Installation

Table 16: Shelf Installation Kit Parts

Description	Qty	Assemble per	Item
Shelf	2①	Steps 2 and 3	A
Flat head screws	4	Step 3	D
Unit door	1	Step 4	F
Hex head screws	4②	Steps 4 and 5	H
Quarter turn fastener receptacle	2②	Step 5	J

① Shelves are furnished with order. Structure may already have shelf mounted in position.

② All necessary hardware for typical shelf installation is included. Door installation may require additional hardware.

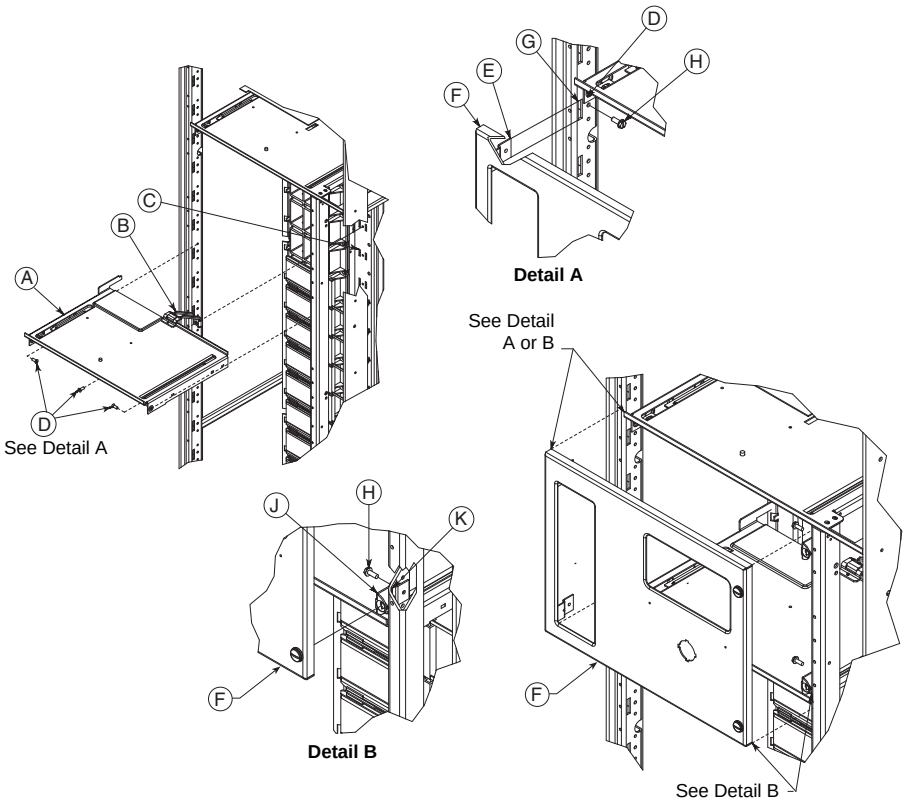


Figure 116: Midshelf for Arc-Rated MCCs

ENGLISH

3. Place the mounting foot (Figure 115, Item B) of the shelf into the mounting pan slots (Item C). Secure the shelf at the mounting foot end, the left side, and the right side with flat head screws (Detail A, Item D).
4. Install the hinge leaves of the door (Detail A, Item E) into the hinge slots (Item G), which are on the structure corner channel. Fasten the hinge leaves to the structure corner channel using hex head screws (Item H).
5. Install fastener receptacles (Detail B, Item J) into the bracket slots (Item K) and fasten with hex head screws (Item H).

Figure 117: Cutting the Vertical Wire Trough Grommet (when supplied)

6. If a grommeted wireway barrier is supplied, locate the vertical wire trough grommet (see Figure 117) 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” on page 49.
7. Remove the manual bus shutter(s) (see Figure 118) to allow insertion of the new control unit; slide out the top bus shutter.

   NOTE: Do not remove the tether.

Figure 118: Removing the Manual Bus Shutter

Figure 119: Engaging the Cam Mechanism

8. 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 (see Figure 119).
9. Press the handles inward until they are flush with the face of the MCC (see Figure 120).

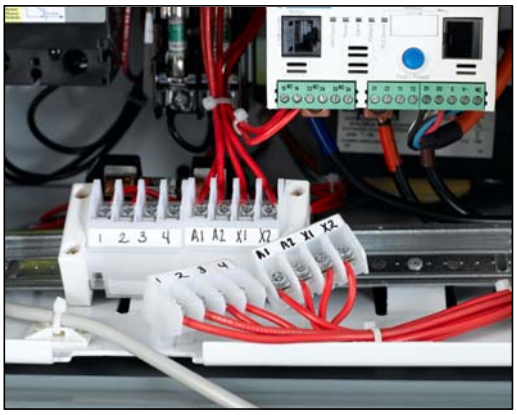
   NOTE: Compac 6 units do not have the twin handle cam mechanism.

Figure 120: Handles Flush with the Front of the MCC

10. Turn the screw on the control unit lock-in panel (when supplied) located at the bottom front of the control unit (see Figure 121), until the lock-in pawl is latched to the support shelf below the control unit.

Figure 121: Tightening the Control Unit Lock-in Panel (when supplied)

Figure 122: Power Leads Connected to Power Terminals



11. Pull the power leads from the vertical wire trough through the grommet and into the control unit. Connect them to the power terminals in the control unit (see Figure 122).

    NOTE: To provide additional working clearance, grasp the control station plate on the right side and pull gently, allowing it to hinge open (see Figure 123).

12. Pull the control leads from the vertical wire trough through the grommet and connect them to the terminals of the top (removable) portion of the control pull-apart terminal blocks (see Figure 123).
13. Close the unit door and secure the fasteners.

Figure 123: Connecting Control Leads to the Terminal Blocks

Compac™ 6 Units

The following describes how to add a Compac 6, six-inch (52 mm) unit to an MCC section. Before installing these units, read and understand the safety precautions at the beginning of this section. For full details about MCC installation, refer to “Section 4—Installing the MCC” on page 18.

NOTE: Arc-rated MCCs must only be expanded or added onto with arc-rated units/sections to maintain the arc containment ratings. Customer must provide the previous arc-rated MCC factory order number when ordering additional arc-rated MCC equipment from the factory.

ENGLISH

Control and Load Wiring

⚠ DANGER

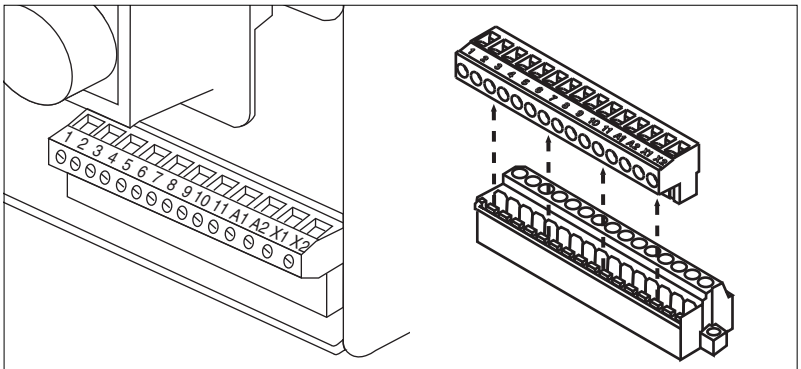
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or 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 this instruction will result in death or serious injury.

Pull-apart control terminals (see Figure 124) are mounted on the floor of the unit adjacent to the wiring port on the right side. Terminate field control wiring on the removable portion of the block.

Figure 124: Pull-apart Terminals



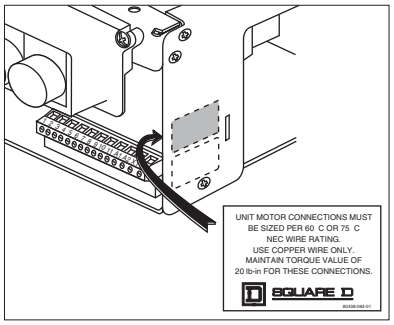
10 A Control Wire Terminal Block

- 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).

Cable Connection Torque Values

Refer to the torque label on the right inside wall of the unit for load terminal wire and torque requirements (see Figure 125).

Figure 125: Typical Unit Torque Label



Fuse clips in six-inch (52 mm) units accommodate 600 V, Class J fuses only. The switch mounted fuse base (see Figure 126) is configured either for 30 A or 60 A fuses. The bottom plate mounted fuse base accepts 100 A fuses.

Figure 126: Fuse Bases

Switch Mounted Fuse Base

Bottom Plate Mounted Fuse Base

Compac 6 Control Unit Installation

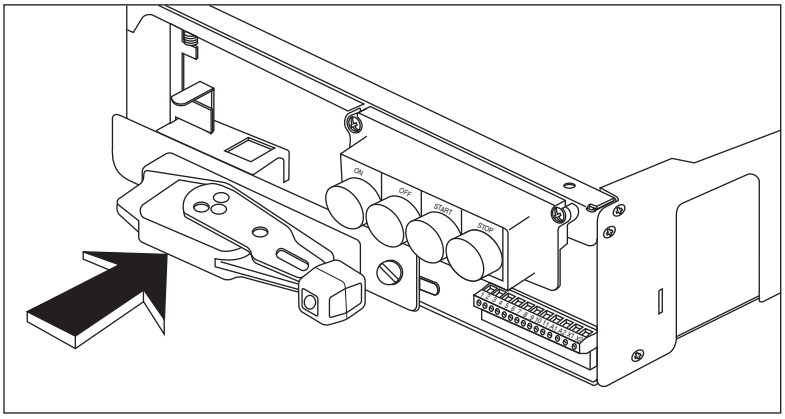
If Compac 6 control units have been removed from the structure, reinstall them when maintenance work on them is complete. For control unit replacement, follow these instructions:

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. Ensure that the operator handle of the control unit is in the OFF position.
3. Place the control unit into the structure in the proper location.
4. 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 (Figure 127).

   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.

5. Retrieve the pull-apart terminal block from the vertical wire trough in through the wiring port.

Figure 127: Reinstalling the Compac 6 Control Unit



6. Connect the pull-apart terminal block to the control unit. If necessary, remove the control panel. Replace the control panel when the connection is made.
7. Refer to the termination tags placed during removal of the control unit (Step 4 on 61) to properly connect the power wiring to the starter terminals.
8. Shut the door and tighten the fasteners (see Detail B of Figure 115 on page 95).

ENGLISH

Section 11—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 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 this instruction will result in death or serious injury.

The following table 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. Damage caused by water or flood conditions requires special treatment. Contact your Schneider Electric field sales representative.

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

ENGLISH

Table 17: 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 (3-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 fault. Ensure 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 an environmentally safe (CFC-free) contact cleaner. Reduce the entry of foreign matter into the enclosure. 6. Remove the fault; 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; failure of the magnet to 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.
	Failure To Trip	1. Incorrect thermal units. 2. Mechanical binding, dirt, corrosion, etc. 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 a fault and correct the condition. Replace the contact or the entire relay as necessary.

ENGLISH

Table 17: Motor Control Center Troubleshooting Chart *(continued)*

Part	Problem	Cause	Remedy
Motor Logic™ Overload Relays	Overload relay trips on start-up (after more than 3 seconds).	1. Load is too heavy for motor horsepower.	1. Remove excessive motor load or resize motor.
		2. Wrong overload trip class selected for application.	2. Use Trip Class 20 overload relay instead of Trip Class 10.
		3. Incorrect overload FLA setting.	3. Set FLA adjustment according to motor full-load current.
		4. Use of electronic DC injection brake.	4. Do not use electronic DC injection brakes with solid-state overload relay.
	Overload relay trips on start-up (in less than 3 seconds).	1. Motor branch circuit fuse blown.	1. Replace blown motor branch circuit fuse(s).
		2. Loose motor branch circuit.	2. Tighten motor branch circuit connection.
		3. Motor circuit is not 3-phase.	3. Select different type of overload relay for non 3-phase applications.
		4. Voltage unbalance on feeder.	4. Correct voltage unbalance in feeder.
		5. Motor winding damage in one or more windings.	5. Check motor winding impedance. Rewind if necessary.
		6. Phase loss in primary of wye-delta or delta-wye transformer.	6. Replace blown fuses or tighten connections.
		7. One or more load lead(s) is not routed through relay window or is routed in opposite direction.	7. Pass each load lead through its respective window in the same direction.
		8. Number of load lead passes are different.	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.	1. Remove excessive motor load or resize motor.
		2. Incorrect overload FLA setting.	2. Set FLA adjustment according to motor full-load current.
		3. Use of electronic DC injection brake.	3. Do not use electronic DC injection brakes with solid-state overload relay.
		4. Incorrect overload FLA setting. (Multiple pass applications.)	4. Recalculate FLA adjustment and set according to motor full-load current and number of looped passes.
TeSys™ T	Minor internal faults	Invalid configuration error	Indicates either a bad checksum (Config checksum error) or good checksum but bad data (Invalid config error). Both caused by hardware failure. Take the following steps: 1. Cycle power and wait 30 s. 2. Reset the configuration settings to factory settings. 3. If the fault persists, replace the TeSys T.
		Configuration checksum (EEROM) error	
		Internal network communications failure	These faults indicate a hardware failure. Take the following steps: 1. Cycle power and wait 30 s. 2. If the fault persists, replace the TeSys T.
		A/D out of range error	
	Diagnostic errors	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 fault reset. 2. If the fault persists, cycle power and wait 30 s. 3. If the fault still persists, replace the TeSys T.
		Stop command check	
		Stop check back	
		Run check back	

ENGLISH

Table 17: Motor Control Center Troubleshooting Chart *(continued)*

Part	Problem	Cause	Remedy
TeSys T	Wiring/configuration errors	CT reversal error	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 fault reset. 2. If the fault persists, cycle power and wait 30 s. 3. If the fault still persists, replace the TeSys T.
		Current/voltage phase reversal error	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 fault reset. 2. If the fault persists, cycle power and wait 30 s. 3. If the fault still persists, replace the TeSys T.
		Phase configuration error	
		PTC connection error	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 fault reset. 2. If the fault persists, cycle power and wait 30 s. 3. If the fault still persists, replace the TeSys T.
		Voltage phase loss error	Check for: • improper wiring, such as loose terminations • blown fuse • cut wire • single-phase motor configured for 3-phase operation • failure to wire a single phase motor through both A and C load CT windows • failure of power source (for example, utility power failure) After all checks are complete: 1. Perform a fault reset. 2. If the fault persists, cycle power and wait 30 s. 3. If the fault still persists, replace the TeSys T.
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.
	Failure To 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.
	Failure To 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	Overtravel of the actuator.	Use a resilient actuator, or operate within the tolerance of the device.
Manual Starters	Failure To Reset	Latching mechanism worn or broken.	Replace the starter.

ENGLISH

Section 12—Insulation Resistance

NOTE: Disconnect all solid state devices such as SPDs, drives, soft starts, capacitors, filters, 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 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” on page 66.

Failure to follow this instruction will result in death or serious injury.

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

ENGLISH

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 to be used at that current rating.

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

ENGLISH

Melting Alloy Overload Selection Tables for Combination Starter Units (cont.)

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
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

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
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		

ENGLISH

Melting Alloy Overload Selection Tables for Part Winding Combination Starter Units (cont.)

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 4.85
147–163	B 1.84	420–465	B 5.50
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
185–209	B 2.40	498–532	B 6.90
210–229	B 2.65		

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		

ENGLISH

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

ENGLISH

Section 13—Circuit Breaker and Fusible Switch Replacement

For F-frame and K-frame circuit breakers and 100/200 A fusible switches, Schneider Electric recommends replacing the entire disconnect assembly instead of replacing the circuit breaker or fusible switch. The disconnect assembly includes the operator mechanism and the appropriate circuit breaker or 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 *Disconnect Assembly Replacement* (80439-666-01) for disconnect assembly installation instructions.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

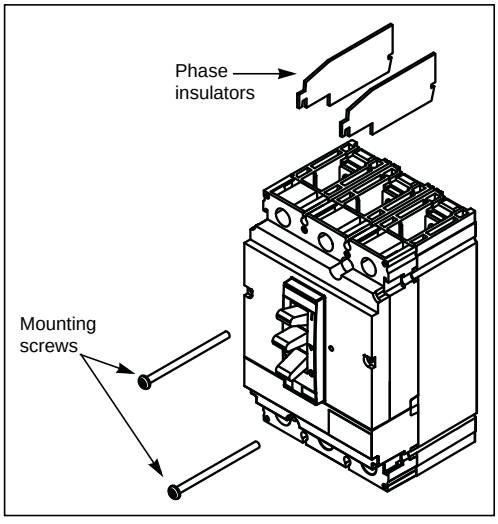
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always 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 this instruction will result in death or serious injury.

For PowerPact™ H-frame and J-Frame circuit breakers, order a replacement circuit breaker only. 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” on page 57.
3. Open the line insulator tabs.
4. Loosen the screw lugs for the line/load cables; detach the cables.
5. Remove the two circuit breaker mounting screws (see Figure 128).
6. Remove the circuit breaker from the unit and then remove the phase insulators from the breaker (see Figure 128).
7. Unpack the new circuit breaker and reinstall the circuit breaker phase insulators in the slots provided on the circuit breaker.
8. 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.
9. Attach the line/load cables to the breaker using the screw lugs removed in step 4; torque the screw lugs to the value indicated on the circuit breaker.
10. Close the line insulator tabs.
11. Reinstall the control unit in the MCC. Close and fasten the door.

Figure 128: Circuit Breaker Replacement



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 D—Technical Support” on page 131 for the MCC TAG technical support number.

Section 14—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

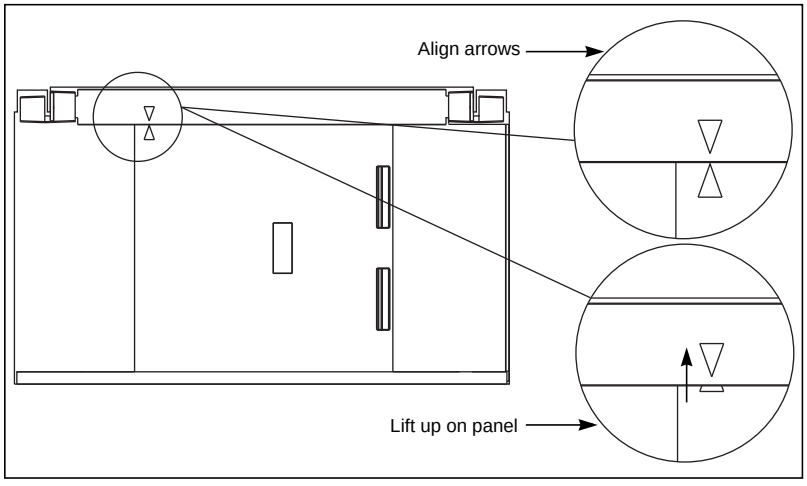
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always 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 this instruction 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 Figure 129. Lift the panel out of the bottom track, and remove the panel.
4. Align the arrows on the right panel and top track as shown in Figure 129. Lift the panel out of the bottom track, and remove the panel.

Figure 129: Aligning the Arrows on the Panels



ENGLISH

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 Figure 130).

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 Figure 131.
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.

Figure 130: Right Panel (Side View)

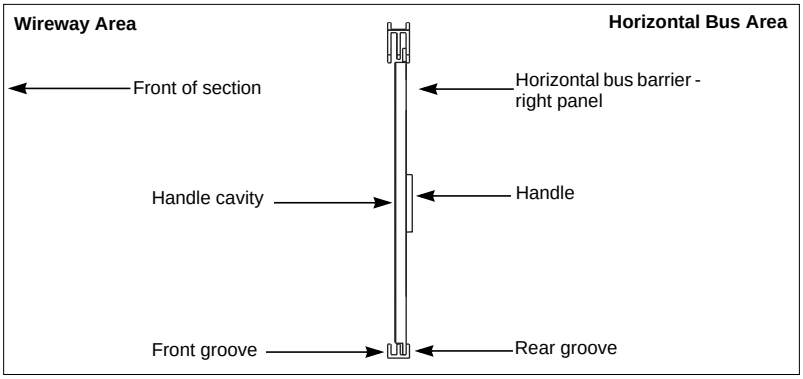
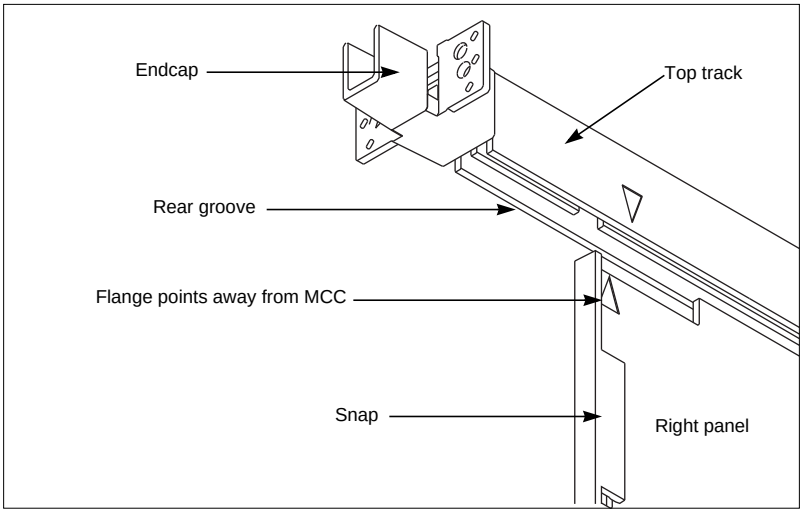


Figure 131: Installing the Right Panel into the Rear Groove



Fixed Barrier

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

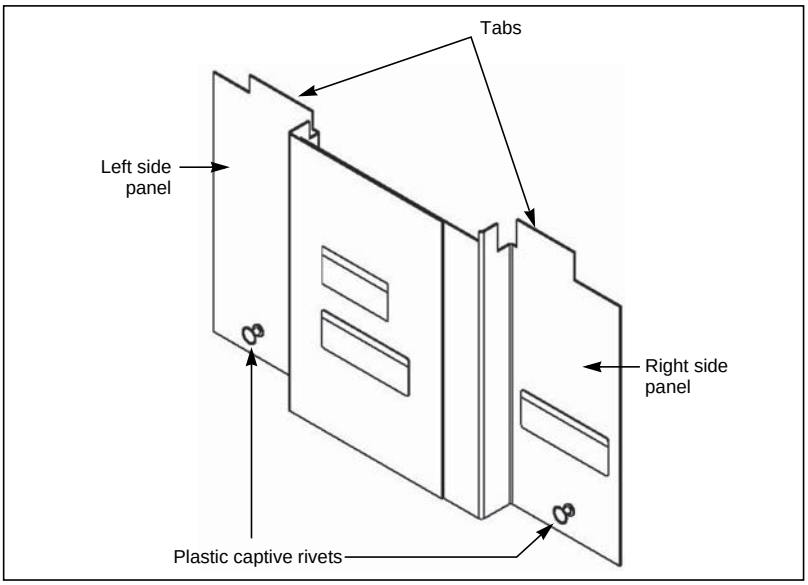
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always 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 this instruction 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 Figure 132 below, and Figures Figure 133 and Figure 134 on 116).

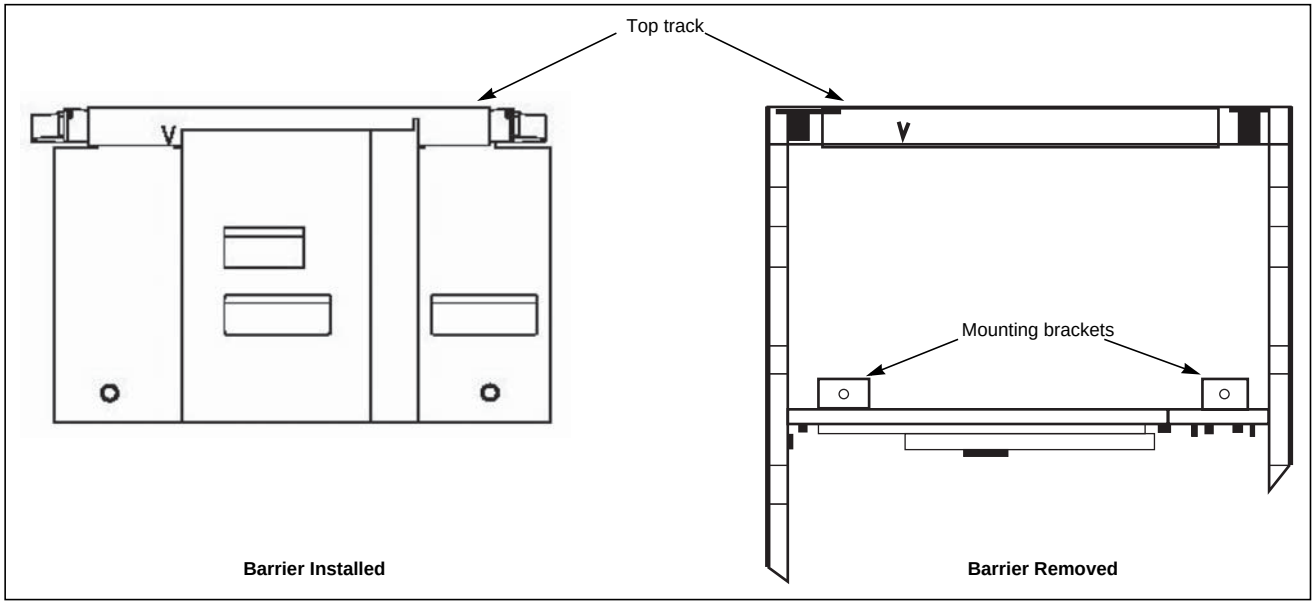
Figure 132: Fixed Horizontal Bus Barrier



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 Figure 133 on page 116).
5. Remove the panel from the MCC.
6. Repeat steps 3–5 for the right side panel.

ENGLISH

Figure 133: Horizontal Bus Barrier Installation and Removal



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 Figure 132 on page 115 and Figure 133).
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 134: Barrier Installed and Removed

Installed

Removed

ENGLISH

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.

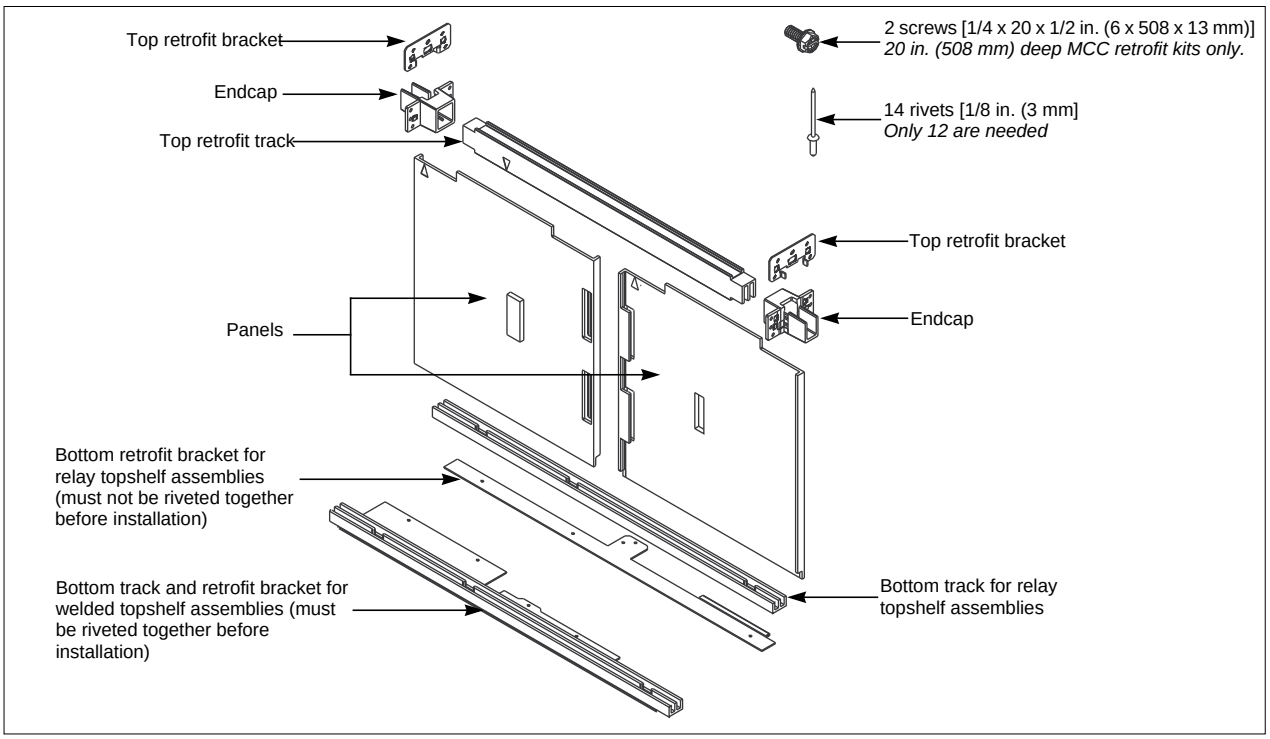
⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E 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.
- 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 this instruction will result in death or serious injury.

Figure 135: Retrofit Kit Components



ENGLISH

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 Figure 136).

Refer to either the Model 5 MCC Installation and Maintenance Manual (# 8998IM9101R5/92) or “Removing the Control Unit” on page 57 of this bulletin for 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 Figure 136). Discard the brackets after removal.

NOTE: Discard all retrofit brackets if the existing bus barrier bracket “B” (see Figure 136) is present on the 15 in. (381 mm) deep MCC. All holes are already present for direct mounting of the horizontal bus barrier.

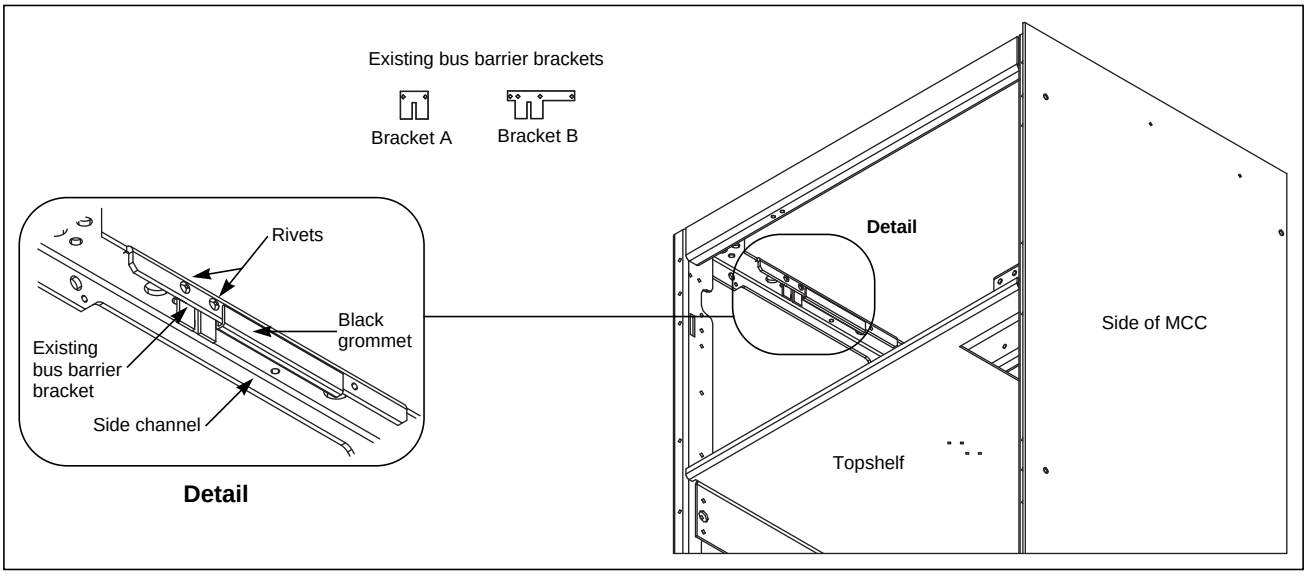
⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

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 this instruction will result in death or serious injury.

Figure 136: Remove Existing Brackets on the 15 in. (381 mm) Deep MCC



ENGLISH

Install the Retrofit Kit

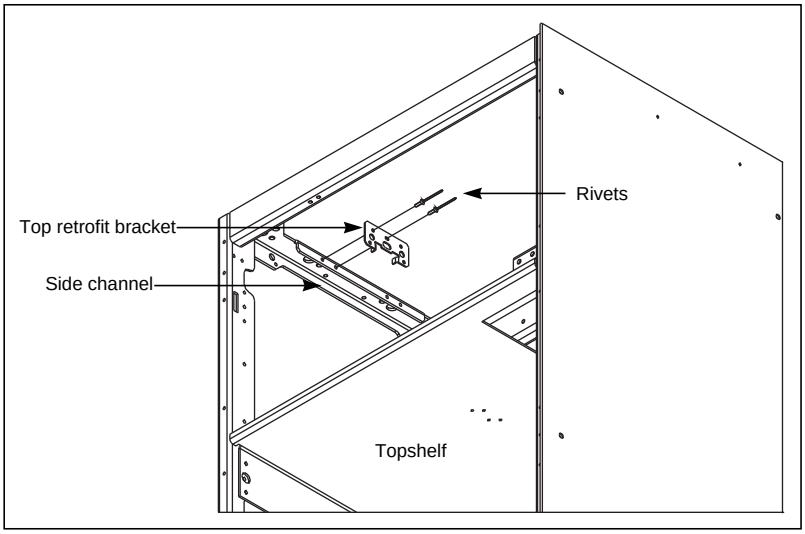
Retrofit Brackets and Endcaps

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 Figure 137).
- 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 Figure 138 on page 120.

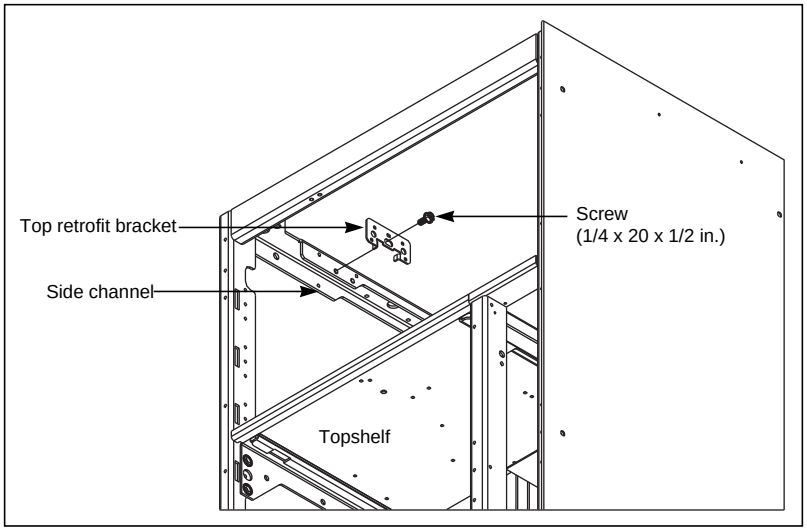
NOTES:
- Even if the holes are present for a direct mounting of the endcap to the side channels, use the top retrofit bracket on 20 in. (508 mm) deep MCCs.
- Before tightening the screws, push the bracket away from you so that the rear bracket hole is properly aligned with the side channel hole.

Figure 137: 15 in. (381 mm) Deep MCC Retrofit Bracket



ENGLISH

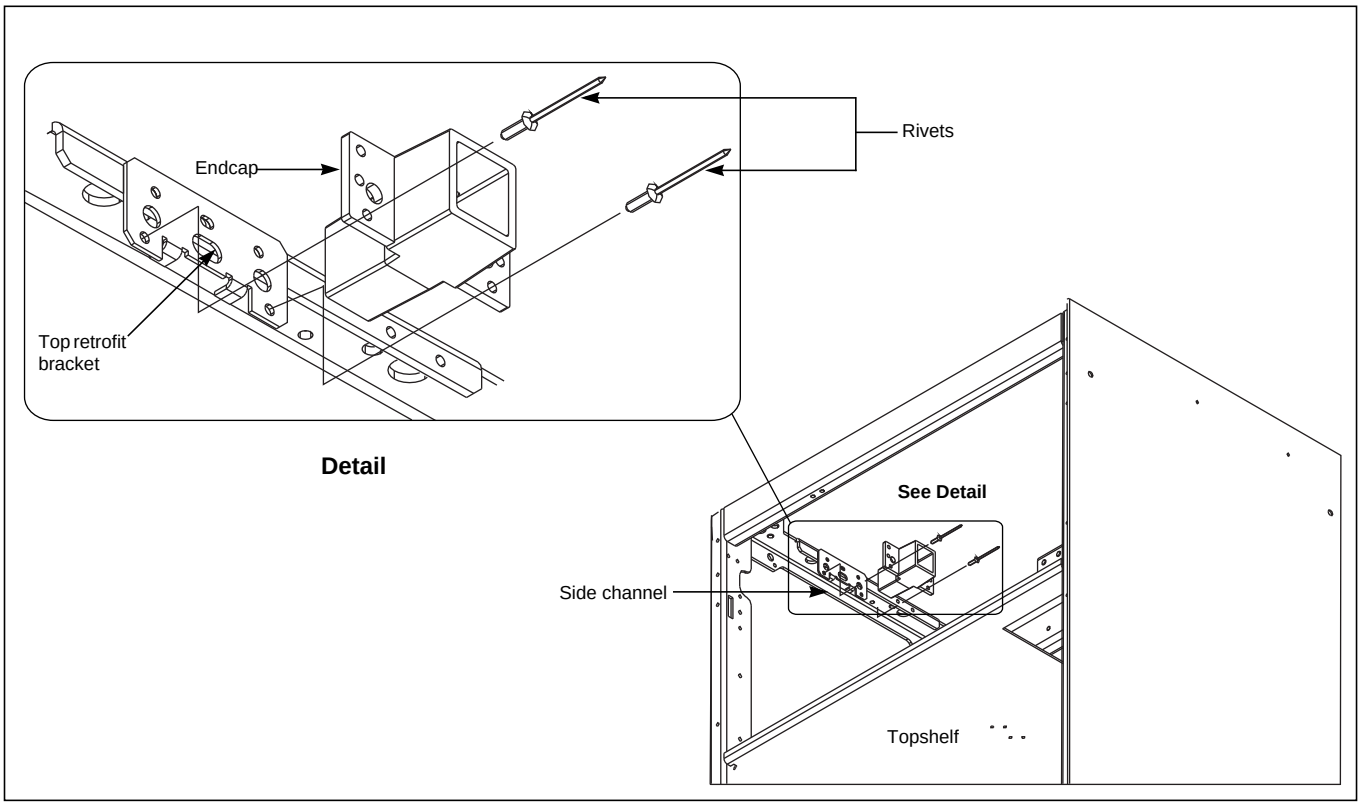
Figure 138: 20 in. (508 mm) Deep MCC Retrofit Bracket



Follow the steps below to install the endcaps (see Figure 139).

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.

Figure 139: Endcap Placement



Bottom Track and Bottom Retrofit Bracket

1. Using a 1/8 in. (3 mm) drill bit, drill out both of the rivets on the horizontal bus barrier bracket (the L-shaped bracket located on the topshelf—see Figure 140). Remove the bracket and discard it.
2. To install the bottom retrofit track, follow step a if you have a welded topshelf, or step b if you have a relay topshelf (see Figure 141):
   a. Welded topshelf: Align the holes of the shelf with those on the bottom track (see Figure 141). 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.

   b. Relay topshelf: Align the two holes on the relay shelf with the bottom retrofit bracket holes (see Figure 141). 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 in.–0.147 in. (3 mm–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 140: Horizontal Bus Barrier (L-shaped) Bracket

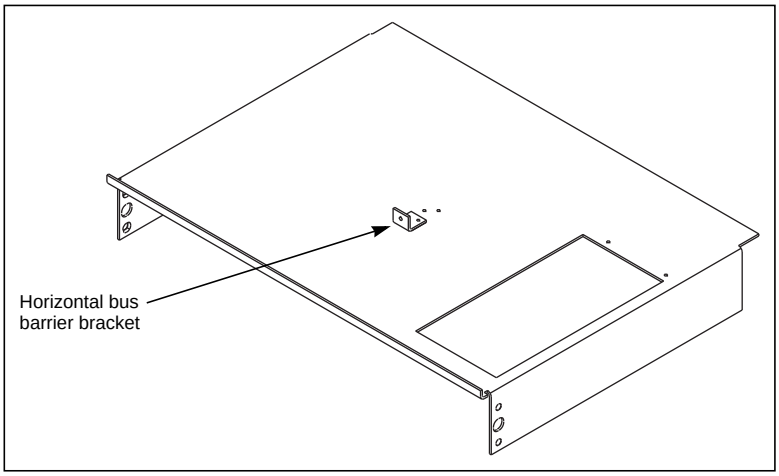
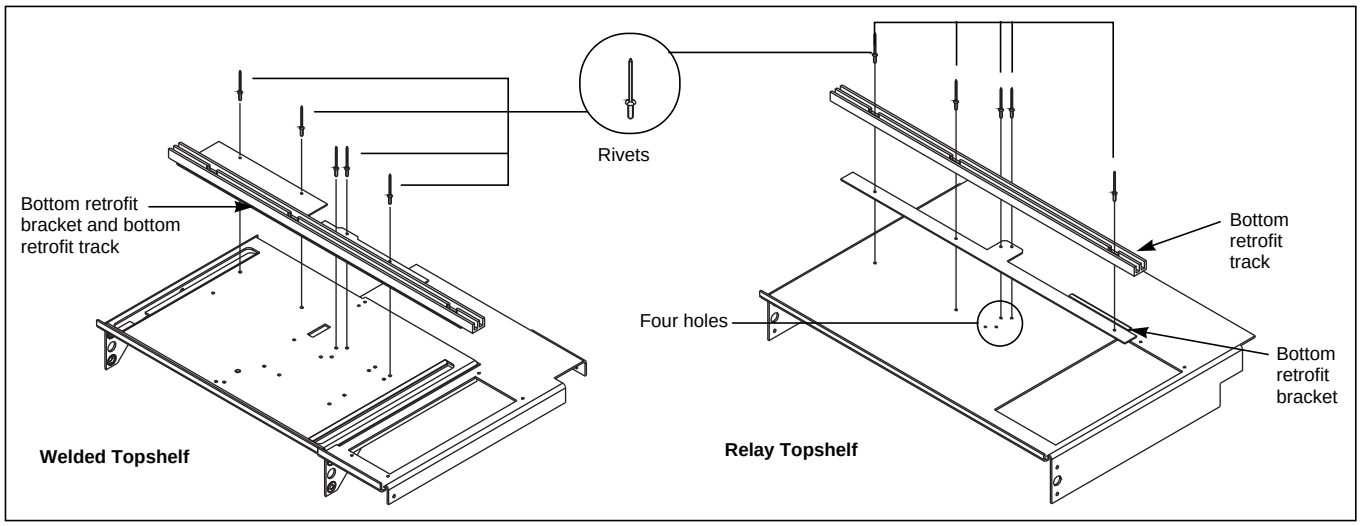


Figure 141: Welded and Relay Topshelf Assemblies



ENGLISH

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 Figure 142).

1. Align the arrows on the right panel and top track as shown in Figure 143.
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.

Figure 142: Right Panel (Side View)

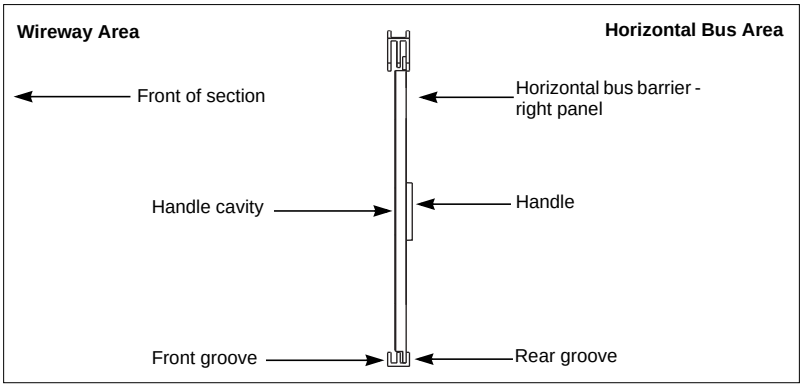
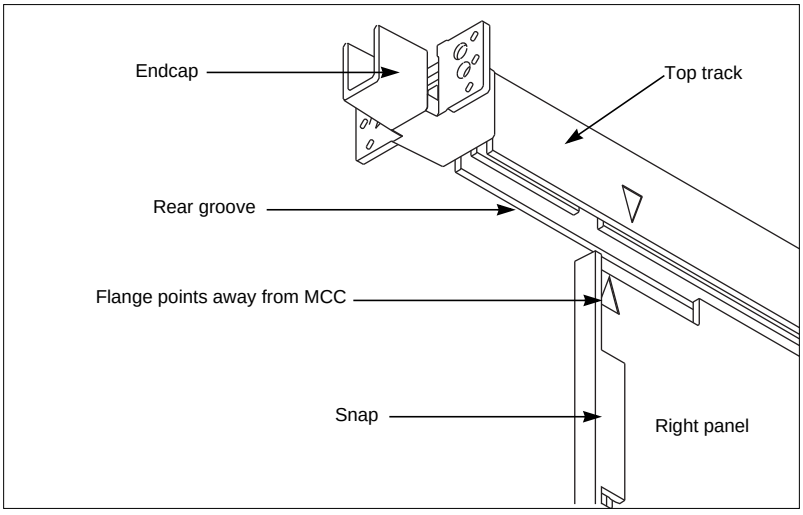


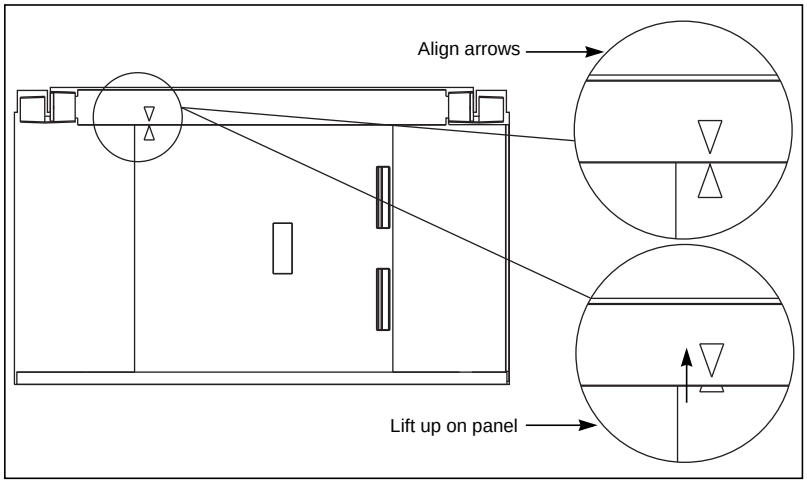
Figure 143: Installing the Right Panel into the Rear Groove



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 Figure 144. Lift the panel out of the bottom track, and remove the panel.
3. Align the arrows on the right panel and top track as shown in Figure 144. Lift the panel out of the bottom track, and remove the panel.

Figure 144: Aligning the Arrows on the Panels



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 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 this instruction will result in death or serious injury.

Follow the steps below to replace the components of the MCC.

1. Install the unit you removed in the section, “Units Below the Topshelf” on page 118. Refer to either the Model 5 MCC Installation and Maintenance Manual (# 8998IM9101R5/92) or “Removing the Control Unit” on page 57 of this bulletin 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.

ENGLISH

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 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 this instruction will result in death or serious injury.

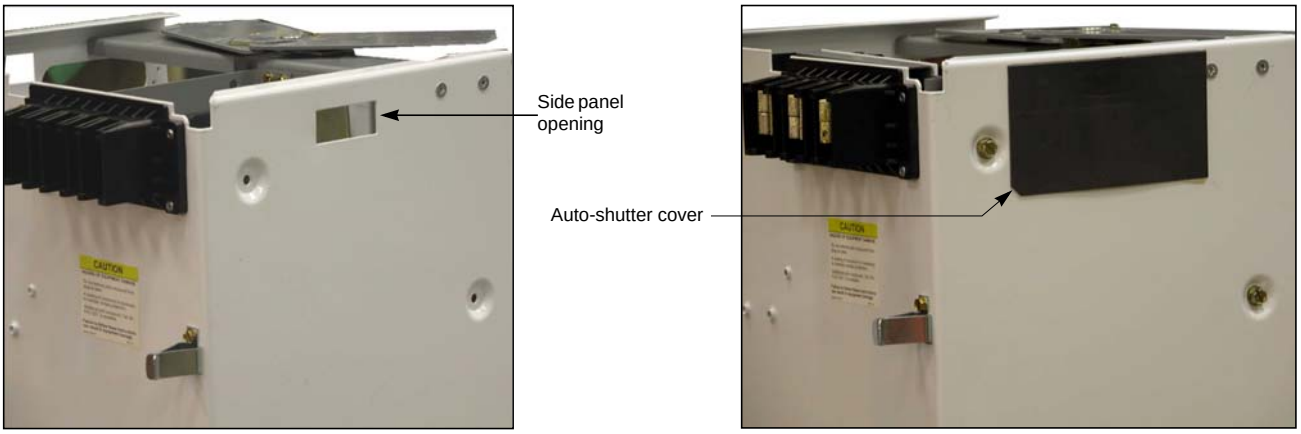
The automatic vertical bus shutter is an optional feature for the Model 6 motor control center (MCC) vertical bus. The shutters are pre-assembled and installed as part of the MCC line-up.

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.

NOTES:
- 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. or taller that shipped before July 2003 with a side-panel opening as shown in Figure 145A, require an auto-shutter cover (Square D Seneca part #80451-765-01). The auto-shutter cover aligns with the back edge of the center-most flat head screw as shown in Figure 145B.

Figure 145: Location of Auto-Shutter Cover for Side-Panel Opening



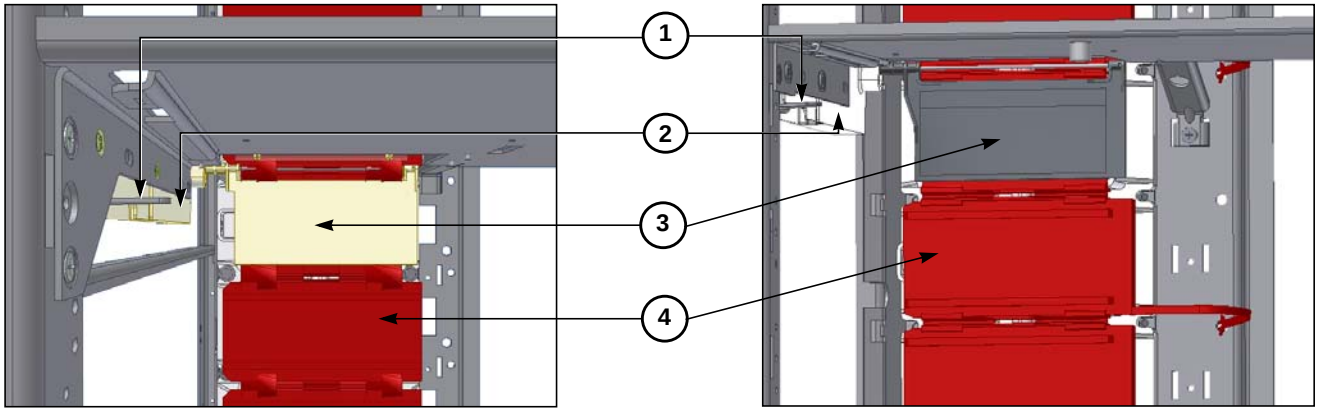
145A **145B**

There are four main components of the automatic vertical bus shutter (see Figure 146 on page 125):

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:** Prevents 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 146: 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 on 128.

NOTE: Arc-rated MCCs have a midshelf specifically designed for arc-rated MCCs (Schneider Electric part no. 80466-007-50; see Figure 116 on page 95). 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

⚠ 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 CSA Z462.
- 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 this instruction will result in death or serious injury.

Follow these instructions to install the automatic vertical bus shutter assembly (see Figure 148 on page 126) to an existing Style 1 midshelf:

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 (Figure 148, Item A on 126) in the appropriate area of the structure.
3. Place the mounting foot (Item B) of the shelf into the mounting pan slots (Item C). Secure the shelf on the left and right with flat head screws (Detail A, Item D).
4. Install the hinge leaves (Detail A, Item E) and the door (Item F) into the hinge slots (Item G), which are on the structure corner channel. Fasten the hinge leaves to the structure corner channel using hex head screws (Item H).
5. Install the fastener receptacles (Detail B, Item J) into the bracket slots (Item K) and fasten with hex head screws (Item 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.

ENGLISH

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.

Figure 147: Shelf Installation—Style 1

Table 18: Shelf Installation Kit Parts—Style 1

Description	Quantity	Item
Midshelf	1①	A
Flat head screws	2	D
Unit door	1	F
Hex head screws	4 ②	H
Quarter turn fastener receptacle	2 ②	J

① Shelf is furnished with order, and may already be mounted in position.

② All necessary hardware for typical shelf installation is included. Door installation may require additional hardware.

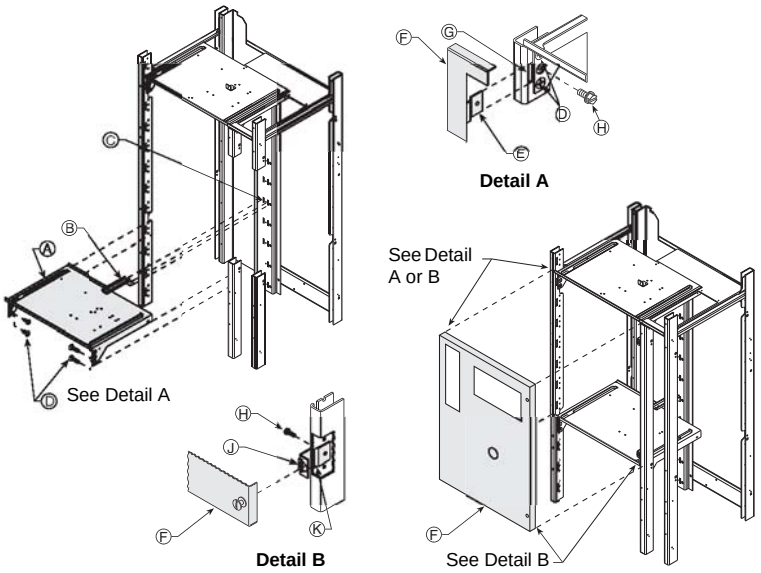
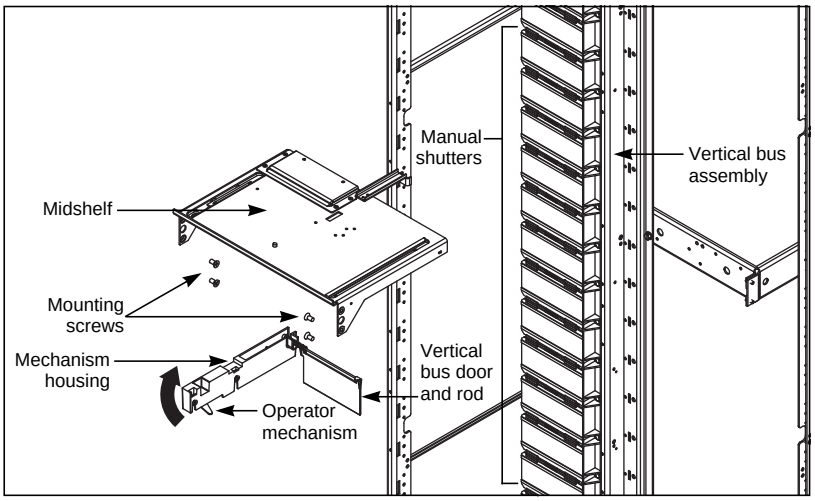


Figure 148: Automatic Vertical Bus Shutter Installation—Style 1



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 “Section 4—Installing the MCC”.
14. Replace all devices, doors, and covers before turning on the power to the equipment.

Removal—Style 1

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

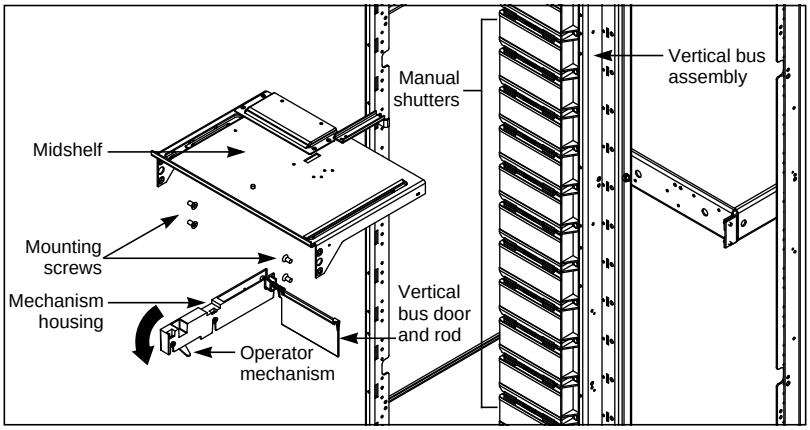
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside.
- Always use 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 this instruction will result in death or serious injury.

Follow these instructions to remove the automatic vertical bus shutter assembly (see Figure 149) from an existing Style 1 midshelf.

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 “Section 4—Installing the MCC”.
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.

Figure 149: Automatic Vertical Bus Shutter Removal—Style 1



ENGLISH

Installation—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 or CSA Z462.
- 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 this instruction will result in death or serious injury.

Follow these instructions to install the automatic vertical bus shutter assembly (see Figure 148 on page 126) to an existing Style 2 midshelf (see Figure 146 on page 125):

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 (Figure 147, Item A) in the appropriate area of the structure.
3. Place the mounting foot (Item B) of the shelf into the mounting pan slots (Item C). Secure the shelf at the mounting foot end, the left side, and the right side with flat head screws (Detail A, Item D).
4. Install the hinge leaves of the door (Detail A, Item E) into the hinge slots (Item G), which are on the structure corner channel. Fasten the hinge leaves to the structure corner channel using hex head screws (Item H).
5. Install fastener receptacles (Detail B, Item J) into the bracket slots (Item K) and fasten with hex head screws (Item 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.

Figure 150: Shelf Installation—Style 2

Table 19: Shelf Installation Kit Parts—Style 2

Description	Quantity	Item
Midshelf	2①	A
Flat head screws	3	D
Unit door	1	F
Hex head screws	4②	H
Quarter turn fastener receptacle	2②	J

① Shelves are furnished with order. Structure may already have shelf mounted in position.

② All necessary hardware for typical shelf installation is included. Door installation may require additional hardware.

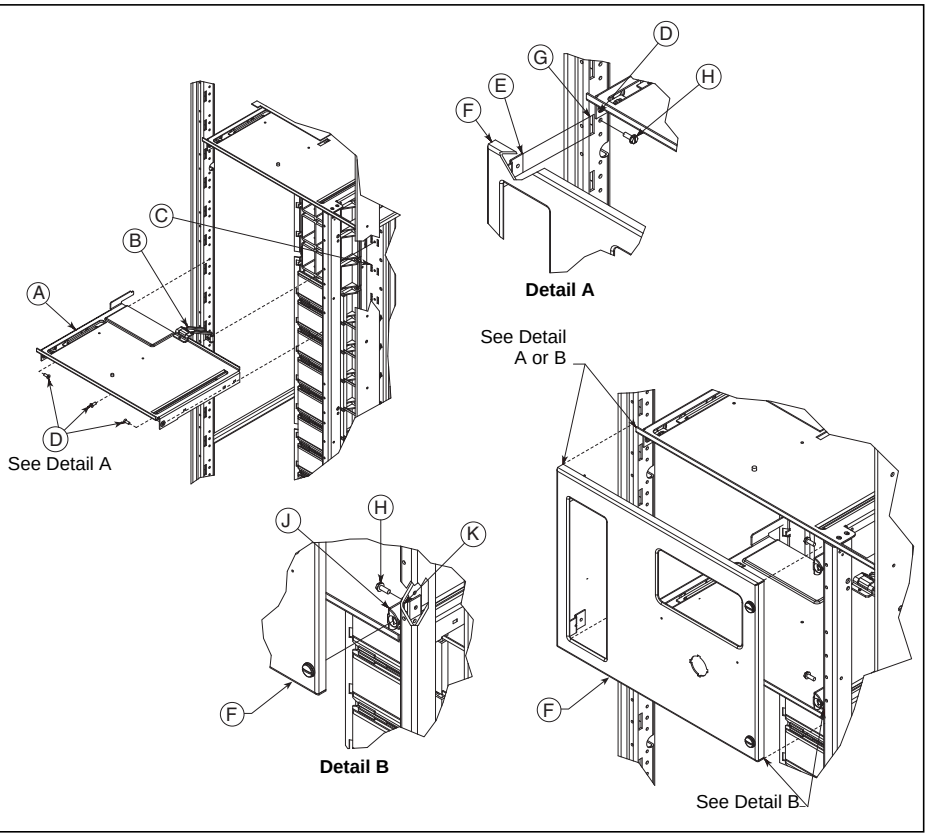
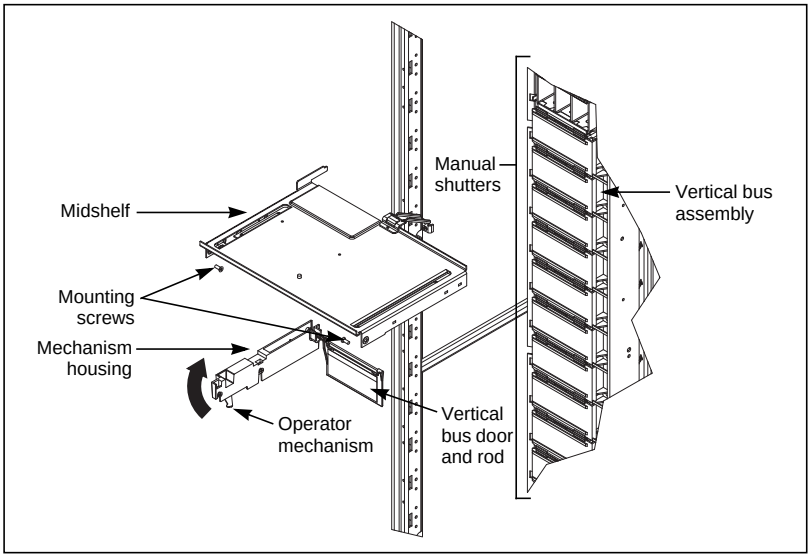


Figure 151: Automatic Vertical Bus Shutter Installation—Style 2



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. See Figure 148.
13. Insert the unit into the MCC. Follow the procedures in “Section 4—Installing the MCC”.
14. Replace all devices, doors, and covers before turning on the power to the equipment.

ENGLISH

Removal—Style 2

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

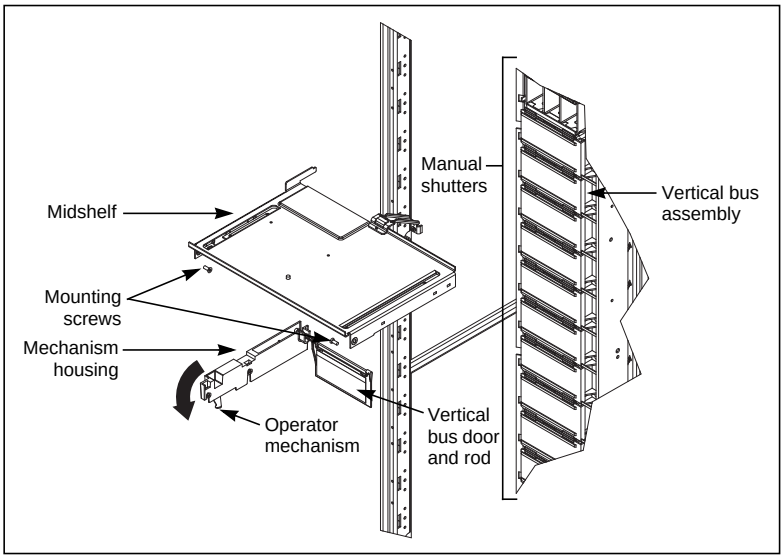
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside.
- Always use 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 this instruction will result in death or serious injury.

Follow these instructions to remove the automatic vertical bus shutter assembly (see Figure 152 on page 130) from an existing Style 2 midshelf:

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 “Section 4—Installing the MCC”.
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 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.

Figure 152: Automatic Vertical Bus Shutter Removal—Style 2



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 will close when a unit is removed from the structure. The shutter door provides a barrier against incidental contact with the MCC vertical bus.

Appendix D—Technical Support

The Model 6 Motor Control Center incorporates many Schneider Electric products within one package. Following are the Technical Support numbers for some of these products:

Device Name	Location	Technical Support No.
Motor Control Centers[1]	Seneca, SC: MCC Technical Assistance Group (TAG)	(800) 634-2003
PowerLogic™ Equipment SMS-3000 Software	La Vergne, TN: PowerLogic Technical Assistance	(615) 287-3400
Variable Frequency Drives Soft Starters Starters/Contactors/Overloads	Raleigh, NC: Raleigh Help Desk	(919) 266-8600
Schneider Automation Equipment and Software	North Andover, MA: Customer Central	(800) 468-5342
Industrial Application Team	Raleigh, NC	(800) 468-5342
Field Services Organization Support	Florence, KY	(800) 634-2003

1 The MCC Technical Assistance Group is your first point of contact for any MCC questions. Or, contact your local distributor/Schneider Electric field sales office.

ENGLISH

Notes

Notes

Notes

ENGLISH

Schneider Electric USA, Inc.
1990 Sandifer Blvd.
Seneca, SC 29678 USA
1-888-778-2733
www.schneider-electric.us

80459-641-01E 10/2012
Replaces 80459-641-01D 09/2008