MotorSeT[™]

Load Break Interrupter Switch 400 A, 5 kV

Instruction Bulletin

PKR8059601 R03/2024







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Safety Information

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



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



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

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

AWARNING

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

ACAUTION

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

NOTICE

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

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

Please Note

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

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

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

About This Document

Document Scope

Use this document to:

• Install, operate, maintain, and troubleshoot the MotorSeT[™] Load Break Interrupter Switch 400 A, 5 kV.

Validity Note

This instruction bulletin is valid for MotorSeT Load Break Interrupter Switch 400 A, 5 kV installations in the North American region only. Visit the Schneider Electric website (www.se.com) for additional information regarding this offer.

NOTE: This equipment is certified to Underwriters Laboratories Inc., standard UL 347. For regions outside of North America, consult your local and national standards to determine if and how they differ from UL 347.

For product compliance with environmental directives such as RoHS, REACH, PEP, and EOLI, go to www.se.com/green-premium.

For technical characteristics of the physical modules described in this bulletin, go to www.se.com.

The technical characteristics presented in this bulletin should be the same as those that appear online. The content may be revised over time to improve clarity and accuracy. If there is a difference between the information contained in this bulletin and online information, use the online information.

Safety Precautions

Read and understand the following precautions before performing any procedures in this document.

A A DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSA Z462 or local equivalent.
- Only qualified personnel familiar with power switch equipment are to perform work described in this set of instructions. Workers must understand the hazards involved in working with or near power switch circuits.
- Perform such work only after reading and understanding all of the instructions contained in this bulletin.
- Turn off all power supplying this equipment before working on or inside the equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Before performing visual inspections, tests, or maintenance on the equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, grounded, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding. More than one disconnector switch may be required to de-energize the equipment before servicing.
- Do not remove covers, open doors, or work on the equipment unless the power is off and all circuits are de-energized and disconnected.
- Handle this equipment carefully and install, operate, and maintain it correctly in order for it to function properly.
- Do not make any modifications to the equipment or operate the system with the interlocks removed. Contact your local field sales representative for additional instruction if the equipment does not function as described in this manual or if parts are missing or damaged.
- Comply with all codes, standards, and regulations to promote safe electrical installations. A permit may be needed to do electrical work, and some codes may require an inspection of the electrical work.
- Carefully inspect your work area and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

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



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

Qualified Personnel

Only appropriately trained persons who are familiar with and understand the content of this instruction bulletin and all other related product documentation are authorized to work on and with this product.

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

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

Pay particular attention to adhere to any safety information, electrical requirements, and normative standards that apply to your machine or process in the use of this equipment.

Refer to NFPA 70E, CSA Z462, or NOM-029-STPS for more information on safe electrical work practices and qualified personnel.

Intended Use

The product described in this instruction bulletin is intended for use according to the instructions, directions, examples, and safety information contained in this document and other supporting documentation.

The product may only be used in compliance with all applicable safety regulations and directives, the specified requirements, and the technical data.

Before using the product, perform a risk assessment of the planned application. Based on the results, appropriate safety related measures must be implemented.

Since the product is used as a component of a machine or process, the safety of persons must be ensured by means of the overall system design.

Whenever specific manufacturer components and accessories are specified as mandatory within the instruction manual or in equipment job drawings, those components must be used.

Any use other than the use explicitly permitted is prohibited and can result in unanticipated hazards.

Cybersecurity

NOTE: Schneider Electric adheres to industry best practices in the development and implementation of control systems. This includes a "Defense-in-Depth" approach to secure an industrial control system. This approach places the controllers behind one or more firewalls to restrict access to authorized personnel and protocols only.

AWARNING

UNAUTHENTICATED ACCESS AND SUBSEQUENT UNAUTHORIZED MACHINE OPERATION

- Evaluate whether the environment or machines are connected to critical infrastructure and, if so, take appropriate steps in terms of prevention, based on Defense-in-Depth, before connecting the automation system to any network.
- Limit the number of devices connected to a network.
- Isolate the industrial network from other networks.
- Protect any network against unintended access by using firewalls, VPN, or other, proven security measures.
- Monitor activities within the systems.
- Prevent subject devices from direct access or direct link by unauthorized parties or unauthenticated actions.
- Prepare a recovery plan, including backup of the system and process information.

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

Introduction

The MotorSeT Load Break Interrupter Switch 400 A, 5 kV provides an efficient means for connecting and disconnecting motor control equipment. The design of the stored energy mechanism provides positive and constant closing force of the main blades.

The MotorSeT Load Break Interrupter Switch 400 A, 5 kV is one of the latest designs and innovations in Schneider Electric medium voltage, high-current, switching equipment for motor control applications.

This instruction bulletin contains installation, operation, maintenance, and troubleshooting procedures for the MotorSeT Load Break Interrupter Switch. In addition, this document contains information about ratings and optional features.

A typical MotorSeT Load Break Interrupter Switch assembly is shown in Typical MotorSeT Load Break Interrupter Switch Views, page 10.





Table 1 - Legend — Typical Views

Α	Lifting eyebolts (removable)
В	Viewing window
С	Low voltage section
D	Medium voltage section
E	Disconnector switch handle
F	Ground bus
G	Ground bar for disconnector switch
Н	800 A bus
I	Disconnector shield
J	Disconnector switch
к	Power fuses
L	Low voltage section hygrostat

Table 1 - Legend — Typical Views (Continued)

М	Wireway
N	Motor landing pads
0	Space heater

Carefully read this instruction bulletin, safety statements, and all product labels before installation and operation.

Moisture Contamination Avoidance and Mitigation

A A DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Store the equipment in a clean, dry (including no condensation), well-ventilated area with an ambient temperature above 70°F (21°C).
- If heaters are furnished in the assembly, energize them from an external source. When energizing heaters from an external source, remove the primary and secondary overcurrent protective devices from the control power transformer.
- If heaters are not installed in the assembly, and the area is cold and damp, use a temporary heating source within the assembly. A minimum of 125 watts of heat per section is recommended.
- Avoid greasy, smoky heaters that can deposit carbon on insulation, which could lead to tracking and insulation breakdown.
- If moisture, condensation, or chemical ingress is observed, do not energize the equipment. If the equipment is already energized, de-energize it immediately.

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

FIRE HAZARD

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

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

Requirements for Shipping, Receiving, and Storage

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

- The equipment should be treated as if it is in storage until it is installed and operational. The storage area should be clean, dry (75% or less relative humidity), and climate controlled with proper ventilation.
- To keep the equipment dry, the use of heaters is required in some cases (for example, during seasonal or low periods of electrical loading and equipment deenergization).
 - Consult the Engineer of Record for the appropriate environmental control settings or means to mitigate environmental influences.
 - If so equipped, ensure that the thermostats and/or humidistats are set to mitigate condensation. A minimum of 125 watts of heat per section is suggested.
 - If heaters are being used with the equipment that were not included in the equipment by Schneider Electric, they must be clean and free of debris and grease. Greasy and/or smoky heaters can contaminate electrical insulation and lead to dielectric breakdown and/or tracking.

- Shipping packaging is not suitable for and cannot be used by itself for equipment storage unless otherwise indicated on the shipping packaging labeling.
- When receiving equipment, the equipment may be at a lower temperature than the ambient air temperature. Allow time for the equipment temperature, including the temperature of internal components, to rise to the ambient air temperature before making openings in or otherwise disturbing the packaging. Condensation can occur on and inside the equipment if warm air contacts cold surfaces of the equipment. Moisture damage can occur, destroying the dielectric capabilities of the equipment and rendering it unusable.
- The factory shipping wrap around the equipment on shipping pallets is not suitable for non-enclosed over-the-road transportation that risks exposing the equipment to the elements. The factory shipping wrap around the equipment should remain on the equipment until the equipment is ready to be inspected and stored or inspected and installed. After receiving the equipment and allowing it to acclimate to the environment, remove the packaging and inspect the equipment for damage that may have occurred in transit. If damage is found or suspected, immediately file a claim with the carrier and notify your Schneider Electric representative.
- Follow these guidelines every time the equipment is moved to a new storage location or to its final destination.

Requirements for Installation, Operation, and Maintenance

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

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

Exposure to Moisture, Chemicals, and Condensation

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

Receiving, Handling, and Storage

A A DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

If signs of moisture contamination are present, do not follow the instructions in this section, contact the Schneider Electric Customer Care Center at 888-778-2733.

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

Receiving

- The factory shipping wrap around the equipment should remain on the equipment until the equipment is ready to be inspected and stored or inspected and installed.
- Check the packing list against the equipment received to ensure the order and shipments are complete.
- Make claims for shortages or other errors in writing within 30 days after receipt of shipment. Failure to do so constitutes unqualified acceptance and a waiver of all such claims to the purchaser.
- Inspect the equipment for damage. If you find or suspect damage, immediately file a claim with the carrier and notify Schneider Electric. Delivery of equipment to a carrier at any of the Schneider Electric plants or other shipping point constitutes delivery to the purchaser regardless of freight payment and title. All risk of loss or damage passes to the purchaser at that time.

NOTE: The equipment is shipped with the load break switch in the Closed position. To open the medium voltage door, the switch must be in the Open position. Refer to Opening the Disconnector Switch, page 45 for details.

See Requirements for Shipping, Receiving, and Storage, page 12 for additional information.

US

Identification

MotorSeT identification rating nameplate is located on the rear of the low voltage door.

Figure 2 - Example of Identification Rating Label



UL MODEL NO.: CEMVATI -1000-4	4160-12	
RATED VOLTAGE:	X V _{RMS}	LISTED
3 PHASE	XHz	HIGH VOLTAGE
RATED CONTINUOUS CURRENT:	X A _{RMS}	INDUSTRIAL
APPLICATION LOAD:	X HP	CONTROL
CONTROL VOLTAGE:	X VAC	FOLIPMENT
IMPULSE:	X KV BIL	65MI
INTERRUPTING RATING:	X KA @ 4.8KV	OSIVIL
SCHNEIDER ITEM NO.:		PA
NNNN		
SERIAL NO.: XXXXXXX-YY		
CLASS E2 CONTROLLER		
ENVIRONMENTAL RATING: TYPE	Х	
ALTITUDE RATING:	3300 Ft	
Use 75 deg C insulation Copper V	Vire (CU Only)	

_						
	FUSE # FU1	MFR MERSEN	MODEL A480R9R-1	AMPS 200	VOLTS 5500	
	FU2	MERSEN	A480R9R-1	200	5500	
	FU3	MERSEN	A480R9R-1	200	5500	
	FU4	MERSEN	A480T2E	2	4800	
	FU5	MERSEN	A480T2E	2	4800	
	FU6	MERSEN	ATQR	10	600	

Handling

Review the shipping documentation to verify the actual weight of the MotorSeT Load Break Interrupter Switch to ensure that the lifting equipment is sufficient. When an overhead crane is not available, rollers, pipes, or a forklift may be used.

This equipment is shipped in individual sections or multiple sections coupled together in a shipping split. The maximum length of a shipping split is 144.00 in. (3657 mm) wide.

EQUIPMENT TOPPLING

- · Do not remove the skids until the equipment is at the final location.
- Consult with a certified rigging and lifting expert for any situation not covered in these instructions.

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

Using a Forklift

AWARNING

UNSTABLE LOAD

- If lifting the equipment by forklift, stabilize the shipping section with a safety strap to reduce the possibility of the equipment toppling over.
- Consult with a certified rigging and lifting expert for any situation not covered in these instructions.

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

Figure 3 - Handling Using a Forklift



This equipment is shipped in individual sections or multiple sections coupled together in a shipping split. The maximum length of a shipping split is 144.00 in. (3657 mm) wide.

Using a Crane

LIFTING EYE DAMAGE

If moving by crane, the interior angle of the lifting sling should not exceed 90°. Angles greater than 90° apply greater inward pressure on lifting lugs which can damage or dislodge lifting lugs from the switchgear.

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

The switchgear is normally shipped in one to four section shipping splits. Each section has four lifting lugs bolted on top. If more than two bays are shipped as one section, lifting channels, frames, or spreader bars must be used when lifting.

1. Insert a crane hook through each of the four lifting eyes (see Lifting Sling, page 17) to lift and move the sections.

NOTE: Use load-rated cables or chains with safety hooks or shackles. A spreader bar might be necessary to maintain proper angles for lifting.

2. To help prevent structural damage, rig the lifting sling so that the minimum angle between lifting cables or chains and the top of the equipment is 45°, and the maximum interior angle is 90°.

Figure 4 - Lifting Sling



- 3. If a crane is not available, contact Schneider Electric before using any other lifting method.
- 4. After the equipment has been placed in position, remove and discard the lifting eyes.
- 5. Use the bolts from the lifting eyes to cover the mounting holes.
- 6. Factory-built equipment is assembled using fixtures and on flat and level floor surfaces to maximize the alignment of the sheet metal components. Door and panel adjustments might be necessary once the equipment is removed from the pallet and placed in position.

Storage

- Keep this equipment in a clean, dry place that is free from corrosive elements and mechanical abuse.
- Energize the heaters inside the equipment, or add heat from a separate source, such as a light bulb or blower. Use a minimum of 125 watts of heat per unit to keep the equipment dry during storage.
- Remove all flammable materials away from heaters prior to energizing.
- Cover the equipment with a tarpaulin when necessary to help protect it from contaminants and moisture. Do not store indoor or outdoor units outdoors.
- Do not stand or rest heavy objects on the equipment, as it might damage the equipment.
- Monitor the equipment closely in areas with high humidity. If necessary, use additional heat to keep the equipment dry.
- Contact the factory if the internal heaters do not adequately help prevent condensation for your location or environmental condition.

See Requirements for Shipping, Receiving, and Storage, page 12 for additional information.

Dimensions

The MotorSeT Load Break Interrupter Switch 400 A, 5 kV dimensions are as follows:





The switch is available in various width and depth options. The width and depth is determined on a case by case basis, based on the customer's requirements.

Table 2 - Switch Panel Dimer	nsions
------------------------------	--------

Madal	А	В	С	
Woder	Height in. (mm)	Width in. (mm)	Depth in. (mm)	
5 kV option 1		24.0 (610)	30.0 (762)	
5 kV option 2		24.0 (610)	36.0 (914)	
5 kV option 3	92.5 (2350)	30.0 (762)	30.0 (762)	
5 kV option 4		30.0 (762)	36.0 (914)	
5 kV option 5		36.0 (914)	30.0 (762)	
5 kV option 6		36.0 (914)	36.0 (914)	
7.2 kV option 1		30.0 (762)	36.0 (914)	
7.2 kV option 2		36.0 (914)	36.0 (914)	

NOTE: If the unit is equipped with the arc-resistant option, the depth will be either 36 in. (914 mm) or 48 in. (1219 mm) depending on the internal arc-resistant rating.

Product Description

Schneider Electric MotorSeT Load Break Interrupter Switches are used in the control and switching of motor control systems having nominal AC voltage ratings from 2.4–7.2 kV. They are capable of switching 400 A. Indoor air interrupter switch ratings, page 23 lists the applicable limits and conditions of switching for this equipment. When used in conjunction with fuses, they will help supply overload, short circuit, and disconnect services.

These MotorSeT switches can be used as follows:

- A primary disconnect for a medium voltage (MV) motor control center (MCC)
- A primary disconnect for larger motor soft starters
- A primary disconnect on transformers and isolation within an MCC
- The fuse protection and isolation of single-circuit systems within an MCC
- · The fuse protection and isolation of multi-circuit systems

Layout and Configurations

The equipment entry and exit locations can be configured several ways to meet various requirements for field installation. The configuration is determined when the order is placed and is typically not field-changeable. See Switch Entry/Exit Configurations, page 21 for more information.



Figure 6 - Typical Layout — MotorSeT Load Break Interrupter Switch 400 A

Table 3 - Legend — Typical Layout of MotorSeT Load Break Interrupter Switch (400 A)

А	Lifting eyebolts (removable)
В	Viewing window
С	Low voltage section
D	Medium voltage section
E	Disconnector switch handle
F	Ground bus
G	Ground bar for disconnector switch
н	800 A bus
I	Disconnector shield
J	Disconnector switch
к	Power fuses
L	Low voltage section hygrostat
Μ	Wireway
Ν	Motor landing pads
0	Space heater

Figure 7 - Switch Entry/Exit Configurations



Configuration 3: Disconnect bottom entry—Top/bus exit

Disconnect bottom entry-Bottom exit

Enclosure

The enclosure is constructed of welded 11-gauge sheet metal. All doors are also 11gauge sheet metal with flanges that provide a sturdy, rigid structure. Latches and hinges are constructed of corrosion-resistant material. The door interlocks help prevent the medium voltage doors from being opened when the disconnector switch is closed.

Enclosures are free-standing units available in NEMA 1, NEMA 3R, NEMA 12 and NEMA 12 V (ventilated enclosure with filter elements) configurations.

Optional Features

Surge Arresters

Surge arresters are furnished only when listed in the user's specifications. The vulnerability of the incoming and outgoing lines to lightning strikes or other high voltage transient conditions determines their type and justification.

Heaters

Heaters come standard in outdoor equipment only. By maintaining a slight temperature differential, the heaters help keep the inside of equipment dry by helping prevent condensation and deterioration.

Heaters supplied with the equipment can be powered by either internal or external power. Ensure that either source of power is energized prior to placing the equipment into service. In all cases, the supply of power must be adequate to feed the entire heater load.

A A DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect any backfed transformers and safely ground the primaries before energizing the auxiliary power. When supplying external sources of control power to this switch, it can cause backfeed to the high voltage bus through control power or potential transformers.
- Remove all grounds prior to energizing this equipment.

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

Ratings

The following ratings apply to switches and equipment with stored energy-operated switches.

Table 4 - Indoor air interrupter switch ratings

System rating kV	Nominal kV rms	Max design kV rms	1.2 x 50 impulse withstand peak, kV	Cont. Amp., rms	Load switching Amp. rms	Mom. Amp., rms, asym.	2-second A, rms	Fault close A, rms, asym.
5	4.16	4.76	60	600	400	22500	14000	22500
7.2	6.9	8.25	95	600	400	22500	14000	22500

Installation

This section contains instructions for installing the MotorSeT Load Break Interrupter Switch 400 A. This section also covers site selection and preparation, foundation specifications, and conduit location. Carefully read and follow all the safety precautions outlined below and throughout this section before performing any procedures.

See Requirements for Installation, Operation, and Maintenance, page 13 for additional information.

NOTE: If the assembly is stored prior to installation, follow the safety precautions found in Requirements for Shipping, Receiving, and Storage, page 12.

A D A N G E R

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSA Z462 or local equivalent.
- Only qualified personnel familiar with power switch equipment are to perform work described in this set of instructions. Workers must understand the hazards involved in working with or near power switch circuits.
- Perform such work only after reading and understanding all of the instructions contained in this bulletin.
- Turn off all power supplying this equipment before working on or inside the equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Before performing visual inspections, tests, or maintenance on the equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, grounded, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding. More than one disconnector switch may be required to de-energize the equipment before servicing.
- Do not remove covers, open doors, or work on the equipment unless the power is off and all circuits are de-energized and disconnected.
- Handle this equipment carefully and install, operate, and maintain it correctly in order for it to function properly.
- Do not make any modifications to the equipment or operate the system with the interlocks removed. Contact your local field sales representative for additional instruction if the equipment does not function as described in this manual or if parts are missing or damaged.
- Comply with all codes, standards, and regulations to promote safe electrical installations. A permit may be needed to do electrical work, and some codes may require an inspection of the electrical work.
- Carefully inspect your work area and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

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

Site Preparation

Site preparation is essential for proper installation and operation of the equipment. To prepare the site for installation, be sure to:

- Compare the site plans and specifications with the switch drawings to be sure there are no discrepancies.
- Check the site to verify that the equipment will fit properly and withstand the weight of the equipment. The impact loading is approximately 1.1 times the static load.
- Ensure that the floor is level within 1/16 in. per ft. (2 mm per 305 mm), or a maximum of 1/4 in. (6 mm) within the area of the switch lineup. If the floor is not within the tolerances, use steel shims or other means to ensure equipment is installed on level surface.
- Ensure there are suitable means for anchoring the equipment to the floor and completely align the equipment prior to final anchoring.
- Ensure the floor channels are level and straight with respect to each other. If the floor is not level and flush with the floor channels, it will be difficult to align the equipment and open the doors.
- Ensure that the installation site meets all environmental specifications for the enclosure's NEMA type rating, and all other applicable NEMA/CEMA rating.
- Allow working space clearance per National Electrical Code (NEC) Article 110.34, "Work Space and Guarding." Minimum clearances must meet all local and national requirements.
- Provide area ventilation, heating, and air conditioning to maintain the ambient temperature around the equipment between 0°C (32°F) and 40°C (104°F).
- Adequate lighting and convenience outlets with the correct power source should be available near the equipment.
- Ensure that the power cables have the correct NEC/CSA current rating for the unit being installed. Consult local and national codes for selecting wire size.
- Route sewer, water, and steam lines away from the equipment.
- Provide floor drains to help prevent water buildup.
- For outdoor units, caulk the entire base with a suitable compound to help prevent the entrance of moisture. You must also seal the conduits.

Equipment Installation for Seismic Applications

Introduction

Seismic certification is an optional feature in the MotorSet product line that provides seismic conformance options to any of the North American and International building codes and seismic design standards identified in List of Supported Regional Building Codes and Seismic Design Standards, page 26. A MotorSeT product that is seismic certified has been certified to the seismic requirements of the listed code per the manufacturer's certificate of compliance (CoC). Equipment compliance labels and CoC's are provided with all seismic certified MotorSeT products. Refer to the equipment CoC for certification details and applicable seismic parameters. To maintain the validity of this certification, the installation instructions provided in this section must be followed.

Table 5 - List of Supported Regional Building Codes and Seismic Design Standards

Country/Region	Code Reference ID	Code Name
Argentina	INPRES-CIRSOC103	Argentinean Standards for Earthquake Resistant Constructions
Australia	AS 1170.4–2007 (R2018)	Structural design actions, Part 4: Earthquake actions in Australia
Canada	NBCC	National Building Code of Canada
Chile	NCh 433.Of1996	Earthquake resistant design of buildings
China	GB 50011-2010 (2016)	Code of Seismic Design of Buildings
Colombia	NSR-10 Titulo A	Colombian Regulation of Earthquake Resistant Construction
Europe	Eurocode 8 EN1998-1	Design of structures for earthquake resistance — Part 1: General rules, seismic actions and rules for buildings
India	IS 1893 (Part 1): 2016	Criteria for Earthquake Resistant Design of Structures Part 1 General Provisions and Buildings
Indonesia	SNI 1726:2019	Earthquake Resistance Planning Procedures for Building and Non-building Structures
Japan	Building Standard Law	The Building Standard Law of Japan
Mexico	CFE MDOC-15	Civil Works Design Manual, Earthquake Design
New Zealand	NZS 1170.5:2004+A1	Structural design actions, Part 5: Earthquake actions — New Zealand
Peru	N.T.E E.030	National Building Code, Earthquake-Resistant Design
Russia	СП 14.13330.2018	Building norms and regulations: Construction in seismic regions
Saudi Arabia	SBC 301	Saudi Building Code, Loads & Forces Requirements
Taiwan	CPA 2011	Seismic Design Code and Commentary for Buildings
Turkey	TBEC-2018	Turkey Buildings Earthquake Standard
	IBC per ASCE 7	International Building Code—IBC
United States	CBC per ASCE 7	California Building Code—CBC
	UFC per DoD	Uniform Facilities Criteria—UFC

Responsibility for Mitigation of Seismic Damage

The MotorSeT equipment is considered a nonstructural building component as defined by regional building codes and seismic design standards. Equipment capacity was determined from tri-axial seismic shake-table test results in accordance with the International Code Counsel Evaluation Service (ICC ES) Acceptance Criteria for Seismic Certification by Shake-Table Testing of Non-structural Components (ICC-ES AC156).

An equipment importance factor, I_p , that is greater than one ($I_p > 1.0$) is assumed and indicates that equipment functionality is required after a seismic event and after seismic simulation testing. This importance factor is applicable for designated seismic systems (for example, special certification) servicing critical infrastructure and essential buildings where post-earthquake equipment functionality is a requirement.

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

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

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

Tie-Down Points for Rigid Floor Mounted Equipment

The equipment enclosure provides anchorage tie-down points to accept anchor attachments to the building structure or foundation. Indoor and outdoor enclosures provide enclosure base frame clearance holes for bolted anchorage attachments as shown in job drawings.

Equipment installations of single, stand-alone sections must be anchored using all enclosure tie-down points as shown in job drawings for indoor and outdoor applications respectively. Equipment installations of multiple-section lineups (2 or more MotorSeT units bolted together) may not require every tie-down point to be used and specifics will be shown in the job drawings.

Equipment installations using welded supports and attachments in lieu of bolted supports and attachments must ensure the weld locations are distributed similarly to the locations of enclosure anchorage clearance holes. Welded supports and attachments must be properly sized to ensure the weldment withstand capacity exceeds the earthquake demand at the location of equipment installation. Precautions shall be made to properly vent and shield the equipment enclosure during the field welding process. Schneider Electric is not responsible for equipment damage caused by field welded supports and attachments.

Anchorage Assembly Instructions

The bolted anchor assembly view depicted in job drawings illustrates the equipment's as-tested attachment to the seismic shake-table test fixture. The equipment seismic rated capacity, as stated on the Schneider Electric CoC, was achieved with the identified size and grade attachment hardware. For bolted attachments, the use of grade 5 or better hardware with thick, hardened, Belleville conical spring washers, where specified in job drawings, are required to maintain seismic conformance. Field installed equipment attachment and support detailing shall be in accordance with the anchorage system requirements as defined by the construction site EOR or RDP.

Field Installation

After properly preparing the site, field assemble the shipping splits.

- Shipping splits are made to provide convenience for the installer.
- The installer must properly align, level, and bolt the units together and to the concrete floor.
- The installer must properly install the interconnection bus and any interconnection secondary control, instrumentation, heaters, wiring, etc. Schneider Electric provides all materials for interconnections including hardware, bus, insulation and internal secondary wiring.
- Install all interconnections in accordance with drawings and wiring diagrams provided with the equipment.

Accessing the Isolation Section Compartment

To access the isolation section compartment, follow these steps:

1. Remove the bolts attaching the side cover and set the cover aside.





2. If an optional keylock is provided, use the key to unlock the isolation section front cover.

3. Remove the disconnector switch operator handle from the front cover. Loosen the retaining nut and turn the operator handle rod counterclockwise.

Figure 9 - Handle Locknut



4. Remove the bolts attaching the isolation front cover to the unit.

Figure 10 - Isolation Section Cover



- 5. Remove the front cover and set it aside.
- 6. When reversing the above steps to install the medium voltage isolation section side and front covers, make sure to fully tighten the bolts attaching the covers, tighten the hardware attaching the operator handle, and lock the cover lock, if a keylock option is included.

Accessing the Medium Voltage Compartment

NOTE: To open the medium voltage door, the disconnector switch must in the Open position. Refer to Opening the Disconnector Switch, page 45.

To access the medium voltage compartment, follow these steps:

- 1. If an optional keylock is provided, use the key to unlock the medium voltage door.
- 2. Using a screwdriver or nut driver, loosen the screws on the door closure brackets and slide the door closure brackets off the door flange tabs.



- 3. The medium voltage door can now be opened.
- 4. When reversing the above steps to close the medium voltage door, make sure to slide brackets over the door flange tabs before fully tightening the door closure bracket screws and lock the door lock, if a keylock option is included.

Anchoring the Equipment

Anchoring and Joining the Shipping Splits

Follow the steps below for instructions on anchoring the units.

1. Review the assembly drawings to ensure that the equipment shipping splits will be assembled in the correct order.

NOTE: If the equipment will be connected to an existing lineup, mount the connecting section or shipping split first.

2. Locate and anchor the first shipping split.

For seismic hazard designated locations, each section must be anchored per details supplied by the Engineer of Record to the load-bearing path of the building structure system. Use grade 5 or better hardware with thick, hardened, Belleville washers as specified in the job drawings to maintain equipment seismic ratings.

For non-seismic hazard locations, 1/2 in. (12 mm) grade 5 or higher bolts are recommended; however, 3/8 in. (10 mm) grade 5 bolts are permissible. For either application,

NOTE: Be sure to mount all shipping splits on the same plane and level them to verify that they are properly connected.



Figure 11 - Bolt Hole Location for Enclosures — (24 in. wide shown)

3. Locate the next shipping split according to the assembly job drawings.

4. Level the shipping split and join it to the previously installed shipping split. Apply vertical and horizontal gasket and bolt enclosures together using 3/8 in. or M10 mm hardware in all eight locations (see Gasket, page 32 and Joining Enclosure Mounting Hole Locations, page 32).

Figure 12 - Gasket







Connections

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSA Z462 or local equivalent.
- Only qualified personnel familiar with power switch equipment are to perform work described in this set of instructions. Workers must understand the hazards involved in working with or near power switch circuits.
- Perform such work only after reading and understanding all of the instructions contained in this bulletin.
- Turn off all power supplying this equipment before working on or inside the equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Before performing visual inspections, tests, or maintenance on the equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, grounded, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding. More than one disconnector switch may be required to de-energize the equipment before servicing.
- Do not remove covers, open doors, or work on the equipment unless the power is off and all circuits are de-energized and disconnected.
- Handle this equipment carefully and install, operate, and maintain it correctly in order for it to function properly.
- Do not make any modifications to the equipment or operate the system with the interlocks removed. Contact your local field sales representative for additional instruction if the equipment does not function as described in this manual or if parts are missing or damaged.
- Comply with all codes, standards, and regulations to promote safe electrical installations. A permit may be needed to do electrical work, and some codes may require an inspection of the electrical work.
- Carefully inspect your work area and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

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

Main Bus Assembly

- 1. Remove the compartment covers.
- 2. Bolt splice plates and bus bars together. Follow the assembly instructions in Bus Connections, page 34

Insulated Bus Systems

If insulated bus is provided as optional equipment, insulate all field assembly primary joints and terminations for the operating voltage. The two methods of insulating joints are:

- Boots (where applicable)
- · Taped joints for others

See for the joint insulation (when required) procedure.

Taped Joints

When it is required to tape joints, follow these steps:

- 1. Prepare all joints as described in Ground Bus Connections, page 36.
- 2. Form a smooth surface for taping by filling all cavities around the bolts and nuts with a 4-in. wide filler compound to block incoming air.

NOTE: This compound is used to fill air gaps and block incoming air. It is not intended to be used as a standalone insulating medium. Do not use it for insulating purposes.

- 3. Cover conductors and hardware with at least 1/8-in. of filler.
- 4. Apply urethane tape 210 (1-1/2-in. wide, 0.0010 thick), starting with a minimum of 1-1/4-in. over the end of the busbar insulation and fully covering the joint at 2/3 seam lap using two layers. Apply additional layers to sharp angles to obtain equivalent of the insulation on the flat surfaces.
- 5. Apply a vinyl finish tape (black or red), beginning 1-in. over the end of the urethane tape, fully cover at 2/3 seam lap forming a smooth tight covering.
- 6. Mask off busbar insulation and brush a heavy coat of brown varnish over the final taping. If necessary, the varnish can be thinned using xylene.
- 7. Inspect bus work and phase barriers to ensure that no tools or other objects are left inside the unit.
- 8. Replace all covers that were previously removed.

Cleaning Bus Insulation

Insulated main busbars (when supplied) are insulated with a high temperature thermoplastic material having dielectric and mechanical properties. When it is necessary to clean the insulated main busbars, use a clean cloth dampened with either distilled or purified water or isopropyl alcohol to remove any foreign material from the insulation surfaces.

Bus Connections

When shipping several sections of switchgear for a lineup, it is necessary to disconnect the main bus before shipping.

- It is important that the load break interrupter switchgear be anchored in place before reconnecting the main bus.
- It is essential that the bus bar connections be securely bolted to create the necessary pressure for proper conductivity between the bus bars.

Refer to the provided drawings and Bolt Torque Values for Bus Connections, page 35 for more information.

Follow these steps for all field-assembled joints in primary conductors, regardless of material or insulation method:

- 1. Wipe the bus surface clean. Do not use sandpaper or any abrasive on the plated surface. Avoid touching the cleaned surface as much as possible.
- 2. Join the clean contact surfaces by using the hardware provided, see Busbar Connections, page 35 for more information.
- 3. Use the torque values as listed in Bolt Torque Values for Bus Connections, page 35.

NOTE: The torque values in Bolt Torque Values for Bus Connections, page 35 do not apply to the contact mechanism of switches.

Figure 14 - Busbar Connections



Table 6 - Legend — Busbar Connections Diagram

Call-out	Description
А	Lock washer ¹
В	Flat washer ¹
С	Busbars
D	Bolt
E	Nut

Table 7 - Bolt Torque Values for Bus Connections

Bolt Material	Torque in Feet (ft.) - Pounds (lbs.) for bolt size					
	1/ 4-20	5/16-18	3/8-16	1/ 2-13	5/8-11	
Steel	5	12	20	50	95	
Silicon bronze	5	10	15	40	55	

Cable Connections

Before making cable connections, check to verify if special site preparation requirements are needed. Determine the phase identity of each cable and tag the cable accordingly. Avoid sharp turns, corners, and edges that could damage or weaken the cable insulation. Follow the cable manufacturer's instructions to determine the minimum bending radius of the cables. It is important that the connections be clean and securely bolted.

^{1.} These can be replaced with "Belleville" spring washer when specified.

Primary Cable Connections

Cable termination space is provided in the cubicle for top or bottom entry. Maintain adequate electrical clearance between cables, energized parts, and grounded metal parts.

Before making any primary cable connections, label the cables to indicate their phase relationship with the switch connections. This helps ensure that motors will rotate in the proper direction and that the phase rotation is the same when interconnecting two different sources of power.

Fully insulate non-shielded portions of cable from ground potential and any associated devices such as window current transformers (CTs).

When using shielded cable, follow the cable manufacturer's instructions in stripping the shield and cleaning the unshielded portion of the cable. Install the appropriate stress cone in accordance with the stress cone manufacturer's instructions.

When using non-shielded cable, follow the cable manufacturer's instructions for proper clearance of cables, conduits, and bus.

Cables must be securely fastened or braced to withstand short circuit forces and to help prevent strain on the terminals.

Ground Bus Connections

A A DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Connect the ground bus to the proper equipment ground according to the local installation code requirements. The ground bus must be connected for proper operation of relaying and instrumentation, and for personnel safety.
- · Ensure that all parts of the equipment are grounded properly.

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

The ground bus is bolted to the frame near the bottom of the equipment. It is arranged so that connectors to the station ground can be made in any unit. If the equipment is shipped in more than one group, connect the sections of the ground bus by using the splice plates provided with the equipment. Assemble joints as described in Bus Connections, page 34.

Ground bus connections are made in the lower portion of the cable entrance compartment. Connect the ground bus to the station ground bus using a conductor with a current-carrying capacity equal to that of the ground bus.

Accessing the Low Voltage Compartment

To access the low voltage compartment, follow these steps:

- 1. If an optional keylock is provided, use the key to unlock the low voltage door.
- 2. Using a screwdriver or nut driver, loosen the screws on the door closure brackets and slide the door closure brackets off the door flange tabs.

Figure 15 - Low Voltage Door Locking Brackets



- 3. The low voltage door can now be opened.
- 4. When reversing the above steps to close the low voltage door, make sure to slide brackets over the door flange tabs before fully tightening the door closure bracket screws and lock the door lock, if a keylock option is included.

Control Connections

A A DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect any backfed transformers and safely ground the primaries before energizing the auxiliary power. When supplying external sources of control power to this switch, it can cause backfeed to the high voltage bus through control power or potential transformers.
- · Remove all grounds prior to energizing this equipment.

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

Control wires between shipping sections should be reconnected as marked by the factory. Connections which are to be connected to the terminals in an apparatus remote from the switch should be carefully checked against the connection diagram. When making connections to terminals, care should be exercised to assure that the connections are properly made.

Site Preparation

Site preparation is essential for proper installation and operation of the equipment. To prepare the site for installation, be sure to:

- Compare the site plans and specifications with the switch drawings to be sure there are no discrepancies.
- Check the site to verify that the equipment will fit properly and withstand the weight of the equipment. The impact loading is approximately 1.1 times the static load.
- Ensure that the floor is level within 1/16 in. per ft. (2 mm per 305 mm), or a maximum of 1/4 in. (6 mm) within the area of the switch lineup. If the floor is not within the tolerances, use steel shims or other means to ensure equipment is installed on level surface.
- Ensure there are suitable means for anchoring the equipment to the floor and completely align the equipment prior to final anchoring.
- Ensure the floor channels are level and straight with respect to each other. If the floor is not level and flush with the floor channels, it will be difficult to align the equipment and open the doors.
- Ensure that the installation site meets all environmental specifications for the enclosure's NEMA type rating, and all other applicable NEMA/CEMA rating.
- Allow working space clearance per National Electrical Code (NEC) Article 110.34, "Work Space and Guarding." Minimum clearances must meet all local and national requirements.
- Provide area ventilation, heating, and air conditioning to maintain the ambient temperature around the equipment between 0°C (32°F) and 40°C (104°F).
- Adequate lighting and convenience outlets with the correct power source should be available near the equipment.
- Ensure that the power cables have the correct NEC/CSA current rating for the unit being installed. Consult local and national codes for selecting wire size.
- · Route sewer, water, and steam lines away from the equipment.
- · Provide floor drains to help prevent water buildup.
- For outdoor units, caulk the entire base with a suitable compound to help prevent the entrance of moisture. You must also seal the conduits.

Aligning the Switch Doors

If it is necessary to realign the doors of the equipment during installation, follow the steps below:

- 1. Check the equipment to ensure it is level and can be supported by the installation surface as described in Site Preparation, page 38.
 - Start at either end of the line-up and realign each door individually as required.
 - · Ensure that the top of each door is level with the adjacent doors.
 - Ensure equal space between adjacent doors to allow them to swing freely.
 - Ensure the doors are aligned in exact or uniform appearance.
 - Adjust door stops to allow a door swing of approximately 110°.
 - Once the doors are properly aligned, the doors of the outdoor switch must be tightly sealed all around the entire gasket.

 Close and latch the door, then check the seal with a card (3 x 5 in. card, shipping tag – for example, an IBM card or similar) around the edge of the door. If the card can pass between the door and gasket, the door is not properly adjusted. Readjust the door so that the card no longer passes between the door and gasket.

Fuse Installation

The fuses provided by Schneider Electric should be installed following the switch equipment installation process. The installer is responsible for the proper installation of fuses, holders, fittings, etc.

A A DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Do not perform fuse installation or replacement on energized equipment.

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

- Ensure that all fuses, holders, etc. are correctly installed and secured.
- Ensure that all fuses are latched/locked in place if latching/locking style fuses are provided.

Refer to the relevant fuse instruction manuals for detailed assembly and installation instructions.

Interlocks

Interlocks should be checked for proper operation before power is applied to the switchgear. Check the access interlock to ensure that:

- The power fuses cannot be accessed unless the interrupter switch is open.
- The interrupter switch cannot be closed while the power fuses are accessible.

A A DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Properly destroy extra interlock keys (when supplied), or store them in a secure location.
- · Make extra interlock keys accessible only to appropriate personnel.
- Do not modify or alter interlocks.

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

Before placing the equipment into operation, see Load Break Interrupter Switch 400 A, 5 kV, page 45, and consult the drawings for proper operating sequence.

The load break interrupter switch is equipped with a mechanical device that blocks access to a closed switch.

Pre-Operational Inspection and Testing

Pre-Operational Checks

A A DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA® 70E® Standard for Electrical Safety in the Workplace®, NOM-029-STPS, Maintenance of Electrical Installations in the Workplace – Safety Conditions, or CSA Z462 or local equivalent.
- Only qualified personnel familiar with power switch equipment are to perform work described in this set of instructions. Workers must understand the hazards involved in working with or near power switch circuits.
- Perform such work only after reading and understanding all of the instructions contained in this bulletin.
- Turn off all power supplying this equipment before working on or inside the equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Before performing visual inspections, tests, or maintenance on the equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, grounded, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding. More than one disconnector switch may be required to de-energize the equipment before servicing.
- Do not remove covers, open doors, or work on the equipment unless the power is off and all circuits are de-energized and disconnected.
- Handle this equipment carefully and install, operate, and maintain it correctly in order for it to function properly.
- Do not make any modifications to the equipment or operate the system with the interlocks removed. Contact your local field sales representative for additional instruction if the equipment does not function as described in this manual or if parts are missing or damaged.
- Comply with all codes, standards, and regulations to promote safe electrical installations. A permit may be needed to do electrical work, and some codes may require an inspection of the electrical work.
- Carefully inspect your work area and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

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

- Care should be taken to help prevent the MEI (Metal-Enclosed Interrupter) switchgear equipment from being energized by the power system during preliminary tests.
- If an upstream disconnecting means is not available, line leads should be disconnected.
- All internal connections should be examined to ensure that they have not been loosened or damaged during shipment or installation, and all bolted connections and joints should be tightened to ensure good contact.

- If spring washers are used under bolt head and nuts, they should be tightened in accordance with the provided equipment drawings.
- All wiring connections should be checked for tightness, including those at instrument transformers and all terminal blocks.
- Current transformer (CT) shorting devices on all active circuits should be removed when connected to an appropriate load.
- The integrity of control circuits should be checked with an ohmmeter to ensure against short circuits in the control wiring.
- Perform a power frequency withstand test on the power circuit, such as the bus and interrupter switch.
- After the MEI switchgear equipment has been installed and all interconnection completed, any control schemes should be operationally tested, and power connections given a final check for phase rotation and sequence before the switchgear is finally energized for service.

Carefully read and follow the instructions and safety precautions listed in this document. Operate at least 15 open/close operations and observe for proper performance prior to energizing.

AWARNING

OVERVOLTAGE TO CONTROL AND PROTECTIVE COMPONENTS

Disconnect all control and protective devices that may become damaged when conducting high-potential tests or insulation resistance tests. Consult the factory drawings to determine which devices must be disconnected from the circuit.

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

Final Inspection

A A DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSA Z462 or local equivalent.
- Only qualified personnel familiar with power switch equipment are to perform work described in this set of instructions. Workers must understand the hazards involved in working with or near power switch circuits.
- Perform such work only after reading and understanding all of the instructions contained in this bulletin.
- Turn off all power supplying this equipment before working on or inside the equipment.
- · Always use a properly rated voltage sensing device to confirm power is off.
- Before performing visual inspections, tests, or maintenance on the equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, grounded, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding. More than one disconnector switch may be required to de-energize the equipment before servicing.
- Do not remove covers, open doors, or work on the equipment unless the power is off and all circuits are de-energized and disconnected.
- Handle this equipment carefully and install, operate, and maintain it correctly in order for it to function properly.
- Do not make any modifications to the equipment or operate the system with the interlocks removed. Contact your local field sales representative for additional instruction if the equipment does not function as described in this manual or if parts are missing or damaged.
- Comply with all codes, standards, and regulations to promote safe electrical installations. A permit may be needed to do electrical work, and some codes may require an inspection of the electrical work.
- Carefully inspect your work area and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

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

After installing the equipment and making all connections, inspect and test the equipment before placing it in service.

- Ensure that no foreign materials, tools, or any other objects are placed on or near high voltage parts by performing the following:
 - Vacuum the floors to remove all debris.
 - Do not use compressed air to blow dust or debris from surfaces inside the controller.
 - Wipe and clean all barriers, bus insulators, bushings, and switch with a clean cloth dampened with either denatured or isopropyl alcohol. Then, wipe with a clean dry cloth.
 - Clean the control surface components and amorphous (Lexan) plastic covers and barriers with a clean cloth dampened with distilled or purified water. Then, wipe with a clean dry cloth. Do not use alcohol on these surfaces.

Final Field Test

Although the equipment and devices have been tested at the factory, perform a final field test. Check the equipment to ensure it is properly installed and that all connections are correct and have not become loose during transportation.

A A DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSA Z462 or local equivalent.
- · Ensure that there is no backfeed through the main circuit.

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

To test devices such as relays and meters, refer to the manual for each device. Specific instruction manuals are provided that describes operating sequences for each device, including complicated automatic equipment.

- When transformers are provided to supply the control power, select the primary taps to obtain the control voltage indicated on the wiring diagram on the secondary of the transformer.
- When a battery supplies the control power, the cables from the battery to the switch must be large enough to avoid excessive voltage drop.

Perform a one minute high potential test on the primary circuit, busing and interrupter switch, at a field test value of either 14 kV AC or 20 kV DC.

Operation

See also, Requirements for Installation, Operation, and Maintenance, page 13 for additional information.

Load Break Interrupter Switch 400 A, 5 kV

The MotorSeT Load Break Interrupter Switch 400 A, 5 kV has spring mechanisms that provide quick "make" (rated fault closing) and quick "break" (rated load interruption) operation.

As the operator handle is rotated, the charged spring is driven off-center and releases its energy, thereby rotating the operating shaft. The switch blades will not move, in either a closing or opening direction, until the main spring causes rotation of the operating shaft.

NOTE: Once the springs are moved off-center and released, the operator cannot control the opening or closing operation. As a result, the mechanism provides a fault closing and rated load break feature independent of the speed of the operating handle movement.

The load break interrupter switch has several built-in features:

- A door interlock that blocks opening the enclosure's front door while the switch is in the closed position
- A switch interlock that blocks manual operation of the handle mechanism while the door is open
- A viewing window to view each switch contact position
- Capability for padlocking the switch in the Off/Open position
- Capability for padlocking the door handles closed
- · Mechanical indicators showing whether the switch is open or closed
- · Key interlocks (when provided) force a sequence of operation

Disconnector Switch Operation

Opening the Disconnector Switch

To open the disconnector switch, follow these steps:

1. If the controller is supplying power to the motor, press the Stop button on the control panel to remove power to the motor.

2. Grasp the disconnector switch operator handle and rotate the handle counterclockwise downward to the Off/Open position (shown in Handle Positions, page 46).

Figure 16 - Handle Positions



3. Use the viewing window to view the disconnector switch and verify that the disconnector switch is in the Off/Open position.

A A D A N G E R

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- After operating disconnect switch to the open position, always look through the viewing window and verify all 3 main and arc interrupter blades are fully open.
- Do not work on or in this equipment or on down stream equipment if any of the main or arc interrupter blades remain closed after the switch is opened. Contact Schneider Electric if blades remain closed.
- Perform inspection and preventative maintenance on disconnect switch at a minimum of once each year.

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

Closing the Disconnector Switch

To close the disconnector switch, follow these steps:

1. Use the viewing window to view the disconnector switch and verify that the disconnector switch is in the Off/Open position (shown in Handle in Off/Open Position, page 47).

Figure 17 - Handle in Off/Open Position



2. Grasp disconnector switch operator handle and rotate the handle clockwise upward to the On/Closed position (shown in Switch Handle On/Closed Position, page 47).





3. Use the viewing window to view the disconnector switch and verify that the blades for all three phases are in the On/Closed position (shown in Switch Blades in Closed Position, page 47).





Maintenance

Read and understand the following precautions before performing any maintenance. See Requirements for Installation, Operation, and Maintenance, page 13 for additional information.

A A DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSA Z462 or local equivalent.
- Only qualified personnel familiar with medium voltage equipment are to perform work described in this set of instructions. Workers must understand the hazards involved in working with or near medium voltage circuits.
- Perform such work only after reading and understanding all of the instructions contained in this bulletin.
- 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.
- Inspection and maintenance should only be performed with the primary source (s) of power disconnected and locked open. Be sure there is no back-feed through any feeder circuit.
- Before performing visual inspections, tests, or maintenance on the equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, grounded, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding. More than one disconnector switch may be required to de-energize the equipment before servicing.
- Disconnect, de-energize, lockout and properly ground circuit(s) before working on the equipment.
- Do not open the front cover while the power is on or the starter is running.
- Disconnect the equipment and enable a lockout command prior to performing maintenance on the equipment.
- Ensure that any stored energy in the capacitors has dissipated before energizing or de-energizing the equipment.
- Carefully inspect your work area and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

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

Regular Inspections

Environmental Conditions	Inspection Frequency
 Normal conditions, such as: Ambient air temperature is between 14°F (-10°C) and 104°F (40°C) Relative humidity is non-condensing and below 75% Altitude is less than 3300 ft (1000 m) Effect of solar radiation is not significant No excessive pollutants or dirt in the immediate environment No excessive vibrations No electrical overloads Usage of mechanical components such as disconnect switches less than 500 operations per year 	Every year
 Harsh conditions, such as: Ambient air temperature is less than 14°F (-10°C) or greater than 104°F (40°C) Relative humidity is above 75% and non-condensing Altitude is greater than 3300 ft (1000 m) Effect of solar radiation is significant Excessive pollutants or dirt in the immediate environment Excessive vibrations Electrical overloads Usage of mechanical components such as disconnect switches exceeding 500 operations per year 	Every three months

Table 8 - Regular Inspections Frequency

NOTE: If issues are found during the inspection that require adjustment or repair, contact your local Schneider Electric field sales representative.

Cleaning the Switch Components

All switch components, including insulators and blade assemblies must be cleaned as follows:

- Every year or after 1000 operations
- Wipe the dust from the components with a clean dry cloth. After cleaning, apply a light coat of non-corrosive high-temperature grease that will not harden upon exposure to air (SHC-32 Mobiltemp or equivalent) to all contact surfaces.

Contact Inspection

Check the blades and ensure that they are making good contact.

- Conduct a contact resistance measurement between (1) the jaw and spade terminal and (2) the hinge spade terminals. It should read less than 80 microohms.
- Ensure that the blades can be "opened" from the jaw casting with a pulling force of 8–10 pounds measured at the aluminum spacer between the main blades.
- Wipe and clean the contacts, especially if the switch has not been in operation for a while. Open and close the switch several times in succession to do so.

SWITCH BLADE CONTACT DAMAGE

Do not clean the blades with abrasive materials or abrasive cleaners.

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

Insulators

Keep all insulator surfaces clean, particularly when the switches are in harsh environmental conditions. Clean the insulators with a clean lint-free cloth dampened with either denatured alcohol or isopropyl alcohol.

Carefully inspect all insulators for signs of carbon tracking. Focus on areas where the conductor passes through an insulator or are near a barrier. Examine the surface for cracks or discoloration. Contact your Schneider Electric field sales representative if any of these conditions exist.

Bus and Conductor (Switch Blade)

Inspect the bus and connections for evidence of overheating or damage.

- Using an appropriate insulation tester or Megger[™], measure and record the resistance to ground, and the resistance between phases of the bus and connections insulation.
- Measure and record the ambient temperature and humidity.

Analyze these readings over consecutive periods to identify trends indicating insulation degradation.

Operating Shaft

The operating shaft connects the stored energy mechanism to the switch operating arm. Lightly coat the shaft bearings, door interlocks, and door latch surfaces with lubricant (white lithium grease).

Push Rods

Each main blade in the switch is connected to the main operating shaft by an insulating pushrod. Check the pushrods for signs of damage to either end each time a normal maintenance inspection is performed.

Stored Energy Mechanism

The moving parts are the front and rear latches, which are spring-operated, and the two shaft bearings. Check the moving parts after approximately 100 operations to make sure the latches rotate freely up and down using finger pressure on the rollers. Check for loose bearing bolts.

Lubrication

Mechanical (non-electrical contacts): Clean and lubricate the bearing points and sliding surfaces at regular intervals with a thin film of white lithium grease. Before lubrication, remove any hardened grease and dirt from the latch and bearing surfaces with a clean, dry lint-free cloth.

Disconnector switch contacts: Clean and grease the contact surface of the movable blades and the stationary contact surfaces with SCH-32 Mobiltemp, or equivalent.

High Potential Tests

Perform a one minute high potential test on the primary circuit, busing and interrupter switch, at a field test value of either 14 kV AC or 20 kV DC.

Maintenance Checklist

The following tables list the inspection checks that are necessary to maintain and to verify that the equipment remains operational.

Table 9 - Cable and Bus Checklist

Inspect bolts on bus connections for tightness
Check clearance phase-to-phase and phase-to-ground of cable and bus.
Check the bus and cable supports to verify they are adequate.
Inspect the cables for insulation damage and broken conductor strands near the cable lug.
Inspect the cable termination in the cable lugs for tightness.
Inspect the placement of phase markings.
Check the plating on busbars.
Inspect the taped joints for tightness (when applicable).
Check the connections on the lugs.
Inspect the taped joints for coverage of insulating varnish and heating.

Table 10 - Key Interlocks Checklist

Check the door block for lubrication.
Check the key interlock system for appropriate sequence and operation.
Verify that the interlock is free from binding.
Check to verify the weather cap fits securely (outdoor only).
Ensure that the key nameplate matches the key number.
Check to verify that the handle stops on casting do not interfere with the interlock mechanism.
Remove all spare keys.

Table 11 - Fuse Accessories Checklist

Check contact of fuses mounted in the fuse clip.	
Inspect the unit for spare fuse holder or mounting.	
Check the alignment of fuses with the fuse clips.	

Table 12 - Unit General Misc. Checklist

Inspect the phase barriers for proper mounting.
Check the unit for nomenclature and manufacturer's nameplates.
Inspect the paint coverage of unit.
Inspect the door handles, locking bars and mechanism and lubricate.
Inspect for damaged, bent, or twisted doors.
Check the unit for proper device markings.
Inspect the unit for gasketed joints (outdoor only).
Check the unit for water tightness, dirt, moisture, and rust.
Inspect the unit for door stop alignment (when applicable).
Inspect the unit doors for adequate opening.
Check the louvers (if applicable) for proper backup and clean filters.
Seal all non-ventilation openings to help prevent moisture, vermin, rodents, snakes, etc. from entering the equipment.
Check the insulator for heat.
Check and torque all bolts.
Check the heaters, thermostats, and other environmental controls.

Troubleshooting

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSA Z462 or local equivalent.
- Only qualified personnel familiar with power switch equipment are to perform work described in this set of instructions. Workers must understand the hazards involved in working with or near power switch circuits.
- Perform such work only after reading and understanding all of the instructions contained in this bulletin.
- Turn off all power supplying this equipment before working on or inside the equipment.
- · Always use a properly rated voltage sensing device to confirm power is off.
- Before performing visual inspections, tests, or maintenance on the equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, grounded, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding. More than one disconnector switch may be required to de-energize the equipment before servicing.
- Do not remove covers, open doors, or work on the equipment unless the power is off and all circuits are de-energized and disconnected.
- Handle this equipment carefully and install, operate, and maintain it correctly in order for it to function properly.
- Do not make any modifications to the equipment or operate the system with the interlocks removed. Contact your local field sales representative for additional instruction if the equipment does not function as described in this manual or if parts are missing or damaged.
- Comply with all codes, standards, and regulations to promote safe electrical installations. A permit may be needed to do electrical work, and some codes may require an inspection of the electrical work.
- Carefully inspect your work area and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

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

For detail information about operation, troubleshooting, and maintenance requirements for the disconnector switch module, see the disconnector switch module manual.

Problem Probable Cause		Action
		If the excess current causes the switch to overheat, either:
	Overload	 Replace the switch with a switch that has a rating adequate for the present load or future loads.
		Rearrange circuits to remove excess load on the switch.
	Poor contact (contact out of alignment)	Adjust contacts.
Overheating	Connections to switch: inadequate current- carrying capacity	Increase the capacity of the connections by adding conductors or by replacing with heavier conductors.
	Contact burned or pitted	Dress and fit the contacts properly.
	The bolts and nuts on the connections are not tight	Tighten all bolts and nuts.
		NOTE: Do not apply too much pressure when tightening the nuts on bolts. Using a wrench that is too large can further loosen the connection by causing the bolts to expand beyond their elastic limit. See Bolt Torque Values for Bus Connections, page 35.
	Ambient temperature too high (too close to a boiler, a furnace, etc.)	Relocate to the equipment to a cooler place or implement cooling methods.

Table 13 - Troubleshooting — High Voltage Fuses and Disconnect Switches

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As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

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