

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

# **BreakMaster™ V**

## Medium voltage load interrupter switchgear





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# Safety measures and classifications

Read the following hazard classifications carefully, and fully inspect the equipment for any identifiable hazards prior to installation, operation or maintenance. The following classifications listed below will appear throughout this document or on labels located on the equipment. These are standard symbols defined by ANSI Z535.4-2011, which were established for recognition of potential hazards that pose risk to life and property. The classification is based on the probability and severity of injury if the hazard is not avoided. Please follow instructions, warnings, labels and codes for proper installation, operation and maintenance of equipment and devices. Only qualified persons, as defined by NFPA 70, should provide installation, operation and maintenance on this equipment and devices.

## Danger symbol/warning symbol

The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists that 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 physical 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.



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



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



**Notice** is used to address practices not related to physical injury.

This document is based on information available at the time of its publication. While efforts have been made to ensure accuracy, the information contained herein does not cover all details or variations in hardware and software, nor does it provide for every possible contingency in connection with installation, operation and maintenance. Features may be described herein that are not present in all hardware and software systems. ABB assumes no obligation of notice to holders of this document with respect to changes subsequently made.

ABB makes no representation or warranty, expressed, implied or statutory, with respect to, and assumes no responsibility for the accuracy, completeness, sufficiency or usefulness of the information contained herein. No warranties of merchantability or fitness for purpose shall apply.



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# Introduction

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01  
BreakMaster V

This publication provides guidelines for installation, operation and maintenance of the Breakmaster™ V load interrupter switchgear, as shown in figure 01. The information provided does not cover all details or variations in this product offering, nor does it address all possible contingencies to be met in connection with installation, operation or maintenance.

Should further information be desired, contact Post-Sales Support: 1-888-437-3765. Refer to the order number found on the data nameplate located at the front of the equipment when calling for assistance.

## General description

BreakMaster V load interrupter switchgear consists of an air-insulated, three-pole, gang-operated, quick-make, quick-break, load interrupter switch in a floor-mounted metal enclosure.

It is used with IEEE tested VD4 or VM1 circuit breakers to provide safe, economical switching and circuit protection. The BreakMaster V is designed for medium voltage circuit applications ranging from 2.4 kV through 15 kV from 600 A to 1200 A load ratings.

The switch is operated externally from the front of the cubicle and is equipped with a quick-make, quick-break mechanism to open and close the switch independent of the speed with which the operating handle is moved, manually or power operated.

The switchgear meets or exceeds all applicable ANSI and IEEE standards. UL/cUL listing is available as an option.



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01

# Receiving, handling and storage

## Receiving

Before leaving the factory, the load interrupter switchgear is given a final mechanical and electrical inspection and is packed in accordance with best practices for electrical equipment.

On receipt of any apparatus, make an immediate inspection for any damage or loss of equipment in transit. Should damage or missing material be noted, file a claim immediately with the carrier and notify the nearest ABB sales office. Information such as description of damage and order number, as well as serial number and drawing number (located on the nameplate), should be given to the ABB representative whenever identification of the assembly is required.

## Equipment packages

Every package leaving the factory is marked with the customer's order number. If the equipment has been split for shipment, the section numbers of the equipment enclosed in each shipping package are identified.

### NOTICE

**Notice:** To avoid loss of any parts when unpacking, the contents of each container should be carefully checked against the packing list before discarding packing material. The contents of each shipping package are listed on the master packing list.

## Handling

Load interrupter switchgear sections are always shipped in an upright position, in single or group sections. Sections must be maintained in an upright position during all handling. Removable lifting plates are provided on the top of the BreakMaster™ V structure for insertion of hooks to lift the complete structure. This is the only recommended method of moving the BreakMaster V structure. Extreme care should be used not to damage or deform the unit if other moving methods are employed.

## Storage

If it is necessary to store the equipment before installation, keep it in a clean, dry location with ample air circulation and heat to prevent condensation. Like all electrical apparatus, these units contain insulation that must be protected against dirt and moisture.

### NOTICE

**Notice:** Outdoor units may be stored outside only if roof caps are installed, space heaters energized and any openings are covered.

## Enclosure lifting

It is preferable to leave the shipping skids in place under the enclosure until it reaches its final location. The equipment should be installed in its final location. The enclosure sections are best handled by lifting with a crane as shown in figure 03. Removable lifting plates are provided, as standard equipment, on top of each shipping section. To preserve the external appearance of the equipment, it is suggested that the lifting plates be left in place except where adjacent equipment must be bolted together, i.e., shipping splits, etc.

### CAUTION

**Caution:** Use two/four equal length cables and an overhead crane, each with a minimum load rating of twice the weight of the enclosure. Estimated weights for shipping splits appear on the front view drawings.

### NOTICE

**Notice:** The angle between the cables and the top of the equipment must be at least 45 degrees. If this is not possible because of lack of headspace, spreader bars must be used. Also, lift cables with greater load capability may be necessary, depending upon the angle between the cables and the crane hook.

—  
02  
Use standard lifting  
angles or lifting eyes  
to hoist the enclosure

—  
03  
45° angle between  
equipment lifting  
hook and cables

Connect a cable from the crane to the two/four lifting plates located on the top-front/rear of the enclosure as shown in figure 02.

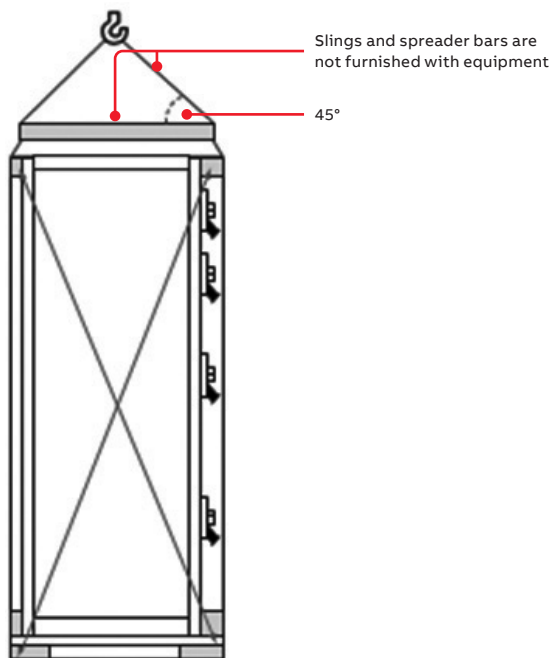
Observe the following points when lifting the equipment:

- Do not pass cables or ropes through support holes
- Always use load-rated, inspected and approved shackles or safety hooks to attach hoisting equipment to the lifting points

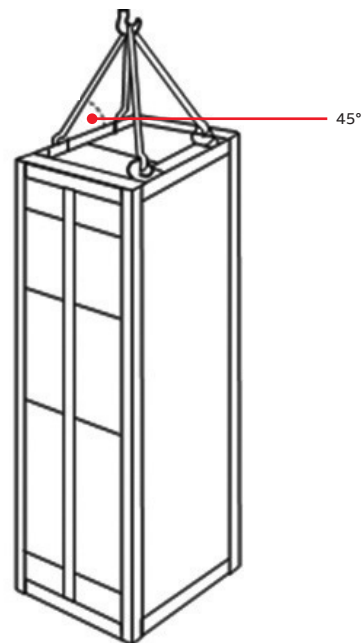
- Rig slings so that the legs are no less than 45° from horizontal, as shown in figure 03
- Take up the slack in the lifting device very carefully and manually stabilize the enclosure to prevent it from rotating

**NOTICE**

**Notice:** The weight of the load interrupter switchgear can vary. Check the weight of the section against the capacity of the crane when lifting.



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02



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03

# Installation

## Access to BreakMaster™ V vertical sections containing switches

Each BreakMaster V load interrupter switchgear is shipped from the factory with the switch in the closed position to maintain alignment during shipping and handling. The safety interlocking prevents opening of the door of the vertical section when the switch is closed. To gain access to the interior, be sure the switchgear is on a true and level surface. To open a switch in the BreakMaster V, rotate the handle to the open position. When handling the BreakMaster V enclosure and moving it, be sure the switches are in the closed position. Do not operate switches unless they are sitting on true and level surfaces.

## Identification of shipping splits

Refer to the front view drawing. Below this drawing, shipping splits will be identified in relation to group numbers for each cubicle. Normally, shipping sections will not exceed 90 inches in width.

## Procedures for joining BreakMaster V enclosures at shipping splits

The joining of sections consists of two bolted connections on the top and bottom of each depth frame member. In addition, two bolted connections are made on each vertical frame member. The vertical connections are located 1/3 and 2/3 up from the bottom of the BreakMaster V load interrupter switchgear (if 90-inch high switch, connections are made at 30 inches and 60 inches off the ground).

Make any main and ground bus connections using splice plates and hardware furnished. Bus bars are usually tin- or silver-plated. To ensure a proper electrical connection, care should be taken to protect the plating from damage. **DO NOT** use joint compound.

### NOTICE

**Notice:** Cleaning bus joints with abrasive or chemical cleansers may remove plating, which may cause joint overheating.

## Connection of switchgear to transformer

Indoor assemblies: Holes are pre-drilled in the side of the BreakMaster V structure to match holes provided in the transformer.

## Outdoor throat connection

- Switch and transformer should be brought together to give spacing of 1/2 inch between throat flanges
- Apply double bead of caulking material supplied with BreakMaster V switchgear to outside surfaces of both flanges
- Move switch and transformer together to compress caulking material

## Bolting torque values

BreakMaster V load interrupter switches are furnished with medium carbon steel hardware having a high tensile strength of 120,000 psi. SAE grade 5 or better hardware should be used for any additional bolting. The use of a torque wrench is recommended to assure the following torques. The torque values shown in table 1 apply to aluminum or copper connections. When torquing bolts, the following values are nominal. Flat washers and lock washers should be used for all connections. Washers should not be included under the heads of carriage bolts.

Table 1: Bolt torques

Bolt size (inches)	Torque (lb. ft.)
1/4	4
5/16	9
3/8	16
1/2	39
5/8	80



### Electrical clearances

Table 2 shows the minimum clearances that should be maintained after field modifications.

**Table 2: Minimum clearance for field modification**

	2.4 kV–5 kV	7.2 kV–15 kV
Between live parts of adjacent phases:		
Through air:	3-1/2"	5-3/4"
Over surface:	3-1/2"	5-3/4"
Between live parts and grounded metal through air over surface:		
	3-1/2"	5-3/4"

### Grounding

The ground bus is bolted to the uprights of the frame structure. It is arranged so that connections to the station ground can be made in any unit. A ground bus is included in each section for connecting the BreakMaster™ V equipment to the station ground.



**WARNING**

**Warning:** It is very important that the equipment be adequately grounded to ensure that all parts of the equipment, other than live parts, need to be at ground potential.

### Medium voltage electrical connections

#### Connection by cable supplied with BreakMaster V switchgear

- Cables are not factory pre-cut to proper length. Installer must cut to fit.
- Since factory cables are unshielded, they must be properly separated from each other, from all grounded metal parts and from transformer bushing/terminals of other phases.
- BreakMaster V conforms to ANSI/IEEE standards concerning phasing. Phases are arranged A, B, C, front to rear, top to bottom and left to right at connection points unless otherwise noted on the drawings. The installer is responsible for maintaining continuity of phasing throughout the system.

- Lugs are provided with the switchgear for terminating cable to the transformer bushings/terminals.

#### Connection by bus bar

- Flexible bus straps or splice plates and hardware are furnished with the BreakMaster V load interrupter switchgear.
- Copper bus bar is tin- or silver-plated connections to metal-clad switchgear assembly.

#### Indoor switchgear

Holes are predrilled in the side of the BreakMaster V load interrupter switchgear structure to match holes provided in metal-clad switchgear. Bolt together using hardware furnished with BreakMaster V load interrupter switchgear.

#### Outdoor switchgear

- Position units side by side. Holes in BreakMaster V switchgear side sheet around bus cutout will match holes in metal-clad switchgear flange.
- Press weather-stripping putty onto flange for weather-tight seal.
- Join enclosures using bolts supplied with BreakMaster V switchgear. Opposite side of metal-clad switchgear flange has nuts welded in place for ease of connection.

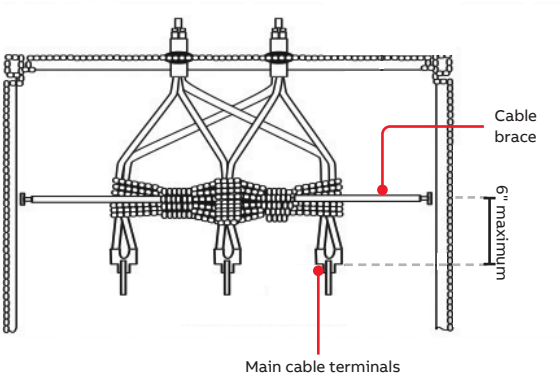
#### Connection of customer power cables

Cable termination space is provided in the cubicle for top or bottom cable entry as shown on the outline drawings. Adequate electrical clearance must be maintained between cables, energized parts and grounded metal parts. It is also the installer's responsibility to adequately support cables so that insulators or bus bars do not carry the strain of the cables.

Tin-plated aluminum clamp-type terminals are suitable for acceptance of copper or aluminum cable. If potheads or other special terminations are supplied, termination should be made according to the terminator manufacturer's instructions.

**Ambient temperature and circuit loading**  
BreakMaster™ V load interrupter switchgear is designed for installation where the average ambient temperature does not exceed 40 °C (104 °F). For higher temperatures, derating is required. The conductor temperatures within the enclosure may be as high as 90 °C (194 °F). Make sure you follow the load requirements for each device.

**Installation procedure for main cables when cable brace is provided**  
Align conduit holes in a linear orientation directly over or as close as possible to the braces. Consideration should be given to installing conduits or sleeves that might be required for future connections. Run and bend the main cable in the most convenient orientation, making sure the main cable has been located directly up against the cable braces before it connects to the main cable terminals. Lash the main cable according to figure 4 below, using a 3/8" nominal nylon rope, or a polyester braided rope having a tensile strength of 2000 lb. minimum, making six revolutions around the “A” and “B” phase main cables and six revolutions around the “B” and “C” phase main cables. Continue wrapping the cord around the main cable lashing and around the cable braces (if applicable), in between the phases, tying a knot to the cable brace or cable as you complete your last revolution. All revolutions should be made as tight as possible so as to prevent whipping during short circuits. The nylon rope is not provided.



**Field taping of electrical connections**

- Materials**
- Filler – insulation putty – ABB Part #: 55A213957
  - Insulating tape – black, linerless H.V. EPR tape – ABB Part # MMC#130C1 (1") or MMC#130C2 (2")
- Procedure**
- Clean area of dirt and foreign matter per the maintenance section of this manual.
  - Apply filler (installation putty) over bare conductor and hardware to cover and smooth out the surface. Blend contour into pre-insulation surfaces. Cover conductors and hardware with at least 1/8" of filler.
  - Apply insulating tape, lapping and layering as specified in table 3. Tape must overlap factory-installed insulation by 1". Elongate insulating tape 10 to 25 percent during application to ensure a smooth, tight fit. Should a tape roll be used up, start the new roll by overlapping any previous end by 1/2 turn.

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**Table 3: Insulation requirements for field-taped connections**

	Lap of tape	No. of layers
Up to 5 kV	1/2	1
Over 5 kV to 15 kV	2/3	2

**Securing switchgear to foundations**  
All anchoring hardware and necessary devices are to be supplied by the installer. Indoor and outdoor units can be secured to the foundation using 1/2" diameter anchor bolts (SAE grade 5 or stronger).

The four 5/8" holes in the base for these bolts are shown on the floor plan included with the drawings.

**Connection of space heaters to customer source**

Space heaters, when supplied, must be energized to prevent condensation. Heaters are supplied for 120 or 240 volt sources as shown on drawings. For line-ups or units with heater control devices, heaters will be internally wired and brought to a terminal block. A wiring diagram will be furnished with the drawings showing connection points for power.

**Switch inspection before setup**

The following procedure should be performed to ensure proper operation of the switch. Open and close the switch 2–5 times in succession. Do not attempt to grind the blades with powdered emery or other abrasives. Such practice inevitably results in poor contact and overheating.

Switch contact adjustment should be checked as follows:

1. Operate the switch several times, checking for main blade and arcing blade alignment with the stationary contacts and arc chute.
2. Check switch resistance by using a low resistance ohm meter connected between the jaw spade terminal and the hinge spade terminals. Perform this measurement for each pole of the assembly.

Any low resistance meter capable of measurements in the micro-ohm range may be used. Suitable meters include:

- Valhalla Scientific, Inc.
  - Model 4150 ATC
  - Digital ohmmeter
- Biddle Instruments
  - Cat. no. 247350
  - Digital low resistance ohmmeter

# Operation

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05  
Switch interlock

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06  
Door interlock  
cable bracing

## Mechanical safety interlocks

BreakMaster™ V switchgear is equipped with switch interlocks and door interlocks as well as provisions for padlocking in either the open or closed position.



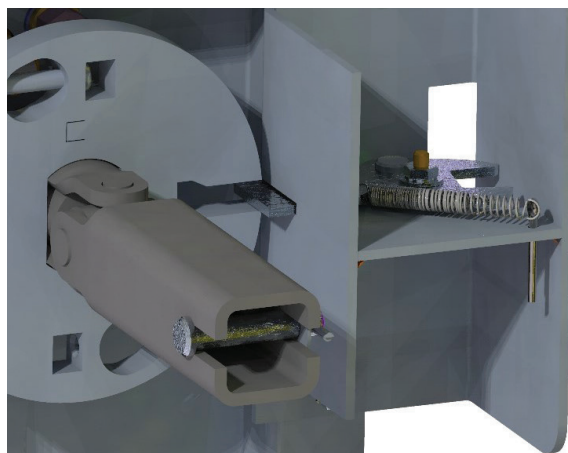
**Danger:** Ensure all power sources are de-energized before attempting any maintenance.



**Warning:** Do not defeat or disengage any safety interlocks. Defeating or disengaging safety interlocks on a BreakMaster V switchgear that is connected to a power source may result in property damage, bodily injury or death.

## Switch interlock

This interlock prevents inadvertent closure of switch if the enclosure door is open. When the door is closed, the catch plate on the door moves the safety latch out of the blocking position. See figure 05.



—  
05

## Door interlock

This interlock prevents the door of the enclosure from being opened when the switch is closed. When the switch is closed, the door catch plate is captured by the locking cam, preventing the door from being opened. See figure 06.

## Upper door interlock



**Danger:** Ensure all power sources are de-energized before attempting any maintenance.

The lower switch access door has a metal interlock that forces the upper door to be closed in order to close the lower door.



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06



### Key interlock



#### WARNING

**Warning:** Key interlocks, when supplied from the factory, will have a key for each lock; however, for correct sequence of operation, one or more of the keys must be eliminated. These excess keys must either be destroyed or locked away where they will not be accessible to operating personnel. Failure to do so may result in severe injury or death.



#### CAUTION

**Caution:** Operating a BreakMaster™ V switch with a key interlock bolt extended will result in equipment damage and may also expose a person to bodily injury or death. The key must be inserted into the interlock and rotated to retract the locking bolt before operating the BreakMaster V switch.

Key interlocks are supplied when specified. Certain BreakMaster V switchgear configurations require key interlocks, and they are, therefore, included. Standard schemes are available for locking the switch in the open position or the closed position as well as locking the main door closed. Numerous other schemes are available for special requirements, which can coordinate with upstream or downstream devices supplied by ABB or other equipment manufacturers.

### Switch operation



#### DANGER

**Danger:** Ensure all power sources are de-energized before attempting any maintenance.



#### WARNING

**Warning:** 'OPEN' and 'CLOSE' or 'I' and 'O' labels on the switch handle operators are to indicate only the DIRECTION to open or close the switch. **DO NOT RELY ON THE LABELS AS SWITCH POSITION INDICATORS.**



#### CAUTION

**Caution:** Before and after each operation, visually check through the BreakMaster V LIS upper door windows, that all poles of the switch have opened properly and are completely disengaged from the upper terminals.



#### DANGER

**Danger:** Do not open the upper or lower doors if the switch blades are not completely disengaged from the upper contacts of the switch.



#### CAUTION

**Caution:** Disengage any padlocks or key interlocks required to operate the switch (if equipped).

### Switches equipped with a chain drive

To manually close or open the switch, rotate the handle up or down as appropriate. This charges the compression spring, and as the spring lever goes over center, the stored energy of the spring is transferred to the shaft, which snaps the switch open or closed. The blades thus move at a predetermined speed that is independent of the operator.

### Switches equipped with a direct drive

To open the switch:

1. Ensure all enclosure doors are closed.
2. Engage the removable operating handle with the splined shaft of the manual drive.
3. Rotate the handle counterclockwise until the switch snaps open. (Switches equipped with a shunt trip will trip open in the first 20° of rotation.)
4. Continue to rotate the handle counterclockwise until it hits the hard stop. (This action also charges the opening spring of switches equipped with a shunt trip. Prematurely stopping handle rotation will prevent the switch from closing operation and keep the door interlock engaged.)
5. Remove the operating handle and store it.
6. Visually check that all poles of the switch have opened completely.

To close the switch:

1. Ensure all enclosure doors are closed.
2. Engage the removable operating handle with the splined shaft of the manual drive.
3. Rotate the handle in the clockwise direction until it hits the hard stop to close the switch.
4. Remove the operating handle and store it.

**NOTICE**

**Notice:** In certain configurations, such as units placed close to a wall or in outdoor front extensions, space may be limited to operate the handle in one single rotation. In such cases, the operating handle can be removed in an intermediate position and re-engaged to complete the rotation to the hard stop.

In both chain and direct drives, the quick-make mechanism provides power to overcome blowout forces that occur if the switch is closed into a fault. However, these forces are not transmitted to the operating handle since it is not rigidly connected to the blades. Therefore, the switch can be safely closed under short circuit conditions within its fault-close rating.

Load interruption is accomplished by arcing blade and engaging contact fingers located inside an arc chute. On opening the switch, the main blades open first, and all current is shunted through the spring-loaded arcing blades. Further travel of the main blades causes the arcing blades to snap out of their contact fingers where associated arcing takes place within the arc chutes.

**Shunt trip operation**

Shunt trip option is available only with the direct drive configuration.

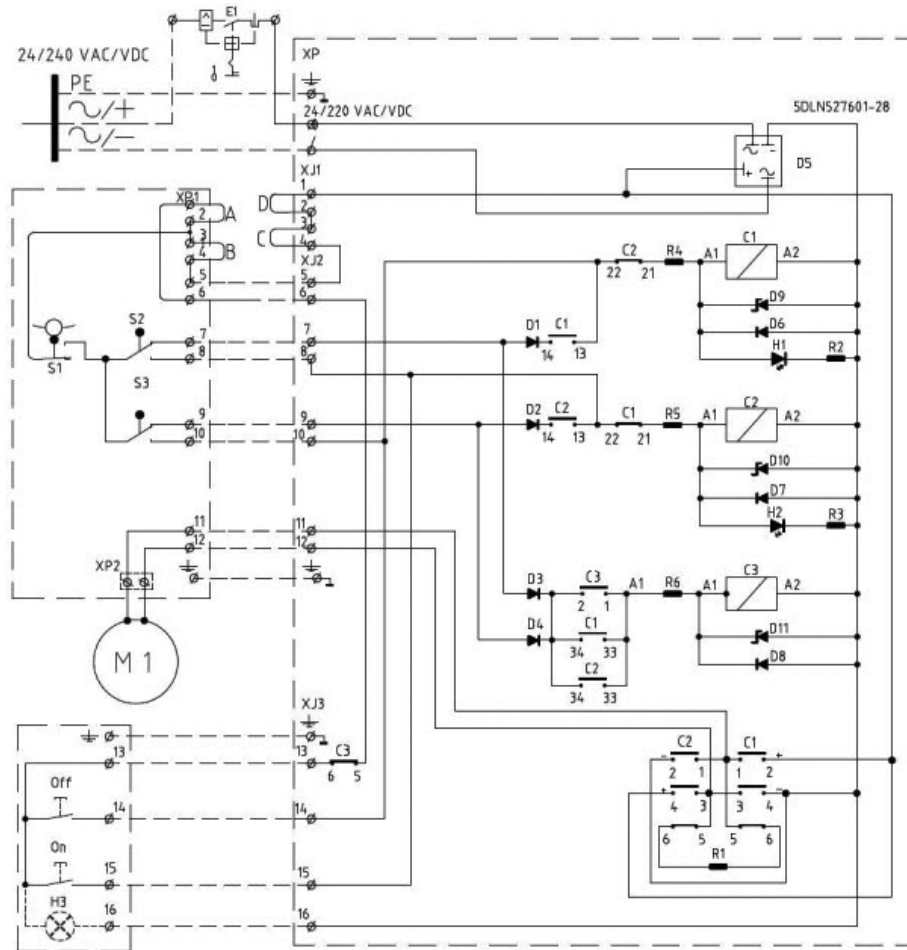
**Motor operator**

Motor operator option is available only with the direct drive configuration. The motor operated units are also equipped with coordinated key interlocking on the operating handle and the lower door. Operation of the motor is disabled when the switch is locked in open position and key interlock of the door is open.



**Caution:** Ensure all padlocks and keyed interlocks are withdrawn before the motor is operated. Failure to do so may overload and damage the motor, control board and mechanical operators.

07  
Motor operator  
circuit diagram



C1-C2 CONTACTOR WITH AUXILIARY CONTACTS  
C3 CONTACTOR  
R2-R6 RESISTOR  
D1-D4 DIODE  
D5 DIODE BRIDGE (not for 24v)  
D6-D8 DIODE  
D9-D11 ZENEDIODE  
XP1/XP2 TERMINATIONS FOR MOTOR  
XJ1-XJ3 TERMINATIONS FOR CONTACTOR UNIT  
M1 MOTOR  
B,C,D CONNECTIN FOR CUSTOMER INTERLOCKING

S1 MICRO SWITCH, START POSITION  
S2-S3 MICRO SWITCH, END POSITION  
PB1 PUSHBUTTON ON/OFF  
PB2 PUSHBUTTON ON/OFF  
E1 MINI CIRCUIT BREAKER  
H1/H2 LIGHT DIODES  
( H3 CONTROL LAMP "DEVICE OK" )  
A CONNECTION FOR AUXILIAR SWITCH FOR FUSE INTERRUPTION

# Maintenance

## General requirements

**DANGER**

**Danger:** Only trained and qualified personnel should carry out maintenance procedures. This manual covers only routine maintenance.

Ensure all power sources are de-energized before attempting any maintenance. Voltage may be present within the equipment from remote sources, even though all main- and branch-circuit disconnects have been opened at the equipment. Failure to observe this precaution can result in serious injury or death.

**CAUTION**

**Caution:** Only qualified ABB Service personnel or ABB trained and qualified service personnel are authorized to perform overhaul or service of the load break switch and associated accessories. Contact ABB Service.

**CAUTION**

**Caution:** Ensure proper ventilation and other precautions are taken when using any chemical cleaner.

## Periodic checking

The customer should prepare a maintenance program consisting of a schedule and checklist matrix listing items to be periodically examined on the installed equipment.

Load break switches should be examined and checked at least once a year or more often when conditions require it (such as numerous operations, polluted atmosphere or overloading of the switch). All switches should be opened and closed annually 2–5 times in succession, not exceeding their rated duty.

## Cleaning

**NOTICE**

**Notice:** DO NOT USE any type of alcohol-based cleaners on the VersaRupter® load break switch. This results in weakening of the mechanical properties of tension rods and can cause them to crack.

All switches, including insulators and operating arms, should be thoroughly cleaned periodically by wiping with a clean cloth to prevent accumulation of dust. Strong solvents and alcohol-based fluids must not be used. For cleaning, water with soap may be used.

## Lubrication

**NOTICE**

**Notice:** Arcing knives, piston and cylinder of the VersaRupter load break switch must not be greased.

After cleaning, the contact area of the main blades and the fixed contacts of the VersaRupter load break switch must be greased with ISOFLEX TOPAS NCA 52. If the VersaRupter switch is placed in a very humid and polluted area, which will reduce the tracking resistance, it is recommended to polish the insulators and insulated components with Silicon Type DC200 Fluid 100 cst.

Other bearing points and sliding surfaces in the BreakMaster™ V load interrupter switchgear should be lubricated at the regular inspection periods (annually) with a thin film of low temperature lubricant.

## Insulators

The insulators' surfaces must be kept clean. This is essential, particularly when the switches are located where cement dust, metallic dust, salt spray, acid fumes or other unfavorable environmental conditions exist. A light detergent is recommended for cleaning the insulator parts. Discard and replace any insulators showing signs of tracking.



**Insulation check**

When making an annual check, all insulation should be carefully examined for tracking. Special attention must be given to areas where the conductor passes through an insulator or lays near a barrier. Examine the surface for cracks or streaked discoloration. When tracking is found, the insulation involved must be replaced. In such a case, contact your local ABB sales office for replacement parts.

**Bus and conductor (switch blade) check**

Inspect the buses and connections carefully every year for evidence of overheating or damage. It is desirable to measure the resistance to ground and between phases of the insulation of buses and connections with a meter (or use a Megger of proper voltage). A record should be kept of this reading. Weakening of the insulation from one maintenance period to the next can be recognized from the recorded readings. At recording time, the record should include the temperature, the humidity and the date.

Inspect main and vertical bus joints and main bus supports and tighten, if necessary. Refer to table 1 for torque specifications.

**Chain drive**

The chain drive assembly connects the operating mechanism to the operating handle on the front of the housing. It consists of a length of roller-type chain fastened in a loop by two adjustable turnbuckles with locking nuts. Ensure turnbuckles and locking nuts are tight. No adjustments are necessary.

**Direct drive**

The direct drive assembly connects the operating mechanism to the operating handle on the front of the housing. It consists of a hollow tube connecting the bevel gears to the manual drive operator. Inspect the locking pins. No adjustments are necessary.

**Pushrods**

Each main blade of the switch is connected to the throw arms or the main operating shaft by an insulated pushrod. These pushrods should be examined during each normal maintenance procedure for signs of damage to either end. If a damaged pushrod is encountered, replacement parts are needed.

**Operating mechanisms**

The chain or direct drive operating mechanisms consists of a housing with a one-piece crank sprocket assembly supported by bearings and a spring assembly. These units are factory adjusted and should need no adjustment in the field.

**Wiring and instruments**

Check all unit wiring for deterioration of insulation and tighten all connections. Visually check meters and instruments. Check critical instrument calibrations. Check all indicating lights and replace if required.

**Interlocks**

Check all unit door interlocks for proper operation.

**Interruption devices**

Should it be necessary to clean the devices during inspection, these procedures are specified for breakers.

**Tripping device: Actuator and transmission system**

To ensure correct operation of the circuit breaker, inspection and maintenance of the tripping devices must be carried out every 2000 operations. Please contact the ABB Service office for assistance.

**Circuit breaker pole**

The circuit breaker pole and vacuum interrupter are maintenance-free until the maximum number of electrical operations for the type of interrupter is reached.

**Repairs**

Replacement of spare parts and accessories must only be carried out by ABB personnel or suitably qualified and specially trained personnel.

Always work with the circuit breaker open and locked so that it cannot be closed again, with the work area insulated and made safe.

The operating mechanism spring must be discharged. All power supply sources must be disconnected and made safe against any reclosing during removal and installation work

**Caution:** Only qualified ABB Service personnel or

**CAUTION**

ABB trained and qualified service personnel are authorized to perform overhaul or service of the load break switch and associated accessories. Spare parts shown below for purchasing reference only. Contact ABB Service for installation support. The replacement of parts not included in the “list of spare parts/accessories” (par. 12.1.) must only be carried out by ABB personnel. In particular:

- Complete pole with bushings/connections
- Actuator and transmission system closing spring set opening spring shock-absorber

**Table 4: Recommended spare parts**

Description	Order code
Aux. switch	244006519
Shunt trip 125 V DC	186873007
Shunt trip 110 V AC	186873002
NM motor and control board (110 V AC/DC)	245869003
Chain kit (chain drive)	247100503
Removable handle	183786001
Contact knife assembly 15 kV 600 A	245847501
K-mechanism, 40 kA	186041001
A-mechanism, 40 kA	186872002
K-mechanism, 61 kA	2RFA018256A0008
A-mechanism, 61 kA	2RFA018257A0005
VersaRupter® 15 kV 600 A with K-mechanism	VK3M1564U000000000
VersaRupter 15 kV 600 A with A-mechanism	VA3M1564U000000000
VersaRupter 15 kV 1200 A with K-mechanism	VK3L1516U000000000
VersaRupter 15 kV 1200 A with A-mechanism	VA3L1516U000000000

**Circuit breaker spare parts**

- Shunt opening release
- Additional shunt opening release
- Undervoltage release
- Contact for signaling undervoltage release energized/de-energized
- Time delay device for undervoltage release
- Mechanical override for undervoltage release
- Shunt closing release
- Spring-charging geared motor with electrical signaling of spring charged
- Contact signaling protection circuit breaker for the geared motor open/closed
- Contact signaling closing spring charged/discharged
- Transient contact with momentary closing during circuit breaker opening
- Circuit breaker auxiliary contacts
- Locking electromagnet on the operating mechanism
- Position contact of the withdrawable truck
- Contacts signaling connected/isolated
- Opening solenoid
- Key lock in open position
- Isolation interlock with the door
- Protection for opening pushbutton
- Protection for closing pushbutton
- Locking electromagnet on the withdrawable truck

**Reference document numbers**

- VersaRupter® MV indoor switch Installation, Operation and Maintenance Manual  
[library.abb.com](http://library.abb.com).
- VD4 Installation and Service Instructions  
[library.abb.com](http://library.abb.com).

**Service**

Post-shipment service is dedicated to customers using ABB electrical distribution products. Contact ABB Service at 1-888-437-3765.

Typical reasons for calling ABB Service:

- Need help installing a product
- Incomplete or damaged shipment
- Wrong product in shipment
- Product failure





# Product end-of-life

ABB products are manufactured to meet or exceed the standards of compliance for quality, in accordance with ISO 9001.

**Methods of disposal**

Disposal can be carried out in a manner of ways depending upon material of product. Following is the recommended method of disposal for various raw materials.

During disposal of the product, it is always necessary to act in accordance with local legal requirements in force.

**Table 5: Recommended methods of disposal based on raw material**

Raw material	Recommended method of disposal
Metal material (Fe, Cu, Al, Ag, Zn, W, etc.)	Separation and recycling
Thermoplastics	Recycling or disposal
Epoxy resin	Separation of metal and disposal of remains
Rubber	Disposal
Oil (transformer oil)	Draining and recycling or proper disposal
Packing material	Recycling or disposal



# Typical product weight

**Table 6: Typical switchgear weights**

Configuration	Weight (kg/lbs)	
	NEMA 1	NEMA 3R
Single	635/1400	794/1750
Mains/ties	907/2000	1179/2600
Branch	635/1400	794/1750
20" wide incoming cable	272/600	386/850
35" wide incoming cable	476/1050	635/1400

**Table 7: Circuit breaker weights**

Model	Description	Weight (kg/lbs)
VD4/N 15.20.32 P210	Fixed VCB 15 kV/2000 A/31.5 kA P210	80/176
VD4 15.12.40 P210	Fixed VCB 15 kV/1200–2000 A/40 kA P210	75/165
VM1/N 15.20.32 P210	Fixed VCB 15 kV/2000 A/31.5 kA P210	130/287







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