

DISTRIBUTION SOLUTIONS

GridShield® 3P/3SP recloser

Installation, operations
and maintenance manual

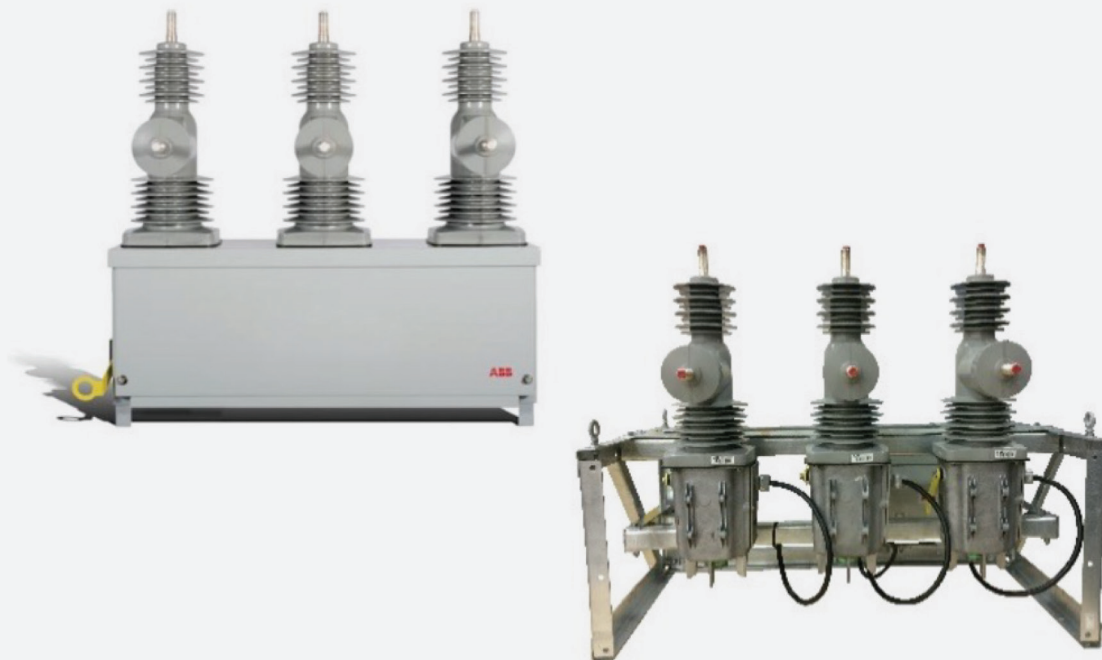


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GridShield®
3P/3SP recloser



Notice

This document provides information about ABB products and may refer to relevant standards. However, the description or reference to a standard does not imply that all ABB products mentioned in this document support all features of the described standard. To determine the specific features supported by a particular ABB product, please consult the product specifications.

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The system/product owner must establish and maintain appropriate security measures, such as firewalls, authentication, encryption, antivirus programs, etc., to protect the products, network, system and interfaces against security breaches, unauthorized access, interference, intrusion, data leakage or theft.

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1 Important safety notes and warnings

The operation of equipment relies on correct handling, installation and maintenance. Ignoring these essential requirements can result in harm to individuals, equipment failure and damage to property. Safety, as explained in this instruction manual, encompasses two aspects:

- Personal injury
- Damage to products or property

1.1 Safety notations

Safety notations are important indicators that inform personnel about potential risks of death, injury or property damage. These notations are placed prior to the step where the particular condition is relevant. There are three levels of hazard notations, accompanied by a single safety notice. They are as follows:

DANGER

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

WARNING

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

CAUTION

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

NOTICE

Notice is used when there is a danger that can lead to equipment damage only.

For the proper installation, operation and maintenance of this equipment, it is essential that personnel possess a comprehensive understanding of local, regional, industry, government and OSHA safety procedures, as well as commonly accepted safe working practices. Furthermore, individuals working in or around this equipment must exercise common sense and good judgment to recognize potential hazards for themselves and others in the vicinity. These instructions are specifically designed for fully qualified personnel and should not be considered a substitute for adequate training, experience and supervision.

If any clarification or additional information is required, please direct your inquiries to the nearest ABB sales office. When communicating with ABB regarding the product covered in this IOM manual, always include the ABB assigned order number.

The GridShield® 3P/3SP medium voltage three-phase vacuum recloser should be installed in accordance with the specified design limitations indicated on its nameplate and in these instructions.

Additionally, it is crucial to adhere to your company's safety procedures.

This recloser should never be relied upon as the sole means of isolating a high voltage circuit. To ensure the safety of personnel conducting maintenance operations on the recloser or connecting equipment, all components must be electrically disconnected using a visible break and securely grounded.

This product is intended for operation and maintenance by qualified individuals who have received thorough training and possess knowledge of the associated hazards. This publication is exclusively intended for such qualified individuals and should not be considered a substitute for adequate training and experience in the safety procedures for this device.

This document does not provide detailed descriptions of standard repair procedures, safety principles or service operations. It is important to note that certain warnings and cautions are included to prevent personal injury to service personnel or damage to equipment. However, these warnings do not encompass all conceivable service methods, whether recommended by ABB or not. Furthermore, ABB cannot anticipate or investigate every potential hazard resulting from all conceivable service methods. Therefore, anyone using service procedures or tools, regardless of ABB's recommendations, must ensure that both personal safety and equipment safety are not compromised by the selected service method or tools.

All information contained in this manual is based on the most up-to-date product information available at the time of printing. ABB reserves the right to make changes without notice.

2 Introduction

2.1 General instructions

Please carefully read these instructions before proceeding with installation, and refer to them as a guide throughout the installation and initial operation process. It is essential to keep these instructions filed together with other instruction books, drawings and descriptive data for the recloser. This manual should always be easily accessible for future reference during the equipment's installation, operation and maintenance. By following these instructions, you will ensure the proper maintenance of the equipment and extend its useful life.

2.2 Scope of instructions

The provided instructions are of a general nature and cover the requirements for installation, setup, operation and maintenance of all ratings of the ABB GridShield® 3P/3SP medium voltage three-phase vacuum recloser. However, please note that these instructions do not cover all possible variations and combinations of equipment and installations.

For specific information regarding installations, please refer to the following resources:

- Bills of materials: These lists include electrical devices and equipment.
- Single line drawings: These diagrams illustrate power connections.
- Elementary and schematic diagrams: These diagrams provide detailed visual representations.
- Connection diagrams: These diagrams show how different components are connected.

It's important to understand that these instructions do not aim to address every possible question that may arise during the application, operation and maintenance of the product. Additionally, as improvements are made to parts and assemblies, the appearance of some parts may differ from the illustrations. However, their functionality will remain equivalent.

2.3 GridShield 3P/3SP recloser introduction

The GridShield vacuum recloser is an advanced device that operates in three phases. It consists of three vacuum interrupters, each driven by a separate magnetic actuator. These components, along with the voltage and current sensors, are embedded in a pole cast from a special material called hydrophobic cycloaliphatic epoxy (HCEP) polymer. The current-sensing current transformer (CT) is located in the H2 (horizontal or Y-side) position. In a standard SVS (single voltage sensing) unit, the voltage sensor is placed in the H2 bushing. In a DVS (dual voltage sensing) unit, the voltage sensors are positioned in both the H1 (vertical or Z-side) and H2 (horizontal or Y-side) bushings (see figure 11).

The recloser is equipped with specialized control functions. It can detect an overload and automatically open. After a pre-set time delay, it will close again. If the overload persists, the recloser will trip and reclose once more. With the standard GridShield controls (RER620 and RER615), the recloser can perform up to five reclosing operations before it locks open. Alternatively, using the optional Beckwith M-7679 or SEL-651R controls, the recloser allows up to four reclosing operations before it goes into lockout mode. To restore normal service, the fault causing the condition must be eliminated.

To help ensure satisfactory performance of the recloser, correct installation, adequate maintenance and proper servicing of the product are crucial. By carefully studying and following these instructions, users can maximize the benefits they obtain from this device.

3 Receiving, handling and storage

The recloser undergoes assembly and testing at the factory before it is made ready for shipment. This equipment is carefully packed and sent out from the factory in impeccable condition. If any damage is observed, it is important to immediately contact the carrier for inspection and request an inspection report. Along with the paid freight bill, inspection report and invoice, file a formal claim with the carrier. Additionally, make sure to inform the local ABB sales office.

3.1 Receiving inspection

Upon receiving the shipment, it is crucial to promptly inspect it to ensure that the correct materials have been received. If any items are missing, notify the local ABB sales office immediately. As you unpack the items, compare them against the shipping list.

Make sure to keep the instructions and literature that come with the recloser together with the unit. The low voltage control cabinet serves as a convenient storage location for the instruction book, schematic diagram, connection diagram, frame assembly drawing, high voltage wiring diagram and outline drawing of the unit. If you need additional copies or a certified test report, you can request them from the local ABB sales office.

The enclosure door of the recloser has a documentation bin on its inner side, and the front swing panel above the relay also provides access to it.

3.2 Handling the equipment

Always lift reclosers in an upright position, considering their high center of gravity. Before performing any loading operations, ensure that all necessary precautions to protect personnel and materials have been taken into account.

CAUTION

Please observe the following precautions:

1. Verify that the crane or hoist being used has the capacity to lift the recloser assembly. The weight of the assembly can be found on the drawings and, if available, on the physical recloser frame. Never exceed the lifting capacity of the hoist or crane.
2. Choose rigging gear that has a capacity greater than the weight of the recloser assembly.
3. Only use the provided lifting rings on the recloser frame to lift the recloser.
4. When using chains and slings for lifting, exercise extra caution to prevent them from pushing against the recloser poles. Applying unusual forces or bending to the recloser poles can cause permanent damage. Ensure that the sling angle is always greater than 45 degrees, and adjust it if necessary to avoid contact between the slings and recloser components on the frame during lifting.
5. Avoid placing the recloser assembly on uneven surfaces. Take care when moving the recloser assembly to prevent damage to the indicator cups located on the bottom of the recloser.

- 01 Lifting a GridShield 3P single-tank recloser
- 02 Lifting GridShield 3SP recloser (compact frame)
- 03 Lifting GridShield 3SP recloser (substation frame)
- 04 Lifting GridShield 3SP recloser (cross-arm frame)

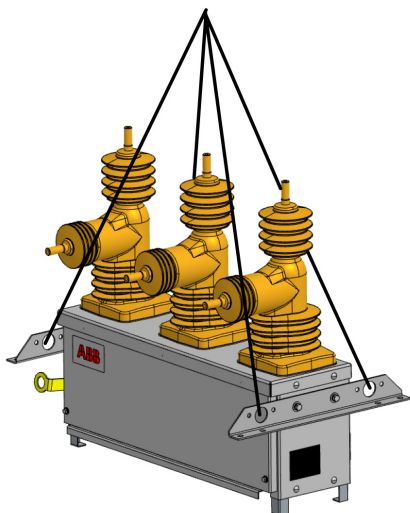
3.2.1 GridShield® 3P (single-tank recloser)

The GridShield 3P recloser is equipped with two brackets that can be attached to its sides. These brackets serve as a means to lift the recloser. It is strongly recommended to use a four-point lift, using the loops provided in these brackets (refer to figure 1). If the unit is shipped unassembled, you will find these brackets in one of the shipping boxes. If the substation frames are shipped already assembled, carefully lift the frame off the pallet, being cautious not to cause any damage to the poles. Then, position the frame at the desired location. Afterward, detach the lifting brackets from the frame and attach them to the recloser for lifting purposes. It is important to avoid placing the recloser on an uneven surface to prevent any potential damage to the open/close indicators.

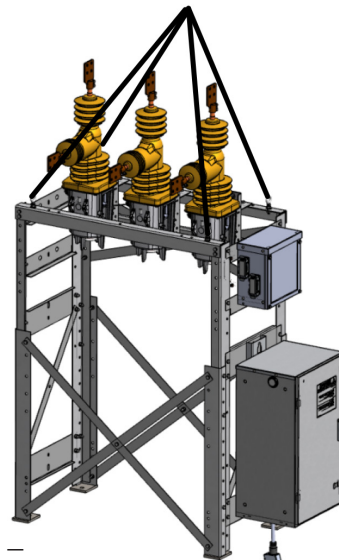
3.2.2 GridShield 3SP (three individual poles)

To ensure proper installation of a 3SP recloser, follow these guidelines:

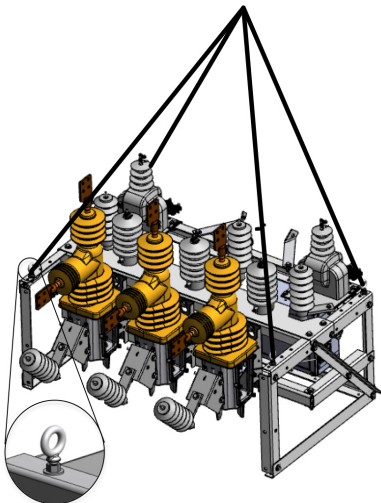
1. Lift the site-ready unit using either four-point lifting points (for compact frame) or the center lifting point (for cross-arm frame).
2. If you're dealing with individual poles, you can use lifting straps. Alternatively, for a wrap-around frame, lifting straps can also be used.
3. Refer to the illustrations below for visual representation.



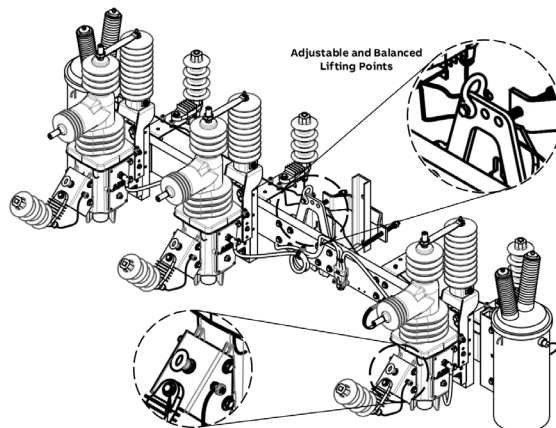
01



03



02



04

3.3 Storing the equipment

For long-term storage, it is recommended to store the cabinets indoors. If either cabinet needs to be stored outdoors, make sure to activate the anti-condensation heaters inside the low voltage control cabinet. It is also recommended to use a heater in the recloser head, if available.

NOTICE

The GridShield® recloser and the control cabinet must be stored in an upright position to avoid moisture buildup.

The low voltage control cabinet includes rechargeable batteries. These batteries need to be supplied with power of the correct voltage and frequency through the charger assembly. It is advisable to periodically check the battery voltage.

NOTICE

Battery is disconnected for transportation. Reconnect the batteries prior to use.

If the recloser will not be put into immediate use, it is crucial to handle and store it properly to help ensure good operating condition in the future. The accessories and cables can be stored separately in a box. For long-term storage, these boxes should be placed indoors to prevent water accumulation and rust on the equipment.

4 General description

— 05 GridShield 3P recloser

— 06 GridShield 3SP recloser

— 07 Junction box

4.1 Recloser assembly

The GridShield® 3P recloser assembly consists of three individual phase poles mounted on a common housing (see figure 5). On the other hand, the GridShield 3SP recloser assembly has three individual phase poles mounted on their respective buckets (see figure 6). Both assemblies can perform single-phase trip and lockout functions. Each GridShield pole is a separate unit consisting of a vacuum interrupter and a current sensor. These components are encapsulated in an advanced hydrophobic cycloaliphatic epoxy (HCEP) polymer molded pole assembly, and they are connected to a magnetic actuator.

There are two different configurations of the recloser assembly. The 24-pin configuration uses a 250 V DC actuator, while the 32-/42-pin configuration uses a 155 V DC actuator. In the 24-pin configuration, the control cabinet includes the heater pins. In the 32-/42-pin configuration, a separate heater cable is required to power the heaters.

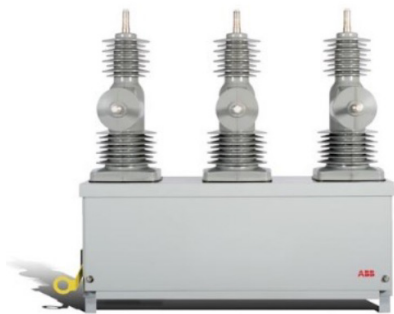
For the GridShield 3P units, the main recloser tank has a connector with either 24 or 32 pins. This connector is where you connect the control cable.

For GridShield 3SP units with a 24-pin or 32-/42-pin configuration, a junction box should be used (see figure 7 for reference). In this configuration, the individual pole cables with 16 pins are connected to the junction box. The control cable is then connected to the junction box using a connector.

4.2 Housing

The cover of the recloser housing, known as the recloser cabinet, can be easily removed. It is secured in place by six bolts specifically designed for GridShield 3P. To indicate the position of each phase, indicators mounted on the floor of the cabinet can be seen from below. On the right-hand side of the housing, you will find the recloser nameplate, which displays important information such as the rating, serial number, shop order number and manufacturing date. To prevent condensation, a heater is included in the recloser bucket and junction box.

In the 3SP recloser unit, each phase pole is equipped with its own bucket. Additionally, each pole has a distinct yellow tripping handle and an indicator cup located underneath the bucket.



— 05



— 06



— 07

- 08 Embedded single voltage sensing (3VS)
- 09 Embedded dual voltage sensing (6VS)
- 10 Integrated dual voltage sensing (IDVS)
- 11 Recloser pole assembly

4.3 Pole assembly

Figure 11 provides detailed information about the pole assembly. The top terminal stud is connected to a capacitive voltage sensor enclosed within a protective casing. This sensor is directly linked to the fixed contact stud located at the upper end of the vacuum interrupter. The current transfer assembly is secured to the lower end of the vacuum interrupter. The lateral stud terminal passes through a ring-type current and capacitive voltage sensor before exiting the molded assembly.

The transformer’s secondary current output leads, along with the voltage sensing leads, are also encapsulated and brought down to a terminal block mounted on the side of the actuator assembly. In the case of GridShield® 3SP units, these wires are taken out of their individual compartments and connected to the junction box. The junction box serves as an interface with the control cable.

NOTICE

If the control cable is disconnected from the recloser, the OCP installed across the CT leads in the recloser cabinet will prevent voltage buildup on the CT secondary.

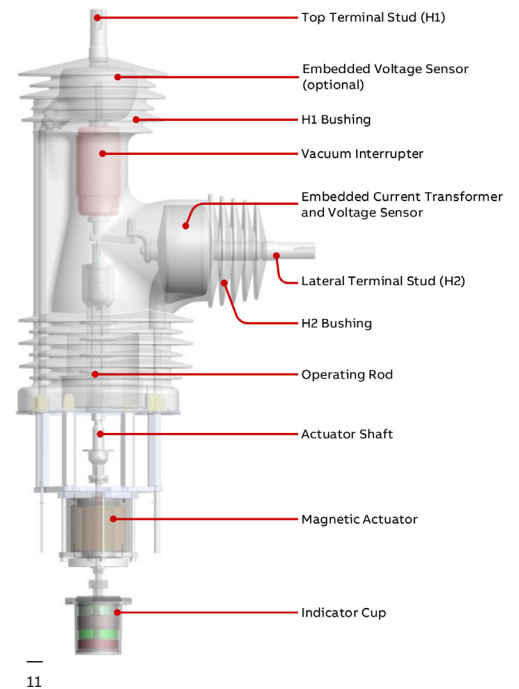
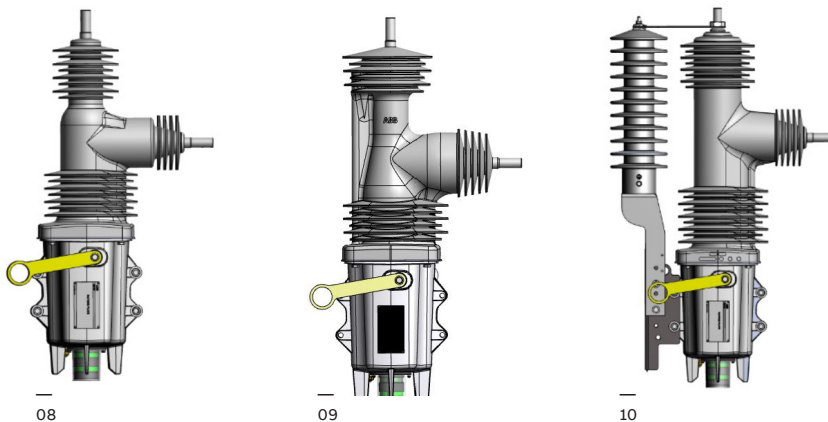
(horizontal) and Z-side (vertical) voltage sensors are embedded within the HCEP pole (refer to figure 9). In an integrated dual voltage sensing unit (IDVS), the horizontal bushing contains one embedded voltage sensor, while the vertical bushing features an integrated VLS voltage sensor (see figure 10). The embedded current transformer on the horizontal bushings typically has a ratio of 600:1. However, the embedded dual voltage sensing unit also offers the option of a 300:1 CT ratio. The CT ratio is generally set during manufacturing but can be adjusted in the field.

Table 1: CT and voltage sensor ratios

	CT ratio	Voltage sensor ratio Y-side	Voltage sensor ratio Z-side
3VS Single voltage sensing	600:1	10,000:1	—
6VS (15/27 kV only) Embedded dual voltage sensing	600:1	10,000:1	10,000:1
3VS + integrated Integrated dual voltage sensing using VLS sensors	300:1	600:1	2200:1 (15/27 kV) 5000:1 (38 kV)

Current sensing accuracy: ±3% for metering and ±10% for protection.
Voltage sensing accuracy: ±1% between -10° C and +40° C on horizontal and vertical bushings.

For a single voltage sensing unit (3VS), a voltage sensor is embedded within the horizontal bushing (see figure 8). In the case of an embedded dual voltage sensing unit (6VS), both the Y-side



The molded pole assembly is connected to the magnetic actuator assembly using four hex posts. The magnetic actuator contains a highly powerful permanent magnet assembly that keeps the interrupter closed, even without current in the actuator coil.

For 24-pin recloser variants, the actuator operates at 250 V DC, while for the 32-/42-pin variants, it operates at 155 V DC.

The armature has two stainless steel guide rods. The upper guide rod, also known as the adjusting rod, is connected to the lower end of the main operating rod or pushrod. The pushrod directly links to the moving contact of the vacuum interrupter. The lower guide rod, referred to as the actuator shaft, holds the opening spring, armature and indicator assembly. When the actuator shaft moves, it toggles two microswitches that indicate the recloser status and the status of the yellow handle to the control cabinet.

It is not recommended to disassemble the magnetic actuator. Lubrication or maintenance is unnecessary and will void the warranty. If the actuator fails to operate, please contact ABB for service.

4.4 Control

4.4.1 Low voltage control cabinet

A separate weatherproof relay-agnostic control cabinet houses the low voltage control components. A hinged panel allows front and rear access to the control components. Other devices can be mounted on the sidewalls of the cabinet. Connections to the recloser are made through a shielded 24-/32-/42-pin cable. The hinged door has provisions for a padlock shackle.

For power, communication and control inputs to the control cabinet, the floor is equipped with removable access plate and two knockout holes. A knockout is also provided for a radio antenna connection. The enclosure also has provisions for mounting a radio, modem or other user equipment. Contact your ABB representative for more information.

The controls operate with 24 V DC and are connected to two 12 V DC batteries for backup. The batteries should be checked periodically and replaced every three to five years. This assumes an average ambient of 77 °F (25 °C). Note that the batteries could take up to 48 hours to fully charge after initial power up.

Depending on the configuration, the enclosure contains up to two large actuator-assist capacitors. They store the energy necessary to ensure proper operation of the magnetic actuator under all operating conditions. They also decouple any dependency on opening and closing due to poor battery condition (e.g., low charge, high impedance/shorted cell, missing battery, etc.). The recloser control comes with a capacitor discharge switch on the front panel to discharge the capacitors and remove high voltage before working inside the control cabinet.

- 12 24-/32-/42-pin relay-agnostic control cabinet
- 13 24-pin RER620 control cabinet
- 14 SEL-651R control cabinet

4.4.2 Control relay

The standard ABB control cabinet supplied with the GridShield® recloser includes a relay-agnostic control cabinet (figure 12). This cabinet comes with the option of Beckwith M-7679, RER620 or RER615 (for 3-phase operation only). Optionally, a dedicated RER620 control cabinet is available with 24-pin option (figure 13). This controller integrates most of the normal recloser control functions into a single device, providing a wide range of protection, control, metering, automation and remote control options. Additionally, a complete SEL-651R control cabinet is an option (figure 14). For details on programming, operating and testing of the control, please refer to its respective instruction manual. For details on the overall control circuit, refer to the specific wiring diagrams supplied with the recloser.

4.4.3 Control cable

The ABB GridShield recloser is equipped with a 24-/42-pin control cable, specifically designed by ABB. We strongly advise using the ABB control cable to ensure precise measurement of current and voltage by the embedded sensors on the poles and to optimize the overall performance of the recloser. If you require a spare control cable or need to replace your current cable, please reach out to your ABB sales representative.



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5 Operation

All GridShield® reclosers can perform both three-phase and single-phase trip and close operations. You can achieve electrical opening and closing using the associated control. For single-tank units (3P), you can achieve mechanical opening by pulling down the yellow trip handle. For 3SP units, you need to pull down three separate yellow handles, one per pole, to achieve mechanical opening.

5.1 Closing

When in the open position, the armature is positioned against a spacer in the actuator assembly. It remains there due to the force exerted by the opening spring and a small force generated by the magnet. When the coil is energized correctly, it produces a magnetic flux in the same direction as the magnet assembly. This magnetic force pulls the armature into the coil, causing it to make contact with the upper pole piece.

Once the armature is in contact with the upper pole piece, the coil is no longer energized, and the magnet alone holds the armature in place. As the armature is drawn into the coil, the operating rod, which is connected to the adjustment rod, moves the moving contact of the vacuum interrupter to the closed position.

It's worth noting that the actuator has a greater range of movement than the vacuum interrupter. Therefore, the interrupter contacts make contact before the actuator completes its full stroke. The additional movement of the operating rod after the contact closes is necessary to allow the contact pressure spring to compress at the top of the operating rod. This extra travel, also known as contact wipe, accounts for contact wear during operation and helps maintain low contact resistance.

5.2 Opening

When the coil is energized with the opposite polarity, the magnetic flux it produces counteracts the force generated by the magnet assembly. As a result, the holding force decreases, and the armature is released. Subsequently, the opening spring, with some initial assistance from the contact pressure spring, propels the operating rod to the open position.

5.3 Mechanical opening

If the electrical system becomes disabled or de-energized, the upper recloser unit can be safely opened using a mechanical method. To manually open it, simply pull down quickly and firmly on the yellow trip lever located on the side of the HV unit. This action will mechanically open all three poles at the same time.

In the case of a 32-/42-pin single-tank recloser unit, the yellow trip handle should be turned a full 90 degrees from a horizontal to a vertical position. This position provides a clear and visible indication. The recloser unit includes a standard feature called block close (69 function), which prevents a local or remote close. The 69 switch is connected to a relay input and programmed to block the closing operation. For single-tank reclosers, the yellow handle mechanically prevents the closing operation until it is reset.

In 3SP units, each pole has its own individual yellow trip handle. The handle should be turned at 45 degrees from the horizontal position to activate the block close (69 function). To perform a manual mechanical 3-phase open, you need to pull down each trip handle individually. Alternatively, you can program the relay to simultaneously open all poles when any one of the yellow handles is pulled down. An optional CLOSE BLOCK feature can be added to enable manual trips.

6 Standard production tests (factory only)

The standard production tests for our products include the following:

1. **Verification of wiring:** We check all connections based on the provided diagrams. If the SEL control system is being used, we test the wiring through actual operation.
2. **Electrical operation:** We perform tests to ensure the proper functioning of the recloser. This includes closing and tripping operations, as well as checking the response to overcurrent events and automatic reclosing.
3. **Manual controls:** We check all the manual controls on the RER620, RER615 and Beckwith M-7679 models. This includes testing local and remote operation, non-reclosing, ground disabling and other functions. For SEL control, we use the default programming to test the operations using the front-panel pushbuttons.
4. **Contact pole resistance:** We measure the contact pole resistance on each phase of a complete recloser.
5. **Voltage withstand test:** We conduct a comprehensive test based on IEC 62271-1 dielectric tests. This test includes checking insulation between live parts and the tank, across open contacts and between phases. The applied test voltage follows ANSI C37.60 standards: 60 kV for a 15.5 kV rated maximum voltage, 60 kV for a 27 kV rated maximum voltage and 70 kV for a 38 kV rated maximum voltage. The test duration is 1 minute, during which we measure leakage current.
6. **Minimum trip test:** We verify the minimum trip capability of the recloser.
7. **Partial discharge testing:** We perform tests in accordance with IEC 62271-1 to detect any partial discharge.
8. **Timing tests:** We conduct timing tests for each phase, including measuring close time, open time and bounce duration.
9. **Mechanical operation testing:** We perform manual tripping and carry out 25 open/close operations to test the mechanical components.
10. **Voltage sensing calibration:** We calibrate the voltage sensing mechanism at the nominal rated voltage.
11. **CT ratio, polarity and metering check:** We check the CT ratio, polarity and metering accuracy.

7 Operational checks prior to installation

Before energizing the recloser in the power system, it is important to conduct mechanical and electrical tests. Ensure that the necessary control power connections, including the cable between the recloser and the low voltage control cabinet, are made beforehand. If needed, remove the cover of the recloser compartment to observe its mechanical operations.

The GridShield® recloser and its control cabinet undergo testing as a complete system. ABB ships the recloser system together on a single pallet, unless otherwise specified by the customer. During installation, make sure to match the control cabinet with the recloser head with which it was shipped, because calibrations were performed for the system during factory testing. If matching is not possible, please refer to section 8.6 of this manual for the calibration setting procedure.

After installation, it is necessary to perform basic voltage and metering checks to verify the phase ordering, phase assignments, phase angles, phase rotation and CT polarities. Most of these parameters can be adjusted physically or through settings in the relay.

NOTICE

Control cabinets are recloser voltage range specific. Please contact the factory before mixing high voltage recloser units and control cabinets.

NOTICE

Do not ground either side of the battery or attach ground to the terminals of the actuator operating coils. This will result in permanent damage to the unit.

7.1 Electrical close

To operate Beckwith M-7679, follow these steps:

1. Press the phase selection pushbutton to choose the correct phases for operation.
2. Press the CLOSE pushbutton to initiate the closing action.
3. The LED next to the CLOSE pushbutton indicates the status of the recloser.
4. You can adjust the pulse duration for the closing command using the relay settings.

For RER620 and RER615, follow these guidelines:

1. Verify the close status by checking the red LED beside the CLOSE pushbutton.
2. If the relay is programmed for single-phase tripping, a menu will appear on the LCD screen, displaying choices for each phase.
3. You can control the pulse duration for the closing command through relay settings.
4. In case of a malfunction, the OPEN and CLOSE LEDs on RER620 and RER615 will blink alternately in red and green.
5. If both OPEN and CLOSE LEDs are off, it means the recloser is in a single-phase mode, where some phases are open and others are closed.

7.2 Electrical trip

Beckwith M-7679 on standard

ABB control cabinet:

To operate the Beckwith M-7679, you need to press the phase selection pushbutton to choose the correct phases. Then, press the OPEN pushbutton. The LED next to the OPEN pushbutton indicates the status of the recloser. You can adjust the duration of the closing command by changing the relay settings.

RER620 and RER615 on standard

ABB control cabinet:

To check the open status of RER620 and RER615, look for the green LED next to the CLOSE pushbutton. If the relay is set to single-phase tripping, a menu will appear on the LCD screen with options for each phase. You can control the duration of the opening command through relay settings. In case of a malfunction, the OPEN and CLOSE LEDs on RER620 and RER615 will alternate between blinking red and green. If both LEDs are off, it means the recloser is in a single-phase mode, where some phases are open and others are closed.

NOTICE

For IEC applications, the open/close status colors are reversed.

7.3 Programmable pushbuttons

The GridShield® standard control cabinet provides various options, including RER620, RER615 and Beckwith M-7679. It works in conjunction with an actuator control module (ACM) to facilitate open/close operations on the recloser unit. The cabinet includes essential features, such as reclosing, hot line tagging, ground disabling and additional spare pushbuttons for customization.

The GridShield 24-pin control cabinet with RER620 includes a front panel with control pushbuttons for various standard recloser functions. These functions activate an adjacent LED to provide indication. Below the standard functions are pre-programmed pushbuttons PROG1 and PROG2. The functions assigned to these buttons are as follows:

- **PROG 1: Battery test (typical)** — This function is applicable when batteries are present in the control cabinet and the RER620 includes the UPS module. If the battery test fails, a “Battery Failed” message will appear. Other assignable functions include enabling/disabling sensitive earth fault (SEF) through the RER620 controller or user-specific logic-based functions.
- **PROG 2: No setting (typical)** — Assignable functions include enabling/disabling single-phase tripping functionality, enabling switch mode (which allows the recloser to operate as a simple switch without protection capabilities) or user-specific logic-based functions.

For detailed information on pushbutton functions for the SEL-651R, please refer to the SEL-651R instruction manual.

7.4 Vacuum test procedure

To ensure that the vacuum seal of each interrupter has not been compromised during transportation or handling, it is recommended to conduct a dielectric (hi-pot) test. Experience has shown that a vacuum interrupter with an intact vacuum seal can withstand 37.5 kV AC when the contacts are open. However, the same interrupter, when exposed to normal atmosphere, will experience a flashover at a significantly lower voltage.

Radiation warning: It is important to note that applying high voltage across an open gap in a vacuum can generate X-ray radiation. However, no radiation is emitted when the recloser is closed because there is no gap. Additionally, when the recloser is open within the specified contact spacing and tested with the specified voltages, the X-ray radiation at a distance of one meter is below the level of concern. However, there may be a danger of radiation exposure at voltages above or contact spacing below those specified on the nameplate.

WARNING



High voltage applied across an open gap in a vacuum can produce X-ray radiation.

Following is a general guideline for conducting vacuum integrity testing on the recloser poles:

1. With the recloser in the open position, connect the three top terminals together and connect the three lateral terminals. Ground both the lateral terminals and the housing. Apply the high voltage to the top terminals.
2. Ensure that you stand at a safe distance of more than one meter away before energizing the high voltage source.
3. Do not exceed 37.5 kV AC for any recloser voltage class. The applied voltage should not be sustained for more than 60 seconds.

NOTICE

Do not use DC voltage for hi-pot testing. Applying DC voltage for hi-pot testing is more destructive and, therefore, is not recommended.

4. If an internal flashover occurs, isolate the phases and independently test each one to identify the defective interrupter. Any pole assembly found to be defective must be replaced before putting the recloser into service.

8 Installation

15 Pole-mounting assembly drawing (front view)

16 Recloser lifting bracket

17 Pole-mounting assembly drawing (side view)

The GridShield® recloser can be installed in different ways — within a substation frame, a pole-mounting frame or a structure provided by the customer. Regardless of the chosen method, it is important to ensure that the recloser is mounted vertically, level and securely fastened. Follow your company guidelines and relevant codes to determine the appropriate height for the recloser, secure the frame to the pole or foundation and make the necessary connections.

Please note that it is acceptable to loop extra control cable, but do not pass any conductors or grounds through the control cable loop. It is generally recommended to keep the ground away from the control cable as much as possible to prevent any induced voltage in the control cable due to grounding.

NOTICE

The bend radius of the control cable is 7 inches. Do not bend the cable more than a radius of 7 inches to avoid damage to the cable.

NOTICE

The H1 and H2 terminal spade connectors are equipped with 3/8" silicon bronze fasteners, which must be torqued to between 15–20 ft-lbs.

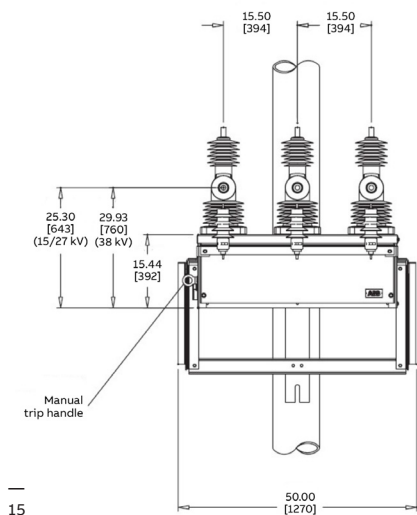
8.1 Mounting

The recloser can be shipped with three different mounting options — a pole-mounting frame, a substation frame or no frame at all. The following section outlines the recommended installation procedure for each type of frame.

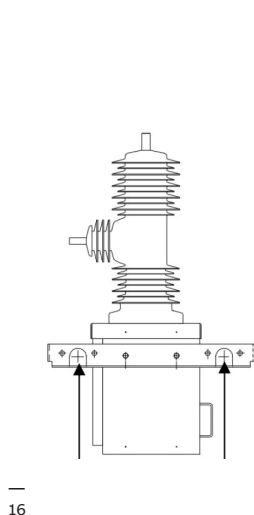
8.1.1 Pole mounting

To install single-tank recloser pole frames (see figures 15 and Figure 17), follow these steps:

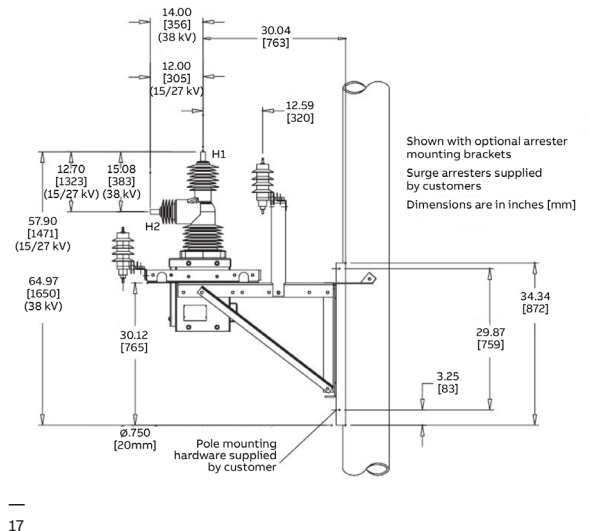
1. Attach the lifting brackets (see figure 16) to the sides of the recloser according to the lifting instructions.
2. If the frame is not pre-assembled when shipped, assemble it on a flat surface following the provided instructions. Pay close attention to the drawing, and ensure that the correct bracket is used to mount the recloser frame to the pole.



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- 18 3SP wrap-around frame
- 19 3SP cross-arm frame
- 20 3SP compact frame (side view)

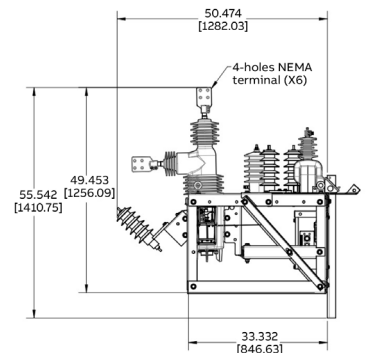
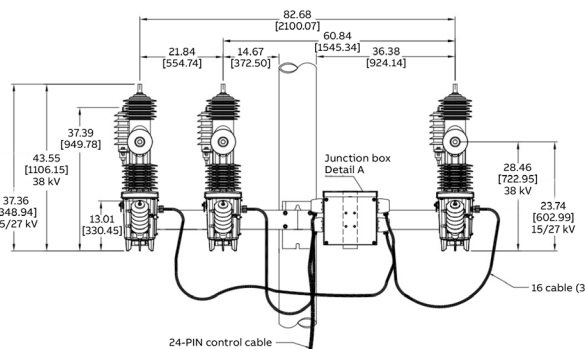
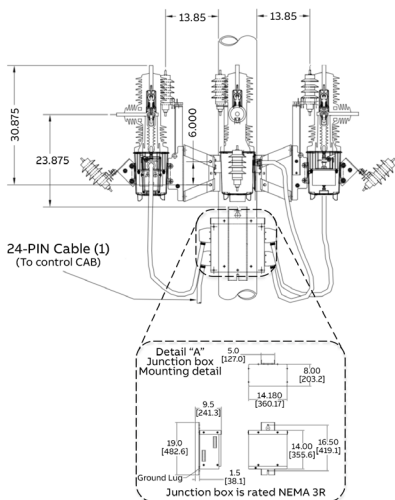
3. Insert mounting bolts (not included) into the pole for both the recloser and the control cabinet.
4. Use the lifting brackets at four points (refer to figure 1) to raise the recloser, and then secure the frame by bolting it to the two holes at the bottom of the bracket on both sides of the recloser.
5. Once the frame is mounted, lift the assembly onto the bolts in the pole. If voltage transformers (VTs) are being used, it is recommended to install the frame without the VTs first, and then install the VTs after the recloser and VT mounting brackets are on the pole. Alternatively, if you prefer to mount VTs on the frame before attaching it to the pole, follow these steps:
 - a. Install and wire the VTs on the frame without mounting the recloser.
 - b. Lift the frame onto the pole using a four-point lift at the corners of the frame.
 - c. With the lifting bracket attached to the recloser, lift the recloser onto the frame and bolt it into place.
6. Secure the pole-mounting bracket to the control cabinet, and then bolt the control cabinet to the pole.
7. Ensure that all hardware is securely tightened.

To install the 3SP recloser pole frames (refer to figures 18 to 23), follow these steps:

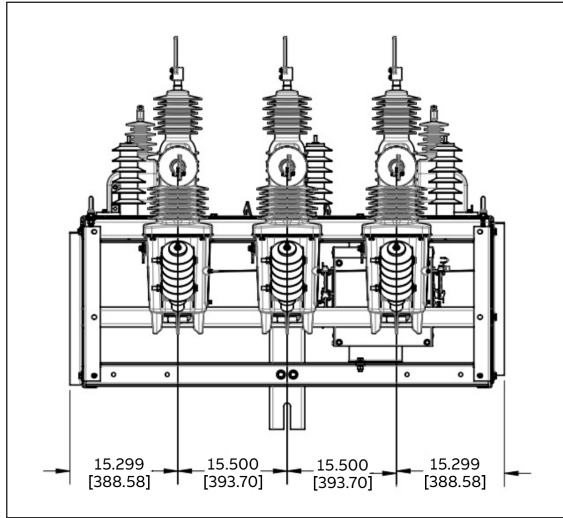
1. If the unit is not ready for installation at the site, assemble the frame according to the provided instructions. Pay close attention to the drawings and ensure the correct bracket is used to mount the recloser frame to the pole.
2. Attach the recloser poles to the assembled frame. Make sure to properly install the junction box as well.
3. Use mounting bolts (not included) to secure the recloser and the control cabinet to the pole.
4. Lift the assembled frame with the recloser poles and place it on the pole. If you're using compact frames (see figure 2), use a four-point lift at the corners of the frame. For cross-arm frames (see figure 4), use the center lifting point. For a wrap-around frame, use lifting straps.
5. Mount the recloser frame onto the pole and securely fasten it.
6. Attach the pole-mounting bracket to the control cabinet, and then secure the control cabinet to the pole using bolts.
7. Double-check that all the hardware is tightly secured.

NOTICE

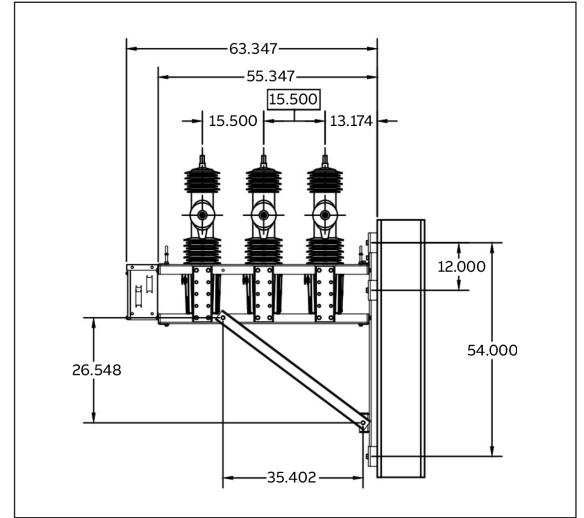
Do not exceed 50 lbs. cantilever force on any of the terminals in any directions. Failure to comply will result in permanent damage to the recloser.



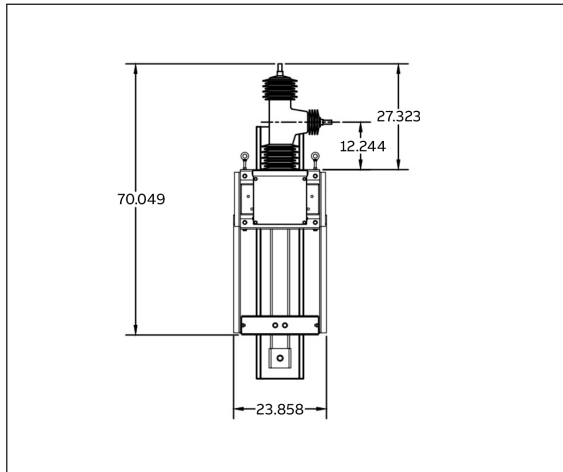
- 21 3SP compact frame (front view)
- 22 3SP side mount (front view)
- 23 3SP side mount (side view)



21



22



23

- 24 GridShield® 3P substation mount (top view)
- 25 GridShield 3P substation mount base
- 26 GridShield 3P substation mount (side view 1)

8.1.2 Substation Mounting

To install a 3P/3SP style recloser in a substation frame (see figures 24 to 30), follow these steps:

1. Attach the lifting brackets to the substation frame. Use a crane and the provided lifting bracket to lift the frame off the pallet and move it to the desired position.

NOTICE

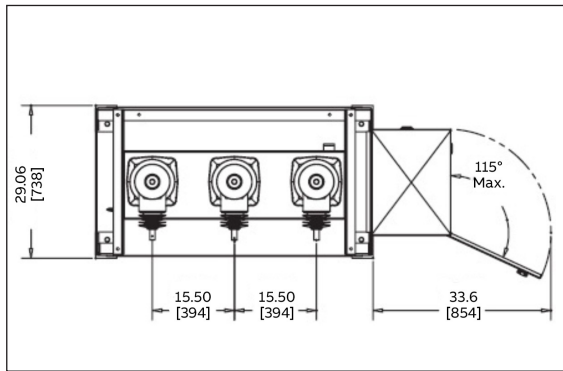
Do not use a forklift to move the substation frame or the recloser.

2. Securely bolt the frame to the concrete pad. Adjust the upper portion of the frame to the desired height. The frame allows for adjustments in 3-inch increments.

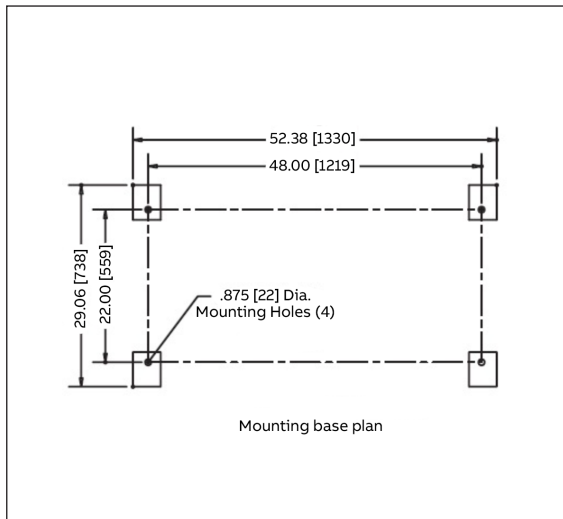
3. Remove the lifting brackets from the frame and attach them to the sides of the recloser. If you are using a 3SP unit, use the lifting straps around the individual pole body.
4. Lift the recloser (or the poles if it is a 3SP unit) over the top of the frame and carefully lower it into place (see figure 3).
5. Bolt the control cabinet to the cross members on the side of the substation frame.
6. Ensure that all hardware is securely tightened.

NOTICE

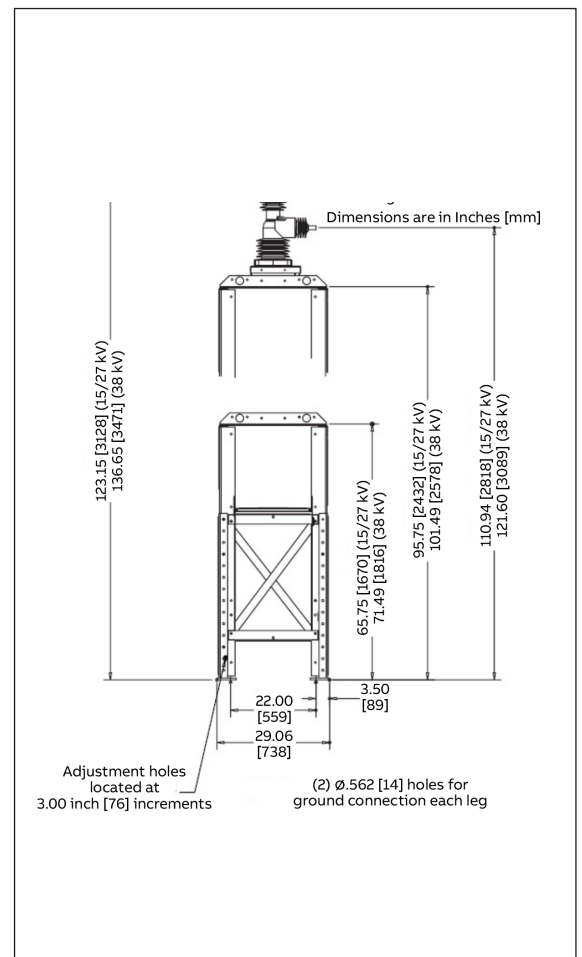
Do not exceed 50 lbs. cantilever force on any of the terminals in any direction. Failure to comply will result in permanent damage to the recloser.



24

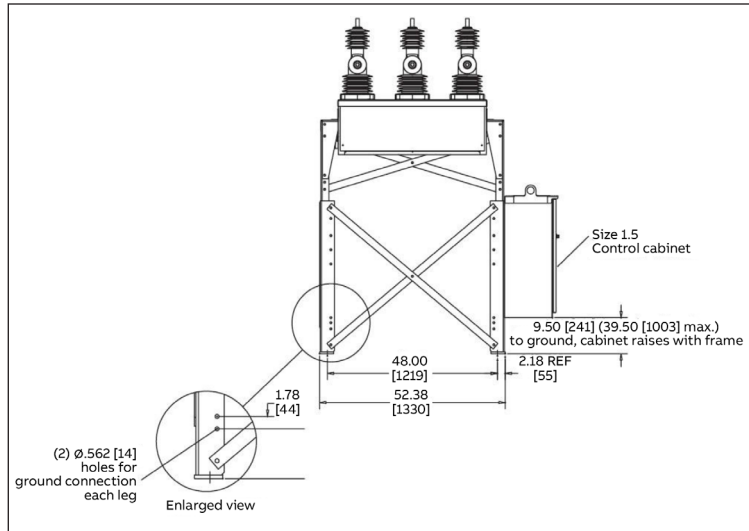


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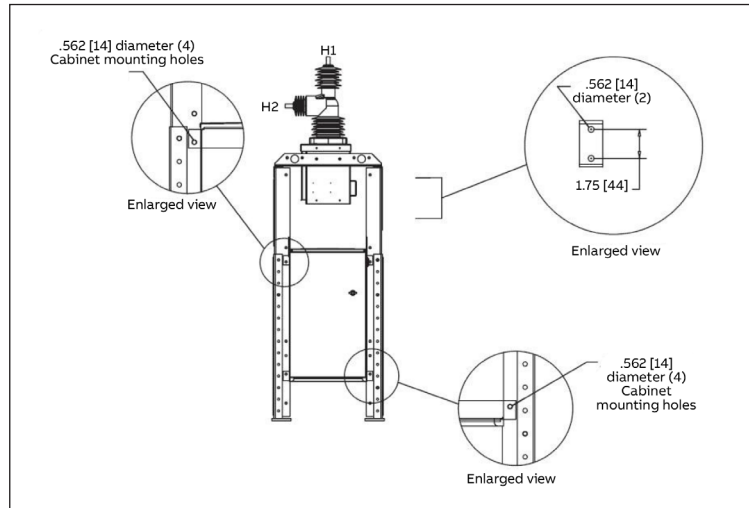


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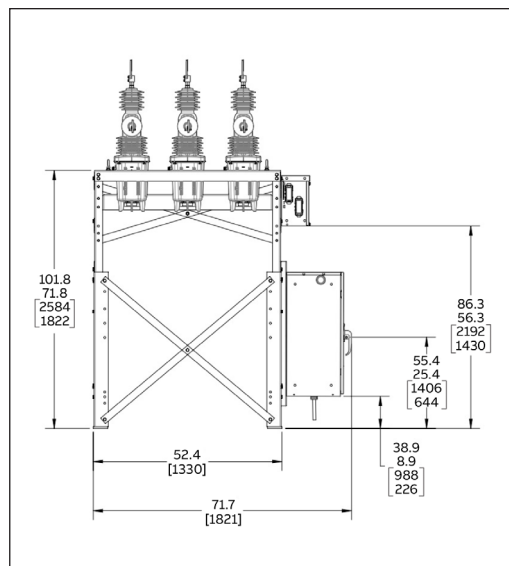
- 27 GridShield® 3P substation mount (front view)
- 28 GridShield 3P substation mount (side view 2)
- 29 GridShield 3SP substation mount (front view)
- 30 GridShield 3SP substation mount (side view)



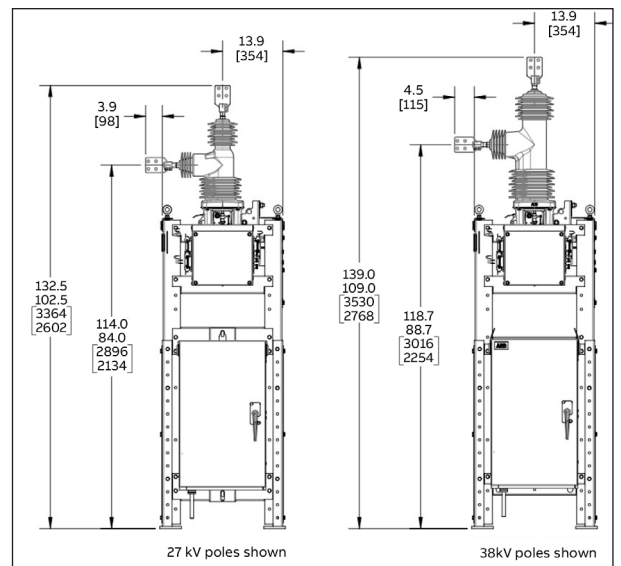
27



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08

- 31 Grounding pad on recloser's HV tank
- 32 Grounding on bucket of individual 3SP poles
- 33 Grounding on back of LV control cabinet

8.1.3 No frame

1. Attach the lifting brackets to the recloser (GridShield® 3P single tank). Lift the frame off the pallet and place it in the desired position. For 3SP units, use lifting straps around each individual pole body.
2. If a different bracket provided by the customer is used to mount the recloser, be careful while lifting it. Avoid lifting the single-tank recloser by the poles to prevent any damage to them.

8.2 Grounding

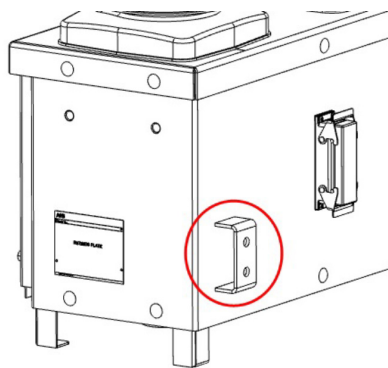
Grounding is crucial to ensure the proper functioning of electronic components and to prevent the intrusion of EMC noise and other transients into sensitive electronic circuits, such as relays, modems and radios.

In the single-tank recloser cabinet, you will find a standard NEMA 2-hole drilled, unpainted stainless steel pad at the back for grounding (refer to figure 31). In 3SP units, each pole bucket has a grounding point located underneath (refer to figure 32). If voltage transformers are being used, they should be grounded to the main ground wire that leads from the recloser to the ground.

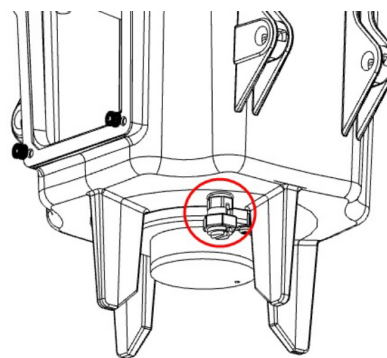
To ground the low voltage control cabinet (refer to figure 33), use the provided connector (found in the shipping bag within the control cabinet). This connector can accommodate a #6–2/0 AWG conductor. Connect the control cabinet to the main ground wire using this external connector. Ensure that all ground wires used are minimum #4 AWG.

NOTICE

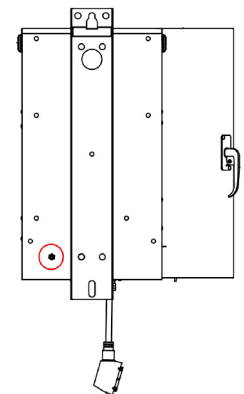
Both the high voltage cabinet and low voltage control cabinet should be firmly grounded in series when installed.



— 31



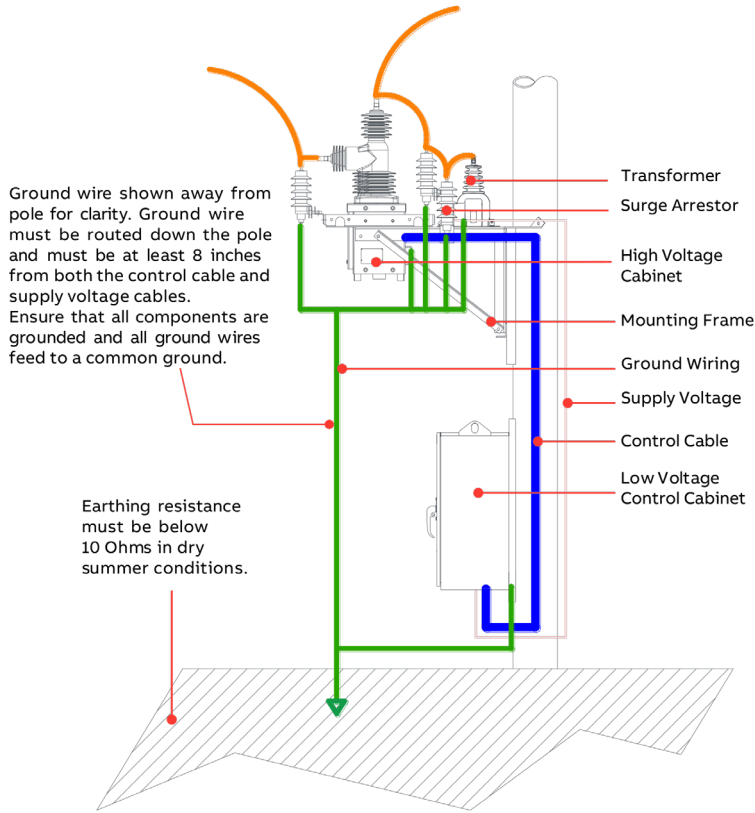
— 32



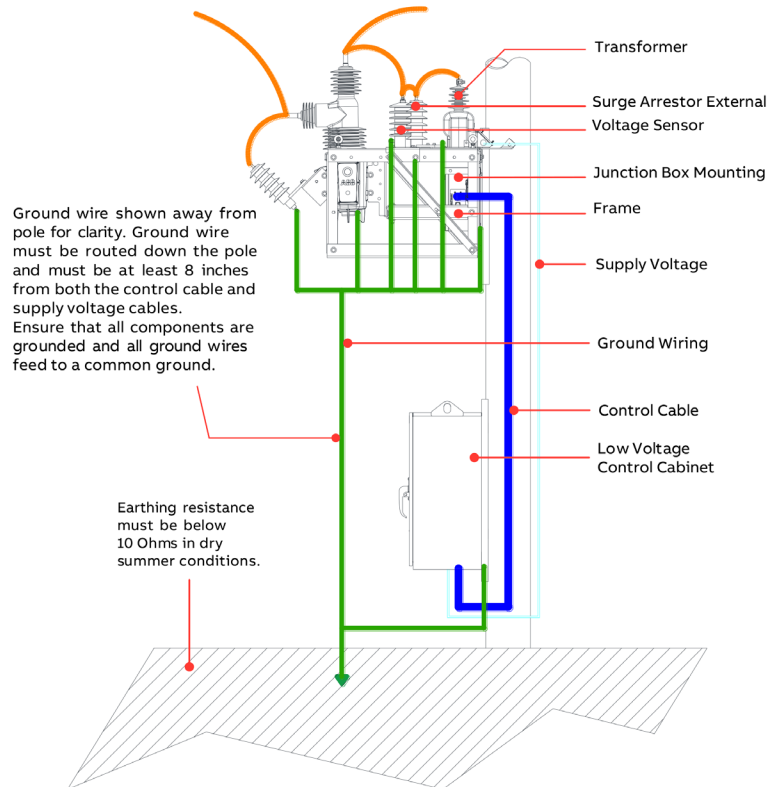
— 33

- 34 GridShield® 3P grounding connections
- 35 GridShield 3SP grounding connections

8.2.1 Pole-mounted recloser grounding



34

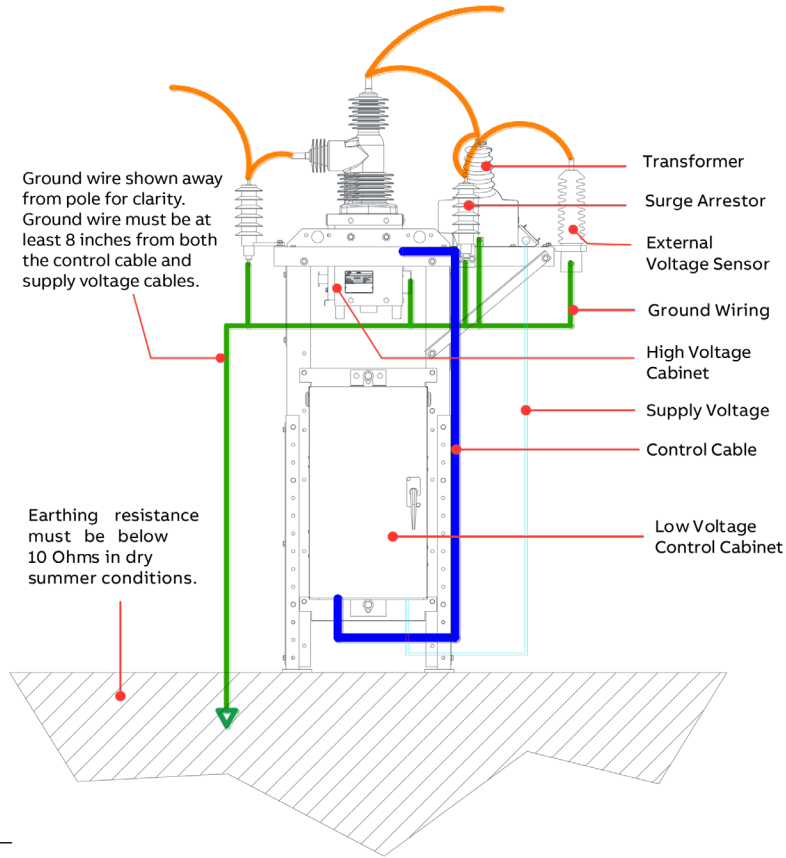


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—
36 GridShield® 3P
substation-mount
grounding

8.2.2 Substation-mount recloser grounding



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36

8.3 Arrester protection

Surge arresters must be installed on both the source and load sides of the recloser. It is advisable to connect the arrester grounds to the recloser ground and extend them to the pole ground. To minimize stray inductance and maximize the effectiveness of the arresters, it is recommended to keep the leads connecting to the arresters as short as possible.

8.4 Control power

The control power is supplied according to the typical wiring diagram provided in appendix A.

CAUTION

Caution should be exercised when connecting the hot and neutral to the desired source. If 240 V AC is used, the GFI receptacle should be labeled accordingly.

If the control comes with a 2-, 3-, 5- or 8-pin power connector and power cable, connect the AC source to this cable. If not, you can use one of the knockouts or drill the removable plate to accommodate a conduit.

For three-phase voltage wiring, you can connect from the recloser to the low voltage control cabinet terminal block and then to the voltage inputs on the back of the relay for metering and voltage-dependent protection. When the control cabinet has a 5- or 8-pin power connector, the connections go through an AC transfer switch first. Otherwise, wire the three voltage transformers (VTs) directly to the terminal block in the control cabinet. There's no need to wire any voltage inputs directly to the back of the relay.

If you have optional voltage sensing cables from external sensors, they can also provide voltage inputs to the back of the relay.

If you want to obtain control power from one of the three VTs used for metering, you need to add jumpers to the control cabinet distribution terminal block to connect one of the voltage sources to the control power input. Follow the unit-specific wiring diagram and add a connection from the incoming voltage terminal block to the control power inputs in the control cabinet. Make sure all terminal block connections are properly tightened. For detailed information on the overall control circuit, always refer to the specific wiring diagrams provided with the recloser.

8.5 Line connections

The recloser is connected in series with the power line and can operate in either direction. However, there are three important considerations:

1. The voltage transformer used to supply power should be installed on the source side of the recloser. This ensures that the battery backup system is not unnecessarily drained when the circuit is open at the recloser.
2. When voltage transformers are used for metering and protection purposes, they should be installed on the source side. Additionally, the top terminal of the poles must be connected to the source side. This is necessary to accurately measure power flow and allow the directional protection elements to function according to the programmed settings.
3. The relay settings can be adjusted to change the CT polarity and phase orientation.

8.6 Setting voltage correction factors

The GridShield® recloser comes pre-configured with voltage correction factors. These correction factors can be found in various locations depending on the ordered configuration. Typically, you can locate them on a label inside the door of the HV unit, a separate label on the frame, on the nameplate, on the door of the LV unit and in the provided test reports.

If you need to enter new correction factors into the relay or update existing ones, follow these steps:

1. Determine the new calibration factors by calculating the phase voltage for each phase:
 - a. If you're referring to a PT-connected phase-to-phase connection, multiply the voltage from the PT tap by the PT's ratio.
 - b. If you're referring to a PT-connected phase-to-neutral connection, multiply the voltage from the PT tap by the PT's ratio and 1.732.
2. Divide each phase voltage by the corresponding voltages displayed on the relay. The results will be the correction factors.
3. Enter the correction factors either through the front panel or the relay's software:
 - a. For RER615 and RER620, navigate to Configuration > Analog Inputs > Voltage (VA, VB, VC, VT) > Amplitude Correction on the front panel to enter these correction factors.
 - b. For RER615 and RER620, use PCM600 to update these settings by going to IED Configuration > Configuration > Analog Inputs > Voltage (3U, VT). Right-click on the parameter settings to select and update them.

8.7 Final inspection

When installing the recloser and completing all mechanical and electrical connections, EXCEPT ENERGIZING THE POWER LINE, it is recommended to inspect the following points:

1. Verify that the recloser is properly leveled and securely anchored.
2. Perform a final check to ensure all hardware is tightened.
3. Securely tighten terminal and ground connections.
4. Check the tightness of control cable entrance fittings.
5. Ground both the recloser head and low voltage control cabinets.
6. Test the recloser by operating it from the control cabinet front panel to confirm normal operation.
7. If the recloser has been stored improperly or if there is suspicion of rough handling during shipping, it is advisable to check the recloser alignments, including the vacuum interrupter (VI) contact wipe and microswitches. If necessary, contact your ABB representative for assistance.

9 Inspection, maintenance and adjustment

37 Contact wear measurement/adjustment for 24-pin GridShield 3P

The GridShield® recloser is a straightforward device that requires minimal maintenance when handled properly and based on the frequency of operation and local environmental conditions.

The safety and proper functioning of any apparatus or system connected to the recloser largely depend on the correct installation, commissioning and programming of the unit.

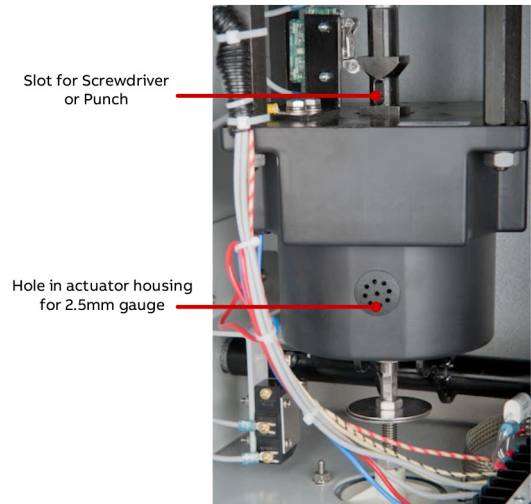
To help ensure long and reliable service, it is important to regularly inspect the recloser. Factors such as operating experience, environmental conditions, the number of operations, current magnitude and any unusual service conditions should guide you in establishing a maintenance schedule.

Here is a minimum checklist to follow:

1. Inspect the molded pole assemblies for external damage and clean them if contamination is present. You can clean the poles with a mild detergent, while the HCEP bushings can be cleaned with isopropyl alcohol.
2. Check contact wear (only for 24-pin single-tank units) — As the vacuum interrupter continues to switch current, material from the contact is pushed deeper into the interrupter by the operating mechanism. The over-travel spring at the upper end of the operating rod ensures proper contact pressure in the closed position. Contact erosion reduces the compression of the over-travel spring, increasing contact travel (the actuator's total travel is fixed). To easily confirm allowable contact erosion, use the 2.5 mm gauge provided with the recloser. See figure 37, and follow these steps:
 - a. Ensure the recloser is in the open position.
 - b. Connect an ohmmeter across the H1 and H2 terminals.

- c. Insert the 2.5 mm gauge into the holes in the actuator housing.
- d. Insert a large screwdriver or punch into the slot on the actuator shaft.
- e. Pry on the screwdriver to raise the shaft as far as it can move.
- f. The ohmmeter should indicate approximately zero resistance. If the ohmmeter reads open, it means the contact erosion limit has been reached, and the pole needs replacement.
- g. Remove the 2.5 mm gauge and screwdriver from the actuator.

For 32-/42-pin GridShield recloser units and in general, you can monitor contact wear through the breaker wear-monitoring function built into the relay. Contact ABB technical support to obtain the appropriate life curves for each type of vacuum interrupter.



3. Verify correct operation of the recloser using the electrical controls.
4. Perform a hi-pot test to verify the vacuum integrity.

WARNING



High voltage applied across an open gap in a vacuum can produce X-ray radiation.

- Radiation note:** When high voltage is applied across an open gap in a vacuum, X-ray radiation can be produced. No radiation is emitted when the recloser is closed because there is no gap. Additionally, when the recloser is open to the specified contact spacing during service or testing within the specified voltages, X-ray radiation at one meter is below a concerning level. However, there could be a danger at voltages above or contact spacing below the specified values on the nameplate. Follow these steps for the hi-pot test:
- a. With the recloser in the open position, connect the three top terminals and the three lateral terminals with jumpers. Ground the lateral terminals and the housing. Connect the high voltage source to the top terminals.
 - b. Stand more than one meter away before energizing the high voltage source.
 - c. Do not exceed 37.5 kV for 15/27 kV or 38 kV reclosers, and do not apply the voltage for more than 60 seconds.

NOTICE

Do not use DC voltage for hi-pot testing. Applying DC voltage for hi-pot testing is more destructive and, therefore, is not recommended.

- d. If internal flashover occurs, isolate the phases and test each one independently to identify the defective interrupter. Replace any defective pole assembly before putting the recloser into service.

5. Measure the contact resistance using suitable equipment (e.g., micro-ohm meter) rated at least 100 A DC. The resistance should not exceed 150 micro-ohms. Measure the resistance across terminals H1 and H2 when the contacts are closed.
6. Measure the actuator coil resistance for each phase. The coil resistance should not exceed 10 ohms. Refer to table 2 for the correct set of pins to measure the coil resistance.

Table 2: Actuator coil resistance measurement pins

	24-pin control	32-pin control	42-pin control
Phase A	Pins 10, 22	Pins Y, Z	Pins 2, 3
Phase B	Pins 9, 21	Pins F, G	Pins 4, 5
Phase C	Pins 8, 20	Pins H, J	Pins 6, 7

7. Measure the microswitch resistance for the 52a/b contacts. This can be done at the pole level, on the other end of the control cable or inside the control cabinet terminal block. This measurement can also verify continuity. The measured resistance should not exceed 1.5 ohms. Refer to table 3 to identify the correct set of pins for measuring microswitch resistance.

Table 3: Microswitch resistance measurement pins

	24-pin control (52b)	32-pin control (52a)	42-pin control (52a)	42-pin control (52b)
Phase A	Pins 7, 19	Pins F, U	Pins 29, 9	Pins 29, 22
Phase B	Pins 7, 6	Pins F, V	Pins 29, 8	Pins 29, 17
Phase C	Pins 7, 18	Pins F, W	Pins 29, 1	Pins 29, 16

Note: For 24-pin (52b) and 42-pin (52b) measurements, the recloser needs to be in the open state.

8. Perform a battery test (if programmed). Press the PROG1 button on the front of the RER620. The RER620 will display a "Delta V" voltage. This value should not exceed 10 percent of the nominal battery voltage (e.g., 4.8 V for a 48 V battery). A returned value of 99 V for the "Delta V" indicates that the battery has a very low charge, is disconnected or has failed. The Delta indication will also provide a "Pass" or "Fail" message.

For reclosers using the ACM control cabinet, the battery is continuously monitored by the Nextys UPS, eliminating the need for periodic battery testing. If a battery problem arises during continuous monitoring, an alarm is activated in the relay.

- 38 Actuator circuit board assembly
- 39 Jumper setting for 600:1 ratio
- 40 Jumper setting for 300:1 ratio

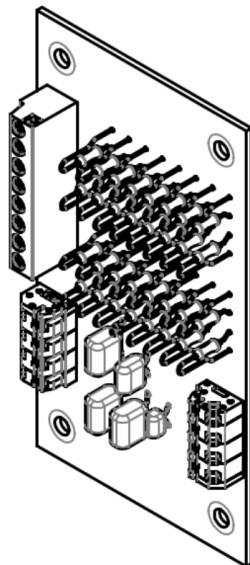
9.1 Pole replacement

To help ensure easy replacement of vacuum interrupters or embedded current transformers, the pole assembly is specifically designed as a complete unit. It consists of the molded pole and actuator component, which can be directly installed as a replacement. For detailed instructions on the complete pole replacement procedure, please reach out to ABB technical support.

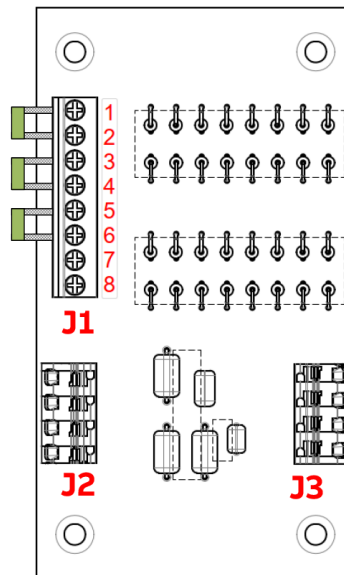
9.2 Changing the CT ratio

The CT ratio in all GridShield® reclosers is initially set to 600:1 by default. However, in the embedded dual voltage sensing recloser, there is an option to choose a 300:1 ratio. During the ordering process, you can specify your preferred ratio. Alternatively, it is also possible to change the ratio after the unit is installed in the field. To change the CT ratio, follow the steps below:

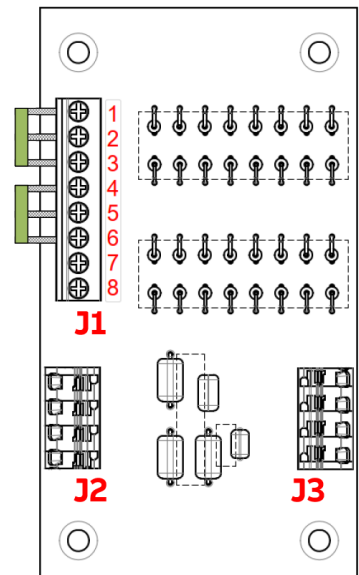
1. For single-tank units, remove the front door. For 3SP units, remove the pole bucket to access the circuit board mounted on the actuator assembly (see figure 38).
2. Locate the J1 terminal on the circuit board.
3. Obtain a terminal block jumper strip with at least 6 pins.
4. Depending on the desired ratio, break the jumper strip into either 3 sets of 2 pins for a 600:1 ratio or 2 sets of 3 pins for a 300:1 ratio.
5. For a 600:1 ratio, insert the 3 sets of 2-pin jumpers into pins 1–2, 3–4 and 5–6 of the J1 terminal (see figure 39).
6. For a 300:1 ratio, insert the 2 sets of 3-pin jumpers into pins 1–2–3 and 4–5–6 of the J1 terminal (see figure 40).
7. Contact ABB technical support to inform them about this change. Request an updated nameplate based on the unit's serial number.
8. Adjust the relay settings to reflect the new CT ratio.



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9.3 Relay removal from case

The RER620 and RER615 models are designed with a withdrawable case for easy replacement and maintenance. However, it's important to note that these IEDs are not meant for "hot swapping." Before removing or installing the relay, please carefully follow the steps provided below. You can also find these instructions on a label located inside the control cabinet's exterior door. Failure to adhere to these steps may result in electrical shock, causing serious personal injury, damage to the unit and/or voiding of the warranty.

Removal:

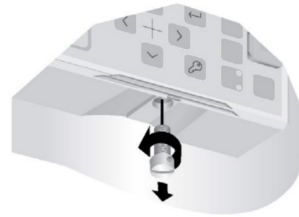
1. Turn the capacitor discharge switch clockwise to activate the discharge position.
2. Allow the capacitors to discharge for approximately 2 minutes or until the capacitor discharge LED (located on the ACM cabinet) turns off. Avoid touching anything during this time.
3. Once the designated time has passed, turn the screw that secures the IED handle clockwise until it is fully screwed in, allowing the handle to move freely.



4. Lift the handle to a 90-degree angle with the relay.
5. Pull the relay straight out and place it on a surface that is safe from electrostatic discharge (ESD).

Installation:

1. Confirm that the capacitor discharge switch is still in the discharge position.
2. With the relay handle at a 90-degree angle to the relay, carefully slide the relay back into its case, ensuring proper alignment during reinstallation. Do not apply excessive force when inserting the relay.
3. Push the handle down, ensuring that the relay securely locks back into the case.
4. Turn the handle screw counter-clockwise until the screw head is flush with the handle, securely locking the handle in place.



5. Turn the capacitor discharge switch counter-clockwise to the charge position.

10 End-of-life recycle/disposal

ABB is committed to complying with relevant legal and other statutory requirements for environmental protection according to the ISO 14001 standard. It is the duty of the end user to facilitate end-of-life recycling and disposal according to applicable regulations.

During disposal of the product, it is important to follow all local legal requirements in force. Disposal can be carried out either thermally in an incineration plant or by storing on a waste site.

Following are the methods of recycle/disposal:

Table 4: Recycle/disposal methods

Raw material	Recycle	Environmental effects and reuse purposes
Iron	Yes	Separate, use instead of new source (ore)
Stainless steel	Yes	Separate, use instead of new source (ore)
Copper	Yes	Separate, use instead of new source (ore)
Brass	Yes	Separate, use instead of new source (ore)
Aluminum	Yes	Separate, use instead of new source (ore)
Zinc	Yes	Separate, use instead of new source (ore)
Thermoplastic	Yes	Make granulate, re-use or apply as energy superior
Epoxy incl. 60% quartz	Yes	Additive in refuse incineration
Rubber	Yes	Cut into pieces and use as high-grade energy
Porcelain	Yes	Additive in cement mill
Packing foil	Yes	Cut into pieces and use for landfills
Wooden pallet	Yes	High-grade energy additive in refuse incineration

11 Disclaimer of warranties and limitation of liability

There are no understandings, agreements, representations of warranties, expressed or implied, including warranties of merchantability or fitness for a particular purpose, other than those specifically set out by an existing contract between the parties. Any such contract states the entire obligation of the seller. The contents of this document shall not become part of or modify any prior or existing agreement, commitment or relationship. The information, recommendations, descriptions and safety notations in this document are based on ABB experience and judgment with respect to the GridShield® 3P/3SP recloser. This information should not be considered to be all inclusive or covering all contingencies.

No warranties, expressed or implied, including warranties of fitness for a particular purpose or merchantability, or warranties of fitness for a particular purpose or merchantability, or warranties arising from course of dealing or usage of trade, are made regarding the information, recommendations, descriptions and safety notations contained herein. In no event will ABB be responsible to the user in contract, in tort (including negligence), strict liability or otherwise for any special, indirect, incidental or consequential damage or loss whatsoever including but not limited to damage to or loss of use of equipment, plant or power system, cost of capital, loss of profits or revenue, cost of replacement power, additional expenses in the use of existing power facilities or claims against the user by its customers resulting from the use of information, recommendations, descriptions and safety notations contained herein.

12 Appendix A — Typical drawings

ABB standard control cabinet with RER615, RER620 or Beckwith M-7679

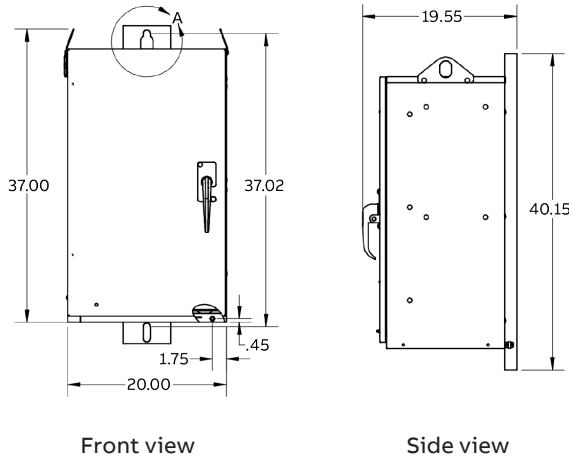


ABB 24-pin control cabinet with RER620

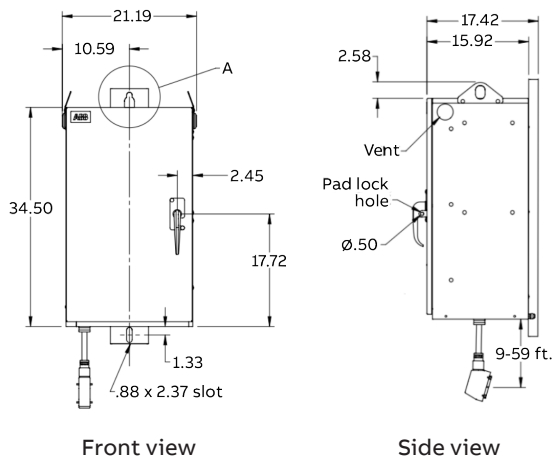
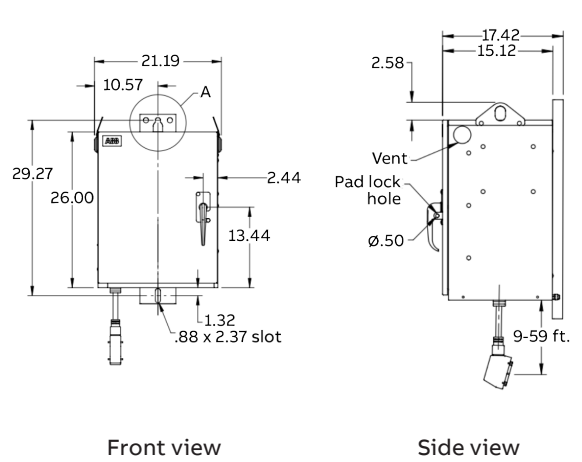


ABB 24-pin low profile control cabinet with RER620



NOTE: Please refer to SEL-651R instruction manual for SEL control cabinet dimensions.

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42 Typical recloser
nameplate (single tank)
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43 Typical recloser
nameplate (3SP)

ABB	
Serial No: 1VAS19C124GS2	UL, CSA
S.O. MWS0152-30	Date of MFR: 3/22/2019
TYPE GRIDSHIELD	RECLOSER
Customer Ratings 15kV - 800A - 110kV BIL - 12.5kA IR	
Rated Voltage 15 kV	Rated Frequency 50/60 Hz
Rated Continuous Current 1000 A	KV Range Factor K 1.0
Rated Lightning Impulse Withstand Voltage 125 kV	
Rated Symmetrical Interrupting Current 12.5 kA	
Rated Symmetrical Interrupting Time 3.0 Cycles	
Weight 330 LBS	
Style No. A1231CS4ASS1E1GN	IB No. 1VAL265401-MB
Diagram No. 1B12200	Control Input = 120 VAC
Additional Information:	
INCLUDES 3-600/1 CURRENT SENSORS	
Correction Factors: A-PHASE 0.949 B-PHASE 0.936 C-PHASE 0.950	
MADE in MEXICO FOR PARTS OR SERVICE CALL 1-800-929-7947 OR YOUR LOCAL ABB REPRESENTATIVE	

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ABB	
Serial No: 1VAS19J176GS2	UL, CSA
S.O. WD108406-10	Date of MFR: 10/15/2019
TYPE GRIDSHIELD	RECLOSER
Customer Ratings 15kV - 800A - 110kV BIL - 12.5kA IR	
Rated Max Voltage 15 kV	Rated Frequency 50/60 Hz.
Rated Continuous Current 1000 A	KV Range Factor K 1.0
Rated Lightning Impulse Withstand Voltage 125 kV	
Rated Symmetrical Interrupting Current 12.5 kA	
Rated Symmetrical Interrupting Time 3.0 Cycles	
Weight 190 Kg	
Style No. C1467AU2NBA1C1HN	IB No. 1VAL265401-MB
Diagram No. 2RGA015324	Control Input = 120 VAC
Additional Information: INCLUDES 1-600/1 CURRENT SENSORS Correction Factor: 0.946	
MADE in MEXICO FOR PARTS OR SERVICE CALL 1-800-929-7947 OR YOUR LOCAL ABB REPRESENTATIVE	

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Revision history

Rev.	Pages	Change description	Date/initial
D	All	Updated content with detailed pictures	Mar 2012
E	All	Added GridShield® 3SP related content Added measurement values for maintenance Added dual voltage sensing unit related information	Dec 2020/DP
F	All	General update	Oct 2023/CV

**Additional information**

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