Installation and Operation

Table of Contents

July 27, 2020

Qualified Persons

⚠ WARNING

Only qualified persons who are knowledgeable in the installation, operation, and maintenance of overhead and underground electric distribution equipment, along with all associated hazards, may install, operate, and maintain the equipment covered by this publication. A qualified person is someone who is trained and competent in:

- The skills and techniques necessary to distinguish exposed live parts from nonlive parts of electrical equipment
- The skills and techniques necessary to determine the proper approach distances corresponding to the voltages to which the qualified person will be exposed
- The proper use of special precautionary techniques, personal protective equipment, insulated and shielding materials, and insulated tools for working on or near exposed energized parts of electrical equipment

These instructions are intended ONLY for such qualified persons. They are not intended to be a substitute for adequate training and experience in safety procedures for this type of equipment.

Read this Instruction Sheet

NOTICE

Thoroughly and carefully read this instruction sheet and all materials included in the product's instruction handbook before installing or operating the IntelliRupter PulseCloser Fault Interrupter. Familiarize yourself with the Safety Information and Safety Precautions on pages 5 and 6. The latest version of this publication is available online in PDF format at **sandc.com/en/support/product-literature/**.

Retain this Instruction Sheet

This instruction sheet is a permanent part of your IntelliRupter® fault interrupter. Designate a location where you can easily retrieve and refer to this publication.

Proper Application

⚠ WARNING

The equipment in this publication is only intended for a specific application. The application must be within the ratings furnished for the equipment. Ratings for the IntelliRupter fault interrupter are listed in the ratings table in Specification Bulletin 766-31.

Application Notes

The following factors should be considered when applying Pad-Mounted Style IntelliRupter PulseCloser Fault Interrupters:

System voltage restrictions. For adequate power to be available from the integral power module(s), an IntelliRupter fault interrupter must be applied on a system that is solidly grounded, uni-grounded, grounded through a grounding transformer, or resonant-grounded through a Peterson coil; the base of the IntelliRupter fault interrupter must be grounded; and the line-to-line voltage must be in the range shown in Table 1.

Table 1. Interrupter fault interrupter line-to-line voltage ratings

Range, kV, at 60 Hz	Range, kV, at 50 Hz
11.43 through 15.5	9.0 through 19.2
18.81 through 27	20 through 24

When furnished with the external power supply, an IntelliRupter fault interrupter may be applied at line-to-line voltage as low as 4.13 kV, 50/60 Hz.

For application on a completely ungrounded system, the external power supply must be specified, less integral power module(s). Integral power modules cannot be applied on completely ungrounded systems.

Application of surge arresters. Elbow-style surge arresters are required on both sides of an IntelliRupter fault interrupter when installed on feeders, to protect it from surges beyond its ratings. When installed in substations or at the base of riser/dip poles, surge arresters are only required on load side of an IntelliRupter fault interrupter.

Special Warranty Provisions

The standard warranty contained in S&C's standard conditions of sale, as set forth in Price Sheets 150 and 181, applies to your Pad-Mounted Style IntelliRupter PulseCloser Fault Interrupter and its associated options, except for the control group (the protection and control module and communication module), as applicable. For these devices, the first and second paragraphs of said warranty are replaced by the following:

(1) General: The seller warrants to the immediate purchaser or end user for a period of 10 years from the date of shipment that the equipment delivered will be of the kind and quality specified in the contract description and will be free of defects of workmanship and material. Should any failure to conform to this warranty appear under proper and normal use within 10 years after the date of shipment, the seller agrees, upon prompt notification thereof and confirmation that the equipment has been stored, installed, operated, inspected, and maintained in accordance with recommendations of the seller and standard industry practice, to correct the nonconformity either by repairing any damaged or defective parts of the equipment or (at seller's option) by shipment of necessary replacement parts. The seller's warranty does not apply to any equipment that has been disassembled, repaired, or altered by anyone other than the seller. This limited warranty is granted only to the immediate purchaser or, if the equipment is purchased by a third party for installation in third-party equipment, the end user of the equipment. The seller's duty to perform under any warranty may be delayed, at the seller's sole option, until the seller has been paid in full for all goods purchased by the immediate purchaser. No such delay shall extend the warranty period.

The seller further warrants to the immediate purchaser or end user that for a period of two years from the date of shipment the software will perform substantially in accordance with the then-current release of specifications if properly used in accordance with the procedures described in seller's instructions. The seller's liability regarding any of the software is expressly limited to exercising its reasonable efforts in supplying or replacing any media found to be physically defective or in correcting defects in the software during the warranty period. The seller does not warrant the use of the software will be uninterrupted or error-free.

Warranty Qualifications

The standard warranty contained in the seller's standard conditions of sale, as set forth in Price Sheets 150 and 181, does not apply to major components not of S&C manufacture, such as batteries, customer-specified remote terminal units and communication devices, as well as hardware, software, resolution of protocol-related matters, and notification of upgrades or fixes for those devices. The seller will assign to the immediate purchaser or end user all manufacturers' warranties that apply to such major components.

The seller's standard warranty does not apply to any components not of S&C manufacture that are supplied and installed by the purchaser, or to the ability of the seller's equipment to work with such components.

Warranty of equipment/services packages is contingent upon receipt of adequate information on the user's distribution system, sufficiently detailed to prepare a technical analysis. The seller is not liable if an act of nature or parties beyond S&C's control negatively impact performance of equipment/services packages; for example, new construction that impedes radio communication, or changes to the distribution system that impact protection systems, available fault currents, or system loading characteristics.

Understanding Safety-Alert Messages

Several types of safety-alert messages may appear throughout this instruction sheet and on labels and tags attached to the IntelliRupter PulseCloser Fault Interrupter. Familiarize yourself with these types of messages and the importance of these various signal words:

⚠ DANGER

"DANGER" identifies the most serious and immediate hazards that will likely result in serious personal injury or death if instructions, including recommended precautions, are not followed.

⚠ WARNING

"WARNING" identifies hazards or unsafe practices that can result in serious personal injury or death if instructions, including recommended precautions, are not followed.

⚠ CAUTION

"CAUTION" identifies hazards or unsafe practices that can result in minor personal injury if instructions, including recommended precautions, are not followed.

NOTICE

"NOTICE" identifies important procedures or requirements that can result in product or property damage if instructions are not followed.

Following Safety Instructions

If you do not understand any portion of this instruction sheet and need assistance, contact your nearest S&C Sales Office or S&C Authorized Distributor. Their telephone numbers are listed on S&C's website sandc.com, or call the S&C Global Support and Monitoring Center at 1-888-762-1100.

NOTICE

Read this instruction sheet thoroughly and carefully before installing the Pad-Mounted Style IntelliRupter fault interrupter.

Replacement Instructions and Labels

If additional copies of this instruction sheet are needed, contact your nearest S&C Sales Office, S&C Authorized Distributor, S&C Headquarters, or S&C Electric Canada Ltd.

It is important that any missing, damaged, or faded labels on the equipment be replaced immediately. Replacement labels are available by contacting your nearest S&C Sales Office, S&C Authorized Distributor, S&C Headquarters, or S&C Electric Canada Ltd.

⚠ DANGER

Pad-Mounted Style IntelliRupter fault interrupters operate at high voltage. Failure to observe these precautions will result in serious personal injury or death.

Some of these precautions may differ from your company's operating procedures and rules. Where a discrepancy exists, follow your company's operating procedures and rules.

1. **QUALIFIED PERSONS.** Access to Pad-Mounted Style IntelliRupter fault interrupters must be restricted only to qualified persons. See the "Qualified Persons" section on page 2.
2. **SAFETY PROCEDURES.** Always follow safe operating procedures and rules.
3. **PERSONAL PROTECTIVE EQUIPMENT.** Always use suitable protective equipment such as rubber gloves, rubber mats, hard hats, safety glasses, and flash clothing, in accordance with safe operating procedures and rules.
4. **SAFETY LABELS.** Do not remove or obscure any of the "DANGER," "WARNING," "CAUTION," or "NOTICE" labels.
5. **OPERATING MECHANISM AND BASE.** The Pad-Mounted Style IntelliRupter fault interrupter contains fast-moving parts that can severely injure fingers. Do not remove or disassemble operating mechanisms or remove access panels on the IntelliRupter fault interrupter base unless directed by S&C Electric Company.
6. **ENERGIZED COMPONENTS.** Always consider all parts live until de-energized, tested, and grounded.
7. **GROUNDING.**
   - The Pad-Mounted Style IntelliRupter fault interrupter enclosure must be connected to a suitable earth ground before energizing IntelliRupter fault interrupter and at all times when energized.
   - The ground wire(s) must be bonded to the system neutral, if present. If the system neutral is not present, proper precautions must be taken to ensure the local earth ground cannot be severed or removed.
8. **VACUUM INTERRUPTER POSITION.**
   - Always confirm the **Open/Close** position of each interrupter by visually observing its indicator.
   - Interrupters, terminal pads, and disconnect blades on disconnect style models may be energized from either side of the IntelliRupter fault interrupter.
   - Interrupters, terminal pads, and disconnect blades on disconnect style models may be energized with the interrupters in any position.
9. **MAINTAINING PROPER CLEARANCE.** Always maintain proper clearance from energized components.

Packing

Pad-Mounted Style IntelliRupter fault interrupters are fastened to a wood skid for shipment. Optional features, which may be shipped, unassembled or partially factory-assembled, are packed separately and, when practicable, are shipped within the enclosure.

At the first opportunity, remove all packing materials (cardboard, paper, foam padding, etc.) from the outside of the gear. This will prevent the finish from being damaged by rainwater absorbed by the packing materials and will also prevent wind-induced abrasion from loose cardboard.

A catalog dimensional drawing applicable to this Pad-Mounted Style IntelliRupter fault interrupter will be found in the "Installation and Operation Information Kit," a water-resistant envelope shipped with the IntelliRupter fault interrupter. Study this drawing carefully and check the parts lists to verify all parts are at hand. Along with this instruction sheet are copies of S&C Instruction Sheet 766-520, "IntelliRupter® PulseCloser® Fault Interrupter: *Wi-Fi*, *SCADA*, *and GPS Communication Setup Instructions*."

Inspection

Examine the shipment for external evidence of damage as soon after receipt as possible, preferably before removal from the carrier's conveyance. Check the bill of lading to make sure that all listed shipping skids, crates, cartons, and containers are present.

If there is visible loss and/or damage:

1. Notify the delivering carrier immediately.
2. Ask for a carrier inspection.
3. Note the condition of shipment on all copies of the delivery receipt.
4. File a claim with the carrier.

If concealed damage is discovered:

1. Notify the delivering carrier within 15 days of receipt of shipment.
2. Ask for a carrier inspection.
3. File a claim with the carrier.

Also, notify S&C Electric Company in all instances of loss and/or damage.

Handling

⚠ WARNING

When handling the Pad-Mounted Style IntelliRupter fault interrupter with an overhead hoist, observe standard lifting practices as well as these general instructions below. **Failure to follow these precautions can result in serious personal injury or equipment damage.**

When handling Pad-Mounted Style IntelliRupter fault interrupters:

- Make sure the lifting tabs are securely bolted to the enclosure before lifting the gear.
- Use 4-foot (122-cm) or longer hoist slings of equal length to prevent overstressing the enclosure during lifting.
- Arrange the hoist slings so they distribute the lifting forces equally between the lifting tabs. See Figure 1.
- Avoid sudden starts and stops.

Figure 1. Lifting the Pad-Mounted Style IntelliRupter fault interrupter.

To power the protection and control module and communication module for pre-installation uploading and downloading of configuration settings, plus radio programming and battery charging, as applicable, use S&C Power Supply catalog number TA-3221 *only*. After installing the protection and control module and communication module, as directed on page 15, attach the power supply output cable to the connector inside the low-voltage compartment.

When finished, remove both modules before transporting the Pad-Mounted Style IntelliRupter fault interrupter to the installation site.

NOTICE

S&C Power Supply catalog number TA-3221 is intended for indoor use only, in the user's service center or lab.

NOTICE

Remove the protection and control module and communication module before transporting the Pad-Mounted Style IntelliRupter fault interrupter to the installation site. If modules are not removed, module connectors may be damaged and communication module battery (if supplied) may discharge.

Accessing the Interior

Access to the cable-termination compartment, the IntelliRupter fault interrupter compartment, and the low-voltage compartment can be obtained by opening doors equipped with the Penta-Latch® Mechanism. Access to the front of the low-voltage compartment can be obtained by opening a hinged, padlockable cover. See Figure 2.

Opening the Doors

Note: The S&C Penta-Latch Mechanism must be opened with a pentahead socket wrench or tool except when optional hexhead actuators are specified. The latching mechanism is coordinated with the provisions for padlocking so the mechanism can be unlatched only after the padlock has been removed, and the padlock can be installed only after the door has been securely closed and completely latched.

Follow these steps to open the doors:

STEP 1. Use a pentahead socket wrench or tool (or a hexhead socket wrench or tool) to unlatch the Penta-Latch Mechanism by rotating the actuator *counterclockwise* approximately 60 degrees against spring resistance until a distinct "click" is heard and the actuator reaches its stop. See Figure 2. This single motion unlatches the mechanism and recharges the latching spring for the subsequent closing operation.

STEP 2. Pull the door open and secure it with the door holder.

NOTICE

Do not force doors or hinged, padlockable covers open. Forcing a door or hinged, padlockable cover open can damage the latching mechanism.

When unlatching a Penta-Latch Mechanism with a pentahead socket wrench, a distinct click indicates the mechanism is unlatched and recharged.

Opening the door.

When firmly pushing the door closed, the mechanism latches automatically when all latching points are engaged.

Figure 2. Penta-Latch Mechanism operation.

Opening a Hinged, Padlockable Cover

Follow these steps to open a hinged, padlockable cover:

STEP 1. Remove the padlock from the hasp.

STEP 2. Completely loosen the captive bolt and firmly pull downward on the handle.

STEP 3. When the cover is unlatched, swing it out of the way. See Figure 3.

Figure 3. Opening the hinged, padlockable cover.

Opening the Roof Section

The roof section over the cable-termination compartment is hinged to allow easy cable pulling during installation.

Follow these steps to open the roof section:

STEP 1. Remove the ⅜–16-inch standard ESNA nuts, ⅜-inch standard washers, and the ⅜-inch large washers that attach the roof section to the Pad-Mounted Style Interrupter fault interrupter enclosure. Each side of the roof section will have 2 ESNA nuts, 2 standard washers, and 2 large flat washers. See Figure 4 for the location of the hardware.

STEP 2. After removing the roof hardware, the spring-loaded roof section will pop up slightly. See Figure 4.

STEP 3. Lift up the roof section and latch it at both ends using the supplied retainers. See Figure 4.

Closing the Roof Section

Follow these steps to close the roof section:

STEP 1. Remove the retainers from the roof section and place them in the horizontal position.

STEP 2. Lower the roof section.

STEP 3. While applying downward force to the roof section, secure the roof to the enclosure using the ⅜-inch large flat washers, ⅜-inch standard washers, and ⅜–16-inch ESNA nuts. A mechanical interlock prevents the door from closing and latching when the roof section is not secured to the enclosure.

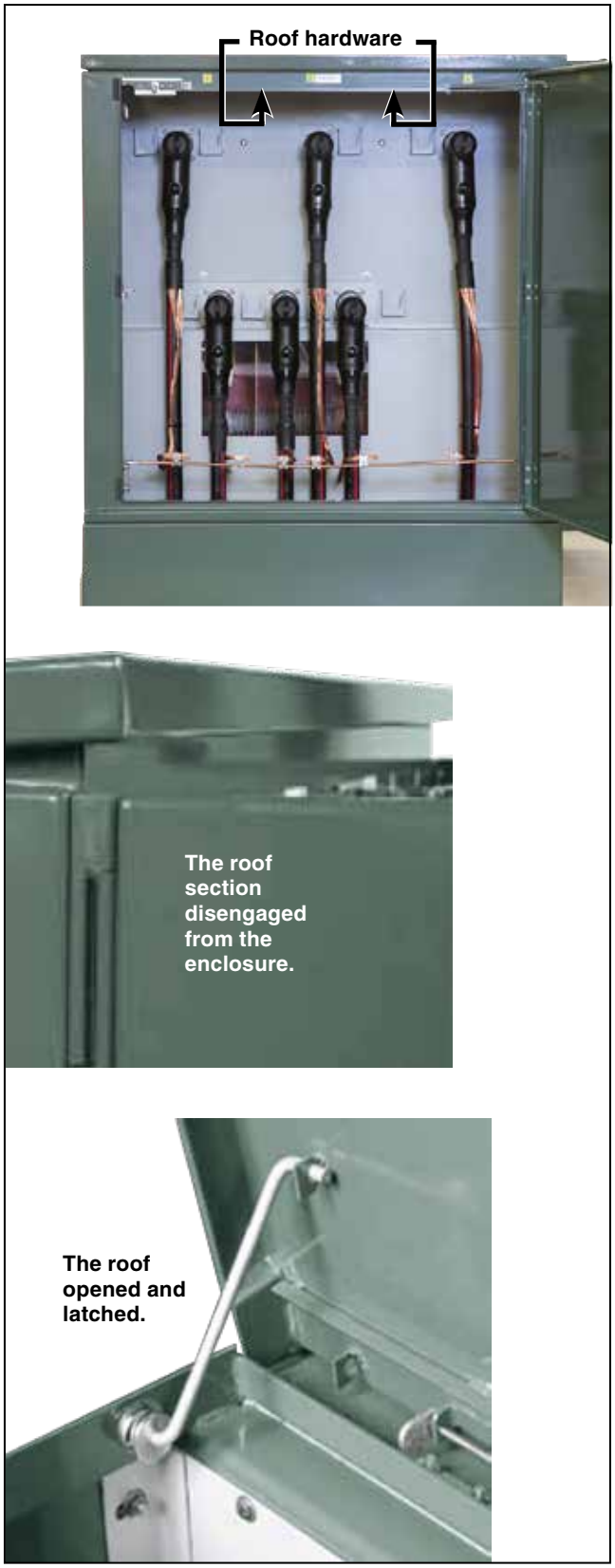


Figure 4. Opening the roof section.

Closing Doors

Follow these steps to close a door equipped with the Penta-Latch Mechanism:

STEP 1. Place one hand at the midpoint of the door-front near the edge and firmly push the door closed. See Figure 2 (bottom image) on page 9. When the latch points are positively engaged, the spring mechanism will trip to latch the door.

STEP 2. If the roof section is not latched to the pad-mounted gear, a mechanical interlock in the door will prevent the door from properly latching. Check the roof to make sure all sections are properly secured.

STEP 3. Pull outward on the cover of the Penta-Latch Mechanism to verify the door has latched securely. If it has not, use a pentahead (or hexhead, when applicable) socket wrench or tool to rotate the actuator *counterclockwise* until a distinct "click" is heard and the actuator reaches its stop.

STEP 4. If the actuator will not rotate counterclockwise, the mechanism was already charged for closing but was not closed properly. Close the door again, making sure all latch points engage completely and simultaneously.

STEP 5. When the door is securely latched, a padlock may be inserted into the hasp.

Closing the Hinged Padlockable Roof Cover

Follow these steps to close the hinged padlockable cover:

STEP 1. Swing the cover into position over the protection and control module and communication module.

STEP 2. While pushing the cover fully closed, pivot the handle upward to engage the latches.

STEP 3. Pull outward on the edge of the hinged cover to verify it is latched securely.

STEP 4. Fully tighten the captive bolt and then insert the padlock into the hasp and securely lock it.

Placement

Follow these steps to install the Pad-Mounted Style IntelliRupter fault interrupter at the installation site:

STEP 1. Remove all separately packaged components shipped with the Pad-Mounted Style IntelliRupter fault interrupter and set them aside in a protected area.

STEP 2. Unbolt the enclosure from its skid and lift the unit onto the mounting pad, observing the precautions given in the "Handling" section on page 7.

STEP 3. Open the doors to the interior of the gear and secure them with the door holders.

STEP 4. Refer to the catalog dimensional drawing furnished and verify the enclosure compartments are positioned correctly and that the unit is properly aligned with respect to the anchor bolts (or flush anchors).

STEP 5. Level the enclosure using metal shims as required between the mounting pad and the enclosure.

STEP 6. Shim the enclosure until the top of each door is parallel with the top of the gear.

STEP 7. Secure the enclosure to the pad using the anchor brackets provided (see anchor-bolt detail on the catalog dimensional drawing). ***Make sure all doors and hinged, padlockable covers open and latch closed without binding.*** Binding indicates enclosure distortion which must be corrected by additional shimming.

STEP 8. If the Pad-Mounted IntelliRupter fault interrupter is installed on a pad with cables in conduit, the roof section over the cable-termination compartment can be opened to allow the cables to be pulled up through the roof opening rather than the door opening.

Cable Terminations

⚠ DANGER

Before energizing the gear, replace the shipping caps on all bushings with elbows or insulated protective covers or plugs. **Failure to replace the shipping caps can result in a flashover and serious personal injury or death.**

Terminals are equipped with 600-ampere-rated bushings that conform to ANSI/IEEE Standard 386 to accept all standard separable insulated connectors—"elbows"—and inserts. Appropriate elbows must be supplied and installed by the user.

The 600-ampere bushings supplied in Pad-Mounted Style IntelliRupter fault interrupters are equipped with a stud as standard. Bushings without studs are furnished when catalog number suffix "-M1" is specified.

Application Note: The cable-termination compartment can accommodate either single 600-ampere deadbreak connectors equipped with elbow-style surge arresters or stacked (two) 600-ampere deadbreak connectors without elbow-style surge arresters. See the "Application Notes" section on page 2 concerning the need for surge arresters on both sides of IntelliRupter fault interrupters.

Follow these steps to install the cables:

STEP 1. Before installing elbows, remove the shipping covers from bushings.

STEP 2. Terminate the cables with elbows following the elbow manufacturer's instructions.

NOTICE

Do not allow solvents used to clean cables before termination to come in contact with the viewing window. Solvents can permanently etch the polycarbonate material.

NOTICE

ALWAYS follow proper cable-installation practices. When installing cable to be attached to a Pad-Mounted Style IntelliRupter fault interrupter, provide a strain-relief segment to minimize the load on the bushings. Cables must be allowed to expand and flex without putting a significant load on the bushings. For a pit, either loop the cable in the pit or bring it into the pit horizontally and up to the gear at a 90-degree angle. **Failure to follow these precautions can result in damage to the bushings**.

STEP 3. Connect the cable concentric-neutral ground wires to the ground bails and rods provided, making sure the cables have sufficient mobility to allow the elbows to be moved from the bushings to parking stands.

STEP 4. Connect the ground pads inside the enclosure to the system ground facility in accordance with the user's standard grounding practice. Use the equivalent of 4/0 copper cable (or cable sized in accordance with the user's standard practice) in either a single or multiple connection to realize the maximum momentary rating of the gear. For a multiple connection, cables smaller than 1/0 copper or equivalent should not be used.

⚠ DANGER

The Pad-Mounted Style IntelliRupter fault interrupter must be connected to a suitable earth ground before energizing the IntelliRupter fault interrupter and at all times when energized. The ground wire(s) must be bonded to the system neutral, if present. If the system neutral is not present, proper precautions must be taken to ensure the local earth ground cannot be severed or removed. **Failure to observe these instructions can result in serious personal injury or death.**

Fault Indicators

Optional mounting provisions for fault indicators are available. Fault indicators are to be furnished by the user and installed in accordance with the manufacturer's instructions. If mounting provisions are specified, mount the fault indicators on the mounting brackets and attach the associated sensors to the cables below the cable terminators.

Completing the Installation

Follow these steps to complete the installation:

STEP 1. Check functional operation of key interlocks, if furnished.

NOTICE

Do not force doors or hinged, padlockable covers open. Forcing a door or hinged, padlockable cover open can damage the latching mechanism.

⚠ WARNING

An extra set of keys is provided with Pad-Mounted Style IntelliRupter fault interrupters that have optional key interlocks. These keys are for use only during installation. After installation, either: (1) destroy the extra set of keys or (2) make them accessible only to authorized persons. This will maintain the integrity of the key-interlock scheme. Unauthorized access may result in death or injury.

Note: Key interlocks are not security locks and are not a substitute for padlocks.

STEP 2. Make sure the doors and hinged, padlockable covers open and close without binding and that shimming of the enclosure is adequate. A resilient closed-cell gasket on the bottom flange of the enclosure protects the finish from being scratched during installation and isolates it from the alkalinity of a concrete foundation. This gasket also helps to seal the enclosure to the foundation to guard against entry of rodents, insects, or weeds, and to discourage tampering.

STEP 3. When the gasket cannot compensate for an uneven foundation, grout the bottom of the enclosure as necessary. Any grout applied should be recessed enough to permit caulking.

STEP 4. Caulk around the bottom of the enclosure with a weatherproof compound applied with a standard caulking gun. A room-temperature vulcanizing (RTV) silicon-rubber compound is recom-mended.

STEP 5. Apply a suitable compound to fill the spaces between the cable and the conduit

STEP 6. Cap all empty conduits to prevent the entry of moisture or rodents.

STEP 7. Remove the lifting tabs and replace the bolts to plug the blind-tapped holes.

STEP 8. Check the interior of the enclosure. Remove all foreign materials and tools that may have been mislaid, and sweep the interior clear of debris.

STEP 9. Wipe down the exterior of the enclosure with a clean, damp cloth. To preserve the integrity of the surface, refinish any scratches or abrasions with S&C touch-up finish and red-oxide primer, which are available in aerosol spray cans. Order catalog number 9999-058 for olive-green finish, 9999-080 for light gray finish, and 9999-061 for red-oxide primer. No other finish or primer is approved. The area to be touched up should be cleaned to remove all oil and grease. Sand the area, removing any traces of rust that may be present, and make sure all edges are feathered before applying primer.

STEP 10. Labels indicating the area around the Pad-Mounted Style IntelliRupter fault interrupter that must be kept clear so work on the gear can be done safely are provided in the "Installation and Operation Information Kit." These labels (or equivalent labels) should be affixed to the exterior of the enclosure.

Installing the Communication Module Battery

The 12-Vdc, 8-ampere-hour battery pack for the communication module, if supplied, is shipped separately in the carton containing the communication module. If the Pad-Mounted Style IntelliRupter fault interrupter has been in storage for more than six months, the battery should be charged.

Follow these steps to install the battery:

STEP 1. Loosen the battery compartment cover locking screw. See Figure 5.

STEP 2. Insert the battery assembly, pushing it most of the way in. To connect the battery leads, push the connector halves together until the tab on the lower-connector half engages the fixed connector half, then push battery assembly all the way in. See Figure 6.

STEP 3. Inspect the battery compartment gasket. Close the battery compartment cover, and secure the locking screw. See Figure 7.

Installing a Radio

A radio providing wide-area network capability for SCADA applications, if specified, is furnished factory-installed in the communication module. Alternately, a user-furnished radio can be installed in the field. Some radios must be programmed using a cable connected to a computer. In such instances, remove the radio tray assembly to connect the radio, and power the radio with the battery or a separate power supply. Refer to S&C Instruction Sheet 766-520, "IntelliRupter® PulseCloser® Fault Interrupter: *Wi-Fi*, *SCADA*, *and GPS Communication Setup Instructions*."

Figure 5. To open the battery compartment cover, loosen the locking screw using a 3/16-inch Allen wrench.

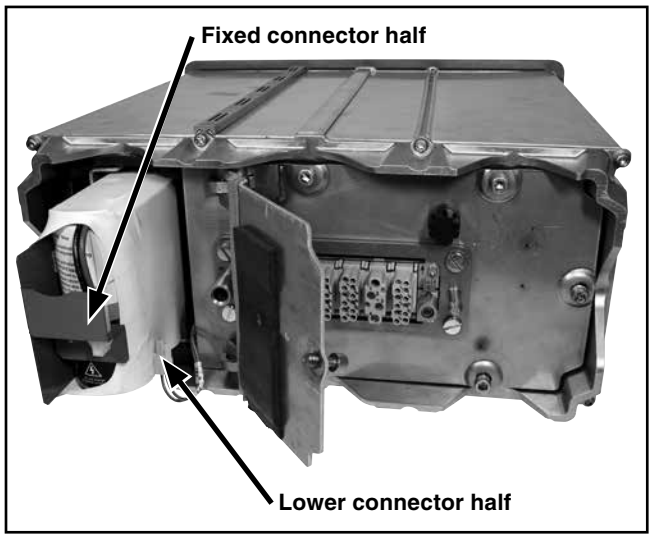


Figure 6. Insert the battery assembly most of the way in. Connect the battery leads as described in Step 2, and then push the battery assembly all the way in.

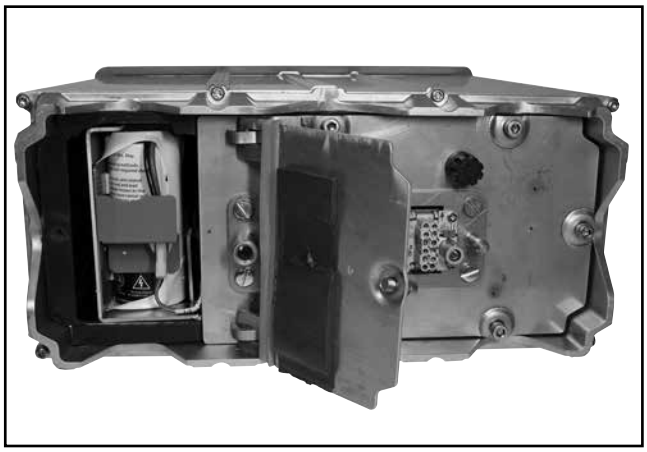


Figure 7. Close the battery cover and secure the locking screw.

Installing the Modules

⚠ CAUTION

The modules are heavy. Remove and replace the modules using the module stub handle (catalog number 4435) or the module handling fitting (catalog number 4450) attached to a short hookstick. One module stub handle is included with each Pad-Mounted Style IntelliRupter fault interrupter; it's stored in the low-voltage compartment.

NOTICE

Remove the protection and control module and communication module from the low-voltage compartment before transporting the Pad-Mounted Style IntelliRupter fault interrupter to the installation site. If the modules are not removed, module connectors may be damaged and the communication module battery (if supplied) may discharge.

The protection and control module is installed in the upper bay of the low-voltage compartment, and the communication module is installed in the lower bay.

Follow these steps to install the modules:

STEP 1. Remove the plastic covers from the module bays.

STEP 2. With the module resting on a clean dry surface, insert the stub handle or the handling fitting into the module latch. While pushing down on handle (or hookstick), rotate the stub handle handling fitting 90 degrees *counterclockwise* to open the latch. See Figure 8.

STEP 3. While maintaining a secure stance, rotate the stub handle (or hookstick) with the module on the end of it 90 degrees.

STEP 4. Insert the module into the bay in the low-voltage compartment.

(a) For the communication module, match the black arrow on module to the black arrow on the front of the low-voltage compartment.

(b) For the protection and control module, match the white arrow on the module to the white arrow on the front of the low-voltage compartment.

STEP 5. Push on the handle (or hookstick) with enough force to engage the wiring connectors. See Figure 9 on page 18.

STEP 6. While pushing on the stub handle (or hookstick), rotate the handling fitting 90 degrees clockwise to close the latch. Remove the stub handle or the handling fitting from the latch.

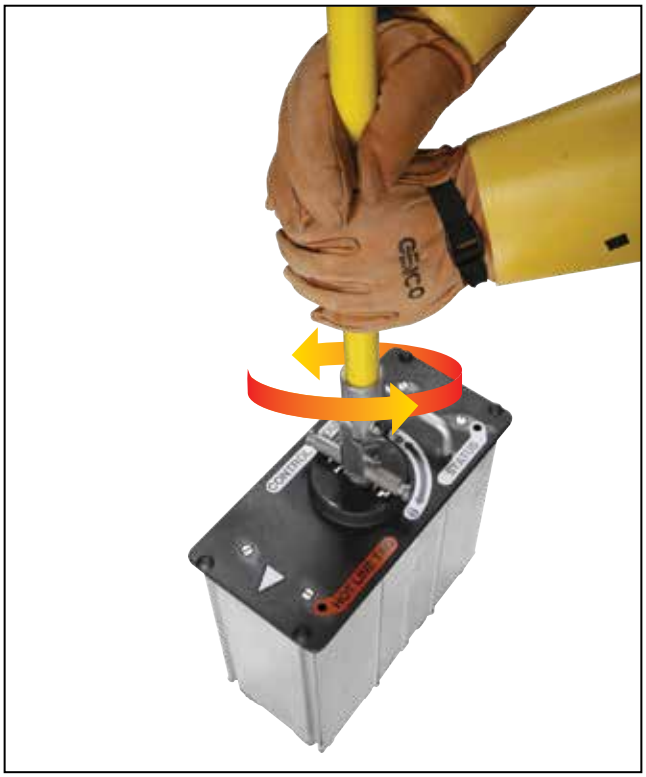


Figure 8. Insert the module handling fitting into the module latch. While pushing down on the hookstick, rotate the fitting 90 degrees counterclockwise to open the latch.

Establishing a Wi-Fi Communication Link

The Wi-Fi transceiver in the communication module provides secure wireless point-to-point communication to a wireless-equipped personal computer operating under the IEEE 802.11b standard. Transmission range is typically 150 feet (4572 cm) or less. The Wi-Fi connection permits local configuration and control of the IntelliRupter fault interrupter. Further, if a wide-area network radio has been furnished—and the radio supports configuration through its serial port—it can be configured using the Wi-Fi connection. SpeedNet™ and UtiliNet® Radios furnished by S&C may be configured in this manner.

The Wi-Fi transceiver and associated software provide extensive security features to prevent unauthorized access. These security features are described in S&C Instruction Sheet 766-523. "S&C IntelliRupter® PulseCloser® Fault Interrupter: *Wi-Fi and Security Administration*."

The communication module must be installed and powered, and IntelliLink® Setup Software must be installed on a personal computer before a Wi-Fi connection can be established.

NOTICE

With firmware later than version 7.3.100, the default passwords for all user accounts, including the Admin account, must be changed before the IntelliLink software can connect to and configure a control. See Instruction Sheet 766-530, "IntelliRupter Fault Interrupter: *Protection and Communication Setup,*" for more information.

Follow these steps to establish a Wi-Fi connection:

STEP 1. Open the IntelliLink software program and click on the **Start Programs> S&C> IntelliLink** entries.

STEP 2. Select the **Choose an IntelliRupter** option.

STEP 3. Select the device name from the drop-down list or by typing it in.

Figure 9. The protection and control module (top) and communication module (bottom) installed in the low-voltage compartment.

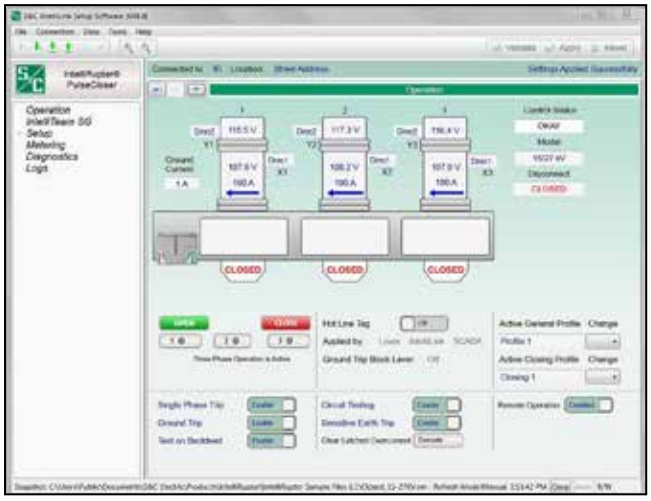


Figure 10. The IntelliRupter fault interrupter *Operation* screen.

STEP 4. If security keys have not been entered—enter the IntelliRupter fault interrupter's serial number by using the **Configure New IntelliRupter/Wi-Fi** option. Then, click on the **Connect to IntelliRupter** option. If the computer is properly configured and has the appropriate Wi-Fi security key, the IntelliLink software will establish a secure Wi-Fi connection and communicate with the IntelliRupter. See Figure 10 on page 18.

STEP 5. Log in to the IntelliLink software with the proper password. The IntelliRupter fault interrupter *Operation* screen will open.

STEP 6. Confirm the device name "Connected to:" at the bottom of the screen is the IntelliRupter fault interrupter with which communication is desired.

Remote Operation

On the IntelliRupter fault interrupter *Operation* screen, set the Remote Operation selection box to the **On** state. See Figure 10 on page 18. The IntelliRupter fault interrupter can now be operated only by remote supervisory control (i.e., SCADA). If applicable, a dispatcher can test electrical operation of the IntelliRupter fault interrupter as well as the entire SCADA control path, including communication.

Local Operation

On the IntelliRupter *Operation* screen, set the **Remote Operation** selection box to the **Off** state. See Figure 10 on page 18. The IntelliRupter fault interrupter can now be operated only by local commands via a Wi-Fi communication link. Select the OPEN or CLOSE operation button as appropriate. The three interrupter OPEN/CLOSE indicators on the bottom of the IntelliRupter fault interrupter base indicate the contact positions of the interrupters. See Figure 11. The red target with an "I" indicates that the interrupter is closed; the green target with an "O" indicates that the interrupter is open. Set **Remote Operation** mode to the **On** state. This allows remote commands to control the IntelliRupter fault interrupter.

Manual Operation

The interrupters can be opened and closed manually using the interrupter OPEN/CLOSE/READY lever. See Figure 12.

Figure 11. The Interrupter fault interrupter OPEN/CLOSED indicator, one at each pole. A red target with an "I" shows the interrupter is closed; a green target with an "O" shows the interrupter open.

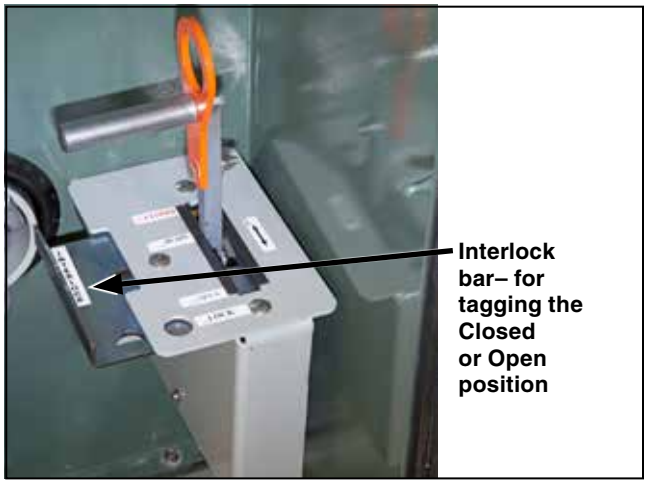


Figure 12. Manual OPEN/CLOSE/READY lever in the Ready position.

Follow these steps to open the manual lever:

STEP 1. Starting from the **Ready** position with the hookstick in the left-most position, slide the interlock bar to the right to the middle position.

STEP 2. Pull the OPEN/CLOSE/READY lever toward you. See Figure 13. The three interrupters will be physically opened, and a mechanical block on each actuator prevents the actuator from electrically closing its interrupter. Manually opening the interrupters does not require control power; it may be performed during an outage. If control power is available, an electronic assist will open all closed poles.

STEP 3. Slide the interlock bar to the right position. Install the tag if desired.

Follow these steps to close the manual lever:

STEP 1. The interrupters can only be closed when control power is available. Return the OPEN/CLOSE/READY lever to the **Ready** position.

STEP 2. Remove the tag (if present) and slide the interlock bar left to the middle position.

STEP 3. Push the OPEN/CLOSE/READY lever to the **Ready** position

STEP 4. Slide the interlock bar to the left to the left position.

STEP 5. Push on the OPEN/CLOSE/READY lever once to effect the first closing profile or twice, without delay, to effect the second closing profile. The IntelliRupter fault interrupters will use the specified closing-protection profile to close the interrupters. See Figure 14. Closing profiles initiated by the manual lever will be three-phase commands and will attempt to close all open poles using the associated closing profile protection elements.

For example, assume poles 1 and 3 are open, and pole 2 is closed. A single push on the OPEN/CLOSE/READY lever will initiate a PulseClosing® Technology sequence on pole 1, and if it results in a successful close, then a PulseClosing Technology sequence will be initiated on pole 3. If a fault is detected at any time during the use of the PulseClosing Technology, either single-phase or three-phase tripping will result, in accordance with the configuration for the active general profile.

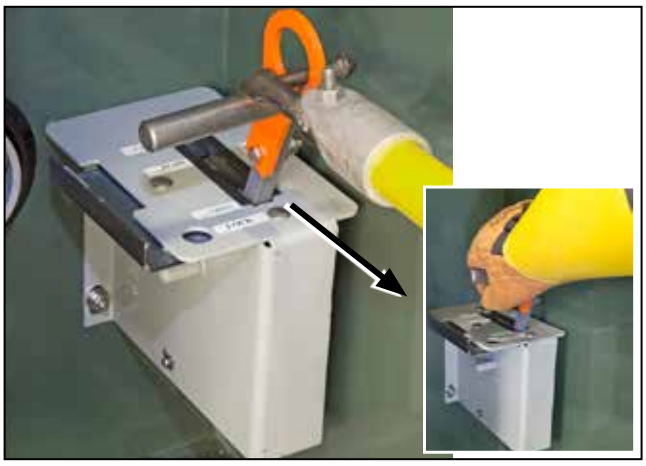


Figure 13. To open the interrupters, place interlock bar in the middle position, and then pull the OPEN/CLOSE/READY lever.

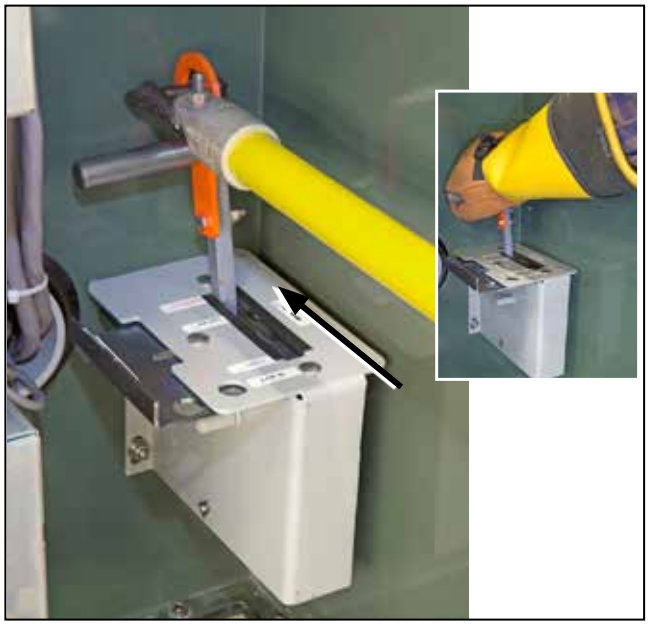


Figure 14. To close the interrupters, remove the tag (if present) and slide the interlock bar to the left to middle position. Push the OPEN/CLOSE/READY lever to Ready position. Slide the interlock bar to the left-most position, and push the OPEN/CLOSE/READY lever once to effect the first closing profile or twice, without delay, to effect the second closing profile.

Manual Lever Position. The IntelliRupter fault interrupter will not respond to an **Open** or **Close** command or perform any automatic operation when set to the **Locked Open** state by the OPEN/CLOSE/READY lever. The line crew should place the OPEN/CLOSE/READY lever in the **Ready** state before leaving the site, unless the unit is being purposely disabled.

Note: A standard shepherds hook tag can be used in the lock hole. The lock hole is not designed or intended for use with a standard padlock.

Manual Hot-Line Tag

The **Hot-Line Tag** mode can be set locally using the toggle switch located in the low-voltage enclosure or remotely using SCADA or the IntelliLink software. The **Hot-Line Tag** mode is normally removed using the same method by which it was applied. However, the toggle switch can be used to remove electronically set tags as well. A **Hot-Line Tag** mode will only be cleared when all manually set and electronically set tags have been cleared. This approach satisfies NESC 442.E requirements, which allow local removal of a remotely set **Hot-Line Tag** mode if local indication of the electronic tag is provided. To apply a local **Hot-Line Tag** mode, place the toggle switch in the **Up** position. See Figure 15. To remove the local **Hot-Line Tag** mode, place the toggle switch in the **Down** position.

To remove a SCADA- or IntelliLink software-applied tag when a local **Hot-Line Tag** mode has also been applied, push down on the toggle switch, and then pull up and push down on the toggle switch once, without delay. To remove a SCADA- or IntelliLink software-applied tag when a local **Hot-Line Tag** mode has not been applied, pull up and push down on the toggle switch twice, without delay.

The HOT-LINE TAG indicator is located on the protection and control module. See Figure 17 on page 22. When **Hot-Line Tag** mode is set, the HOT-LINE TAG indicator flashes for ½ second every 2 seconds. When **Hot-Line Tag** mode is removed, the indicator is not lit.

Figure 15. The HOT-LINE TAG and GROUND TRIP BLOCK toggle switches. The features are enabled when the switches are in the Up position.

Manual Ground Trip Block *(if furnished)*

Ground Trip Block mode can be set locally using the toggle switch located in the low-voltage enclosure or remotely by a SCADA or IntelliLink software command. A **Ground Trip Block** mode can only be removed by the method used to set it, and (unlike **Hot-Line Tag** mode) the toggle switch cannot remove a **Ground Trip Block** feature set by a SCADA or IntelliLink software command.

To apply a local **Ground Trip Block** mode, place the toggle switch in the **Up** position. See Figure 15 on page 19. To remove a local **Ground Trip Block** feature, place the toggle switch in the **Down** position. The status indicator (white LED) is located on the control module. See Figure 17 on page 22. When **Ground Trip Block** mode is either set or removed, the status indicator will light at 100% brightness for 10 seconds to indicate the GROUND TRIP BLOCK lever command has been received.

Ground Trip Block mode removed. Overcurrent protection will operate normally. If a ground-overcurrent protection element is configured for the active profile, it will respond to a fault event. If a ground-overcurrent element is not configured in the active profile, removing the **Ground Trip Block** mode does not create a ground TCC curve nor does it enable the element.

Ground Trip Block mode set. Enabling the **Ground Trip Block** feature immediately disables and resets all selected elements, even if timing for a fault when the toggle switch was moved. The GROUND TRIP BLOCK toggle switch is effective for any profile: all general profiles, both closing profiles, and **Hot-Line Tag** mode.

Available for selection are the **Ground**, **Negative Sequence**, and **Sensitive Earth Overcurrent** elements. If the GROUND TRIP BLOCK toggle switch is configured to block circuit testing, circuit testing will immediately terminate. If the test sequence was in the middle of an open interval when circuit testing was terminated, the sequence will immediately go to lockout. If the test sequence was not in an open interval when the test sequence was terminated, the next trip will result in a Lockout state.

If the GROUND TRIP BLOCK toggle switch is configured for an alternate general profile, the designated general profile becomes the active profile unless the unit is testing. If the unit is testing, the alternate general profile does not become active until the active test sequence has completed. Closing profiles and Hot-Line Tag profiles are not affected by the position of the GROUND TRIP BLOCK toggle switch. SCADA or IntelliLink software commands to change the general profile while using the alternate profile are accepted, but the IntelliRupter fault interrupter will not revert to the commanded general profile until the GROUND TRIP BLOCK toggle switch has been returned to the **Unblocked** position.

Operating the Disconnect

Follow these steps to operate the visible disconnect:

STEP 1. Remove the padlock and open the switch-operating-shaft access cover. See Figure 16.

STEP 2. Remove the folding operating handle from its storage pocket behind the access cover. Unfold the handle and slide it onto the hex disconnect-operating shaft.

STEP 3. Note the disconnect-position indicator attached to the hex disconnect operating shaft rests against a stop in either the **Open** or **Closed** position. Arrows indicate the disconnect **Open** or **Closed** positions.

STEP 4. Rotate the handle in the appropriate direction to open or close the disconnect, and check the disconnect-position indicator to verify the disconnect is in the desired position. A viewing window is provided in the cable-termination compartment to allow positive visual verification of the disconnect-blade position. See Figure 4 (top) on page 12.

NOTICE

Always confirm the **Open/Closed** position of the disconnect by visually observing the position of the switch blades.

STEP 5. Remove and fold the disconnect-operating handle, and return the handle to its storage position. Then, close and padlock the access cover.

NOTICE

Do not leave the disconnect-operating-shaft access cover unlocked if the gear is left unattended by qualified persons.

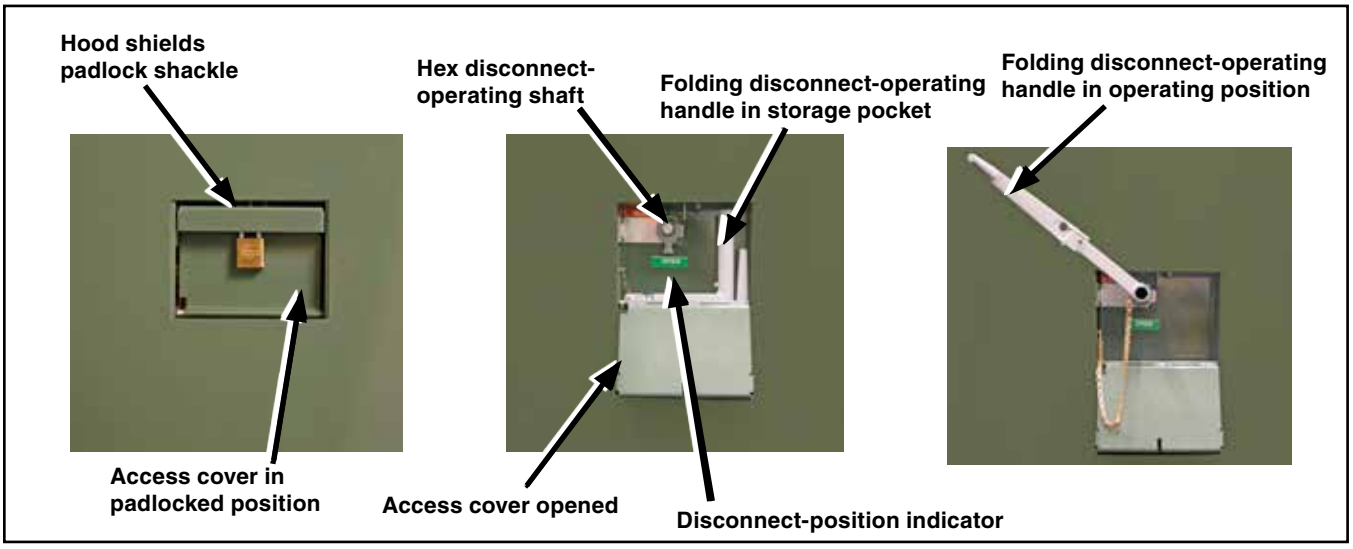


Figure 16. Disconnect-operating handle access.

Status Indicator

The STATUS indicator (white LED) shows operational status of the Pad-Mounted Style IntelliRupter fault interrupter. See Figure 17.

Off:

- The IntelliRupter fault interrupter is not powered or it is not functioning properly.

Solid On:

- The **Remote Operation** feature is disabled.

Flashes for ½ second every 30 seconds:

- Normal operation

On 10 seconds and then flashes for ½ second every 30 seconds:

- Wi-Fi has been disconnected or the interrupter OPEN/CLOSE/READY lever has been moved from the:
  - **Ready** to **Open** position
  - **Ready** to **Close** position
  - **Open** to **Ready** position
- The GROUND TRIP BLOCK toggle switch has been moved from:
  - Removed to **Enabled** status
  - Enabled to **Removed** status

Pulsates dim to bright:

- Wi-Fi is connected.

Flashes for ½ second every second:

- Any **Error** state is active.
- **Settings Mismatch** status is active.

Flashes three times (½ second on, ½ second off) every 30 seconds:

- Loop Restoration **Ready** status is active.

Hot-Line Tag Indicator

The HOT LINE TAG indicator (amber LED) shows status of hot-line tags.

Off:

- All hot-line tags have been removed.

Flashes for ½ second every 2 seconds:

- The **Hot-Line Tag** mode has been applied.

Figure 17. The HOT LINE TAG and STATUS indicators are located on the face of the protection and control module.

Components

No mechanical maintenance is required for Pad-Mounted Style IntelliRupter fault interrupters. However, occasional inspection of the gear and exercising of the disconnect is recommended.

Enclosure Finish

The responsibility for ensuring a finish protects the enclosure lies with both the manufacturer and the user. Pad-Mounted IntelliRupter fault interrupters are finished with the Ultradur™ II Outdoor Finish, which provides lasting protection for the enclosure. To retain this protection, the user should take periodic corrective action as follows:

- Touch up any penetration of the finish to bare metal—such as scratches and abrasions caused by shipping or vandalism—to maintain the original integrity. S&C touch-up finish and primer are available in aerosol spray cans—order by catalog number: 9999-058 for olive green finish, 9999-080 for light gray finish, and 9999-061 for red-oxide primer. No other finish or primer is approved. The area to be touched up should be cleaned to remove all oil and grease. Sand the area, removing any traces of rust that may be present, and make sure all edges are feathered before applying primer.
- Provide an occasional simple washdown—such as an automobile would be given—to remove surface contaminants. Use any ordinary mild household detergent solution.

In those cases where the enclosure must be refinished by the user before the finish has weathered—for example, to match other equipment—a special precaution must be taken. The entire surface must be sanded to provide a rough surface to bond the new coat to the unusually tough and smooth Ultradur II Outdoor Finish.

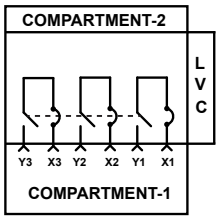
NOTICE

These recommendations may differ from company operating procedures and rules. Where a discrepancy exists, users should follow their company's operating procedures and rules.

NOTICE

For S&C Pad-Mounted Style IntelliRupter PulseCloser Fault Interrupters equipped with integral power modules (option suffix "-Pxxx"): Do not apply test voltage greater than normal system voltage to terminals X1 or X1 and Y3, as applicable. Refer to Table 2. If these directions are not followed, damage to the integral power modules will result.

Table 2. Text Voltage Limitations

	Control Power Source Option Suffix①	Do NOT Apply Test Voltage Greater than Normal System Voltage to Terminal(s)
 CONNECTION DIAGRAM	-P162, -P163, -P362, -P363, -P151, -P152, -P153, -P351, -P352, -P353	X1
	-P262, -P263, -P462, -P463, -P251, -P252, -P253, -P451, -P452, -P453	X1 and Y3

① Refer to the catalog number on the nameplate to identify the control power source option suffix.

⚠ CAUTION

Keep personnel more than 2 meters (6.6 ft.) from vacuum interrupter during tests.

X-rays can be produced when high voltage withstand test levels are placed across open contacts.

Exposure to X-radiation can be hazardous to your health.

⚠ WARNING

The test procedures must be performed by qualified persons who are knowledgeable in the installation, operation, and maintenance of overhead electric power distribution equipment along with the associated hazards.

⚠ WARNING

When performing electrical withstand tests on Pad-Mounted Style IntelliRupter fault interrupters, observe the following precautions. Failure to observe these precautions can result in a flashover, injury, and equipment damage.

1. Completely de-energize the Pad-Mounted Style IntelliRupter fault interrupter, and disconnect the cable connectors from all six bushings.
2. Terminate bushings with an insulated cap or other appropriate cable termination capable of withstanding the test voltage.
3. Open the IntelliRupter interrupters locally using the Wi-Fi communications link as described on page 18 or do so manually by using the OPEN/CLOSE/READY lever as described on page 20.

For the convenience of users who normally perform electrical tests on system components such as Pad-Mounted Style IntelliRupter PulseCloser Fault Interrupters, appropriate withstand test values are given in Table 3. These test values are significantly greater than the normal operating voltage of the IntelliRupter fault interrupter and are near the flashover voltage of the equipment. They should be applied only when the IntelliRupter fault interrupter is completely de-energized and disconnected from all power sources.

Table 3. Withstand Test Voltages

IntelliRupter Rating, kV				Withstand Test Voltage, kV		
60 Hz		50 Hz		60-Hz, RMS①②	Dc③	Impulse (BIL)
Nom.	Max.	Nom.	Max.			
11.43	15.5	9	19.2	35	42	95
18.81	27	20	24	40	42	125

① The power frequency withstand test voltages listed are approximately 80% of the design values for new equipment.

② These values may be applied from bushing to bushing or from bushing to ground for a duration not to exceed one minute.

③ Dc withstand test voltages are given for reference only for users performing dc withstand tests. The presence of these values does not imply a dc withstand rating or performance requirement for Pad-Mounted Style IntelliRupter fault interrupters. A dc withstand design test is specified for new equipment because the equipment may be subjected to dc test voltage when connected to cables. The dc withstand test voltages listed are approximately equal to the peak of the power frequency withstand test voltages.