Installation

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NOTICE

The latest IntelliRupter® fault interrupter instruction sheets are posted as PDF files at **sandc.com/en/support/product-literature/**. IntelliRupter fault interrupter software (all revisions) can be downloaded at **sandc.com/en/support/sc-customer-portal/**. If needing assistance, contact **sandc.com/en/support/technical-support/** or call our 24/7 support center at (888) 762-1100.

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. Become familiar with the Safety Information and Safety Precautions on pages 4 through 6. The latest version of this publication is available online in PDF format at **sandc.com/en/support/product-literature/**.

Video

A video of this instruction sheet is available at **sandc.com/videos/install-intellirupter**. The video is supplementary to this instruction sheet and should in no way be considered a replacement for the written instructions.

Retain this Instruction Sheet

This instruction sheet is a permanent part of the IntelliRupter PulseCloser Fault Interrupter. Designate a location where users can easily retrieve and refer to this publication.

Proper Application

⚠ WARNING

The equipment in this publication must be selected for a specific application. The application must be within the ratings in S&C Specification Bulletin 766-31

Warranty

The warranty and/or obligations described in S&C's Price Sheet 150, "Standard Conditions of Sale – Immediate Purchasers in the United States" (or Price Sheet 153, "Standard Conditions of Sale – Immediate Purchasers Outside the United States"), plus any special warranty provisions, as set forth in the applicable product-line specification bulletin, are exclusive. The remedies provided in the former for breach of these warranties shall constitute the immediate purchaser's or end user's exclusive remedy and a fulfillment of the seller's entire liability. In no event shall the seller's liability to the immediate purchaser or end user exceed the price of the specific product that gives rise to the immediate purchaser's or end user's claim. All other warranties, whether express or implied or arising by operation of law, course of dealing, usage of trade or otherwise, are excluded. The only warranties are those stated in Price Sheet 150 (or Price Sheet 153), and THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY EXPRESS WARRANTY OR OTHER OBLIGATION PROVIDED IN PRICE SHEET 150 (OR PRICE SHEET 153) IS GRANTED ONLY TO THE IMMEDIATE PURCHASER AND END USER, AS DEFINED THEREIN. OTHER THAN AN END USER, NO REMOTE PURCHASER MAY RELY ON ANY AFFIRMATION OF FACT OR PROMISE THAT RELATES TO THE GOODS DESCRIBED HEREIN, ANY DESCRIPTION THAT RELATES TO THE GOODS, OR ANY REMEDIAL PROMISE INCLUDED IN PRICE SHEET 150 (or PRICE SHEET 153.)

Understanding Safety-Alert Messages

Several types of safety-alert messages may appear throughout this instruction sheet and on labels attached to the IntelliRupter fault interrupter. Become familiar with these types of messages and the importance of these 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 any portion of this instruction sheet is unclear and assistance is needed, contact the 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

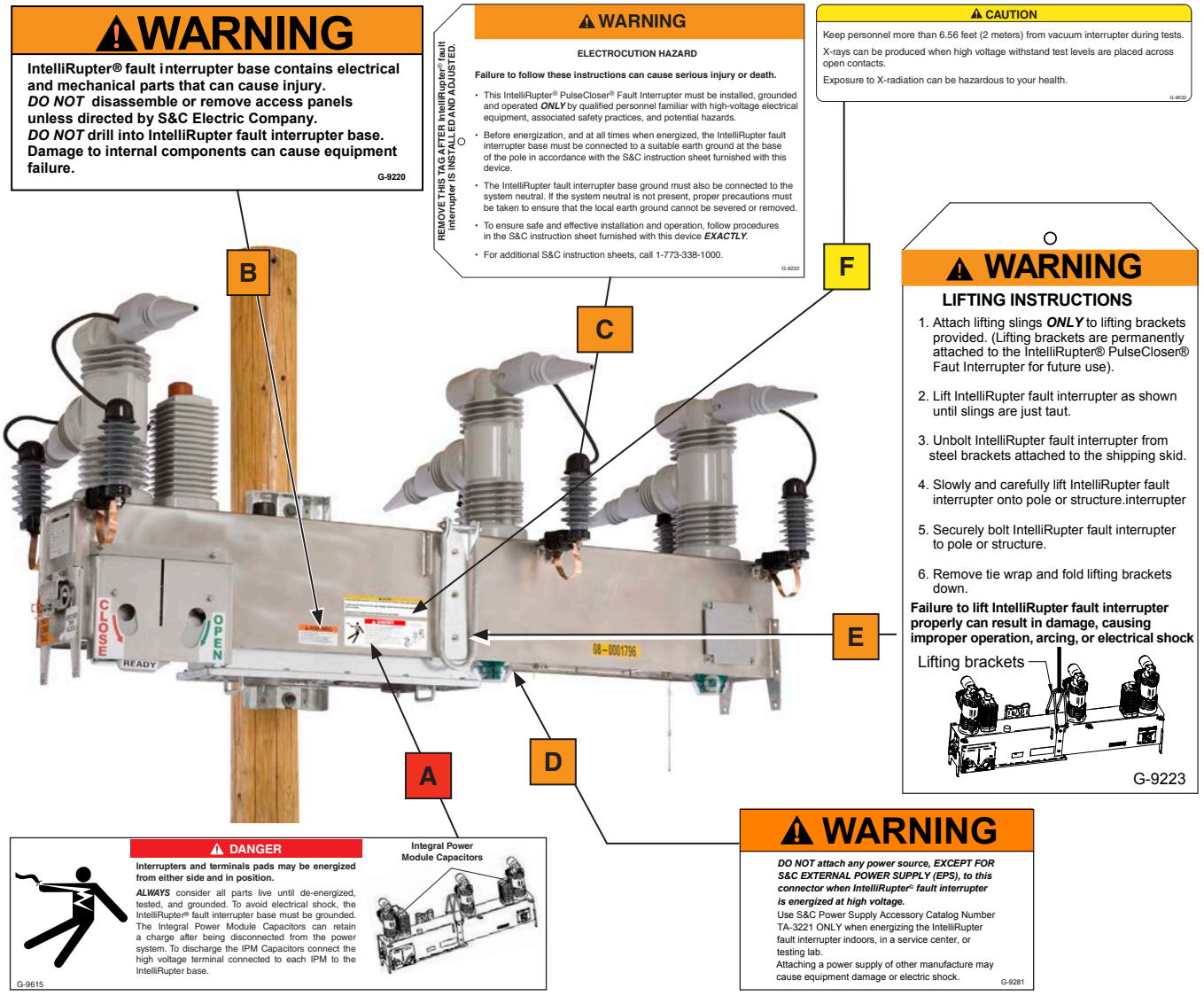
Read this instruction sheet thoroughly and carefully before installing or operating an IntelliRupter PulseCloser Fault Interrupter.

Replacement Instructions and Labels

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

Location of Safety Labels



Reorder Information for Safety Labels

Location	Safety Alert Message	Description	Part Number
A	DANGER	Interrupters and terminal pads may be energized from either side . . .	G-9615●
B	WARNING	IntelliRupter fault interrupter base contains electrical and . . .	G-9220
C	WARNING	Electrocution Hazard—Failure to follow these instructions can . . .	G-9222■
D	WARNING	Do not attach any power source to this connector if IntelliRupter fault interrupter. . .	G-9281
E	WARNING	Lifting Instructions—1. Attach lift slings only to lifting brackets . . .	G-9223■
F	CAUTION	Keep personnel more than 6.56 feet (2 meters) from vacuum . . .	G-9632

● Label is placed on the front and back of the IntelliRupter fault interrupter base.

■ Tag is removed and discarded after the IntelliRupter fault interrupter is installed and adjusted.

⚠ DANGER

IntelliRupter PulseCloser Fault Interrupters operate at high voltage. Failure to observe the precautions below 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 an IntelliRupter fault interrupter 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.** IntelliRupter fault interrupters contain 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 to do so by S&C Electric Company.
6. **ENERGIZED COMPONENTS.** Always consider all parts live until de-energized, tested, and grounded. The integrated power module (IPM) contains components that can retain a voltage charge for many days after the IntelliRupter fault interrupter has been de-energized and can derive a static charge when in close proximity to a high-voltage source. Voltage levels can be as high as the peak line-to-ground voltage last applied to the unit. Units that have been energized or installed near energized lines should be considered live until tested and grounded.
7. **GROUNDING.** The IntelliRupter fault interrupter base must be connected to a suitable earth ground at the base of the utility pole, or to a suitable building ground for testing, before energizing an 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, or building 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.
10. **X-RAY EXPOSURE.** Keep personnel more than 6.56 feet (2 meters) from the vacuum interrupters 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 one's health**.

To power both the protection and control module and the 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 both the protection and control module and the communication module, as directed on page 16, attach the power supply output cable to the connector on the underside of the IntelliRupter fault interrupter base, near the center pole-unit OPEN/CLOSE indicator.

When finished, remove both modules before transporting the 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.

Packing

An S&C IntelliRupter fault interrupter shipment includes the following items:

- A three-pole IntelliRupter fault interrupter, complete with sensors, integral power module(s), control group, and radio (if applicable), factory-assembled on a single base. (The pole mounting bracket is permanently attached to the base.)
- A radio antenna (if applicable)
- Optional features, which may be shipped unassembled or partially factory assembled

An erection drawing applicable to this IntelliRupter fault interrupter is in a water-resistant envelope shipped with the fault interrupter. Study this drawing carefully and check the parts lists to verify all parts are included. 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*"
- S&C Instruction Sheet 766-545, "IntelliRupter PulseCloser Fault Interrupter: *Quick Operating Guide*" (for 15 kV and 27 kV)
- S&C Instruction Sheet 766-546, "Compact IntelliRupter® PulseCloser® Fault Interrupter: *Quick Operating Guide*"
- S&C Instruction Sheet 766-547, "38-kV IntelliRupter PulseCloser Fault Interrupter: *Quick Operating Guide*"
- Reference drawings detailing the installation of optional features such as surge arresters and bracket-mounted antennas

Note: The configuration software is not included. IntelliRupter fault interrupter software (all revisions) can be downloaded at **sandc.com/en/support/sc-customer-portal/**.

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 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.

Storage

Follow these guidelines when handling and storing IntelliRupter fault interrupters in their shipping crates:

- The storage temperature for IntelliRupter fault interrupters, the communication module, and control module: –40°C (-40°F) to +60°C (140°F).
- The communication module, control module, and optional external power supply are shipped in water-resistant containers placed inside a plastic bag. This provides protection from the elements during shipping. After receipt, they must be stored indoors. Storing the communication module, control module, and optional external power outside will void the warranty.
- Communication modules other than option suffix "-C0" contain a battery that must be charged within 6 months of shipment from the factory. Communication modules stored for an extended period should have the battery removed and placed on float charge.

- Installing a communication module that has a battery in an IntelliRupter fault interrupter that will not be energized for a day or more can lead to excessive battery discharge. If the IntelliRupter fault interrupter will be installed and left de-energized, remove the communication module and install the protective cover or unplug the battery and reinstall the communication module.
- Shipping crates should not be stored in an area prone to flooding or where water can accumulate more than 2 inches (5.1 cm) deep.
- Shipping crates should NOT be stacked more than two high for storage.

NOTICE

The communication module, control module, and optional external power must be stored inside. Storing them outside will void the warranty.

Handling

NOTICE

Do not lift an IntelliRupter fault interrupter by the pole-units, the base, or any part or fitting on the base except the lifting brackets. Damage to IntelliRupter fault interrupter components, such as the Wi-Fi antenna or interrupter open/closed indicators, may result.

⚠ WARNING

To avoid accident or injury, use a crane capable of safely lifting the IntelliRupter fault interrupter.

Non-disconnect-style weights:
15-kV/27-kV 835 lbs. (379 kg)
38-kV 865 lbs. (392 kg)

Disconnect-style weights:
15-kV/27-kV 1010 lbs. (458 kg)
38-kV 1040 lbs. (472 kg)

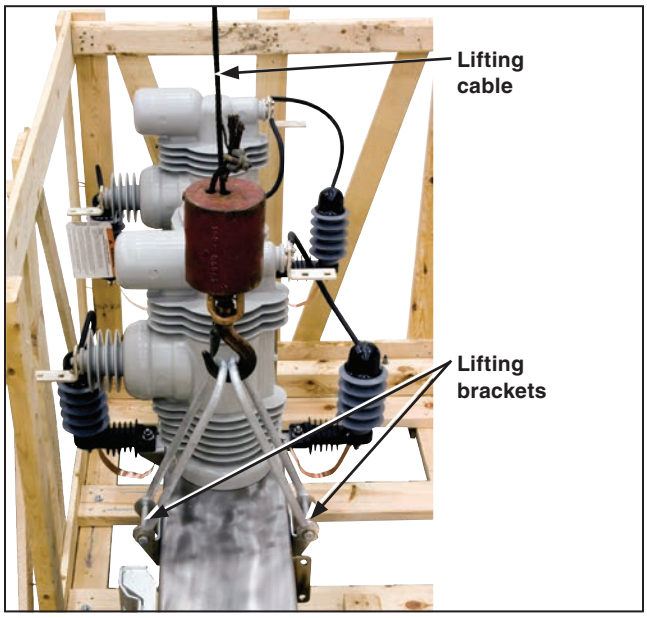


Figure 1. Lifting the upright-crossarm, non-disconnect-style IntelliRupter fault interrupter.

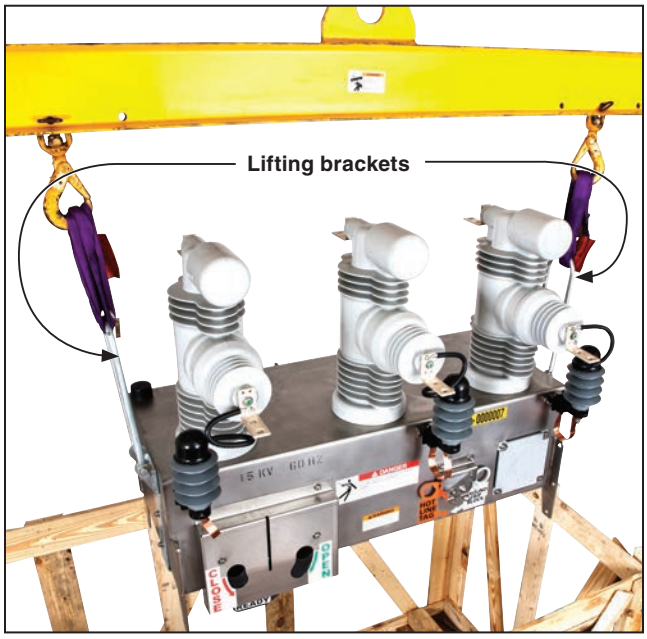


Figure 2. Lifting the compact-crossarm IntelliRupter fault interrupter with a two-point lifting bar.

Uncrating

Before uncrating the unit, note that either side of the IntelliRupter fault interrupter can be the source side or the load side. However, when supplied with a three-phase disconnect, the disconnect is typically placed on the load side. Also consider whether the IntelliRupter fault Interrupter has one or two integral power modules. If only one module is present, make certain the lead from the module to the bushing faces the source side.

To uncrate the IntelliRupter fault interrupter, follow these steps:

STEP 1. Remove the crate.

(a) Cut the plastic cable ties securing the top of the shipping crate.

(b) Remove the top, and remove the cartons containing the protection and control module and the communication module. Set these aside, and remove and set aside the waterproof envelope containing the installation and operating instructions.

(c) Swing up the two lifting brackets as shown in Figures 1 and 2 on page 9—Figure 1 for the standard IntelliRupter fault interrupter models and Figure 2 for the compact-crossarm models.

(d) Attach a suitable sling through the holes in the lifting brackets. Lift the unit until the sling is just taut.

(e) Unbolt the fault interrupter base from its skid. See Figure 3. The shipping supports can be left on if the IntelliRupter fault interrupter is to be set on the ground for any reason. Slowly and carefully hoist the IntelliRupter fault interrupter out of the crate.

NOTICE

Once the IntelliRupter fault interrupter is removed from the skid base, do not set on ground. Doing so may damage the indicators located on the bottom of the fault interrupter.

(f) When the unit is a few feet off the ground, remove the two SD-6183 plastic dust covers from the module bays in the base. See Figure 4 for the location. Store the covers inside the module bay, as shown in Figures 5 and 6. If the modules are not going to be

Figure 3. Unbolting a fault interrupter from the shipping supports.

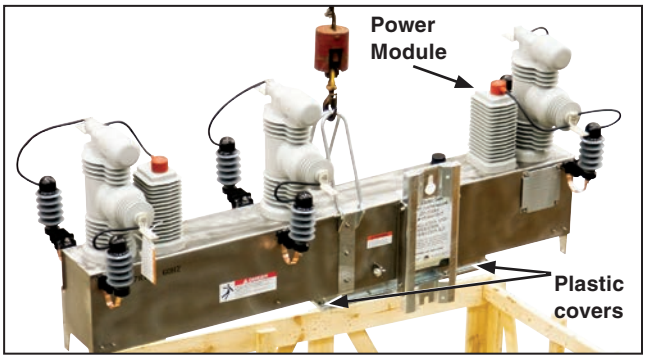


Figure 4. Removing plastic covers from module bays in base.

Figure 5. Placing the dust cover in the module bay.

Figure 6. Set the dust cover on the shelf in the bay.

installed immediately after mounting the switch to the utility pole, leave the dust covers in place to protect against wildlife intrusion into the module bays.

The lifting brackets are permanently attached to the IntelliRupter fault interrupter base. After installation is completed, remove the tie wrap and fold down the brackets to the storage position.

Drilling the Pole

STEP 2. Drill two 13⁄16-inch (21-mm) diameter holes in the utility pole at the desired height for mounting the IntelliRupter fault interrupter. Refer to the catalog drawing. The centerline-to-centerline distance of the holes is 22⅜ inches (568 mm).

Inserting Pole Mounting Hardware

STEP 3. Insert one ¾-inch diameter through-bolt (not furnished) into the upper hole. Secure the bolt loosely, using the nut on the other side of the pole, with a round washer under the bolt head so the head projects approximately 3 inches (76 mm) from the face of the pole to engage the keyhole of the IntelliRupter fault interrupter mounting bracket. See Figure 7.

Attaching an IntelliRupter Fault Interrupter to the Pole

NOTICE

Do not lift the IntelliRupter fault interrupter by the pole-units, the base, or any part or fitting on the base except the lifting brackets. Damage to the IntelliRupter fault interrupter may result.

NOTICE

When mounting an IntelliRupter fault interrupter to a wood pole, place suitably sized round flat washers under the bolt heads. Insert the bolts into the pole from the mounting bracket side. To compensate for pole shrinkage and to maintain fastener tightness, put a square washer and a spring-type washer under the nut, with the spring-type washer between the square washer and the nut.

Figure 7. Properly mounting an IntelliRupter fault interrupter.

STEP 4. Lift the fault interrupter as discussed on pages 9 and 10. When the unit is hoisted to mounting level, guide it so the through-bolt head projecting from the utility pole slips into the keyhole in the mounting bracket. See Figure 7 on page 11. A round washer must be used between the head of the through-bolt and the mounting bracket.

(a) Lower the fault interrupter slightly so it bears on the through-bolt. Insert a second through-bolt through the bottom slot, using a washer under the bolt head. On the back of the pole put a square washer, then a spring washer, and a nut on each through-bolt.

(b) Fully tighten the through-bolts, making sure the flat washer for each bolt is between the bolt head and the switch mounting bracket. See Figure 9.

(c) Install a ½-inch lag screw (not furnished) that is a minimum of 2 inches (51 mm) long at each of the four corners of the mounting bracket. See Figure 8.

⚠ CAUTION

Make sure the lifting brackets are swung down into their resting position. Leaving the lifting brackets in the **Up/Lifting** position may cause flashover when the IntelliRupter fault interrupter is energized.

(d) When all nuts and lag screws have been fully tightened, remove the hoist from the lifting brackets and swing down the two lifting brackets.

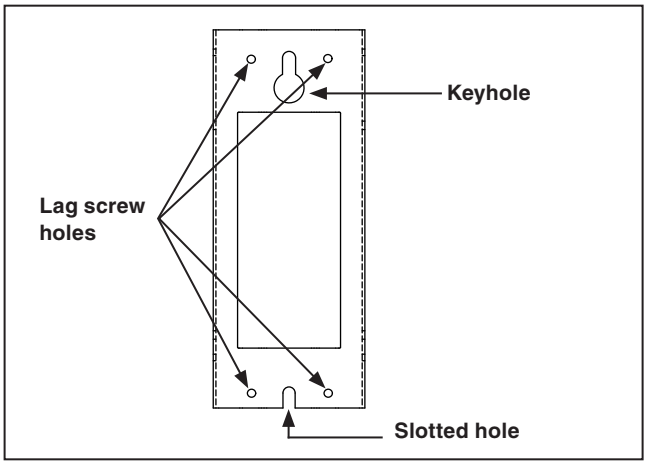


Figure 8. The IntelliRupter fault interrupter mounting bracket.

Figure 9. Tightening the through-bolts. Make sure a flat washer is between the bolt head and the mounting bracket.

Grounding the Base

⚠ DANGER

The IntelliRupter fault interrupter base must be connected to a suitable earth ground at the base of the utility pole before energizing 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 will result in serious personal injury or death.**

STEP 5. Ground the IntelliRupter fault interrupter base by solidly connecting one Number 2 AWG copper wire (or two Number 6 AWG copper wires, or wires having an equivalent cross-sectional area) to the grounding lug on the back of the IntelliRupter fault interrupter base. Connect the other end of the wire(s) to a suitable earth ground at the base of the utility pole and bond them 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.

Ground impedance must be 25 ohms or less to properly protect the equipment.

Installing Surge Arresters

NOTICE

Surge arresters are required on both sides of an IntelliRupter fault interrupter to protect it from surges beyond its ratings.

STEP 6. See Table 7 in S&C Specification Bulletin 766-31, "S&C IntelliRupter® PulseCloser® Fault Interrupter," for a list of available surge arrester options. Mounting provisions for surge arresters are provided. If optional surge arresters have not been specified, install surge arresters of the desired voltage rating on both sides of the IntelliRupter fault interrupter using hardware supplied with the arresters. Ground surge arresters to the IntelliRupter fault interrupter base; a separate ground strap between poles is not required. Refer to reference drawing RD-6924 included in the detailed instruction manual RD-6949.

Connectors, Terminal Pads, and Conductors

NOTICE

DO NOT wire-brush terminal pads. Wire brushing may scratch the plating.

STEP 7. Prepare the surfaces of connectors, terminal pads, and conductors as follows:

NOTICE

Terminal pads are not intended for dead-ending and should only have jumpers attached to them. Mechanical loading from each jumper must not exceed 90 lbs. in-line and 30 lbs. perpendicular to the terminal pad. Refer to the latest issue of ANSI/IEEE Standard C37.32, Section 8.8.2.2.

(a) Apply a liberal coating of "NO-OX-id E" or other suitable aluminum connector compound to the connector surface.

(b) Securely bolt the connectors to the terminal pads.

(c) Prepare the conductors using established procedures, and clamp them in the connectors. If the optional wildlife protection feature is furnished (catalog number suffix "-W1" or "-W2"), refer to the "Installing Optional Wildlife Protection Feature" section on page 14.

Installing Optional Wildlife Protection Feature

Note: Only S&C Connectors, catalog numbers 4740R1, 4741R2, or 4581, can be used with the wildlife protection option. Four-bolt compression connectors cannot be used with **Wildlife Protection** feature catalog number suffix "-W1" or "-W2." S&C Connector catalog number 4581 can only be used with user-supplied two-bolt compression connectors on IntelliRupter fault interrupters with catalog number suffix "-W1" or "-W2."

STEP 8. If an IntelliRupter fault interrupter is supplied with the optional **Wildlife Protection** feature (catalog number suffix "-W1" or "-W2"), all components are factory installed except for the terminal-pad covers and the tap covers.

Install terminal-pad covers and tap covers as follows:

(a) Measure the diameter of the jumper conductor. Measure and cut the tapered end of the tap cover to match the diameter of the jumper conductor. The tapered end of the tap cover should fit snugly around the jumper conductor. See Figure 10.

(b) Insert the jumper conductor into the *nontapered* end of the tap cover. Slide the tap cover part way over the jumper conductor.

(c) Prepare the jumper conductor using established procedures. Attach the compression lug or the terminal-pad connector. Bolt the compression lug or the terminal-pad connector to the IntelliRupter fault interrupter terminal pad.

(d) Attach the lower terminal-pad cover (SD-5284) to the interrupter housing. Confirm the surge arrester and/or integral power module wires line up with the bottom half of the hole in the lower terminal-pad cover. See Figure 10.

(e) Attach the upper terminal pad cover (SD-5283) to the interrupter housing. It aligns with and engages the lower cover. If necessary, use tape or a plastic cable tie to hold the upper and lower covers together. Confirm the surge arrester and/or the integral power module wires extend from the holes in the side of the terminal pad cover without undue stress or strain. See Figure 11.

(f) Slide the tap cover part way over terminal-pad cover and remove the tape or cable tie. Slide the tap cover all the way over the terminal-pad cover until it snaps into place. A silicone-based lubricant can be used if the tap cover does not slide easily. Pins in the terminal-pad cover will engage the holes in the tap cover. See Figure 12.

Figure 10. Installing the lower terminal-pad cover.

Figure 11. Installing the upper terminal-pad cover.

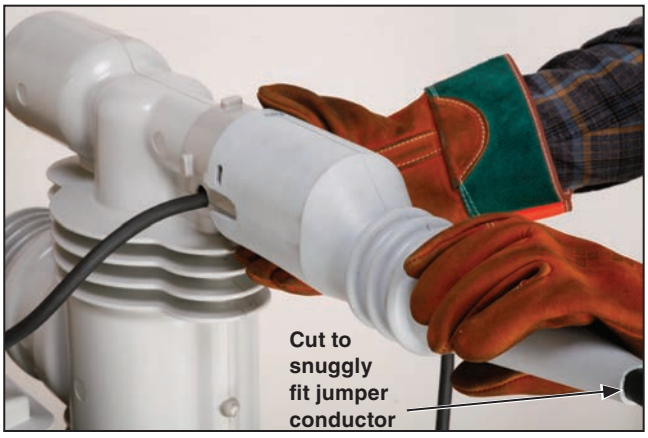


Figure 12. Installing the tap cover.

Note: The lower terminal-pad cover is shipped installed on the disconnect side of disconnect-style IntelliRupter fault interrupters. Attach the compression lug or the terminal-pad connector using the hardware provided. Install the upper terminal-pad cover and tap cover as described in the "Connectors, Terminal Pads, and Conductors" section on page 13.

Installing Communication Module Battery

STEP 9. The 12-Vdc, 8-ampere-hour battery pack for the communication module, if supplied, is shipped separately in the carton containing the communication module (SDA-4554). If the IntelliRupter fault interrupter has been in storage for more than six months, the battery must be charged. Do not install the battery if the module will not be energized for more than three days.

To install the battery:

(a) Loosen battery compartment cover locking screw. See Figure 13.

(b) Insert the battery assembly; push 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. Push the battery assembly all the way in. See Figure 14.

(c) Inspect the battery compartment gasket. Close the battery compartment cover and secure the locking screw. See Figure 15.

Installing a Radio

STEP 10. A radio providing wide-area network capability for SCADA applications, if specified, is furnished factory-installed in the communication module. Alternatively, 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, removing the radio tray assembly is required to connect the radio. Power the radio with the battery or a separate power supply. Refer to S&C Instruction Sheet 766-520, "S&C IntelliRupter® PulseCloser® Fault Interrupter: *Wi-Fi*, *SCADA*, *and GPS Communication Setup Instructions*."

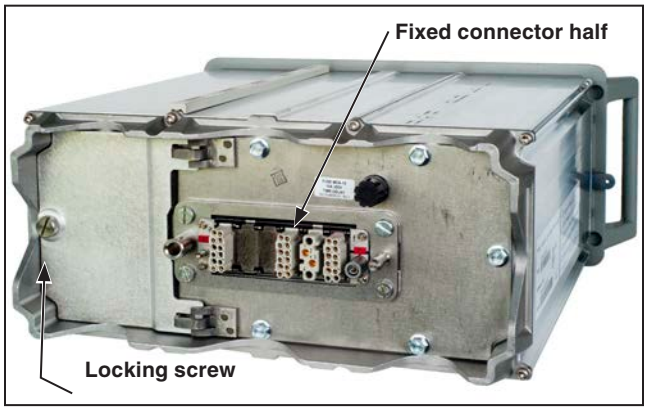


Figure 13. The communication module battery door.

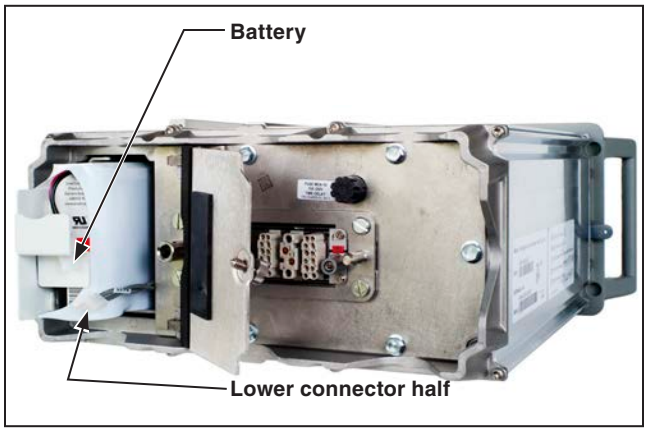


Figure 14. Inserting a battery into the communication module.

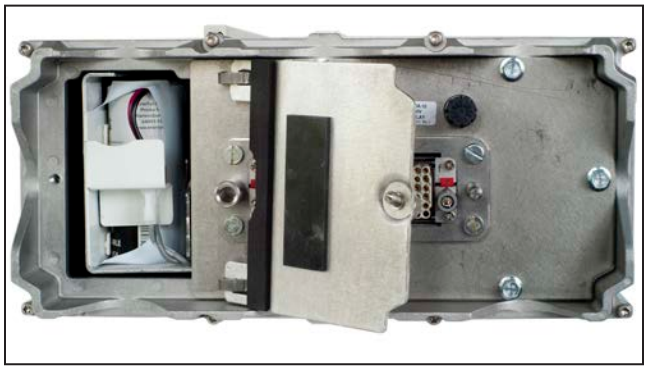


Figure 15. The battery inside the communication module.

Installing Modules

NOTICE

The modules are heavy. Removal and replacement from the ground using an extendostick is not recommended. Remove and replace the modules from a bucket truck using the module handling fitting attached to a suitable hookstick.

STEP 11. The communication module is installed in the left-hand side bay, on the underside of the IntelliRupter fault interrupter base. The protection and control module is installed in the right-hand side bay—as viewed from the side with the OPEN/CLOSE/READY lever. If not having already been done, remove the plastic covers from the module bays in the IntelliRupter fault interrupter base.

To install a module in the IntelliRupter fault interrupter base:

(a) Attach module handling fitting, catalog number 4450, to a suitable hookstick. With the module resting on a clean dry surface, insert the fitting into the module latch. While pushing down on the hookstick, rotate the handling fitting 90 degrees counterclockwise to open the latch. See Figure 16.

(b) While standing in the bucket, rotate the hook-stick (with the module on the end of it) 180 degrees—lift and insert the module into the bay in the IntelliRupter fault interrupter base. For the communication module, match the black arrow on the module to the black arrow on the base. For the protection and control module, match the white arrow on the module to the white arrow on the base. Push up on the hookstick quickly with enough force to engage the wiring connectors. See Figure 17.

(c) While pushing upward on the hookstick, rotate handling fitting 90 degrees clockwise (as viewed from the underside of the base) to close the latch. Remove the handling fitting from the latch. See Figure 18.

Figure 16. The module-handling fitting inserted in the module latch.

Figure 17. Inserting the module into the bay in the base.

Figure 18. Locking the module into the base.

Installing SCADA Antenna

Note: Make sure there is a clear line of sight to the antennas of other IntelliRupter fault interrupters and/or other radio-equipped automated distribution equipment.

The antenna connector is located on the underside of the IntelliRupter fault interrupter base.

If a bracket-mounted antenna has not been specified, screw the 5-dBi gain wire-whip antenna (if provided) into the connector on the base. See Figure 19.

STEP 12. Bracket-mounted antennas (catalog number suffix "-B1" through "-B3") are shipped partially assembled, with the bracket attached to the base on the side opposite the interrupter OPEN/CLOSE/READY lever. The bracket can be mounted at whichever end of the base achieves the highest quality radio signal. Position 1 is the end closest to the antenna connector. Position 2 is the end farthest from the antenna connector. See Reference Drawing RD-6927.

To install the antenna bracket for catalog number suffix "-B1" (900-MHz, 3-dBd gain, omnidirectional 25-inch (635-mm) fiberglass antenna) mounted in position 1:

(a) Remove and retain the hardware attaching the antenna bracket to the IntelliRupter fault interrupter base.

(b) Rotate the bracket 180 degrees, as viewed from the top.

(c) Attach the bracket to the base using the hardware removed in Step 12(a).

(d) Loosen the U-bolt that attaches the antenna to the bracket. Reposition the antenna in the U-bolt so it points up and the fiberglass section is above the top of the bracket. Tighten the U-bolt.

(e) Attach the antenna cable, and secure it with three plastic cable ties (provided) at the locations marked on page 2 of Reference Drawing RD-6927.

Figure 19. A wire-whip antenna attached to the connector on the bottom of the IntelliRupter fault interrupter base.

STEP 13. To install the antenna bracket for catalog number suffix "-B1" (900-MHz, 3-dBd gain, omnidirectional 25-inch (635-mm) fiberglass antenna) mounted in position 2:

(a) Remove and retain the hardware attaching the antenna bracket to the IntelliRupter fault interrupter base.

(b) Attach the bracket to the opposite end of the base using the hardware removed in Step 13(a).

(c) Attach the antenna cable, and secure it with three plastic cable ties (provided) at the locations marked on page 2 of Reference Drawing RD-6927.

STEP 14. To install the antenna bracket for catalog number suffix "-B2" (900-MHz, 9-dBd gain, directional Yagi antenna) or catalog number suffix "-B3" (bracket only) mounted in position 1:

(a) Remove and retain the hardware attaching the antenna bracket to the IntelliRupter fault interrupter base.

(b) Rotate the bracket 180 degrees, as viewed from the top.

(c) Attach the bracket to the base using the hardware removed in Step 14 (a).

(d) Mount the Yagi antenna or user-supplied antenna, as applicable, to the mast using the hardware provided.

(e) Attach the antenna cable, and secure it with three plastic cable ties (provided) at the locations marked on page 2 of Reference Drawing RD-6927.

STEP 15. To install the antenna bracket for catalog number suffix "-B2" (900-MHz, 9-dBd gain, directional Yagi antenna) or catalog number suffix "-B3" (bracket only) mounted in position 2:

(a) Remove and retain the hardware attaching the antenna bracket to the IntelliRupter fault interrupter base.

(b) Attach the bracket to the opposite end of the base using the hardware removed in Step 15(a).

(c) Mount the Yagi antenna or user-supplied antenna, as applicable, to the mast using the hardware provided.

(d) Attach the antenna cable, and secure it with three plastic cable ties (provided) at the locations marked on page 2 of Reference Drawing RD-6927.

Energizing IntelliRupter Fault Interrupter

⚠ DANGER

The IntelliRupter fault interrupter base must be connected to a suitable earth ground at the base of the utility pole 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, in accordance with this instruction sheet. **Failure to observe these instructions will result in serious personal injury or death.**

STEP 16. Energize the IntelliRupter fault interrupter according to your utility's standard operating practice.

⚠ DANGER

The interrupters, terminal pads, and disconnect blades of disconnect style models may be energized from either side of the IntelliRupter fault interrupter and with the interrupters in any position. Before inspecting, servicing, or repairing an IntelliRupter fault interrupter or working on the conductors on either side of it, test for voltage using proper high-voltage test equipment. Install suitable grounding equipment. **Failure to observe these precautions will result in serious personal injury or death.**

Substation Power and Communication

External Power Supply. An external power supply is an option used when system voltage is below 7.5 kV 60 Hz, 9 kV 50 Hz, or with a pedestal-mounted IntelliRupter fault Interrupter in a substation. See Figure 20. It enables the use of preferred and alternate control power sources, and can be installed in combination with integral power modules. Figure 21 shows the input terminal assignment. For two source applications, the preferred input provides power to the IntelliRupter fault interrupter when voltage is present, and the alternate input takes over when preferred input voltage is lost. Either input may be used for a single-source ac application. The voltage ranges for each input are:

Preferred Input: 100 to 259 Vac, 50/60 Hz

Alternate Input: 100 to 259 Vac, 50/60 Hz, 20 to 60 Vdc, or 100 to 360 Vdc

Figure 20. The optional external power supply can be easily removed.

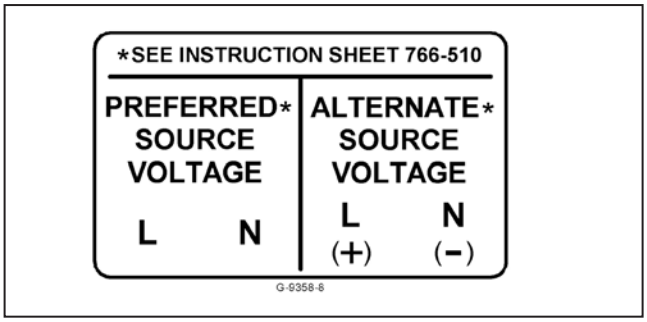


Figure 21. Input power terminals in the user interface box.

When operating in the 100- to 360-Vdc range, a minimum of 100 Vdc is required to power the IntelliRupter fault interrupter from a cold start. When powered, the IntelliRupter fault interrupter remains operational until the alternate input voltage drops to 70 Vdc.

IntelliRupter fault interrupter voltage sensors provide accurate sensing at voltages as low as 4.13 kV, so using the external power supply, instead of integral power modules, expands the IntelliRupter fault interrupter system voltage range down to this level.

A line person can easily remove the external power supply with gloved hands because no tools are required to release the chassis from its mounting plate. See Figure 22. Also, see S&C Instruction Sheet 766-512, ED-850, and ED-855 for more details.

Fiber-Optic Connection. The communication module can be furnished with a factory-installed single-mode or multi-mode fiber-optic modem. A fiber-optic cable connects the faceplate of the communication module to the user interface box, where the IntelliRupter fault interrupter is connected to the fiber-optic network. See Figure 22.

An IntelliRupter fault interrupter can be easily converted from radio communication to fiber-optic communication by changing the communication module.

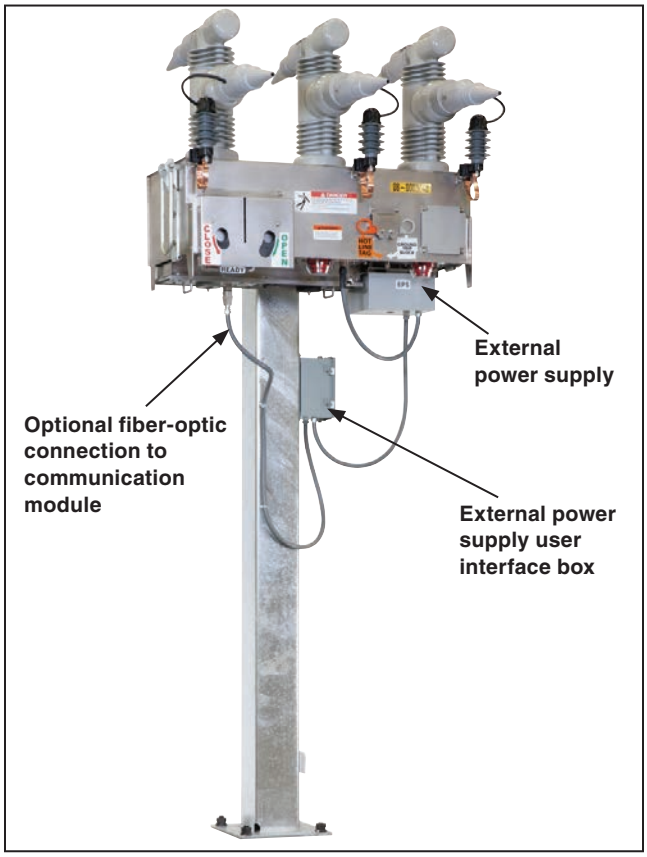


Figure 22. A compact-crossarm IntelliRupter fault interrupter on a substation pedestal with an external power supply and a user interface box.

This section gives an overview of the operation of the IntelliRupter fault interrupter. For full operating instructions, see S&C Instruction Sheet 766-540, "IntelliRupter® PulseCloser® Fault Interrupter: *Operation*."

Establishing a Wi-Fi Communication Link with an IntelliRupter Fault Interrupter

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 an 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, "*Wi-Fi and Security Administration*."

Note: With firmware newer 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, "S&C IntelliRupter® Fault Interrupter: *Protection and Communication Setup*" for more information.

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. To communicate over Wi-Fi:

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

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

STEP 3. Select the device name from the drop-down list or by typing it, or—if security keys have not been entered—enter the IntelliRupter fault interrupter serial number by using the **Configure New IntelliRupter/Wi-Fi** option. Then, click on **Connect to IntelliRupter** option.

STEP 4. 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 fault interrupter.

STEP 5. Log in to the IntelliLink software with the proper password.

STEP 6. The IntelliRupter fault interrupter *Operation* screen will open. See Figure 23.

STEP 7. Confirm the device name shown at "Connected to:" at the bottom of the screen is the IntelliRupter fault interrupter to be communicated with.

Remote Operation

On the *Operation* screen, set the "Remote Operation" selection box to the **Enabled** setting. See Figure 23. The IntelliRupter fault interrupter can now be operated 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

To enable **Local** operation, on the *Operation* screen set the "Remote Operation" selection box to the **Disabled** setting. See Figure 23.

The IntelliRupter fault interrupter can now be operated only by local commands via the Wi-Fi communication link. Select the OPEN or CLOSE operation button as appropriate. The three interrupter OPEN/CLOSE indicators on the underside of the IntelliRupter fault interrupter base indicate the contact positions of the interrupters. See Figure 24. The red target with an "I" indicates the interrupter is closed; the green target with an "O" indicates the interrupter is open. The OPEN/CLOSE indicators do not show the status of the hookstick-operated disconnect on disconnect-style models. Set the **Remote Operation** mode to the **On** setting to allow remote commands to control the IntelliRupter fault interrupter.

Note: Target colors are reversed on an IntelliRupter fault interrupter furnished with catalog number suffix "-F2."

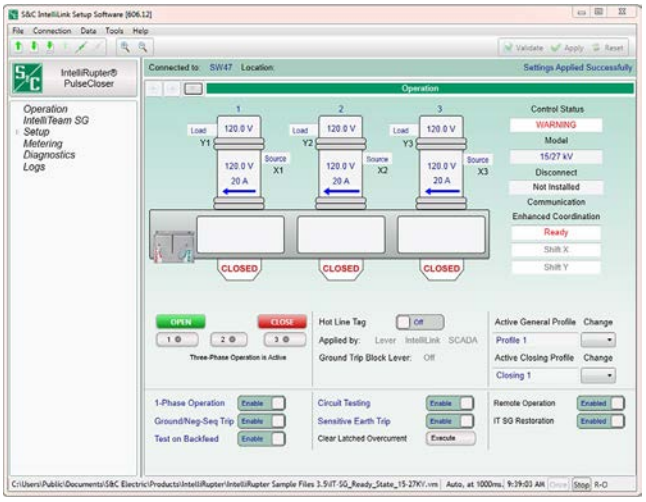


Figure 23. The *Operation* screen.

Figure 24. A red target with an "I" (top) and a green target an "O" (bottom).

Manual Operation

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

Manual Lever Open—Pull the OPEN lever down. See Figure 25. The three interrupters will be physically opened, and a mechanical block on each actuator prevents the actuator from electrically closing its interrupter. The **Open** position can be "tagged" using conventional tagging procedures. See Figure 26. 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.

Manual Lever Close—The interrupters can only be closed when control power is available. To close the interrupters using a hookstick, first return the OPEN lever to the **Ready** (up) position. Pull the CLOSE lever down *once to effect the first closing profile or twice, without delay, to effect the second closing profile*. The IntelliRupter fault interrupter will use the specified closing-protection profile to close the interrupters. See Figure 27. 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 pull on the CLOSE lever will initiate a PulseClosing® Technology operation on pole 1. If it results in a successful close, a PulseClosing Technology operation will be initiated on pole 3. If a fault is detected at any time during the PulseClosing Operation sequence, either single-phase or three-phase tripping will result, in accordance with the configuration for the active general profile.

Manual Lever Position—Either the **Ready** tab or the **Lock** tab will always be visible. The IntelliRupter fault interrupter will not respond to an **Open** or **Close** command or perform any automatic operation when locked open by the OPEN/CLOSE/READY lever (**Lock** tab is visible). The line crew should place the manual lever in the **Ready** position before leaving the site, unless the unit is being purposely disabled.

Figure 25. Opening interrupters manually with a hookstick (shown in the Ready position).

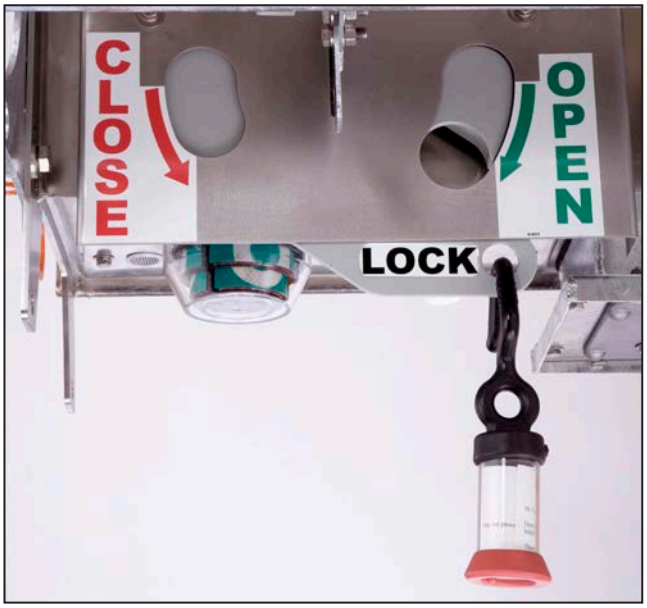


Figure 26. Interrupters open and tagged.

Figure 27. Closing interrupters with a hookstick.

Manual Hot Line Tag

A hot line tag can be set locally using the hookstick lever or remotely using SCADA or IntelliLink software.

The hot line tag is normally removed using the same method by which it was applied. However, the hookstick lever can be used to remove electronically set tags as well. A hot line tag 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 if local indication of the electronic tag is provided.

To apply a local hot line tag, pull down on the HOT LINE TAG lever. It can be "tagged " in this position using conventional procedures. See Figures 28 and 29. To remove the local hot line tag, push up on the HOT LINE TAG lever.

To remove a SCADA or IntelliLink software-applied tag when a local hot line tag has also been applied, push up on the HOT LINE TAG lever. Then, pull down and push up on the HOT LINE TAG lever *once, without delay.* To remove a SCADA or IntelliLink software-applied tag when a local hot line tag has *not* been applied, pull down and push up on the HOT LINE TAG lever *twice, without delay.*

The HOT LINE TAG indicator is located on the protection and control module. See Figure 33 on page 27. When a hot line tag is set, the HOT LINE TAG indicator flashes for ½-second every 2 seconds. Any trip in the Hot Line Tag profile will be performed as a three phase-trip. When the hot line tag is removed, the indicator is in the **Off** setting.

Manual Ground Trip Block (if furnished)

The ground trip block can be set locally with the hookstick lever or remotely using SCADA or IntelliLink software.

A ground trip block can only be removed by the method used to set it, and (unlike the hot line tag) the manual lever cannot remove a ground trip block set by SCADA or IntelliLink software.

To apply a local ground trip block, pull down on the GROUND TRIP BLOCK lever. It can be tagged using conventional procedures. See Figures 28 and 29. To remove a local ground trip block, push up on the GROUND TRIP BLOCK lever. The status indicator (white LED) is located on the control module. See Figure 33 on page 27. When a ground trip block is either set or removed, the status indicator will light at 100% brightness for 10 seconds to indicate that the GROUND TRIP BLOCK lever command has been received.

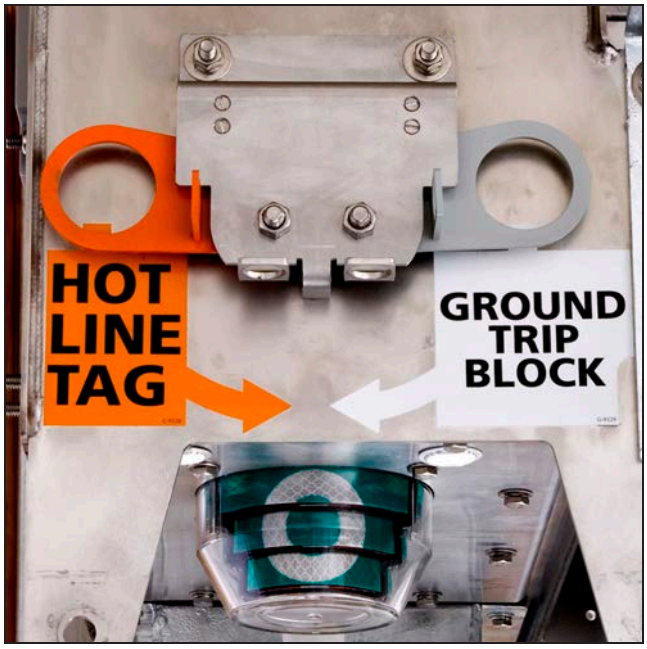


Figure 28. HOT LINE TAG lever and GROUND TRIP BLOCK lever.

Figure 29. Hot line tag manually applied and "tagged."

With ground trip block 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 does not create a ground time-current characteristic curve, nor does it enable the element.

Enabling ground trip block will immediately disable and reset all selected elements, even if they were timing for a fault when the lever was moved. The ground trip block lever is effective for any profile: all general profiles, both closing profiles, and hot line tag. The elements available for selection are: **Ground**, **Negative Sequence**, and **Sensitive Earth Overcurrent** elements. If the GROUND TRIP BLOCK lever 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. If the GROUND TRIP BLOCK lever 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 lever. 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 lever has been returned to the **Unblocked** position.

Hookstick-Operated Disconnect

The hookstick-operated disconnect on Disconnect Style IntelliRupter fault interrupters can be operated after the interrupters have been manually opened using the interrupter OPEN/CLOSE/READY lever. See Figure 25 on page 23.

To open the disconnect, pull down on the "**O**" position of the disconnect operating lever. To close the disconnect, pull down on the "**I**" position of the disconnect operating lever. See Figure 30. The open disconnect can be "tagged" using conventional tagging procedures. See Figure 31.

With the disconnect open, the interrupters can be closed and opened for testing. See Figure 27 on page 23.

To close the disconnect, first open the interrupters. Pull down on the "**I**" position of the disconnect operating lever. See Figure 32. Close the interrupters.

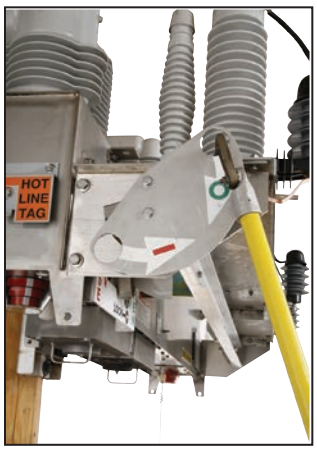


Figure 30. Opening the disconnect operating lever.

Figure 31. Disconnect open and tagged.

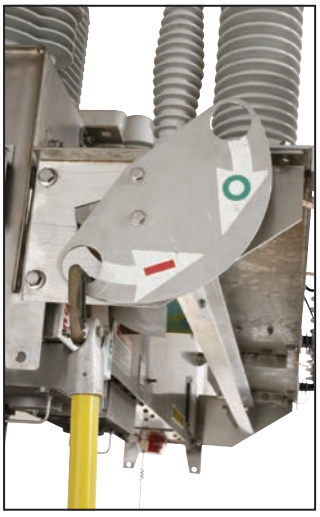


Figure 32. Closing the disconnect operating lever.

Status Indicator

The STATUS indicator (white LED) light shows operational status of the IntelliRupter fault interrupter. See Figure 33.

Off:

- IntelliRupter fault interrupter is not powered
- IntelliRupter fault interrupter is not functioning properly

Solid On:

- If configured by user, **Remote Operation** mode is disabled

Flashes for ½ second every 30 seconds:

- Normal operation

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

- Wi-Fi has been disconnected
- Interrupter OPEN/CLOSE/READY lever has been moved from:
  - Ready to Open
  - Ready to Close
  - Open to Ready
- GROUND TRIP BLOCK lever has been moved from:
  - Removed to Set
  - Set to Removed

Pulsates dim to bright:

- Wi-Fi is connected

Flashes for ½ second every second:

- Any error state is active
- **Settings Mismatch** mode is active and, if configured by the user, Battery Low, Bad or Disconnected condition

Flashes 3 times (½ second on, ½ second off) every 30 seconds:

- IntelliTeam® SG Automatic Restoration System is in the **Ready** state
- Or **Loop Restoration** mode is in the **Ready** state

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:

- Hot line tag has been applied

Figure 33. The HOT LINE TAG and STATUS indicators are located on the face of the protection and control module.

For the convenience of users who normally perform electrical tests on system components such as IntelliRupter fault interrupters, appropriate withstand test values are given in Table 1 on page 29. 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.

⚠ WARNING

The test procedures described in this section 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

ENERGIZED COMPONENTS. Always consider all parts live until de-energized, tested, and grounded. The integrated power module contains components that can retain a voltage charge for many days after the IntelliRupter fault interrupter has been de-energized and can derive a static charge when in close proximity to a high-voltage source. Voltage levels can be as high as the peak line-to-ground voltage last applied to the unit. Units that have been energized or installed near energized lines should be considered live until tested and grounded.

⚠ CAUTION

Keep personnel more than 6.56 feet (2 meters) 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 one's health.

⚠ WARNING

When performing electrical withstand tests on IntelliRupter fault interrupters, observe the following precautions. Failure to observe these precautions can result in a flashover, injury, and death.

STEP 1. Completely de-energize the IntelliRupter fault interrupter and disconnect the phase conductors from all six terminal pads. If the IntelliRupter fault interrupter is supplied with the optional **Wildlife Protection** feature (catalog number suffix "-W1" or "-W2"), slide the tap cover back far enough to gain access to the terminal pads. Remove the upper and lower terminal-pad covers to permit the removal of the phase conductors. Retain the covers for reuse at the conclusion of the test.

STEP 2. At each of the six terminal pads, disconnect the leads for the surge arresters. Make sure the surge arrester leads are tied back so they are at least 8 inches (203 mm) from any terminal pad.

STEP 3. At the appropriate terminal pads, disconnect the lead(s) for the integral power module (or modules). Ground the lead(s) from the integral power module (or modules). At the test voltages specified, damage to the integral power module (or modules) will result if they are not disconnected and grounded.

STEP 4. Open the IntelliRupter fault interrupters locally using the Wi-Fi communications link, as described on page 21, or manually by using a hookstick to pull down on the OPEN lever. For disconnect-style models, close the hookstick-operated disconnect.

Table 1. Withstand Test Voltages

IntelliRupter Fault Interrupter Rating, kV				Withstand Test Voltage, kV		
60 Hz		50 Hz		60-Hz, RMS①②	Dc③	Impulse (BIL)
Min.	Max.	Min.	Max.			
11.43	15.5	10	17.5	48	67	110
18.81	27	20	24	48	67	125
23.8	38	29.7	38	56	79	170

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

② These values may be applied from terminal to terminal or from terminal 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 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 listed dc withstand test voltages are approximately equal to the peak of the power frequency withstand test voltages.