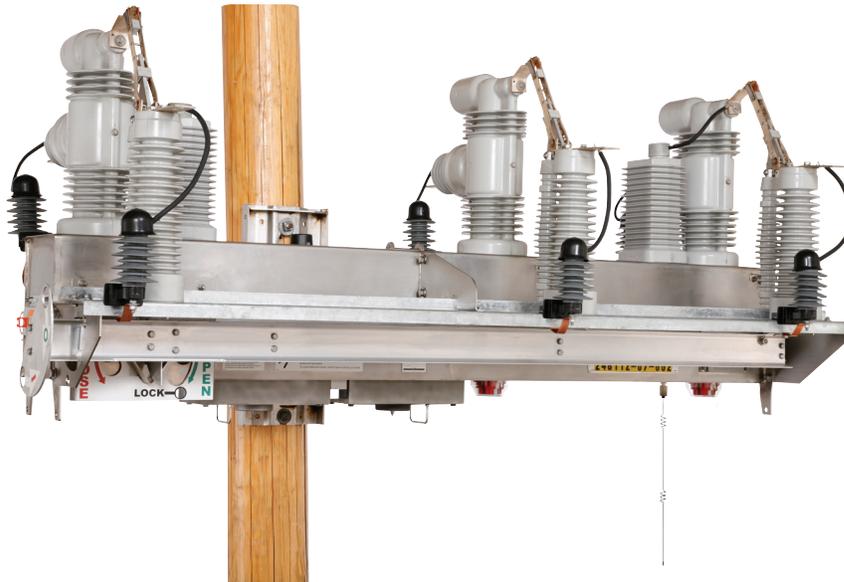


External Interface Installation

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Introduction

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 an IntelliRupter PulseCloser Fault Interrupter. Familiarize yourself with the Safety Information and Safety Precautions on pages 4 through 6.

Retain this Instruction Sheet

This instruction sheet is a permanent part of the IntelliRupter® fault interrupter. Designate a location where you can easily retrieve and refer to this publication. The latest version is available online in PDF format at sandc.com/en/Support/Product-Literature/.

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.

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 the IntelliRupter fault interrupter, except that the first paragraph of the said warranty is 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 the 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 the 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.

Replacement parts provided by the seller or repairs performed by the seller under the warranty for the original equipment will be covered by the special warranty provision for its duration. Replacement parts purchased separately will be covered by the above special warranty provision.

For equipment/services packages, the seller warrants for a period of one year after commissioning that the IntelliRupter fault interrupter will provide automatic fault isolation and system reconfiguration per agreed-upon service levels. The remedy shall be additional system analysis and reconfiguration of the IntelliTeam SG Automatic Restoration System until the desired result is achieved.

Warranty of the IntelliRupter fault interrupter is contingent upon the installation, configuration, and use of the control or software in accordance with S&C's applicable instruction sheets.

This warranty does not apply to major components not manufactured by S&C, such as batteries and communication devices. However, S&C will assign to immediate purchaser or end user all manufacturer's warranties that apply to such major 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/service 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.

Safety Information

Understanding Safety-Alert Messages

Several types of safety-alert messages may appear throughout this instruction sheet and on labels 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 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 or operating the IntelliRupter PulseCloser Fault Interrupter.



Replacement Instructions and Labels

If additional copies of this instruction sheet are required, 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.

Location of Safety Labels

⚠ WARNING

IntelliRupter® fault interrupter base contains electrical and mechanical parts that can cause injury. **DO NOT** disassemble or remove access panels unless directed by S&C Electric Company. **DO NOT** drill into IntelliRupter fault interrupter base. Damage to internal components can cause equipment failure.

G-9220

⚠ WARNING

ELECTROCUTION HAZARD

Failure to follow these instructions can cause serious injury or death.

- This IntelliRupter® PulseClose® Fault Interrupter must be installed, grounded and operated **ONLY** by qualified personnel familiar with high-voltage electrical equipment, associated safety practices, and potential hazards.
- Before energization, and at all times when energized, the IntelliRupter fault interrupter base must be connected to a suitable earth ground at the base of the pole in accordance with the S&C instruction sheet furnished with this device.
- The IntelliRupter fault interrupter base ground must also be connected to the system neutral. If the system neutral is not present, proper precautions must be taken to ensure that the local earth ground cannot be severed or removed.
- To ensure safe and effective installation and operation, follow procedures in the S&C instruction sheet furnished with this device **EXACTLY**.
- For additional S&C instruction sheets, call 1-773-338-1000.

G-9222

⚠ WARNING

LIFTING INSTRUCTIONS

- Attach lifting slings **ONLY** to lifting brackets provided. (Lifting brackets are permanently attached to the IntelliRupter® PulseClose® Fault Interrupter for future use).
- Lift IntelliRupter fault interrupter as shown until slings are just taut.
- Unbolt IntelliRupter fault interrupter from steel brackets attached to the shipping skid.
- Slowly and carefully lift IntelliRupter fault interrupter onto pole or structure.
- Securely bolt IntelliRupter fault interrupter to pole or structure.
- Remove tie wrap and fold lifting brackets down.

Failure to lift IntelliRupter fault interrupter properly can result in damage, causing improper operation, arcing, or electrical shock

Lifting brackets

G-9223

⚠ DANGER

Interrupters and terminals pads may be energized from either side and in position.

ALWAYS consider all parts live until de-energized, tested, and grounded. To avoid electrical shock, the IntelliRupter® fault interrupter base must be grounded. The Integral Power Module Capacitors can retain a charge after being disconnected from the power system. To discharge the IPM Capacitors connect the high voltage terminal connected to each IPM to the IntelliRupter base.

G-9615

⚠ WARNING

DO NOT attach any power source, **EXCEPT FOR S&C EXTERNAL POWER SUPPLY (EPS), to this connector when IntelliRupter® fault interrupter is energized at high voltage.**

Use S&C Power Supply Accessory Catalog Number TA-3221 **ONLY** when energizing the IntelliRupter fault interrupter indoors, in a service center, or testing lab.

Attaching a power supply of other manufacture may cause equipment damage or electric shock.

G-9281

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 EXCEPT FOR S&C EXTERNAL POWER SUPPLY. . .	G-9281
E	⚠ WARNING	Lifting Instructions—1. Attach lifting slings ONLY to lifting brackets . . .	G-9223■

- Label is placed on front and back of IntelliRupter fault interrupter base.
- Tag is removed and discarded after 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 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.

Inspection

Examine the shipment for external evidence of damage as soon after receipt as possible.

If there is visible loss and/or damage:

1. Notify the delivering carrier immediately.
2. Ask for a carrier inspection.
3. Note 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.

Overview

An IntelliRupter fault interrupter with catalog number suffix “-C11” is shipped with the SDA-5799 Protection and Control Module shown in Figure 1. This control features a fiber-optic interface that allows the control to be connected to an external interface assembly.

There are two versions of external interface assembly. S&C catalog number SDA-5798 has connectors that accept up to two 16AWG wires or one 14AWG wire. S&C catalog number SDA-5798-1 has terminal blocks that accept wires terminated with a ring lug suited for use with a #8 screw. Figure 2 shows the SDA-5798-1 external interface assembly.

A fiber-optic cable is required to connect the SDA-5799 Control Module to the external interface assembly. Refer to S&C Specification Bulletin 766-31 for a complete list of the available fiber-optic cables.

There are also two mounting options for the external interface assembly. Refer to S&C Specification Bulletin 766-31 for a complete list of the available mounting options.



Figure 1. The SDA-5799 Protection and Control Module.

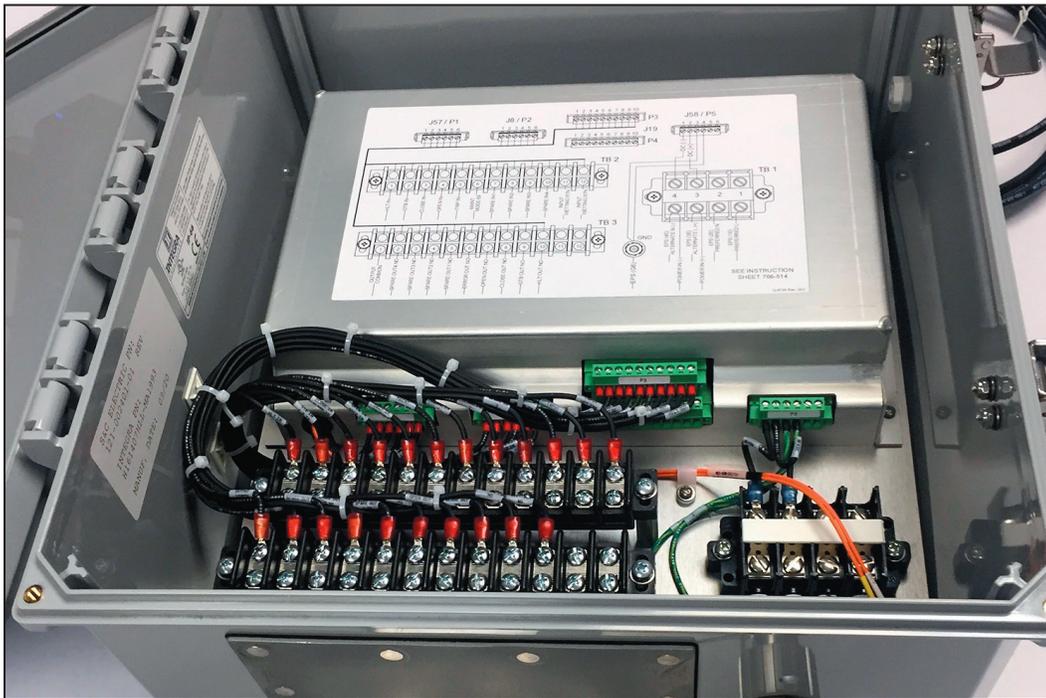


Figure 2. Interior of the SDA-5798-1 external interface assembly.

Control Power

The external interface assembly can be operated from a control voltage source and is compatible with 24-Vdc, 48-Vdc, and 125-Vdc substation batteries. By default, it is wired for a 120-Vac source or 125-Vdc battery. Alternatively, it can be wired for a 24-Vdc or 48-Vdc battery. Figure 3 shows the connections for 125-Vdc battery or 120-Vac operation. Figure 4 shows the default wiring for the 24-Vdc and 48-Vdc battery operation.

The absolute input range for J58/P5 Terminals 1 and 2 is 19 Vdc to 68 Vdc.

The absolute input ranges for J58/P5 Terminals 5 and 6 are 100 Vdc to 180 Vdc or 102 Vdc to 208 Vac.

When operating from a battery, the IntelliRupter fault interrupter requires one of the external power supply options. Refer to S&C Specification Bulletin 766-31 for a complete list of the options. The control power terminal block in the external interface assembly is designed to allow external power supply connection. See S&C Instruction Sheet 766-512 for more information about the external power supply.

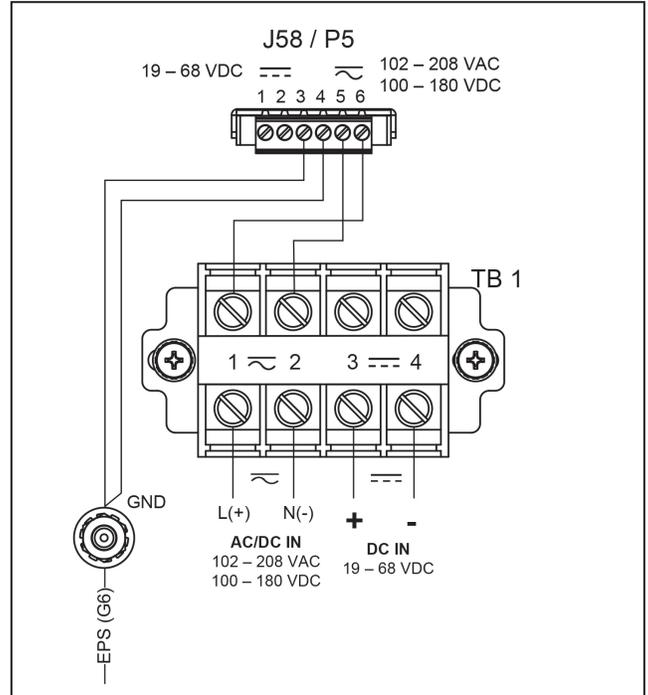


Figure 3. The default power connections.

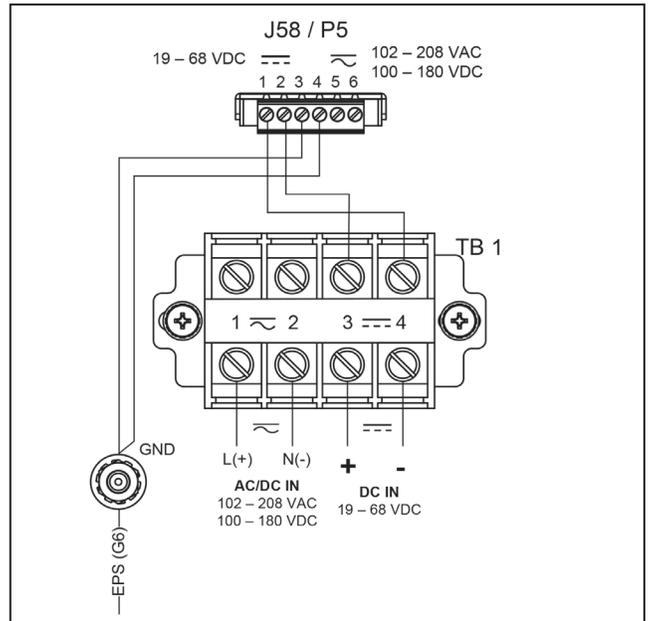


Figure 4. The 24-Vdc/48-Vdc control power connections.

Installation

Installing the External Interface Assembly

Follow these steps to install the external interface assembly:

- STEP 1.** Select the appropriate control power connection from Figures 3 and 4 on page 9. Connect control power to connector J58/P5.
- STEP 2.** Install the mounting bracket to the back of the external interface assembly. See Figure 5. See S&C catalog number SDA-206029 for the square pole mounting kit and SDA-26030 for the round pole mounting kit.
- STEP 3.** Attach the external interface assembly to the pole or pedestal as applicable.

STEP 4. Determine conduit access needs and remove the gland plate. Add the connection holes as needed. See Figure 6 for location of the gland plate. A hole accommodating a standard $\frac{3}{4}$ -inch liquid-tight conduit connector is provided for the external power supply connection.

STEP 5. Reinstall the gland plate and mount the external interface assembly to the pole or pedestal. See Figure 11 on page 19 for the mounting bracket hole details. See S&C catalog number CM-21641-1 for the pedestal mounting bracket and CM-21641-2 for the pole mounting bracket.

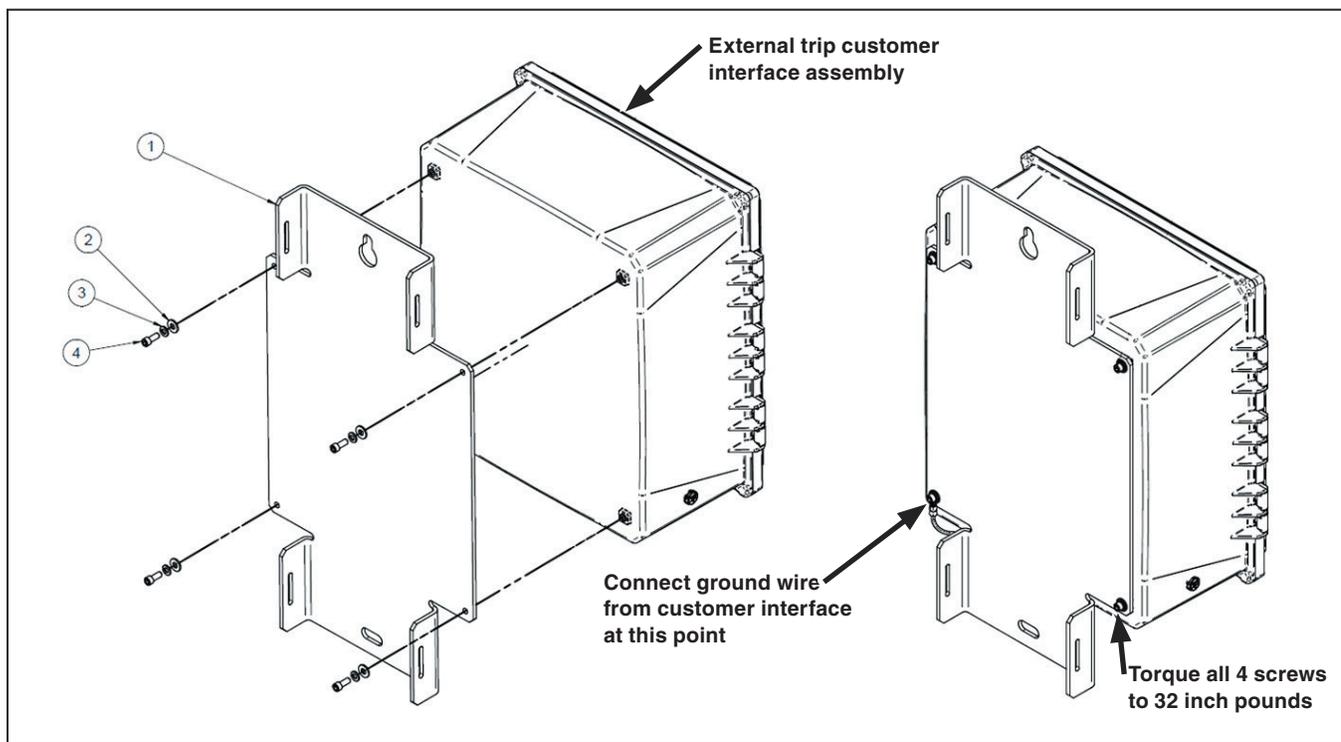


Figure 5. The mounting bracket attachment to the external interface assembly.

STEP 6. Ground the external interface assembly to an appropriate earth ground with an impedance of ≤ 20 ohms. See Figure 6 for location of the ground connection.

STEP 7. Install the conduit for the customer-supplied connections and the external power supply conduit to the external interface assembly. See Figure 7 on page 12.

STEP 8. Remove the fiber-optic cable protector. Connect the fiber-optic cable to the customer interface assembly and the control module. See Figure 6. For more information refer to Installation Drawing RD-9067.

NOTICE

The minimum bend radius for the fiber-optic cable is 4.25 inches (108 mm).

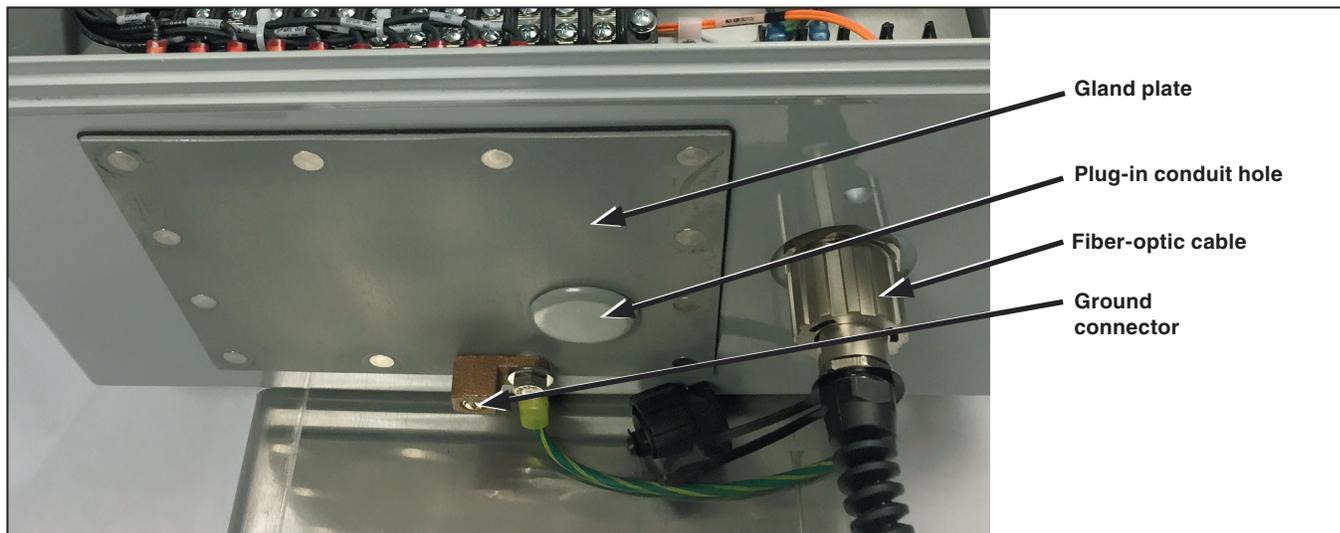


Figure 6. The bottom of the SDA-5798 external interface assembly enclosure.

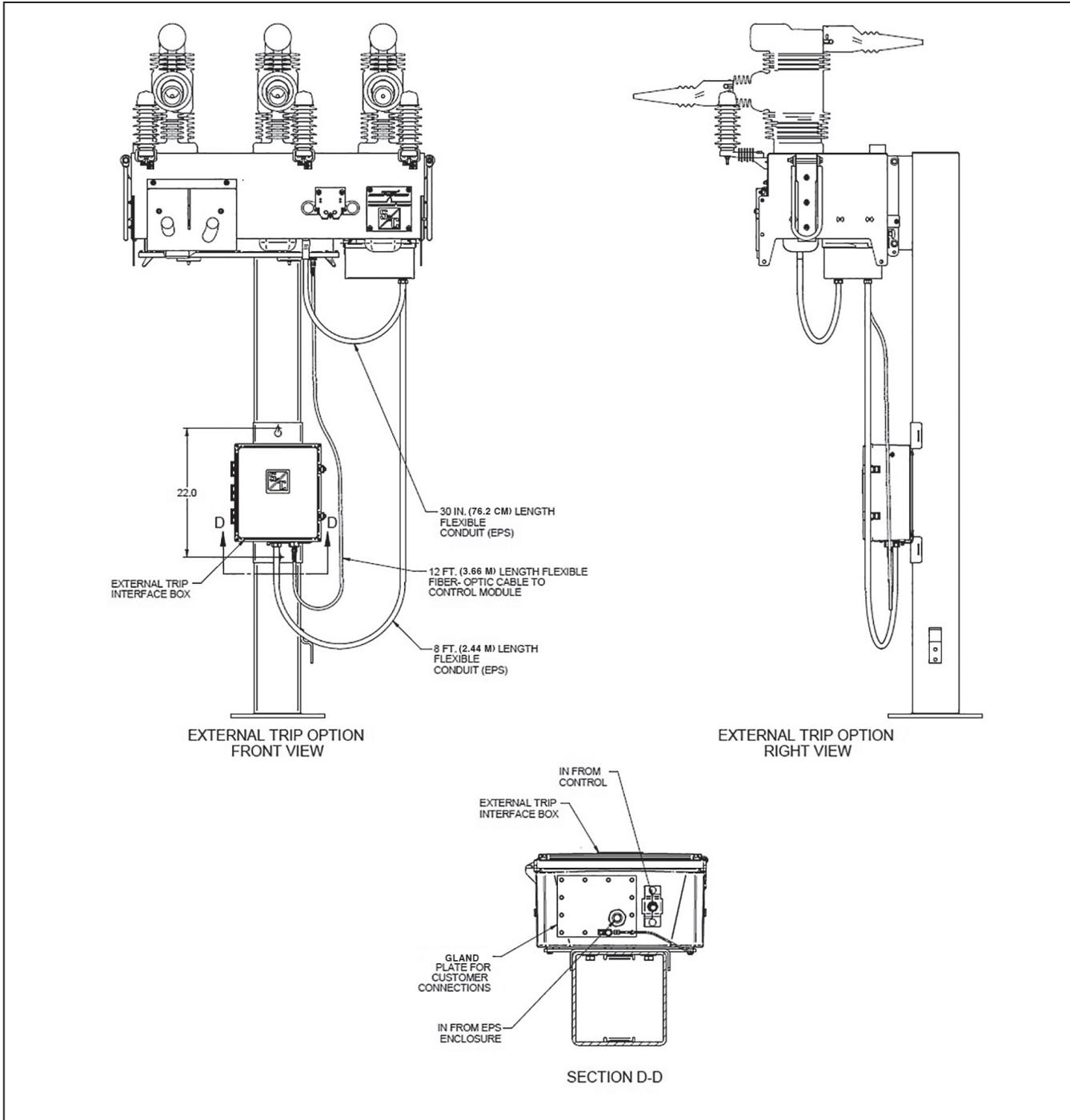


Figure 7. A pedestal-mounted external interface assembly.

Wiring

Follow these steps to install wiring to the terminal blocks:

STEP 1. Terminal blocks for control power require wires terminated with ring or spade lugs suitable for use with #10 screws. Refer to the “Control Power” section on page 9 and attach the external interface assembly power connections to terminal strip TB 1.

STEP 2. Connect the wetting voltage return for the inputs to the terminals labeled Input Wetting RTN. For SDA-5798, see Figure 8, and for SDA-5798-1, see Figure 10 on page 15.

Note: The wetting return is the dc-negative connection or the ac-neutral connection. The drive current of the input will vary based on the application voltage shown in Table 1.

Table 1. Application Voltage Drive Current

Application Voltage	Input Drive Current
24 Vdc	2.75 mA
48 Vdc	3.34 mA
125 Vdc	5.12 mA
120 Vac	5.89 mA

STEP 3. Connect the other inputs as required.

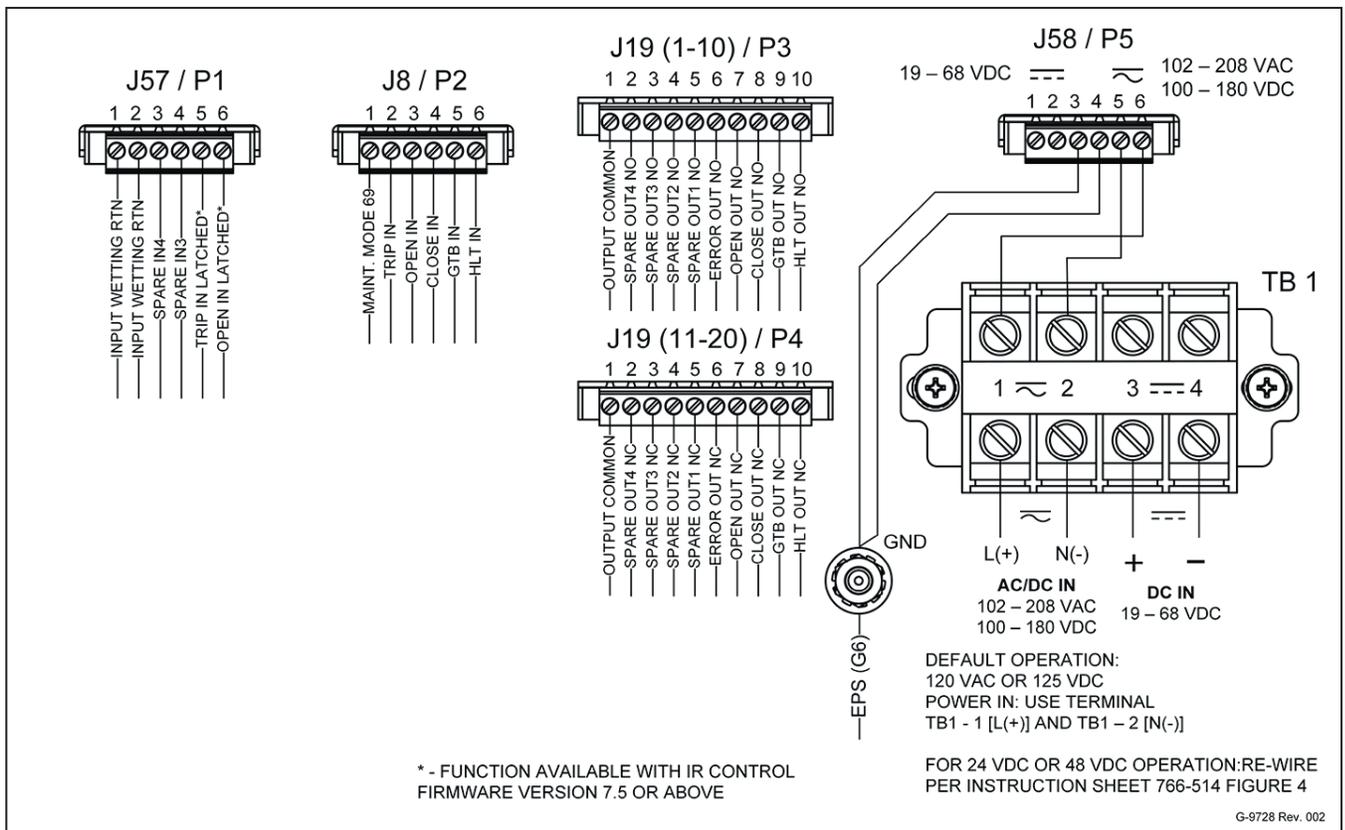


Figure 8. The SDA-5798 connection diagram.

Installation

STEP 4. The output relays provide a form C contact configuration, as shown in Figure 9. The common contact of each output relay is connected to the Output Common terminal. Either the wetting voltage hot (dc+ or ac line) or the wetting voltage common (dc- or ac neutral) can be connected to the Output Common terminal. For the outputs, connect the desired wetting voltage signal to the Output Common terminal. For SDA-5798, see Figure 8 on page 13, and for SDA-5798-1, see Figure 10 on page 15.

Note: The output contacts have limited current-carrying capabilities that are dependent on the wetting voltage being used. See Table 2 for the current limitations.

Table 2. Output Current Carrying Limitations

Wetting Voltage	Maximum Current
19 to 30 Vdc	1.6 amps
31 to 110 Vdc	0.24 amps
111 to 180 Vdc	0.22 amps
102 to 125 Vac	0.4 amps
126 to 208 Vac	0.2 amps

STEP 5. For SDA-5798, connect the other outputs as required. For SDA-5798-1, note that only the normally open (NO) contact is brought to the terminal block. If a normally closed (NC) contact is needed, remove the desired output connection from J19 (1-10)/P3 and transfer it to

the same location on J19 (11-20)/P4. See Figure 8 on page 13 for the detailed terminal designations. To change all of the outputs from normally open to normally closed, move the plug in J19 (1-10)/P3 to J19 (11-20)/P4.

NOTICE

Normally open contacts are open when the logic driving the output is inactive and closed when the logic driving the output is active. Example: When the IntelliRupter fault interrupter is open, the open-output normally open contact is closed.

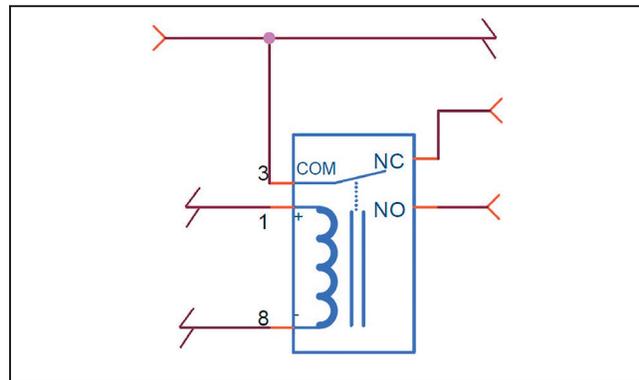


Figure 9. The output relay connections.

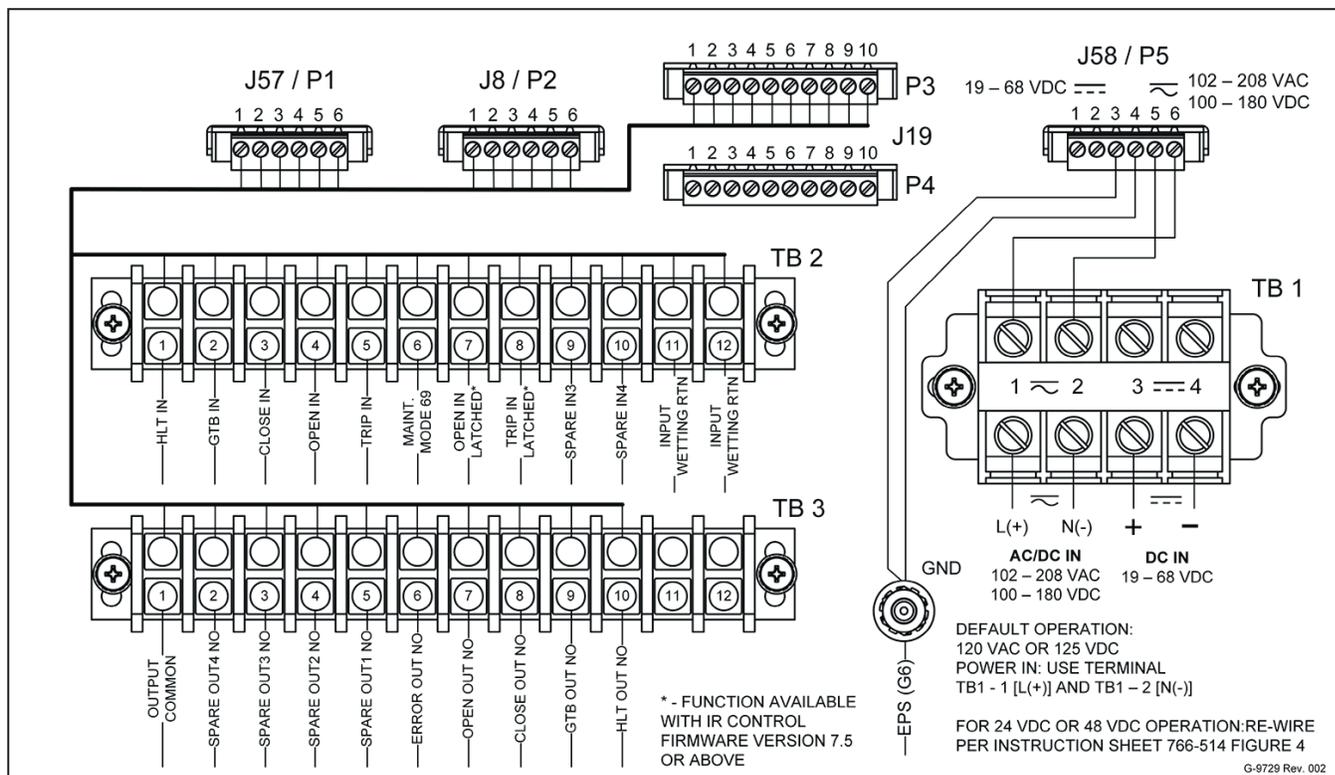


Figure 10. The SDA-5798-1 connection diagram.

Inputs

There are defined function inputs where functions correspond to the input name.

Table 3. Defined Function Inputs

Input Name	Description	Terminal
Maint. Mode 69	This is provided for connection to a 69 switch. See S&C Instruction Sheet 766-530 for configuration options.	P2-1
Trip	This trips the IntelliRupter fault interrupter open from the protective device. Response time is 22 ms from logic high to interrupter operation. Total Clear time \leq 56 ms.①②	P2-2
Open	This opens the IntelliRupter fault interrupter. This is provided for the control house manual interface and will operate at the same speed as the trip input.③④	P2-3
Close	This closes the IntelliRupter fault interrupter. Response time is 59 ms from logic high to first pole close. Total close time is eight cycles for point-on-wave closing and 21.5 to 26.5 cycles for PulseClosing® Technology.	P2-4
Ground Trip Block	This applies the Ground Trip Block function when a logic high is applied. See S&C Instruction Sheet 766-530 for configuration options.	P2-5
Hot Line Tag	This applies the Hot Line Tag function when a logic high is applied. See S&C Instruction Sheet 766-530 for configuration options.	P2-6
Open Latched③	This opens the IntelliRupter fault interrupter. A latched signal at this input puts the IntelliRupter fault interrupter into the Latched Open state and blocks closing until it is removed. This operates at the same speed as the open input. This latching input is only available with firmware version 7.5.x and later.	P1-6
Trip Latched①	This trips the IntelliRupter fault interrupter open. A latched signal at this input puts the IntelliRupter fault interrupter into the Latched Trip state and blocks closing until it is removed. This operates at the same speed as the trip input. This latching input is only available with firmware version 7.5.x and later.	P1-5

① Use either the trip or trip latched input, not both at the same time.

② This input is non-latching; use the trip latched input for a latching input.

③ Use either the open or open latched input, not both at the same time.

④ This input is non-latching; use the open latched input for a latching input.

IntelliTeam® SG Automatic Restoration System

The IntelliTeam SG Automatic Restoration System recognizes the **Trip**, **Open**, and **Close** commands of the external interface as follows:

- The **Trip** command is recognized as an automatic operation allowing restoration.
- The **Open** and **Close** commands are recognized as a manual operation, disabling the IntelliTeam SG Automatic Restoration System.
- The **Maintenance Mode** state blocks **Open/Close** IntelliTeam SG system commands.
- The **Latched Trip** or **Open** state blocks **Open/Close** IntelliTeam SG system commands.

Latched Inputs

Table 4. Latched Input Characteristics

Input Name	Description
Maint. Mode 69	This function is held active until the input is removed. A pulsed input only results in a momentary assertion of the function.
Open Latched ^①	A latched signal at this input puts the IntelliRupter fault interrupter into the Latched Open state and blocks closing until it is removed. This latching input is only available for firmware version 7.5.x or later.
Trip Latched ^①	A latched signal at this input puts the IntelliRupter fault interrupter into the Latched Trip state and blocks closing until it is removed. This latching input is only available for firmware version 7.5.x or later.
Close ^①	A latched signal at the closed input does not prevent the IntelliRupter fault interrupter from being opened. If the IntelliRupter fault interrupter is open while a latched signal is present at the closed input, a transition from latched to unlatched must occur before the next close operation is executed from the close input.
Ground Trip Block	This function is held active until the input is removed. A pulsed input only results in a momentary assertion of the function.
Hot Line Tag	This function is held active until the input is removed. A pulsed input only results in a momentary assertion of the function.

^① If the control receives an input from both the open and close inputs, the control will open the IntelliRupter fault interrupter and enter an **Open/Close Mismatch Error** state.

Outputs

There are defined function outputs where functions correspond to the output name.

Each output has a normally open contact and a normally closed contact. When the designated function is active, the contact states will change until that function is deactivated.

Table 5. Defined Function Outputs

Input Name	Description
Error	This output will activate when the connection to the control has been lost or the control is in an Error state indicating that operations through the external interface are not possible.
Open	Only three-phase indication is provided. When there is a Pole Mismatch state, the indication is "Closed." Only when all three poles are open will the indication be "Open."
Close	Only three-phase indication is provided. When there is a Pole Mismatch state, the indication is "Closed." Only when all three poles are open will the indication be "Open."
Ground Trip Block	This is active when the Ground Trip Block function is applied. See S&C Instruction Sheet 766-530 for configuration options.
Hot Line Tag	This is active when the Hot Line Tag function is applied. See S&C Instruction Sheet 766-530 for Hot Line Tag protection profile options.
Spare OUT1	These options will be provided in a future firmware version. See S&C Instruction Sheet 766-530 for configuration options.
Spare OUT2	Same as OUT1.
Spare OUT3	Same as OUT1.
Spare OUT4	Same as OUT1.

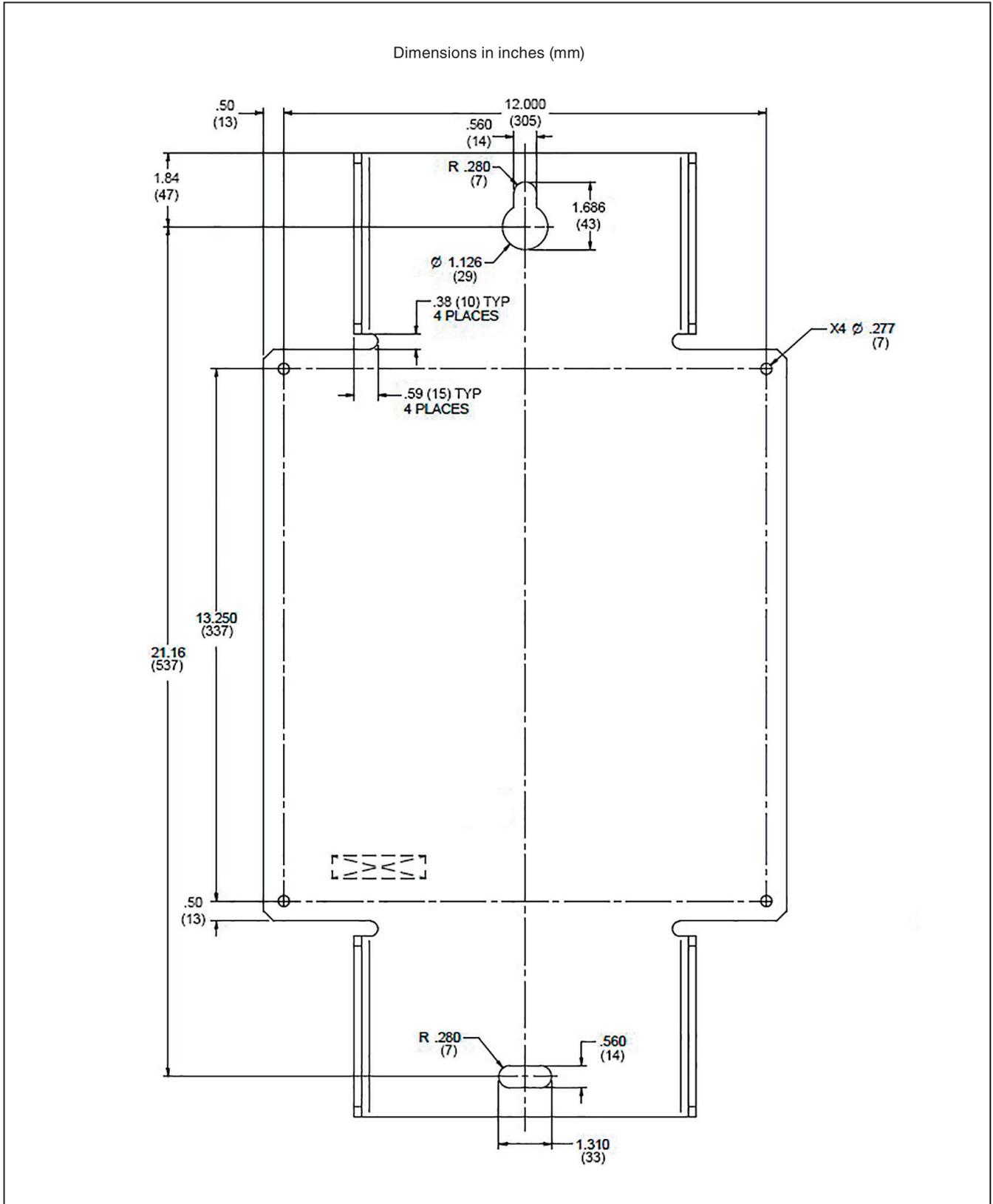


Figure 11. Mounting bracket dimensions.