Instruction Booklet **IB158011EN**

Effective April 2023
Supersedes March 2023

# Innovative Technology SPD products —the I.T. Protector

This Instruction Booklet covers the installation and operation of the following SPD products: PTE050, PTE080, PTE/X100, PTE/X120, PTE/X160, PTE/X200.


## Contents



Powering Business Worldwide

# 1.0 Introduction

## 1.1 Scope

This instruction booklet covers the installation and operation of Eaton's line of I.T. Protector™ surge protective devices (SPDs) for the following electrical system wiring configurations:

- Single-phase (1P101, 1P201)
- Split-phase (1S101)
- Three-phase wye (star) (3Y101, 3Y201, 3Y300)
- Three-phase high-leg delta (3D101)
- Three-phase delta (no neutral) (NN201, NN400, NN501)

## 1.2 I.T. Protector catalog numbering system

Before connecting the SPD to the electrical system, locate the label applied to the SPD that contains the device's catalog number, and then use the guide below to verify that the SPD matches the electrical system's voltage and wiring configuration.

**PT X 100 3Y101- NS4N**

| Model |
|---|
| **PT** = I.T. Protector |

| Circuit design |
|---|
| **X** = Standard suppression |
| **E** = Active Tracking Network® (ATN) Sine wave tracking, UL® 1283 7th Edition |

| Per phase peak surge current (kA) | |
|---|---|
| **050** = 50 ① | **120** = 120 |
| **080** = 80 ① | **160** = 160 |
| **100** = 100 | **200** = 200 |

| Options |
|---|
| **NL** = LED display |
| **NS** = S.M.A.R.T. system diagnostics |

| Options |
|---|
| **4N** = NEMA® 4 |
| **4X** = NEMA 4X |

| Configuration and voltage ranges (Vac) | Number of wires |
|---|---|
| **1P101** = Single-phase—100, 110, 120, 127 | 2W+G |
| **1P201** = Single-phase—200, 208, 220, 230, 240, 277 | 2W+G |
| **1S101** = Split-phase—100/200, 110/220, 120/240, 127/254 | 3W+G |
| **3Y101** = Three-phase wye (star)—100/175, 110/190, 120/208, 127/220 | 4W+G |
| **3Y201** = Three-phase wye (star)—220/380, 230/400, 240/415, 277/480 | 4W+G |
| **3Y300** = Three-phase wye (star)—305/525, 347/600 | 4W+G |
| **3D101** = Three-phase high-leg delta—120/240 | 4W+G |
| **NN201** = Three-phase delta (no neutral)—200, 208, 220, 230, 240 | 3W+G |
| **NN400** = Three-phase delta (no neutral)—380, 400, 415, 440, 480 | 3W+G |
| **NN501** = Three-phase delta (no neutral)—525, 600 | 3W+G |

① 050/080 kA models PTE only.

FLUSHMNTPLATE15 = flushmount plate, PTE/PTX 050–100 kA
FLUSHMNTPLATE16 = flushmount plate, PTE/PTX 120–200 kA

In this example, catalog number PTX1003Y101-NS4N identifies a protector with the following features and ratings:

PTX = Standard suppression

100 = 100 kA surge current rating

3Y = Three-phase wye configuration

101 = 100/175 to 127/220 Vac voltage range

-NS4N = S.M.A.R.T.™ system diagnostics with NEMA® 4 enclosure (powder-coated steel enclosure)

## 1.3 Safety precautions

All safety codes, safety standards, and/or regulations must be strictly observed in the installation, operation, and maintenance of this device. A licensed/qualified electrician must complete all instructions and measurements described in this instruction booklet in accordance with the U.S. National Electrical Code®, state and local codes, or other applicable country codes. The U.S. National Electrical Code, state and local requirements, (or other applicable country codes) supersede this instruction booklet.

Read and understand all instructions before beginning the installation.

**⚠ WARNING**

**THE USE OF THE WORD WARNING IN THIS MANUAL DENOTES A POTENTIAL HAZARD ASSOCIATED WITH THE USE OF THIS EQUIPMENT. IT CALLS ATTENTION TO A PROCEDURE, PRACTICE, CONDITION, OR THE LIKE, WHICH IF NOT CORRECTLY PERFORMED OR ADHERED TO, COULD RESULT IN PERSONAL INJURY OR DEATH.**

**⚠ CAUTION**

**THE USE OF THE WORD CAUTION IN THIS MANUAL DENOTES A POTENTIAL HAZARD ASSOCIATED WITH THE USE OF THIS EQUIPMENT. IT CALLS ATTENTION TO A PROCEDURE, PRACTICE, CONDITION, OR THE LIKE, WHICH IF NOT CORRECTLY PERFORMED OR ADHERED TO, COULD RESULT IN DAMAGE TO THE EQUIPMENT.**

**⚠ WARNING**

**SHOCK HAZARD—DO NOT OPEN.
AVERTISSEMENT: RISQUE DE DECHARGE ELECTRIQUE—NE PAS OUVRIR.**

**⚠ WARNING**

**IMPROPER INSTALLATION CAN CAUSE DEATH, INJURY, AND/OR EQUIPMENT DAMAGE. FOLLOW ALL WARNINGS AND CAUTIONS. COMPLETELY READ AND UNDERSTAND THE INFORMATION IN THIS DOCUMENT BEFORE ATTEMPTING TO INSTALL OR OPERATE THIS EQUIPMENT.**

**⚠ WARNING**

**IMPROPER WIRING COULD CAUSE DEATH, INJURY, AND/OR EQUIPMENT DAMAGE. ONLY LICENSED/QUALIFIED ELECTRICIANS WHO ARE TRAINED IN THE INSTALLATION AND SERVICE OF ELECTRICAL DEVICES ARE TO SERVICE THIS EQUIPMENT. ALWAYS DISCONNECT, LOCK-OUT AND TAG THE CURRENT AND VOLTAGE SOURCES AND THE CONTROL POWER SUPPLY CIRCUIT BEFORE REMOVING ENCLOSURE COVER FROM THIS DEVICE.**

**⚠ WARNING**

**USE APPROPRIATE SAFETY PRECAUTIONS, PPE AND EQUIPMENT FOR ARC FLASH PROTECTION.**

**⚠ WARNING**

**DURING NORMAL OPERATION, HAZARDOUS VOLTAGES ARE PRESENT INSIDE THE UNIT.**

**⚠ WARNING**

**FOR USE ON CIRCUITS DELIVERING UP TO 200,000 RMS AMPS.
CONVIENT Á DES CIRCUITS PRODUCISANT AU PLUS 200,000 A EFF.**

# 2.0 Installation

## 2.1 Before Installation

Perform or plan the following before installing the SPD:

1. Refer to Section 1.2 and verify that the correct SPD model is being installed.

**⚠ WARNING**

**SHOCK HAZARD: WHEN WORKING INSIDE THE SPD AS DESCRIBED IN ANY OF THE FOLLOWING STEPS, BE SURE TO FOLLOW ALL SAFE WORK PRACTICES TO AVOID AN ELECTRICAL SHOCK HAZARD.**

2. For systems with a neutral wire, there must be a neutral to ground/earth bond present at the SPD. Note that the SPD may be damaged if not connected to ground.
3. Measure the voltage between neutral and ground. If this voltage is greater than 5 Vac, then a problem may exist in the electrical system. The SPD can still be installed under this condition, but a licensed electrician should be consulted to correct the problem.
4. If necessary, the cover may be rotated in 90-degree increments. When removing the cover, be careful not to damage the indicator light circuit board or wiring attached to the cover as outlined in Section 3.1.
5. Isolated ground: The SPD's ground wire is internally bonded to its housing. If the electrical system utilizes an isolated ground, then the SPD's housing must be isolated from ground using insulated conduit fittings, and its ground wire must be connected to the system's isolated ground bus. When making this connection, always follow national, state, and local wiring codes.
6. When a NEMA 4X enclosure is used, plan on installing weatherproof (corrosion resistant) conduit and fittings to maintain the enclosure's 4X rating.
7. Plan to install the SPD as close as possible to the electrical panel. Long lead lengths and sharp bends between the SPD and the electrical panel will degrade the performance of the SPD.
8. If necessary, install an overcurrent protective device between the SPD and electrical system per national, state, and local electrical codes as described in Section 4.0.

# 3.0 Mounting the SPD

Select a location where the SPD will be mounted based on the internal configuration of the electrical panel and the physical surroundings outside the panel. Choose a mounting location that provides the shortest possible wire length to the overcurrent protective device (when used) and then to the electrical panel's bus bar.

Once a location has been determined, mount the SPD to the nearby supporting surface using the SPD's mounting feet and suitable fasteners. Mounting feet and hole dimensions of each SPD model are shown in **Figure 2** through **Figure 5**.

## 3.1 Rotating the SPD

The SPD can be rotated to minimize wire length. The cover can then be rotated in 90-degree increments to improve viewing. To rotate the cover, follow these steps.

1. Loosen, but do not remove, the cover clips.
2. Support the cover, which has a printed circuit board mounted to the back of it, while removing the cover from the base. The cover is attached to the base with a ground wire.
3. Carefully rotate the cover and place it back onto the base and secure the cover clamps. Torque to 35 in-lb (±3 in-lb).

### 3.2 Conduit installation guidelines

The following guidelines should be followed when installing conduit between the SPD and electrical panel:

- Avoid using 90-degree elbows and keep the conduit run as short and straight as possible (see **Figure 1**)
- If the electrical system utilizes an isolated ground, then the SPD's housing must be isolated from ground using insulated conduit fittings
- When applicable, use weatherproof (corrosion resistant) conduit and fittings to maintain the enclosure's NEMA 4 or 4X rating

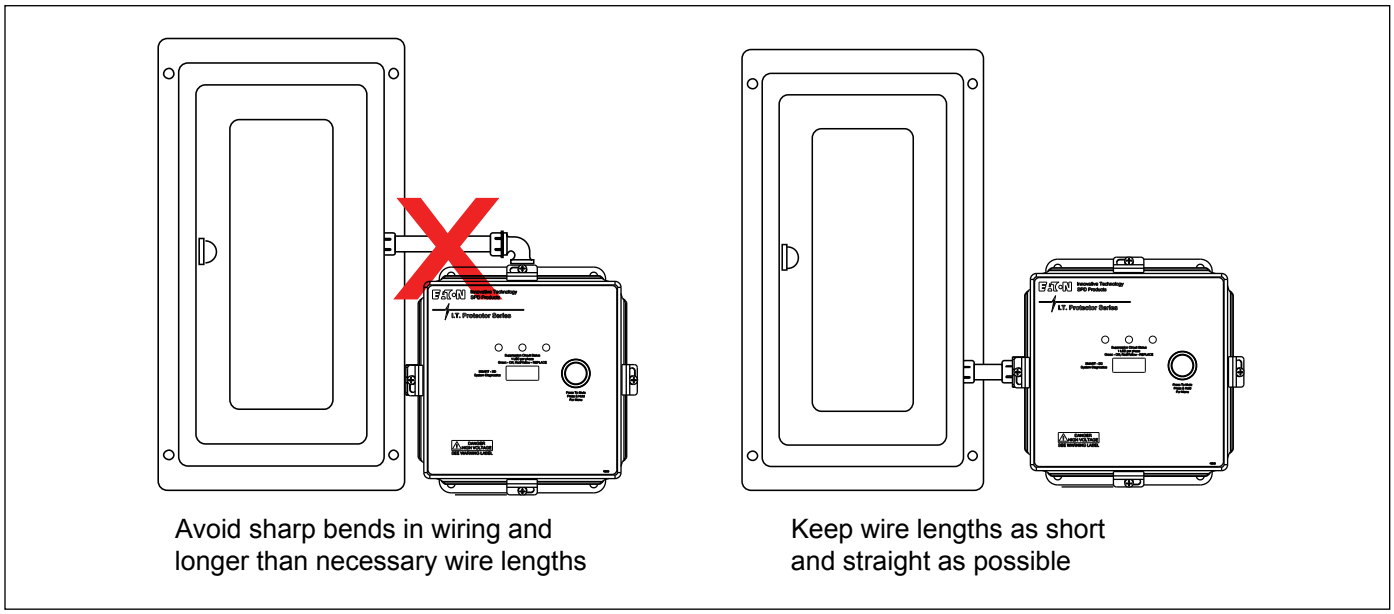


**Figure 1. Conduit installation guidelines**

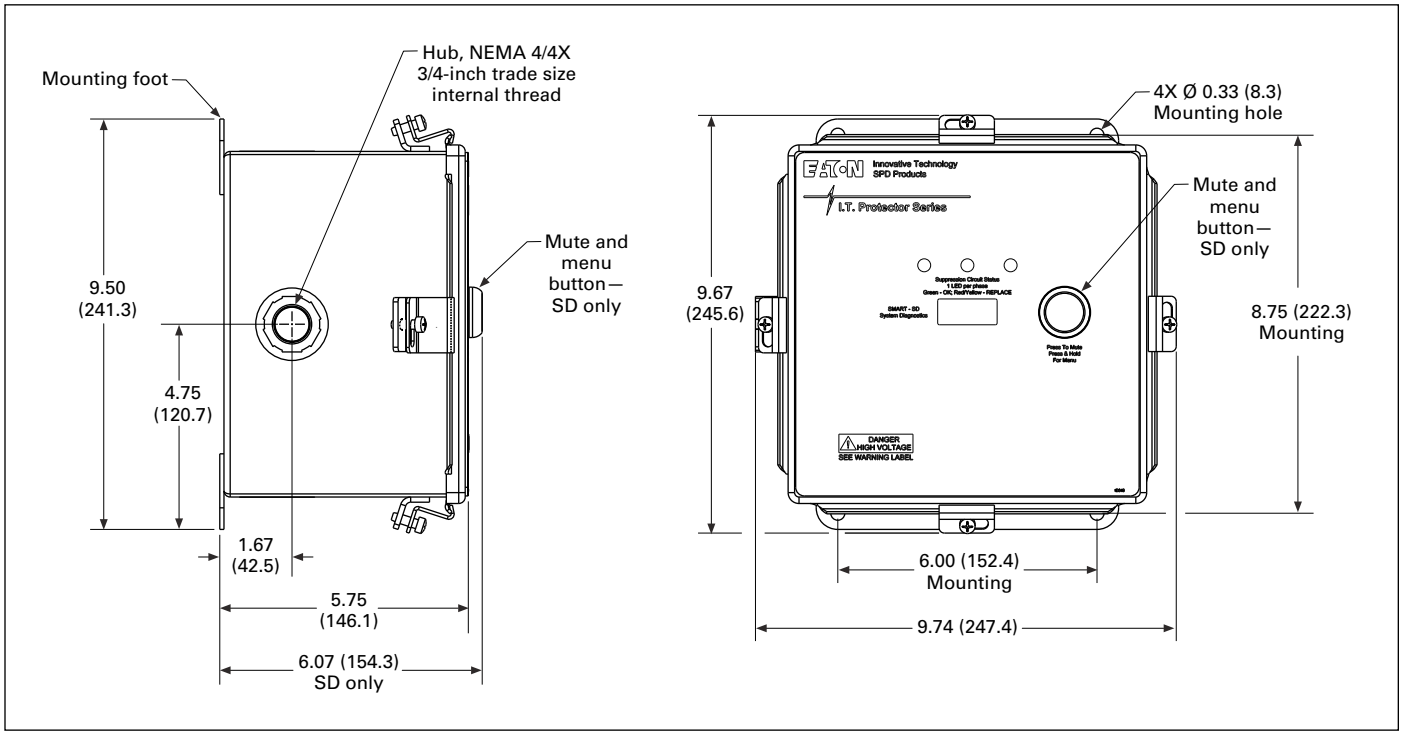


**Figure 2. PTE050, PTE080, PTE/X100—all models**

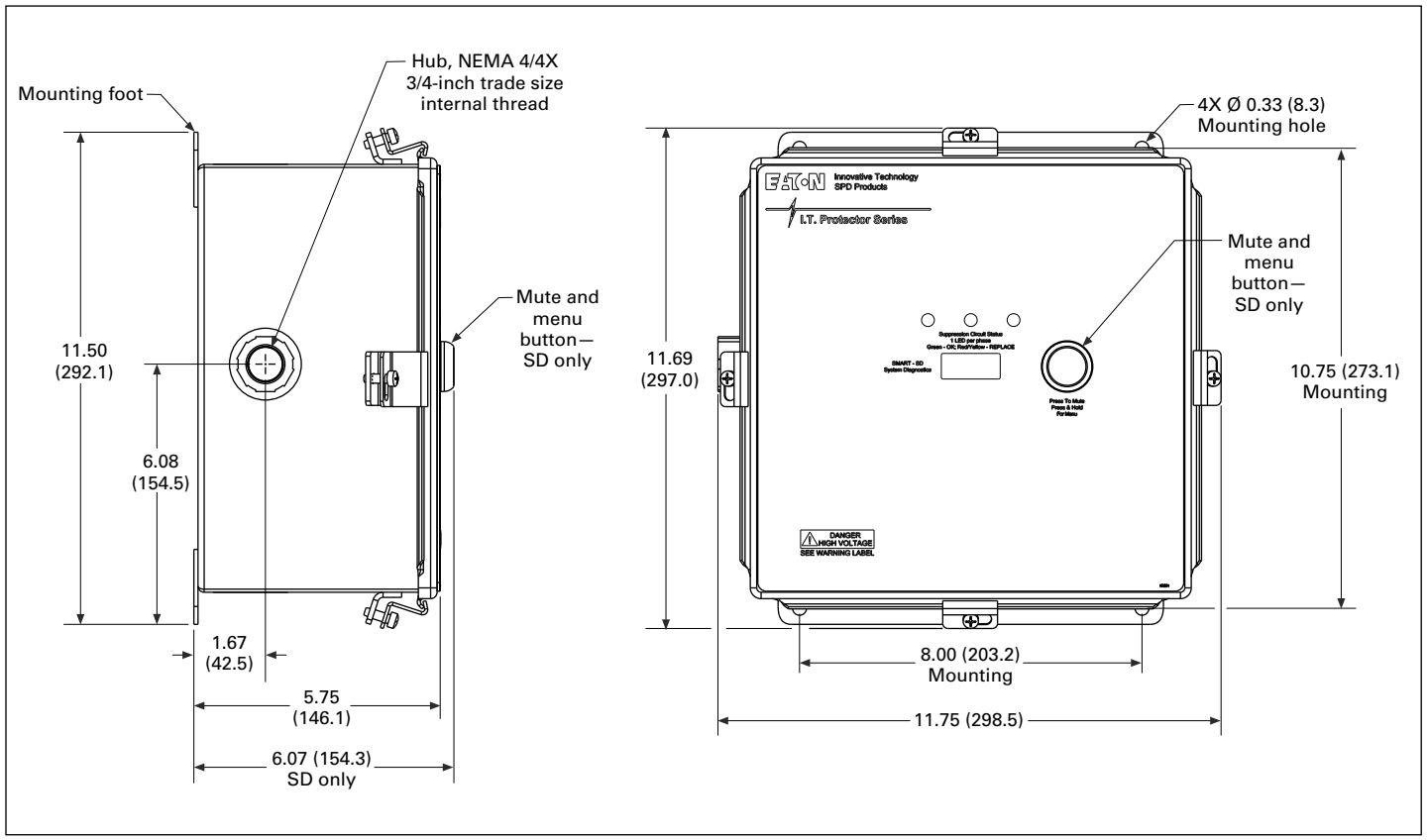


**Figure 3. PTE/X120, PTE/X160, PTE/X200—all models**

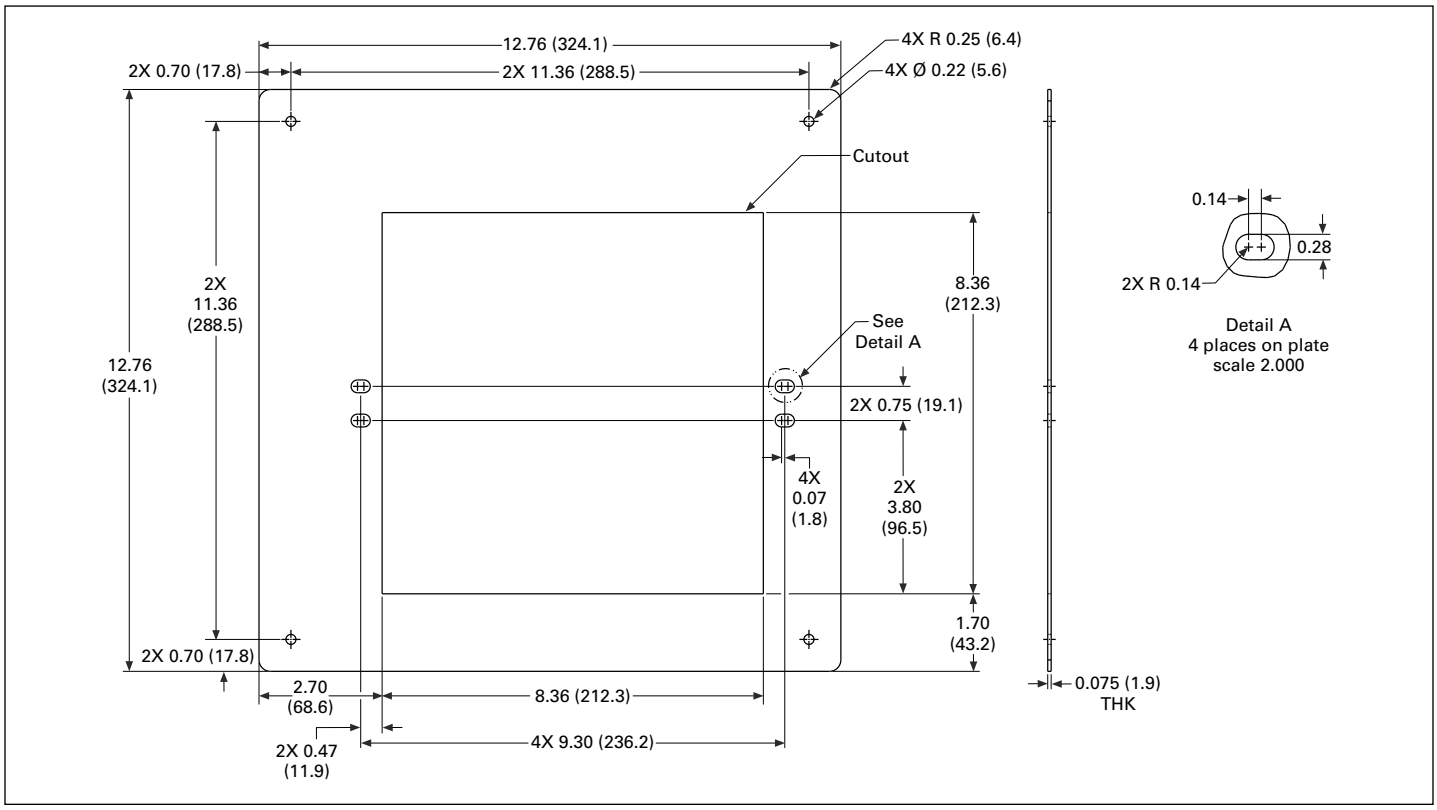


**Figure 4. FLUSHMNTPLATE15 PTE/X units 50, 80, 100 kA**

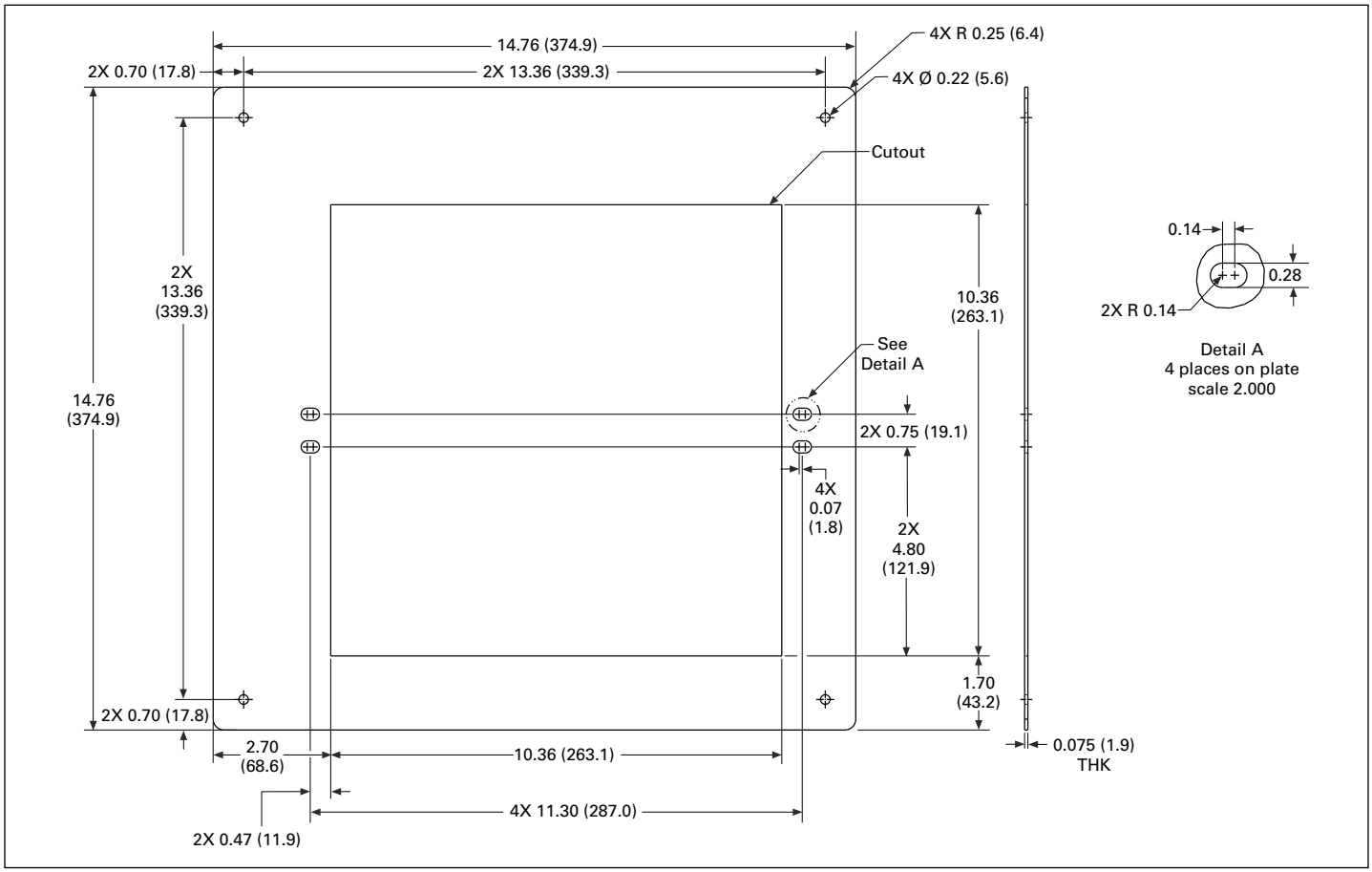


**Figure 5. FLUSHMNTPLATE16 PTE/X units 120, 160, 200 kA**

## 4.0 Wiring SPD to electrical system

**⚠ WARNING**

**SHOCK HAZARD: WHEN WORKING INSIDE THE SPD, BE SURE TO DE-ENERGIZE THE ELECTRICAL SYSTEM AND FOLLOW SAFE WORK PRACTICES TO AVOID AN ELECTRICAL SHOCK HAZARD.**

**Important!**

- Keep all connecting leads as short and straight as possible. Eaton does not recommend extending the lead lengths. Additionally, the conductors should be twisted together by approximately one turn every two inches for as much of the wire run as possible to achieve maximum SPD performance
- Always connect the SPD to the **load side** of the main disconnect
- If the system utilizes an isolated ground, then the SPD's ground wire must be connected to the system's isolated ground bus

Follow these steps to install the SPD.

1. Verify the SPD is the correct voltage configuration for the system voltage. Refer to Section 1.2.
2. Identify the neutral, ground, and phase wires. These wires are labeled and/or color coded as follows:

   **Neutral** = White or Gray
   **Ground** = Green or Green w/Yellow Stripe
   **Phase A, B, C** = Black or Orange
   Note that SPDs (models NN201, NN400, and NN501) that are connected to three-phase delta (no neutral) electrical systems do not contain a neutral (WHT) wire.
3. See **Figure 6** through **Figure 10**. Locate the wiring diagram of the electrical system to which the SPD is being connected. Perform the procedure associated with that wiring diagram to connect the SPD.
4. Route the wires from the SPD (through conduit, weatherproof conduit, and fittings for NEMA 4X applications) into the electrical panel.
5. If using the Form C relay for remote alarm purposes, then proceed to Section 4.1.
6. **For Type 2 SPD models, a customer supplied 30 A single-throw circuit breaker can be installed, normally located inside the electrical panel in close proximity to the SPD's wire-entry point.**

- **Single-phase (1P101, 1P201)**

  a. Connect the SPD's ground (GRN) wire directly to the electrical panel's ground bus bar.

  b. Do the following:

  **Phase A line connection**—Connect the SPD's phase A (BLK) wire to the electrical panel's phase A voltage bus bar.

  **Neutral connection**—Connect the SPD's neutral (WHT) wire directly to the electrical panel's neutral bus bar.

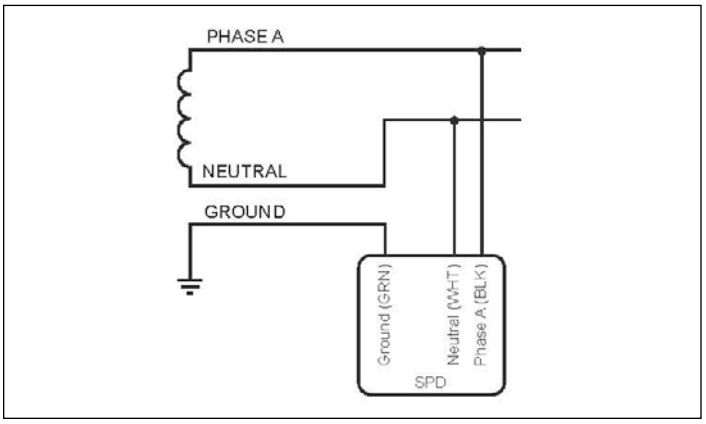


**Figure 6. Single-phase (1P101, 1P201)**

- **Split-phase (1S101)**

  **Important!** Do not install SPD if the neutral to ground (earth) bond is not present as the SPD may be damaged.

  a. Connect the SPD's ground (GRN) wire directly to the electrical panel's ground bus bar.

  b. Connect the SPD's neutral (WHT) wire directly to the electrical panel's neutral bus bar.

  c. Connect the SPD's phase A (BLK) wire to the electrical panel's phase A voltage bus bar.

  d. Repeat Step c to connect the SPD's phase C (BLK) wire to its associated bus bar.

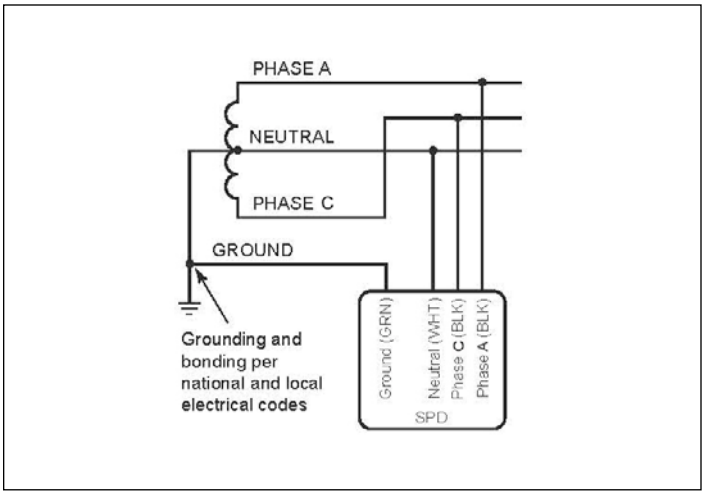


**Figure 7. Split-phase (1S101)**

- **Three-phase wye (star) (3Y101, 3Y201, 3Y300)**

  **Important!** Do not install SPD if the neutral to ground (earth) bond is not present as the SPD may be damaged.

  a. Connect the SPD's ground (GRN) wire directly to the electrical panel's ground bus bar.
  b. Connect the SPD's neutral (WHT) wire directly to the electrical panel's neutral bus bar.
  c. Connect the SPD's phase A (BLK) wire to the electrical panel's phase A voltage bus bar.
  d. Repeat Step c to connect the SPD's phase B (BLK) and C (BLK) wires to their associated bus bars.

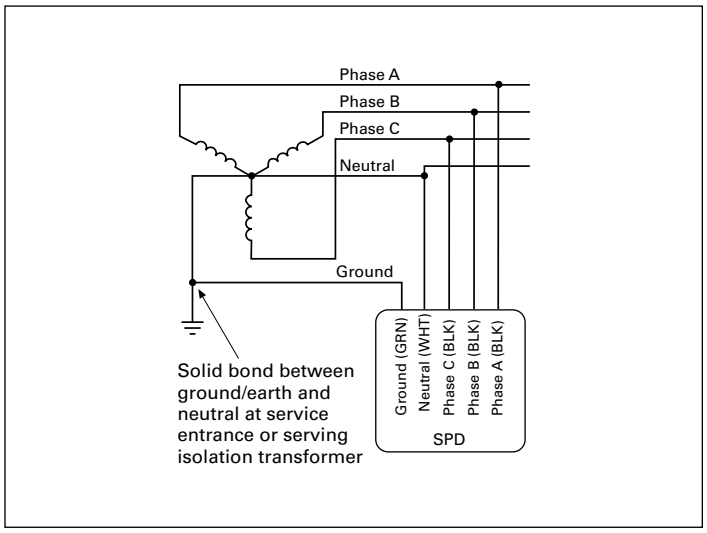


**Figure 8. Three-phase wye (star) (3Y101, 3Y201, 3Y300)**

- **Three-phase delta (no neutral) (NN201, NN400, NN501)**

  a. Connect the SPD's ground (GRN) wire directly to the electrical panel's ground bus bar.
  b. Connect the SPD's phase A (BLK) wire to the electrical panel's phase A voltage bus bar.
  c. Repeat Step b to connect the SPD's phase B (BLK) and C (BLK) wires to their associated bus bars.

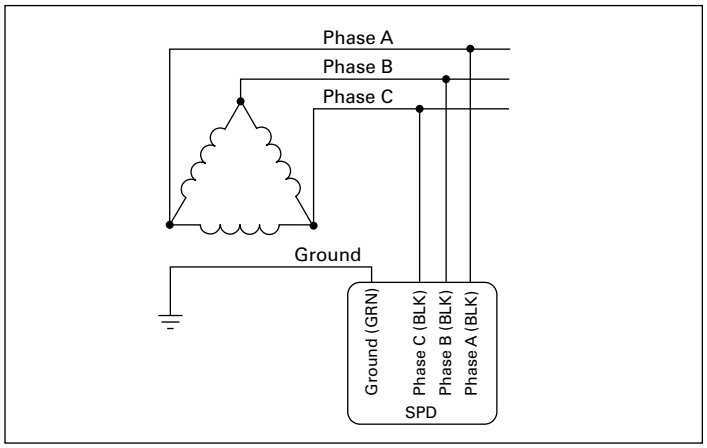


**Figure 9. Three-phase delta (no neutral) (NN201, NN400, NN501)**

- **Three-phase delta (high leg) (3D101)**

  **Important!** Do not install SPD if the neutral to ground (earth) bond is not present as the SPD may be damaged.

  a. Connect the SPD's ground (GRN) wire directly to the electrical panel's ground bus bar.
  b. Connect the SPD's neutral (WHT) wire directly to the electrical panel's neutral bus bar.
  c. Connect the SPD's phase A (BLK) wire to the electrical panel's phase A voltage bus bar.
  d. Repeat Step c to connect the SPD's phase B (ORG) and C (BLK) wires to their associated bus bars.

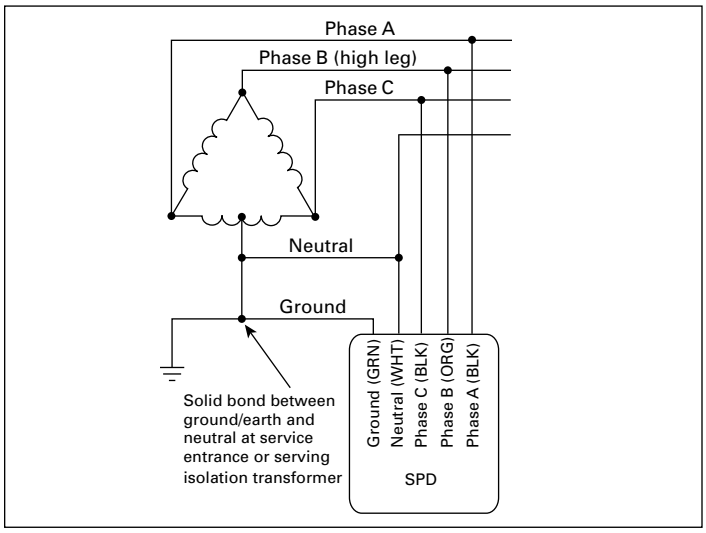


**Figure 10. Three-phase delta (high leg) (3D101)**

### 4.1 Form C relay contacts

The SPD's Form C relay (mounted to the inside of the cover) provides two sets of dry contacts labeled NO (normally open), NC (normally closed), and COM (common). The label indicates the position of the contacts when the relay is energized.

The relay contacts are rated 125 Vac at 0.5 A, or 30 Vdc at 1 A.

The Form C relay contacts are "fail safe" and only change state when the relay is energized by all phase voltages being protected. By connecting a remote alarm to these contacts, the alarm can be made to activate when the relay de-energizes as the result of losing protection on at least one phase voltage.

Connect the SPD's Form C relay contacts to a remote alarm device as follows:

**⚠ WARNING**

**SHOCK HAZARD: WHEN WORKING INSIDE THE SPD, BE SURE TO DE-ENERGIZE THE ELECTRICAL SYSTEM AND FOLLOW SAFE WORK PRACTICES TO AVOID AN ELECTRICAL SHOCK HAZARD.**

1. Carefully remove the SPD cover by loosening, but not removing, the cover clamps, taking care not to damage the printed circuit board and wiring mounted to the cover. A ground wire attached to the cover will support the cover.
2. Using a small flat-blade screwdriver, connect a customer supplied alarm device (and if required, a power source) to the Form C relay's COM and N/C or N/O terminals as necessary for proper device operation. Note that the relay terminals accept AWG #26 to #16 (0.16 to 0.5 $mm^2$) wire rated 600 V. Be sure to follow applicable U.S. NEC® Articles (or other applicable country codes). Also, follow rules of wiring class used when determining routing of alarm leads.
3. In the example shown in **Figure 11**, the Form C relay will de-energize if one of the phase voltages loses protection, causing the alarm to activate.

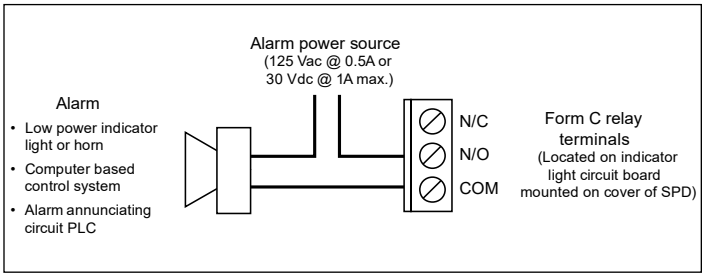


**Figure 11. Typical alarm wiring**

4. Recheck all connections and then reinstall cover. Torque to 35 in-lb (±3 in-lb).

## 5.0 Operation

### 5.1 Power up and system checkout

Switch main panel power to ON and then switch branch circuit breaker to ON. One LED should light for each phase voltage being monitored. Single-phase electrical systems will light only one LED, split-phase systems light two LEDs, and three-phase systems will light all three LEDs. If the connected LEDs do not light, remove power, check connections, and test again. If the LEDs still do not light, contact your local authorized distributor or Power Quality Technical Resource Center at: 1-800-809-2772, option 5, sub-option 2, or email spd@eaton.com as the SPD may be damaged.

### 5.2 LED color states

The LEDs located on the lid of the SPD have three LED color states:

Green: Fully protected

Yellow: Loss of neutral to ground protection

Red: Loss of phase protection

If the electrical system is single-, split- or three-phase, the SPD will have either one, two or three green illuminated LEDs, respectively. Each LED will illuminate when its associated phase voltage is present. If any of these LEDs are not green, then a problem may exist. Disconnect power, check connections and test again. If the LEDs are still not green, disconnect power to the SPD and contact your local authorized distributor or Power Quality Technical Resource Center at: 1-800-809-2772, option 5, sub-option 2, or email spd@eaton.com as the SPD may be damaged.

### 5.3 Options: audible alarm and Form C relay

**Note:** Utilization of Form C contacts is optional. Connection is not required for the proper operation of the SPD.

The audible alarm ① and Form C relay are tied to the Phase LEDs located on the enclosure's lid. If voltage or protection to one or more phases is lost, then the following will occur:

- Single-, split-, and three-phase devices—if all voltage is lost to the SPD, then the green LED(s) will go out, the alarm will not sound, and the relay will not be energized
- Split- and three-phase devices—if one phase voltage is lost to the SPD, then that one green LED will go out, the alarm will not sound, and the relay will stay energized (if there is another phase voltage present)
- Three-phase wye and three-phase high-leg delta devices—if one or two phase voltages are lost to the SPD, then one or two green LEDs will go out, the alarm will not sound, and the relay will stay energized (if there is another phase voltage present)
- Three-phase delta—SPD needs at least two phases to energize the relay and to keep the alarm from sounding (if installed)
- Single-, split-, and three-phase devices—if one or more LEDs turn red, then the alarm will sound and the relay will de-energize. To silence the alarm, press the Mute button, disconnect power to the SPD, and contact your local authorized distributor or Power Quality Technical Resource Center at: 1-800-809-2772, option 5, sub-option 2, or email spd@eaton.com as the SPD may be damaged

**Note:** Form C relay contacts are "fail safe" and only change state when power is applied to the SPD and the electrical system is operating normally or when loss of protection is detected and yellow or red LEDs are illuminated.

**Note:** If the initial power-up voltage to the SPD is of a slow rising ramp configuration, the Form C relay may not activate correctly. This can be cleared by running through the Test Mode portion of the front panel navigation menu in order to reset the Form C relay.

① The audible alarm is only included on the "-NS" option.

## 6.0 S.M.A.R.T. system diagnostics (-NS) option

The S.M.A.R.T. (Suppression Monitoring And Recording Technology) system diagnostics is installed on the lid of the I.T. Protector when the suffix "-NS" is part of the SPD's model number.

The S.M.A.R.T. surge counter is multi-functional with four (low, medium, high, and total) surge recordings, LED phase protection indicators, and an audible alarm.


**Figure 12. S.M.A.R.T. surge counter**

### Display

A two-line, eight characters per line LCD. The LCD displays the following as applicable:

- Phase protection indication
- Number of low/medium/high surge events since the last counter reset
- Total surge events detected since installation
- S.M.A.R.T. display configuration and circuitry test menus

### MUTE/RESET pushbutton

Located to the right of the display, this momentary pushbutton performs the following actions:

- Mutes the audible alarm when activated by a phase protection loss condition
- Resets the surge counter
- Changes operating parameters
- Performs circuit test functions

### LEDs

- LEDs, visible through the front cover, glow green when an LED's associated phase is fully protected. A red or yellow LED signifies a reduction in protection

### Buzzer (audible alarm)

- When enabled, a 3.7 kHz, 90 dB buzzer will beep at a rate of one-per-second upon the loss of protection on any phase voltage
- The buzzer will also beep once for each detected surge event, and also beep each time the MUTE/RESET button is pressed

### Remote alarm relay contacts

- The S.M.A.R.T. unit is equipped with Form C relay contacts. These dry contacts are labeled NO (normally open), NC (normally closed), and COM (common) with the relay energized
- The relay contacts are rated 125 Vac at 0.5 A, or 30 Vdc at 1 A
- This relay operates in a "fail-safe" mode, causing it to energize only when all phase voltages are present; in turn, causing its N/O and N/C contacts to be open and closed, respectively
- By connecting a remote alarm to these contacts, the remote alarm can be made to activate when the relay de-energizes if protection is lost on one of the system phase voltages

### 6.1 S.M.A.R.T. operation

When power is first applied to the I.T. Protector, the S.M.A.R.T. display will show the unit's revision number and the firmware's date of compilation, tech support information, followed by the phase status display.

If all phase protection is present, the three front panel LEDs will glow green (for single-phase systems, only a single LED will glow), and the remote alarm Form C relay will be energized.

Press the MUTE/RESET button for <2 seconds to cycle the display through its phase status display and surge count displays (LOW / MED / HIGH / TOTAL).

**Phase status display:** If all phases are fully protected, the display will show "PHASE(S) OK."

| **PHASES**<br>**OK** | In this example, the display shows that all phases of a three-phase system are protected. |
|---|---|

If a phase protection is lost, however, the following occurs:

- The display shows "PHASE(S), ABC OUT" (depending on the number of system phases and the phase affected). Once a phase voltage returns to normal, its "PHASE ABC OUT" message is removed from the display

| **PHASE**<br>**A OUT** | This display shows that phase A has lost protection. |
|---|---|

- The corresponding front panel phase LED turns red
- The Form C relay de-energizes
- The unit's internal buzzer produces an audible sound. Note that pressing the MUTE/RESET pushbutton can mute the buzzer. The buzzer can also be muted as described in Section 6.2 S.M.A.R.T. setup and test

#### Surge counter displays (LOW / MED / HIGH)

These three displays show the number of low, medium, and high surges that have been detected since the surge counter was last reset. Surge levels are recorded in approximate accordance with ANSI C62.41-1991, Category A, B, and C surge levels. If the unit detects a surge, the buzzer produces a single beep and the appropriate SURGES counter will increment by the number of surges that were detected at a particular level (low/med/high). If a surge occurs while the unit is displaying its phase status, then the display will automatically switch to the surge display. If a surge occurs while the unit is in its setup mode, the surge will be recorded but the display will not change. Note that the buzzer can be muted as described in Section S.M.A.R.T. unit setup and test.

| **LOW SRG**<br>**00000537** |
|---|

- This display shows that 537 low-level surges have been detected since the SURGES counter was last reset
- Up to 99999999 surges can be recorded, with the next surge causing the counter to be set back to 00000001

**Surge counter display (TOTAL)**

This display shows the total number of surges that have been detected since the I.T. Protector was first installed. This counter is a factory setting and can only be cleared by an authorized factory representative.

| |
|---|
| **TOTAL**<br>**00565890** |

This display shows that a total of 565,890 surges have been detected since the I.T. Protector was first installed.

### 6.2 S.M.A.R.T. setup and test

The S.M.A.R.T. unit contains setup and test functions that allow a user to:

- Enable/disable the phase protection loss buzzer
- Enable/disable the surge counter buzzer
- Clear the low/med/high surge counters
- Test the operation of the LEDs, relay, and buzzer

**Entering the setup mode**

| |
|---|
| **HOLD FOR**<br>**SETUP** |

Enter the setup mode by pressing and holding down the MUTE/RESET pushbutton for >2 seconds, or until "SETUP MODE" appears on the display.

| |
|---|
| **SETUP**<br>**MODE** |

Once in the setup mode, release the MUTE/RESET pushbutton to display the first setup parameter. Step through the individual setup parameters by pressing and holding the MUTE/RESET pushbutton for <2 seconds. After the last parameter is displayed, the unit asks if you want to enter the test mode. Momentarily pressing the MUTE/RESET pushbutton at this time will restart the S.M.A.R.T. unit.

**Phase loss buzzer setup**

| |
|---|
| **PHASE(S)**<br>**MUTE:OFF** |

The factory sets the unit to beep when protection on a phase is lost (MUTE:OFF).

| |
|---|
| **PHASE(S)**<br>**MUTE:ON** |

To disable the phase protection loss buzzer, press and hold down the MUTE/RESET pushbutton until "MUTE:ON" is displayed. To turn the buzzer back ON, again press and hold the MUTE/RESET pushbutton until "MUTE:OFF" is displayed.

**Surge counter buzzer setup**

| |
|---|
| **SURGE(S)**<br>**MUTE:OFF** |

The factory sets the unit to beep upon the detection of each surge event (MUTE:OFF).

| |
|---|
| **SURGE(S)**<br>**MUTE:ON** |

To disable the surge count buzzer, press and hold down the MUTE/RESET pushbutton until "MUTE:ON" is displayed. To turn the buzzer back ON, again press and hold the MUTE/RESET pushbutton until "MUTE:OFF" is displayed.

**Clear surge counter**

| |
|---|
| **CLEAR?**<br>**SURGE(S)** |

To clear the LOW/MED/HIGH SURGES counter, press and hold down the MUTE/RESET pushbutton until "SURGES CLEARED!" is displayed.

| |
|---|
| **SURGE(S)**<br>**CLEARED!** |

**Clear total surge counter**

| |
|---|
| **CLEAR?**<br>**TOTAL** |

The total surge counter is a factory setting and can only be cleared by an authorized factory representative.

**Test mode (Tests the LEDs, Form C relay, and buzzer)**

| |
|---|
| **TEST?**<br>**MODE** |

To bypass the test mode without performing any of the tests, press the MUTE/RESET pushbutton for <2 seconds. To enter the test mode, press and hold down the MUTE/RESET pushbutton until "TURN ON LED(S)?" is displayed.

| |
|---|
| **TURN ON**<br>**LED(S) ?** |

Toggle the LEDs ON (green) by pressing and holding down the MUTE/RESET pushbutton until the LEDs turn green.

| |
|---|
| **TURN OFF**<br>**LED(S) ?** |

Toggle the LEDs OFF (red) by again pressing and holding down the MUTE/RESET pushbutton until the LEDs turn red.

| |
|---|
| **TURN ON**<br>**RELAY ?** |

Toggle the Form C relay ON by pressing and holding down the MUTE/RESET pushbutton until the relay energizes.

| |
|---|
| **TURN OFF**<br>**RELAY ?** |

Toggle the Form C relay OFF by again pressing and holding down the MUTE/RESET pushbutton until the relay de-energizes.

| |
|---|
| **TURN ON**<br>**BUZZER ?** |

Toggle the buzzer (audible alarm) ON by pressing and holding down the MUTE/RESET pushbutton until the buzzer turns ON.

| |
|---|
| **TURN OFF**<br>**BUZZER ?** |

Toggle the buzzer (audible alarm) OFF by again pressing and holding down the MUTE/RESET pushbutton until the buzzer turns OFF.

**Exit Test Mode**

To exit the Test Mode, momentarily press the MUTE/RESET pushbutton for <2 seconds to display "TEST? MODE," and then momentarily press the MUTE/RESET pushbutton a second time to restart the S.M.A.R.T. unit.

## 7.0 Specifications

**Table 1. Specifications**

| Description | Specification | |
|---|---|---|
| Surge current capacity per phase | 50, 80, 100, 120, 160, 200 kA ratings available | |
| Nominal discharge current ($I_n$) | 20 kA | |
| Short-circuit current rating (SCCR) | 200 kA | |
| SPD type | UL 1449 5th Edition and CSA Type 1 and Type 2 SPD | |
| Single-phase | 100, 110, 120, 127, 200, 208, 220, 230, 240, 277 | |
| Standard split-phase voltages available | 100/200, 110/220, 120/240, 127/254 | |
| Three-phase wye system voltages available | 100/175, 110/190, 120/208, 127/220, 220/380, 230/400, 240/415, 277/480, 305/525, 347/600 | |
| Three-phase delta system voltages | 200, 208, 220, 230, 240, 380, 400, 415, 440, 480, 525, 600 | |
| Three-phase high-leg delta system voltages | 120/240 | |
| Input power frequency | 50/60 Hz | |
| Protection modes | Single split-phase | L-N, L-G, N-G, L-L |
| | Single-phase | L-N, L-G, N-G |
| | Three-phase wye | L-N, L-G, N-G, L-L |
| | Three-phase delta | L-G, L-L |
| | Three-phase high-leg delta | L-N, L-G, N-G, L-L, H-N, H-G, H-L |
| Maximum continuous operating voltage (MCOV) | | |
| 208Y, 220Y, 240S voltage codes | 150 L-N, 150 L-G, 150 N-G, 300 L-L | |
| 230L | 320 L-N, 320 L-G, 320 N-G | |
| 240H | 150 L-N, 150 L-G, 150 N-G, 300 L-L, 320 H-N, 320 H-G, 470 H-L | |
| 400 and 480Y voltage codes | 320 L-N, 320 L-G, 320 N-G, 640 L-L | |
| 600Y | 420 L-N, 420 L-G, 420 N-G, 840 L-L | |
| 240D | 320 L-G, 300 L-L | |
| 480D | 550 L-G, 640 L-L | |
| 600D | 840 L-G, 840 L-L | |
| Ports | 1 | |
| Operating temperature | –40 °C to +50 °C (–40 °F to +122 °F) S.M.A.R.T. models rated 0 °C to 50 °C (32 °F to 122 °F) | |
| Operating humidity | 5% through 95%, noncondensing | |
| Operating altitude | Up to 6561 ft (2000 m) | |
| Weight | 50–100 kA—approximately 6.8 kg (15 lb), 120–200 kA—approximately 9.1 kg (20 lb) | |
| Form C relay contact ratings | 125 Vac at 0.46 A, 30 Vdc at 1 A, terminal block connector rated 300 V, 1 A suitable for use with 26–16 AWG solid or stranded copper wire. Torque 5–7 lb-in | |
| Form C relay contact logic | Power on, normal state, NO contact = OPEN, NC contact = CLOSED<br>Power off, fault state, NO contact = CLOSED, NC contact = OPEN | |
| Mounting feet torque rating | 20.3 lb-in (2.3 N m) | |
| EMI/RFI filtering attenuation | Up to 40 dB from 10 kHz to 100 MHz | |
| Agency certifications and approvals | UL 1449 Standard for surge protective devices—Edition 5 for SPD Type 1 and Type 2—revision date 2021/08/01<br>UL 1283 Standard for electromagnetic interference filters—Edition 7—revision date 2018/06/05<br>CSA C22.2 No. 269.1-17 surge protective devices—Type 1 permanently connected, 1st Edition, dated November 2014<br>CSA C22.2 No. 269.2-17 surge protective devices—Type 2 permanently connected, 1st Edition, dated June 2013<br>CSA C22.2 No. 8-13 electromagnetic interference (EMI) filters—Edition 5—issue date 2013/11/01 | |
| Warranty | 15 years, 20 years if you register on www.eaton.com/itvss and click the warranty registration icon | |
| UL 96A compliant | Yes | |
| RoHS compliant | Yes | |
| NOM compliant | Yes | |
| Prop 65 compliant | Yes | |
| NFPA® 780 compliant | Yes | |
| Wire length and AWG | Factory prewired with ~30 inches of #10 AWG wire | |

## 8.0 Warranty

Eaton warrants these products for a period of 15 years from the date of delivery to the purchaser, 20 years if the product is properly registered with Eaton, to be free from defects in both workmanship and materials. To register, visit www.eaton.com/itvss and click the warranty registration icon. Eaton assumes no risk or liability for results of the use of the products purchased from it, including but without limiting the generality of the foregoing: (1) The use in combination with any electrical or electronic components, circuits, systems, assemblies, or any other materials or substances; (2) Unsuitability of any product for use in any circuit or assembly.

Purchaser's rights under the warranty shall consist solely of requiring Eaton to repair, or at Eaton's sole discretion, replace, free of charge, F.O.B. factory, and defective items received at said factory within said term determined by Eaton to be defective. The giving of or failure to give any advice or recommendations by Eaton shall not constitute any warranty by or impose any liability upon Eaton. The foregoing constitutes the sole and exclusive liability of Eaton AND IS IN LIEU OF ANY AND ALL OTHER WARRANTIES EXPRESSED, IMPLIED OR STATUTORY AS TO THE MERCHANTABILITY, FITNESS FOR PURPOSE SOLD, DESCRIPTION, QUALITY, PRODUCTIVENESS OR ANY OTHER MATTER.

In no event shall Eaton be liable for special or consequential damages or for delay in performance of the warranty.

This warranty does not apply if the product has been misused, abused, altered, tampered with, or used in applications other than specified on the nameplate. At the end of the warranty period, Eaton shall be under no further warranty obligation expressed or implied.

The product covered by this warranty certificate can only be repaired or replaced by the factory. For help on troubleshooting the SPD, or for warranty information, call 1-800-809-2772 or email SPD@eaton.com. Repair or replacement units will be returned collect. If Eaton finds the return to be a manufacturer's defect, the product will be returned prepaid.

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