Eaton ® CVX050/100 Surge Protective Device

Installation and Operation Manual

Powering Business Worldwide

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Revision 09

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Chapter 1 Introduction

This manual describes how to install an CVX050 or CVX100 surge protective device (SPD) in parallel (shunt) across the electrical supply of the following types of electrical systems:

- Single-phase
- Split-phase
- Three-phase Wye (star)
- Three-phase Delta (no neutral)
- Direct Current (DC)

The SPD is designed to be installed on service entrance, branch panels, and/or individual equipment disconnects, and functions to protect sensitive electronic equipment from damaging voltage transients. The connecting wires do not carry supply current. Instead, they carry only short-duration currents that are associated with a transient event.

These instructions do not cover all details, variations, or combinations of the equipment, its storage, delivery, installation, checkout, safe operation, or maintenance. If you require further information regarding a particular application or installation that is not covered in this manual, please contact Eaton's Power Quality Technical Support at 1-800-647-8877.

1.1 Safety Precautions

A licensed/qualified electrician must complete all instructions described in this manual in accordance with the U.S. National Electrical Code™, state and local codes, or other applicable country codes. All electrical codes supersede these instructions.

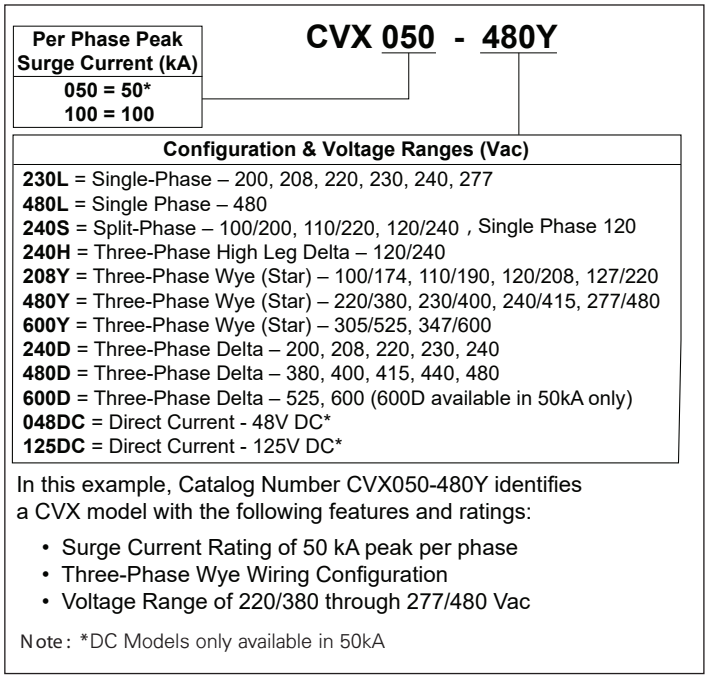
⚠WARNING

- Improper installation can cause death, injury, and/or equipment damage. Follow all warnings and cautions. Completely read and understand the information in this instruction manual before attempting to install or operate this equipment.
- 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 install this equipment. Use appropriate safety precautions and equipment for arc flash protection.
- During normal operation, hazardous voltages are present inside the SPD.
- When installing the SPD, follow all safe work practices to avoid electrical shock.

⚠CAUTION

- Do not perform a High-Pot test with the SPD connected to the electrical system. Failure to disconnect the SPD during a Highpot test will result in damage to the SPD.
- After installation, this device is not repairable and contains no serviceable parts. If the unit should malfunction or needs to be replaced, contact a qualified electrician or Eaton care at 877-ETN-CARE (877-386-2273).

Table 1. Catalog Numbering System



1.2 Getting Help

If help is needed with any of the following:

- A question about any of the information in this manual
- A question this manual does not answer

SPD Help:1-800-809-2772 or email SPD@eaton.com

Eaton Help Desk: United States: 1-800-843-9433

Chapter 2 Installation

Refer to Table 1 and look at the label on the SPD to verify that the SPD's voltage rating and wiring configuration matches that of the electrical system. Use a voltmeter to measure the system's line voltage to ensure that the correct model of SPD is being installed. Damage to the SPD may result if it is connected to an electrical system of a higher voltage or different wiring configuration.

2.1 Mounting

The SPD can be mounted directly to the electrical panel or mounted to a wall using the enclosure's internal mounting holes or optional external mounting feet.

IMPORTANT

Choose a mounting location for the SPD that provides the shortest and straightest possible wiring (lead length) from the SPD to the electrical system connections. Excessive lead length and sharp bends will degrade SPD performance.

If the electrical system uses an isolated ground, the SPD must be isolated from ground using insulated conduit fittings.

When using conduit, avoid using 90° elbows and keep the conduit run as short and straight as possible.

2.1.1 Conduit Installation

Mount the SPD directly to the electrical panel using a 3/4-inch chase nipple as shown in Figure 1.

When mounting the SPD outdoors, use weatherproof conduit and fittings to maintain the enclosure's NEMA® 4X rating. See Figure 2.

Figure 1. 3/4-inch Chase Nipple Mounting

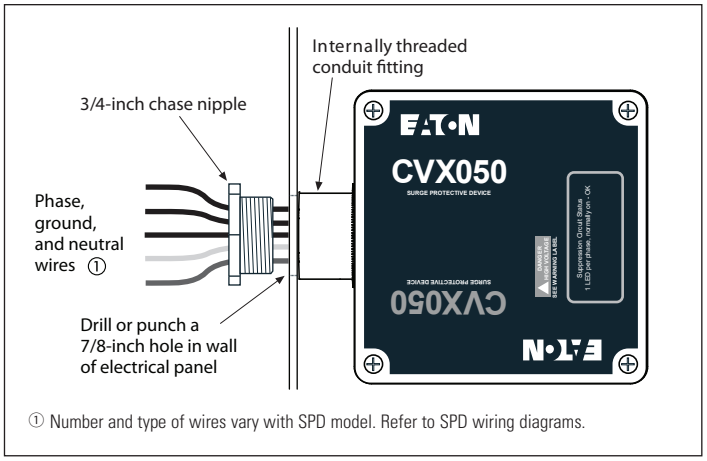
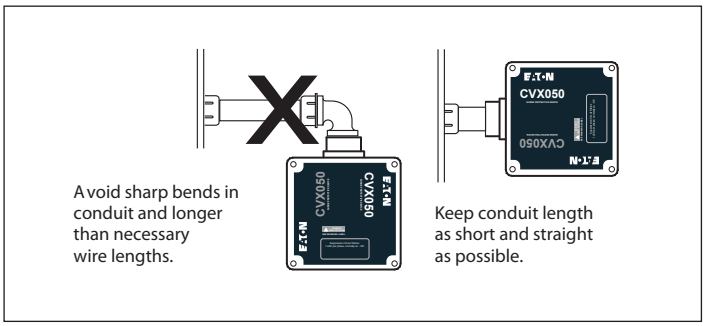


Figure 2. Conduit Installation

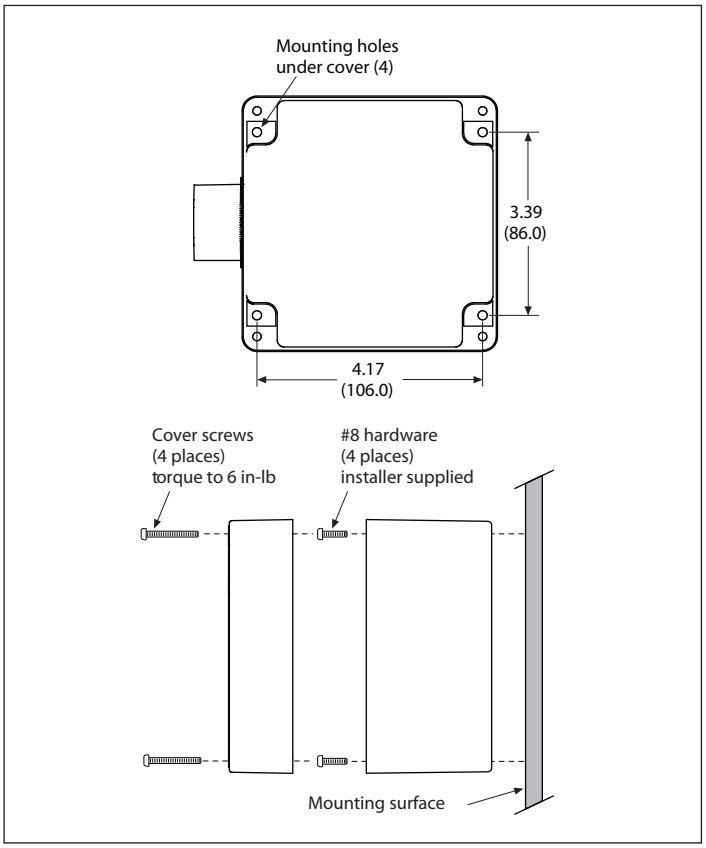


2.1.2 Wall Mounting

Mount the SPD directly on a wall using the SPD's internal mounting holes as follows:

1. Gain access to the internal mounting holes by first removing the SPD's four front cover screws, and then removing the front cover. See Figure 3.
2. Place the SPD against the wall and mark the locations of the four mounting holes.
3. Attach the SPD to the wall using #8 hardware.
4. Reinstall the front cover.

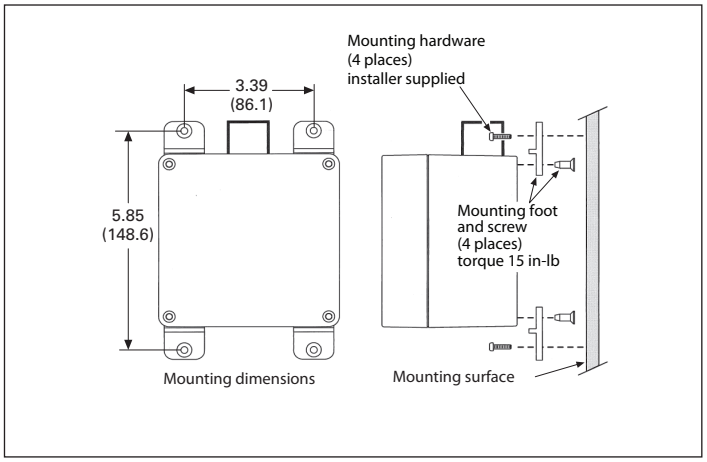
Figure 3. Wall Mounting Using Internal Mounting Holes



2.1.3 External Mounting Feet (Optional)

Optional external mounting feet with screws (catalog number MNTGFTX) can be used to mount the SPD to a wall without removing the front cover as shown in Figure 4.

Figure 4. Wall Mounting Using External Mounting Feet



2.2 Wiring for AC Units

IMPORTANT

Be sure to follow all national, state, and local electrical codes when making wiring connections.

NOTE When connecting the wires from the SPD to the electrical system, cut the wires as necessary to keep them as short as possible.

NOTE To maximize the SPD's performance, twist and bind the wires together to reduce the impedance of the wire (one twist/inch).

NOTE If the system utilizes an isolated ground, the SPD's ground wire must be connected to the system's Isolated Ground Bus.

1. Locate the electrical system's applicable wiring diagram in 2.2.1 *SPD Wiring Diagrams*. Reference this wiring diagram as necessary in Steps 2, 3, and 4.
2. Connect the SPD's ground wire (green) to the system's ground connection.
3. Connect the SPD's neutral wire (white) to the system's neutral connection (not required for three-phase delta systems—240D, 480D, 600D).
4. Connect the SPD's phase A, B, and C wires (black) to the system's corresponding phase A, B, and C connections according to applicable national, state, and local electrical codes.

2.2.1 SPD Wiring Diagrams

Figure 5. Single-Phase (230L, 480L)

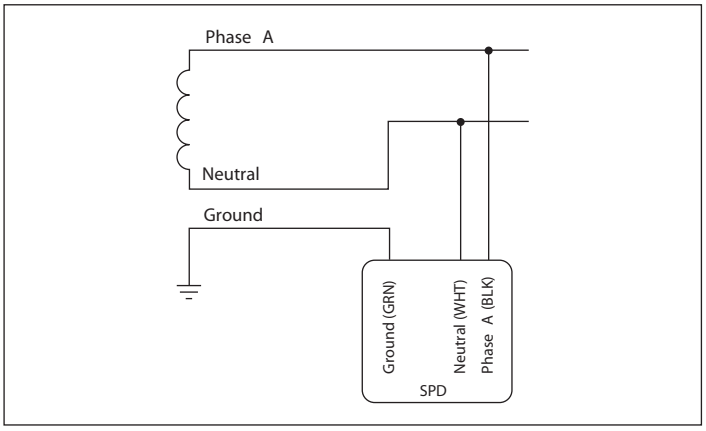


Figure 6. Split-Phase (240S)

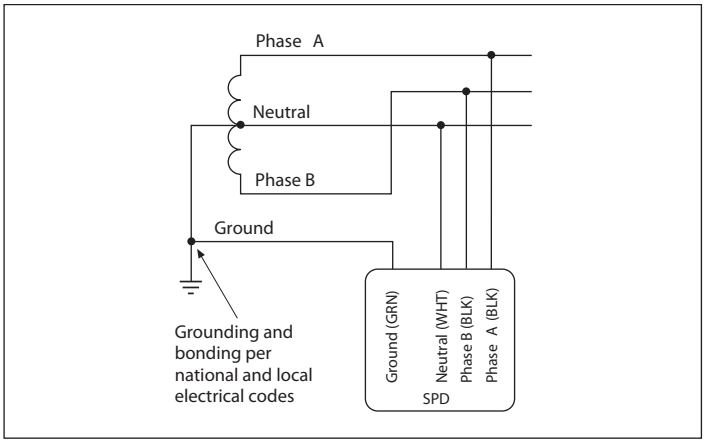


Figure 7. High Leg (240H)

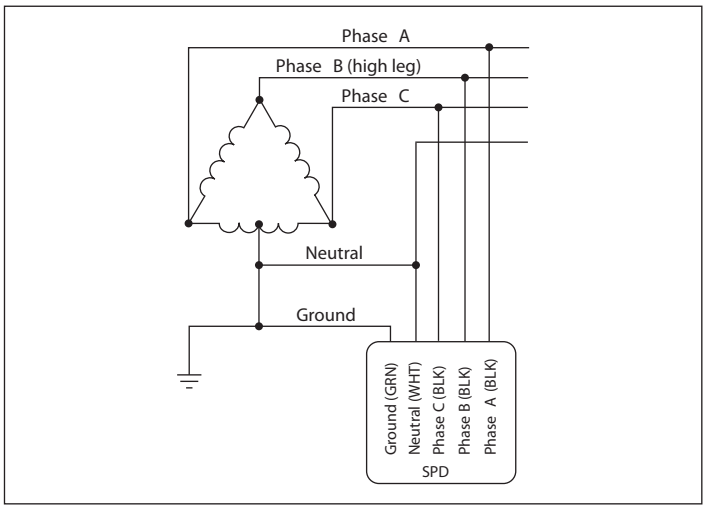


Figure 8. Three-Phase Wye (star) (208Y, 480Y, 600Y))

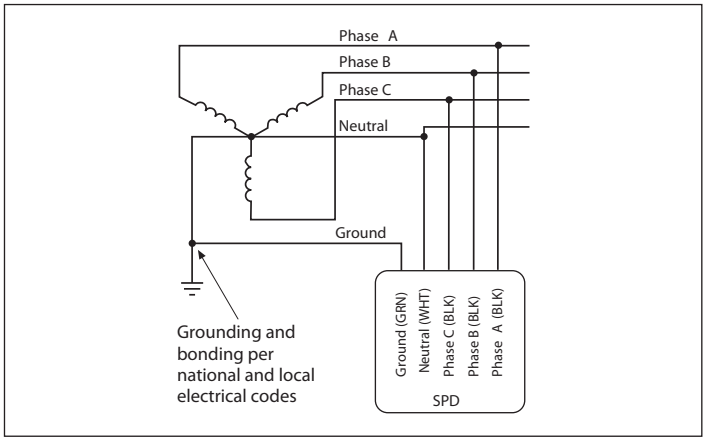


Figure 9. Three-Phase Delta (no neutral) (240D, 480D, 600D)

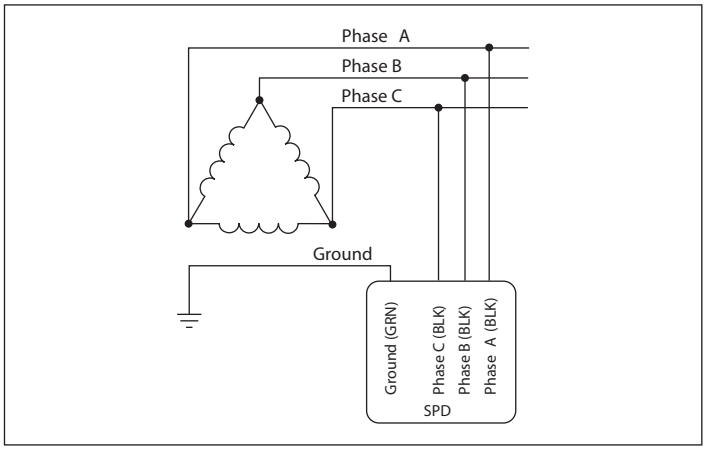


Figure 10. Single-Phase 120 V (240S)

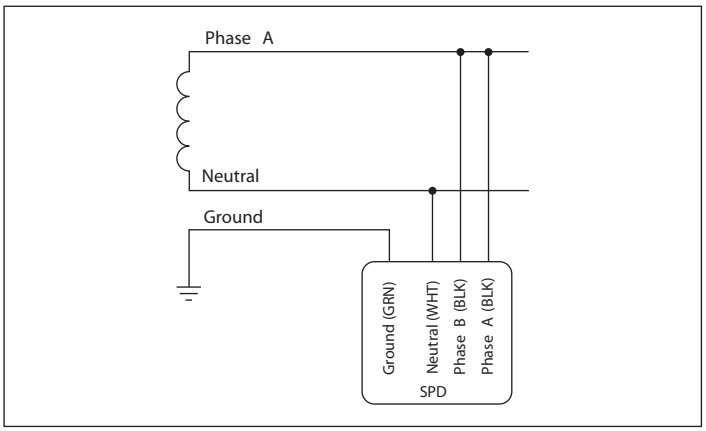
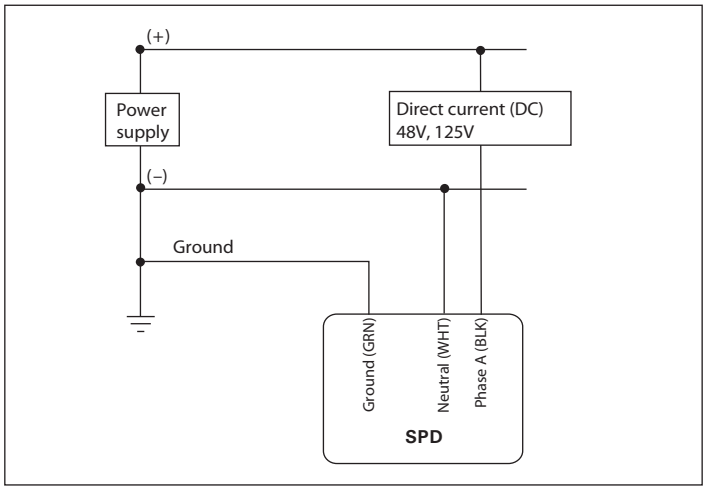


Figure 11. DC Units



Before Installation as SPD

2.2.2 Wiring, for DC Units

1. Verify system voltage does not exceed maximum suggested operating voltage listed in Table 2.
   - All voltage measurements should be completed with a DC voltmeter
   - Do not install suppressor if measured voltage exceeds maximum suggested operating limits.

Table 2. Maximum Suggested Operating Voltages and Wire Colors

Model number	Line-to-Ground	Line-to-Neutral	(+) Wire Color	(-) Wire Color	Ground Wire Color
CVX050-048DC	130	65	Black	White	Green
CVX100-125DC	288	144	Black	White	Green

2. Choose suppressor installation location so leads are kept as short and straight as possible.

Before Installation as a Secondary Surge Arrestor

1. Follow 2.2.2 *Wiring, for DC Units* step 1.
2. No circuit interrupt device is required.

Installation Instructions as SPD

1. Remove power from the electrical system before installing suppressor.
2. Mechanically mount the suppressor:

   Suppressor is to be installed through a panel knockout and via suppressor optional (these are not on this unit) mounting feet.

   a. Place the suppressor against the mounting surface and mark the feet positions if applicable.

   b. Complete the conduit connection installation.

NOTE Make sure weatherproof conduit and fittings are used to maintain NEMA 4 rating

   c. Screw the box to the surface with appropriate screws.

IMPORTANT

The suppressor is to be mounted for the shortest and straightest possible wire installation from the suppressor to the system bus. Excessive wire length and sharp bends degrade the suppressor performance; therefore, avoid excessive wire length and sharp bends when at all possible.

   If installing on a system other than electrical panel, mount in close proximity to the system being protected using necessary means for mounting.

   The suppressor contains no position-oriented components and can be mounted upside down or sideways.

3. Wire the suppressor into electrical system:
   - Cut the wire(s) as short as possible for optimum suppressor performance
   - Connect the GROUND (green) wire to the system ground busbar.
   - Connect the black wire(s) to "+" and white wire to "–".
4. Apply power to the system. The indicator light should glow. If the light does not glow, remove power and the contact supplier.

Installation Instructions as a Secondary Surge Arrestor

Install per Installation Instructions as SPD . A circuit interrupt device is not required.

Chapter 3 Specifications

Table 3. Specifications

Description	Catalog No.	
Peak kA per Phase	CVX050 = 50 kA*; CVX100 = 100 kA	
Peak kA per Mode	50	
Nominal Discharge Current	20 kA (480L, 600D, 600Y = 10 kA)	
Single-Phase Voltages	200, 208, 220, 230, 240, 277, 480	
Split-Phase Voltages	100/200, 110/220, 120/240, 120	
Wye System Voltages	100/175, 110/190, 120/208, 127/220, 220/380, 230/400, 240/415, 277/480, 305/525, 347/600	
Delta System Voltages	200, 208, 220, 230, 240, 380, 400, 415, 440, 480, 525, 600	
Direct Current (DC) Voltages	48 V, 125 V	
Input Power Frequency	47 to 420 Hz (50/60 Hz Typical)	
Protection Modes	Single-Phase	L-N, N-G, L-G
	Split phase	L-N, N-G, L-G, L-L
	Wye	L-N, N-G, L-G, L-L
	Delta	L-G, L-L
	Direct current (DC) *	L-L, L-G
Ports	1	
Specific Energy	100 kJ/ohm	
Operating Temperature	–13 to 140 °F (–25 to 60 °C)	
Weight	≈ 2.0 lb (1.0 kg)	
Certification/Listing	UL1449 4th Edition Type 1 and Type 2 SPD, CSA®Type 2 SPD (AC Models only)	

*DC models only available in 50 kA.

Chapter 4 Operation

4.1 Power Up and System Checkout

Apply system power. One LED should light for each phase voltage being monitored (see Figure 12). Single-phase electrical systems will light only one LED, split-phase systems light two LEDs, while three-phase systems light all three.

If the connected LEDs do not light, remove power, check connections, and test again. If the LEDs still do not light, contact your supplier.

4.2 Routine Operation

After system power has been applied, the SPD automatically begins to protect downstream electrical devices from damaging voltage transients and surges.

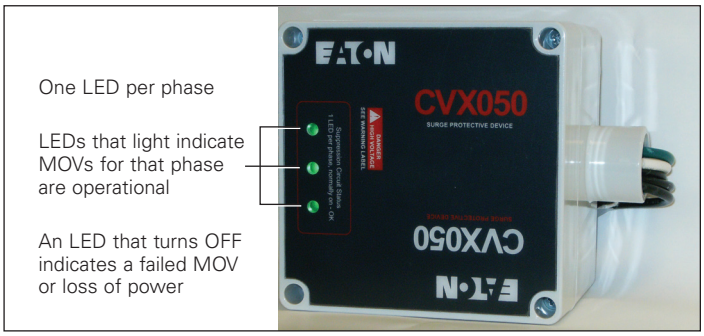
With all phase voltages present, if an LED turns OFF, the SPD has disconnected itself from that phase of the electrical system because one of its thermally protected MOVs has failed. If a thermally protected MOV fails, power will be maintained to the load; however, the load is now **unprotected**.

The CVX050/100 is **not repairable** and contains no user serviceable parts. If the unit fails, as shown by at least one of the LEDs turning OFF, the unit must be replaced. Please contact your distributor as the SPD may be under warranty.

⚠WARNING

Do not use the Suppression Circuit Status LEDs as an indication of the presence or absence of system phase voltages.

Figure 12. Suppression Circuit Status LEDs



Chapter 5 Warranty and Disclaimer

Warranty

Eaton warrants these products for a period of 5 years from the date of delivery to the purchaser. 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, option 4, sub-option 2. 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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