ASCO Power Technologies™

Surge Protective Devices

Installation & Operation Manual

Model 430

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Safety Information

Important Information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury. The safety alert symbol shall not be used with this signal word.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by ASCO Power Technologies for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

Precautions

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

Failure to follow these instructions will result in death or serious injury.

⚠ **WARNING:** This product can expose you to chemicals including DINP, which is known to the State of California to cause cancer, and DIDP which is known to the State of California to cause birth defects or other reproductive harm. For more information go to: www.P65Warnings.ca.gov.

NOTICE

LOSS OF BRANCH CIRCUIT POWER / LOSS OF SURGE SUPPRESSION

- Perform periodic inspection of the surge protective device status indicator lights as part of the preventative maintenance schedule.
- Promptly replace the surge protective device when an alarm state exists.
- Use dry contacts to signal an alarm state to the central supervisory system for unmanned, inaccessible, or critical installations.
- Use multiple surge protective devices to achieve redundancy for critical applications.

Failure to follow these instructions can result in equipment damage.

At end-of-life conditions, Surge Protective Devices (SPDs) can lose their ability to suppress power system transient voltage spikes and attempt to draw excessive current from the line. This SPD is equipped with overcurrent and overtemperature components that will automatically disconnect the surge suppression elements from the mains should the surge suppression elements reach end of life. Tripping of the branch circuit breaker or fuse feeding the SPD can occur. Mitigate the tripping of the branch circuit breaker or fuse feeding the SPD by coordinating the surge suppression elements with the branch circuits.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Do not energize the surge protective device until the electrical system is completely installed, inspected and tested.
- Ensure all conductors are connected and functional.
- Verify the voltage rating of the device and system prior to energizing.
- Perform high-potential insulation testing, or any other tests where surge protective device components will be subjected to voltages higher than their rated turn-on voltage, with the neutral and surge protective device disconnected from the power source

Failure to follow these instructions will result in death or serious injury.

Introduction

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

Failure to follow these instructions will result in death or serious injury.

Note: For troubleshooting, call technical assistance at 1-800-237-4567 or customercare@ascopower.com

Proper installation is imperative to maximize the ASCO 430 SPDs effectiveness and performance. Follow the steps outlined in this instruction bulletin to ensure proper installation. Read the entire instruction bulletin before beginning the installation. These instructions are not intended to replace national or local electrical codes. Check all applicable electrical codes to verify compliance. Installation of ASCO 430 surge suppressors must only be performed by qualified electrical personnel.

Unpacking and Preliminary Inspection

Inspect the entire shipping container for damage or signs of mishandling before unpacking the device. Remove the packing material and further inspect the device for any obvious shipping damage. If any damage is found and is a result of shipping or handling, immediately file a claim with the shipping company.

Storage

The device should be stored in a clean, dry environment. Storage temperature is -40° F to +140° F (-40° C to +60° C). All of the packaging materials should be left intact until the device is ready for installation.

Identification Nameplate

The identification nameplate is located on the side of the unit.

ASCO POWER TECHNOLOGIES, LP
CAT# 430_____ **CW**
PART# __XDS_____ **UL 1449-4**
VOLTAGE: _____V 50-60Hz **SPD TYPE __**
MAX RATED AMBIENT AIR TEMP: _____
MFG DATE: _____ MCOV: ____ / _____
UL Holigram
ENC TYPE: XXXX
In: 20 kA
VOLTAGE PROTECTION RATING
L-N ____
L-G ____
N-G ____
L-L ____
___V
Suitable for use on a circuit capable of delivering not more than _____ rms symmetrical amperes

SPD Location Considerations

Environment

The device is designed to operate in an ambient temperature range of -13 °F to +140 °F (-25°C to +60°C) with a relative humidity of 0 to 95% non-condensing. This device has a Type 4X housing.

Audible Noise

The device background noise is negligible and does not restrict the location of the installation.

Mounting

The device has been designed to be surface mounted. An additional flush mount kit is also available if required (KITFMXF) or stainless steel flush mount kit (KITFMXFSS).

Service Clearance

The service clearance should meet all applicable code requirements.

Equipment Performance

To obtain optimum surge suppression, locate the SPD as close as possible to the circuitry being surge-limited to minimize the wire length. Minimizing the wire length reduces the impedance between the circuitry and the SPD.

Refer to the Voltage Protection Rating (VPR) values on the SPD nameplate. These VPR values were obtained by testing the SPD with six-inch long leads (per UL1449). For every additional foot of wire beyond six inches, the effective VPR increases by approximately 160 volts.

Electrical

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Confirm the surge protective device voltage rating on the module or nameplate label is not less than the operating voltage.

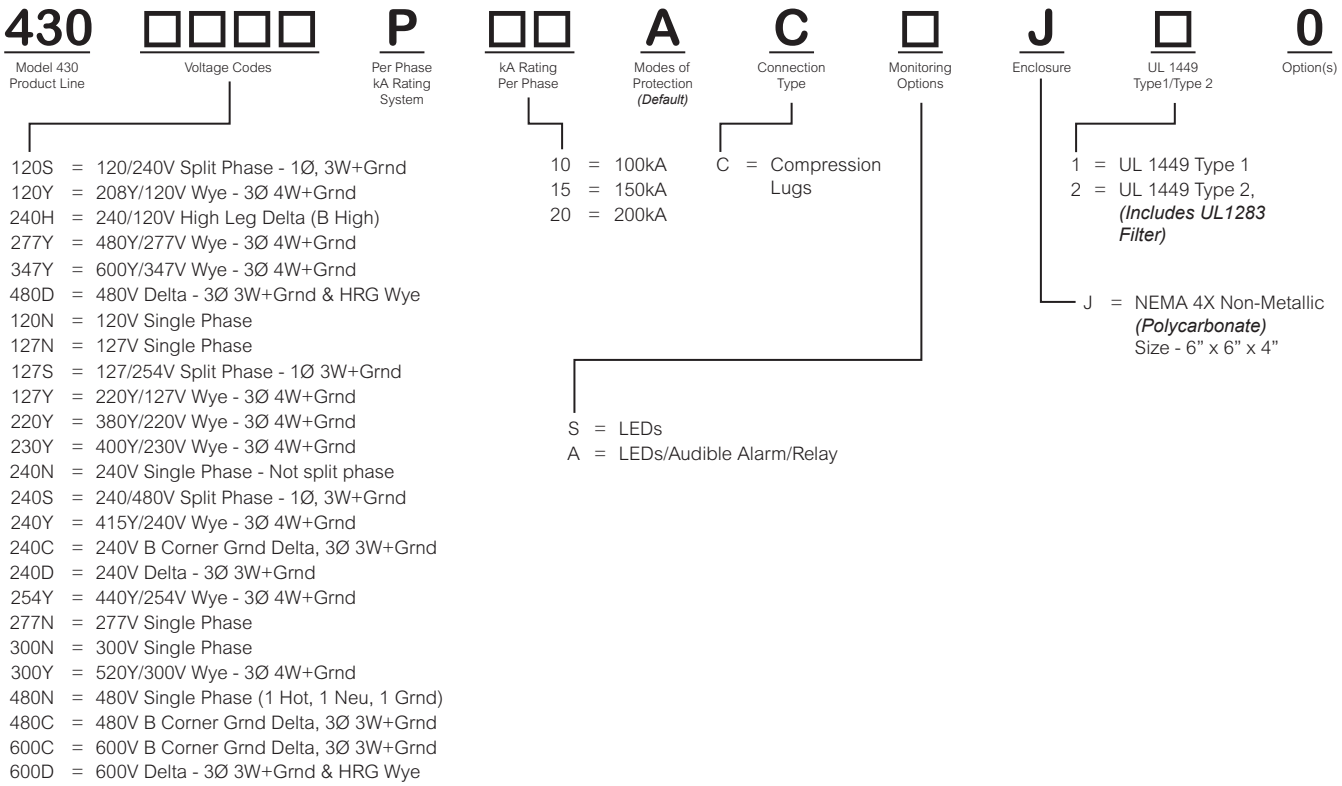
Failure to follow these instructions will result in death or serious injury.

Voltage Rating

Prior to mounting the SPD, verify that the device has the same voltage rating as the power distribution system in which it is installed. Compare the nameplate voltage or model number on the SPD with the nameplate of the electrical distribution equipment.

The specifier or user of the device should be familiar with the configuration and arrangement of the power distribution system in which the SPD is to be installed. The system configuration of any power distribution system is based strictly on how the secondary windings of the transformer supplying the service entrance main or load are configured. This includes whether or not the transformer windings are referenced to earth via a grounding conductor. The system configuration is not based on how any specific load or equipment is connected to a particular power distribution system. See Table 1 for the service voltage of each SPD.

Table 1: Model 430 Service Voltages



Branch Circuit Overcurrent Protection and Disconnect Means

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Use conductors rated for the Overcurrent Protection Device (OCPD) per applicable codes.
- Use conductors rated for the application per applicable codes.

Failure to follow these instructions will result in death or serious injury.

A branch circuit Overcurrent Protection Device (OCPD) either in the form of a circuit breaker or fuse must be provided for the ASCO 430 Type 2 device. The branch circuit OCPD should either provide or include a disconnecting means.

Since the current drawn by the ASCO 430 device during normal operation is negligible, the ASCO 430 device can be connected to a dedicated, separate branch circuit or connected to a suitable existing branch circuit.

When connected to a separate, dedicated branch circuit, the OCPD setting must be selected to protect the conductors feeding the ASCO 430 device per applicable state and local building codes.

Location of Surge Protective Device (SPD)

UL 1449 Type 1 SPDs have been designed and approved for line side applications prior to the main service disconnect without supplemental overcurrent protection. Type 2 SPDs must be installed on the load side of the main Overcurrent Protective Device (OCPD). All installations should either provide or include a disconnecting means.

Type 1 SPDs can also be used in Type 2 applications (load side of OCPD). When either Type 1 or Type 2 SPDs are used on the load side, they must be installed per local codes.

Locate the SPD as close as possible to the circuit mains being surge-limited to minimize the wire length and optimize SPD performance. Avoid long wire runs so that the device will perform as intended. To reduce the impedance that the wire displays to surge currents, the phase, neutral, and ground conductors (wye and high-leg delta configurations), or phase and ground conductors (delta configurations), must be routed within the same conduit and tightly bundled or twisted together to optimize device performance. Avoid sharp bends in the conductors. See Figures 2 and 3.

Figure 2: SPD Wiring for Wye and High-Leg Delta Configurations

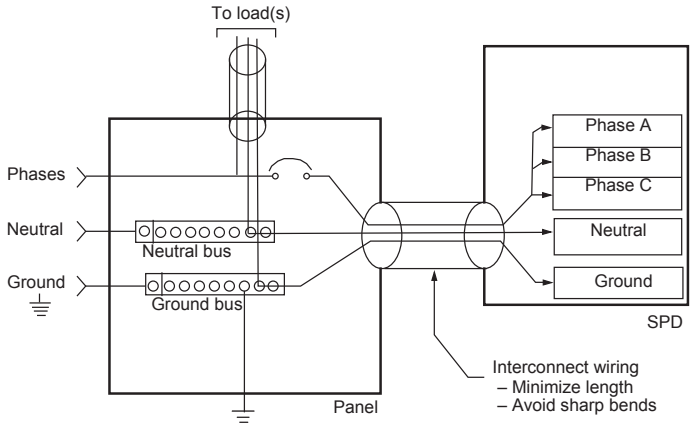
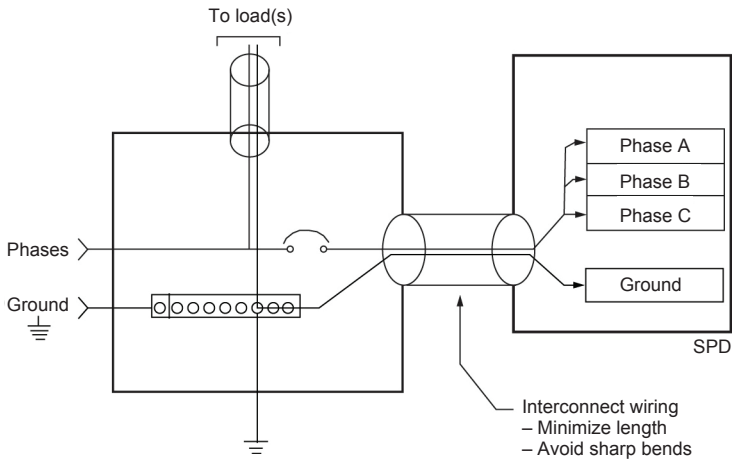


Figure 3: SPD Wiring for Delta Configurations



System Grounding

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Ungrounded power systems are inherently unstable and can produce excessively high line-to-ground voltages during certain electrical fault conditions. Durign these electrical fault conditions any electrical equipment, including a surge protective device, may be subjected to voltages which exceed their designed ratings.
- Make an informed decision before installing any electrical equipment on an ungrounded power system.

Failure to follow these instructions will result in death or serious injury.

NOTICE

LOSS OF SURGE SUPPRESSION

- Verify that the service entrance equipment is bonded to ground in accordance with all applicable codes.

Failure to follow these instructions can result in equipment damage.

The ASCO 430 has SPD elements connected from phase to ground. It is critical that there be a robust and effective connection to the building grounding structure. The grounding connection must utilize an equipment grounding conductor run with the phase and neutral connection of the power system. Do not connect the SPD to a separate isolated ground. For proper voltage suppression by the ASCO 430 SPD, use a single-point ground system where the service entrance grounding electrode system is connected to, and bonded to, all other available electrodes, building steel, metal water pipes, driven rods, etc. (for reference, see NEC Art 250). The ground impedance measurement of the electrical system must be as low as possible and in compliance with all applicable codes for sensitive electronic and computer systems.

Wiring

NOTICE

LOSS OF SURGE SUPPRESSION

- Install an insulated grounding conductor inside a metallic raceway when the raceway is used as an additional grounding conductor. Size the conductor in accordance with all applicable codes.
- Maintain adequate electrical continuity at all raceway connections.
- Do not use isolating bushings to interrupt a metallic raceway run.
- Do not use a separate isolated ground for the surge protective device.
- Verify proper equipment connections to the grounding system.
- Verify ground grid continuity by inspections and testing as part of a comprehensive electrical maintenance program.

Failure to follow these instructions can result in equipment damage.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.
- Confirm the surge protective device voltage rating on the module or nameplate label is not less than the operating voltage.

Failure to follow these instructions will result in death or serious injury.

Table 2: Wiring Diagram Location[1]

Wiring for:	Figure and Page
Single-phase, three-wire, grounded installation	Figure 6 on page 11
Single-phase, two-wire, + ground	Figure 7 on page 11
Three-phase, three- or four-wire, grounded WYE installation	Figure 8 on page 12
Three-phase, three- or four-wire, high-leg delta installation	Figure 9 on page 12
Three-phase, three-wire + ground, delta installation	Figure 10 on page 12
Three-Phase, Three-Wire, Corner Grounded, Delta Installation	Figure 11 on page 12

[1] See “Dry Contacts” on page 15 for dry contact wiring.

Follow steps 1 through 7 to make wiring connections:

1. Turn off all power supplying this equipment before working on or inside any enclosure containing this equipment.
2. Confirm SPD is rated for your system by comparing voltage measurements to the Line Voltage (L-L, L-N) on the product label.
3. Identify proper location for the SPD. Locate as close as possible to the mains of the panel being surge-limited so the wires are as short as possible. Mount unit securely.
   Note: The SPD must be installed in an accessible location (not within walls unless surface mounted with the ASCO KITFMXF flush mount kit).
4. Install in accordance with national and local electrical codes and match the branch circuit Overcurrent Protection Device (OCPD) to the wire size.
5. Twist conductors 1/2 turn or more for every twelve inches of length.
6. Do not loop or coil wires. Be sure to maintain adequate wire bending space per NEC.
7. Use on solidly grounded systems unless the SPD model is designed for installation on ungrounded/HRG systems.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

For outdoor installation use and appropriate weather sealing at the nipple (o-ring, sealing conduit, etc).

Failure to follow these instructions will result in death or serious injury.

Figure 4: Conduit Installation

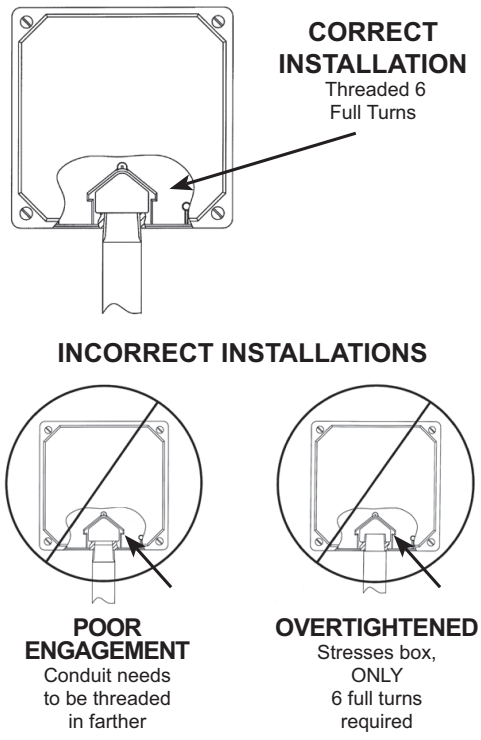


Figure 5: Typical panel Installation

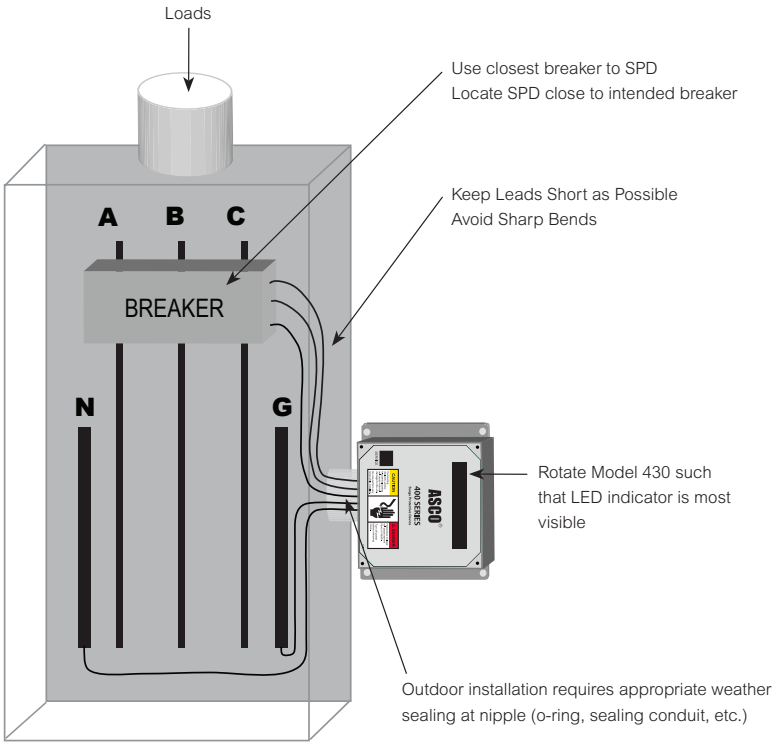


Figure 6: Single-Phase, Three-Wire, Grounded Installation

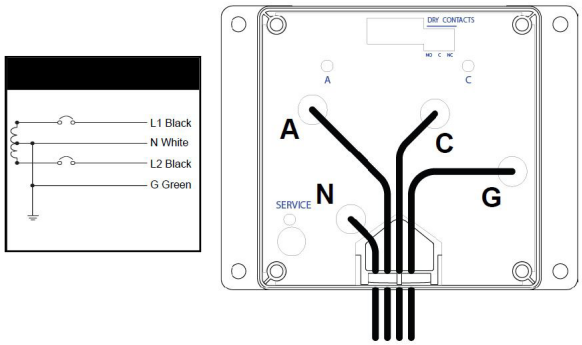
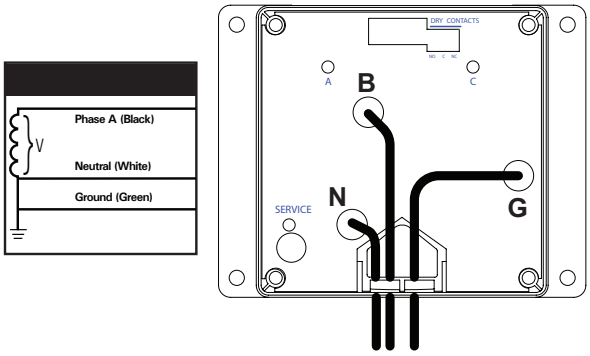


Figure 7: Single-Phase, Two-Wire, Ground



Note 1: The neutral conductor is not present on three-wire Wye grounded power systems. For improved operation of the SPD, bond the neutral and ground lugs together inside the SPD.

Figure 8: Three-Phase, Three- or Four-Wire, Grounded WYE Installation[1]

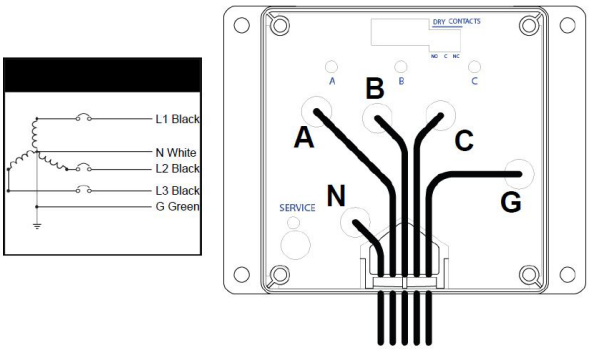


Figure 9: Three-Phase, Three- or Four-Wire, High-Leg Delta Installation[2]

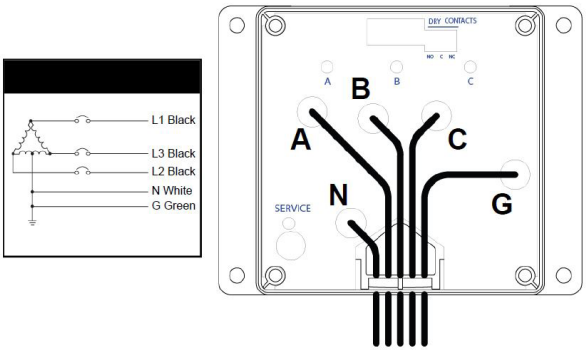


Figure 10: Three-Phase, Three-Wire, Delta Installation

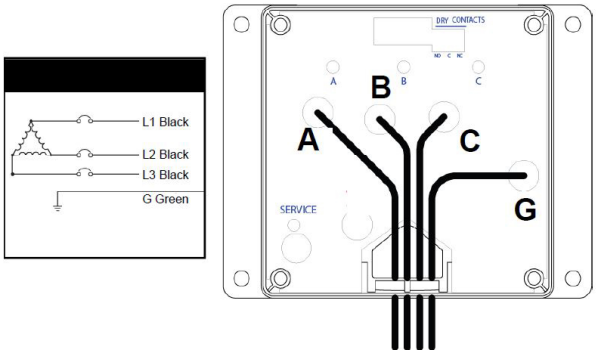
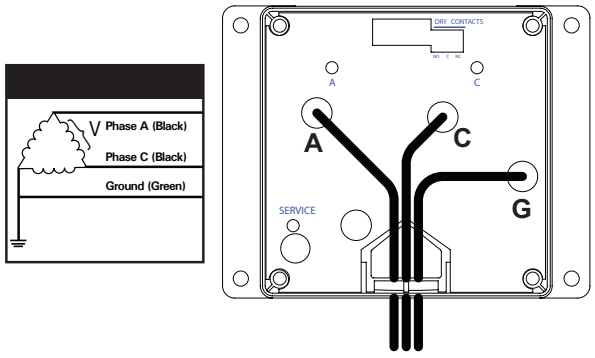


Figure 11: Three-Phase, Three-Wire, Corner Grounded, Delta Installation



⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- The high-leg of the power system must connect to the B phase lug of the SPD.

Failure to follow these instructions will result in death or serious injury.

Note 2: The neutral conductor is not present on three-wire High-Leg Delta grounded power systems. For improved operation of the SPD, bond the neutral and ground lugs together inside the SPD.

Installation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

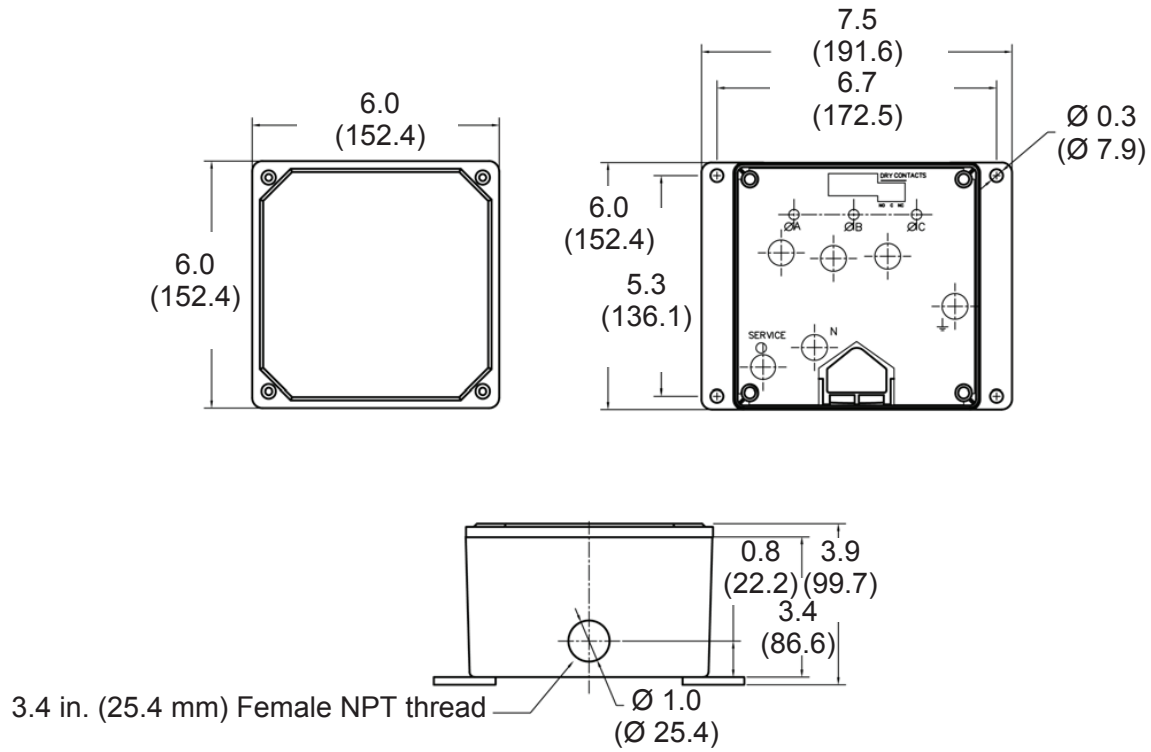
Failure to follow these instructions will result in death or serious injury.

Note: Mount the unit as close as possible to the protected panel.

Surface Mount Installation

1. Make perforations on the wall according to the screw holes located on the enclosure. See Figure 11. (Rotate dimensions 90° as appropriate depending on orientation).
2. Configure the electrical conductor and conduit connection consistent with the installation instructions on pages 9 through 13.
3. Install faceplate/cover, applying a torque of 5 lb-in (0.5 N•m) to the four screws, prior to energizing and testing the unit.

Figure 11: General Dimensions (in. / mm.)

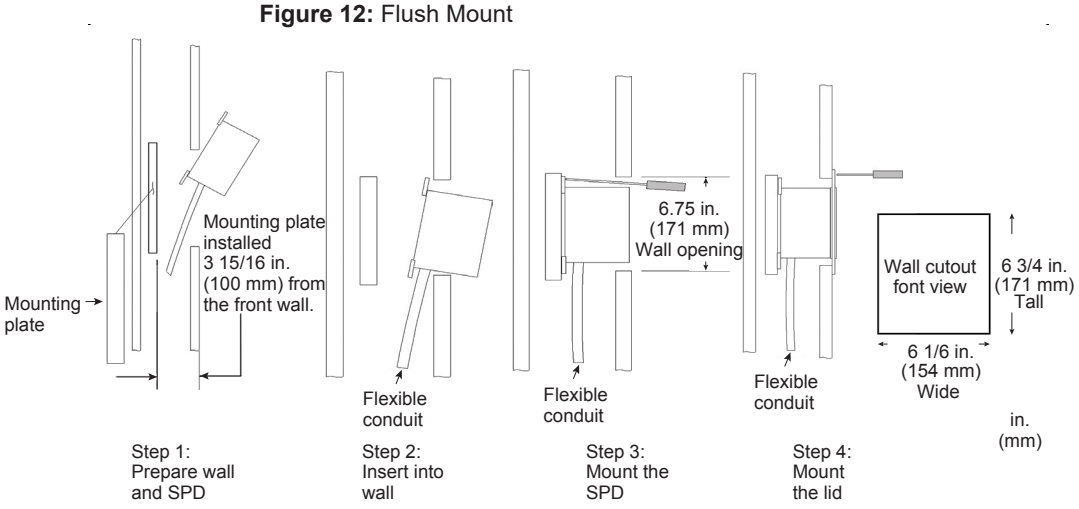


Flush Mount Installation

Note: Mount the unit as close as possible to the protected panel.

1. Create a wall opening 6 3/4 in. x 6 1/16 in. and 3 15/16 in. of clearance. See Figure 12. (Rotate dimensions 90° as appropriate depending on orientation).
2. Configure an appropriate backing plate inside the wall cavity 3 15/16 inches from the wall face such that the unit will be supported from its back.
3. Configure the electrical conductor and conduit connection consistent with the installation instructions on pages 9 through 13. Preplan connections such that they are completed prior to fastening the unit to the backing plate.
4. Install faceplate/cover, applying a torque of 5 lb-in (0.5 N•m) to the four screws, prior to energizing and testing the unit.

Figure 12: Flush Mount



Note: Supplemental instructions for deep wall mounting (walls over 4 in. (101 mm) thick using the enclosed mounting feet.

Operation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
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- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

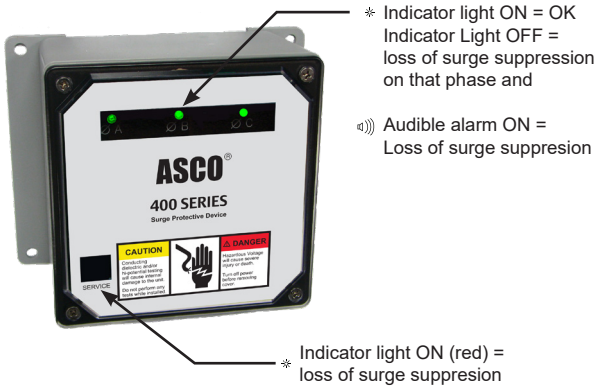
Failure to follow these instructions will result in death or serious injury.

LED Status Indicators

Diagnostic LEDs are located on the front of the ASCO 430 SPD device. They operate as follows:

- Verify that all phase voltages are present. If any of the LEDs are not illuminated, the device may not be installed correctly. Check the power supply and service voltage. Upon energizing the SPD, check the LED status.
- If all of the LEDs are illuminated, surge suppression is operating.
- If one or more LEDs are not illuminated, there is a loss of surge suppression on that phase.
- If an inoperative condition occurs the device must be replaced by qualified electrical personnel.

Figure 13: Diagnostic Operation



Audible Alarm

The audible alarm does not have a silence switch. Silence the alarm by removing power from the SPD. The alarm indicates that the device needs replacement by qualified electrical personnel.

Dry Contacts

⚠ CAUTION

INADEQUATE DRY CONTACT USE

- Do not supply more than 24 Vdc / 24 Vac and no more than a current of 2 A.

Failure to follow these instructions can result in injury and equipment damage.

The ASCO 430 series SPD device is provided with dry contacts. The unpowered state shall be closed between the common wire and the normally closed wire. This is also the alarm condition. The opposite state, closed between the common wire and the normally open wire, indicates that power is on to the unit and that no alarm condition exists (See Table 3). These dry contact leads can be used for remote indication of the SPD operating status to a computer interface board or emergency management system. Also, these dry contact leads are designed to work with the SPD remote monitor option described in the following section.

The dry contacts are designed for a maximum voltage of 24 V dc / 24 V ac and a maximum current of 2 A. Higher energy applications may require additional relay implementation outside the SPD. Damage to the SPD's relay caused by use with energy levels in excess of those discussed in this instruction bulletin are not covered by warranty. For application questions, call the ASCO Tech Support at (800) 237-4567 or email customercare@ascopower.com.

Table 3: Dry Contact Configuration

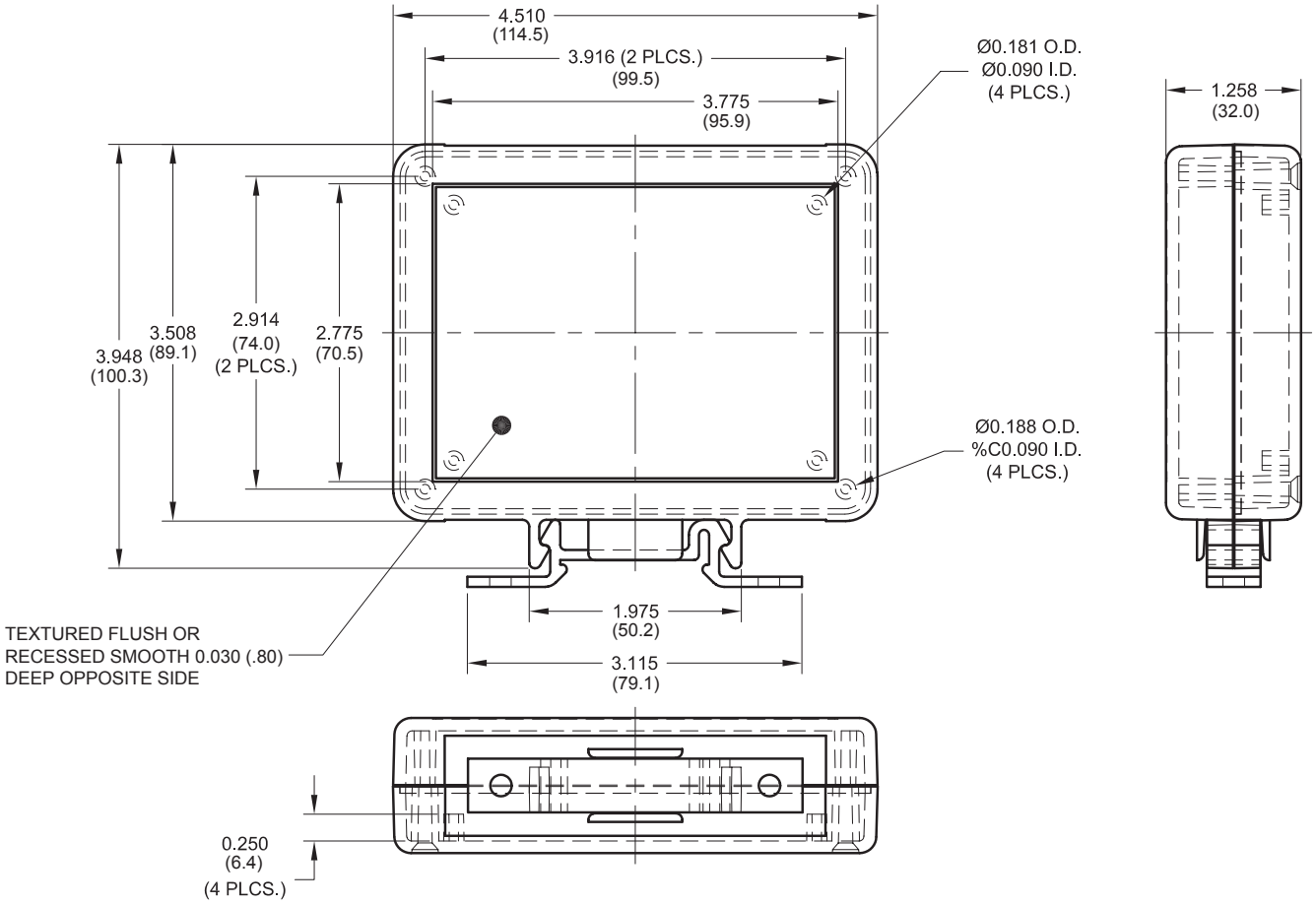
Dry Contact Terminal	Power off or Alarm Condition	Power on and no Alarm Condition
N/O (Normally Open)	Open	Closed
COM Common	Common	Common
N/C Normally Closed	Closed	Open

Remote Monitor Option

The remote monitor option has two LEDs, one red and one green, and an audible alarm with an enable/disable switch. Normal status is a lit green LED, and no audible alarm. To test the integrity of the remote monitor, press the push-to-test switch. The green LED will turn off, the red LED will turn on, and the alarm will sound, if the alarm is enabled. Releasing the switch will complete the test; the red LED will turn off, the green LED will turn on and the alarm will shut off.

If suppression on any phase is lost, the green LED will turn off, the red LED will illuminate and an alarm will sound. The audible alarm can be silenced by pushing the alarm enable/disable/test switch. The alarm will silence and the green alarm LED will not be lit. The red LED will continue to be illuminated until the inoperative condition has been cleared.

The remote monitor includes a 120 V ac to 12 V dc adapter with a six-foot power cord. Connections are made to the ASCO 430 SPD diagnostic panel with the twenty-four inch (61 cm) dry contact leads (provided). To extend the remote monitor further (up to 1,000 ft. (305 m), use an additional length of solid or stranded 22 to 14 AWG wire (not provided).



Preventive Maintenance

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

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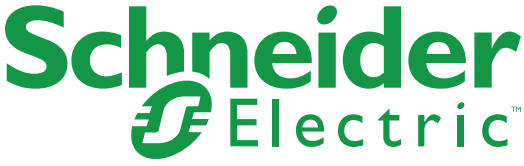
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

Failure to follow these instructions will result in death or serious injury.

Inspect the SPD periodically to maintain system performance and continued transient voltage surge suppression. During this inspection, check the state of the display LED status indicators.



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