

ASCO[®]

Surge Protective Devices

Installation & Operation Manual



Model 425

**ASCO SURGE PROTECTIVE DEVICE
INSTALLATION, OPERATION AND MAINTENANCE MANUAL**

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Thank you for choosing an **ASCO Model 425 Surge Protective Device (SPD)**. Model 425 is a high quality, high energy surge suppressor designed to protect sensitive equipment from damaging transient overvoltages. Model 425 is parallel connected such that circuit ampacity is unlimited. Proper installation is important to maximize performance. Please follow steps outlined herein. This entire Operation and Maintenance Manual should be read prior to beginning installation. These instructions are not intended to replace national or local codes. Follow all applicable electrical codes to ensure compliance. Installation of this SPD should only be performed by qualified electrical personnel.

ASCO SPDs are extensively tested in accordance with industry standards such as ANSI/IEEE C62.41.1, C62.41.2, C62.45, C62.62, C62.72, UL1449, UL 1283, IEC 61643, CSA C22.2 No. 269, etc.

WARNING Risk of Electric Shock

- **ONLY QUALIFIED LICENSED ELECTRICIANS SHOULD INSTALL OR SERVICE SPDS**
- **SPDS SHOULD NEVER BE INSTALLED OR SERVICED WHEN ENERGIZED OR DURING ELECTRICAL STORMS**
- **USE APPROPRIATE SAFETY PRECAUTIONS INCLUDING PERSONAL PROTECTION EQUIPMENT**
- **FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN DEATH, SERIOUS INJURY, AND/OR EQUIPMENT DAMAGE**
- **WHEN USED IN OUTDOOR APPLICATIONS, CUSTOMER MUST SEAL THE CONDUIT NIPPLE USING WATERTIGHT FITTINGS (NOT INCLUDED) TO ENSURE A WATERTIGHT CONNECTION**
- **READ THIS MANUAL IN ITS ENTIRETY PRIOR TO INSTALLING**

Industry Nomenclature Changes

In the late 2000's, there were significant nomenclature changes associated with a revision to UL 1449 and 2008 NEC® Article 285. Model 425 complies with the latest regulatory actions and is UL 1449 & CSA 22.2 No. 269, Listed as such (VZCA.E321351). There is an emphasis on installation location, identified as Types 1, 2 and 3, outlined below.

Type 1 SPD: Installation on the line side or load side of the service disconnect overcurrent device. Type 1 SPDs may be used in Type 2 installations. Examples: surge arrestors, lightning arrestors, meter hubs, metering cabinets, ran out of breaker positions, etc.

Type 2 SPD: Downstream of service disconnect; probably will connect via breaker. Examples: switchboards, power panels, panelboards, equipment, motors, pumps, etc.

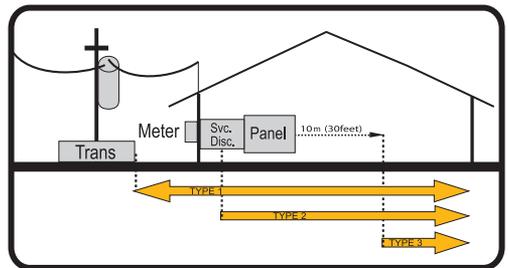
Type 3 SPD: Point of Use SPD, sometimes plug-connected SPD.

Type 4 SPD: Has different contexts in UL 1449 and CSA 22.2 No. 269. Call for assistance.

FIGURE1: NEC® ARTICLE 285 & UL 1449-4

SPD Types: Types 1, 2, & 3

Based on Location within electrical distribution system
(also coincides with ANSI/IEEE C62.41.2 - 2002 Categories C, B & A)



The Model 425 are available as Type 1 or Type 2 SPDs per UL 1449 and CSA 22.2 No. 269. (Construction is identical for Type 1 and Type 2 Model 425s.) Type 1 SPDs are evaluated more rigorously by UL 1449 for NEC® Article 285 and CEC compliance. Type 1 SPDs and their connecting leads have been evaluated for line side applications without need for supplemental overcurrent protection. Type 1 SPDs include internal overcurrent protection. As a generalization, it is more practical to install SPDs on the load side of the main overcurrent protection device for maintenance and serviceability reasons. . When connected on load side of main disconnect, we suggest connecting via a 30A circuit breaker due to 10 AWG conductors. The circuit breaker serves as a disconnect switch and provides NEC® imposed short circuit protection to the conductors in Type 2 applications. A change in the 2014 NEC® Ten Foot Tap Rule may be useful in certain applications: 240.21(B)(1)(1)b Exception:

“When listed equipment, such as a surge protective devices(s) [SPD(s)], is provided with specific instructions on minimum conductor sizing, the ampacity of the tap conductors supplying that equipment shall be permitted to be determined based on the manufacturer’s instructions.”

Model 425 SPDs have demonstrated 200kA Short Circuit Current Ratings (SCCR). 120V and 120/240V Model 425s have demonstrated 100kA SCCR. Confer to label on unit.

Simplified Explanation of Operation: SPDs sense overvoltage and create a momentary low impedance path to redirect harmful surge energy. They reset automatically and wait for the next surge. This is similar to the pressure relief valve on a water heater: pressure goes up, valve opens to relieve pressure and then resets. In an electrical system, an SPD senses overvoltage, reduces impedance which equalizes damaging voltages and then resets. SPDs are capable of repeating this function thousands of times.

Parts List

- 1 - Model 425 suppressor including 3' (~1m) conductors
- 1 - Installation Sheet (this document)
- 1 - Data Sheet (attached)

If the Flush Mount Kit was ordered, additional parts include:

- 1 - Flush Mount Plate
- 4 - Mounting Screws

*See Figure 3 For Installation

Model 425 has demonstrated 200kA or 100kA Short Circuit Current Ratings (SCCR) including leads. See UL Label markings on SPD or see Data Sheet for specs.) Supplemental overcurrent protection is not required to protect this SPD. However, NEC® and CEC convention requires that connecting conductors have overcurrent protection in Type 2 applications. Follow applicable codes.

This device features internal overcurrent and overtemperature protection that will disconnect affected surge suppression components at the end of their useful life, but will maintain power to the load – now unprotected. If this situation is undesirable for the application, follow these instructions for replacing the device. Model 425 is ultrasonically welded closed and contains no user serviceable parts.

INSTALLATION

Pre-Plan your installation. You need to accomplish the following:

- Meet all National and Local codes (NEC® Article 285 and CEC address SPDs).
 - Confirm System voltage to SPD voltage (a 120V SPD will fail instantly on 240V, 277V, etc.).
 - Mount SPD as close to panel or equipment as possible to keep leads short (long leads hurt performance).
 - Ensure leads are as short and straight as possible, including neutral and ground. If using a breaker, use a breaker position that is close to the SPD and the panel's neutral and ground.
 - If using a breaker, recommended breaker size is 30A due to 10 AWG conductor.
 - Make sure system is grounded per NEC® and CEC and clear of faults before energizing SPD (inadvertent system problem may fail SPD).
 - Never Hi-Pot test Any SPD (will prematurely fail SPD).
 - Do not install Model 425 through the bottom of a NEMA 3R panel. (Accumulating water could drip into the SPD, prematurely failing the SPD a sealed pipe nipple installed in the SPD rising above the water line may be a solution).
1. Use voltmeter to check voltages and ensure correct SPD. See Data Sheet for specs and wire-outs.
 2. Determine Mounting location – weather resistant equipment may be required.
 3. If SPD has optional Dry Contact Flush Mount Kit, or Remote Indicator, pre-plan their installation. See Figure 3. (If flush mounting, be careful to not drop SPD into wall).
 4. Remove power from panel/source. Confirm panel/source is de-energized.
 5. Identify breaker location and SPD location. Position SPD such that LEDs are best visible.
 6. Mount SPD – weather resistant applications require additional sealing, etc. (not included).
 - Remove an appropriately sized knockout from panel.
 - Connect conductors as appropriate – short and straight as possible (System Hi-Leg should be connected to SPD Phase B).
 7. Label or mark conductors as appropriate (neutral: white, ground: green, energized: black, hi-leg: orange).
 8. Make sure system is bonded per NEC® and CEC and is clear of hazards or faults before energizing (Not bonding N-G per NEC® and CEC will fail SPDs: this is the #1 cause of SPD failures).
 9. Energize and confirm proper operation of green LED indicators and/or options.

FIGURE 2: LEADS SHORT & STRAIGHT

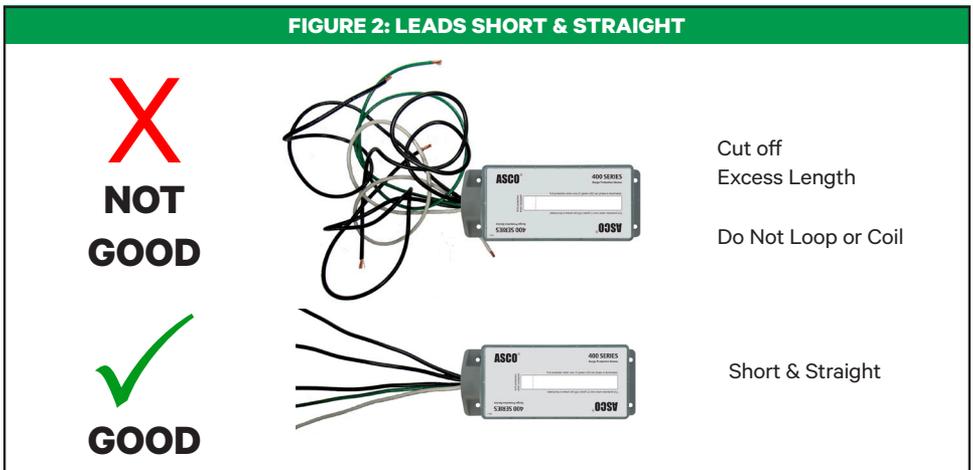


FIGURE 3: TYPICAL PANEL INSTALLATION

(Type 1 or individual equipment installations may vary)

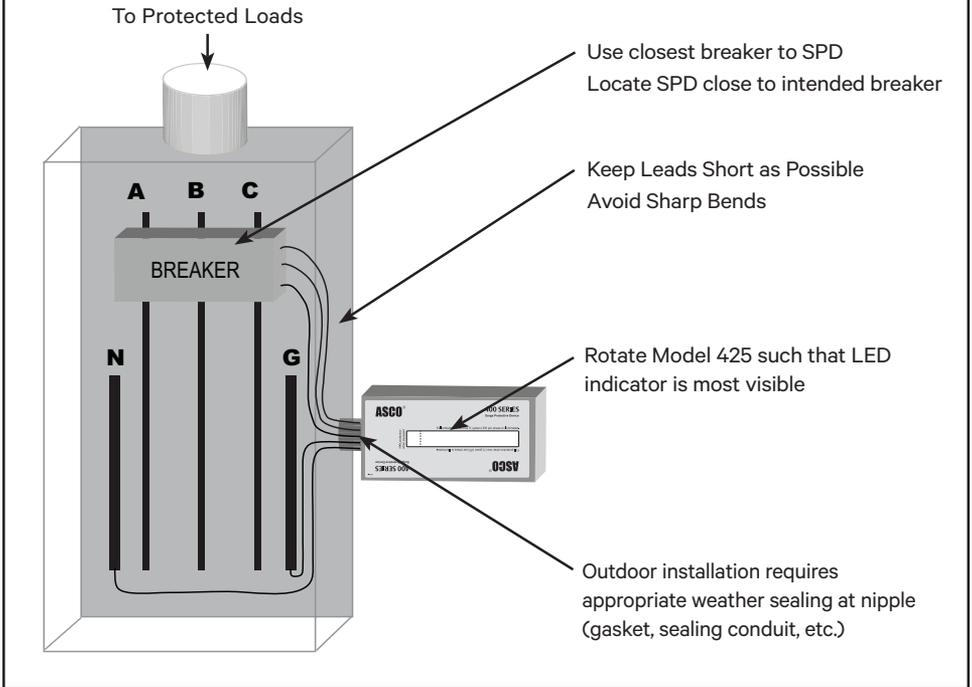
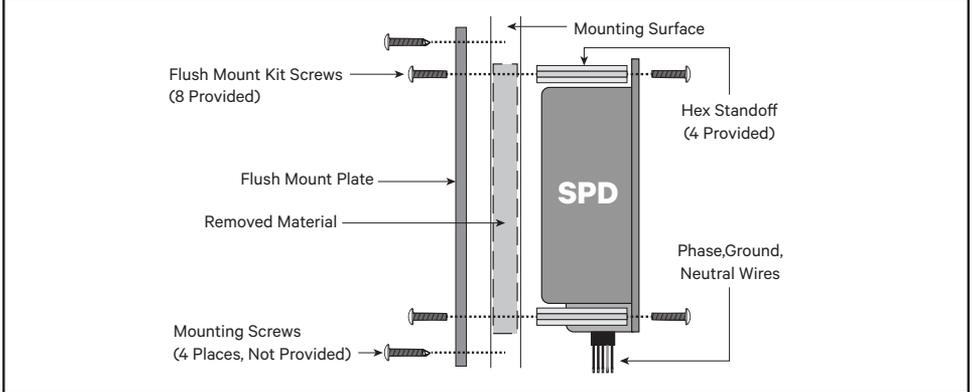


FIGURE 4: FLUSH MOUNT DIAGRAM



WARNING

- Confirm XO N-G Bonding at Upstream Transformer
- Do Not Hi-Pot Test
- Resulting Damage is not Covered Under Warranty



WARNING

VERIFY THAT ALL POWER CIRCUITS ARE DEENERGIZED BEFORE MAKING CONNECTIONS
All electrical connections should be performed by a qualified (licensed) electrician or technician. All wiring must comply with the National Electrical Code (NEC®) and applicable local codes.

FIGURE 5: DIMENSIONS & WEIGHT

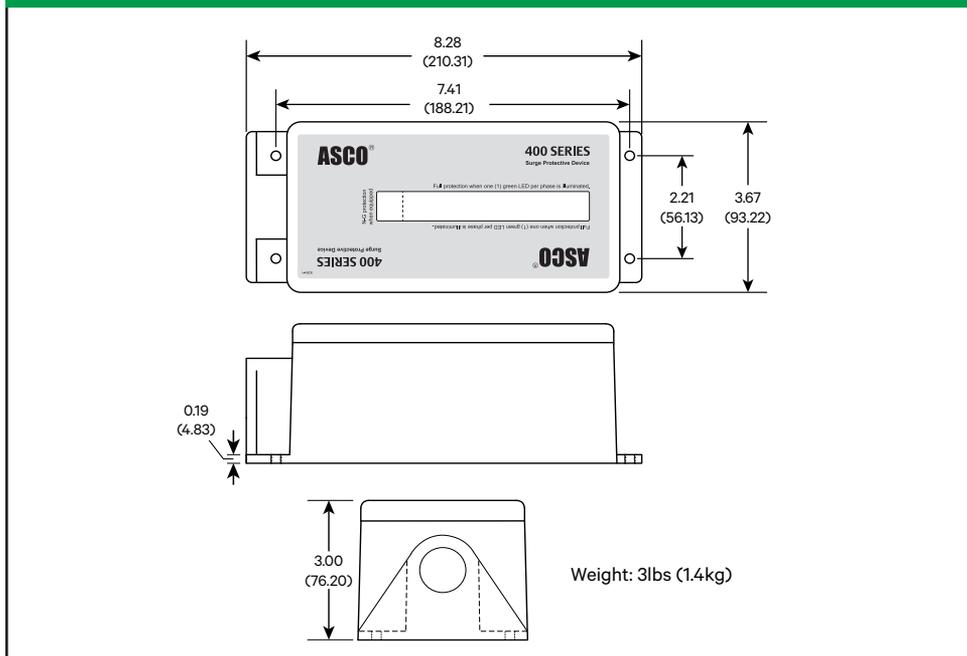


TABLE 1: SPECIFICATIONS

Temperature Operating	-40°C (-40°F) to 85°C (+185°F)
Temperature Storage	-55°C (-67°F) to 65°C (+149°F)
Wire Size & Installation Torque	10 AWG; 18 inch-pounds
Appropriate Circuit Breaker based on conductor size	30A (SPD includes internal OCP)
NEMA 250 Enclosure Rating	Type 4X with appropriate sealing and sealing conduits

Voltage Rating & Application

Before installing SPD, verify by nameplate voltage or model number that it has the same voltage rating as the power distribution system. See attached Data Sheet or call ASCO Tech Support at (800) 237-4567 as appropriate. The SPD’s specifier or user should be familiar with the configuration and arrangement of the power distribution system. The system is defined by 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. SPDs should be installed per the distribution system, not per a load or motor’s wiring connection.

For example, suppose a 480V three phase motor appears to be connected as a 480V Delta. In actuality, the serving distribution system might be a 480Y/277V grounded Wye, with or without a neutral pulled to the motor or MCC. The system is still a 480Y/277V Wye, even though the load is connected as a Delta. A grounded Wye has a defined reference to ground (i.e., neutral is bonded to ground). In contrast, some Delta systems are ungrounded, which have no reference to ground.

SPDs on Ungrounded Systems

Caution – Ungrounded systems are inherently unstable and can produce excessively high line-to-ground voltages during certain fault conditions. During these fault conditions, any electrical equipment including an SPD, may be subjected to voltages which exceed their designed ratings. This information is being provided to the user so that an informed decision can be made before installing any electrical equipment on an ungrounded power system.

Connecting Optional Form C Dry Contact & Audible Alarm

Three (3) 3' (~1m) 18 AWG wires are included through the nipple with this option. (These are smaller than the 10 AWG SPD conductors.) Gray is Common, Blue is Normally Open and Red is Normally Closed. Normally Open and Normally Closed are based on the 'Normal' condition of the unit being energized and operating correctly. When not energized, or not operating correctly, the contacts' state will be opposite of 'Normal'. (We generally recommend the Normally Closed configuration because it detects disconnected or failed wiring whereas Normally Open does not.) The contact is rated 250V, 5A. Higher energy applications require supplemental relaying. This option monitors suppression element condition and is not intended for use as phase loss or phase detection monitoring. If the Dry Contacts are not utilized, insulate lead ends, coil and secure. Audible Alarm will still function correctly.

Remote Indication Option

This is a supplemental diagnostic LED that can be mounted in a conspicuous location if the SPD is installed such that on-board LEDs are not readily visible. A green LED bezel assembly includes two pre-attached wires and two butt-splice connectors. The SPD includes two yellow 18 AWG wires, pre-wired through the SPD's nipple mounting connection. Pre-plan the installation per normal installation Instructions. Mount the LED assembly in an appropriate conspicuous location. Connect the LED wires to the yellow SPD wires with the provided butt-splice connectors. These are not polarity sensitive. Test by energizing and de-energizing SPD. Operation is straightforward: green LED On = SPD is OK. If the LED is out, the SPD has failed, power is not present, or one of more phases are not energized.

FIGURE 7: LEADS



- Normally Closed (suggested):
Use Gray and Red
- Normally Open:
Use Gray and Blue

NORMAL OPERATION

Green LED Indicator

Each phase has an LED indicator, which illuminates when the SPD is energized and operating correctly. SPDs equipped with Neutral-Ground protection include a N-G LED at one end of the translucent white label window. SPDs without N-G protection such as those for Delta power systems do not include this feature. Every suppression element is monitored and connected by logic to the LED. Should any suppression element fail, the Green LED will extinguish.

Form C Dry Contact and Audible Alarm Option

Similar to the green LEDs above, the Dry Contact will change state and the Audible Alarm will sound upon suppression element failure. The Audible Alarm may be silenced by removing power to the SPD.

Maintenance

SPDs require minimal maintenance. We recommend periodic inspection of diagnostic indicators to ensure proper operation. We also recommend keeping the SPD clean as appropriate.

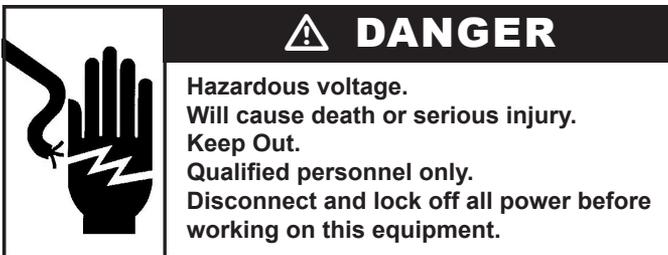
Troubleshooting & Service

Please contact us for any service related issues. We want to take care of any problems.

Quality SPDs withstand severe duty and attempt to protect their load until failure. There are electrical anomalies that SPDs cannot protect against. These are generally Sustained Overvoltages also known as Temporary Overvoltages (TOVs). In this context, Sustained Overvoltages may be only a few cycles. Failed SPDs tend to be symptoms, not root causes. We suggest treating a failed SPD as a 'canary in the coal mine' as there may be larger issues at play. As a generalization, the single largest 'killer' of SPDs is reference to ground issues. If the SPD shows problems on startup, there is reasonable chance of bonding/grounding/misapplication issue. This permanently damages the unit. If not corrected, it will happen again.

There are no user serviceable parts inside. We strongly recommend against disassembly.

Units may be returned to the factory for factory service, qualification and return. Please contact factory at (800) 237-4567 for assistance.



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