ASCO Power Technologies™

Surge Protective Devices

Installation & Operation Manual

Model 420
DC Voltage

Table of Contents

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

Model 420D15XP05 complies with UL 1449 Fourth Edition (Listing VZCA. E321351) for DC rated SPDs for Photovoltaic Systems. UL 1449 certification requires AC voltage specific language, which is also included below.

Models 420D300P05, 420D600P05, 420D10XP05 are not UL listed.

Be aware that photovoltaic systems generate maximum voltage at coldest temperatures and brightest light. For example, full sunup after a cool/cold night produces maximum voltage on photovoltaic systems. The system's maximum voltage rating must take this into account.

Table 1: Input Voltages

Unit	Range of Input Operating Voltage	Maximum Input Voltage
420D300P05	0 – 375V DC	424V DC
420D600P05	0 – 750V DC	905V DC
420D10XP05	0 – 1000V DC	1188V DC
420D15XP05	0 – 1500V DC	1500V DC

The following graphic on the SPD's label represents DC voltage: ⎓

Model 420 is parallel connected such that circuit ampacity is unlimited. Proper installation is needed to maximize performance. Please follow steps outlined herein. These instructions are not intended to replace national or local codes. Follow all applicable electrical codes to ensure compliance.

Parts List

1 - Model 420 suppressor including 3' (~1m) conductors
1 - Mounting L bracket
1 - 3/4" conduit nut
2 - Panhead mounting screws
1 - Data Sheet
1 - Installation Sheet (this document)

Model 420 Includes Internal Overcurrent Protection

Supplemental overcurrent protection is not required to protect this SPD. (See UL Label markings on each SPD or see Data Sheet for specs.)

Follow all applicable codes. Based on the size of conductor, we recommend an immediate upstream overcurrent protective device rated: not greater than 40A for 8 AWG conductor; not greater then 30A for 10 AWG contuctor.

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. Follow these instructions for replacing the device.

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.
- 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.

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.
4. Mount SPD. For weather resistant applications additional sealing, O-ring is required. (not included) See figure 5.
5. Install in accordance with national and local electrical codes and match the branch circuit Overcurrent Protection Device (OCPD) to the wire size.
6. For all wires Twist conductors 1/2 turn or more for every twelve inches of length.
7. Do not loop or coil wires. Be sure to maintain adequate wire bending space per NEC. Trim excessive wire length.
8. Replace all devices, doors, and covers before turning on power to the equipment.
9. Energize and confirm proper operation of green LED indicator.

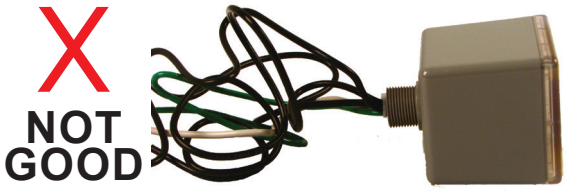
⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

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

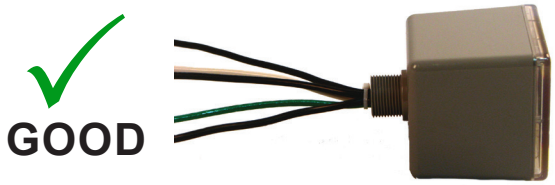
Failure to follow these instructions will result in death or serious injury.

Figure 1: Leads short and straight



Remove Excess Wire Length

Do Not Loop or Coil



Short & Straight

Figure 2: Wiring Diagram

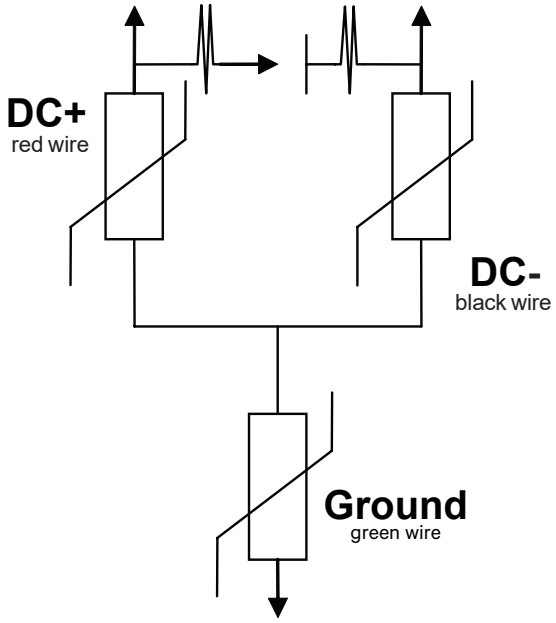


Figure 3: Nipple

Sealing Gasket:
two choices
1.) At 3/4" nom. thread: ID is 1.05"
2.) At 0.14" high 'base step': ID is 1.25"

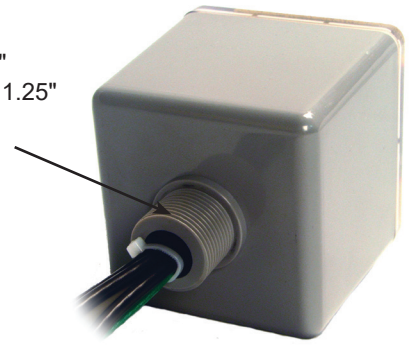
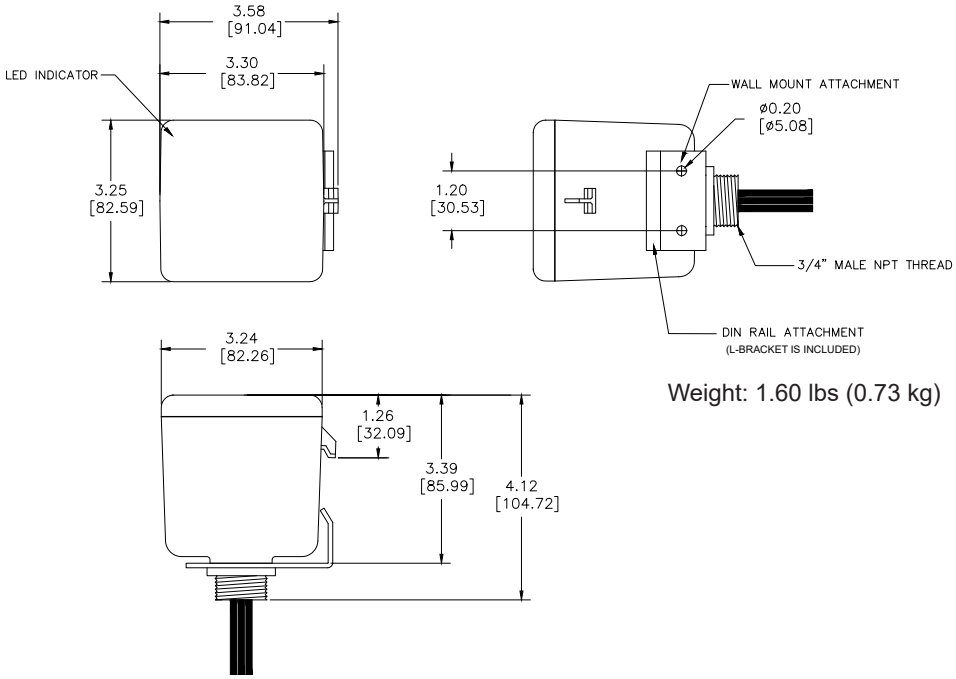


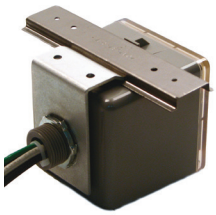
Figure 4: Dimensions and weight



Weight: 1.60 lbs (0.73 kg)

Figure 5: Model 420 Mounting Options

Std. 3/4”-14 Nipple



DIN-Rail Mount (rail not incl.)

Bracket Mount for flat surfaces

- 3/4” pipe nipple (conduit nut included)
- With L-bracket mounting kit accessory
  - Standard 35mm DIN-Rail (not included) L-bracket tightens onto DIN-Rail
  - Standard flat mounting surface Attach L-bracket to surface via mounting holes

If standard front facing label is not viewable when installed, unit may be installed so side label is front facing.

Table 2: Specifications

Temperature Operating	-40° C (-40° F) to 65° C (+149° F)
Temperature Storage	-55° C (-67° F) to 65° C (+149° F)
1500 VDC Models	-35° C (-31° F) to 85° C (+185° F)
Wire Size and Installation Torque	10AWG: 20 lb - in 8 AWG: 25 lb - in 6 AWG (Ground): 35 lb - in
NEMA 250 Enclosure Rating	Type 4X with appropriate sealing & sealing condulets

Normal 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.
- 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.
- Use the standard Model 420 DC SPD when DC- is bonded to ground. When DC+ is bonded to ground < 420 DC SPD having the ‘G’ option suffix.

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

Green LED Indicator

The LED indicator illuminates when the SPD is energized and operating correctly. Indicator operation: Every suppression element is connected via logic to the green LED. Should any suppression element stop working, the green LED will extinguish. Be aware that LED requires sufficient voltage to operate. Photovoltaic applications having limited sunlight may not generate enough power to illuminate the LED.

Microswitch Option

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Do not exceed 12VDC and/or 50mA.

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

A UL Listed 'M' option allows a user to monitor the operational status of internal MOVs.

The 'M' option monitors each MOV's integral microswitches via logic. Two 20 AWG wires exit the pipe nipple for customer connection to remote sensing equipment. Power must be limited to 50mA at 12VDC. At the ends of the 20 AWG wires, correct operational state is Open circuit. If any MOV disconnects, the microswitch will Close. The diagnostic LED is not available with the 'M' option.

Please contact ASCO Tech Support with any questions at (800) 237-4567.

Preventive Maintenance

⚠ 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.

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.

14550 58th Street North
Clearwater, Florida 33760

se.com/us/en/work/support
1-888-778-2733

IO-70068 RevG 03-21