

Installation and Operation Manual

APC Panel Mount Modular SPDs

PMP3S-A
PMP3DS-A
PMP4S-A
PMP4DS-A
PMF3S-A
PMF3DS-A
PMF4S-A
PMF4DS-A
PMG3S-A
PMG3DS-A
PMG4S-A
PMG4DS-A
PML3S-A
PML3DS-A
PML4S-A
PML4DS-A





The APC Modular Panel Product Surge Protective Devices (SPD), are designed to provide specification grade performance at the service entrance, branch panels or other critical locations. The APC SurgeArrest® Modular Panel Mount Products have replaceable phase modules with integrated LED monitoring, a display panel with surge counter and LED status indicators, an audible alarm, and comes in a NEMA 3R/12 Enclosure. Modular Panel Products are available with 120 kA and 160 kA maximum surge current per phase ratings.

Compliant with UL1449 3rd Edition requirements dated September 29, 2009.

Table of Contents

Precautions	4
Introduction	6
Unpacking and Preliminary Inspection	7
Storage	7
Safety Labels	7
Identification Nameplate	7
Surge Protective Device (SPD) Location Considerations	8
Environment	8
Audible Noise	8
Mounting	8
Service Clearance	8
Equipment Performance	8
Electrical	9
Voltage Rating	9
Terminals, Wire Size, and Installation Torque	10
Branch Circuit Overcurrent Protection and Disconnect Means	10
Integral Switch	10
Location of Surge Protective Device (SPD)	10
Grounding	11
General	12
Power System Grounding	12
Solidly-Grounded Power System	12
Installation	13
Conduit Location and Recommendations	13
Special Enclosure Considerations	13
Removing and Reconnecting the RJ45 Patch Cables	13
NEMA 3R Applications	13
Optional Flush Mounting	13
Optional Integral Switch	13
Wiring	14
Wiring Diagrams Without Integral Switch	15
Wiring Diagrams with Integral Switch	16
Operation	17
LED Status Indicators	17
Audible Alarm	18
Surge Counter	18
Dry Contacts	18
Remote Monitor Option	19
Maintenance and Troubleshooting	20
Preventive Maintenance	20
Troubleshooting	21
Replacement Parts	21
Warranty	21
Customer Support	24

Precautions

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.
- 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.

⚠ CAUTION

LOSS OF BRANCH CIRCUIT POWER/LOSS OF SURGE SUPPRESSION

- Ensure that the branch circuit breaker or fuse trip characteristic has been coordinated with the overcurrent components inside the SPD (See Table 1).
- Perform periodic inspection of the SPD status indicator lights as part of the preventative maintenance schedule.
- Promptly service the SPD 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 SPDs to achieve redundancy for critical applications.

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

Surge Protective Devices (SPDs) can lose their ability to block power system voltage 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 when the surge suppression elements reach end of life. Mitigate the tripping of the branch circuit breaker or fuse feeding the SPD by coordinating the surge suppression elements with the branch circuits.

For the purposes of coordination, the SPD is equipped with overcurrent components that will limit the per phase I^2t , I_{apparent} , I_p , and I_{th} values to those listed in table 1 when connected to a power system with a short-circuit current rating not exceeding 200,000 A.

Table 1:

SPD	Per Phase I^2t	I_{apparent}	I_p	I_{th}
Modular Panel Mount Series	175 kA ² seconds	17,000 A RMS	40,000 A RMS	220 A

Precautions

⚠ CAUTION

LOSS OF SURGE SUPPRESSION

- Do not energize the SPDs until the electrical system is completely installed, inspected, tested, and all conductors have been connected and functional, including the neutral.
- Verify the voltage rating of the device and system before energizing the SPD.
- Disconnect the SPD, including the neutral, from the power source before performing high-potential insulation testing or any tests where SPD components will be subjected to voltages higher than their rated turn-on voltage.

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

NOTE: Type 2 SPDs are designed for use on the load side of the service entrance Overcurrent Protection Device (OCPD) only.

NOTE: For troubleshooting, call APC Technical Support at 1-800-800-4272.

Proper installation is imperative to maximize the modular Surge Protective Device's (SPD's) effectiveness and performance. The installer should 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 modular surge suppressors should only be performed by qualified electrical personnel.

Introduction

Introduction

Thank you for choosing the APC SurgeArrest® Modular Surge Protective Device.

The APC Modular Surge Protective Device (SPD) is a high-quality, high-energy surge attenuation system that has been designed to protect sensitive equipment from damaging transient voltage surges. Proper installation is imperative to maximize the surge suppressor's effectiveness and performance.

This manual is to be used as a guide for installing the device. Read and understand all information contained in this manual prior to installation. The outlined procedures are not intended to supersede local or national electrical codes. **Check all applicable electrical codes to assure compliance.**

This device must be installed by qualified electrical personnel. The installer should follow the steps detailed in this manual to ensure proper installation. **A copy of the installer's invoice, detailing the installation of this device, is required in order to take advantage of the unit's product warranty.**

The SurgeArrest® Modular product lines specify a parallel SPD designed for service entrance and downstream panelboard applications. These units provide replaceable modular surge protection and are available in 120 kA and 160 kA per phase rating.

All APC products are extensively tested according to industry standards as set by IEEE C62.41 and C62.45 for Type 2 Applications. Type 2 applications are permanently connected to SPDs intended for installation on the load side of the service equipment overcurrent device; including SPDs at the branch panel.

Save this manual! It includes instructions regarding the product warranty and replacement parts.

Testing

Any factory or on-site testing that exceeds the normal operating voltage, such as high-potential insulation testing or other tests where the suppression components will be subjected to voltages higher than their rated "turn on" voltage, must be run with the suppressor disconnected from the power source. For 4-wire devices, the neutral connection at the SPD must also be disconnected prior to performing high-potential testing and then reconnected upon completion of the test.

Failure to disconnect this surge suppression device and its associated suppression components during elevated voltage testing will result in damage to the suppression components and/or other electronic components.

Inspection

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 -20 °C to +65 °C (-4 °F to +149 °F). All of the packaging materials should be left intact until the device is ready for installation.

Safety Labels

English, Spanish, and French versions of all safety labels (Danger, Warning, and Caution) are provided.

Identification Nameplate

The identification nameplate is located on the inside of the door/cover.

Figure 1: SPD Nameplate Example



SPD Location Considerations

Surge Protective Device (SPD) Location Considerations

Environment

The device is designed to operate in an ambient temperature range of -4 °F to +149 °F (-20 °C to + 65 °C) with a relative humidity of 0 to 95% non-condensing. The operating temperature of the LCD on the diagnostic display panel is -10 °C to +60 °C (+14 °F to +140 °F). Refer to the product catalog for further details on enclosures. All EMA devices operate normally without reduction in performance when subjected to shock and vibrations described in IEC 60721-3-3, Class 3M4.

Audible Noise

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

Mounting

The device is designed to be surface or flush mounted. Refer to the device submittal drawings or the product catalog for typical mounting dimensions and weight.

Service Clearance

The service clearance should meet all applicable code requirements.

Equipment Performance

To obtain the maximum system performance, locate the device as close to the circuit being addressed as possible to minimize the interconnecting wiring length. For every foot of wire length, approximately 160 volts (6 kV / 3 kA, 8/20 microsecond) is added to the suppressed voltage. The Voltage Protection Rating (VPR) is located on the device nameplate and is measured 6 inches from the enclosure sidewall, according to UL® 1449 Third Edition.

Electrical

Electrical

Voltage Rating

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Confirm the SPD voltage rating on the module or nameplate label is the same as the operating voltage.

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

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 any 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 2 for the service voltage of each SPD.

Table 2: Voltage Ratings

Service Voltage	Configuration	KA Rating	Model Numbers
120/208Y ¹	3Ph. 4-wire +G	120 kA	PMF3S-A
120/208Y ¹	3Ph. 4-wire +G	120 kA	PMF3DS-A ²
120/240 (Single Phase)	1Ph. 3-wire +G	120 kA	PMP3S-A
120/240 (Single Phase)	1Ph. 3-wire +G	120 kA	PMP3DS-A ²
277/480Y ³	3Ph. 4-wire +G	120 kA	PMG3S-A
277/480Y ³	3Ph. 4-wire +G	120 kA	PMG3DS-A ²
347/600Y	3Ph. 4-wire +G	120 kA	PML3S-A
347/600Y	3Ph. 4-wire +G	120 kA	PML3DS-A ²
120/208Y ¹	3Ph. 4-wire +G	160 kA	PMF4S-A
120/208Y ¹	3Ph. 4-wire +G	160 kA	PMF4DS-A ²
120/240 (Single Phase)	1Ph. 3-wire +G	160 kA	PMP4S-A
120/240 (Single Phase)	1Ph. 3-wire +G	160 kA	PMP4DS-A ²
277/480Y ³	3Ph. 4-wire +G	160 kA	PMG4S-A
277/480Y ³	3Ph. 4-wire +G	160 kA	PMG4DS-A ²
347/600Y	3Ph. 4-wire +G	160 kA	PML4S-A
347/600Y	3Ph. 4-wire +G	160 kA	PML4DS-A ²

¹ 120/208Y series also applies to the following voltage 127/220Y.

² DS-A designates disconnect models.

³ 277/480Y series also applies to the following voltages 220/380Y, 230/400Y, 240/415Y.

Electrical

Terminals, Wire Size, and Installation Torque

Terminals are provided for phase (line), neutral, and equipment ground connections. The SPD terminals accept a range of 12 AWG (3 mm²) to 2 AWG (34 mm²) copper wire for phase, neutral, and ground connectors. Torque connections to the following values.

Table 3: Terminal Torque

Power Connection	Torque
AØ, BØ, CØ and N	35 lb-in. (4 N•m)
Ground	

Branch Circuit Overcurrent Protection and Disconnect Means

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

Since the current drawn by the SPD during standby operation is negligible, the SPD 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 SPD.
- When connected to an existing branch circuit, the conductors connected to the SPD must have an ampacity not less than the setting of the existing OCPD. Refer to Terminals, Wire Size, and Installation Torque section above, for the maximum conductor cross-section that can be connected to the SPD.

During overvoltage surge diversion, current will flow through the SPD. The branch circuit OCPD must pass this current without tripping for the SPD to function properly.

For further information concerning coordination of the OCPD with the SPD, refer to the Caution statement “Loss of Branch Circuit Power/Loss of Surge Suppression” on page 4.

Integral Switch

The integral switch is a mechanical means for qualified electrical personnel to isolate the entire surge suppressor to service the device's components. The switch opens the phase and neutral connections to the surge protective device. The integral switch feature allows the SPD to be isolated for service without the necessity of interrupting power on the entire branch circuit.

Turn switch handle to the OFF (O) position prior to opening the door of the unit. With the handle in the OFF (O) position, the SPD will be disconnected from the circuit and the circuit will not have surge suppression. Once the absence of voltage is verified, maintenance may now be performed inside the SPD enclosure. Upon completion of repairs, close the door of the unit and turn the handle to the ON (I) position.

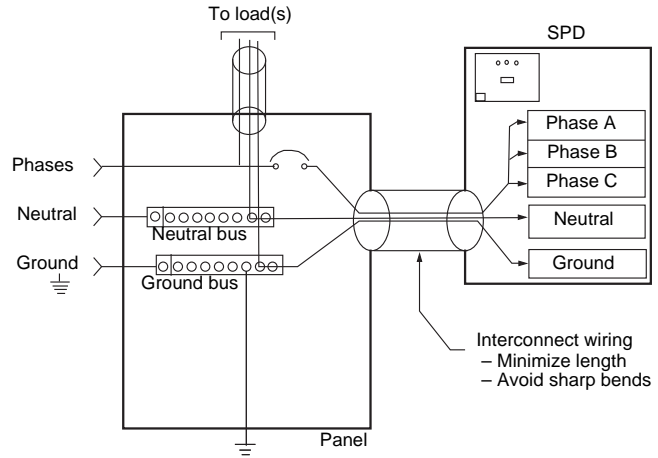
Location of Surge Protective Device (SPD)

Install SPDs on the load side of the main Overcurrent Protection Device (OCPD) to comply with NEC Article 285 for Type 2 SPDs.

Locate the SPD as close as possible to the circuit being addressed 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 must be routed within the same conduit and tightly bundled or twisted together to optimize device performance. Avoid sharp bends in the conductors. See Figure 2.

Grounding

Figure 2: Surge Protective Device Wiring Practice



Grounding

⚠ WARNING

HAZARDOUS TOUCH VOLTAGE

- Connect the SPD ground terminal to the building grounding grid structure.
- Use an appropriately sized equipment grounding conductor.
- When using metallic raceway or conduit:
 - Do not use the SPD ground unless augmented with an insulated equipment grounding conductor installed inside the metallic raceway or conduit.
 - Do not use isolated bushings to interrupt the metallic raceway or conduit.
 - Maintain electrical continuity at all raceway and conduit connections using appropriate bonding devices.
- Do not use a separate isolated ground for the SPD.
- Verify proper equipment connection to the grounding system.
- Verify ground grid continuity by performing regularly scheduled inspections and testing as part of a comprehensive electrical maintenance program.

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

The SPD has leakage current to ground when energized and can present a hazardous touch voltage.

Grounding

General

The SPD device has SPD components connected from phase to ground. To prevent hazardous touch voltage on the SPD enclosure during normal operation or during SPD end-of-life, 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 (if present) connection of the power system. The SPD device should not be connected to a separate isolated ground.

When metallic raceway is used as the wiring method, an insulated grounding conductor should be run inside the raceway and sized in accordance with all applicable codes. Maintain electrical continuity at all raceway connections using appropriate bonding devices and do not install isolating bushings to interrupt a metallic raceway run.

For best overvoltage suppression by the SPD device, 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 IEEE 142-2007). The ground impedance measurement of the electrical system should be as low as possible, and in compliance with all applicable codes.

Power System Grounding

In addition to the power system configuration and voltage, the power system grounding method must be considered when selecting the appropriate SPD. Refer to the following chart to determine the appropriate power system grounding method.

Table 4: Grounding Methods

Panel Mount Series SPDs	Power System Grounding Method
All Panel Mount Products	Solidly-Grounded

Solidly-Grounded Power System

<h3>CAUTION</h3>
<p>SPD DAMAGE AND POWER SYSTEM OVERVOLTAGE</p> <ul style="list-style-type: none">• Do not connect SPDs rated for use on solidly-grounded power systems to resistance-grounded (for example, HRG) or ungrounded power systems.• Verify that the serviced entrance equipment is bonded to ground in accordance with all applicable codes.• Verify that the neutral terminal of the power system transformer feeding the EMA product is bonded to system ground in accordance with all applicable codes. <p>Failure to follow these instructions can result in equipment damage.</p>

SPDs rated for use on solidly-grounded power systems must not be connected to resistance-grounded (for example, HRG) or ungrounded power systems. Such a connection can result in damage to the SPD within the SPD product.

Always verify the power system grounding configuration prior to application of power to the SPD device. Confirm that all ground bonds are installed at both the service entrance equipment and power system transformer prior to application of power.

Installation

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.
- 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.

Conduit Location and Recommendations

The recommended conduit entry is at the bottom of the device enclosure. Use a conduit seal that is appropriate for the enclosure rating.

Special Enclosure Considerations

Removing and Reconnecting the RJ45 Patch Cables

The RJ45 patch cables are marked with matching phase connections. If any of the cables are removed, reconnect the cables as marked.

NEMA 3R Applications

Remove screws from the bottom of the enclosure to create drain holes.

Optional Flush Mounting

The flush mount collar option provides a mechanical means to install the surge suppressor flush to the surface of sheetrock or firewall construction.

Optional Integral Switch

After making electrical cable connections to the SPD integral switch and prior to energizing the SPD, ensure that the line barrier is in place and intact.

Wiring

Wiring

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- 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.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Confirm the SPD voltage rating on the module or nameplate label is the same as the operating voltage.

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

Follow the steps listed below when making wiring connections.

1. Turn off all power supplying this equipment before working on or inside any enclosure containing this equipment.
2. Confirm the SPD voltage rating and configuration is the same as the system voltage and power system configuration to which it will be connected.
3. Identify proper location for surge protective device. Locate as close as possible to the panel being addressed so the wires are as short as possible. Mount unit securely.

NOTE: The surge protective device must be installed in an accessible location as described in the NEC®.

4. Install in accordance with National Electrical Code® (NEC®) and local electrical codes for overcurrent protection recommendations and wire ampacity considerations.

NOTE: The neutral connection is not present on 3-wire, 3-phase wye ground or 2-wire single-phase mid-point ground power systems. For these systems, bond the neutral and ground lugs together in the SPD.

NOTE: See “Terminals, Wire Size, and Installation Torque” section for the acceptable wire size and installation torque on page 10.

5. Twist conductors 1/2 turn or more for every 12 inches of length. Do not loop or coil wires. Be sure to maintain adequate wire bending space per NEC.
6. If the remote signaling contacts of the diagnostic display panel are to be used, refer to the section, “Dry Contacts”, on page 18 for wiring instructions.
7. Replace all devices, doors, and covers, including the line barrier for the optional integral disconnect, before turning on power to the equipment. If the SPD is properly installed and functioning, the green LED indicators on the display will be lit.

NOTE: Always install the SPD on the LOAD side of the main Overcurrent Protection Device (OCPD).

If you have any questions pertaining to the installation of this device, contact the APC Technical Support at 1-800-800-4272.

Wiring

Wiring Diagrams Without Integral Switch

Figure 3: Single-Phase, Two- or Three-Wire, Grounded Installation

NOTE 1: The neutral conductor is not present on two-wire grounded power systems. For these systems, bond the neutral and ground lugs together inside the SPD using 10 AWG wire.

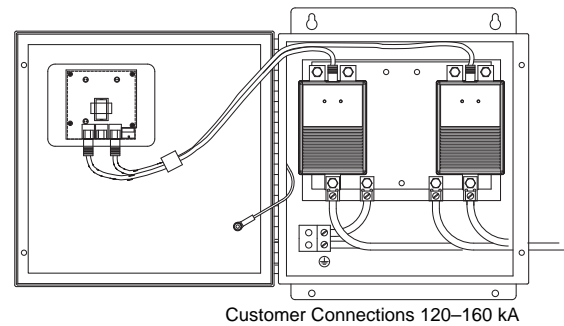
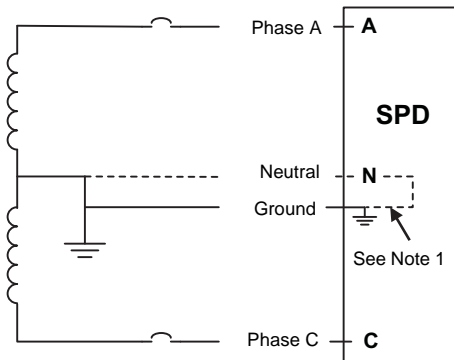
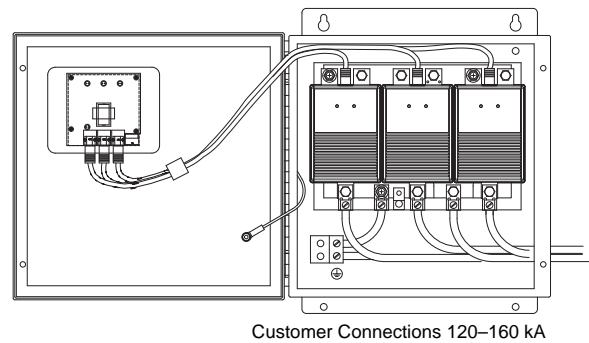
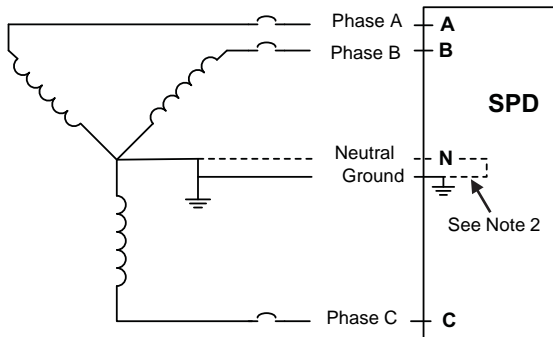


Figure 4: Three-Phase, Three- or Four-Wire, Grounded Wye Installation

NOTE 2: The neutral conductor is not present on three-wire, grounded power systems. For these systems, bond the neutral and ground lugs together inside the SPD using 10 AWG wire.



Wiring

Wiring Diagrams with Integral Switch

Figure 5: Single-Phase, Three-Wire, Grounded Installation with Integral Switch

NOTE 1: The neutral conductor is not present on two-wire grounded power systems. For these systems, bond the neutral and ground lugs together inside the SPD using 10 AWG wire.

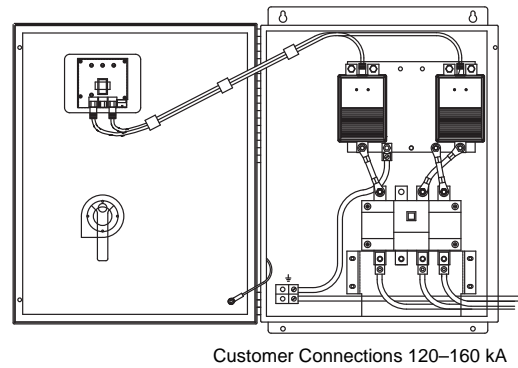
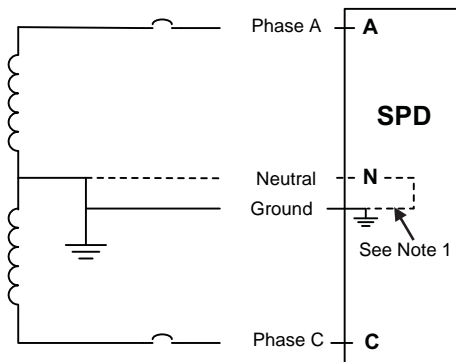
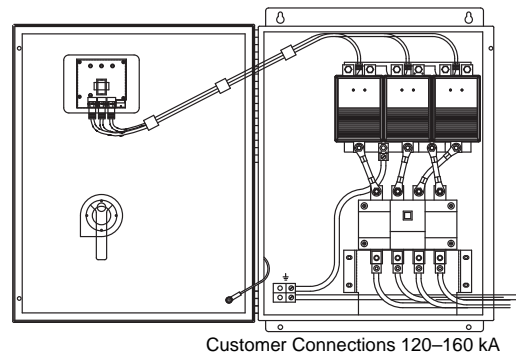
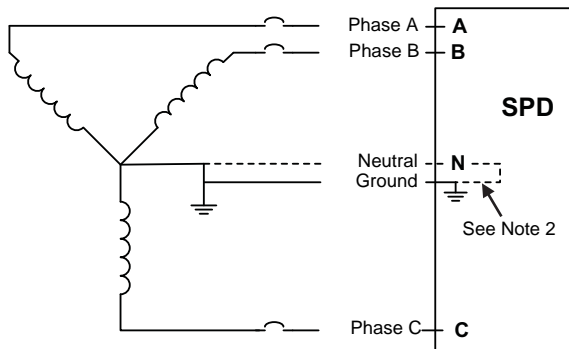


Figure 6: Three-Phase, Three- or Four-Wire, Grounded Wye Installation with Integral Switch

NOTE 2: The neutral conductor is not present on three-wire grounded power systems. For these systems, bond the neutral and ground lugs together inside the SPD using 10 AWG wire.



Operation

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.
- 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.

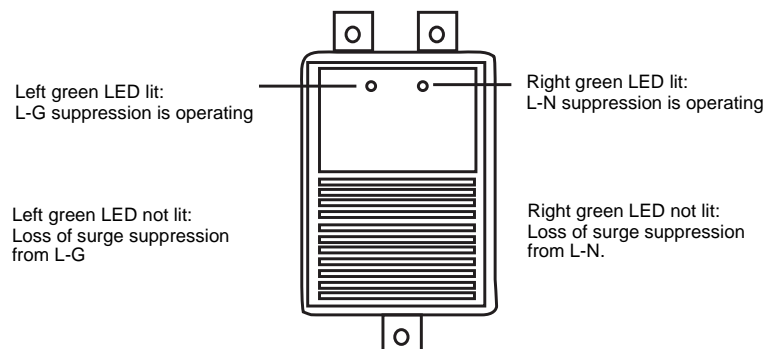
LED Status Indicators

The SPD diagnostic display panel shows the status of each SPD module with diagnostically controlled green/red LEDs (see Figure 8). If a unit is operating correctly, all of the phase LEDs will be illuminated green. To test the integrity of the diagnostics for each phase, push the button below the phase LEDs on the diagnostic display panel. The green LED will turn red and the alarm will sound, if the alarm is enabled. Releasing the test button will complete the test; the red LED will turn green and the alarm will shut off.

If an inoperable condition occurs on any phase, the audible alarm sounds and the corresponding phase LED on the diagnostic display panel is illuminated red. This indicates that the device needs service by qualified electrical personnel. The audible alarm can be silenced, until a qualified person is able to evaluate and service the SPD, by pressing the alarm enable/disable button. The alarm will silence and the green alarm LED will not be lit. The red phase LED will continue to be illuminated until the inoperative condition had been cleared.

On the SurgeArrest® module (see Figure 7), if the left green LED is not lit, it indicates a loss of suppression from line-to-ground for that phase. If the right green LED is not lit, it indicates a loss of suppression from line-to-neutral for that phase. If either LED is not lit the module should be replaced.

Figure 7: SurgeArrest® Module LEDs



When power is applied to the SPD and one or more of the diagnostic display panel LEDs are red, and one or more module LEDs are out, the module should be replaced. Refer to “Maintenance and Troubleshooting” on page 20 for proper troubleshooting procedures.

Operation

Audible Alarm

Push the alarm enable/disable button to enable or disable the alarm (see Figure 8). If the green alarm LED is lit the alarm is enabled. If the green alarm LED is not lit the alarm is disabled.

Surge Counter

The surge counter displays the number of transient voltage surges since the counter was last reset. The counter is battery powered to retain memory in the event of a power loss to the diagnostic display panel. To reset the surge counter remove all power and press the small switch located inside the unit on the underside of the diagnostic circuit board near the RJ45 connectors (also refer to Figure 9). This will reset the counter to zero.

Figure 8: Three-Phase Diagnostic Display Panel with Surge Counter

NOTE: Phase B is not present on single-phase applications

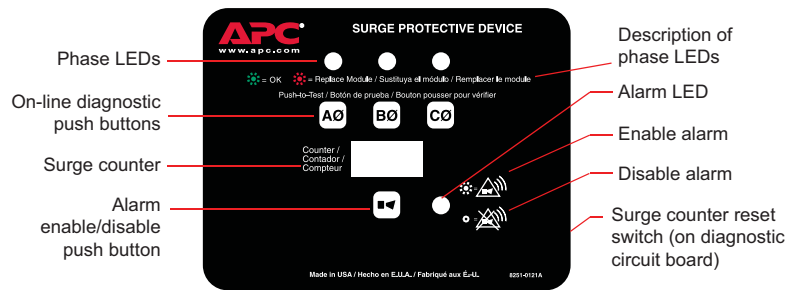
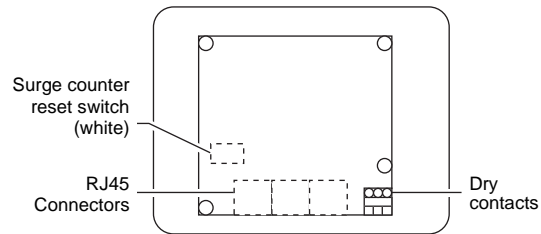


Figure 9: Rear of Diagnostic Circuit Board



Dry Contacts

The SurgeArrest® series SPDs come standard with dry contacts. The connection for the dry contacts is located on the back of the diagnostic display panel (lower right corner). The dry contacts are 3-position, Form “C” type with Normally Open, Normally Closed and Common connections. In the unpowered state the contact is closed between terminals NC and COM. This is also the alarm condition. The opposite state, closed between terminals NO and COM, indicates that power is on to the unit and that no alarm condition exists (See Table 5). These contacts can be used for remote indication of the SPD’s operating status to a computer interface board or emergency management system. Also, these contacts are designed to work with the SPD remote monitor option described below.

The dry contacts are designed for a maximum voltage of 24 Vdc / 24 Vac 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, contact APC Technical Support at 1-800-800-4272.

Operation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Use 600 Vac rated dry contact wiring.
- Dry contact wiring must have less than 1/16 in. (1.6 mm) exposed wire from the dry contact block.
- Maintain at least 1.0 in. (25 mm) separation between dry contact wiring and the power wiring in the enclosure.

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

Care must be taken in installing the dry contact wiring because the terminals are on a moving door. Avoid the door hinge, any switches, and the high voltage areas of the enclosure when routing the wiring. To avoid the door hinge, tie wrap any dry contact wiring to the existing cable harness which crosses the hinge. Once the dry contact wiring is secured on a non-moving point of the enclosure, it is the user's responsibility to maintain at least 1.0 in. (25 mm) separation between 600 Vac rated dry contact wiring and the power wiring in the enclosure.

Table 5: Dry Contact Configuration

Alarm Contact Terminals	Contact State with Power Applied
NO to COM	Closed
NC to COM	Open

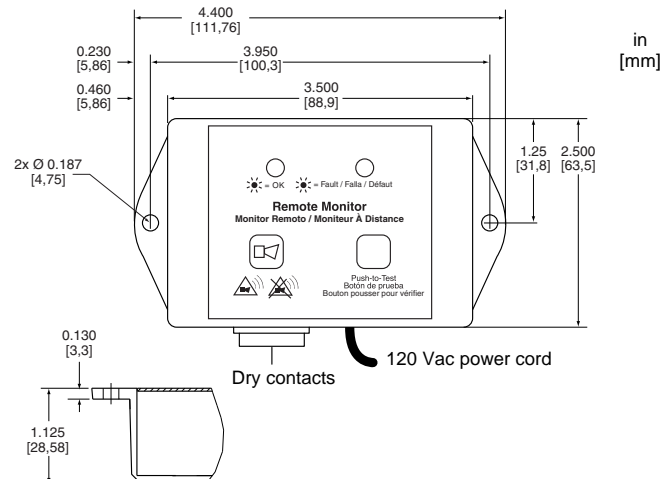
Remote Monitor Option

The remote monitor option (Figure 10) 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. If the alarm is enabled, the green LED will turn off, the red LED will turn on, and the alarm will sound. 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 turn on and an alarm will sound. The audible alarm can be silenced by pushing the alarm enable/disable button. 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 Vac to 12 Vdc adapter with a six-foot power cord. Connections are made to the SPD diagnostic panel with three-position Form "C" type dry contacts (provided) and the appropriate length of solid or stranded 22 to 14 AWG wire (not provided).

Figure 10: Remote Monitor Option



Maintenance and Troubleshooting

Maintenance and Troubleshooting

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- 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.

Preventive Maintenance

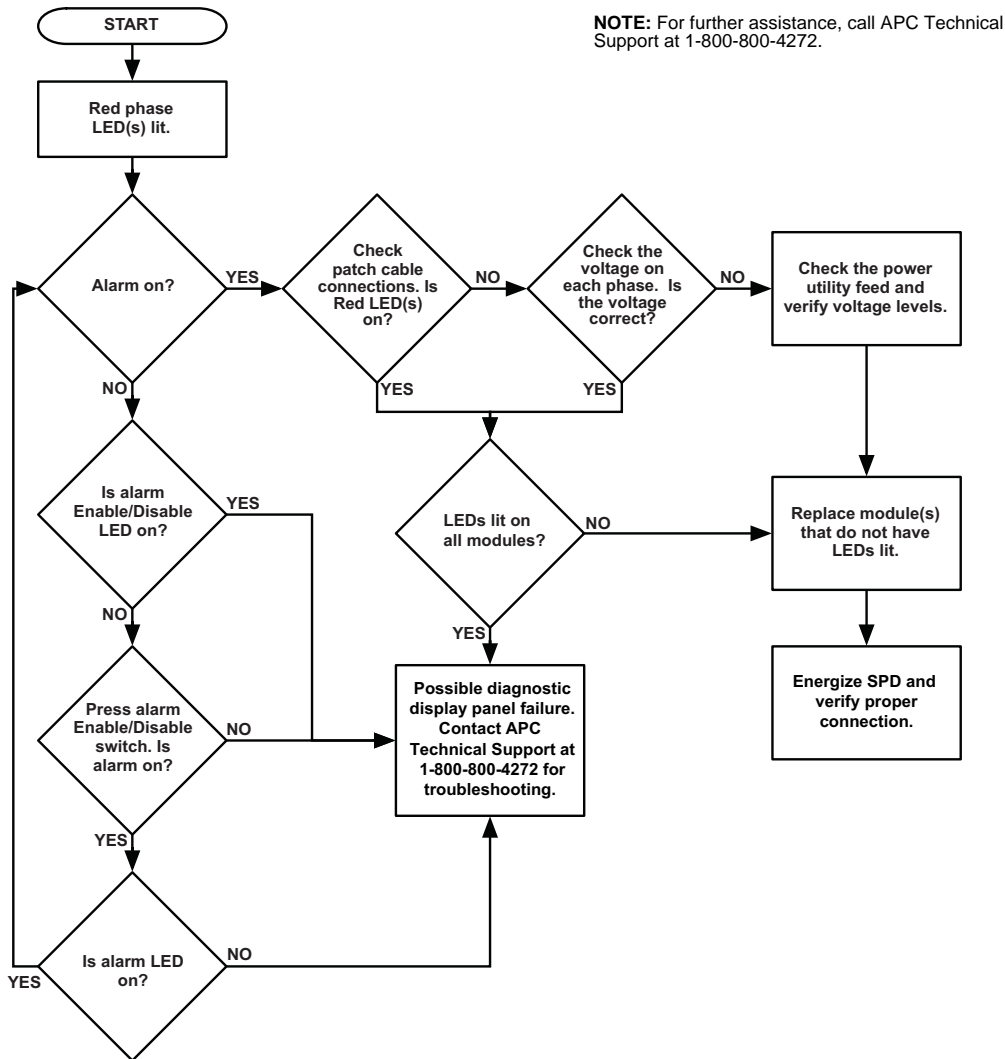
Inspect the SPD periodically to maintain reliable system performance and continued transient voltage surge suppression. Periodically check the state of the diagnostic display panel LED status indicators. Routinely use the built-in diagnostics to inspect for inoperative modules

Maintenance and Troubleshooting

Troubleshooting

If a module shows two green indicator lights and the display panel shows a red phase indicator light, follow the Troubleshooting Flow Chart in Figure 11 below.

Figure 11: Troubleshooting Flowchart



Replacement Parts

The following replacement parts are available. For ordering information refer to the product catalog.

- SPD modules. Replacement instructions are included with the replacement parts.
- Diagnostic display panel assemblies. Replacement instructions are included with the replacement parts.

Warranty

For warranty information about your Surge Protection Device, go to the APC website www.apc.com. Choose Products, and then choose Surge Protection and Power Conditioning. Scroll down to Modular Surge Suppression.

Choose your part number from among the categories listed under Modular Surge Suppression. A screen containing information specific to your Surge Protection Device is then displayed. Click on the Documentation tab to locate the file containing your warranty.



APC Worldwide Customer Support

Customer support for this or other APC products is available at no charge in the following ways:

- Visit the APC website to access documents in the APC Knowledge Base and to submit customer support requests.
 - **www.apc.com** (Corporate Headquarters)
Connect to localized APC Web sites for specific countries, each of which provides customer support information.
 - **www.apc.com/support**
Global support searching APC Knowledge Base and using e-support.
- Contact the APC Customer Support Center by telephone or e-mail.
 - Local, country-specific centers: go to **www.apc.com/support/contact** for contact information.

For information on how to obtain local customer support, contact the APC representative or other distributors from whom you purchased your APC product.

© 2010 APC by Schneider Electric. APC, the APC logo, and APC SurgeArrest® are owned by Schneider Electric Industries S.A.S., American Power Conversion Corporation, or their affiliated companies. All trademarks are property of their respective owners.



990-3423A (8251-0132C)

10/2010