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PM3 and PM4 Series
Modular Surge Protection Device (SPD)
User's Manual

132 Fairgrounds Road
P.O. Box 278
West Kingston, Rhode Island 02892 USA

990-0524 10/00

SurgeArrest® PM Series

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INTRODUCTION

Thank you for choosing the APC SurgeArrest PM3 or PM4 Series Surge Protection Device.

The APC modular Surge Protection 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.

Read and understand all information contained in this manual prior to installation. This manual is to be used as a guide for installing the device. The procedures contained in this manual are not intended to supercede local or national electical codes. **Check all applicable electrical codes to assure compliance.** In all instances, local and/or national electric code requirements are to be followed.

This device must be installed by a licensed electrician. The electrician should follow the steps outlined in this manual to insure proper installation. **A copy of the installer's invoice detailing the installation of this device is required in order to obtain warranty service for the device**.

The PM Series modular product line is a parallel SPD designed for service entrance and downstream panelboard applications.

The PM Series has one module per phase and is available with a 120kA or 160kA per phase rating. All APC products are extensively tested according to industry standards as set by IEEE C62.41, and C62.45, for Categories A, B, and C. The connection method of these devices may require several feet of wire. Increased lead length adversely affects clamping voltages.

Save this manual! It includes instructions for obtaining warranty service and replacement parts.

INSTALLATION

During installation into an electrical system, SPD's must NOT be energized until the electrical system is completely installed, inspected, and tested. All conductors must be connected and functional, including the neutral (if required). The voltage rating of the device and system must always be verified before energizing the SPD.

Failure to follow these guidelines can lead to abnormally high voltage being applied to the SPD. This may cause the SPD to prematurely fail or significantly shorten the effective life. The warranty does not cover an incorrectly installed device.

TESTING

Any factory or on-site testing that exceeds the normal operating voltage such as high-potential insulation testing, or any 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 TVSS devices, the neutral connection at the TVSS 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.

Unpacking & Preliminary Inspection

- Inspect the entire shipping container for damage or signs of mishandling before unpacking the unit.
- Remove the cardboard packing and further inspect the unit for any obvious shipping damages.
- If damage found is a result of shipping or handling, immediately file a claim with the shipping company and forward a copy to APC.

Storage

The unit should be stored in a clean, dry environment. Storage temperature is -40^{o} C (-40^{o} F) to +60^{o} C (+140^{o} F). Avoid exposing the unit to areas of high condensation. All of the packaging materials should be left intact until the unit is ready for installation. If the unit has been stored for an extended period of time, it may be necessary to clean the unit and make a complete inspection of the unit prior to installing and placing it into service.

LOCATION CONSIDERATIONS

The following paragraphs provide information and guidance about what should be taken into consideration before installing an APC SPD.

Environment

The unit is designed to operate indoors in an ambient temperature* range of -40^{o} C (-40^{o} F) to +60^{o} C (+140^{o} F) with a relative humidity of 0% to 95% non-condensing. The standard unit is in a Type 1 industrial use enclosure intended for indoor use. Primarily, it provides a degree of protection against contact with the enclosed equipment. It should not be installed in areas with excessive dust, flammable materials, corrosive vapors or explosive atmospheres.

*Surge Counter option has an operating temperature range of -0^{o} C (32^{o} F) to +60^{o} C (+140^{o} F).

Audible Noise

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

Mounting and Cabinet Data

The PM Series is designed to be wall mounted. Unit model sizes and weights are defined in Table 1.

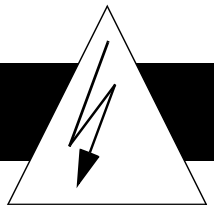
Table 1: PM3 and PM4 Dimensions and Weights

Model Number	12"W x 12"H x 6.25"D (30.48 x 30.48 x 16.13 cm)	Weight / Shipping Weight	14"W x 16"H x 6.25"D (35.56 x 40.64 x 16.13 cm)	Weight / Shipping Weight
	PMP3	23 / 25 lbs. (10.43 / 11.43 kg)	PMP3D	29 / 32 lbs. (13.15 / 14.51 kg)
	PMP4	23 / 25 lbs. (10.43 / 11.43 kg)	PMP4D	29 / 32 lbs. (13.15 / 14.51 kg)
	PMF3	23 / 25 lbs. (10.43 / 11.43 kg)	PMF3D	29 / 32 lbs. (13.15 / 14.51 kg)
	PMF4	23 / 25 lbs. (10.43 / 11.43 kg)	PMF4D	29 / 32 lbs. (13.15 / 14.51 kg)
	PML4	23 / 25 lbs. (10.43 / 11.43 kg)	PMG3D	29 / 32 lbs. (13.15 / 14.51 kg)
	PMG4	23 / 25 lbs. (10.43 / 11.43 kg)	PMG4D	29 / 32 lbs. (13.15 / 14.51 kg)
	PMG3	23 / 25 lbs. (10.43 / 11.43 kg)	PML3D	29 / 32 lbs. (13.15 / 14.51 kg)
	PML3	23 / 25 lbs. (10.43 / 11.43 kg)	PML4D	29 / 32 lbs. (13.15 / 14.51 kg)
	PML3S	24 / 26 lbs. (10.88 / 11.79 kg)	PML4DS	30 / 33 lbs. (13.60 / 14.96 kg)
	PMG4S	24 / 26 lbs. (10.88 / 11.79 kg)	PMG4DS	30 / 33 lbs. (13.60 / 14.96 kg)
	PML4S	24 / 26 lbs. (10.88 / 11.79 kg)		
	PMF3S	24 / 26 lbs. (10.88 / 11.79 kg)		

Service Clearance

In addition to national and local code requirements, 32 inches of service clearance is needed at the front of the SPD.

*****Surge Protection Devices are designed for use on the load side of the service entrance disconnect only*****



WARNING

- **MAINTENANCE OF THIS SURGE PROTECTION DEVICE SHOULD BE PERFORMED BY QUALIFIED PERSONNEL ONLY.**
- **DURING NORMAL OPERATION, HAZARDOUS VOLTAGES ARE PRESENT INSIDE THE UNIT.**
- **WHEN SERVICING THIS UNIT, BE SURE TO FOLLOW ALL ELECTRICAL SAFETY PRECAUTIONS.**
- **ALL POWER SOURCES TO THIS UNIT SHOULD BE LOCKED OFF BEFORE SERVICING. THIS WILL PREVENT THE RISK OF RECEIVING AN ELECTRICAL SHOCK.**

Equipment Performance

To obtain the maximum system performance, the unit must be located as close to the circuit to be protected as possible, minimizing the interconnecting wire length. For every foot of wire length, approximately one (1) nanosecond of turn-on/turn-off time will be added, and approximately 175 volts (6kV/3kA, 8/20 microseconds) will be added to the clamp voltage.

For optimum transient surge protection, staged surge suppression should be implemented at the service entrance and all other electrical connections to the building (telephone, CATV, etc.). It should also be implemented at recognized surge generating loads within the building (arc welding rigs, large motors, switched capacitors, etc.). Additionally, it should be implemented for sensitive electronic loads (computer equipment, facsimile machines, copy machines, solid state motor drives, variable frequency drives, etc.). For interconnected electronic loads (via data cabling), surge protection devices should also be utilized to protect the devices on either end of the interconnecting data cables.

APC manufactures a complete line of surge protection devices for both alternating current (AC) and direct current (DC) applications. Contact an authorized APC reseller, or order directly from APC at www.APC.com.

Product Orientation

To decode the Model Number and determine the unit's configuration, locate the printed nameplate on the inside of the unit door. ***Note:*** The Serial Number, Date of Manufacture, and UL 1449 Suppression Voltage Rating (SVR) are also on the unit identification nameplate. The Model Number can be decoded as follows:

- PM identifies a SurgeArrest Panel Mount. The following alpha character indicates the voltage and wiring configuration of the device.
- Following the alpha character is the number 3 or 4. These numbers identify Surge Current Ratings of 120kA, or 160kA per phase respectively.
- Following the letter designation is optional equipment, shown as: D = Disconnect, S = Surge Counter.

Options are detailed later in this manual.

All electrical connections should be performed by a qualified (licensed) electrician. All wiring must comply with the National Electric Code (NEC) and applicable local codes.

Overcurrent Protection

The Surge Protection Device (SPD) draws very little current under normal conditions and will only conduct for a brief duration upon encountering a transient surge voltage. APC SPD's contain UL Listed internal fusing to protect against abnormal voltage conditions. Note: Only use fuses supplied by APC (see Replacement Parts list).

Voltage Rating

Prior to mounting the SPD, verify that the unit has the correct voltage rating by checking the nameplate voltage or model number. The service type should match the intended power source. See Table 2 for the voltage rating and service type of the SPD.

Table 2: Voltage Rating and Service Type (by Model)

Model Number	Voltage Rating and Service Type
PMP3, PMP3D, PMP4 and PMP4D	120/240 Volts, Single Phase
PMF3, PMF3D, PMF3S, PMF4, and PMF4D	120/208 Volts, 3-Phase, WYE, 5 Wire
PMG3, PMG3D, PMG4, PMG4D, PMG4S, and PMG4DS	277/480 Volts, 3-Phase, WYE, 5 Wire
PML3, PML3D, PML3S, PML4, PML4D, PML4S, and PML4DS	347/600 Volts, 3-Phase, WYE, 5 Wire

Terminals

Terminals have been provided inside the APC modular SPD units for line (phase), neutral (if used), and equipment safety ground connections. Terminal wire size range for all models is #8 AWG - #1 AWG. Installation torque is 65 inch-pounds.

System Grounding

An equipment grounding conductor must be used on all electrical circuits connected to the SPD. This requirement is primarily for safety, although SPD performance is enhanced by proper grounding. Proper operation of any surge suppression system or device depends on a proper grounding system. Incorrect grounding practices will reduce the effectiveness or interfere with SPD system operation and performance, as well as endanger personnel and equipment. For the best performance, 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 sensitive electronics and computer systems, it is recommended that the ground impedance measurement be 25 ohms or less. When a metallic raceway is used as an additional grounding conductor, an insulated grounding conductor should be run inside the raceway. Adequate electrical continuity must be maintained at all raceway connections. Do not use isolating bushings to interrupt a metallic raceway run. A separate isolated ground for the SPD is NOT recommended.

****On 4-Wire Power Systems, neutral to ground bonding should be installed per the NEC. Failure to do so could cause equipment damage.****

Parallel Connection

When making a parallel type of connection (Figure 1), the length of the wiring to the Surge Protection Device (SPD) must be kept as short as possible to substantially enhance the performance. Long wire runs are to be avoided if the unit is to perform as intended.

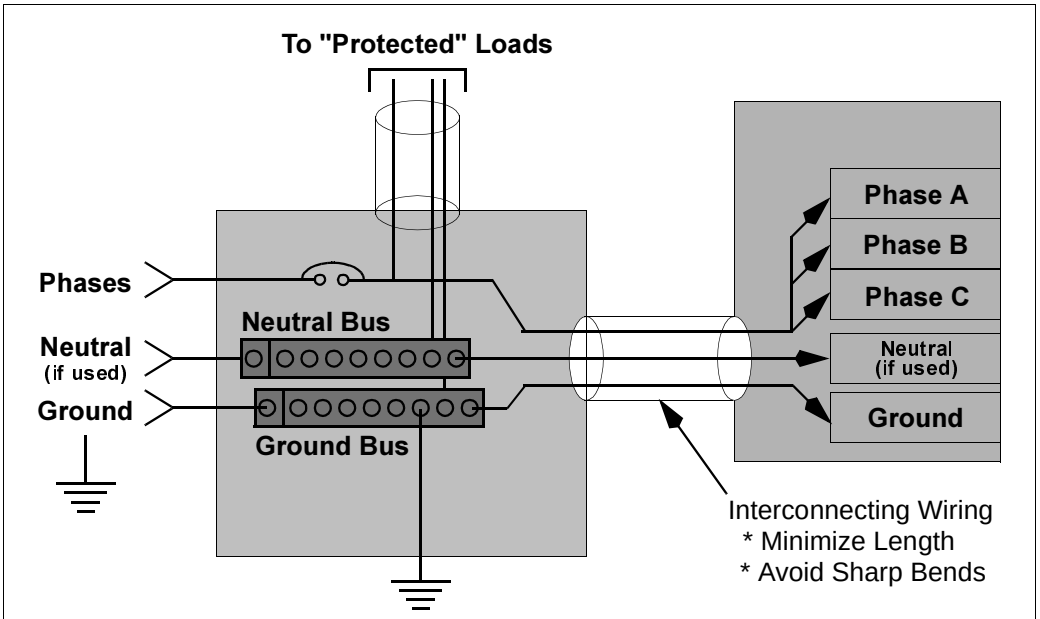


Figure 1. Typical Parallel Connections

To reduce the impedance the wire displays to surge currents, the phase, neutral (if used), and ground conductors are to be routed within the same conduit and should be tightly bundled or twisted together to optimize performance of the unit. Sharp bends in the conductors are to be avoided.

Wire Size

With a parallel connection, the size of the wiring to the SPD is independent of the ampere rating of the circuit to be protected. The recommended wire size is based on the unit's transient surge current capabilities. #6 AWG is the recommended wire size for phase, neutral, and ground.

*****Surge Protection Devices are designed for use on the load side of the service entrance disconnect only*****

Typical Unit Installation - Three Phase WYE, 4 Wire, plus Ground

This section provides basic installation instructions for the PM3 and PM4 SPDs. Per UL 1449 Paragraph 1.4, SPDs "are intended for installation on the load side of the main overcurrent protection". Locate the SPD as close as possible to the circuit to be protected to minimize the wire length. This will optimize SPD performance.

Note that these instructions are not intended to supercede local or national codes. The installation should be performed by a licensed electrician. To install a PM3 or PM4 SPD, refer to Figure 2 and proceed as follows:

1. Unpack and inspect the unit for signs of damage. If the unit is damaged, contact APC Customer Service (see Page 17 for the APC Customer Service phone number, as well as obtaining service under the Warranty.

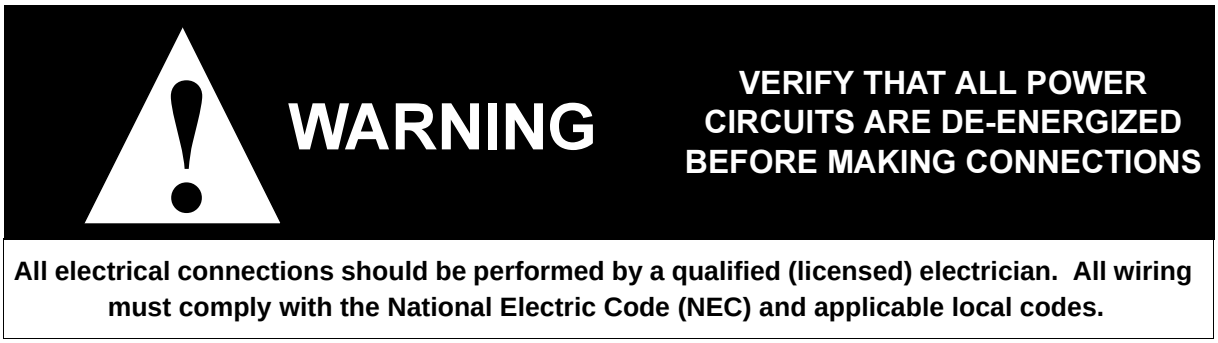
2. Locate where the unit is to be installed. Ensure wire lengths between the SPD and the service panel are kept to a minimum.

3. Open the door on the unit by loosening the two screws that secure the door latches in place. Slide the top latch upward and rotate it so that it no longer secures the door. Slide the bottom latch downward and rotate it so that it no longer secures the door.

4. Drill a hole large enough to allow for the installation of the correct sized UL approved conduit with anti-short bushings (not supplied) to accomodate the wiring being installed. NOTE: In order to keep wiring length and bend radii at a minimum, APC recommends that wiring be installed through the left side or bottom of the SPD. APC also recommends that the hole be sealed with putty after wiring installation.

5. Drill four (4) pilot holes (mounting holes in the SPD are 5/16" in diameter) to provide for mounting of the SPD.

6. Mount the device via the flanges as close as possible to the panel being protected.



All electrical connections should be performed by a qualified (licensed) electrician. All wiring must comply with the National Electric Code (NEC) and applicable local codes.

7. Connect the unit to the service panel through the UL approved conduit with anti-short bushings. The connecting wires should be twisted together or tightly bundled and kept as short as possible to enhance the performance of the SPD. Terminal wire size range is #8 AWG to #1 AWG. Torque screws to 65 inch-pounds. The recommended wire size for phase, neutral, and ground is #6 AWG.

   Connect a wire (in conduit) to the safety ground bus of the distribution panel, and to the ground connection of the SPD as shown in the diagram on the following page, and as marked on the unit. Proper grounding is essential, use a green wire or yellow/green striped wire for the ground connection. Connect a wire (in conduit) to the NEUTRAL bus of the panel and to the NEUTRAL connector of the SPD as marked on the unit. Use a white wire or mark with a white band for the neutral connection.

   Connect a wire (in conduit) to each phase (HOT) feed on the LOAD side of the three-pole breaker. Be sure the breaker is turned OFF prior to making any connections of any kind. If a breaker is not available, then it will be necessary to install or connect to an existing main disconnect switch (on the LOAD side). Disconnect switches are available from APC as an option and must be specified at the time of purchase; the disconnect is not an "add-on" device and may change the size of the enclosure. Be sure the disconnect switch is open (OFF) and the power is secured before making any connections. Refer to the diagram on the following page and the markings on the unit when connecting the phase wires.

   For answers to questions about installation, call APC's Customer Service Department at: 800-800-4APC.

   *****Always Install the SPD on the LOAD side of the main disconnect*****

   After all connections have been made and no hazards exist, restore power to the panel, breaker, or disconnect switch as required. If the SPD is installed and functioning properly, the green LED indicators on the front panel display will be lit, the module LED indicators will be lit, and there will be no audible or visual alarms.

8. Use an AC voltmeter to check all voltages to ensure that the proper unit type has been installed for the service rating being protected.

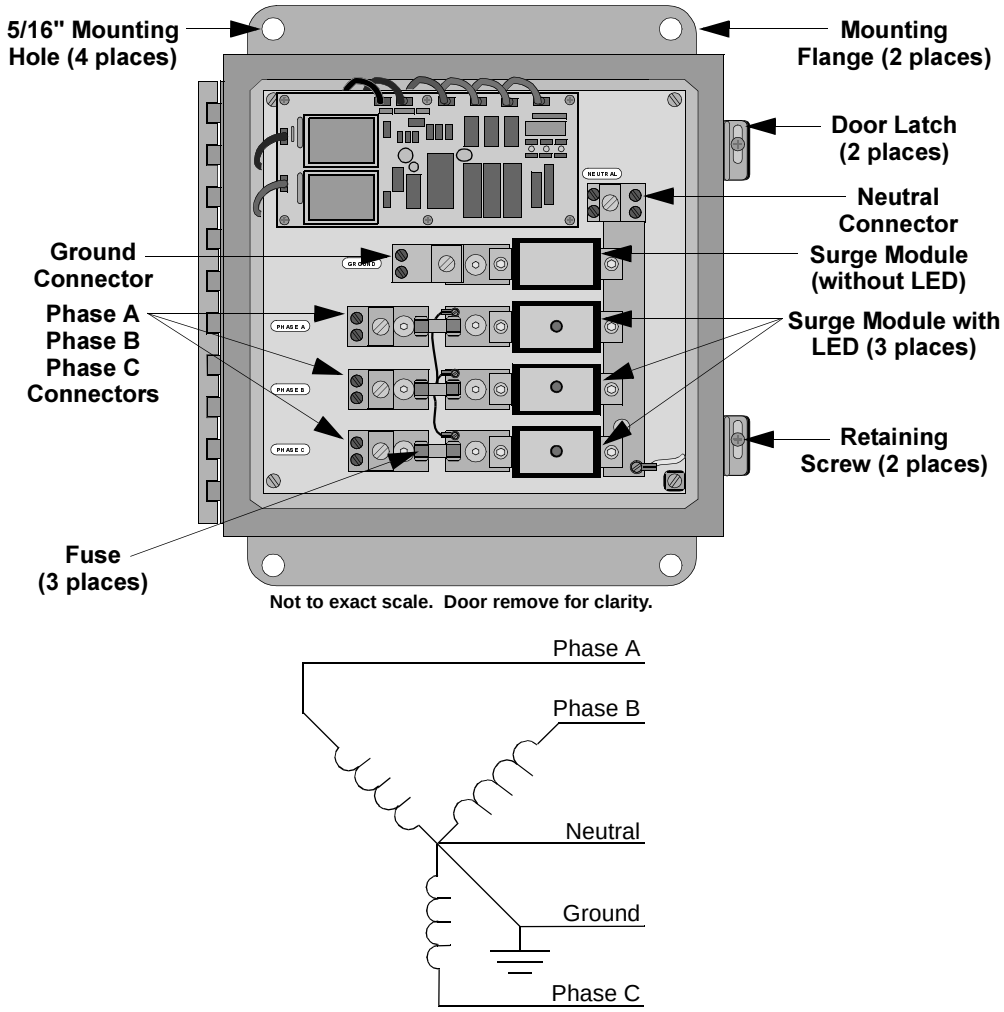


Figure 2. Basic PM3 and PM4 Configuration and Wiring Diagram (3-Phase WYE, 4-Wire, plus Ground)

Disconnect Switch Option

All APC modular series SPDs can be equipped with an optional internal disconnect switch (Figure 3). The disconnect switch provides a means to de-energize the entire suppressor, to facilitate servicing of unit's components. (See Warning regarding the Neutral when testing the distribution system).

NOTE: A disconnect switch will add length, which increases the response time and the clamp voltage. To minimize the additional lead length and optimize performance, units are available with an optional internal disconnect switch. The disconnect switch is not a device that can be added to the unit after purchase. It must be ordered with the unit as the mounting cabinet is larger for units having the option.

If an internal disconnect switch is to be used, the location of the SPD and the disconnect switch should be planned out carefully to avoid excessive lead length when wiring the devices.

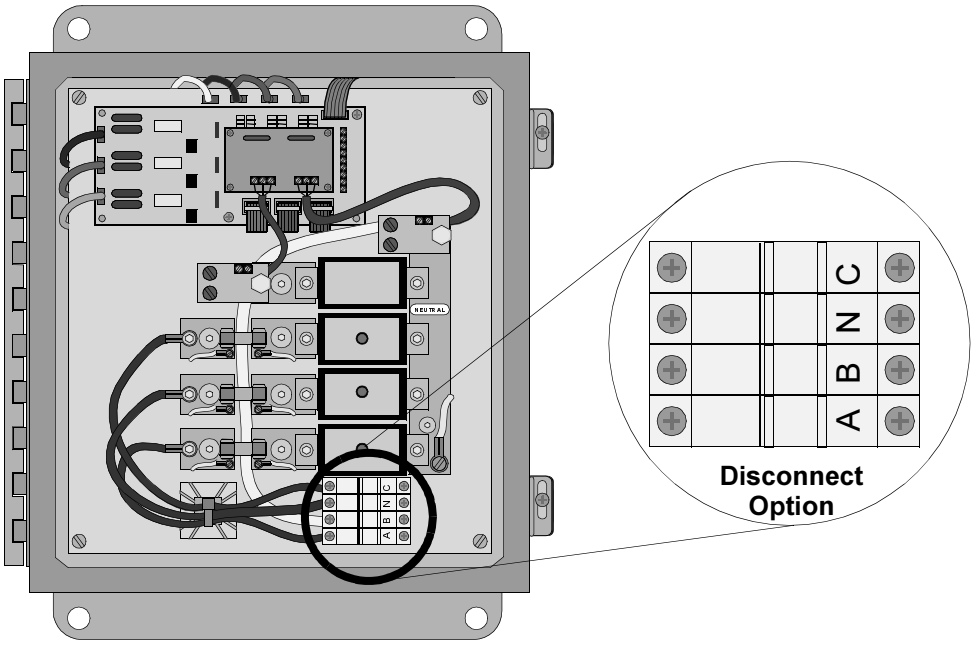
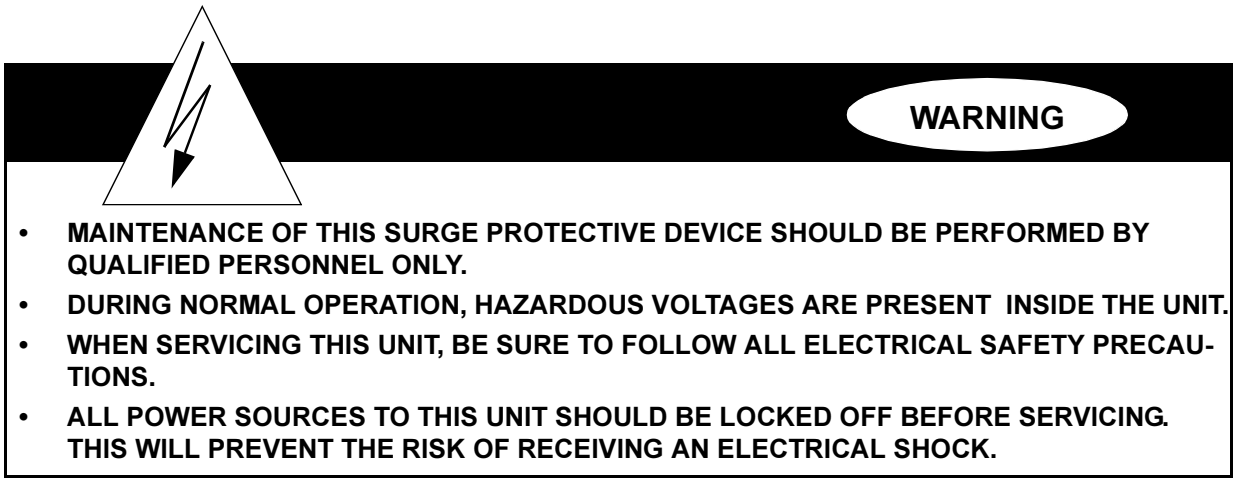


Figure 3. Basic PM3 and PM4 Configuration with Disconnect Switch Option (Daughterboard for Optional Surge Counter Shown)



Operation and Features

SPD's do not require alot of operator intervention after installation.

NOTE: The PM Series has a green LED for each phase which extinguishes when the module is no longer providing protection (fault condition).

All of the PM series of SPDs contain a diagnostic circuit which monitors the suppressors status continuously and automatically. If a fault condition were to occur, the built-in front panel audible alarm will sound and a red "Service" LED will light, indicating that the unit is in need of service by a qualified technician.

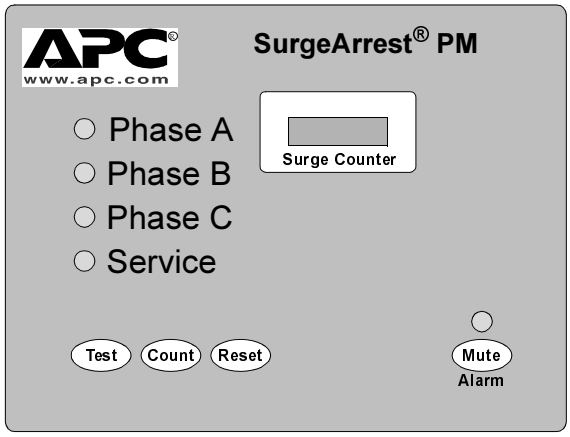
The audible alarm can be silenced by pressing the "Mute Alarm" button on the touchpad, until a qualified electrician or service person is available to service the unit. The red "Service" LED will continue to be illuminated even though the audible alarm has been silenced. This will continue until the fault condition has been cleared.

Each of the internal surge protection modules have a green LED that lights to signify that the module is on-line and functioning properly (the N-G module does not have an LED). In addition to module LED's, the front panel also displays the status of each internal module by use of diagnostically controlled green LED's. This technique ensures that a false indication does not occur if an LED were to burn out. A true/hard fault condition can be confirmed by having an audible alarm with the red "Service" LED lit, as well any module LED and front panel status LED extinguished. By utilizing all of these built in diagnostic features, an operator can more easily determine if a hard fault exists or if a status LED is faulty. If power is applied to the SPD and one or more of the module LED's are extinguished and any diagnostic LED on the front panel concurs with any module LED, then the faulted module may need to be replaced. Use the troubleshooting section of this manual to locate and repair the fault.

Status Panel Controls, Indicators, and Alarms

All indicators and controls are located on the front diagnostic panel (Figure 4) of the SDP unit. Each phase features a tri-color LED indicator. Green indicates correct operation. Amber indicates reduced protection. Red indicates loss of protection. If an inoperative condition were to occur, the built-in audible alarm will sound and the red Service LED will illuminate. This indicates that the unit needs evaluation by a qualified electrician or technician. Until a qualified person evaluates the unit, press the Mute Alarm touchpad to silence the alarm. (The LED indicator above the Mute Alarm touchpad illuminates when the alarm is deactivated. Normal operation occurs with the Mute Alarm LED extinguished.) The red Service LED will remain illuminated even though the Audible Alarm has been silenced. The Test touchpad tests the red Service LED and the Audible Alarm.

If LEDs are illuminated in a manner that suggests contradictory information, there may be an internal logic problem and the unit needs replacement. If none of the LEDs are illuminated, the unit may not be installed correctly. Please note that the internal storage capacitor for surge counter backup must be energized for about 15 minutes before the "count" push button will function. If a green LED is not illuminated and is suspect of being faulty, a qualified electrician or technician may attempt to diagnose the problem by de-energizing the unit, removing the front cover and exchanging ribbon cable leads with another phase (if available). Upon reenergizing the SPD, the appropriate LED will illuminate if the suspect LED has failed. If troubleshooting indicates a failed LED, please contact APC Technical Support at: 800-800-4APC.



Test: Tests the red Service LED and audible alarm

Count: Increments the optional surge counter by one.

Reset: Resets the optional surge counter.

Mute Alarm: Turns the Alarm off. (Note that the alarm is de-activated when the LED is lit).

Phase A, **B**, and **C**: Tri-color LED status indicators:
Green = Full protection
Amber = Partial protection
Red = No protection
Service: LED illuminates for any amber or red indication.

Surge Counter: Displays the total number of surges encountered by the SPD.

Figure 4. Status Panel with Surge Counter Option

Surge Counter Option

In units so equipped, the surge counter option provides a means to total the number of transient voltage surges encountered since the counter was last reset. The surge counter circuitry includes a "supercap". This will provide power up to four days to retain memory should a power outage occur. NOTE: There is a 10 - 15 minute charging cycle once power is connected, before the surge counter operates. The Surge Counter registers the sum of L-N and L-G transient surges. There are Count and Reset touchpads. Pressing the Count touchpad increments the counter by one. Pressing the Reset touchpad resets the counter to zero count.

Dry Contacts Option

The Dry Contacts option utilize a DB-9 connector. This feature provides two sets of both normally open (NO) and normally closed (NC) contacts through the DB-9 connector. These relay contacts can be used for remote indication of the SPD's operating status by changing state when there is an alarm condition. Examples could include a computer interface board, an emergency management system, etc. The relay contact pin arrangement is defined in Table 3. (Please note the jumpered connections. Pins 7, 8, & 9 do not represent a third set of contacts).

Table 3: Relay Contact Pin Arrangement

Pin	Contact Type
1	Normally Closed (1)
2	Common (1)
3	Normally Open (1)
4,7	Normally Closed (2)
5,8	Common (2)
6,9	Normally Open (2)

For custom applications using Dry Contacts, please note the following information: The Dry Contacts are designed for low voltage or control signals only. Maximum switching current is 1 amp. Maximum switching voltage is 24 volts, DC or AC. Higher energy application may require additional relay implementation outside the PM. Damage to the PM's relay caused by implementation with energy levels in excess of those discussed in this manual will not be covered by warranty.

Corrective Maintenance (Repair)

Surge Protection Devices (SPD) are designed for years of reliable, trouble-free operation. Unfortunately, even the most reliable equipment can fail.

Built-in diagnostics are an integral part of the SPD and will aid in isolating which of the protection module(s) have failed. To keep the SPD operating at peak performance, replacement of any bad module should be performed according to surge module removal and replacement instructions at the earliest service opportunity.

If a single module on a particular phase fails, the fuse takes the module off-line. It is recommended by APC that if a module fails on any specific phase, that all modules be replaced at the same time, according to module removal instructions that follow.

Standard troubleshooting procedures should be used to isolate other problems not associated with failed modules. See Figure 5 (Troubleshooting Flowchart) for assistance. Replace bad components with identically rated parts to continue proper operation and safety. **It is very important that fuses be replaced with the exact fuse specified on the fuse replacement warning label shipped with each unit.** This label is found on the SPD mounting plane.

After all failed modules have been replaced, prior to returning power, inspect the entire SPD for other damaged components and replace as necessary. Table 4 lists typical replacement parts.

Troubleshooting

Troubleshooting of an SPD consists of performing the sequence of steps provided in the Troublshooting Flow Chart in Figure 5. Perform the steps in this chart only to the extent necessary to clear the fault.

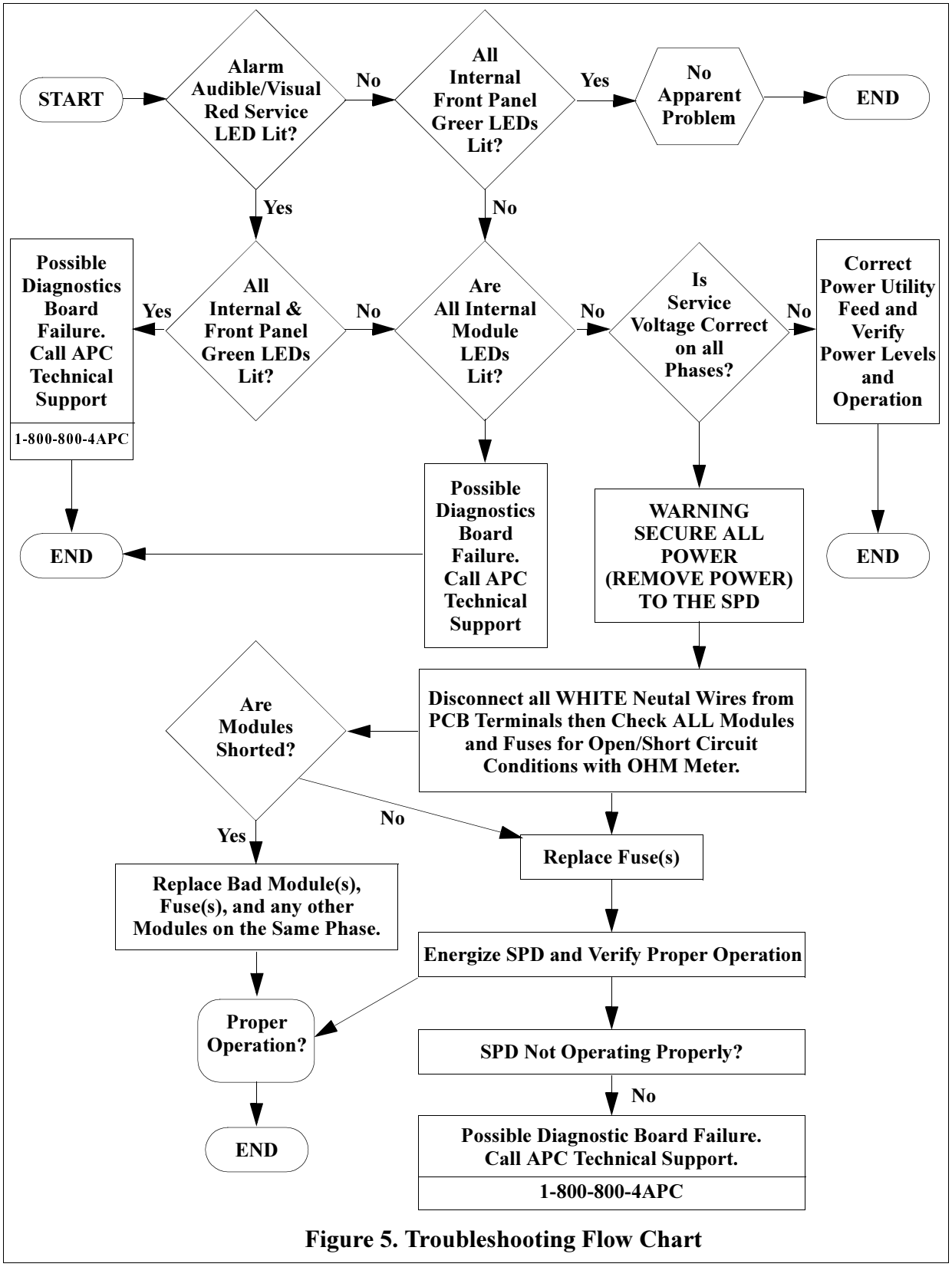


Figure 5. Troubleshooting Flow Chart

WARNING

- **MAINTENANCE OF THIS SURGE PROTECTIVE DEVICE SHOULD BE PERFORMED BY QUALIFIED PERSONNEL ONLY.**
- **DURING NORMAL OPERATION HAZARDOUS VOLTAGES ARE PRESENT INSIDE THE UNIT.**
- **WHEN SERVICING THIS UNIT, BE SURE TO FOLLOW ALL ELECTRICAL SAFETY PRECAUTIONS.**
- **ALL POWER SOURCES TO THIS UNIT SHOULD BE LOCKED OFF BEFORE SERVICING. THIS WILL PREVENT THE RISK OF RECEIVING AN ELECTRICAL SHOCK.**

Display Board Removal & Replacement Instructions

To remove the Display board, refer to Figure 6 and proceed as follows:

1. Disconnect power to the SPD.
2. Open the door on the unit by loosening the two screws that secure the door latches in place. Slide the top latch upward and rotate it so that it no longer secures the door. Slide the bottom latch downward and rotate it so that it no longer secures the door.
3. Remove the nuts that secure the display board to the panel, then remove the board.
4. Remove the connectors one at a time from the existing board and insert them into the appropriate connector on the replacement board.
5. Install the replacement board into the panel, install the nuts and tighten securely.
6. Close and secure the cabinet door and apply power to the SPD.

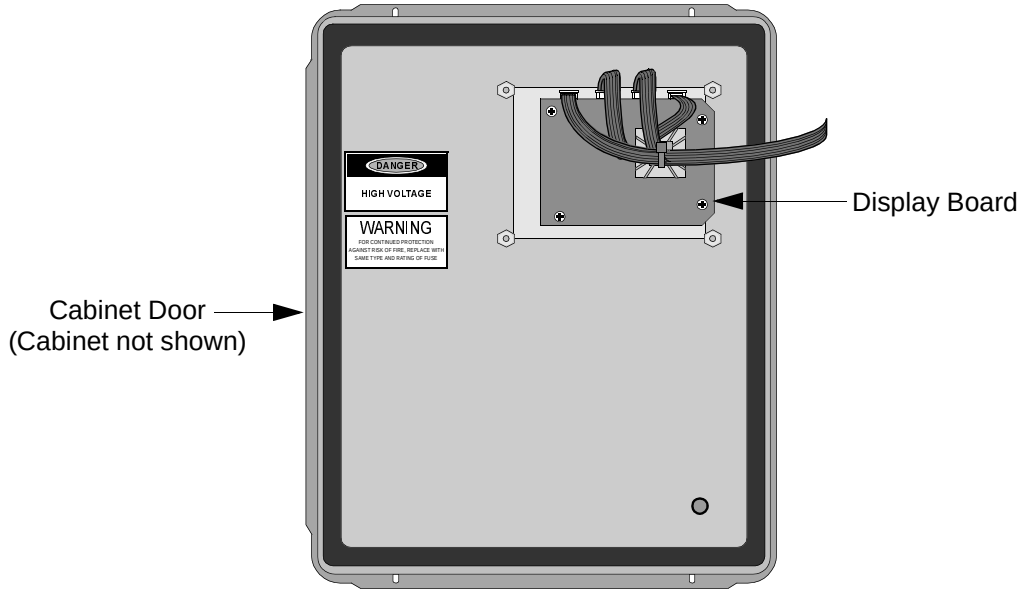


Figure 6. Display Board Locator Diagram

Diagnostic Board Removal and Replacement Instructions

To remove and replace the Diagnostic Board, refer to Figure 7 and proceed as follows:

1. Disconnect power to the SPD.
2. Remove the board from the standoffs.
3. Remove the connectors one at a time from the existing board and insert them into the appropriate connector on the replacement board.
4. Install the replacement board onto the standoffs.

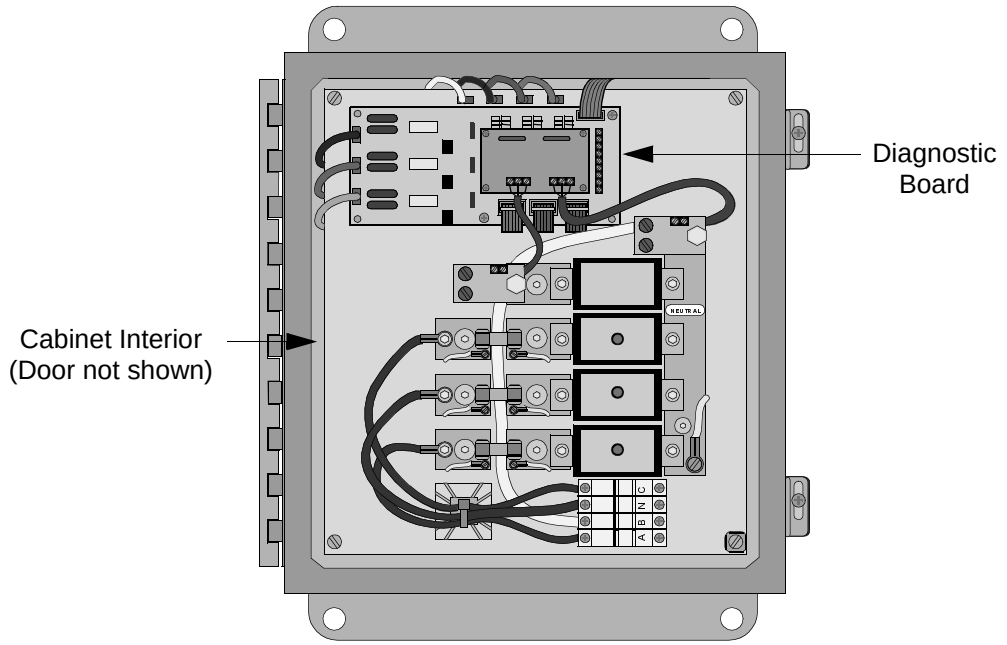


Figure 7. Diagnostic Board Locator Diagram

Surge Module Removal and Replacement Instructions

Surge modules within the SPD may become damaged and require replacement. To remove and replace a surge module, refer to Figure 8 and proceed as follows:

1. Disconnect power to the SPD.
2. Open the door on the unit by loosening the two screws that secure the door latches in place. Slide the top latch upward and rotate it so it no longer secures the door. Slide the bottom latch downward and rotate it so that it no longer secures the door.
3. Remove the two allen-head screws that secure the surge module to the chassis.
4. Pull the surge module out of the chassis.
5. Note the location and part number of each module removed as this information is not supplied elsewhere in the cabinet.

   NOTE: Surge Modules should only be replaced with a new module having the same part number as the removed module.
6. Unpack and inspect the replacement surge module for damage. If the replacement module is damaged, contact APC Technical Support.

7. Align the replacment surge module with the mounting holes in the chassis. Install the two allen-head screws removed in step 3 and torque to 65 inch-pounds.
8. Power up the SPD and verify that the green LED is lit and that all alarms have cleared.

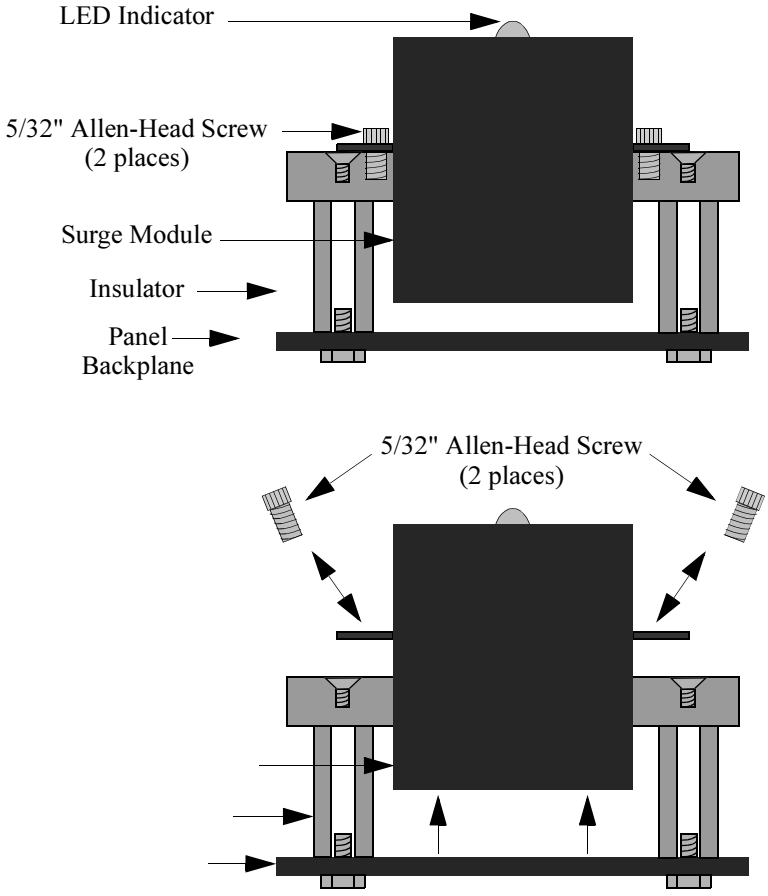


Figure 8. Surge Module Removal and Replacement

Preventive Maintenance - Inspection and Cleaning

Inspection of the SPD should be performed periodically to maintain reliable system performance and continued transient voltage surge protection. While it is difficult to establish a preventive maintenance schedule because conditions vary from location to location, inspections for failed modules and other signs of trouble utilizing the built-in diagnostics should be performed on a routine basis (weekly or monthly).

Replacement Parts Listing
APC offers the items listed in Table 4 as field replaceable items.

Table 4: Replacement Parts List

APC Model Number	Voltage System	Description	Part Works With:
M4	208/120V, 3-Phase WYE 240/120V, Split Phase	160kA Phase Module	all PMP4 units
M4N	208/120V, 3-Phase WYE 240/120V, Split Phase	160kA N-G Module	all PMP4 units
MG4	480/277V	160kA Phase Module	all PMG4 units
MG4N	480/277V	160kA N-G Module	all PMG4 units
ML4	347/600	160kA Phase Module	all PML4 units
ML4N	347/600	160kA N-G Module	all PML4 units
M3	208/120V, 3-Phase WYE 240/120V, Split Phase	120kA Phase Module	all PMP3 units
M3N	208/120V, 3-Phase WYE 240/120V, Split Phase	120kA N-G Module	all PMP3 units
MG3	480/277V	120kA Phase Module	all PMG3 units
MG3N	480/277V	120kA N-G Module	all PMG3 units
ML3	600/347V	120kA Phase Module	all PML3 units
ML3N	600/347V	120kA N-G Module	all PML3 units
RF	all	Fuse (for all modular units)	all modular units
DB	208/120V, 3-Phase WYE 240/120V, Split Phase	120 Volt Diagnostic PCB	all modular PMP, PMF units
DBG	480/277V	277 Volt Diagnostic PCB	all modular PMG units
DBL	600/347V	347 Volt Diagnostic PCB	all modular PML units
SB	all	Surge Counter PCB	all modular units with Surge Counter
DPB	all	Display PCB	all 120/160kA units without Surge Counter
DPBS	all	Display PCB with Surge Counter	all 120/160kA units with Surge Counter

Limited Warranty

APC warrants it's AC panel protection products against defects in workmanship and materials for 5 years from the date of original purchase. The panel protection device must be installed by a qualified and licensed electrician in order to qualify for warranty proctection.

Liability is limited to the replacement of the defective product. A Return Material Authorization must be given by APC prior to the return of any product (see Technical Support and Customer Service). A copy of the invoice from the installer (electrician or electrical service company) must accompany the defective device being returned. If the return of a device is authorized by APC, APC will immediately ship a replacement unit to the customer. Along with the replacement unit, APC will include a pre-paid shipping tag for the return of the originally defective unit. The replacement unit will not be warranteed unless the defective unit is received by APC.

Under no circumstance is APC responsible for the cost of removal or installation of any panel protection device.

APC also offers unlimited replacement of modular and component parts within the warranty period previously described.

The company specifically disclaims all other warranties, expressed or implied. Additionally, the company will not be responsible for incidental or consequential damages resulting from any defect in any product or component thereof.

Technical Support and Customer Service

United States and Canada: 1-800-800-4APC

This manual, as well as information about the entire APC product line is available on the internet at: www.apc.com. Prior to calling APC for technical assistance or ordering parts, please have the following information available:

Model Number of unit: _____

Serial Number of unit: _____

Manufacture Date: _____

Purchase Date: _____

Your Order Number: _____

Return Shipment Address

American Power Conversion Corporation
132 Fairgrounds Road
P.O. Box 278
West Kingston, Rhode Island 02892
USA