Surge Protective Devices

SPD50K Series

SOLAHD

EMERSON

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 Appleton Grp LLC d/b/a Appleton Group 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.
- Confirm the SPD voltage rating on the module or nameplate label is not less than operating voltage the operating voltage.

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.
- 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.

Proper installation is imperative to maximize the SolaHD SPD50K's effectiveness and performance. Follow the steps outlined in this instruction manual to ensure proper installation. Read the entire instruction manual 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 these surge suppressors must only be performed by qualified electrical personnel.

Unpacking and Preliminary Inspection

Inspect the shipping container for damage before unpacking the device. Remove the packing material and further inspect the device for shipping damage. If any damage is found, immediately file a claim with the shipping company.

Parts List

- 1 - SPD50K Surge Protective Device (SPD) including 3 ft (approximately 1m) conductors
- 1 - 3/4 in. conduit nut
- 1 - L bracket mounting kit with two pan head screws

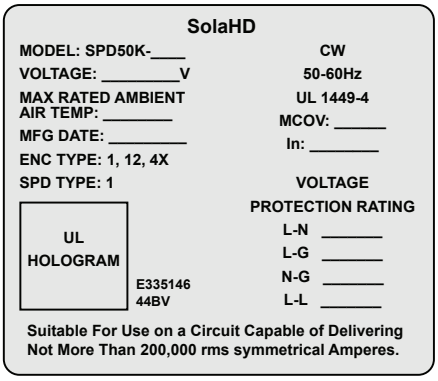
Storage

The device should be stored in a clean, dry environment. Storage temperature is -67 °F to +149 °F (-55°C to +65°C). All of the packaging materials should be left intact until the device is ready for installation.

Identification Nameplate

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

Figure 1: SPD 50K Identification Nameplate



IMPORTANT: Verify the SPD is properly rated for installation on your distribution system. Confirm the surge protective device voltage rating on the nameplate label exceeds the voltage of the distribution system (operating system voltage) it will be installed in.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Confirm the SPD voltage rating on the module or nameplate label is not less than operating voltage the operating voltage.

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

For any questions, contact SolaHD Technical Support. See the last page of this manual for contact information.

SPD Location Considerations

Environment

The device is designed to operate in an ambient temperature range of -40 °F to +140 °F (-40°C to +60°C) with a relative humidity of 0 to 95% non-condensing. This device has a Type 4X housing.

Audible Noise

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

Mounting

The device has been designed to be DIN-rail, bracket or surface mounted.

Service Clearance

The service clearance should meet all applicable code requirements.

Equipment Performance

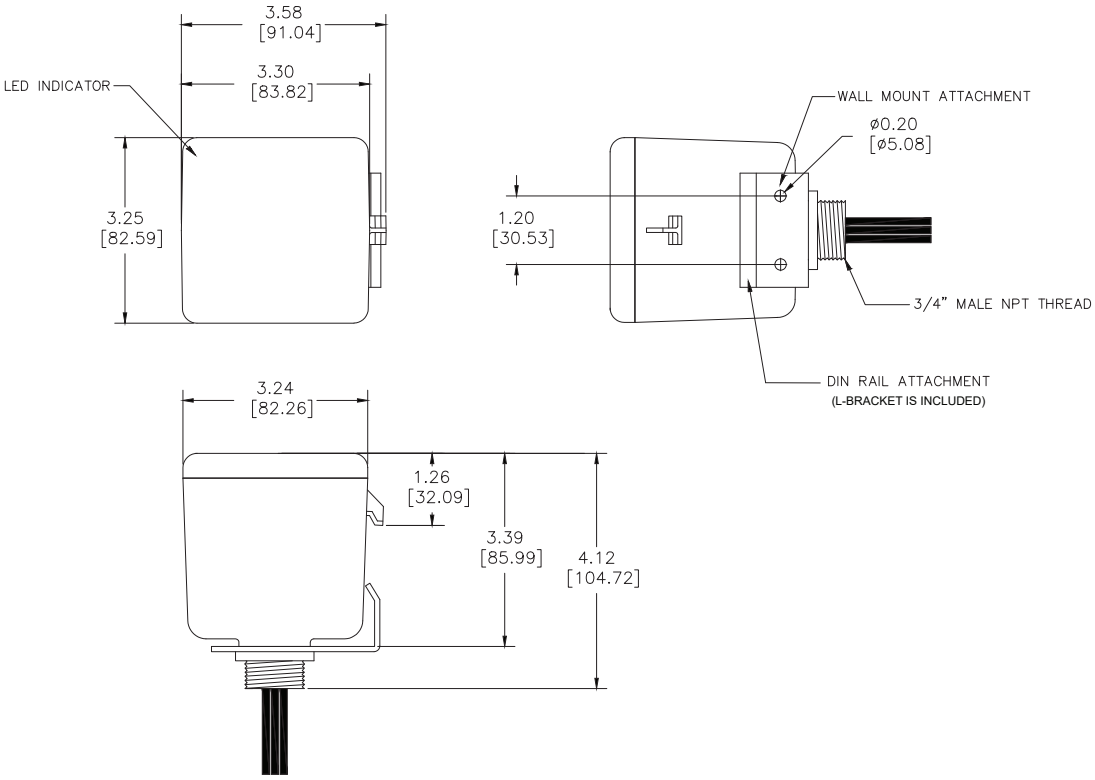
To obtain optimum surge suppression, locate the SPD as close as possible to the circuitry being surge-limited to minimize the wire length. Minimizing the wire length reduces the impedance between the circuitry and the SPD.

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

Technical Data Sheet

Performance Specifications	Diagnostic Monitoring
• 50kA per phase • UL 1449 tested Inominal: 20kA • UL 1449 tested SCCR: 200kA • Individually fused & thermally protected MOVs • Repetitive impulse: 5000 - 3kA - 8 x 20µs; 1000 - 10kA - 8 x 20µs	• Green LED visible = okay, Green LED off, with power present = replace SPD • Every MOV is monitored as opposed to 'power is present'
Physical Specifications	**Features**
• Relative humidity range: 0 - 95% non-condensing • Operating frequency: 47 - 63 Hz • Operating temperature: -40° C (-40° F) to +85° C (185° F) • Response time: < 1 nanosecond • Solid state bi-directional operation • NEMA 4X polycarbonate enclosure—UL746C(f1), UL 94-5VA • Pre-wired with 3 feet (0.9 meter) of #10 AWG conductor • Typical connection: 30A breaker • Weight:1.60 lbs (0.73 kg)	• Dry contacts & audible alarm • Dry contact connection leads exit through nipple via 18 AWG • Standard, 35 mm DIN-Rail or Bracket (flat surface) Mount Installation • Audible alarm with relay contacts, dry contact leads provided
Quality, Standards & Validation	
• cULus Listed • Type 1: UL 1449, CSA 22.2 No. 269.1 • ANSI/IEEE C62.41.1-2002, C62.41.2-2002, C62.45-2002, C62.62-2010 and C62.72-2016 • IEC 61643, CE • RoHS compliant	

Dimensions (in./mm)



Electrical

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

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

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

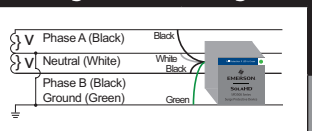
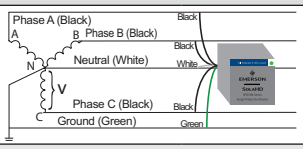
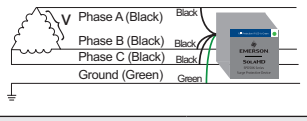
Voltage Rating

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

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

Table 1: Model SPD50K Service Voltages

SPD	**50K**	**□□□**
Surge Protective Device	**50kA Rating Per Phase**	**Voltage Codes** 10S – 120V/240V 10Y – 208Y/120V 27Y – 480Y/277V 24D – 240V Delta 48D – 480V Delta 34Y – 600Y/347V 60D – 600V Delta

		System Configuration	Reference Diagram	UL 1449 Test Data						
Model	2 POLE			L-N	L-L	N-G	L-G	I_n	SCCR	MCOV
SPD50K10S		120/240V		700	1200	600	1200	20kA	200kA	150
Models	WYE			L-N	L-L	N-G	L-G	I_n	SCCR	MCOV
SPD50K10Y		208Y/120V		700	1200	600	1200	20kA	200kA	150
SPD50K27Y		480Y/277V		1200	2000	1000	1800	20kA	200kA	320
SPD50K34Y		600Y/347V		1500	2500	1200	2500	20kA	200kA	420
Models	DELTA			L-N	L-L	N-G	L-G	I_n	SCCR	MCOV
SPD50K24D*		240V Delta		-	1500	-	1200	20kA	200kA	320
SPD50K48D*		480V Delta		-	3000	-	1800	20kA	200kA	552
SPD50K60D*		600V Delta		-	2500	-	2500	20kA	200kA	690

* Does not include N-G protection

Location of Surge Protective Device (SPD)

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

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

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

Figure 2: SPD Wiring for Wye Configuration

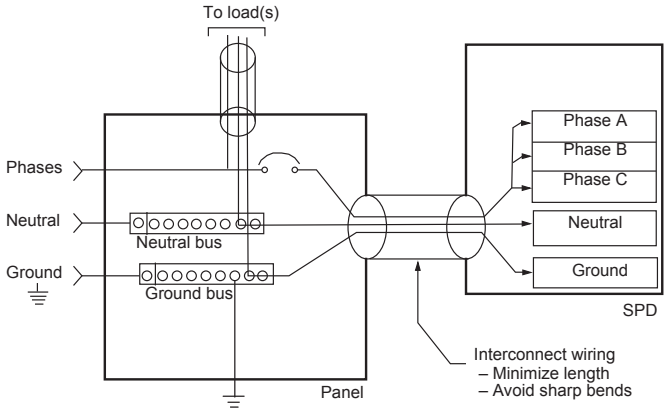
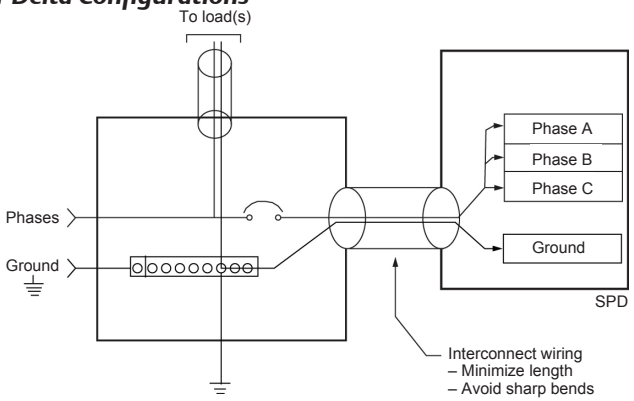


Figure 3: SPD Wiring for Delta Configurations



System Grounding

⚠ CAUTION

SPD DAMAGE AND POWER SYSTEM OVER VOLTAGE

- Ungrounded power 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.
- Resistance-grounded power systems must be maintained in a over-damped state to limit voltage overshoot and duration during operation.
- Verification and adjustment of correct power system damping should be done following power system modifications and periodically, as part normal system maintenance.

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

NOTICE

LOSS OF SURGE SUPPRESSION

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

Failure to follow these instructions can result in equipment damage.

The SPD50K has SPD elements connected from phase to ground. It is critical that there be a robust and effective connection to the building grounding structure. The grounding connection must utilize an equipment grounding conductor run with the phase and neutral connection of the power system. Do not connect the SPD to a separate isolated ground. For proper voltage suppression by the SPD50K, use a single-point ground system where the service entrance grounding electrode system is connected to, and bonded to, all other available electrodes, building steel, metal water pipes, driven rods, etc. (for reference, see NEC Art 250). The ground impedance measurement of the electrical system must be as low as possible and in compliance with all applicable codes for sensitive electronic and computer systems.

NOTICE

INADEQUATE RACEWAY ELECTRICAL CONTINUITY

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

Failure to follow these instructions can result in equipment damage.

Wiring and 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.

Parts List

1 - SPD50K suppressor including 3' (~1m) conductors
1 - 3/4” conduit nut
1 - L bracket mounting kit; includes two pan head screws
1 - Instructions

Table 2: Wire Color	
Wye and Delta Systems	
Wire	**Color**
Phase 1-3	Black
Neutral	White
Ground	Green
Delta Systems	
Wire	**Color**
Phase 1-3	Black
Ground	Green

Follow steps 1 through 10 to make wiring connections:

1. Turn off all power supplying this equipment before working on or inside any enclosure containing this equipment.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Turn off all power supplying this equipment before working on or inside equipment.

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

2. If Dry Contacts are to be used, pre-plan the installation of the relay wires.
3. Confirm SPD is rated for your system by comparing voltage measurements to the Line Voltage (L-L, L-N) on the product label.
4. 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. See Figure 5.
   - **Note:** The SPD must be installed in an accessible location.
5. Mount SPD. For weather resistant applications additional sealing, O-ring is required (not included). See Figure 4 and 5.

⚠ 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.

6. Install in accordance with national and local electrical codes and match the branch circuit Overcurrent Protection Device (OCPD) to the wire size.
7. For all wires Twist conductors 1/2 turn or more for every twelve inches of length.
8. Do not loop or coil wires. Be sure to maintain adequate wire bending space per NEC. Trim excessive wire length.
9. Use on solidly grounded systems unless the SPD model is designed for installation on ungrounded/ HRG systems.
10. Energize and confirm proper operation of green LED indicator.

Figure 4: Nipple

Sealing gasket:

Two choices
1) At 3/4 in. nom. thread: ID is 1.05 in.

2) At 0.14 in. high 'base step': ID is 1.25 in.

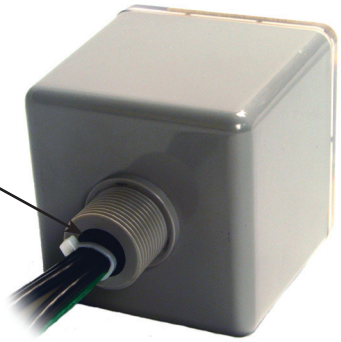


Figure 5: Typical panel Installation

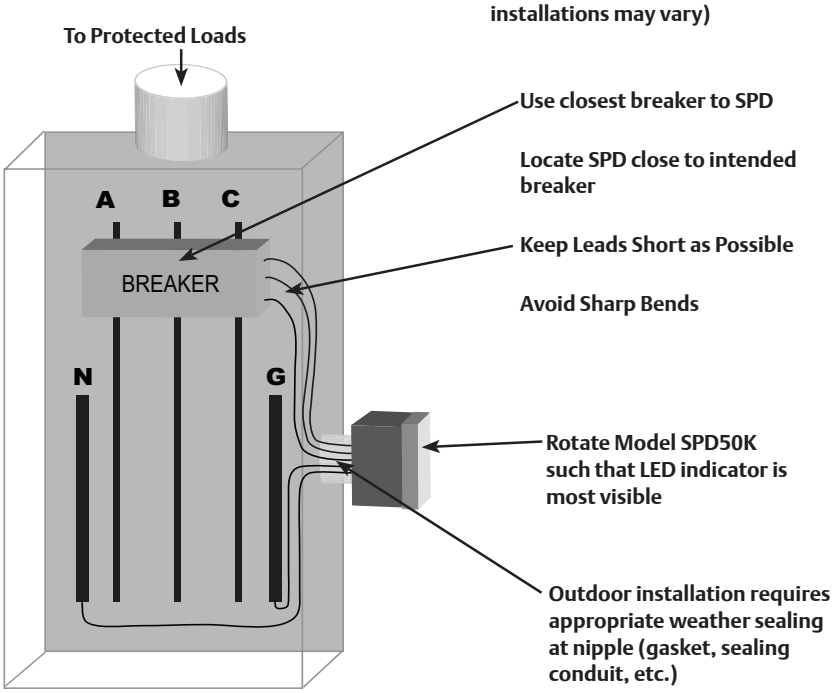


Figure 6: Single-Phase, Three-Wire Installation

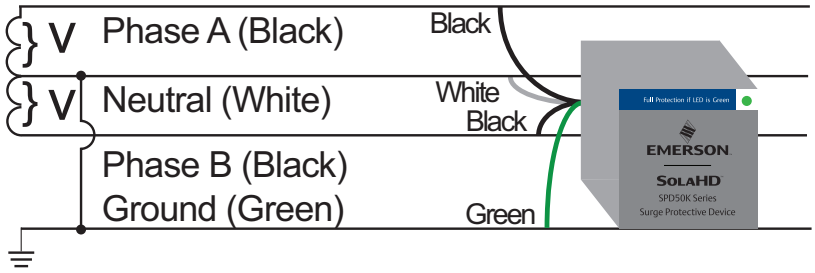
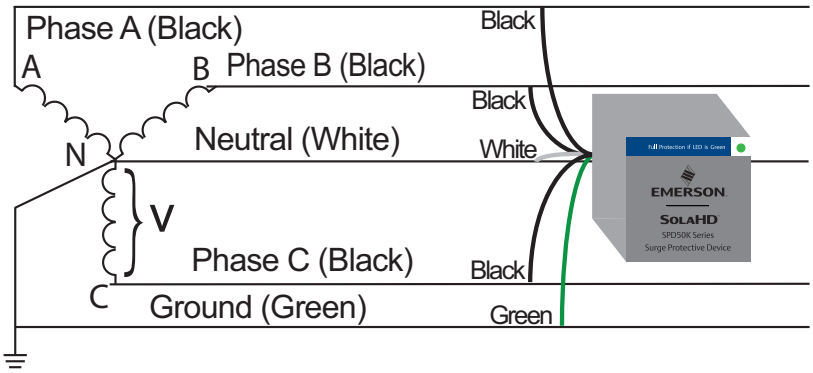


Figure 7: Three-Phase, Three- or Four-Wire, Grounded WYE Installation[1]



Note 1: The neutral conductor is not present on three-wire Wye grounded power systems.

Figure 8: Three-Phase, Three-Wire, Delta Installation

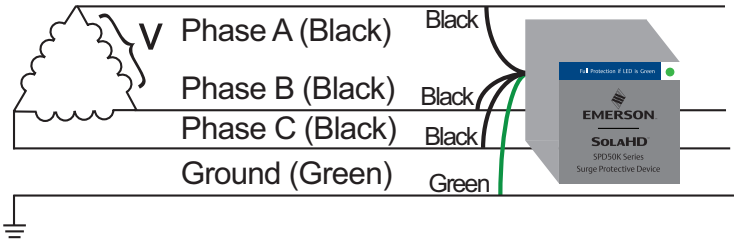
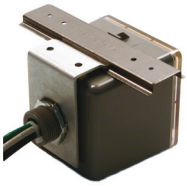


Figure 9: Mounting the SPD50K

- 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

Std. 3/4"-14
Nipple



DIN-Rail Mount
(rail not incl.)

Bracket Mount
for flat surfaces

Surface-Mount Installation

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

1. Make perforations on the wall according to the screw holes located on the enclosure. (Rotate dimensions 90° as appropriate depending on orientation).
2. Configure the electrical conductor and conduit connection consistent with the installation instructions in this manual.

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.

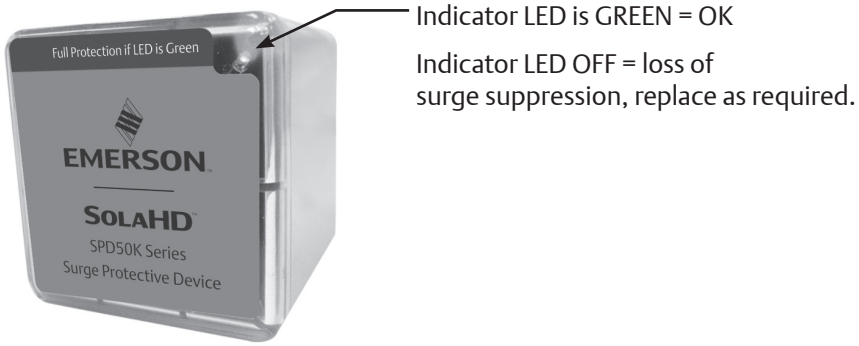
Failure to follow these instructions will result in death or serious injury.

LED Status Indicators

Diagnostic LEDs are located on the front of the SPD50K device. They operate as follows:

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

Figure 10: Diagnostic Operation



Dry Contacts

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Use 600VAC rated dry contact wiring.
- Dry contact wiring must have less than 1/16 in. (1.6mm) exposed wire from the dry contact block.
- Do not supply more than 24VDC / 24VAC and no more than a current of 2 A.

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

This SPD50K device is provided with dry contacts. The unpowered state shall be closed between the common wire and the normally closed wire. This is also the alarm condition. The opposite state, closed between the common wire and the normally open wire, indicates that power is on to the unit and that no alarm condition exists. These dry contact leads can be used for remote indication of the SPD operating status to a computer interface board or emergency management system.

The dry contacts are designed for a maximum voltage of 24VDC / 24VAC 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, please contact SolaHD Technical Services.

Connecting Optional Form C Dry Contact & Audible Alarm

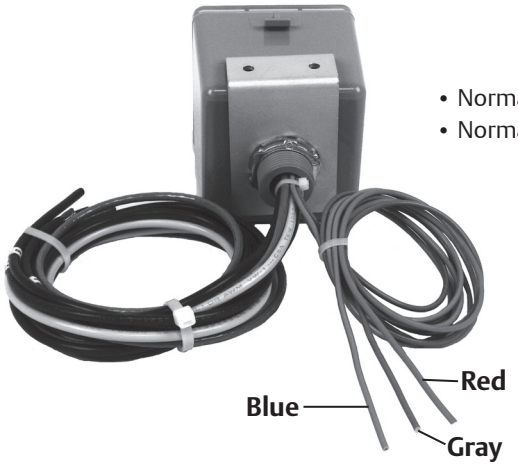
The dry contacts are designed for a maximum voltage of 24VDC / 24VAC and a maximum current of 2 A. Higher energy applications may require additional relay implementation outside the SPD. Damage to the SPD's relay caused by use with energy levels in excess of those discussed in this instruction bulletin are not covered by warranty. For application questions, call the SolaHD technical support at 1-800-377-4384 or email us at solahd.technicalservices@emerson.com.

Three 3 ft. (~1 m) 18 AWG wires are included through the nipple with this option. See Figure 12. Gray is Common, Blue is Normally Open and Red is Normally Closed when energized in its expected installation. (When not energized, the SPD is no longer in its 'Normal' state and contacts will be reversed.)

If the dry contacts are not utilized, insulate lead ends, coil and secure. Audible Alarm will still function correctly.

The contact is rated 24VDC / 24VAC and a maximum current of 2 A. Higher energy applications require supplemental relaying. This option monitors the suppression elements condition and is not intended for use as phase loss or phase detection monitoring.

Figure 11: Leads



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

Preventive Maintenance

⚠ DANGER

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

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

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.

Technical Support

Website: www.solahd.com

Technical Support E-Mail: solahd.technicalservices@emerson.com

Toll-Free: (800) 377-4384

USA: (847) 268-6651

Warranty

Please see the “Terms & Conditions of Sale” document.

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