



Surge Protection Made Simple™

UL & Data Signal SPD Guide for North American Applications



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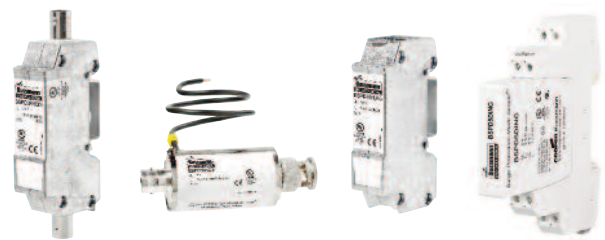
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Today's world is full of electronic products and electrical devices that are susceptible to damage from overvoltage surges.

Surges caused by static discharge, capacitive and inductive loads or lightning can quickly destroy sophisticated electronic equipment and components used in industrial and commercial applications and cripple operations – particularly the data and communication systems that virtually every enterprise relies upon today, including UL 508A panels with their reliance on control circuits.

Cooper Bussmann offers a wide selection of surge protection products that help assure power quality by eliminating damaging surge and overvoltage conditions.

Surge Protection Case Studies and References for Industrial and Commercial Applications

- G.W. Allen and D. Segall with IBM – Two year study at over 200 location in 25 cities – 88.5% of AC power problems are transient voltage related.
- 2011 Erimar Systems Integration - A lightning strike entered the metals fabricating facility and destroyed \$20,000 worth of control panels, electrical infrastructure and the Cisco infrastructure. Loss of data system also cost 11 days of production.
- IEEE Emerald Book and NFPA 780 both recommend using surge protection as a part of a building's lightning protection system. Suppressors at the service entrance only reduce, but not completely eliminate, the high-energy transient. A second surge protective device must be applied upstream of critical equipment. All SPDs should comply with UL 1449 latest edition.
- 1999-2001 Electric Power Research Institute (EPRI) Study – Concluded downtime from power sags, surges and transients cost US industry:
 - \$50 Billion+ in 1999
 - \$100 Billion+ in 2000
 - \$200 Billion+ in 2001
 - Continues to escalate as more electronic equipment is used
- Plant Services Magazine – 35% of lost production hours can be attributed to transient voltage problems.
- Florida Light & Power 1999 Study - Sources of Facility Surge and Overvoltage Events:
 - ~60% Internally Generated
 - ~40% Externally Generated

Causes and Relevance of Transients and Surges

- Lightning Strikes - Large scale impact, high current and voltage, but least common occurrence.
- Power Switching - Increasing occurrences:
 - Utility & Customer Load Switching – Motors, large loads, faults, capacitor banks, fuse and circuit breaker operation*, etc.
 - Source Switching - Smart grid, gensets, photovoltaic power systems and wind power generation, etc.

* During overcurrent events, both circuit breakers and fuses can produce arc voltages 2-3 times the system voltage in accordance with the UL standards.

Damaging Effects of Transients and Surges

- Disruptive – A voltage transient enters an electronic component and it interprets the transient as a valid logic command, resulting in system lock-up, malfunction, faulty output or corrupted files.
- Dissipative – Associated with short duration repetitive low energy level surges, resulting in equipment failure over time including electronic components, ballasts, motors and controllers, service entrance equipment, panelboards and switchgear.
- Destructive – Associated with high level energy surges, resulting in immediate equipment failure including electronic components, ballasts, motors and controllers, service entrance equipment, panelboards and switchgear.



Internal Damage - PCB Destroyed By Overvoltage Surge



Service Entrance Destroyed By Overvoltage

* From the NFPA 70® National Electrical Code® 2011 Edition.

** Note: UL now refers to these only as "Surge Protective Devices."

Surge Protective Devices are defined as various *Types* by both UL and the NEC. They are NOT the same. UL and NEC *types* differ significantly by:

1. **UL** designating the *UL Standards* of an SPD.
2. **NEC®** designating *Installation Requirements* and where an SPD is permitted to be installed.

UL SPD Standards

SURGE PROTECTIVE DEVICES - UL 1449, Section 1 effective September 29, 2009, states the following on UL Types:

1.1 These requirements cover Surge Protective Devices (SPDs) designed for repeated limiting of transient voltage surges as specified in the standard on 50 or 60 Hz power circuits not exceeding 1000 V and designated as follows:

Type 1 – Permanently connected SPDs intended for installation between the secondary of the service transformer and the line side of the service equipment overcurrent device, as well as the load side, including watt-hour meter socket enclosures and intended to be installed without an external overcurrent protective device.

Type 2 – Permanently connected SPDs intended for installation on the load side of the service equipment overcurrent device; including SPDs located at the branch panel.

Type 3 – Point of utilization SPDs, installed at a minimum conductor length of 10 meters (30 feet) from the electrical service panel to the point of utilization, for example cord connected, direct plug-in, receptacle type and SPDs installed at the utilization equipment being protected. See marking in 64.2. The distance (10 meters) is exclusive of conductors provided with or used to attach SPDs.

Type 4 Component Assemblies – Component assembly consisting of one or more Type 5 components together with a disconnect (integral or external) or a means of complying with the limited current tests in 39.4.

Type 1, 2, 3 Component Assemblies – Consists of a Type 4 component assembly with internal or external short circuit protection.

NEC® SPD Installation/Connection*

NEC Article 285, Surge-Protective Devices (SPDs), 1kV or Less states the following on where in an electrical system SPDs can be installed and or connected.

III. Connecting SPDs

285.21 Connection. Where an SPD (surge arrester or TVSS**) device is installed, it shall comply with 285.23 through 285.28.

285.23 Type 1 SPDs (Surge Arresters).** Type 1 SPDs shall be installed in accordance with 285.23(A) and (B).

(A) Installation. Type 1 SPDs (surge arresters) shall be installed as follows:

- (1) Type 1 SPDs (surge arresters) shall be permitted to be connected to the supply side of the service disconnect as permitted in 230.82(4) or
- (2) Type 1 SPDs (surge arresters) shall be permitted to be connected as specified in 285.24.

(B) At the Service. When installed at services, Type 1 SPDs shall be connected to one of the following:

- (1) Grounded service conductor
- (2) Grounding electrode conductor
- (3) Grounding electrode for the service
- (4) Equipment grounding terminal in the service equipment

285.24 Type 2 SPDs (TVSSs).** Type 2 SPDs (TVSSs) shall be installed in accordance with 285.24(A) through (C).

(A) Service-Supplied Building or Structure. Type 2 SPDs (TVSSs) shall be connected anywhere on the load side of a service disconnect overcurrent device required in 230.91, unless installed in accordance with 230.82(8).

(B) Feeder-Supplied Building or Structure. Type 2 SPDs (TVSSs) shall be connected at the building or structure anywhere on the load side of the first overcurrent device at the building or structure.

(C) Separately Derived System. The SPD (TVSS) shall be connected on the load side of the first overcurrent device in a separately derived system.

285.25 Type 3 SPDs. Type 3 SPDs (TVSSs**) shall be permitted to be installed on the load side of branch-circuit overcurrent protection up to the equipment served. If included in the manufacturer's instructions, the Type 3 SPD connection shall be a minimum 10 m (30 ft) of conductor distance from the service or separately derived system disconnect.

285.26 Conductor Size. Line and grounding conductors shall not be smaller than 14 AWG copper or 12 AWG aluminum.

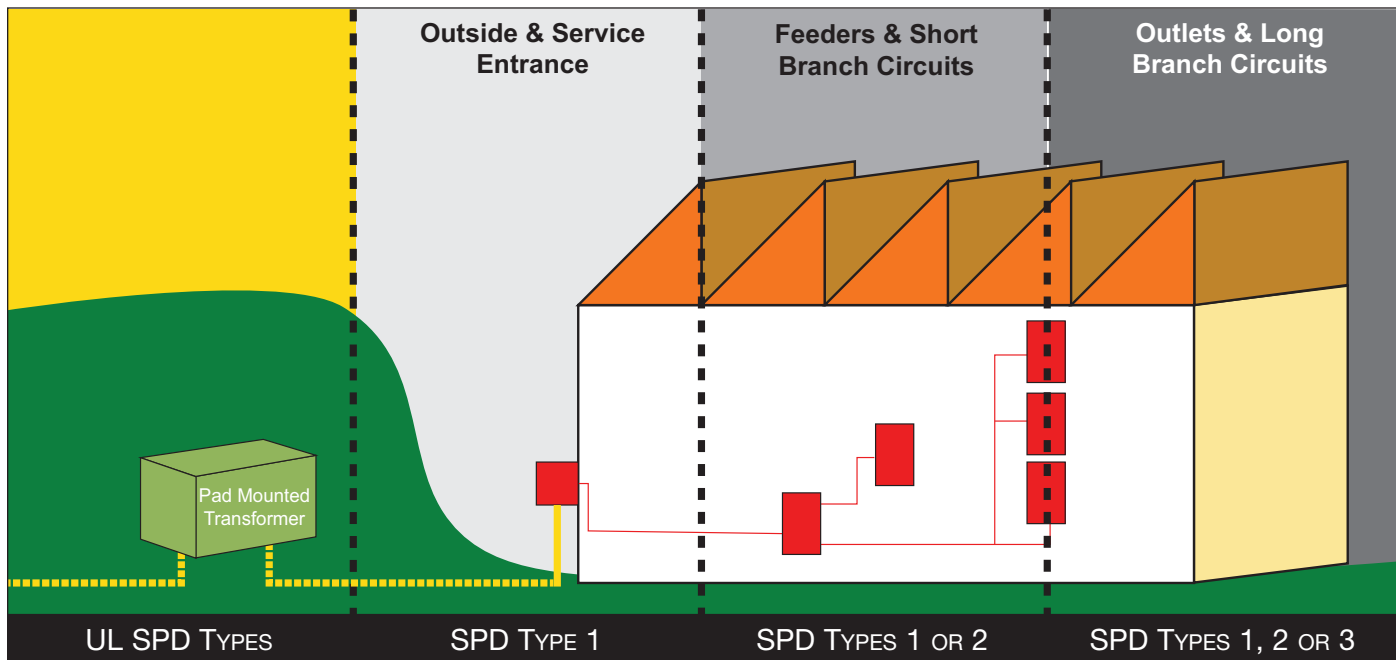
285.27 Connection Between Conductors. An SPD (surge arrester or TVSS*) shall be permitted to be connected between any two conductors — ungrounded conductor(s), grounded conductor, equipment grounding conductor, or grounding electrode conductor. The grounded conductor and the equipment grounding conductor shall be interconnected only by the normal operation of the SPD (surge arrester or TVSS) during a surge.

285.28 Grounding Electrode Conductor Connections and Enclosures. Except as indicated in this article, SPD grounding connections shall be made as specified in Article 250, Part III. Grounding electrode conductors installed in metal enclosures shall comply with 250.64(E).

* From the NFPA 70® National Electrical Code® 2011 Edition.

** Note: UL now refers to these only as "Surge Protective Devices."

North American Application of UL SPD Types by NEC® Location Guide



NEC® 285 Type 1

Type 1 SPDs (surge arresters*) shall be installed as follows:

(1) Type 1 SPDs (surge arresters) shall be permitted to be connected to the supply side of the service disconnect as permitted in 230.82(4) or... as well as the loadside, including watt-hour meter socket enclosures and intended to be installed without an external overcurrent protective device.

(2) Type 1 SPDs (surge arresters) shall be permitted to be connected as specified in 285.24.

NEC® 285 Type 2

Type 2 SPDs (TVSSs) shall be installed in accordance with 285.24(A) through (C).

(A) Service-Supplied Building or Structure. Type 2 SPDs (TVSSs*) shall be connected anywhere on the load side of a service disconnect overcurrent device required in 230.91, unless installed in accordance with 230.82(8).

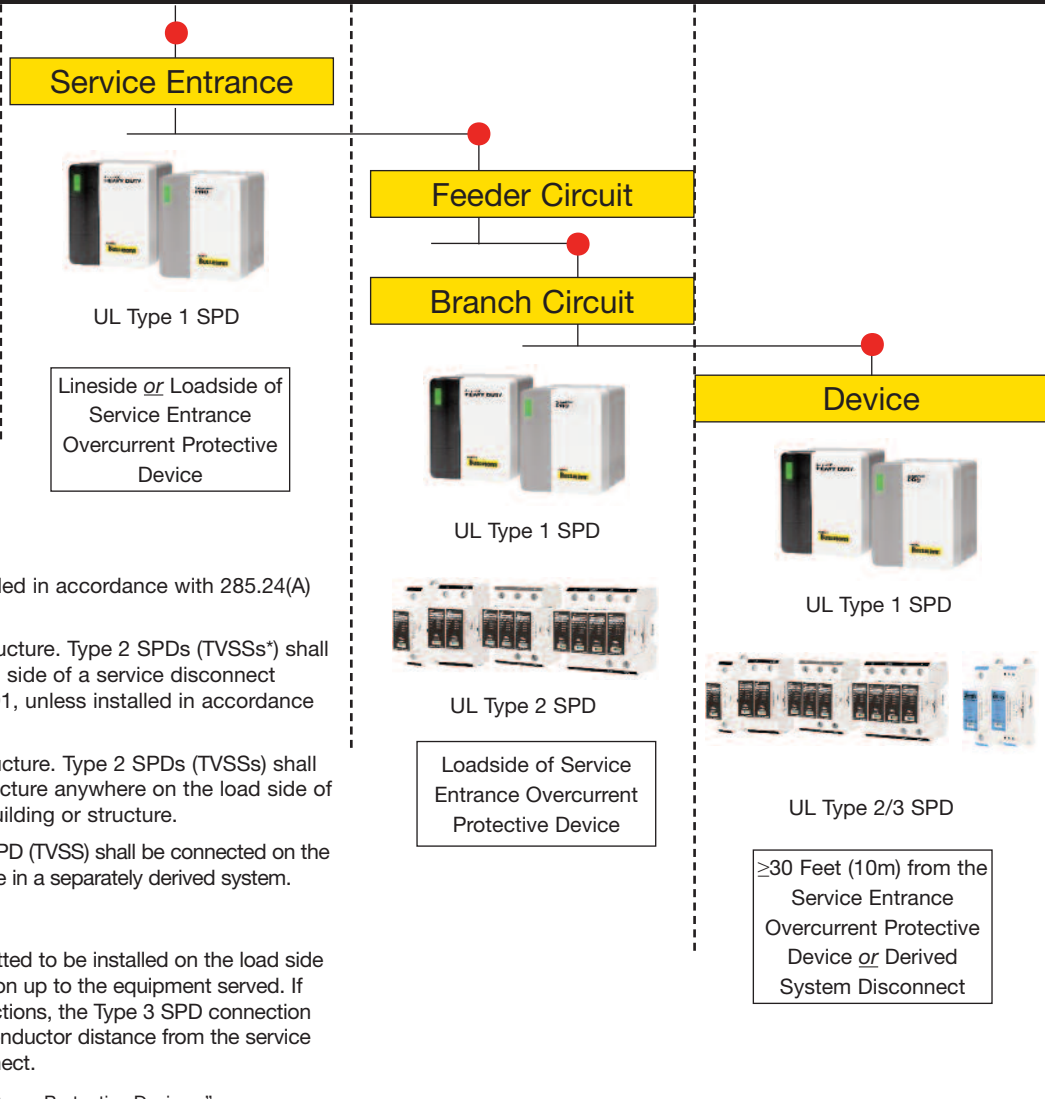
(B) Feeder-Supplied Building or Structure. Type 2 SPDs (TVSSs) shall be connected at the building or structure anywhere on the load side of the first overcurrent device at the building or structure.

(C) Separately Derived System. The SPD (TVSS) shall be connected on the load side of the first overcurrent device in a separately derived system.

NEC® 285 Type 3

Type 3 SPDs (TVSSs*) shall be permitted to be installed on the load side of branch-circuit overcurrent protection up to the equipment served. If included in the manufacturer's instructions, the Type 3 SPD connection shall be a minimum 10 m (30 ft) of conductor distance from the service or separately derived system disconnect.

* Note: UL now refers to these only as "Surge Protective Devices."



Type 1 UL Listed

UL Type 1 NEMA 4X SPDs - Black & Grey Labels



SurgePOD™ HEAVY DUTY

AC Voltages 120 to 600Vac
Critical Commercial and Industrial Applications



SurgePOD™ PRO

AC Voltages 120 to 480Vac
Residential and Light Commercial

Type 2 & 3 UL Recognized

UL DIN-Rail Type 2 & 3 SPDs-Black & Blue Labels



1-Pole



2-Pole



3-Pole



4-Pole

Black Label High SCCR Rated BSP Type 2 UL Series

AC Power Type 2 SPD
AC Voltages Up To 600Vac



1-Pole



2-Pole

Blue Label Non-SCCR Rated

Type 2* Power SPD **Type 3* Control SPD**

Non-SCCR BSP LV Series

AC/DC Voltages 24 to 600V
*See "UL Types" on page 54 for definitions.

UL 497B Data Signal

UL 497B DIN-Rail and In-Line Data Signal SPDs - Grey Label



BNC Coaxial Cable DIN-Rail & In-Line

For Nominal Voltage Up to 5V



RJ45 Cable DIN-Rail

For Nominal Voltage Up to 48V

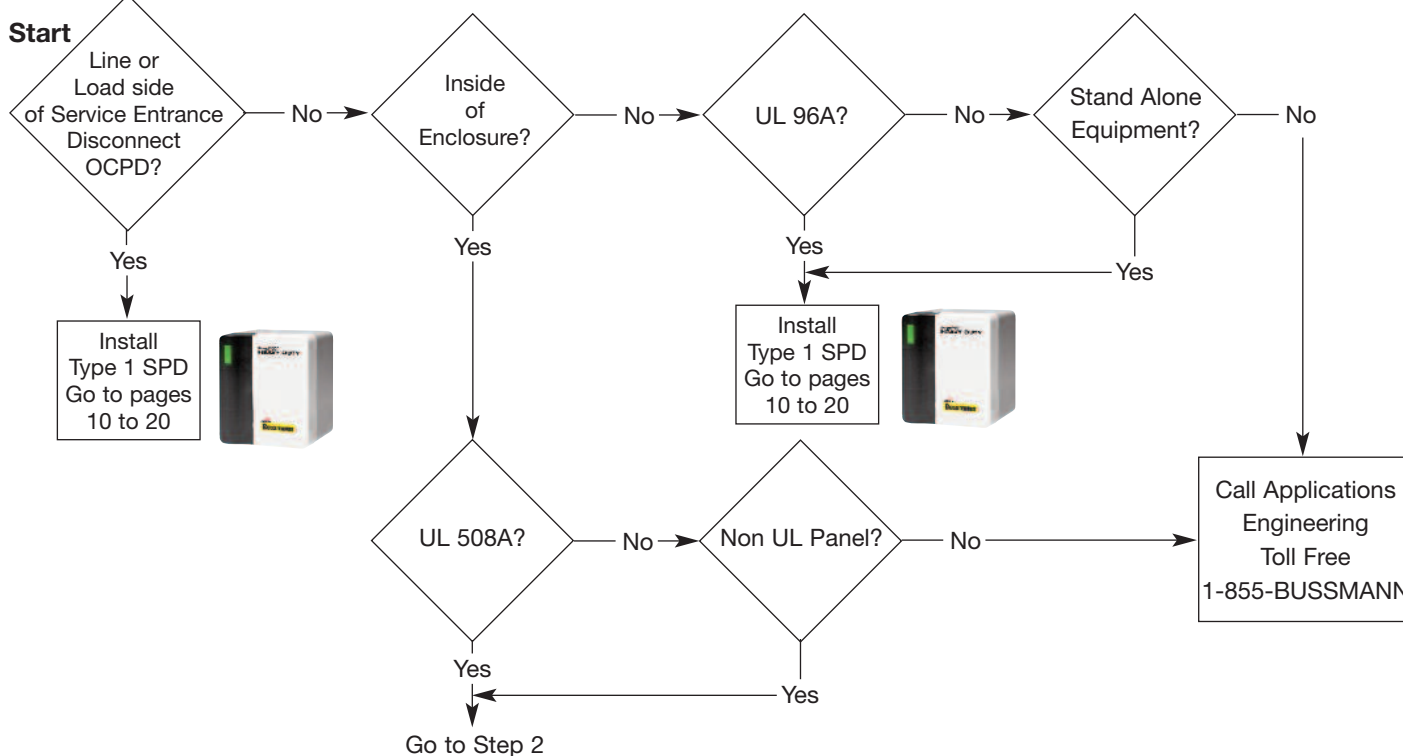


Universal 4 Wire DIN-Rail

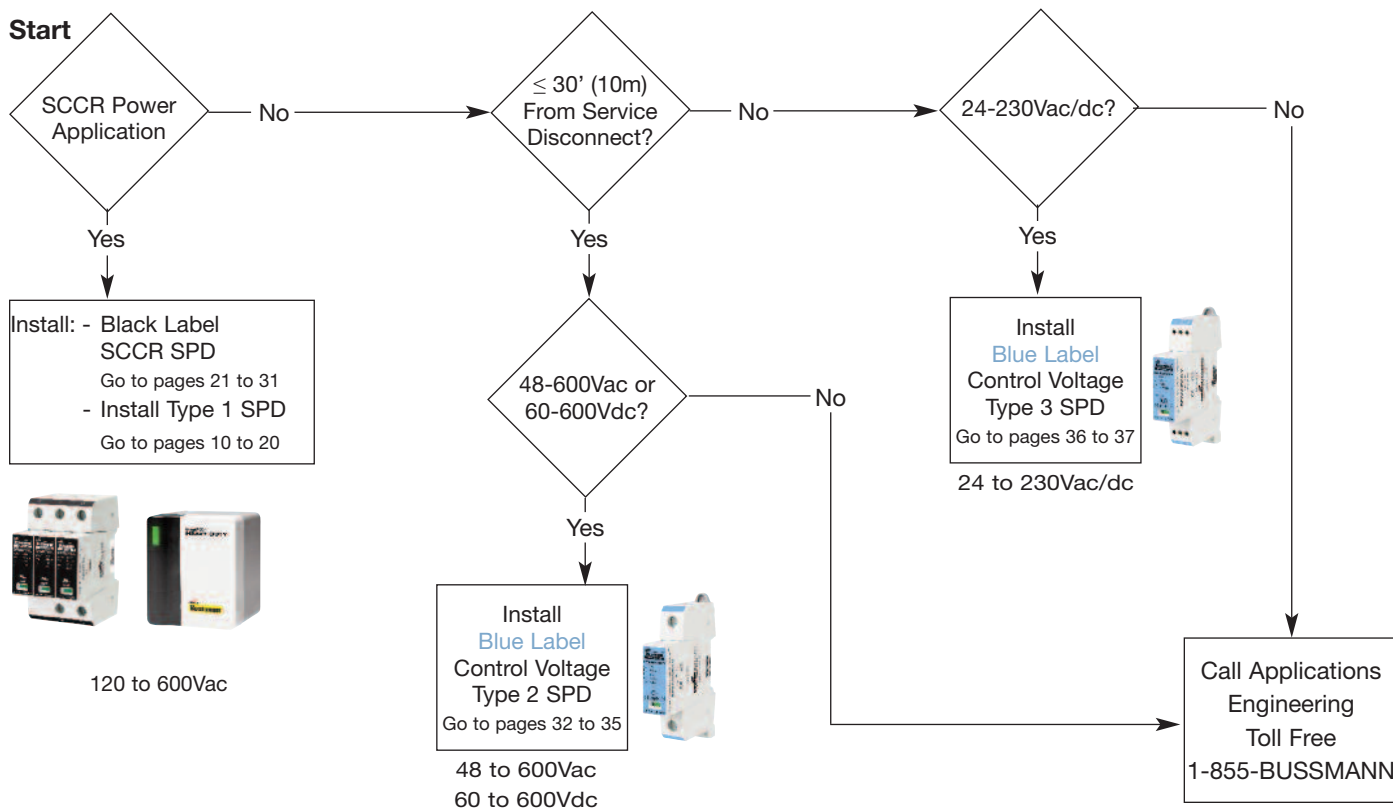
For Nominal Voltage Up to 180V

UL POWER & CONTROL SPD TYPE 1, 2 & 3 SELECTION PROCESS FLOWCHART FOR ≤ 600V SYSTEMS

Step 1. Determine Installation Location and Suitable Type



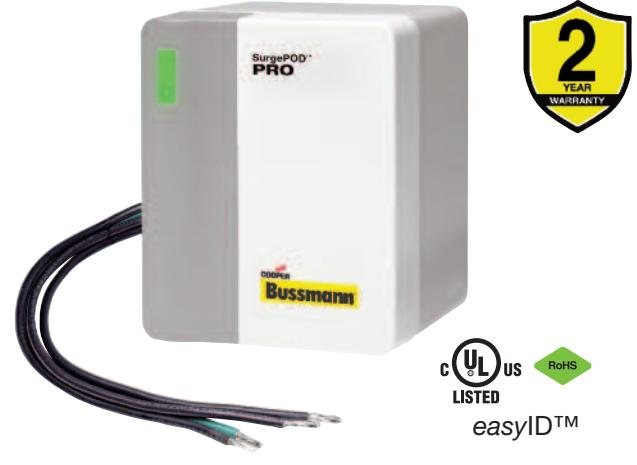
Step 2. Determine Type 1, or Type 2 & 3 DIN-Rail SPD



| UL Types | UL Listed Type 1 | DIN-Rail UL Recognized Type 2 & Type 3 | |
|-------------------------------------|---|---|---|
| Markets | UL Listed Type 1 SPD SCCR Rated 120-600Vac SurgePOD™ Module MOV (Heavy Duty) & Thermal Disconnect MOV (Pro) Technology | UL Recognized Type 2 SPDs SCCR Rated Black Label 120-600Vac MOV Technology | UL Recognized Type 2 & 3 SPDs Control Voltage Blue Label 24- 600Vac/dc MOV or Hybrid Technology |
| Agriculture | <ul style="list-style-type: none"> • Pump panels requiring SCCR ratings • Service panels | <ul style="list-style-type: none"> • Pump panels requiring SCCR ratings | <ul style="list-style-type: none"> • AC/DC Pump panels not requiring SCCR ratings |
| Commercial - Institutional | <ul style="list-style-type: none"> • Elevator control • Emergency generator control • Feeders • Fire pump control • HVAC • Lighting panels • Main switchgear • Motor control centers • Step down transformer primary • UL 508A panels requiring SCCR ratings • UPS | <ul style="list-style-type: none"> • Elevator control • Emergency generator control • Fire pump control • HVAC • Mission critical panelboards • UPS • UL 508A panels requiring SCCR ratings • VFD | <ul style="list-style-type: none"> • Elevator control • Emergency generator control • Fire alarm • Fire pump control • HVAC • Security systems • UPS |
| Contractor | <ul style="list-style-type: none"> • Installation on outside of enclosure or ahead of service entrance disconnect | <ul style="list-style-type: none"> • Field service work requiring SCCR from 120V-600V | <ul style="list-style-type: none"> • Field service work that does not require SCCR from 24-600V |
| Data Centers | <ul style="list-style-type: none"> • Emergency generator control • Feeders • HVAC • Main switchgear • Power Distribution Unit • Remote Power Panel • UPS | <ul style="list-style-type: none"> • Emergency generator control • HVAC • Power Distribution Unit • Remote Power Panel • UPS | <ul style="list-style-type: none"> • Emergency generator control • HVAC • Servers • UPS |
| Industrial | <ul style="list-style-type: none"> • Emergency generator control • HVAC • Lighting panels • Main switchgear • Motor control centers • Step down transformer primary • UL 508A panels requiring SCCR ratings • UPS • VFD | <ul style="list-style-type: none"> • Conveyor systems • Crane control • HVAC • Power supplies • Step down transformer primary • UL 508A panels requiring SCCR ratings • VFD | <ul style="list-style-type: none"> • Discrete control • HMI • HVAC • PLCs • Power supplies • Sensors |
| OEM | <ul style="list-style-type: none"> • Installation on outside of enclosure • UL 508A panels requiring SCCR ratings | <ul style="list-style-type: none"> • I/Os • PLC • Power supplies • Step down transformer primary • UL 508A panels requiring SCCR ratings • VFD | <ul style="list-style-type: none"> • HMI • I/Os • PLC • Power supplies • Sensors • Step down transformer primary |
| Oil and Gas | <ul style="list-style-type: none"> • Emergency generator control • Lighting panels • Main switchgear • Motor control centers • Step down transformer primary • UL 508A panels requiring SCCR ratings • UPS • VFD | <ul style="list-style-type: none"> • Conveyor systems • Crane control • Power supplies • Step down transformer primary • UL 508A panels requiring SCCR ratings • VFD | <ul style="list-style-type: none"> • Discrete control • HMI • PLCs • Power supplies • Sensors |
| Residential | <ul style="list-style-type: none"> • Service entrance | N/A | N/A |
| UL 508A Shops | <ul style="list-style-type: none"> • Installation on outside or inside of enclosure or ahead of service entrance disconnect | <ul style="list-style-type: none"> • I/Os • Installation on the lineside of the enclosure disconnect OCPD • PLC • Power supplies • Step down transformer primary • VFD | <ul style="list-style-type: none"> • HMI • I/Os • PLC • Power supplies • Sensors • Step down transformer primary |
| Waste Water- Water Treatment | <ul style="list-style-type: none"> • Main switchgear • Motor control centers • UL 508A panels requiring SCCR ratings | <ul style="list-style-type: none"> • Control panels • UL 508A panels requiring SCCR ratings • VFD | <ul style="list-style-type: none"> • PLC • Power supplies • Sensors |

Type 1 SPDs for UL 1449 3rd Edition Listed Loadside and Lineside Protection

- Type 1 UL 1449 3rd Edition Listed SPDs are easily selected and installed on the loadside or lineside of the service entrance overcurrent protective device
- Thermal disconnect technology eliminates the need for additional fusing
- Voltage specific models precisely match and protect electrical systems and equipment better than “One-Size-Fits-All” SPDs
- Compact UV resistant NEMA 4X for indoor or outdoor applications
- easyID™ LED status indicator provides surge protection status at a glance



SurgePOD™ HEAVY DUTY

Robust Type 1 SPDs Provide Ultimate Surge Protection for Critical Commercial and Industrial Applications

- 120 to 600Vac
- 200kA SCCR
- Single-phase, split-phase, Wye, Delta & Highleg Delta systems
- Five-year warranty

SurgePOD™ PRO

Type 1 SPDs Provide Optimal Surge Protection for Light Commercial and Residential Applications

- 120 to 480Vac
- 200kA SCCR
- Single-phase, split-phase, Wye, Delta systems
- Thermal disconnect MOV technology eliminates the need for additional fusing
- Two-year warranty

SurgePOD™ HEAVY DUTY and PRO Comparisons

| SurgePOD™ Model / Color | HEAVY DUTY - Black | PRO - Grey |
|---|---|--|
| Markets | Commercial & Industrial | Residential, Light Commercial & UL 508A Panels |
| Product Warranty | 5 Years* | 2 Years* |
| System Types | Single, Split, Delta, Highleg Delta and Wye | Single, Split, Delta and Wye |
| Nominal System Voltage | 120, 208, 240, 277, 347, 480, 600 | 120, 208, 240, 480 |
| Max. Continuous Operating AC Voltage | Sized to Nominal Voltage | Sized to Nominal Voltage |
| MCOV [Vc] | (150V to 550V) | (150V to 550V) |
| Installation Connections | 2, 3, 4, 5 Wires | 2, 3, 4 Wires |
| N-G Protection | Yes | No |
| Protection From | Severe Transient & TOV | Severe Transient & TOV |
| SCCR | 200kA | 200kA |
| Nominal Discharge Current (8x20µs) I _N | 20kA | 10kA |
| Max. Discharge Current (8x20µs) I _{max} | 50kA | 40kA |
| Response Time (ns) t _A | <25ns | <25ns |
| Frequency | 50/60Hz | 50/60Hz |
| Operating Status/Fault Indication | One Bi-Color LED Green (Good) / Red (Replace) | One Bi-Color LED Green (Good) / Red (Replace) |
| Conductor Gauge / Length | 10 AWG Stranded Copper/ 18 inches | 10 AWG Stranded Copper/ 18 inches |
| Mounting | Chase Nipple/Bracket | Chase Nipple/Bracket |
| Enclosure Rating | NEMA 4X - UL 94-5VA | NEMA 4X - UL 94-5VA |
| Degree of Protection (Installed State) | IP20 (finger-safe) | IP20 (finger-safe) |
| SPD Install Location | Indoor/Outdoor | Indoor/Outdoor |
| Circuit Location | Lineside/Loadside | Lineside/Loadside |
| Standards/ Agency Information | UL 1449 3 rd Edition Type 1 Listed SPD cULus, CSA**, RoHS Compliant | UL 1449 3 rd Edition Type 1 Listed SPD cULus, RoHS Compliant |
| Operating Temperature | -40°C to +85°C | -40°C to +65°C |
| Operating Altitude | 16,000 Feet | 12,000 Feet |
| Data Sheets | 2163 | 10033 |

* See Cooper Bussmann SPD Limited Warranty Statement (3A1502) for details at www.cooperbussmann.com/Surge.

** 600V Wye versions not CSA Certified.



SURGEPOD™ MODULE SPD TECHNOLOGY

The SurgePOD™ HEAVY DUTY Advantage

At the heart of the SurgePOD HEAVY DUTY Type 1 SPD is the Cooper Bussmann SurgePOD™ Module. These are board-mounted devices that upon encountering an overvoltage condition, their voltage clamping feature becomes conductive, safely shunting the surge to ground.

Capable of meeting the highest NEC® requirements with 200kA SCCR and 50kA surge rating, the SurgePOD has Patent pending thermal disconnect technology eliminates the need for additional overcurrent protection.

All SurgePOD devices are UL 1449 3rd Edition Recognized Type 1 SPDs and contain an internal element that safely disconnects the device upon reaching an overvoltage breakdown or thermal runaway condition.

Agency Information

UL 1449 3rd Edition Recognized Type 1 Surge Protective Device; File E340782.



Traceability Specifications

All SurgePOD devices are individually marked with a serial number for easy identification and tracking.

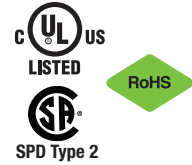
Environmental Specifications

Flammability Rating: UL 94V0

Operating and Storage Temperature Range: -40°C to 85°C

See Data Sheet # 1170 for details.

SURGE PROTECTION MADE SIMPLE™ FOR ALL UL APPLICATIONS SURGEPOD™ HEAVY DUTY SPD FOR UL 1449 3rd Edition Listed Loadside and Lineside Protection



Description

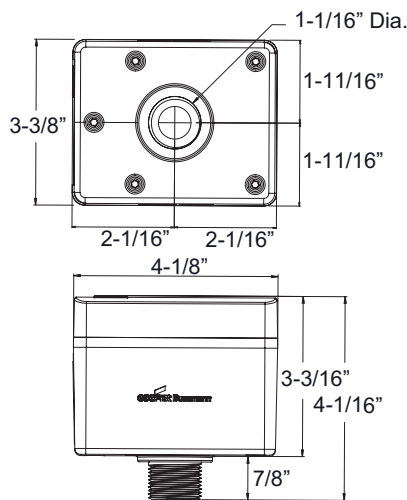
The Cooper Bussmann SurgePOD™ HEAVY DUTY is a Type 1 UL Listed 1449 3rd Edition surge protective device suitable for installation on both the loadside or lineside of the service entrance overcurrent protective device.

Available in voltage and system specific versions to match electrical system and equipment requirements. The SurgePOD HEAVY DUTY delivers optimum surge protection using advanced patent pending SurgePOD™ module featuring thermal disconnect technology that eliminates the need for additional overcurrent protection.

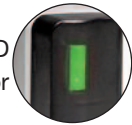
Parallel connection to the electrical system permits the SurgePOD HEAVY DUTY SPD to be installed on **any** ampacity panel.

- Type 1 UL 1449 3rd Edition Listed SPDs are easily selected and installed on the loadside or lineside of the service entrance overcurrent protective device
- Patented Cooper Bussmann SurgePOD module technology eliminates the need for additional fusing
- Voltage specific models precisely match and protect electrical systems and equipment up to 600Vac
- Compact UV resistant NEMA 4X for indoor or outdoor applications
- easyID™ LED status indicators provide surge protection status at a glance

Dimensions - in



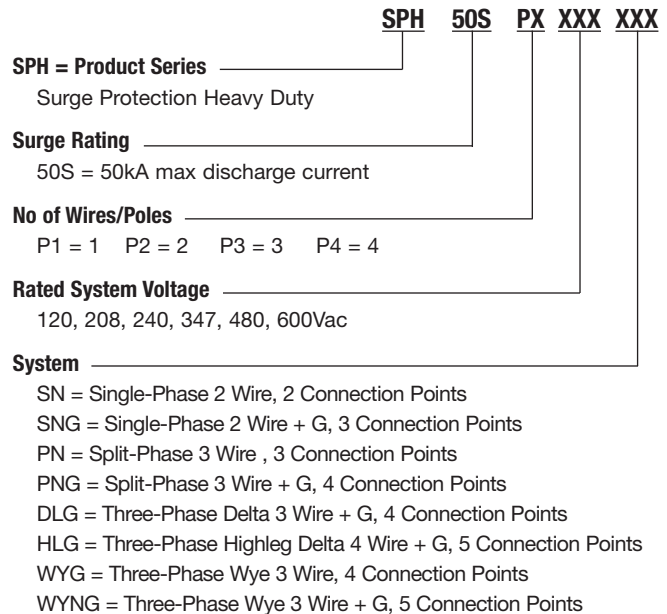
easyID™ LED Status Indicator



| | | |
|----------------|----------------|-----------------|
| SPH50SP1120SN | SPH50SP2480PN | SPH50SP3208WYG |
| SPH50SP1240SN | SPH50SP3240PNG | SPH50SP3480WYG |
| SPH50SP1347SN | SPH50SP3480PNG | SPH50SP3600WYG |
| SPH50SP2120SNG | SPH50SP3240DLG | SPH50SP4208WYNG |
| SPH50SP2240SNG | SPH50SP3480DLG | SPH50SP4480WYNG |
| SPH50SP2347SNG | SPH50SP4240HLG | SPH50SP4600WYNG |
| SPH50SP2240PN | SPH50SP4480HLG | |

NEMA 4X Rated Heavy Duty Type 1 UL Listed SPD

Type 1 SPD Part Number System



easyID™ LED Status Indicator

The easyID™ LED status indicator will illuminate when the unit is properly installed and the system or equipment being protected is energized. The following LED color/status indicates:



GREEN LED = Good

The circuit is energized and *protected*.



RED LED = Replace

The circuit is *energized and unprotected*.

The unit **needs** replacing.



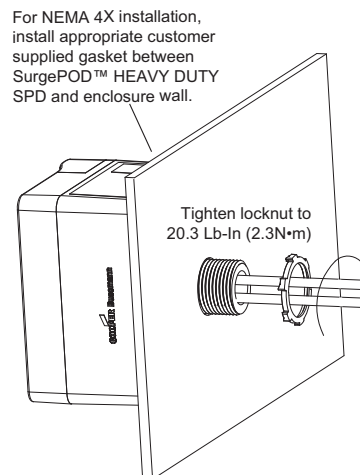
LED is Out / Unlit:

- The circuit is most likely deenergized
- The unit's leads are disconnected
- The unit is damaged

Authorized personnel should follow all prescribed lockout/tagout and safety procedures in troubleshooting the cause for the above conditions. Opening SurgePOD HEAVY DUTY enclosure will void UL listing and warranty.

Mounting

SurgePOD HEAVY DUTY is a panel mount device. It may also be mounted using a customer supplied bracket or directly onto a female threaded conduit fitting.



SurgePOD™ HEAVY DUTY Technical Information

| Catalog Number | Nominal System Voltage | Max. Continuous Operating AC Voltage (MCOV) (V _C) | System Type | Connection Points |
|-----------------|------------------------|---|--------------------------------------|-------------------|
| SPH50SP1120SN | 120V | 150V | Single-Phase 2 Wire | 2 |
| SPH50SP1240SN | 240V | 320V | Single-Phase 2 Wire | 2 |
| SPH50SP1347SN | 347V | 420V | Single-Phase 2 Wire | 2 |
| SPH50SP2120SNG | 120V | 150V | Single-Phase 2 Wire + G | 3 |
| SPH50SP2240SNG | 240V | 320V | Single-Phase 2 Wire + G | 3 |
| SPH50SP2347SNG | 347V | 420V | Single-Phase 2 Wire + G | 3 |
| SPH50SP2240PN | 120/240V | 150V | Split-Phase 3 Wire | 3 |
| SPH50SP2480PN | 240/480V | 320V | Split-Phase 3 Wire | 3 |
| SPH50SP3240PNG | 120/240V | 150V | Split-Phase 3 Wire + G | 4 |
| SPH50SP3480PNG | 240/480V | 320V | Split-Phase 3 Wire + G | 4 |
| SPH50SP3240DLG | 240V | 320V | Three-Phase Delta 3 Wire + G | 4 |
| SPH50SP3480DLG | 480V | 550V | Three-Phase Delta 3 Wire + G | 4 |
| SPH50SP4240HLG | 120/240V | 150/320V | Three-Phase Highleg Delta 4 Wire + G | 5 |
| SPH50SP4480HLG | 240/480V | 320/550V | Three-Phase Highleg Delta 4 Wire + G | 5 |
| SPH50SP3208WYG | 208Y/120V | 150V | Three-Phase Wye 3 Wire + G | 4 |
| SPH50SP3480WYG | 480Y/277V | 320V | Three-Phase Wye 3 Wire + G | 4 |
| SPH50SP3600WYG | 600Y/347V | 420V | Three-Phase Wye 3 Wire + G | 4 |
| SPH50SP4208WYNG | 208Y/120V | 150V | Three-Phase Wye 4 Wire + G | 5 |
| SPH50SP4480WYNG | 480Y/277V | 320V | Three-Phase Wye 4 Wire + G | 5 |
| SPH50SP4600WYNG | 600Y/347V | 420V | Three-Phase Wye 4 Wire + G | 5 |

SurgePOD™ HEAVY DUTY Technical Information

| Specifications (for all SurgePOD HD units) | Values |
|---|--|
| Short Circuit Current Rating (SCCR) | 200kA |
| Nominal Discharge Current (8x20μs) I _n | 20kA |
| Max. Discharge Current (8x20μs) I _{max} | 50kA |
| Response Time t _A | <25ns |
| Frequency | 50/60Hz |
| Operating State/Fault Indication | Bi-Color LED - Green (good) / Red (replace) |
| Conductor Length / Gauge | 18 inches, 10 AWG Stranded Tinned Copper |
| Mounting | Chase Nipple / Bracket* |
| Enclosure / Flammability Ratings | NEMA 4X - UL 94-5VA |
| Degree of Protection (Installed State) | IP20 (finger-safe) |
| SPD Install Location | Indoor/Outdoor |
| Circuit Location | Lineside or Loadside of service entrance overcurrent protective device |
| Standard | UL 1449 3 rd Edition Type 1 Listed SPD |
| Agency Information | cULus, CSA**, RoHS Compliant |
| Product Warranty | 5 Years*** |
| Operating Temperature | -40°C to +85°C |
| Maximum Operating Altitude | 16,000FT |

* Customer-supplied bracket.

** 600V Wye versions not CSA Certified.

*** See Cooper Bussmann SPD Limited Warranty Statement (3A1502) for details at www.cooperbussmann.com/Surge.

Voltage Protection Ratings (VPRs)

| Catalog Number | Rated System Voltage (V _o) | MCOV (V _c) | Voltage Protection Ratings (VPRs) | | | |
|-----------------|--|------------------------|-----------------------------------|-----------|-----------|-----------|
| | | | L-N | L-L | L-G | N-G |
| SPH50SP1120SN | 120V | 150V | 700 | — | — | — |
| SPH50SP1240SN | 240V | 320V | 1200 | — | — | — |
| SPH50SP1347SN | 347V | 420V | 1500 | — | — | — |
| SPH50SP2120SNG | 120V | 150V | 700 | — | 1200 | 700 |
| SPH50SP2240SNG | 240V | 320V | 1200 | — | 2500 | 1200 |
| SPH50SP2347SNG | 347V | 420V | 1500 | — | 2500 | 1500 |
| SPH50SP2240PN | 120V/240V | 150V | 700 | 1200 | — | — |
| SPH50SP2480PN | 240V/480V | 320V | 1200 | 2500 | — | — |
| SPH50SP3240PNG | 120V/240V | 150V | 700 | 1200 | 1200 | 700 |
| SPH50SP3480PNG | 240V/480V | 320V | 1200 | 2500 | 2500 | 1200 |
| SPH50SP3240DLG | 240V | 320V | — | 2500 | 1200 | — |
| SPH50SP3480DLG | 480V | 550V | — | 3000 | 1800 | — |
| SPH50SP4240HLG | 120/240V | 150V/320V | 700/1200 | 1200/2500 | 1200/2500 | 700/1200 |
| SPH50SP4480HLG | 240/480V | 320V/550V | 1200/1800 | 2500/3000 | 2500/3000 | 1200/1800 |
| SPH50SP3208WYG | 208Y/120V | 150V | — | 1200 | 700 | — |
| SPH50SP3480WYG | 480Y/277V | 320V | — | 2500 | 1200 | — |
| SPH50SP3600WYG | 600Y/347V | 420V | — | 2500 | 1500 | — |
| SPH50SP4208WYNG | 208Y/120V | 150V | 700 | 1200 | 1200 | 700 |
| SPH50SP4480WYNG | 480Y/277V | 320V | 1200 | 2500 | 2500 | 1200 |
| SPH50SP4600WYNG | 600Y/347V | 420V | 1500 | 2500 | 2500 | 1500 |

SURGE PROTECTION MADE SIMPLE™ FOR ALL UL APPLICATIONS SURGEPOD™ PRO SPD FOR UL 1449 3rd Edition Listed Loadside and Lineside Protection



Description

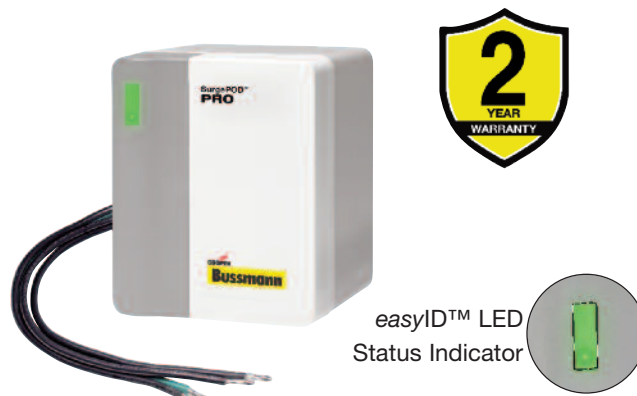
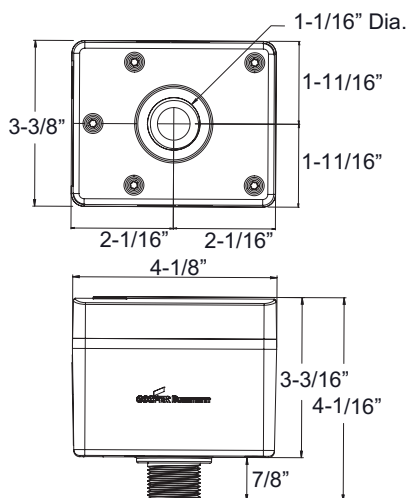
The Cooper Bussmann SurgePOD™ PRO is a Type 1 UL Listed 1449 3rd Edition surge protective device suitable for installation on both the loadside or lineside of the service entrance overcurrent protective device.

Available in popular voltage and system specific versions to match common residential and light commercial electrical system and equipment requirements, the SurgePOD PRO delivers superior surge protection using MOV thermal disconnect technology that eliminates the need for additional overcurrent protection.

Parallel connection to the electrical system permits the SurgePOD PRO SPD to be installed on **any** ampacity panel.

- Type 1 UL 1449 3rd Edition Listed SPDs are easily selected and installed on the loadside or lineside of the service entrance overcurrent protective device
- Voltage specific models precisely match and protect electrical systems and equipment better than “one-size-fits-all” SPDs
- Thermal disconnect technology eliminates the need for additional fusing
- Compact UV resistant NEMA 4X enclosure for indoor or outdoor applications
- easyID™ LED status indicator provides surge protection status at a glance

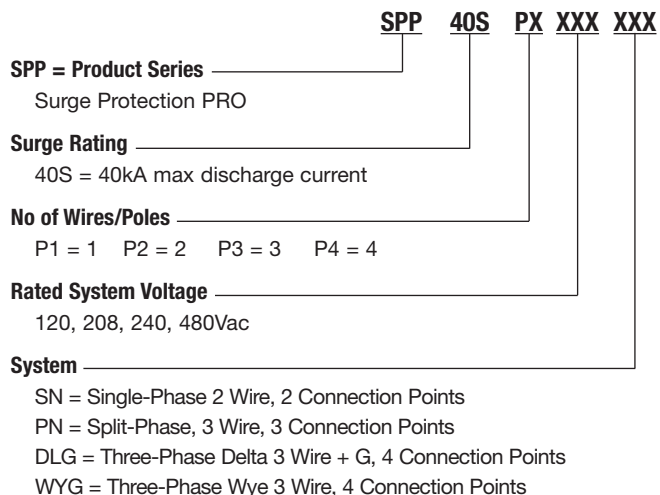
Dimensions - in



- | | | |
|----------------------|-----------------------|-----------------------|
| SPP40SP1120SN | SPP40SP3240DLG | SPP40SP3208WYG |
| SPP40SP2240PN | SPP40SP3480DLG | SPP40SP3480WYG |

**NEMA 4X Rated Pro
Type 1 UL Listed SPD**

Type 1 SPD Part Number System



easyID™ LED Status Indicator

The easyID™ LED status indicator will illuminate when the unit is properly installed and the system or equipment being protected is energized. The following LED color/status indicates:



GREEN LED = Good

The circuit is energized and *protected*.



RED LED = Replace

The circuit is *energized and unprotected*.

The unit **needs** replacing.



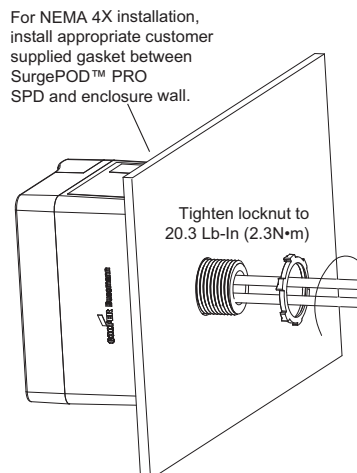
LED is Out / Unlit:

- The circuit is most likely deenergized
- The unit's leads are disconnected
- The unit is damaged

Authorized personnel should follow all prescribed lockout/tagout and safety procedures in troubleshooting the cause for the above conditions. Opening SurgePOD PRO enclosure will void UL listing and warranty.

Mounting

SurgePOD PRO is a panel mount device. It may also be mounted using a customer supplied bracket or directly onto a female threaded conduit fitting.



SurgePOD™ PRO Technical Information

| Catalog Number | Nominal System Voltage | Max. Continuous Operating AC Voltage (MCOV) (V _C) | System Type | Connection Points |
|----------------|------------------------|---|------------------------------|-------------------|
| SPP40SP1120SN | 120V | 150V | Single-Phase 2 Wire | 2 |
| SPP40SP2240PN | 120/240V | 150V | Split-Phase 3 Wire | 3 |
| SPP40SP3240DLG | 240V | 320V | Three-Phase Delta 3 Wire + G | 4 |
| SPP40SP3480DLG | 480V | 550V | Three-Phase Delta 3 Wire + G | 4 |
| SPP40SP3208WYG | 208Y/120V | 150V | Three-Phase Wye 3 Wire + G | 4 |
| SPP40SP3480WYG | 480Y/277V | 320V | Three-Phase Wye 3 Wire + G | 4 |

| Specifications (for all SurgePOD PRO units) | Values |
|---|--|
| Short Circuit Current Rating (SCCR) | 200kA |
| Nominal Discharge Current (8x20μs) I _N | 10kA |
| Max. Discharge Current (8x20μs) I _{max} | 40kA |
| Response Time (ns) t _A | <25ns |
| Frequency | 50/60Hz |
| Operating State/Fault Indication | Bi-Color LED - Green (good) / Red (replace) |
| Conductor Length / Gauge | 18 inches, 10 AWG Stranded Tinned Copper |
| Mounting | Chase Nipple / Bracket* |
| Enclosure / Flammability Ratings | NEMA 4X - UL 94-5VA |
| Degree of Protection (Installed State) | IP20 (finger-safe) |
| SPD Install Location | Indoor/Outdoor |
| Circuit Location | Lineside or Loadside of service entrance overcurrent protective device |
| Standard | UL 1449 3 rd Edition Type 1 Listed SPD |
| Agency Information | cULus, RoHS Compliant |
| Product Warranty | 2 Years** |
| Operating Temperature | -40°C to +65°C |
| Maximum Operating Altitude | 12000FT |

* Customer-supplied bracket.

** See Cooper Bussmann SPD Limited Warranty Statement (3A1502) for details at www.cooperbussmann.com/Surge.

Voltage Protection Ratings (VPRs)

| Catalog Number | Nominal System Voltage | MCOV (V _C) | Voltage Protection Ratings (VPRs) | | |
|----------------|------------------------|------------------------|-----------------------------------|------|------|
| | | | L-N | L-L | L-G |
| SPP40SP1120SN | 120V | 150V | 700 | — | — |
| SPP40SP2240PN | 120V/240V | 150V | 700 | 1200 | — |
| SPP40SP3240DLG | 240V | 320V | — | 2500 | 1200 |
| SPP40SP3480DLG | 480V | 550V | — | 3000 | 1800 |
| SPP40SP3208WYG | 208Y/120V | 150V | — | 1200 | 700 |
| SPP40SP3480WYG | 480Y/277V | 320V | — | 2500 | 1200 |

SurgePOD HEAVY DUTY & SurgePOD PRO Wiring Connections and Electrical Systems

Understanding the following points will help assure that the correct surge protective device is specified for the electrical system or equipment.

- Typical North American electrical systems include single-phase, split-phase, Delta and Wye.
- Selecting the wrong SPD generally arise from misunderstanding the nominal system voltage, ground and neutral connections.
- General convention has it that a “ground” wire is not counted as a wire in the system description (e.g., 3-wire, 4-wire, etc.), but it is counted as a connection point if the selected SPD has a ground wire.

- Selection of a device voltage rating for Wye systems must be based upon its nominal system voltage rating and not on the leg-to-leg voltages in the Wye.
- Bonded N-G configurations do not require protection at the service entrance transformer, but protection is required in downstream bonded N-G systems if the length of conductor making the bond is greater than 10 feet (3m)*.

*See FAQ #24 for more information.

The following are the SurgePOD HEAVY DUTY and SurgePOD PRO catalog numbers, and the electrical systems and voltages to which they can be applied along with any notes that help in understanding the context of the application.

Contact Cooper Bussmann Application Engineering for electrical systems not covered in this section.

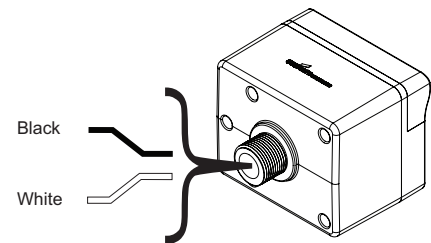
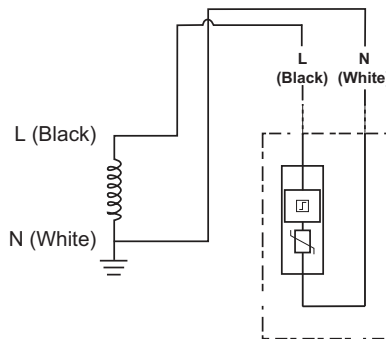


1. Single-Phase

120, 240, 347V (L-N)

2 Wire

Less common than believed and often for one leg or piece of equipment. Must be installed within 10 feet (3m) of a bonded neutral ground connection per IEEE C62.41-1991.



HEAVY DUTY Part #s
 SPH50SP1120SN,
 SPH50SP1240SN,
 SPH50SP1347SN

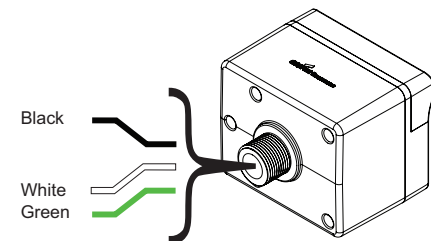
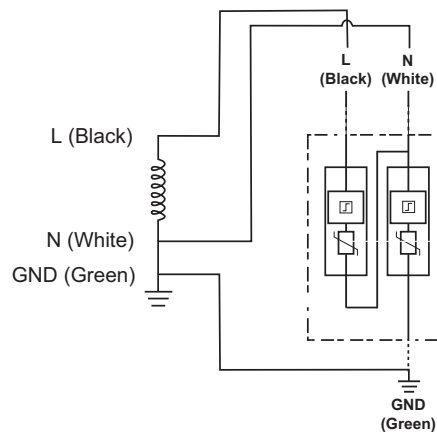
PRO Part #s
 SPP40SP1120SN,

2. Single-Phase + Ground

120, 240, 347V (L-N)

2 Wire + Ground

A very common system. For installation when located greater than 10 feet (3m) of a bonded neutral-ground connection. The Neutral is usually pulled into facility and is bonded to ground.



HEAVY DUTY Part #s
 SPH50SP2120SNG,
 SPH50SP2240SNG,
 SPH50SP2347SNG

Contact Cooper Bussmann Application Engineering for electrical systems not covered in this section.

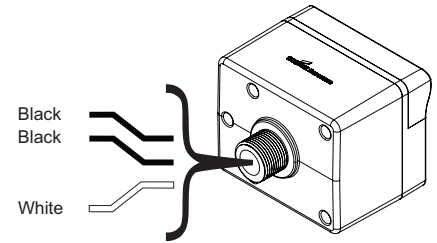
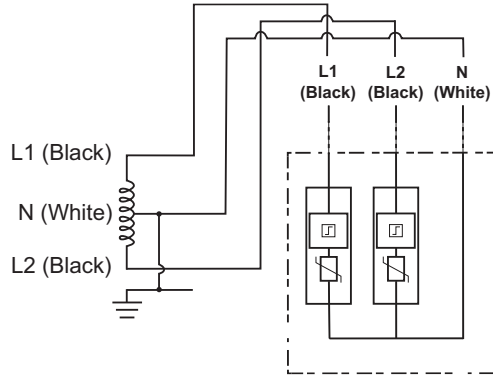
SurgePOD HEAVY DUTY Installation Instructions - Document 3A1984

SurgePOD PRO Installation Instructions - Document 3A2204

3. Two-Pole with Neutral

120V (L-N) / 240V (L1-L2),
 240V (L-N) / 480V (L1-L2)
 Single Phase (Split) Center Tap

For installations at or less than 10 feet (3m) from the transformer.
 A very common system.
 The Neutral is usually pulled into facility and is bonded to ground.
 Must be installed within 10 feet (3m) of a bonded-neutral ground connection.

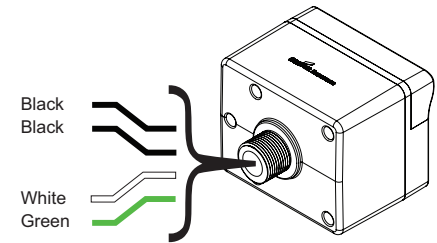
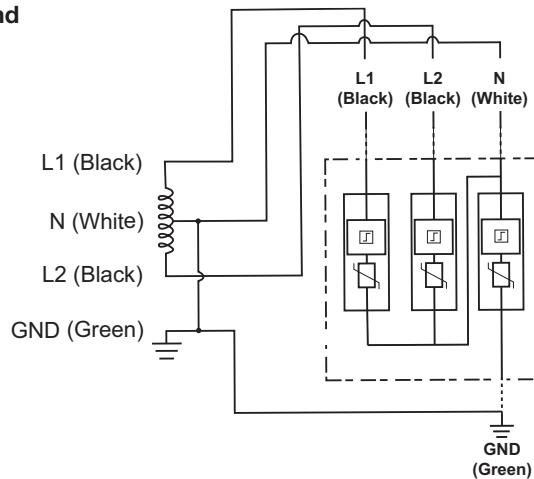


| | |
|--|------------------------------------|
| HEAVY DUTY Part #s SPH50SP2240PN, SPH50SP2480PN | PRO Part # SPP40SP2240PN |
|--|------------------------------------|

4. Two-Pole with Neutral + Ground

120V (L-N) / 240V (L1-L2),
 240V (L-N) / 480V (L1-L2)
 Single Phase (Split)
 Center Tap + Ground

For installation when located greater than 10 feet (3m) of a bonded-neutral ground connection.
 A very common system.
 The Neutral is usually pulled into facility and is bonded to ground.

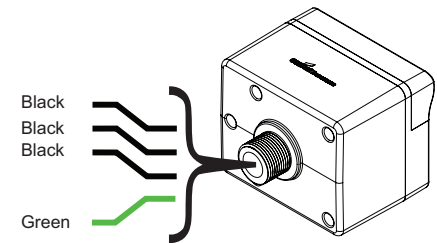
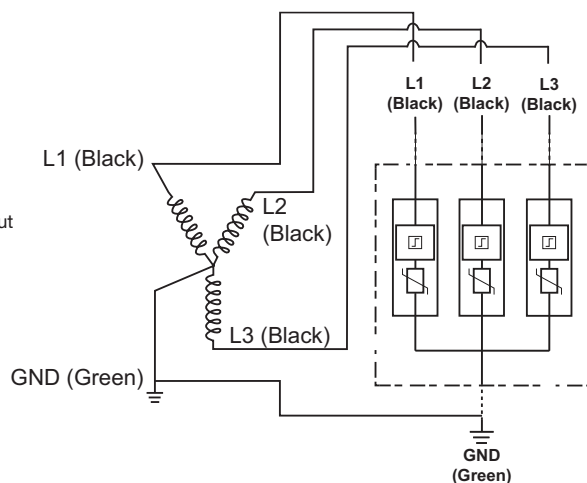


| |
|--|
| HEAVY DUTY Part #s SPH50SP3240PNG, SPH50SP3480PNG |
|--|

5. Wye + Ground

208, 480, 600V (L-L)
 3 Wire Wye + Ground

A common MCC configuration at for pumping and water/waste water treatment.
 Neutral NOT pulled into the facility, but is bonded to ground.



| | |
|---|---|
| HEAVY DUTY Part #s SPH50SP3208WYG, SPH50SP3480WYG, SPH50SP3600WYG | PRO Part #s SPP40SP3208WYG, SPHP4SP3480WYG |
|---|---|

Contact Cooper Bussmann Application Engineering for electrical systems not covered in this section.

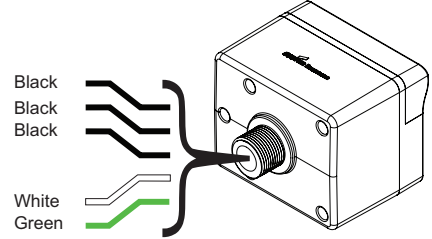
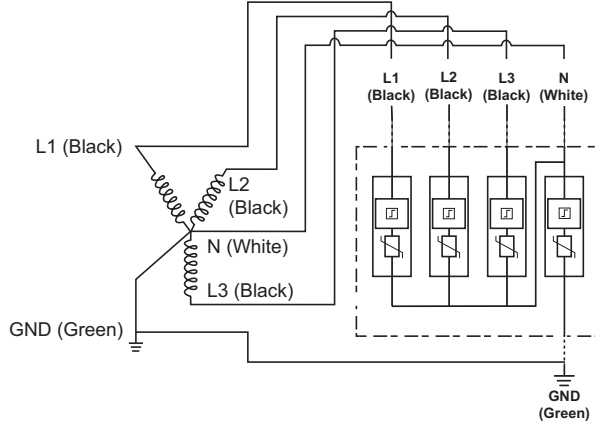
SurgePOD HEAVY DUTY Installation Instructions - Document 3A1984

SurgePOD PRO Installation Instructions - Document 3A2204

6. Wye with Neutral + Ground

120V (L-N) / 208V (L-L),
 127V (L-N) / 220V (L-L),
 277V (L-N) / 480V (L-L),
 347V (L-N) / 600V (L-L)
 4 Wire Wye + Ground

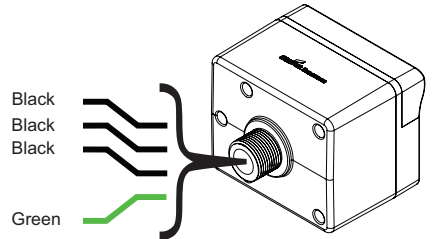
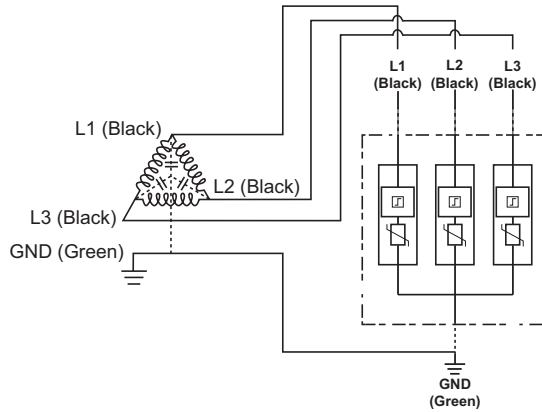
Common system configuration with Neutral pulled into facility and bonded to ground.



HEAVY DUTY Part #s
 SPH50SP4208WYNG,
 SPH50SP4480WYNG,
 SPH50SP4600WYNG

7. Delta + Ground

240, 480V (L-L)
 3 Wire Delta + Ground

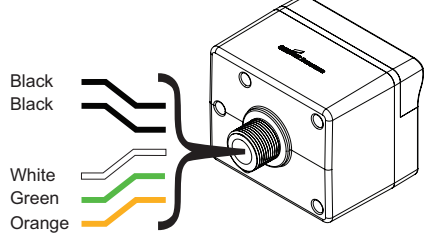
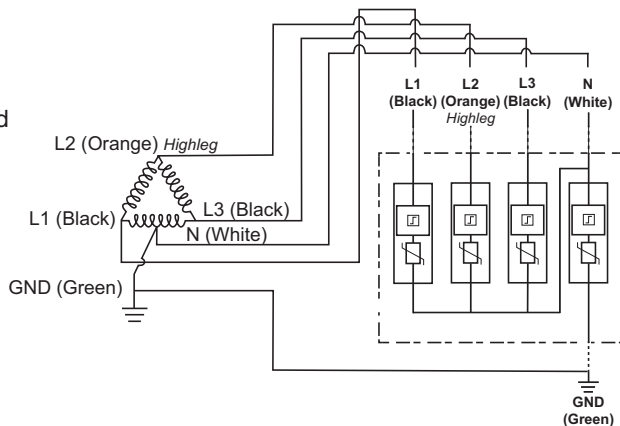


| | |
|--|---|
| HEAVY DUTY Part #s SPH50SP3240DLG, SPH50SP3480DLG | PRO Part #s SPP40SP3240DLG, SPP40SP3480DLG |
|--|---|

8. Highleg Delta

120V (L1 / L3-N) / 240V (L-L),
 240V (L1 / L3-N) / 480V (L-L)
 4 Wire Highleg Delta + Ground

A common system configuration with one "center tapped" transformer winding. The Neutral is often pulled into facility and is bonded to ground. The Highleg-to-Neutral voltage is half the Line-Line voltage multiplied by $\sqrt{3}$



HEAVY DUTY Part #s
 SPH50SP4240HLG,
 SPH50SP4480HLG

Contact Cooper Bussmann Application Engineering for electrical systems not covered in this section.

SurgePOD HEAVY DUTY Installation Instructions - Document 3A1984

SurgePOD PRO Installation Instructions - Document 3A2204

Comprehensive High SCCR Surge Protection Solutions for North American UL 508A Applications

- UL 1449 3rd Edition Recognized SPD devices provide optimum surge protection for the United States and Canadian panel markets
- Modular DIN-Rail design with color coding and rejection feature makes it easy to identify, install and maintain
- easyID™ Visual indication and optional remote contact signaling make status monitoring simple
- Vibration and shock resistant according to EN 60068-2 standards to withstand harsh environments
- IP20 Finger-safe design improves electrical safety



SCCR Rated BSP UL Series



easyID™



The Need for Surge Protection

Today's world is full of electronic products and devices that are susceptible to damage from overvoltage surges.

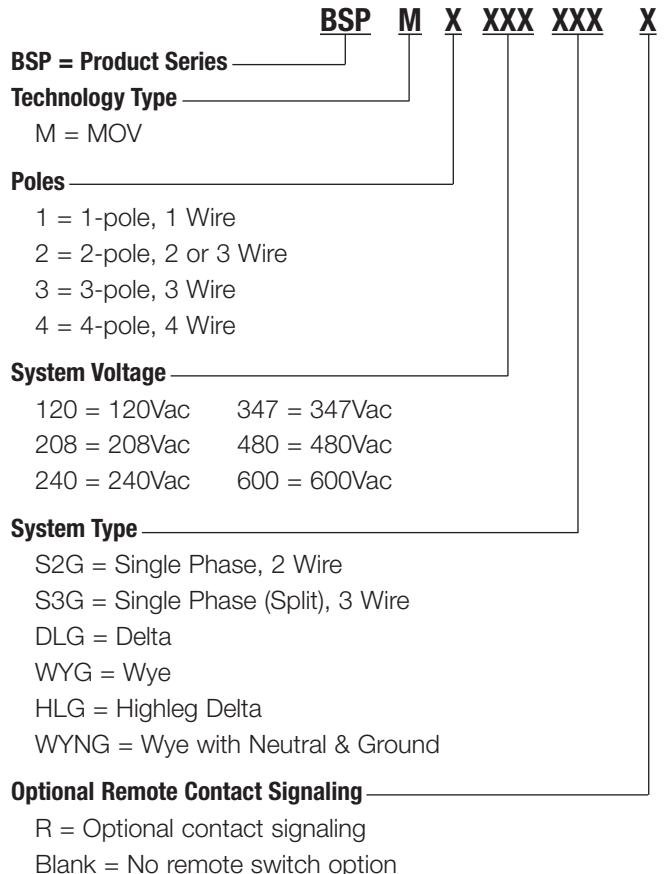
Whether the cause is static discharge or lightning, overvoltage surges can quickly destroy consumer electronics or sophisticated electronic packages used in industrial and commercial applications.

Surge protection products from Cooper Bussmann help provide power quality that's free from damaging surges and overvoltage conditions.

Customer Testimonial

A manufacturing facility in Van Wert, Ohio has a surface treatment line that is a core process that cannot afford down time. Every part shipped out of this facility depends on this process. In effort to reduce the risk of an electrical power surge compromising this process, Cooper Bussmann surge protective devices were installed. These components were easy to install in the existing machine control panel. The result is a process that is more reliable and available as well as easier to maintain. Prior to the use of this product, a lightning-caused surge, damaged the HMI device that resulted in multiple days of unscheduled down time and a large unexpected expense to replace it. Since the install no problems have occurred.

UL-SPD Part Number System



BSP UL Series Type 4 Recognized SCCR Rated SPD Specification Overview* - No Additional Fusing Required

| Family Designation | Technology | Poles/Wires | Nominal Voltage | System Type | Remote Contact Signaling |
|--------------------|------------|---|--|--|--------------------------------------|
| BSP | M = MOV | 1 = 2 Wire 2 = 2 wire / 3 Wire 3 = 3 Wire 4 = 4 Wire | 120 = 120V 208 = 208V 240 = 240V 347 = 347V 480 = 480V 600 = 600V | S2G = Single Phase 2 Wire w/ Gnd S3G = Single Phase (Split) 2 Wire / 3 Wire w/ Gnd DLG = Delta w/ Gnd HLG = Highleg Delta w/ Gnd WYG = Wye w/ Gnd WYNG = Wye w/ Neutral and Gnd | Blank = No Remote R = With Remote |

* See descriptions below for specific values by part number.

UL Type 4 Recognized SPD for UL Type 2 Applications - (For remote signaling contact, add "R" suffix to the part number)

| UL-SPD Part Number* | Description | Replacement Module (Qty) | Poles | Volts (AC) | SCCR (kA) | Figure | UL/cUL Recognized, CSA |
|---------------------|--|---------------------------------|-------|------------|-----------|--------|------------------------|
| BSPM1120S2G | 120V Single Phase (USA) 127V Single Phase (Mexico) | BPM275UL (1x) | 1 | 120 | 200 | A | Y |
| BSPM1240S2G | 240V Single Phase (USA) 254V Single Phase (Mexico) 277V Single Phase (USA) | BPM385UL (1x) | 1 | 240 | 200 | A | Y |
| BSPM1347S2G | 347 V Single Phase (USA) | BPM600UL (1x) | 1 | 347 | 125 | A | Y |
| BSPM2240S3G | 127/254V Split Phase - 1Ø 3W + Gnd (Mexico) 240V Corner Gnd Delta - 1Ø 2W + Gnd (USA) | BPM275UL (2x) | 2 | 240 | 200 | B | Y |
| BSPM2480S3G | 240/480 Split Phase - 1Ø 3W + Gnd (USA) 480V Corner Gnd Delta, 1Ø 2W + Gnd (USA) | BPM385UL (2x) | 2 | 480 | 200 | B | Y |
| BSPM3240DLG | 240V Delta - 3Ø 3W + Gnd (USA) | BPM275UL (3x) | 3 | 240 | 200 | C | Y |
| BSPM3480DLG | 480V Delta - 3Ø 3W + Gnd & HRG Wye (USA) | BPM600UL (3x) | 3 | 480 | 125 | C | Y |
| BSPM3208WYG | 120/208 Wye 3Ø 3W + Gnd | BPM275UL (3x) | 3 | 208 | 200 | C | Y |
| BSPM3480WYG | 277/480 Wye 3Ø 3W + Gnd | BPM385UL (3x) | 3 | 480 | 200 | C | Y |
| BSPM3600WYG | 347/600 Wye 3Ø 3W + Gnd | BPM600UL (3x) | 3 | 600 | 125 | C | Y |
| BSPM4240HLG | 120/240 Highleg Delta - B High (USA) | BPM275UL (4x) | 4 | 240 | 200 | D | Y |
| BSPM4480HLG | 240/480 3 Phase Highleg 3Ø 3W + Gnd | BPM385UL (3x), BPM600UL (1x) | 4 | 480 | 125 | D | Y |
| BSPM4208WYNG | 120/208 Wye - 3Ø 4W + Gnd (USA) 127/220 Wye - 3Ø 4W + Gnd (Mexico) | BPM275UL (4x) | 4 | 208 | 200 | D | Y |
| BSPM4480WYNG | 277/480 Wye - 3Ø 4W + Gnd (USA) | BPM385UL (3x), BPM275UL (1x) | 4 | 480 | 200 | D | Y |
| BSPM4600WYNG | 347/600 Wye - 3Ø 4W + Gnd (Canada) | BPM600UL (3x), BPM275UL (1x) | 4 | 600 | 125 | D | Y |

Fig. A†



BSPM1120S2G
BSPM1240S2G
BSPM1347S2G

Fig. B†



BSPM2240S3G
BSPM2480S3G

Fig. C†



BSPM3208WYG
BSPM3480WYG
BSPM3600WYG
BSPM3240DLG
BSPM3480DLG

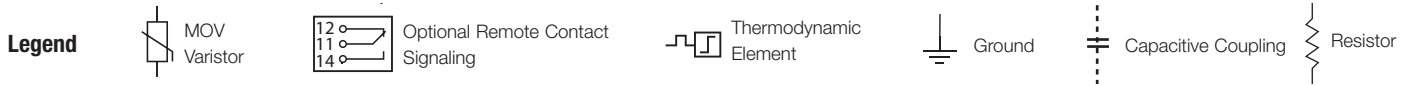
Fig. D†



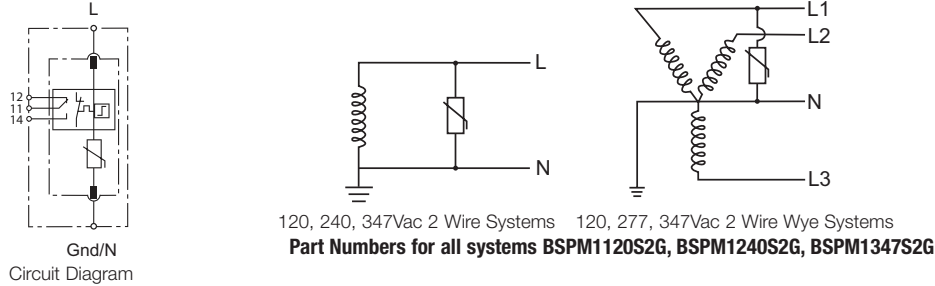
BSPM4208WYNG
BSPM4480WYNG
BSPM4600WYNG
BSPM4240HLG
BSPM4480HLG

† For remote signaling contact, add "R" suffix to the part number.

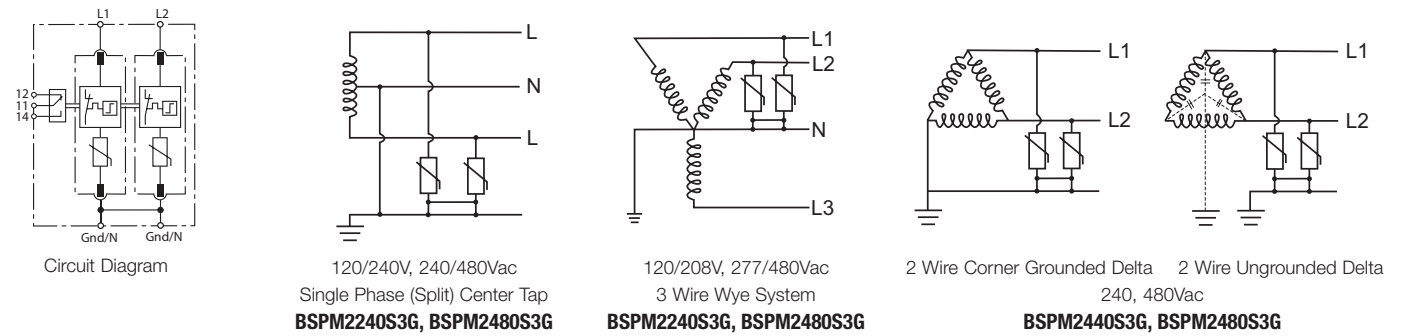
Selecting BSP UL Series By Circuit Diagrams, Wiring Configurations and Voltages



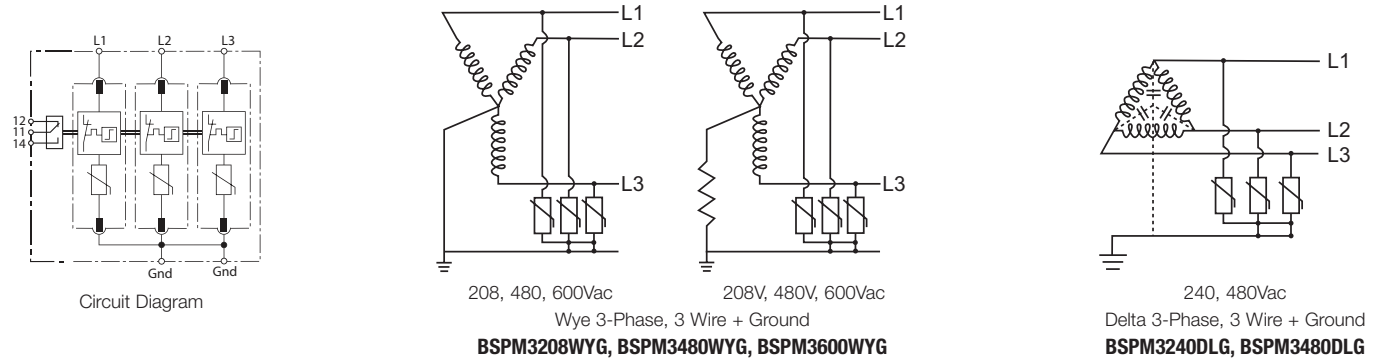
1-Pole (2 Wire) & Single Phase Two (2) Connection Points



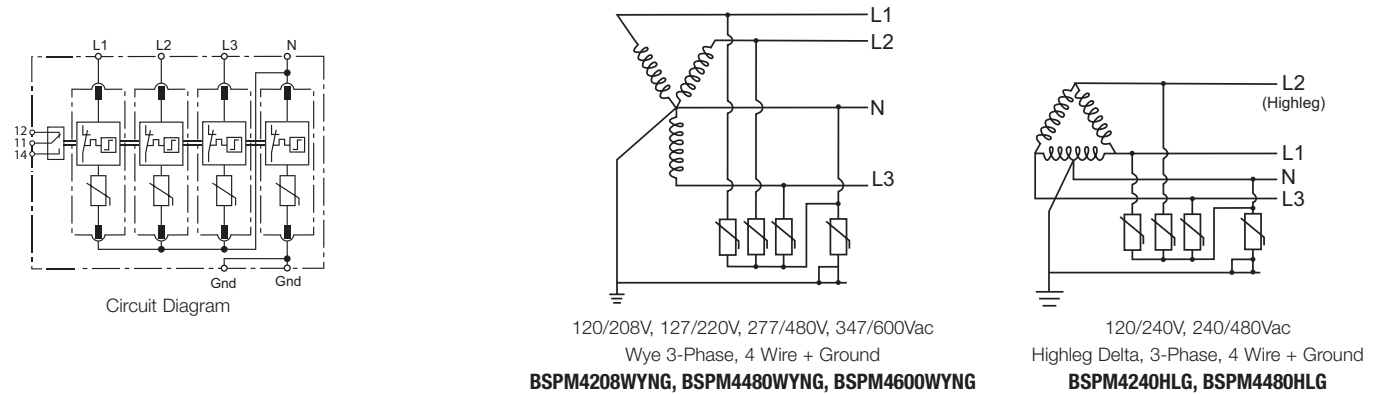
2-Pole (2 wire / 3 Wire) Three (3) Connection Points



3-Pole (3 Wire) 3-Phase Four (4) Connection Points



4-Pole (4 Wire) 3-Phase Five (5) Connection Points



Surge Protection Made Simple™ for UL Applications

Single Pole BSP UL Series for 120, 240 and 347Vac Single-Phase 2 Wire Systems



Description



The Cooper Bussmann single pole UL modular surge arresters for 120, 240 and 347Vac single-phase systems feature local, easyID™ visual indication and optional remote contact signaling. The unique module locking system fixes the protection module to the base part. Modules can be easily replaced without tools by simply depressing the release buttons. Integrated mechanical coding between the base and protection module ensures against installing an incorrect replacement module.

- Surge arrester according to UL 1449 3rd Edition, Type 2 Component Assembly helps meet UL 508A requirements
- Heavy-duty zinc oxide varistors for high discharge capacity
- "Thermodynamic Control" SPD monitoring device ensures high reliability against surge events
- Module locking system with module release button makes module replacement easy without tools
- Up to 200kA Short-Circuit Current Rating (SCCR) makes higher assembly SCCR ratings possible
- Optional remote signaling of all protection modules makes status monitoring easy and accurate in any monitoring scheme
- No upstream overcurrent protection necessary to make installation easier and more economical
- Vibration and shock tested according to EN 60068-2 to withstand harsh environments



BSPM1120S2G
BSPM1240S2G
BSPM1347S2G



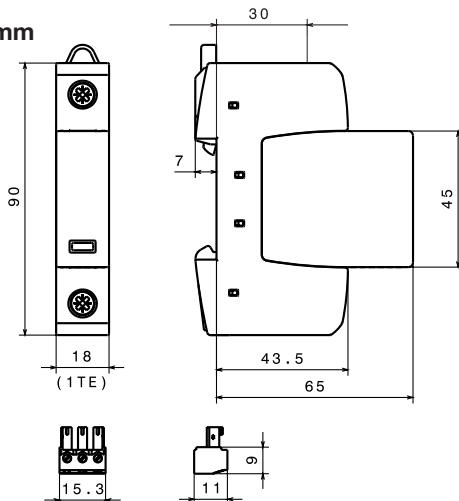
easyID™ Visual Status Indication  Remote Signal Contact Available 

SCCR Rated BSP UL Series

Optional Remote Signaling Contact

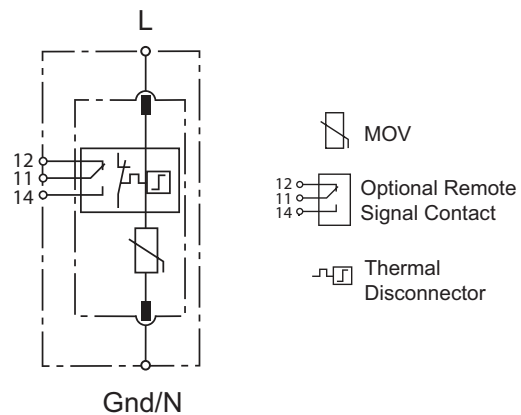
The remote signaling contact versions have a floating changeover contact for use as a break or make contact for easy adoption in any monitoring application.

Dimensions - mm



Shown with optional remote contact signaling

Circuit Diagram

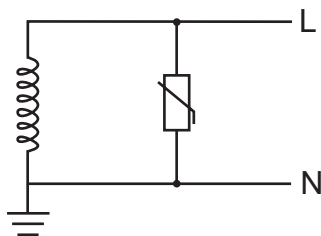


BSPM1120S2G, BSPM1240S2G, BSPM1347S2G*

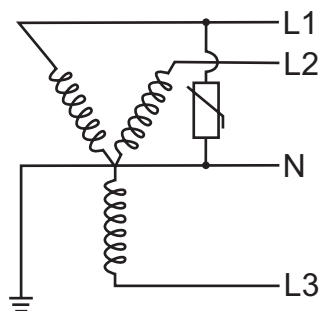
Shown with optional remote contact signaling

* For remote signaling contact, add "R" suffix to the part number.
 E.g., BSPM1347S2G**R**

| ORDERING INFORMATION | | | |
|--|---|--|--------------|
| Nominal System Voltage | 120Vac | 240, 277 or 240 & 277Vac | 347Vac |
| Max. Continuous Operating AC Voltage (MCOV) [V _C] | 275Vac | 385Vac | 600Vac |
| Catalog Numbers: | Without Remote Signaling | BSPM1120S2G | BSPM1240S2G |
| | With Remote Signaling | BSPM1120S2GR | BSPM1240S2GR |
| Replacement Module | MOV Technology | BPM275UL | BPM385UL |
| | | | BPM600UL |
| SPECIFICATIONS | | | |
| Rated Voltage | 120-127Vac | 240-277Vac | 347Vac |
| Voltage Protection Rating V _{PR} | 1kV | 1.5kV | 2kV |
| SCCR | 200kA | 200kA | 125kA |
| Nominal Discharge Current I _n (kA) | | 20kA | |
| Max. Discharge Current I _{max} (kA) | | 40kA | |
| Response Time t _A | | ≤25 ns | |
| Frequency | | 50/60Hz | |
| Number of Poles | | 1 | |
| Number of Wires/Connection Points | | 2 Wires / 2 Connection Points | |
| Operating State/Fault Indication | | Green (good) / Red (replace) | |
| Cross-Sectional Area (min.) | | 14AWG - Cu Stranded, Solid or Fine | |
| Cross-Sectional Area (max.) | | 2AWG - Cu Solid or Stranded / 4AWG - Cu Fine | |
| Terminal Torque | | 45 lb-in | |
| For Mounting On | | 35mm DIN Rail per to EN 60715 | |
| Enclosure Material | | Thermoplastic, UL 94V0 | |
| Degree of Protection | | IP20 (finger-safe) | |
| Location Category | | Indoor | |
| Capacity | | 1 Mods, DIN 43880 | |
| Application | | UL Type 2 Component Assembly | |
| Standard | | UL 1449, 3 rd Edition | |
| Agency Information | | cURus, CSA, RoHS Compliant | |
| Product Warranty | | Five Years* | |
| REMOTE CONTACT SIGNALING | | | |
| Remote Contact Signaling Type | Changeover Contact | | |
| AC Switching Capacity (Volts/Amps) | 250V/0.5A | | |
| DC Switching Capacity (Volts/Amps) | 250V/0.1A; 125V/0.2A; 75V/0.5A | | |
| Conductor Ratings and Cross-Sectional Area for Remote Contact Signal Terminals | 60/75°C Max. 1.5mm ² /14AWG Solid/Flexible | | |
| Ordering Information | Order from Catalog Numbers Above | | |



120, 240, 347Vac 2 Wire Systems



120, 277, 347Vac 2 Wire Wye Systems

Part Numbers for all systems BSPM1120S2G, BSPM1240S2G, BSPM1347S2G

* See Cooper Bussmann SPD Limited Warranty Statement (3A1502) for details at www.cooperbussmann.com/Surge.

Surge Protection Made Simple™ for UL Applications

2-Pole BSP UL Series for 120/240, 120/208, 127/254, 240, 240/480, 277/480 and 480Vac Single Phase & Three Phase 2 Wire / 3 Wire Systems



Description

The Cooper Bussmann 2-pole UL modular surge arresters for 120/240, 120/208, 127/254, 240, 240/480, 277/480 and 480Vac (split-phase) systems feature local, easyID™ visual indication and optional remote contact signaling. The unique module locking system fixes the protection module to the base part. Modules can be easily replaced without tools by simply depressing the release buttons. Integrated mechanical coding between the base and protection module ensures against installing an incorrect replacement module.

- Surge arrester according to UL 1449 3rd Edition, Type 2 Component Assembly helps meet UL 508A requirements
- Heavy-duty zinc oxide varistors for high discharge capacity
- "Thermodynamic Control" SPD monitoring device ensures high reliability against surge events
- Module locking system with module release button make module replacement easy without tools
- Up to 200kA Short-Circuit Current Rating (SCCR) make higher assembly SCCR ratings possible
- Optional remote signaling of all protection modules make status monitoring easy and accurate in any monitoring scheme
- No upstream overcurrent protection necessary to make installation easier and more economical
- Vibration and shock tested according to EN 60068-2 to withstand harsh environments

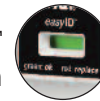


BSPM2240S3G
BSPM2480S3G



easyID™

Visual Status Indication



Remote Signal Contact Available

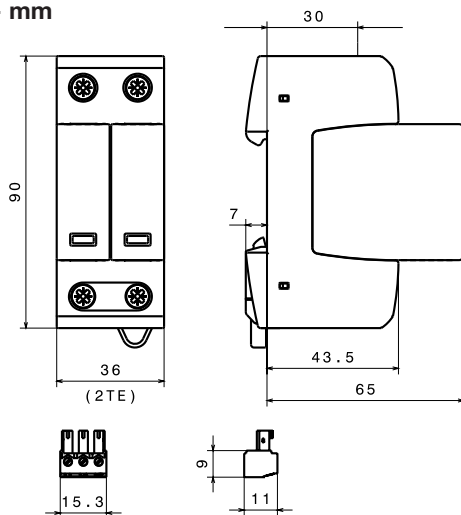


SCCR Rated BSP UL Series

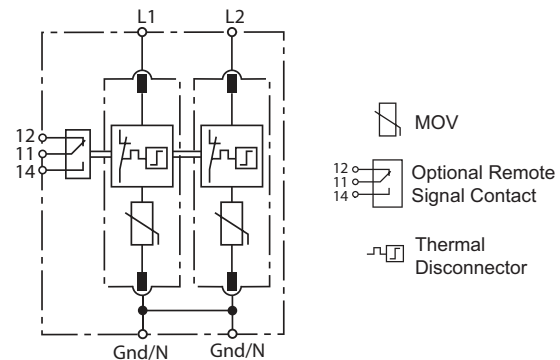
Optional Remote Signaling Contact

The remote signaling contact versions have a floating changeover contact for use as a break or make contact for easy adoption in any monitoring application.

Dimensions - mm



Circuit Diagram



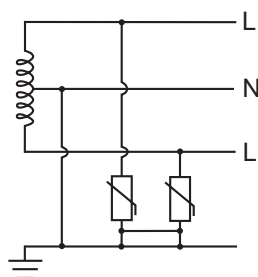
BSPM2240S3G, BSPM2480S3G*

Shown with optional remote contact signaling

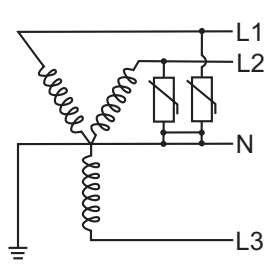
* For remote signaling contact, add "R" suffix to the part number.
E.g., BSPM2480S3G**R**

Shown with optional remote contact signaling

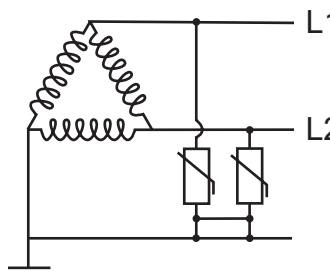
| ORDERING INFORMATION | | | |
|--|--------------------------|------------------------------------|---|
| Nominal System Voltage | | 120/240, 240Vac | 240/480Vac |
| Max. Continuous Operating Voltage MCOV [L-G/L-L] | | 275/550Vac | 385/770Vac |
| Catalog Numbers: | Without Remote Signaling | BSPM2240S3G | BSPM2480S3G |
| | With Remote Signaling | BSPM2240S3GR | BSPM2480S3GR |
| Replacement Module | MOV Technology | BPM275UL | BPM385UL |
| SPECIFICATIONS | | | |
| Rated Voltage | | 120-127Vac 240-254Vac 240Vac | 240-480Vac 480Vac |
| Voltage Protection Rating V_{PR} [L-G/L-L] | | 1kV/1.8kV | 1.5kV/2.5kV |
| Nominal Discharge Current I_n (kA) | | | 20kA |
| Max. Discharge Current I_{max} (kA) | | | 40kA |
| Response Time t_A | | | ≤25 ns |
| SCCR | | | 200kA |
| Frequency | | | 50/60Hz |
| Number of Poles | | | 2 |
| Number of Wires/Connection Points | | | 2 Wires or 3 Wires / 3 Connection Points |
| Operating State/Fault Indication | | | Green (good) / Red (replace) |
| Cross-Sectional Area (min.) | | | 14AWG - Cu Stranded, Solid or Fine |
| Cross-Sectional Area (max.) | | | 2AWG - Cu Solid or Stranded, 4AWG - Cu Fine |
| Terminal Torque | | | 45 lb-in |
| For Mounting On | | | 35mm DIN-Rail per EN 60715 |
| Enclosure Material | | | Thermoplastic, UL 94V0 |
| Degree of Protection | | | IP20 (finger-safe) |
| Location Category | | | Indoor |
| Capacity | | | 2 mods, DIN 43880 |
| Application | | | UL Type 2 Component Assembly |
| Standard | | | UL 1449, 3 rd Edition |
| Agency Information | | | cURus, CSA, RoHS Compliant |
| Product Warranty | | | Five Years* |
| REMOTE CONTACT SIGNALING | | | |
| Remote Contact Signaling Type | | | Changeover Contact |
| AC Switching Capacity (Volts/Amps) | | | 250V/0.5A |
| DC Switching Capacity (Volts/Amps) | | | 250V/0.1A; 125V/0.2A; 75V/0.5A |
| Conductor Ratings and Cross-Sectional Area for Remote Contact Signal Terminals | | | 60/75°C Max. 1.5mm ² /14AWG Solid/Flexible |
| Ordering Information | | | Order from Catalog Numbers Above |



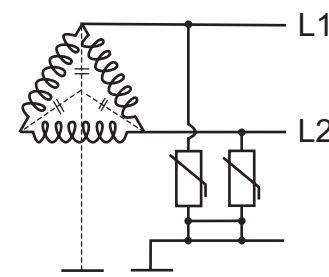
120/240V, 240/480Vac
Single Phase (Split) Center Tap
BSPM2240S3G, BSPM2480S3G



120/208V, 277/480Vac
3 Wire Wye System
BSPM2240S3G, BSPM2480S3G



240, 480Vac
2 Wire Corner Grounded Delta
BSPM2440S3G, BSPM2480S3G



240, 480Vac
2 Wire Ungrounded Delta
BSPM2440S3G, BSPM2480S3G

* See Cooper Bussmann SPD Limited Warranty Statement (3A1502) for details at www.cooperbussmann.com/Surge.

2-Pole BSP UL Series Installation Instructions - Document 3A1637

Surge Protection Made Simple™ for UL Applications

3-Pole BSP UL Series for 240 and 480Vac Three Phase 3 Wire Delta, 208, 480 and 600Vac Three Phase 3 Wire Wye and 240, 480Vac Impedance Grounded Systems



Description

The Cooper Bussmann 3-pole UL modular surge arresters for 240 and 480 3-phase Delta, and 120/208, 277/480 and 347/600Vac 3-phase Wye systems feature local, *easyID*™ visual indication and optional remote contact signaling. The unique module locking system fixes the protection module to the base part. Modules can be easily replaced without tools by simply depressing the release buttons. Integrated mechanical coding between the base and protection module ensures against installing an incorrect replacement module.

- Surge arrester according to UL 1449 3rd Edition, Type 2 Component Assembly helps meet UL 508A requirements
- Heavy-duty zinc oxide varistors for high discharge capacity
- "Thermodynamic Control" SPD monitoring device ensures high reliability against surge events
- Module locking system with module release button make module replacement easy without tools
- Up to 200kA Short-Circuit Current Rating (SCCR) make higher assembly SCCR ratings possible
- Optional remote signaling of all protection modules make status monitoring easy and accurate in any monitoring scheme
- No upstream overcurrent protection necessary to make installation easier and more economical
- Vibration and shock tested according to EN 60068-2 to withstand harsh environments

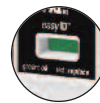


BSPM3208WYG
BSPM3480WYG
BSPM3600WYG
BSPM3240DLG
BSPM3480DLG



easyID™

Visual Status Indication



Remote Signal Contact Available

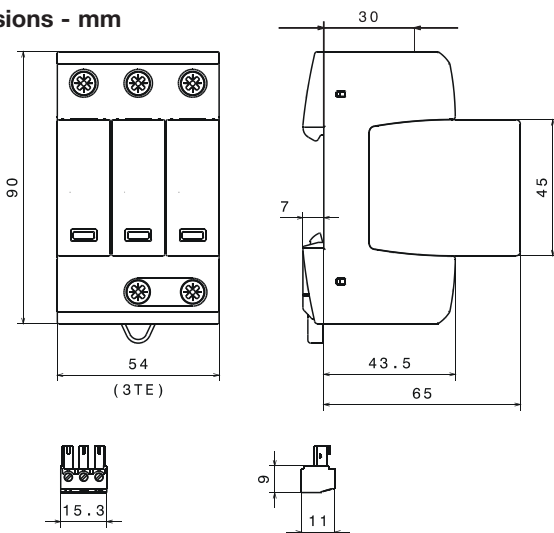


SCCR Rated BSP UL Series

Optional Remote Signaling Contact

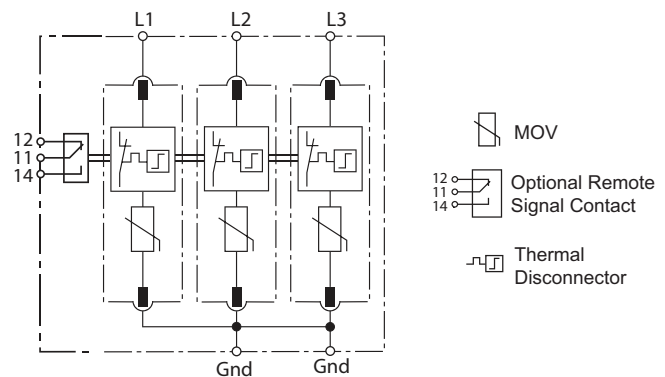
The remote signaling contact versions have a floating changeover contact for use as a break or make contact for easy adoption in any monitoring application.

Dimensions - mm



Shown with optional remote contact signaling

Circuit Diagrams



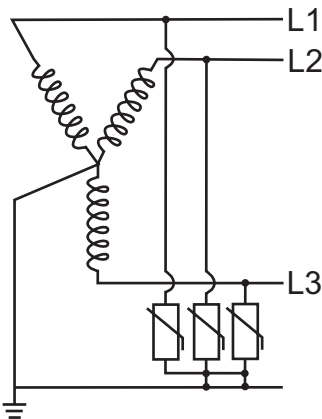
BSPM3208WYG, BSPM3480WYG, BSPM3600WYG,
BSPM3240DLG, BSPM3480DLG*

Shown with optional remote contact signaling

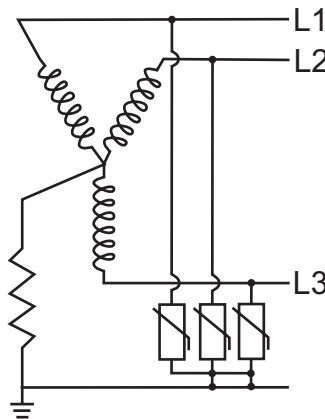
* For remote signaling contact, add "R" suffix to the part number.

E.g., BSPM3480DLGR

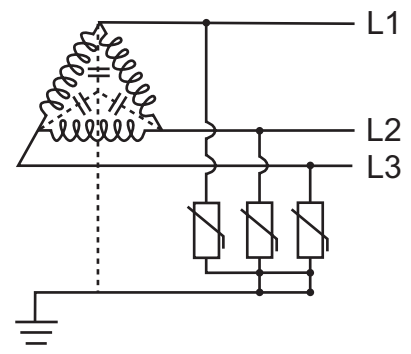
| ORDERING INFORMATION | | | | | |
|--|---|--------------|--------------|--------------|--------------|
| Nominal System Voltage | 120/208Vac | 240Vac | 277/480Vac | 480Vac | 347/600Vac |
| Max. Continuous Operating AC Voltage MCOV [L-G/L-L] | 275/550Vac | 275/550Vac | 385/770Vac | 600/1200Vac | 600/1200Vac |
| Catalog Numbers: | Without Remote Signaling | BSPM3208WYG | BSPM3240DLG | BSPM3480WYG | BSPM3480DLG |
| | With Remote Signaling | BSPM3208WYGR | BSPM3240DLGR | BSPM3480WYGR | BSPM3480DLGR |
| Replacement Module | MOV Technology | BPM275UL | BPM275UL | BPM385UL | BPM600UL |
| SPECIFICATIONS | | | | | |
| Rated Voltage | 120-127Vac, 208-220Vac | 240Vac | 277/480Vac | 480Vac | 347/600Vac |
| Voltage Protection Rating VPR [L-G/L-L] | 1kV/1.8kV | 1kV/1.8kV | 1.5kV/2.5kV | 2kV/4kV | 2kV/4kV |
| SCCR | 200kA | 200kA | 200kA | 125kA | 125kA |
| Nominal Discharge Current I_n (kA) | 20kA | | | | |
| Max. Discharge Current I_{max} (kA) | 40kA | | | | |
| Response Time t_A | ≤25 ns | | | | |
| Frequency | 50/60Hz | | | | |
| Number of Poles | 3 | | | | |
| Number of Wires/Connection Points | 3 Wires / 4 Connection Points | | | | |
| Operating State/Fault Indication | Green (good) / Red (replace) | | | | |
| Cross-Sectional Area (min.) | 14AWG - Cu Stranded, Solid or Fine | | | | |
| Cross-Sectional Area (max.) | 2AWG - Cu Solid or Stranded, 4AWG - Cu Fine | | | | |
| Terminal Torque | 45 lb-In | | | | |
| For Mounting On | 35mm DIN-Rail per to EN 60715 | | | | |
| Enclosure Material | Thermoplastic, UL 94V0 | | | | |
| Degree of Protection | IP20 (finger-safe) | | | | |
| Location Category | Indoor | | | | |
| Capacity | 3 Mods, DIN 43880 | | | | |
| Application | UL Type 2 Component Assembly | | | | |
| Standard | UL 1449, 3 rd Edition | | | | |
| Agency Information | cURus, CSA, RoHS Compliant | | | | |
| Product Warranty | Five Years* | | | | |
| REMOTE CONTACT SIGNALING | | | | | |
| Remote Contact Signaling Type | Changeover Contact | | | | |
| AC Switching Capacity (Volts/Amps) | 250V/0.5A | | | | |
| DC Switching Capacity (Volts/Amps) | 250V/0.1A; 125V/0.2A; 75V/0.5A | | | | |
| Conductor Ratings and Cross-Sectional Area for Remote Contact Signal Terminals | 60/75°C Max. 1.5mm ² /14AWG Solid/Flexible | | | | |
| Ordering Information | Order from Catalog Numbers Above | | | | |



208, 480, 600Vac



208V, 480V, 600Vac



240, 480Vac

Wye 3-Phase, 3 Wire + Ground
BSPM3208WYG, BSPM3480WYG, BSPM3600WYG

Delta 3-Phase, 3 Wire + Ground
BSPM3240DLG, BSPM3480DLG

* See Cooper Bussmann SPD Limited Warranty Statement (3A1502) for details at www.cooperbussmann.com/Surge.

Surge Protection Made Simple™ for UL Applications

4-Pole BSP UL Series for 120/240, 240/480Vac Three Phase 4 Wire Highleg Delta and 120/208, 127/220, 277/480 and 347/600Vac Three Phase 4 Wire Wye Systems



Description

The Cooper Bussmann 4-pole UL modular surge arresters for 120/240, 240/480Vac 3-phase Highleg Delta and 120/208, 127/220, 277/480 and 347/600Vac 3-phase 4 wire Wye systems feature local, **easyID™** visual indication and optional remote contact signaling. The unique module locking system fixes the protection module to the base part. Modules can be easily replaced without tools by simply depressing the release buttons. Integrated mechanical coding between the base and protection module ensures against installing an incorrect replacement module.

- Surge arrester according to UL 1449 3rd Edition, Type 2 Component Assembly helps meet UL 508A requirements
- Heavy-duty zinc oxide varistors for high discharge capacity
- "Thermodynamic Control" SPD monitoring device ensures high reliability against surge events
- Module locking system with module release button make module replacement easy without tools
- Up to 200kA Short-Circuit Current Rating (SCCR) make higher assembly SCCR ratings possible
- Optional remote signaling of all protection modules make status monitoring easy and accurate in any monitoring scheme
- No upstream overcurrent protection necessary to make installation easier and more economical
- Vibration and shock tested according to EN 60068-2 to withstand harsh environments



- BSPM4208WYNG**
- BSPM4480WYNG**
- BSPM4600WYNG**
- BSPM4240HLG**
- BSPM4480HLG**



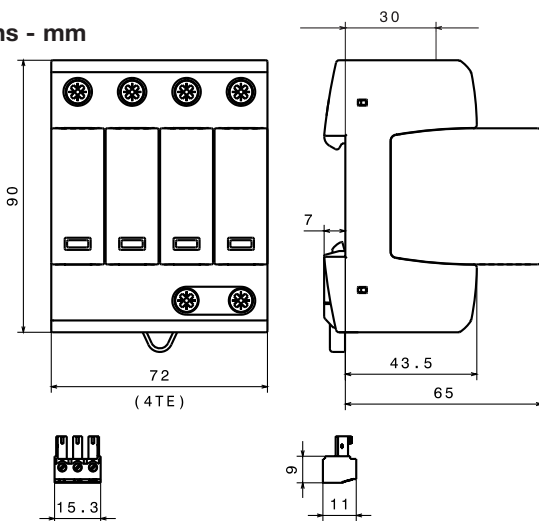
easyID™ Visual Status Indication  Remote Signal Contact Available 

SCCR Rated BSP UL Series

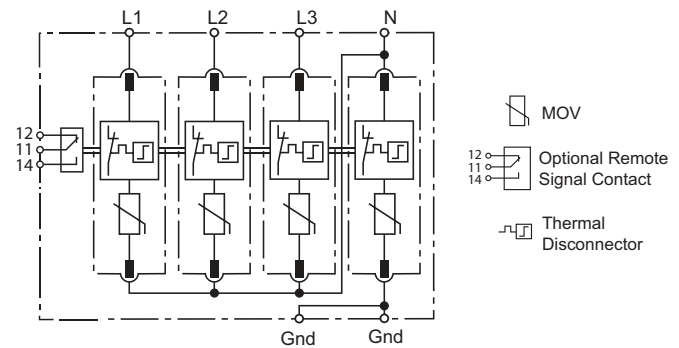
Optional Remote Signaling Contact

The remote signaling contact versions have a floating changeover contact for use as a break or make contact for easy adoption in any monitoring application.

Dimensions - mm



Circuit Diagram



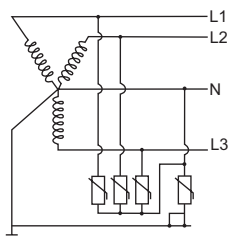
BSPM4208WYNG, BSPM4480WYNG, BSPM4600WYNG
BSPM4240HLG, BSPM4480HLG*

Shown with optional remote contact signaling

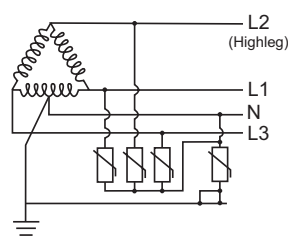
* For remote signaling contact, add "R" suffix to the part number. E.g., **BSPM4480HLGR**

Shown with optional remote contact signaling

| ORDERING INFORMATION | | | | | | | |
|--|--------------------------|---|--------------|--------------|---------------|---------------|----------|
| Nominal System Voltage | | 120/208Vac, 127/220Vac | 120/240Vac | 240/480Vac | 277/480Vac | 347/600Vac | |
| Max. continuous operating AC voltage MCOV | [L-N]/[L-G] | 275/550Vac | 275/550Vac | 385/770Vac | 385/660Vac | 600/875Vac | |
| | [N-G]/[L-L] | 275/550Vac | 275/550Vac | 385/770Vac | 275/770Vac | 275/1200Vac | |
| | [H-N]/[H-G] | — | 275/550Vac | 600/985Vac | — | — | |
| | [H-L] | — | 550Vac | 985Vac | — | — | |
| Catalog Numbers: | Without Remote Signaling | BSPM4208WYNG | BSPM4240HLG | BSPM4480HLG | BSPM4480WYNG | BSPM4600WYNG | |
| | With Remote Signaling | BSPM4208WYNGR | BSPM4240HLGR | BSPM4480HLGR | BSPM4480WYNGR | BSPM4600WYNGR | |
| Replacement Modules MOV Technology Four (4) Total Required | Module Positions | L1 or L3 | BPM275UL | BPM275UL | BPM385UL | BPM385UL | BPM600UL |
| | | L2 | BPM275UL | BPM275UL | BPM600UL | BPM385UL | BPM600UL |
| | | N | BPM275UL | BPM275UL | BPM385UL | BPM275UL | BPM275UL |
| SPECIFICATIONS | | | | | | | |
| Rated Voltage | | 120/208Vac, 127/220Vac | 120/240Vac | 240/480Vac | 277/480Vac | 347/600Vac | |
| Voltage Protection Rating V_{PR} | [L-N/L-G] | 1kV/1.8kV | 1kV/1.8kV | 1.5kV/2.5kV | 1.5kV/2.5kV | 2kV/3kV | |
| | [N-G/L-L] | 1kV/1.8kV | 1kV/1.8kV | 1.5kV/2.5kV | 1kV/2.5kV | 1kV/4kV | |
| | [H-N/H-G] | — | 1kV/1.8kV | 2kV/3kV | — | — | |
| | [H-L] | — | 1.8kV | 3kV | — | — | |
| SCCR | | 200kA | 200kA | 125kA | 200kA | 125kA | |
| Nominal Discharge Current I_n (kA) | | 20kA | | | | | |
| Max. Discharge Current I_{max} (kA) | | 40kA | | | | | |
| Response Time t_A | | ≤ 25 ns | | | | | |
| Frequency | | 50/60Hz | | | | | |
| Number of Poles | | 4 | | | | | |
| Number of Wires/Connection Points | | 4 Wires / 5 Connection Points | | | | | |
| Operating State/Fault Indication | | Green (good) / Red (replace) | | | | | |
| Cross-Sectional Area (min.) | | 14AWG - Cu Stranded, Solid or Fine | | | | | |
| Cross-Sectional Area (max.) | | 2AWG - Cu Solid or Stranded, 4AWG - Cu Fine | | | | | |
| Terminal Torque | | 45 lb-in | | | | | |
| For Mounting On | | 35mm DIN-Rail per to EN 60715 | | | | | |
| Enclosure Material | | Thermoplastic, UL 94V0 | | | | | |
| Degree of Protection | | IP20 (finger-safe) | | | | | |
| Location Category | | Indoor | | | | | |
| Capacity | | 4 Mods, DIN 43880 | | | | | |
| Application | | UL Type 2 Component Assembly | | | | | |
| Standard | | UL 1449, 3 rd Edition | | | | | |
| Agency Information | | cURus, CSA, RoHS Compliant | | | | | |
| Product Warranty | | Five Years* | | | | | |
| REMOTE CONTACT SIGNALING | | | | | | | |
| Remote Contact Signaling Type | | Changeover Contact | | | | | |
| AC Switching Capacity (Volts/Amps) | | 250V/0.5A | | | | | |
| DC Switching Capacity (Volts/Amps) | | 250V/0.1A; 125V/0.2A; 75V/0.5A | | | | | |
| Conductor Ratings and Cross-Sectional Area for Remote Contact Signal Terminals | | 60/75°C Max. 1.5mm ² /14AWG Solid/Flexible | | | | | |
| Ordering Information | | Order from Catalog Numbers Above | | | | | |



120/208V, 127/220V, 277/480V,
347/600Vac
Wye 3-Phase, 4 Wire + Ground
**BSPM4208WYNG, BSPM4480WYNG,
BSPM4600WYNG**



120/240V, 240/480Vac
Highleg Delta, 3-Phase, 4 Wire + Ground
BSPM4240HLG, BSPM4480HLG

* See Cooper Bussmann SPD Limited Warranty Statement (3A1502) for details at www.cooperbussmann.com/Surge.

4-Pole BSP UL Series Installation Instructions - Document 3A1639

Efficient and Reliable Protection for UL 508A AC/DC Control and Power Applications

- Modular DIN-Rail design with color-coding and rejection feature makes it easy to identify, install and maintain
- Combination of spark-gap and heavy-duty zinc oxide varistors provide high surge discharge capacity
- easyID™ Visual indication and optional remote contact signaling make status monitoring simple
- Optional remote signaling of all protection modules make status monitoring easy and accurate in any monitoring scheme
- Vibration and shock resistant according to EN 60068-2 standards for reliability in harsh environments
- Easily coordinated with other Cooper Bussmann DIN-Rail surge protective devices
- Ideal for telecom and UL 508A low voltage applications



Control Voltage
Type 2 SPD

Control Voltage
Type 3 SPD



Non SCCR BSP AC/DC Control & Power Voltage Series

The Need for Surge Protection

Today's world is full of electronic products and devices that are susceptible to damage from overvoltage surges.

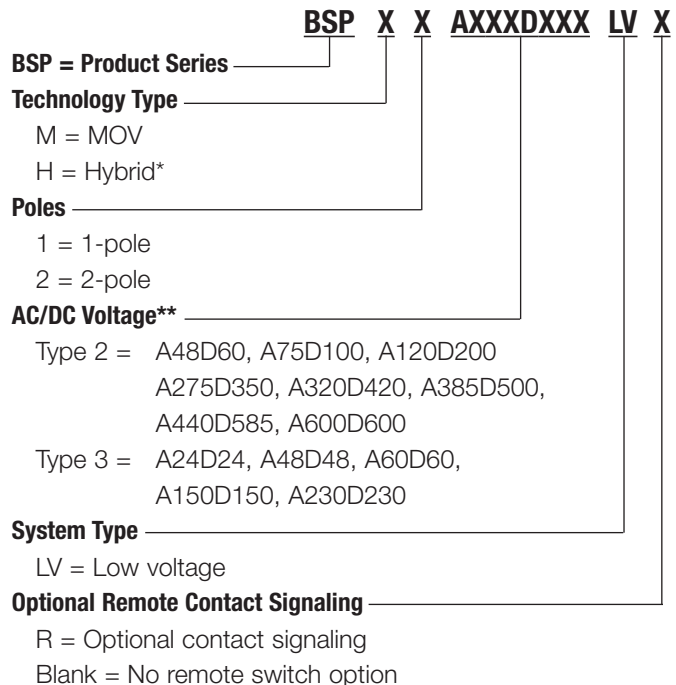
Whether the cause is static discharge or lightning, overvoltage surges can quickly destroy consumer electronics or sophisticated electronic packages used in industrial and commercial applications.

Surge protection products from Cooper Bussmann help provide power quality that's free from damaging surges and overvoltage conditions.

Safe and Simple

- IP20 Finger-safe construction and suppressor rejection feature make it easy to know the suppressor system is installed and properly operating to protect your low voltage control system investment
- Simply specify the system voltage, circuit configuration and whether the remote contact signaling is desired

Part Number System



* Hybrid technology is a combination of one or more technologies in one module such as an MOV with a Gas Discharge Tube (GDT).
** See specific catalog numbers for exact combinations of AC and DC voltage ratings.



BSP UL Non-SCCR AC/DC Control and Power Series Specification Overview

| Family Designation | Technology | Poles | AC/DC Voltages and System Type | Distance from Service Entrance Disconnect OCPD | Remote Signaling Contact |
|--------------------|-------------|------------|---|--|--------------------------------------|
| BSP | M = MOV | 1 = 2 Wire | 48Vac/60Vdc - Type 2 75Vac/100Vdc - Type 2 120Vac/200Vdc - Type 2 275Vac/350Vdc - Type 2 320Vac/420Vdc - Type 2 385Vac/500Vdc - Type 2 440Vac/585Vdc - Type 2 600Vac/600Vdc - Type 2 | <30 Feet (10m) | Blank = No Remote R = With Remote |
| BSP | H = Hybrid* | 2 = 4 Wire | 24Vac/24Vdc - Type 3 48Vac/48Vdc - Type 3 60Vac/60Vdc - Type 3 120Vac/120Vdc - Type 3 230Vac/230Vdc - Type 3 | >30 Feet (10m) | Blank = No Remote R = With Remote |

*Hybrid technology is a combination of one or more technologies in one module such as an MOV with a Gas Discharge Tube (GDT).

UL Type 4 Recognized SPD for Type 2 & Type 3 Assemblies (For remote signaling contact, add "R" suffix to the part number)

| UL-SPD Part Number | Description | Replacement Module | UL Type | Poles | AC Voltage | DC Voltage | I _n | I _{max} | KEMA | CSA | cURus | Figure |
|--------------------|--------------------------------|--------------------|---------|-------|------------|------------|----------------|------------------|------|-----|-------|--------|
| BSPM1A48D60LV | 48Vac / 60Vdc MOV DIN LV SPD | BPMA48D60LV | 2 | 1 | 48 | 60 | 10 | 25 | N | N | N | A |
| BSPM1A75D100LV | 75Vac / 100Vdc MOV DIN LV SPD | BPMA75D100LV | 2 | 1 | 75 | 100 | 10 | 40 | Y | Y | Y | A |
| BSPM1A150D200LV | 150Vac / 200Vdc MOV DIN LV SPD | BPMA150D200LV | 2 | 1 | 120 | 200 | 15 | 40 | Y | Y | Y | A |
| BSPM1A275D350LV | 275Vac / 350Vdc MOV DIN LV SPD | BPMA275D350LV | 2 | 1 | 275 | 350 | 20 | 40 | Y | Y | Y | A |
| BSPM1A320D420LV | 320Vac / 420Vdc MOV DIN LV SPD | BPMA320D420LV | 2 | 1 | 320 | 420 | 20 | 40 | Y | Y | Y | A |
| BSPM1A385D500LV | 385Vac / 500Vdc MOV DIN LV SPD | BPMA385D500LV | 2 | 1 | 385 | 500 | 20 | 40 | Y | Y | Y | A |
| BSPM1A440D585LV | 440Vac / 585Vdc MOV DIN LV SPD | BPMA440D585LV | 2 | 1 | 440 | 585 | 20 | 40 | Y | Y | Y | A |
| BSPM1A600D600LV | 600Vac / 600Vdc MOV DIN LV SPD | BPMA600D600LV | 2 | 1 | 600 | 600 | 15 | 30 | Y | Y | Y | A |
| BSPH2A24D24LV | 24V Hybrid DIN LV SPD | BPHA24D24LV | 3 | 2 | 24 | 24 | 1 | 2 | Y | Y | Y | B |
| BSPH2A48D48LV | 48V Hybrid DIN LV SPD | BPHA48D48LV | 3 | 2 | 48 | 48 | 1 | 2 | Y | Y | Y | B |
| BSPH2A60D60LV | 60V Hybrid DIN LV SPD | BPHA60D60LV | 3 | 2 | 60 | 60 | 2 | 4 | Y | Y | Y | B |
| BSPH2A150D150LV | 150V Hybrid DIN LV SPD | BPHA150D150LV | 3 | 2 | 120 | 120 | 2 | 4 | Y | Y | Y | B |
| BSPH2A230D230LV | 230V Hybrid DIN LV SPD | BPHA230D230LV | 3 | 2 | 230 | 230 | 3 | 5 | Y | Y | Y | B |



Fig. A[†]

Control Voltage Type 2 SPD
 BSPM1A48D60LV, BSPM1A75D100LV
 BSPM1A150D200LV, BSPM1A275D350LV
 BSPM1A320D420LV, BSPM1A385D500LV
 BSPM1A440D585LV, BSPM1A600D600LV



Fig. B[†]

Control Voltage Type 3 SPD
 BSPH2A24D24LV, BSPH2A48D48LV
 BSPH2A60D60LV, BSPH2A150D150LV
 BSPH2A230D230LV

[†] For remote signaling contact, add "R" suffix to the part number. E.g., BSPM1A48D60LV**R**

Surge Protection Made Simple™ for Power Voltage Applications

UL Type 2 BSP LV Power Series for 48Vac/60Vdc, 75Vac/100Vdc, 120Vac/200Vdc, 275Vac/350Vdc, 320Vac/420Vdc, 385Vac/500Vdc, 440Vac/585Vdc and 600Vac/dc Systems



Description

The Cooper Bussmann UL Type 2 48Vac/60Vdc, 75Vac/100Vdc, 120Vac/200Vdc, 275Vac/350Vdc, 320Vac/420Vdc, 385Vac/500Vdc, 440Vac/585Vdc and 600Vac/dc single pole, modular surge arresters feature local, easyID™ visual indication and optional remote contact signaling. The unique module locking system fixes the protection module to the base part. Modules can be easily replaced without tools by simply depressing the release buttons. Integrated mechanical coding between the base and protection module ensures against installing an incorrect replacement module.

LV Control System Arresters

The features of these single-pole devices are for use as a single device or in combination with other devices for AC and DC voltage systems.

- Surge arrester according to UL 1449 3rd Edition, Type 2 Component Assembly helps meet UL 508A requirements*
- Proven MOV technology for reliable surge protection
- "Thermodynamic Control" SPD monitoring device ensures high reliability against surge events
- Module locking system with module release button make module replacement easy without tools
- Optional remote signaling of all modules make status monitoring easy and accurate in any monitoring scheme
- No upstream overcurrent protection necessary to make installation easier and more economical
- Vibration and shock tested according to EN 60068-2 to withstand harsh environments

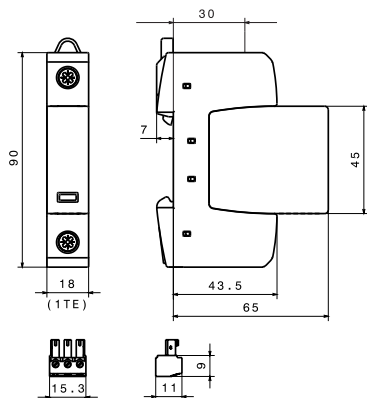
Optional Remote Signaling Contact

The remote signaling contact versions have a floating changeover contact for use as a break or make contact for easy adoption in any monitoring application.

* Except as noted in data sheets.

Dimensions - mm

Shown with optional remote contact signaling



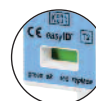
- BSPM1A48D60LV***
- BSPM1A75D100LV**
- BSPM1A150D200LV**
- BSPM1A275D350LV**
- BSPM1A320D420LV**
- BSPM1A385D500LV**
- BSPM1A440D585LV**
- BSPM1A600D600LV**



* No KEMA, UL or CSA Agency Information.

easyID™

Visual Status Indication

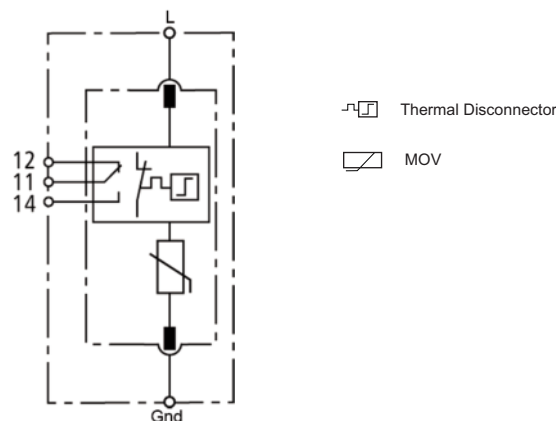


Remote Signal Contact Available



Non SCCR BSP LV AC/DC Power Series

Circuit Diagrams



- BSPMA48D60LV, BSPMA75D100LV, BSPMA150D200LV,**
- BSPM1A275D350LV, BSPM1A320D420LV, BSPM1A385D500LV,**
- BSPM1A440D585LV, BSPM1A600D600LV***

Shown with optional remote contact signaling

* For remote signaling contact, add "R" suffix to the part number.
E.g., BSPMA150D200LV**R**

| Ordering Information - 48Vac/60Vdc to 275Vac/350Vdc | | | | |
|--|----------------|---------------------|---------------------|---------------------|
| System Voltage | 48Vac/60Vdc | 75Vac/100Vdc | 120Vac/200Vdc | 275Vac/350Vdc |
| Catalog Numbers: W/O Remote Signaling (Base + Modules) | BSPM1A48D60LV | BSPM1A75D100LV | BSPM1A150D200LV | BSPM1A275D350LV |
| Catalog Numbers: With Remote Signaling | BSPM1A48D60LVR | BSPM1A75D100LVR | BSPM1A150D200LVR | BSPM1A275D350LVR |
| Replacement Modules | BPMA48D60LV | BPMA75D100LV | BPMA150D200LV | BPMA275D350LV |
| Specifications | | | | |
| Max. continuous operating AC voltage [V _C] | 48Vac | 75Vac | 150Vac | 275Vac |
| Max. continuous operating DC voltage [V _C] | 60Vdc | 100Vdc | 200Vdc | 350Vdc |
| Nominal discharge current (8/20 μs) [I _n] | 10kA | 10kA | 15kA | 20kA |
| Max. discharge current (8/20 μs) [I _{max}] | 25kA | 40kA | 40kA | 40kA |
| Voltage protection level [V _{PR}] | ≤ 0.3 kV | ≤ 0.4kV | ≤ 0.7kV | ≤ 1.25kV |
| Voltage protection level at 5kA [V _{PR}] | ≤ 0.25kV | ≤ 0.35kV | ≤ 0.55kV | ≤ 1kV |
| Temporary overvoltage (TOV) | 70V / 5 sec. | 90V / 5 sec. | 175V / 5 sec. | 335V / 5 sec |
| Agency Information* | - - | UL / cUL, CSA, KEMA | UL / cUL, CSA, KEMA | UL / cUL, CSA, KEMA |

| Ordering Information - 320Vac/420Vdc to 600Vac/dc | | | | |
|--|---------------------|---------------------|---------------------|---------------------|
| System Voltage | 320Vac/420Vdc | 385Vac/500Vdc | 440Vac/585Vdc | 600Vac/600Vdc |
| Catalog Numbers: W/O Remote Signaling (Base + Modules) | BSPM1A320D420LV | BSPM1A385D500LV | BSPM1A440D585LV | BSPM1A600D600LV |
| Catalog Numbers: With Remote Signaling | BSPM1A320D420LVR | BSPM1A385D500LVR | BSPM1A440D585LVR | BSPM1A600D600LVR |
| Replacement Modules | BPMA320D420LV | BPMA385D500LV | BPMA440D585LV | BPMA600D600LV |
| Specifications | | | | |
| Max. continuous operating AC voltage [V _C] | 320Vac | 385Vac | 440Vac | 600Vac |
| Max. continuous operating DC voltage [V _C] | 420Vdc | 500Vdc | 585Vdc | 600Vdc |
| Nominal discharge current (8/20 μs) [I _n] | 20kA | 20kA | 20kA | 15kA |
| Max. discharge current (8/20 μs) [I _{max}] | 40kA | 40kA | 40kA | 30kA |
| Voltage protection level [V _{PR}] | ≤ 1.5kV | ≤ 1.75kV | ≤ 2kV | ≤ 2.5kV |
| Voltage protection level at 5kA [V _{PR}] | ≤ 1.2kV | ≤ 1.35kV | ≤ 1.7kV | ≤ 2kV |
| Temporary overvoltage (TOV) | 335V / 5 sec. | 385V / 5 sec. | 580V / 5 sec. | 600V / 5 sec. |
| Agency Information* | UL / cUL, CSA, KEMA | UL / cUL, CSA, KEMA | UL / cUL, CSA, KEMA | UL / cUL, CSA, KEMA |

| Ordering Information - All Models | |
|--|---|
| SPD according to EN 61643-11 | Type 2 |
| SPD according to IEC 61643-1 | Class II |
| Response time [t _A] | ≤ 25 ns |
| TOV characteristics | Withstand |
| Operating temperature range [T _U] | -40°C to +80°C |
| Operating state/fault indication | Green (good) / Red (replace) |
| Number of ports | 1 |
| Cross-sectional area (min.) | 1.5mm ² /14AWG solid/flexible |
| Cross-sectional area (max.) | 35mm ² /1AWG stranded/25mm ² /2AWG flexible |
| For mounting on | 35mm DIN-Rail per EN 60715 |
| Enclosure material | Thermoplastic, UL 94V0 |
| Location category | Indoor |
| Degree of protection | IP20 |
| Capacity | 1 Mod., DIN 43880 |
| Product Warranty | Five Years** |
| Remote Contact Signaling | |
| Remote Contact Signaling Type | Changeover Contact |
| AC Switching Capacity (Volts/Amps) | 250V/0.5A |
| DC Switching Capacity (Volts/Amps) | 250V/0.1A; 125V/0.2A; 75V/0.5A |
| Conductor Ratings / Cross-Sectional Area for Remote Contact Signal Terminals | 60/75°C Max. 1.5mm ² /14AWG Solid/Flexible |
| Ordering Information | Order from Catalog Numbers Above |

* Agency information not applicable to DC ratings.

** See Cooper Bussmann SPD Limited Warranty Statement (3A1502) for details at www.cooperbussmann.com/Surge.

Single Pole BSP LV Control Series Installation Instructions - Document 3A1564

Surge Protection Made Simple™ for LV Control Voltage Applications

UL Type 3 BSP LV Control Series for 24Vac/dc to 230Vac/dc LV Systems



Description

The Cooper Bussmann UL Type 3 24Vac/dc, 48Vac/dc, 60Vac/dc, 120Vac/dc and 230Vac/dc, two-pole, modular surge arresters feature local, *easyID*™ visual indication and optional remote contact signaling. The unique module locking system fixes the protection module to the base part. Modules can be easily replaced without tools by simply depressing the release buttons. Integrated mechanical coding between the base and protection module ensures against installing an incorrect replacement module.

LV Control System Arresters

The features of these two-pole devices are for use in coordination with other upstream SPDs in UL 508A Applications*.

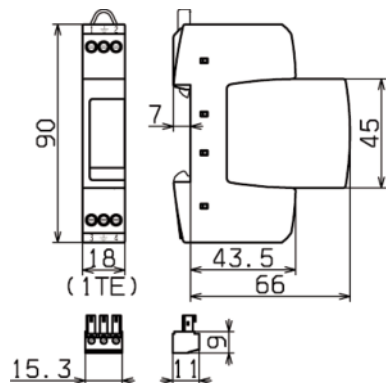
- Surge arrester according to UL 1449 3rd Edition, Type 3 Component Assembly helps meet UL 508A requirements
- Proven MOV and GDT hybrid technology for reliable surge protection
- "Thermodynamic Control" SPD monitoring device ensures high reliability against surge events
- Module locking system with module release button make module replacement easy without tools
- Optional remote signaling of all modules make status monitoring easy and accurate in any monitoring scheme
- No upstream overcurrent protection necessary to make installation easier and more economical
- Vibration and shock tested according to EN 60068-2 to withstand harsh environments

Optional Remote Signaling Contact

The remote signaling contact versions have a floating changeover contact for use as a break or make contact for easy adoption in any monitoring application.

* UL 1449 3rd Edition not applicable to DC voltages.

Dimensions - mm



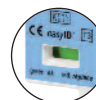
Shown with optional remote contact signaling



- BSPH2A24D24LV**
- BSPH2A48D48LV**
- BSPH2A60D60LV**
- BSPH2A150D150LV**
- BSPH2A230D230LV**



easyID™
Visual Status Indication

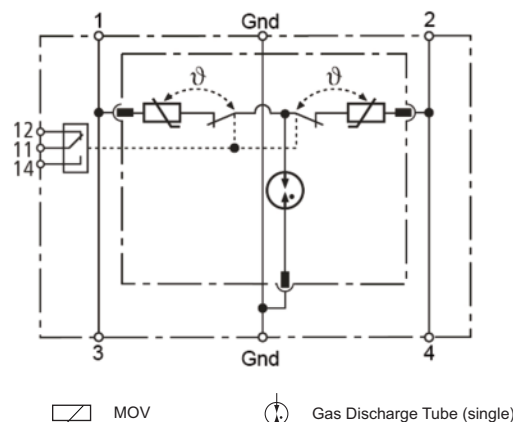


Remote Signal
Contact Available



Non SCCR BSP AC/DC Control Voltage Series

Circuit Diagrams



- BSPH2A24D24LV, BSPH2A48D48LV, BSPH2A60D60LV**
- BSPH2A150D150LV, BSPH2A230D230LV***

Shown with optional remote contact signaling

* For remote signaling contact, add "R" suffix to the part number.
E.g., BSPH2A230D230LV**R**

| Ordering Information | | | | | |
|--|--|----------------|----------------|------------------|-----------------------------|
| System Voltage | 24Vac/dc | 48Vac/dc | 60Vac/dc | 120Vac/dc | 230Vac/dc |
| Max. Continuous operating AC voltage (MCOV) [V _C] | 30Vac/dc | 60Vac/dc | 75Vac/dc | 150Vac/dc | 255Vac/dc |
| Catalog Numbers: Without Remote Signaling (Base + Modules) | BSPH2A24D24LV | BSPH2A48D48LV | BSPH2A60D60LV | BSPH2A150D150LV | BSPH2A230D230LV |
| With Remote Signaling | BSPH2A24D24LVR | BSPH2A48D48LVR | BSPH2A60D60LVR | BSPH2A150D150LVR | BSPH2A230D230LVR |
| Replacement Modules | BPHA24D24LV | BPHA48D48LV | BPHA60D60LV | BPHA150D150LV | BPHA230D230LV |
| Specifications | | | | | |
| Nominal AC voltage [V _O] | 24V | 48V | 60V | 120V | 230V |
| Max. continuous operating AC voltage [V _C] | 30V | 60V | 75V | 150V | 255V |
| Max. continuous operating DC voltage [V _C] | 30V | 60V | 75V | 150V | 255V |
| Nominal load current AC [I _L] | 25A | 25A | 25A | 25A | 25A |
| Nominal discharge current (8/20 μs) [I _n] | 1kA | 1kA | 2kA | 2kA | 3kA |
| Total discharge current (8/20 μs) [L+N-Gnd] [I _{total}] | 2kA | 2kA | 4kA | 4kA | 5kA |
| Combined impulse [U _{OC}] | 2kV | 2kV | 4kV | 4kV | 6kV |
| Combined impulse [L+N-Gnd] [U _{OC} total] | 4kV | 4kV | 8kV | 8kV | 10kV |
| Voltage protection level [L-N] [V _{PR}] | ≤180V | ≤350V | ≤400V | ≤640V | ≤1250V |
| Voltage protection level [L/N-Gnd] [V _{PR}] | ≤630V | ≤730V | ≤730V | ≤800V | ≤1500V |
| Temporary overvoltage (TOV) [L-N] | — | — | — | — | 335V / 5 sec. |
| Temporary overvoltage (TOV) [L/N-Gnd] | — | — | — | — | 400V / 5 sec. |
| Temporary overvoltage (TOV) [L+N-Gnd] | — | — | — | — | 1200V + V _O / 20 |
| TOV characteristics [L-N] | — | — | — | — | Withstand |
| TOV characteristics [L/N-Gnd] | — | — | — | — | Withstand |
| TOV characteristics [L+N-Gnd] | — | — | — | — | Failure |
| SPD according to EN 61643-11 | Type 3 | | | | |
| SPD according to IEC 61643-1 | Class III | | | | |
| Response time [L-N] [t _Δ] | ≤25 ns | | | | |
| Response time [L/N-Gnd] [t _Δ] | ≤100 ns | | | | |
| Operating temperature range [T _U] | -40°C to +80°C | | | | |
| Operating state/fault indication | Green (good) / Red (replace) | | | | |
| Number of ports | 1 | | | | |
| Cross-sectional area (min.) | 0.5mm ² /18AWG solid/flexible | | | | |
| Cross-sectional area (max.) | 4mm ² /10AWG solid/2.5mm ² /12AWG flexible | | | | |
| For mounting on | 35mm DIN-Rail per EN 60715 | | | | |
| Enclosure material | Thermoplastic, UL 94V0 | | | | |
| Location category | Indoor | | | | |
| Degree of protection | IP20 | | | | |
| Capacity | 1 Mod., DIN 43880 | | | | |
| Agency Information* | UL / cUL, CSA, KEMA | | | | |
| Product Warranty | Five Years** | | | | |
| Remote Contact Signaling | | | | | |
| Remote Contact Signaling Type | Changeover Contact | | | | |
| AC Switching Capacity (Volts/Amps) | 250V/0.5A | | | | |
| DC Switching Capacity (Volts/Amps) | 250V/0.1A; 125V/0.2A; 75V/0.5A | | | | |
| Conductor Ratings and Cross-Sectional Area for Remote Contact Signal Terminals | 60/75°C Max. 1.5mm ² /14AWG Solid/Flexible | | | | |
| Ordering Information | Order from Catalog Numbers Above | | | | |

* Agency information not applicable to DC ratings.

** See Cooper Bussmann SPD Limited Warranty Statement (3A1502) for details at www.cooperbussmann.com/Surge.

2-Pole BSP LV Control Series Installation Instructions - Document 3A1565

Complete Data Signal Surge Protection for Telecom and Instrumentation Applications

- UL 497B Listed to protect equipment and wiring against the effects of excessive currents caused by lightning
- BNC Coax Cable, RJ45 / Ethernet Data Cable and Universal 4-Pole versions available for popular data signal applications
- DIN-Rail mount makes installation easy
- Universal 4-pole SPD is easy to apply in most instrumentation applications up to 180V
- Data signal SPDs complement SurgePOD Type 1 and DIN-Rail UL/Low Voltage surge product lines for comprehensive system overvoltage protection



BNC Coaxial Cable



RJ45 Ethernet



Universal 4-Pole



For Measurement, Control and Regulation Circuits, and Twisted Pairs

Universal four-pole, DIN-Rail mounted surge arresters provide effective protection with minimum space requirements and are designed for stringent requirements on the availability of measurement, control and regulation circuits, and bus systems.

- Function-optimized design for safe use and easy installation
- Module removal without signal interruption via “make-before-break” circuitry
- 0-180V BSPD0180DINL automatically adjusts to system operating voltage and can protect data circuits of different voltages to a maximum 100mA load current.

For BNC Coaxial Data Cables

BNC Cable surge protective devices for coaxial cable-connected systems. The BSPD5BNCDD features direct (VCD) shield connection while the BSPD5BNCDI features indirect shield connection (VCID) to prevent leakage pickups.

- Plug-in surge protective devices with BNC sockets for easy retrofitting

- BSPD5BNCDD and BSPD5BNCDI mount on supplied rail terminal lug or standard 35mm DIN-Rail
- Inline BSPD5BNCSI plugs into terminal equipment to provide surge protection

For RJ45 Ethernet Data Cables

The DIN-Rail mount BSPD48RJ45 SPD for Ethernet cable systems is easy to install between the patch panel and the active component in new, or retrofitting into existing, installations. It is well suited for Gigabit Ethernet, ATM, ISDN, Voice over IP and Power over Ethernet (PoE).

- CAT 6 according to ISO/IEC 11801 and in the channel (Class E)
- Power over Ethernet (PoE+ according to IEEE 802.3at) up to 57 volts.

Five Year Warranty on All Data Signal Products

Electrical Specifications

| SPD Type | Universal 4-Pole | BNC Coaxial Cable | RJ45 Ethernet |
|----------------------|------------------|--------------------|----------------|
| Connectors | Screws | BNC | RJ45 |
| System Voltages | 0-180V | 5V | 48V |
| MCOV DC | 6-180V | 6.4-8V | 48V |
| Grounding | DIN-Rail | DIN-Rail/Conductor | DIN-Rail |
| Protection | IP20 | IP20 | IP20 |
| Operating Temp Range | -40°C to +80°C | -40°C to +80°C | -40°C to +80°C |
| Housing Material | Polyamide PA 6.6 | Zinc Die Cast | Zinc Die Cast |
| Agency Information | UL Listed 497B | UL Listed 497B | UL Listed 497B |
| RoHS Compliant | Yes | Yes | Yes |

Surge Protection Made Simple™ for Twisted Pair Data Cables

UL Listed 497B DIN-Rail Mount Universal Surge Protective Device for Measuring and Control Circuits, and Bus Systems



Description

The Cooper Bussmann universal four-pole, DIN-Rail mounted surge arresters provide effective protection with minimum space requirements and are designed for stringent requirements on the availability of measuring and control circuits, and bus systems.

To ensure safe operation, the arresters provide protection against vibration and shock up to a 30-fold acceleration of gravity. The function-optimized design of the devices allows quick and easy removal of protection modules via “make-before-break” terminals that assure continuity of data signals in the protected and unprotected state.

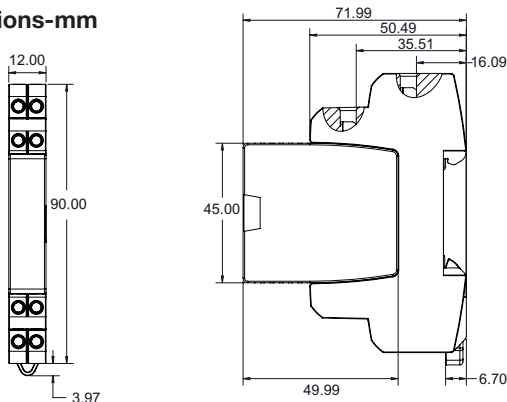
For IEC Applications - Instruction for Surge Protective Device Use In Zone 2 Explosive Atmospheres per ATEX

- When installed in potentially explosive atmospheres, the Data Signal DIN Series shall be installed into an enclosure which meets the requirements of a recognized type of protection, in accordance with EN 60079-0.
- The Data Signal DIN Series as transient suppressor. This approval applies to the following equipment types:
 - BSPD5DING • BSPD12DING • BSPD24DING
 - BSPD48DING • BSPD5DINLHF • BSPD24DINLHF

Ambient and Temperature Class

- -40°C to +80°C, T4:
DEKRA 12ATEX0254 X: II 3 G Ex nA IIC T4 Gc
- Standards used for:
ATEX: EN60079-0: 2009, EN 60079-15: 2005
- UL 497B Listed
- Function-optimized design for safe use and easy installation
- Four-pole and base mounts on grounded 35mm DIN-Rail
- Module removal without signal interruption via “make-before-break” circuitry
- 0-180V BSPD0180DINL automatically adjusts to system operating voltage and can protect data circuits of different voltages up to 100mA load current.

Dimensions-mm

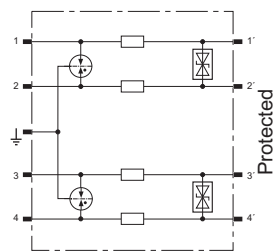
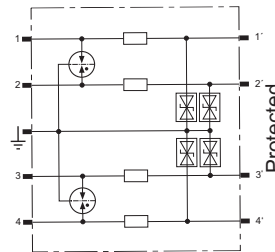


- BSPD5DING
- BSPD12DING
- BSPD24DING
- BSPD48DING
- BSPD5DINLHF
- BSPD24DINLHF
- BSPD0180DINL



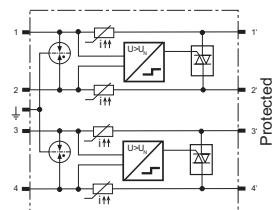
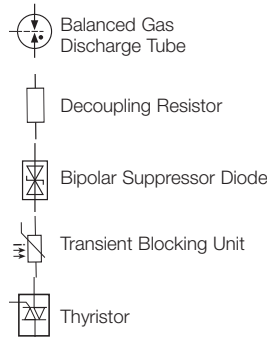
Four-Pole DIN-Rail Mount Universal SPD for Data Signal Applications

Circuit Diagrams

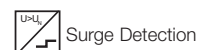


**BSPD5DING,
BSPD12DING,
BSPD24DING,
BSPD48DING**

**BSPD5DINLHF
BSPD24DINLHF**



BSPD0180DINL



| TECHNICAL DATA | | | | | | | |
|---|-------------------------------------|-----------|-------------------------------------|-----------|------------|-------------|---------------|
| Catalog number — Prefix: BSPD... | ...5DING | ...12DING | ...24DING | ...48DING | ...5DINLHF | ...24DINLHF | ...0180DINL |
| Nominal voltage (U_N) | 5V | 12V | 24V | 48V | 5V | 24V | 0-180V |
| Nominal current at 45°C (I_L) | 1.0A | 0.75A | 0.75A | 0.75A | 1.0A | 1.0A | ≤0.1A@80°C |
| VPL line-line for I_{imp} D1 (U_p) | ≤29V | ≤50V | ≤102V | ≤160V | ≤25V | ≤65V | ≤ $U_N + 53V$ |
| VPL line-PG for I_{imp} D1 (U_p) | ≤27V | ≤37V | ≤66V | ≤95V | ≤550V | ≤550V | - |
| VPL line-line at 1kV/μs C3 (U_p) | ≤18V | ≤38V | ≤90V | ≤140V | ≤11V | ≤47V | see Note 1 |
| VPL line-PG at 1kV/μs C3 (U_p) | ≤9V | ≤19V | ≤45V | ≤70V | ≤550V | ≤550V | - |
| VPL line-line for I_n C2 (U_p) | - | - | - | - | - | - | see Note 2 |
| VPL line-PG for C2 / C3 / D1 | - | - | - | - | - | - | ≤ 550V |
| D1 Total lightning impulse current (10/350μs) (I_{imp}) | 10kA | 10kA | 10kA | 10kA | 10kA | 10kA | 10kA |
| D1 Lightning impulse current (10/350μs) per line (I_{imp}) | 2.5kA | 2.5kA | 2.5kA | 2.5kA | 2.5kA | 2.5kA | 2.5kA |
| C2 Total nominal discharge current (8/20μs) (I_n) | 20kA | 20kA | 20kA | 20kA | 20kA | 20kA | 20kA |
| C2 Nominal discharge current (8/20μs) per line (I_n) | 10kA | 10kA | 10kA | 10kA | 10kA | 10kA | 10kA |
| Series impedance per line | 1.0Ω | 1.8Ω | 1.8Ω | 1.8Ω | 1.0Ω | 1.0Ω | 10Ω/7.5Ω typ |
| Frequency of the operating voltage (f_{UN}) | - | - | - | - | - | - | 0-400Hz |
| Max. continuous operating DC voltage (U_C) | 6V | 15V | 33V | 54V | 6V | 33V | 180V |
| Max. continuous operating AC voltage (U_C) | 4.2V | 10.6V | 23.3V | 38.1V | 4.2V | 23.3V | 127V |
| Permissible superimposed signal voltage (U_{Signal}) | | | | | | | ± 5V |
| "Nominal current at 80°C (I_L) (corresponds to max. short-circuit current)" | - | - | - | - | - | - | 100mA |
| Cut-off frequency line-PG (f_G) | 1.0MHz | 2.7MHz | 6.8MHz | 8.7MHz | 100MHz | 100MHz | - |
| Cut-off frequency line-line (U_{Signal} , balanced 100Ω) (f_G) | - | - | - | - | - | - | 50MHz |
| Capacitance line-line (C) | ≤2.7nF | ≤1.0nF | ≤0.5nF | ≤0.35nF | ≤25pF | ≤25pF | ≤80pF |
| Capacitance line-PG (C) | ≤5.4nF | ≤2.0nF | ≤1.0nF | ≤0.7nF | ≤16pF | ≤16pF | ≤16pF |
| ATEX Approvals | † | † | † | † | † | † | - |
| Agency information | †† | †† | †† | †† | †† | †† | ‡ |
| IEC 61643-21 Test category | D1, C2, C3 | | | | | | |
| Operating temperature range | -40°C to +80°C | | | | | | |
| Degree of protection | IP20 | | | | | | |
| For mounting on | 35mm DIN-Rails per EN 60715 | | | | | | |
| Grounding | Via base part | | | | | | |
| Color / enclosure material | Grey / Polyamide PA 6.6 | | | | | | |
| Test standards | IEC 61643-21 / EN 61643-21, UL 497B | | | | | | |
| Connection (input / output) | Screw terminal | | | | | | |
| Conductors | Solid | | 12-28AWG (4-0.08mm ²) | | | | |
| | Flexible | | 14-28AWG (2.5-0.08mm ²) | | | | |
| Terminal torque | 3.5 Lb-In (0.4 N•m) | | | | | | |
| Warranty | 5 Years* | | | | | | |

0-180V SPD Application and Mode of Operation

The BSPD0180DINL surge protective device automatically adjusts to the operating voltage (from 0 to 180 volts) of the protected device.

When an overvoltage event occurs, the SPD voltage protection level adjusts itself based upon the output terminal operating voltage of the base.

Note 1 - See Diagram 1 - VPL line-line graph line C3.

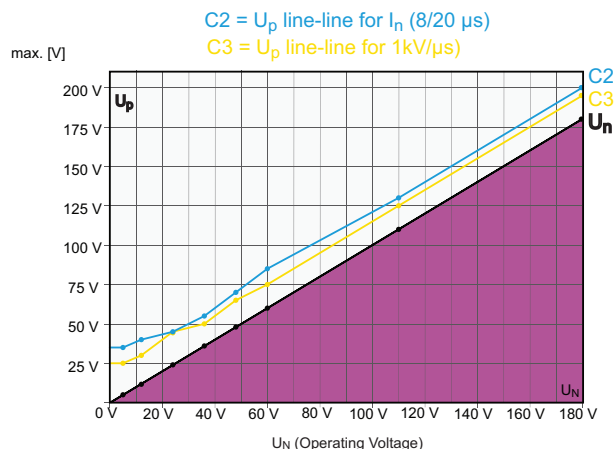
Note 2 - See Diagram 1 - VPL line-line graph line C2.

† DEKRA 12ATEX0254 X: II 3 G Ex nA IIC T4 Gc

†† ATEX, UL, CSA

‡ UL 497B

Diagram 1: Voltage Protection Level U_p (V) (Line - Line)



* See Cooper Bussmann SPD Limited Warranty Statement (3A1502) for details at www.cooperbussmann.com/surge.

DIN-Rail RJ45 SPD Installation Instructions - Documents 3A1980 (5-48V) & 3A1981 (0-180V)

DIN-Rail Universal 4 Wire Data Signal SPDs and Applications

Universal 4 wire data signal SPD products are specified by communication technology. The table below contains the

specific SPD product, by part number, and the applications to which they are suited to be used.



| Part Numbers | BSPD5DING | BSPD12DING | BSPD24DING | BSPD48DING | BSPD5DINLHF | BSPD24DINLHF | BSPD0180DINL |
|---|-----------|------------|------------|------------|-------------|-----------------|--------------|
| BUS SYSTEMS AND MEASURING, AND CONTROL TECHNOLOGY | | | | | | | |
| 0-20 mA, 4-20 mA Signals | | | X | | | X (4-20mA only) | X |
| Binary Signals | X | X | X | X | | | |
| CAN-Bus (data line only) | | | | | X | | X |
| C-Bus (Honeywell) | | | | | X | | X |
| Data Highway Plus | | | | | | | X |
| Device Net (data line only) | | | | | X | | X |
| Dupline | | | | | | | X |
| E-Bus (Honeywell) | | | | | | | X |
| Fieldbus Foundation | | | | | | X | X |
| FIPIO / FIPWAY | | | | | | X | |
| FSK | | | | | X | | X |
| IEC-Bus (RS485) | | | | | X | | X |
| Interbus INLINE (I/O) | | | | | | | X |
| Interbus INLINE, Long-distance bus | | | | | X | | X |
| K Bus | | | | | | X | |
| LON - TP/XF 78 | | | | | X | | |
| LUXMATE Bus | | | | | | X | X |
| M Bus | | | | | | | X |
| MODBUS | | | | | X | | X |
| MPI Bus | | | | | X | | X |
| Procontic CS31 (RS232) | | X | | | | | |
| Procontic T200 (RS422) | | | | | X | | X |
| PROFIBUS DP/FMS | | | | | X | | X |
| PROFIBUS PA | | | | | | X | X |
| PROFIBUS SIMATIC NET | | | | | X | | X |
| PSM EG RS422 & RS485 | | | | | X | | X |
| Rackbus (RS485) | | | | | X | | X |
| R Bus | | | | | X | | X |
| RS 485 | | | | | X | | X |
| RS422, V11 | | | | | X | | X |
| SafetyBUS p | | | | | X | | X |
| Securilan LON Bus | | | | | X | | |
| SIGMASYS | | | | X | | | |
| SS97 SIN/X (RS 232) | | X | | | | | |
| SUCONET | | | | | X | | X |
| Resistance Temp. Measuring Ni1000, PT100, PT1000 Wire NTC & PTC Thermistors | | X | | | | | |
| TTL | | X | | | | | |
| TTY 4-20mA | | | X | | | | |
| TELECOMMUNICATION, TELEPHONY | | | | | | | |
| a/b Wires | | | | | | | X |
| ADSL, ADSL 2+ | | | | | | | X |
| ISDN S ₀ , S _{2m} /U _{2m} , U _{KO} /U _{PO} | | | | | | | X |
| Modem M1 | | X | | | | | |
| SDSL, SHDSL | | | | | | X | X |
| Telephony Systems (e.g., Siemens, HICOM, Alcatel) | | | | | | | X |
| T-DSL | | | | | | | X |
| Telecommunication Systems (e.g., Siemens, HICOM, Alcatel) | | | | | | | X |
| VDSL | | | | | | | X |
| DATA NETWORKS | | | | | | | |
| V 24 (RS232 C) | | X | | | | | |

Surge Protection Made Simple™ for Coaxial Data Cables

UL Listed 497B DIN-Rail Mount Surge Protective Device for BNC Connector Cable Systems



Description

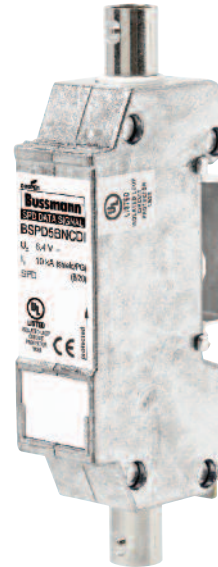
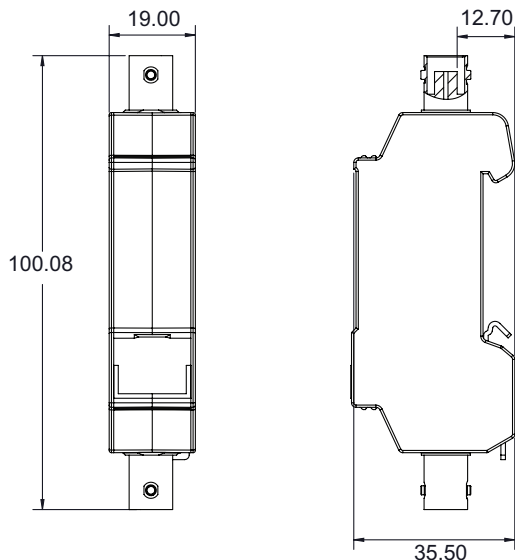
The Cooper Bussmann BSPD5BNCDD and BSPD5BNCDI two-stage DIN-Rail mounted surge arresters are for protecting coaxial cable-connected systems (such as video and camera systems) from potential damage. The BSPD5BNCDD features direct (VCD) shield connection while the BSPD5BNCDI features indirect shield connection (VCID) to prevent leakage pickups.

The BSPD5BNCDD and BSPD5BNCDI shielded surge arresters are mounted on the supplied bracket with cable lug or mounted on a rack mounted DIN-Rail with suitable grounding. BNC connector terminated data or video signal cables are plugged into surge arrester with the equipment plugged into the protected side.

Common applications include protecting outdoor video surveillance systems or video control centers or coaxial data lines. For BSPD5BNCDI, the cable shield is indirectly grounded via a gas discharge tube to avoid being influenced by leakage pickups.

- UL 497B Listed
- Plug-in surge protective device for easy retrofitting
- The space-saving surge arrester with BNC socket is mounted on supplied rail terminal lug or standard 35mm DIN-Rail
- Integrated direct or indirect shield grounding avoids leakage pickups
- Easily adaptable due to BNC sockets

Dimensions-mm

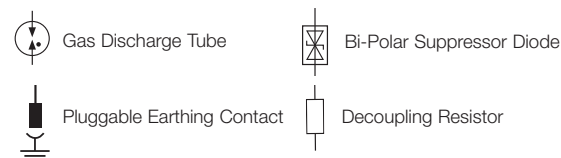
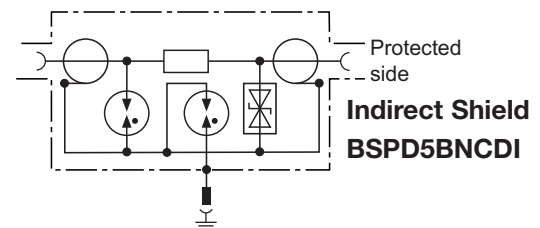
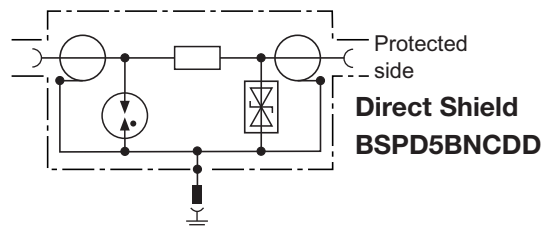


BSPD5BNCDD
BSPD5BNCDI



DIN-Rail Mount SPD for BNC Coax

Circuit Diagrams



| Technical Data | | |
|--|---|------------|
| Catalog Number | BSPD5BNCDD | BSPD5BNCDI |
| Return loss at 300MHz | ≥8dB | ≥10dB |
| Capacitance shield-PG (C) | — | ≤20pF |
| Voltage protection level shield-PG for I _n C2 (U _p) | — | ≤650V |
| Voltage protection level shield-PG at 1kV/μs C3 (U _p) | — | ≤600V |
| Nominal voltage (U _N) | 5V | |
| Max. continuous operating DC voltage (U _C) | 6.4V | |
| Nominal current (I _N) | 0.1A | |
| C2 Nominal discharge current (8/20μs) shield-PG (I _n) | 10kA | |
| C2 Nominal discharge current (8/20μs) line-shield (I _n) | 5kA | |
| Voltage protection level line-shield for I _n C2 (U _p) | ≤35V | |
| Voltage protection level line-shield at 1kV/μs C3 (U _p) | ≤13V | |
| Frequency range | 0-300MHz | |
| Insertion loss at 160MHz | ≤0.4dB | |
| Insertion loss at 300MHz | ≤3dB | |
| Return loss at 130MHz | ≥20dB | |
| Impedance (Z) | 50Ω | |
| Series impedance per line | 4.7Ω | |
| Capacitance line-shield (C) | ≤25pF | |
| Operating temperature range | -40°C to +80°C | |
| Degree of protection | IP10 | |
| For mounting on | 35mm DIN-Rails per EN 60715 | |
| Connection (input / output) | BNC Socket (female) / BNC Socket (female) | |
| Grounding | Via 35mm DIN-Rail per EN 60715 | |
| Enclosure material | Zinc die casting | |
| Color | Bare surface | |
| Test standards | IEC 61643-21 / EN 61643-21 | |
| Agency Information | UL 497B | |
| Warranty | 5 Years* | |

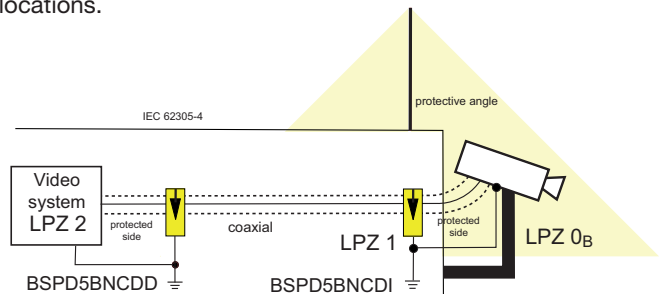


Direct vs. Indirect Shielding - Application Example

Apply the BSPD5BNCDD (direct shield) at the equipment location and apply the BSPD5BNCDI (indirect shield) near exterior protected equipment. The indirect shield grounding at the exterior device will help avoid picking up leakage currents that can degrade signal quality while providing surge protection when needed. See illustration below for installation locations.

DIN-Rail BNC SPD Applications

| Part Numbers | BSPD5BNCDD | BSPD5BNCDI |
|---|------------|------------|
| Bus Systems and Measuring, and Control Technology | | |
| Control Net | X | X |
| Melsec Net 2 | X | X |
| N1 LAN | X | X |
| Data Networks | | |
| Arcnet | X | X |
| Video Systems | | |
| Video (coax) | X | X |



* See Cooper Bussmann SPD Limited Warranty Statement (3A1502) for details at www.cooperbussmann.com/Surge.

DIN-Rail BNC Coax SPD Installation Instructions - Document 3A1977

Surge Protection Made Simple™ for Coaxial Data Cables

UL Listed 497B In-line Surge Protective Device for BNC Connector Cable Systems



Description

The Cooper Bussmann BSPD5BNCSI two-stage in-line surge arrester is for protecting coaxial cable-connected systems (such as video and camera systems) from potential damage.

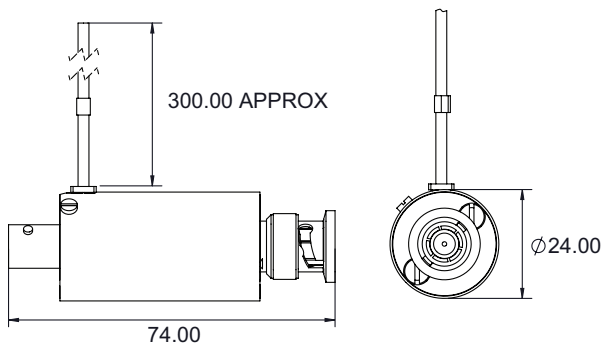
The BSPD5BNCSI shielded surge arrester is plugged into coaxial terminal equipment or connections. Common applications include protecting outdoor video surveillance systems or video control centers. The cable shield is indirectly grounded via a gas discharge tube to avoid being influenced by leakage pickups. The arrester input is used as a socket and the protected output as a plug.

- UL 497B Listed
- Plug-in surge protective device for easy retrofitting
- Directly plugs into terminal equipment with BNC coaxial connections
- Integrated indirect shield grounding avoids leakage pickups

BSPD5BNCSI

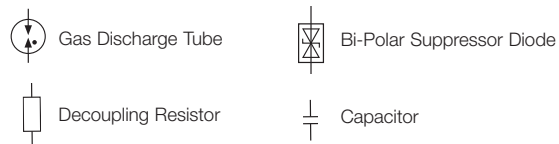
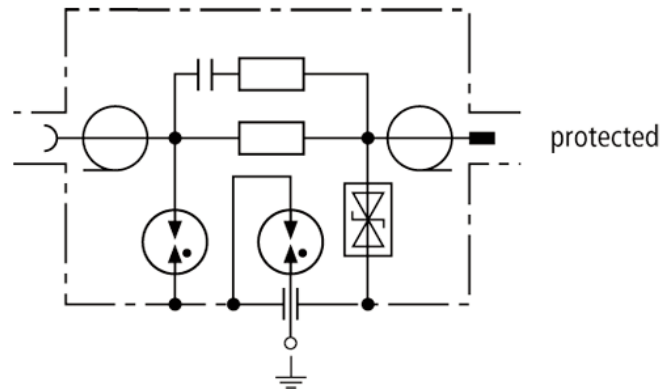


Dimensions-mm



In-line SPD for BNC Coax

Circuit Diagram



| TECHNICAL DATA | |
|---|---|
| Catalog Number | BSPD5BNCSI |
| Nominal voltage (U_N) | 5V |
| Max. continuous operating DC voltage (U_C) | 8V |
| C2 Nominal discharge current (8/20 μ s) per line (I_n) | 2.5kA |
| C2 Nominal discharge current (8/20 μ s) shield-PG (I_n) | 10kA |
| Voltage protection level line-shield for I_n C2 (U_p) | $\leq 25V$ |
| Voltage protection level line-shield at 1kV/ μ s C3 (U_p) | $\leq 15V$ |
| Voltage protection level shield-PG at 1kV/ μ s C3 (U_p) | $\leq 600V$ |
| Insertion loss at 265MHz | $\leq 3dB$ |
| Return loss at 40MHz | $\geq 20dB$ |
| Impedance (Z) | 75 Ω |
| Series impedance per line | 10 Ω |
| Capacitance line-shield (C) | $\leq 50pF$ |
| Operating temperature range | -40°C to +80°C |
| Connection (input / output) | BNC Socket (female) / BNC Plug (male) |
| Grounding | Via outgoing earth conductor 18AWG (0.75mm ²) |
| Shield grounding | Indirectly via an integrated spark gap element |
| Test standards | IEC 61643-21 / EN 61643-21 |
| Agency information | UL 497B |
| Warranty | 5 Years* |

In-line BNC SPD Applications

| Part Number | BSPD5BNCSI |
|--|------------|
| Bus Systems and Measuring & Control Technology | |
| Control Net | X |
| Melsec Net 2 | X |
| Data Networks | |
| Arcnet | X |
| Video Systems | |
| Video (coax) | X |



* See Cooper Bussmann SPD Limited Warranty Statement (3A1502) for details at www.cooperbussmann.com/Surge.

In-Line BNC Coax SPD Installation Instructions - Document 3A1978

Surge Protection Made Simple™ for Ethernet Data Cables

UL Listed 497B Universal DIN-Rail Mount Surge Protective Device for RJ45/Ethernet Cable Systems



Description

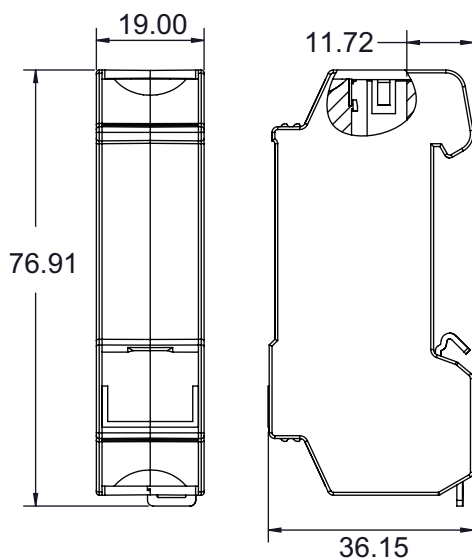
The Cooper Bussmann DIN-Rail mount BSPD48RJ45 Surge Protective Device (SPD) for Ethernet cable systems with RJ connectors is easy to install in new, or retrofitting into existing, installations.

The BSPD48RJ45 is installed between the patch panel and the active component (a switch for example). The snap-in mechanism of the supporting foot allows the SPD to be safely grounded via the DIN-Rail. For single applications, the BSPD48RJ45 comes with supplied mounting bracket with cable lug.

Fulfilling the requirements of Category 6, the BSPD48RJ45 can be universally used for all data services up to nominal voltages of 48V. It is well suited for existing services such as Gigabit Ethernet, ATM, ISDN, Voice over IP and Power over Ethernet (PoE+ acc. to IEEE 802.3at up to 57V) and similar applications in structured cabling systems according to Class E up to 250MHz. Protection of all pairs by means of powerful gas discharge tubes and one adapter filter matrix per pair.

- UL 497B Listed
- Easy to install or retrofit for protection of all lines
- CAT 6 according to ISO/IEC 11801
- CAT 6 in the channel (Class E)
- Power over Ethernet (PoE+ according to IEEE 802.3at)

Dimensions -mm

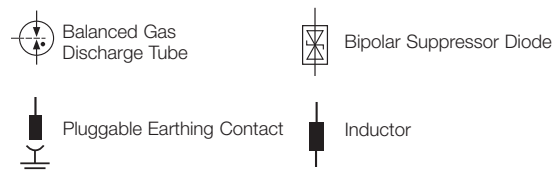
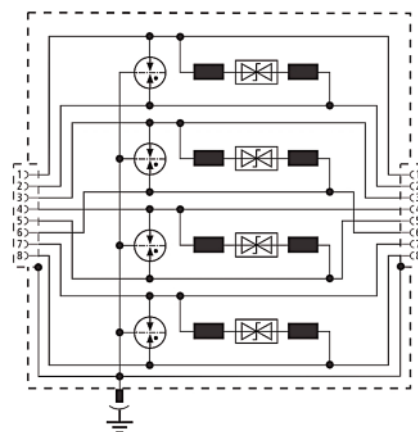


BSPD48RJ45



DIN-Rail Mount SPD for RJ45 / Ethernet Connection

Circuit Diagram



| TECHNICAL DATA | |
|--|---------------------------------|
| Catalog Number | BSPD48RJ45 |
| Nominal voltage (U _N) | 48V |
| Max. continuous operating DC voltage (U _C) | 48V |
| Max. continuous operating AC voltage (U _C) | 34V |
| Max. continuous DC voltage pair-pair (PoE) (U _C) | 57V |
| Nominal current (I _N) | 1A |
| C2 Nominal discharge current (8/20μs) line-line (I _n) | 150A |
| C2 Nominal discharge current (8/20μs) line-PG (I _n) | 2.5kA |
| C2 Total nominal discharge current (8/20μs) line-PG (I _n) | 10kA |
| C2 nominal discharge current (8/20μs) pair-pair (PoE) (I _n) | 150A |
| Voltage protection level line-line for I _n C2 (U _P) | ≤190V |
| Voltage protection level line-PG for I _n C2 (U _P) | ≤600V |
| Voltage protection level line-line for I _n C2 (PoE) (U _P) | ≤600V |
| Voltage protection level line-line at 1kV/μs C3 (U _P) | ≤180V |
| Voltage protection level line-PG at 1kV/μs C3 (U _P) | ≤500V |
| Voltage protection level pair-pair at 1kV/μs C3 (PoE) (U _P) | ≤600V |
| Insertion loss at 250MHz | ≤3dB |
| Capacitance line-line (C) | ≤30pF |
| Capacitance line-PG (C) | ≤25pF |
| Operating temperature range | -40°C to +80°C |
| Degree of protection | IP10 |
| For mounting on | 35mm DIN-Rails per EN 60715 |
| Connection (input / output) | RJ45 socket / RJ45 socket |
| Pinning | 1 / 2, 3 / 6, 4 / 5, 7 / 8 |
| Grounding | Via 35mm DIN-Rails per EN 60715 |
| Enclosure material | Zinc die casting |
| Color | Bare surface |
| Test standards | IEC 61643-21 / EN 61643-21 |
| Agency information | UL 497B |
| Warranty | 5 Years* |

DIN-Rail RJ45 SPDs Applications

| Part Number | BSPD48RJ45 |
|---|------------|
| Bus systems and Measuring, and Control Technology | |
| Industrial Ethernet | X |
| Data Networks | |
| ATM | X |
| Ethernet 10/100/1000 | X |
| FDDI, CDDI | X |
| Industrial Ethernet | X |
| Power over Ethernet (PoE) | X |
| Token Ring | X |
| VG Any LAN | X |
| Video Systems | |
| Video (2 wire) | X |



* See Cooper Bussmann SPD Limited Warranty Statement (3A1502) for details at www.cooperbussmann.com/Surge.

DIN-Rail RJ45 SPD Installation Instructions - Document 3A1979

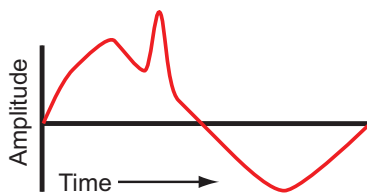
1. What are Surges, transients and temporary overvoltage (TOV)?

All these are various forms of overvoltage and are often used interchangeably. The true definition of these terms is related to their defined duration.

Transients as defined by IEEE Standard 1313.1-1996 are “a short-duration highly damped, oscillatory or non-oscillatory overvoltage, having duration of a few milliseconds or less. Transient overvoltage is classified as one of the following types: lightning, switching and very fast front, short duration.” These can be generated by voltage spikes which contain very little energy but are sufficient in voltage to cause damage to sensitive electronics.

Surge is an overvoltage condition that usually lasts longer in duration, $>10\mu\text{s}$ & $<1\text{Ms}$ and has higher energy to them that can cause damage to electrical and electronic equipment.

Temporary OverVoltage (TOV) are created by faults on the utility power distribution system and can cause extensive damage since their time domain is much longer (ms to seconds to hours).



Surges & Transients

2. What is a surge protector?

A surge protector is a device that limits transient overvoltages to a safe level, thus protecting equipment it is connected to from damage. A surge protector may be expressed using the following terms: SPD (Surge Protective Device), TVSS (Transient Voltage Surge Suppressor). There are different variations of SPD such as lightning arresters and surge arresters or secondary surge arrester.

3. What is the difference between terms "Surge Arrester," "Surge Protective Devices (SPD)" and "Transient Voltage Surge Suppressor (TVSS)"?

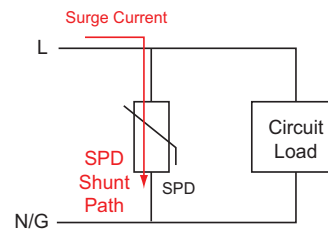
These terms are often used interchangeably and rather loosely. However, the two terms have different meanings as determined by the National Electrical Code® (NEC®) (www.nfpa.org), their UL listing, and applicable IEEE/ANSI standards.

According to NEC 2011 Article 285 TVSSs have been redefined as “Surge Protective Devices (SPDs) 1kV or Less.” Previously titled “Transient Voltage Surge Suppressors: TVSSs,” this Article now uses the “type” designations that parallel the new requirements in UL 1449, 3rd Edition. It also includes general, installation, and connection requirements for these SPD types installed on premises wiring systems rated 1kV or less.

4. How does a SPD work?

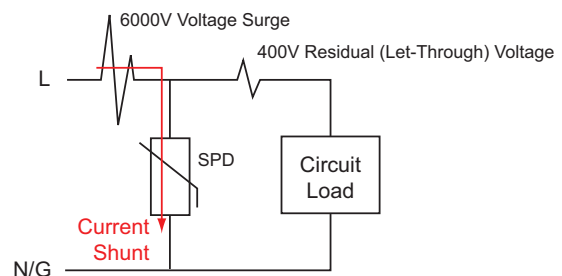
A surge protector works by momentarily “switching” from an open circuit mode into a low impedance mode and shunting the surge energy to the ground and in doing so, limits the overvoltage to a safe level. When the surge event is over, the protector returns to its open circuit mode, ready for the next event or at end of life fails open safely until replaced.

In other words, the SPD acts as a pressure relief valve. The pressure relief valve (SPD) does nothing until an overpressure (voltage surge) occurs in the Supply (power) similar to the pressure relief valve.



5. What is Shunting?

Shunting is the term used to describe the process by which an SPD redirects voltage transient energy to ground through a low impedance path.



6. How to size an SPD?

SPD size is determined by factors such as geography, size of distribution transformer, electrical environment, importance of equipment in operation, cost of downtime, etc.

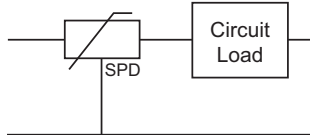
Call Cooper Bussmann at 636-527-1270 for more information.

7. Can anyone install AC or DC SPD?

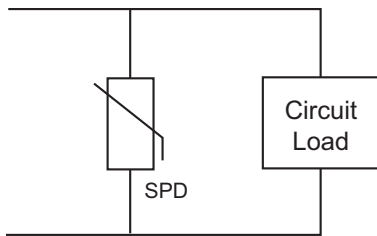
Only a qualified electrician should be used for all hardwired protectors. This will help ensure that all the safety requirements and all local codes are met. Most common Installation is in “parallel” to the load/device.

8. What are Series SPD vs. Parallel SPD?

Series installed SPD are typically used at the equipment level, either right in front of, or within the equipment they are protecting. These SPD have an “input” and an “output” whereas parallel SPD do not. A common example of a series connected SPD is a “surge strip.” Since they are connected in series with the equipment, they conduct load current. It is also common for a series AC SPD to contain a EMI/RFI noise filter. This filtering is useful when it is right in front of the equipment to filter out noise generated by other loads.



Parallel SPD do not conduct load current and simply “tap” into the power system via a circuit protective device. Parallel SPD are commonly used where large surge energies exist. They’re used on service entrance panels and switchgear, plus branch and local panels. Parallel connected protectors are the essential for all commercial and industrial AC applications.



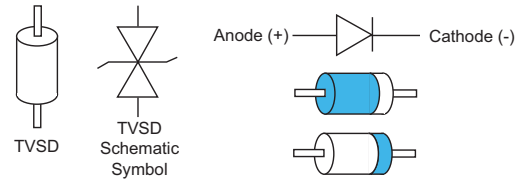
9. What is a modular SPD?

A modular SPD contains modules that are field replaceable, thus making maintenance easy and minimizing time with reduced protection, or no protection at all in some cases. The modules usually contain the metal oxide varistors (MOV) and fuses (although sometimes the fuses are external to the modules). They are the heart of the surge protector. A modular protector also allows for decreased labor and cost required for servicing the protector.

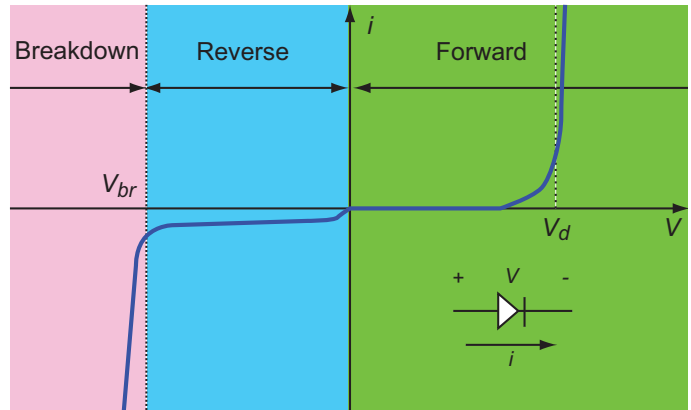


10. What Technologies are used in making SPD?

Silicon Diode Technology (SAD):



The diode is installed reverse-biased under normal conditions. When the voltage rises above normal conditions the diode becomes forward-biased.



Not to Scale

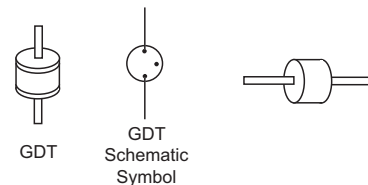
Advantages

- Excellent voltage clamping
- Sub nanosecond response time
- Repeatable
- Low capacitance
- Compact

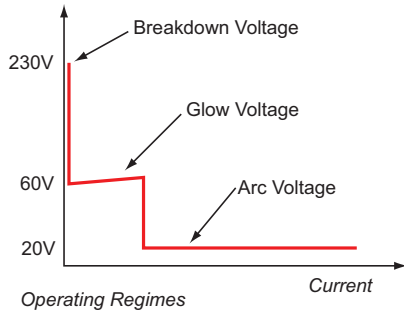
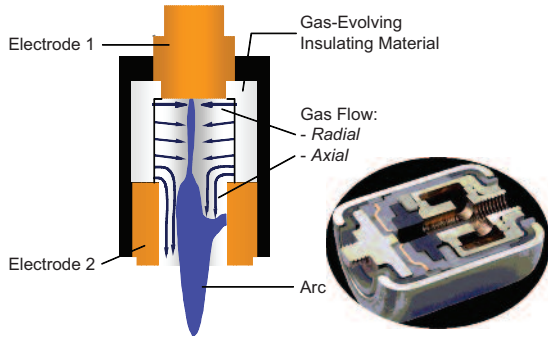
Disadvantages

- Limited impulse or current capability

Gas Discharge Tube (GDT):



The GDT may be regarded as a very fast acting switch having conducting properties that change very rapidly when breakdown occurs and transforms from an open-circuit to a quasi-short circuit. The result is an arc voltage of about 20V DC. There are four stages of operation before the tube fully switches.



1. Non-operating domain: Characterized by practically infinite insulation resistance.
2. Glow domain: At the breakdown, the conductance increases suddenly. If the current is drained off by the gas discharge tube is less than about 0.5A (rough value that differs from component to component) , the glow voltage across the terminals will be in the 80-100V range.
3. Arc regime: As the current increases, the gas discharge tube shifts from glow voltage to the arc voltage (20V). It is this domain that the gas discharge tube is most effective because the current discharge can reach several thousand amps without the arc voltage across the terminals increasing.
4. Extinction: At a bias voltage roughly equal to the glow voltage, the gas discharge tube recovers to its initial insulating properties.

Advantages:

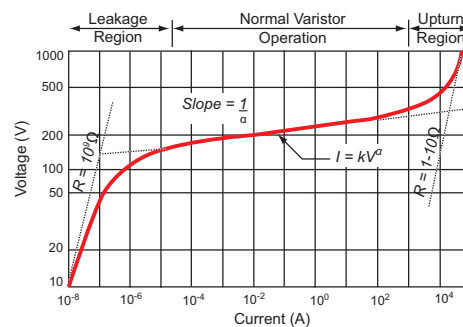
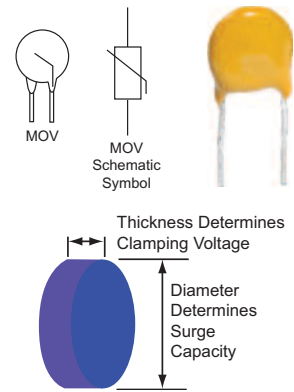
- Handles very high impulse currents, makes it ideal for Lightning arresters
- Low capacitance
- Rugged and compact
- Low conduction voltage
- Repeatable

Disadvantages:

- Takes longer to turn on, 2 to 3 μ s response time
- Extinguishing it is a challenge
- Breakdown voltage depends on transient rise time allowing high overshoot voltage

Metal Oxide Varistor (MOV):

An MOV is a variable resistor typically made of a large block of zinc oxide grains. They act like semiconductors, an insulator below the conduction voltage and a low value resistor above it. In conduction mode, the MOV diverts and dissipates the transient. MOVs generally connects in parallel to load. The thickness of the MOV determines the clamping voltage and Diameter determines the current capacity.



Advantages:

- Fast, sub micro second, response time
- Good voltage conduction clamping, makes it ideal for Surge arresters
- Handles high impulse currents
- Rugged
- Repeatable

Disadvantages

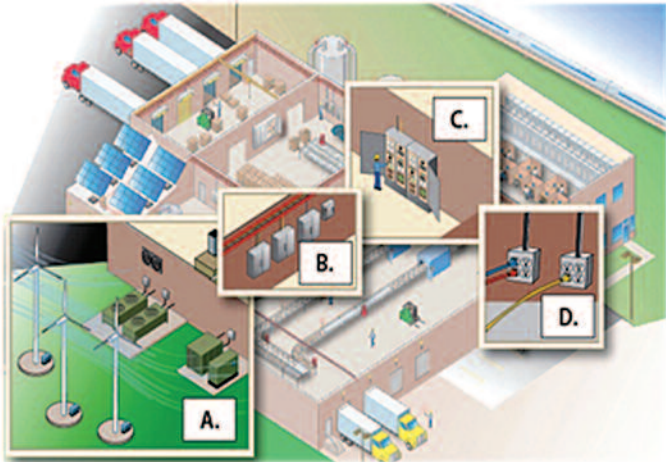
- Large relative size
- High relative capacitance

11. What is a hybrid SPD?

A hybrid protector is a protector that uses more than one protection technology.

12. Where is the best place to install SPD?

Ideally, a SPD should be installed at the main service entrance as close to the N-Gnd (neutral-to-ground) bond as possible, as shown below. This will ensure that surge energies are routed to earth by the most direct path. In larger facilities where distances between this primary protection and the equipment being protected are long, it is also good practice to use distributed protection all the way to point-of-use.



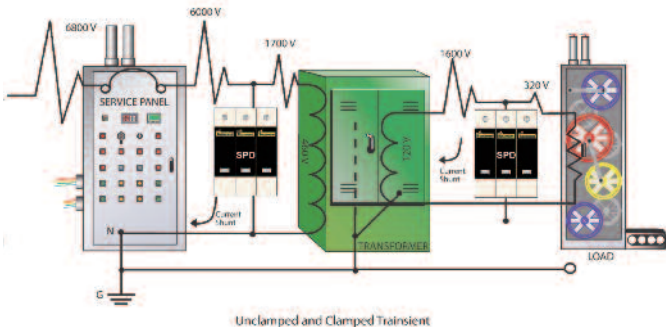
Locations

A-Very Exposed, B-Outside & Service Entrance, C-Feeders & Branch Circuits, D-Outlet and Point of Use

13. What is distributed protection?

Distributed Protection, Cascading Protection or Coordination is the process of coordinating protection between the primary service entrance to a large facility and the internal branch distribution panels. Generally a surge protective device (SPD) with high surge handling capacity is installed at the service entrance while SPDs of lower surge ratings will be installed on the branch panels or dedicated supplies feeding sensitive equipment. This approach can be taken further to include point-of-use SPDs on long lines where they terminate to sensitive or critical equipment. A further example of such a distributed protection philosophy might include hardwired SPDs at the main and sub-panels and additional plug-in protectors on select equipment. (See pages 5 and 6 for SPD Types and installation locations.)

Surge Protection Applications
SPD Locations- Coordination (IEC)/ Cascading (UL)

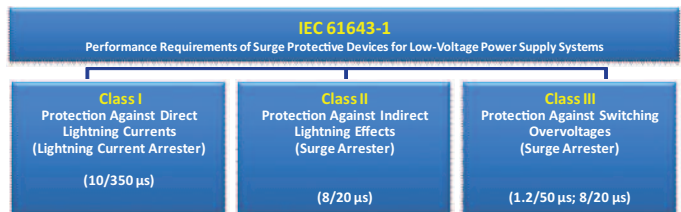


14. What Standards govern the SPD?

INTERNATIONAL STANDARD - IEC 61643-1



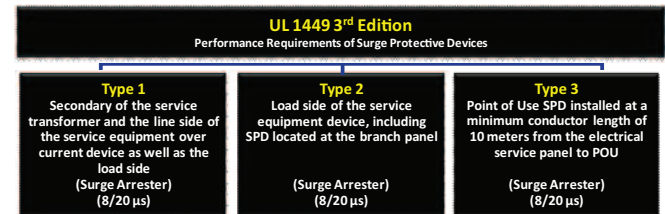
Low-voltage surge protective devices – Part 1: Surge protective devices connected to 50/60Hz AC and dc power circuits, and equipment rated up to 1000V_{rms}, or 1500Vdc. Requirements and tests. It is a self certification or third party such as KEMA validates the test results.



NORTH AMERICA - ANSI - UL1449 3rd Edition



Standard for Surge Protective Devices (SPDs) designed for repeated limiting of transient voltage surges as specified in the standard on 50 or 60Hz power circuits not exceeding 1000V. UL 1449 does the testing and based on the product either list or recognizes the products.



15. How is North American surge suppression industry defined by safety standards and regulations?



2011 National Electrical Code® (NEC)

Requirements that SPDs follow:

1. Installation of the SPD (Articles 280 and 285)



Institute of Electrical & Electronic Engineers (IEEE) Manages SPD:

1. Surge Environment C62.41.1
2. Characterization C62.41.2
3. Testing Practices C62.45



National Electrical Manufacturers Association (NEMA) Standards that SPDs follow:

1. Receptacles and Plugs
2. Enclosures



Underwriters Lab (UL) Certifies to SPD Standards:

1. Standard 1449 – 3rd Edition – SPD Standard
2. As required: Standard 1283 – EMI / Filters
3. NEMA ratings 1449 3rd Edition Current Standard for SPDs

16. What is UL1449?

UL1449 is the standard for safety for AC surge protective devices (SPD) used on systems with voltages of 600Vac and less. This standard addresses SPDs that are installed on the load side of the main disconnect. A UL1449 listed or recognized surge protector has been thoroughly tested for safe operations. A VPR (Voltage Protection Rating) is assigned to a UL1449 listed SPD as a result of these tests to help users compare SPDs. UL 1449 3rd edition went into effect in September, 2009, making all previous SPDs obsolete. Any older SPDs should be inspected and may be replaced to meet the new safety standard prescribed by NEC® (NEC 2011 Articles 280 and 285) which calls for SPD Type products that is part of the new 1449 3rd Edition.

17. What is NEMA LS 1?

NEMA LS 1 was a surge protector performance standard. A surge protector which meets this standard is typically used in the most hostile surge environments, at the service entrance location. Other protector locations such as branch panel and local panel protection usually do not require such a formidable protector. *NEMA LS 1 was rescinded in 2009* because the document was determined to be out of date and many industry standards related to the surge environment and surge suppression had been significantly updated since the original LS 1 standard was published in 1992.

18. I have a PV (photovoltaic) system with net metering; does it need a surge protection system?

Yes. For PV systems, DC surge protection should be installed where the DC voltage from the PV arrays terminates at the charge controller/inverter. AC protection should be installed at the inverter's AC output to protect it from transients on the utility power lines. This can be caused by lightning or utility switching transients. In certain cases, protection should be located at the PV array locations, and at the array's local DC control circuits - where applicable. See PV SPD data sheet and Installation Instructions for more details on the application of the SPD.

19. Why is the lead (wire) length of an AC SPD so critical?

The shorter the lead length between the protector and your panel, the lower the let-through voltages will be to your equipment. This is crucial to the effectiveness of all parallel-connected surge protectors.

SPD are typically connected in parallel with the load. This means that the protector does not carry load current. But more importantly, it means that the SPD must efficiently divert transient currents through it during an overvoltage event. The SPD must "look" like an electrical short circuit momentarily in order to efficiently divert large amounts of current. The longer the wire, the more inductance it has, and the greater the (L x di/dt) factor will be. So when installing parallel surge protectors, keep the leads as close to, but not less than, six inches as possible for best performance.

20. What are the different designations for ratings between UL 1449 and IEC 61643-1.

The rating designations used in UL and IEC are in the table below.

| Ratings | Agency Designation | |
|---|--------------------|------------------|
| | UL 1449 | IEC 61643-1 |
| Nominal System Voltage | V _o | U _n |
| Maximum Discharge Current 8x20 μs | I _{max} | I _{max} |
| Nominal Discharge Current 8x20 μs | I _n | I _n |
| Impulse Current 10x350 μs | - | I _{imp} |
| Voltage Protection Level | V _{PR} | U _p |
| Maximum Continuous Operating Voltage (MCOV) | V _c | U _c |
| Temporary Overvoltage | TOV | U _t |

21. How long does an SPD last?

How long an MOV based SPD lasts depends upon how often the MOV experiences an overvoltage event and for how long. Every time an MOV switches, it's life is slightly degraded. The greater the transient hit, the greater the degradation of the MOV. One hit of 20kA may degrade the MOVs life just as much as 15 hits at 0.2kA. So, in other words it may last a day taking a large hit or years with smaller surges.

22. By VPR, what are the IEEE C62.41 defined withstand categories of equipment?

Category I: Sensitive electronic circuits <1500V overvoltage
 Category II: Domestic electrical equipment <2500V overvoltage
 Category III: Distribution panels, switchgear <4000V overvoltage
 Category IV: Industrial equipment, meters <6000V overvoltage

23. Can a SurgePOD HEAVY DUTY insulated conductor be permanently identified for equipment grounding at each end using color tape?

No, the 2011 NEC® only permits changing identification on 6AWG and larger conductors. The SurgePOD HEAVY DUTY conductors are 10AWG and too small.

Details are contained in section 250.119 Identification of Equipment Grounding Conductors.

NEC® 250.119 (A) contains these specific words: "An insulated or covered conductor larger than 6AWG shall be permitted, at the time of installation, to be permanently identified as an equipment grounding conductor at each end and at every point where the conductor is accessible."

24. Why are there requirements for installing some Type 1 SPDs not more than 10 feet from a bonded neutral-ground connection or greater than 10 feet from the bonded neutral-ground connection?

These requirements reflect a best practice for SPD wiring, as opposed to any Code requirements. When an SPD is located within 10 feet (3m) of the main service panel, the system can make use of the neutral line as an effective ground, due to the close proximity to the service entrance grounding conductor.

For distances greater than 10 feet (3m), it is a best practice to select an SPD that has Neutral to Ground protection. This helps ensure a proper grounding is available for an SPD, which is critical to effectively protect the electrical system.

25. Where can I find the Agency Certificates for these SPDs?

To see the complete UL and CSA and other agency certificates go online to www.cooperbussmann.com/Surge. Then go to the web page of the desired product and click on the certificate links available.

SPD Glossary

10/350 Wave Test - 10/350 Current Impulse (I_{imp}) For Class 1 Test

Current impulse with a virtual front time of 10µs and a time to half-value of 350µs. This is used for the classification of the SPD for test Class I Lightning Arresters per IEC 61643-1 Standard.

8/20 Wave Test - 8/20 Current Impulse

Current impulse with a virtual front time of 8µs and a time to half-value of 20µs as defined by UL1449 3rd Edition and IEC 61643-1 Standards.

IEC Classes - Per IEC 61643-1 Standard

Class I Protection Against Direct Lightning Currents; based on 10/350 wave test (Lightning Current Arrester).

Class II Protection Against Indirect Lightning Effects; based on 8/20 wave test (Surge Arrester).

Class III Protection Against Switching Overvoltages; based on 1.2/50µs; 8/20µs wave test (Surge Arrester).

I_{imp} - Impulse Current Rating

Defined by three parameters, a current peak value (I_{peak}), a charge Q and a specific energy. Note: This is used for the classification of the SPD for test Class I SPDs under IEC 61643-1 Standard. UL DOES NOT have this RATING.

I_{max} - Maximum Discharge Current

Crest value of a current through the SPD having an 8/20 wave shape and magnitude according to the test sequence of the Class II operating duty test; I_{max} is the voltage and current development must not show any marks of disruptive obvious damage or aberration from the temperature stability; records of greater than I_n; arrester must safely discharge this current without an discharge or spark over. An SPD can withstand a Single shot of Surge Current. In UL markets, this is a self certification rating.

I_n - Nominal Discharge Current

Peak value of the current, selected by the manufacturer, through the SPD having a current wave shape of 8/20 where the SPD remains functional after 15 surges.

I_{sc} - Fault Current

Failure condition - Current through MOV/SPD when it has failed in a short-circuit condition – tends to be continuous.

Lightning Arrester

SPD that has an I_{imp} rating based on IEC 61643-1 Standard. These products are typically DIN-Rail style SPDs.

MCOV/V_c/U_c - Maximum Continuous Operating Voltage

The maximum designated root mean-square (rms) value of the power frequency voltage that may be continuously applied to the mode of protection of an SPD. Voltage at which an SPD starts to conduct.

MOV - Metal Oxide Varistor

MOV is a ceramic mass of zinc oxide grains, in a matrix of other metal oxides (such as small amounts of bismuth, cobalt, manganese) sandwiched between two metal plates (the electrodes).

NEMA 4X - Electrical Enclosure Rating

Type 4X Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (windblown dust); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow, splashing water, and hose directed water); that provides an additional level of protection against corrosion; and that will be undamaged by the external formation of ice on the enclosure.

SCCR - Short-Circuit Current Rating

The suitability of an SPD for use on an AC power circuit that is capable of delivering not more than a declared rms symmetrical current at a declared voltage during a short-circuit condition.

SPD - Surge Protective Device

A surge protector is a device that limits transient overvoltages to a safe level, thus protecting equipment it is connected to from damage. A surge protector may also be expressed using the following terms:

SPD Surge Protective Device

TVSS Transient Voltage Surge Suppressor

There are different variations of SPD such as lightning arresters and surge arresters or secondary surge arrestor.

Surge Arrester

SPD that has an In rating based on IEC 61643-1 or UL 1449 3rd edition. These products can be either DIN-Rail Style SPD in an assembly or NEMA Style SPDs (Surge-in-a-Box).

Surge Current

Normal operation - Current through MOV/SPD while conducting a surge – tends to be momentary.

Thermal Disconnect

Protecting MOV from going into a thermal runaway condition thus preventing catastrophic MOV failure.

Thermal Runaway

Operational condition when the sustained power dissipation of an SPD exceeds the thermal dissipation capability of the housing and connections, leading to a cumulative increase in the temperature of the internal elements culminating in failure.

TOV - Temporary Overvoltage

Temporary Overvoltages (TOVs) are created by faults on the utility power distribution system and can cause extensive damage since their time domain is much longer (ms to seconds to hours).

UL SPD Types - Per 1449 3rd Edition

- Type 1 These are permanently connected SPDs intended for installation between the secondary of the service transformer and the line side of the service equipment overcurrent device as well as the load side (including watt-hour meter adapters). Previously known as surge arresters, these devices are intended to be installed without an external overcurrent protective device. DIN-Rail SPDs are NOT Type 1.
- Type 2 These are permanently connected SPDs intended for installation on the load side of the service equipment overcurrent device, including SPDs located at the branch panel. UL 508A Power Applications
- Type 3 These are point-of-utilization SPDs, which are installed at a minimum conductor length of 10 meters (approximately 30 feet) from the electrical service panel to the point of utilization (e.g., cord-connected, direct plug-in, receptacle type, and SPDs installed at the utilization equipment being protected). The 10 meter distance is exclusive of conductors provided with or used to attach SPDs. UL 508A Control Applications
Note: Type 2 and 3 SPDs were previously known as TVSSs.
- Type 4 There are RECOGNIZED COMPONENTS tested to either UL Type 1, 2 or 3 categories. DIN-Rail SPD falls under this category and are tested to typically Type 2 category and Type 3 category.

V_0/U_n - Nominal System Voltage

A nominal value assigned to designate a system of a given voltage class in accordance with ANSI C84.1. Typical voltages include 120, 208, 240, 277, 347, 480, 600 Vac.

V_{PR} - Voltage Protection Rating

A rating selected from a list of preferred values as given in Table 63.1 of UL 1449 3rd Edition and assigned to each mode of protection. The value of VPR is determined as the nearest highest value taken from Table 63.1 to the measured limiting voltage determined during the transient-voltage surge suppression test using the combination wave generator at a setting of 6kV, 3kA. It is also known as "let-through voltage."



Cooper Bussmann SPD Limited Warranty Statement

Limited Warranty Terms:

- (a) Cooper Bussmann, LLC ("Seller") warrants to each original Buyer of Products that Products are in good working order and conform to Seller's official published specifications.
- (b) Seller's obligation under this warranty for any Product proved not to be as warranted within the applicable warranty period is limited to, at its option, replacing the Product, refunding the purchase price of the Product, or using reasonable efforts to repair the Product during normal business hours at any authorized service facility of Seller. Seller may require the return of any Product claimed not to be as warranted to one of its authorized service facilities. All costs of transportation of any Product claimed not to be as warranted and of any repaired or replacement Product to or from such service facility shall be borne by Buyer. The cost of labor for removing a Product and for installing a repaired or replacement Product shall be borne by Buyer. Replacement parts or Products provided under the terms of this limited warranty are warranted for the remainder of the warranty period of the Products that were repaired or replaced.
- (c) The warranty period for Products is either five (5) years or two (2) years from the date of shipment by Seller, based upon the respective Product series (see Product Series Table below). Seller shall not be liable for damages caused by any delays involving warranty service. This limited warranty does not cover defects attributable to or resulting from misapplication of Product beyond capacities, installation inconsistent with instructions, opening or tampering with the base or protection modules, normal wear, and failure caused by the operation of surge suppression. This limited warranty is not transferable.

Product Series Table

| Five (5) Year Warranty | | Two (2) Year Warranty | |
|------------------------------------|------------------------|--------------------------------|------------------------|
| DIN-Rail SPDs | Series Catalog Symbols | DIN-Rail SPDs | Series Catalog Symbols |
| Black Label UL High SCCR SPDs | BSPS | Yellow Label Photovoltaic SPDs | BSPP |
| Blue Label UL Control & Power SPDs | BSPM, BSPH | Type 1 SPDs | |
| Red Label IEC SPDs | BSPS, BSPM, BSPG, BSPH | Grey Label SurgePOD™ PRO | SPP |
| White Label Wind SPDs | BSPS, BSPM, BSPG, BSPH | | |
| Yellow Label Photovoltaic SPDs | BSPH, BSPS | | |
| Grey Label Data Signal SPDs* | BSPD | | |
| Type 1 SPDs | | | |
| Black Label SurgePOD™ HEAVY DUTY | SPH | | |

* Includes DIN-Rail BNC/Coaxial Cable, RJ45/Ethernet and Universal 4-Pole SPDs, and BNC/Coaxial Cable Inline SPD.

- (d) This limited warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Except for the express limited warranty set forth above, Seller provides Products as is and makes no other express warranties. In no event shall Seller be liable for the cost of procurement or installation of substitute goods.
- (e) IN NO EVENT SHALL SELLER BE LIABLE FOR ANY SPECIAL, CONSEQUENTIAL, INDIRECT, INCIDENTAL, STATUTORY, EXEMPLARY, PUNITIVE, OR LIQUIDATED DAMAGES, LOSS OF REVENUE, OR LOSS OF USE, EVEN IF INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. SELLER'S LIABILITY FOR DAMAGES ARISING OUT OF OR RELATED TO A PRODUCT SHALL IN NO CASE EXCEED THE PURCHASE PRICE OF THE PRODUCT FROM WHICH THE CLAIM ARISES. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU.

Submit Warranty Claims to : Cooper Bussmann
 114 Old State Road
 Ellisville, MO 63021
 Attention: SPD Warranty Claims Department

Phone: 1-855-BUSSMANN

Customer Assistance

Customer Satisfaction Team

Available to answer questions regarding Cooper Bussmann products & services Monday-Friday, 8:00 a.m. – 6:00 p.m. Central Time. Contact:

- Phone: 636-527-3877
- Toll-free fax: 800-544-2570
- E-mail: busscustsat@cooperindustries.com

Emergency and After-Hours Orders

Next flight out or will call shipment for time-critical needs. Customers pay only standard product price, rush freight charges, & modest emergency service fee. Place these orders through the Customer Satisfaction Team during regular business hours. For after-hours, contact:

- After hours 314-995-1342

C³ – the Enhanced, Online Cooper Customer Center Provides real time product availability, net pricing, order status & shipment tracking across six Cooper divisions: B-Line, Bussmann, Crouse-Hinds, Lighting, Power Systems & Wiring Devices. Call 877-995-5955 for log-in assistance. Available at:

- www.cooperc3.com

Application Engineering

Technical assistance is available to all customers. Application support is available Monday-Friday, 8:00 a.m. – 5:00 p.m. Central Time. Contact:

- Phone: 636-527-1270
- Fax: 636-527-1607
- E-mail: fusetech@cooperindustries.com

Online Resources

Visit www.cooperbussmann.com for the following resources:

- Product search & cross-reference
- Product & technical materials
- Solutions centers for information on topical issues including arc-flash, selective coordination & short-circuit current rating
- Technical tools, like our arc-flash calculator
- Where to purchase Cooper Bussmann product

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St. Louis, MO 63178
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