

# Eaton's SPD Series

For integration into electrical distribution equipment



## Introduction

### Eaton's SPD Series surge protective devices

Eaton's SPD Series surge protective devices are the latest and most advanced UL® 1449 4th Edition certified surge protectors. Units are available integrated within Eaton electrical assemblies, including panelboards, switchboards, motor control centers, switchgear and bus plugs. Application of SPD Series units throughout a facility will ensure that equipment is protected with the safest and most reliable surge protective devices available.

SPD Series units are available in all common voltages and configurations, and also in a variety of surge current capacity ratings from 50 kA through 400 kA. Three feature package options are also available to choose from.

## Applications

### The increasing necessity for facility-wide surge protection

The ever-increasing use of microprocessors and other sensitive electronic equipment has increased the necessity for facility-wide surge protection. These sensitive electronic components are used within many pieces of equipment, including computers, programmable logic controllers, and other commonly used electrical and electronic equipment. Surges can wreak havoc on equipment, causing catastrophic failures, process interruptions and premature aging leading to failure. The application of surge protective devices (SPDs) can mitigate problems with sensitive electronic equipment, keeping the equipment and the related processes up and running reliably without disruption or damage due to surge-related events.

In addition to externally generated surge events, such as lightning and grid switching, equipment is also susceptible to damage by internally generated surges. In fact, the majority of surges are generated internally by commonly used items, such as fluorescent lighting ballasts, light dimmers, photocopiers, fax machines and variable frequency drives. This further reinforces the necessity for facility-wide surge protection applied at all stages of the electrical distribution system, from the electrical service entrance down to the single-phase loads.

## Standards and certifications

- UL 1449 4th Edition recognized component for the United States and Canada, covered by Underwriters Laboratories certification and follow-up service



## Features

- Uses thermally protected metal oxide varistor (MOV) technology
- 20 kA nominal discharge current (In) rating (maximum rating assigned by UL)
- 50 through 400 kA surge current capacity ratings
- Three feature package options
- 200 kA short-circuit current rating (SCCR)
- Available integrated within the following Eaton electrical assemblies: panelboards, switchboards, motor control centers, switchgear, automatic transfer switches and bus plugs
- Can be used for UL 96A compliance
- Can be used for NFPA 780 compliance
- Can be used for RoHS compliance
- 10-year warranty

The breadth of the SPD Series' features, options and configurations ensures that the correct unit is available for all electrical applications, including service entrances, distribution switchboards, panelboards and point-of-use applications.



Powering Business Worldwide

### The SPD Series makes surge suppression safer than ever

The SPD Series employs safety and design features that make surge protection safer than ever. Unlike many surge protective devices, the SPD Series contains no user-serviceable parts or items that require periodic maintenance, such as replaceable surge modules, replaceable fuses, surge counter memory backup batteries or wire lugs that require periodic retightening. Integrated versions of the unit are factory installed, meaning no potential contact with harmful voltages present within the unit is possible.

The SPD Series has also taken safety to the next level by using thermally protected metal oxide varistors (MOVs) as its core surge suppression component. These thermally protected MOVs operate in a safe manner, even when subjected to abnormal conditions, such as temporary overvoltages or high fault current conditions. When one of these conditions exists, the thermally protected MOVs are removed from the circuit quickly and safely before a potentially unsafe condition can occur, with absolutely no discharge of smoke or ionized gases. Usage of this technology eliminates any concerns of damage occurring to other components within the electrical assembly should failure of an integrated SPD occur. Using the latest in technology and surge protective device design, the SPD Series provides safe, reliable, worry-free surge protection.

### The integrated SPD performance advantage

Installation conductor length is the single most important factor related to an SPD's performance. Performance decreases as the connected conductor length increases. Integrating the SPD within the electrical assembly provides the best possible surge protection by keeping installation conductor lead lengths as short as possible. Integrating the SPD within an electrical assembly can decrease let-through voltages by hundreds of volts, providing you with the best possible surge protection for sensitive electronic loads.

The SPD Series is available as an integrated device within the following Eaton electrical assemblies:

- Panelboards
- Switchboards
- Motor control centers
- Switchgear
- Automatic transfer switches
- Bus plugs

### Enhanced protection status indicators

The Eaton SPD Series has elevated the features normally found within surge protective devices to the next level. Unlike many surge protectors that may have only single-colored indicators that simply indicate whether power is applied to the surge protective device, each SPD Series unit includes dual-colored protection status light emitting diodes (LEDs) that indicate the true status of the protection. On three-phase units, if power is removed from a phase, the unit's protection status LEDs continue to indicate the status of the protection on that phase, not the status of the power applied to the phase. This new feature ensures that the user is supplied with accurate information concerning the status of the protection the SPD is supplying on the phase, not the status of the power applied to the phase.

All units that require a neutral wire connection also contain an additional set of dual-colored LEDs that report the status of the protection in the neutral-ground (N-G) protection mode. Like the phase protection status LEDs, the N-G protection status LEDs also report the true status of the protection in the N-G mode.

Although most SPDs on the market contain N-G mode protection, they do not monitor and indicate the status of the protection in that mode. Specifying the SPD Series' N-G protection mode status indication feature will ensure that users are supplied with complete and accurate information concerning the surge protective device's protection status.

### 20 kA nominal discharge current rating ( $I_n$ )

The entire SPD Series product offering has a nominal discharge current ( $I_n$ ) of 20 kA, the highest achievable rating for this important parameter. This is a new rating for SPDs that is included as part of UL 1449 4th Edition testing and certification. This rating provides an indication of the SPD's design robustness and ability to handle a number of large-magnitude surges over a short period of time and remain operational within tested parameters.

During  $I_n$  testing, the SPD is subjected to 15 surges of a current magnitude chosen by the SPD's manufacturer. Valid current magnitude choices for the test are 20 kA and 10 kA for Type 1 SPDs. Valid choices for Type 2 SPDs are 20 kA, 10 kA, 5 kA and 3 kA. The 15 surges are then applied at the value chosen by the manufacturer.

Prior to the start of  $I_n$  testing, a preliminary voltage protection rating (VPR) is measured. The VPR is the measured let-through voltage of the unit when a 6 kV, 3 kA surge is applied. This value is documented and saved as a reference. After all surges have been applied, the VPR is measured once again and compared to the value that was recorded prior to the 15-surge sequence. In order to pass the  $I_n$  test, the SPD must survive all 15 surges, and the measured pre- and post-VPR values must be within  $\pm 10\%$  of each other.

Choosing an SPD with an  $I_n$  of 20 kA ensures that your equipment is being protected by a unit that will continue to maintain a high level of surge protection performance, even after being subjected to multiple high-magnitude surges.

Industry standards for lightning protection systems require the installed SPDs to have a nominal discharge current of 20 kA. The 2008 Edition of National Fire Protection Agency (NFPA®) Standard 780, titled "Standard for the Installation of Lightning Protection Systems," states the requirement in Section 4.18.3.1.2. The 2007 Edition of Underwriters Laboratories (UL) Standard 96A, titled "Installation Requirements for Lightning Protection Systems," states the requirement in Section 13.1. Choosing an SPD with an  $I_n$  of 20 kA will ensure that compliance with these standards can be achieved.

## SPD Series unit



SPD Series unit integrated within an Eaton panelboard.



In this installation, the SPD Series is mounted directly to the panelboard's bus bars. This type of installation will provide the best possible surge protection by minimizing the connected lead length.



The SPD Series is also available as an integrated unit interfaced via a circuit breaker resident in the electrical assembly. This installation keeps connected lead lengths short while providing a means of disconnecting power to the unit quickly and easily.

## Feature package options

The SPD Series provides users with the option of selecting between three feature packages. These feature packages are the basic, standard and standard with surge counter. The proper feature package can be selected based on the requirements of the application or specification.

### Basic feature package

The basic feature package is perfect for applications where basic, cost-effective, safe and reliable surge protection is required but budgets don't allow for extra, additional features. Rather than sacrifice performance or safety due to cost, SPD Series units with the basic feature package provide you with high-performing surge protection without sacrificing safety or reliability. The basic feature package provides the same level of surge protection and safety provided by the standard and standard with surge counter feature packages minus some of the features found in them.

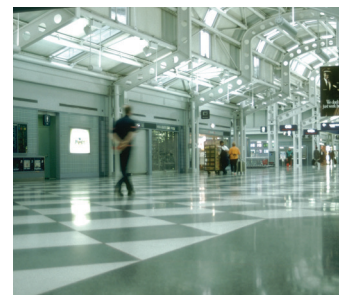
The package contains dual-colored protection status LEDs that report the true status of the protection in each phase/mode. All four-wire plus ground units also contain an additional set of dual-colored protection status LEDs that report the status of the protection in the N-G mode.

### Standard feature package

The standard feature package includes all of the features found in the basic feature package, plus an audible alarm with silence button, EMI/RFI filtering, and a Form C relay contact that can be used for remote annunciation of the SPD's status. The audible alarm activates, and the Form C relay contact changes state when any loss of protection is detected or a fault condition exists with the unit. Should such a condition occur, the audible alarm can be silenced by pressing the silence button. The EMI/RFI filter provides up to 50 dB of noise attenuation over the range of 10 kHz through 100 MHz.

### Standard with surge counter feature package

The standard with surge counter feature package includes all of the features found in the standard feature package plus a six-digit surge counter with a reset button. The surge counter indicates the ongoing count of the number of surges the unit has been exposed to and stores them in nonvolatile memory. Should power to the SPD Series unit be completely interrupted, the surge counter will recall and display the surge count prior to the interruption when power is restored. Unlike many surge protectors, the SPD Series' surge counter memory feature does not require a backup battery that would require periodic replacement in order to achieve its memory functionality.



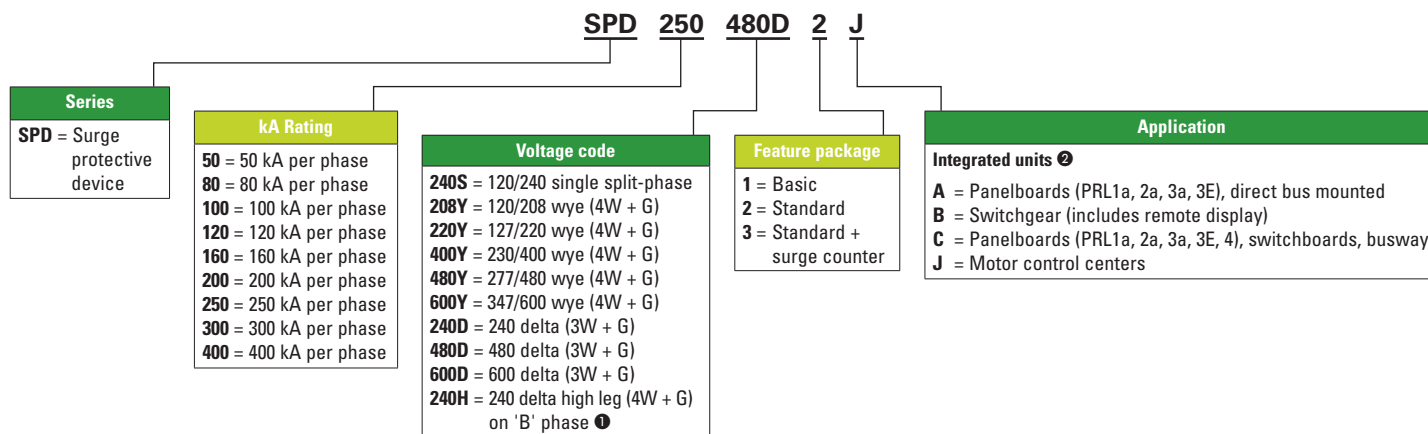
## Side-by-side comparison of the SPD Series' available feature packages

Feature package comparison	Basic	Standard	Standard with surge counter
Surge protection using thermally protected MOV technology	■	■	■
Dual-colored protection status indicators for each phase	■	■	■
Dual-colored protection status indicators for the N-G protection mode	■	■	■
Audible alarm with silence button		■	■
Form C relay contact		■	■
EMI/RFI filtering, providing up to 50 dB of noise attenuation from 10 kHz to 100 MHz		■	■
Surge counter with reset button			■

## Specifications

Description	Ratings
Surge current capacity per phase	50, 80, 100, 120, 160, 200, 250, 300 and 400 kA ratings available
Nominal discharge current ( $I_n$ )	20 kA
Short-circuit current rating (SCCR)	200 kA
SPD type	Basic feature package = Type 1 (can also be used in Type 2 applications) Standard and standard with surge counter feature packages = Type 2
System voltages available (Vac)	
Single split-phase (three-wire plus ground)	120/240
Three-phase wye (four-wire plus ground)	120/208, 127/220, 230/400, 277/480, 347/600
Three-phase delta (three-wire plus ground)	240, 480, 600
Three-phase high leg delta (four-wire plus ground)	120/240
Input power frequency	50/60 Hz
Protection modes	
Single split-phase	L-N, L-G, L-L, N-G
Three-phase wye	L-N, L-G, L-L, N-G
Three-phase delta	L-G, L-L
Three-phase high leg delta	L-N, L-G, L-L, N-G
Operating temperature	−40 °F to +122 °F (−40 °C to +50 °C)
Operating humidity	5% through 95%, noncondensing
Agency certifications and approvals	UL 1449 4th Edition recognized component for the United States and Canada UL 1283 7th Edition (Type 2 SPDs only)
Warranty	10 years

## SPD Series catalog number configuration for units integrated into electrical distribution equipment



**Example:** SPD250480D2J = SPD Series, 250 kA per phase, 480D voltage, standard feature package, motor control center application

❶ Please consult the factory for 240 delta high leg (4W + G) applications with high leg on 'C' phase.

❷ Units used in PRL1a, 2a, 3a and 3E panelboard applications are available in 50–200 kA ratings only.  
Use the 'C' option for PRL1a, 2a, 3a and 3E panelboard applications when unit is connected through a circuit breaker.

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