

# Low Voltage Surge Protection Products

Australia and New Zealand



*Powering Business Worldwide*



# Low Voltage Surge Protection

## Understanding Surge Protection & its Applications

### Why do I need surge protection?

If a surge is of sufficient energy level then it can damage or destroy electrical equipment or even the electrical infrastructure itself. Direct & indirect costs to a business can be very expensive. A surge protection device is in real terms very in- expensive & when correctly selected & installed can prevent damage occurring.

### What is a surge?

A surge is a random, short burst of excess electrical energy to a system. It is typically measured in micro & milli-seconds. Also referred to as a transient, impulse or spike, these electrical disturbances can damage or even destroy sensitive microprocessor-based equipment. Surge protection devices are designed to reduce the amount of harmful energy that flows into a system.

### Where do they come from?

80% of transients are generated from internal sources such as load switching, motors starting up or even turning on air conditioning systems. The other 20% of transients are typically generated from external sources such as lightning strikes & power company grid switching. Like it or not, most electrical systems are subjected to some level of transients.

### What is SPD?

Referred to as Surge Protection Device (SPD). They are defined as: "A device designed to protect electrical equipment from power surges & voltage spikes."

### Are there any standards that apply?

For many years now there have been internationally recognised standards for surge & lightning risk assessment & protection. Research & standards committees publish many standards relating to surge risk & immunity. These standards however differ from one geography to another. Of importance is that there are two basic low voltage standards in the world. In the U.S. it is 120Vac, 60Hz. ( half the voltage & twice the current ). In Europe, Australasia & parts of Asia it is 220-240Vac, 50Hz. ( twice the voltage, half the current ). It is important to recognise that there are differing methodologies & compliance regulations for both systems. There are similarities between the US & European standards, but at key points the standards become mutually exclusive.

### So what standards do I use?

Our electrical infrastructure in Australia has been developed based on European standards. It is therefore appropriate to use the European standards as our guide. There are many surge standards that can be followed. Most AS/NZS standards

have great similarity to the IEC standards. There are several levels of standards that can apply to any solution. It is important to understand that there is a hierarchy of standards. At the highest level there are the Low Voltage Framework Directives. Below this are Lightning & Surge Risk Assessment standards. Below this again are TVSS & SPD equipment standards & within these are test & waveform standards. All these standards need to be used in conjunction with local electrical switchboard & wiring codes. Some of the standards that apply & are often mentioned are:

- IEC LV Framework
- ANSI / IEEE C62.41 Waveform, test & current standards & limits.
- AS/NZS1768 Lightning & Surge Protection - Risk assessment.
- IEC61643, UL1449 Equipment standards
- IEC 61006-1,2,3,4 EMI/RFI generation & immunity

And that's not all of them. There's a lot to understand.

Some standards overlap, it is easy to confuse them & apply an in appropriate standard. Understanding the standards is key to success.

### System design

System design is not as difficult as it seems. As long as the basic principles of applicable standards are applied then the job at hand is to:

1. Divert the incoming excess energy at the point-of-entry. (Stop it BEFORE it gets into the system. It's cheaper & easier to deal with it at the point of entry).

2. Control current flow to the next zone.

Do it again!

1. Divert excess residual energy.

2. Control current flow to the next zone.

It's that simple. However, understanding what the correct risk rating is, what needs to be protected vs. what does not, what product to use & how to correctly install it for full

performance benefit can be difficult. By following the next few pages we make it easier to identify risk, classify protection zones & identify suitable products.

#### What are the rules for installation?

One of the key issues often overlooked is the correct placement & installation practice that should be applied. Each site is different. There is no single definitive design that can be applied across the board for all surge protection situations. It very much depends on the specific site infrastructure. There are however, some basic rules that should be practiced to ensure that a solution will work effectively. Whilst not comprehensive, the following are guidelines for successful installation.

#### Physical & electrical location.

Location, Location, Location. It's a familiar line but very true. Getting the location of an SPD right is paramount to success. It should be located as close as possible to Main Switch or metering point – within Main SWB if possible. The earthing point for the SPD (for Main SWBs) must be located within a short distance. The main earthing point is where you want the excess energy to end up being safely dissipated.

#### Safety disconnectors.

It is preferred to use HRC Gg/GI fuses, not CBs. HRC fuses perform better than CB's which are not designed for surge waveforms & fast rising transients. For medium & high-current services (250-3000A), use the maximum fuse as recommended by the manufacturer. For low-current services (<250A), the fuse rating will limit surge capacity. For very low-current services (<80A), it may be necessary to rely on line fuses.

#### Cable length & type.

Cable length (inductance) is the biggest issue. Multiple, small cables are better than one large cable. Where permitted, busbars are much preferred as they provide the lowest impedance return path for the surge energy.

Wherever possible, keep the total connection length below 0.5m on any cable & always tie cables tightly together. Try to keep surge voltage drop to <1kV/cable. Don't loop extra cable! It only adds more inductance & reduces the surge withstand capacity of the circuit. EVERY millimetre counts.

#### Earthing.

The site earth must be as good as possible. This is where the excess energy will end up. Again, if possible, busbars should be used for runs <3m. Use a 'star' (or 'single-point') earthing system in all cases. Do not daisy-chain earth in a surge circuit. Daisy chaining earth simply allows the surge return path to be connected to the load with the potential to damage the load instead of being diverted to the main earth & safely dissipated AWAY FROM THE LOAD.

By following the above guidelines you will maximise your investment in a surge product. All products in this catalogue have been designed & tested to international standards by Eaton's SPD Engineering Division in laboratories in Australia & China. For more information including engineering support, white papers, specification advice & product support, contact your Eaton representative.

If a surge is of sufficient energy level then it can damage or destroy electrical equipment or even the electrical infrastructure itself.

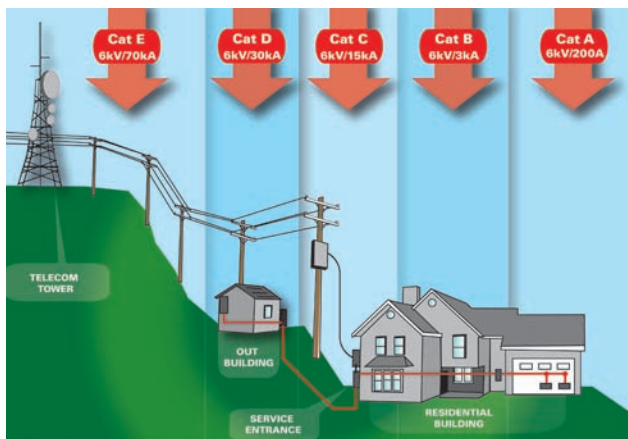


## Contents

Selecting Surge Protection Equipment	4	<b>Class II/Cat C &amp; B - Secondary Protection</b>	
<b>Class I/Cat D &amp; E - Direct Strike Protection</b>		ESF – 1 & 3 Phase 40-63A Surge Filter	25
SPDSG50-300 – Spark Gap Diverter	7	DSFI – 1 Phase High Performance Surge Filter	27
SPDSG50-255 – GDT Diverter	7	CSFI – Din Rail Compact Surge Filter	29
<b>Class II/Cat D &amp; C - Point of Entry Protection</b>		SPD50NGI – Neutral-Earth Surge Protector	31
PPFi – 3 Phase Premium Power Filter	9	<b>Class III/Cat A - Point of Use Protection</b>	
SPD3200 – 3 Phase Shunt Surge Diverter	13	PSFI – 1 Phase Surge Filter	34
SPDI – Din Rail Mounted Surge Diverters	15	SPD DM Series – 5-48V Low Voltage Diverters	36
SPDV60 & SPDT60 – Din Surge Diverters	18	SF8RM – Single Phase Rack Surge Filter	40
Quickmov – Integrated Surge Protection	20		
PVD40 Series – Photovoltaic Surge Diverters	22		

# Selecting Surge Protection Equipment

### Protection Categories



Eaton manufactures a complete range of power protection components. These components fall into a number of categories, depending upon where they are utilised in an electrical installation. The 3 main categories are, according to ANSI/IEEE C62.41 & AS/NZS1768-2007:

**Category A** (6kV/200A): Long final sub circuits & power outlets

**Category B** (6kV/3kA): Major sub mains & short final sub circuits

**Category C** (6kV/15kA): Point of entry

In addition to these categories, there are 2 more categories which simply extend the Category C rating:

**Category D** (6kV/30kA): Point of entry, high exposure

**Category E** (6kV/70kA): Point of entry, very high exposure & critical load

Equipment listed in this catalogue is referenced by category to make the selection of correct components easier.

### Selecting Surge Protection Equipment for Commercial & Industrial Applications

#### High risk direct strike or point of entry. Class I/Cat D & E

For very high risk installations it is recommended that Class I type SPD's are used. Such devices are commonly referred to as "Spark gap arresters". For this situation the SPDSG50-300 should be used for L-N and L-E modes and the SPDSG50-255NPE should be used for N-E mode.

#### Point of Entry – Class II/Category C

Basically, all installations should at least be protected at the point of entry. The starting point for protection is the surge diverter. Surge diverters effectively clamp the incoming lines to neutral or earth, protecting switchboards, contactors,

transformers & motors from burnout due to extreme voltages. A properly installed surge diverter can limit surges to below 2000V.

If the main load in an installation is critical of high voltages (computers, communications systems, test equipment etc.), or generates electrical noise (variable speed motor drives, high-frequency welders etc.), a Surge/Power Filter (PPFI) should be used. In an PPFI, surge diverters are utilised in conjunction with low-pass filtering to reduce the surge voltage & remove noise. In normal operation, an PPFI can be expected to reduce surge potentials to less than 1000V whilst providing up to 70dB of noise attenuation.

#### Method

Firstly determine whether or not you require filtering or just surge diversion. If selecting a surge diverter, select a device appropriate for the protection category. The SPD3200 & SPDI are suitable for category C & B locations. Quickmov surge diverters can also be used in these locations for protection of Quicklag & DIN panelboards.

If the site requires filtering at the point of entry, select an PPFI with the appropriate current rating for the load, then select the model appropriate for the protection category.

For DC solar panel arrays with Grid Interactive inverters it is recommended that Cat C / Class II, DC type SPD's are used. For this situation the PVD40 series Photo Voltaic Diverters in 500, 600 and 1000vdc versions be used.

#### Minor sub mains & short final sub circuits – Class II/Category B

Once past the main board, most protection involves both surge diversion & filtering. Non-critical loads such as lighting & general-purpose power circuits do not necessarily require protection.

#### Method

For large 3-phase loads such as mainframe computers or computer-controlled machinery, select an PPFI appropriate for the load. In this case the protection level required is usually taken as 'one step' below the protection level applied to the point of entry. For single-phase loads up to 63A, the DSFI & ESFI filter ranges are suitable (for current < 25A, the CSFI filter also provides installation compatibility with modular switchboards). Generally, filters should be mounted as close as possible to the equipment being protected.

### Long Final Sub circuits & Power Outlets - Class III/Category A

When protecting final sub circuits & power points there are 2 options. Either fit hard-wired filters to the circuit or use plug-in filters on the equipment to be protected. This choice will be determined by the load (plug-in filters are only rated up to 6A), & whether or not there is space for a plug-in filter adjacent to the equipment. With large computer networks, many administrators prefer not to use plug-in filters as they can be accidentally unplugged by the operator's foot, causing network problems. For small servers however, a plug-in filter provides extra protection at the computer for 'insurance'.

#### Method

Firstly select whether a hard-wired or plug-in filter is to be used. If selecting a hard-wired filter, the DSFI range is suitable for currents up to 32A (for currents < 25A, the CSFI filter also provides installation compatibility with modular switchboards). For plug-in filters, the PSFI series provides high levels of protection with good filtering.

### Selecting Surge Protection Equipment for Domestic & Home-office Applications

#### Point of Entry – Class II/Cat C, B

As with commercial & industrial applications, all installations should at least be protected at the point of entry. Again, this usually involves the use of surge diverters. Surge diverters effectively clamp the incoming lines to neutral or earth, protecting the switchboard & wiring from damage due to extreme voltages.

Surge diverters are a 'must' if the building is located in an exposed position or fed by long aerial cables, as in rural installations. If the building is part of a medium or high-density development & is fed by an underground cable, the risk of high-energy surges is quite low. In these cases, a surge diverter may not be necessary.

In most domestic buildings, the main switchboard is the only switchboard & therefore, if it is desired to provide filtered power for critical applications such as computers, office equipment or entertainment systems, this should be done on the main switchboard. Few domestic applications use 3-phase power & those that do usually only use it for heating or air-conditioning. For this reason, only the phase supplying power to critical equipment is actually filtered. The remaining phases are simply fitted with shunt diverters.

#### Method

Firstly determine whether or not you require filtering or just surge diversion. If selecting a shunt diverter, select a device appropriate for the installation. The SPD360Ni, SPD360Gi, SPDV60 & SPDT60 are suitable for single & multi-phase installations whilst the SPD150i is ideal for very exposed sites (on hilltops or with long aerial cables).

If the site requires filtering at the point of entry, select a DSFI filter with the appropriate current rating for the load. The DSFI filter is rated at 5-32A (for current < 25A, the CSFI filter also provides installation compatibility with modular switchboards).

#### Final Sub circuits & Power Outlets – Class III/Cat A

When protecting final sub circuits & power points there are 2 options. Either fit hard-wired filters to the circuit or use plug-in filters on the equipment to be protected. This choice will be determined by the load (plug-in filters are only rated up to 10A), & whether or not there is space for a plug-in filter adjacent to the equipment. Generally, a plug-in filter, used in conjunction with protection at the switchboard, gives the best protection.

#### Method

Firstly select whether a hard-wired or plug-in filter is to be used.

If selecting a hard-wired filter, the DSFI is suitable for currents from 5 to 32A (for currents < 25A, the CSFI filter also provides installation compatibility with modular switchboards).

For plug-in filters, the PSFI provides high levels of protection with good filtering.

Note: cable systems are electrically referred to mains neutral which only increases the potential of damage from electrical faults. If high levels of filtering are required such as for home automation or high-end audio visual, or other noise-critical equipment, the sub circuits supplying these systems should be protected at the switchboard by a high level device such as the CSFI.

# Direct Strike Protection

Class I/Category D & E (6kV/30kA)



# Eaton® SPDSG Series



## Shunt Surge Diverter 3 Phase, 100-400A, 80-240kA

The new SPDSG series diverters are designed as IEC 61643-1, Class I, direct strike, surge diverters to protect high risk installations. Typically known as spark gap devices, these diverters use the latest technology

multiple gap element design to ensure accurate triggering & with no follow current. There are 2 models to choose from. The SPDSG50-300 is suitable for connection across L-N or L-E. The SPDSG50-255NPE is suitable for connection in common mode across N – E. Each have been tested to the stringent requirements of 10/350us waveform standard , commonly known as I imp, & exhibit exceptionally low let through voltage of less than 2.5kV at 50kA.

### Specifications

- 1 mode protection. N-E, L-E or L-N
- 50kA surge suppression rating
- Compact modular solution
- 2 unit DIN43880 case, 36mm DIN-rail mount

### Applications

- Direct strike point of entry locations.

Technical Specifications	SPDSG50-300	SPDSG50-255NPE
Technology	Encapsulated Spark Gap	Encapsulated Gas Arrester
Method of mounting	35mm Din rail	35mm Din rail
Input voltage (Un)	230vac nominal	230vac nominal
Max Continuous Voltage (Mcov)	300vac	255vac
Test classification IEC	Class I	Class I
Maximum rated surge current – (I imp) 10/350us	50kA	50kA
Max rated surge current – (Imax) 8/20us	140kA	140kA
Residual voltage (Vpl)	<2.5KV	<2.5KV
Leakage current	None	None
Response time	<100ns	<100ns
External disconnecter max	160A gL	None
Terminations	35mm multi-strand	35mm multi-strand
Insulation resistance	> 103 M Ohm	> 103 M Ohm
Enclosure material	Thermo plastic. UL94-V0	Thermo plastic. UL94-V0
Enclosure rating	IP20	IP20
Applicable standards.	IEC61643-1:2001	IEC61643-1:2001
Dimensions	35mm (W) x 100mm (H) x 77mm (D)	35mm (W) x 100mm (H) x 77mm (D)
Weight	200 grams	200 grams
Environment	-40c to +80c	-40c to +80c
Warranty	5 years	5 years

Note: Specifications are subject to change without notice.

# Point of Entry Protection

Class II/Category C (6kV/15kA)





## Eaton® PPFi



### Series Power & Noise Filter with Shunt Surge Diverter 3 Phase, 100-400A, 80-240kA

#### Applications

- All Power Circuits including "Point-of-Entry"
- Telecommunications Systems & Rectifiers
- Process & Control Systems & UPS Systems
- Computer Systems & Medical Systems
- AV circuits for clubs & hotels
- All sensitive Electronic Equipment

#### Key Features

- Surge suppression & filtering in a single package
- Standard Current ratings from 100A to 400A
- 1 mode, Multi-Element Series Filter
- 2 mode, 3 stage Surge Diverter
- Surge suppression ratings from 80kA to 240kA
- Provides extensive high frequency & RF filtering
- Incorporates a EN certified EMI/RFI filter
- Panel-mounted mimic display
- Protection Fail Alarm Relay
- Enclosed in IP24 painted steel cabinet
- 5 Year Warranty

#### Options

- Custom configurations
- Isolation switches & circuit breakers
- Custom cabinets
- Chassis Mount versions

The PPFi is designed to provide point-of-entry (Category C) & sub-circuit protection (Category B) against power surges caused by external sources such as lightning strikes & substation switching as well as providing a measure of protection from surge events generated on the secondary side of the filter. An ideal device for all Category locations.

The PPFi is a 3-stage protection system utilising primary & secondary MOV protection in conjunction with a Low-Q LC filter. The unit provides filtering of the line harmonics, noise & RF transmitters with a cut-off frequency of <10kHz & a minimum attenuation of 70dB above 1MHz. Special care has been taken in the design of the filter to minimise ringing caused by light loads, surge diverter operation & inductive load back-EMF.

All models in the PPFi Series are fully enclosed in wall mounting IP24 steel enclosures. A graphical mimic display provides at-a-glance indication of the status of the PPFi with indicators showing correct functions in green & faults in red. The alarm function provides a summary alarm output for protection failure & power failure.



## Class II/Cat C & D - 3 Phase Premium Power Filter

# Eaton® PPFi

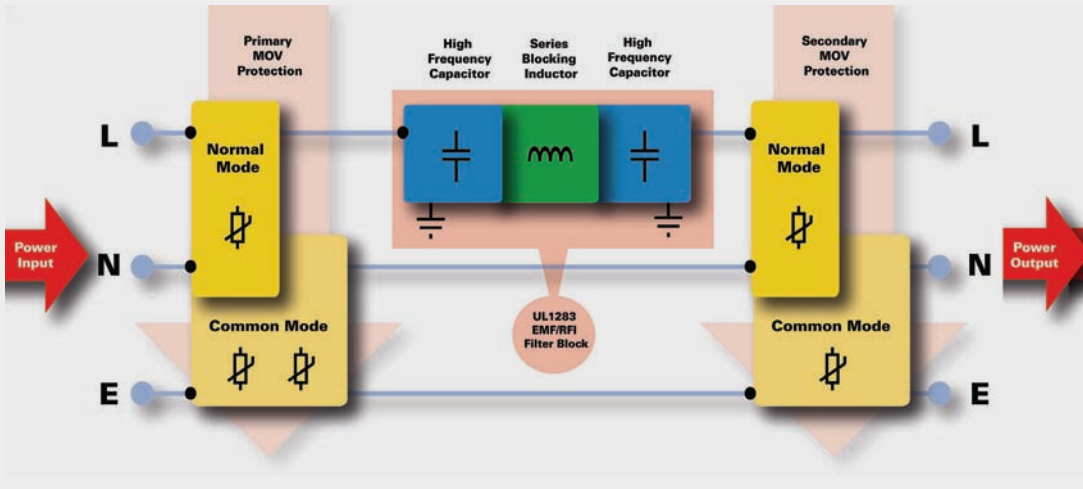
Technical Specifications	PPFXXX3CEi	PPFXXX3DEi	PPFXXX3EEi
Input voltage	380 - 440VAC 3 Phase		
Maximum continuous voltage – MCOV	300VAC L-N		
Temporary overvoltage - TOV	320VAC, 15 mins		
Service type	TT, TN, TN C-S or any 3-phase system with a grounded neutral. This unit must not be connected to an ungrounded system		
Test classification	Class II		
Energy Absorption rating - per mode (Joules)			
Primary protection L-N:	1,200J/ph, 3,600J total.	1,800J/ph, 5400J total.	3,600J/ph, 10,800J total.
Secondary protection L-N:	600J/ph, 1,600J total.	600J/ph, 1800J total.	600J/ph, 1,800J total.
Common mode protection N-E:	2,130J.	710J.	710J.
Aggregate rating:	7,530J.	7,910J.	13,310J.
Current rating – continuous (standard models)	100A, 160A, 200A, 300A, 400A		
Recommended maximum over current protection	100A, 160A, 200A, 300A, 400A		
Residual current	<1 mA		
Short circuit withstand (1 sec)	29kA		
Protection modes	Line-Neutral, Neutral-Earth	Line-Neutral, Neutral-Earth	Line-Neutral, Neutral-Earth
In 8/20us (Line-Neutral) Nominal Surge Life	30kA x 20 hits/ph	45kA x 20 hits/ph	90kA x 20 hits/ph
In 8/20us (Neutral-Earth) Nominal Surge Life	45kA x 20 hits	45kA x 20 hits	45kA x 20 hits
Ismax 8/20us (Line-Neutral) Max surge level	80kA	120kA	240kA
Ismax 8/20us (Neutral-Earth) Max surge level	120kA	40kA	40kA
Filter attenuation	70dB nominal above 1MHz		
Initial clamp voltage (Line-Neutral)	560V (350Vac RMS)		
Initial clamp voltage (Line-Earth)	1240V (700Vac RMS)		
Initial clamp voltage (Neutral-Earth)	680V (420Vac RMS)		
Residual voltage (Vpl) Line-Neutral	<900Vac (3kA, 8/20uS) IEC61643.1		
Residual voltage (Vpl) Line-Earth	<1100Vac (3kA, 8/20uS) IEC61643.1		
Residual voltage (Vpl) Neutral-Earth	<1000Vac (3kA, 8/20uS) IEC61643.1		
Internal protection (fusing)	All surge diverter connections are fused via HRC fuses to IEC269-2-1		
Terminations	Bolted lug. 8mm bolts for phase & neutral connections. 8mm PE (earth) stud provided on geartray.		
Alarms/indicators	Mimic panel display via LED (2 colour), OK - Green; Protection Fault - Red. Dry contact alarm relay output – 250Vac/32Vdc, 10A, 4kV isolation, Alarm under-voltage cutoff 180Vac.		
Enclosure rating	IP24		
Design standards:	IEC61643-1, IEC610006-1,2,3,4 ANSI/IEEE C62.41 Cat B,C,D AS1768-2007 Cat B,C,D,E AS3000, AS3100, CE mark		
Dimensions	600 x 200 x 800 mm (W x D x H) = 100A to 200A 800 x 400 x 1000 mm (W x D x H) = 300A & 400A		
Weight	100A & 160A = 50 kg, 200A = 60 kg, 300A & 400A = 75 kg		
Environment	-10 to 65°C, 10 to 90%RH (non-condensing)		

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# Eaton® PPFi

## PPFXXX3CEi Block Diagram

1 Mode Multi-Element Series Filter - 2 Mode 2 Stage Surge Diverter



### Surge Category

The PPFi is suitable for use in all category locations:

#### Class II/Cat D

(6kV/30kA) Point of Entry, High Exposure

#### Class II/Cat C

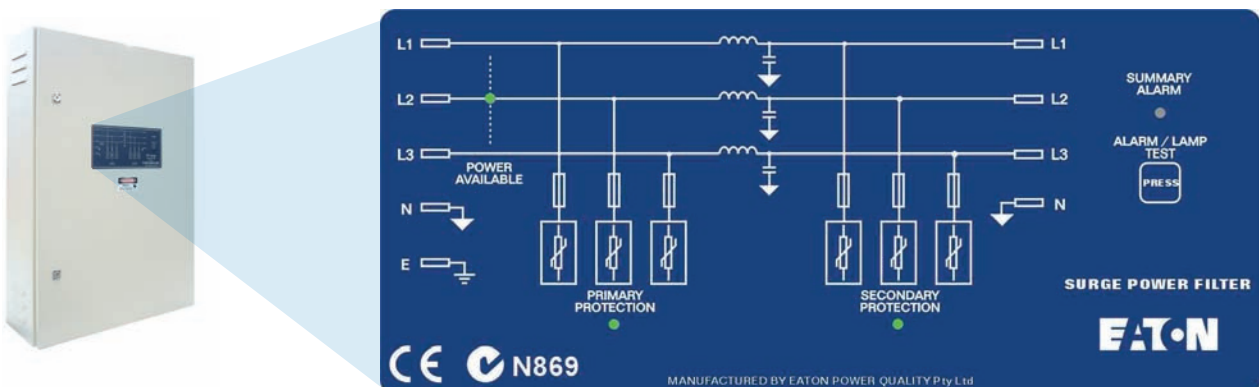
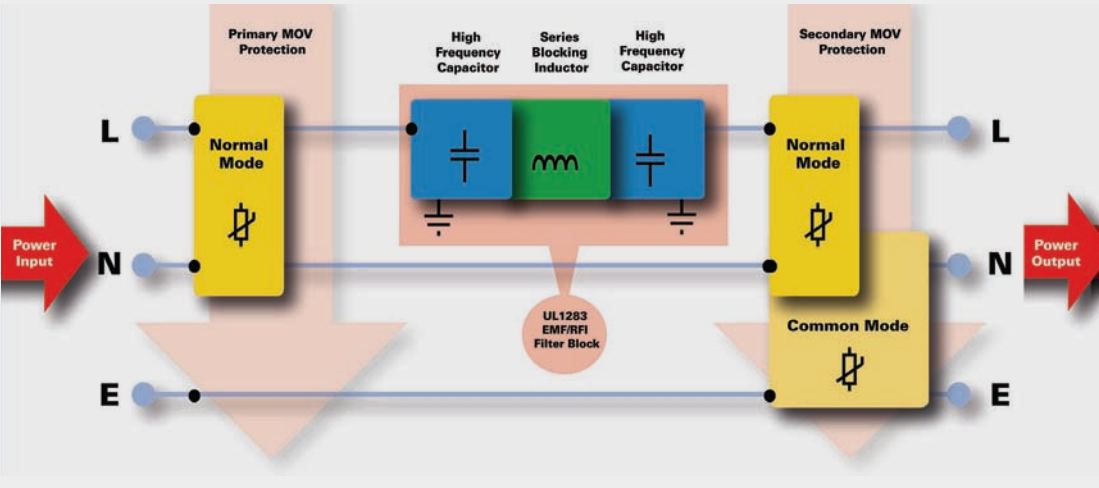
(6kV/15kA) Point of Entry/ Service Entrance

#### Class II/Cat B (Special Applications)

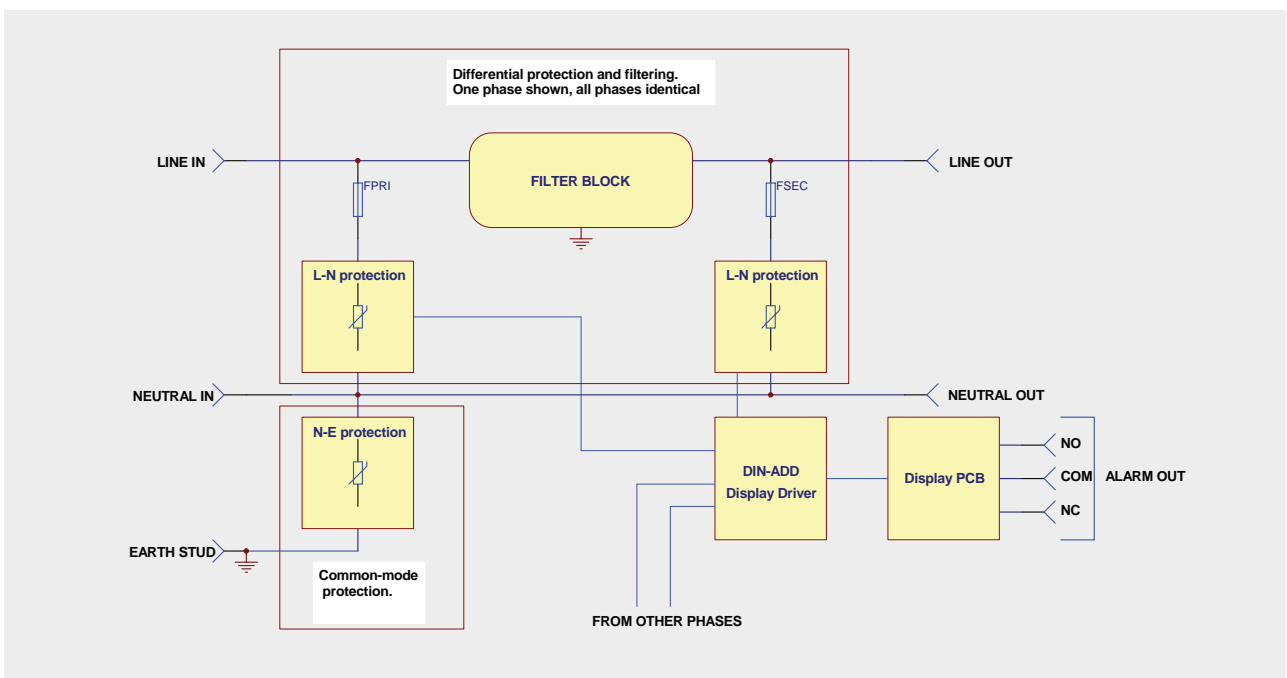
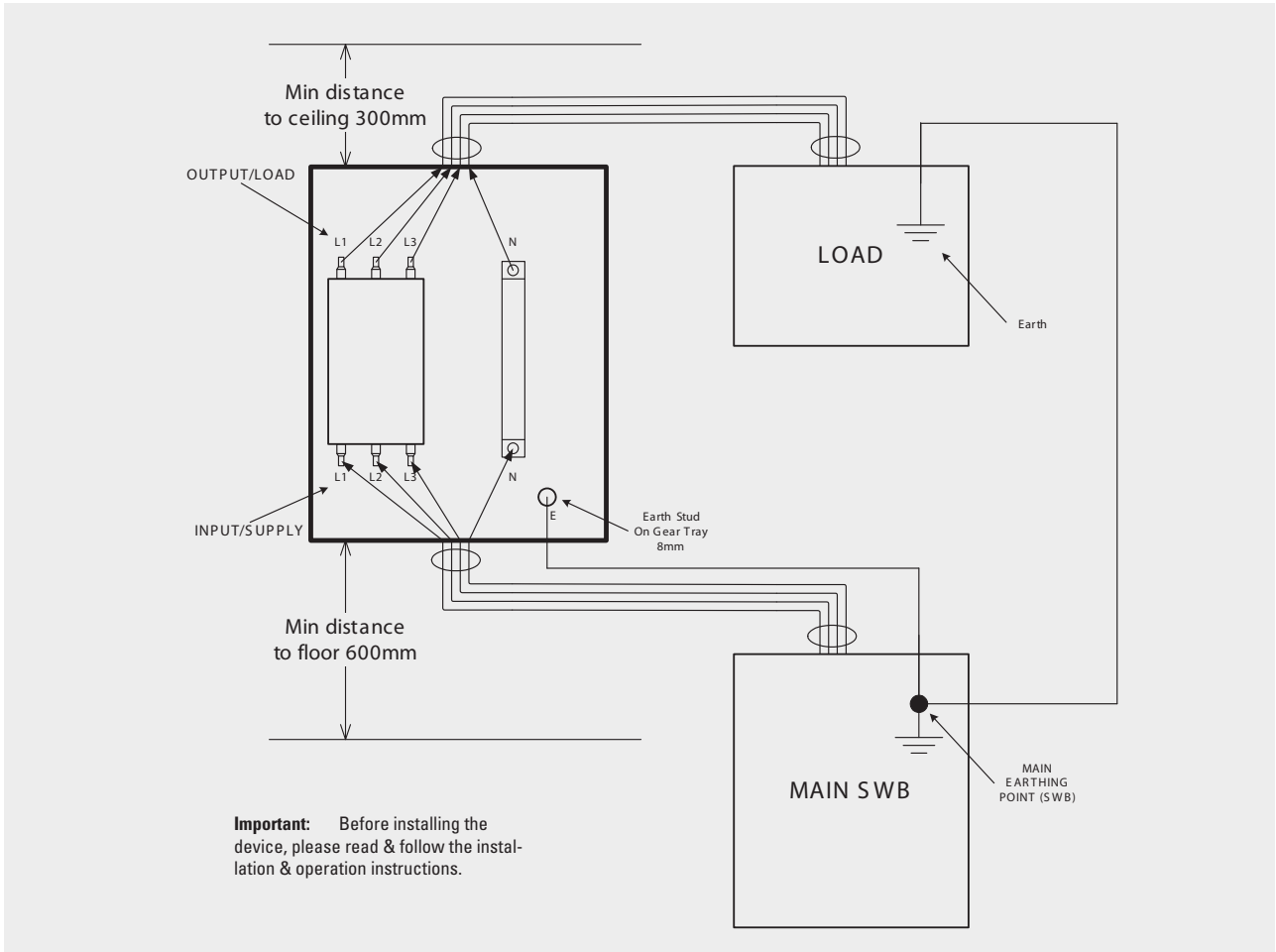
(6kV/3kA) Major sub mains & short final sub circuits

## PPFXXX3DEi & PPFXXX3EEi Block Diagram

1 Mode Multi-Element Series Filter - 2 Mode 2 Stage Surge Diverter



# Eaton® PPFi



# Eaton® SPD3200



### Key Features

- 3 Mode, 2 Stage Surge Diverter
- Surge suppression rating of 200kA
- Internal MCB safety disconnect
- Enclosed in IP24 cabinet
- LED indication of Power On and MOV operational status
- Surge counter
- Protection Fail Alarm Relay
- 5 Year Warranty

The SPD3200-TN-E is designed to protect three phase power systems against damage from surges and spikes caused by lightning and other electrical sources. The unit is intended for point of entry or main board protection with an M.E.N. connection and is connected in parallel with the power system via its own integrated safety disconnect MCB.

### Shunt Surge Diverter, 3 Phase 200kA

#### Typical applications

- All Power Circuits including "Point-of-Entry"
- Telecommunications Systems & Rectifiers
- Computer & Medical Systems
- Multi-storey buildings
- All sensitive Electronic Equipment

Differential and common mode transients are diverted to mains earth via internally mounted surge diverters through a common earth bus. All internal connections are designed for minimum impedance to enable maximum current flow back to earth.

The operation status of the SPD3200-TN-E is indicated by blue indicators on the front panel and an LCD surge counter that records the number of L-E surges.

### Surge Category

The SPD3200-TN-E is suitable for use in category locations:

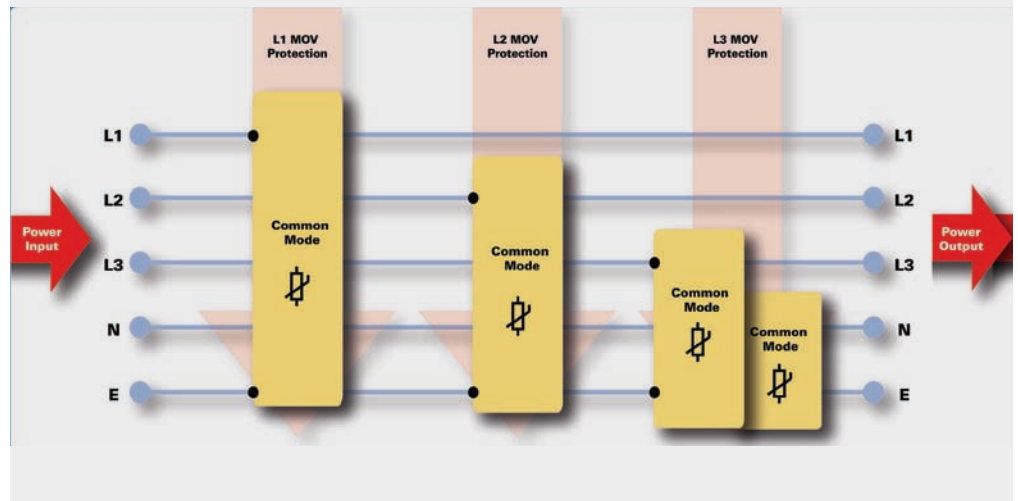
#### Class II/Cat D

(6kV/30KA) Point of Entry, High Exposure

#### Class II/Cat C

(6kV/15kA) Point of Entry/ Service Entrance

### SPD3200-TN-E Block Diagram 2 mode 1 stage surge diverter



# Eaton® SPD3200

Technical Specifications	SPD3200-TN-E
Input voltage	200 - 250VAC (380 - 440VAC 3 Phase)
Maximum continuous voltage (MCOV)	300VAC L-E
Temporary overvoltage - TOV	350VAC L-E, 15 mins
Service type	TN, TN C-S or any 3-phase system with a grounded neutral
Recommended max. overcurrent protection	63A GL HRC fuse
Protection modes	Line-Earth, Neutral-Earth
In 8/20us (Line-Earth) Nom. surge level	200kA
In 8/20us (Neutral-Earth) Nom. surge level	100kA
Residual Voltage (VPL) L-E	<1kV (3kA 8/20us), <1.3kV (20kA 8/20us)
Internal protection	63A MCB safety disconnect and internal thermal fusing on MOV modules
Alarms/indicators	LEDs to indicate power available and MOVs functioning
Enclosure rating	IP50
Design Standards:	IEC61643-1, IEC610006-1,2,3,4 ANSI/IEEE C62.41 Cat B,C,D,E AS1768-2007 Cat B,C,D,E AS3000, AS3100, CE mark
Dimensions & Weight	370 x 160 x 560 mm (W x D x H), 14kg
Environment	-10 to 65°C, 10 to 90%RH (non-condensing)

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## Eaton® SPDI Series



### Key Features:

- Surge ratings starting from 60kA up to 150kA (8/20uS)
- DIN43880 profile IP20 enclosure allows compatibility with most common switchboards
- Versatile mounting clips offer the option of DIN rail or surface mount with ease
- Clear & concise protection status indicators & a dry-contact alarm
- Extended voltage range to suit most common power distribution systems

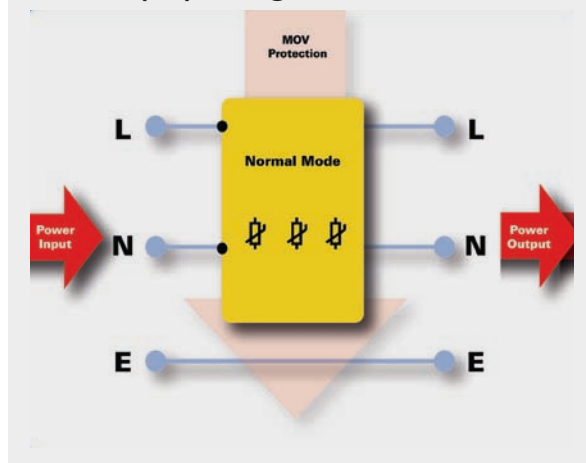
### Shunt Surge Diverter, 1 & 3 Phase, 60kA & 150kA

Eaton's SPDI surge diverters provide the ultimate solution for surge protection in single & multi-phase systems. Whether the application involves residential homes, telecommunication facilities, hospitals, schools or heavy industrial plants, the SPDI surge diverters provide protection against the damaging effects of lightning, utility switching, switching electric motors & more. SPDI surge diverters can be installed as point-of-entry or sub-board protection & are connected in parallel with the power circuit via separate protection HRC fuses. These devices are ideal for Category C & B locations.



Class I/Cat D

### SPD150i Block Diagram 1 Mode (LN) 1 Stage Diverter



The SPD150i is designed to protect single-phase power systems against surges & spikes caused by lightning strikes & other electrical sources. The unit is intended for point-of-entry or main board protection in medium to high exposed locations. SPD150i are easily configured for L-N or L-E protection for installations adjacent or remote from the M.E.N. link, which means it can provide protection for commercial buildings to rural sites.

# Eaton® SPDI Series



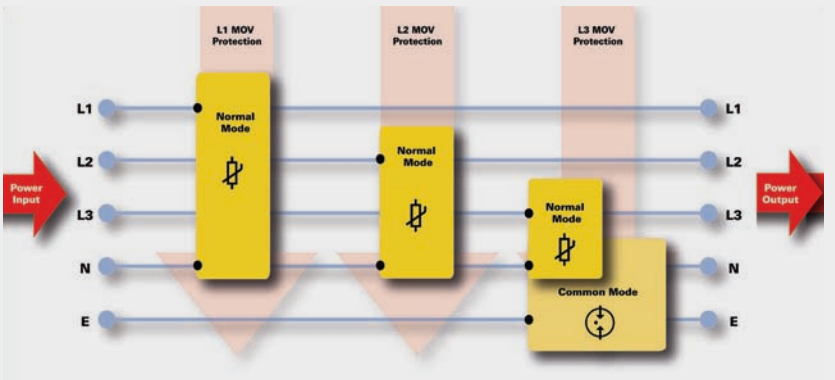
### Applications

- Ideal for Point of Entry or Sub-board Protection
- Telecommunication Systems & Rectifiers
- Process & Control Systems
- Computer Systems
- Medical Systems
- All Sensitive Electronic Equipment

### Class II/Cat C & B

The SPD360Ni is designed to protect 3-phase power systems against damage from surges & spikes caused by lightning & other electrical sources. The unit is intended for point-of-entry or sub-board protection in low to medium exposed locations adjacent to the M.E.N. link. For protection in locations remote from the M.E.N. link use a SPD360Gi Gas Arrestor model.

### SPD360Ni Block Diagram 3 Mode 1 Stage Surge Diverter



### Surge Category

The SPDI is suitable for use in category locations:

#### Class II/Cat D

(6kV/30kA) Point of Entry, High Exposure (SPD150i Only)

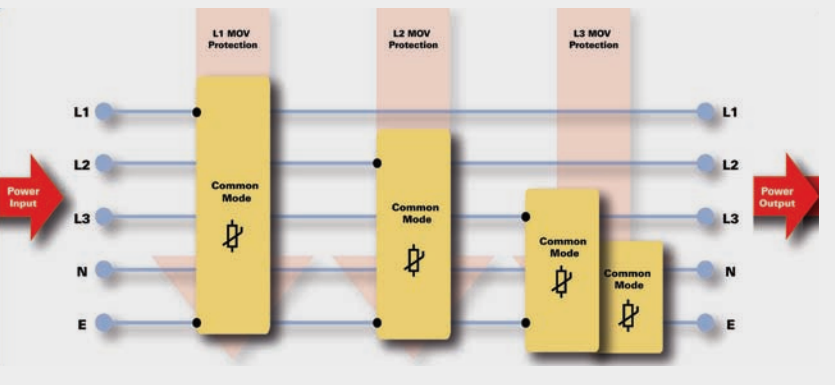
#### Class II/Cat C

(6kV/15kA) Point of Entry/ Service Entrance

#### Class II/Cat B

(6kV/3kA) Major sub mains & short final sub circuits

### SPD360Gi Block Diagram 1 Mode (LN) 1 Stage Diverter



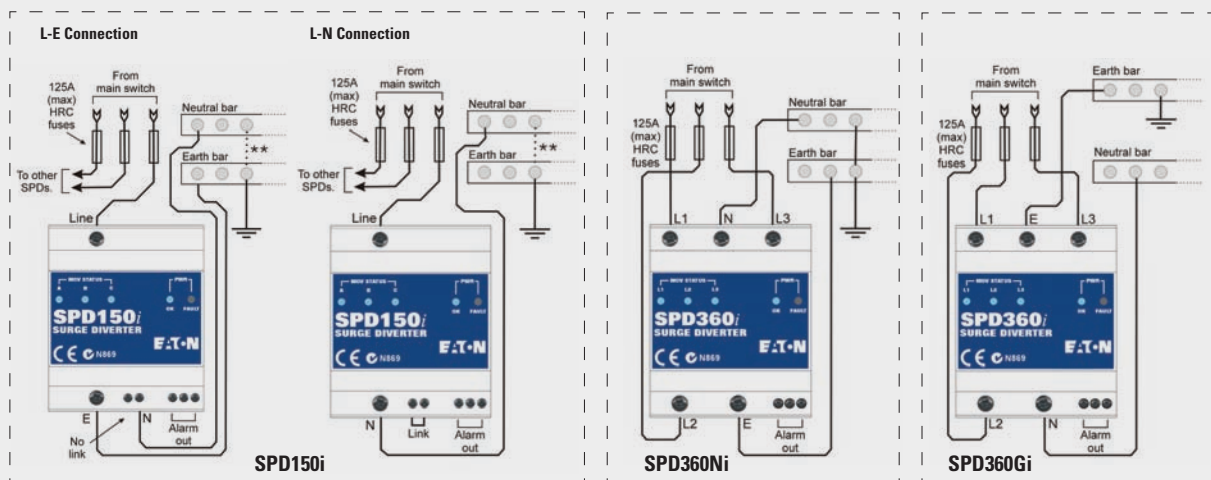


# Eaton® SPDI Series

Technical Specifications	SPD150i	SPD360Ni	SPD360Gi
Input voltage	220-277VAC (380-480V) 40-70 Hz	220-277VAC (380-480V) 40-70 Hz	220-300VAC (380-520V) 40-70 Hz
Maximum continuous operating voltage (MCOV)	320VAC		350VAC
Temporary overvoltage - TOV	350VAC, 15 mins		420VAC, 15 mins
Service Type	TN-C & TN C-S (3-wire with grounded neutral)		TN-S & TT (3-wire with grounded neutral)
Test Classification (IEC61643-1)	Class II		
Initial clamp voltage	560V		680V
Maximum rated surge current - Ismax 8/20us	120kA	60kA / Phase	
Nominal surge current - In 8/20us	120kA	30kA / Phase	
Residual voltage (Vpl) @ 3kA, 8/20us	1.0kV	≤1.2kV L-N, 900V N-E	≤1.2kV L-N, 1.4kV N-E
Residual voltage (Vpl) @ 40kA, 8/20us	1.65kV	≤2.1kV L-N, 1.46kV N-E	≤2.1kV L-N, 2.45kV N-E
Energy absorption (2ms)	2130 Joules		3640 Joules
Nominal surge lifetime (In)	60kA (8/20us), 20 times	30kA (8/20us), 20 times	
Recommended maximum over-current protection	gG/gL HRC fuses, 1 per phase, 125A maximum		
Terminations	Power terminals 16mm <sup>2</sup> , Alarm terminals 1.5mm <sup>2</sup>		
Alarms/Indicators	5 indicators, dry contact alarm relay - 250VAC/32VDC, 5A		
Design standards	IEC61643-1, IEC610006, ANSI/IEEE C62.41, AS1768-2007, AS3100, CE mark		
Dimensions & Weight	(DIN43880) 70 x 68 x 90 mm (WxDxH), 200g		

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## Connection Diagrams



**Important:** Before installing the device, please read & follow the installation & operating instructions.

# Eaton® SPDV60 & SPDT60



### Key Features

- 1 mode plug-in protection
- 60kA 8/20uS maximum surge rating
- Compact solution for primary protection
- DIN43880 case, 35mm DIN-rail
- Removable dry-contact alarm connection
- Thermally protected

### Applications

- Mains point-of-entry / Sub-board
- Factories / Workshops
- Small Offices / Residential homes

## Shunt Surge Diverter, 1 Pole 60kA

The new SPDV60-300 & SPDT60-255 single pole DIN surge diverters offer 60kA of surge suppression, making them suitable for either main or sub-board protection. The compact modular design allows the units to be easily installed in new or retrofitting existing installations. The units feature a plug-in module that may be replaced without rewiring in the event of a fault.

The SPDV60-300 utilises the latest thermal MOV technology, making it suitable for point-of-entry protection in main switchboards & can be used in conjunction with an SPDT60-225 Gas Arrestor for protection on distribution boards remote from the M.E.N. point. Both models come as standard with mechanical flag status indication & a dry contact alarm for remote status monitoring.

### Surge Category

The SPDV60 & SPDT60 is suitable for use in category locations:

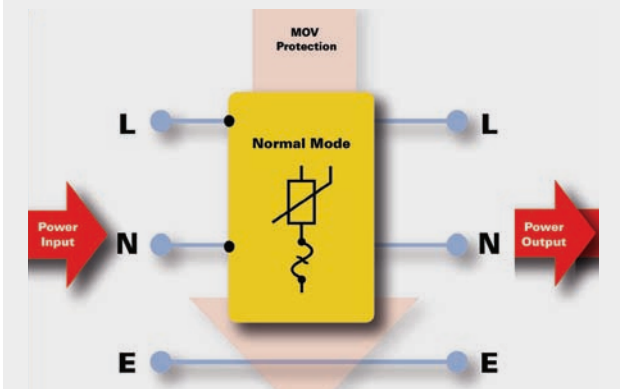
#### Class II/Cat C

(6kV/15kA) Point of Entry/ Service Entrance

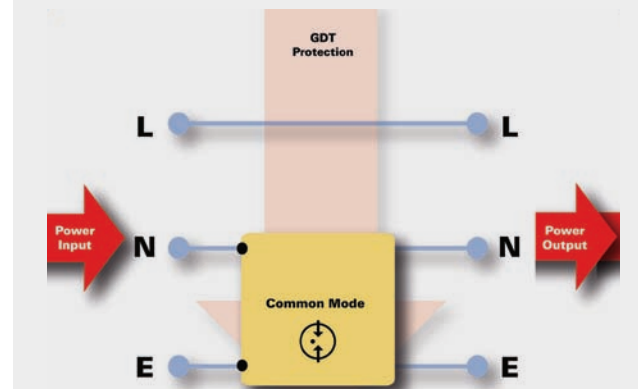
#### Class II/Cat B

(6kV/3kA) Major sub mains & short final sub circuits

### SPDV60 Block Diagram 1 Mode (LN) 1 Stage Diverter



### SPDT60 Block Diagram 1 Mode (N-E) 1 Stage Diverter



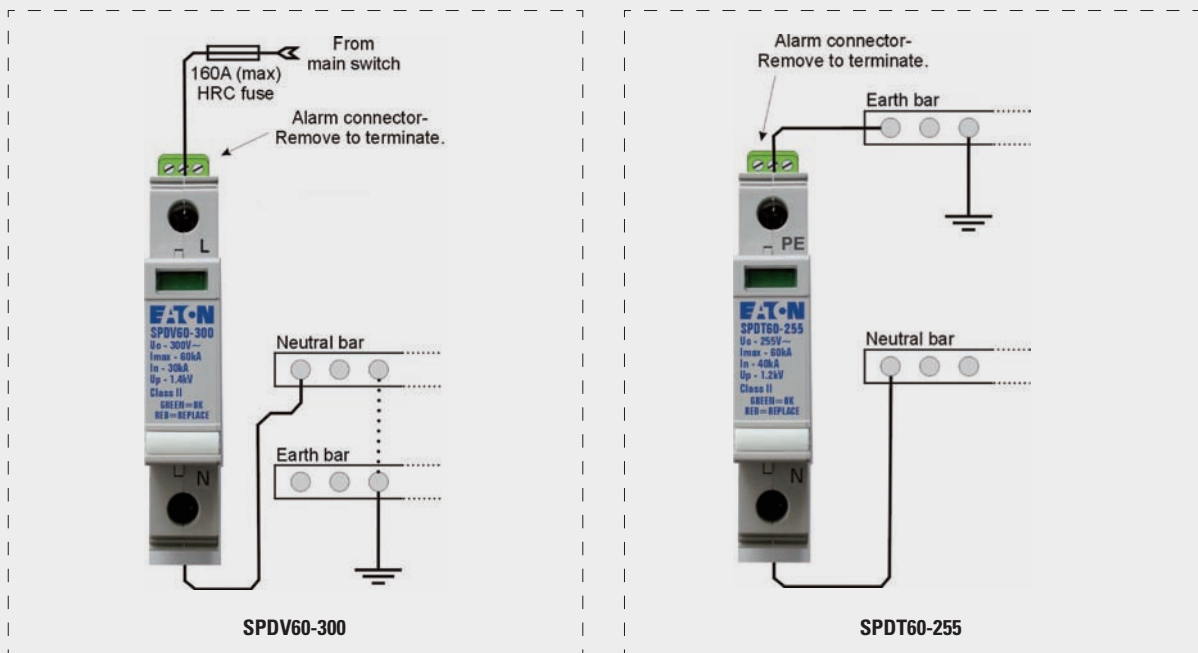
# Eaton® SPDV60 & SPDT60

Technical Specifications	SPDV60-300	SPDT60-255
Input voltage	220-250VAC (380-480V) 40-70Hz	Neutral - Earth connection only. System voltage 220-250VAC (380-440V)
Maximum Continuous voltage - MCOV	300VAC	255VAC (no conduction under load fault conditions)
Shunt Technology	MOV	GDT
Service type	TN-C & TN C-S (3-Phase with grounded neutral)	Single & 3-Phase with remotely grounded neutral
Test Classification (IEC61643-1)	Class II	
Supply Current	<10mA	
Initial clamp voltage	470V	N/A
Initial spark over voltage	N/A	600V
Maximum rated surge current - Ismax 8/20us	60kA	
Nominal surge current - in 8/20us	30kA	40kA
Residual voltage (Vpl) @ 3kA, 8/20us	1.0kV	N/A
Residual voltage (Vpl) @ Ismax, 8/20us	1.4kV	1.8kV
Energy absorption (2ms)	2130 Joules	N/A
Nominal surge lifetime (In)	30kA (8/20us), 20 times	40kA (8/20us), 20 times
Internal protection	MOV thermal disconnect device	Thermal disconnecter
Recommended maximum over-current protection	gG/gL HRC fuses, 1 per phase, 160A max	None
Terminations	Power terminals 16mm <sup>2</sup> , Alarm terminals 1.5mm <sup>2</sup>	
Alarms / indicators	Flag indicator, dry contact alarm relay - 250VAC/24VDC, 2A	
Design Standards:	IEC61643-1, IEC610006, ANSI/IEEE C62.41, AS1768-2007, AS3100, CE mark	

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Dimensions & Weight	(DIN43880) 17 x 68 x 90 mm (not incl relay), 100g
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## Connection Diagrams



**Important:** Before installing the device, please read & follow the installation & operating instructions.

# Eaton® Quickmov™



## Shunt Surge Diverter, 1 Pole 60kA

Quickmov™ is Australia's first fully integrated Surge Protection Device (SPD), designed to protect single & multi-phase electrical distribution systems against the damaging effects of voltage spikes & surges.

The new Quickmov™ SPD plugs straight into a Quicklag™ loadcentre, connecting to the chassis busbar for the lowest source impedance. Its integrated HRC fuse enables the Quickmov™ to be connected directly to the neutral bar, providing the shortest possible cable length for superior protection of the entire loadcentre. The advanced MOV technology is housed in a dual barrier flame retardant case to provide optimum surge protection performance without compromising safety & reliability.

The Quicklag™ range of mounting accessories compliments the Quickmov™, extending its features & benefits to many applications. Its integrated protection reduces the amount of extra components required to carry out a typical installation, saving valuable space & installation time. With a 60kA (MOV I<sub>max</sub>) surge suppression rating, Quickmov™ is ideal for primary protection in main switchboards & can be used in conjunction with an Eaton SPD50NG1 Neutral-Earth arrestor for distribution boards remote from the M.E.N. point.

### Surge Category

The Quickmov™ is suitable for use in category locations:

**Class II Cat C** (6kV/15kA) Point of Entry/ Service Entrance

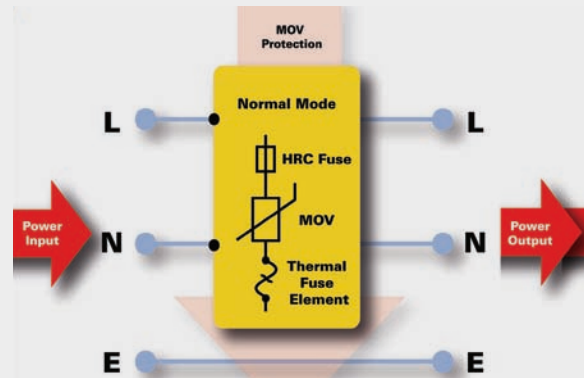
**Class II Cat B** (6kV/3kA) Major sub mains & short final sub circuits

### Key Features

- Surge rating 30kA I<sub>nom</sub> & 60kA I<sub>max</sub>
- Integrated Surge Protection solution
- In-built HRC fusing
- Dual Barrier Flame Retardant Housing
- Fail Safe Status Indicator
- Protection for MEN & non-MEN applications
- Compatibility with Quicklag™ accessories
- Designed in Australia

## Quickmov Block Diagram

### 1 Mode (LN) 1 Stage Diverter

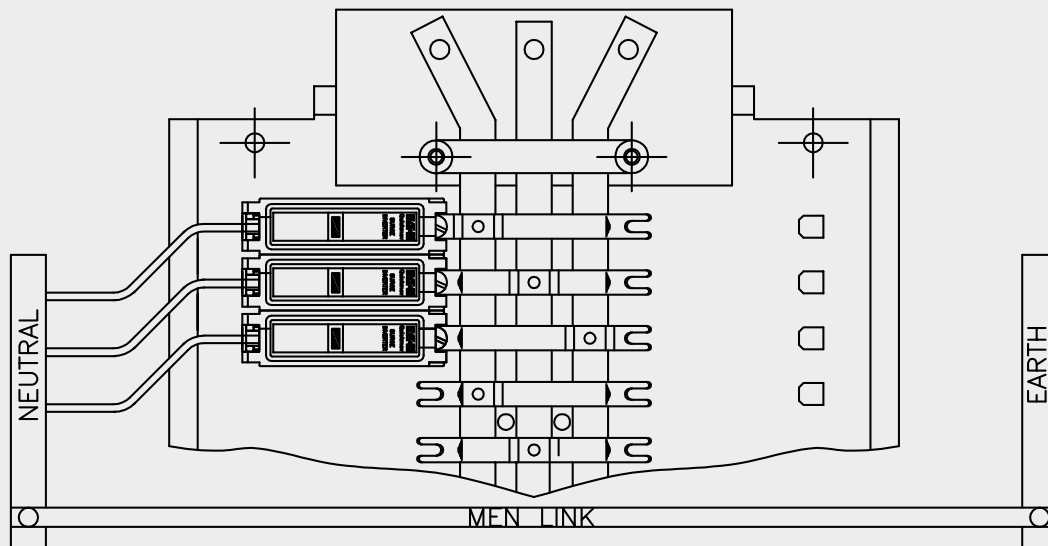


# Eaton® Quickmov™

Technical Specifications	SPDQM1
Protection Mode	Single Mode - connected L-N
Service type	TNC, TN C-S (for TNS add 1 x SPD50NGI protector)
System voltage - Un	220 - 250VAC (380 - 440VAC 3 Ph) 50/60 Hz
Test Classification	Class II (IEC 61643-1), Category C3 (ANSI/IEEE C62.41)
Maximum Continuous Over Voltage (MCOV - Uc)	300VAC
Temporary Over Voltage (TOV) (5s)	330VAC
External disconnector requirements	None. In-built 100AgL/50kA HRC fuse
Surge current rating In (20 times)	30kA (8/20us)
Surge current rating I <sub>max</sub> (2 times)	60kA (I <sub>max</sub> MOV rating, 8/20us)
Residual voltage (V <sub>pl</sub> ) @ 3kA	1.1kV (cable trimmed to 250mm)
Residual voltage (V <sub>pl</sub> ) @ In	1.8kV (device only)
Connections	Quicklag™ terminal for phase connection. 6mm <sup>2</sup> cable (black) for Neutral connection (500mm length)
Dimensions & Weight	25 x 71 x 93 mm (WxDxH), 310g

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## Connection Diagrams



**Important:** Before installing the device, please read & follow the installation & operating instructions.

# Eaton® PVD40 Series



## Shunt Surge Diverter, 60kA

The new PVD series diverters are designed to protect home & industrial solar panel arrays commonly used in grid interactive power solutions in the 1.5kW to 10kW range. These systems commonly use voltages between 500-1000VDC from the solar panels.

The PVD series diverters are designed to protect the DC input side of grid interactive inverters from harmful transients that can appear on the output of solar arrays, especially where they are located on roof or other high infrastructure locations. These units can be combined with existing SPDV60 series diverters on the AC Input/Output side of the inverter to provide complete protection from surges & thus increasing the life of a grid interactive solution investment. IEC61643-1 & UL1449 ed3 compliant. Available in 3 models to suit nominal 500, 600 & 1000VDC systems.

### Key Features

- 2 mode plug in protection
- 40kA surge suppression rating
- Compact modular solution
- 2 & 3 unit DIN43880 case, 36 & 54mm DIN-rail mount

### Applications

- Standalone & Grid Interactive Solar arrays.

Technical Specifications	PVD40-500-V-C	PVD40-600-V-C	PVD40-1000-V-CD
Nominal Voltage Un	500VDC	600VDC	1000VDC
Voltage Uc	530VDC	620VDC	1060VDC
Nominal Discharge Current ( 8/20us, kA ) Inom.	20	20	20
Max Discharge Current ( 8/20us, kA ) Imax.	40	40	40
Nominal current (ma) IL	10	10	10
Residual voltage (Vpl) @ Inom 20kA, 8/20us	1.6kV	2.0kV	3.2kV
Test classification	Class II	Class II	Class II
External disconnect ( if required )	125A Gg/GI fuse	125A Gg/GI fuse	125A Gg/GI fuse
Internal protection	MOV thermal disconnect	MOV thermal disconnect	MOV thermal disconnect
Alarm & indicators	Red flag indicator on module Alarm relay contact. 250vac/24vdc, 2A	Red flag indicator on module Alarm relay contact. 250vac/24vdc, 2A	Red flag indicator on module Alarm relay contact. 250vac/24vdc, 2A
Terminations	Main terminals 25mm Alarm terminals 1.5mm	Main terminals 25mm Alarm terminals 1.5mm	Main terminals 25mm Alarm terminals 1.5mm
Degree of protection ( IP rating).	20	20	20
Mounting	Din rail	Din rail	Din rail
Enclosure material	UL94 V0	UL94 V0	UL94 V0
Environment temperature ( C )	-10 to 60c, 0-90% RH	-10 to 60c, 0-90% RH	-10 to 60c, 0-90% RH
Applicable standards	IEC61643-1:2000 UL1449 ed3	IEC61643-1:2000 UL1449 ed3	IEC61643-1:2000 UL1449 ed3
Weight	180g	180g	240g
Dimensions	90mm (H) x 36mm (W) x 68mm (D) excluding alarm connectors	90mm (H) x 36mm (W) x 68mm (D) excluding alarm connectors	90mm (H) x 54mm (W) x 68mm (D) excluding alarm connectors
Warranty	12 months	12 months	12 months



# Faster than a speeding bullet

## Much faster.

In microseconds a power surge can do major damage to sensitive equipment and data. It can come from anywhere, and like a bullet, you only know it has been by the destruction left behind. That's why surge protection is so critical. And why Eaton builds so much

quality into our full line of surge protection products. Eaton has a world beating reputation for Power Quality and a full range of surge protection solutions, covering every eventuality.

**EATON**

*Powering Business Worldwide*

# Secondary Point Protection

Class II/Category B (6kV/3kA)





## Eaton® ESF Series Surge Filters



ESF 1 & 3 phase enclosed models

### Functional Description

The ESF series surge filters are Class II, single and three phase, 2 port SPDs, designed to provide complete site surge protection in a compact footprint. These models utilize UL1449 ed3 certified thermally-fused MOV devices in conjunction with air-wound inductors to provide a current-limited output, coordinated to surge levels below 3kA. This means that all downstream power circuits are protected to ANSI/IEEE C62.41 Category B level, the common level that medium power LV loads (UPS, rectifier, industrial machines) are designed to accept. The design results in an exceptionally low let through voltage. (<600V, 3kA, 8/20us). In addition, the units also provide filtering of line harmonics, noise and RF transmitters with a cut off frequency of <10KHz and a nominal attenuation of 48dB above 1MHz.

The units can be supplied in gear-tray format for installation into a switchboard, or enclosed in an IP54 enclosure. When installed in compliance with the manufacturer's instructions and applicable standards, this unit provides a high degree of protection to connected loads. Models are offered in 1 or 3 phase for TT or TN-based power systems in the range of 50A to 80A.

### Typical applications

- Telecommunications systems
- Medical equipment
- Industrial equipment
- Data centres
- Control systems
- Switch boards

### Key Features

- Compact solution for Class II / Cat B,C & D, Point of Entry, distribution board and sub board surge protection
- All mode protection L-N, L-E & N-E
- High kA rating per phase 100kA, I<sub>max</sub>
- Exceptionally low let through voltage <600V @ 3kA/8/20us, <800V @ 50kA / 8/20us, I<sub>nom</sub>
- 50A to 80A single and three phase models
- Fully enclosed and gear tray versions to suit switch boards
- Can be configured for 3:1 phase bypass loads
- Available in TN & TT systems versions
- 5 Year Warranty

### Principle of Operation

Excess potentials are captured by the primary protection stage, resulting in a protection level of <600V @ 3kA, (8/20us) and <800V @ 50kA, I<sub>nom</sub> (8/20us). The filter components reduce rise-time of the remaining surge and control current to the secondary MOVs. A 'Low Q' filter design is utilized to avoid resonance effects. When the secondary MOVs conduct, the unit's output is clamped and the inductor provides current-limiting of the surge into the externally-connected load circuits. TN models use Neutral as the primary and secondary surge return paths and provide Neutral-Earth protection via a high-energy gas arrester. TT models use Earth as the primary surge return and Neutral as the secondary surge return path. TT models use MOV devices for Neutral-Earth protection. These units are applicable to TT, TN-C, TN-S and TNC-S power systems nominally rated between 380 and 440V.

# Eaton® ESF Series Surge Filters

Technical Specifications	Available Models
Model part numbering guide: ESFWWX-YY-Z	Enclosed versions : TN-S, TN C-S SYSTEMS.
ESF E model Surge Filter	ESF501-TN-E, ESF503-TN-E, ESF631-TN-E, ESF633-TN-E, ESF801-TN-E, ESF803-TN-E
WW Current. 50, 63 or 80 Amp	
X Phases 1 or 3	Gear tray versions : TN-S, TN C-S SYSTEMS.
-YY TN for TN based systems. TT for TT based systems	
-Z E for enclosed units. Blank for gear tray units	ESF501-TN, ESF503-TN, ESF631-TN, ESF633-TN, ESF801-TN, ESF803-TN
Input voltage – Uc	220 – 250VAC 1Ø 380 – 440VAC 3Ø
Maximum continuous voltage – MCOV	320VAC L-N
Service type	TN-S, TN C-S SYSTEMS
Nominal discharge current	Class II In L-N 50kA, N-E 50 kA
Current rating – continuous	50, 63 or 80A
Recommended maximum over current protection	HRC gL fuse rated according to the unit's rating.
Residual current	<10 mA
Short circuit withstand (1 sec)	29kA
Primary protection modes – TN models	Line-Neutral, Neutral-Earth
Primary protection modes – TT models	Line-Earth, Neutral-Earth
In 8/20us (Line-Neutral or Line-Earth)	50kA
In 8/20us (Neutral-Earth)	50kA
Ismax 8/20us ( Line – Neutral )	100kA
Nominal surge lifetime	15 hits @ 50kA (8/20uS, each mode)
Filter attenuation	48dB nominal above 1MHz
Initial clamp voltage (Line-Neutral)	510V
Initial clamp voltage (Line-earth – TT models)	680V
Initial clamp voltage (Neutral-Earth)	TN = 255V

Technical Specifications	
Residual voltage (Vpl) Line-Neutral	<600V (3kA, 8/20uS)
Residual voltage (Vpl) Neutral-Earth	<1000V (3kA, 8/20uS)
Residual voltage (Vpl) Line-Neutral	<800V (50kA, 8/20uS)
Residual voltage (Vpl) Neutral-Earth	<1100V (50kA, 8/20uS)
Internal protection (fusing)	All surge diverter elements are thermally fused.
External disconnecter requirements	Line side: 1 or 3 pole, HRC gL fuse, 500v, 50KAIC. Load side: 10kAIC or better MCB.
Terminations	Bolted lug. 8mm bolts for phase and neutral connections. 6mm PE (earth) stud provided on gear tray. All connections identified on unit.
Alarms/indicators	Includes status indicators, dry contact alarm relay output (normally-closed with power applied and all SPD's at 100% capacity). Contact rating 250Vac/32Vdc, 5A, alarm under-voltage cut off 180Vac.
Location Category	Internal mounting location only. Must be installed within a suitable enclosed space, allowing for cooling airflow.
Thermal dissipation	Max 200W @ full load, 3 phase, 80A model.
Standards. Designed in accordance with :	IEC61643-1:2005, IEC610006-1,2,3,4 ANSI/IEEE C62.41, AS/NZS1768, AS/NZS3000:2007, AS3100
Installation instructions	Supplied with unit.
Dimensions – 1 phase including hinges	Enclosed models : 520H x 240W x 220D (mm) Gear tray models : 350H x 200W x 190D
Dimensions – 3 phase including hinges	Enclosed models :520H x 400W x 220D (mm) Gear tray models : 350H x 360W x 190D
Weight	6kg (single phase), 10kg (3 phase)
Environment	-10 to 65°C, 10 to 90%RH (non-condensing) IP42 Enclosed IP20 Gear tray
Warranty	5 years, workmanship and materials

Note: installation must be carried out by suitably qualified personnel. Please refer to installation instructions prior to proceeding with installation.

## Surge Category

The ESF is suitable for use in category locations:

### Class II/Cat C

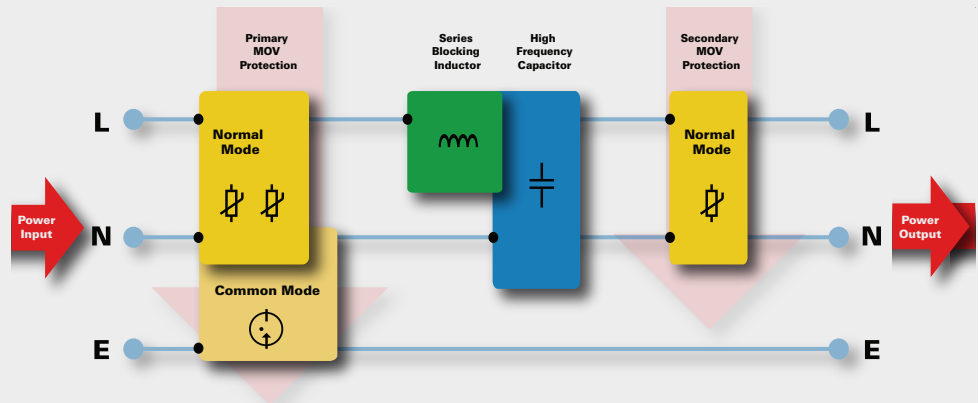
(6kV/15kA) Point of Entry/ Service Entrance

### Class II/Cat B

(6kV/3kA) Major sub mains & short final sub circuits

## ESF Block Diagram (Single Phase Shown)

1 Mode 2 Element Series Filter  
All Mode 2 Stage Surge Diverter



# Eaton® DSFI



### Applications

- Secondary power circuits/Sub-boards
- UPS Systems & Rectifiers
- Telecommunications Systems & Rectifiers
- Process & Control Systems & UPS's up to 6kVA
- Computer Systems & Medical Systems
- AV circuits for clubs & hotels
- All sensitive Electronic Equipment

### Key Features

- Surge suppression & filtering in a single package
- Modular design
- Enclosed in IP20 painted steel housing
- Protection Fail Alarm Relay
- 3 mode, 3 Stage Protection
- 5 Year Warranty

### Series Filter with Shunt Surge Diverter, 1 Phase 5-32A, 40kA Primary

The DSFI is designed to provide secondary protection against power surges caused by external sources such as lightning strikes & substation switching as well as providing a measure of protection from surge events generated on the secondary side of the filter.

The DSFI is a 3-stage protection unit utilising primary & secondary MOV protection in conjunction with a 2-stage Low-Q LC filter (i.e. 2 inductive coils) using separate differential mode & common mode circuits. The unit provides filtering of the line harmonics, noise & RF transmitters with a cut-off frequency of <1.5kHz & a minimum attenuation of >55dB to 10MHz.

Secondary MOV protection (in all 3 modes) is located after the inductive coils, to provide further surge reduction & to protect against load-generated surges. An ideal device for Category B & A locations.

### Surge Category

The DSFI is suitable for use in category locations:

#### Category B

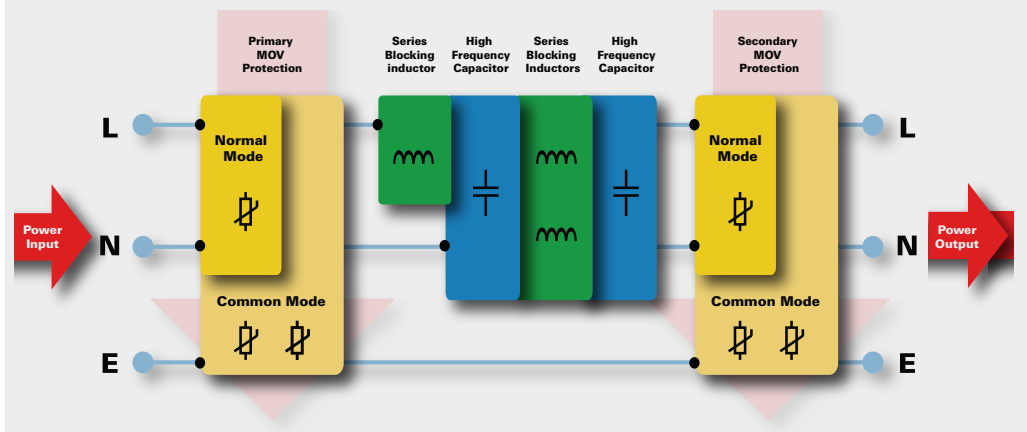
(6kV/3kA) Major sub mains & short final sub circuits

#### Category A

(6kV/200A) Long final sub circuits & power

### DSFi Block Diagram

2 Mode 5 Element Series Filter  
3 Mode 2 Stage Surge Diverter

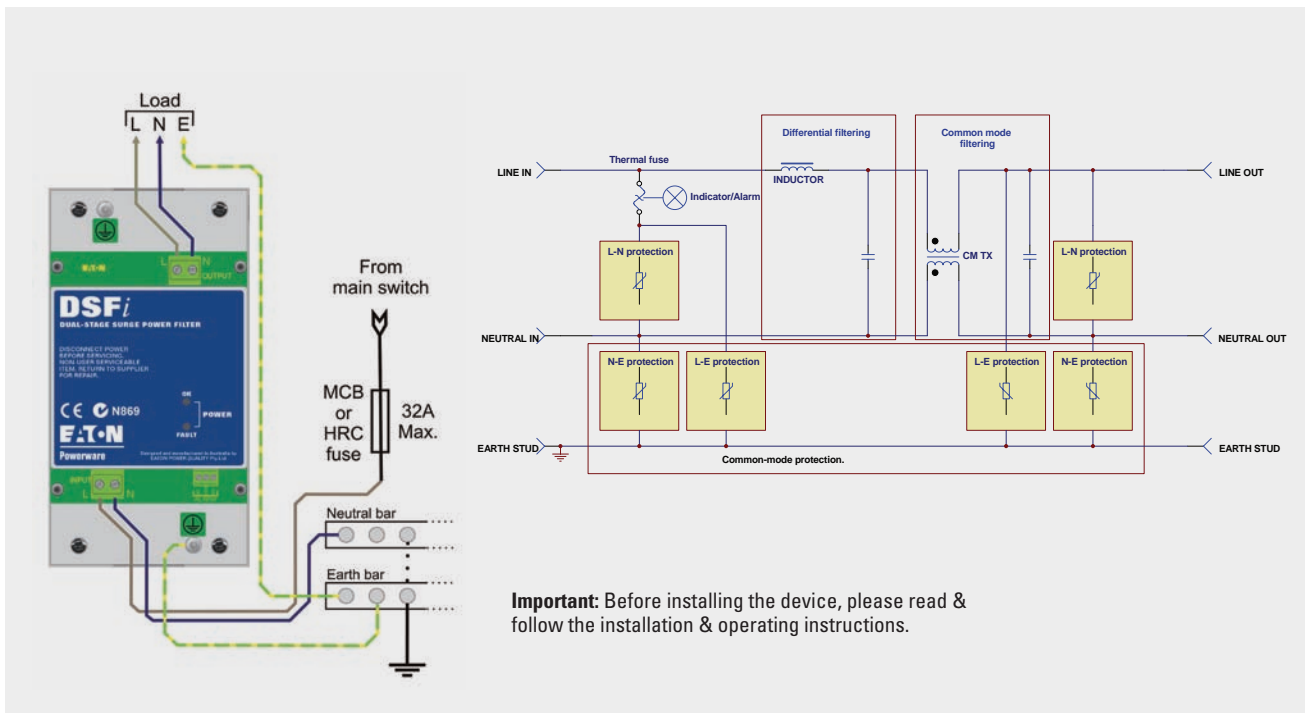


# Eaton® DSFI

Technical Specifications	DSFI
Input voltage	200-250VAC 1 Phase
Service type	TT, TN, TN C-S or any single-phase system with a grounded neutral.
Test Classification	Class III (IEC 61643-1), Category A & B (ANSI/IEEE C62.41)
Energy Absorption rating - per mode (joules)	Primary Protection L-N = 740 J Primary common mode protection L-E & N-E = 780 J Secondary protection L-N = 225J Secondary common mode protection L-E & N-E = 480J Aggregate rating = 2,225J
Current rating – continuous	5 - 32A
Recommended max. overcurrent protection	32A (C curve MCCB)
Short circuit withstand (1 sec)	Suitable for use with a 6kAIC C Curve MCB
Protection modes	Line-Neutral, Line-Earth, Neutral-Earth
In 8/20us (Line-Neutral)	15kA x 20 hits
In 8/20us (Line-Earth)	10kA x 20 hits
In 8/20us (Neutral-Earth)	10kA x 20 hits
Ismax 8/20us (Line-Neutral)	40kA
Ismax 8/20us (Line-Earth)	25kA
Ismax 8/20us (Neutral-Earth)	25kA
Filter attenuation	>55dB to 10MHz
Internal protection (fusing)	Thermal
Terminations	10mm <sup>2</sup> PCB Mounted Terminals
Alarms/indicators	2 LED display, Power OK & Protection OK LEDs, Dry contact alarm relay output – 250Vac/32Vdc, 5A, 5kV isolation, Alarm under-voltage cutoff 180Vac
Enclosure rating	IP20
Design Standards:	IEC61643-1, IEC610006-1,2,3,4 ANSI/IEEE C62.41 Cat B,C,D,E AS1768-2007 Cat B,C,D,E AS3000,AS3100, CE mark
Dimensions & Weight	140 x 50 x 270 mm (W x D x H), 1.5kg
Environment	-10 to 65°C, 10 to 90%RH (non-condensing)

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## Connection & Line Diagram



# Eaton® CSFi



### Applications

- Secondary power circuits, Sub-boards
- UPS Systems & Rectifiers
- Telecommunications Systems
- Process & Control Systems, Homes & Units
- Computer Systems & Medical Systems
- All sensitive Electronic Equipment

### Key Features

- Surge suppression & filtering in a single package
- Modular design
- Enclosed in IP 20 ABS plastic housing
- DIN rail mountable (4 pole wide)
- Protection Fail Alarm Relay
- 3 mode, 3 Stage Protection
- 12 Month Warranty

### Series Filter with Shunt Surge Diverter, 1 Phase 3-25A, 25kA Primary

The CSFi is designed for mounting in distribution boards to provide secondary protection against power surges caused by external sources such as lightning strikes & substation switching as well as providing a measure of protection from surge events generated on the secondary side of the filter. An ideal device for Category B locations.

The CSFi is a 3-stage protection unit utilising primary & secondary MOV protection in conjunction with a Low-Q LC filter. The unit provides filtering of the line harmonics, noise & RF transmitters with a cut-off frequency of <10kHz & a nominal attenuation of >60dB.

All CSFi units are provided with indicators showing power & protection status. Alarms are indicated on the front panel of the unit. The alarm function provides a summary alarm output for protection degradation as well as power failure. The protection alarm is configured to partial protection failure. The summary alarm relay contacts provide remote signalling to other equipment.

### Surge Category

The CSFi is suitable for use in category locations:

#### Class II/Cat B

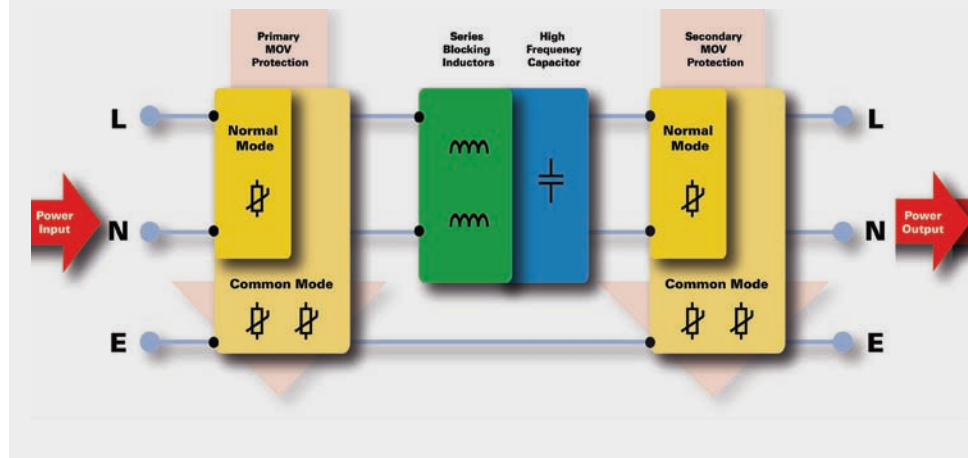
(6kV/3kA) Major sub mains & short final sub circuits

#### Class II/Cat A

(6kV/200A) Long final sub circuits & power outlets

### CSFi Block Diagram

2 Mode 3 Element Series Filter  
3 Mode 2 Stage Surge Diverter

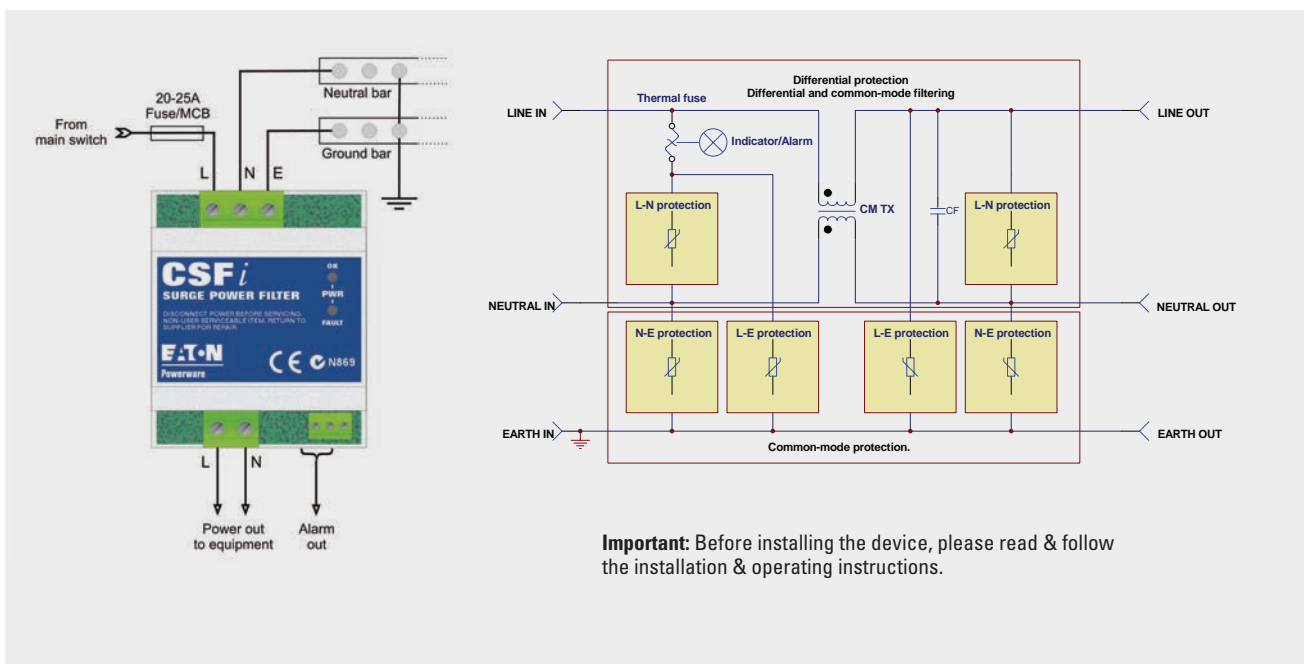


# Eaton® CSFI

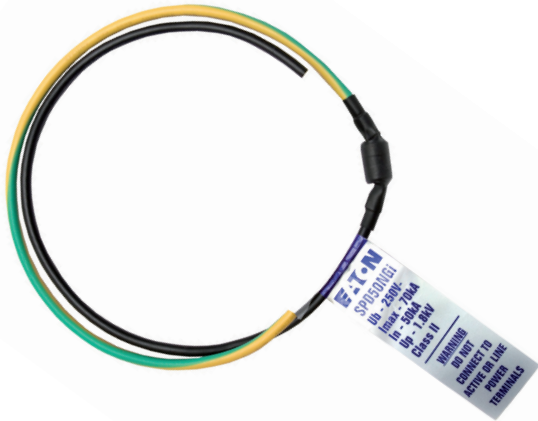
Technical Specifications	CSFI
Input voltage	200-250VAC 1 Phase
Service type	TT, TN, TN C-S or any single-phase system with a grounded neutral. This unit must not be connected to an ungrounded system
Test Classification	Class III (IEC 61643-1), Category A & B (ANSI/IEEE C62.41)
Energy Absorption rating - per mode (joules)	Primary protection L-N = 370J Primary common mode protection L-E & N-E = 480J Secondary protection L-N = 225J Secondary common mode protection L-E & N-E = 480J Aggregate rating = 1555J
Current rating - continuous	3 - 25A
Recommended max. overcurrent protection	25A (C curve MCB 25A)
Protection modes	Line-Neutral, Line-Earth, Neutral-Earth
In 8/20us (Line-Neutral) Nominal surge life	10kA x 20 hits
In 8/20us (Line-Earth) Nominal surge life	3kA x 20 hits
In 8/20us (Neutral-Earth) Nominal surge life	3kA x 20 hits
Ismax 8/20us (Line-Neutral) Max surge level	25kA
Ismax 8/20us (Line-Earth) Max surge level	10kA
Ismax 8/20us (Neutral-Earth) Max surge level	10kA
Filter attenuation	62dB above 1MHz
Internal protection (fusing)	All surge diverter connections are fused via HRC fuses to IEC269-2-1
Terminations	6mm <sup>2</sup> PCB Mounted Terminals
Alarms/indicators	2 LED display, Power OK & Protection OK LEDs, Dry contact alarm relay output – 250Vac/32Vdc, 5A, 5kV isolation, Alarm under-voltage cutoff 180Vac
Location Category	Indoor
Enclosure rating	IP20
Design Standards:	IEC61643-1, IEC610006-1,2,3,4 ANSI/IEEE C62.41 Cat B,C,D,E AS1768-2007 Cat B,C,D,E AS3000,AS3100, CE mark
Dimensions & Weight	70 x 68 x 90 mm (W x D X H), 200g
Environment	-10 to 65°C, 10 to 95%RH (non-condensing)

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## Connection & Line Diagram



# Eaton® SPD50NGI



**Applications:**

- Equipotential Coupler
- Neutral-Earth Surge Arrestor
- Sub-boards remote from MEN point

**Key Features:**

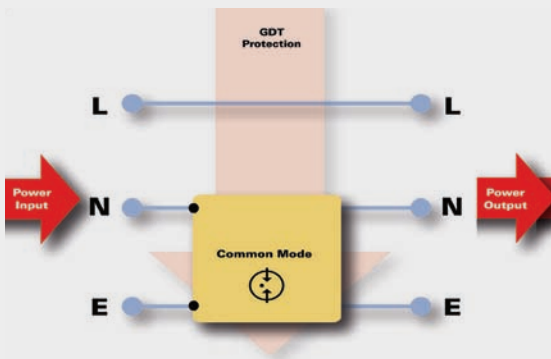
- Compact Neutral-Earth Protection Solution
- Surge current rating from 50kA - 100kA In, 70kA - 150kA Imax
- Compatible with most switchboards
- Quick & simple installation

### Neutral-Earth or Earth-Earth Equipotential Clamp

The SPD50NGI is designed for use as an equipotential coupler between separately-grounded systems to provide protection against surge transients. Under normal conditions the coupler does not conduct, preventing earth loops & inter-circuit coupling. Under surge conditions, effectively interconnecting the circuits for the duration of the surge.

The SPD50NGI is an ideal companion for the Quickmov™ surge diverter for surge protection in distribution boards remote from an M.E.N point. the SPD50NGI equipotential coupler (gas arrestor) is connected between the neutral & earth bar for N-E surge protection. The SPD50NGI is supplied as an "in-line" cable assembly for ease of installation.

**SPD50NGi Block Diagram**  
1 Mode (N-E) 1 Stage Diverter



### Surge Category

The SPD50NGI is suitable for use in category locations:

**Class II/Cat C**

(6kV/15kA) Point of Entry/  
Service Entrance

**Class II/Cat B**

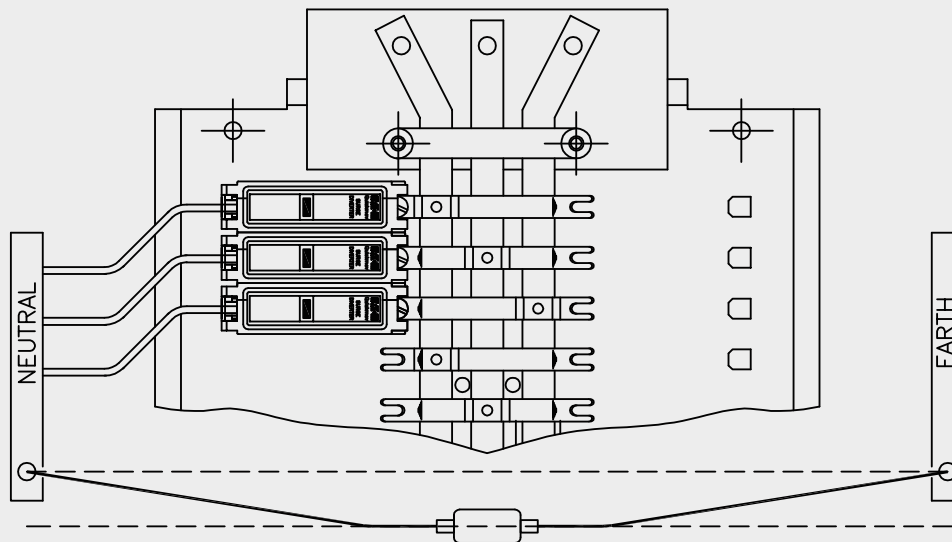
(6kV/3kA) Major sub mains &  
short final sub circuits

# Eaton® SPD50NGI

Technical Specifications	SPD50NGI
Protection Mode	Single Mode - connected Neutral-Earth or between separately earthed systems
Service type (N-E protection only)	TNS or similar (neutral must be grounded either locally or remotely)
System voltage - Un	Applicable to any common LV system voltage
Test Classification	Class I & II (IEC 61643-1) Cat B & C ANSI C62.41
External disconnector requirements	None
DC breakdown voltage (1mA)	230V +/-20%
Firing voltage	800V +/-20%
Operating current	<1mA
Surge current rating In (20 times)	50kA (8/20us)
Surge current rating Ismax (2 times)	70kA (8/20us)
Residual voltage with full cable	<1.3kV (3kA, 8/20uS)
Residual voltage with minimal cable (100mm total)	<1.3kV (15kA, 8/20uS) <2.5kV (50kA, 8/20uS)
Connections	6mm <sup>2</sup> cable (black & green/yellow) for connection
Mounting	None required for fixed installation (suspended by cable)
Dimensions & Weight	60 x 15 x 15 mm (not including cables), 70g

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## Connection Diagram



Sub-board with remote MEN link connection

**Important:** Before installing the device, please read & follow the installation & operating instructions.



# Point of Use Protection

Class III/Category A (6kV/200A)



# Eaton® PSFI



### Applications

- Plug-in UPS systems
- Servers
- Portable instrumentation
- POS systems
- Small office systems
- Industrial & rural surge prone sites

### Key Features

- Surge suppression & filtering in a single package
- IEC input & output connectors
- Enclosed in IP 24 painted metal housing
- Surge suppression rating of 40kA (L-N)
- Protection Fail and On Indicators
- 3 mode Protection
- 12 Month Warranty

## Surge Filter, 1 Phase 10A & 16A, 60kA Mass Aggregate

The PSFI is designed to provide secondary protection against power surges caused by external sources such as lightning strikes & substation switching, as well as providing a measure of protection from surge events generated on the secondary side of the filter. The unit has been designed in accordance with AS3100, AS1768, IEC61643-1, IEC61000-6-1, 2, 3, 4 & other standards & codes as applicable.

The PSFI is a 3-stage protection unit utilising primary & secondary MOV protection in conjunction with a Low-Q LC filter. The unit provides filtering of the line harmonics, noise & RF transmitters with a cut-off frequency of <10kHz & a minimum attenuation of 40dB above 1Mhz. The operation status of the PSFI is indicated by lamps on the front panel. The "OK" light indicates that power is applied to the PSFI. The "FAULT" light indicates that the surge protection circuitry is damaged & the unit should be replaced. An ideal device for Category A locations.

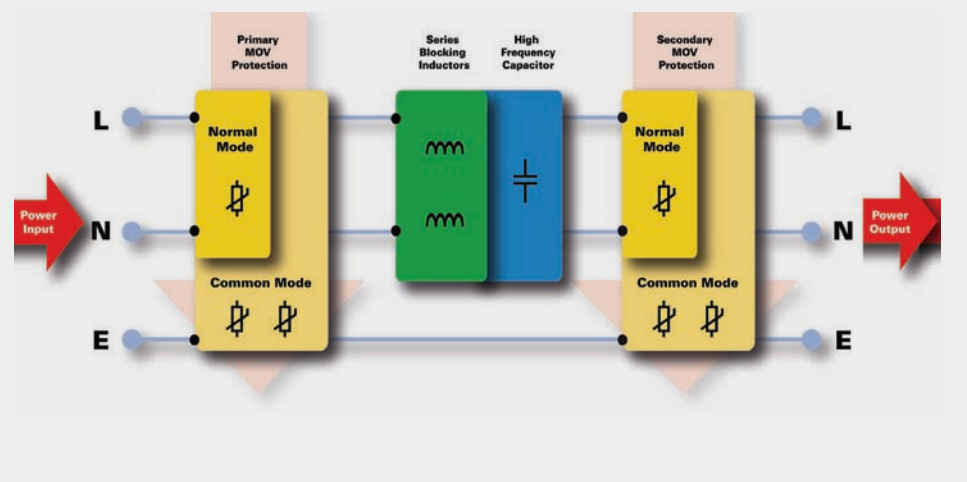
### Surge Category

PSFI0I & PSFI6I are suitable for use in category locations:

### Class III/Cat A

(6kV/200A) Long final sub circuits & power outlets

### PSFi Block Diagram 2 Mode 3 Element Series Filter 3 Mode 2 Stage Surge Diverter

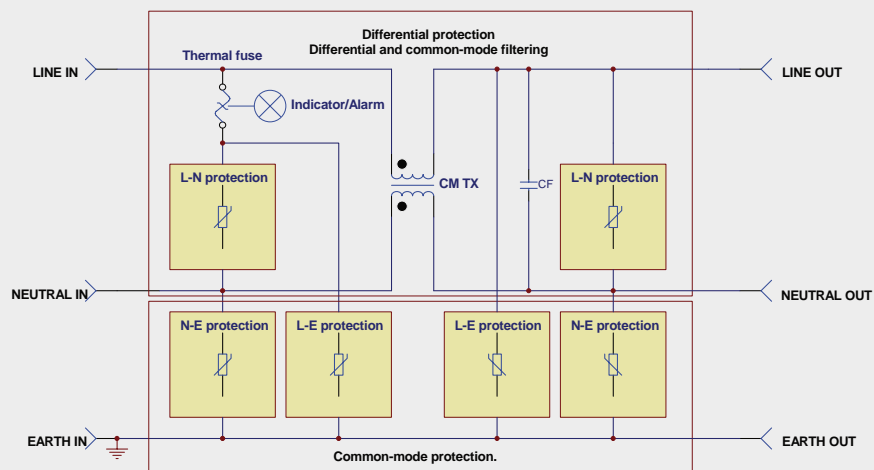


# Eaton® PSFI

Technical	PSFI01	PSFI61
Number of ports	2 Port	
Method of mounting	Portable	
Input voltage - Uc	200-250VAC 1 Phase	
Maximum Continuous voltage - MCOV	320VAC L-N	
Temporary overvoltage - TOV	350VAC L-N, 15 mins	
Service type	TT, TN, TN C-S or any 1 phase system with a grounded neutral. This unit must not be connected to an ungrounded system.	
Test Classification	Class III	
Current rating - continuous	10A	16A
Test Classification	Class III (IEC 61643-1), Category A (ANSI/IEEE C62.41)	
Recommended max. overcurrent protection	10A	16A
Residual current	<0.5 mA	
Protection modes	Line-Neutral, Line-Earth, Neutral-Earth	
Nominal surge life	20kA x 15 hits (8/20uS each mode)	
In 8/20us (Line-Earth) Nominal surge life	3kA x 20 hits	
In 8/20us (Neutral-Earth) Nominal surge life	3kA x 20 hits	
Ismax 8/20us (Line-Neutral) Max surge level	40kA	
Filter attenuation	40dB nominal above 1MHz	
Initial clamp voltage (Line-Neutral)	560V (350VAC RMS)	
Initial clamp voltage (Line-Earth)	680V (420VAC RMS)	
Initial clamp voltage (Neutral-Earth)	680V (420VAC RMS)	
Residual voltage (Vpl) (Line-Neutral) (Let through voltage)	<900 (3kA, 8/20uS)	
Internal protection (fusing)	Thermal fusing on primary line-connected MOVs	
Terminations	IEC 320-C14 10A input x 1, IEC 320-C13 10A output x 1	IEC 320-C20 16A input x 1, IEC 320-C19 16A output x 1
Alarms/indicators	2 LED display, Power OK, Protection Fault	
Location Category	Indoor	
Enclosure rating	IP24	
Design Standards:	IEC61643-11, IEC610006-1, 2, 3, 4 ANSI/IEEE C62.41 Cat B, C, D, E AS1768-1991 Cat B, C, D, E AS3000, AS3100, CE mark	
Dimensions & Weight	90 x 205 x 55 mm (W x L x D), 1kg	
Environment	-10 to 50°C, 0 to 95% RH (non-condensing)	

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## Line Diagram



# Eaton® SPD-DM Series



## DM Series

The new SPD 'D' series digital signalling surge diverters are designed for low voltage data signalling systems in the 5 volt to 48 volt range. Models are available in 5, 12, 24 & 48 volt DC. All are IEC 61643-21:2000 compliant.

## Key Features

- 1 mode plug-in protection
- 10kA surge suppression rating
- Compact solution for data systems protection
- DIN43880 case, 13mm wide

## Applications

- Data networks signalling protection

Specifications	
Part Code	Description
SPD-DM05	1 Pole, 5vdc, 10kA, 1 mode Surge Diverter w/ removable module
SPD-DM12	1 Pole, 12vdc, 10kA, 1 mode Surge Diverter w/ removable module
SPD-DM24	1 Pole, 24vdc, 10kA, 1 mode Surge Diverter w/ removable module
SPD-DM48	1 Pole, 48vdc, 10kA, 1 mode Surge Diverter w/ removable module

Technical Specifications	SPD-DM05	SPD-DM12	SPD-DM24	SPD-DM48
Nominal Voltage Un	5	12	24	48
Max Continuous Voltage Uc AC/DC	5/6	12/15	24/28	48/60
Nominal Discharge Current ( 8/20us, kA ) per line. Inom.	5	5	5	5
Max Discharge Current ( 8/20us, kA ) Per line. Imax.	10	10	10	10
Nominal current (A) IL	0.5	0.5	0.5	0.5
Voltage Protection Level ( 8/20us, V ) Up Line - Line Line - Ground	<80v <350v	<150v <350v	<200v <500v	<250v <500v
Voltage Protection Level ( 1KV/us, V ) Up Line - Line Line - ground	<10v <600v	<18v <600v	<30v <600v	<70v <600v
Series impedance per line ( Ohm )	4	4	4	4
Insertion loss at 100Mhz (dB)	<3.0	<3.0	<3.0	<3.0
Degree of protection ( IP rating ).	20	20	20	20
Mounting	Din rail	Din rail	Din rail	Din rail
Enclosure material	UL94 V0	UL94 V0	UL94 V0	UL94 V0
Environment temperature ( C )	-40 to 80c, 0-90% RH	-40 to 80c, 0-90% RH	-40 to 80c, 0-90% RH	-40 to 80c, 0-90% RH
Warranty ( months )	12	12	12	12

# Quickmov™ Fast, Safe & Dependable



## Safety and Performance.

Eaton's Quickmov™ is a fully integrated Surge Protection Device (SPD), designed for stand-alone mounting or to plug straight into a Quicklag™ loadcentre, connecting to the chassis busbar for the lowest source impedance.

Quickmov™ employs advanced MOV technology with embedded thermal protection housed in a dual barrier flame retardant case to provide optimum surge protection performance. With a 60kA surge suppression rating, Quickmov™ is

ideal for primary protection in main switchboards and can be used in conjunction with an Eaton Neutral-Earth arresistor for distribution boards remote from the M.E.N point.

Quickmov™ combines surge diversion with fail-safe protection to deliver unsurpassed levels of safety and performance.

**EATON**

*Powering Business Worldwide*

# Eaton® SF8RM



### Key Features

- 8 way 10A Power Filter
- Can be rack or surface mounted
- 3 mode, 3 stage protection
- Resettable circuit breaker for over-current protection

### Surge Filter, 1 Phase 10A, 25kA Primary

The SF8RM is designed to protect equipment against power surges & electrical noise whilst providing a convenient combination of power outlets to suit most applications. A unique mounting system allows mounting in many different modes to suit crowded racks. Even if no rack space exists, the units may be mounted externally on the front or rear of the rack. For horizontal mounting, the units require a single 1RU rack space for installation. The unit may also be flush mounted to either side of a rack or cabinet.

Technical Specifications	SF8RM
Current rating	10A total
Configuration	Single-phase, L/N/E.
Surge Protection Category	AS/NZS1768-2007 Category B
Primary protection modes	L-N, L-E, & N-E
Secondary protection modes	L-N, L-E, & N-E
Surge rating (8/20uS L-N)	22.5kA
Let-through voltage	< 700V@ 3kA
Overvoltage withstand	300VRMS
Filter type	Low Q/low C filter providing differential & common-mode filtering.
Attenuation	> 50dB above 1MHz.
Voltage drop	Less than 3V at rated load.
Input connection	Approved power cord with Australian 10A plug
Output connections	Australian 3 pin 10A (x8).
Enclosure	Steel, powder coated, black.
Dimensions (without brackets)	441 x 120 x 44 mm (W x D x H)
Weight	1.2kg

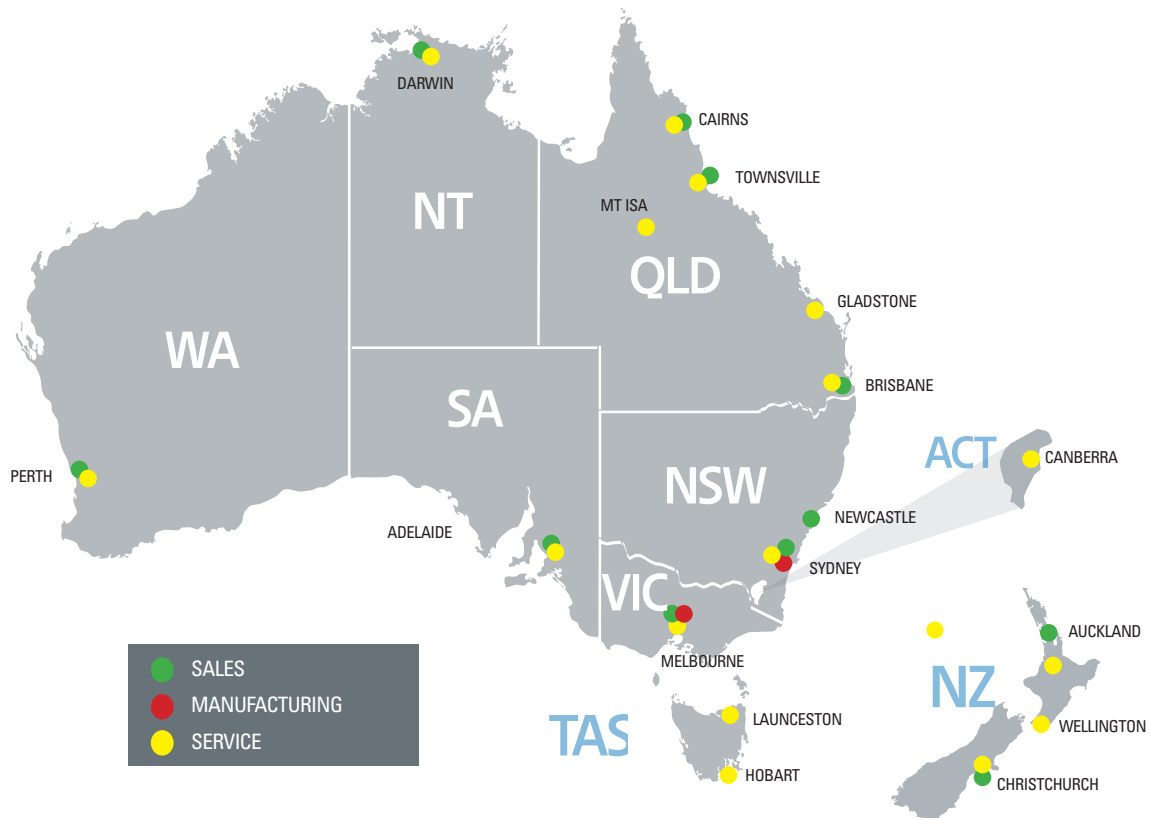
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Our focus is on delivering the right solution for the application. But, decision makers demand more than just innovative products. They turn to Eaton for an unwavering commitment to personal support that makes customer success a top priority. For more information, visit [www.eaton.com/electrical](http://www.eaton.com/electrical).

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