Surge protection devices

Modular, pluggable and high capacity surge protection solutions for commercial and industrial applications

Since 1968, NHP has been an independent Australian owned company passionate about providing our customers with local choice powered by global partners.

The NHP Difference

With 50 years of electrical and engineering industry excellence and over 22 branches across Australia and New Zealand, at NHP it is our local people and footprint that helps us understand your specific project needs, no matter how big or small.

While we go to market with over 15,000 stocked items, we are much more than a product supplier. Together with our extensive network of global partners, we offer choice in product, choice in technology, choice in service, choice in support and ultimately choice in how you deal with us – whether that be in person or online, where and when you need us.

This enables NHP to customise integrated solutions and bring to life smart and secure technologies that automate production, control power and manage energy.

When it comes to finding a local partner with a global network for your next project, choosing NHP will unlock a world of expertise, knowledge and experience across electrical and automation products, systems and solutions.

What makes NHP different from our competitors are these three distinct promises.

THE POWER OF LOCAL

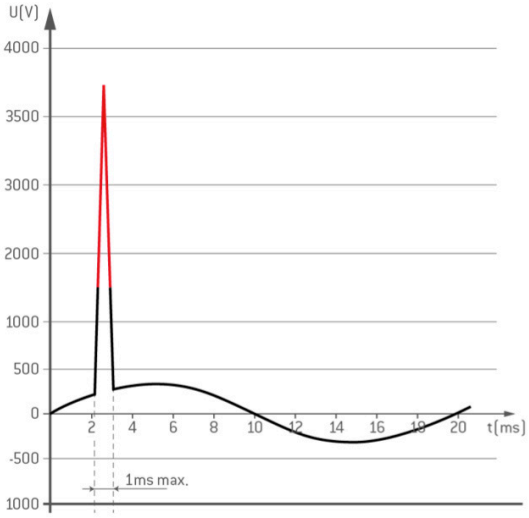
In your local community, city and industry, we understand your specific project needs.

THE POWER OF CHOICE

Choice in product, technology, service, and support enabling you to customise and push boundaries.

THE POWER OF GLOBAL PARTNERS

With a global network of suppliers, we bring the world's best products and knowledge to your doorstep.



Introduction to Surge Protection

What are surges?

Surges are transient over voltages that can reach tens of kilovolts with durations in the order of microseconds. Despite their short duration, the high energy content can cause serious problems to equipment connected to the line like premature aging of electronic components, equipment failure or disruptions to service and financial loss.

Origin of surges

Lightning: The most destructive source of surge. Based on the IEC 61643-12 standard, energy from lightning can reach up to 200 kA. However for reference, estimates indicate 65% are less than 20kA and 85% are less then 35kA.

Induction: Sources include cloud to cloud lightning or nearby lightning impacts where the current flow induces an over voltage on supply lines or other metallic conductors.

There is no way of really knowing when, where, the size, or the duration/waveform of a surge. Therefore within the Standards some assumptions have been made and 2 main waveforms have been chosen to simulate different surge events:

Types of Surges

Conduction

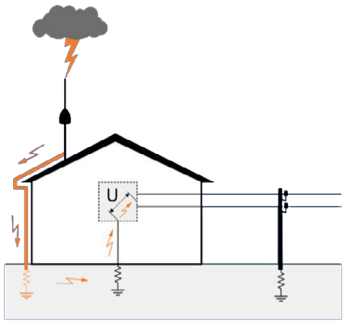
Conduction or 10/350µs simulates energy from lightning direct impact

Induction

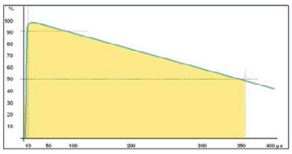
Induction or 8/20µs simulates energy from indirect lightning impact

Important
Don't confuse this kA rating with the fault levels of the installation. Fault ratings given by the transformer are kA for 1 second. Surge kA rates are for micro seconds. Protection in front of surge will be based on this statement.

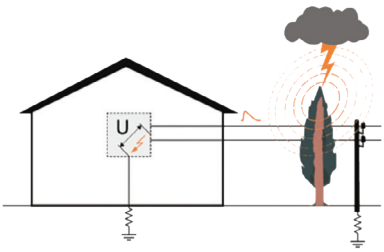
Conduction



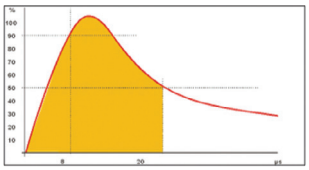
Current wave 10/350



Induction



Current wave 8/20



Internal sources: These are the main source of surge in real life

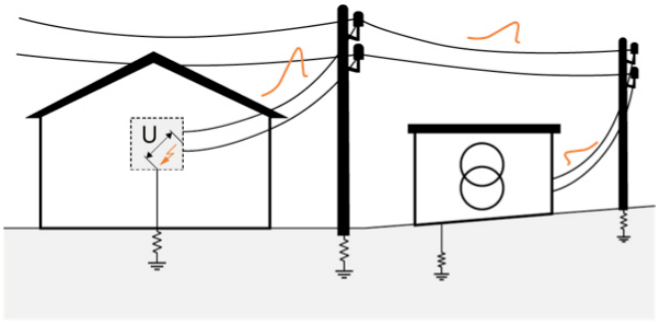
They come from utility grid switching, disconnection of motors or other inductive loads. Energy from these sources is also analysed with the 8/20 wave form.

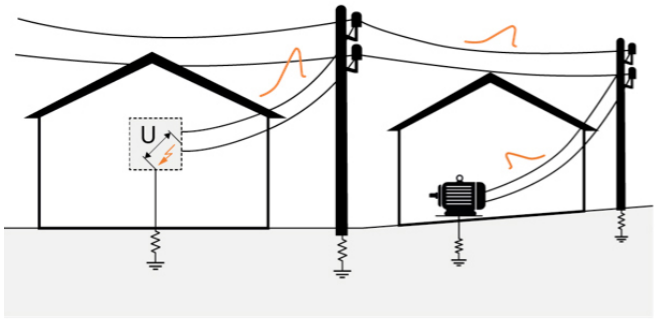
Transient over voltages do not occur solely in power distribution lines, and are also common in any line formed by metal conductors, such as telephony, communications, measurement and data.

Protector in front of surges: SPD (Surge Protection Device)

A transient over voltage protection device acts as a voltage controlled switch and is installed between the active conductors and ground in parallel with the equipment to be protected. When the supply voltage is lower than its activation voltage, the protector acts as a high-impedance element so that no current flows through it. When the supply voltage is higher than the activation voltage, the protector acts as an element with impedance close to zero, diverting the over voltage to earth and preventing it from affecting equipment downstream.

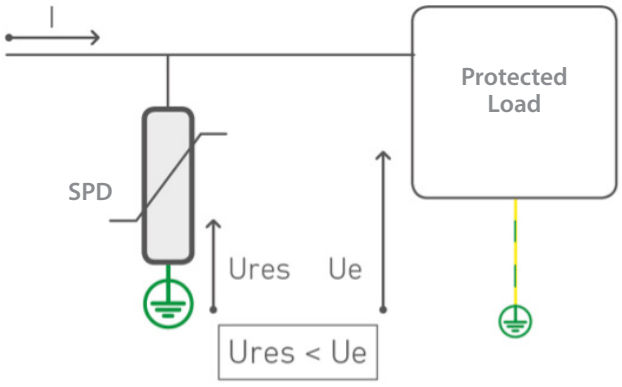
Nevertheless, in the terminals of the SPD there will always be a residual voltage (Ures) which it is not a fixed rate. Higher surge current leads to higher residual voltage. To protect your electrical equipment the residual voltage across the SPD, including the wires and connections, needs to be less than the over voltage withstand of the equipment.





Above
Electrical surge created by switching utility grid.

Bottom
Electrical surge created when discounting electrical motors.



I: peak current.
U_{res}: voltage protection level. Residual voltage at In.
U_e: impulse voltage the equipment can withstand

3P or 4P? When is the N-PE pole required

Surge Protection Devices (SPDs) are installed in parallel upstream from electrical equipment in a position such that, during any excessive voltage event, the SPD will act as a low-impedance path to earth. This channels the high voltage energy away from the downstream equipment before its voltage withstand rating is exceeded thus avoiding damage.

A common enquiry regarding SPDs is the distinction between the application of 3 pole and 4 pole devices. In the case of TN-C-S wiring systems, the neutral conductor is directly connected to earth (MEN link). Should an SPD be installed within 10 metres of this MEN link, only a 3 pole device is required. The additional N-PE pole provided by 4 pole devices is made redundant in this situation as there is already a path to earth through the neutral via the MEN link. This has been further clarified and confirmed in AS/NZS1768. Reference 5.6.3.7

However, if an SPD is installed further than 10 metres from a MEN link, a 4 pole SPD is required. As the impedance to earth increases with cable length, a surge energy now has the potential to enter the network after the MEN link and damage the downstream equipment.

Classification of protectors

Protection devices are classified into types according to discharge capacity:

Type 1:

- Tested with a 10/350 µs waveform (Class I test), which simulates the current produced by a direct lightning strike.
- Ability to discharge very high currents to earth, providing a high Up - voltage protection level.
- Must be accompanied by downstream Type 2 protectors. Designed for use in incoming power supply panels where the risk of lightning strike is high, for example in buildings with an external protection system.

Type 2:

- Tested with a 8/20 µs waveform (Class II test), which simulates the current produced in the event of a switching or lightning strike on the distribution line or its vicinity.
- Ability to discharge high currents to earth, providing a medium Up - voltage protection level. Designed for use in distribution panels located downstream of Type 1 protectors or in incoming power supply panels in areas with low exposure to lightning strikes.

Type 3:

- Tested with a combined 1.2/50 µs - 8/20 µs waveform (Class III test), which simulates the current and voltage that can reach the equipment to be protected.
- Ability to discharge medium currents to earth, providing a low Up - voltage protection level. Always installed downstream of a Type 2 protection designed to protect sensitive equipment or equipment located more than 20m downstream of the Type 2 device.

The technology can provide protection solutions that combine different types of protection: Type 1+2 and Type 2+3.

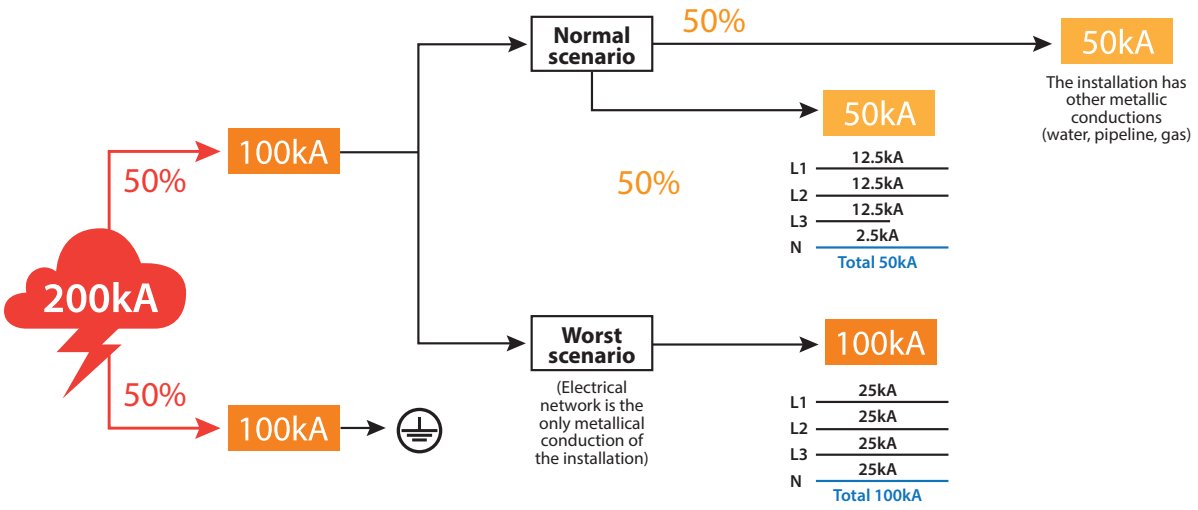
Important Note

UL1449 uses similar parameter units, however the tests are different giving different results. When assessing SPDs ensure you are comparing IEC parameters with IEC parameters. Don't mix standards.

SPD features based on the IEC 61643 standard

Protector parameters

U_p Level of protection	Maximum residual voltage between the terminals of the protection device during the application of a peak current.
I_n Nominal current	Peak current in 8/20 µs waveform the protection device can withstand 20 times without reaching end of life.
I_{max} Maximum discharge current	Peak current with 8/20 µs waveform which the protection device can withstand.
U_c Maximum continuous operating voltage	Maximum effective voltage that can be applied permanently to the terminals of the protection device.
I_{imp} Impulse current	Peak current with 10/350 µs waveform which the protection device can withstand without reaching end of life.



SPD placement in your design

Where to start the protection design?

As the origin of the installation, the main switchboard is the place to start the design of SPDs on the network.

How to start the protection design?

As previously stated, the SPD protection design does not depend on the fault ratings given by the transformer it only depends on the level of exposure in front of surge. So, what SPD do we have to install in the main switchboard?

See the diagram above from IEC 63205-1 standard which displays the dispersion of the highest lightning considered: 200kA @ 10/350µs.

In the worst case scenario, 50% of this energy is conducted away to earth leaving 100kA potential across the networks 3 phase and neutral.

Here a 25kA @ 10/350µs (I_{imp}) Type 1 SPD is highly recommended for cases when a lightning strikes on or close to the building's earth connection – in particular when a building has a lightning rod.

In the "Normal Scenario" it is assumed any direct lightning strike to the network will be at such a distance from the installation that another 50% of the energy is dispersed to earth via other conductors before entering your point of connection. In this scenario a device with a 12.5kA @ 10/350µs (I_{imp}) Type 1 is recommended. Furthermore, based on the IEC 61643-12 standard, 12.5 kA is the minimum kA rating when a Type 1 is needed.

If the level of exposure of the installation is lower than above described scenarios Type 2 SPD (I_{max}) may be considered along with risk and cost of equipment and downtime.

Do we have to consider more SPDs in the distribution boards?

The IEC 60634-4-443 standard classifies electrical devices in categories, depending on how sensitive they are to the surge over voltage (U_e). Category 1 devices (electronic receivers) are the most sensitive, U_e has to be at least 1.5kV. Whereas category 4 devices can withstand 6kV or more. Generally, components in main switchboards are category 4 devices ie ACB, MCCB etc.

Category	IV	III	II	I
230/400 lines	Counters / MCCB / ACB	MCBs and RCCDs	Electrical devices	Electronic receivers
Example				
Impulse voltage withstand	6kV	4kV	2.5kV	1.5kV

Then, let's consider an example below, where a Type 1+2 SPD is installed in the main distribution board of an installation. Following chart analysis, the status of the SPD, the status of the category 1 loads (the most sensitive U_e: 1.5kV) in front of different surge scenarios:

		I_{imp} = 25kA I_{max} = 100kA I_n = 25kA $U_p \leq$ 1.5kV	U_e = 1.5kV
		In accordance with the IEC 61643-11	Robustness classification for electric and electronic devices according to IEC 60634-4-443
			
Surge Example	**≤ 25kA**	👍	👍
	100kA	👍	👎
	10kA	👎	👎

Statements

1) For discharges over the maximum capacity (I_{max}) of the SPD, the loads and the SPD itself will be damaged.

2) I_{imp} and I_{max} describe the maximum surge level the SPD itself can withstand but do not describe the protection.

3) Only I_n describes the level of protection as at In the residual voltage, U_p, is seen.

4) As surges may be induced in cable between the main switchboard and distribution board or by the final loads themselves, a SPD in the main switchboard may not be close enough to direct a surge in time to protect other final loads.

Conclusions

1) With just one stage of protection only equipment close to the SPD is protected and only up to a surge of I_n.

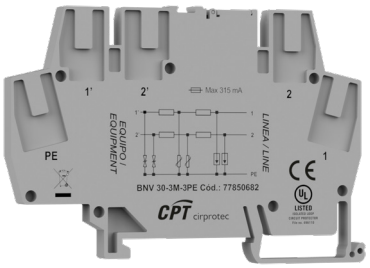
2) To improve the protection possibilities, at least, a second stage of protection in a distribution board is a must. This SPD design is called cascading protection.

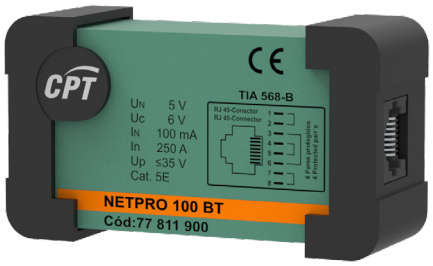
Do I need to install a third stage of surge protection devices?

A third stage of surge protection installed at the final load may be considered depending on what loads it, how critical, expensive, cost of downtime and sensitive it is. If the cost of the equipment and/or downtime is high then installing a third stage Type 3 (1.5/50µs) device will further reduce the risk of any last surge energy getting to your equipment.

Examples of applications that should include a 3rd stage of surge protection are:

- Hospitals
- Data Centres
- Airports
- Banking and Insurance
- Transportation





* See pages 11 and 12 for fine protection diverters

Selection Guide - First Stage of Surge Protection

Service Entrance - Generally in the main switchboard

Main switchboard

Does the building have external lightning protection?
(A lightning rod)

YES →

NO ↓

Conducted Lightning Energy
- Direct lightning strike to building
- Lightning rod

Worst case as per IEC 61643
Because the lightning rod increases the likelihood of a lightning strike and secondly as the strike is local a maximum proportion of the energy will enter the supply.

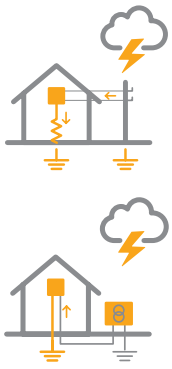
USE I_{imp} 25kA
(10/350 µs waveform)

Type 1 + 2 PSC - 25 kA →

SPD Distance from M.E.N link		Poles	NHP Part No.
Single Phase	< 10m	L-N	CPT-PSC1-25-230IR
	> 10m	L-N+PE	CPT-PSC2-25-230IR
Three Phase	< 10m	L-L-L-N	CPT-PSC3-25-400IR
	> 10m	L-L-L-N+PE	CPT-PSC4-25-400IR

Parameters per Range	
I_{imp}	25 kA
I_{max}	100 kA
I_{msc}	200 kA
I_n	20 kA
U_p	≤ 1.5 kV

Does your building have overhead supply or is in a region with greater than 2.2 lightning flashers per km² per year*?



YES →

NO ↓

Conducted Lightning Energy
- Direct strike to overhead lines but at a distance

Normal case as per IEC 61643
It is assumed that it is less likely the energy from a lightning strike will enter the supply and if it does a greater percentage of the energy will already have been diverted to earth by other conductors.

USE I_{imp} 12.5kA
(10/350 µs waveform)
- Consider upgrading to I_{imp} 25kA

Type 1 + 2 PSC - 12.5 kA →

SPD Distance from M.E.N link		Poles	NHP Part No.
Single Phase	< 10m	L-N	CPT-PSC1-12-230IR
	> 10m	L-N+PE	CPT-PSC2-12-230IR
Three Phase	< 10m	L-L-L-N	CPT-PSC3-12-400IR
	> 10m	L-L-L-N+PE	CPT-PSC4-12-400IR

Parameters per Range	
I_{imp}	12.5 kA
I_{max}	65 kA
I_n	20 kA
U_p	≤ 1.5 kV

Underground mains supply

YES →

Induced Surges Events

- Cloud to cloud lightning
- Supply Network switching
- Inductive/Capacitive loads

It is assumed that no energy from a lightning strike will directly enter the supply

USE I_{max} 40kA
(8/20µs waveform)
- Consider upgrading to PSC I_{imp} 12.5kA

Type 2 PSM - 40 kA →

SPD Distance from M.E.N link		Poles	NHP Part No.
Single Phase	< 10m	L-N	CPT-PSM1-40-230IR
	> 10m	L-N+PE	CPT-PSM2-40-230IR **
Three Phase	< 10m	L-L-L-N	CPT-PSM3-40-400IR
	> 10m	L-L-L-N+PE	CPT-PSM4-40-400IR **

* Replace IR with SG for inbuilt earth loop impedance monitoring

Parameters per Range	
I_{max}	40 kA
I_n	20 kA
U_p	≤ 1.3 kV

Second Stage of Surge Protection

Generally, in the distribution board

Distribution board

Type 2 PSM - 40 kA

SPD Distance from M.E.N link		Poles	NHP Part No.
Single Phase	< 10m	L-N	CPT-PSM1-40-230IR
	> 10m	L-N+PE	CPT-PSM2-40-230IR **
Three Phase	< 10m	L-L-L-N	CPT-PSM3-40-400IR
	> 10m	L-L-L-N+PE	CPT-PSM4-40-400IR **

Parameters per Range	
I_{max}	40 A
I_n	20 kA
U_p	≤ 1.3 kV

Type 2 PSM - 20 kA

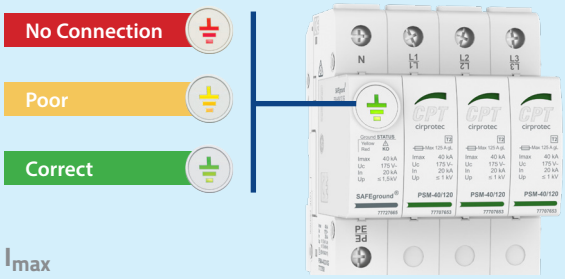
SPD Distance from M.E.N link		Poles	NHP Part No.
Single Phase	< 10m	L-N	CPT-PSM1-20-230IR
	> 10m	L-N+PE	CPT-PSM2-20-230IR **
Three Phase	< 10m	L-L-L-N	CPT-PSM3-20-400IR
	> 10m	L-L-L-N+PE	CPT-PSM4-20-400IR **

Parameters per Range	
I_{max}	20 kA
I_n	10 kA
U_p	≤ 1.3 kV

Type 2: PSM- 40 SafeGround Series with integrated Earth Loop Impedance Monitoring

**Upgrade the PSM range to SAFEGROUND® to monitor the earth connection critical to provide a path to direct surge energy.

Ground status



I_{max}
40kA (type 2)

Effective surge protection

When the SAFEGROUND® LED is green, it indicates that the ground path is good enough to shunt the energy peaks to ground effectively.

Confirmation of propper installation

When the SAFEGROUND® LED isv green, it indicates that the protection device is properly wired and powered up.

Safety information in the event of indirect contact

When the SAFEGROUND® cannot detect any ground connection, it is advisable to check the installation status.

*Check the lightning density in your region here:

Australia:
http://www.bom.gov.au/jsp/ncc/climate_averages/thunder-lightning/index.jsp

New Zealand:
https://statisticsnz.shinyapps.io/lightning_strikes/

Based on Australia and New Zealand's Main Electrical supply of 230 / 400 V AC. For other voltages, please contact NHP.

Electrical network diverters

CPTPSC3-25-400IR

Type 1+2: PSC-25 and PSC-12 Series

The PSC pluggable range consists of Type 1+2 surge protective devices with low Up (protection of downstream equipments) for single-phase and three-phase electrical power networks. These units are ideal for protection of service entrances and distribution panels in areas exposed to lightning activity or externally generated heavy transients.

No. of phases	Width (in multiples of 18 mm)	I_{imp}	I_{max}	Connection	I_n	U_c	U_p	Catalogue No.
0	1	25 kA	65 kA	N+PE	25 kA	255 V	< 1.5 kV	CPTPSC1-25N
0	1	50 kA	100 kA	N+PE	50 kA	255 V	< 1.5 kV	CPTPSC1-50N
0	2	100 kA	100 kA	N+PE	50 kA	255 V	< 1.5 kV	CPTPSC1-100N
1	1	12.5 kA	65 kA	L-N	25 kA	275 V	< 1.3 kV	CPTPSC1-12-230 IR
1	1	25 kA	100 kA	L-N	25 kA	275 V	< 1.3 kV	CPTPSC1-25-230 IR
1	2	12.5 kA	65 kA	L-N+PE	25 kA	275 V	< 1.3 kV	CPTPSC2-12-230 IR
1	2	25 kA	100 kA	L-N+PE	25 kA	275 V	< 1.3 kV	CPTPSC2-25-230 IR
3	3	12 kA	100 kA	L-L-L-N	25 kA	440 V	< 1.3 kV	CPTPSC3-12-400 IR
3	6	25 kA	100 kA	L-L-L-N	25 kA	440 V	< 1.3 kV	CPTPSC3-25-400 IR
3	4	12.5 kA	65 kA	L-L-L- N+PE	25 kA	440 V	< 1.3 kV	CPTPSC4-12-400 IR
3	8	25 kA	100 kA	L-L-L-N+PE	25 kA	440 V	< 1.3 kV	CPTPSC4-25-400IR

CPTPSM4-40-400 IR

Type 2: PSM- 40 Series

The PSM-40 pluggable range consists of Type 2 surge protective devices designed for protection against transient overvoltages in single-phase and three-phase electrical power networks. These units are ideal for protection of distribution and branch panels which should be installed downstream of a Type 1 device.

No. of phases	Width (in multiples of 18 mm)	I_{max}	Connection	I_n	U_c	U_p	Catalogue No.
0	1	40 kA	N+PE	20 kA	265 V	< 1.5 kV	CPTPSM1-40N
1	1	40 kA	L-N	20 kA	275 V	< 1.3 kV	CPTPSM1-40-230 IR
1	2	40 kA	L-N+PE	20 kA	275 V	< 1.3 kV	CPTPSM2-40-230 IR
3	4	40 kA	L-L-L-N+PE	20 kA	275 V	< 1.3 kV	CPTPSM4-40-400 IR

CPTPSM4-40-400 SG

Type 2: PSM- 40 SafeGround Series with integrated Earth Loop Impedance Monitoring

No. of phases	Width (in multiples of 18 mm)	I_{max}	Connection	I_n	U_c	U_p	Catalogue No.
1	2	40 kA	L-N+PE	20 kA	440 V	< 1.3 kV	CPTPSM2-40-230 SG
3	4	40 kA	L-L-L-N+PE	20 kA	440 V	< 1.3 kV	CPTPSM4-40-400 SG

Fine protection diverters

CPTPSM2-20-230 IR

Type 2+3: PSM-20 Series

The PSM-20 pluggable range consists of Type 2+3 surge protective devices designed for fine protection of sensitive equipment in single phase or three phase networks. These units should be installed as close as possible to the equipment you intended to protect and finalise the offering as a cascaded surge protected network, downstream of a Type 2 device.

No. of phases	Width (in multiples of 18 mm)	I_{max}	Connection	I_n	U_c	U_p	Catalogue No.
0	1	20 kA	N+PE	10 kA	255 V	< 1.5 kV	CPTPSM1-20N
1	1	20 kA	L-N	10 kA	320 V	< 1.4 kV	CPTPSM1-20-230 IR
1	2	20 kA	L-N+PE	10 kA	320 V	< 1.4 kV	CPTPSM2-20-230 IR
3	4	20 kA	L-L-L-N+PE	10 kA	320 V	< 1.4 kV	CPTPSM4-20-400 IR

CPTDM2-230-20A

Type 2+3: DM2 series with EMI filter

The DM2 Type 2+3 surge diverter and filter is used to protect sensitive equipment. The unit has an EMI filter that reduces high-frequency disturbance propagated through the network, which can affect the operation of connected equipment. The DM2 is installed in series with the equipment to be protected and activates with different discharge stages, which are co-ordinated so as to provide a lower residual voltage at the output while at the same time being able to shunt a high discharge current.

I_{max}	I_n	I_{nom}	EMI / RFI Noise Rejection	U_c	U_p	Catalogue No.
20 kA (L-G)	10 kA (L-G)	20 A	- 74 dB (differential mode)	275 V	< 1.2 kV	CPTDM2-230-20A
20 kA (N-G)	10 kA (N-G)		- 82 dB (common mode)			

CPTCSF21-230 IR

Type 2+3: CSF-21 Series

CSF is the range of combined Type 2+3/Type II+III devices intended for protecting against induced voltage surges (8/20 µs) while providing a very fine protection (1,2/50 µs) to sensitive equipment, in accordance with the IEC/EN 61643-11 standard. Suitable for the second and final steps of protection in panels with Type 2 protection devices installed upstream, such as PSM 40. These systems should be installed as close as possible to the equipment to be protected. Ideal for small spaces. Wide range of rated voltages.

U_n (V)	U_c (V)	I_{max}	I_n (kA)	U_p	Catalogue No.
12	20	6	3	≤0,22 (L1-L2) 0,7 (L1/L2-PE)	CPTCSF21-12 IR
24	30	6	3	≤0,22 (L1-L2) 0,7 (L1/L2-PE)	CPTCSF21-24 IR
48	60	6	3	≤0,33 (L1-L2) 0,7 (L1/L2-PE)	CPTCSF21-48 IR
60	75	6	3	≤0,5 (L1-L2) 0,9 (L1/L2-PE)	CPTCSF21-60 IR
120	150	6	3	≤0,7 (L1-L2) 0,9 (L1/L2-PE)	CPTCSF21- 120 IR
230	275	20	10	≤1,4 (L1-L2) 1,4 (L1/L2-PE)	CPTCSF21-230 IR

CPTDIN24V-3A

Type 3: DIN V-3A Series

The DIN 24 V-3 A Type 3 unit is designed for installations and equipment supplied with 24 V and is installed in series and as close as possible to the equipment being protected.

I_{max}	I_n	I_{nom}	U_c	U_p	Catalogue No.
10 kA	< 5 kA	3 A	30 V	< 0.045 kV	CPTDIN24V-3A

Fine protective diverters

Telephone lines, Data Network, Measurement and Control

	Signal type	Maximum comms. voltage	Protected wires	Maximum transmission frequency	Protection format	Connector type	Product reference
Telephone lines				3MHz	DIN	Terminal	CPTDIN-ADSL
 CPTKPL1CG	ADSL telephony	200 V	2	3MHz	Aerial	RJ11 Female	CPTMCH-ADSL
				3MHz	krone	Krone terminal block	CPTKPL1 CG
				3MHz	R &M	R&M terminal block	CPTTPL1 CG
Data network			4x2	Cat. 5e (250MHz)	1 pole	RJ45 Female	CPTNETPRO 100 BT
	Ethernet Cat. 5e	5 V	(4x2)x18	Cat. 5e (250MHz)	18 pole rack	RJ45 Female	CPTNETPRO CG18P (CAT. 6)
			(4x2)x24	Cat. 5e (250MHz)	24 pole rack	RJ45 Female	CPTNETPRO CG-24P (CAT. 5.e)
 CPTNETPRO100BT	Ethernet Cat. 6	5 V	4x2	Cat. 6 (250MHz)	1 pole	RJ45 male UTP cable	CPTNETPRO CG-1P M
			(4x2)x18	Cat. 6 (250MHz)	18 pole rack	RJ45 Female	CPTNETPRO CG18P (CAT. 6)
			(4x2)x24	Cat. 6 (250MHz)	24 pole rack	RJ45 Female	CPTNETPRO CG-24P (CAT. 6)
	Power over Ethernet, POE	48 V DC / 5 V DC	4x2	Cat. 6	1 pole	RJ45 Male (cable)	CPTNETPRO 1P POE (CAT. 6)
Measurement and control	Profibus PA	24 V	1 pair	4MHz	DIN	Terminal	CPTDIN 24V-2C
				3MHz	DIN	Terminal	CPTBNV 30
 CPTBNV30			2 pairs	2MHz	DIN	Terminal	CPTDIN 24V-2G2
			2+GND	2MHz	Sub-D 9	Sub-D	CPT DB9-PFB/2HS
	RS 485 / 422	12 V	1 pair	1.2MHz	DIN	Terminal	CPTDIN 485-2C
 CPTDIN12V-2C			1 pair+GND	3MHz	DIN	Terminal	CPTDIN 485-3
			2 pair+GND	3MHz	DIN	Terminal	CPTDIN 485-5N
		24 V	1 pair	4MHz	DIN	Terminal	CPTDIN 24V-2C
			2 pairs	2MHz	DIN	Terminal	CPTDIN 24V-2G2
	4 - 20 mA	12 V	1 pair	1.2MHz	DIN	Terminal	CPTDIN 12V-2C
 CPTDIN24V-2G2		24 V	1 pair	4MHz	DIN	Terminal	CPTDIN 24V-2C
				3MHz	DIN	Terminal	CPTBNV 30
				4MHz	DIN	Terminal	CPTDIN 24V-2C
			2 pairs	2MHz	DIN	Terminal	CPTDIN 24V-2G2
	Binary signals	12 V	2	1.2MHz	DIN	Terminal	CPTDIN 12V-2C
 CPTDIN485-3		24 V	2	4MHz	DIN	Terminal	CPTDIN 24V-2C
				3MHz	DIN	Terminal	CPTBNV 30
			4	2GHz	DIN	Terminal	CPTDIN 24V-4G1
	Temperature probe (PTC)	6 V	1 pair	1MHz	DIN	Terminal	CPTDIN 6V-2C

- Indent item

Photovoltaic (PV) diverters

Photovoltaic installations are highly exposed to atmospherical phenomena as well as to the resulting power surges and induced over voltages. 80% of the damages affecting inverter units happen as a result of over voltages. Almost 100% of service interruptions in these plants are associated to atmospherical phenomena (lightning strikes or discharges). It is therefore very important that both the DC and AC electrical lines in photovoltaic systems be protected with the appropriate surge protection devices.

DC Protection

CPTPSC3-5-1000IR

PSC3 Pluggable

The PSC3 series of surge protective devices comprises of Type 1+2 pluggable protectors for common and differential mode protection at the DC side of photovoltaic power plants with operating voltages of up to 1500 V.

These units are ideal for protection of PV applications connected to service entrances and distribution panels in areas exposed to lightning activity or externally generated heavy transients.

I_{imp}	I_{max}	I_n	U_{oc}	U_p	Catalogue No.
5 kA	65 kA	20 kA	1000 V DC	< 3.6 kV	CPTPSC3-5-1000IR

CPTPSM3-40-600IR

PSM3 Pluggable

The PSM3 series of surge protective devices comprises of Type 2 pluggable protectors for common and differential mode protection at the DC side of photovoltaic power plants with operating voltages of up to 1500 V.

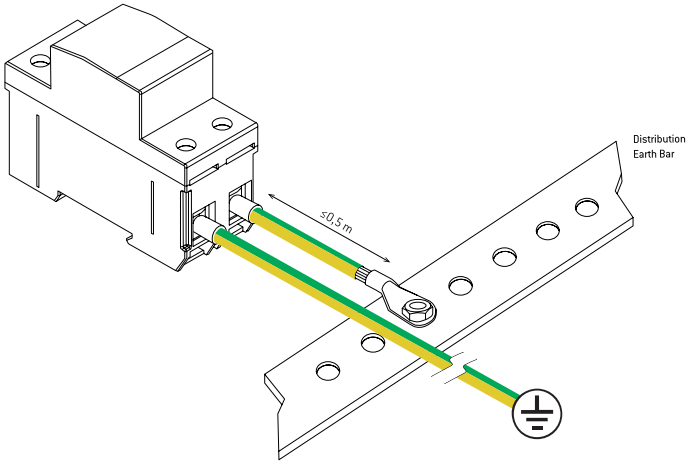
These units are ideal for protection of PV applications connected to distribution and branch panels etc.

I_{max}	I_n	U_{oc}	U_p	Catalogue No.
40 kA	20 kA	600 V DC	< 2.6 kV	CPTPSC3-5-1000IR
40 kA	20 kA	1000 V DC	< 4 kV	CPTPSM3-40-1000IR
40 kA	20 kA	1500 V DC	< 5 kV	CPTPSM3-40-1500IR

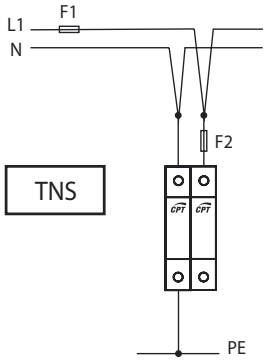
Recommended lengths and connection types according to 61643-12

In order to achieve optimum over voltage protection, connecting conductors of SPDs shall be as short as possible. Long lead lengths will degrade the protection offered by the SPD.

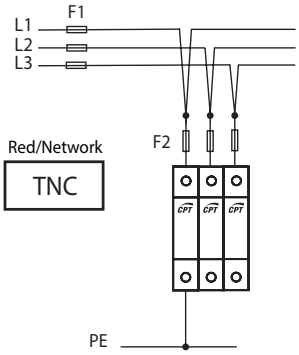
When connecting an SPD in parallel, the optimal connection is a "V-type" (see image to the below). Whenever this is not feasible, the maximum derivation cable length should be less than 0.5m.



Wiring, general considerations (lengths and sections)



< 10m from MEN link



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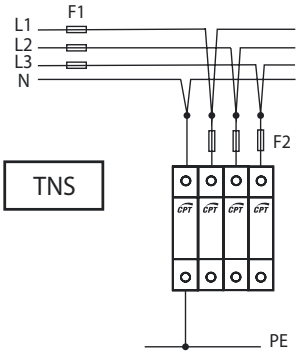
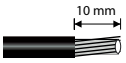
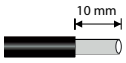


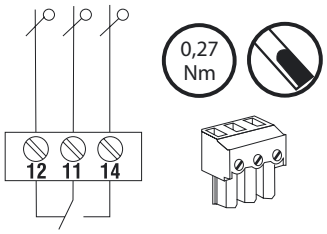
	STRANDED	RIGID
Type of wire		
Ø min. L,N,PE	6mm²	
Ø max. L,N,PE	25 mm²	35 mm²

When do you have to install a back-up fuse or circuit breaker *

Range		Maximum back-up rating according to manufacturer		Recommend back up protection
PSC T12 25	I_{imp} 25kA	If F1>315 A then ↓ F2 315 A	If F1315 A then ↓ F2 not required	250 A gG [1]
PSC T12 12,5	I_{imp} 12,5kA	F1>200 A ↓ F2 200 A	If F1200 A then ↓ F2 not required	160 A gG [1]
PSM T2 40	I_{max} 40kA	F1>125 A ↓ F2 125 A	If F1125 A then ↓ F2 not required	63A MCB [2]
PSM T2 20	I_{max} 20kA	F1>80 A ↓ F2 80 A	If F180 A then ↓ F2 not required	32A MCB [2]

(1) Fuse rating recommended in IEC 61643 for Type 1 SPD
(2) Tested MCB ratings to In and Imax
* If the main circuit breaker has a rating less than the maximum required by the SPD, then additional protection is not required.

Remote indication

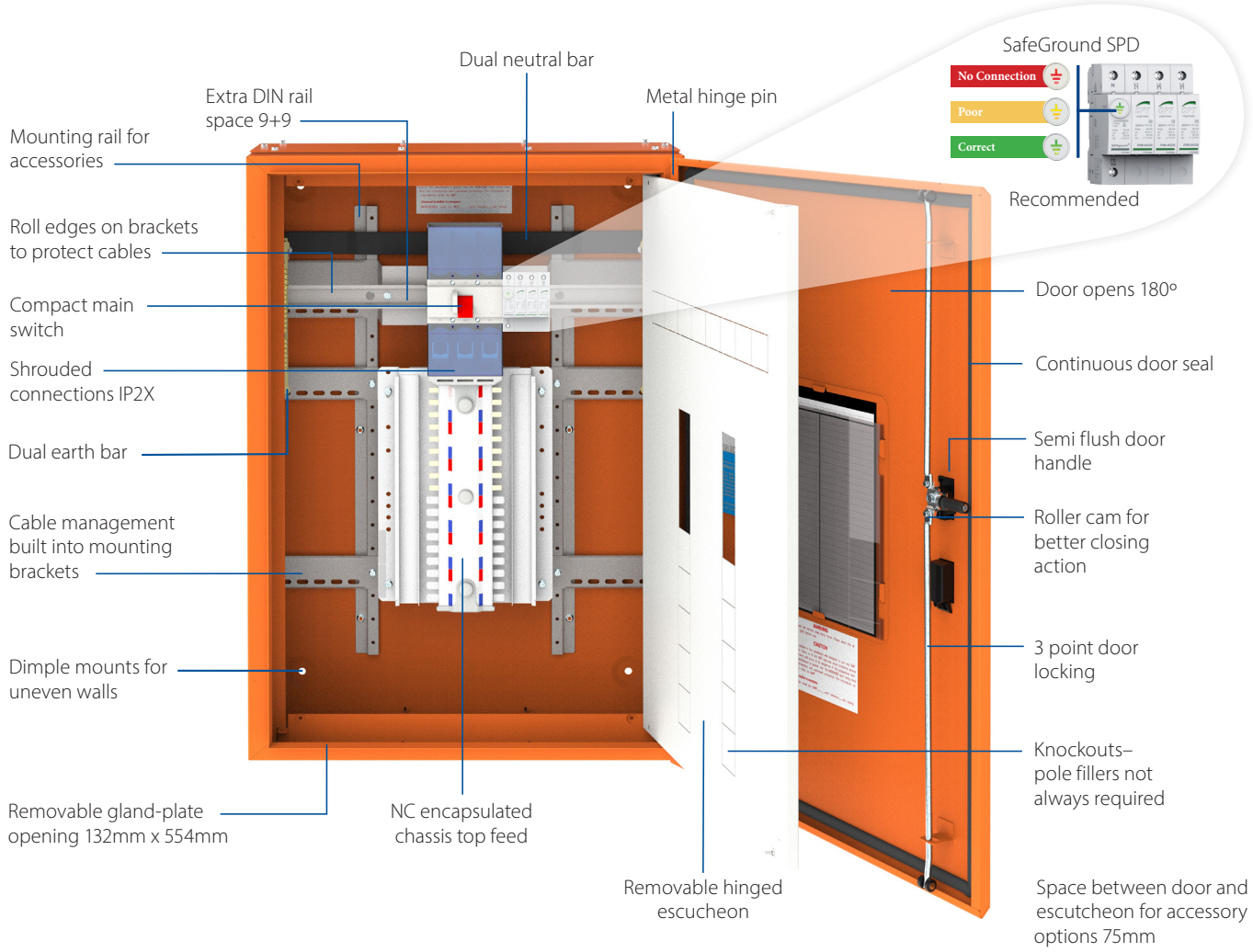


	U_{max} / I_{max}
AC	250V / 1A
DC	125V / 0,2A

max 1,5 mm²
min 0,05 mm²

Concept Panelboards with Surge Protection

An extensive and flexible range of panelboards to suit your various application needs



NHP CONCEPT PANELBOARDS

Concept One

The essential panelboard

The Concept One panelboard offers the core range of essential features. Concept One offers compact enclosure with a neutral finish to blend in.

Concept Plus

The multipurpose panelboard

The Concept Plus panelboard is a multipurpose panelboard for general purpose applications offering large range of features and options. Concept Plus offers IP42 rating with option IP52.

Concept Premier

The premium panelboard

The Concept Premier panelboard is a premium panelboard offering all the features of Concept Plus but also includes additonal features such as IP66 rating, 3 point door locking and stainless steel option. The increased depth between escutcheon and door allows load break handles and locking devices to be fitted

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NHP3BCH 06/20