

cirprotec
by MERSEN

SURGE PROTECTION

OUTDOOR LED
LIGHTING



WHY CHOOSE CIRPROTEC



The specialist brand
in lightning and surge
protection

We protect electrical installations with reliable, certified,
and easy-to-install solutions that ensure maximum safety.



50
INDUSTRIAL
PLANTS

21
R+D+I
CENTERS

4
TESTING
LABORATORIES

MERSEN

CIRPROTEC
TERRASSA

MERSEN CENTRE OF EXCELLENCE IN
SURGE PROTECTION

As part of the Mersen Group, a global leader in electrical protection and a benchmark in surge and overcurrent protection, we strengthen our ability to provide safe, comprehensive, and high-quality solutions. Being part of the group gives us greater technological strength, industrial capacity, and a long-term strategic vision.

Your protection partner

We aim to be your partner in overvoltage protection, providing **a complete solution** in this field: **a wide product range, technical advice, made-to-measure products, luminaire testing, etc.**

Made-to-measure solutions

Cirprotec's R&D department is available to LED lighting manufacturers for the joint development of specific solutions.

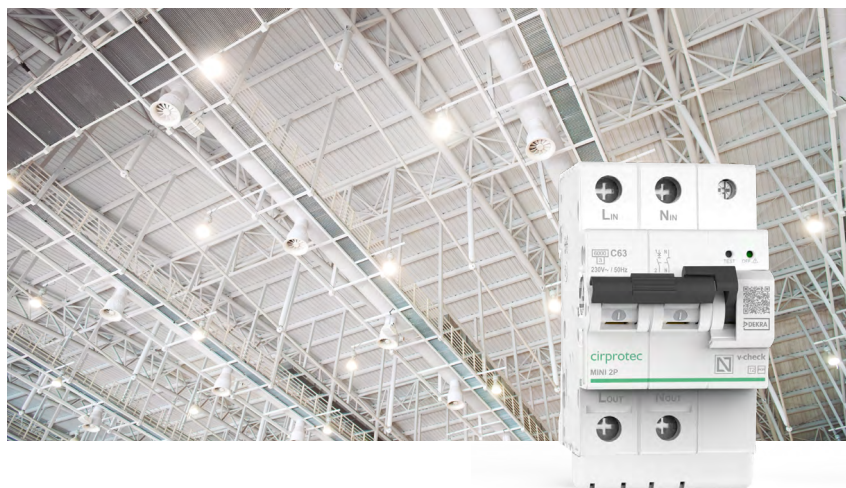
“The leading manufacturers of LED luminaires are protected with Cirprotec”

Your luminaire, protected, tested and certified against overvoltages

At Cirprotec we ensure both the protection of the LED luminaire and the coordinated design between the luminaire and the arrester (SPD).

For manufacturers working with large scale projects, **Cirprotec provides testing and certification of luminaires in terms of resistance to overvoltages in accordance with standards, by an internationally accredited laboratory.**

ADD VALUE TO YOUR LUMINAIRE.



Protection of interior lighting

Interior luminaires are also exposed to overvoltages, caused chiefly by inductions through long runs of wiring.

LED OUTDOOR LIGHTING SYSTEMS

The need for protection

Why is protection needed?

LED technology has become the reference technology for lighting, mainly because of four characteristics: **efficiency, versatility, energy savings and longer life.**

In spite of these benefits, the technology has a number of drawbacks: Higher cost of implementation (initial investment) and internal electronics (LED optics and drivers), much more complex and sensitive to overvoltages than in the case of traditional light sources.

For these reasons, **the use of overvoltage protection systems is a very cost-effective investment**, since it extends the life of the luminaires, ensures the cost effectiveness (ROI) of LED projects and reduces the costs of maintenance and replacement of luminaires.

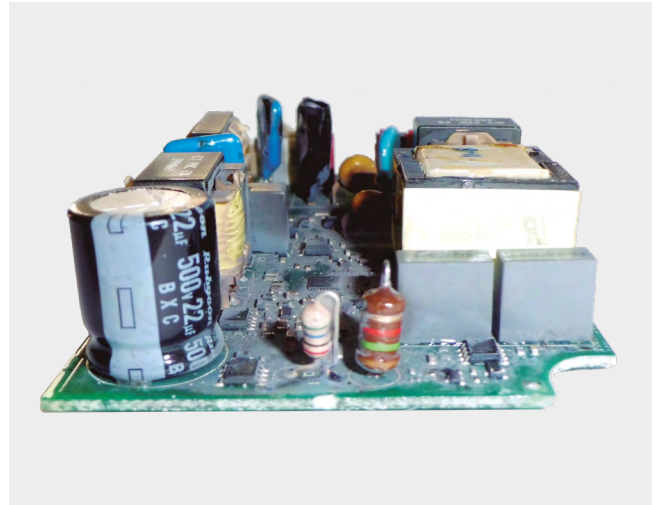
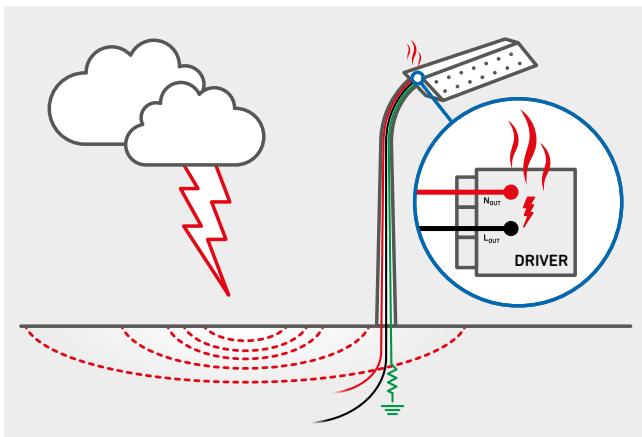
A surge protection device (SPD) connected upstream of the driver, complements the intrinsic immunity of the luminaire, creating much more robust protection against the effects of lightning and overvoltages.

Overview

Luminaires with LED technology are used in a large number of applications where overall exposure to atmospheric phenomena is generally high: **street lighting, tunnels, public lighting, stadiums, industries, etc.**

Overvoltages can be subdivided into 5 different types:

1. **Increased earth potential** due to a nearby strike, depending on the resistivity of physical earth.
2. **Switching** due to normal operation. (e.g. all the luminaires being switched on at once).
3. **Induced** in the circuitry: resulting from the electromagnetic field of a nearby (<500 m) strike.
4. **Direct strike** on a luminaire or supply lines.
5. **Permanent or temporary overvoltages (POP)** due to supply problems



The likelihood of a voltage surge caused by a lightning strike or induction is usually very high in lighting installations, although the risk is determined by the nature of the installation (indoors, outdoors) and the degree of exposure (elevated locations, isolated sites, cable extensions, etc.).

Damage and cost of repairs

Drivers usually have a certain level of immunity (2 to 4 kV) to transient overvoltages. This is enough to pass the tests for luminaires but insufficient to withstand voltage surges caused by lightning (10 kV/10 kA) under field conditions.

The experience of the installed base of the LED lighting industry has shown that **without a proper SPD, a high percentage of luminaires reach end of life prematurely.** This leads to a number of costs for the replacement of equipment, maintenance costs, continuity of service, etc which end up adversely affecting project ROIs and their image.

Continuity of service is vital in lighting installations where good illumination is a key safety issue (crime, road safety, workplace lighting, etc.).

Proper sizing of an "SPD + luminaire" system ensures that repeated overvoltage events do not lead to driver end-of-life, or not before the SPD in the worst case. This translates into cost savings, especially because of the reduction of corrective maintenance actions.

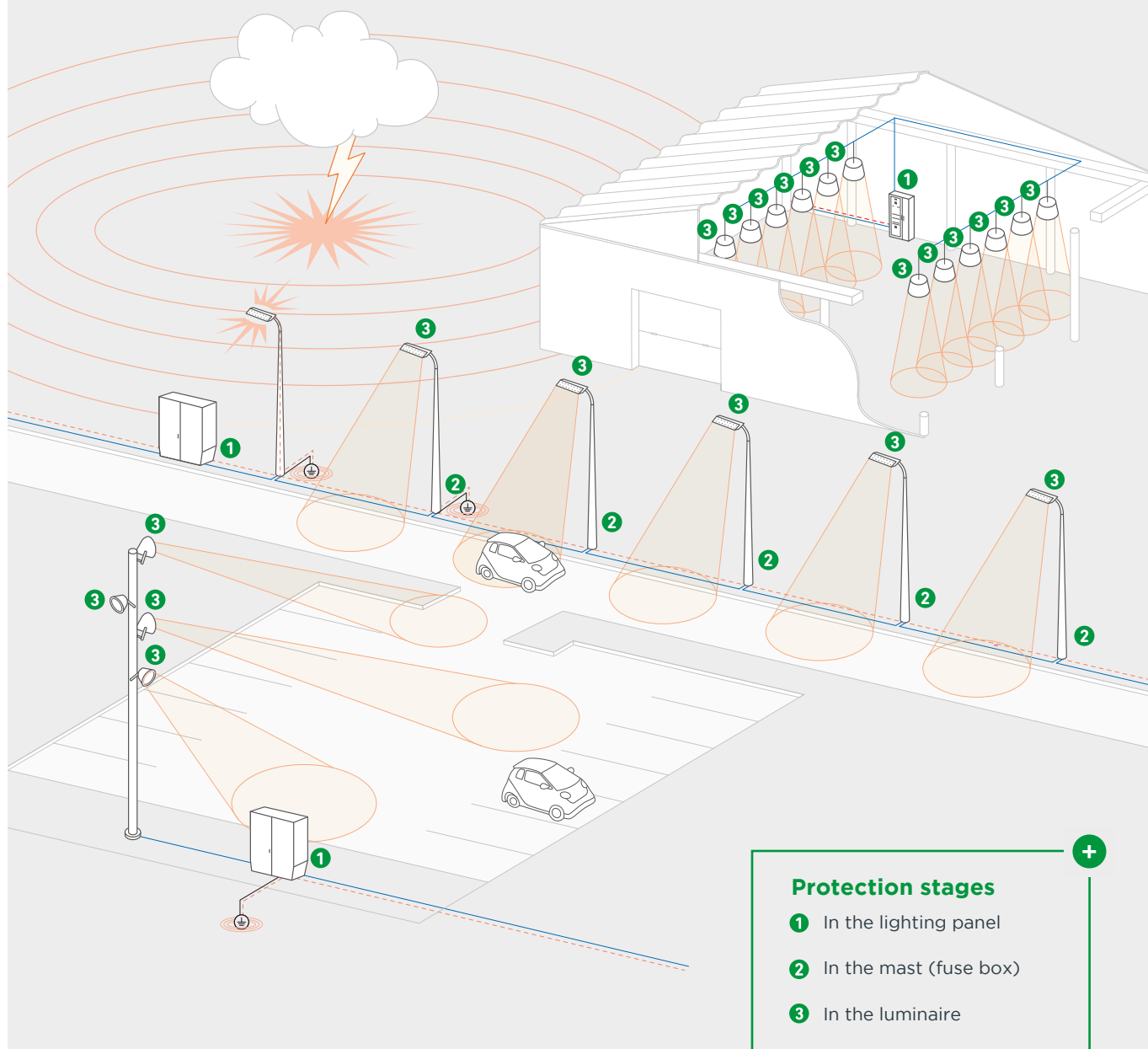
Comprehensive protection

Surge protection devices (SPD) protect equipment by discharging the overvoltage to earth, thus limiting the voltage reaching the equipment (residual voltage).

An effective overvoltage protection design comprises staggered protection, with stages for each of the sensitive components in the system. In this way part of the overvoltage is discharged in each protection stage

until only a small residual voltage is left close to the luminaire.

Protection in the lighting panel ① although necessary, is by itself insufficient because overvoltages can also be induced in long cable runs, which means that the final **protection should always be as close as possible to the equipment being protected ② ③**.



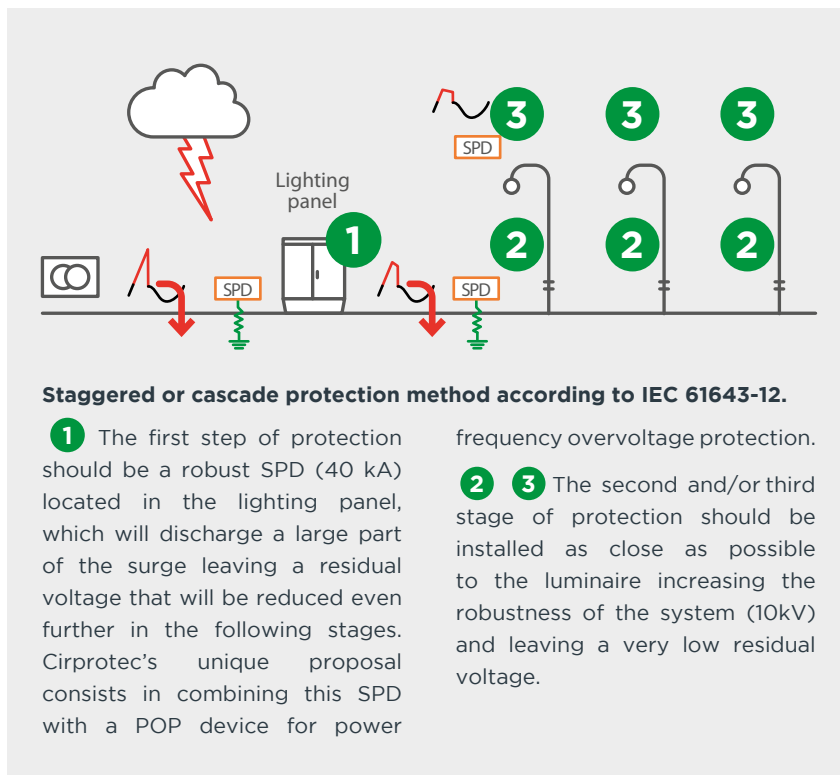
Key design principles for the best protection

Cascade protection

Location of protection

The typical configuration of an outdoor lighting installation consists of a general lighting panel and a set of luminaires with long cable runs between them, and between them and the panel.

For effective protection in a system like this, it is essential to have staggered protection with high discharge capacity and low residual voltage. This requires a minimum of two stages of protection (see table).

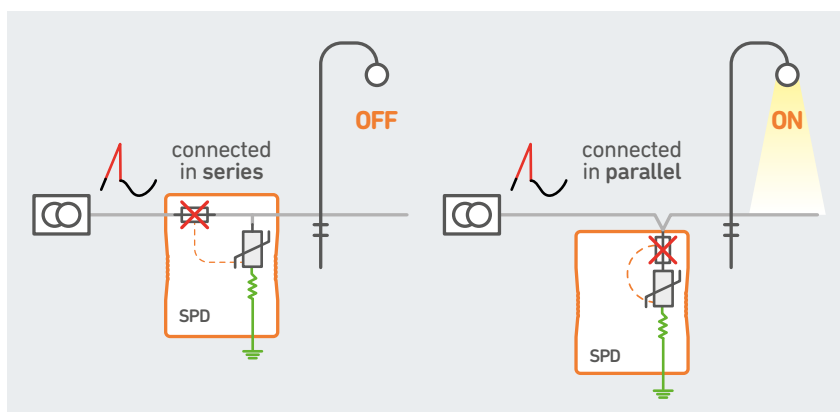


Protection - in series or parallel

Surge protection devices (SPD) can be connected in series or parallel as shown in the image. Each has its advantages and disadvantages

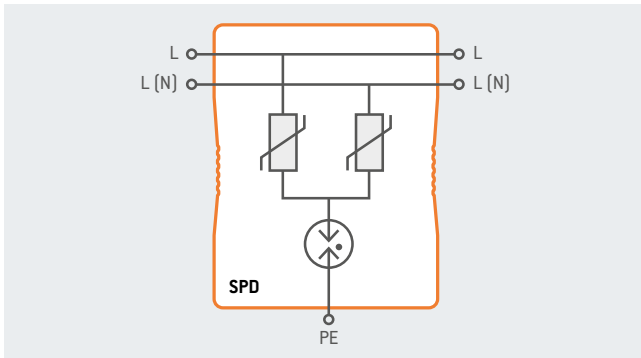
Parallel: if the SPD reaches end-of-life the luminaire will remain connected, giving priority to continuity of service.

Series: if the SPD reaches end-of-life the luminaire will be turned off, giving priority to protection. This connection is recommended because it makes it possible to know if any SPD has reached its end-of-life. This avoids having to open each luminaire to check the status of the arrester.



Safety and universality

Safety and universality are key issues in both the **design and the installation of the luminaire**, since this **provides comfort and peace-of-mind** to the installer or specifier/client. Since the manufacturer often does not know where or how the luminaire is installed, only a UNIVERSAL, SAFE SPD provides a guarantee of proper operation in all cases.



How is the luminaire installed?

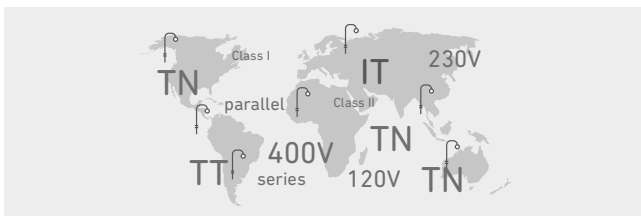
The standard (IEC 60598), requires that **at no time in its life should an SPD generate leakage currents**. To achieve this, a component called a gas discharge tube (GDT) is used, which is not suitable on its own for the Line- PE connection. Since the L-PE connection is crucial to the safety and universality of SPDs, **the solution is to use a symmetrical protection circuit** so that in common mode the SPD will always have a varistor (MOV) in series with GDT to PE.

- **Wiring errors.** Inverting L and N is a typical error that can cause an electrical hazard in the event of surge but which is not detected during installation.
- **SPD wiring in series or parallel.** A compromise between continuity of service and protection for the luminaire. It's for the final customer to decide.

Where is the luminaire installed?

- IT, TT, TN networks. A standard SPD cannot withstand a line-to-earth fault in 120/230 V networks.
- 230 V L-N or L-L networks. These networks are common in several regions and situations, not all SPDs can be connected L-L.

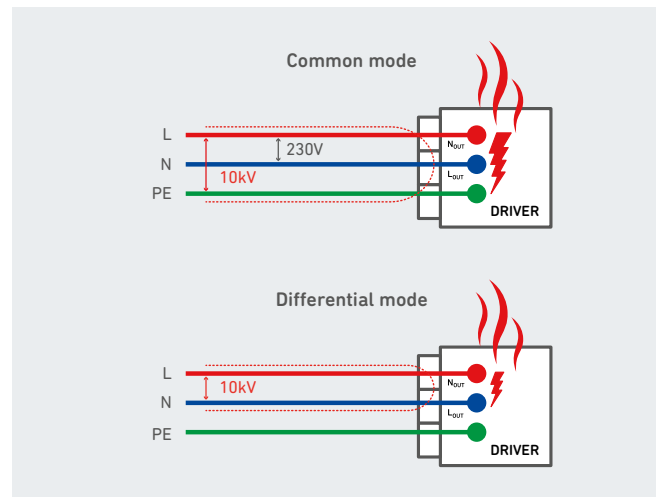
Suitable for all installations worldwide



Common and differential mode

Surge may occur in differential mode, between live L-N conductors or in common mode between live conductors and earth.

Surge in common mode, typical of direct lighting strikes and increases in earth potential, are more destructive than in differential mode, so it is very important to provide earth protection for both Class 1 and Class 2 luminaires. In the majority of Class 2 systems the luminaire mast is made of metal and can generate an arc of tens of kilovolts between the metal structure and the circuitry. An arrester with common mode protection ensures this problem does not arise.

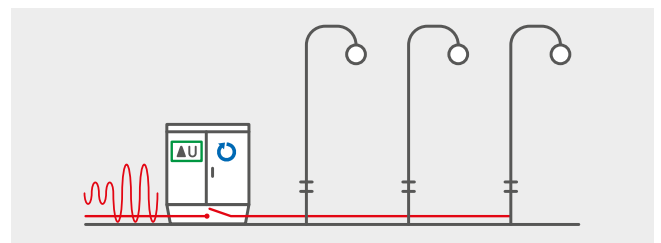


POP protection

Temporary or permanent overvoltages (POP) are increases in voltage of more than 20% of nominal voltage up to 400 V for several seconds, minutes or hours. These overvoltages are usually due to breakage of the neutral or to unbalanced loads. The only way to protect against such events is to disconnect the load, in this case through the contactor.

Temporary overvoltage protection - POP, adds value to the installation:

- Automatic reconnection via the contactor in the lighting panel.
- Tripping curve in accordance with EN 50550.





Standards

- EN IEC 61643-11



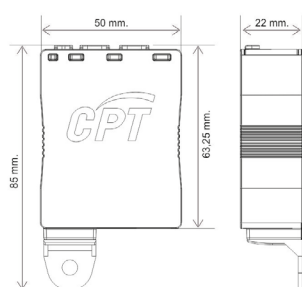
More info



Part numbers

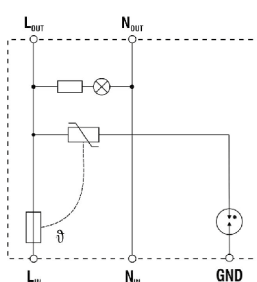
Item number	Item description	Internal conf.	Uc [V]	Un [V]	I _{max} [kA]	In [kA]	IL [A]	Up at In [kV]	Uoc [kV]
77705644	NSB-10/230-C4-WW-IP	C4	320	230/400	10	5	2.5	≤1.5	10

Dimensions

NSB C4

Internal configuration

TT, TN (C4)



LED LIGHTING SPDs

NSS PP



Type 2+3 surge protection device with I_{max} 10 kA, with push-in quick connection and hardwired. The NSS PP range is suitable for protecting LED lighting installations with extremely sensitive electronics.

Standards

- EN IEC 61643-11

Optional accessory providing maximum installation flexibility, allowing the SPD to be mounted in either a vertical or horizontal position depending on the available space inside the luminaire. Please contact our sales team for more information.



Part numbers

Item number	Item description	Internal conf.	Uc [V]	Un [V]	I _{max} [kA]	I _n [kA]	I _L [A]	Up at I _n [kV]	Uoc [kV]
77705975	NSS-10/230-C4-PP	C4	320	230/400	10	5	5	≤1.5	10
77708776	NSS-10/230-C2-PP	C2	320	230/400	10	5	5	≤1.5	10

Dimensions

C2

C4

Internal configuration

TT, TN, IT (C2)

TT, TN (C4)

LED LIGHTING SPDs

NSB DD



Type 2+3 surge protection device (SPD) for transient overvoltages with I_{max} 20 kA, hardwired, with different connection options. NSB DD range is suitable for protecting LED lighting installations with extremely sensitive electronics.

Standards

- EN IEC 61643-11

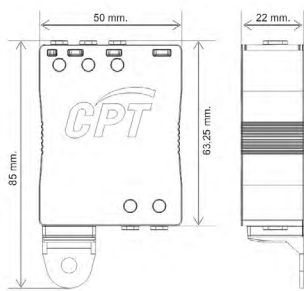


Part numbers

Item number	Item description	Internal conf.	Uc [V]	Un [V]	I _{max} [kA]	I _n [kA]	IL [A]	Up at I _n [kV]	Uoc [kV]
77705891	NSB-20/230-C4-DD	C4	275	230/400	20	10	2.5	≤1.5	20

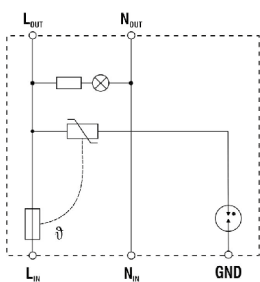
Dimensions

NSB C4



Internal configuration

TT, TN (C4)



LED LIGHTING SPDs

CSF FB



Type 2+3 surge protection device (SPD) for transient overvoltages compact design for installation in fuse-holder enclosures with I_{max} 10 kA. The CSF FB range is suitable for LED lighting installations.

Standards

- EN IEC 61643-11

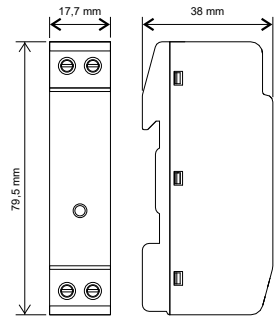


Part numbers

Item number	Item description	Internal conf.	Network configuration	Uc [V]	Un [V]	I _{max} [kA]	I _n [kA]	IL [A]	Up at I _n [kV]	Uoc [kV]
77704120	CSF21-10/230 FB	1+1	TT, TNS	320	230	10	5	2.5	≤1.5	10

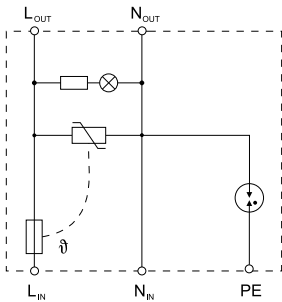
Dimensions

TT, TNS (1+1)



Internal configuration

TT, TNS (1+1)



POWER FREQUENCY OVERVOLTAGE PROTECTION DEVICES

V-CHECK 4RC



Combined protector against permanent (POP) and Type 2 transient overvoltages (SPD) with I_{max} 40 kA. V-CHECK 4RC range is suitable for protecting tertiary/commercial low-voltage installations against overvoltages.

Standards

- EN IEC 61643-11

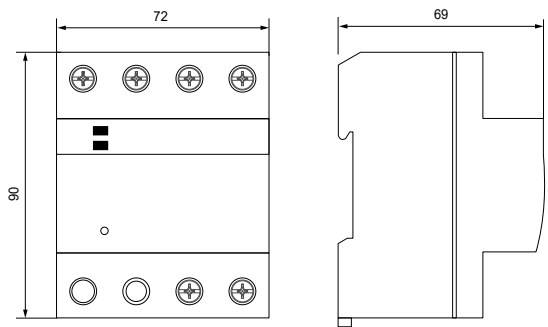


Part numbers

Item number	Item description	N° poles+ conf	N° DIN rail modules	Actuation method	Uc (L-N) [V]	Un [V]	I _{max} [kA]	In (L-N) [kA]	IR
77706417	V-CHECK 4RC	4 Poles, 3P+N	4	Contactor	275	230/400	40	15	
77706418	V-CHECK 4RC IR	4 Poles, 3P+N	4	Contactor	275	230/400	40	15	✓

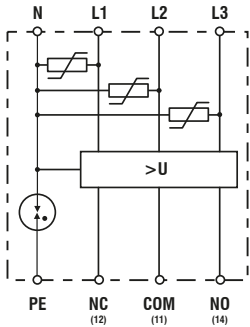
Dimensions

Three-phase



Internal configuration

Three-phase



Applications

A wide range of lighting applications, which by their nature and usage, make overvoltage protection particularly necessary. Good protection guarantees system operation (continuity of service), provides safety and helps protect the investment (ROI) in LED lighting equipment.



Street lighting



Industrial lighting



Public lighting



Car park



Stadiums



Tunnels



THE SPECIALIST BRAND IN LIGHTNING AND SURGE PROTECTIONS

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