Surge Protector

To guarantee optimal LED fixture performance during the expected service life,
Disano provides its luminaires with an advanced surge protector that can withstand surges of up to 8 kV, based on product.
The surge protector is compliant with EN 61547 and has the aim to protect the LED module and related driver. It operates in two modes:

• **differential mode:** surge between power conductors, between the phase conductor to the neutral conductor. Substantially, between phase (L) and neutral (N) no substantial surges are present because voltage peaks are suppressed by other equipment connected to the power line; as a consequence a lower surge protector is sufficient. Depending on the type of product, Disano provides a protection from surges of up to 6 kV.

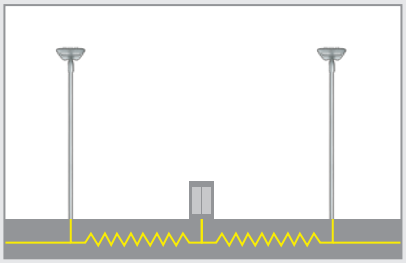
• **common mode:** surge between power conductors, L/N, to the ground or the body of the luminaire if it is classified in class II (i.e. it is installed on a metal pole). Overvoltage in the common mode are generated by lightning strikes and may reach very high levels. Depending on the type of product, Disano provides a protection from surges of up to 8 kV (10kV upon request).

Every year, public/road and amenity lighting managers are called to face the numerous damages caused by lightning and overcurrents. To protect lighting installations from *surge*, i.e. the rapid increase in voltage between parts of opposite polarities and/or the ground, Disano has equipped its luminaires with an EN 61547 compliant **surge protector**, capable of protecting the LED module and their related driver from voltage spikes.

Surge protective device
Street lighting installations and generally all lighting fixtures mounted outdoors are directly exposed to three types of overvoltage which may be caused by:
• the line powering the system/luminaires
• the environment due to the accumulation of electrostatic discharges (ESD)
• lightning strikes falling near the lighting system
LEDs and their related drivers are designed exclusively for low voltage values, making them particularly sensitive to overvoltage. The economic benefits deriving from the use of LED lighting systems could be lost in case of system failure and the consequent maintenance or replacement of the LED modules; it is therefore necessary to equip luminaires with the right surge protective device.

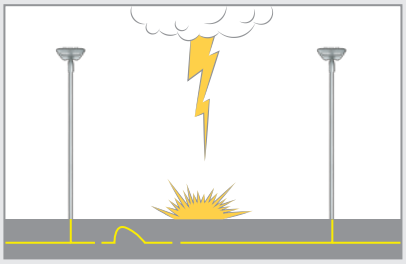
The effects of surges
Surges of reduced magnitude do not necessarily cause the immediate failure of the LED modules or of the drivers that have not been adequately protected. However, if such surges occur very often, they can cause the early wear of the LED and consequently shorten its service life. High power surges caused by lightning, instead may translate into a sudden failure of the LED modules or of the drivers. Overvoltage can cause high current to flow in drivers and in the LED modules, resulting into the following effects:
• partial or total failure of the LED modules or of the drivers
• faster deterioration of the LED modules, shortening their service life
• failure of the command interface

What is a surge
A surge is a rapid increase in voltage on a power line between parts of opposite polarities and/or the ground. Some power surges may exceed the isolation or immunity threshold of electronic components causing it to fail. A power surge may be caused by one of the following conditions:

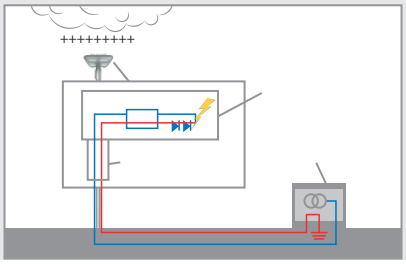


Switching processes/changing the load on the power line

Differential mode: between power conductors, and between the phase conductor and the neutral pole conductor. This mode mainly concerns the primary circuits of the LED driver causing it to fail by short circuit. But if the phenomenon accumulates high energy, it could also affect the LED modules before it dissipates.
Common mode: between power conductors, L/N, to the ground phase or to the body of the luminaire if it is classified in class II (i.e. it is installed on a metal pole). This does not damage the driver's internal circuits but it will be transferred to the secondary circuit, directly affecting the LED modules.



Lightning falling near the installation
These surges are originated when lightning strikes near the lighting installation. The high voltage discharged by the lighting propagates to the ground diminishing its strength as it goes further away from the point where it fell. The metal pole takes on the same potential of the surrounding ground, electrically affecting the LED module and the related driver



Accumulation of electrostatic discharges
Since the fixture's power system is connected to the ground (TT and TN distribution systems require the connection of the neutral connector to the ground in the transformer station), a differential in potential is created between the luminaire's body and the LED driver's internal circuits connected to the neutral of the power line. The voltage value that is created is so high that it generate a discharge onto the neutral-ground conductors in the following order: metal body – heat sink –LED module – LED driver – neutral conductor. In this case, the failure affects mostly the LED module.