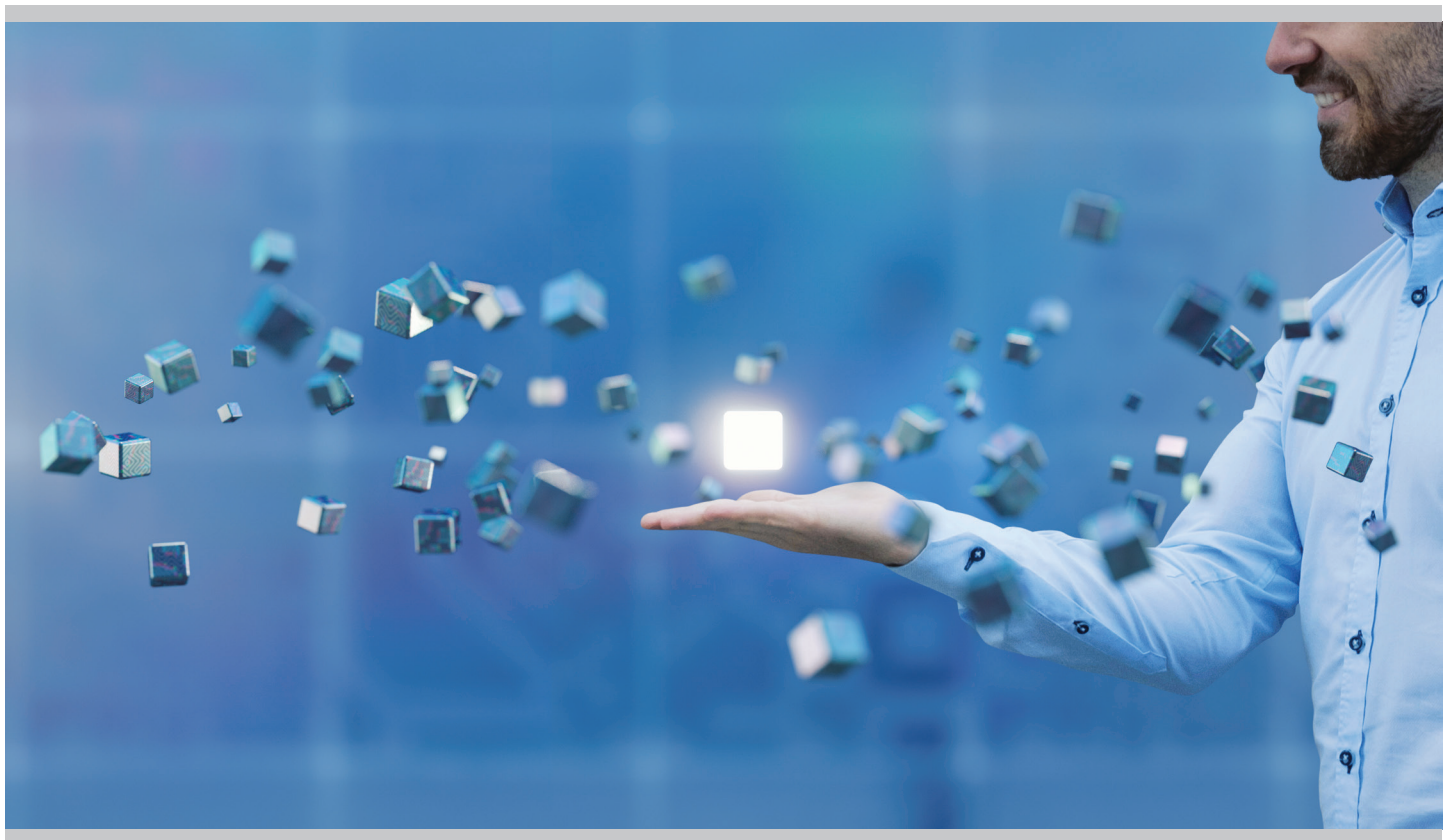


# Important information for the installation of LED luminaires! (with and without HF sensors)



All information listed here must be taken into account when installing LED luminaires. Damages at the LED fixture and as well consequential damages, caused by non-compliance with these instructions and regulations, can't be claimed as a guarantee or warranty case.

## Electrical Conditions and Requirements

### Connection of LED Luminaires / Hot Plugging

The LED luminaire should not be connected under voltage!  
This is not only prohibited but can be harmful for the life of the LED Luminaire and its LED modules.

In this so-called Hot Plugging at a constant current ballast, with a for example operating current of 700 mA, a short-term current up to 22 A can be a consequence and damaging the LEDs.  
LED luminaires should preferably not be installed

within the same circuit with other devices or machines. As well not too many LED luminaires should be connected in one and the same secured circuit (please note chapter: overvoltage and inrush current).

When installing special switches / relays, please also pay attention about the notes within the chapters „Staircase switching“ and „Special switches / Dimming“.

### Overvoltage / Overvoltage Protection

The legal overvoltage protection standards DIN VDE 0100-443 and DIN VDE 0100-534 regulate when overvoltage protections are required in low voltage installations and where and how it must be installed.

On the 14.12.2018, the transition period for DIN VDE 0100-443 / -534 is expired.

Thus, a surge protection is now basically also in private housing and small commercial applications mandatory.

All projects planned before the publication of the two standards, means on 01.10.2016, but have not yet been completed, must now be adapted and possibly retrofitted to these standards.

Transient overvoltage in the supply network are caused by electrostatic discharges, switching of larger loads, switching sparks

on switching contacts or by lightning strike in the close area. They can also be coupled by adjoining interference -capacitively or inductively into the supply or signal lines.

Transient overvoltage are often arbitrary for the luminaire and existent only for a few micro- or nanoseconds, but can lead to malfunction and breakage of the ballasts or destroy the LEDs by microscopic thermal overload.

If several LED luminaires are installed, an overvoltage protection must be used at every 10 m distance.

Please observe the legal requirements for overvoltage protection of the country in which the luminaires are installed.

### Inrush Current and Voltage Spikes

When switching on LED luminaires a very high current peak is generated for a short time. This inrush current is caused by the capacitive behavior of these LED luminaires. These power supplies generate inrush currents up to 100 times of the rated current. The extremely high power continues at LED luminaires only for a few microseconds. For triggering the fuse within domestic

applications this form of inrush current is normally not a problem. The inrush current of LED luminaires often becomes a problem when several luminaires are operating in parallel. Fuses trip regularly or switch contacts wear out very quickly. An inrush current limiter can effectively reduce inrush current.

## Electrical Conditions and Requirements

### Fault from the Power Grid / Fault in the Power Grid

Power grid faults can cause problems with LED lighting. If the LED itself causes interference, it can be fed back into the power grid and affect other electrical consumers.

#### LED lights are flashing

In some cases, the LED lights will flash when switched off or flash regularly. Common causes are inductive or capacitive couplings. The resulting leakage current activates the switching power supply in the luminaire and switches on the LED. The voltage breaks down and the LED goes out again.

#### LEDs leuchten nach

In some electrical installations the connection of the LED luminaire is even, after switching off, not completely free of tension. This is caused also here by capacitive or inductive effects. A small residual voltage is sufficient for the LED to shine permanently.

A possible solution is the installation of an interference suppression capacitor. Make only use of approved suppression capacitors to solve this problem. For LED fixtures without protective earth an X1 or X2 capacitor is the right choice. For LED luminaires with protective earth a X1Y2 or X2Y2 capacitor is the right one. The capacitance of an X1 or X2 capacitor should be between 0.1  $\mu\text{F}$  and 0.4  $\mu\text{F}$ . The capacity of the Y2 capacitor should be between 2.2 nF and 2.7 nF (this is a non-binding information).

### Stairwell Switches

When using non-dimmable LED wall and ceiling lights, in combination with a stairwell switch relay, it is to be noted, that these luminaires can operate easily in a simple ON/ OFF mode.

An electronic control with shutdown warning by for example a short dimming or flashing leads to interference up to failure.

### Special switch / Dimmability

Momentary pushbutton with touch function or other special switches with electronic light control must not be used with non-dimmable LED luminaires. These switches, in combination with non-dimmable LED luminaires, can lead to malfunction or

failure of the LED components or switch.

For dimmable LED luminaires only the dimmers may be used, which are indicated by the manufacturer.

### Switch Cycles

The number of switching cycles determines how often a LED fixture can be switched on and off. With a domestic used room lighting only a few switch cycles occur daily, while in stairwell applications many switch cycles per day can be achieved. For LED luminaires with motion sensor a setting with a longer

lighting duration is recommended in that cases. This leads to a reduction of the switch cycles. The number of switch cycles is a mandatory indication of the manufacturer and should be found on the mounting instruction or packaging.

### Motion Detector for LED Luminaires

Motion detectors are equipped with an electronic switch or electromechanical relay.

The electronic switch always needs a certain amount of minimum load in order to function properly. A lower minimum load, an exceeded maximum load or a wrong one load capability is often the cause of malfunction. For a trouble-free operation the

motion sensor must be designed for capacitive loads. The minimum load must be below the power of the connected LEDs. Motion detectors with an electromechanical relays are basically suitable for LED lighting, but here is the maximum load is to be taken into account as well.

## Protection Degree and Installation Locations

### IP protection

The protection degree specifies the suitability of electrical equipment (e.g. devices, luminaires, ...) for different environmental conditions and additionally the protection of humans against potential danger during their use.

Protection degrees are IP00 to IP69K. The degree of protection (IPXX) describes protection against direct contact or penetration of solids and liquids.

**IP20** is protected against solid foreign bodies with  $\varnothing \geq 12.5$  mm, no protection against water

**IP44** is protected against solid foreign bodies with  $\varnothing \geq 1.0$  mm, protected against splash water on all sides

**IP54** is protected against dust in damaging dimensions, protected against sprayed water on all sides

**IP65** is dustproof, protected against water jets from any angle

### Installation Site and Heights

The specifications of the IP protection degree must be taken into account when installing LED luminaires.

For LED spotlights with motion sensors, despite the water protection, a protected place should be selected to ensure a perfect and permanent function.

LED luminaires with motion sensors should be installed at the specified height to ensure a sufficient range of the sensor. Outside of closed areas the use of interior luminaires with a higher protection degree is only allowed in areas without direct sunlight and without direct rainfall.

## Special Features HF Sensor

### Function HF Sensor

LED luminaires with HF sensor, also called microwave sensor, work on a basis of microwaves and react, unlike an infrared sensor, not on heat but on motion. Even movements behind windows or wooden walls can be

detected. When planning to avoid these perhaps unwanted effects caused by e.g. lifts, people behind doors and traffic behind windows or glass panels these conditions should be taken into consideration.

### Distance between luminaires with HF sensor to each other

LED luminaires with an HF-sensor should not be installed too close to each other because the transmission of microwaves could affect the neighboring luminaire. A safe function is not guaranteed.

### Interference of the HF sensor due to WLAN or other Sources

Since some radio transmission systems, like WLAN and video transmission in Quadro copter/ drones (sometimes the user does not stick to the performance limitation), also are working at a frequency of 5.8 GHz, it may in rare cases cause interference or malfunction.

Other sources of interference could be:

1. Curtains moved by wind.
2. An installation site with a lot of traffic in the immediate neighborhood.
3. An installation site near to occurred electrical sparks.