

# Replace old fluorescent lamps with modern LED tubes

Older lighting systems with fluorescent (FL) lamps require intensive maintenance. It is worth checking whether FL lamps can be replaced with LED tubes, especially in rooms used for long periods.

## Action

Replace existing fluorescent lamps (T8 and T5) with modern LED tubes (retrofit).

## Requirement

This action is especially suitable for rooms with long usage periods (over 3000 hours per year) and low requirements for visual comfort (garages, warehouses, circulation/traffic areas, production halls).

**Replacing the fluorescent lamps achieves energy savings of 40 to 60 percent on lighting.**

## What to do

### 1. Determine the lamp type

The lamp type (T8 (G13) or T5) can be identified from the lamp base. Check the holder (socket), which is usually marked with this information.

### 2. Determine the type of ballast

- T8 lamps with a starter are equipped with a conventional ballast (CB) or a low-loss ballast (LLB).
- All T5 lamps and T8 lamps without a starter are equipped with an electronic ballast (EB).

### 3. Choose the right LED tube

Make sure that the LED tube you choose is suitable for the type of ballast that is installed (conventional/low-loss ballast or electronic ballast).

### 4. Convert part of the installation for a test

- Convert part of the lighting system (see overleaf).
- Test the new LED tubes over a small area for three to six months to examine whether the tubes prove worthwhile in practice (illumination and light quality).



### 5. Convert the rest of the lighting

After a successful test, you can convert the entire lighting system.

## Costs – effort

- Price of LED tubes: CHF 15 to CHF 50 per tube

Your own labour:

- Systems with a conventional/low-loss ballast: 5 to 10 minutes (per luminaire)
- Systems with an electronic ballast: 15 to 20 minutes (it is mandatory for an electrician to carry out this work)

## Please note!

- For the retrofit solution with LED tubes, the light quality depends on the specific product in each case. This should first be assessed by performing a test, especially for large systems. If the LED tube does not meet the requirements for light distribution and glare, it is advisable to replace the entire luminaire. This, however, necessitates larger investments. If the light colour is not adequate or if the LED tube flickers, the solution may be a different product.
- For lighting equipment that is difficult to access (e.g. in high-ceilinged halls), the use of LED tubes is particularly worthwhile because fewer lamp changes are required.

# Additional explanations

## Replacement for systems with conventional/low-loss ballasts

- Turn the power off
- Remove the fluorescent tubes
- Remove the old starter from the holder
- Place the new LED starter in the holder
- Insert the LED tube
- Turn the power back on

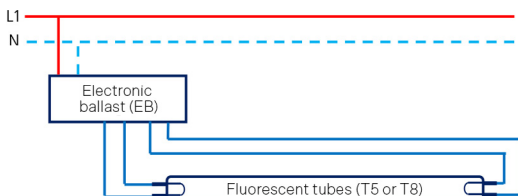


## Replacement for systems with electronic ballasts

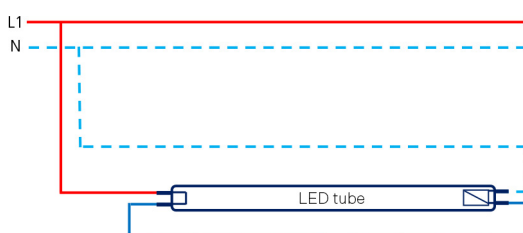
Important: it is mandatory for a specialist (electrician) to carry out this conversion.

- Remove the electronic ballast, or bridge it
- Insert the LED tube

### Before



### After



## Assessing LED tubes

- Good products come with a manufacturer's warranty for at least three years or 30'000 operating hours.
- Energy efficiency is determined by the luminous efficacy. This should be at least 120 lm/W (calculation based on luminous flux and electrical power).

- Pay attention to the radiation angle of the LED tubes because they can cause glare.
- Design types: clear glass LED tubes are more efficient but they tend to cause more glare. Frosted glass tubes are not quite as efficient but they cause less glare.
- Choose a light colour that is appropriate for the type of usage.
  - Warm white: 2700 Kelvin – welcoming, comfortable
  - Neutral white: 4000 Kelvin – functional
  - Cool white: 6500 Kelvin – cool, technical

## What does this mean: L80B10C5 = 30'000h?

The “L-B-C” value specifies the LED's lifetime (here: 30'000 hours) in more detail.

L80 = after the 30'000 hours, the lamp still delivers at least 80 percent of the original luminous flux (80–100 as a typical value)

B10 = less than 10 percent of the lamps fail due to reduced luminous flux (0–10 as a typical value)

C5 = less than 5 percent of the lamps fail completely during their lifetime of 30'000 hours (1–5 as a typical value)

## Pay attention to the inrush current

The LED tube's electronics generate a short-lived inrush current peak. This is no problem for one single luminaire. However, if an entire lighting system is converted, the inrush current must be taken into account. Good-quality LED tubes often have a low inrush current. The problem can also be mitigated with an inrush current limiter or a zero-cross switch. It may be necessary to replace the existing circuit breakers and install additional relays. This makes it possible to switch the lighting on gradually. It is worth engaging an electrical installer for this purpose.

## Additional information

- Technical book: “Light in the home – energy-efficient lighting”, [www.faktor.ch](http://www.faktor.ch)
- [Efficient lighting for small businesses](#)