



**Radium**  
Die Lichtmarke



# Installation Instruction.

## LED Tubes.





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## **2. Retrofitting in a CCG – Luminaire**

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## **4. Retrofitting in an ECG-Luminaire**

4.1 Multi circuit lamp luminaire

The type of luminaire is essential.

## The right LED tube for every application.

When replacing fluorescent lamps with the latest Radium LED technology, the choice of the right LED tube depends on the type of luminaire. Basically, there are three circuit options:

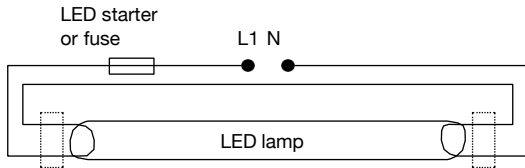
- With direct wiring, the LED tube is operated directly on mains voltage. If the existing luminaire is not designed for this type of operation, the luminaire must be converted. We always recommend to use the supplied LED starter and to mark the luminaire clearly (only for LED tubes).
- For luminaires with conventional control gear (CCG), the fluorescent tube is replaced 1:1 by an LED tube. In addition, the starter is replaced by the supplied LED starter.  
We recommend removing the compensation capacitor.
- Our HF or UN versions are suitable for luminaires with electronic control gear (ECG). The tubes are replaced 1:1, but compatibility must be checked against the compatibility list.



# Which operating mode is being used?



## Direct wiring (230V).



## Which output do you need?

<p><b>LED Essence T9 Ring EM</b></p> <p>Up to 2000lm</p> <p>Electromagnetic</p> <p>Page 32</p>	<p><b>LED Star Tube T5 HE UN</b></p> <p>Up to 2800lm</p> <p>High Efficiency Universal</p> <p>Page 29</p>	<p><b>LED Star Tube T8 UN</b></p> <p>Up to 3100lm</p> <p>Universal</p> <p>Page 30</p>	<p><b>LED Star Tube T8 EM</b></p> <p>Up to 3100lm</p> <p>Electromagnetic</p> <p>Page 31</p>	<p><b>LED Star Tube T8 HO UN</b></p> <p>Up to 3700lm</p> <p>High Output Universal</p> <p>Page 30</p>
<p>205mm</p> <p>RL-T9 C22 840/G10qEM <input type="radio"/></p> <p>RL-T9 C22 865/G10qEM <input checked="" type="radio"/></p>	<p>549mm</p> <p>RL-T5 14 HE 830/G5UN <input type="radio"/></p> <p>RL-T5 14 HE 840/G5UN <input type="radio"/></p> <p>RL-T5 14 HE 865/G5UN <input checked="" type="radio"/></p>	<p>600mm</p> <p>RL-T8 18 S 830/G13UN <input type="radio"/></p> <p>RL-T8 18 S 840/G13UN <input type="radio"/></p> <p>RL-T8 18 S 865/G13UN <input checked="" type="radio"/></p>	<p>600mm</p> <p>RL-T8 18 S 840/G13EM <input type="radio"/></p> <p>RL-T8 18 S 865/G13EM <input checked="" type="radio"/></p>	<p>1200mm</p> <p>RL-T8 36 HO 840/G13UN <input type="radio"/></p> <p>RL-T8 36 HO 865/G13UN <input checked="" type="radio"/></p>
<p>298mm</p> <p>RL-T9 C32 840/G10qEM <input type="radio"/></p> <p>RL-T9 C32 865/G10qEM <input checked="" type="radio"/></p>	<p>849mm</p> <p>RL-T5 21 HE 830/G5UN <input type="radio"/></p> <p>RL-T5 21 HE 840/G5UN <input type="radio"/></p> <p>RL-T5 21 HE 865/G5UN <input checked="" type="radio"/></p>	<p>1200mm</p> <p>RL-T8 36 S 830/G13UN <input type="radio"/></p> <p>RL-T8 36 S 840/G13UN <input type="radio"/></p> <p>RL-T8 36 S 865/G13UN <input checked="" type="radio"/></p>	<p>900mm</p> <p>RL-T8 30 S 840/G13EM <input type="radio"/></p> <p>RL-T8 30 S 865/G13EM <input checked="" type="radio"/></p>	<p>1500mm</p> <p>RL-T8 58 HO 840/G13UN <input type="radio"/></p> <p>RL-T8 58 HO 865/G13UN <input checked="" type="radio"/></p>
<p><b>LED Essence Tube T8 EM</b></p> <p>Up to 2000lm</p> <p>Electromagnetic</p> <p>Page 32</p>	<p>1149mm</p> <p>RL-T5 28 HE 830/G5UN <input type="radio"/></p> <p>RL-T5 28 HE 840/G5UN <input type="radio"/></p> <p>RL-T5 28 HE 865/G5UN <input checked="" type="radio"/></p>	<p>1500mm</p> <p>RL-T8 58 S 830/G13UN <input type="radio"/></p> <p>RL-T8 58 S 840/G13UN <input type="radio"/></p> <p>RL-T8 58 S 865/G13UN <input checked="" type="radio"/></p>	<p>1200mm</p> <p>RL-T8 36 S 840/G13EM <input type="radio"/></p> <p>RL-T8 36 S 865/G13EM <input checked="" type="radio"/></p>	<p><b>LED Star Tube T5 HO UN</b></p> <p>Up to 5600lm</p> <p>High Output Universal</p> <p>Page 28</p>
<p>600mm</p> <p>RL-T8 18 830/G13EM <input type="radio"/></p> <p>RL-T8 18 840/G13EM <input type="radio"/></p> <p>RL-T8 18 865/G13EM <input checked="" type="radio"/></p>	<p>1449mm</p> <p>RL-T5 35 HE 830/G5UN <input type="radio"/></p> <p>RL-T5 35 HE 840/G5UN <input type="radio"/></p> <p>RL-T5 35 HE 865/G5UN <input checked="" type="radio"/></p>	<p>1500mm</p> <p>RL-T8 58 HO 830/G13EM <input type="radio"/></p> <p>RL-T8 58 HO 840/G13EM <input type="radio"/></p> <p>RL-T8 58 HO 865/G13EM <input checked="" type="radio"/></p>	<p><b>LED Star Tube T8 HO EM</b></p> <p>Up to 3700lm</p> <p>High Output Electromagnetic</p> <p>Page 31</p>	<p>1149mm</p> <p>RL-T5 54 HO 830/G5UN <input type="radio"/></p> <p>RL-T5 54 HO 840/G5UN <input type="radio"/></p> <p>RL-T5 54 HO 865/G5UN <input checked="" type="radio"/></p>
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<p>1500mm</p> <p>RL-T8 58 830/G13EM <input type="radio"/></p> <p>RL-T8 58 840/G13EM <input type="radio"/></p> <p>RL-T8 58 865/G13EM <input checked="" type="radio"/></p>	<p>1449mm</p> <p>RL-T5 49 HO 830/G5UN <input type="radio"/></p> <p>RL-T5 49 HO 840/G5UN <input type="radio"/></p> <p>RL-T5 49 HO 865/G5UN <input checked="" type="radio"/></p>	<p>1200mm</p> <p>RL-T8 36 HO 840/G13EM <input type="radio"/></p> <p>RL-T8 36 HO 865/G13EM <input checked="" type="radio"/></p>	<p>1500mm</p> <p>RL-T8 58 HO 840/G13EM <input type="radio"/></p> <p>RL-T8 58 HO 865/G13EM <input checked="" type="radio"/></p>	<p>1449mm</p> <p>RL-T5 80 HO 830/G5UN <input type="radio"/></p> <p>RL-T5 80 HO 840/G5UN <input type="radio"/></p> <p>RL-T5 80 HO 865/G5UN <input checked="" type="radio"/></p>

# Which operating mode is being used? CCG operation.



Lamp



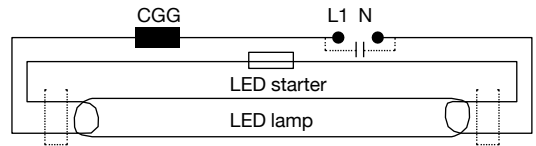
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Starter



+

Conventional control gear



## Which output do you need?

<p><b>LED Essence T9 Ring EM</b></p> <p>Up to 2000lm</p> <p>Electromagnetic</p> <p>Page 32</p>	<p><b>LED Essence Tube T8 EM</b></p> <p>Up to 2000lm</p> <p>Electromagnetic</p> <p>Page 32</p>	<p><b>LED Star Tube T8 EM</b></p> <p>Up to 3100lm</p> <p>Electromagnetic</p> <p>Page 31</p>	<p><b>LED Star Tube T8 UN</b></p> <p>Up to 3100lm</p> <p>Universal</p> <p>Page 30</p>	<p><b>LED Star Tube T8 HO EM</b></p> <p>Up to 3700lm</p> <p>High Output Electromagnetic</p> <p>Page 31</p>
<p>205mm</p> <p>RL-T9 C22 840/G10qEM <input type="radio"/></p> <p>RL-T9 C22 865/G10qEM <input checked="" type="radio"/></p>	<p>600mm</p> <p>RL-T8 18 830/G13EM <input checked="" type="radio"/></p> <p>RL-T8 18 840/G13EM <input type="radio"/></p> <p>RL-T8 18 865/G13EM <input checked="" type="radio"/></p>	<p>600mm</p> <p>RL-T8 18 S 840/G13EM <input type="radio"/></p> <p>RL-T8 18 S 865/G13EM <input checked="" type="radio"/></p>	<p>600mm</p> <p>RL-T8 18 S 830/G13UN <input checked="" type="radio"/></p> <p>RL-T8 18 S 840/G13UN <input type="radio"/></p> <p>RL-T8 18 S 865/G13UN <input checked="" type="radio"/></p>	<p>1200mm</p> <p>RL-T8 36 HO 840/G13EM <input type="radio"/></p> <p>RL-T8 36 HO 865/G13EM <input checked="" type="radio"/></p>
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	<p>1500mm</p> <p>RL-T8 58 S 840/G13EM <input type="radio"/></p> <p>RL-T8 58 S 865/G13EM <input checked="" type="radio"/></p>			<p>1200mm</p> <p>RL-T8 36 HO 840/G13UN <input type="radio"/></p> <p>RL-T8 36 HO 865/G13UN <input checked="" type="radio"/></p>
				<p>1500mm</p> <p>RL-T8 58 HO 840/G13UN <input type="radio"/></p> <p>RL-T8 58 HO 865/G13UN <input checked="" type="radio"/></p>

# Which operating mode is being used? ECG operation.

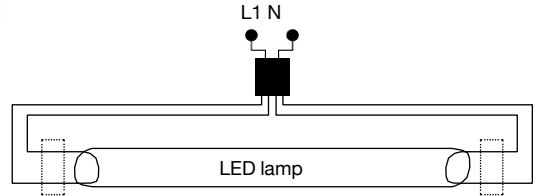


Lamp

Electronic control gear



+



## Which output do you need?

LED Star Tube T5 HE UN	LED Star Tube T8 UN	LED Star Tube T8 HO UN	LED Star Tube T5 HO UN
Up to 2800lm	Up to 3100lm	Up to 3700lm	Up to 5600lm
High Efficiency Universal Page 29	Universal Page 30	High Output Universal Page 30	High Output Universal Page 28
549mm	600mm	1200mm	1149mm
<input type="radio"/> RL-T5 14 HE 830/G5 UN <input type="radio"/> RL-T5 14 HE 840/G5 UN <input checked="" type="radio"/> RL-T5 14 HE 865/G5 UN	<input type="radio"/> RL-T8 18 S 830/G13 UN <input type="radio"/> RL-T8 18 S 840/G13 UN <input checked="" type="radio"/> RL-T8 18 S 865/G13 UN	<input type="radio"/> RL-T8 36 HO 840/G13 UN <input checked="" type="radio"/> RL-T8 36 HO 865/G13 UN	<input type="radio"/> RL-T5 54 HO 830/G5 UN <input type="radio"/> RL-T5 54 HO 840/G5 UN <input checked="" type="radio"/> RL-T5 54 HO 865/G5 UN
849mm	1200mm	1500mm	1449mm
<input type="radio"/> RL-T5 21 HE 830/G5 UN <input type="radio"/> RL-T5 21 HE 840/G5 UN <input checked="" type="radio"/> RL-T5 21 HE 865/G5 UN	<input type="radio"/> RL-T8 36 S 830/G13 UN <input type="radio"/> RL-T8 36 S 840/G13 UN <input checked="" type="radio"/> RL-T8 36 S 865/G13 UN	<input type="radio"/> RL-T8 58 HO 840/G13 UN <input checked="" type="radio"/> RL-T8 58 HO 865/G13 UN	<input type="radio"/> RL-T5 49 HO 830/G5 UN <input type="radio"/> RL-T5 49 HO 840/G5 UN <input checked="" type="radio"/> RL-T5 49 HO 865/G5 UN <input type="radio"/> RL-T5 80 HO 830/G5 UN <input type="radio"/> RL-T5 80 HO 840/G5 UN <input checked="" type="radio"/> RL-T5 80 HO 865/G5 UN
1149mm	1500mm		
<input type="radio"/> RL-T5 28 HE 830/G5 UN <input type="radio"/> RL-T5 28 HE 840/G5 UN <input checked="" type="radio"/> RL-T5 28 HE 865/G5 UN	<input type="radio"/> RL-T8 58 S 830/G13 UN <input type="radio"/> RL-T8 58 S 840/G13 UN <input checked="" type="radio"/> RL-T8 58 S 865/G13 UN		
1449mm			
<input type="radio"/> RL-T5 35 HE 830/G5 UN <input type="radio"/> RL-T5 35 HE 840/G5 UN <input checked="" type="radio"/> RL-T5 35 HE 865/G5 UN			

Operate only on approved ECGs according to Radium compatibility list  
[www.radium.de/compatibility](http://www.radium.de/compatibility)

# 1. Installation options

## 1.1 Retrofitting a CCG luminaire accord. to EN 62776

Replacing fluorescent T8-tube and installed starter by LED Tube EM T8 and LED Tube starter. The CCG remains in luminaire and electric circuit. LED Essence S9, S11 and DUO EM can also be operated via CCG.

## 1.2 Conversion of an ECG- or CCG luminaire

Basically, rewiring of the luminaire becomes necessary if fluorescent tubes in ECG-luminaires shall be replaced by LED Tube EM. This also applies to CCG-luminaires if the CCG should be taken out of the electric circuit. LED Essence S9, S11, DUO EM or Long HF can also be operated via direct wiring.

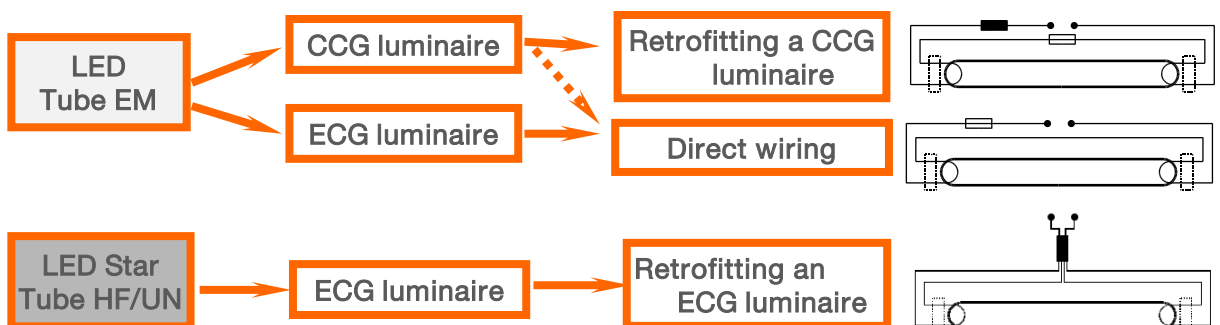
Installation must be done by qualified electricians and all security precautions described herein must be followed. Please, refer to chapter 2.2.2 'Example installation direct wiring' for more details.

## 1.3 Retrofitting an ECG luminaire accord. to EN 62776

Replacing conventional fluorescent T8 tube by LED Tube T8 HF. The ECG remains in luminaire and electric circuit. LED Essence Long HF can also be operated via ECG.

**Note:** Please, check the driver compatibility list at [www.radium.de/compatibility](http://www.radium.de/compatibility), before the change, as the LED Star Tube HF must be compatible with the installed ECG. In any case, only use the ECGs specified there as compatible!

### Overview of possible installation.



## 2. Retrofitting of a CCG luminaire

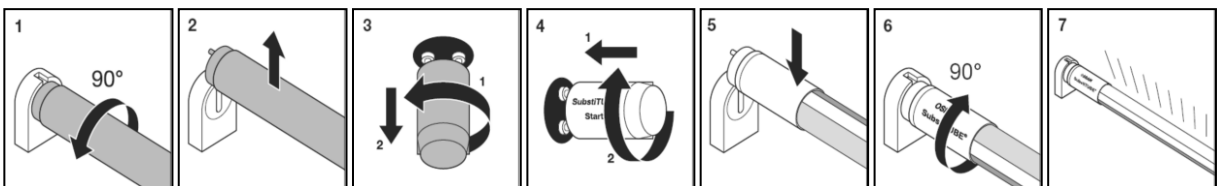
### Description.

The fluorescent T8 lamp is exchanged with a LED Tube T8 EM or UN ausgetauscht, Kompaktleuchtstofflampen gegen den passenden LED-Ersatz wie die LED Essence S9, S11 oder DUO EM. and the starter is replaced by a LED Tube Starter. The built-in CCG can be used as it is and existing certifications remain valid. Its losses are reduced to ohmic losses of usually about 1W.

**Note:** If the starter has not been changed to LED Tube starter, the lamp will start blinking. Please, switch off immediately and change the starter, because in this case LED Tube EM can be damaged.

LED Tube EM can be used in luminaires with changeable starters only.

### Retrofitting for common lamp holders



### Note:

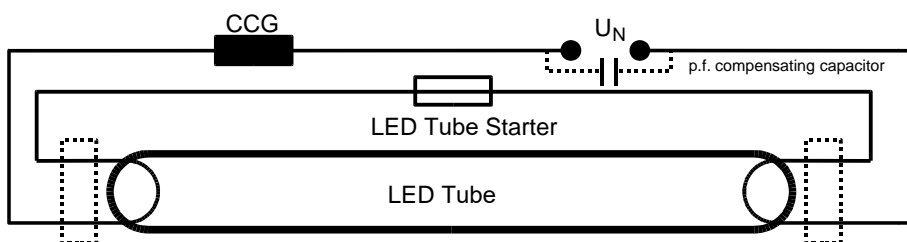
The LED Tube starter with integrated fuse 250V, T2A is absolutely required for operation and safety!



## 2.1 Luminaires with compensating capacitors

LED Tube EM can be applied in luminaires with integrated compensating capacitors. The maximum number of LED Tube EM in compensated luminaires possibly operated at one automatic fuse can be found in the LED Tube product data sheet → download area at related product [www.radium.de](http://www.radium.de).

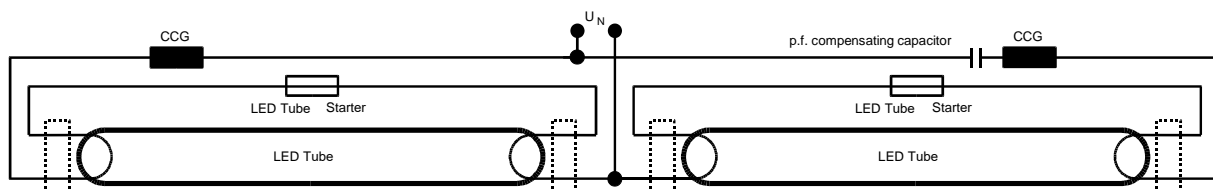
### Circuit diagram of a retrofitted CCG luminaire



## 2.2 Duo circuit lamp luminaires

Double lamp luminaires can be refitted in analogy to below scheme to single lamp luminaires if they show duo circuit wiring. Usage in tandem circuitry luminaires with serially wired lamps requires rewiring (typically in 2ft installations).

### Circuit diagram of a retrofitted double lamp CCG luminaire



## 3. Direct Wiring

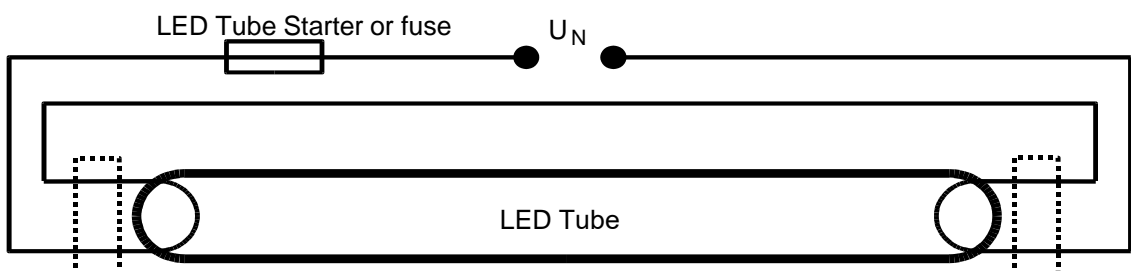
### 3.1 Direct line voltage connection

LED Tube EM and UN, as well as LED Essence S9, S11 DUO EM and Long HF can be operated directly at mains voltage 220V-240V. Operation in an ECG luminaire is not possible, so its conversion offers a good way out. When the lamp in a CCG luminaire is just changed, the CCG remains in the luminaire – with all its losses. Direct mains operation of LED avoids all these losses.

**Conversion must be done according to 3.2 “Example installation direct wiring”.**

Rewire a luminaire on both sides as shown below. Thus, LED Tube can be inserted in any direction with standardised IEC compliant G13 lamp holders. All wires need to be approved for the existing voltages and the appliance class, respectively. Usually, solid wires with single isolation can be used for class I, double insulation wires could be used for class II. The maximum wire cross-section for lamp holders and starters is typically 0.5 mm<sup>2</sup>. Built-in control gears (ballasts) must not remain connected after rewiring.

### Direct wiring circuit of a retrofitted luminaire



## Installation Guide.

**Note:** Rework by qualified electricians only.

- Make sure that the supply voltage is disconnected
- Remove the conventional lamp
- Remove power factor correction capacitor (if installed to improve power factor)
- Rewire the luminaire as shown in the circuit diagram on the page before

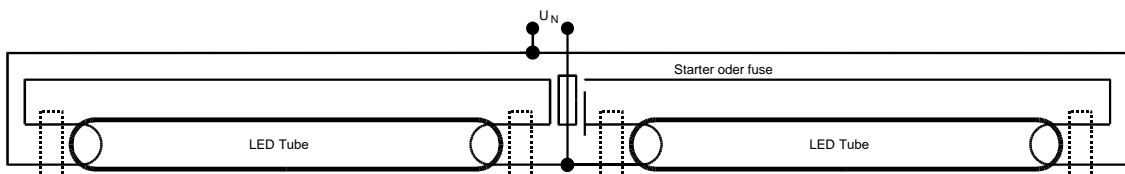
**Note:** Use LED Tube Starter or a fuse (250V, T2A).

- Insert LED Tube into lamp holders and check light distribution angle
- Make sure with appropriate tests, that the rewired luminaire complies to all relevant safety requirements and other applicable regulations, e.g. acc. to DIN VDE 0701-0702 or 2004/108/EC
- Mark rewired luminaire with new type plate

**Note:** LED Tube Starter or fuse (250V, T2A) is necessary for installation protection (possible components on next page)

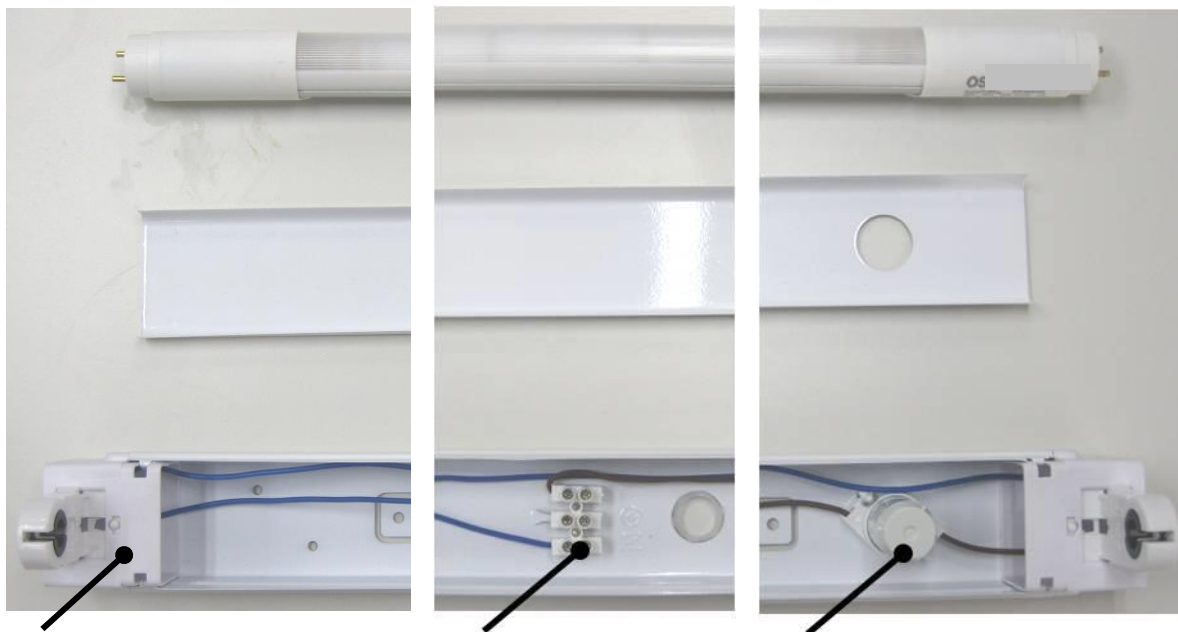
- Do not insert fluorescent lamps, as they would be destroyed
- Responsibility of technical and safety consequences of the converted luminaire is shifted to the party carrying out the conversion.
- The installer becomes the legally responsible person for the converted luminaire.

## Direct wiring circuit diagram of a retrofitted double lamp luminaire



### 3.2 Example installation direct wiring.

Direct wiring of a luminaire for RaLED Tube EM (control gear).



G13 lamp holder

L, N connection unit

LED Tube starter

Make sure to modify the wiring completely, otherwise e.g. short circuits could lead to damage.



Example for an integrated holder for LED Tube and Starter

Example for terminal block with integrated fuse holder



## 4. Retrofitting of an ECG luminaire

### Description.

Replacing the lamp is all that needs to be done to upgrade an existing luminaire with electrical control gear to newest Radium HF or UN-LED-technology. Since only the lamp is replaced, there is no constructive modification necessary in the luminaire.

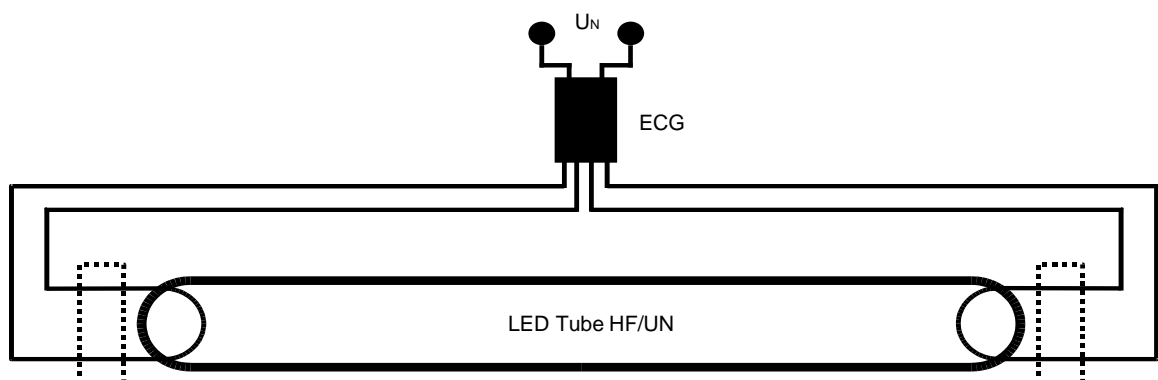
The fluorescent lamp has to be exchanged with LED Star TUBE HF or UN.

The LED Star TUBE HF for UN tube is compatible with ECGs of various brand manufacturers. For further information regarding the tested ECGs a compatibility list is available on [www.radium.de/compatibility](http://www.radium.de/compatibility). In any case, only use the ECGs specified there as compatible!

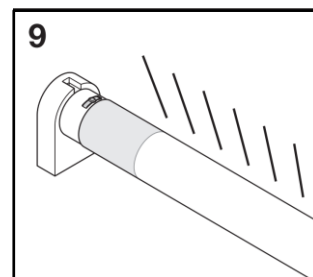
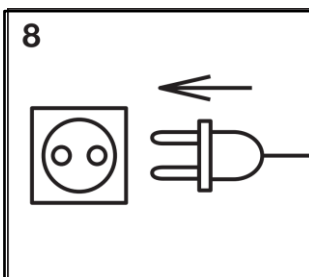
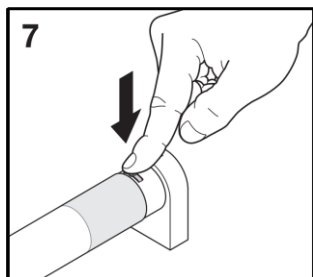
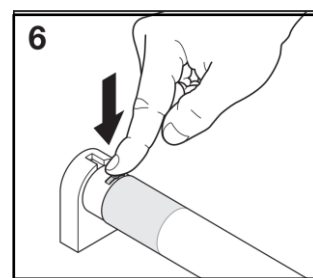
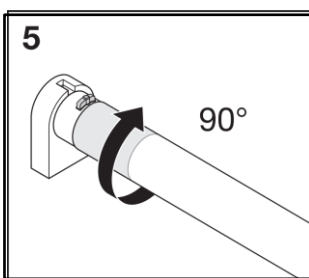
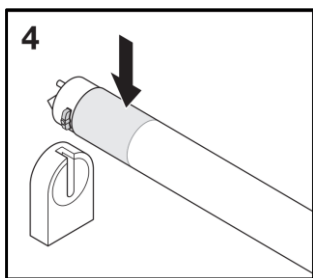
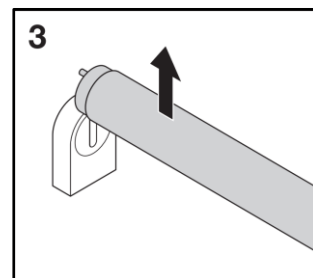
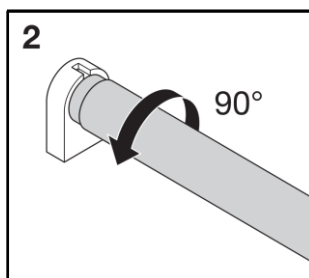
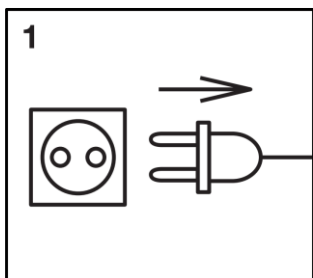
The energy consumption of the ballast will not be reduced by retrofitting, as compared to a retrofitted CCG luminaire.

For activating LED Star TUBE HF or UN-Type press the safety buttons on either side of the lamp. This is part of the new international safety standard IEC 62776 to prevent electrical shocks during installation. By reconnecting the luminaire to supply voltage you switch the lamp on.

### Circuit diagram of a retrofitted ECG luminaire



## Retrofitting for common lamp holders.

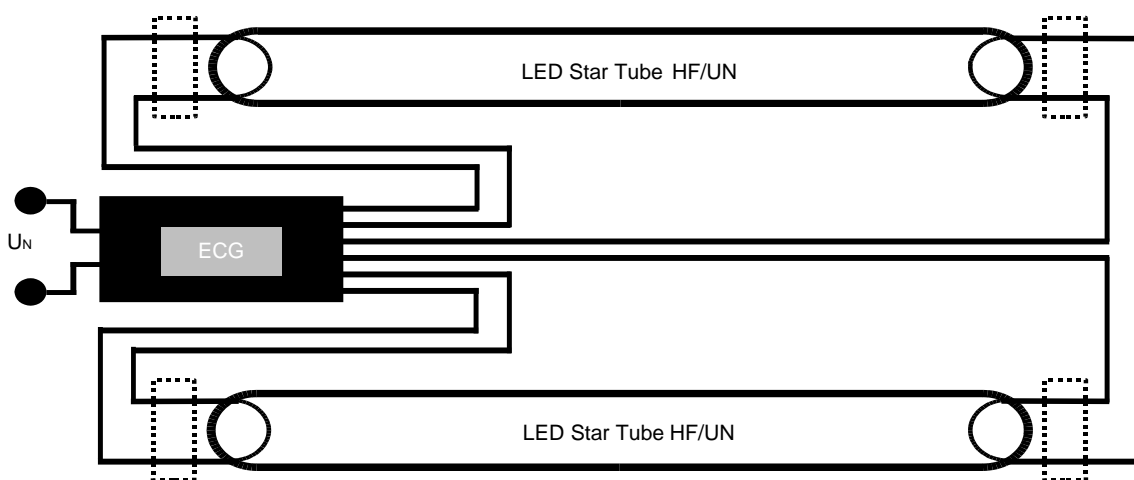


## 4.2 Multi circuit lamp luminaires

Double lamp luminaires can be retrofitted in analogy to single lamp luminaires. However, the compatibility of the newly applied LED Star Tubes HF or UN with the integrated ECG has to be checked with the compatibility list at [www.radium.de/compatibility](http://www.radium.de/compatibility) beforehand. In any case, only use the ECGs specified there as compatible!

**Rewiring of the luminaire is not required.** An example wiring for luminaires with OSRAM® ECGs is shown below.

### Circuit diagram of a retrofitted double lamp ECG luminaire



Even ECG luminaires with more than two lamps do not need to be changed. However, LED Star Tube HF or UN must be compatible with the ECG installed.



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