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## Installation Instructions




# SubstiTUBE® HF- and EM-Types

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# Portfolio

Product line	SubstiTUBE® EM	SubstiTUBE® EM-Rotatable	SubstiTUBE® HF
Product picture			
Compatibility	Electromagnetic driver (EM/CCG) and line voltage (220-240V)	Electromagnetic driver (EM/CCG) and line voltage (220-240V)	High frequency / electronic driver (HF/ECG). Operation with ECG in luminaire only!

# Agenda

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## 1. Installation Options

## 2. SubstiTUBE® EM-Types

### 2.1 Retrofitting in a CCG luminaire

#### 2.1.1 Luminaires with compensating capacitor

#### 2.1.2 Duo circuit lamp luminaire

### 2.2 Conversion / Direct Wiring

#### 2.2.1 Direct line voltage connection

#### 2.2.2 Sample installation direct wiring

### 2.3 Product feature: Rotatable end cap

## 3. SubstiTUBE® HF-Types

### 3.1 Retrofitting in an ECG luminaire

### 3.2 Multi circuit lamp luminaire

# 1. Installation options

## I) Retrofitting a CCG luminaire accord. to EN 62776

Replacing fluorescent T8-tube and installed starter by SubstiTUBE® EM T8 and SubstiTUBE® Start.

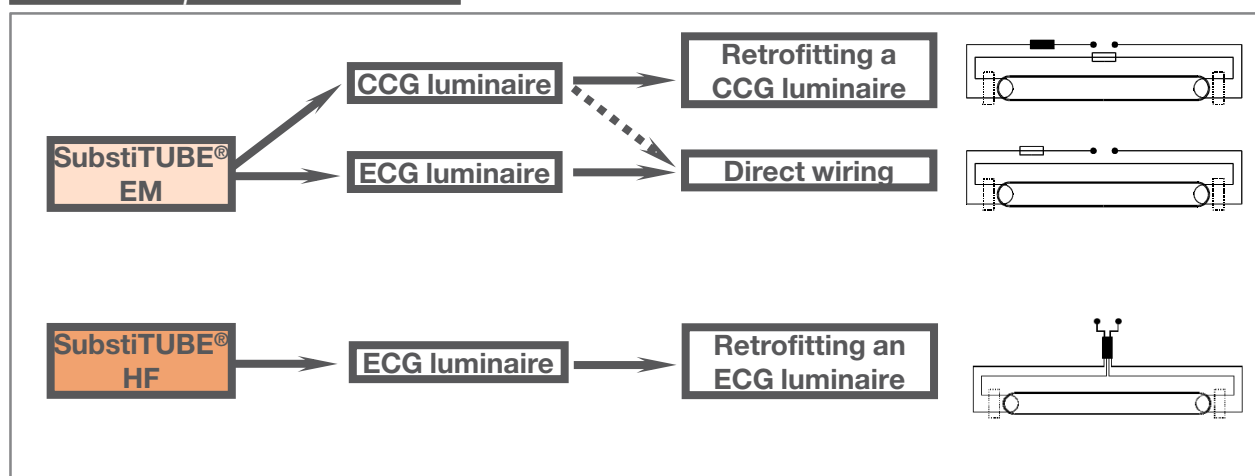
## II) Conversion of an ECG or CCG luminaire

Rewiring of the luminaire necessary for replacing fluorescent tube by SubstiTUBE® EM in ECG luminaires. Rewiring is also possible for replacement by SubstiTUBE® EM in CCG luminaires. Installation must be done by qualified Electricians and all security precautions described herein must be followed. Please refer to chapter 2.2.2 “Sample installation direct wiring” for more details.

## III) Retrofitting an ECG luminaire accord. to EN 62776

Replacing conventional fluorescent T8 tube by SubstiTUBE® HF T8. Before retrofitting, check driver compatibility list on [www.osram.com/SubstiTUBE-HF](http://www.osram.com/SubstiTUBE-HF), as SubstiTUBE® HF has to be compatible with installed ECG.

### Overview of possible installations



## 2. EM-Types

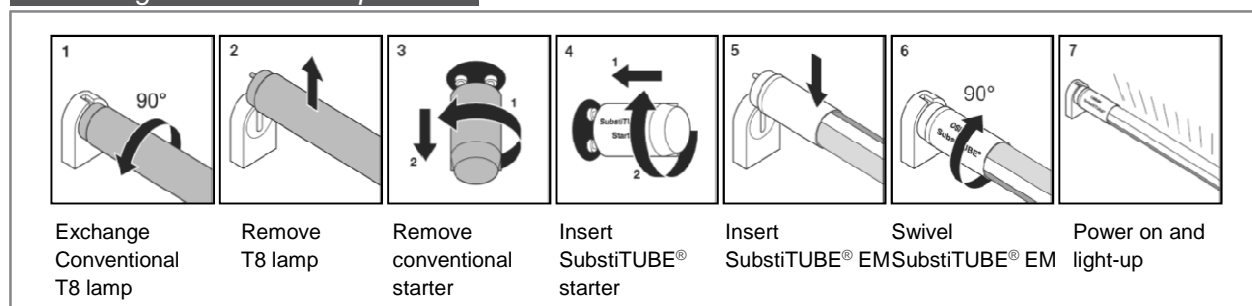
### 2.1 Retrofitting in a CCG luminaire

#### 2.1 Retrofitting in a CCG luminaire

Simple luminaire upgrade with a LED Tube. The fluorescent T8 lamp has to be exchanged by SubstiTUBE® EM T8 and the starter being replaced by SubstiTUBE® Start. 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 SubstiTUBE® Start the luminaire will start blinking. Please switch off immediately and change the starter, because SubstiTUBE® EM can be damaged. SubstiTUBE® EM can be used in luminaires with changeable starters only.

#### Retrofitting for common lamp holders



**Note:** SubstiTUBE® Start with integrated fuse 250V, T2A necessary for operation.

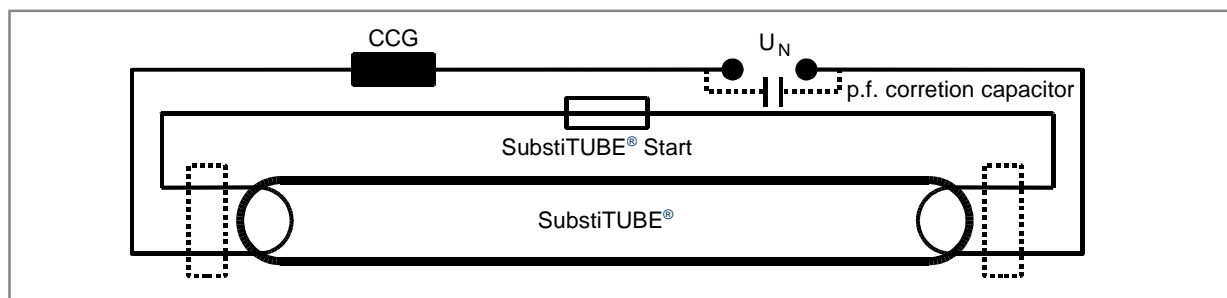
## 2. EM-Types

### 2.1 Retrofitting in a CCG luminaire

#### 2.1.1 Luminaires with compensating capacitors

SubstiTUBE® EM can be applied in luminaires with integrated compensating capacitors. The maximum possible amount of SubstiTUBE® EM in compensated luminaires operated at one circuit breaker can be found in the SubstiTUBE® product data sheet → download area at related product ([www.osram.com/substitube](http://www.osram.com/substitube)).

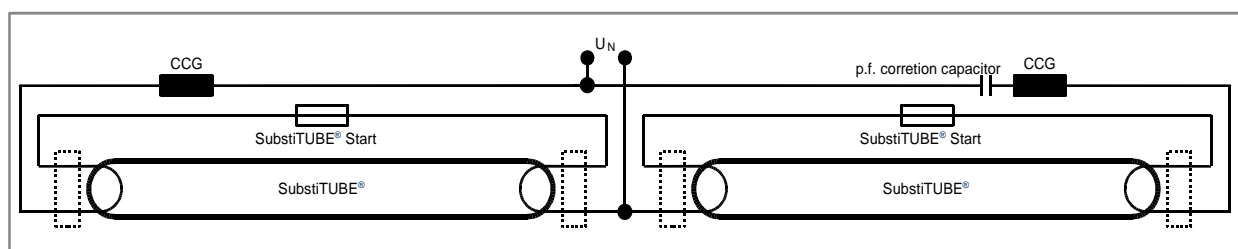
*Circuit diagram of a retrofitted CCG luminaire*



#### 2.1.2 Duo circuit lamp luminaires

Double lamp luminaires can be refitted analogue to single lamp luminaires if they show duo circuit wiring according to below scheme. Usage in tandem circuitry luminaires with serial wired lamps requires rewiring (typically in 2ft installations) → see chapter 2.2.

*Circuit diagram of a retrofitted double lamp CCG luminaire*



## 2. EM-Types

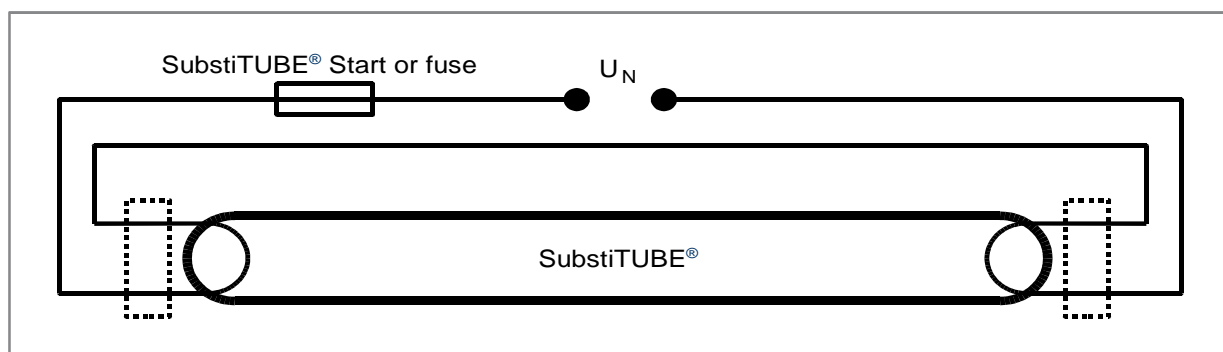
### 2.2 Conversion / Direct Wiring

#### 2.2.1 Direct line voltage connection

SubstiTUBE® EM products can be operated at direct mains voltage 220V-240V. Hence conversion of an ECG luminaire is necessary to enable operation with SubstiTUBE® EM. To eliminate remaining losses in CCG luminaires it is also possible to convert those fittings for direct mains operation with SubstiTUBE® EM. Conversion must be done according to below description in 2.2.2 “Sample installation direct wiring”.

Rewire a luminaire on both sides as shown below. Thus SubstiTUBE® EM can be inserted in any direction with standardized IEC compliant G13 lamp holders. All wires need to be approved for the existing voltages and appliance class. 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 0.5mm<sup>2</sup>. Built-in control gears must not remain connected after rewiring.

*Direct wiring circuit diagram of a retrofitted luminaire*



## 2. EM-Types

### 2.2 Conversion / Direct Wiring

#### Installation instruction:

**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

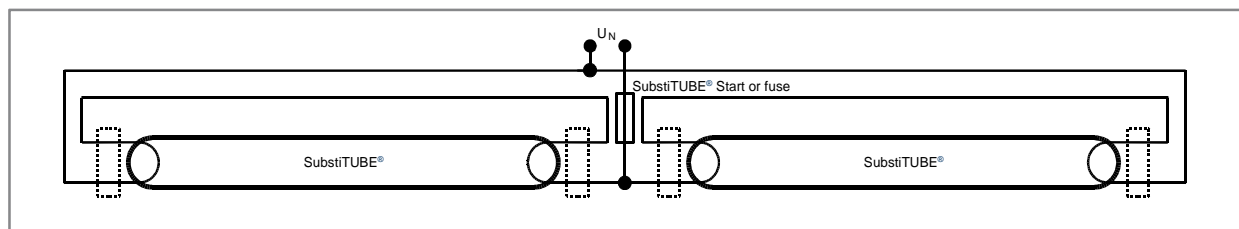
**Note:** Use SubstiTUBE® Start or a fuse (250V, T2A).

- Insert SubstiTUBE® EM 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:** SubstiTUBE® Start or fuse (250V, T2A) is necessary for installation protection (possible items 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 legal responsible for the converted luminaire

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



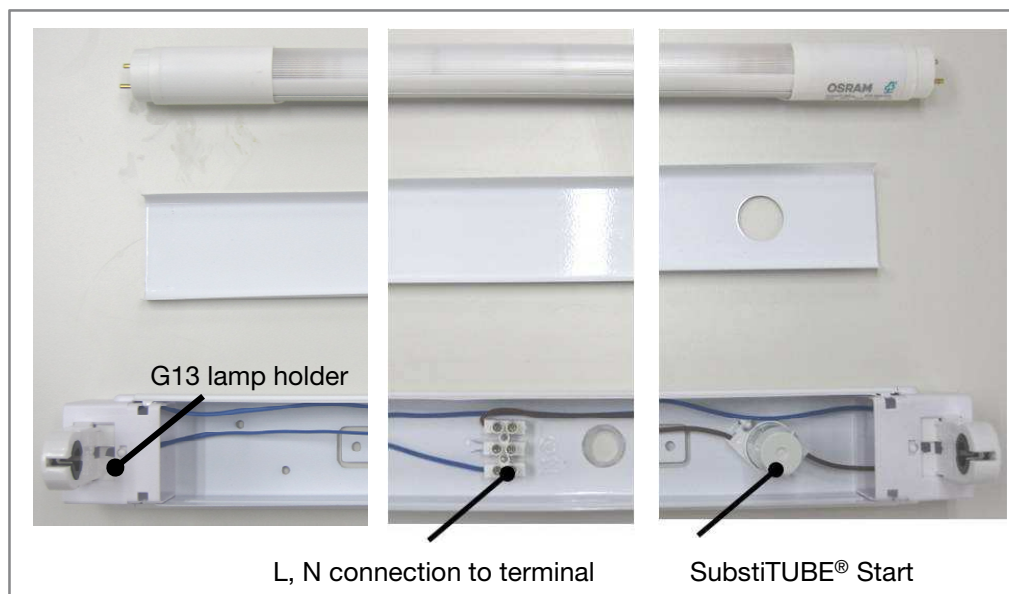


## 2. EM-Types

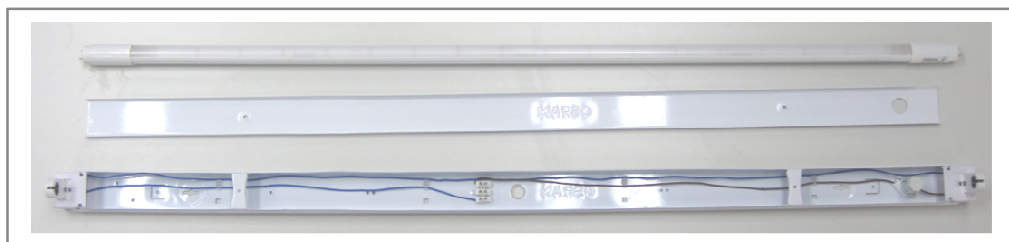
### 2.2 Conversion / Direct Wiring

#### 2.2.2 Sample installation direct wiring

*Direct wiring of a luminaire for SubstiTUBE® EM (control gear removed)*



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



*Example for an integrated holder for SubstiTUBE® EM + Starter*



*Example for terminal block with integrated fuseholder*



## 2. EM-Types

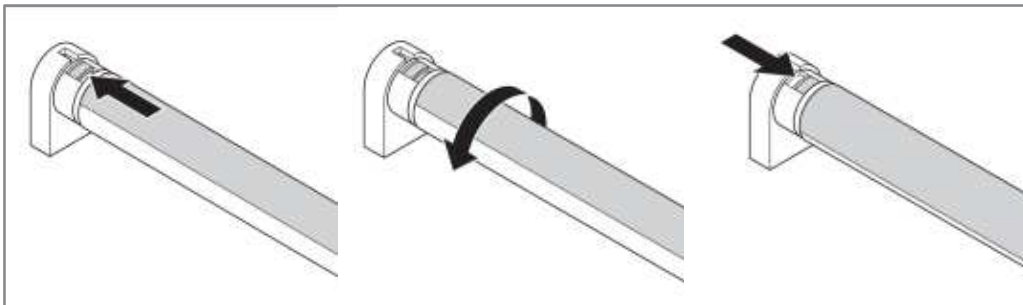
### 2.3 Special Feature: Rotatable End Caps

#### Rotatable EM-Tubes

SubstiTUBE® EM types are also available as Rotatable Tubes. Following points have to be noted in addition to the already mentioned instructions.

- Alignment of the lamp
- Unlock lamp at both ends with switches
- Align orientation of illumination by rotating the lamp
- Check angle of light emission
- Lock the lamp at both ends with switches
- Not usable in luminaires with serial lamp connection i.e. more than one tube at one magnetic ballast (tandem circuitry)

#### Setting rotation angle



#### Rotatable end cap



## 3. HF-Types

### 3.1 Retrofitting in an ECG luminaire

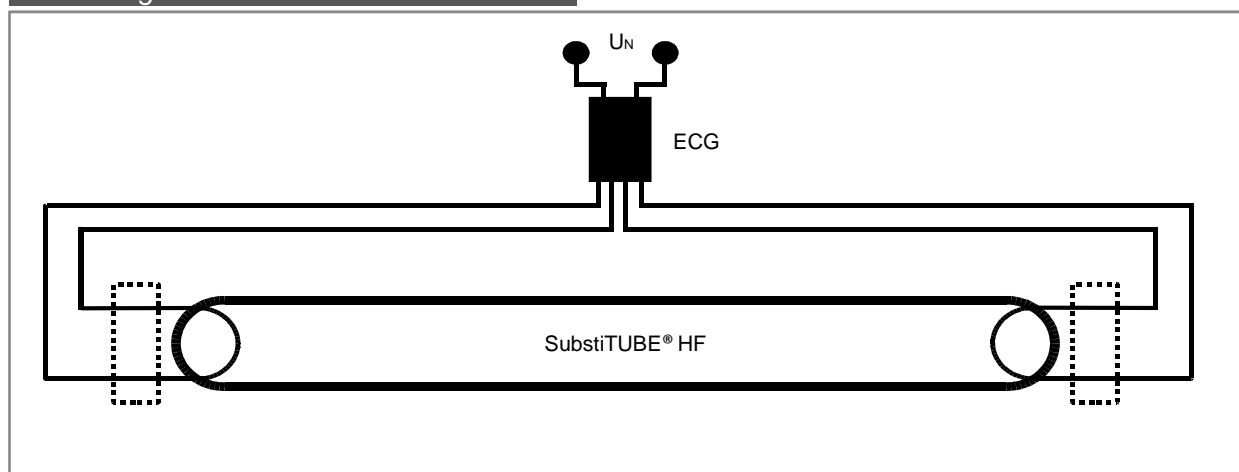
#### 3.1 Retrofitting in an ECG luminaire

Replacing the lamp is all what needs to be done to upgrade an existing luminaire with electrical control gear to newest OSRAM® HF-LED-technology. Since only the lamp is replaced, there is no constructive modification necessary to the luminaire. The fluorescent lamp has to be exchanged with SubstiTUBE® HF. The SubstiTUBE® HF tube is compatible with ECGs of various brand manufacturers. For further information regarding the tested ECGs a compatibility list is available on [www.osram.com/SubstiTUBE-HF](http://www.osram.com/SubstiTUBE-HF).

Energy consumption on ballast level will not be reduced by retrofitting, compared to a retrofitted CCG luminaire.

For activating SubstiTUBE® HF-Type, press the safety buttons on each side of the lamp. This is part of the new international safety norm IEC 62776 to prevent electrical shocks during installation. Then reconnect the luminaire to supply voltage to make the lamp burn.

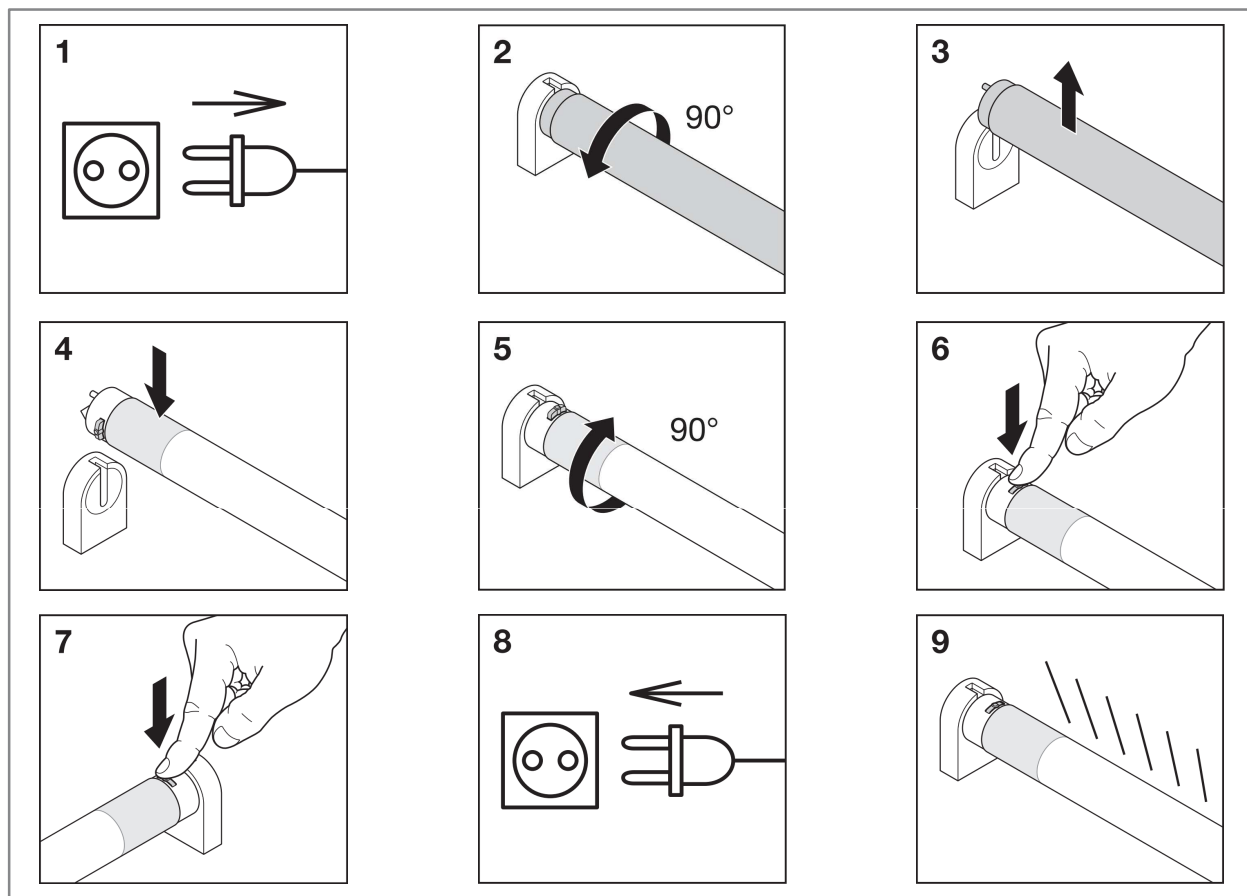
*Circuit diagram of a retrofitted ECG luminaire*



## 3. HF-Types

### 3.1 Retrofitting in an ECG luminaire

*Retrofitting for common lamp holders*



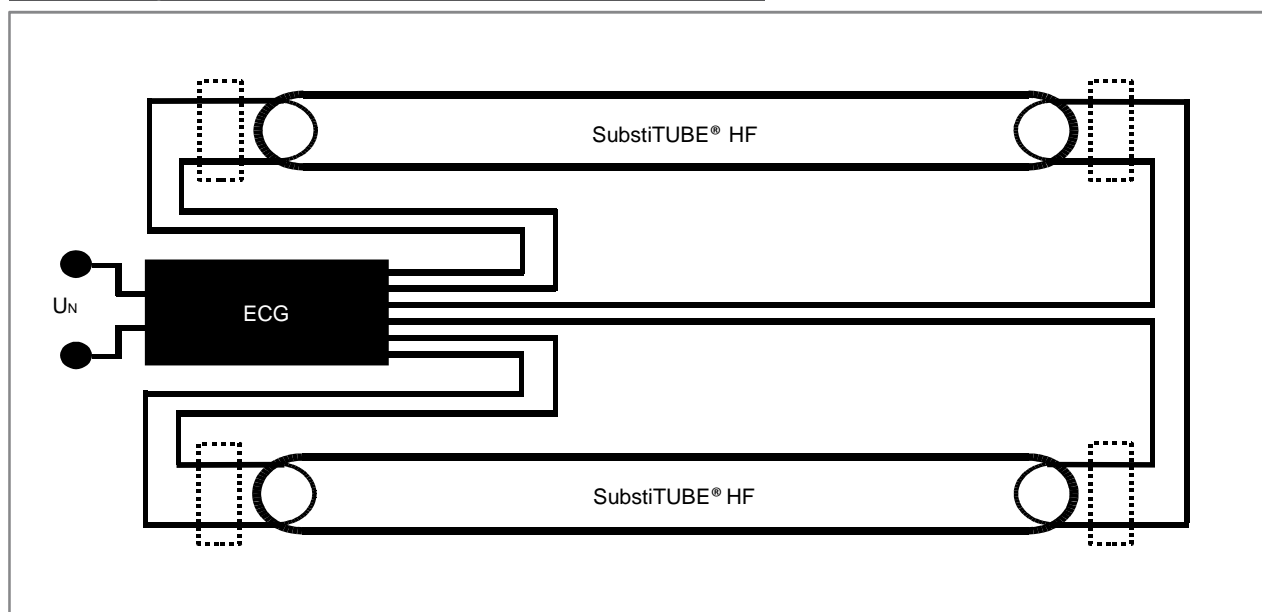
## 3. HF-Types

### 3.2 Multi circuit luminaires

#### 3.2 Multi circuit lamp luminaires

Double lamp luminaires can be retrofitted analogue to single lamp luminaires. Only the fluorescent lamps have to be replaced by SubstiTUBE® HF tubes. An example wiring for luminaires with OSRAM® ECGs is shown below.

*Circuit diagram of a retrofitted double lamp ECG luminaire*



ECG luminaires with more than two lamps are wired similarly.

However, **the wiring of the luminaire remains the same** after retrofitting with SubstiTUBE® HF.

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