

#### EM powerLED SELFTEST FX LiFePO4 1 – 2 W

Combined emergency lighting LED driver 1 – 4 W

#### Product description

- Emergency lighting LED driver with self-test function
- For self-contained emergency lighting
- SELV for output voltage < 60 V DC
- Low profile casing (21 x 30 mm cross-section)
- 5 years guarantee (conditions at [www.tridonic.com](http://www.tridonic.com))

#### Properties

- Mains and emergency operation
- Self-test as per IEC 62034
- Constant current mode
- With either screw or clip fastening (clip-fix)
- 1, 2 or 3 h rated duration
- Selectable operating time (jumper)
- Two-colour status display LED
- „Rest mode“ function
- SELV (outputs powerLED, battery, status LED, test switch)
- Very low energy consumption from the battery after activation of the deep discharge protection



LiFeGuard

#### Battery management

- Intelligent charge system
- Deep discharge protection
- Temperature protection
- Polarity reversal protection

#### Batteries

- LiFePO4 batteries with Tridonic LiFeGuard
- Overcharge-/Overdischarge protection
- Ensures safety in use
- LiFePO<sub>4</sub>: 4 – 8 years design life
- 5 years guarantee for LiFePO<sub>4</sub> batteries (conditions at [www.tridonic.com](http://www.tridonic.com))



**Standards**, page 6

**Wiring diagrams and installation examples**, page 7

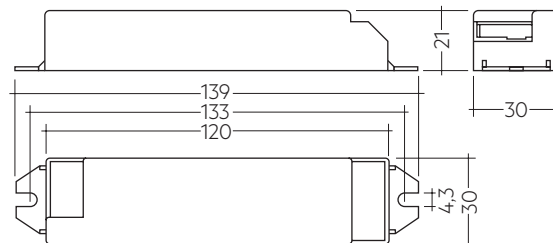
IP20 SELV         
RoHS

## EM powerLED SELFTEST FX LiFePO4 1 – 2 W

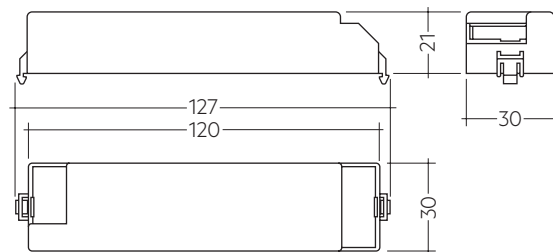
Combined emergency lighting LED driver 1 – 4 W

### Technical data

Rated supply voltage	220 – 240 V
AC voltage range	198 – 264 V
Mains frequency	50 / 60 Hz
Overvoltage protection	320 V (for 48 h)
THD (at 230 V, 50 Hz, full load)	< 120 %
U-OUT (including open- / short-circuit and double load)	15 V
Max. open circuit voltage	15 V
Output current tolerance	± 10 %
Typ. output LF current ripple at full load	± 5 %
Starting time (at 230 V, 50 Hz, full load)	< 0.7 s
Output current	see chapter 5.3
Ambient temperature range ta	-25 ... +55 °C
Max. casing temperature tc	75 °C
Mains voltage changeover threshold	according to EN 60598-2-22
Mains surge capability (between L – N)	1 kV
Surge voltage at output side (against PE)	< 2 kV
Mains surge capability (between L/N – PE)	2 kV
Type of protection	IP20
Lifetime	up to 100,000 h
Guarantee	5 years



Screw-fix



Clip-fix

### Ordering data

Type <sup>①</sup>	Article number	Dimensions L x W x H	Max. number of LEDs	Packaging, carton	Packaging, pallet	Weight per pc.
<b>Screw fastening version</b>						
<b>EM pLED ST FX 201 LiFePO4 1W SCREW</b>	<b>89800798</b>	139 x 30 x 21 mm	1	25 pc(s).	1,200 pc(s).	0.054 kg
<b>EM pLED ST FX 202 LiFePO4 2W SCREW</b>	<b>89800800</b>	139 x 30 x 21 mm	2	25 pc(s).	1,200 pc(s).	0.054 kg
<b>Clip fastening version</b>						
<b>EM pLED ST FX 201 LiFePO4 1W CLIP</b>	<b>89800797</b>	127 x 30 x 21 mm	1	25 pc(s).	1,200 pc(s).	0.054 kg
<b>EM pLED ST FX 202 LiFePO4 2W CLIP</b>	<b>89800799</b>	127 x 30 x 21 mm	2	25 pc(s).	1,200 pc(s).	0.054 kg

### Specific technical data

Type	Rated duration	Number of LEDs	Typ. λ (at 230 V, 50 Hz)	Forward voltage range LED module <sup>④</sup>	Non-maintained operation		Maintained operation	
					Mains current in charging operation <sup>②</sup>	Mains power in charging operation <sup>②</sup>	Mains current in charging operation <sup>②</sup>	Mains power in charging operation <sup>②</sup>
<b>EM pLED ST FX 201 LiFePO4 1W</b>	1h	1	0.55C	2.6 – 3.4 V	16/11 mA	1.5/0.9 W	27/23 mA	3.5/2.8 W
	2h	1	0.55C	2.6 – 3.4 V	16/11 mA	1.5/0.9 W	27/23 mA	3.5/2.8 W
	3h	1	0.55C	2.6 – 3.4 V	21/11 mA	2.1/0.9 W	31/23 mA	4.0/2.8 W
<b>EM pLED ST FX 202 LiFePO4 2W</b>	1h	1	0.58C	2.6 – 3.4 V	16/11 mA	1.5/0.9 W	27/23 mA	3.5/2.8 W
		2	0.58C	5.2 – 6.8 V	16/11 mA	1.5/0.9 W	37/33 mA	5.0/4.1 W
	2h	1	0.58C	2.6 – 3.4 V	20/11 mA	2.2/0.9 W	31/23 mA	4.0/2.8 W
		2	0.58C	5.2 – 6.8 V	20/11 mA	2.2/0.9 W	42/33 mA	5.5/4.1 W
	3h	1	0.58C	2.6 – 3.4 V	22/11 mA	2.5/0.9 W	33/23 mA	4.5/2.8 W
		2	0.58C	5.2 – 6.8 V	22/11 mA	2.5/0.9 W	44/33 mA	5.8/4.1 W

<sup>①</sup> EM = Emergency

<sup>②</sup> For LiFePO4 batteries voltage dependent constant current charging is used. The values displayed are for charging on / charging off.

<sup>③</sup> When exceeding the rated power of 1 respectively 2 W the LED current is reduced proportionally.

<sup>④</sup> Tolerance range for electrical data: ±10 %.

## ACCESSORIES

## Test switch EM2

## Product description

- For connection to the emergency lighting unit
- For checking the device function



## Ordering data

Type	Article number	Packaging, bag	Packaging, carton	Weight per pc.
Test switch EM 2	89805277	25 pc(s).	600 pc(s).	0.011 kg

## ACCESSORIES

## Status indication bi-colour LED

## Product description

- Two-colour status display LED
- Green: system OK, red: fault



## Ordering data

Type	Article number	Packaging, bag	Packaging, carton	Weight per pc.
LED EM bi-colour	89899720	25 pc(s).	200 pc(s).	0.017 kg
LED EM bi-colour, high brightness	89899753	25 pc(s).	800 pc(s).	0.013 kg

ACCES-  
SORIES

Extension Cable LiFePO4

Product description

- Extension cable for LiFePO<sub>4</sub> batteries
- Cable length 500 mm
- 3-pole plug connection



Ordering data

Type	Article number	Packaging, bag	Packaging, carton	Weight per pc.
EXTENSION CABLE LiFePO4 500mm	28002461	10 pc(s).	200 pc(s).	0.01 kg

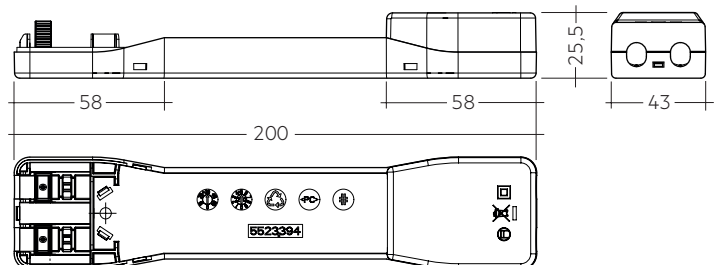
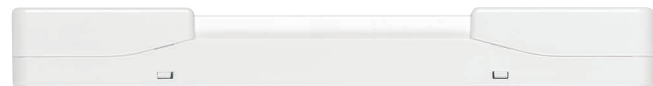
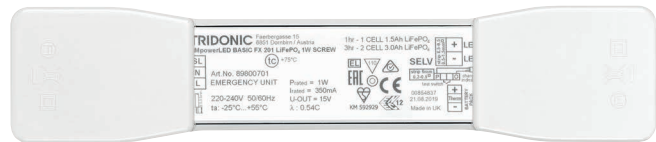
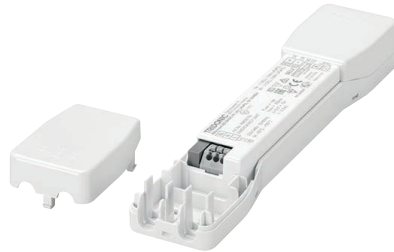


ACCESSORIES

EMpLED Strain-relief set 200x43x25.5mm

Product description

- Optional strain-relief set for independent applications
- Transforms the EM powerLED into a fully class II compatible LED driver (e.g. ceiling installation)
- Easy and tool-free mounting to the EM powerLED, screwless cable-clamp channels with strain-relief (200 x 43 x 25,5 mm)




Permissible cable jacket diameter 2.2 – 9 mm

Ordering data

Type	Article number	Packaging, carton	Packaging, pallet	Weight per pc.
EMpLED SR	28004033	10 pc(s).	1,260 pc(s).	0.06 kg

## 1. Standards

- EN 61347-2-7
- EN 61347-2-13
- EN 62384
- EN 55015
- EN 61000-3-2
- EN 61547
- EN 60068-2-29
- EN 60068-2-30
- EN 60068-2-64
- according to EN 50172
- according to EN 60598-2-22
- according to EN 62034

Meaning of marking 

Double or reinforced insulation for built-in electronic LED drivers.

### 1.1 Glow-wire test

according to EN 61347-1 with increased temperature of 850 °C passed.

### 1.2 Insulation and electric strength testing of luminaires

Electronic LED drivers can be damaged by high voltage. This has to be considered during the routine testing of the luminaires in production.

According to IEC 60598-1 Annex Q (informative only!) or ENEC 303-Annex A, each luminaire should be submitted to an insulation test with 500 V<sub>DC</sub> for 1 second. This test voltage should be connected between the interconnected phase and neutral terminals and the earth terminal. The insulation resistance must be at least 2 MΩ.

As an alternative, IEC 60598-1 Annex Q describes a test of the electrical strength with 1,500 V<sub>AC</sub> (or 1,414 x 1,500 V<sub>DC</sub>). To avoid damage to the electronic devices this test **must not be conducted**.

## 2. Thermal details and lifetime

### 2.1 Lifetime

Average lifetime 100,000 hours under rated conditions with a failure rate of less than 10 %. Average failure rate of 0.2 % per 1000 operating hours.

#### Expected lifetime

EM pLED ST FX LiFePO <sub>4</sub>	t <sub>a</sub>	40 °C	45 °C	50 °C	55 °C
	t <sub>c</sub>	60 °C	65	70 °C	75 °C
	lifetime	> 100,000 h	> 100,000 h	> 100,000 h	76,000 h

The emergency lighting LED driver is designed for a lifetime stated above under reference conditions and with a failure probability of less than 10 %.

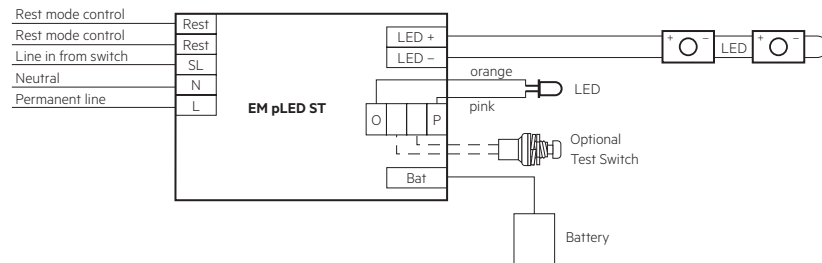
The relation of t<sub>c</sub> to t<sub>a</sub> temperature depends also on the luminaire design. If the measured t<sub>c</sub> temperature is approx. 5 K below t<sub>c</sub> max., t<sub>a</sub> temperature should be checked and eventually critical components (e.g. ELCAP) measured. Detailed information on request.

### 3. Installation / Wiring

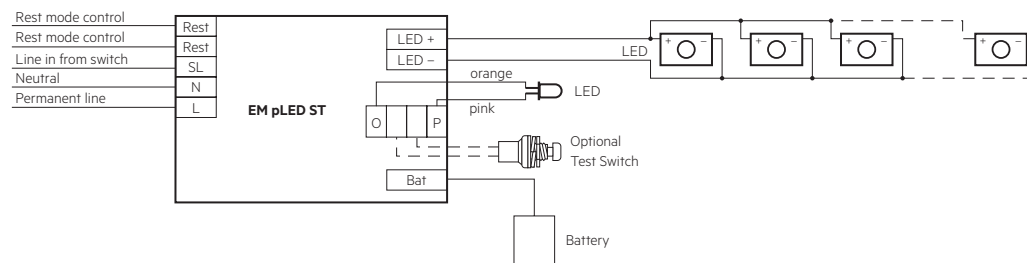
#### 3.1 Wiring diagram

##### 3.1.1 Wiring with one or multiple LED modules

###### Serial:



###### Parallel:



Take care that the LED is connected with the right polarity. LED that are connected to the EM powerLED devices should have a reverse polarity protection device such as a schottky diodes fitted, otherwise irreversible damage could occur if the LED is connected in reverse polarity. Any protection device must be capable of handling in excess of 700 mA.

### 3.1.2 Simple CORRIDOR FUNCTION

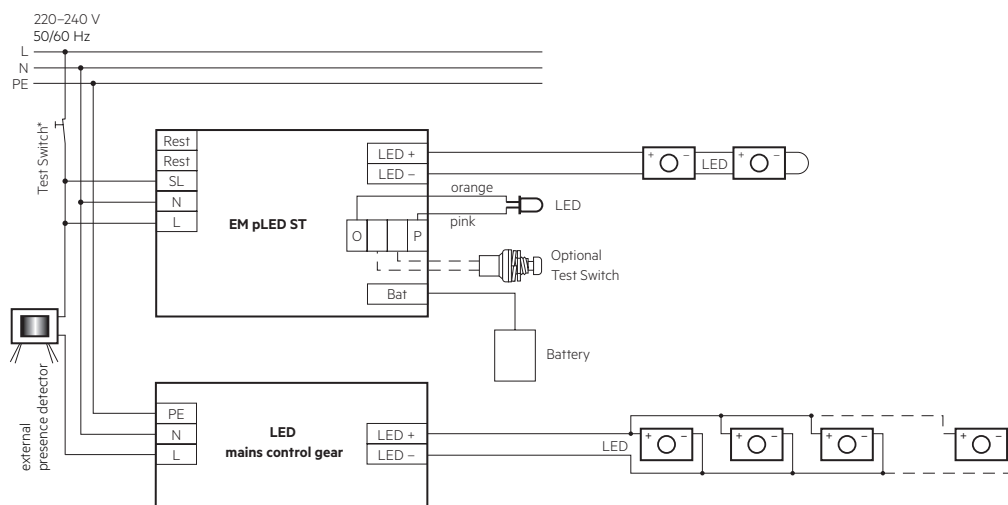
With the mains operation function of the EM powerLED a simple corridor function can be realised.

An external presence detector switches the mains LED driver.

The EM powerLED has the switched line SL connected to permanent mains supply.

On presence both mains LED driver and EM powerLED are active and driving all LEDs. With no presence the mains LED driver is switched off by the presence detector and the EM powerLED stays on operating the emergency LEDs at low power.

Use a circuit similar to that shown next.



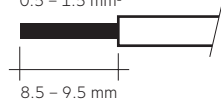
\* Use 230 V Test switch

### 3.2 Wiring type and cross section

LED module/LED driver/supply:

Use solid/stranded wire with a cross section of 0.5 – 1.5 mm<sup>2</sup> for wiring. Strip 8.5 – 9.5 mm of insulation from the cables to ensure perfect operation of terminals.

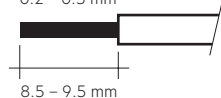
wire preparation:  
0.5 – 1.5 mm<sup>2</sup>



Status indication LED / Test switch:

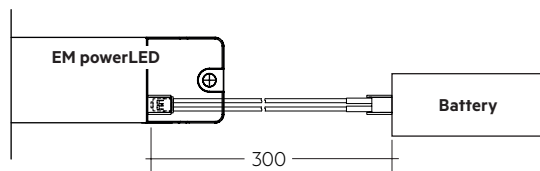
Use solid wire with a cross section of 0.2 – 0.5 mm<sup>2</sup> for wiring. Strip 8.5 – 9.5 mm of insulation from the cables to ensure perfect operation of terminals.

wire preparation:  
0.2 – 0.5 mm<sup>2</sup>

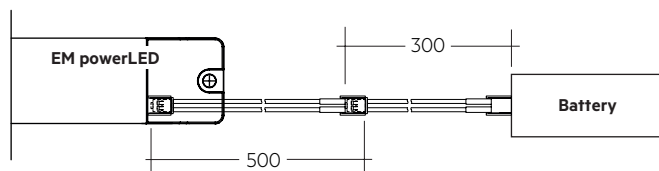


### 3.3 Battery connection

LiFePO<sub>4</sub>: Direct connection

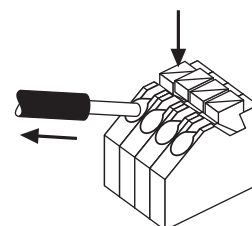


LiFePO<sub>4</sub>: Connection with extension



### 3.4 Loose wiring

Press down the “push button” and remove the cable from front.





### 3.5 Wiring guidelines

- The LED terminals, battery, indicator LED and test switch terminals are classified as SELV (output voltage < 60 V DC). Keep the wiring of the input terminals separated from the wiring of the SELV classified terminals or consider special wiring (double insulation, 6 mm creepage and clearance) when these connections should be kept SELV.
- The output to the LED is DC but has high frequency content, which should be considered for good EMC compliance.
- LED leads should be separated from the mains connections and wiring for good EMC performance.
- Maximum lead length on the LED terminals is 3 m. For a good EMC performance keep the LED wiring as short as possible.
- The secondary wires (LED module) should be routed in parallel to ensure good EMC performance.
- Maximum lead length for the Test switch and Indicator LED connection is 1 m. The test switch and Indicator LED wiring should be separated from the LED leads to prevent noise coupling.
- Battery leads are specified with 0.5 mm cross section and a length of 0.8 m
- To avoid the damage of the control gear, the wiring must be protected against short circuits to earth (sharp edged metal parts, metal cable clips, louver, etc.)

To ensure that a luminaire containing LED emergency units complies with EN 55015 for radio frequency conducted interference in both normal and emergency mode it is essential to follow good practice in the wiring layout.

### 3.6 Maximum lead length

LED	3 m (6 m loop) <sup>①</sup>
Test switch	1 m
Status indication LED	1 m
Batteries	0.8 m

<sup>①</sup> Note: Do not exceed the length of LED leads to the LED module. Leads should always be kept as short as possible.

### 3.7 Use of different phases

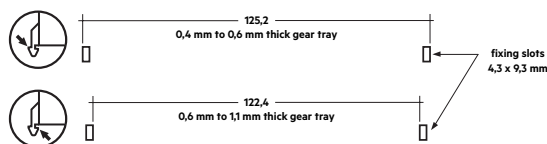
The use of different phases for switched line and unswitched line is allowed. When using different phases, the unswitched line must fail if the switched line fails. This is required to assure correct switching into emergency mode. It can be realised with a relay.

## 4. Mechanical values

### 4.1 Housing properties

- Casing manufactured from polycarbonate.
- Type of protection: IP20

### Recommended fixing details for clip fixing



Max. torque for mounting screws: 0.8 Nm

### 4.2 Mechanical data accessories

LED bi-colour status indicator

- Green / Red
- Mounting hole 6.5 mm diameter, 1 – 1.6 mm thickness
- Lead length 1.0 m
- Insulation rating: 90 °C

Test switch

- Mounting hole 7.0 mm diameter
- Lead length 0.55 m

Battery connection

- Plug connection 0.3 m
- Extension 0.5 m

## 5. Electrical values

### 5.1 Maximum loading of automatic circuit breakers

Automatic circuit breaker type	B10	B13	B16	B20	C10	C13	C16	C20	Inrush current	
Installation Ø	1.5 mm <sup>2</sup>	1.5 mm <sup>2</sup>	2.5 mm <sup>2</sup>	2.5 mm <sup>2</sup>	1.5 mm <sup>2</sup>	1.5 mm <sup>2</sup>	2.5 mm <sup>2</sup>	2.5 mm <sup>2</sup>	I <sub>max</sub>	time
<b>EM pLED ST FX LiFePO4</b>	90	130	130	130	180	260	260	260	6 A	55 µs

### 5.2 Insulation matrix

	Mains	Switched Live	Battery, Test switch, Indicator LED	Rest
<b>Mains</b>	–	•	••	•
<b>Switched Live</b>	•	–	••	•
<b>Battery, Test switch, Indicator LED</b>	••	••	–	•
<b>Rest</b>	•	•	•	–

• Represents basic insulation

•• Represents double or reinforced insulation

### 5.3 LED current

#### EM pLED ST FX LiFePO4, 1 / 2 / 3 h

Type	EM pLED ST FX LiFePO4 1W	EM pLED ST FX LiFePO4 2W
Article no.	89800797, 89800798	89800799, 89800800
LED current in emergency operation 1 x LED	350 mA	600 mA
2 x LED	–	350 mA
LED current in mains operation 1 x LED	350 mA	350 mA
2 x LED	–	350 mA

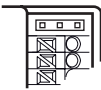

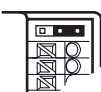
### 5.4 Emergency output factor EOFi

#### EM pLED ST FX LiFePO4, 1 / 2 / 3 h

Type	EM pLED ST FX LiFePO4 1W	EM pLED ST FX LiFePO4 2W
Article no.	89800797, 89800798	89800799, 89800800
Cells	1 / 2 cells	1 / 2 / 3 cells
LED load	LED load	LED load
1 x LED 350 mA	97 %	–
1 x LED 600 mA	–	170 %
2 x LED 350 mA	–	97 %

## 6. Electrical values

### 6.1 Duration link selection

Duration	Link Position
1 hr	 without jumper
2 hr	 position A
3 hr	 position B

### 6.2 Jumper selection

Module supplied with jumper in 3 hours position (position B).

The position of the link will only be read on first power up. If it is changed afterwards both the battery and mains supply must be disconnected for 10 seconds to enable the EM powerLED to read the new link position on reconnection of the battery and mains. It will lead to a false battery failure indication if the link is changed after installation without this reset.



## 7. Battery data

### 7.1 Battery selection

EM pLED ST FX LiFePO<sub>4</sub>, 1 / 2 / 3 h

		Type	EM pLED ST FX LiFePO <sub>4</sub> 1W			EM pLED ST FX LiFePO <sub>4</sub> 2W		
		Article no.	89800797, 89800798			89800799, 89800800		
		Duration	1 h	2h	3 h	1 h	2h	3 h
		Cells	1	1	2	1	2	3
Technology andDesign capacity	Number of cells	Type	Article no.	Assignable batteries				
LiFePO <sub>4</sub> 1,5 Ah 18650 cells	stick	1 x 1	ACCU-LiFePO <sub>4</sub> 1A CON	28002317	•	•	•	
	stick	1 x 2	ACCU-LiFePO <sub>4</sub> 2A CON	28002318			•	
	stick	1 x 3	ACCU-LiFePO <sub>4</sub> 3A CON	28002320				•
	side by side	2 x 1	ACCU-LiFePO <sub>4</sub> 2B CON	28002319			•	
	side by side	3 x 1	ACCU-LiFePO <sub>4</sub> 3B CON	28002321				•
	remote box	1 x 3	PACK-LiFePO <sub>4</sub> 4.5Ah 3 CON	28003806				•

### 7.2 Battery charge / discharge data

EM pLED ST FX LiFePO<sub>4</sub>, 1 / 2 / 3 h

Type		EM pLED ST FX LiFePO4 1W			EM pLED ST FX LiFePO4 2W		
Article no.		89800797, 89800798			89800799, 89800800		
Duration		1 h	2 h	3 h	1 h	2 h	3 h
Battery charge time	Initial charge	24 h					
	Trickle charge	continuously					
Charging current	Initial charge	120 – 150 mA	120 – 150 mA	240 – 300 mA	120 – 150 mA	240 – 300 mA	300 – 360 mA
	Trickle charge <sup>®</sup>	120 – 150 mA / 0 mA	120 – 150 mA / 0 mA	240 – 300 mA / 0 mA	120 – 150 mA / 0 mA	240 – 300 mA / 0 mA	300 – 360 mA / 0 mA
Discharge current		430 – 530 mA			800 – 970 mA		
Charge voltage range <sup>®</sup>				2.0 – 3.6 V per cell			
Discharge voltage range				2.3 – 3.6 V per cell			

<sup>①</sup> Automatic recharge when battery voltage falls below 3.4 V. Charger off (0 mA) when battery voltage exceeds 3.6 V.

Note: Battery protected against operation at excessive temperatures (charging stopped when battery cell temperature < 0 °C or > 60 °C). The emergency lighting LED driver will recharge the battery normally after running the test of 61347-2-7 CL 22.3 (abnormal operating conditions).

<sup>②</sup> The battery will not be charged below 2.0 V.

**7.3 ACCU-LiFePO4****Capacity 1.5 Ah**

International designation	IFpR 19/66
Battery voltage/cell	3.2 V
Cell type	18650
Case temperature range to ensure	
4 years design life	+55 °C
6 years design life	+45 °C
8 years design life	+35 °C
Max. short term battery case temperature (shorter than 1 month over the battery lifetime)	70 °C
Max. number discharge cycles	50 cycles total
Max. storage time	12 months at +5 °C to +25 °C

**7.4 ACCUpack-LiFePO4****Capacity 1.5 Ah**

International designation	IFpR 19/66
Battery voltage/cell	3.2 V
Cell type	18650
Case temperature range to ensure	
4 years design life	+5 °C to +45 °C
6 years design life	+5 °C to +35 °C
8 years design life	+5 °C to +25 °C
Max. short term battery case temperature (shorter than 1 month over the battery lifetime)	70 °C
Max. number discharge cycles	50 cycles total
Max. storage time	12 months at +5 °C to +25 °C

Comply with UN 38.3 and IEC 62133 (safety testing) protected against over charge, over discharge, charging at excessive temperatures, short-circuit and over current.

Only use Tridonic batteries.

**7.5 Safety**

Note: LiFeGuard ensures safe and reliable battery operation by offering a comprehensive three-layered safety system. It addresses the cell, battery pack and emergency driver.

**7.5.1 Deep discharge protection**

When the battery remains connected without charging for a long period of time after the battery cut off of the driver the battery voltage can still drop. To make sure the cells are not damaged by this voltage drop, the battery protection prevents the battery from further discharge below 2.0 V.

**7.5.2 Overcharge protection**

If in case of an error or the use of a wrong driver the battery gets overcharged the battery protection will disconnect the battery from the driver at a voltage of 3.9 V. A discharge of the battery is still possible after the protection circuit was triggered to guarantee emergency operation.

**7.5.3 Short-circuit protection**

In case of a short circuit the battery protection opens the connection to the driver and the output is therefore free of voltage. The output will be reactivated again when the short circuit is removed.

**7.5.4 Temperature protection**

The battery is protected against temporary thermal overheating. If the temperature limit is exceeded the further charging of the battery is no longer possible. The temperature protection is activated below approx. 0 °C and above approx. +60 °C. The discharging of the battery is still possible to guarantee emergency operation.



Battery has built in thermal sensor for safe charging. Mount battery away from heat source.  
Positioning of the thermal sensor see battery data sheet.

**7.6 Wiring batteries**

To inhibit inverter operation disconnect the batteries by removing the connection at battery side.

For further informations refer to corresponding battery datasheet.

**7.7 Storage, installation and commissioning**

Relevant information about storage conditions, installation and commissioning are provided in the battery datasheets.

## 8. Miscellaneous

### 8.1 Battery replacement

After a battery replacement and a subsequent full charge cycle (24 h) a duration test is mandatory to prove that with the new battery the rated duration is achieved.

### 8.2 Mains-connected transformers

The EM powerLED does not contain mains-connected windings of transformers.

### 8.3 FELV control terminals



FELV control terminals marked „Risk of electric shock“ are not safe to touch. Insulate circuits connected to any FELV control terminal for the Low Voltage supply voltage of the control gear. Protect terminals connected to the FELV circuit against accidental contact.

### 8.4 Additional information

Additional technical information at [www.tridonic.com](http://www.tridonic.com) → Technical Data

Guarantee conditions at [www.tridonic.com](http://www.tridonic.com) → Services

Lifetime declarations are informative and represent no warranty claim.  
No warranty if device was opened.