Product description
• Self contained emergency lighting LED Driver for manual testing
• Non-maintained and maintained operation
• For luminaire installation
• Nominal lifetime up to 100,000 h
• 5 years guarantee

Functions
• 1 or 3 h rated duration depending on connected battery
• For 1 or 2 LEDs connected in series
• Automatic detection of connected LED load
• Switched live for switching the LED output

Battery management
• Intelligent charge system
• Deep discharge protection
• Temperature protection
• Polarity reversal protection for battery provided by 3-pole connector

Batteries
• LiFePO4 batteries with Tridonic LiFeGuard
• Temperature protection
• Overcharge-/Overdischarge protection
• Ensures safety in use
• Up to 8 year design life
• 3 year guarantee
• For battery compatibility refer to chapter „Battery selection”

Standards, page 5
Wiring diagrams and installation examples, page 6
Emergency lighting units
EM powerLED

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): < 0.5 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): < 1.5 kV
- Mains surge capability (between L/N – PE): 2 kV
- Type of protection: IP20
- Lifetime: up to 100,000 h
- Guarantee: 5 years

Ordering data

<table>
<thead>
<tr>
<th>Type</th>
<th>Article number</th>
<th>Dimensions L x W x H</th>
<th>Max. number of LEDs</th>
<th>Packaging carton</th>
<th>Packaging pallet</th>
<th>Weight per pc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw fastening version</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EM powerLED BASIC FX 201 LiFePO4 1W SCREW</td>
<td>89800701</td>
<td>139 x 30 x 21 mm</td>
<td>1</td>
<td>25 pc(s).</td>
<td>1,200 pc(s).</td>
<td>0.05 kg</td>
</tr>
<tr>
<td>EM powerLED BASIC FX 202 LiFePO4 2W SCREW</td>
<td>89800702</td>
<td>139 x 30 x 21 mm</td>
<td>2</td>
<td>25 pc(s).</td>
<td>1,200 pc(s).</td>
<td>0.05 kg</td>
</tr>
<tr>
<td>Clip fastening version</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EM powerLED BASIC FX 201 LiFePO4 1W CLIP</td>
<td>89800703</td>
<td>127 x 30 x 21 mm</td>
<td>1</td>
<td>25 pc(s).</td>
<td>1,200 pc(s).</td>
<td>0.05 kg</td>
</tr>
<tr>
<td>EM powerLED BASIC FX 202 LiFePO4 2W CLIP</td>
<td>89800704</td>
<td>127 x 30 x 21 mm</td>
<td>2</td>
<td>25 pc(s).</td>
<td>1,200 pc(s).</td>
<td>0.05 kg</td>
</tr>
</tbody>
</table>

Specific technical data

<table>
<thead>
<tr>
<th>Type</th>
<th>Rated duration</th>
<th>Number of LEDs</th>
<th>Typ. λ (at 230 V, 50 Hz)</th>
<th>Forward voltage range LED module</th>
<th>Non-maintained operation</th>
<th>Maintained operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM powerLED BASIC FX 201 LiFePO4 1W</td>
<td>1/3 h</td>
<td>1</td>
<td>0.55C</td>
<td>24 – 34 V</td>
<td>16 / 9 mA</td>
<td>27 / 21 mA</td>
</tr>
<tr>
<td>EM powerLED BASIC FX 202 LiFePO4 2W</td>
<td>1/3 h</td>
<td>1</td>
<td>0.58C</td>
<td>24 – 34 V</td>
<td>21 / 10 mA</td>
<td>32 / 21 mA</td>
</tr>
<tr>
<td>EM powerLED BASIC FX 202 LiFePO4 2W</td>
<td>1/3 h</td>
<td>2</td>
<td>0.58C</td>
<td>48 – 68 V</td>
<td>24 / 18 W</td>
<td>47 / 30 mA</td>
</tr>
</tbody>
</table>

- EM = Emergency
- For LiFePO4 batteries voltage dependent constant current charging is used. The values displayed are for charging on / charging off
- When exceeding the rated power of 1 respectively 2 W the LED current is reduced proportionally
- Tolerance range for electrical data =±10 %
Product description

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

Product description

- A green LED indicates that charging current is lowing into the battery

<table>
<thead>
<tr>
<th>Type</th>
<th>Article number</th>
<th>Packaging, per pc.</th>
<th>Weight per pc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test switch EM2</td>
<td>89805277</td>
<td>25 pc(s) 600 pc(s)</td>
<td>0.011 kg</td>
</tr>
</tbody>
</table>

Ordering data

<table>
<thead>
<tr>
<th>Type</th>
<th>Article number</th>
<th>Packaging, per pc.</th>
<th>Weight per pc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED EM green</td>
<td>89899605</td>
<td>25 pc(s) 200 pc(s)</td>
<td>0.011 kg</td>
</tr>
<tr>
<td>LED EM green, ultra high brightness</td>
<td>89899756</td>
<td>25 pc(s) 200 pc(s)</td>
<td>0.012 kg</td>
</tr>
</tbody>
</table>
Extension Cable LiFePO4

Product description
- Extension cable for LiFePO4 batteries
- Cable length 500 mm
- 3-pole plug connection

Ordering data

<table>
<thead>
<tr>
<th>Type</th>
<th>Article number</th>
<th>Packaging, bag</th>
<th>Packaging, carton</th>
<th>Weight per pc</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTENSION CABLE LiFePO4 500mm</td>
<td>28002461</td>
<td>10 pc(s)</td>
<td>200 pc(s)</td>
<td>0.01 kg</td>
</tr>
</tbody>
</table>
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

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 DC 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 AC (or 1,414 x 1,500 V DC). To avoid damage to the electronic devices this test must not be conducted.

2. Thermal details and lifetime

2.1 Lifetime

Average lifetime 50,000 hours under rated conditions with a failure rate of less than 10 %. Average failure rate of 0.2 % per 1000 operating hours.

<table>
<thead>
<tr>
<th>Expected lifetime</th>
<th>tc</th>
<th>60 °C</th>
<th>65 °C</th>
<th>70 °C</th>
<th>75 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM powerLED BASIC FX LiFePO4</td>
<td>lifetime</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>70,000 h</td>
<td>50,000 h</td>
</tr>
</tbody>
</table>

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 tc to ta temperature depends also on the luminaire design. If the measured tc temperature is approx. 5 K below tc max., ta temperature should be checked and eventually critical components (e.g. ELCAP) measured. Detailed information on request.

3. Installation / Wiring

3.1 Wiring diagram

One or two LED modules can be connected to the EM powerLED. These LED module(s) are operated in emergency mode from the associated battery. In normal mains mode all LED modules are operated from the mains supply.

Use of the test switch: For checking the device function press the test switch for a minimum of 3 seconds.
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 600 mA.

Due to the fact that independent circuits are used for general and emergency lighting it is important that the normal supply of the mains LED Driver is switched off together with the permanent emergency supply prior to checking the operation of the emergency LEDs. If this is not done then it may not be possible to see that the emergency LEDs are operating. Use a circuit similar to that shown next.

* Use 230 V Test switch
3.2 Wiring type and cross section

Solid wire with a cross section of 0.5 – 1.5 mm². Strip 8.5 – 9.5 mm of insulation from the cables to ensure perfect operation of terminals.

Wiring: LED module/LED Driver/Supply
wire preparation:
0.5 – 1.5 mm²
8.5 – 9.5 mm

3.3 Battery connection

LiFePO₄: Direct connection

LiFePO₄: 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.)

Within the luminaire the switched and unswitched 50 Hz supply wiring must be routed as short as possible and be kept as far away as possible from the LED leads. Through wiring may affect the EMC performance of the luminaire.

3.6 Maximum lead length

LED 3 m (6 m loop)
Test switch 1 m
Status indication LED 1 m
Batteries 0.8 m

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 status indicator
- Green
- Mounting hole 6.5 mm diameter, 1 – 1.6 mm thickness
- Lead length 0.3 m / 0.6 m / 10 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

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.
5. Electrical values

5.1 Maximum loading of automatic circuit breakers

<table>
<thead>
<tr>
<th>Automatic circuit breaker type</th>
<th>Ø B10</th>
<th>Ø B13</th>
<th>Ø B16</th>
<th>Ø B20</th>
<th>Ø C10</th>
<th>Ø C13</th>
<th>Ø C16</th>
<th>Ø C20</th>
<th>Inrush current Iₘₐₓ</th>
<th>tᵣₑₜₑ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation Ø</td>
<td>1.5 mm²</td>
<td>1.5 mm²</td>
<td>2.5 mm²</td>
<td>2.5 mm²</td>
<td>1.5 mm²</td>
<td>1.5 mm²</td>
<td>2.5 mm²</td>
<td>2.5 mm²</td>
<td>90</td>
<td>130</td>
</tr>
</tbody>
</table>

EM powerLED BASIC FX LiFePO4

5.2 Insulation matrix

<table>
<thead>
<tr>
<th></th>
<th>Mains</th>
<th>Switched Live</th>
<th>Battery, LED, Test switch, Indicator LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Switched Live</td>
<td>•</td>
<td>–</td>
<td>•</td>
</tr>
<tr>
<td>Battery, LED, Test switch, Indicator LED</td>
<td>• •</td>
<td>–</td>
<td>•</td>
</tr>
</tbody>
</table>

• Represents basic insulation
• • Represents double or reinforced insulation

5.3 LED current

EM powerLED 1-2 W BASIC, 1 / 3 h

<table>
<thead>
<tr>
<th>Type</th>
<th>EM powerLED BASIC FX LiFePO4 1W</th>
<th>EM powerLED BASIC FX LiFePO4 2W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Article no.</td>
<td>89800701, 89800703</td>
<td>89800702, 89800704</td>
</tr>
<tr>
<td>LED current in emergency operation</td>
<td>350 mA</td>
<td>600 mA</td>
</tr>
<tr>
<td>1 x LED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 x LED</td>
<td>–</td>
<td>350 mA</td>
</tr>
<tr>
<td>LED current in mains operation</td>
<td>350 mA</td>
<td>350 mA</td>
</tr>
<tr>
<td>1 x LED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 x LED</td>
<td>–</td>
<td>350 mA</td>
</tr>
</tbody>
</table>
6. Battery data

6.1 Battery selection

<table>
<thead>
<tr>
<th>Technology and Design capacity</th>
<th>Number of cells</th>
<th>Type</th>
<th>Article no.</th>
<th>Assignable batteries</th>
</tr>
</thead>
<tbody>
<tr>
<td>LiFePO4, 15 Ah</td>
<td>18650 cells</td>
<td>stick</td>
<td>1 x 1</td>
<td>Accu-LifePO4 1A CON 28002317</td>
</tr>
<tr>
<td></td>
<td></td>
<td>stick</td>
<td>1 x 2</td>
<td>Accu-LifePO4 2A CON 28002318</td>
</tr>
<tr>
<td></td>
<td></td>
<td>stick</td>
<td>1 x 3</td>
<td>Accu-LifePO4 3A CON 28002320</td>
</tr>
<tr>
<td></td>
<td></td>
<td>side by side</td>
<td>2 x 1</td>
<td>Accu-LifePO4 2B CON 28002319</td>
</tr>
<tr>
<td></td>
<td></td>
<td>side by side</td>
<td>3 x 1</td>
<td>Accu-LifePO4 3B CON 28002321</td>
</tr>
<tr>
<td></td>
<td>remote box</td>
<td>1 x 1</td>
<td>PACK-LifePO4 1.5Ah 1 CON 28003804</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>remote box</td>
<td>1 x 2</td>
<td>PACK-LifePO4 3.0Ah 2 CON 28003805</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>remote box</td>
<td>1 x 3</td>
<td>PACK-LifePO4 4.5Ah 3 CON 28003806</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>remote box</td>
<td>1 x 4</td>
<td>PACK-LifePO4 6.0Ah 4 CON 28003807</td>
<td>*</td>
</tr>
</tbody>
</table>

6.2 Battery charge / discharge data

<table>
<thead>
<tr>
<th>Battery charge / discharge data</th>
<th>Type</th>
<th>EM powerLED BASIC FX LiFePO4, 1 / 3 h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Article no.</td>
<td>89800701, 89800703</td>
<td>89800702, 89800704</td>
</tr>
<tr>
<td>Duration</td>
<td>1 / 3 h</td>
<td>1 / 3 h</td>
</tr>
</tbody>
</table>

Battery charge time:
- Initial charge: 24 h
- Trickle charge: continuously

Charging current:
- Initial charge: 145 – 185 mA
- Trickle charge: 145 – 185 mA / 0 mA
- Discharge current: 455 – 505 mA

<table>
<thead>
<tr>
<th>Charge voltage range</th>
<th>Discharge voltage range</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 – 3.6 V per cell</td>
<td>2.3 – 3.6 V per cell</td>
</tr>
</tbody>
</table>

Note: Battery protected against operation at excessive temperatures (charging stopped when battery cell temperature < -5 °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).
6.3 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 temperature**: 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.

6.4 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 temperature (reduced lifetime)**: 45 °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.

6.5 Safety

6.5.1 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.

6.5.2 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 39 V. A discharge of the battery is still possible after the protection circuit was triggered to guarantee emergency operation.

6.5.3 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.

6.5.4 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.

6.6 Wiring batteries

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

For further informations refer to corresponding battery datasheet.

6.7 Storage, installation and commissioning

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

7. Miscellaneous

7.1 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.

7.2 Additional information

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

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

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