Product description

- Emergency lighting LED driver with self-test function
- For self-contained emergency lighting
- For LED modules with a forward voltage of 10 – 54 V
- SELV for output voltage < 60 V DC
- Low profile casing (21 x 30 mm cross-section)
- For luminaire installation
- Compatible with Tridonic’s LLE FLEX modules (ADV, EXC)
- Nominal lifetime up to 100,000 h
- 5 years guarantee (conditions at www.tridonic.com)

Properties

- Non maintained operation
- Self-test as per IEC 62034
- 1, 2 or 3 h rated duration
- Operating time selectable with plug (duration link)
- Compatible with most constant current LED drivers (see 5.4)
- 3-pole technology: 2-pole LED module changeover and delayed power switching for the LED driver
- Automatic shutdown of output if LED load is out of range
- Constant power output
- Two-colour status display LED
- Electronic charge system
- Deep discharge protection
- Short-circuit-proof battery connection
- Polarity reversal protection for battery provided by by 3-pole connector
- Automatic detection of the connected battery technology (NiMH or LiFePO4 batteries)

Self-test:

- Status of the battery
- Status of the LED
- Function test
- Duration test

Batteries

- High-temperature cells
- NiMH or LiFePO4 batteries
- LA or 18650 cells
- 4-year design life for NiMH batteries
- 1-year guarantee for NiMH batteries
- 4 - 8 years design life for LiFePO4 batteries
- 4 years guarantee for LiFePO4 batteries
- For battery compatibility refer to chapter „Battery selection“

Standards, page 5

Wiring diagrams and installation examples, page 6
### Technical data

- **Rated supply voltage**: 220 – 240 V
- **AC voltage range**: 198 – 246 V
- **Mains frequency**: 50 / 60 Hz
- **LED module forward voltage range**: 10 – 54 V
- **Output current**: see chapter 5.3
- **Starting time**: < 0.5 s from detection of emergency event
- **Overvoltage protection**: 320 V (for 48 h)
- **U-OUL (including open- / short-circuit and double load)**: 60 V
- **Max. open circuit voltage**: 60 V
- **Ambient temperature range ta**: -25 – +55 °C
- **Max. casing temperature tc**: 80 °C
- **Mains voltage changeover threshold**: according to EN 60598-2-22
- **Mains surge capability (between L – N)**: 1 kV
- **Mains surge capability (between L/N – PE)**: 2 kV
- **Type of protection**: IP20
- **Rest mode max. number of emergency units**: 100
- **Rest mode max. wiring distance**: 1000 m
- **Duration test**: Yearly 1h / 2h / 3 h test
- **Lifetime**: up to 100,000 h
- **Guarantee (conditions at www.tridonic.com)**: 5 years
- **Dimensions LxWxH**: 179 x 30 x 21 mm

### Specific technical data

#### Type

<table>
<thead>
<tr>
<th>Battery technology</th>
<th>Rated duration</th>
<th>Typ output power emergency</th>
<th>Mains current in charging operation</th>
<th>Rated power in charging operation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EM converterLED ST 202A MH/LiFePO4 50 V</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NiMH</td>
<td>2 h 0.65C</td>
<td>15 W</td>
<td>15 mA</td>
<td>16 mA</td>
</tr>
<tr>
<td>LiFePO4</td>
<td>2 h 0.65C</td>
<td>15 W</td>
<td>19 mA</td>
<td>19 mA</td>
</tr>
<tr>
<td></td>
<td>3 h 0.65C</td>
<td>15 W</td>
<td>19 mA</td>
<td>19 mA</td>
</tr>
<tr>
<td></td>
<td>1 h 0.65C</td>
<td>15 W</td>
<td>15 mA</td>
<td>15 mA</td>
</tr>
<tr>
<td></td>
<td>2 h 0.65C</td>
<td>15 W</td>
<td>19 mA</td>
<td>19 mA</td>
</tr>
<tr>
<td></td>
<td>3 h 0.65C</td>
<td>15 W</td>
<td>19 mA</td>
<td>19 mA</td>
</tr>
<tr>
<td><strong>EM converterLED ST 202A MH/LiFePO4 50 V</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NiMH</td>
<td>2 h 0.70C</td>
<td>2.3 W</td>
<td>16 mA</td>
<td>16 mA</td>
</tr>
<tr>
<td>LiFePO4</td>
<td>2 h 0.70C</td>
<td>2.3 W</td>
<td>20 mA</td>
<td>20 mA</td>
</tr>
<tr>
<td></td>
<td>3 h 0.70C</td>
<td>2.3 W</td>
<td>20 mA</td>
<td>20 mA</td>
</tr>
<tr>
<td></td>
<td>1 h 0.65C</td>
<td>2.3 W</td>
<td>15 mA</td>
<td>15 mA</td>
</tr>
<tr>
<td></td>
<td>2 h 0.65C</td>
<td>2.3 W</td>
<td>19 mA</td>
<td>19 mA</td>
</tr>
<tr>
<td></td>
<td>3 h 0.65C</td>
<td>2.3 W</td>
<td>19 mA</td>
<td>19 mA</td>
</tr>
<tr>
<td></td>
<td>2 h 0.70C</td>
<td>2.5 W</td>
<td>20 mA</td>
<td>20 mA</td>
</tr>
<tr>
<td></td>
<td>3 h 0.70C</td>
<td>2.5 W</td>
<td>20 mA</td>
<td>20 mA</td>
</tr>
<tr>
<td></td>
<td>1 h 0.65C</td>
<td>2.5 W</td>
<td>19 mA</td>
<td>19 mA</td>
</tr>
<tr>
<td></td>
<td>2 h 0.65C</td>
<td>2.5 W</td>
<td>24 mA</td>
<td>24 mA</td>
</tr>
<tr>
<td></td>
<td>3 h 0.65C</td>
<td>2.5 W</td>
<td>24 mA</td>
<td>24 mA</td>
</tr>
<tr>
<td></td>
<td>2 h 0.70C</td>
<td>2.5 W</td>
<td>20 mA</td>
<td>20 mA</td>
</tr>
<tr>
<td></td>
<td>3 h 0.70C</td>
<td>2.5 W</td>
<td>20 mA</td>
<td>20 mA</td>
</tr>
<tr>
<td></td>
<td>1 h 0.70C</td>
<td>3.5 W</td>
<td>17 mA</td>
<td>20 mA</td>
</tr>
<tr>
<td></td>
<td>2 h 0.70C</td>
<td>3.5 W</td>
<td>23 mA</td>
<td>23 mA</td>
</tr>
<tr>
<td></td>
<td>3 h 0.70C</td>
<td>3.5 W</td>
<td>23 mA</td>
<td>23 mA</td>
</tr>
<tr>
<td></td>
<td>2 h 0.70C</td>
<td>3.5 W</td>
<td>19 mA</td>
<td>19 mA</td>
</tr>
<tr>
<td></td>
<td>3 h 0.70C</td>
<td>3.5 W</td>
<td>24 mA</td>
<td>24 mA</td>
</tr>
</tbody>
</table>

- **EM = Emergency**
- **In case of NiMH batteries: Intermittent charge is used. Value 1 is for 4 min. charge on / Value 2 is for 16 min. charge off. In case of LiFePO4 batteries voltage dependent constant current charging is used**
- **2 h battery charging time for 2 h emergency lighting function when used with LiFePO4 batteries**

---

**Note:** LED driver supplied with duration link in 3 hours position. Duration link must be set before battery and mains connection.

### Ordering data

<table>
<thead>
<tr>
<th>Type</th>
<th>Article number</th>
<th>Rated supply voltage</th>
<th>Packaging, per pc.</th>
<th>Weight per pc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM converterLED ST 202A MH/LiFePO4 50 V</td>
<td>89800900</td>
<td>2/2/3 h</td>
<td>10 pc(s)</td>
<td>1600 pc(s)</td>
</tr>
<tr>
<td>EM converterLED ST 202A MH/LiFePO4 50 V</td>
<td>89800624</td>
<td>2/2/3 h</td>
<td>10 pc(s)</td>
<td>1600 pc(s)</td>
</tr>
<tr>
<td>EM converterLED ST 203A MH/LiFePO4 50 V</td>
<td>89800625</td>
<td>2/2/3 h</td>
<td>10 pc(s)</td>
<td>1600 pc(s)</td>
</tr>
<tr>
<td>EM converterLED ST 204A MH/LiFePO4 50 V</td>
<td>89800626</td>
<td>2/2/3 h</td>
<td>10 pc(s)</td>
<td>1600 pc(s)</td>
</tr>
</tbody>
</table>
**Product description**

- Optional strain-relief set for independent applications
- Transforms the LED driver into a fully class II compatible LED driver (e.g. ceiling installation)
- Easy and tool-free mounting to the LED driver, screwless cable-clamp channels with strain-relief (240 x 43 x 30 mm)

**Permissible cable jacket diameter 2.2 – 9 mm**

**Ordering data**

<table>
<thead>
<tr>
<th>Type</th>
<th>Article number</th>
<th>Packaging, carton</th>
<th>Packaging, pallet</th>
<th>Weight per pc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMcLED SR</td>
<td>28003813</td>
<td>10 pc(s)</td>
<td>1,260 pc(s)</td>
<td>0.08 kg</td>
</tr>
</tbody>
</table>

Subject to change without notice. Information provided without guarantee.
**Product description**
- For connection to the emergency lighting unit
- For checking the device function
- 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>Test switch EM 3</td>
<td>89899956</td>
<td>25 pc(s)</td>
<td>200 pc(s)</td>
<td>0.013 kg</td>
</tr>
</tbody>
</table>

---

**Product description**
- Two-colour status display LED
- Green: system OK, red: fault
- 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>LED EM bi-colour, 1.0 m CON</td>
<td>89800273</td>
<td>25 pc(s)</td>
<td>200 pc(s)</td>
<td>0.015 kg</td>
</tr>
<tr>
<td>LED EM bi-colour, high brightness HO 1.0 m CON</td>
<td>89800275</td>
<td>25 pc(s)</td>
<td>200 pc(s)</td>
<td>0.015 kg</td>
</tr>
<tr>
<td>LED EM bi-colour, 0.6 m CON</td>
<td>89800474</td>
<td>25 pc(s)</td>
<td>200 pc(s)</td>
<td>0.005 kg</td>
</tr>
<tr>
<td>LED EM bi-colour, high brightness HO 0.6 m CON</td>
<td>89800475</td>
<td>25 pc(s)</td>
<td>200 pc(s)</td>
<td>0.005 kg</td>
</tr>
<tr>
<td>LED EM bi-colour, 0.3 m CON</td>
<td>89800274</td>
<td>25 pc(s)</td>
<td>200 pc(s)</td>
<td>0.005 kg</td>
</tr>
<tr>
<td>LED EM bi-colour, high brightness HO 0.3 m CON</td>
<td>89800276</td>
<td>25 pc(s)</td>
<td>200 pc(s)</td>
<td>0.005 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>

Connection Cable NiMH

Product description
- Connection cable for NiMH batteries
- Cable length 500 mm
- 2-pole plug connection for batteries and 3-pole plug connection for LED driver

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>CONNECTION CABLE NiMH 500mm</td>
<td>28002462</td>
<td>10 pc(s)</td>
<td>200 pc(s)</td>
<td>0.015 kg</td>
</tr>
</tbody>
</table>
1. Standards

- EN 61347-1
- EN 61347-2-13
- EN 61347-2-7
- EN 55015
- EN 61000-3-2
- EN 61000-3-3
- EN 61547
- EN 60068-2-64
- EN 60068-2-29
- EN 60068-2-30
- EN 62384
- 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. The control gear relies upon the luminaire enclosure for protection against accidental contact with live parts.

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 with NiMH batteries</th>
<th>65 °C</th>
<th>70 °C</th>
<th>75 °C</th>
<th>80 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM converterLED ST 202A MH/LiFePO4 50V</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>99,000 h</td>
<td>70,000 h</td>
</tr>
<tr>
<td>EM converterLED ST 202 MH/LiFePO4 50V</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>73,000 h</td>
</tr>
<tr>
<td>EM converterLED ST 203 MH/LiFePO4 50V</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>99,000 h</td>
<td>70,000 h</td>
</tr>
<tr>
<td>EM converterLED ST 204 MH/LiFePO4 50V</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>16,000 h</td>
<td>68,000 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 more LED modules with a total forward voltage of 10 to 54 V can be connected to the EM converterLED. These LED module(s), marked with “Emergency” are operated in emergency mode from the associated battery. In normal mains mode all LED modules are operated by the mains LED driver.

Expected lifetime with LiFePO4 batteries:

<table>
<thead>
<tr>
<th>Expected lifetime with LiFePO4 batteries</th>
<th>65 °C</th>
<th>70 °C</th>
<th>75 °C</th>
<th>80 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM converterLED ST 202A MH/LiFePO4 50V</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>78,000 h</td>
</tr>
<tr>
<td>EM converterLED ST 202 MH/LiFePO4 50V</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>79,000 h</td>
</tr>
<tr>
<td>EM converterLED ST 203 MH/LiFePO4 50V</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>78,000 h</td>
</tr>
<tr>
<td>EM converterLED ST 204 MH/LiFePO4 50V</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>78,000 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

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<th>70 °C</th>
<th>75 °C</th>
<th>80 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM converterLED ST 202A MH/LiFePO4 50V</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>78,000 h</td>
</tr>
<tr>
<td>EM converterLED ST 202 MH/LiFePO4 50V</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>79,000 h</td>
</tr>
<tr>
<td>EM converterLED ST 203 MH/LiFePO4 50V</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>78,000 h</td>
</tr>
<tr>
<td>EM converterLED ST 204 MH/LiFePO4 50V</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>100,000 h</td>
<td>78,000 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 more LED modules with a total forward voltage of 10 to 54 V can be connected to the EM converterLED. These LED module(s), marked with “Emergency” are operated in emergency mode from the associated battery. In normal mains mode all LED modules are operated by the mains LED driver.
EM converterLED SELFTEST with one LED module for non-maintained emergency operation

EM converterLED SELFTEST with a standard LED driver and one LED module for mains and emergency operation

EM converterLED SELFTEST with a standard LED driver and series operation of LED modules

One LED module is operated in emergency mode.
All LED modules are operated in mains mode.
EM converterLED SELFTEST with a standard LED driver and parallel operation of LED modules

One LED module is operated in emergency mode.
All LED modules are operated in mains mode.

3.2 Wiring type and cross section

Solid wire with a cross section of 0.5 – 1.5 mm². Strip 8 – 9 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 – 9 mm

3.3 Battery connection

NiMH: Connection with extension

When using an EM converterLED in combination with a NiMH battery, order the CONNECTION CABLE NiMH 500mm separately.

LiFePO₄: Direct connection

LiFePO₄: Connection with extension
3.4 Loose wiring

Loosen wire through twisting and pulling or using a Ø 1 mm release tool

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 equivalent 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.
- Separate LED leads from the mains and REST 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.
- Route the secondary wires (LED module) in parallel to ensure good EMC performance.
- Maximum lead length for the Test switch and Indicator LED connection is 1 m. Separate the test switch and Indicator LED wiring 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
- REST terminals are mains proof.
- Protect the wiring against short circuits to earth (sharp edged metal parts, metal cable clips, louver, etc.) to avoid the damage of the control gear.

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.

Within the luminaire route the switched and unswitched 50 Hz supply wiring as short as possible and keep it as far away as possible from the LED leads.

Through wiring may affect the EMC performance of the luminaire.

Do not exceed the max. length of LED leads to the LED module. Note that the length of the EM converterLED leads to the LED module is added to the length of the leads from the LED driver to the EM converterLED module when considering the max. permitted lead length of the LED driver.

3.6 Maximum lead length

<table>
<thead>
<tr>
<th>Component</th>
<th>Lead Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED</td>
<td>3 m (6 m loop)</td>
</tr>
<tr>
<td>Status indication LED</td>
<td>1 m</td>
</tr>
<tr>
<td>Batteries</td>
<td>0 8 m</td>
</tr>
</tbody>
</table>

3.8 Compatibility with LLE FLEX modules

The EM converterLED can be used within certain restrictions to operate constant voltage LED loads from the Tridonic LLE FLEX (ADV, EXC) product range. A certain minimum length of the LLE FLEX is required for correct operation.

Detailed information in the download area of the ST and PRO product pages at www.tridonic.com (EM converterLED manual).

4. Mechanical values

4.1 Housing properties

- Casing manufactured from polycarbonate.
- Type of protection: IP20
- Max. torque at the mounting screws: 0.8 Nm

4.2 Mechanical data accessories

- LED status indicator
  - Bi-colour
  - Mounting hole 6.5 mm diameter, 1 – 1.6 mm thickness
  - Lead length 0.3 m / 1.0 m
  - Insulation rating: 90 °C
  - Plug connection
- Test switch
  - Mounting hole 7.0 mm diameter
  - Lead length 0.55 m
  - Plug connection
- Battery connection
  - Plug connection 0.3 m
  - Extension 0.5 m

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.
## 5. Electrical values

### 5.1 Maximum loading of automatic circuit breakers

<table>
<thead>
<tr>
<th>Automatic circuit breaker type</th>
<th>B10</th>
<th>B13</th>
<th>B16</th>
<th>B20</th>
<th>C10</th>
<th>C13</th>
<th>C16</th>
<th>C20</th>
<th>Inrush current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation Ø</td>
<td>1.5 mm²</td>
<td>1.5 mm²</td>
<td>1.5 mm²</td>
<td>1.5 mm²</td>
<td>1.5 mm²</td>
<td>1.5 mm²</td>
<td>2.5 mm²</td>
<td>2.5 mm²</td>
<td>Iₘₚ time</td>
</tr>
<tr>
<td>EM converterLED ST MH/LiFePO4 50V</td>
<td>90</td>
<td>100</td>
<td>130</td>
<td>130</td>
<td>180</td>
<td>260</td>
<td>260</td>
<td>260</td>
<td>10 A 120 μs</td>
</tr>
</tbody>
</table>

### 5.2 Insulation matrix

<table>
<thead>
<tr>
<th>Mains</th>
<th>Switched Live</th>
<th>Battery, LED, Test switch, Indicator LED</th>
<th>REST</th>
<th>LED driver (SELV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>–</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>•</td>
<td></td>
<td>**</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>**</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

- ** Represents basic insulation
- • • Represents double or reinforced insulation

When using a non-SELV LED driver insulate the battery, LED, test switch and indicator LED in the luminaire according to the U-OUT rating of the LED driver.
5.3 Typ. LED current/voltage characteristics

The LED current in emergency mode is automatically adjusted by the EM converterLED module based on the total forward voltage of the LED modules connected and the associated battery. The start of the LED in emergency mode does not result in a current peak.

**EM converterLED ST 202A MH/LiFePO4 50V**
- Article number: 89800900
- NiMH battery, 3.6 V battery voltage
- 730 – 790 mA battery discharge current (tolerance)
- LiFePO4 battery, 3.2 V battery voltage
- 830 – 890 mA battery discharge current (tolerance)

**EM converterLED ST 202 MH/LiFePO4 50V**
- Article number: 89800624
- NiMH battery, 2.4 V battery voltage
- 730 – 790 mA battery discharge current (tolerance)
- LiFePO4 battery, 3.2 V battery voltage
- 530 – 570 mA battery discharge current (tolerance)

**EM converterLED ST 203 MH/LiFePO4 50V**
- Article number: 89800625
- NiMH battery, 3.6 V battery voltage
- 890 – 960 mA battery discharge current (tolerance)
- LiFePO4 battery, 3.2 V battery voltage
- 770 – 830 mA battery discharge current (tolerance)

**EM converterLED ST 204 MH/LiFePO4 50V**
- Article number: 89800626
- NiMH battery, 4.8 V battery voltage
- 785 – 845 mA battery discharge current (tolerance)
- LiFePO4 battery, 3.2 V battery voltage
- 1,255 – 1,350 mA battery discharge current (tolerance)
5.4 LED driver compatibility

The EM converterLED emergency unit use 3 pole technology and is compatible with most LED drivers on the market, however it is important to check that the rating of the LED driver does not exceed the values specified below:

- The max. allowed output current rating of the associated LED driver is 2 A eff (current rating of the terminals of EM converterLED) and 2.4 A peak (current rating of switching relays of EM converterLED)
- The max. allowed inrush current rating of the associated LED driver is 60 A peak for 1 ms or 84 A for 255 μs (inrush current rating of switching relay of EM converterLED)
- The max. allowed output voltage of the associated LED driver applied to the EM converterLED output is 450 V (voltage withstand between adjacent contact of the single switching relay of the EM converterLED)
- The max. allowed LED load of the associated LED driver is 150 W in operation. The load must be an LED module.

Check compatibility with the carried out function test (duration at least 5 seconds) individually for each device.

6. Functions

6.1 Duration link selection

<table>
<thead>
<tr>
<th>Duration</th>
<th>Link position</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 hr</td>
<td>Position A</td>
</tr>
<tr>
<td>2 hr</td>
<td>No duration link</td>
</tr>
<tr>
<td>1 hr</td>
<td>Position B</td>
</tr>
</tbody>
</table>

Emergency lighting LED driver supplied with duration link in 3 hours position (position A).

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 converterLED 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.

6.2 Status indication

System status is indicated by a bi-colour LED.

<table>
<thead>
<tr>
<th>LED indication</th>
<th>Status</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent green</td>
<td>System OK</td>
<td>AC mode</td>
</tr>
<tr>
<td>Fast flashing red</td>
<td>Function test</td>
<td></td>
</tr>
<tr>
<td>(0.2 sec on – 0.1 sec off)</td>
<td></td>
<td>Underway</td>
</tr>
<tr>
<td>Slow flashing red</td>
<td>Duration test</td>
<td></td>
</tr>
<tr>
<td>(0.1 sec on – 1 sec off)</td>
<td></td>
<td>Underway</td>
</tr>
<tr>
<td>Red LED on</td>
<td>Load failure</td>
<td>Open circuit / Short circuit / LED failure</td>
</tr>
<tr>
<td>Slow flashing red</td>
<td>Battery failure</td>
<td></td>
</tr>
<tr>
<td>(0.1 sec on – 0.1 sec off)</td>
<td></td>
<td>Battery failed the duration test or function test / Battery is defect or deep discharged/ Incorrect battery voltage</td>
</tr>
<tr>
<td>Fast flashing red</td>
<td>Charging failure</td>
<td>Incorrect charging current</td>
</tr>
<tr>
<td>(0.1 sec on – 0.1 sec off)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Double pulsing green</td>
<td>Inhibit mode</td>
<td>Switching into inhibit mode via controller</td>
</tr>
<tr>
<td>Green and red off</td>
<td>DC mode</td>
<td>Battery operation (emergency mode)</td>
</tr>
</tbody>
</table>

6.3 Commissioning

After installation of the luminaire and initial connection of the mains supply and battery supply to the EM converterLED the unit will commence charging the batteries for the initial charge time. The recharge occurs also if a new battery is connected or the module exits the rest mode condition.

The following automatic commissioning duration test is only performed when a battery is replaced and fully charged.

6.4 Testing

Commissioning test

A full commissioning test is carried out automatically after permanent connection of the supply for 5 days. The easy commissioning feature will set the initial test day and time to ensure random testing of units.

Functional test

Functional tests are carried out for 5 seconds on a weekly basis under the control of the Micro controller. Initiation and timing of these tests is set during the commissioning of the luminaire.

Duration test

A full duration test is carried out yearly to check the capacity of the batteries.

For a full description of commissioning and test features please refer to application notes.

Test switch

An optional test switch can be wired to each EM converterLED. This can be used to:

- Initiate a 5 seconds function test: press 200 ms < T < 1 s
- Execute function test as long as switch pressed: press > 1 s
- Reset selftest timer (adjust local timing): press > 10 s

Timer reset functionality

The timer for function and duration test can be set to a particular time of the day by either pressing the test switch for longer than 10 seconds or cycling the unswitched line supply 5 times within 1 minute. The timer adjustment will enable the test start time to be defined manually at time in day when the timer was reset. It will also disable the adaptive test algorithm thereby forcing the unit to perform the test at the same time rather than it being defined by the adaptive algorithm. This function will only work provided the interval time is greater than zero (automatic test mode enabled). The delay timer value set when the unit was commissioned will be reloaded in order to randomise the tests between adjacent units.
Rest Mode / Inhibit Mode

Emergency operation is automatically started when the mains supply is switched off. If the Rest Mode is activated, the discharging of the battery will be minimized by switching off the LED output. If the Inhibit Mode has been activated before the mains supply is switched off, Rest Mode will be automatically activated if the mains supply is switched off within 15 minutes.

Rest Mode and Inhibit Mode can be initiated by applying a short pulse between 9.5 and 22.5 V<sub>DC</sub> in amplitude for a period of 150 to 1,000 ms. This pulse shall be applied to terminals marked Rest.

After a mains reset the EM converterLED exits the Rest Mode. Rest Mode and Inhibit Mode can both be disabled by applying a voltage pulse of 1,000 to 2,000 ms to the terminals marked as Rest to send the RE-LIGHT/RESET INHIBIT command.

Rest Mode / Inhibit Mode are not supported from EM converterLED in case of combination with a 1-cell battery.

<table>
<thead>
<tr>
<th>Pulse/Mode</th>
<th>Standby</th>
<th>Emergency</th>
<th>Rest</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 – 1,000 ms</td>
<td>Inhibit</td>
<td>Rest</td>
<td>–</td>
</tr>
<tr>
<td>1,000 – 2,000 ms</td>
<td>Cancel inhibit</td>
<td>–</td>
<td>Re-light</td>
</tr>
</tbody>
</table>

7. Battery data

7.1 Battery selection

<table>
<thead>
<tr>
<th>Technology and capacity</th>
<th>Design</th>
<th>Number of cells</th>
<th>Type</th>
<th>Article no.</th>
<th>Assignable batteries</th>
</tr>
</thead>
<tbody>
<tr>
<td>NiMH 4.0 Ah</td>
<td>stick</td>
<td>1 x 2</td>
<td>Accu-NiMH 2A CON</td>
<td>89800236</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>stick</td>
<td>1 x 3</td>
<td>Accu-NiMH 3A CON</td>
<td>89800441</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>stick</td>
<td>1 x 4</td>
<td>Accu-NiMH 4A CON</td>
<td>89800442</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>stick</td>
<td>2 x 2</td>
<td>Accu-NiMH 4C CON</td>
<td>89800438</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>remote box</td>
<td>1 x 3</td>
<td>Pack-NiMH 4Ah 3 CON</td>
<td>28001896</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>remote box</td>
<td>1 x 4</td>
<td>Pack-NiMH 4Ah 4 CON</td>
<td>28001897</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>stick</td>
<td>1 x 1</td>
<td>Accu-LiFePO4 1A CON</td>
<td>28002317</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>stick</td>
<td>1 x 2</td>
<td>Accu-LiFePO4 2A CON</td>
<td>28002318</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>stick</td>
<td>1 x 3</td>
<td>Accu-LiFePO4 3A CON</td>
<td>28002320</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>stick</td>
<td>1 x 4</td>
<td>Accu-LiFePO4 4A CON</td>
<td>28002322</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>stick</td>
<td>1 x 5</td>
<td>Accu-LiFePO4 5A CON</td>
<td>28002325</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>stick</td>
<td>2 x 2</td>
<td>Accu-LiFePO4 4C CON</td>
<td>28002324</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>stick</td>
<td>3 x 2</td>
<td>Accu-LiFePO4 5C CON</td>
<td>28002327</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>side by side</td>
<td>2 x 1</td>
<td>Accu-LiFePO4 2B CON</td>
<td>28002319</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>side by side</td>
<td>3 x 1</td>
<td>Accu-LiFePO4 3B CON</td>
<td>28002321</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>side by side</td>
<td>4 x 1</td>
<td>Accu-LiFePO4 4B CON</td>
<td>28002323</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>side by side</td>
<td>5 x 1</td>
<td>Accu-LiFePO4 5B CON</td>
<td>28002326</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>remote box</td>
<td>1 x 1</td>
<td>PACK-LiFePO4 1.5Ah 1 CON</td>
<td>28003804</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>remote box</td>
<td>1 x 2</td>
<td>PACK-LiFePO4 3.0Ah 2 CON</td>
<td>28003805</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>remote box</td>
<td>1 x 3</td>
<td>PACK-LiFePO4 4.5Ah 3 CON</td>
<td>28003806</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>remote box</td>
<td>1 x 4</td>
<td>PACK-LiFePO4 6.0Ah 4 CON</td>
<td>28003807</td>
<td>*</td>
</tr>
</tbody>
</table>
7.2 Battery charge / discharge data

### EM converterLED ST, 1 / 2 / 3 h, NiMH

<table>
<thead>
<tr>
<th>Type</th>
<th>Article no.</th>
<th>Duration</th>
<th>1 h</th>
<th>2/3 h</th>
<th>1 h</th>
<th>2/3 h</th>
<th>1 h</th>
<th>2/3 h</th>
<th>1 h</th>
<th>2/3 h</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM converterLED ST</td>
<td>89800900</td>
<td>Initial charge</td>
<td>110 – 150 mA</td>
<td>280 – 320 mA</td>
<td>110 – 150 mA</td>
<td>280 – 320 mA</td>
<td>110 – 150 mA</td>
<td>280 – 320 mA</td>
<td>110 – 150 mA</td>
<td>280 – 320 mA</td>
</tr>
<tr>
<td></td>
<td>89800624</td>
<td>Fast recharge</td>
<td>110 – 150 mA</td>
<td>280 – 320 mA</td>
<td>110 – 150 mA</td>
<td>280 – 320 mA</td>
<td>110 – 150 mA</td>
<td>280 – 320 mA</td>
<td>110 – 150 mA</td>
<td>280 – 320 mA</td>
</tr>
<tr>
<td></td>
<td>89800625</td>
<td>Trickle charge</td>
<td>110 – 150 mA</td>
<td>280 – 320 mA</td>
<td>110 – 150 mA</td>
<td>280 – 320 mA</td>
<td>110 – 150 mA</td>
<td>280 – 320 mA</td>
<td>110 – 150 mA</td>
<td>280 – 320 mA</td>
</tr>
<tr>
<td></td>
<td>89800626</td>
<td>Discharge current</td>
<td>110 – 150 mA</td>
<td>280 – 320 mA</td>
<td>110 – 150 mA</td>
<td>280 – 320 mA</td>
<td>110 – 150 mA</td>
<td>280 – 320 mA</td>
<td>110 – 150 mA</td>
<td>280 – 320 mA</td>
</tr>
</tbody>
</table>

#### Battery charge
time

Initial charge

Fast recharge

Trickle charge

Charge voltage range

Discharge voltage range

**Note:**
- The battery will be charged below 0.9 V. The EM converterLED will indicate a battery fault.
- The emergency lighting LED driver will recharge the battery normally after running the test of 61347-2-7 CL 22.3 (abnormal operating conditions).

### EM converterLED ST, 1 / 2 / 3 h, LiFePO4

<table>
<thead>
<tr>
<th>Type</th>
<th>Article no.</th>
<th>Duration</th>
<th>1 h</th>
<th>2/3 h</th>
<th>1 h</th>
<th>2/3 h</th>
<th>1 h</th>
<th>2/3 h</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM converterLED ST</td>
<td>89800900</td>
<td>Initial charge</td>
<td>110 – 155 mA</td>
<td>250 – 290 mA</td>
<td>110 – 155 mA</td>
<td>250 – 290 mA</td>
<td>110 – 155 mA</td>
<td>250 – 290 mA</td>
</tr>
<tr>
<td></td>
<td>89800624</td>
<td>Fast recharge</td>
<td>110 – 155 mA</td>
<td>250 – 290 mA</td>
<td>110 – 155 mA</td>
<td>250 – 290 mA</td>
<td>110 – 155 mA</td>
<td>250 – 290 mA</td>
</tr>
<tr>
<td></td>
<td>89800625</td>
<td>Trickle charge</td>
<td>110 – 155 mA</td>
<td>250 – 290 mA</td>
<td>110 – 155 mA</td>
<td>250 – 290 mA</td>
<td>110 – 155 mA</td>
<td>250 – 290 mA</td>
</tr>
<tr>
<td></td>
<td>89800626</td>
<td>Discharge current</td>
<td>110 – 155 mA</td>
<td>250 – 290 mA</td>
<td>110 – 155 mA</td>
<td>250 – 290 mA</td>
<td>110 – 155 mA</td>
<td>250 – 290 mA</td>
</tr>
</tbody>
</table>

#### Battery charge
time

Initial charge

Fast recharge

Trickle charge

Charge voltage range

Discharge voltage range

**Note:**
- Automatic recharge when battery voltage falls below 3.4 V. Charger off (0 mA) when battery voltage exceeds 3.6 V.
- 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).
- The battery will not be charged below 2.0 V.
7.3 Accu-NiMH

Capacity 4.0 Ah

- International designation: HRMU 19/90
- Battery voltage/cell: 1.2 V
- Cell type: LA
- Case temperature range to ensure 4 years design life: +5 °C to +50 °C
- Max. short term battery case temperature (shorter than 1 month over the battery lifetime): 70 °C
- Max. number discharge cycles: 4 cycles per year plus 30 cycles during commissioning
- Max. storage time: 12 months at +5 °C to +25 °C

7.4 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

7.5 Accupack-NiMH

Capacity 4.0 Ah

- Battery voltage/cell: 1.2 V
- Cell type: LAL
- Ambient temperature range to ensure 4 years design life: +5 °C to +35 °C
- Tc point: +40 °C
- Max. short term battery case temperature (shorter than 1 month over the battery lifetime): 70 °C
- Max. number discharge cycles: 4 cycles per year plus 4 cycles during commissioning
- Max. storage time: 12 months

7.6 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

7.7 Safety

7.7.1 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.

7.7.2 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.

7.7.3 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.

7.7.4 Overtemperature 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.

7.8 Storage, installation and commissioning

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

Activating NiMH batteries: In order to activate new batteries, 2-3 full charge-discharge cycles could be needed. This activating process is defined by charging (24 h) and discharging (1/2/3 h) of the batteries. If the first duration test fails, please repeat the test after a 24 hour charging period.

8. Miscellaneous

8.1 Maximum number of switching cycles

EM converterLEDs are tested with 50,000 mains switching cycles of the associated LED driver.

8.2 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.

8.3 Mains-connected transformers

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

8.4 Additional information

Additional technical information at www.tridonic.com → Technical Data

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