EM powerLED PRO 220–240 V 50/60 Hz

**Description:**
Low profile LED emergency lighting modules with DALI interface and automatic testing facility to cover 1 hour, 2 hours and 3 hours duration operating from NiMh Cs batteries. Duration can be selected by means of a removable 3 way link system (jumper). For normal mains and emergency operation of 1 W and 2 W Power LEDs. The 2 W module can either drive a single LED at 600 mA or two LEDs at 350 mA in series. Both modules are able to operate multiple LED (3–12) wired in parallel for example with exit signs.

Power control technology ensures maximum emergency light output for a given duration time with a minimum battery cell count in consideration of LED tolerances. The case is available for both clip and screw fixings.

DALI interface terminals are provided to allow control and monitoring via a seperate controller. Fitted with the unique EZ easy addressing feature which uses the LED to indicate the DALI address during commissioning.

**Features:**
- **Module**
  - LED emergency lighting module
  - Normal and emergency operation
  - DALI interface for controlled monitoring and reporting
  - DALI switchable in mains operation (on/off; the switched line SL has to be on)
  - Low-profile cross-section (21 x 30 mm)
  - Constant current mode
  - 1 W or 2 W version
  - 3-hour, 2-hour or 1-hour operation
  - Operating time selected by means of removable short circuit plugs (jumper)
  - NiMh batteries
  - Electronic multilevel charging system
  - 12 hours accu recharge time
  - Power output restriction
  - Automatic restart after LED change within 2 s
  - Bi-colour LED to indicate status
  - powerLED output, battery, indicator LED and test switch output are SELV equivalent
  - Reverse battery protection
  - Deep discharge protection
  - Short-circuit-proof
  - Testing
    - Battery condition
    - LED condition
    - Charge condition
  - EZ easy addressing feature

**Batteries**
- NiMh Cs cells
- High temperature cells
- Spade terminals for easy connection

**Standards**
ENEC
CE according to EN 60598-2-22
according to EN 50172

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<table>
<thead>
<tr>
<th>wattage W</th>
<th>type</th>
<th>article number</th>
<th>number of LED</th>
<th>LED current in mA</th>
<th>LED current in mA</th>
<th>1 h /</th>
<th>2 h /</th>
<th>3 h /</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2</td>
<td>EM powerLED 1 W PRO</td>
<td>89899862</td>
<td>1 x LED</td>
<td>350</td>
<td>350</td>
<td>2</td>
<td>3</td>
<td>3</td>
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<tr>
<td>2.0</td>
<td>EM powerLED 2 W PRO</td>
<td>89899861</td>
<td>1 x LED</td>
<td>600</td>
<td>350</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>2.4</td>
<td>EM powerLED 2 W PRO</td>
<td>89899861</td>
<td>2 x LED</td>
<td>350</td>
<td>350</td>
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<td>4</td>
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</table>

**Clip fix version**

<table>
<thead>
<tr>
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<th>type</th>
<th>article number</th>
<th>number of LED</th>
<th>LED current in mA</th>
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<td>350</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
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<td>EM powerLED 2 W PRO</td>
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<td>2 x LED</td>
<td>350</td>
<td>350</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

**Screw fix version**

<table>
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<th>type</th>
<th>article number</th>
<th>number of LED</th>
<th>LED current in mA</th>
<th>LED current in mA</th>
<th>1 h /</th>
<th>2 h /</th>
<th>3 h /</th>
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</thead>
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<td>350</td>
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<td>3</td>
<td>3</td>
</tr>
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<td>EM powerLED 2 W PRO</td>
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<td>350</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

**Test switch**
An optional test switch can be wired to the EM powerLED. This can be used to check local operation of the luminaire.

**Emergency-LED**
Available – for further information please contact Tridonic.

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**Features:**
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  - LED emergency lighting module
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- High temperature cells
- Spade terminals for easy connection

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CE according to EN 60598-2-22
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Data sheet 12/10-672-1  We reserve the right to make technical changes without prior notice.
The EM powerLED has a unique power regulation circuit; this is designed to limit the total power drawn from the battery in the event of using LED’s with excessively high forward voltages (Vf).

In such cases the unit will reduce the LED current in order to maintain an acceptable drain current from the battery and hence meet the required duration time. This feature enables the EM powerLED to have minimum battery count for a given range of LED’s.

At a low charge state of the battery (<1.5 battery count for a given range of LED’s) the LED will not be driven in maintained mode via the switched line until the rated battery voltage levels are exceeded.

Testing:

**DALI Control**

A DALI command from a suitable control unit can be used to initiate function and duration tests at individually selected times. Status flags are set for report back and data logging of results.

When DALI has never been used with the EM powerLED PRO or if the test interval and delay times were set by DALI in the internal memory of the module it will operate in the self testing mode and will conduct tests in accordance with the times stored in the EEPROM (factory default is a weekly function test and every 13 weeks a duration test). The EM powerLED PRO will still accept tests over the DALI bus but these will be in addition to those in self test mode. The test interval and delay times have to be set to zero so that the EM powerLED performs tests only on demand by the controller.

### Technical data EM powerLED PRO

<table>
<thead>
<tr>
<th>Rated mains supply voltage</th>
<th>220–240 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains frequency</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Mains input current:</td>
<td></td>
</tr>
<tr>
<td>1 W unit</td>
<td>30 mA</td>
</tr>
<tr>
<td>2 W unit</td>
<td>42 mA</td>
</tr>
<tr>
<td>Mains power in maintained operation:</td>
<td></td>
</tr>
<tr>
<td>1 W unit</td>
<td>4 W</td>
</tr>
<tr>
<td>2 W unit</td>
<td>6 W</td>
</tr>
<tr>
<td>Maximum LED forward voltage Vf</td>
<td>3.4 V</td>
</tr>
<tr>
<td>Overvoltage protection</td>
<td>320 V for 1 hour</td>
</tr>
<tr>
<td>Recharge period</td>
<td>12 hours</td>
</tr>
<tr>
<td>Battery discharge current:</td>
<td></td>
</tr>
<tr>
<td>1 W</td>
<td>160 mA</td>
</tr>
<tr>
<td>2 W</td>
<td>480 mA</td>
</tr>
<tr>
<td>1 h</td>
<td>790 mA</td>
</tr>
<tr>
<td>2 h</td>
<td>850 mA</td>
</tr>
<tr>
<td>610 mA</td>
<td>3.4 V</td>
</tr>
<tr>
<td>600 mA</td>
<td>440 mA</td>
</tr>
<tr>
<td>Change current NiMh 2.0 Ah:</td>
<td></td>
</tr>
<tr>
<td>Initial</td>
<td>125 mA</td>
</tr>
<tr>
<td>Power charge</td>
<td>210 mA</td>
</tr>
<tr>
<td>Trickie</td>
<td>50 mA</td>
</tr>
<tr>
<td>Earth leakage current</td>
<td>&lt; 0.5 mA</td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>-25 °C to +50 °C</td>
</tr>
<tr>
<td>Maximum case temperature tc</td>
<td>70 °C</td>
</tr>
<tr>
<td>Mains change over voltage</td>
<td>in accordance with EN 60598-2-22</td>
</tr>
<tr>
<td>Ingress protection</td>
<td>IP20</td>
</tr>
<tr>
<td>Safety class</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of LED</th>
<th>LED current mains mode</th>
<th>LED current emergency mode</th>
<th>Nominal output power</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 W</td>
<td>1 x LED</td>
<td>350 mA</td>
<td>350 mA</td>
<td>1.2 W</td>
</tr>
<tr>
<td>2 W</td>
<td>1 x LED</td>
<td>350 mA</td>
<td>600 mA</td>
<td>2.0 W</td>
</tr>
<tr>
<td>2 W</td>
<td>2 x LED</td>
<td>350 mA</td>
<td>380 mA</td>
<td>2.4 W</td>
</tr>
</tbody>
</table>

The EM powerLED has a unique power regulation circuit; this is designed to limit the total power drawn from the battery in the event of using LED’s with excessively high forward voltages (Vf).

In such cases the unit will reduce the LED current in order to maintain an acceptable drain current from the battery and hence meet the required duration time. This feature enables the EM powerLED to have minimum battery count for a given range of LED’s.

### Addressing

The EM powerLED PRO includes the new EZ easy addressing system which allows addressing and identification by using the bi-colour LED in conjunction with the EZ PRO ADDRESS tool. Binary address codes given by the LED can be simply converted to the DALI addresses 0 to 63. For single handed addressing using this method it is necessary to send a broadcast ident command every 3 to 9 seconds. During this command the LED will be switched off and the status indication LED will flash the 6 bit binary address preceded by a 3 second start indication period.

### Commissioning

After installation of the luminaire and initial connection of the mains supply and battery supply to the EM powerLED PRO the unit will commence charging the batteries for 20 hours (initial charge). Afterwards the module will conduct a commissioning test for the full duration. The 20 hours 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 (after 20 hrs) and the interval time is not set to zero, otherwise the system is expected to perform the testing.

### Functional test

The time of day and frequency of the 5 seconds function test can be set by the DALI controller. If the EM powerLED PRO unit is not connected to a DALI bus or has not received a DALI command the test will default to 5 seconds duration on a weekly basis.

### Duration test

Test times can be set by the DALI controller. If the EM powerLED PRO unit is not connected to a DALI bus or has not received a DALI command the test will be conducted every 13 weeks.

### Prolong time

Prolong time can be set by the DALI controller. This is the delay time between return of the mains supply and the end of the emergency operation.

### Test switch

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

- initiate a 5 seconds function test: press 200 ms < T < 1 s
- execute function test for the time set as prolong time: > 1 second press
- adjust local timing when used in self test mode: > 10 second press

### DALI Controller

DALI controllers and hardware/software solutions like the e-touchBOX are available from Tridonic. Please refer to the separate data sheet for the e-touchBOX at the Lighting controls section.

### Technical data Accu-NiMh

<table>
<thead>
<tr>
<th>case temperature range to ensure 4 years design life</th>
<th>0 °C to +45 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>storage life in temperate conditions</td>
<td>4 years</td>
</tr>
<tr>
<td>battery voltage</td>
<td>1.2 V per cell</td>
</tr>
<tr>
<td>capacity Cs</td>
<td>2.0 Ah</td>
</tr>
</tbody>
</table>

### Storage

- Batteries should be stored within the specified temperature range in low humidity conditions. Optimal storage conditions are
  - temperature: +5°C to +25°C
  - humidity: 65% ±20%
- Avoid atmosphere with corrosive gas
- It is recommended to disconnect the battery before store or delivery
- Avoid to store the batteries discharged
- A long term storage in open circuit leads to battery self discharge and deactivation of chemical components. It could be required to charge and discharge the batteries a few times to recover the initial performance.

### Service life

Average service life 50,000 hours under rated conditions with a failure rate of less than 10 %. Average failure rate of 0.2 % per 1000 operating hours.
Mechanical details
Case manufactured from polycarbonate.
- LED bi-colour status indicator
  - Green / red
- Mounting hole 6.5 mm dia
- Lead length 1000 mm

Test switch
- Mounting hole 7.0 mm dia
- Lead length 550 mm

Batteries leads
- Quantity: 1 red and 1 black
- Length: 1 m
- Wire type: 0.5 mm² solid conductor
- Insulation rating: 90 °C

Battery end termination
Push on 4.8 mm receptacle to suit battery spade fitted with insulating cover

Module end termination
8.0 mm stripped insulation

Two-piece batteries are supplied with a 200 mm lead with 4.8 mm receptacles at each end and insulating covers to connect the separate sticks together.

Recommended fixing details for clip fixing

Wiring type and cross section
The wiring can be in flexible cable or solid.
Strip 8.5–9.5 mm of insulation from the cables to ensure perfect operation of the push-wire terminals.

Wiring mains (SL, N, L)
DALI (DA)
LED (LED +, LED –)

wire preparation: 0.5 – 1.5 mm²
8.5 – 9.5 mm

Maximum lead length
LED
status indication LED
batteries
3 m
1 m
1 m

Max. lead insulation diameter
Battery
Test switch
Indicator LED
2.1 mm
2.1 mm
2.1 mm

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

Link positions for duration and cell count

<table>
<thead>
<tr>
<th>Duration</th>
<th>Link Position</th>
<th>1 W Power</th>
<th>2 W Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 hr</td>
<td>position B</td>
<td>2 cell</td>
<td>3 cell</td>
</tr>
<tr>
<td></td>
<td>without jumper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 hr</td>
<td>position A</td>
<td>3 cell</td>
<td>4 cell</td>
</tr>
<tr>
<td></td>
<td>2 cell</td>
<td>3 cell</td>
<td>5 cell</td>
</tr>
</tbody>
</table>

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.

Status indication
System status is indicated by a bi-colour LED and by a DALI status flag.

<table>
<thead>
<tr>
<th>LED Indication</th>
<th>Status</th>
<th>Commentary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent green</td>
<td>System OK</td>
<td>AC mode</td>
</tr>
<tr>
<td>Fast flashing green</td>
<td>(0.1 sec. on – 0.1 sec. off)</td>
<td>Function test</td>
</tr>
<tr>
<td>Slow flashing green</td>
<td>(1 sec. on – 1 sec. off)</td>
<td>Duration test</td>
</tr>
<tr>
<td>Red LED on</td>
<td>Load failure</td>
<td>Open circuit / Short circuit / LED failure 1</td>
</tr>
<tr>
<td>Slow flashing red test /</td>
<td>Battery failure</td>
<td>Battery failed the duration test or function</td>
</tr>
<tr>
<td></td>
<td>1 sec. on – 1 sec. off)</td>
<td>Battery is defect / Incorrect battery voltage</td>
</tr>
<tr>
<td>Fast flashing red</td>
<td>Charging failure</td>
<td>Incorrect charging current</td>
</tr>
<tr>
<td></td>
<td>(0.1 sec. on – 0.1 sec. off)</td>
<td></td>
</tr>
<tr>
<td>Double pulsing green</td>
<td>Blocking mode</td>
<td>Switching into blocking mode via controller</td>
</tr>
<tr>
<td>Binary transmission of address via green/red LED</td>
<td>Address identification</td>
<td>During address identification mode</td>
</tr>
<tr>
<td>Green and red off</td>
<td>DC mode</td>
<td>Battery operation (Emergency mode)</td>
</tr>
</tbody>
</table>

1 If the EM powerLED is operated in non-maintained mode and an LED fault is detected, the red indicator LED will be illuminated and the output will be stopped. The unswitched mains supply must be switched off before the LED is changed in order that the new LED can be detected. A function or duration test will not reset the fault indication.
Emergency lighting modules with DALI interface

LED

Wiring diagram

Wiring diagram for one LED or two LED in series

Wiring diagram for multiple LED (3–12) in 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.

Note: The Tridonic Emergency-LED is therefore fitted with a protection diode across the powerLED.

Wiring instructions

- The powerLED terminals, battery, indicator LED and test switch terminals are classified as SELV. Keep the wiring of the DALI and 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 at 125 kHz, which should be considered for good EMC compliance.
- powerLED leads should be separated from the mains and DALI connections and wiring for good EMC performance.
- Maximum lead length on the powerLED terminals is 3 m. For a good EMC performance keep the LED wiring as short as possible.
- 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 powerLED leads to prevent noise coupling.
- Battery leads are specified with 0.8 mm cross section and a length of < 1 m.
- DALI terminals are mains proof.
- Switched live and unswitched live supplies must be off the same phase.

Addressing Tool

An addressing tool is available to convert the LED binary identification signal to a DALI address of between 0 to 63. This simple tool is powered from a 9 V battery (not supplied).

Packaging

EM powerLED PRO
box of 25

Status LED
box of 25

Accu NiMh
25 pieces per box

For comprehensive instructions consult the Tridonic website www.tridonic.com

EZ PRO ADDRESS: 89899836

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