Product description

- Emergency LED Driver
- Electronic circuit board
- Emergency lighting function for manual testing, self-test or DALI autotest

Properties

- Output power 1.50 W
- Very low stand-by power loss
- Non-maintained operation
- 3 h rated duration
- Plug-in Lithium Iron Phosphate battery
- 5 years guarantee (conditions at www.tridonic.com) electronic (LED Driver)
- 3 years guarantee battery for EM R2A NM BASIC
- 4 years guarantee battery for EM R2A NM ST/PRO

Standards, page 5
Data sheet 10/21-EM088-5
Subject to change without notice. Information provided without guarantee.
www.tridonic.com

Emergency lighting units
EM LED Light Engines

Technical data
Rated supply voltage AC 220 – 240 V
Input voltage range AC (tolerance for safety) 198 – 264 V
Input voltage range AC (tolerance for performance) 198 – 254 V
Mains frequency 50 / 60 Hz
Overvoltage protection 320 V (for 48 h)
Time to light (emergency operation) < 0.5 s from detection of emergency event
Output current tolerance ± 5 %
Low frequency current ripple ± 5 %
Ambient temperature range ta +5 ... +40 °C
Max. casing temperature tc (C10) +60 °C
Mains voltage changeover threshold according to EN 60598-2-22
Lifetime up to 50,000 h
EoF 1

Specific technical data

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of battery cells</th>
<th>Rated duration (230 V, 50 Hz) non-maintained operation</th>
<th>Mains current (230 V, 50 Hz) non-maintained operation</th>
<th>Mains power (230 V, 50 Hz) non-maintained operation</th>
<th>Typ. λ (at 230 V, 50 Hz, charging)</th>
<th>Typ. output current</th>
<th>Output voltage range</th>
<th>Output power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EM R2A BASIC NM 132 2W PCB</td>
<td>2</td>
<td>3</td>
<td>16 mA</td>
<td>5 mA</td>
<td>2.5 W</td>
<td>0.6 W</td>
<td>0.63</td>
<td>-</td>
</tr>
<tr>
<td>EM R2A ST NM 132 2W PCB</td>
<td>2</td>
<td>3</td>
<td>20 mA</td>
<td>10 mA</td>
<td>2.5 W</td>
<td>0.6 W</td>
<td>0.63</td>
<td>-</td>
</tr>
<tr>
<td>EM R2A PRO NM 132 2W PCB</td>
<td>2</td>
<td>3</td>
<td>20 mA</td>
<td>10 mA</td>
<td>2.5 W</td>
<td>0.6 W</td>
<td>0.63</td>
<td>-</td>
</tr>
</tbody>
</table>

| Emergency operation |
| EM R2A BASIC NM 132 2W PCB | 2 | 3 | - | - | - | - | 126 mA | 11 – 13.5 V | 150 W |
| EM R2A ST NM 132 2W PCB | 2 | 3 | - | - | - | - | 126 mA | 11 – 13.5 V | 150 W |
| EM R2A PRO NM 132 2W PCB | 2 | 3 | - | - | - | - | 126 mA | 11 – 13.5 V | 150 W |

Ordering data

<table>
<thead>
<tr>
<th>Type</th>
<th>Article number</th>
<th>Rated duration</th>
<th>Number of cells</th>
<th>Packaging, carton</th>
<th>Packaging, pallet</th>
<th>Weight per pc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM R2A BASIC NM 132 2W PCB</td>
<td>89800680</td>
<td>3 h</td>
<td>2</td>
<td>15 pc(s)</td>
<td>480 pc(s)</td>
<td>0.019 kg</td>
</tr>
<tr>
<td>EM R2A ST NM 132 2W PCB</td>
<td>89800681</td>
<td>3 h</td>
<td>2</td>
<td>15 pc(s)</td>
<td>480 pc(s)</td>
<td>0.031 kg</td>
</tr>
<tr>
<td>EM R2A PRO NM 132 2W PCB</td>
<td>89800682</td>
<td>3 h</td>
<td>2</td>
<td>15 pc(s)</td>
<td>480 pc(s)</td>
<td>0.031 kg</td>
</tr>
</tbody>
</table>
Product description
- Bezel and lenses for the EM ready2apply PCB
- Status LED and test switch included
- Integrated LED module with heat sink
- Click-in multi lens option
- Anti-panic, escape route and spot illumination
- Simple connection with plug-in system

Ordering data
<table>
<thead>
<tr>
<th>Type</th>
<th>Article number</th>
<th>Packaging, carton</th>
<th>Weight per pc</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM R2A NM LED+LENS KIT 40mm</td>
<td>89800684</td>
<td>15 pc(s)</td>
<td>0.04 kg</td>
</tr>
</tbody>
</table>

Product description
- Extension cable for EM LED+LENS KIT
- Cable length 100 mm
- 4-pole connection

Ordering data
<table>
<thead>
<tr>
<th>Type</th>
<th>Article number</th>
<th>Packaging, carton</th>
<th>Weight per pc</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTENSION CABLE EM R2A LED 100mm</td>
<td>28002676</td>
<td>3,000 pc(s)</td>
<td>0.002 kg</td>
</tr>
</tbody>
</table>
Product description
- High-temperature LiFePO4 cells for use with emergency lighting units
- Up to 8 years design life
- 3 years guarantee from delivery date

Properties
- Environmental friendly technology
- High energy density
- Low profile cross-section with removable end caps
- Constant high-temperature operation
- Good charging properties at high temperature
- Electronic thermal battery management
- High energy maintenance of the charged battery
- Long shelf life
- Integrated electronics
- Safety features incorporated
- Certified quality manufacturer
- In various configurations
- Simple connection with plug-in system
- With polycarbonate fixing caps
- Suitable for emergency lighting equipment as per IEC 60598-2-22

Ordering data

<table>
<thead>
<tr>
<th>Type</th>
<th>Article number</th>
<th>Number of cells</th>
<th>Capacity</th>
<th>Packaging carton</th>
<th>Packaging outer box</th>
<th>Weight per pc</th>
</tr>
</thead>
<tbody>
<tr>
<td>LiFePO4 cells – stick, 1.5 – 9.0 Ah</td>
<td>28002318</td>
<td>1 x 2</td>
<td>3.0 Ah</td>
<td>5 pc(s)</td>
<td>25 pc(s)</td>
<td>0.108 kg</td>
</tr>
<tr>
<td>Accu-LiFePO4 3.0 Ah 2A CON</td>
<td>28002319</td>
<td>2 x 1</td>
<td>3.0 Ah</td>
<td>5 pc(s)</td>
<td>25 pc(s)</td>
<td>0.100 kg</td>
</tr>
</tbody>
</table>
1. Standards

according to EN 50172
EN 55015
EN 60068-2-6
according to EN 60068-2-30
EN 61000-3-2
EN 61347-1
EN 61347-2-7
EN 61347-2-13
EN 61547
EN 62384

2. Thermal data

2.1 Expected 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.

Expected lifetime

<table>
<thead>
<tr>
<th>Type</th>
<th>ta</th>
<th>25 °C</th>
<th>30 °C</th>
<th>40 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM R2A</td>
<td>lifetime</td>
<td>&gt; 50,000 h</td>
<td>50,000 h</td>
<td>50,000 h</td>
</tr>
</tbody>
</table>

2.2 Storage conditions

- Humidity 45 % up to max. 85 %, not condensed
- Storage time / temperature: max. 6 months at -20 °C up to +45 °C (< 3 months at +45 °C)

Note: The devices have to be within the specified temperature range (ta) before they are operated.

3. Installation / Wiring

3.1 Wiring type and cross-section

Wiring PRO:
Mains (N, L): blue, brown
DALI (DA, DA): orange, orange

Wiring SELFTEST:
Mains (N, L): blue, brown
Rest: orange, orange

Wiring BASIC:
Mains (N, L): blue, brown

3.2 Lens assembly

- Wear gloves when mounting the lens
- Take care of the mounting direction of the escape route lens
- Use screwdriver for replacing/removing lens
  1. + 2. Push lens clips with screwdriver via openings on both sides
  3. Remove lens

4. Mechanical data

4.1 Battery connection

Battery pack end termination
Compact 3-pole connector providing safe battery connection

4.2 Fixing of PCB

For fixing the PCB in the luminaire housing use 1 x M4 self tapping screw for EM R2A BASIC variant and 2 x M4 self tapping screw for EM R2A ST/PRO variants in combination with an moulded boss in polycarbonate or a washer.

Ensure that the mains connector is on the bottom side of the PCB. Therefore fix the PCB to the luminaire housing with a spacer (made of a non-conductive material e.g. plastic).

The max. torque is 1.6 Nm.
5. Electrical data

5.1 Maximum loading of automatic circuit breakers

<table>
<thead>
<tr>
<th>Automatic circuit breaker type</th>
<th>C10</th>
<th>C13</th>
<th>C16</th>
<th>C20</th>
<th>B10</th>
<th>B13</th>
<th>B16</th>
<th>B20</th>
<th>Inrush current</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>4 mm²</td>
<td>15 mm²</td>
<td>15 mm²</td>
<td>2.5 mm²</td>
<td>4 mm²</td>
<td>I max time</td>
</tr>
<tr>
<td>EM R2A</td>
<td>90</td>
<td>260</td>
<td>260</td>
<td>260</td>
<td>90</td>
<td>130</td>
<td>130</td>
<td>130</td>
<td>10 A</td>
</tr>
</tbody>
</table>

5.2 Harmonic distortion in the mains supply (at 230 V / 50 Hz and 2-cell maintained charging) in %

<table>
<thead>
<tr>
<th>THD</th>
<th>3</th>
<th>5</th>
<th>7</th>
<th>9</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM R2A</td>
<td>&lt; 75</td>
<td>&lt; 62</td>
<td>&lt; 33</td>
<td>&lt; 19</td>
<td>&lt; 13</td>
</tr>
</tbody>
</table>

6. Functions

6.1 BASIC

6.1.1 Status indication

The indication LED is integrated in the bezel. A green LED indicates that charging current is flowing into the battery.

LED current: 9 mA

The battery is protected against operation at excessive temperatures (charging stops and indication LED turns off when battery cell temperature < 0 °C or > 60 °C).

6.1.2 Test switch

The test switch is integrated in the bezel. To execute a function test press the test switch > 1 s.

6.2 SELFTEST

6.2.1 Status indication

The indication LED is integrated in the bezel. The system status is indicated by a bi-colour LED. LED current: 9 mA

<table>
<thead>
<tr>
<th>LED indication</th>
<th>Status Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent green</td>
<td>System OK, AC mode</td>
</tr>
<tr>
<td>Fast flashing green (0.1 sec on – 0.1 sec off)</td>
<td>Function test underway</td>
</tr>
<tr>
<td>Slow flashing green (1 sec on – 1 sec off)</td>
<td>Duration test underway</td>
</tr>
<tr>
<td>Red LED on</td>
<td>Load failure, Open circuit / Short circuit / LED failure</td>
</tr>
<tr>
<td>Slow flashing red (1 sec on – 1 sec off)</td>
<td>Battery failure, Battery failed the duration test or function test / Battery is defect or deep discharged / Incorrect battery voltage / Battery is outside of its temperature range for charging (0 – 60 °C)</td>
</tr>
<tr>
<td>Fast flashing red (0.1 sec on – 0.1 sec off)</td>
<td>Charging failure, Incorrect charging current</td>
</tr>
<tr>
<td>Double pulsing green</td>
<td>DALI inhibit, Switching into DALI inhibit mode via controller</td>
</tr>
<tr>
<td>Binary transmission of address via green/red LED</td>
<td>Address identification, During address identification mode</td>
</tr>
<tr>
<td>Green and red off</td>
<td>DC mode, Battery operation (emergency mode)</td>
</tr>
</tbody>
</table>

6.2.2 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.
6.3 PRO

6.3.1 Status indication

The indication LED is integrated in the bezel. 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>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent green</td>
<td>System OK</td>
<td>AC mode</td>
</tr>
<tr>
<td>Fast flashing green (0.1 sec on – 0.1 sec off)</td>
<td>Function test underway</td>
<td></td>
</tr>
<tr>
<td>Slow flashing green (1 sec on – 1 sec off)</td>
<td>Duration test underway</td>
<td></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 (1 sec on – 1 sec off)</td>
<td>Battery failure</td>
<td>Battery failed the duration test or function test / Battery is defect or deep discharged / Incorrect battery voltage / Battery is outside of its temperature range for charging (0 – 60 °C)</td>
</tr>
<tr>
<td>Fast flashing red (0.1 sec on – 0.1 sec off)</td>
<td>Charging failure</td>
<td>Incorrect charging current</td>
</tr>
<tr>
<td>Double pulsing green</td>
<td>DALI inhibit</td>
<td>Switching into DALI inhibit 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>

6.3.2 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 a DALI bus has not been connected or when a DALI bus is connected but the DALI default DELAY and INTERVAL times have not been re-set by sending appropriate DALI commands, then the EM R2A PRO will conduct self-tests in accordance with the default times set within the EEPROM. These default times are factory pre-set, in accordance with the DALI standard EN 62386-202, to conduct an automatic function test every 7 days and a duration test every 52 weeks. Since the DELAY time is factory pre-set to Zero, all units are tested at the same time. Test times can be changed with a command over the DALI bus.

The DELAY and INTERVAL time values must be re-set when the emergency system test times are to be scheduled by a DALI control and monitoring system. Note that once the default values have been set to Zero, tests will only be conducted following a command from the control system. If the DALI bus is disconnected the EM R2A PRO does not revert to self-testing mode.

Note: If the battery is connected the DALI communication is only possible after power reset.

**Commissioning**

After installation of the luminaire and initial connection of the mains supply and battery supply to the EM R2A 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 20hrs) 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. The default setting is a 5 seconds test on a weekly basis.

**Duration test**

The time of day and frequency of the duration test can be set by the DALI controller. The default setting is a duration test conducted every 52 weeks.

For 2 h operation, the first commissioning duration test has a time of 120 minutes, subsequent through life tests are conducted for 90 minutes. When the battery is changed or disconnected and re-connected the unit will next conduct a 120 minute test.

**Test switch**

The test switch is integrated in the bezel. It 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 reloading in order to randomise the tests between adjacent units.

**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. The default prolong time is set as 0 minutes as specified within the DALI standard. Indicator LED will stay off for the duration of the prolong time.

**Rest Mode**

Rest mode can be initiated by the DALI controller. The appropriate command should be sent after the mains supply has been disconnected and whilst the module is in emergency operation. After a mains reset the EM R2A PRO exits the rest mode. EM R2A PRO supports the re-light command via the DALI bus. Max. rest mode duration: 21 days from fully charged battery

**DALI Controller**

DALI controllers and hardware/software solutions are available from Tridonic. Please refer to the Lighting controls section.
## 7. Battery data

### 7.1 Battery charge / discharge

<table>
<thead>
<tr>
<th>Device configuration</th>
<th>EM R2A BASIC/ST/PRO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Article no.</td>
<td>89800680 / 89800681 / 89800682</td>
</tr>
<tr>
<td>Cells</td>
<td>2 cells</td>
</tr>
<tr>
<td>Duration</td>
<td>3 h</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Battery charge time</th>
<th>Initial 20 h</th>
<th>Recharge 12 h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typ. charge current&lt;sup&gt;3&lt;/sup&gt;</td>
<td>Initial charge 290 mA</td>
<td>Recharge 290 mA</td>
</tr>
<tr>
<td></td>
<td>Trickle charge 290 mA / 0 mA</td>
<td></td>
</tr>
<tr>
<td>Mains power consumption</td>
<td>Initial charge &lt; 1095 W</td>
<td>Recharge &lt; 1095 W</td>
</tr>
<tr>
<td></td>
<td>Trickle charge &lt; 1095 W / 0 W</td>
<td></td>
</tr>
<tr>
<td>Discharge current at 3.2 V (nominal)</td>
<td>625 mA</td>
<td></td>
</tr>
<tr>
<td>Max. charge voltage</td>
<td>3.55 – 3.65 V</td>
<td></td>
</tr>
<tr>
<td>End of discharge voltage</td>
<td>2.6 – 2.7 V</td>
<td></td>
</tr>
</tbody>
</table>

<sup>3</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)

### 7.2 Accu-LiFePO4

#### 1.5 Ah

- International designation: 18650
- Battery voltage/cell: 3.2 V
- Cell type: 18650
- Case temperature range to ensure
  - 4 years design life: +55 °C
  - 6 years design life: +65 °C
  - 8 years design life: +35 °C
- Max. short term temperature (reduced 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.

## 8. Miscellaneous

### 8.1 Black Box data recording

Recording of several parameters only accessible for Tridonic.

### 8.2 Additional information

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

Lifetime declarations are informative and represent no warranty claim.