Product description
- LED emergency module suitable for direct installation in ceilings
- Complete set with integrated electronics, LED module, heat sink, optics and battery
- Includes click-in multi-lens option for anti-panic, escape route and spot illumination
- Emergency lighting with self-test function
- Small size ceiling hole, 40 – 43 mm diameter; 80 mm height

Properties
- Output power 1.5 W
- Very low stand-by power loss
- White or black housing colour options
- Non-maintained variant
- 1 or 3 h rated duration (separate variants)
- White or black housing color options
- Plug-in Lithium Iron Phosphate battery with strain-relief
- 5 years guarantee (conditions at www.tridonic.com) electronic (LED Driver)
- 4 years guarantee battery

Standards, page 4
Wiring diagrams and installation examples, page 4
## 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
- **THD normal operation** (maintained operation, at 230 V, 50 Hz, charging): 75 %
- **Output current tolerance**: ± 5 %
- **LF current ripple**: ± 5 %
- **Ambient temperature ta (insulated ceilings)**: +5 ... +30 °C
- **Ambient temperature ta (non-insulated ceilings)**: +5 ... +40 °C
- **Mains voltage changeover threshold**: According to EN 60598-2-22
- **Type of protection**: IP20
- **Impact protection rating**: IK03
- **Protection class**: II
- **Colour temperature**: 6,500 K
- **Colour rendering index CRI**: > 80
- **Lifetime**: up to 50,000 h

### Specific technical data

<table>
<thead>
<tr>
<th>Type*</th>
<th>Article number</th>
<th>Colour</th>
<th>Operating mode</th>
<th>Rated duration</th>
<th>Number of cells</th>
<th>Mains current (230 V, 50 Hz), maintained (Charging, Charger off)</th>
<th>Mains current (230 V, 50 Hz), non-maintained (Charging, Charger off)</th>
<th>Mains power (230 V, 50 Hz), maintained (Charging, Charger off)</th>
<th>Mains power (230 V, 50 Hz), non-maintained (Charging, Charger off)</th>
<th>Typ. λ (at 230 V, 50 Hz, charging)</th>
<th>Typ. output current</th>
<th>Typ. forward voltage</th>
<th>Output power</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM R2A ST NM 111 2W</td>
<td>89800538</td>
<td>White</td>
<td>Non-maintained</td>
<td>1 h</td>
<td>1</td>
<td>15 mA</td>
<td>10 mA</td>
<td>15 W</td>
<td>0.6 W</td>
<td>0.42c</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>EM R2A ST NM 132 2W</td>
<td>89800540</td>
<td>White</td>
<td>Non-maintained</td>
<td>3 h</td>
<td>2</td>
<td>20 mA</td>
<td>10 mA</td>
<td>2.5 W</td>
<td>0.6 W</td>
<td>0.50c</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>EM R2A ST NM 132 2W B</td>
<td>89801052</td>
<td>Black</td>
<td>Non-maintained</td>
<td>3 h</td>
<td>2</td>
<td>20 mA</td>
<td>10 mA</td>
<td>2.5 W</td>
<td>0.6 W</td>
<td>0.50c</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

### Ordering data

<table>
<thead>
<tr>
<th>Type*</th>
<th>Article number</th>
<th>Colour</th>
<th>Operating mode</th>
<th>Rated duration</th>
<th>Number of cells</th>
<th>Mains current (230 V, 50 Hz), maintained (Charging, Charger off)</th>
<th>Mains current (230 V, 50 Hz), non-maintained (Charging, Charger off)</th>
<th>Mains power (230 V, 50 Hz), maintained (Charging, Charger off)</th>
<th>Mains power (230 V, 50 Hz), non-maintained (Charging, Charger off)</th>
<th>Typ. λ (at 230 V, 50 Hz, charging)</th>
<th>Typ. output current</th>
<th>Typ. forward voltage</th>
<th>Output power</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM R2A ST NM 111 2W</td>
<td>89800538</td>
<td>White</td>
<td>Non-maintained</td>
<td>1 h</td>
<td>1</td>
<td>15 mA</td>
<td>10 mA</td>
<td>15 W</td>
<td>0.6 W</td>
<td>0.42c</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>EM R2A ST NM 132 2W</td>
<td>89800540</td>
<td>White</td>
<td>Non-maintained</td>
<td>3 h</td>
<td>2</td>
<td>20 mA</td>
<td>10 mA</td>
<td>2.5 W</td>
<td>0.6 W</td>
<td>0.50c</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>EM R2A ST NM 132 2W B</td>
<td>89801052</td>
<td>Black</td>
<td>Non-maintained</td>
<td>3 h</td>
<td>2</td>
<td>20 mA</td>
<td>10 mA</td>
<td>2.5 W</td>
<td>0.6 W</td>
<td>0.50c</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1. IK rating valid for lens
2. EM = Emergency

---

Data sheet 03/22-EM063-20
Subject to change without notice. Information provided without guarantee.
Product description

- Lithium Iron Phosphate replacement battery pack for use with EM ready2apply emergency lighting units
- 8-year design life (at up to 30 °C ambient, insulated ceilings)
- 6-year design life (at up to 40 °C ambient, non-insulated ceilings)
- 3 years guarantee

Properties

- Certified quality manufacturer
- Casing material made of polycarbonate
- Charge efficiency > 90 %
- Low self discharge
- Compact micro USB type B connector providing polarity safe battery connection
- Protection and monitoring circuit built into battery enclosure
- Deep discharge protection
- Suitable for emergency lighting equipment as per IEC 60598-2-22

Lithium Iron Phosphate Battery pack 1.5 – 3.0 Ah

Batteries

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>Battery pack 1.5 Ah</td>
<td>PACK-LiFePO4 1,5Ah R2A 89800555</td>
<td>75 pc(s)</td>
<td>0.064 kg</td>
</tr>
<tr>
<td>Battery pack 3.0 Ah</td>
<td>PACK-LiFePO4 3,0Ah R2A 89800556</td>
<td>75 pc(s)</td>
<td>0.104 kg</td>
</tr>
</tbody>
</table>

Lens options

- Anti panic
- Escape route
- Spot

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>Lens Kit</td>
<td>R2A 89800557</td>
<td>1 pc(s)</td>
<td>0.012 kg</td>
</tr>
</tbody>
</table>
1. Standards

according to EN 50172
EN 55015
EN 60068-2-6
according to EN 60068-2-30
EN 60598-1
EN 60598-2-2
EN 60598-2-22
EN 61000-3-2
EN 61347-1
EN 61347-2-7
EN 61347-2-13
EN 61547
EN 62034
EN 62384
IEC 62133 (related to Lithium Iron battery)
UN 38.3 (related to Lithium Iron battery)
EN 62031
EN 62471

1.1 Glow-wire test

according to EN 60598-1 with increased temperature of 850 °C passed.

2. Thermal data

2.1 Temperature range

According to the standard IEC 60598-1 a LED Driver for remote installation has a max. case temperature of 90 °C. The ambient temperature range $ta$ for the EM R2A ST is defined to meet this requirement.

2.2 Expected lifetime

2.2.1 Electronics

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

2.2.2 Lifetime, lumen maintenance and failure rate for LED module

The light output of an LED module decreases over the lifetime, this is characterized with the $L$ value.

$L70$ means that the LED module will give 70 % of its initial luminous flux. This value is always related to the number of operation hours and therefore defines the lifetime of an LED module.

As the $L$ value is a statistical value the lumen maintenance may vary over the delivered LED modules.

The $B$ value defines the amount of modules which are below the specific $L$ value, e.g. $L70B10$ means 10 % of the LED modules are below 70 % of the initial luminous flux, respectively 90 % will be above 70 % of the initial value.

Lifetime declarations are informative and represent no warranty claim.

<table>
<thead>
<tr>
<th>$ta$ temperature</th>
<th>L90 / B50</th>
<th>L80 / B50</th>
<th>L70 / B10</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 °C</td>
<td>50,000 h</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>50,000 h</td>
<td></td>
</tr>
<tr>
<td>30 °C</td>
<td></td>
<td>50,000 h</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 °C</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.3 Storage conditions

- Humidity 45 % up to max. 85 %, not condensed (max. 56 days/year at 85 %)
- 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.

- Store batteries within the specified temperature range in low humidity conditions. Optimal storage conditions are:
  - Temperature: -20 ... +25 °C for up to 12 months
  - Relative humidity: 65 % +5 %
- Avoid atmosphere with corrosive gas
- Disconnect batteries before store or delivery
- Avoid storage of discharged batteries

3. Installation / Wiring

3.1 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

![Diagram of lens assembly](image-url)
3.2 Wiring diagrams

220–240 V
50/60 Hz
L
N
Rest
Rest

Note: Battery must be connected before mains connection.

3.3 Wiring type and cross-section

Wiring
Mains (N, L): brown, blue
Rest: orange, orange
Cable length: 250mm with strain relief at the R2A ST module
Cable: low smoke, halogen free

Recommended connector with strain-relief (plug and socket): to be defined
No terminal block included. The installation of the terminal block has to be done by a qualified person.
Only a terminal complying with EN 60998-2-1 or EN 60998-2-2 shall be used
Note: If mains cable or battery strap are damaged the luminaire must be disposed.

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>Ø6.5</th>
<th>Ø8</th>
<th>Ø10</th>
<th>Ø12</th>
<th>Ø16</th>
<th>Ø20</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>25 mm²</td>
<td>4 mm²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EM R2A ST</td>
<td>90</td>
<td>130</td>
<td>130</td>
<td>260</td>
<td>260</td>
<td>260</td>
<td>260</td>
<td>10 A</td>
<td>120 μs</td>
<td></td>
<td></td>
<td></td>
<td></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></th>
<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 ST</td>
<td>&lt; 75</td>
<td>&lt; 62</td>
<td>&lt; 33</td>
<td>&lt; 19</td>
<td>&lt; 18</td>
<td>&lt; 13</td>
</tr>
</tbody>
</table>
5.3 Insulation matrix

<table>
<thead>
<tr>
<th></th>
<th>Mains</th>
<th>Battery</th>
<th>Rest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains</td>
<td>–</td>
<td>⬠</td>
<td>⬠</td>
</tr>
<tr>
<td>Battery</td>
<td>⬠</td>
<td>–</td>
<td>⬠</td>
</tr>
<tr>
<td>Rest</td>
<td>⬠</td>
<td>⬠</td>
<td>–</td>
</tr>
</tbody>
</table>

- ⬠ Represents basic insulation
- ⬠ ⬠ Represents double or reinforced insulation

5.4 Battery charge regime / discharge

EM R2A ST 2 W, 1 / 3 h

<table>
<thead>
<tr>
<th>Type</th>
<th>EM R2A ST 2 W</th>
<th>EM R2A ST 2 W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Article no.</td>
<td>89800538</td>
<td>89800540, 89801052</td>
</tr>
<tr>
<td>Cells</td>
<td>1 cells</td>
<td>2 cells</td>
</tr>
<tr>
<td>Duration</td>
<td>1 h</td>
<td>3 h</td>
</tr>
</tbody>
</table>

- Battery charge time:
  - Initial: 20 h
  - Recharge: 12 h
- Typ. charge current:
  - Initial charge: 140 mA / 0 mA
  - Recharge: 140 mA / 0 mA
  - Trickle charge: continuously and battery voltage controlled
- Mains power consumption:
  - Initial charge: < 1.095 W
  - Recharge: < 1.095 W
  - Trickle charge: < 1.095 W / 0 W
- Discharge current at 3.2 V (nominal): 625 mA / 0 W

Battery charge regime / discharge:

- 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)

5.5 Battery selection for replacement

EM R2A ST 2 W, 1 / 3 h

<table>
<thead>
<tr>
<th>Type</th>
<th>EM R2A ST 2 W</th>
<th>EM R2A ST 2 W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Article no.</td>
<td>89800538</td>
<td>89800540, 89801052</td>
</tr>
<tr>
<td>Cells</td>
<td>1 cells</td>
<td>2 cells</td>
</tr>
<tr>
<td>Duration</td>
<td>1 h</td>
<td>3 h</td>
</tr>
</tbody>
</table>

- Technology and capacity
  - Lithium Iron Phosphate 15 Ah: single cell
    - Number of cells: 1
    - Article no.: 89800555
  - Lithium Iron Phosphate 3 Ah: side by side
    - Number of cells: 1 + 1
    - Article no.: 89800556

Note: If the rated duration of operation cannot be reached the battery must be replaced. Remove mains during battery replacement.
6. Functions

6.1 Status indication

System status is indicated by a bi-colour LED. The indication LED is integrated in the bezel:

<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>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>

6.2 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.

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

Test switch is integrated in the bezel. 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

To initiate a test use a suitable tool, refer to drawing below.

![Status LED Test Switch](image)

Note: Press test switch carefully to avoid damaging it.

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

Rest mode can be initiated by applying a short pulse of between 9.5 V DC and 225 V DC in amplitude for a period of between 150 ms and 1.0 s. This should be applied to terminals marked Rest after the mains supply has been disconnected and whilst the module is in emergency operation. Terminals are not sensitive to polarity.

After a mains reset the EM R2A ST exits the rest mode. The EM R2A ST supports the re-light function.

<table>
<thead>
<tr>
<th>Pulse/Mode</th>
<th>Standby</th>
<th>Emergency</th>
<th>Rest</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 – 1000 ms</td>
<td>Inhibit</td>
<td>Rest</td>
<td>–</td>
</tr>
<tr>
<td>1001 – 2000 ms</td>
<td>Cancel inhibit</td>
<td>–</td>
<td>re-light</td>
</tr>
</tbody>
</table>

6.3 Technical data batteries

Accu Lithium Iron Phosphate

Case temperature range to ensure 8 years design life:
- 15 / 3.0 Ah, insulated ceilings: +5 °C to +35 °C
- 15 / 3.0 Ah, non-insulated ceilings: +5 °C to +45 °C

International designation: IFpR 19/66

Battery voltage/cell: 3.2 V

Single cell dimensions:
- Diameter: 18 mm
- Height: 65 mm
- Capacity one cell: 15 Ah
- Capacity two cell pack: 30 Ah
- Max. short term temperature (reduced lifetime): 55 °C
- Max. number discharge cycles: 50 cycles total
- Packing quantity: 1 pc. per carton

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.

For battery data see separate data sheet.
7. Optical properties

7.1 Anti panic

Max. spacing for >0.5 lux:\(^1\)

<table>
<thead>
<tr>
<th>Height</th>
<th>Centre to end(^\circ)</th>
<th>Centre to centre(^\circ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5 m</td>
<td>3.85 m</td>
<td>10.85 m</td>
</tr>
<tr>
<td>3.0 m</td>
<td>3.80 m</td>
<td>11.90 m</td>
</tr>
<tr>
<td>3.5 m</td>
<td>3.80 m</td>
<td>12.90 m</td>
</tr>
<tr>
<td>4.0 m</td>
<td>3.70 m</td>
<td>13.85 m</td>
</tr>
<tr>
<td>5.0 m</td>
<td>3.55 m</td>
<td>14.90 m</td>
</tr>
<tr>
<td>6.0 m</td>
<td>3.10 m</td>
<td>15.05 m</td>
</tr>
</tbody>
</table>

All values for ta = 30 °C
Luminous flux: 200 lm
\(^1\) Maintenance factor = 0.8, photometric data available on request
\(^\circ\) Distance between module and wall
\(^\circ\) Distance between two modules

7.2 Escape route

Max. spacing for >1.0 lux:\(^1\)

<table>
<thead>
<tr>
<th>Height</th>
<th>Centre to end(^\circ)</th>
<th>Centre to centre(^\circ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5 m</td>
<td>4.75 m</td>
<td>11.65 m</td>
</tr>
<tr>
<td>3.0 m</td>
<td>4.80 m</td>
<td>12.75 m</td>
</tr>
<tr>
<td>3.5 m</td>
<td>5.05 m</td>
<td>13.45 m</td>
</tr>
<tr>
<td>4.0 m</td>
<td>5.20 m</td>
<td>13.60 m</td>
</tr>
<tr>
<td>5.0 m</td>
<td>5.50 m</td>
<td>14.30 m</td>
</tr>
<tr>
<td>6.0 m</td>
<td>5.70 m</td>
<td>15.05 m</td>
</tr>
<tr>
<td>7.0 m</td>
<td>5.75 m</td>
<td>15.60 m</td>
</tr>
<tr>
<td>8.0 m</td>
<td>5.65 m</td>
<td>16.05 m</td>
</tr>
</tbody>
</table>

All values for ta = 30 °C
Luminous flux: 200 lm
\(^1\) Maintenance factor = 0.8, photometric data available on request
\(^\circ\) Distance between module and wall
\(^\circ\) Distance between two modules

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 → Technical Data

The light source of this luminaire is not replaceable: when the light source reaches its end of life replace the whole luminaire. Lifetime declarations are informative and represent no warranty claim. No warranty if device was opened.