TRIDONIC

EM ready2apply NM 132 2 W PCB

EM ready2apply

EM R2A NM BASIC

EM R2A NM ST/PRO

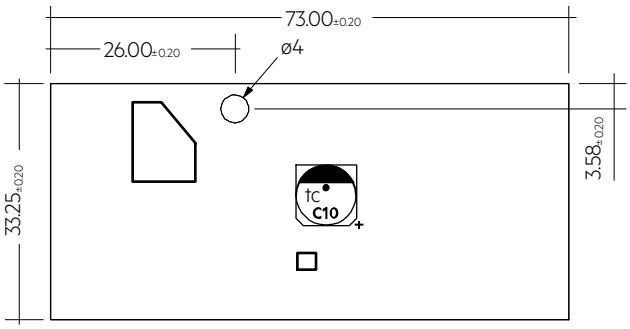
Product description
_ Emergency lighting LED driver
_ Electronic circuit board
_ Emergency lighting function for manual testing, self-test or DALI autotest
_ EM = Emergency

Properties
_ Output power 1.5 W
_ Very low stand-by power loss
_ Non maintained operation
_ 3 h rated duration
_ Plug-in Lithium Iron Phosphate battery
_ 5 years guarantee electronic (LED driver) (conditions at https://www.tridonic.com/en/int/services/manufacturer-guarantee-conditions)
_ 5 years guarantee for LiFePO4 batteries (conditions at https://www.tridonic.com/en/int/services/manufacturer-guarantee-conditions)

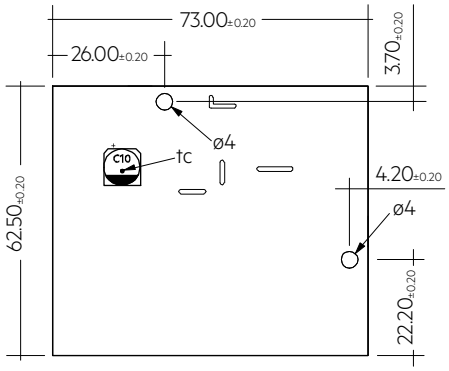
Website
http://www.tridonic.com/89800680

EM ready2apply NM 132 2 W PCB

EM ready2apply



EM R2A NM BASIC



EM R2A NM ST/PRO

Ordering data

Type	Article number	Rated duration	Number of cells	Packaging, carton	Packaging, pallet	Weight per pc.
EM R2A BASIC NM 132 2W PCB	**89800680**	3 h	2	15 pc(s).	480 pc(s).	0.019 kg
EM R2A ST NM 132 2W PCB	**89800681**	3 h	2	15 pc(s).	480 pc(s).	0.031 kg
EM R2A PRO NM 132 2W PCB	**89800682**	3 h	2	15 pc(s).	480 pc(s).	0.031 kg

Technical data

Rated supply voltage	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)
Starting time (Emergency operation)	< 0.5 s from detection of emergency event
Output current tolerance	± 5 %
LF current ripple	± 5 %
Ambient temperature range	+5 … +45 °C
Max. casing temperature tc	60 °C
Mains voltage changeover threshold	According to EN 60598-2-22
Lifetime	up to 50,000 h
EoFI	1

Approval marks

SELV EL EL-T CE RoHS

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

Specific technical data

Type	Number of battery cells	Rated duration	Mains current (230 V, 50 Hz), non-maintained		Mains power (230 V, 50 Hz), non-maintained		Typ. λ (at 230 V, 50 Hz, charging)	Typ. output current	Output voltage range	Output power
			Charging	Charger off	Charging	Charger off				
Normal operation										
EM R2A BASIC NM 132 2W PCB	2	3 h	16 mA	5 mA	2.5 W	0.6 W	0.63C	–	–	–
EM R2A ST NM 132 2W PCB	2	3 h	20 mA	10 mA	2.5 W	0.6 W	0.63C	–	–	–
EM R2A PRO NM 132 2W PCB	2	3 h	20 mA	10 mA	2.5 W	0.6 W	0.63C	–	–	–
Emergency operation										
EM R2A BASIC NM 132 2W PCB	2	3 h	–	–	–	–	–	126 mA	11 – 13.5 V	1.5 W
EM R2A ST NM 132 2W PCB	2	3 h	–	–	–	–	–	126 mA	11 – 13.5 V	1.5 W
EM R2A PRO NM 132 2W PCB	2	3 h	–	–	–	–	–	126 mA	11 – 13.5 V	1.5 W

LED+LENS KIT

Accessory

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

Website
http://www.tridonic.com/89800684

Ordering data

Type	Article number	Packaging, carton	Weight per pc.
EM R2A NM LED+LENS KIT 40mm	**89800684**	15 pc(s).	0.04 kg

Connection Cable EM R2A LED

Accessory

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

Website
http://www.tridonic.com/28002676

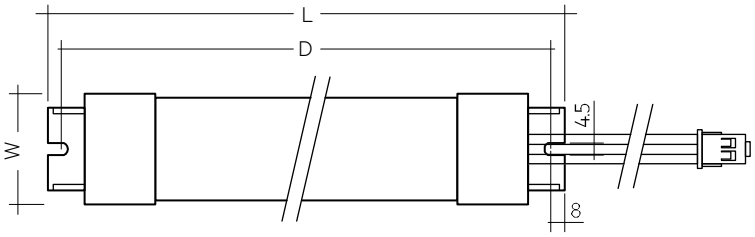
Ordering data

Type	Article number	Packaging, carton	Weight per pc.
EXTENSION CABLE EM R2A LED 100mm	**28002676**	3,000 pc(s).	0.002 kg

LiFePO4 Accus 1.5 – 9.0 Ah

Accessory

Stick



Stick

Product description
_ High-temperature LiFePO4 cells only for use with Tridonic emergency lighting units
_ LiFePO4: up to 12 years design life
_ 8 years guarantee for LiFePO4 batteries (conditions at https://www.tridonic.com/en/int/services/manufacturer-guarantee-conditions)

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

Website
http://www.tridonic.com/28002318

Ordering data

Type	Article number	Number of cells	Capacity	Packaging, carton	Packaging, outer box	Weight per pc.
LiFePO4 cells – stick, 1.5 – 9.0 Ah						
ACCU-LiFePO4 3.0Ah 2A CON	**28002318**	1 x 2	3.0 Ah	5 pc(s).	25 pc(s).	0.108 kg
LiFePO4 cells – side by side, 3.0 – 9.0 Ah						
ACCU-LiFePO4 3.0Ah 2B CON	**28002319**	2 x 1	3.0 Ah	5 pc(s).	25 pc(s).	0.100 kg

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

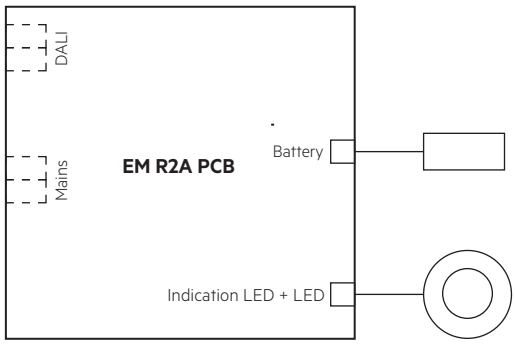
Type	ta	25 °C	30 °C	40 °C
EM R2A	lifetime	> 50,000 h	50,000 h	50,000 h

2.2 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.

3. Installation / Wiring



EM R2A BASIC version: Green indication LED
EM R2A ST/PRO version: Green / Red indication LED

3.1 Wiring type and cross-section

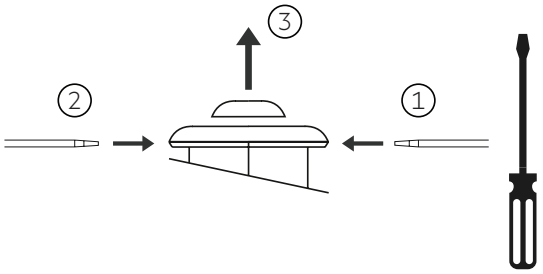
Wiring PRO:
Mains (N, L): blue, brown
DALI (DA, DA): orange, orange

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

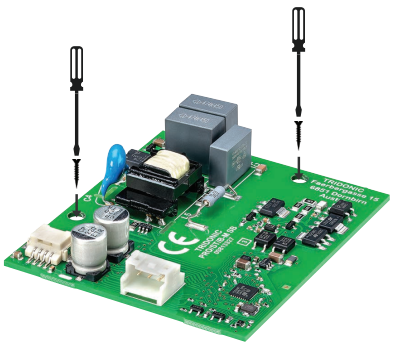
Battery pack end termination
Compact 3-pole connector providing safe battery connection

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

Automatic circuit breaker type	C10	C13	C16	C20	B10	B13	B16	B20	Inrush current	
Installation Ø	1.5 mm²	1.5 mm²	2.5 mm²	4 mm²	1.5 mm²	1.5 mm²	2.5 mm²	4 mm²	I_{max}	time
EM R2A	180	260	260	260	90	130	130	130	10 A	120 µs

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

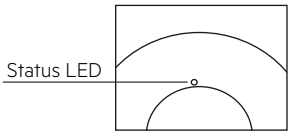
	THD	3.	5.	7.	9.	11.
EM R2A	< 75	< 62	< 33	< 19	< 18	< 13

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 Testing

Emergency operation can be manually tested by removal of the mains supply.

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

LED indiction	Status	Comment
Permanent green	System OK	AC mode
Fast flashing green (0,1 sec on – 0,1 sec off)	Function test underway	
Slow flashing green (1 sec on – 1 sec off)	Duration test underway	
Red LED on	Load failure	Open circuit / Short circuit / LED failure
Slow flashing red (1 sec on – 1 sec off)	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)
Fast flashing red (0,1 sec on – 0,1 sec off)	Charging failure	Incorrect charging current
Double pulsing green	DALI Inhibit	Switching into DALI inhibit mode via controller
Binary transmission of address via green/red LED	Address identification	During address identification mode
Green and red off	DC mode	Battery operation (emergency mode)

6.2.2 Testing

Emergency operation can be manually tested by removal of the mains supply.

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.

Timer reset functionality
The timer for function and duration test can be set to a particular time of the day by 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
Initiate the rest mode by applying a short pulse of between 9.5 V_{DC} and 22.5 V_{DC} in amplitude for a period of between 150 ms and 1.0 s. Apply this to the 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.

Pulse/Mode	Standby	Emergency	Rest
150 – 1,000 ms	Inhibit	Rest	–
1,001 – 2,000 ms	Cancel inhibit	–	re-light

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.
LED current: 9 mA

LED indiction	Status	Comment
Permanent green	System OK	AC mode
Fast flashing green (0,1 sec on – 0,1 sec off)	Function test underway	
Slow flashing green (1 sec on – 1 sec off)	Duration test underway	
Red LED on	Load failure	Open circuit / Short circuit / LED failure
Slow flashing red (1 sec on – 1 sec off)	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)
Fast flashing red (0,1 sec on – 0,1 sec off)	Charging failure	Incorrect charging current
Double pulsing green	DALI Inhibit	Switching into DALI inhibit mode via controller
Binary transmission of address via green/red LED	Address identification	During address identification mode
Green and red off	DC mode	Battery operation (emergency mode)

6.3.2 Testing

Emergency operation can be manually tested by removal of the mains supply.

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 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. 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.

Timer reset functionality
The timer for function and duration test can be set to a particular time of the day by 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.

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

EM R2A BASIC/ST/PRO 3 h

	Device configuration	**EM R2A BASIC/ST/PRO**
	Article no.	**89800680 / 89800681 / 89800682**
	Cells	**2 cells**
	Duration	**3 h**
Battery charge time	Initial	20 h
	Recharge	12 h
	Trickle charge	continuously and battery voltage controlled
Typ. charge current[1]	Initial charge	290 mA
	Recharge	290 mA
	Trickle charge	290 mA / 0 mA
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
Charge voltage range		2.0 – 3.6 V
Discharge voltage range		2.3 – 3.6 V

[1] 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	+45 °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	15 months at -20 °C to +35 °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 accessable for Tridonic.

8.2 Additional information

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

Lifetime declarations are informative and represent no warranty claim.