TRIDONIC

EM pLED ST SR LiFePO4 180lm KIT 36mm

Combined emergency lighting LED driver 1 – 4 W





Product description
- The EM AP Lighthead Kit is a strain-relief solution for a variety of application requirements
- 36 mm variant for independent use
- The complete set includes an EM powerLED 1W, the EMpLED SR, the antipanic lighthead with integrated indication LED, the LiFePO4 battery pack and the fixing flange nut
- EM AP LIGHTHEAD with 180 lumen light output
- IP65 for EM AP Lighthead in installed state
- SELV for output voltage < 60 V DC
- Non maintained operation
- Self-test as per IEC 62034
- 3 h rated duration
- EM = Emergency
- Nominal lifetime up to 100,000 h
- 5 years guarantee (conditions at https://www.tridonic.com/en/int/services/manufacturer-guarantee-conditions)

Battery management
- Intelligent charge system
- Deep discharge protection
- Temperature protection
- Polarity reversal protection for battery provided by 3-pole connector

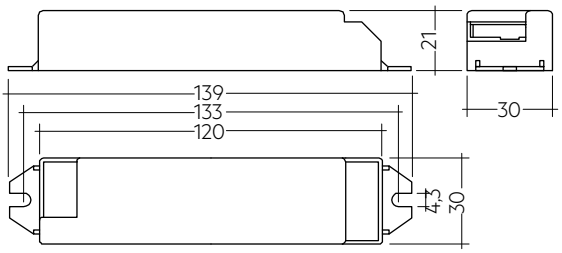
Batteries
- LiFePO4 batteries with Tridonic LiFeGuard
- Temperature-protected
- Overcharge-/Overdischarge protection
- Ensures safety in use
- LiFePO4: 4 – 8 years design life
- 5 years guarantee for LiFePO4 batteries (conditions at https://www.tridonic.com/en/int/services/manufacturer-guarantee-conditions)

Website
http://www.tridonic.com/89801386



EM pLED ST SR LiFePO4 180lm KIT 36mm

Combined emergency lighting LED driver 1 – 4 W



Ordering data

Type	Article number	Dimensions L x W x H	Rated duration	Max. number of LEDs	Packaging, carton	Packaging, pallet	Weight per pc.
Screw fastening version							
EM pLED ST SR LiFePO4 180lm KIT 36mm	**89801386**	200 x 43 x 25.5 mm	3 h	1	1 pc(s).	155 pc(s).	0.395 kg

Technical data

Rated supply voltage	220 – 240 V
AC voltage range	198 – 264 V
Mains frequency	50 / 60 Hz
THD (at 230 V, 50 Hz, full load)	< 120 %
U-OUT (including open- / short-circuit and double load)	15 V
Max. open circuit voltage	15 V
LED current in emergency operation (1 x LED)	350 mA
Output current tolerance	± 10 %
Typical output LF current ripple at full load	± 5 %
Starting time	< 0.7 s
Output current	Refer to data sheet
Overvoltage protection	320 V (for 48 h)
Max. casing temperature tc	75 °C
Ambient temperature ta	-25 … +55 °C
Mains voltage changeover threshold	According to EN 60598-2-22
Mains surge capability (between L - N)	1 kV
Surge voltage at output side (against PE)	< 2 kV
Mains surge capability (between L/N - PE)	2 kV
Type of protection	IP20
Lifetime	up to 100,000 h
Guarantee (conditions at www.tridonic.com)	5 Year(s)

Approval marks

IP20 SELV EL-T RoHS

Standards

EN 61347-2-7, EN 61347-2-13, EN 62384, EN 55015, EN 61000-3-2, EN 61547, EN 60068-2-29, EN 60068-2-30, EN 60068-2-64, according to EN 50172, according to EN 60598-2-22, acc. to EN 62034

Specific technical data

Type	Rated duration	Number of LEDs	Typ. λ (at 230 V, 50 Hz)	Forward voltage range LED module①	Non-maintained operation		Maintained operation	
					Mains current in charging operation②	Mains power in charging operation②	Mains current in charging operation②	Mains power in charging operation②
EM pLED ST SR LiFePO4 180lm KIT 36mm	3 h	1	0.55C	2.6 – 3.4 V	21 / 11 mA	2.1 / 0.9 W	31 / 23 mA	4 / 2.8 W

① Tolerance range for electrical data: ±10 %.

② For LiFePO4 batteries voltage dependent constant current charging is used. The values displayed are for charging on / charging off.

1. Standards

- EN 61347-2-7
- EN 61347-2-13
- EN 62384
- EN 55015
- EN 61000-3-2
- EN 61547
- EN 60068-2-29
- EN 60068-2-30
- EN 60068-2-64
- 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.

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 VDC 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 VAC (or 1,414 x 1,500 VDC). To avoid damage to the electronic devices this test **must not be conducted**.

2. Thermal details and lifetime

2.1 Lifetime

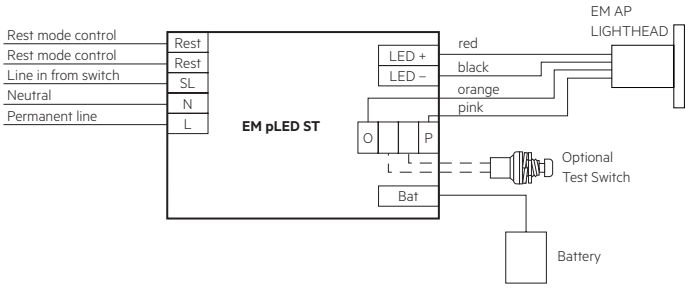
Average lifetime 100,000 hours under rated conditions with a failure rate of less than 10 %. Average failure rate of 0.2 % per 1000 operating hours.

Expected lifetime					
EM pLED ST SR LiFePO4 180lm KIT 36mm	ta	40 °C	45 °C	50 °C	55 °C
	lifetime	> 100,000 h	> 100,000 h	> 100,000 h	76,000 h

The emergency lighting LED driver is designed for a lifetime stated above under reference conditions and with a failure probability of less than 10 %.

3. Installation / Wiring

3.1 Wiring diagram

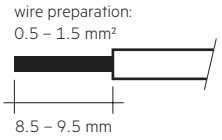


The SL terminal (Line in from switch) on the EM pLED must not be connected. The EM AP Lighthead is designed for non-maintained operation, which is why triggering maintained operation via the SL terminal is not permitted due to thermal reasons.

3.2 Wiring type and cross section

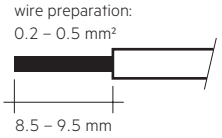
LED module/LED driver/supply:

Use solid/stranded wire with a cross section of 0.5 – 1.5 mm² for wiring. Strip 8.5 – 9.5 mm of insulation from the cables to ensure perfect operation of terminals.



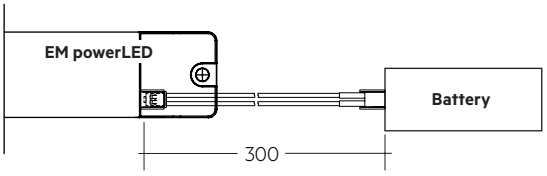
Status indication LED / Test switch:

Use solid wire with a cross section of 0.2 – 0.5 mm² for wiring. Strip 8.5 – 9.5 mm of insulation from the cables to ensure perfect operation of terminals.



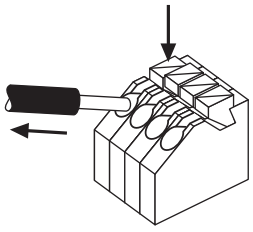
3.3 Battery connection

$LiFePO_4$: Direct connection



3.4 Loose wiring

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



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 classified 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.
- LED leads should be separated from the mains 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.
- The secondary wires (LED module) should be routed in parallel to ensure good EMC performance.
- 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 LED leads to prevent noise coupling.
- Battery leads are specified with 0.5 mm cross section and a length of 0.8 m
- To avoid the damage of the control gear, the wiring must be protected against short circuits to earth (sharp edged metal parts, metal cable clips, louver, etc.)

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.

3.6 Maximum lead length

LED	3 m (6 m loop)[1]
Test switch	1 m
Status indication LED	1 m
Batteries	0.8 m

[1] Note: Do not exceed the length of LED leads to the LED module. Leads should always be kept as short as possible.

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.

4. Mechanical values

4.1 Housing properties

- Casing manufactured from polycarbonate.
- Type of protection: IP20

Max. torque for mounting screws: 0.8 Nm

5. Electrical values

5.1 Maximum loading of automatic circuit breakers

Automatic circuit breaker type	B10	B13	B16	B20	C10	C13	C16	C20	Inrush current	
Installation Ø	1.5 mm²	1.5 mm²	2.5 mm²	2.5 mm²	1.5 mm²	1.5 mm²	2.5 mm²	2.5 mm²	I_{max}	time
EM pLED ST SR LiFePO4 180lm KIT 36mm	90	130	130	130	180	260	260	260	6 A	55 µs

5.2 Insulation matrix

	Mains	**Battery, Test switch, Indicator LED**	**Rest**
Mains	–	••	•
Battery, Test switch, Indicator LED	••	–	•
Rest	•	•	–

• Represents basic insulation

•• Represents double or reinforced insulation

6. Electrical values

6.1 Status indication

System status is indicated by a bi-colour LED.

LED indiction	**Status**	**Commentary**
Permanent green	System OK	AC mode
Fast flashing green (0.1 s on – 0.1 s off)	Function test underway	
Slow flashing green (1 s on – 1 s off)	Duration test underway	
Red LED on	Load failure	Open circuit / Short circuit / LED failure ①
Slow flashing red (1 s on – 1 s off)	Battery failure	Battery failed the duration test or function / Battery is defect / Incorrect battery voltage
Fast flashing red (0.1 s on – 0.1 s off)	Charging failure	Incorrect charging current
Double pulsing green	Rest mode	Switching into blocking mode via controller
Green and red off	DC mode	Battery operation (Emergency mode)

① If the EM powerLED (operated in non-maintained mode) detects a fault at the LED module, the red LED indicator lights up and the output is stopped.
After the correction of the fault disconnect the unswitched phase from the mains supply or carry out a function or duration test. This will detect the new LED module and reset the error display.

6.2 Testing

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.

Commissioning
After installation of the luminaire and initial connection of the mains supply and battery supply to the EM powerLED ST the unit will commence charging the batteries for 24 hours (initial charge). Afterwards the module will conduct a commissioning test for the full duration. The 24 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 24 hours).
The easy commissioning feature will set the initial test day and time to ensure random testing of units.

Test switch
An optional test switch can be wired to each EM powerLED ST.
This can be used to to:
- initiate a 5 seconds function test — press 200 ms < T < 1 s
- execute function test as long as switch pressed — > 1 s press
- adjust local timing — > 10 s press

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.
The factory programmed delay offset (1 – 28 days) will be loaded after the reset into the delay timer for the function and duration test in order to randomize 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_{DC} 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 powerLED ST 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.
In combination with a 1-cell battery the EM powerLED does not support Rest Mode / Inhibit Mode.

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

7. Battery data

7.1 Battery selection

EM pLED ST SR LiFePO4 180lm KIT 36mm, 3 h

Type	**EM pLED ST SR LiFePO4 180lm KIT 36mm**
Article no.	**89801386**
Duration	**3 h**
Cells	**2**

Technology and capacity	Design	Number of cells	**Type**	**Article no.**	**Assignable batteries**
$LiFePO_4$ 1.5 Ah 18650 cells	remote box	1 x 2	**PACK-LiFePO4 3.0Ah 2 CON**	**28005854**	•

7.2 Battery charge / discharge data

EM pLED ST SR LiFePO4 180lm KIT 36mm, 3 h

	Type	**EM pLED ST SR LiFePO4 180lm KIT 36mm**
	Article no.	**89801386**
	Duration	**3 h**
Battery charge time	Initial charge	24 h
	Trickle charge	continuously
Charging current	Initial charge	240 – 300 mA
	Trickle charge[1]	240 – 300 mA / 0 mA
Discharge current		430 – 530 mA
Charge voltage range[2]		2.0 – 3.6 V per cell
Discharge voltage range		2.3 – 3.6 V per cell

[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).

The emergency lighting LED Driver will recharge the battery normally after running the test of 61347-2-7 CL 22.3 (abnormal operating conditions).

[2] The battery will not be charged below 2.0 V.

7.3 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 tc (shorter than 1 month over the battery 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.

Only use Tridonic batteries.

7.4 Safety



Note: LiFeGuard ensures safe and reliable battery operation by offering a comprehensive three-layered safety system.
It addresses the cell, battery pack and emergency driver.

7.4.1 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.

7.4.2 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 3.9 V. A discharge of the battery is still possible after the protection circuit was triggered to guarantee emergency operation.

7.4.3 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.

7.4.4 Temperature 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. The charging is automatically activated when the temperature is within the range of 0 to 60°C again.



Battery has built in thermal sensor for safe charging. Mount battery away from heat source.
Positioning of the thermal sensor see battery data sheet.

7.5 Wiring batteries

To inhibit inverter operation disconnect the batteries by removing the connection at battery side.

For further informations refer to corresponding battery datasheet.

7.6 Storage, installation and commissioning

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

8. Miscellaneous

8.1 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.

8.2 Mains-connected transformers

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

8.3 FELV control terminals



FELV control terminals marked „Risk of electric shock“ are not safe to touch. Insulate circuits connected to any FELV control terminal for the Low Voltage supply voltage of the control gear. Protect terminals connected to the FELV circuit against accidental contact.

8.4 Additional information

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

Guarantee conditions at www.tridonic.com → Services

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