TRIDONIC



EM powerLED SELFTEST 1 - 2 W

Combined emergency lighting LED Driver 1 – 4 W

Product description

- Emergency lighting LED Driver with self-test function
- SELV for output voltage < 60 V DC
- Low profile casing (21 x 30 mm cross-section)
- 5-year guarantee

Properties

- · Mains and emergency operation
- Self-test as per IEC 62034
- · Constant current mode
- With either screw or clip fastening (clip-fix)
- 1, 2 or 3 h rated duration
- Selectable operating time (jumper)
- · Output power limitation
- · Two-colour status display LED
- "Rest mode" function
- Simple set-up
- · Automatic restart after LED replacement
- Electronic multi-level charge system
- SELV (outputs powerLED, battery, status LED, test switch)
- Polarity reversal protection for battery
- Deep discharge protection
- Very low energy consumption from the battery after activation of the deep discharge protection
- Short-circuit-proof battery connection
- Emergency lighting LEDs available Self-test:
- Status of the battery
- Status of the LED
- Charge condition
- Function test
- Life-time test

Batteries

- High-temperature cells: 2 Ah
- NiMH batteries
- Cs cells
- 4-year design life
- 1-year guarantee



Standards, page 5

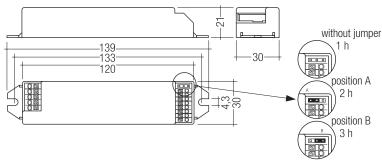
For wiring diagrams and installation examples, page 8 and 9 $\,$



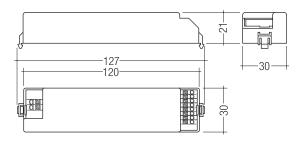
Screw-fix



Clip-fix



Screw-fix



Clip-fix

Technical data

Rated supply voltage	220 – 240 V
Mains frequency	50 / 60 Hz
Forward voltage range LED module (1 x LED)	2.8 – 3.4 V
Forward voltage range LED module (2 x LED)	5.6 – 6.8 V
Mains current, 1 W device	30 mA
Mains current, 2 W device	40 mA
Power in mains operation, 1 W device	3.5 W
Power in mains operation, 2 W device	5 W
Time to light	0.31 s from detection of emergency event
Overvoltage protection	320 V (for 1 h)
Battery discharge current	See page 4
Max. casing temperature to	70 °C
Ambient temperature ta	-25 +50 °C
Mains voltage changeover threshold	according to EN 60598-2-22
Type of protection	IP20

Ordering data

Туре	Article number	Packaging, carton	Packaging, pallet	Weight per pc.	Max. number of LED	Power
Screw fastening version	1					
EM powerLED 1 W ST	89899860	25 pc(s).	600 pc(s).	0.101 kg	1	1.2 W
EM powerLED 2 W ST	89899861	25 pc(s).	600 pc(s).	0.101 kg	2	2.0 W
Clip fastening version						
EM powerLED 1 W ST	89899867	25 pc(s).	600 pc(s).	0.101 kg	1	1.2 W
EM powerLED 2 W ST	89899868	25 pc(s).	600 pc(s).	0.101 kg	2	2.0 W

Specific technical data

Тур	Rated duration	Тур. λ	Mains	Mains current in charging operation®			Mains power in charging operation®		
	Rated duration	(at 230 V, 50 Hz) [®]	Initial charge	Fast recharge	Trickle charge	Initial charge	Fast recharge	Trickle charge	
EM powerLED 1 W ST	1 h	0.52	15.4 mA	17.9 mA	13.9 mA	1.3 W	1.6 W	1.1 W	
EM powerLED 1 W ST	2 h	0.52	14.2 mA	17.6 mA	11.8 mA	1.1 W	1.6 W	0.8 W	
EM powerLED 1 W ST	3 h	0.52	14.2 mA	17.6 mA	11.8 mA	1.1 W	1.6 W	0.8 W	
EM powerLED 2 W ST	1 h	0.57	14.3 mA	17.3mA	11.7 mA	1.1 W	1.6 W	0.8 W	
EM powerLED 2 W ST	2 h	0.57	15.7 mA	20.4mA	12.8 mA	1.4 W	2.0 W	0.9 W	
EM powerLED 2 W ST	3 h	0.57	18.4 mA	23.3mA	14.5 mA	1.7 W	2.4 W	1.2 W	

[®] Maintained operation

[®] Non-maintained operation

ACCES-SORIES

Test switch EM2

Product description

- For connection to the emergency lighting unit
- For checking the device function



Ordering data

Туре	Article number		Packaging, carton	Weight per pc.
Test switch EM 2	89805277	25 pc(s).	600 pc(s).	0.011 kg

ACCES-SORIES

Status indication bi-colour LED

Product description

- Two-colour status display LED
- Green: system OK, red: fault



Ordering data

Туре	Article number	Packaging, bag	Packaging, carton	weight per pc.
LED EM bi-colour	89899720	25 pc(s).	200 pc(s).	0.017 kg
LED EM bi-colour, high brightness	89899753	25 pc(s).	800 pc(s).	0.013 kg

Battery selection

EM powerLED 1-2 W ST, 1 / 2 / 3 h

		-		Туре	EM powerLED 1 W ST		EM powerLED 2 W ST			
				Article no.	89899860, 89899867			89899861, 89899868		
				Duration	ration 1 h 2 h 3 h			1 h	2 h	3 h
				Cells	2 cells	3 cells	3 cells	3 cells	4 cells	5 cells
Technology and Design Number Type capacity of cells		Туре	Article no.	Assignable batteries						
	stick	1 x 2	Accu-NiMH C2A	89899755	•					
	stick	1 x 3 A	Accu-NiMH C3A	89899744		•	•	•		
NiMH 2Ah Cs cells	stick	1 x 4 A	Accu-NiMH C4A	89899700					•	
Cs cells	stick	1 x 5	Accu-NiMH C 5A	89899703						•
	side by side	5 x 1 A	Accu-NiMH C 5B	89899704						•

Battery charge / discharge data

EM powerLED 1-2 W ST, 1 / 2 / 3 h

	Туре	EM powerLED 1 W ST			EM powerLED 2 W ST					
	Article no.	89	9899860, 8989986	67	89899861, 89899868					
	Duration	1 h	2 h	3 h	1 h	2 h	3 h			
	Cells	2 cells	3 cells	3 cells	3 cells	4 cells	5 cells			
	Initial charge	20 h								
Battery charge time	Fast recharge	12 h								
	Trickle charge	continuously								
	Initial charge			125	mA					
Charge current	Fast recharge			210	mA					
	Trickle charge			50	mA					
Discharge	1 x LED	790 mA	440 mA	440 mA	850 mA	610 mA	480 mA			
ourront	2 x LED	-	-	-	830 mA	600 mA	480 mA			

LED current

EM powerLED 1-2 W ST, 1 / 2 / 3 h

Type		EM powerLED 1 W ST	EM powerLED 2 W ST
	Article no.	89899860, 89899867	89899861, 89899868
LED current	1 x LED	350 mA	600 mA
in emergency operation	2 x LED	-	350 mA
LED current in	1 x LED	350 mA	350 mA
mains operation	2 x LED	-	350 mA

Standards

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

Duration link selection

Duration	Link Position
1 hr	without jumper
2 hr	position A
3 hr	position B

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.

Technical data Accu-NiMH

Case temperature range

to ensure 4 years design life

2.0 Ah Cs +5 °C to +45 °C Battery voltage 1.2 V

Single cell dimensions

2.0 Ah Cs

Diameter 22 mm
Height 42.5 mm
Capacity 2.0 Ah
Max. short term temperature (reduced life-time) 70 °C

Max. number discharge cycles 4 cycles per year plus

4 cycles during comissioning

Packing quantity 5 pcs. per carton

Storage, installation and commissioning

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

Batteries

Connection method: 4.8 x 0.5 mm spade tag welded to end of cell

For stick packs this connection is accessible after the battery caps have been fitted.

To inhibit inverter operation disconnect the batteries by removing the connector from the battery spade tag.

For battery data see separate data sheet.

Further technical data

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 a forward voltage (Vf) higher than 3.4 V.

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 ($<1.5\,V$ at the 1 W driver and $<3\,V$ at the 2 W driver) the LED will not be driven in maintained mode via the switched line until the rated battery voltage levels are exceeded.

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 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 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:

ullet 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

Rest mode

Rest mode can be initiated 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 $1.0\,s$. This should be applied to terminals marked Rest. Terminals are not sensitive to polarity. A mains reset is required to exit the rest mode.

Life-time

Average life-time 50,000 hours under rated conditions with a failure rate of less than 10%. Average failure rate of 0.2% per 1000 operating hours.

Isolation and electric strength testing of luminaires

Electronic devices 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 isolation test with 500 Vpc for 1 second. This test voltage should be connected between the interconnected phase and neutral terminals and the earth terminal. The isolation resistance must be at least $2\,\mathrm{M}\Omega$.

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 Vac). To avoid damage to the electronic devices this test must not be conducted.

Status indication

System status is indicated by a bi-colour LED.

LED Indication	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 ®
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 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.

Mechanical details

Case manufactured from polycarbonate.

Glow-wire test according to EN 61347-1 with increased temperature of 850 °C passed.

LED bi-colour status indicator

- Green / red
- Mounting hole 6.5 mm dia
- Lead length 1000 mm
- Insulation rating: 90 °C

Test switch

- Mounting hole 7.0 mm dia
- Lead length 550 mm

Battery 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.

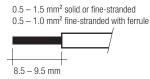
Recommended fixing details for clip fixing



Wiring type and cross section

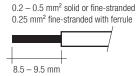
Wiring

mains (SL, N, L) LED (LED +, LED -)



Wiring

batteries (Bat +, Bat -) test switch (switch) status indication LED (status K, A)



Use one wire for each terminal connector only.

Max. lead insulation diameter

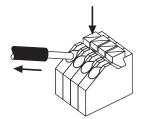
Battery 2.1 mm Test switch 2.1 mm Indicator LED 2.1 mm

Maximum lead length

LED 3 m status indication LED 1 m batteries 1 m

Release of the wiring

Press down the "push button" and remove the cable from front.

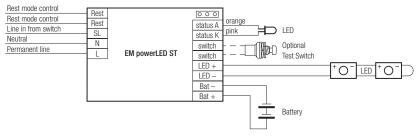


Maximum loading of automatic circuit breakers

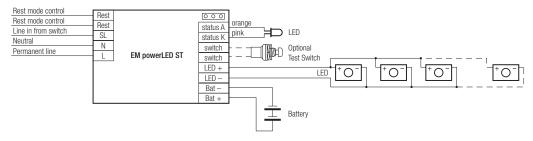
9						
Automatic circuit breaker type	B10	B13	B16	B20	Inrush current	
Installation Ø	1.5 mm ²	1.5 mm ²	$2.5\mathrm{mm}^2$	2.5 mm ²	l _{max}	time
EM powerLED 1 W ST	90	130	130	130	10 A	120 µs
EM powerLED 2 W ST	90	130	130	130	10 A	120 µs

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 capaple of handling in excess of 700 mA.

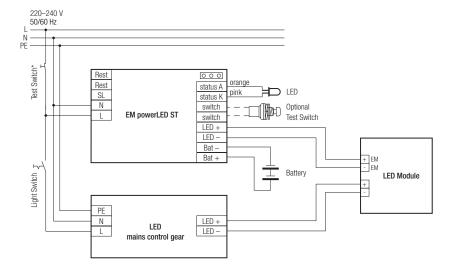
Note: Please ensure that at the terminal of the EM powerLED module the battery negative is not connected to the negative of the LED load.

Manually tested emergency lighting with combined LED modules for general and emergency lighting (e.g. STARK QLE CLASSIC EM, STARK LLE 24-280-1250 EM, STARK CLE CLASSIC EM, STARK SLE CLASSIC EM):

Due to the fact that independent circuits are used for general and emergency lighting it is important that the normal supply of the mains LED Driver is switched off together with the permanent emergency supply prior to checking the operation of the emergency LEDs.

If this is not done then it may not be possible to see that the emergency LEDs are operating.

Use a circuit similar to that shown next.



* Use 230 V Test switch

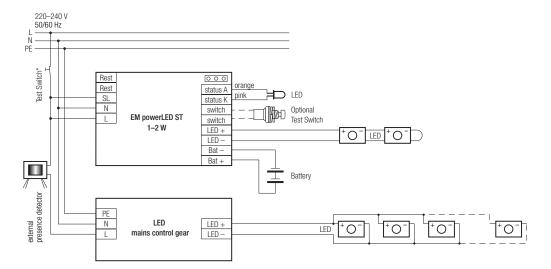
Simple CORRIDOR FUNCTION with EM powerLED 1-2 W

With the mains operation function of the EM powerLED $1-2~\mathrm{W}$ a simple corridor function can be realised.

An external presence detector switches the mains LED Driver. The EM powerLED 1–2 W has the switched line SL connected to permanent mains supply.

On presence both mains LED Driver and EM powerLED 1-2 W are active and driving all LEDs. With no presence the mains LED Driver is switched off by the presence detector and the EM powerLED 1-2 W stays on operating the emergency LEDs at low power.

Use a circuit similar to that shown next.



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 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 0.5 mm² cross section and a length of < 1.3 m
- DALI terminals are mains proof.
- Switched live and unswitched live supplies must be off the same phase.

Additional information

Additional technical information at $\underline{www.tridonic.com} \rightarrow Technical Data$

Guarantee conditions at www.tridonic.com → Services

No warranty if device was opened.