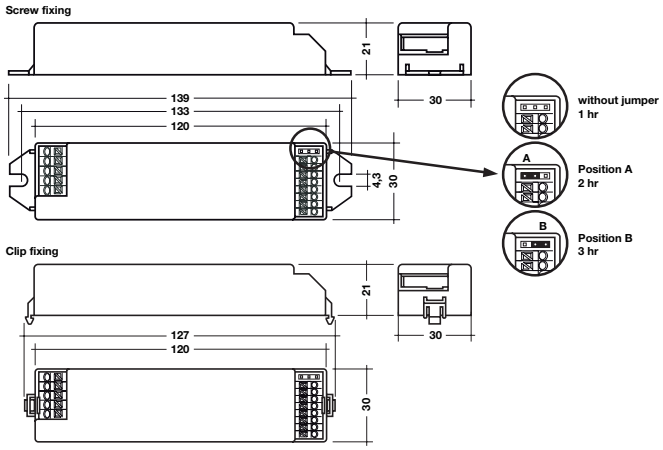
Emergency lighting modules with DALI interface
LED

EM powerLED PRO 220–240 V 50/60 Hz



Description:

Low profile LED emergency lighting modules with DALI interface and automatic testing facility to cover 1 hour, 2 hours and 3 hours duration operating from NiMh Cs batteries. Duration can be selected by means of a removable 3 way link system (jumper). For normal mains and emergency operation of 1 W and 2 W Power LEDs. The 2 W module can either drive a single LED at 600 mA or two LEDs at 350 mA in series. Both modules are able to operate multiple LED (3–12) wired in parallel for example with exit signs.

Power control technology ensures maximum emergency light output for a given duration time with a minimum battery cell count in consideration of LED tolerances. The case is available for both clip and screw fixings.

DALI interface terminals are provided to allow control and monitoring via a seperate controller.

Fitted with the unique EZ easy addressing feature which uses the LED to indicate the DALI address during commissioning.

wattage W	type	article number	number of LED	LED current in mA emergency operation	LED current in mA mains operation	number of cells / jumper 1 h / removed	2 h / position A	3 h / position B
Screw fix version								
1.2	EM powerLED 1 W PRO	89899862	1 x LED	350	350	2	3	3
2.0	EM powerLED 2 W PRO	89899863	1 x LED	600	350	3	4	5
2.4	EM powerLED 2 W PRO	89899863	2 x LED	350	350	3	4	5
Clip fix version								
1.2	EM powerLED 1 W PRO	89899869	1 x LED	350	350	2	3	3
2.0	EM powerLED 2 W PRO	89899870	1 x LED	600	350	3	4	5
2.4	EM powerLED 2 W PRO	89899870	2 x LED	350	350	3	4	5

type	article number
LED bi-colour	89899720
LED bi-colour high brightness	89899753

type	article number
test switch EM 2	89805277

Test switch

An optional test switch can be wired to the EM powerLED. This can be used to check local operation of the luminaire.

Emergency-LED

Available – for further information please contact Tridonic.

NiMh 2.0 Ah, Cs cells	type	number of cells	article number
Accu-NiMh C 2A	stick	2	89899755
Accu-NiMh C 3A	stick	3	89899744
Accu-NiMh C 4A	stick	4	89899700
Accu-NiMh C 5A	stick	5	89899703
Accu-NiMh C 5B *	side by side	5	89899704

* on request

Features:

Module

- LED emergency lighting module
- Normal and emergency operation
- DALI interface for controlled monitoring and reporting
- DALI switchable in mains operation (on/off; the switched line SL has to be on)
- Low-profile cross-section (21 x 30 mm)
- Constant current mode
- 1 W or 2 W version
- 3-hour, 2-hour or 1-hour operation
- Operating time selected by means of removable short circuit plugs (jumper)
- NiMh batteries
- Electronic multilevel charging system
- 12 hours accu recharge time
- Power output restriction
- Automatic restart after LED change within 2 s
- Bi-colour LED to indicate status
- powerLED output, battery, indicator LED and test switch output are SELV equivalent
- Reverse battery protection
- Deep discharge protection
- Short-circuit-proof
- Testing
  - – Battery condition
  - – LED condition
  - – Charge condition
- EZ easy addressing feature

Batteries

- NiMh Cs cells
- High temperature cells
- Spade terminals for easy connection

Standards

ENEC
CE
according to EN 60598-2-22
according to EN 50172

Technical data EM powerLED PRO

Rated mains supply voltage	220–240 V		
Mains frequency	50/60 Hz		
Mains input current:			
1 W unit	30 mA		
2 W unit	42 mA		
Mains power in maintained operation:			
1 W unit	4 W		
2 W unit	6 W		
Maximum LED forward voltage Vf	3.4 V		
Overvoltage protection	320 V for 1 hour		
Recharge period	12 hours		
Battery discharge current:	1 W	2 W	
	1 LED	1 LED	2 LED
1 h	790 mA	850 mA	830
mA 2 h			440 mA
610 mA 600 mA 3 h			
440 mA 480 mA 480 mA			
Charge current NiMh 2.0 Ah:			
Initial	125 mA		
Power charge	210 mA		
Trickle	50 mA		
Earth leakage current	< 0.5 mA		
Ambient temperature range	-25 °C to +50 °C		
Maximum case temperature tc	70 °C		
Mains change over voltage	in accordance with EN 60598-2-22		
Ingress protection	IP20		
Safety class	1		
Weight	73 g		

Type	Number of LED	LED current mains mode	LED current emergency mode	Nominal output power
1 W	1 x LED	350 mA	350 mA	1.2 W
2 W	1 x LED	350 mA	600 mA	2.0 W
2 W	2 x LED	350 mA	350 mA	2.4 W

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 excessively high forward voltages (Vf).

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:

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 DALI has never been used with the EM powerLED PRO or if the test interval and delay times were set by DALI in the internal memory of the module it will operate in the self testing mode and will conduct tests in accordance with the times stored in the EEPROM (factory default is a weekly function test and every 13 weeks a duration test). The EM powerLED PRO will still accept tests over the DALI bus but these will be in addition to those in self test mode. The test interval and delay times have to be set to zero so that the EM powerLED performs tests only on demand by the controller.

Addressing
The EM powerLED PRO includes the new EZ easy addressing system which allows addressing and identification by using the bi-colour LED in conjunction with the EZ PRO ADDRESS tool. Binary address codes given by the LED can be simply converted to the DALI addresses 0 to 63. For single handed addressing using this method it is necessary to send a broadcast ident command every 3 to 9 seconds. During this command the LED will be switched off and the status indication LED will flash the 6 bit binary address preceded by a 3 second start indication period.

Commissioning
After installation of the luminaire and initial connection of the mains supply and battery supply to the EM powerLED 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. If the EM powerLED PRO unit is not connected to a DALI bus or has not received a DALI command the test will default to 5 seconds duration on a weekly basis.

Duration test
Test times can be set by the DALI controller. If the EM powerLED PRO unit is not connected to a DALI bus or has not received a DALI command the test will be conducted every 13 weeks.

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.

Test switch
An optional test switch can be wired to each EM powerLED PRO. This can be used to to:

- initiate a 5 seconds function test — press 200 ms < T < 1 s
- execute function test for the time set as prolong time — > 1 second press
- adjust local timing when used in self test mode — > 10 second press

DALI Controller
DALI controllers and hardware/software solutions like the e-touchBOX are available from Tridonic. Please refer to the separate data sheet for the e-touchBOX at the Lighting controls section.

Technical data Accu-NiMh

case temperature range to ensure 4 years design life	0 °C to +45 °C
storage life in temperate conditions	4 years
battery voltage	1.2 V per cell
capacity Cs	2.0 Ah

Storage

- Batteries should be stored within the specified temperature range in low humidity conditions. Optimal storage conditions are
  – temperature: +5°C to +25°C
  – humidity: 65% ±20%
- Avoid atmosphere with corrosive gas
- It is recommended to disconnect the battery before store or delivery
- Avoid to store the batteries discharged
- A long term storage in open circuit leads to battery self discharge and deactivation of chemical components. It could be required to charge and discharge the batteries a few times to recover the initial performance.

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

Mechanical details
Case manufactured from polycarbonate.

LED bi-colour status indicator
- Green / red
- Mounting hole 6.5 mm dia
- Lead length 1000 mm

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.

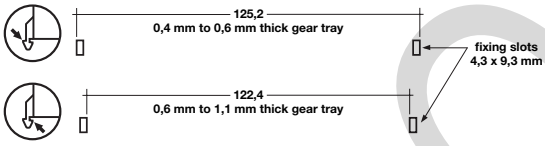
Batteries
Connection method: 4.8 x 0.5 mm spade tag welded to end of cell

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.

Recommended fixing details for clip fixing



Wiring type and cross section
The wiring can be in flexible cable or solid. Strip 8.5–9.5 mm of insulation from the cables to ensure perfect operation of the push-wire terminals.

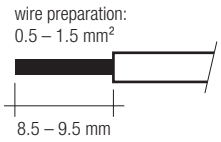
Maximum lead length

LED	3 m
status indication LED	1 m
batteries	1 m

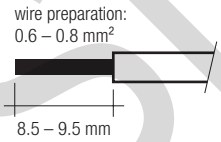
Max. lead insulation diameter

Battery	2.1 mm
Test switch	2.1 mm
Indicator LED	2.1 mm

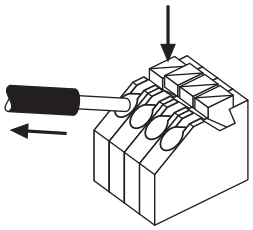
Wiring
mains (SL, N, L)
DALI (DA)
LED (LED +, LED –)



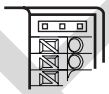
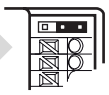
Wiring
batteries (Bat +, Bat –)
test switch (switch)
status indication LED (status K, A)



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



Link positions for duration and cell count

Duration	Link Position	1 W Power	2 W Power
1 hr	 without jumper	2 cell	3 cell
2 hr	 position A	3 cell	4 cell
3 hr	 position B	3 cell	5 cell

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.

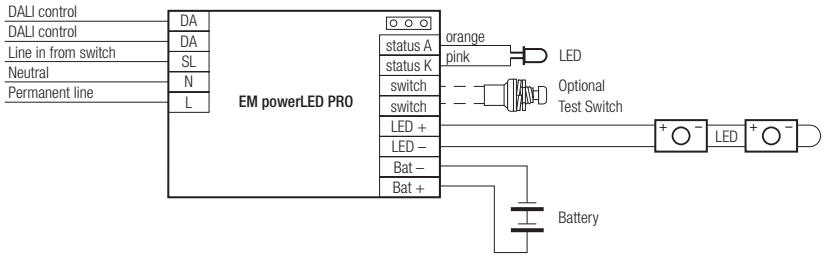
Status indication
System status is indicated by a bi-colour LED and by a DALI status flag.

LED Indication	Status	Commentary
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 ①
Slow flashing red test / (1 sec. on – 1 sec. off)	Battery failure	Battery failed the duration test or function Battery is defect / Incorrect battery voltage
Fast flashing red (0,1 sec. on – 0.1 sec. off)	Charging failure	Incorrect charging current
Double pulsing green	Blocking mode	Switching into blocking 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)

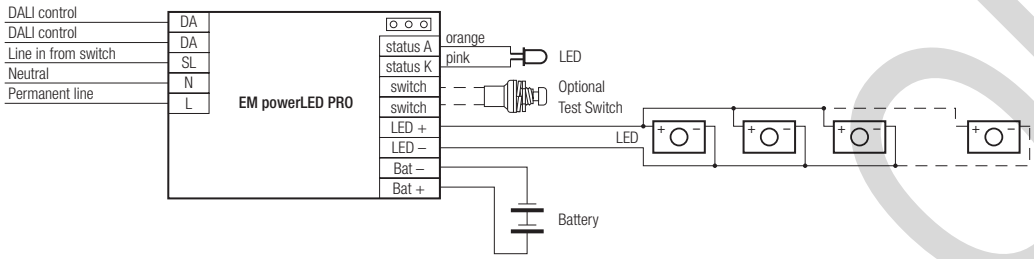
① If the EM powerLED is operated in non-maintained mode and an LED fault is detected, the red indicator LED will be illuminated and the output will be stopped. The unswitched mains supply must be switched off before the LED is changed in order that the new LED can be detected. A function or duration test will not reset the fault indication.

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 polartity 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: The Tridonic Emergency-LED is therefore fitted with a protection diode across the powerLED.

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 equivalent 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 0.8 mm cross section and a length of < 1 m
- DALI terminals are mains proof.
- Switched live and unswitched live supplies must be off the same phase.

ⓘ **For comprehensive instructions consult the Tridonic website www.tridonic.com**

Addressing Tool

An addressing tool is available to convert the LED binary identification signal to a DALI address of between 0 to 63. This simple tool is powered from a 9 V battery (not supplied).

EZ PRO ADDRESS: 89899836

Packaging

EM powerLED PRO
box of 25

Status LED
box of 25

Accu NiMh
25 pieces per box