EM ready2apply SELFTEST 2 W

EM ready2apply

Product description

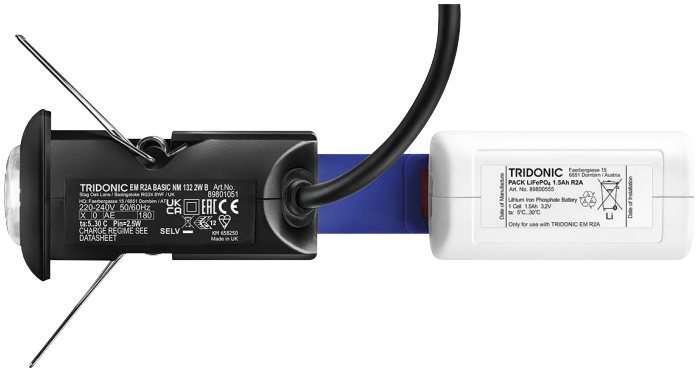
- LED emergency module suitable for direct installation in ceilings
- Complete set with integrated electronics, LED module, heat sink, optics and battery
- Includes click-in multi-lens option for anti-panic, escape route and spot illumination
- Emergency lighting with self-test function
- Small size 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)
- 5 years guarantee for LiFePO4 batteries (conditions at www.tridonic.com)

Standards, page 4

Wiring diagrams and installation examples, page 4



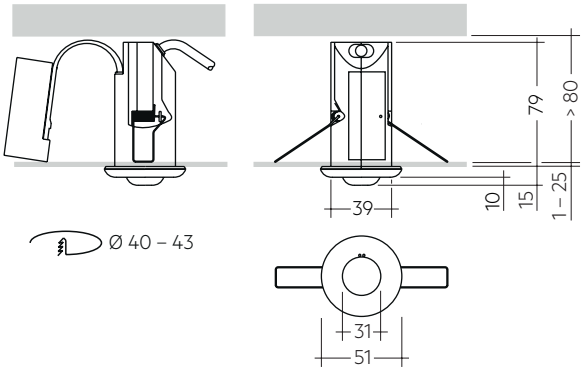
SELV RoHS

EM ready2apply SELFTEST 2 W

EM ready2apply

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[1]	IK03
Protection class	II
Colour temperature	6,500 K
Colour tolerance	Mac Adams 3
Colour rendering index CRI	> 80
Lifetime	up to 50,000 h
EoF_i	1



Ordering data

Type[2]	Article number	Colour	Operating mode	Rated duration	Number of cells	Packaging, carton	Packaging, pallet	Weight per pc.
EM R2A ST NM 111 2W	**89800538**	White	Non-maintained	1 h	1	1 pc(s).	380 pc(s).	0.19 kg
EM R2A ST NM 132 2W	**89800540**	White	Non-maintained	3 h	2	1 pc(s).	380 pc(s).	0.23 kg
EM R2A ST NM 132 2W B	**89801052**	Black	Non-maintained	3 h	2	1 pc(s).	380 pc(s).	0.23 kg

Specific technical data

Type[2]	Number of battery cells	Rated duration	Mains current (230 V, 50 Hz), maintained		Mains current (230 V, 50 Hz), non-maintained		Mains power (230 V, 50 Hz), maintained		Mains power (230 V, 50 Hz), non-maintained		Typ. λ (at 230 V, 50 Hz, charging)	Typ. output current	Typ. forward voltage	Output power
			Charging	Charger off	Charging	Charger off	Charging	Charger off	Charging	Charger off				
Normal operation														
EM R2A ST NM 111 2W	1	1 h	–	–	15 mA	10 mA	–	–	1.5 W	0.6 W	0.42c	–	–	–
EM R2A ST NM 132 2W	2	3 h	–	–	20 mA	10 mA	–	–	2.5 W	0.6 W	0.50c	–	–	–
EM R2A ST NM 132 2W B	2	3 h	–	–	20 mA	10 mA	–	–	2.5 W	0.6 W	0.50c	–	–	–
Emergency operation														
EM R2A ST NM 111 2W	1	1 h	–	–	–	–	–	–	–	–		126 mA	12 V	1.50 W
EM R2A ST NM 132 2W	2	3 h	–	–	–	–	–	–	–	–		126 mA	12 V	1.50 W
EM R2A ST NM 132 2W B	2	3 h	–	–	–	–	–	–	–	–		126 mA	12 V	1.50 W

[1] IK rating valid for lens

[2] EM = Emergency

ACCES-SORIES

Lithium Iron Phosphate Battery pack 1.5 – 3.0 Ah

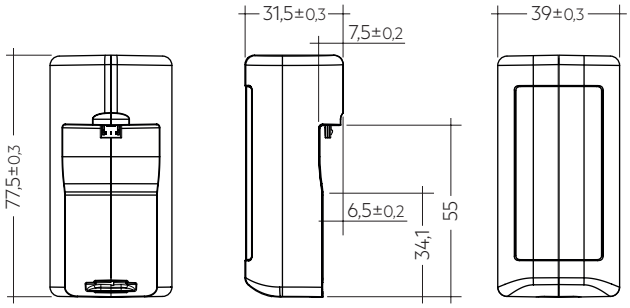
Batteries

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



Ordering data

Type	Article number	Packaging, carton	Weight per pc.
Battery pack 1.5 Ah			
PACK-LiFePO4 1,5Ah R2A	**89800555**	75 pc(s).	0.064 kg
Battery pack 3.0 Ah			
PACK-LiFePO4 3,0Ah R2A	**89800556**	75 pc(s).	0.104 kg

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.

Expected lifetime

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

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 inital luminous flux, respectivly 90 % will be above 70 % of the initial value.

Lifetime declarations are informative and represent no warranty claim.

ta temperature	L90 / B50	L80 / B50	L70 / B10
25 °C	50,000 h	–	50,000 h
30 °C	–	50,000 h	–
40 °C	–	50,000 h	–

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)

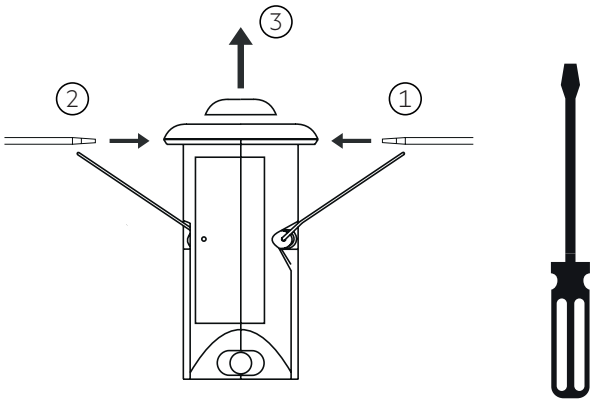
Note: The devices have to be within the specified temperature range (ta) before they are operated.

- Store batteries within the specified temperature range in low humidity conditions. Optimal storage conditions are:
  – Temperature: -20 ... +25 °C for up to 12 months
  -20 ... +35 °C for up to 6 months
  – Relative humidity: 65 % ±5 %
- Avoid atmosphere with corrosive gas
- Disconnect batteries before store or delivery
- Avoid storage of discharged batteries

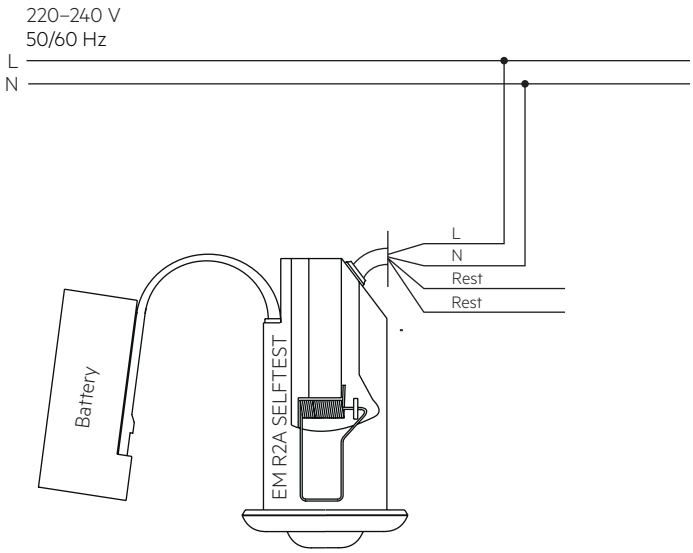
3. Installation / Wiring

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



3.2 Wiring diagrams

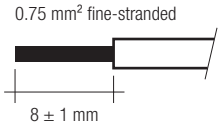


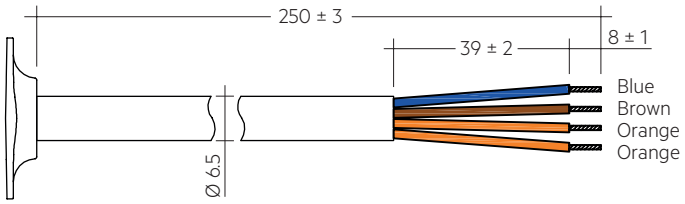
Note: Battery must be connected before mains connection.

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

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 ST	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 ST	< 75	< 62	< 33	< 19	< 18	< 13

4. Mechanical data

4.1 Housing properties

- Polycarbonate white RAL 9016
- Polycarbonate black RAL 9005

4.2 Battery connection

Battery pack end termination
Compact micro USB type B connector providing safe battery connection

Module end termination
- Battery strap with compact micro USB type B connector
- Strain relief at the module casing and locking clip for secure connection of the battery pack
- Battery strap: low smoke, halogen free

Note: Strap not suitable for connection of any other micro USB device other than the ready2apply battery pack

4.3 Fixing

Spring fixing through hole in ceiling

- Hole diameter: 40 – 43 mm
- Ceiling thickness: 1 – 25 mm
- Ceiling void height: > 80 mm

5.3 Insulation matrix

	Mains	Battery	Rest
Mains	–	• •	•
Battery	• •	–	•
Rest	•	•	–

- • Represents basic insulation
- • • Represents double or reinforced insulation

5.4 Battery charge regime / discharge

EM R2A ST 2 W, 1 / 3 h

	Type	**EM R2A ST 2 W**	**EM R2A ST 2 W**
	Article no.	**89800538**	**89800540, 89801052**
	Cells	**1 cells**	**2 cells**
	Duration	**1 h**	**3 h**
Battery charge time	Initial	20 h	
	Recharge	12 h	
	Trickle charge	continuously and battery voltage controlled	
Typ. charge current[1]	Initial charge	140 mA	290 mA
	Recharge	140 mA	290 mA
	Trickle charge	140 mA / 0 mA	290 mA / 0 mA
Mains power consumption	Initial charge	< 1.095 W	< 1.095 W
	Recharge	< 1.095 W	< 1.095 W
	Trickle charge	< 1.095 W / 0 W	< 1.095 W / 0 W
Discharge current at 3.2 V (nominal)		625 mA	625 mA

[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)

5.5 Battery selection for replacement

EM R2A ST 2 W, 1 / 3 h

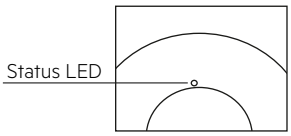
				Type	**EM R2A ST 2 W**	**EM R2A ST 2 W**
				Article no.	**89800538**	**89800540, 89801052**
				Cells	**1 cells**	**2 cells**
				Duration	**1 h**	**3 h**
Technology and capacity	Design	Number of cells	**Type**	**Article no.**	**Assignable batteries**	
Lithium Iron Phosphate 1.5 Ah	single cell	1	**PACK-LiFePO4 1,5Ah R2A**	**89800555**	•	
Lithium Iron Phosphate 3 Ah	side by side	1 + 1	**PACK-LiFePO4 3,0Ah R2A**	**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.



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	Inhibit mode	Switching into inhibit mode via controller
Green and red off	DC mode	Battery operation (emergency mode)

6.2 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
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 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 Technical data batteries

Accu Lithium Iron Phosphate

Case temperature range to ensure 8 years design life	
1.5 / 3.0 Ah, insulated ceilings	+5 °C to +35 °C
Case temperature range to ensure 6 years design life	
1.5 / 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	1.5 Ah
Capacity two cell pack	3.0 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 lux①

Height	Centre to end②		Centre to centre③	
	Trans	Axial	Trans	Axial
2.5 m	3.85 m	3.80 m	10.90 m	10.85 m
3.0 m	3.80 m	3.75 m	11.90 m	11.90 m
3.5 m	3.80 m	3.80 m	12.90 m	12.90 m
4.0 m	3.70 m	3.70 m	13.90 m	13.85 m
5.0 m	3.55 m	3.50 m	14.90 m	14.90 m
6.0 m	3.10 m	3.05 m	15.10 m	15.05 m

All values for ta = 30 °C

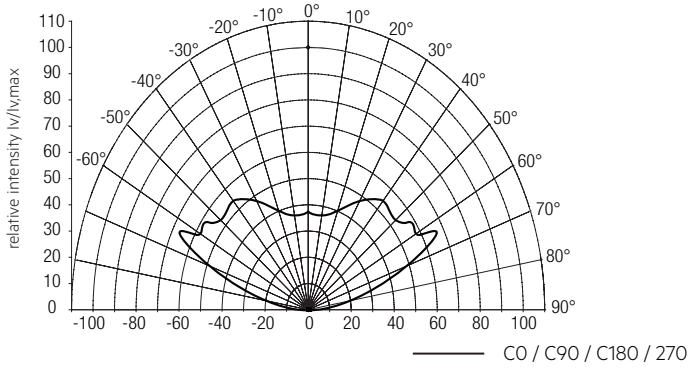
Luminous flux: 200 lm

① Maintainance factor = 0.8, photometric data available on request

② Distance between module and wall

③ Distance between two modules

Light distribution



7.2 Escape route

Max. spacing for >1.0 lux①

Height	Centre to end②		Centre to centre③	
	Trans	Axial	Trans	Axial
2.5 m	4.75 m	2.75 m	11.65 m	6.55 m
3.0 m	4.80 m	2.95 m	12.75 m	7.20 m
3.5 m	5.05 m	1.50 m	13.45 m	6.85 m
4.0 m	5.20 m	1.65 m	13.60 m	6.50 m
5.0 m	5.50 m	1.80 m	14.30 m	4.35 m
6.0 m	5.70 m	1.90 m	15.05 m	4.85 m
7.0 m	5.75 m	1.90 m	15.60 m	5.15 m
8.0 m	5.65 m	1.85 m	16.05 m	5.35 m

All values for ta = 30 °C

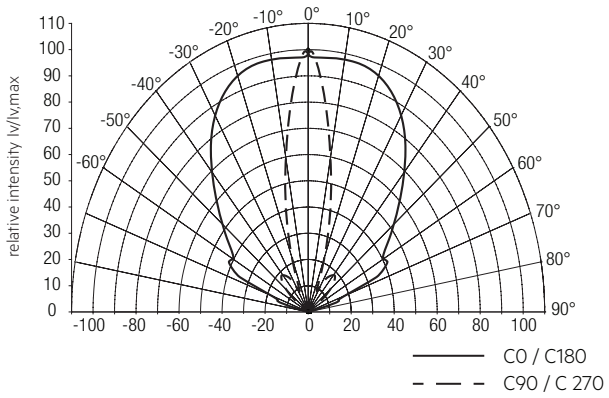
Luminous flux: 200 lm

① Maintainance factor = 0.8, photometric data available on request

② Distance between module and wall

③ Distance between two modules

Light distribution



7.3 Spot

Max. spacing for >0.5 lux / > 5 lux①

Minimum illuminance	Height	Centre to end②		Centre to centre③	
		Trans	Axial	Trans	Axial
0.5	2.5 m	1.05 m	1.90 m	8.40 m	4.30 m
	3.0 m	2.35 m	1.25 m	5.35 m	5.20 m
	3.5 m	2.80 m	1.45 m	6.25 m	6.05 m
	4.0 m	1.70 m	1.70 m	7.90 m	5.85 m
	5.0 m	2.10 m	2.05 m	8.90 m	8.40 m
	6.0 m	2.30 m	2.30 m	8.15 m	8.10 m
	7.0 m	2.50 m	2.45 m	8.00 m	8.00 m
	8.0 m	2.65 m	2.60 m	7.80 m	7.85 m
5.0	2.5 m	0.85 m	0.80 m	2.50 m	2.45 m
	3.0 m	0.90 m	0.85 m	2.55 m	2.55 m
	3.5 m	0.90 m	0.90 m	2.75 m	2.75 m
	4.0 m	0.90 m	0.95 m	2.95 m	2.95 m
	5.0 m	0.95 m	0.90 m	3.30 m	3.25 m
	6.0 m	0.95 m	0.90 m	3.50 m	3.45 m
	7.0 m	0.85 m	0.85 m	3.60 m	3.55 m
	8.0 m	0.75 m	0.75 m	3.60 m	3.60 m

All values for ta = 30 °C

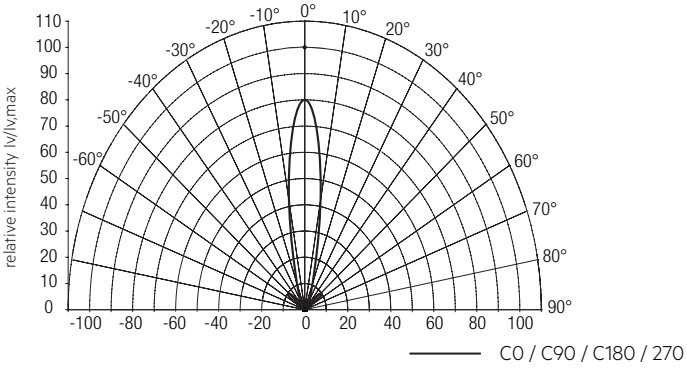
Luminous flux: 200 lm

① Maintainance factor = 0.8, photometric data available on request

② Distance between module and wall

③ Distance between two modules

Light distribution



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

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.