



EM powerLED ST FX SR 45 W

Combined emergency lighting LED Driver

Product description

- Independent dimmable LED Driver
- Emergency lighting LED Driver with automatic selftest functionality
- For self-contained emergency lighting
- For LED modules with a forward voltage of 20 – 50 V
- SELV for output voltage < 60 V DC
- Compact plastic casing (209 x 82 x 34 mm) with strain relief



Properties

- Output power 6 – 45 W
- Constant current LED operation
- 300 – 1,400 mA output current in mains operation, adjustable with I-SELECT 2 PLUG in steps of 25 mA
- Integrated emergency lighting unit
- 1, 2 or 3 h rated duration
- Operating time selectable with dip switch (2-way)
- Automatic shutdown of output if the forward voltage of the LED is out of range
- Two-colour status display LED
- Electronic multi-level charge system
- Pulse current charging for NiMH batteries
- Polarity reversal protection for battery
- Deep discharge protection
- Short-circuit-proof battery connection
- 5 years guarantee



Interfaces

- switchDIM
- Rest mode
- Terminal blocks: 45° push terminals

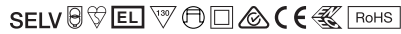
Batteries

- High-temperature cells
- NiCd or NiMH batteries
- D, Cs, LA or LAL cells
- Battery box for independent use
- 4-year design life
- 1-year guarantee
- For battery compatibility refer to chapter 8.1 „Battery selection“



Standards, page 9

Wiring diagrams and installation examples, page 10

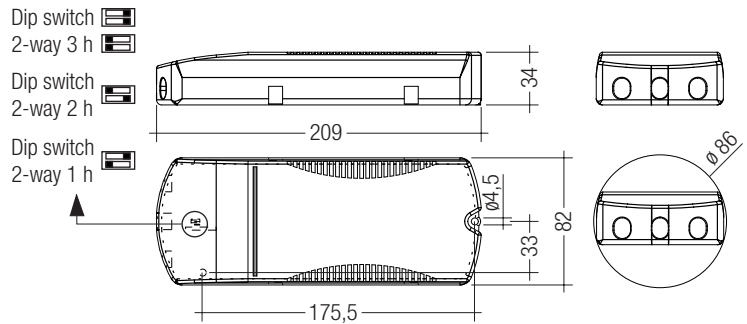


EM powerLED ST FX SR 45 W

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Technical data

Rated supply voltage	220 – 240 V
Mains frequency	50 / 60 Hz
Typ. λ (at 230 V, 50 Hz, normal operation)	0.95
Leakage current (PE)	< 0.5 mA
Overvoltage protection	320 V (for 48 h)
Max. open circuit voltage	60 V
Time to light	< 0.5 s from detection of emergency event
Output LF current ripple (< 120 Hz)	< 2 %
Output current tolerance	7 %
THD normal operation	< 10 %
Ambient temperature $t_a > 40$ W output power	-5 ... +45 °C
Ambient temperature $t_a \leq 40$ W output power	-5 ... +50 °C
Max. casing temperature t_c	75 °C
Dimensions LxBxH	209 x 82 x 34 mm
Mains voltage changeover threshold	according to EN 60598-2-22
Type of protection	IP20



Note: LED Driver supplied with duration dip switch (2-way) in 3 hours position. Duration dip switch and I-SELECT 2 PLUG must be set before battery and mains connection.

Ordering data

Type®	Article number	Rated duration	Number of cells	Packaging, carton	Packaging, pallet	Weight per pc.
EM powerLED ST FX 103 SR NiCd 45W 50V	89800432	1/2/3 h	3	10 pc(s)	400 pc(s)	0.245 kg
EM powerLED ST FX 104 SR NiCd 45W 50V	89800414	1/2/3 h	4	10 pc(s)	400 pc(s)	0.245 kg
EM powerLED ST FX 103 SR NiMH 45W 50V	89800503	1/2/3 h	3	10 pc(s)	400 pc(s)	0.245 kg
EM powerLED ST FX 104 SR NiMH 45W 50V	89800507	1/2/3 h	4	10 pc(s)	400 pc(s)	0.245 kg

Specific technical data

Type [®]	Number of battery cells	Output current	Min. output voltage	Max. output voltage	Min. output power	Max. output power	Input power (at 230 V, 50 Hz, full load), fast / trickle charge	Input current (at 230 V, 50 Hz, full load), fast / trickle charge	Efficiency (at 230 V, 50 Hz), fast / trickle charge	λ (at 230 V, 50 Hz, full load)		Ambient temperature ta ^①	tc/ta for ≥ 50.000 h ^②
										Fast charge	Trickle charge		
Normal operation													
-		300 mA	20 V	50 V	6.0 W	15.00 W	23.0 / 21.0 W	124 / 109 mA	71 / 75 %	0.81c	0.83c	-5 ... 50 °C	50 / 75 °C
-		325 mA	20 V	50 V	6.5 W	16.25 W	24.2 / 22.8 W	128 / 116 mA	72 / 73 %	0.82c	0.85c	-5 ... 50 °C	50 / 75 °C
-		350 mA	20 V	50 V	7.0 W	18.00 W	26.0 / 23.0 W	133 / 116 mA	74 / 79 %	0.84c	0.85c	-5 ... 50 °C	50 / 75 °C
-		375 mA	20 V	50 V	7.5 W	18.75 W	27.0 / 25.0 W	138 / 125 mA	74 / 77 %	0.85c	0.87c	-5 ... 50 °C	50 / 75 °C
-		400 mA	20 V	50 V	8.0 W	20.00 W	28.0 / 26.0 W	142 / 126 mA	76 / 81 %	0.86c	0.87c	-5 ... 50 °C	50 / 75 °C
-		425 mA	20 V	50 V	8.5 W	21.25 W	29.8 / 27.8 W	149 / 136 mA	75 / 78 %	0.87c	0.89c	-5 ... 50 °C	50 / 75 °C
-		450 mA	20 V	50 V	9.0 W	23.00 W	30.0 / 28.0 W	151 / 137 mA	78 / 82 %	0.87c	0.89c	-5 ... 50 °C	50 / 75 °C
-		475 mA	20 V	50 V	9.5 W	23.75 W	32.6 / 30.6 W	160 / 147 mA	77 / 79 %	0.87c	0.90c	-5 ... 50 °C	50 / 75 °C
-		500 mA	20 V	50 V	10.0 W	25.00 W	33.0 / 31.0 W	161 / 147 mA	80 / 83 %	0.89c	0.91c	-5 ... 50 °C	50 / 75 °C
-		525 mA	20 V	50 V	10.5 W	26.25 W	34.6 / 32.7 W	168 / 155 mA	80 / 82 %	0.90c	0.91c	-5 ... 50 °C	50 / 75 °C
-		550 mA	20 V	50 V	11.0 W	28.00 W	36.0 / 34.0 W	172 / 158 mA	81 / 84 %	0.90c	0.92c	-5 ... 50 °C	50 / 75 °C
-		575 mA	20 V	50 V	11.5 W	28.75 W	36.9 / 35.2 W	177 / 165 mA	82 / 83 %	0.91c	0.93c	-5 ... 50 °C	50 / 75 °C
-		600 mA	20 V	50 V	12.0 W	30.00 W	38.0 / 36.0 W	182 / 169 mA	82 / 85 %	0.92c	0.93c	-5 ... 50 °C	50 / 75 °C
-		625 mA	20 V	50 V	12.5 W	31.25 W	39.6 / 37.7 W	188 / 176 mA	82 / 84 %	0.92c	0.93c	-5 ... 50 °C	50 / 75 °C
-		650 mA	20 V	50 V	13.0 W	33.00 W	41.0 / 39.0 W	192 / 180 mA	83 / 86 %	0.92c	0.94c	-5 ... 50 °C	50 / 75 °C
-		675 mA	20 V	50 V	13.5 W	33.75 W	42.1 / 40.0 W	198 / 185 mA	83 / 86 %	0.93c	0.94c	-5 ... 50 °C	50 / 75 °C
-		700 mA	20 V	50 V	14.0 W	35.00 W	44.0 / 42.0 W	204 / 191 mA	84 / 86 %	0.93c	0.94c	-5 ... 50 °C	50 / 75 °C
-		725 mA	20 V	50 V	14.5 W	36.25 W	45.1 / 42.9 W	210 / 197 mA	83 / 86 %	0.93c	0.95	-5 ... 50 °C	50 / 75 °C
-		750 mA	20 V	50 V	15.0 W	38.00 W	46.0 / 44.0 W	215 / 203 mA	84 / 87 %	0.94c	0.95	-5 ... 50 °C	50 / 75 °C
-		775 mA	20 V	50 V	15.5 W	38.75 W	47.7 / 45.6 W	221 / 209 mA	84 / 86 %	0.94c	0.95	-5 ... 50 °C	50 / 75 °C
-		800 mA	20 V	50 V	16.0 W	40.00 W	49.0 / 47.0 W	225 / 212 mA	85 / 87 %	0.94c	0.95	-5 ... 50 °C	50 / 75 °C
-		825 mA	20 V	50 V	16.5 W	41.25 W	50.5 / 48.5 W	233 / 221 mA	84 / 86 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		850 mA	20 V	50 V	17.0 W	43.00 W	51.0 / 49.0 W	235 / 223 mA	86 / 88 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		875 mA	20 V	50 V	17.5 W	43.75 W	52.7 / 51.3 W	241 / 229 mA	86 / 86 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		900 mA	20 V	50 V	18.0 W	45.00 W	54.0 / 52.0 W	247 / 235 mA	86 / 88 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		925 mA	20 V	49 V	18.5 W	45.00 W	54.7 / 52.7 W	250 / 238 mA	85 / 86 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		950 mA	20 V	47 V	19.0 W	45.00 W	54.0 / 52.0 W	247 / 235 mA	86 / 88 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		975 mA	20 V	46 V	19.5 W	45.00 W	54.6 / 52.5 W	250 / 238 mA	85 / 87 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		1,000 mA	20 V	45 V	20.0 W	45.00 W	54.0 / 52.0 W	247 / 235 mA	86 / 88 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		1,025 mA	20 V	44 V	20.5 W	45.00 W	54.1 / 52.0 W	247 / 235 mA	86 / 88 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		1,050 mA	20 V	42 V	21.0 W	45.00 W	54.0 / 52.0 W	247 / 235 mA	86 / 88 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		1,075 mA	20 V	42 V	21.5 W	45.00 W	54.2 / 52.2 W	248 / 236 mA	86 / 87 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		1,100 mA	20 V	40 V	22.0 W	45.00 W	54.0 / 52.0 W	247 / 235 mA	87 / 88 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		1,125 mA	20 V	40 V	22.5 W	45.00 W	54.0 / 52.0 W	247 / 236 mA	86 / 88 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		1,150 mA	20 V	39 V	23.0 W	45.00 W	54.0 / 52.0 W	247 / 235 mA	87 / 88 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		1,175 mA	20 V	38 V	23.5 W	45.00 W	53.7 / 51.5 W	246 / 233 mA	86 / 89 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		1,200 mA	20 V	37 V	24.0 W	45.00 W	54.0 / 52.0 W	247 / 235 mA	87 / 88 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		1,225 mA	20 V	37 V	24.5 W	45.00 W	54.0 / 52.0 W	247 / 235 mA	86 / 88 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		1,250 mA	20 V	36 V	25.0 W	45.00 W	54.0 / 52.0 W	247 / 235 mA	87 / 88 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		1,275 mA	20 V	35 V	25.5 W	45.00 W	54.2 / 52.0 W	248 / 236 mA	86 / 88 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		1,300 mA	20 V	34 V	26.0 W	45.00 W	54.0 / 52.0 W	247 / 235 mA	87 / 88 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		1,325 mA	20 V	34 V	26.5 W	45.00 W	54.4 / 52.2 W	248 / 236 mA	85 / 87 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		1,350 mA	20 V	33 V	27.0 W	45.00 W	54.0 / 52.0 W	247 / 235 mA	87 / 88 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		1,375 mA	20 V	33 V	27.5 W	45.00 W	54.2 / 52.1 W	248 / 236 mA	86 / 87 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
-		1,400 mA	20 V	32 V	28.0 W	45.00 W	54.0 / 52.0 W	247 / 235 mA	87 / 90 %	0.95	0.96	-5 ... 50 °C	50 / 75 °C
Emergency operation													
EM powerLED ST FX 103 SR 45W 50V	3	see chapter 5.8	15 V	50 V	21 W	2.75 W	-	-	-	-	-	-	-
EM powerLED ST FX 104 SR 45W 50V	4	see chapter 5.8	15 V	50 V	2.7 W	3.50 W	-	-	-	-	-	-	-

^① Ambient temperature range ta defined in normal operation

^② EM = Emergency

RoHS

ACCES-
SORIES

Test switch EM2

Product description

- For connection to the emergency lighting LED Driver
- For checking the device function



Ordering data

Type	Article number	Packaging, bag	Packaging, carton	Weight per pc.
Test switch EM 2	89805277	25 pc(s).	600 pc(s).	0.009 kg

ACCES-
SORIES

Status indication bi-colour LED EM

Product description

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



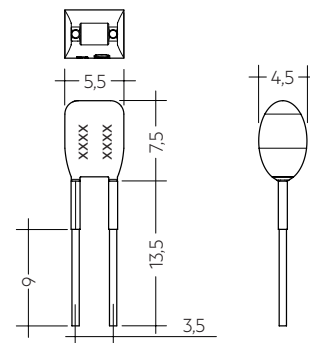
Ordering data

Type	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

I-SELECT 2 PLUG PRE / EXC

Product description

- Ready-for-use resistor to set output current value
- Compatible with LED Driver featuring I-select 2 interface; not compatible with I-select (generation 1)
- Resistor is base isolated
- Resistor power 0.25 W
- Current tolerance $\pm 2\%$ to nominal current value
- Compatible with LED Driver series PRE and EXC as well as with EM powerLED series PRO and ST



Example of calculation

- $R [k\Omega] = 5 V / I_{out} [mA] \times 1000$
- Resistor value tolerance $\leq 1\%$; resistor power $\geq 0,1 W$; base isolation necessary
- When using a resistor value beyond the specified range, the output current will automatically be set to the minimum value (resistor value too big), respectively to the maximum value (resistor value too small)

Ordering data

Type	Article number	Colour	Marking	Current	Packaging bag	Weight per pc.
I-SELECT 2 PLUG 300MA BL	28001108	Blue	0300 mA	300 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 325MA BL	28001109	Blue	0325 mA	325 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 350MA BL	28001110	Blue	0350 mA	350 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 375MA BL	28001111	Blue	0375 mA	375 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 400MA BL	28001112	Blue	0400 mA	400 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 425MA BL	28001251	Blue	0425 mA	425 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 450MA BL	28001113	Blue	0450 mA	450 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 475MA BL	28001252	Blue	0475 mA	475 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 500MA BL	28001114	Blue	0500 mA	500 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 550MA BL	28001115	Blue	0550 mA	550 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 600MA BL	28001116	Blue	0600 mA	600 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 650MA BL	28001117	Blue	0650 mA	650 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 700MA BL	28001118	Blue	0700 mA	700 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 750MA BL	28001119	Blue	0750 mA	750 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 800MA BL	28001120	Blue	0800 mA	800 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 850MA BL	28001121	Blue	0850 mA	850 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 900MA BL	28001122	Blue	0900 mA	900 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 950MA BL	28001123	Blue	0950 mA	950 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 1000MA BL	28001124	Blue	1000 mA	1,000 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 1050MA BL	28001125	Blue	1050 mA	1,050 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 1100MA BL	28001126	Blue	1100 mA	1,100 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 1150MA BL	28001127	Blue	1150 mA	1,150 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 1200MA BL	28001128	Blue	1200 mA	1,200 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 1250MA BL	28001129	Blue	1250 mA	1,250 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 1300MA BL	28001130	Blue	1300 mA	1,300 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 1350MA BL	28001131	Blue	1350 mA	1,350 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG 1400MA BL	28001132	Blue	1400 mA	1,400 mA	10 pc(s).	0.001 kg
I-SELECT 2 PLUG MAX BL	28001099	Blue	MAX	MAX	10 pc(s).	0.001 kg

RoHS

ACCES-
SORIES**NiCd Battery pack 1.8 – 4.5 Ah**

Batteries

Product description

- High-temperature NiCd battery pack for use with emergency lighting units
- 4-year design life
- 1-year guarantee

Properties

- Constant high-temperature operation – depending on the emergency lighting unit used (refer to respective emergency control gear datasheet)
- Good charging properties at high temperature
- High energy maintenance of the charged battery
- Certified quality manufacturer
- Casing material made of polycarbonate
- 0.2 m double-insulated cable with plug connection
- 0.8 m double-insulated cable with plug and pre-stripped ends for connection with the emergency unit
- 1.0 mm² solid wire, pre-stripped
- Suitable for emergency lighting equipment as per IEC 60598-2-22

**Ordering data**

Type	Article number	Packaging, carton	Weight per pc.
Battery pack 1.8 Ah with plug			
Pack-NiCd 3C CON	28001221	5 pc(s).	0.270 kg
Pack-NiCd 4C CON	28001222	5 pc(s).	0.320 kg
Battery pack 4.5 Ah with plug			
Pack-NiCd 3D CON	89800389	5 pc(s).	0.534 kg
Pack-NiCd 4D CON	89800390	5 pc(s).	0.661 kg

NiMH Battery pack 2.2 – 4.0 Ah

Batteries

Product description

- High-temperature NiMH battery pack for use with emergency lighting units
- 4-year design life
- 1-year guarantee

Properties

- Constant high-temperature operation
- Temperature depending on the used emergency lighting unit (refer to respective emergency control gear datasheet)
- Good charging properties at high temperature
- High energy maintenance of the charged battery
- Certified quality manufacturer
- Casing material made of polycarbonate
- 1.0 mm² stranded wire
- Suitable for emergency lighting equipment as per IEC 60598-2-22



Fig. 1



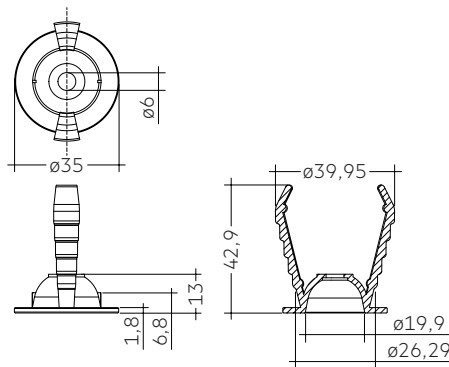
Fig. 2

Ordering data

Type	Article number	Packaging, carton	Packaging, outer box	Weight per pc.
Battery pack 2.2 Ah				
Pack-NiMH 2.2Ah 3 CON	28001898	5 pc(s).	25 pc(s).	0.32 kg
Pack-NiMH 2.2Ah 4 CON	28001899	5 pc(s).	25 pc(s).	0.36 kg
Battery pack 4.0 Ah				
Pack-NiMH 4Ah 3 CON	28001896	5 pc(s).	25 pc(s).	0.40 kg
Pack-NiMH 4Ah 4 CON	28001897	5 pc(s).	25 pc(s).	0.48 kg

Product description

- Holder for indicator LED in emergency operation
- Glow-wire test with a temperature of 850 °C passed



Ordering data

Type	Article number	Colour	Packaging carton	Weight per pc.
ACD EM LED INDICATOR HOLDER	28002189	White	10 pc(s).	0.010 kg

1. Standards

EN 55015
 EN 60068-2-64
 EN 60068-2-29
 EN 60068-2-30
 EN 61000-3-2
 EN 61000-3-3
 EN 61347-1
 EN 61347-2-7
 EN 61347-2-13
 EN 61547
 EN 62034
 EN 62384
 according to EN 60598-2-22
 according to EN 50172

1.1 Glow-wire test

according to EN 60598-1 with increased temperature of 850 °C passed.

1.2 Isolation and electric strength testing of luminaires

Electronic LED Driver 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 V_{DC} 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 MΩ.

As an alternative, IEC 60598-1 Annex Q describes a test of the electrical strength with 1,500 V_{AC} (or 1,414 x 1,500 V_{DC}). To avoid damage to the electronic devices this test **must not be conducted**.

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 *t_a* for the EM powerLED ST FX SR 45W is defined to meet this requirement.

2.2 Expected 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.

Expected life-time

Type	Output power	<i>t_a</i>	40 °C	50 °C
EM powerLED ST FX 103 / 104 SR 45W 50V	10 W	<i>t_c</i>	56 °C	66 °C
		life-time	> 100,000 h	> 100,000 h
	20 W	<i>t_c</i>	59 °C	69 °C
		life-time	> 100,000 h	> 100,000
	30 W	<i>t_c</i>	63 °C	73 °C
		life-time	> 100,000 h	> 100,000 h
	40 W	<i>t_c</i>	65 °C	75 °C
		life-time	> 100,000 h	80,000 h
	45 W	<i>t_c</i>	70 °C	x
		life-time	80,000 h	x

x = not permitted

2.3 Storage conditions

Humidity: 5 % up to max. 85 %,
 not condensed
 (max. 56 days/year at 85 %)

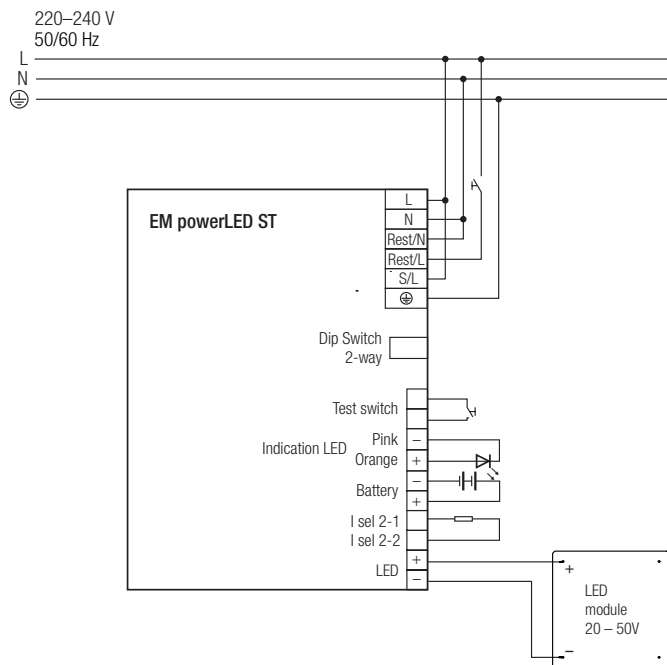
Storage temperature: -40 °C up to max. +80 °C

The devices have to be within the specified temperature range (*t_a*) before they are operated.

3. Installation / Wiring

3.1 Wiring diagrams

switchDIM

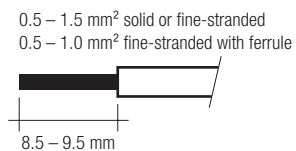


In switchDIM operation the emergency unit will work as SELFTTEST unit. All functions and duration tests will perform automatically. The randomized testing is not active. For details refer to chapter 7.9 Testing, DALI Control.

3.2 Wiring type and cross-section

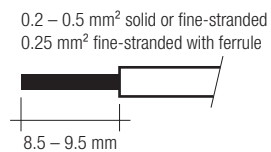
Wiring

Mains (N, L, Earth, S/L)
Rest (Rest/N, Rest/L)
LED (LED +, LED -)
Batteries (Bat +, Bat -)
I sel 2



Wiring

Test switch
Indication LED



Use one wire for each terminal connector only.
Use each strain relief channel for one cable only.



max. $\varnothing = 10$ mm
min. $\varnothing = 6,3$ mm

Max. lead insulation diameter

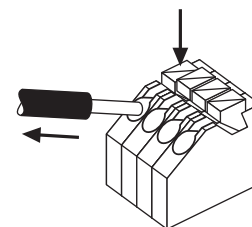
Battery	2.1mm
Test switch	2.1mm
Indicator LED	2.1mm

Maximum lead length

LED	3 m
status indication LED	1 m
batteries	1.3 m

3.3 Release of the wiring

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

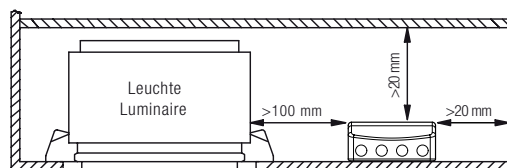


Installation instruction

Max. torque for the mounting screws: 0.5 Nm / M4.

3.4 Fixing conditions

Dry, acidfree, oilfree, fatfree. It is not allowed to exceed the maximum ambient temperature (t_a) stated on the device. Minimum distances stated below are recommendations and depend on the actual luminaire. Is not suitable for fixing in corner.



3.5 Wiring guidelines

- The cables should be run separately from the mains connections and mains cables to ensure good EMC conditions.
- The LED wiring should be kept as short as possible to ensure good EMC. The max. secondary cable length is 2 m (4 m circuit), this applies for LED output as well as for I-select 2.
- Secondary switching is not permitted.
- The LED Driver has no inverse-polarity protection on the secondary side. Wrong polarity can damage LED modules with no inverse-polarity protection.
- Wrong wiring of the LED Driver can lead to malfunction or irreparable damage.
- 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 1.3 m.
- If the optional mains switch is not used, connect S/L to L.
- 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.

Within the luminaire the switched and unswitched 50Hz supply wiring must be routed as short as possible and be kept as far away as possible from the LED leads. Through wiring may affect the emc performance of the luminaire.

The length of LED leads must not be exceeded.

The output current depends on the forward voltage and the tolerance of the LED modules.

The mains power must be removed before changing the LED load.

3.6 Hot plug-in

Hot plug-in is not supported due to residual output voltage of > 0 V. If a LED load is connected the device has to be restarted before the output will be activated again. This can be done via mains reset or via interface (DALI, DSI, switchDIM).

3.7 Earth connection

The earth connection is conducted as protection earth (PE). The LED Driver can be earthed via earth terminal. If the LED Driver will be earthed, protection earth (PE) has to be used. There is no earth connection required for the functionality of the LED Driver. Earth connection is recommended to improve following behaviour:

- Electromagnetic interferences (EMI)
- LED glowing at standby
- Transmission of mains transients to the LED output

In general it is recommended to earth the LED Driver if the LED module is mounted on earthed luminaire parts respectively heat sinks and thereby representing a high capacity against earth.

3.8 External I-select 2 resistors on LED modules

LED modules with on-board I-select 2 resistors may cause irreparable damages, caused by surge / burst peaks.

4. Mechanical data

4.1 Mechanical data accessories

LED status indicator

- Bi-colour
- Mounting hole 6.5 mm dia
- Lead length 1.0 m
- Insulation rating: 90 °C

Test switch

- Mounting hole 7.0 mm dia
- Lead length 0.55 m

Battery leads

- Quantity: 1 red and 1 black
- Length: 1.3 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

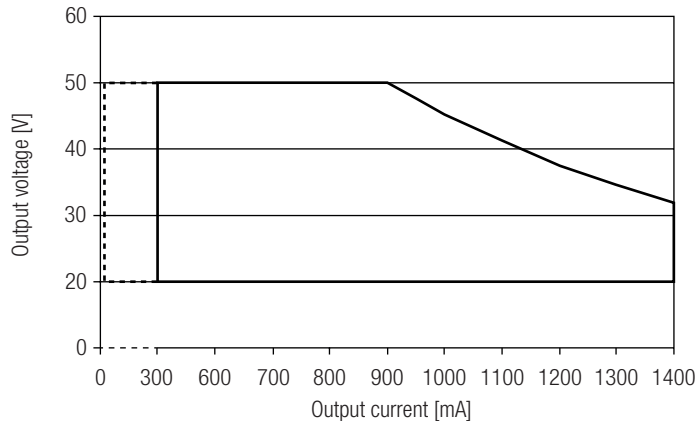
Module end termination

8.0 mm stripped insulation

Two-piece batteries are supplied with a 200 mm lead with 4.8 mm receptacle at each end and insulating covers to connect the separate sticks together.

5. Electrical data

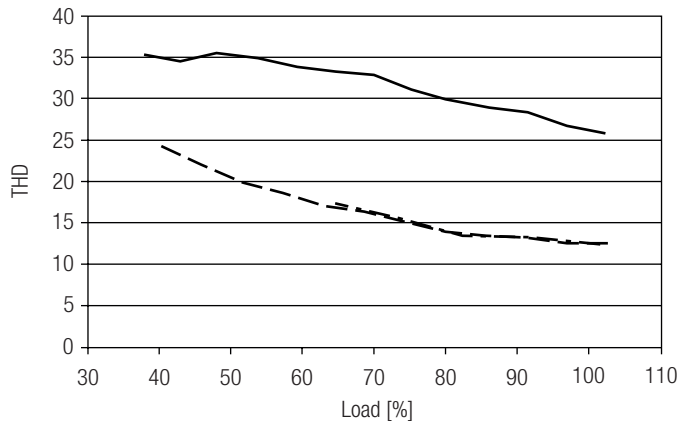
5.1 Operating window



— Operating window 100 %
 - - - - - Operating window dimmed

Make sure that the LED Driver is operated within the given window under all operating conditions, also in dimming operation. Otherwise certain limitations may occur. This is due to the nature of amplitude modulation dimming. The stated minimum output voltage shall not be undercut as this may cause the device to shut-down.

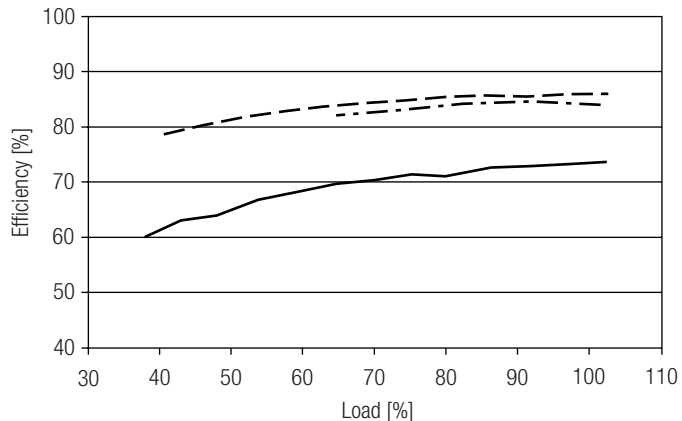
5.4 THD vs load



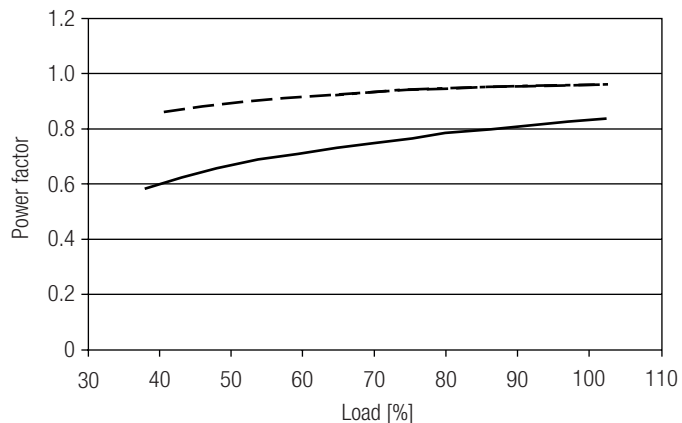
— 300 mA
 - - - 900 mA
 - . - . 1400 mA

100 % load corresponds to the max. output power (full load) according to the table on page 2.

5.2 Efficiency vs load



5.3 Power factor vs load



5.5 Maximum loading of automatic circuit breakers

Automatic circuit breaker type	C10	C13	C16	C20	B10	B13	B16	B20	Inrush current	
Installation Ø	1.5 mm ²	1.5 mm ²	2.5 mm ²	4 mm ²	1.5 mm ²	1.5 mm ²	2.5 mm ²	4 mm ²	I _{max}	time
EM powerLED ST FX SR	18	26	30	36	9	13	15	18	23.9 A	187 µs

5.6 Harmonic distortion in the mains supply (at 230 V / 50 Hz and full load) in %

	THD	3.	5.	7.	9.	11.
EM powerLED ST FX SR	< 10	< 9	< 3	< 3	< 2	< 1

5.7 Dimming

Dimming range 1% to 100 %

Dimming curve is adapted to the eye sensitiveness.

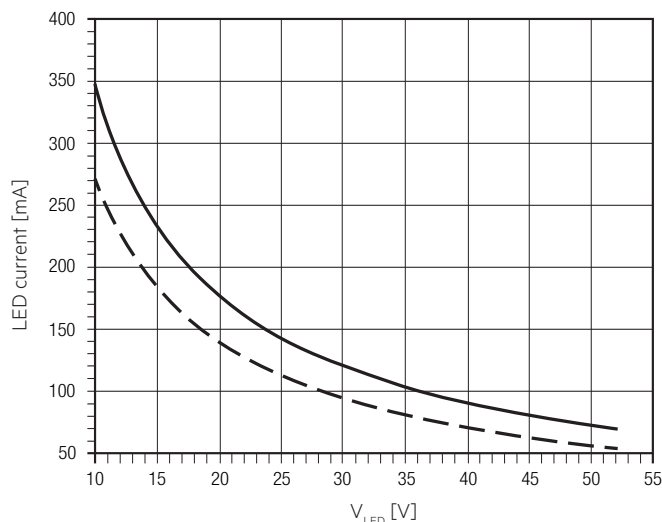
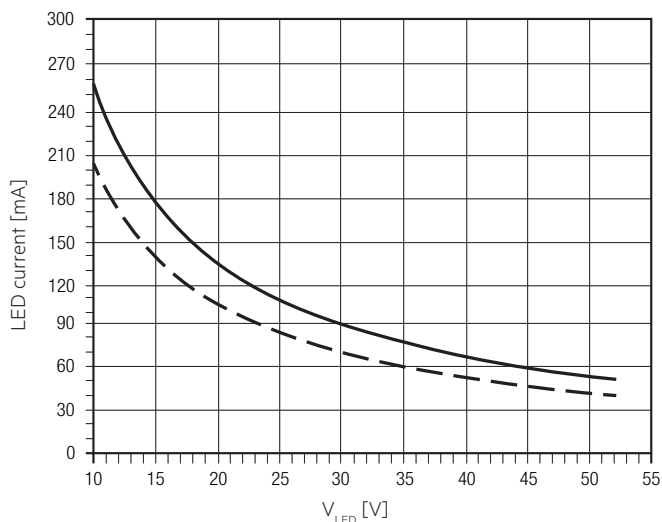
Dimming is realized by amplitude dimming.

5.8 Typ. LED current/voltage characteristics

The LED current in emergency mode is automatically adjusted by the EM powerLED module based on the total forward voltage of the LED modules connected and the associated battery.

EM powerLED ST FX 103 SR 45W 50V – 3 cells
 Article number: 89800432 / 89800503
 3.6 V battery voltage
 750 – 960 mA battery discharge current (tolerance)

EM powerLED ST FX 104 SR 45W 50V – 4 cells
 Article number: 89800414 / 89800507
 4.8 V battery voltage
 750 – 960 mA battery discharge current (tolerance)



--- LED current at nominal battery voltage and min. battery discharge current
 — LED current at nominal battery voltage and max. battery discharge current

LED peak current at start in emergency mode – 3 cells

Voltage	Inrush current	Duration
19.8 V	329 mA	12.9 ms
22.6 V	297 mA	12.0 ms
25.3 V	265 mA	11.5 ms
28.0 V	244 mA	10.8 ms
30.7 V	234 mA	10.3 ms
33.4 V	216 mA	10.1 ms
36.1 V	202 mA	9.8 ms
38.8 V	192 mA	9.7 ms
41.5 V	183 mA	9.1 ms
44.2 V	174 mA	8.8 ms
47.0 V	168 mA	8.1 ms
49.7 V	161 mA	6.9 ms

LED peak current at start in emergency mode – 4 cells

Voltage	Inrush current	Duration
19.8 V	395 mA	16.5 ms
22.6 V	360 mA	15.3 ms
25.3 V	338 mA	14.5 ms
28.0 V	308 mA	14.0 ms
30.7 V	293 mA	13.8 ms
33.4 V	270 mA	12.7 ms
36.1 V	263 mA	12.1 ms
38.8 V	248 mA	11.7 ms
41.5 V	242 mA	9.8 ms
44.2 V	225 mA	8.9 ms
47.0 V	218 mA	7.8 ms
49.7 V	211 mA	7.5 ms

Note: LED peak current is measured at the max. battery discharge current.

6. Interfaces / communication

6.1 Control input (Rest/N, Rest/L)

A standard switch (switchDIM) or a rest mode controller can be wired on the terminals Rest/N and Rest/L.

The control signal is not SELV. Install control cables in accordance to the requirements of low voltage installations. Different functions depending on each module.

6.2 switchDIM

Integrated switchDIM function allows a direct connection of a pushbutton for dimming and switching.

Brief push (< 0.6 s) switches LED Driver ON and OFF. The dimm level is saved at power-down and restored at power-up.

When the pushbutton is held, LED modules are dimmed. After repush the LED modules are dimmed in the opposite direction.

In installations with LED Drivers with different dimming levels or opposite dimming directions (e.g. after a system extension), all LED Drivers can be synchronized to 50 % dimming level by a 10 s push.

Use of pushbutton with indicator lamp is not permitted.

7. Functions

7.1 Output current setting

Output current can be set by connecting a resistor between the 2 "I sel 2" terminals. Relationship between output current and resistor value can be found at the table "Specific technical data". Resistor values specified from standardised resistor value ranges.

Resistor value tolerance has to be $\leq 1\%$.

Resistor power has to be ≥ 0.1 W.

Resistor detection at each start.

Change of the resistor value during the operation will be not considered.

Resistors for the main output current values can be ordered from Tridonic (see accessories).

7.2 Overload protection

LED Driver will switch off at overload operation. Mains reset (switched life) is required to restart the LED Driver.

7.3 Underload operation

LED Driver will switch off at underload operation. Mains reset (switched life) is required to restart the LED Driver.

7.4 Short-circuit behaviour

In case of a short circuit the unit switches to shut down mode. After elimination of the short circuit a mains reset (SL off/on) is necessary.

7.5 Forward voltage out of range

If the forward voltage is out of range the unit switches to shut down mode. After elimination of the short circuit a mains reset (SL off/on) is necessary.

7.6 No-load operation or load loss during operation

LED Driver will detect a load loss during operation. In this case and no-load operation the max. output voltage can apply at the LED output for max. 5 s before LED Driver shuts down. Mains reset (switched life) is required to restart the LED Driver.

7.7 Function: adjustable current

The output current of the LED Driver can be adjusted in a certain range. For adjustment there are three options available.

I-select 2:

By inserting a suitable resistor into the I-select 2 interface, the current value can be adjusted. The relationship between output current and resistor value can be found in the chapter "Accessories I-SELECT 2 Plugs".

If the resistor is connected by wires a consistent base isolation must be ensured. Furthermore, a max. wire length of 2 m may not be exceeded and potential interferences have to be avoided.



Please note that the resistor values for I-select 2 are not compatible with I-select (generation 1). Installation of an incorrect resistor may cause irreparable damage to the LED module(s).

Resistors for the main output current values can be ordered from Tridonic (see accessories).

The priority for current adjustment methods is the use of I-select 2.

7.8 Status indication

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

LED indication	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
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
Binary transmission of address via green/red LED	Address identification	During address identification mode
Green and red off	DC mode	Battery operation (emergency mode)

7.9 Testing:

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 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.

For a full description of commissioning and test features please refer to application notes.

Test switch

An optional test switch can be wired to each EM converterLED 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: press > 1 s
- reset selftest timer (adjust local timing): press > 10 s

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.

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.

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

8. Battery data

8.1 Battery selection

EM powerLED ST FX 45 W 50 V, 1 / 3 h

		Type	EM powerLED ST FX 103 SR NiCd 45W 50V	EM powerLED ST FX 103 SR NiMH 45W 50V	EM powerLED ST FX 104 SR NiCd 45W 50V	EM powerLED ST FX 104 SR NiMH 45W 50V		
		Article no.	89800432	89800503	89800414	89800507		
		Cells	3 cells		4 cells			
		Duration	1 h	2 / 3 h	1 h	2 / 3 h	1 h	2 / 3 h
Technology and capacity	Design	Number of cells	Type	Article no.	Assignable batteries			
NiCd 1.6 Ah Cs cells	stick	1 x 3	Accu-NiCd C 3A	89899743	•			
	stick	1 x 4	Accu-NiCd C 4A	89899692			•	
	stick + stick	2 + 2	Accu-NiCd C 4C	89899694			•	
NiCd 4 Ah D cells	stick	1 x 3	Accu-NiCd 3A	89895960		•		
	stick	1 x 4	Accu-NiCd 4A 55	89800089			•	
	stick + stick	2 + 2	Accu-NiCd 4C	89895978			•	
	side by side	3 x 1	Accu-NiCd 3B 55	89800384		•		
NiCd 1.8 Ah Cs cells	remote box	1 x 3	Pack-NiCd 3C CON	28001221	•			
	remote box	1 x 4	Pack-NiCd 4C CON	28001222			•	
NiCd 4.5 Ah D cells	remote box	1 x 3	Pack-NiCd 3D CON	89800389		•		
	remote box	1 x 4	Pack-NiCd 4D CON	89800390			•	
NiMH 2.2 Ah Cs cells	stick	1 x 3	Accu-NiMH 3A	28002088		•		
	stick	1 x 4	Accu-NiMH 4A	28002089				•
NiMH 4 Ah LA cells	stick	1 x 3	Accu-NiMH 4Ah 3A CON	89800441		•		
	stick	1 x 4	Accu-NiMH 4Ah 4A CON	89800442				•
	stick + stick	2 + 2	Accu-NiMH 4Ah 4C CON	89800438				•
NiMH 2.2 Ah Cs cells	remote box	1 x 3	Pack-NiMH 2.2Ah 3 CON	28001898		•		
	remote box	1 x 4	Pack-NiMH 2.2Ah 4 CON	28001899				•
NiMH 4 Ah LAL cells	remote box	1 x 3	Pack-NiMH 4Ah 3 CON	28001896		•		
	remote box	1 x 4	Pack-NiMH 4Ah 4 CON	28001897				•

8.2 Battery charge / discharge

EM powerLED ST FX 45 W 50 V, 1 / 2 / 3 h

	Type	EM powerLED ST FX 103 SR NiCd 45W 50V		EM powerLED ST FX 103 SR NiMH 45W 50V		EM powerLED ST FX 104 SR NiCd 45W 50V		EM powerLED ST FX 104 SR NiMH 45W 50V	
		89800432		89800503		89800414		89800507	
	Article no.	3 cells				4 cells			
	Cells	3 cells				4 cells			
	Duration	1 h	2 / 3 h	1 h	2 / 3 h	1 h	2 / 3 h	1 h	2 / 3 h
Battery charge time	Initial charge	20 h							
	Fast recharge	10 h	15 h	10 h	15 h	10 h	15 h	10 h	15 h
	Trickle charge	continuously							
Charge current	Initial charge	130 mA	300 mA	130 mA	300 mA	130 mA	300 mA	130 mA	300 mA
	Fast recharge	210 mA	330 mA	210 mA	330 mA	210 mA	330 mA	210 mA	330 mA
	Trickle charge	50 mA	130 mA	127 mA / 4 min. 0 mA / 16 min.	200 mA / 4 min. 0 mA / 16 min.	50 mA	130 mA	127 mA / 4 min. 0 mA / 16 min.	200 mA / 4 min. 0 mA / 16 min.
Power consumption	Initial charge	2.2 W	3.7 W	2.2 W	3.7 W	2.5 W	4.4 W	2.5 W	4.4 W
	Fast recharge	2.9 W	4.0 W	2.9 W	4.1 W	3.4 W	4.8 W	3.3 W	4.8 W
	Trickle charge	1.6 W	2.2 W	1.6 / 2.2 W	1.6 / 2.8 W	1.7 W	2.5 W	1.6 / 2.5 W	1.6 / 3.3 W
	Discharge current	850 – 960 mA	850 – 960 mA	850 – 960 mA	850 – 960 mA	850 – 960 mA	850 – 960 mA	850 – 960 mA	850 – 960 mA

8.3 Accu-NiCd**1.6 Ah**

Battery voltage/cell	1.2 V
Cell type	Cs
Case temperature range to ensure 4 years design life	+5 °C to +50 °C
Max. short term temperature (reduced life-time)	70 °C
Max. number discharge cycles	4 cycles per year plus 4 cycles during commissioning
Max. storage time	6 months

4.2 / 4.5 Ah

Battery voltage/cell	1.2 V
Cell type	D
Case temperature range to ensure 4 years design life	+5 °C to +55 °C
Max. short term temperature (reduced life-time)	70 °C
Max. number discharge cycles	4 cycles per year plus 4 cycles during commissioning
Max. storage time	6 months

8.4 Accu-NiMh**2.2 Ah**

Battery voltage/cell	1.2 V
Cell type	Cs
Case temperature range to ensure 4 years design life	+5 °C to +50 °C
Max. short term temperature (reduced life-time)	70 °C
Max. number discharge cycles	4 cycles per year plus 30 cycles during commissioning
Max. storage time	6 months

4.0 Ah

Battery voltage/cell	1.2 V
Cell type	LA
Case temperature range to ensure 4 years design life	+5 °C to +45 °C
Max. short term temperature (reduced life-time)	70 °C
Max. number discharge cycles	4 cycles per year plus 30 cycles during commissioning
Max. storage time	6 months

8.5 Accupack-NiCd**1.8 Ah**

Battery voltage/cell	1.2 V
Cell type	Cs
Ambient temperature range to ensure 4 years design life	+5 °C to +40 °C
tc point	+45 °C
Max. short term temperature (reduced life-time)	70 °C
Max. number discharge cycles	4 cycles per year plus 4 cycles during commissioning
Max. storage time	6 months

4.5 Ah

Battery voltage/cell	1.2 V
Cell type	D
Ambient temperature range to ensure 4 years design life	+5 °C to +40 °C
tc point	+45 °C
Max. short term temperature (reduced life-time)	70 °C
Max. number discharge cycles	4 cycles per year plus 4 cycles during commissioning
Max. storage time	6 months

8.6 Accupack-NiMH**2.2 Ah**

Battery voltage/cell	1.2 V
Cell type	Cs
Ambient temperature range to ensure 4 years design life	+5 °C to +35 °C
tc point	+40 °C
Max. short term temperature (reduced life-time)	70 °C
Max. number discharge cycles	4 cycles per year plus 4 cycles during commissioning
Max. storage time	6 months

4.0 Ah

Battery voltage/cell	1.2 V
Cell type	LAL
Ambient temperature range to ensure 4 years design life	+5 °C to +35 °C
tc point	+40 °C
Max. short term temperature (reduced life-time)	70 °C
Max. number discharge cycles	4 cycles per year plus 4 cycles during commissioning
Max. storage time	6 months

8.7 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 further information refer to corresponding battery datasheet.

8.8 Storage, installation and commissioning

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

9. Miscellaneous**9.1 Additional information**

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

Guarantee conditions at www.tridonic.com → Services

Life-time declarations are informative and represent no warranty claim. No warranty if device was opened.