Product description
• Emergency lighting LED Driver with self-test function
• Only for US applications
• Battery pack enclosed
• For self-contained emergency lighting
• For LED modules with a forward voltage up to 57 V
• Class 2
• UL certified
• 5 years guarantee

Properties
• Non maintained operation
• Self-test
• 90 minutes rated duration
• Compatible with most constant current LED Drivers (see 5.2)
• 3-pole technology 2-pole LED module changeover and delayed power switching for the LED Driver
• Automatic shutdown of output if LED load is out of range
• Constant power output
• Combined status display LED and test switch included
• Electronic charge system
• Deep discharge protection
• Short-circuit-proof battery connection
• Polarity reversal protection for battery
  Self-test:
  • Status of the battery
  • Status of the LED
  • Function test
  • Duration test

Batteries
• High-temperature cells
• NiMH batteries
• 5 years guarantee for NiMH batteries

Standards, page 3
Wiring diagrams and installation examples, page 3
Technical data
Rated supply voltage 120 – 277 V
Mains frequency 50 / 60 Hz
Typ. λ 0.5C
Output current see chapter 5.1
Starting time < 0.25 s from detection of emergency event
Overvoltage protection 305 V
U-OUT (including open-/ short-circuit and double load) 60 V
Max. open circuit voltage 60 V
Ambient temperature range 0 ... +50 °C
Max. casing temperature tc 70 °C
Mains voltage changeover threshold emergency mode 30 V
Mains voltage changeover threshold mains mode 70 V
Type of protection IP20
Functional test Monthly 30 s test
Duration test Yearly 90 minutes test

Ordering data
<table>
<thead>
<tr>
<th>Type</th>
<th>Article number</th>
<th>Rated duration</th>
<th>Packaging, carton</th>
<th>Packaging, pallet</th>
<th>Weight per pc</th>
<th>Hole spacing D</th>
<th>Dimensions LxWxH</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM converterPACK ST 1-9-5 60V UNV COND</td>
<td>28002865</td>
<td>1.5 h</td>
<td>16 pc(s)</td>
<td>480 pc(s)</td>
<td>0.90 kg</td>
<td>252 mm</td>
<td>260 x 65 x 22 mm</td>
</tr>
<tr>
<td>EM converterPACK ST 1-9-9 60V UNV COND</td>
<td>28002868</td>
<td>1.5 h</td>
<td>10 pc(s)</td>
<td>400 pc(s)</td>
<td>1.05 kg</td>
<td>299 mm</td>
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<tr>
<td>EM converterPACK ST 1-9-15 60V UNV COND</td>
<td>28002871</td>
<td>1.5 h</td>
<td>10 pc(s)</td>
<td>400 pc(s)</td>
<td>1.35 kg</td>
<td>364 mm</td>
<td>372 x 65 x 22 mm</td>
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Specific technical data
<table>
<thead>
<tr>
<th>Type</th>
<th>Mains voltage</th>
<th>LED module forward voltage range</th>
<th>Typ. output power P emergency</th>
<th>Mains current in charging operation</th>
<th>Rated power in charging operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM converterPACK ST 1-9-5 60V UNV COND</td>
<td>120 V</td>
<td>13 – 57 V</td>
<td>5 W</td>
<td>40 mA</td>
<td>21 W</td>
</tr>
<tr>
<td>EM converterPACK ST 1-9-9 60V UNV COND</td>
<td>120 V</td>
<td>14 – 57 V</td>
<td>9 W</td>
<td>51 mA</td>
<td>29 W</td>
</tr>
<tr>
<td>EM converterPACK ST 1-9-15 60V UNV COND</td>
<td>120 V</td>
<td>15 – 57 V</td>
<td>15 W</td>
<td>62 mA</td>
<td>39 W</td>
</tr>
</tbody>
</table>

EM = Emergency
1. Standards

UL 924  
FCC Part 15, Class A  
ICES-005

Product not designed for European Economic Area.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:  
(1) this device may not cause harmful interference, and  
(2) this device must accept any interference received, including interference that may cause undesired operation.

2. Thermal details and lifetime

2.1 Lifetime

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.

<table>
<thead>
<tr>
<th>Expected lifetime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>EM converterPACK ST 1-9-x 60V UNV COND</td>
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<table>
<thead>
<tr>
<th></th>
<th>lifetime</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM converterPACK ST</td>
<td>65,000 h</td>
</tr>
<tr>
<td></td>
<td>55,000 h</td>
</tr>
<tr>
<td></td>
<td>50,000 h</td>
</tr>
<tr>
<td></td>
<td>45,000 h</td>
</tr>
</tbody>
</table>

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

The relation of tc to ta temperature depends also on the luminaire design. If the measured tc temperature is approx. 5 K below tc max., ta temperature should be checked and eventually critical components (e.g. ELCAP) measured. Detailed information on request.

3. Installation / Wiring

3.1 Wiring diagram

One or more LED modules with a total forward voltage in the forward voltage range of the EM converterPACK can be connected. These LED module(s), marked with “Emergency” are operated in emergency mode from the associated battery. In normal mains mode all LED modules are operated by the mains LED Driver.

EM converterPACK SELFTEST with one LED module for mains and emergency operation

- Green/Yellow(GND)
- Black(L)
- White(N)
- Black
- Black/Orange
- Yellow(+)  
- Yellow/Black(–)
- Yellow/Black

LED Test Switch

- Red/Black(+)
- Blue/Black(–)
- Red(+)
- Blue(–)

LED Module

Emergency Lighting Equipment

- Output Red(+)
- Red/Black(+)

LED Driver

- From LED Driver

Switched Line in

Switched Line out

LED Test Switch

SELV

- Yellow

Data sheet 11/21-EM104-7
Subject to change without notice. Information provided without guarantee. www.tridonic.com
3.2 Wiring type and cross section

<table>
<thead>
<tr>
<th></th>
<th>Solid / Stranded</th>
<th>Cross section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth</td>
<td>Solid</td>
<td>0.5 – 1.5 mm²</td>
</tr>
<tr>
<td>L</td>
<td>Solid</td>
<td>0.5 – 1.5 mm²</td>
</tr>
<tr>
<td>N</td>
<td>Solid</td>
<td>0.5 – 15 mm²</td>
</tr>
<tr>
<td>Live in</td>
<td>Stranded</td>
<td>0.5 – 15 mm²</td>
</tr>
<tr>
<td>Live out</td>
<td>Stranded</td>
<td>0.5 – 15 mm²</td>
</tr>
<tr>
<td>Test switch +</td>
<td>Stranded</td>
<td>0.5 – 15 mm²</td>
</tr>
<tr>
<td>Test switch -</td>
<td>Stranded</td>
<td>0.5 – 15 mm²</td>
</tr>
<tr>
<td>LED driver +</td>
<td>Solid</td>
<td>0.5 – 15 mm²</td>
</tr>
<tr>
<td>LED driver -</td>
<td>Solid</td>
<td>0.5 – 15 mm²</td>
</tr>
<tr>
<td>LED +</td>
<td>Solid</td>
<td>0.5 – 15 mm²</td>
</tr>
<tr>
<td>LED -</td>
<td>Solid</td>
<td>0.5 – 15 mm²</td>
</tr>
<tr>
<td>Battery +</td>
<td>Stranded</td>
<td>0.5 – 15 mm²</td>
</tr>
<tr>
<td>Battery -</td>
<td>Stranded</td>
<td>0.5 – 15 mm²</td>
</tr>
</tbody>
</table>

3.3 Wiring guidelines

- For good EMC compliance consider that the output to the LED is DC but has high frequency content.
- Separate LED leads from the mains connection and wiring for good EMC performance.
- Keep the LED wiring as short as possible for a good EMC performance.
- Route the secondary wires (LED module) in parallel to ensure good EMC performance.
- Maximum lead length for the LED test switch connection is 250 mm / 9.84 inch. Separate the LED test switch wiring from the LED leads to prevent noise coupling.
- 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.).

3.4 Maximum lead length

LED test switch 250 mm

3.5 Use of different phases

The use of different phases for switched line and unswitched line is prohibited.

4. Mechanical values

4.1 Housing properties

- Casing manufactured from metal.
- Type of protection: IP20
- The housing incorporates DIP switches. The position of the DIP switches is essential for the correct operation and must not be changed. Altering their position will prohibit the correct operation of the emergency lighting LED Driver.

4.2 Mechanical data accessories

LED test switch

- Mounting hole 4.2 mm diameter
- Mounting hole strength < 5 mm
- Lead length 250 mm
- For direct installation or use in a separate junction box
5. Electrical values

5.1 Typ. LED current/voltage characteristics

The LED current in emergency mode is automatically adjusted by the EM converterPACK module based on the total forward voltage of the LED modules connected and the associated battery. The start of the LED in emergency mode does not result in a current peak.

**EM converterPACK ST 1-9-5 60V UNV COND**
Article number: 28002865
NiMH battery, 9.6 V battery voltage
540 – 630 mA battery discharge current (tolerance)

**EM converterPACK ST 1-9-9 60V UNV COND**
Article number: 28002868
NiMH battery, 10.8 V battery voltage
860 – 1,150 mA battery discharge current (tolerance)

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**EM converterPACK ST 1-9-15 60V UNV COND**
Article number: 28002871
NiMH battery, 10.8 V battery voltage
1,410 – 1,720 mA battery discharge current (tolerance)
5.2 LED Driver compatibility

The EM converterPACK emergency unit use 3 pole technology and is compatible with most LED Drivers on the market, however it is important to check that the rating of the LED Driver does not exceed the values specified below:

- The max. allowed output current rating of the associated LED Driver is 5 A peak (current rating of switching relays of EM converterPACK)
- The max. allowed output voltage of the associated LED Driver applied to the EM converterPACK output is 60V (voltage withstand between adjacent contact of the single switching relay of the EM converterPACK)
- The max. allowed LED load of the associated LED Driver is 300 W in operation. The load must be an LED module.

6. Functions

6.1 Status indication

System status is indicated by LED test switch.

<table>
<thead>
<tr>
<th>LED indication</th>
<th>Status</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent on</td>
<td>System OK</td>
<td>AC mode</td>
</tr>
<tr>
<td>Slow flashing</td>
<td>Charging</td>
<td>Battery not yet fully charged</td>
</tr>
<tr>
<td>(2 sec on - 2 sec off)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fast flashing</td>
<td>Battery failure</td>
<td>Battery failed the duration test or function test / Battery is defect or deep discharged/ incorrect battery voltage</td>
</tr>
<tr>
<td>(0.5 sec on - 0.5 sec off)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gradual change</td>
<td>Test underway</td>
<td>Function or duration test</td>
</tr>
</tbody>
</table>

6.2 Commissioning

After installation of the luminaire and initial connection of the mains supply and battery supply to the EM converterPACK ST the unit will commence charging the batteries for the initial charge time. The recharge occurs also if a new battery is connected. The following automatic commissioning duration test is only performed when a battery is replaced and fully charged.

6.3 Testing

Functional test
Functional tests are carried out for 30 seconds on a monthly 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.

LED test switch
LED test switch can be wired to each EM converterPACK ST.
This can be used to:
- Initiate a 30 seconds function test: press two times within 5 s
- Initiate a duration test: press 3 times within 5 s
7. Battery data

7.1 Battery charge / discharge data

<table>
<thead>
<tr>
<th>Type</th>
<th>EM converterPACK ST 1-9-5 60V UNV COND</th>
<th>EM converterPACK ST 1-9-9 60V UNV COND</th>
<th>EM converterPACK ST 1-9-15 60V UNV COND</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery charge time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial charge</td>
<td>24 h</td>
<td>153 mA</td>
<td>210 mA</td>
</tr>
<tr>
<td>Fast recharge</td>
<td>24 h</td>
<td>110 mA</td>
<td>190 mA</td>
</tr>
<tr>
<td>Trickle charge</td>
<td>continuously</td>
<td>75 mA</td>
<td>105 mA</td>
</tr>
<tr>
<td>Charging current</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial charge</td>
<td>119 mA</td>
<td>119 mA</td>
<td>210 mA</td>
</tr>
<tr>
<td>Fast recharge</td>
<td>90 mA</td>
<td>110 mA</td>
<td>190 mA</td>
</tr>
<tr>
<td>Trickle charge</td>
<td>75 mA</td>
<td>105 mA</td>
<td>190 mA</td>
</tr>
</tbody>
</table>

7.2 Technical data batteries

<table>
<thead>
<tr>
<th>Type</th>
<th>EM converterPACK ST 1-9-5 60V UNV COND</th>
<th>EM converterPACK ST 1-9-9 60V UNV COND</th>
<th>EM converterPACK ST 1-9-15 60V UNV COND</th>
</tr>
</thead>
<tbody>
<tr>
<td>Article no.</td>
<td>28002865</td>
<td>28002868</td>
<td>28002871</td>
</tr>
<tr>
<td>Voltage</td>
<td>9.6 V</td>
<td>10.8 V</td>
<td>10.8 V</td>
</tr>
<tr>
<td>Capacity</td>
<td>1,500 mAh</td>
<td>2,100 mAh</td>
<td>3,800 mAh</td>
</tr>
<tr>
<td>Discharge cycles</td>
<td>500</td>
<td>500</td>
<td>500</td>
</tr>
</tbody>
</table>

8. Miscellaneous

8.1 Maximum number of switching cycles

EM converterLEDs are tested with 10,000 mains switching cycles of the associated LED driver.

8.2 Additional information

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

Guarantee conditions at www.tridonic.com → Services

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