1x23-80 W Dimmable DALI LED driver

• DALI control input 1 % – 100 % dimming range
• Enhanced Hybrid dimming, with varying PWM frequency
• Current setting by software, Constant Light Output (CLO) and load recognition
• Suitable for use in emergency lighting
• Ideal solution for closed luminaires where protection done with luminaire construction
• Highest efficiency up to 0.95
• Long lifetime, up to 100 000 h
• Wide operation range, linear output current setting with an external resistor

Connections

Mains Characteristics
Voltage range 198 VAC – 264 VAC
DC range 176 VDC – 280 VDC, starting voltage > 190 VDC
Max mains current at full load 0.22 A – 0.42 A
Frequency 0 / 50 Hz – 60 Hz
Stand-by power 0.30 W

Load Output (non-isolated)
Output current (I_{out}) 150 mA (default) – 350 mA
- Accuracy ± 5 %
- Ripple < 2 %* at ≤ 120 Hz
U_{out}[max] (abnormal) 400 V
EOFx (EL use) > 0.98

Operating Conditions and Characteristics
Max. temperature at t_{c} point 75 °C
Life time (90 % survival rate) 100 000 h, at t_{c} = 65 °C
90 000 h, at t_{c} = 70 °C
60 000 h, at t_{c} = 75 °C
Ambient temperature range –20 °C ... +50 °C
Storage temperature range –40 °C ... +80 °C
Maximum relative humidity no condensation

Connections and Mechanical Data
Wire size 0.5 mm² – 1.5 mm²
Wire type solid core and fine-stranded
Wire insulation According to EN 60598
Maximum driver to LED wire length 5 m
Weight 220 g
IP rating IP20

Functional Description
• DALI memory bank functionality
• Adaptive overload protection up to 85 W
• Limited outrush current (600 mA) during load change
• Programmable output current
• Multipurpose terminal; I[set]
• Constant Light Output CLO, up to 100 000 h, maximum 75 % reduction (default disabled)
• Full load recognition, automatic recovery

Note:
• Not suitable for load side switching operation.

Current setting (p. 2)
Resistor R output I_{out}
open 150 mA
0 Ω 350 mA

<table>
<thead>
<tr>
<th>I_{out}</th>
<th>150 mA</th>
<th>350 mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>P_{out}[max]</td>
<td>52.5 W</td>
<td>80 W</td>
</tr>
<tr>
<td>U_{out}</td>
<td>150 V – 350 V</td>
<td>64 V – 228 V</td>
</tr>
<tr>
<td>η, max load</td>
<td>0.96</td>
<td>0.98</td>
</tr>
<tr>
<td>Efficiency (η), max load</td>
<td>0.95</td>
<td>0.94</td>
</tr>
</tbody>
</table>
Load output

Hybrid dimming technique

![Graph showing dimming techniques]

<table>
<thead>
<tr>
<th>Dimming range</th>
<th>Dimming technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 % – 20 %</td>
<td>Pulse Width Modulation (PWM)*</td>
</tr>
<tr>
<td>20 % – 100 %</td>
<td>Constant Current Reduction (CCR)</td>
</tr>
</tbody>
</table>

* PWM dimming frequency 1 – 8 kHz

Current setting resistor values (Nominal $I_{\text{out}}$ ±5 % tol.)

<table>
<thead>
<tr>
<th>$R$ (Ω)</th>
<th>0</th>
<th>100</th>
<th>220</th>
<th>390</th>
<th>560</th>
<th>820</th>
<th>1k</th>
<th>1k5</th>
<th>1k8</th>
<th>2k2</th>
<th>2k7</th>
<th>3k3</th>
<th>3k9</th>
<th>4k7</th>
<th>5k6</th>
<th>8k2</th>
<th>12k</th>
<th>18k</th>
<th>39k</th>
<th>Open</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_{\text{set}}$ (mA)</td>
<td>350</td>
<td>340</td>
<td>330</td>
<td>320</td>
<td>310</td>
<td>300</td>
<td>290</td>
<td>280</td>
<td>270</td>
<td>260</td>
<td>250</td>
<td>240</td>
<td>230</td>
<td>220</td>
<td>210</td>
<td>200</td>
<td>190</td>
<td>180</td>
<td>170</td>
<td>160</td>
</tr>
</tbody>
</table>

Dimensions

- Width: 270 mm
- Height: 27.1 mm
- Length: 280 mm

Quantity of drivers per miniature circuit breaker 16 A Type C

<table>
<thead>
<tr>
<th>Based on $I_{\text{cont}}$</th>
<th>Based on $I_{\text{peak}}$</th>
<th>Typ. inrush current</th>
<th>1/2 value time, $\Delta t$</th>
<th>Calculated energy, $I_{\text{peak}}^2\Delta t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>31 pcs.</td>
<td>31 pcs.</td>
<td>41 A</td>
<td>187 µs</td>
<td>0.24 A²s</td>
</tr>
</tbody>
</table>
LL1x23-80-DA LED driver is suited for in-built luminaire usage. In order to have safe and reliable LED driver operation, the LED luminaires will need to comply with the relevant standards and regulations (e.g. IEC/EN 60598-1). The LED luminaire shall be designed to adequately protect the LED driver from dust, moisture and pollution. The luminaire manufacturer is responsible for the correct choice and installation of the LED drivers according to the application and product datasheets. Operating conditions of the LED drivers may never exceed the specifications as per the product datasheets.

Installation & operation

Miniature Circuit Breakers (MCB)
Type-C MCB’s with trip characteristics in accordance to EN 60898 are recommended.

LED driver earthing
- LED drivers are designed to support different luminaire classifications, such as Class I or Class II fittings (no earth required). Check the individual LED driver type for its exact safety class rating.
- For Helvar LED drivers to have a reliable operation and EMC performance, the luminaires are expected to have an earth connection.

Maximum Tc temperature
Reliable operation and lifetime is only guaranteed if the maximum Tc point temperature is not exceeded under the conditions of use.

Installation site
- Ensure that the LED driver does not exceed temperature higher than specified on the product datasheets.
- The general preferred installation position of LED drivers for independent use is to have the top cover facing upwards.

Current setting resistor
LL1x23-80-DA LED driver features an adjustable constant current output.
- An external resistor can be inserted in to the current setting terminal, allowing the user to adjust the LED driver output current.
- When no external resistor is connected, then the LED drivers will operate at their default lowest current level.
- A standard through-hole resistor can be used for the current setting. To achieve the most accurate output current it is recommended to select a quality low tolerance resistor.
- For the resistor/current value selection, refer to the table on page 2.
- For drivers not providing isolation (non-isolated), current setting resistor must be insulated according safety regulations.

Conformity & standards

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<th>General and safety requirements</th>
<th>EN 61347-1</th>
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<tr>
<td>Particular safety requirements for DC or AC supplied electronic control gear for LED modules</td>
<td>EN 61347-2-13</td>
</tr>
<tr>
<td>Additional safety requirements for AC/DC supplied electronic controlgear for emergency lighting</td>
<td>EN 61347-2-13 Annex J</td>
</tr>
<tr>
<td>Thermal protection class</td>
<td>EN 61347, C5e</td>
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<tr>
<td>Mains current harmonics</td>
<td>EN 61000-3-2</td>
</tr>
<tr>
<td>Limits for voltage fluctuations and flicker</td>
<td>EN 61000-3-3</td>
</tr>
<tr>
<td>Radio frequency interference</td>
<td>EN 55015</td>
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<tr>
<td>Immunity standard</td>
<td>EN 61547</td>
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<tr>
<td>Performance requirements</td>
<td>EN 62384</td>
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<tr>
<td>Digital addressing lighting interface (DALI Standard Rev 2)</td>
<td>EN 62386-207</td>
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<tr>
<td>Compliant with relevant EU directives</td>
<td></td>
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<tr>
<td>ENEC and CE marked</td>
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