



Driver LCAI 65W 150mA–400mA ECO INDUSTRY sl
ECO series

Product description

- Dimmable constant current built-in control gear for LED, particularly suitable for industrial applications in tough environments such as cold warehouses or factories with elevated ambient temperatures
- The LED Driver is designed for a life-time stated above under reference conditions and with a failure probability of less than 10 %
- If being operated up to 50 °C ambient temperature for 100,000 h the LED Driver offers a lower failure probability of less than 2.5 %
- Output current adjustable between 150 – 400 mA
- Max. output power 65 W
- Dimming range 1 ... 100 %
- Nominal life-time up to 100,000 h
- 8-year guarantee
- Suitable for mains voltage peaks (burst/surge) up to 4 kV
- Extended temperature range of -40 ... +70 °C



Properties

- White slim metal casing
- Type of protection IP20

Interfaces

- DALI DEVICE Type 6
- DSI
- switchDIM (with memory function)
- corridorFUNCTION

Functions

- Adjustable output current (I-select resistor or DALI)
- Power-up fading at AC
- Intelligent Temperature Guard (overtemperature protection)
- Short-circuit proof
- Overload protection
- Constant Light Output function
- Suitable for emergency escape lighting systems acc. to EN50172
- Intelligent Voltage Guard (overvoltage and undervoltage monitoring)



Standards, page 4

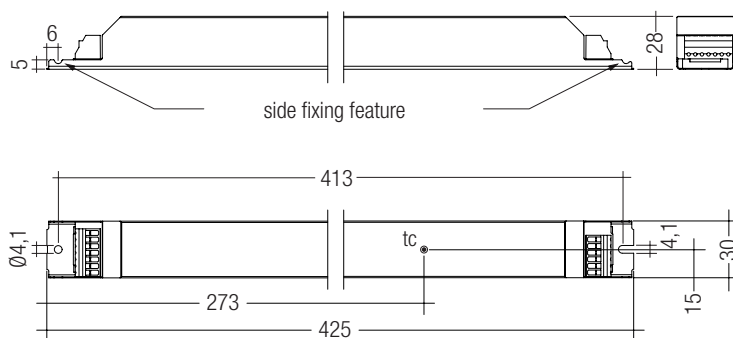
IP20

Driver LCAI 65W 150mA–400mA ECO INDUSTRY sl

ECO series

Technical data

| | |
|--|------------------------------|
| Rated supply voltage | 220 – 240 V |
| AC voltage range | 198 – 264 V |
| DC voltage range | 176 – 280 V |
| Mains frequency | 0 / 50 / 60 Hz |
| Overvoltage protection | 320 V AC, 48 h |
| Typ. current (at 230 V, 50 Hz, full load) ^① | 323 mA |
| Typ. current (230 V, 0 Hz, full load, 15 % dimming level) ^② | 56 mA |
| Leakage current (PE) | < 0.27 mA |
| Max. input power | 72.8 W |
| Typ. efficiency (at 230 V, 50 Hz, full load) ^③ | > 90 % |
| λ (at 230 V, 50 Hz, full load) ^④ | 0.98 |
| Typ. power input on standby ^⑤ | 123 mW |
| THD (at 230 V, 50 Hz, full load) ^⑥ | < 5.3 % |
| Time to light (at 230 V, 50 Hz, full load) ^⑦ | < 0.6 s |
| Time to light (DC mode) | < 0.2 s |
| Switchover time (AC/DC) | < 0.2 s |
| Turn off time (at 230 V, 50 Hz, full load) | < 50 ms |
| Hold on time (at 230 V, 50 Hz, full load) ^⑧ | 20 ms |
| Output current tolerance ^⑨ | ± 3 % |
| Output LF current ripple (< 120 Hz) | < 2 % |
| Max. peak output current | \leq output current + 18 % |
| Max. output voltage (no-load voltage) | 250 V |
| PWM frequency ^⑩ | 500 Hz |
| Dimming range | 1 – 100 % |
| Dimming range (no PWM) | 35 – 100 % |
| Suitable for burst / surge peaks up to (between L - N) | 4 kV |
| Suitable for burst / surge peaks up to (between L/N - PE) | 4 kV |
| Burst / surge peaks output side against PE | < 0.5 kV |
| Dimensions L x W x H | 425 x 30 x 28 mm |



Ordering data

| Type | Article number | Packaging carton | Packaging pallet | Weight per pc. |
|--------------------------------------|----------------|------------------|------------------|----------------|
| LCAI 65W 150mA-400mA ECO INDUSTRY sl | 28000348 | 10 pc(s). | 480 pc(s). | 0.411 kg |

Specific technical data

| Type | Output current ^① | Min. forward voltage | Max. forward voltage ^② | Max. output power ^③ | Typ. power consumption (at 230 V, 50 Hz, full load) | Typ. current consumption (at 230 V, 50 Hz, full load) | Max. casing temperature tc | Ambient temperature ta max. | I-select resistor value |
|--------------------------------------|-----------------------------|----------------------|-----------------------------------|--------------------------------|---|---|----------------------------|-----------------------------|-----------------------------|
| | 150 mA | 121 V | 220 V | 33 W | 38 W | 174 mA | 90 °C | -40 ... +75 °C | open |
| | 175 mA | 115 V | 220 V | 39 W | 43 W | 196 mA | 90 °C | -40 ... +75 °C | 63.40 k Ω |
| | 200 mA | 110 V | 220 V | 44 W | 49 W | 219 mA | 90 °C | -40 ... +75 °C | 54.90 k Ω |
| | 225 mA | 105 V | 220 V | 50 W | 55 W | 247 mA | 90 °C | -40 ... +75 °C | 47.50 k Ω |
| | 250 mA | 99 V | 220 V | 55 W | 62 W | 275 mA | 90 °C | -40 ... +70 °C | 40.20 k Ω |
| LCAI 65W 150mA-400mA ECO INDUSTRY sl | 275 mA | 99 V | 220 V | 61 W | 67 W | 295 mA | 90 °C | -40 ... +70 °C | 34.00 k Ω |
| | 300 mA | 98 V | 217 V | 65 W | 71 W | 316 mA | 90 °C | -40 ... +70 °C | 27.40 k Ω |
| | 325 mA | 90 V | 200 V | 65 W | 72 W | 319 mA | 90 °C | -40 ... +70 °C | 22.00 k Ω |
| | 350 mA | 84 V | 186 V | 65 W | 73 W | 323 mA | 90 °C | -40 ... +70 °C | 12.00 k Ω |
| | 375 mA | 78 V | 173 V | 65 W | 73 W | 323 mA | 90 °C | -40 ... +70 °C | 6.19 k Ω |
| | 400 mA | 73 V | 163 V | 65 W | 73 W | 323 mA | 90 °C | -40 ... +70 °C | short circuit (0 Ω) |

^① Valid at 100 % dimming level.

^② Depending on the selected output current.

^③ Depending on the DALI traffic at the interface.

^④ At power failure.

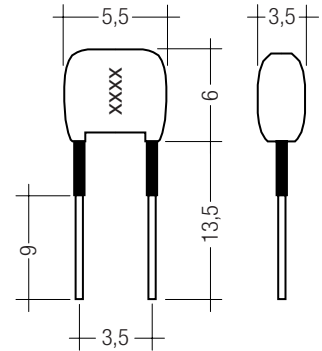
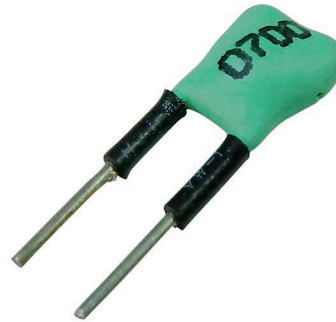
^⑤ ± 10 %.

^⑥ At full load.

^⑦ Output current is mean value.

Product description

- Ready-for-use resistor to set output current value
- Compatible with LED Driver series TOP and ECO
- Resistor is base isolated
- Resistor power 0.25 W
- Resistor value tolerance $\pm 1\%$



Ordering data

| Type | Article number | Colour | Marking | Resistor value | Packaging bag | Weight per pc. |
|------------------------|----------------|--------|---------|------------------|---------------|----------------|
| I-SELECT PLUG 175mA BL | 28000446 | Blue | 0175 | 63.40 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT PLUG 200mA BL | 28000447 | Blue | 0200 | 54.90 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT PLUG 225mA BL | 28000448 | Blue | 0225 | 47.50 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT PLUG 250mA BL | 28000368 | Blue | 0250 | 40.20 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT PLUG 275mA BL | 28000369 | Blue | 0275 | 34.00 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT PLUG 300mA BL | 28000275 | Blue | 0300 | 27.40 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT PLUG 325mA BL | 28000449 | Blue | 0325 | 22.00 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT PLUG 350mA BL | 28000276 | Blue | 0350 | 12.00 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT PLUG 375mA BL | 28000450 | Blue | 0375 | 6.19 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT PLUG MAX GR | 28000274 | Grey | MAX | 0 Ω | 10 pc(s). | 0.001 kg |

Standards

EN 55015
 EN 60068-2-27 (shock – test case: 1,000 shocks in 6 directions with 30 g / 18 ms)
 EN 60068-2-64 (vibration – test case: acc. to table A.1 transport / category 2)
 EN 61000-3-2
 EN 61000-3-3
 EN 61347-1
 EN 61347-2-13
 EN 62384
 EN 61547
 EN 62386-101 (according to DALI standard V1)
 EN 62386-102
 EN 62386-207
 According to EN 50172 for use in central battery systems
 According to EN 60598-2-22 suitable for emergency lighting installations

Overload protection

If the output voltage range is exceeded the LED Driver turns off the LED output. After restart of the LED Driver the output will be activated again. The restart can either be done via mains reset or via interface (DALI, DSI, switchDIM).

Overtemperature protection

The LED Driver is protected against temporary thermal overheating. If the temperature limit is exceeded the output current of the LED is reduced. The temperature protection is activated approx. +5 °C above $t_{c\ max}$ (see page 2). On DC operation this function is deactivated to fulfill emergency requirements.

Short-circuit behaviour

In case of a short circuit at the LED output the LED output is switched off. After restart of the LED Driver the output will be activated again. The restart can either be done via mains reset or via interface (DALI, DSI, switchDIM).

No-load operation

The LED Driver will not be damaged in the no-load operation. The output will be deactivated and therefore free of voltage. If a LED load is connected the device has to be restarted before the output will be activated again.

Hot plug-in

Hot plug-in is not recommend within 5 s after shutdown due to 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 with mains reset, DALI, DSI or switchDIM.

Conditions of use and storage

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 can be operated.

Expected life-time

| Type | Output current | t_a | 40 °C | 50 °C | 55 °C | 60 °C | 65 °C | 70 °C | 75 °C |
|---|----------------|-----------|-------------|-------------|-------------|-------------|-------------|----------|----------|
| LCAI 65W 150mA-400mA ECO INDUSTRY sl | < 250 mA | t_c | 55 °C | 65 °C | 70 °C | 75 °C | 80 °C | 85 °C | 90 °C |
| | | Life-time | > 100,000 h | > 100,000 h | > 100,000 h | > 100,000 h | > 100,000 h | 77,000 h | 55,000 h |
| | 250 – 400 mA | t_c | 60 °C | 70 °C | 75 °C | 80 °C | 85 °C | 90 °C | x |
| | | Life-time | > 100,000 h | > 100,000 h | > 100,000 h | > 100,000 h | 94,000 h | 67,000 h | x |

The LED Driver is designed for a life-time stated above under reference conditions and with a failure probability of less than 10 %.

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 | 2.5 mm ² | 1.5 mm ² | 1.5 mm ² | 2.5 mm ² | 2.5 mm ² | I_{max} time |
| LCAI 65W 150mA-400mA ECO INDUSTRY sl | 14 | 20 | 24 | 32 | 7 | 10 | 12 | 16 | 40 A 200 µs |

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

| | THD | 3. | 5. | 7. | 9. | 11. |
|---|-----|-----|-----|-----|-----|-----|
| LCAI 65W 150mA-400mA ECO INDUSTRY sl | 5.3 | 5.3 | < 1 | < 1 | < 1 | < 1 |

Control input (DA/N, DA/L)

Digital DALI signal or switchDIM can be wired on the same terminals (DA/N and DA/L).

Digital signal DALI/DSI

The control input is non-polar for digital control signals (DALI, DSI). The control signal is not SELV. Control cable has to be installed in accordance to the requirements of low voltage installations.

Different functions depending on each module.

switchDIM

Integrated switchDIM function allows a direct connection of a push to make switch for dimming and switching.

Brief push (< 0.6 s) switches LED Driver ON and OFF. The LED Drivers switch-ON at light level set at switch-OFF.

When the push to make switch 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 push to make switch with indicator lamp is not permitted.

corridorFUNCTION

The corridorFUNCTION can be programmed in two different ways.

To program the corridorFUNCTION by means of software a DALI-USB interface is needed in combination with a DALI PS. The software can be the masterCONFIGURATOR.

To activate the corridorFUNCTION without using software a voltage of 230 V simply has to be applied for five minutes at the switchDIM connection.

The unit will then switch automatically to the corridorFUNCTION.

Note:

If the corridorFUNCTION is wrongly activated in a switchDIM system (for example a switch is used instead of pushbutton), there is the option of installing a pushbutton and deactivating the corridorFUNCTION mode by five short pushes of the button within three seconds.

switchDIM and corridorFUNCTION are very simple tools for controlling ballasts with conventional momentary-action switches or motion sensors.

To ensure correct operation a sinusoidal mains voltage with a frequency of 50 Hz or 60 Hz is required at the control input.

Special attention must be paid to achieving clear zero crossings. Serious mains faults may impair the operation of switchDIM and corridorFUNCTION.

Dimming

Dimming range 1 % to 100 %

Digital control with:

- DSI signal: 8 bit Manchester Code
Speed 1 % to 100 % in 1.4 s
- DALI signal: 16 bit Manchester Code
Speed 1 % to 100 % in 0.2 s
Programmable parameter:
Minimum dimming level
Maximum dimming level
Default minimum = 1 %
Programmable range $1\% \leq \text{MIN} \leq 100\%$
Default maximum = 100 %
Programmable range $100\% \geq \text{MAX} \geq 1\%$

Dimming curve is adapted to the eye sensitiveness.

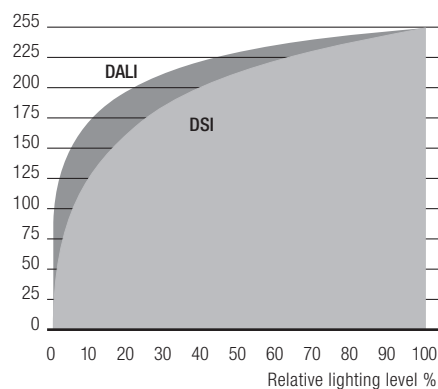
Dimming is realized by a combination of analog amplitude dimming and PWM dimming.

35 ... 100 %: amplitude dimming

1 ... 34 %: PWM dimming

Dimming characteristics

Digital dimming value



Dimming characteristics as seen by the human eye

DC emergency operation

The LED Driver is designed for operation on DC voltage and pulsed DC voltage.

Light output level programmable from 1 – 100 %
Programming by extended DSI or DALI signal (16 bit).
Default value is 15 %

In DC operation dimming mode can be activated.

The voltage-dependent input current of Driver incl. LED module is depending on the used load.

The voltage-dependent no-load current of Driver (without or defect LED module) is for:

AC: 46 mA

DC: 5 mA

Function: adjustable current (I-select)

The output current of the LED Driver can be selected between 150 and 400 mA. For adjustment there are two options available.

Option 1: „I-select resistor“

In 25 mA steps adjustable (see page 2, specific technical data, „I-select resistor value“).

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.

If the resistor is connected with wires a max. wire length of 2 m may not be exceeded and possible interferences have to be avoided.

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

Option 2: DALI

Adjustment is done by masterCONFIGURATOR (see masterCONFIGURATOR documentation).

Constant light output (CLO)

The luminous flux of an LED decreases constantly over the life-time. The CLO function ensures that the emitted luminous flux remains stable. For that purpose the LED current will increase continuously over the LED life-time. In masterCONFIGURATOR it is possible to select a start value (in percent) and an expected life-time. The LED Driver adjusts the current afterwards automatically.

Intelligent temperature monitoring (ITM)

The device offers the possibility to connect a silicon based temperature sensor (KTY81-210, KTY82-210) to monitor the LED temperature and protect the module against thermal damages.

If the temperature limit is exceeded the LED output will be dimmed or turned off. If the temperature falls below threshold the device will automatically return to the nominal operation.

The use of a NTC or PTC resistor is not possible.

The device can be operated without a sensor (default setting).

The function can be adjusted via masterCONFIGURATOR.

Intelligent Voltage Guard

Intelligent Voltage Guard is the name of the electronic monitoring of the mains voltage. It immediately shows if the mains voltage rises above certain thresholds. Measures can then be taken quickly to prevent damage to the LED Driver.

- If the mains voltage rises above approx. 280 Vrms (voltage depends on the Driver type), the LED light starts flashing on and off.
- To avoid a damage of the LED Driver the mains supply has to be switched off at this signal.

Power-up fading

The power-up fading function offers the opportunity to realise a soft start. The soft start will be applied at turning on the mains and at starts by switch-DIM.

The function is programmed as a DALI fade time in the range from 0.7 to 16 seconds and dims in the selected time from 0 % to the power-on level. By factory default power-up fading is not active (0 seconds).

Programming

With appropriate software and a USB interface different functions can be activated and various parameters can be configured in the LED Driver. All that is needed is a DALI-USB and the software (masterCONFIGURATOR).

masterCONFIGURATOR

From version 2.8:

For programming functions (CLO, I-select, power-up fading, corridorFUNCTION) and device settings (fade time, ePowerOnLevel, DC level, etc.). For further information see masterCONFIGURATOR manual.

Electrical connections

Wiring

LED module/LED Driver/supply

IDC interface

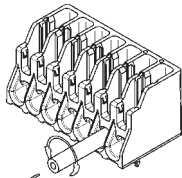
- solid wire with a cross section of 0.5 mm²

Horizontal interface

- solid wire with a cross section of 0.5–0.75 mm² with an insulation diameter up to 2.5 mm
- strip 8–9 mm of insulation from the cables to ensure perfect operation of the push terminals
- Loosen wire through twisting and pulling

wire preparation:
0.5 – 0.75 mm²

8 – 9 mm



Loosen wire through
twisting and pulling

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.
- 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 irreparable damage and no proper function is given anymore.
- With mains transients of 4 kV can voltage peaks up to 4 kV occur against PE at the output of the LED Driver. This has to be considered concerning the dielectric strength of the LED module (isolation against PE).
- To avoid the damage of the Driver, the wiring must be protected against short circuits to earth (sharp edged metal parts, metal cable clips, louver, etc.).

Earth connection

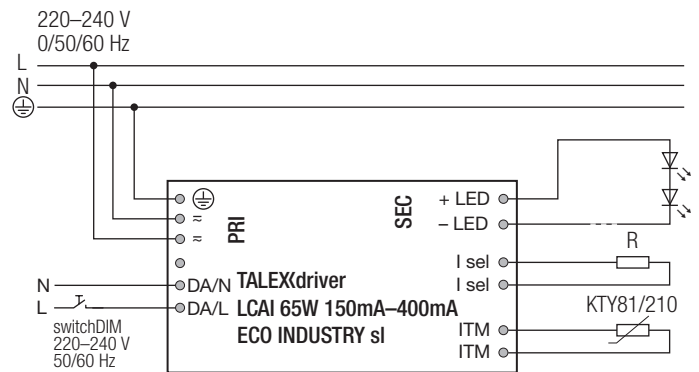
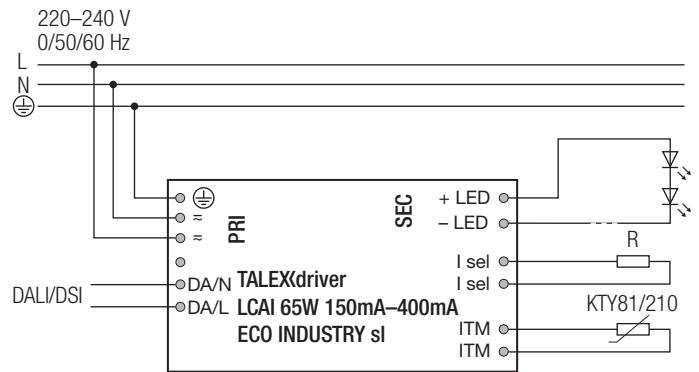
The earth connection is conducted as protection earth (PE). The LED Driver can be earthed via earth terminal or metal housing. If the LED Driver will be earthed, protection earth (PE) has to be used. There is no earth connection required for the functionality of the LED Driver.

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.

Circuit diagram



Isolation and electric strength testing of luminaires

Electronic devices 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 1500 V_{AC} (or 1.414 x 1500 V_{DC}). To avoid damage to the electronic devices this test must not be conducted.

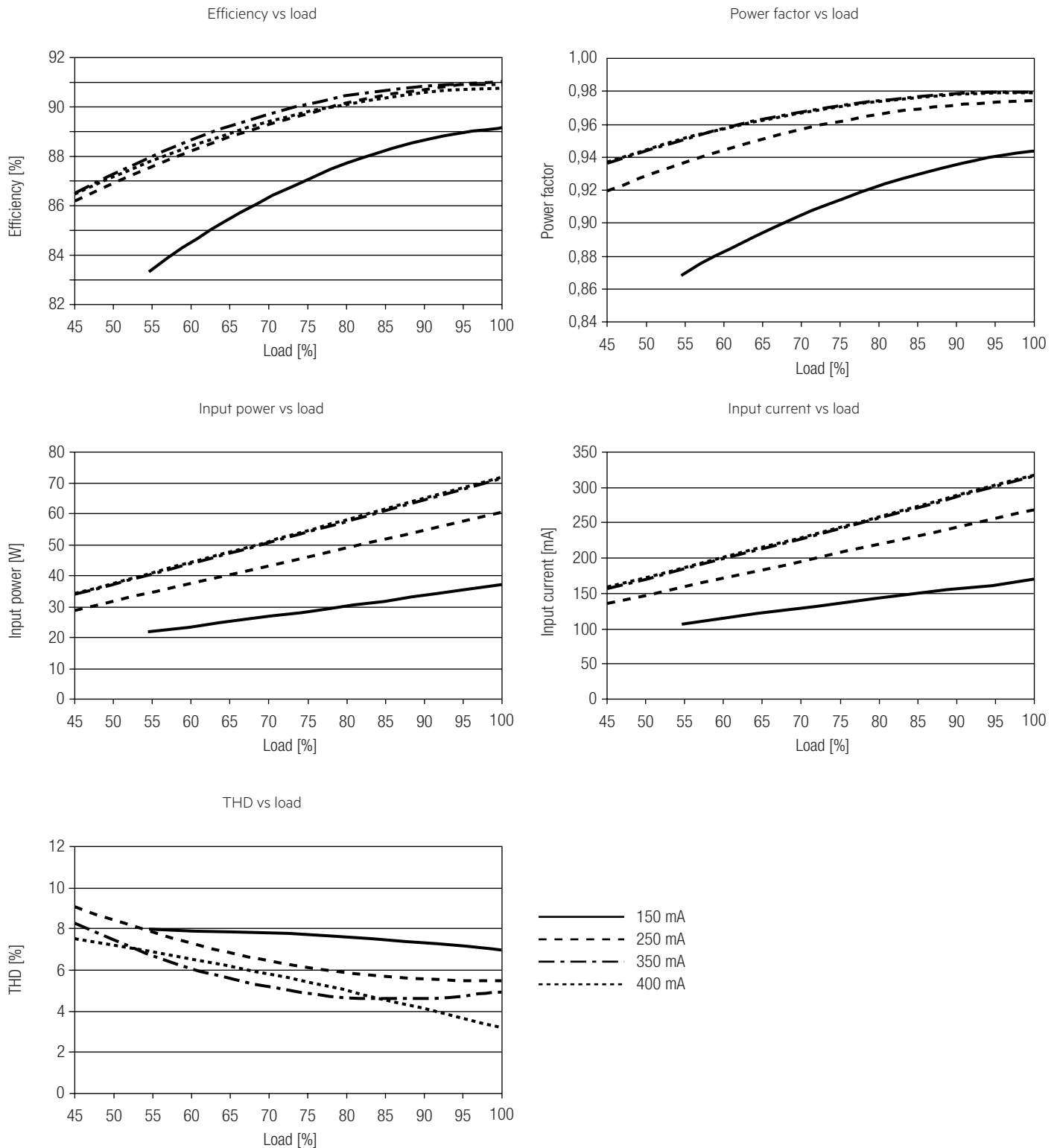
Additional information

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.

Diagrams LCAI 65W 150mA-400mA ECO INDUSTRY sl



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