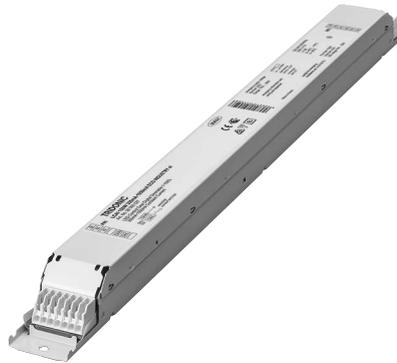




Driver LCAI 150W 350mA–1050mA ECO sl ECO series

Product description

- Dimmable constant current built-in control gear for LED, particularly suitable for industrial applications in moderate environments such as logistic warehouses or semiconductor factories
- Output current adjustable between 350 – 1,050 mA
- Max. output power 150 W
- Dimming range from 1 – 100 %
- Nominal life-time up to 100,000 h
- 5-year guarantee
- Suitable for mains voltage peaks (burst/surge) up to 4 kV
- Temperature range of -25 ... +60 °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 eD)
- 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 EN 50172
- Intelligent Voltage Guard (overvoltage and undervoltage shutdown)



Standards, page 5

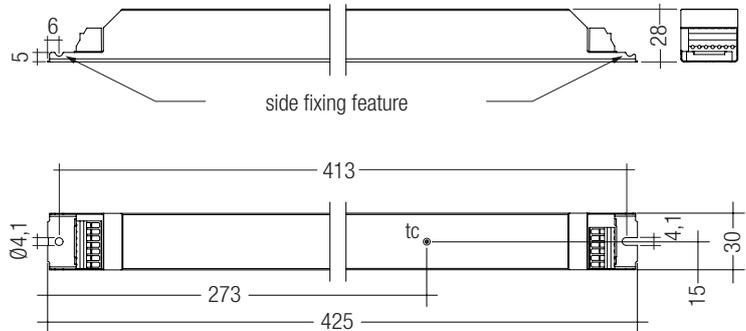
IP20      

Driver LCAI 150W 350mA-1050mA ECO sl

ECO series

Technical data

Rated supply voltage	220 – 240 V
Input voltage, AC	198 – 264 V
Input voltage, DC	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	700 mA
Typ. current (220 V, 0 Hz, full load, 15 % dimming level) ^②	150 mA
Leakage current (PE)	< 0,7 mA
Max. input power	160 W
Typ. efficiency (at 230 V, 50 Hz, full load) ^③	95 %
λ (at 230 V, 50 Hz, full load) ^④	0,98
Typ. power input on standby ^⑤	< 200 mW
Typ. input current in no-load operation	75 mA
Typ. input power in no-load operation	< 200 mW
In-rush current (peak / duration)	60 A / 200 μ s
THD (at 230 V, 50 Hz, full load) ^⑥	< 10 %
Time to light (at 230 V, 50 Hz, full load) ^⑦	< 0,6 s
Time to light (DC mode)	< 0,4 s
Switchover time (AC/DC)	< 0,4 s
Turn off time (at 230 V, 50 Hz, full load)	< 50 ms
Output current tolerance ^⑧	\pm 3 %
Output LF current ripple (< 120 Hz)	< 2 %
Max. peak output current	\leq output current + 20 %
Max. output voltage (no-load voltage)	420 V
PWM frequency ^⑨	500 Hz
Dimming range	1 – 100 %
Dimming range (without 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	4 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 150W 350mA-1050mA ECO sl	28001586	10 pc(s).	480 pc(s).	0.385 kg

Specific technical data

Type	Output current	Min. forward voltage	Max. forward voltage ^①	Max. output power ^②	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 ^③
LCAI 150W 350mA-1050mA ECO sl	350 mA	126 V	300 V	105 W	110 W	478 mA	85 °C	-25 ... +60 °C	open
	375 mA	126 V	300 V	113 W	118 W	513 mA	85 °C	-25 ... +60 °C	71.50 kΩ
	400 mA	126 V	300 V	120 W	125 W	543 mA	85 °C	-25 ... +60 °C	66.50 kΩ
	425 mA	126 V	300 V	128 W	133 W	578 mA	85 °C	-25 ... +60 °C	61.90 kΩ
	450 mA	126 V	300 V	135 W	141 W	613 mA	85 °C	-25 ... +60 °C	57.60 kΩ
	475 mA	126 V	300 V	143 W	149 W	648 mA	85 °C	-25 ... +60 °C	53.60 kΩ
	500 mA	126 V	300 V	150 W	156 W	678 mA	85 °C	-25 ... +60 °C	49.90 kΩ
	525 mA	126 V	286 V	150 W	156 W	678 mA	85 °C	-25 ... +60 °C	45.30 kΩ
	550 mA	123 V	273 V	150 W	156 W	678 mA	85 °C	-25 ... +60 °C	42.20 kΩ
	575 mA	117 V	261 V	150 W	156 W	678 mA	85 °C	-25 ... +60 °C	38.30 kΩ
	600 mA	113 V	250 V	150 W	158 W	687 mA	85 °C	-25 ... +60 °C	35.70 kΩ
	625 mA	108 V	240 V	150 W	158 W	687 mA	85 °C	-25 ... +60 °C	32.40 kΩ
	650 mA	104 V	231 V	150 W	158 W	687 mA	85 °C	-25 ... +60 °C	28.70 kΩ
	675 mA	100 V	222 V	150 W	158 W	687 mA	85 °C	-25 ... +60 °C	26.10 kΩ
	700 mA	96 V	214 V	150 W	158 W	687 mA	85 °C	-25 ... +60 °C	22.00 kΩ
	725 mA	93 V	207 V	150 W	158 W	687 mA	85 °C	-25 ... +60 °C	17.40 kΩ
	750 mA	90 V	200 V	150 W	158 W	687 mA	85 °C	-25 ... +60 °C	15.00 kΩ
	775 mA	87 V	194 V	150 W	158 W	687 mA	85 °C	-25 ... +60 °C	12.40 kΩ
	800 mA	84 V	188 V	150 W	158 W	687 mA	85 °C	-25 ... +60 °C	10.00 kΩ
	825 mA	82 V	182 V	150 W	158 W	687 mA	85 °C	-25 ... +60 °C	7.68 kΩ
	850 mA	79 V	177 V	150 W	160 W	696 mA	85 °C	-25 ... +60 °C	5.36 kΩ
	900 mA	75 V	167 V	150 W	160 W	696 mA	85 °C	-25 ... +60 °C	short circuit (0 Ω)
	925 mA	73 V	162 V	150 W	160 W	696 mA	85 °C	-25 ... +60 °C	eD
	950 mA	71 V	158 V	150 W	160 W	696 mA	85 °C	-25 ... +60 °C	eD
	975 mA	69 V	154 V	150 W	160 W	696 mA	85 °C	-25 ... +60 °C	eD
	1,000 mA	68 V	150 V	150 W	160 W	696 mA	85 °C	-25 ... +60 °C	eD
1,025 mA	66 V	146 V	150 W	160 W	696 mA	85 °C	-25 ... +60 °C	eD	
1,050 mA	64 V	143 V	150 W	160 W	696 mA	85 °C	-25 ... +60 °C	eD	

① Valid at 100 % dimming level.

② Depending on the selected output current.

③ Depending on the DALI traffic at the interface.

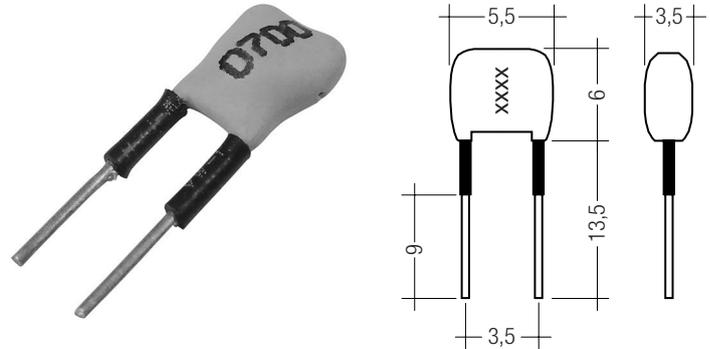
④ ± 10 %.

⑤ At full load.

⑥ eD: Can only be set via eD.

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 375mA GN	28000450	Blue	0375	6.19 k Ω	10 pc(s).	0.001 kg
I-SELECT PLUG 400mA GN	28000451	Green	0400	66.50 k Ω	10 pc(s).	0.001 kg
I-SELECT PLUG 450mA GN	28000452	Green	0450	57.60 k Ω	10 pc(s).	0.001 kg
I-SELECT PLUG 500mA GN	28000277	Green	0500	49.90 k Ω	10 pc(s).	0.001 kg
I-SELECT PLUG 550mA GN	28000453	Green	0550	42.20 k Ω	10 pc(s).	0.001 kg
I-SELECT PLUG 600mA GN	28000454	Green	0600	35.70 k Ω	10 pc(s).	0.001 kg
I-SELECT PLUG 650mA GN	28000455	Green	0650	28.70 k Ω	10 pc(s).	0.001 kg
I-SELECT PLUG 700mA GN	28000278	Green	0700	22.00 k Ω	10 pc(s).	0.001 kg
I-SELECT PLUG 750mA GN	28000456	Green	0750	15.00 k Ω	10 pc(s).	0.001 kg
I-SELECT PLUG 800mA GN	28000457	Green	0800	10.00 k Ω	10 pc(s).	0.001 kg
I-SELECT PLUG 850mA GN	28000458	Green	0850	5.36 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 3). 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. A voltage of 320 V DC is permanent at the output. In the first 5 seconds it can even be higher. If a LED load is connected the device has to be restarted before the output will be activated again.

Expected life-time

Type	Output current	t_a	40 °C	50 °C	55 °C	60 °C
LCAI 150W 350mA-1050mA ECO sl	350 – 1050 mA	t_c	65 °C	75 °C	80 °C	85 °C
		Life-time	>200,000 h	200,000 h	140,000 h	100,000 h

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 150W 350mA-1050mA ECO sl	8	12	14	20	4	6	7	10	60 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 150W 350mA-1050mA ECO sl	7	< 3,5	< 3,5	< 3,5	< 3	< 2

Hot plug-in

Hot plug-in is not recommend 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.

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.

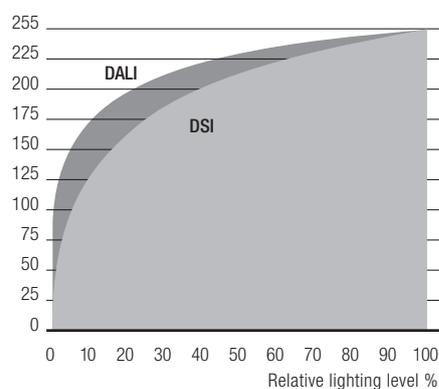
Dimming is realized by a combination of analog amplitude dimming and PWM dimming.

35 ... 100 %: amplitude dimming

1 ... < 35 %: PWM dimming

Dimming characteristics

Digital dimming value



Dimming characteristics as seen by the human eye

Light level in DC operation

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.

Function: adjustable current (I-select)

The output current of the LED Driver can be selected between 350 and 1050 mA. For adjustment there are two options available.

Option 1: „I-select resistor“

Adjustable range	350 – 900 mA
Step width	25 mA (see page 3)
Resistor value range	E96
Resistor value tolerance	± 1 %
Resistor power	≥ 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 avoid.

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

Option 2: eD (adjustable between 350 – 1,050 mA)

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.

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 switchDIM.

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.

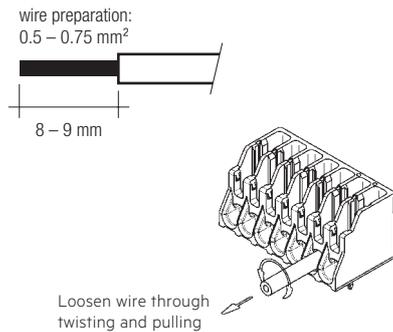
Electrical connections

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 simultaneously 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).

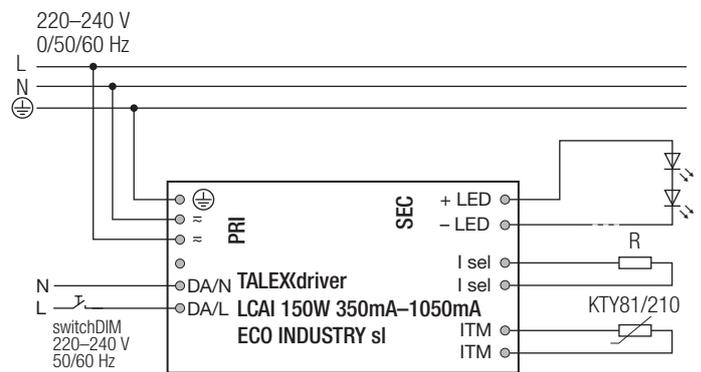
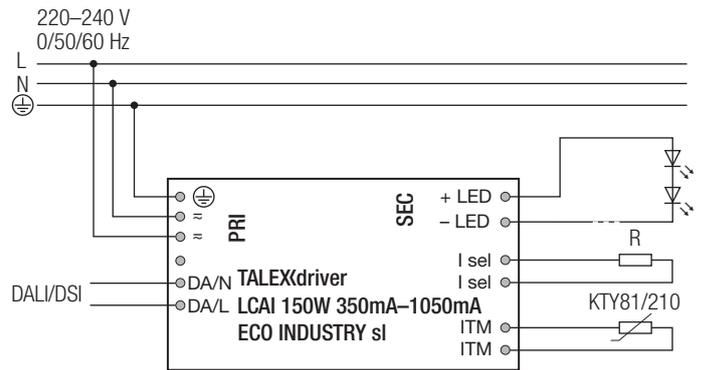
Earth connection

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

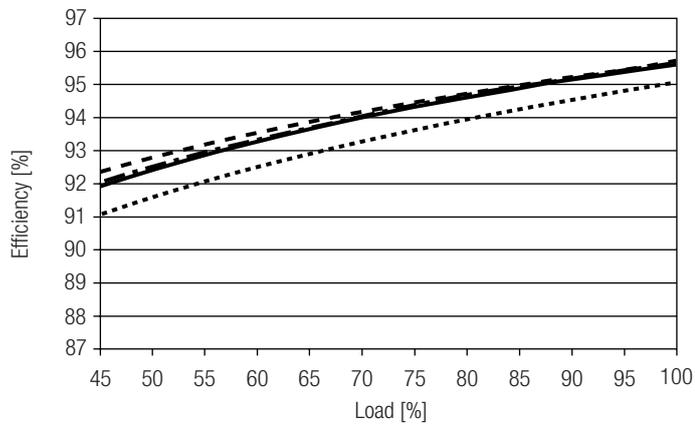
Additional technical information at www.tridonic.com → Technical Data

Guarantee conditions at www.tridonic.com → Services

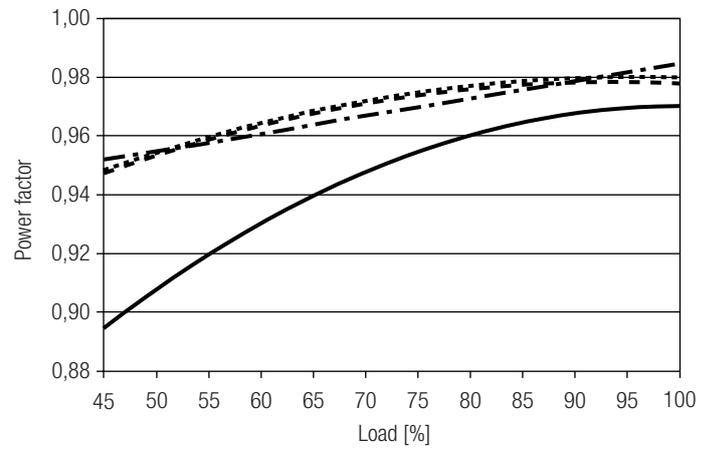
Life-time declarations are informative and represent no warranty claim. No warranty if device was opened.

Diagrams LCAI 150W 350mA-1050mA ECO

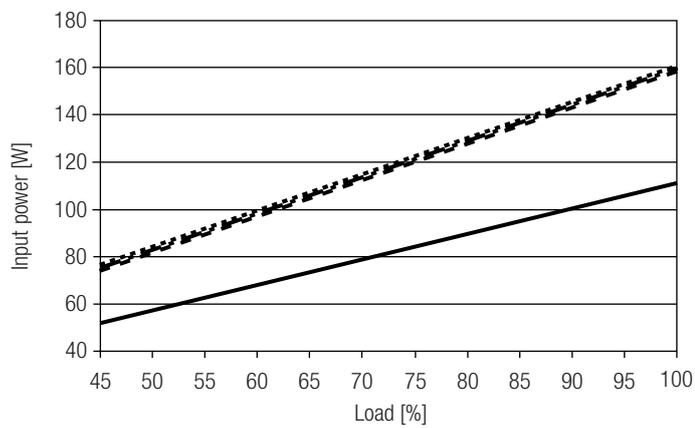
Efficiency vs load



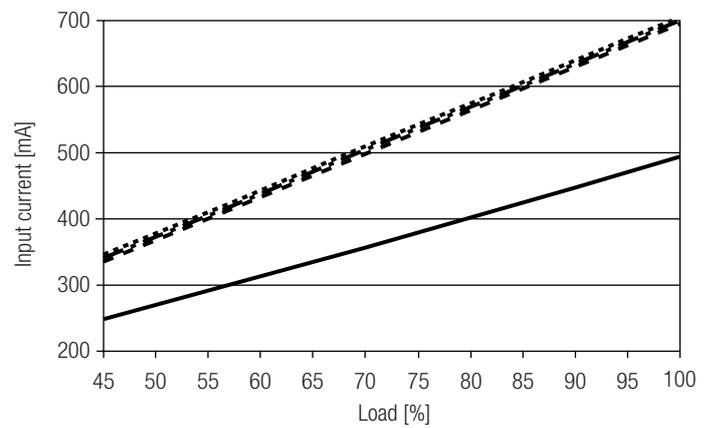
Power factor vs load



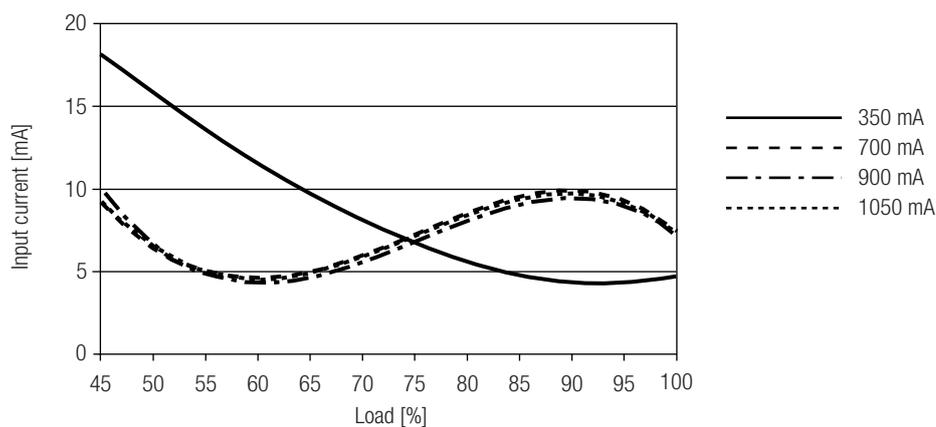
Input power vs load



Input current vs load



THD vs load



- 350 mA
- - - 700 mA
- · - · 900 mA
- · · · 1050 mA

100 % load correspond to the max. output power (full load) according to the table on page 3.