

## CC LINEAR DIP SWITCH



### COMFORTLINE DIP SWITCH L-R2

**186820, 186824, 186982, 186983, 186984**

#### Typical Applications

Built-in in linear luminaires for

- Office lighting
- Industry lighting



#### ComfortLine DIP switch L-R2

- **SELECTABLE OUTPUT CURRENT VIA DIP SWITCH**
- **VERY LOW RIPPLE CURRENT: < 3%**
- **SUITABLE FOR EMERGENCY ESCAPE LIGHTING SYSTEMS ACC. TO EN 50172**
- **LONG SERVICE LIFE:  
UP TO 100,000 HRS.**
- **PRODUCT GUARANTEE: 5 YEARS**



## ComfortLine DIP switch L-R2

### Product features

- Linear casing shape

### Functions

- Selectable current output via DIP switch
- Suitable for central battery system for emergency lighting acc. to EN 50172

### Electrical features

- Mains voltage: 220–240 V  $\pm 10\%$
- Mains frequency: 50–60 Hz
- DC operation: 198–276 V, 0 Hz
- Push-in terminals: 0.5–1.5 mm<sup>2</sup>
- Power factor at full load: 0.96
- Max. working voltage (U<sub>OUT</sub>): 250 V or 300 V (186824)
- Secondary side switching of LED modules is not allowed.

### Safety features

- Protection against transient main peaks up to 1 kV (between L and N) and up to 2 kV (between L, N and PE)
- Electronic short-circuit protection
- Overload protection
- Protection against "no load" operation
- Degree of protection: IP20
- Protection class I

### Packaging units

| Ref. No. | Packaging unit    |                     | Weight<br>g |
|----------|-------------------|---------------------|-------------|
|          | Pieces<br>per box | Boxes<br>per pallet |             |
| 186820   | 30                | 64                  | 169         |
| 186824   | 30                | 64                  | 173         |
| 186982   | 30                | 64                  | 180         |
| 186983   | 30                | 64                  | 176         |
| 186984   | 30                | 64                  | 176         |



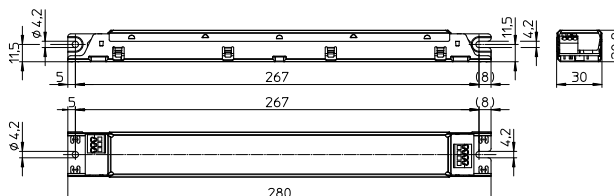
### Applied standards

- EN 61347-1
- EN 61347-2-13
- EN 61547
- EN 61000-3-2
- EN 62384
- EN 60598-2-22
- EN 55015



### Dimensions

- Casing: M7.1
- Length: 280 mm
- Width: 30 mm
- Height: 21 mm



### Product guarantee

- 5 years
- The conditions for the Product Guarantee of the Vossloh-Schwabe Group shall apply as published on our homepage ([www.vossloh-schwabe.com](http://www.vossloh-schwabe.com)). We will be happy to send you these conditions upon request.

The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.

## Electrical characteristics

| Max. output W | Type         | Ref. No.      | Voltage 50–60 Hz V | Mains current mA | Inrush current A / $\mu$ s | Current output DC mA ( $\pm$ 5%) | Voltage output DC (V) | THD at full load % (230 V) | Efficiency at full load % (230 V) | Ripple 100 Hz % |
|---------------|--------------|---------------|--------------------|------------------|----------------------------|----------------------------------|-----------------------|----------------------------|-----------------------------------|-----------------|
| 20            | ECXe 350.327 | <b>186820</b> | 220–240            | 180–170          | 24 / 132                   | 200                              | 50–100                | < 17                       | 90                                | < 2             |
| 25            |              |               |                    |                  |                            | 250                              |                       |                            | 91                                |                 |
| 30            |              |               |                    |                  |                            | 300                              |                       |                            | 91                                |                 |
| 35            |              |               |                    |                  |                            | 350                              |                       |                            | 92                                |                 |
| 24.5          | ECXe 250.410 | <b>186982</b> | 220–240            | 180–170          | 19 / 160                   | 175                              | 70–140                | < 16                       | 92                                | < 2             |
| 28            |              |               |                    |                  |                            | 200                              |                       |                            | 92                                |                 |
| 31.5          |              |               |                    |                  |                            | 225                              |                       |                            | 92                                |                 |
| 35            |              |               |                    |                  |                            | 250                              |                       |                            | 91                                |                 |
| 36            | ECXe 350.331 | <b>186824</b> | 220–240            | 310–290          | 27 / 225                   | 200                              | 85–180                | < 12                       | 92                                | < 2             |
| 45            |              |               |                    |                  |                            | 250                              |                       |                            | 93                                |                 |
| 54            |              |               |                    |                  |                            | 300                              |                       |                            | 93                                |                 |
| 63            |              |               |                    |                  |                            | 350                              |                       |                            | 93                                |                 |
| 58            | ECXe 700.412 | <b>186984</b> | 220–240            | 360–340          | 25 / 269                   | 550                              | 50–105                | < 10                       | 93                                | < 2             |
| 63            |              |               |                    |                  |                            | 600                              |                       |                            | 93                                |                 |
| 68            |              |               |                    |                  |                            | 650                              |                       |                            | 93                                |                 |
| 73            |              |               |                    |                  |                            | 700                              |                       |                            | 93                                |                 |
| 52.5          | ECXe 500.411 | <b>186983</b> | 220–240            | 370–340          | 24 / 264                   | 350                              | 75–150                | < 9                        | 93                                | < 2             |
| 60            |              |               |                    |                  |                            | 400                              |                       |                            | 93                                |                 |
| 67.5          |              |               |                    |                  |                            | 450                              |                       |                            | 93                                |                 |
| 75            |              |               |                    |                  |                            | 500                              |                       |                            | 93                                |                 |

## Maximum ratings

Exceeding the maximum ratings can lead to reduction of service life or destruction of the drivers.

| Ref. No. | Ambient temperature range |              | Operation humidity range |        | Storage temperature range |         | Storage humidity range |        | Max. operation temperature at $t_c$ point °C | Degree of protection |
|----------|---------------------------|--------------|--------------------------|--------|---------------------------|---------|------------------------|--------|----------------------------------------------|----------------------|
|          | °C min.                   | °C max.      | % min.                   | % max. | °C min.                   | °C max. | % min.                 | % max. |                                              |                      |
| 186820   | –25                       | +70          | 5                        | 60     | –40                       | +85     | 5                      | 95     | +75 (200 mA)                                 | IP20                 |
|          |                           | +65          |                          |        |                           |         |                        |        | +75 (250 mA)                                 |                      |
|          |                           | +65          |                          |        |                           |         |                        |        | +75 (300 mA)                                 |                      |
|          |                           | +60          |                          |        |                           |         |                        |        | +75 (350 mA)                                 |                      |
| 186982   | –25                       | +60          | 5                        | 60     | –40                       | +85     | 5                      | 95     | +70                                          | IP20                 |
| 186824   | –25                       | +60          | 5                        | 60     | –40                       | +85     | 5                      | 95     | +70 (200 mA)                                 | IP20                 |
|          |                           |              |                          |        |                           |         |                        |        | +70 (250 mA)                                 |                      |
|          |                           |              |                          |        |                           |         |                        |        | +70 (300 mA)                                 |                      |
|          |                           |              |                          |        |                           |         |                        |        | +75 (350 mA)                                 |                      |
| 186984   | –25                       | +50          | 5                        | 60     | –40                       | +85     | 5                      | 95     | +70                                          | IP20                 |
| 186983   | –25                       | +60 (350 mA) | 5                        | 60     | –40                       | +85     | 5                      | 95     | +70                                          | IP20                 |
|          |                           | +60 (400 mA) |                          |        |                           |         |                        |        |                                              |                      |
|          |                           | +55 (450 mA) |                          |        |                           |         |                        |        |                                              |                      |
|          |                           | +55 (500 mA) |                          |        |                           |         |                        |        |                                              |                      |

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# LED Drivers – ComfortLine DIP switch L-R2

## Expected service life time

at operation temperatures at  $t_c$  point

| Ref. No. | Operation current (mA) | Temperature | Service life hrs. | Temperature | Service life hrs. |
|----------|------------------------|-------------|-------------------|-------------|-------------------|
| 186820   | 200                    | 65 °C       | 100,000           | 75 °C       | 50,000            |
|          | 250                    |             | 100,000           |             | 50,000            |
|          | 300                    |             | 100,000           |             | 50,000            |
|          | 350                    |             | 100,000           |             | 50,000            |
| 186982   | All                    | 60 °C       | 100,000           | 70 °C       | 50,000            |
| 186824   | 200                    | 60 °C       | 100,000           | 70 °C       | 50,000            |
|          | 250                    |             | 100,000           |             | 50,000            |
|          | 300                    |             | 100,000           |             | 50,000            |
|          | 350                    | 65 °C       | 100,000           | 75 °C       | 50,000            |
| 186984   | All                    | 60 °C       | 100,000           | 70 °C       | 50,000            |
| 186983   | All                    | 60 °C       | 100,000           | 70 °C       | 50,000            |

## DIP switch settings

| Pin 1 | Pin 2 | Operation current (mA) |        |        |        |
|-------|-------|------------------------|--------|--------|--------|
|       |       | 186820, 186824         | 186982 | 186983 | 186984 |
| OFF   | OFF   | 200                    | 175    | 350    | 550    |
| ON    | OFF   | 250                    | 200    | 400    | 600    |
| OFF   | ON    | 300                    | 225    | 450    | 650    |
| ON    | ON    | 350                    | 250    | 500    | 700    |

## Product labels

**INPUT**  
**U<sub>N</sub> = 220...240 V**  
I<sub>N</sub> = 180...170 mA  
f<sub>N</sub> = 0/50...60 Hz  
λ = 0,96  
Range of application  
DC 198...276 V

**Vossloh-Schwabe Deutschland GmbH**  
Hohe Steinert 8, D-58509 Lüdenscheid  
Electronic converter for LED  
**Type ECXe 350.327**  
Ref.-No. 186820  
Made in Serbia (Europe)

EN 61347-1  
EN 61347-2-13  
EN 62384  
EN 61547  
EN 55015  
EN 61000-3-2

| Pin1 | Pin2 | I <sub>rated</sub> (mA) | U <sub>rated</sub> (V) | P <sub>rated</sub> (W) | U <sub>out</sub> (V) | t <sub>a</sub> (°C) | t <sub>c</sub> (°C) |
|------|------|-------------------------|------------------------|------------------------|----------------------|---------------------|---------------------|
| OFF  | OFF  | 200                     | 50...100               | 20                     | <250                 | -25...+70           | 75                  |
| ON   | OFF  | 250                     | 50...100               | 25                     |                      | -25...+65           | 75                  |
| OFF  | ON   | 300                     | 50...100               | 30                     |                      | -25...+65           | 75                  |
| ON   | ON   | 350                     | 50...100               | 35                     |                      | -25...+60           | 75                  |

**Non isolated**

**LED +**  
**LED -**

**INPUT**  
**U<sub>N</sub> = 220...240 V**  
I<sub>N</sub> = 310...290 mA  
f<sub>N</sub> = 0/50...60 Hz  
I = 0,98  
Range of application  
DC 198...276 V

**Vossloh-Schwabe Deutschland GmbH**  
Hohe Steinert 8, D-58509 Lüdenscheid  
Electronic converter for LED  
**Type ECXe 350.331**  
Ref.-No. 186824  
Made in Serbia (Europe)

EN 61347-1  
EN 61347-2-13  
EN 62384  
EN 61547  
EN 55015  
EN 61000-3-2

| Pin1 | Pin2 | I <sub>rated</sub> (mA) | U <sub>rated</sub> (V) | P <sub>rated</sub> (W) | U <sub>out</sub> (V) | t <sub>a</sub> (°C) | t <sub>c</sub> (°C) |
|------|------|-------------------------|------------------------|------------------------|----------------------|---------------------|---------------------|
| OFF  | OFF  | 200                     | 85...180               | 36                     | <300                 | -25...+60           | 70                  |
| ON   | OFF  | 250                     | 85...180               | 45                     |                      | -25...+60           | 70                  |
| OFF  | ON   | 300                     | 85...180               | 54                     |                      | -25...+60           | 70                  |
| ON   | ON   | 350                     | 85...180               | 63                     |                      | -25...+60           | 75                  |

**Non isolated**

**LED +**  
**LED -**

**INPUT**  
**U<sub>N</sub> = 220...240 V**  
I<sub>N</sub> = 180...170 mA  
f<sub>N</sub> = 0/50...60 Hz  
I = 0,96  
Range of application  
DC 198...276 V

**Vossloh-Schwabe Deutschland GmbH**  
Hohe Steinert 8, D-58509 Lüdenscheid  
Electronic converter for LED  
**Type ECXe 250.410**  
Ref.-No. 186982  
Made in Serbia (Europe)

EN 61347-1  
EN 61347-2-13  
EN 62384  
EN 61547  
EN 55015  
EN 61000-3-2

| Pin1 | Pin2 | I <sub>rated</sub> (mA) | U <sub>rated</sub> (V) | P <sub>rated</sub> (W) | U <sub>out</sub> (V) | t <sub>a</sub> (°C) | t <sub>c</sub> (°C) |
|------|------|-------------------------|------------------------|------------------------|----------------------|---------------------|---------------------|
| OFF  | OFF  | 175                     | 70...140               | 24,5                   | <250                 | -25...60            | 70                  |
| ON   | OFF  | 200                     | 70...140               | 28                     |                      | -25...60            | 70                  |
| OFF  | ON   | 225                     | 70...140               | 31,5                   |                      | -25...60            | 70                  |
| ON   | ON   | 250                     | 70...140               | 35                     |                      | -25...60            | 75                  |

**Non isolated**

**LED +**  
**LED -**

**INPUT**  
**U<sub>N</sub> = 220...240 V**  
I<sub>N</sub> = 370...340 mA  
f<sub>N</sub> = 0/50...60 Hz  
I = 0,98  
Range of application  
DC 198...276 V

**Vossloh-Schwabe Deutschland GmbH**  
Hohe Steinert 8, D-58509 Lüdenscheid  
Electronic converter for LED  
**Type ECXe 500.411**  
Ref.-No. 186983  
Made in Serbia (Europe)

EN 61347-1  
EN 61347-2-13  
EN 62384  
EN 61547  
EN 55015  
EN 61000-3-2

| Pin1 | Pin2 | I <sub>rated</sub> (mA) | U <sub>rated</sub> (V) | P <sub>rated</sub> (W) | U <sub>out</sub> (V) | t <sub>a</sub> (°C) | t <sub>c</sub> (°C) |
|------|------|-------------------------|------------------------|------------------------|----------------------|---------------------|---------------------|
| OFF  | OFF  | 350                     | 75...150               | 52,5                   | <250                 | -25...60            | 70                  |
| ON   | OFF  | 400                     | 75...150               | 60                     |                      | -25...60            | 70                  |
| OFF  | ON   | 450                     | 75...150               | 67,5                   |                      | -25...55            | 70                  |
| ON   | ON   | 500                     | 75...150               | 75                     |                      | -25...55            | 75                  |

**Non isolated**

**LED +**  
**LED -**

**INPUT**  
**U<sub>N</sub> = 220...240 V**  
I<sub>N</sub> = 360...340 mA  
f<sub>N</sub> = 0/50...60 Hz  
I = 0,98  
Range of application  
DC 198...276 V

**Vossloh-Schwabe Deutschland GmbH**  
Hohe Steinert 8, D-58509 Lüdenscheid  
Electronic converter for LED  
**Type ECXe 700.412**  
Ref.-No. 186984  
Made in Serbia (Europe)

EN 61347-1  
EN 61347-2-13  
EN 62384  
EN 61547  
EN 55015  
EN 61000-3-2

| Pin1 | Pin2 | I <sub>rated</sub> (mA) | U <sub>rated</sub> (V) | P <sub>rated</sub> (W) | U <sub>out</sub> (V) | t <sub>a</sub> (°C) | t <sub>c</sub> (°C) |
|------|------|-------------------------|------------------------|------------------------|----------------------|---------------------|---------------------|
| OFF  | OFF  | 550                     | 50...105               | 58                     | <250                 | -25...50            | 70                  |
| ON   | OFF  | 600                     | 50...105               | 63                     |                      | -25...50            | 70                  |
| OFF  | ON   | 650                     | 50...105               | 68                     |                      | -25...50            | 70                  |
| ON   | ON   | 700                     | 50...105               | 73                     |                      | -25...50            | 75                  |

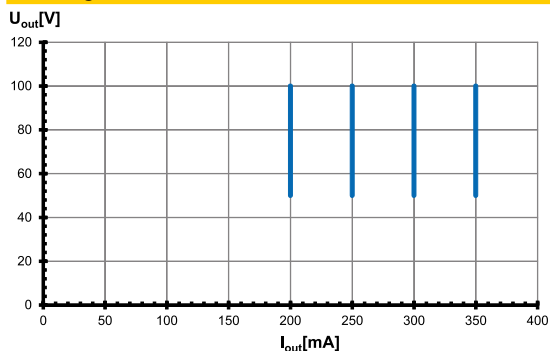
**Non isolated**

**LED +**  
**LED -**

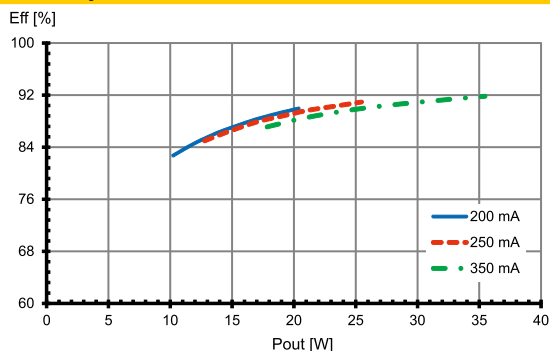
The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.

## Typ. performance graphs for 186820 / Type ECXe 350.327

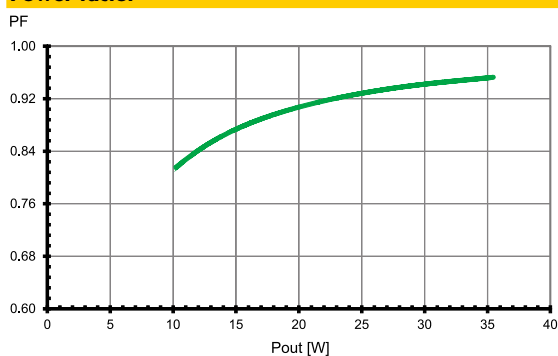
### Working area



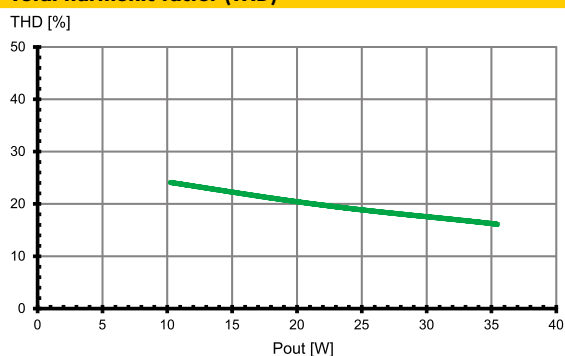
### Efficiency



### Power factor

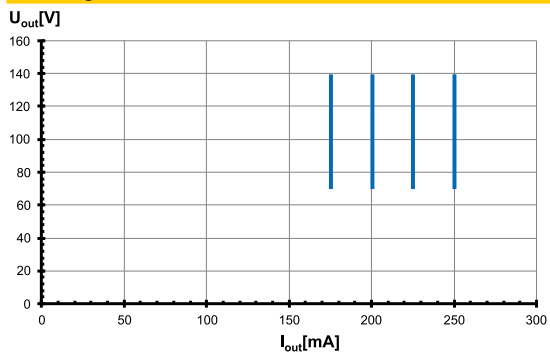


### Total harmonic factor (THD)

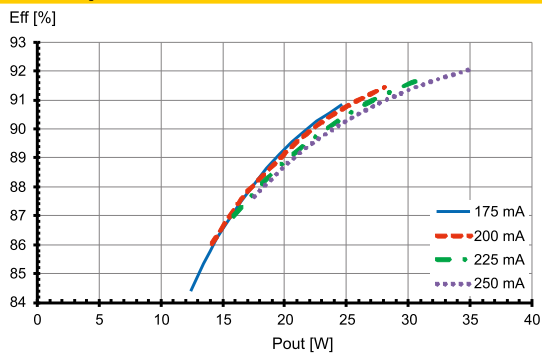


## Typ. performance graphs for 186982 / Type ECXe 250.410

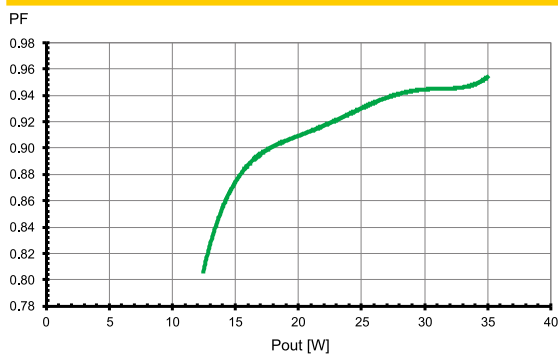
### Working area



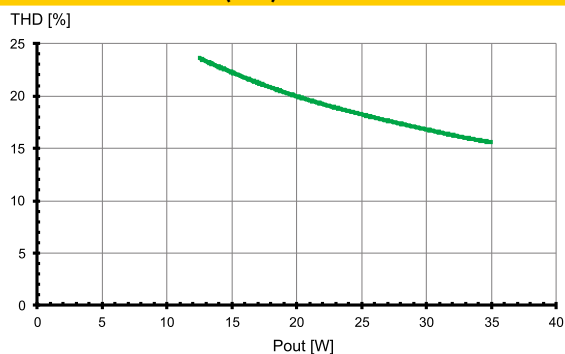
### Efficiency



### Power factor



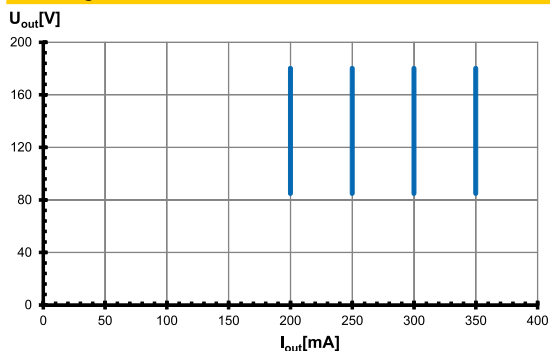
### Total harmonic factor (THD)



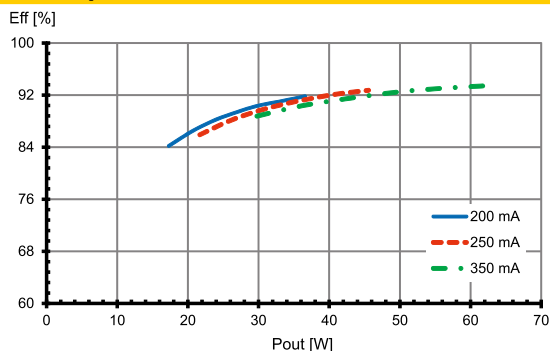
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## Typ. performance graphs for 186824 / Type ECXe 350.331

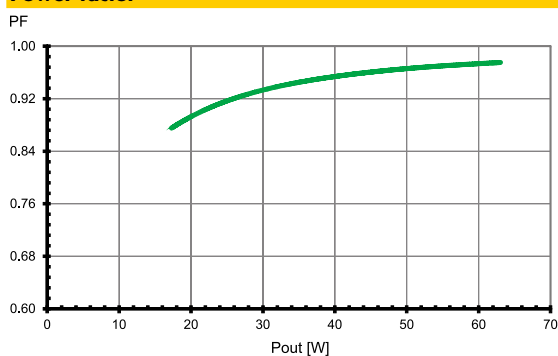
### Working area



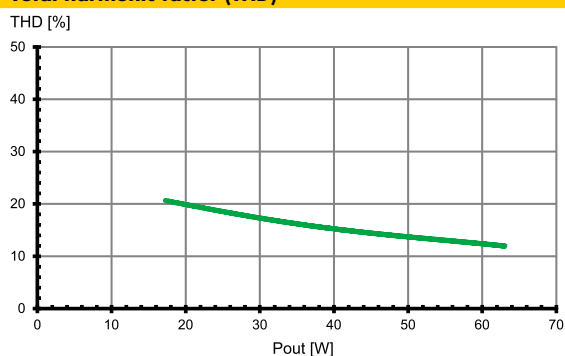
### Efficiency



### Power factor

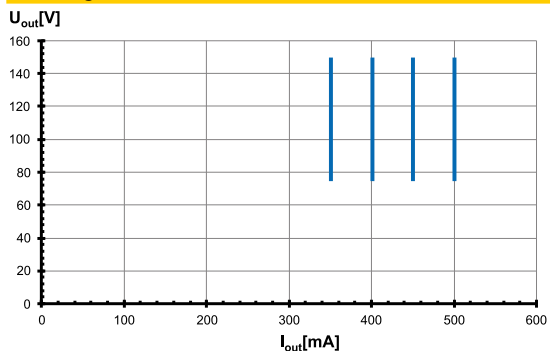


### Total harmonic factor (THD)

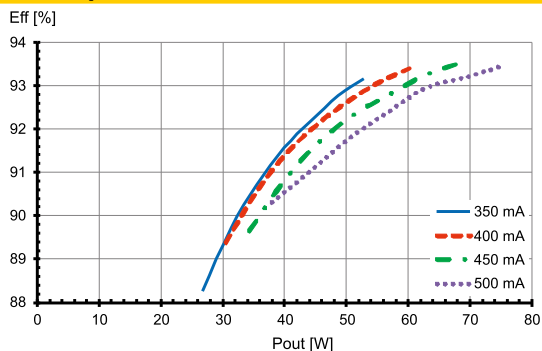


## Typ. performance graphs for 186983 / Type ECXe 500.411

### Working area



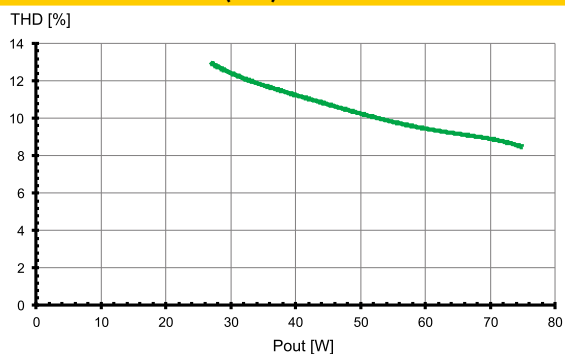
### Efficiency



### Power factor



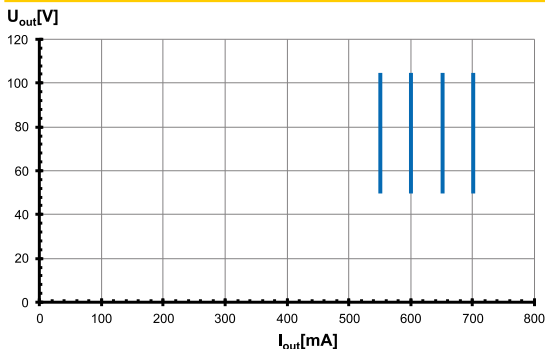
### Total harmonic factor (THD)



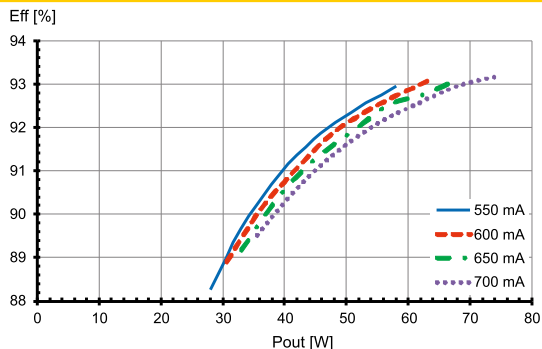
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## Typ. performance graphs for 186984 / Type ECXe 700.412

### Working area



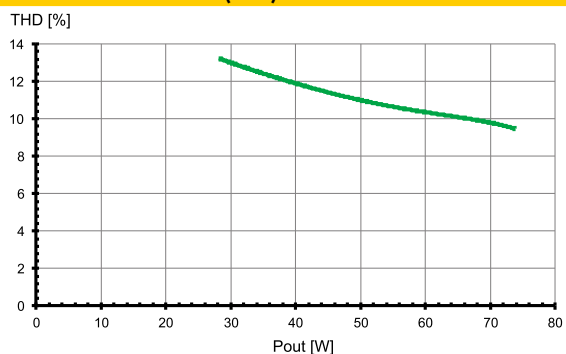
### Efficiency



### Power factor



### Total harmonic factor (THD)



## Safety functions

- Transient mains peaks protection:  
Values are in compliance with EN 61547 (interference immunity).  
Surges between L-N: up to 1 kV  
Surges between L/N-PE: up to 2 kV
- Short-circuit protection: The control gears are protected against permanent short-circuit with automatic restart function.
- Overload protection: The control gears only work in range of rated output power and voltage problemfree.  
Please check before switch-on mains power supply that the selected LED load is suitable (see Electrical Characteristics on data sheet).
- No load operation: The control gear is protected against no load operation (open load).
- If any of the above mentioned safety functions will be triggered, disconnect the control gear from the power supply then find and eliminate the cause of the problem.

## DC and emergency lighting operation

The control gears are suitable for direct voltage operation (DC). Reliable DC operation is guaranteed if the specified working area of LED driver is maintained.

- DC range: 198–276 V
- Reducing to 176 V: With reduced service life time possible
- Light level at DC operation ( $EOF_1$ ): 100% (not adjustable)
- DC operation: 3 hrs. according to EN 50172

The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.



## Assembly and Safety Information

Installation must be carried out under observation of the relevant regulations and standards. Installation must be carried out in a voltage-free state (i.e. disconnection from the mains). The following advices must be observed; non-observance can result in the destruction of the LED drivers, fire and/or other hazards.

### Mandatory regulations

- DIN VDE 0100
- EN 60598-1

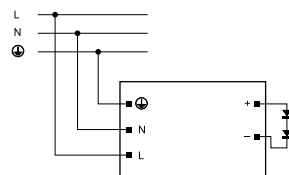
### Mechanical mounting

- Mounting position: Built-in: Any position inside a luminaire is allowed  
Independent application: Drivers are not allowed to use for independent applications
- Mounting location: LED drivers are designed for integration into luminaires or comparable devices.  
Installation in outdoor luminaires: degree of protection for luminaire with water protection rate  $\geq 4$  (e.g. IP54 required).
- Degree of protection: IP20
- Clearance: Min. 0.10 m from walls, ceilings and insulation
- Surface: Solid and plane surface for optimum heat dissipation required.
- Heat transfer: If the driver is destined for installation in a luminaire, sufficient heat transfer must be ensured between the driver and the luminaire casing.  
LED drivers should be mounted with the greatest possible clearance to heat sources.  
During operation, the temperature measure at the driver's  $t_c$  point must not exceed the specified maximum value.
- Fastening: Using M4 screws in the designated holes

### Electrical installation

- Connection terminals: Push-in terminals for rigid conductors with a section of 0.5–1.5 mm<sup>2</sup>; AWG20-16
- Stripped length: 8–9 mm
- Wiring: The mains conductor within the luminaire must be kept short (to reduce the induction of interference).  
Mains and lamp conductors must be kept separate and if possible should not be laid in parallel to one another.
- Polarity: Please ensure the correct polarity of the leads prior to commissioning. Reversed polarity can destroy the modules.

- Secondary load: The sum of forward voltages of LED loads has to be within the tolerances which are mentioned in the table "Electrical Characteristics" in this data sheet.
- Wiring diagram:



### Selection of automatic cut-outs for VS LED drivers

- Dimensioning automatic cut-outs  
High transient currents occur when an LED driver is switched on because the capacitors have to load. Ignition of LED modules occurs almost simultaneously. This also causes a simultaneous high demand for power. These high currents when the system is switched on put a strain on the automatic conductor cut-outs, which must be selected and dimensioned to suit.
- Release reaction  
The release reaction of the automatic conductor cut-outs comply with VDE 0641, part 11, for B, C characteristics. The values shown in the following tables are for guidance purposes only and are subject to system-dependent change.
- No. of LED drivers  
The maximum number of VS LED drivers applies to cases where the devices are switched on simultaneously. Specifications apply to single-pole fuses. The number of permissible drivers must be reduced by 20% for multi-pole fuses. The considered circuit impedance equals 400 mΩ (approx. 20 m [2.5 mm<sup>2</sup>] of conductor from the power supply to the distributor and a further 15 m to the luminaire).

| Type                   | Ref. No.      | Automatic cut-out type and possible no. of VS drivers pcs. |        |        |        |        |        |
|------------------------|---------------|------------------------------------------------------------|--------|--------|--------|--------|--------|
| Automatic cut-out type |               | B 10 A                                                     | B 13 A | B 16 A | C 10 A | C 13 A | C 16 A |
| ECXe 350.327           | <b>186820</b> | 27                                                         | 35     | 44     | 45     | 59     | 73     |
| ECXe 250.410           | <b>186982</b> | 27                                                         | 35     | 43     | 45     | 59     | 73     |
| ECXe 350.331           | <b>186824</b> | 13                                                         | 17     | 21     | 22     | 29     | 35     |
| ECXe 700.412           | <b>186984</b> | 12                                                         | 15     | 19     | 20     | 26     | 32     |
| ECXe 500.411           | <b>186983</b> | 12                                                         | 16     | 20     | 21     | 27     | 34     |

- To limit capacitive inrush currents the current carrying capacity of each circuit breaker (fuse) can be increased with the help of our ESB (Ref. No.: 149820, 149821, 149822) inrush current limiters.

The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.