

CC LINEAR  
LEDSET  
DIMMABLE



PRIMELINE LEDSET L-R1 DALI

186564, 186565

**Typical Applications**

Built-in in compact luminaires for

- Office lighting
- Industry lighting



PrimeLine LEDSet L-R1 DALI

- **SELECTABLE OUTPUT CURRENT VIA LEDSET**
- **DIMMABLE: DALI (ED. 1) AND PUSH KEY**
- **VERY LOW RIPPLE CURRENT: < 1%**
- **SUITABLE FOR EMERGENCY ESCAPE LIGHTING SYSTEMS ACC. TO EN 50172**
- **LONG SERVICE LIFE: UP TO 100,000 HRS.**
- **PRODUCT GUARANTEE: 5 YEARS**



## Primeline LEDSet L-R1 DALI

### Product features

- Linear casing shape

### Functions

- The output current can be freely adjusted between 275 mA and 700 mA by using a resistor (according LEDSet standard).

### Electrical features

- Mains voltage: 220–240 V  $\pm 10\%$
- Mains frequency: 50–60 Hz
- DC operation: 198–276 V, 0 Hz
- Push-in terminals: 0.2–1.5 mm<sup>2</sup>
- Power factor at full load  
186564: > 0.98  
186565: > 0.96
- Max. operation voltage (U<sub>OUT</sub>): 250 V
- Secondary side switching of LED modules is not allowed.

### Dimming

- Dimming function is realised by hybrid dimming.  
Analogue dimming:  $\geq 275$  mA  
PWM dimming: < 275 mA
- Dimming range: 3 to 100%
- If no dimming interface is connected, brightness will stay at 100%.

### 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
- Overtemperature protection
- Protection against "no load" operation
- Degree of protection: IP20
- Protection class I

### Packaging units

Ref. No.	Packaging unit		Weight g
	Pieces per box	Boxes per pallet	
186564	20	48	265
186565	20	48	235



### Applied standards

- EN 61347-1
- EN 61347-2-13
- EN 61547
- EN 61000-3-2
- EN 62384
- EN 62386
- EN 55015



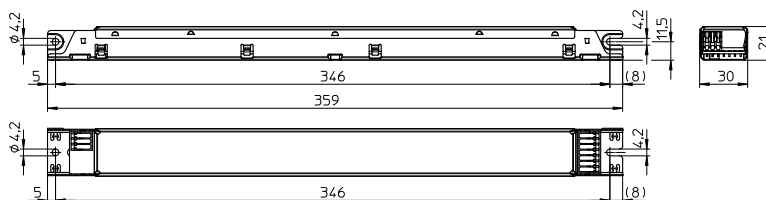
### Dimming

Hybrid (analogue/PWM)



### Dimensions

- Casing: M10
- Length: 359 mm
- Width: 30 mm
- Height: 21 mm



### Current adjustment



### 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.

# LED Drivers – Primeline LEDSet L-R1 DALI

## 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 %
42	ECXd 700.214	<b>186565</b>	220–240	215–200	26 / 200	275–700	30–153	< 12.7	> 91	< 1
84	ECXd 700.213	<b>186564</b>	220–240	410–380	32 / 240	275–700	60–220	< 5.4	> 94	< 1

\* Factory setting for current output: 275 mA; no resistor is necessary

## 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.		
186565	-25	+50	5	60	-40	+85	5	95	+60	IP20
186564									+75	

## Expected service life time

at operation temperatures at  $t_c$  point

Operation current	Ref. No. 186565		Ref. No. 186564	
	All	50 °C	60 °C	65 °C
hrs.	100,000	50,000	100,000	50,000

## Product labels

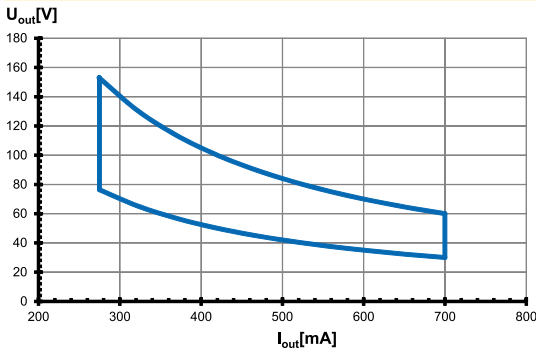
<ul style="list-style-type: none"> <li>■ </li> <li>■ N</li> <li>■ ~</li> <li>■ PUSH</li> <li>■ do</li> <li>■ DALI</li> </ul>	<b>INPUT</b> <b>Un=220...240 V~</b> In = 410...380 mA fn = 50...60 Hz I = 0,97 Range of application DC 198...264V	 <b>VOS LIGHTING SOLUTIONS</b> Vossloh-Schwabe Deutschland GmbH Hohe Steinert 8 · 58509 Lüdenscheid Dimmable and current selectable electronic converter for LED <b>Type ECXd 700.213</b> Ref.-No. 186564 Made in Serbia (Europe)	EN 61347-1 EN 61347-2-13 EN 62384 EN 62386 EN 61547 EN 55015 EN 61000-3-2	  	<b>OUTPUT</b> Irated (mA) 275...700 mA rms U <sub>I</sub> (V) 60...220 V Prated (W) 42...84 W tc (°C) 75 to (°C) -25...+50 U <sub>o</sub> (V) <250	LEDset ■ GNDset ■ LED+ ■ LED- ■
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<ul style="list-style-type: none"> <li>■ </li> <li>■ N</li> <li>■ ~</li> <li>■ PUSH</li> <li>■ do</li> <li>■ DALI</li> </ul>	<b>INPUT</b> <b>Un=220...240 V~</b> In = 215...200 mA fn = 50...60 Hz I = 0,95 Range of application DC 198...264V	 <b>VOS LIGHTING SOLUTIONS</b> Vossloh-Schwabe Deutschland GmbH Hohe Steinert 8 · 58509 Lüdenscheid Dimmable and current selectable electronic converter for LED <b>Type ECXd 700.214</b> Ref.-No. 186565 Made in Serbia (Europe)	EN 61347-1 EN 61347-2-13 EN 62384 EN 62386 EN 61547 EN 55015 EN 61000-3-2	  	<b>OUTPUT</b> Irated (mA) 275...700 mA rms U <sub>I</sub> (V) 30...153 V Prated (W) 21...42 W tc (°C) 60 to (°C) -25...+50 U <sub>o</sub> (V) <250	LEDset ■ GNDset ■ LED+ ■ LED- ■
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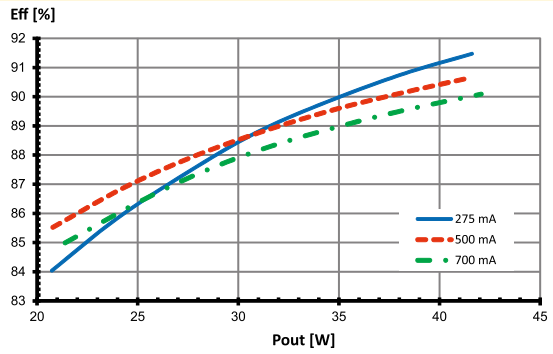
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## Typ. performance graphs for 186565 / Type ECXd 700.214

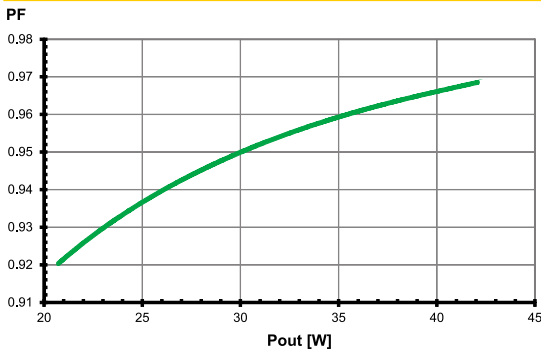
### Working area



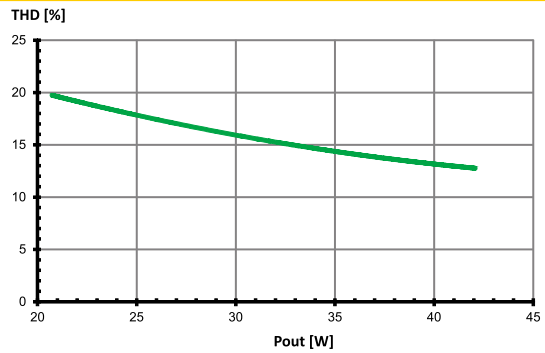
### Efficiency



### Power factor

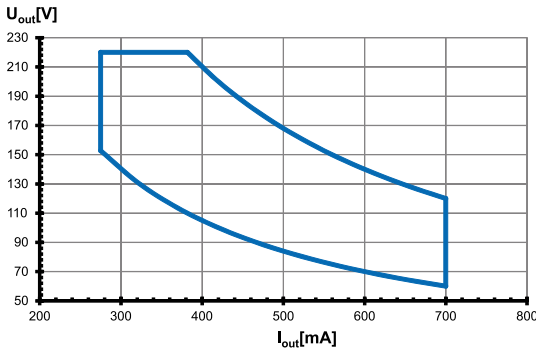


### Total harmonic factor (THD)

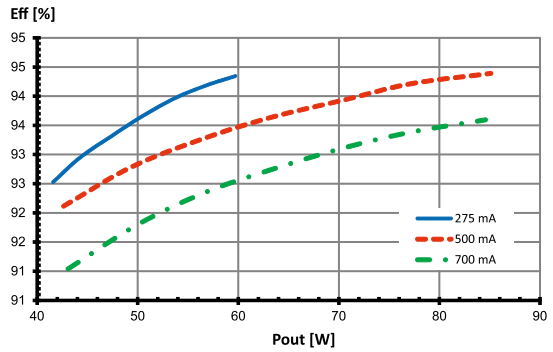


## Typ. performance graphs for 186564 / Type ECXd 700.213

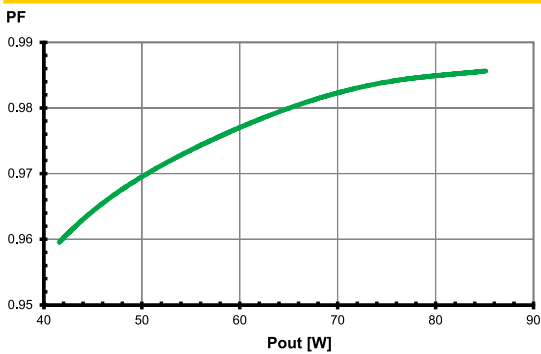
### Working area



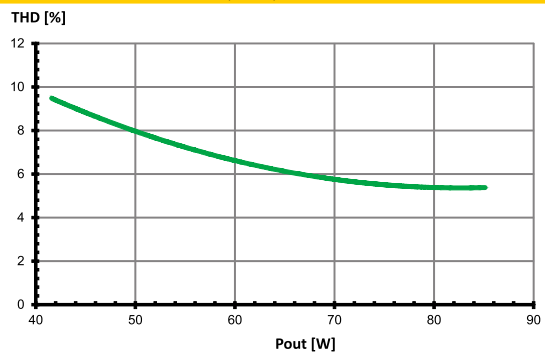
### Efficiency



### Power factor



### Total harmonic factor (THD)



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## 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 gear is protected against permanent short-circuit with automatic restart function.
- Overload protection: The control gear only works 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).
- Overheating: The control gear has overheating protection acc. to IEC 61347-1 C 5e.  
In case of overheating the control gear will shut down. For restart switch of the mains for 1 min. and start again.  
In case of overheating the control gear will dimm down and if necessary shut down.  
After cooling the operating device will start again and dimm automatically to the last dimm level.
- 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.

## Output voltage ( $U_{OUT}$ )

According to EN 61347-1,  $U_{OUT}$  indicates which voltage can occur at the output terminals directly or between the output terminals and the PE terminal of the LED driver. This value is given for non-insulated drivers. The used LED module must have an insulation voltage that is at least as high as the specified  $U_{OUT}$  voltage of the driver.

## Leakage current

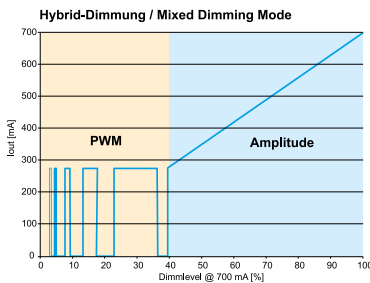
Leakage currents are present in all electronic converters or luminaires with PE connection and must be observed especially when using non-insulated LED drivers.

The PCB surfaces of LED modules form a capacitance with grounded LED aluminum circuit boards, heat sinks or mounting plates. This leads to capacitive leakage currents between the connection poles of the LED (+ and -) and the PE terminal. These capacitances should be kept as small as possible, since they are responsible for a possible glowing or flickering of the LEDs in standby mode. In extreme cases, the maximum permissible leakage current of the luminaire according to EN 60598 paragraph 10.3 may be exceeded. The leakage current is also relevant when using RCD circuit breakers.

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## Dimming

- Down to 275 mA the dimming is realized by amplitude dimming (see graphic). For dimming < 275 mA a PWM method at 2 kHz is used. IEEE 1789-15 will be observed.
- Max. dimming speed: 0.075 seconds
- Dimming curve is adapted to the eye sensitiveness.



## PUSH function characteristic

- Just one key for dimming and ON/OFF
- Polarity- and phase-independent control
- Control input with large working voltage range
- Suitable for multi-layer control
- Fully DC-compatible – no functional restrictions during DC operation
- After disconnection from the primary voltage the ballast will reproduce the last stored lighting level
- Soft start
- Automatic recognition of DALI and PUSH signals

## PUSH operating voltage ranges during control signal input

LED driver type	ECXd 700.213, ECXd 700.214	All other DALI/PUSH ballasts
AC	220–240 V ±10%	10–230 V
DC	198–264 V	–

Failing to observe these working voltage ranges can lead to non-recognition of the signals; exceeding the maximum voltages can lead to the destruction of the data inputs.

## PUSH control signals (key activation)

Short push	(80 ms < t < 460 ms)	(0 ms < t < 500 ms)
	Is used to switch between ON/OFF lighting states. After the device is switched on, the last selected lighting level is restored and the next dimming direction will be upwards.	
Long push	(460 ms < t < 10 s)	(500 ms < t < ∞)
	Is used to dim upwards or downwards; a long push will change the dimming direction. Thus, a long push will reverse the dimming direction until the upper or lower limit is reached. If the light was off, a long push will switch it on and the dimmer will start at the lowest light intensity.	
Push to synchronise	(t > 10 s)	long – short – long
	Light is dimmed to the preset factory level and the next dimming direction will be upwards.	Starting situation: luminaires are switched off. The "long – short – long" combination first switches the lamp on, then off and finally on again, after which it gets gradually brighter. The EBs will be synchronised again after this procedure.
Synchronisation	Any 1-key dimmer that does not feature a central control module (as each ballast will have its own controls) can develop asynchronous behaviour (e.g. children might play with the key). The system will then be out of sync, i.e. some lamps will be on, others off or the dimming direction will differ from lamp to lamp.	
	Two methods of synchronisation can be used: <ul style="list-style-type: none"> <li>• Push the key for more than 10 seconds, after which the light will be dimmed to a preset level and the next dimming direction will be upwards.</li> <li>• Start with a long push of the key so that all lamps are switched on. Follow with a short push to turn the system off. The system will now be resynchronised.</li> </ul>	

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## 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

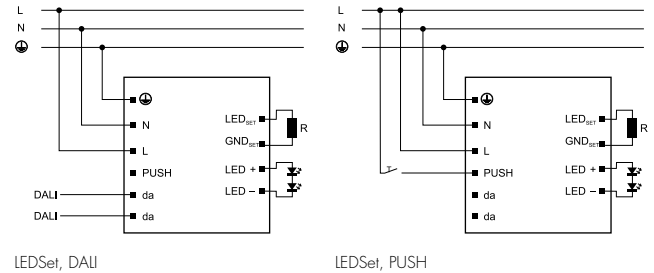
### Mechanical mounting

- 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
- Tightening torque: 0.2 Nm

### Electrical installation

- Connection terminals: Push-in terminals for rigid or flexible conductors with a section of 0.2–1.5 mm<sup>2</sup>
- Stripped length: 8.5–10 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.
- Through-wiring: Is not allowed.

- Secondary load: The sum of forward voltages of LED loads is within the tolerances which are mentioned in the Electrical Characteristics on the 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 m $\Omega$  (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.		
<b>Automatic cut-out type B</b>				
		B 10 A	B 13 A	B 16 A
ECXd 700.213	<b>186564</b>	10	13	16
ECXd 700.214	<b>186565</b>	15	20	25
<b>Automatic cut-out type C</b>				
		C 10 A	C 13 A	C 16 A
ECXd 700.213	<b>186564</b>	17	22	28
ECXd 700.214	<b>186565</b>	26	34	41

- To limit capacitive inrush currents the current carrying capacity of each circuit breaker (fuse) can be increased by a factor of 2.5 with the help of our ESB (Ref. No.: 149820, 149821, 149822) inrush current limiters.

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## Choice of LEDSet Resistor

### Output current selection:

- The output current can be adapted within the rated output current range
  - between 275 and 700 mA.
- To change the preset output current it is necessary to use the correct LEDSet resistor. Values for different currents are figured out in the table below.
- The LEDSet resistor should have a maximum tolerance of 1%.
- Please refer to the electrical values and the operating window to see which combinations are possible.
- Output current / needed LEDSet resistor can be calculated as follows:

$$I_{OUT} = 5V/R_{set} \times 1000$$

$$R_{set} = 5V/I_{OUT} \times 1000$$

- If no LEDSet resistor is mounted (delivery condition) output current is less than nominal ( $I_{min.}$ )
- If LEDSet interface is short circuit output current is limited to  $I_{max.}$

Resistors		ECXd 700.213				ECXd 700.214			
Nominal current $I_{rated}$ mA	Resistor R kΩ	LED output voltage $U_{LED}$		LED nominal output $P_{rated}$		LED output voltage $U_{LED}$		LED nominal output $P_{rated}$	
		V min.	V max.	W min.	W max.	V min.	V max.	W min.	W max.
275	18.18	153	220	42.1	60.5	76	153	20.9	42.1
300	16.67	140	220	42.0	66.0	70	140	21.0	42.0
325	15.38	129	220	41.9	71.5	64	129	20.8	41.9
350	14.29	120	220	42.0	77.0	60	120	21.0	42.0
375	13.33	112	220	42.0	82.5	56	112	21.0	42.0
400	12.50	105	210	42.0	84.0	52	105	20.8	42.0
425	11.76	98	197	41.7	83.7	49	99	20.8	42.1
450	11.11	93	186	41.9	83.7	46	93	20.7	41.9
475	10.53	88	176	41.8	83.6	44	88	20.9	41.8
500	10.00	84	168	42.0	84.0	42	84	21.0	42.0
525	9.52	80	160	42.0	84.0	40	80	21.0	42.0
550	9.09	76	152	41.8	83.6	38	76	20.9	41.8
575	8.70	73	146	42.0	84.0	36	73	20.7	42.0
600	8.33	70	140	42.0	84.0	35	70	21.0	42.0
625	8.00	67	134	41.9	83.8	33	67	20.6	41.9
650	7.69	64	129	41.6	83.9	32	65	20.8	42.3
675	7.41	62	124	41.9	83.7	31	62	20.9	41.9
700	7.14	60	120	42.0	84.0	30	60	21.0	42.0

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