

# LED LINE SMD TUNEABLE

L28/56 W2



## LED LINE SMD TUNEABLE - L28/56 W2

**WU-M-643 / WU-M-644**

### Typical Applications

Built-in luminaires/general illumination

- Office lighting
- Retail, corridor and shelf lighting
- T5/T8 replacement as built-in module
- Furniture lighting
- Backlighting for advertising

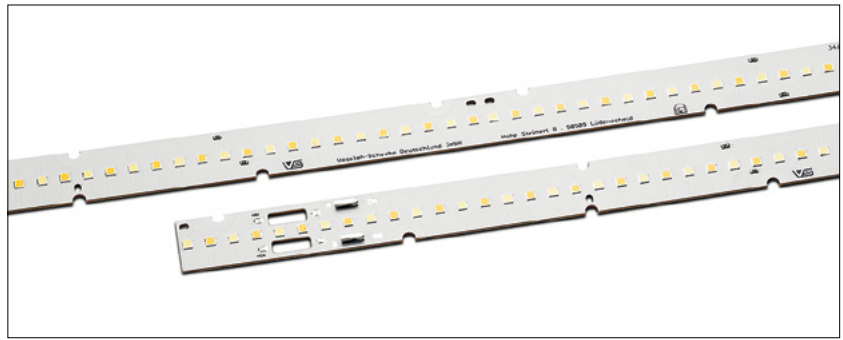
### LED Line SMD Tuneable W2

- **COLOUR DYNAMIC FROM 2700 TO 6500 K**
- **LONG SERVICE LIFE TIME: > 60,000 H (L80, B10)**
- **HIGHLY EFFICIENT: UP TO 175 LM/W  
AT  $T_p = 50^\circ\text{C}$**
- **2 LENGTHS AVAILABLE: 280 / 560 MM**
- **ZHAGA-COMPLIANT HOLE DISTANCE**

## LED Line SMD Tuneable - L28/56 W2

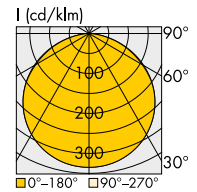
### Technical Notes

- LED built-in module for integration into luminaires
- Dimensions  
WU-M-643: 280x20 mm  
WU-M-644: 560x20 mm
- Driving current: 350 mA / 500 mA / 700 mA
- On-board push-in connector (WAGO 2065)
- Colour tolerance: 3-step MacAdam or 4-step MacAdam at colour mixing



### Typical Light Distribution Curve

Data are available in .ldt format for download under [www.vossloh-schwabe.com](http://www.vossloh-schwabe.com).



### Covers and W2 optics

Please visit our homepage for details for suitable covers and W2 optics:

- [www.vossloh-schwabe.com/en/products/optics-reflectors/linear-covers/linear-covers-1-for-led-line-smd-w2-pcb/](http://www.vossloh-schwabe.com/en/products/optics-reflectors/linear-covers/linear-covers-1-for-led-line-smd-w2-pcb/)
- [www.vossloh-schwabe.com/en/products/optics-reflectors/linear-optics/linear-optics-1-for-led-line-smd-w2-pcb/](http://www.vossloh-schwabe.com/en/products/optics-reflectors/linear-optics/linear-optics-1-for-led-line-smd-w2-pcb/)

### Electrical Characteristics

bei  $t_c1 / t_c2 (t_p) = 50 \text{ }^\circ\text{C}$

Type	Number of LEDs*	Typ. voltage DC** (V)						Typ. power consumption** (W)					
		350 mA		500 mA		700 mA		350 mA		500 mA		700 mA	
		CRI 80	CRI 90	CRI 80	CRI 90	CRI 80	CRI 90	CRI 80	CRI 90	CRI 80	CRI 90	CRI 80	CRI 90
WU-M-643	18	16.9	17.2	17.4	17.8	18.1	18.6	5.9	6	8.7	8.9	12.7	13
WU-M-644	36	33.8	34.4	34.9	35.6	36.3	37.1	11.8	12	17.4	17.8	25.4	26

\* per channel | \*\* Tolerance of voltage and power:  $\pm 10\%$  / data per channel

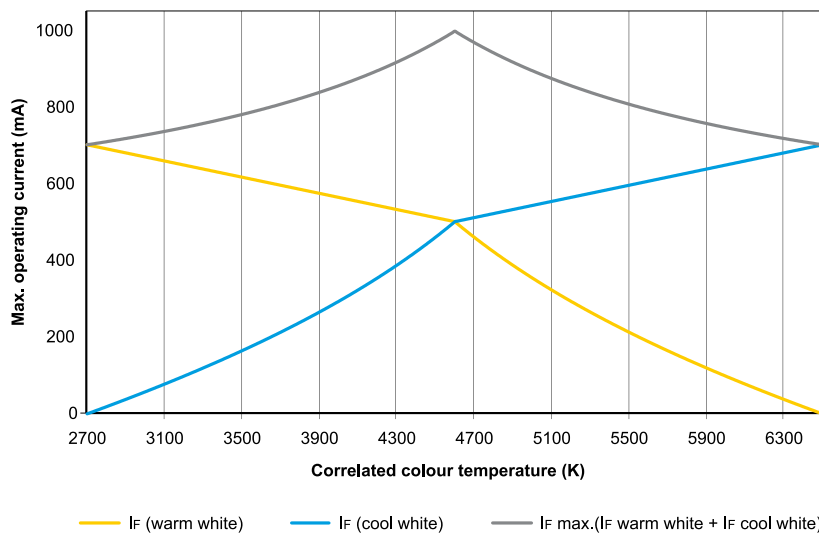
**Use of external LED constant current driver required.**

### Maximum Ratings

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

Type	Operating current (mA)	Operation temperature range at $t_c$ point		Storage temperature range		Max. allowed repetitive peak current mA
		$^\circ\text{C}$ min.	$^\circ\text{C}$ max.	$^\circ\text{C}$ min.	$^\circ\text{C}$ max.	
All types	350	-20	+80	-40	+100	1200
	500	-20	+80	-40	+100	1200
	700	-20	+80	-40	+100	1200

### Max. operating current vs. colour temperature



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## LED Line SMD Tuneable – L28/56 W2

### Operating Life

L80/B10

in hours at measured temperature at  $t_p$  point

Type	350 mA			500 mA			700 mA		
	40 °C	50 °C	75 °C	40 °C	50 °C	75 °C	40 °C	50 °C	75 °C
WU-M-643	> 60,000	> 60,000	> 60,000	> 60,000	> 60,000	> 60,000	> 60,000	> 60,000	> 60,000
WU-M-644	> 60,000	> 60,000	> 60,000	> 60,000	> 60,000	> 60,000	> 60,000	> 60,000	> 60,000

### Optical Characteristics

at  $t_c1 / t_c2 (t_p) = 50 °C$ ; without secondary optics

Type	Ref. No. Connection		Colour	Correlated colour temperature* K	Luminous flux** (lm) and efficiency** (lm/W) at						Min. CRI $R_G$	Beam angle °	
	Small top (STC)	Bottom (BC)			350 mA		500 mA		700 mA				
				typ. lm		typ. lm/W		typ. lm		typ. lm/W			
<b>LED Line SMD Tuneable White – 280 mm – 18 LEDs per channel</b>													
WU-M-643	570381	570382	Tuneable White	2700	995	169	1395	160	1900	150	80	120	
				6500	1035	175	1445	166	1970	155			
WU-M-643	570383	570384	Tuneable White	2700	825	137	1155	130	1565	121	90	120	
				6500	855	142	1190	134	1615	124			
<b>LED Line SMD Tuneable White – 560 mm – 36 LEDs per channel</b>													
WU-M-644	570385	570386	Tuneable White	2700	1995	169	2790	160	3800	150	80	120	
				6500	2070	175	2895	166	3945	155			
WU-M-644	570387	570388	Tuneable White	2700	1655	137	2305	130	3135	121	90	120	
				6500	1705	142	2380	134	3235	124			

\* Colour tolerance: 3-step MacAdam or 4-step MacAdam at color mixing | \*\* Production tolerance of luminous flux and efficiency: ± 10%

**Minimum order quantity (packaging unit): 120 pcs.**

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## LED Line SMD Tuneable - L28/56 W2

### Tuneable Characteristics - CRI 80

at  $t_c1 / t_c2 (t_p) = 50 \text{ }^\circ\text{C}$ ; without secondary optics

**CCT (K) for type WU-M-643**

Channel 1 / 2700 K	700 mA	2720 K	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed
	600 mA	2720 K	3030 K	3290 K	not allowed	not allowed	not allowed	not allowed	not allowed
	500 mA	2720 K	3090 K	3380 K	3630 K	3840 K	4020 K	not allowed	not allowed
	400 mA	2720 K	3170 K	3510 K	3790 K	4020 K	4220 K	not allowed	not allowed
	300 mA	2720 K	3290 K	3700 K	4020 K	4270 K	4480 K	not allowed	not allowed
	200 mA	2720 K	3510 K	4020 K	4380 K	4650 K	4850 K	5010 K	not allowed
	100 mA	2720 K	4020 K	4650 K	5010 K	5260 K	5430 K	5560 K	not allowed
	0 mA		6480 K	6480 K	6480 K	6480 K	6480 K	6480 K	6480 K
<b>Operating current</b>	0 mA	100 mA	200 mA	300 mA	400 mA	500 mA	600 mA	700 mA	
<b>Channel 2 / 6500 K</b>									

**CCT (K) for type WU-M-644**

Channel 1 / 2700 K	700 mA	2720 K	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed
	600 mA	2720 K	3030 K	3290 K	not allowed	not allowed	not allowed	not allowed	not allowed
	500 mA	2720 K	3090 K	3380 K	3630 K	3840 K	4020 K	not allowed	not allowed
	400 mA	2720 K	3160 K	3510 K	3790 K	4020 K	4210 K	not allowed	not allowed
	300 mA	2720 K	3290 K	3700 K	4020 K	4270 K	4480 K	not allowed	not allowed
	200 mA	2720 K	3510 K	4020 K	4380 K	4640 K	4850 K	5010 K	not allowed
	100 mA	2720 K	4020 K	4640 K	5010 K	5250 K	5430 K	5560 K	not allowed
	0 mA		6480 K	6480 K	6480 K	6480 K	6480 K	6480 K	6480 K
<b>Operating current</b>	0 mA	100 mA	200 mA	300 mA	400 mA	500 mA	600 mA	700 mA	
<b>Channel 2 / 6500 K</b>									

**Typ. luminous flux (lm) for type WU-M-643**

Channel 1 / 2700 K	700 mA	1900 lm	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed
	600 mA	1650 lm	1965 lm	2260 lm	not allowed	not allowed	not allowed	not allowed	not allowed
	500 mA	1395 lm	1710 lm	2005 lm	2290 lm	2570 lm	2840 lm	not allowed	not allowed
	400 mA	1130 lm	1445 lm	1740 lm	2025 lm	2305 lm	2575 lm	not allowed	not allowed
	300 mA	860 lm	1175 lm	1470 lm	1755 lm	2035 lm	2305 lm	not allowed	not allowed
	200 mA	585 lm	900 lm	1195 lm	1480 lm	1760 lm	2030 lm	2300 lm	not allowed
	100 mA	300 lm	615 lm	910 lm	1195 lm	1475 lm	1745 lm	2015 lm	not allowed
	0 mA		315 lm	610 lm	895 lm	1175 lm	1445 lm	1715 lm	1970 lm
<b>Operating current</b>	0 mA	100 mA	200 mA	300 mA	400 mA	500 mA	600 mA	700 mA	
<b>Channel 2 / 6500 K</b>									

**Typ. luminous flux (lm) for type WU-M-644**

Channel 1 / 2700 K	700 mA	3800 lm	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed
	600 mA	3300 lm	3925 lm	4515 lm	not allowed	not allowed	not allowed	not allowed	not allowed
	500 mA	2790 lm	3415 lm	4005 lm	4580 lm	5140 lm	5685 lm	not allowed	not allowed
	400 mA	2260 lm	2885 lm	3475 lm	4050 lm	4610 lm	5155 lm	not allowed	not allowed
	300 mA	1725 lm	2350 lm	2940 lm	3515 lm	4075 lm	4620 lm	not allowed	not allowed
	200 mA	1175 lm	1800 lm	2390 lm	2965 lm	3525 lm	4070 lm	4600 lm	not allowed
	100 mA	605 lm	1230 lm	1820 lm	2395 lm	2955 lm	3500 lm	4030 lm	not allowed
	0 mA		625 lm	1215 lm	1790 lm	2350 lm	2895 lm	3425 lm	3945 lm
<b>Operating current</b>	0 mA	100 mA	200 mA	300 mA	400 mA	500 mA	600 mA	700 mA	
<b>Channel 2 / 6500 K</b>									

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## LED Line SMD Tuneable - L28/56 W2

### Tuneable Characteristics - CRI 90

at  $t_c1 / t_c2 (t_p) = 50 \text{ }^\circ\text{C}$ ; without secondary optics

**CCT (K) for type WU-M-643**

Channel 1 / 2700 K	700 mA	2720 K	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed
	600 mA	2720 K	3030 K	3290 K	not allowed	not allowed	not allowed	not allowed	not allowed
	500 mA	2720 K	3080 K	3380 K	3630 K	3830 K	4010 K	not allowed	not allowed
	400 mA	2720 K	3160 K	3510 K	3790 K	4010 K	4210 K	not allowed	not allowed
	300 mA	2720 K	3290 K	3700 K	4010 K	4270 K	4470 K	not allowed	not allowed
	200 mA	2720 K	3510 K	4010 K	4370 K	4640 K	4840 K	5000 K	not allowed
	100 mA	2720 K	4010 K	4640 K	5000 K	5250 K	5420 K	5550 K	not allowed
	0 mA		6480 K	6480 K	6480 K	6480 K	6480 K	6480 K	6480 K
	<b>Operating current</b>	0 mA	100 mA	200 mA	300 mA	400 mA	500 mA	600 mA	700 mA
<b>Channel 2 / 6500 K</b>									

**CCT (K) for type WU-M-644**

Channel 1 / 2700 K	700 mA	2720 K	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed
	600 mA	2720 K	3030 K	3290 K	not allowed	not allowed	not allowed	not allowed	not allowed
	500 mA	2720 K	3080 K	3380 K	3630 K	3830 K	4010 K	not allowed	not allowed
	400 mA	2720 K	3160 K	3510 K	3790 K	4010 K	4210 K	not allowed	not allowed
	300 mA	2720 K	3290 K	3700 K	4010 K	4270 K	4470 K	not allowed	not allowed
	200 mA	2720 K	3510 K	4010 K	4370 K	4640 K	4840 K	5000 K	not allowed
	100 mA	2720 K	4010 K	4640 K	5000 K	5250 K	5420 K	5550 K	not allowed
	0 mA		6480 K	6480 K	6480 K	6480 K	6480 K	6480 K	6480 K
	<b>Operating current</b>	0 mA	100 mA	200 mA	300 mA	400 mA	500 mA	600 mA	700 mA
<b>Channel 2 / 6500 K</b>									

**Typ. luminous flux (lm) for type WU-M-643**

Channel 1 / 2700 K	700 mA	1565 lm	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed
	600 mA	1365 lm	1620 lm	1865 lm	not allowed	not allowed	not allowed	not allowed	not allowed
	500 mA	1155 lm	1410 lm	1655 lm	1895 lm	2120 lm	2345 lm	not allowed	not allowed
	400 mA	935 lm	1190 lm	1435 lm	1675 lm	1900 lm	2125 lm	not allowed	not allowed
	300 mA	715 lm	970 lm	1215 lm	1455 lm	1680 lm	1905 lm	not allowed	not allowed
	200 mA	485 lm	740 lm	985 lm	1225 lm	1450 lm	1675 lm	1890 lm	not allowed
	100 mA	250 lm	505 lm	750 lm	990 lm	1215 lm	1440 lm	1655 lm	not allowed
	0 mA		255 lm	500 lm	740 lm	965 lm	1190 lm	1405 lm	1615 lm
	<b>Operating current</b>	0 mA	100 mA	200 mA	300 mA	400 mA	500 mA	600 mA	700 mA
<b>Channel 2 / 6500 K</b>									

**Typ. luminous flux (lm) for type WU-M-644**

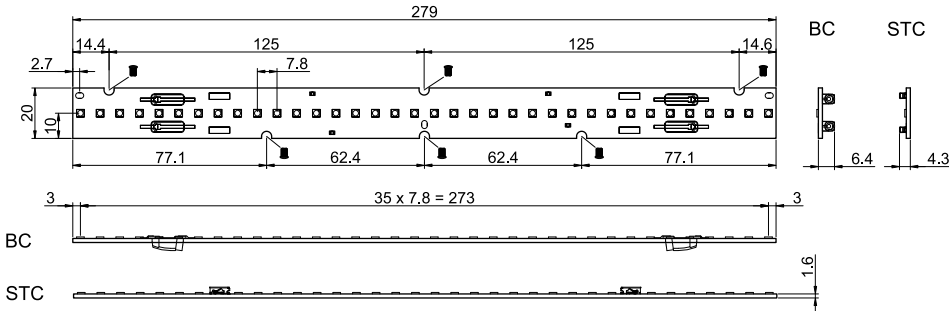
Channel 1 / 2700 K	700 mA	3130 lm	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed
	600 mA	2730 lm	3240 lm	3730 lm	not allowed	not allowed	not allowed	not allowed	not allowed
	500 mA	2310 lm	2820 lm	3310 lm	3790 lm	4240 lm	4690 lm	not allowed	not allowed
	400 mA	1870 lm	2380 lm	2870 lm	3350 lm	3800 lm	4250 lm	not allowed	not allowed
	300 mA	1430 lm	1940 lm	2430 lm	2910 lm	3360 lm	3810 lm	not allowed	not allowed
	200 mA	970 lm	1480 lm	1970 lm	2450 lm	2900 lm	3350 lm	3780 lm	not allowed
	100 mA	500 lm	1010 lm	1500 lm	1980 lm	2430 lm	2880 lm	3310 lm	not allowed
	0 mA		510 lm	1000 lm	1480 lm	1930 lm	2380 lm	2810 lm	3230 lm
	<b>Operating current</b>	0 mA	100 mA	200 mA	300 mA	400 mA	500 mA	600 mA	700 mA
<b>Channel 2 / 6500 K</b>									

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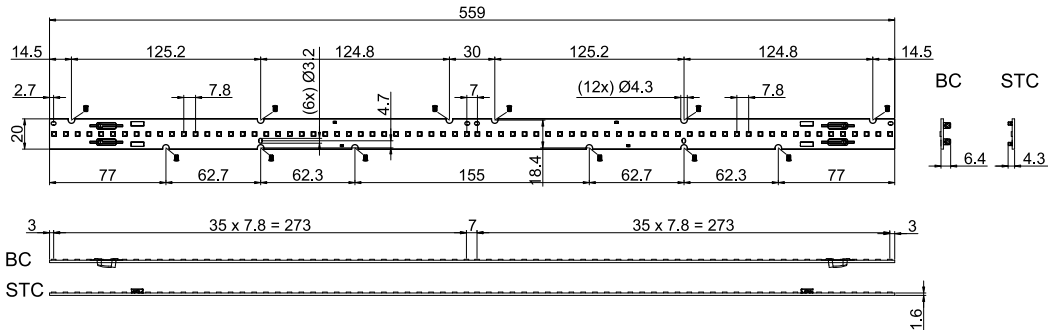
## LED Line SMD Tuneable - L28/56 W2

### Mechanical Dimensions

#### WU-M-643

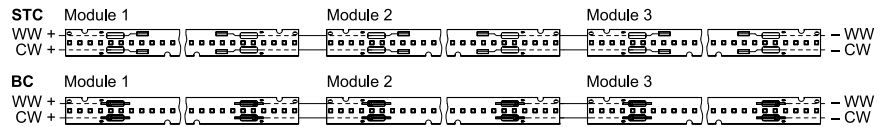


#### WU-M-644



### Connection Example

- The number of modules that can be connected in series depends on the available output voltage of the LED driver.
- The clearance and creepage distances are designed for working voltages up to 250 V DC (basic insulation) and 125 V DC (reinforced insulation).
- Max. diameter of screw head (M4): Ø 8 mm

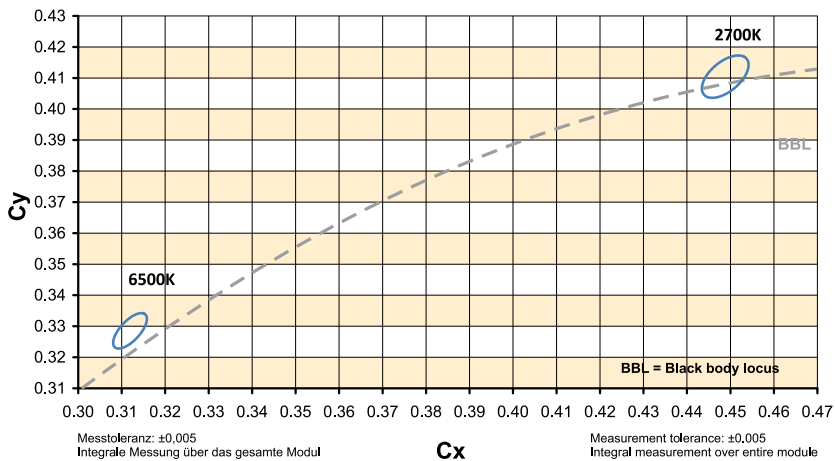


WU-M-643 / WU-M-644

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## LED Line SMD Tuneable - L28/56 W2

### Bins



### Fixing Clip

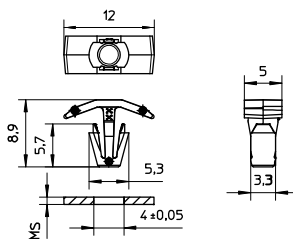
For fastening LED PCBs to luminaire sheets without needing screws

PCB hole dia.: 4.3-4.5 mm

Vibration resistant version

Material: PC, white (UL-94 V2)

Weight: 0.2 g, Packaging unit: 1000 pcs. (.11 = 10,000 pcs.)



Type	Ref. No.	For luminaire sheet thickness (MS) mm
98050	<b>562870</b>	0.5-1.0*

\* PCB thickness: 1.6 mm

## Linear LED Constant Current Drivers

Please visit our homepage for details for suitable

LED constant current drivers: [www.vossloh-schwabe.com](http://www.vossloh-schwabe.com)

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## LED Line SMD Tuneable – L28/56 W2

### Assembly and Safety Information

Installation must be carried out under observation of the relevant regulations and standards. The LED modules are designed for operation within a casing or luminaire. Installation must be carried out in a voltage-free state (i.e. disconnection from the mains). The following advice must be observed; non-observance can result in the destruction of the LED assembly modules, fire and/or other hazards.

- Consider safety regulations acc. EN 60598 in the luminaire design, especially when the operating LED driver is not galvanic isolated.
  - In mode of operation regard to sufficient isolation.
  - Live parts must not be touched in operation mode.
    - Danger in life!!!
- ESD (electrostatic discharge) protection measures must be observed when handling and installing the LED modules. See VS's application notes on ESD protection.
- Adequate anti-static electricity measures, including the use of conductive shoes, ionizers, work bench grounding, wrist straps, flooring and stools should be used.
- LED assembly modules must not be subjected to any undue mechanical stress, e. g.:
  - do not treat as bulk cargo
  - avoid shear and compressive forces during handling and installation
  - do not damage circuit paths
  - avoid any pressure on the light emitting surface
- Safe operation only possible by the use of external constant current sources ( $I_{max}$ . see table "Electrical Characteristics").
- Operation only with power supply units that feature the following protection:
  - Short-circuit protection
  - Overload protection
  - Overheating protection
- The module can be fixed with M4 screws. Fixation only with flat or cylinder head screws (M4) (no countersank screws)  
Max. torque: 1.2 Nm (M4)
- Please ensure the correct polarity of the leads prior to commissioning. Reversed polarity can destroy the modules.
- For interconnection the LED modules is equipped with push-in terminals.
- Safety regulations acc. to EN 60598 (or further standards) has to be observed if the maximum output voltage exceed the permitted touchable value.
- Measurement tolerances:
  - luminous flux:  $\pm 7\%$
  - voltage:  $\pm 3\%$
  - CRI:  $\pm 1$
- The following points must be observed when connecting LED modules in parallel:
  - All LED strings that are wired in parallel must contain the same number of LEDs (symmetrical loading).
  - Owing to differing forward biases, there can be a difference of up to 10% in brightness between modules connected in parallel.



- To ensure problem-free operation, the specified maximum temperature at the  $t_p$  point (see "Operating Life") must be observed (and measured in accordance with EN 60598-1). To satisfy this point, it may be necessary to put measures in place to ensure any heat is dissipated from the PCB to the environment.
- In the event of outdoor applications or applications in damp locations, care must be taken to protect LED assembly modules against humidity, splashes and jets of water. Any corrosion damage resulting from humidity or contact with condensation will not be recognised as a defect or manufacturing fault. LED assembly modules are not specially protected against foreign bodies or dust. Depending on the type of application, further protection must be ensured to prevent dust and foreign bodies from entering.
- Due to the manufacturing process, the PCBs of the LED assembly modules can have sharp edges and corners. Care must therefore be taken during handling and installation to avoid injury.
- For optimal load of used constant current driver the modules can only be connected in series. The quantity of LED modules is limited by the sum of forward voltage and the capacity of used constant current driver. Safety regulations acc. to EN 60598 has to be observed if the sum of forward voltage exceed the permitted touchable value.
- Operating LED modules in the presence of certain chemical substances or in chemically enriched (aggressive) environments can impair module functionality or even cause total module failure. Detailed information can be found in our "Chemical Incompatibility" PDF on our website [www.vossloh-schwabe.com](http://www.vossloh-schwabe.com)
- The photobiological safety of the LED modules must be classified into risk groups in accordance with EN 62471: 2008. Rating in accordance with IEC / TR 62778: risk group 1

CCT K	Max. operating current for risk group 1 mA	E threshold for higher operating currents lx
2700	846 (max. rated 700 mA)	1130
6500	550	773

### Applied Standards

EN 62031

LED modules for general lighting – Safety specifications

EN 62471

Photobiological safety of lamps and lamp systems

### 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.

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