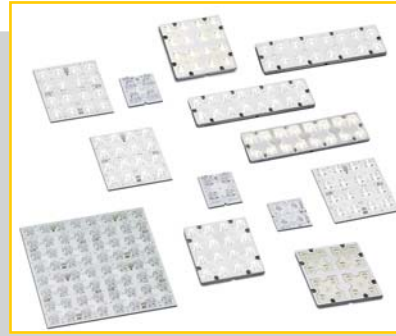


## M-CLASS, S-CLASS, AREA

### IP20 BUILT-IN MODULES



## LED STREET AND OUTDOOR LIGHTING

### WU-M-444/B, WU-M-475, WU-M-488

These LED modules are suitable for standard-compliant street lighting, paths and squares in accordance with EN 13201.

These modules were designed for built-in into luminaire casings. They enable a modular luminaire design.

The VS ECXd 700/150 W LED driver enables power reduction via phase inversion.

The modules are available in three shapes (4, 16 or 64 LEDs) and in three white colour tones.

#### Typical Applications

- Integration in luminaires
- Streetlighting for ME- and S-classes (acc. to EN 13201)
- Illumination of public places

#### LED Street and Outdoor Lighting

■ **HIGHLY EFFICIENT: UP TO 136 LM/W**

■ **VERY HOMOGENOUS ILLUMINATION**


■ **SURGE PROTECTION: 4 KV**

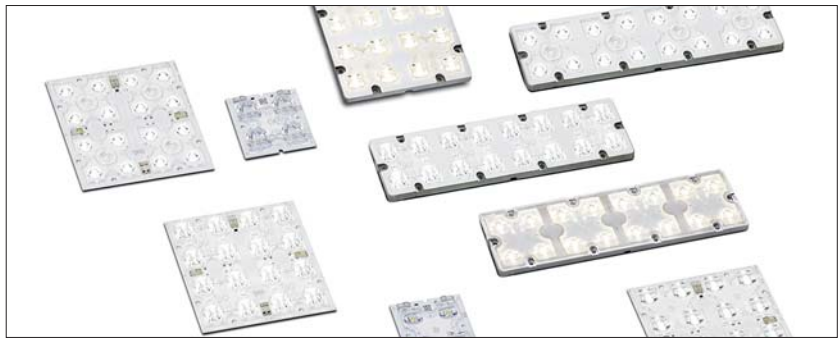
■ **VDE APPROVED (ACC. TO EN 62031)**



## M-Class, S-Class, Area

### Technical Notes

- LED built-in module for integration into luminaires 
- 4, 16 or 64 high-efficiency High Power LEDs
- Push-in terminals (WAGO series 2060)
- Design for optimum thermal management
- Degree of protection: IP20
- ESD protection class 2
- Surge protection: 4 kV



### Electrical Characteristics at $t_p = 60\text{ }^\circ\text{C}$

Type	Ref. No.	Number of LEDs	Colour	Typ. voltage DC* (V)				Temperature coefficient (mV/K)	Typ. power consumption (W)			
				400 mA	700 mA	1050 mA	1400 mA		400 mA	700 mA	1050 mA	1400 mA
WU-M-444/B	<b>All types</b>	4	All	11.3	12	13	13.8	-10	4.5	8.4	13.7	19.3
WU-M-475/16	<b>All types</b>	16	All	45	48	52	55	-40	18	33.6	54.6	77
WU-M-488	<b>All types</b>	16	All	45	48	52	55	-40	18	33.6	54.6	77
WU-M-475/64	<b>All types</b>	64	All	180	192	208	220	-160	72	134.4	218.4	308

\* Voltage and power tolerance:  $\pm 10\%$  | Use of external LED constant current driver required.

### Maximum Ratings

Exceeding the maximum ratings can lead to destruction of the module.

Type	Operation current mA	Operation temperature range at $t_c$ point $^\circ\text{C}$		Storage temperature range $^\circ\text{C}$		Max. allowed repetitive peak current mA
		min.	max.	min.	max.	
All types	400	-20	+85	-20	+85	1810
All types	700	-20	+85	-20	+85	1670
All types	1050	-20	+80	-20	+85	1580
All types	1400	-20	+60	-20	+85	1510

### Optical Characteristics at $t_p = 60\text{ }^\circ\text{C}$

Type	Number of LEDs	Colour	Correlated colour temperature* K	Typ. luminous flux* (lm)								CRI**
				400 mA		700 mA		1050 mA		1400 mA		
				min.	typ.	min.	typ.	min.	typ.	min.	typ.	
WU-M-444/B-WW	4	warm white	3000 -130/+220	500	565	825	920	1125	1240	1425	1575	$\geq 70$
WU-M-444/B-NW	4	neutral white	4000 -290/+260	500	565	825	920	1125	1240	1425	1575	$\geq 70$
WU-M-444/B-CW	4	cool white	5000 -255/+310	550	615	890	975	1225	1350	1550	1700	$\geq 65$
WU-M-475/16-WW	16	warm white	3000 -130/+220	2000	2250	3300	3600	4500	4950	5700	6300	$\geq 70$
WU-M-475/16-NW	16	neutral white	4000 -290/+260	2000	2250	3300	3600	4500	4950	5700	6300	$\geq 70$
WU-M-475/16-CW	16	cool white	5000 -255/+310	2200	2450	3550	3900	4900	5400	6200	6800	$\geq 65$
WU-M-488-WW	16	warm white	3000 -130/+220	2000	2250	3300	3600	4500	4950	5700	6300	$\geq 70$
WU-M-488-NW	16	neutral white	4000 -290/+260	2000	2250	3300	3600	4500	4950	5700	6300	$\geq 70$
WU-M-488-CW	16	cool white	5000 -255/+310	2200	2450	3550	3900	4900	5400	6200	6800	$\geq 65$
WU-M-475/64-WW	64	warm white	3000 -130/+220	8000	9000	13200	14400	18000	19800	22800	25200	$\geq 70$
WU-M-475/64-NW	64	neutral white	4000 -290/+260	8000	9000	13200	14400	18000	19800	22800	25200	$\geq 70$
WU-M-475/64-CW	64	cool white	5000 -255/+310	8800	9800	14200	15600	19600	21600	24800	27200	$\geq 65$

\* On account of the complex manufacturing process of the modules, the above values only represent statistical variables.

The values do not necessarily correspond exactly to the actual parameters of every single product, which can vary from the typical specification.

\*\* CRI > 80 on request | Measurement tolerance of luminous flux:  $\pm 7\%$

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

## M-Class, S-Class, Area

### Operating Life

Modules	Operating life in hours at measured temperature at $t_p$ point											
	$I_f$ 400 mA			$I_f$ 700 mA			$I_f$ 1050 mA			$I_f$ 1400 mA		
	40 °C	60 °C	80 °C	40 °C	60 °C	80 °C	40 °C	60 °C	80 °C	40 °C	60 °C	80 °C
L80/B10*	> 60,000	> 60,000	44,000	> 60,000	> 55,000	27,000	55,000	27,000	13,000	21,000	10,000	–
L70/B10*	> 60,000	> 60,000	> 60,000	> 60,000	> 60,000	50,000	> 60,000	52,000	31,000	50,000	36,000	–

These values do not refer to the colour temperature. | \* Lxx/Byy (lumen maintenance at xx%, failure rate yy%)

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## LED Roadway Light M-Class - IP20

### Technical Notes

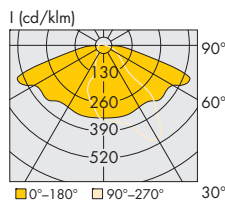
- Dimensions (incl. optics) LxWxH  
4 LEDs: 60x65x10.3 mm  
16 LEDs: 120x120x10.3 mm  
64 LEDs: 240x240x10.3 mm
- Lenses for street lighting applications of M class (acc. to EN 13201)
- Optimum illumination - installation ratio: 4.5:1 (distance between luminaire poles to height of the luminaire pole)



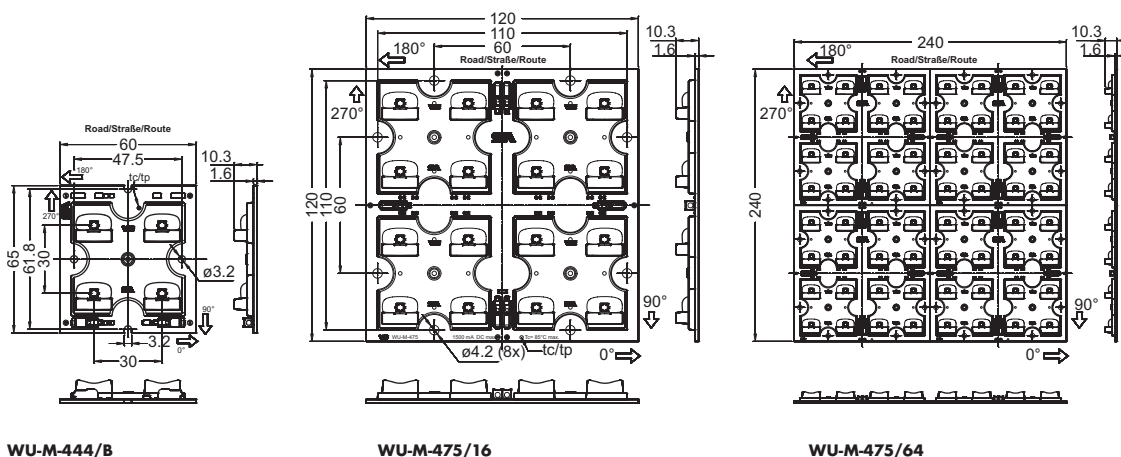
### Reference Numbers

Type	Ref. No.	Number of LEDs
WU-M-444/B-WW	<b>554901</b>	4
WU-M-444/B-NW	<b>553927</b>	4
WU-M-444/B-CW	<b>553926</b>	4
WU-M-475/16-WW	<b>556227</b>	16
WU-M-475/16-NW	<b>553908</b>	16
WU-M-475/16-CW	<b>553907</b>	16
WU-M-475/64-WW	<b>556228</b>	64
WU-M-475/64-NW	<b>554804</b>	64
WU-M-475/64-CW	<b>554022</b>	64

### Typical Light Distribution Curve



### Mechanical Dimensions



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

## LED Roadway Light Linear M-Class - IP20

### Technical Notes

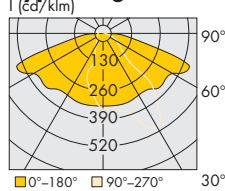
- Dimensions (incl. optics) LxWxH:  
60x240x10.3 mm
- Lenses for street lighting applications of M class  
(acc. to EN 13201)
- Optimum illumination - installation ratio: 4.5:1  
(distance between luminaire poles to height  
of the luminaire pole)



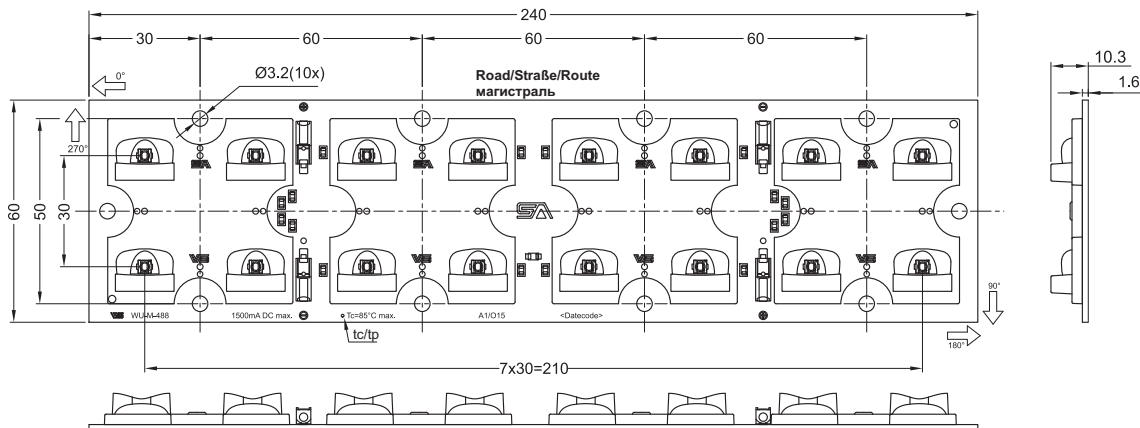
### Reference Numbers

Type	Ref. No.	
	lengthwise	crosswise
WU-M-488-WW	<b>560871</b>	<b>560875</b>
WU-M-488-NW	<b>556493</b>	<b>556571</b>
WU-M-488-CW	<b>556293</b>	<b>556292</b>

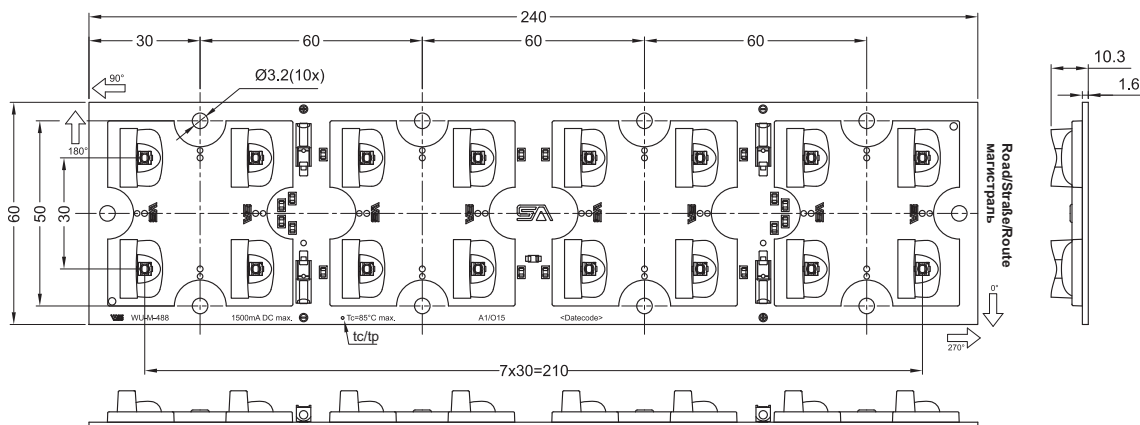
### Typical Light Distribution Curve



### Mechanical Dimensions



WU-M-488 M-Class - lengthwise



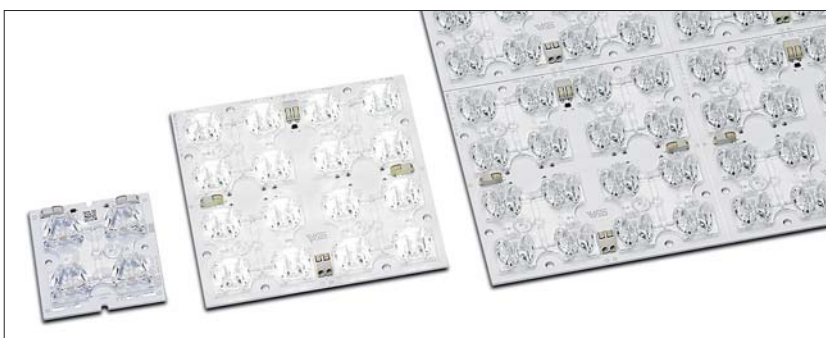
WU-M-488 M-Class - crosswise

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

## LED Roadway Light S-Class – IP20

### Technical Notes

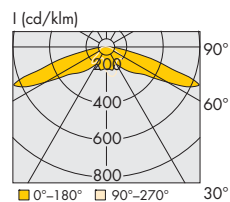
- Dimensions (incl. optics) LxWxH  
4 LEDs: 60x65x12.4 mm  
16 LEDs: 120x120x12.4 mm  
64 LEDs: 240x240x12.4 mm
- Lenses for street lighting applications of S class (acc. to EN 13201)
- Optimum illumination – installation ratio: 7.5:1 (distance between luminaire poles to height of the luminaire pole)



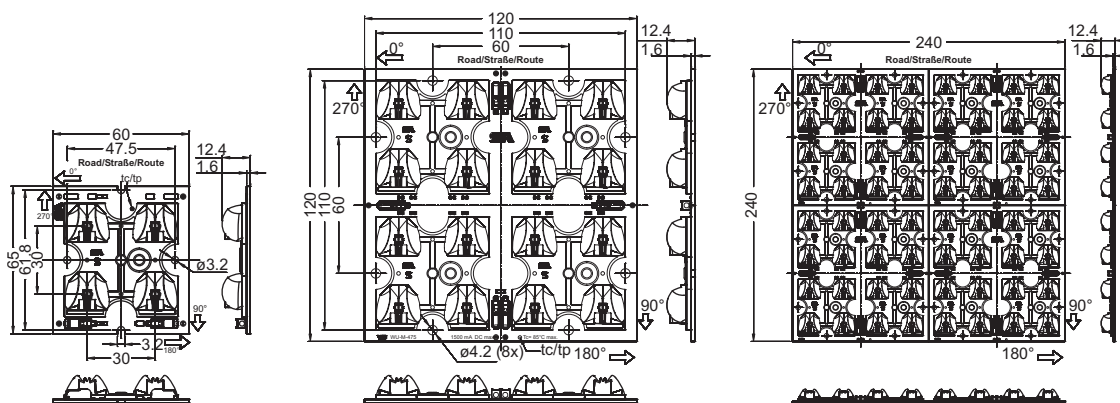
### Reference Numbers

Type	Ref. No.	Number of LEDs
WU-M-444/B-WW	<b>556229</b>	4
WU-M-444/B-NW	<b>553930</b>	4
WU-M-444/B-CW	<b>553929</b>	4
WU-M-475/16-WW	<b>556230</b>	16
WU-M-475/16-NW	<b>553912</b>	16
WU-M-475/16-CW	<b>553911</b>	16
WU-M-475/64-WW	<b>556231</b>	64
WU-M-475/64-NW	<b>554805</b>	64
WU-M-475/64-CW	<b>556706</b>	64

### Typical Light Distribution Curve



### Mechanical Dimensions



WU-M-444/B

WU-M-475/16

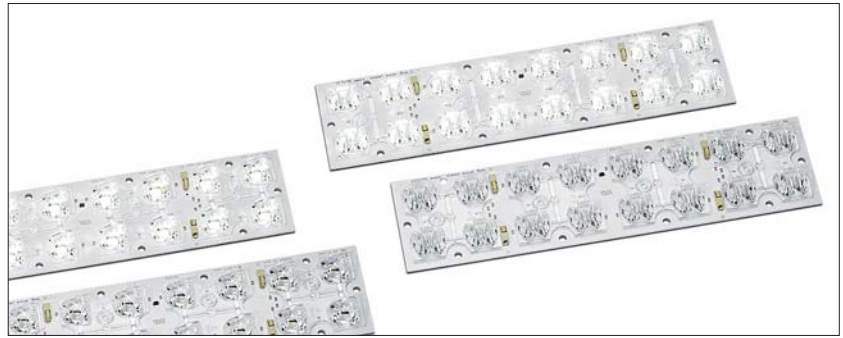
WU-M-475/64

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

## LED Roadway Light Linear S-Class – IP20

### Technical Notes

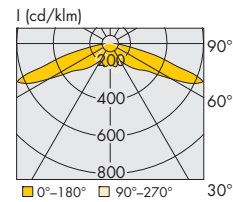
- Dimensions (incl. optics) LxWxH:  
60x240x12.4 mm
- Lenses for street lighting applications of S class  
(acc. to EN 13201)
- Optimum illumination – installation ratio: 7.5:1  
(distance between luminaire poles to height  
of the luminaire pole)



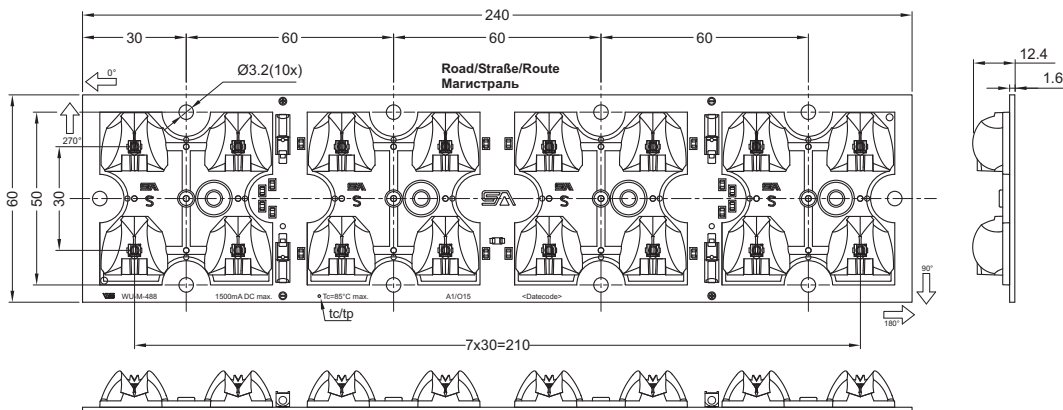
### Reference Numbers

Type	Ref. No.	
	lengthwise	crosswise
WU-M-488-WW	<b>560877</b>	<b>560879</b>
WU-M-488-NW	<b>560878</b>	<b>560880</b>
WU-M-488-CW	<b>556295</b>	<b>556294</b>

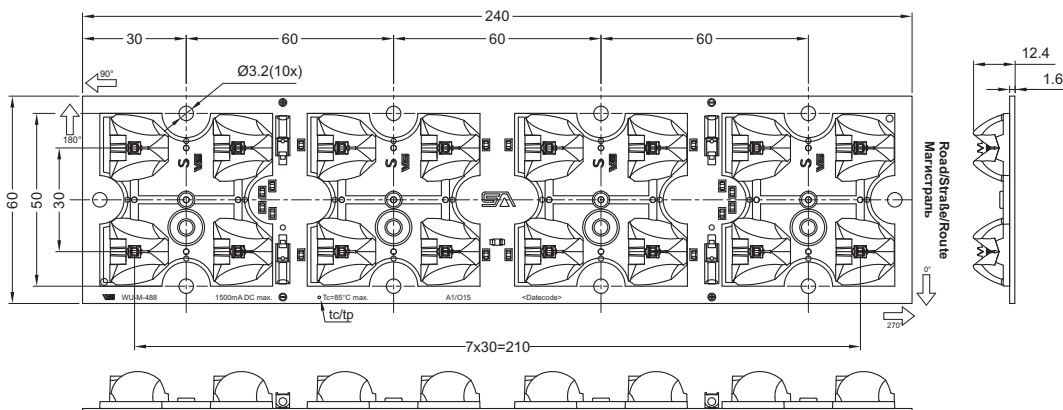
### Typical Light Distribution Curve



### Mechanical Dimensions



### WU-M-488 S-Class – lengthwise



### WU-M-488 S-Class – crosswise

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

## LED Roadway Light Area - IP20

### Technical Notes

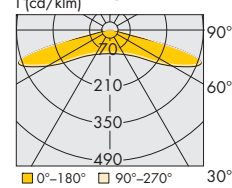
- Dimensions (incl. optics) LxWxH  
 4 LEDs: 120x65x6.7 mm  
 16 LEDs: 120x120x6.7 mm  
 64 LEDs: 240x240x6.7 mm
- Lenses for the illumination of public places
- Optimum illumination - installation ratio: 5.5:1  
 (distance between luminaire poles to height of the luminaire pole)



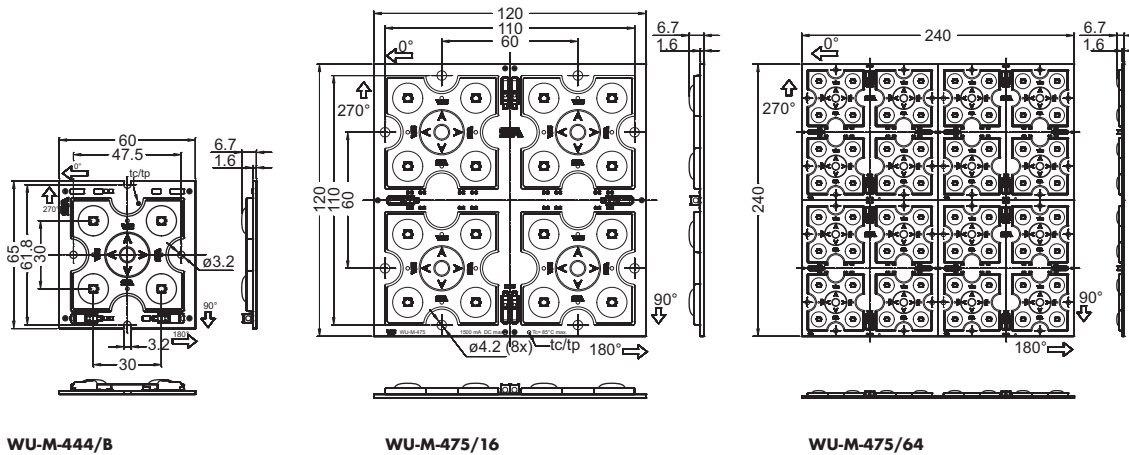
### Reference Numbers

Type	Ref. No.	Number of LEDs
WU-M-444/B-VVW	<b>556232</b>	4
WU-M-444/B-NW	<b>553939</b>	4
WU-M-444/B-CW	<b>553938</b>	4
WU-M-475/16-VVW	<b>556233</b>	16
WU-M-475/16-NW	<b>553921</b>	16
WU-M-475/16-CW	<b>553920</b>	16
WU-M-475/64-VVW	<b>556234</b>	64
WU-M-475/64-NW	<b>554808</b>	64
WU-M-475/64-CW	<b>554803</b>	64

### Typical Light Distribution Curve



### Mechanical Dimensions



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



## LED Roadway Light Linear Area – IP20

### Technical Notes

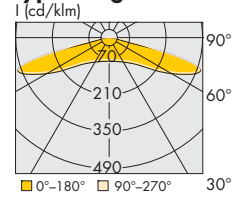
- Dimensions (incl. optics) LxWxH:  
60x240x6.7 mm
- Lenses for the illumination of public places
- Optimum illumination – installation ratio: 5.5:1  
(distance between luminaire poles to height of the luminaire pole)



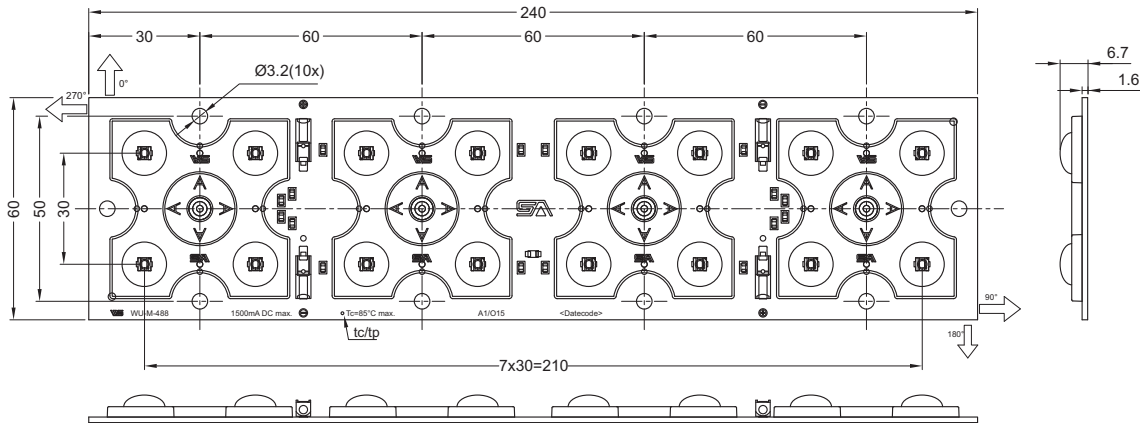
### Reference Numbers

Type	Ref. No.
WU-M-488-VVV	560881
WU-M-488-NW	560882
WU-M-488-CW	556296

### Typical Light Distribution Curve



### Mechanical Dimensions



### WU-M-488 Area

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

## LED Roadway Light M-Class, S-Class, Area – IP20

### 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. Safety regulations acc. to EN 60598 has to be observed. Installation must be carried out in a voltage-free state (i.e. disconnection from the mains).

- LED built-in modules must not be subjected to any undue mechanical stress, e. g.:
  - handle LED modules carefully
  - avoid shear and compressive forces onto the optics during handling and installation
  - avoid vibrations of more than 2 kHz, 40 G
- The module must be fixed onto a thermally conductive surface with 4 to 32 screws (WU-M-444/B: M3, WU-M-488 and WU-M-475/XX: M4). Recommended torque: 0.6-0.8 Nm.
- When installing/screwing the module into a luminaire, please ensure that the cables are not squeezed between luminaire/heat-sink and LED module.
- Safe operation only possible by the use of external constant current sources ( $I_{max}$ , see table "Electrical Characteristics").
- Operation is dependent on constant current drivers that should provide the following protective measures:
  - short-circuit protection
  - overload protection
  - overheating protection
- Please ensure the correct polarity of the leads prior to commissioning. Reversed polarity can destroy the modules.
- The maximum output of the power supply must be observed.
- 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.
- The LED module WU-M-444/B has to be operated with LED drivers which carry the SELV sign. In case of use Non-SELV drivers or operating devices with working voltages > 120 V DC, additional insulation must be provided in accordance with EN 60598. The clearance and creepage distances of LED modules WU-M-475, WU-M-488 are designed for working voltages up to 450 V DC (acc. to EN 62031/EN 60598).
- Insulation of LED modules WU-M-475/16, WU-M-488 and WU-M-475/64 is designed for basic insulation for working voltages of up to max. 450 V.
- Please ensure standard ESD (electrostatic discharge) protection measures are employed when handling and installing LED modules. Electrostatic discharge can damage LEDs.

- To ensure problem-free operation, the specified maximum temperature at the  $t_c$  and  $t_p$  point (see "Operating Life") must be observed (measured in accordance with EN 60598-1). To satisfy this point, it is necessary to put measures in place to ensure any heat is dissipated from the LED module to the environment.
  - A parallel connection of the modules is not allowed.
  - 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.
  - 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/en/home/products/led-lighting-technology/notes-on-led-technology.html](http://www.vossloh-schwabe.com/en/home/products/led-lighting-technology/notes-on-led-technology.html)
  - The photobiological safety of the LED modules must be classified into risk groups in accordance with EN 62471: 2008.
    - general lighting exempt group: WU-M-444/B, WU-M-475/16, WU-M-488, WU-M-475/64
    - other applications risk group 2: WU-M-444/B, WU-M-475/16, WU-M-488, WU-M-475/64
- Assessment in acc. with IEC/TR 62778:  
Given a clearance of more than  $d_{min}$ , within which the lighting intensity limit of  $E_{thr} = 1200 \text{ lx}$  is attained, the classification goes down to Risk Group 1.



### Applied Standards

EN 62031  
LED modules for general lighting – Safety specifications



EN 62471  
Photobiological safety of lamps and lamp systems

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