

# REPLACEMENT KIT

BRAVE  
WITH PROTECTION GLASS  
SINGLE (12 LED<sub>s</sub>) AND  
DOUBLE (24 LED<sub>s</sub>) VERSION



## BRAVE

**Modular built-in light engines for outdoor applications with glass**

Very flexible solutions due to a combination of four different colour temperatures, a wide range of lenses and two different LED modules

### Typical applications

Integration in luminaires

- Street lighting, urban street lighting
- Tunnel lighting
- Flood and area lighting
- Industrial lighting for production halls & warehouses
- Indoor lighting
- Lighting for sports facilities

### Replacement Kit – BRAVE

- **DEGREE OF PROTECTION: IP67**
- **IMPACT RESISTANCE: IK09**
- **COLOUR TEMPERATURES:  
2200K / 3000K / 4000K / 5000K**
- **HIGHLY EFFICIENCY: UP TO 147 LM/W**
- **SURGE PROTECTION UP TO 4 KV**
- **WIDE RANGE OF  
LIGHT DISTRIBUTIONS**
- **MADE IN ITALY**



## BRAVE

### Replacement kit for street lighting

#### Technical notes

LED built-in engines with glass for integration into luminaires



Equipped with SMD PCB WU-M-630-S, optics, silicone gasket, heat sink and connection leads

Lens material: PMMA (PC on request)

Light distribution: IESNA Type M3M, Type P2M, Type A5 (further LDCs on request)

Degree of protection: IP67 (acc. to IEC 60529), IK09

ESD protection class 2

Surge protection: up to 4 kV

Max. operating temperature at  $t_c$  point: 70 °C

Lumen maintenance: L80/B10; > 54,000 hrs.

at max. allowed operation current and

60 °C at  $t_p$  point

Temperature depends on installation situation and has to be checked by the luminaire manufacturer.

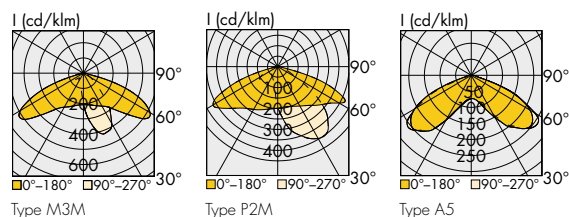
Initial colour accuracy: 5 SDCM

Heat sink material: thermoconductive resin

Leads: bi-polar cable, double insulation FEP/PVC,

AWG22, lead length: 400 mm,

with PG-7 cable gland



### Electrical Characteristics

at  $t_p = 60$  °C

Type	No. of LEDs	Voltage DC (V)												Temperature coefficient mV/K
		500 mA			600 mA			700 mA			750 mA			
		min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	
BRV-12-630S-XXX-YY	12	31.1	32.7	34.3	31.4	33.1	34.8	31.9	33.6	35.2	32.1	33.8	35.4	-12.51
BRV-24-630S-XXX-YY	24	62.2	65.4	68.6	62.8	66.2	69.6	-	-	-	-	-	-	-12.51

Type	No. of LEDs	Power consumption (W)											
		500 mA			600 mA			700 mA			750 mA		
		min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.
BRV-12-630S-XXX-YY	12	15.6	16.4	17.2	18.9	19.8	20.9	22.3	23.5	24.6	24.0	25.3	26.6
BRV-24-630S-XXX-YY	24	31.1	32.7	34.3	37.7	39.7	41.8	-	-	-	-	-	-

Use of external LED constant current driver required. | \* Two separate LED modules: values are calculated for series connection.

### Maximum Ratings

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

Type	Operation current mA	Operation temperature range at $t_c$ point		Storage temperature range		Max. allowed repetitive peak current mA
		°C min.	°C max.	°C min.	°C max.	
BRV-12-630S-XXX-YY	750	-30	+70	-40	+80	1600
BRV-24-630S-XXX-YY	600	-30	+70	-40	+80	1600

Use of external LED constant current driver required. | \* Two separate LED modules: values are calculated for series connection.

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

# LED Solutions – BRAVE with protection glass

## Optical characteristics

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

Type	Ref. No.	No. of SMDs	Colour	Correlated colour temperature K	Typ. luminous flux* (lm) and efficiency* (lm/W) at						Light distribution	CRI**  Ra
					500 mA		700 mA		750 mA			
					lm	lm/W	lm	lm/W	lm	lm/W		
12 LEDs												
BRV-12-630S-730-M3M	572433	12	warm white	3000	2495	152	3380	144	3595	142	Type M3M	≥ 70
BRV-12-630S-740-M3M	572578	12	neutral white	4000	2690	164	3640	155	3875	153	Type M3M	≥ 70
BRV-12-630S-750-M3M	on request	12	cool white	5000	2650	162	3590	153	3815	151	Type M3M	≥ 70
BRV-12-630S-730-P2M	572575	12	warm white	3000	2520	154	3420	146	3635	144	Type P2M	≥ 70
BRV-12-630S-740-P2M	572577	12	neutral white	4000	2720	166	3685	157	3920	155	Type P2M	≥ 70
BRV-12-630S-750-P2M	on request	12	cool white	5000	2680	163	3630	154	3860	153	Type P2M	≥ 70
BRV-12-630S-730-A5	572576	12	warm white	3000	2550	155	3460	147	3680	145	Type A5	≥ 70
BRV-12-630S-740-A5	572579	12	neutral white	4000	2750	168	3725	159	3965	157	Type A5	≥ 70
BRV-12-630S-750-A5	on request	12	cool white	5000	2710	165	3670	156	3905	154	Type A5	≥ 70

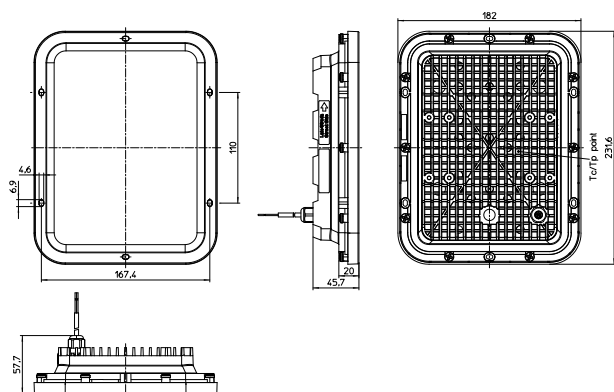
\* Measurement tolerance of luminous flux and efficiency:  $\pm 10\%$  | \*\* Measurement tolerance CRI:  $\pm 2$

Type	Ref. No.	No. of SMDs	Colour	Correlated colour temperature K	Typ. luminous flux* (lm) and efficiency* (lm/W) at 500 mA lmlm/W600 mA lm lm/W				Light distribution	CRI** Ra
24 LEDs										
BRV-24-630S-730-M3M	572434	24	warm white	3000	4990	153	5870	148	Type M3M	≥ 70
BRV-24-630S-740-M3M	572589	24	neutral white	4000	5380	165	6330	159	Type M3M	≥ 70
BRV-24-630S-750-M3M	on request	24	cool white	5000	5300	162	6240	157	Type M3M	≥ 70
BRV-24-630S-730-P2M	572586	24	warm white	3000	5040	154	5940	150	Type P2M	≥ 70
BRV-24-630S-740-P2M	572588	24	neutral white	4000	5440	166	6400	161	Type P2M	≥ 70
BRV-24-630S-750-P2M	on request	24	cool white	5000	5360	164	6310	159	Type P2M	≥ 70
BRV-24-630S-730-A5	572587	24	warm white	3000	5100	156	6010	151	Type A5	≥ 70
BRV-24-630S-740-A5	572590	24	neutral white	4000	5500	168	6470	163	Type A5	≥ 70
BRV-24-630S-750-A5	on request	24	cool white	5000	5420	166	6380	161	Type A5	≥ 70

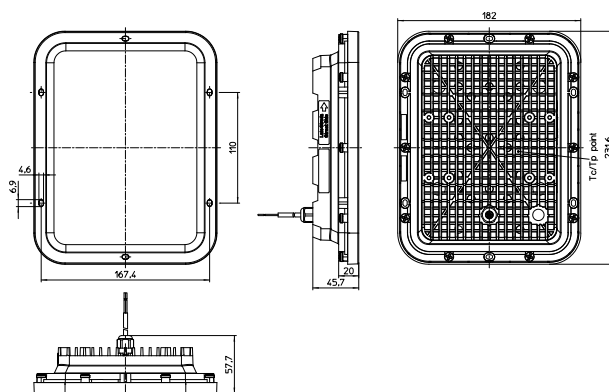
\* Measurement tolerance of luminous flux and efficiency:  $\pm 10\%$  | \*\* Measurement tolerance CRI:  $\pm 2$

## Mechanical measurement

### BRV-12-630S-XXX-YY



### BRV-24-630S-XXX-YY



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## BRAVE

### Replacement kit for street lighting

#### Technical notes

LED built-in engines with glass for integration into luminaires

Equipped with SMD PCB WU-M-541-SQ5, optics, silicone gasket, heat sink and connection leads

Lens material: PMMA (PC on request)

Light distribution: IESNA T2, T3, VSM

(further LDCs on request)

Degree of protection: IP67 (acc. to IEC 60529), IK09

ESD protection class 2

Surge protection: up to 4 kV

Max. operating temperature at  $t_c$  point: 70 °C

Lumen maintenance: L80/B10; > 100,000 hrs.

at max. allowed operation current and

60 °C at  $t_p$  point

Temperature depends on installation situation and has to be checked by the luminaire manufacturer.

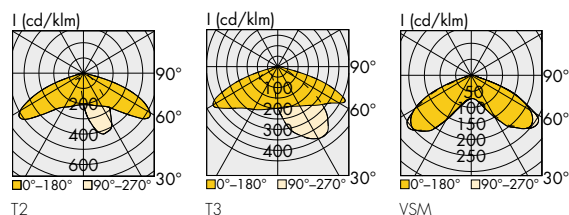
Initial colour accuracy: 5 SDCM

Heat sink material: thermoconductive resin

Leads: bi-polar cable, double insulation FEP/PVC,

AWG22, lead length: 400 mm,

with PG-7 cable gland



### Electrical Characteristics

at  $t_p = 60$  °C

Type	No. of LEDs	Voltage DC (V)												Temperature coefficient mV/K
		500 mA			550 mA			600 mA			700 mA			
		min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	
BRV-12-541SQ5-XXX-YY	12	30.9	32.6	34.4	31.0	32.8	34.5	31.1	32.9	34.7	31.4	33.2	35.0	-18.3
BRV-24-541SQ5-XXX-YY	24	61.8	65.2	68.8	62.0	65.5	69.1	-	-	-	-	-	-	-18.3

Type	No. of LEDs	Power consumption (W)											
		500 mA			550 mA			600 mA			700 mA		
		min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.
BRV-12-541SQ5-XXX-YY	12	15.5	16.3	17.2	17.0	18.0	19.0	18.7	19.7	20.8	22.0	23.2	24.5
BRV-24-541SQ5-XXX-YY	24	30.9	32.6	34.4	34.1	36.0	38.0	-	-	-	-	-	-

Use of external LED constant current driver required. | \* Two separate LED modules: values are calculated for series connection.

### Maximum Ratings

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

Type	Operation current mA	Operation temperature range at $t_c$ point		Storage temperature range		Max. allowed repetitive peak current mA
		°C min.	°C max.	°C min.	°C max.	
BRV-12-541SQ5-XXX-YY	700	-30	+70	-40	+80	2000
BRV-24-541SQ5-XXX-YY	550	-30	+70	-40	+80	2000

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## Optical characteristics

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

Type	Ref. No.	No. of SMDs	Colour	Correlated colour temperature K	Typ. luminous flux* (lm) and efficiency* (lm/W) at						Light distribution	CRI**  R <sub>a</sub>
					500 mA		600 mA		700 mA			
					lm	lm/W	lm	lm/W	lm	lm/W		
12 LEDs												
BRV-12-541SQ5-722-T2	on request	12	warm white	2200	2150	132	2500	127	2845	123	T2	≥ 70
BRV-12-541SQ5-730-T2	572580	12	warm white	3000	2600	160	3045	155	3485	150	T2	≥ 70
BRV-12-541SQ5-740-T2	572583	12	neutral white	4000	2800	172	3280	166	3760	162	T2	≥ 70
BRV-12-541SQ5-750-T2	on request	12	cool white	5000	2800	172	3280	166	3760	162	T2	≥ 70
BRV-12-541SQ5-722-T3	on request	12	warm white	2200	2225	137	2585	131	2945	127	T3	≥ 70
BRV-12-541SQ5-730-T3	572581	12	warm white	3000	2690	165	3145	160	3605	155	T3	≥ 70
BRV-12-541SQ5-740-T3	572584	12	neutral white	4000	2895	178	3390	172	3890	168	T3	≥ 70
BRV-12-541SQ5-750-T3	on request	12	cool white	5000	2895	178	3390	172	3890	168	T3	≥ 70
BRV-12-541SQ5-722-T VSM	on request	12	warm white	2200	2175	133	2530	128	2880	124	VSM	≥ 70
BRV-12-541SQ5-730-T VSM	572582	12	warm white	3000	2630	161	3075	156	3525	152	VSM	≥ 70
BRV-12-541SQ5-740-T VSM	572585	12	neutral white	4000	2830	174	3315	168	3805	164	VSM	≥ 70
BRV-12-541SQ5-750-T VSM	on request	12	cool white	5000	2830	174	3315	168	3805	164	VSM	≥ 70

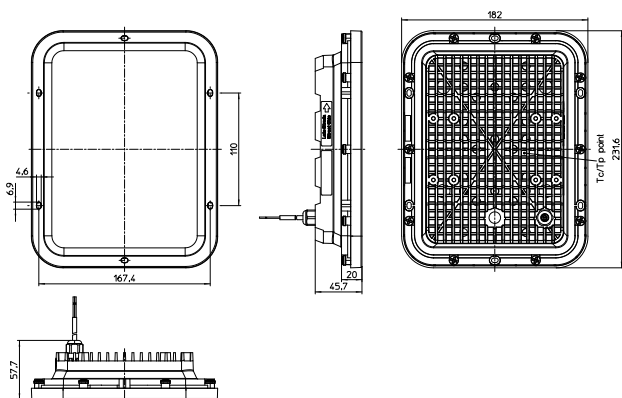
\* Measurement tolerance of luminous flux and efficiency:  $\pm 10\%$  | \*\* Measurement tolerance CRI:  $\pm 2$

Type	Ref. No.	No. of SMDs	Colour	Correlated colour temperature K	Typ. luminous flux* (lm) and efficiency* (lm/W) at 500 mA lm lm/W				550 mA lm lm/W		Light distribution	CRI** R <sub>a</sub>
24 LEDs												
BRV-24-541SQ5-722-T2	on request	24	warm white	2200	4300	132	4650	129	T2	≥ 70		
BRV-24-541SQ5-730-T2	572591	24	warm white	3000	5200	160	5640	157	T2	≥ 70		
BRV-24-541SQ5-740-T2	572594	24	neutral white	4000	5600	172	6080	169	T2	≥ 70		
BRV-24-541SQ5-750-T2	on request	24	cool white	5000	5600	172	6080	169	T2	≥ 70		
BRV-24-541SQ5-722-T3	on request	24	warm white	2200	4450	137	4810	134	T3	≥ 70		
BRV-24-541SQ5-730-T3	572592	24	warm white	3000	5380	165	5840	162	T3	≥ 70		
BRV-24-541SQ5-740-T3	572595	24	neutral white	4000	5790	178	6290	175	T3	≥ 70		
BRV-24-541SQ5-750-T3	on request	24	cool white	5000	5790	178	6290	175	T3	≥ 70		
BRV-24-541SQ5-722-T VSM	on request	24	warm white	2200	4350	133	4700	131	VSM	≥ 70		
BRV-24-541SQ5-730-T VSM	572593	24	warm white	3000	5260	161	5710	159	VSM	≥ 70		
BRV-24-541SQ5-740-T VSM	572596	24	neutral white	4000	5660	174	6150	171	VSM	≥ 70		
BRV-24-541SQ5-750-T VSM	on request	24	cool white	5000	5660	174	6150	171	VSM	≥ 70		

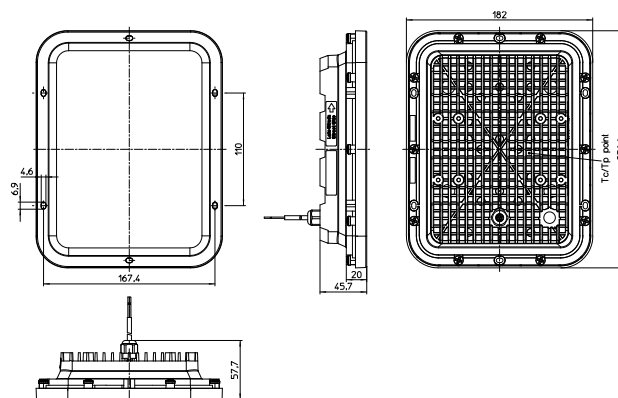
\* Measurement tolerance of luminous flux and efficiency:  $\pm 10\%$  | \*\* Measurement tolerance CRI:  $\pm 2$

## Mechanical measurement

### BRV-12-541SQ5-XXX-YY



### BRV-24-541SQ5-XXX-YY



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## General information

Performance acc. to IEC 62717: L70/B50  $t_p = 60^\circ\text{C} - > 100,000$  hrs.

## Packaging unit

Type	Packaging unit pcs.	Box dimensions (LxWxH) mm	Weight single (g)	Gross weight packaging unit (g)
BRV-12-ZZZ-XXX-YY	6	416x271x180	980	6620
BRV-24-ZZZ-XXX-YY	6	416x271x180	1060	7100

## General safety and installation instructions

- These instructions must be carefully read before installing and commissioning the system, as this is the only way to ensure safe and correct handling.
- VS product may only be installed and commissioned by authorised and fully qualified staff.
- No object can be placed in contact with heat sink: thermal management might be compromised.
- An external constant-current driver is required.
- Before any work is carried out on the equipment, it must be disconnected from the mains.
- All valid safety and accident-prevention regulations must be observed.
- The products should never be inexpertly opened. Repairs may only be undertaken by the manufacturer.

## EPREL information

Containing product	Light Source		
Types	Type	EPREL Reg.No.	EE Class
BRV-12-630S-730-YY	WU-M-630-S-730	920402	C
BRV-24-630S-730-YY	WU-M-630-S-730	920402	C
BRV-12-630S-740-YY	WU-M-630-S-740	920403	C
BRV-24-630S-740-YY	WU-M-630-S-740	920403	C
BRV-12-630S-750-T3	WU-M-630-S-750	920404	C
BRV-24-630S-750-T3	WU-M-630-S-750	920404	C
BRV-12-541SQ5-722-YY	WU-M-541-SQ5-722	914598	D
BRV-24-541SQ5-722-YY	WU-M-541-SQ5-722	914598	D
BRV-12-541SQ5-730-YY	WU-M-541-SQ5-730	920467	C
BRV-24-541SQ5-730-YY	WU-M-541-SQ5-730	920467	C
BRV-12-541SQ5-740-YY	WU-M-541-SQ5-740	920468	C
BRV-24-541SQ5-740-YY	WU-M-541-SQ5-740	920468	C
BRV-12-541SQ5-750-T3	WU-M-541-SQ5-750	920469	C
BRV-24-541SQ5-750-T3	WU-M-541-SQ5-750	920469	C

## 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)

## Surge Protection

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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## 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).

- Mains frequency: 0 Hz
- 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
  - do not carry or move the LED engines by using the wires
- When installing/screwing the module into a luminaire, please ensure that the cables are not squeezed between luminaire and LED engine.
- The LED engine must not be used in hermetically sealed casings.
- 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.
- A parallel connection of the LED engines is not allowed.
- The clearance and creepage distances of LED engines are designed for working voltages up to 450 V DC (basic insulation) acc. to EN 62031/EN 60598. This value is designed between live parts and accessible metal parts.
- For insulation class II a LED driver with double or reinforced insulation between LV supply and secondary circuit shall be used when the LED module is integrated in a containing product where accessible metal parts are connected to an equipotential bond (acc. to EN 60598-1, Annex X).
- If a system consists of multiple LED engines BREK connected to a single driver, only one module will be monitored by the NTC. That means that one module is in "master" mode operated and the rest are operated in "slave" mode.
- 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 engine to the environment.

- To ensure good thermal behaviour take care about "general safety and installation instructions".
- 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

- general lighting  
exempt group: WU-M-630-S/xx-X
- other applications  
risk group 2: WU-M-630-S/xx-X

Assessment in acc. with IEC/TR 62778:

Given a clearance of more than  $d_{min}$ , within which the lighting intensity limit of  $E_{thr} = 900 \text{ lx}$  is attained, the classification goes down to Risk Group 1.

- 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-541-SQ5/xx
- other applications  
risk group 2: WU-M-541-SQ5/xx

Assessment in acc. with IEC/TR 62778:

Given a clearance of more than  $d_{min}$ , within which the lighting intensity limit of  $E_{thr} = 740 \text{ lx}$  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

EN 62778

### 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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