

StreetLED

LIGHTING SOLUTIONS

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Introduction

Streetlights (excerpts from the DIN EN 13201 standard)

The most important task of street lighting is to protect road users – pedestrians, cyclists and motorists – from life damage, limb or health in the dark. A proven scientific correlation between the quality of street lighting and traffic safety exists. With good street lighting, people, obstacles and hazards on or near the road are identified in time and road users can react accordingly. Good street lighting is an effective way to reduce the number and severity of accidents in the dark, thus making them a major contribution to road safety management.

The quality characteristics for street lighting are specified in the European standard DIN EN 13201, «Street Lighting». This standard pursues the principle that the quality of street lighting must be higher when there is a higher safety risk for the road users. This is in turn determined primarily by the meeting of road users at different speeds (for example, pedestrians, cyclists, motor vehicles) and the risk of collision. The traffic volume at night – in terms of the amount and frequency – and the danger of disturbances resulting from the meeting of pedestrians and stationary traffic (parked at the side of the road) with motorists are further criteria that determine the quality characteristics of lighting.

Traffic regulations in Europe are unifary; there are also uniform minimum requirements for street lighting since November 2003. Nevertheless, it is possible for people in the European regions to design their street lighting according to their own conceptions of value and design.

The uniform lighting standard EN 13201-2 for street lighting is valid in 28 European countries: Belgium, Denmark, Germany, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Austria, Poland, Portugal, Sweden, Switzerland, Slovakia, Slovenia, Spain, Hungary, Czech Republic, Cyprus. It was worked out by CEN TC 169 (CEN = Comité Européen de Normalisation; TC = Technical Committee).

Street lighting: light-related requirements

Light-related requirements for streetlights are described by quality characteristics. The most important are:

- luminance/illuminance and its uniformity,
- glare reduction,
- colour reproduction.

The quality characteristics of lighting apply to when it is dark. The minimum values of individual quality characteristics can change during the night and over seasons, for example due to changes in traffic density and the ambient brightness.

In addition to these quality characteristics, other features of the lighting system are critical to producing a smooth flow of traffic. In particular, this includes visual guidance. For example, lights with a higher luminous flux as well as with other light colours are positioned at intersections, drawing attention to them even from a distance. It may also be necessary to use additional lights to improve the visual alignment of the road so that, for example, drivers can recognise a windy route in time.

Set up

Design/Material

The StreetLED is made out of extruded aluminium. The castings are powder-painted and thermally machined.

The aluminium parts are guaranteed by IK10 and IP66 classes.

LED

Cree LED chips are used, with a standard performance of at least $118 \, \text{Im/W}$ at $Tj = 85^{\circ} \, \text{C}$. The colour temperature is a confortable neutral white with approx. 4'000 K, but street lights in warm white or pure white are also available upon request.

Optics/Light

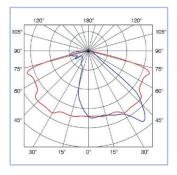
The optical lenses of the StreetLED are manufactured according to the highest PMMA degree, with over 90% light transmission. They are UV- and ozone-resistant. By combining various quantities and positions, the lenses can satisfy the most demanding technical requirements.

Drive

The driver is designed for the entire lifetime (a minimum of 100'000 h) and with numerous interesting optional features. DALI transmitter, 1-10 V dimmer or autonomous dimming system. We can offer a wireless management system or a NEMA plug with a photocell.









- ✓ = from stock, offer subject to prior sale
- Other versions, such as autonomous dimming or protection class II, are available on request.
- various accessories and spare parts available

Selection

How do I make my choice?

Here is a simplified sequence with which the lighting class can be determined.

The most important classes at a glance (excerpted from DIN EN 13201-2):

ME classes

Classes ME1 to ME6 apply to roads with medium to high driving speeds. Classes MEW1 to MEW5 apply to wet roads. The quality characteristics of the lighting correspond to the luminance rating.

Quality characteristics: Lm, U0, UI, TI, SR.

CF classes

Lighting classes CE0 to CE5 are applied in the same manner as ME classes, but for roads with zones of conflict, as well as intersections, junctions, roundabouts, traffic jam areas at intersections, streets with pedestrians and cyclists, shopping and commercial streets, and subways and stairs. The quality characteristics of the lighting correspond to the illuminance rating.

Quality characteristics: Em, U0

S classes

Lighting classes S1 to S7 are applied to pedestrian and cycling areas, breakdown lanes, road shoulders, and other areas outside of the roadways, for prestigious streets, residential streets, pedestrian zones, sidewalks, bike paths, park roads, school playgrounds, etc.

The lighting is evaluated according to the illuminance rating.

Die Gütemerkmale sind: Em, Emin

Additional classes

A class

ES classes

EV classes

Im Service value of the mean luminance on the road; the actual value must never be below this value.

Em Service value of the mean illuminance on the road; the actual value must never be below this value.

U0 Overall uniformity; ratio of the lowest luminance (or illuminance) to the mean luminance on the road surface.

UI Longitudinal uniformity; ratio of the lowest luminance to the highest luminance on the centre line of a lane.

TI Threshold value increase; a measure of the loss of visibility of a visual object due to physiological glare from lights that are too bright.

SR Ambient illuminance ratio to improve spatial orientation so that the areas adjacent to the roadway – if they are not illuminated themselves – can also be seen.

Lighting situation	Lighting class	Quality characteristics
A1, A2, A3	ME1-ME5	\overline{L}_{m} , U_{o} , U_{l} , T_{l} , SR
B1, B2	ME1-ME6	$\Gamma_{\rm m}$, $U_{\rm o}$, $U_{\rm i}$, $T_{\rm i}$, SR
C1	S1-S6	$\overline{\mathbb{E}}_{m}, \mathbb{E}_{min}$
D1, D2	CE2-CE5	$\overline{\mathbb{E}}_{m}$, \mathbb{U}_{0}
D3, D4	S1-S6	$\overline{E}_{m}, \overline{E}_{min}$
E1	S1-S6, CE2	$\overline{E}_{m}, \overline{E}_{min}$
E2	S1-S5, CE2	$\overline{E}_{m},\overline{E}_{min}$

Determination of light-related requirements

One of the most important tasks in planning street lighting is determining the lighting class with which the light-related system data are specified.

The procedure for determining the quality characteristics of lighting on a certain street is divided into the following steps:

First, the street to be lighted must be classified – in terms of traffic-related data – in a lighting situation according to CEN/TR 13201-1.

The lighting class is then chosen according to CEN/TR 13201-1, based on the primary tables and additional tables

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Finally, the lighting category is used to determine the light-related requirements for the lighting according to DIN EN 13201-2.

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Relux lighting calculation

View of a road lighting calculation with additional visualisation

Luminaire data

Make: StreetLED CUBE Modular

N° art.: 860943

Luminaire name: StreetLED CUBE Modular 36 Equipment: 1×LED CREE 78 W/11600 lm

Road profile: Undivided carriageway

Width of the roadway (b): 8.00 m Number of lanes: 2 Road surface: R3 q0: 0.08

 Lighting placement:
 Row right

 Light mounting height (h):
 10.00 m

 Distance between luminaires (a):
 15.00 m

 Luminaire overhang (u):
 -0.50 m

 Luminaire inclination (δ):
 0.00°

 Maintenance factor:
 0.75

Luminance

 $\begin{tabular}{lll} Viewer position 1: & x=-60.00\,m,\,y=2.00\,m,\,z=1.50\,m\\ Middle: & 1.91\,cd/m^2~(ME3a~mind.~1)\\ Uo~(min./medium): & 0.56~(ME3a~mind.~0.4)\\ \end{tabular}$

 $\begin{array}{lll} \mbox{Viewer position 2:} & & x = -60.00 \, \mbox{m, y} = 6.00 \, \mbox{m, z} = 1.50 \, \mbox{m} \\ \mbox{Middle:} & & 2.12 \, \mbox{cd/m}^2 \, (\mbox{ME3a min. 1}) \\ \mbox{Uo (min./medium):} & & 0.54 \, (\mbox{ME3a min. 0.4}) \\ \end{array}$

Longitudinal uniformity

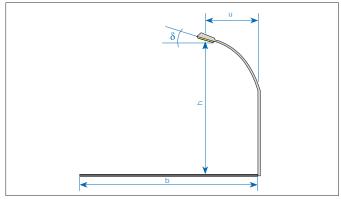
UI (B1: x=-60.00, y=2.00, z=1.50): 0.86 (ME3a min. 0.7) UI (B2: x=-60.00, y=6.00, z=1.50): 0.88 (ME3a min. 0.7)

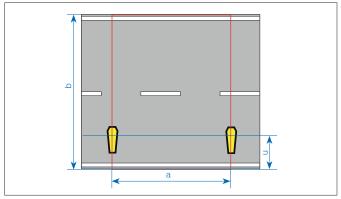
Glare/ambient brightness

TI (B1: y=2.00 m): 6% (ME3a max. 15) SR: 0.66 (ME3a min. 0.5)









Comparison of model ranges

StreetLED CUBE

	StreetLED CUBE 12	StreetLED CUBE 24	StreetLED CUBE 48	StreetLED CUBE 72
	0	0		·
Item no.	860936	860937	860938	860939
Number LED	12	24	48	72
Height of light spot	to 5 m	5-7m	7-12m	7-12m
Pole spacing	24 m (at 5 m height)	26 m (at 6 m height)	38 m (at 8 m height)	38 m (at 10 m height)
Dimmable	yes	yes	yes	yes
Colour temperature	4'000 K	4'000 K	4'000 K	4'000 K
Luminous efficiency	152lm/W	155 lm/W	162lm/W	159lm/W
Dimensions	273×274×77 mm	333×274×77 mm	503×274×77 mm	503×274×77 mm
Variability	-15° to +15° (5°-steps)	-15° to +15° (5°-steps)	-15° to +15° (5°-steps)	-15° to +15° (5°-steps)
Temperature range	-40°C to +50°C	-40°C to +50°C	-40°C to +50°C	-40°C to +50°C
Auxiliary module	internal	internal	internal	internal
Connection cable	8 m 4×1.0 mm ²	8 m 4×1.0 mm ²	12m 4×1.0mm ²	12m 4×1.0 mm ²
for details, see page	8	9	10	11

StreetLED CUBE Modular

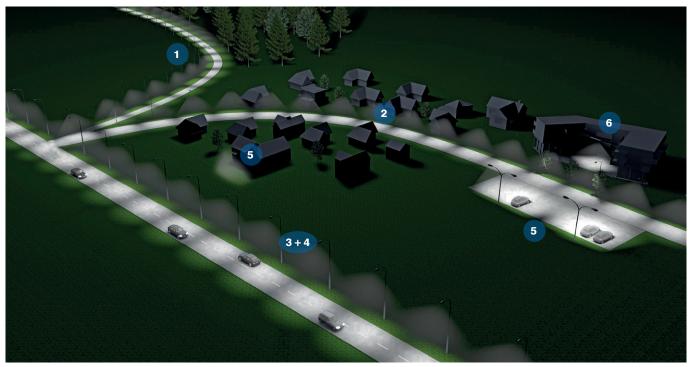
	StreetLED CUBE Modular 24	StreetLED CUBE Modular 36	StreetLED CUBE Modular 72
Item no.	860942	860943/860944	860945
Number LED	24	36	72
Height of light spot	5-7 m	7-12 m	7-12m
Pole spacing	26 m (at 6 m height)	38 m (at 8 m height)	38 m (at 10 m height)
Dimmable	yes	yes	yes
Colour temperature	4'000 K	4'000 K	4'000 K
Luminous efficiency	118lm/W	119 lm/W /118 lm/W	132lm/W
Dimensions	520×319×70 mm	520×319×70 mm	520×319×70 mm
Variability	-15° to +15° (5°-steps)	-15° to +15° (5°-steps)	-15° to +15° (5°-steps)
Temperature range	-40°C to +50°C	-40°C to +50°C	-40°C to +50°C
Auxiliary module	internal	internal	internal
Connection cable	8 m 4×1.0 mm ²	8m 4×1.0 mm ² / 12m 4×1.0 mm ²	12m 4×1.0 mm ²
for details, see page	16	17	18

Comparison of model ranges

StreetLED CUBE Place and hanging lamp

	Place lamp StreetLED CUBE S48 Hanging lamp StreetLED CUBE H72	
Item no.	860940	860941
Number LED	48	72
Height of light spot	7-12m	7-12m
Pole spacing	38 m (at 8 m height)	-
Dimmable	yes	yes
Colour temperature	4'000 K	4'000 K
Luminous efficiency	162lm/W	153 lm/W
Dimensions	526×274×77 mm	466×274×77 mm
Variability	_	-
Temperature range	-40°C to +50°C	-40°C to +50°C
Auxiliary module	internal	internal
Connection cable	8m 4×1.0 mm ²	8 m 4×1.0 mm ²
for details, see page	12	13



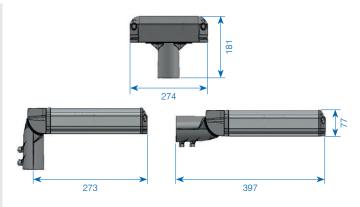


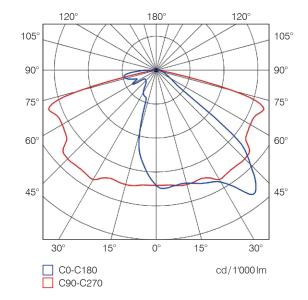
StreetLED CUBE 12

The right light for needs of approx. 5 lx, corresponding to lighting class S4. Classic applications of StreetLED CUBE 12 are smaller neighbourhood streets, pedestrian and cycling paths, private forecourts, alleys and car parks.



Item no.	860936 √
System performance	16W
Input voltage	202-254 VAC/47-63 Hz
Power factor	>0.95
Luminaire flux	2'390 lm
Luminous efficiency	152lm/W
Colour temperature	4'000 K
CRI (Colour rendering index)	Ra>70
Lifetime ca.	L90/B10, 100'000h
Protection category	IP66 and IK10
Height of light spot	to 5 m
Dimensions	273×274×77 mm
Weight	3.9 kg
Variability	0° or 90°, -15° to +15° (5°-steps)
Temperature range	–40°C to +50°C
with regulation	50% control phase 230 VAC (autonomous dimming p. 14-15)
Overvoltage protection	20kV/10kA
Mounting	flange Ø 60 mm (optional 76 mm)
Connection cable	8m 4×1.0mm ²











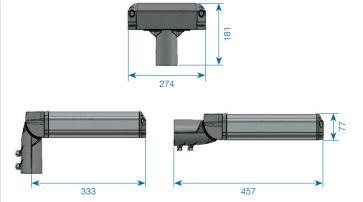


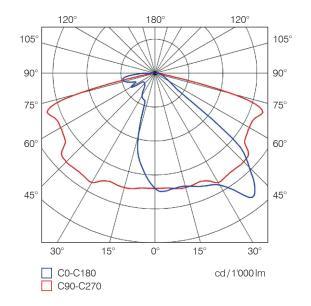
StreetLED CUBE 24

The right light for needs of approx. $7.5 \, \text{lx}$ or $0.5 \, \text{cd/m}^2$, corresponding to lighting classes S3 and ME5. Classic applications of StreetLED CUBE 24 are neighbourhood streets, major pedestrian and cycling paths, private areas and industrial sites.



Item no.	860937 √
System performance	31 W
Input voltage	202-254 VAC/47-63 Hz
Power factor	>0.95
Luminaire flux	4'730 lm
Luminous efficiency	155 lm/W
Colour temperature	4'000 K
CRI (Colour rendering index)	Ra>70
Lifetime ca.	L90/B10, 100'000h
Protection category	IP66 and IK10
Height of light spot	5-7m
Dimensions	333×274×77 mm
Weight	5.2 kg
Variability	0° or 90°, –15° to +15° (5°-steps)
Temperature range	-40°C to +50°C
with regulation	50% control phase 230 VAC (autonomous dimming p. 14-15)
Overvoltage protection	20kV/10kA
Mounting	flange Ø 60 mm (optional 76 mm)
Connection cable	8m 4×1.0mm ²











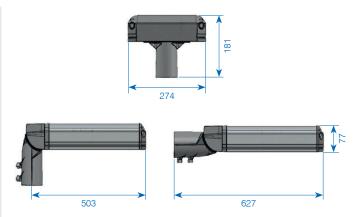


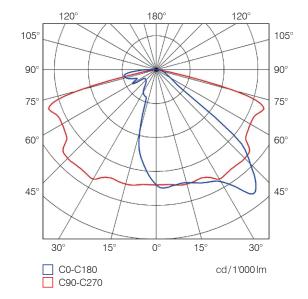
StreetLED CUBE 48

The right light for lighting needs of approx. $0.75\,\text{cd/m}^2$, corresponding to lighting class ME4. Typical applications of StreetLED CUBE 48 are local roads, intersections, car parks and demanding outdoor and industrial premises.



Item no.	860938 √
System performance	57W
Input voltage	202-254 VAC / 47-63 Hz
Power factor	>0.95
Luminaire flux	9'280 lm
Luminous efficiency	162 lm/W
Colour temperature	4'000 K
CRI (Colour rendering index)	Ra>70
Lifetime ca.	L90/B10, 100'000h
Protection category	IP66 and IK10
Height of light spot	7-12m
Dimensions	503×274×77 mm
Weight	7kg
Variability	0° or 90°, -15° to +15° (5°-steps)
Temperature range	-40°C to +50°C
with regulation	50% control phase 230 VAC (autonomous dimming p. 14-15)
Overvoltage protection	20kV/10kA
Mounting	flange Ø 60 mm (optional 76 mm)
Connection cable	12m 4×1.0 mm ²











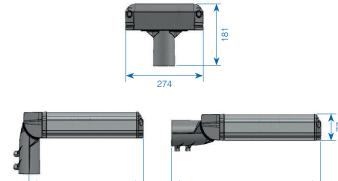


StreetLED CUBE 72

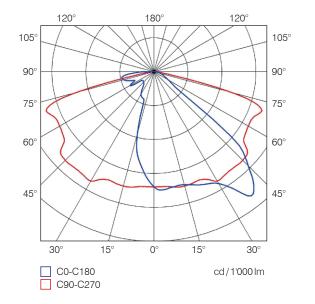
The right light for lighting needs of approx. $1.0\,\text{cd/m}^2$, corresponding to lighting class ME3. Typical applications of StreetLED CUBE 72 are urban streets and squares, multiple intersections, large areas and car parks, and large outdoor and industrial premises.



Item no.	860939 ✓
System performance	86W
Input voltage	202-254 VAC / 47-63 Hz
Power factor	>0.95
Luminaire flux	13'660 lm
Luminous efficiency	159 lm/W
Colour temperature	4'000 K
CRI (Colour rendering index)	Ra>70
Lifetime ca.	L90/B10, 100'000h
Protection category	IP66 and IK10
Height of light spot	7-12m
Dimensions	503×274×77 mm
Weight	7 kg
Variability	0° or 90°, –15° to +15° (5°-steps)
Temperature range	-40°C to +50°C
with regulation	50% control phase 230 VAC (autonomous dimming p. 14-15)
Overvoltage protection	20kV/10kA
	<u> </u>
Mounting	flange Ø 60 mm (optional 76 mm)
Connection cable	12m 4×1.0mm ²



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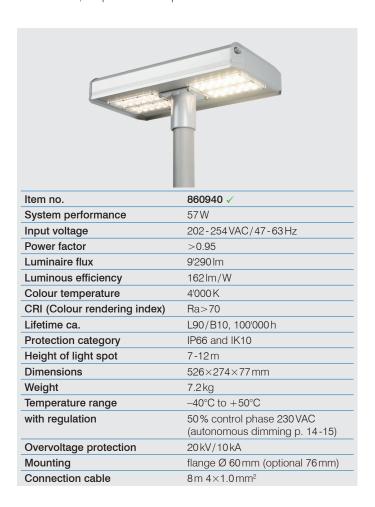
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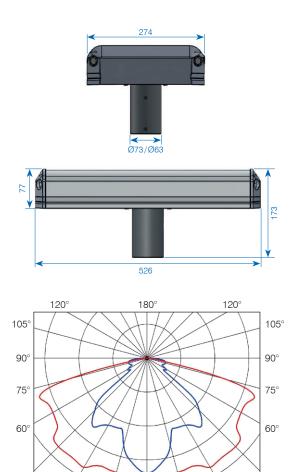


Place lamp

StreetLED CUBE S48

The right light for needs of approx. 0.75 cd/m², corresponding to lighting class ME4. Classic applications of StreetLED CUBE S48 are municipal roads, intersections, car parks and complicated outdoor and industrial sites.





0°

15°

45°

30°

cd/1'000 lm



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45°

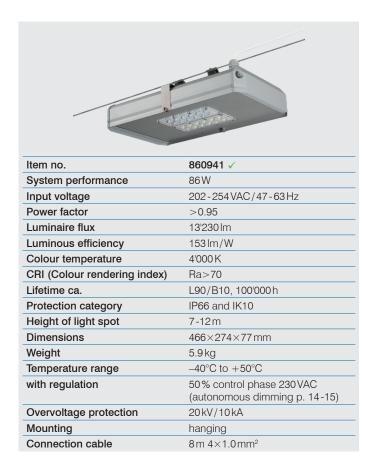
30°

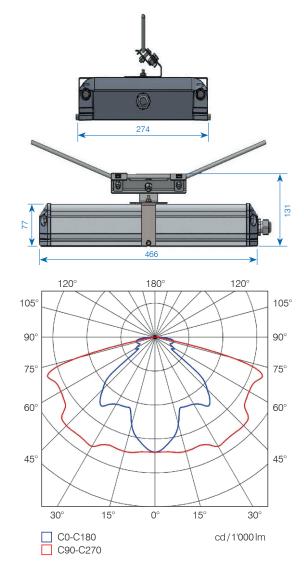
C0-C180

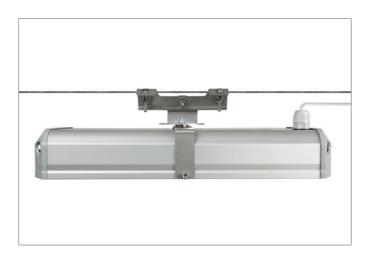
Hanging lamp

StreetLED CUBE H72

The right light for needs of approx. 1.0 cd/m², corresponding to lighting class ME3. Classic applications of StreetLED CUBE H72 are urban streets and squares, multiple intersections, large areas and car parks, and large outdoor and industrial sites.







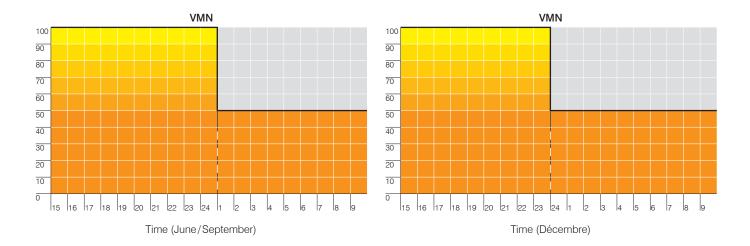
Autonomous dimming

StreetLED CUBE 12 and 24

The full power of street lighting is not needed when there is little traffic on the streets and in the deep of the night. Therefore, we now offer a light with autonomous dimming capabilities that reduce luminosity to 50% at these times.

All this occurs completely automatically. An integrated clock controls this automatically; therefore, no additional control is required. However, additional settings or controls can be subsequently installed.

- The driver automatically counts the hours for which the lamp is switched on. Virtual midnight VMN. The middle of the entire time interval.
- The driver dims to 50% from VMN until morning.



	Switch on time *	Dimminglevel at midnight	Switch off time *	
June** (VMN = 01:00h)	21:00	21:00 01:00		
Dimming level	100%	50%	0%	
Lamp type		StreetLED 24		
Consumption	38 W	21W	0W	
Power consumption	With autonomous dimming: 236Wh Without autonomous dimming: 304Wh			
September** (VMN = 01:00 h)	19:30	01:00	06:30	
Dimming level	100%	100% 50%		
Lamp type	StreetLED 24			
Consumption	38 W	0W		
Power consumption	With autonomous dimming: 324.5 Wh, Without autonomous dimming: 418 Wh			
December (VMN = 00:00 h)	16:30	00:00	07:30	
Dimming level	100%	50%	0%	
Lamp type	StreetLED 24			
Consumption	38W 21W		0W	
Power consumption	With autonomous dimming: 442.5Wh Without autonomous dimming: 570Wh			

The hours shown above are approximate!

If the duration of the night changes by more than 1 hour, the VMN has to be recalculated. It takes 3 days until the rhythm is completely correct. In this 3-day warm-up phase, autonomous dimming does not work.

- * The switch-on and switch-off times are determined based on sunrise and sunset times.
- ** The driver cannot detect the 1-hour time difference during summer; therefore, all dimming times are approx. 1 hour later than during winter.

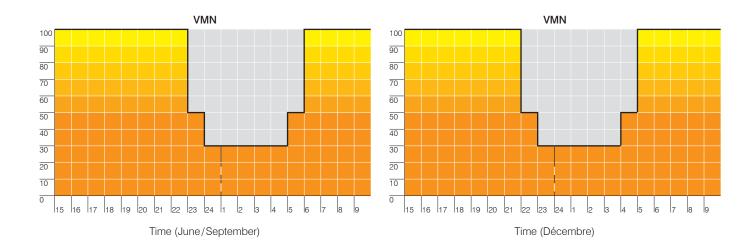
Autonomous dimming

StreetLED CUBE 48 and 72

The full power of street lighting is not needed when there is little traffic on the streets and in the deep of the night. Therefore, we now offer a light with autonomous dimming capabilities that reduce luminosity to 50% at these times.

All this occurs completely automatically. An integrated clock controls this automatically; therefore, no additional control is required. However, additional settings or controls can be subsequently installed.

- The driver automatically counts the hours for which the lamp is switched on. Virtual midnight VMN. The middle of the entire time interval.
- The driver is programmed to be dimmed×hours before the VMN, and returns to 100 % Y hours after the VMN.
- Up to 5 dimming levels can be programmed in one night.
- These settings can be programmed on costumers requirements, but there are also other default settings available.



	Switch on time *	Dimminglevel 2 hours before midnight	2. Dimminglevel 1 hour before midnight	3. Dimminglevel 3 hours after midnight	4. Dimminglevel 5 hours after midnight	Switch off time *
June** (VMN = 01:00h)	21:00	23:00	00:00	05:00	06:00	05:00
Dimming level	100%	50%	30%	50%	100%	0%
Lamp type			Stree	etLED		
Consumption	118W	58W	36W	58 W	118W	OW
Power consumption	Wi	With autonomous dimming: 474Wh			nomous dimming: 94	4Wh
September** (VMN = 01:00 h)	19:30	23:00	00:00	05:00	06:00	06:30
Dimming level	100%	50%	30%	50%	100%	0%
Lamp type		StreetLED				
Consumption	118W	58 W	36W	58 W	118W	OW
Power consumption	Wi	th autonomous dimm	ning: 768 Wh	Without autor	nomous dimming: 1'2	98 Wh
December (VMN = 00:00 h)	16:30	22:00	23:00	04:00	05:00	07:30
Dimming level	100%	50%	30%	50%	100%	0%
Lamp type		StreetLED				
Consumption	118W	58W	36W	58W	118W	0W
Power consumption	Wit	With autonomous dimming: 1'240 Wh			nomous dimmina: 1'7	70 Wh

The hours shown above are approximate!

If the duration of the night changes by more than 1 hour, the VMN has to be recalculated. It takes 3 days until the rhythm is completely correct. In this 3-day warm-up phase, autonomous dimming does not work.

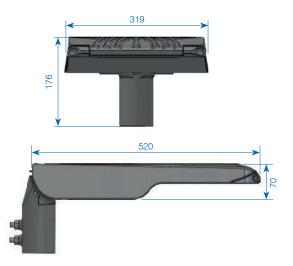
- * The switch-on and switch-off times are determined based on sunrise and sunset times.
- ** The driver cannot detect the 1-hour time difference during summer; therefore, all dimming times are approx. 1 hour later than during winter.

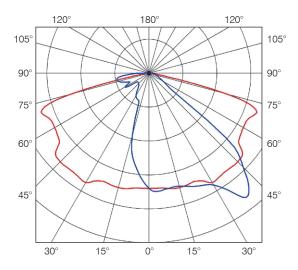
Streetlight Modular

StreetLED CUBE Modular 24

Typical applications of StreetLED CUBE Modular 24 are urban streets and squares, multiple intersections, large areas and car parks, and large outdoor and industrial premises.











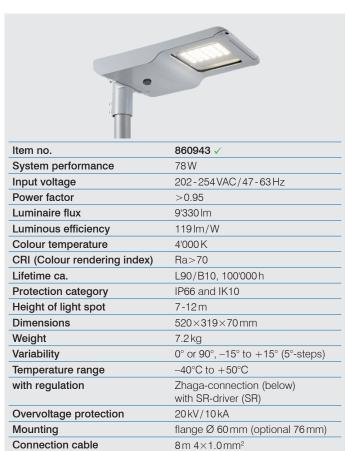


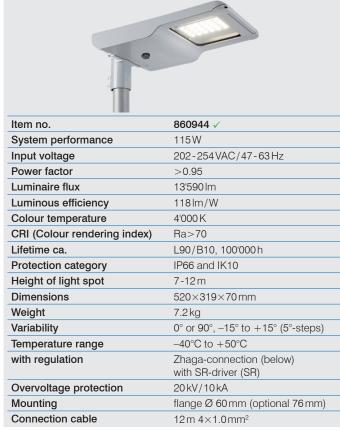


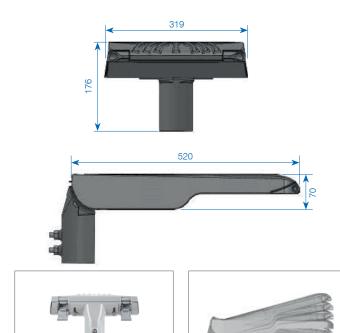
Streetlight Modular

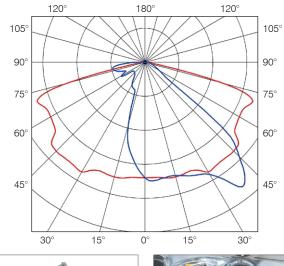
StreetLED CUBE Modular 36

Typical applications of StreetLED CUBE Modular 36 are local roads, intersections, car parks and demanding outdoor and industrial premises.









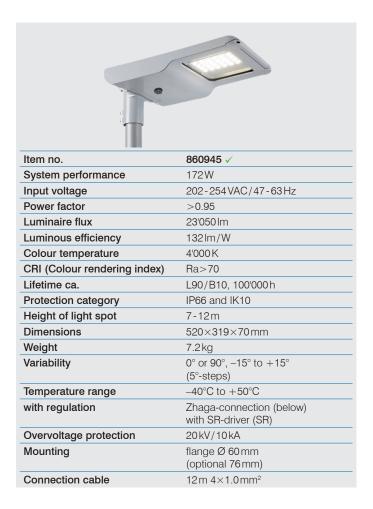




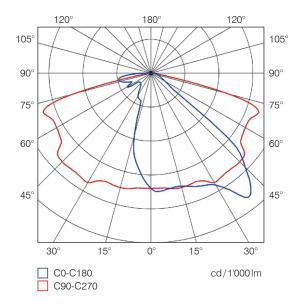
Streetlight Modular

StreetLED CUBE Modular 72

Typical applications of StreetLED CUBE Moduar 72 are local roads, intersections, car parks and demanding outdoor and industrial premises.









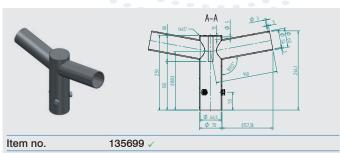




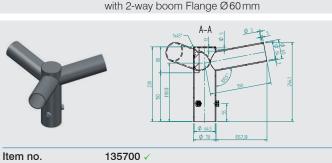


Accessories for models with flange mounting

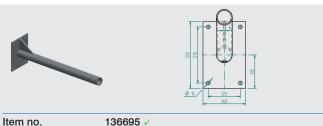
for Ø60 mm for Ø76mm



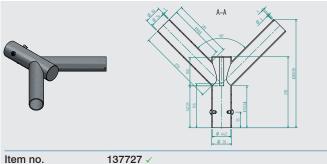
Designation Galvanised mast adapter for 60 mm diam., with 2-way boom Flange Ø60 mm



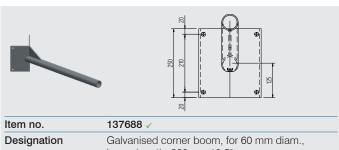
Designation Galvanised mast adapter for Flange Ø60 mm diam., with 3-way boom Flange Ø60 mm



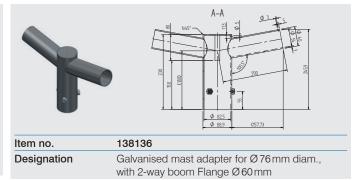
Galvanised wall boom for 60 mm diam., Designation boom length: 800 mm 10.5°

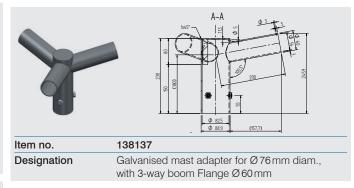


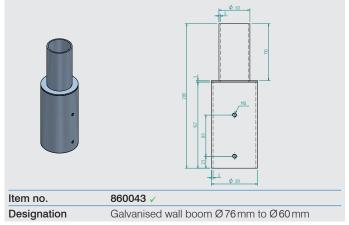
Designation Galvanised boom adapter to corner boom and wall boom, flange Ø60 mm, with 3-way boom, Flange Ø 60 mm



boom length: 800 mm 10.5°











THE SOLUTION PARTNER

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