

A tall, slender, black solar-powered lighting column stands against a clear blue sky. The column has a series of vertical solar panels along its length and a modern, curved light fixture at the top. The background shows a landscape with greenery and a building under a bright sky.

PUBLIC LIGHTING

solar-powered lighting columns

Sunlight empowers

in pursuing our customer's independence & sustainability by ensuring sight for safety



Our **vision**

Our aim is to contribute to a sustainable future by efficient use of energy, while maintaining the sense of safety and/or ambience of an enlightened environment.

We value our customer's independency and having a certain extend of freedom in light design. Thinking of the grid's future function, we believe that the common centralized electricity grid should not be the obvious choice for public lighting. Especially for non-urban locations, where the grid besides for lighting is redundant. All without compromising aesthetics.

The SWISS LED product line is a clever designed, innovative off-grid lighting solution - ready for a sustainable future.

During daytime, sunlight is converted into electric energy by solar panels. The energy is stored in a battery, which is the energy source for the highly efficient LED luminaire at night. This robust stand-alone outdoor lighting solution is designed for a sustainable future, in both rural and urban areas. In an early stage is key in finding an optimum in the design!

Our **columns**

SWISS LED provides a high quality and sustainable solution for autonomous public lighting. Our solar lighting columns, or popularly called solar masts, generate all the energy needed for illuminating the environment by high-quality Euro-pean produced solar panels. Solar panels are deliberately mounted vertically along four sides of the column. This prevents the accumulation of dirt and has a positive effect on the seasonal variation in the angle of sunlight irradiation. Produced energy is high efficiently stored in a durable and recyclable battery, under supervision of the in-house developed control unit's charging program. Additionally, the control unit monitors the condition of the complete system and acts upon it to maintain a high efficient (>97%) and reliable way of lighting your environment.

The clever design of the mast serves the quality and lifetime of the complete system. For example: the natural air flow guided through the column which limits the operation temperature and positively effects the solar energy generation, or the foundation box which replaces the regular concrete foundation and at the same time contains a compartment for the battery underground, which limits temperature fluctuations and increases the lifetime expectancy of the battery.

In conclusion: SWISS LED is sustainable in use of energy, but also in use and total costs of ownership due to its clever holistic design, robust, low maintenance construction and long-lasting components.

Off-grid

Functioning fully off-grid and focus on light performance.

Sustainable

Solar powered and designed with high quality materials.

Reliable

Selection of the best (proven) technology.



Basic principle

The SWISS LED product line is 100% autonomous and ready for the sus-tainable future, we all prefer.

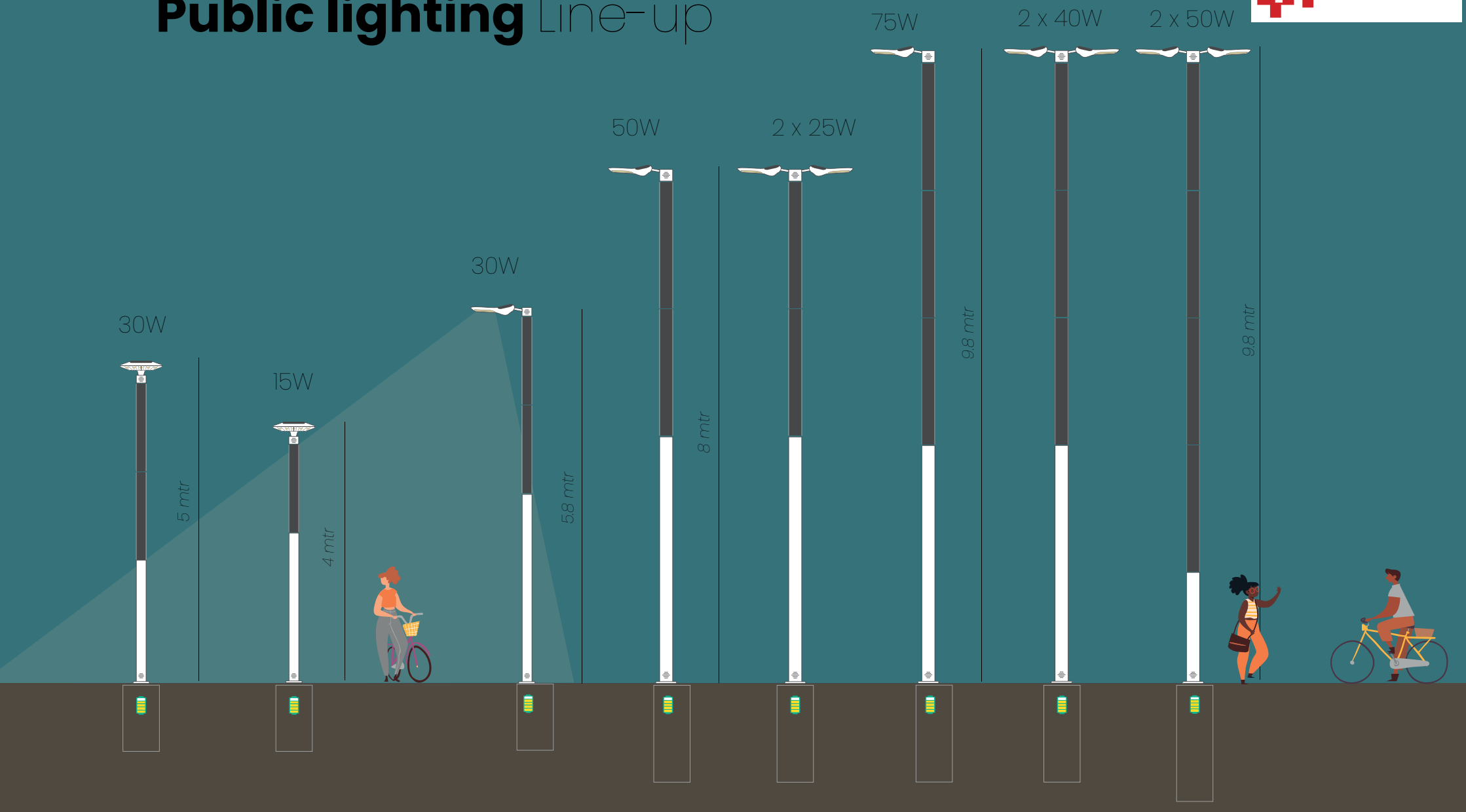
During daytime, sunlight is converted into electricity by photo-voltaic technology – better known as solar panels. This energy is stored efficiently and safely in an integrated battery, which guar-antees sufficient lighting by activating the efficient LED overnight – even with cloudy weather forecasts.

The condition of the column and its functions are monitored and controlled by an intelligent control unit, integrated in the column and accessible through the service hatch.

This robust stand-alone solution is designed for a sustainable and reliable lighting experience in both rural and urban areas.



Public lighting Line-up



XS2.11

XS1.11

XS2.11

S2.12

S2.12

S3.12

S3.12

S4.12

	XS 1.11 4m	XS 2.11 5m	XS 2.11 5.8m	S2.12 8m	S3.12 10m	S4.12 10m
Construction						
Height (in meters)	4	5	5.8	8	9,8	9,8
Rectangular column dim.	150x150 mm	150x150 mm	150x150 mm	200x200 mm	200x200 mm	200x200 mm
Material & finishing	European quality steel (type S355) hot-dipped galvanized, durable powder coating RAL 9010 (white) - other colours optionally. All exterior mounting elements and locks are stainless steel (AISI 316/A4).					
Installation	Standard: Mounted on in-ground steel foundation, including battery storage compartment (all plug-and-play).					
Lifetime expectancy	40 years, produced in accordance to NEN-EN 1090 EXC.2					
Energy use						
LED-luminaire	On-top and side bracket (single and double) possible for XS-types. S-types are always equipped with Alexia. For more details on the luminaires - see pages 17-18.					
Max. power*	up to 15W	up to 30W	up to 30W	up to 50W	up to 75W	up to 100W
System voltage	12V/24V	12V/24V	12V/24V	24V	24V	24V
Lifetime expectancy	15 years					
Energy generation						
Solar panels	High-quality Monocrystalline Silicon Solar Cells (IK 08)					
Wp total	128	256	256	456	684	912
Lifetime expectancy	20 years - 80% performance					
Energy storage						
Battery technology	Valve regulated lead acid (VRLA)/ LiFePO4 (Lithium)					
Capacity VRLA (Wh)*	>600	>1200	>1200	>2000	>3000	>4000
Capacity Lithium (Wh)*	>430	>860	>860	>1440	>1440/>2880	>2880
Lifetime expectancy	VRLA: 7 years at operation temperature 25°C in battery box at DoD 30% Lithium: 10 years at operation temperature 25°C in battery box at DoD 50%					
Smart control & monitoring						
Autonomy without charging / dimming	2/3 days standard					
Charging	Maximum Power Point Tracking on four sides and temp. compensating charge technology					
Efficiency	>97%					
Monitoring	Decentral datalogging, history available on request via low energy bluetooth					
Control	Designed for plug-and-play; using GPS+astronomical calender combined with SWISS LEDs smart energy programs. Standard: dimming					
Remote communication	protocol. Standard; Low energy bluetooth (IoT). Optional; monitoring and control via secure protocol.					
Protection	IP67-rating for connectors; all electronics are encapsulated (resin mixture)					
Lifetime expectancy	10 years					

* depends on location/sun irradiation.

Install & maintenance

SWISS LED stands for high quality. All details of components that we choose for our design are up to our standards. Two ex-amples of our fully optimized design:

The **service hatch** gives access to the control unit and is locked with a special SWISS LED-lock. This lock is universal though only to open with the SWISS LED-key, appended to each delivery. The hinges of the hatch are, as well as the lock, of high qual-ity stainless steel, tailored to the SWISS LED standards.

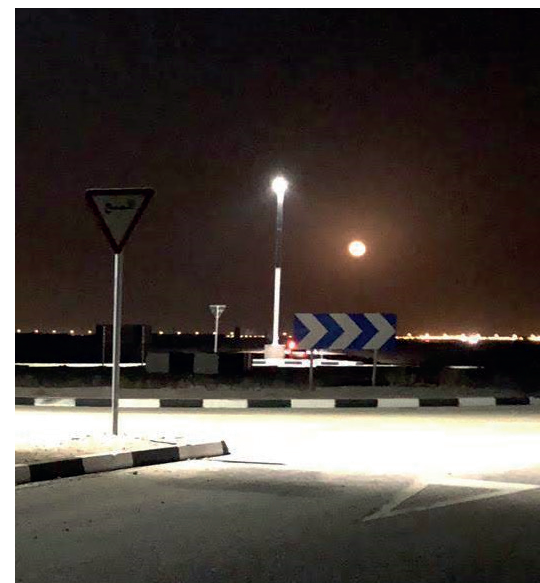
The SWISS LED solar lighting columns are designed as a com-plete system. The steel, galvanized **foundation** is part of that. This is literally the basis of the columns, hence have to be solid and reliable.

After placing the foundation inground, the column can be erected and mounted. After connecting the plug-and-play electrical elements, the columns updates the LED-program on the basis of GPS information.

Secondary function is containing the battery. The founda-tion box contains a special compartment, which helps in smoothing the fluctuations in the temperature around the battery and so increasing the lifetime of the battery.

The foundation box is easy accessible after installation and facilitates maintenance, for example to replace batteries after lifetime. The lock is similar to the SWISS LED-lock of the ser-vice hatch.

Both examples confirm that choices in design are always made to be clever and lean, and support the installer's ac-tivities.





Bright light

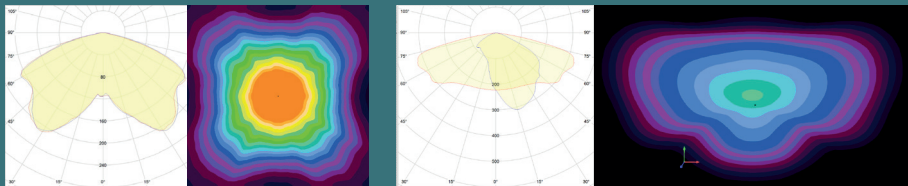
Energy management is one of the main challenges of solar powered public lighting. All energy produced by the integrated solar panels is to be treasured and used as efficient as possible. The efficiency of the system, and in particular the efficiency of the luminaire is key in optimizing the complete system. We strive for the best lumen per watt ratio.

The number of outdoor luminaires is excessive. Almost all functioning on 110/220/230 Volt alternating current (AC). And that, together with the lack in urging to be as efficient as possible, is exactly the reason why the choice for luminaires compatible for solar powered lighting columns is poor – these use direct current (DC) 12/24 Volt. From solar to battery and from battery to LED. Energy is generated, stored and used, all in DC, so conversion losses are eliminated.

Detailed examination of high quality and very efficient AC luminaires, results in a selection of two luminaires. The best LED's in combination with a variety of optics, for parks and plazas, and roads and highways, all with their own design and aesthetics.

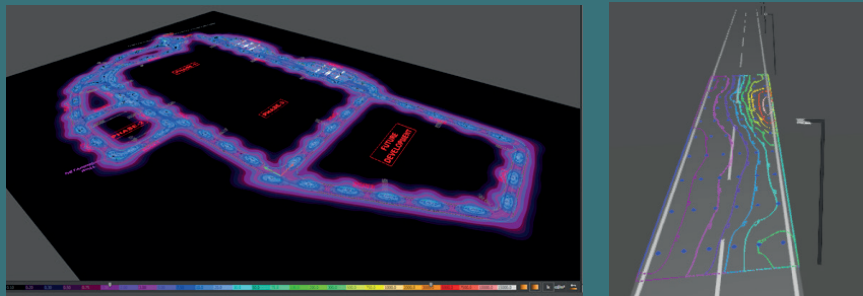
Design the light

While planning public lighting, we advise to execute a photometric study to assess the result on the urban en-vironment. For each situation, there is a suitable fit. SWISS LED Anne is perfect for illumination of plazas and parks; SWISS LED Alexia for parks and residential areas, but also for efficient road lighting.



ANNE Optics for square/plaza

ALEXIA Optics for road lighting and residential areas

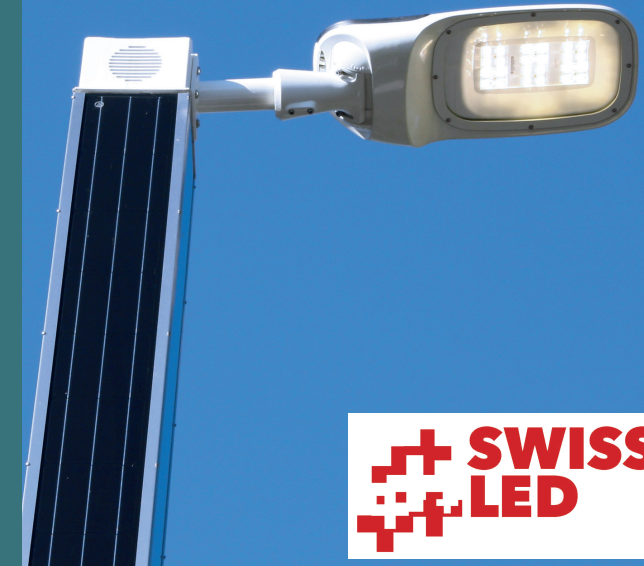


Examples of photometric studies to determine the quantity of columns needed.



Specifications Anne

Luminaire output	15W power output	2100 lumen
	30W power output	3750 lumen
	Voltage	24V DC
	Colour temperature rendering index	4000K standard >70
LED driver	Dimmable PCB	1-10V 10-100% on-board
LED specification	Type	Cree 179 lm/W
	Lumen maintenance life L70	100,000 hours @ $T_{amb} < 30^{\circ}C$ 50,000 hours @ $T_{amb} < 55^{\circ}C$
Installation	On-top Plug-and-play	Spigot-fit to SWISS LED solar powered lighting column XS-type With cable connectors IP66
Environmental factors	Operating temperature	-20°C +55°C
	IP rating IK rating housing IK rating glass	IP66 IK10 IK08
Exterior	Housing material	Die-cast aluminium LM6-quality, non-corrosive RAL 9010 (Pure white)
	On-top cassette material	PC RAL 2100 (Noir)
	Lens material efficiency	PMMA PC 90%
Dimensions	Length x width x height weight	590 x 590 x 200 mm 11kg



Specifications Alexia

Luminaire output	15W power output	2325 lumen 24 LED
	25W power output	3750 lumen 24 LED
	30W power output	4350 lumen 24 LED
	40W power output	6000 lumen 48 LED
	50W power output	7250 lumen 48 LED
	75W power output	10875 lumen 48 LED
	Voltage	24V DC
	Colour temperature rendering index	≤30W 4000K 50W 5700K >70
LED driver	Dimmable PCB	1-10V 10-100% on-board/cassette
LED specification	Type	Cree 179 lm/W
	Lumen maintenance life L70	100,000 hours @ $T_{amb} < 30^{\circ}C$ 50,000 hours @ $T_{amb} < 55^{\circ}C$
Installation	Side-bracket Plug-and-play	Spigot-fit to SWISS LED solar powered lighting column XS- and S-type With cable connectors IP66
Environmental factors	Operating temperature	-20°C +55°C
	IP rating IK rating housing IK rating glass	IP66 IK10 IK08
Exterior	Housing material	Die-cast aluminium LM6-quality, non-corrosive RAL 9010 (Pure white)
	On-top cassette material	PC RAL 2100 (Noir)
	Lens material efficiency	PMMA Glass Energy Vision 3 92%
Dimensions	Length x width x height weight	600 x 290 x 100 mm 7.5kg

In detail **column technology**

SWISS LED's intelligent technology is all integrated in the control unit. This unit is responsible for the smart management and preservation of the system. In this way, the lifetime of electrical elements can be stretched. This is the reason that the SWISS LED solar lighting column is so unique. Without diving into too much technical details, the technological highlights of the control unit are explained below.

control unit

Our control unit is the intelligent core of the electrical system, securely capsulated - resin-moulded. It is programmed to monitor and control the solar powered lighting column. Energy production -storage and -use are managed by the control unit. Via short range communication technology (bluetooth low energy), the status and data can be retrieved. Remote (long range) communication per control unit is optional.



four sided MPPT

Maximum Power Point Tracking (or MPPT) is a technology to maximize power extraction under all conditions. As the amount of sunlight among the four sides/vertically mounted solar panels varies significantly, the load characteristic that gives the highest power transfer efficiency differs. The MPPT optimizes the efficiency of the system when the load characteristic changes to

keep the power transfer at highest efficiency. Unique to the SWISS LED solar lighting column is that it uses MPPT for four sides separately.

Besides the amount of light, temperature also influences the system. Solar cells have a complex relationship between temperature and total resistance that produces a non-linear output efficiency (the I-V curve). Our control unit uses this information to use MPPT and chooses the best load to be presented to the cells in order to get the most usable power output.

Furthermore, MPPT resolves mismatches in the PV panel maximum power point voltage and the battery's voltage.

lifetime of battery

The functional lifetime of cyclic lead acid batteries depends on the number of discharges and the depth of discharge (DoD). Our system is optimized to - under normal conditions - to maintain a DoD of 30%. For example: We expect our VRLA batteries to have a lifetime of over 2.500 cycles. For lithium we expect 4000 cycles at a DoD of 50%.

Additionally, the charging temperature defines the lifetime of the battery. Therefore we measure the operation temperature very frequently and adapt our charging strategy on it.

We use valve regulated lead acid (VRLA) battery or LiFePO₄-technology: these can be mounted in any orientation, and do not require constant maintenance.

In conclusion

100% autonomous

All configurations and standard products of SWISS LED are designed as 100% autonomous. This means that all units are off-grid and independent of any electricity grid. Every energy facet is and is being examined and optimized by us: -generation (solar), -storage (battery) and -use (LED) with the elimination of conversion reductions by the DC-electrical design.

Smart system

The intelligent control unit is the mastermind of the mast. It monitors and controls the unit to actuate and manage the energy ecosystem of the mast, but also maintain the lifetime of the total system. Optionally, remote monitoring and control is available.

Optimized and modular

All configurations are modularly built, based on the sun irradiation and lighting requirements. The selected models are the most optimized in combination of luminaire, solar panels and batteries, to provide the best lighting effects on illumination, uniformity and glare. An additional advantage of this modularity: solar panels and batteries are easily replaced if necessary.

Designed for extreme conditions

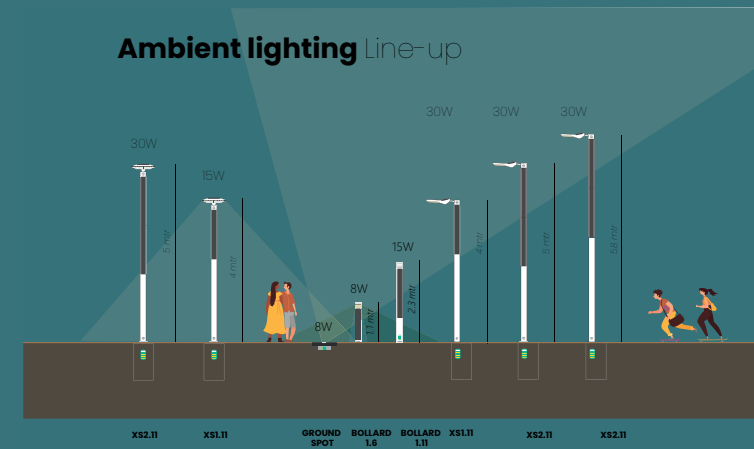
Heat, wind, dust, salt and sand, or other harsh (weather) conditions has no or little impact on the units. All units are produced and finished in high quality. Some examples: The units are designed for wind speeds up to 160 km/h, produced from European steel, hot-dipped galvanized and finished with a durable two-layer powder coating. Colour is standard RAL 9010 - other colours are optional. Also the electrical system is being protected by a continuous airflow through the column - all connectors are IP 67. The condition of the battery is constantly monitored by the control unit and acted upon if required.

Complete and plug-and-play

The units are complete plug-and-play. The actual basis of the mast is the foundation, which also includes a battery compartment, on which the mast is mounted. After erecting the column, the system can be electronically activated by plugging the connectors. The control unit ensures defining the location and so actuates the correct lighting program.

Extra: ambient light

Besides public lighting, we have an additional set of ambient lighting products. These have the same high standards in quality and design and would make a perfect fit for parks to guide pedestrians through the walkways or give an ambient feeling and the perception of safety.



Ask for the separate brochure to view all of our ambient lighting products.

