



Self-contained street lighting kit
using photovoltaic solar energy

NEW VERSION WITH LED LAMP

Self-contained street lighting kit using photovoltaic solar energy

Conchiglia's range of public lighting systems now includes the "self-contained photovoltaic street lighting kit". The photovoltaic kit is designed for lighting in parking lots, roads, public gardens, parks and wherever it is uneconomical to install conventional lighting systems. It is particularly advantageous where limitations of an environmental type, safety reasons, areas where there are thoroughfares, railway or motorway crossings would make it extremely costly to build cable ducts for connection to the electricity main.

General specifications

- Requires no power from the electricity main, thus each pole is self-contained and does not need to be physically connected to the others;
- The energy is exclusively produced from the sunlight, which is stored during the day and drawn upon at night;
- Operators are not required as, once programmed, the electronic control unit turns the lamps on and off (the control unit is required for the model with the SOX lamp while it is included in the LED board in models with the LED lamp);
- The system is extremely reliable as it is constructed solely from solid-state components. A fault in an individual pole will not affect another.

Which solution to choose

The following parameters must be considered when choosing the right photovoltaic solar kit:

- Period in which there is the least sunlight (June, NSW, 3.63 hours/day)
- Period of most sunlight (December)
- The energy production in relation to the place in which the kit is installed
- The amount of energy consumed by the various different components
- Number of days the KIT remains operational without sun

NUMBER OF DAYS KIT REMAINS ON WITHOUT SUN*

Type of kit	120 Ah Battery	144 Ah Battery
KFV140/S26	3 days	3 days
KFV50/L12	5 days	6 days
KFV70/L12	5 days	6 days
KFV90/L12	5 days	6 days
KFV90/L18	4 days	4 days
KFV140/L18	4 days	4 days

* the data refer to a fully charged battery

LED light source:

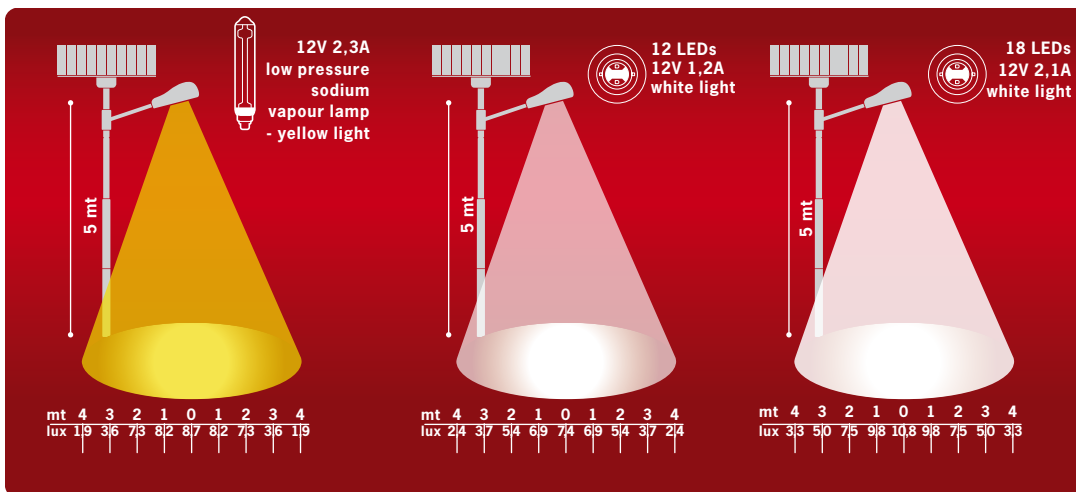
brighter, longer lasting, lower costs

Thanks to a new light source with luminous diodes (LED), **the new KfV/LED photovoltaic solar streetlight marks** an important turning point when it comes to self-contained lighting systems by introducing new standards of efficiency, reliability and running economy that would have been impossible until only a few years ago.

The KfV/LED streetlight features the following characteristics:

- It emits a **white** light thus, illumination being equal, the human eye perceives colours and details in a much better way;
- Guaranteed ignition throughout the night;
- One-way light emission, thus a total absence of light pollution;
- The road surface is illuminated to a greater extent than when low pressure sodium vapour lamps of equal power are used;
- Longer lasting than any type of filament or gaseous discharge lamp. The average life prior to a failure (MTBF) is about 100,000 hours;
- Very highly reliable, since the light source is formed by lots of independent units;
- The luminous power can be adjusted;
- The system is not affected by the ambient temperature, so there is no difficulty in turning on the lamps in colder climates.

Performance comparisons between a sodium vapour lamp and a LED lamp



Type of lamp	Type of light	Energy consumption	Light-emitting performances
12 V low pressure sodium vapour	Yellow	2,3 A	8,7 Lux
12 LEDs - 12 V	White	1,2 A	7,4 Lux
18 LEDs - 12 V	White	2,1 A	10,8 Lux

The three drawings compare the performance, both as to electricity consumption and light emitting efficiency, of a standard street armature with a low pressure sodium vapour lamp and a KfV/LED light source in the two configurations with 12 and 18 LEDs. The illumination data given in the graphs were certified by Istituto Giordano - www.giordano.it - The test was conducted by considering the following standards:

- UNI EN 13201-3:2004 of 01/09/2004 "Road lighting - Part 3: Calculation of performance",
- UNI EN 13032-1:2005 of 01/01/2005 "Light and lighting - Measurement and presentation of photometric data of lamps and luminaires - Part 1: Measurement and file format".

It will be more than evident that although the LED lamp consumes about 50% less energy (picture in the center), its light emitting performance is more or less equivalent (8.7 lux for the SOX lamp and 7.4 lux for the lamp with 12 LEDs) while with a consumption of an equal entity (2.1 A for the lamp with 18 LED and 2.3 A for the SOX lamp) the light emitting efficiency of the LED source is decidedly higher (10.8 lux for the lamp with 18 LED). Besides this very important parameter, one must also consider that the light produced by the LED source is WHITE in colour. The light intensity is very easy to regulate and the LED lamp is extremely long-lasting and reliable, much more so than the low pressure sodium vapour lamp.

Common components in the kits

Solar cell panels

The electric energy is produced by photovoltaic solar panels formed by highly efficient single-crystal silicon. The technology used for the high-efficiency solar cell panels produces much more current (10-17%) than the typical operating voltage of a battery (12-13 Volts).

Designed to function in the most difficult environmental and operating conditions, the solar cell panels have proved to be extremely tough and long-lasting (more than 30 years on average).

The solar cell panels must point towards the NORTH.

They comply with standards IEC 1215 and EN 61215, Class II equipment.

Peak power (Wp)	50 Watts	70 Watts	90 Watts	140 Watts*
Short-circuit current (ISC)	3.50 Amps	4.46 Amps	6.10 Amps	4.46 Amps
Open circuit voltage (Voc)	20.80 Volts	21.00 Volts	20.90 Volts	21.00 Volts
Voltage at maximum power point (Vmp)	16.66 Volts	17.00 Volts	16.50 Volts	17.00 Volts
Current at maximum power point (Imp)	3.00 Amps	4.12 Amps	5.46 Amps	4.12 Amps
Typical current at battery voltage (12-13 V)	3,15 Amps	4,25 Amps	5,70 Amps	4,25 Amps
Wind load or surface pressure	2400 N/m ² **	2400 N/m ² **	2400 N/m ² **	2400 N/m ² **
Hail impact strength	24 mm a 80 kph	24 mm a 80 kph	24 mm a 80 kph	28 mm a 80 kph
Operating and upkeep temperature	from -40 to +95°C	from -40 to +95°C	from -40 to +95°C	from -40 to +95°C
Maximum voltage of the system	600 Volts	1000 Volts	750 Volts	1000 Volts
Relative humidity	up to 100%	up to 100%	up to 100%	up to 100%
Dimensions (mm)	750x524x34	1130x524x34	1440x524x34	1130x1048x34
Weight (kg)	4.6	7.9	9.3	7.9x2
Tolerance margin on technical specifications	± 10%	± 10%	± 10%	± 10%
Power warranty	80% 25 years	80% 25 years	80% 25 years	80% 25 years

* Two 70 W panels ** equiv. 200 kph

Fixing structure of the photovoltaic modules

The photovoltaic modules are fixed by means of a hot-dip galvanized steel section metal structure with pole top connection possessing the following specifications:

- Angle of inclination (TILT) of photovoltaic field: 20° for tropical countries and 35° for NSW obtained with a single accessory supplied in the kit;
- Bracket for fixing to 60 to 89 mm diameter poles;
- Wind load rating up to 100 kph.

Arm for street armature

In hot-dip galvanized steel. Collar for fixing to 60 to 89 mm diameter poles.

Version with SOX lamp

Light fitting

The street light fitting (suitable for power ratings of up to 35 W) consists of a single unit which houses the SOX E26 lamp, the control unit and igniter. It is connected to:

- two 70 Wp solar cell panels for a total 140 Wp;
- a 12V 144 Ah/20h accumulator.

The structure of the light fitting comprises:

- casing and reflector made of aluminium;
- cover in grey coloured (RAL 7035) shockproof polycarbonate, stabilized against deterioration caused by UV radiation;
- front cap: the structure is protected at the front by flat glass. This is fixed to the light fitting by strong hinges that allow the unit to be serviced without the cap having to be removed. The cap is closed by three stainless steel clips and a seal, ensuring that the lamp compartment is perfectly tight;
- 12 Vdc power supply. An easily removable powering plate contains the electrical equipment, which comprises an electronic control and monitoring circuit and a high frequency electronic reactor; IP 65 norms; Standards CEI 34-21 - IP 23 Electrical compartment.



SOX E26 low pressure sodium vapour lamp

- Power supply voltage: 58 Veff.
- Tolerated voltage variation: +/- 5%
- Lamp power: 31 W
- Lamp current: 0.53 Aeff.
- Connection: BY22D
- Luminous flux: 4000 Lumen
- Luminous efficiency: 129 Lumen/Watt
- Colour temperature: 1800°K

Storage battery

The storage battery specifications are listed below:

- 12 V voltage rating and 144 Ah/20h capacity;
- suitable for photovoltaic applications;
- maintenance-free;
- low auto-discharge;
- able to carry out charging/discharging cycles in accordance with standard IEC 896 part 2;
- dimensions 342 x 172 x h. 285 mm;
- 12-month warranty from installation date.

Since the daily charging/discharging cycles in photovoltaic pole applications are less than 1/4 of the capacity, the working life of the storage battery can be as long as 5-6 years.

Thanks to the technical methods and materials used, this product is the ideal solution for installations designed to supply energy for systems requiring high performance, the utmost reliability and small size.

Electronic control and monitoring circuit

- charge regulator;
- protection against complete battery discharge;
- dusk to dawn switch.

The electronic monitoring circuit detects the installation data and ensures that the streetlight functions in a reliable and fully automatic way. There are no relays in the control unit. All commutations take place with solid-state components.

During the day, a power mosfet connects the panels to the storage battery, the voltage of which is kept continuously under control. When the voltage is sufficient to ensure that the storage system completely recharges, the mosfet disconnects the solar panels to prevent the storage battery from being damaged by an overload. At dusk, a dusk to dawn switch enables the igniter which generates the alternate voltage able to power the lamp.

The length of time the lamp remains on is determined by a programmable timer in the electronic monitoring circuit. The streetlight comes on each evening at dusk and is turned off after the required number of preset hours have elapsed. Moreover, a threshold circuit keeps the powering voltage under constant control overnight. If this drops below 11 V owing to a fault or a long period of bad weather, the lamp is turned off to prevent the storage battery from discharging completely as it could sustain irreversible damage if this were to occur. The control unit is covered by a 12-month warranty from the installation date.

Electronic igniter

Specific model for low pressure sodium vapour lamps. Although its consumption is particularly low, this igniter gets the most out of the light emitting characteristics of SOX lamps.

Characteristics of the electronic igniter for SOX 26 W lamps (suitable for power ratings of up to 35 W):

- Power supply voltage: 12 Vdc;
- Oscillation frequency: over 19 KHz;
- Conforms to standard EMI EN55015;
- Electronic with high frequency oscillator and protection against over-voltage and short-circuits.



Version with LED lamp

Light fitting

The streetlight fitting consists of a single unit which houses the LED plate, the control unit and switching power supplier. It is connected to:

- solar cell panel (with a power rating that ranges from 50 to 140 W, depending on the application and lamp power);
- 12 V storage battery (with a capacity ranging from 120 to 144 Ah, depending on the application).



The structure of the light fitting comprises:

- casing and dissipator made of aluminium;
- cover in grey coloured (RAL 7035) shockproof polycarbonate, stabilized against deterioration caused by UV radiation;
- front cap: the structure is protected at the front by flat glass. This is fixed to the light fitting by strong hinges that allow the unit to be serviced without the cap having to be removed. The cap is closed by three stainless steel clips and a seal, ensuring that the LED compartment is perfectly tight;
- 12 Vdc power supply. An easily removable powering plate contains the electrical equipment, which comprises an electronic control and monitoring circuit and a high frequency switching power supplier; During the winter months or lengthy periods of bad weather, the control circuit will automatically reduce the brightness of the LEDs during the central hours of the night and depending on the battery charge, thus saving the stored energy so that it is available for the following nights.
- IP 65 norms; Standards CEI 34-21 - IP 23 Electrical compartment.

Storage battery

Specifications:

- 12 V voltage rating and 144 Ah/20h capacity (or 120 Ah/20h capacity);
- suitable for photovoltaic applications;
- maintenance-free;
- low auto-discharge;
- able to carry out charging/discharging cycles in accordance with standard IEC 896 part 2;
- Dimensions 342 x 172 x h. 285 mm (for 144 Ah); 331 x 175 x h. 220 mm (for 120 Ah);
- 12-month warranty from installation date.

Since the daily charging/discharging cycles in photovoltaic pole applications are less than 1/4 of the capacity, the working life of the storage battery can be as long as 5-6 years.

Thanks to the technical methods and materials used, this product is the ideal solution for installations designed to supply energy for systems requiring high performance, the utmost reliability and small size.

Initials	Code	Type of battery	n. panels	lamp
KFV50/L12	081931016	120Ah	n.1 da 50W	12 LED
KFV70/L12	081931024	120Ah	n.1 da 70W	12 LED
KFV90/L12	081931032	120Ah	n.1 da 90W	12 LED
KFV90/L18	081932014	120Ah	n.1 da 90W	18 LED
KFV140/L18	081932022	144Ah	n.2 da 70W	18 LED

Components not included in the kit

Pole

Lamp, panel and control unit are normally installed on a hot-dip galvanized pole. Height 7 meters above ground. Lamp installed at a height of 5 meters.

The recommended pole measures:

- diameter at base: 168 mm
- diameter at top of pole: 89 mm
- thickness: 4 mm

With reference to the recommended type of pole, the following table lists kit installations depending on the zone and categories of ground.

Initials	Code	Panel area	Kit weight	zones	ground cat.	zones	ground cat.	zones	ground cat.
KFV50/L12	081931016	0,40 m ²	19 kg	1,2,3,4,5,6,8	II	7	III	9	I
KFV70/L12	081931024	0,60 m ²	22 kg	1,2,3,4,5,6,8	II	7	III	9	I
KFV90/L12	081931032	0,75 m ²	23,5 kg	1,2,3,4,5,6,8	II	7	III	9	I
KFV90/L18	081932014	0,75 m ²	23,5 kg	1,2,3,4,5,6,8	II	7	III	9	I
KFV140/L18	081932022	1,20 m ²	30 kg	1,2,3,4,5,6	II	7	III		
KFV140/S26	081930018	1,20 m ²	30 kg	1,2,3,4,5,6	II	7	III		

Reference standard: loads and overloads Ministerial Decree DM 16/01/96 and verifications Ministerial Decree 09/01/96.

Note: refer to the data provided by the pole manufacturers for special calculations or specific installations.

Battery housing

In a cabinet at the base of the pole or in an underground well, depending on the type of installation.



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