

VERTICAL SOLAR PV POLES



LIGMAN



Seamless vertical solar PV module integration

Seamless vertical integration is a clean efficient method to integrate solar photovoltaic technology into column lighting systems. Using this method, large flat solar panels are not fixed on top of lighting column or system, but instead are placed around the lighting pole itself. Seamlessly integrating the technology aesthetically without compromising the efficiency, adding value to both designers and end users.

Vertical integration is more wind-resistant, reducing wind-loads and minimising the need for more expensive pole foundations as well as providing a reduced maintenance burden with reduction of dirt build up on the photovoltaic surfaces requiring both less frequent and easier cleaning. The vertical wrap-around panels receive light more evenly and efficiently from the sun and sky during the course of daylight hours, even in darker climates and seasons.



Universal Application

Can be used on any type of aluminium or steel pole, easy to assemble and locked into place. Poles can be sourced separately if needed and the modular design with adjustable spacing brackets ensures easy assembly into any type of pole configuration.



360° Full Day Charging

6 slim solar sections are fixed tightly onto a hexagon frame which ensures 50% of solar panel will face to sunshine at any time of the day. No onsite orientation is needed.



Modular Installation

This solar cylindrical solar PV module is based on modular design concept for easy installation and disassembly. It can be quickly and easily mounted onto any suitable pole.



Patented Design

Solar cylindrical solar PV module is designed based on advanced concepts and manufactured to high standards. PCT pre-registration was processed in 180 countries to protect keymarkets.



Strong Wind Resistance

The cylindrical design reduces the wind load area, and each module is directly fastened to the pole by 12 screws for better wind resistance. Ideal for very windy regions.



Anti Snow Covering

Solar cylindrical solar PV modules are mounted vertically, preventing build up of snow and dirt. Ensuring enough power can be generated even in very snowy climates.



Easy to Clean

Less dust will fall on surface than on a regular solar panel. Maintenance workers can clean it easily standing on ground with a extending low-pressure hose brush or spray clean. Resulting in higher work efficiency and reduced maintenance cost.



Design Aesthetics

The module system is the real answer to design aesthetics, providing a compact and fully integrated green energy solution to the pole.

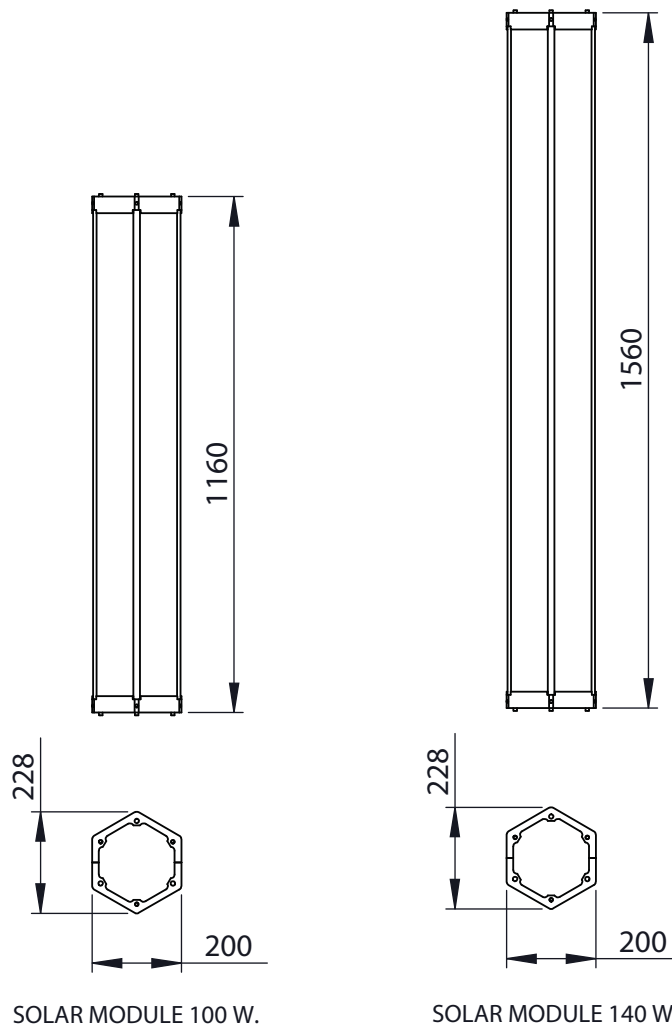


PV Specification

Model number	PV-100		PV-140	
Maximum power	100W		140W	
Maximum power voltage	18V	36V	18V	36V
Maximum power current	5.56A	2.78A	7.78A	3.89A
Cell type	Mono - Crystalline			
Material	Aluminium+tempered glass			
International Protection Standard Rate	IP65			
Solar cell efficiency	>20.5%			
Cable type	2.5mm2 with MC4			
Operating temperature	-40 °C ~+80 °C			
Warranty	5 years			
Rated Life-Time	>20 years			
Net Weight	15.80 kgs		25.60 kgs	
Gross Weight	17.50Kgs		27.80Kgs	



PV Dimensions



Lithium Ion Phosphate (LiFeP04) Battery

12.8V16.5Ah

Features

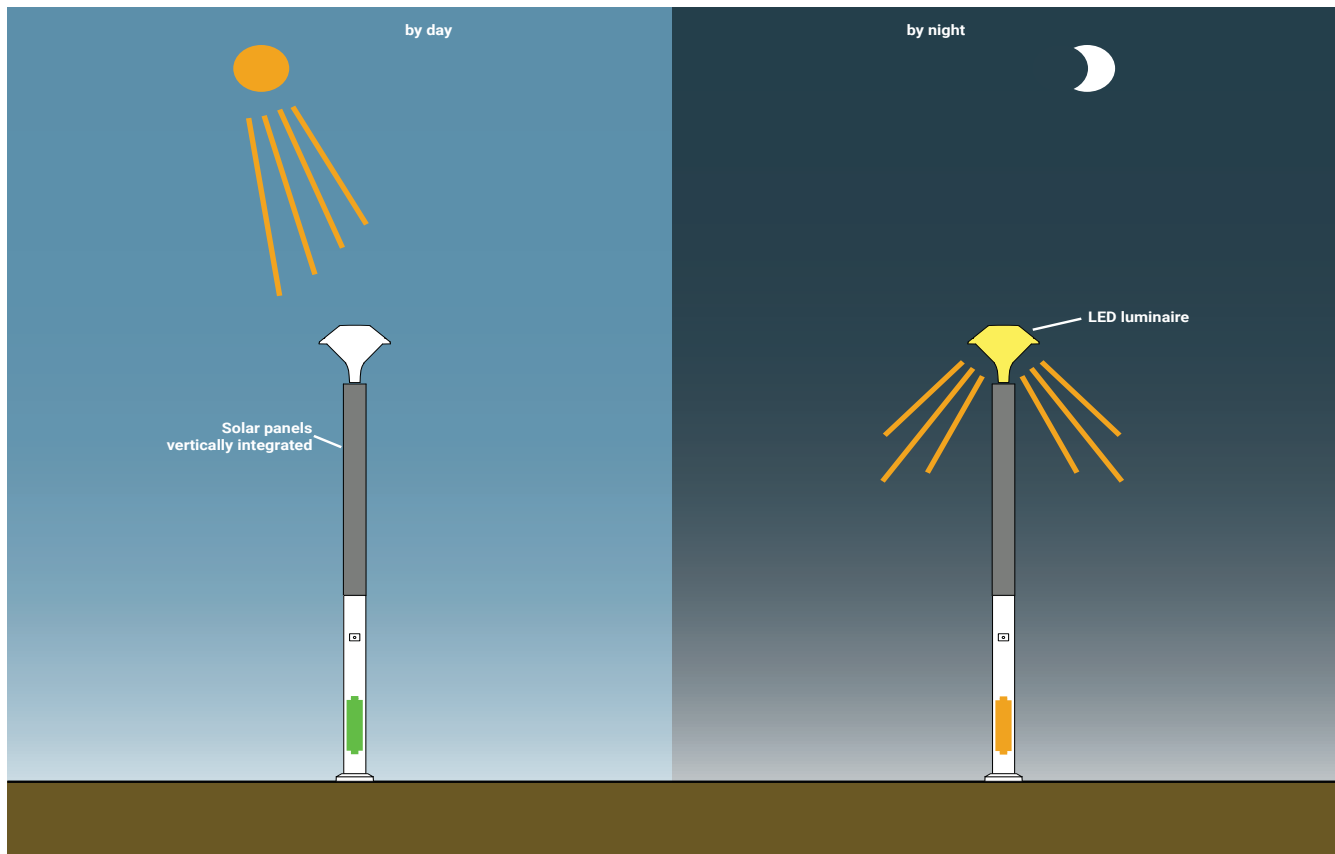
- ◆ Using the technology of lithium ion phosphate cell, superior safety, thousands of cycles, 100%DOD, under normal conditions.
- ◆ Built-in automatic protection for over-charge, over discharge, over current and over temperature.
- ◆ Free of maintenance .
- ◆ Internal cell balancing.
- ◆ Lighter weight: About 40% ~50% of the weight of a comparable lead acid battery.
- ◆ Can be charged using most standard lead-acid charges (set).
- ◆ Wider temperature range:-20°C~60°C .
- ◆ Support for Series application expansion (up to 51.2V) and two in parallel.



General Specifications

Electrical Characteristics	Nominal Voltage	12.8V
	Nominal Capacity	16.5Ah@0.2C
	Energy	211.2Wh
	Internal Resistance	60≤mΩ
	Cycle Life	2000 Cycles @ 0.2C Charging/Discharging ,Until 70% Capacity
	Self Discharge	≤3.5% per month at 25°C
Standard Charging	Max.Charging Voltage	14.0~14.6V
	Charging Mode	At 0°C~45°C temperature, charged to 14.6V at a constant current of 0.2C5A, and then,changed continuously with constant voltage of 14.6V until the current was not more than 0.02C5A
	Charging Current	3.3A
	Max.Charging Current	8.25A
Standard Discharging	Discharging Current	3.3A
	Max. Continuous Current	15A
	Max.Pulse Current	50A(<3S)
	Discharging Cut-off Voltage	10.0
Operating Conditions	Charge Temperature	0°C to 45°C(32°F to 113°F) @60±25% Relative Humidity
	Discharge Temperature	-20°C to 60°C(-4°F to 140°F) @60±25% Relative Humidity
	Storage Temperature	0°C to 45°C(32°F to 113°F) @60±25% Relative Humidity
	Water Dust Resistance	IP55
Structure	Cell & Format	IFR32700 N55,4S3P
	Casing	Plastic
	Dimension(L*W*H*TH)	181*77*167*167mm
	Weight	Approx. 2Kg
	Terminal	M5

Rechargeable batteries are mounted inside the pole

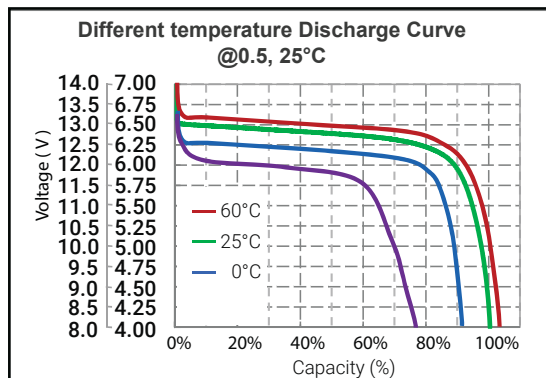
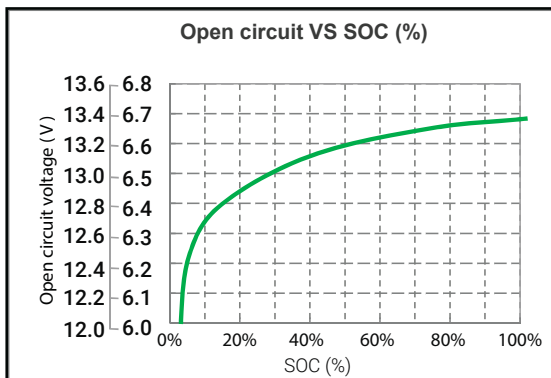
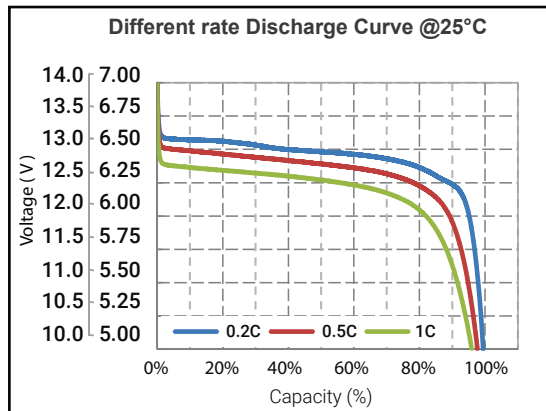
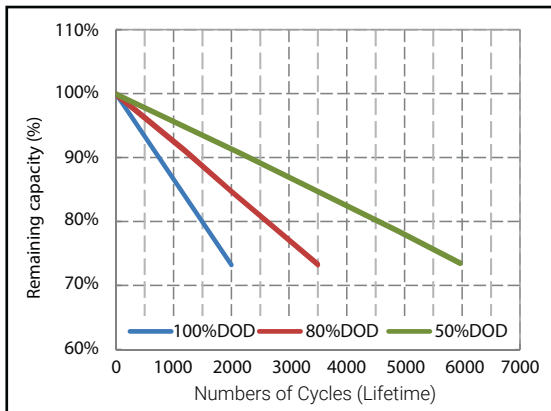


Energy stored within the batteries

Batteries release energy to power the luminaire(s)

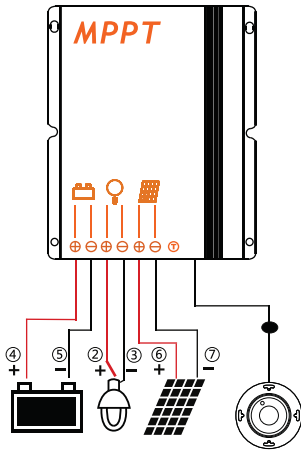
Test Performance of LiFe PO4 batteries













Different Depth of discharge (DOD) Discharge Cycle Life Curve @25°C



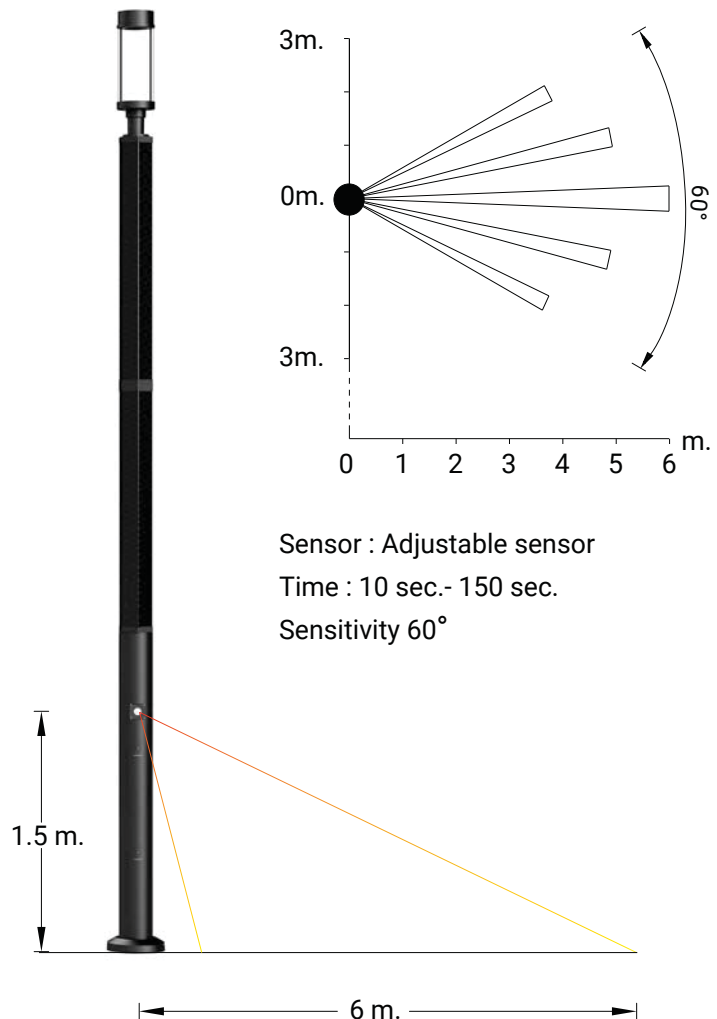
Solar charge controller

Advantages



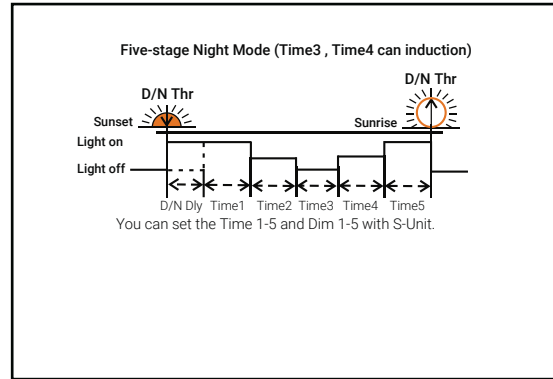
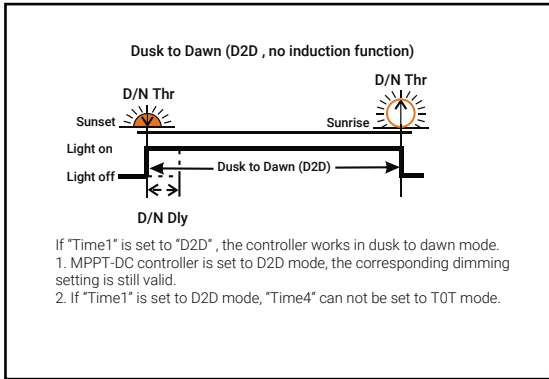
-  - Innovative Max Power Point Tracking (MPPT) technology, tracking efficiency >99%
-  - If battery voltage dim low, it can be set to dimming automatically
-  - Full digital technology, high charge conversion efficiency up to 97%
-  - 12V/24V system voltage automatic recognition
-  - Full digital technology, high discharge conversion efficiency up to 96%
-  - Motion detector for dimming light distribution
-  - Can output adjustably constant current, precision: 50mA, minimum current: 100mA
-  - External temperature sensor
-  - 5 stages time and dimming can be adjusted, dimming 0~100%
-  - IP67, Strong and durable aluminum case
-  - By remote unit
-  - Full automatic electronic protect function

Motion Sensor Detection Area

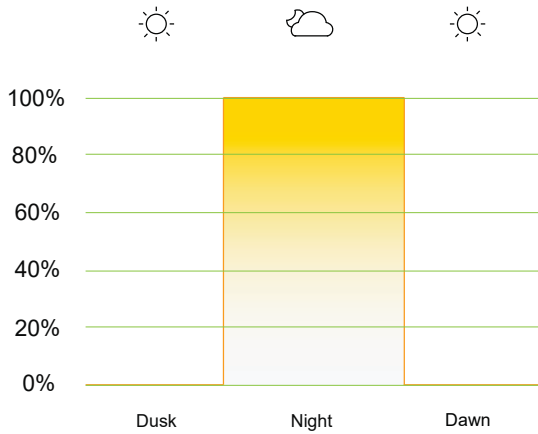


Charge Controllers

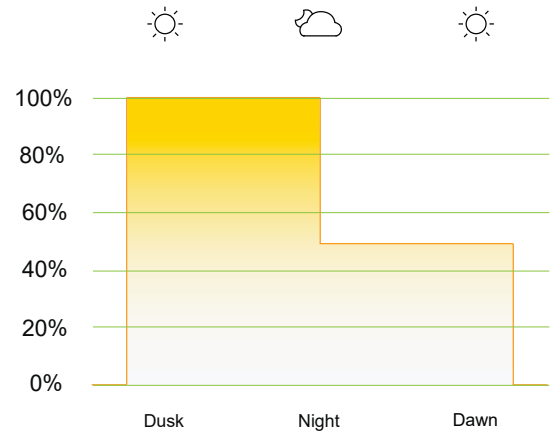
LIGMAN provides programmable charge controllers that can be set for any desired setting for dusk to dawn pole operation. With timers and/or sensor overrides as required. Some typical algorithm examples are shown below:



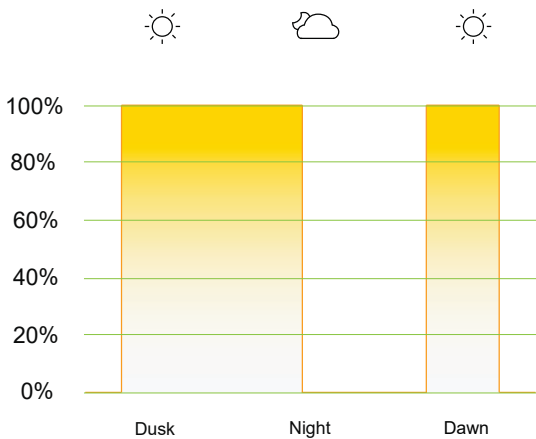
On/Off



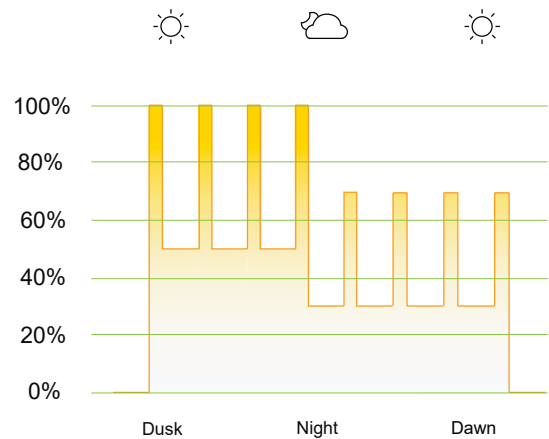
Step Dimming program



Custom hours (Timer)



Motion Sensor Override





Post top luminaires on request



Aberdeen

IP65 IK08



Forrey

IP65 IK08



Macaron

IP66 IK07



Arizona

IP65 IK08

Street & Area luminaires on request



Billund

IP66 IK09



PowerMission

IP66 IK07



Steamer rectangular

IP66 IK07



Steamer round

IP66 IK07

Feature Symbol



Luminaire colour code



Light Symbol



Area lighting with light distribution – Type-2

Shallow reach horizontal lighting distribution



Area lighting with light distribution – Type-3

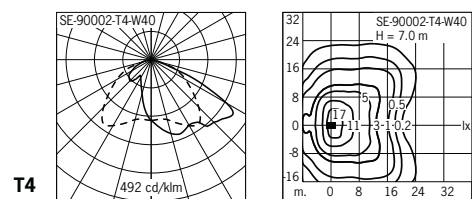
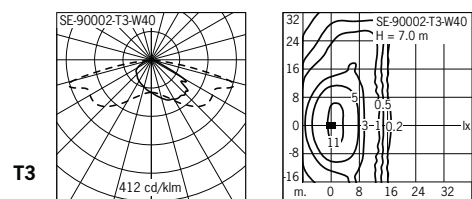
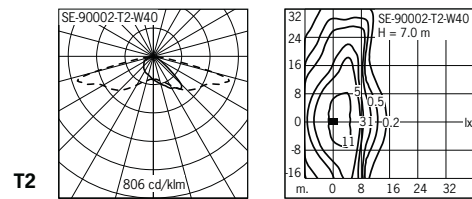
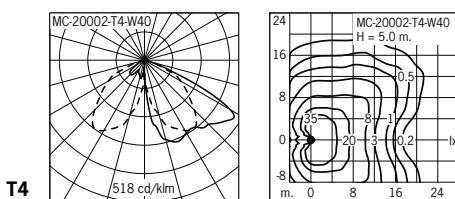
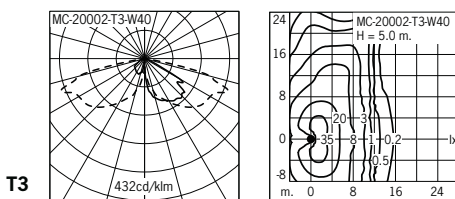
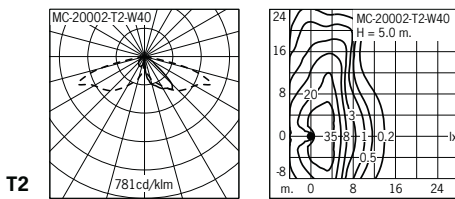
Mid-range horizontal lighting distribution



Area lighting with light distribution – Type-4

Forward-throw lighting distribution

Photometric



<p>Product code guide ABA-20001-SO-20 - T3 - W30 - STD - SOL-20001- A92291</p> <p> Optic Option setting type Accessory Colour Vertical solar pv pole</p>	<p>Colour Temperature W30 - Warm white 3000K W40 - Neutral white 4000K</p> <p>Option Setting Type STD - Standard CT - Custom</p> <p>Accessory A92291 - Remote S-Unit</p>	<p>Vertical solar pv pole option for post top SOL-20001 - (2X100W - H. 4M. - 2X16.5Ah) SOL-20011 - (2X140W - H. 5M. - 3X16.5Ah)</p> <p>Vertical solar pv pole option for street & area SOL-20021 - (4X100W - H. 7M. - 4X16.5Ah) SOL-20031 - (4X140W - H. 8M. - 4X16.5Ah) SOL-20041 - (4X140W - H. 9M. - 6X16.5Ah)</p>
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Post top & Street area Poles							Luminaires Operating 100%				Dimming	Motion sensor
Product code	System	Solar Module Power	Battery LiFePO4 12V 16.5Ah	Weight	Support Luminaire	20W	40W	60W	80W			
Post top												
SOLAR PV POLE 1	SOL-20001	12Vdc	2X100 W	2X16.5Ah	136.6 kg.	20W - 40W	8-10 Hr.	4-5 Hr.	-	-	8-12 Hr. (40W)	
SOLAR PV POLE 2	SOL-20011	12Vdc	2X140 W	3X16.5Ah	170.6 kg.	20W - 40W	16-20 Hr.	8-10 Hr.	-	-	16-20 Hr. (40W)	
Street & area												
SOLAR PV POLE 3	SOL-20021	24Vdc	4X100 W	4X16.5Ah	199.3 kg.	40W - 80W	-	12-14 Hr.	9-11 Hr.	6-8 Hr.	12-16 Hr. (80W)	
SOLAR PV POLE 4	SOL-20031	24Vdc	4X140 W	4X16.5Ah	263.5 kg.	40W - 80W	-	12-14 Hr.	9-11 Hr.	6-8 Hr.	12-16 Hr. (80W)	
SOLAR PV POLE 5	SOL-20041	24Vdc	4X140 W	6X16.5Ah	284.8 kg.	40W - 80W	-	22-24 Hr.	14-16 Hr.	10-12 Hr.	20-24 Hr. (80W)	

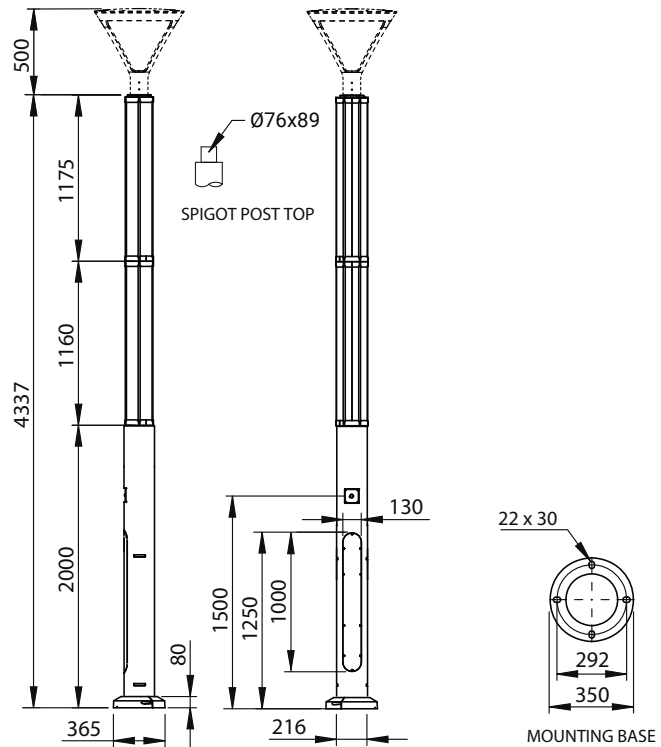
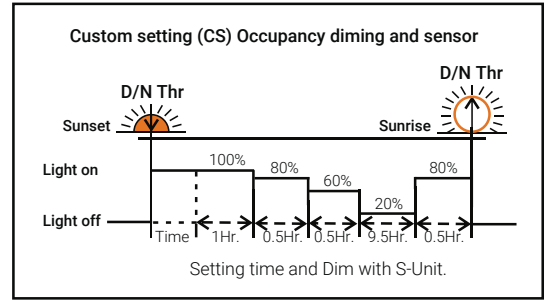
Post top & Street area lighting luminaires											
Product code	Lamp	Power	Lumens	EEC	Colour	Optic			Weight		
						T2	T3	T4			
POST TOP											
ABERDEEN 1	ABA-20001-SO-20	24 LED	20 W	2738 lm	A++	30 40	142°x59°	142°x72°	102°x63°	11.5 kg.	
	ABA-20001-SO-40	24 LED	40 W	5477 lm	A++	30 40	142°x59°	142°x72°	102°x63°	11.5 kg.	
ABERDEEN 2	ABA-20011-SO-20	24 LED	20 W	2738 lm	A++	30 40	142°x59°	142°x72°	102°x63°	10.5 kg.	
	ABA-20011-SO-40	24 LED	40 W	5477 lm	A++	30 40	142°x59°	142°x72°	102°x63°	10.5 kg.	
FORREY 14	FOR-20022-SO-20	1 COB	20 W	1907 lm	A+	30 40	140°x100°	132°x103°	137°x117°	13.5 kg.	
	FOR-20022-SO-40	1 COB	40 W	3814 lm	A+	30 40	140°x100°	132°x103°	137°x117°	13.5 kg.	
FORREY 12	FOR-20042-SO-20	1 COB	20 W	1907 lm	A+	30 40	140°x100°	132°x103°	137°x117°	17.0 kg.	
	FOR-20042-SO-40	1 COB	40 W	3814 lm	A+	30 40	140°x100°	132°x103°	137°x117°	17.0 kg.	
MACARON 1	MC-20002-SO-20	24 LED	20 W	2550 lm	A++	30 40	136°x51°	119°x86°	102°x73°	13.5 kg.	
	MC-20002-SO-40	24 LED	40 W	5100 lm	A++	30 40	136°x51°	119°x86°	102°x73°	13.5 kg.	
MACARON 2	MC-20012-SO-20	24 LED	20 W	2550 lm	A++	30 40	136°x51°	119°x86°	102°x73°	13.5 kg.	
	MC-20012-SO-40	24 LED	40 W	5100 lm	A++	30 40	136°x51°	119°x86°	102°x73°	13.5 kg.	
ARIZONA 5	AR-21052-SO-20	16 LED	20 W	2101 lm	A++	30 40	142°x52°	137°x65°	93°x64°	8.1 kg.	
	AR-21052-SO-40	16 LED	40 W	4201 lm	A++	30 40	142°x52°	137°x65°	93°x64°	8.1 kg.	
STREET & AREA											
BILLUND 1	BIU-90002-SO-40	24 LED	40 W	5247 lm	A++	30 40	150°x75°	137°x71°	102°x63°	4.5 kg.	
	BIU-90002-SO-60	24 LED	60 W	7871 lm	A++	30 40	150°x75°	137°x71°	102°x63°	4.5 kg.	
	BIU-90002-SO-80	24 LED	80 W	10494 lm	A++	30 40	150°x75°	137°x71°	102°x63°	4.5 kg.	
POWERMISSION 2	PO29-GP041-SO-40	24 LED	40 W	4889 lm	A+	30 40	142°x53°	141°x69°	99°x79°	4.8 kg.	
	PO29-GP041-SO-60	24 LED	60 W	7110 lm	A+	30 40	142°x53°	141°x69°	99°x79°	4.8 kg.	
	PO29-GP041-SO-80	24 LED	80 W	8890 lm	A+	30 40	142°x53°	141°x69°	99°x79°	4.8 kg.	
STEAMER RECTANGULAR	SE-90002-SO-40	24 LED	40 W	5399 lm	A++	30 40	136°x51°	119°x86°	102°x74°	10.1 kg.	
	SE-90002-SO-60	24 LED	60 W	8098 lm	A++	30 40	136°x51°	119°x86°	102°x74°	10.1 kg.	
	SE-90002-SO-80	24 LED	80 W	10797 lm	A++	30 40	136°x51°	119°x86°	102°x74°	10.1 kg.	
STEAMER ROUND	SE-90022-SO-40	24 LED	40 W	5399 lm	A++	30 40	136°x51°	119°x86°	102°x74°	11.2 kg.	
	SE-90022-SO-60	24 LED	60 W	8098 lm	A++	30 40	136°x51°	119°x86°	102°x74°	11.2 kg.	
	SE-90022-SO-80	24 LED	80 W	10797 lm	A++	30 40	136°x51°	119°x86°	102°x74°	11.2 kg.	

Vertical solar pv pole (Battery 12V 2x16.5Ah)

	Product code	Power	Weight
SOLAR PV POLE 1	SOL-20001	2X100 W	136.6 kg.

Luminaire Structure

- Galvanised steel lighting column thickness 4.0mm. With powder coating.
- Aluminium housing powder paint with high corrosion resistance with chemical chromatised protection.
- Durable silicone rubber gasket.
- Integral control gear.
- Luminaires : 1COB / 24 LED 20W open 8-10 Hr. 100%
- Luminaires : 1COB / 24 LED 40W open 4-5 Hr. 100%
- Solar module consist of monocrystalline high efficiency cells 2x100W.
- Lithium Iron Phosphate (LiFePO4) battery 12V 2x16.5Ah
- Solar charger controller system 12V 15A + temperature & motion sensor
- Solar charger controller full digital technology, high charge conversion efficiency up to 97%, discharge conversion efficiency up to 96%.
- 5 stages time and dimming can be adjusted, dimming 0~100%
- Full automatic electronic protect function.
- Setting by remote control.
- Illumination time approximate 40W 4-5 Hr. autonomy from sunset
- Occupancy dimming and sensor compulsory: 20W / 40W Working hours up to two times from setting time open 100% 1Hr., 80% 0.5Hr., 60% 0.5Hr., 20% 9.5Hr., 80% 0.5Hr.

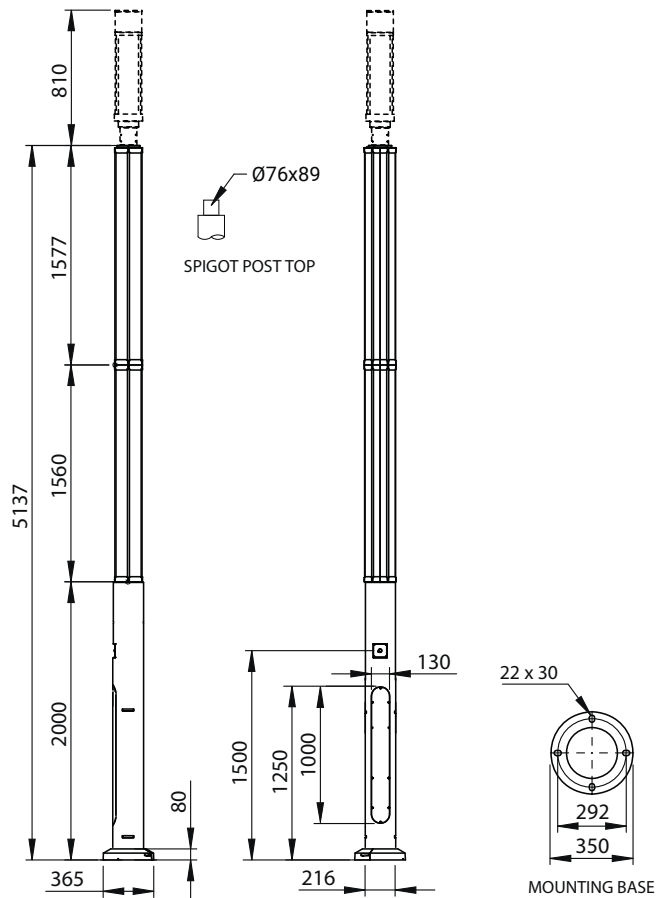
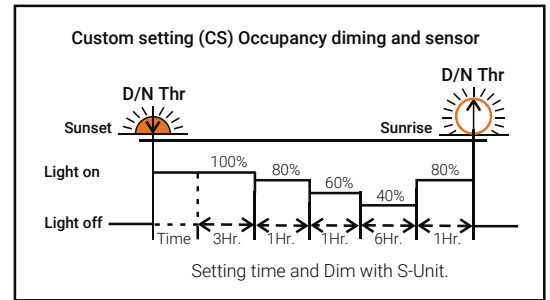


Vertical solar pv pole (Battery 12V 3x16.5Ah)

	Product code	Power	Weight
SOLAR PV POLE 2	SOL-20011	2X140 W	170.6 kg.

Luminaire Structure

- Galvanised steel lighting column thickness 4.0mm. With powder coating.
- Aluminium housing powder paint with high corrosion resistance with chemical chromatised protection.
- Durable silicone rubber gasket.
- Integral control gear.
- Luminaires : 1COB / 24 LED 20W open 16-20 Hr. 100%
- Luminaires : 1COB / 24 LED 40W open 8-10 Hr. 100%
- Solar module consist of monocrystalline high efficiency cells 2x140w.
- Lithium Iron Phosphate (LiFePO4) battery 12V 3x16.5Ah
- Solar charger controller system 12V 15A + temperature & motion sensor
- Solar charger controller full digital technology, high charge conversion efficiency up to 97%, discharge conversion efficiency up to 96%.
- 5 stages time and dimming can be adjusted, dimming 0~100%
- Full automatic electronic protect function.
- Setting by remote control.
- Illumination time approximate 40W 8-10 Hr. autonomy from sunset
- Occupancy dimming and sensor compulsory: 20W / 40W Working hours up to two times from setting time open 100% 3Hr., 80% 1Hr., 60% 1Hr., 40% 6Hr., 80% 1Hr.

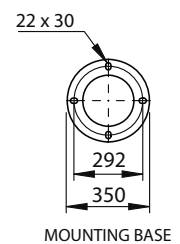
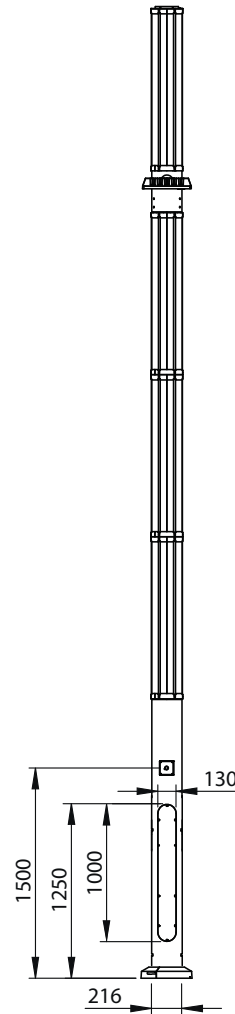
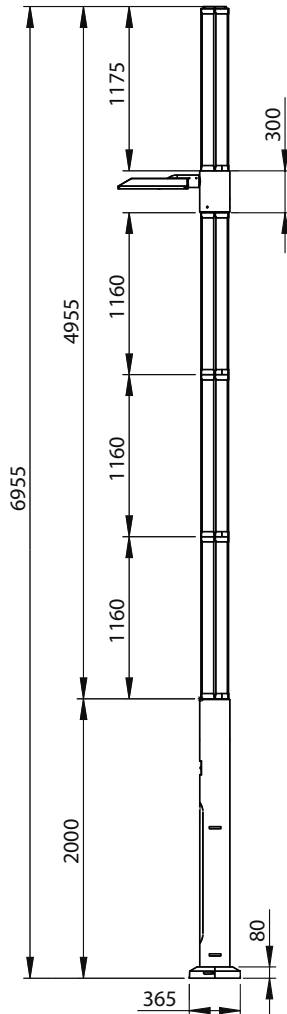
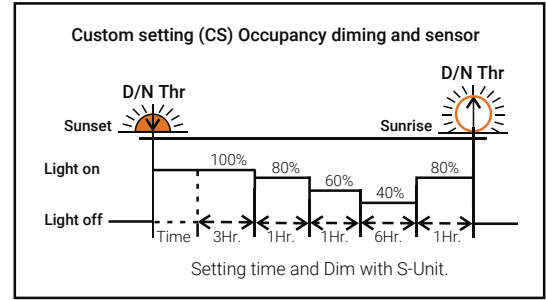


Vertical solar pv pole (Battery 12V 4x16.5Ah)

	Product code	Power	Weight
SOLAR PV POLE 3	SOL-20021	4X100 W	199.3 kg.

Luminaire Structure

- Galvanised steel lighting column thickness 4.0mm. With powder coating.
- Aluminium housing powder paint with high corrosion resistance with chemical chromatised protection.
- Durable silicone rubber gasket.
- Integral control gear.
- Luminaires : 1COB / 24 LED 40W open 12-14 Hr. 100%
- Luminaires : 1COB / 24 LED 60W open 9-11 Hr. 100%
- Luminaires : 1COB / 24 LED 80W open 6-8 Hr. 100%
- Solar module consist of monocrystalline high efficiency cells 4x100W.
- Lithium Iron Phosphate (LiFePO4) battery 12V 4x16.5Ah
- Solar charger controller system 24V 15A + temperature & motion sensor
- Solar charger controller full digital technology, high charge conversion efficiency up to 97%, discharge conversion efficiency up to 96%.
- 5 stages time and dimming can be adjusted, dimming 0~100%
- Full automatic electronic protect function.
- Setting by remote control.
- Illumination time approximate 40W 12-14 Hr. autonomy from sunset
- Occupancy dimming and sensor compulsory: 40W / 80W Working hours up to two times from setting time open 100% 3Hr., 80% 1Hr., 60% 1Hr., 40% 6Hr., 80% 1Hr.

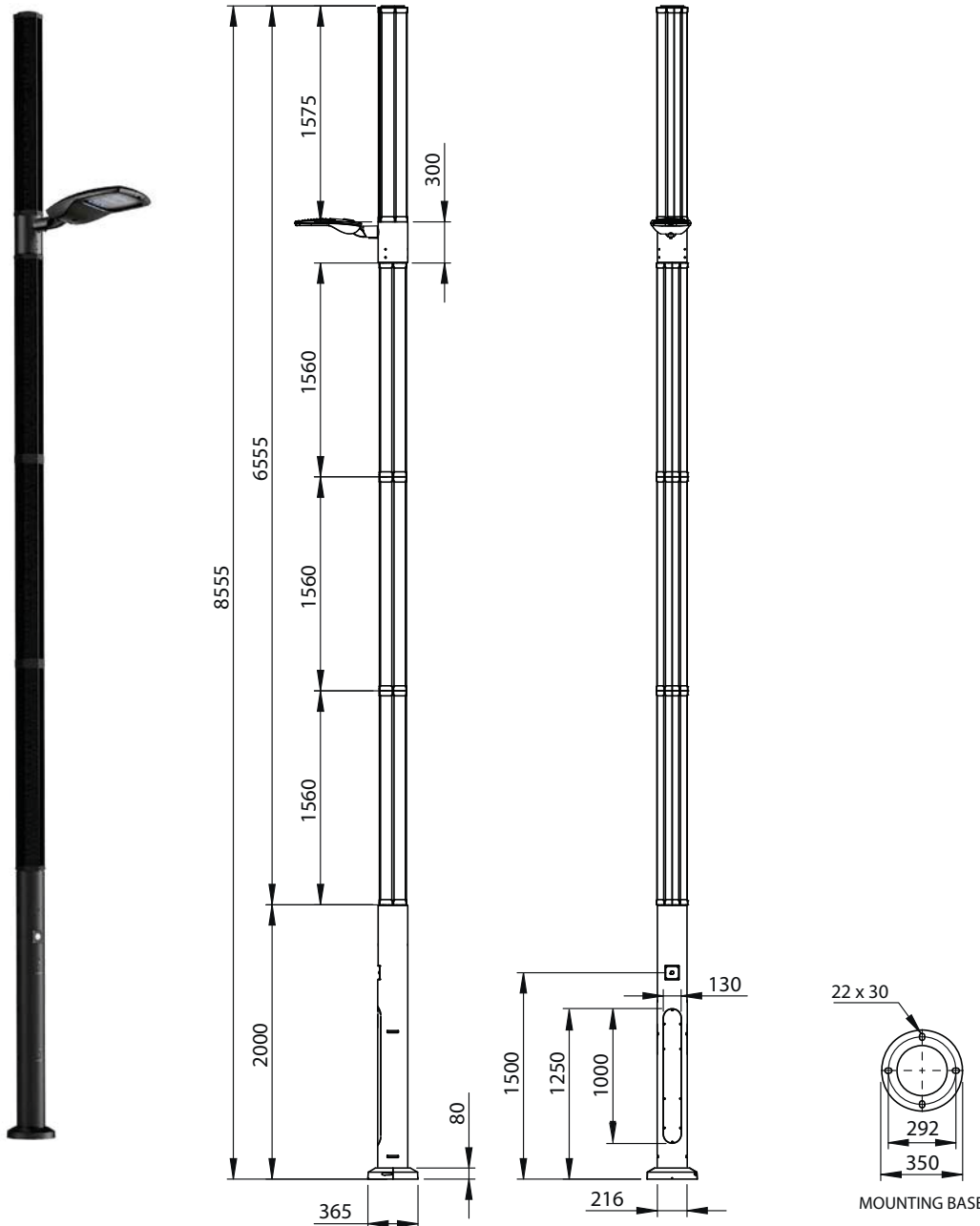
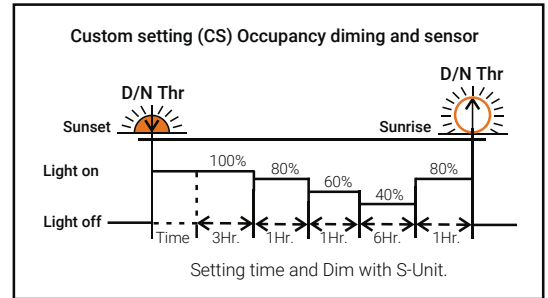


Vertical solar pv pole (Battery 12V 4x16.5Ah)

	Product code	Power	Weight
SOLAR PV POLE 4	SOL-20031	4X140 W	263.5 kg.

Luminaire Structure

- Galvanised steel lighting column thickness 4.0mm. With powder coating.
- Aluminium housing powder paint with high corrosion resistance with chemical chromatised protection.
- Durable silicone rubber gasket.
- Integral control gear.
- Luminaires : 1COB / 24 LED 40W open 12-14 Hr. 100%
- Luminaires : 1COB / 24 LED 60W open 9-11 Hr. 100%
- Luminaires : 1COB / 24 LED 80W open 6-8 Hr. 100%
- Solar module consist of monocrystalline high efficiency cells 4x140W.
- Lithium Iron Phosphate (LiFePO4) battery 12V 4x16.5Ah
- Solar charger controller system 24V 15A + temperature & motion sensor
- Solar charger controller full digital technology, high charge conversion efficiency up to 97%, discharge conversion efficiency up to 96%.
- 5 stages time and dimming can be adjusted, dimming 0~100%
- Full automatic electronic protect function.
- Setting by remote control.
- Illumination time approximate 40W 12-14 Hr. autonomy from sunset
- Occupancy dimming and sensor compulsory: 40W / 80W Working hours up to two times from setting time open 100% 3Hr., 80% 1Hr., 60% 1Hr., 40% 6Hr., 80% 1Hr.

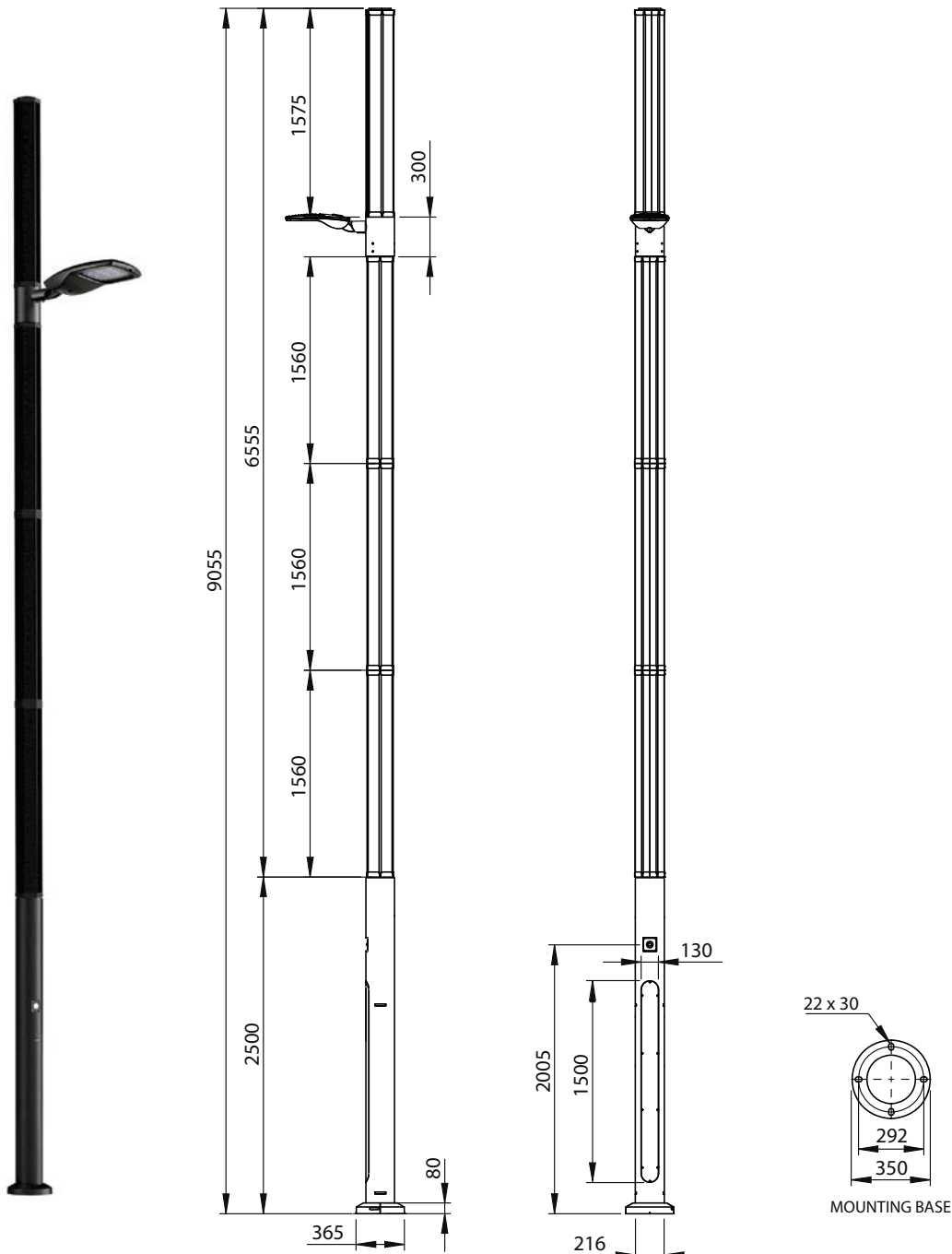
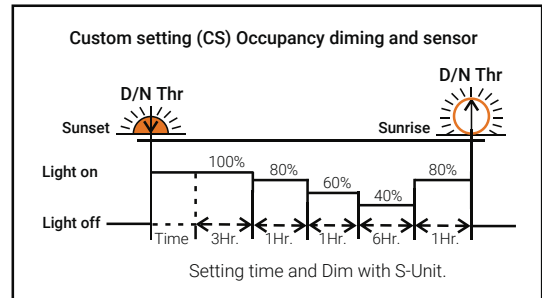


Vertical solar pv pole (Battery 12V 6x16.5Ah)

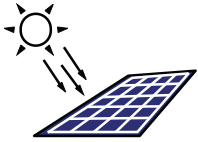
	Product code	Power	Weight
SOLAR PV POLE 5	SOL-20041	4X140 W	284.8 kg.

Luminaire Structure

- Galvanised steel lighting column thickness 4.0mm. With powder coating.
- Aluminium housing powder paint with high corrosion resistance with chemical chromatised protection.
- Durable silicone rubber gasket.
- Integral control gear.
- Luminaires : 1COB / 24 LED 40W open 22-24 Hr. 100%
- Luminaires : 1COB / 24 LED 60W open 14-16 Hr. 100%
- Luminaires : 1COB / 24 LED 80W open 10-12 Hr. 100%
- Solar module consist of monocrystalline high efficiency cells 4x140W.
- Lithium Iron Phosphate (LiFePO4) battery 12V 6x16.5Ah
- Solar charger controller system 24V 15A + temperature & motion sensor
- Solar charger controller full digital technology, high charge conversion efficiency up to 97%, discharge conversion efficiency up to 96%.
- 5 stages time and dimming can be adjusted, dimming 0~100%
- Full automatic electronic protect function.
- Setting by remote control.
- Illumination time approximate 40W 22-24 Hr. autonomy from sunset
- Occupancy dimming and sensor compulsory: 40W / 80W Working hours up to two times from setting time open 100% 3Hr., 80% 1Hr., 60% 1Hr., 40% 6Hr., 80% 1Hr.



Caution and maintenance



The installation area should be in an open space/position, offering a complete view of the sky from the PV. If the PV is subject to any shadows from trees, buildings or any other objects that will obscure sunlight and daylight, the system's efficiency of electricity production is reduced.



Clean the PV every 3-4 months or as appropriate. Accumulation of dirt, dust, sand or other organic material on the solar cell PV will reduce the efficiency of the electricity production.



Solar PV and batteries must not have any cracks or damage



The installation must be grounded to applicable local Earthing Standards

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