



## Reliable charging sources for remote locations

### Photovoltaic power sources

### Overview

Solar panels are photovoltaic power sources capable of recharging batteries. The minimum battery size and solar panel output required depends on 1) the average current drain of the system, 2) the maximum time the battery must supply power to the system without being charged, and 3) the location of the site. If you need assistance in selecting a solar panel, refer to our Power Supplies brochure, application note, or contact a Campbell Scientific Applications Engineer.

Solar panel characteristics assume 1 kW m<sup>-2</sup> illumination and 25°C solar panel temperature. Individual panels may vary up to 10%. The output panel voltage increases as the panel temperature decreases. All solar panels are shipped with hardware for mounting to a tripod or tower.

#### SP5-Series 5-Watt Solar Panels

The SP5-series solar panels are intended only for CR200(X)-series applications that have minimal power requirements.

- **SP5's** cable has a 4.5 m length and can be fitted with a connector that mates with the ENC200 enclosure's power connector.

#### SP10-Series 10-Watt Solar Panels

The SP10-series solar panels source sufficient current for many system configurations at most tropical to temperate latitudes. These solar panels include a 4.5 m cable. The models differ as follows:

- **SP10** uses the regulator in the PS150, PS200, CR6, or CR3000 to recharge their batteries. A CH150 or CH200 regulator is required to recharge the BP12, BP17 or BP24 batteries. The SP10's cable has stripped leads that connect to the power supply or datalogger battery base.

- **SP10R** is supplied with a regulator. It can recharge a user-supplied deep-cycle battery. The SP10R's cable has stripped leads that connect to the battery. Please note that the SP10R draws a continuous 5 mA current drain.

#### SP30-Series 30-Watt Solar Panels

The SP30-series solar panels are often used for system configurations that have higher than average power requirements, or in higher elevation and latitude locations. The models differ as follows:

**SP30** uses the regulator in the PS150, PS200, CR3000, CR6 to recharge their batteries. The SP30 has a 5 m cable with stripped leads that connect to the power supply or datalogger battery base.

- **SP30R** is supplied with a regulator. It can recharge a user-supplied deep-cycle battery. This solar panel has a 5 m cable with stripped leads that connect to the battery. Please note that, the SP30R draws a continuous 5 mA current drain.

#### SP60 60-Watt Solar Panels

The SP60 solar panel is used for our CS110 Electric Field Meter or other systems that require 60 W solar panels. It needs to be connected to a CH150, CH200 Smart Charge Controller or 008116 Morningstar SunSaver regulator (see below).

The SP60 has a 5 m standard length; maximum length is 15 m.

**NOTE: Power ratings quoted on this sales leaflet apply to European customers only.**

## SP100 100-Watt Solar Panels

The SP100 solar panel is used in Eddy Covariance, or other systems that require high-power solar panels. This solar panel needs to be connected to 008116 Morningstar SunSaver regulator (see below).

The SP100 has a 5 m standard length cable; maximum length is 15 m.

## Regulators for the SP60 and SP100

### CH150 Smart Charge Controller

The CH150 is a micro-controller-based smart charger with temperature compensation that optimizes battery charging and increases the battery's life. It is for use with a separate larger battery such as our BP12, BP24, or a user-supplied battery.

### CH200 Smart Charge Controller

The CH200 limits charging current to a maximum of 40 Adc typical, has a quiescent current drain of only 0.3 mA and can precisely charge the following battery families: Yuasa NP Series (includes our PS200, BP12 and BP24), EnerSys Cyclone Series, Concorde Sun Xtender Series or a custom battery.

### 008116 Morningstar SunSaver

The Morningstar SunSaver limits charging current to approximately 10 A, has a quiescent current drain of approximately 8 mA, and can charge sealed (includes our BP17, BP24) or flooded batteries.

## Mounting

The SP5 and SP10 solar panels are supplied with simple, single 'V' bolt fitting for mounting on a pole in the size range of 25-54 mm diameter (see the image on the front page of this leaflet). The angle of the solar panel can be adjusted to be 0 to 90 degrees relative to the pole. If necessary the V-bolt fitting can be removed and the panel fixed to a vertical surface with screws. Optional band clamps are available to allow the brackets to be fitted to larger poles up to 120 mm in diameter.

The SP30 and larger standard panels are supplied with a Solar Panel Multi-Fit bracket (Part number 006607). This is a substantial bracket that fits many different sizes of panels by simply clamping under the rear lip of the frame at either side of the panel (it works with panels up to 500 mm internal width). See the diagrams below showing the multi-fit bracket. This allows easy exchange of the panel in the field, e.g. to upgrade to a larger size panel.

One bracket is supplied as standard with each panel which is suitable for mounting the SP30 panel on poles, tripods or towers in most applications. A single bracket may also be adequate with larger panels in sheltered sites where the lower edge of the panel rests on the ground or on the tripod legs. For exposed windy sites, especially with the larger panels, e.g. the SP60 or SP100, a second bracket should be ordered to allow the panel to be mounted on two vertical tubes rather than one. Those tubes could be the two sides of a larger tower or user supplied poles which are fixed into the ground.

Each bracket has two 'V' bolt fittings for poles in the range of 25-54 mm diameter. Optional band clamps are available to allow the brackets to be fitted to larger poles up to 120 mm in diameter. Larger poles can be catered for to special order. The panel angle can be adjusted in one of six steps from 0-90 degrees relative to the pole.

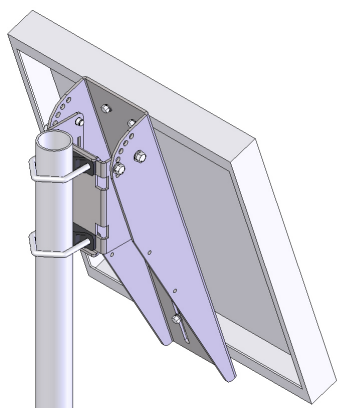


Diagram of a solar panel mounted to pole

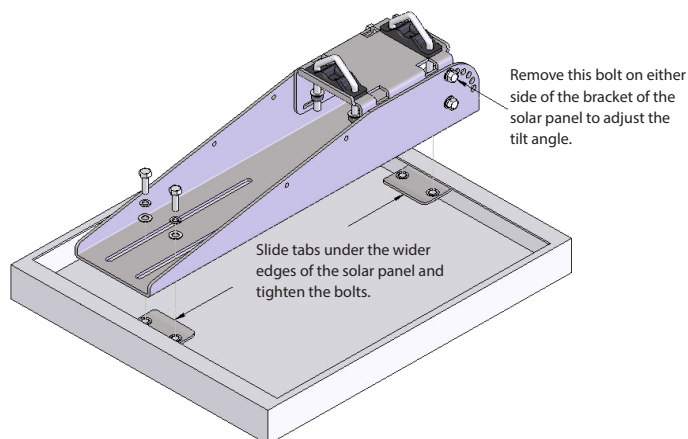


Diagram showing the method of fixing the bracket to the panel

Note: With some smaller panels the bracket will protrude at the bottom side of the panel.

	<b>SP5</b>	<b>SP10</b>	<b>SP30</b>	<b>SP60</b>	<b>SP100</b>
Typical maximum power (W)	4.5(±10%)	10(±10%)	35(+/-5%)	70(+/-5%)	110(+/-5%)
Voltage at peak power**	16.5	16.8	18.1	18.1	17.6
Current at peak power (A)	0.27	0.57	1.94	3.87	6.25
Short circuit current (A)	0.30	0.6	2.1	4.2	6.8
Open circuit voltage**	20.5	21.0	21.7	21.7	21.1
Dimensions (excluding bracket)	251x269 mm	420x269 mm	415x510 mm	535x734 mm	1037x527 mm
Weight (excluding bracket and cable)	0.9 kg	1.9 kg	2.3 kg	4.18 kg	7 kg
Temp. coeff. of voltage (mV/°C)	-80	-72	-63	-61	-61
Temp. coeff. of power (%/°C)	-0.5	-0.37	-0.38	-0.38	-0.38
Cable *** termination	Fixed 4.5 m lead	Fixed 4.5 m lead	0.9 m lead with MC4 connectors	0.9 m lead with MC4 connectors	0.9 m lead with MC4 connectors

\*Power ratings are obtained under standard test conditions of 1000 Wm<sup>-2</sup> and 25°C cell temperature.

\*\*These are voltages at the panel surface. If an external regulator or long cables are used the apparent output voltage will be lower.

\*\*\*Larger panels have two separate output leads fitted with MC4 connectors. A single dual-core extension cable is supplied with mating connectors to make the standard total cable length 5 m.

### Common Specifications:

Maximum temperature range: -40 to +85 °C

Maximum system voltage: 50 V

Warranty on power output (90% of initial power): 10 years

Note: Due to variations in the supply of solar panels and also continued improvement in solar panel technology all specifications are subject to change.