BlueSolar charge controller MPPT 150/70 & 150/85

www.victronenergy.com

Solar charge controllers
MPPT 150/70 and 150/85

PV voltage up to 150 V
The BlueSolar MPPT 150/70 and 150/85 charge controllers will charge a lower nominal-voltage battery from a higher nominal voltage PV array.
The controller will automatically adjust to a 12, 24, 36, or 48 V nominal battery voltage.

Ultra fast Maximum Power Point Tracking (MPPT)
Especially in case of a clouded sky, when light intensity is changing continuously, an ultra fast MPPT controller will improve energy harvest by up to 30% compared to PWM charge controllers and by up to 10% compared to slower MPPT controllers.

Advanced Maximum Power Point Detection in case of partial shading conditions
If partial shading occurs, two or more maximum power points may be present on the power-voltage curve.
Conventional MPPT's tend to lock to a local MPP, which may not be the optimum MPP.
The innovative BlueSolar algorithm will always maximize energy harvest by locking to the optimum MPP.

Outstanding conversion efficiency
Maximum efficiency exceeds 98%. Full output current up to 40°C (104°F).

Flexible charge algorithm
Several preprogrammed algorithms. One programmable algorithm.
Manual or automatic equalisation.
Battery temperature sensor. Battery voltage sense option.

Programmable auxiliary relay
For alarm or generator start purposes

Extensive electronic protection
Over-temperature protection and power derating when temperature is high.
PV short circuit and PV reverse polarity protection.
Reverse current protection.

BlueSolar charge controller	MPPT 150/70	MPPT 150/85
Nominal battery voltage	12 / 24 / 36 / 48V Auto Select	
Rated charge current	70A @ 40°C (104°F)	85A @ 40°C (104°F)
Maximum solar array input power 1)	12V: 1000W / 24V: 2000W / 36V: 3000W / 48V: 4000W	12V: 1200W / 24V: 2400W / 36V: 3600W / 48V: 4850W
Maximum PV open circuit voltage	150V absolute maximum coldest conditions 145V start-up and operating maximum	
Minimum PV voltage	Battery voltage plus 7 Volt to start Battery voltage plus 2 Volt operating	
Standby power consumption	12V: 0,55W / 24V: 0,75W / 36V: 0,90W / 48V: 1,00W	
Efficiency at full load	12V: 95% / 24V: 96,5% / 36V: 97% / 48V: 97,5%	
Absorption charge	14.4 / 28.8 / 43.2 / 57.6V	
Float charge	13.7 / 27.4 / 41.1 / 54.8V	
Equalization charge	15.0 / 30.0 / 45 / 60V	
Remote battery temperature sensor	Yes	
Default temperature compensation setting	-2,7mV/°C per 2V battery cell	
Remote on/off	No	Yes
Programmable relay	DPST AC rating: 240VAC/4A DC rating: 4A up to 35VDC, 1A up to 60VDC	
Communication port	VE.Can: two paralleled RJ45 connectors, NMEA2000 protocol	
Parallel operation	Yes, through VE.Can. Max 25 units in parallel	
Operating temperature	-40°C to 60°C with output current derating above 40°C	
Cooling	Natural Convection	Low noise fan assisted
Humidity (non condensing)	Max. 95%	
Terminal size	35mm² / AWG2	
Material & color	Aluminium, blue RAL 5012	
Protection class	IP20	
Weight	4,2 kg	
Dimensions (h x w x d)	350 x 160 x 135 mm	
Mounting	Vertical wall mount Indoor only	
Safety	EN60335-1	
EMC	EN61000-6-1, EN61000-6-3	

1) If more solar power is connected, the controller will limit input power to the stated maximum

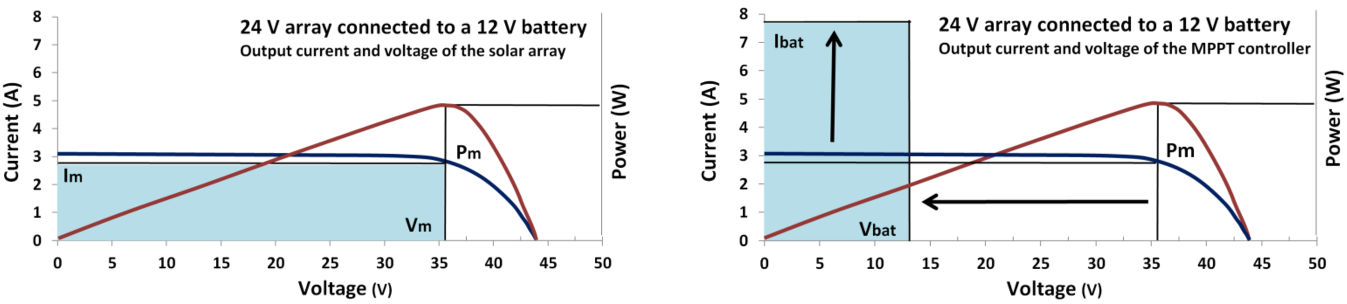
Victron Energy B.V. | De Paal 35 | 1351 JG Almere | The Netherlands
General phone: +31 (0)36 535 97 00 | Fax: +31 (0)36 535 97 40
E-mail: sales@victronenergy.com | **www.victronenergy.com**

Which solar charge controller: PWM or MPPT?

What follows is a summary of our white paper with the same title.

1. What they do

The PWM controller is in essence a switch that connects a solar array to a battery. The result is that the voltage of the array will be pulled down to near that of the battery.
The MPPT controller is more sophisticated (and more expensive): it will adjust its input voltage to harvest the maximum power from the solar array and then transform this power to supply the varying voltage requirement, of the battery plus load. Thus, it essentially decouples the array and battery voltages so that there can be, for example, a 12 volt battery on one side of the MPPT charge controller and a large number of cells wired in series to produce 36 volts on the other.



Graphical representation of the DC to DC transformation as performed by an MPPT controller

2. The resultant twin strengths of an MPPT controller

a) <u>Maximum Power Point Tracking</u>
The MPPT controller will harvest more power from the solar array. The performance advantage is substantial (10% to 40%) when the solar cell temperature is low (below 45°C), or very high (above 75°C), <u>or</u> when irradiance is very low.
At high temperature or low irradiance the output voltage of the array will drop dramatically. More cells must then be connected in series to make sure that the output voltage of the array exceeds battery voltage by a comfortable margin.

b) <u>Lower cabling cost and/or lower cabling losses</u>
Ohm's law tells us that losses due to cable resistance are Pc (Watt) = Rc x I^2, where Rc is the resistance of the cable. What this formula shows is that for a given cable loss, cable cross sectional area can be reduced by a factor of four when doubling the array voltage.
In the case of a given nominal power, more cells in series will increase the output voltage and reduce the output current of the array (P = V x I, thus, if P doesn't change, then I must decrease when V increases).
As array size increases, cable length will increase. The option to wire more panels in series and thereby decrease the cable cross sectional area with a resultant drop in cost, is a compelling reason to install an MPPT controller as soon as the array power exceeds a few hundred Watts (12 V battery), or several 100 Watts (24 V or 48 V battery).

3. Conclusion

PWM

The PWM charge controller is a good low cost solution for small systems, when solar cell temperature is moderate to high (between 45°C and 75°C).

MPPT

To fully exploit the potential of the MPPT controller, the array voltage should be substantially higher than the battery voltage. The MPPT controller is the solution of choice for higher power systems because of the lowest overall system cost due to smaller cable cross sectional areas. The MPPT controller will also harvest substantially more power when the solar cell temperature is low (below 45°C), or very high (above 75°C), <u>or</u> when irradiance is very low.

Victron Energy B.V. | De Paal 35 | 1351 JG Almere | The Netherlands
General phone: +31 (0)36 535 97 00 | Fax: +31 (0)36 535 97 40
E-mail: sales@victronenergy.com | **www.victronenergy.com**