BlueSolar charge controller MPPT 150/35

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Solar charge controller MPPT 150/35

Charge current up to 35 A and PV voltage up to 150 V
The BlueSolar charge controller will charge a lower nominal-voltage battery with a higher nominal voltage PV array.
The controller will automatically adjust to 12 V, 24 V or 48 V nominal battery voltage. (software tool needed to select 36 V)

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.

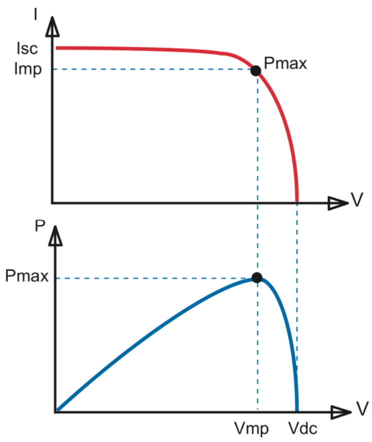
Advanced Maximum Power Point Detection in case of partial shading conditions
If partial shading occurs, two or more maximum power points may be present on the power-voltage curve.
Conventional MPPT's tend to lock to a local MPP, which may not be the optimum MPP.
The innovative BlueSolar algorithm will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

Outstanding conversion efficiency
No cooling fan. Maximum efficiency exceeds 98%. Full output current up to 40°C (104°F).

Flexible charge algorithm
Fully programmable charge algorithm (see the software page on our website), and eight preprogrammed algorithms, selectable with a rotary switch (see manual for details).

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

Internal temperature sensor
Compensates absorption and float charge voltages for temperature.



Maximum Power Point Tracking

Upper curve:
Output current (I) of a solar panel as function of output voltage (V).
The maximum power point (MPP) is the point Pmax along the curve where the product I x V reaches its peak.

Lower curve:
Output power P = I x V as function of output voltage.
When using a PWM (not MPPT) controller the output voltage of the solar panel will be nearly equal to the voltage of the battery, and will be lower than Vmp.

BlueSolar charge controller	MPPT 150/35
Battery voltage	12 / 24 /48 V Auto Select (software tool needed to select 36 V)
Rated charge current	35 A
Maximum PV power, 12V 1a,b)	12V: 500W / 24V: 1000W / 36V: 1500W / 48V: 2000W
Maximum PV open circuit voltage	150V absolute maximum coldest conditions 145V start-up and operating maximum
Maximum efficiency	98 %
Self-consumption	0,0o1 mA (1 µA)
Charge voltage 'absorption'	Default setting: 14,4 / 28,8 / 43,2 / 57,6 V
Charge voltage 'float'	Default setting: 13,8 / 27,6 / 41,4 / 55,2 V
Charge algorithm	multi-stage adaptive
Temperature compensation	-16 mV / °C resp. -32 mV / °C
Protection	Battery reverse polarity (fuse) PV reverse polarity Output short circuit Over temperature
Operating temperature	-30 to +60°C (full rated output up to 40°C)
Humidity	95 %, non-condensing
Data communication port	VE.Direct See the data communication white paper on our website
	ENCLOSURE
Colour	Blue (RAL 5012)
Power terminals	13 mm² / AWG6
Protection category	IP43 (electronic components), IP22 (connection area)
Weight	1,25 kg
Dimensions (h x w x d)	130 x 186 x 70 mm
1a) If more PV power is connected, the controller will limit input power to 700W resp. 1400W 1b) PV voltage must exceed Vbat + 5V for the controller to start. Thereafter minimum PV voltage is Vbat + 1V	

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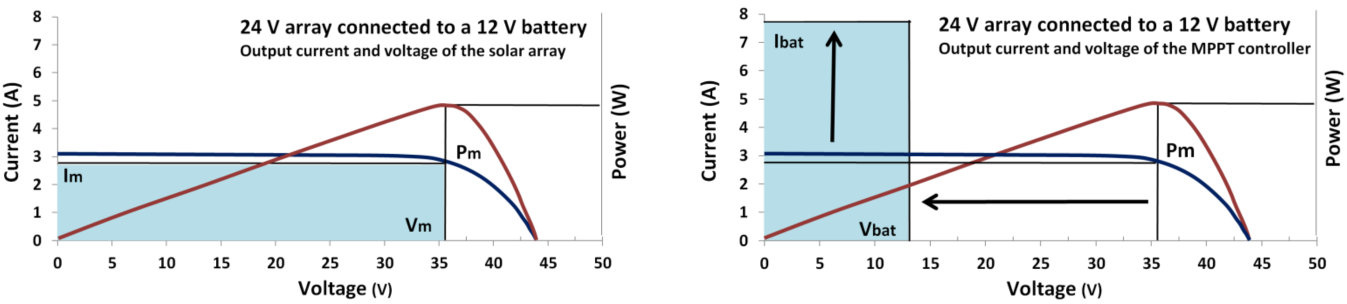
Which solar charge controller: PWM or MPPT?

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) Maximum Power Point Tracking
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), or 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) Lower cabling cost and/or lower cabling losses
Ohm's law tells us that losses due to cable resistance are P_c (Watt) = $R_c \times I^2$, 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), or when irradiance is very low.

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