victron energy
BLUE POWER

Manual EN

Manuel FR

Anleitung DE

Manual ES

IMPORTANT

- **Always connect the batteries first.**
- **Use for 12V battery system only 12V (36 cells) solar panel array.**
- **Use for 24V battery system only 24V (72 cells) solar panel array.**

BlueSolar MPPT Charge Controller

12V | 24V | 40A

1. General Description

1.1 Product description

Important note: Always connect the batteries first.

Through the use of MPPT technology, the BlueSolar MPPT series can increase charge current by up to 30% compared to conventional PWM controllers.

BlueSolar's sophisticated three stage charge control system can be configured to optimize charge parameters to precise battery requirements. The unit is fully protected against voltage transients, over temperature, over current, reverse battery and reverse PV connections. An automatic current limit feature allows use to the full output current capability without worrying about overload or nuisance fuse blow from excessive current.

Fully automatic temperature compensation of charge voltage is available to further improve charge control and battery performance. The sensor element is environmentally sealed and encapsulated into a plastic lug which adheres to directly to the battery terminal.

Several BlueSloar MPPT Controllers can be used in parallel to increase charge current.

1.2 Features

- Maximum Power Point Tracking (MPPT) controller. Increases charge current by up to 30% compared to a PWM controller.
- Charge voltage settings for eight battery types, plus two equalize settings.
- Remote temperature sensor.
- Protected against over current.
- Protected against short circuit.
- Protected against reverse polarity connection of the solar panels and/or battery.
- With low voltage load disconnect output.

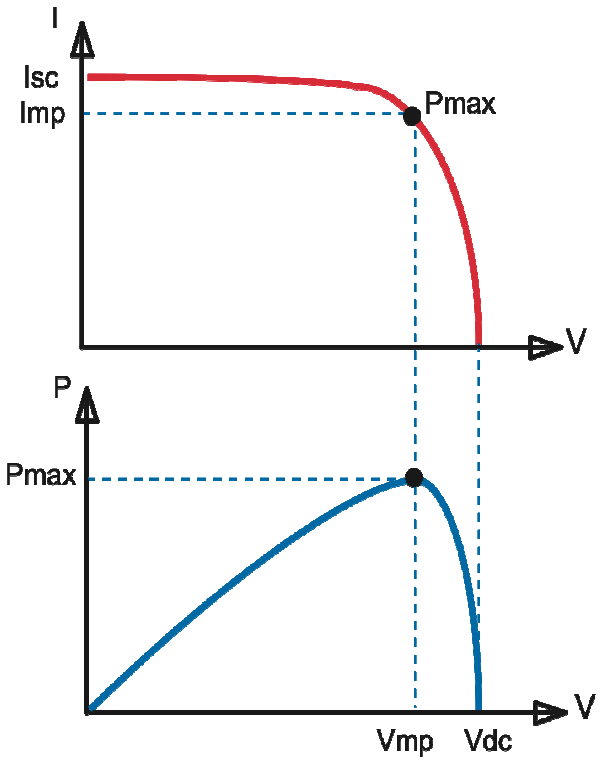
2. Specifications

Battery Voltage		12V or 24V, auto select *	
Rated charge current		20A / 30A / 40A / 50A	
MPPT tracking		Yes	
Automatic Load Disconnect (ALD)		Yes (maximum load 15A)	
Overload protection (ALD output)		2.0*Inom>5s 1.5*Inom>20s 1.25*Inom temperature controlled	
Max PV open circuit array voltage:		for 12V system = 28V for 24V system =55V	
Efficiency		> 97%	
Self consumption		< 10mA	
Default settings			
Absorption charge		14.6V	29.2V
Float charge		13.4V	26.8V
Over voltage disconnect (battery and ALD output)		14.8V	29.6V
Over voltage recovery		13.6V	27.2V
Low voltage load disconnect		10.8V	21.6V
Low voltage load reconnect		12.3V	24.6V
Enclosure & Environmental			
Battery temperature sensor		Remote temperature sensor	
Temperature compensation	Lead-acid	- 30mV/°C	- 60mV/°C
	NiCad	- 20mV/°C	- 40mV/°C
Ambient temperature		0-40°C (full load)	40-60°C (de-rating)
Cooling		Natural convection	
Humidity (non condensing)		Max. 95%	
Protection class		IP20	
Terminal size		10mm²/AWG 8	
Weight		1,4 kg	
Dimensions (h x w x d)		202 x 66 x 140 mm	
Mounting		Vertical wall mount (indoor only)	
Standards			
Safety		EN 60335-1	
EMC		EN 61000-6-1, EN 61000-6-3	

* For 12V use 36cells solar panels and for 24V use 72cells solar panels

Note:
With the battery temperature sensor installed, the controller will increase or decrease the battery charging voltage depending on the temperature of the battery to optimize the charge to the battery and maintain optional performance of the battery.

3. Maximum Power Point Tracking (MPPT)



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 were 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.

The BlueSolar MPPT Controller can charge up to 30% more compared to traditional PWM charge controllers.

4. Charge curve

4.1 Three step charging

The BlueSolar MPPT Charge Controller is configured for a three step charging process: Bulk – Absorption - Float.

1) Bulk stage

   During this stage the Controller delivers as much charge current as possible to rapidly recharge the batteries. When the battery voltage reaches the absorption voltage setting, the Controller activates the next stage (absorption).

2) Absorption stage

   During this stage, the Controller switches to the constant voltage mode, where the absorption voltage is applied to the battery. When the charge current decreases to the float transition current setting, the battery is fully charged and the Controller switches to the float stage.

3) Float stage

   During this stage, the float voltage is applied to the battery to maintain it in a fully charged state. When battery voltage drops below the float setting a new bulk cycle will be triggered.

4.2 Equalization

Equalization charging is the process of deliberately charging a battery at a high voltage for a set period of time. Equalize charging remixes the electrolyte, helps to remove sulfate buildup on the battery plates, and balances the charge of the individual cells. Equalizing the batteries every month or two (depending on usage) prolongs the life of the batteries and provides better battery performance.

Warning: Never apply equalize charge to VRLA (GEL or AGM) batteries.

To set the Equalize Charge:

1) Remove all DC loads connected to the batteries.
2) Remove all battery vent caps.
3) Check the battery water level; it should be just over the top of the plates (do not over fill). Use only distilled or demineralized water for topping up.
4) Set the BATTERY TYPE SELECTOR switch to position “0” or “1”.
5) Reset the BATTERY TYPE SELECTOR switch to the appropriate battery setting when all cells are fully charged (can be verified with a hydrometer).
6) NEVER EQUALIZE Valve Regulated Lead Acid (VRLA) batteries (commonly called Gel or AGM batteries)

4.3 Battery type selector

The battery type selector switch is a 10 position rotary switch used to set the Controller for the proper absorption, float and equalize voltage levels. These levels are selected depending on the type of batteries used. Refer to the table below for the charge voltages in the various switch positions. Consult the battery manufacturer for optimum battery charge settings.

Battery Type Selector

Battery Type Selector Settings.

(Switch position “7” is the default factory setting).

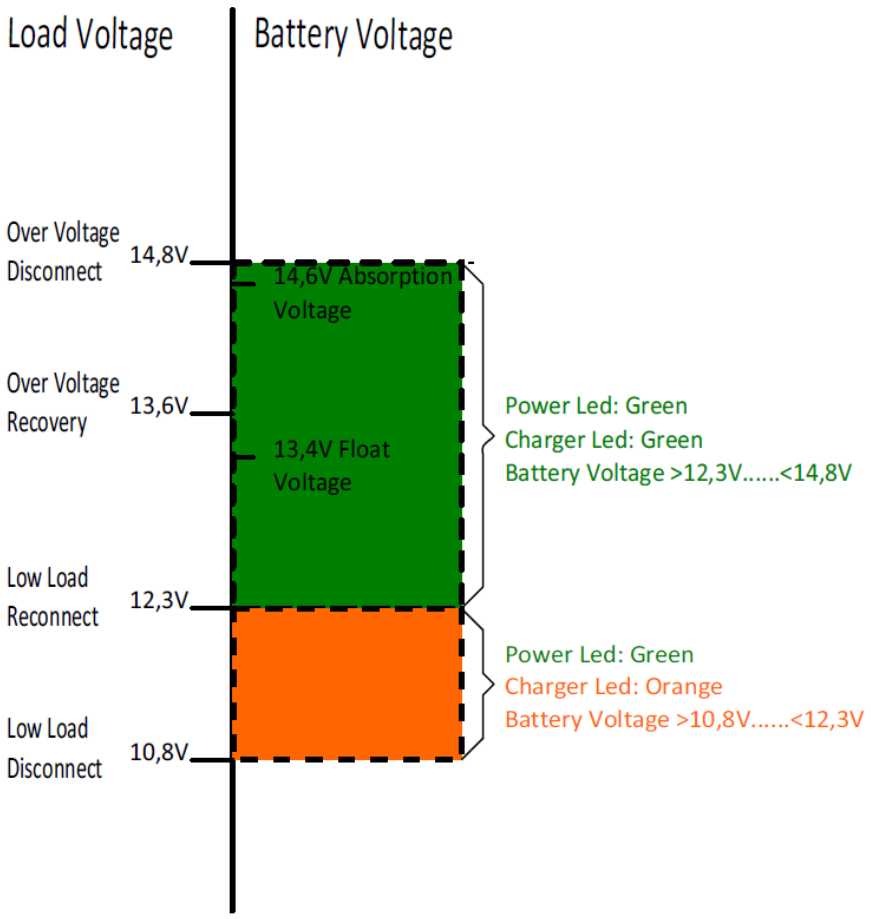
Switch Position	Description	12 Volt		24 Volt		Remarks
		Float voltage(V)	Absorption/ Equalize voltage (V)	Float voltage(V)	Absorption/ Equalize voltage (V)	
0	Equalize 1	13.2	15	26.4	30	Apply to flooded batteries only
1	Equalize 2	13.2	15.5	26.4	31	Apply to flooded batteries only
2	Deep cycle Lead Acid 1	13.3	15	26.6	30	OPzS tubular plate
3	Lead Calcium 1	13.6	14.3	27.2	28.6	Sealed type car batteries
4	Gel Cell 1	13.7	14.4	27.4	28.8	Standard Gel
5	Gel Cell 2	13.5	14.1	27	28.2	OPzV tubular plate gel
6	Lead Calcium 2	13.2	14.3	26.4	28.6	Sealed type car batteries
7	**AGM (Default Setting)**	13.4	14.6	26.8	29.2	Standard AGM
8	NiCad 1	14	16	28	32	10 cells resp. 20 cells
9	NiCad 2	14.5	16	29	32	10 cells resp. 20 cells

5. LED indicators

Single Color (green) LED: “POWER”
Multi Color LED: “CHARGE MODE”

LED indication during normal operation:

- Green LED ON: PV voltage exceeds battery voltage.
- Green LED OFF: PV voltage lower than battery voltage.
- Multi Color LED green: load output ON (battery voltage exceeds low voltage reconnect level).
- Multi Color LED orange: load output ON (battery voltage is higher than low voltage disconnect level, but lower than low voltage reconnect level).



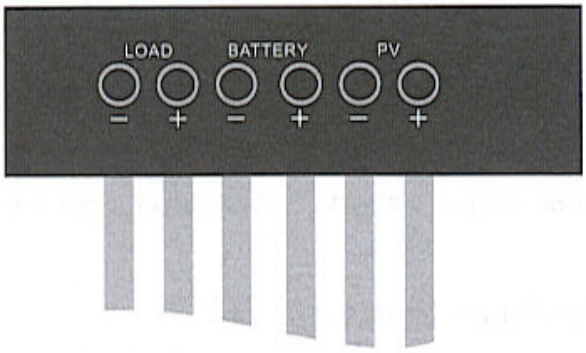
Error indications:

Error Mode	Green Color LED	Multi Color LED
Low Voltage Disconnect (load output switch off delay: 6 minutes)	Off	Blink 1x, off 6 s (orange)
Over Voltage (both battery and load output switched off)	Blink 1x, off 6 s	Off
Over Temperature (load output switched off)	Blink 2x, off 6 s	Off
Over Current* (load output switched off)	Blink 3x, off 6 s	Off

***Over Current**

If the Controller detects an overload or short circuit of the load, the load output will be switched off. After 6 minutes the load output is switched on again. If the default is still present, the process will repeat, continuously until the problem is corrected.

6. Terminals and dimensional drawing



Load:
Load output with automatic low voltage load disconnect. Max current: 15A.

Battery:
40A rated charge current.

PV:
Photovoltaic system

Temperature sensor:
Plug in the BTS port on the left side of the controller

Important note: Always connect the batteries first.