victron energy
BLUE POWER

Manual EN

Handleiding NL

Manuel FR

Anleitung DE

Manual ES

Användarhandbok SE

Appendix

BlueSolar charge controllers
MPPT 75/10
MPPT 75/15

1 General Description

1.1 Ultra fast MPPT tracking
Especially in case of a clouded sky, when light intensity is changing continuously, a fast MPPT algorithm will improve energy harvest by up to 30% compared to PWM charge controllers and by up to 10% compared to slower MPPT controllers.

1.2 BatteryLife: intelligent battery management
1.2.1. Conventional battery management
When a solar charge controller is not able to recharge the battery to its full capacity within one day, the result is often that the battery will be continually be cycled between a “partially charged” state and the “end of discharge” state. This mode of operation (no regular full recharge) will destroy a lead-acid battery within weeks or months.

1.2.2. BatteryLife algorithm
The BatteryLife algorithm will monitor the state of charge of the battery and day by day slightly increase the load disconnect level until absorption voltage is reached. From that point onwards the load disconnect level will be modulated so that absorption voltage is reached about once every week. The BatteryLife algorithm will substantially increase service life of the battery when compared to 1.2.1.

1.2.3. Upsizing the PV array or regularly “downsizing” the load
A lead-acid battery will last even longer if a full recharge, including several hours absorption time, is achieved at least once every week.

1.3 Load output
The load output is short circuit proof and can supply loads with a large DC input capacitor such as an inverter (but it can not start a DC load and an inverter simultaneously).
Alternatively, an inverter can be switched on and off by using the load output to switch the remote on-off of the inverter (see section 3.6).

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

1.5 Automatic battery voltage recognition
The controller will automatically adjust itself to a 12V or a 24V system.

1.6 Three step charging
The controller is configured for a three step charging process: Bulk – Absorption - Float.

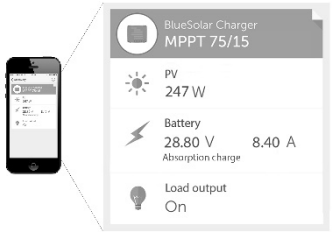
1.6.1. Bulk stage
During this stage the controller delivers as much charge current as possible to rapidly recharge the batteries.

1.6.2. Absorption stage
When the battery voltage reaches the absorption voltage setting, the controller switches to constant voltage mode.
When only shallow discharges occur the absorption time is kept short in order to prevent overcharging of the battery. After a deep discharge the absorption time is automatically increased to make sure that the battery is completely recharged.
Additionally, the absorption period is also ended when the charge current decreases to less than 1 A.

1.6.3. Float stage
During this stage, float voltage is applied to the battery to maintain it in a fully charged state.
When battery voltage drops below 13,2 Volt during at least 1 minute a new charge cycle will be triggered.

1.7 Real-time data display options

1.7.1. Apple and Android smartphones, tablets and other devices
VE.Direct to Buetooth Low Energy (BLE) dongle needed: see our website.



1.7.2 ColorControl panel
VE.Direct cable needed.

2 Safety instructions

Danger of explosion from sparking

Danger of electric shock

● It is advised to read this manual carefully before the product is installed and put into use.
● This product is designed and tested in accordance with international standards. The equipment should be used for the designated application only.
● Install the product in a heatproof environment. Ensure therefore that there are no chemicals, plastic parts, curtains or other textiles, etc. in the immediate vicinity of the equipment.
● Ensure that the equipment is used under the correct operating conditions. Never operate it in a wet environment.
● Never use the product at sites where gas or dust explosions could occur.
● Ensure that there is always sufficient free space around the product for ventilation.
● Refer to the specifications provided by the manufacturer of the battery to ensure that the battery is suitable for use with this product. The battery manufacturer's safety instructions should always be observed.
● Protect the solar modules from incident light during installation, e.g. cover them.
● Never touch uninsulated cable ends.
● Use only insulated tools.
● Connections must always be made in the sequence described in section 3.5.
● The installer of the product must provide a means for cable strain relief to prevent the transmission of stress to the connections.
● In addition to this manual, the system operation or service manual must include a battery maintance manual applicable to the type of batteries used.

3. Installation

3.1. General

● Mount vertically on a non-flammable substrate, with the power terminals facing downwards.
● Mount close to the battery, but never directly above the battery (in order to prevent damage due to gassing of the battery).
● Use cables with 6 mm² cross section. Do not exceed 5 m cable length.
(if the cables to the PV panels must be longer than 5 m, increase cross section or use parallel cables and install a junction box next to the controller and connect with a short 6 mm² cable to the controller).
● 20A battery fuse: replacable fuse in the controller, next to the battery terminals.
● Grounding: if grounding is required, **use one grounding point only. Never ground both the minus of the solar array and the minus of the battery.**

3.2. PV configuration

● The controller will operate only if the PV voltage exceeds battery voltage (Vbat).
● PV voltage must exceed Vbat + 5V for the controller to start. Thereafter minimum PV voltage is Vbat + 1V.
● Maximum open circuit PV voltage: 75V.

The controller can be used with any PV configuration that satisfies the three above mentioned conditions.

For example:

12V battery and mono- or polycristalline panels
● Minimum number of cells in series: 36 (12V panel).
● Recommended number of cells for highest controller efficiency: 72
(2x 12V panel in series or 1x 24V panel).
● Maximum: 108 cells (3x 12V panel in series).

24V battery and mono- or polycristalline panels
● Minimum number of cells in series: 72
(2x 12V panel in series or 1x 24V panel).
● Maximum: 108 cells (3x 12V panel in series).

3.3. Configuration of the controller (see figure 1 and 2 at the end of the manual))
A four pin header is available to select one of three battery management options:

3.3.1. **No jumper:** BatteryLife algorithm (see 1.2.2.)

3.3.2. **Jumper between pin 1 and pin 2:** conventional (see 1.2.1.)
Low voltage load disconnect: 11,1V or 22,2V
Automatic load reconnect: 13,1V or 26,2V

3.3.3**. Jumper between pin 2 and pin 3:** conventional (see 1.2.1.)
Low voltage load disconnect: 11,8V or 23,6V
Automatic load reconnect: 14V or 28V

3.4 LED's

Green LED: will be on or blinking when the battery has been connected
On: one of the two conventional algorithms
Blinking: BatteryLife algorithm

Yellow LED: signals charge sequence
Off: no power from PV array (or PV array connected with reverse polarity)
Blinking fast: bulk charge (battery in partially charged state)
Blinking slow: absorption charge (battery charged to 80% or more)
On: float charge (battery fully charged)

3.5 Cable connection sequence (see figure 3)

First: connect the cables to the load, but ensure that all loads are switched off.

Second: connect the battery (this will allow the controller to recognize system voltage).

Third: connect the solar array (when connected with reverse polarity, the controller will heat up but will not charge the the battery).

The system is now ready for use.

3.6 Connecting an inverter

The load output can be used to supply DC loads and simultaneously to control an inverter.

The Victron inverters model Phoenix 12/800, 24/800, 12/1200 and 24/1200 can be controlled by connecting the right side connection of the inverter remote control directly to the solar charger load output (see figure 4 at the end of this manual).
The bridge between left and right must be removed.

For the Victron inverters model Phoenix 12/180, 24/180, 12/350, 24/350, the Phoenix Inverter C models and the MultiPlus C models an interface cable is needed: the Inverting remote on-off cable, article number ASS030550100, see figure 5 at the end of this manual.

3.7 Battery charging information

The charge controller starts a new charge cycle every moring, when the sun starts shining. The maximum duration of the absorption period is determined by the battery voltage measured just before the solar charger starts up in the morning:

Battery voltage Vb (@start-up)	Maximum absorption time
Vb < 23,8V	6 h
23,8V < Vb < 24,4V	4 h
24,4V < Vb < 25,2V	2 h
Vb > 25,2V	1 h

(divide voltages by 2 for a 12 V system)

If the absorption period is interrupted due to a cloud or due to a power hungry load, the absorption process will resume when absorption voltage is reached again later on the day, until the absorption period has been completed.

The absorption period also ends when the output current of the solar charger drops to less than 1 Amp, not because of low solar array output but because the battery is fully charged (tail current cut off).

This algorithm prevents over charge of the battery due to daily absorption charging when the system operates without load or with a small load.

3.7.1. Automatic equalization

Automatic equalization is default set to “OFF”. By using the configuration tool mpptprefs this setting can be configured with a number between 1 (every day) and 250 (once every 250 days). When automatic equalization is active, the absorption charge will be followed by a voltage limited constant current period. The current is limited to 8% of the bulk current for the factory default battery type, and to 25% of the bulk current for a user defined battery type. The bulk current is the rated charger current unless a lower maximum current setting has been chosen.
When using the factory default battery type, automatic equalization ends when the voltage limit 16.2V / 32.4V has been reached, or after t = (absorption time)/8, whichever comes first. For the user defined battery type automatic equalization ends after t = (absorption time)/2. When automatic equalisation is not completely finished within one day, it will not resume the next day, the next equalisation session will take place as determined by the day interval.

3.8 VE.Direct communication port

Several parameters can be customized (VE.Direct to USB cable, ASS030530000, and a computer needed). See the data communication white paper on our website.
The required software can be downloaded from
http://www.victronenergy.nl/support-and-downloads/software/

The charge controller can be connected the to a Color Control panel, BPP000300100R, with a VE.Direct to VE.Direct cable.

4. Troubleshooting

Problem	Possible cause	Solution
Charger does not function	Reversed PV connection	Connect PV correctly
	No fuse inserted	Insert 20A fuse
Blown fuse	Reversed battery connection	1. Connect battery correctly 2. Replace fuse
The battery is not fully charged	A bad battery connection	Check battery connection
	Cable losses too high	Use cables with larger cross section
	Large ambient temperature difference between charger and battery ($T_{ambient\_chrg} > T_{ambient\_batt}$)	Make sure that ambient conditions are equal for charger and battery
	Only for a 24V system: wrong system voltage chosen (12V instead of 24V) by the charge controller	Disconnect PV and battery, after making sure that the battery voltage is at least >19V, reconnect properly
The battery is being overcharged	A battery cell is defect	Replace battery
	Large ambient temperature difference between charger and battery ($T_{ambient\_chrg} < T_{ambient\_batt}$)	Make sure that ambient conditions are equal for charger and battery
Load output does not become active	Maximum current limit exceeded	Make sure that the output current does not exceed 15A
	DC load in combination with capacitive load (e.g. inverter) applied	Disconnect DC load during start-up of the capacitive load Disconnect AC load from the inverter, or connect inverter as explained in section 3.6
	Short-circuit	Check for short-circuit in the load connection

5 Specifications

BlueSolar charge controller	MPPT 75/10	MPPT 75/15
Battery voltage	12/24 V Auto Select	
Maximum battery current	10 A	15 A
Maximum PV power, 12V 1a,b)	200 W (MPPT range 15 V to 70 V)	
Maximum PV power, 24V 1a,b)	400 W (MPPT range 30 V to 70 V)	
Automatic load disconnect	Yes, maximum load 15 A	
Maximum PV open circuit voltage	75 V	
Peak efficiency	98 %	
Self consumption	10 mA	
Charge voltage 'absorption'	14,4 V / 28,8 V (adjustable)	
Charge voltage 'equalization'	16,2 V / 32,4 V (adjustable)	
Charge voltage 'float'	13,8 V / 27,6 V (adjustable)	
Charge algorithm	multi-stage adaptive	
Temperature compensation	-16 mV / °C resp. -32 mV / °C	
Continuous/peak load current	15 A / 50 A	
Low voltage load disconnect	11,1 V / 22,2 V or 11,8 V / 23,6 V or BatteryLife algorithm	
Low voltage load reconnect	13,1 V / 26,2 V or 14 V / 28 V or BatteryLife algorithm	
Protection	Battery reverse polarity (fuse) Output short circuit / Over temperature	
Operating temperature	-30 to +60°C (full rated output up to 40°C)	
Humidity	100 %, non-condensing	
Maximum altitude	2000m	
Environmental condition	Indoor, unconditioned	
Pollution degree	PD3	
Data communication port	VE.Direct See the data communication white paper on our website	
ENCLOSURE		
Colour	Blue (RAL 5012)	
Power terminals	6 mm² / AWG10	
Protection category	IP43 (electronic components) IP22 (connection area)	
Weight	0,5 kg	
Dimensions (h x w x d)	100 x 113 x 40 mm	
STANDARDS		
Safety	EN/IEC 62109	

1a) If more PV power is connected, the controller will limit input power to 200W resp. 400W.
1b) PV voltage must exceed Vbat + 5V for the controller to start. Thereafter minimum PV voltage is Vbat + 1V.

Figure 1a: configuration pins

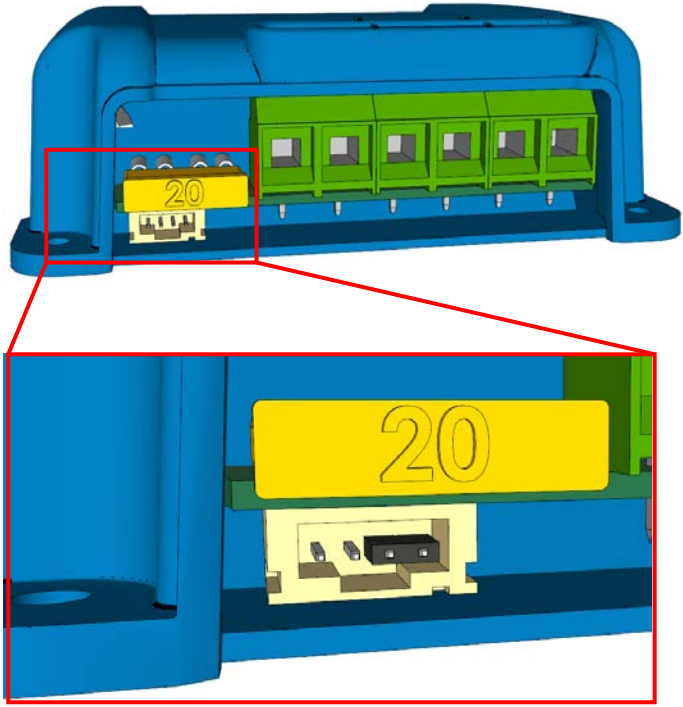


Figure 1b: pin numbering

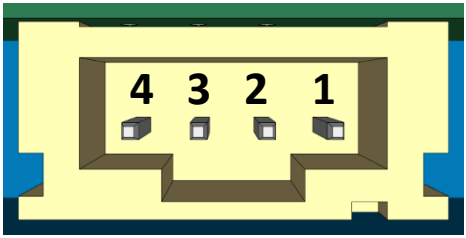


Figure 2: Battery management options

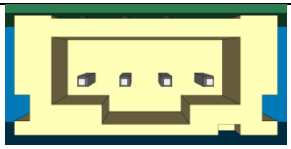
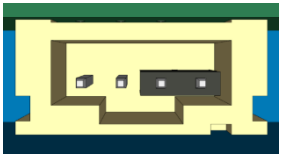
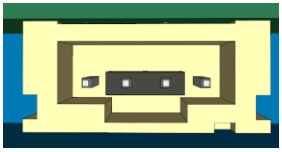
EN: **No bridge:** BatteryLife algorithm NL: **Geen brug:** BatteryLife algoritme FR: **Pas de pont :** Algorithme BatteryLife DE: **Keine Überbrückung:** BatteryLife Algorithmus ES: **Ningún puente:** algoritmo BatteryLife SE: **Ingen brygga:** BatteryLife-algoritm	
EN: **Bridge between pin 1 and 2:** Low voltage disconnect: 11.1V or 22.2V Automatic load reconnect: 13.1V or 26.2V NL: **Brug tussen pin 1 en 2:** Belastingsontkoppeling bij lage spanning: 11,1V of 22,2V Automatische belastingsherkoppeling: 13,1V of 26,2V FR: **Pont entre broche 1 et 2 :** Déconnexion en cas de tension réduite : 11,1V ou 22,2V Reconnexion automatique de la charge : 13,1V ou 26,2V DE: **Überbrückung zwischen Pol 1 und Pol 2:** Unterbrechung bei geringer Spannung:11.1 V oder 22.2 V Automatisches Wiederanschließen:13,1 V oder 26,2 V ES: **Puente entre pines 1 y 2:** Desconexión por baja tensión: 11,1V o 22,2V Reconexión automática de la carga: 13,1V ó 26,2V SE: **Brygga mellan stift 1 och 2:** Frånkoppling låg spänning: 11,1V eller 22,2V Automatiskt omkoppling av belastning: 13,1V eller 26,2V	
EN: **Bridge between pin 2 and 3:** Low voltage disconnect: 11.8V or 23.6V Automatic load reconnect: 14.0V or 28.0V NL: **Brug tussen pin 2 en 3:** Belastingsontkoppeling bij lage spanning: 11,8V of 23,6V Automatische belastingsherkoppeling: 14,0V of 28,0V FR: **Pont entre broche 2 et 3 :** Déconnexion en cas de tension réduite : 11,8 V ou 23,6 V Reconnexion automatique de la charge : 14,0 V ou 28,0 V DE: **Überbrückung zwischen Pol 2 und Pol 3:** Unterbrechung bei geringer Spannungsbelastung: 12,0 V oder 24,0 V Automatisches Wiederanschließen der Last: 14,0 V oder 28,0 V ES: **Puente entre pines 2 y 3:** Desconexión por baja tensión: 11,8V ó 23,6V Reconexión automática de la carga: 14,0V ó 28,0V SE: **Brygga mellan stift 2 och 3:** Frånkoppling låg spänning: 11,8V eller 23,6V Automatiskt omkoppling av belastning: 14,0 V eller 28,0 V	

Figure 3: Power connections

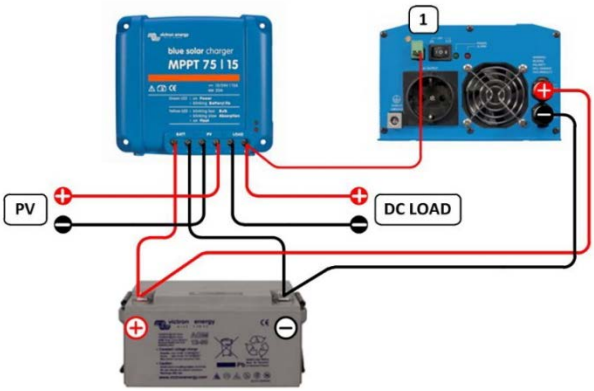


Figure 4: The Victron inverters model Phoenix 12/800, 24/800, 12/1200 and 24/1200 can be controlled by connecting the right side connection (1) of the inverter remote control directly to the solar charger load output

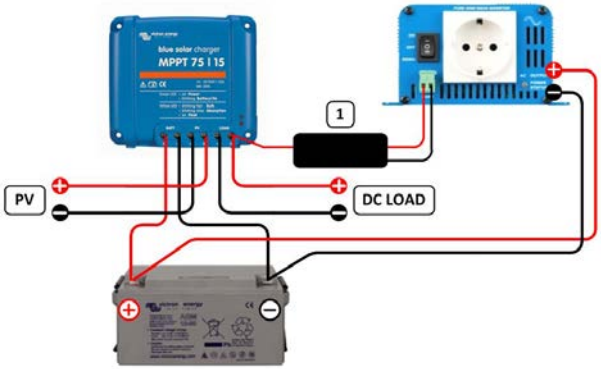


Figure 5: For the Victron inverters model Phoenix 12/180, 24/180, 12/350, 24/350, the Phoenix Inverter C models and the MultiPlus C models an interface cable (1) is needed: the **Inverting remote on-off cable** (article number ASS030550100)

Victron Energy Blue Power

Distributor:

Serial number:

Version : 11
Date : 18 September 2015

Victron Energy B.V.
De Paal 35 | 1351 JG Almere
PO Box 50016 | 1305 AA Almere | The Netherlands

General phone : +31 (0)36 535 97 00
Customer support desk : +31 (0)36 535 97 03
Fax : +31 (0)36 535 97 40

E-mail : sales@victronenergy.com

www.victronenergy.com