victron energy
BLUE POWER

Manual

EN

Appendix

BlueSolar charge controller MPPT 150/70

1. PRODUCT INTRODUCTION

Charge current up to 70 A and PV voltage up to 150 V
The BlueSolar 150/70-MPPT charge controller is able to charge a lower nominal-voltage battery from a higher nominal voltage PV array.
The controller will automatically adjust to a 12, 24, 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
No cooling fan. 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.

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 or dusty 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 insulated tools only.
● At a voltage >75 V, particularly with regard to the open circuit voltage of the PV array, the solar system must be installed according to protection class II. A chassis grounding point is located on the outside of the product. If it can be assumed that the grounding protection is damaged, the product should be taken out of operation and prevented from accidentally being put into operation again; contact qualified maintenance personnel.
● Ensure that the connection cables are provided with fuses or circuit breakers. Never replace a protective device by a component of a different type. Refer to the manual for the correct part.
● Connections must always be made in the sequence described in section 4

3. INSTALLATION

This product may only be installed by a qualified electrical engineer.

3.1 Location

The product must be installed in a dry and well-ventilated area, as close as possible to - but not above - the batteries. There should be a clear space of at least 10 cm around the product for cooling.

The charge controller is intended for wall mounting. For mounting purposes, a hook and two holes are provided at the back of the casing (see appendix G)

3.2 Battery cables and battery fuse

Do not invert the plus and minus battery connection: this will permanently damage the charger.

In order to utilize the full capacity of the product, battery cables with sufficient cross section and a fuse of sufficient current rating should be used.
Some basic formulas for copper cable:
Resistance Rc (mΩ@47°C) of a cable with length L (m) and cross section A (mm²): $Rc = 20*L/A$ (1)
Or, with Rc in Ω (Ohm):

$Rc = 0{,}02*L/A$ (2)

Power loss Pc (W) in a cable carrying current I (A):

$Pc = I^2*Rc = 0{,}02*I^2*L/A$ (3)

Power loss Pc relative to solar array output Pv in %:

$\alpha = (Pc/Pv)*100$ (4)

Cable cross section required to limit relative power loss to α (%):

$A = 2*2L*I/(\alpha*V)$ (5)

(with total cable length 2L)

or:

$A = 2*2L*Pv/(\alpha*V^2)$ (6)

Table 1 below gives some examples of battery cable cross sections calculated with formula (5).
(in this case I and V in formula (5) are the output current and output voltage of the charge controller)

12V system (solar array up to 1000W)									
Maximum solar array output	**Maximum Charge current @13,4V**	**Battery Fuse Rating**	**Power loss in battery cables α (%)**	**Length 2x1,5 m**		**Length 2x2,5 m**		**Length 2x5 m**	
				mm^2	**AWG**	**mm^2**	**AWG**	**mm^2**	**AWG**
500W	37A	63A	1	25	3	35	2	Not recommended	
750W	55A	80A	1,5	25	3	35	2	Not recommended	
1000W	70A 1)	100A	2	25	3	35	2	Not recommended	

24V system (solar array up to 2000W)									
Maximum solar array output	**Maximum Charge current @26,8V**	**Battery Fuse Rating**	**Power loss in battery cables α %**	**Length 2x1,5 m**		**Length 2x2,5 m**		**Length 2x5 m**	
				mm^2	**AWG**	**mm^2**	**AWG**	**mm^2**	**AWG**
500W	18A	35A	1	6	10	10	7	16	5
1000W	37A	63A	1,5	6	10	10	7	25	3
2000W	70A 1)	100A	2	10	7	16	5	35	2

36V system (solar array up to 3000W)									
Maximum solar array output	**Maximum Charge current @40,2V**	**Battery Fuse Rating**	**Power loss in battery cables α %**	**Length 2x2,5 m**		**Length 2x5 m**		**Length 2x10 m**	
				mm^2	**AWG**	**mm^2**	**AWG**	**mm^2**	**AWG**
750W	21	35	0,5	6	10	10	7	16	5
1500W	42	63	0,5	16	5	25	3	35	2
3000W	70A 1)	100	1	16	5	25	3	35	2

48V system (solar array up to 4000W)									
Maximum solar array output	**Maximum Charge current @53,6V**	**Battery Fuse rating**	**Power loss in battery cables α %**	**Length 2x2,5 m**		**Length 2x5 m**		**Length 2x10 m**	
				mm^2	**AWG**	**mm^2**	**AWG**	**mm^2**	**AWG**
1000W	21	35	0,5	6	10	10	7	16	5
2000W	42	63	0,5	10	7	16	5	35	2
4000W	70A 1)	100	1	10	7	16	5	35	2

Taking into account 6% loss (battery cables + controller + PV cables + fuses)

Table 1: Battery cable cross section and power loss

3.3 PV connection

The PV input current of the charge controller is limited to 50A. In case of a potential solar array output exceeding 50A, the solar array voltage will increase up to the level at which the output is reduced to 50A.

The voltage on the PV input should never exceed 150V under any condition. The charger will be permanently damaged if the input voltage is too high.

The required PV cable cross section depends on array power and voltage. The table below assumes that maximum PV power has been installed. Cable cross section can be reduced in case of smaller solar arrays.

The best efficiency is reached at a PV input voltage that is twice the battery voltage.

DC circuit breakers or fuses must be installed in the positive and negative PV cables, to enable isolation of the charger during installation or maintenance.

The table below gives some examples of cable cross sections calculated with formula (5). (in this case I and V are the output current and output voltage of the solar array)

12V system (solar array up to 1000W)								
Solar array MPP-voltage [V]	**Solar array MPP-current [A]**	**Power loss in PV cables α (%)**	**Length 2x5 meter**		**Length 2x10 meter**		**Length 2x20 meter**	
			mm²	**AWG**	**mm²**	**AWG**	**mm²**	**AWG**
18	Max 50A		Not recommended		Not recommended		Not recommended	
36	27	1	16	5	35	2	Not recommended	
54	18	1	10	7	16	5	25	3
72	13	0,75	6	10	10	7	25	3
90	11	0,5	6	10	10	7	16	5
108	9	0,5	4	11	6	10	16	5

24V system (solar array up to 2000W)								
Solar array MPP-voltage [V]	**Solar array MPP-current [A]**	**Power loss in PV cables α %**	**Length 2x5 meter**		**Length 2x10 meter**		**Length 2x20 meter**	
			mm²	**AWG**	**mm²**	**AWG**	**mm²**	**AWG**
36	Max 50A	1	35	2	Not recommended		Not recommended	
54	37	1	16	5	25	3	Not recommended	
72	28	0,75	10	7	25	3	35	2
90	22	0,5	10	7	25	3	35	2
108	19	0,5	6	10	16	5	25	3

48V system (solar array up to 4000W)								
Solar array MPP-voltage [V]	**Solar array MPP-current [A]**	**Power loss in PV cables α %**	**Length 2x5 meter**		**Length 2x10 meter**		**Length 2x20 meter**	
			mm²	**AWG**	**mm²**	**AWG**	**mm²**	**AWG**
72	Max 50A	1	16	5	35	2	Not recommended	
90	44	1	10	7	25	3	35	2
108	37	0,75	10	7	16	5	35	2

Table 2: PV cable cross section and power loss

3.4 Optional connections

3.4.1 Voltage Sense

For compensating possible cable losses during charging, two sense wires can be connected to measure voltage directly on the battery. Use wire with a cross-section of 0,75mm² and insert a 0,1 Amp fuse close to the battery.

During battery charging, the charger will compensate the voltage drop over the DC cables up to a maximum of 1 Volt (i.e. 1V over the positive connection and 1V over the negative connection). If the voltage drop threatens to become larger than 1V, the charging current is limited in such a way that the voltage drop remains limited to 1V.

The warning triangle on the LCD will blink if the voltage drop reaches 1 Volt

3.4.2 Temperature Sensor (see figure 1)

The temperature sensor supplied with the product may be used for temperature-compensated charging. The sensor is isolated and must be mounted on the battery minus pole.

3.4.3 CAN bus interface

The charger is equipped with two CAN bus RJ45 sockets.

The CAN bus on this charger is not galvanically isolated. The CAN bus is referenced to the minus battery connection.

The CAN bus interface will be referenced to ground if the minus pole of the battery is grounded.
In case of a positive grounded system, a CAN isolation module will be needed to reference the CAN bus interface to ground.

To prevent ground-loops, the charge controller has an internal 33 Ohm resistor between CAN-GND and the battery minus output of the charge controller.

3.4.4 Programmable relay
The charge controller is equipped with a potential-free Single Pole Double Throw relay that by default is programmed according to option 3 below.
The relay can be programmed to energize on one of the following events:
option 1: when the maximum voltage on the PV input is exceeded
option 2: when the temperature protection becomes active
option 3: when the battery voltage becomes too low (adjustable low voltage limit)
option 4: when the charger is in equalisation mode
option 5: when the charger is in error mode
option 6: when the charger temperature drops below -20°C (-40°F)
option 7: when the battery voltage becomes too high (adjustable high voltage limit)

3.4.5 Parallel charging

Several charge controllers can be connected to the same battery.

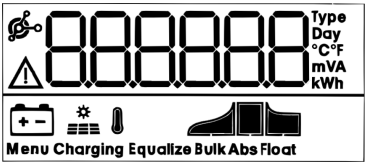
The PV inputs should not be connected in parallel. Each charge controller should be connected to its own PV array.

4. POWERING UP

4.1 Connecting the battery

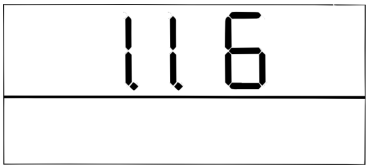
Close the connection to the battery, but **DO NOT** connect the solar array.

All the icons of the display will now light up:



This is followed by the software version:

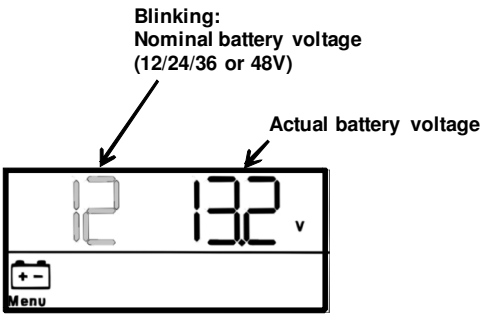
In this case the Software-version is 1.1.6



After the software-version has been displayed, the charger will start the system voltage recognition phase.

The LCD-screen displays two values:

Left: system (= nominal battery) voltage (12/24/36 or 48V), blinking during the battery recognition phase.
Right: actual measured battery voltage.



In some instances the charge controller might not reflect the correct system voltage (e. g. if the battery is deeply discharged and the actual battery voltage is far below the nominal voltage). In that case the system voltage can be adjusted manually, see section 4.2.
If the nominal battery voltage shown is correct, press the SETUP button to accept.
Alternatively, the battery voltage shown becomes final automatically after connecting the PV array, when PV current starts flowing.

4.2 Adjusting system voltage (adjust only if the system voltage as displayed is wrong)

a. Press SETUP during 3 seconds: the “Menu” icon will light up.
b. Press the "-" or "+" button several times until the screen shows “AUto”, or a system voltage.
c. Press SELECT: “AUto” or the system voltage will blink.
d. Use the "-" or "+" button to decrease or increase system voltage.
e. Press SETUP to confirm the change, the value will stop blinking, and the change is made final.

f. Press SETUP during 3 seconds: the display is back in normal. mode and the “Menu” icon will disappear.

Note: a 36V system will not be detected automatically and must be set with help of the above mentioned procedure.

4.3 Charge algorithm

4.3.1. Overview

Several preset charge curves and one user adjustable curve are available, see table below.
The DEFAULT-setting is algorithm nr 2.

Make sure the charge algorithm is correct for the battery-type that must be charged. If necessary, contact the battery supplier for the appropriate battery-settings. Wrong battery settings can cause serious damage to the batteries.

Algorithm number	Description	Absorption and max. abs. time	Float	Equalisation Default: off	Temperature compensation dV/dT
		V / h	V	maxV@% of Inom	mV/°C
1	Gel Victron long life (OPzV) Gel exide A600 (OPzV) Gel MK	56,4V / 8h	55,2V	63,6V@8% max 1h	-65 mV/°C (-2,7 mV/°C per cell)
2	**Default setting** Gel Victron deep discharge, Gel Exide A200 AGM Victron deep discharge Stationary tubular plate (OPzS) Rolls Marine (flooded), Rolls Solar (flooded)	57,6V / 8h	55,2V	64,8V@8% max 1h	-65 mV/°C
3	AGM spiral cell Rolls AGM	58,8V / 8h	55,2V	66,0V@8% max 1h	-65 mV/°C
4	PzS tubular plate traction batteries or OPzS batteries in cyclic mode 1	56,4V / 4h	55,2V	63,6V@25% max 4h	-65 mV/°C

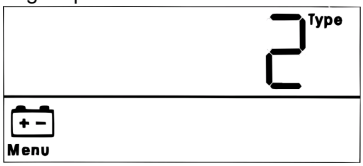
Algorithm number	Description	Absorption and max. abs. time	Float	Equalisation Default: off	Temperature compensation dV/dT
		V / h	**V**	**maxV@% of Inom**	**mV/°C**
5	PzS tubular plate traction batteries or OPzS batteries in cyclic mode 2	57,6V / 4h	55,2V	64,8V@25% max 4h	-65 mV/°C
6	PzS tubular plate traction batteries or OPzS batteries in cyclic mode 3	60,0V / 4h	55,2V	67,2V@25% max 4h	-65 mV/°C
7	Lithium Iron Phosphate (**$LiFePo_4$**) batteries	56,8 / 2h	n. a.	n. a.	0
8 (USr)		Adjustable (default 57,6V)	Adjustable (default 55,2V)	Adjustable (default Vabs. + 7,2V) @25% max 4hrs	Adjustable -65 mV/°C

Table 3: Charge algorithm options. All voltages shown are for a 48V system.

4.3.2. Procedure for choosing a preset charge algorithm

a. Press SETUP during 3 seconds: the “Menu” icon will light up.

b. Press the "-" or "+" button several times until the screen shows the algorithm number (a number with superscript “type”).



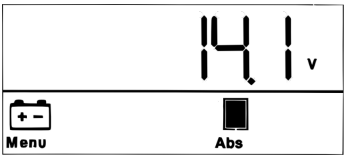
c. Press SELECT: the number will now blink.

d. Use the "-" or "+" button to choose the desire algorithm.

e. Press SETUP to confirm the change, the value will stop blinking, and the change is made final.

f. To return to normal mode, press SETUP during 3 seconds.

4.3.3. User adjustable charge algorithm



a. Proceed as described in the previous section, and select algorithm number 8 (USr)

b. Press the "-" or "+" button to select the parameter that must be changed (absorption voltage, float voltage or equalize voltage).

c. Press SELECT: the voltage will now blink.

d. Use the "-" or "+" button to chose the desired voltage.
e. Press SETUP to confirm the change, the value will stop blinking, and the change is made final. With the "-" or "+" button it is now possible to scroll to another parameter that needs change.
f. To return to normal mode, press SETUP during 3 seconds.

4.3.4. Other charge algorithm related settings

Absorption time: default 8 hours

Temperature compensation: default -2,7 mV/°C per cell (-65 mV/°C for a 48V lead-acid battery)

Equalisation:

Some manufacturers of VRLA (Valve Regulated Lead-Acid: i.e. Gel or AGM) batteries recommend a short equalization period, most do not. Most manufacturers of flooded batteries recommend periodic equalization.

Please see table 5 for more adjustable parameters.

Note about service life of lead-acid batteries

Flat plate VRLA batteries (i. e. all 6V and 12V VRLA batteries) as well as flat plate flooded batteries for automotive application deteriorate quickly when discharged by more than 50%, **especially** when left in discharged state for hours or days. We therefore recommend not to discharge by more than 50% and recharge immediately after a deep discharge.

All lead acid batteries will deteriorate if not fully charged from time to time.

4.4 Connecting the solar array

After the correct charge algorithm has been selected, the controller is ready for use.

Other settings may be changed/entered before or after connecting the solar array.

Close the connection to the solar array.

If there is sufficient sunlight, the charger will automatically start charging the battery.

If, despite sufficient sunlight, the PV voltage reads 000V, please check the polarity of the PV cable connection.

5. MORE INFORMATION ABOUT THE LCD SCREENS

5.1 Scrolling through the LCD screens

The following information will be displayed if the "-" button is pressed (in order of appearance):

Displayed info	Visible icons	Visible units
PV power	Solar panels	W
PV voltage	Solar panels	V
PV current	Solar panels	A
Charger temperature	Thermometer	^{0}C (or ^{0}F)
Battery temperature	Battery + thermometer	^{0}C (or ^{0}F)
Battery kWh-meter	Battery	kWh
Battery power	Battery	W
Battery voltage (+system voltage)	Battery	V
Battery charge current (+system voltage)	Battery	A (default)

Table 4: scrolling through the LCD screens
Pressing the "-" button or the "+"button for 4 seconds activates the auto-scroll-mode.
Now all LCD-screens will pop-up one by one with short intervals.
The auto-scroll-mode can be stopped by pressing the "-" or the "+" button shortly.

Backlight: The LCD backlight will slowly fade one minute after pressing one off the buttons.

5.2 SETUP MENU parameter details

Function or parameter	Visible icons	Text or value visible on alphanumerical display	units	Range and default (bold)	Step size
On-off switch	Menu + Charging	ON or OFF		**ON** - OFF	
System reset to default settings	Menu	rESEt			(1)
Temperature ^{0}C or ^{0}F	menu + thermometer	^{0}C or ^{0}F	^{0}C / ^{0}F	**^{0}C** / ^{0}F	
Absorption time	Menu + Battery + Abs	Value	h	1 - 24 **Default:see table 3**	1 h
Bulktime protection	Menu + Battery + Bulk	OFF or value	h	**OFF** – 10h	
Battery temperature compensation	Menu + Battery + thermometer	Value	mV/^{0}C per cell	-3,5 - **- 2,7** - 0 - 3,5	0,1mV (2)
Low battery voltage alarm	Menu + Battery	Lb+value	V	32,0 - **40,0** - 69,6	0,1V
High battery voltage alarm	Menu + Battery	Hb + value	V	32,0 - **60,0** - 69,6	0,1V
Manual Equalisation	Menu + Battery + Equalise	StArt (blinking)		StArt (**blinking** or solid)	
Automatic Equalisation	Menu + Battery + Equalise	OFF or AUto		**OFF** - AUto	(3)
Equalisation voltage	Menu + Battery + Equalise	Value	V	32,0 - **64,8** - 69,6	0,1V (2)
Float voltage	Menu + Battery + Float	Value	V	32,0 - **55,2** - 69,6	0,1V (2)
Absorbtion voltage	Menu + Battery+ Abs	Value	V	32,0 - **57,6** - 69,6	0,1V (2)
Charge algorithm	Menu + Battery	Number or USr	type	1,**2**,3,4,5, 6, 7, USr	
System voltage	Menu + Battery	Value or AUto	V	12, 24, 36, 48, **AUto**	

Relay function	Menu	rEL. + number		1, 2, **3**, 4 5, 6, 7 OFF	
KWh-meter reset	Menu + Battery	Value	kWh	0 – 999.999	(4)
Maximum charge current (bulk-current)	Menu + Battery + Bulk	Value	A	1,0 – **70,0**	1,0

a. To enter the SETUP Menu, press and hold the SETUP-button during 3 seconds. The "Menu" icon will light up.
b. Press the "-" or "+" button to scroll.
Table 3 below lists in order off appearance all parameters which can be adjusted when pressing the "-" button
c. Press SELECT: the parameter to change will now blink.
d. Use the "-" or "+" button to chose the desired value.
e. Press SETUP to confirm the change, the value will stop blinking, and the change is made final. With the "-" or "+" button it is now possible to scroll to another parameter that needs change.
f. To return to normal mode, press SETUP during 2 seconds.

Table 5: Setup menu parameter details

1) Press SELECT for 4 seconds to reset to original factory settings. After 4 seconds the charger will re-boot. (The kWh-counter will **not** be affected).

2).These values can ONLY be changed for the battery number 8 (USr) (User-defined battery). The values in the table are for a 48V-battery.

3) When Automatic equalisation is "ON", the absorption charge will be followed by a voltage limited constant current period (see table 3). The text "equalize" will be on.
The current is limited to 8% of the bulk current for all VRLA (Gel or AGM) batteries and some flooded batteries, and to 25% of the bulk current for all tubular plate batteries. The bulk current is the rated charger current (70A) unless a lower maximum current setting has been chosen.
If, as recommended by most battery manufacturers, the bulk charge current is does not exceed 20A per 100Ah battery capacity (i.e. 350Ah for a 70A charger), the 8% limit translates to max 1,6A per 100Ah battery capacity, and the 25% limit translates to max 5A per 100Ah capacity.
In case of all VRLA batteries and some flooded batteries (algorithm number 1, 2 or 3) automatic equalization ends when the voltage limit maxV has been reached, or after t = (absorption time)/8, whichever comes first.
For all tubular plate batteries automatic equalization ends after t = (absorption time)/2.

4) Press the"-" button for 3 seconds to reset to zero. Confirm by pressing SETUP.

Warning

Some battery manufacturers do recommend a constant current equalization period, and others do not. Do not use constant current equalization unless recommend by the battery supplier.

6. MANUAL EQUALISATION

The charger can be put in equalise mode only during absorption and float periods. When the charger is still in bulk mode, manual equalisation is not possible.

To enable equalisation, enter the setup-menu and press the "-" or "+" button until the text StArt will blink on the menu. Press SELECT for 4 seconds to start equalisation: the text StArt will stop blinking.
To return to the normal display mode, press SETUP during 2 seconds.

To terminate the equalisation mode prematurely, press the "-" or "+" button until the text StArt appears on the menu. Press ENTER to terminate equalisation: the text StArt will start blinking
To return to the normal display mode, press SETUP during 2 seconds.

Current and voltage limits are identical to the automatic equalise function (see section 4.3). The equalise duration is however limited to max. 1h when triggered manually.

7. TROUBLESHOOTING

With the procedures below, most errors can be quickly identified. If an error cannot be resolved, please refer to your Victron Energy supplier.

Error nr. on LCD display	Problem	Cause / Solution
n. a.	The LCD does not light up (no backlight, no display)	The internal power supply used for powering the converter and the backlight is derived from either the solar-array or the battery. If PV and battery voltage are both below 6V the LCD will not light up.
n. a.	The LCD does not light up (backlight works, no display, charger seems to work)	This may be due to low ambient temperature. If the ambient temperature is below -10 ^{0}C (14^{0}F) the LCD-segments can become vague. Below -20^{0}C (-4^{0}F) the LCD-segments can become invisible. During charging the LCD-display will warm up, and the screen will become visible.
n. a.	The charge controller does not charge the battery	The LCD-display indicates that the charge-current is 0 Amps. Check the polarity of the solar-panels. Check the battery breaker Check if there is an error indication on the LCD Check if the charger is set to "ON" in the menu.
n. a.	High temperature: the thermometer icon blinks	This error will auto-reset after temperature has dropped. Reduced output current due to high temperature. Check the ambient temperature and check for obstructions near the air inlet and outlet holes of the charger cabinet.
Err 1	Battery temperature too high (> 50^{0}C)	This error will auto-reset after temperature has dropped. This error can also be due to a bad/corroded battery- pole to which this sensor is screwed on to, or a faulty sensor. If error persists and charging does not resume, replace sensor, and power-up by entering and leaving the setup menu..
Err 2	Battery voltage too high (>76,8V)	This error will auto-reset after the battery voltage has dropped. This error can be due to other charging equipment connected to the battery or a fault in the charge controller.
Err 3	Suspected wrong connection during power-up. Remote Tsense+ connected to BAT+	Check if the T-sense connector is properly connected to a remote temperature sensor. This error will auto-reset after proper connection.

Err 4	Suspected wrong connection during power-up. Remote Tsense+ connected to BAT-	Check if the T-sense connector is properly connected to a remote temperature sensor. This error will auto-reset after proper connection.
Err 5	Remote temperature sensor failure	This error will not auto-reset. 1. Press and hold the SETUP-button for 2 seconds to enter the SETUP-MENU. 2. Set the charger from ON to OFF. 3. Exit the SETUP-MENU. 4. Scroll through the LCD-screens to find the battery temperature. If the LCD indicates an unrealistic temperature value or "---" replace ....the remote sensor. 5. Power-up by setting the charger from OFF to ON. 6. Check if the battery temperature is now valid.
Err 17	Controller overheated despite reduced output current	This error will auto-reset after charger has cooled down. Check the ambient temperature and check for obstructions near the air inlet and outlet holes of the charger cabinet.
Err 18	Controller over-current	This error will auto-reset. Disconnect the charge controller from all power-sources, wait 3 minutes, and power up again. If the error persists the charge controller is probably faulty.
Err 19	Reverse current flowing from the battery to the solar array	This error will auto-reset. The internal battery current sensor indicates that current is flowing from the battery to the solar array. The charge controller is probably faulty.
Err 20	Maximum Bulk-time exceeded	This error can only occur when the maximun bulk-time protection is active. This error will not auto-reset. This error is generated when the battery-absorption-voltage is not reached after 10 hours of charging. For normal solar installations it is advised not to use the maximum bulk-time protection.
Err 22	Internal temperature sensor short	The charge controller is probably faulty. This error will not auto-reset.
Err 23	Internal temperature sensor connection lost	Disconnect all power-sources from the charger, and open the front cover. Check if the white connector on the control-pcb (at the left of the LCD) is properly connected. If connected properly, close front cover and power-up again. If the error persists the charge controller is

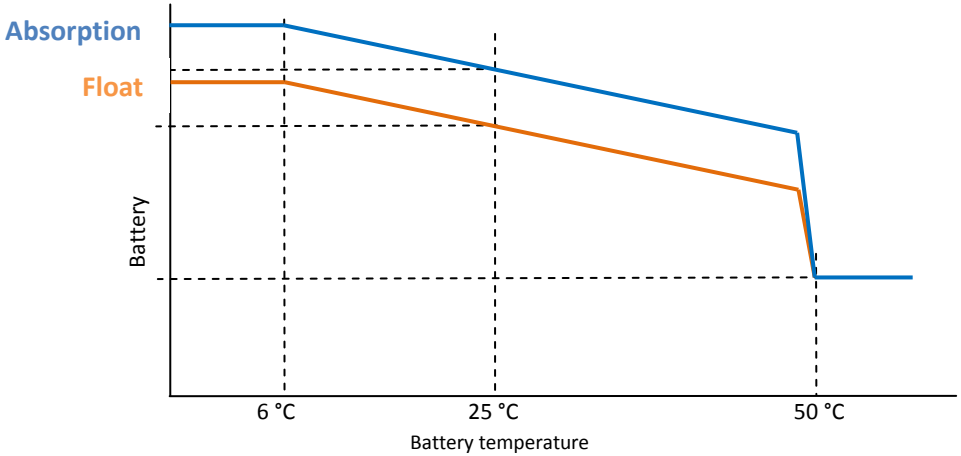
		probably faulty. This error will auto-reset.
Err 33	PV over-voltage	This error will auto-reset after PV-voltage has dropped to safe limit. This error is an indication that the PV-array configuration with regard to open-circuit voltage is critical for this charger. Check configuration, and if required, re-organise panels.
Err 34	PV over-current	The current from the solar-panel array has exceeded 50A. This error could be generated due to an internal system fault. Disconnect the charger from all power-sources, wait 3 minutes, and power-up again. If the error persists the controller is probably faulty. This error will auto-reset.
Err 114	CPU temperature to hot	This error will reset after the CPU has cooled down. If the error persists, check the ambient temperature and check for obstructions near the air inlet and outlet holes of the charger cabinet. Check manual for mounting instructions with regard to cooling. If error persists the controller is probably faulty.

8. SPECIFICATIONS

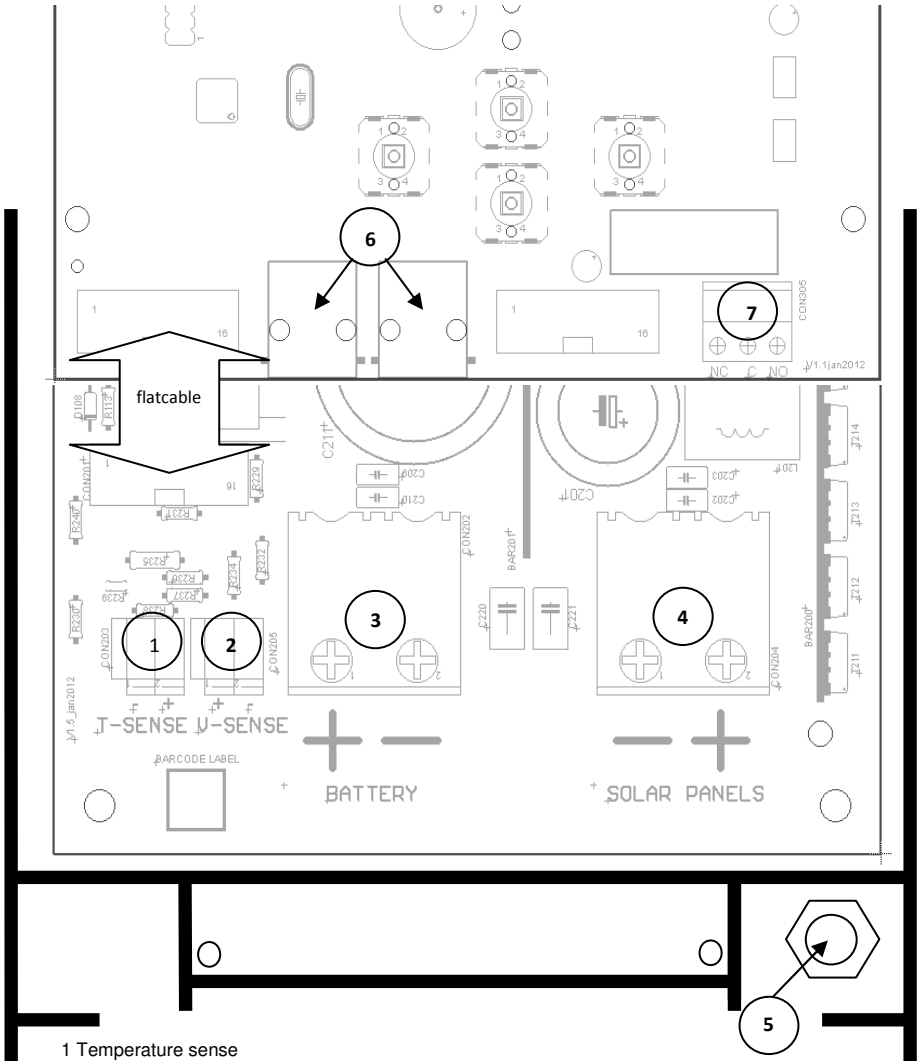
BlueSolar charge controller	MPPT 150/70
Nominal battery voltage	12 / 24 / 36 / 48V Auto Select
Rated charge current	70A @ 40°C (104°F)
Maximum solar array input power	12V: 1000W / 24V: 2000W / 36V: 3000W / 48V: 4000W
Maximum PV open circuit voltage	150V
Minimum PV voltage	Battery voltage plus 7 Volt 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
Programmable relay	DPST AC rating: 240VAC/4A DC rating: 4A up to 35VDC, 1A up to 60VDC
CAN bus communication port	Two RJ45 connectors, NMEA2000 protocol
Operating temperature	-40°C to 60°C with output current derating above 40°C
Cooling	Natural Convection
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

9. TEMPERATURE COMPENSATION

Figure 1: temperature compensation curve



10. OVERVIEW CONNECTIONS



1 Temperature sense
2. Voltage sense
3. Battery
4. Solar array
5.Ground connection (PE)
6. 2x CAN Bus RJ45
7. Programmable relay

Victron Energy Blue Power

Distributor:

Serial number:

Version : 01
Date : 16 July 2012

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