



Manual

BlueSolar Charge controller
12/24V-10A with timer

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Installation and Operation Manual



Specification Summary

Nominal system voltage:	12 / 24VDC*
Maximum PV input voltage:	50V
Nominal charge / discharge current	10A

*** The controller will recognize the system rated voltage when start up. If the battery voltage is lower than 18V, it will recognize the system as 12V. If the battery voltage is greater than 18V, it will recognize the system as 24V.**

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1. Important Safety Information

This manual contains important safety, installation and operating instructions.

The following symbols are used throughout this manual to indicate potentially dangerous conditions or mark important safety instructions, please take care when meeting these symbols.



WARNING: Indicates a potentially dangerous condition. Use extreme caution when performing this task.



CAUTION: Indicates a critical procedure for safe and proper operation of the controller.



NOTE: Indicates a procedure or function that is important for the safe and proper operation of the controller.

General Safety Information

- Read all of the instructions and cautions in the manual before beginning installation.
- There are no user serviceable parts inside the controller. Do not disassemble or attempt to repair it.
- Install external fuses/breakers as required.
- Disconnect the solar module and fuse/breakers near to battery before installing or adjusting the controller.
- Do not allow water to enter the controller.
- Confirm that power connections are tightened to avoid excessive heating from loose connection.

2. General Information

2.1 Product Overview

- 12/24V automatic recognition
- Efficient Series PWM charging, increases battery lifetime and improves solar system performance.
- Uses MOSFET as electronic switch, without any mechanical switch
- Automatic day/night recognition.
- Digital LED menu.
- Intelligent timer function with 1-15 hours option.
- Unique dual timer function, enhances the flexibility of street light system.
- Gel, Sealed and Flooded battery type option.
- Temperature compensated charging and discharging.
- Electronic protection: overheating, over charging, over discharging, overload, and short circuit.
- Reverse current protection.

The controller is for off-grid solar systems, especially solar light systems, and protects the battery from being over charged by the solar module and over discharged by the loads. The charging process has been optimized for long battery life and improved system performance. The comprehensive self-diagnostics and electronic protection functions can prevent damage from installation mistakes or system faults.

Though the controller is easy to operate and use, please take your time to read this manual and become familiar with it. This will help you make full use of all the functions and improve your solar PV system.

2.2 Product Features

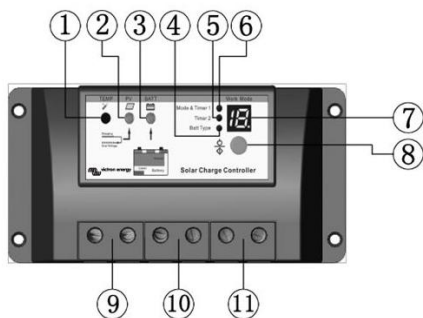


Figure 2-1 Features

1 –Temperature Sensor

Measures ambient temperature. Used for temperature compensated charging and discharging.

2 – Charging status LED indicator

A LED indicator that shows charging status and also indicates when a solar input fault condition exists

3 – Battery status LED indicator

A LED indicator that shows battery status

4 – Battery type setting indicator

The indicator will be on when the battery type is selected.

5 – Timer 2 setting indicator

The indicator will be on when setting timer 2.

6 – Timer 1 setting indicator

The indicator will be on when setting timer 1.

7 –LED digital display

Displays the load mode and status

8 –Setting button (in manual mode used for load ON/OFF)

To set load mode and to select battery type.

9 –Solar Module Terminals

Connect solar modules.

10 –Battery Terminals

Connect batteries.

11 –Load Terminals

Connect loads.



3. Installation Instructions

3.1 General Installation Notes

- Read through the entire installation section before beginning installation.
- Be very careful when working with batteries. Wear eye protection. Have fresh water available to wash and clean any contact with battery acid.
- Uses insulated tools and avoid placing metal objects near the batteries.
- Explosive battery gasses may be present during charging. Be certain there is sufficient ventilation.
- Avoid direct sunlight and do not install in locations where water can enter the controller.
- Loose power connections and/or corroded wires may result in resistive connections that melt wire insulation, burn surrounding materials, or even cause fire. Ensure tight connections and use cable clamps to secure cables and prevent them from swaying in mobile applications.
- Use with Gel, Sealed or Flooded batteries only.
- Battery connection may be wired to one battery or a bank of batteries. The following instructions refer to a singular battery, but it is implied that the battery connection can be made to either one battery or a group of batteries in a battery bank.
- Select the system cables according to $3A/mm^2$ current density.

3.2 Mounting



NOTE: When mounting the controller, ensure free air through the controller heat sink fins. There should be at least 6 inches (150 mm) of clearance above and below the controller to allow for cooling. If mounted in an enclosure, ventilation is highly recommended.



WARNING: Risk of explosion! Never install the controller in a sealed enclosure with batteries! Do not install in a confined area where battery gasses can accumulate.

Step 1: Choose Mounting Location

Locate the controller on a vertical surface protected from direct sun, high temperature, and water.

Step 2: Check for clearance

Place the controller in the location where it will be mounted. Verify that there is sufficient room to run wires and that there is sufficient room above and below the controller for air flow.

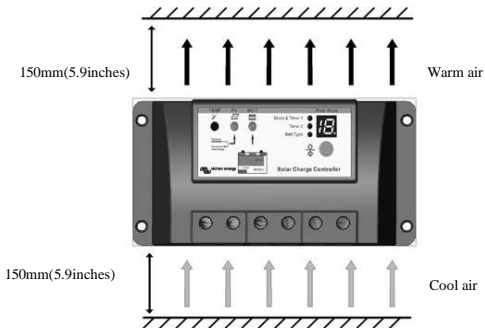


Figure 3-1 Mounting and cooling

Step 3: Mark Holes

Use a pencil or pen to mark the four (4) mounting hole locations on the mounting surface.

Step 4: Drill Holes

Remove the controller and drill 4.5mm holes in the marked locations.

Step 5: Secure Controller

Place the controller on the surface and align the mounting holes with the drilled holes in step 4.

Secure the controller in place using the mounting screws.

3.3 Wiring



NOTE: Please follow the recommended connection order for maximum safety during installation.



NOTE: The controller is a common positive ground controller.



CAUTION: Don't connect loads with surge power exceeding the ratings of the controller.



CAUTION: For mobile applications, be sure to secure all wiring. Use cable clamps to prevent cables from swaying when the vehicle is in motion. Unsecured cables create loose and resistive connections which may lead to excessive heating and/or fire.

Step1: Battery Wiring



WARNING: Risk of explosion or fire! Never short circuit battery positive (+) and negative (-).

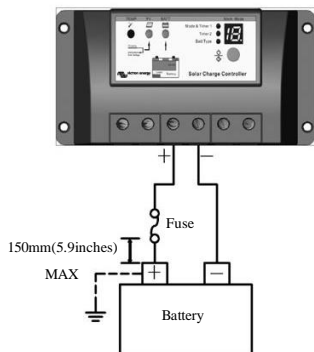


Figure 3-2 Battery connecting

Before connecting the battery, make sure that battery voltage is greater than 6V so as to start up the controller. If the system is 24V, make sure battery voltage is not less than 18V. System voltage can only be automatically recognized when the controller starts up for the first time.

When installing a fuse, make sure that the distance between the fuse holder and the positive terminal of battery is at most 150mm. **Do not insert a fuse at this time.**

Step 2: Load Wiring

The controller loads can be connected to such electrical equipments as lights, pumps, motors and others.

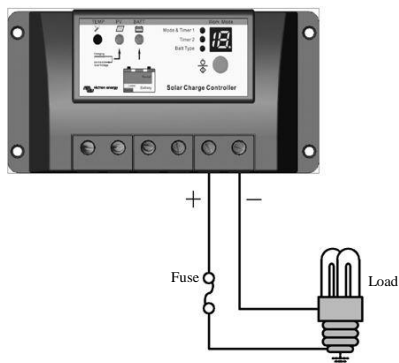


Figure 3-3 Load Wiring

Connect the positive (+) and negative (-) to the controller load terminals as shown in Figure 3-3.

An in-line fuse holder should be wired in series in the load positive (+) or negative (-) wire as shown in Figure 3-3. **Do not insert a fuse at this time.**

If wiring the load connection to a load distribution panel, each load circuit should be fused separately. The total load draw should not exceed the load rated current of the controller.

Step 3: Solar wiring



WARNING: Risk of electric shock! Exercise caution when handling solar wiring. The solar module(s) high voltage output can cause severe shock or injury. Cover the solar module(s) from the sun before installing solar wiring.

The controller can accept 12V or 24V nominal off-grid solar module(s).

Solar Module

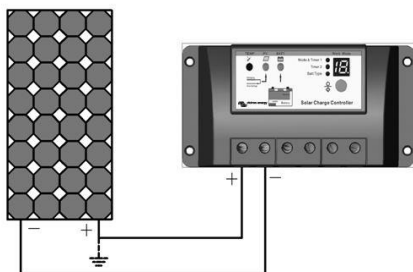


Figure 3-4 Solar wiring

Step 4: Confirm Wiring

Double-check the wiring. Confirm correct polarity at each connection. Verify that all six terminals are tightened.

Solar Module

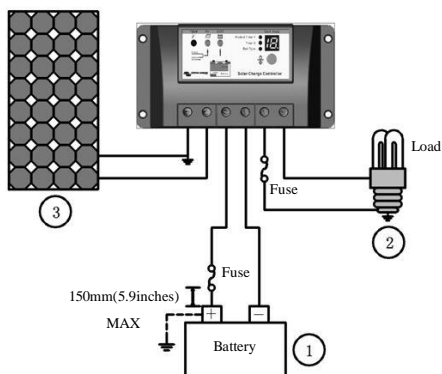


Figure 3-5 System wiring review

Step 5: Install Fuse

Install a suitable fuse in each fuse holder in the following order:

1. Battery circuit
2. Load circuit

Step 6: Confirm power on

When battery power is applied and the controller starts up, the battery LED indicator will be green.

If the controller doesn't start up, or the battery status LED error is on, please refer to section 5 for troubleshooting.

4. Operation

4.1 PWM Technology (Series Pulse Width Modulation)

The controller features advanced series pulse width modulation.

4.2 Battery Charging Information

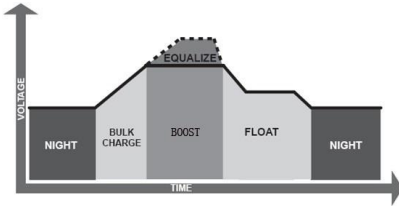


Figure 4-1 PWM Charging mode

- **Bulk Charge**
In this stage, the battery voltage has not yet reached boost voltage and 100% of available solar power is used to charge the battery.
- **Boost/absorption Charge**
When the battery has been recharged to the Boost/absorption voltage setpoint, constant-voltage regulation is used to prevent heating and excessive battery gassing. The Boost/absorption time is 120 minutes
- **Float Charge**
After the battery is fully charged in the Boost/absorption voltage stage, the controller reduces the battery voltage to the Float voltage set point. The purpose of Float stage is to offset the power consumption caused by self consumption and small loads in the whole system, while maintaining full battery storage capacity.

In Float stage, loads can continue to draw power from the battery. In the event that the system load(s) exceed the solar charge current, the controller will no longer be able to maintain the battery at the Float setpoint. Should the battery voltage drop below the Boost setpoint, the controller will exit Float stage and return to Bulk charge.

- Equalize Charge



WARNING: Risk of explosion!

Equalizing a flooded battery can produce explosive gases, good ventilation of the battery box is therefore necessary.



NOTE: Equipment damage!

Equalization may increase battery voltage to a level that is damaging to sensitive DC loads. Ensure that the allowable input voltage of the loads is greater than the equalize charging set point voltage.



NOTE: Equipment damage!

Over-charging and excessive gassing may damage the battery plates and activate material.

Excessive equalizing charge may cause damage. Please carefully review the specific requirements of the battery used in the system.

Certain types of batteries benefit from periodic equalizing charge, which will stir the electrolyte and balance battery voltage.

Only if the battery has been over discharged, the solar controller will automatically turn to equalize charging, and the equalize stage will remain on during 120 minutes.

4.3 LED Indicators

Charging Status LED indicator Battery Status LED indicator

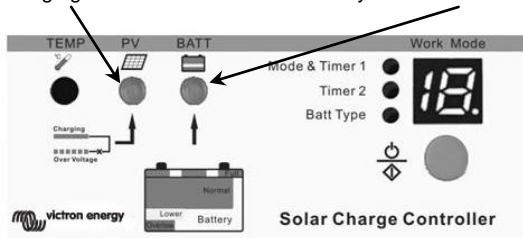


Figure 4-2 LED indicators

- Charging status indicator

GREEN ON whenever sunlight is available for battery charging,

GREEN FAST FLASHING in case of system over voltage.

Please refer to section 5 for troubleshooting.

Charging Status LED indicator

Table 4-1

Color	Indicator	Charging Status
Green	On Solid	Charging
Green	Fast Flashing	Over voltage

- **Battery status indicator**

GREEN ON when battery voltage in normal range

GREEN SLOWLY FLASHING when battery full

ORANGE ON in case of battery under voltage

RED ON when the battery is over discharged

Please refer to section 5 for troubleshooting.

- **Battery status LED indicator**

Table 4-2

Color	Indicator	Battery Status
Green	On solid	Normal
Green	Slowly Flashing	Full
Orange	On solid	Under voltage
Red	On solid	Over discharged

- **Load status indicator**

When the load current is 1.25 times rated current for 60 seconds, or the load current is 1.5 times rated current for 5 seconds (overload); or load current is more than 3.5 times rated current (Short Circuit), the LED display shows "L", slowly flashing. Please refer to section 5 for troubleshooting.

- **Load status LED indicator**

Table 4-3

Color	LED digital tube	Load status
Red	"L" with slowly flashing	Overload or short circuit

- **Overheating protection indicator**

When the heat sink of the controller exceeds 85°C, the controller will automatically cut off the input and output, and the LED display shows “H”, slowly flashing. Please refer to section 5 for troubleshooting.

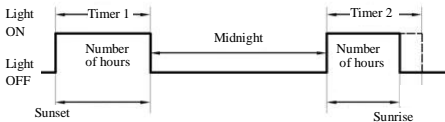
Overheating protection indicator

Table 4-4

Color	LED digital tube	System status
Red	“H” with slowly flashing	Controller overheating

4.4 Operation and settings

Dual timer function



The default night length is 10 hours. The controller can learn the night length referring to the previous night so as to adapt to the different seasons. However, it will take some time to learn it.



NOTE: When the “OFF” time set at timer 1 is later than local sunrise time, the controller will turn off the load output at the sunrise time.

Load Control Settings

1. Dusk to Dawn

At sunset the controller will turn the load on 10 minutes after the voltage of the solar module voltage has decreased below NTV (Night Time Threshold Voltage). To set the number of hours that the load will be on after sunset, please refer section 4.5.

At sunrise the controller will turn the load off 10 minutes after the voltage of the solar module has increased above DTV (Day Time Threshold Voltage). To set the number of hours that the load will be on prior to sunrise, please refer section 4.5.

2. Test mode

This mode is the same as Dusk to Dawn. But there is no 10 minutes delay when controller recognizes the starting voltage. The test mode makes it easy to check the system.

3. ON/OFF mode

This mode is to turn ON and OFF the load manually.

4.5 Setting the timers

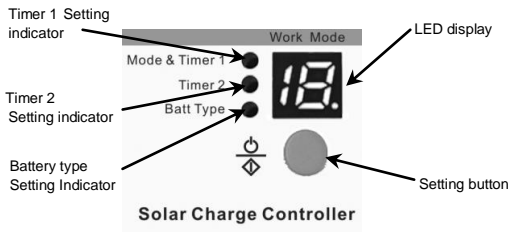


Figure 4-3 Setting operation indicating

Choose the required setting indicator by pressing the setting button.

When the timer 1 LED is on, press the setting button for more than 5 seconds, until the LED display flashes. Then press the setting button until the desired number appears according to the following table. The setting is finished when the display stops flashing.

Repeat the procedure for timer 2.

Load work mode

Table 4-5

Timer 1	LED display No.
Enable	n
Dusk to Dawn, Load will be on all night	0
Load will be on for 1 hour after ten minutes delay since sunset	1
Load will be on for 2 hours after ten minutes delay since sunset	2
Load will be on for 3 hours after ten minutes delay since sunset	3
Load will be on for 4 hours after ten minutes delay since sunset	4
Load will be on for 5 hours after ten minutes delay since sunset	5
Load will be on for 6 hours after ten minutes delay since sunset	6
Load will be on for 7 hours after ten minutes delay since sunset	7
Load will be on for 8 hours after ten minutes delay since sunset	8
Load will be on for 9 hours after ten minutes delay since sunset	9
Load will be on for 10 hours after ten minutes delay since sunset	10
Load will be on for 11 hours after ten minutes delay since sunset	11
Load will be on for 12 hours after ten minutes delay since sunset	12
Load will be on for 13 hours after ten minutes delay since sunset	13
Load will be on for 14 hours after ten minutes delay since sunset	14
Load will be on for 15 hours after ten minutes delay since sunset	15
Test mode	16
ON/OFF mode	17

Load work mode

Table 4-6

Timer 2	LED display No.
Enable	n
Load will be on for 1 hour before sunrise	1
Load will be on for 2 hours before sunrise	2
Load will be on for 3 hours before sunrise	3
Load will be on for 4 hours before sunrise	4
Load will be on for 5 hours before sunrise	5
Load will be on for 6 hours before sunrise	6
Load will be on for 7 hours before sunrise	7
Load will be on for 8 hours before sunrise	8
Load will be on for 9 hours before sunrise	9
Load will be on for 10 hours before sunrise	10
Load will be on for 11 hours before sunrise	11
Load will be on for 12 hours before sunrise	12
Load will be on for 13hours before sunrise	13
Load will be on for 14 hours before sunrise	14
Load will be on for 15 hours before sunrise	15



NOTE: Timer 2 is disabled when timer 1 is set to Dusk to Dawn (0), Test mode (16) or ON/OFF mode (17).

• Battery Type Setting

When the battery type setting LED is on, press the setting button for more than 5 seconds, until the LED display flashes. Then press the setting button until the desired number appears according to the following table. The setting is finished when the display stops flashing.

Battery type setting

Table 4-7

Battery type	LED display
Sealed lead acid battery	1
Gel battery	2
Flooded battery	3



5. Protection, Troubleshooting and Maintenance

5.1 Protection

- **PV Array Short Circuit**
If a PV array short circuit occurs, clear it to resume normal operation.
- **Load output overload**
If the load current exceeds the maximum load current rating, the controller will disconnect the load. The greater the overload, the faster the load will be disconnected. A small overload could take a few minutes to disconnect. Disconnect due to overload must be cleared by pressing the setting button.
- **Load output short circuit**
After one automatic load reconnect attempt, the fault must be cleared by pressing the setting button.
- **PV reverse polarity**
Correct the wiring error to resume normal operation.
- **Battery Reverse Polarity**
Correct the wiring error to resume normal operation.
- **Damaged temperature sensor**
If the temperature sensor is short-circuited or damaged, the controller will be charging or discharging at the default temperature 25°C.
- **Overheating protection**
If the temperature of the controller heat sink exceeds 85°C, the controller will cut-off the input and output.
- **High Voltage Transients**
The battery is protected against high voltage transients. In lightning prone areas, additional external suppression is recommended.



5.2 Troubleshooting

Trouble Shooting

Table 5-1

Faults	Possible reasons	Troubleshooting
Charging LED indicator off during daytime when sunshine falls on PV modules properly.	PV array disconnected	Check that PV and battery wire connections are correct and tight.
Green charging LED indicator fast flashing	Battery voltage higher than over voltage disconnect voltage (OVD)	Check battery voltage. Disconnect the solar module
Battery LED indicators are orange	Battery under voltage	Load output is normal, charging LED indicator will return to green automatically when fully charged.
Battery LED indicators RED color and loads not working.	Battery over discharged	The controller did cut off the load output automatically. The LED indicator will return to green after fully charging the battery.
LED display shows “L”, slowly flashing	Over load or short circuit	Overload: please reduce the load and press the button once, the controller will resume normal operation after 3s. Short circuit: when the first short-circuit occurs, the controller will automatically resume normal operation after 10s; when a second short-circuit occurs, press the button, the controller will resume normal operation after 3s.
LED display shows “H”, slowly flashing	Over temperature	When heat sink of the controller exceeds 85°C, the controller will automatically cut input and output circuit. When the temperature has decreased below 75°C, the controller will resume to work



NOTE: If all LED's are off.

Measure battery voltage with multimeter.

At least 6V is needed to start the controller.



NOTE: No charging status LED indicator with normal connection. Measure the input voltage of solar module, the input voltage must be higher than battery voltage!

5.3 Maintenance

The following inspections and maintenance tasks are recommended at least two times per year for best controller performance.

- Check that the controller is securely mounted in a clean and dry environment.
- Check that the air flow and ventilation around the controller is not blocked. Clear all dirt or fragments on the heat sink.
- Check the wiring to make sure insulation is not damaged by sunlight, frictional wear, insects or rats etc. Replace if necessary.
- Tighten all the terminals. Inspect for loose, broken, or burnt wire connections.
- Pay attention to any troubleshooting or error indication .Take necessary corrective action.



6. Technical specifications

Electrical Parameters

Table 7-1

Description	Parameter
Nominal System Voltage	12 / 24VDC With automatic system voltage recognition
Battery Voltage Range	6-36V
Rated Battery Current	10A
Charge Circuit Voltage Drop	$\leq 0.26V$
Discharge Circuit Voltage Drop	$\leq 0.15V$
Self-consumption	$\leq 6mA$

Threshold Voltage Parameters

Table7-2

Description	Parameter
NTTV (Night Time Threshold Voltage)	5V; x2/24V
DTTV (Day Time Threshold Voltage)	6V; x2/24V

Temperature Compensation Coefficient

Table7-3

Description	Parameter
Temperature Compensation Coefficient*	-30mV/°C/12V (25°C ref)

* Compensation of equalize, boost, float and boost reconnect voltage

Battery Voltage Parameters (temperature at 25°C)

Table 7-4

Charging Parameters			
Battery charging setting	Gel	AGM	Flooded
Over Voltage Disconnect Voltage	16V; x2/24V	16V; x2/24V	16V; x2/24V
Charging Limit Voltage	15.5V;x2/24V	15.5V;x2/24V	15.5V;x2/24V
Equalize Charging Voltage	-----	14.6V;x2/24V	14.8V;x2/24V
Boost/absorption Charging Voltage	14.2V;x2/24V	14.4V;x2/24V	14.6V;x2/24V
Float Charging Voltage	13.8V;x2/24V	13.8V;x2/24V	13.8V;x2/24V
Boost Reconnect Charging Voltage	13.2V;x2/24V	13.2V;x2/24V	13.2V;x2/24V
Low Voltage Reconnect Voltage	12.6V;x2/24V	12.6V;x2/24V	12.6V;x2/24V
Under voltage warning reconnect voltage	12.2V;x2/24V	12.2V;x2/24V	12.2V;x2/24V
Under Voltage Warning Voltage	12V; x2/24V	12V; x2/24V	12V; x2/24V
Low Voltage Disconnect Voltage	11.1V;x2/24V	11.1V;x2/24V	11.1V;x2/24V
Discharging Limit Voltage	10.8V;x2/24V	10.8V;x2/24V	10.8V;x2/24V
Equalize duration	-----	2 hours	2 hours
Boost duration	2 hours	2 hours	2 hours

Environmental parameters

Table 7-5

Environmental parameters	Parameter
Operating temperature	-35°C to +55°C
Storage temperature	-35°C to +80°C
Humidity	10%-90% non condensing
Enclosure	IP30

Mechanical parameters

Table 7-6

Mechanical Parameter	Parameter
Overall dimensions	140(5.51)x65(2.56)x34(1.34) mm/inches
Mounting dimensions	130(5.12) x 45(1.77) mm/inches
Mounting hole size	Φ4.5
Terminals	6mm ²
Net weight	0.15kg

Final interpretation right of the manual belongs to our company.

Any changes without prior notice!

APPENDIX A: Dimensions

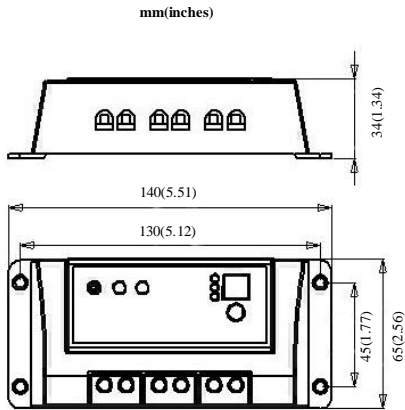


Figure 1-1 Dimensions

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.**

**Use for 48V battery system only 2x24V
(72 cells) solar panel array in series.**

BlueSolar PWM Charge Controller – LCD - USB

12V | 24V | 30A

48V | 10A

48V | 20A

48V | 30A

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.
- Use for 48V battery system only 2x24V (72 cells) solar panel array in series.

1. General Information

The BlueSolar Charge Controller series uses Pulse Width Modulation (PWM) charge voltage control combined with a multistage charge control algorithm.

2. Features

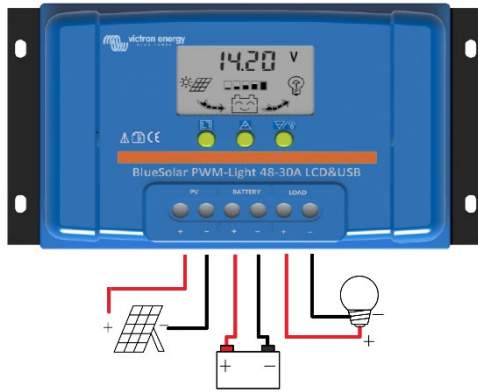
- Three stage battery charging [bulk – absorption – float]
- Battery type: Lead-ACID and LiFePO4 (with internal BMS)
- Protected against over current.
- Protected against short circuit.
- Protected against reverse polarity connection of the solar panels and/or battery.
- Low voltage load disconnect.
- Temperature protection.

3. Installation

Important note: Always connect the batteries first.



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1. Connect the battery to the charge regulator - plus and minus.
2. Connect the solar module to the regulator - plus and minus.
3. Connect the load to the charge regulator - plus and minus.

The reverse order applies when deinstalling!

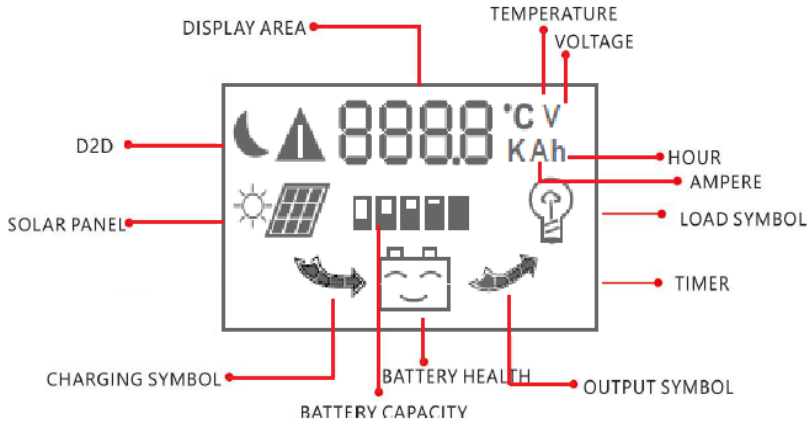
An improper sequence order can damage the BlueSolar Charge Controller!

1. Make sure your battery is charged for the BlueSolar Charge Controller to recognize the battery type before first installation.
2. The battery cable should be as short as possible to minimize losses.
3. The BlueSolar Charge Controller is only suitable for lead-acid, and LiFePO4 batteries.
4. The BlueSolar Charge Controller is only suitable for regulating solar modules. Never connect another charging source to the charge BlueSolar Charge Controller.



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4. LCD DISPLAY and SETTINGS



MENU: switch between different display, or to enter/exit setting by long press.



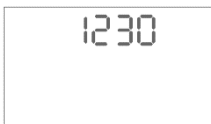
UP: press to change the settings when in setting mode.



DOWN: press to change the settings when in setting mode.
Load on/off button when in H mode.

4.1 Monitoring & Settings

Values between [] are for 24V battery settings. **Bolt** are the 48V settings.



Boot Display. After connecting the batteries, you see the type of charger and the measured battery voltage.


1230= BlueSolar Charge Controller – LCD – USB 12V|30A

2430= BlueSolar Charge Controller – LCD – USB 24V|30A

4810= BlueSolar Charge Controller – LCD – USB 48V|10A

4820= BlueSolar Charge Controller – LCD – USB 48V|20A


4830= BlueSolar Charge Controller – LCD – USB 48V|30A


Press MENU  to enter next display.



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Main display. It shows battery voltage, battery capacity, charging and discharging status. Press MENU  to enter next display.

Change Settings Main display. press on the MENU  key for several seconds until the numbers flash, you are in:




Battery type setting. See table below.

The factory setting is b01

	Battery type	Battery voltage	Absorbtion voltage	Float voltage	Low voltage disconnect factory setting	Low voltage disconnect range	Low voltage reconnect factory setting	Low voltage reconnect range
b01	LEAD-ACID [AGM]	12.0V [24V] 48V	14.4V [28.8V] 57.6V	13.7V [27.4V] 54.8V	11.2V [22.4V] 44.8V	10.5V-12.0V in steps of 0.1V	12.6V [25.2V] 50.4V	12.0V-13.5V in steps of 0.1V
b02	LEAD-ACID [Gel]	12.0V [24V] 48V	14.2V [28.4V] 56.8V	13.7V [27.4V] 54.8V	11.2V [22.4V] 44.8V	10.5V-12.0V in steps of 0.1V	12.6V [25.2V] 50.4V	12.0V-13.5V in steps of 0.1V
b03	LEAD-ACID [Wet]	12.0V [24V] 48V	14.6V [29.2V] 58.4V	13.7V [27.4V] 54.8V	11.2V [22.4V] 44.8V	10.5V-12.0V in steps of 0.1V	12.6V [25.2V] 50.4V	12.0V-13.5V in steps of 0.1V
b04*	12V LiFePO4	12.8V	14.2V	13.35V	11.2V	10.5V-12.0V in steps of 0.1V	12.6V	12.0V-13.5V in steps of 0.1V
b05*	24V LiFePO4	25.6V	28.4V	26.7V	22.4V	21.0V-24.0V in steps of 0.1V	25.2V	24.0V-27.0V in steps of 0.1V


*The controllers do not have a remote on/off input. Therefore use LiFePO4 batteries with integrated BMS only (such as the Victron SuperPack batteries)

NA for 48V

press on the MENU  key again and you are in:



Low voltage disconnect The factory setting is 11.2V [22.4V] **44.8V**


press on the MENU  key again and you are in:



Low voltage reconnect The factory setting is 12.6V [25.2V] **50.4V**



Solar Voltage display. It shows Solar Panel voltage, battery capacity status.


Press MENU  to enter next display.



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Charge current display. It shows solar to battery current and charge status.


Press MENU  to enter next display.



Load working mode.
The factory setting is 24H


Press MENU  to enter next display.


Change Settings in the Load working mode display.

Press on the MENU  key for several seconds until the numbers flash, you are in setting mode for the:



Load working mode setting.
See table below.

H	The load can switch on and off by the  Load on/off switch.
L	Load D2D. The load will switch on at sunset and switch off at sunrise.
L01-L23	The load output will switch on after sunset and switch off after 1-23 hours.
24H	The BlueSolar Charge Controller will continuously supply power to your load.

Press on the MENU  key again and you go to:


(Note: the Phoenix VE.Direct inverters can be controlled by connecting to the left side connection of the remote control to the load output)



Load Setting: trigger value
(Solar Panel Voltage)

When the work mode is L01-L23 the charge Controller will measure the solar panel voltage to decide whether its day or night to switch load on or off. The higher this value is the earlier it switches on the load output.

The factory setting is 4/8V/16V

Press on the MENU  key again and you go to:




L01-L23 trigger delay value
(Seconds)

When the charge Controller measures a solar panel voltage lower this value it will delay for



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Press on the MENU  key again and you go to:




10s and measure again to make sure night falls. The factory setting is 10sec
Short-circuit protection setting.

Some inductive or capacitive consumer will trigger the short-circuit protection during start up. Therefore the SC-protection can be disabled manually. Sc.F=OFF, Sc.n=ON. The default is ON. The factory setting is Sc.n.




Load current display. It shows load current and battery capacity.

Press MENU  to enter next display.



USB Voltage display. It shows the USB voltage 5V (2A max)

Press MENU  to enter next display.



Controller temperature display. If the controller overheats it will automatic shut down and wait for the temperature to drop to normal level and then it will start again.

Press Press MENU  to enter Main display.



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5. Alarms

High temperature

Temp <85°C, controller works normally.

When temp $\geq 85^\circ\text{C}$, controller will adopt first protection phase:

1. Controller will lower the PV input current, in order to lower the controller temp; but Load works normally. There is no alarm on LCD display.

When temp is $>90^\circ\text{C}$, controller will adopt second protection phase:

2. Controller will cut off PV input current. Load output cut off. A high temp alarm icon will show on LCD to notice user.

When temp down under 82°C , the controller will again turn on PV input and Load output. Alarm icon disappears.



Low voltage.

Empty battery symbol flashing means the battery is discharged lower than the LVD voltage. The charge Controller has disabled the output. User should charge the battery until it is up to LVR Low voltage re-connect voltage and then BlueSolar Charge Controller will recover the output status.



Short-circuit protection.

This display means a short-circuit protection occurs. The controller will switch off the output and wait for 30s and then try to recover again. User should check and remove the trouble in time.



Over-current protection.

This display means an output over-current occurs. The controller will switch off the output and wait for 30s and then try to recover again. User should check and remove the trouble in time.

Shut down after 60s in case of 110%-130% load.

Shut down after 5s in case of 130%-160% load.



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6. Specifications

BlueSolar Charge Controller	12V/24V 30A		48V 10A	48V 20A	48V 30A
Battery Voltage	12/24V Auto Select		48V		
Charge & Load Current	30A		10A	20A	30A
Charge mode	PWM, Time and Lighting Control				
Automatic load disconnect	Yes				
Maximum solar voltage	55V		100V		
Solar voltage range	15-28V	30-55V	60-100V		
Self-consumption	<15mA				
Protections	Reverse polarity connection of the solar panels. Reverse polarity connection of the battery. Low voltage disconnect. 110%-130% load: Shuts down after 60sec. 130%-160% load: Shuts down after 5sec. Short circuit: immediate shut down. Over-temperature protection.				
Solar Panel					
Recommended solar panel array	36cell	72cell	2x72cell in series or 4x36cell in series		
Max Solar Input Power	360W	720W	480W	960W	1440W
USB outputs					
Voltage	5V				
Current	2A (total from 2 USB outputs)				
Default settings					
Absorption charge (b01) ¹	14.4V	28.8V	57.6V		
Float charge (b01) ¹	13.7V	27.4V	54.8V		
Load disconnect (b01) ¹	11.2V	22.4V	44.8V		
Load reconnect (b01) ¹	12.6V	25.2V	50.4V		
Enclosure					
Terminal size	16mm ² / AWG6				
Weight	300gr				
Dimension (h x w x d)	101.50x184.00x47.10 mm				
Mounting	Vertical wall mount Indoor only				
Humidity (non condensing)	Max. 95%				
Operating temperature	-35°C to +60°C (full load)				
Cooling	Natural convection				
Protection class	IP20				
Standards					
Safety	EN60335-1, IEC62109-1				
EMC	EN61000-6-1, EN61000-6-3				

¹ See also 3.1 Battery type setting.



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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 Charge Controller

12V | 24V | 20A

1. DISCRIPTION

1.1 General

The BlueSolar Charger series uses Pulse Width Modulation (PWM) charge voltage control combined with a multistage charge control algorithm. This leads to superior charging and enhanced battery performance. The filtered PWM power control system uses highly efficient and reliable power MOSFET transistors.

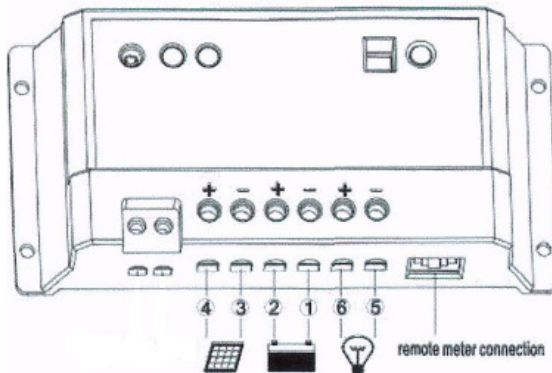
Fully automatic temperature compensation of charge voltage is available to improve charge control and battery performance.

1.2 Features

- ✧ Internal temperature sensor.
- ✧ Three stage battery charging [bulk – absorption – float]
- ✧ Protected against over current.
- ✧ Protected against short circuit.
- ✧ Protected against reverse polarity connection of the solar panels and/or battery.
- ✧ Low voltage load disconnect.
- ✧ Intelligent software control.
- ✧ PWM charging mode.

2. INSTALLATION

Important note: Always connect the batteries first.



Connect the individual components as shown.

- Solar panel(s)
- Battery and loads in order indicated 1-6.

Install the regulator near the battery. The installation environment should be indoor, dry and nonflammable. The cables should be as short as possible and have a suitable cable diameter size to minimize loss, e.g. use 2.5 mm² at 10A; use 5 mm² at 20A

1. Mount the controller on a vertical surface. Allow space above and below the controller for air flow.
2. Connect the battery to the controller. If the connection is correct, the battery indicator will be on.

3. If the battery is connected with inverse polarity, the output polarity will also inverse.
4. A 20A fuse should be inserted in the positive wire to the battery.
5. Connect the photovoltaic module to the charge regulator. If there is sunshine, the charging indicator should turn on.
6. Connect the load to the charge controller; press the ON/OFF button to start.

3. LED INDICATORS



Green LED is ON when solar is charging the battery.
In case of system over voltage the green LED blinks.

Green LED is ON when the battery voltage is in the right range.



Green LED is slowly flashing when the battery is fully charged.

Yellow LED is ON when the battery voltage is low.



Red LED is ON when the load is cut off.

In case of overload the red LED is slowly flashing
(The load current is 1.25 times of rated current for 60 seconds, or
the load current is 1.5 times of rated current for 5 seconds)



Red LED is fast flashing in case of short-circuits.

Red LED is ON when the push button is ON.
Red LED is OFF when the push button is OFF.

Please note:

1. The load output will cut off in case of over load or short circuit. After the first overload or short circuit the controller will resume to work automatically after 30 seconds. Please check the load and press the start push button to start when it happens again.
2. After over discharge, the load will reconnect when the battery is charged to 13.1V/26.2V.
3. After over discharge, the load can be reconnected manually by pressing the on/off push button, if the battery voltage exceeds 12.6V/25.2V.

4. TO CORRECT PROBLEMS

1. Check wires
2. Reduce load if needed
3. Reset controller by pressing the push button

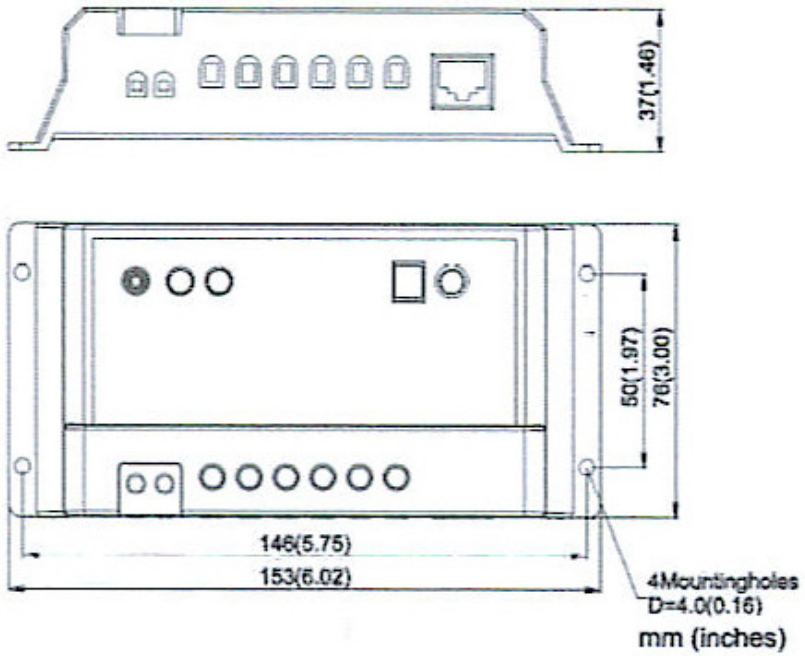
5. SPECIFICATIONS

BlueSolar 12/24-20A	12V/20A		24V/20A	
Battery voltage	12V/24V Auto Select*			
Rated charge current	20A			
Recommended solar panel array	36 cell		72 cell	
Maximum solar voltage*	28V		55V	
Over load, short circuit protection	1.25 times: 60 seconds 1.5 times: 5 seconds			
Self consumption	6mA			
Battery type**	SEL Sealed generic	GEL generic**		FLD Flooded generic
Default settings				
Absorption voltage	14.2V/28.4V	14.4V/28.8V		14.6/29.2V
Float voltage	13.7V/27.4V	13.7V/27.4V		13.7V/27.4V
Load Disconnect	11.1V		22.2V	
Load Reconnect	12.6V (manual) 13.1V (automatic)		25.2V (manual) 26.2V (automatic)	
Battery temperature sensor	Yes (Internal sensor)			
Temperature compensation	10mV/°C		20mV/°C	
Protection class	IP20			
Enclosure				
Terminal size	6mm ² /AWG10			
Weight	180gr			
Dimensions (h x w x d)	76 x 153 x 37 mm			
Mounting	Vertical wall mount. Indoor only			
Humidity	Max. 95%			
Operating temperature	-10°C to +40°C			
Cooling	Natural convection			
Standards				
Safety	EN60335-1			
EMC	EN61000-6-1, EN61000-6-3			

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

** Factory settings: Gel Battery. To change the battery type use the LCD remote meter display.

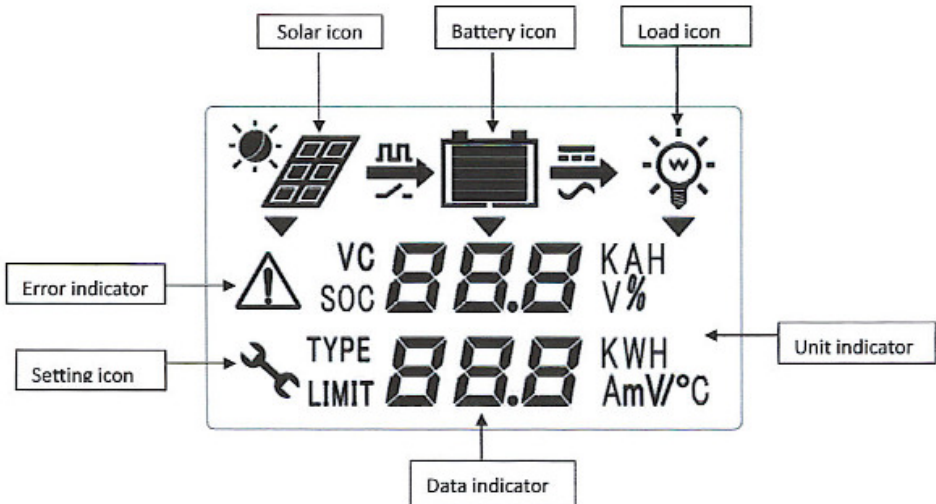
6. MECHANICAL DRAWING



7. REMOTE METER DISPLAY [OPTION]

Features

- ◇ LCD display: all systems parameters in digital value and symbols for system status.
- ◇ Battery type setting.
- ◇ Battery Ah setting.
- ◇ Temperature compensation setting.



7.1 General

Two LED indicators above LCD:

- Green on when charging.
- Red on when error.

The meter backlight has two backlight levels:

- High level for 15 seconds after pressing one of the push buttons.
- Low level during the next 15 seconds.

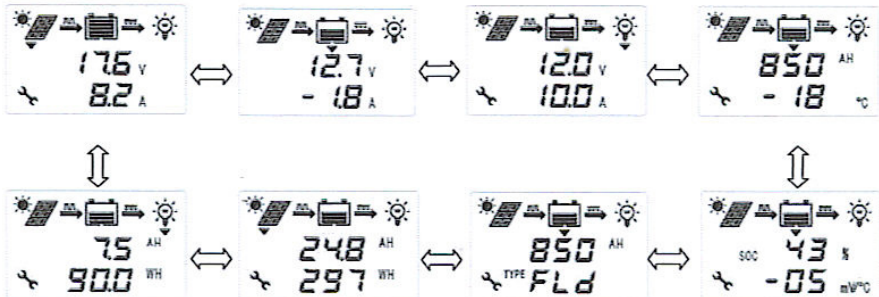
7.2 Remote meter operation instructions

Push button functions from left to right:

- K1: Set
- K2: Left←
- K3: Right→
- K4: ON/OFF/ESC

7.2.1 Meter display options by pressing K2 or K3

- solar panel voltage, solar panel charge current
- battery voltage, charge current
- load voltage, load current
- battery capacity (Ah), temperature
- battery capacity percentage, battery temp compensation
- battery capacity (Ah), battery type
- total charged Ah, total charged Wh
- total discharged Ah, total discharged Wh



7.2.2 Data setting operation:

The following parameters can be adjusted:

- battery capacity
- battery temperature compensation
- battery type

Procedure:

- Use K2 or K3 to select the display option with data to be adjusted.
- Press K1 to enter setting mode.
- Press K2 or K3 to modify data.
- Press K1 to save the modified setting, or press K4 to return to previous setting.

7.2.3. More about the adjustable parameters

Battery capacity:

- Range: from 10Ah to 900Ah, in 10Ah steps.
- Default value: 200Ah.

Battery temperature compensation:

- Range: from 0 to 10mV/Cell/°C.
- Default value: 5mV/Cell/°C.

Battery type:

Three battery types can be chosen:

- Sealed generic (SEL),
- Flooded generic (FLD),
- GEL generic (GEL).

The default setting is GEL.

The corresponding charge voltages are given in section 5. Please choose the charge voltage that is closest the recommendation of the battery manufacturer.

7.2.4. Resetting total charged/discharged values

1. Use K2 or K3 to select the “total charged” or “total discharged” screen.
2. Press K1 to enter setting mode.
3. Press K4 to reset to zero.

7.3 Error Icon

The red LED and the error icon will flash in case of an error.

Please:

1. Check wires
2. Reduce load if needed
3. Reset the controller by pressing K4

7.4 Data updating

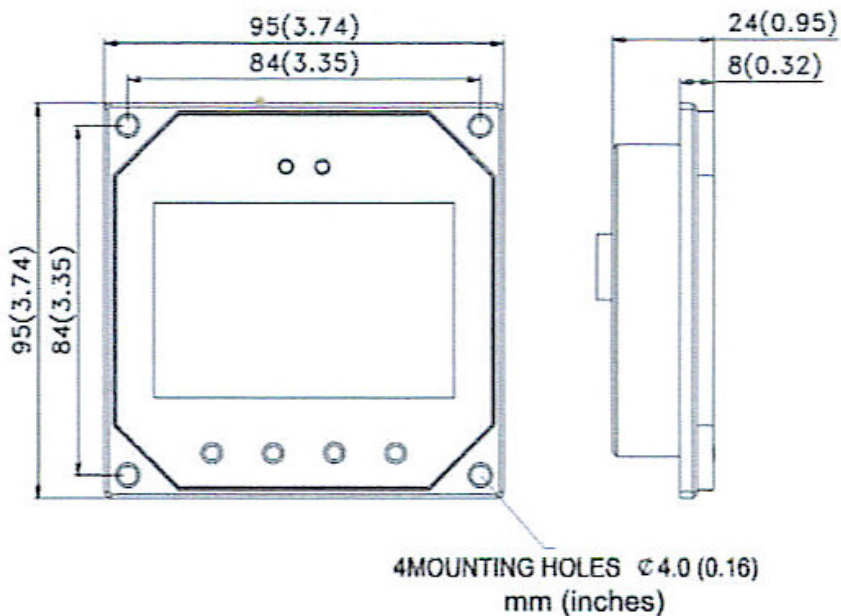
The display is updated every 10 seconds.

The charged/discharged Ah and Wh counters are updated every minute.

8. SPECIFICATIONS

Remote meter LCD specification	
Current consumption	High level backlight on: < 23mA, 15 seconds Low backlight on: < 20mA, 15 seconds Backlight and LED indicator off < 15mA
Communication cable & port	1.5 meters RJ45
Weight	150 gr
Dimensions (h x w x d)	95 x 95 x 24 mm

9. MECHANICAL DRAWING





Manual

BlueSolar DUO Charger

12V | 24V | 20A

1. DESCRIPTION

1.1 General

Series pass Pulse Width Modulation (PWM) charge voltage control combined with a multistage charge control algorithm leads to superior charging and enhanced battery performance. The filtered PWM power control system uses highly efficient and reliable power MOSFET transistors.

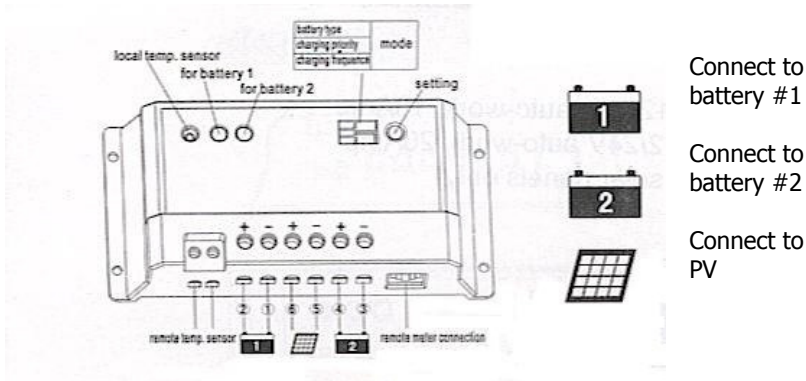
Fully automatic temperature compensation of charge voltage is available to further improve charge control and battery performance. The optional battery temperature sensor is built for long term reliability.

1.2 Features

- ✧ PWM controller.
- ✧ Charges two separate batteries. For example the starter battery and the service battery of a boat or mobile home.
- ✧ Programmable charge current ratio (standard setting: equal current to both batteries).
- ✧ Charge voltage settings for three battery types.
- ✧ Internal temperature sensor and optional remote temperature sensor.
- ✧ Protected against over current.
- ✧ Protected against short circuit.
- ✧ Protected against reverse polarity connection of the solar panels and/or battery.

2. INSTALATION

Important note: Always connect the batteries first.



3. LED INDICATORS

Remote temperature sensor

A connection point for RTS (option) to remotely monitor battery temperature.

Local temperature sensor

Measures ambient temperature. Battery regulation is adjusted accordingly.

For battery 1

Provides charging & battery status and errors

For battery 2

Provides charging & battery status and errors

Remote panel connection(option)

A communication port for the remote panel.

4. TROUBLESHOOTING

1. LED blinking, short circuit, check the PV and battery, and make sure that they are in correct connection.
2. LED slowly flashing: fully charged.
3. LED ON: charging.
4. LED frequent flashing: battery connected, no charge current.
5. LED OFF: no battery or over voltage.
 1. Check wires
 2. Reduce Amps if needed
 3. Reset controller

5. SETTING MODE

After pressing the on/off push button during 5 seconds, one of the three leds starts flashing. Each LED expresses different specifications, choose the LED by pushbutton according to the following information, and then press the switch for 5 seconds until the number you need is flashing, choose one number as you need, leave it for save.

Battery type	mode
Charging priority	
Charging frequency	

The 1st led is the battery type setting

Number shows	Battery type
1	BAT 1
2	BAT 2
3	BAT 3

The 2nd led is for charging priority. Only set the percentage you want for battery #1, the controller will automatically calculate the rest for battery #2.

Number shows	Battery #1 charging	Battery # 2 charging
0	0%	100%

1	10%	90%
2	20%	80%
3	30%	70%
4	40%	60%
5	50%(pre-set)	50%
6	60%	40%
7	70%	30%
8	80%	20%
9	90%	10%

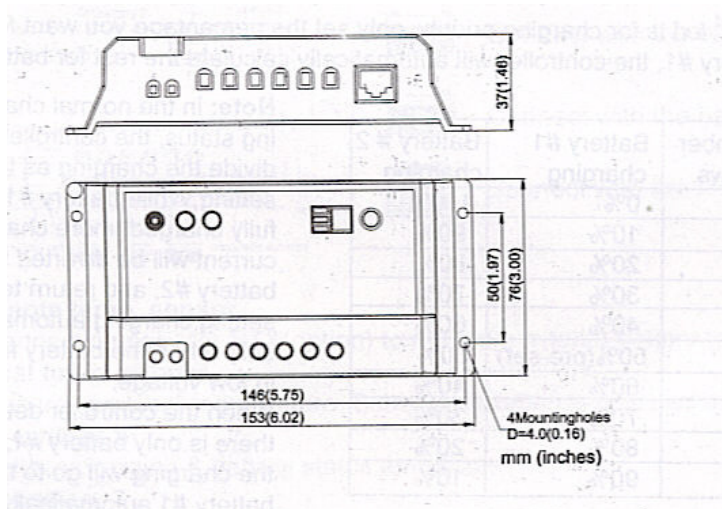
Note: In the normal charging status, the controller will divide the charging as the setting. When battery #1 is fully charged, more charge current will be go to battery #2. When the controller detects that only battery #1 is connected, all the charge current will go to the battery #1 automatically.

The 3rd led is for charging frequency

Number shows	PWM Charging frequency
0	25Hz(pre-set)
1	50Hz
2	100Hz

Set Point	BAT 1	BAT 2	BAT 3
Absorption	14.4V/28.8V	14.6V/29.2V	14.8V/29.6V
Float	13.7V/27.4V	13.7V/27.4V	13.7V/27.4V

6. MECHANICAL DRAWING



7. SPECIFICATIONS

BlueSolar	BlueSolar DUO 12/24-20	
	12V	24V
Battery Voltage	12/24V Auto Select *	
Rated charge current	20A	
Second battery output	Yes	
Recommended solar panel array	12V	24V
Maximum solar voltage	55V	
Self-consumption	4mA	
Default settings		
Absorption charge (1)	14.4V	28.8V
Float charge (1)	13.7V	27.4V
Battery temperature sensor	Yes, internal sensor Remote sensor optional	
Temperature compensation	-30mV/°C	-60mV/°C
Protection class	IP20	
Enclosure		
Terminal size	6mm ² / AWG10	
Weight	180gr	
Dimension (h x w x d)	76x153x37 mm	
Mounting	Vertical wall mount	Indoor only
Humidity (non condensing)	Max. 95%	
Operating temperature	-35°C to +55°C (full load)	
Cooling	Natural convection	
Standards		
Safety	EN60335-1	
EMC	EN61000-6-1, EN61000-6-3	

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

Manual

BlueSolar PWM Charge Controller – LCD - USB

12V | 24V | 5A

12V | 24V | 10A

12V | 24V | 20A

1. General Information

IMPORTANT

- **Always connect the battery first, in order to allow the Controller to recognize system voltage**
- **Use a 12V (36 cells) solar array for a 12V system.**
- **Use a 24V (72 cells) solar array for a 24V system.**

The BlueSolar PWM Charge Controller series uses Pulse Width Modulation (PWM) charge voltage control combined with a multistage charge control algorithm.

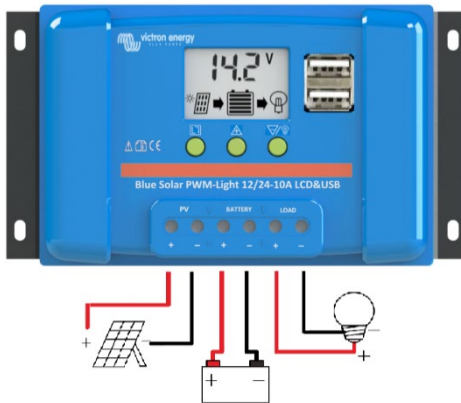
2. Features

- Three stage battery charging [bulk – absorption – float]
- Battery type: Lead-acid and LiFePO4 (with internal BMS)
- Protected against over current.
- Protected against short circuit.
- Protected against reverse polarity connection of the solar panels and/or battery.
- Low voltage load disconnect.
- Temperature protection.

3. Installation

Important note: always connect the batteries first.





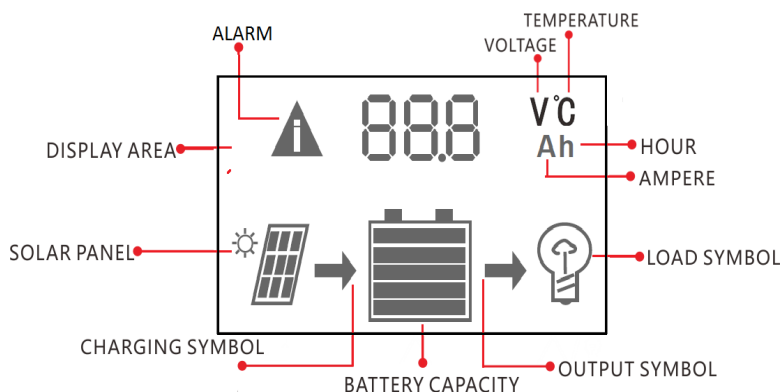
1. Connect the battery - plus and minus.
2. Connect the solar array - plus and minus.
3. Connect the load - plus and minus.

The reverse order applies when deinstalling.

An improper sequence order can damage the BlueSolar PWM Charge Controller!

1. Make sure the battery is charged for the BlueSolar PWM Charge Controller to recognize the battery type before first installation.
2. The battery cable should be as short as possible to minimize losses.
3. The controller is suitable only for lead-acid, and LiFePO4 batteries.
4. The BlueSolar PWM Charge Controller is suitable only for regulating solar panels. Never connect another charging source to the charge BlueSolar PWM Charge Controller.

4. LCD DISPLAY and SETTINGS



MENU: switch between different display, or to enter/exit setting by long press.



UP: press to change the settings when in setting mode.



DOWN: press to change the settings when in setting mode.
Load on/off button when in H mode.


4.1 Monitoring and settings

Values between [] are for 24V battery settings



Boot Display. After connecting the battery the display shows the solar charger model and the system voltage as recognized by the solar charger.

105=BlueSolar PWM Charge Controller – LCD - USB 12V|5A
205=BlueSolar PWM Charge Controller – LCD - USB 24V|5A
110=BlueSolar PWM Charge Controller – LCD - USB 12V|10A
210=BlueSolar PWM Charge Controller – LCD - USB 24V|10A
120=BlueSolar PWM Charge Controller – LCD - USB 12V|20A
220=BlueSolar PWM Charge Controller – LCD - USB 24V|20A

Press MENU  to enter next display.




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Main display: battery voltage, battery state of charge, charging and discharging status.

Press MENU  to enter next display.

Change settings in Main display.

Press the MENU  button for several seconds until the display flashes, you are in:




Battery type setting.
See table below.

The factory setting is b01


	Battery type	Battery voltage	Absorb tion voltage	Float voltage	Low voltage disconnect factory setting	Low voltage disconnect range	Low voltage reconnect factory setting	Low voltage reconnect range
b01	LEAD-ACID [AGM]	12.0V [24V]	14.4V [28.8V]	13.7V [27.4V]	11.2V [22.4V]	10.5V-12.0V in steps of 0.1V	12.6V [25.2V]	12.0V-13.5V in steps of 0.1V
b02	LEAD-ACID [Gel]	12.0V [24V]	14.2V [28.4V]	13.7V [27.4V]	11.2V [22.4V]	10.5V-12.0V in steps of 0.1V	12.6V [25.2V]	12.0V-13.5V in steps of 0.1V
b03	LEAD-ACID [Wet]	12.0V [24V]	14.6V [29.2V]	13.7V [27.4V]	11.2V [22.4V]	10.5V-12.0V in steps of 0.1V	12.6V [25.2V]	12.0V-13.5V in steps of 0.1V
b04	12V LiFePO4*	12.8V	14.2V	13.35V	11.2V	10.5V-12.0V in steps of 0.1V	12.6V	12.0V-13.5V in steps of 0.1V
b05	24V LiFePO4*	25.6V	28.4V	26.7V	22.4V	21.0V-24.0V in steps of 0.1V	25.2V	24.0V-27.0V in steps of 0.1V

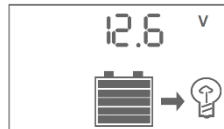
*The controllers do not have a remote on/off input. Therefore use LiFePO4 batteries with integrated BMS only (such as the Victron SuperPack batteries)

Press on the MENU  key again and you are in:



Low voltage disconnect
The factory setting is 11.2V [22.4V]

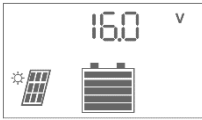
Press on the MENU  key again and you are in:



Low voltage reconnect
The factory setting is 12.6V [25.2V]



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PV Voltage display: PV voltage and the state of charge of the battery.

Press MENU  to enter next display.



Charge current display: PV to battery current and the state of charge of the battery.


Press MENU  to enter next display.



Load output settings.


The factory setting is 24h (load output always on)


Change load output settings.

Press the MENU  button for several seconds until the number flashes.



Load output setting. See table below.

H	The load can switched on and off by the  Load on/off switch.
L	Load D2D Load will switch on at sunset and switch off at sunrise.
L01-L23	The load output will switch on after sunset and switch off after 1-23 hours.
24H	The BlueSolar PWM Charge Controller will continuously supply power to the load.

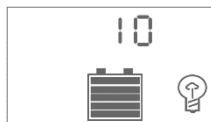
Press MENU  to enter the next display
(Note: the Phoenix VE.Direct inverters can be controlled by connecting to the left side connection of the remote control to the load output)



Trigger level

When the BlueSolar PWM Charge Controller is set to L01-L23 the solar panel voltage will be measured to decide whether it is night or day to switch the load on or off.
The factory setting is 4V.

Press MENU  to enter the next display



Trigger delay time

When the BlueSolar PWM Charge Controller measures a solar panel voltage lower than the trigger value it will delay for 10 seconds and measure again to make sure night falls.
Factory setting: 10 seconds


Press MENU  to enter the next display



Short-circuit protection setting.


Some inductive or capacitive loads will trigger the short-circuit protection during start up. Therefore the SC-protection can be disabled manually. Sc.F = OFF, Sc.n = ON. The default is ON.



Discharge current display: load current and battery capacity,
Press MENU  to enter next display.




USB Voltage display: USB voltage
5V (2A max)

Press MENU  to enter next display.



Internal controller temperature. If the controller overheats it will shut down and wait for the temperature to drop to normal level and then it will start working again.

Press MENU  to enter Main display.



5. Alarms

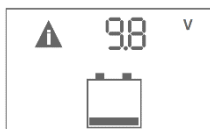


High temperature

When temp $\geq 85^{\circ}\text{C}$, the controller will enter into the first protection phase: it will lower the PV input current in order to lower the temp. There is no alarm on the LCD display.

When temp $>90^{\circ}\text{C}$, the controller will enter into the second protection phase: the PV input current will be reduced to zero, the load output will be switched off and a high temp alarm icon will show on the LCD.

After the temp has decreased to less than 82°C , BlueSolar PWM Charge Controller will resume normal operation.



Low battery voltage

When the battery is discharged to less than the Low Voltage Disconnect (LVD) voltage, the controller will disable the load output. After over-discharge the load output will be re-enabled when the battery voltage reaches the Low Voltage Reconnect (LVR) level.

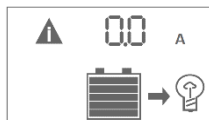


Over-current protection.

A load output over-current or short-circuit is indicated by a flashing load icon. The controller will disable the load output and try to re-enable after 30 seconds.

Shut down after 60s in case of 110%-130% load.

Shut down after 5s in case of 130%-160% load.



Short-circuit protection

The BlueSolar PWM Charge Controller will switch off the load output and wait for 30s and then try to restart. User should check and remove the trouble in time.



6. Specifications

BlueSolar PWM Charge Controller	12V 24V 5A		12V 24V 10A		12V 24V 20A	
	12V	24V	12V	24V	12V	24V
Battery Voltage	12/24V Auto Select					
Charge & Load Current	5A		10A		20A	
Charge mode	PWM, Time and Lighting Control					
Automatic load disconnect	Yes					
Maximum solar array voltage	55V					
Solar voltage range	15-28V [30-55V] ²					
Self-consumption	<10mA					
Protections	Reverse polarity connection of the solar panels. Reverse polarity connection of the battery. Low voltage disconnect. 130% load: Shuts down after 60sec. 160% load: Shuts down after 5sec. Short circuit: immediate shut down. Over-temperature protection.					
Solar Panel						
Recommended solar panel array	36cell [72cell] ²					
Max Solar Input Power	60W	120W	120W	240W	240W	480W
USB outputs						
Voltage	5V					
Current	2A (total from 2 USB outputs)					
Default settings						
Absorption charge (b01) ¹	14.4V [28.8V] ²					
Float charge (b01) ¹	13.7V [27.4V] ²					
Load disconnect (b01) ¹	11.2V [22.4V] ²					
Load reconnect (b01) ¹	12.6V [25.2V] ²					
Enclosure						
Terminal size	6mm ² / AWG10					
Weight	150gr					
Dimension (h x w x d)	96 x 169 x 36 mm					
Mounting	Vertical wall mount, indoor only					
Humidity (non condensing)	Max. 95%					
Operating temperature	-35°C to +60°C (full load)					
Cooling	Natural convection					
Protection class	IP20					
Standards						
Safety	EN60335-1, IEC62109-1					
EMC	EN61000-6-1, EN61000-6-3					

¹ See also 3.1 Battery type setting.

² [V] values for 24V system.





Manual

**BlueSolar PWM-Light 48V
Charge Controller**
(with light turn-off timer)

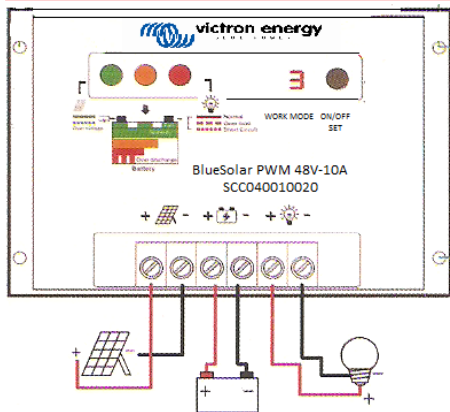
1. DESCRIPTION

- Programmable load output with lighting control mode.
- Three stage battery charging (bulk – absorption – float).
- Protected against over current.
- Protected against short circuit.
- Protected against reverse polarity connection of the battery or solar array.
- Low voltage load disconnect.
- Easy to set up thanks to one digit seven segment display.

2. INSTALLATION

IMPORTANT

- Always connect the batteries first, in order to allow the Controller to recognize system voltage
- Use a 4x36 cells or 2x72 cells for a 48V battery system.



The display will show a "H" if the Controller detects a 48V battery.
Do not exceed Solar and Load ratings

3. LED INDICATORS



Green LED:

Off: No sunlight or not enough sunlight. Charger off.

Fast flashing: Bulk charge.

On: Absorption charge.

Slow flashing: Float charge.



LED=Green: battery fully charged ($> 48,8V$)

LED=Orange: battery ok ($48,8V - 46V$)

LED=Red: battery low ($44,8V$)

LED=Flashing Red: battery fully discharged ($< 44,8V$)

(load output cut off level: $44,8V$)



LED=ON: load output is on.

LED=OFF: load output is off.

LED=Slow flashing: Overload.

LED=Fast flashing: Short Circuit

Please note:

1. The load output will cut off in case of over load or short circuit. The load output will attempt to restart after 30 seconds.
2. After over discharge, the load will reconnect automatically when the battery is recharged to $52,4V$.
3. After over discharge, the load can be reconnected manually by pressing the on/off push button, if the battery voltage exceeds $50,4V$.



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4. SETTING THE LOAD OUTPUT

4.1 Settings

0	Load output permanently off	9	Load output turned on during 9 hours after sunset
1	Load output turned on during 1 hour after sunset	0.	Load output turned on during 10 hours after sunset
2	Load output turned on during 2 hours after sunset	1.	Load output turned on during 11 hours after sunset
3	Load output turned on during 3 hours after sunset	2.	Load output turned on during 12 hours after sunset
4	Load output turned on during 4 hours after sunset	3.	Load output turned on during 13 hours after sunset
5	Load output turned on during 5 hour after sunset	H	Manual load control
6	Load output turned on during 6 hours after sunset	C	Load output controlled by battery voltage only
7	Load output turned on during 7 hours after sunset	L	Dusk to dawn mode
8	Load output turned on during 8 hours after sunset	d	Debug mode



4.2 Settings description

0 Charger only

The load output is switched off permanently.

1-13 Light control + delay

The load output automatically turns on after sunset (array voltage < 32V) and the built-in timer starts counting.

When the timer reaches the set time, or when the low voltage limit is reached, the load output will turn off.

H Manual

The load output can be turned on and off manually with the push button. (low voltage shutdown remains active)

C Load output controlled by battery voltage only

Load disconnect and load reconnect will be based only on battery voltage, see section 3

L Dusk to dawn mode

Turn on delay (array voltage < 32V): 10 seconds.

Turn off delay (array voltage > 32V): 1 minute.

No timer function.

d Debug mode

Same as L mode but without delay of 10s/1min



5. SPECIFICATIONS

BlueSolar PWM 48V	10A	20A	30A
Battery Voltage	48V		
Rated charge current	10A	20A	30A
Recommended solar array	4x36 cell or 2x72 cell for 48V		
Automatic low voltage load disconnect	Yes		
Maximum solar voltage	100V		
Self-consumption	< 10mA		
Overload protection	Shut down after 60s in case of 130% load		
	Shut down after 5s in case of 160% load		
	Short circuit: immediate shut down		
Settings			
Bulk charge**	58,0V		
Absorption charge	56,8V		
Float charge	55,2V		
Load disconnect	44,8V		
Load reconnect	50,4V (manual) 52,4V (automatic)		
Protection class	IP20		
Enclosure			
Terminal size	6mm ² / AWG10		
Weight	165gr		
Dimension (h x w x d)	95 x 140 x 33.5mm		
Mounting	Vertical wall mount	Indoor only	
Humidity (non condensing)	Max. 95%		
Operating temperature	-20°C to +50°C (full load)		
Cooling	Natural convection		
Standards			
Safety	IEC 62109-1		
EMC	EN 61000-6-1, EN 61000-6-3		

** The Controller immediately switches to the lower absorption voltage level after the bulk charge level has been reached.





IMPORTANT

- **Always connect the battery first, in order to allow the Controller to recognize system voltage**
- **Use a 12V (36 cells) solar array for a 12V system.**
- **Use a 24V (72 cells) solar array for a 24V system.**

BlueSolar PWM-Pro Charge Controller

12V | 24V - 5A **SCC010005010**

12V | 24V - 10A **SCC010010010**

12V | 24V - 20A **SCC010020110**

12V | 24V - 30A **SCC010030010**

1. General Safety Information

Read all instructions and cautions in the manual before starting the installation.

Keep the controller away from rain exposure, severe dust, vibration, corrosive gas and intense electromagnetic interference.

Do not allow water to enter the controller.

There are no user serviceable parts inside the controller. Do not disassemble or attempt to repair it.

2. Features

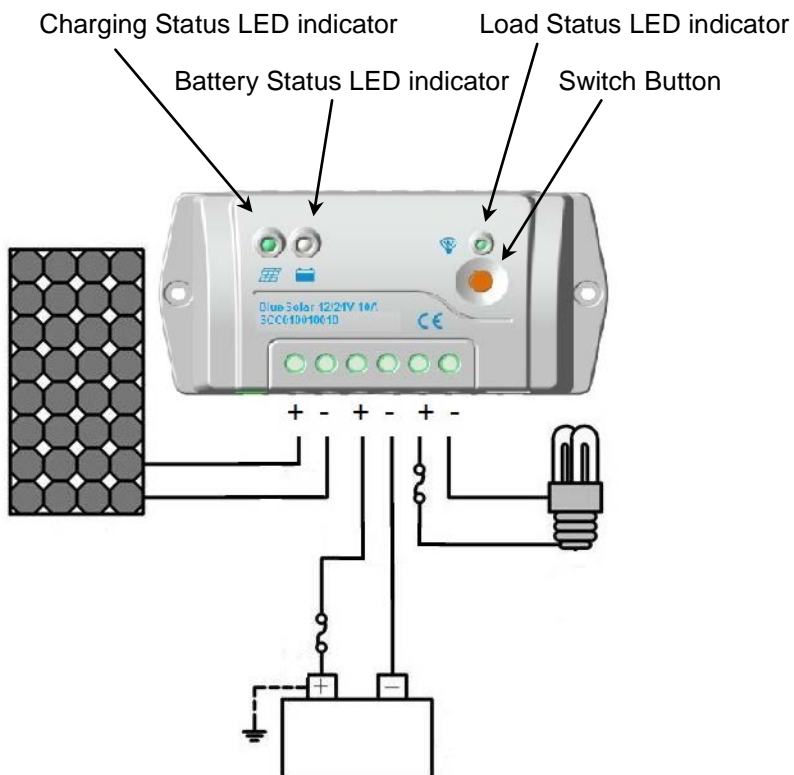
- Lighting control function, fully programmable with software (available free of charge on our website), or the Remote Panel.
- Three stage battery charging (bulk, absorption, float), fully programmable.
- Integrated battery monitor function (Remote Panel needed to display state of charge).
- Load output with low voltage disconnect and manual control (default setting).
- Optional external temperature sensor.
- Load output protected against over load and short circuit.
- Protected against reverse polarity connection of the solar array and/or battery.






3. Installation and operation

Important note: always connect the battery first, in order to allow the controller to recognize system voltage.

- The controller is a common positive controller.
- If system grounding is required, preferably the positive pole of the battery should be grounded.
- Use one system ground only.



Indicator Status Description:

	Green	Off	No voltage from solar array (night time)
	Green	On Solid	Low voltage from solar array (low irradiance)
	Green	Slowly Flashing	Charging
	Green	On Solid	Normal (Vbat > 12,1V resp. 24,2V)
	Green	Slowly Flashing	Full
	Green	Fast Flashing	Over voltage (Vbat > 15V resp. 30V)
	Orange	On Solid	Under voltage (Vbat < 12,5V resp. 23V)
	Red	On Solid	Battery over discharged (Vbat < 10V resp. 20V)
	Red	Flashing	Battery over temperature (if temp. sensor installed) (Tbat > 45°C)
	Red	On Solid	Normal
	Red	Slowly Flashing	Overload
	Red	Fast Flashing	Short circuit
Charging, load and battery indicator (red) flashing simultaneously			System voltage error
Charging, load and battery indicator (orange) flashing simultaneously			Over temperature

Switch Button Functions:

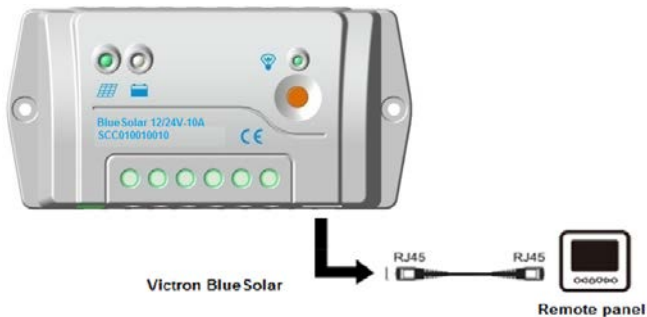
Manual ON/OFF load control.

Resume to normal operation after a fault has been cleared.

4. Programming the controller

The default settings (see specifications) can be modified with help of software (available free of charge on our website), or with the remote panel.

The panel must be connected to the controller with a standard RJ45 UTP cable.



Possible settings (please see the software manual or the manual of the remote panel for details):

Load programs:

- Manual Control (default)
- Light ON/OFF
- Light ON + Timer
- Time Control

Battery Type:

- Gel
- Sealed AGM (default)
- Flooded
- User defined

5. Protection

Load Overload

If the load current exceeds the rated current of controller (≥ 1.05 times rated discharge current), the controller will disconnect the load. Overloading must be cleared, then press the switch button.

Load Short Circuit

Fully protected against load wiring short-circuit (≥ 2 times rated discharge current). After one automatic load reconnect attempt, the fault must be cleared by restarting the controller or pressing the switch button.

PV Reverse Polarity

Full protection against PV reverse polarity, no damage to the controller will result. Correct the wiring to resume normal operation.

Battery Reverse Polarity

Full protection against battery reverse polarity, no damage to the controller will result. Correct the wiring to resume normal operation.

Damaged Temperature Sensor

If the temperature sensor short-circuited or damaged, the controller will be charging or discharging at the default temperature (25°C).

Overheating Protection

If the temperature of the controller heat sink exceeds 85°C , the controller will stop charging and discharging. When the temperature is below 75°C , the controller will restart.

High Voltage Transients

Limited internal transient protection.

In lightning prone areas, additional external suppression is recommended.



6. Troubleshooting

Faults	Possible reasons	Troubleshooting
Charging LED indicator off during daytime when sunshine falls on PV modules	PV array disconnected	Check that PV and battery wire connections are correct and tight.
Green Battery LED indicator fast flashing	Battery voltage higher than over voltage disconnect voltage	Check battery voltage. If too high, disconnect the solar module immediately and replace the controller.
Battery LED indicator orange	Battery under voltage	Load output is normal. Charging LED indicator will return to green automatically when fully charged.
Battery LED indicator RED and loads not working	Battery over discharged	The controller did cut off the output automatically. The LED indicator will return to green when fully charged.
Load status indicator red and slow flashing	Overload	Remove or cut out the additional load and press the button. The controller will restart after 3s.
Load status indicator red and fast flashing	Short circuit	Clear short circuit and press the button, the controller will resume to work after 3s
Charging, load and battery indicator (orange) flashing simultaneously	Over temperature	When the heat sink of the controller exceeds 85°C, the controller will automatically shut down. When the temperature has decreased to less than 75°C, the controller will restart.
Charging, load and battery indicator (red) flashing simultaneously	System voltage error	Check whether the battery voltage matches with the controller working voltage. Please change to a suitable battery or reset the working voltage. Press load button to clear the malfunction.



7. Technical specifications

	BlueSolar PWM-Pro charge controller 12/24V		
	5 A / 10 A	20 A	30 A
Battery voltage	12/24V Auto Select		
Rated charge current	5 A / 10 A	20 A	30 A
Automatic load disconnect	Yes		
Maximum solar voltage	28 V / 55 V (1)		
Self-consumption	8 mA		
DEFAULT SETTINGS			
Absorption charge	14,4 V / 28,8 V		
Float charge	13,8 V / 27,6 V		
Equalization charge	14,6 V / 29,2 V		
Low voltage load disconnect	11,1 V / 22,2 V		
Low voltage load reconnect	12,6 V / 25,2 V		
Load output	Manual control + low voltage disconnect		
ENCLOSURE & ENVIRONMENTAL			
Battery temperature sensor	Optional		
Temperature compensation	-30 mV / °C resp. -60 mV / °C (if temperature sensor installed)		
Operating temperature	-35°C to +50°C		
Cooling	Natural convection		
Humidity	≤95% (non condensing)		
Enclosure	IP30		
Grounding	Positive grounding		
Overall dimensions	138x70x37 mm 5.4x2.7x1.4 inch	160x82x48 mm 6.3x3.2x1.9 inch	200x100x57 mm 7.9x4.0x2.3 inch
Mounting hole size	Φ 4,3 mm	Φ 4,3 mm	Φ 4,5 mm
Terminal size	4 mm ²	10 mm ²	10 mm ²
Weight	0,13 kg	0,3 kg	0,5 kg
Mounting	Vertical wall mount, indoor only		
STANDARDS			
Safety	IEC 62109-1		
EMC	EN 61000-6-1, EN 61000-6-3, ISO 7637-2		

1) For 12 V use 36 cell solar panels

For 24 V use 72 cell solar panels, or 2x 36 cell in series



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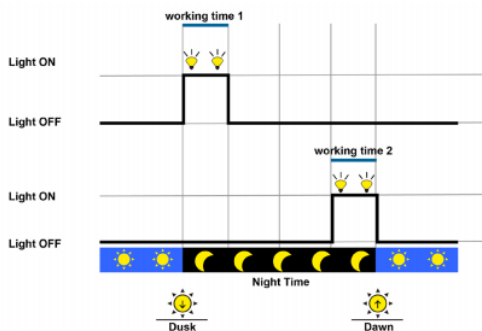
8. Battery related programming options

(see software manual or remote panel manual for details)

Battery related programming options	Gel	Sealed (default setting)	Flooded	User defined
Battery capacity setting (needed for the internal battery monitor)	200Ah			1~9999
Over voltage load disconnect	16.0V			9~17V
Charge limit	15.0V			9~17V
Over voltage reconnect	15.0V			9~17V
Equalize	—	14.6V	14.8V	9~17V
Absorption	14.2V	14.4V	14.6V	9~17V
Float	13.8V	13.8V	13.8V	9~17V
New charge cycle trigger voltage	13.2V			9~17V
Low voltage load reconnect	12.6V			9~17V
Under voltage warning reset	12.2V			9~17V
Under voltage warning	12.0V			9~17V
Low voltage load disconnect	11.1V			9~17V
Discharge limit	10.6V			9~17V
Equalize duration	—	2 hrs.	2 hrs.	0~3
Absorption duration	2 hrs.	2 hrs.	2 hrs.	0~3

Multiply voltages by 2 for a 24V system

9. Day/night timing options (see software manual or remote panel manual)



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Manual

**Blue Solar PWM Pro setup and
monitoring software**

Contents

1. Region and language settings
2. Download the software
3. UnRAR the software
4. Install the software
5. Install and configure the USB driver
6. Establishing communication
7. Other settings
8. Monitoring more than one controller

1. Region and language settings

(Control Panel > Clock, Language and Region)

Different language windows systems have a different character format, therefore the region and language settings must be set to "United States" resp. "English (United States) – US".

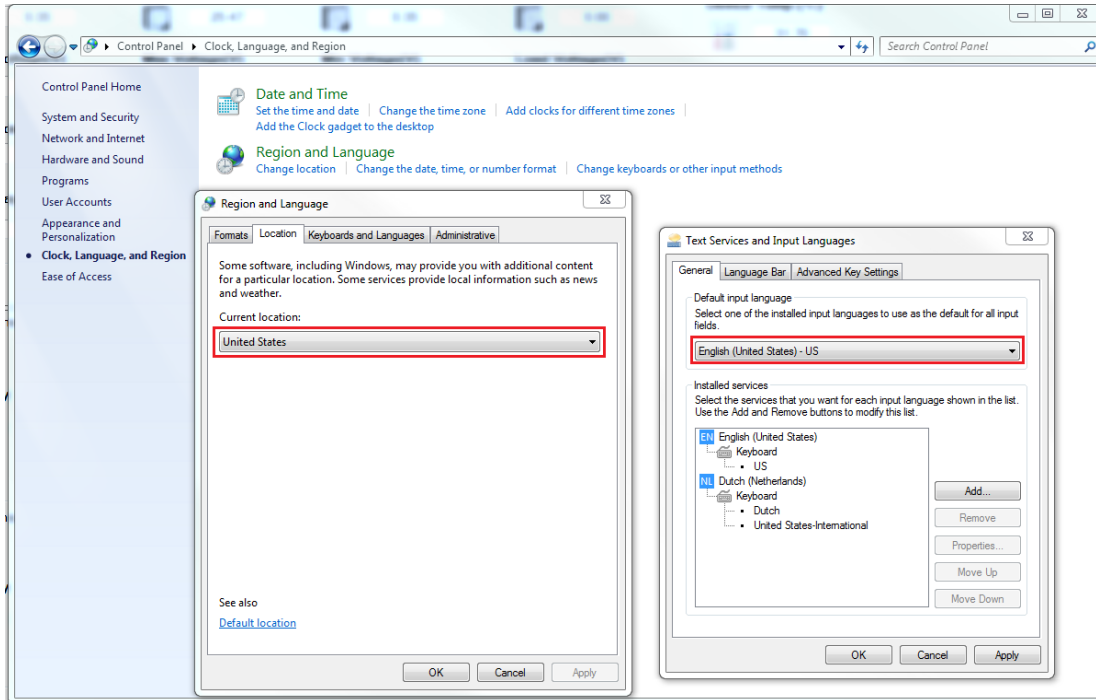
These settings can be found under "Region and Language" on the Control Panel of the computer.

2. Download the software

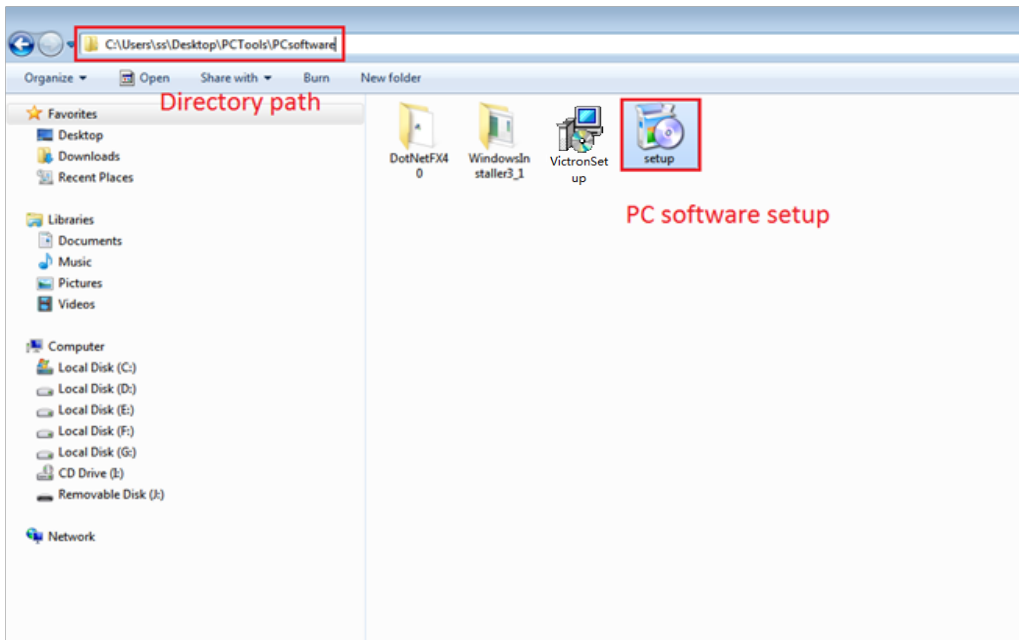
Download the software to your PC from the Victron Energy site.

3. UnRAR the software

Use WinZip or RarZilla Free Unrar.



4. Install the software

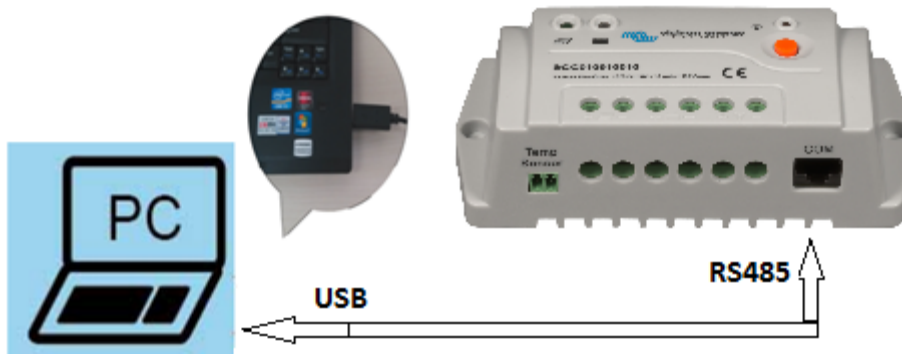


After installation a Victron icon should appear on the computer screen:

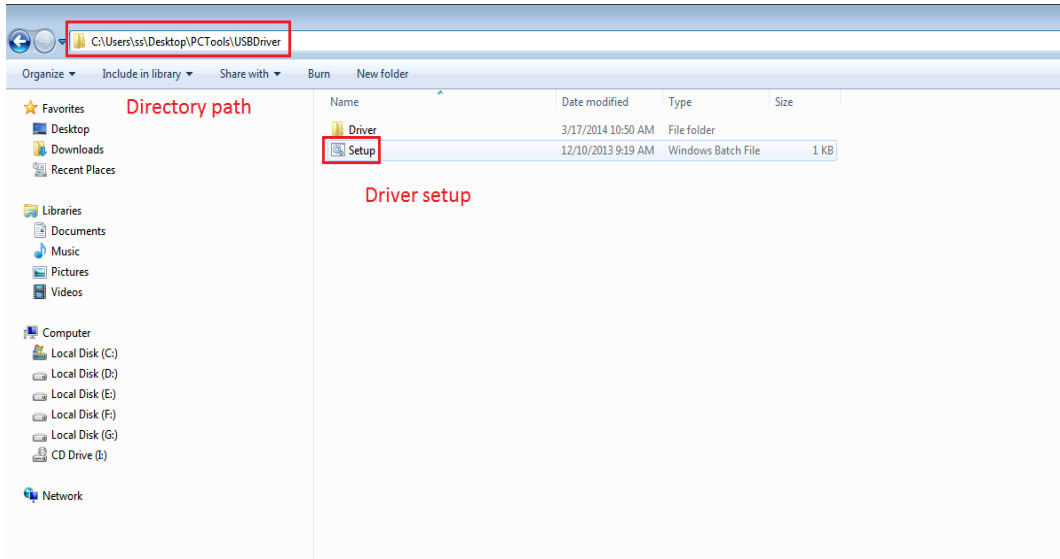


5. Install and configure the USB driver

- 5.1 **Plug the BlueSolar PWM-Pro to USB interface cable (SCC940100200) into the controller and a USB port of the computer.** Plug in one controller only. More controllers (= stations) can be plugged in after installation of the first one, see section 7)

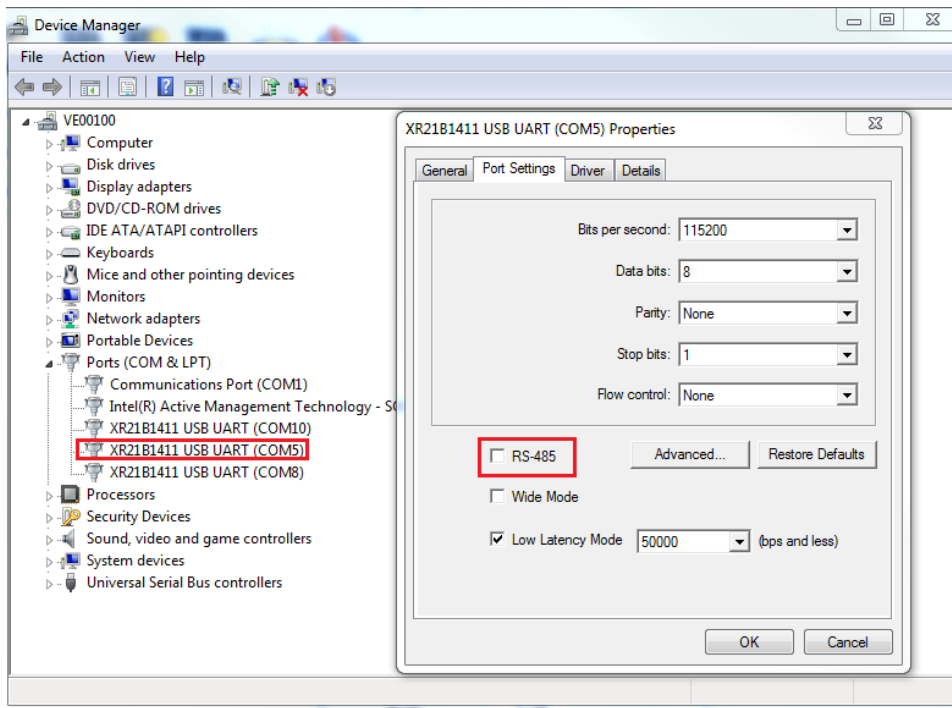


5.2 Install the USB driver

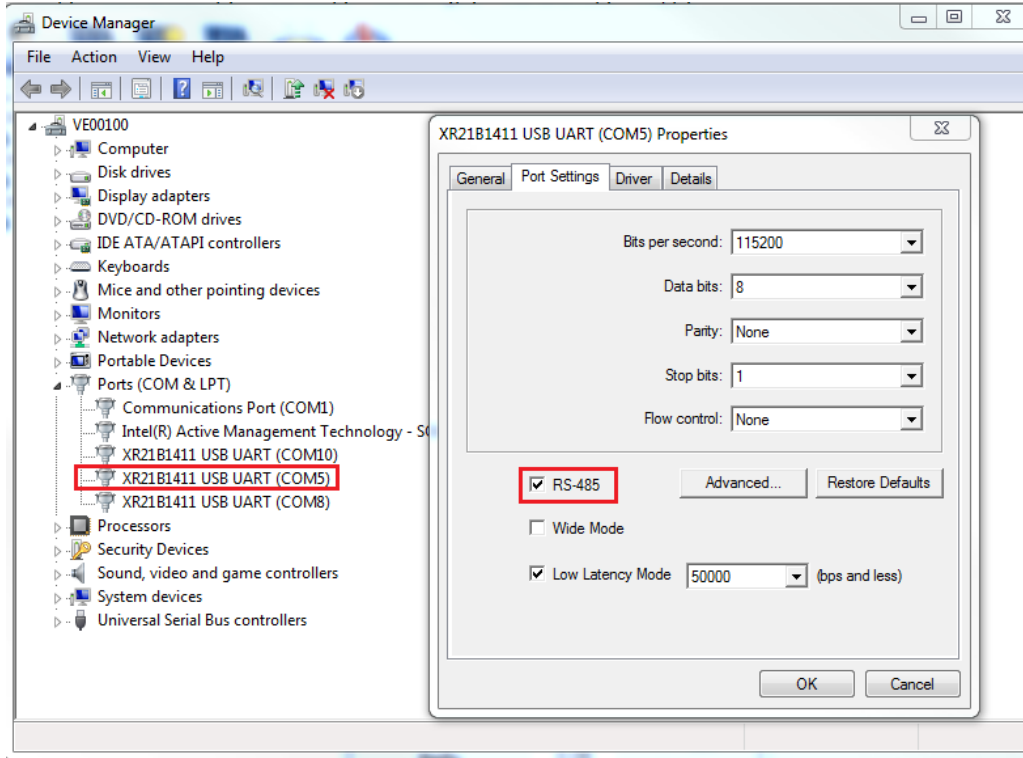


5.3 Configure (Control Panel > Device Manager > Ports (COM and LPT))

In the Device Manager, double click on the port attributed to the interface cable (XR21B1411). Remember the Port number (in this example it is COM3): it will be needed later (in section 5.1 and 5.5). The properties must be set as shown below:



5.4 Check the box RS-485



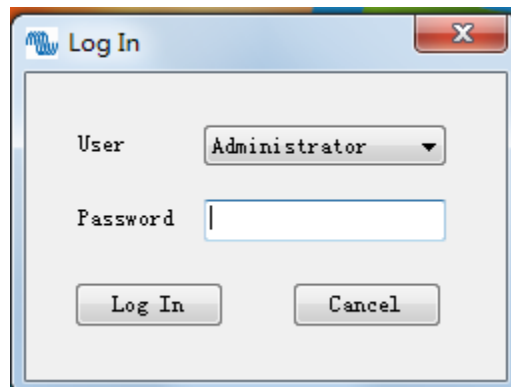
Logging in

5.5 Click the "Solar Station Monitor" icon

5.6 The Log in screen will pop up

When logging in as administrator, settings of the controller can be changed and a password is needed. The default password is "111111".

When logging in as guest, settings cannot be changed no password is needed.



5.7 After logging in the following screen will appear:

Interval(s) 30 Start Monitor Energy Generated(kWh) 0 Energy Consumed(kWh) 0

Station Name	ID	Device Status	Array Status	Charging Status	Load Status	Battery Status	Char energy (kWh)	Dischar energy (kWh)
1	1							

12/5/2014 8:26:55 AM(SCC10020110) Load is turned on manually
12/5/2014 11:46:00 AM(Solar Station Monitor Start up)

6. **Establishing communication with one controller only**

6.1 Click the menu "Communication (C)" in the menu bar of the screen shown in section 5.3.

The dialog box "Serial Port Setting" will appear.

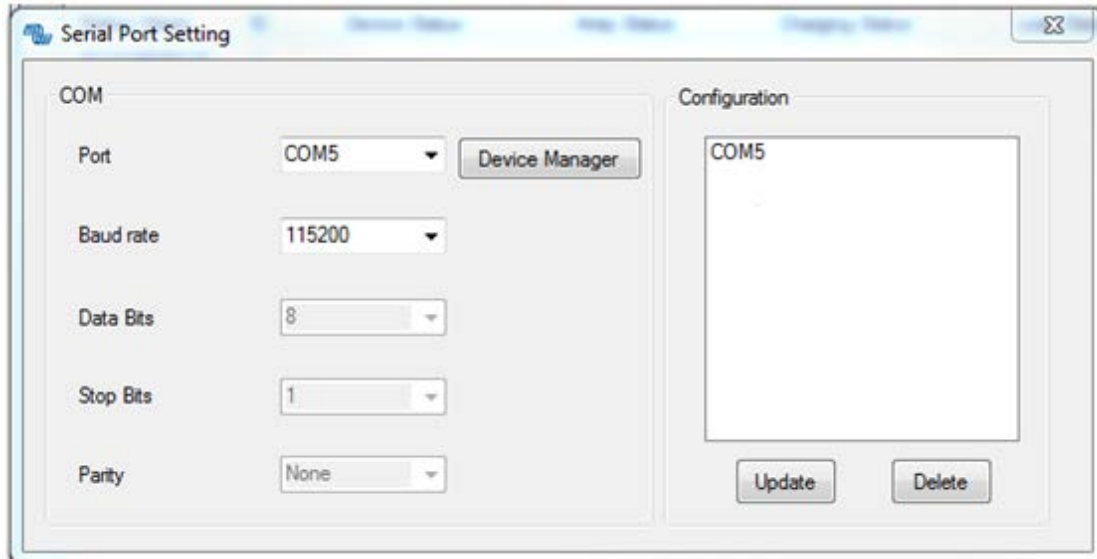
Enter the correct Port number (see section 3.3) and the correct Baud rate (115200).

The Port number must appear under "Configuration" on the right hand side of the dialog box.

If needed, click on "Device Manager" to set the correct Data Bits, Stop Bits and Parity.

Press "Add".

Press "Update" and close the dialog box.



6.2 Station information (= system data)



Click the button in the toolbar, and the dialog box "Station information" as shown below will pop-up.

All boxes marked with "*" must be completed.

The other boxes are for user information only.

Guidelines:

Station Name: any name can be entered (for example: station 1)

Device ID: always enter the number 1 (other numbers are intended for eventual future products)

District: the geographical district or province or street + number

Location: the location (for example: roof of bicycle shed)

Rated power (W): Wp power of the solar array (for example: 200)

Rated voltage (V): Voltage of the battery (for example: 12 or 24)

Battery capacity Ah): the capacity of the battery (for example: 60)

Press "Update".

Station Information

Station Name SCC010020110 *

Device ID 1 *

District Drenthe *

Location Roof *

Contacts

Contacts

Rated Power(W) 200 *

Installation Time 11/14/2014 *

Rated Voltage(V) 24 *

Battery Capacity(Ah) 60

Remarks

Click to add picture

Notice: Items with * must be filled

Update Exit

6.3 PV Arrays (= system data)

Click the tab "PV Arrays" in the "Station information" dialog box.

All boxes marked with "*" must be completed.

The other boxes are for user information only.

Guidelines:

Type: is for user information only

Peak Power: this is the peak power of each string of solar panels in W (for example: 200)

No of parallel strings: the number of parallel strings (for example: 1)

Special Instructions: is for user information only

Peak Power of the complete array (W) = ([Peak Power] x [No of parallel strings]) in Watt

Supplier name: is for user information only

Supplier contacts: is for user information only

Press "Update".

The screenshot shows a software window titled "Station Information" with a tabbed interface. The "PV Arrays" tab is selected. The form contains several input fields: "Type" (text box with "2x SPM101-12 in series"), "Peak Power" (text box with "200" and an asterisk), "Array Number" (text box with "1"), "No. of each Parallel Arrays" (text box with "1" and an asterisk), "Special Instructions" (empty text box), "Peak Power of total(W)" (text box with "200" and an asterisk), "Supplier Name" (empty text box), "Supplier Contacts" (empty text box), and "Remarks" (empty text area). A large box on the right says "Click to add picture". At the bottom, there is a notice: "Notice: Items with * must be filled" and two buttons: "Update" and "Exit".

Type	2x SPM101-12 in series	
Peak Power	200	*
Array Number	1	
No. of each Parallel Arrays	1	*
Special Instructions		
Peak Power of total(W)	200	*
Supplier Name		
Supplier Contacts		
Remarks		

Notice: Items with * must be filled

Update Exit

6.4 Battery (= system data)

Click the tab "Battery" in the "Station information" dialog box.

Guidelines:

Type: is for user information only (for example: USER, SEALED, GEL, FLOODED)

Battery capacity (Ah): already done in tab: "Station information" (section 5.2)

Specifications: is for user information only (for example: BAT412550100)

Voltage of each battery: is for user information only (for example: 12V)

Number of each parallel battery: is for user information only

Supplier name: is for user information only (for example: Victron Energy)

Supplier contacts: is for user information only

Press "Update".

Station Information

Station Information PV Arrays Battery Controller

Type Gel

Battery Capacity(Ah) 60

Specifications BAT412550100

Ah of Each Battery(Ah) 60

Voltage Of Each Battery 12

No. of each Parallel Battery 1

Supplier Name Victron Energy

Supplier Contacts

Remarks

2x 12V60Ah in series

Click to add picture

Notice: Items with * must be filled

Update Exit

6.5 Controller (= system data)

Click the tab "Controller" in the "Station information" dialog box.

Guidelines:

Device ID: already done in tab: "Station information"

Monitor period: is for user information only

Specifications: is for user information only (for example: 12/24V-10A)

Rated power: is for user information only (for example: 200)

Supplier name: is for user information only (for example: Victron Energy)

Supplier Contacts: is for user information only

Allow Communication: must be on

Port: Select the COM port (for example: COM5). This COM port must be the same as selected in section 3.3 and 4.1
Press "Update" and close the dialog box.


The screenshot shows a software window titled "Station Information" with a close button in the top right corner. The window has four tabs: "Station Information", "PV Arrays", "Battery", and "Controller", with "Controller" currently selected. The form contains the following fields and controls:

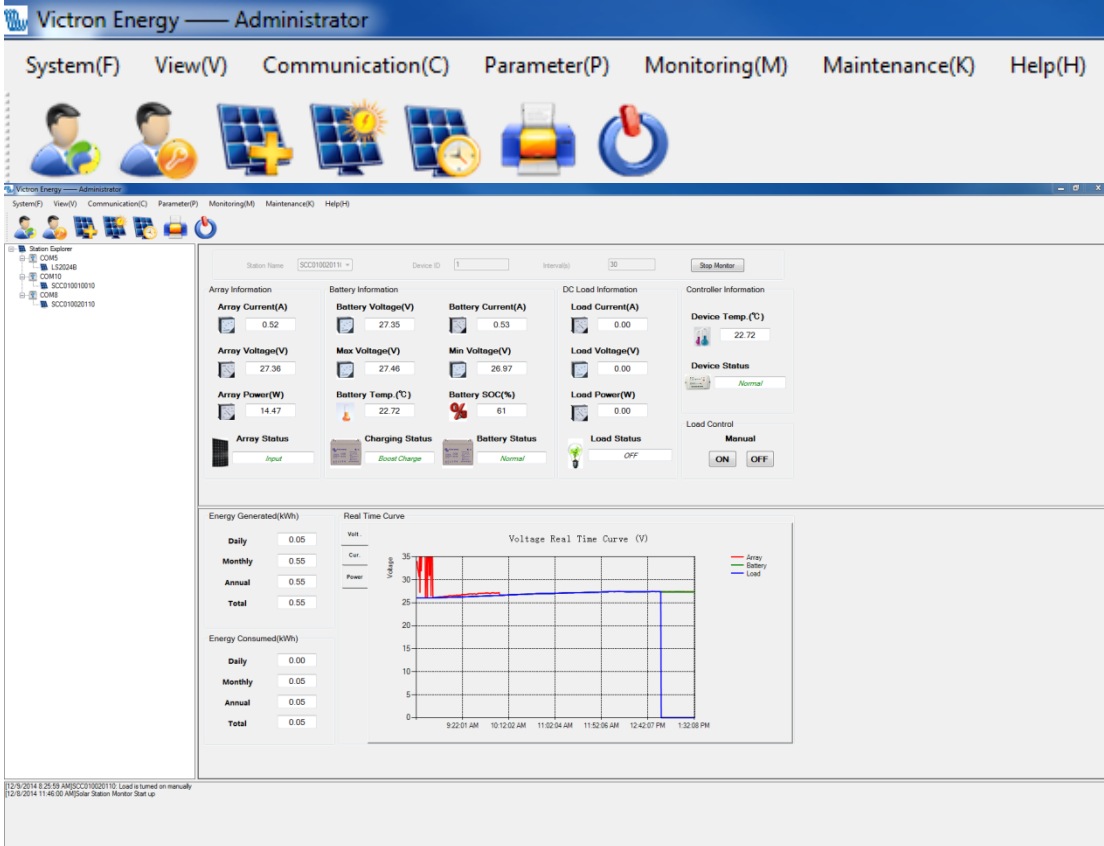
- Device ID:** A text input field containing the number "1".
- Monitor Period:** An empty text input field.
- Specifications:** A text input field containing "12V/24V 10A".
- Rated Power(W):** A text input field containing "200".
- Supplier Name:** A text input field containing "Victron Energy".
- Supplier Contacts:** An empty text input field.
- Allow Communication:** A checked checkbox.
- Port:** A dropdown menu showing "COM5".
- Remarks:** A large empty text area.

On the right side of the form, there is a rectangular box with the text "Click to add picture".

At the bottom of the window, there is a "Notice: Items with * must be filled" and two buttons: "Update" and "Exit".

6.6 Monitoring (M): Real-time monitoring

Click the button  in the toolbar, or Monitoring (M) and the real-time monitoring interface is displayed in the display section of main interface. To start real time monitoring, click the button "Start monitor".



The screenshot displays the Victron Energy Administrator software interface. The top menu bar includes System(F), View(V), Communication(C), Parameter(P), Monitoring(M), Maintenance(K), and Help(H). The Monitoring(M) menu is active, showing a toolbar with various monitoring icons. The main interface displays the real-time monitoring dashboard for station SCCP10020110.

Station Name: SCCP10020110
Device ID: 1
Interval: 30
Stop Monitor button

Array Information	Battery Information	DC Load Information	Controller Information
Array Current(A): 0.52	Battery Voltage(V): 27.35	Battery Current(A): 0.53	Load Current(A): 0.00
Array Voltage(V): 27.36	Max Voltage(V): 27.48	Min Voltage(V): 26.97	Load Voltage(V): 0.00
Array Power(W): 14.47	Battery Temp (°C): 22.72	Battery SOC(%): 61	Load Power(W): 0.00
Array Status: Input	Charging Status: Boost Charge	Battery Status: Normal	Load Status: OFF
			Device Temp (°C): 22.72
			Device Status: Normal
			Load Control: Manual
			ON OFF

Energy Generated(kWh)

Daily	0.05
Monthly	0.55
Annual	0.55
Total	0.55

Energy Consumed(kWh)

Daily	0.00
Monthly	0.05
Annual	0.05
Total	0.05

Real Time Curve

Voltage Real Time Curve (V)

Y-axis: Voltage (0 to 35)
X-axis: Time (9:22:01 AM to 1:32:08 PM)

Legend: Array (Red), Battery (Green), Load (Blue)

Log messages at the bottom:
12/9/2014 8:28:53 AM:SCC010020110: Load is turned on manually
12/9/2014 11:49:00 AM:Solar Station Monitor Start up

7 Other settings

7.1 System (F)

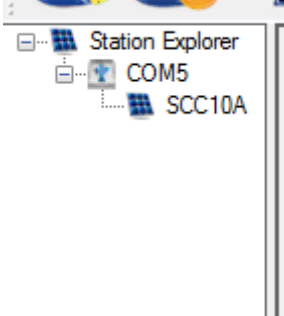
- [Log Off] *To log off from the monitoring software.*
- [User Switch] *To switch from Administrator to Guest or from Guest to Administrator.*
- [Change Password] *Change Password for the monitoring software.*
- [Add Station] *Monitor additional stations. See section 7.*
- [Print Setup] *For printing the "Real Time Curve"*
- [Print Preview(V)] *For previewing the print of the "Real Time Curve"*
- [Exit(X)] *Exit/End the monitoring software*

7.2 View(V)

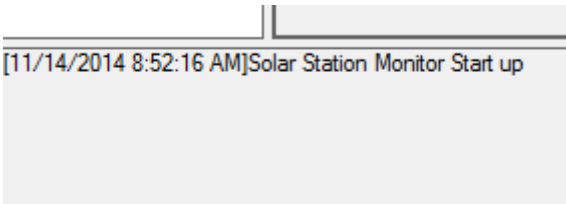
[Tool Bar(T)] *Shows or hides the toolbar*



[Station Explorer] *Shows or hides the Station Explorer on the left side of the screen*



[Messages Window] *Shows or hides the Messages Window on the bottom of the screen.*



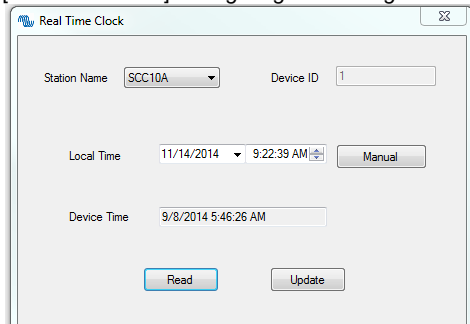
7.3 Communication (C)

[Serial port setting] *See 5.1*

7.4 Parameter (P)

[Device Parameters]

[Real Time Clock] *Configuring and setting of the internal clock of the Solar Charge Controller*



Press "Read" to see the date and time setting of the controller.

The date and time setting can be modified by pressing "Update" after setting the correct date and time.

[Device Parameter setting] *Setting of the internal and external temperature limits.*

[Device ID Setting]

The ID must be set to "1"

[Control Parameter] Battery settings

	Default	Current		Default	Current
Type	Sealed	User	Rated Voltage Level	Auto	
Charging Mode	Volt. Comp.		Boost Duration(m)	120	
Battery Capacity(Ah)	200		Equilibrium Duration(m)	120	
Temp. Compensation Coefficient(mV/°C/2V)	-3		Charging Limit Voltage(V)	15.00	
Over Volt. Disconnect Volt. (V)	16.00		Discharging Limit Volt. (V)	10.60	
Over Volt. Reconnect Volt. (V)	15.00		Low Volt. Disconnect Volt. (V)	11.10	
Equilibrium Charging Volt. (V)	14.60		Low Volt. Reconnect Volt. (V)	12.60	
Boost Charging Volt. (V)	14.40		Under Volt. Warning Volt. (V)	12.00	
Float Charging Volt. (V)	13.80		Under Volt. Warn. Reco. Volt. (V)	12.20	
Boost Recon. Charg. Volt. (V)	13.20		Battery Discharge(%)	30	
Battery Charge(%)	100				

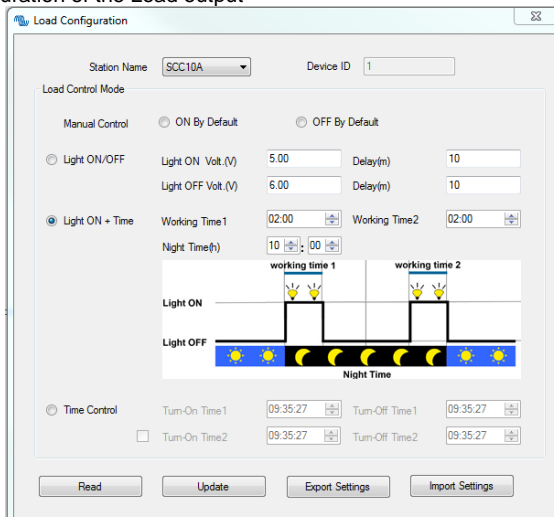
The table below shows the list of battery related parameters that can be modified.

Parameter		Default setting		
Battery type	Gel	Sealed (AGM)	Flooded	User defined
Battery capacity (Ah)	200Ah			1~9999
Temperature compensation coefficient	-3mV/°C per 2V cell			0~9
Rated voltage (system voltage)	Auto			12V/24V
Over voltage load disconnect	16.0V			9~17V
Charge limit (highest charge voltage including temp. compensation)	15.0V			9~17V
Over voltage load reconnect	15.0V			9~17V
Equalize charge	—	14.6V	14.8V	9~17V
Boost charge (absorption charge)	14.2V	14.4V	14.6V	9~17V
Float charge	13.8V	13.8V	13.8V	9~17V
Boost trigger voltage (starts new charge cycle)	13.2V			9~17V
Low voltage load reconnect	12.6V			9~17V
Under voltage warning reset	12.2V			9~17V
Under voltage warning	12.0V			9~17V
Low voltage load disconnect (nominal value at 25°C)	11.1V			9~17V
Discharge limit (lowest low voltage load disconnect including temp. compensation)	10.6V			9~17V
Equalize duration	—	2 hrs.	2 hrs.	0~3 hrs.
Boost/absorption duration	2 hrs.	2 hrs.	2 hrs.	0~3 hrs.

Multiply voltages by 2 for a 24V system

- Press “Read” to see the current settings
- Press “Update” to save the (modified) settings
- Press “Export Settings” to save settings in a file for later use in another controller
- Press “Import Settings” to restore the saved settings or import saved settings into another controller

[Load Configuration]
Configuration of the Load output



Option 1: Manual Control

When the load output is set on Manual Control (default setting), the output can be switched ON or OFF with the orange button on the Charge Controller. The low voltage cut-off is also operational.

Option 2: Light ON/OFF

This is a simple load output ON/OFF option, based on the input voltage of the controller (= output voltage of the solar array).

- When, at dusk, the input voltage of the Controller becomes lower than the light ON voltage (default 0.50 V), the load output is switched on.
- When, at dawn, the input voltage of the Controller becomes higher than the light OFF voltage (default 0.40 V), the load output is switched off.
- In order to prevent unwanted switching a confirmation time (Delay (m)) can be set: default 10 minutes, range 0 – 99 minutes.

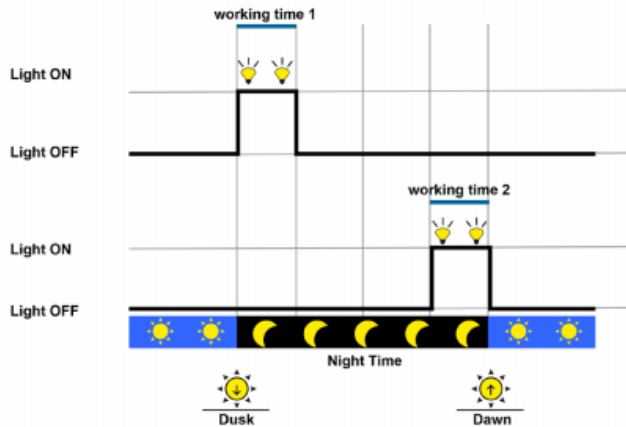
Option 3: Light ON+Timer

This option allows for a pre-set ON-time after dusk and a pre-set OFF-time before dawn.

The dusk and dawn switching moments and confirmation time are set as under option 2.

The remaining parameters are set as follows:

- Night Time: initial setting of the night duration, the controller will subsequently adjust Night Time to the actual duration of the night.
- On Time 1: ON period after dusk.
- On Time 2: ON period before dawn.



Option 4: Time control

This option uses the internal clock (see section 6.5) to set one or two ON-time periods.

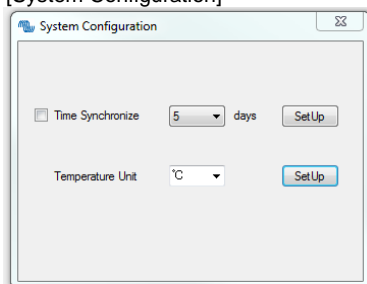
Press "Read" to see the current settings

Press "Update" to save the (modified) settings

Press "Export Settings" to save settings in a file for later use in another controller

Press "Import Settings" to restore the saved settings or import saved settings into another controller

[System Configuration]



To regularly synchronize the time setting of the charge controller with the PC: choose "not", every "5" or "10" days and press "SetUp"

Temperature unit setting: choose "°C" or "°F" and press "SetUp"

[Device Information]

Press "Read" to display the station name, model, version and serial number

[Factory Operation]

Press Load Test "ON" or "OFF" to test the load output

Press "Restore Default" to reset to factory settings

Press "Clear Data" to clear all collected data

7.5 Monitoring (M)

[Real time Monitoring] See 5.6

[Global Monitoring] Displays a list and status of all connected stations.

Station Name	ID	Device Status	Array Status	Charging Status	Load Status	Battery Status	Char.energy (kWh)	Dischar.energy (kWh)
LS2024B	1	Normal	Cut Out	Not Charging	ON	Undervoltage	23.23	2.20
SCC010010010	1	Normal	Cut Out	Not Charging	ON	Undervoltage	0.00	0.50
SCC010020110	1	Normal	Input	Boost Charge	ON	Normal	0.41	0.05

7.6 Maintenance (K)

[Export Data] "Export Data" Saves all data to file.

[Import Data] "Import Data" Restores all data from file.

[Maintenance Record] Text file to record maintenance events.

7.7 Help (H)

[About] There is no online help. See this manual for help

8 Monitoring more than one controller

In order to keep track of each controller we strongly recommend connecting one controller at a time (by plugging in the interface cable), establish communication and configure it. After completion, proceed with the next controller. Each time, follow the procedure as outlined in section 3.1, 3.3, 5 and 6.



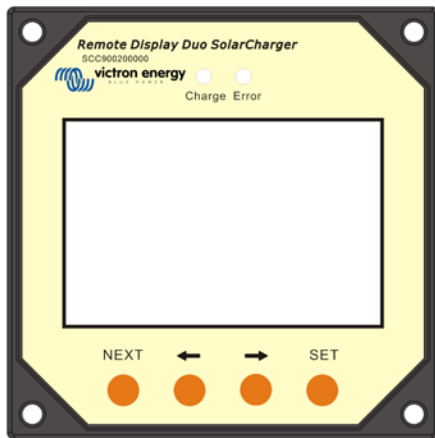
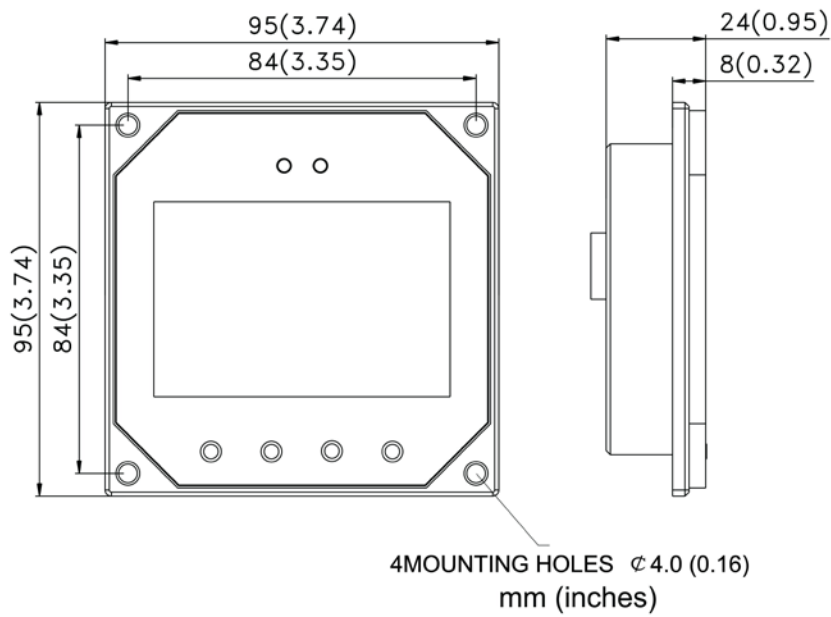
Manual

Meter for BlueSolar DUO 12/24V-20A
For RVs, Caravans and boats

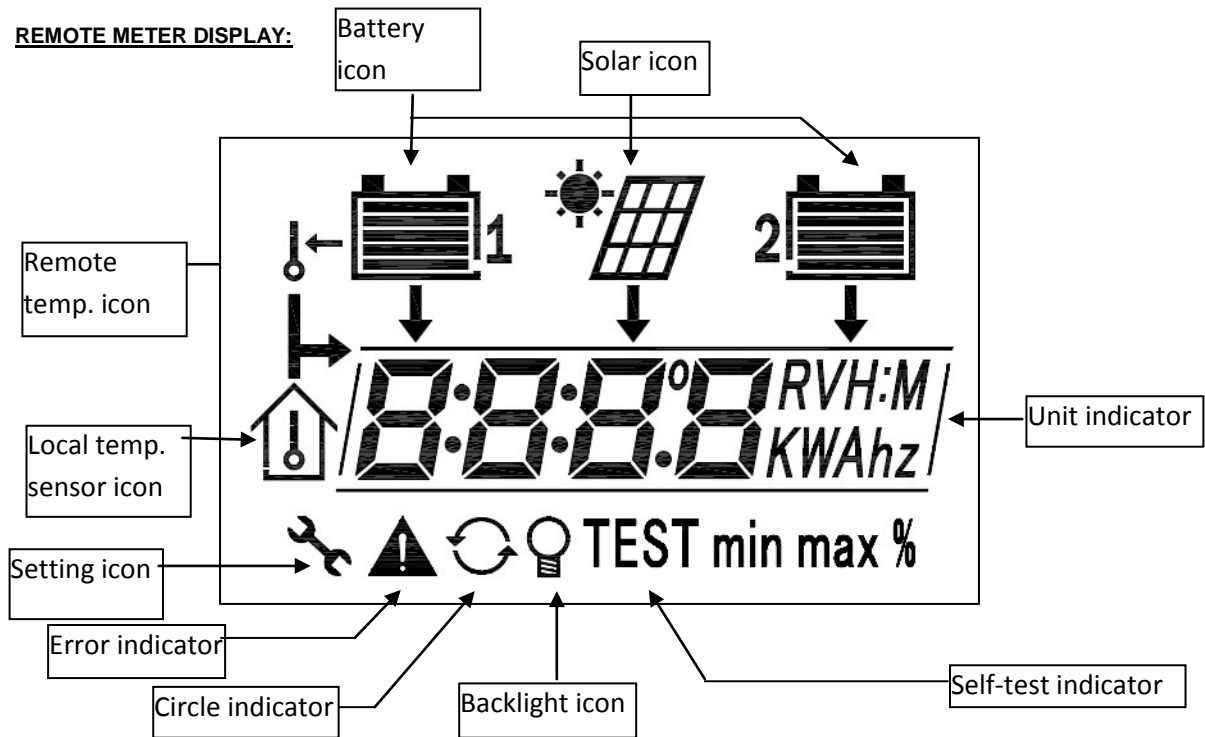
CONTAINS:

Wall mounting board, can be mounted in or on the wall. With 10 meter cable.

MOUNTING DIMENSION:



REMOTE METER DISPLAY:



LEDs on the top of the LCD

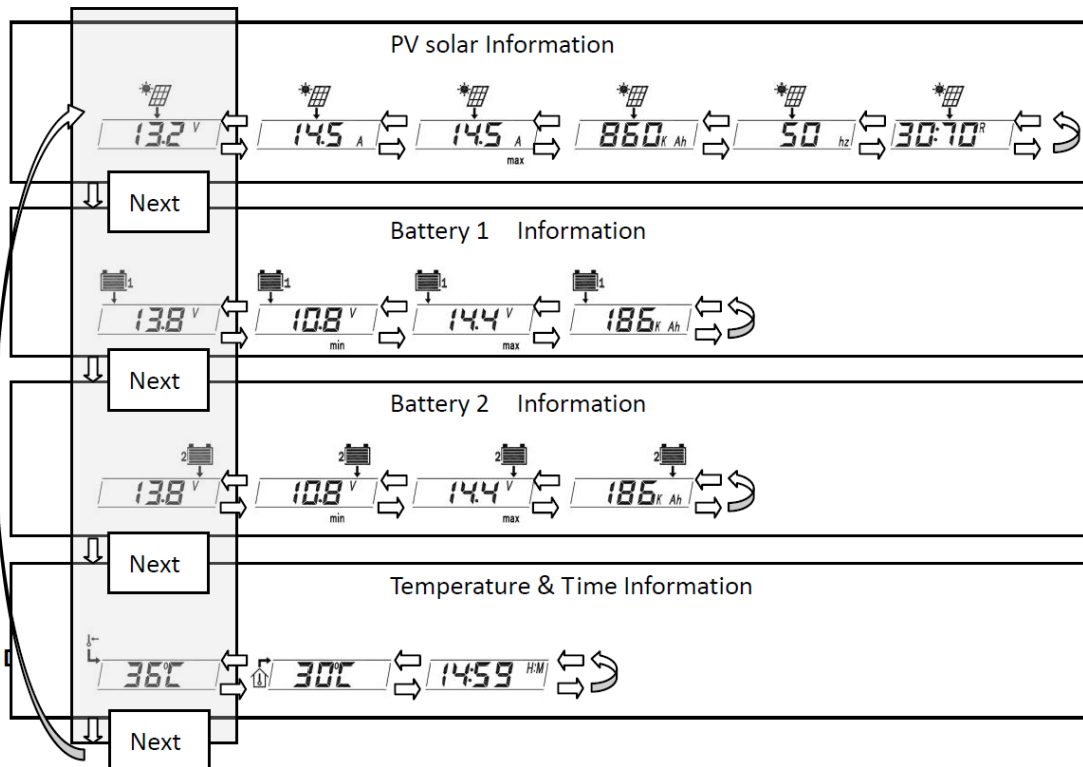
1. Charging LED: green on, charging
2. Error LED: red on, error

REMOTE METER OPERATION INSTRUCTION:

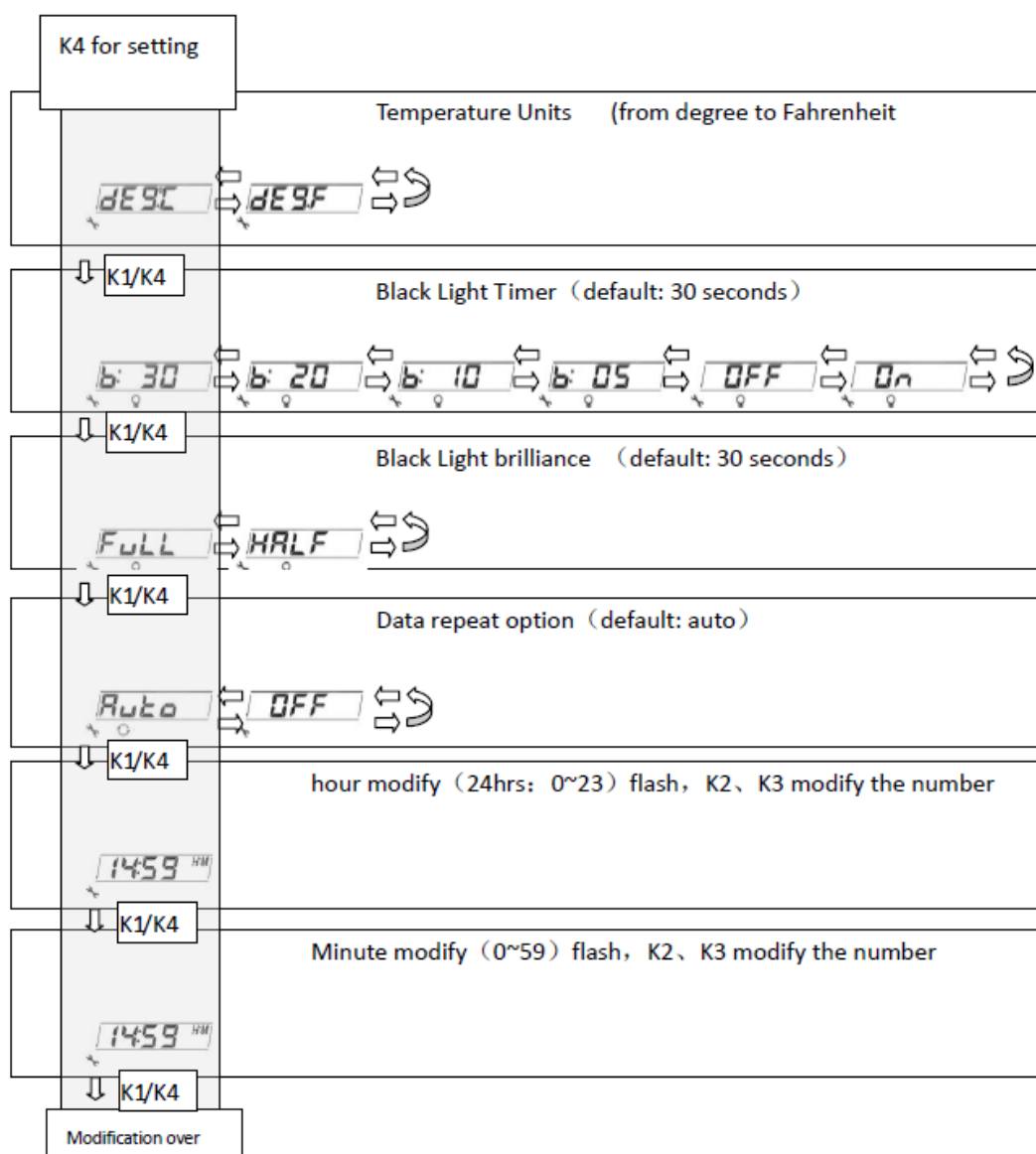
the key(from left to right) is: K1-K4, or Next \downarrow , Left \leftarrow , Right \rightarrow , Set \circ .

The meter display in following order:

Solar panel, battery 1, battery 2, other data as four team data. Use K2 or K3 to check the data between the teams. Symbol \curvearrowright is the repeat between the team 1 and team 4. K1 is the key for repeating the data of the team. Data shows as following picture.



Data setting instructions: on reading display, press K4 for setting and next data, then save it. K1 for next data, without save. K2 and K3 to modify the data, shows as following picture.



1. Temperature option:

- ✧ dEg.°C Celsius scale (°C)
- ✧ dEg.F Fahrenheit (F)

2. Backlight instruction: press any key while it's connected, the backlight will be on. And set the backlight timer on setting mode.

Backlight options:

- OFF:** backlight is off all the time
- On:** backlight is on all the time in any case.
- B: 30** backlight on for 30 seconds
- B: 20** backlight on for 20 seconds
- B: 10** backlight on for 10 seconds
- B: 05** backlight on for 5 seconds

Note: *backlight timer calculated as the last key press. And backlight has 2 classes:*

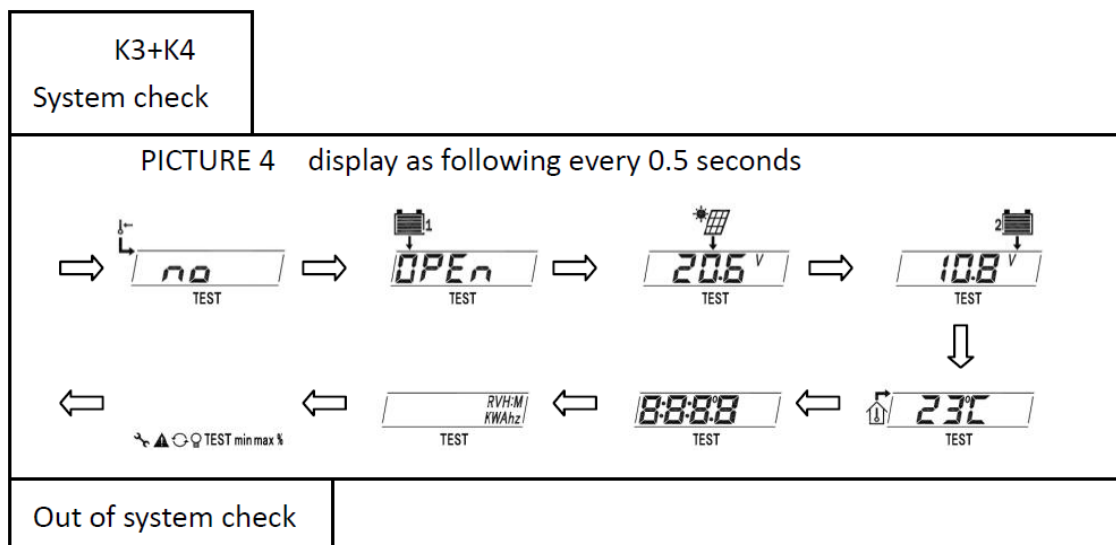
FULL: high bright
HALF: low bright

3. Data repeat: auto or manual, options as following:

- Auto** each team data will repeat every 3 seconds, K1 for next team. K2, K3 for data repeating in the team.
- OFF** data will not repeat automatically, unless press K2 or K3, or K1 for the next team data.

4. **Clock adjust:** hour, minute flash, press K2, K3 modify the data, press K4 to save it.

System checking: at any time, press K3+K4, it will check and display the related data automatically. Details as in PICTURE 4. If there is NO, means there is no connection. If the connections are correct, the related data will be displayed. If no remote temperature sensor is connected, the meter will show thermometer and NO. If connection is correct, it will show the data it detects. **OPEN** means no battery connection or over voltage, the data will be displayed while the connection is right.



Data erase to 0: at any time, press K1+K2, the data will be erased to 0, such as max, min, Ah. AH accumulate from 0.

OTHER INSTRUCTION:

Specifications:

- Rated voltage** : 12V, min voltage (suggest): 8.0V.
- Strong backlight on : <23mA,
- Low backlight on : <20mA
- Backlight and LED indicator off : <17mA
- Operation temperature** : -40°C ~ +60°C
- LCD operation temperature : -10°C ~ +40°C
- Humidity** : 0-100%
- Communication cable** : RJ45(8PIN), 10 meter.

Trouble indicator on : following occasion may occur, check the connection. And the symbol will disappear automatically when it resumes.

1. While one battery disconnect, or open circuit, or over voltage.
2. The remote temperature sensor is no probe.
3. Over charging current
4. Solar PV short-circuits.

Telecommunication port: while the meter run by individual power or the communication cut off, it displays 4 pieces of “_”. Press key, no answer. The display will resume while communications is on.

Note: the data displayed got from the communication, check if the cable correct while the data is error, or if there is strong interference. A too long cable may bring errors too. The data will update every 20 seconds.

Battery capacity strip flash: each strip equals 20% of battery capacity. The over part will be shown as flashing. For example, the first trip flash, the battery capacity is 1-19%, the second trip flash, it is 21-39%, etc.

Note: the calculation takes fully charged voltage as 100%, and over discharged as 0%. All is based on battery voltage, not the real battery capacity.

Battery capacity AH: AH is the accumulation of charging, each one minute will count. The data is not accurate while the charge current is too small. The min. is 1AH, means 1amps charging for 1 hour, AH comes to show.

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Manual



BlueSolar Pro Remote Panel

For BlueSolar PWM-Pro charge controllers 12/24V 5, 10, 20, 30A
Article number SCC900300000

Contents

- 1.Important safety instructions**
- 2.Installation**
- 3.Product features**
 - 3.1 General**
 - 3.2 Display**
 - 3.3 Buttons**
- 4.Monitoring**
- 5.Full setup details**
 - 5.1 Main menu**
 - 5.2 Device Information**
 - 5.3 Test Operation**
 - 5.4 Control Parameters**
 - 5.5 Load Settings**
 - 5.6 Device Parameters**
 - 5.7 Device Password**
 - 5.8 Charge mode**
 - 5.9 Factory reset**
 - 5.10 Failure Information**
 - 5.11 Meter parameters**
- 6.Technical Specifications**
- 7.RS485 connector pinout**
- 8.Dimensions**



1. Important safety instructions

Read all instructions before starting the installation.

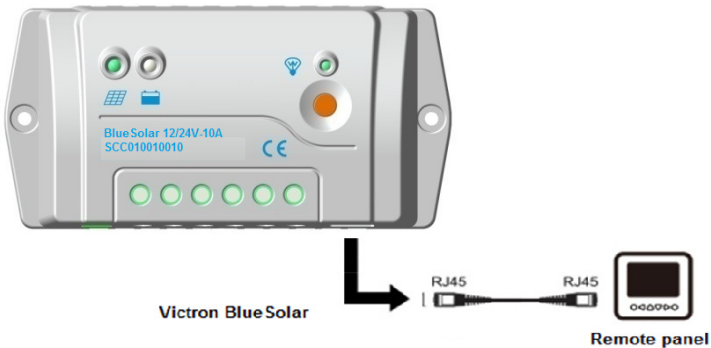
Keep the controller away from rain, exposure, severe dust, vibration, corrosive gas and intense electromagnetic interference.

2. Installation

Please see section 8 for mounting dimensions

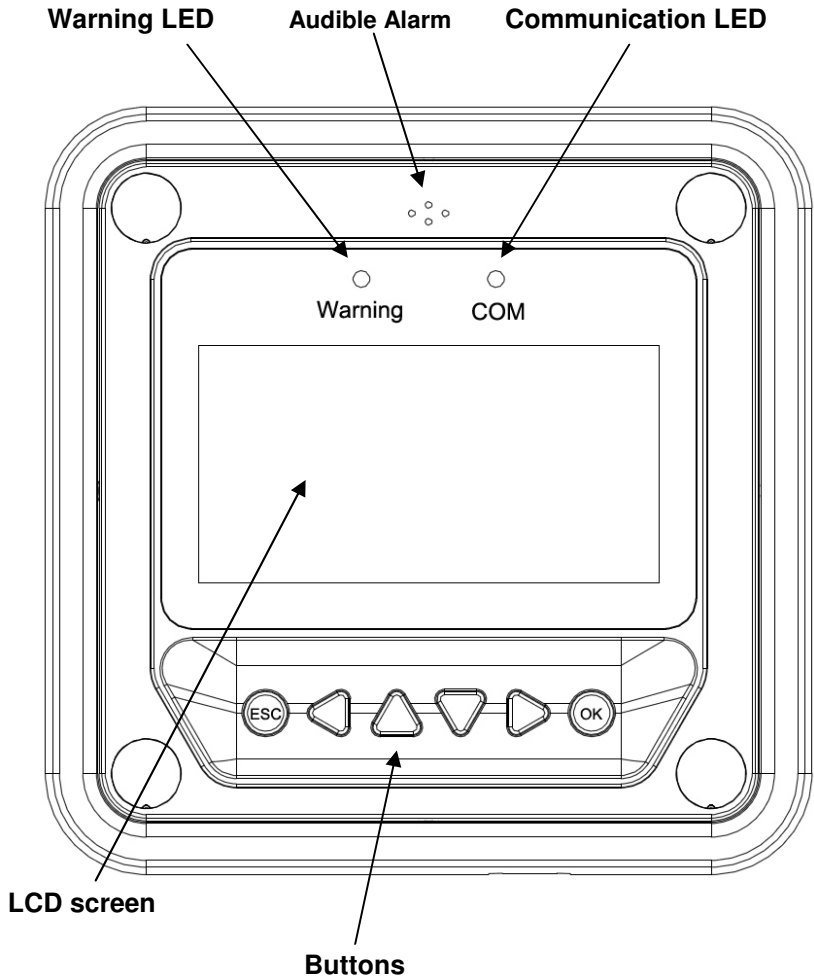
Connection to the BlueSolar PWM-Pro charge controller:

The panel must be connected to the controller with a standard RJ45 UTP cable.

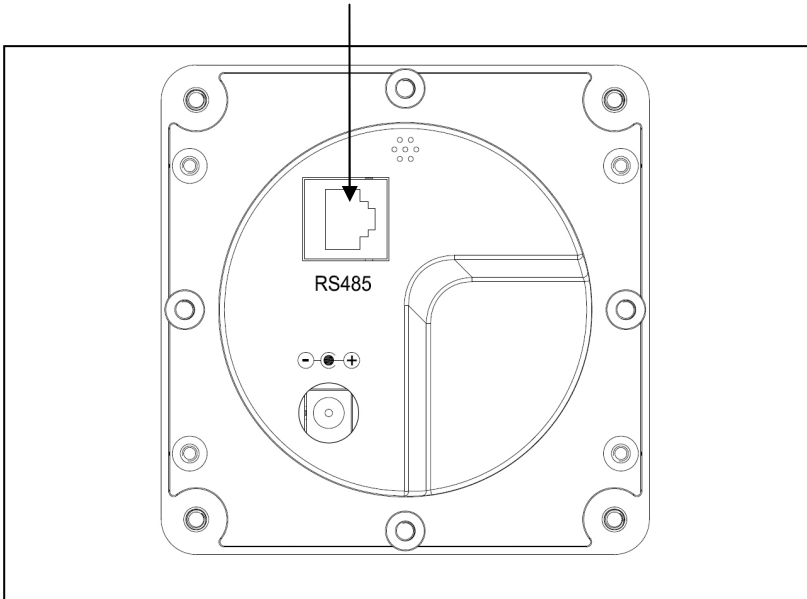


3. Product features

3.1. General



RS485 communication and power interface



Warning LED

The warning indicator LED flashes in case of failure of the connected charge controller.

Audible alarm

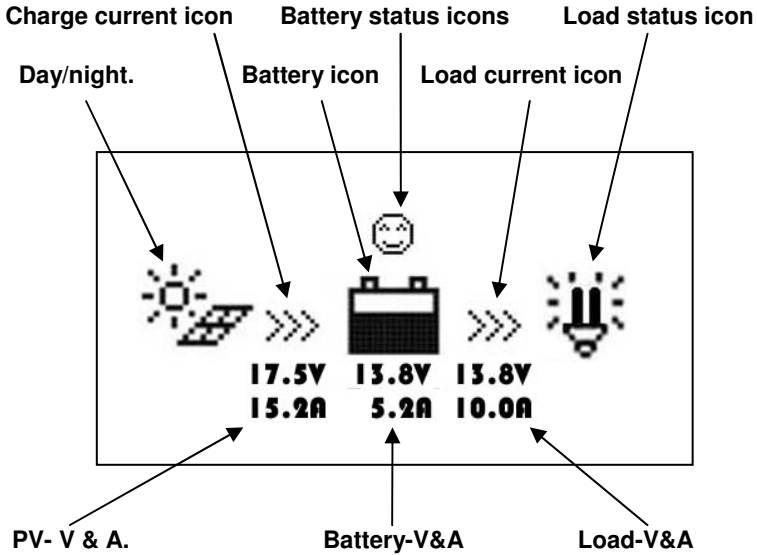
The audible failure alarm can be activated or deactivated.

Communication LED

Indicates communication status when the display is connected with the charge controller.

3.2. Display

After connecting the remote panel, the default monitoring display will be shown:



Day and night icons

☾ - Night, ☀ - day. If the voltage of the solar array is above 1V, the daytime icon is shown.

Battery icon

The battery icon shows the state of charge of the battery. For this function the correct battery capacity must be set (see section 5.4) and all loads must be connected to the load output (i.e. not directly to the battery).

Note: When the battery is fully discharged, the icon displayed is ☒.

Battery status icons



- Normal voltage.



- Under voltage,



- Over discharge

Load status icon

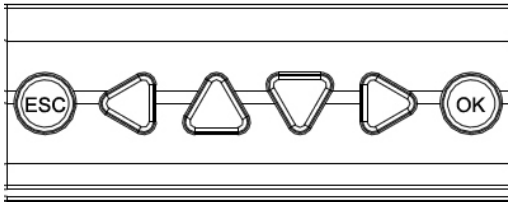


- Load output "on"

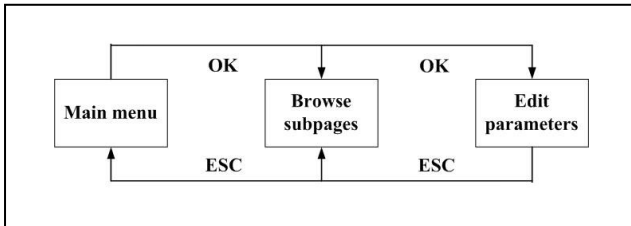


- load output "off"

3.3. Buttons



Operation is visualized in the schematic diagram below:

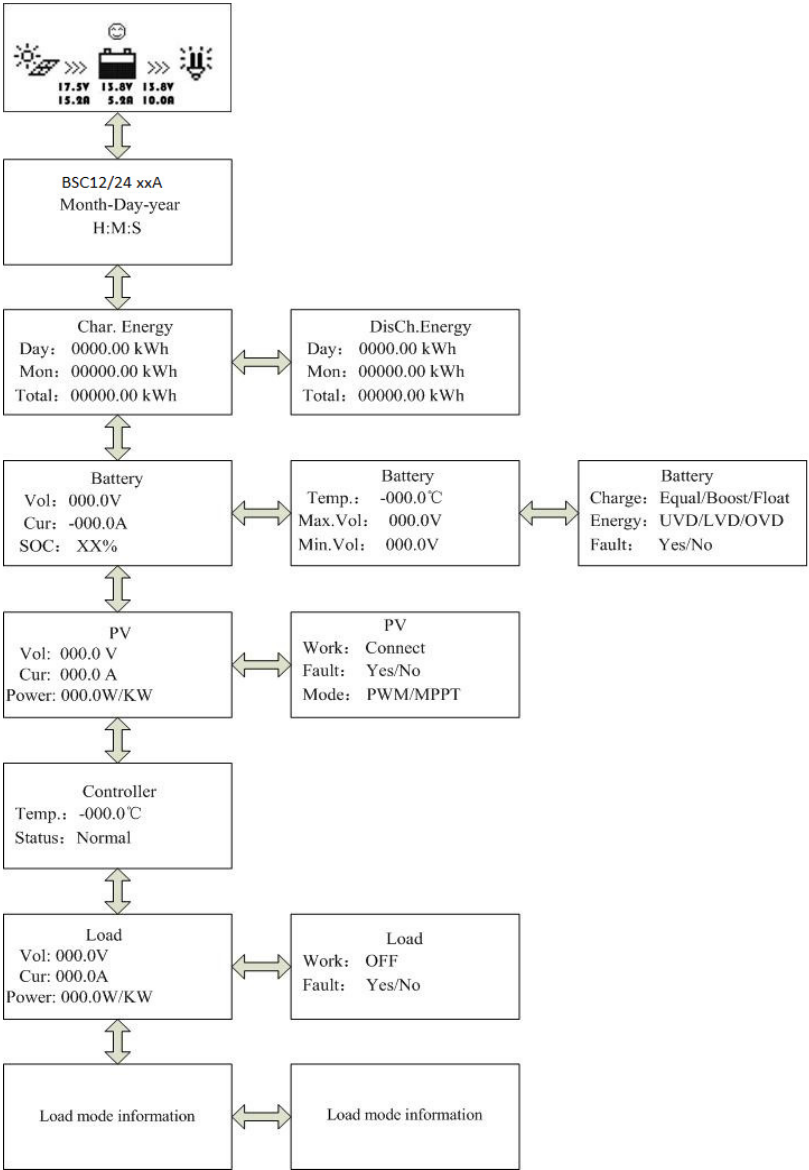


4. Monitoring

The default monitoring display and monitoring subpages can be accessed with the UP/DOWN and LEFT/RIGHT buttons. See the diagram on the next page.



victron energy



5. Full setup details

5.1. Main menu

When in monitoring mode, the main menu is accessed by pressing the ESC button.

The UP and DOWN buttons are used to browse through the main menu:

- 1 Monitoring**
- 2 Device information**
- 3 Test operation**
- 4 Control parameters**
- 5 Load set**
- 6 Device parameters**
- 7 Device password**
- 8 Charge mode**
- 9 Factory reset**
- 10 Failure information**
- 11 Meter parameters**

The OK and ESC buttons are respectively used to enter or exit the corresponding pages of the menu items.

A password must be entered to change settings. When on a settings page, press OK to access the password page and fill in the password to enable changing of settings.

The default password is 000000

5.2 Device information

The charge controller model, ratings and serial number are displayed (press the DOWN button to display the serial number).

5.3 Test Operation

When the load output is set on manual control (default setting, see section 5,5), the output can be switched ON or OFF with the orange switch button on the Charge Controller. The low voltage cut-off is also operational.



The manual control function is disabled when other load output settings are chosen (see section 5.5).
 However, when other load output settings have been chosen, the load output can be tested (i.e. switched ON and OFF) after switching back to Manual Control.

5.4 Control Parameters

The table below shows the list of battery related parameters that can be modified.

(press the DOWN or UP button to scroll through the parameters)

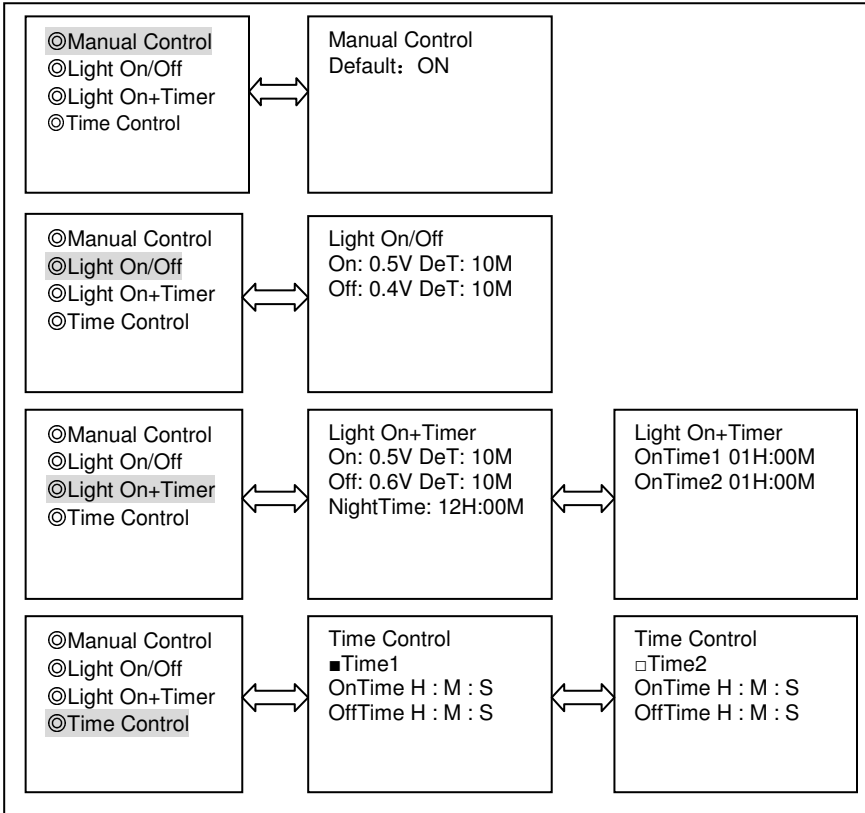
Parameter		Default setting		
Battery type	Gel	Sealed (AGM)	Flooded	User defined
Battery capacity (Ah)	200Ah			1~9999
Temperature compensation coefficient	-3mV/°C per 2V cell			0~9
Rated voltage (system voltage)	Auto			12V/24V
Over voltage load disconnect	16.0V			9~17V
Charge limit (highest charge voltage including temp. compensation)	15.0V			9~17V
Over voltage load reconnect	15.0V			9~17V
Equalize charge	—	14.6V	14.8V	9~17V
Boost charge (absorption charge)	14.2V	14.4V	14.6V	9~17V
Float charge	13.8V	13.8V	13.8V	9~17V
Boost trigger voltage (starts new charge cycle)	13.2V			9~17V
Low voltage load reconnect	12.6V			9~17V
Under voltage warning reset	12.2V			9~17V
Under voltage warning	12.0V			9~17V
Low voltage load disconnect (nominal value at 25°C)	11.1V			9~17V
Discharge limit (lowest low voltage load disconnect including temp. compensation)	10.6V			9~17V
Equalize duration	—	2 hrs.	2 hrs.	0~3 hrs.
Boost/absorption duration	2 hrs.	2 hrs.	2 hrs.	0~3 hrs.

Multiply voltages by 2 for a 24V system



5.5 Load output setting

The load output setting options are shown below:



Option 1: Manual Control

When the load output is set on Manual Control (default setting), the output can be switched ON or OFF with the orange switch button on the Charge Controller. The low voltage cut-off is also operational.



Option 2: Light On/Off

This is a simple load output On/Off option, based on the solar input voltage of the Controller (= output voltage of the solar panel).

- When, at dusk, the input voltage of the Controller becomes lower than the light On voltage (default 0.50V), the load output is switched on.
- When, at dawn, the input voltage of the Controller becomes higher than the light Off voltage (default 0.40V), the load output is switched off.
- In order to prevent unwanted switching a confirmation time (DeT) can be set: default 10 minutes, range 0 – 99 minutes.

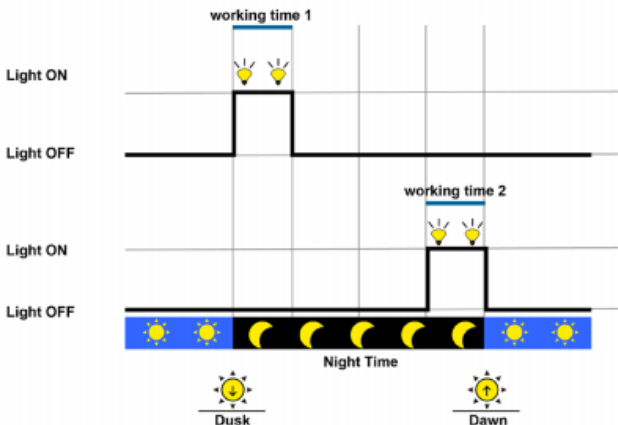
Option 3: Light On+Timer

This option allows for a pre-set On-time after dusk and a pre-set Off-time before dawn.

The dusk and dawn switching moments and confirmation time are set as under option 2.

The remaining parameters are set as follows:

- NightTime: initial setting of the night duration, the controller will subsequently adjust NightTime to the actual duration of the night.
- On Time 1: On period after dusk.
- On Time 2: On period before dawn.



Option 4: Time control

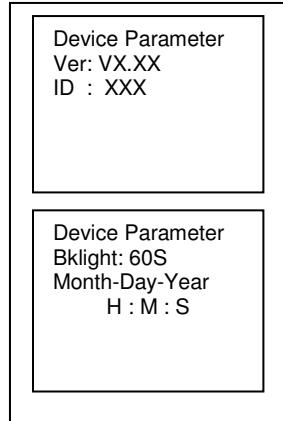
This option uses the internal clock (see section 5.6) to set one (Time1 only) or two on-time periods.

5.6 Device Parameters

The first screen displays the software version and communication ID number of the Charge Controller.

The second screen allows setting of the backlight timer, and local date & time (use the DOWN button to go to the second screen).

The above data are stored in the Charge Controller.



5.7 Device Password

The password is needed to change settings of the charge controller. The default password is "000000". The password is stored in the Charge Controller

5.8 Charge mode

This page is intended for future applications. Please do not change.

5.9 Factory reset

Allows reset of the charge controller to the default settings.



5.10 Failure Information

Displays failures such as Over Voltage, Over Load or Short Circuit. (automatic reset when the fault is corrected).

5.11 Parameters

The first screen displays the type, software version and serial number of the remote meter.

The second screen allows modification of

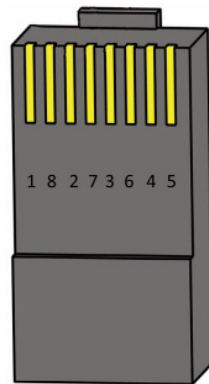
- Switch-Pages (refresh time interval of the monitoring pages, default 0 seconds)
- Backlight duration (default 20 seconds).
- Audible alarm ON/OFF (default OFF).

6 Technical Specifications

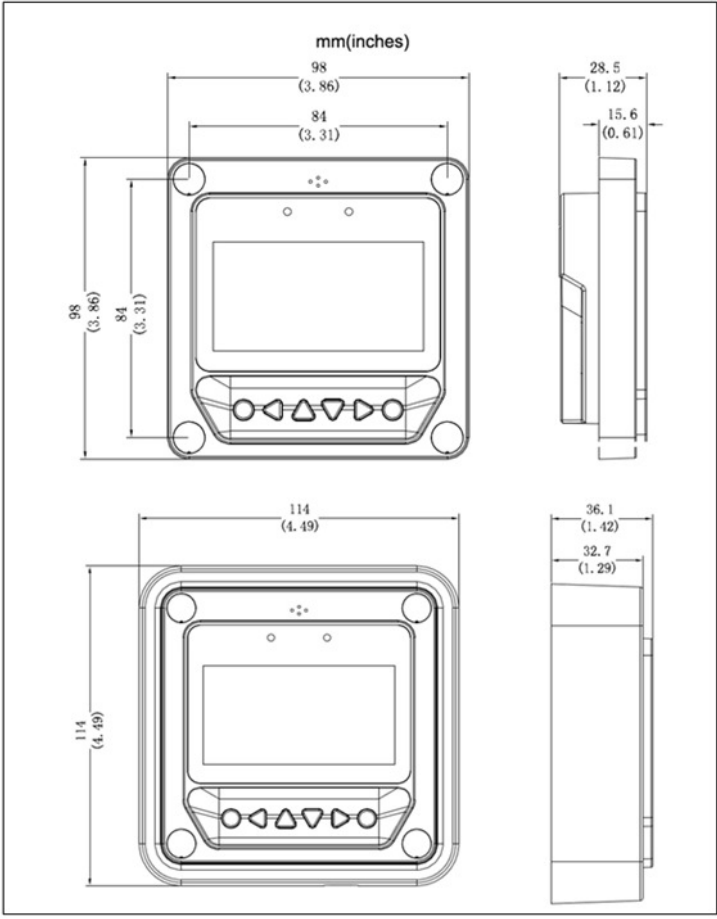
Self-consumption	backlight and acoustic alarm on max. 65mA
	Backlight on max. 23mA
	Backlight off max. 15mA
Faceplate dimensions	98 x 98 mm / 3.86 x 3.86 inch
Frame dimensions	114 x 114 mm / 4.49 x 4.49 inch
Connector type	RJ45
Cable length	Max. 20 m
Weight	0.2 Kg
Ambient Temperature	-20°C~+70 °C / -4°F~158°F

7 RS-485 connector pinout:

Pin No.	
1	Power: +12V
2	RS485 B
3	RS485 A
4	GND
5	GND
6	RS485 A
7	RS485 B
8	Power: +12V



8 Dimensions:



BlueSolar PWM Light Charge Controller 12/24V

(with light turn-off timer)

1. DESCRIPTION

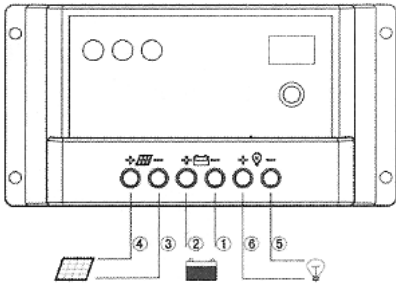
- Programmable load output with lighting control mode.
- Three stage battery charging (bulk – absorption – float).
- Protected against over current.
- Protected against short circuit.
- Protected against reverse polarity connection of the battery or solar array.
- Low voltage load disconnect.
- Easy to set up thanks to two digit seven segment display.

2. INSTALLATION

IMPORTANT

- Always connect the batteries first, in order to allow the Controller to recognize system voltage
- Use a 12V (36 cells) solar array for a 12V battery system.
- Use a 24V (72 cells) solar array for a 24V battery system.

The display will show a "12" if the Controller detects a 12V battery, and a "24" if it detects a 24V battery



Do not exceed Solar and Load ratings

3. LED INDICATORS



Green LED:
 Off: No sunlight or not enough sunlight. Charger off.
 Fast flashing: Bulk charge.
 On: Absorption charge.
 Slow flashing: Float charge.



LED=Green: battery fully charged (> 12,7V)
 LED=Orange: battery ok (12,4V - 12,7V)
 LED=Red: battery low (11,2V - 12,4V)
 LED=Flashing Red: battery fully discharged (< 11,2V)
 (load output cut off level: 11,2V)



LED=ON: load output is on.
 LED=OFF: load output is off.
 LED=Slow flashing: Overload.
 LED=Fast flashing: Short Circuit

Please note:

1. The load output will cut off in case of over load or short circuit. The load output will attempt to restart after 30 seconds.
2. After over discharge, the load will reconnect automatically when the battery is recharged to 13,1V / 26,2V.
3. After over discharge, the load can be reconnected manually by pressing the on/off push button, if the battery voltage exceeds 12,6V / 25,2V.

4. SETTING THE LOAD OUTPUT

4.1 Settings

0	Load output permanently off	9	Load output turned on during 9 hours after sunset
1	Load output turned on during 1 hour after sunset	10	Load output turned on during 10 hours after sunset
2	Load output turned on during 2 hours after sunset	11	Load output turned on during 11 hours after sunset
3	Load output turned on during 3 hours after sunset	12	Load output turned on during 12 hours after sunset
4	Load output turned on during 4 hours after sunset	13	Load output turned on during 13 hours after sunset
5	Load output turned on during 5 hour after sunset	H	Manual load control
6	Load output turned on during 6 hours after sunset	C	Load output controlled by battery voltage only
7	Load output turned on during 7 hours after sunset	L	Dusk to dawn mode
8	Load output turned on during 8 hours after sunset	d	Debug mode

4.2 Settings description

0 Charger only

The load output is switched off permanently.

1-13 Light control + delay

The load output automatically turns on after sunset (array voltage < 4V) and the built-in timer starts counting. When the timer reaches the set time, or when the low voltage limit is reached, the load output will turn off.

H Manual

The load output can be turned on and off manually with the push button. (low voltage shutdown remains active)

C Load output controlled by battery voltage only

Load disconnect and load reconnect will be based only on battery voltage, see section 3

L Dusk to dawn mode

Turn on delay (array voltage < 4V): 10 seconds.
 Turn off delay (array voltage > 4V): 1 minute.
 No timer function.

d Debug mode

Same as L mode but without delay of 10s/1min

5. SPECIFICATIONS

BlueSolar PWM-Light	12/24-5	12/24-10	12/24-20	12/24-30
Battery Voltage	12/24V with automatic system voltage detection*			
Rated charge current	5 A	10 A	20 A	30 A
Recommended solar array	36 cell for 12 V / 72 cell for 24 V			
Automatic low voltage load disconnect	Yes			
Maximum solar voltage	28 V for a 12 V system and 55 V for a 24 V system (1)			
Self-consumption	< 10 mA			
Overload protection	Shut down after 60 s in case of 130% load			
	Shut down after 5 s in case of 160% load			
	Short circuit: immediate shut down			
Grounding	Common positive			
Operating temp. range	-20 to +50°C (full load)			
Humidity (non condensing)	Max 95 %			
Settings				
Charge voltage 'absorption'	14.2 V / 28,4 V			
Charge voltage 'float'	13.8 V / 27,6 V			
Load disconnect	11,2V / 22,4V			
Load reconnect	12,6V / 25,2V (manual) 13,1V / 26,2V (automatic)			
Enclosure				
Protection class	IP20			
Terminal size	5 mm ² / AWG10			
Weight	0,13 kg		0,15 kg	
Dimension (h x w x d)	70 x 133 x 33,5 mm (2.8 x 5.3 x 1.3 inch)			
Mounting	Vertical wall mount		Indoor only	
Humidity (non condensing)	Max. 95%			
Operating temperature	-20°C to +50°C (full load)			
Cooling	Natural convection			
Standards				
Safety	IEC 62109-1			
EMC	EN 61000-6-1, EN 61000-6-3, ISO 7637-2			
1) For 12V use 36 cell solar panels For 24V use 72 cell solar panels or 2x 36 cell in series		2) The controller switches to the lower float voltage level 2 hours after the absorption voltage has been reached. Whenever the battery voltage becomes lower than 13 V, a new charge cycle is triggered.		