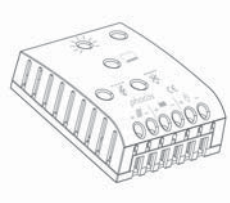
phocos

Phocos CA

Solar Charge Controller

User Manual (English)



Dear customer,

Thank you very much for buying this Phocos product. Please read the instructions carefully and thoroughly before using the product.

Your new CA controller is a state-of-the art device which was developed in accordance with the latest available technical standards. It comes with a number of outstanding features, such as:

- 3 LEDs for a clear, readable display of the state of charge
- 16 mm^2 connector clamps
- Temperature compensation
- Electronic protection without fuses

Please read this manual carefully taking special note of the safety and usage recommendations at the end. The manual gives important recommendations for installing, using and programming as well as a troubleshooting guide for potential problems with the controller.

Description of Functions

- The charge controller protects the battery from being overcharged by the solar array and from being deeply discharged by the loads. The charging takes place through multiple stages which include automatic adaptation to the ambient temperature for optimal charging of the battery.
- The controller is intended for use at 12 V system voltage.
- The charge controller has a number of safety and display functions.

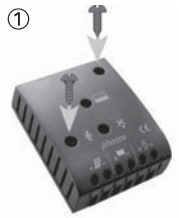
Mounting and Connecting

The controller is intended for indoor use only. Protect it from direct sunlight and place it in a dry environment. Never install it in humid rooms (like bathrooms). The controller measures the ambient temperature to determine the charging voltage. Controller and battery must be installed in the same room.

The controller warms up during operation, and should therefore be installed on a non flammable surface only.

REMARK: *Connect the controller by following the steps described below to avoid installation faults.*

①



When mounting the controller with screws, make sure to use screws that suit the attachment material (use screws with 4 mm shaft and max. 8 mm head diameter, no counter sink). Keep in mind that the screws also have to carry the force applied by the wiring.

Make sure that the ventilator slits on the sides are unobstructed.

A DIN Rail mounting plate is available as an accessory (CX-DR2). This allows mounting the controller on a standard 35mm DIN rail. Place the controller on the mounting plate, and use the screws supplied with the mounting plate to fix it to the controller.

---

②

Connect the wires leading to the battery with correct polarity. To avoid any voltage on the wires, first connect the controller, then the battery. Keep in mind the recommended wire length (min. 30 to max approx. 100 cm) and the wire size:
CA06-2.1: min. 2.5mm^2
CA08-2.1: min. 4mm^2
CA10-2.1: min. 6mm^2
CA14-1.1: min. 10mm^2

***WARNING**: If the battery is connected with reverse polarity, the charge controller will also give the wrong polarity on the load terminals. Never connect loads in this situation!*

***REMARK**: Keep in mind the recommendations of your battery manufacturer. We strongly recommend connecting a fuse directly to the battery to protect any short circuit at the battery wiring. The fuse type must be in accordance with the charge controller's nominal current:*

CA06, CA08-2.1: 20A; CA10-2.1,CA14-1.1:30A

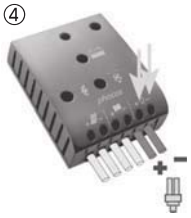
③

Connect the wires leading to the solar array with correct polarity. To avoid any voltage on the wires, first connect the controller, then the solar array. Keep in mind the recommended wire size:
CA06-2.1: min. 2.5mm^2
CA08-2.1: min. 4mm^2
CA10-2.1: min. 6mm^2
CA14-1.1: min. 10mm^2

***REMARK**: place positive and negative wires leading to the solar generator close to each other to minimize electromagnetic effects.*

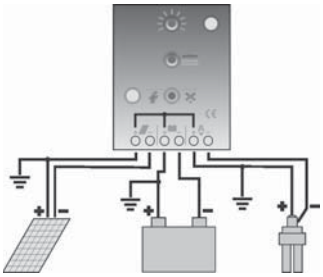
***REMARK**: Solar panels provide voltage as soon as exposed to sun light. Keep in mind the solar panel manufacturers recommendations in any case.*

④



Connect the wires leading to the loads with correct polarity. To avoid any voltage on the wires, first connect the wire to the load, then to the controller. Keep in mind the recommended wire size:
CA06-2.1: min. 2.5mm^2
CA08-2.1: min. 4mm^2
CA10-2.1: min. 6mm^2
CA14-1.1: min. 10mm^2

Grounding the Solar System



Be aware that the positive terminals of the controller are connected internally and therefore have the same electrical potential. If any grounding is required, always do this on the positive wires.

REMARK: *If the device is used in a vehicle which has the battery negative on the chassis, loads connected to the regulator must not have an electric connection to the car body. Otherwise the Low Voltage Disconnect function and the electronic fuse function of the controller are short circuited.*

Starting up the Controller

System Voltage

The controller is intended for use at 12V system voltage.

Battery Type

The controller does not generate an equalization charge, and is therefore suitable for use with lead acid batteries with liquid electrolyte (vented battery) and lead acid batteries with solid electrolyte ('gel' or 'fleece' type).

Recommendations for Use

The controller warms up slightly during normal operation.

The controller does not need any maintenance or service. Remove dust with a dry tissue.

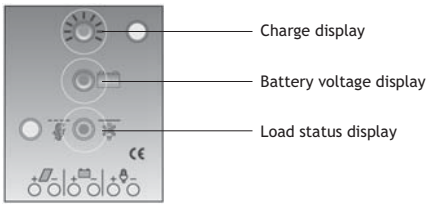
It is important that the battery gets fully charged frequently (at least monthly).

Otherwise the battery will be permanently damaged.

A battery can only be fully charged if not too much energy is drawn during charging. Keep that in mind, especially if you install additional loads.

Display Functions in normal operation

The controller is equipped with 3 LEDs for display of the operating status.



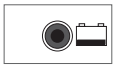
In normal operation mode, the controller displays the charging status, the status of battery voltage, and the status of the load output.

Charge display

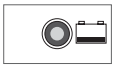
(green LED off)
Solar array does not supply electricity

(green LED on)
Solar array does supply electricity

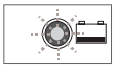
Battery voltage display



OK (LED off)



low (LED on)



very low
(LED flashing)

When the battery voltage is indicated as low, it is recommended to use the remaining energy economically. The charge controller will subsequently switch off the load.

Load status display

In case of deep discharge or overload/short-circuit, the load output is switched off. This is indicated by:

(LED off)
Normal
operation

(LED on)
Low voltage
disconnect

(LED flashing)
Overload or
Short-circuit of load

Low Voltage Disconnect Function (LVD)

The controller is equipped with a low voltage disconnection function to protect the battery against a deep discharge: This function is controlled by the voltage, and automatically switches off the load output at a battery voltage lower than 11.5V. As soon as the battery reaches a voltage of 12.5V, the load output is switched on again.

Safety Features

The controller is protected against improper installation or use:

	At the solar terminal	At the battery terminal	At the load terminal
Battery connected with correct polarity	Unrestricted	Normal operation	Unrestricted
Battery connected with wrong polarity	Unrestricted	Yes, if only the battery is connected.	Unrestricted
Reverse polarity	Unrestricted	Yes, if only the battery is connected.	Load output is protected, but loads might be damaged.
Short circuit	Unrestricted	Unrestricted. **CAUTION:** Battery must be protected by fuse.	Unrestricted
Overcurrent	No protection	-------	Controller switches off load.
No connection	Unrestricted	Unrestricted	Unrestricted
Reverse current	Unrestricted	-------	-------
Overvoltage	Varistor 56 V, 2.3 J	Max. 30 V	No protection
Undervoltage	Normal operation	Controller switches off load terminal.	Controller switches off load terminal.

WARNING: *The combination of different error conditions may cause damage to the controller. Always remove an error before you continue connecting the controller!*

Error Description

Error	Display	Reason	Recomendation
Loads are not supplied		Battery is low (LED on)	Load will reconnect as soon as battery is recharged.
		Overcurrent/ Short circuit of loads (LED flashing)	Switch off all loads. Remove short circuit. Controller will switch on load automatically after max 1 minute.
Battery is empty again after a short time		Battery has low capacity (LED on)	Change battery
Battery is not being charged during the day		Solar array faulty or wrong polarity	Remove faulty connection / reverse polarity

General Safety and Usage Recommendations

Intended Use

The charge controller is intended exclusively for use in photovoltaic systems with 12V nominal voltage, and in conjunction with vented or sealed (VRLA) lead acid batteries only.