



SOLAR CHARGE CONTROLLERS

SCF 0606 / SCF 0808 / SCF 1010 / SCF 1515



Instruction Manual

Please read user manual carefully before use.



Instructions and description of controllers with overcharge and over discharge protection, gassing regulation and temperature compensation.

In photovoltaic solar systems lead batteries are often used for storing solar current. These batteries have to be protected against overcharging and over discharging. The Solar charge controller SCF0606 / SCF0808 / SCF1010 / SCF1515 fulfill both tasks in one device. They can be used for 12 and 24 V systems.

1. Overcharge Protection

When the battery exceeds the final charge voltage, it starts to gas. As this process is temperature dependent, the final charge voltage is adapted automatically to the ambient temperature by built-in sensor. Strong gassing leads an electrolyte loss and finally the destruction of the battery. The battery is however not charged completely when the final charge voltage is reached, so that the current flow should not be interrupted. The charge controller therefore reduces the current flow into the battery just as much as that the final charge voltage is not exceeded. This procedure is called "IU-charging" which is considered to be especially fast and gentle. The reduction of the current flow is effected by very quick, temporary short-circuiting (pulse width modulation) of the solar generator.

2. Gassing Regulation

The final charge voltage is changed in dependence with the discharge level. When a lead battery is operated without gas development for a longer time, there is the danger of a harmful acid layering. This acid layering can be avoided by limited, controlled gassing; this function is fulfilled by the gassing regulation. The gassing regulation switches off the overcharge protection until the so-called final gassing voltage is reached. Further more the gassing regulation increases the final charge voltage during high cyclization. By this temperature dependent function, the battery capacity is better used.

3. Over discharge protection

The batteries have to be protected from over discharge, as it would be destroyed otherwise. Therefore the charge controller protects the battery from over discharge by disconnecting the loads when the voltage falls below the final charge voltage. After the battery has been recharged by the solar generator and the reconnection voltage is reached, the users are again reconnected.

4. Description

4.1 Functions

The solar charge controller

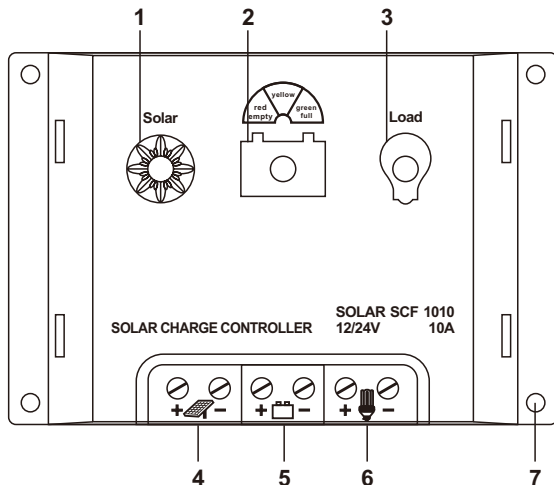
- monitors the state of charge of the battery bank.
- controls the charging process.
- controls the connection/disconnection of loads.

This optimizes battery use and significantly extends its service life.

4.2 Construction

The solar charge controller consists of the following components:

1. Solar LED.
2. Battery capacity LED.
3. Load LED.
4. Terminal block for connecting the solar module.
5. Terminal block for connecting the battery.
6. Terminal block for connecting the loads.
7. 4.3mm mounting hole.



4.3 LED displays

	Solar LED	Battery LED	Load LED
Normal mode	—	☉!	—
Charging mode	☉	☉!	—
Load mode	—	☉!	☉
Solar reverse / short mode	☆	☉!	—
Load short / overload mode	—	☉!	☆
Solar over circuit mode	—	☉!	—
Battery reverse mode	—	—	—
Battery type wrong	—	☆ (RED)	—
Temperature high mode	—	☆ (RED)	☆

Note:

☉: ILLUMINATE. ☆ : FLASH. — : EXTINGUISH .

! : The LEDs illuminate in different colors according to battery capacity.

4.4 LED displays

LED	Status	Meaning
Solar LED	illuminates green	battery charging by solar
	flashes green	solar module polarity reverse or short circuit
	extinguishes green	over current protection
Battery LED	illuminates red	deep-discharge deactivation, state of charge < 30%
	illuminates yellow	battery weak, state of charge > 40% to 70%
	illuminates green	battery full, state of charge > 80% to 100%
	illuminates red	Load discharge, battery capacity < 30%
	flashes red	wrong battery type connection
	extinguishes red	battery polarity reverse
Load LED	illuminates red	load discharge state
	flashes red	load short or overload
High Temperature mode	battery and load led flashes red	over temperature

Do not forget that the connected users do not use more current than admissible for your regulator.

5. Advice for Installation

The controller has to be installed possibly near the battery and must not be exposed to direct weather conditions. The controller is to be operated in well-ventilated rooms. The connection terminals have to point downwards when it is installed. In order to activate the protective functions the controller has to be connected with solar generator, battery and user.

All system components i.e. solar generator, battery users and controller have to be coordinated concerning voltage. This is to be checked before installation. Pay attention to the correct nominal voltage. Ask your dealer when you are in doubt.

6. Connection

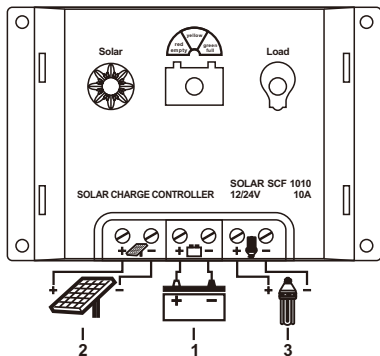


WARNING

Danger of explosion from sparking! Danger of electric shock!

Solar modules generate electricity under incident light. The full voltage is present even when the incident light levels are low.

- ▶ Protect the solar modules from incident light during installation, e. g. cover them.
- ▶ Never touch un-insulated cable ends.
- ▶ Use only insulated tools.
- ▶ Ensure that all loads to be connected are switched off. If necessary, remove the fuse.
- ▶ Connections must always be made in the sequence described below.



Connection sequence

1. battery
2. solar module
3. loads

1st step: Connect the battery

- ▶ Label the battery connection cables as a plus cable (A+) and a minus cable (A-).
- ▶ Lay the battery cables in parallel between the solar charge controller and the battery.
- ▶ Connect the battery connection cable with the correct polarity to the middle pair of terminals on the solar charge controller (with the battery symbol).
- ▶ If necessary, remove any external fuse.
- ▶ Connect battery connection cable A+ to the positive pole of the battery.
- ▶ Connect battery connection cable A- to the negative pole of the battery.
- ▶ Replace the external fuse in the battery connection cable.
- ▶ If the polarity connection is correct, the battery LED illuminates.



2nd step: Connect the solar module

- ▶ Ensure that the solar module is protected from incident light.
- ▶ Ensure that the solar module does not exceed the maximum permissible input current.
- ▶ Label the solar module connection cables as a plus cable (M+) and a minus cable (M-).
- ▶ Lay both solar module connection cables in parallel between the solar module and the solar charge controller.
- ▶ First connect the M+ solar module connection cable to the correct pole of the left pair of terminals on the solar charge controller (with the solar modules symbol), then connect the M- cable.
- ▶ Remove the covering from the solar module.



3rd step: Connect loads

Notes

- Connect loads that must not be deactivated by the solar charge controller deep discharge protection, e.g. emergency lights or radio connection, directly to the battery.
- Loads with a higher current consumption than the device output can be directly connected to the battery. However, the solar charge controller deep discharge protection will no longer intervene. Loads connected in this manner must also be separately fused.
- ▶ Label the load connection cables as a plus cable (L+) and a minus cable (L-).
- ▶ Lay the load connection cables in parallel between the solar charge controller and the load.
- ▶ First connect the L+ load cable to the correct pole of the right pair of terminals on the solar charge controller (with the lamp symbol), then connect the L- cable.
- ▶ Replace the load fuse or switch on the load.



4th step: Final work

- ▶ Fasten all cables with strain relief in the direct vicinity of the solar charge controller (clearance of approx. 10cm).

7. Grounding

The components in stand-alone systems do not have to be grounded - this is not standard practice or may be prohibited by national regulations. Consult the technical manual for more information.

8. Lightning protection

In systems subjected to an increased risk of overvoltage damage, we recommend installing additional lightning protection / overvoltage protection to reduce dropouts. Consult the technical manual for more detailed information.

9. Operation

The solar charge controller immediately begins operation once the battery is connected or the external fuse is inserted. The displays of the solar charge controller show the current operating mode. User intervention or user settings are not required.

10. Protection functions

The following integrated protection functions of the solar charge controller ensure that the battery is handled as gently as possible.

The following protection functions are part of the basic function of the controller

- Overcharge protection.
- Deep discharge protection.
- Battery low voltage protection.
- Solar module polarity reverse protection

The following installation faults do not destroy the controller. After correcting the fault, the device will continue to operate correctly:

- Protection from solar module short circuit / incorrect solar module polarity.
- Protection from short circuits at the load output or excessive load current.
- Protection from battery connection with incorrect polarity.
- Protection from solar module over current.
- Protection from device over temperature.
- Protection from overvoltage at the load output.
- Protection from the wrong connection sequence.

11. Attention

1. Avoid short circuit: danger of fire!
2. Users which may not switched off must be installed near the battery and protected by a fuse(e. g. position lights)
3. Sparking can develop especially in direct current systems during installation and operation. Do not install PV-components in rooms where easy flammable gases mixtures can develop (e. g. by gas bottles, lacquers, solvents). Consult your dealer when in doubt.

12. Adjustment of nominal voltage

Automatic adjustment takes effect to the system voltage when the regulator is installed.

When you pay attention to his instructions, your solar system will give you many years of pleasure. The battery reaches a life of ten years or longer. As the solar module and the charge controller have a considerably higher life age, only the battery has to be exchanged. A defective battery can be recognized, although the above-mentioned charging has already taken place, the over discharge protection would switch off even the user has already started using it.

13. Technical data

Solar charge controller / P/No.	SCF 0606	SCF 0808	SCF 1010	SCF 1515
Max module input short circuit current at 25°C	6A	8A	10A	15A
Max load output current at 25°C	6A	8A	10A	15A
System voltage	12 V / 24 V			
Max. voltage of Solar collector	47 V DC			
Enclosure protection class	IP 32			
Terminal size(fine/single wire)	2.5mm ² / 4mm ²			
Temperature compensation	-4 mV / K / Zelle			
Thermal Protection	85°C			
Ambient temperature allowed	-25°C +50°C			
Weight	165g			
Dimensions l x w x h	130 x 88 x 39 mm			

✱ Specifications are subjected to change without prior notice.

Charging voltage	State of charge SOC	12V system	24V system
Deep discharge warning	SOC<40%	11.7V	23.4V
Load switch-off	SOC<30%	11.1V	22.2V
Shift-in	SOC>50%	12.5V	25.0V
Boost charging (14.4V / 28.8V)	SOC<40%	11.7V	23.4V
Equalization charging (14.7V / 29.4V)	SOC<70%	12.4V	24.8V
End-of-charge voltage(float)	SOC>70%	13.9V	27.8V

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CAUTION

ALWAYS PLACE THE SOLAR CHARGE CONTROLLER IN AN ENVIRONMENT WHICH IS:

- A. WELL VENTILATED.
- B. NOT EXPOSED TO DIRECT SUNLIGHT OR HEAT SOURCE.
- C. OUT OF REACH FROM CHILDREN.
- D. AWAY FROM WATER / MOISTURE, OIL OR GREASE.
- E. AWAY FROM ANY FLAMMABLE SUBSTANCE.
- F. SECURE NO RISK OF FALLING.