

## Operating manual

### Solar charge controller 10 A / 8 A / 6 A

**Please read these instructions completely before installation!**

#### 1. About this manual

This symbol indicates that these operating instructions are part of the product. Read these operating instructions carefully before use, keep them over the entire lifetime of the product, and pass them on to any future owner or user of this product.

This manual describes the installation, function, operation and maintenance of the solar charge controller. These operating instructions are intended for end customers.

A technical expert must be consulted in cases of uncertainty.

#### 2. Safety

The solar charge controller may only be used in PV systems for charging and controlling lead-acid batteries in accordance with this operating manual and the charging specifications of the battery manufacturer.

The solar charge controller may only be connected to the local loads and the battery by trained personnel and in accordance with the applicable regulations. Follow the installation and operating instructions for all components of the PV system.

No energy source other than a solar generator may be connected to the solar charge controller. Follow the general and national safety and accident prevention regulations.

Keep children away from PV systems. Do not use the solar charge controller in dusty environments, in the vicinity of solvents or where inflammable gases and vapours can occur. No open fires, flames or sparks in the vicinity of the batteries. Ensure that the room is adequately ventilated. Check the charging process regularly.

Follow the charging instructions of the battery manufacturer. Battery acid splashes on skin or clothing should be immediately rinse with plenty of water. Seek medical advice.

Do not operate the solar charge controller when it does not appear to function at all. The solar charge controller or connected cables are visibly damaged or loose. In these cases immediately remove the solar charge controller from the solar modules and battery.

#### 3. 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 optimises battery use and significantly extends its service life.

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

Overcharge protection ; Deep discharge protection ; Battery undervoltage protection ; Solar module reverse current protection.

#### 4. Installation

##### 4.1 Mounting location requirements

Do not mount the solar charge controller outdoors or in wet rooms. Do not subject the solar charge controller to direct sunshine or other sources of heat. Protect the solar charge controller from dirt and moisture.

Mount upright on the wall (concrete) on a non-flammable substrate. Maintain a minimum clearance of 10 cm below and around the device to ensure unhindered air circulation. Mount the solar charge controller as close as possible to the batteries (with a safety clearance of at least 30 cm).

##### 4.2 Fastening the solar charge controller

Mark the position of the solar charge controller fastening holes on the wall.

Drill 4 Ø 6 mm holes and insert dowels. Fasten the solar charge controller to the wall with the cable openings facing downwards, using 4 oval head screws M4x40 (DIN 7996).

##### 4.3 Connection

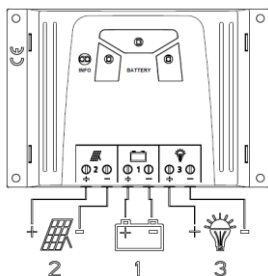
Use an wire size suited to the current ratings of the charge controller, e.g. 6mm<sup>2</sup> for 10A, 5 mm<sup>2</sup> for 8A, 4 mm<sup>2</sup> for 6A, 3 mm<sup>2</sup> for 5A for cable length of 10 m.

An additional external 20A fuse (not provided) must be connected to the battery connection cable, close to the battery pole. The external fuse prevents cable short circuits.

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 non-isolated 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.



incident light (cover it or wait for night).

Ensure that the solar module does not exceed the maximum permissible input current.

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 module symbol), then connect the M- cable. Remove the covering from the solar module.

#### 1st step: Connect 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 present, 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. Insert the external fuse in the battery connection cable.

If the connection polarity is correct, the info LED illuminates green.

#### 2nd step: Connect the solar module

Ensure that the solar module is protected from

#### 3rd step: Connect loads

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. Insert the load fuse or switch on the load.

**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.

#### 4th step: Final work

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

#### 5. LED displays

| LED                | Status                 | Meaning  |
|--------------------|------------------------|--|
| Info LED           | illuminates green      | normal operation   |
|                    | flashes slowly red*    | system fault<br>- too high charging current<br>- overload / short circuit<br>- overheated<br>together with red LED :<br>- too low battery voltage<br>together with green LED :<br>- too high battery voltage |
| Battery red LED    | flashing quickly*      | battery empty, low voltage disconnection prewarning, loads still on  |
|                    | flashing slowly*       | deep discharge protection active (LVD), loads disconnected   |
| Battery yellow LED | illuminates            | battery weak, loads are on   |
|                    | flashes slowly yellow* | LVD reconnection setpoint has not yet been reached, loads still disconnected   |
| Battery green LED  | illuminates            | battery good   |
|                    | flashes quickly green* | battery full, charge regulation active   |

\*flashing slowly: 0,4Hz: 4 times in 10 second, flashing quickly: 3Hz: 3 times in 1 second

#### 6. 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 (e.g.: DIN 57100 Part 410: Prohibition of grounding protective low voltage circuits). Ask your dealer for technical assistance.

#### 7. Lightning protection

In systems subjected to an increased risk of overvoltage damage, we recommend installing additional lightning protection / overvoltage protection to reduce dropouts.

Ask your dealer for technical assistance.

#### 8. Maintenance

The solar charge controller is maintenance-free.

All components of the PV system must be checked at least annually, according to the specifications of the respective manufacturers. Ensure adequate ventilation of the cooling element. Check the cable strain relief. Check that all cable connections are secure. Tighten screws if necessary. Check corrosion on terminals.

#### 9. Faults and remedies

**No display:** Check battery polarity and external fuse. Or battery voltage is too low or battery defective.

**Battery is not charged:** Check if solar module is connected with correct polarity or if short circuit at the solar input. If solar module voltage is lower than battery voltage or if solar module is defective the battery cannot be charged.

**Battery displays jumps quickly:** Battery voltage changes quickly. Large pulse currents cause voltage fluctuation. Battery is too small or defective. Ask your dealer for technical assistance.

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

- \* solar module short circuits
- \* short circuits at load output
- \* reversed battery polarity<sup>\*1</sup>
- \* device overtemperature
- \* reverse solar module polarity<sup>\*2</sup>
- \* excessive load current
- \* solar module overcurrent
- \* overvoltage at the load output

#### 10. Technical Data

| Solar charge controller  | 6 A  | 8 A | 10 A |
|--|--|-----|------|
| <b>Characterisation of the operating performance</b>                 |  |     |      |
| System voltage   | 12 V (24 V)  |     |      |
| Own consumption  | < 4 mA   |     |      |
| <b>DC input side</b>   |  |     |      |
| Open circuit voltage solar module (at minimum operating temperature) | < 47 V   |     |      |
| Module current   | 6 A  | 8 A | 10 A |
| <b>DC output side</b>  |  |     |      |
| Load current   | 6 A  | 8 A | 10 A |
| End of charge voltage  | 13.9 V (27.8 V)                                    |     |      |
| Boost charge voltage   | 14.4 V (28.8 V)                                    |     |      |
| Reconnection voltage (SOC / LVR) <sup>*3</sup>                       | > 50 % / 12.4 V ... 12.7 V<br>(24.8 V ... 25.4 V)  |     |      |
| Deep discharge protection (SOC / LVD) <sup>*3</sup>                  | < 30 % / 11.2 V ... 11.6 V<br>(22.4 V ... 23.2 V)  |     |      |
| <b>Operating conditions</b>  |  |     |      |
| Ambient temperature  | -25 °C ... +50 °C                                  |     |      |
| Maximum relative humidity  | 95%, non condensing                                |     |      |
| Maximum altitude   | 2000 m a. s. l.                                    |     |      |
| Pollution degree   | 2  |     |      |
| <b>Fitting and construction</b>                                      |  |     |      |
| Terminal (fine / single wire)  | 4 mm <sup>2</sup> / 6 mm <sup>2</sup> - AWG 12 / 9 |     |      |
| Degree of protection   | IP 30 / NEMA Type 1                                |     |      |
| Dimensions (X x Y x Z)   | 145 x 100 x 24 mm                                  |     |      |
| Weight   | approx. 150 g                                      |     |      |

<sup>\*1</sup> Solar charge controller is protected against reverse battery polarity together with polarity protected loads. Reverse battery polarity combined with short circuited or polarised load could cause damages in load or regulator

<sup>\*2</sup> The reverse-polarity protection of the solar module in a 24 V system is only provided up to an open-circuit module voltage of 36 V.

<sup>\*3</sup> Lower value for nominal current, higher value for lowest current



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