

3 OFF	ON	Battery became deep-discharged.  Deep-discharged battery was connected to the charger.  The solar panel charges over the allowed voltage.	Load-disconnection is active, load is disconnected.  Automatic system voltage detection; charger switches over to 12V system when battery voltage is less than 18V.  There is no battery connected, only solar panel. The battery fuse is blown. The battery cables are somewhere disconnected. The charge controller is faulty.
4 ON	ON	The Battery is fully charged.  Little or no charging current at all.  Load requires more power than the solar module can deliver.	Advanced warning: load will be disconnected upon reaching the DDP threshold.  The solar module is somewhere disconnected, the module is faulty, dirty or partly/fully covered.  Reduce power requirement or increase the charging capacity.

#### Specifications of DC load output

Nominal voltage:	12 / 24 V
Solar module current:	10 / 20 / 30 A (according to each model)
Load current:	10 / 20 / 30 A (according to each model)
Max. current consumption:	10 mA
- Charging limit, float charge at 25°C:	13,8 V / 27,6 V
- Charging limit, Gas control at 25°C:	14,4 V / 28,8 V
- Gas control activation:	12,3 V / 24,6 V
- Temperature-compensation:	-4 mV/K/Cell
Deep discharge disconnection:	
- Constant:	10,5 V / 21,0 V
- Reset voltage:	12,0 V / 24,0 V
Fuse:	10 / 20 / 30 A (according to each model)
Temperature range:	-25° C ... +40° C
Optional:	
Port:	RS232 Pin 2=TXD 3=RXD 5=GND
LCD display:	1x16 digit, alphanumeric
- Voltage range:	8,00V ... 32,00V +/- 2Digit +/-2% from max. value
- Current range:	- 30,0A ...+ 30,0A +/- 2Digit +/-5% from max. value
- Temperature range:	- 40 °C ...+ 50°C +/- 2Digit +/- 5% from max. value
Dimensions (L×W×H):	190×120×53mm
Weight (without LCD / with LCD):	0,45kg / 0,5kg



## OPERATING INSTRUCTIONS

PSC 10A, 20A, 30A - PSCD 10A, 20A, 30A solar charge controllers



- PWM series regulation
- Automatic system voltage detection 12/24 V
- Temperature-compensated charging with Gas control
- Deep discharge Protection (DDP) with advanced warning
- PV module and DC load disconnection
- Suitable for power sources other than solar cells

Dear Customer,

Thank you for buying our product. You have bought one of the most powerful, compact and reliable units of its class. Please read the operating instructions carefully before use.

#### WARNING!!! Safety Instructions!!!

- Do not use the unit:  
In places, which are dusty, damp, in a high-humidity area (over 80% rel. humidity), at temperatures above 50°C, in areas containing inflammable materials (liquids/solvents, gas). Do not immerse in water.
- Use only in closed, dry areas.
- Should the unit fail to operate, or show signs of not operating properly unplug immediately and make sure that the unit is not put into further operation. Do not use the unit when visible signs of damage - due to transport or inadequate storage are noticeable.
- To prevent the risk of explosion by overcharging, install the battery in a well-ventilated place.
- To prevent a short-circuit between solar charger unit and battery, install a fuse on the positive battery pole.
- Equipment, which on account of its function must not be switched off by means of load disconnection (e.g. navigation lights), must be connected directly to the battery and fused.
- When recharging sealed lead acid batteries, switch off the gas-control (see Factory settings).
- Follow installation instructions strictly when connecting the unit!
- The unit should be disconnected in reverse order (see installation procedures).

#### DESCRIPTION OF OPERATION

The use of lead-batteries is common for the storage of solar energy (photovoltaic solar system). Lead-batteries require protection against overcharging and deep discharging. This unit satisfies both requirements.

#### Protection against deep discharge

Lead-batteries need to be protected against being discharged, otherwise damage can occur to the battery cells. The Solar Charge Controller Unit protects lead-batteries from deep discharging when the required battery power output is not achieved by automatically switching-off. As soon as the batteries are recharged by the solar cells, the load is automatically reconnected.

#### Protection against overcharge

Exceeding the final charging voltage leads to the formation of gas. Gassing leads to the loss of electrolyte inside the battery and can also cause the formation of detonating gas through creating hydrogen. Due to the loss of electrolyte, the plates inside the battery are not covered completely which can lead to battery damage. In case you experience gas formation, eliminate the cause of the problem (please check chart for faults) and check the electrolyte level. The amount of gas depends on the temperature. The inbuilt temperature-sensor automatically regulates the final charging voltage in accordance with the temperature in the area of use/operation. The battery is not fully charged when the final charging voltage is reached. The charging current is then reduced just to the level that the final charging voltage is not exceeded. The charging process - „IU-charging” recharges the batteries evenly and quickly. The PSC charge controller uses PWM (Pulse Width Modulation) series regulation, e.g. the charging limit is regulated by modulating the charging current coming from the solar module. Therefore other charger types can also be connected additionally to the PV input terminal.

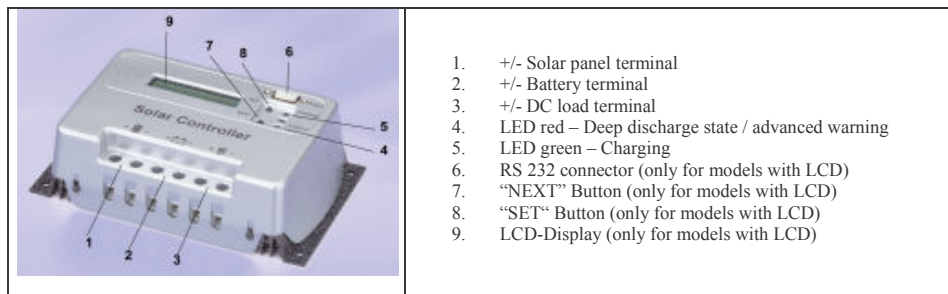
#### Gas control

An over extended use of lead-batteries without a controlled gas-formation can lead to the development of damaging lead-sulphate layers. The Solar Charger Unit controls the gas-formation and therefore prevents the development of the sulphate layers. This process depends upon the temperature and is regulated by the in-built temperature-sensor. The PSC charge controller is suitable for charging Gel, Sealed or Flooded batteries, as the thresholds were carefully chosen the way that the recombination of hydrogen inside the closed cells happens without affecting the pressure vents.

### Temperature compensation

The in-built temperature compensator adjusts and regulates the final charging voltage and gas-formation of the batteries to the temperature in area of use. For that reason the charge controller should be mounted in the same room as the batteries.

### Connection and operating elements



1. +/- Solar panel terminal
2. +/- Battery terminal
3. +/- DC load terminal
4. LED red – Deep discharge state / advanced warning
5. LED green – Charging
6. RS 232 connector (only for models with LCD)
7. “NEXT” Button (only for models with LCD)
8. “SET” Button (only for models with LCD)
9. LCD-Display (only for models with LCD)

**Warning:** Should the terminals be reverse polarity connected to the load output, can even fused units be completely damaged. Each system component must be individually fused.

The Solar Charger Unit should be placed in close proximity to the battery and be sufficiently protected against the weather. Take care to place the battery in a well-ventilated place. To enable the unit to cool properly, the electrical connections should face downwards in order to allow free air ventilation along the rear side. The charge controller must not be installed above a heat-source. Minimum 100mm free space must be allowed above and beneath the unit.

### Installation

Warning: Take care of the right polarity! To guarantee that the unit functions properly it must be connected to the solar generator, the lead-battery and the load. Each part of the system - solar generator, lead battery, load and Solar Charger Unit should correspond in voltage and current with one another. Please check this before installations, when in doubt contact your local dealer! Pay careful attention to the following order of installation instructions:

1. Connect the battery to the corresponding terminals on the Solar Charger Unit. To avoid voltage drop in the cable and the related heat development, please use a suitable flexible cable diameter. Up to 16mm<sup>2</sup> cable can be connected to the terminals. The minimum cable diameter is 1,5mm<sup>2</sup> up to 10A, 2,5mm<sup>2</sup> up to 20A and 4mm<sup>2</sup> up to 30A
2. Always fuse the battery + terminal. Both system components must be installed close together in the same room.
3. Connect the solar module to the corresponding terminals on the Solar Charger Unit.
4. Connect the load to the Solar Charger Unit. The connection-terminals are pictured on the Solar Charger Unit or see diagram.

### Changing the internal fuse

The PSC charge controller has an internal fuse. In case the fuse has burnt, the top cover of the unit must be removed for fuse replacement. To remove cover, all connected cables and the four screws from sides must be removed. After the removal of cover the fuse can be accessed. Caution! By versions with LCD display the upper printed circuit board (PCB) that is fixed to the cover is connected to the lower PCB via bus cable! Please take care while placing back the cover that the LEDs are well in place and the no cable is squeezed in.

### Battery fully loaded

The LEDs indicate the charge level of the batteries, the actual charging status of the solar cells and possible system faults. When the battery voltage is within the operating limit, the upper green LED lights.

### Deep Discharge Protection – advanced warning

When the battery voltage has sunk under its nominal value (12V/24V), the red LED lights together with the green LED as advance indication.

### Deep Discharge Protection (red LED)

When battery deep discharging occurs, all loads are automatically switched off and the red LED lights. When the battery is recharged, the LED stops illuminating and the loads are re-connected. Now the battery is ready to supply power again.

### LCD-Display (only for models with LCD)

After the charge controller is connected to the battery, the initializing takes about 1 sec.

During this time the name of the manufacturer (or local distributor) appears in the display.

Panelectron Ltd.

After the initializing process the display will show the following:

12.34V 0.0A I

The left value shows the battery voltage, the right value shows the battery current. The letter in the right corner indicates the status: L = Charging; E = Discharging.

During the initializing process the null point of the current indicator is balanced. Should there be larger offset values with the time, the null point of the current indicator can be balanced by pressing „Set“ and „Next“ button at the same time. Both the PV module and the DC load will be disconnected for a short time and the null point will be newly calibrated.

Pressing the „Next“ button will bring out further measured values. The next menu shows the current value:

10.0a >> - 10.0A

The left value shows the maximum charging current; the right value shows minimum charging current. The negative sign indicates discharging. To erase the max./min. values press the „Set“ and „Next“ button simultaneously. Then the actual values will be stored in the max./min. memory.

The next menu shows the voltage value:

13.45V >> 11.89V

The left value shows the maximum battery voltage; the right value shows minimum battery voltage. To erase the max./min. values press the „Set“ and „Next“ button simultaneously. Then the actual values will be stored in the max./min. memory.

The next menu shows the actual temperature:

25°C

By pressing the „Next“ button the display will jump back to the original starting point.

### Serial port (only for models with LCD)

The system data can also be accessed via the serial port with the help of a standard 9-pin RS232 cable. Further details can be found in the “read me” file provided with the software. Minimum PC requirements: processor: Pentium, min. 100MHz; min. 16MB RAM memory, operating system: Windows 9X/NT/XP/ME/2000; serial port. For installing the software there should be approx. 4 MB free disc space on the computer. Recommended screen resolution is 1024x768.

### The Solar System fails to function - possible reasons.

Battery terminals are reverse connected: The fuse has blown, replace with a same type. (see „changing the internal fuse“ section).

Module terminals are reverse connected: Avoid at all costs!!!

Load terminals are reverse connected: The equipment can be seriously damaged before the fuse blows. Batteries contain considerable amounts of electrical energy. A short-circuit can result in a large build-up of heat leading to FIRE!

Two LEDs indicate the operating status under different circumstances and possible mal-functions in the Solar Charger Unit.

Green LED	Red LED	Fault	Instructions
1 OFF	OFF	Internal fuse is blown. Battery fuse is blown.	Check fuses. Find the cause of the problem (why blown).
		Load is not supplied although the fuse is OK.	The charge controller is faulty.
2 ON	OFF	Battery is being charged. Battery is not fully charged.	Operating status OK.