

PHOTOVOLTAIC CHARGE CONTROLLER

RSD80



Soluciones Energéticas S.A.

AV Real de Pinto, 146 - 28021 Villaverde Alto, Madrid, Spain

Tlf: +34 915.392.700 Fax: +34 915.050.079

<http://www.solener.com> solener@solener.com

Version 13.06

1.- DESCRIPTION

The **SOLÉNER RSD80** charge controller has been designed and manufactured by **SOLUCIONES ENERGÉTICAS, S.A.** to control battery charge in standalone photovoltaic installations. Its reliability, versatility and ease of use make it an ideal equipment for medium-sized domestic systems, while its remote signaling and communications capacity make it optimal for professional systems. It is compact and easily installed.

It includes an intelligent input diode to prevent reverse current flow from the battery to the solar modules during the night, while maintaining low power loss in normal mode.

2.- INSTALLATION

WARNING: Pay attention to the polarity connection. The regulator by itself is protected, but if the battery is connected with its polarities inverted it might cause damage to the loads (and in extreme cases the output stage). **It is important to observe the following connection sequence during commissioning:**

1. Connect the battery to the charge controller.
2. Connect the photovoltaic module to the charge controller (Positive and negative)
3. Connection of loads to the charge controller.

For disconnection reverse order must be followed.

Tighten terminals well (using a 13 mm socket wrench), if it is not well tighten the passage of electric current will overheat the

terminals, burning the contact. After two or three days retighten them (over time, copper yields slightly).

Although the controller is protected against battery disconnection it is recommended that you do not remove the modules if they are charging, as this can damage the consumption by surge (overvoltage).

The initial charge stage is the equalization charge, it recurs whenever the controller cuts off due to low battery or is restarted again by the user; In gel batteries this stage does not exist.

The temperature probe (a cable that connects to the lower left-hand side) should be left hanging, its purpose is to read the ambient temperature under the charge controller.

The connector functions are described below in section 9.

3.- PRESENTATION

3.1.- LCD (Liquid Crystal Display)

The Liquid Crystal Display (LCD) of the **SOLENER RSD80 controller** offers the end user abundant information on the status of the photovoltaic system. It is of a good size and backlit for easy reading; It includes an energy savings function that reduces lighting when not in use.

The information changes automatically every few seconds, but it offers the possibility of scrolling through the information or

maintaining it on screen more time by using the left and right keys. It offers the possibility to select one of the following languages: Spanish, English, French and Portuguese. The data that appears on the display screen are:

- Serial number and version of the program that is installed.
- Manufacturer's data and contact information.
- Battery voltage and battery type selected.
- System stage and battery state of charge.
- Remaining time for equalization stage (if applicable).
- Ambient temperature and historical minimum/maximum.
- Load and consumption voltage and intensity.
- Load and consumption peaks.
- Energy charged and consumed since the last system reset.
- Date and time.
- Input current reading I_{4-20} .
- Analog input readings An_1 and An_2
- Status of relays
- Average power stored and consumed per week

3.2.- STATUS INDICATORS

The two left LED indicate the status of the controller:

- A yellow flashing LED light indicates through the number of flashes the stage of charge of the charge controller: **One** flash per second indicates **Float** stage, **two** flashes per second indicates **Absorption** stage and **three** flashes per second indicate **Equalization** stage. It remains off while the controller is recovering from a short-circuit and on when there is a high voltage alarm or a power stage is shut off.

- The red LED light turns on when there is a problem that implies disconnection of a power stage (overcurrent, short-circuit, high temperature or voltage). In these cases the controller will try to reinitiate the power stage after a prudent time frame.

3.3.- BATTERY INDICATORS (SEMAPHORE)

The column with three LED lights on the right, indicate the battery status:

- The red LED light flashes when the battery voltage is low. It remains on when for a period longer than 4 seconds the voltage is lower than the consumption disconnection value (recommended by the manufacturer), causing the **shutdown** in the output and activating the equalization cycle. Consumption will automatically reestablish when the battery reaches the **consumption reconnection voltage value**.

- The yellow LED light flashes when the battery is at half capacity.

- The green LED light flashes when the battery is reaching its full capacity. It maintains on when the controller shuts off the input because the battery is fully charged.

The acoustic and visual battery alarms warn that consumption disconnection will take place shortly. The user should minimize or disconnect consumption to extend the autonomy with the remaining battery charge.

A high battery voltage indicates that there is a problem in the installation (battery without electrolyte, bridges in poor condition,

loose connections...). Immediately inform the installation technician if this occurs.

3.4.- RELAY INDICATORS

Each of the remote signalling relay has an associated blue LED, which illuminates when the relay is activated. These LEDs are located next to the eight-terminal connector that leads to the relay contacts, located on the right side of the controller.

4.- SETUP

By pressing the central button you access the Setup menu. This menu will allow you to change the language, change the display contrast, reset counters, set the clock and access the service menu. The service menu is protected by password. The default password is 0000, if it is kept the controller will not ask you for a password; If you change it, take note of the new password because if you forget it you will not be able to enter the service menu again.

From the service menu you can change the password and several other parameters; Amongst them is P25, which is battery type selection. P02 to P24 are for remote signalling.

If you change a parameter, this will not take effect until you press the central key; if you exit using the left key (or if it is left during a period of time without pressing any key) the change will not take effect.

When adjusting time, it is convenient to use the solar time.

5.- COMMUNICATIONS

The controller has a mini USB connector that will allow you to connect it to a computer; When doing so, it will appear as a Virtual Serial Port (the controller must be powered during the process). **WARNING:** the chassis of the connector is connected to the negative of the battery.

Linux systems with kernel 3.0.0 or higher do not need driver; for other systems, driver must be installed prior to connecting the controller to the computer, you can download the driver through our web site (<http://www.solener.com/descargas.html>).

As an option it can have a real serial port (with DB9 connector) instead of a USB to connect the controller to modems or PLC.

The connection parameters are 9600 bauds, 8 bits of data, no parity, one stop bit and RTS/CTS flow control.

Communication protocol is very simple, it uses text commands separated by spaces and finished with an ASCII Line Feed (0x0A) character. To manually connect with the controller you may use the terminal program included with the operating system or PuTTY, which is a free platform. The protocol is available in the link provided in the second paragraph of this section.

For automation you can develop your own program or consult us.

6.- REMOTE SIGNALLING RELAYS

The function of each of the remote signal relays may be chosen from the following chart:

Code	Function
0	Startup of generator, it picks-up when the battery is low.
2	Beacon, it picks-up at night.
4	Low voltage alarm.
6	High voltage alarm.
8	It picks-up when battery is charged (Float Stage)
10	I ₄₋₂₀ input in programmed range
12	An ₁ input in programmed range.
14	An ₂ input in programmed range.
16	Excessive temperature of the controller.
18	Always on.
20	Timer 1 in programmed range.
22	Timer 2 in programmed range.
24	Timer 3 in programmed range.
26	Timer 4 in programmed range.

To obtain the opposite function it is necessary to add 1 to the code. For example, if code 8 makes the relay pick-up when the battery is charged then 9 makes the relay pick-up when the battery is not charged.

By default RL₁ has function 0 (Generator Startup), RL₂ has function 2 (Beacon), RL₃ has function 4 (Low voltage alarm) and RL₄ has function 6 (high voltage alarm).

Electrical specifications of the contacts are in section 8.2. Please note that it is not specified for voltages greater than 125 V_{ac}.

7.- VOLTAGE OF BATTERIES

PARAMETER	SOLAR OPEN	OPEN TRACTION	OPEN STARTUP	SOLAR GEL
HIGH VOLTAGE ALARM	15,75	15,88	15,75	15,56
EQUALIZATION STAGE RANGE	14,70 / 15,00	15,00 / 15,25	14,70 / 15,00	-
ABSORPTION STAGE RANGE	14,70	15,25	14,40	14,70
FLOAT STAGE RANGE	13,80 / 14,40	13,80 / 14,40	13,80 / 14,40	13,80 / 14,40
DEEP RECHARGE	12,62	12,62	12,62	12,62
LOW VOLTAGE ALARM	11,12	11,37	11,25	11,12
CONSUMPTION DISCONNECTION	11,00	11,25	11,12	11,00
CONSUMPTION RE-CONNECTION	13,00	13,00	13,00	13,00

- The voltages listed above are for 12 V operation; If the system operates at 24 V you have to multiply them by two, and if it is 48 V, by four.

- These voltages are for 25 °C. The charge controller is temperature compensated, which means that the actual voltage will be slightly different.

- If battery is sealed (Gel or Absorbed Glass Mat –AGM- type) you must choose the fourth column. If it is a wet or flooded battery and it is not included in the above chart, you should consult manufacturers data and choose the type that most matches the specifications above.

8.- FEATURES

8.1.- Physical

Length × Width × Height	245 × 140 × 60 mm
Weight	1,65 kg
Enclosure	Galvanized steel
Paint	Furnace-painted epoxy
Protection Rating	IP32
Operating Range	-10 to 50 °C
Terminals	8 mm screw with a 13 mm nut

8.2.- Electrical

Nominal Voltage	12/24 V _{dc}	48 V _{dc}	
Battery Voltage range	10-18	20-36	40-72 V _{dc}
Open Circuit Voltage (V _{oc})	50 V _{dc}	60 V _{dc}	105 V _{dc}
Maximum current during charge/discharge	80/80 A		
Analog Inputs (An ₁ and An ₂)	0 a 10 V _{dc} , R _{in} = 100 kΩ		
Current Input (I ₄₋₂₀)	0 a 27 mA, V _{oc} = 9 V		
Autoconsumption	70/39 mA	21 mA	
Maximum charge/discharge loss	20/5 W	34/15 W	
Relay contacts (resistive load)	1 A at 30 V _{dc} , 0,5 A at 125 V _{ac}		

8.3.- General

Blocking Diode	Yes
Temperature compensation	Yes
Control	Series
Communications	USB (RS232 optional)
Protocol	ASCII commands
Remote Signal	4 potential free contacts
Real time watch	Yes

These features may be modified with no previous notification. The real time watch has a special rechargeable battery,

that does not require maintenance but only maintains the hour for a couple of days.

9.- Connectors

Counting of Connectors terminals start from the top part of the controller. Left side connectors, from top to bottom are:

Terminal	Function
1	Positive of 4 to 20 mA connection loop.
2	Negative of 4 to 20 mA connection loop.

Terminal	Function
1	0 to 10 V (An ₁) Input
2	0 to 10 V (An ₂) Input
3	Common

The connector with five terminals is reserved for a future expansion. To avoid confusion, the temperature probe, located at the bottom, is different from others.

The USB connector is located at the right side, and beneath is the connector that provides access to the remote signal relays.

Terminal	Function
1	RL ₁ contact (maximum 1 A resistive, see section 8.2)
2	
3	RL ₂ contact (maximum 1 A resistive, see section 8.2)
4	
5	RL ₃ contact (maximum 1 A resistive, see section 8.2)
6	
7	RL ₄ contact (maximum 1 A resistive, see section 8.2)
8	

14.- WARRANTY

SOLUCIONES ENERGÉTICAS, S.A. ensures that its products comply with all written specifications in this manual.

The warranty period of **SOLÉNER** products are 2 years, which will begin to take effect from product shipment date from **SOLUCIONES ENERGÉTICAS, S.A.** or, if it is sold to an authorized retailer, from the authorized retailer shipment date to the customer.

SOLUCIONES ENERGÉTICAS, S.A. may, at its discretion and cost, repair or replace products for new or reconditioned ones, provided they are returned by the buyer together with date and proof of purchase.

If **SOLUCIONES ENERGÉTICAS, S.A.**, after examining and testing any product returned by the buyer to be repaired or replaced, finds, that such product is not faulty, he will inform the customer and will dispose of the product according to customers instructions with costs bared by the customer, and the customer shall pay to **SOLUCIONES ENERGÉTICAS, S.A.** the costs incurred to examine and test the product according to current tariffs.

The warranty is limited solely to the repair (materials and labor) of the equipment, in no case includes travel expenses, freight or shipping costs, or any damage caused by the use of or inability to use the equipment. The use of our products in life support devices without the express written permission of our company President is specifically prohibited.

The use or continued possession of the products after the expiration of the warranty period, shall be deemed as conclusive evidence that the warranty has been fulfilled to the full satisfaction of the buyer.

The warranty set forth above shall not apply to the faults or defects caused by misuse, abnormal use or product abuse, or by negligence, alteration, improper installation, opening, unauthorized modification, inadequate testing, entry of foreign bodies, animals or gases, accidents or external causes to the product, including those of force majeure such as earthquakes, hurricanes or floods.

In case of non acceptance of the warranty terms and conditions, equipment must be returned in a term not exceeding 15 days with all original accessories and in its original packaging.