

Operating manual

Solareg II BASIC



Microcontroller-controlled temperature difference controller for solar thermal systems

Explanation of the graphic symbols



Attention!
Symbol indicates possible dangers and errors



Attention 230V~ voltage!
Symbol indicates risks posed by lethally high voltages.



List



Please note!



Information for handling / special features







Implementation / procedure



Test / check

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1 Application area / device features

1.1 Application area

The SOLAREG II BASIC controllers are high-performance microprocessor-controlled units for controlling the functions of solar thermal systems. The SOLAREG II BASIC perfectly controls solar power systems equipped with one collector and one storage tank.

The controllers are designed for use in dry rooms as well as residential, business and commercial applications. Prior to commissioning the device, make sure to verify that the intended use complies with the applicable regulations.

1.2 Device features

The SOLAREG II generation of controllers is equipped with the following features:

- Intuitive operating menu with graphic symbols and four operating buttons
- Adjustable values
- Integrated operating hours counter for storage tank charging
- Solar circuit pump RPM controll or switching controll
- Extensive functions for system monitoring that display symbols to indicate errors and faults
- Storage of all values even during a prolonged mains power supply outage
- Various protective functions, such as system protection, collector protection, recoling and flow monitoring
- Generous wiring space

Available accessories:

- Temperature sensor PT1000
- Sensor connection box
- Immersion sleeves

2 Safety instructions

- Always completely disconnect the device from the operating voltage before performing installation or wiring work on the electrical equipment. Never mix up the connections of the protective low voltage areas (sensor, flow sensor) with the 230V connections. Otherwise, the device will be destroyed. The device and the connected sensors may carry deadly voltages.
- Solar power systems can reach high temperatures. Such temperatures pose a risk of burns! Exercise caution when installing the temperature sensors!
- Mount the SOLAREG II controller in a position where it will not be subjected to excessive operating temperatures (> 50°C) by any external heat sources. For safety reasons, the system may only remain in manual operation for testing purposes. In this operating mode, the system does not monitor for maximum temperatures and sensor functions. If there is any recognisable damage to the controller, cables or the connected pumps and valves, the system must not be started.



All installation and wiring work must only be carried out on the controller when the device is disconnected from the power supply. The SOLAREG II must only be connected and commissioned by qualified personnel. In doing so, the applicable safety regulations must be observed.



The controller must only be installed in dry and non-explosive areas. Mounting the controller on an inflammable surface is prohibited



Prior to switching on or commissioning the device: make sure to close the cover until both sides securely lock into place!

3 Mounting the device

3.1 Opening the device

Prior to opening the device, make sure to disconnect the mains voltage and ensure that it cannot be switched back on again. The upper part of the housing is locked to the lower part using two latches. Pull the side pieces (cover plates) of the upper part of the housing outwards (see picture) to unlatch it and upwards until the cover plate is opened.



3.2 Wall mounting

The device is mounted on the marked points. A drilling template is provided with the device. Insert the "Quick Info" card provided with the device into the pocket provided on the back of the device. The "Quick Info" card provides the user with an overview of the functions to facilitate rapid device operation.




4.2 Operating the device





The SOLAREG II controller is convenient and easy to operate using four operating buttons. Using the operating buttons, you can:

- Access display values
- Perform device settings

The graphic display symbols allow you to easily navigate through the operating structure.

The operating buttons have the following functions:


 The display illuminates when any button is pressed.










Operating buttons	Function	Description
	"Up" „+“	<ul style="list-style-type: none"> ■ Increase menu items Value change: increases the displayed value by 1; when the button is held longer, the value increases continuously
	"Scroll left" "Exit" "Cancel"	<ul style="list-style-type: none"> ■ Scroll left in the main menu ■ Exit a menu ■ Exit a menu item ■ Cancel a value change without storing it
	"Access" "Down" "_"	<ul style="list-style-type: none"> ■ Access a main menu, Decrease menu items ■ Value change: decreases the displayed value by 1; when the button is held longer, the value decreases continuously
	"Scroll right" "Select" "Confirm"	<ul style="list-style-type: none"> ■ Scroll right in the main menu ■ Select a menu item ■ Confirm a value change and store it

5 Menu structure

5.1 "Info" menu







The following measured and yield values are displayed in the Info menu:

 The number of displayed values depends on the activated additional functions.

Display e.g.		Meaning	Can be reset
75 °C		Displays current collector temperature	No
min 12 °C		Displays minimum collector temperature can be reset to the current temperature	Yes
max 105 °C		Displays maximum collector temperature can be reset to the current temperature	Yes
52 °C		Displays current storage tank temperature	No
min 40 °C		Displays minimum storage tank temperature can be reset to the current temperature	Yes
max 67 °C		Displays maximum storage tank temperature can be reset to the current temperature	Yes
60 °C		Displays the current temperature - S3	No
1234 h		Operating hours for charging storage tank Can be reset to 0 h	Yes

5.2 "Programming" menu




The operating parameters are displayed and can be changed, if necessary, in the Programming menu. The preset values generally ensure fault-free system operation.


Display e.g.		Meaning	Value range	Typical setting	Current setting
max 65 °C		Storage tank: Maximum permissible temperature	15–95°C	65°C	
dT max 7K		Storage tank: Switch-on difference	3–40K	7K	
dT min 3K		Storage tank: Switch-off difference	2–35K	3K	
min 100	 	Set the minimum pump capacity using the RPM control 100% = RPM control off	30%–100%	100%	

5.3 "Manual operation" menu

Automatic operation is switched off during manual operation. The outputs can be manually switched on and off for servicing and testing purposes.

Once the menu has been exited or after 8 hours, automatic operation is reactivated.

Display 	Meaning	Value range
 	Manually switching on / off the switching output A1 (pump 1)	0 = Off 1 = On


 *Settings and changes in this menu must only be carried out by a specialised technician. Incorrect settings can damage or adversely affect the function of the solar power system.*

5.4 "Basic Setup" menu

The hydraulic diagrams and additional functions are displayed in the Basic Setup menu. Settings must only be changed by a specialised technician. Settings may only be adjusted in the menu:

a) within one minute after the device has been switched on or

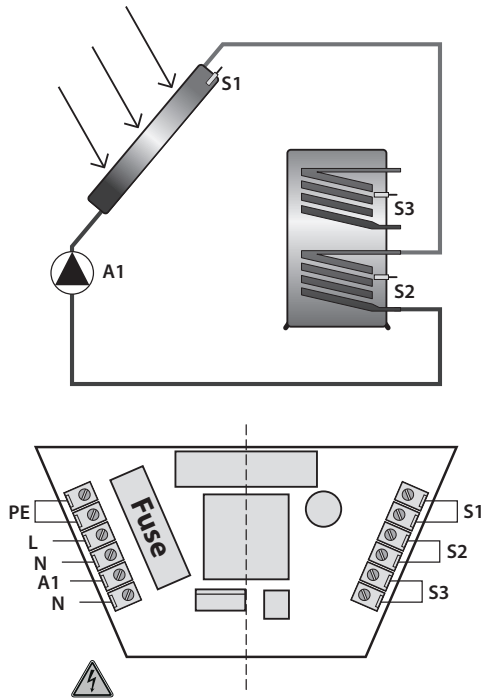
b) after simultaneously pressing the buttons: 

 *Settings and changes in this menu must only be carried out by a specialised technician. Incorrect settings can damage or adversely affect the function of the solar power system.*

Display Line	Value	Meaning	Value range	Factory setting	Current setting
0	0	Collector protection function	0 = Off 1 = On	0 = Off	
1	120 °C	Collector protection function	110–150°C	120°C	
2	0	Recooling function (only if the collector protection is on)	0 = Off 1 = On	0 = Off	
3	40°C	Recooling temperature	30–90°C	40°C	

6 System diagram

1 collector, 1 storage tank



230V connections

- | | |
|----|---|
| L | Mains phase |
| N | Neutral conductor - mains and outputs |
| A1 | Solar circuit pump (switching output 1) |

Sensor connections

- | | |
|----|---------------------------|
| S1 | Collector sensor |
| S2 | Lower storage tank |
| S3 | General temperature point |




Controller functions

7.1 General controller functions

The controller compares the temperatures of the various measuring points and optimally charges the storage tank. If the collector temperature exceeds the storage tank temperature, the solar circuit pump is switched on. Monitoring and protection functions ensure safe operation.

7.1.2 RPM control

The output A1 can be operated using an RPM control.

„Programming“ menu 			
Display	Meaning	Value range	Typical setting
min 100	 	Set the minimum pump capacity using the RPM control 100% = RPM control off	30% – 100% 100%

7.2 Protective functions

The controller is equipped with the following protective functions.

7.2.1 Collector protection


If the storage tank has reached the set maximum temperature and the collector temperature exceeds the set collector protection temperature (line 1), the solar circuit pump is switched on. The solar circuit pump is switched off once the collector temperature is 10K below the maximum value.

In this case, the storage tank is charged up to 95°C regardless of the set maximum temperature.

7.2.2 Recooling (Holiday function)

The collector protection function is only effective if the storage tank temperature is below the temperature limit (95°). Therefore, during the holiday period, for example, the storage tank is discharged at night to the set recooling temperature.

Make sure not to activate this function together with the backup heating!

"Basic Setup" menu 				
Display	Meaning	Value range	Factory setting	
Line	Value			
0	0	Switches on or off the collector protection function	0 = Off 1 = On	0 = Off
1	120 °C	Temperature at which the collector protection function is activated	110 – 150°C	120°C
2	0	Switches on or off the recooling function (only if the collector protection is on)	0 = Off 1 = On	0 = Off
3	40°C	Temperature to which the storage tank is recooled once the collector protection function is activated	30 – 90°C	40°C



Settings and changes in this menu must only be carried out by a specialised technician. Incorrect settings can damage or adversely affect the function of the solar power system.

7.2.3 System protection


If the collector temperature exceeds the collector protection temperature (see 7.2.2) by 10K, the solar circuit pump is switched off to protect the system components.

If the collector temperature drops below the collector protection temperature, the solar circuit pump is switched on. The function is always activated.

8 System monitoring

If an error occurs, the flashing  symbol is generally displayed.

8.1 Sensor monitoring

The connected sensors and sensor cables are monitored for interruptions and short-circuits. Errors are indicated by the  symbol. You can find the error source by scrolling up or down the Info menu.

8.2 Flow monitoring

The controller is programmed to display a message if the flow is interrupted, e.g. pump fault or if vapour is in the system. This message, however, does not switch off the pump.

"Basic Setup" menu

Display

Meaning













No circulation in the solar circuit

9 Troubleshooting

System faults are distinguished into two general categories:

- Faults that are automatically detected by the controller and therefore can be displayed using error messages
- Faults that the controller cannot detect

9.1 Faults with error messages



Error indication in the display	Possible causes	Measures
 	<ul style="list-style-type: none"> ■ Sensor cable is interrupted 	<ul style="list-style-type: none"> 🔧 Check cable
 Flashing	<ul style="list-style-type: none"> ■ Defective sensor 	<ul style="list-style-type: none"> 🔧 Check sensor resistance and replace sensor if necessary
 	<ul style="list-style-type: none"> ■ Short-circuit in the sensor cable 	<ul style="list-style-type: none"> 🔧 Check cable
 Flashing	<ul style="list-style-type: none"> ■ Defective sensor 	<ul style="list-style-type: none"> 🔧 Check sensor resistance and replace sensor if necessary
Circulation error: No flow SFlb	<ul style="list-style-type: none"> ■ Error in the pump connection 	<ul style="list-style-type: none"> 🔧 Check wiring
 +  Flashing	<ul style="list-style-type: none"> ■ Defective pump 	<ul style="list-style-type: none"> 🔧 Replace pump
	<ul style="list-style-type: none"> ■ Air in the system 	<ul style="list-style-type: none"> 🔧 Deaerate the system
	<ul style="list-style-type: none"> ■ Defective flow meter 	<ul style="list-style-type: none"> 🔧 Check whether the flow meter impeller moves freely when the system is running (if visible)
Additional display for energy yield measurement:	<ul style="list-style-type: none"> ■ Defective connection to the flow meter 	<ul style="list-style-type: none"> 🔧 Check cable
SFlb	<ul style="list-style-type: none"> ■ Sensor cable is interrupted 	<ul style="list-style-type: none"> 🔧 Check cable
 	<ul style="list-style-type: none"> ■ Defective sensor 	<ul style="list-style-type: none"> 🔧 Check sensor resistance and replace sensor if necessary



Faults that affect the 230V/A mains power supply must only be remedied by a specialist!

9.2 Faults without error messages

Faults and malfunctions that cannot be displayed as well as possible causes and their error source can be identified using the following table. If you cannot remedy the fault using the description below, contact the supplier or installer.

Problem	Possible causes	Measures
Display does not function 	<ul style="list-style-type: none"> ■ 230V mains voltage not available 	<ul style="list-style-type: none"> 🔧 Switch on or connect controller 🔧 Check the connection's main fuse
	<ul style="list-style-type: none"> ■ Defective fuse inside the device 	<ul style="list-style-type: none"> 🔧 Check the fuse*, replace with a new type 2A/T, if necessary. 🔧 Check the 230V components for short-circuits
	<ul style="list-style-type: none"> ■ Defect device 	<ul style="list-style-type: none"> 🔧 Contact the supplier
Outputs are not switched on	<ul style="list-style-type: none"> ■ Controller is in manual operation 	<ul style="list-style-type: none"> 🔧 Exit "Manual" operation.
	<ul style="list-style-type: none"> ■ Switch-on condition is not satisfied. 	<ul style="list-style-type: none"> 🔧 Wait until switch-on condition is satisfied.
"Pump" symbol rotates, but the pump is not on 	<ul style="list-style-type: none"> ■ Connection to the pump interrupted. 	<ul style="list-style-type: none"> 🔧 Check the cable leading to the pump
	<ul style="list-style-type: none"> ■ Pump is blocked. 	<ul style="list-style-type: none"> 🔧 Free the pump
	<ul style="list-style-type: none"> ■ No voltage present at the switching output. 	<ul style="list-style-type: none"> 🔧 Contact the supplier.
Temperature display strongly fluctuates at short intervals	<ul style="list-style-type: none"> ■ Sensor cables are installed near the 230V cables 	<ul style="list-style-type: none"> 🔧 Relocate sensor cables, shield sensor cables
	<ul style="list-style-type: none"> ■ Long sensor cables extended without shielding 	<ul style="list-style-type: none"> 🔧 Shield sensor cables
	<ul style="list-style-type: none"> ■ Defect device 	<ul style="list-style-type: none"> 🔧 Contact the supplier

10 SOLAREG II Specifications

Housing

Material	100% recyclable ABS housing for wall mounting
Dimensions L x W x D in mm, weight	175 x 134 x 56; approx. 360 g
Protection class	IP20 according to DIN 40050, IEC 529, VDE 0470, EN 60529

Electrical specifications

Operating voltage	AC 230 Volts, 50Hz, -10 – +15%
Radio interference level	N according to VDE 0875
Max. cable cross-section 230V connections	2.5 mm ² fine-wire/single wire
Temperature sensor / temperature range	PT1000 1 kΩ at 0°C, -25°C - 200°C
Testing voltage	4 kV 1 min according to EN 60730/DIN, VDE 0631, IEC 60664/IEC
Output Voltage	230V~
Power - switching output	1 A / approx. 230VA for cos φ = 0,7-1,0
Fuse protection	Fine-wire fuse 5 x 20mm, 2A/T (2 amperes, delayed-action fuse)

Miscellaneous

Operating temperature	0 – 50°C
Storage temperature	-10 – +65°C
Humidity	max. 60 %



Subject to change in accordance with technical advances!

11 Resistance table PT1000

The temperature sensors can be checked for proper function using the following temperature resistance table and an ohmmeter:

Temperature in °C	Resistance in Ohm	Temperature in °C	Resistance in Ohm
-30	882	60	1232
-20	921	70	1271
-10	960	80	1309
0	1000	90	1347
10	1039	100	1385
20	1077	120	1461
30	1116	140	1535
40	1155	200	1758
50	1194		

12 Warranty conditions

The SOLAREG II controllers are carefully produced and tested on an automatic testing station. If any failures occur, first check if there are any operation / setting or system errors. Furthermore, check the pump and temperature sensor connections. PROZEDA GmbH provides a 2-year warranty starting at the date of purchase and according to the following conditions.

- a) The warranty comes into effect if the purchased good exhibits a material or quality defect. If the defect is caused by improper handling, by exceeding the permitted values stated in the specifications, improper wiring, invalid technical modifications to the device performed by the buyer or by another company other than PROZEDA GmbH, the warranty shall be void.
- b) The warranty requires a written notice that describes the defect in detail as well as a copy of the customer invoice.
PROZEDA GmbH can choose to fulfil the guarantee, at its own discretion, by one of the following measures
 - Repair (reconditioning) or
 - Delivery of a fully functional replacement productThe device shall be repaired within 1 month after PROZEDA GmbH has received it.
If the device is not repaired within the two repairs attempts, the buyer is entitled to delivery of a fully functional replacement product.
If a replacement product is delivered, a new warranty that corresponds to these conditions shall come into effect.
- c) Any further warranty (redhibitory action, reduction of price) is excluded.

Warranty claims may only be submitted by the customer and are non-transferable. If a defect occurs during the warranty period, please contact the supplier / installer. When returning the device for warranty service, please make sure to send a description of the error and, if possible, the system diagram along with the wiring diagram.

13 Declaration of conformity

We, Prozeda GmbH, declare under our sole responsibility that the SOLAREG type 1316 product complies with the following standards:

DIRECTIVE 2004/108/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 15 12.2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC

Law on the electromagnetic compatibility of equipment (EMC) of 26 February 2008

DIRECTIVE 2006/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 December 2006 on the approximation of the laws of the Member States concerning electrical equipment for use within certain voltage limits

DIN EN 61326-1, VDE 0843-20-1:2006-10 Electrical measurement, control and laboratory use - EMC requirements - Part 1: General requirements (IEC 61326-1:2005); German version EN 61326 -1:2006

DIN EN 61326-2-2, VDE 0843-20-2-2:2006-10 Electrical measurement, control and laboratory use - EMC requirements - Part 2-2: Particular requirements - Test, operating conditions and performance requirements for portable test, measurement and monitoring equipment for use in low voltage power supply systems (IEC 61326-2-2:2005); German version EN 61326-2-2:2006