Installation, Wiring and Operation Instructions

REGULUS SRS3 Controller

CE

Regulus

EN
v. 2.0

CONTENTS

This Instruction Manual applies to the following hardware version:

SRS3 V2

1 output mechanical relay, 230VAC
1 output electronic relay with a standard pump speed control
1 PWM/0-10V output for low-energy pumps
3 inputs for Pt1000 temperature sensors

Safety Instructions

A.1 Declaration

The manufacturer declares that the SRS3 Solar Controller is marked with the CE mark and conforms to the following relevant safety regulations:

- Directive 2006/95/ES - EC low voltage directive (LVD)
- Directive 2004/108/ES - EC electromagnetic compatibility directive (EMC)

A.2 General Information **- please read carefully!**

These installation and operating instructions contain basic instructions and important information regarding safety, installation, commissioning, maintenance and the optimal use of the unit. Therefore these instructions must be read completely and understood by the installation technician/specialist and by the system user before installing, commissioning and operating the unit. The installation shall be done in compliance with valid standards and rules. The controller does not under any circumstances replace any safety devices (e.g. safety valve, air vent valve etc.) to be installed into a solar circuit! Installation of the unit may only be carried out by a specialist who is trained on the required level.
For the user: Make sure that the specialist gives you detailed information on the function and operation of the controller. Always keep these instructions in the vicinity of the controller. Any changes to the controller or tampering with may pose a risk to safe operation of the appliance and to the complete solar system.

A.3 Explanation of symbols

Failure to observe these instructions can result in danger to life from electric voltage.

Failure to observe these instructions can result in serious damage to health such as scalding, or even life-threatening injuries.

Failure to observe these instructions can result in destruction of the unit or the system, or damage to the environment.

Information especially important for the function and optimal use of the unit and the system.

A.4 Changes to the Controller

- No interference to the controller is allowed except for when approved by the Manufacturer in writing.
- It is forbidden to install any additional device into the controller that has not been tested together with the controller.
- The controller shall not be used after an accident when its functions may have been affected – e.g. after a fire. The controller shall be switched off immediately.
- Use original spare parts only.
- Marking of the Manufacturer and Distributor shall not be altered or removed.
- All adjustments shall be done in compliance with this Guide.

Description

B.1 Specification

Electric specification:

Mains voltage	230VAC +/- 10%
Mains frequency	50 - 60Hz
Power consumption	1,5W - 2,3W
Internal fuse	T2A / 250V slow blow
IP protection	IP40
El. protection class	II
Overvoltage category	II
Pollution degree	II

	SRS3
Mechanical relay 460VA (AC1), 460W /AC3)	1 (R2)
Electronic relay min 5W, max.120W pro AC3)	1(R1)
Pt1000 sensors, from -40 °C to +300 °C	3

Permissible cable lengths for sensors and accessories:

Solar collector and outdoor sensor	<30m
Other Pt1000 sensors	<10m
PWM / 0...10V	<3m
Electronic relay	<3m
Mechanical relay	<10m

Clock backup period 24hod

Permissible ambient conditions:

Ambient temperature:	
for controller operation	0°C...40 °C
for transport/storage	0°C...60 °C
Air humidity:	
for controller operation	max. 85% rel. humidity at 25 °C
for transport/storage	no moisture condensation permitted

Other specifications and dimensions:

Housing design	3-part, ABS plastic
Installation methods	wall installation, optionally panel installation
Overall dimensions	163mm x 110mm x 52mm
Installation aperture dimensions	157mm x 106mm x 31mm
Display	fully graphic display, 128 x 128
Light diode	multicolour
Operation	4 entry keys

Temperature sensors:

°C	0	10	20	30	40	50	60	70	80	90	100
Ω	1000	1039	1077	1116	1155	1194	1232	1270	1308	1347	1385

B.2 Description

SRS3 Controller is designed for automatic control of solar thermal systems. The SRS3 model is intended to control solar systems with up to 2 independent solar arrays and one or two heat sinks. The heat sink can be a storage water heater, a heat exchanger for a swimming pool, and a thermal store for heating. All hydraulic variants are described in Chapter 2.

- both graphics and texts on a backlit display
- simple viewing of the current measurement values
- approximate solar heat measurement
- analysis and monitoring of the system also by means of statistical graphics
- extensive setting menus with explanations
- menu lock can be activated to prevent unintentional setting changes
- usual preset parameters in factory setting
- further measurement and switching applications using a temperature difference and a thermostat function

B.3 Scope of supply

- SRS 3 Controller
- 3 screws 3.5 × 35 mm for wall installation
- 6 strain relief clips with 12 screws
- replacement fuse T2A/250V
- 3 Pt1000 temperature sensors

B.4 Disposal

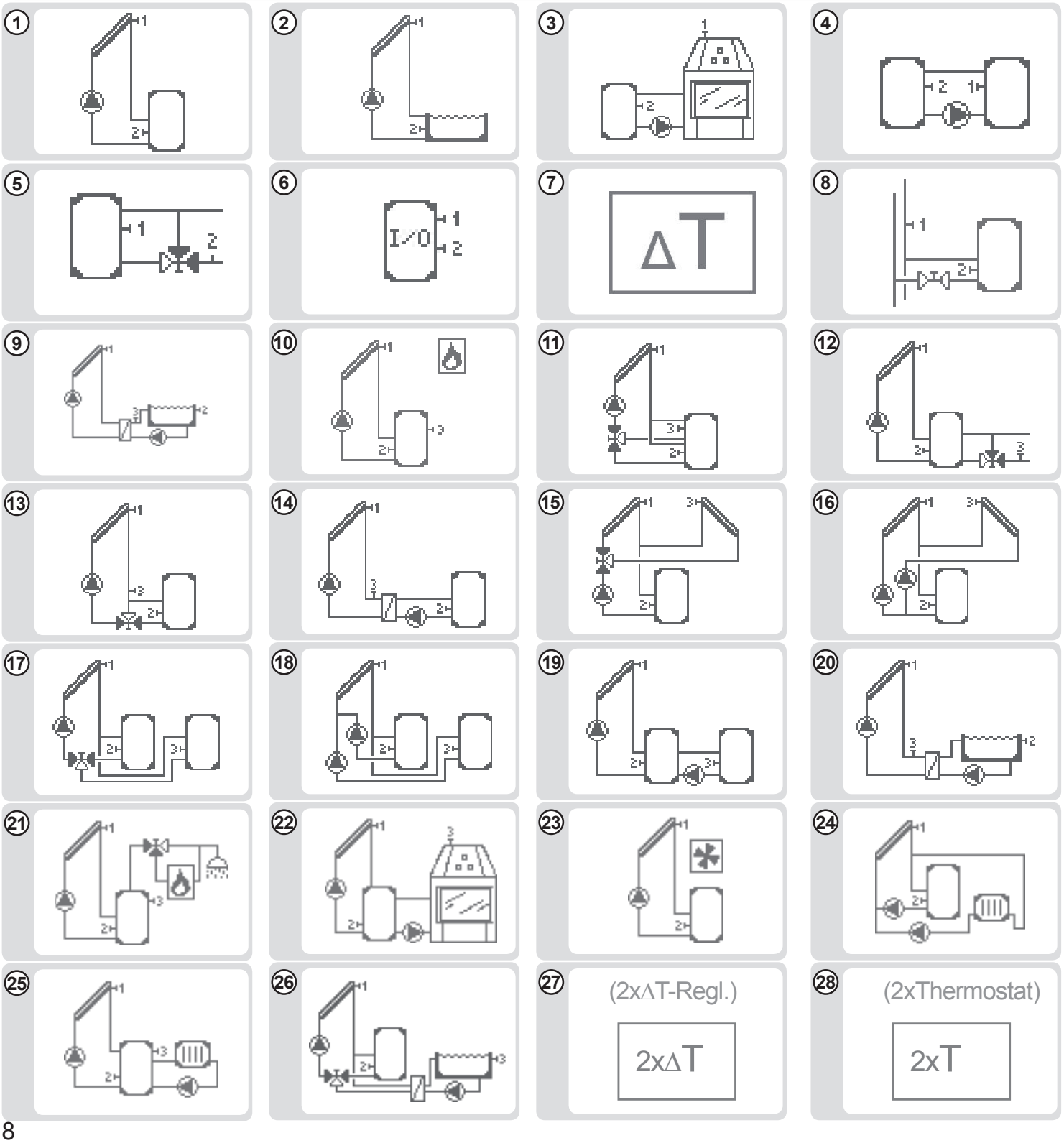
IMPORTANT INFORMATION ON DISPOSAL IN COMPLIANCE WITH THE EUROPEAN DIRECTIVE 2002/96/ES

WEEE registration number: 02771/07-ECZ

European Directive 2002/96/EC requires that the equipment bearing this symbol on the product and/or its packaging must not be disposed of with unsorted municipal waste. The symbol indicates that this product should be disposed of separately from regular household waste streams. It is your responsibility to dispose of this and other electric and electronic equipment via designated collection facilities appointed by the government or local authorities. Correct disposal and recycling will help prevent potential negative consequences to the environment and human health. For more detailed information about the disposal of your old equipment, please contact your local authorities, waste disposal service, or the shop where you purchased the product.

B.5 Hydraulic variants

1. Solar system with a storage tank
2. Solar system with a directly connected swimming pool
3. Solid-fuel boiler
4. 2 storage tanks with a pump
5. Return line preheating
6. Thermostat
7. Differential ΔT controller
8. Two-way valve
9. Solar system with a swimming pool via heat exchanger
10. Solar system with thermostat for heating or cooling a storage tank
11. Solar system with a thermally stratified storage tank
12. Solar system with return line preheating
13. Solar system with a by-pass
14. Solar system with a heat exchanger
15. Solar system with 2 collector arrays (East/West)
16. Solar system with 2 collector arrays and 2 pumps
17. Solar system with 2 storage tanks and a zone valve
18. Solar system with 2 storage tanks and 2 pumps
19. Solar system with two storage tanks and a heat exchange pump
20. Solar system with a swimming pool, heat exchanger, prim. circ. sensor
21. Solar system + zone valve + thermostat
22. Solar system + solid-fuel boiler
23. Solar system + cooling 1
24. Solar system + cooling 2
25. Solar system + cooling 3
26. Solar system with a swimming pool and storage tank
27. 2 temperature difference controllers 2×ΔT (no solar functions)
28. 2 thermostats (no solar functions)

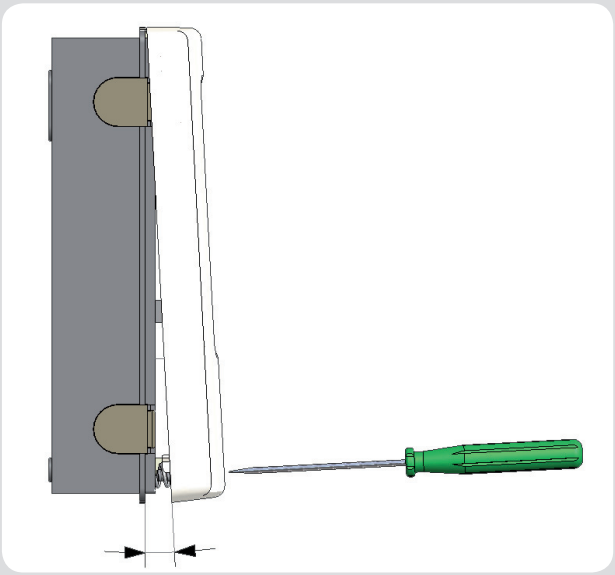


C.1 Wall installation

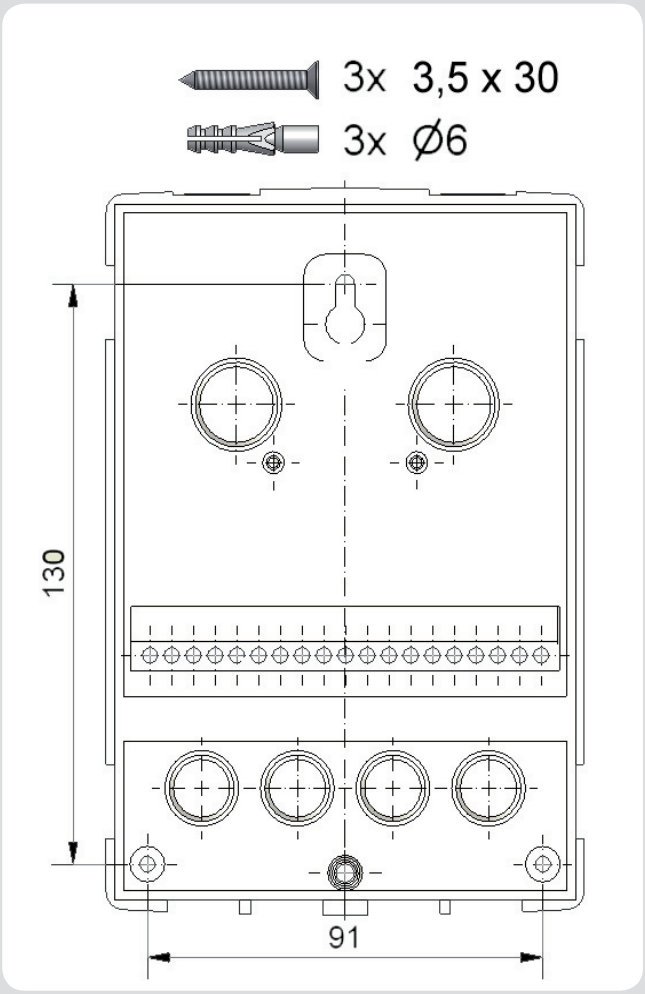
Warning

Install the controller in dry areas only .

C.1.1



C.1.2



Installation instructions:

1. Unscrew cover screw completely.

2. Carefully pull upper part of housing from lower part.

3. Set the upper part of housing aside, being sure not to damage the electronics when doing so.

4. Hold the lower part of the housing up to the selected position and mark the 3 mounting holes. Make sure that the wall surface is as even as possible so that the housing does not become distorted when it is screwed on.

5. Mark the position on the wall with a pencil. Using a drill and size 6 bit, drill 3 holes at the points marked on the wall and push in the plugs.
Fig. C 1.1.

6. Insert the upper screw and screw it in slightly.

7. Fit the upper part of the housing and insert the other two screws

8. Align the housing and tighten the three screws.

C.2 Electrical wiring

Before working on the unit, switch off the power supply and secure it against being switched on again! Check for the absence of power! Electric wiring may only be done by a specialist in compliance with valid rules. Do not use the controller if its case shows visible damage.

Low-voltage cables such as temperature sensor cables must be routed separately from mains voltage cables. Feed temperature sensor cables only into the left-hand side of the unit, and mains voltage and relay cables only into the right-hand side.

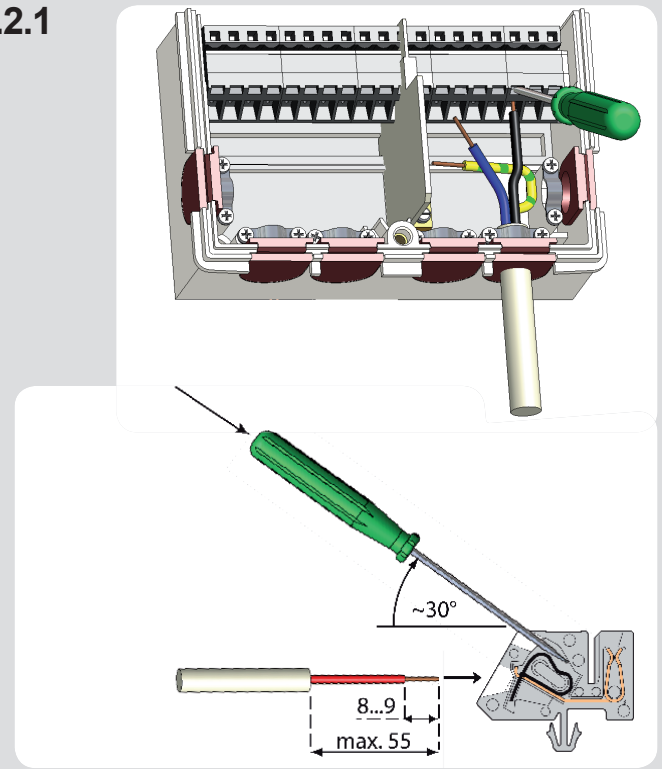
The controller is not equipped with a mains switch. For this purpose please use e.g. a circuit breaker.

The cables being connected to the unit must not be stripped by more than 55 mm, and the cable jacket must reach into the housing just to the other side of the strain relief.

With hydraulic variants D1-D8 the relays R1 and R2 are switched on simultaneously. This enables to connect another heat sink to relay R2. If speed control is set for D1, then relay R2 is on during the purge period.

Wiring instructions:

C.2.1



C 2. 1 Wiring instructions:

1. Select a suitable hydraulic scheme (D.1 to D.20).

2. Open the controller as described in C1

3. Strip the cable by 55 mm max., insert and fit the cable strain relief. Strip the last 8-9 mm of all the wires (Fig. C 2.1)

4. Open the terminals using a flat screw-driver (Fig. C 2.1) and wire the leads following the diagram.

5. Refit the upper housing part and fasten with screw.

6. Switch on mains voltage and place controller in operation.

C.3 Installing the temperature sensors

The controller operates with Pt1000 temperature sensors.

Caution

Max. sensor lead length for S1 and S5 is 30 m and its cross section at least 0.75 mm^2. Max. sensor lead length for S2 to S4 is 10 m and its cross section at least 0.75 mm^2. Make sure there is no contact resistance in the wiring! Select the proper location for the sensor where it feels the right temperature. Use only immersion sensors. Pipe-mounted sensors only in exceptional cases.

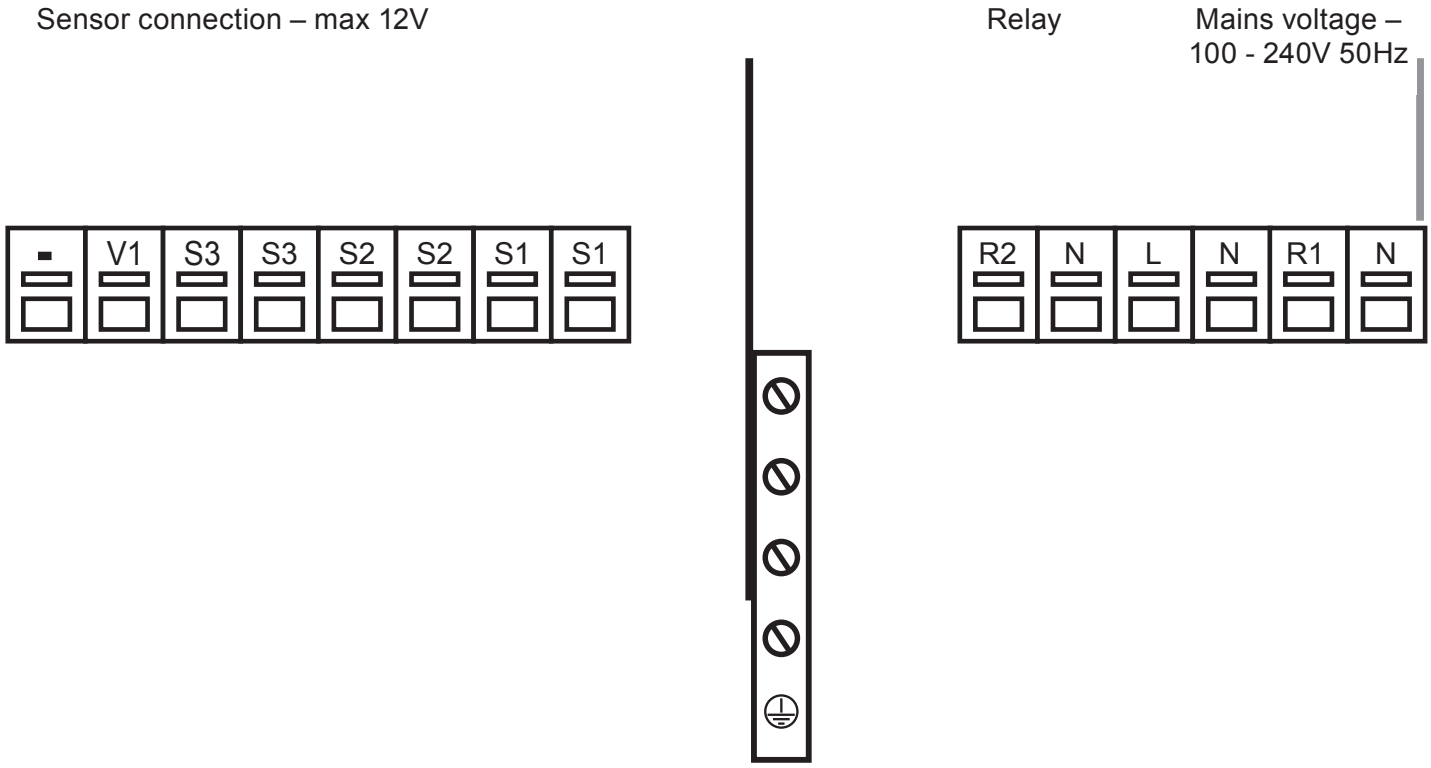
Make sure that the terminals of extension cables and sensors are properly tightened. Use only immersion or pipe-mounted sensors.

Warning

The temperature sensor cables must be routed separately from mains voltage cables!

Installation

D. - Terminal block wiring



Warning

max. 12V

Low voltage, max. 12V– sensor connection

Terminal:	connection for:
S1 (2x)	sensor 1
S2 (2x)	sensor 2
S3 (2x)	sensor 3

Danger

Mains voltage 230V

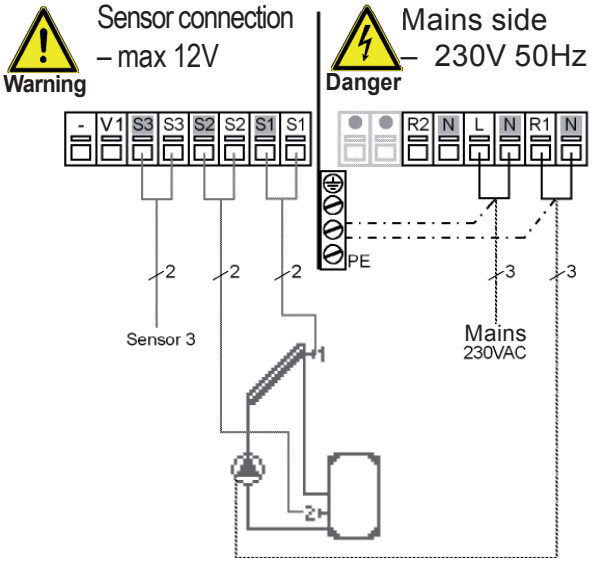
Mains voltage 230V 50Hz

Terminal:	connection for:
R1	Relay 1
N	Neutral
R2	Relay 2
N	Neutral
L	Mains phase
N	Mains neutral

PE protective conductor (green-yellow)

D Terminal wiring for separate variants

D.1 Solar system with storage tank



Relays R1 and R2 switch at the same time in this wiring, so the pump can be wired to R2.

Example: solar system with a storage tank and el. heating element with integrated thermostat.

Low voltage - sensor connection

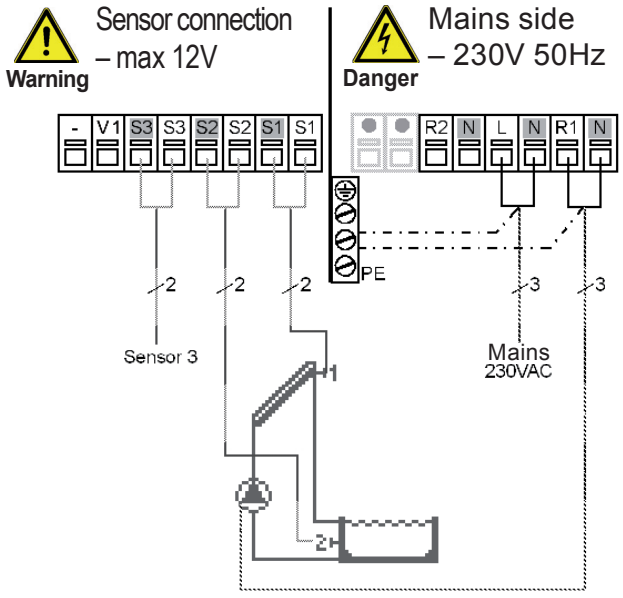
Terminal:	connection for:
S1 (2x)	sensor 1 collector
S2 (2x)	sensor 2 storage tank
S3 (2x)	sensor 3

The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	pump L
N	pump N
PE	protective conductor (green-yellow)

D.2 Solar system with a directly connected swimming pool



Low voltage - sensor connection

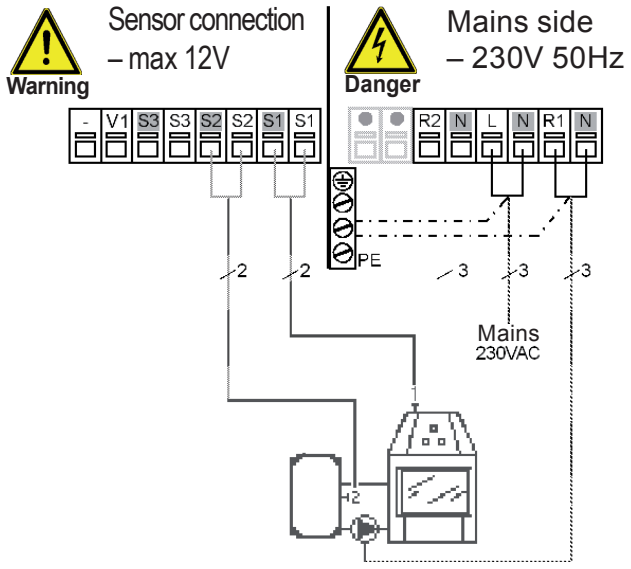
Terminal:	connection for:
S1 (2x)	sensor 1 kolektor
S2 (2x)	sensor 2 swimming pool
S3 (2x)	sensor 3

The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pool pump L
N	pool pump L
R2	free
N	free
PE	protective conductor (green-yellow)

D.3 Solid-fuel boiler



Low voltage - sensor connection

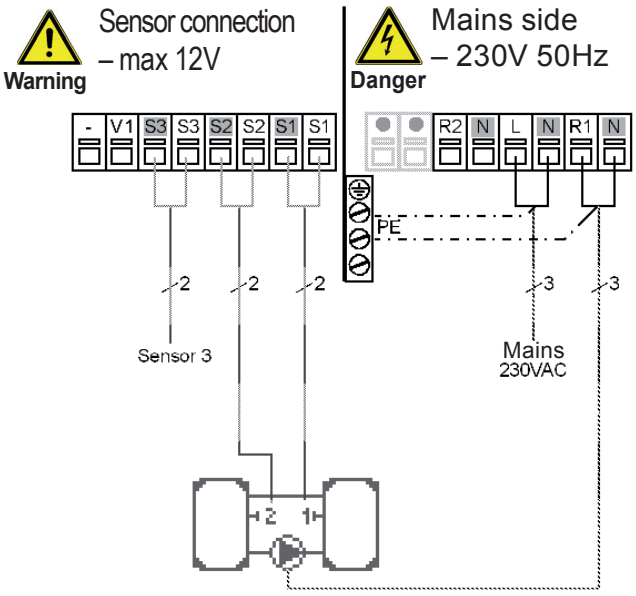
Terminal:	connection for:
S1 (2x)	sensor solid-fuel boiler
S2 (2x)	sensor 2 storage tank
S3 (2x)	sensor 3

The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	-
N	-
PE	protective conductor (green-yellow)

D.4 2 storage tanks with a heat exchange pump



Low voltage - sensor connection

Terminal:	connection for:
S1 (2x)	sensor 1 storage tank 1
S2 (2x)	sensor 2 storage tank 2
S3 (2x)	sensor 3

The polarity of the sensors is freely selectable.

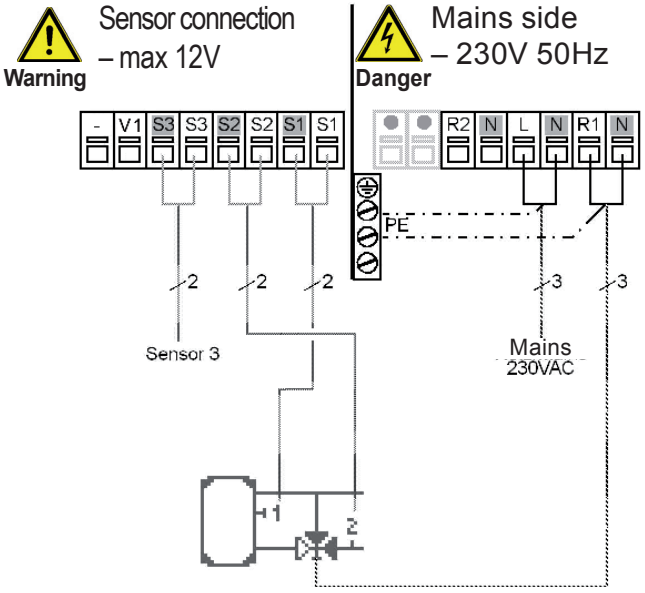
Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	-
N	-
PE	protective conductor (green-yellow)

Caution

Heat is transferred from tank 1 to tank 2.

D.5 Return line preheating



Low voltage - sensor connection

Terminal:	connection for:
S1 (2x)	sensor 1 storage tank
S2 (2x)	sensor 2 heating return
S3 (2x)	sensor 3

The polarity of the sensors is freely selectable.

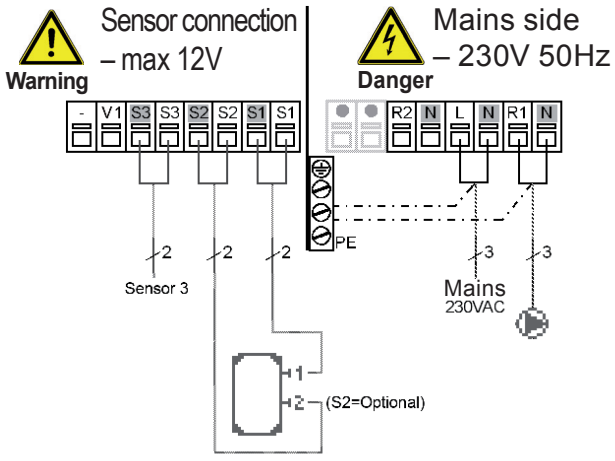
Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	-
N	-
PE	protective conductor (green-yellow)

Caution

Note: **Zone valve** on the return line:
R1 off = valve closed = flow B-AB = no backup heating
R1 on = valve open = flow A-AB = flow into the storage tank

D.6 Thermostat



Low voltage - sensor connection

Terminal:	connection for:
S1 (2x)	sensor 1 storage tank
S2 (2x)	sensor 2
S3 (2x)	sensor 3

The polarity of the sensors is freely selectable.

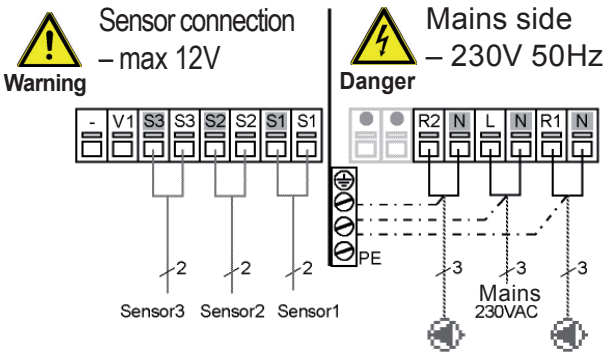
Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	-
N	-
PE	protective conductor (green-yellow)

Caution

Note: If sensor S2 is connected, then S1 is the switch-on sensor and S2 is the switch-off sensor.

D.7 Differential ΔT controller (no solar functions)



Controller switching function: If the temperature at S1 exceeds that at S2, the R1 pump relay will close.

Low voltage - sensor connection

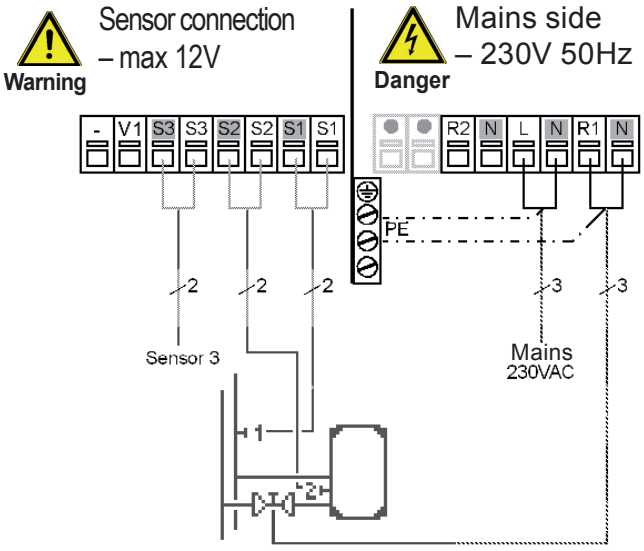
Terminal:	connection for:
S1 (2x)	sensor 1 (control)
S2 (2x)	sensor 2 (reference)
S3 (2x)	sensor 3

The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	-
N	-
PE	protective conductor (green-yellow)

D.8 Two-way valve



Low voltage - sensor connection

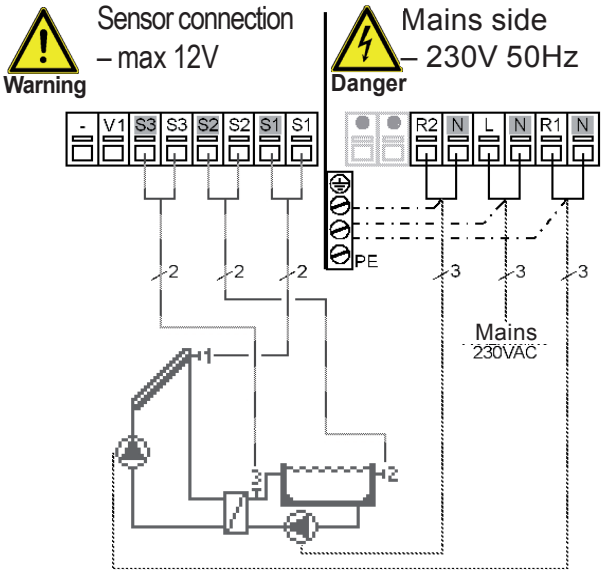
Terminal:	connection for:
S1 (2x)	sensor 1 heating
S2 (2x)	sensor 2 storage tank
S3 (2x)	sensor 3

The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	valve L
N	valve N
R2	-
N	-
PE	protective conductor (green-yellow)

D.9 Solar system with a swimming pool via heat exchanger



Low voltage - sensor connection

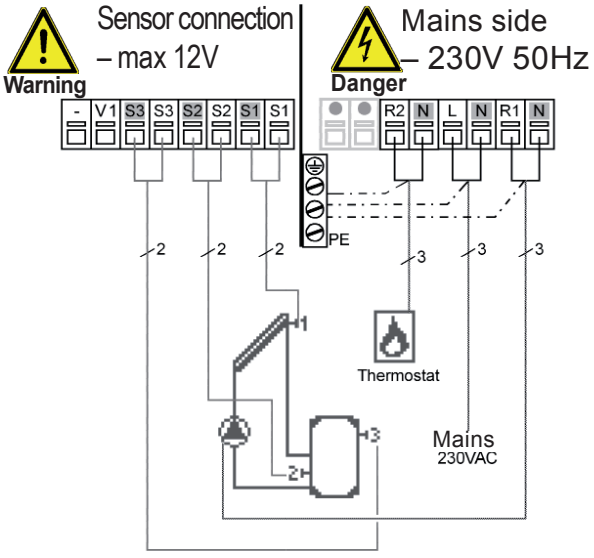
Terminal:	connection for:
S1 (2x)	sensor 1 collector
S2 (2x)	sensor 2 swimming pool
S3 (2x)	sensor 3 heat exchanger

The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	heating pump L
N	heating pump N
R2	pool pump L
N	pool pump N
PE	protective conductor (green-yellow)

D.10 Solar system with thermostat for heating or cooling a storage tank



Low voltage - sensor connection

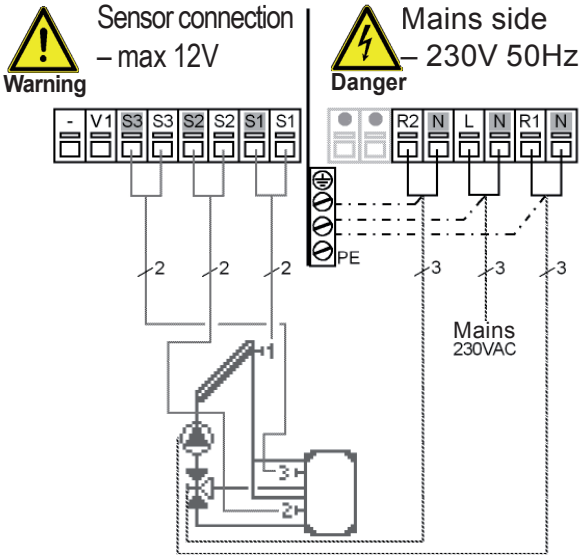
Terminal:	connection for:
S1 (2x)	sensor 1 collector
S2 (2x)	sensor 2 storage tank lower
S3 (2x)	sensor 3 storage tank upper

The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	Thermostat L
N	Thermostat N
PE	protective conductor (green-yellow)

D.11 Solar system with a thermally stratified storage tank



Low voltage - sensor connection

Terminal:	connection for:
S1 (2x)	sensor 1 collector
S2 (2x)	sensor 2 storage tank lower
S3 (2x)	sensor 3 storage tank upper

The polarity of the sensors is freely selectable.

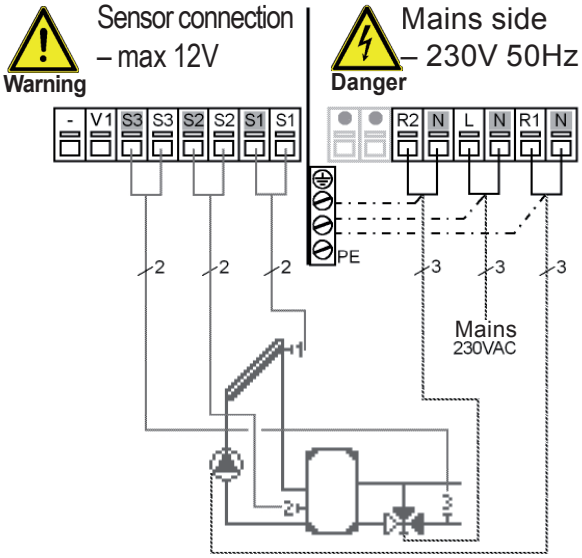
Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	zone valve L
N	zone valve N
PE	protective conductor (green-yellow)

Note: **Zone valve** wiring:
R2 off = valve closed = flow AB-B = flow into the tank lower section (S2 sensor)
R2 on = valve open = flow AB-A = flow into the tank upper section (S3 sensor)

Example: Solar heat will be stored either to the upper or lower tank section, depending on the temperature available from the solar thermal system.

D.12 Solar system with return line preheating



Low voltage - sensor connection

Terminal:	connection for:
S1 (2x)	sensor 1 collector
S2 (2x)	sensor 2 storage tank
S3 (2x)	sensor 3 zpátečka topení

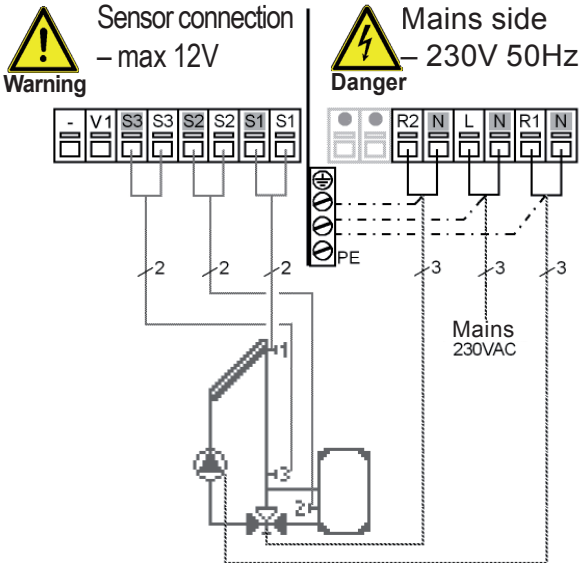
The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	zone valve L
N	zone valve N
PE	protective conductor (green-yellow)

Note: **Zone valve** on the return line:
R2 off = valve closed = flow B-AB = no backup heating
R2 on = valve open = flow A-AB = flow into the storage tank

D.13 Solar system with a by-pass



Low voltage - sensor connection

Terminal:	connection for:
S1 (2x)	sensor 1 collector
S2 (2x)	sensor 2 storage tank
S3 (2x)	sensor 3 return

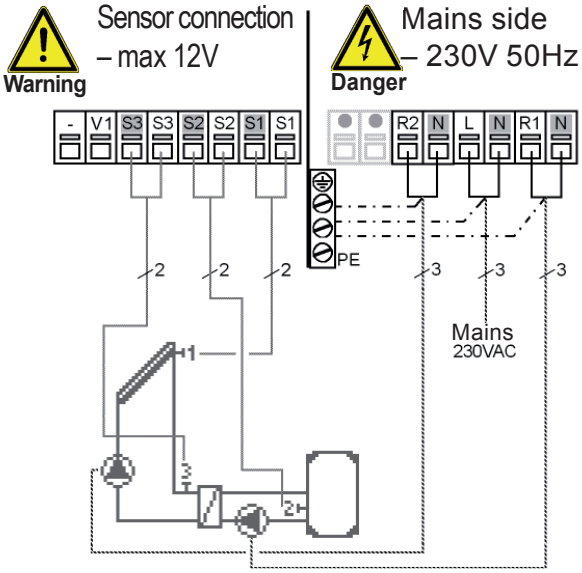
The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	zone valve L
N	zone valve N
PE	protective conductor (green-yellow)

Note: **Zone valve** wiring:
R2 off = valve closed = flow B-AB = heat flow to the storage tank
R2 on = valve open = flow A-AB = heat flow through by-pass

D.14 Solar system with a heat exchanger



Low voltage - sensor connection

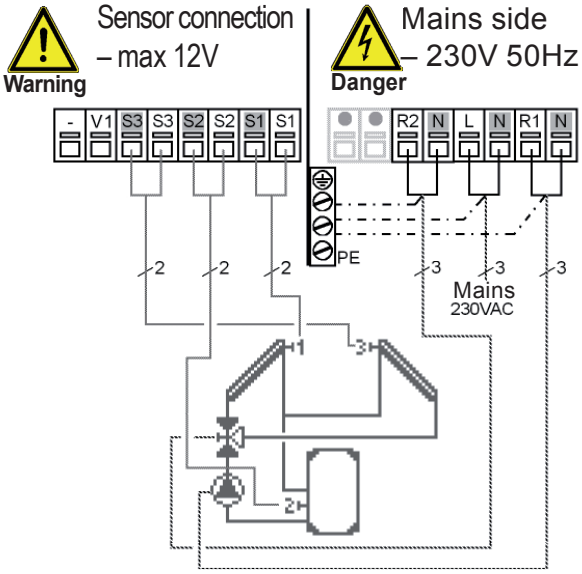
Terminal:	connection for:
S1 (2x)	sensor 1 collector
S2 (2x)	sensor 2 storage tank
S3 (2x)	sensor 3 solar out

The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	secondary pump L
N	secondary pump N
R2	primary pump L
N	primary pump N
PE	protective conductor (green-yellow)

D.15 Solar system with 2 collector arrays (East/West)



Low voltage - sensor connection

Terminal:	connection for:
S1 (2x)	sensor 1 collector 1
S2 (2x)	sensor 2 storage tank
S3 (2x)	sensor 3 collector 2

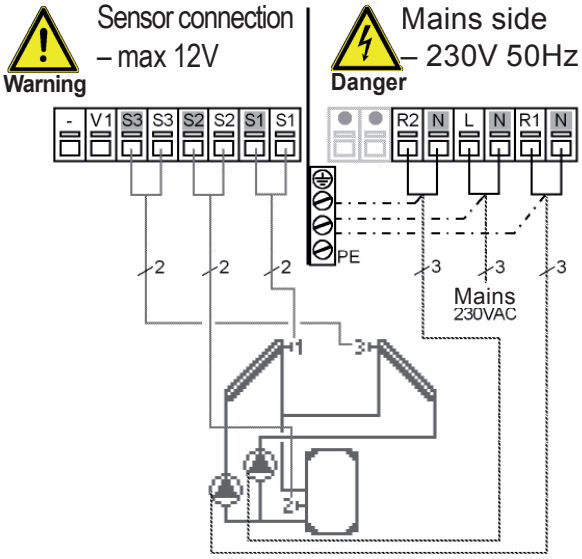
The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	zone valve L
N	zone valve N
PE	protective conductor (green-yellow)

Note: **Zone valve** wiring:
R2 off = valve closed = flow AB-B = flow from the collector array 1 (S1 sensor)
R2 on = valve open = flow AB-A = flow from the collector array 2 (S3 sensor)

D.16 Solar system with 2 collector arrays and 2 pumps



Low voltage - sensor connection

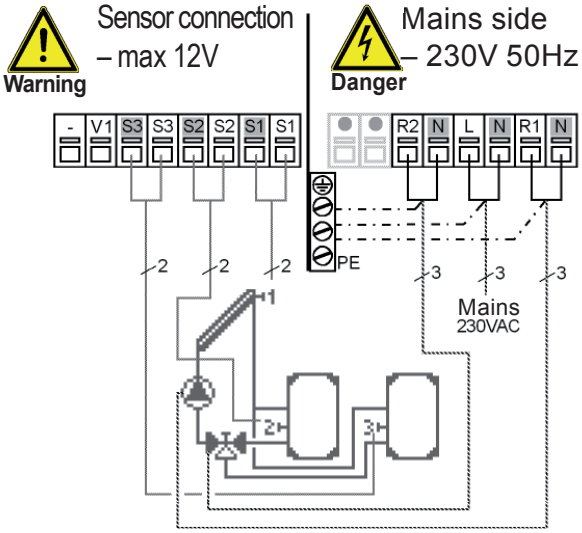
Terminal:	connection for:
S1 (2x)	sensor 1 collector 1
S2 (2x)	sensor 2 storage tank
S3 (2x)	sensor 3 collector 2

The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	collect. 1 pump L
N	collect. 1 pump N
R2	collect. 2 pump L
N	collect. 2 pump N
PE	protective conductor (green-yellow)

D.17 Solar system with 2 storage tanks and a zone valve



Low voltage - sensor connection

Terminal:	connection for:
S1 (2x)	sensor 1 collector
S2 (2x)	sensor 2 storage tank 1
S3 (2x)	sensor 3 storage tank 2

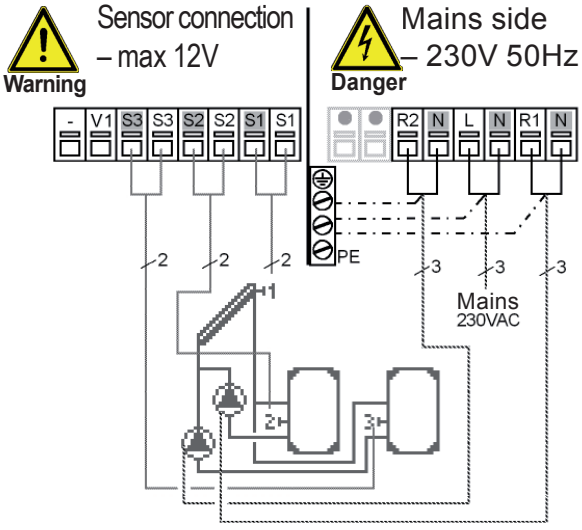
The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	zone valve L
N	zone valve N
PE	protective conductor (green-yellow)

Note: **Zone valve** wiring:
R2 off = valve closed = flow B-AB = heat into storage tank 1 (sensor S2)
R2 on = valve open = flow A-AB = heat into the storage tank 2 (sensor S3)

D.18 Solar system with 2 storage tanks and 2 pumps



Low voltage - sensor connection

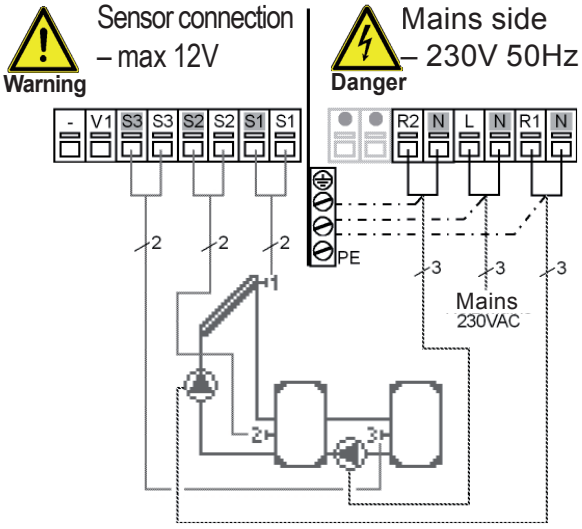
Terminal:	connection for:
S1 (2x)	sensor 1 collector
S2 (2x)	sensor 2 storage tank 1
S3 (2x)	sensor 3 storage tank 2

The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	tank 1 pump L
N	tank 1 pump N
R2	tank 2 pump L
N	tank 2 pump N
PE	protective conductor (green-yellow)

D.19 Solar system with two storage tanks and a heat exchange pump



Low voltage - sensor connection

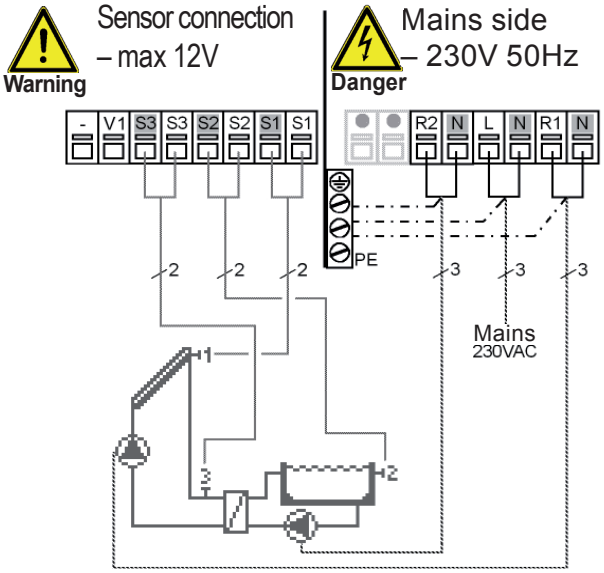
Terminal:	connection for:
S1 (2x)	sensor 1 collector
S2 (2x)	sensor 2 storage tank 1
S3 (2x)	sensor 3 storage tank 2

The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	tank 2 pump L
N	tank 2 pump N
PE	protective conductor (green-yellow)

D.20 Solar system with a swimming pool, heat exchanger, primary circuit sensor



Low voltage - sensor connection

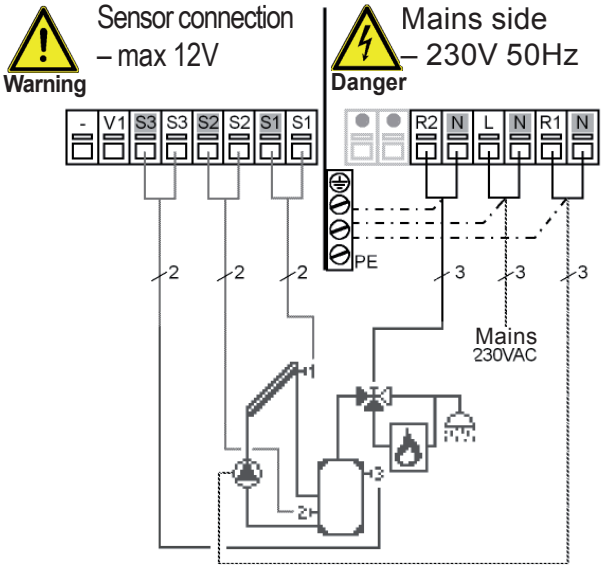
Terminal:	connection for:
S1 (2x)	sensor 1 collector
S2 (2x)	sensor 2 swimming pool
S3 (2x)	sensor 3 solar return

The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	pool pump L
N	pool pump N
PE	protective conductor (green-yellow)

D.21 Solar system + zone valve + thermostat



Low voltage - sensor connection

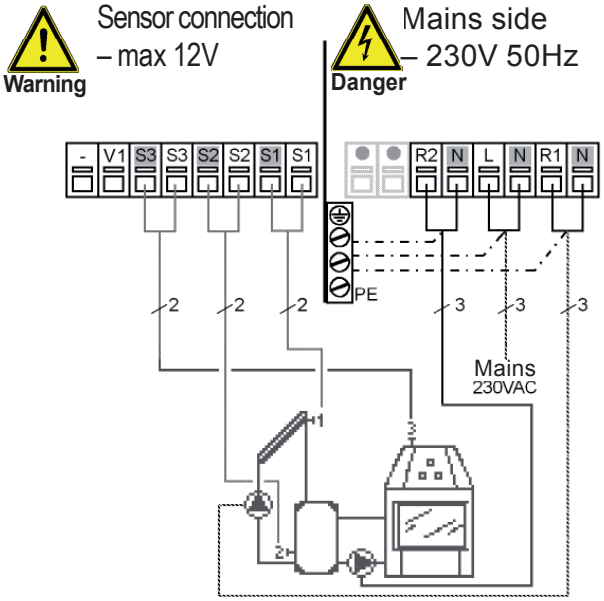
Terminal:	connection for:
S1 (2x)	sensor 1 collector
S2 (2x)	sensor 2 storage tank lower
S3 (2x)	sensor 3 storage tank upper

The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	zone valve L
N	zone valve N
PE	protective conductor (green-yellow)

D.22 Solar system + solid-fuel boiler



Low voltage - sensor connection

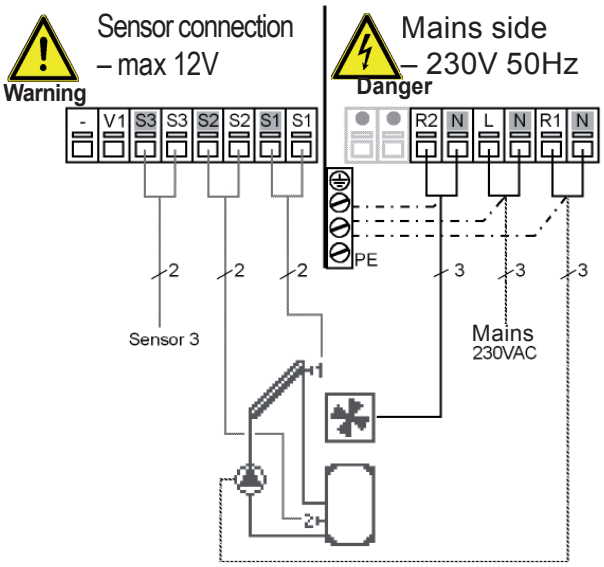
Terminal:	connection for:
S1 (2x)	sensor 1 collector
S2 (2x)	sensor 2 storage tank
S3 (2x)	sensor 3 solid-fuel boiler

The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	solar pump L
N	solar pump N
R2	boiler pump L
N	boiler pump N
PE	protective conductor (green-yellow)

D.23 Solar system + cooling 1



For the description of cooling see 6.4.1

Low voltage - sensor connection

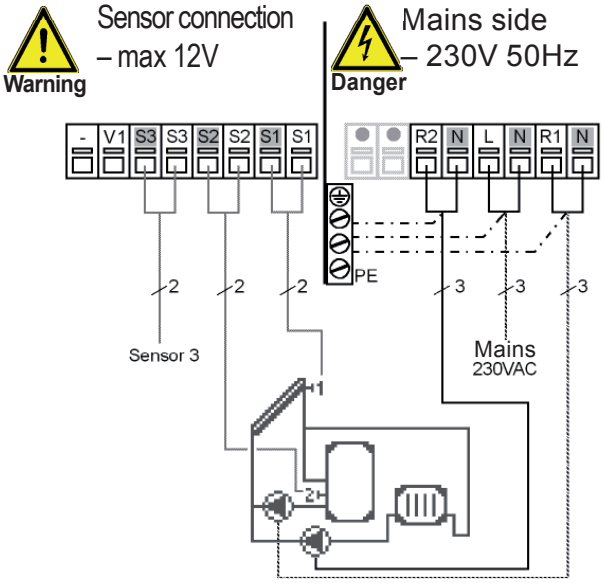
Terminal:	connection for:
S1 (2x)	sensor 1 collector
S2 (2x)	sensor 2 storage tank
S3 (2x)	sensor 3

The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	cooling L
N	cooling N
PE	protective conductor (green-yellow)

D.24 Solar system + cooling 2



For the description of cooling see 6.4.1

Low voltage - sensor connection

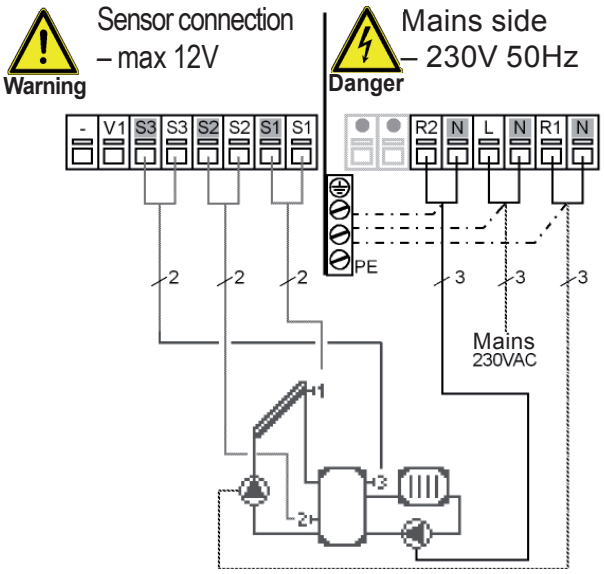
Terminal:	connection for:
S1 (2x)	sensor 1 kolektor
S2 (2x)	sensor 2 zásobník
S3 (2x)	sensor 3

The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	cooling pump L
N	cooling pump N
PE	protective conductor (green-yellow)

D.25 Solar system + cooling 3



Low voltage - sensor connection

Terminal:	connection for:
S1 (2x)	sensor 1 collector
S2 (2x)	sensor 2 storage tank lower
S3 (2x)	sensor 3 storage tank upper

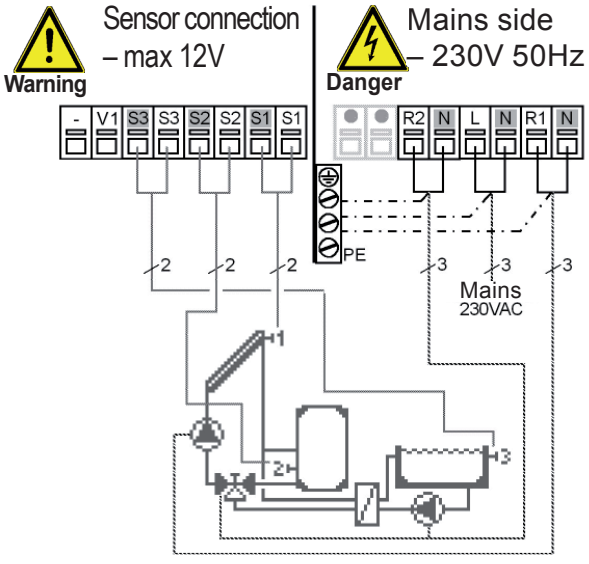
The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	cooling pump L
N	cooling pump N
PE	protective conductor (green-yellow)

For the description of cooling see 6.4.1

D.26 Solar system with a swimming pool and storage tank



Low voltage - sensor connection

Terminal:	connection for:
S1 (2x)	sensor 1 collector
S2 (2x)	sensor 2 storage tank
S3 (2x)	sensor 3 swimming pool

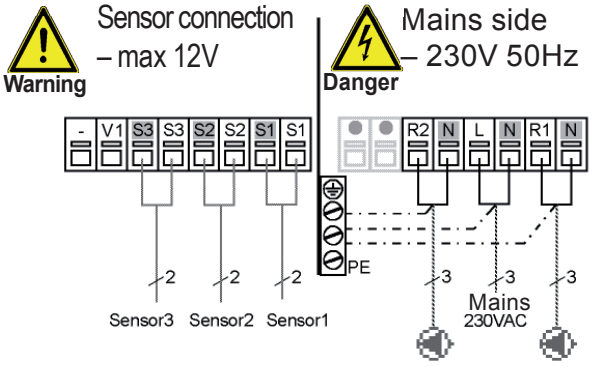
The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	pool pump + 3-way valve L
N	pool pump + 3-way valve N
PE	protective conductor (green-yellow)

Note: **Zone valve** wiring:
R2 off = valve closed = flow B-AB = heat into storage tank (sensor S2)
R2 on = valve open = flow A-AB = pool heating (sensor S3)

D.27 2 temperature difference controllers 2×ΔT (no solar functions)



Low voltage - sensor connection

Terminal:	connection for:
S1 (2x)	sensor 1
S2 (2x)	sensor 2
S3 (2x)	sensor 3

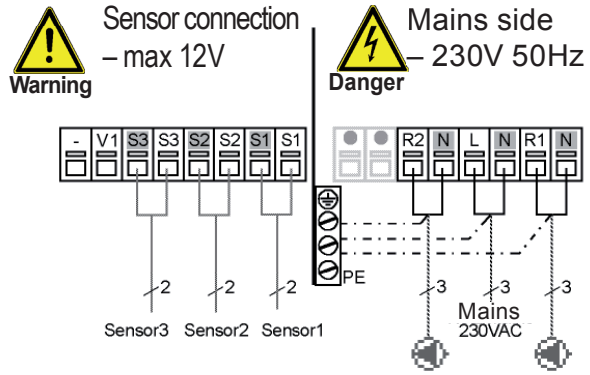
The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	pump 2 L
N	pump 2 N
PE	protective conductor (green-yellow)

Controller switching function:
If the temperature at S1 exceeds that at S2, the R1 pump relay will close.
If the temperature at S2 exceeds that at S3, the R2 pump relay will close.

D.28 2 thermostats (no solar functions)



Low voltage - sensor connection

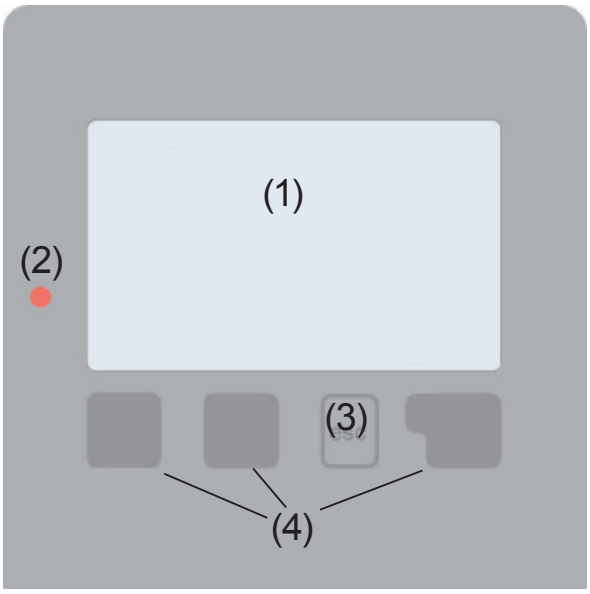
Terminal:	connection for:
S1 (2x)	sensor 1 collector
S2 (2x)	sensor 2 storage tank
S3 (2x)	sensor 3 solar out

The polarity of the sensors is freely selectable.

Mains voltage – 230V 50Hz

Terminal:	connection for:
L	mains phase conductor
N	mains neutral conductor
R1	pump L
N	pump N
R2	pump 2 L
N	pump 2 N
PE	protective conductor (green-yellow)

E.1 Display and input



The display (1) shows graphic and text info on the hydraulic variant, set and measured values and other text info.

The LED lamp (2):
lights up green - if a relay is closed and the controller works right
lights up red - if the controller is set to automatic operation and all relays are open
flashes slowly red - if manual operation mode is set
flashes quickly red - if an error occurred

Examples of display symbols:

 pump (rotates in operation)

 valve (direction of flow black)

 collector

 storage tank

 swimming pool

 temperature sensor

 heat exchanger

 warning/error message

 new information available

Entries are made using four keys (3+4), which are assigned to different functions depending on the situation.

The „esc" key (3) is used to cancel an entry or to exit a menu.
If applicable there will be a request for confirmation as to whether the changes which have been made should be saved.
The function of each of the other three keys (4) is shown in the display line directly above the keys; the right-hand key generally has a selection and confirmation function.

Examples of key functions:

+/-	= increase/decrease values
▼/▲	= scroll menu up/down
YES/NO	= confirm/reject
Info	= additional information
Back	= to previous screen
ok	= selection confirmation
Confirm	=setting confirmation

E.2 Commissioning help

The first time the controller is turned on, language and clock need to be set.
After that a query appears as to whether you want to parameterize the controller using the commissioning help or not. The commissioning help can also be terminated or called up again at any time in the special functions menu. The commissioning help guides you through the necessary basic settings in the correct order, and provides brief descriptions of each parameter in the display.
Pressing the „esc" key takes you back to the previous value so you can look at the selected setting again or adjust it if desired. Pressing the „esc" more than once takes you back step by step to the selection mode, thus cancelling the commissioning help.
Finally, menu 4.2 under operating mode „Manual" should be used to test the switch outputs with the consumers connected, and to check the sensor values for plausibility. Then switch on automatic mode.

E.3 Free commissioning

If you decide not to use the commissioning help, you should make the necessary settings in the following sequence:

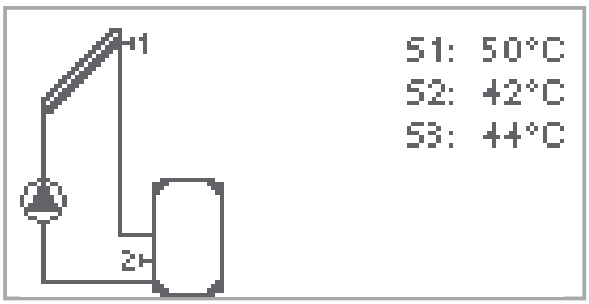
- Menu 10. Language (see 14.)
- Menu 7.2 Time and date (see 12.2)
- Menu 7.1 Program selection 12.1)
- Menu 5. Settings, all values (see 10.)
- Menu 6. Protective functions if modifications are necessary (see 11.)
- Menu 7. Special functions if additional changes are necessary (see 12.)

Finally, menu 4.2 under operating mode "Manual" should be used to test the switch outputs with the consumers connected, and to check the sensor values for plausibility. Then switch on automatic mode.

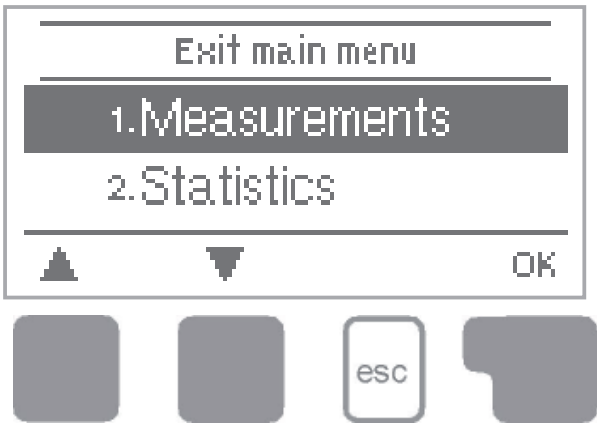
Caution

Observe the explanations for the individual parameters on the following pages, and check whether further settings are necessary for your application.

E.4 Menu structure



The graphics or overview mode appears when no key has been pressed for 2 minutes, or when the main menu is exited by pressing “esc“.



Pressing any key (4) in graphics or overview mode takes you directly to the main menu. The following menu items are then available for selection there:

1. Measurements	Current temperature values with explanations
2. Statistics	Function control of the system with operating hours etc.
3. Display Mode	Select graphics mode or overview mode
4. Operating Mode	Automatic mode, manual mode or switch unit off
5. Settings	Set parameters needed for normal operation
6. Protections	Solar and frost protection, recooling...
7. Special functions	Commissioning help, program selection, sensor calibration, clock etc.
8. Menu lock	Menu lock against unintentional setting changes
9. Service data	Diagnosis in the event of an error
10. Language	Language selection

Measurement values

1. - Measurement values

Menu “1. Measurement values” serves to display the currently measured temperatures.
What measurement values are displayed depends on the selected program and the specific controller model.
The menu is closed by pressing “esc” or selecting “Exit measurement values”.

Selecting “Info” leads to a brief help text explaining the measurement values.

Selecting “Overview” or “esc” exits the Info mode.

Caution

If “--” appears on the display instead of the measurement value, then there may be a defective temperature sensor or its wiring. If the cables are too long or the sensors are not placed optimally, the result may be small deviations in the measurement values. In this case the display values can be compensated for using the function of sensor compensation - see Chapter 7.5.
Which sensors are displayed will depend on the program selected, sensors connected and settings.

2. - Statistics

Menu “2. Statistics” is used for function control and long-term monitoring of the system.
The menu is closed by pressing “esc” or selecting “Exit statistics”.

Caution

For analysis of the system data it is essential that time is set accurately on the controller. Please note that the clock does not continue to run if the mains voltage is interrupted, and must therefore be reset. Incorrect time set in the controller may result in data being deleted, recorded incorrectly or overwritten.

2.1. - Operating hours

Display of operating hours of the solar pump connected to the controller; various time spans are available (last day, week, month, year).

2.2. - Average ΔT

Display of the average temperature difference between the reference sensors of the solar thermal system and heat sink (with the pump switched on).

2.3. - Heat output

Display of the approximate heat output of the solar thermal system.

2.4. - Graphic overview

This function provides a clearly-organized display of operating hours, average ΔT and heat output as a bar graph. Various time ranges are available. The two left-hand keys can be used to page through the data.

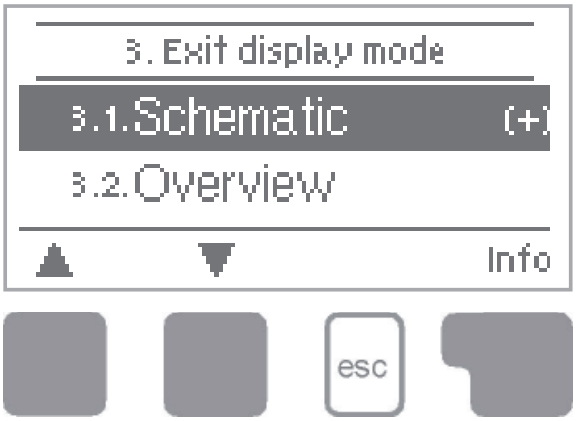
2.5. - Error log

Display of the last 10 events occurring in the system with indication of date and time.

2.6. - Reset / clear

Resetting and deleting the individual analyses. The function “All statistics” clears all analyses but not the error messages.

3. - Display mode



Menu “3. Display mode” is used to define the controller’s display for normal operation.
This display is shown during current operation of the solar thermal system.
It appears whenever two minutes go by without any key being pressed.
The menu is closed by pressing “esc” or selecting “Exit display mode”.

3.1. - Diagram

In graphics mode, the selected hydraulic systems are depicted with the measured temperatures and operating states of the connected valves and pumps.

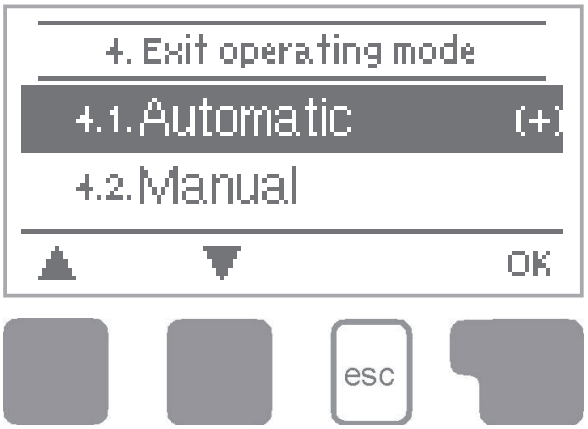
3.2. - Overview

In overview mode, the measured temperatures and operating states of the connected consumers are shown in text form. No hydraulic system is shown.

3.3. - Alternating

In alternating mode the diagram mode and then the overview mode are active for 5 seconds at a time.

4. - Operation mode



In menu “4. Operation mode” the controller can either be switched to automatic mode, switched off, or switched to a manual operating mode.

The menu is closed by pressing “esc” or selecting “Exit operation mode”.

4.1. - Automatic

Automatic mode is the normal operating mode of the controller.
Only automatic mode provides proper controller function taking into account the current temperatures and the parameters that have been set!

4.2. - Manual

The relay and thus the connected pump, valve or heating rod are switched on and off manually by pressing a key, with no regard to the current temperatures and the parameters which have been set. The measured temperatures are also shown.

Danger

The manual mode is intended to be used by a technician when commissioning or checking the system. Activating manual mode in current operation can lead to system damage or overheating of water in the storage tank!

4.3. - Off

Warning

When the operating mode “Off” is activated, all controller functions are switched off. This can lead, for example, to overheating of the solar collector or other system components. The measured temperatures are displayed even when the controller is Off.

Never select other mode than automatic without a reason. Long-term operation in manual mode may lead to collector or storage tank overheating and limiting the lifetime of solar fluid and other solar thermal components!

4.4. - Fill system

Caution

This special operating mode is intended only for the filling procedure for a special „Drain Master System” with a fill level contact. It is not used in Regulus solar systems. However, if you activate it, be sure to terminate the function when finished!

After an interruption of the mains voltage the controller automatically returns to the last operating mode selected!

5. - Settings

The system parameters are set in menu “5. Settings”.

Warning

This does not under any circumstances replace the safety facilities to be provided by the customer!

The menu is closed by pressing “esc” or selecting “Exit settings”.

Caution

Various settings can be made depending on the selection of hydraulic variant 1-28. An overview of the variants is shown in Table B.5. The respective sensors and outputs are also shown in the table. Generally valid settings are described on the following pages.

5.1. - Tmin S1

Sensor S1 switch-on temperature
If this value is exceeded at sensor S1 and the other conditions are also met, then the controller switches on the associated pump and/or valve. If the temperature at sensor S1 drops below the value of TminS1 - 5 °C, then the pump and/or the valve are switched off again.
Setting range: 0-99 °C /default setting: 20 °C

5.2. - Tmin S2

Sensor S2 switch-on temperature
If this value is exceeded at sensor S2 and the other conditions are also met, then the controller switches on the associated pump and/or valve. If the temperature at sensor S2 drops below the value of TminS2 - 5 °C, then the pump and/or the valve are switched off again..
Setting range: 0-99 °C /default setting: 40 °C

5.3. - Tmin S3

Sensor S3 switch-on temperature
If this value is exceeded at sensor S3 and the other conditions are also met, then the controller switches on the associated pump and/or valve. If the temperature at sensor S3 drops below the value of TminS3 - 5 °C, then the pump and/or the valve are switched off again.
Setting range: 0-99 °C /default setting: 40 °C

5.4. - Tmax S2

Sensor S2 switch-off temperature
If this value is exceeded at sensor S2 the other conditions are also met, then the controller switches off the associated pump and/or valve. If sensor S2 temperature falls below this value, then the controller switches on the pump and/or valve again.
Setting range: 0-99 °C/Default setting: 60 °C


Danger

Temperature values which are set high will allow higher solar heat accumulation but it shall be checked that all system components are resistant to high temperatures and scalding protection is provided. Regulus solar systems are safe for heating water up to 95 °C.

5.5. - Tmax S3

Sensor S3 switch-off temperature
If this value is exceeded at sensor S3 the other conditions are also met, then the controller switches off the associated pump and/or valve. If sensor S3 temperature falls below this value, then the pump and/or the valve are switched on again.
Setting range: 0-99 °C /Default setting: 60 °C (30 °C in swimming pool variants; default setting in hydraulic variants without S3: Vyp)


Danger

Temperature values which are set high will allow higher solar heat accumulation but it shall be checked that all system components are resistant to high temperatures and scalding protection is provided. Regulus solar systems are safe for heating water up to 95 °C..

5.6. - ΔT R1

Switch-on/switch-off temperature difference for R1 output
If the temperature difference between the reference sensors is higher than ΔT R1 and the other conditions as in the table are also met, then the controller switches the pump on. When the temperature difference drops below ΔT R1 Off, then the pump is switched off again.
Setting range: ΔT R1 … 4-20 °C , ΔT R1 Off …… 2-19 °C
Default setting: ΔT R1 10 °C , ΔT R1 Off 3 °C


Caution

Setting the temperature difference too small may lead to a situation when the heat source will not be able to heat up the heat sink to the value when the pump is switched off. Then the pump will run continuously. Setting the temperature difference too big may lead to switching the circulation pump on and off permanently.
Please refer to special rules described in Chapter 7.9 for switching pumps with controlled speed.

5.7. - ∆T R2

Switch-on/switch-off temperature difference for R2 output
If the temperature difference between the reference sensors is higher than ΔT R2 and the other conditions are also met, then the controller switches the pump on. When the temperature difference drops **below ΔT R2 Off**, then the pump is switched off again.
Setting range: ΔT R2 4-20 °C, ΔT R2 Off 2-19 °C
Default setting: ΔT R2 10 °C , ΔT R2 Off 3 °C


Caution

Setting the temperature difference too small may lead to a situation when the heat source will not be able to heat up the heat sink to the value when the pump is switched off (Tsource - **ΔT R2 Off**). Then the pump will run continuously. Setting the temperature difference too big may lead to switching the circulation pump on and off permanently.

5.8. - Tset S3

Thermostat function at sensor S3 (for hydraulic variant No.2 and No.14)
If the temperature at sensor S3 exceeds this value, the respective relay is switched on. If the temperature at sensor S3 drops below this value, the relay is switched off.
Setting range: Tset 0-99°C/default setting: 60° C


Danger

Setting temperatures too high may result in scalding or damage to the system. Scalding protection must be provided by the customer!


Caution

In Energy saving mode other settings may apply, e.g. TecoS3, see 5.16

5.9. - Hysteresis

Hysteresis for thermostat function at sensor S3
If the setting is Hysteresis = 0, the thermostat function is off.
Setting range: Hysteresis 2 to 20 °C/default setting: 10 °C

5.10. - Priority sensor

Charging priority in systems with two storage tanks

A setting must be made as to which storage tank (storage tank sensor) has priority for charging. That one will be charged first.

A) After the desired temperature (TmaxSx) is reached in the higher priority storage tank, charging is diverted to the lower priority storage tank.

B) If the collector temperature does not enable charging the higher priority tank, and at the same time the temperature in the higher priority tank is above Tpriority, then charging is diverted to the lower priority tank.

Note: Tpriority (=lower temperature limit for absolute priority)

C) Charging of the lower-priority storage tank is interrupted at regular intervals to check whether the temperature increase at the collector can enable charging of the higher-priority storage tank.

Setting range: S2 or S3/Default setting: S2

Example: Setting:

Priority sensor = S2	Tpriority = 40 °C
Charging interruption = 10 min	Increase = 3 °C/min
T maxS2 = 60 °C	ΔT R1 = 10 °C

If the temperature at S2 is below 60 °C,…..…… S2 storage tank (higher priority) is charged.

A) If the temperature at S2 is above 60°C,…..……

B) Temperature difference between collector and S2 tank…. S1-S2 < ΔT R1

and at the same time S2 > 40 °C…… S3 storage tank (lower priority) is charged

C) After 10 min. (Charging interruption) the solar pump(s) stop and the temperature increase is measured.

If Increase > 3 °C/min., Interruption time is extended until the switching condition S1-S2 < ΔT R1 for S2 storage tank is met.

If the increase is less than 3 °C/min, ……S3 storage tank is charged

5.11. - Tpriority - Priority switching temperature

Lower temperature limit for absolute priority

Charging the lower-priority tank is possible only after this temperature (Tpriority) is reached in the higher-priority storage tank.

Setting range: 0-90 °C/Default setting: 40 °C

5.12. - Charging interruption

Interruption of charging into the lower priority storage tank

The charging of the lower-priority storage tank is interrupted after this settable time in order to check whether the collector has reached a temperature level that allows charging in the higher-priority storage tank. If not, charging the lower-priority storage tank continues until the next interruption.

Setting range: 5-90 min./ Default setting:10 min.

5.13. - Increase

Temperature increase during charging interruption

The temperature increase is measured during interruption in charging to the lower-priority storage tank.

If temperature increase is higher than the set value for Increase, Interruption time is extended until the switching condition for charging the higher-priority tank is met (S1-S2 < ΔT R1).

If the temperature increase does not reach the value set (Increase), the interruption is terminated and the lower-priority tank continues in being charged.
Setting range: 1-10 °C/min /default setting: 3 °C/min

5.14. - Thermostat periods

Set the desired periods of time when the thermostat should be active. 2 periods can be set per day, settings can also be copied to other days. Outside the set times the thermostat is switched off.
Setting range: od 00:00 to 23:59 / default setting: 06:00 až 22:00

5.15. - „Party function“

With the party function the storage tank is heated up once to the set temperature (Tset) regardless of the thermostat timer. The party mode is enabled by pressing the „esc“ key for 3 seconds in the main menu. While this mode is active, the system heats up to the set value to the reference temperature (TrefS3+hysteresis, respectively TecoS3+hysteresis in energy saving mode), unattached to preset thermostat times. The mode is ended once the required temperature is reached.


Caution

The party mode is enabled not from menu but by pressing the „esc“ key for over 3 seconds in the main menu..


Caution

If the energy saving mode is on, then the Party mode will cause the storage tank to be heated to the temperature “Tset+hysteresis” or “TecoS3+ hysteresis”.

5.16. - Energy saving mode

In energy saving mode the additional heating (e.g. an el. heating rod) via R2 is switched on at “TecoS3” and heats up to “TecoS3+hysteresis”.
When no solar heat is available during the energy saving function, then the value of Tset S3 is used like in normal mode.
Setting range: ON, OFF /default setting: OFF

5.17. - TecoS3

Minimum temperature S3 in Energy saving mode

If the temperature at sensor 3 falls below this value and the thermostat function is active (see 5.14), additional heating via relay R2 is switched on.
Additional heating is on until Teco S3 + hysteresis is exceeded.
Setting range: 0°C – 99 °C /default setting: 20 °C
Example:

Thermostat period (5.14) is set to 10:00 to 17:00. TsetS3 = 50 °C.

Additional heating mode is on (5.16) and Teco is set to 35 °C.

In the morning, family members use hot water and the temperature in the storage tank sinks to 30 °C.

In a sunny day:
After solar collectors heat up, the solar pump starts and by 10:00 the water in storage tank is heated to above 35 °C. During operation of the solar pump, backup heating will stay off and water is heated by the sun.

In a cloudy day:
At 10:00 backup heating will start and run until the desired temperature TsetS3=50 °C is reached.

6. - Protective functions

Menu „**6. Protections**" can be used to activate and set various protective functions.

Warning

These functions do not under any circumstances replace safety elements in solar systems!

The menu is closed by pressing „esc" or selecting „Exit protections".

6.1. - Seizing protection

Pump seizing protection using regular short turning on a pump or a valve. Seizing may occur after prolonged inactivity of valves or pumps. If this protection is activated, then the controller switches the relay in question and the connected consumer on every day at 12:00 or on Sundays at 12:00 (for weekly settings) for 5 seconds in order to prevent the pump and/or the valve from sticking after an extended stationary period.
Setting range: R1: daily, weekly, off /Default setting: daily
Setting range: R2: daily, weekly, off /Default setting: daily

6.2. - Frost protection

A two-stage frost protection function is available. In stage 1 the controller switches the pump on for 1 minute every hour if the collector temperature drops below the set value „**Frost stage 1**". If the collector temperature drops further to the set value „**Frost stage 2**", the controller switches the pump on continuously. If the collector temperature then exceeds the value „**Frost stage 2**" by 2 °C, then the pump switches off again.

Setting range Frost stage: on/off, /Default setting: off
Setting range Frost stage 1: -25 to 10 °C or off/Default setting: 7 °C
Setting range Frost stage 2 : -25 to 8° C or off /Default setting: 5 °C

Caution

This function causes energy loss via the collector!
As Regulus solar systems are filled with antifreeze fluid, the antifreeze protection shall remain off.

6.3. - System protection

Protection of the highest priority
If „**SProt Ton**" is exceeded at the collector, the pump is switched off. The collector is left at high temperature. The pump is activated again when the temperature drops below „**SProt TOff**".
Solar circuit protection Setting range: ON, OFF / default setting: ON
Setting range: SProt Ton 60 °C to 150 °C / default setting: 120 °C
Setting range: SProt TOff 50 °C to SProt Ton – 5 °C / default setting: 115 °C

Collectors do not get cooled and stay heated. This may result in limited lifetime of the solar fluid. If you use this function, please check your solar fluid regularly.

6.4. - Collector protection

If „**CP Ton**" is exceeded at the collector sensor, the pump is switched on in order to cool the collector down. The pump turns off when the collector temperature drops below „**CP Toff**" or the temperature „**CP Tmax storage**" is exceeded in the storage or pool. In systems with 2 storage tanks only the lower-priority tank or pool is used for collector cooling.
Collector protection - Setting range: ZAP, VYP / default setting: VYP
Setting range: CP Ton 60°C to 150 °C / default setting: 110 °C
Setting range: CP Toff 50 °C to to CP Ton – 5 °C
/ default setting: 100 °C
Setting range: CP Tmax storage(x). 0 °C to 140 °C/default setting: 90 °C
** (x) is the storage tank number.*

When this function is active, a storage tank or swimming pool may get heated up to "CP Tmax storage", over Tmax S2 (see 5.2. - Tmax S) which might cause damage to the system. When only pool is heated, it is not utilized for collector protection.

6.4.1. - Cooling functions

The cooling variants are set in program selection (7.1)

Hydraulic Variant 14 Solar + cooling 1:
If „**CProt Ton**" is exceeded at S1 (collector), cooling at R2 is switched on until the temperature drops to „**CProt Toff**". If the storage tank exceeds „**CProt Tmax storage**", the pump at R1 is switched off.

Hydraulic Variant 15 Solar + cooling 2:
If „**CProt Ton**" is exceeded at S1, cooling at R2 is switched on. If the storage tank exceeds „**CProt Tmax storage**", R1 is switched off with R2 still running to keep on cooling. If the temperature at S1 drops to „**CProt Toff**", cooling at R2 is switched off.

Hydraulic Variant 16 Solar + cooling 3:
If „**CProt Ton**" is exceeded at S1, the pump at R1 is switched on to cool the collector by heating up the storage tank.
If the storage tank exceeds "**CProt Tmax storage**", R1 pump is switched off. Once the storage tank at S3 exceeds "**Tset S3**", cooling at R2 is switched on until "**TsetS3**"- hysteresis is reached.

6.5. - Col.- Alarm

If this temperature is exceeded at the collector sensor when the solar pump is on, a warning is triggered. A red LED starts flashing and a warning message is shown in the display.
Setting range: Collector alarm OFF, ON /Default setting: OFF
Setting range: Col. alarm 60 °C - 300 °C / Default setting: 150 °C

6.6. - Recooling

At the end of a sunny day the temperature in a storage tank may easily reach high values. In order to prevent further temperature increase the next day, excess energy can be released into the air via collectors under cloudy conditions or after sunset.
If the temperature in the storage tank exceeds the value „**Recool Tsetpoint**" and the collector is at least by 20 °C cooler than the storage tank, the solar pump starts. The storage tank is then cooled down until the „**Recool Tsetpoint**" is reached. In systems with two storage tanks the setting applies to both the storage tanks.
Setting range: Recooling: ON, OFF /Default setting: OFF
Setting range: Recooling Tsetpoint: 0 °C to 99 °C /Default setting: 70 °C


Caution

This function enables to release excess heat from the storage tank considerately and without solar fluid overheating, via piping and collectors into the ambient air. It is recommended to keep activated.

6.7. - Anti-Legionella

With the “**AL function**” activated the controller makes it possible to heat the storage tank up once at certain intervals the (“**AL frequency**”) to a higher temperature (“**AL Tsetpoint S2**”), assuming that the energy source allows this.

Setting range AL function: ON or OFF /default setting: OFF
Setting range AL Tsetpoint S2: 60°C to 99°C /default setting: 70°C
Setting range AL frequency: 1 to 28 days/default setting: 7 days
AL function: Shows the last time the AL function was active


Caution

The anti-Legionella function is switched off at delivery. This function is only relevant for storage tanks where sensor 2 is installed. Whenever heating-up has been carried out with the anti-Legionella function switched on, an information message with the date appears on the display.

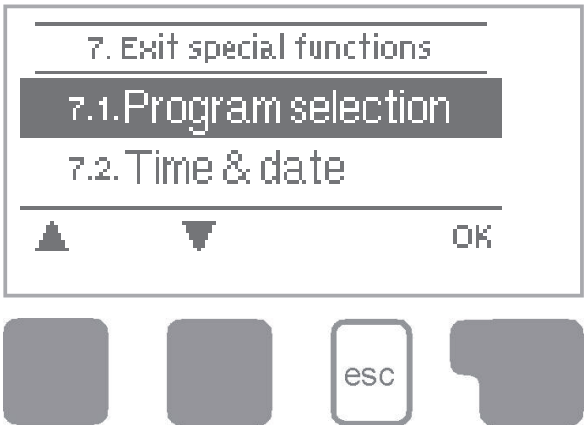

Danger

During the anti-Legionella function the storage tank is heated up over the set value „**Tmax S2**“!


Warning

To provide complete protection against Legionella bacteria, the function must be applied to all the tanks and sufficient energy must be available for safe heating the system up to the necessary temperature. This protection is efficient only where a high temperature is present, that is why the circulation pump shall be switched on at the same time, ensuring piping protection as well.

7. - Special functions



Menu “7. Special functions” is used to set basic items and expanded functions.

Warning

Time and Date is the only function to be set by the user. Other functions may be set by a specialist only.

The menu is closed by pressing “esc” or selecting “**Exit special functions**”.

Caution

Menu numbering depends on the hydraulic variant selected.

7.1. - Program selection

The suitable hydraulic variant for the specific application is selected and set here (see Chapter Hydraulic variants). The associated diagram can be displayed by pressing “info”.

Setting range: Program selection: 1-27 /Default setting: 1

Caution

Normally the program selection is made only once during initial commissioning by the specialist. Incorrect program selection can lead to wrong operation and unpredictable errors. Once the program is changed, other settings are reset to factory values.

7.2.1.2. - Show signal

This option will display the set signal in a text and graphic form.

7.3. - Pump speed control

7.3.1. - Variants of speed control

Off: There is no speed control. The connected pump is only switched on or off with full speed.
Variant V1 - Control to the set ΔT, starts from max. speed:
The pump starts at max. speed. After the purging time the controller switches to the set max. speed. If the temperature difference ΔT between the reference sensors (collector and storage tank) is less than the set value, then the speed is decreased by one stage after the Sweep time elapses. If the temperature difference between the reference sensors is greater than the set value, then the speed is increased by one stage after the Sweep time elapses. If the controller has adjusted the speed of the pump down to the smallest stage and the ΔT between the reference sensors is less than ΔT off, the pump is switched off.
Variant V2 - Control to the set ΔT, starts from min. speed:
The pump starts at max. speed. After the purging time the controller switches to the set min. speed. If the temperature difference ΔT between the reference sensors (collector and storage tank) is greater than the set value, then the speed is increased by one stage after the Sweep time elapses. If the temperature difference between the reference sensors is less than the set value, then the speed is decreased by one stage after the Sweep time elapses. If the controller has adjusted the speed of the pump down to the smallest stage and the ΔT between the reference sensors is below TΔoff, the pump is switched off.
Variant V3 - Control to a constant collector temperature, starts from min. speed:
The pump starts at max. speed. After the purging time the controller switches to the set min. speed. If the temperature at the collector sensor (or relay R2 in variants with a heat exchanger) is greater than the Setpoint, then the speed is increased. If the temperature at the collector sensor is less than the Setpoint, then the speed is decreased.
Variant V4 - If the storage tank of the highest priority is heated to the desired temperature, then the speed control works by variant M3. If the (secondary) storage tank of a lower priority is heated to the desired temperature, then the speed control works by variant M2.
Setting range: M1, M2, M3,M4, off/Default setting: off

7.3.2. - Purging time

During this time the pump runs at its full speed (100 %) to ensure reliable starting. Only after this purging time does the pump run with speed control and switches to the max. or min. speed, depending on the variant set (V1-V4). Purging is not used for PWM/0-10V output.
Setting range: Purging time 5-600 sec. /Default setting: 8 sec.

7.3.3. - Sweep time

In the process of speed control a certain delay before any speed change is needed in order to avoid quick speed changes and subsequent large temperature oscillations. The meaning of the parameter is described above.
Setting range: Sweep time 1-15 min. /Default setting: 4 min.

7.3.4. - Max. speed

The maximum speed of the pump.
Setting range: 70-100% /Default setting: 100%


Caution

The indicated percentages are approximate values that may vary to a greater or lesser extent depending on the system, pump and pump stage.

7.3.5. - Min. speed

The minimum speed of the pump at relay R1 is specified here.
Setting range: from (see 7.2.1.6. - Speed when „On““ on page 45) to max. speed -5 % / Default setting: 30%


Caution

The indicated percentages are approximate values that may vary to a greater or lesser extent depending on the system, pump and pump stage. 100% is the maximum for the given supply voltage and frequency.

7.3.6. - Setpoint

This value is the control setpoint for variant V3 (see Chap. 7.3.1, page 45). If the value at the collector sensor drops below the Setpoint, the speed is reduced. If it rises above the Setpoint, the speed is increased.
Setting range: 0 - 90 °C/Default setting: 60 °C

7.4. - Time & date

This menu is used to set the current time and date.


Caution

For a proper working of the controller and analysis of the system data it is essential for the time to be set accurately on the controller. Please note that if the mains voltage is interrupted the clock continues to run for 24 hours and then stops and needs to be reset after that.

7.5. - Sensor calibration

Deviations in the temperature values displayed, for example due to cables which are too long or sensors which are not positioned optimally, can be compensated for manually here. The settings can be made for each individual sensor in steps of 0.5 °C.
Sensor offset S1…S3 - Setting range: -100 ... +100 (-50 °C…+50 °C) / Default setting: 0 °C


Caution

These settings are only necessary in special cases at the time of initial commissioning and may be done by a specialist only. Incorrect settings may lead to an error.

7.6. - Commissioning

Starting the commissioning help guides you in the correct order through the basic settings necessary for commissioning, and provides brief descriptions of each parameter in the display.
Pressing the “esc” key takes you back to the previous value so you can look at the selected setting again or adjust it if desired. Pressing the “esc“ more than once takes you back step by step to the selection mode, thus cancelling the commissioning help.


Caution

May only be started by a specialist during commissioning! Observe the explanations for the individual parameters in these instructions, and check if further settings are necessary for your application.

7.7. - Factory settings

All of the settings that have been made can be reset, thus returning the controller to its delivery state.


Caution

The entire parameterization, analyses, etc. of the controller will be lost irrevocably. The controller must then be commissioned and set once again.

7.8. - Heat quantity

When the heat quantity measurement mode is set to “Flow”, the approximate heat output is calculated using the values set by the user. These values are antifreeze type, glycol portion and flow rate. These values are then related to the temperature data from the collector and tank sensors.


Caution

The heat output is a calculated estimation for system function control.

7.8.1. - Heat metering

Activate or deactivate the heat metering function.
Setting range: On / off, Default setting: Off

7.8.2. - AF type

Adjust the type of antifreeze used in the system. If none is used, please set 0.
Setting range: Ethylene / Propylene / Default setting: Ethylene

7.8.3. - Glycol portion

Adjust the percentage of glycol that has been used in the system.
Setting range: 0-60 % / Default setting: 40 %

7.8.4. - Průtok

Adjust the flow rate to be used for heat output calculation.
Setting range: 10-5000 l/h / Default setting: 500 l/h

7.8.5. - ΔT Offset

The value for temperature difference offset.
Since the temperatures of the collector and storage tank are used for heat metering, the temperature difference in flow/return line can be compensated for by changing ΔT Offset.
Example: Displayed collector temp. 40 °C, measured flow temp. 39 °C, displayed storage temp. 30° C, measured return temp. 31 °C = the resulting correction value is -20% (displayed ΔT 10K, actual ΔT 8K = -20 % offset value).
Setting range: -50 to +50 % / Default setting: 0 %

7.9. - Start aid function

With some solar thermal systems, namely with vacuum tube collectors, it may occur that measurement at the collector sensor takes too long or is not quite precise, which is often caused by the sensor not being placed at the hottest location. When the start aid function is activated, the following is performed:
If the temperature at the collector sensor increases by the value specified under „Increase” within one minute, then the solar pump is switched on for the set „Purging time” so that the medium to be measured can be moved to the collector sensor. If this still does not result in a normal switch-on condition, then the start help function is subject to a 5-minute lockout time.
Start aid setting range: on, off/Default setting: off
Purging time setting range: 2 - 30 s /Default setting: 5 s
Increase setting range: 1 °C -10 °C/Default setting: 3 °C/min.

Caution

This function shall be activated by an expert only, in case when problems with acquiring measured values appear. First of all, instructions from the collector manufacturer shall be respected.

8. - Menu lock

Menu “8. Menu lock” can be used to secure the controller against unintentional changing of the set values.

The menu is closed by pressing “esc” or selecting ”Exit menu lock”.

The menus listed below remain completely accessible despite the menu lock being activated, and can be used to make adjustments if necessary:
1. Measurement values
2. Statistics
3. Display mode
7.2 Time&date
8. Menu lock
9. Service values

To lock the other menus, select “Menu lock on”. To enable the menus again, select “Menu lock off”.
Setting range: on, off /Default setting: off

9. - Service values

The menu “9. Service values” can be used for remote diagnosis by a specialist in the event of an error etc.

Caution

Note down data at the time when an alarm or error occurs, e.g. into the following table.

The menu can be closed at any time by pressing “esc”.

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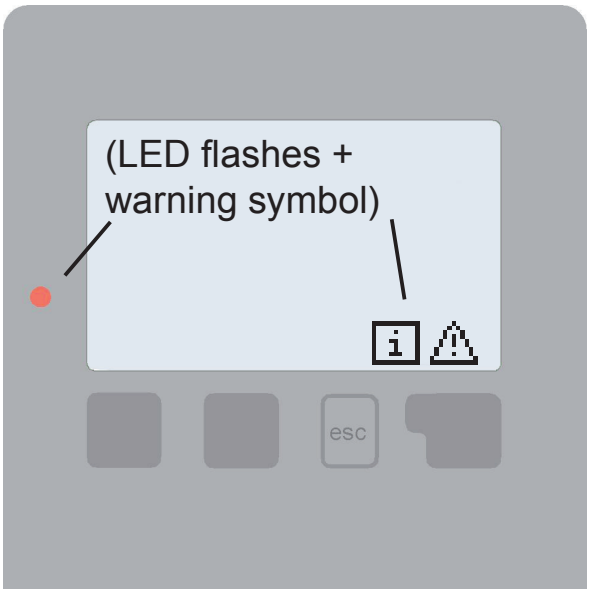
10. - Language

Menu “10. Language” can be used to select the language for the menu guidance. This is queried automatically during initial commissioning.

Z.1. Malfunctions with error messages



If the controller detects a malfunction, the red light flashes and the warning symbol also appears in the display. If the error is no longer present, the warning symbol changes to an info symbol and the red light no longer flashes.
To obtain more detailed information on the error, press the key under the warning or info symbol.

Consult a specialist in the event of an error!

Possible error messages:	Notes for the specialist:
Sensor x defective ---------->	Means that either the sensor, the sensor input at the controller or the connecting cable is defective. (Resistance table see chap. B.1)
Collector alarm ---------->	Means that the collector has risen above the temperature set in 6.5
Restart ---------->	Means that the controller was restarted, for example due to a power failure. Check the date&time!
Night circulation ---------->	Means that the solar pump is/was in operation between 23:00 and 04:00. (Exception see 6.4)

Z.2 Replacing the fuse

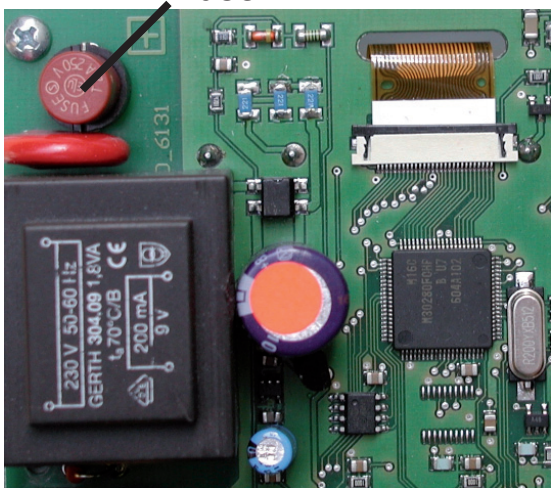
Danger

Repairs and maintenance may only be performed by a specialist. Before working on the unit, switch off the power supply and secure it against being switched on again! Check for the absence of power!

Danger

Only use the supplied spare fuse or a fuse of the same design with the following specifications: T2A 250V.

Z.2.1



If the mains voltage is switched on and the controller still does not function or display anything, then the internal device fuse may be defective. In that case, disconnect the device, open it, remove the old fuse and check it. Replace the defective fuse with a new one, locate the external source of the error (e.g. pump) and replace it. Then first re-commission the controller and check the function of the switch outputs in manual mode as described in Chap. 4.2.

Z.3 Maintenance

Caution

In the course of the general annual maintenance of your heating system you should also have the functions of the controller checked by a specialist and have the settings optimized if necessary.

Performing maintenance:
- Check the date and time (see 7.2.)
- Assess/check plausibility of analyses (see 2.4)
- Check the error log (see 2.5.)
- Verify/check plausibility of the current measurement values (see 1)
- Check the switch outputs/consumers in manual mode (see 4.2)
- If needed, optimize the parameter settings

Useful hints and tricks

Instead of setting the flow rate for the system using a flow rate limiter, it is better to adjust the flow rate using the switch on the pump and by means of the “Max. speed” setting on the controller (see 7.9.4 Max. speed). This saves electricity!

The service values (see 9) include not only current measurement values and operating states, but also all of the settings for the controller. Write the service values down once commissioning has been successfully completed.

In the event of uncertainty as to the control response or malfunctions the service values are a proven and successful method for remote diagnosis. Write the service values down (see 9) at the time when the suspected malfunction occurs. Send the service value table by fax or e-mail with a brief description of the error to the specialist.

In a system with a swimming pool, the pool can be easily switched off (e.g. for the winter) using a simple function. Just press and hold the “esc” key for several seconds while the system is displayed. As soon as the pool is switched off or on, the respective information will be displayed.

The Operating hours displayed in the “Analysis” menu are solar operating hours. This therefore only takes into account hours in which the solar pump is active. In the universal programs the times refer to relay R1.

It is recommended to record any analyses and data that are particularly important to you at regular intervals.

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