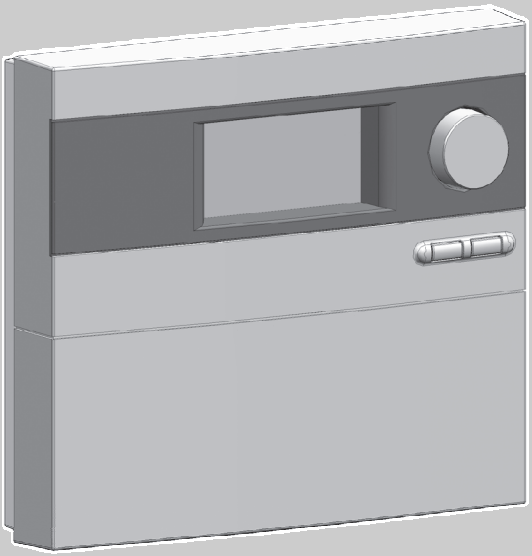
Installation and servicing instructions

Solar thermal controller



7747006071-00.1 SD

Logamatic SC40

For Heating Engineers

Please read carefully prior to installation.

7 747 017 473 GB (2007/08) OSW

Buderus

Contents

1 Safety instructions and explanation of symbols

1.1 General safety instructions

About this manual

This manual contains important information for the safe and correct installation and operation of the solar thermal controller.

This manual is intended for heating engineers.

- Read this manual carefully and keep it for future reference.
- Always observe the safety instructions to prevent injury and damage to property.

Intended use

The solar thermal temperature difference controller (referred to from now on as the "controller") may only be used for the operation of solar thermal systems under the specified ambient conditions (→ Section 2.4).

The controller must not be used outdoors, in damp rooms or in rooms where easily combustible gas mixtures could form.

- Only operate the solar thermal system as intended and when the system is in perfect working order.

Electrical connections

Any work that requires the controller to be opened may only be carried out by a qualified electrician.

- The electrical supply must be connected by a qualified electrician.
- Make sure that an all-pole mains isolating device compliant with EN 60335-1 for disconnection from the power supply is fitted.
- Isolate the controller from the mains power supply before opening.

Domestic hot water temperature

- To limit the DHW outlet temperature to max. 60 °C, fit a thermostatic blending valve.

Standards and guidelines

- Ensure that installation and operation of the device conforms to the local standards and guidelines.

Disposal

- Dispose of packaging in an environmentally responsible manner.
- When replacing components, dispose of the old parts in an environmentally responsible manner.

1.2 Symbols

Safety instructions in this document are identified by a warning-triangle symbol and are printed on a grey background.

Hazard warnings indicate the seriousness of the consequences of not following the safety instructions.

- **Caution** indicates that minor damage to property could result.
- **Warning** indicates that minor personal injury or serious damage to property could result.
- **Danger** indicates that serious personal injury could result. In particularly serious cases, lives could be at risk.

Notes are identified by the symbol shown on the left. They are bordered by horizontal lines above and below the text.

Notes contain important information in cases where there is no risk of personal injury or damage to property.

2 Details of the product

2.1 EU Declaration of Conformity

The design and operation of this product conform to the applicable European directives and supplementary national requirements. Confirmity has been demonstrated. You can request a copy from your local Buderus office.

CE

2.2 Package contents

- controller SC40
- Collector temperature sensor NTC 20K (FSK)
- Storage cylinder temperature sensor NTC 10K
- Fixings and cable clamps (for wall-mounting)

Additional components that may be required such as temperature sensors, heat meters and valves are available as optional accessories.

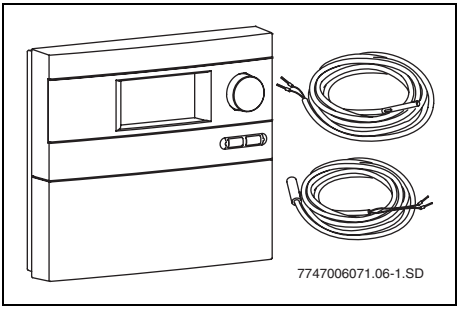


Fig. 1 Controller and temperature sensors

2.3 Product description

The controller is designed for use with a solar thermal system. It can be mounted on a wall or is integrated in a solar pumping station.

In normal operating mode, the display screen on the controller stays illuminated in green/yellow for 5 minutes after the last button was pressed (activated by pressing the rotary selector , for example). The display shows the following:

- Pump status (as simple schematic diagram not representative of actual system)
- System values (e.g. temperatures)
- Selected functions
- Fault messages

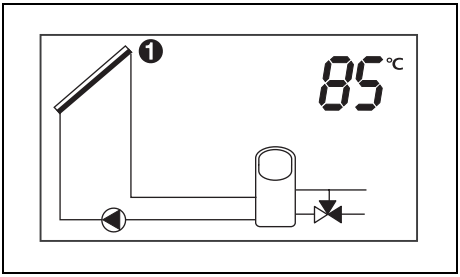


Fig. 2 Example of screen display

2.4 Specifications

controller SC40	
Power consumption	1.8 W
Enclosure rating	IP20 / DIN 40050
Supply voltage	230 V AC, 50 Hz
Operating current	I_{max}: 5 A
Maximum power consumption	5 A (max. 1.1 A per output/1 device per output)
Sensing range	–30 °C to +180 °C
Permissible ambient temperature	0 to +50 °C
Collector temperature sensor	NTC 20K with 2.5 m cable
Cylinder temperature sensor	NTC 10K with 3 m cable
Dimensions H x W x D	170 x 190 x 53 mm

Tab. 1 Specifications

Temperature sensor S1 (S5 with 2 fields) NTC 20K				Temperature sensor S2 ... S8 NTC 10K			
T (°C)	**R (kΩ)**	**T (°C)**	**R (kΩ)**	**T (°C)**	**R (kΩ)**	**T (°C)**	**R (kΩ)**
-20	198.4	**60**	4.943			**60**	2.49
-10	112.4	**70**	3.478			**70**	1.753
0	66.05	**80**	2.492	**0**	32.56	**80**	1.256
10	40.03	**90**	1.816	**10**	19.86	**90**	0.915
20	25.03	**100**	1.344	**20**	12.487	**100**	0.677
30	16.09	**110**	1.009	**30**	8.060	**110**	0.509
40	10.61	**120**	0.767	**40**	5.331	**120**	0.387
50	7.116	**130**	0.591	**50**	3.606	**125**	0.339

Tab. 2 Resistances of the temperature sensors

The temperature sensors must be disconnected from the controller for their resistances to be measured.

3 Regulations

This device complies with the applicable EN requirements.

- Observe the following regulations and guidelines:
  - Local regulations and requirements of the electricity supplier concerned.
  - Commercial/industrial codes and regulations and fire regulations.

4 Installation (for engineers only)

4.1 Mounting the controller on a wall

The controller is attached to the wall by three screws.

Caution: Risk of injury and damage to the casing if incorrectly mounted.
- Do not use the rear panel of the casing as a drilling template.

- Drill the upper mounting hole (→ Fig. 3, item 1). Drive in a screw leaving the head proud by 5 mm. Slacken the screw at the bottom of the controller and remove the cover. Hang the controller on the wall by means of the slot in the rear panel. Mark out the lower mounting holes (→ Fig. 3, item 2), drill the holes and insert wall plugs. Straighten the controller and screw firmly in place through the lower mounting holes, left and right.

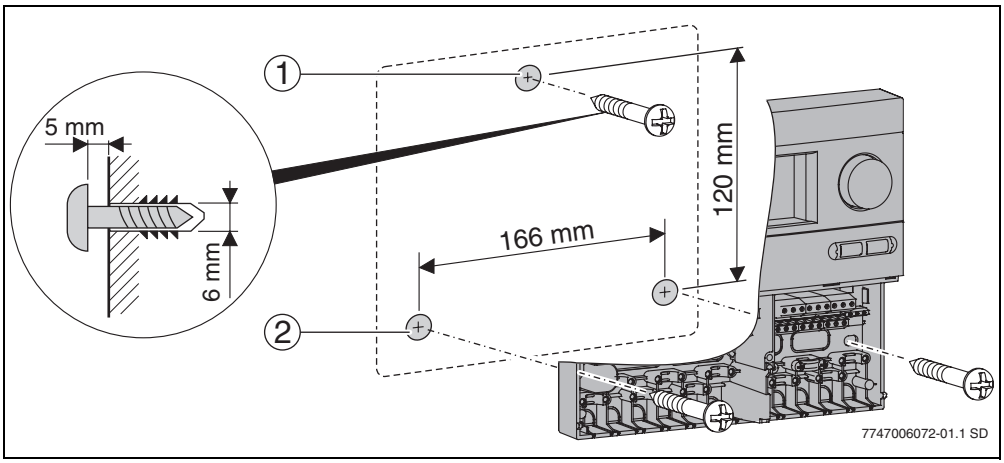


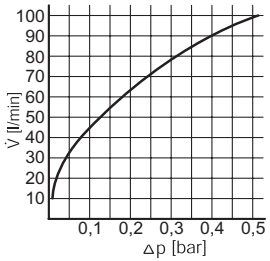
Fig. 3 Mounting the controller on a wall

1 Top fixing hole
2 Bottom fixing holes

4.2 Installing diverter valve for return boost (optional)

The "return boost" function for boosting the heating system using the solar thermal system requires a diverter valve to be fitted. The diverter valve directs the flow of central heating water either through the thermal store or directly back to the boiler depending on the heating system's return temperature.

Specifications of diverter valve	
Max. closing pressure	0.55 bar (55 kPa)
Max. static pressure	8.6 bar (860 kPa)
Max. fluid temperature	95 °C, 110 °C for short periods
kV rating	8.2
Voltage	230 V, 50 Hz
Maximum ambient temperature	50 °C



Tab. 3 Specifications and pressure loss characteristics of diverter valve

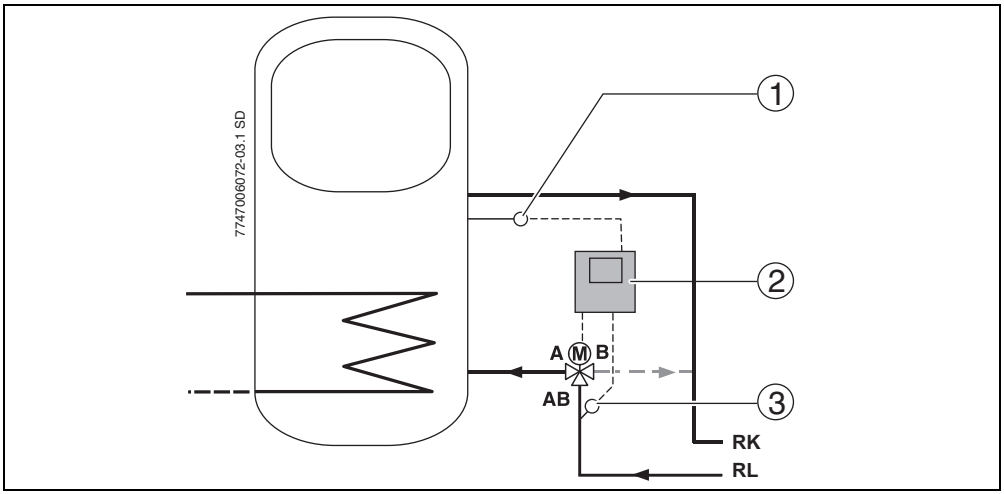


Fig. 4 Installation diagram for combination cylinder return boost

1 Cylinder temperature sensor S6
2 Solar thermal controller Logamatic SC40
3 Return temperature sensor S3
RL Heating return
RK Boiler return

Observe the connection markings on the diverter valve.The valve in Fig. 4 allows fluid to flow from AB to B when de-energised. Once the set temperature difference is reached, the valve switches over to divert the flow from AB to A.

Caution: Risk of system damage if the valve positioner casing is damaged.

- Use spanner on union nuts not on valve body.

- Fit the diverter valve in the return pipe between the solar storage cylinder (→ Fig. 4) and the boiler.

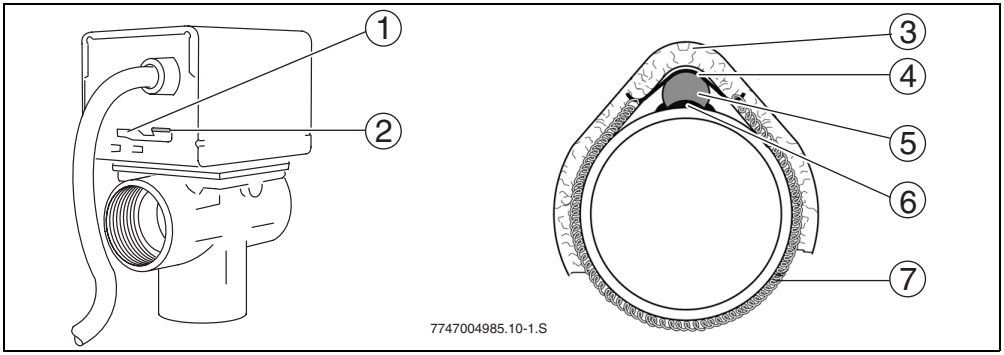


Fig. 5 Diverter valve (left) and fitted temperature sensor (right)

Function of valve switch

Use the "MAN" (manual, → Fig. 5, item 2) setting for filling, bleeding or draining the system or as the safety setting when there is a power failure. In the "MAN" position, the valve actuator is in the centre position. This allows even flow of the fluid through both outlet connections.

- For normal operation, set the switch to "AUTO" (→ Fig. 5, item 1).

Installing the temperature sensors

There are 2 temperature sensors supplied with the valve. They can be used as cylinder temperature sensors or pipe contact sensors (→ Table 1, page 6).

- Apply heat conducting paste (→ Fig. 5, item 6) to temperature sensor S3 (→ Fig. 5, item 5).
- Fit temperature sensor S3 using retaining plate (→ Fig. 5, item 4) and spring strap (→ Fig. 5, item 7) to the return pipe approx. 20 cm upstream of the diverter valve.
- Provide temperature sensor S3 with insulation at least 20 cm long (→ Fig. 5, item 3).
- Fit temperature sensor S6 in the position provided on the cylinder (see installation instructions for cylinder).

4.3 Fitting a heat meter (optional)

The heat meter gives an approximation of the heat gained from the solar panels.

Included in delivery:

- Item 1: water meter connections, ¾" inc. seals (2 off)
- Item 2: temperature sensor NTC 10K inc. fixings (2 off)
- Item 3: volumetric flow meter (1 off)

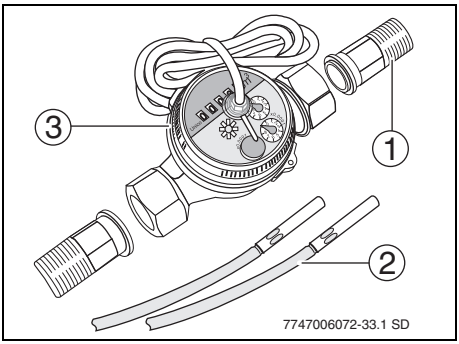


Fig. 6 Heat meter

Tab. 4

Number of collectors	Rated volumetric flow rate
1 - 5	0.6 m³/h
6 - 10	1.0 m³/h
11 - 15	1.5 m³/h

Tab. 5 Rated volumetric flow rate

- Fit volumetric flow meter below the solar pumping station in the solar return pipe (→ Fig. 7, item 1). Pay attention to direction of flow and fitted position (meter dial must not face downwards).
- Fix temperature sensor for solar return (→ Fig. 7, item 2) in position. For details of temperature sensor fixing, refer to page 10, Fig. 5.
- Fix temperature sensor for solar flow (→ Fig. 7, item 3) in position. For details of temperature sensor fixing, refer to page 10, Fig. 5.

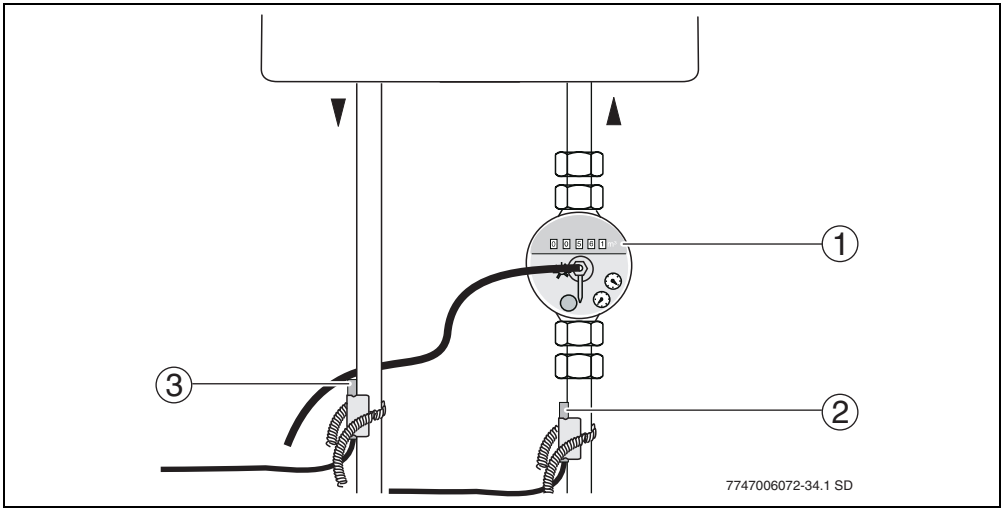


Fig. 7 Fitting the volumetric flow meter and temperature sensors

1 Volumetric flow meter
2 Return temperature sensor
3 Flow temperature sensor

The heat meter is used only to check system function. It is not capable of metering to EN 1434 or determining yield. Calculation of yield requires a device with a calibration certificate, usage data (water volume, room heating heat requirement), weather data and system simulation.

- Wire up electrical connections as shown in Section 4.4.

4.4 Electrical connections

Danger: risk of electric shock.
- Disconnect the power supply (230 V AC) before opening up the controller.
- Secure the cable with the cable grip.

4.4.1 Preparing cable entry

The cables can be fed into the housing from behind (→ Fig. 8, item 4) or from below (→ Fig. 8, item 3).

- Maintain IP 20 protection when installing:
  - Cut open only the cable entries required.
  - Cut open the cable entry only as much as required.
- To avoid jagged edges, cut out the cable entries with a knife (→ Fig. 8).
- Secure cables with the appropriate cable grips (→ Fig. 8, item 2). The strain relief clamp can also be fitted in the reverse position (→ Fig. 8, item 1).

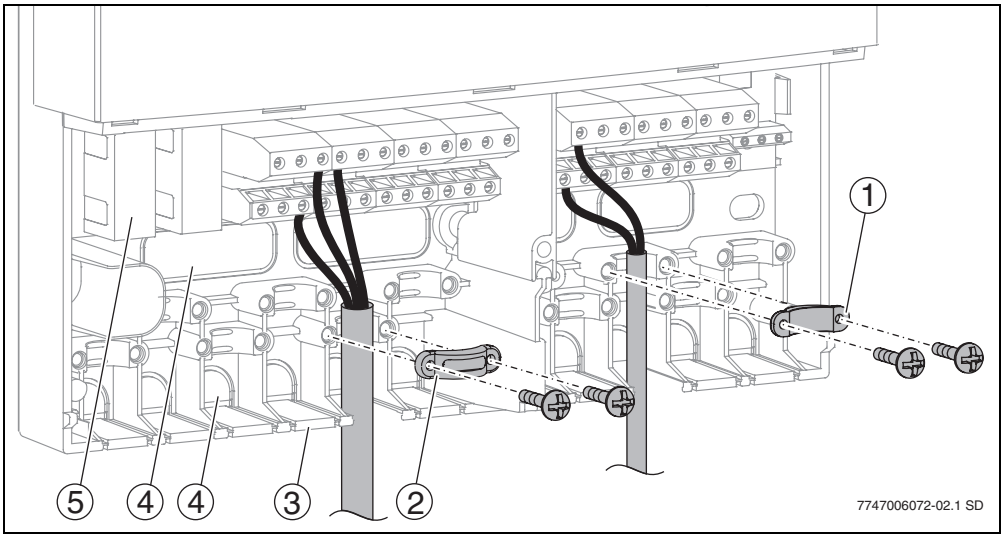


Fig. 8 Feeding in and securing cables

1 Cable grip reversed
2 Cable grip
3 Cable entry from below
4 Cable entry from the rear
5 Fuse, 2.5 A slow (2 off)

4.4.2 Connecting the leads

Observe the following when connecting the cables:

- Comply with local regulations, such as protective earthing tests etc.
- Only use pumps, valves and sensors supplied by Buderus.
- Protect the controller from overloads and short-circuits.
- The power supply must match the specifications on the rating plate. See also Table 1, page 6.
- Connect only 1 lead to each terminal (max. 1.5 mm^2).
- The temperature sensor leads can be connected either way round. The sensor leads can be up to 100 metres long (up to 50 m length = 0.75 mm^2, up to 100 m = 1.5 mm^2).
- Route all sensor leads separately from cables carrying 230 V or 400 V to avoid inductive interference (minimum separation 100 mm).
- Use shielded low-voltage cables if external inductive interference is expected (e.g. from power substations, high-voltage power cables, microwaves).
- For the 230 V connection, use a cable of at least type H05 VV- ... (NYM...).
- Ensure that structural fire safety features are not impaired.
- The leads from the motorised diverter valves shown in the configuration diagrams must be connected as follows: brown = R, blue = N, yellow and green = Earth.
- Only connect pumps to the outputs R1 and R2 (speed control on these connections only).
- Motorised valves with OPEN/CLOSE command (or mixer units) must also be connected to terminals $\overline{R3}$ to $\overline{R5}$.
- The connections L3 to L5 are for the power supply for special functions of connected components.

The use of some functions (double match flow, cooling, daily heating and heat exchanger anti-icing) requires additional components (valves, temperature sensors) that must be purchased separately (→ Table 13, page 53).

Warning: risk of damage to system due to pump failure.

- If a pump with internal electronic control circuitry is to be connected, deactivate the speed modulation function (→ Section 7.5.2, page 56).

- Connect the leads according to the desired configuration diagram (→ pages 15 - 41).
- After completing the work, close the controller by replacing the cover and tightening the securing screw.

4.4.3 Configuration diagram T1 - domestic water heating

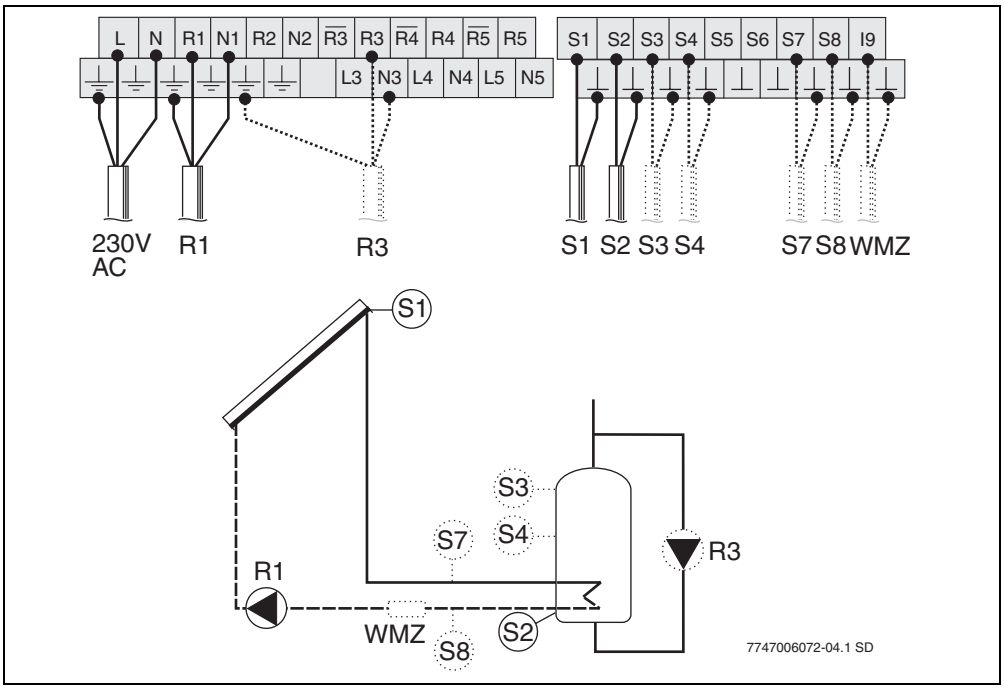


Fig. 9

R1 Solar circuit pump 1
R3 Daily heating pump (optional)
S1 Collector temperature sensor FSK
S2 Cylinder bottom temperature sensor
S3 Cylinder top temperature sensor (optional)
S4 Cylinder centre temperature sensor (optional)
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.4 Configuration diagram T2 - solar water heating with East/West aspect function

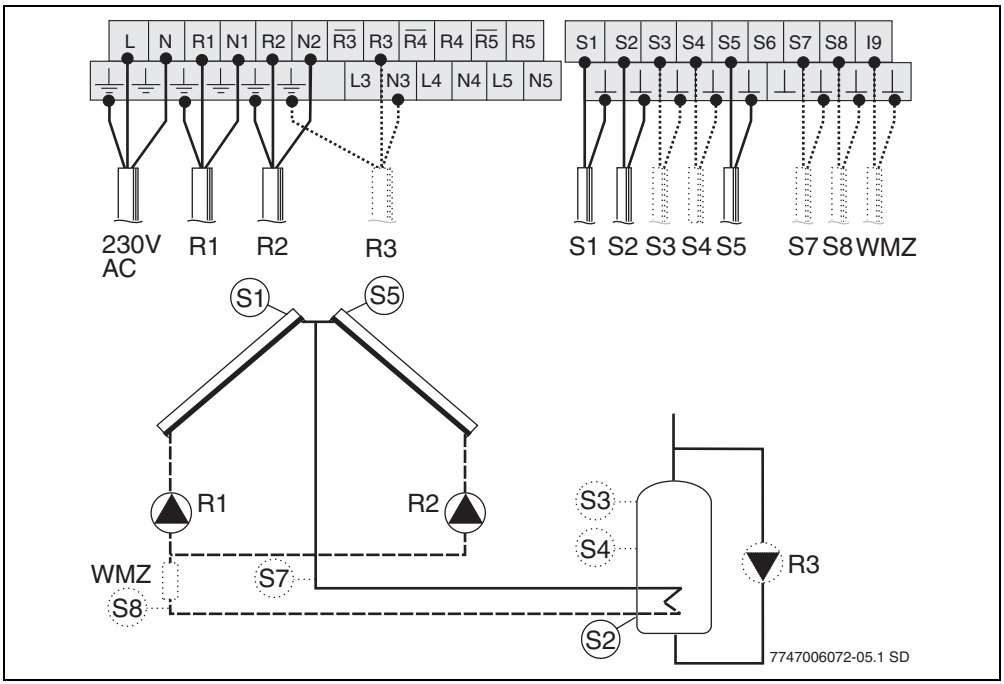


Fig. 10

R1 Solar circuit pump 1
R2 Solar circuit pump 2
R3 Daily heating pump (optional)
S1 Collector temperature sensor FSK, field 1
S2 Cylinder bottom temperature sensor
S3 Cylinder top temperature sensor (optional)
S4 Cylinder centre temperature sensor (optional)
S5 Collector temperature sensor FSK, field 2
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.5 Configuration diagram T3 - solar water heating with external heat exchanger

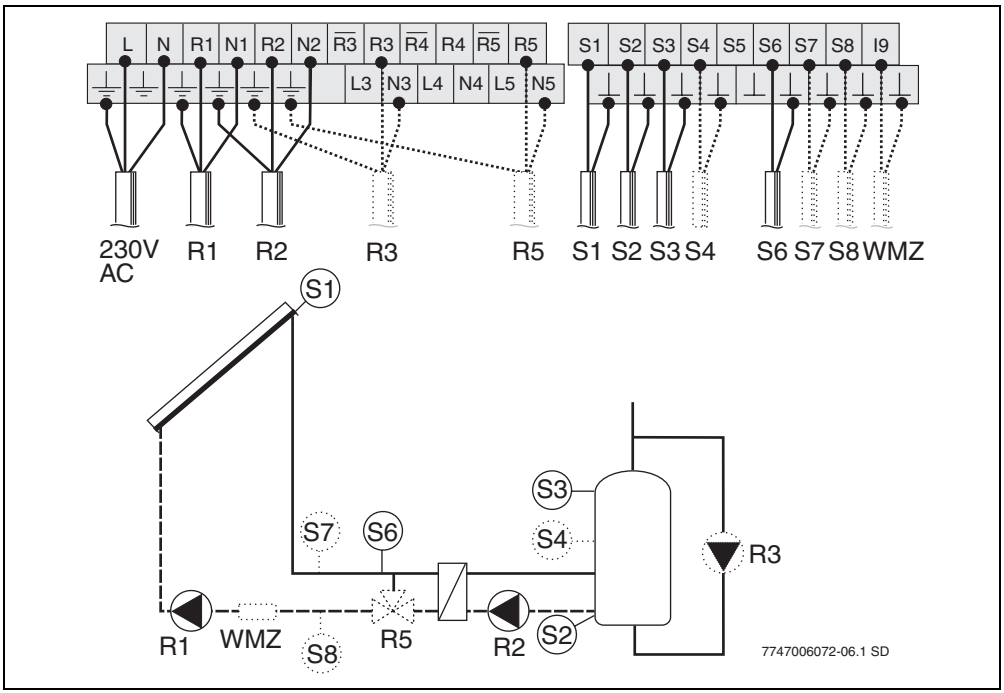


Fig. 11

R1 Solar circuit pump 1
R2 Heat exchanger pump
R3 Daily heating pump (optional)
R5 Anti-icing system valve (optional)
S1 Collector temperature sensor FSK
S2 Cylinder bottom temperature sensor
S3 Cylinder top temperature sensor (required for shutdown at 95 °C)
S4 Cylinder centre temperature sensor (optional)
S6 Temperature sensor for external heat exchanger
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.6 Configuration diagram T4 - solar water heating with external heat exchanger and East/West aspect function

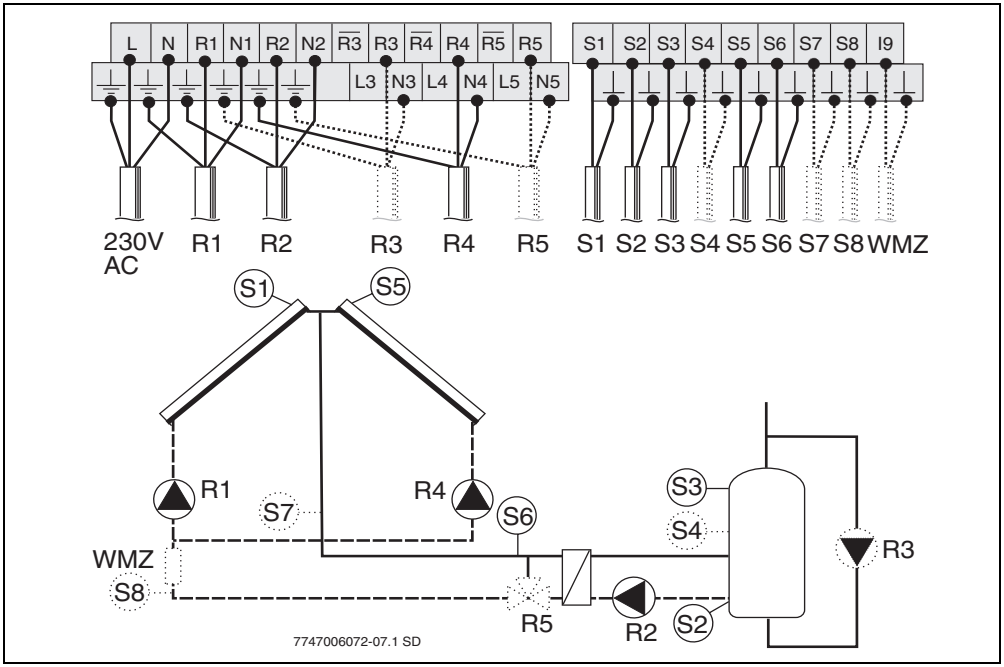


Fig. 12

R1 Solar circuit pump 1
R2 Heat exchanger pump
R3 Daily heating pump (optional)
R4 Solar circuit pump 2
R5 Anti-icing system valve (optional)
S1 Collector temperature sensor FSK, field 1
S2 Cylinder bottom temperature sensor
S3 Cylinder top temperature sensor (required for shutdown at 95 °C)
S4 Cylinder centre temperature sensor (optional)
S5 Collector temperature sensor FSK, field 2
S6 Temperature sensor for external heat exchanger
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Heat meter WMZ return temperature sensor (optional)
WMZ Heat meter (optional)

4.4.7 Configuration diagram T5 - solar water heating with preheating stage charge transfer

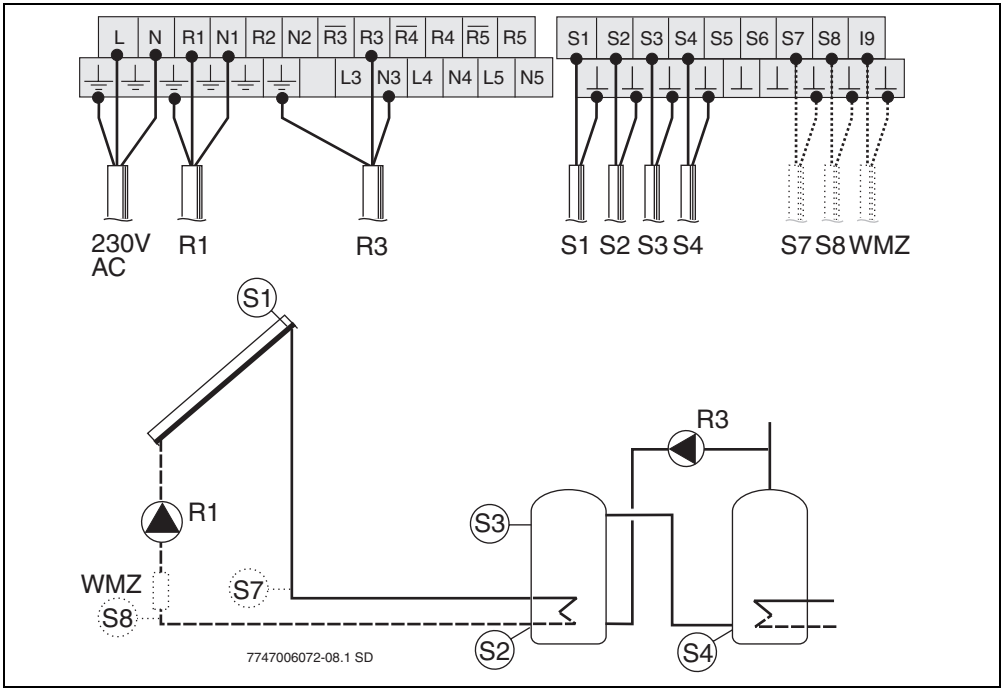


Fig. 13

R1 Solar circuit pump 1
R3 Charge transfer pump
S1 Collector temperature sensor FSK
S2 Cylinder 1 bottom temperature sensor
S3 Cylinder 1 top temperature sensor
S4 Cylinder 2 bottom temperature sensor
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.8 Configuration diagram T6 - solar water heating with East/West aspect function and preheating stage charge transfer

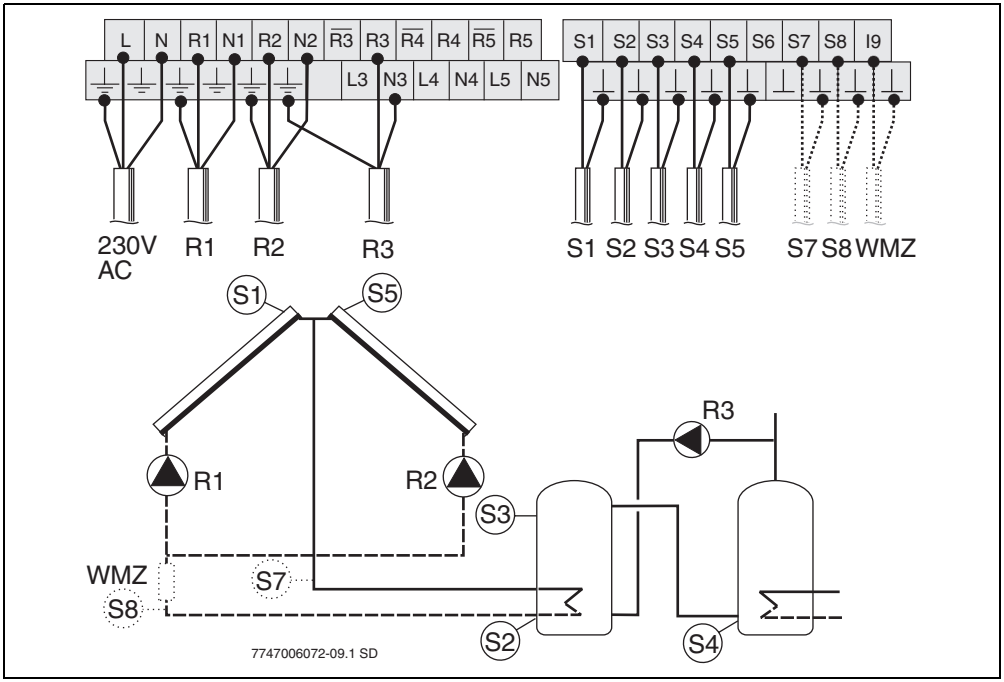


Fig. 14

R1 Solar circuit pump 1
R2 Solar circuit pump 2
R3 Charge transfer pump
S1 Collector temperature sensor FSK, field 1
S2 Cylinder 1 bottom temperature sensor
S3 Cylinder 1 top temperature sensor
S4 Cylinder 2 bottom temperature sensor
S5 Collector temperature sensor FSK, field 2
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.9 Configuration diagram T7 - solar water heating with preheating stage charge transfer and external heat exchanger

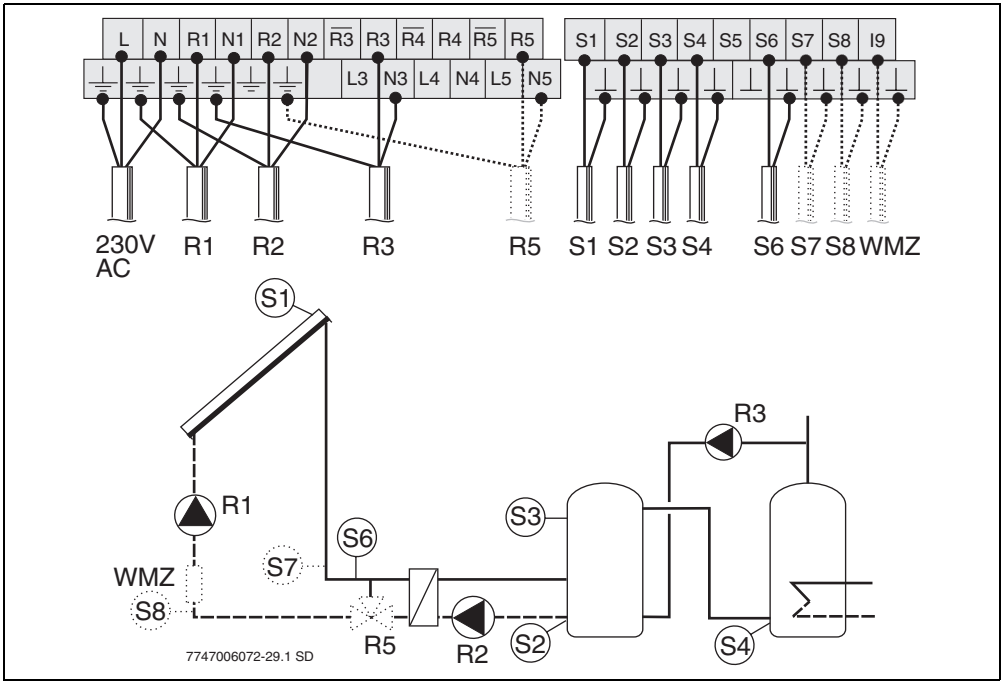


Fig. 15

R1 Solar circuit pump 1
R2 Heat exchanger pump
R3 Charge transfer pump
R5 Anti-icing system valve (optional)
S1 Collector temperature sensor FSK
S2 Cylinder 1 bottom temperature sensor
S3 Cylinder 1 top temperature sensor
S4 Cylinder 2 bottom temperature sensor
S6 Temperature sensor for external heat exchanger
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.10 Configuration diagram T8 - solar water heating with East/West aspect function, preheating stage charge transfer and external heat exchanger

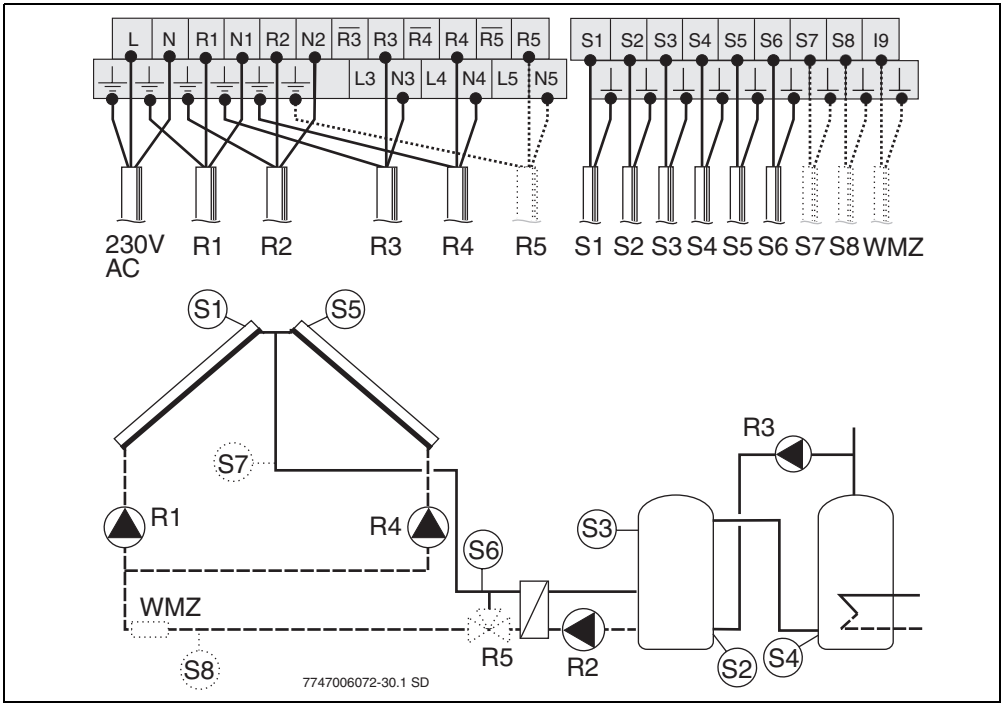


Fig. 16

R1 Solar circuit pump 1
R2 Heat exchanger pump
R3 Charge transfer pump
R4 Solar circuit pump 2
R5 Anti-icing system valve (optional)
S1 Collector temperature sensor FSK, field 1
S2 Cylinder 1 bottom temperature sensor
S3 Cylinder 1 top temperature sensor
S4 Cylinder 2 bottom temperature sensor
S5 Collector temperature sensor FSK, field 2
S6 Temperature sensor for external heat exchanger
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.11 Configuration diagram H1 - heating boost system

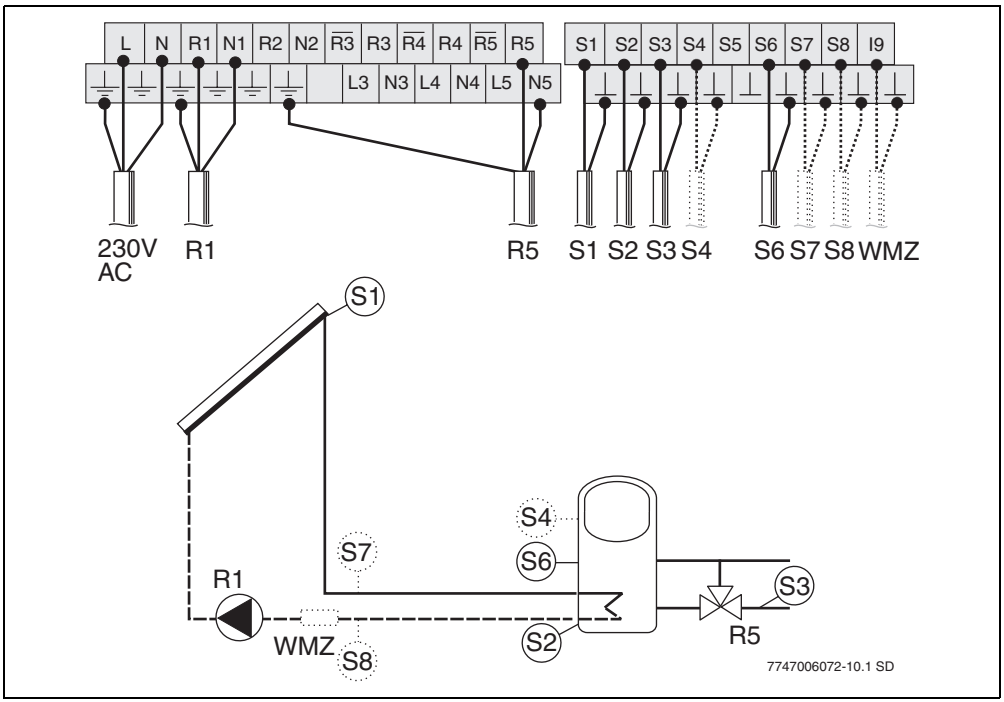


Fig. 17

R1 Solar circuit pump 1
R5 Return flow boost valve
S1 Collector temperature sensor FSK
S2 Cylinder bottom temperature sensor
S3 Heating return temperature sensor
S4 Cylinder top temperature sensor (optional)
S6 Cylinder centre temperature sensor
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.12 Configuration diagram H2 - heating boost system with East/West aspect function

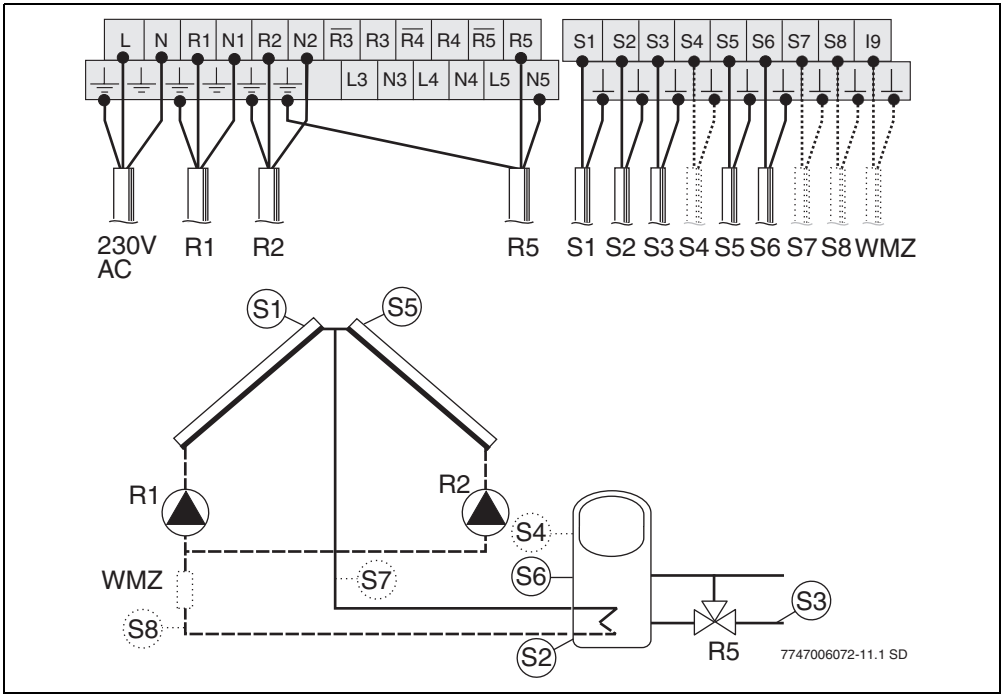


Fig. 18

R1 Solar circuit pump 1
R2 Solar circuit pump 2
R5 Return flow boost valve
S1 Collector temperature sensor FSK, field 1
S2 Cylinder bottom temperature sensor
S3 Heating return temperature sensor
S4 Cylinder top temperature sensor (optional)
S5 Collector temperature sensor FSK, field 2
S6 Cylinder centre temperature sensor
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.13 Configuration diagram H3 - heating boost system with external heat exchanger

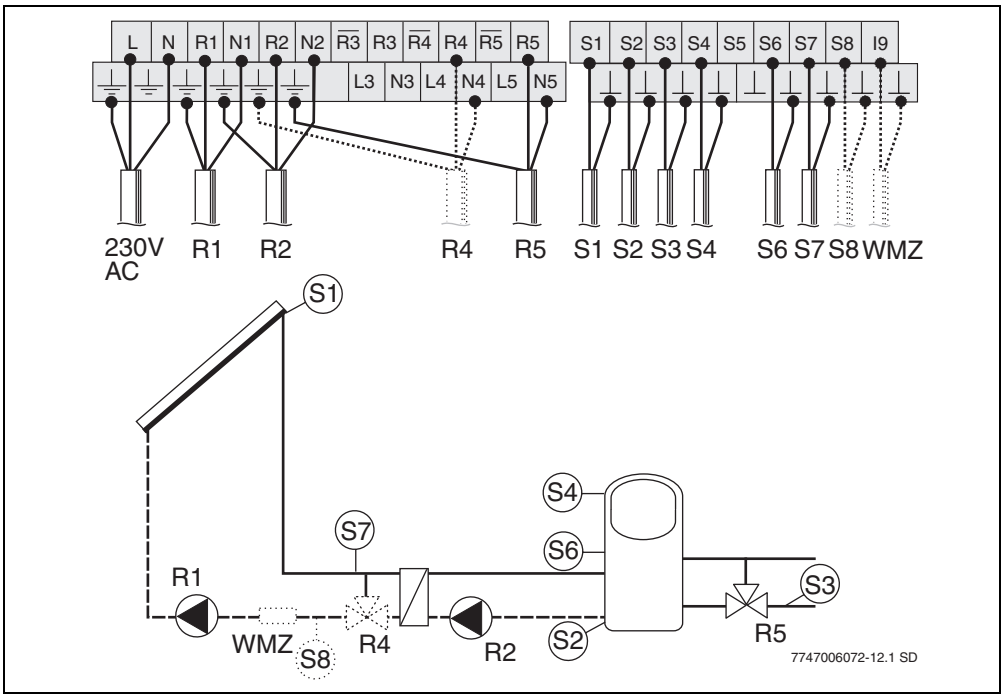


Fig. 19

R1 Solar system pump
R2 Heat exchanger pump
R4 Anti-icing system valve (optional)
R5 Return flow boost valve
S1 Collector temperature sensor FSK, field 1
S2 Cylinder bottom temperature sensor
S3 Heating return temperature sensor
S4 Cylinder top temperature sensor (required for shutdown at 95 °C)
S6 Cylinder centre temperature sensor
S7 Temperature sensor on external heat exchanger (heat meter flow)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.14 Configuration diagram H4 - heating boost system with East/West aspect function and external heat exchanger

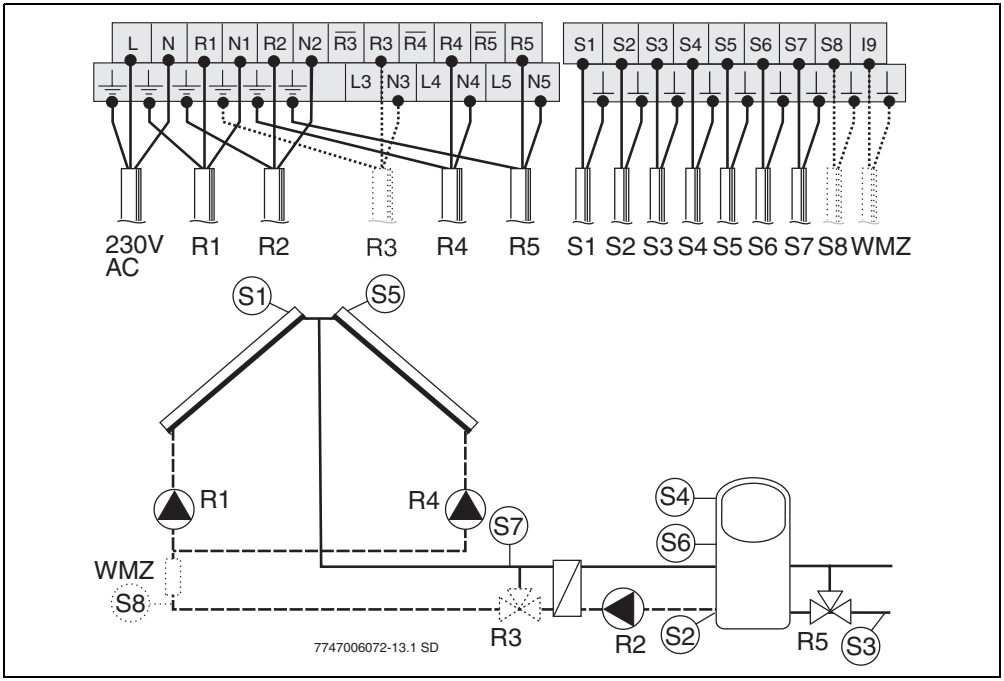


Fig. 20

R1 Solar circuit pump 1
R2 Heat exchanger pump
R3 Anti-icing system valve (optional)
R4 Solar circuit pump 2
R5 Return flow boost valve
S1 Collector temperature sensor FSK, field 1
S2 Cylinder bottom temperature sensor
S3 Heating return temperature sensor
S4 Cylinder top temperature sensor (required for shutdown at 95 °C)
S5 Collector temperature sensor FSK, field 2
S6 Cylinder centre temperature sensor
S7 Temperature sensor on external heat exchanger (heat meter flow)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.15 Configuration diagram H5 - heating boost system with 2 cylinders connected via valve

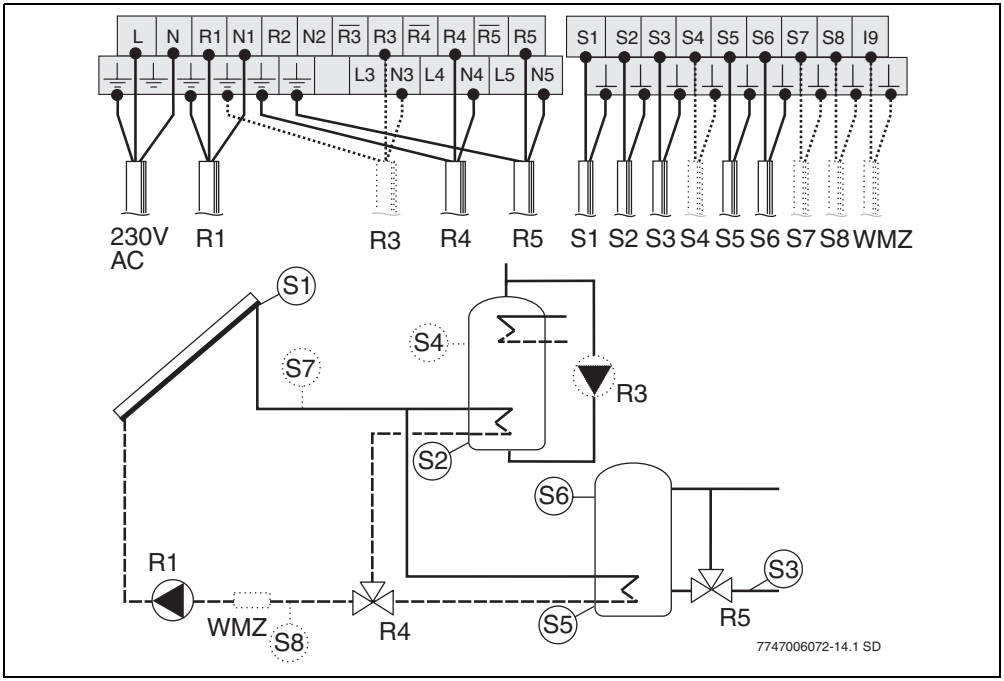


Fig. 21

R1 Solar circuit pump 1
R3 Daily heating pump (optional)
R4 Cylinder selection valve
R5 Return flow boost valve
S1 Collector temperature sensor FSK
S2 Cylinder 1 bottom temperature sensor
S3 Heating return temperature sensor
S4 Cylinder 1 top temperature sensor (optional)
S5 Cylinder 2 bottom temperature sensor
S6 Cylinder 2 top temperature sensor
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.16 Configuration diagram H6 - heating boost system with 2 cylinders and 2 pumps

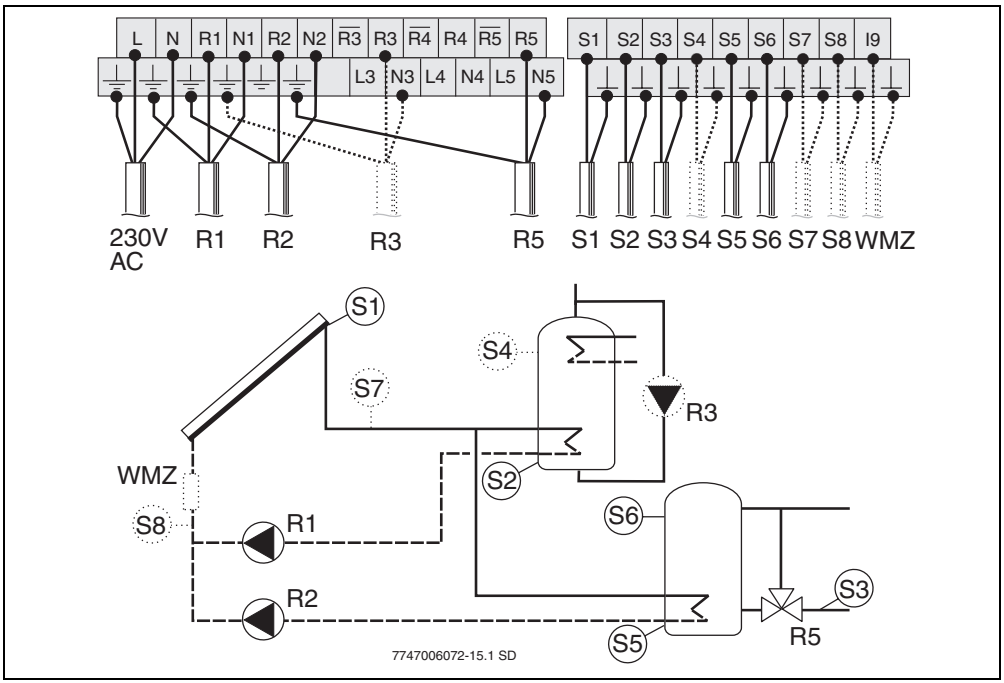


Fig. 22

R1 Solar circuit pump 1
R2 Solar circuit pump 2
R3 Daily heating pump (optional)
R5 Return flow boost valve
S1 Collector temperature sensor FSK
S2 Cylinder 1 bottom temperature sensor
S3 Heating return temperature sensor
S4 Cylinder 1 top temperature sensor (optional)
S5 Cylinder 2 bottom temperature sensor
S6 Cylinder 2 top temperature sensor
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.17 Configuration diagram H7 - heating boost system with East/West aspect function and 2 cylinders connected via valve

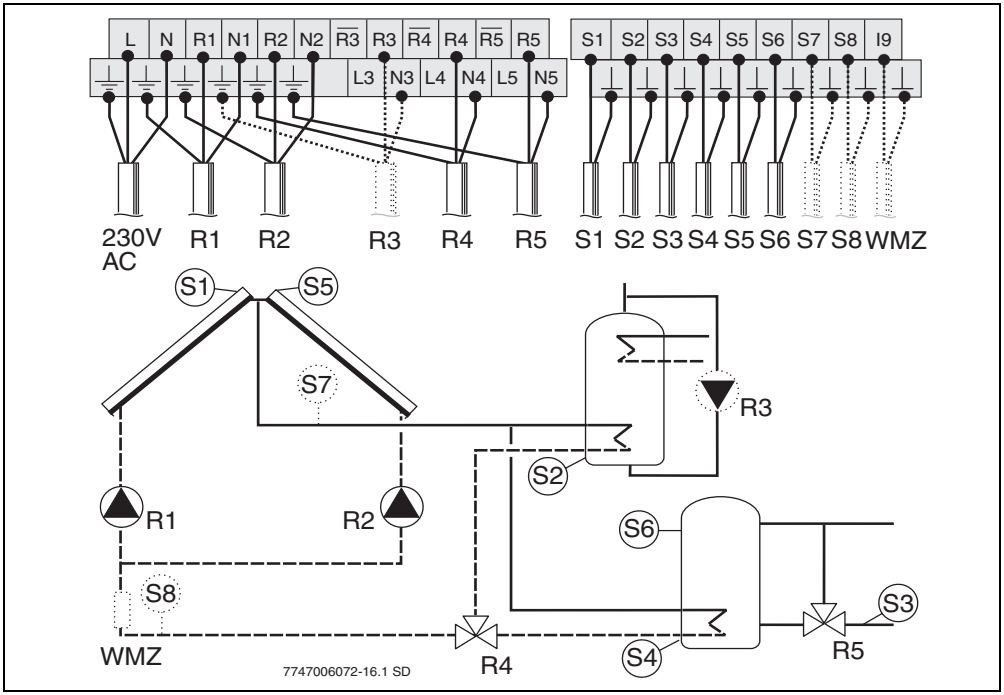


Fig. 23

R1 Solar circuit pump 1
R2 Solar circuit pump 2
R3 Daily heating pump (optional)
R4 Cylinder selection valve
R5 Return flow boost valve
S1 Collector temperature sensor FSK, field 1
S2 Cylinder 1 bottom temperature sensor
S3 Heating return temperature sensor
S4 Cylinder 2 bottom temperature sensor
S5 Collector temperature sensor FSK, field 2
S6 Cylinder 2 top temperature sensor
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.18 Configuration diagram H8 - heating boost system with 2 cylinders connected via valve and external heat exchanger

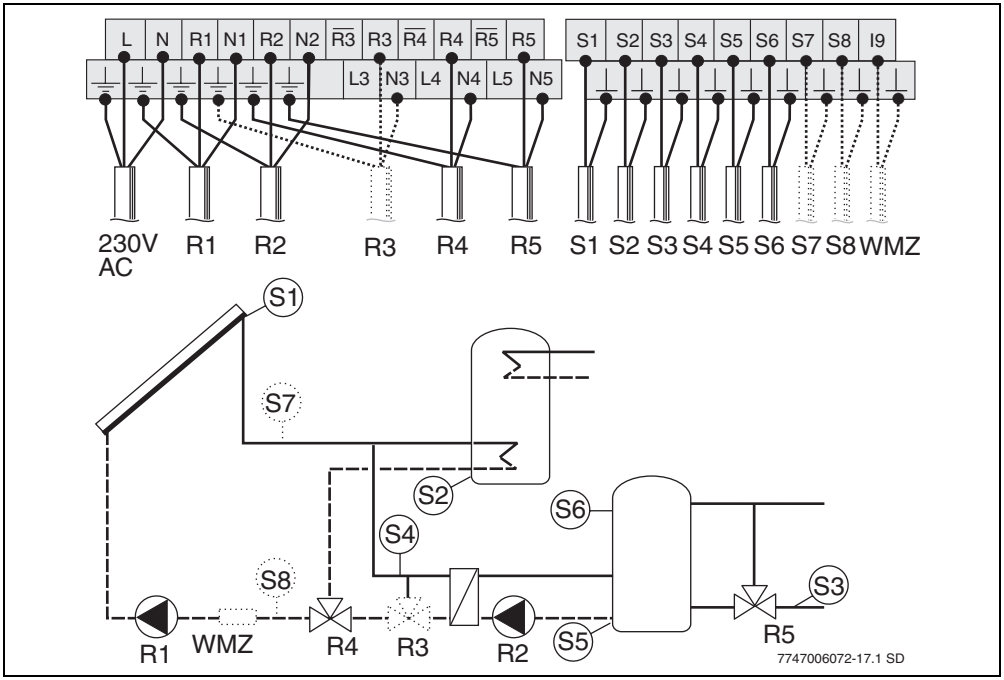


Fig. 24

R1 Solar circuit pump 1
R2 Heat exchanger pump
R3 Anti-icing system valve (optional)
R4 Cylinder selection valve
R5 Return flow boost valve
S1 Collector temperature sensor FSK
S2 Cylinder 1 bottom temperature sensor
S3 Heating return temperature sensor
S4 Temperature sensor for external heat exchanger
S5 Cylinder 2 bottom temperature sensor
S6 Cylinder 2 top temperature sensor
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.19 Configuration diagram H9 - heating boost system with 2 cylinders, external heat exchanger and 2 pumps

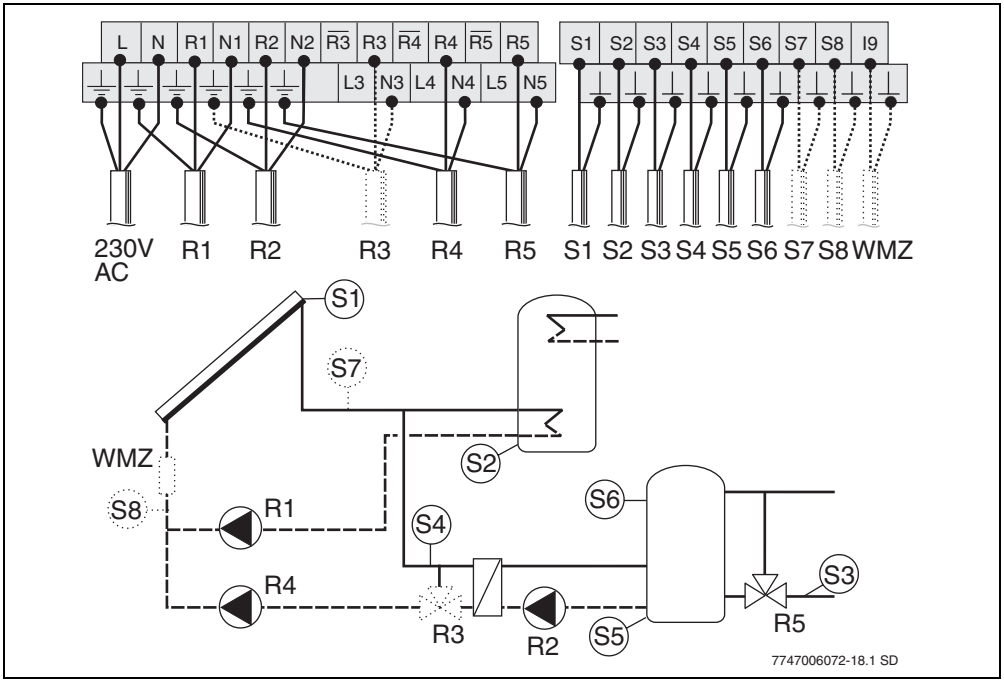


Fig. 25

R1 Solar circuit pump 1
R2 Heat exchanger pump
R3 Anti-icing system valve (optional)
R4 Solar circuit pump 2
R5 Return flow boost valve
S1 Collector temperature sensor FSK
S2 Cylinder 1 bottom temperature sensor
S3 Heating return temperature sensor
S4 Temperature sensor for external heat exchanger
S5 Cylinder 2 bottom temperature sensor
S6 Cylinder 2 top temperature sensor
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.20 Configuration diagram H10 - heating boost system with 2 cylinders connected via valve and without return boost valve

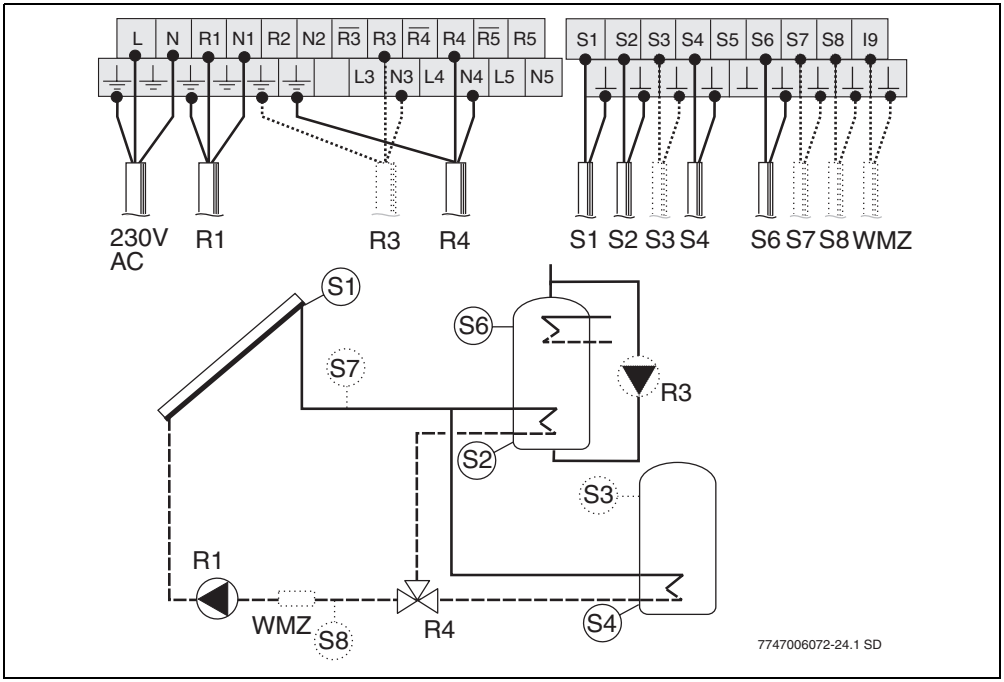


Fig. 26

R1 Solar circuit pump 1
R3 Daily heating pump (optional)
R4 Cylinder selection valve
S1 Collector temperature sensor FSK
S2 Cylinder 1 bottom temperature sensor
S3 Cylinder 2 top temperature sensor (optional)
S4 Cylinder 2 bottom temperature sensor
S6 Cylinder 1 top temperature sensor (optional)
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.21 Configuration diagram H11 - heating boost system with East/West aspect function and 2 cylinders connected via valve and without return boost valve

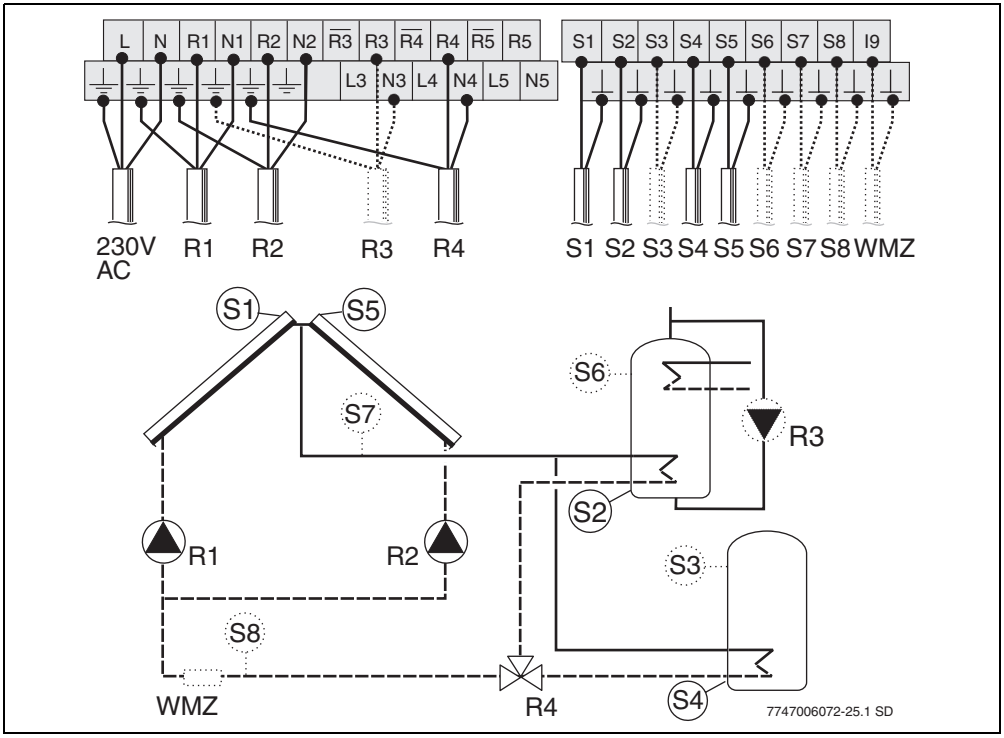


Fig. 27

R1 Solar circuit pump 1
R2 Solar circuit pump 2
R3 Daily heating pump (optional)
R4 Cylinder selection valve
S1 Collector temperature sensor FSK, field 1
S2 Cylinder 1 bottom temperature sensor
S3 Cylinder 2 top temperature sensor (optional)
S4 Cylinder 2 bottom temperature sensor
S5 Collector temperature sensor FSK, field 2
S6 Cylinder 1 top temperature sensor (optional)
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.22 Configuration diagram H12 - heating boost system with 2 cylinders connected via valve and external heat exchanger, and without return boost valve

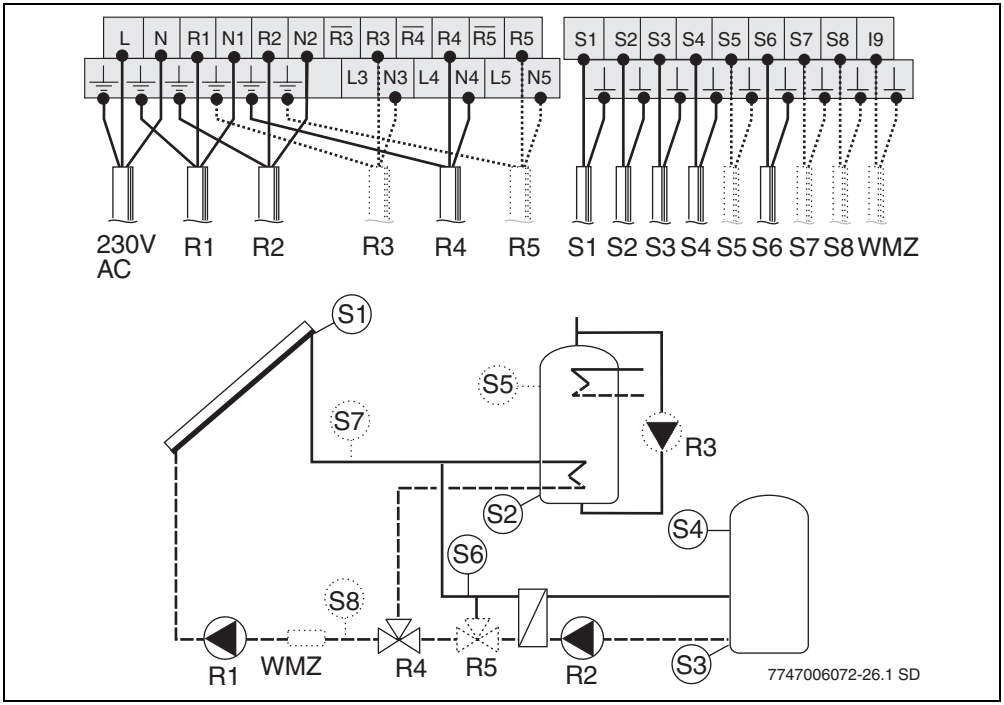


Fig. 28

R1 Solar circuit pump 1
R2 Heat exchanger pump
R3 Daily heating pump (optional)
R4 Cylinder selection valve
R5 Anti-icing system valve (optional)
S1 Collector temperature sensor FSK
S2 Cylinder 1 bottom temperature sensor
S3 Cylinder 2 bottom temperature sensor
S4 Cylinder 2 top temperature sensor (required for shutdown at 95 °C)
S5 Cylinder 1 top temperature sensor (optional)
S6 Temperature sensor for external heat exchanger
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.23 Configuration diagram H13 - heating boost system with East/West aspect function, 2 cylinders connected via valve and external heat exchanger, and without return boost valve

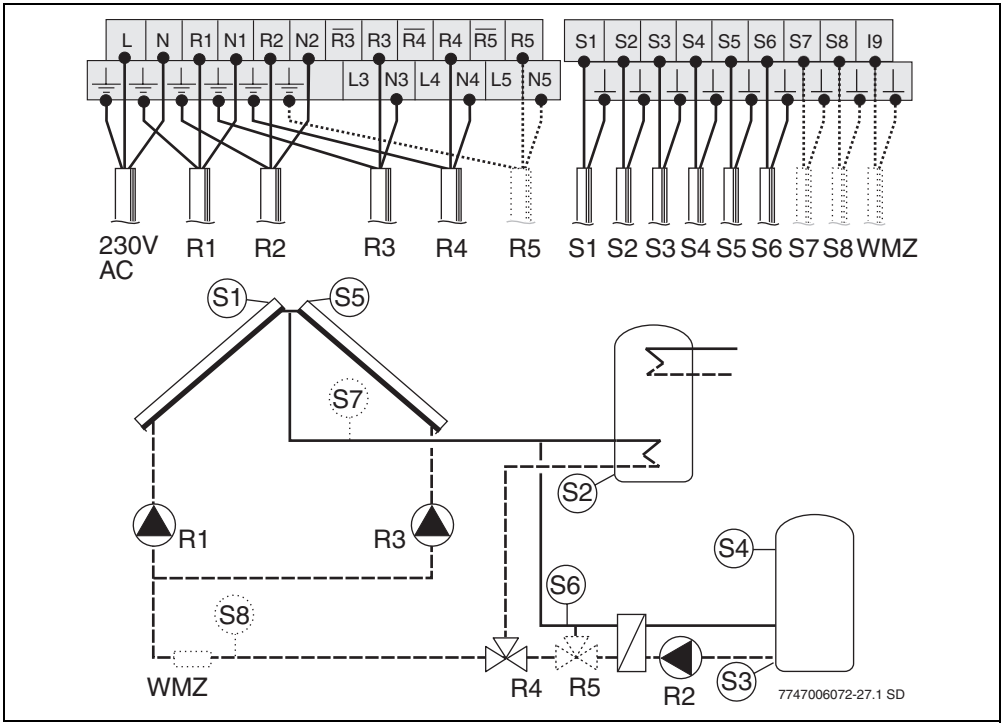


Fig. 29

R1 Solar circuit pump 1
R2 Heat exchanger pump
R3 Solar circuit pump 2
R4 Cylinder selection valve
R5 Anti-icing system valve (optional)
S1 Collector temperature sensor FSK, field 1
S2 Cylinder 1 bottom temperature sensor
S3 Cylinder 2 bottom temperature sensor
S4 Cylinder 2 top temperature sensor (required for shutdown at 95 °C)
S5 Collector temperature sensor FSK, field 2
S6 Temperature sensor for external heat exchanger
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.24 Configuration diagram S1 - swimming pool connected via valve

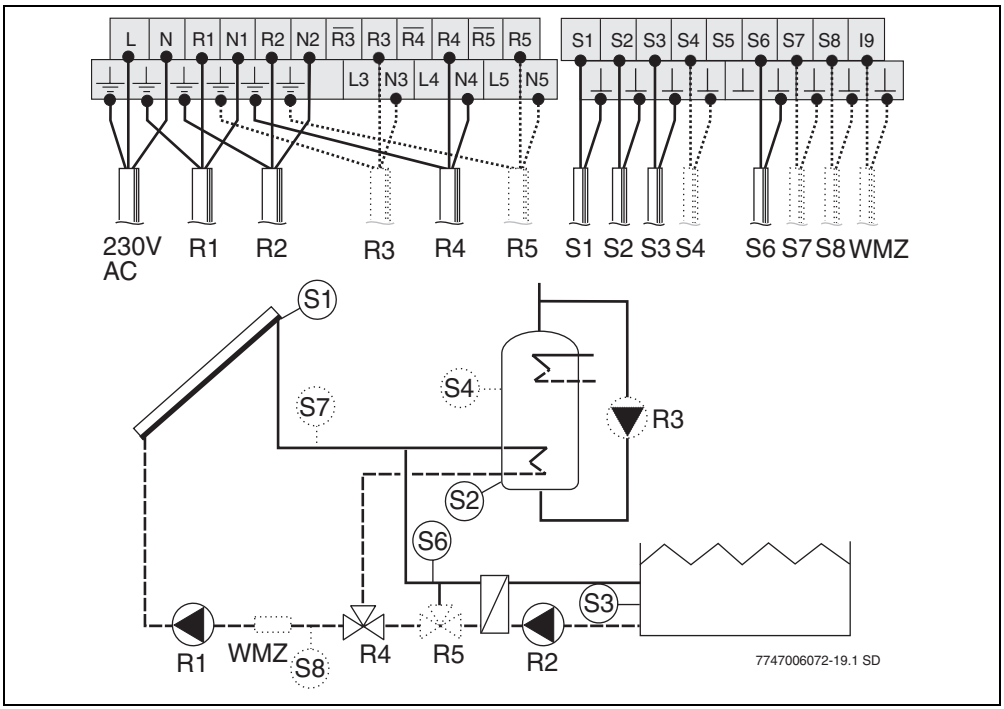


Fig. 30

R1 Solar circuit pump 1
R2 Heat exchanger pump
R3 Daily heating pump (optional)
R4 Cylinder selection valve
R5 Anti-icing system valve (optional)
S1 Collector temperature sensor FSK
S2 Cylinder bottom temperature sensor
S3 Swimming pool temperature sensor
S4 Cylinder centre temperature sensor (optional)
S6 Temperature sensor for external heat exchanger
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.25 Configuration diagram S2 - swimming pool connected via second pump

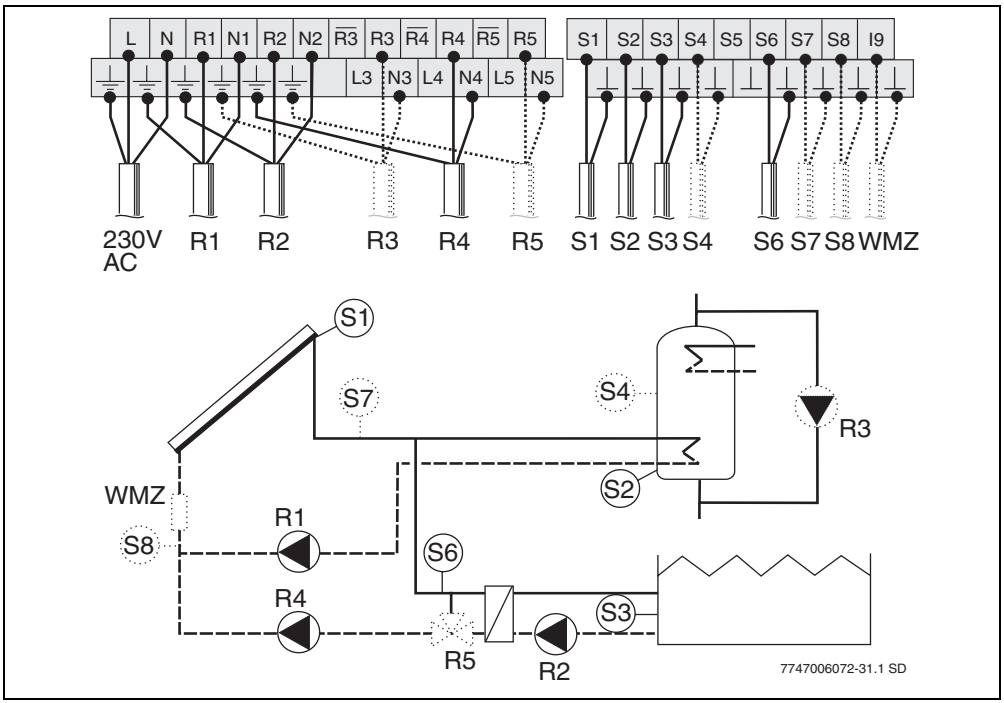


Fig. 31

R1 Solar circuit pump 1
R2 Heat exchanger pump
R3 Daily heating pump (optional)
R4 Solar circuit pump 2
R5 Anti-icing system valve (optional)
S1 Collector temperature sensor FSK
S2 Cylinder bottom temperature sensor
S3 Swimming pool temperature sensor
S4 Cylinder centre temperature sensor (optional)
S6 Temperature sensor for external heat exchanger
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.26 Configuration diagram S3 - swimming pool with East/West aspect function

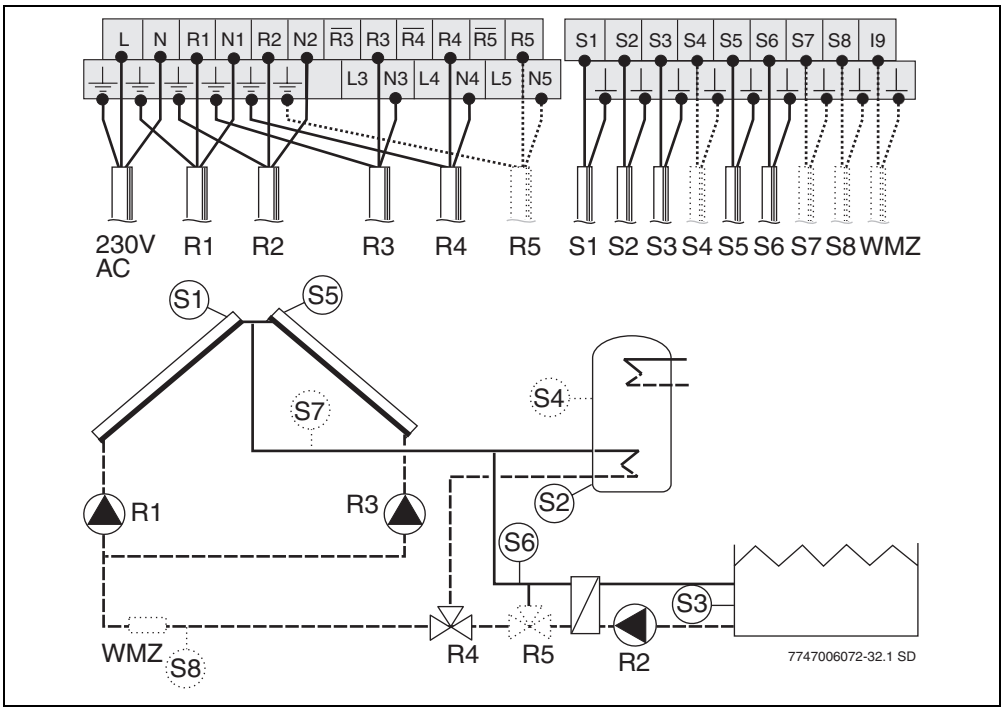


Fig. 32

R1 Solar circuit pump 1
R2 Heat exchanger pump
R3 Solar circuit pump 2
R4 Cylinder selection valve
R5 Anti-icing system valve (optional)
S1 Collector temperature sensor FSK, field 1
S2 Cylinder bottom temperature sensor
S3 Swimming pool temperature sensor
S4 Cylinder centre temperature sensor (optional)
S5 Collector temperature sensor FSK, field 2
S6 Temperature sensor for external heat exchanger
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.27 Configuration diagram S4 - swimming pool and heating boost system connected via valve

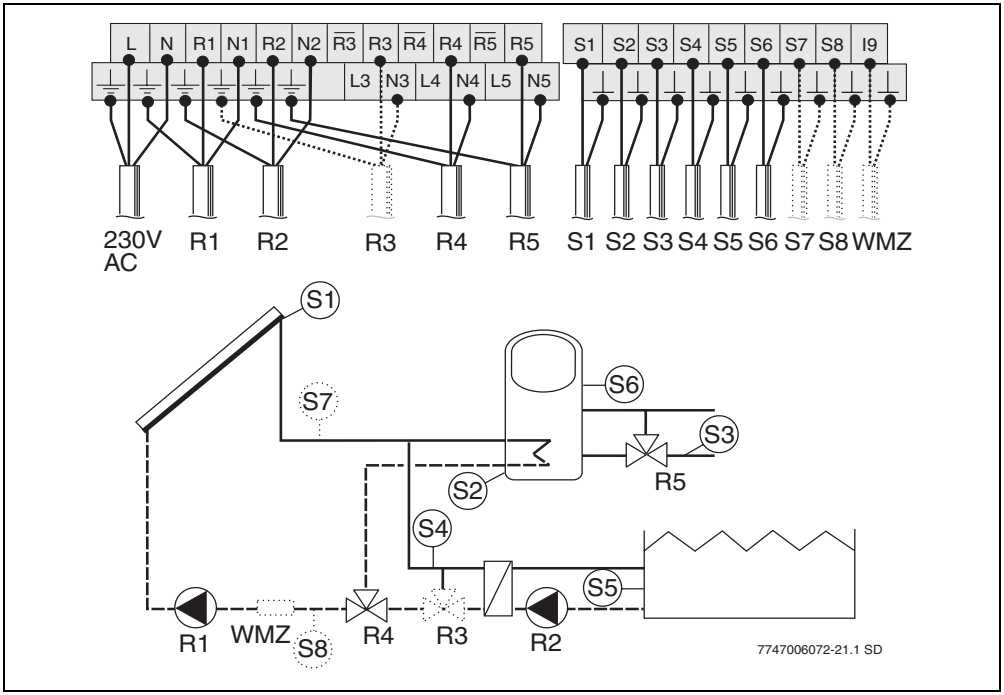


Fig. 33

R1 Solar system pump
R2 Heat exchanger pump
R3 Anti-icing system valve (optional)
R4 Cylinder selection valve
R5 Return flow boost valve
S1 Collector temperature sensor FSK
S2 Cylinder bottom temperature sensor
S3 Heating return temperature sensor
S4 Temperature sensor for external heat exchanger
S5 Swimming pool temperature sensor
S6 Cylinder centre temperature sensor
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.28 Configuration diagram S5 - swimming pool and heating boost system connected via second pump

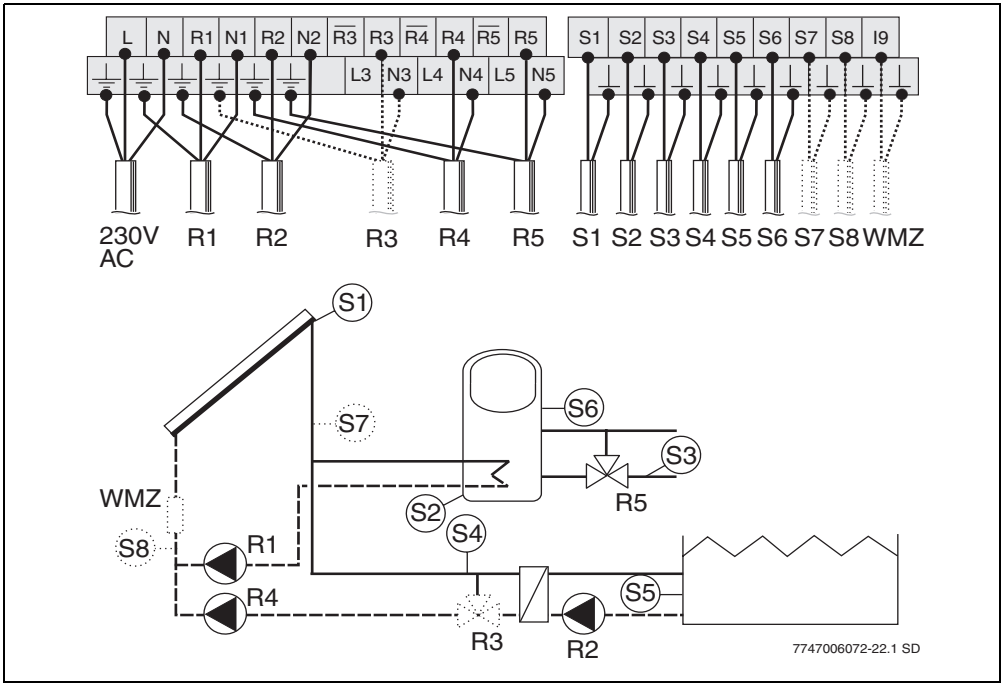


Fig. 34

R1 Solar circuit pump 1
R2 Heat exchanger pump
R3 Anti-icing system valve (optional)
R4 Solar circuit pump 2
R5 Return flow boost valve
S1 Collector temperature sensor FSK
S2 Cylinder bottom temperature sensor
S3 Heating return temperature sensor
S4 Temperature sensor for external heat exchanger
S5 Swimming pool temperature sensor
S6 Cylinder centre temperature sensor
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.29 Configuration diagram S6 - swimming pool with two cylinders

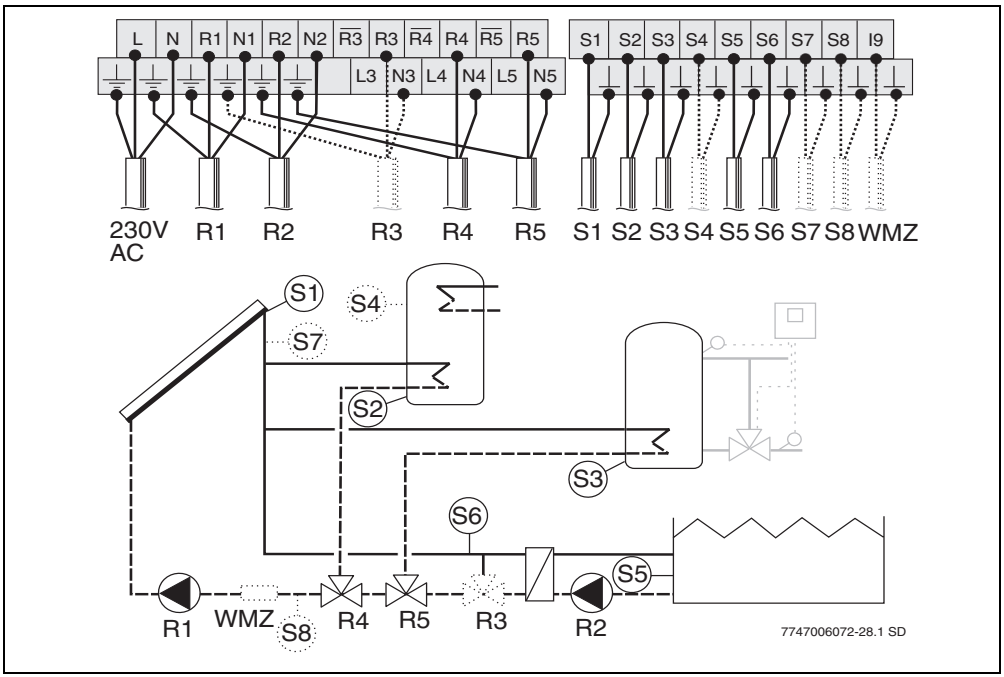


Fig. 35

R1 Solar system pump
R2 Heat exchanger pump
R3 Anti-icing system valve (optional)
R4 Cylinder selection valve 1
R5 Cylinder selection valve 2
S1 Collector temperature sensor FSK
S2 Cylinder 1 bottom temperature sensor
S3 Cylinder 2 bottom temperature sensor
S4 Cylinder 1 top temperature sensor (optional)
S5 Swimming pool temperature sensor
S6 Temperature sensor for external heat exchanger
S7 Flow heat meter WMZ temperature sensor (optional)
S8 Return heat meter temperature sensor (optional)
WMZ Heat meter (optional)

4.4.30 Connecting a PC or remote display

The controller has an RS232 serial interface for data output. The Tx and Rx signals are inverted by the controller. Connection is by way of a 4-pole screw-clamp terminal.

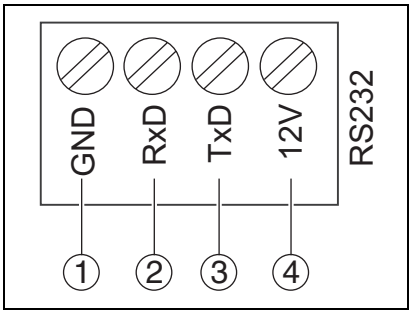


Fig. 36

1 Earth
2 Signal in
3 Signal out
4 No function

5 Operation

- Hand all documents to the user.
- Explain to the user how the device works and how to operate it.

5.1 controller controls

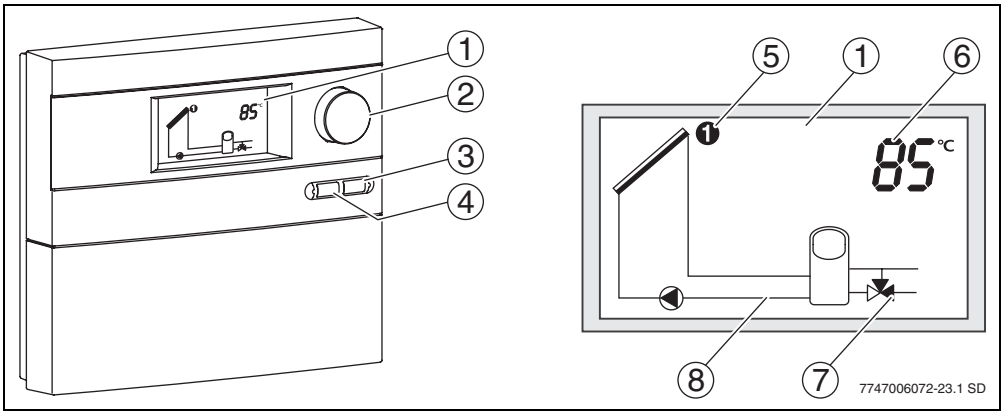


Fig. 37 Controller and display

1 Display
2 Rotary selector
3 Back button
4 OK button
5 Symbol for temperature sensor
6 Displays of temperatures, hours of operation, etc.
7 Valve symbol (black = open outlet)
8 Active circulation diagram

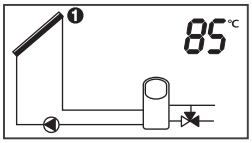
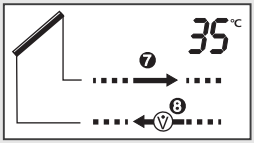
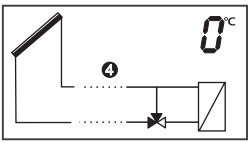
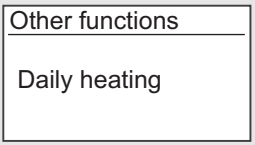
Control	Symbol	Functions
Rotary selector		– Selecting system settings (View level) – Selecting function (Service level) – Changing setting (Service level)
OK button	OK	– Opening submenu (Service level) – Changing/saving setting (Service level)
Back button		– Returning to higher menu level (Service level) – Reverting to collector panel temperature display (View level)

Tab. 6

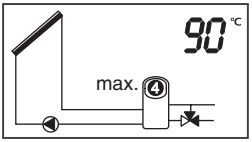
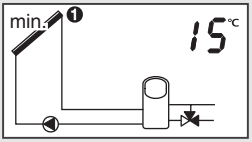
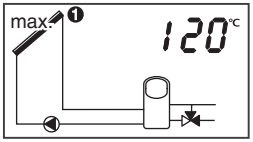
5.2 controller operation levels

5.2.1 View level

At View level you can use the rotary selector to view the following system data.

Display	Supplementary function	System data
	**None**	– Temperature (°C) – Hours of operation, cumulative (h) – Hours of operation, today (hours/day) – Pump speed (%) – Pump and valve status
	**Heat meter**	– Flow temperature (°C) – Return temperature (°C) – Heat usage, cumulative (kWh) – Heat usage, today (kWh/d)
	**Heat exchanger anti-icing system**	– Flow temperature (°C) – Hours of operation, cumulative (h) – Hours of operation, today (hours/day)
	**Activated functions** Shows other active functions. Possible indications (display flashes when function is active): – Double Match Flow – Evacuated tube collector function – S. Europe function – Daily heating – Cooling function	

Tab. 7 Overview of system data

Status display	
	**Cylinder maximum temperature** The cylinder maximum temperature is displayed if the set limit is exceeded.
	**Collector minimum temperature** The collector minimum temperature is displayed if the temperature drops below the limit of 20 °C.
	**Collector maximum temperature** The collector maximum temperature is displayed if the set limit is exceeded.

Tab. 8 Status indications

5.2.2 Service level menu (for qualified heating engineers only)

The controller's Service level menu can be used to select additional functions and system configurations. The controller has to be set to suit the specifics of the solar thermal system. An overview of the Service level functions can be found on page 48.

6 Commissioning (for engineers only)

Warning: risk of damage to pump if run dry.

- Make sure that the solar thermal circuit is filled with solar fluid (→ installation and maintenance instructions for solar pumping station).

- Follow the instructions in the technical documentation for the solar pumping station, the collectors and the solar storage cylinder when commissioning the solar thermal system.
- Only put the solar thermal system into operation when all pumps and valves are in proper working order.

Warning: commissioning when there is frozen water or vaporisation in the solar thermal system can damage the system.

- Shield the collectors from direct sunlight during commissioning.
- Do not commission the solar thermal system at sub-zero temperatures.

Perform the following steps in connection with the solar pumping station:

- Check the system is clear of air.
- Check and adjust the flow rate.
- Enter the controller settings in the commissioning and maintenance report (→ installation and operating instructions for the solar pumping station).

Warning: setting the wrong operating mode can damage the system.

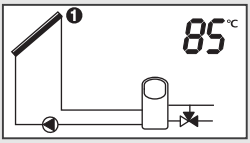
In order to prevent undesirable starting of the pump when the power supply is connected, the controller is factory-set to **Always off** mode.

- For normal operation, set the controller to **Auto**. (→ Section 7.6, page 67).

6.1 Entering basic settings

When the controller is initially installed, the language and time must be entered.

- Enter the language and time before continuing with commissioning.

LANGUAGE English	• Hold down the OK button and use the rotary selector to select the desired language. • To save the setting: release the OK button.
Time Set hours 12:00 h	• Using the rotary selector , select Set hour. • Hold down the OK button and use the rotary selector to set the hour. • To save the setting: release the OK button.
Time Set minutes 12:00 h	• Using the rotary selector , select Set minutes. • Hold down the OK button and use the rotary selector to set the minutes. • To save the setting: release the OK button.
	Switch to View level by turning the rotary selector . Subsequent changes can be made from the Service level menu by selecting Settings.

Tab. 9 Basic settings after installation

7 Service level menu (for qualified heating engineers only)

The Service level menu is used to set the controller to suit the specifics of the solar thermal system.

- To switch to the Service level menu: simultaneously press the OK and ↩ buttons.

If no entry is made for more than 60 seconds, the controller exits the Service level menu.

7.1 Service level menu functions

Menu	Submenu	Page
Select language		50
Set time	Set hour	51
	Set minutes	51
Select system	Domestic hot water systems	52
	Central heating boost systems	52
	Systems with swimming pool heating	52
Settings	Solar system cut-in temperature differential	55
	Pump 1 speed modulation	56
	Pump 1 minimum output	56
	Maximum collector temperature	57
	Evacuated tube collector function	57
	Cylinder 1 maximum temperature	58
	Double Match Flow	58
	Return flow boost cut-in temperature differential	58
	Return boost cut-out temperature differential	59
	Heat meter	59
	Glycol content	59

Tab. 10 Functions selectable from Service menu

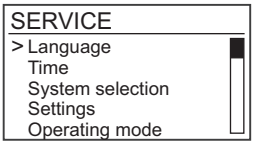
Menu	Submenu	Page
	Switch to 2nd consumer	60
	Cylinder 2 maximum temperature	60
	Cylinder charge transfer cut-in temperature limit	61
	Cylinder charge transfer cut-out temperature limit	61
	Pump 2 speed modulation/Plate heat exchanger	62
	Pump 2 minimum output/Plate heat exchanger	62
	Daily heating	63
	Daily heating time	64
	Daily heating target temperature	64
	Cooling function	65
	S. Europe function	66
	Heat exchanger anti-icing function	66
Operating mode	Solar system operating mode	67
Fault diagnosis	Function test	68
	Version	68
Reset	For resetting the controller to the default settings	69

Tab. 10 Functions selectable from Service menu

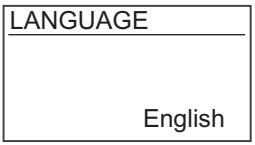
7.2 Language selection

Menu: Service > Language

- To switch to the Service level menu: simultaneously press the OK and ↩ buttons.



- Use the rotary selector to select **Language** then press OK to confirm.
- Hold down the OK button and use the rotary selector to select the desired language.



- To save the new setting: release the OK button.
- To return to the next menu up, press the ↩ button.

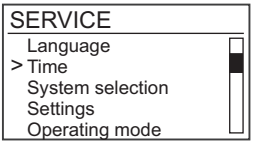
Setting range	Default setting	New setting
German, English, French, Italian, Spanish, Portuguese, Turkish, Croatian, Slovenian, Romanian	English	

Tab. 11

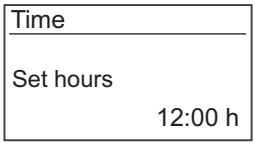
7.3 Time, setting

Menu: Service > Time

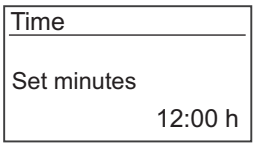
- To switch to the Service level menu: simultaneously press the OK and ↩ buttons.
- Use the rotary selector ◯ to select **Time** then press OK to confirm.



- Use the rotary selector ◯ to select **Set hour** then press OK to confirm.



- Hold down the OK button and use the rotary selector ◯ to set the required figure.
- To save the new setting: release the OK button.
- Use the rotary selector ◯ to select **Set minutes** then press OK to confirm.



- Hold down the OK button and use the rotary selector ◯ to set the required figure.
- To save the new setting: release the OK button.
- To return to the next menu up, press the ↩ button.

7.4 Select system

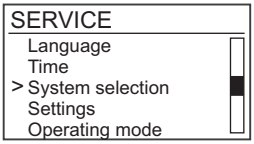
Manu: Service > Select system

The Select system option allows you to select the basic system and the configuration diagram for the solar system. There are three basic system options:

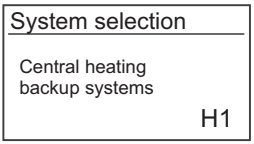
– Domestic hot water systems
– Domestic hot water systems with central heating boost facility
– Domestic hot water systems with swimming pool heating

Within each basic system there are various choices of configuration diagram for the solar thermal system. The precise designations and layouts of all configuration diagrams are detailed in Section 4.4 “Electrical connections”.

- To switch to the Service level menu: simultaneously press the OK and ↩ buttons.
- Use the rotary selector to select **Select system** then press OK to confirm.



- Select the required basic system using the rotary selector.
- Hold down the OK button and use the rotary selector to select the desired system configuration diagram.



- To save the new setting: release the OK button.
- To return to the next menu up, press the ↩ button.

Setting range	Default setting	New setting
Configuration diagrams T1 to T8 Configuration diagrams H1 to H13 Configuration diagrams S1 to S6	H1	

Tab. 12

7.4.1 Additional function options dependent on configuration diagram

The functions listed below are dependent on the configuration diagram selected and have to be selected from **Settings** (→ Section 7.5, page 55).
Functions not listed are not dependent on configuration diagram or else a standard feature of the selected configuration.

X	=	Function also available from **Settings**
--	=	Function not available
(S4)	=	Temperature sensor required for function

Configuration diagram	Page	Function			
		Double Match Flow	Cooling function	Daily heating	Heat exchanger anti-icing system
T1	15	X (S4)	X (S1, S2)	X (S2, S3)	--
T2	16	X (S4)	X (S1, S2, S5)	X (S2, S3)	--
T3	17	X (S4)	X (S1, S2)	X (S2, S3)	X (S6)
T4	18	X (S4)	X (S1, S2, S5)	X (S2, S3)	X (S6)
T5	19	X (S3)	X (S1, S2)	X (S2, S3, S4)	--
T6	20	X (S3)	X (S1, S2, S5)	X (S2, S3, S4)	--
T7	21	X (S3)	X (S1, S2)	X (S2, S3, S4)	X (S6)
T8	22	X (S3)	X (S1, S2, S5)	X (S2, S3, S4)	X (S6)
H1	23	X (S4)	X (S1, S2)	--	--
H2	24	X (S4)	X (S1, S2, S5)	--	--
H3	25	--	X (S1, S2)	--	X (S7)
H4	26	--	X (S1, S2, S5)	--	X (S7)
H5	27	X (S4)	X (S1, S2, S5)	X (S2, S4)	--
H6	28	X (S4)	X (S1, S2, S5)	X (S2, S4)	--
H7	29	--	X (S1, S2, S4, S5)	X (S2)	--
H8	30	--	X (S1, S2, S5)	--	X (S4)

Tab. 13 Additional functions and temperature sensors required

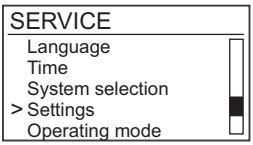
Configuration diagram	Page	Function			
		Double Match Flow	Cooling function	Daily heating	Heat exchanger anti-icing system
H9	31	--	X (S1, S2, S5)	--	X (S4)
H10	32	X (S6)	X (S1, S2, S4)	X (S2)	--
H11	33	X (S6)	X (S1, S2, S4, S5)	X (S2)	--
H12	34	X (S5)	X (S1, S2, S3)	X (S2)	X (S6)
H13	35	--	X (S1, S2, S3, S5)	--	X (S6)
S1	36	X (S4)	--	X (S2, S4)	X (S6)
S2	37	X (S4)	--	X (S2, S4)	X (S6)
S3	38	--	--	--	X (S6)
S4	39	--	--	--	X (S4)
S5	40	--	--	--	X (S4)
S6	41	X (S4)	--	--	X (S6)

Tab. 13 Additional functions and temperature sensors required

7.5 Settings

The system-related controller settings are dependent on the solar thermal system configuration chosen.

- Check all settings (→ Section 7.1, page 48) for relevance to the selected configuration diagram.
- To switch to the Service level menu: simultaneously press the OK and ↩ buttons.
- Use the rotary selector ◯ to select **Settings** then press OK to confirm.



- Use the rotary selector ◯ to select the desired setting.
- Press and hold the OK button and use the rotary selector ◯ to change the setting.
- To save the new setting: release the OK button.
- To return to the next menu up, press the ↩ button.

7.5.1 Cut-in temperature differential

Menu: Service > Settings > Solar system cut-in temperature differential

If the set cut-in temperature differential (ΔT) between the bottom of the cylinder and collector field is reached and all conditions for switching on are met, the solar system pump starts up.

Setting range	Default range setting	New setting
7 -20 K (°C)	10 K (°C)	

Tab. 14

7.5.2 Solar system pump 1 speed modulation

Menu: Service > Settings > Solar system pump 1 speed modulation

Warning: risk of damage to system due to pump failure.

- If a pump with internal electronic control circuitry is connected, deactivate the speed modulation function on the controller.

The speed modulation function improves the efficiency of the solar thermal system by keeping the temperature difference within the set cut-in temperature differential.
If the “Double match flow” function is active, the speed is controlled by that function. We recommend leaving this setting activated.

Setting range	Default setting	New setting
Yes/No	Yes	

Tab. 15

7.5.3 Solar system pump 1 minimum output

Menu: Service > Settings > Solar system pump 1 minimum output

This setting determines the minimum speed of the solar system pump.

In systems with external heat exchanger and 2 heat consumers or systems with external heat exchanger and East/West aspect function, the pump is run at 100 %.

The minimum pump output for solar system pumps 1 and 2 is always the same with configurations T3, T7 and H3 (if the output for one pump is changed, the controller sets the others to the same output).

Setting range	Default setting	New setting
30 - 100 %	50 %	

Tab. 16

7.5.4 Collector maximum temperature

Menu: Service > Settings > Collector maximum temperature

If the collector maximum temperature is exceeded, the solar system pump is switched off or (if already off) not switched on.

Setting range	Default setting	New setting
100 - 140 °C	120 °C	

Tab. 17

7.5.5 Evacuated tube collector function

Menu: Service > Settings > Tube collector function

In order to pump the heated solar solar fluid to the temperature sensor with evacuated tube collectors, between the hours of 6:00 am and 10:00 pm and upwards of a collector temperature of 20 °C, the solar system pump is switched on briefly every 15 minutes.

This function is not possible or is limited if the collector sensor is external to the collector.

Setting range	Default setting	New setting
Yes/No	No	

Tab. 18

If the Tube collector function is active, the cooling function (→ Section 7.5.22, page 65) is automatically deactivated.

7.5.6 Cylinder 1 maximum temperature

Menu: Service > Settings > Cylinder 1 maximum temperature

When the temperature detected by the cylinder temperature sensor reaches the maximum cylinder temperature, charging of the cylinder is stopped.

Setting range	Default setting	New setting
20 - 90 °C	60 °C	

Tab. 19

7.5.7 Double Match Flow

Menu: Service > Settings > Double Match Flow

This function is used for quick charging of the top part of the cylinder to 45 °C to reduce the amount of time the domestic hot water is reheated by the boiler.

This function is only possible when **Speed modulation** is active.

If the **Daily heating** function is also used, the **Double match flow** function may be limited as the necessary sensor position for **Daily heating** (top 1/3 of the cylinder) may be within the part of the cylinder reheated by the boiler.

Setting range	Default setting	New setting
Yes/No	No	

Tab. 20

7.5.8 Return boost cut-in temperature differential

Menu: Service > Settings > Reserve bypass cut-in temperature differential

If the Return boost function is active, the temperature of the solar storage cylinder is compared with the return temperature of the heating system. If necessary, the return boost valve is opened to feed heat from the solar system from the thermal store into the heating system.

The minimum difference from the cut-out temperature difference is 3 K (°C).

Setting range	Default range setting	New setting
6 - 20 K (°C)	6 K (°C)	

Tab. 21

7.5.9 Return boost cut-out temperature differential

Menu: Service > Settings > Reserve bypass cut-out temperature differential

When the temperature difference between the solar storage cylinder and the thermal system return drops to the set figure, the return boost valve is closed.

The minimum difference from the cut-in temperature difference is 3 K (°C).

Setting range	Default range setting	New setting
3 - 17 K (°C)	3 K (°C)	

Tab. 22

7.5.10 Heat meter

Menu: Service > Settings > Heat meter

Switches the yield calculation function on or off. The heat quantity is calculated and totalled up by means of a volumetric flow meter (1 pulse/litre) and the difference between the flow and return temperatures. The heat usage for the current twenty-four hour period can also be viewed.

When a heat meter is used, the glycol content must be set.

Setting range	Default range setting	New setting
Yes/No	No	

Tab. 23

7.5.11 Glycol content

Menu: Service > Settings > Glycol content

In order to obtain accurate readings from the heat meter, the glycol content of the solar fluid must be specified.

Setting range	Default range setting	New setting
0 %, 30 %, 40 %, 45%, 50 %	50 %	

Tab. 24

7.5.12 Switch to 2nd consumer

Menu: Service > Settings > Switch to 2nd consumer

If there is more than one heat consumer in a solar thermal system, a cylinder priority order must be defined. That definition determines the priority for charging the heat consumers. A distinction is made between high and low priority heat consumers.

When the high priority heat consumer reaches its cut-in temperature differential, it is charged until it reaches its maximum temperature. If it reaches its cut-in temperature differential while the low priority heat consumer is being charged, charging of the low priority heat consumer is interrupted until the high priority heat consumer has been charged to its maximum temperature.

If only one of the cylinders is selected as a heat consumer, only the selected cylinder is charged.

Setting range	Default setting	New setting
With 2 heat consumers: auto 1 -> 2 auto 2 -> 1 1 2	auto1 -> 2	
With 3 heat consumers: auto 1 -> 2 -> 3 auto 1-> 2 auto 1-> 3 1 2 3	auto 1 -> 2 -> 3	

Tab. 25

7.5.13 Cylinder 2 maximum temperature

Menu: Service > Settings > Cylinder 2 maximum temperature

When the cylinder maximum temperature is reached, the solar system pump is switched off.

Setting range	Default setting	New setting
20 - 90 °C	60 °C	

Tab. 26

7.5.14 Swimming pool maximum temperature

Menu: Service > Settings > Swimming pool maximum temperature

If configuration S6 is selected, the maximum temperature of the swimming pool can also be set. When the maximum temperature is reached, the solar system pump is switched off.

Setting range	Default setting	New setting
20 - 90 °C	60 °C	

Tab. 27

7.5.15 Cylinder charge transfer cut-in temperature differential

Menu: Service > Settings > Charge transfer cut-in temperature differential

In solar systems with preheating cylinder and standby cylinder, the cylinder contents are transferred as soon as the temperature of the standby cylinder drops below that of the preheating cylinder. The cut-in temperature differential is definable.

Setting range	Default setting	New setting
7 - 20 K (°C)	10 K (°C)	

Tab. 28

7.5.16 Cylinder charge transfer cut-out temperature differential

Menu: Service > Settings > Charge transfer cut-out temperature differential

If the temperature difference falls below the set figure, cylinder charge transfer is stopped.

Setting range	Default setting	New setting
4 - 17 K (°C)	5 K (°C)	

Tab. 29

7.5.17 Solar system pump 2 speed modulation/Plate heat exchanger

Menu: Service > Settings > Solar system pump 2 speed modulation/Plate heat exchanger

Warning: risk of damage to system due to pump failure.

- Connect pump to output R2.
- If a pump with internal electronic control circuitry is connected, deactivate the speed modulation function on the controller.

The speed modulation function improves the efficiency of the solar thermal system by keeping the temperature difference between the relevant sensors within the set cut-in temperature differential. If the “Double match flow” function is active, the pump speed is controlled by that function. We recommend leaving this setting activated.

Setting range	Default setting	New setting
Yes/No	Yes	

Tab. 30

7.5.18 Solar system pump 2 minimum output/Plate heat exchanger

Menu: Service > Settings > Solar system pump 2 minimum output

This setting determines the minimum speed of solar system pump 2.

In systems with external heat exchanger and 2 heat consumers or systems with external heat exchanger and East/West aspect function, the pump is run at 100 %.

The minimum pump output for solar system pumps 1 and 2 is always the same with configurations T3, T7 and H3 (if the minimum output for one pump is changed, the controller sets the others to the same output).

Setting range	Default setting	New setting
30 - 100 %	50 %	

Tab. 31

7.5.19 Daily heating

Menu: Service > Settings > Daily heating

Daily heating is a preventive measure to ensure domestic hot water hygiene.
If the required temperature has not been reached by the heat from the solar system over the past 24 hours, the water in the cylinder is circulated by a pump at the set time. This ensures that the entire contents of the cylinder are heated by the reheating function.
Afterwards, the pump for the heat exchanger (if present) starts up so as to include that circulation system as well.

Warning: health risk if daily heating function is impaired.

- Check the daily heating function manually with the aid of a thermometer when commissioning the system.

Ensure the following criteria are met in order to guarantee that daily heating functions:

– The heat output for daily heating must not be greater than the maximum heat output of the conventional supplementary heating system for the standby cylinder.
– The piping for the daily heating system should be better thermally insulated than standard.
– The length of the piping runs for daily heating must be kept as short as possible (preheating cylinder located in close proximity of standby cylinder).
– The temperature of the standby cylinder must not drop below the 60 °C limit during thermal disinfection.
– Hot water circulation must be switched off during daily heating of the preheating stage (no return from circulation to standby cylinder).
– If the daily heating function is available on the controller for the standby cylinder (heating system), the time window for that function must be staggered (e.g. by 30 mins) to start before the time window of the daily heating function of the preheating cylinder (time window synchronisation).
– The hysteresis for the controller must be observed (required hysteresis = 5 K (°C)).
– The controller for the standby cylinder must be set so that domestic hot water takes priority.
– Daily heating of the preheating stage must be scheduled for times without hot water demand.

Setting range	Default setting	New setting
Yes/No	No	

Tab. 32

7.5.20 Daily heating time

Menu: Service > Settings > Daily heating time

This setting determines the start time for daily heating. Daily heating runs for a maximum of 3 hours.

Warning: Risk of scalding due to water temperatures over 60 °C!

- Only schedule daily heating for periods outside normal usage times.
- Inform the occupants of the premises of the times for daily heating.

Setting range	Default setting	New setting
00:00 h - 23:59 h	00:00 h	

Tab. 33

7.5.21 Daily heating target temperature

Menu: Service > Settings > Daily heating target temperature

This setting determines the temperature for daily heating.

Setting range	Default setting	New setting
60 - 70 °C	60 °C	

Tab. 34

7.5.22 Cooling function

Menu: Service > Settings > Cooling function

The cooling function minimises the solar thermal system stagnation periods. The solar thermal system is run at a high temperature to maximise piping heat loss.

If the cylinder temperature is 9 K (°C) below the cylinder maximum temperature (in systems with two heat consumers always that of the low-priority cylinder) the solar system pump is switched off. If the collector temperature is 10 K (°C) below the collector maximum temperature, the solar system pump starts up and runs until the collector has cooled down by 10 K (°C). The solar system pump then switches off and the collector heats up again. When the cylinder maximum temperature is reached, the solar system pump switches off and the cooling function is stopped.

The cooling function can not be activated if the evacuated tube collector option is active or a configuration diagram including a swimming pool has been selected.

Systems with a domestic hot water cylinder that is charged by an external heat exchanger: in “hard water” areas, increased levels of limescale formation can occur in the heat exchanger secondary system.

Setting range	Default setting	New setting
Yes/No	No	

Tab. 35

7.5.23 S. Europe function

Menu: Service > Settings > Med climate function

The Mediterranean climate function is intended solely for use in regions where higher temperatures generally mean that there is little or no risk of frost damage.

If the collector temperature falls below 5 °C when the Mediterranean climate function is active, the solar pump is switched on. This means that hot water from the cylinder is pumped through the collector. When the collector temperature reaches 7 °C, the pump is switched off.

Warning: risk of system damage due to frost!

The Mediterranean climate function does not offer an absolute guarantee of protection from frost damage.

- Only use the function in regions with very low risk of frost.
- If necessary use a water/glycol mixture as solar fluid.

Setting range	Default setting	New setting
Yes/No	No	

Tab. 36

7.5.24 External heat exchanger anti-icing system

Menu: Service > Settings > Ext. heat exchanger anti-icing

The anti-icing function is intended for solar thermal systems which have long pipe lengths in areas exposed to frost and transfer solar heat via an external heat exchanger.

If the flow temperature of the external heat exchanger drops below 10 °C, a bypass valve diverts the solar fluid to bypass the heat exchanger. The solar fluid is directed into the collector and is heated further. Upwards of a flow temperature of 15 °C, the solar system is connected through to the heat exchanger again.

Fit the bypass valve so that the fluid flow is directed through the external heat exchanger when the valve is de-energised and bypasses the heat exchanger when the valve is energised.

Warning: risk of frost damage to heat exchanger!

- Fit valve with a positioner that achieves a switching time of less than 45 seconds.

Setting range	Default setting	New setting
Yes/No	No	

Tab. 37

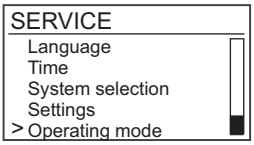
7.6 System operating mode

Menu: Service > Operating mode

When the solar controller is first installed, the operating mode **Always off** is active in order to prevent unintentional starting of the pumps.

For normal operation, the operating mode must be set to **Auto**.

- To switch to the Service level menu: simultaneously press the OK and ↩ buttons.
- Use the rotary selector ◯ to select **Operating mode** then press OK to confirm.



- Press and hold the OK button and use the rotary selector ◯ to change the setting.
- To save the new setting: release the OK button.
- To exit **Operating mode**, press the ↩ button.

Setting range	Default setting	New setting
Always off, Auto	Always off	

Tab. 38

7.7 Fault diagnosis

7.7.1 Function test

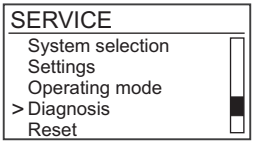
Menu: Service > Diagnosis > Function test

The **Function test** can be used to test the connected pumps and valves.
When **Function test** is active, all outputs are automatically set to **Off**.

Valves with ON/OFF control (on $\overline{R3}$ to $\overline{R5}$) are switched as soon as Diagnosis is selected. If a relay ($\overline{R3}$ to $\overline{R5}$) is then set to **On**, the connected valve responds again.

When the submenu **Function test** is exited, the controller reverts to its original status.

- To switch to the Service level menu: simultaneously press the OK and ⮌ buttons.
- Use the rotary selector ◯ to select **Diagnosis** then press OK to confirm.



- Use the rotary selector ◯ to select **Function test** then press OK to confirm.

The Function test menu allows every output to be manually set to **On** or **Off**.

- Select the required output using the rotary selector ◯.
- Press and hold the OK button and use the rotary selector ◯ to change the setting.
- To save the new setting: release the OK button.
- To exit **Function test**, press the ⮌ button.

Warning: risk of scalding if cylinder temperature limiter deactivated during the function test!

- Turn off all hot water points.
- Inform occupants of the premises of the risk of scalding.

7.7.2 Version

Menu: Service > Diagnosis > Version

The **Version** menu shows the current version of the software.

7.8 Reset

Menu: Service > Reset

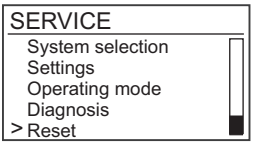
The reset function allows you to reset the solar controller to the default settings.

Resetting to the default settings removes all individual settings so that they then have to be re-entered. The time, configuration diagram and language settings are retained.

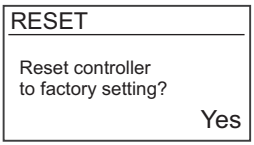
Warning: setting the wrong operating mode can damage the system.

- Select the appropriate configuration diagram (→ Section 7.1, page 48).
- Set the Operating mode function to **Auto** (→ Section 7.6, page 67).

- To switch to the Service level menu: simultaneously press the OK and ↩ buttons.
- Use the rotary selector ◯ to select **Reset** then press OK to confirm.



- Press and hold the OK button and use the rotary selector ◯ to select **Yes**.



- To save the new setting: release the OK button.

8 Faults

8.1 Faults indicated on the display

When indicating a fault, the display is back-lit in red. In addition, the type of fault is indicated by symbols. The individual fault messages can be retrieved using the rotary selector. Fault messages continue to be displayed until the fault is rectified.

- In the case of sensor faults, eliminate the cause of the fault to cancel display of the fault.
- With other faults, eliminate the cause of the fault and then press the rotary selector OK to cancel display of the fault.

Indication/Type of fault		
Effect	**Possible causes**	**Remedy**
Sensor failure S1 ... S8		
Associated components (pumps/valves) are switched off.	Temperature sensor not/incorrectly connected.	Check sensor connections. Check temperature sensors for breakages or incorrect positioning.
	Temperature sensor or sensor lead defective.	Replace temperature sensor. Check sensor lead.
Sensor short circuit S1 ... S8		
Associated components (pumps/valves) are switched off.	Temperature sensor or sensor lead defective.	Replace temperature sensor. Check sensor lead.
“No fluid flow in solar systems”/“secondary system”		
The temperature difference between collector temperature sensor and bottom cylinder temperature sensor or between heat exchanger flow temperature sensor and bottom cylinder temperature sensor is too great.	Air in the system.	Bleed the system.
	Pump is stalled.	Check the pump.
	Valves or shut-offs are closed.	Check valves and isolators.
	Pipe clogged.	Check/flush out pipe.
“Daily heating running time error”		
The daily heating function has not been carried out.	Target temperature not reached.	Check the pump. Check the cylinder temperature. Check supplementary heating.
“Collector connections reversed”		
Collector temperature drops 10 K (°C) within 15 seconds of switching on.	Collector connections reversed.	Fit flow and return pipes correctly.

Tab. 39 Possible faults indicated on the display

8.2 Faults not indicated on the display

Type of fault		
Effect	**Possible causes**	**Remedy**
Pump not running even though conditions for switching on are met.		
The solar storage cylinder is not being supplied by the solar thermal system.	No power supply; fuse or power cable faulty.	Check fuse and replace if necessary. Have electrical system checked by an electrician.
	Pump switched off in “manual mode”.	Use the “manual mode” function to switch to automatic.
	The temperature at the bottom of the cylinder is close to, or above the set maximum cylinder temperature.	When the temperature drops 3 K (°C) below the maximum cylinder temperature, the pump switches on.
	The collector temperature is close to, or above the set maximum collector temperature.	When the temperature drops 5 K (°C) below the maximum collector temperature, the pump switches on.
	There is no electrical power lead to the pump or it is not connected.	Check the line.
	Cooling function active.	–
	The controller checks which cylinder can be charged (only in systems with two cylinders)	–
	Pump is faulty.	Check pump and replace if necessary.
The system animation on the display is running and the pump is “humming”.		
The solar storage cylinder is not being supplied by the solar thermal system.	The pump is stalled due to a mechanical blockage.	Unscrew and remove the slotted screw on the pump head and use a screwdriver to release the pump shaft. Do NOT strike the pump shaft.
Temperature sensor is displaying an incorrect figure.		
Pump is being activated/deactivated too early/too late.	Temperature sensor incorrectly fitted. Incorrect temperature sensor fitted.	Check position, installation and type of sensor; add heat insulation if necessary.
Domestic hot water is too hot.		
Risk of scalding	Storage cylinder temperature limit and mixing valve are set too high.	Set the cylinder temperature limit and hot water mixer to a lower setting.
Domestic hot water too cold (or hot water flow rate too slow).		
	Domestic hot water thermostat on heating appliance, on heating controller or on mixing valve is set too low.	Set temperature according to the appropriate operating instructions (max. 60 °C).

Tab. 40 Possible faults not indicated on the display

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