INSTALLATION AND OPERATING INSTRUCTIONS

SOLAR HEATING PROGRAMMER
TDS 300

6720613720-00.1SD

UK/IE

benchmark
COLLECTIVE MARK
THE MARK OF QUALITY FOR THE INSTALLATION, COMMISSIONING AND SERVICING OF DOMESTIC HEATING AND HOT WATER SYSTEMS

WORCESTER
Bosch Group

6 720 644 593 (2010/04)

Contents

1 Safety instructions and explanation of symbols

1.1 General safety instructions

About this manual

This manual contains important information about the safe and correct installation and operation of the solar heating programmer.

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 heating programmer (referred to from now on as the programmer) may only be used for operating solar heating systems under the permissible ambient conditions (→ Section 2.4).

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

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

Electrical connections

Any work that requires the programmer 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 programmer from the mains power supply before opening.

Domestic hot water temperature

- To limit the domestic hot water temperature to 60 °C max., fit a hot water 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.

Signal words indicate the seriousness of the hazard in terms 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. Conformity has been demonstrated.

2.2 Package contents

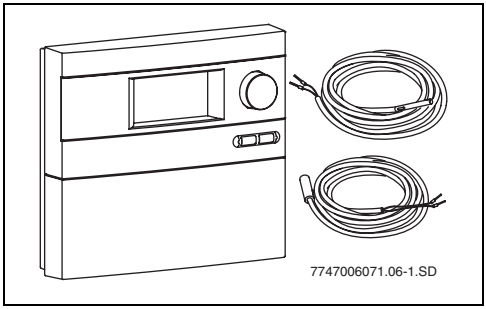


Fig. 1 Programmer and temperature sensors

- TDS 300 programmer
- Collector temperature sensor NTC 20K
- 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.

2.3 Product description

The programmer is designed for use with a solar heating system. It can be mounted on a wall or is integrated in a solar pump station.

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

The display shows the following:

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

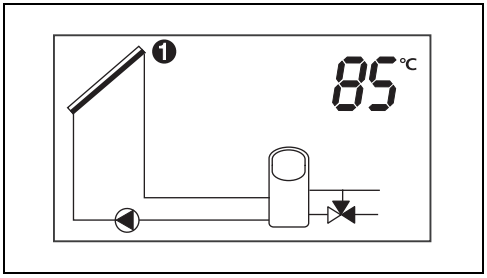


Fig. 2 Example of screen display

2.4 Specifications

TDS 300 programmer	
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 to + 180 °C
Permissible ambient temperature	0 to + 50 °C
Collector temperature sensor	NTC 20K with 2.5m cable
Cylinder temperature sensor	NTC 10K with 3m cable
Dimensions H x W x D	170 x 190 x 53 mm

Tab. 1 Specifications

Temperature sensor S1 (S5 with 2 arrays) NTC 20K				**Temperature sensor S2 ... S8 NTC 10K**			
T (°C)	**R (k Ω)**	**T (°C)**	**R (k Ω)**	**T (°C)**	**R (k Ω)**	**T (°C)**	**R (k Ω)**
-20	198.4	**60**	4.943			**60**	3.243
-10	112.4	**70**	3.478			**70**	2.332
0	66.05	**80**	2.492	**0**	35.975	**80**	1.704
10	40.03	**90**	1.816	**10**	22.763	**90**	1.262
20	25.03	**100**	1.344	**20**	14.772	**100**	0.95
30	16.09	**110**	1.009	**30**	9.786	**110**	
40	10.61	**120**	0.767	**40**	6.653	**120**	
50	7.116	**130**	0.591	**50**	4.608	**125**	

Tab. 2 Resistances of the temperature sensors

The temperature sensors must be disconnected from the programmer 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 programmer on a wall

The programmer 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 top fixing hole (→ Fig. 3, Item 1) and screw in the screw supplied leaving a length of 5 mm protruding.
- Unscrew the screw at the bottom of the programmer and remove the cover.
- Locate top slot in programmer over top screw.
- Mark bottom fixing holes (→ Fig. 3, Item 2), drill holes and insert plugs.
- Align the programmer and fix in place using the left and right fixing holes at the bottom.

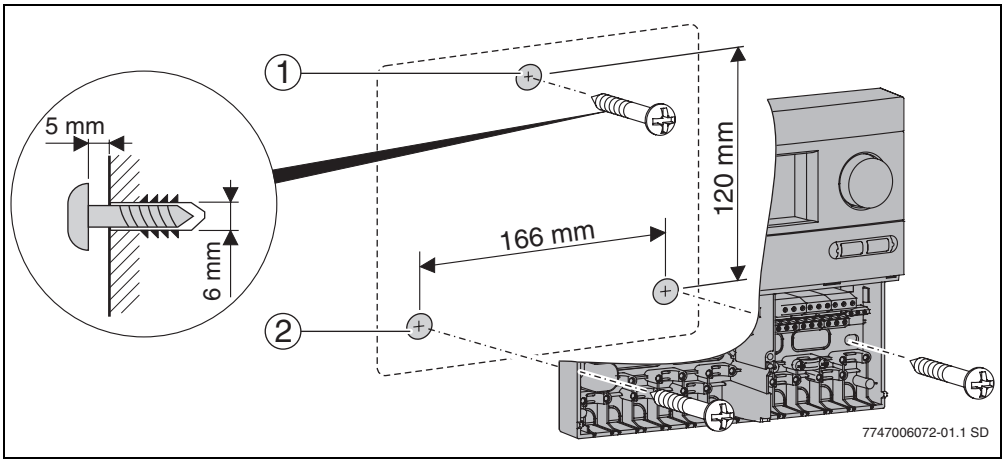


Fig. 3 Mounting the programmer on a wall

1 Top fixing hole
2 Bottom fixing holes

4.2 Installing motorised 3-way diverter valve DWU (option)

The motorised diverter valve DWU can be used for a number of purposes.

CAUTION: risk of damage to valve and system!

- ▸ Observe the connection markings on the valve. The valve positioner must not face downwards.
- ▸ Use spanner on union nuts not on valve body.

4.2.1 Description of function

Valve de-energised (closed)

- Passage from **I** to **III** is clear.
- The position indicator in only just visible (→ Fig. 4).

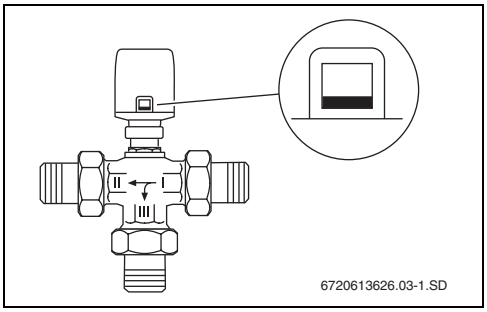


Fig. 4 Position indicator when valve is de-energised.

Valve energised (open).

- The 3-way motorised valve opens within approx. 3 minutes, allowing through passage from **I** to **II**.
- The position indicator is fully visible (→ Fig. 5).

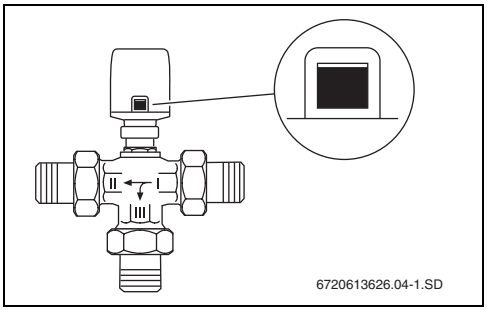


Fig. 5 Position indicator when valve is energised.

- As soon as the power to the motorised 3-way valve is switched off, it connects through to **III** again. The repositioning time is once again approx. 3 minutes.

Opening valve manually

In order to fill, bleed or drain the system, the valve can be opened manually.

▸ Remove the valve positioner
This allows the fluid to flow from **I** to **II**.

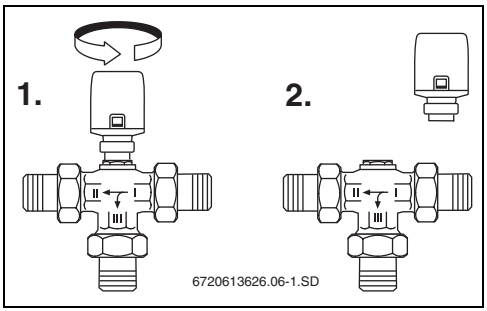


Fig. 6 Removing the valve positioner

4.2.2 Specifications

Specifications	
Max. closing pressure	0.50 bar (55 kPa)
Max. static pressure	8.6 bar (860 kPa)
Union size	R1
Max. flow temperature	100 °C
Kvs rating	6.5
Voltage	230 V, 50 Hz
Max. ambient temperature	-5 to +50 °C

Tab. 3 Specifications

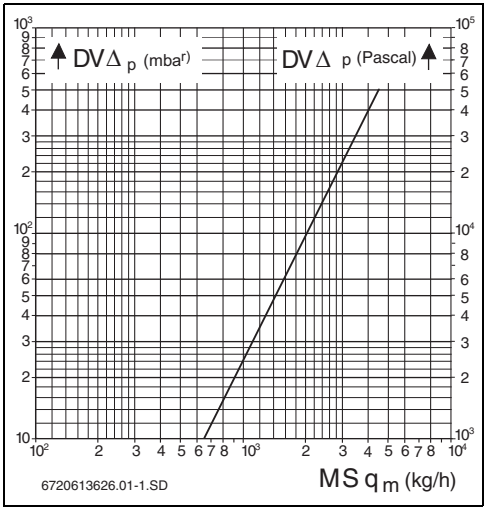


Fig. 7 Pressure loss graph for 3-way motorised valve

4.2.3 Installation for return boost function

The “return boost” function for heating system boosting in a solar heating system, requires a valve that directs the flow either through the reserve cylinder or directly back to the boiler depending on the return temperature.

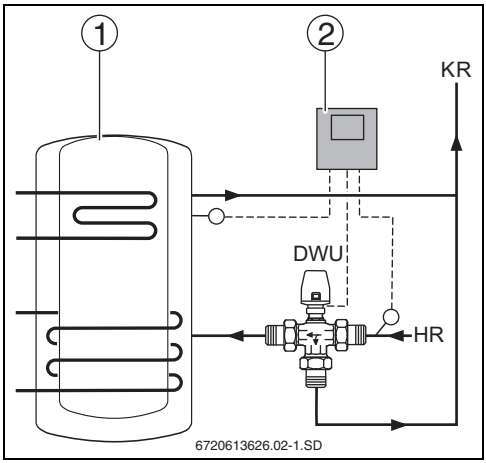


Fig. 8 Valve for return boost

1 Combination cylinder
2 TDS 300 solar heating programmer
HR Heating system return
KR Boiler return
DWU Motorised 3-way diverter valve

- Fit 3-way motorised valve in return pipe between reserve cylinder or combination cylinder (→ Fig. 8, Item 1) and boiler according to the table below.

Mark	Connection
I	From heating system (return)
II	To cylinder
III	To boiler

Tab. 4 Connection markings on valve.

4.2.4 Installation for cylinder selection function

The “cylinder selection” function in a solar heating system requires a valve that directs the flow to the cylinders according to the switching conditions and cylinder priority (→ Section 9.5.18, page 68).

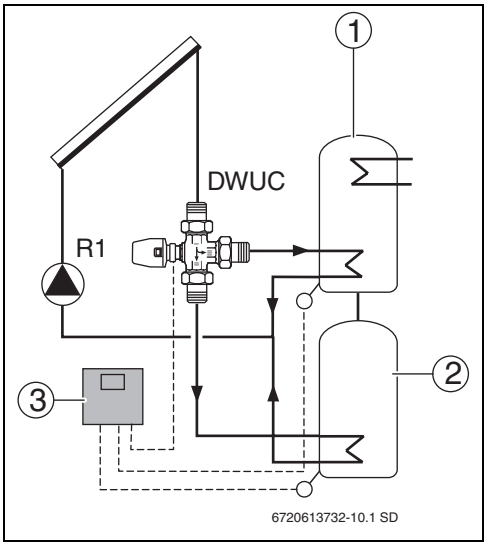


Fig. 9 Valve for cylinder selection

1 Solar system cylinder
2 Cylinder C
3 TDS 300solar heating programmer

▸ Fit 3-way motorised valve in the flow pipe of the solar system according to the table below.

Mark	Connection
I	From collector array (flow)
II	To cylinder C
III	To solar system cylinder

Tab. 5 Connection markings on valve.

4.3 Fitting a heat meter (option)

The heat meter measures the heat in the solar system (solar yield).

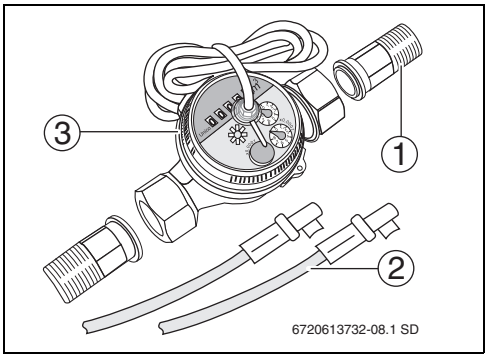


Fig. 10 Heat meter package contents

1 Water meter unions, ¾", inc. seals (2 off)
2 Temperature sensor NTC 10K inc. fixings (2 off)
3 Volumetric flow meter (1 off)

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. 6 Rated volumetric flow rate

- Fit volumetric flow meter below the solar heating centre in the solar system return (Fig. 11, Item 1). Pay attention to direction of flow and fitted position (meter dial must not face downwards).
- Fix temperature sensor for solar system return (Fig. 11, Item 2) with jubilee clip supplied.
- Fix temperature sensor for solar system flow (Fig. 11, Item 3) with jubilee clip supplied.

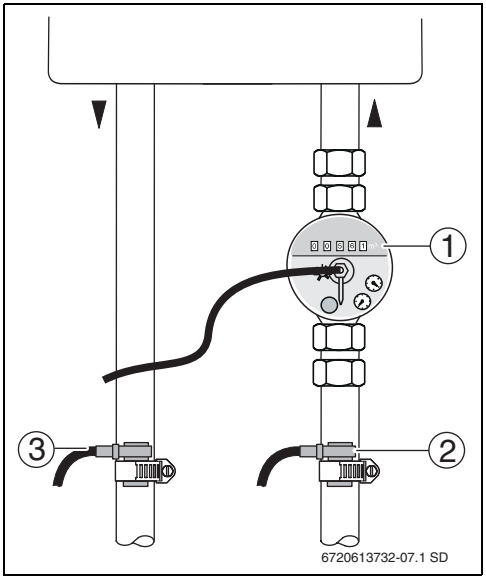


Fig. 11 Fitting the volumetric flow meter and temperature sensors

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 (optional accessory), usage data (water volume, room heating heat requirement), weather data and system simulation.

▸ Wire up electrical connections as shown in Section 5.

5 Electrical connections (for engineers only)

DANGER: risk of fatal electric shock.

- Disconnect the power supply (230 V AC) before opening up the solar heating programmer.
- Secure the cable with the cable grip.

5.1 Preparing the cable entry

Depending on the fitting situation, the cables can be fed into the casing from behind (→ Fig. 12, Item 4) or from below (→ Fig. 12, 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 sharp edges, cut out the cable entries with a knife (→ Fig. 12).
- Secure cables with the appropriate cable grips (→ Fig. 12, Item 2). The cable grip can also be fitted with the concave side facing out (→ Fig. 12, Item 1).

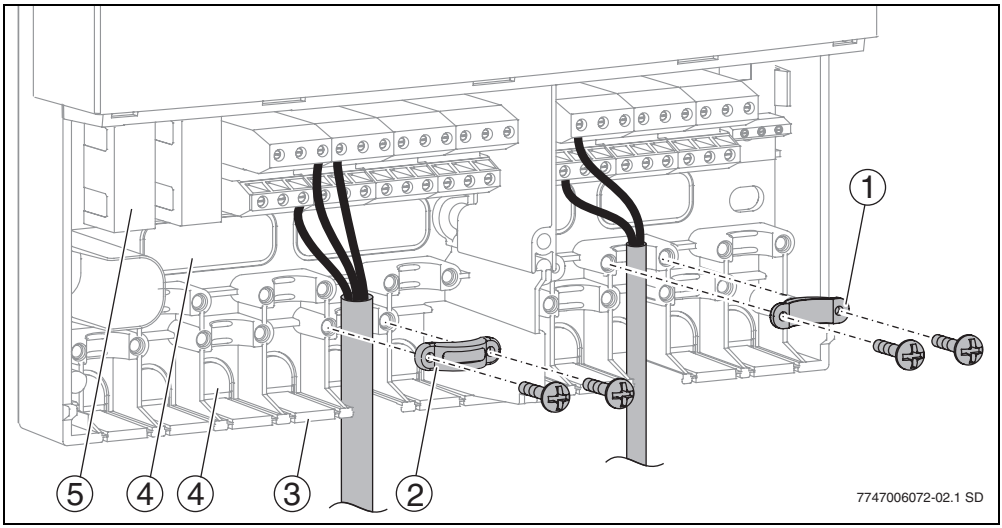


Fig. 12 Feeding in and securing cables

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)

5.2 Connecting the leads

Observe the following points when connecting the leads:

- Comply with local regulations, such as protective earthing tests etc..
- Only use pumps, valves and sensors supplied by the manufacturer.
- Protect the programmer from overloads and short-circuits.
- The power supply must match the specifications on the rating plate. See also Table 1, page 9.
- 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 m 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 3-way 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 (cooling, thermal disinfection and heat exchanger anti-icing) requires additional components (valves, temperature sensors) that must be purchased separately.

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

- ▶ If a pump with internal electronic circuitry is to be connected, deactivate the speed control function (→ Section 9.5.5, page 64).

- ▶ Connect the leads according to the desired configuration diagram (→ pages 22 - 48).
- ▶ After completing the work, close the programmer by replacing the cover and the securing screw.

5.3 Designation of configuration diagrams

Each configuration diagram has an alphanumeric designation code that enables basic identification of the type of system.

1 = Standard system
2 = Heating boost system

A = 2nd collector array
B = Staged charge system
C = High/low priority
D = External heat exchanger
E = Thermal disinfection

p = Pump
v = Valve

5.3.1 Example 1

Configuration diagram 1-ACD p-v (→ page 38) in its basic configuration means:

Standard system, solar water heating	1
2nd collector array (east/west rule)	A
High/low priority system with multiple heat consumers	C
External heat exchanger	D
Heat consumers controlled by pump and valve	p-v

5.3.2 Example 2

Configuration diagram 2-CD p-p (→ page 44) in its basic configuration means:

Heating boost system	2
High/low priority system with multiple heat consumers	C
External heat exchanger	D
Both heat consumers controlled by a pump	p-p

5.4 Configuration diagrams for standard systems

5.4.1 Configuration diagram 1-0 - solar water heating

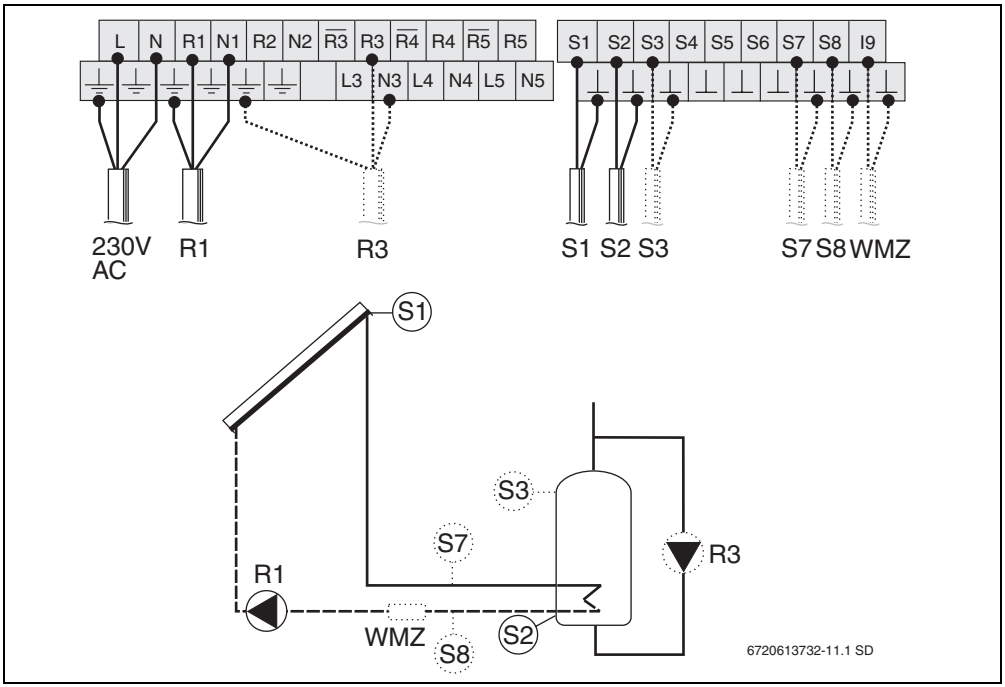


Fig. 13

R1 Pump SP, solar circulation system
R3 Pump PE, thermal disinfection (option)
S1 Temperature sensor (T1), collector FSK
S2 Solar cylinder bottom temperature sensor (T2)
S3 Solar cylinder top temperature sensor (option)
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.4.2 Configuration diagram 1-A - solar water heating with 2nd collector array

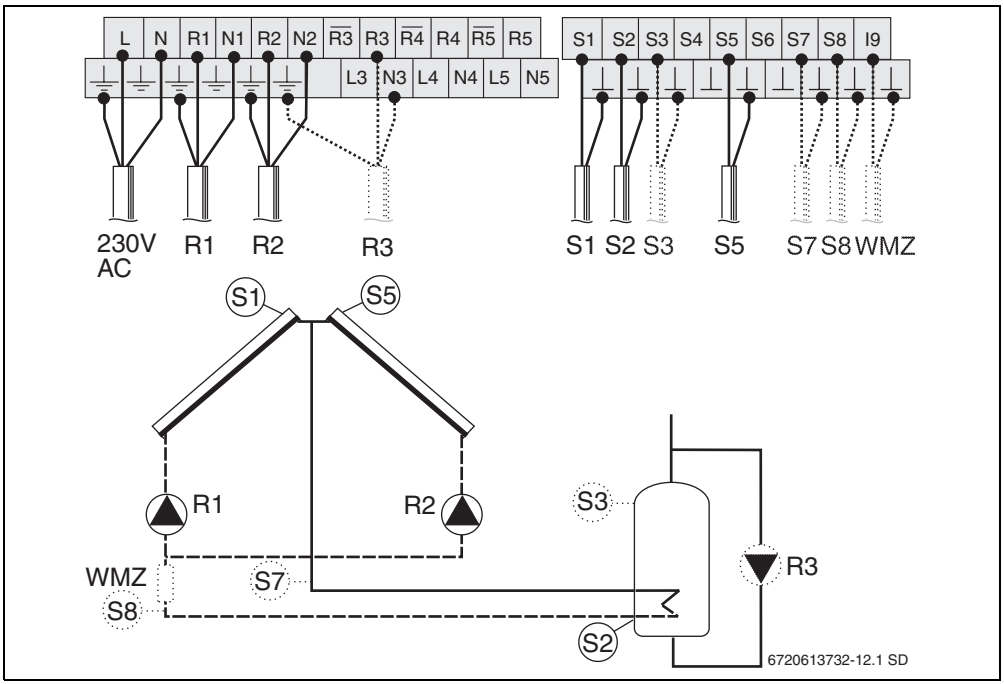


Fig. 14

R1 Pump SP, solar circulation system
R2 Pump PA, 2nd collector array
R3 Pump PE, thermal disinfection (option)
S1 Temperature sensor (T1), collector FSK, array 1
S2 Solar cylinder bottom temperature sensor (T2)
S3 Solar cylinder top temperature sensor (option)
S5 Temperature sensor (TA), collector FSK, array 2
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.4.3 Configuration diagram 1-B - solar water heating with pre-heat system

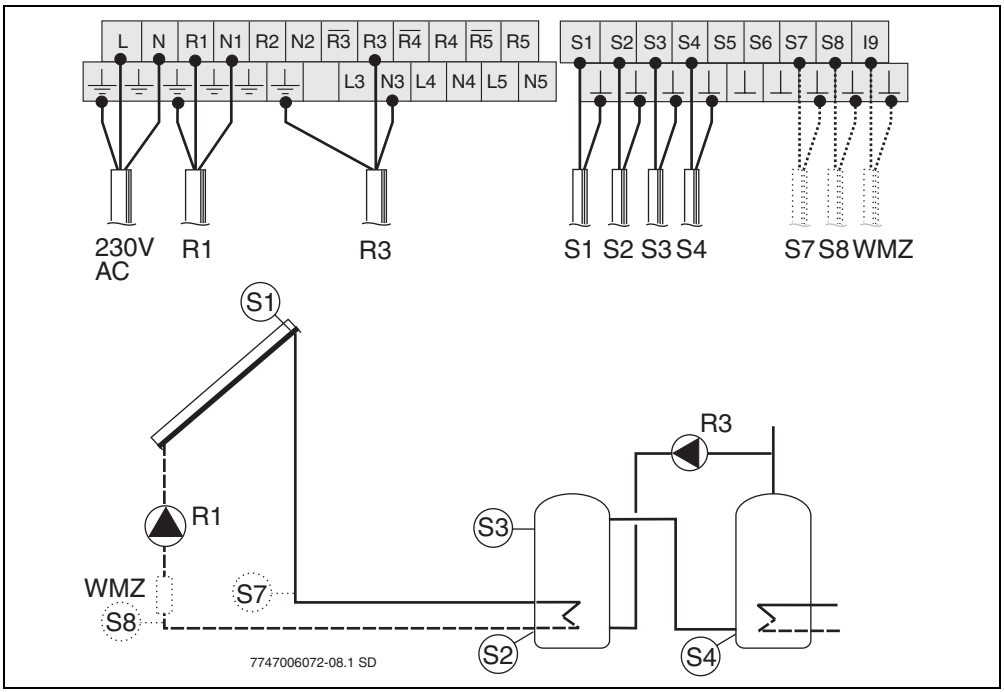


Fig. 15

R1 Pump SP, solar circulation system
R3 Pump PB, staged charging system
S1 Temperature sensor (T1), collector FSK
S2 Solar cylinder bottom temperature sensor (T2)
S3 Solar cylinder top temperature sensor
S4 Cylinder B bottom temperature sensor (TB)
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.4.4 Configuration diagram 1-AB - solar water heating with 2nd collector array and staged charging system

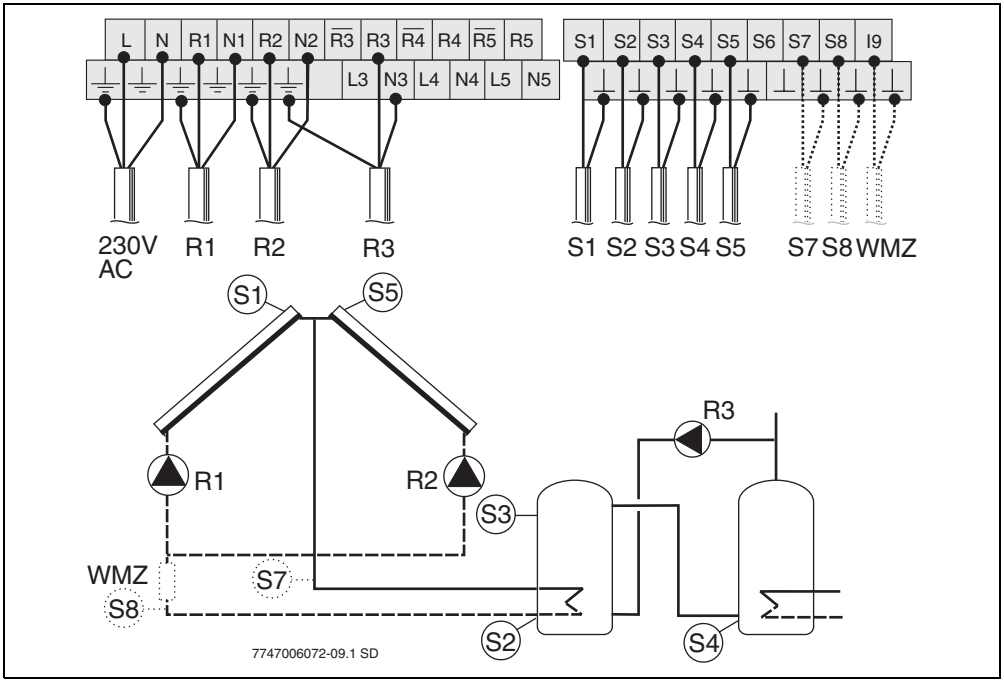


Fig. 16

R1 Pump SP, solar circulation system
R2 Pump PA, 2nd collector array
R3 Pump PB, staged charging system
S1 Temperature sensor (T1), collector FSK, array 1
S2 Solar cylinder bottom temperature sensor (T2)
S3 Solar cylinder top temperature sensor
S4 Cylinder B bottom temperature sensor (TB)
S5 Temperature sensor (TA), collector FSK, array 2
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.4.5 Configuration diagram 1-C p-p - solar water heating with 2 cylinders and 2nd pump

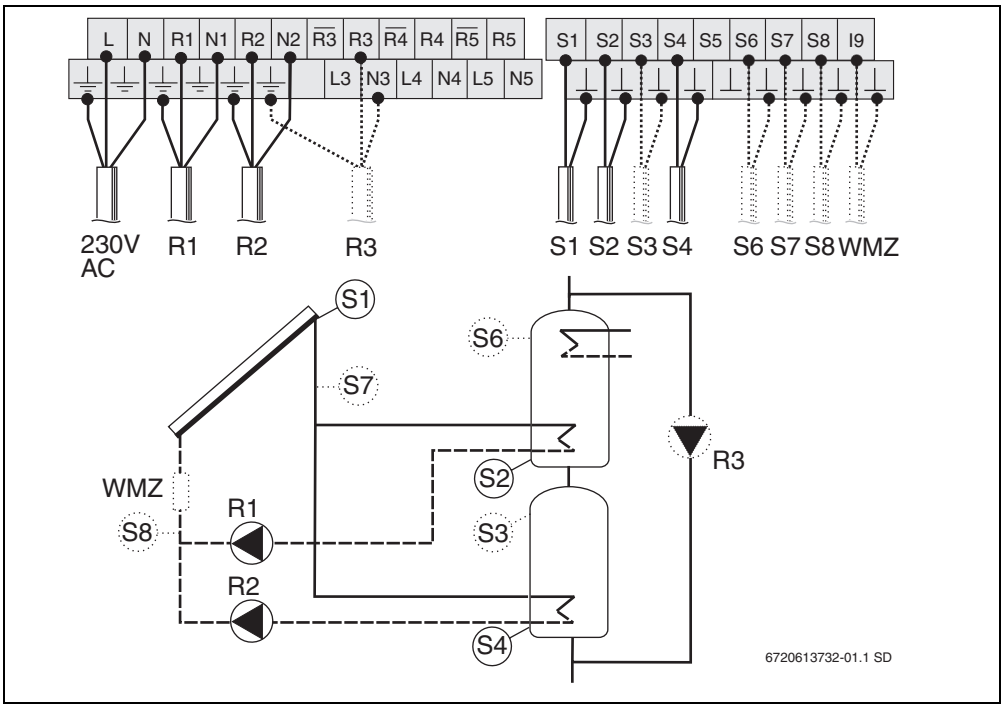


Fig. 17

R1 Pump SP, solar circulation system
R2 Pump PC, 2nd heat consumer
R3 Pump PE, thermal disinfection (option)
S1 Temperature sensor (T1), collector FSK
S2 Solar cylinder bottom temperature sensor (T2)
S3 Cylinder C top temperature sensor (option)
S4 Cylinder C bottom temperature sensor (TC)
S6 Solar cylinder top temperature sensor (option)
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.4.6 Configuration diagram 1-C p-v - solar water heating with 2 cylinders and diverter valve

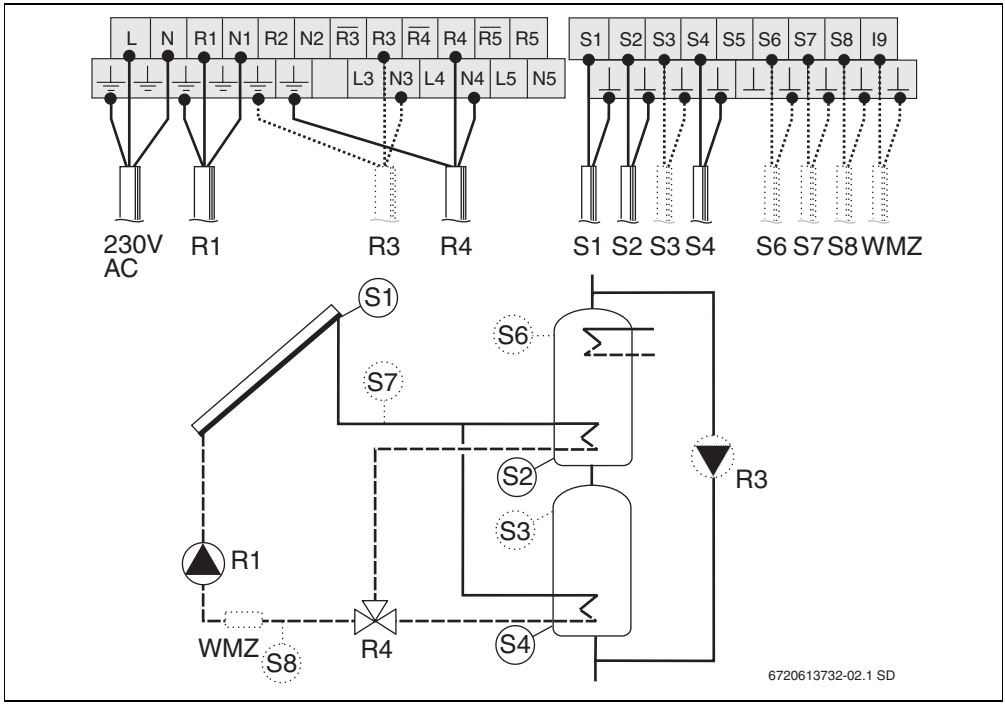


Fig. 18

R1 Pump SP, solar circulation system
R3 Pump PE, thermal disinfection (option)
R4 Valve DWUC for cylinder selection
S1 Temperature sensor (T1), collector FSK
S2 Solar cylinder bottom temperature sensor (T2)
S3 Cylinder C top temperature sensor (option)
S4 Cylinder C bottom temperature sensor (TC)
S6 Solar cylinder top temperature sensor (option)
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.4.7 Configuration diagram 1-AC - solar water heating with 2nd collector array and 2 cylinders with diverter valve

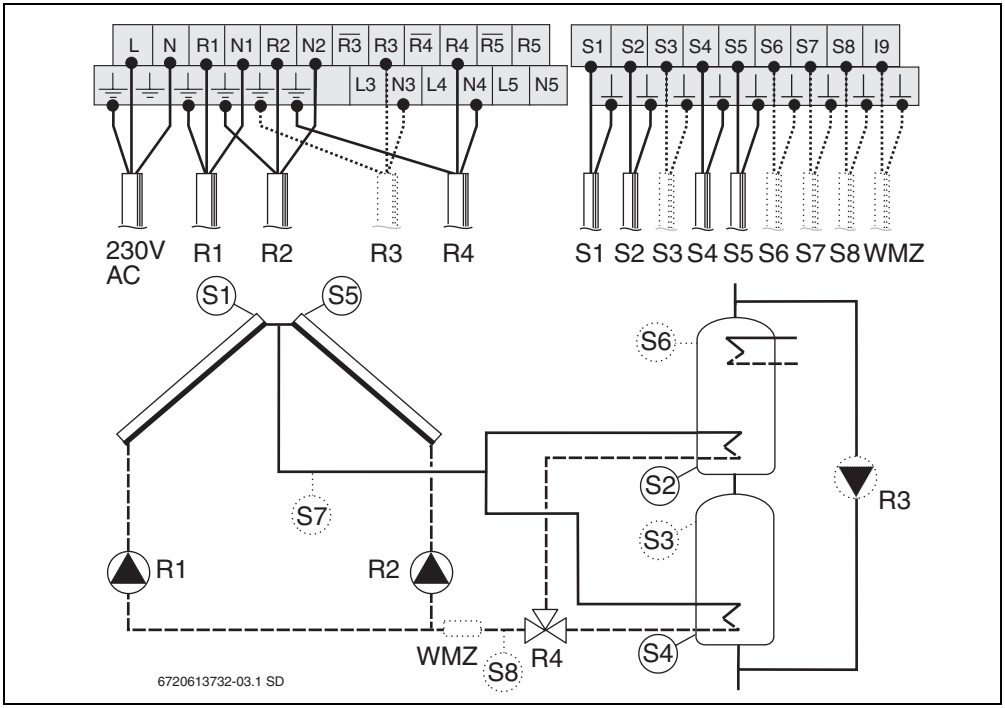


Fig. 19

R1 Pump SP, solar circulation system
R2 Pump PA, 2nd collector array
R3 Pump PE, thermal disinfection (option)
R4 Valve DWUC for cylinder selection
S1 Temperature sensor (T1), collector FSK, array 1
S2 Solar cylinder bottom temperature sensor (T2)
S3 Cylinder C top temperature sensor (option)
S4 Cylinder C bottom temperature sensor (TC)
S5 Temperature sensor (TA), collector FSK, array 2
S6 Solar cylinder top temperature sensor (option)
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.4.8 Configuration diagram 1-D - solar water heating with external heat exchanger

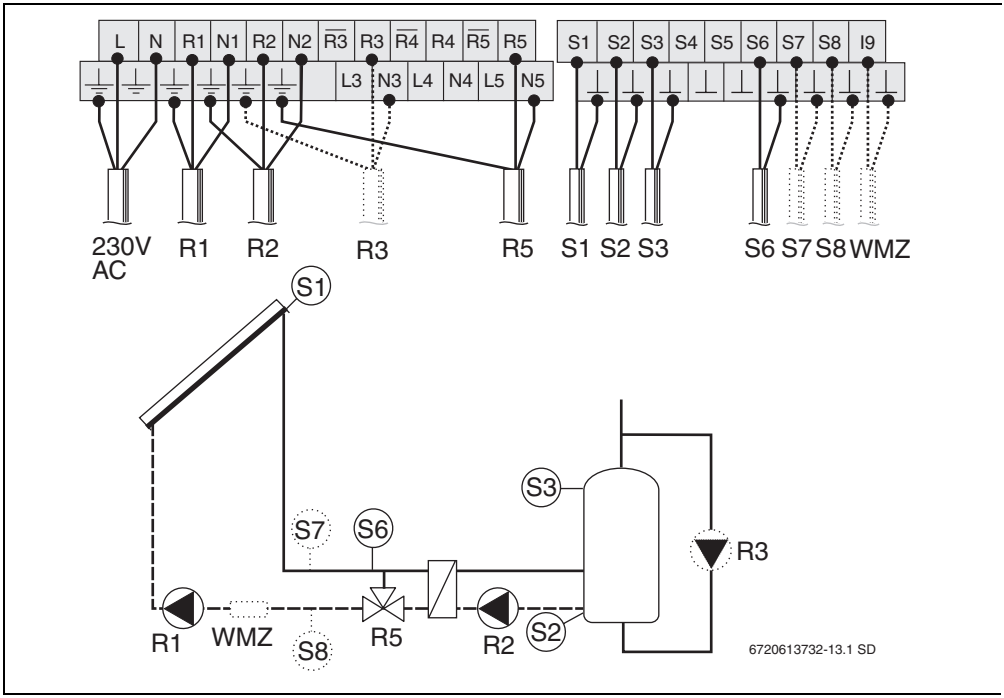


Fig. 20

R1 Pump SP, solar circulation system
R2 Pump PD, heat exchanger
R3 Pump PE, thermal disinfection (option)
R5 Valve DWUD, anti-icing system (option)
S1 Temperature sensor (T1), collector FSK
S2 Solar cylinder bottom temperature sensor (T2)
S3 Solar cylinder top temperature sensor (required for shutdown at 95 °C)
S6 Temperature sensor (TD), external heat exchanger
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.4.9 Configuration diagram 1-AD - solar water heating with 2nd collector array and external heat exchanger

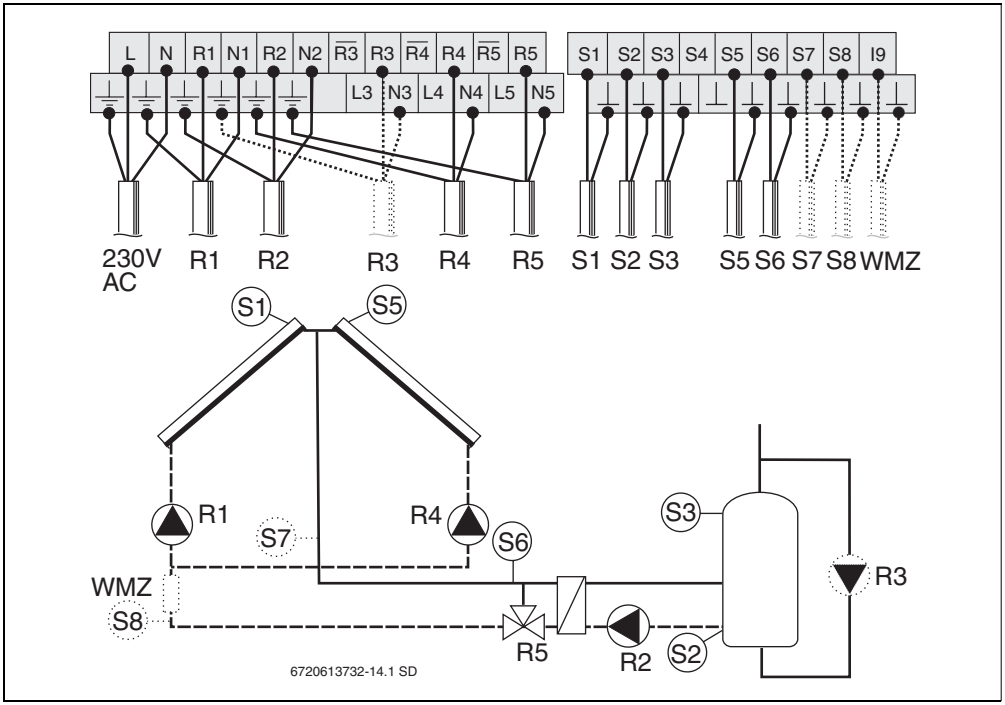


Fig. 21

R1 Pump SP, solar circulation system
R2 Pump PD, heat exchanger
R3 Pump PE, thermal disinfection (option)
R4 Pump PA, 2nd collector array
R5 Valve DWUD, anti-icing system (option)
S1 Temperature sensor (T1), collector FSK, array 1
S2 Solar cylinder bottom temperature sensor (T2)
S3 Solar cylinder top temperature sensor (required for shutdown at 95 °C)
S5 Temperature sensor (TA), collector FSK, array 2
S6 Temperature sensor (TD), external heat exchanger
S7 Flow heat meter WMZ temperature sensor (option)
S8 Heat meter WMZ return temperature sensor (option)
WMZ Heat meter (option)

5.4.10 Configuration diagram 1-BD - solar water heating with staged charging system and external heat exchanger

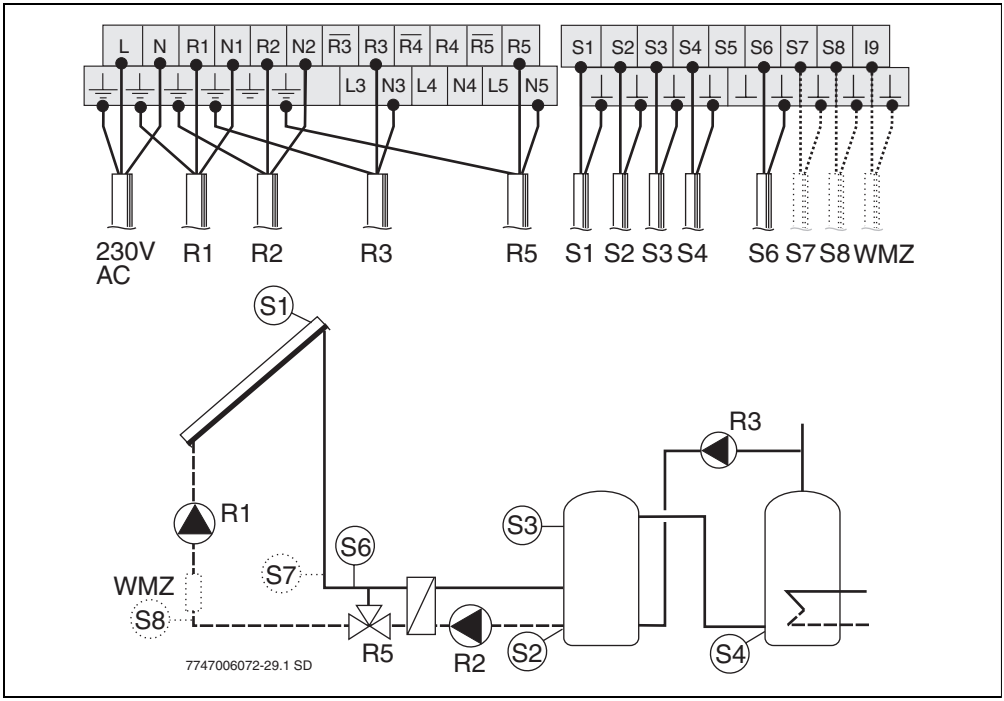


Fig. 22

R1 Pump SP, solar circulation system
R2 Pump PD, heat exchanger
R3 Pump PD, charge transfer
R5 Valve DWUD, anti-icing system (option)
S1 Temperature sensor (T1), collector FSK
S2 Solar cylinder bottom temperature sensor (T2)
S3 Solar cylinder top temperature sensor
S4 Cylinder B bottom temperature sensor (TB)
S6 Temperature sensor (TD), external heat exchanger
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.4.11 Configuration diagram 1-ABD - solar water heating with 2nd collector array, staged charging system and external heat exchanger

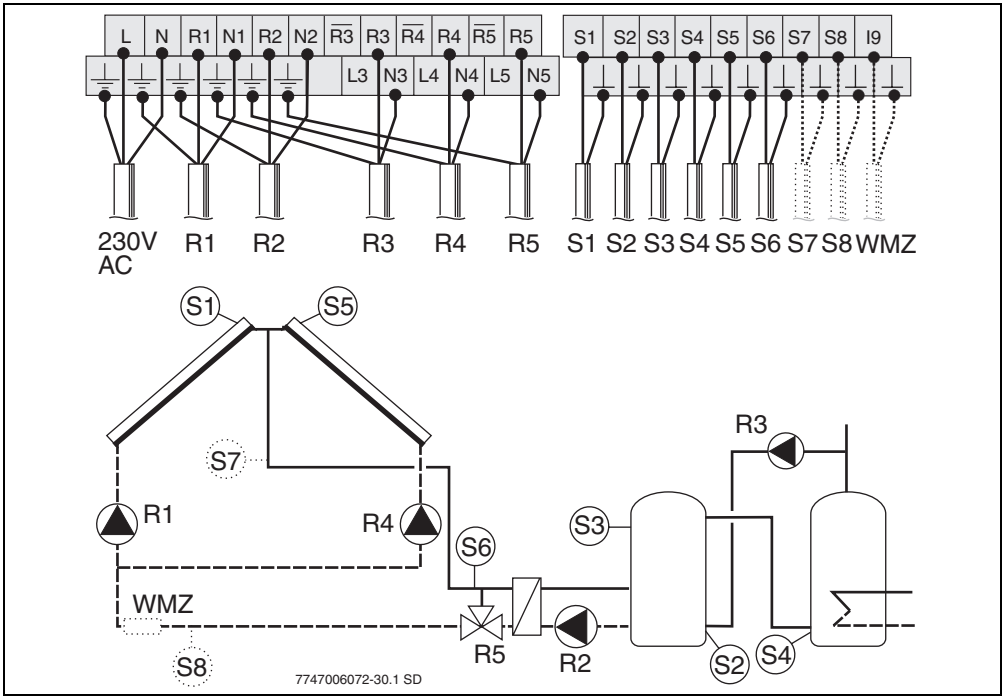


Fig. 23

R1 Pump SP, solar circulation system
R2 Pump PD, heat exchanger
R3 Pump PD, charge transfer
R4 Pump PA, 2nd collector array
R5 Valve DWUD, anti-icing system (option)
S1 Temperature sensor (T1), collector FSK, array 1
S2 Solar cylinder bottom temperature sensor (T2)
S3 Solar cylinder top temperature sensor
S4 Cylinder B bottom temperature sensor (TB)
S5 Temperature sensor, collector FSK, array 2
S6 Temperature sensor (TD), external heat exchanger
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.4.12 Configuration diagram 1-CD p-p - solar water heating with 2 cylinders and 2nd pump and external heat exchanger

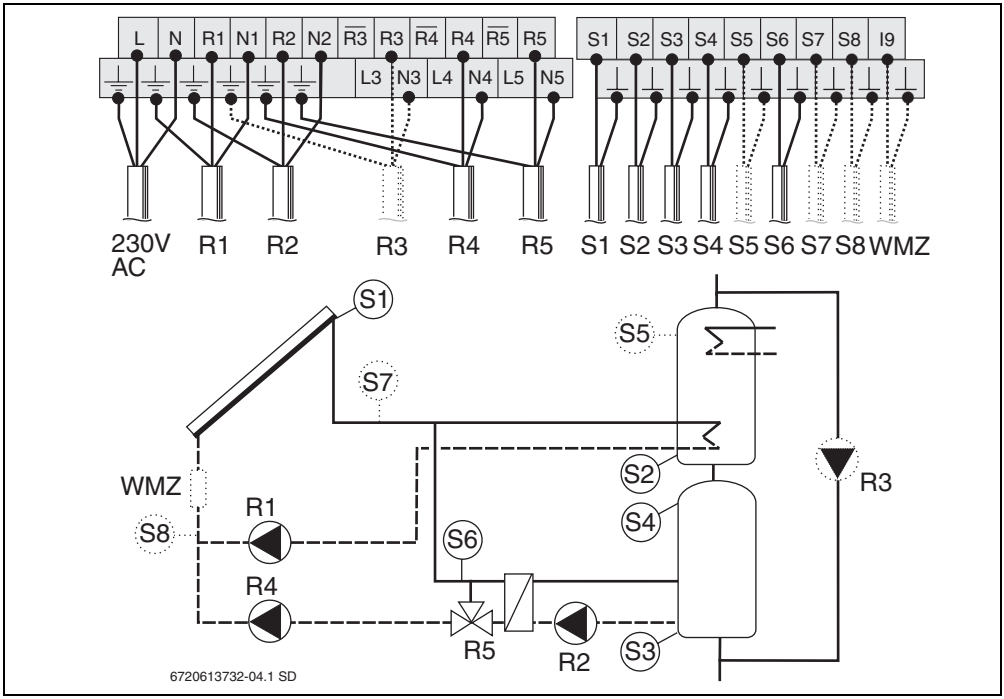


Fig. 24

R1 Pump SP, solar circulation system
R2 Pump PD, heat exchanger
R3 Pump PE, thermal disinfection (option)
R4 Pump PC, 2nd heat consumer
R5 Valve DWUD, anti-icing system (option)
S1 Temperature sensor (T1), collector FSK
S2 Solar cylinder bottom temperature sensor (T2)
S3 Cylinder C bottom temperature sensor (TC)
S4 Cylinder C top temperature sensor (required for shutdown at 95 °C)
S5 Solar cylinder top temperature sensor (option)
S6 Temperature sensor (TD), external heat exchanger
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.4.13 Configuration diagram 1-CD p-p - solar water heating with swimming pool and external heat exchanger with 2nd pump

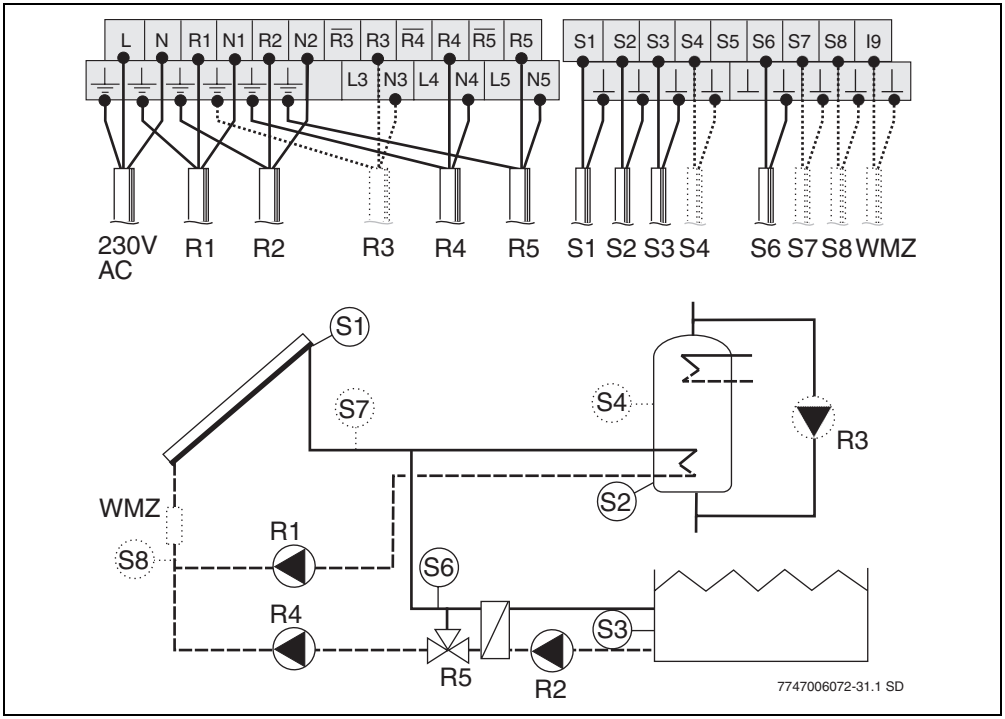


Fig. 25

R1 Pump SP, solar circulation system
R2 Pump PD, heat exchanger
R3 Pump PE, thermal disinfection (option)
R4 Pump PC, 2nd heat consumer
R5 Valve DWUD, anti-icing system (option)
S1 Temperature sensor (T1), collector FSK
S2 Solar cylinder bottom temperature sensor (T2)
S3 Swimming pool temperature sensor
S4 Solar cylinder middle temperature sensor (option)
S6 Temperature sensor (TD), external heat exchanger
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.4.14 Configuration diagram 1-CD p-v - solar water heating with 2 cylinders connected via valve and external heat exchanger

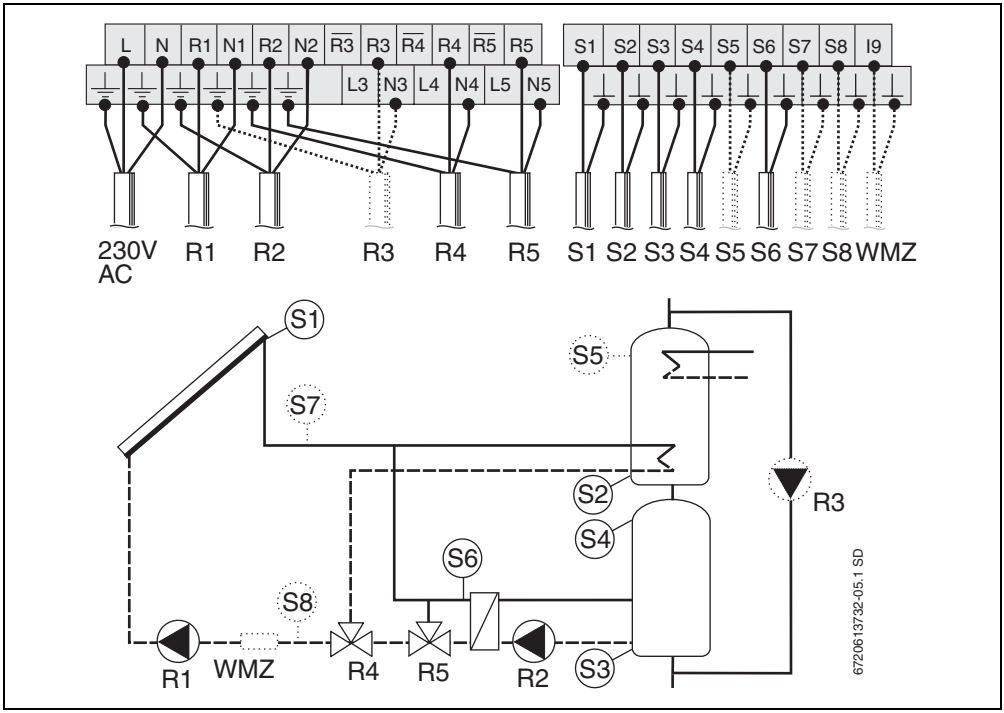


Fig. 26

R1 Pump SP, solar circulation system
R2 Pump PD, heat exchanger
R3 Pump PE, thermal disinfection (option)
R4 Valve DWUC for cylinder selection
R5 Valve DWUD, anti-icing system (option)
S1 Temperature sensor (T1), collector FSK
S2 Solar cylinder bottom temperature sensor (T2)
S3 Cylinder C bottom temperature sensor (TC)
S4 Cylinder C top temperature sensor (required for shutdown at 95 °C)
S5 Solar cylinder top temperature sensor (option)
S6 Temperature sensor (TD), external heat exchanger
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.4.15 Configuration diagram 1-CD p-v - solar water heating with swimming pool connected via valve and external heat exchanger

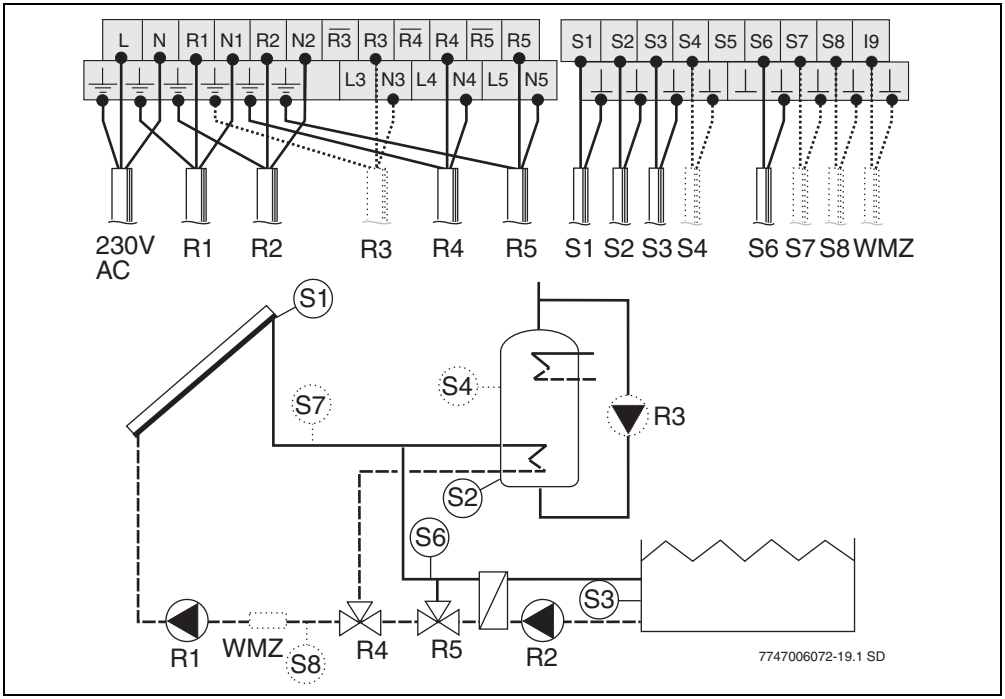


Fig. 27

R1 Pump SP, solar circulation system
R2 Pump PD, heat exchanger
R3 Pump PE, thermal disinfection (option)
R4 Valve DWUC for cylinder selection
R5 Valve DWUD, anti-icing system (option)
S1 Temperature sensor (T1), collector FSK
S2 Solar cylinder bottom temperature sensor (T2)
S3 Swimming pool temperature sensor
S4 Solar cylinder middle temperature sensor (option)
S6 Temperature sensor (TD), external heat exchanger
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.4.16 Configuration diagram 1-ACD p-v - solar water heating with 2nd collector array, 2 cylinders connected via valve and external heat exchanger

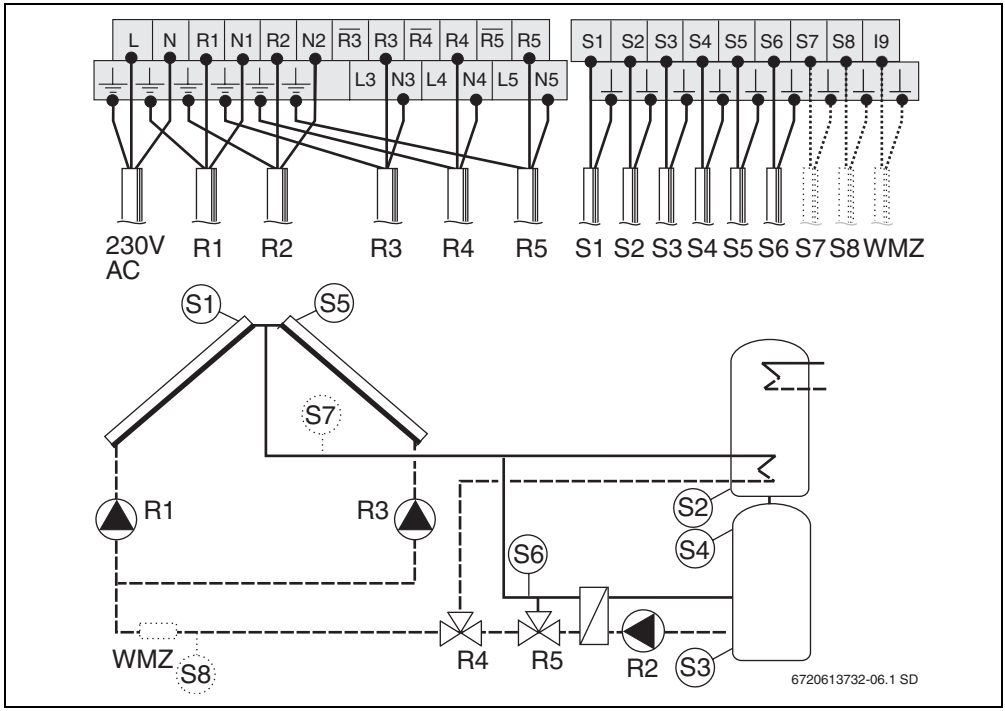


Fig. 28

R1 Pump SP, solar circulation system
R2 Pump PD, heat exchanger
R3 Pump PA, 2nd collector array
R4 Valve DWUC for cylinder selection
R5 Valve DWUD, anti-icing system (option)
S1 Temperature sensor (T1), collector FSK, array 1
S2 Solar cylinder bottom temperature sensor (T2)
S3 Cylinder C bottom temperature sensor (TC)
S4 Cylinder C top temperature sensor (required for shutdown at 95 °C)
S5 Temperature sensor (TA), collector FSK, array 2
S6 Temperature sensor (TD), external heat exchanger
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.4.17 Configuration diagram 1-ACD p-v - solar water heating with 2nd collector array, swimming pool (connected via valve) and external heat exchanger

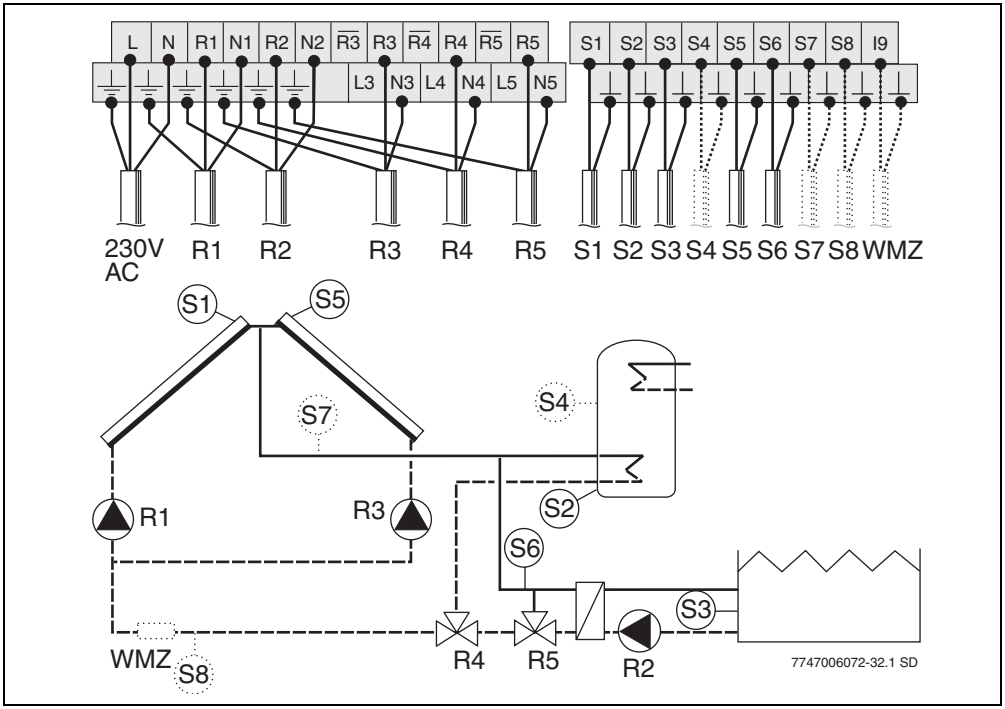


Fig. 29

R1 Pump SP, solar circulation system
R2 Pump PD, heat exchanger
R3 Pump PA, 2nd collector array
R4 Valve DWUC for cylinder selection
R5 Valve DWUD, anti-icing system (option)
S1 Temperature sensor (T1), collector FSK, array 1
S2 Solar cylinder bottom temperature sensor (T2)
S3 Swimming pool temperature sensor
S4 Solar cylinder middle temperature sensor (option)
S5 Temperature sensor (TA), collector FSK, array 2
S6 Temperature sensor (TD), external heat exchanger
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.5 Configuration diagrams for heating boost system

5.5.1 Configuration diagram 2-0 - heating boost system

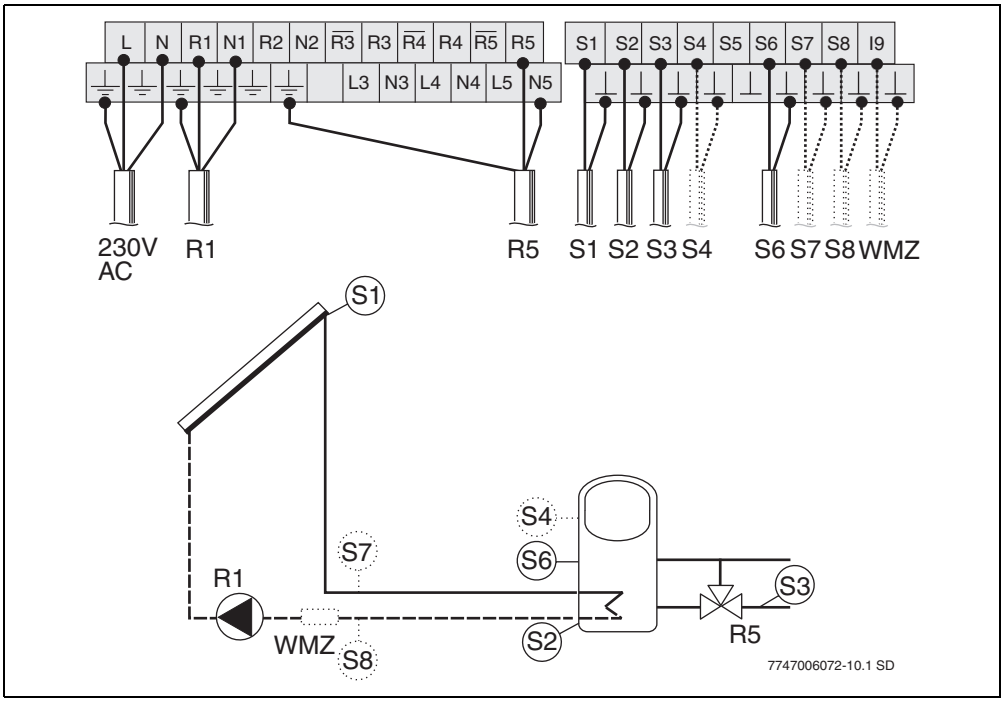


Fig. 30

R1 Pump SP, solar circulation system
R5 Valve DWU1, return boost
S1 Temperature sensor (T1), collector FSK
S2 Solar cylinder bottom temperature sensor (T2)
S3 Heating return temperature sensor (T4)
S4 Solar cylinder top temperature sensor (option)
S6 Solar cylinder middle temperature sensor (T3)
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.5.2 Configuration diagram 2-A - heating boost system with 2nd collector array

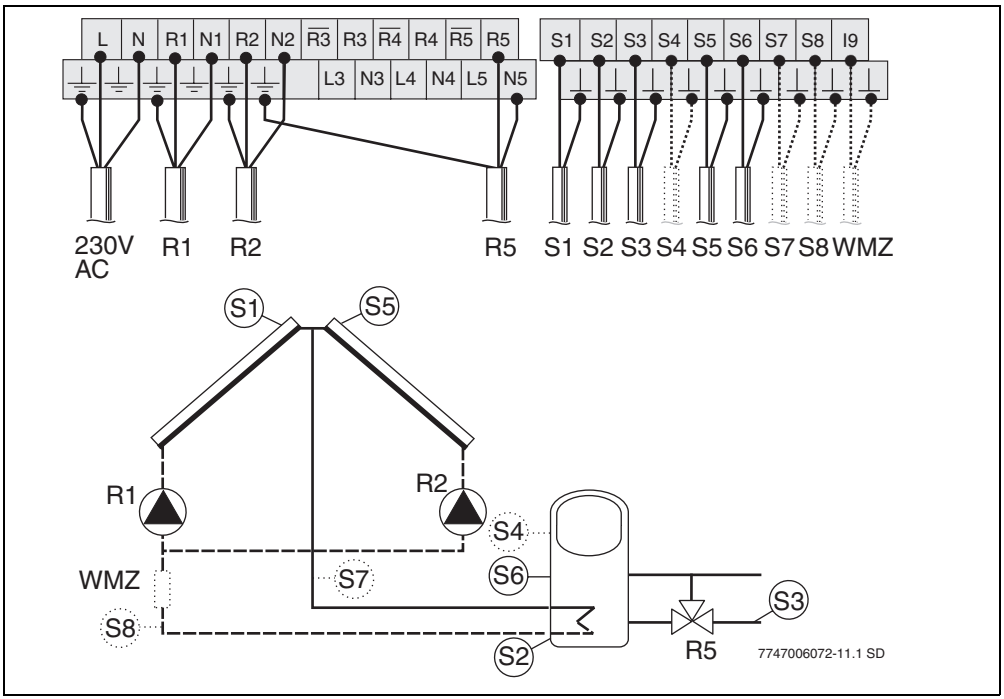


Fig. 31

R1 Pump SP, solar circulation system
R2 Pump PA, 2nd collector array
R5 Valve DWU1, return boost
S1 Temperature sensor (T1), collector FSK, array 1
S2 Solar cylinder bottom temperature sensor (T2)
S3 Heating return temperature sensor (T4)
S4 Solar cylinder top temperature sensor (option)
S5 Temperature sensor (TA), collector FSK, array 2
S6 Solar cylinder middle temperature sensor (T3)
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.5.3 Configuration diagram 2-C p-p - heating boost system with 2 cylinders and 2 pumps

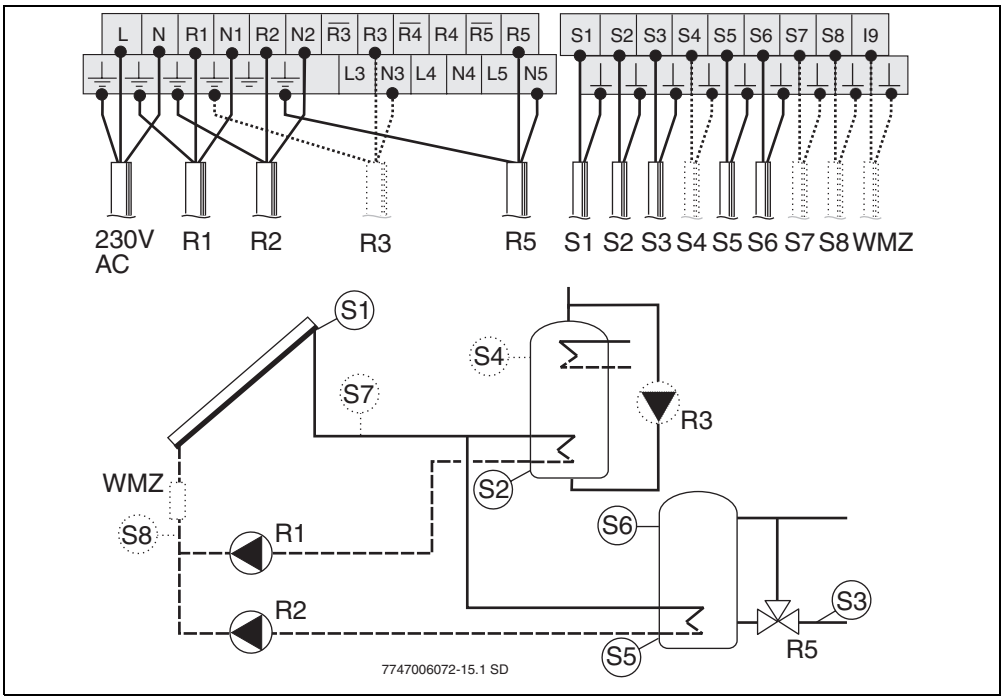


Fig. 32

R1 Pump SP, solar circulation system
R2 Pump PC, 2nd heat consumer
R3 Pump PE, thermal disinfection (option)
R5 Valve DWU1, return boost
S1 Temperature sensor (T1), collector FSK
S2 Solar cylinder bottom temperature sensor (T2)
S3 Heating return temperature sensor (T4)
S4 Solar cylinder top temperature sensor (option)
S5 Cylinder C bottom temperature sensor (TC)
S6 Cylinder C top temperature sensor (T3)
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.5.4 Configuration diagram 2-C p-v - heating boost system with 2 cylinders connected via valve

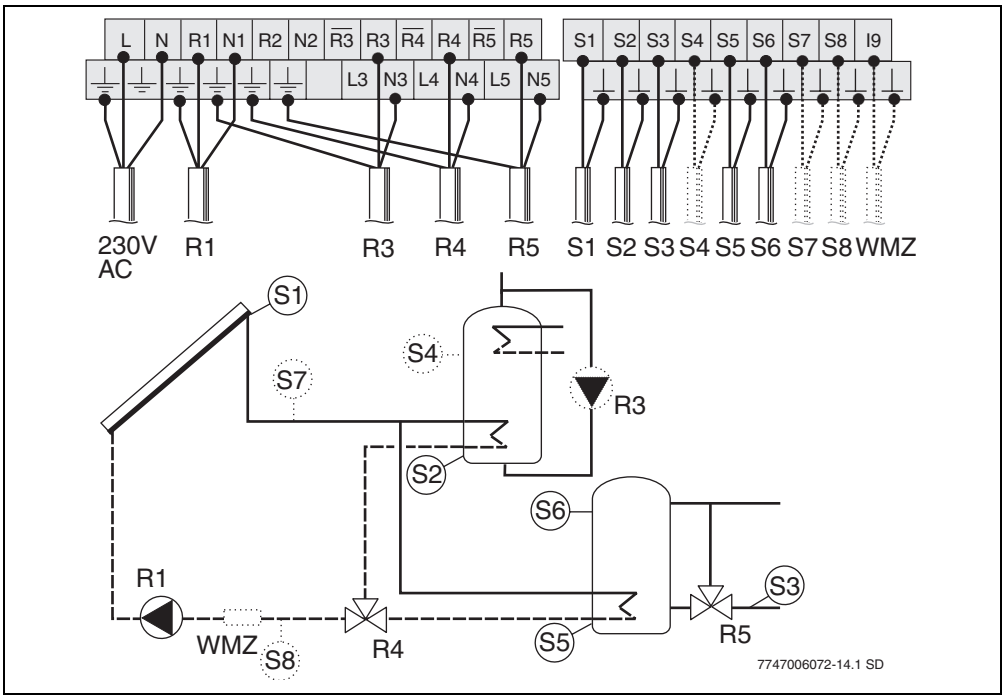


Fig. 33

R1 Pump SP, solar circulation system
R3 Pump PE, thermal disinfection (option)
R4 Valve DWUC for cylinder selection
R5 Valve DWU1, return boost
S1 Temperature sensor (T1), collector FSK
S2 Solar cylinder bottom temperature sensor (T2)
S3 Heating return temperature sensor (T4)
S4 Solar cylinder top temperature sensor (option)
S5 Cylinder C bottom temperature sensor (TC)
S6 Cylinder C top temperature sensor (T3)
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.5.5 Configuration diagram 2-AC p-v - heating boost system with 2nd collector array and 2 cylinders connected via valve

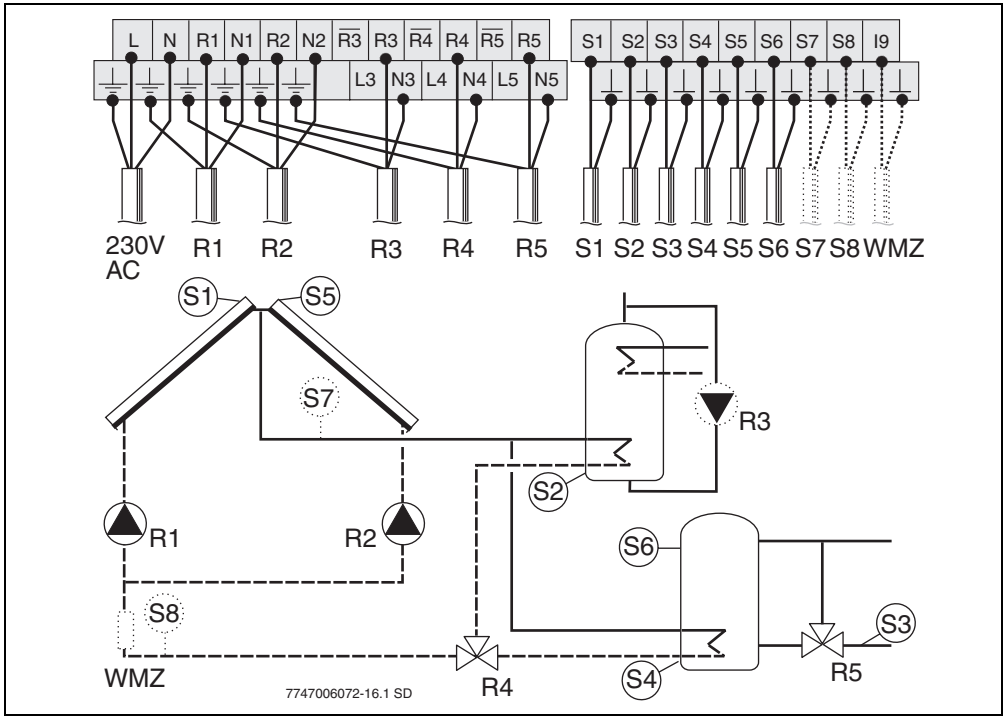


Fig. 34

R1 Pump SP, solar circulation system
R2 Pump PA, 2nd collector array
R3 Pump PE, thermal disinfection (option)
R4 Valve DWUC for cylinder selection
R5 Valve DWU1, return boost
S1 Temperature sensor (T1), collector FSK, array 1
S2 Solar cylinder bottom temperature sensor (T2)
S3 Heating return temperature sensor (T4)
S4 Cylinder C bottom temperature sensor (TC)
S5 Temperature sensor (TA), collector FSK, array 2
S6 Cylinder C top temperature sensor (T3)
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.5.6 Configuration diagram 2-CD p-p - heating boost system with 2 cylinders connected via 2 pumps, and external heat exchanger

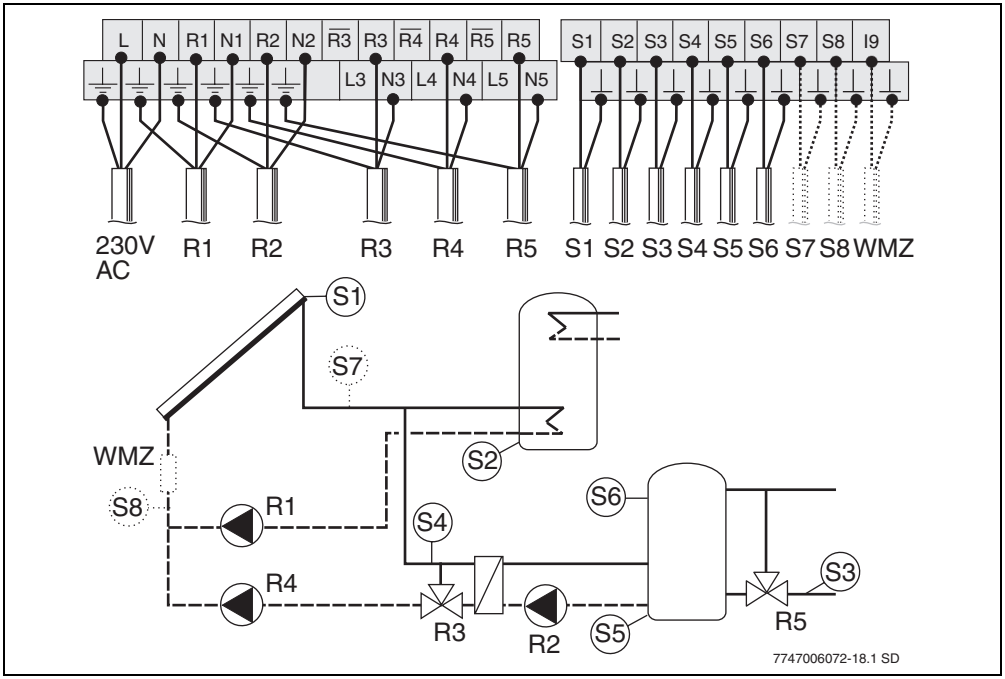


Fig. 35

R1 Pump SP, solar circulation system
R2 Pump PD, heat exchanger
R3 Valve DWUD, anti-icing system (option)
R4 Pump PC, 2nd heat consumer
R5 Valve DWU1, return boost
S1 Temperature sensor (T1), collector FSK
S2 Solar cylinder bottom temperature sensor (T2)
S3 Heating return temperature sensor (T4)
S4 Temperature sensor (TD), external heat exchanger
S5 Cylinder C bottom temperature sensor (TC)
S6 Cylinder C top temperature sensor (T3)
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.5.7 Configuration diagram 2-CD p-v - heating boost system with 2 cylinders connected via valve and external heat exchanger

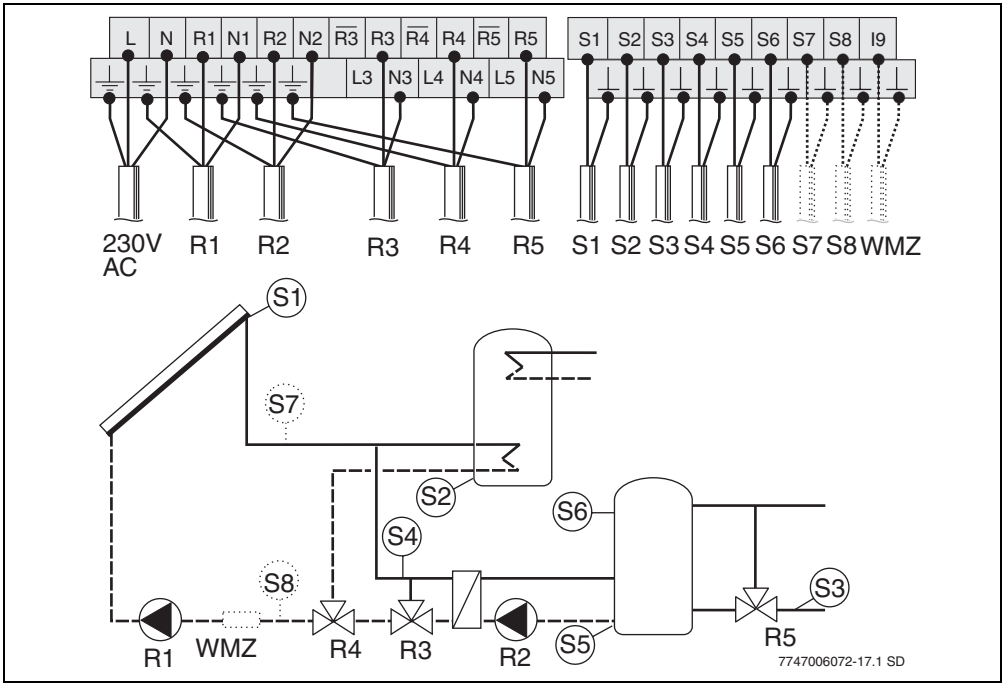


Fig. 36

R1 Pump SP, solar circulation system
R2 Pump PD, heat exchanger
R3 Valve DWUD, anti-icing system (option)
R4 Valve DWUC for cylinder selection
R5 Valve DWU1, return boost
S1 Temperature sensor (T1), collector FSK
S2 Solar cylinder bottom temperature sensor (T2)
S3 Heating return temperature sensor (T4)
S4 Temperature sensor (TD), external heat exchanger
S5 Cylinder C bottom temperature sensor (TC)
S6 Cylinder C top temperature sensor (T3)
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.5.8 Configuration diagram 2-CD p-p - heating boost system with swimming pool connected via second pump, and external heat exchanger

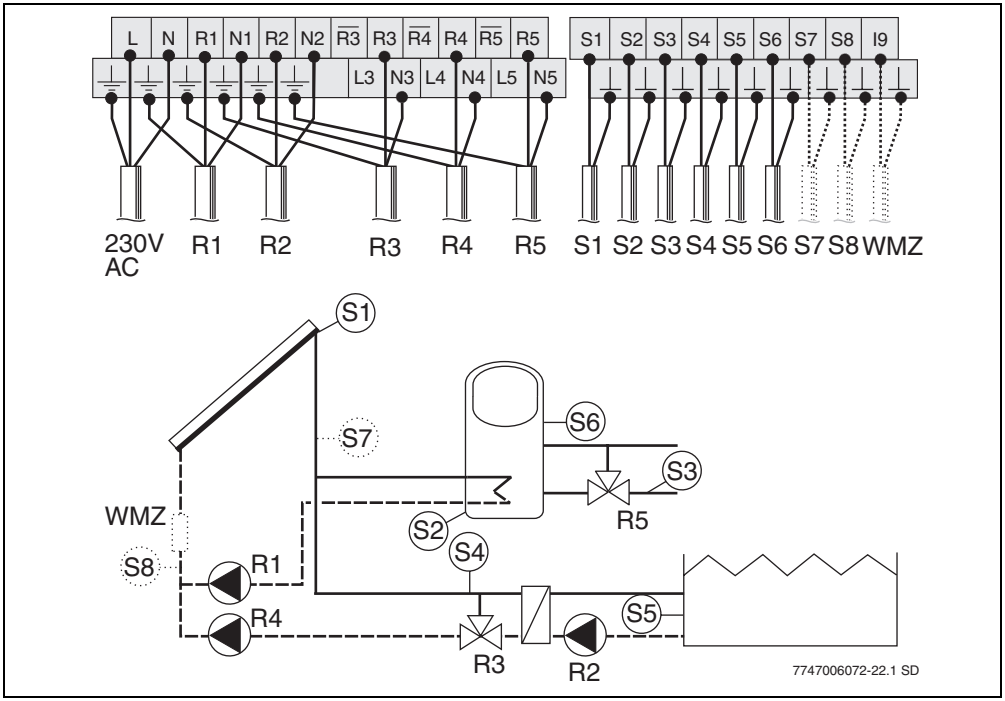


Fig. 37

R1 Pump SP, solar circulation system
R2 Pump PD, heat exchanger
R3 Valve DWUD, anti-icing system (option)
R4 Pump PC, 2nd heat consumer
R5 Valve DWU1, return boost
S1 Temperature sensor (T1), collector FSK
S2 Solar cylinder bottom temperature sensor (T2)
S3 Heating return temperature sensor (T4)
S4 Temperature sensor (TD), external heat exchanger
S5 Swimming pool temperature sensor
S6 Solar cylinder middle temperature sensor (T3)
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.5.9 Configuration diagram 2-CD p-v - heating boost system with swimming pool connected via valve, and external heat exchanger

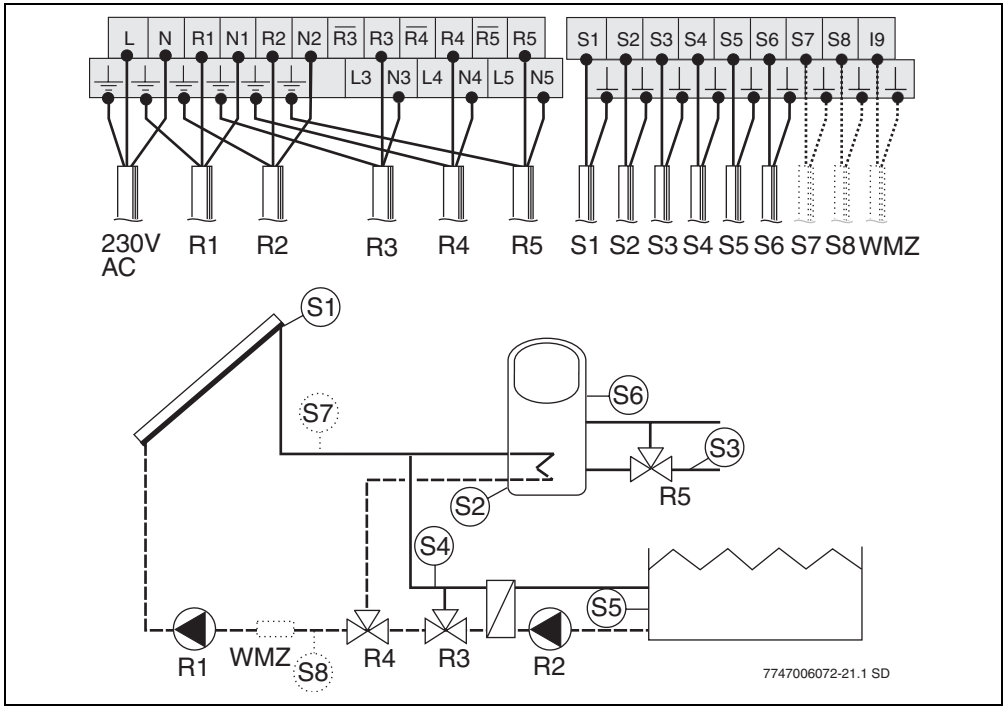


Fig. 38

R1 Pump SP, solar circulation system
R2 Pump PD, heat exchanger
R3 Valve DWUD, anti-icing system (option)
R4 Valve DWUC for cylinder selection
R5 Valve DWU1, return boost
S1 Temperature sensor (T1), collector FSK
S2 Solar cylinder bottom temperature sensor (T2)
S3 Heating return temperature sensor (T4)
S4 Temperature sensor (TD), external heat exchanger
S5 Swimming pool temperature sensor
S6 Solar cylinder middle temperature sensor (T3)
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

5.5.10 Configuration diagram 2-CD p-v-v - heating boost system with swimming pool with two cylinders connected via valves, and external heat exchanger

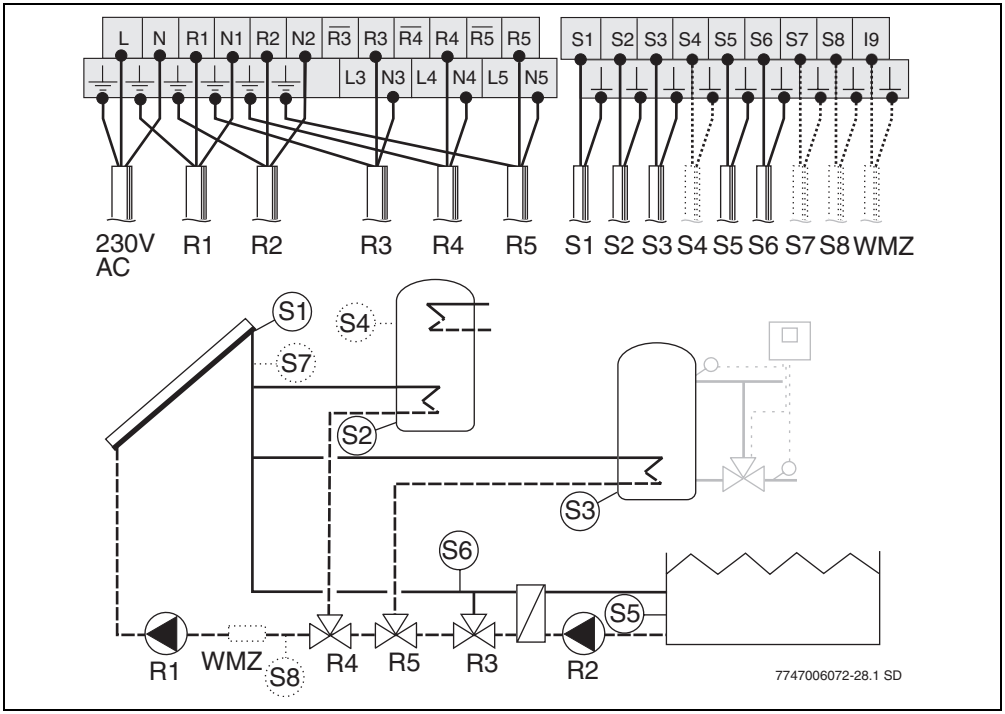


Fig. 39

R1 Pump SP, solar circulation system
R2 Pump PD, heat exchanger
R3 Valve DWUD, anti-icing system (option)
R4 Valve DWUC for cylinder 1 selection
R5 Valve DWU3 for cylinder 2 selection
S1 Temperature sensor (T1), collector FSK
S2 Solar cylinder bottom temperature sensor (T2)
S3 Cylinder C bottom temperature sensor (TC)
S4 Solar cylinder top temperature sensor (option)
S5 Swimming pool temperature sensor
S6 Temperature sensor (TD), external heat exchanger
S7 Flow heat meter WMZ temperature sensor (option)
S8 Return heat meter WMZ temperature sensor (option)
WMZ Heat meter (option)

6 Operation

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

6.1 Programmer controls

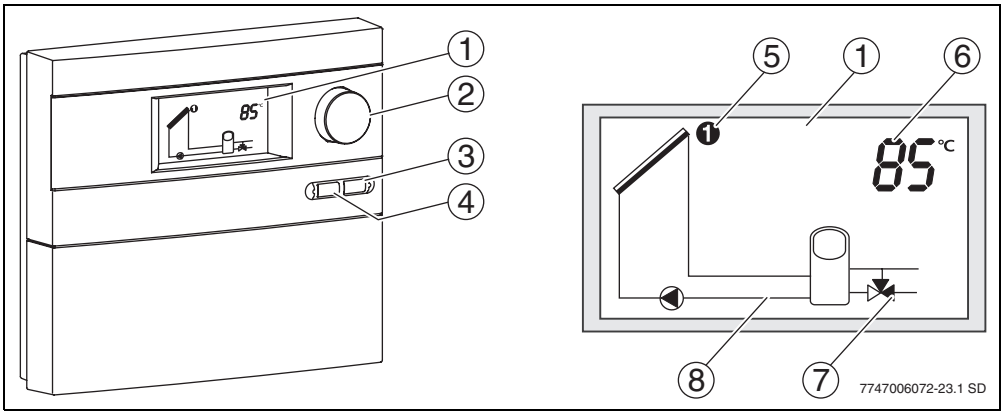


Fig. 40 programmer and display

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

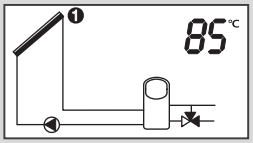
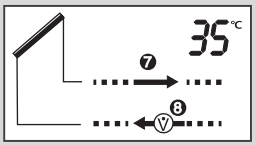
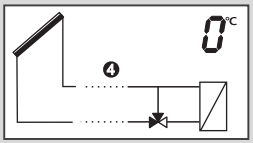
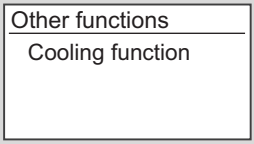
Control	Symbol	Functions
Rotary selector(can be turned and pressed)	ok	• Selecting system settings (View level) • Selecting, starting and saving functions (Main/Expert menu) • Changing and saving settings (Main/Expert menu)
Menu button	menu	• Opening submenus (Main/Expert menu)
Back button		• Returning to higher menu level • Reverting to collector temperature display (View level)

Tab. 7

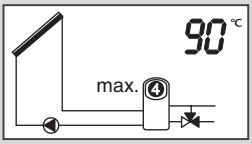
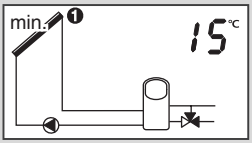
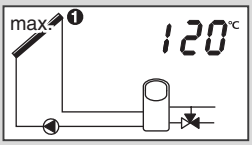
6.2 Programmer operation levels

6.2.1 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, current 24-hour period (h/d) • Pump speed (%) • Pump and valve status
	**Heat meter**	• Flow temperature (°C) • Return temperature (°C) • Heat usage, cumulative (kWh) • Heat usage, current 24-hour period (kWh/d)
	**Heat exchanger anti-icing system**	• Flow temperature (°C) • Hours of operation, cumulative (h) • Hours of operation, current 24-hour period (h/d)
	**Other functions** Shows other active functions. Possible indications (display flashes when function is active): • Evacuated tube collector • Mediterranean climate function • Thermal disinfection • Cooling function	

Tab. 8 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 set limit.
	**Collector maximum temperature** The collector maximum temperature is displayed if the set limit is exceeded.

Tab. 9 Status indications

6.2.2 Main menu

The Main menu can be used to set the maximum temperatures for the heat consumers(→ Section 8, page 54).

6.2.3 Expert menu (for qualified technicians only)

The programmer's Expert menu can be used to select additional functions and system configurations. The control mode must be adapted to suit the specifics of the solar heating system (→ Section 9, page 55).
An overview of the Expert menu functions can be found on page 55.

7 Commissioning (for engineers only)

7.1 Before commissioning

WARNING: risk of damage to pump if allowed to run dry.

- Make sure that the solar heating system is filled with heat transfer fluid (→ installation and maintenance instructions for solar heating centre).

- Follow the instructions in the technical documentation for the solar heating centre, the collectors and the solar cylinder when commissioning the solar heating system.
- Only put the solar heating 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 heating system can damage the system.

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

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

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

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

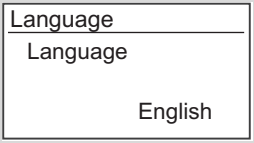
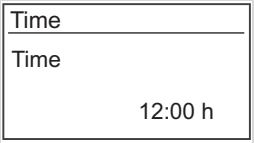
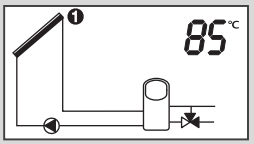
In order to prevent undesirable starting of the pump when the power supply is connected, the programmer option **Start solar system** is factory-set to **No**.

- For normal operation, set programmer option **Start solar system** to **Yes**. (→ Section 9.6, page 77).

7.2 Entering basic settings

When the programmer is first installed, you are requested to enter the language and time.

- Enter the language and time before continuing with commissioning.

Basic settings	
	▸ To select the language turn the rotary selector . ▸ To save the setting, press the rotary selector .
	▸ Use the rotary selector to select the time. ▸ To change the time, turn the rotary selector (separately for hours and minutes). ▸ To save the setting, press the rotary selector (separately for hours and minutes).
	Switch to View level by turning the rotary selector . Subsequent changes can be made from the Expert menu.

Tab. 10 Basic settings after installation

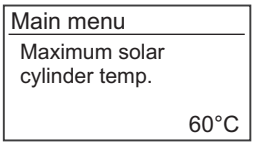
8 Main menu

The Main menu can be used to set the maximum temperatures for the heat consumers (solar cylinder, cylinder C, swimming pool).

Once the cylinder or swimming pool reaches the maximum temperature, charging of that heat consumer is stopped.

If no entry is made for more than 60 seconds, the programmer exits the main menu.

- Press the menu button to switch to the Main menu.



- Use the rotary selector to select the required heat consumer.
- To change the maximum temperature, press the rotary selector (temperature starts flashing).
- To change the setting, turn the rotary selector .
- To save the new setting, press the rotary selector .
- To exit the Main menu, press the Back button .

Setting range	Default setting	New setting
10 - 95 °C	60 °C	

9 Expert menu (for qualified technicians only)

The Expert menu is used to set the programmer to suit the specifics of the solar heating system.

▸ To switch to the Expert menu, press and hold the menu button for 5 seconds.

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

9.1 Expert menu functions

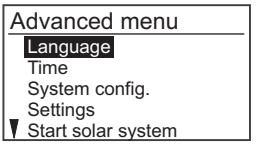
Menu	Submenu	Page
Language		56
Time		57
System configuration	Basic system - 1: standard DHW system (configuration diagrams)	58
	Basic system - 2: Back-up heating (configuration diagrams)	58
Settings	1: Standard system (pump SP, collector temperatures/type)	62
	2: Back-up heating (valve DWU1)	65
	A: 2nd collector array (pump PA)	66
	B: Recharge system (pump PB)	67
	C: Priority secondary (pump PC, valve DWUC/DWU3)	68
	D: External heat exchanger (pump PD, anti-icing system, cylinder top temperature limiter, valve DWUD)	70
	E: Thermal disinfection (pump PE)	72
	Solar yield (heat meter)	74
	Cooling function	75
	Water filled system function	76
Start solar system	For switching solar heating system on or off	77
Reset	For resetting the programmer to the default settings	78

Tab. 11

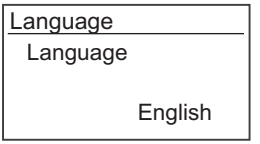
9.2 Language selection

Menu: Expert menu > Language

- To switch to the Expert menu, press and hold the menu button for 5 seconds.



- Turn the rotary selector to select **Language** and press the rotary selector to confirm.
- To change the language, press the rotary selector again (language starts flashing).



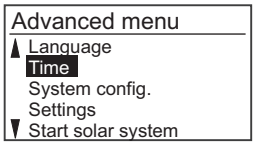
- Turn the rotary selector to select the new language.
- To save the setting, press the rotary selector.
- To return to the next menu up, press the button.

Setting range	Default setting	New setting
German,English, ...	English	

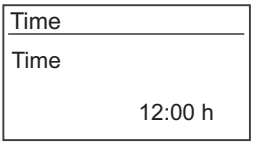
9.3 Time, setting

Menu: Expert menu > Time

- To switch to the Expert menu, press and hold the menu button for 5 seconds.
- Turn the rotary selector to select **Time** and press the rotary selector to confirm.



- To change the hours, press the rotary selector (hours start flashing).
- To change the hours setting, turn the rotary selector .
- To change the minutes, press the rotary selector (minutes start flashing).
- To change the minutes setting, turn the rotary selector .
- To save the setting, press the rotary selector .



- To return to the next menu up, press the button.

9.4 System configuration

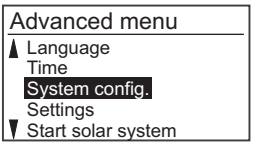
Menu: Expert menu > System config.

The System configuration option allows you to select the basic system and the configuration diagram. There are two basic system options:

- 1: Standard systems
- 2: Heating boost systems

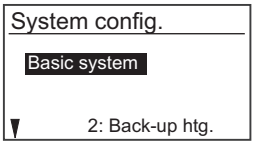
Within each basic system there are various choices of configuration diagram for the solar heating system. The precise designations and layouts of all configuration diagrams are detailed in Sections 5.4 and 5.5 (starting on page 22).

- ▸ To switch to the Expert menu, press and hold the menu button for 5 seconds.
- ▸ Turn the rotary selector to select **System config.** and press the rotary selector to confirm.



9.4.1 Changing the basic system

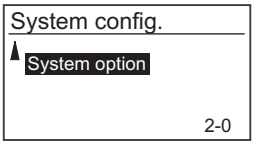
- ▸ Turn the rotary selector to select **Basic system** and press the rotary selector to confirm (name of basic system starts flashing).
- ▸ To change the **basic system**, turn the rotary selector .
- ▸ To save the setting, press the rotary selector .



Setting range	Default setting	New setting
1: Standard systems 2: Back-up htg.	2: Back-up htg.	

9.4.2 Changing the configuration diagram

- Turn the rotary selector to select **System option** and press the rotary selector to confirm (configuration diagram no. starts flashing).



- To select the desired configuration diagram, turn the rotary selector .
- To save the setting, press the rotary selector .
- To return to the next menu up, press the button.

Setting range	Default setting	New setting
2-0, 2-A, 2-C pp ...	2-0	

9.4.3 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 9.5, page 62).
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

		Function		
Configuration diagram	**Page**	**Cooling function**	**Thermal disinfection**	**Heat exchanger anti-icing system**
1-0	22	X (S1, S2)	X (S2, S3)	--
1-A	23	X (S1, S2, S5)	X (S2, S3)	--
1-B	24	X (S1, S2)	X (S2, S3, S4)	--
1-AB	25	X (S1, S2, S5)	X (S2, S3, S4)	--
1-C p-p	26	X (S1, S2, S4)	X (S2, S3, S4)	--
1-C p-v	27	X (S1, S2, S4)	X (S2, S3, S4)	--
1-AC p-v	28	X (S1, S2, S4, S5)	X (S2, S3, S4)	--
1-D	29	X (S1, S2)	X (S2, S3)	X (S6)
1-AD	30	X (S1, S2, S5)	X (S2, S3)	X (S6)
1-BD	31	X (S1, S2)	X (S2, S3, S4)	X (S6)
1-ABD	32	X (S1, S2, S5)	X (S2, S3, S4)	X (S6)
1-CD p-p (2 cylinders)	33	X (S1, S2, S3)	X (S2, S4, S3)	X (S6)
1-CD p-p (swimming pool)	34	--	X (S2)	X (S6)
1-CD p-v (2 cylinders)	35	X (S1, S2, S3)	X (S2, S3, S4)	X (S6)
1-CD p-v (swimming pool)	36	--	X (S2)	X (S6)
1-ACD p-v (2 cylinders)	37	X (S1, S2, S3, S5)	--	X (S6)

Tab. 12 Additional functions and temperature sensors required

		Function		
Configuration diagram	**Page**	**Cooling function**	**Thermal disinfection**	**Heat exchanger anti-icing system**
1-ACD p-v (swimming pool)	38	X (S1, S2, S5)	--	X (S6)
2-0	39	X (S1, S2)	--	--
2-A	40	X (S1, S2, S5)	--	--
2-C p-p	41	X (S1, S2, S5)	X (S2, S4)	--
2-C p-v	42	X (S1, S2, S5)	X (S2, S4)	--
2-AC p-v	43	X (S1, S2, S4, S5)	X (S2)	--
2-CD p-p (2 cylinders)	44	X (S1, S2, S5)	--	X (S4)
2-CD p-v (2 cylinders)	45	X (S1, S2, S5)	--	X (S4)
2-CD p-p (swimming pool)	46	--	--	X (S4)
2-CD p-v (swimming pool)	47	--	--	X (S4)
2-CD p-v-v	48	--	--	X (S6)

Tab. 12 Additional functions and temperature sensors required

9.5 Settings

The system-related programmer settings are dependent on the solar heating system configuration chosen.

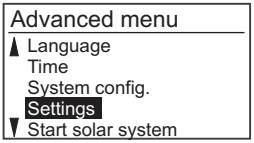
- Check all setting options (→ Section 9.1, page 55) for relevance to the selected configuration diagram.

WARNING: risk of scalding if cylinder temperature limiter deactivated!

If pumps or valve settings are manually altered, all safety functions are disabled.

- Turn off all hot water points and inform occupants of the premises of the risk of scalding.
- Cancel manual mode once it is no longer required.

- To switch to the Expert menu, press and hold the menu button for 5 seconds.
- Turn the rotary selector to select **Settings** and press the rotary selector to confirm.



- Use the rotary selector to select the desired setting and press the rotary selector to confirm.
- To change the setting, press the rotary selector again (setting starts flashing).
- To change the setting, turn the rotary selector .
- To save the new setting, press the rotary selector .
- To return to the next menu up, press the button.

9.5.1 Pump SP cut-in temperature differential

Menu: Expert menu > Settings > 1: Standard system > SP pump switch-on temp. differential

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

When the cut-in temperature differential for pump SP is altered, the cut-out temperature differential for pump SP is automatically set to half the cut-in temperature differential.

Setting range	Default setting	New setting
7 -20 K	8 K	

9.5.2 Pump SP cut-out temperature differential

Menu: Expert menu > Settings > 1: Standard system > SP pump switch-off temp. differential

If the temperature differential between the bottom of the solar cylinder and the collector array drops below the set cut-out temperature differential (ΔT) , the solar system pump switches off.

The minimum difference from the pump SP cut-in temperature differential is 3 K.

Setting range	Default setting	New setting
4-17 K	4 K	

9.5.3 Maximum collector temperature

Menu: Expert menu > Settings > 1: Standard system > Maximum collector temperature

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

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

9.5.4 Minimum collector temperature

Menu: Expert menu > Settings > 1: Standard system > Minimum collector temperature

If the temperature falls below the minimum collector temperature, the solar system pump does not cut in even if the other conditions for switching on are satisfied.

Setting range	Default setting	New setting
10 - 80 °C	20 °C	

9.5.5 Pump SP speed control

Menu: Expert menu > Settings > 1: Standard system > SP pump speed control

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

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

The speed control function improves the efficiency of the solar heating system by keeping the temperature difference within the set cut-in temperature differential.

In systems with external heat exchanger and 2 heat consumers or systems with external heat exchanger and 2nd collector array, pump SP is always run at 100 %.

Setting range	Default setting	New setting
On, Off	on	

9.5.6 Pump SP modulation

Menu: Expert menu > Settings > 1: Standard system > SP pump modulation

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 2nd collector array, pump SP is always run at 100 %.

The minimum pump speed of pumps SP and PD is always the same for the configurations 1-D or 1-BD. If the setting for one of the pumps is changed, the programmer automatically alters the other to match.

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

9.5.7 Collector type

Menu: Expert menu > Settings > 1: Standard system > Collector type

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

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

Setting range	Default setting	New setting
Flat collector, Tube collector	Flat collector	

If **Tube collector** is selected, the cooling function (→ Section 9.5.36, page 75) is automatically deactivated.

9.5.8 Pump SP operating mode

Menu: Expert menu > Settings > 1: Standard system > SP pump operating mode

In **Auto** mode, the connected pump runs whenever the conditions for switching on are met.

Selecting the option **On** activates the pump on.

Selecting the option **Off** deactivates the pump.

Setting range	Default setting	New setting
Auto, On, Off	Auto	

9.5.9 Return boost cut-in temperature differential

Menu: Expert menu > Settings > 2: Back-up htg. > DWU1 valve switch-on temp. differential

When the set cut-in temperature differential between the reserve cylinder and the heating system return is reached, the valve switches over and the flow is diverted through the cylinder.

The minimum difference from the cut-out temperature differential is 3 K.

Setting range	Default setting	New setting
6 - 20 K	6 K	

9.5.10 Return boost cut-out temperature differential

Menu: Expert menu > Settings > 2: Back-up htg. > DWU1 valve switch-off temp. differential

When the set cut-out temperature differential between the reserve cylinder and the heating system return is reached, the valve switches over and the flow is not directed through the cylinder but diverted to the boiler.

The minimum difference from the cut-in temperature differential is 3 K.

Setting range	Default setting	New setting
3 - 17 K	3 K	

9.5.11 Return boost mode

Menu: Expert menu > Settings > 2: Back-up htg. > DWU1 valve operating mode

In **Auto** mode, the valve allows fluid to flow from **I** to **II** when the conditions for doing so are met.

If the option **On** is selected, the valve allows fluid to flow from **I** to **II**.

If the option **Off** is selected, the valve allows fluid to flow from **I** to **III**.

Setting range	Default setting	New setting
On, Off, Auto	Auto	

9.5.12 Pump PA speed control

Menu: Expert menu > Settings > A: 2nd collector array > PA pump speed control

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

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

The speed control function improves the efficiency of the solar heating system by keeping the temperature difference within the set cut-in temperature differential.

Setting range	Default setting	New setting
On, Off	on	

9.5.13 Pump PA modulation

Menu: Expert menu > Settings > A: 2nd collector array > PA pump modulation

This setting determines the minimum speed of the pump for the 2nd collector array.

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

9.5.14 Pump PA operating mode

Menu: Expert menu > Settings > A: 2nd collector array > PA pump operating mode

In **Auto** mode, the connected pump runs whenever the conditions for switching on are met.

Selecting the option **On** switches the pump on.

Selecting the option **Off** deactivates the pump.

Setting range	Default setting	New setting
Auto, On, Off	Auto	

9.5.15 Pump PB cut-in temperature differential

Menu: Expert menu > Settings > B: Recharge system > PB pump switch-on temp. differential

If the set cut-in temperature differential (ΔT) is reached and all conditions for switching on are met, pump PB starts up.

The minimum difference from the cut-out temperature differential is 3 K.

Setting range	Default setting	New setting
7 -20 K	8 K	

9.5.16 Pump PB cut-out temperature differential

Menu: Expert menu > Settings > B: Recharge system > PB pump switch-off temp. differential

If the temperature differential drops below the set cut-out temperature differential (ΔT), pump PB is switched off.

The minimum difference from the cut-in temperature differential is 3 K.

Setting range	Default setting	New setting
4-17 K	4 K	

9.5.17 Pump PB operating mode

Menu: Expert menu > Settings > B: Recharge system > PB pump operating mode

In **Auto** mode, the connected pump runs whenever the conditions for switching on are met.

Selecting the option **On** switches the pump on.

Selecting the option **Off** deactivates the pump.

Setting range	Default setting	New setting
Auto, On, Off	Auto	

9.5.18 Heat consumer charging

Menu: Expert menu > Settings > C: Prio./sec.prio.

If there is more than one heat consumer in a solar heating 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: Solar cylinder/cylinder C Solar system cylinder Cylinder C Cylinder C/Solar cylinder	Solar cyl. / Cyl. C	
With 3 heat consumers: Solar cylinder/cylinder C/pool Swimming pool Cylinder C Solar system cylinder Solar cylinder/cylinder C Solar cylinder/swim. pool	Solar cyl. / cyl. C / pool	

9.5.19 Pump PC speed control

Menu: Expert menu > Settings > C: Prio./sec.prio > PC pump speed control

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

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

The speed control function improves the efficiency of the solar heating system by keeping the temperature difference within the set cut-in temperature differential.

If connection R4 is used for the pump PC, it can not be controlled by the speed control function.

Setting range	Default setting	New setting
On, Off	on	

9.5.20 Pump PC modulation

Menu: Expert menu > Settings > C: Prio./sec.prio > PC pump modulation

This setting determines the minimum speed of the pump for the 2nd heat consumer.

If connection R4 is used for the pump PC, it can not be controlled by the speed control function.

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

9.5.21 Pump PC/Valve DWUC operating mode

Menu: Expert menu > Settings > C: Prio./sec.prio > PC pump/DWUC valve operating mode

In **Auto** mode, the connected pump runs whenever the conditions for switching on are met. Selecting the option **On** switches the pump on. Selecting the option **Off** deactivates the pump.

In **Auto** mode, the valve allows fluid to flow from **I** to **II** when the conditions for doing so are met. If the option **On** is selected, the valve allows fluid to flow from **I** to **II**. If the option **Off** is selected, the valve allows fluid to flow from **I** to **III**.

Setting range	Default setting	New setting
Auto, On, Off	Auto	

9.5.22 Valve DWU3 operating mode

Menu: Expert menu > Settings > C: Prio./sec.prio > DWU3 valve operating mode

In **Auto** mode, the valve allows fluid to flow from **I** to **II** when the conditions for doing so are met.

If the option **On** is selected, the valve allows fluid to flow from **I** to **II**.

If the option **Off** is selected, the valve allows fluid to flow from **I** to **III**.

Setting range	Default setting	New setting
On, Off, Auto	Auto	

9.5.23 Pump PD speed control

Menu: Expert menu > Settings > D: Ext. heat exchanger > PD pump speed control

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

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

The speed control function improves the efficiency of the solar heating system by keeping the temperature difference within the set cut-in temperature differential.

Setting range	Default setting	New setting
Off, On	on	

9.5.24 Pump PD modulation

Menu: Expert menu > Settings > D: Ext. heat exchanger > PD pump modulation

This setting determines the minimum speed of the pump for the 2nd collector array.

The minimum pump speed of pumps SP and PD is always the same for the configurations 1-D or 1-BD. If the setting for one of the pumps is changed, the programmer automatically alters the other to match.

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

9.5.25 External heat exchanger anti-icing system

Menu: Expert menu > Settings > D: Ext. heat exchanger > Anti-icing

The anti-icing function is intended for solar heating 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 heat transfer fluid to bypass the heat exchanger. The heat transfer 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
Off, On	Off	

9.5.26 Cylinder top temperature limiter

Menu: Expert menu > Settings > D: Ext. heat exchanger > Temperature limiter top cylinder

The purpose of the temperature limiter is to prevent the cylinder connected to the external heat exchanger being heated to over 95 °C.

WARNING: risk of personal injury and damage to the system by temperatures over 95 °C in the top part of the cylinder.

If this function is deactivated, vapour pressure pulses can be produced.

Setting range	Default setting	New setting
On, Off	on	

9.5.27 Pump PD operating mode

Menu: Expert menu > Settings > D: Ext. heat exchanger > PD pump operating mode

In **Auto** mode, the connected pump runs whenever the conditions for switching on are met.

Selecting the option **On** switches the pump on.

Selecting the option **Off** deactivates the pump.

Setting range	Default setting	New setting
Auto, On, Off	Auto	

9.5.28 Anti-icing valve operating mode

Menu: Expert menu > Settings > 2: Back-up htg. > Anti-icing valve operating mode

In **Auto** mode, the valve directs the flow to bypass the heat exchanger whenever the conditions for doing so are met.

If the option **On** is selected, the valve diverts the flow to bypass the heat exchanger.

If the option **Off** is selected, the valve directs the flow through the heat exchanger.

Setting range	Default setting	New setting
On, Off, Auto	Auto	

9.5.29 Thermal disinfection

Menu: Expert menu > Settings > E: Therm. disinfection

Thermal disinfection 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. This ensures that the entire contents of the cylinder are heated up by the supplementary heating system.

Afterwards, the pump for the heat exchanger (if present) starts up so as to include that circulation system as well.

WARNING: health risk if thermal disinfection function is impaired.

- ▸ Check the thermal disinfection function manually with the aid of a thermometer when commissioning the system.

Ensure the following criteria are met in order to guarantee that thermal disinfection functions:

- The heat output for thermal disinfection must not be greater than the maximum heat output of the conventional supplementary heating system for the standby cylinder.
- The piping for the thermal disinfection system should be better thermally insulated than standard.

- The length of the piping runs for thermal disinfection must be kept as short as possible (preheat cylinder located in close proximity of standby cylinder).
- The temperature of the standby cylinder must not drop below the 60-degree limit.
- Hot water circulation must be switched off during thermal disinfection of the preheating stage (no return from circulation to standby cylinder).
- If the standby cylinder (central heating system) programmer has a “Thermal disinfection” function: the time window for that function must start a certain amount of time before (e.g. 0.5 h) the time window for the thermal disinfection of the preheat cylinder (synchronisation of time windows).
- The hysteresis for the programmer must be observed (required hysteresis = 5 K).
- The programmer for the standby cylinder must be set so that domestic hot water takes priority.
- Thermal disinfection of the preheating stage must be scheduled for times without hot water demand.

Setting range	Default setting	New setting
On, Off	Off	

9.5.30 Thermal disinfection target temperature

Menu: Expert menu > Settings > E: Therm. disinfection > Target temp.

This setting determines the temperature for thermal disinfection.

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

9.5.31 Thermal disinfection time setting

Menu: Expert menu > Settings > E: Therm. disinfection > Start time

This setting determines the start time for thermal disinfection. Thermal disinfection runs for a maximum of 3 hours.

WARNING: risk of scalding due to water temperatures over 60 °C!

- ▸ Only schedule thermal disinfection for periods outside normal usage times.
- ▸ Inform the occupants of the premises of the times for thermal disinfection.

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

9.5.32 Pump PE operating mode

Menu: Expert menu > Settings > E: Therm. disinfection > PE pump operating mode

In **Auto** mode, the connected pump runs whenever the conditions for switching on are met.

Selecting the option **On** switches the pump on.

Selecting the option **Off** deactivates the pump.

Setting range	Default setting	New setting
Auto, On, Off	Auto	

9.5.33 Heat meter

Menu: Expert menu > Settings > Solar yield > Heat meter

This setting 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 setting	New setting
On, Off	Off	

9.5.34 Glycol content

Menu: Expert menu > Settings > Solar yield > Glycol content

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

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

9.5.35 Resetting the metered heat usage

Menu: Expert menu > Settings > Solar yield > Reset energy volume

The metered heat usage can be reset to zero.

Setting range	Default setting	New setting
Yes, No	No	

9.5.36 Cooling function

Menu: Expert menu > Settings > Cooling function

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

If the cylinder temperature is 9 K below the cylinder maximum temperature (in systems with two heat consumers always that of the low-priority cylinder) the solar pump is switched off.

If the collector temperature is 10 K below collector maximum temperature, the solar pump starts up and runs until the collector has cooled down by 10 K. The solar pump then switches off and the collector heats up again.

When the cylinder maximum temperature is reached, the solar 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
Off, On	Off	

9.5.37 Mediterranean climate function

Menu: Expert menu > Settings > S. Europe function

The Mediterranean climate function is intended solely for use in regions where the high temperatures generally mean that there is 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.

Setting range	Default setting	New setting
On, Off	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 heat transfer fluid.

9.5.38 Mediterranean climate function cut-in temperature

Menu: Expert menu > Settings > S. Europe function > Switch-on temp.

When the Mediterranean climate function is active, the cut-in temperature can be changed. When the cut-in temperature is reached, the solar pump switches on.

The minimum difference from the cut-out temperature is 2 K.

Setting range	Default setting	New setting
4 °C - 8 °C	5 °C	

9.5.39 Mediterranean climate function cut-out temperature

Menu: Expert menu > Settings > S. Europe function > Switch-off temp.

When the Mediterranean climate function is active, the cut-out temperature can be changed. When the temperature is reached, the solar pump switches off.

The minimum difference from the cut-in temperature is 2 K.

Setting range	Default setting	New setting
6 °C - 10 °C	7 °C	

9.6 Start solar system

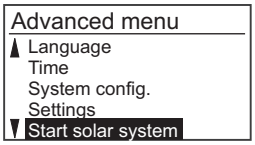
Menu: Expert menu > Start solar system

When the solar programmer is first installed, the system status **Solar system OFF** is active in order to prevent unintentional starting of the pumps.

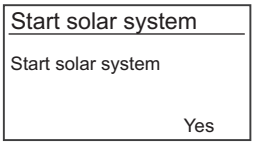
For normal operation, the solar system must be switched on.

Setting range	Default setting	New setting
Yes, No	No	

- To switch to the Expert menu, press and hold the menu button for 5 seconds.
- Turn the rotary selector to select **Start solar system** and press the rotary selector to confirm.



- To change the setting, press the rotary selector again (setting starts flashing).
- To change the setting, turn the rotary selector .
- To save the new setting, press the rotary selector .



- To return to the next menu up, press the button.

9.7 Reset

Menu: Expert menu > Reset

This function allows you to reset the solar programmer to the default settings.

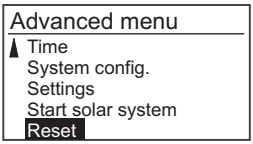
Resetting to the default settings removes all individual settings so that they then have to be re-entered.

Setting range	Default setting	New setting
Yes, No	No	

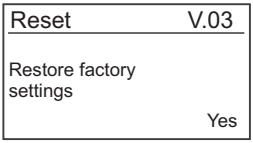
WARNING: setting the wrong operating mode can damage the system.

- Select the appropriate configuration diagram (→ Section 9.1, page 55).
- Set the function **Start solar system** to **Yes** (→ Section 9.6, page 77).

- To switch to the Expert menu, press and hold the menu button for 5 seconds.
- Turn the rotary selector to select **Reset** and press the rotary selector to confirm.



- To change the setting, press the rotary selector again (setting starts flashing).
- To change the setting, turn the rotary selector .
- To save the new setting, press the rotary selector .



The current software version is indicated at the top right of the display.

- To return to the next menu up, press the button.

10 Fault Finding

10.1 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.

Tab. 13 Possible faults indicated on the display

Indication/Type of fault Effect	Possible causes	Remedy
“Therm. disinfection running time error”		
The thermal disinfection has not been carried out.	Target temperature not reached.	Check the pump. Check the cylinder temperature. Check supplementary heating. Check time setting on programmer and supplementary heating.
“Collector connections reversed”		
The collector temperature drops 10 K within 15 seconds of switching on.	Collector connections reversed.	Fit flow and return pipes correctly.
“Gravity fed circulation (at night) ”(Expert menu > Settings)		
The cut-in temperature differential for pump SP is reached between 22:00 and 6:00.	Gravity-feed restrictor opened manually or defective.	Check gravity-feed restrictor.

Tab. 13 Possible faults indicated on the display

10.2 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 cylinder is not being supplied by the solar heating system.	No power supply; fuse or power cable faulty.	Check fuse and replace if necessary. Have electrical system checked by an electrician.
	The temperature at the bottom of the cylinder is close to, or above the set maximum cylinder temperature.	When the temperature drops 3 K 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 below the maximum collector temperature, the pump switches on.
	There is no electrical power to the pump or it is not connected.	Check the line.
	Cooling function active.	–
	The programmer 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 cylinder is not being charged by the solar heating 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 with the screwdriver.

Tab. 14 Possible faults not indicated on the display

Type of fault Effect	Possible causes	Remedy
Cylinder temperature limit and hot water mixer are set too high.		
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	Cylinder temperature limit and hot water blending valve are set too high.	Set the cylinder temperature limit and hot water blending valve to a lower setting.
Domestic hot water too cold (or hot water flow rate too slow).		
	Domestic hot water temperature is set too low on boiler control, on heating programmer or on hot water blending valve.	Set temperature according to the appropriate operating instructions (max. 60 °C).

Tab. 14 Possible faults not indicated on the display

Notes

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