Installation
SÜS-20

Solar heat transfer station for SolvisVital, SolvisDirekt and SolvisMax

- Installation
- Start-up
- Maintenance

Wärme. Leben. Zukunft.

1 Information About These Instructions

These instructions are intended for you as a technician from an installation company. You will find the specifications for installation, start-up and maintenance of the system here.
Please keep these instructions with the system so they can be referred to when necessary.
We recommend that you participate in a Solvis training course to ensure safe and proper installation.
As we are interested in improving our technical documentation, we appreciate feedback of any kind.

Copyright

A list of our international representatives is provided at www.solvis.com.
Please understand that the telephone numbers are reserved for use by our installers.
Interested system operators should contact their installer.

Using these instructions

Additional documentation
Additional documentation, see ➔ *sec. "Scope of Delivery", p. 6.*
The following documents, which may be required, are also referred to in these instructions:

- Operating instructions for system operators (BAL-SBSX-K or BAL-SD-3-K)
- Operating instructions for installers (BAL-SBSX-3-I)
- Installation instructions for the system in which the solar heat transfer station is to be installed (MAL-MAX-7 or MAL-SR-7).
- System diagrams (ALS-MAX-7 or ALS-SV-3-U)

Symbols used

DANGER
Immediate danger, with serious health consequences and even death.

WARNING
Danger, with potentially serious health consequences.

CAUTION
Possible risk of moderate or light injury.

CAUTION
Risk of damage to unit or system.

Useful information, notes and work tips.

Change of document, referring to another document.

Energy-saving tip with suggestions on how to save energy. This reduces costs and helps protect the environment.

Contents

2 Safety Notes

Make sure that you are familiar with the safety notes before beginning installation. This is for your own safety.

Observe and adhere to the relevant safety regulations and the valid accident prevention regulations when installing the system.

DANGER

What to do if there is a risk of fire

- Immediately actuate the heating emergency switch.
- Shut off the fuel supply.
- Have a suitable fire extinguisher ready.

CAUTION

Country-specific regulations

Regulations can differ depending on the country and the region.

- These are to be observed and adhered to in order to ensure safe and faultless operation.
- If certain laws and regulations do not apply in a particular country, they are to be replaced by the country's own specific laws and regulations.

CAUTION

Please note the following:

- The unit is not suitable for use in potentially explosive atmospheres.
- Install the unit in a dry room only.
- Never install the unit on a flammable surface.

CAUTION

Observe instructions

Solvis is not liable for any damage resulting from non-observance of these instructions.

- Read the instructions carefully before operating or installing the system.
- Contact our Technical Sales department if you have any questions.

CAUTION

Avoid contaminants

- Water, oil, grease, solvent, dust, foreign bodies, aggressive vapours and other contaminants must be kept away from the system and the units.
- Cover the system and the units when performing construction or other work in the area to protect them from dirt and contaminants.

CAUTION

Observe ambient conditions

Malfunction or failure of system possible.

- Avoid ambient temperatures outside of the permitted range of 5°C to +50°C.
- Avoid dew condensation and an annual mean relative humidity higher than 75% (briefly 95%).

CAUTION

Do not make any unauthorised modifications

Otherwise, there is no guarantee that the system will function correctly.

- You must not make any changes to the components of the unit.
- Only use original spare parts.

CAUTION

Check for damage

Damage to the controller, to cables or to connected pumps or valves may cause severe damage to the system.

- Do not operate the system/unit if there is visible damage to any of its components.

Exclusion of liability

Solvis accepts no responsibility for damage to the unit or resulting damages if:

- installation and start-up have not been carried out by a specialist company recognised by Solvis,
- the system is not being used as intended or is being operated incorrectly,
- maintenance was not performed, or
- maintenance, modifications or repairs have been performed on the heating system by someone who is not a specialist.

Intended use

This system is intended only for heating purposes and for drinking water heating with optional solar support, as described in this document.

Operating this system for any other purpose is prohibited. Exceptions require express written approval or a statement from Solvis in advance.

Observe the following regulations

- DIN EN 12828 Heating systems in buildings
- DIN EN 12977 Thermal solar systems
- DIN 4807 Expansion vessels
- DWA-M 115 Notes for discharging waste water

3 Applications

The solar heat transfer station SÜS-20 is used for **matched flow solar systems** with SolvisFera or SolvisCala flat-plate collectors with a collector surface area up to approx. 20 m². It is also ideal for connection to the SolvisLuna evacuated tube collector with a collector surface area up to 9 m².

This complete station is used to transfer the solar heat to the large solar system SolvisVital 3 or to the small solar systems SolvisMax Pur and Solo with the SolvisControl 2/3 system controller. When combined with control version MA150 or older (storage tanks from the 6 series), additional analogue/PWM adaptor plates (PL-PWM-KB) are required to control the pumps (one plate per pump).

In comparison to standard pumps, the high-efficiency pumps that are used in the SÜS-20 significantly reduce the electrical energy that is used.

The solar heat transfer station is not only compact and space-saving but is also quick and easy to install.

4 Scope of Delivery

Primary circuit

Transports the solar liquid between the collector and the countercurrent plate heat exchanger; consisting of:

Solar flow (collector side)
- Clamp ring screw connection, 18 mm
- Ball valve with adjustable gravity brake and thermometer, red
- Flow temperature sensor
- Deaerator with manual bleeder

Solar return (collector side)
- Boiler filling and emptying valve with hose nozzle and cap
- ¾" flow meter, 1 to 15 l/min
- Pump, Grundfos UPM3 Solar 15-145 130 CZA (PWM) or WILO Para ST 15/13
- Ball valve with adjustable gravity brake and thermometer, blue
- ¾" screw connection for outlet to the primary tank and expansion vessel
- Boiler filling and emptying valve with hose nozzle and cap
- Clamp ring screw connection, 18 mm

Countercurrent plate heat exchanger

SWEP B15THx30/1P-SC-Y 4x3/4", for transferring solar heat to the buffer. Made from stainless steel AISI 316, soldered with copper.

Secondary circuit

For charging SolvisMax Pur systems or SolvisMax Solo; consisting of:

Flow (storage tank side)
- Flow temperature sensor
- Ball valve with adjustable gravity brake and thermometer, red
- Clamp ring screw connection, 18 mm

Return (storage tank side)
- Clamp ring screw connection, 18 mm
- Ball valve with thermometer, blue
- Pump, Grundfos UPM3 Solar 15-75 130 CZA (PWM) or WILO Para ST 15/7
- ¾" flow meter, 1 to 15 l/min
- Return temperature sensor
- 6 bar safety valve

Installation accessories
- Station fully isolated with EPP half-shells
- Wall bracket and attachment material
- For connecting the expansion vessel: ¾" cap valve with BFD valve and hose connection
- Safety group with manometer (10 bar) and connection for safety valve (6 bar or 8 bar) (both supplied)
- One extension cable per pump for connecting the pumps to the mains
- One common extension cable for the temperature sensors and the controller connection of the pumps (PWM)
- Volume flow encoder, including screw connections for installation on the solar return ball valve, secondary side
- Socket board set for straightforward connection of sensor and actuator lines to the contacts of the mains circuit board
- Installation instructions (MAL-SUES-20-EN, this document).

5 Installation

CAUTION

When installing the system:

- Consider the length of the supplied extension cable (5 m) when selecting the installation location.
- The installation location must be dry and frost-proof and have sufficient load-bearing capacity.
- Use only temperature-resistant pipe lines and insulation.
- Do not over-tighten the clamp ring screw connections on the piping of the system. Do not tighten by more than one revolution.

CAUTION

Avoid excessively high temperature loads.

Otherwise, the solar system may be subjected to vapour shock or damage.

- The collector field must be positioned above the solar station.
- The pipe lines must always run down from the collector connection points to the station.
- Do **not** run the pipe lines higher than the collector connection points.

5.1 Solar station

Installing the solar heat transfer station

To ensure correct operation, the solar heat transfer station must be installed vertically, as shown in ➔ *fig. 1* .

1. Copy the fastening hole measurements onto the installation surface; see ➔ *fig. 14, p. 22*.
2. Drill the holes and insert the wall plugs provided.
3. Insert the screws so that they extend out from the wall by about 3 cm.
4. Remove the front half of the insulation. Hang the station and tighten the screws.

5.1.1 Volume flow encoder

Install the supplied volume flow encoder on the secondary return ball valve.

5.1.2 Safety valve

WARNING

When the safety valve trips:

Escaping hot steam may cause severe scalding, possibly even in the face.

- You must create a blow out tube running from the safety valve to a suitable container.

Install the secondary circuit safety valve

1. Screw on the safety valve with the pre-assembled extension.
2. Route the (customer-supplied) blow-out tube to a suitable container.

5.1.3 BFD valve

Install the BFD valve.

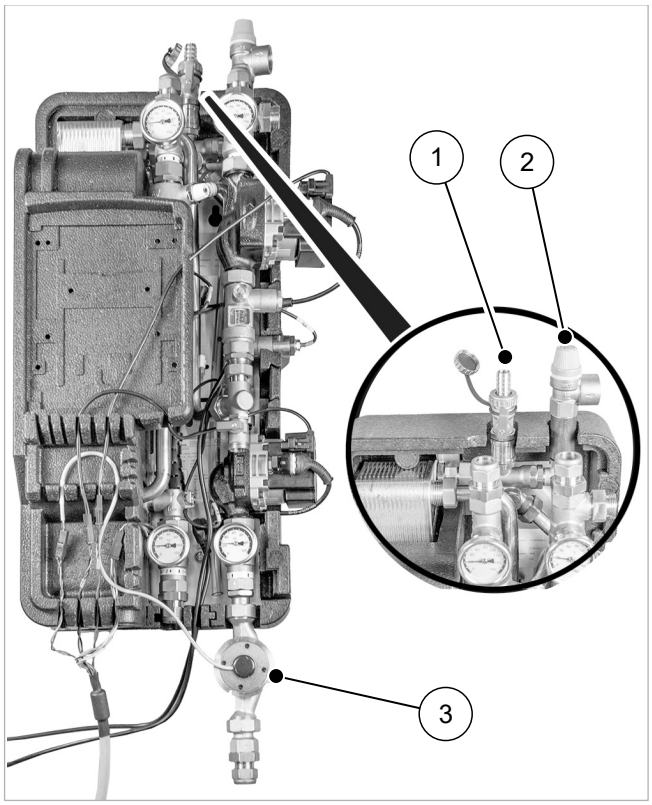


Fig. 1: Secondary-side attachment parts

1 BFD valve
2 Safety valve, secondary
3 Volume flow encoder

5.2 Pressure maintenance (primary side)

CAUTION

Expansion vessels are required for solar and heating systems

- Expansion vessels must be used with solar and heating systems.
- Neither install nor operate the system until a system-specific design for the expansion vessel has been laid out.

CAUTION

Observe the admission pressure of the solar expansion vessel

- The admission pressure of the solar expansion vessel must be set carefully in order to ensure safe and fault-free operation.
- Make sure that a counterpressure does not build up in the solar circuit when setting the admission pressure (open solar circuit or open cap and drain valve).

A calculation table sheet for the expansion vessel design (and a primary solar tank where applicable) and for determining the admission pressure and system filling pressure can be downloaded using the following link:

https://extranet.solvis.de/public/user_upload/MAG_Nachdruckhaltung_ab.xls

Setting the admission pressure on the solar expansion vessel

1. Determine the admission pressure of the solar expansion vessel at system height according to the following formula.

$$p_o = \frac{H_{Koll} - H_{MAG}}{10} + 2{,}3[\text{bar}] \qquad (\text{min. } 2{,}3\,\text{bar})$$

P_0 *Solar expansion vessel admission pressure [bar]*
H_{Coll} *Height of the highest point of the collector [m]*
H_{MEV} *Height of the expansion vessel [m]*

2. Release the admission pressure on the solar expansion vessel valve or refill with nitrogen if necessary.

Preparing the safety group

Up to a system height (height difference between the top edge of the collector and the connection point of the expansion vessel) of 12 meters, use the 6 bar safety valve. Use the 8 bar safety valve above 12 meters. Install the selected safety valve on the safety group (O-ring with locknut).

Depending on the type and number of collectors and the system height between the MEV and the upper edge of the collector, a safety valve with a reaction pressure of 6 bar or 8 bar must be installed in the collector circuit. The respective maximum system heights for a 6 bar valve are specified in the table below. If the system height exceeds this value, the 8 bar safety valve must be used.

Install the selected safety valve on the safety group (O-ring with locknut).

Type	Pcs.	QFD*	VG-xx	AG-xx	H**
F-553	1	12	5	35	12
	2	12	12	50	9
	3	15	18	80	11
	4	15	35	100	11
F-653	1	12	8	35	9
	2	12	18	80	14
	3	15	35	100	12
C-254 control/ECO	2	12	5	35	12
	3	12	8	50	14
	4	12	12	50	10
	5	12	12	80	15
	6	15	18	80	12
LU-304	1	12	8	35	12
	2	12	12	50	10
	3	12	18	80	12

* Quick fit duct with an overall length of up to 50 m
** System height up to which a 6 bar safety valve can still be used

Notes on installing flat seals:

- **Cleaning and inspection**: sealing surfaces and threads must be clean and free from cracks. Flat seals must be dry and must not be damaged.
- **Lubrication**: provide the thread with a suitable lubricant (e.g. Solar Fermit).
- **Applying seals**: hand-tighten the screw connection
- **Tightening**: tighten by a half-turn, while applying counterpressure.

5.2.1 Primary tank

- A primary tank protects the membrane in the membrane expansion vessel (MEV) from inadmissibly high temperatures.
- To ensure that the tank can be bled, fit the primary tank vertically so that there is a nozzle at the high point!
- To avoid pressure surges, connect the primary tank to the solar circuit from above!
- Connect the primary tank and expansion vessel to the solar return!

Installing the primary tank

1. Depending on its size, position the primary tank on the wall or floor in such a way that it can be bled.
2. Connect the solar return (SÜS return ball valve) to the primary tank using a corrugated pipe or a fixed pipework provided by the customer.
3. Fit the safety group to the lower connection of the primary tank using a flat seal and union nut.
4. Connect a blow out tube to the outlet of the solar safety valve and run it into a suitable empty container at the installation site.

5.2.2 Membrane expansion vessel

Installing the cap valve and solar expansion vessel

1. Seal the outer thread of the MEV (**11**) with hemp and brush with Solar Fermit.
2. With MEV-80 and MEV-150 only: Install the reducer socket nipple (**14**) for converting from 1" to ¾". Seal the connection nipple with hemp and brush with Solar Fermit.
3. Fit the connector piece (**13**) for the cap valve with the (fixed) internal thread onto the MEV connection. Attach the cap valve (**12**) with the inserted flat seal to the connector piece.
4. Position the MEV on the floor or wall (in the case of the MEV-35/50).
5. Attach the connection pipe (**9**) coming from the primary tank with the flat seal to the free end of the cap valve, while applying counter-pressure.

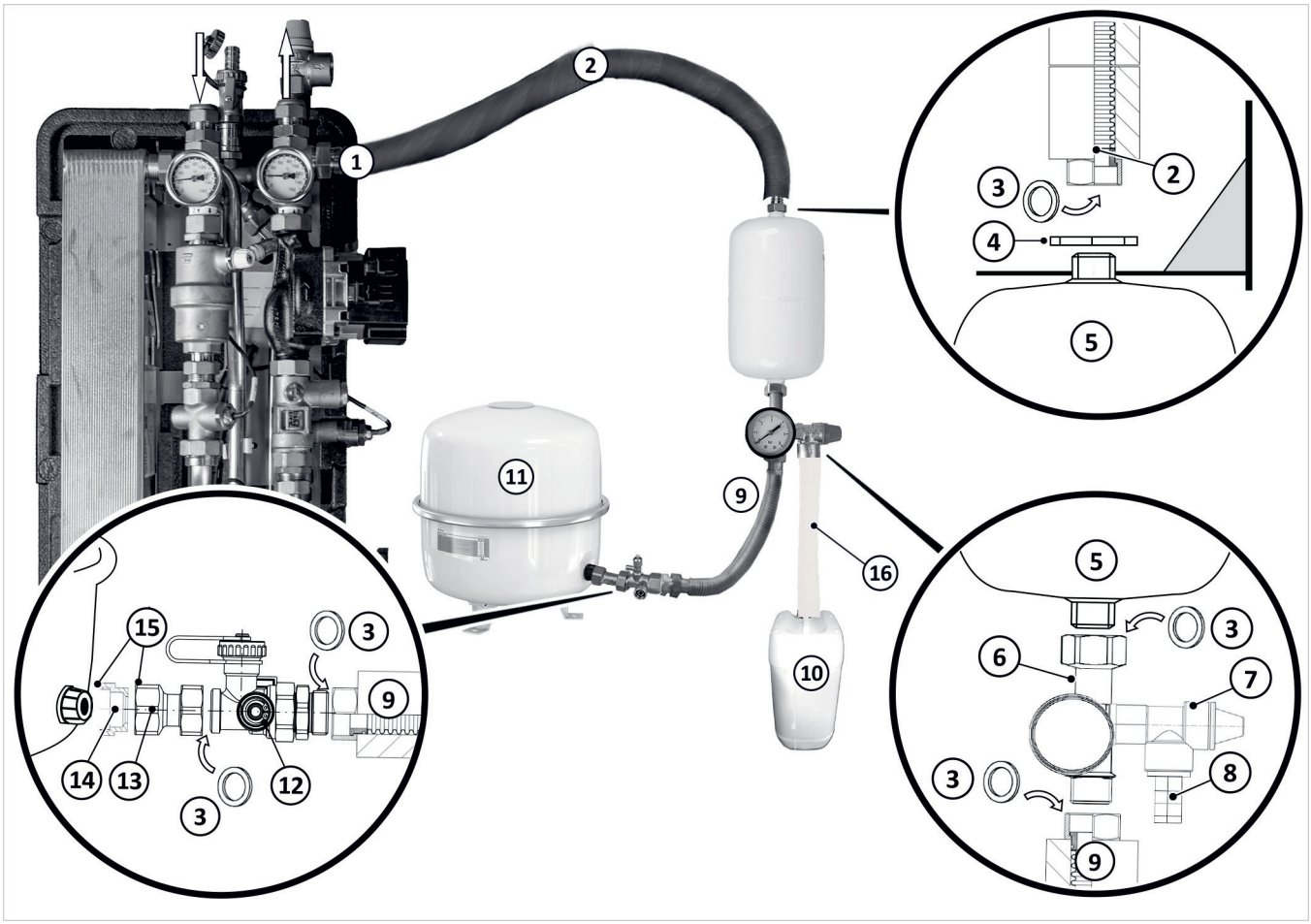


Fig. 2: Connecting the solar MEV to the solar heat transfer station

1	*Connection on the SÜS-20 return*
2	*Customer-supplied connection pipe*
3	*Flange gasket*
4	*Wall bracket locknut (installation example)*
5	*Primary tank*
6	*Safety group*
7	*Safety valve, 6 or 8 bar*
8	*Blow-out tube connection*
9	*Customer-supplied connection pipe*
10	*Collecting container (e.g. Tyfocor canister)*
11	*Membrane expansion vessel (MEV)*
12	*Cap valve (supplied)*
13	*Connector piece, flat sealing (included)*
14	*Socket nipple, 1" / 3/4" (for AG-80/150)*
15	*Seal male thread with hemp*
16	*Blow-out tube*

5.3 Hydraulic Connection

Piping the primary circuit

1. Create the piping between the collector (field) and the station.
2. Use a suitable piping material and insulate for high temperature resistance. We recommend using copper pipes or our SMR-12/SMR-15 quick-fit duct.
3. The pipe line must always run down from the collector connection points to the station. Whenever possible, do not run the pipe lines higher than the collector connection points.

Piping the secondary circuit

1. Lay the pipe between the storage tank and the station as shown in ➔ *Fig. 16, p. 23*.

We recommend installing T-pieces with a boiler filling and emptying valve at the storage tank connection for draining the storage tank.

Installing the clamp ring screw connection

1. Slide the union nut (**4**) and clamp ring (**3**) onto the copper pipe (**5**). To ensure that the power circuit is safe and sealed, the pipe must extend at least 3 mm from the clamp ring.
2. Slide the support sleeve (**2**) into the copper pipe.
3. Insert the copper pipe with the connected individual parts (**2**, **3** and **4**) as far as possible into the screw connection housing (**1**).
4. Tighten the union nut (**4**) by hand first.
5. Fully tighten the union nut (**4**) with one complete rotation. To avoid damaging the sealing ring when doing so, prevent the screw connection housing (**1**) from rotating.

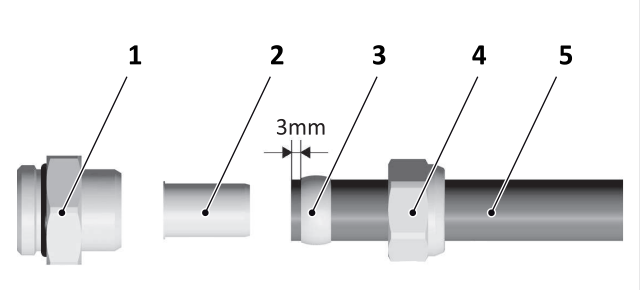


Fig. 3: Installation of clamp ring screw connection

5.4 Electrical connection

5.4.1 General information

DANGER

Risk of electrical shock

Damage to health, cardiac arrest possible.

- Disconnect the system from the mains before carrying out work on it and ensure that it cannot be turned on again

WARNING

In the event of incorrect mains connection

Contact voltages can be extremely hazardous.

- All mains connection work must be performed by authorised technicians.
- Work must be done in compliance with relevant regulations, especially DIN VDE 0100/IEC 60364 (Erection of power installations), accident prevention regulations and the guidelines of the responsible power supply company.
- Before connection, the current type and the mains voltage must be compared with the specifications on the unit nameplate.
- The minimum cross section of all connection lines must be designed in accordance with the power consumption of the unit.
- Only operate the unit while observing the prescribed safety measures and information in these instructions.
- Incorporate the unit into the local equipotential bonding while observing the minimum cross section.
- Ensure that the phase is correct during multiphase mains connection.

CAUTION

Fixed mains connections

- If a fixed mains connection is used, it must be possible to interrupt the mains supply for the controller using a suitable switch.
- No switch is required for a mains connection using a shockproof plug.

CAUTION

Criteria for line installation

Malfunction or failure of heating system possible.

- Check that all cable and plug connections are connected correctly.
- The bus and sensor lines must be routed separately from lines over 50 V to prevent the controller from being influenced by electromagnetic fields.
- Do not install control devices directly adjacent to control cabinets or electrical devices.
- The electrical lines must not come into contact with hot parts.
- If possible, run all lines in a cable channel and, if necessary, secure with strain relief devices.

CAUTION

Criteria for line length

Risk of heating system fault or failure.

- The total cable resistance for the sensor cables must not exceed 2.5 ohms. For cables with a cross section of 0.25 mm², this corresponds to a length of up to 5 m.
- For cross sections of 0.5 or 0.75 mm², the maximum cable length is 15 or 50 m.
- Sensor cables for temperature sensors should not be unnecessarily long. For very long cables, sensor correction can be performed to minimise the systematic variance errors.

5.4.2 Sensor and control cables

The station comes with three temperature sensors. Their cables are routed to a common connection socket at the factory (**1**).

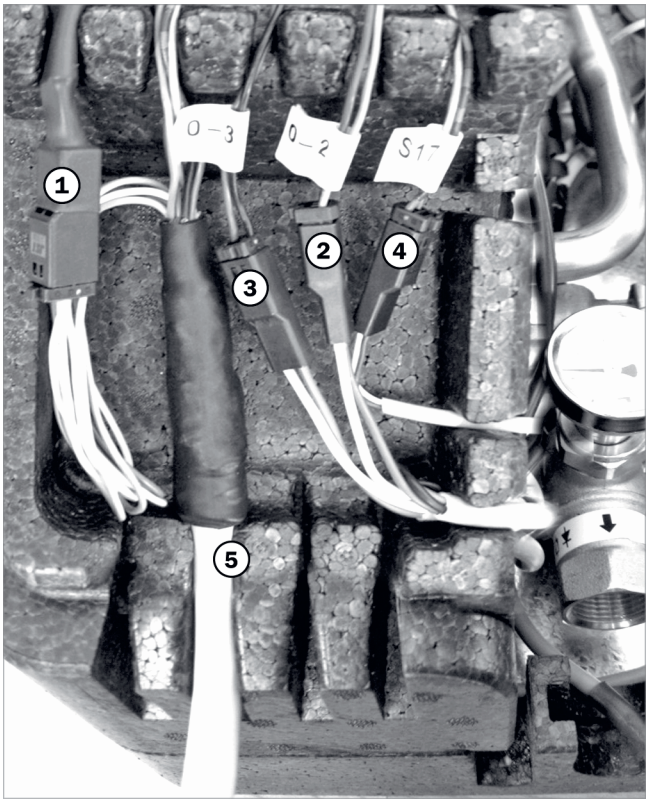


Fig. 4: Connections on the extension cable

1 *Solar circuit sensors S5, S6 and S7/S15*
2 *Primary pump controller (collector side) O-2*
3 *Secondary pump controller (storage tank side) O-3*
4 *Volume flow encoder connection S17*
5 *Cable loom*

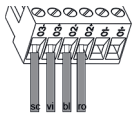
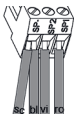
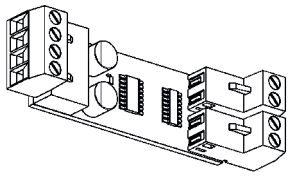
Name of the solar circuit sensors (solar flow, collector side):

- For storage tank series 6: “S15”
- For storage tank series 7: “S7”

In addition to a power cable for the supply voltage, the primary and secondary pumps on the solar heat transfer stations each have an additional cable for carrying PWM control signals so that the controller can adjust the speed remotely . The control cables are each wired with a connection socket at the factory. This also applies to the volume flow encoder.

Establishing connections

1. Insert the supplied cable loom (6 x 2 x 0.5 mm²) from below into the station into the recess provided in the insulating shell.
2. Connect the plugs of the cable loom to the sockets of the sensor cables and pump control cables.
3. Install the lightning protection box in the vicinity of the collector under the roof and connect the cable for collector temperature sensor S8 (FKY-5,5) and an extension cable to the lightning protection box (BD).
4. Route the cable loom from the solar transfer station and the extension cable from the lightning protection box in protective pipes or cable ducts to the mains circuit board.
5. Position the cable ends on the respective connectors on the mains circuit board according to the labelling with the supplied socket boards (see the table below for an overview).

Sensors/actuators		
	SolvisMax 6 series / SolvisVital	SolvisMax 7 series
Temperature sensor in secondary solar flow	S5	
Temperature sensor in secondary solar return	S6	
Temperature sensor in primary solar flow	S15	S7
Secondary volume flow	S17	
Primary pump control cable	+ O-2 (red), - O-2 (blue)	SP1 (red), SP- (blue)
Secondary pump control cable	+ O-3 (purple), - O-3 (black)	SP2 (purple), SP- (black)
Control cable socket board		
Pump control additional module	2 x adaptor plate PL-PWM-KB 	None

5.4.3 Control cable connection

SolvisMax 6 series / SolvisVital

Connecting the PWM adapter plate

See installation instructions for MAL-PWM-KB (supplied with the adaptor plate).

1. Connect the control cables of both solar pumps to separate adaptors on “PWM (1)” and “⊥”.
2. Connect the “0-10V (1)” and “VCC” connectors of the adaptors to “+O-2” and “-O-2” (solar pump 1) or “+O-3” and “-O-3” (solar pump 2) of the control cable socket board and plug them into the mains circuit board. A three-wire cable is supplied with the adapter plate for this purpose.

SolvisMax 7 series

Connecting a control cable socket board

1. Connect the socket board to the three-pole connector “Solar” (“SP- | SP1 | SP2”), see ➔ *Fig. 5, p. 13*

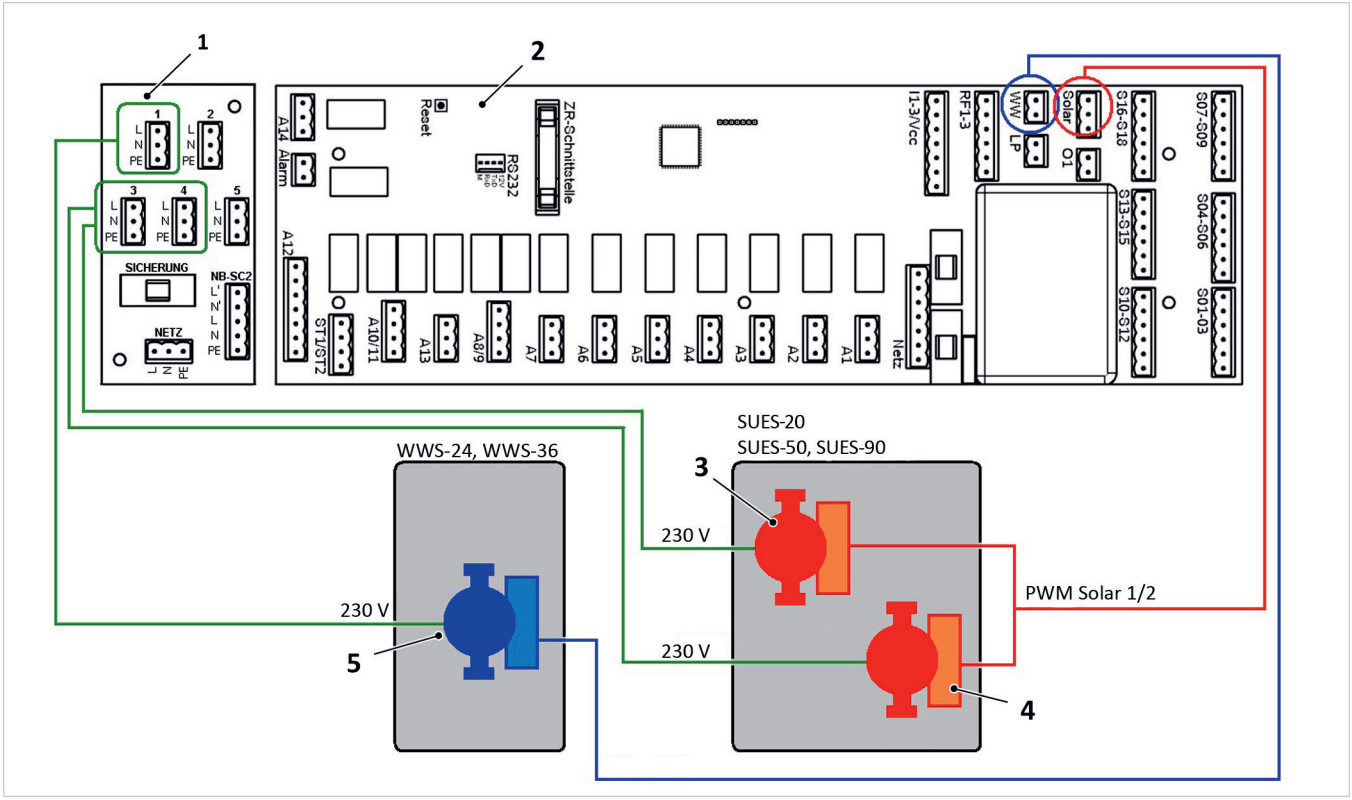


Fig. 5: Connection diagram for speed-controlled solar pumps and hot water pump to SolvisControl 3 / SolvisControl 2, mains circuit board version 3 (SolvisMax 7 series)

1	*Expansion board*	3	*Solar pump 1 (primary)*	5	*Hot water pump*
2	*Mains circuit board, version 3*	4	*Solar pump 2 (secondary)*		

5.4.4 Power supply

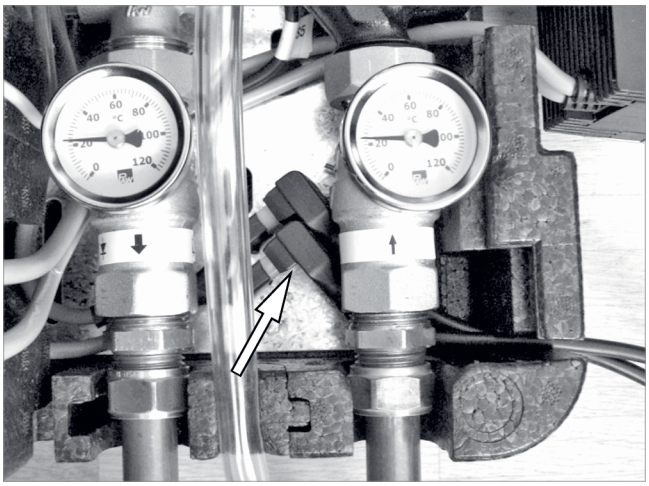


Fig. 6: Connecting the Molex plugs

Connecting the pumps

1. Guide the two supplied extension cables for connecting the pumps to the mains into the right side of the station from below and connect them to the pump as follows:
   - directly (Wilo pumps) or
   - using the attached Molex to AMP Superseal adapter cable (Grundfos pumps).

2. Lay the extension cables in the protective conduit or cable channel to the SolvisMax or SolvisDirekt or SolvisVital system and then on to the mains circuit board of the SolvisControl system controller.

SolvisMax 6 series / SolvisVital

Connecting the plugs

1. Attach the cable ends to the proper connections on the mains module of the SolvisControl 2:
   • A1: Primary solar circuit pump (collector side)
   • A7: Secondary solar circuit pump (storage tank side)
   To avoid malfunctions, be sure to make the connections properly.

SolvisMax 7 series

Connecting the voltage supply plugs

1. The 230 V connection of the solar pumps is made on the expansion board (**1**) to the left of the mains circuit board (**2**), see ➔ *Fig. 5, p. 13*. There are five additional connection sockets here for supplying HE pumps with mains voltage.

5.5 Final Tasks

Attaching the insulation shell

1. Tighten all connections.
2. After installing and filling the system and checking it for leaks, (see ➔ *Start-Up, S.14*) complete the station by attaching the front insulation shell.

For detailed specifications of the control parameters, refer to the operating instructions for your system controller.

6 Start-Up

WARNING

Risk of hot steam escaping when working on the solar system

Scalding of hands and face possible.

- Carry out work on the solar system only when there is no direct sunlight or when the collectors are covered.

CAUTION

When filling the solar circuit:

- Fill only with original Tyfocor LS-rot ready-mixed heat transfer fluid and flush.
- Using other types of heat transfer fluid in this system is prohibited because it may damage the solar circuit components.
- Use only the Füll-Jet unit to flush and fill the system (please order separately).

Prerequisites for proper start-up:

- The buffer has been started up correctly, see ➔ *MAL-SR-7, MAL-MAX-7* or others as applicable
- Open all flow meters fully
- Make sure that all the air is discharged
- Fill in the start-up report and leave it with the system.

6.1 Secondary side (storage tank side)

6.1.1 Flushing the storage tank side

Flush the storage tank (→ *fig. 8*)

1. Connect the pressure hose for the treated heating water to the BFD valve (**1**).
2. If applicable, deactivate the gravity brake (**4**) on the storage tank.
3. Connect the hose for the flushing water outlet to the BFD valve (**7**) in the station and route it into a drain.
4. Close the return ball valve (**8**) and set the flow ball valve (**6**) to 45°, meaning the non-return valve is out of operation.
5. Open shut-off valves (**2**) and (**3**) on the storage tank.
6. Open BFD valves (**1)** and (**7**).
7. Flush: BFD (**1**) => storage tank => storage tank flow => BFD (**7**).
8. Actuate the bleeder on the buffer.

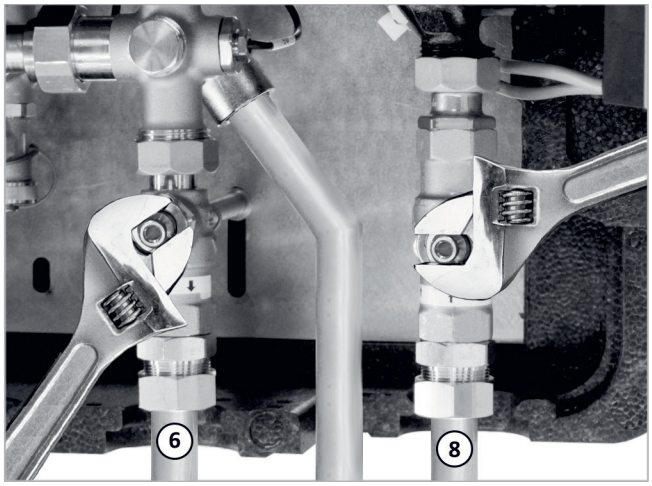


Fig. 7: Ball valves half open / closed

6 *Flow (here: 45° position – half open, non-return valve off)*
8 *Return (here: 90° position – closed)*

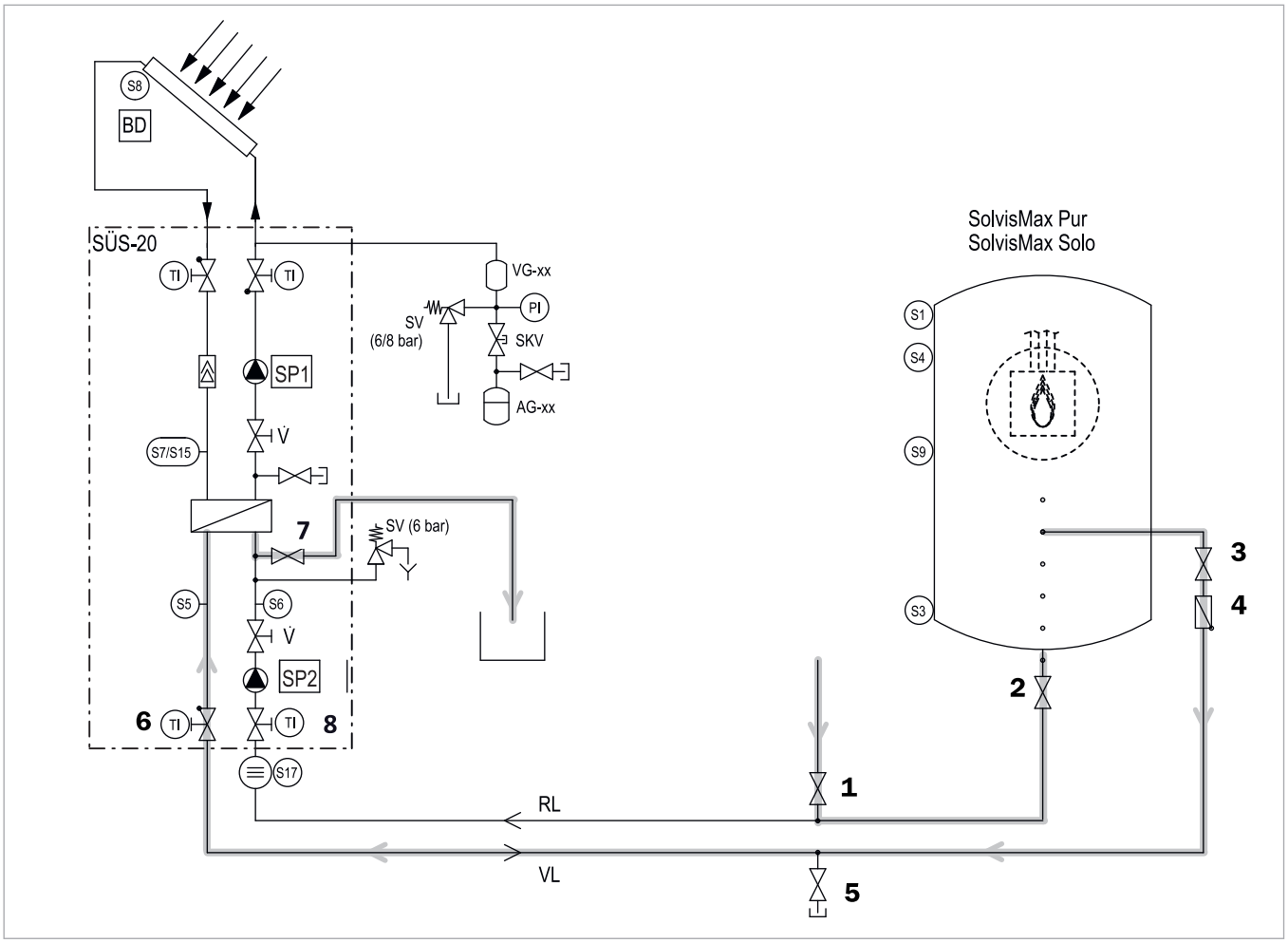


Fig. 8: Flushing the storage tank

1 *BFD valve, return flow*
2 *Shut-off valve, return storage tank*
3 *Shut-off valve, flow storage tank*
4 *Non-return valve, flow storage tank*
5 *BFD valve, flow*
6 *Flow ball valve, storage tank side*
7 *BFD valve, plate heat exchanger*
8 *Return ball valve, storage tank side*

6.1.2 Flushing the pump line

Flushing the pump line (→ *Fig. 10*)

1. Open the return ball valve (**8**) and close the flow ball valve (**6**).
2. Flush: BFD (**1**) => primary pump => BFD (**7**).
3. Bleed the safety valve by opening briefly.
4. Open the flow ball valve (**6**) again fully.

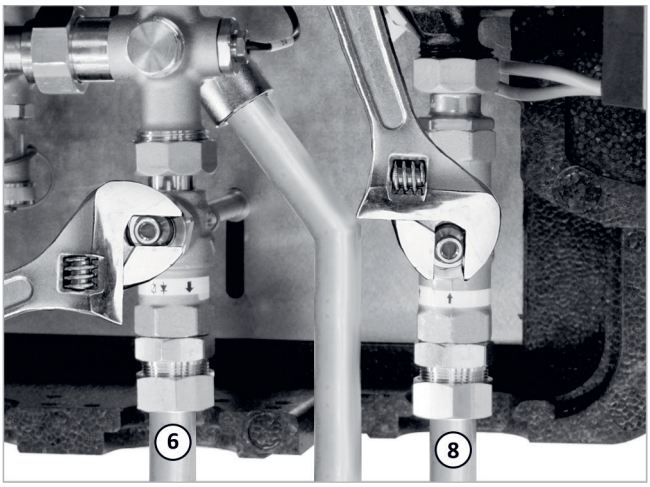


Fig. 9: Flush ball valves, position for flushing plate heat exchanger

6 *Flow (here: 90° position – closed)*
8 *Return (here: position 0° – fully open)*

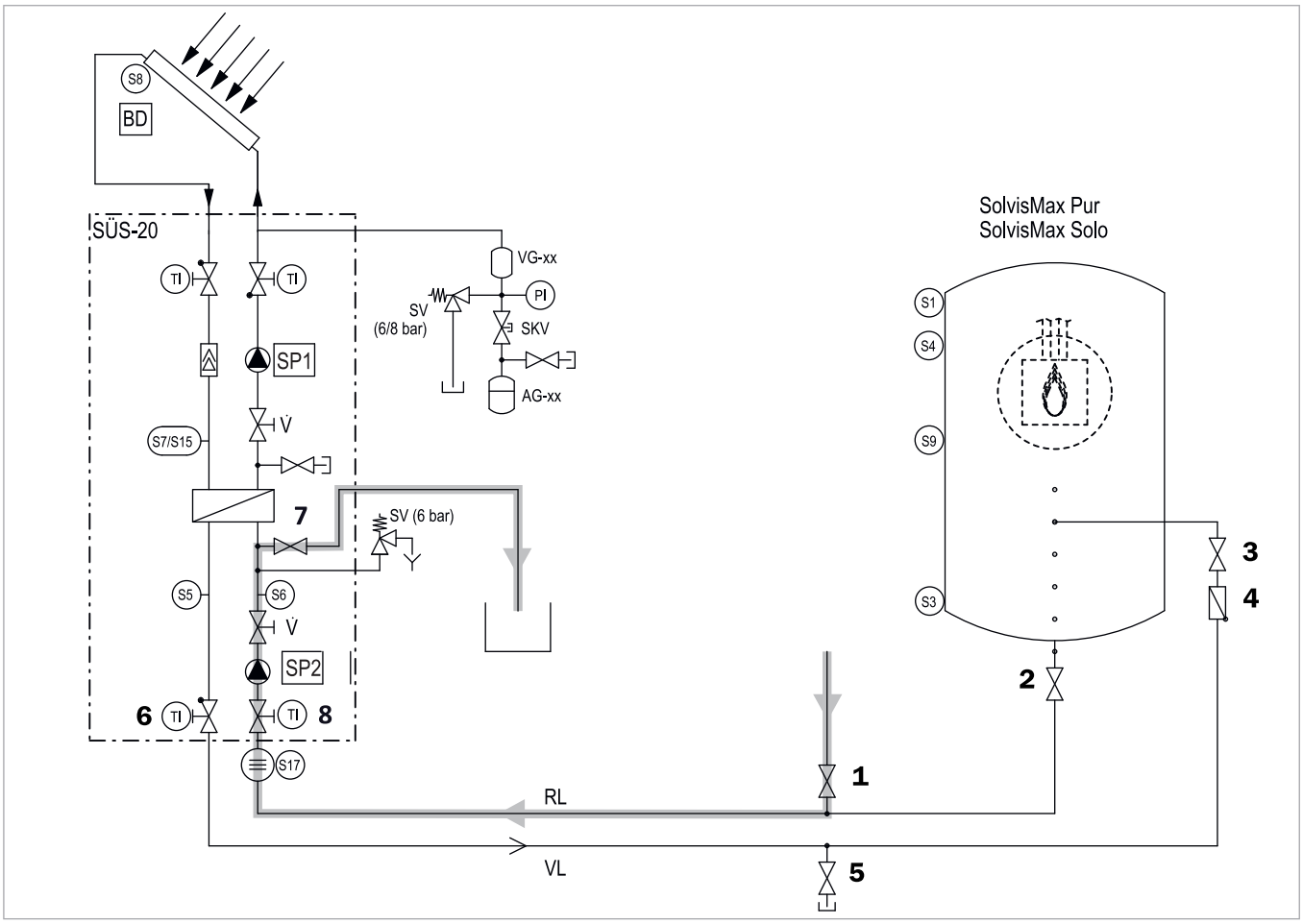


Fig. 10: Flushing the pump line on the plate heat exchanger (cylinder side)

1 *BFD valve, return flow*
2 *Shut-off valve, return storage tank*
3 *Shut-off valve, flow storage tank*
4 *Non-return valve, flow storage tank*
5 *BFD valve, flow*
6 *Flow ball valve, storage tank side*
7 *BFD valve, plate heat exchanger*
8 *Return ball valve, storage tank side*

6.1.3 Pressure test/commissioning

Pressure test and starting up → *(Fig. 10)*

1. Close the BFD valve (**7**) and increase the system pressure in the storage tank circuit to 3 bar (SolvisStrato: 6 bar).
2. Bleed again and refill the storage tank circuit to the test pressure if required.
3. Carefully check all connections for leaks.
4. Establish the operating pressure in the storage tank circuit.
5. Close the BFD valve (**1**).
6. Remove the filling and flushing hoses.

6.2 Primary side (collector side)

6.2.1 Flushing

Flushing the collector field (→ *fig. 11*)

1. Connect the pressure hose of the filling pump to the BFD valve (**1**).
2. Connect BFD valve (**6**) to the flushing container and insert the filling pump intake hose into the flushing container.
3. Close the return flow ball valve (**7**) 90° and close the flow ball valve (**4**) 45° to deactivate the gravity brake.
4. Open BFD valves (**1**) and (**6**) and flush them with LS-rot antifreeze **for at least 10 minutes**: Pump => BFD valve (**1**) => collector field => plate heat exchanger => BFD valve (**6**) => filter => container.
5. Open and close the return ball valve (**7**) while flushing to remove air from the pump line.
6. Actuate the manual bleeder at the deaerator (**5**).
7. Flush until the solar liquid flows out without any bubbles.

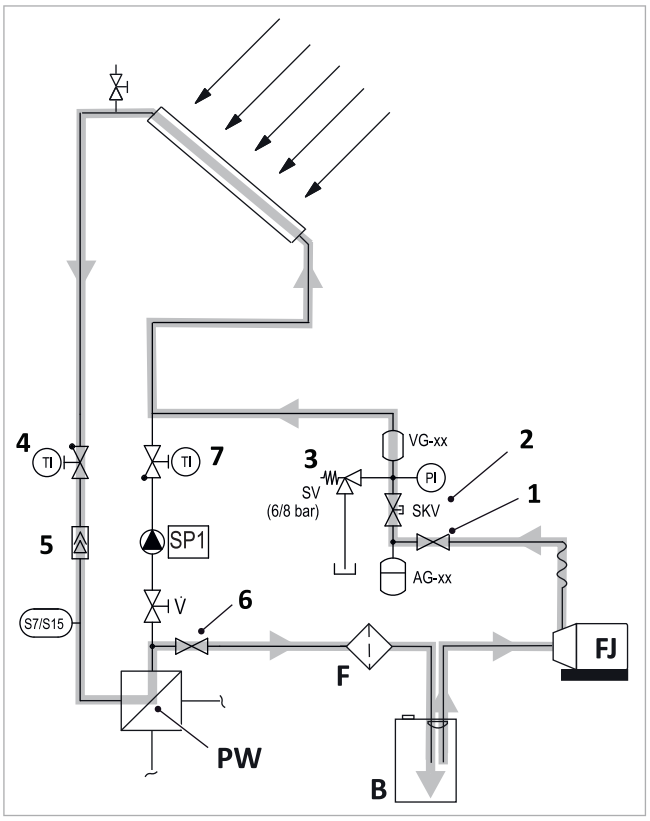


Fig. 11: Primary circuit: Flushing the collector field

1	*BFD valve in safety group*	B	*Container with Tyfocor LS-rot*
2	*Cap valve*	F	*Filter*
3	*Safety valve*	FJ	*Füll-Jet filling pump*
4	*Ball valve in the solar flow*	AG	*Solar expansion vessel*
5	*Deaerator*	VG	*Primary tank*
6	*BFD valve*	V̇	*Flow meter*
7	*Ball valve in the solar return*	PW	*Plate heat exchanger*

6.2.2 Pressure test

Testing the primary circuit under pressure (→ *Fig. 11*)

1. Close the BFD valve (**6**).
2. Increase the system pressure to 5 bar, close the BFD valve (**1**).
3. Carefully check all connections for leaks.

6.2.3 Collector (field) ventilation

Bleeding the collector field

1. If installed, fit a suitable hose to the filling and emptying valve on the collector.
2. Direct the end of the hose into a suitable collecting container.
3. Gently open the valve and allow the air to escape. The solar liquid must flow out under pressure. If the pressure drops too much, top up the solar liquid at the solar station.
4. Secure the valve and remove the hose.

6.2.4 Primary circuit startup

Start up the primary circuit (see ➔ *Fig. 11, p. 17*).

CAUTION

Fully open all flow meters on the primary side!

- The flow meter must be fully open due to the speed control of the pump.

1. Ensure that the admission pressure in the solar expansion vessel is set correctly.
2. Open the cap valve (**2**) to the SOL-MAG and seal the cap.
3. Open the flow and return flow ball valve (**4** and **7**), position 0°.
4. Set the system to the calculated pressure (rule of thumb: SOL-MAG admission pressure + 0.3 bar): to set this, open the BFD tap (**6**) slightly and close again when the filling pressure is reached.
5. Close the BFD valve (**1**), remove the filling and flushing hoses.
6. On the SolvisControl system controller, adjust the primary and secondary circuits in accordance with the instructions (see ➔ *chapter "Basic settings for pumps", p. 18*).

6.3 Final Tasks

Completing the work

1. Ensure that the solar circuit and the storage tank connections are fully insulated.
2. Attach the insulation shell to the station.

CAUTION

Bleed the solar system after start-up

- Once the solar circuit has been refilled, gas will be emitted during operation, which collects in the station deaerator ➔ *Fig. 11, p. 17* (**7**). The gas emissions decrease as the operation time increases. It is therefore important to bleed the deaerator and check the system pressure every day in the first few days after start-up and then at regular intervals, depending on the amount of air discharged.

6.4 Basic settings for pumps

Basic setting of the primary circuit adjusts the minimum speed of the particular solar pump to the actual pressure loss of the solar circuit. The factory setting for the secondary circuit is the optimum setting.

The procedures are described and illustrated for the use of SolvisControl 3. In the case of SolvisControl-2 controllers of series 7, the menu navigation is the same, but the display is different.

Prerequisites for setting

- The entire system must be installed properly
- The solar circuit has been flushed and bled properly
- The safety devices must be set correctly
- The solar system is cold

Grundfos: Checking the setting of the control type

Proceed as follows only for Grundfos pumps:

1. If you press the button on the pump for more than 2 seconds, the LEDs on the pump flash and indicate the current control type.
2. Each time that you press the button again, you switch to a different control type. Repeat this process until the required control type (PWM-C) is displayed with the LEDs:
   • Off/green (rapid flashing) /yellow/yellow/yellow.
3. After 10 seconds, the display switches back to the operating display and the last setting remains saved.
4. Do this for both pumps.

Wilo pumps are permanently set to PWM signal, therefore there is no need to check the settings.

Checking the primary volume flow

The SolvisControl uses the speed control on the solar pump to continuously optimise the flows based on the solar energy provided by the sun.

- With the minimum requirement, the value:

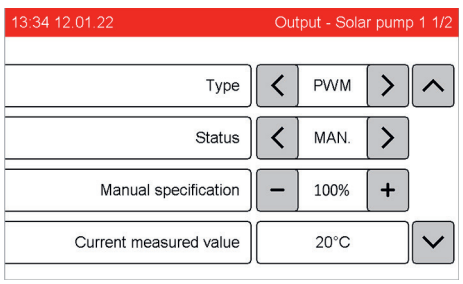
$$\dot{V}_{min} = \frac{A\ [in\ m^2]}{6} \left[\frac{l}{min}\right]$$

  should not be exceeded in the primary circuit. Regulate the flow meter if required. (A = installed collector surface).
- With the maximum requirement, the value:

$$\dot{V}_{max} = \frac{A\ [in\ m^2]}{3} \left[\frac{l}{min}\right]$$

  at minimum should be reached in the primary circuit. Check the pipe dimensions and wiring if necessary. (A = installed collector surface).
- The factory setting for the secondary circuit is the optimum setting.

1. Switch to the "**Installer**" user mode.
2. Open the "**Outputs**" submenu.
3. In the "**Outputs**" menu, open the "**Analogue/PWM**" menu item and then the "**Solar pump 1**" output.
4. Switch the "**Status**" from "**Auto**" to "**Manual**".
5. Set the "**Manual specification**" to 100 %.



6. Read the volume flow at the flow meter (on the upper surface of the float.

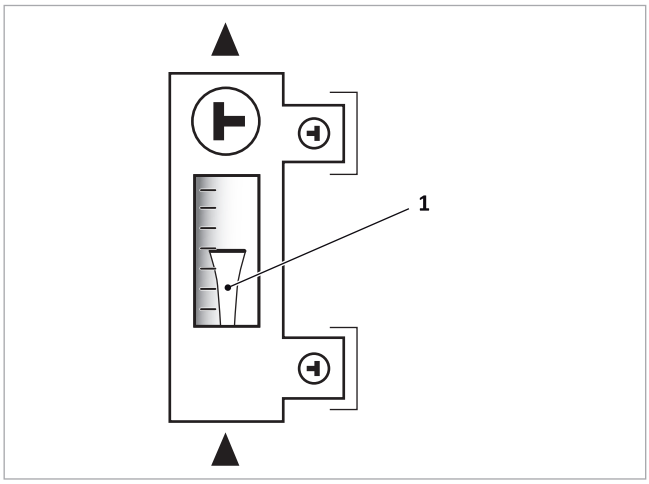
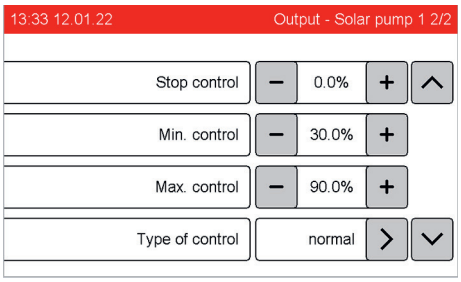


*Fig. 12: Read the volume flow at the upper edge of the float (**1**)*

7. Note the value in the start-up report.
8. Set the "**Manual specification**" to 30 %; this is the factory setting for the minimum requirement.
9. Check the volume flow at the flow meter.

Alternative handling:

- If a flow cannot be read, increase the "**Manual specification**" incrementally until a flow can be detected. Apply the set percentage value from the second page "**Outputs - Solar pump 1 2/2**" for "**Min. requirement**".



- If the flow is too high (see the energy saving tip), regulate the volume flow accordingly using the flow meter and repeat steps 5 to 7.

10. Set "**Type of control**" to "**normal**".

Setting up the secondary pump

1. In the "**Outputs**" menu, open the "**Analogue/PWM**" menu item and then the "**Solar pump 2**" output.
2. Set "**Type of control**" to "**normal**".

7 Maintenance

WARNING

Risk of hot steam escaping when working on the solar system

Scalding of hands and face possible.

- Carry out work on the solar system only when there is no direct sunlight or when the collectors are covered.

- Maintenance must be performed by a specialist and documented in the maintenance report.
- Store the maintenance report in the systems folder in the vicinity of the system.

Checking the solar liquid (annually)

1. Bleed the solar circuit and take a sample at the deaerator at the same time.
2. Perform a visual check and odour check. Replace the solar liquid if there is a pungent odour or dark colour.
3. Check the antifreeze using the antifreeze refractometer. (The antifreeze limit must not exceed -23 °C).
4. Test the pH value with a test strip. (If the pH value is below 8.0, replace the solar liquid.)
5. Check the solar operating pressure.

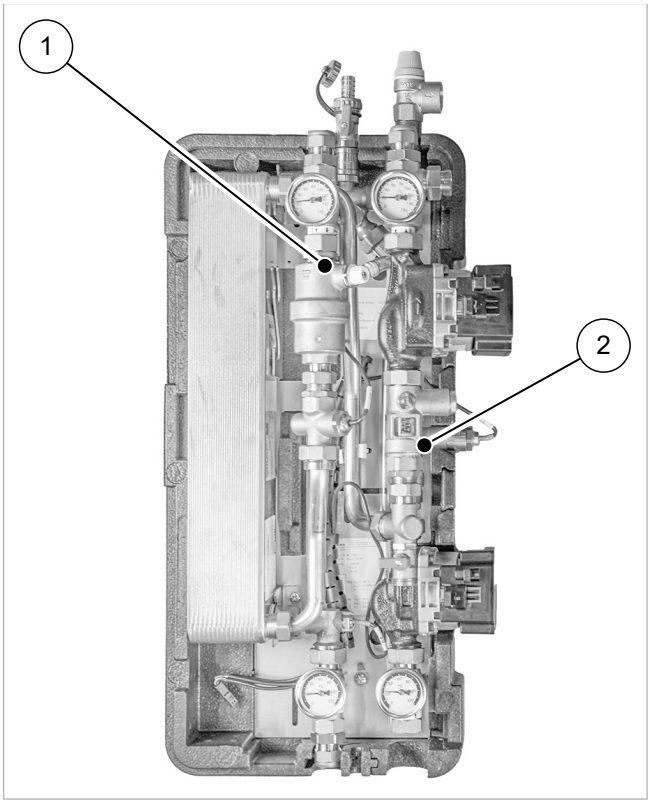


Fig. 13: Position of the valves for maintenance

1 Manual bleeder for deaerator
2 Flow meter in the primary circuit

Checking the solar expansion vessel admission pressure (every 2 years)

1. Close thecap valve (**2**, see ➔ *fig. 2, p. 9*) on the solar expansion vessel.
2. Open the BFD valve on the cap valve and drain the water supply from the expansion vessel.
3. Check the admission pressure on the valve of the expansion vessel and refill with nitrogen if necessary; see ➔ *"Setting the admission pressure on the solar expansion vessel", chapter "Membrane expansion vessel", p. 9.*
4. Close the drain valve.
5. Open the cap valve.
6. Refill the water supply.
7. Check the final pressure once heating is complete.

Checking the flow (every 2 years)

1. Switch on the solar pump (manual mode).
2. Check the flow at the flow meter on the primary solar circuit (collector circuit).

Checking the sensor values

1. Check that the temperatures measured at the solar heat transfer station are plausible.
2. Check that the temperatures measured on the collector sensor and the storage tank reference sensor are plausible.

Checking the solar circuit

1. Check all the components and safety valves on the solar station for leaks and ensure that they are functioning properly.
2. Visually check the collector(s), pipe lines, and associated insulation.
3. Check that the collector mounting system is positioned and functioning correctly.

8 Technical Information

8.1 Technical Data

SÜS-20 solar heat transfer station specifications

Name	Unit	Value
Collector surface area (with “matched flow” flow rate)	m²	up to approx. 20*)
Rated flow (“matched flow” flow rate)	l/m²h	10 to 25
Dimensions (W x H x D)	mm	355 x 730 x 250
Primary circuit		
Connection, clamp ring screw connection	mm	18
Flow meter, ¾"	l/min	1 to 15
Maximum temperature	°C	120
Safety valve	bar	6 / 8
Insulation, heat insulation made from	–	EPP
Pump in primary circuit		
Type	–	Grundfos UPM3 Solar 15-145 or WILO Para ST 15/13
Control signal for remote speed adjustment, PWM	%	0 to 100
Maximum permitted operating pressure	bar	10
Maximum permissible temperature (pumping medium)	°C	120
Maximum permitted ambient temperature	°C	+ 70
Mains connection	–	1 ~ 230 V; 50 Hz
Countercurrent plate heat exchanger		
Type	–	Swep B15THx30
Number of plates	Pieces	30
Total content	l	1.83
Secondary circuit		
Connections	–	¾" input, VSG: 18 mm clamp ring
Volume flow encoder		VSG-SÜS
Flow meter, ¾"	l/min	1 to 15
Maximum temperature	°C	95
Safety valve	bar	6
Insulation, heat insulation made from	–	EPP
Pump in secondary circuit		
Type	–	Grundfos UPM3 Solar 15-75 or WILO Para ST 15/7
Control signal for remote speed adjustment, PWM	%	0 to 100
Maximum permitted operating pressure	bar	10
Maximum permissible temperature (pumping medium)	°C	95
Maximum permitted ambient temperature	°C	+ 70
Mains connection	–	1 ~ 230 V; 50 Hz

**) The size of the possible collector surface area depends on the pressure loss through the collector field and the piping.*

8.2 Connection Dimensions

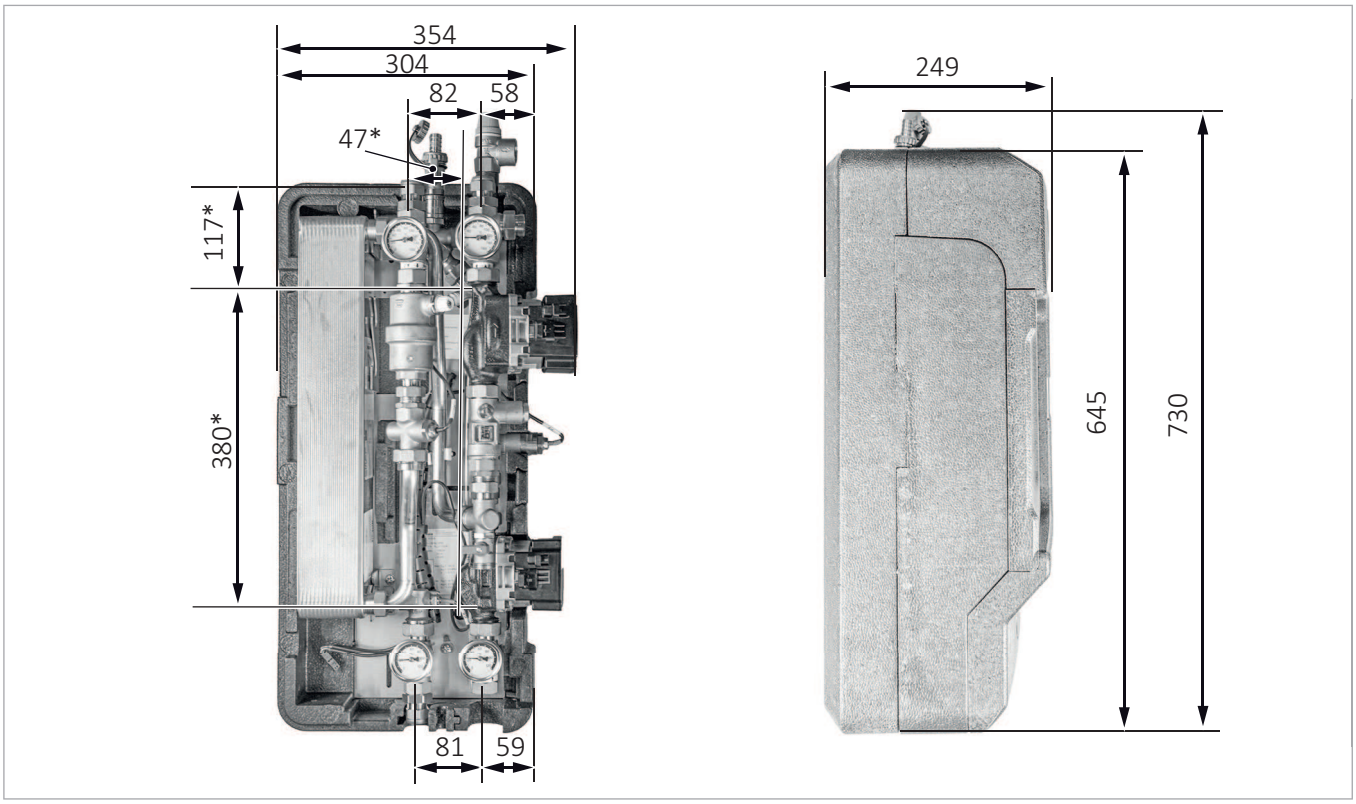


Fig. 14: Dimensions of the solar heat transfer station

* Dimensions for the suspension points (hole dimensions)

8.3 Pressure Loss

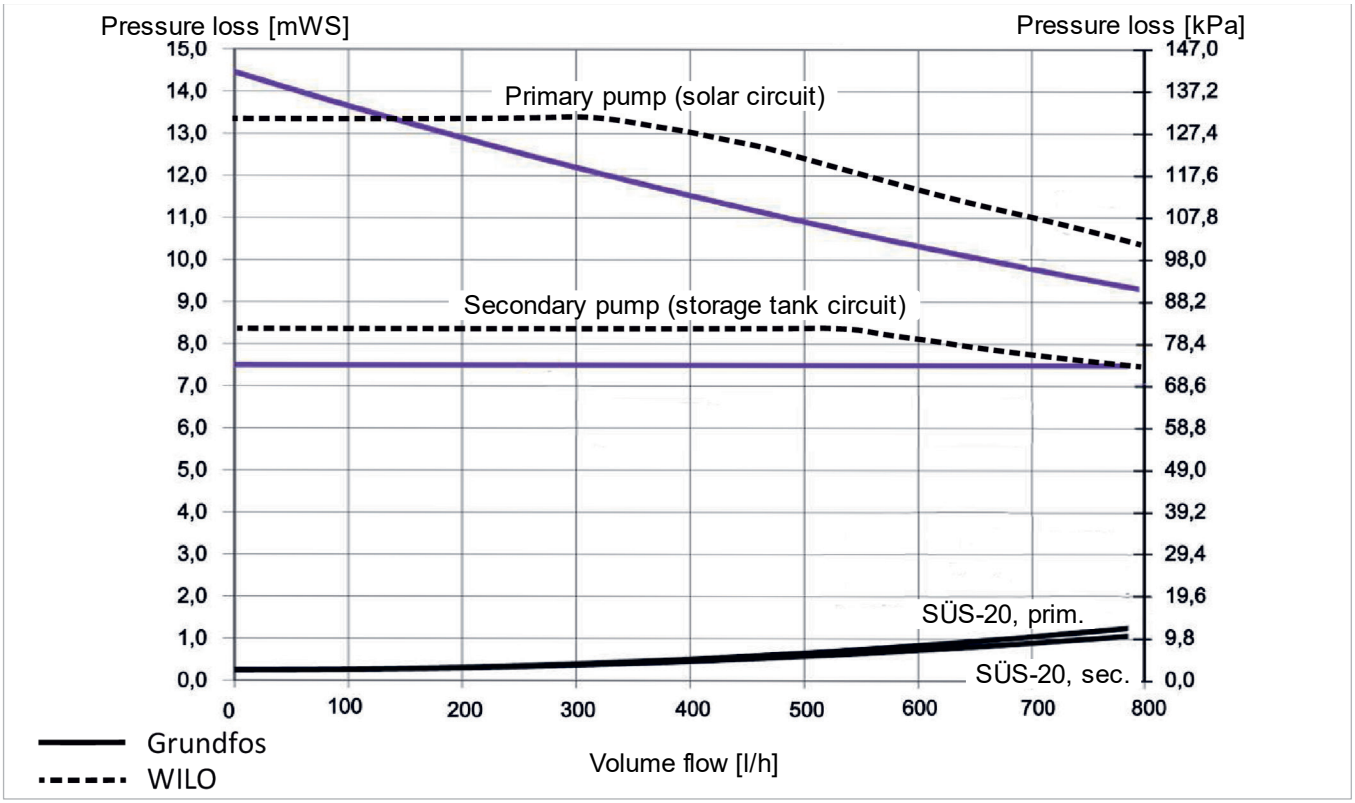


Fig. 15: Pressure loss curve for the SÜS-20 solar heat transfer station

9 Appendix

9.1 System diagram

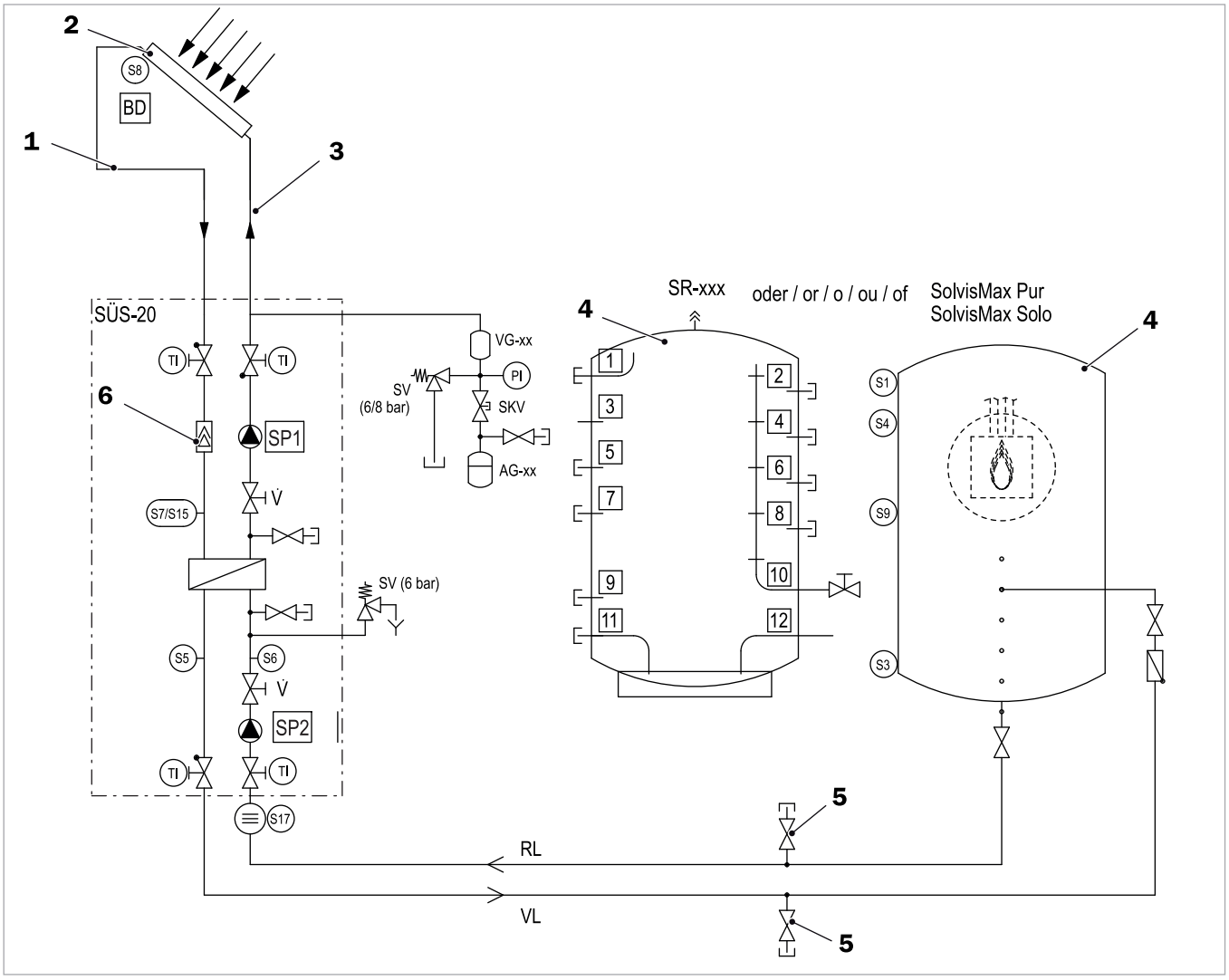


Fig. 16: Solar heat transfer station with SolvisMax Pur system (gas, oil, district heating or heat pump) or SolvisMax Solo

Inputs:

S5	*Solar flow 2*
S6	*Solar return 2*
S8	*Collector*
S7/S15	*Solar flow 1*
S17	*Solar circuit volume flow encoder*

Outputs:

SP1/O-2	*Solar circuit pump 1 (control line)*
SP2/O-3	*Solar circuit pump 2 (control line)*

Accessories:

AG-xx	*Solar expansion vessel*
SV	*Solar safety valve*
SKV	*Solar cap valve*
SÜS-20	*Solar heat transfer station*
VG-xx	*Primary solar tank*

Additional components:

1	*Solar flow*
2	*Solvis collector(s)*
3	*Solar return*
4	*SolvisStrato (SR-xx) or SolvisMax Pur/Solo*
5	*Shut-off valves and BFD valves (customer-supplied)*
6	*Deaerator (bleeding)*

10 Index

Notes

Notes

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