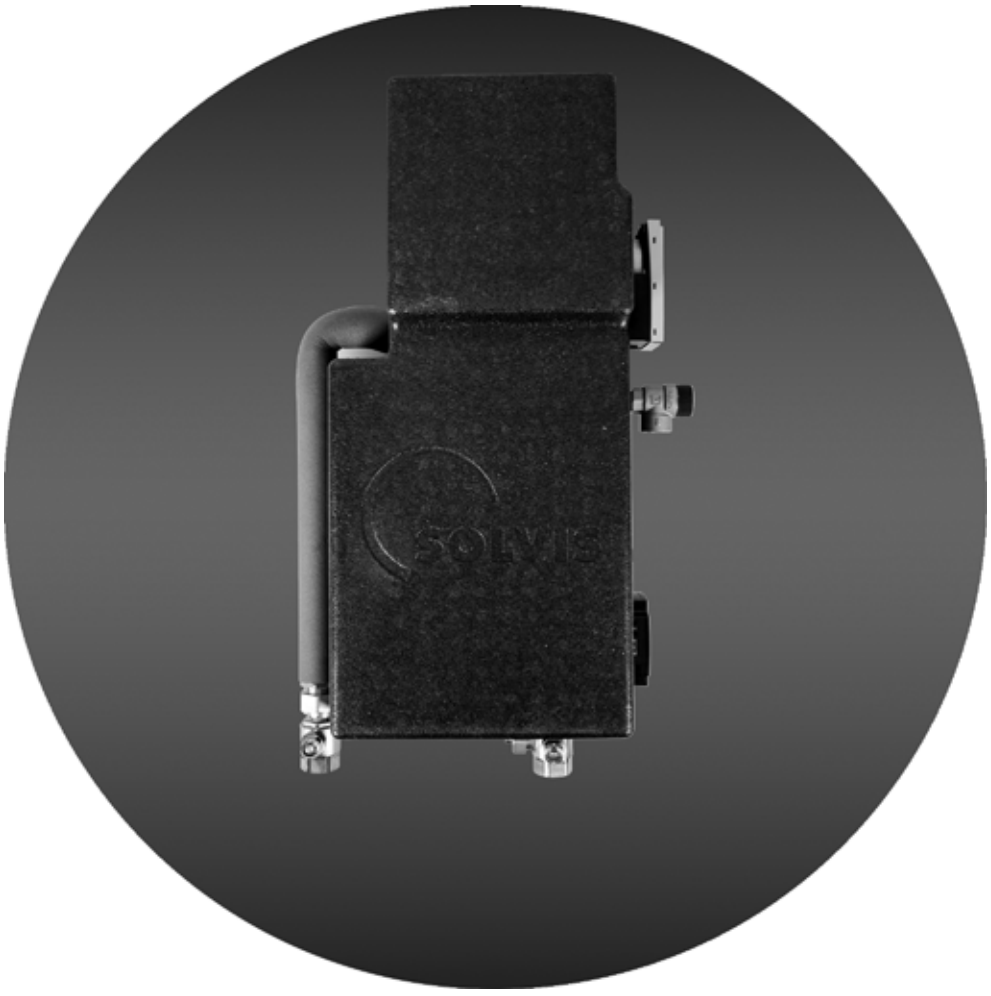
Installation

SUES-5.5/20

SUES-5.5 and SUES-20 solar stations

- 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.

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 switch off 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

The units and components in this system are intended only for heating and for hot water production with possible solar support, as described in this document.

Operating this system for any other purpose is prohibited. Exceptions require express written approval or 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

CAUTION

Avoid excessively high temperature loads.

Otherwise, there may be damage to the solar system.

- The lower edge of the collector field **must not** be below the upper edge of the SolvisMax!

The SUES-5.5 and SUES-20 solar heat transfer stations are used for **matched flow solar systems** with Solvis collectors with a collector area of up to approx. 5.5 or 20 m².

These wall-mounted complete stations are used to transfer solar heat to the SolvisBen or the large solar systems SolvisVital 3 or SolvisDirekt 3 with the SolvisControl 2 system controller.

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, SF1)

- Connecting the clamp ring screw connection (**1**)
- Ball valve with adjustable gravity brake (**15**)
- Deaerator with manual bleeder (**14**)
- Flow temperature sensor S7 (**11**)

Solar return (collector side, SR1)

- Connection for MEV (**16**)
- 0.5 – 15 l/min flow meter with BFD valves (**5**)
- Primary pump, Wilo-Yonos PARA (**3**)
  - SUES-5.5: ST 15/7
  - SUES-20: ST 15/13
- Ball valve with adjustable gravity brake (**2**)
- Connecting the clamp ring screw connection (**1**)

Countercurrent plate heat exchanger

Danfoss XB05M-1, for transferring solar heat to the buffer tank (**10**).
- SUES-5.5: 10 plates
- SUES-20: 30 plates

Secondary circuit

For loading the SolvisBen or SolvisStrato storage tank (SUES-20), consisting of:

Flow (storage tank side)

- Flow temperature sensor S5 (**12**)
- 4 bar safety valve (**4**)
- Manual bleeder (**13**)
- Ball valve with adjustable gravity brake (**9**), 1" female mm connection

Return (storage tank side)

- Ball valve with return temperature sensor S6 (**8**), 1" female mm connection
- Secondary pump, Grundfos UPM 3 15–40 (**7**)
- Volume flow encoder (**6**)

Installation accessories

- Station fully isolated with EPP half-shells
- Wall bracket
- To connect the primary tank and expansion vessel:
  - ¾" corrugated pipe
  - Safety group with pressure gauge and 6 bar and 8 bar safety valves for installation downstream from the primary tank
  - Cap valve with BFD valve for installation on the expansion vessel
- One common extension cable for the temperature sensors and the controller connection for the pumps, with junction box
- SUES-5.5 only:
  - Corrugated pipe for SolvisBen secondary flow connection
  - T-piece for SolvisBen secondary return connection
- Installation instructions (this document)

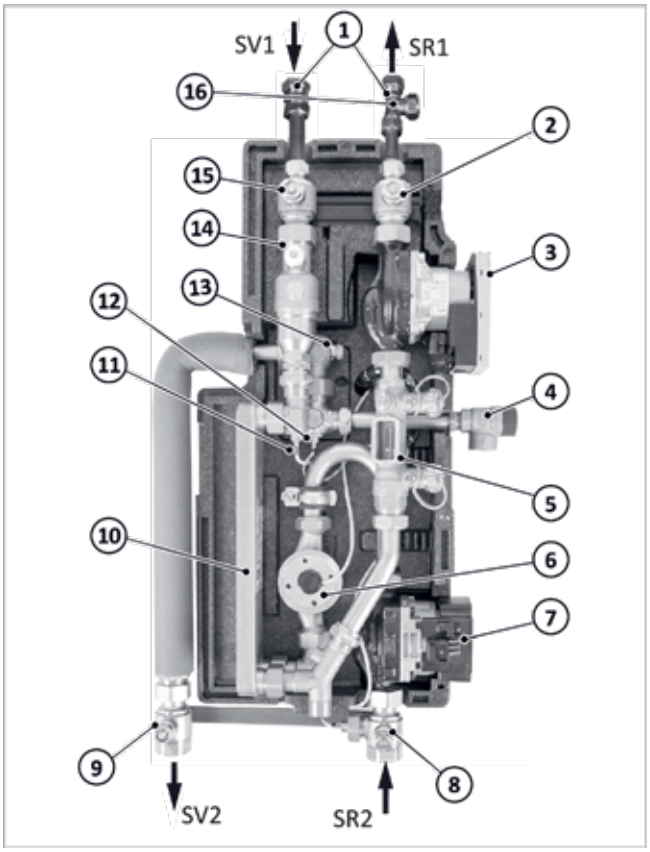


Fig. 1: Solar heat transfer station

SF1 *Solar flow, primary*
SF2 *Solar flow, secondary*
SR1 *Solar return, primary*
SR2 *Solar return, secondary*

5 Installation

5.1 Installation notes

CAUTION

When installing the system:

- Consider the length of the supplied extension cable 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.

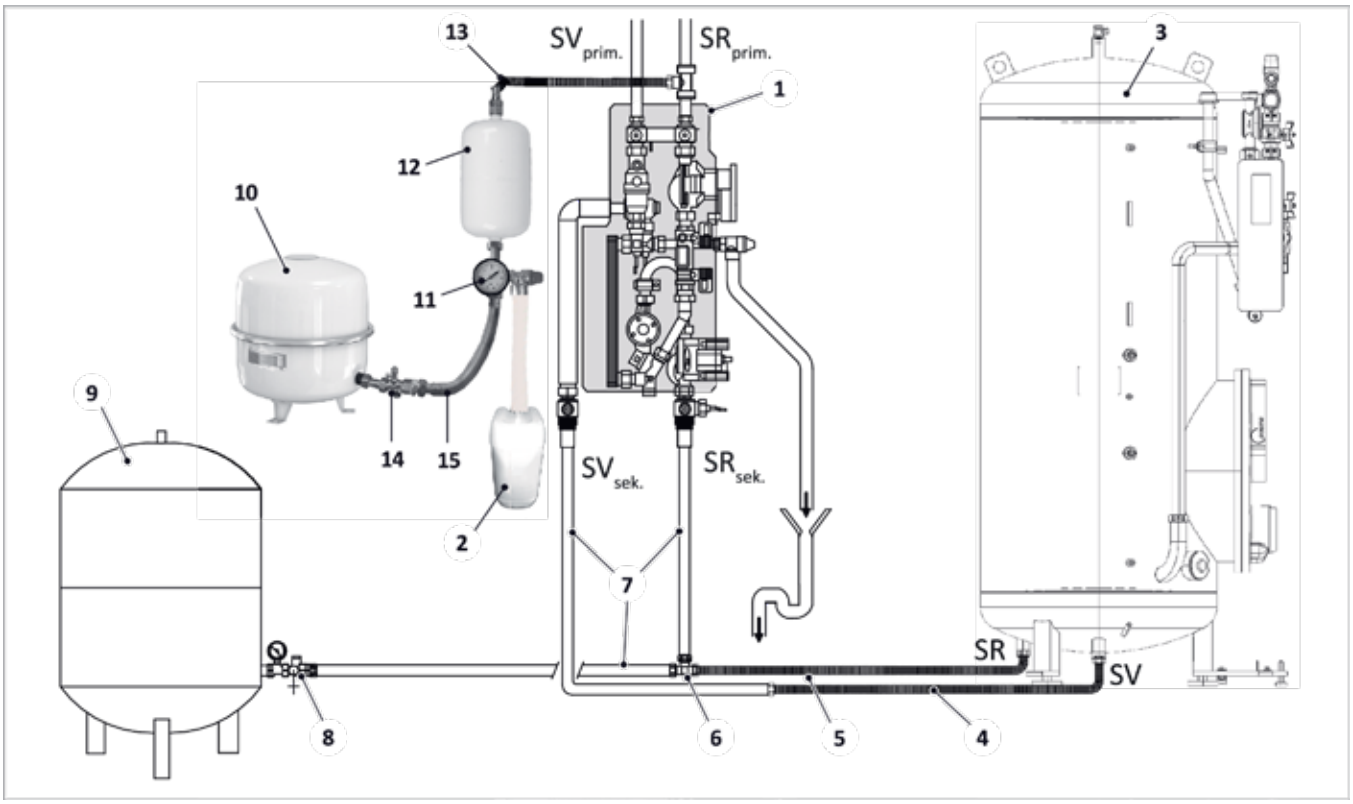


Fig. 2: Installation of SUES-5.5, SOL-MAG and H-MAG on the SolvisBen

1	*Solar heat transfer station SUES-5.5*	9	*Heating expansion vessel, customer-supplied*
2	*Tyfocor collecting container*	10	*Solar expansion vessel AG-xx (included in the delivery of the collector installation package)*
3	*SolvisBen solar heating system*	11	*6 bar/8 bar safety group (included in the delivery of the SUES-5.5)*
4	*Corrug. pipe solar comp. pump (included in the scope of delivery of the SUES-5.5)*	12	*Primary tank VG-xx (included in the delivery of the collector installation package)*
5	*Corrug. pipe solar comp. pump (included in the delivery of the SolvisBen)*	13	*Corrugated pipe 1000 (included in the delivery of the collector installation package)*
6	*¾" T-piece (included in the delivery of the SUES-5.5)*	14	*Cap valve with BFD valve (in the delivery of the SUES-5.5)*
7	*Pipelines, customer-supplied*	15	*Corrugated pipe (included in the delivery of the SUES 5.5)*
8	*4 bar MEV connection group (included in the delivery of the SolvisBen)*		

5.2 Solar station

Installing the solar heat transfer station

1. Install the wall bracket with suitable attachment material.

Recommendation: height of approx. 1.2 m, horizontal distance to the SolvisBen or fresh water station: approx. 0.5 m.

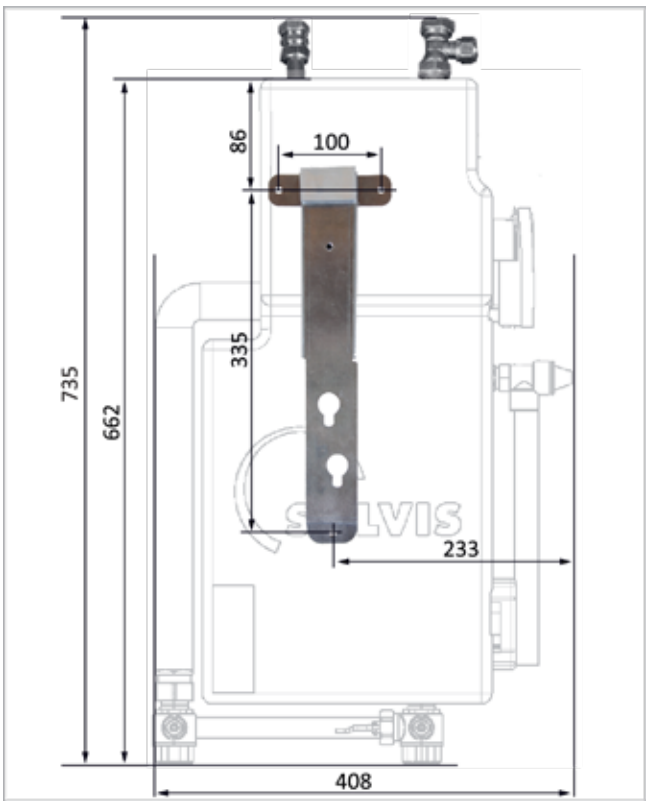


Fig. 3: Mounting diagram

2. Hang up the station. Fasten the nut behind the station.

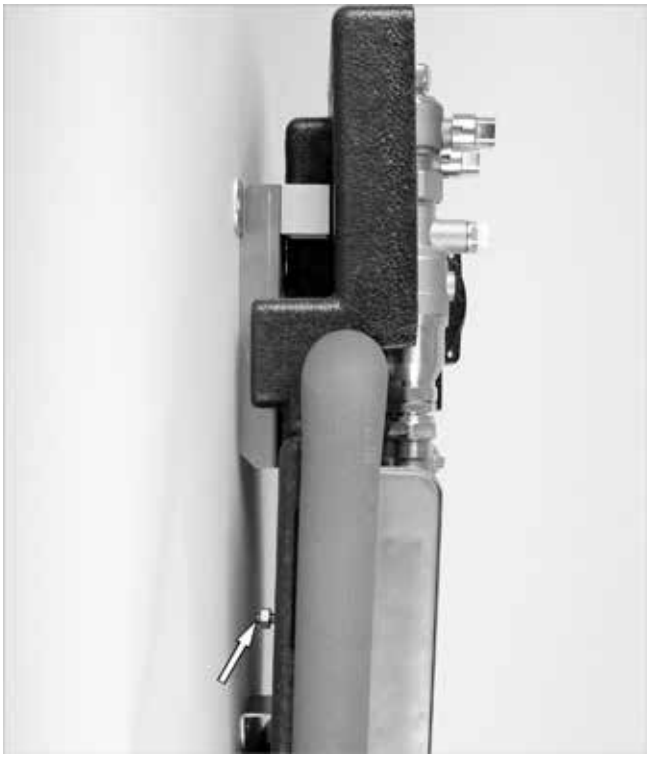


Fig. 4: Tighten the nut

5.3 Solar expansion vessel

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 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!

There is a calculation program for designing the expansion vessel and the primary tank (if present) as well as for determining the admission pressure and system filling pressure under the business partner section on the SOLVIS homepage (http://www.solvis.de) under “Auslegungsprogramme” (Design Programs)l, or contact our Technical Sales department.

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.
2. Release the admission pressure on the solar expansion vessel valve or refill with nitrogen if necessary (however, at least to 1.9 bar, like for roof installations with a 0 metre height difference).

$$p_o = \frac{H_{Koll} - H_{Sp}}{10} + 1{,}9\,[\text{bar}] \qquad (\text{min. } 1{,}9 \text{ bar})$$

P_0 *Solar expansion vessel admission pressure [bar]*
H_{Coll} *Height of the highest point of the collector [m]*
H_{St} *Height of the lower edge of the storage tank [m]*

Preparing the safety group

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.

Type	Pcs.	QFD*	VG-xx	AG-xx	H**
F-553	1	12	5	35	18
C-254 AR/ECO	2	12	5	35	18
LU-304	1	12	8	35	18

* 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.

CAUTION
Note in the event of leaks
Seals/connections may become damaged.

- Retighten only at the **ambient temperature**
- and when the unit is **de-pressurised**.

Establish pressure-tight joints using hemp and a suitable sealing paste, e.g. Solar Fermit.

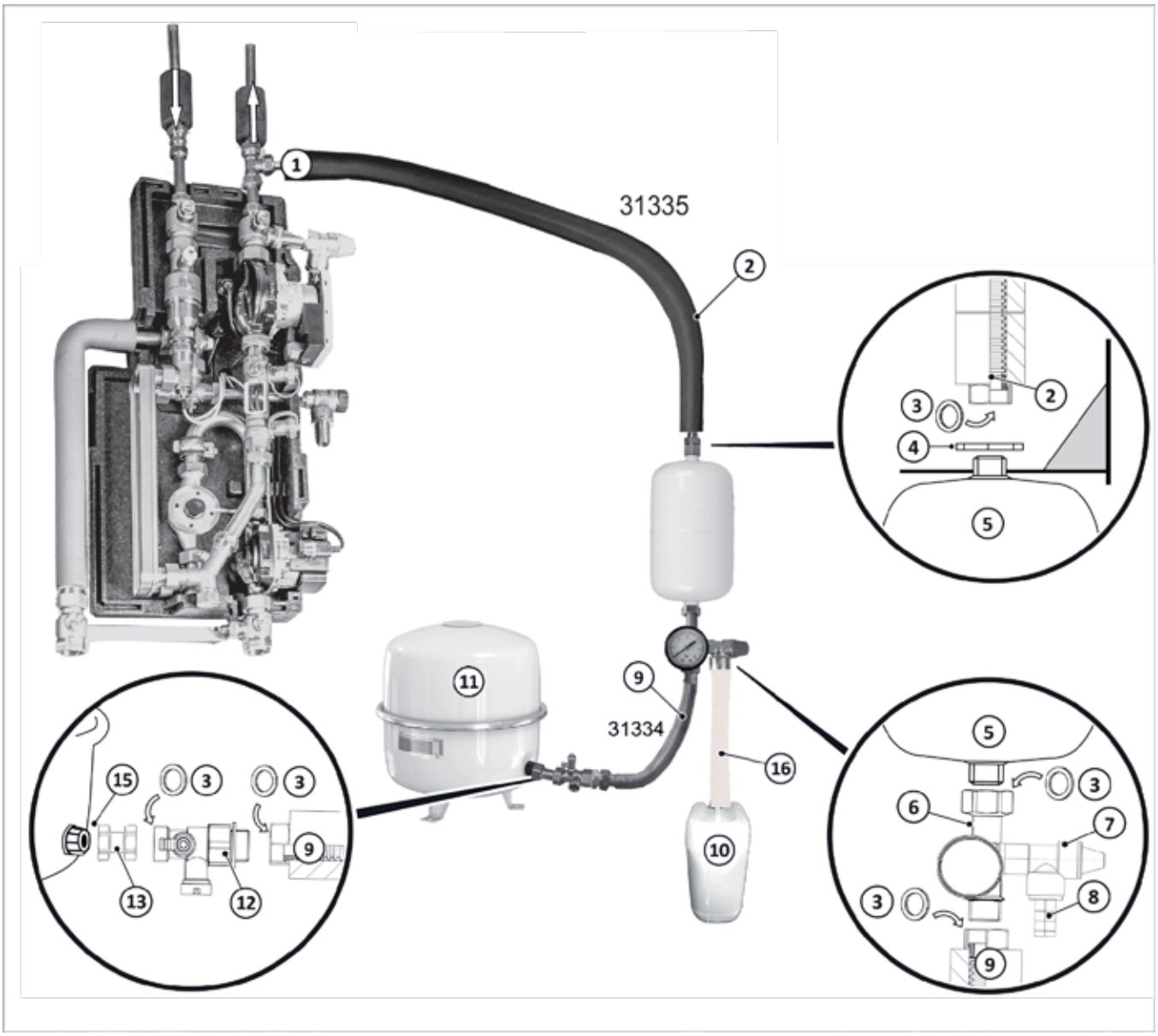


Fig. 5: Connecting the solar MEV

1	*T-piece on return*	9	*Flexible corrugated pipe, 400 mm (included)*
2	*Flexible corrugated pipe, 1 m (can be extended with 31021 and 31022)*	10	*Collecting container (e.g. Tyfocor canister)*
3	*Flat seal (included)*	11	*Membrane expansion vessel AG-xx*
4	*Angle bracket nut*	12	*Cap valve 31359*
5	*Primary tank VG-xx*	13	*Connector piece, flat sealing (included)*
6	*Safety group 31291*	15	*Seal male thread with hemp*
7	*Safety valve, 6 or 8 bar*	16	*Blow out tube*
8	*Hose nozzle 08298*		

Installing the primary tank and safety group

1. Select a suitable installation variant based on the size of the tanks and the space available. Note the corrugated hose lengths!
2. Attach the wall bracket for the primary tank so that the safety group blow out tube below the primary tank can be routed into a collecting container.
3. Mount the primary tank on the wall bracket using the locknut (**4**).
4. Install the safety value (**7**) with the self-sealing thread on the safety group (**6**). Follow the instructions provided!
5. Screw the hose nozzle (**8**) into the safety valve. Connect a blow out tube of a suitable length onto the hose nozzle and fasten it. Guide the tube into a collecting container (e.g. an empty Tyfocor canister (10 l)).
6. Install the safety group (**6**) with the flat seal on the bottom of the primary tank (**5**).

7. Establish the connection between the solar return through the T-piece (**1**) and the primary tank using the supplied 1 m corrugated pipe (**2**): install the clamp ring screw connection on the solar return, and the flat seal on the primary tank. Hold the pieces in place while tightening them.
8. Attach the flexible 400 mm corrugated pipe (**9**) with the inserted flat seal to the free end of the safety group.

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. 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.
3. Position the MEV on the floor or wall.
4. Attach the flexible 400 mm corrugated pipe (**9**) coming from the primary tank with the inserted flat seal to the free end of the cap valve, while applying counter-pressure.

Mounting the storage tank-side blow out tube

1. Attach another blow out tube to the secondary safety valve (**1**) (not running into the same container, but into a drain).

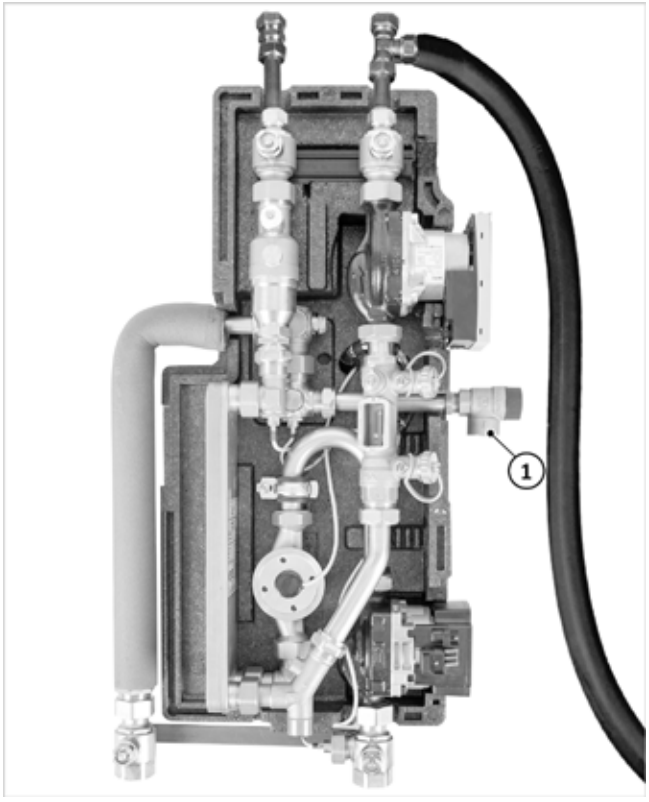


Fig. 6: Connecting the blow out tube to the solar station SUES-5.5

5.4 Hydraulic Connection

Piping the primary circuit

1. Create the piping between the collector (field) and the station.
2. Use suitable piping material and insulate for high temperature resistance. We recommend using our SMR-12 or SMR-15 quick-fit ducts.
3. The pipe line must always run down from the collector connection points to the station. Do not install the piping above the collector connection points.

When installing the SMR-12, use the supplied reducer clamp ring 15-12.

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.

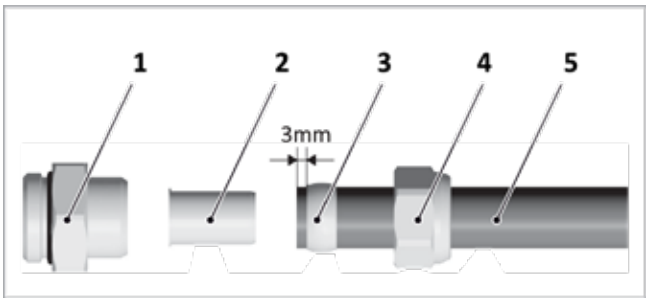


Fig. 7: Installation of clamp ring screw connection

If you have not done so already, install the heating expansion vessel (see the ➔ *chapter "Heating expansion vessel" in the MAL-BEN or MAL-BEN-SL installation instructions)*.

Piping the secondary circuit

Connect the secondary SUES-5.5 as follows:

1. If necessary, drain the SolvisBen storage tank.
2. Remove the cap on the solar flow connection (**1**).

3. Attach the supplied corrugated pipe to the solar flow connection and route it back on the left or right.

The corrugated pipe (➔ *fig. 10*, **3**) and the heating expansion vessel are connected at the solar return connection (**2**).

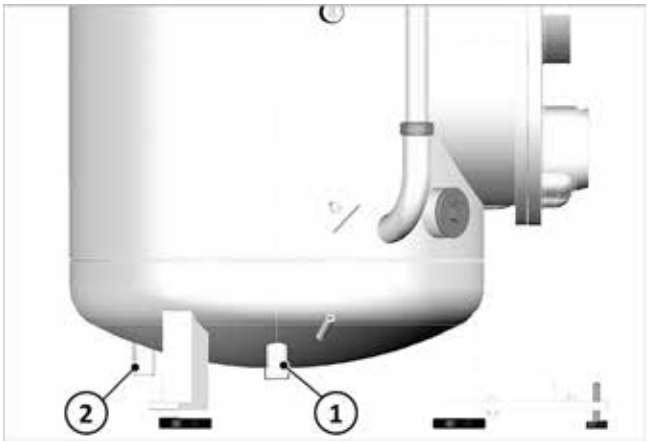


Fig. 8: Solar connection on the SolvisBen

1 *Solar flow*
2 *Solar return (and heating expansion vessel)*

4. Connecting the corrugated pipe with the flow ball valve (**1**) of the solar heat transfer station

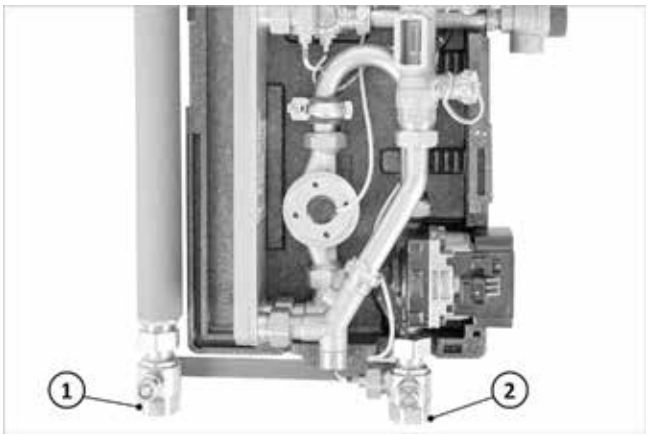


Fig. 9: Connecting the SolvisBen to the solar heat transfer station

5. Install the T-piece (**2**) between the corrugated pipe (**3**) on the solar return and the MEV connection group (**1**).

6. Connect the free outlet on the T-piece (**2**) with the return ball valve (➔ *fig. 9*, **2**) of the solar heat transfer station.

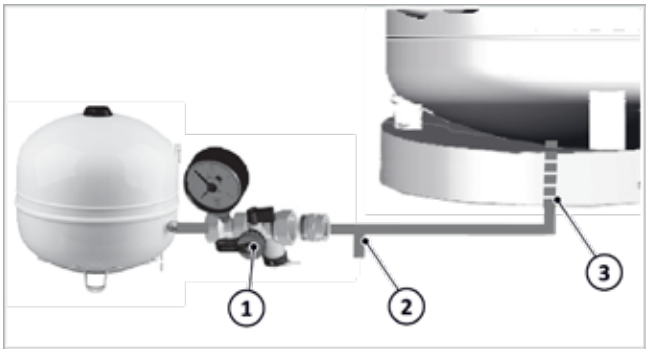


Fig. 10: Connecting the solar return and heating expansion vessel

5.5 Electrical connection

5.5.1 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.
- The sensor cable for volume flow encoders should not be longer than 10 m.

5.5.2 Sensor and control cables

Installing the connection socket

The sensor and signal cables of all the SUES components are connected by the customer in a connection socket using a 5 m extension cable. This extension cable is fitted to the corresponding sockets of the SC-2 controller on the other end.

1. Install the connection socket (**1**) next to the SUES.

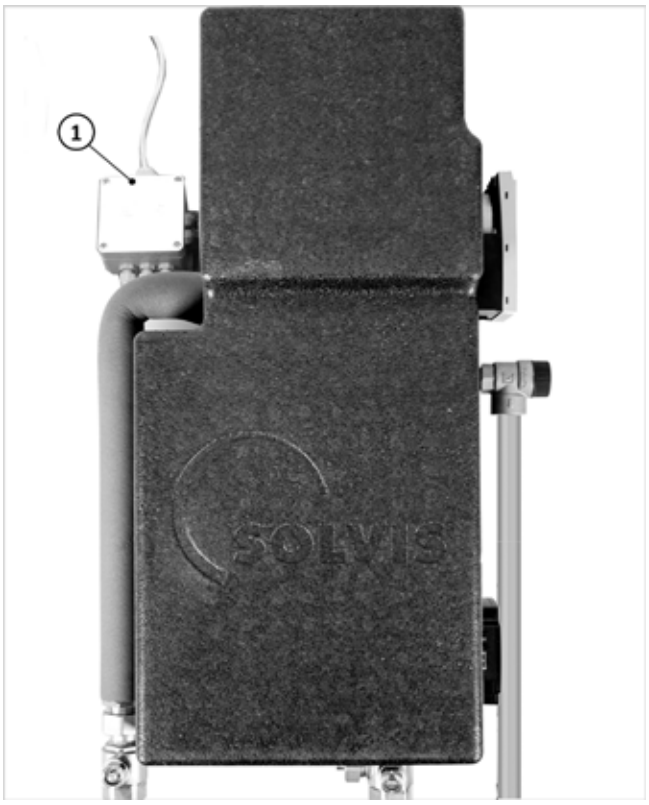


Fig. 11: Installed connection socket

Connecting the cable (SolvisBen)

1. Route the extension cable to the SolvisBen in a suitable protective conduit or cable duct. In the SolvisBen, use the left cable routing duct (**1**) in the cover area.

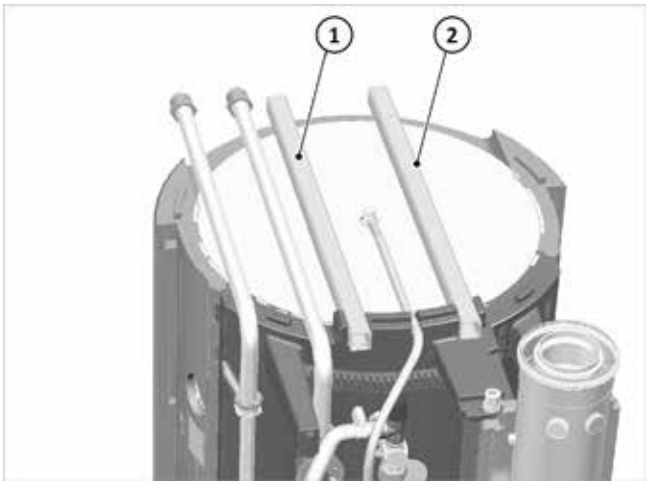


Fig. 12: Cable routing ducts

2. Guide the line in the area of the hot water station behind the station to the bottom left.
3. Press the line that emerges from the WWS insulation in the bottom left corner (**1**) towards the front into one of the free slots (**3**) in the rear insulation shell to fix its course.

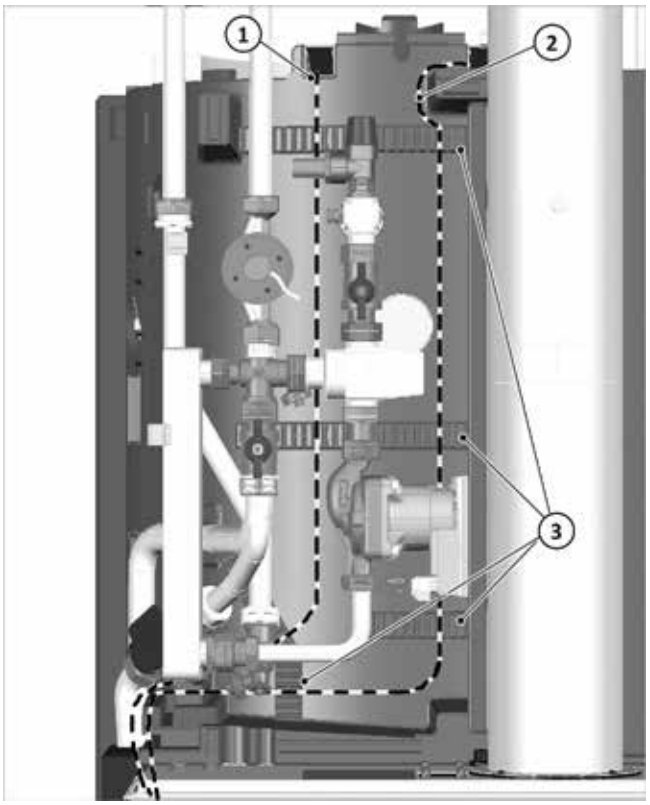


Fig. 13: Cable routing through the hot water station insulation

4. Route the line into the mains module housing from below and connect the sockets to the mains module as per the connection diagram (see ➔ *chapter "Appendix", page 25*).
5. Between the hot water station insulation shell and the mains module housing, lay a loop to ensure that the mains module door can be opened without any issues.
6. Fasten the cable to the mains module housing inlet using cable ties.

Connecting the cable (general)

1. Route the extension cable to the system controller mains module in a suitable protection pipe or cable duct.
2. Connect the sockets to the mains module according to the system connection diagram.
3. Fasten the cable to the mains module housing inlet using cable ties.

5.5.3 Mains connection

The mains power lines for the voltage supply of the two SUES pumps must be routed to the expansion board in the mains module housing as follows.

Establishing the mains connection (SolvisBen)

1. Route the extension cable to the SolvisBen in a suitable protective conduit or cable duct. In the SolvisBen, route the cable to the front through the right cable routing duct (➔ *fig. 12* (**2**)) in the cover area.
2. In the same way as a control/signal extension cable, pull the mains extension cable through the WWS area, fasten it and route it to the mains module housing using a loop (see ➔ *fig. 13* (**2**)).
3. Route the line up at the side and into the mains module housing.
4. Use the appropriate socket to connect to a free space on the expansion board (output 1 or 2).
5. Secure the line using a strain relief device on the mains module housing.

Establishing the mains connection (general)

1. If necessary, extend the cable with a min. 3 x 0.75 mm² extension cable.
2. Route the mains connection cables for the two pumps to the mains module housing in a suitable protective conduit or cable duct and connect them to the expansion board.

6 Start-Up

Prerequisites for a proper start-up:

- The buffer tank must have been started up correctly.
- Use only the Füll-Jet unit to flush and fill the system (order separately)
- Open all flow meters fully
- Be sure that all the air is discharged
- Fill in the start-up report and leave it with the system when work is completed.

Start-up takes place in the prescribed order:

6.1 Secondary side (storage tank side)

Flushing the secondary side

1. Fully open the ball valve for the storage tank return (position 0°) and close the ball valve for the storage tank flow.

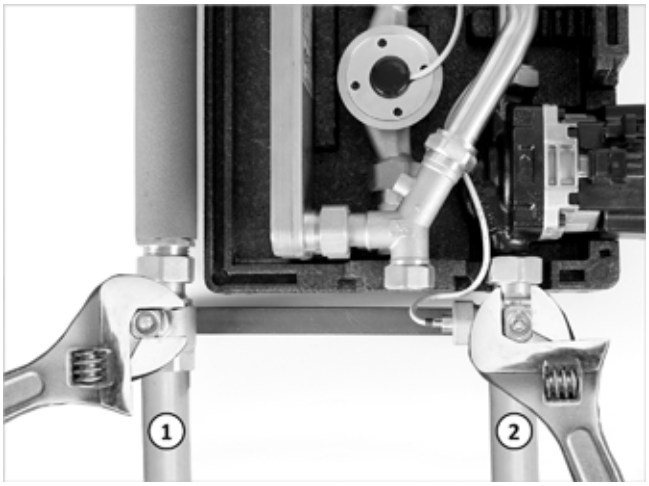


Fig. 14: Ball valves closed/fully open

1 *Flow (here: position 90° – closed)*
2 *Return (here: position 0° – fully open)*

2. Bleed the secondary side using the manual bleeder.
3. Half-open the ball valve for the storage tank flow (45° position, gravity brake off) and bleed again.

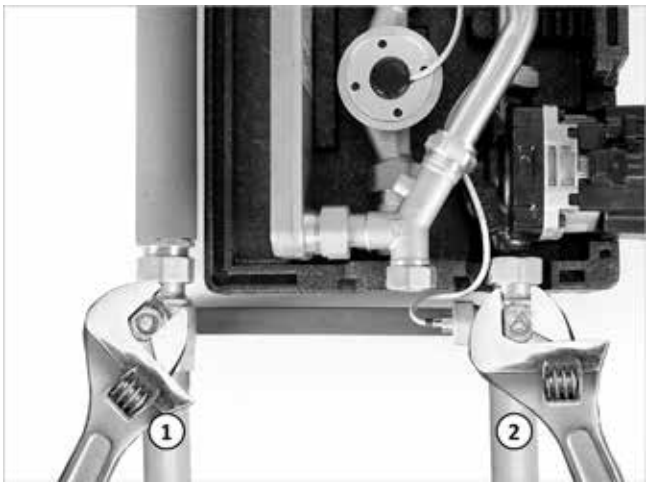


Fig. 15: Ball valves half open/fully open

1 *Flow (here: 45° position – half-opened, gravity brake off)*
2 *Return (here: position 0° – fully open)*

4. Flush the secondary side of the station.
5. Fully open both ball valves.

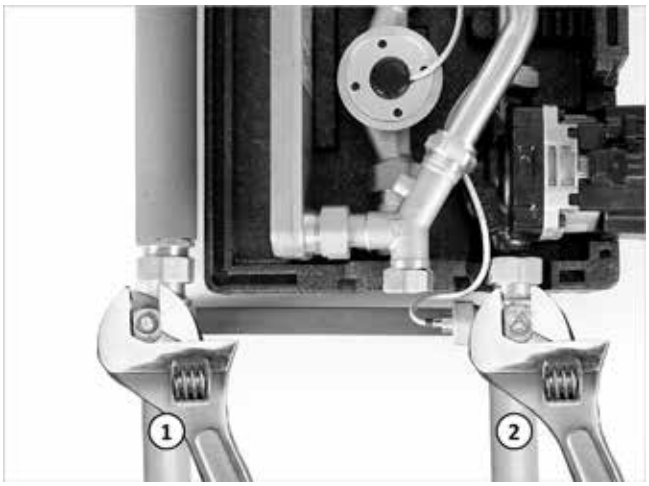


Fig. 16: Both ball valves fully open

1 *Flow (here: position 0° – fully open)*
2 *Return (here: position 0° – fully open)*

Testing the secondary circuit under pressure

1. To test the pressure of the secondary circuit, fill this system component (storage tank circuit) to approximately 3 bar.
2. Bleed using the manual bleeder (using a splash guard) and refill the buffer circuit up to approx. 3 bar, if needed. **Max. operating pressure of the storage tank: 3 bar**
3. Carefully check all connections for leaks.
4. Set the operating pressure in the secondary circuit.

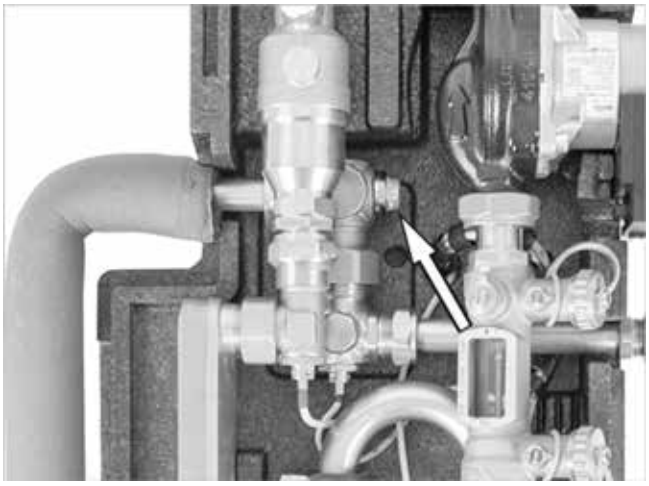


Fig. 17: Secondary-side manual bleeder

5. Carefully check all connections for leaks.
6. Set the operating pressure in the secondary circuit.
7. Insulate the connection lines.

6.2 Primary side (collector side)

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

Hot surfaces

Risk of burns without proper attention.

- The solar lines, primary tank and expansion vessel may become hot during operation.

CAUTION

When filling the solar circuit:

- Use only original Solvis Tyfocor LS-rot ready-mixed heat transfer medium to fill and flush the solar circuit.
- Using other types of heat transfer fluid in this system is prohibited and may damage the solar circuit components.

6.2.1 Flushing the MEV line

Flushing the MEV line

1. If not performed before: check the admission pressure of the MEV(s) and adjust it according to the system height.
2. Set the flow meter ($\dot{V}$) to flushing position 1.

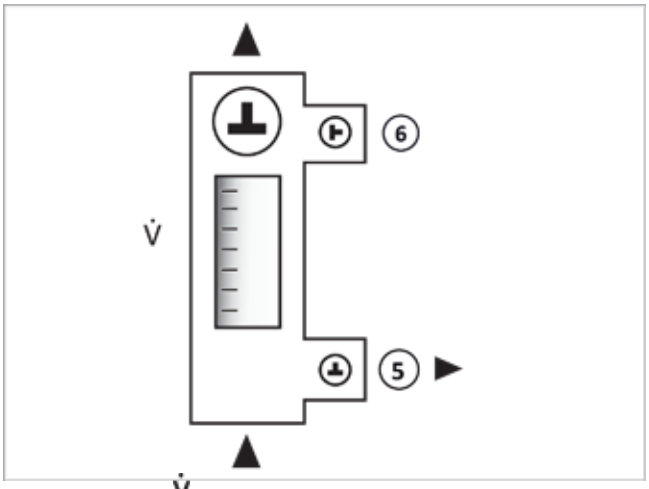


Fig. 18: Flow meter $\dot{V}$ in flushing position 1

3. Fully open the cap valve (**3**) on the MEV.
4. Connect the pressure hose for the flushing and filling station (**FFS**) to the BFD valve (**4**) and open the BFD valve.
5. Connect the FFS flushing hose to the BFD valve (**5**) and open the BFD valve.
6. Fill the solar circuit with Tyfocor LS-rot antifreeze and flush: FFS => BFD valve (**4**) => primary tank => collector field => solar heat transfer station to BFD valve (**5**) => FFS
7. Flush until the solar fluid exits into the FFS container free of bubbles and clear (flush for at least 5 minutes).
8. Close the BFD valve (**4**) and switch off the FFS pump.
9. Close the cap valve on the MEV.

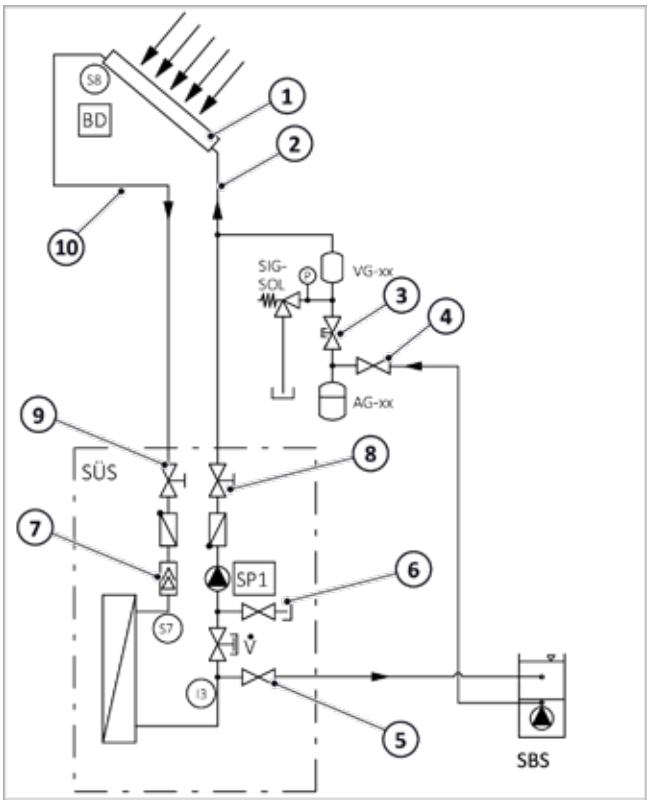


Fig. 19: Solar heat transfer station: Flushing the heat exchanger

1	*Solvis collectors*
2	*Solar return*
3	*Cap valve*
4	*BFD valve for pressure hose*
5	*BFD valve for flushing hose*
6	*BFD valve*
7	*Deaerator*
8	*Ball valve in the solar return*
9	*Ball valve in the solar flow*
10	*Solar flow*
AG-xx	*Expansion vessel*
BD	*Lightning protection box*
FFS	*Flushing and filling station FUES-SBS (accessory part)*
SUES	*Solar heat transfer station (primary circuit)*
VG-xx	*Primary tank (accessories)*
$\dot{V}$	*Flow meter*

6.2.2 Flushing the pump line

Flushing the pump line

1. Set the flow meter ($\dot{V}$) to flushing position 2.

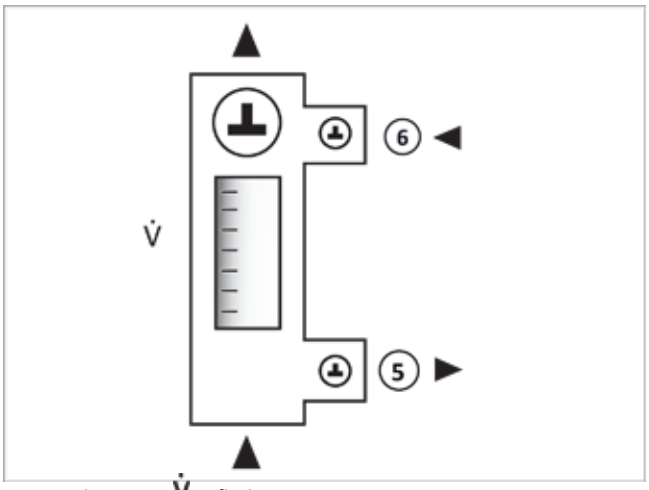


Fig. 20: Flow meter V̇ in flushing position 2

2. Connect the pressure hose for the flushing and filling station (**FFS**) to the BFD valve (**6**) of the flow meter and open the BFD valve.
3. Switching on and flushing the flushing pump: FFS => BFD valve (**6**) => primary pump => collector field => solar heat transfer station to BFD valve (**5**) => FFS
4. Flush until the solar fluid exits into the FFS container free of bubbles and clear (flush for at least 15 minutes).
5. Bleed the solar circuit again by building up and releasing pressure. To do so, close and open the BFD valve (**5**) two to three times.
6. If Tyfocor exits without any bubbles, close the BFD valve (**5**) and increase the system pressure to 4 bar.
7. Close the BFD valve (**6**) and switch off the FFS pump. Check the system to ensure that there are no leaks.
8. Bleed the deaerator (**7**).
9. Fully open the cap valve (**3**).
10. Set the system pressure to the calculated operating pressure by slowly opening the BFD valve (**5**). Rule of thumb: MEV admission pressure + 0.3 bar.
11. Set the flow meter to the flow position (see ➔ *fig. 22, page 18*), close the BFD valves (**5**) and (**6**), remove the SBS and screw on the caps.

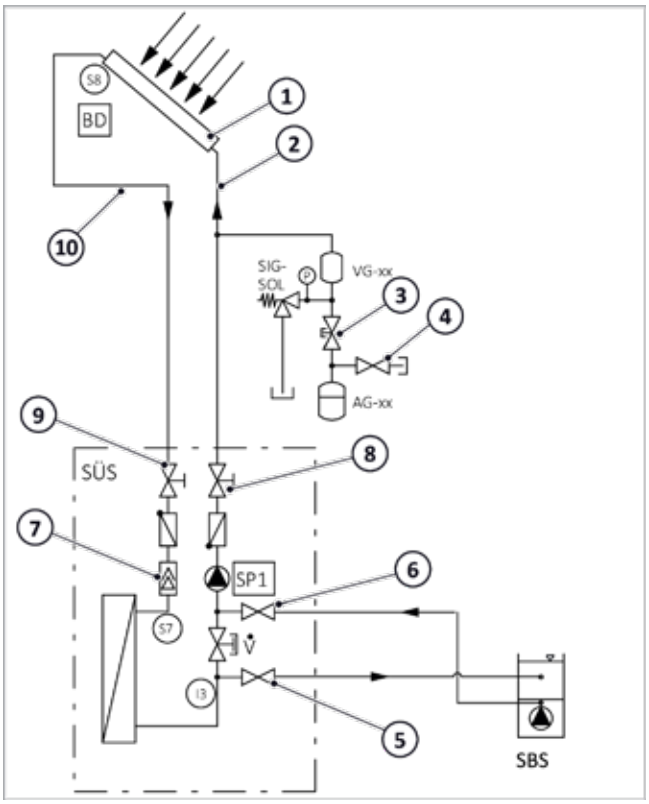


Fig. 21: Solar heat transfer station: Flushing the pump line

1	*Solvis collectors*
2	*Solar return*
3	*Cap valve*
4	*BFD valve*
5	*BFD valve for flushing hose*
6	*BFD valve for pressure hose*
7	*Deaerator*
8	*Ball valve in the solar return*
9	*Ball valve in the solar flow*
10	*Solar flow*
AG-xx	*Expansion vessel*
BD	*Lightning protection box*
FFS	*Flushing and filling station FUES-SBS (accessory part)*
SUES	*Solar heat transfer station (primary circuit)*
VG-xx	*Primary tank (accessories)*
V̇	*Flow meter*

6.2.3 Completing the solar 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. 21, page 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.

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 minimum control, 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. (With A = installed collector surface).

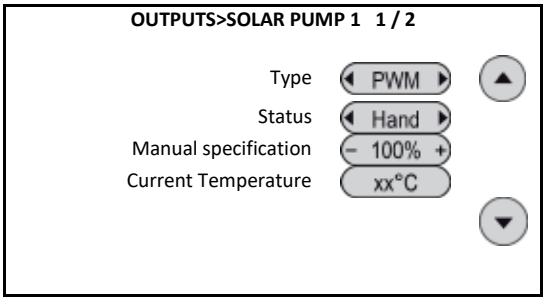
- With maximum control, the value:

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

at minimum should be reached in the primary circuit. Check the pipe dimensions and wiring if necessary. (With 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.

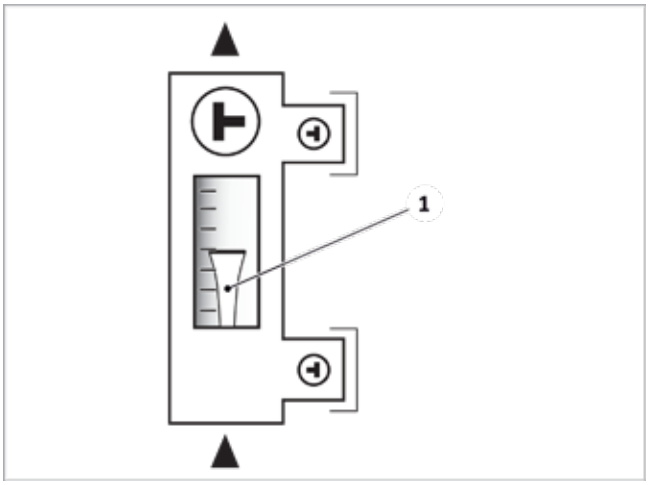
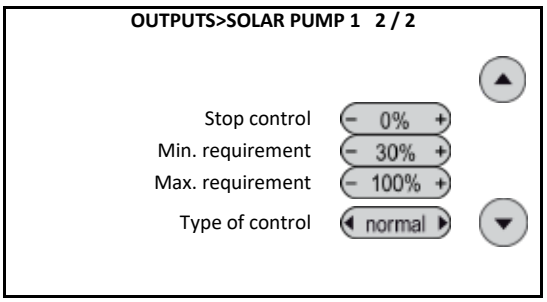


*Fig. 22: Read the volume flow at the upper edge of the float (**1**)*

7. Note the value in the start-up report.
8. Set the "**Manual specification**" to 30 %; this is the factory setting for minimum control.
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 percentage value set for "**Min. control**" on the second page, "**OUTPUTS>SOLAR PUMP 1 2 / 2**".



- 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 the "**Status**" to "**Auto**" again.

6.3 Bleeding

With SolvisFera Standard/Diagonal only

Bleeding the solar circuit

1. Attach a suitable hose to the solar flush-fill drain on the collector (¾" connection).
2. Direct the end of the hose into a suitable collecting container.
3. Gently open the relevant flush-fill-drain valve and allow the air to escape. The solar liquid must flow out under pressure.
4. If the pressure drops too much, top up the solar liquid at the solar station.
5. Close the flush-fill-drain valve firmly.

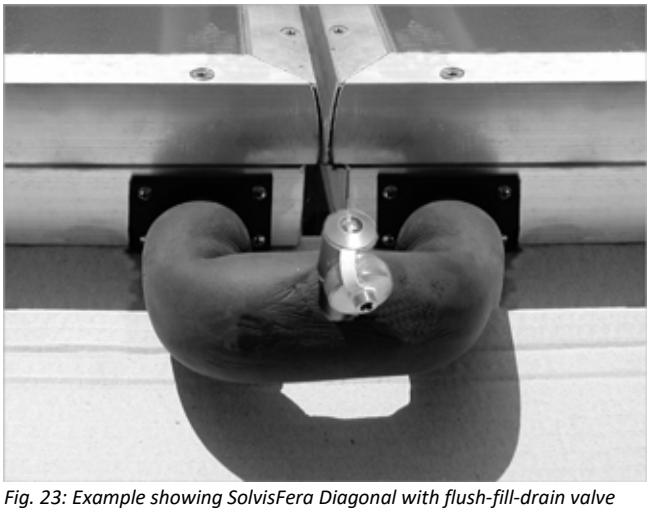


Fig. 23: Example showing SolvisFera Diagonal with flush-fill-drain valve

6. Bleed the deaerator ➔ *(fig. 21, page 17***7**) on the station using the manual bleeder.

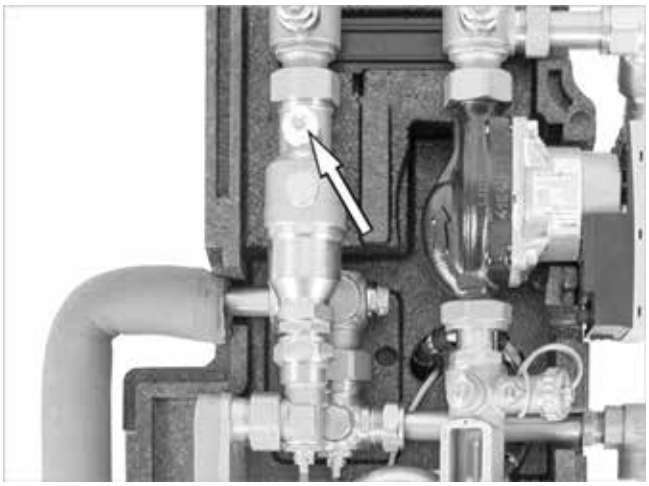


Fig. 24: Bleeding the deaerator

6.4 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. 21, page 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.

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.

CAUTION

Hot surfaces

Risk of burns without proper attention.

- The solar lines, primary tank and expansion vessel may become hot during operation.

Checking the solar liquid (annually)

1. Bleed the solar circuit and take a sample at the deaerator at the same time.
2. Perform a sensory test. 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.

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

1. Close the cap valve (**7**, see ➔ *fig. 21, p. 17*) on the solar expansion vessel (horizontal marking).
2. Open the drain valve on the cap valve using a 6 mm open-end wrench and discharge the overpressure 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 "Solar expansion vessel", p. 8.*
4. Close the drain valve.
5. Open the cap valve (vertical marking).

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

Solar transfer station SUES-5.5/SUES-20 characteristics

Name	Unit	SUES-5.5	SUES-20
Max. recommended collector surface	[m²]	2.5-5.5	5-20
Rated flow	[l/(h*m²)]	15-30	10-25
Primary circuit			
Flow meter	[l/min]	0.5-15	
Pressure sensor	[bar]	0-6	
Max. operating temperature	[°C]	120	
Safety valve	[bar]	6	
Connection	[mm]	15 (12)	
Primary pump			
Make/type		Wilo Yonos-PARA ST 15/7.0	Wilo Yonos-PARA ST 15/13
Operating temperature	[°C]	0–110	
Ambient temperature	[°C]	50	
Pressure level		PN10	
Minimum inflow pressure	[mWS]	0.5	
Power consumption	[W]	3-47	3–76
Power consumption	[A]	0.028-0.433	0.028–0.7
Energy efficiency index	EEI	< 0.21	
Plate heat exchanger			
Make/type		Danfoss XB05M-1-10	Danfoss XB05M-1-30
Number of plates		10	30
Capacity per side	[litre]	0.1	0.3
Performance			
Primary 75/60 °C and secondary 55/70 °C		3.8 kW	14 kW
Primary 65/33 °C and secondary 25/60 °C		1.9 kW	7 kW.
Secondary circuit			
Max. operating temperature	[°C]	95	
Safety valve	[bar]	4	
Secondary pump			
Make/type		Grundfos UPM3 15-40	
Operating temperature	[°C]	0–95	
Ambient temperature	[°C]	50	
Pressure level		PN10	
Minimum inflow pressure	[mWS]	0.5	
Power consumption	[W]	2-25	
Power consumption	[A]	0.04-0.3	
Energy efficiency index	EEI	< 0.20	

8.2 Connection Dimensions

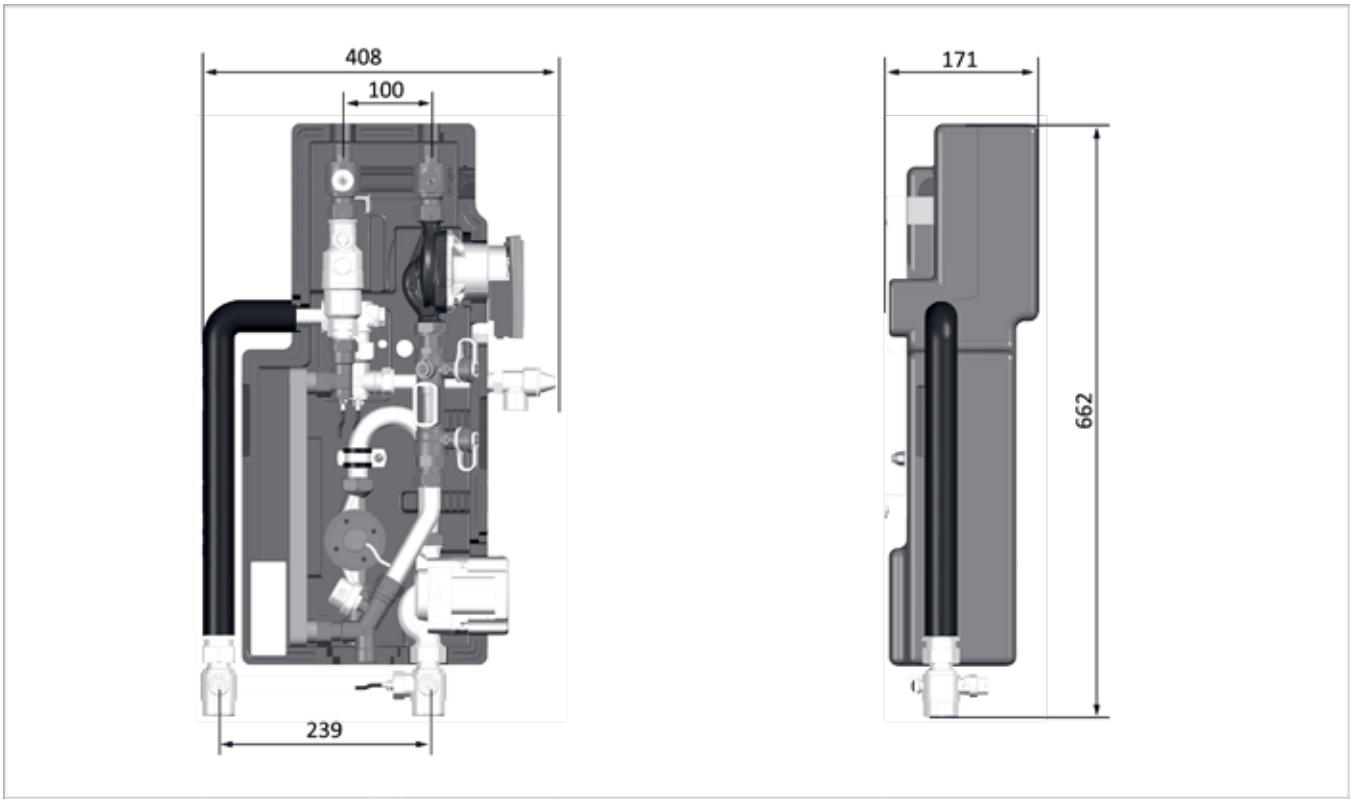


Fig. 25: Dimensions of the solar heat transfer station

8.3 SUES-5.5 pressure loss

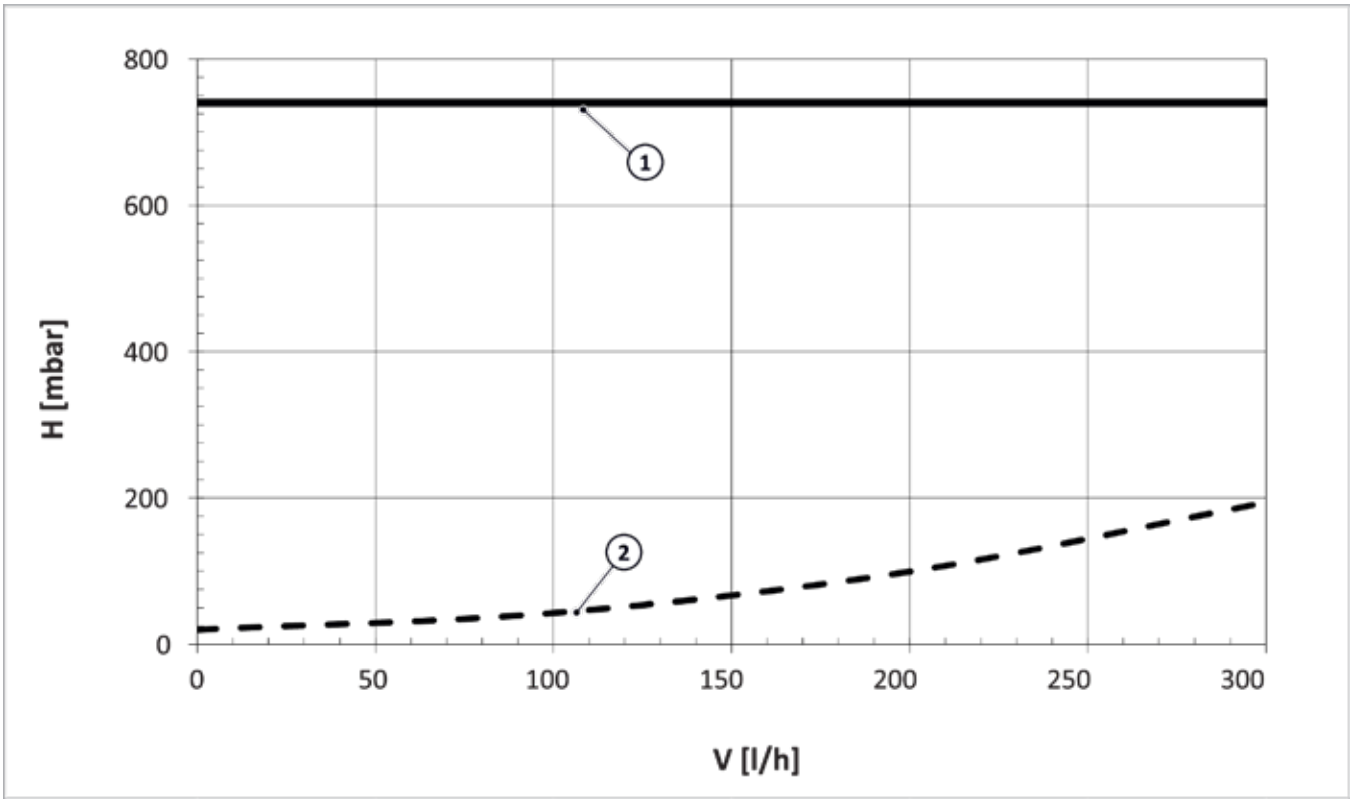


Fig. 26: Pressure loss curve for the SUES-5.5 primary circuit

1 *Wilo Yonos-PARA ST 15/7.0 pump characteristic curve*

2 *Pressure loss characteristic curve for the SUES-5.5 primary circuit*

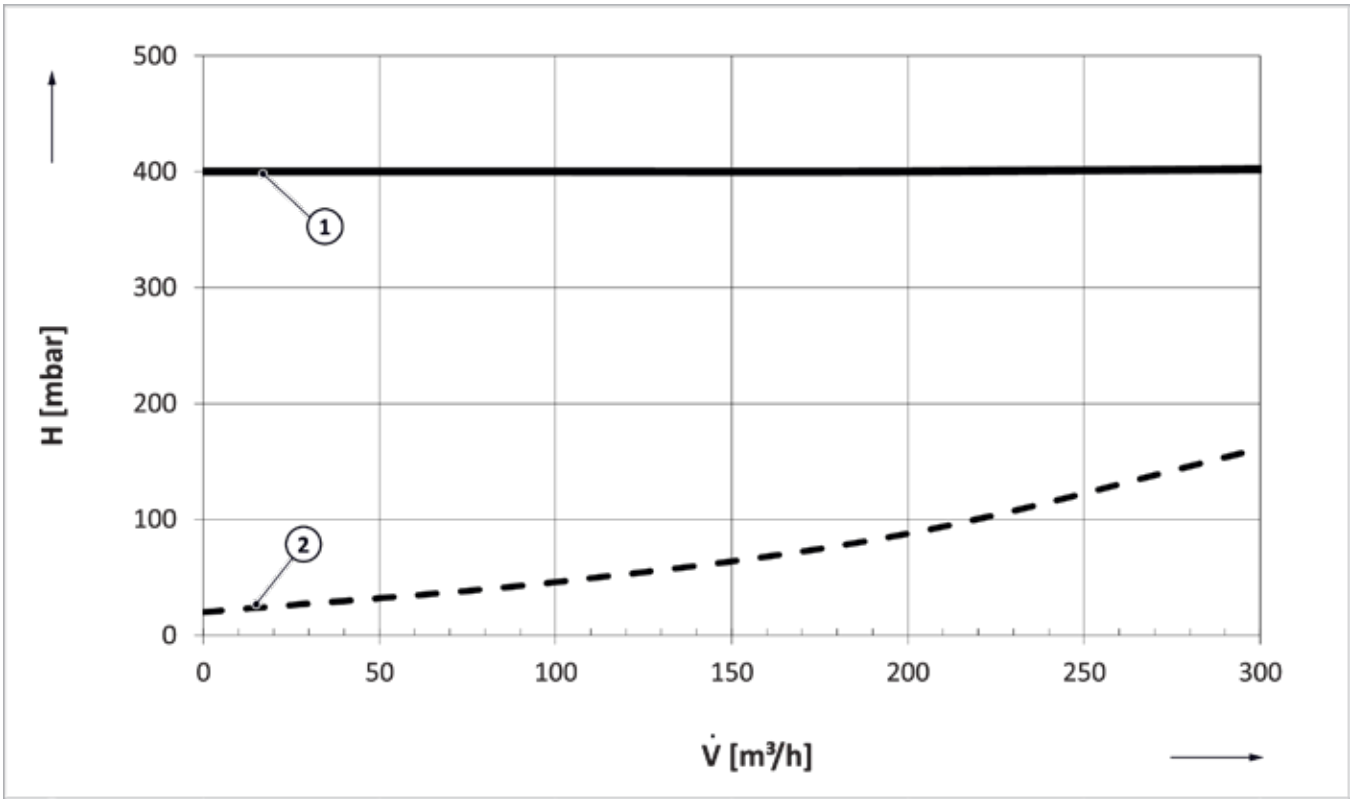


Fig. 27: Pressure loss curve for the secondary circuit

1 *Grundfos UPM3 15–40 pump characteristic curve*

2 *Pressure loss characteristic curve for the SUES-S secondary circuit*

8.4 Pressure loss in the SÜS-20

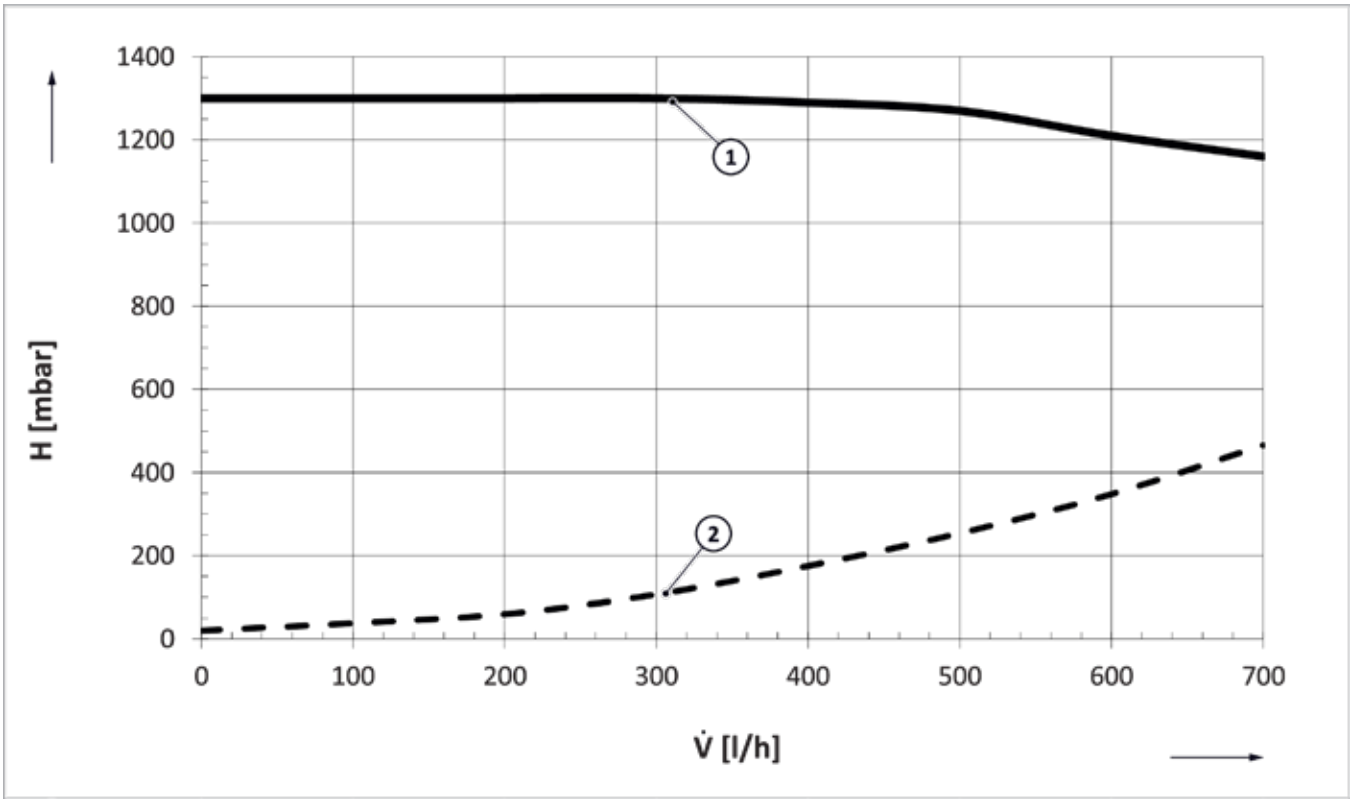


Fig. 28: Pressure loss curve for the primary circuit

1 *Wilo Yonos-PARA ST 15/13 pump characteristic curve*

2 *Pressure loss characteristic curve for the SUES-20 primary circuit*

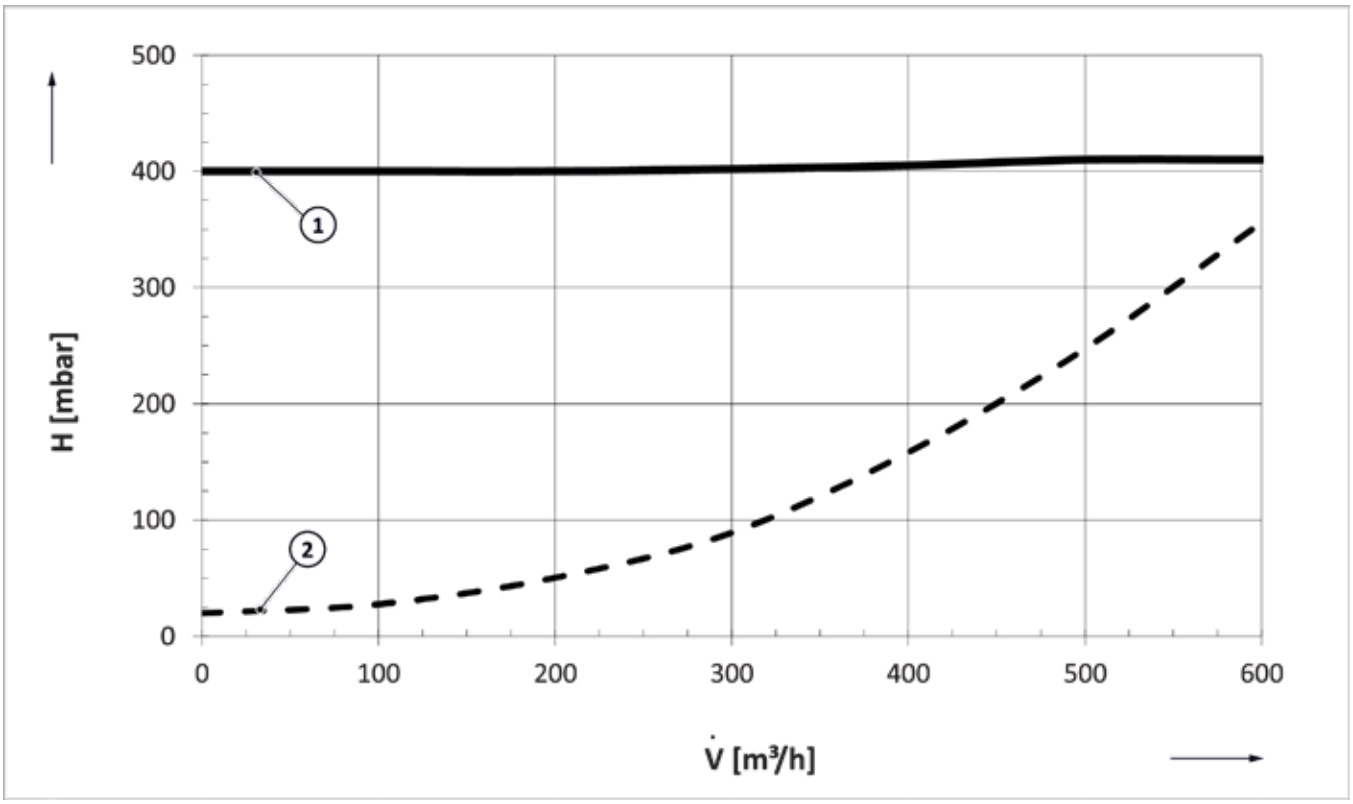


Fig. 29: Pressure loss curve for the secondary circuit

1 *Grundfos UPM3 15–40 pump characteristic curve*

2 *Pressure loss characteristic curve for the SUES-20 secondary circuit*

9 Appendix

9.1 SolvisBen Gas/Öl system diagram

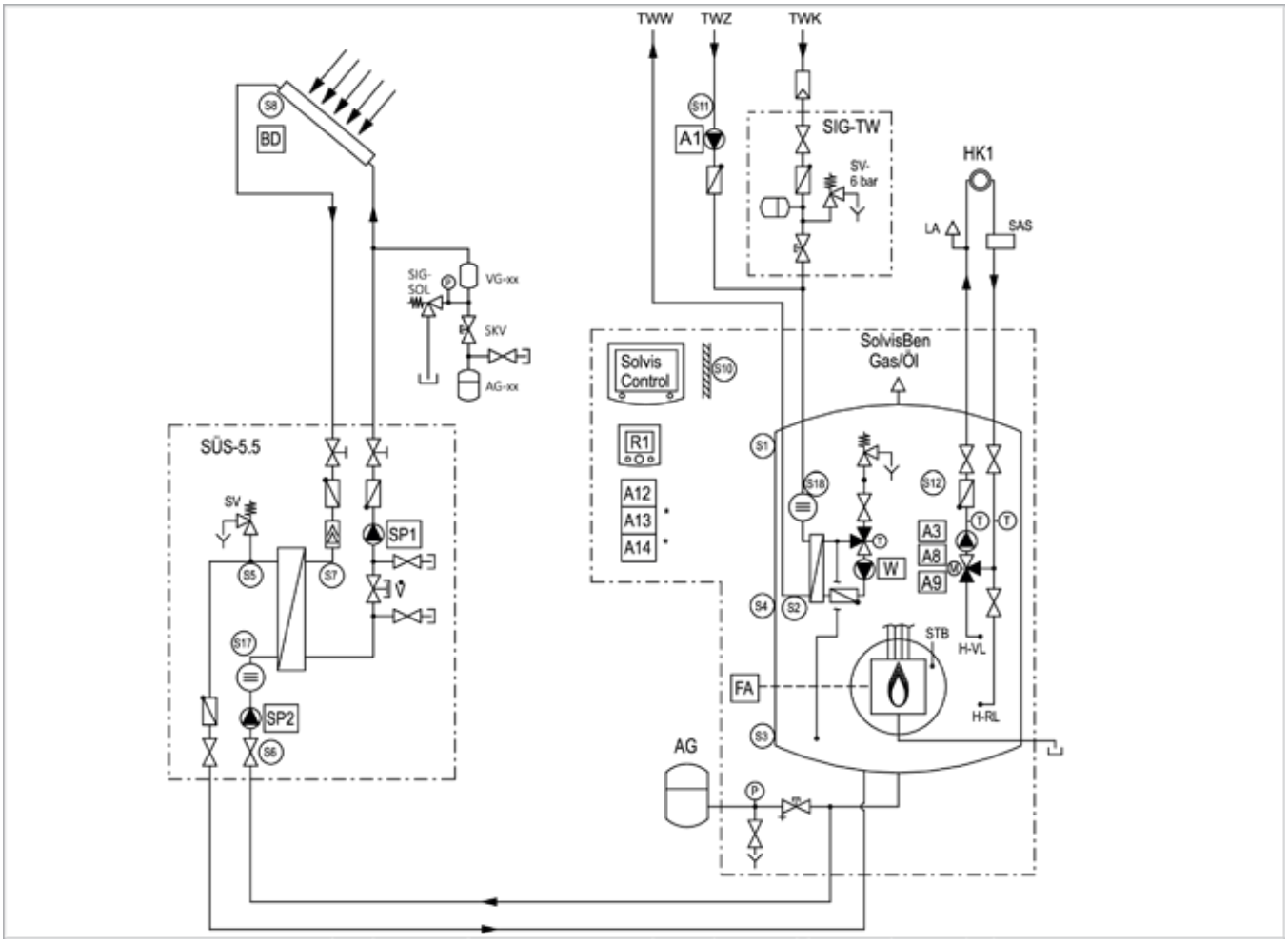


Fig. 30: SolvisBen Gas/SolvisBen Öl with integrated heating circuit station and solar system

*Only applies to SolvisBen Öl

Equipment

- Oil or gas condensing system
- Stratified solar storage tank
- SolvisControl 3 system controller
- Drinking water heating
- Solar circuit with one collector (field)
- One mixed heating circuit

Assemblies:

R1	*Room operating unit, heating circuit 1*
SIG-TW	*Safety group, drinking water connection*
BD	*Lightning protection box*
AG-xx	*Membrane expansion vessel, solar circuit*
VG-xx	*Primary tank, solar circuit*
SUES-5.5	*Solar heat transfer station*

Abbreviations

LA	*Air separator*
AG	*Expansion vessel*
SAS	*Sludge separator*
SV	*Safety valve*
TWK	*Drinking water network, cold connection*
TWW	*Drinking water network, hot connection*
TWZ	*Drinking water network, circulation connection*
FA	*Automatic firing system*
HRL	*Heating return*
HRV	*Heating flow*
STB	*Safety temperature limiter*
SV-SOL	*Safety valve, solar circuit*
SOL-SKV	*Cap valve, solar circuit*
V̇	*Adjusting valve*
HK1	*Heating circuit 1*

The diagram shown represents an overview of the system based on the information available to us. It does not replace detailed and specific planning. Please note: to ensure the system functions correctly, the installation, operating and maintenance instructions must be followed. When connecting a third-party boiler, do not rely solely on the information provided by Solvis – always consult the manufacturer of the boiler.

The shut-off and safety valves shown provide a rough guide only. Observe all the relevant standards, guidelines and technical rules at all times. This is the only way to ensure that installations are carried out correctly.

9.2 Mains module

9.2.1 Connection table (system status)

SolvisBen Gas/SolvisBen Öl

Sensors (temperature sensors and volume flow encoders)			Actuators (pumps, signals and control valves)		
Inputs		Designation (sensor)	Outputs		Designation
no.	Option*		no.	Option*	
S1	All	Sto. tank, top	**A1**	All	Circulation pump
S2	All	Hot water	**A2**	All	(Unused)
S3	All	Sto. tank reference	**A3**	All	Pump for heating circuit 1
S4	All	Heating buffer, upper	**A4**	All	Pump for heating circuit 2
S5	All	Solar flow 2	**A5**	All	Pump for heating circuit 3
S6	All	Solar return 2	**A6**	East-west roof	Valve 1
S7	All	Solar flow 1		SFB	(Unused)
S8	All	Collector		HC 3	Heating circuit 3 mixer open
S9	All	Heating buffer, lower	**A7**	East-west roof	Valve 2
S10	All	Outdoor temperature		SFB	Load pump
S11	All	Circulation		HC 3	Heating circuit 3 mixer closed
S12	All	Flow for heating circuit 1	**A8**	All	Heating circuit 1 mixer (open)
S13	All	Flow for heating circuit 2	**A9**	All	Heating circuit 1 mixer (closed)
S14	All	(Unused)	**A10**	All	Heating circuit 2 mixer (open)
S15	All	Cold water (optional)	**A11**	All	Heating circuit 2 mixer (closed)
S16	East-west roof	Collector 2	**A12**	All	Burner (230 V ~)
	SFB	Wood boiler	**A13**	Öl	Burner 2
	Other	Flow for heating circuit 3		Gas	(Unused)
S17	All	Solar volume flow encoder	**A14**	Öl	Fault elim.
S18	All	Water volume flow encoder		Gas	(Unused)
I-1	All	External burner requirement	**O-1**	All	(Unused)
I-2	All	(Unused)	**SP1**	All	PWM solar pump 1
I-3	All	(Unused)	**SP2**	All	PWM solar pump 2
R1	All	Room control element for heating circuit 1	**W**	All	PWM hot water pump
R2	All	Room control element for heating circuit 2 (optional)	**LP**	All	(Unused)
R3	All	Room control element for heating circuit 3 (optional)	**Alarm**	All	Malfunction message (floating)
ST1	Öl	mSTL			
	Gas	Jumper			
ST2	All	Jumper			

** "All" = applies to SolvisBen Gas and SolvisBen Öl, "SFB" = additional solid fuel boiler or "HC 3" = additional mixed circuit*

9.2.2 Connection Diagram

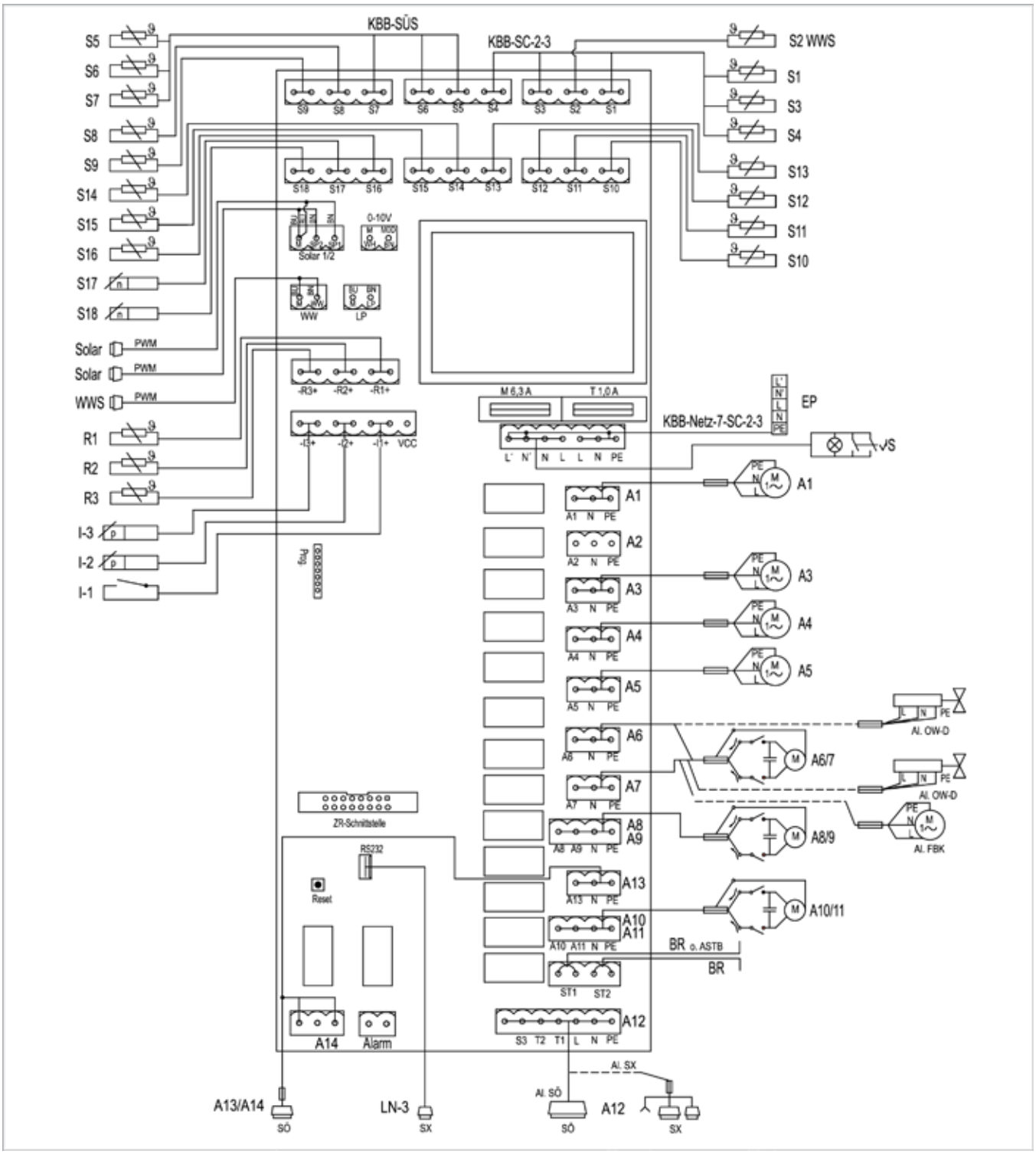


Fig. 31: SolvisControl 3 mains module for SolvisBen Gas and Öl

* Exhaust safety temperature limiter (ASTB) required only in Switzerland

AL SFB	*Solid fuel boiler alternative*
AL OWD	*East-west roof alternative*
AL SÖ	*Alternative connection for SolvisBen Öl*
AL SX	*Alternative connection for SolvisBen Gas*
ASTB	*Exhaust safety temperature limiter*
BR	*Jumper*
EP	*Expansion board, see* ➔ fig. 32, p. 28
KBB SC-2-3	*SolvisControl 3 sensor cable harness*
KBB-SUES	*Sensor cable harness for solar heat transfer station*
mSTL	*Mechanical safety temperature limiter*
WWS	*Hot water station*
ZR	*Central controller interface*

9.3 Expansion Board

9.3.1 Connection table

Actuators (pumps)	
Output no.	**Designation (230 V mains connection)**
1	Solar pump 1
2	Solar pump 2
3	Hot water pump
4	Load pump

9.3.2 Connection Diagram

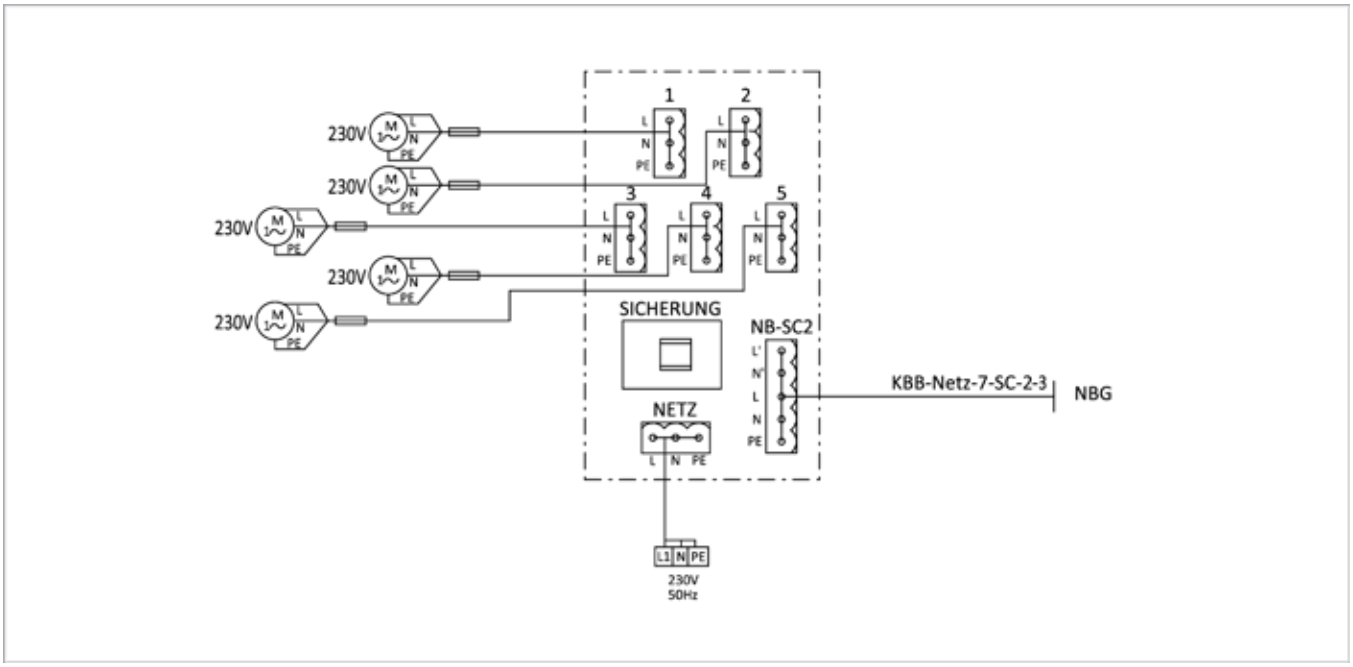


Fig. 32: Expansion board for SolvisControl 3 mains module

KBB	*Cable harness*	NB-SC2	*SolvisControl 3 mains module*
NBG	*SolvisControl 3 mains module*	FUSE	*Glass socket fuse, 5x20mm, max. 4A delayed-action*
MAINS	*Mains connection*		

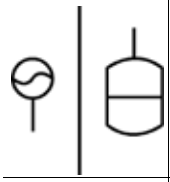
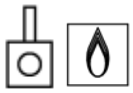
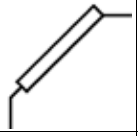
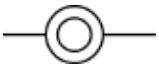
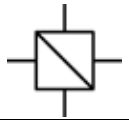
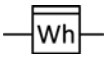
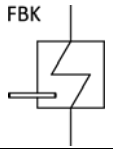
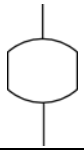
9.4 Explanation of Symbols

9.4.1 Hydraulic elements

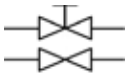
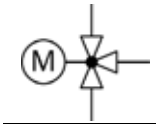
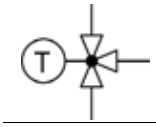
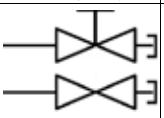
Valves

Symbol	Meaning
	Manometer
	Thermometer

Components

Symbol	Meaning
	Membrane expansion vessel
	Oil or gas burner
	Solar collector
	Consumers in the heating circuit
	Heat exchanger
	Heat quantity counter
	Solid fuel boiler (FBK) or pellet boiler (Lino 3)
	Primary tank VG-xx

Valves

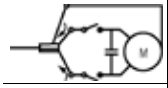
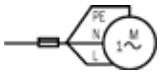
Symbol	Meaning
	Shut-off valve or valve
	Adjusting valve
	Bleeding tap
	Motor-driven mixing valve
	Gravity brake / non-return valve
	Safety valve
	Thermostatic mixing valve
	Solar cap valve
	Boiler filling and draining valve
	Thermal discharge safety device (TAS)

Other hydraulic components

Symbol	Meaning
	Volume flow encoder
	Pump
	Sludge separator
	Drinking water filter

9.4.2 Electrical symbols

Actuators

Symbol	Meaning
	General actuator (pump / control valve / mixing valve / connection)
	Servomotor (e.g. on the three-way mixing valve)
	Motor (e.g. of a pump)

Sensors

Symbol	Meaning
	General sensor (temperature sensor, volume flow encoder, etc.)
	Volume flow encoder
	Temperature sensor

Other electrical components

Symbol	Meaning
	Jumper
	On/off switch (button with lock function)
	Automatic firing system
	Lightning protection box
	Room control element
	Terminal S3 at output A12

9.5 Accessories

All accessories are listed in the ➔ *Solvis price list*.

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