Installation
SolvisMax

Stratified solar storage tank

including WWS-24 or WWS-36
hot water station

Wärme. Leben. Zukunft

Contents

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.

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.

2 Safety Notes

Observe the safety notes

This is for your own safety

- Make sure that you are familiar with the safety notes before beginning work.
- Observe and adhere to the relevant safety regulations and the valid accident prevention regulations.

2.1 General Information

Work to be performed only by qualified technicians

- Only trained specialist companies may install or maintain the system.
- Only qualified electricians may work on electrical equipment.

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

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.

2.2 Regulations

Observe the following regulations

- DIN EN 12828 Heating systems in buildings
- DIN 4752 Hot water heating systems
- DIN 4757 Solar heating systems
- DIN 4753 Water heating systems
- DIN 4807 Expansion vessels
- DIN EN 1717 Protection of drinking water
- DIN 1988 Drinking water supply systems (TRWI)
- DIN EN 806 Specifications for installations inside buildings conveying water for human consumption
- VDI 2035 Part 1, Prevention of damage in water heating installations - Scale formation
- VDI 2035 Part 2, Prevention of damage in water heating installations - Water corrosion
- Directives of the German Institute for Structural Engineering
- German Building Regulations ("Landesbauordnung" - LBO)
- VDE 0100/IEC 60364 Erection of low voltage systems

3 System Versions

The SolvisMax is available in 3 storage tank sizes: 450, 750, and 950 litre.

It is available in a basic version (SolvisMax Solo) and in versions with different heat generators (SolvisMax Gas, SolvisMax Öl, SolvisMax Fernwärme (with district heating), SolvisTeo and SolvisVaero).

Depending on the configuration, the SolvisMax may also include a solar heat transfer station in addition to a hot water station (choice of WWS-24 and WWS-36).

The solar heat transfer station can also be retrofitted at any time to utilise all of the benefits of solar thermal support.

4 Scope of Delivery

The basic kit is delivered in several packages plus documentation. Additional accessories are added to create an entire system.

All accessories are listed in the Solvis price list.

SolvisMax

- Steel stratified storage tank that can be fitted with an integrated heat generator, completely pre-assembled, including sensor sleeves and an integrated solar and heating combined stratified charger.
- Charging module including pre-fitted SolvisControl system controller and, depending on the version, with a WWS-24 or WWS-36 hot water station and solar heat transfer station, where applicable.
- Sensor cable harness
- Piping sets
- Front bracket
- Flange insulation
- Protective cover
- Storage tank insulation
- Assembly pack (with seals, outdoor sensor, attachment material, etc.)
- Documentation

5 Installation Conditions and Transport

Maintain the following conditions

- When (dry) storing, transporting, and assembling the components, ensure that the storage tank is not scratched, warped, or deformed by external factors. Otherwise, the safe and long-lasting operation of the storage tank cannot be guaranteed.

Storage tank transport

WARNING

Danger due to the heavy transport weight (more than 200 kg)

Personal injury or damage to property.

- Provide suitable transport equipment or enough people for installing the storage tank.
- The storage tank connections must be facing up so that they do not get damaged.
- To transport the storage tank, tilt it back on the carrying aid. If necessary, a sack trolley can be used between the rear feet.
- Do not fit the adjustable feet until after transport because they may break or become damaged during transport.

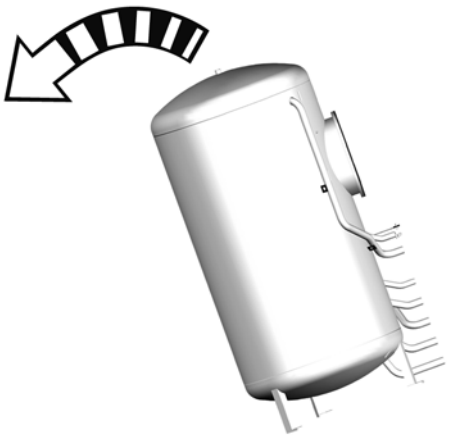


Fig.1: Tilting the storage tank

CAUTION

Heavy weight of the system may be hazardous.

Risk of damage to the system and building

- Ensure that the floor has sufficient load bearing capacity to support the weight of the system, especially that of the filled storage tank.

- Floors must be level at the installation site (+/-1 cm).
- The system must only be operated in a frost-proof room inside a building.
- The system must not be installed in damp rooms such as kitchens, bathrooms, or laundry rooms.

To prevent fluids from spilling (leakages), we recommend using a suitable draining option (floor drain).

If the design makes this impossible, we recommend using a collecting tray; see the price list.

Observe the clearances

- 0.5 m at the front (for operating and performing maintenance work)
- 0.3 m at the side and rear (for the installation of insulation, jacket thickness 120 mm).

6 Installation

6.1 Basic equipment

6.1.1 Storage tank

Installing and insulating the storage tank

1. Plan the space required: approx. 0.30 m of space to the side and rear of the storage tank for installing the storage tank insulation.
2. Screw in the feet (**1**) up to a maximum of 35 mm and screw in foot (**2**) completely.
3. Install the storage tank and use the adjustable storage tank feet (**1**) to align the storage tank vertically (spirit level).
4. Twist out the foot (**2**) until it reaches the floor.

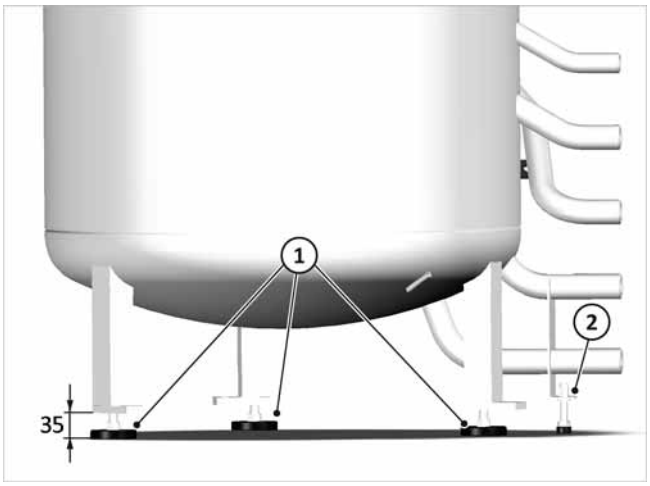


Fig.2: Installing the storage tank

5. Remove the envelope (**2**) with the copy of the nameplate and place it to the side.

Attach the copy of the nameplate to the storage tank in a clearly visible position when you have finished the installation; see ➔ *fig. 34, p. 26*.

6. Remove the carrying aid and close the socket (**1**) using the supplied plugs.
7. Fit the sensor cable harness (**4**) to the storage tank and set S1, S3, S4, and S9 into the sensor sleeves using heat conducting paste.
8. Attach the cable to the container wall using the pipe fixings (**5**), lead it to the storage tank holder (**3**), and attach it there. In the next steps, guide the cable outward through the opening in the insulation for the storage tank holder.

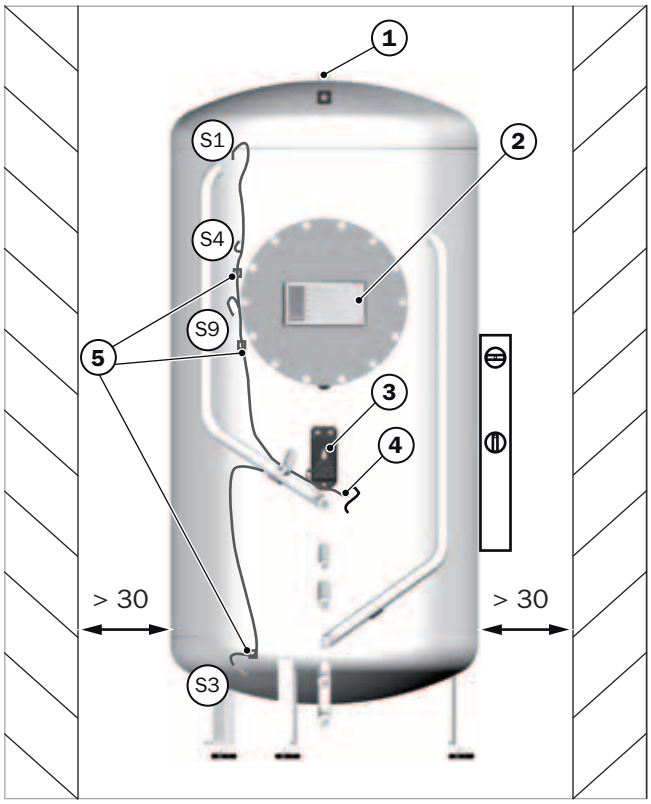


*Fig.3: Storage tank with the nameplate in the envelope (**2**)*

9. Position the floor base plates below the storage tank and position the lower cover base plates on the storage tank.

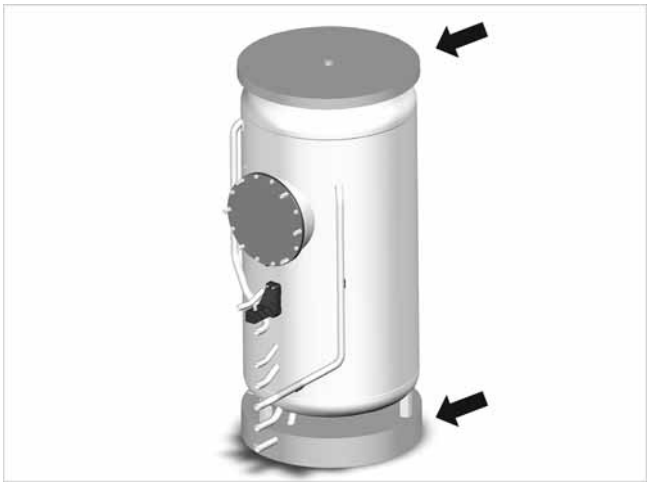


Fig.4: Position the floor and cover base plates

10. Fitting the flange collar shell

Fig.5: Fit the flange collar shell

11. Screw the rear flange insulation (in 2 parts) onto the flange cover or, where applicable, onto the heat exchanger insert.

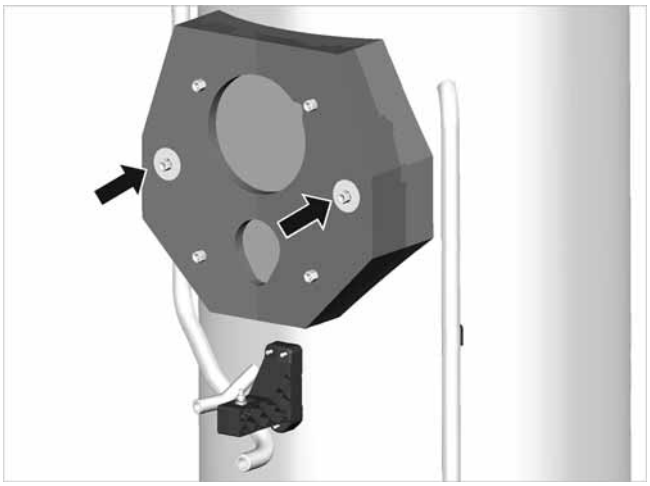


Fig.6: Install the rear flange insulation

12. Lay the insulation, guide it through the specified passage over the bleeder connection, and close it. Press the cover strips onto the fastening strips.

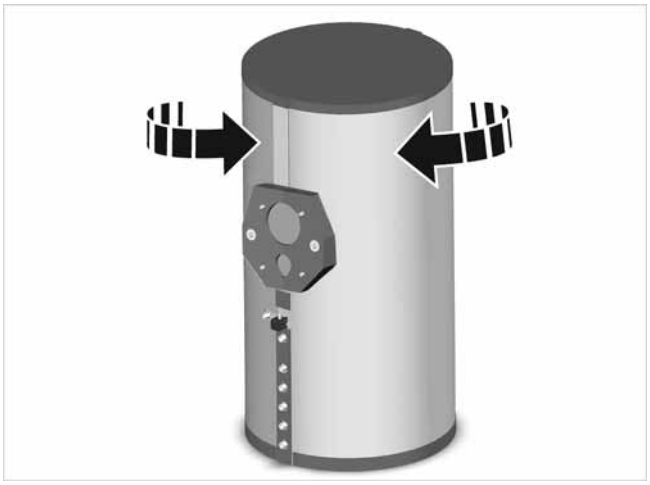


Fig.7: Insulating the storage tank

Fitting the burner or heat generator insert ➔ *Chapter 5.1, Installation instructions for the heat generator*.

You do not have to switch to a different document unless you want to fit a heat generator in the storage tank.

To protect the storage tank against contamination during the installation, you can attach an installation guard that is supplied separately over the storage tank insulation.

Installing the front flange insulation

1. Install and screw on the front flange insulation in the order (**1**), (**2**), (**3**). If you are using a heat generator, insulate the front surfaces using insulation pads.

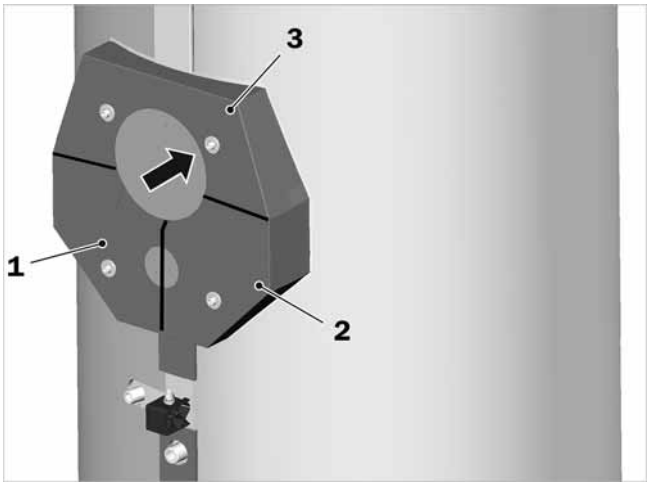


Fig.8: Installing the front flange insulation

Fitting the front bracket

The storage tank and base console are connected to each other by the front bracket (U support).

1. Attach the front bracket (U support) to the bracket on the storage tank and screw it on by hand with the washer and hexagon nut.

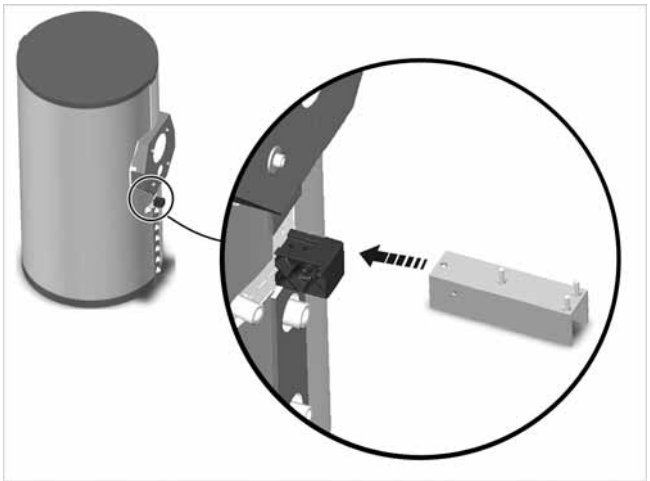


Fig.9: Front bracket

2. Guide the bolt through the bore hole on the side and fasten with the retaining washer.

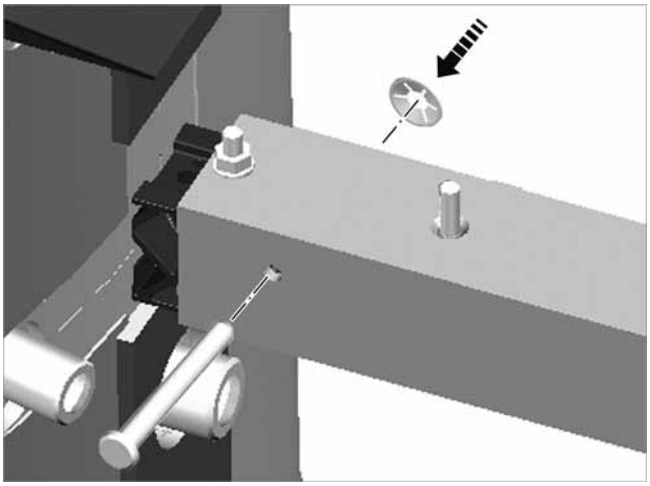


Fig.10: Bolt and retaining washer

Fitting the ball valve

1. Fit the supplied ball valve for the hot water station and solar heat transfer station.

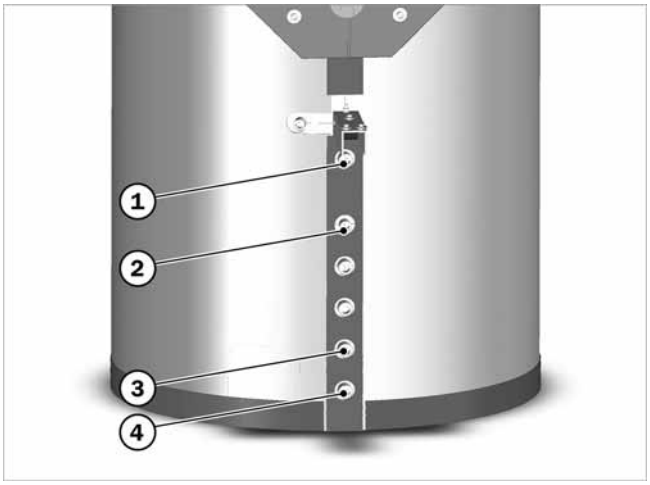


Fig.11: Fit the connections with ball valves

1 *Hot water flow*
2 *Solar flow*
3 *Hot water return*
4 *Solar return*

Installing the charging module

The charging module contains the appropriate stations and valves for the specific system configuration.

1. Put the charging module in place and fasten it with the nuts. The oblong holes in the frame allow for horizontal alignment (**2**).

2. Set the clearance (**3**) on both sides; the height of the clamp can be aligned marginally (**1**), depending on the tightness of the nuts.

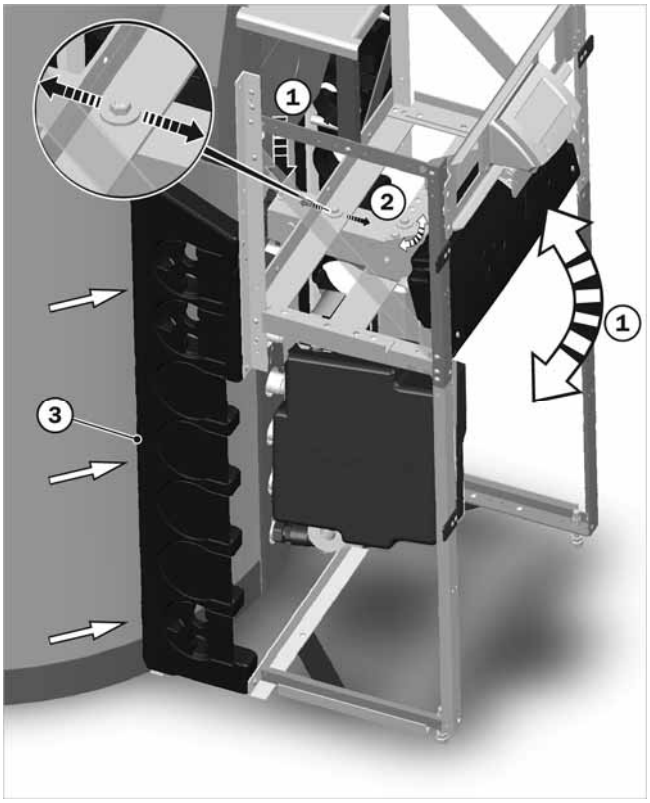


Fig.12: Aligning the charging module

3. Finally, screw the feet at the front of the frame downwards to the floor.

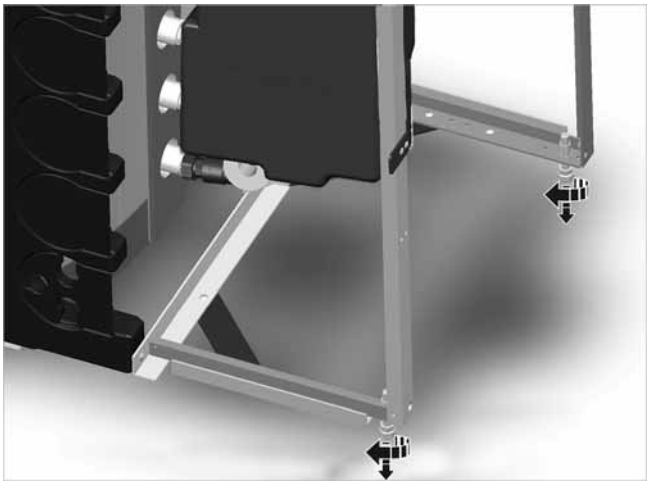


Fig.13: Screw the frame feet downward to the floor

Pipe lead-throughs

The pipe lead-throughs sit on the side of the frame to the left and right. They are adapted to the different lines using inserts.

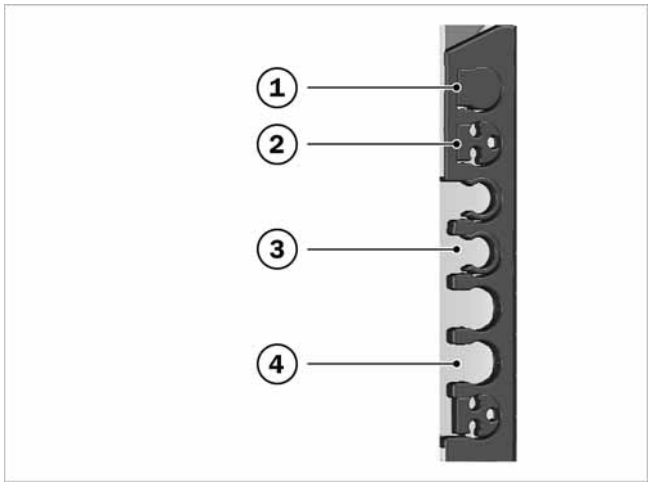


Fig.14: Inserts for the pipe lead-throughs

1 *Cover (closes the pipe lead-through)*
2 *3 x reducer (for typical burner lines, electrical lines, etc.)*
3 *Reducer insert (e.g. for drinking water)*
4 *No insert (e.g. heating pipes)*

Guide the bleed connection

All pipe lead-throughs can be fitted on either the left or right side of the frame.

1. Guide the bleed connection for the storage tank to the second pipe lead-through from the top of the frame with the supplied corrugated pipe and fasten it to the frame using the mounting bracket.

The system operator should be able to reach the bleeder from the outside.

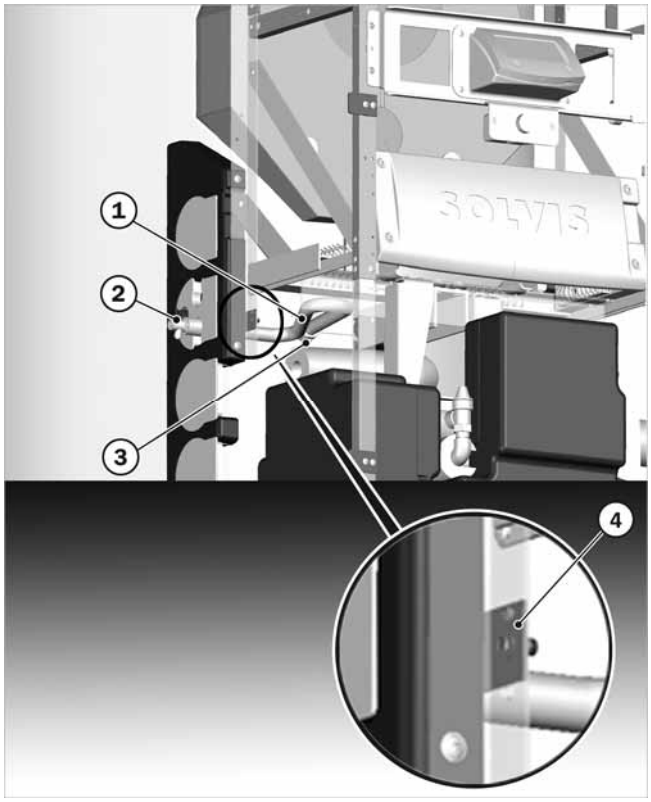


Fig.15: Fit the bleeder connection with the corrugated pipe

1 *Corrugated pipe*
2 *Bleeder*
3 *Bleeder connection*
4 *Mounting bracket*

6.1.2 Heating circuits

Connect the heating circuit

1. You can insert the corrugated pipe into the station on either the right or left and connect it to the container.
2. Press the insulation into the pipe lead-throughs and connect it to the heating circuit on the outside of the frame.

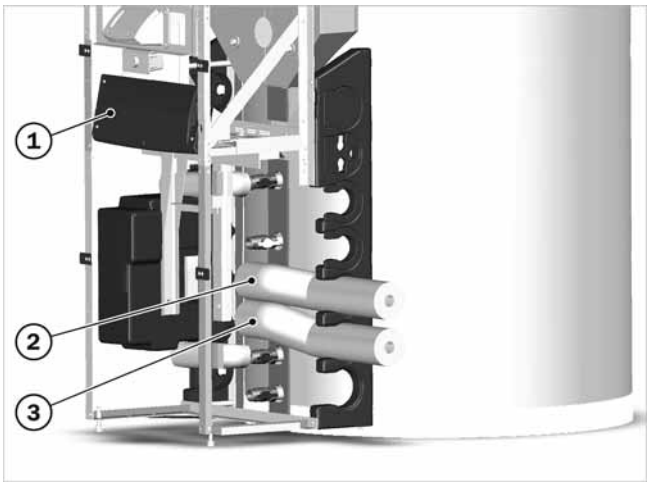


Fig.16: Hydraulic heating circuit connection

1 *Mains module housing*
2 *Heating return*
3 *Heating flow*

3. Guide the cable for the flow sensors and pumps from the heating circuit station through a pipe lead-through (with a 3 x reducer insert) into the front frame.
4. Guide the cable further into the mains module housing.

CAUTION

Danger due to overpressure

Potential damage to the heating system

- The system must be secured using a heating safety valve with a reaction pressure of max. 3 bar.

IMPORTANT

Expansion vessel required for heating systems

- An expansion vessel is required for heating systems.
- Take the heating water volume into account when selecting the size of expansion vessel, and opt for a larger rather than a smaller vessel (in accordance with DIN 4807-2 or local equivalent).

6.1.3 Membrane 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 on the expansion vessel

- The admission pressure of the membrane expansion vessel must be set carefully in order to ensure safe and fault-free operation.
- Make sure no counterpressure can build up when setting the admission pressure (depressurise the system or open the cap and drain valve).

Set the expansion vessel admission pressure (MEV)

1. Determine the admission pressure of the expansion vessel with the following formula. However, it must be a minimum of 1.5 bar and maximum of 2.0 bar.
2. Release the admission pressure on the expansion vessel valve or refill with nitrogen if necessary.

- Admission pressure too low:
  Risk of steam build-up and air intake increases.
- Admission pressure too high:
  Blow out via the safety valve when the maximum operating temperature is reached causes a risk of water loss and consequent pressure loss.

$$p_o = \frac{H_{Hk} - H_{Sp}}{10} + 0{,}5\ [\text{bar}] \qquad (\text{min. } 1{,}5\ \text{bar})$$

P_0 *Expansion vessel admission pressure [bar]*
H_R *Height of the highest point of the radiator [m]*
H_{St} *Height of the lower edge of the storage tank [m]*

Installing the expansion vessel

1. Attach the expansion vessel to the wall or floor. Observe the length of the corrugated pipe from the station.
2. Connect the expansion vessel using the cap valve as per DIN EN 12828.

6.1.4 Hot water station

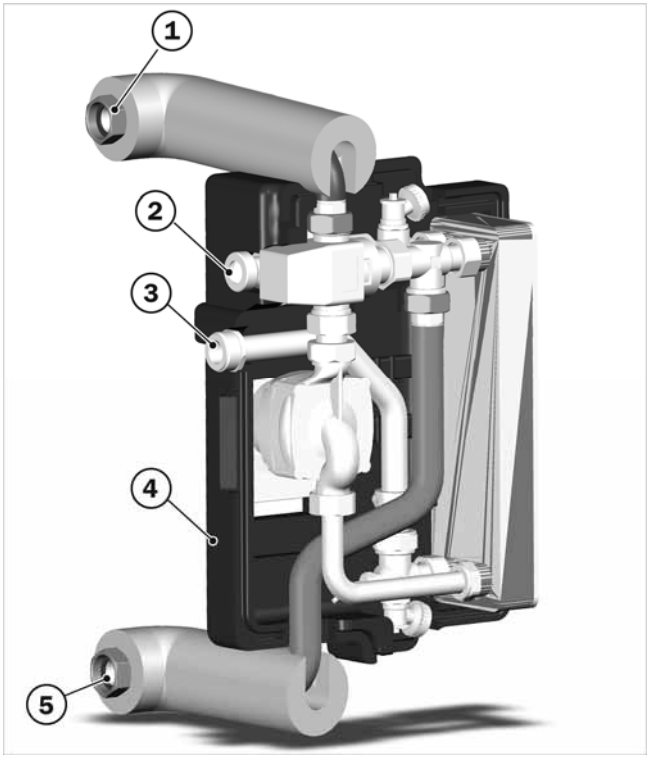


Fig.17: WWS-24 connections

1 *Primary flow (HW flow, here: WWS-24)*
2 *Drinking water, cold*
3 *Drinking water, hot*
4 *Thermal insulation shell, rear*
5 *Primary flow (HW return)*

The hot water station is already prefitted in the charging module.

Connecting the hot water station

1. Connect the station on the storage tank side to the ball valves for the storage tank connections using the corrugated pipes.

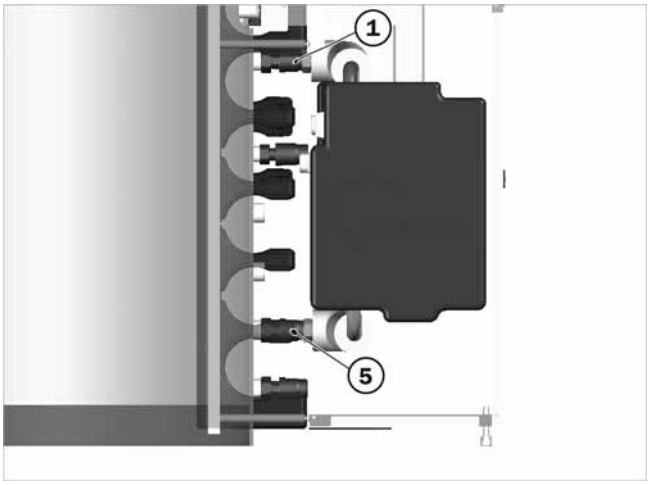


Fig.18: Connecting the hot water station

1 *Primary flow (HW flow, here: WWS-24)*
5 *Primary flow (HW return)*

2. Screw the cold and hot water corrugated pipes in the station onto the connections using seals. Then press the lines into the pipe lead-through and the pipe insulation on either the left or the right (use the supplied reducers for the pipe lead-through).

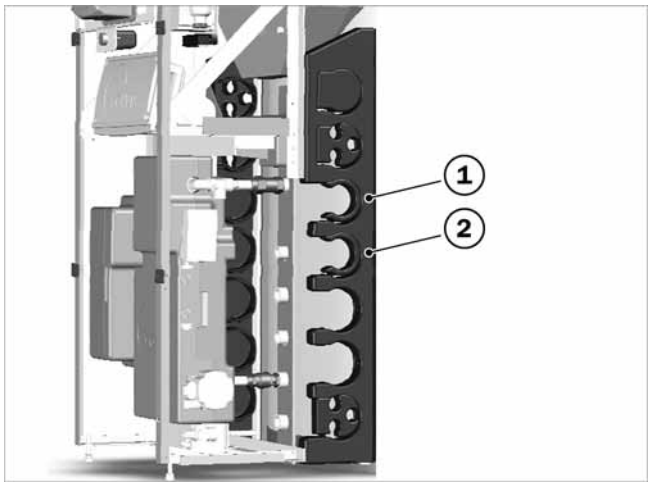


Fig.19: Drinking water pipe lead-through for the hot water station

1 *Cold water lead-through with reducer insert*
2 *Warm water lead-through with reducer insert*

3. Connect the corrugated pipes to the drinking water supply outside of the frame. If the pipes are guided out of the frame to the left, they can be shortened on the pipe section.

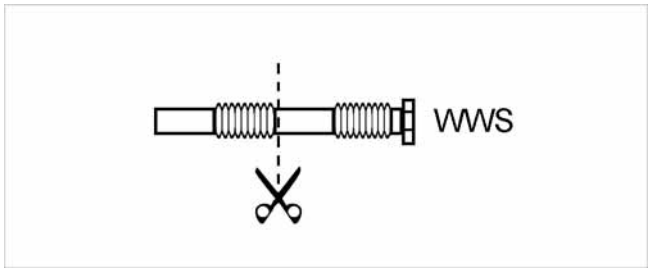


Fig.20: If required, shorten the corrugated pipe

Connect the circulation line according to the system diagram (ALS-MAX-7). Due to the integrated circulation return stratification in the heating layer charger (combined stratified charger), an external circulation station is not required.

6.1.5 Solar heat transfer station

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!

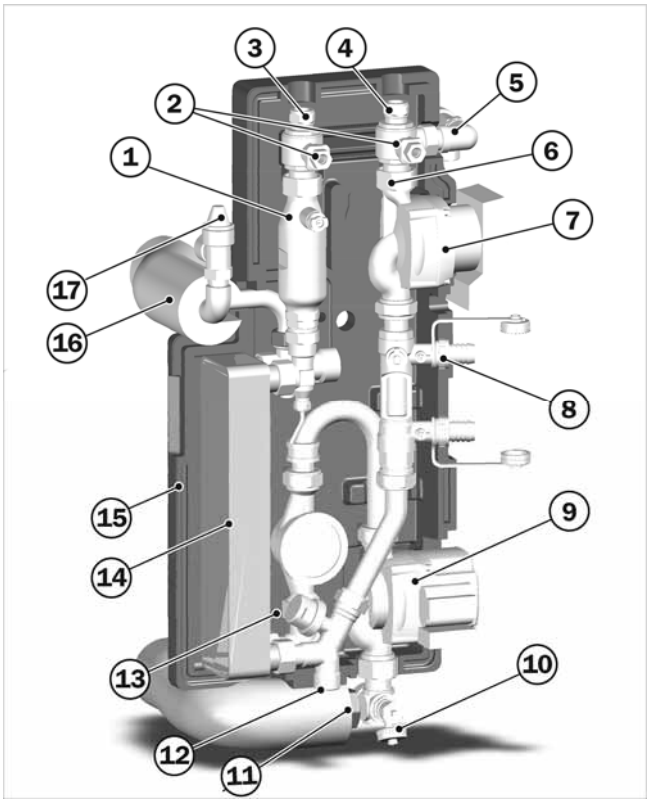


Fig.21: Overview of the solar heat transfer station parts

1 *Compressed air cylinder*
2 *Ball valves*
3 *Solar flow (collector side)*
4 *Solar return (collector side)*
5 *Safety valve (collector side)*
6 *non-return flap*
7 *Primary pump*
8 *Filling and flushing connections*
9 *Secondary pump*
10 *Boiler filling and emptying valve*
11 *Solar return (storage tank side)*
12 *Membrane expansion vessel connection*
13 *Pressure sensor*
14 *Plate heat exchanger*
15 *Rear wall insulation shell*
16 *Solar flow (storage tank side)*
17 *Safety valve (storage tank side)*

Depending on the system configuration, the solar heat transfer station is a part and in this case is prefitted in the charging module.

Connecting the solar heat transfer station (optional)

1. Remove the cover of the insulation shell and connect the station (connections **11** and **16**) to the ball valves on the storage tank connections using the 2 corrugated pipes.

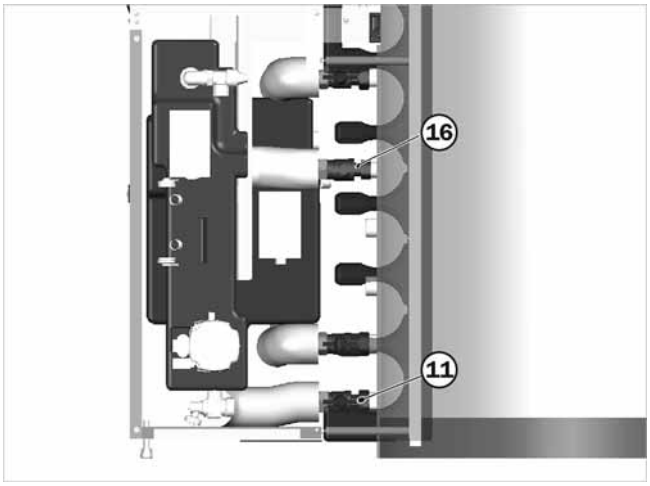


Fig.22: Connecting the solar heat transfer station

11 *Solar flow return (storage tank side)*
16 *Solar flow (storage tank side)*

2. Connect the collectors to the top connections using the SMR-12 or SMR-15 quick-fit ducts. Solar flow on the left (**3**), solar return on the right (**4**). Use support sleeves.

3. For SMR-15, use the corresponding clamp rings from the accessory pack.

You can guide the quick-fit duct to the solar heat transfer station either from the top (in front of the flue duct) or through the side pipe lead-throughs.

4. Screw the hose nozzle onto the collector-side safety valve (**5**) from behind and fasten it with the discharge hose. Guide the discharge hose into the supplied vessel.

5. Fit the storage tank-side safety valve (**17**) with a blow out tube.

6. On the T-piece of the solar return (**12**), connect the corrugated pipe for the membrane expansion vessel and lead it from the charging module.

6.1.6 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 on the expansion vessel

- The admission pressure of the membrane expansion vessel must be set carefully in order to ensure safe and fault-free operation.
- Make sure no counterpressure can build up when setting the admission pressure (depressurise the system or open the cap and drain valve).

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.

Contact our Technical Sales department if you have any questions.

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.

$$p_0 = \frac{H_{Koll} - H_{MAG}}{10} + 0{,}8\ [bar] \qquad (min.\ 0{,}8\ bar)$$

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.

Install the solar expansion vessel

1. Attach the solar expansion vessel to the wall or the floor.

2. Install the cap valve onto the SG-xx solar expansion vessel using the manometer T-piece. Connect it to the corrugated pipe that comes from the station.

3. If the system requires a VG-x primary tank, install it between the cap valve and the corrugated pipe.

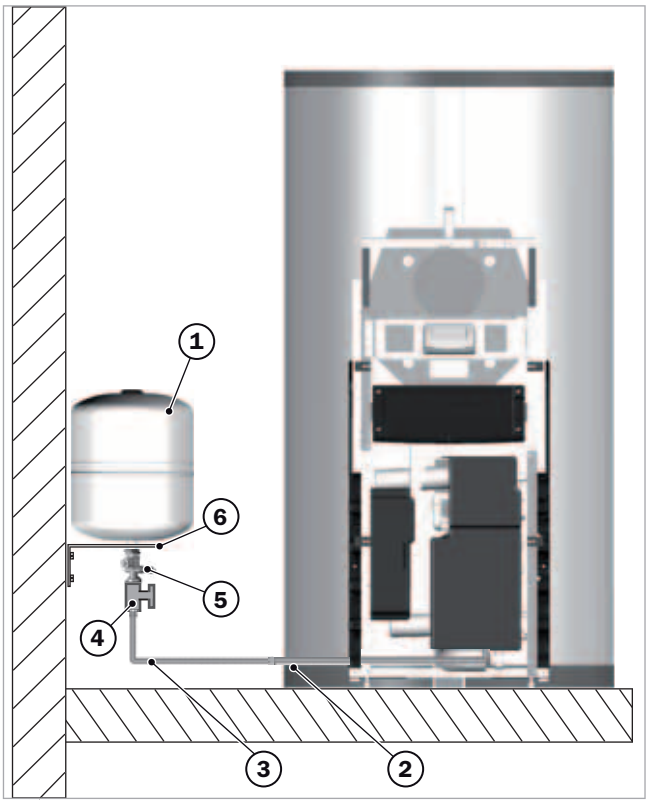


Fig. 23: Solar expansion (here: AG-24) fitted

1 *Solar expansion vessel (accessory)*
2 *Corrugated pipe*
3 *MEV corrugated pipe (accessory)*
4 *Manometer*
5 *Cap valve*
6 *Mounting bracket (accessory)*

Reasons for choosing a primary tank

- A primary tank protects the membrane in the expansion vessel from inadmissibly high temperatures.
- German VDI guideline 6002 recommends the use of a primary tank when the contents of the pipes are less than 50% of the intake capacity of the expansion vessel that is used.

6.2 Burner (continued)

To continue the installation of the heat generator, see ➔ *chapter 5.2, Installation instructions for the heat generator*.

You do not have to switch to a different document unless you want to fit a heat generator in the storage tank.

6.3 Electrical connection

6.3.1 General information

DANGER

Risk of electrical shock

Damage to health up to and including cardiac arrest possible.

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

CAUTION

Country-specific regulations

Country-specific 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.

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

Prevent the system from being influenced by electromagnetic fields.

Risk of heating system malfunction or failure.

- Prevent electrostatic discharges.
- Keep strong electrical fields such as those created by mobile phones away from the heating system. These fields can cause sensitive electronic components to malfunction.

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 overall cable resistance for the sensor cables may not exceed 2.5 Ohms. For cables with a diameter of 0.25 mm², this corresponds to a length of up to 5 m.
- For diameters of 0.5 or 0.75 mm², the maximum cable length is 15 or 50 m.
- The sensor cable may not be longer than necessary. For very long cables, sensor correction can be performed to minimise systematic deviation errors.

CAUTION

Observe ambient conditions

Malfunction or failure of system possible.

- Avoid ambient temperatures outside of the permitted range of 0°C to +50°C.
- Avoid dew condensation and an annual mean relative humidity higher than 75>% (briefly 95%).

6.3.2 Equipotential bonding

DANGER

Be careful of electrically conductive parts

Overvoltages may result in injury or even cardiac arrest (electric shock).

- Equipotential bonding must always be carried out according to DIN VDE 0100.

Each building has a main earthing terminal for equipotential bonding in the building connection room. All of the conductive parts of a building, such as the heating or water pipes, are connected to this main earthing terminal using a equipotential bonding conductor.

Connect the equipotential bonding

Incorporate the unit into the local equipotential bonding.

1. Lay an equipotential bonding conductor with green and yellow marking and a cable width of at least 6 mm² from the main earthing terminal in the building connection room to the SolvisMax.
2. Attach the equipotential bonding conductor on the charging module console in accordance with the figure (see the “Equipotential bonding” label on the bottom of the console).

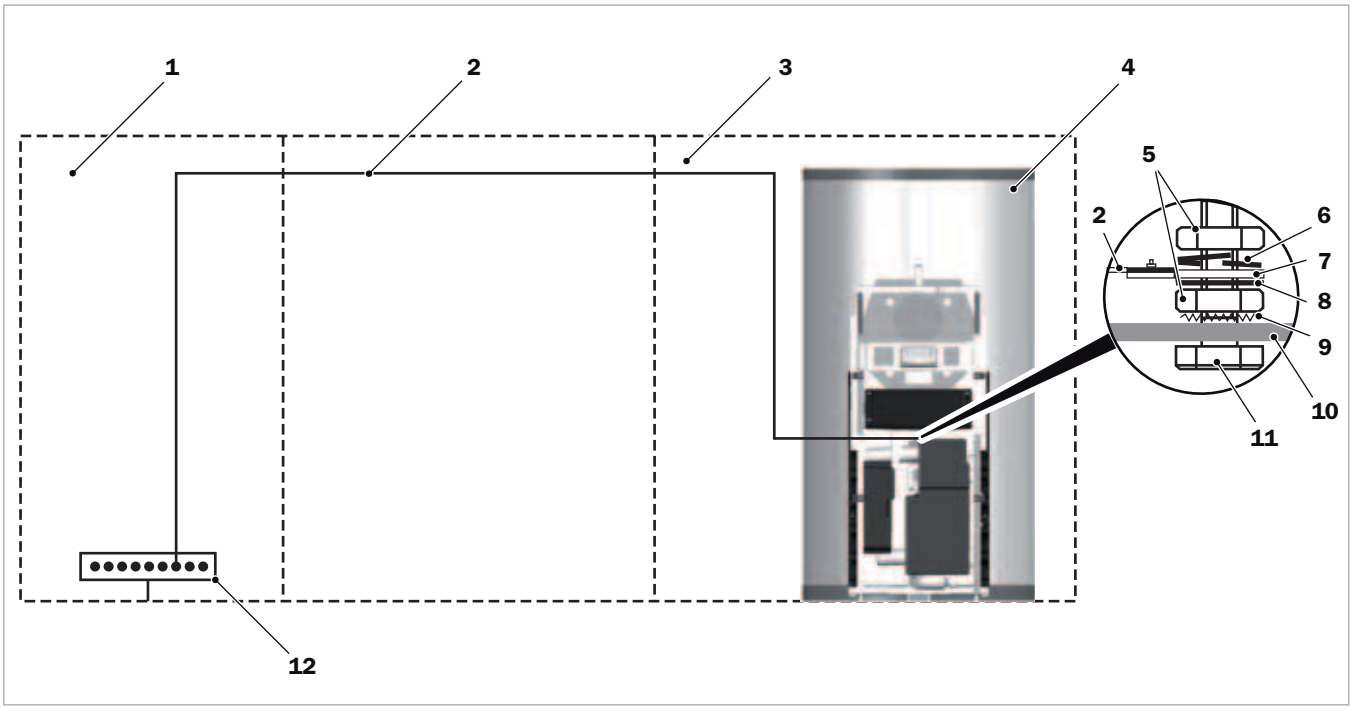


Fig. 24: Equipotential bonding for the SolvisMax

1	*Building connection room*	7	*Cable lug*
2	*Equipotential bonding conductor*	8	*Washer*
3	*Installation site*	9	*Toothed washer*
4	*SolvisMax*	10	*SolvisMax charging module console*
5	*Nut*	11	*Screw*
6	*Spring washer*	12	*Main earthing terminal*

6.3.3 Connection to the mains module

Checking the connections on the mains module

1. Connect the sensors, servomotors, and pumps according to the connection diagram and check their connections.

Connection diagrams for the mains module, see ➔ *“Connection and system diagrams” document (ALS-MAX-7).*

Connecting the power supply

1. Lead the supply line to the mains module and connect it to the terminals “Mains PE/N/L”.
2. Lead the supply line through the strain relief device and secure.

Check the wiring to prevent the unit from malfunctioning:

- L = L, N = N, etc.
- 230 V must be applied to L.

6.3.4 Connecting the outdoor sensor

Installing the outdoor sensor

The outdoor sensor (S10) measures the temperature on the outdoor wall.

- Position the outdoor sensor on the north or north-east side of the building.
- Half way up the facade, however at a height of at least 2.5 m (see fig.).

1. Lay a suitable sensor line on site.
2. Connect the outdoor sensor (polarity is not important).

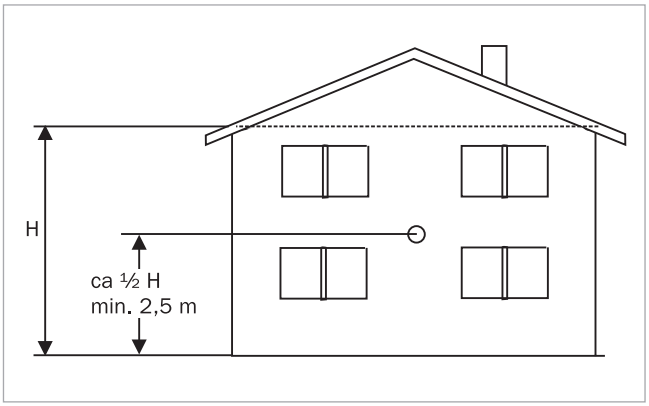


Fig. 25: Position of the outdoor sensor

6.3.5 Connecting the heating circuit station (only HKS-G)

Heating circuit mixer test run

- The terminals “open” and “close” from terminal strips (SM 1) and (SM 2) specify the run direction of the servomotor.
- If the mixer runs in the wrong direction, reverse the connections on these terminals.
- Connection to (A8/A9): Black wire on pin 9, brown on pin 8 and blue on N.
- Connection to (A10/A11): Black wire on pin 11, brown on pin 10 and blue on N.

Install the flow sensor

1. Slide the flow sensor into the sensor immersion tube on the ball valve of the heating circuit station and secure it using the screw.
2. Connect the cable to terminal S12 (heating circuit 1), S13 (heating circuit 2), or S16 (heating circuit 3). This must be a “heating circuit match”: that is, if the pump has been connected to A3 (= heating circuit 1), then the sensor must be connected to S12 (= heating circuit 1).

The check is temporarily carried out in manual mode, see ➔ *“Testing the outputs” in the operating instructions (BAL-MAX-7-I).*

6.3.6 Connecting the room controller

Fit the housing

DANGER

Risk of electrical shock

Damage to health up to and including cardiac arrest possible.

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

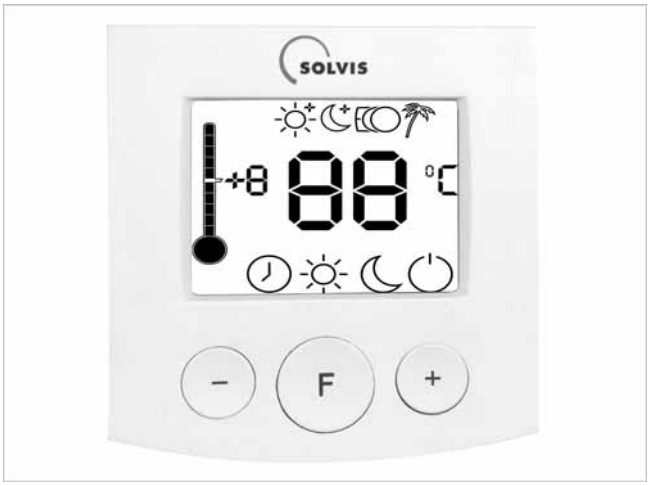


Fig. 26: Room controller BE-SC-2

- Install the room controller in the coldest room to be heated.
- It must not be installed in close proximity to a heat source or by a window.
- No thermostat valves should be used in this room.

1. Lift the front cover on the lower side with a screw driver.
2. Swing the front plate forward slightly and pull upwards to remove it (see ➔ *figure 27*).
3. Fix the housing to the wall with the supplied plugs and screws.

Fig. 27: Opening the housing

Connect the room controller

It is connected via a two-wire line. The line is used for both the voltage supply and data transfer from the mains module.

1. Connect the connection line to the two-pole terminal of the room controller, observing the polarity (see ➔ *fig. 28*).

Fig. 28: Connect the room controller

Connect to the mains module

1. Connect the two-wire line to one of the terminal pairs (“R 1” to “R 3”) on the mains module (observing the polarity).

The room controller has polarity reversal protection to ensure that it is not damaged if the polarity is incorrect.

Close the housing

1. Before closing, ensure that the plug and the socket board of the plug connection are aligned.

If nothing is shown on the display after switching the system on, the poles of the connection lines may be reversed.

2. Close the housing.

6.3.7 Completing the connection tasks

Close the protective housing for the mains module

1. Check that all lines have been routed correctly and were not caught while the cover was being closed.
2. Carefully put on the strain relief devices.
3. Check that all the socket boards have been plugged into the mains module.
4. Fasten the cover (**1**) using 4 screws (**2**).

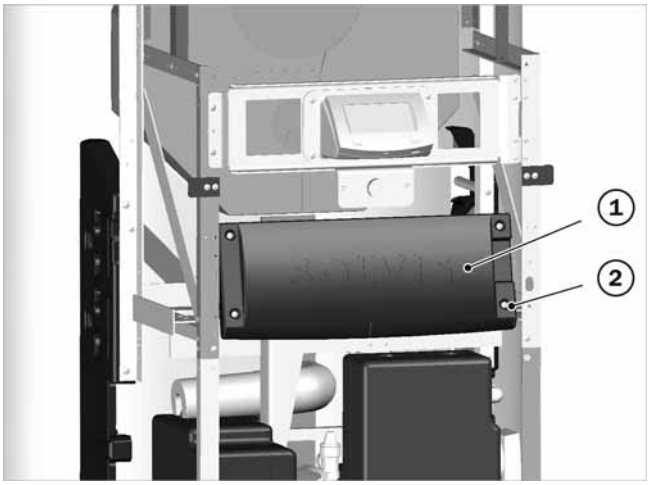


Fig. 29: Fastening the mains module cover

6.4 Filling the storage tank

CAUTION

Observe the quality of the fill water

There may be damage due to limescale formation/corrosion in the heating system.

- The fill water for the heating system must meet the requirements of VDI 2035, parts 1 and 2.

If water treatment is required for the raw water, we recommend the “Permasoft-ALU” system from Permatrade-Wassertechnik GmbH.

Fill the system (pressure test)

1. Fill the system with fill water.
2. Bleed the system, including the storage tank.
3. Check that there are no leaks.

CAUTION

Pay attention to the pressure in the heating system

The safety valve may blow out.

- The maximum permitted pressure for the SolvisMax is 3.0 bar.

4. Set the filling pressure to 0.5 bar above the admission pressure, between 2.0 and 2.5 bar.

7 Start-Up

Start-up takes place in the prescribed order:

When starting up the system, the start-up report (included in the documentation) must be filled out completely and kept together with the system.

7.1 Configuration of the Solvis-Control

Configuring the SolvisControl

SolvisControl must be configured before starting up the system.
After configuration, the startup process can be continued.

1. Configure the SolvisControl.

Carry out all the steps described, see ➔ *sec. "Configuration of the SolvisControl" in the operating instructions (BAL-MAX-7-I).*

2. Perform the SolvisControl basic settings.

Perform all of the described steps in accordance with ➔ *"Basic settings: Heating, water and circulation, if required" in the operating instructions (BAL-MAX-7-I).*

For a basic introduction on operating the system controller, see ➔ *sec. "Operating the SolvisControl" in the operating instructions for (BAL-MAX-7-K).*

7.2 Setting the thermal mixing valve

TMV factory default

The thermal mixing valve (TMV) on the hot water station has a factory setting of 60 ˚C:

- **WWS-24**: "**60 ˚C**"
- **WWS-36**: from "**70 ˚C**", turn closed with approximately 3 turns (≈ 60 ˚C)

To reach the rated output, the TMV setting has to be changed.

- WWS-24: "**65 ˚C**"
- WWS-36: From factory default 1, turn open toward "**70 ˚C**" (≈ 65 ˚C)

If the drinking water is hard, this setting may cause increased lime deposits.

7.3 Starting up the burner

Start up the burner; see ➔ *the "Start-up" chapter in the installation instructions for the burner or external heat generator.*

7.4 Starting up the heating system

"Thermally inhibit" the heating water

We recommend heating up the whole heating system to approximately 60 ˚C (you must observe the permitted temperatures).

1. Switch the hot water pump to "ON" (manual mode) on the SolvisControl while heating up the water to circulate the storage tank volume (output A2) ("Installer menu > Outputs > Manual mode").
2. Set the heat generator to maximum power; see the ➔ *chapter "Switching the heat generator on and off for maintenance" in the (installer) operating instructions for the heat generator*.
3. If possible, activate the heating circuits (pump, mixer, and thermostat valves).
4. When the setpoint is reached at S4, the heating process can be finished.
5. Then, check the filling pressure. It should be within a range of 1.5 to 2.5 bar.

7.5 Starting up the solar circuit

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:

- 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.

Flush the primary side

1. Close the cap valve to the SOL-MAG (**7**).
2. Set the flow meter ($\dot{V}$) to the flushing position.

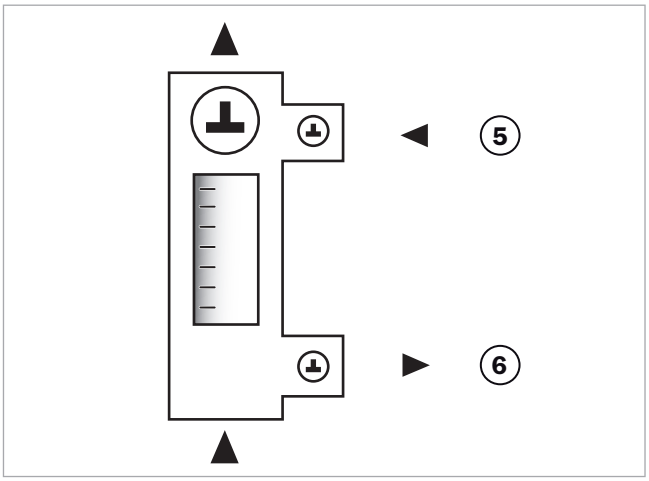


Fig. 30: Flow meter in flushing position

3. Connect the pressure hose for the flushing and filling station (**FFS**) to the BFD valve (**5**).
4. Connect the FFS flushing hose to the BFD valve (**6**).
5. Open BFD valves (**5**) and (**6**) and flush them with LS-rot antifreeze in the direction of operation: FFS => BFD valve (**5**) => Collector field => BFD valve (**6**) => FFS
6. Flush for at least 15 minutes until all air is removed and the solar liquid exits into the FFS container without bubbles.
7. Close the BFD valve (**6**) and increase the system pressure to 4 bar.

You can read the solar pressure on the SolvisControl in the “System status” window.

8. Close the BFD valve (**5**) and switch off the FFS. Check the system to ensure that there are no leaks.
9. Bleed the deaerator (**8**).
10. Open the bleed valve on the cap valve (**7**) and open the cap valve slowly to bleed the connection pipe. Then, close the bleed valve and open the cap valve fully.
11. Set the system pressure to the calculated operating pressure by slowly opening the BFD valve (**6**). Rule of thumb: MEV admission pressure + 0.3 bar; see ➔ *chapter “Membrane expansion vessel”, p. 13*.
12. Set the flow meter ($\dot{V}$) to the flow position (see ➔ *fig. 32, p. 25*), close BFD valves (**6**) and (**5**), remove the SBS, and screw on the caps.

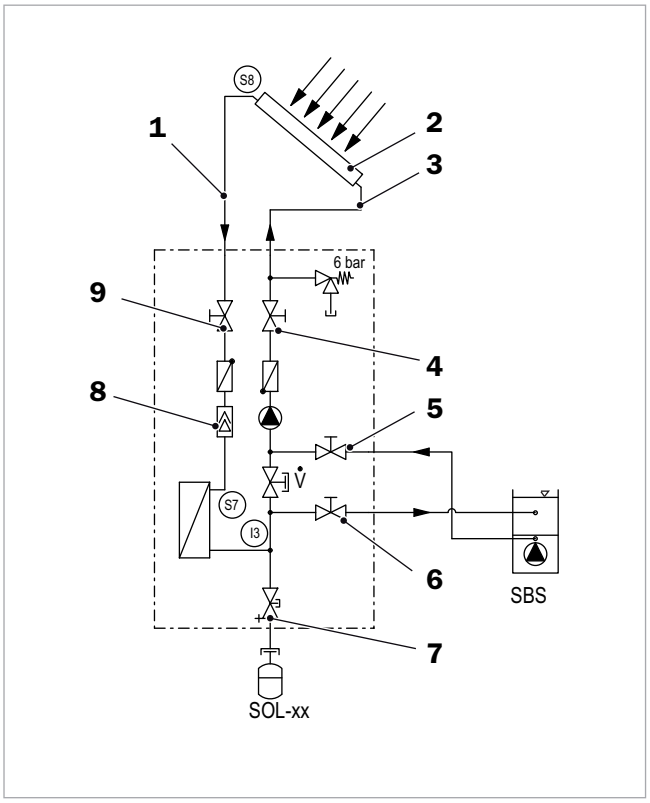


Fig. 31: Primary circuit: Flushing the plate heat exchanger

1	*Solar flow*
2	*Solvis collectors*
3	*Solar return*
4	*Ball valve in the solar return*
5	*BFD valve for flushing hose*
6	*BFD valve for pressure hose*
7	*Cap valve*
8	*Deaerator*
9	*Ball valve in the solar flow*
FFS	*FUES-SBS flushing and filling station*
SOL	*Solar expansion vessel*
$\dot{V}$	*Flow meter*

Finishing the solar station

1. Ensure that the solar circuit and the storage tank connections are fully insulated.
2. Attach the insulation shell to the station.
3. Position the empty 3 litre cannister behind the solar station and guide in the safety valve blow out tube.

CAUTION

Bleed the solar system after start-up

- Once the solar circuit has been refilled, gas will be emitted during operation; this will collect in the station deaerator (**8**). The gas emissions will 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).

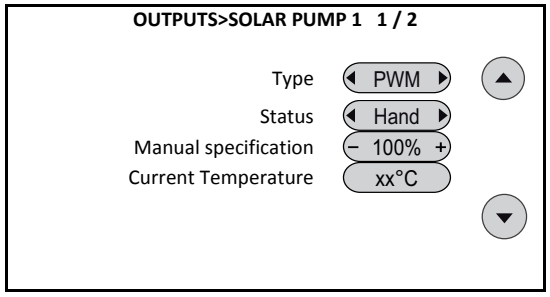
- With maximum control, the value:

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

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.

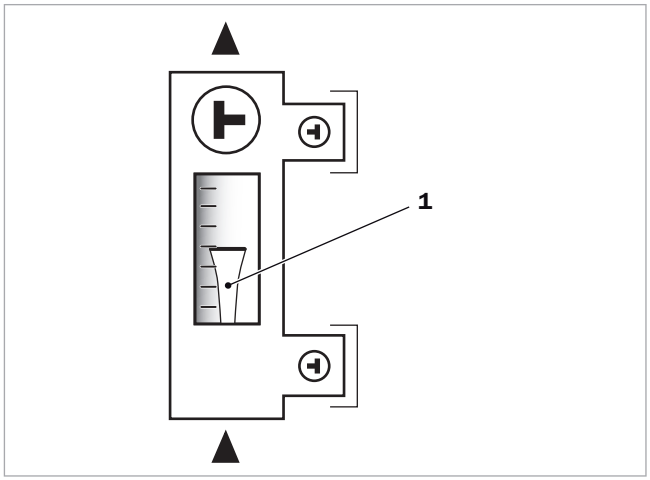
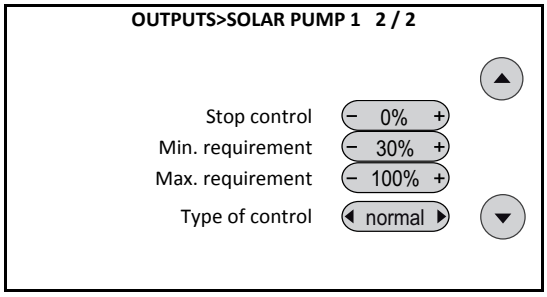


*Fig. 32: Read the volume flow at the upper edge of the float (**1**)*

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.

7.6 Basic settings

Carrying out the basic settings

Final basic settings and checks are required before starting up the system. Start-up can continue once these settings have been made.

1. Perform the SolvisControl basic settings.

- ➔ *"Skid control",*
- ➔ *"Plausibility check" and*
- ➔ *"Saving your data" in the operating instructions (BAL-MAX-7-I).*

7.7 Final Tasks

Testing the hot water temperature

1. Test the hot water temperature of a tap.

If the water is not warm enough, see ➔ *sec. "Troubleshooting" in the operating instructions for (BAL-MAX-7-I).*

Completing the work

1. Fit the casing. When doing so, insert the side parts from behind, first the lower one and then the upper one.

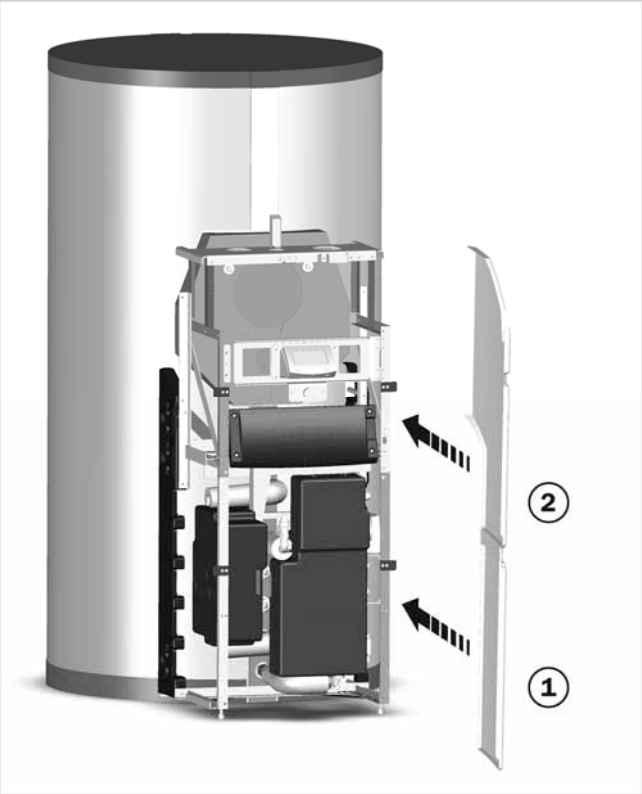


*Fig. 33: Insert the lower side part (**1**) first.*

2. Affix the nameplate copy to the system paneling in a visible location.
3. Label pipes and cables.
4. Keep the instructions by the system.

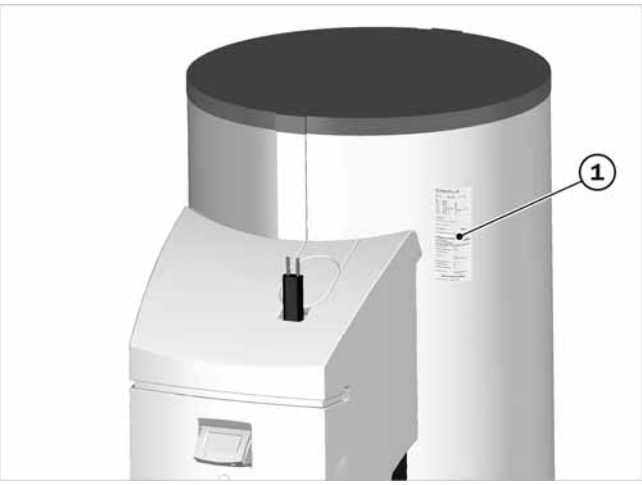


*Fig.34: Nameplate (**1**) attached to the insulation*

5. Instruct the system operator regarding expert operation.
6. Explain the settings for heating, hot water and circulation.

8 Maintenance

Maintenance and cleaning work must be performed once a year in accordance with German Energy Conservation Regulations (EnEV) and to maintain warranty claims.

- Maintenance must be performed by a specialist and documented in the maintenance report.
- Keep the maintenance report together with the system.

8.1 General maintenance

Checking the general condition (annually)

1. Check the general condition. Remove dirt with a damp cloth. Do not use caustic or solvent-based cleaners.
2. Check that the system controller functions flawlessly (sensor values, operating modes and set values).
3. Check that hot water production and the circulation controller function properly.
4. Check to ensure that mixer motors and mixers are functioning flawlessly (plausible sensor values, correct opening direction and operating modes in automatic).
5. Check that the pumps function flawlessly (heating circuit pumps, hot water pump, solar pump).

Bleeding the storage tank

WARNING
Sudden steam blasts that occur when bleeding the storage tank can be hazardous.
Risk of scalding hands and face.
- Use a hose and suitable collecting vessel for safe bleeding.

1. Plug the hose onto the bleeder.
2. Carefully bleed the storage tank.

Checking the pH value of the heating water

1. Check the pH value of the heating water and readjust it if necessary.

Flushing the hot water heat exchanger, if necessary

Only flush if contamination or calcification leads to an interruption in the hot water supply.

1. Flush the hot water heat exchanger on the drinking water side in the opposite direction of operation using 20% formic acid.
2. Check the aerators on the taps and clean if necessary.
3. Carefully flush the taps after cleaning.

WARNING
Handling acids and alkalis can be hazardous.
Risk of acid burns on hands and face.
- Observe the safety data sheet.
- Apply the specified safety measures.

Testing the admission pressure on the expansion vessel (MEV)

1. Check the admission pressure on the expansion vessel and adjust it if necessary.

Checking the filling pressure on the heating system

1. Check the filling pressure on the heating system and adjust it if necessary.
2. Check all connections for leaks (visual inspection).

Checking the safety functions

1. Check the safety valves for leaks and correct functioning in the drinking water and heating circuits, and in the solar circuit, if necessary.

8.2 Solar system 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.

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.

You can read the solar pressure on the SolvisControl in the “System status” window.

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

1. Close the cap valve (**7**, see ➔ *fig. 31, p. 24*) 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 "Membrane expansion vessel", p. 13.*

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.

8.3 Burner maintenance

Service the burner; see ➔ *the chapter "Maintenance" in the installation instructions for the burner or external heat generator.*

9 Technical Data

9.1 Storage tank

SolvisMax technical data

Designation	Abb.	Unit	457	757	957
Rated volume		**[litre]**	**450**	**750**	**950**
Actual volume		[litre]	470	718	909
Storage tank distribution					
Hot water standby volume		[litre]	96	171	82 / 212 / 301 Provision regarding sensor positioning
Heating buffer volume		[litre]	22	34	34
Solar buffer volume		[litre]	352	512	793 / 663 / 574
Tank					
Tank material		–	S235JR, primed exterior, raw interior		
Heating flow/return connection		–	28 mm pipe		
Cold/hot drinking water connection		–	28 mm pipe		
Operating limits					
Maximum operating pressure		[bar]	3		
Maximum operating temperature		[˚C]	95		
Maximum heating flow/return volume flow		[m³/h]	2		
Dimensions					
Maximum width (including insulation)	D	[mm]	870	1020	
Maximum depth	T	[mm]	1380	1550	
Maximum height	H	[mm]	1800	1940	2330
Tilt height without insulation	k	[mm]	1670	1760	2140
Diameter without insulation	d	[mm]	650	790	
Exhaust connection height	A	[mm]	1569		
Centre of exhaust elbow to back of insulation	U	[mm]	1064	1210	
Minimum front spacing		[mm]	500		
Minimum side/rear spacing		[mm]	300		

Dimensions of the system

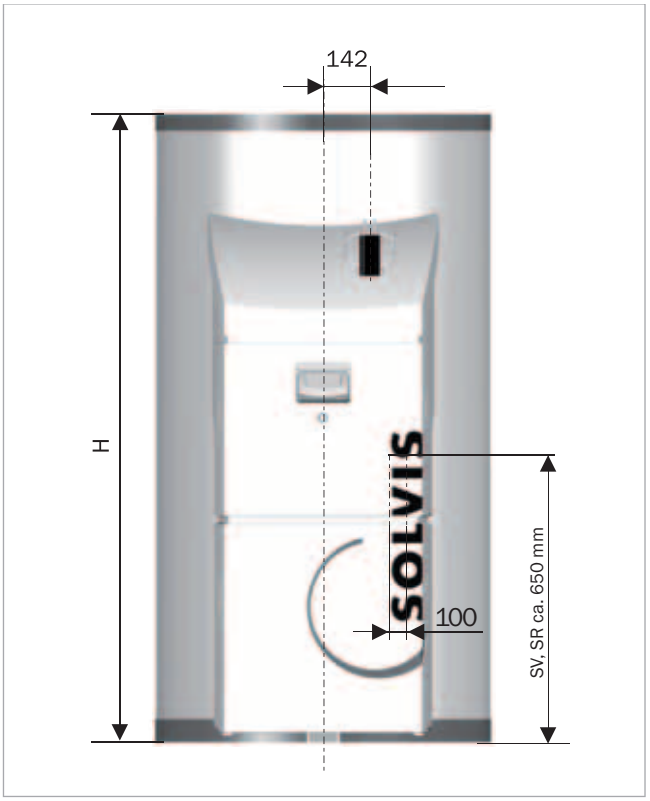


Fig. 35: Front view

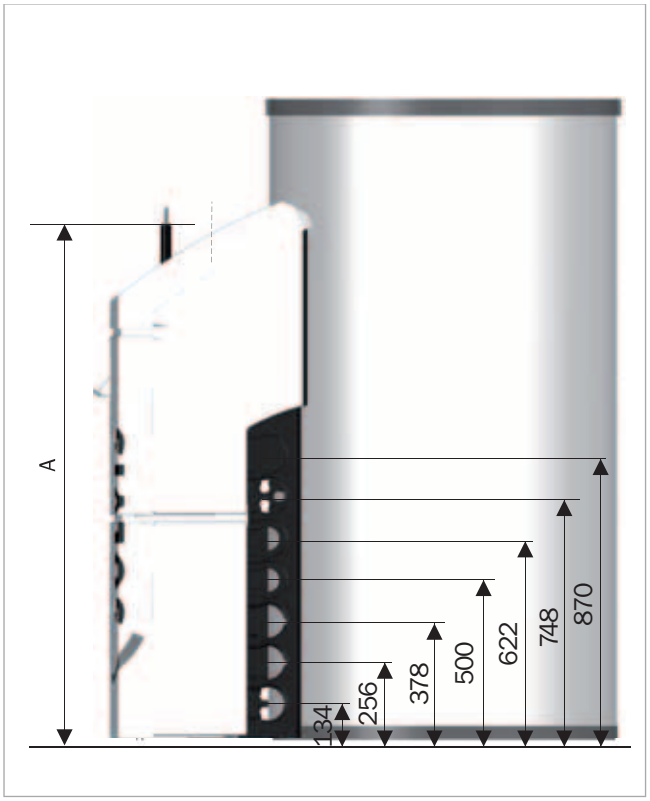


Fig. 37: Side view

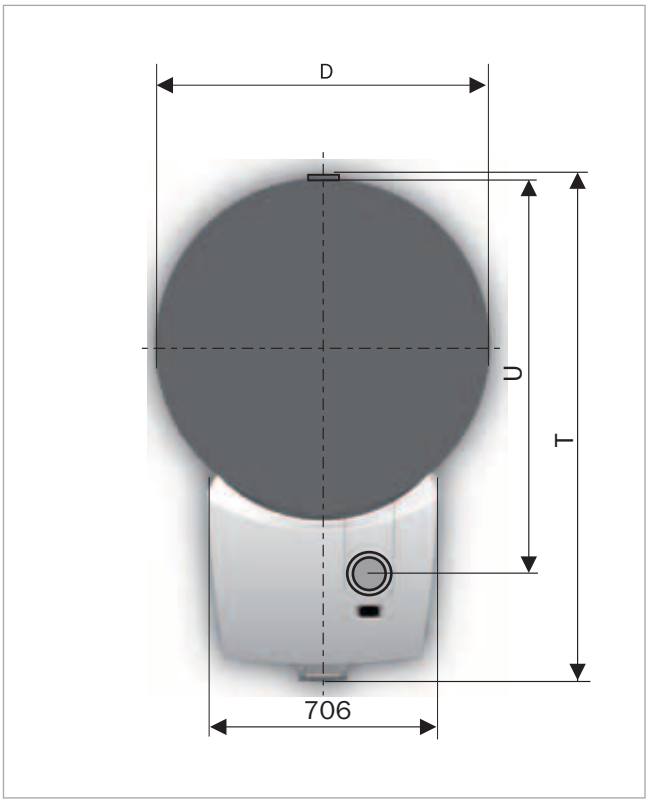


Fig. 36: Top view

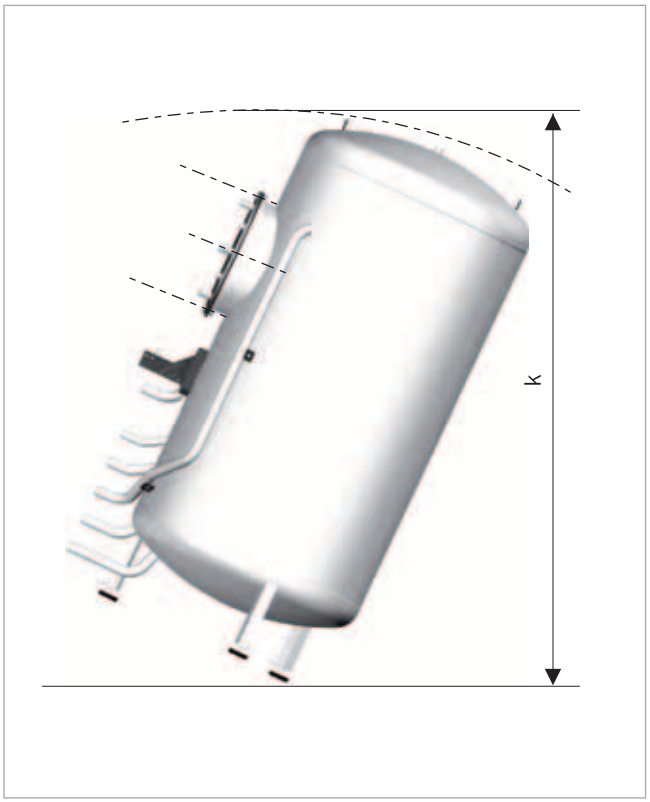


Fig. 38: Tilt height

9.2 Hot water station

Hot water station technical data

Designation	Unit	WWS-24	WWS-36
Dispensing volume flow			
TWK/TWW/flow = 10/48/60 ˚C	[l/min]	21	31
TWK/TWW/flow = 10/48/65 ˚C	**[l/min]**	**24**	**36**
TWK/TWW/flow = 10/55/65 ˚C	[l/min]	18	22
TWK/TWW/flow = 10/55/70 ˚C	[l/min]	-	32
TWK/TWW/flow = 10/60/65 ˚C	[l/min]	14	21
TWK/TWW/flow = 10/60/70 ˚C	[l/min]	-	26
Operating limits			
Maximum operating temperature	[˚C]	95	
Maximum operating pressure (drinking water side)	[bar]	10	
Ambient temperature	[˚C]	50	
Pump			
Make/type	Make/type	Wilo Yonos-PARA RS 15/7.0	
Min. inflow pressure (heating side)	[mWS]	0.5	
Current consumption	[W]	3-45	
Power consumption	[A]	0.03-0.44	
Energy efficiency index	EEI	≤ 0.20	
Plate heat exchanger			
Make/type		Danfoss XB06H+-1-30	Danfoss XB06H+-1-50
Number of plates		30	50
Capacity per side	[litre]	0.4	0.6
Discharge output			
Primary 65/19 ˚C and secondary 10/48 ˚C	[kW]	64	95

9.3 SolvisControl system controller

For exact specifications, see ➔ *the chapter "Technical data" in the operating instructions (BAL-MAX-7-I).*

9.4 Solar heat transfer station

Solar heat transfer station technical data

Designation	Unit	SUES-Max
Max. recommended collector surface	[m²]	5-20
Rated flow	[l/(h*m²)]	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]	12/15
Primary pump		
Make/type		Wilo Yonos-PARA ST 15/13.5
Operating temperature	[˚C]	0-110
Ambient temperature	[˚C]	50
Pressure level		PN10
Minimum inflow pressure	[mWS]	0.5
Current consumption	[W]	3-76
Power consumption	[A]	0.028-0.7
Energy efficiency index	EEI	< 0.21
Plate heat exchanger		
Make/type		Danfoss XB05M-1-30
Number of plates		30
Capacity per side	[litre]	0.3
Performance		
Primary 75/60 ˚C and secondary 55/70 ˚C		14 kW
Primary 65/33 ˚C and secondary 25/60 ˚C		7 kW.
Secondary circuit		
Volume flow encoder		VSG-SÜS
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
Current consumption	[W]	2-25
Power consumption	[A]	0.04-0.3
Energy efficiency index	EEI	< 0.20

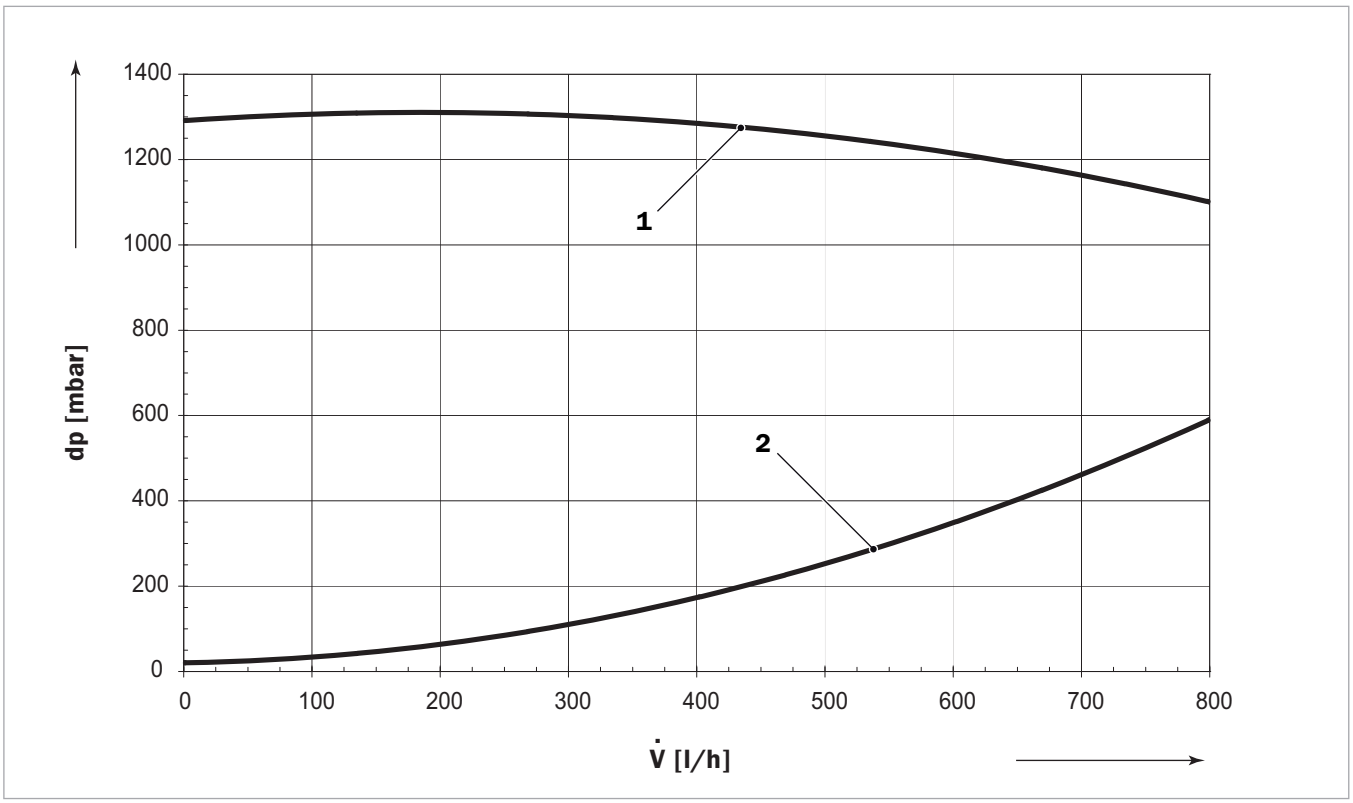


Fig. 39: Pressure loss curve for the primary circuit

1 *Yonos ST13,5*

2 *Primary circuit of the SÜS-Max*

10 Appendix

10.1 Sensors and connections on the storage tank

Fig. 40: Front view of the stratified storage tank

1	*Socket for bleeding*	7	*Solar return (SÜS)*
2	*Hot water flow (WWS)*	8	*Storage tank bleeder*
3	*Solar flow (SÜS)*	S1	*Upper storage tank temperature sensor*
4	*Heating return*	S3	*Storage tank reference temperature sensor*
5	*Heating flow*	S4	*Upper heating buffer temperature sensor*
6	*Hot water return (WWS)*	S9	*Lower heating buffer temperature sensor*

10.2 Accessories

All accessories are listed in the Solvis price list.

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