Conversion
SolvisMax 7 with external heating

External heating pumps operated on SolvisMax 7 solar heating systems

For storage tank sizes:

- 757
- 957

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 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.
- You should also follow the safety notes from the available system documentation.

2.1 Use

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.

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.

2.2 Functional description

With the aid of the conversion kit UB-MAX-7-EXT-WP, existing SolvisMax 7 Gas, Oil or Solo solar heating systems as well as new SolvisMax 7 Solo systems can be converted for operation with external heating pumps.

For this purpose, a flange cover with two integrated charging lances and a switching valve are fitted. The upper charging lance charges the hot water buffer while the lower lance charges the heating buffer. In the case of a HW requirement, the SolvisControl switches to HW priority mode, meaning that the heating circuit pump is switched off until the HW buffer is charged. Only then can the heating buffer be charged in the case of a heating requirement (heating mode).

The two operating modes are implemented hydraulically with the aid of one or two switching valves, depending on whether the external heating pump employed features its own switching valve. If the switching valve is already integrated, additional sensors must be fitted to the storage tank. Before starting the installation work, the heating pump manufacturer should be contacted to establish whether the heating pump features multiple flow connections.

The switching valves are controlled in parallel with the control of the heating circuit pump of the 1st heating circuit; see ➔ *section "Connecting the switching valve group", page 16*. When the heating pump is running, heating mode is assumed. If it is not running, water heating takes place when a corresponding HW requirement exists.

Up to 3 heating circuits can generally be operated. When using multiple heating circuits, it must be ensured that at least the 1st heating circuit is always active. Under no circumstances must the heating circuit pumps of the 2nd and 3rd heating circuits be started without the 1st heating circuit (e.g. through deactivation of the 1st heating circuit based on a room sensor).

Therefore, heating circuit 1 (output A3) should always be used for the rooms with the greatest heating requirement and should always be operated with the hot water priority setting.

The following functions are covered by the heating pump controller, where available (please address any questions to the heating pump manufacturer):

- Bivalence operation
- Smart grid
- Cooling function

We recommend close cooperation and discussion with the manufacturer whose heating pumps you are considering, particularly during the planning phase.

2.3 Prerequisites

If the use of an air/water heating pump is planned, the manufacturer should be contacted before purchasing the system to establish how much energy is required for defrosting in the worst case. If this is too high, this can result in a considerable drop in the temperature level in the HW buffer layer, meaning that the water cannot become sufficiently hot when required and this in turn will lead to reduced comfort.

For better heating pump efficiency, a time program adapted to the user behaviour should be selected on the SolvisControl 3 both for HW heating and for heating mode. This prevents the WP from maintaining a consistently high temperature level, which would otherwise result in greater losses.

When using an external heating pump, we recommend paying special attention to the HW production with regard to HW comfort and the associated storage tank size. Depending on the required level of HW comfort and the relevant number of persons, we recommend using the 750 or 950 litre storage tank size.

3 Scope of Delivery

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

The conversion kit consists of the following:

- Flange cover with integrated charging lances
- 2 switching valves
- Piping material
- Junction box
- Electrical connection material
- Installation instructions UBA-MAX-7-EWP (this document)

4 Installation

4.1 Preparations

Only when retrofitting existing systems

CAUTION

Allow the storage tank to cool down

Otherwise, there is no guarantee that the connection is sealed.

- Before commencing the work, allow the storage tank to cool down to room temperature.

Shutting down the system

1. Shut off the fuel supply if necessary.
2. Shut down the system and disconnect it from the power supply.
3. Open the protective cover and disconnect the burner plug.
4. Allow the system (burner) to cool down.

Draining the storage tank

Collect the heating system water in suitable containers so that it can be reused.

1. Remove the front casing.
2. Remove the flange insulation.
3. Drain the storage tank.

Drainage quantities (flange is free)

Storage tank size	Minimum drainage volume [l]
757	400
957	600

4.2 Flange cover installation

SolvisMax Gas/Oil only

Removing the combustion chamber

1. Remove the combustion chamber as described in the accompanying installation instructions for the heat exchanger insert seal (RPA-WT-DI).

SolvisMax Solo only

Removing the flange

1. Remove front casing and unscrew charging module from the storage tank.
2. Completely remove flange insulation.

Fig.1: Removing the flange insulation

WARNING

While loosening the screws, note the following:

The flange cover may become loose and fall off, which poses a risk of injury!

- Secure the flange cover so that it does not fall off.

CAUTION

While releasing the flange cover, note the following:

There may be leakage due to damage.

- The flange cover may need to be pried loose with a small lever. Do not damage the sealing surface on the storage tank flange when doing so.

3. Use a jaw spanner (size 19) to unscrew and remove the screws on the flange cover.

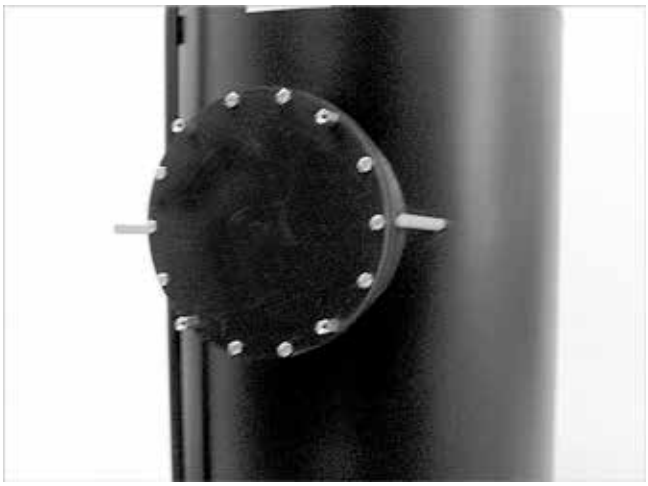


Fig.2: Removing the flange cover

All SolvisMax models

Fitting the new flange cover

1. Clean the sealing surfaces on the flange and flange cover and place the supplied flange seal onto the flange.
2. Insert the new flange cover into the storage tank opening: The pipe on the flange cover must point upwards.
3. Tighten the flange cover crosswise with a **tightening torque of 17 Nm**.

Fig.3: Inserting the flange cover

4.3 Storage tank for heating pump

The ➔ *installation instructions MAL-MAX-7* explain how to install a storage tank for the SolvisMax Gas and Oil systems as well as SolvisMax Solo systems with pellet boilers or third-party boilers.
The buffer for the external heating pump differs in its design and is installed as follows:

Fitting the sensors

1. Route the sensor cable from the mains module to the storage tank.
2. Fit the sensor cable harness (**4**) to the storage tank and set S1 and S3 into the sensor sleeves using heat conducting paste. S4 and S9 are installed in the following steps.
3. Fit sensor S4 to the lower flange cover charging lance ("**S4 Heating buffer top**" on the sticker) with heat conducting paste and cable binders.

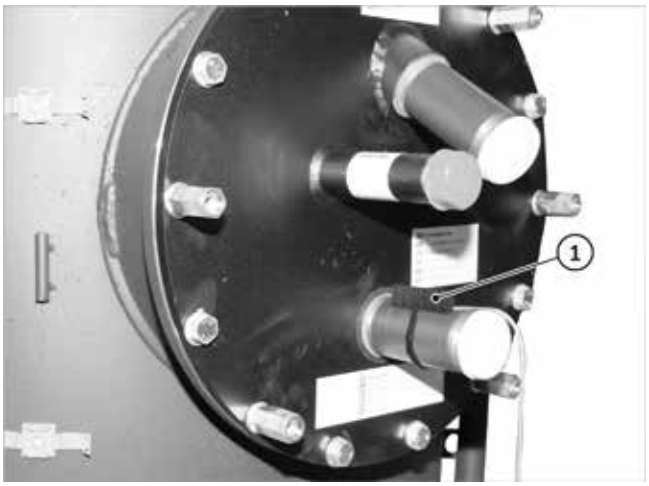


*Fig. 4: Sensor S4 (**1**) fitted*

4. Fit sensor S9 to the bleeder pipe (near the storage tank, with the "**S9 Heating buffer bottom**" sticker) with heat conducting paste and cable binders.

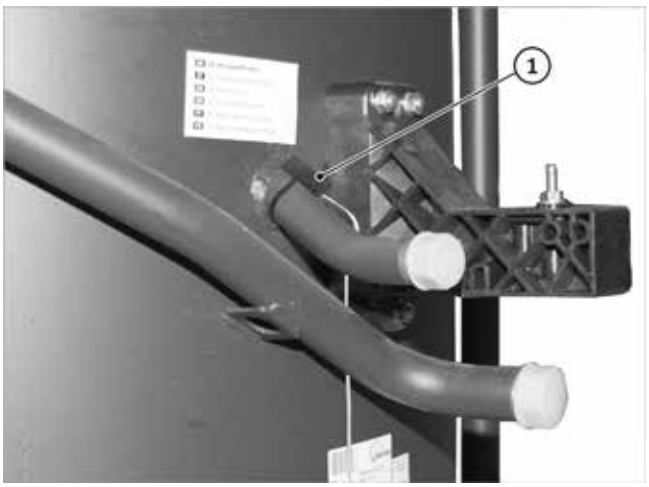


*Fig. 5: Sensor S9 (**1**) fitted*

5. Attach the cable to the container wall using pipe fixings (**5**), lead it to the storage tank holder (**3**) and attach it there. Then route the cable out through the opening in the insulation for the storage tank holder.

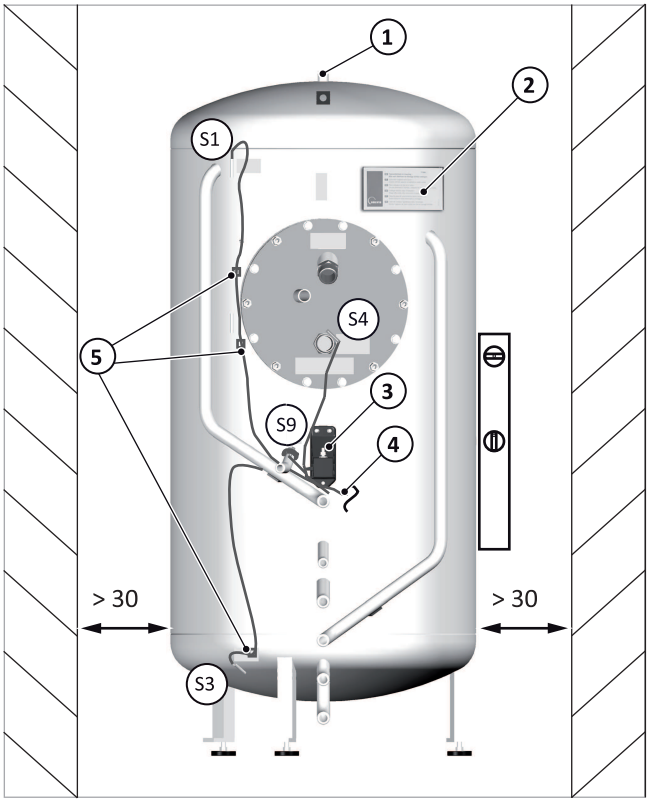


Fig.6: Arrangement of sensors, all dimensions in cm

1 *Socket*
2 *Envelope*
3 *Storage tank holder*
4 *Sensor cable harness and sensor cable*
5 *Line fixings*

Filling the recess on the flange insulation

To minimise heat loss, proceed as follows:

1. Fill the gaps in the flange insulation with the black hoses.

4.4 Heating pump connection pipes

Fitting the pipe assembly and charging module

Before installing the charging module, prepare the SolvisTeo connection as follows:

1. Fit the switching valve (**1**) on the third connection from the bottom.

The pipes can be routed either on the right or left.

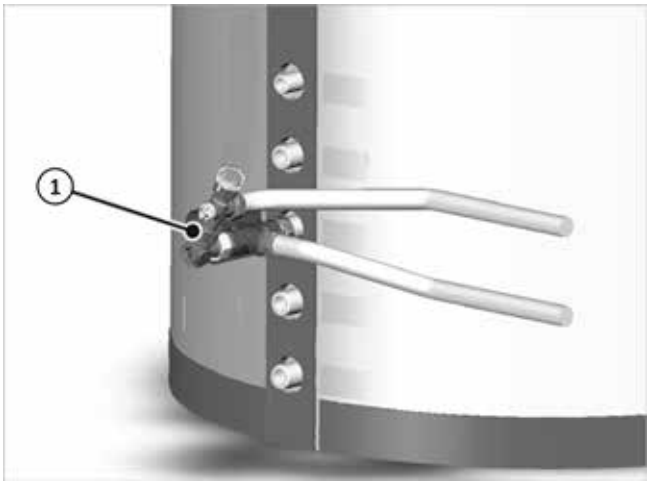


Fig. 7: Switching valve fitted

2. Fit the charging module as described in ➔ *section "Charging module", p. 9*.
3. Fit the pipes (**1**) and (**3**) and the pipe elbow (**2**); to do so, insert the flat seals and connect the pipes.

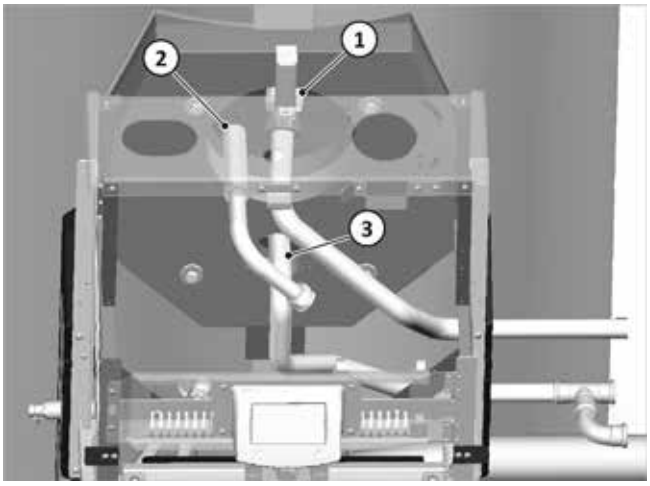


Fig. 8: Three tubes fitted at the top

4. Fit the connection pipe to the top pipe elbow (**1**), and route and connect it to the switching valve at the bottom (**2**) (see ➔ *Fig. 9*).

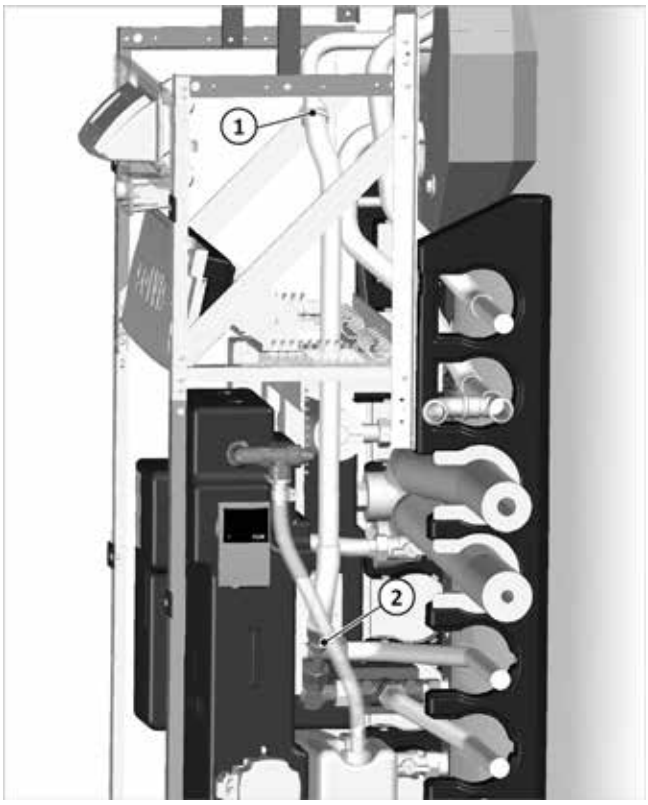


Fig. 9: Connection pipe fitted

Where applicable, fit the external heating pump ➔ *"Installation" section in the installation instructions of the heating pump manufacturer*.

4.5 Charging module

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.

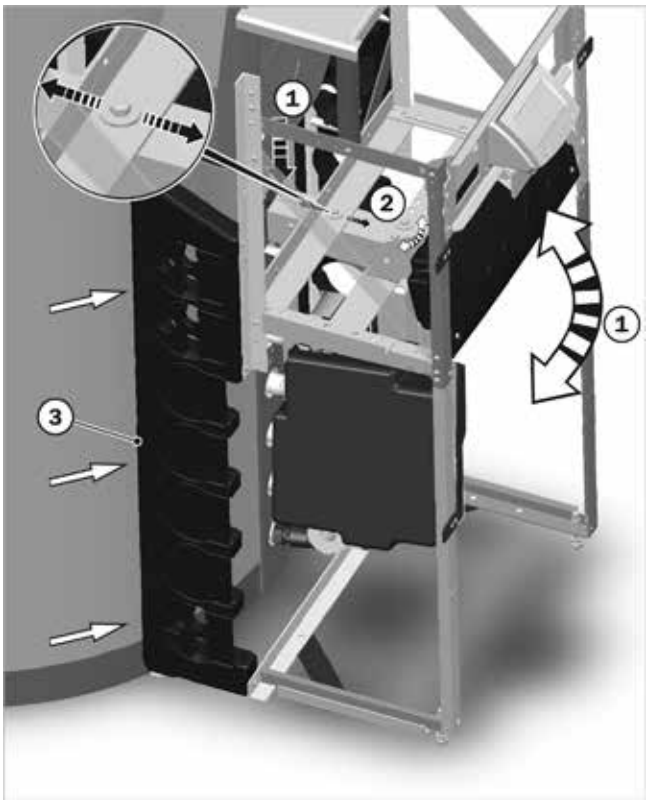


Fig.10: Aligning the charging module

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

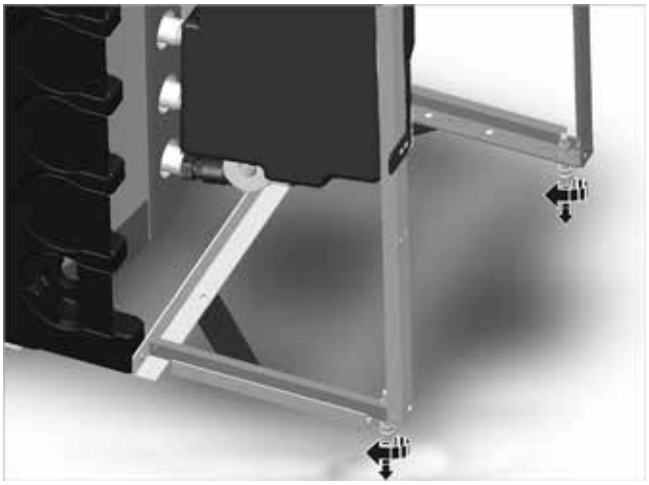


Fig.11: Screw the frame feet downward to the floor

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.

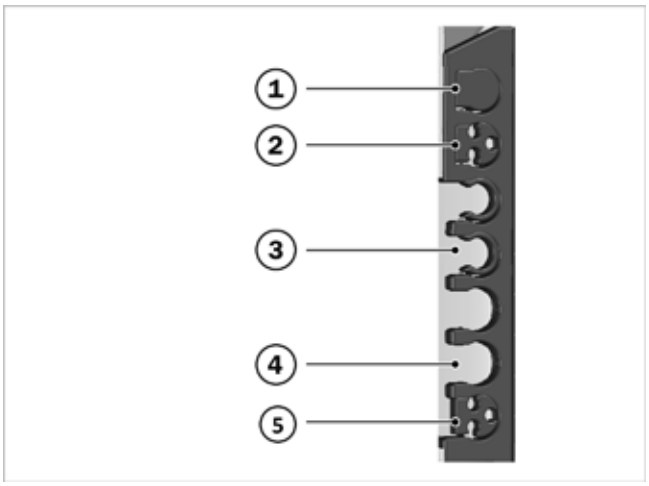


Fig.12: Inserts for the pipe lead-throughs

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

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.

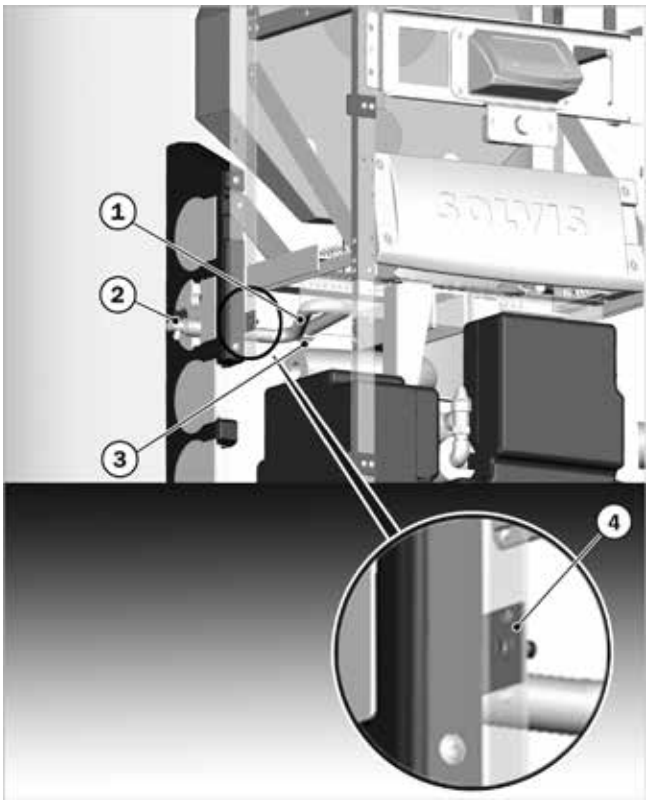


Fig.13: Fit the bleeder connection with the corrugated pipe

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

4.6 Heating circuit station

4.6.1 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.

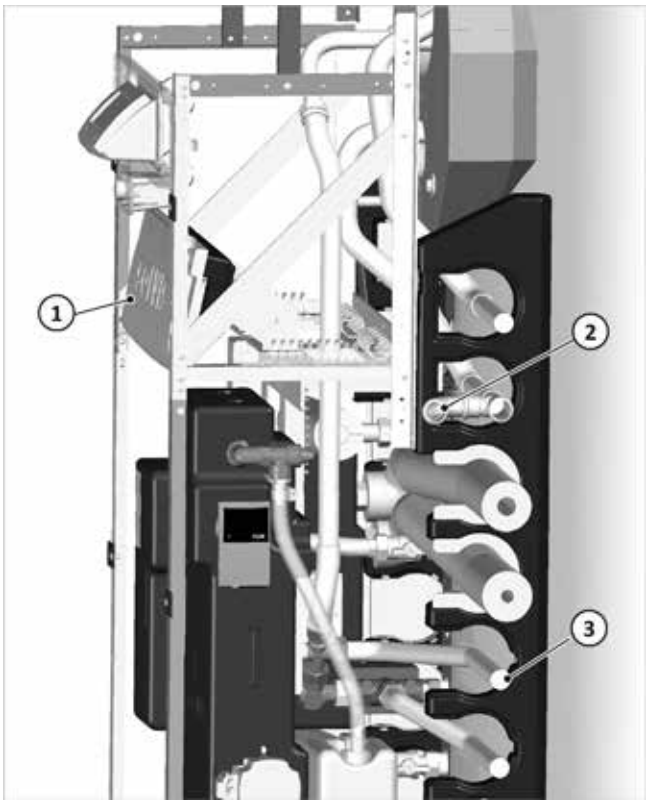


Fig.14: Hydraulic heating circuit connection

1 *Mains module housing*
2 *Heating circuit station, heating flow*
3 *Heating circuit station, heating return*

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).

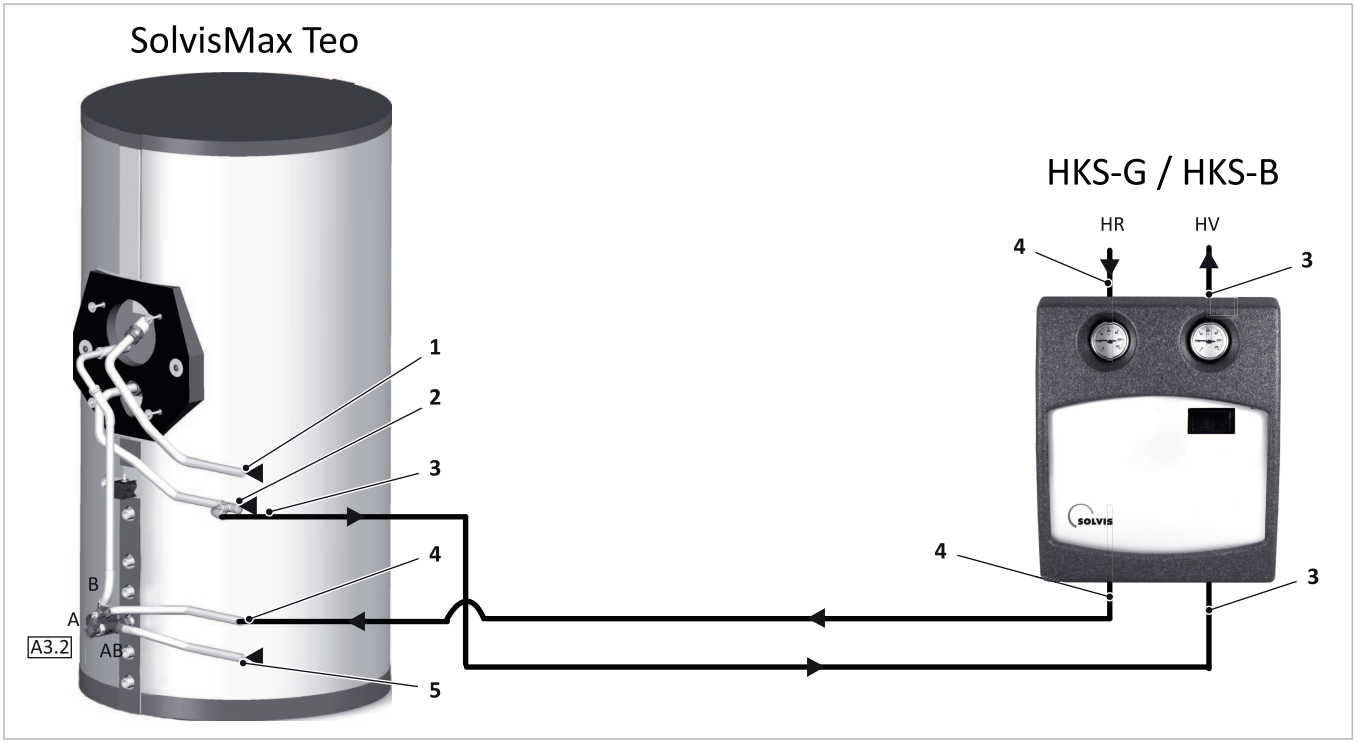


Fig. 15: Connecting a heating circuit

1	*Heating pump, hot water flow*
2	*Heating pump, heating flow*
3	*Heating flow*
4	*Heating return*
5	*Heating pump return*

4.6.2 Membrane expansion vessel

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.
2. Connect the expansion vessel using the cap valve as per DIN EN 12828.

4.7 Hot water station

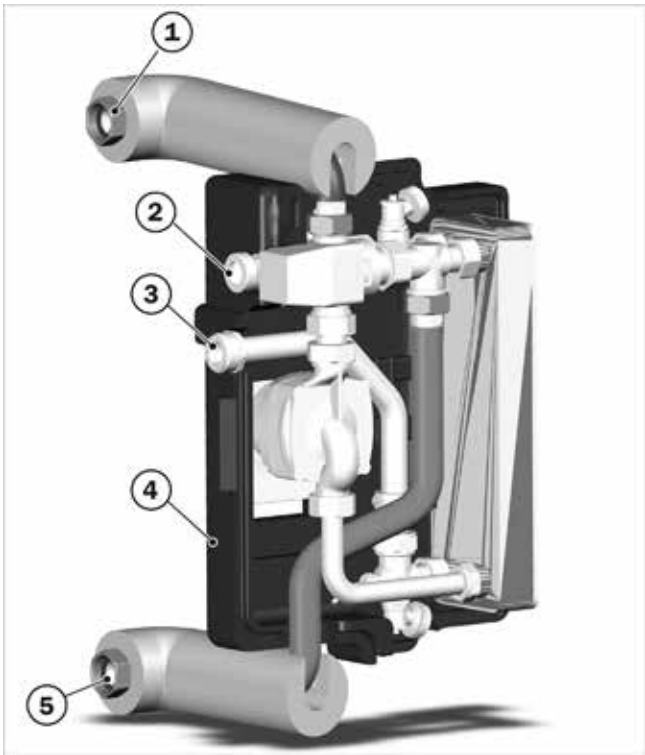


Fig.16: WWS-24 connections

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.

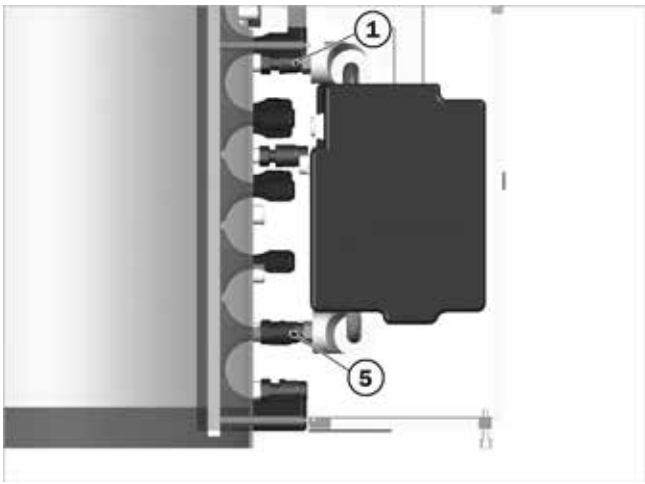


Fig.17: Connecting the hot water station

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

2. Screw the cold and hot water pipes onto the station connections using the seals.
3. Insulate the pipes; if necessary, shorten the supplied pipe insulation to do so.

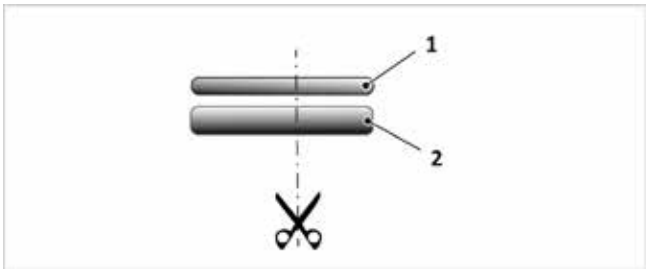


Fig.18: If necessary, shorten the pipe insulation

1 *Cold water pipe insulation*
2 *Hot water pipe insulation*

4. Insert the supplied reducers for the pipe lead-through.

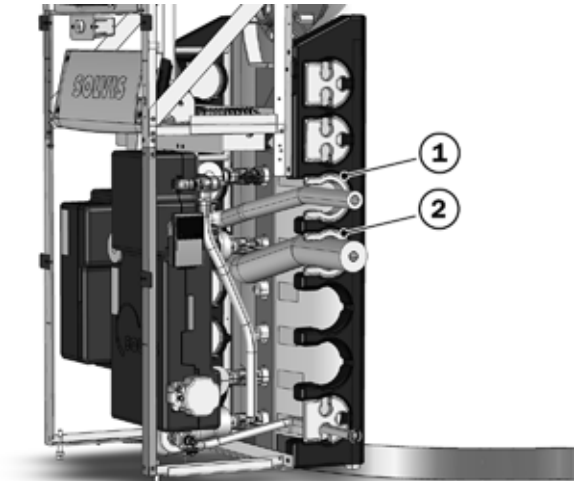


Fig.19: Hot water station, lead-through for drinking water pipes (right)

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

5. Connect the pipes to the drinking water supply outside of the frame.

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.

4.8 Connecting the heat generator

Hydraulic connection of the external heating pump

The heating pump must be hydraulically connected to the storage tank as per the system diagram for external heating pumps (see appendix).

1. Route the summing gate AB of the switching valve A3.2 (**3**) to the load pump / charge station.
2. From there, route to the “heating pump return” connection of the external heating pump.
3. If the load pump is integrated into the heating pump, connect the summing gate AB directly to the “heating pump return” connection of the external heating pump.
4. Connect the heating pump flow to the summing gate AB of the switching valve A3.3 for the flow, which is included in the accessories.

5. Connect gate A (heating) to connection (**2**) and gate B (hot water) to connection (**1**).
6. If the heating pump features a HW flow and a heating flow, connect these directly to the relevant connections without using an additional switching valve A3.3. In this case, the heating pump sensors must also be installed next to the sensor positions of S1 (hot water) and S4 (heating).

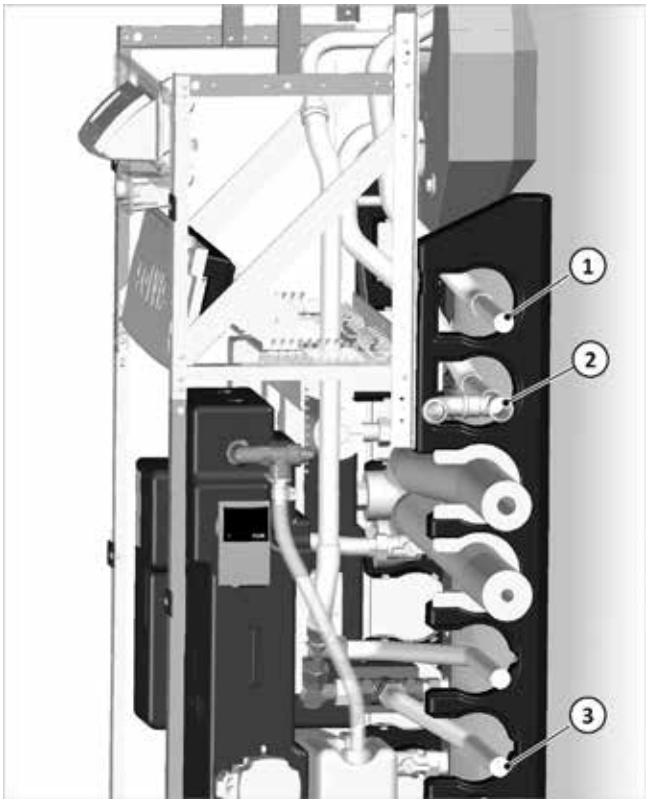


Fig. 20: Connecting the external heating pump

4.9 Electrical connection

4.9.1 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

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.

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 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.

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%).

4.9.2 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 gas, 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 boiler.
2. Fasten the equipotential bonding conductor to the frame as shown in the figure.

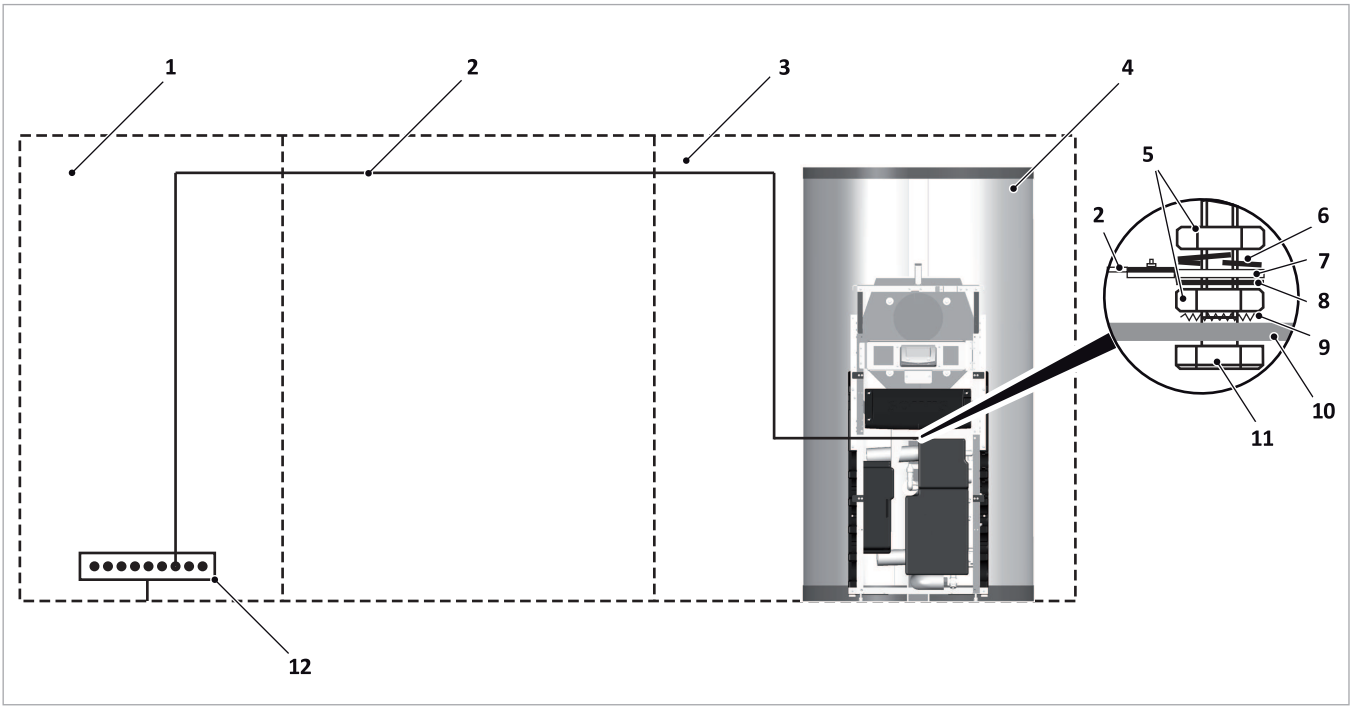


Fig. 21: Equipotential bonding for the SolvisMax

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*

4.9.3 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 ➔ *"System diagrams SovisMax 7" document (ALS-MAX-7).*

Connecting the power supply

1. Route the supply line to the mains module and connect it to the "Mains PE/N/L" terminals on the expansion board.
2. Lead the supply line through the strain relief device and secure.

Check that the wiring is correct to prevent unit malfunctions:
- L=L, N=N, etc.
- 230 V must be applied on L.

4.9.4 Connecting the outdoor sensor

Fitting the outdoor sensor

The outdoor sensor (S10) measures the temperature on the outdoor wall.
- It is preferable to 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). To do so, use socket board "S10" from the installation pack.

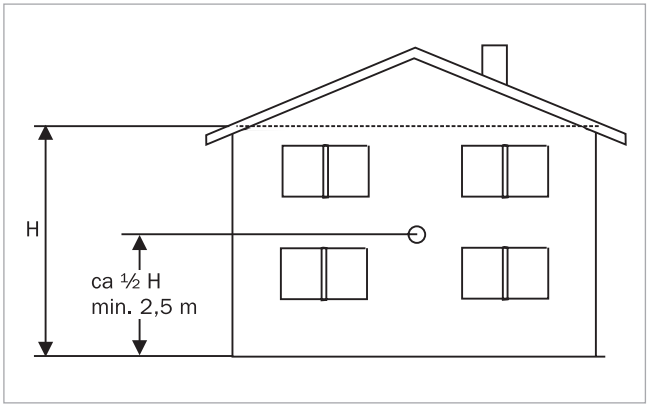


Fig. 22: Position of the outdoor sensor

4.9.5 Connecting the heating pumps

SolvisControl offers 3 outputs for connecting the heating pump:

- A12 (230 V signal, on and off)
- A14 (floating contact, on and off)
- Modulating signal O1 (analogue, 0-10 V).

For a description of the settings, see ➔ *section "Configuration of the external heat generator", page 19*.

Establish the electrical connection of the external heating pump and finish the installation; see ➔ *section "Electrical connection" in the installation instructions of the heating pump manufacturer.*

4.9.6 Connecting the switching valve group

For connecting the switching valves, cables with connectors are supplied in the accessories. Both valves are identical in construction. The connectors, valves and actuator drives can thus not be exchanged.

The actuator drive is controlled via a permanent L, a permanent N and a switching L', which is actuated by the output A3.

"L" and "N" can be tapped from A12, for example. Ensure that L' and L are secured by the same fuse.

To facilitate the connection of multiple wires on a single connector, connection terminals are supplied with the accessories. The wiring must be installed on site in accordance with ➔ *Fig. 23* .

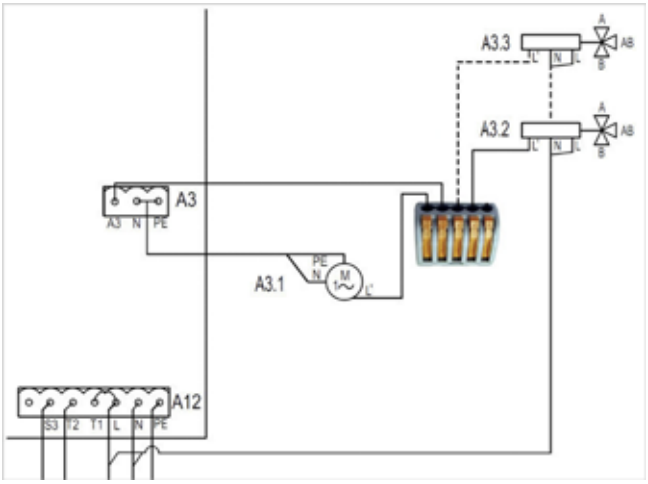


Fig. 23: Wiring plan for switching valve connection

The switching valves are connected in parallel to the heating pump A31:

- Depending on the manufacturer, A3.3 is optionally provided if only one heating pump flow exists.
- A12 can supply power to the heating pump (L, N, PE).
- S3/A12 can be used as a collective fault input (230 V at S3/A12 = fault).

4.9.7 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 incorrect direction: Swap the connections at these terminals.

Heating circuit mixer connection

Connection	Colour of the wires		
	Brown	Black	Blue
A8/A9 (heating circuit 1)	Pin A8	Pin A9	Pin N
A10/A11 (heating circuit 2)	Pin A10	Pin A11	Pin N
A6 and A7 (heating circuit 3)	Pin A6	Pin A7	Pin N (A6 or A7)

Installing 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 (= heat. circuit 1), then the sensor must be connected to S12 (= heating circuit 1).

Checking the heating circuit mixer

The terminals “open” and “close” from terminal strips (SM 1) and (SM 2) specify the run direction of the servomotor.

1. If the mixer runs in the incorrect direction: Swap the connections at these terminals.

Following start-up, proceed as described below to check that the heating circuit mixer is connected correctly:

2. Switch output A8 (or A10) to “**Manual on**” for at least 150 s.
3. Check the sensor setting; the temperature at S12 (or S13) must correspond to the temperature at S4.

The check is temporarily carried out in manual mode, see ➔ *“Testing the outputs” in the operating instructions (BAL-SBSX-3-I).*

4.9.8 Connecting the room controller

Fit the housing

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

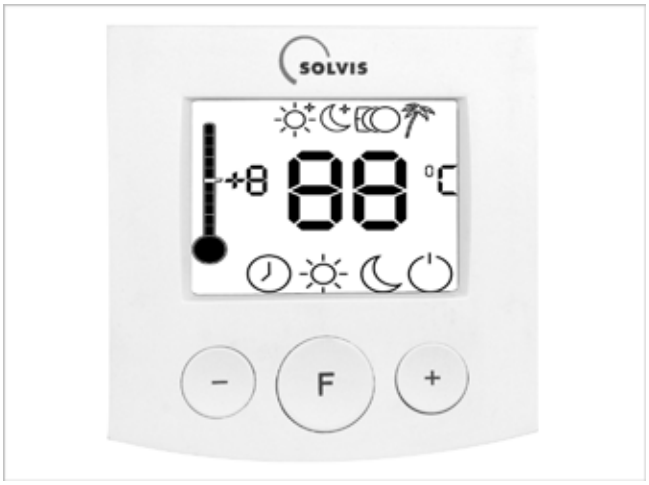


Fig. 24: Room controller BE-SC-2

- 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 25*).
3. Fix the housing to the wall with the supplied plugs and screws.

Fig. 25: 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. 26*).

Fig. 26: 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.

4.9.9 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**).

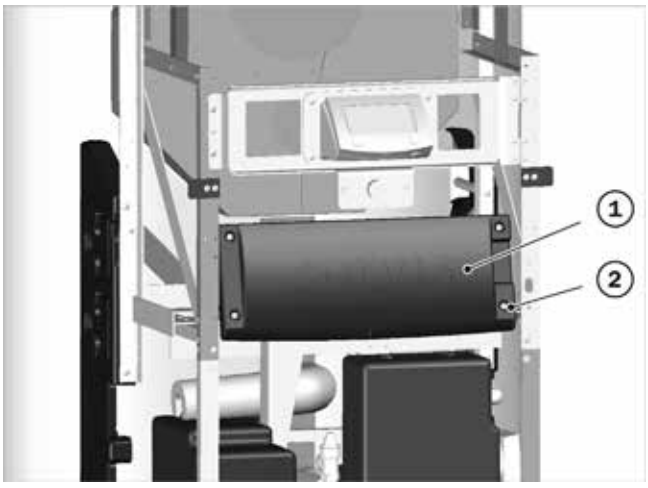


Fig. 27: Fastening the mains module cover

5 Start-Up

The systems folder includes a start-up report that must be filled out completely when starting up the system and kept together with the system.

5.1 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.

Use the system log included in the plant documentation; it serves as proof of proper heating water treatment.

Fill the system (pressure test)

1. Fill the system using the boiler filling and emptying valve (**1**).

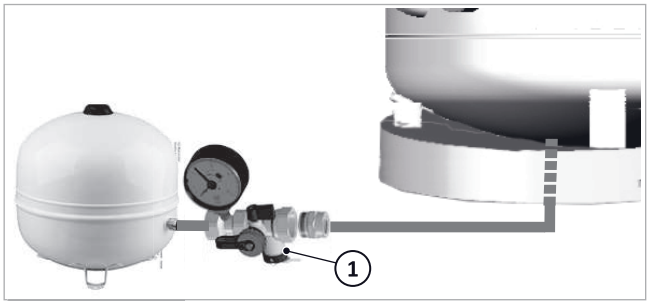


Fig. 28: Boiler filling and emptying valve on the MEV connection group

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 is 3.0 bar.

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

5.2 Configuration SolvisControl

For a basic introduction to operating the system controller, see ➔ *chapter "Operating the SolvisControl" in the operating instructions (BAL-SBSX-3-K).*

The controller must be re-initialised; for new systems, the initialisation starts automatically when the SolvisControl is switched on. On existing systems, the menu item "**Load factory settings**" must be selected in the installer menu under "**Other**" => "**Data**".

When prompted, the base system of SolvisMax 7, "**Solo / Direct (SL/SD)**" must then be selected, followed by "**Third-party boiler**".

The SolvisControl then performs the entire heat management for the weather-based heating circuit and the water heating.

Only for new systems

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-SBSX-3-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-SBSX-3-I).*

5.3 Configuration of the heat generator activation

All SolvisMax models

5.3.1 Configuration of the external heat generator

The SolvisControl has three different control options (see ➔ *section "Connecting the heating pumps", p. 16*) for the external heating pump. A modulating signal for controlling the heating pump can be provided via the analogue output O-1. This can be used to send the required temperature to the heating pump as a voltage value.

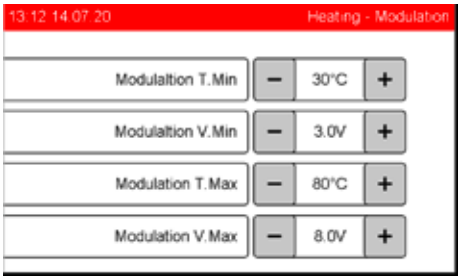
If the external heating pump receives the switch-on and switch-off signal via the outputs A12 or A14, it must be operated with fixed condensation (i.e. with a fixed flow temperature value).

Setting modulation (temperature setpoint)

For external boilers that require an analogue modulation voltage, scale output O-1 as follows:

1. Select "**Modulation**".
2. Set the values according to the boiler manufacturer's specifications.

The factory settings are suitable for controlling standard boilers. You may need to change the values according to the specifications of the boiler manufacturer (➔ *chapter "Modulation", page 26*).

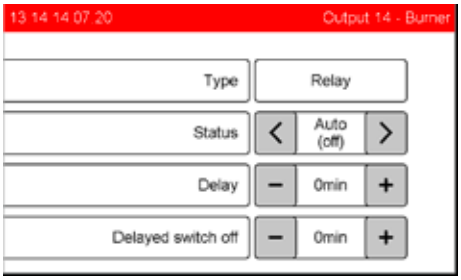


Setting the delay/delayed switch off (time control)

In the menu: "**Installer**" => "**Outputs**" => "**A12**" (230 V signal) or "**A14**" (floating contact) => "**Delay**" or "**Delayed switch off**", you can set that the connected boiler starts or switches off with a delay in the same way as for output A13. The values are preset for the system at the factory.

1. Select "**Delay**" or "**Delayed switch off**".
2. Change values to meet your requirements if necessary.

Always consult Solvis customer service before making any changes to the factory settings.



5.3.2 Configuration of the boiler load pump

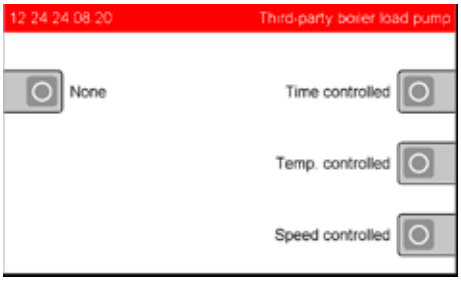
Prerequisites

The external boiler has been connected according to the system diagram and is ready for operation.

If the heat generator automatically controls the boiler load pump, the output at SolvisControl does not require further configuration after the completion of initialisation.

The initialisation process

Depending on the system, the control of the third-party boiler load pump is specified as follows:



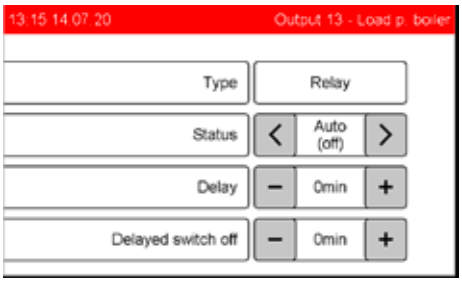
Select the menu item "**time-controlled**" for the load pump.

Configuring the time control

When the third-party boiler is required, the load pump waits until the delay time has passed and then starts. If the requirement is switched off, the load pump continues to run for the set delayed switch off time.

1. Go to the installer menu and choose "**Output**".
2. In the "**OUTPUTS**" menu, select the output of the relevant load pump.
3. Set the delay and delayed switch-off for the boiler load pump.

If the load pump is not controlled by the heating pump, it must be connected to output A13. In this case, the delay should be changed from 5 minutes to 0 minutes and the delayed switch-off time set to 1 minute. This is necessary to bring the residual heat from the line into the storage tank.



Set values

On-site boiler	Delay	Delayed switch off
External heating pump	0	1 min

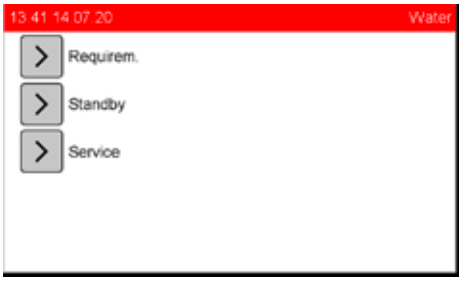
5.3.3 Setting the HW requirement

To avoid malfunctions, the requirement temperatures of the SolvisControl for water heating should be limited. The technical data of the heating pumps must be used for this purpose.

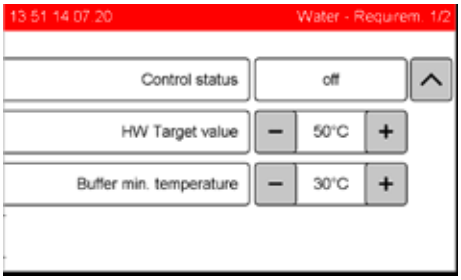
For efficient heating pump operation, the requirement temperatures and temperature increases should be set as high as necessary but as low as possible.

Setting the hot water requirement

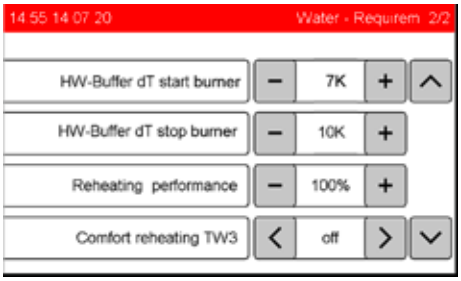
1. Switch to the "**INSTALLER MENU**".
2. Select "**Water**".
3. Select "**Requirement**".



4. Adjust the values, if necessary.



5. Use the navigation button to move to the next page.
6. Adjust the values, if necessary.



The hot water pump is switched on when the temperature at sensor S1 is lower than "**HW target value**" + "**HW buffer dT start burner**". It is switched off again when the temperature at S1 is warmer than "**HW target value**" + "**HW buffer dT stop burner**".

The maximum hot water temperature to be set ("**HW target value**") depends on the maximum achievable flow temperature of the heating pump. To ensure that the switch-off temperature can be reached, the maximum flow temperature must be at least 3 K higher than the switch-off temperature (temperature increase).

Set values

On-site boiler	HW buffer dT start burner	HW buffer dT stop burner
External heating pump	7 K	10 K

Example:

The heating pump has a maximum flow temperature of 55° C. With the set values for external heating pumps, the maximum HW requirement temperature is calculated as follows: 55° C - 3 K = 52° C. The maximum HW flow temperature to be set is then calculated as follows: "**HW target value**" = 52° C - "**HW buffer dT stop burner**" = 52° C - 10 K = 42° C.

5.4 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-SBSX-3-I / BAL-LEA-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.

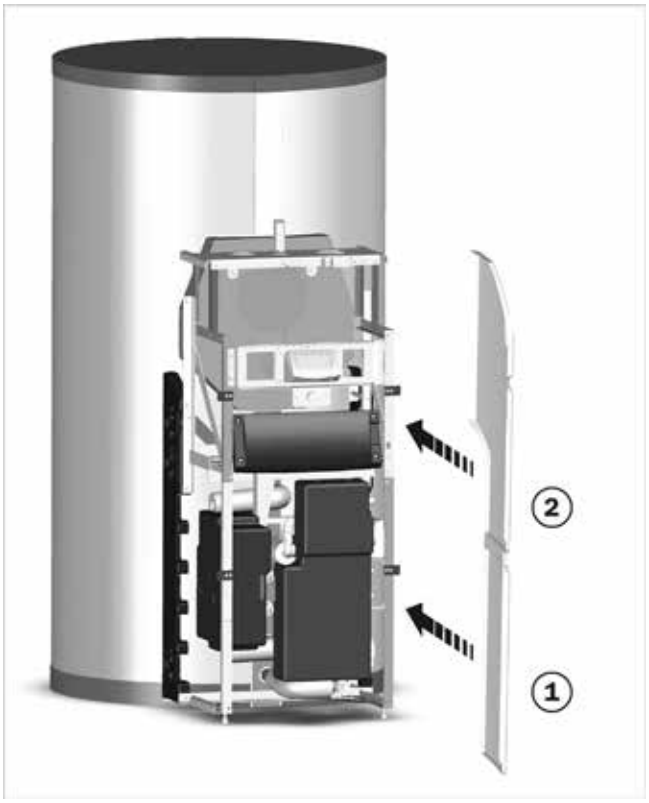


*Fig. 29: Insert the lower side part (**1**) first.*

2. Attach the copy of the nameplate and energy label to the unit casing in a clearly visible position.
3. Label pipes and cables.
4. Store the instructions in the systems folder.

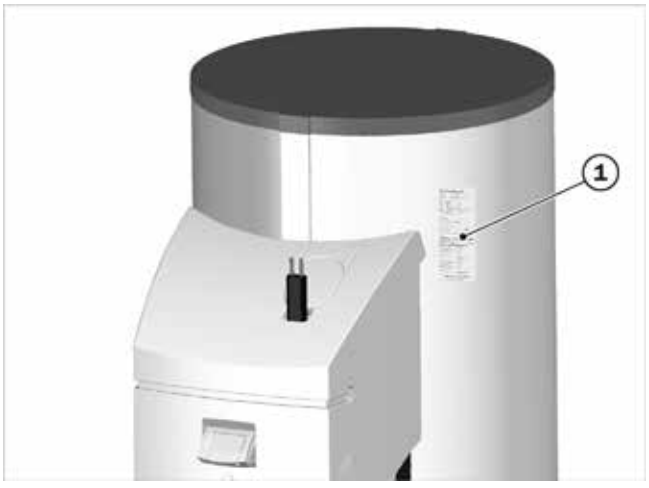


*Fig.30: Nameplate (**1**) attached to the insulation*

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

6 Technical Data

SolvisMax technical data

Name	Abb.	Unit	757	957
Rated volume		**[l]**	**750**	**950**
Actual volume		[l]	718	909
Storage tank distribution				
Hot water ready volume		[l]	171	82 / 212 / 301 Provision regarding sensor positioning
Heating buffer volume		[l]	34	34
Solar buffer volume		[l]	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]	1020	
Maximum depth	T	[mm]	1550	
Maximum height	H	[mm]	1920	2300
Tilt height without insulation	k	[mm]	1760	2140
Diameter without insulation	d	[mm]	790	
Exhaust connection height	A	[mm]	1569	
Centre of exhaust elbow to back of insulation	U	[mm]	1210	
Minimum front spacing		[mm]	500	
Minimum side/rear spacing		[mm]	300	

Dimensions of the system

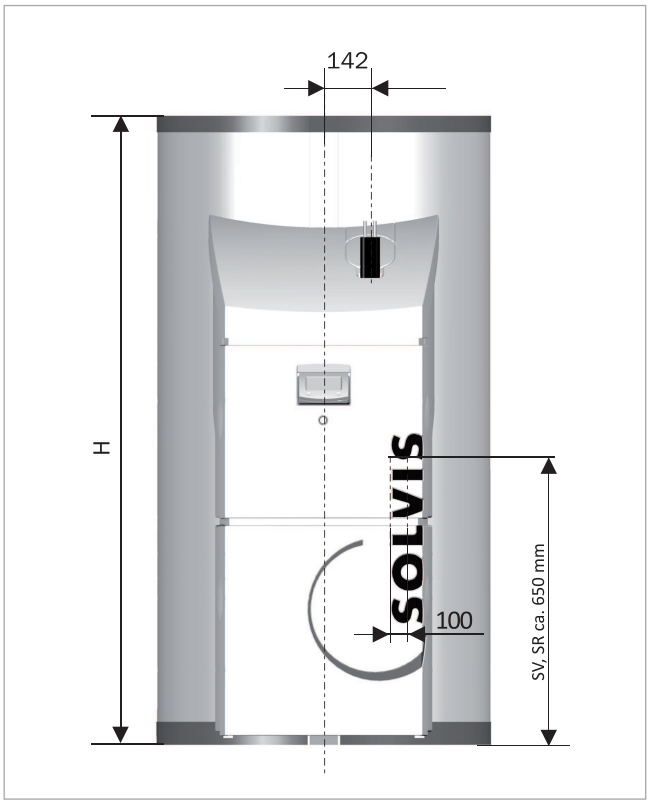


Fig. 31: Front view

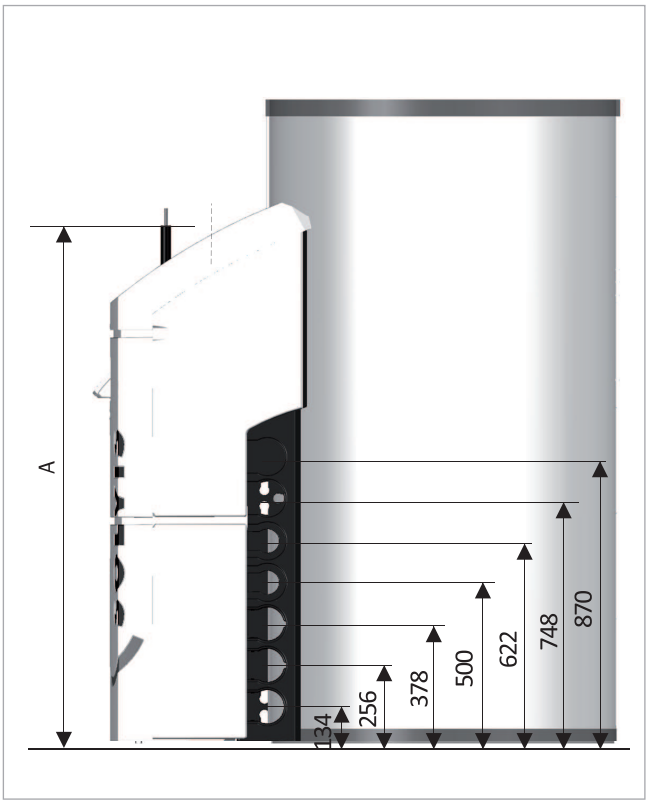


Fig. 33: Side view

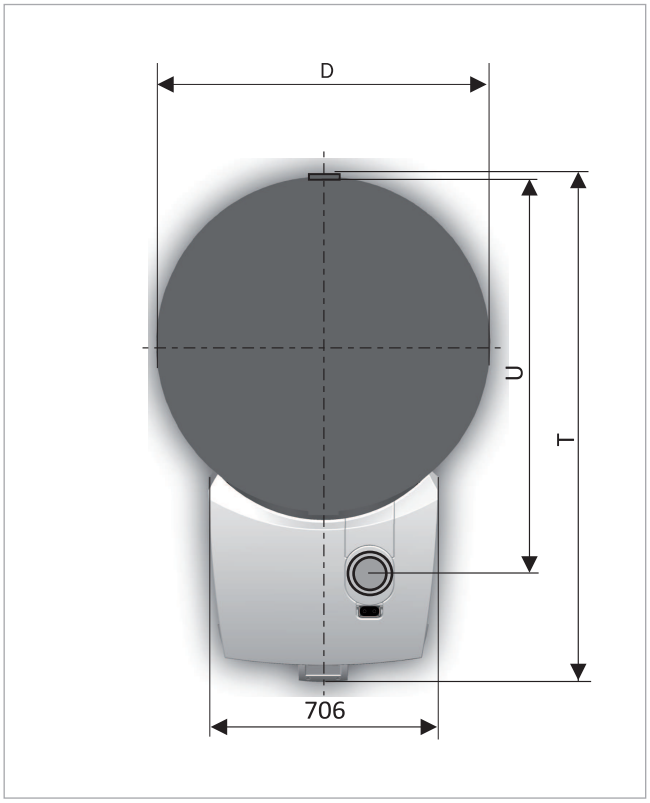


Fig. 32: Top view

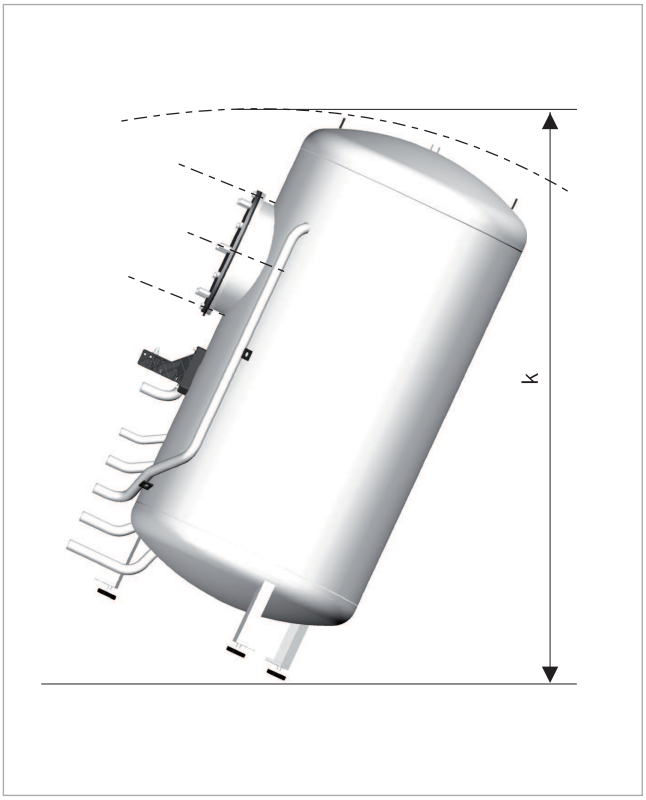


Fig. 34: Tilt height

7 Appendix

7.1 System diagram

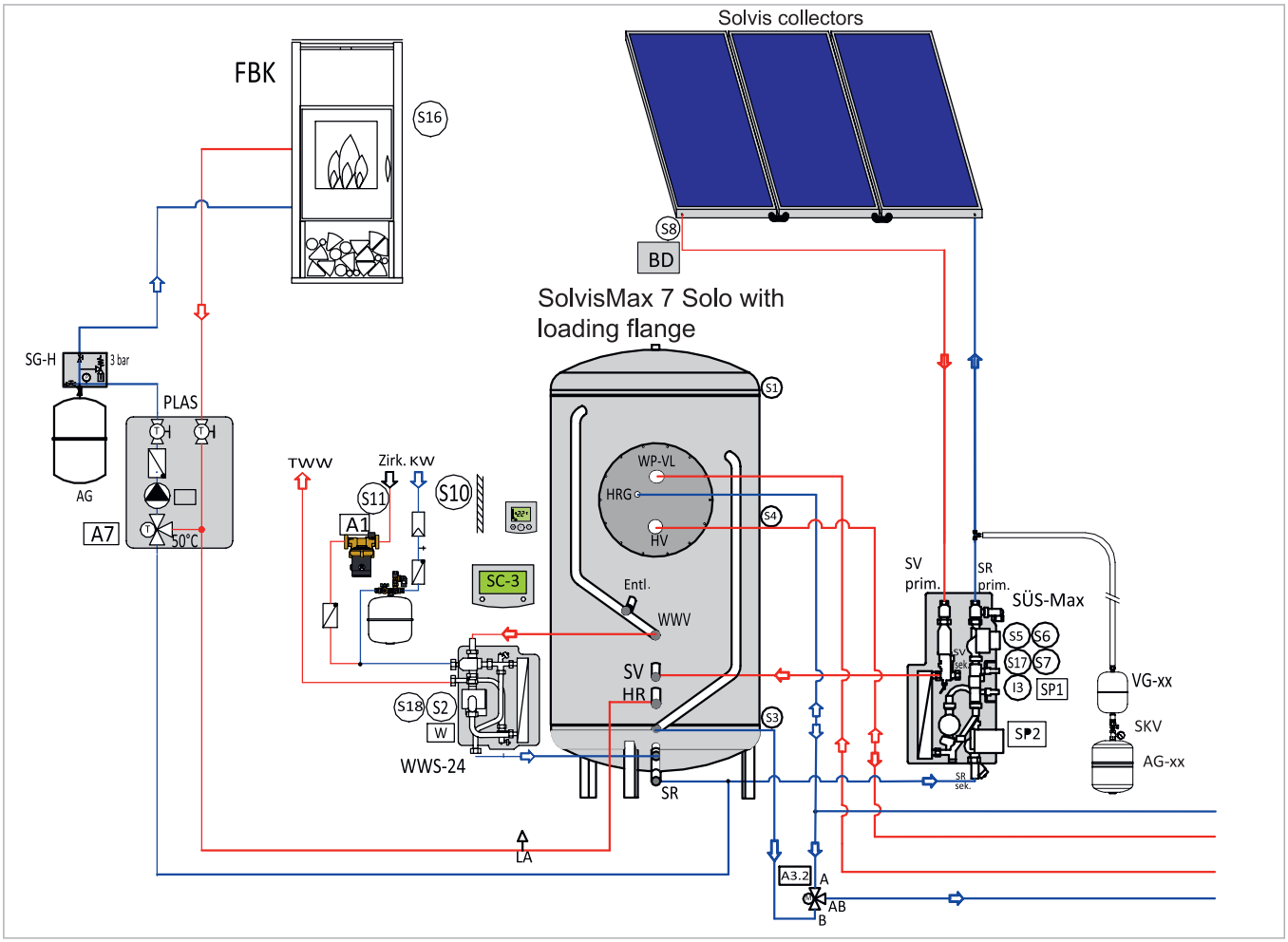


Fig. 35: SolvisMax 7 Solo with flue, solar system, 2 heating circuits and external heating pump – part 1

* optional

Equipment

- SolvisControl 3 system controller
- Drinking water heating and 2 mixed heating circuits
- Solar circuit with one collector (field)
- Adjacent on-site heating pump (external heating pump)
- additional solid fuel boiler

Assemblies:

BD	*Lightning protection box*
HKS-G	*Heating circuit station, mixed*
AG-xx	*Solar expansion vessel*
VG-xx	*Primary solar tank*
WWS	*Hot water station*
SG-H	*Heating circuit safety group*
SIG-TW	*Safety group for drinking water connection*
SÜS-LM	*Solar heat transfer station*
PLAS	*Buffer charging station*
VTL-2	*Distributor bar, 2-way*

Abbreviations

LA	*Air separator*
AG	*Expansion vessel*
SAS	*Sludge separator*
SKV	*Solar cap valve*
TWK	*Drinking water network, cold connection*
TWW	*Drinking water network, hot connection*
TWZ	*Drinking water network, circulation connection*
HK1-2	*Heating circuit 1 to 2*
H/K-VL	*Heating and boiler return*
H/K-VL	*Heating and boiler flow*
K-RL	*Boiler return*
EWP	*External heating pump (on site)*
SFB	*Solid fuel boiler (on site)*

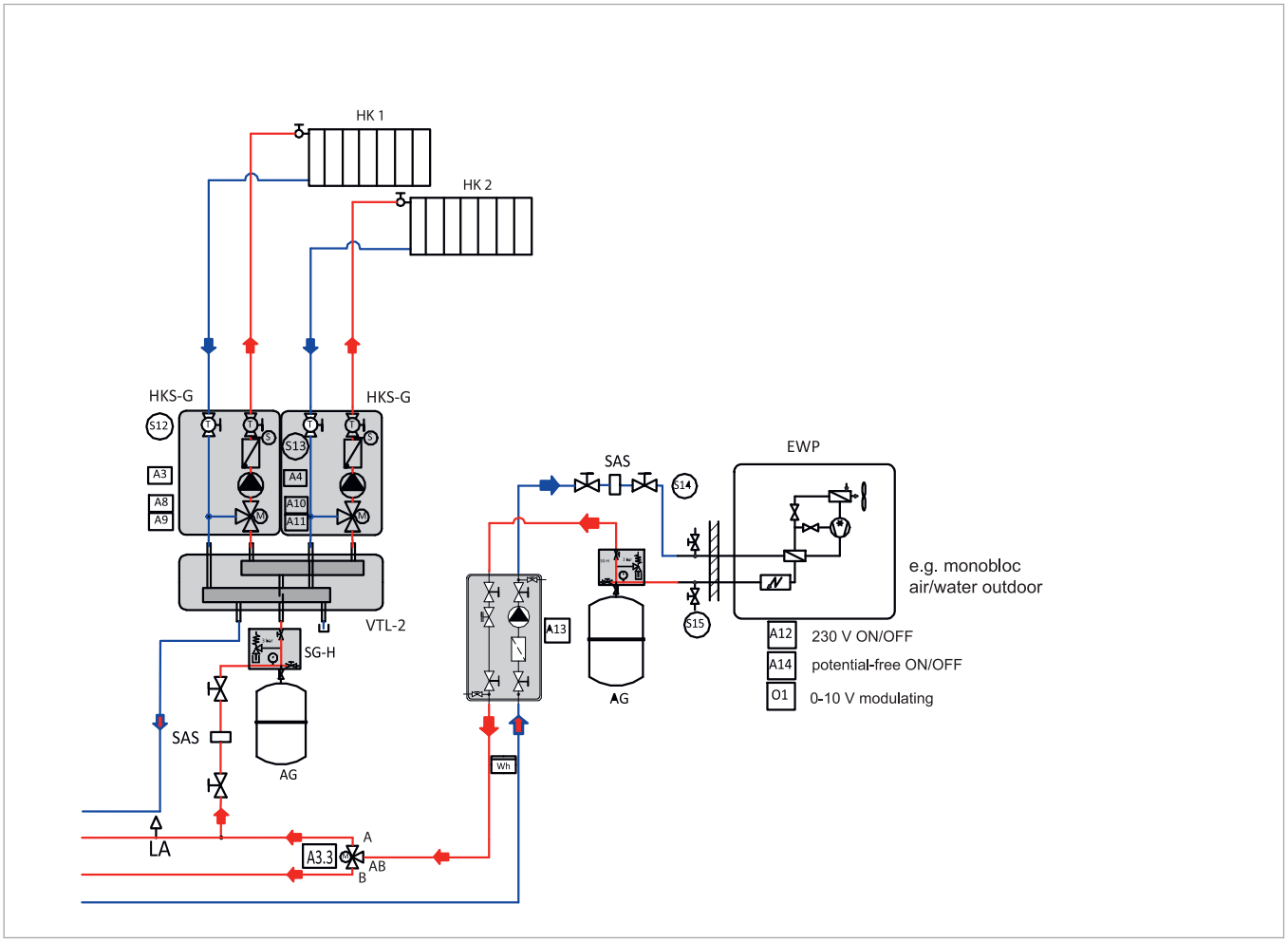


Fig. 36: SolvisMax 7 Solo with flue, solar system, 2 heating circuits and external heating pump – part 2

This diagram is not a substitute for detailed technical planning. To ensure the correct function of the system, our installation, operating and maintenance instructions must be followed. When connecting a third-party boiler, do not rely solely on the information provided – always consult the manufacturer of the boiler.	

Correct circulation pump

Before connecting a circulation pump, consult the operating instructions of the manufacturer to check whether your model is suitable for operation on a switching relay output.

Some pumps are equipped with their own control electronics to adapt to user behaviour (e.g. Grundfos UPS 15-14 BA PM). Such adaptive pumps may not be switched using the SolvisControl. They must be permanently connected to the mains voltage. To do this, use a free connection on the 230V supply board directly beside the mains module or set output A1 to Hand/ON in the installer under Output A1.

Pumps without their own electronics that are intended for frequent switching on and off may be connected as usual to output A1 in pulse, time or combined operation mode. If it is uncertain whether the relay output of the SolvisControl will function with the circulation pump to be used without causing problems, use a cut-off relay. This should be installed between output A1 and the mains supply of the circulation pump. This will reliably prevent any damage to the control.

7.2 Modulation

Temperature setpoint

The required boiler flow temperature is output as an analogue voltage signal (0-10 volts) via output O1 to a modulating boiler. The corresponding scaling must be set in the "**Modulation**" menu (according to boiler type and manufacturer).

Standard settings for scaling:

The controller scaling that is set at the factory is for a standard boiler.

- 30° C is assigned to 3.0 V (**1**) and
- 80° C is assigned to 8.0 V (**2**).

The relationship of the voltage signal to the boiler's flow temperature is shown in the following diagram.

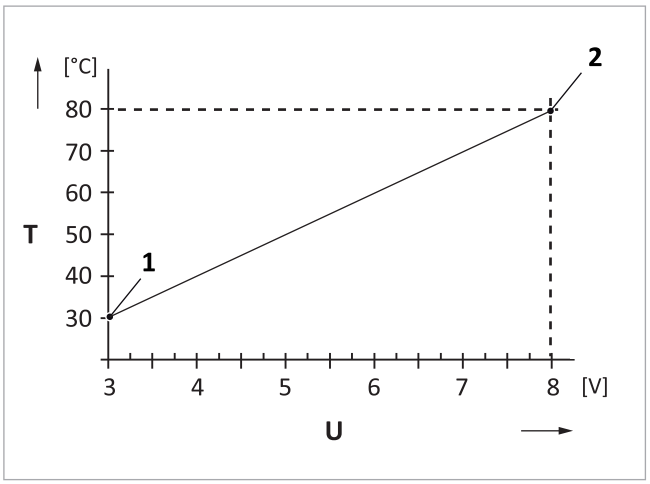


Fig. 37: Standard scaling (standard boilers)

Determining the scaling

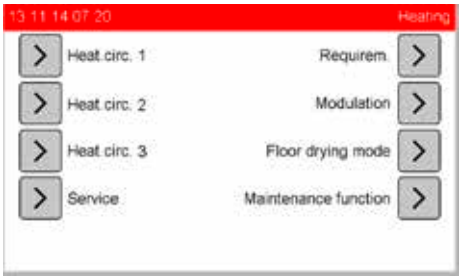
The appropriate values must be taken from the specific data (table or diagram) provided by the boiler manufacturer. The values determined must then be entered in the
➔ **"Flow temperature specification" table**.

Flow temperature specification

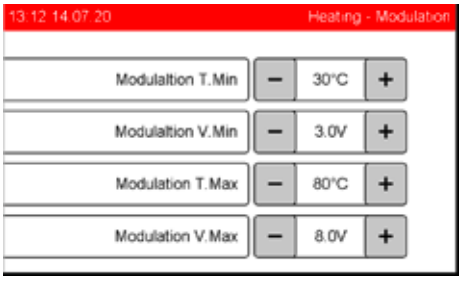
Flow temperature [° C]		Input voltage [V]		Boiler status
Factory	User	Factory	User	
–		0.0		Off
30		3.0		On/Start
80		8.0		On/Max

Setting scaling

1. Switch to the "**INSTALLER MENU**".
2. Select "**Heating**".
3. Select "**Modulation**".



4. Enter the boiler flow temperature to be controlled ("**Mod. T min**", "**Mod. T max**").
5. Enter the appropriate control voltage ("**Mod. V min**", "**Mod. V max**").



7.3 Sensors and connections on the storage tank

Fig. 38: Front view of the stratified storage tank

1	*Socket for bleeding*	9	*Hot water return (WWS)*
2	*Heating pump, hot water buffer flow*	10	*Solar return (SÜS)*
3	*Heating return*	11	*Storage tank bleeder*
4	*Heating flow*	S1	*Upper storage tank temperature sensor*
5	*Hot water flow (WWS)*	S3	*Storage tank reference temperature sensor*
6	*Solar flow (SÜS)*	S4o	*Upper heating buffer temperature sensor*
7	*Free, please seal*	S4u	*Lower heating buffer temperature sensor*
8	*Heating pump, heating return*	S9	

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