Conversion

SolvisBen with SolvisMia

For connecting the SolvisMia heating pump

SolvisBen conversion

- Gas to Gas Hybrid
- Oil to Oil Hybrid
- Solo with SolvisMia

Wärme. Leben. Zukunft.

1 Information About These Instructions

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

Copyright

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

Symbols used

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

WARNING
Danger, with potentially serious health consequences.

CAUTION
Possible risk of moderate or light injury.

CAUTION
Risk of damage to unit or system.

Useful information, notes and work tips.

Change of document, referring to another document.

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

Contents

2 Safety Notes

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.

Work to be performed 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.

3 System Versions

The conversion kit is suitable for retrofitting a SolvisBen Gas, SolvisBen Oil or SolvisBen Solo. The conversion kit differs depending on whether the heating circuit station is integrated into the storage tank or external.
It is essential for connecting a SolvisMia 10 or SolvisMia 14 heating pump.

The buffer charging station with a speed-controlled pump is used to adjust the output, the sludge separator to protect the heating pump and the switching valve group is used to feed the charging current into the SolvisBen's stratified storage tank, depending on the operating status.

4 Scope of Delivery

Not shown:

- Sludge separator (**SAS**)
- SmartGrid Box
- Hydraulic connection material
- Sensors and electron. accessories (including Modbus and connection cables, socket boards)

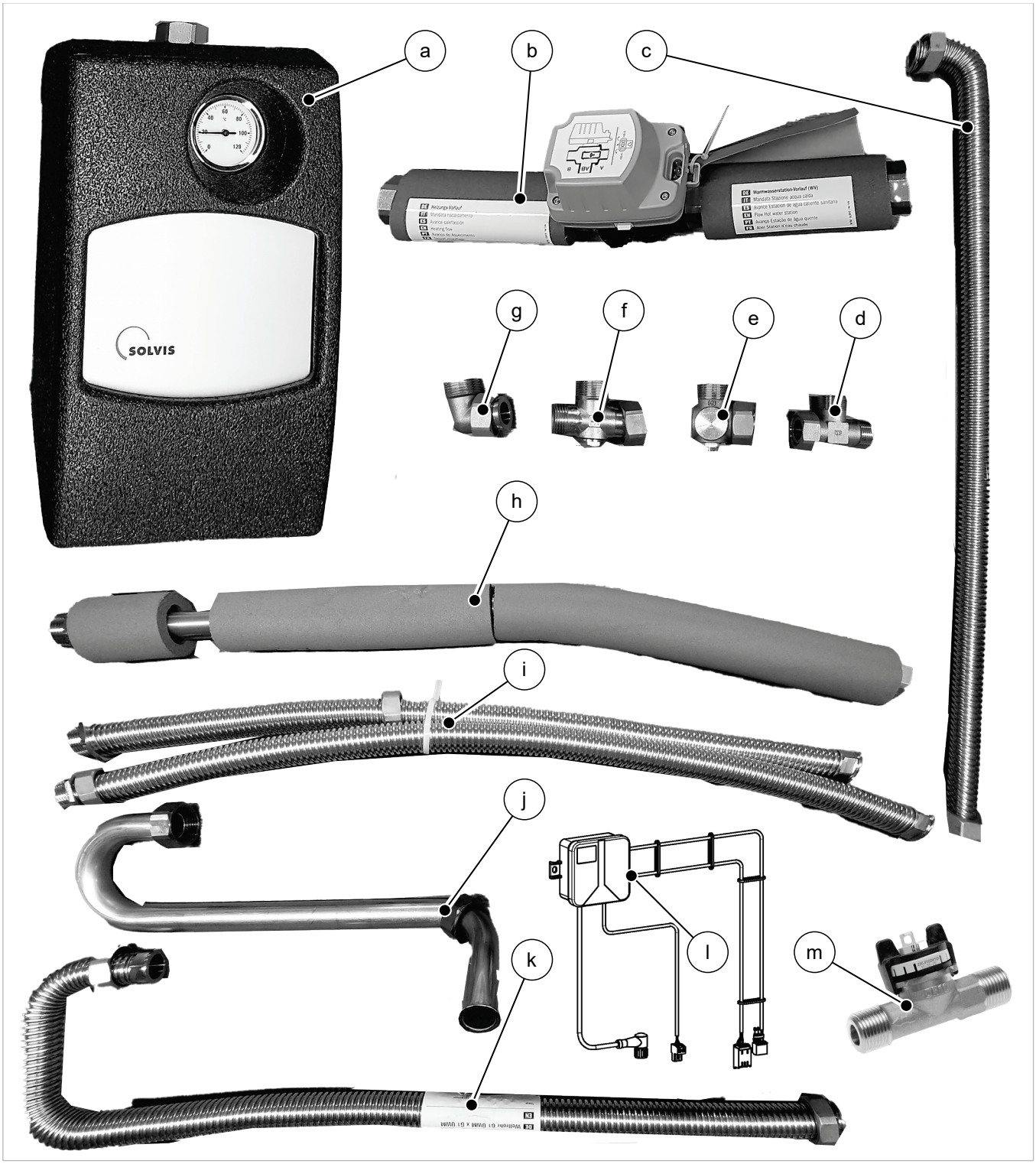


Fig. 1: Kits for converting SolvisBen and SolvisBen HKS with SolvisMia

a	*Buffer charging station PLAS-WP-HB-WM*	**Only in the conversion kit for the SolvisBen HKS:**		j	*Bottom connection pipe, heating flow, SL/WP*
b	*3-way switching valve group*	f	*T-piece 30528*	k	*Corrugated pipe G1 UN x UN*
c	*Corrugated pipe, solar compensating line*	g	*Bracket G1 ÜW x G1 AG*	l	*Volume flow sensor connection box*
d	*T-piece G 3/4*	h	*Corrugated pipe WP-VL-SBHB*	m	*Volume flow sensor DFS 235*
e	*Sensor elbow G1*	l	*Corrugated pipe set G1*		

5 Installation

5.1 Installing SolvisMia

Installing the SolvisMia

1. Install the SolvisMia according to the installation instructions (MAL-MIA) and route the connection pipes to the SolvisBen.

5.2 Draining the SolvisBen

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 protective cover and disconnect 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. Drain the storage tank.

Drainage quantities (flange is free)

Storage tank size	Minimum drainage volume [l]
SolvisBen	200

5.3 Installing the buffer charging station

5.3.1 Switching valve installation

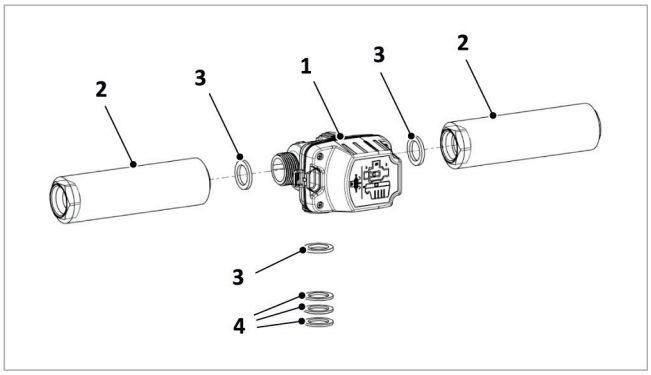


Fig. 2: Switching valve group with seals (pre-assembled)

1 *Switching valve group*
2 *Connector*
3 *Rubber seal*
4 *Flange gasket*

Connecting the switching valve group to the buffer charging station

For part designations with a letter, see also ➔ *fig. 1, p. 7*.

1. Insert the rubber seal into the union nut and screw it to the free outlet of the switching valve. Align the switching valve so that it is legible from the front. Do not overtighten the rubber seal; tightening torque 15 Nm.

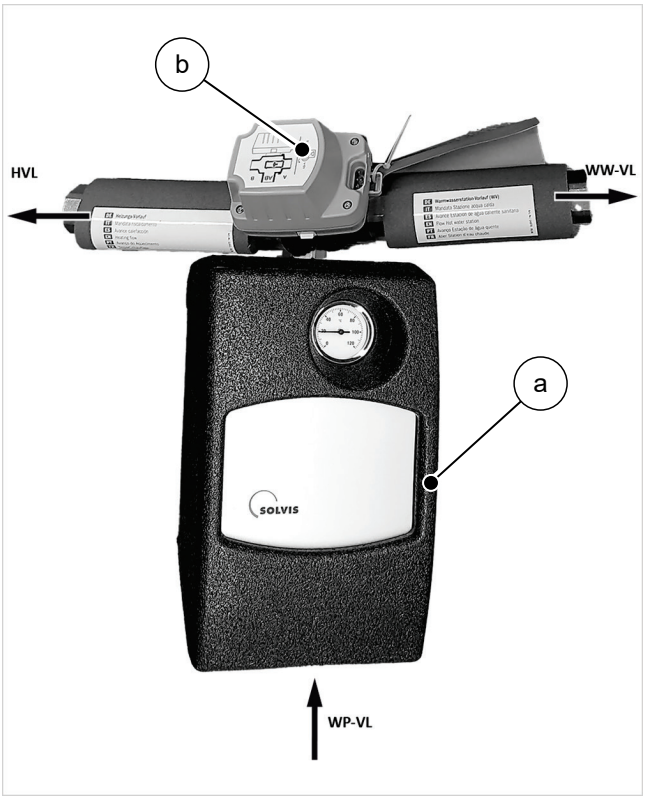


Fig.3: Buffer charging station with switching valve

a *Buffer charging station PLAS-WP-HB-WM*
b *3-way switching valve group*
WW-VL *Hot water flow**
WP-VL *Heating pump flow*
HVL *Heating water flow*

** This is the heating water for water heating.*

5.3.2 Wall-Mounted Installation

Installing the wall-mounted WP buffer charging station

1. Using suitable attachment material, attach the buffer charging station (PLAS) pre-assembled with the 3-way switching valve to the wall or alternatively directly in the pipe line next to the SolvisBen. The flow direction can be from bottom to top or horizontal. The installation must take place in the flow line.
2. If the buffer charging station has been installed vertically, bend down the left and right corrugated pipe for the hot water or heating water flow.
3. Connect the volume flow sensor (**m**, see ➔ *fig. 1 , p. 7*) to the HP flow connection on the buffer charging station.

5.4 Heating flow preparation

5.4.1 SolvisBen without internal HCS

Preparing the connection

For part designations with a letter, see also ➔ *fig. 1, p. 7*.

1. In the heating flow (**1**), insert a customer-supplied T-piece between the storage tank and the heating distributor bar/heating circuit station.
2. Replace the elbow on the heating return connection in the SolvisBen with the sensor elbow G1 (**e**).

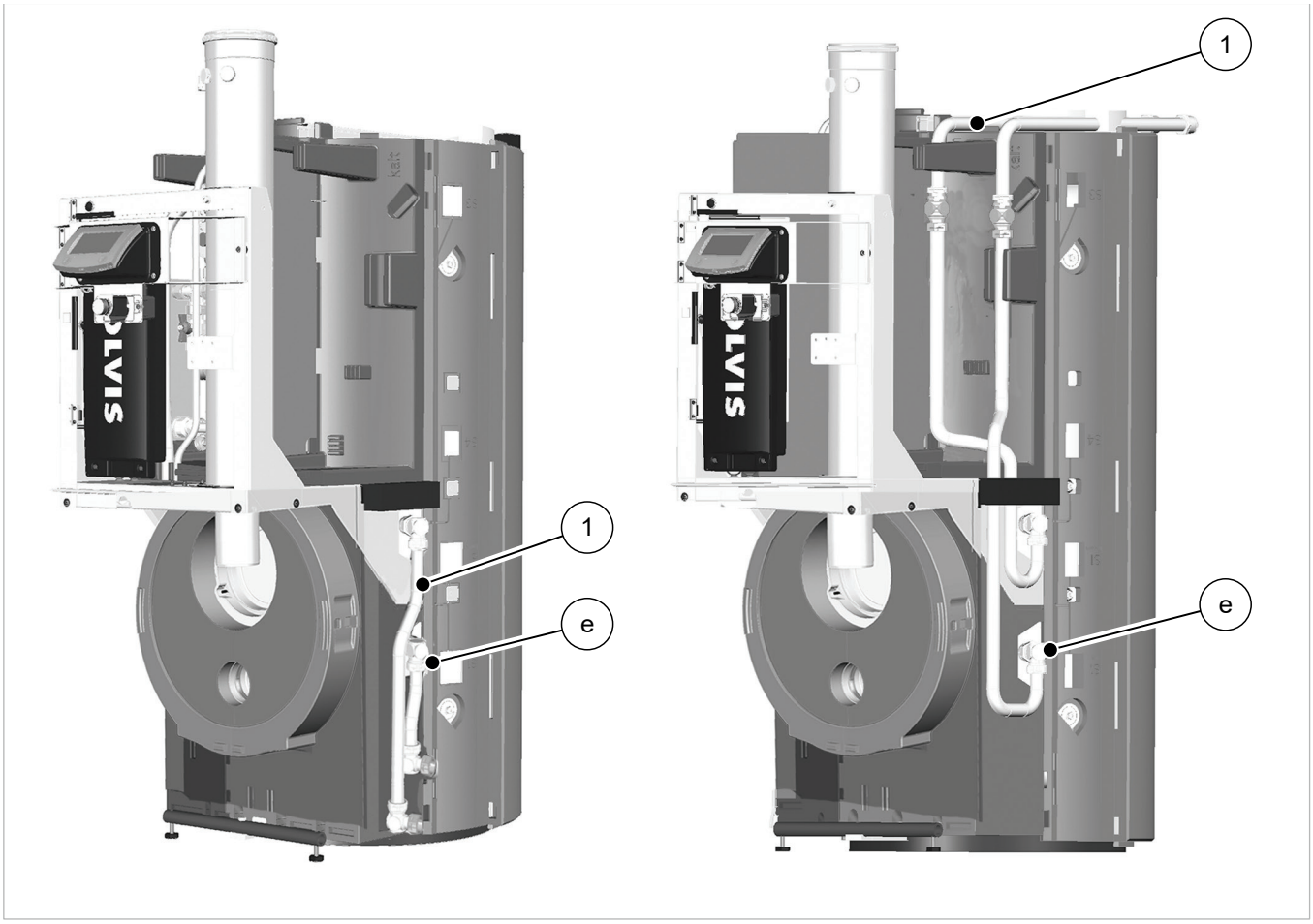


Fig. 4: Ext. connections for HCS routed down (left side) and routed back (right side)

1	*Heating flow*
e	*Sensor elbow G1*

For part designations with a letter, see also ➔ fig. 1, page 7*).*

5.4.2 SolvisBen with internal HCS

Performing the conversion

For part designations with a letter, see also ➔ *fig. 1, p. 7*.

1. Remove the three pipe sections (**2**) below the shut-off valves in the heating flow and return.

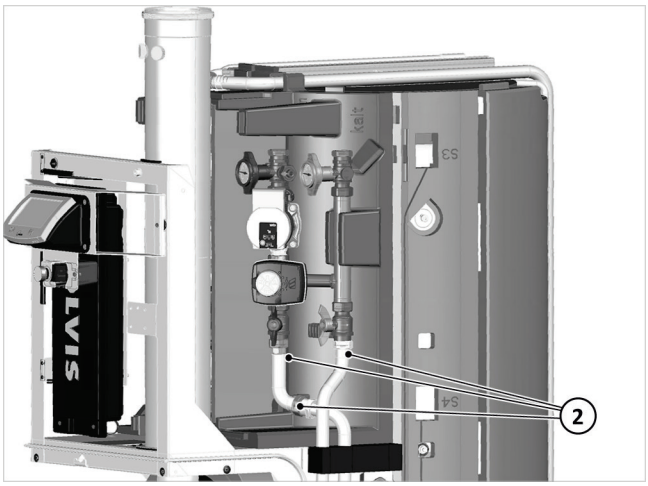


*Fig. 5: Removing the pipe sections (**2**)*

2. Replace the elbow on the return storage tank connection with the sensor elbow G1 (**e**).
3. Install T-piece 30528 (**f**) directly on the heating flow ball valve. Do not tighten it yet.
4. Attach the bottom heating flow connection pipe SL/WP (**j**) to the side outlet of the T-piece 30528 (**f**) and connect it to the heating flow connection on the Ben.
5. Fasten T-piece 30528 (**f**) on the ball valve.
6. Screw bracket G1 ÜW x G1 AG (**g**) to T-piece 30528 (**f**) and corrugated pipe WP-VL-SBHB (**h**) (HP flow).
7. Attach corrugated pipe WP-VL-SBHB to the flue duct* with clamps (**1**). (* = for Ben manufactured from September 2020, alternatively connect with pipe clamp around flue duct).
8. Connect corrugated pipe G1 UN x G1 UN (**k**) to sensor elbow G1 (**e**) and connect the heating circuit station return connection. Bend the pipe so that it does not collide with the side casing.

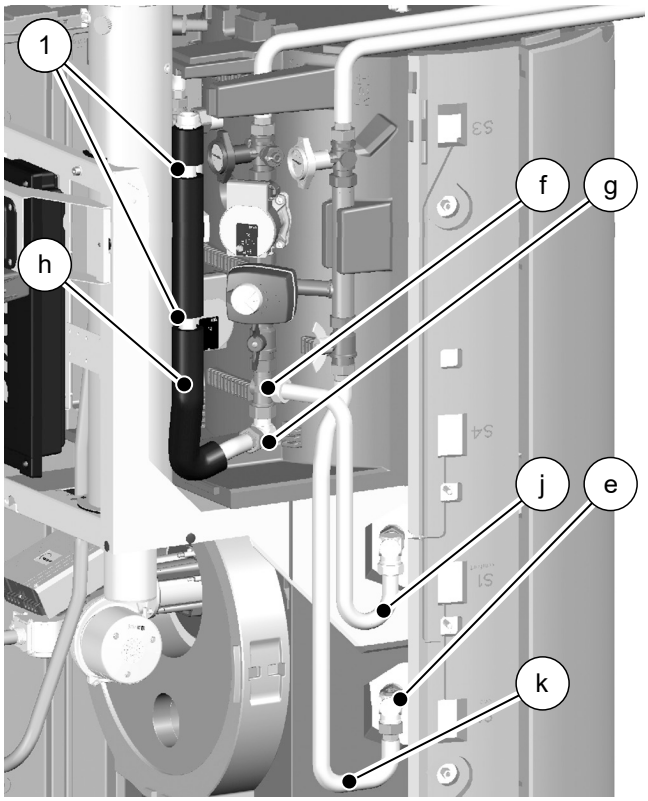


Fig. 6: Converted HCS connection

1 *Clamp (30747) + threaded pin (31388)*
e *Sensor elbow G1*
f *T-piece 30528 (heating flow)*
g *Bracket G1 ÜW x G1 AG*
h *Corrugated pipe WP-VL-SBHB*
j *Bottom connection pipe, heating flow, SL/WP*
k *Corrugated pipe G1 UN x UN*

5.5 Preparing the HP flow connection, where necessary

Only SolvisBen with installed solar system

On the SolvisBen, the hot water buffer is charged via the solar stratified charger. If a thermal solar system is already connected, the T-piece G3/4 must be used to create a bypass in the solar flow between the STS and the storage tank; see ➔ *Fig. 7*.

This sketch serves as guidance only and does not claim to be complete. It does not replace detailed and specific planning.

- To ensure the installation type is performed correctly, follow all the applicable standards, guidelines and technical rules at all times.

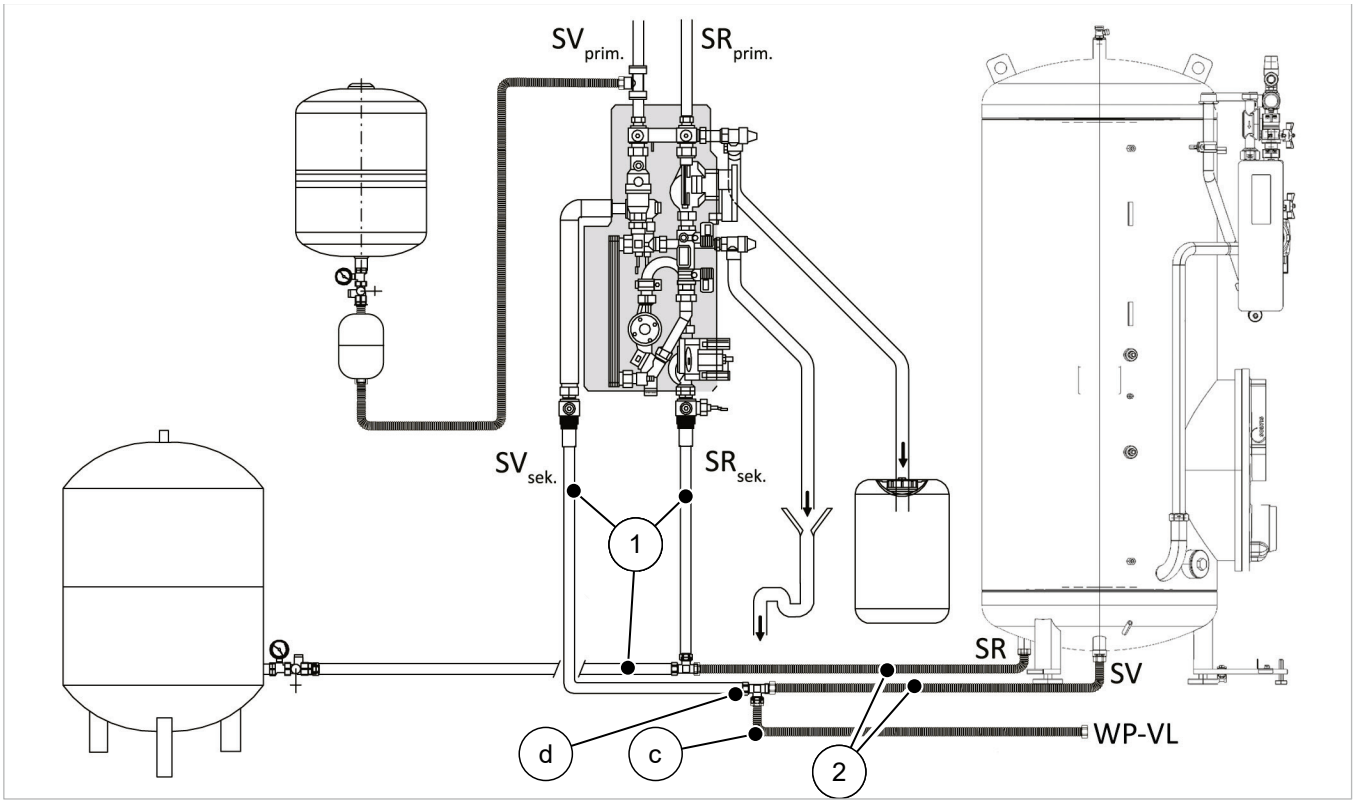


Fig. 7: Position of the 3-way switching valve (connections on the right)

1	*Pipelines, customer-supplied*
2	*Corrugated pipe for solar compensation line (included in the scope of delivery of the SUES-5.5)*
c	*Corrug. pipe solar comp. pump*
d	*T-piece, ¾"*
SV	*Solar flow*
SR	*Solar return*
$SV_{prim.}$	*Solar flow (collector side)*
$SR_{prim.}$	*Solar return (collector side)*
$SV_{sek.}$	*Solar flow (storage tank side)*
$SR_{sek.}$	*Solar return (storage tank side)*
WP-VL	*Heating pump flow*

For part designations with a letter, see also ➔ fig. 1, page 7*).*

5.6 Heating pump connection

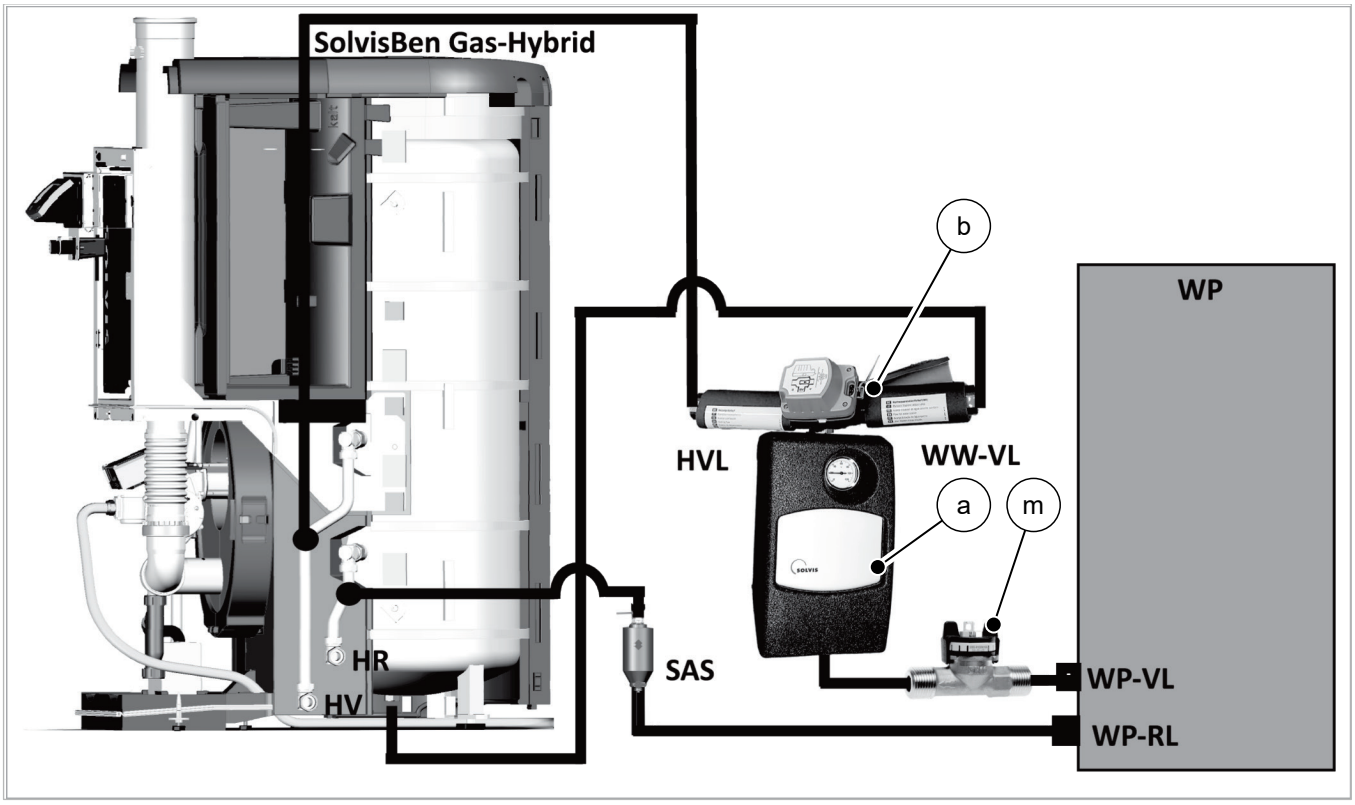


Fig. 8: Overview of the connection of the SolvisMia to the SolvisBen Gas-Hybrid, without an integrated heating circuit station (HKS)

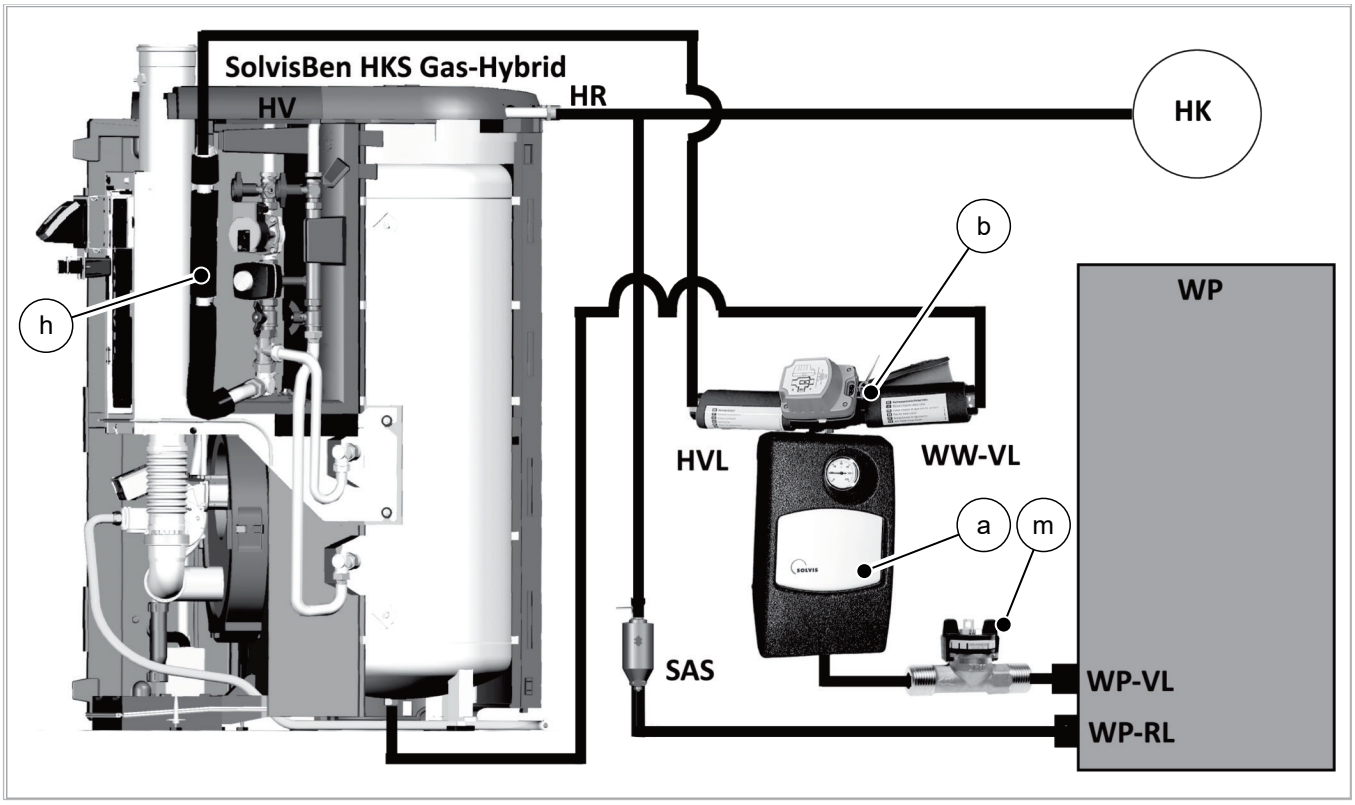


Fig. 9: Overview of the connection of the SolvisMia to the SolvisBen HKS Gas-Hybrid

a	*Buffer charging station PLAS-WP-HB-WM*	HR	*Heating return*	WP	*Heating pump*
b	*3-way switching valve group*	HV	*Heating flow*	WP-RL	*Heating pump return*
h	*Corrugated pipe WP-VL-SBHB*	HVL	*Heating water flow*	WP-VL	*Heating pump flow*
m	*Volume flow sensor DFS 235*	SAS	*Sludge separator*	WW-VL	*Hot water flow**

** This is the heating water for water heating.*
For part designations with a letter, see also ➔ fig. 1, p. 7.

This sketch serves as guidance only and does not claim to be complete. It does not replace detailed and specific planning.

- To ensure the installation type is performed correctly, follow all the applicable standards, guidelines and technical rules at all times.

5.6.1 Heating pump return connection

Installing the sludge separator

1. Fit the supplied sludge separator (**SAS**) in the return line between the heating pump (**WP**) and SolvisBen (see also ALS-BEN).

Connecting the heating pump return

1. Connect the return line for the heating pump to the shared return line of the heating circuits (see ALS-BEN).

5.6.2 Heating pump flow connection

CAUTION

Danger due to overpressure

Potential damage to the heating system

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

Connecting the heating pump flow to the buffer charging station

1. Route the flow line coming from the heating pump to the buffer charging station and connect it.
2. Guide the power cable and the control lines for the buffer charging station pump and the switching valve into the front frame through a pipe lead-through (with a 3x reducer insert).
3. Route the cables into the housing for the mains circuit board.

Connecting the switching valve to the SolvisBen

For part designations with a letter, see also ➔ *fig. 1, page 7*, *fig. 8, page 12* and *fig. 9, page 12*.

1. Connect the connection WW-VL to the three-way switching valve (**b)** on site to the solar stratified charger (**4**) on the Ben.

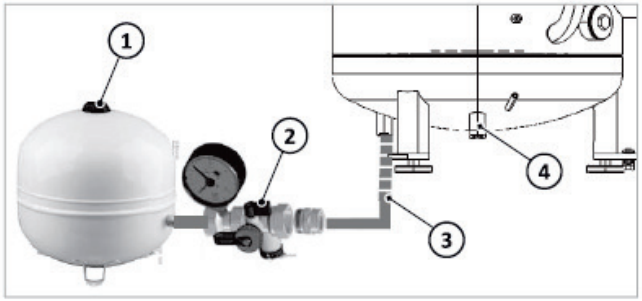


Fig. 10: Connecting the HW flow to the storage tank (without solar system)

1 *Membrane expansion vessel (MEV)*
2 *MEV connection group*
3 *Corrugated pipe*
4 *Solar flow (solar stratified charger)*

2. When using solar systems connected to the stratified solar storage tank, see ➔ *chapter "Preparing the HP flow connection, where necessary" on page 11*.
3. **SolvisBen HKS only**: Connect the connection HVL to the three-way switching valve (**b**) on site to the connection pipe (**h**). To do so, cut the EPP cover (**1**) at the embossed sections.

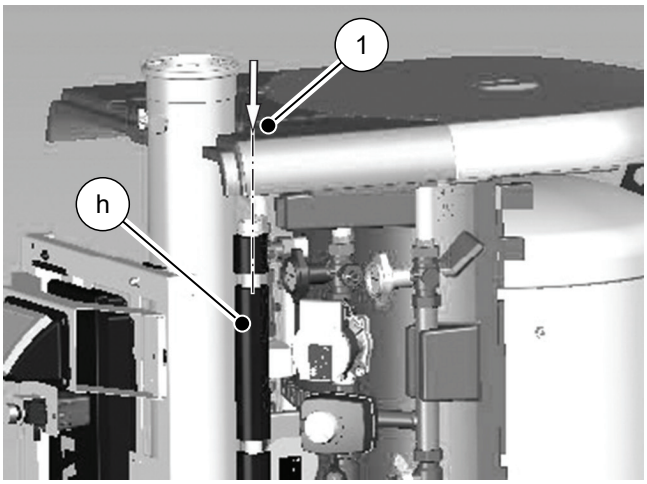


Fig. 11: Cutting the EPP cover

4. When using the SolvisBen without an internal HCS, see ➔ *chapter "SolvisBen without internal HCS" on page 9*.
5. Insert the cable supplied for the switching valve into the switching valve and route it to the mains circuit board housing.

5.7 Electrical connection

5.7.1 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%).

5.7.2 Modbus connection

Overview

The SolvisControl system controller and the internal heating pump controller communicate via a Modbus connection.

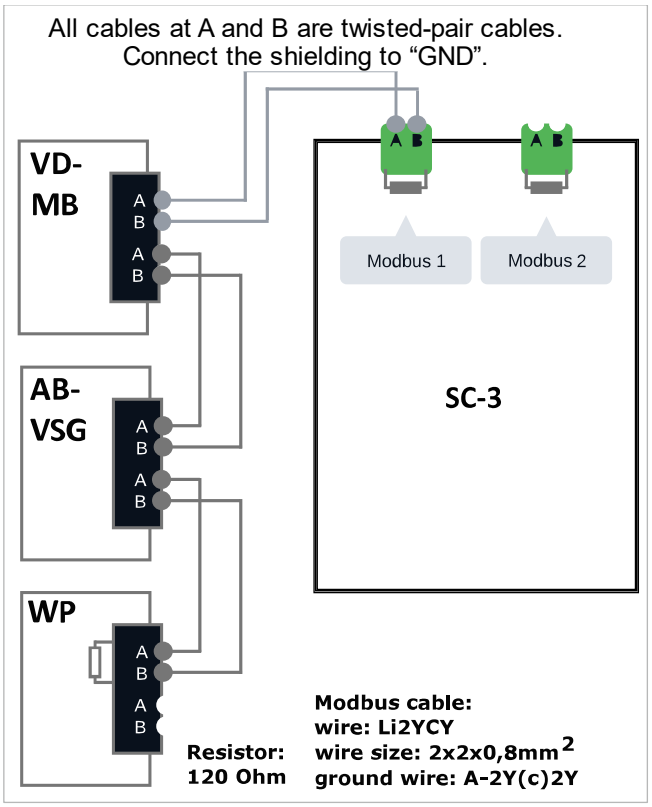


Fig. 12: Connection to the SC-3 Modbus

AB-VSG	*Volume flow sensor connection box*	VD-MB	*Modbus junction box*
SC-3	*SolvisControl 3*	WP	*Heating pump*

VSG Junction box

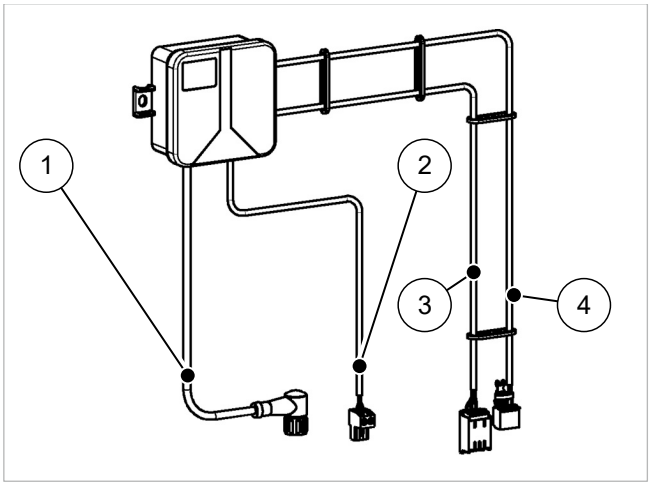


Fig. 13: Volume flow sensor connection box

1	*Volume flow sensor connection cable*	3	*Modbus loop, cable 1*
2	*Voltage supply*	4	*Modbus loop, cable 2*

Installing the volume flow sensor connection box

1. Insert the cable from the junction box into the flow sensor and secure.
2. Fit the connection box to the wall at a suitable location.
3. Extend the power supply cable to the expansion board and connect it to a free 12 V connection (DC1 to DC5).

Connecting the Modbus cable from the heating pump

1. Extend cable 1 (**3**, see ➔ *fig. 13*) to the heating pump and connect it there.

Connect the wires according to the colour coding – brown = earth / white = A / green = B.

2. Extend cable 2 (**4**, see ➔ *fig. 13*) to the Modbus junction box.

Modbus junction box

Installing the Modbus junction box

The junction box with the Modbus interface must be installed outside the SolvisBen.

1. Route the Modbus cable from the junction box through the pipe lead-throughs of the charging module (3x reducer insert) to the SolvisControl 2 controller and plug it into the rear of the “**Modbus 1**” connection.
2. Fit the junction box to the wall at a suitable location.

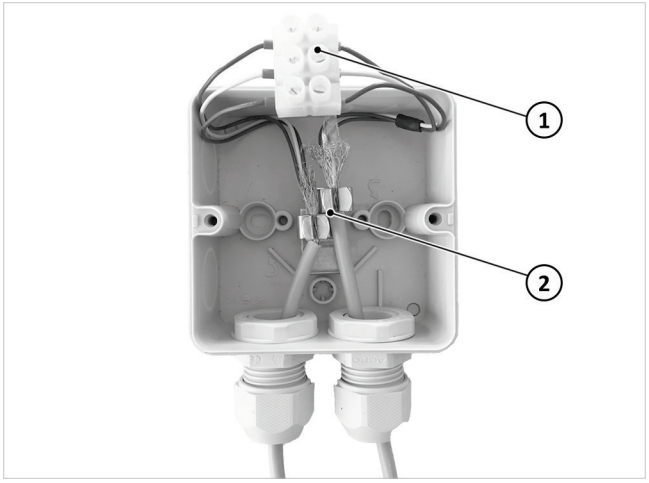


Fig. 14: Attaching the Modbus junction box

1 *Connection terminals*
2 *Shield clamps*

Connecting the Modbus cable from the volume flow sensor connection box

1. Open the junction box.
2. Where applicable, insert the shielded Modbus cable from the volume flow sensor connection box into the junction box.
3. Only with a shielded cable: Strip the cable, expose the shielding and fasten it in the shield clamp.
4. Strip the insulation from the wires and attach wire end sleeves to them.
5. Connect the wires according to the colour coding (brown/white/green) to the pre-assembled terminals.

For more information, see the ➔ *SolvisMia installation instructions (MAL-MIA)*.

5.7.3 Connecting the PLAS-WP-WM pump

Connecting the pump

The pump has two connection cables.

1. Route the power and signal cable of the pump to the mains circuit board of the SolvisControl 3.
2. Connect the power cable to output A2 and secure the cable via the strain relief device.
3. Connect the signal cable to output LP as follows:
   - Blue: “LP -”
   - Brown: “LP +”

5.7.4 Connecting the switching valve group

Applies only to SolvisBen Oil: Remove the suppressor contacts of the burner at output A14 in the mains module. Burner suppression is only possible via the interface.

Connecting the switching valve

1. Run the connection cable for the three-way switching valve to the SolvisControl 3 mains circuit board.
2. Connect the power cable to output A14 and secure the cable using the strain relief device.

5.7.5 Sensor connection

Connecting the sensors

1. Attach sensor S9 to the sensor elbow on the Ben heating return using the supplied grub screw.

5.7.6 Connecting SmartGrid (optional)

The following operating states can be implemented via the SmartGrid connection board according to the “SG-ready” label.

- Heating pump lock (e.g. idle period of utility supply company)
- Increased heating pump operation
- External requirement by the utility supply company or heating pump operation, e.g. via energy management system

If not in use, heating pump runs in normal mode.

Installing the SmartGrid Box

1. Install the supplied SmartGrid box (**1**) in the Ben. Use adhesive or drill 2 holes in the rear panel of the mains module.

If the SolvisBen was produced after September 2020, two drill holes are already provided.

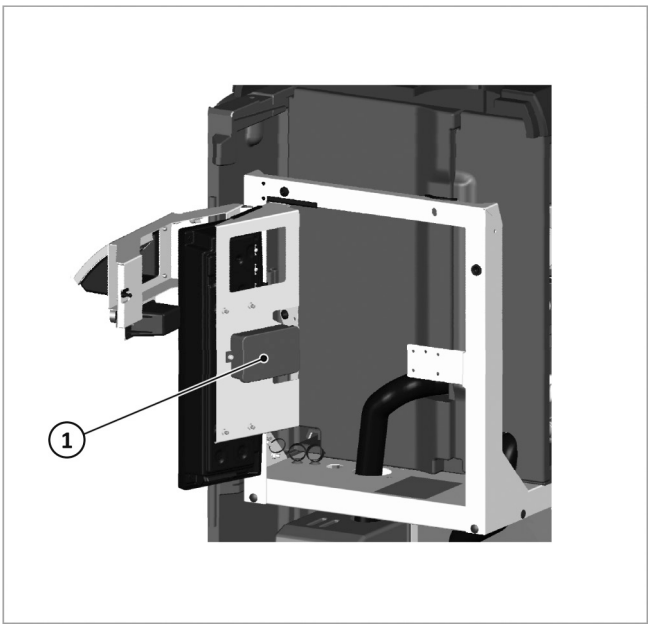


Fig. 15: Rear panel of the mains module

Establishing a power supply for the SmartGrid Box

1. Connect the supplied SmartGrid connection cable to the SmartGrid board.
2. Guide the cable into the mains module housing of the charging module.
3. Plug into the expansion board (see ALS-BEN).

Connecting the SmartGrid

1. Route the control line(s) of the SmartGrid device to the connection board of the SolvisBen and connect according to the connection diagram (section “Smart-Grid connection board”).

5.7.7 SolvisMia connection

Making the connection area accessible

1. Unscrew the screws on the sides of the cover and remove the cover.

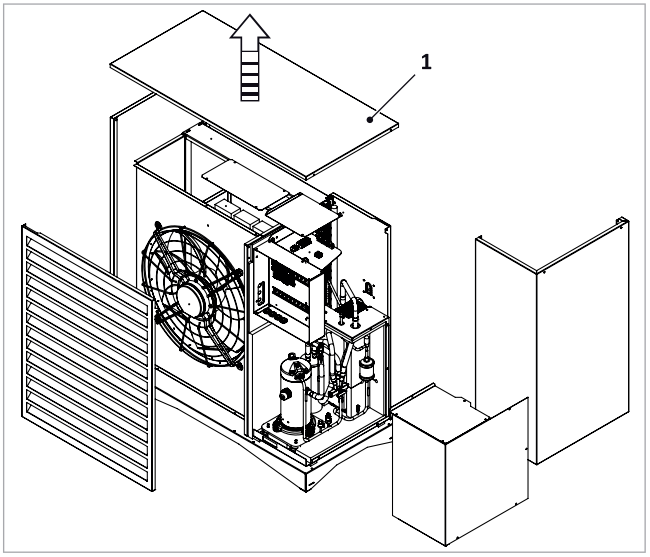


Fig. 16: Unscrewing the screws and removing the cover

2. Screw the cable guide elbows onto the housing and guide the cables through.
3. Route the electrical lines through the strain relief devices (**1**) into the connection area.

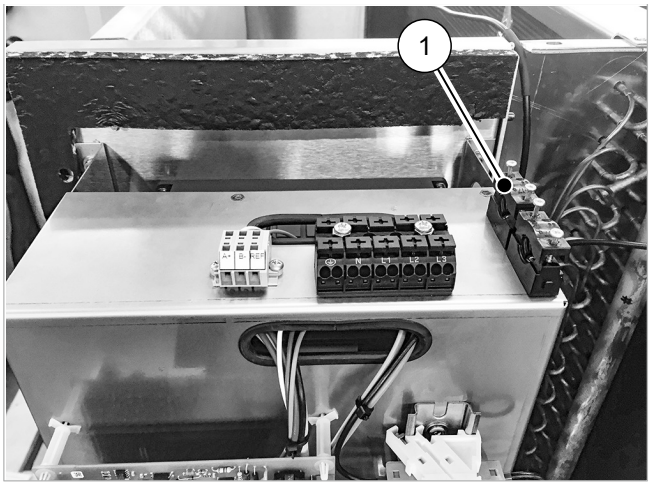


Fig. 17: Guiding the cables through

1 Strain relief device

Connecting the SolvisMia

1. Route the electrical connection pipes and signal cables either as underground cables or through separate conduits from the building to the heating pump.
2. Connect the electrical cables according to one of the two figures below.

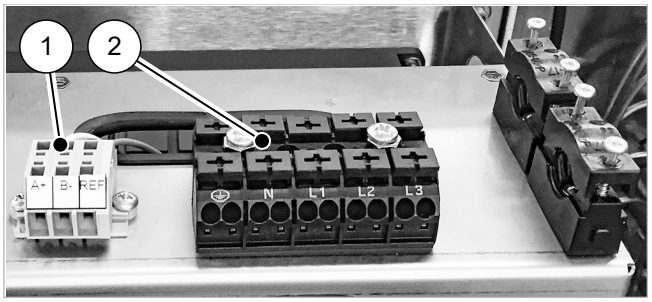


Fig. 18: SolvisMia connection area

1 Low voltage safety (BUS)
• BUS A, BUS B and earth BUS (REF)
2 Compressor (inverter)
• L1, L2, L3, N and PE

3. Check the function of the strain relief device.

Always connect the emergency/auxiliary heating (in monoenergetic systems, this is installed on the storage tank) to ensure the trouble-free operation of the heating pump (antifreeze). For more information about switching off the auxiliary heating via the controller, see ➔ *operating instructions (BAL-SBSX-3-K)*.

Trace heating

The trace heating must be connected to a separate power supply on the subdistributor.

5.7.8 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**).

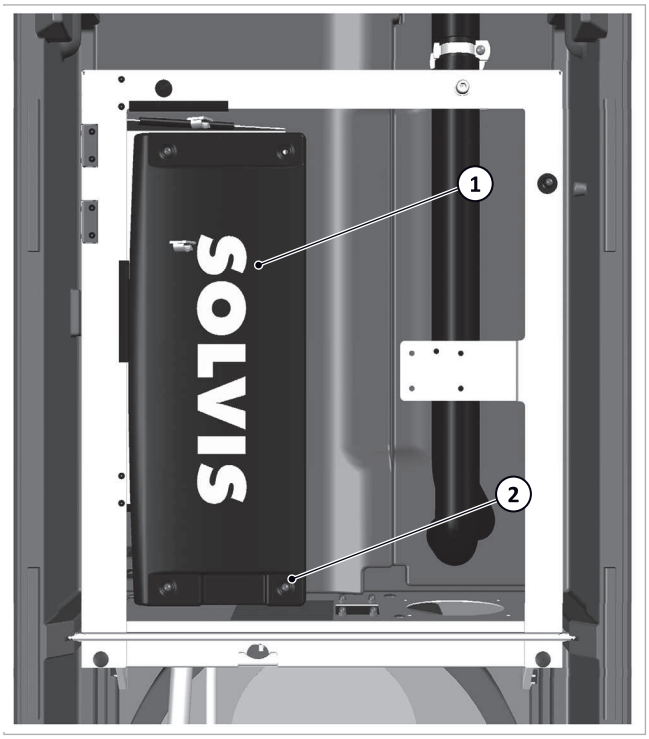


Fig. 19: Attach the cover of the mains circuit board

6 Start-Up

Start-up takes place in the prescribed order:

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.

6.1 Filling the system

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**).

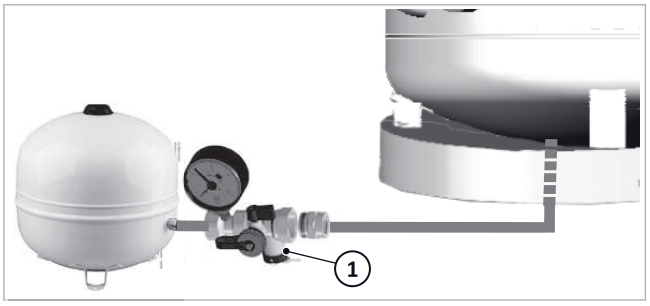


Fig. 20: Boiler filling and emptying valve on the MEV connection group

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.

6.2 Flushing the load circuit and SolvisMia

Flush the SolvisMia and connection pipes to the SolvisBen; see ➔ *installation instructions (MAL-MIA).*

6.3 Configuration SolvisControl

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).*

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

6.4 Buffer charging station pump

6.4.1 Adjustment options

The Wilo Para 15/8 iPWM is speed-controlled by a PWM signal from the SC-3. The pump does not need to be set.

6.4.2 Bleeding

Bleeding the pump

If the pump does not bleed automatically, operate the pump manually for a few minutes alternating between high speed and low speed to convey the accumulated air from the pump into the system. Proceed as follows:

1. Switch to the "**Installer** menu on the SC-3.
2. Select "**Outputs**" → "**More**" → "**Analogue/PWM**" → "**Load pump**" from the menu.
3. Set "**Manual specification**" to "**100%** ".

→ Pump runs at maximum speed.

4. Set to "**0%**" after approx. 20 seconds by pressing "**+**".

→ Pump does not run.

5. Set to "**100%**" after approx. 10 seconds by pressing "**–** ".

→ Pump runs at maximum speed.

6. Repeat the procedure for a few minutes.
7. Set "**Manual specification**" to "**Auto**".

6.5 Final Tasks

Start up the system with SolvisMia (see MAL-MIA) and hand over the system to the operator.

7 Troubleshooting

7.1 Pumps

7.1.1 Malfunction, cause and remedy

Work to be performed only by qualified technicians

- Troubleshooting must be performed only by qualified specialists.
- Work on the electrical connection must be performed only by qualified electricians.

Fault	Causes	Remedy
The pump does not run even though the power supply is switched on	Faulty electrical fuse	Check fuses
	Pump has no voltage	Correct the interruption to the voltage supply
Pump is making noises	Cavitation due to insufficient flow pressure	Increase the system pressure within the permitted range
		Check the delivery height setting and adjust it to a lower height if necessary
The building is not warming up	The heat output of the heating surfaces is too	Check hydraulic balancing, increase the setpoint if necessary

7.1.2 Wilo PARA malfunction messages

- The malfunction report LED indicates a malfunction

LED	Faults	Causes	Remedy
Lights up red	Blocking	Rotor blocked	Activate manual restart or contact customer service
	Contact / winding fault	Winding faulty	
Flashing red	Undervoltage/ overvoltage	Mains voltage supply too low/high	Check the mains voltage and operating conditions; contact customer service.
	Module overheated	The inside of the module is too warm	
	Short circuit	Motor current too high	
Flashing red/ green	Generator operation	Flowthrough of pump hydraulics; pump has no mains voltage	Check mains voltage, water quantity/ -pressure and ambient conditions
	Dry run	Air in the pump	
	Overload	Sluggish motor; pump is operated outside the specification (e.g. high module temperature) The speed is lower than in normal mode.	

7.2 SolvisMia heating pump

For information about heating pump malfunction messages, see the ➔ *SolvisMia installation instructions (MAL-MIA)*.

8 Technical Data

8.1 SolvisMia heating pump

For the technical data for the heating pumps, see the ➔ *SolvisMia installation instructions (MAL-MIA)*.

8.2 Wall-mounted WP buffer charging station

PLAS-WP

Dimensions	
PLAS tube connections	1" male thread, flat sealing
Insulation	Heat insulation shell made from EPP

PLAS-WP hydraulics

PLAS pump	
Manufacturer/type	Wilo PARA 15/8 iPWM1
Installation length	130 mm
Speed control	via PWM1
Permitted media temperature	2 °C to 95 °C
Minimum inflow pressure	0.5 bar (at 95 °C)
Mains connection	230 V ~/ 50 Hz
Maximum power consumption	2 to 75 W
Power consumption	0.03 – 0.38 A
EEI	≤ 0.21

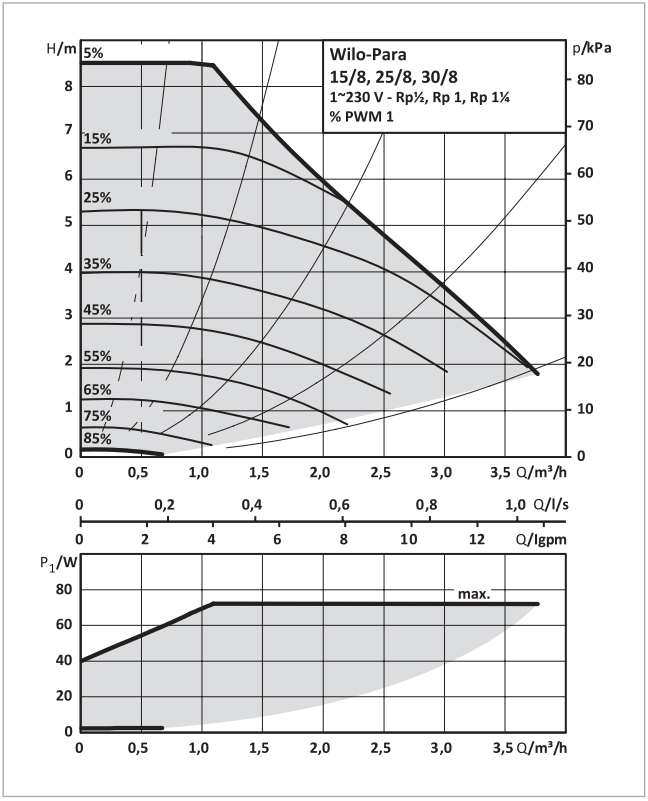


Fig. 21: Wilo PARA 15/8 pump characteristic curves

H *Pump height [m]*
P_1 *Power consumption [kW]*
Q *Volume flow [m³/h]*

Contrary to the information given in the installation instructions, pumps of the type IMP NMT Mini PWM 15/80-130 may have been installed in the buffer charging stations due to supply bottlenecks.

For use in an external buffer charging station, the pump cables must be extended on site. The existing pump cables can be used for this (cut off plugs and connect cables according to regulations).

Alternatively, 5 m cables can be ordered separately (KB-2-0.5-5000 and KB-3-0.5-5000)

Pump

Name	**Value**
Type	IMP NMT Mini PWM 15/80-130
Protection class	IP 44
Permitted media temperature (at 30 °C ambient temperature)	2 °C to 95 °C
Maximum permitted operating pressure	10 bar
Minimum inflow pressure (heating side)	0 mWS
Mains connection	230 V ~/ 50 Hz
Maximum power consumption	50 W
Maximum power consumption	0.5 A
Energy efficiency index (EEI)	≤0.18

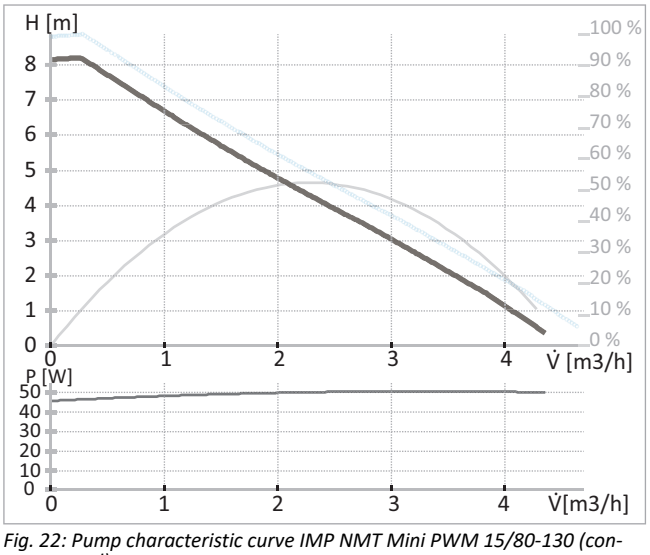


Fig. 22: Pump characteristic curve IMP NMT Mini PWM 15/80-130 (constant speed)

H *Pump height [m]*
P_1 *Power consumption [W]*
$\dot{V}$ *Volume flow [m³/h]*

9 Appendix

9.1 System diagram

9.1.1 SolvisBen HKS WP with SolvisMia

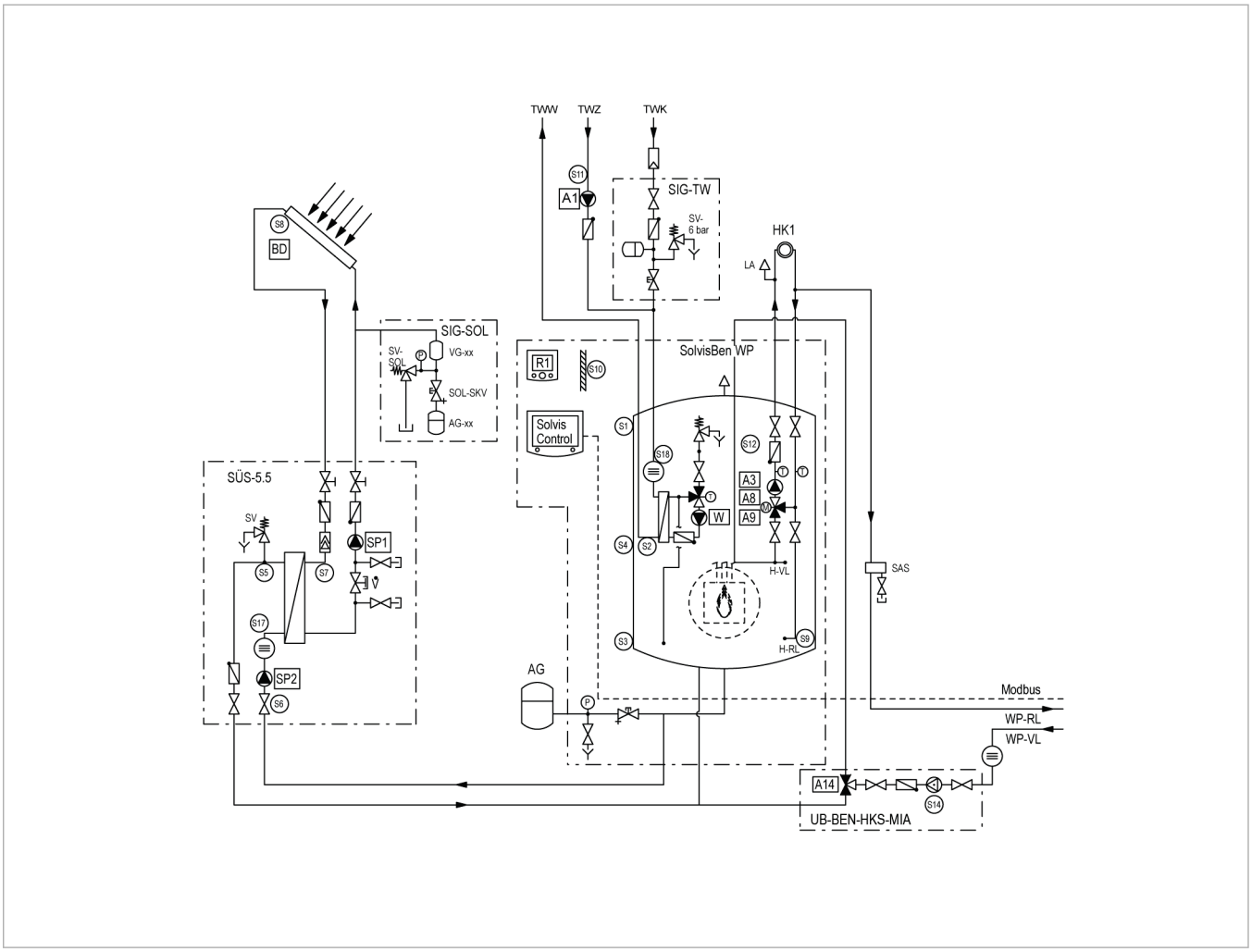


Fig. 23: SolvisBen WP with integrated heating circuit station, solar system and SolvisMia heating pump – part 1

Equipment

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

Assemblies:

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

Abbreviations

LA	*Air separator*
AG	*Expansion vessel*
SAS	*Sludge separator*
SV	*Safety valve*
TWK	*Drinking water network, cold connection*
TWW	*Drinking water network, hot connection*
TWZ	*Drinking water network, circulation connection*
H-RL	*Heating return*
H-VL	*Heating flow*
LP	*Load pump*
SIG-SOL	*Solar circuit safety group*
SKV	*Cap valve, solar circuit*
V	*Adjusting valve*
HK1	*Heating circuit 1*

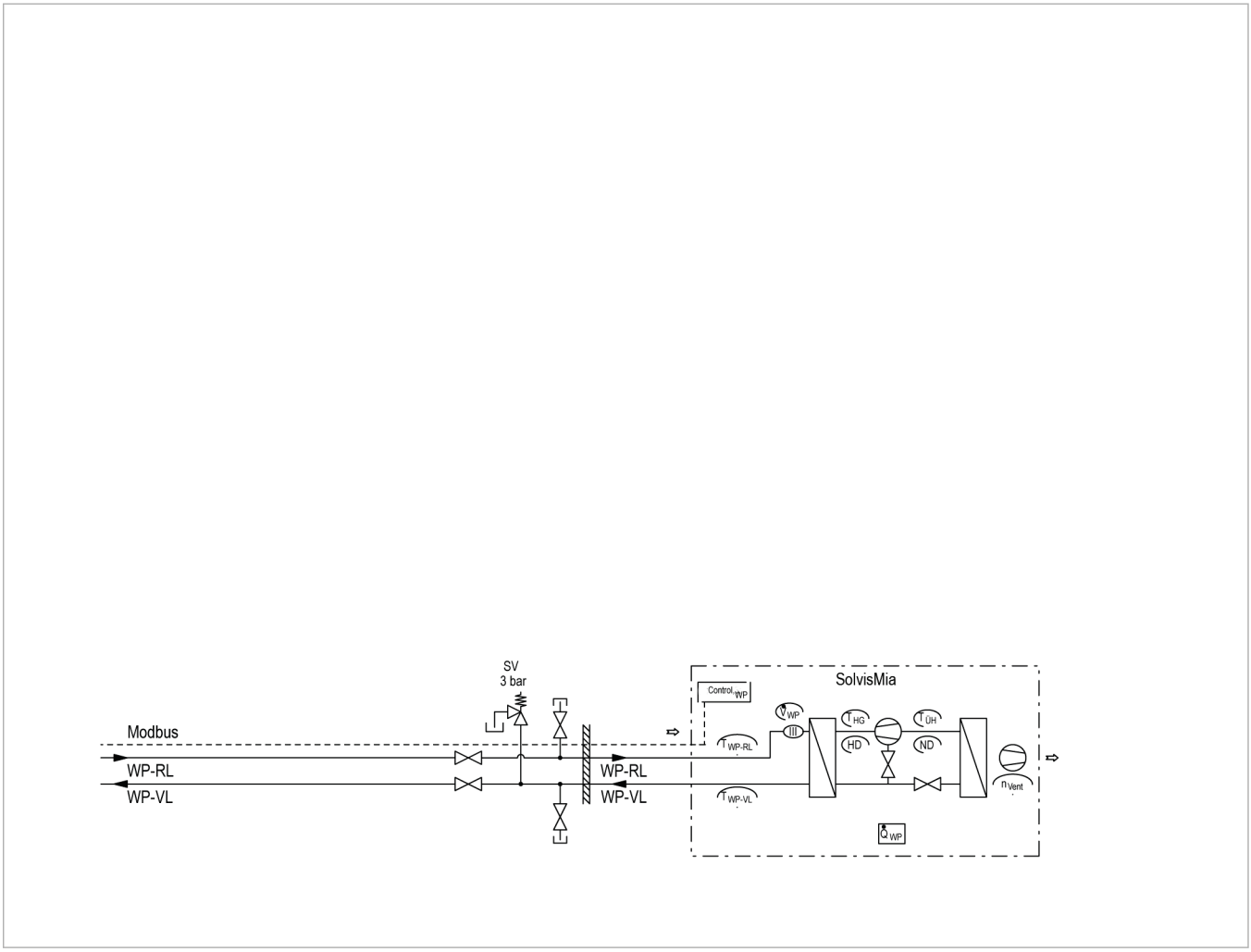


Fig. 24: SolvisBen WP with integrated heating circuit station, solar system and SolvisMia heating pump – part 2

The diagram shown represents an overview of the system based on the information available to us. It does not replace detailed and specific planning. Please note: to ensure the system functions correctly, the installation, operating and maintenance instructions must be followed. When connecting a third-party boiler, do not rely solely on the information provided by Solvis – always consult the manufacturer of the boiler. The shut-off and safety valves shown provide a rough guide only. Observe all the relevant standards, guidelines and technical rules at all times. This is the only way to ensure that installations are carried out correctly.	

9.1.2 SolvisBen WP with SolvisMia and 3 heating circuits

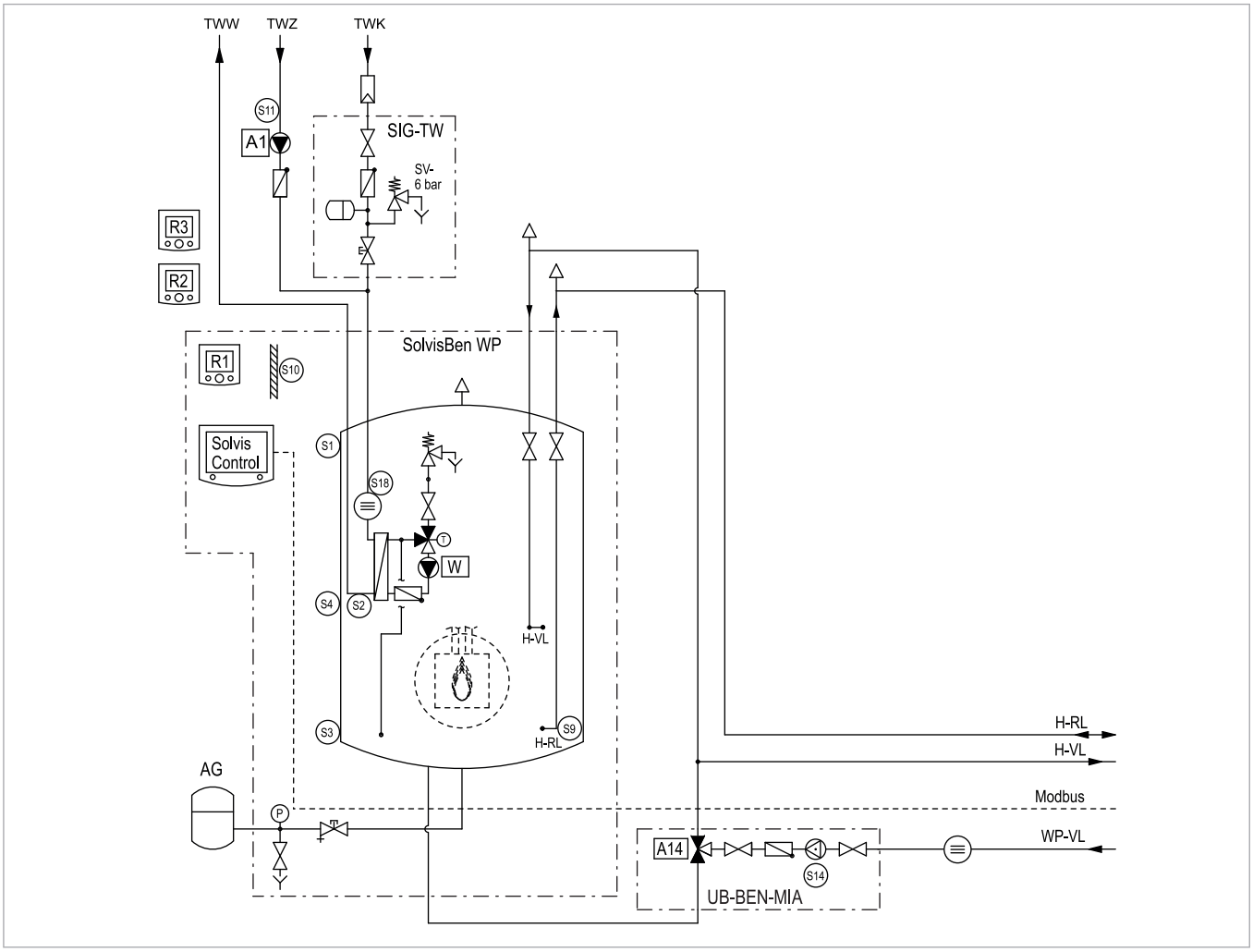


Fig. 25: SolvisBen WP with three mixed heating circuits and SolvisMia heating pump – part 1

Equipment

- Stratified solar storage tank
- SolvisControl 3 system controller
- Drinking water heating
- Three mixed heating circuits

Assemblies:

R1	*Room operating unit, heating circuit 1*
SIG-TW	*Safety group, drinking water connection*
BD	*Lightning protection box*

Abbreviations

LA	*Air separator*
AG	*Expansion vessel*
SAS	*Sludge separator*
SV	*Safety valve*
TWK	*Drinking water network, cold connection*
TWW	*Drinking water network, hot connection*
TWZ	*Drinking water network, circulation connection*
H-RL	*Heating return*
H-VL	*Heating flow*
LP	*Load pump*
V̇	*Adjusting valve*
HK1-3	*Heating circuit 1-3*

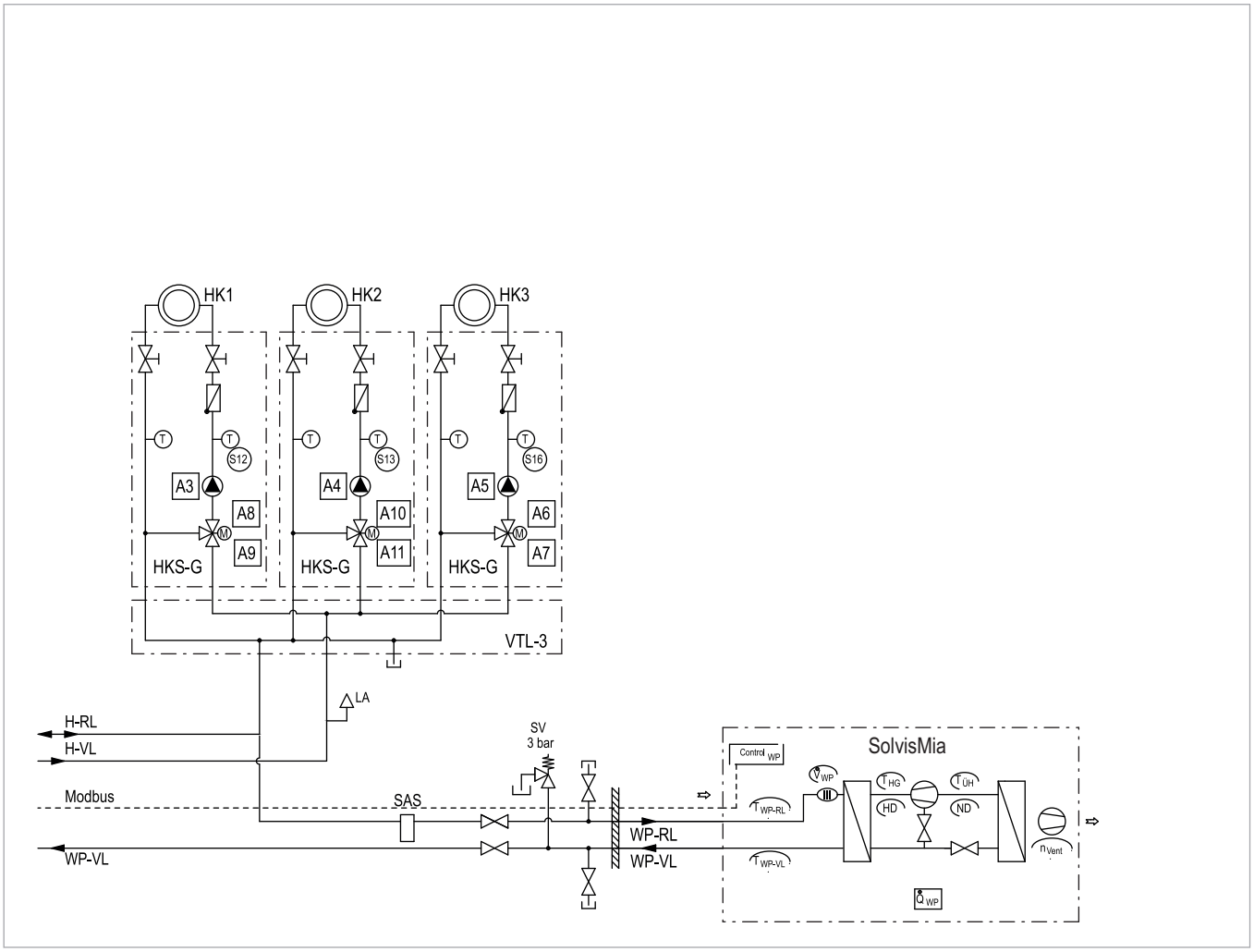


Fig. 26: SolvisBen WP with three mixed heating circuits and SolvisMia heating pump – part 2

The diagram shown represents an overview of the system based on the information available to us. It does not replace detailed and specific planning. Please note: to ensure the system functions correctly, the installation, operating and maintenance instructions must be followed. When connecting a third-party boiler, do not rely solely on the information provided by Solvis – always consult the manufacturer of the boiler. The shut-off and safety valves shown provide a rough guide only. Observe all the relevant standards, guidelines and technical rules at all times. This is the only way to ensure that installations are carried out correctly.	

9.2 Mains circuit board SolvisBen WP

9.2.1 Connection table (system status)

SolvisBen WP / SolvisBen Lino / SolvisBen Solo

Sensors (temperature sensors and volume flow encoders)			Actuators (pumps, signals and control valves)		
Inputs		Designation (sensor)	Outputs		Designation
No.	Option*		No.	Option*	
S1	All	Sto. tank, top	A1	All	Circulation pump
S2	All	Hot water	A2	Lino / Solo	(Unused)
S3	All	Sto. tank reference		WP	PLAS WP load pump
S4	All	Heating buffer, top (HPo)	A3	All	Pump for heating circuit 1
S5	All	Solar flow 2	A4	All	Pump for heating circuit 2
S6	All	Solar return 2	A5	All	Pump for heating circuit 3
S7	All	Solar flow 1	A6	East-west roof	Valve 1
S8	All	Collector		SFB	(Unused)
S9	All	Heating buffer, bottom (HPu)		HC 3	Heating circuit 3 mixer open
S10	All	Outdoor temperature	A7	East-west roof	Valve 2
S11	All	Circulation		SFB	Load pump
S12	All	Flow for heating circuit 1		HC 3	Heating circuit 3 mixer closed
S13	All	Flow for heating circuit 2	A8	All	Heating circuit 1 mixer (open)
S14	All	Flow of heating pump / SolvisLino 4 / third-party boiler	A9	All	Heating circuit 1 mixer (closed)
S15	All	Cold water (optional)	A10	All	Heating circuit 2 mixer (open)
S16	East-west roof	Collector 2	A11	All	Heating circuit 2 mixer (closed)
	SFB	Solid fuel boiler	A12	Lino / Solo	Burner (L = 230 V~)
	Other	Flow for heating circuit 3		WP	SolvisLea control voltage (L/N/PE), heating element, stage 1 and 3 (A12->DHC1)
S17	All	Solar volume flow encoder	A13	Lino / Solo	PLAS Lino load pump / third-party boiler
S18	All	Water volume flow encoder		WP	Heating element, stage 2 and 3 (->DHC2)
I-1	Lino / Solo	External burner requirement	A14	Lino / Solo	Burner (floating)
	WP	SmartGrid connection board		WP	3-way switching valve
I-2	All	(Unused)	O-1	Lino / Solo	Modulation (0 to 10 V)
I-3	All	(Unused)		WP	(Unused)
R1	All	Room control element for heating circuit 1	SP1	All	PWM solar pump 1
R2	All	Room control element for heating circuit 2	SP2	All	PWM solar pump 2
R3	All	Room control element for heating circuit 3	W	All	PWM hot water pump
ST1	All	Jumper	LP	All	PWM load pump, PLAS WP/PLAS Lino
ST2	All	Jumper			

* *"All" = applies to SolvisBen WP, SolvisBen Lino and SolvisBen Solo, "SFB" = additional solid fuel boiler or "HC 3" = additional mixed circuit*

9.2.2 Connection Diagram

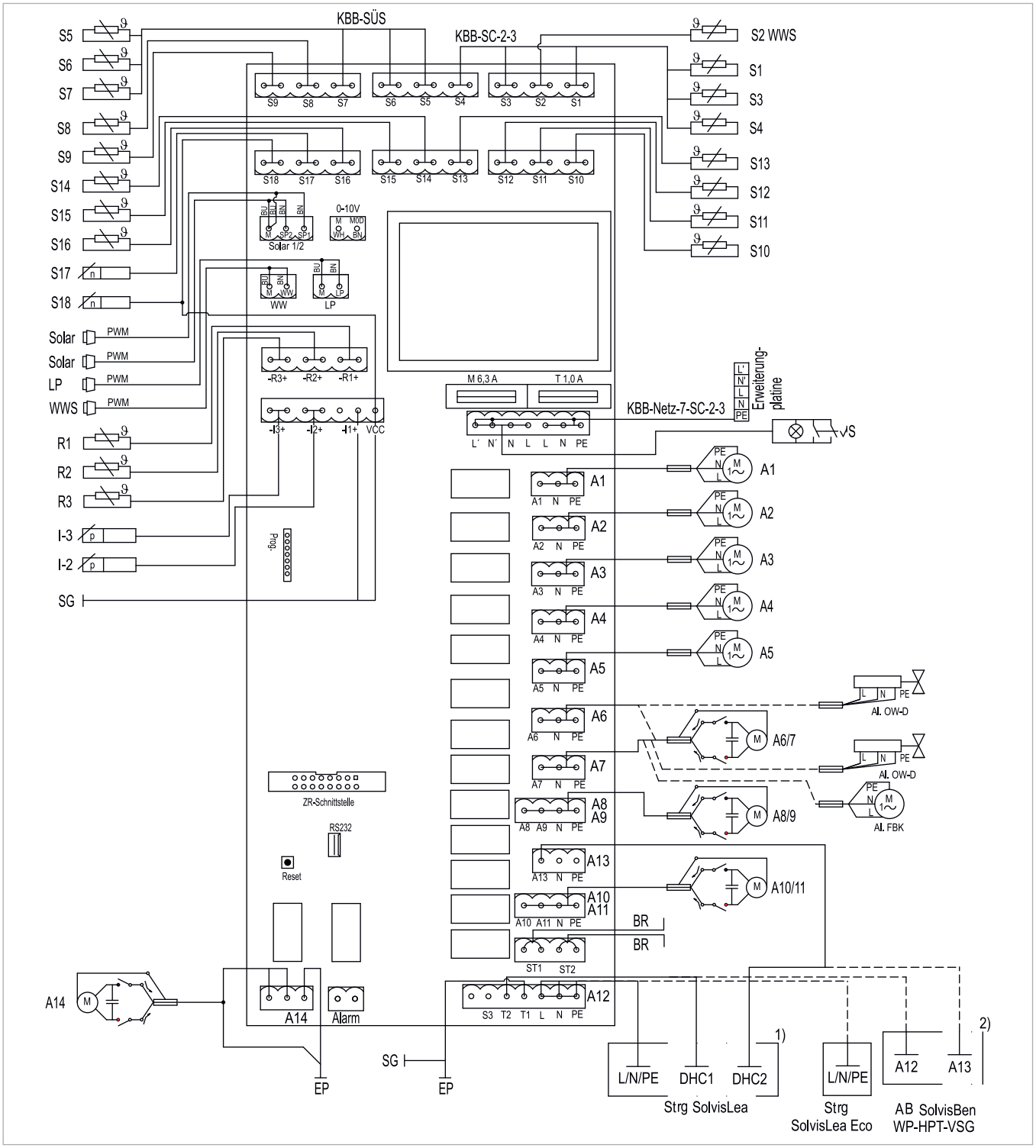


Fig. 27: SolvisControl 3 mains circuit board for SolvisBen WP

1) SolvisLea: with SolvisBen WP (integrated EHS in heating pump, S14 sensor in SolvisBen), 2) SolvisLea Eco and SolvisMia: with SolvisBen WP-HPT-VSG (integrated EHS and volume flow/temperature sensor in the SolvisBen)

AL FBK	*Solid fuel boiler alternative*
AL OWD	*East-west roof alternative*
BR	*Jumper*
AB	*SolvisBen connection box*
EP	*Expansion board, see* ➔ fig. 29, p. 30
KBB SC-2-3	*SolvisControl 3 sensor cable harness*
KBB-SÜS	*Sensor cable harness for solar heat transfer station*
LP	*Load pump*
PWM	*Pulse width modulation*
R1-R3	*Room operating unit*
SG	*SmartGrid connection board, see* ➔ Fig. 30, p. 31
Solar	*Solar pump*
Strg	*Solvis Lea/Lea Eco control*
WWS	*Hot water station*
ZR	*Central controller interface*
UV	*Switching valve*

9.3 Mains circuit board SolvisBen Hybrid

9.3.1 Connection table (system status)

SolvisBen/SolvisMax Gas Gas/Oil and Gas/Oil Hybrid

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

** "All" = applies to SolvisMax/Ben Gas and SolvisMax/Ben Oil as well as for SolvisMax/Ben Gas Hybrid and SolvisMax/Ben Oil Hybrid, "SFB" = additional solid fuel boiler or "HC 3" = additional mixed heating circuit*

9.3.2 Connection Diagram

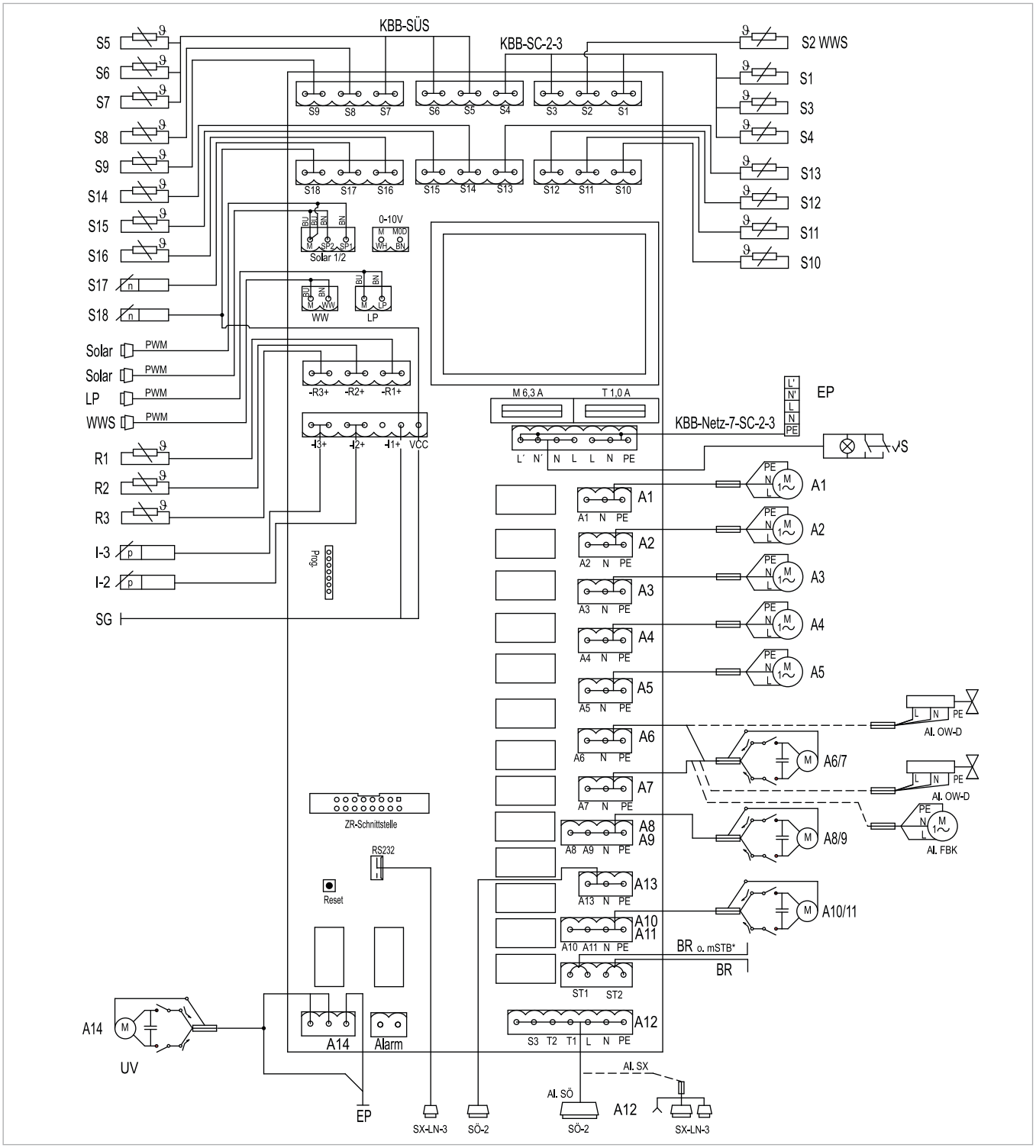


Fig. 28: SolvisControl 3 mains circuit board for SolvisBen Gas/Oil Hybrid

* mSTB for SolvisBen Hybrid Oil only

AL SFB	*Solid fuel boiler alternative*
AL OWD	*East-west roof alternative*
AL SÖ	*Alternative connection for SolvisBen Oil*
AL SX	*Alternative connection for SolvisBen Gas*
BR	*Jumper*
EP	*Expansion board, see* ➔ fig. 29, p. 30
KBB SC-2-3	*SolvisControl 3 sensor cable harness*
KBB-SÜS	*Sensor cable harness for solar heat transfer station*
mSTB	*Mechanical safety temperature limiter*
SG	*SmartGrid connection board, see* ➔ Fig. 30, p. 31
UV	*Switching valve*
WWS	*Hot water station*
ZR	*Central controller interface*

9.4 Expansion Board

9.4.1 View

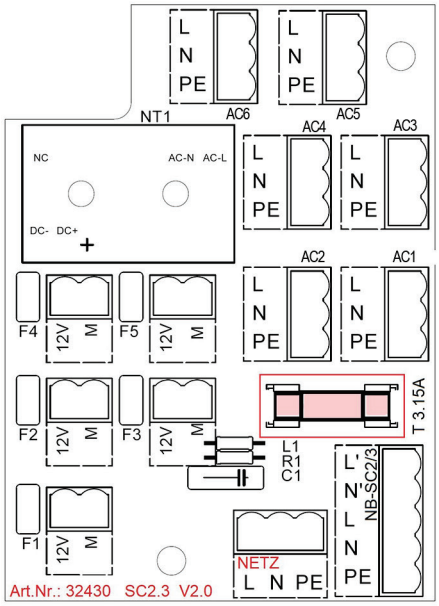


Fig. 29: Expansion board for SolvisControl 3 mains circuit board

9.4.2 Connection table

SolvisBen Gas/Oil and SolvisBen Gas/Oil Hybrid

Actuators (pumps)		
Output no.	**SolvisBen Gas/Oil Hybrid**	**SolvisBen Gas/Oil**
AC1	SmartGrid connection board and A12 voltage supply	(Reserve)
AC2	A14 voltage supply	(Reserve)
AC3	SolvisLea/SolvisLea Eco control voltage	(Reserve)
AC4	Solar pump 1 and 2	Solar pump 1 and 2
AC5	Hot water pump	Hot water pump

SolvisBen Solo

Actuators (pumps)		
Output no.	**SolvisBen HP**	**SolvisBen Lino/Solo**
AC1	SmartGrid connection board and A12 voltage supply	(Reserve)
AC2	A14 voltage supply	Load pump
AC3	(Reserve)	(Reserve)
AC4	Solar pump 1 and 2	Solar pump 1 and 2
AC5	Hot water pump	Hot water pump

9.5 SmartGrid connection board

The SmartGrid connection board is an interface with several functions. It can relieve the mains by switching off the heating pump. It is also possible to take advantage of favourable tariffs during periods with low loads to charge the hot water area to a particularly high temperature.

Furthermore, instead of low-cost electricity, your own electricity from a PV system can also still be used (additional hardware and potential inverter programming necessary).

9.5.1 Connection table

Operating status	Switch state		Explanation
	SG1	SG2	
1 – “utility supply company idle period”	1	0	Heating pump disabled by utility supply company
2 – Normal mode	0	0	If nothing is connected to the connection board, this state is continuously active.
3 – Increased operation	0	1	Increase of the setpoint
4 – ext. requirement	1	1	Heating pump switches on if possible; operation as 3

9.5.2 Connection Diagram

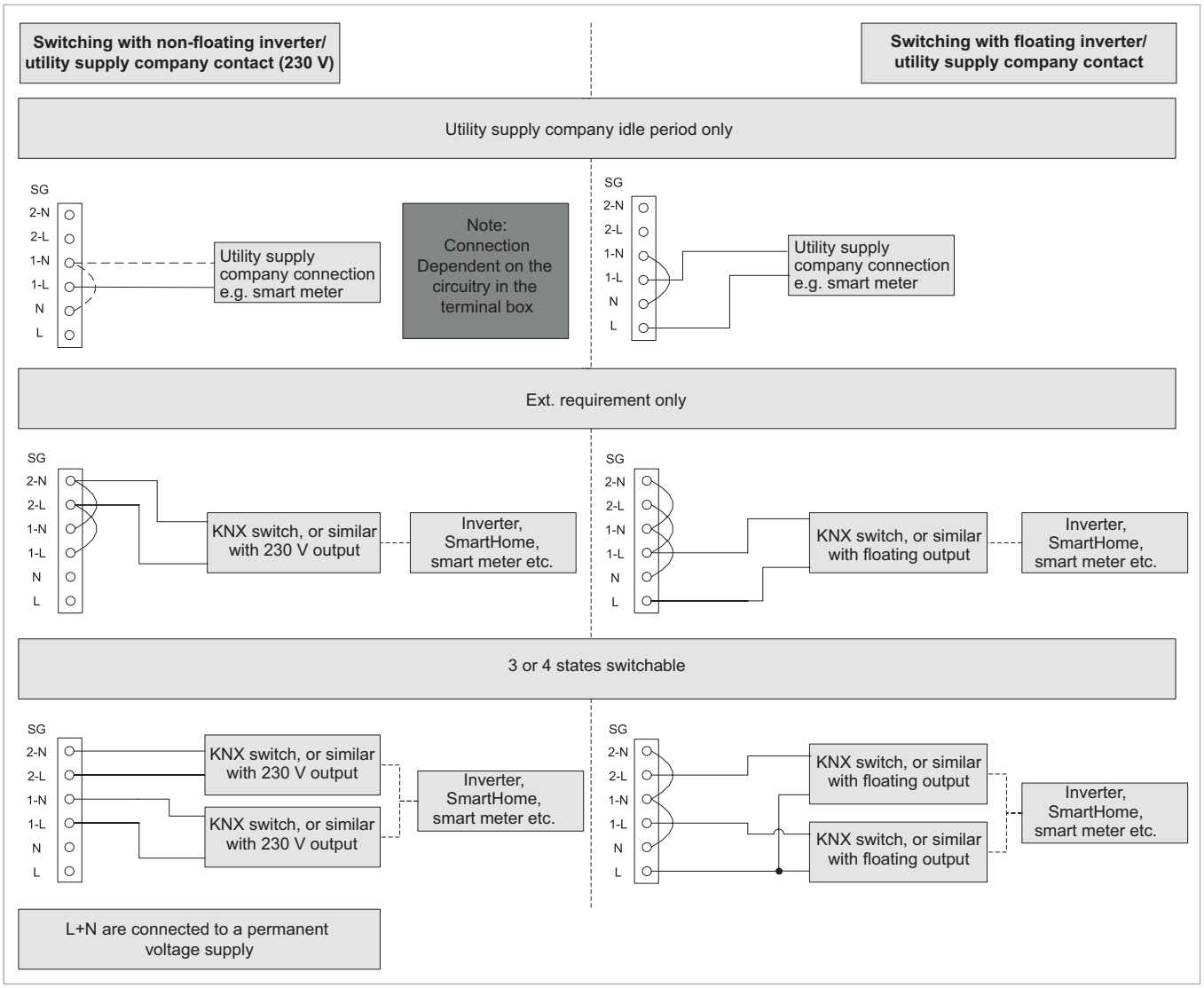


Fig. 30: SmartGrid connection options for the SolvisControl 3 mains circuit board

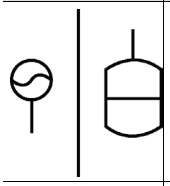
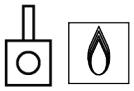
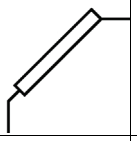
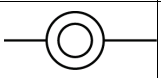
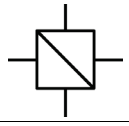
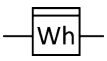
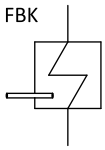
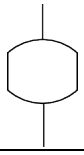
9.6 Explanation of Symbols

9.6.1 Hydraulic elements

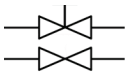
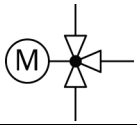
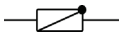
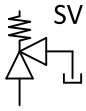
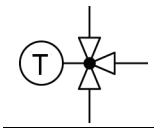
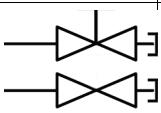
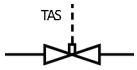
Valves

Symbol	Meaning
	Manometer
	Thermometer

Components

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

Valves

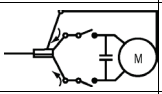
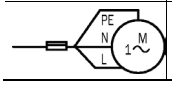
Symbol	Meaning
	Shut-off valve or valve
	Adjusting valve
	Bleeding tap
	Motor-driven mixing valve
	Gravity brake / non-return valve
	Safety valve
	Thermostatic mixing valve
	Solar cap valve
	Boiler filling and draining valve
	Thermal discharge safety device (TAS)

Other hydraulic components

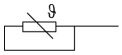
Symbol	Meaning
	Volume flow encoder
	Pump
	Sludge separator
	Drinking water filter

9.6.2 Electrical symbols

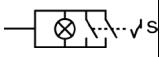
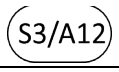
Actuators

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

Sensors

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

Other electrical components

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

Notes

Art.-Nr.: 33953 - UBA-BEN-MIA-EN - Dokument-Nr.: 33953-2 / Redaktioneller Stand: 05.23 - Technischer Stand: 11.22

SOLVIS GmbH
Grotrian-Steinweg-Straße 12
D-38112 Braunschweig

Phone: +49 (0) 531 28904-0
Fax.: +49 (0) 531 28904-100
E-mail: info@solvis.de

Internet: www.solvis.com