

# Conversion

## SolvisBen with SolvisLea

For connecting the SolvisLea heating pump

SolvisBen conversion

- Gas to Gas Hybrid
- Oil to Oil Hybrid
- Solo with SolvisLea



# 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.

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A list of our international representatives is provided at [www.solvis.com](http://www.solvis.com).

Please understand that the telephone numbers are reserved for use by our installers.

Interested system operators should contact their installer.

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## 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.

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# Contents

|          |                                                         |           |
|----------|---------------------------------------------------------|-----------|
| <b>1</b> | <b>Information About These Instructions .....</b>       | <b>2</b>  |
| <b>2</b> | <b>Safety Notes.....</b>                                | <b>5</b>  |
| <b>3</b> | <b>System Versions .....</b>                            | <b>6</b>  |
| <b>4</b> | <b>Scope of Delivery.....</b>                           | <b>7</b>  |
| <b>5</b> | <b>Installation.....</b>                                | <b>8</b>  |
| 5.1      | Installing SolvisLea.....                               | 8         |
| 5.2      | Draining the SolvisBen .....                            | 8         |
| 5.3      | Installing the buffer charging station.....             | 8         |
| 5.3.1    | Switching valve installation.....                       | 8         |
| 5.3.2    | Wall-Mounted Installation.....                          | 8         |
| 5.4      | Heating flow preparation.....                           | 9         |
| 5.4.1    | SolvisBen without internal HCS .....                    | 9         |
| 5.4.2    | SolvisBen with internal HCS.....                        | 10        |
| 5.5      | Preparing the HP flow connection, where necessary ..... | 11        |
| 5.6      | Heating pump connection.....                            | 11        |
| 5.6.1    | Heating pump return connection.....                     | 13        |
| 5.6.2    | Heating pump flow connection .....                      | 13        |
| 5.7      | Electrical connection .....                             | 13        |
| 5.7.1    | General information .....                               | 13        |
| 5.7.2    | Preparing the Modbus connection.....                    | 14        |
| 5.7.3    | Connecting the PLAS-WP-WM pump .....                    | 15        |
| 5.7.4    | Connecting the switching valve group .....              | 15        |
| 5.7.5    | Sensor connection .....                                 | 15        |
| 5.7.6    | Connecting SmartGrid (optional) .....                   | 15        |
| 5.7.7    | SolvisLea voltage supply .....                          | 16        |
| 5.7.8    | Completing the connection tasks.....                    | 16        |
| <b>6</b> | <b>Start-Up.....</b>                                    | <b>17</b> |
| 6.1      | Filling the system.....                                 | 17        |
| 6.2      | Flushing the load circuit and SolvisLea.....            | 17        |
| 6.3      | Configuration SolvisControl .....                       | 17        |
| 6.4      | Buffer charging station pump.....                       | 17        |
| 6.4.1    | Adjustment options .....                                | 17        |
| 6.4.2    | Bleeding.....                                           | 17        |
| 6.5      | Final Tasks .....                                       | 17        |
| <b>7</b> | <b>Troubleshooting.....</b>                             | <b>18</b> |
| 7.1      | Pumps .....                                             | 18        |
| 7.1.1    | Malfunction, cause and remedy .....                     | 18        |
| 7.1.2    | Wilo PARA malfunction messages .....                    | 18        |
| 7.2      | SolvisLea heating pump .....                            | 18        |
| <b>8</b> | <b>Technical Data .....</b>                             | <b>19</b> |
| 8.1      | SolvisLea heating pump .....                            | 19        |
| 8.2      | Wall-mounted WP buffer charging station .....           | 19        |

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|          |                                                      |           |
|----------|------------------------------------------------------|-----------|
| <b>9</b> | <b>Appendix .....</b>                                | <b>20</b> |
| 9.1      | System diagram for SolvisBen WP with SolvisLea ..... | 20        |
| 9.1.1    | A heating circuit with solar .....                   | 20        |
| 9.1.2    | Three heating circuits .....                         | 22        |
| 9.2      | Mains circuit board .....                            | 24        |
| 9.2.1    | Connection table (system status) .....               | 24        |
| 9.2.2    | SolvisBen WP connection diagram .....                | 25        |
| 9.2.3    | SolvisBen Gas/Oil Hybrid connection diagram .....    | 26        |
| 9.3      | Expansion Board .....                                | 27        |
| 9.3.1    | View .....                                           | 27        |
| 9.3.2    | Connection table .....                               | 27        |
| 9.4      | SmartGrid connection board .....                     | 28        |
| 9.4.1    | Connection table .....                               | 28        |
| 9.4.2    | Connection Diagram .....                             | 28        |
| 9.5      | Explanation of Symbols .....                         | 29        |
| 9.5.1    | Hydraulic elements .....                             | 29        |
| 9.5.2    | Electrical symbols .....                             | 30        |

## 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 SolvisLea Eco (8 kW) or SolvisLea (11 kW or 14 kW) 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. The conversion kit is not suitable for a combination of the SolvisBen Solo with a SolvisLeaEco.

## 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)

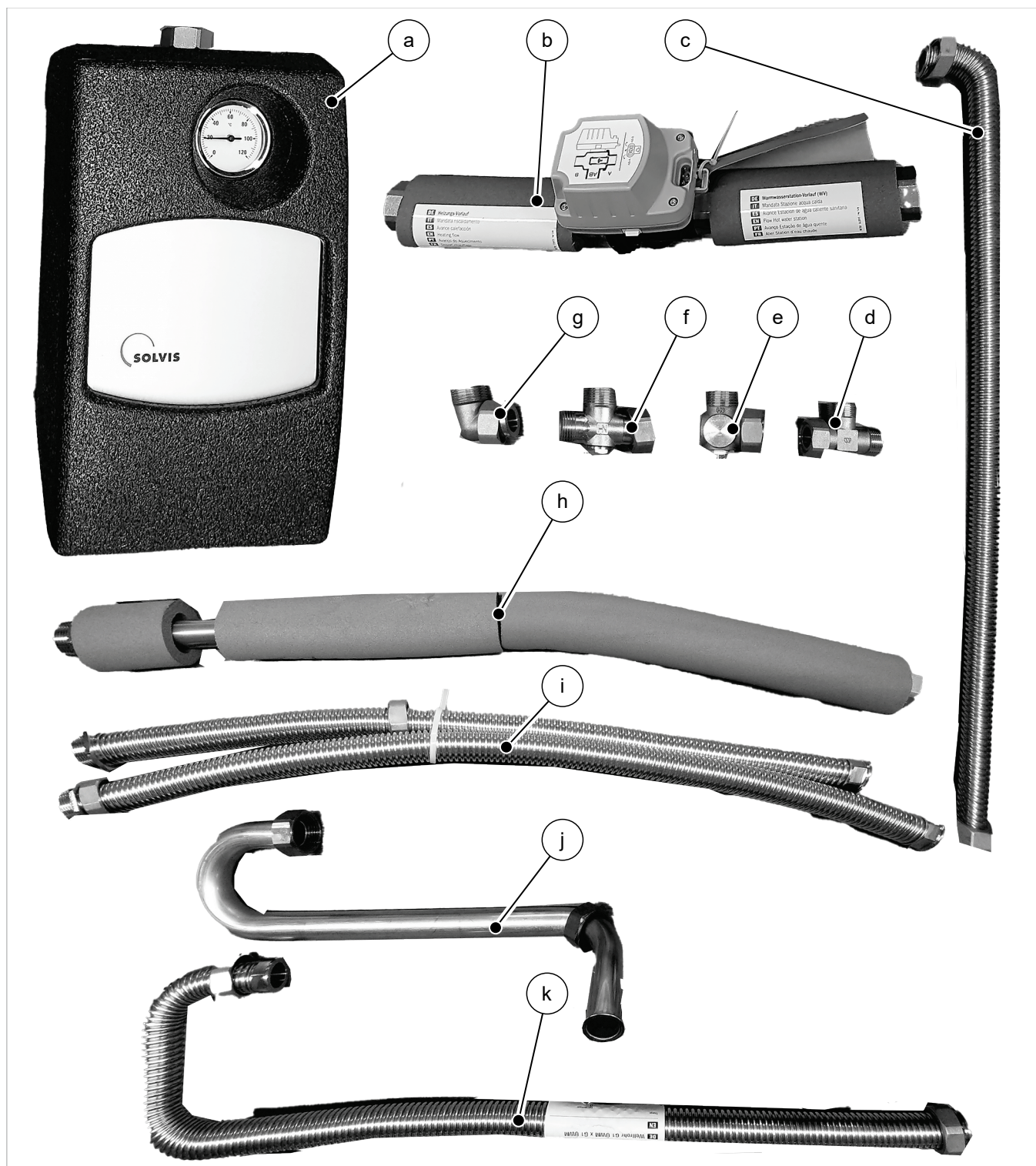


Fig. 1: Kits for converting SolvisBen and SolvisBen HKS to SolvisLea

- a Buffer charging station PLAS-WP-HB-WM
- b 3-way switching valve group
- c Corrugated pipe, solar compensating line
- d T-piece G 3/4
- e Sensor elbow G1

- Only in the conversion kit for the SolvisBen with a heating circuit station:**
- f T-piece 30528
  - g Bracket G1 ÜW x G1 AG
  - h Corrugated pipe WP-VL-SBHB
  - i Corrugated pipe set G1

- j Bottom connection pipe, heating flow, SL/WP
- k Corrugated pipe G1 UN x UN

## 5 Installation

### 5.1 Installing SolvisLea

#### Installing the SolvisLea

1. Install the SolvisLea according to the installation instructions (MAL-LEA) 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

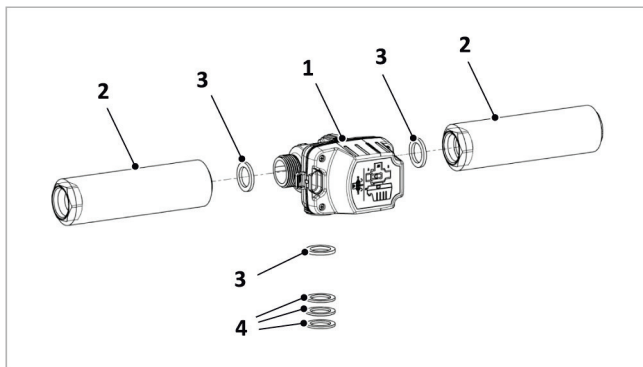


Fig. 2: Switching valve group with seals (pre-assembled)

- 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, page 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.

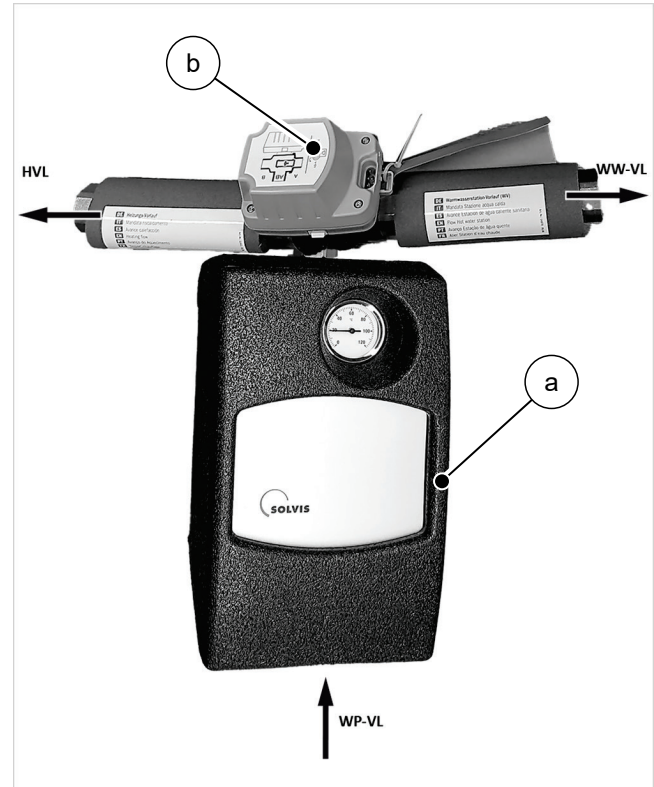


Fig. 3: Buffer charging station with switching valve

- 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 flow

#### 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-WP-HB-WM 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, carefully bend down the left corrugated pipe for the hot water flow. Bend the right corrugated pipe for the heating flow downwards.

## 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, page 7).

1. In the heating flow (1), insert a customer-supplied T-piece close to the storage tank.
2. Replace the elbow on the heating return connection in the SolvisBen with the sensor elbow G1 (e).

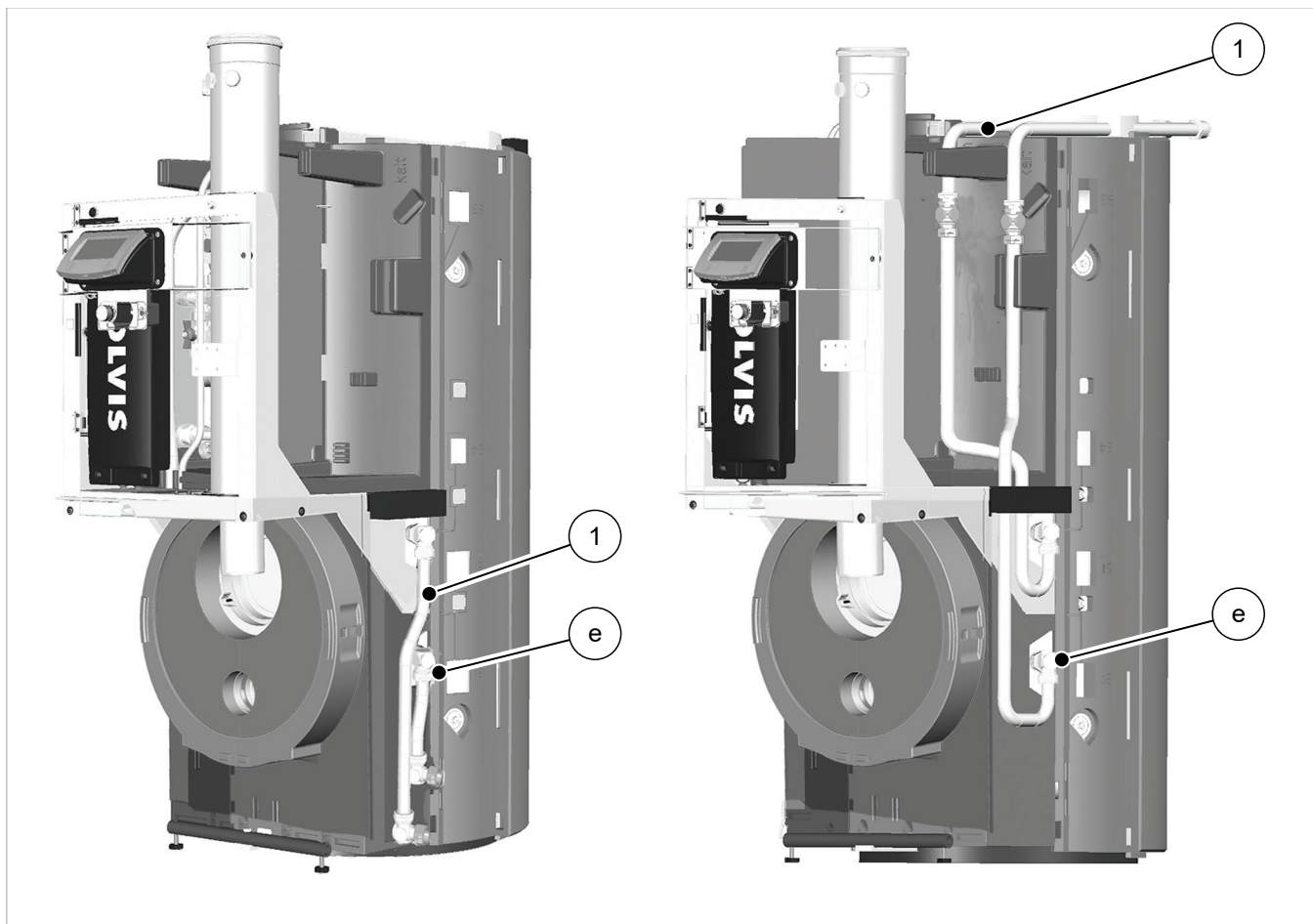


Fig. 4: Ext. connections for HCS routed down (left side) and routed back (right side)

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, page 7*).

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

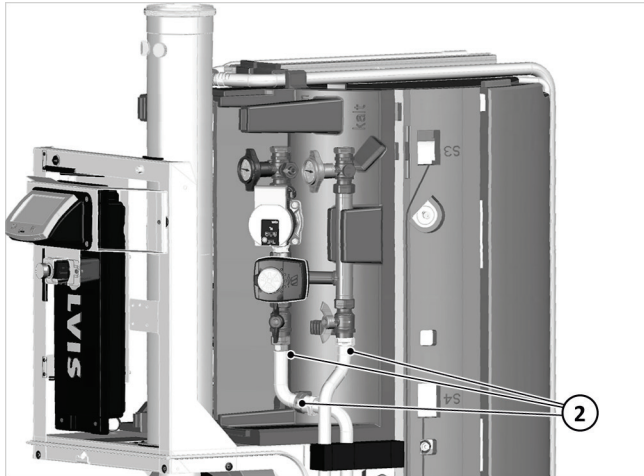


Fig. 5: Removing the pipe sections (2)

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 re- turn connection. Bend the pipe so that it does not col- lide with the side casing.

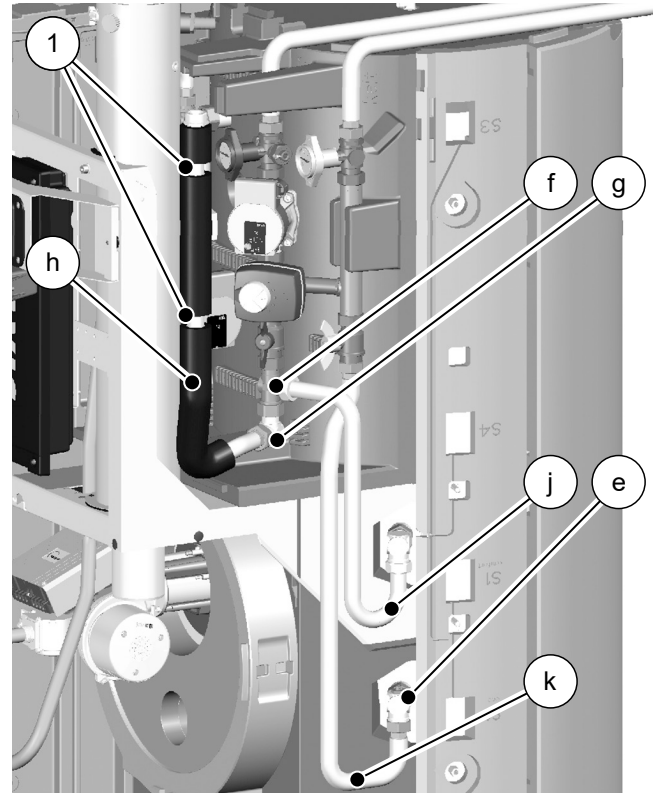


Fig. 6: Converted HCS connection

- 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.

**i** 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.

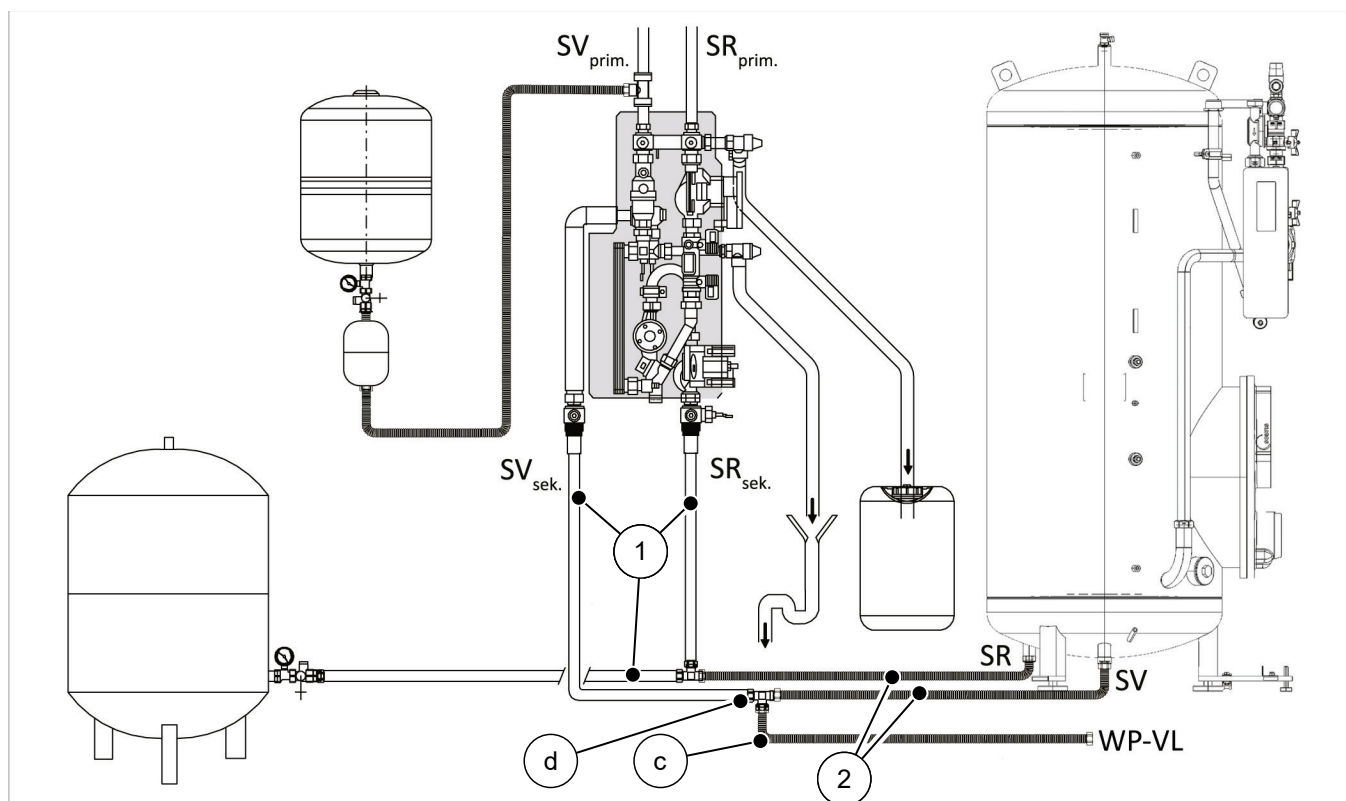


Fig. 7: Position of the 3-way switching valve (connections on the right)

- 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, 3/4"
- SV Solar flow
- SR Solar return
- SV<sub>prim.</sub> Solar flow (collector side)
- SR<sub>prim.</sub> Solar return (collector side)
- SV<sub>sek.</sub> Solar flow (storage tank side)
- SR<sub>sek.</sub> 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

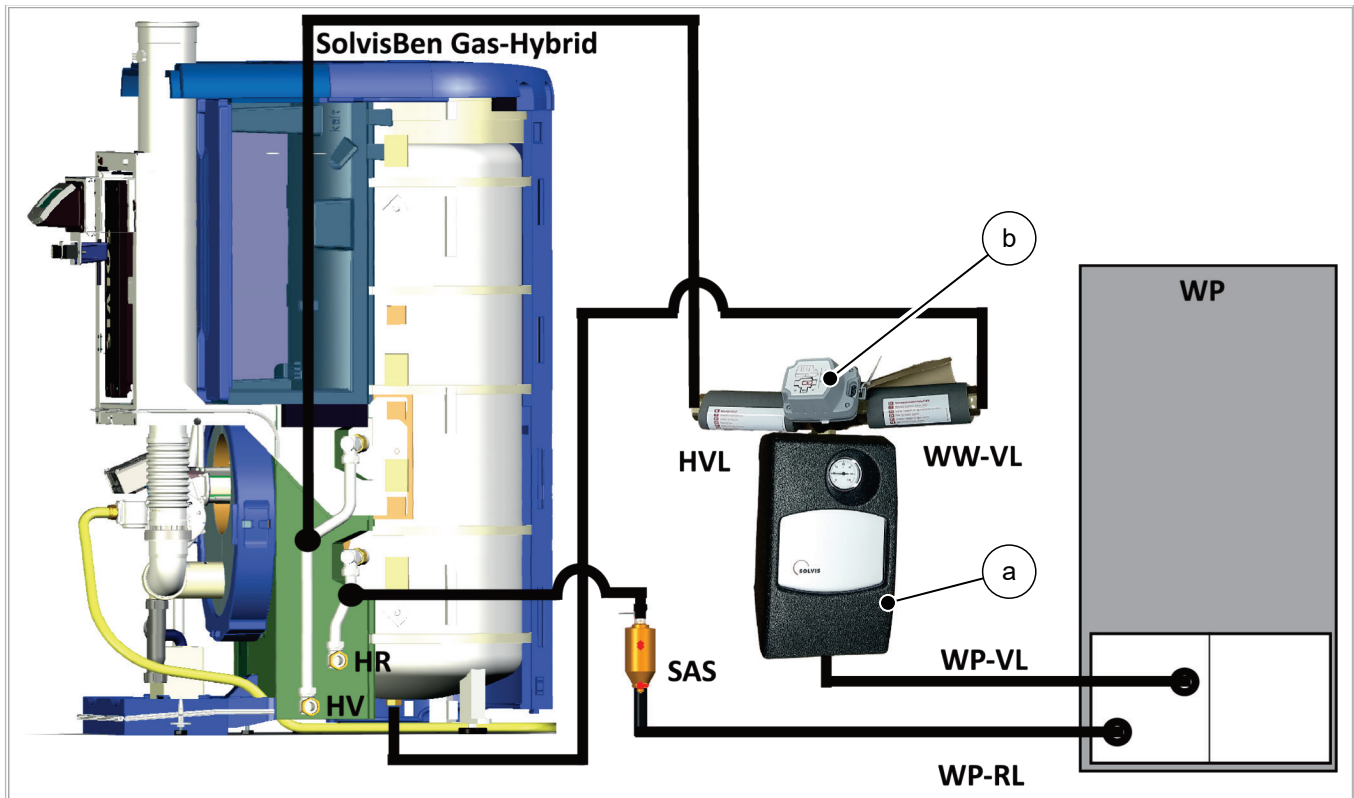


Fig. 8: Overview of the connection of the SolvisLea to the SolvisBen Gas-Hybrid, without an integrated heating circuit station

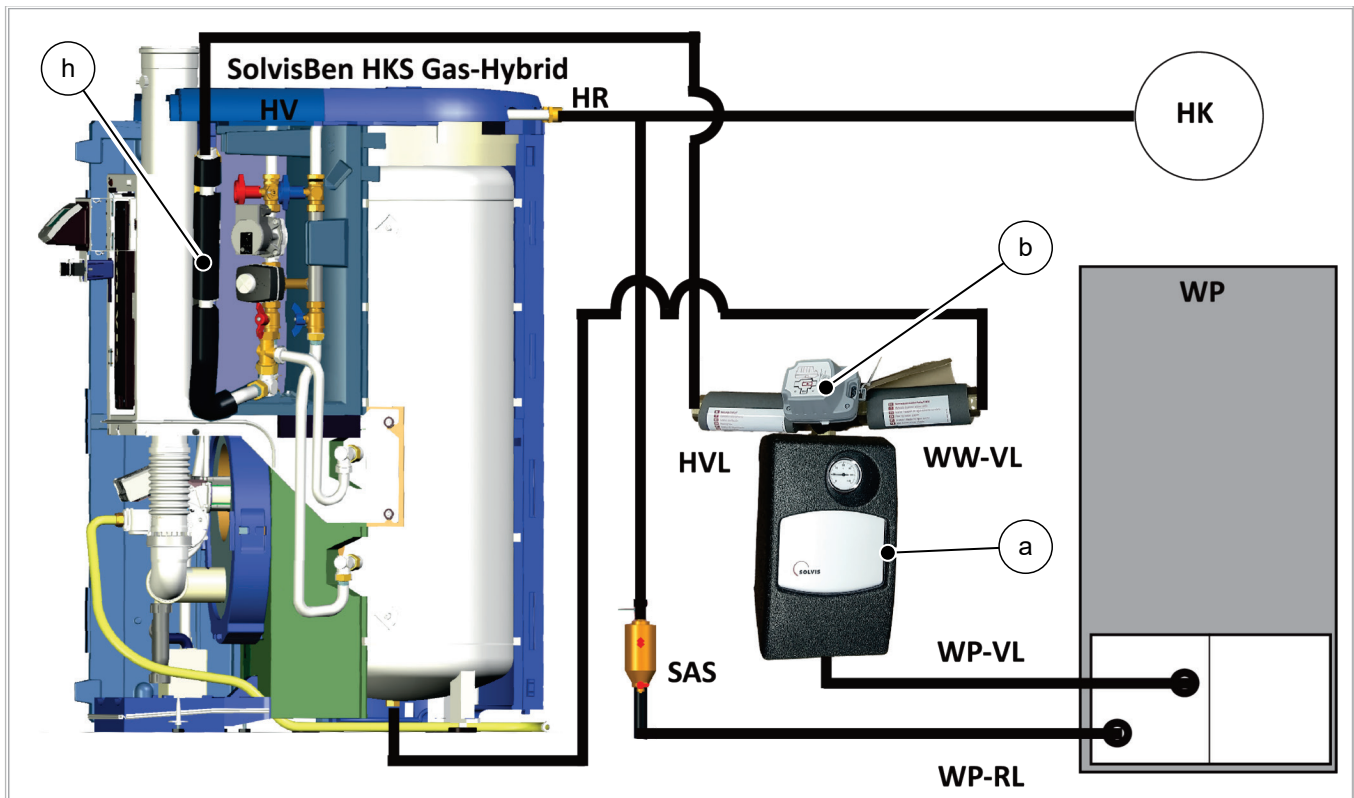


Fig. 9: Overview of the connection of the SolvisLea to the SolvisBen HKS Gas-Hybrid

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

\* This is the heating water for preparing hot water.  
For part designations with a letter, see also → fig. 1, page 7).

**i** 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.

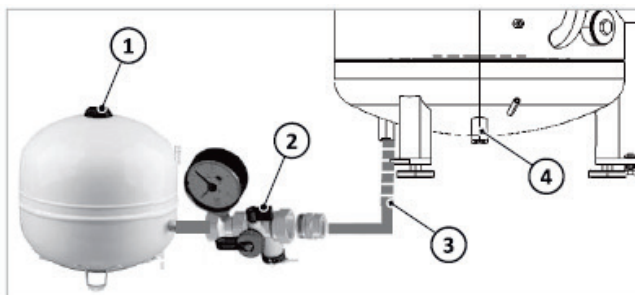


Fig. 10: Connecting the HW flow to the storage tank (without solar system)

- 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.

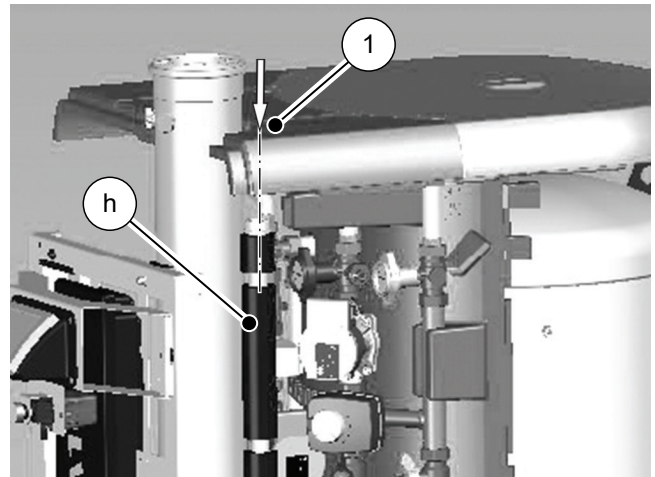


Fig. 11: Cutting the EPP cover

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 multi-phase 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 mm<sup>2</sup>, this corresponds to a length of up to 5 m.
- For cross sections of 0.5 or 0.75 mm<sup>2</sup>, 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 Preparing the Modbus connection

The SolvisControl 3 system controller and the internal heating pump controller of the SolvisLea communicate via a Modbus connection. The connection must be established via shielded cables to avoid interference.

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

### Installing the Modbus junction box

1. Guide the cable on the Modbus junction box through the pipe lead-throughs of the charging module (3x reducer insert).
2. Install the junction box at a suitable location.

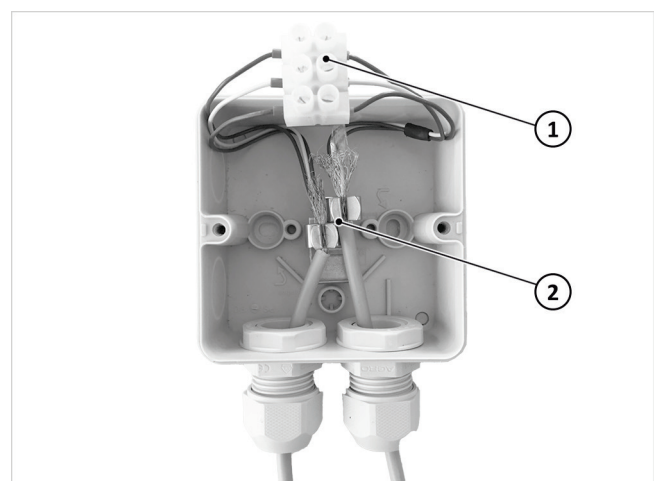


Fig. 12: Attaching the Modbus junction box

- 1 Connection terminals
- 2 Shield clamps

### Connecting the Modbus cable from the heating pump

1. Open the junction box.

2. Insert the shielded Modbus cable from the heating pump into the junction box.
3. 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.



See also → *SolvisLea (MAL-LEA), SolvisLea Eco (MAL-LEA-E) or SolvisMia (MAL-MIA) installation instructions.*

### 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.

#### Connecting flow sensor S14

1. Run the cable for flow temperature sensor S14 to the SolvisControl 3 mains circuit board.
2. Connect the cable socket board to S14.

### 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.

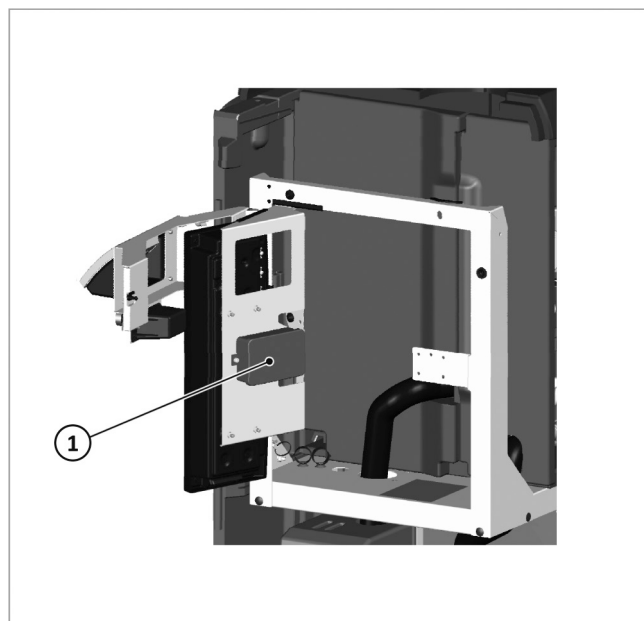


Fig. 13: Rear panel of the mains module

#### 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).
4. **BenSolo with Lea only:** In addition, plug connector A12, which is linked to the connection cable, into the mains module.

#### 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 SolvisLea voltage supply

The voltage supply for the internal heating pump controller of the SolvisLea Eco is provided by the mains circuit board of the charging module.

#### Connecting the voltage supply for SolvisLea

1. Route the three-wire supply line from the SolvisLea to the mains circuit board and connect it to an available area on the expansion board with the PE/N/L terminals.
2. Lead the supply line through the strain relief device and secure.



The compressor itself is supplied with voltage separately and not through the SolvisBen; see → section “Electrical connection” in the installation instructions (MAL-LEA).

### 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).

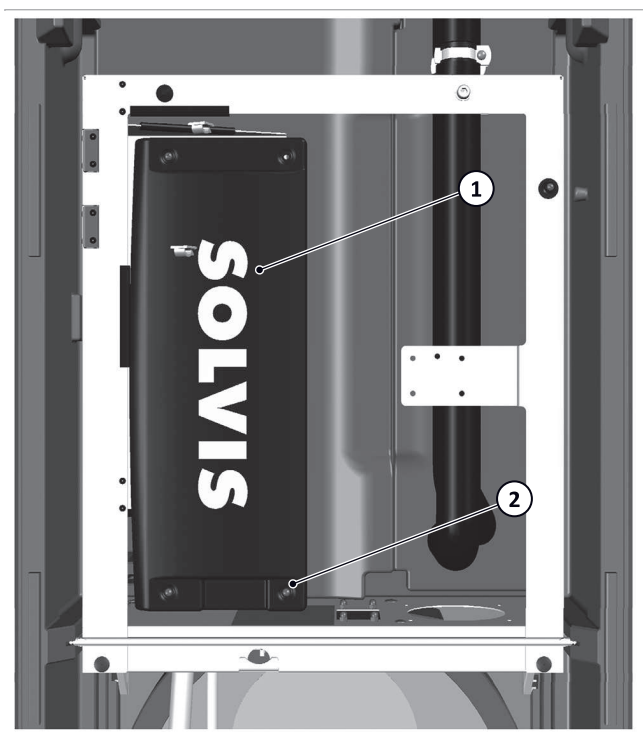


Fig. 14: Attach the cover of the mains circuit board

## 6 Start-Up

Start-up takes place in the prescribed order:

**i** 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).

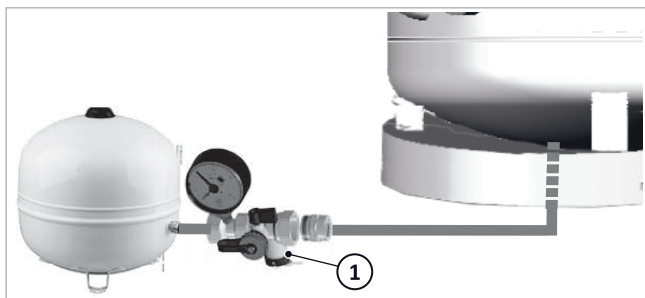


Fig. 15: Boiler filling and emptying valve on the MEV connection group

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 SolvisLea



Flush the SolvisLea and connection pipes to the SolvisBen; see → *installation instructions (MAL-LEA)*.

## 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 **"Output"** => **"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 SolvisLea (see MAL-LEA) 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                                                                                                                    |                                                                             |
| Flash-ing red        | Undervoltage/ overvoltage | Mains voltage supply too low/high                                                                                                 | Check the mains voltage and operating conditions; contact customer service. |
|                      | Module over-heated        | The inside of the module is too warm                                                                                              |                                                                             |
|                      | Short circuit             | Motor current too high                                                                                                            |                                                                             |
| Flash-ing 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 SolvisLea heating pump



For information about heating pump malfunction messages, see the → *SolvisLea (MAL-LEA)*, *SolvisLea Eco (MAL-LEA-E)* or *SolvisMia (MAL-MIA)* installation instructions.

## 8 Technical Data

### 8.1 SolvisLea heating pump



For the technical data for the heating pumps, see the → *SolvisLea (MAL-LEA), SolvisLea Eco (MAL-LEA-E) or SolvisMia (MAL-MIA) installation instructions.*

### 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        |
| EEL                         | ≤ 0.21               |

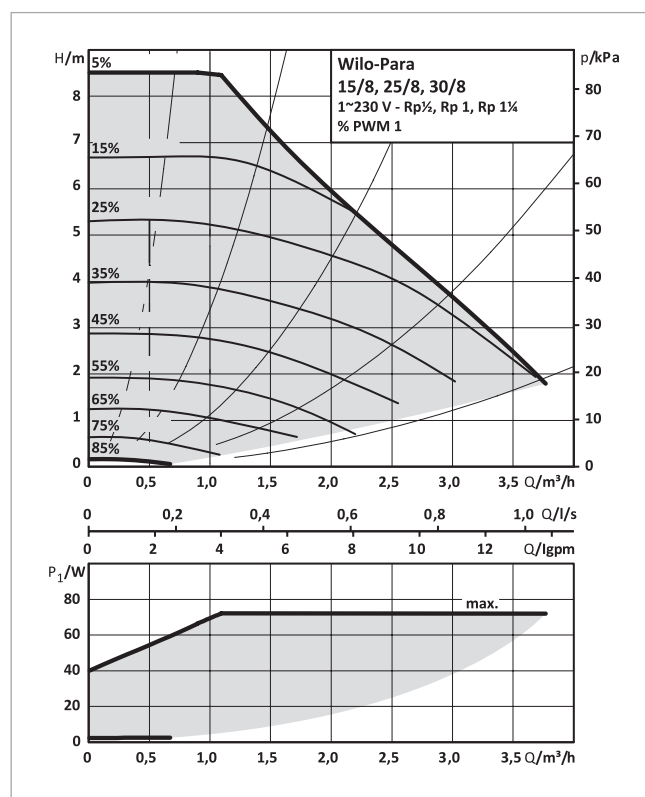


Fig. 16: Wilo PARA 15/8 pump characteristic curves

H Pump height [m]  
 P<sub>1</sub> Power consumption [kW]  
 Q Volume flow [m³/h]

# 9 Appendix

## 9.1 System diagram for SolvisBen WP with SolvisLea

### 9.1.1 A heating circuit with solar

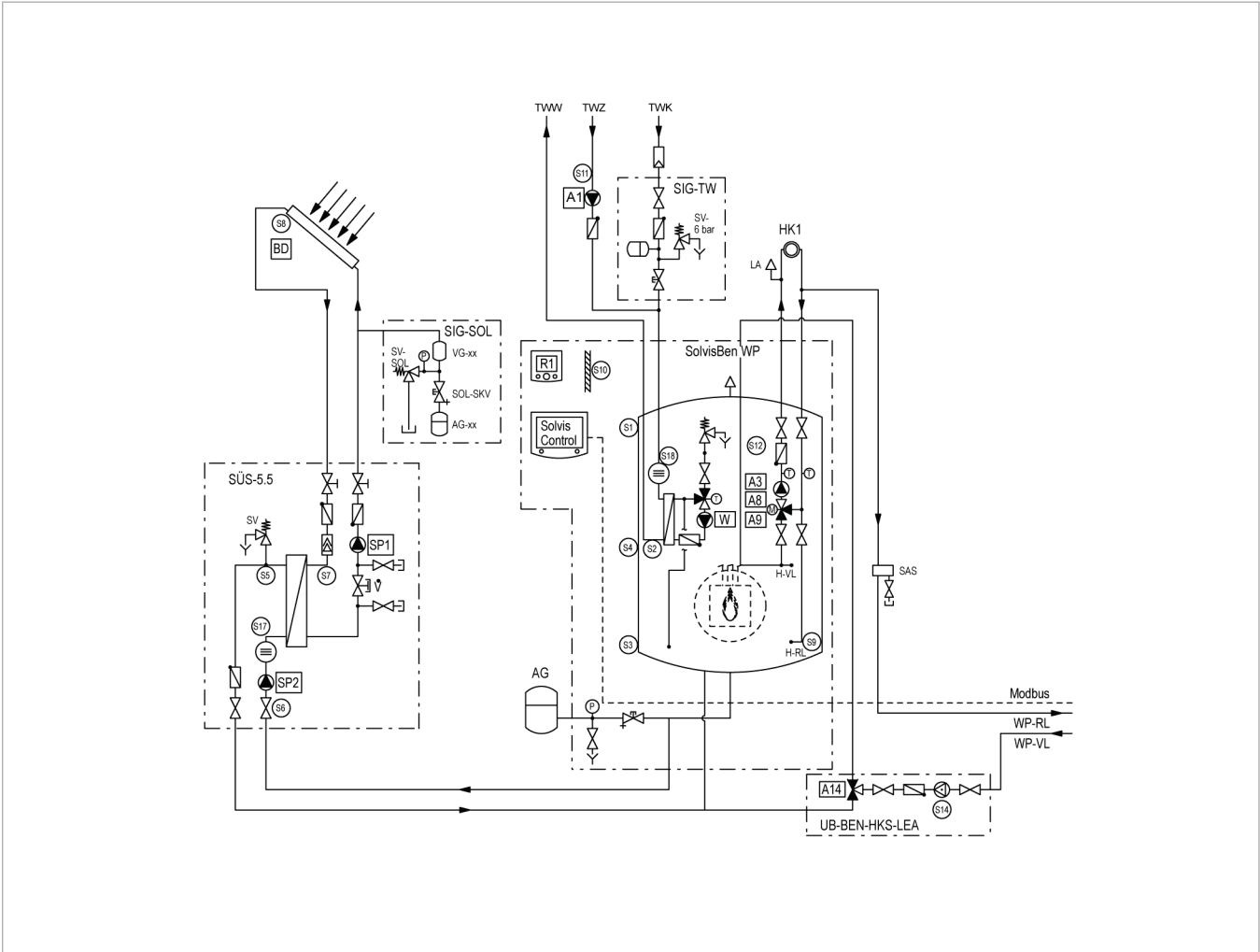


Fig. 17: SolvisBen WP with integrated heating circuit station, solar system and SolvisLea heating pump – part 1

#### 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                              |

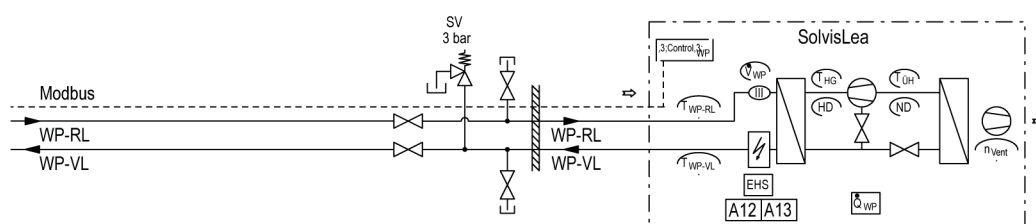


Fig. 18: SolvisBen WP with integrated heating circuit station, solar system and SolvisLea heating pump – part 2

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.

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### 9.1.2 Three heating circuits

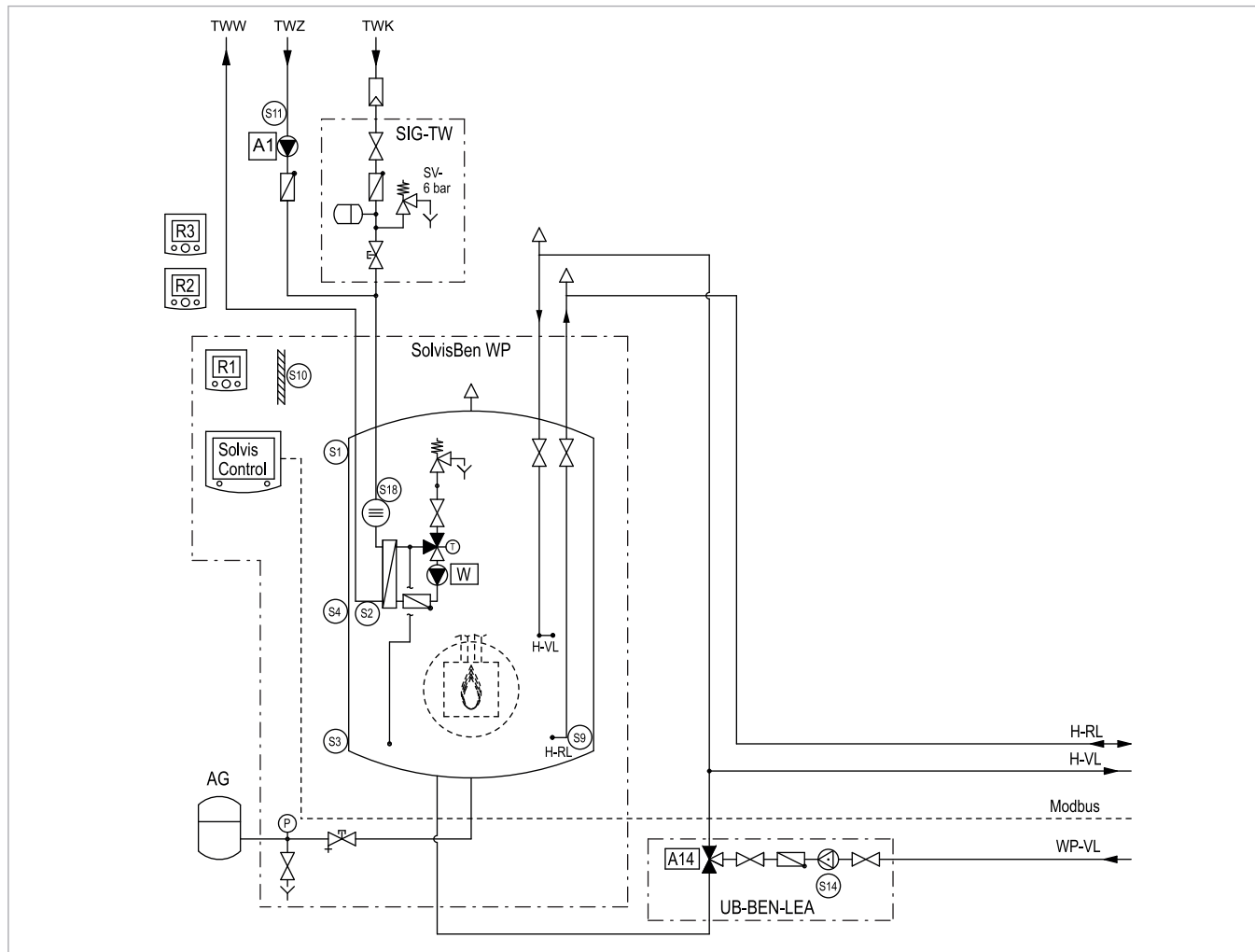


Fig. 19: SolvisBen WP with three mixed heating circuits and SolvisLea heating pump – part 1

#### 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                                      |
| V     | Adjusting valve                                |
| HK1-3 | Heating circuit 1-3                            |

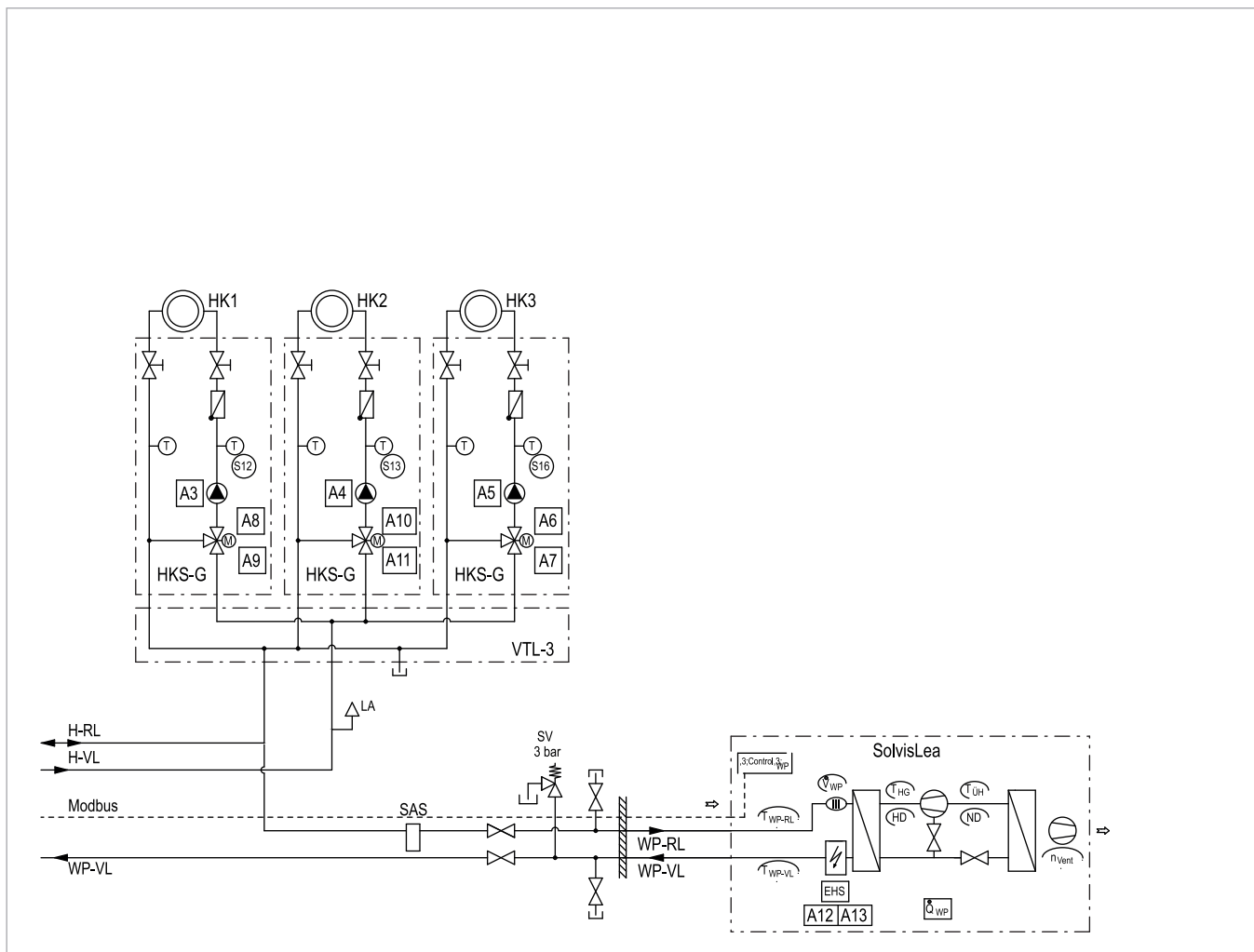


Fig. 20: SolvisBen WP with three mixed heating circuits and SolvisLea heating pump – part 2

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.

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## 9.2 Mains circuit board

### 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            | SolvisLea/SolvisLino 4 flow / 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 SolvisBen WP connection diagram

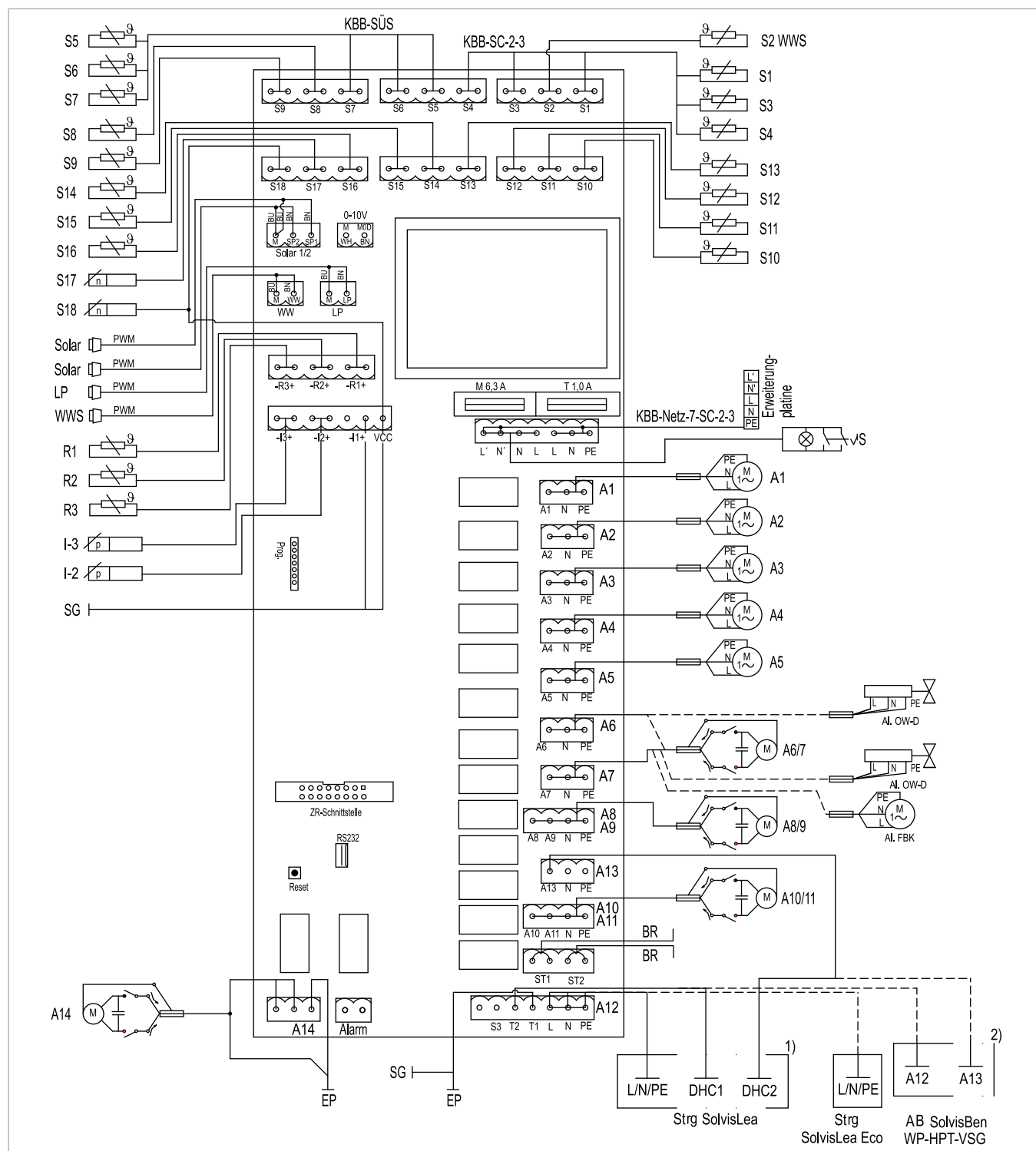


Fig. 21: SolvisControl 3 mains circuit board for SolvisBen WP

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. 23, p. 27                |
| 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. 24, p. 28 |
| Solar | Solar pump                                       |
| Strg  | Solvis Lea/Lea Eco control                       |
| WWS   | Hot water station                                |
| ZR    | Central controller interface                     |
| UV    | Switching valve                                  |

### 9.2.3 SolvisBen Gas/Oil Hybrid connection diagram

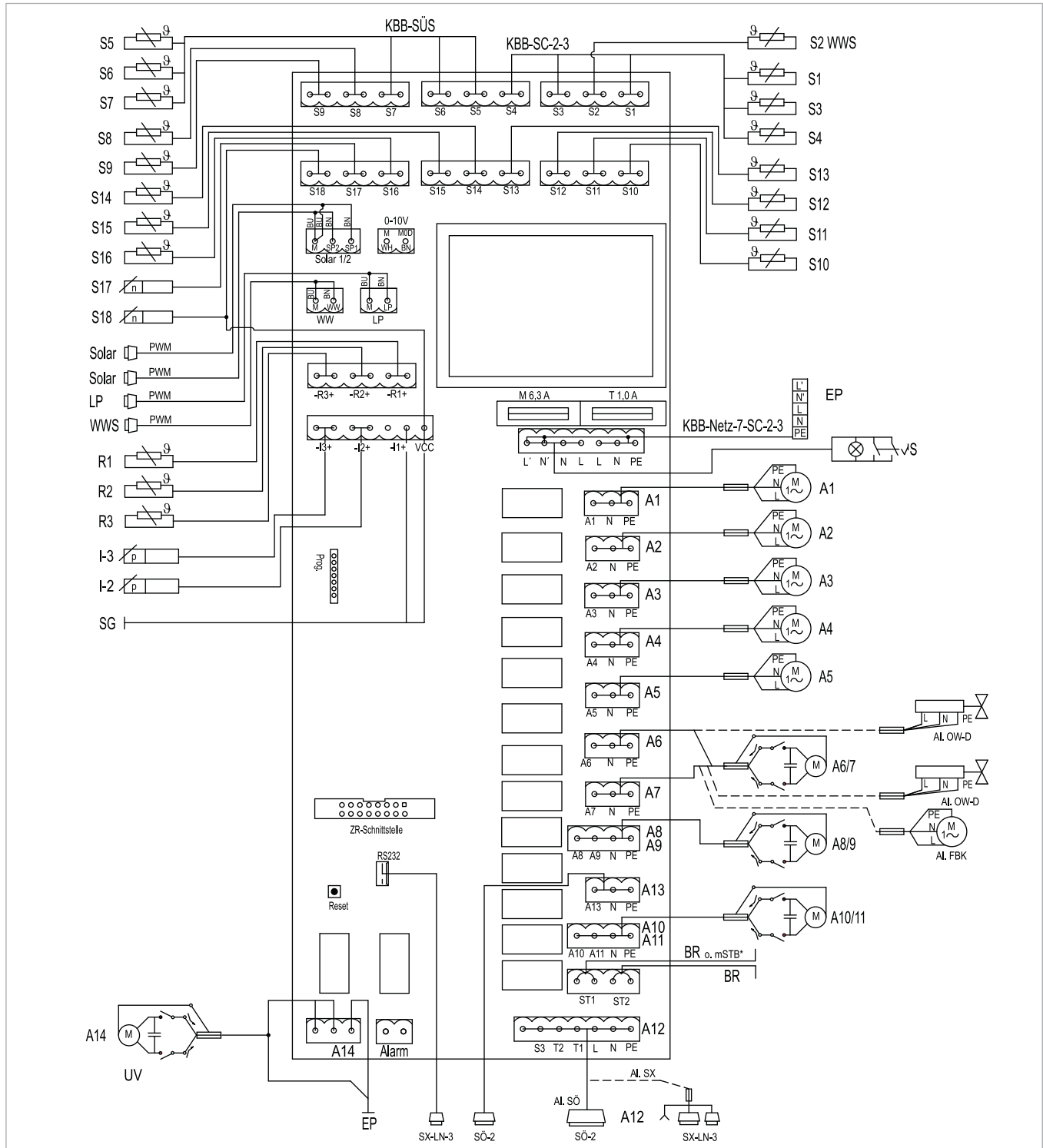


Fig. 22: SolvisControl 3 mains circuit board for SolvisBen Gas/Oil Hybrid

\* 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. 23, p. 27    |
| 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. 24, p. 28     |
| UV      | Switching valve                                      |
| WWS     | Hot water station                                    |
| ZR      | Central controller interface                         |

## 9.3 Expansion Board

### 9.3.1 View

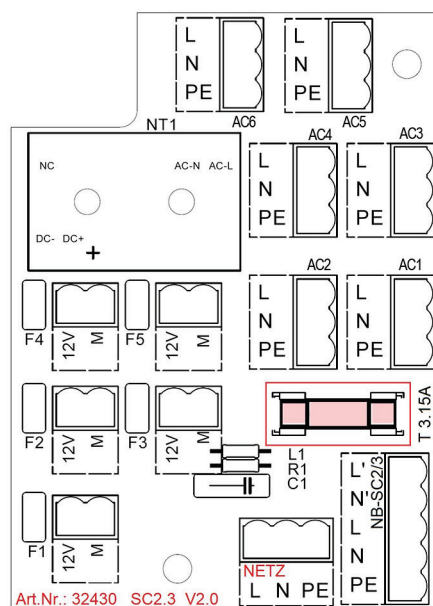


Fig. 23: Expansion board for SolvisControl 3 mains circuit board

### 9.3.2 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                 | (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      |

9.4 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).

9.4.1 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                                |

9.4.2 Connection Diagram

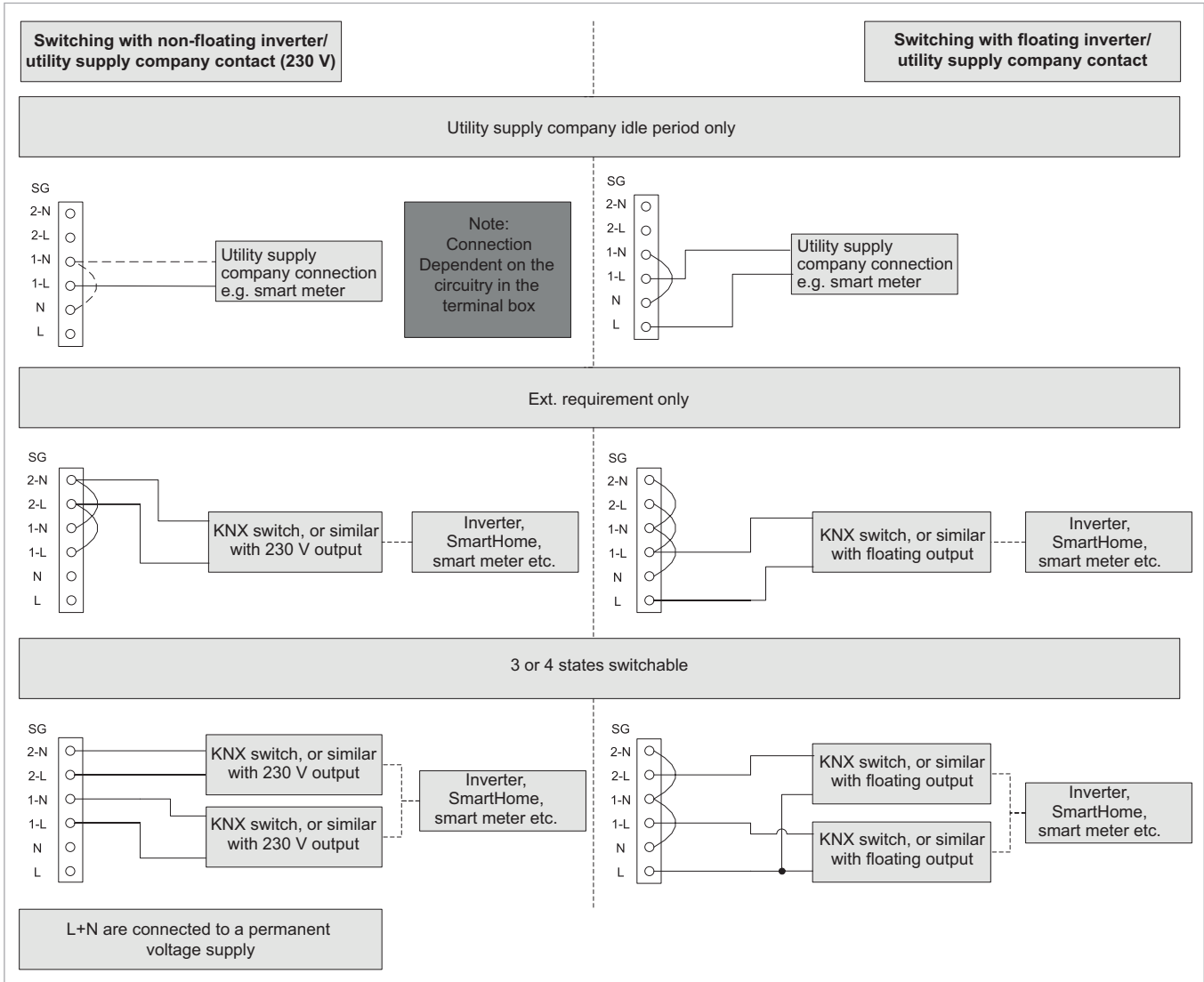


Fig. 24: SmartGrid connection options for the SolvisControl 3 mains circuit board

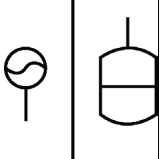
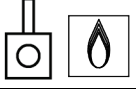
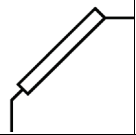
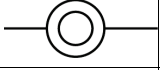
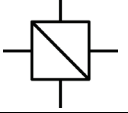
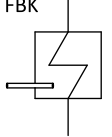
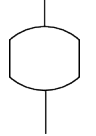
## 9.5 Explanation of Symbols

### 9.5.1 Hydraulic elements

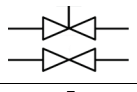
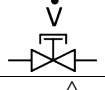
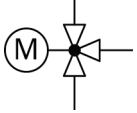
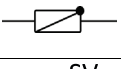
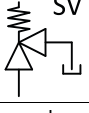
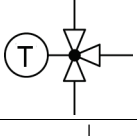
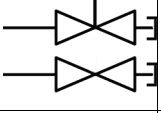
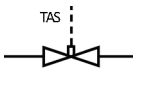
#### Valves

| 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

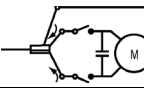
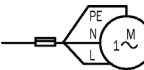
| Symbol                                                                              | Meaning                               |
|-------------------------------------------------------------------------------------|---------------------------------------|
|    | Shut-off valve or valve               |
|    | 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

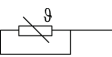
| Symbol                                                                              | Meaning               |
|-------------------------------------------------------------------------------------|-----------------------|
|  | Volume flow encoder   |
|  | Pump                  |
|  | Sludge separator      |
|  | Drinking water filter |

## 9.5.2 Electrical symbols

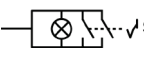
### Actuators

| 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                 |





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