Conversion

SolvisBen WP with SolvisMia

For connecting the SolvisMia heating pump

SolvisBen conversion

- WP with Mia
- WP-HPT with Mia

Wärme. Leben. Zukunft.

1 Information About These Instructions

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

Copyright

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

Symbols used

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

WARNING
Danger, with potentially serious health consequences.

CAUTION
Possible risk of moderate or light injury.

CAUTION
Risk of damage to unit or system.

Useful information, notes and work tips.

Change of document, referring to another document.

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

Contents

2 Notes

2.1 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 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.

2.2 System Versions

The conversion kit is suitable for retrofitting a SolvisBen WP or SolvisBen WP HPT. The conversion kit differs depending on whether or not a heating cartridge is integrated into the storage tank.

It is a prerequisite for connecting a SolvisMia 10 or SolvisMia 14 heating pump.

2.3 Scope of Delivery

Conversion kits for SolvisBen WP and SolvisBen WP HPT:

- Volume flow sensor with sensor elbow G1 and safety valve
- Volume flow sensor connection box
- WP-VL BEN WP HPT connection pipe
- Installation accessories

Conversion kit for SolvisBen WP plus:

- SolvisBen heating cartridge and installation accessories

3 Installation

3.1 Installing SolvisMia

Installing the SolvisMia

Install the SolvisMia according to the installation instructions and route the connection pipes to the SolvisBen.

→ see *MAL-MIA*

3.2 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

3.3 Preparing the heating pump flow connection

Preparing the heating pump flow connection

Install the connection according to ➔ *fig. 1* as follows:

1. Remove the heating pump flow connection pipe from the buffer charging station (**1**).
2. Attach the heating cartridge (**2**) to the buffer charging station connection.
3. Fit the associated connection box (**3**).
4. Fit the volume flow sensor (**4**) with safety valve to the heating cartridge connection.
5. Connect the WP-VL Ben WP HPT (**5**) connection pipe.

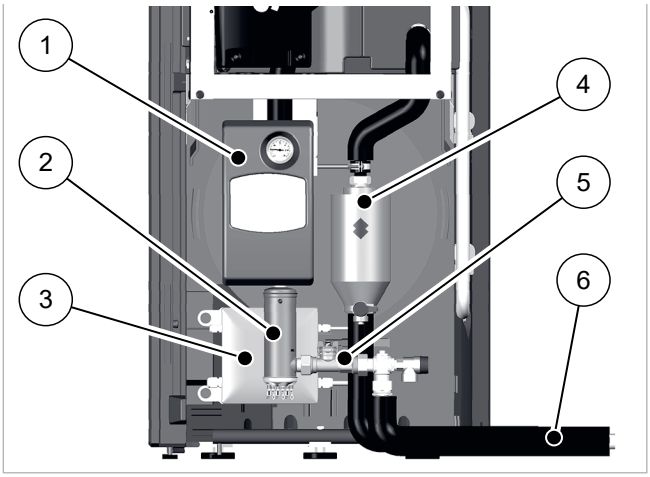


Fig. 1: Installation overview: Ben WP HPT with Mia

1 Buffer charging station PLAS WP
2 Heating cartridge (HPT)
3 Heating cartridge connection box
4 Sludge separator
5 Volume flow sensor with safety valve
6 WP-VL Ben WP HPT connection pipe

Installing the safety temperature limiter

Only if a heating cartridge (**2**) is installed:

1. Push the safety temperature limiter (**1**) into the sleeve of the heating cartridge and secure it with the spring connector supplied.

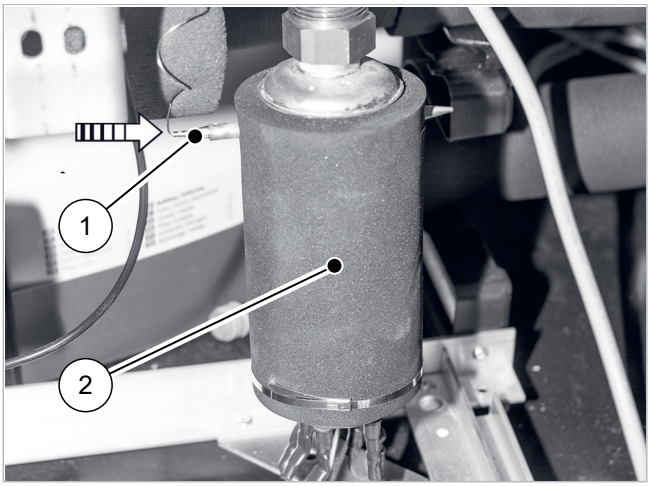


Fig. 2: Push the mSTL into the sleeve (symbolic image)

1 Safety temperature limiter (mSTL)
2 Heating cartridge

3.4 Heating pump connection

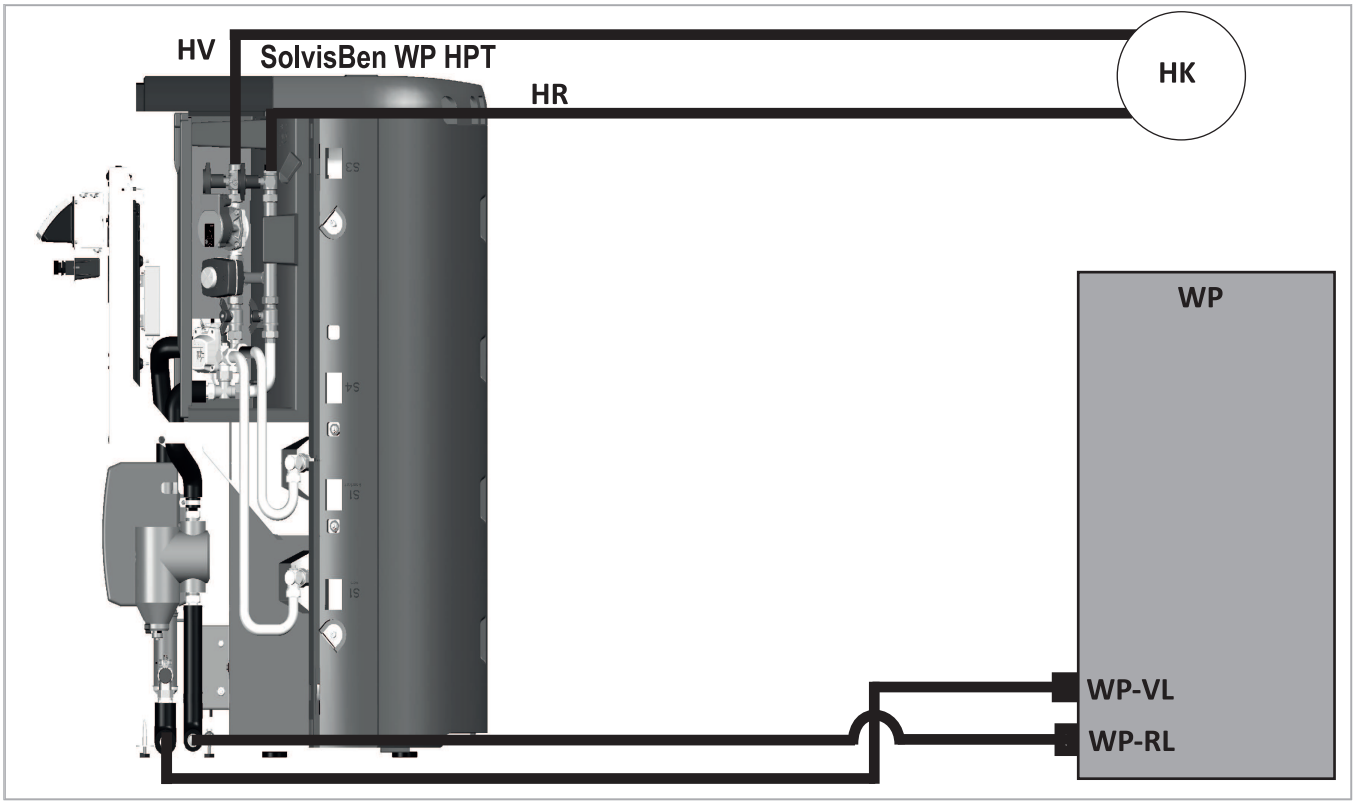


Fig. 3: Overview of the connection of the SolvisMia to the SolvisBen WP HPT

HK	*Heating circuit*	HR	*Heating return*	HV	*Heating flow*
WP	*Heating pump*	WP-RL	*Heating pump return*	WP-VL	*Heating pump flow*

These diagrams serves as guidance only and do not claim to be complete. They are not intended to 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.

Hydraulic connection of the heating pump

1. For information about connecting the heating pump flow and return flow from the heating pump on site to the SolvisBen, see ➔ *fig. 3*.

3.5 Electrical connection

3.5.1 General information

DANGER

Risk of electrical shock

Damage to health, cardiac arrest possible.

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

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

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.

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%).

3.5.2 Voltage supply for heating cartridge

The heating cartridge is wired to the connection box at the factory. By connecting the connections of the connection box to the power supply, the electrical power of the heating cartridge is determined: 3L/N/PE with 8.8 kW (variant A) or 2L/N/PE with 6.2 kW (variant B). The protection is provided either with 3xB16A (variant A) or with 2xB16A (variant B). For more technical data, see → *"Heating cartridge" chapter, p. 15*.

Connecting the heating cartridge

1. Open the connection box and connect the customer's supply line (min.5 x 2.5 mm²) to the feedthrough terminals (**1**).
2. For variant B (6.2 kW total power), do not connect phase L2 or remove the grey bridge cable (**2**).

When using 5-wire lines and the desired 6.2 kW connection, the connection between the relay and the L2 supply voltage is interrupted.

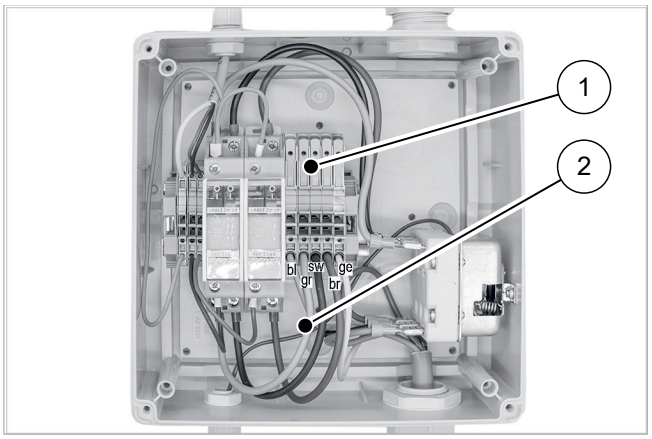


Fig. 4: Connection box, open

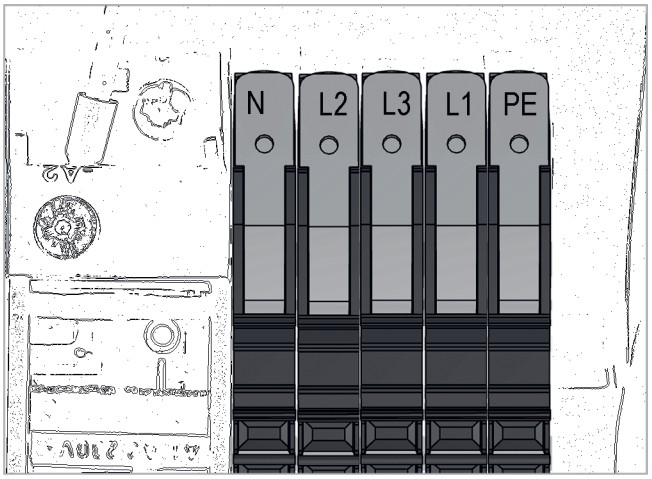


*Fig. 5: Connection assignment of (**1**)*

L1	*Brown*	L2	*Grey*	L3	*Black*
N	*Blue*	PE	*Green/yellow*		

3. Close the connection box again.
4. Connect the control line (see → item **2** in *Fig. 15, p. 15*).

To connect the **control line**, proceed as follows:

- If the **control line is assembled with connectors**: Connect them to the mains circuit boards (A12 and A13).
- Otherwise, connect the **cable ends** to the unused connectors of A12 and A13:
  - Brown to T2/A12
  - Black to 13/A13
  - Blue to N/A13.

3.5.3 Modbus connection

Overview

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

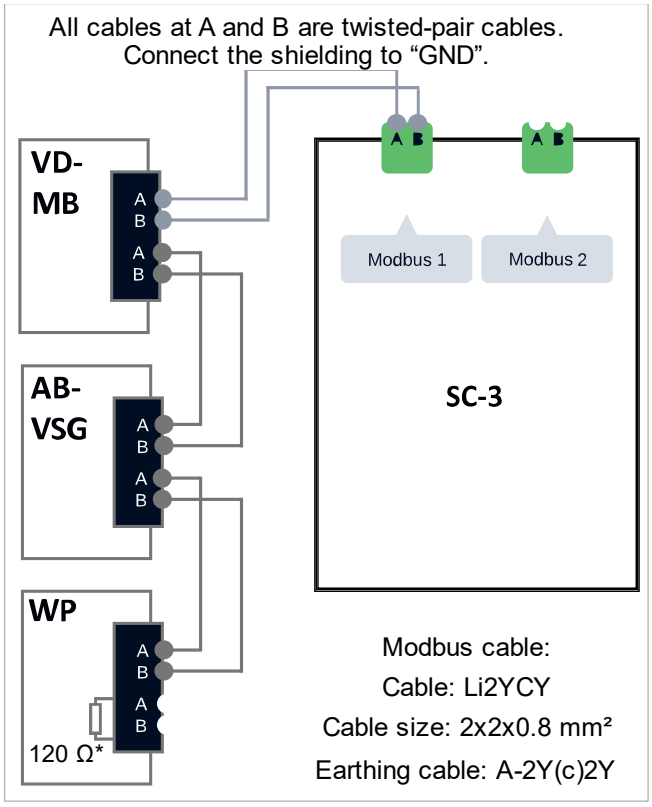


Fig. 6: Connection to the SC-3 Modbus

* Resistor is already pre-wired

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

VSG Junction box

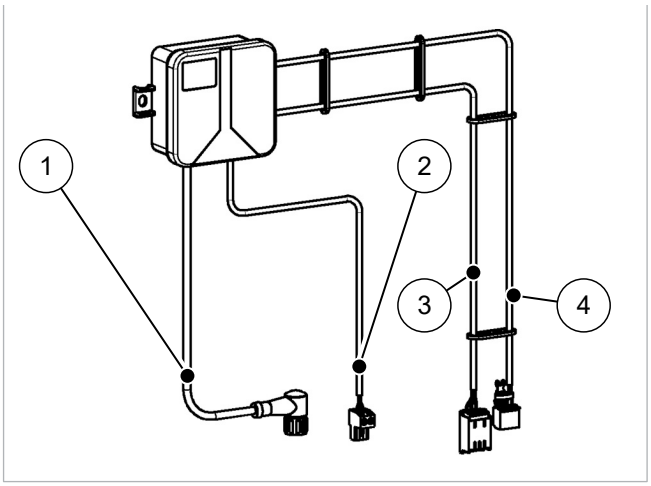


Fig. 7: Volume flow sensor connection box

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. 7*) 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. 7*) to the Modbus junction box.

Modbus junction box

Installing the Modbus junction box

1. Route the Modbus line of the junction box through the cable routing duct ➔ *Fig. 8* (**1**) in the cover area.
2. Install the junction box at a suitable location.

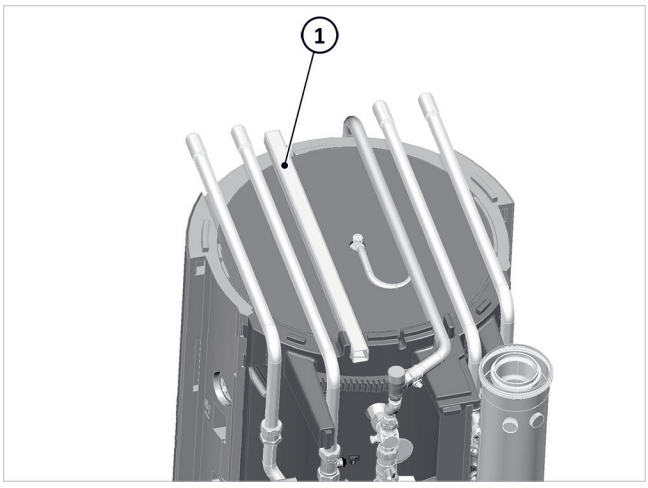


Fig. 8: Cable routing duct

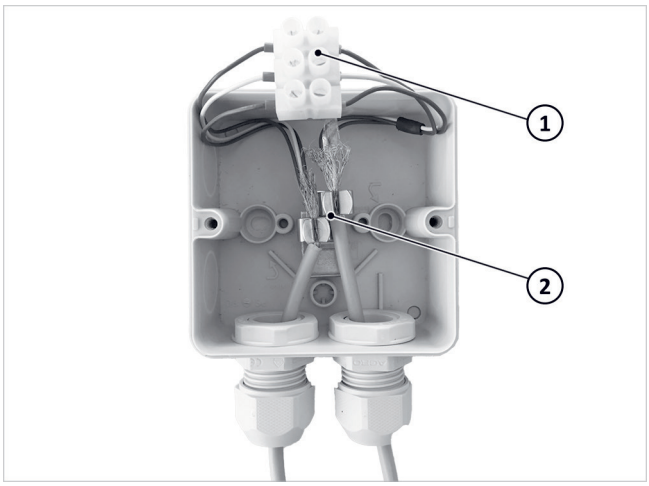


Fig. 9: Attaching the Modbus junction box

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)*.

3.5.4 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.

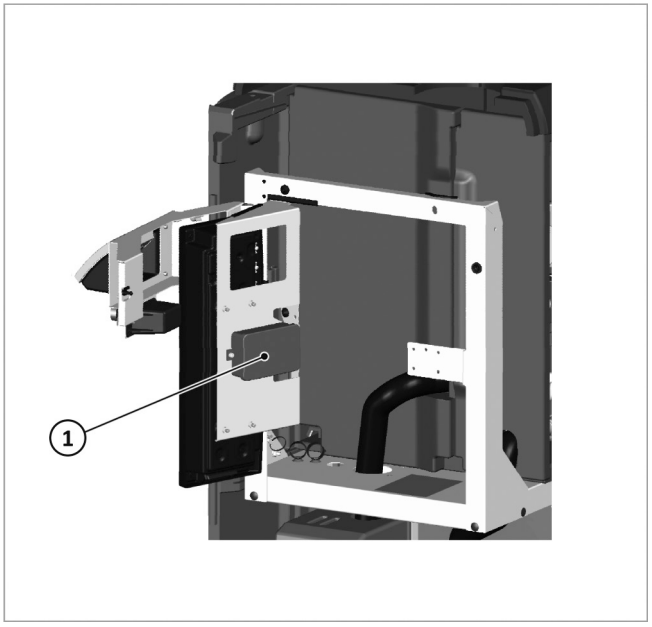


Fig. 10: Rear panel of the mains module

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 of the SmartGrid device to the SolvisBen connection board and connect it according to the connection diagram (see → *fig. 23, page 23*).

3.5.5 SolvisMia connection

The voltage is supplied separately and not via the SolvisBen. See the ➔ *“Connecting the SolvisMia” section of the “Electrical connection” chapter in the installation instructions (MAL-MIA).*

3.5.6 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**).

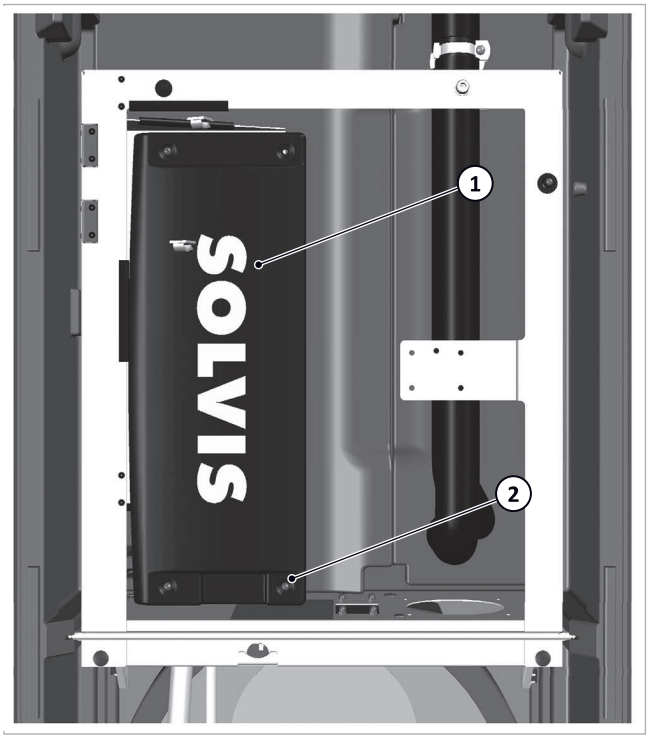


Fig. 11: Attach the cover of the mains circuit board

4 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.

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

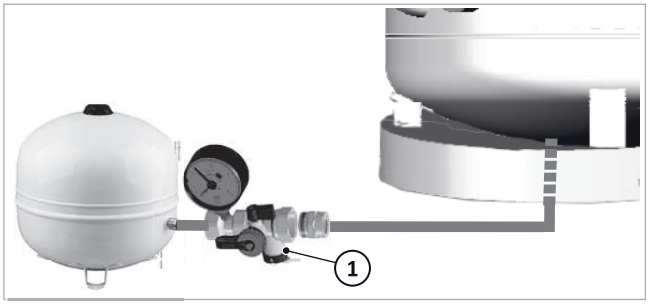


Fig. 12: Boiler filling and emptying valve on the MEV connection group

2. Bleed the system, including the storage tank.
3. Check that there are no leaks.

CAUTION

Pay attention to the pressure in heating system

The safety valve may blow out.

- The maximum permitted pressure is 3.0 bar.
- External devices such as heating pumps may be designed for lower maximum system pressures.

See installation instructions for ➔ *MAL-LEA, MAL-LEA-8P, MAL-LEA-E or MAL-MIA* heating pumps

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

4.2 Flushing the load circuit and SolvisMia

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

4.3 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).*

4.4 Buffer charging station pump

4.4.1 Adjustment options

The load pump is speed-controlled by a PWM signal from the SC-3. The pumps do not need to be set.

4.4.2 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. Go 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 is running at maximum speed
4. After approx. 20 seconds, press "**+**" and set to "**0%**".
   → Pump is not running
5. After approx. 10 seconds, press "**–**" and set to "**100%**".
   → Pump is running at maximum speed
6. Repeat the procedure for a few minutes.
7. Set "**Manual specification**" to "**Auto**".

4.5 Final Tasks

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

5 Troubleshooting

5.1 Pumps

5.1.1 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

5.1.2 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.	

5.1.3 IMP NMT Mini PWM malfunction messages

In the event of an error, the three-part level display flashes as follows:

Flashes	Error	Cause/solution
1 x	Load error	• Low water level detected (pump running dry) • Motor overloaded (tough medium / faulty motor)
2 x	Active protection	• Module is hot (power reduced or switched off) •Hardware overloaded (safety shutdown) • Mains voltage too high or too low
3 x	Hot motor	Average motor load too high (pump load is higher than permitted)
4 x	Elec. fault	• LED fault • 15 V missing (internal) or DC voltage in the impermissible range
5 x	Motor fault	Motor is working in the impermissible range
No display		Disconnect and reconnect the mains connection
Pump is not running		Check the connection voltage and fuse

5.2 SolvisMia heating pump

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

6 Technical Data

6.1 SolvisMia heating pump

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

6.2 Buffer charging station PLAS-WP

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

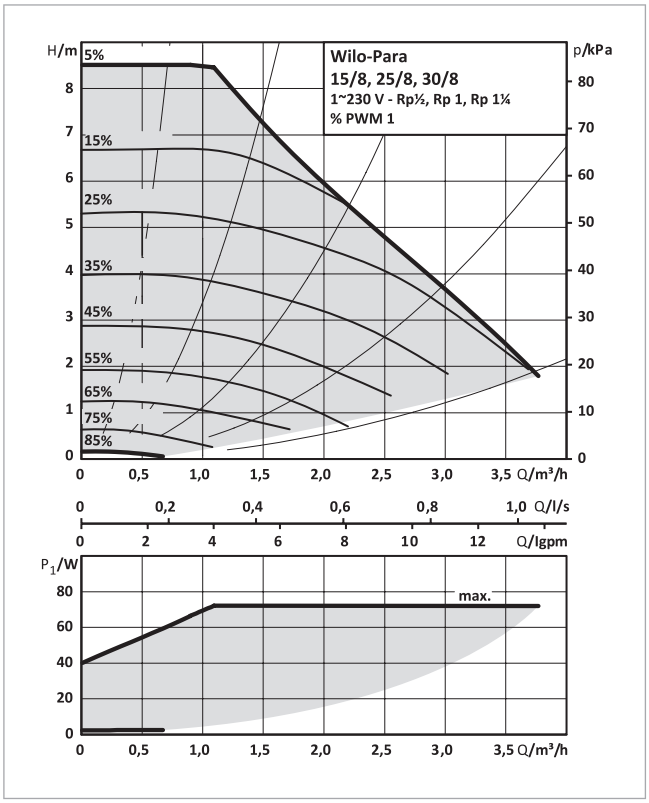


Fig. 13: Wilo PARA 15/8 pump characteristic curves

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
Maximum delivery height	8.2 m
Maximum volume flow	4.4 m³/h
Permitted media temperature (at 30 °C ambient temperature)	-10 °C to 110 °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

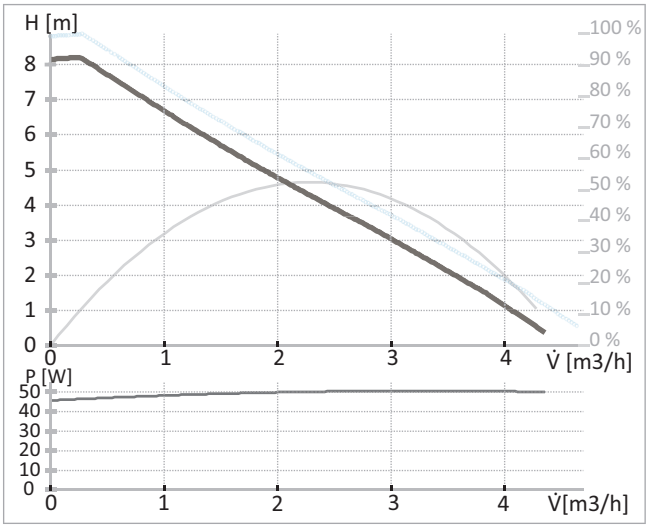


Fig. 14: Pump characteristic curve IMP NMT Mini PWM 15/80-130 (constant speed)

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

6.3 Heating cartridge

6.3.1 Dimensions

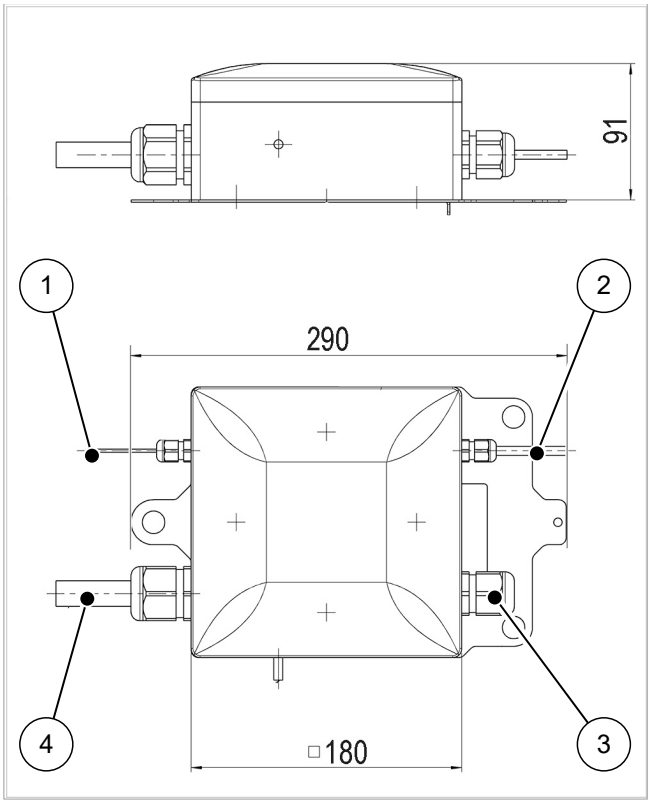


Fig. 15: Connection box dimensions

1 Mechanical safety temperature limiter
2 Control line for SC-3
3 Heating cartridge power supply
4 Heating cartridge connection cable

6.3.2 Electrical data

- 3 x 230 V ~/ N / PE
- L1 3200 W / 13.91 A (brown)
- L2 2600 W / 11.30 A (grey)
- L3 3000 W / 13.04 A (black)

Version:	A	B
Electrical power:	8.8 kW	6.2 kW
Connection:	L1/L2/L3/N/PE	L1/L3/N/PE
Automatic fuse:	3xB16A	2xB16A

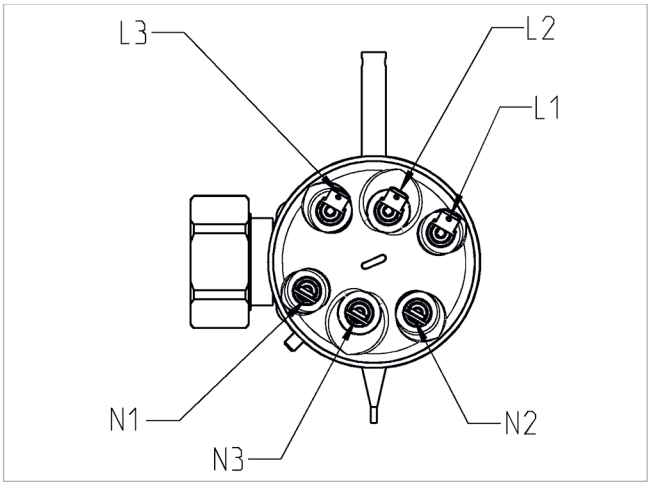


Fig. 16: Heating cartridge connection

SolvisControl 3 switching logic

The SolvisControl controls the heating cartridge fully automatically. If the heating switches to emergency mode, for example, output A12 and thus level I of the heating cartridge is activated immediately. After a waiting period of 60 minutes, controller A12 switches off and A13 on (level II of the heating cartridge) if the heat is insufficient. If even more heat is required, A12 also switches on after a further 60 minutes (level III).

This coordinated control of the heater cartridge levels minimises power consumption. To reduce the power consumption even further, the heating cartridge can be connected according to variant B if the heating requirement is correspondingly low.

Level	Output	Phase	Power variant A
I	A12	L1	3.2 kW
II	A13	L2 + L3	5.6 kW
III	A12 + A13	L1 + l2 + L3	8.8 kW

Heating output for heating cartridge with variant A

Level	Output	Phase	Power variant B
I	A12	L1	3.2 kW
II	A13	L3	3.0 kW
III	A12 + A13	L1 + L3	6.2 kW

Heating output for heating cartridge with variant B

Power selection:

- For single-phase machines, a maximum of 6.2 kW should be used to avoid any unbalanced loads in the grid
- For 3-phase machines and heating pump outputs over 12 kW, all 3 phases of the heating cartridge should generally be used
- For 3-phase machines below 12 kW,the power can be selected; optimally, the power should be selected according to the deficit at NAT.

7 Appendix

7.1 System diagram

7.1.1 A heating circuit with solar

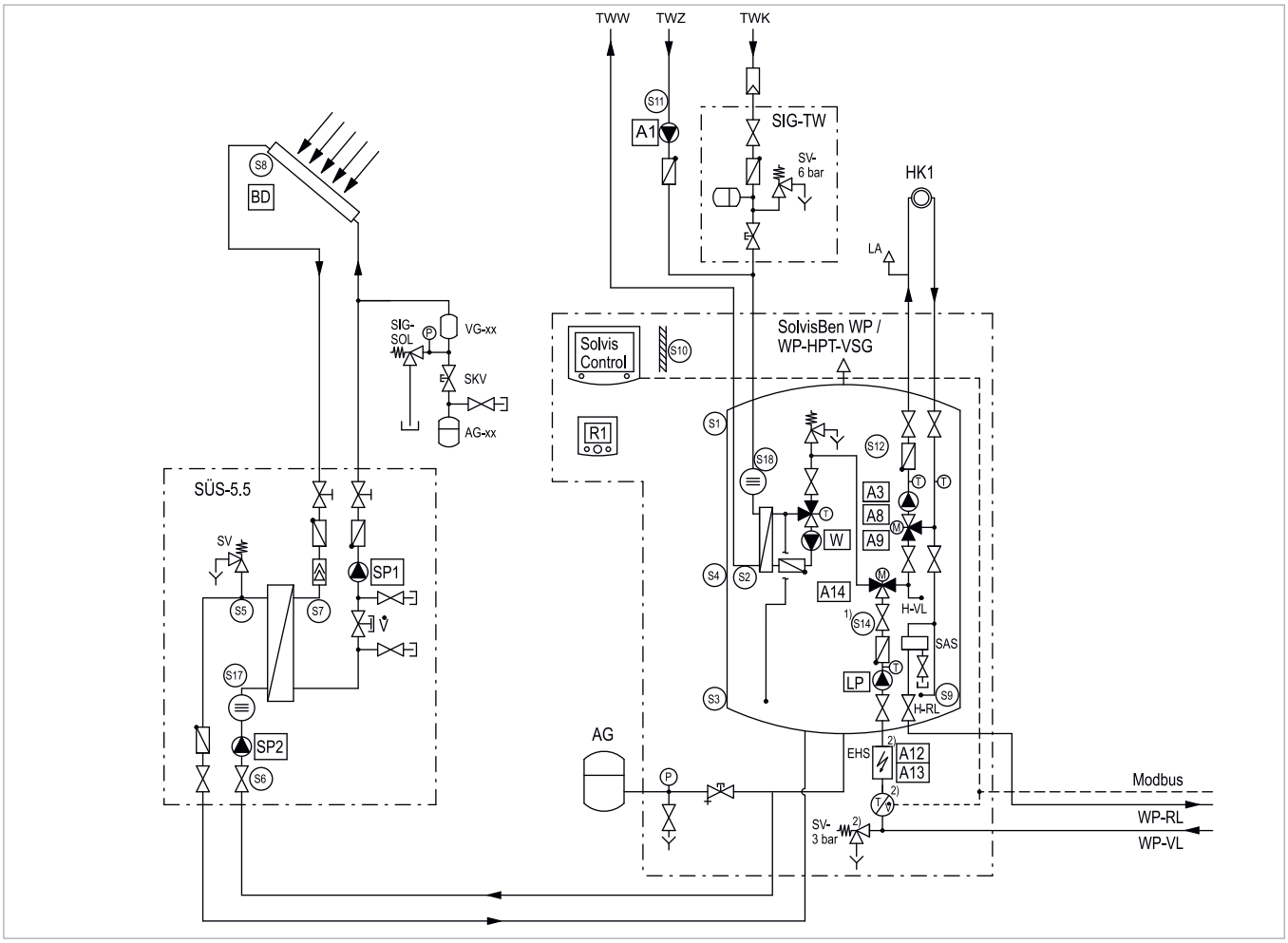


Fig. 17: SolvisBen WP with integrated heating circuit station, solar system and heating pump – part 1

1) SolvisLea and SolvisLea Premium: 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)

Equipment

- Stratified solar storage tank
- SolvisControl 3 system controller
- Drinking water heating
- Solvis heating pump
- 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*
WP-RL	*Heating pump return*
WP-VL	*Heating pump flow*
LP	*Load pump*
Modbus	*Modbus signal cable*
EHS	*Electrical heating element*
HD	*High pressure*
ND	*Low pressure*
SIG-SOL	*Solar circuit safety group*
SKV	*Cap valve, solar circuit*
V̇	*Adjusting valve*
HK1	*Heating circuit 1*

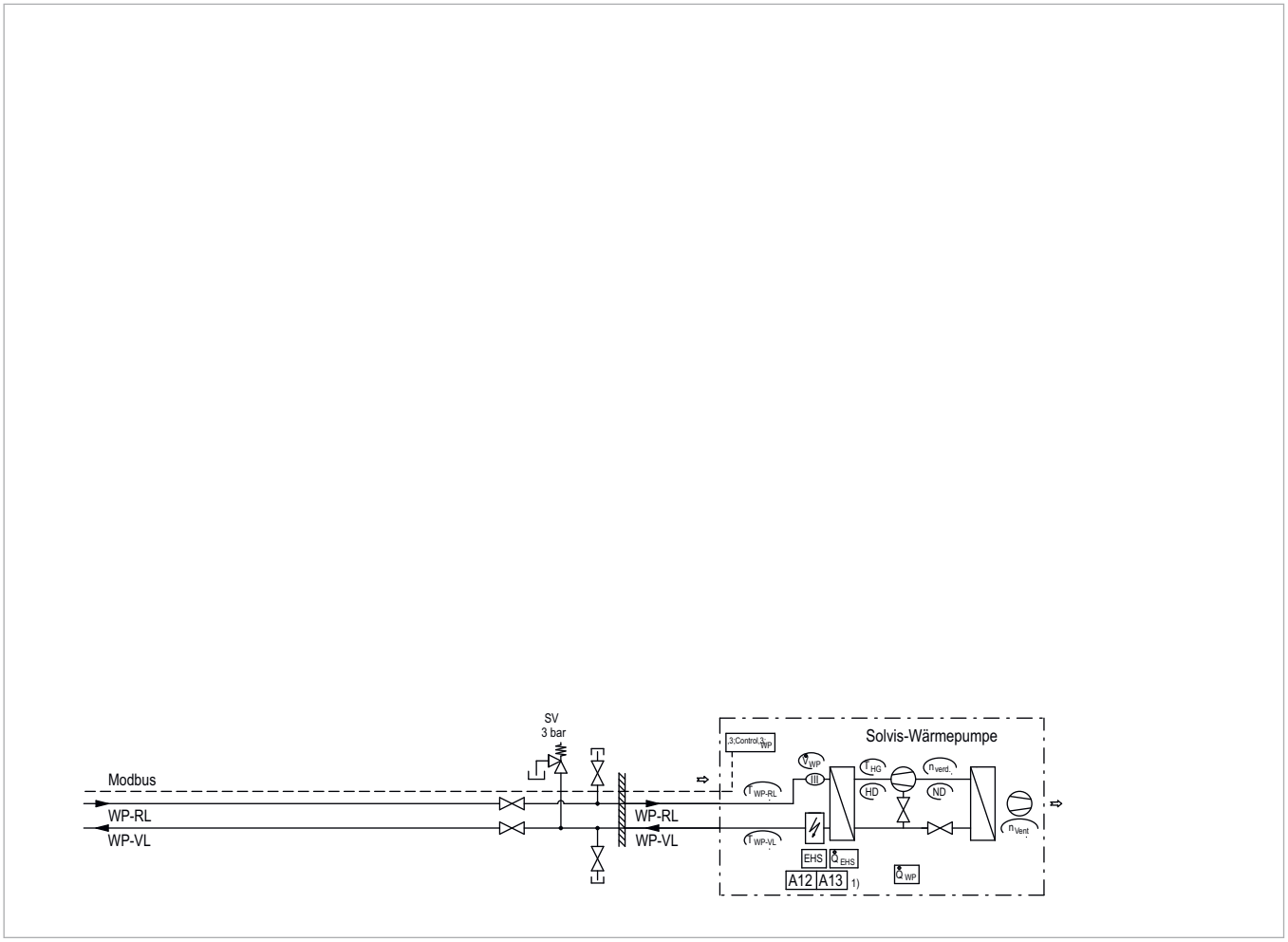


Fig. 18: SolvisBen WP with integrated heating circuit station, solar system and heating pump – part 2

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.	

7.1.2 Three heating circuits and solar

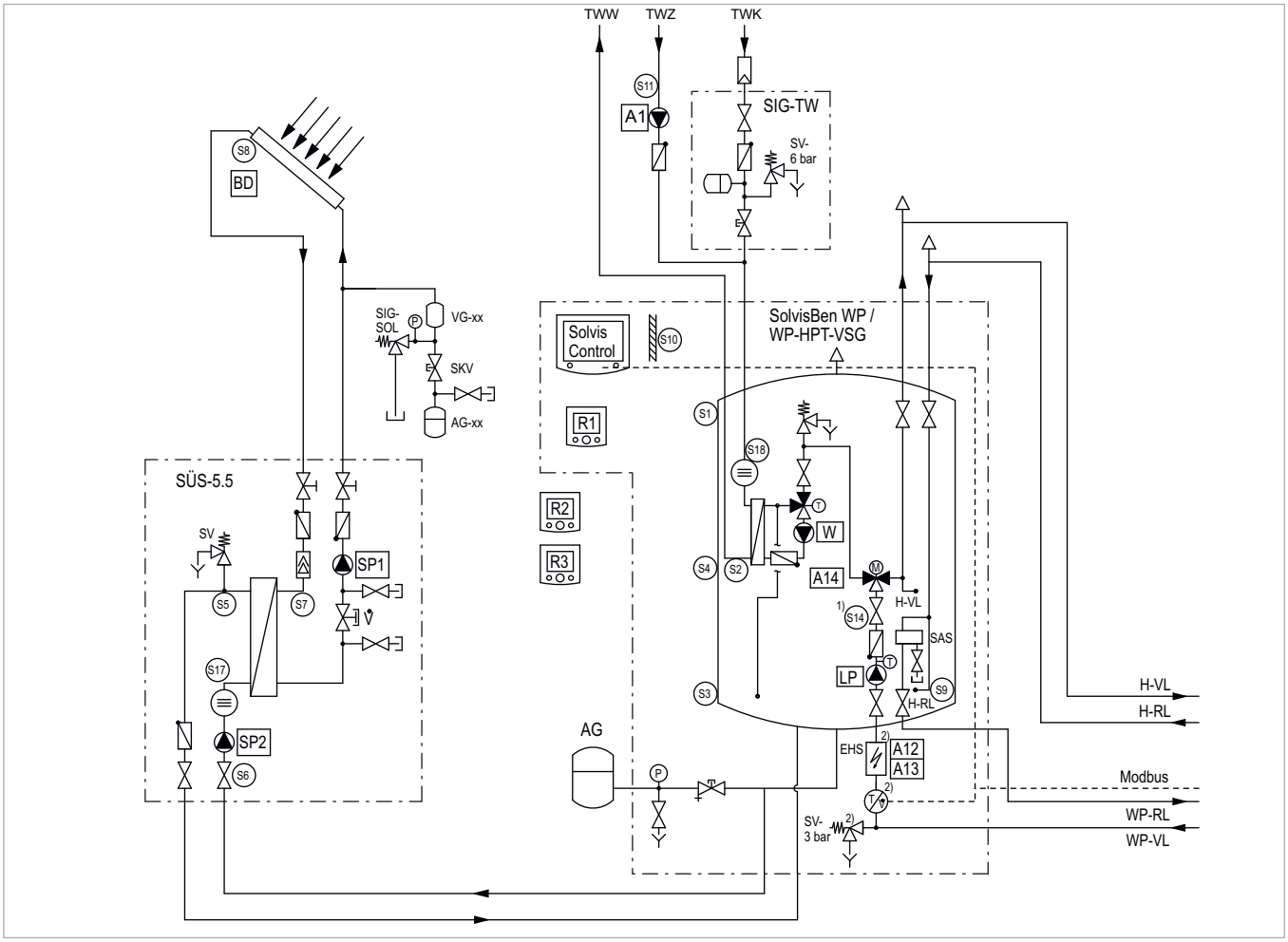


Fig. 19: SolvisBen WP with three mixed heating circuits, solar system and heating pump – part 1

1) SolvisLea and SolvisLea Premium: 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)

Equipment

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

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*
R2	*Room operating unit, heating circuit 2*
R3	*Room operating unit, heating circuit 3*
HKS-G	*Heating circuit station, mixed*
VTL-3	*Distributor bar, 3-way*

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*
WP-RL	*Heating pump return*
WP-VL	*Heating pump flow*
LP	*Load pump*
Modbus	*Modbus signal cable*
EHS	*Electrical heating element*
HD	*High pressure*
ND	*Low pressure*
SIG-SOL	*Solar circuit safety group*
SKV	*Cap valve, solar circuit*
V̇	*Adjusting valve*
HK1-3	*Heating circuit 1 to 3*

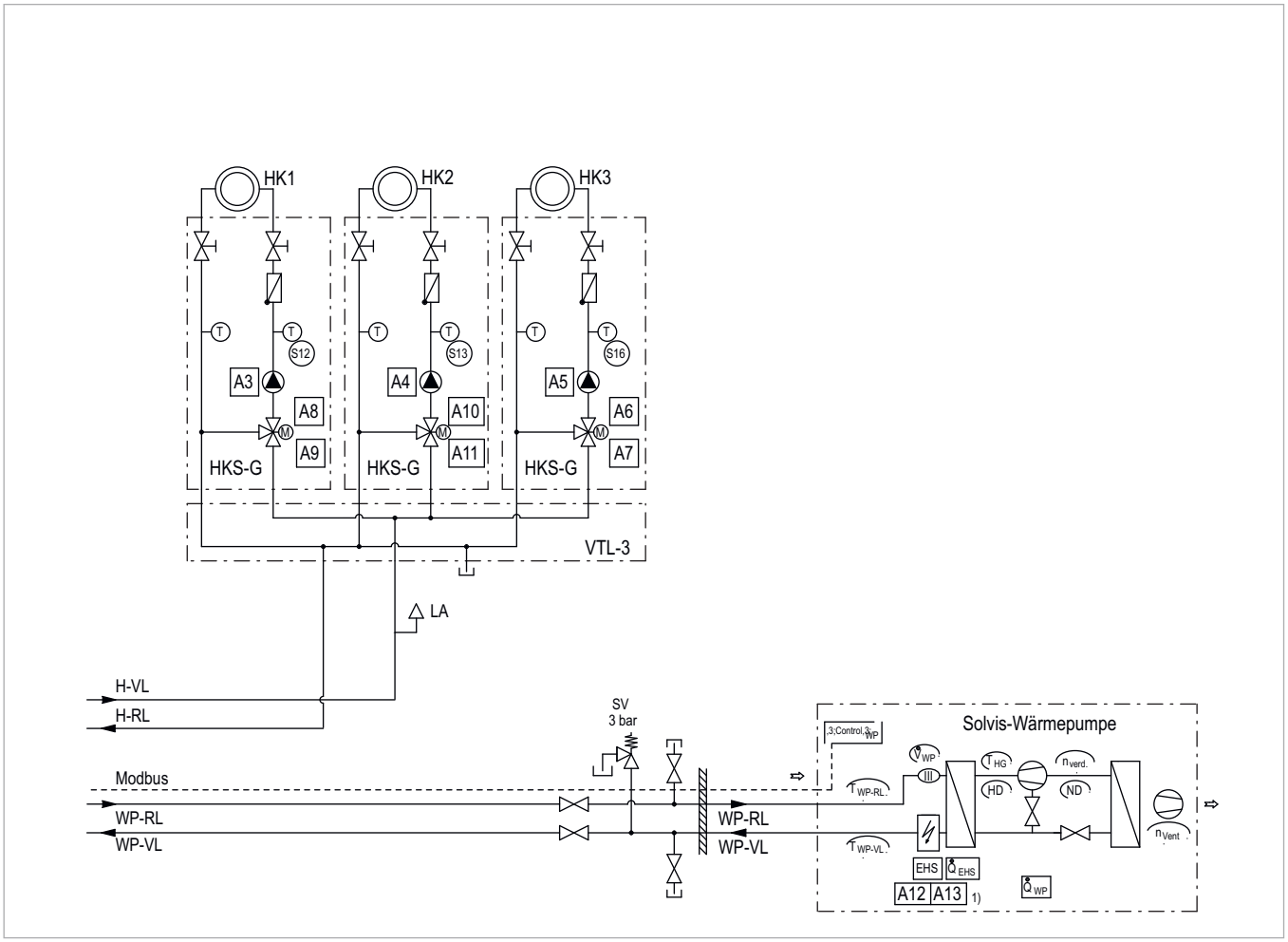


Fig. 20: SolvisBen WP with three mixed heating circuits, solar system and heating pump – part 2

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.	

7.2 Mains circuit board SolvisBen WP

7.2.1 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*

7.2.2 Connection Diagram

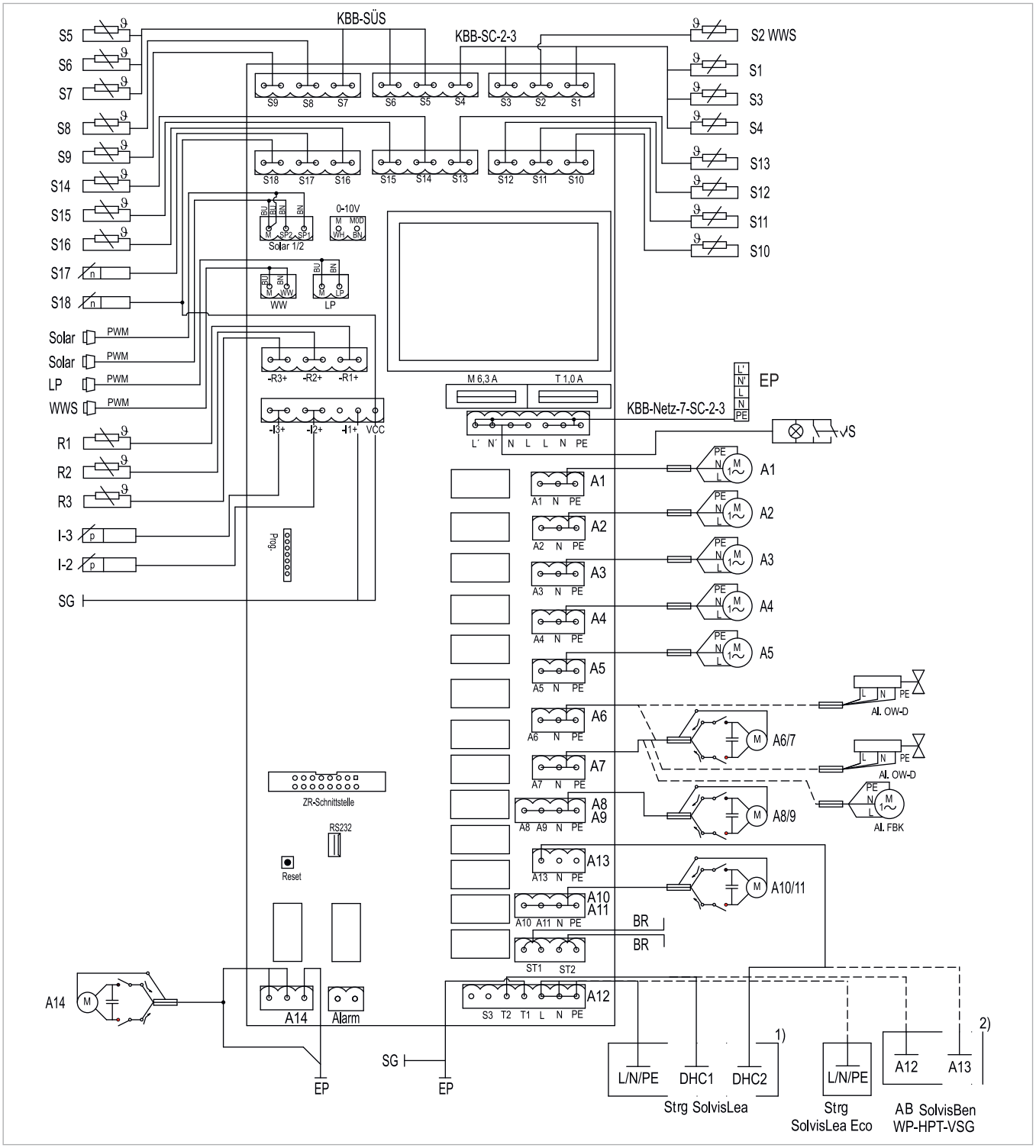


Fig. 21: SolvisControl 3 mains circuit board for SolvisBen WP

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. 22, p. 22
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. 23, p. 23
Solar	*Solar pump*
Strg	*Solvis Lea/Lea Eco control*
WWS	*Hot water station*
ZR	*Central controller interface*
UV	*Switching valve*

7.3 Expansion Board

7.3.1 View

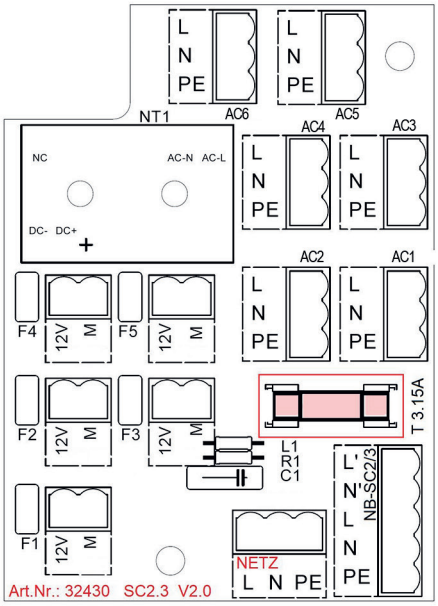


Fig. 22: Expansion board for SolvisControl 3 mains circuit board

7.3.2 Connection table

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

7.4 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).

7.4.1 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

7.4.2 Connection Diagram

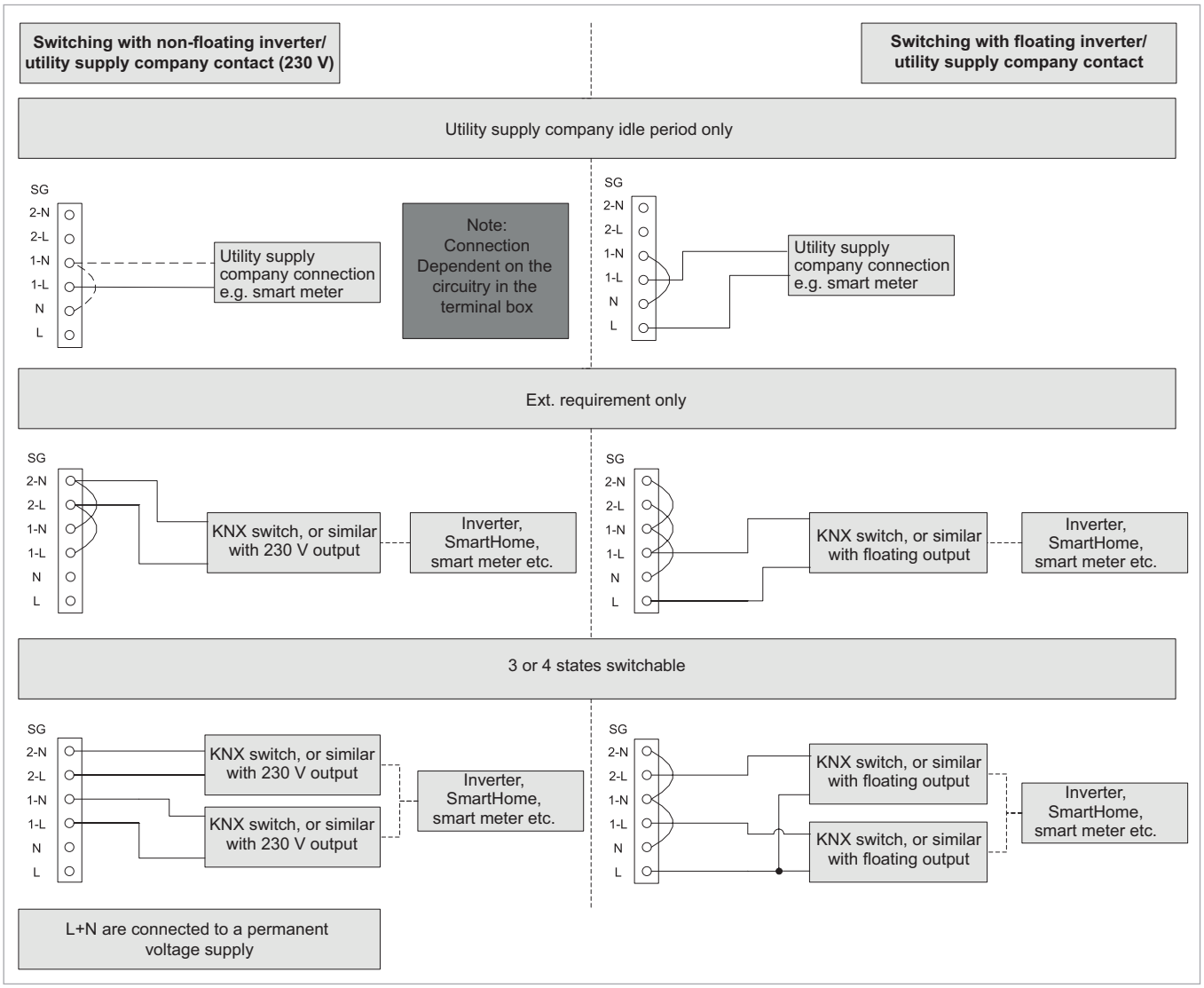


Fig. 23: SmartGrid connection options for the SolvisControl 3 mains circuit board

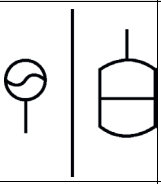
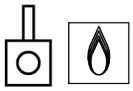
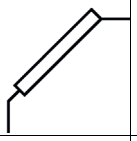
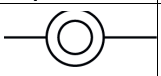
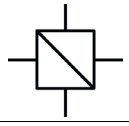
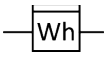
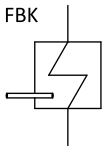
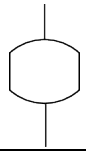
7.5 Explanation of Symbols

7.5.1 Hydraulic elements

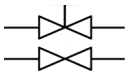
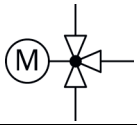
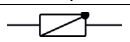
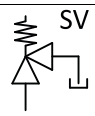
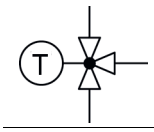
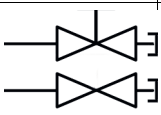
Sensors

Symbol	Meaning
	Pressure
	Temperature

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

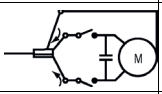
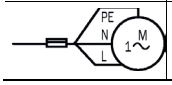
Symbol	Meaning
	Shut-off valve or valve
	Adjusting valve
	Bleeding tap
	Motor-driven mixing valve
	Gravity brake / non-return valve
	Safety valve
	Thermostatic mixing valve
	Solar cap valve
	Boiler filling and draining valve
	Thermal discharge safety device (TAS)

Other hydraulic components

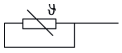
Symbol	Meaning
	Volume flow encoder
	Pump
	Sludge separator
	Drinking water filter

7.5.2 Electrical symbols

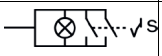
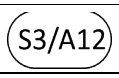
Actuators

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

Notes

Art.-Nr.: 33959 - UBA-BENWP-MIA-EN - Dokument-Nr.: 33959-2a / Redaktioneller Stand: 06.24 - Technischer Stand: 01.24

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