

Installation

SolvisMax

Stratified solar storage tank

- Installation
- Start-up
- Maintenance



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.

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

1	Information About These Instructions.....	2
2	Safety Notes.....	6
3	System Versions.....	7
4	Scope of Delivery	8
5	Installation Conditions and Transport	10
6	Installation.....	11
6.1	Storage tank and insulation	11
6.2	Charging module	14
6.2.1	Mounting the charging module on the storage tank	14
6.2.2	Assemble the switching valve, charging modules LEA/MIA, PIA, LEA-SL/MIA-SL and PIA-SL	16
6.2.3	Assemble the heating cartridge, charging modules LEA-SL, MIA-SL and PIA-SL	17
6.3	Gas burner	18
6.3.1	Gas supply	18
6.3.2	Conversion to liquid gas	18
6.3.3	Program update gas burner	20
6.3.4	Installing the gas burner.....	20
6.3.5	eSTL	21
6.3.6	Gas line.....	22
6.3.7	Electrical connection for the gas burner	22
6.3.8	Sealing the line lead-through	24
6.3.9	Gas side connection	24
6.4	Oil burner	24
6.4.1	Installing the oil burner	24
6.4.2	eSTL	26
6.4.3	Oil pipe	27
6.4.4	Electrical connection for the oil burner.....	28
6.4.5	Sealing the line lead-through	29
6.4.6	Oil supply.....	30
6.5	Exhaust system	32
6.5.1	Air supply line.....	32
6.5.2	Internal exhaust routing.....	32
6.5.3	Condensate discharge	34
6.5.4	External exhaust duct.....	34
6.5.5	Silencer	35
6.5.6	Permitted lengths of the exhaust paths.....	35
6.6	Front flange insulation.....	36
6.7	Condensate discharge line connection	38
6.8	Heating pump	39
6.8.1	Placement.....	39
6.8.2	Installing the buffer charging station	39
6.8.3	Installing the air separator	39
6.8.4	Installing the sludge separator	39
6.8.5	Heating pump connection.....	39
6.9	Heating expansion vessel.....	40

6.10	Heating circuits	40
6.11	Hot water station	41
6.12	Solar option	42
6.12.1	Solar heat transfer station	42
6.12.2	Connecting the collector(s)	43
6.12.3	Solar expansion vessel	44
6.13	Electrical connection	48
6.13.1	General information	48
6.13.2	Equipotential bonding	48
6.13.3	Connecting the outdoor sensor	49
6.13.4	Connecting the room controller	49
6.13.5	Connecting Modbus	50
6.13.6	Connecting the PLAS-WP-WM pump	51
6.13.7	Connecting switching valve group	51
6.13.8	Connecting the heating circuit stations	51
6.13.9	Connecting the collector sensor	51
6.13.10	Connecting SmartGrid (optional)	52
6.13.11	Heating pump voltage supply	52
6.13.12	Voltage supply for heating cartridge	53
6.13.13	Mains connection	53
6.13.14	Completing the connection tasks	53
7	Start-Up	54
7.1	Thermal mixing valve	54
7.2	Filling the storage tank	54
7.3	Configuration SolvisControl	55
7.4	Heat generator design	55
7.5	Gas burner	55
7.5.1	Burner activation	55
7.5.2	Settings	55
7.6	Oil burner	56
7.7	Heating system	58
7.8	Solar circuit (optional)	58
7.8.1	Flushing the MEV line	58
7.8.2	Flushing the pump line	59
7.8.3	Completing the solar station	60
7.9	Hot water station pump	61
7.10	Buffer charging station pump	61
7.10.1	Adjustment options	61
7.10.2	Bleeding	61
7.11	Heating circuit pumps	62
7.12	Basic settings	62
7.13	Final Tasks	62
7.13.1	Check	62
7.13.2	Fitting the protective cover	62
7.13.3	Handover	63
8	Maintenance	64
8.1	General maintenance	64

8.2	Gas burner maintenance	64
8.2.1	Condensate siphon.....	64
8.2.2	Gas burner.....	65
8.3	Oil burner maintenance.....	66
8.3.1	Condensate siphon.....	66
8.3.2	Parking position.....	66
8.3.3	Oil burner	67
8.4	Solar system maintenance	70
8.5	Cleaning the surfaces	70
9	Troubleshooting.....	71
9.1	Pumps	71
9.1.1	Malfunction, cause and remedy.....	71
9.1.2	Wilo PARA malfunction messages.....	71
9.1.3	IMP pump error messages	71
9.1.4	Bleeding.....	71
9.2	Gas burner	71
9.3	Unlocking the automatic firing system	72
9.4	Unlocking the heating cartridge.....	72
9.5	Gas burner error codes	73
9.6	Oil burner	75
9.6.1	Program sequence display	75
9.6.2	Table of malfunctions by symptom	75
9.6.3	Table of malfunctions by error message.....	76
9.7	Heating pump	77
10	Technical Data.....	78
10.1	Storage tank.....	78
10.2	Burner	80
10.2.1	Gas burner.....	80
10.2.2	Oil burner	81
10.3	Heating pump	82
10.4	SolvisControl system controller	83
10.5	Hot water station	84
10.6	Solar heat transfer station	85
10.7	Heating cartridge	86
10.7.1	Dimensions.....	86
10.7.2	Electrical data	86
11	Appendix.....	87
11.1	System diagrams and connection diagrams	87
11.2	Sensors and connections on the storage tank	87
11.3	Burner connection diagram	88
12	Index.....	89

2 Safety Notes



DANGER

Observe the safety notes

This is primarily for your own safety.

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

General Information



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.

Regulations

Observe the following specifications

- DIN EN 12828 Heating systems in buildings
- DIN EN 1717 Protection of drinking water (d. w.)
- DIN 1988-100 Codes of practice for d. w. installat. (TRWI)
- DIN EN 806 Specifications for installations inside buildings conveying water for human consumption
- VDI 2035 Part 1, Prevention of damage in water heating installations - Scale formation
- VDI 2035 Part 2, Prevention of damage in water heating installations - Water corrosion
- Directives of the German Institute for Structural Engineering
- German Building Regulations (LBO)
- VDE 0100/IEC 60364 Erection of low voltage systems
- Low Voltage Directive 2006/95/EC.

With heat pump:

- DIN EN 378 Refrigerating systems and heat pumps - Safety and environmental requirements
- IEC 60335 Part 2-40 (Special requirements for electrically driven heat pumps)
- Chemicals Climate Protection Ordinance (ChemKlimaschutzV)
- EU Regulation 2024/2215 Certification of personnel for the handling of fluorinated greenhouse gases or alternatives to fluorinated greenhouse gases

With integrated burner, also:

- German State Firing Ordinance (FeuVO)
- DIN EN 13384-1: Chimneys – thermal and fluid dynamic calculation methods
- Local discharge regulations
- ATV A 115 Notes for discharging waste water
- ATV M 251 Discharging condensate water

With oil burner:

- Technical Regulations for Oil Systems ("Technische Regeln Ölanlagen" - TRÖI)

With gas burner:

- German technical rules for gas installation (TRGI) and, if necessary, technical rules for liquid gas (TRF)
- Gas Appliances Regulation 2016/426/EU
- Electromagnetic Compatibility (EMC) Directive 2014/30/EU
- Test regulations used:
 - EN 15502-1:2015
 - EN 15502-2-1: 2017, EN 607301-1: 2011
 - EN 60730-2: 2009.

Additional specifications in Switzerland

- SVGW (Swiss Gas and Water Industry Association) G1 guidelines for gas installations
- EKAS-Form. 1942: Liquid gas guideline, Part 2
- Specifications from cantonal authorities (e.g. fire service guidelines).

3 System Versions

The SolvisMax is available in the three cylinder sizes 450, 750 and 950 liters and in the following versions:

- as a gas condensing boiler SolvisMax Gas in 4 output levels: 10, 18, 25 or 30 kW
- as an oil condensing boiler SolvisMax Oil in 3 output levels: 17, 23 or 28 kW
- as a combined heat pump / gas condensing boiler SolvisMax Gas-Hybrid with heat pump SolvisLea Premium, SolvisLea Pro, SolvisMia or SolvisPia and gas burner in 4 output levels: 10, 18, 25 or 30 kW
- as a combined heat pump / oil condensing boiler SolvisMax oil hybrid with heat pump SolvisLea Premium, SolvisLea Pro, SolvisMia or SolvisPia and oil burner in 3 output levels: 17, 23 or 28 kW
- as SolvisMax Solo for connecting the SolvisLino 4 pellet boiler or an external heat generator (incl. district heating, various gas or oil burners can be retrofitted at a later date)
- as SolvisMax Solo with special charging modules for connecting the SolvisLea Premium, SolvisLea Pro, SolvisMia or SolvisPia air-to-water heat pumps.

Two versions of the integrated hot water station are available:

- WWS-36 (with copper-soldered heat exchangers)
- WWS-30 (with stainless steel brazed heat exchangers).

Depending on the configuration, the SolvisMax also includes a solar heat transfer station.

- SÜS-LM

If required, the SÜS-LM can also be retrofitted at any time to take advantage of all the benefits of solar thermal support.

Our wall-mounted heating circuit stations (HKS-xx) are available in various versions for up to 3 heating circuits as further combination options.

4 Scope of Delivery

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



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

Equipment variants SolvisMax charging module 7:

Equipment	Basis	Pur	SÜS	LEA Pur/SL	LEA SÜS/SL	PIA Pur	PIA SÜS	PIA Pur SL	PIA SÜS SL	MIA Pur	MIA SÜS	MIA Pur SL	MIA SÜS SL
can be combined with:													
• SolvisMax Solo	✓	✓	✓										
• SolvisMax Solo with SolvisLea 8.3 Premium				✓	✓								
• SolvisMax Solo with SolvisLea Pro				✓	✓								
• SolvisMax Solo with SolvisPia								✓	✓				
• SolvisMax Solo with SolvisMia												✓	✓
• SolvisMax Hybrid with SolvisLea 8.3 Premium				✓	✓								
• SolvisMax Hybrid with SolvisLea Pro				✓	✓								
• SolvisMax Hybrid with SolvisPia						✓	✓						
• SolvisMax Hybrid with SolvisMia										✓	✓		
• SolvisMax Solo with SolvisLino 4 / 5		✓	✓										
Pre-assembled:													
• SolvisControl 3 system controller with mains circuit board and main switch	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
• Hot water station, depending on version as: – WWS-36 (number of plates of the heat exchanger: 50 plates and adapted version of the therm. mixing valve) or – WWS-30 (40 plates, stainless steel-brazed)	--	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
• Solar heat transfer station for solar thermal collector surfaces of up to approx. 20 m ²	--	--	✓	--	✓	--	✓	--	✓	--	✓	--	✓
• SmartGrid connection box	--	--	--	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Included:													
• Charging module assembly pack (with connection pipes and sensor wiring harness, for LM Basis w/o WWS connection pipe set)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
• Pur/solar installation pack (with outdoor sensor, ball valves, air vent, seals and small items for installation, solar: additionally with cap valve)	--	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
• LM WP 3-W valve assembly pack (changeover valve group for heating/WW operation)	--	--	--	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
• LM WP-SL HPT installation pack (electric heating cartridge incl. mSTB, relay box and connection material)	--	--	--	--	--	--	--	✓	✓	--	--	✓	✓
• Assembly pack LM WP electrical parts (with flow sensor, connection material)	--	--	--	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
• Buffer charging station (with Modbus connection box)	--	--	--	✓	✓	2	2	2	2	✓	✓	✓	✓
• Modbus connection box	--	--	--	--	--	1	1	1	1	--	--	--	--
• Sludge separator	--	--	--	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
• Protective cover	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

✓ = available, -- = not available

¹ only for SolvisPia 12, ² only for SolvisPia 13 and SolvisPia 17

SolvisMax – storage tank

- Steel stratified storage tank that can be fitted with an integrated heat generator, completely pre-assembled, including sensor sleeves and an integrated solar and heating combined stratified charger.
- Technical documents:
 - SolvisMax installation instructions (MAL-MAX-7, this document)
 - SolvisMax installer operating instructions (BAL-SBSX-3-I)
 - SolvisMax system diagram (ALS-MAX-7)
 - Privacy policy
- “My Solvis System” systems folder with other documentation.

Storage tank insulation box

- Storage tank insulation
- Flanschonde (mineral wool)
- Rear flange insulation (EPP ring)
- Cover disk and floor disk
- Cover strips for the fastener
- Cover and foot edge
- Rubber gloves

SolvisMax Solo

Also includes:

Flanschiso Solo box

- Flanschiso
- 3 pcs. screw adapters
- Spring washer

SolvisMax Gas / Öl

Also includes:

Intake chamber box

- Intake chamber with condensate hose assembled
- Front flange insulation (4-part)
- Assembly materials: Seals, retaining plates, nuts, etc.

SolvisMax Gas

Also includes:

→ Burner box

- Pre-mixed, modulating low NOx radiant burner
- Safety temperature limiter (eSTB)
- Burner cable
- Attachment nuts
- Burner sealing cable

→ Accessories box

- Exhaust connection elbow with siphon
- Flue pipe coupling
- Boiler brush
- Gas line
- Assembly pack (gaskets, attachment material, socket boards, etc.).

SolvisMax Öl

Also includes:

→ Burner box

- 2-stage low NOx blue-flame burner
- Safety temperature limiter (eSTB)
- Burner plug

→ Accessories box

- Exhaust connection elbow with siphon and condensate hose
- Boiler brush
- Exhaust connection fitting
- Assembly pack (gaskets, attachment material, socket boards, etc.)
- Oil microfilter with vacuum manometer and retaining plate
- Reflective silencer
- Filling pipe cap.

5 Installation Conditions and Transport



CAUTION

Prevent corrosive particles in the air

Otherwise, they may cause damage to or even the total failure of the system

- Keep the combustion air and the air in the installation room free from dust and corrosive particles such as those found in propellants, solvents, cleaning agents, and so on.



CAUTION

Heavy weight of the system may be hazardous.

Risk of damage to the system and building

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

Storage tank transport



WARNING

Danger due to the heavy transport weight (> 200 kg)

Personal injury or damage to property.

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

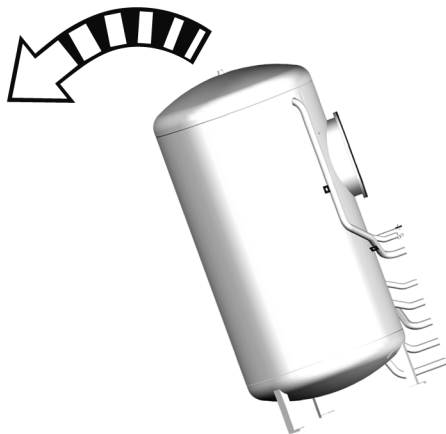


Fig. 1: Tilting the storage tank

Maintain the following conditions

- When (dry) storing, transporting, and assembling the components, ensure that the storage tank is not scratched, warped, or deformed by external factors. Otherwise, the safe and long-lasting operation of the storage tank can no longer be guaranteed.

- Floors must be level at the installation site (+/-1 cm).
- The system must be installed and operated only in a frost-proof room inside a building.
- The system must not be installed in damp rooms such as kitchens, bathrooms or laundry rooms.
- For ambient air-dependent operation and for the SolvisMax Oil with ambient air-dependent operation, you require:
 - An adequately sized intake opening, with an open cross-section of at least 150 cm².
 - Air vents must not be obstructed or blocked.
 - The flow area and air connection for the combustion air must not be obstructed.



To prevent fluids from spilling (leakages), we recommend using a suitable draining option (floor drain). If the design makes this impossible, we recommend using a collecting tray; see the price list.

Observe the clearances

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

6 Installation

6.1 Storage tank and insulation

Installing and insulating the storage tank

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

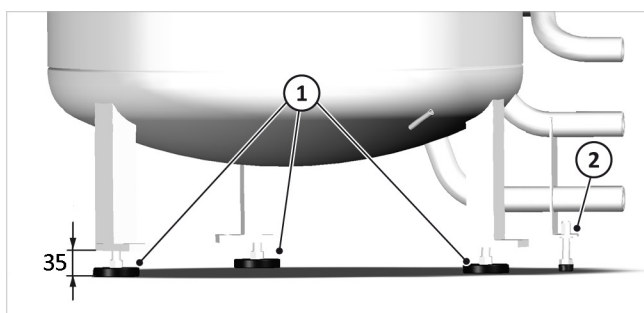


Fig. 2: Installing the storage tank

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

When you have finished the installation, attach the copy of the nameplate to the storage tank in a clearly visible position (see → Fig. 133, Page 63).

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

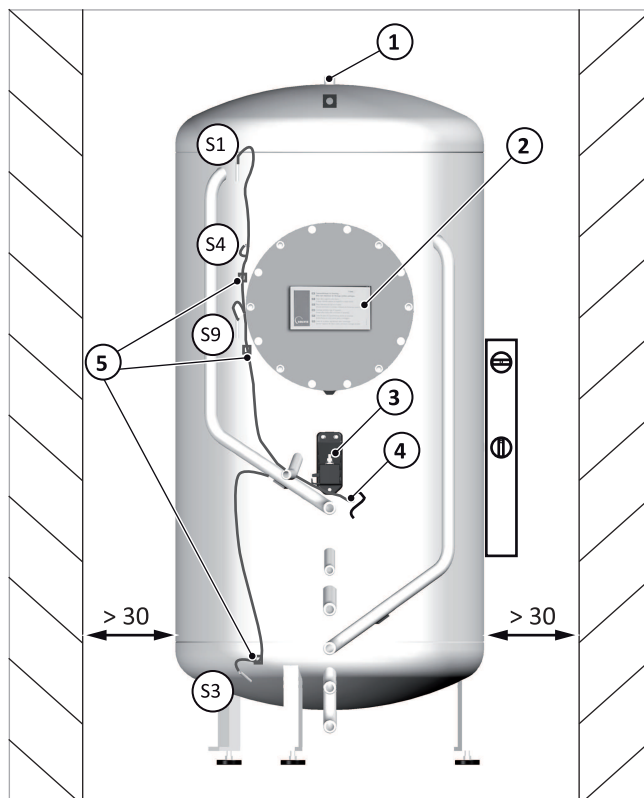


Fig. 3: Storage tank with the nameplate in the envelope (2)

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

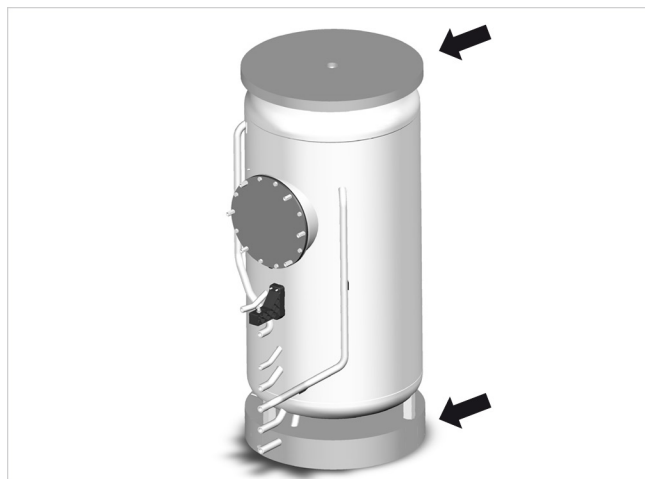


Fig. 4: Position the floor and cover base plates

10. Assemble the flange chronicle (1)



Fig. 5: Assemble the flange chronicle (1)

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



Fig. 6: Insulating the storage tank

12. Assemble the threaded rods and tighten hand tight.

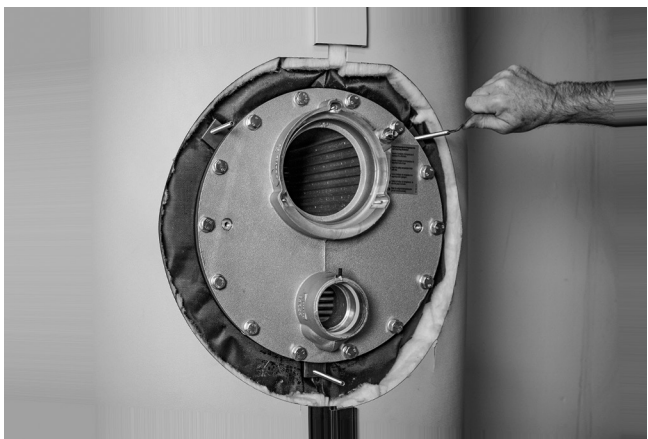


Fig. 7: Assemble the threaded rods

13. Fit the rear flange insulation (EPP ring).



Fig. 8: Fit the rear flange insulation (EPP ring)

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

SolvisMax Solo only

Assemble the Solo flange insulation

1. Assemble the Solo flange insulation (1) and fix in place with screw adapters (2) tightened hand tight.

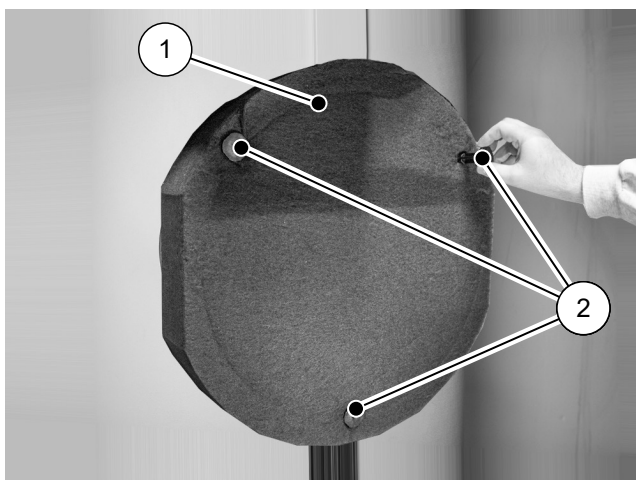


Fig. 9: Fix the Solo flange insulation

2. Clamp the wire ring (3) behind the screw adapters.



Fig. 10: Solo flange insulation assembled

i Continue the installation with the section “Fitting the front bracket” (see → “Fig.15: Front bracket”, Page 13).

SolvisMax Gas/Oil and Gas/Oil Hybrid only

Assembling the intake chamber rear cover

1. Disassemble the intake chamber by unlocking the 4 clips on the locking rails.



Fig. 11: Disassemble the intake chamber

2. Disassemble the left-hand locking rail.



Fig. 12: Disassemble the locking rail

3. Set the rear cover of the intake chamber down on the threaded rods.



Fig. 13: Assemble the intake chamber rear cover

4. Fix the rear cover in place with 3 nuts. **Risk of over-tightening:** Tighten nuts **hand tight** as far as possible.



Fig. 14: Assemble the intake chamber rear cover

i For information about installing the burner, see → chapter “Gas burner”, Page 18 and → chapter “Oil burner” on Page 24.

Fitting the front bracket

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

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

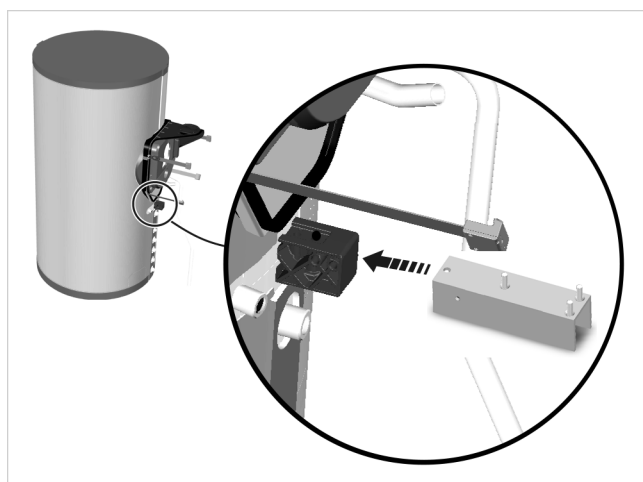


Fig. 15: Front bracket

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

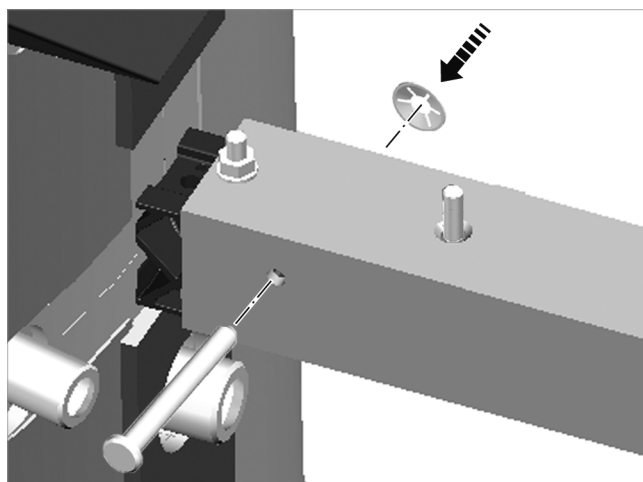


Fig. 16: Bolt and retaining washer

Fitting the ball valve

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



Fig. 17: Fit the connections with ball valves

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

6.2 Charging module

6.2.1 Mounting the charging module on the storage tank

Installing the charging module

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

1. Put the charging module in place and fasten it with the nuts. The oblong holes in the frame allow for horizontal alignment (2).
2. Set the clearance (3) on both sides; the height of the clamp can be aligned marginally (1), depending on the tightness of the nuts.

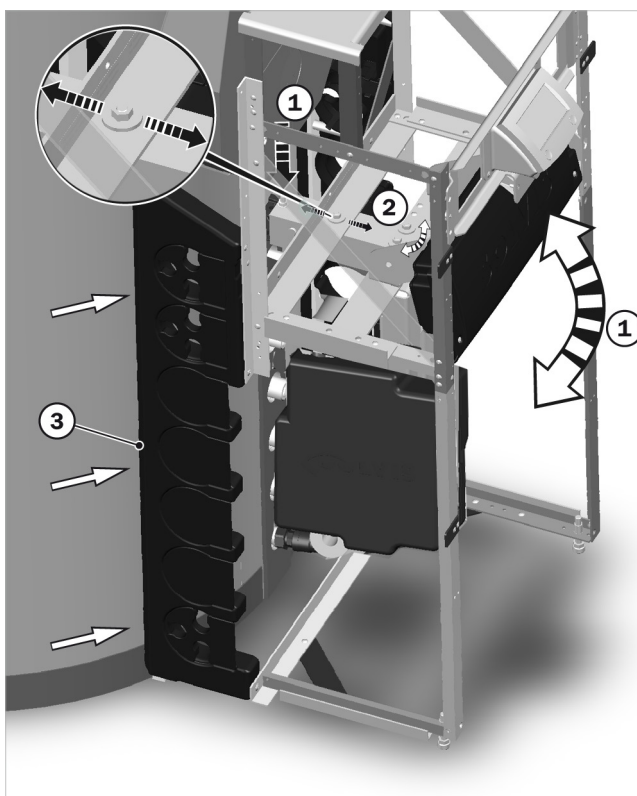


Fig. 18: Aligning the charging module

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

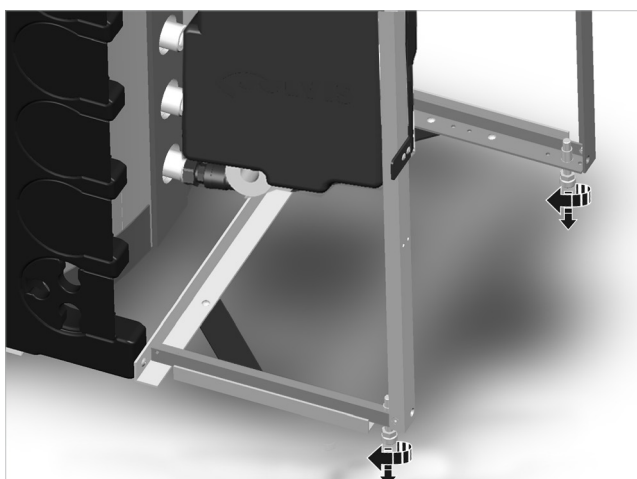


Fig. 19: Screw the frame feet downward to the floor

Pipe lead-throughs

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

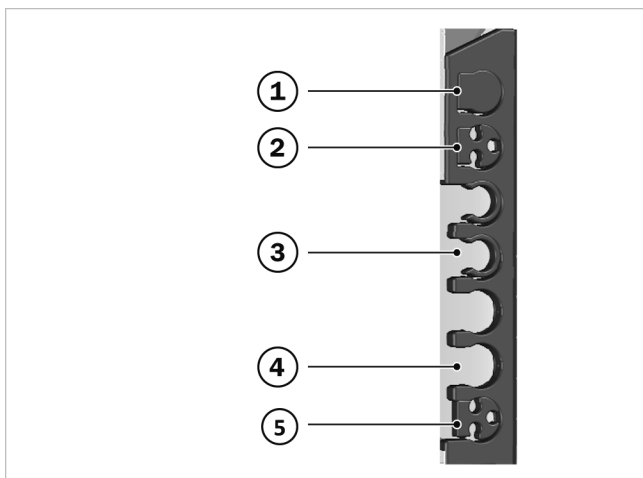


Fig. 20: Inserts for the pipe lead-throughs

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

Laying the sensor cable harness

Lay the sensor cable harness to the controller as follows and connect it:

1. Lay the sensor cable harness through the cable routing to the mains circuit board. The black sheathing must end flush to the cable routing (1).

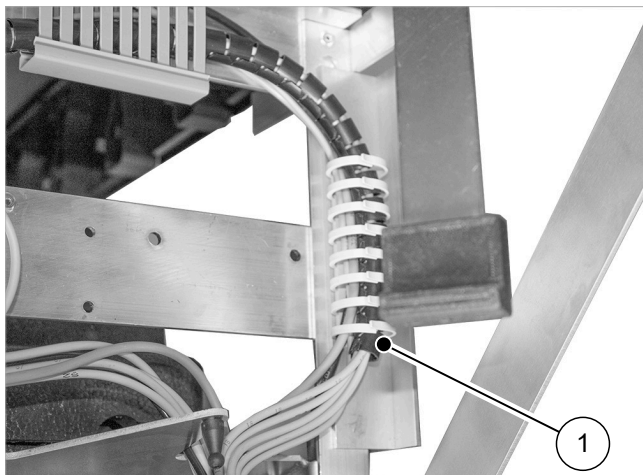


Fig. 21: Routing the cable harness to the mains circuit board

2. Connect the plug to the mains circuit board and secure the cable with the strain relief.
3. Fix the loose cable to the cable harness with two cable ties.

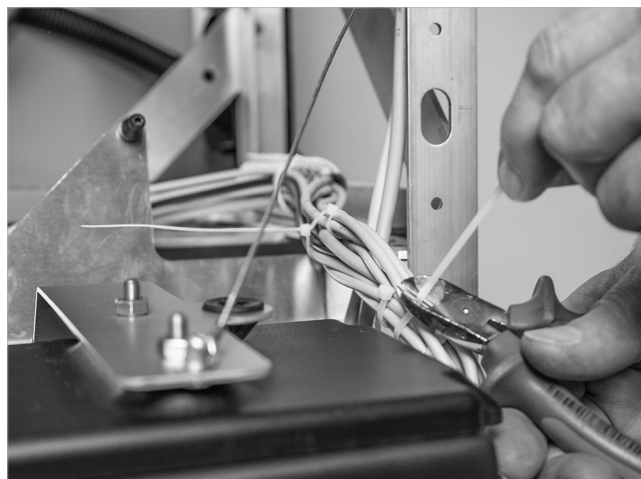


Fig. 22: Fix the cable to the cable harness.

Guide the bleed connection

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

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

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

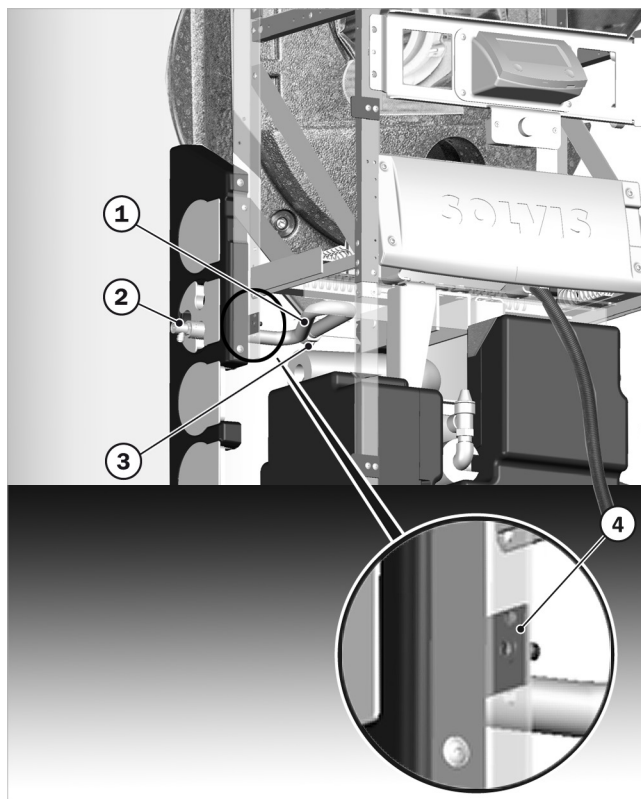


Fig. 23: Fit the bleeder connection with the corrugated pipe

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

i For information about how to continue with the installation of the connection pipes, see → Chapter “Gas line”, Page 21 (gas burners) or → Chapter “Oil pipe”, Page 27 (oil burners).

You do not have to switch to the chapter specified above unless you want to fit a heat generator in the storage tank.

6.2.2 Assemble the switching valve, charging modules LEA/MIA, PIA, LEA-SL/MIA-SL and PIA-SL

Scope of delivery

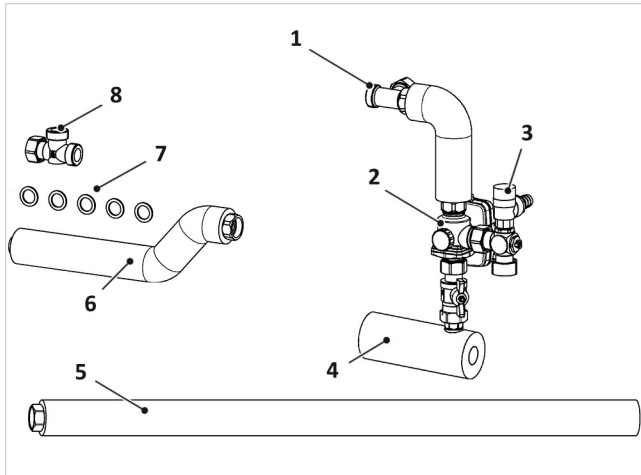


Fig. 24: Assembly pack for LM-WP 3-way valve:

- 1 T-piece (WWS flow)
- 2 3-way switching valve
- 3 Bracket with temperature sensor S14
- 4 Corrugated pipe for heating flow
- 5 WP-VL connection pipe:
- 6 Corrugated pipe for heating flow
- 7 5x seals, 30 x 21 mm
- 8 T-piece G1 (heating flow)

Installation overview

→ Fig. 25 shows the position of the 3-way switching valve at the connections for the storage tank and charging module. The connection pipes for the heating pump and heating flow can be routed through the side pipe lead-through on the right or left.

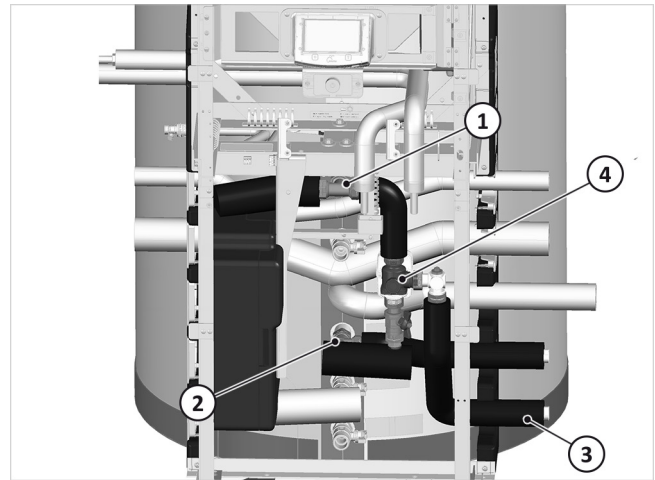


Fig. 25: Position of the 3-way switching valve (connections on the right)

- 1 Step 1: Connection to WWS flow
- 2 Step 2: Connection to heating flow
- 3 Step 3: Routing the heating pump flow (here, on the right)
- 4 3-way switching valve

Installing the switching valve group

1. Fit the switching valve supplied on the HWS flow (1).

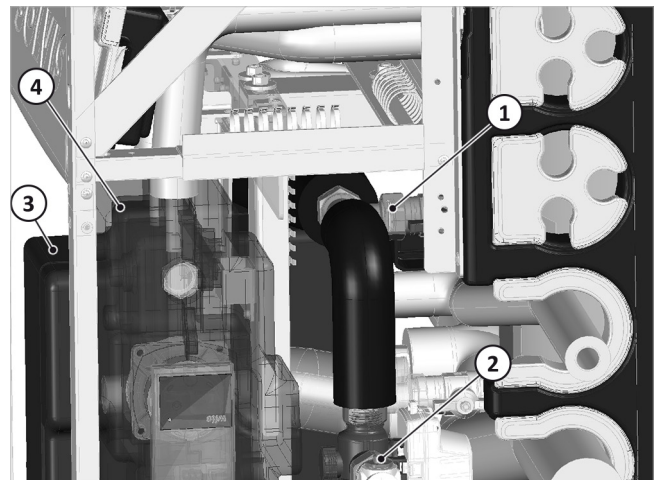


Fig. 26: Fitting the switching valve (WP flow to the right)

- 1 Connection to HWS flow
 - 2 3-way switching valve
 - 3 Hot water station (HWS)
 - 4 Solar heat transfer station (shown as transparent here)
2. Assemble the T-piece (8) supplied with the gasket on the heating flow connection of the storage tank and connect it to the corrugated pipe heating flow (4). Assemble the connection pipe for heating flow (6) to the free end of the T-piece, to the pipe lead-through on the left or right and tighten it while holding it in place.

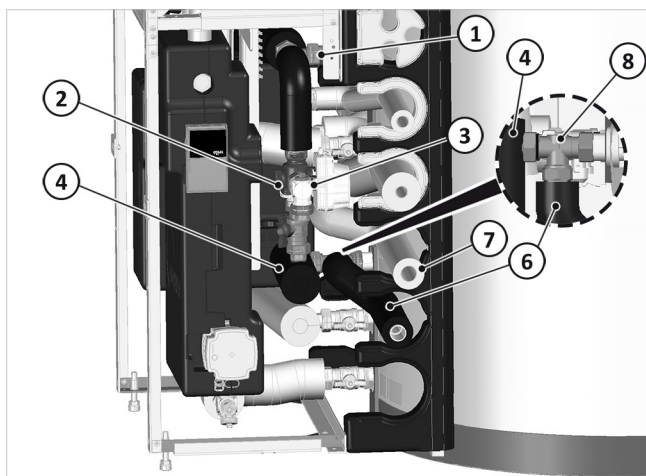


Fig. 27: Fitting the switching valve (WP flow to the right)

- 1 Connection to WWS flow
- 2 3-way switching valve
- 3 Bracket with temperature sensor S14
- 4 Corrugated pipe for heating flow
- 6 Corrugated pipe for heating flow
- 7 Heating return flow (and heating pump return flow)
- 8 T-piece on heating flow

3. Connect the switching valve cable supplied to the switching valve.
4. Lay the connection pipe for the heating pump flow (5) to the left or right to the pipe lead-through. Tighten the screwed joint while holding it in place.
5. Insert the temperature sensor S14 supplied in the immersion tube on the bracket (3) and fix it in place.

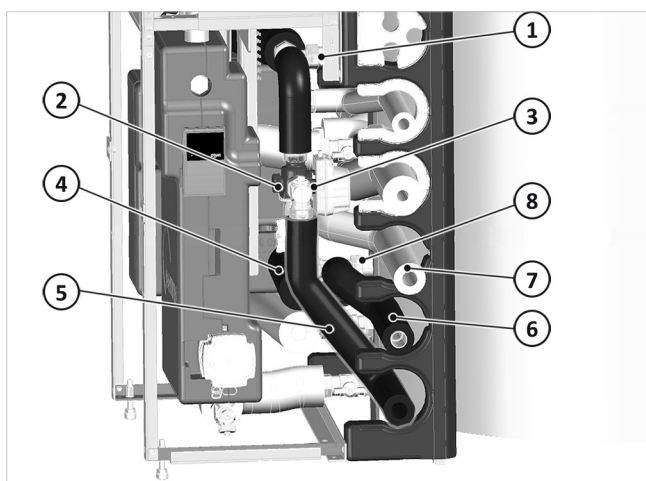


Fig. 28: Connection pipe for WP flow assembled (to right)

- 1 Connection to WWS flow
- 2 3-way switching valve
- 3 Bracket with temperature sensor S14
- 4 Corrugated pipe for heating flow
- 5 WP-VL connection pipe:
- 6 Corrugated pipe for heating flow
- 7 Heating return flow (and heating pump return flow)
- 8 T-piece on heating flow

6.2.3 Assemble the heating cartridge, charging modules LEA-SL, MIA-SL and PIA-SL

When the SolvisMax Solo is combined with the SolvisPia, SolvisMia or SolvisLea Eco, the charging modules PIA-SL and LEA-SL/MIA-SL the heating cartridge (HPT) supplied must also be integrated in the heating pump flow. This "Assembly pack LM WP-SL HPT" (→ Fig. 29) replaces the "Connection pipe WP-VL", cf. → Fig. 24 (5).

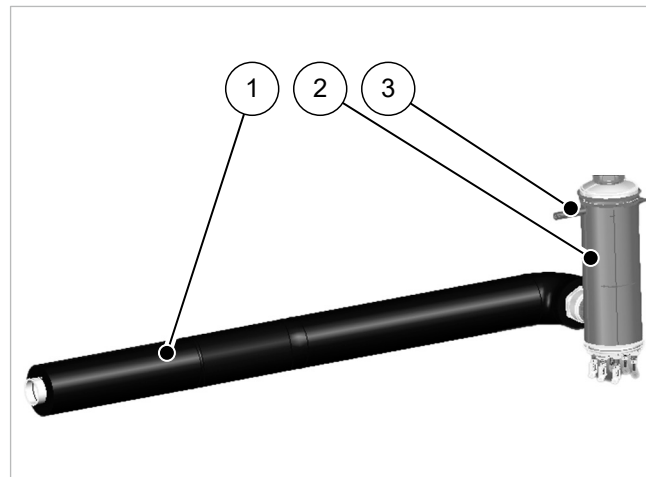


Fig. 29: Heating cartridge with HP flow pipe

- 1 WP-VL Max WP HPT connection pipe
- 2 Ben-Max heating cartridge (incl. mSTL and connection box)
- 3 Sleeve for safety temperature limiter

The following are also included:

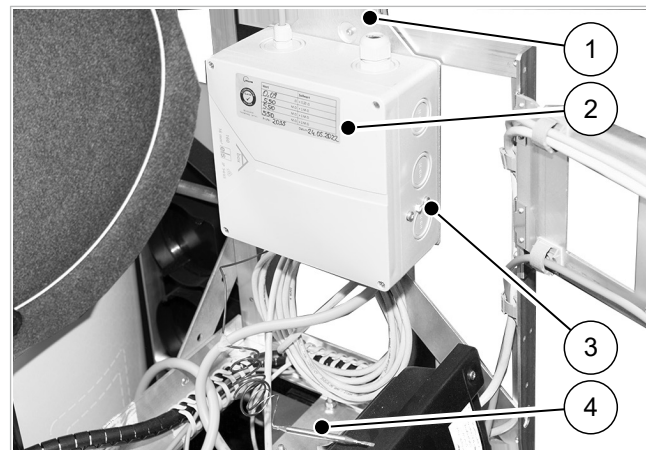


Fig. 30: Connection box for heating cartridge, fitted

- 1 EAK HPT Max retaining plate
- 2 Heating cartridge connection box
- 3 Unlocking heating cartridge malfunctions
- 4 Safety temperature limiter (mSTL)

The retaining plate and connection box are screwed together at the factory. The connection box is already connected to the heating cartridge via a cable and can be fastened to the top of the charging module using two screws/nuts/U-washers.

Position of the components

→ Fig. 31 indicates the positions of the connection box (1) and heating cartridge (3) in the charging module. The connection pipes for the heating pump and heating flow can be routed through the side pipe lead-through on the right or left.

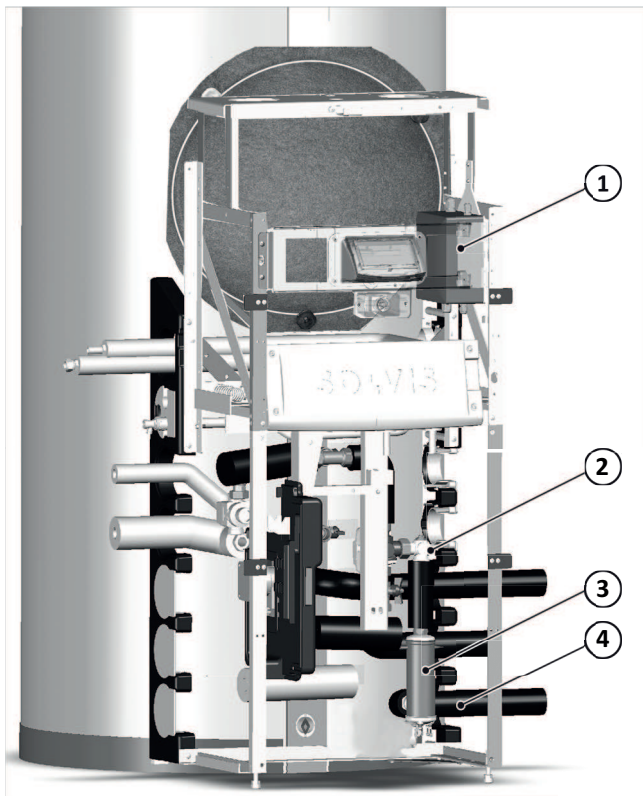


Fig. 31: Position of the components in the charging module

- 1 Junction box
- 2 3-way switching valve
- 3 Heating cartridge (incl. mSTL)
- 4 WP-VL Max WP HPT connection pipe

Installing the heating cartridge

1. Complete the preparatory work for the charging module in accordance with → Chap. "Assemble the switching valve, charging modules LEA/MIA, PIA, LEA-SL/MIA-SL and PIA-SL", Pg. 16.
2. Assemble the heating cartridge on the bracket with the safety valve of the switching valve group using gaskets and lay the heating pump flow pipe to the pipe lead-through. Tighten while holding in place.

Installing the connection box

Only applies to SolvisLea Eco / SolvisMia / SolvisPia with SolvisMax Solo:

1. Screw the connection box onto the top of the charging module; see → Fig. 31 (1).

Installing the safety temperature limiter

1. Push the safety temperature limiter (4, → fig. 30) into the sleeve of the heating cartridge and secure it with the spring connector supplied.

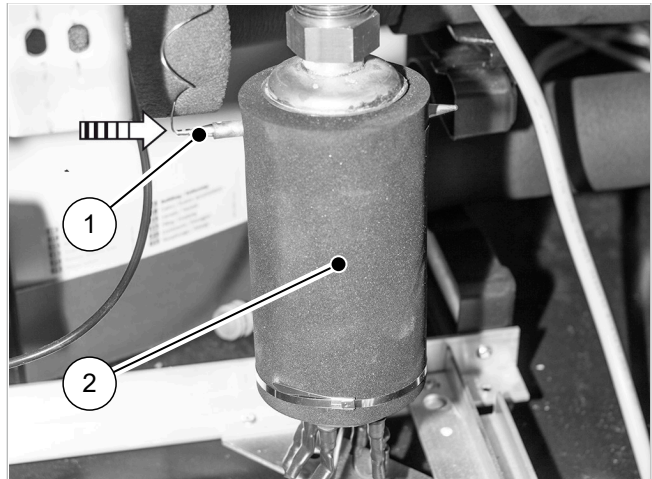


Fig. 32: Push the mSTL into the sleeve

- 1 Safety temperature limiter (mSTL)
- 2 Heating cartridge

6.3 Gas burner

SolvisMax Gas and Gas Hybrid only

6.3.1 Gas supply



DANGER

Observe the gas connection rules

- The gas connection must only be performed by installers who are authorised by the gas supply company.
- Observe the DVGW worksheet G 600 (TRGI) and "Technical regulations for liquid gases" (TRF) when making a gas connection.
- According to heating regulations, a thermally triggered shut-off valve (TAE) must be added directly before the unit shut-off valve, see → sec. "Installing the gas burner", P. 20.



- To protect the gas solenoid valves in the burner, we recommend installing a gas filter in accordance with DIN 3386 in the supply line to the unit.
- SolvisMax/SolvisBen Gas can be operated with fuel gases from gas categories 2 and 3.
- The refitting set for liquid gas (accessories, please order separately) must be installed when using gases from gas category 3 (liquid gases), see the section on → "Conversion to liquid gas" on Page 18.

6.3.2 Conversion to liquid gas

Refitting set for liquid gas (if required)



The burner is preset for operation with natural gas "H". Order the appropriate refitting set for conversion to liquid gas:

- Burner 1.9 – 10 kW: UB-SX-LN-3-10-FG
- Burner 2.9 – 18 kW: UB-SX-LN-3-18-FG
- Burner 4.8 – 25 kW: UB-SX-LN-3-25-FG
- Burner 4.8 – 30 kW: UB-SX-LN-3-30-FG

**CAUTION**

- The flow pressure of the liquid gas at the input of the gas combination valve must not exceed 60 mbar.

Installing a liquid gas nozzle for burners

1. Remove gas combination valve with two screws (1).

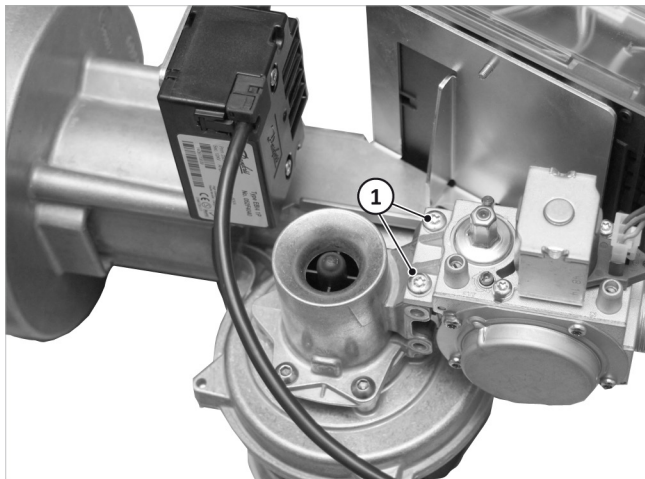


Fig. 33: Removing the gas combination valve

2. Pull the built-in seal (2) off of the gas combination valve.
3. Insert the liquid gas nozzle (ø 4.4 mm, 3) into the removed seal and then into the gas combination valve.

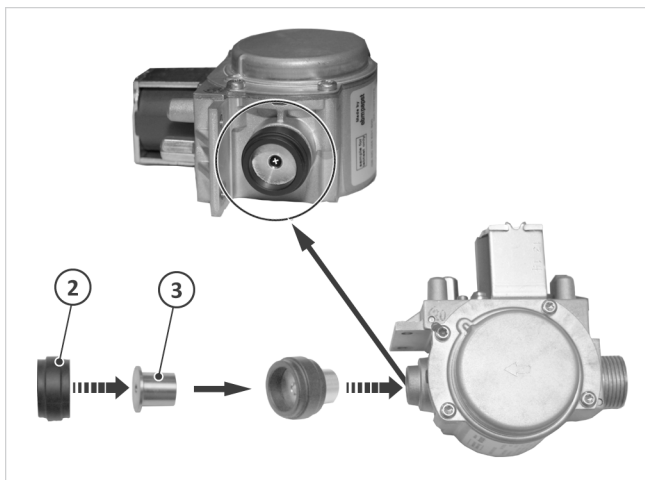


Fig. 34: Installing the liquid gas nozzle

4. Install the gas combination valve with the screws (1).

Presetting the burner for liquid gas

1. Turn the CO₂ adjusting screw (1) by 1¼ rotations in the minus direction (clockwise).

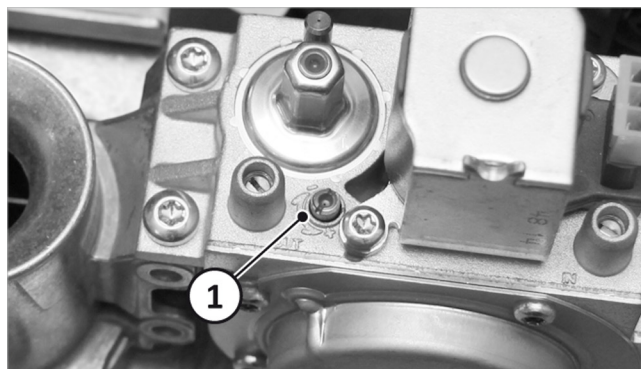


Fig. 35: Setting the burner

Installing the burner chip card

Install the burner chip card for operation with liquid gas.

1. Unscrew the housing cover from the automatic firing system.
2. Make the opening for the memory card at the predetermined breaking point.
3. Insert the burner chip card and screw the housing cover closed again.

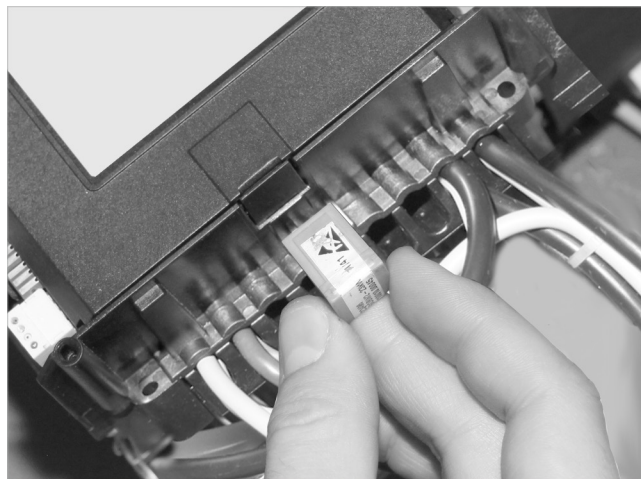


Fig. 36: Installing the burner chip card



Perform a program update following conversion to liquid gas!

- Observe DVGW-TRGI 2008.
- For systems with fluid gas: Observe DVGW-TRF 2012.
- After the conversion, it is essential to check the CO₂ levels. See → "Setting the CO₂ value (max. burner performance)", section "Settings", P. 55.

6.3.3 Program update gas burner

i When handling the Burner Chip Card (BCC), observe the following:

- The BCC may **never** be inserted or removed while the system is switched on.
- Reversing the BCC update to reinstate the original parametrisation is not possible.
- An additional update using a new BCC (new BCC ID) is possible.
- If the BCC is activated in the automatic firing system, then it must always remain in the automatic firing system. Otherwise the system will go into safety shut-down (error message "F163") until the original BCC is inserted or another update is performed using a new BCC (new BCC ID).

Updating the burner

When updating the burner using the burner chip card, you must always follow the steps below:

1. Switch off the system.
2. Remove the old chip card or panel.
3. Connect the new chip card.
4. Switch on the system.

Malfunction message (burner malfunction) "F050" appears.

5. Acknowledge the malfunction message via the SC-3. Programming running (blower starts).

Malfunction message "F051" (burner malfunction) appears briefly and disappears again.

After error "F051" has disappeared automatically and the blower has switched off, the burner switches to normal mode and the update was successful.

Readout automatic firing system

After a successful update the automatic firing system must be read out by the SC-3.

1. On the SC-3, call up "Other" → "Continue" → "Change user".
2. Choose the user "Factory service" (Code 0128).
3. Call up the menu "Heating" → "Burner performance".
4. Confirm "Query performance" (choose right arrow).

6.3.4 Installing the gas burner

Assembling the exhaust connection piece

1. Fix the exhaust connection piece on the opening in the intake chamber using 4 hexagon socket screws.



Fig. 37: Fit the exhaust connection piece

Burner installation

1. Insert the entire burner sealing cable into the groove of the heat exchanger insertion flange. To do this, start with the center of the sealing cord at 7 o'clock and insert it to the left and right. Compress the cord slightly so that the ends meet at 1 o'clock, shorten the cord slightly if necessary.



WARNING

Prevent leaks on the burner seal

Risk of toxic gas leakage.

- Never operate the burner if the burner sealing cable is not inserted.
- The joint must be at 1 o'clock.
- Shorten the burner sealing cord carefully!



Fig. 38: Inserting the burner sealing cord, joint at 1 o'clock

2. Check the spacing of the ionisation electrodes with the aid of an electrode gauge → Fig. 40 (2) (correct them, if necessary, by carefully bending them).

Distance to burner fleece:

- Ionisation electrode → Fig. 39 (1): 7.25 mm
- Ignition electrode → Fig. 39 (2): 6.9 mm
- Between the electrodes → Fig. 40 (1): 3.5 mm

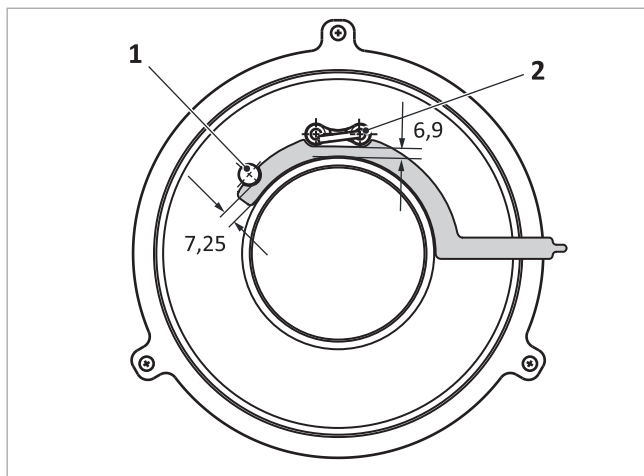


Fig. 39: Clearance from ionisation electrode and ignition electrode to burner tile

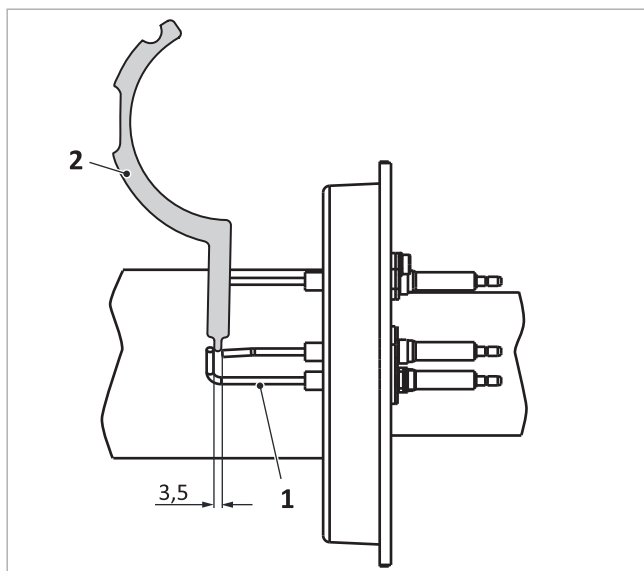


Fig. 40: Clearance from electrode to gauges on the ignition electrode

3. Slide on the door firebrick (1).

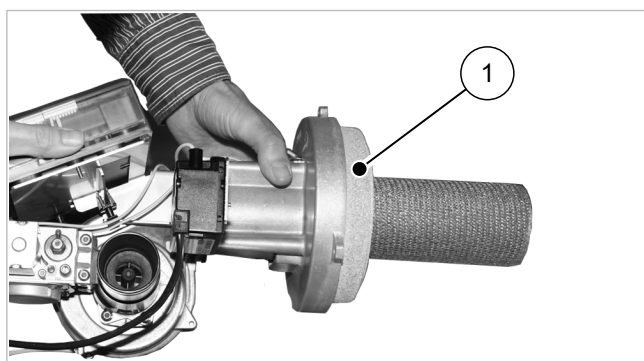


Fig. 41: Slide on the door firebrick.

4. Attach the burner to the pre-fitted threaded bolts with the "Top" marking facing up.
5. Fix the burner flange at 3 positions (1, none visible here) using the long nuts supplied.



Fig. 42: Assemble the burner

6. Tighten the nuts evenly using an 8 mm socket spanner.

6.3.5 eSTL

Plug the electrical safety temperature limiter (eSTL) into the combustion chamber

The eSTL is connected to the burner by a red cable.

1. Push the screw connection and insert onto the cable.
2. Insert the eSTL into the immersion tube on the top right of the combustion chamber as far as it will go (front tip of the eSTL approx. 15 cm deep).
3. Tighten the screw fitting.

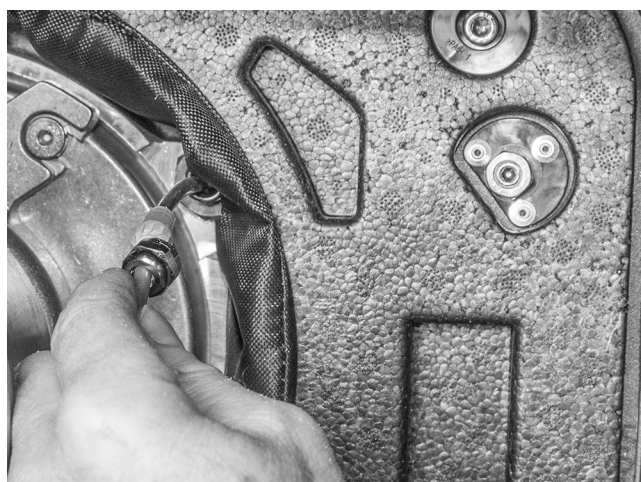


Fig. 43: Inserting the eSTL

i Continue the installation with the section "Fitting the front bracket" (see → "Fig.15: Front bracket", Page 13).

6.3.6 Gas line

Laying the gas line

1. Lay the gas line (3) upwards and insert it through the opening in the suction chamber (2).
2. Guide the gas line straight up next to the flue duct and fix it in place using the pipe clamp (1) on the flue duct.

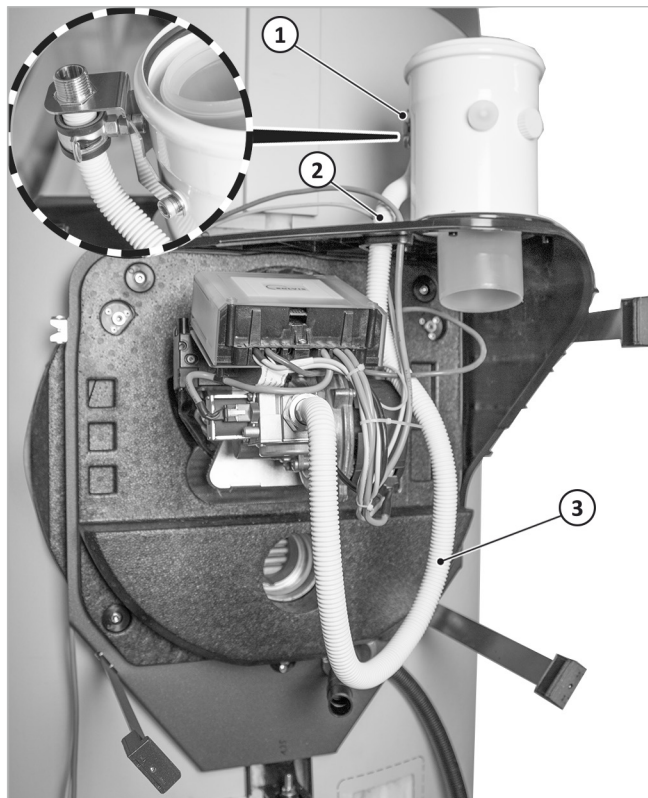


Fig. 44: Lay the gas line laid to the top

Connecting the gas line to the burner

1. Install the corrugated hose onto the gas connection of the burner (flat seal → assembly pack).



Fig. 45: Connecting the gas line



CAUTION

When installing the system:

- When tightening the screw connection, hold the connection still using a second wrench.

6.3.7 Electrical connection for the gas burner

Laying the burner connection cable to the power board

1. Route the two burner connection cables (1) through the feed-through on the intake chamber, through which the gas line (2) already runs, up to the mains circuit board. Fit the lines with the molded rubber piece (3).

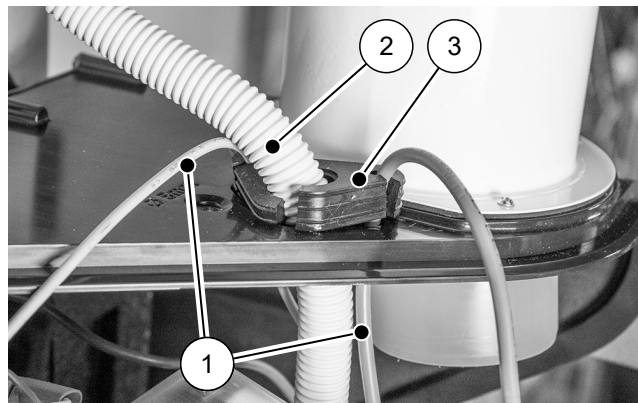


Fig. 46: Cable feed-through at the intake chamber

Connecting to the mains circuit board

Opening the mains circuit board housing

1. Open the mains circuit board housing cover.

Connecting the burner plug to the mains circuit board

1. Guide the connection pipe to the side through the strain relief device for the mains circuit board and attach it to the mains circuit board (observe the labeling).

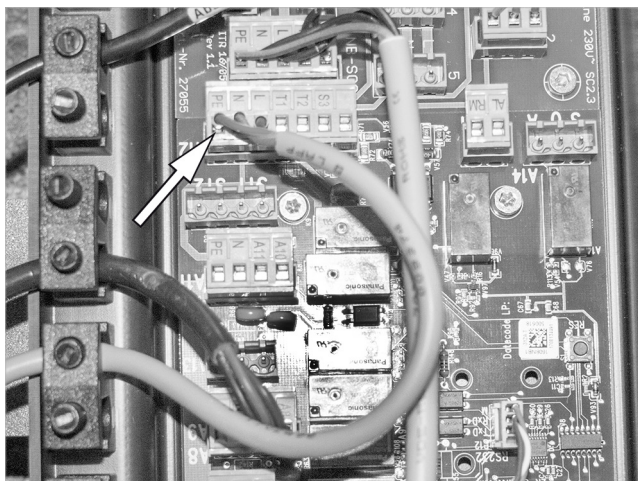


Fig. 47: Connecting the gas burner plug to A12

SolvisMax Gas-Hybrid only

When using the charging module, a plug is connected to A12 on the mains circuit board. This plug is not required for the Gas Hybrid. Therefore, disconnect this plug and use the strain relief device to secure it in the mains circuit board housing.

Connecting the bus plug to the mains circuit board

1. Connect the bus plug from the SX-LN-3 burner to the mains circuit board.

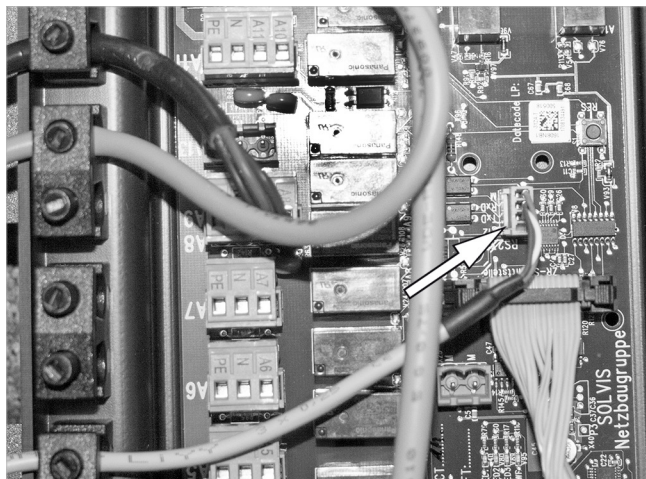


Fig. 48: Connecting the bus plug

Securing the connection lines

1. Lead all the lines on the side through the strain relief devices of the control console.
2. Secure the lines with the strain relief devices.

Attaching socket boards ST/1/ST/2

1. Attach the supplied socket boards ST/1/ST/2 to the mains circuit board (observe the labelling).

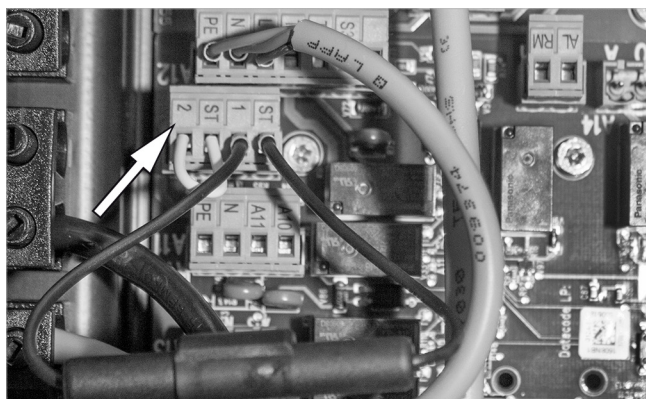


Fig. 49: Attaching a socket board

Attaching the socket boards to the mains circuit board

1. Attach the socket boards included in the assembly pack onto any free slots of the mains circuit board according to the labelling.



See → "Connection and system diagrams" document (ALS-MAX-7).

Exhaust gas safety temp. limiter, if applicable connect**Exhaust safety temperature limiter (ASTB)****Regulation in Switzerland.**

- If an additional ASTB is stipulated, connect it to the malfunction input on the system controller of the SolvisControl (please order the ASTB separately).
- The ASTB must have a floating 230 V~ switching contact.
- To install the ASTB in the exhaust line, replace the supplied exhaust elbow with the exhaust elbow AB-ASTB (please order separately, see → price list).

1. Connect a two-pole connection cable to the switching contact of the ASTB switch contact.
2. Remove the jumper (ST 2) from the socket strip on the mains circuit board.
3. Route the connecting cable further to the mains circuit board and connect it to the terminals (ST 2) of the socket strip. Polarity is not important.

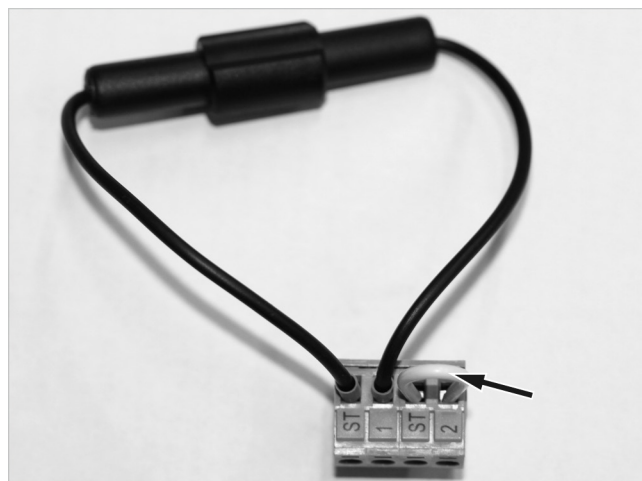


Fig. 50: Socket plug with fuse (black) for SX-LN-3 burner (for the ASTB connection, see the arrow)

6.3.8 Sealing the line lead-through



DANGER

Make sure that the intake chambers are air-tight.
Risk of suffocation

- The airtight sealing of the pipe penetration with the molded rubber piece is mandatory for room air-independent operation.

Close the feed-through

1. Press the fuel lines and connection cable into the molded rubber piece (1) to close the feed-through.

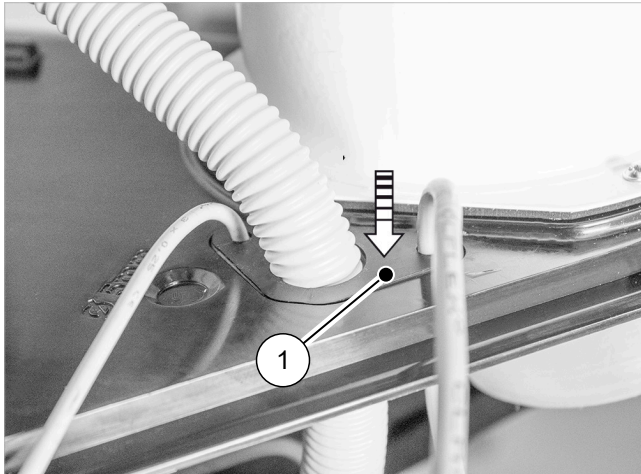


Fig. 51: Close the feed-through

6.3.9 Gas side connection



DANGER

Observe the gas connection rules

- The gas connection must only be performed by installers who are authorised by the gas supply company.
- Observe the DVGW worksheet G 600 (TRGI) and "Technical regulations for liquid gases" (TRF) when making a gas connection.
- According to heating regulations, a thermally triggered shut-off valve (TAE) must be added directly before the unit shut-off valve, see → sec. "Installing the gas burner", P. 20.



- To protect the gas solenoid valves in the burner, we recommend installing a gas filter in accordance with DIN 3386 in the supply line to the unit.
- SolvisMax/SolvisBen Gas can be operated with fuel gases from gas categories 2 and 3.
- The refitting set for liquid gas (accessories, please order separately) must be installed when using gases from gas category 3 (liquid gases), see the section on → "Conversion to liquid gas" on Page 18.

Connecting the gas line

1. Connect the gas line to the gas supply on site.

6.4 Oil burner

SolvisMax Oil and Oil Hybrid only

6.4.1 Installing the oil burner

Assembling the oil vapour nipple and exhaust connection piece

1. Drill a 5.2 mm hole at the prescribed point beside the top exhaust connection piece on the intake chamber.



Fig. 52: 5.2 mm hole diameter

2. Fix the exhaust connection piece on the opening in the intake chamber using 4 hexagon socket screws.



Fig. 53: Assembling the exhaust connection piece

3. Fit the oil vapour nipple supplied in the opening and fix in place with the nut.

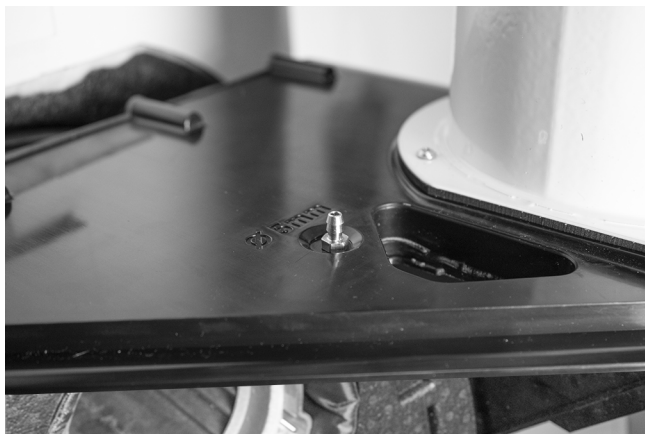


Fig. 54: Fix the oil vapour nipple with the nut

4. Connect the plastic tube supplied.

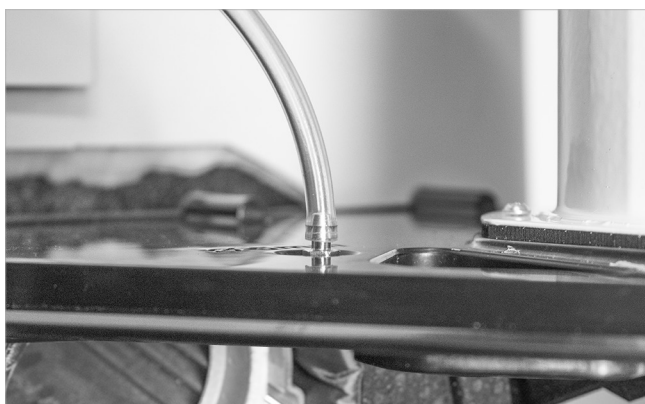


Fig. 55: Assemble the tube

Burner installation

1. Insert the entire burner sealing cable into the groove of the heat exchanger insertion flange. To do this, start with the center of the sealing cord at 7 o'clock and insert it to the left and right. Compress the cord slightly so that the ends meet at 1 o'clock, shorten the cord slightly if necessary.



WARNING

Prevent leaks on the burner seal

Risk of toxic gas leakage.

- Never operate the burner if the burner sealing cable is not inserted.
- The joint must be at 1 o'clock.
- Shorten the burner sealing cord carefully!



Fig. 56: Inserting the burner sealing cord, joint at 1 o'clock

2. Remove the burner from the box.
3. Release the quick-release screws and remove the burner from the housing.
4. Check the electrodes as shown in the → Fig. 57 and correct them by carefully bending them, if necessary.

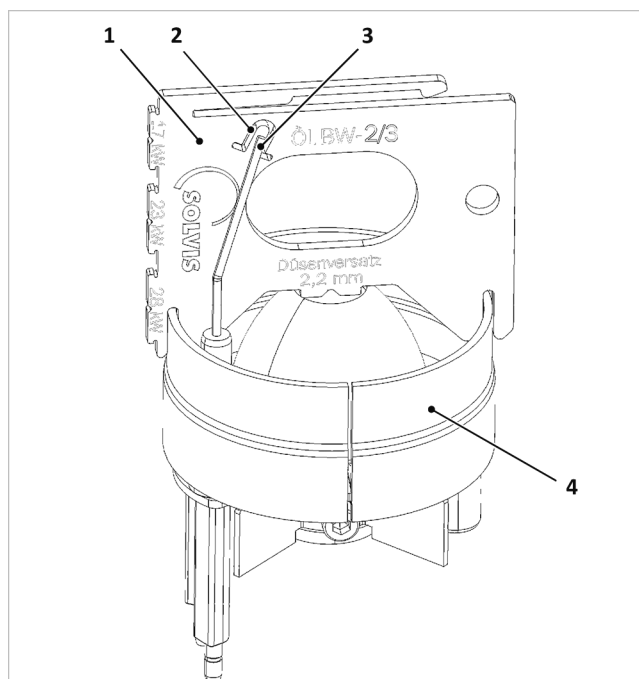


Fig. 57: Checking the position of the ignition electrodes

- | | |
|------------------|-----------------------|
| 1 Setting gauge | 3 Ignition electrodes |
| 2 Control window | 4 Mixer head |

5. Check the electrode gaps as shown in the → Fig. 58 and correct them by carefully bending them, if necessary.

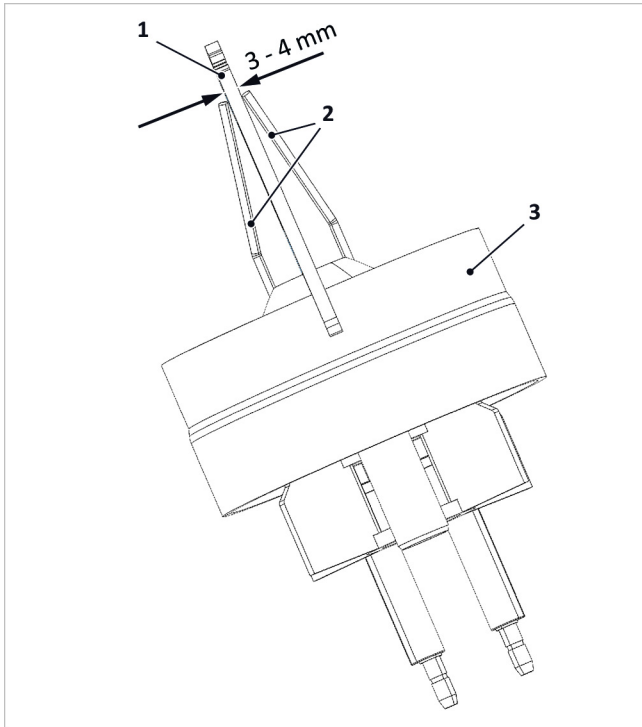


Fig. 58: Checking the ignition electrode gaps

- | | |
|-----------------------|--------------|
| 1 Setting gauge | 3 Mixer head |
| 2 Ignition electrodes | |

6. Reinsert the burner.
7. Put the door firebrick in place as shown.

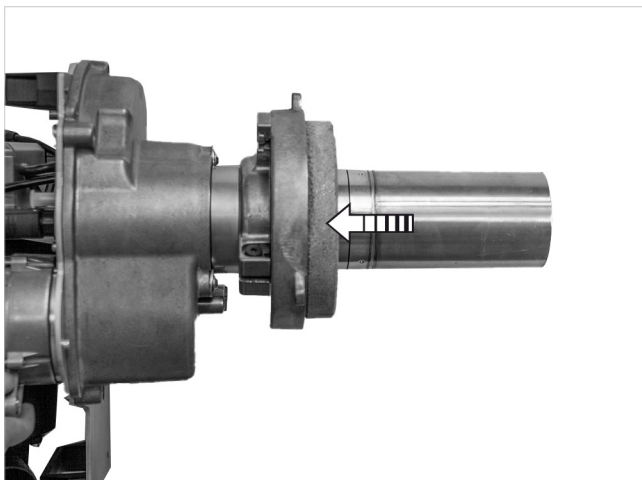


Fig. 59: Putting the door firebrick in place

8. Place the burner onto the pre-fitted threaded bolts.
9. Fasten the burner flange with the three nuts supplied.
10. Tighten the nuts evenly using an 8 mm socket spanner.

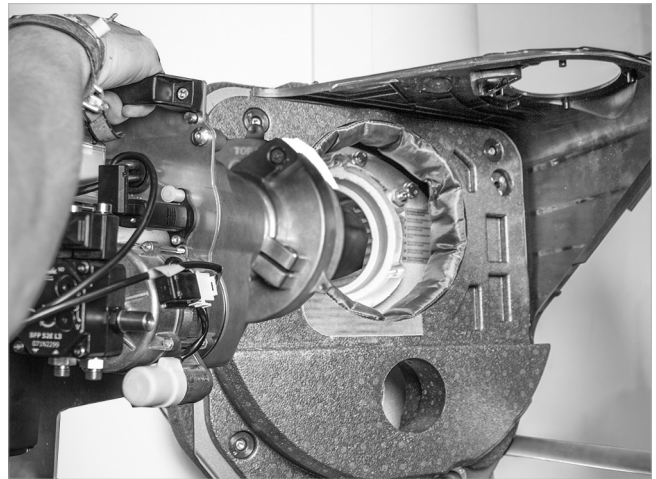


Fig. 60: Fitting the burner



Fig. 61: Fix the burner with long nuts (1).

6.4.2 eSTL

Plug the electrical safety temperature limiter (eSTL) into the combustion chamber

The eSTL is connected to the burner by a red cable.

1. Push the screw connection and insert onto the cable.
2. Insert the eSTL into the immersion tube on the top right of the combustion chamber as far as it will go (front tip of the eSTL approx. 15 cm deep).
3. Tighten the screw fitting.



Fig. 62: Inserting the eSTL

i Continue the installation with the section “Fitting the front bracket” (see → “Fig.15: Front bracket”, Page 13).

6.4.3 Oil pipe

Installing the oil filter and oil pipes

1. Fit the oil filter holder, as required, on the left or right-hand side (right-hand side in this case) of the console plate using the hexagon socket screw supplied (-> assembly box).



Fig. 63: Attaching the oil filter bracket

2. Fix the mounting plate on the oil filter bracket.



Fig. 64: Fix the mounting plate

3. Fit the oil filter onto the bracket.



CAUTION

Do not draw the oil with the oil pump.

The oil pump will be damaged if it runs dry.

- Draw the oil into the filter using a hand pump.
- Never use an automatic bleeder to draw the oil.



Fig. 65: Attaching the oil filter

4. Guide the oil lines (2) from the burner through the opening at the top of the intake chamber and lay them together with the oil vapour line (1) to the side towards the oil filter.

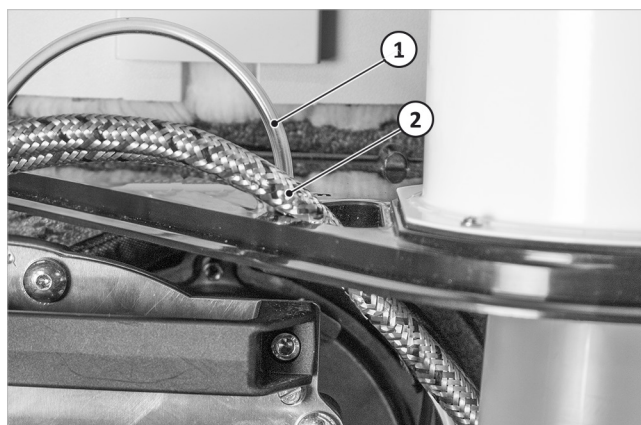


Fig. 66: Fit the oil lines through the opening

5. If the filter, viewed from the front, is mounted on the left-hand side, the oil lines and oil vapour line must be guided behind the intake chamber using the clip (1) supplied.

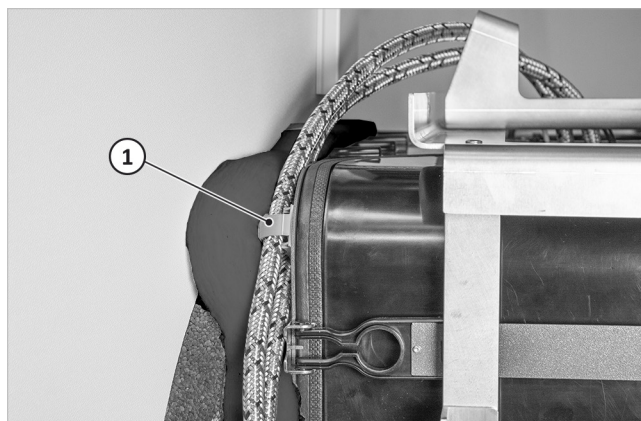


Fig. 67: Fix the oil lines with the clip

6. Lay the oil vapour line (1) and oil lines (2) through one of the top pipe lead-throughs with the aid of a 3-way reducer and connect to the filter.
7. Screw on the flow and return tightly, according to the labels on the parts that show the direction of flow.

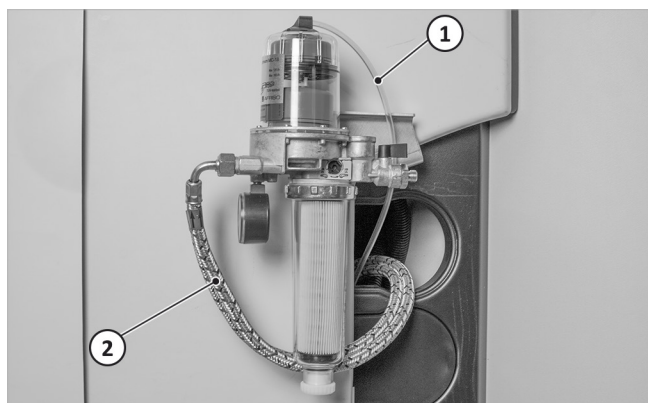


Fig. 68: Connecting the oil pipes

6.4.4 Electrical connection for the oil burner

Route the burner connection cable to the power board

1. Route both burner connection cables (1) to the mains circuit board through the feed-through on the intake chamber, through which the two oil lines (2) already run.

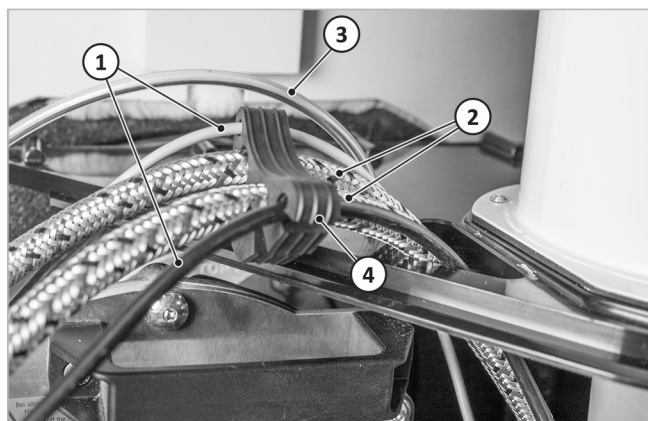


Fig. 69: Line lead-through on the intake chamber

- | | |
|----------------|-------------------|
| 1 Burner cable | 3 Oil vapour line |
| 2 Oil lines | 4 Rubber adapter |

Connecting to the mains circuit board

Opening the mains circuit board housing

1. Open the mains circuit board housing cover.

Connecting the burner plug to the mains circuit board

1. Guide the connection pipe to the side through the strain relief device for the mains circuit board and attach it to the mains circuit board (observe the labeling).

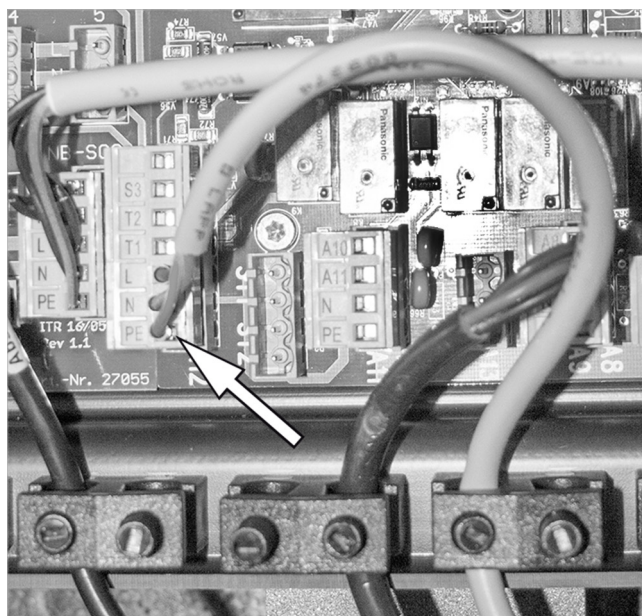


Fig. 70: Connecting the oil burner plug to A12

SolvisMax Oil Hybrid only

When using the charging module, a plug is connected to A12 on the mains circuit board. This plug is not required for the Oil Hybrid. Therefore, disconnect this plug and use the strain relief device to secure it in the mains circuit board housing.

Connecting the bus plug to the mains circuit board

1. Connect the bus plug from the Oil BW-3 burner to the mains circuit board.
2. Install the socket plug with fuse.

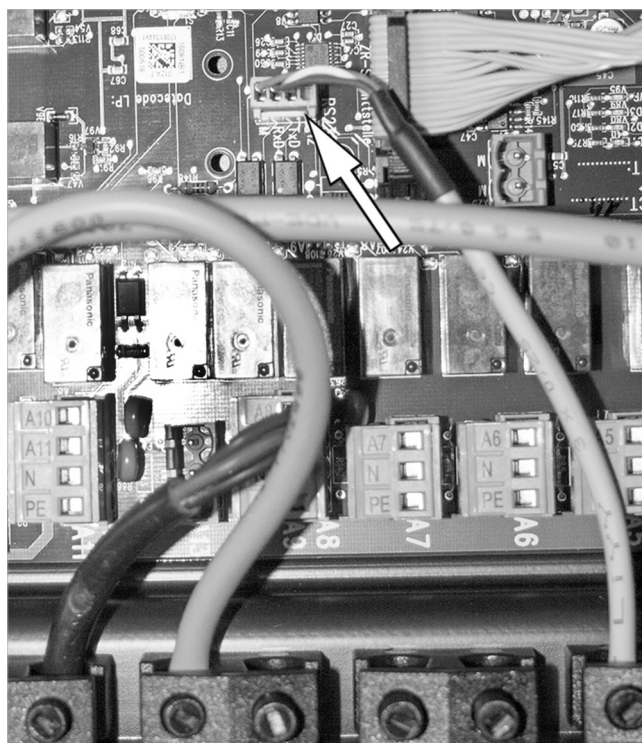


Fig. 71: Connecting the bus plug

Securing the connection lines

1. Guide all the lines from below through the strain relief devices for the control console.
2. Secure the lines with the strain relief devices.

Attaching socket boards ST/1/ST/2

1. Attach the supplied socket boards ST/1/ST/2 to the mains circuit board (observe the labelling).

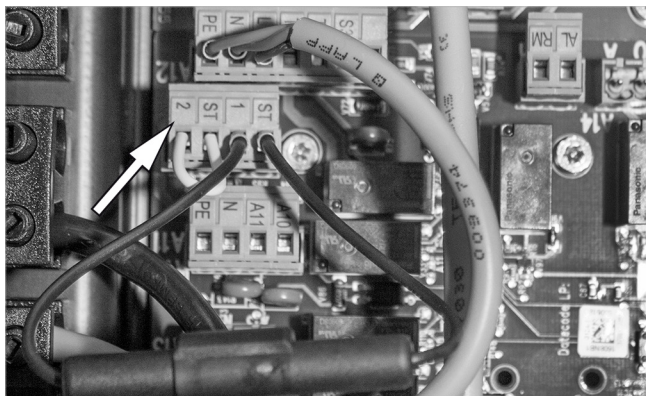


Fig. 72: Attaching a socket board

Attaching the socket boards to the mains circuit board

1. Attach the socket boards included in the assembly pack onto any free slots of the mains circuit board according to the labelling.

See → "Connection and system diagrams" document (ALS-MAX-7).

Exhaust gas safety temp. limiter, if applicable connect Exhaust safety temperature limiter (ASTB)

i Regulation in Switzerland.

- If an additional ASTB is stipulated, connect it to the malfunction input on the system controller of the SolvisControl (please order the ASTB separately).
 - The ASTB must have a floating 230 V~ switching contact.
 - To install the ASTB in the exhaust line, replace the supplied exhaust elbow with the exhaust elbow AB-ASTB (please order separately, see → price list).
1. Connect a two-pole connection cable to the switching contact of the ASTB switch contact.
 2. Remove the jumper (ST 2) from the socket strip on the mains circuit board.
 3. Route the connecting cable further to the mains circuit board and connect it to the terminals (ST 2) of the socket strip. Polarity is not important.

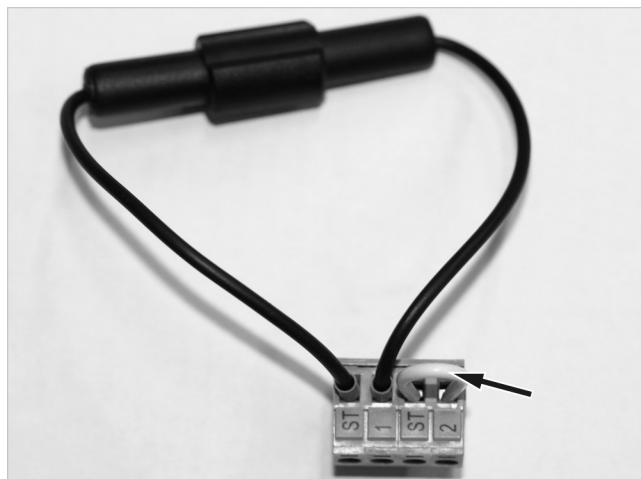


Fig. 73: Socket plug with fuse (black) for SX-LN-3 burner (for the ASTB connection, see the arrow)

6.4.5 Sealing the line lead-through



DANGER

Make sure that the intake chambers are air-tight.
Risk of suffocation

- The airtight sealing of the pipe penetration with the molded rubber piece is mandatory for room air-independent operation.

Close the feed-through

1. Press the fuel lines and connection cable into the molded rubber piece (1) to close the feed-through.

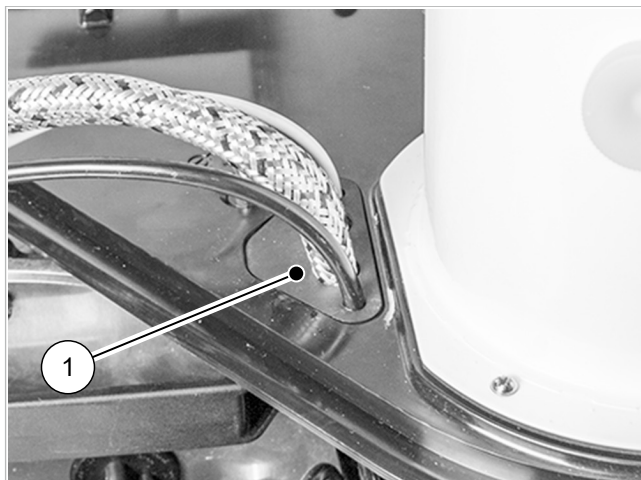


Fig. 74: Closing the feed-through (symbolic photo)

6.4.6 Oil supply



CAUTION

Permitted fuel

To fulfil the terms of the warranty

- The SolvisMax / Ben Oil BW may only be operated with low-sulphur heating oil (max. 50 ppm sulphur). This also applies during start-up.
- We strongly recommend using premium-quality, low-sulphur heating oil, as per DIN 51603-1.
- In addition, all oil heating boilers for (low-sulphur) heating oils with an organic content of up to 10 % are approved, as per DIN SPEC 51603-6.



CAUTION

Observe the following information regarding the oil connection

- The oil pipes must always be routed in a single pipe system using 6 x 1 mm copper pipes.
- Always use oil filters with a filter mesh < 20 µm.
- During start-up, do not suck the heating oil into the burner with the oil pump. The oil pump will be damaged if it runs dry.

Fuel storage

We require that the on-site tank system be constructed according to the applicable local regulations, especially the TRÖI in Germany.

Cleaning the tank

When switching to low-sulphur heating oil, we require that the tank system be cleaned by a specialty firm according to the applicable regulations so that no residual sulphur-containing oil or sludge remains in the tank. We recommend that you replace the tank valves when you refurbish a boiler.

Fuel delivery

The boiler must be switched off (main switch) while oil is being delivered. After the tank has been filled, the boiler

must not be switched on for at least another 2 to 4 hours. It is not possible to run the solar system and the hot water production during this time.



CAUTION

Vacuum on the oil manometer (vacuum gauge) below -0.35 bar

Loud running noise of the oil pump

Disruption of the oil supply

Potential damage to the pump

- Switch off the burner when the pressure drops below -0.35 bar.
- Do not switch the burner back on until the fault has been rectified.

Connecting an oil supply system

If an oil supply system is required due to structural factors, we recommend that you install a burner-independent suction supply system on-site.



For connecting and installing the oil supply system, see → *Operating instructions of the oil supply system*.

Oil pipe

The pipe diameter and length and the leak tightness of the heating oil pipe are extremely important for the proper functioning of the oil supply from the tank system to the boiler.

The maximum pipe length for Ø 6 x 1 mm copper pipe as a function of the height difference of the tank system is shown in the diagram, (see example).

The diagram applies under the following conditions:

- Copper pipe: Ø 6 x 1 mm
- Oil temperature >10°C
- EL heating oil up to 700 m above sea level
- 1 filter, 1 check valve, and 6 x 90 ° elbows are included in the diagram.

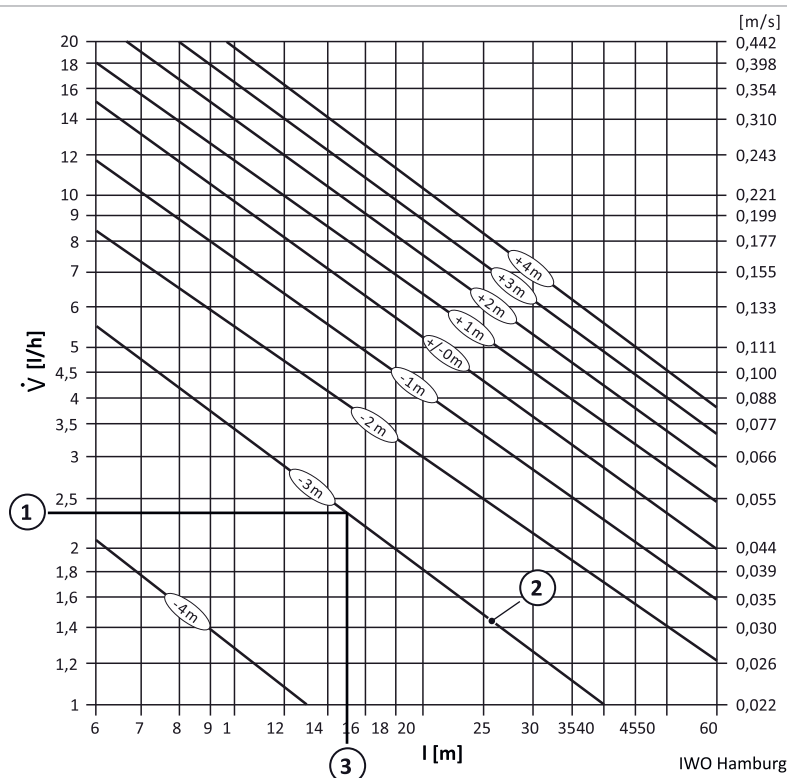


Fig. 75: Maximum pipe length in the single pipe system as a function of delivery height

- $\dot{V}$ Oil throughput
 l Max. suction pipe length
 (+) Inflow height
 (–) Suction height

Example for SÖ-BW with 23 kW burner performance:

According to the table, a performance of 23 kW results in an oil throughput of 1.95 kg/h. For EL heating oil with a specific gravity of $\rho = 0.86$, the oil throughput (l/h) is calculated as follows:

$$\frac{1,95 \text{ kg/h}}{0,86 \text{ kg/l}} = 2,3 \text{ [l/h]}$$

Horizontal line in diagram (1)

For example, the oil pump on the burner must overcome a maximum suction height of –3 m to the external underground tank (diagonal line on diagram (2)). The vertical line (3) from the intersection of the two other lines shows the maximum permitted pipe length. The result in this example is a maximum permitted suction pipe length of **15 m**.

6.5 Exhaust system

6.5.1 Air supply line

Supply air enters through the outer annular gap. If the concentric flue pipe has not yet been assembled, see → Chap. "Gas burner", P. 18
or → Chap. "Oil burner", P. 24.

6.5.2 Internal exhaust routing

Installing the flue pipe

1. Connect the flue pipe coupling (1) on the top of the flue pipe connection piece on the intake chamber.



Fig. 76: Attach the flue pipe coupling to the flue pipe connection piece.

2. Connect the coupling with the flexible flue pipe pre-assembled flue gas elbow (1) into the lower opening of the flue gas heat exchanger until the spring pin in the flue gas elbow locks into place.
3. Then insert the flexible pipe (2) in the flue pipe coupling (3) and align it straight (2).

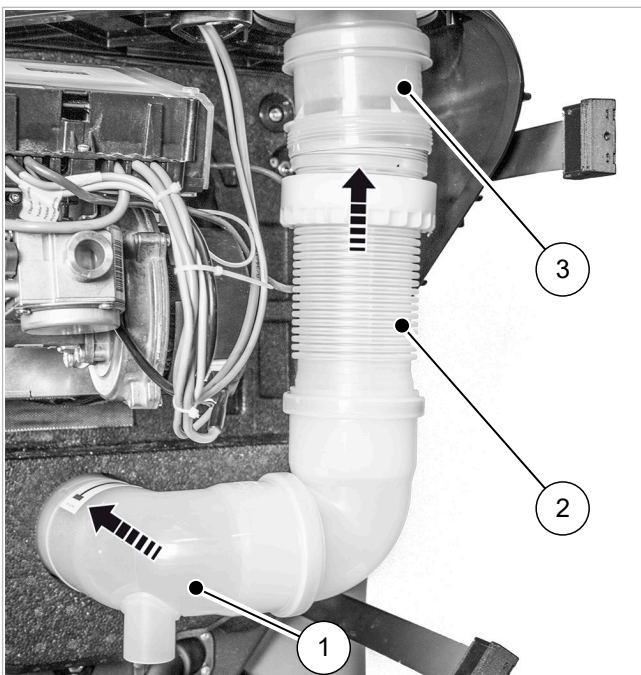


Fig. 77: Flue pipe bend fitted

The following steps 4 - 6 only apply for oil and hybrid oil:

4. First, connect the short inner pipe silencer in the flue pipe coupling and slide it into the exhaust connection piece.

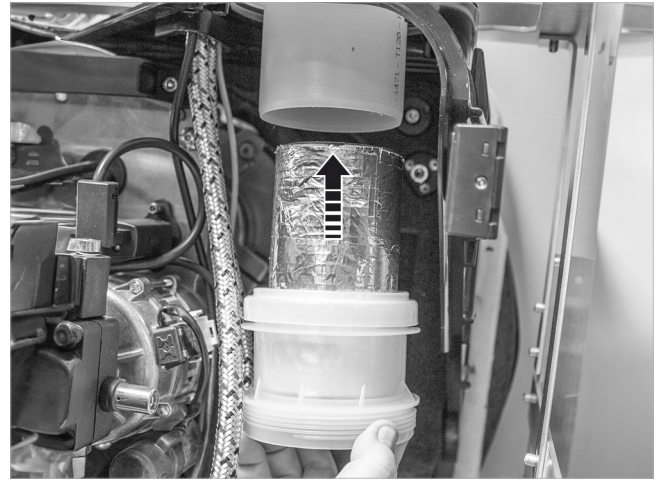


Fig. 78: Insert the short silencer at the top

5. Then push the long inner pipe silencer into the flexible flue pipe at the bottom.



Fig. 79: Insert the long silencer at the bottom

6. Press the star ring into the first two grooves.



Fig. 80: Lock the star ring

7. If necessary, grease the seal with Centrotherm lubricant from the CAS basic kits.
8. Fit the union nut (1), the snap ring (2) and the seal (3) on the upper pipe end of the flexible flue pipe as shown in the illustrations.

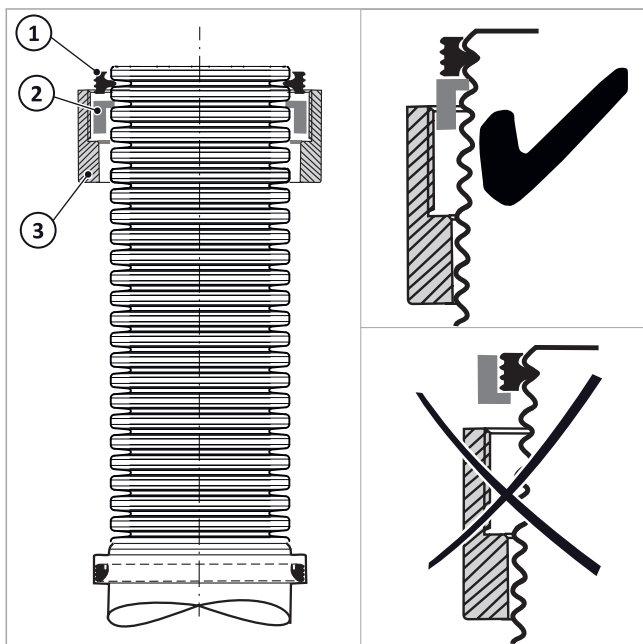


Fig. 81: Screw connection fitted onto the flexible pipe

9. Fit the upper end of the flexible flue pipe with the union nut on the flue pipe coupling at the top of the intake chamber. Ensure that the sealing ring and the snap ring are seated straight in the union nut.
10. Pull the union nut (3) upwards and screw it to the flue pipe coupling.



Fig. 82: Screw the flexible pipe to the flue pipe coupling

i The flue elbow can be removed by 1. turning it roughly 15° clockwise and then 2. pulling it out. When turning the flue elbow, the spring lock is springs out of the opening.

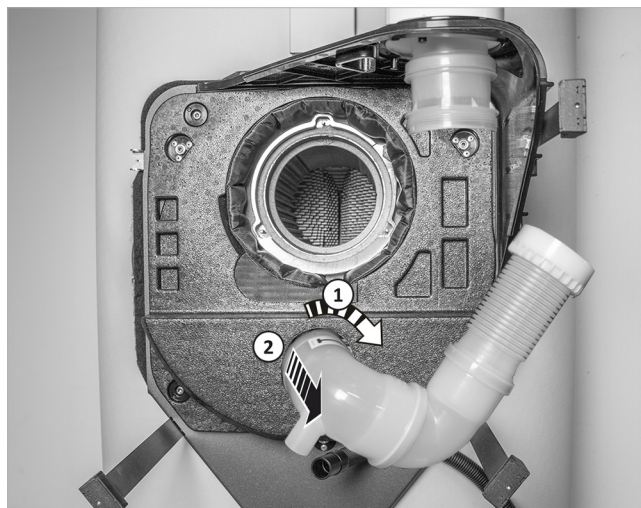


Fig. 83: Turn the flue elbow (1) and pull it out (2)

6.5.3 Condensate discharge

Installing the condensate siphon

1. Condensate siphon (1) to the condensate hose (2) in the intake chamber. Tighten the union nut hand-tight.



Fig. 84: Connecting the condensate siphon to the condensate hose

2. Attach union nut (1) with snap ring (2) to the connection on the flue gas elbow.

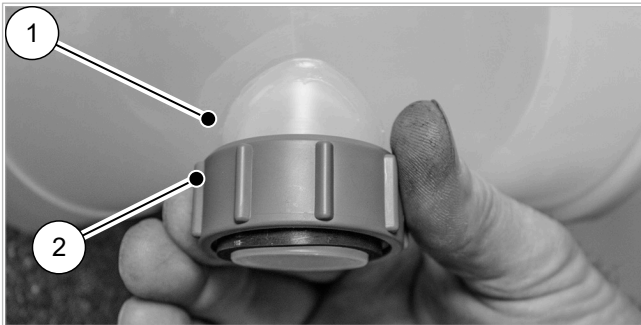


Fig. 85: Attach union nut and snap ring

3. Fill condensate siphon with water, insert and screw hand-tight with union nut.



Fig. 86: Screw on condensate siphon hand-tight

6.5.4 External exhaust duct

General information on the exhaust system

The following information is authoritative for installing exhaust systems offered by Solvis.

Standards and regulations

As well as the recognised technical regulations, the following points must be observed in particular:

- Regulations from the approval certificate (supplied with the assembly pack).
- German federal state building regulations.
- The regulations for the exhaust routing can differ depending on the country and region.
- The responsible chimney sweep authority must therefore be included during system planning.

Application area of the CAS exhaust system

The pipes and fitting pieces of the CAS exhaust system are made of polypropylene. The concentric outer pipes are made of white, powder-coated metal. Plug connections are used to fabricate the entire exhaust line out of pipes, fittings and seals. The exhaust lines can be installed in or on buildings. The maximum permitted exhaust temperature for the Centrotherm exhaust system (CES) is 120°C.

The number of maximum lengths are to be taken from the tables below (see → Chapter "Permitted lengths of the exhaust paths", Page 35).

Shaft requirements

The exhaust lines must be arranged outside of the installation room of the fireplace in separate, adequately ventilated shafts (see the → "Required minimum internal dimensions" table). The shafts must be made of non-flammable, deformation-resistant materials and must be fire-resistant for 90 min. They may be fire-resistant for just 30 min for buildings with low heights.

Required minimum internal dimensions

Shaft type	DN 60	DN 80
Square	110 x 110	135 x 135
Round	ø 110	ø 155

All dimensions in mm

With ambient-air-independent fireplaces, lower distances can also be selected between the line and shaft. In this case, a custom design is required for the system. Please contact the customer centre (see page 2 for telephone number).

Shortening the flue duct

All flue ducts can be shortened.

The flue must protrude at least 100 mm out of the shaft cover when laid in a shaft.

Cleaning old flues

The flue must be thoroughly cleaned by a specialist company if combustion air is drawn from an existing flue shaft. This applies particularly when fireplaces for oil or solid fuel were previously connected. If dust from crumbling flue mortar is likely to be present again after cleaning, suitable countermeasures must be taken (e.g. centrifuge).

Spacers

Spacers must be mounted in the shaft at least every 2 m and at every elbow or T-piece. With a flexible flue duct, an additional spacer is required before and after each offset.

The maximum shaft dimensions should not exceed a diameter or edge length of 240 mm to ensure that the spacers function properly.

Attachment of the exhaust lines

The exhaust lines must be attached with clamps every 1 m in the room.

Minimum gradient for exhaust lines

The exhaust line must be laid on a gradient toward the fireplace so that condensate water can run off the exhaust line to the central condensate water collector.

Minimum gradient:

- Horizontal exhaust line > 5% (5 cm per 1 m)

Cleaning and inspection openings

Exhaust systems must be easy and safe to clean and it must be possible to inspect the open cross section and check for leaks. To do this, at least one cleaning opening must be provided in the exhaust line in the installation room, and an additional one is required for each redirector. Exhaust systems that cannot be inspected and cleaned by accessing the mouth must have an additional cleaning opening in the attic. Shafts for the exhaust lines must not have any openings except the required cleaning and inspection openings as well as openings for the exhaust line rear ventilator.

Clearance to combustible parts

Maintain proper clearance to combustible components when installing the exhaust system. This is specified in the approval for the exhaust systems (clearance category), which can be found in the documentation that is included with the exhaust system.

Surface temperatures on the unit casing and exhaust line will be below 85°C when the system is running properly.

Approval

The individual components for the exhaust system are approved for construction by the German Institute for Building Technologies ("Deutsches Institut für Bautechnik" – "DIBT") in Berlin.

Installing the exhaust line

1. Connect the exhaust line to the pre-fitted exhaust measuring element.



CAUTION

- Only use approved components for the exhaust line.
- Only use the Centrocerin lubricant supplied with the basic kits for exhaust systems CAS-1 to CAS-8.

6.5.5 Silencer

Oil and hybrid oil only

Reflective silencer

1. Remove the black exhaust end pipe from the chimney cap.
2. Insert the reflective silencer into the chimney cap from above.

The screw connection for the silencer (1) must be located above the chimney cap.



Fig. 87: Inserted reflective silencer

Acoustic emissions

If an excessive amount of noise develops in the exhaust system, a supplemental absorption-type silencer can be installed to reduce the noise.

6.5.6 Permitted lengths of the exhaust paths

The following tables give an overview of the permitted lengths of the individual exhaust systems.

The maximum exhaust lengths stated relate to:

- DN 60: SolvisMax Gas/SolvisBen Gas with 10 and 18 kW
- DN 80: SolvisMax Gas/SolvisBen Gas with 10, 18, 25 and 30 kW
- DN 80: SolvisMax Oil/SolvisBen Oil with 17, 23 and 28 kW

The minimum exhaust length is 1 m.



If the exhaust lengths given do not suffice, then inquire with us for individualised calculations (see telephone number → P. 2).

Complete Solvis exhaust systems (system certified)

CAS-1 (B₂₃) ambient air-dependent

Shaft design	
Max. permissible length	20 m
Maximum horizontal length	4 m

CAS-2 (B₃₃) ambient air-dependent

Shaft design	
Max. permissible length	20 m
Maximum horizontal length	4 m

CAS-2 (C_{33x}) ambient air-Independent

Shaft design	
Max. permissible length	16 m
Maximum horizontal length	4 m

CAS-5-R/CAS-5-S (C_{33x}) ambient air-Independent

Concentric outlet turret	
Max. permissible length	15 m
Maximum horizontal length	4 m

CAS-7 (C_{33x}) ambient air-Independent

Concentric shaft outlet	
Max. permissible length	16 m
Maximum horizontal length	4 m

CAS-8 (C_{33x}) ambient air-Independent

External wall (not in DN 60)

Max. permissible length 20 m

Maximum horizontal length 4 m

CAS-6 (C_{13x}) ambient air-Independent

Horizontal external wall mouth

Max. permissible length 10 m



- This type of installation is only permitted in some German States under certain conditions. Observe the relevant regional building regulations.
- The installer can limit the rated heat output.

Solvis exhaust systems in conjunction with approved flues (system certified)

The maximum effective length is calculated using the data from the exhaust gas mass flow and exhaust temperature at partial and full load in relation to the shaft/exhaust gas flue used. For burner and exhaust properties for the flue calculation, see the → table "Technical combustion data", chapter "Gas burner", Page 80.

CAS-3 (B₂₃) ambient air-dependent

Fireplace manufacturer performs calculation

Connection only to a flue approved for the heating technology that is not sensitive to moisture

CAS-4 (C_{43x}) ambient air-Independent

Fireplace manufacturer performs calculation

Connection only to a flue approved for the heating technology that is not sensitive to moisture

Offset measurements of the flue ducts

Angle/Diameter	Offset V	Length L
15° Bend: DN 60 / DN 80	22 / 20.0	167.1 / 150.0
30° Bend: DN 60 / DN 80	46.5 / 43.0	173.6 / 161.5
45° Bend: DN 60 / DN 80	74.9 / 69.5	175.9 / 168.0
87° Bend: DN 60 / DN 80	179.9 / 142.0	189.3 / 150.0

All dimension specifications in mm



The measurements apply for the ambient air-dependent system and ambient air-independent system. Due to differences in the shank, the offset and length measurements for DN 60 are larger than those for DN 80.

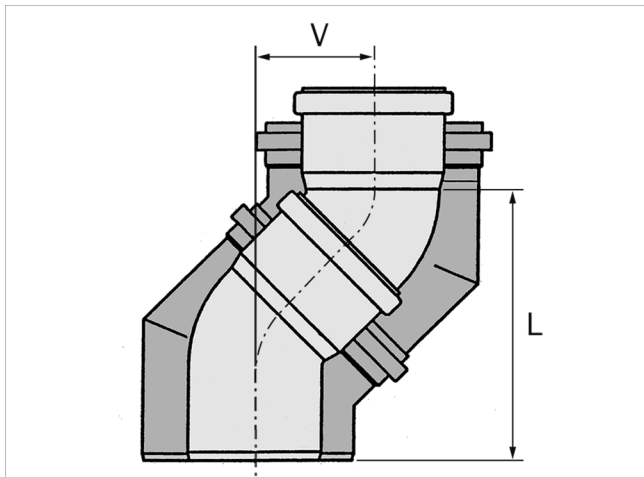


Fig. 88: Offset and length

6.6 Front flange insulation

The front flange insulation, which is initially disassembled during the burner installation (see → chapter "Installing the gas burner", page 20 or → chapter "Installing the oil burner", page 24) initially disassembled front flange insulation consists of one left and two right parts.

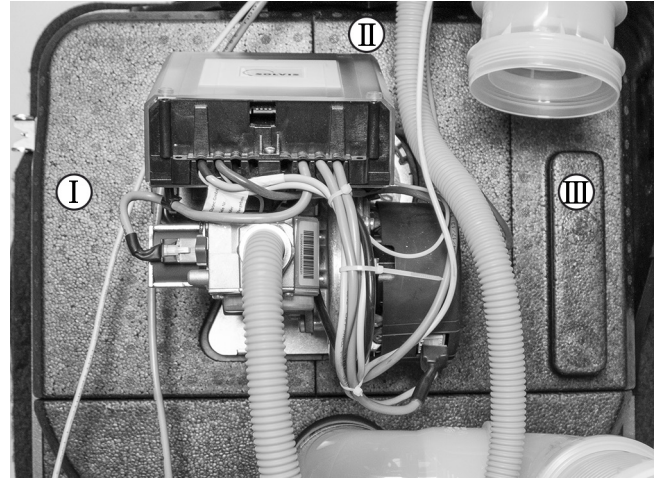


Fig. 89: Front flange insulation (3-part)

With the rear locking springs (2), which are provided for each part, the parts of the front flange insulation to the rear flange insulation already fitted to the appliance.

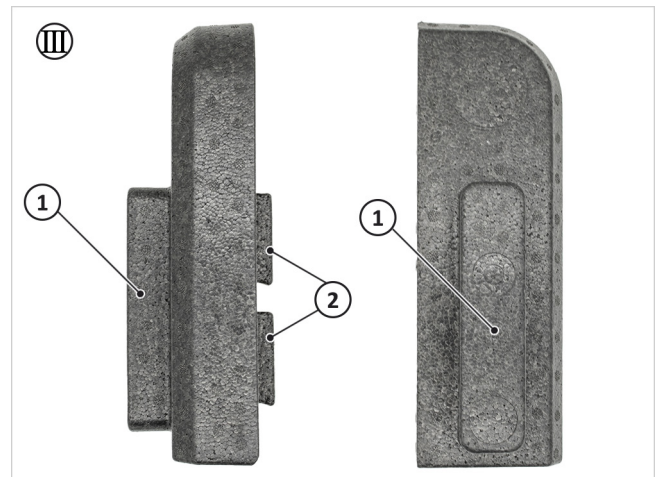


Fig. 90: Front flange insulation (III) with locking springs

- 1 Handle
- 2 Locking spring

Installing the front flange insulation

1. Fold down the exhaust pipe

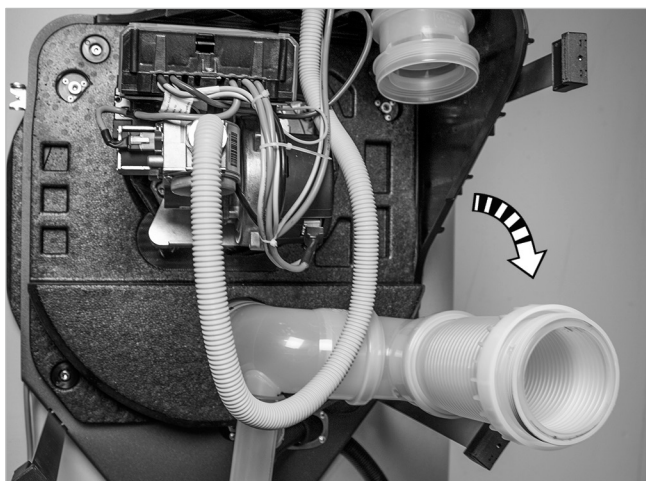


Fig. 91: Folding down the exhaust pipe

2. Insert the larger of the two right-hand parts into the front flange insulation with the spring clips in the grooves of the rear flange insulation.
3. Now push the front flange insulation sideways inwards to the middle and press it into the grooves.

The front flange insulation should lie flush to the rear flange insulation.



Fig. 92: Installing the right-hand front flange insulation (part II)

4. Insert the second part of the front right flange insulation, press it into the groove and push both halves flush together.



Fig. 93: Fitting the right-hand front flange insulation (part III)

5. Insert the left-hand part of the front flange insulation from the left, press it into the groove and push both halves flush together.

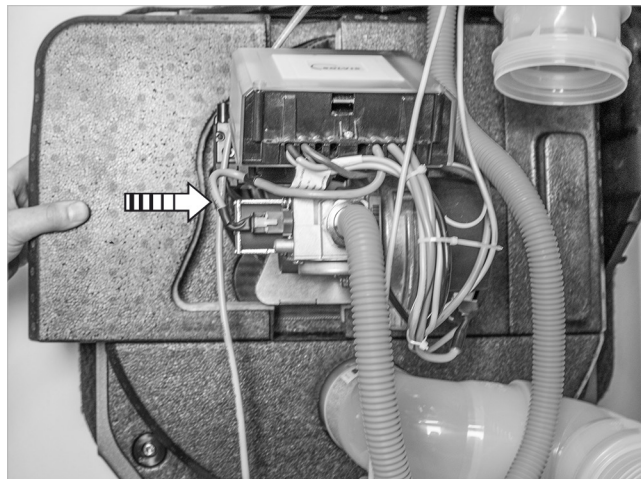


Fig. 94: Fitting the right-hand front flange insulation (part I)

**CAUTION****Ensure correct positioning**

Possible damage to neighbouring components

- The front flange insulation must lie flush to the rear flange insulation all around.
- The two halves should engage flush with each other.

Close the intake chamber

1. Insert the guide strut into the holder and fold the closing rail forwards.

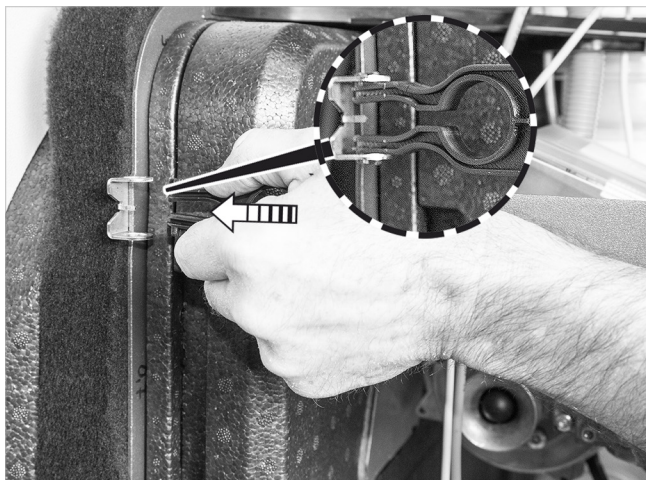


Fig. 95: Fitting the guide rail

2. Fit the cover of the suction chamber and engage the locking rails in the cover. Press against the hood from the front.

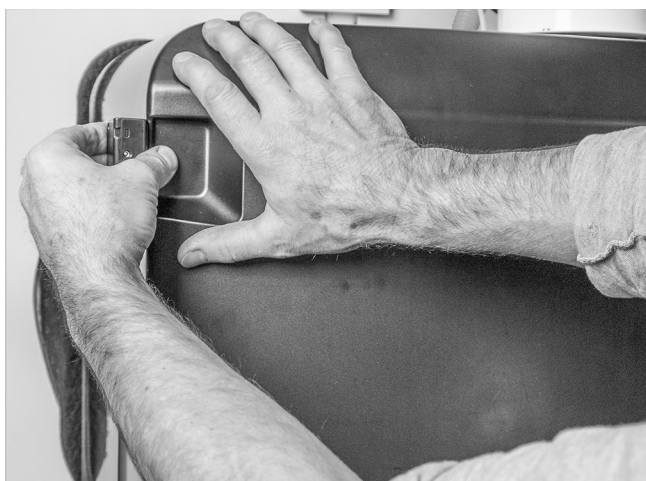


Fig. 96: Fitting the hood

3. If the holding force is too low, readjust the locking rails if necessary to close the sealing gap.

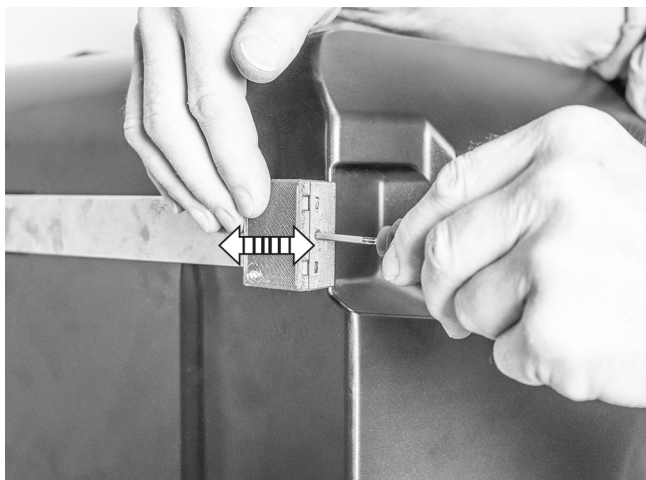


Fig. 97: Readjust the locking rails if necessary



DANGER

Make sure that the intake chambers are air-tight.
Risk of suffocation

- For the cable routing from the intake chamber, use only its designated opening.
- Ensure that the cover is seated correctly, the sealing gap must be closed.
- Ensure that the sealing sleeve for the cable bushing is seated correctly.
- Any measures taken by the customer must not impinge the leak tightness of the intake chambers.

6.7 Condensate discharge line connection



CAUTION

Observe the following information.

- Local regulations must be observed when delivering the accumulated condensate in public sewage systems.
- Acid-resistant condensate discharge lines must be used. The condensate discharge line must be laid on a gradient for run off.



CAUTION

Prevent condensate back-up

Condensate may leak.

- Ensure that there are no bends ("second siphon") when laying the condensate hose.
- Always lay the condensate hose on an incline.

Laying the condensate hose

Do not attach the condensate discharge line higher than 20 cm below the siphon height.

1. Guide the condensate hose out through the pipe lead-throughs of the base console on the left or right (use a 3 x reducer).
2. Connect the condensate hose to the waste water line of the building without hindrance.

Using a condensate lifting pump



- If the use of a condensate lifting pump is required due to structural factors, you can order it as an accessory.
- Observe the pump connection and installation instructions.
- When using the Oil and Hybrid Oil, the **dirt trap tray from the installation accessory pack** should be installed on the siphon.



For information about installing a condensate pump, see ➔ *Installing a condensate pump (MAL-PUKD)*.

6.8 Heating pump

SolvisMax Solo or SolvisMax Gas/Oil Hybrid only

Prerequisites

The charging modules of the SolvisMax Hybrid/SolvisMax Solo systems have the 3-way changeover valve required for operation with the heat pump and, if provided, the heating cartridge already installed.

The scope of delivery also includes the PLAS-WP wall-mounted buffer charging station (not for SolvisPia 12) and the sludge separator, both of which must be installed in the connecting lines between the SolvisMax and the heat pump.

6.8.1 Placement

Setting up the heating pump

1. Install the heating pump according to the supplied installation instructions and route the connection pipes to the SolvisMax.

6.8.2 Installing the buffer charging station

only SolvisLea, SolvisLea Pro, SolvisMia and SolvisPia 13/17

Installing the WP-WM buffer charging station

1. Attach the buffer charging station supplied to the wall using suitable attachment material or, alternatively, directly in the pipe line near the storage tank. The direction of flow should be from bottom to top or horizontal. It can be installed in the flow or return flow line of the heating pump (observe the direction of flow of the pump).



For installation instructions regarding the buffer charging station, see → MAL-PLAS-WP-WM.

6.8.3 Installing the air separator

SolvisLea and SolvisMia only

Installing an air separator

1. Install an automatic air separator in the heating flow (cf. System diagram ALS-MAX-7).

only SolvisLea Pro and SolvisPia



DANGER

Do not install an air separator

- For safety reasons, an air separator is located in the SolvisLea Pro or SolvisPia and therefore outside the building.
- No automatic air vents may be used inside the building.

6.8.4 Installing the sludge separator

Installing the sludge separator

1. Fit the supplied sludge separator into the return line between the SolvisMax and heating pump (see system diagram ALS-MAX-7).

6.8.5 Heating pump connection

Heating pump Connect to SolvisMax

1. Connect the return line of the heat pump to the common return line of the heating circuits (see system diagram ALS-MAX-7).
2. Lead the flow line to the charging module of the SolvisMax and connect it to the heat pump flow line (3) of the charging module.

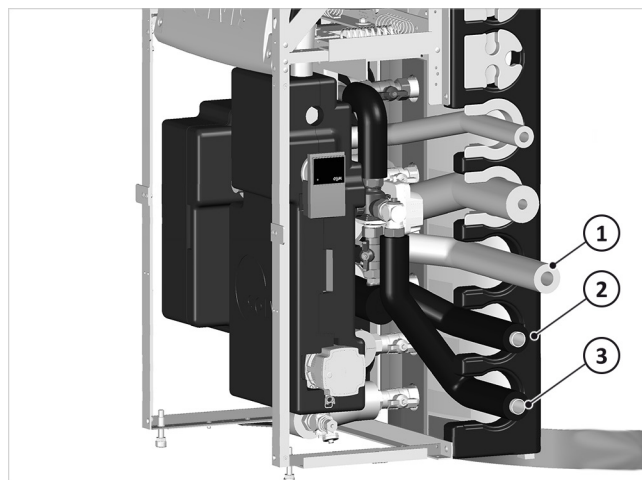


Fig. 98: Hydraulic heat pump connection

- 1 Heating/heating pump return
- 2 Heating flow
- 3 Heating pump flow

3. Route the mains cable and control line of the pump in the buffer charging station through one of the pipe feedthroughs (with 3-way reducer insert) into the front section and further into the circuit board housing (not required for SolvisPia 12).



CAUTION

Danger due to overpressure

Potential damage to the heating system

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

6.9 Heating expansion vessel



IMPORTANT

Expansion vessel required for heating systems

- Depending on the heating water volume (incl. storage tank volume), the design must be selected generously in accordance with DIN EN 12828.
- The SolvisLea 8.3 Premium, SolvisLea Pro and SolvisPia heat pumps have an integrated safety valve with a response pressure of 2.5 bar. The heating expansion vessel (MAG) should always be designed with this value.
- When retrofitting, the design of an existing heating expansion vessel must be checked and changed if necessary.



CAUTION

Observe the admission pressure on the expansion vessel

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

Set the expansion vessel admission pressure (MEV)

- Determine the pre-pressure of the expansion vessel using the following formula: minimum 1.3 bar, maximum 1.7 bar.
- Release the admission pressure on the expansion vessel valve or refill with nitrogen if necessary.



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

$$p_o = \frac{H_{Hk} - H_{Sp}}{10} + 0,3 \text{ [bar]} \quad (\text{min. } 1,3 \text{ bar})$$

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

Installing the expansion vessel

- Attach the expansion vessel to the wall or floor.
- Connect the expansion vessel using the cap valve as per DIN EN 12828.



The safety group 3.0 HKS provides a simple connection option: The expansion vessel with cap valve can be connected to the system there using a corrugated pipe (see the system diagram ALS-MAX-7).

6.10 Heating circuits

Connect the heating circuit

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

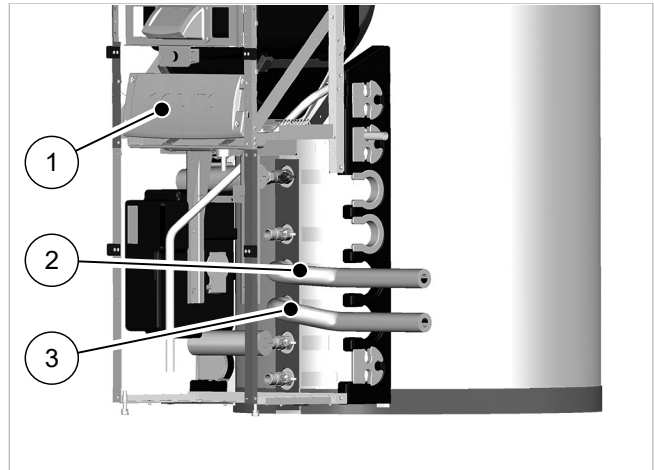


Fig. 99: Hydraulic heating circuit connection

- Mains module housing
- Heating return
- Heating flow

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



CAUTION

Danger due to overpressure

Potential damage to the heating system

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



CAUTION

For unmixed heating circuits, flow temperatures of up to 90 °C can be reached.



Note on unmixed heating circuits

- With unmixed heating circuits, a sensor must be used on the heating circuit flow and connected to the appropriate input (S12, S13 or S16).
- The item SEN-T105-KTY, for example, is available for this purpose.

**IMPORTANT****Expansion vessel required for heating systems**

- Depending on the heating water volume (incl. storage tank volume), the design must be selected generously in accordance with DIN EN 12828.
- The SolvisLea 8.3 Premium, SolvisLea Pro and SolvisPia heat pumps have an integrated safety valve with a response pressure of 2.5 bar. The heating expansion vessel (MAG) should always be designed with this value.
- When retrofitting, the design of an existing heating expansion vessel must be checked and changed if necessary.

6.11 Hot water station

**CAUTION****Pressure fluctuations due to the hot water device**
Overpressure may damage the system.

- Secure the drinking water installation in accordance with DIN 1988 and DIN 4753.
- We also recommend installing a drinking water expansion vessel.



A drinking water safety group (SIG-TW) with a DVGW-tested membrane expansion vessel is available as an accessory.

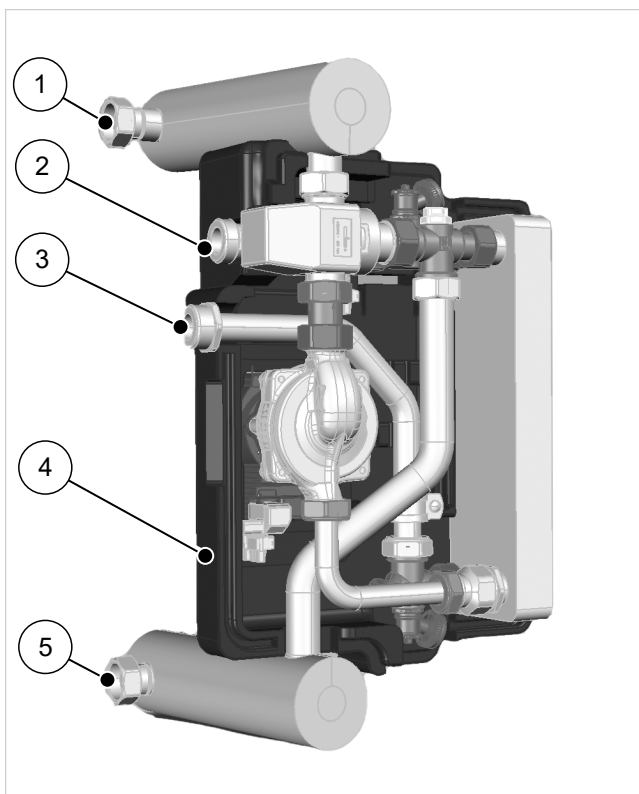


Fig. 100: WWS-30 connections

- 1 Primary flow (HW flow, here: WWS-30)
- 2 Drinking water, cold
- 3 Drinking water, hot
- 4 Thermal insulation shell, rear
- 5 Primary return (HW return)

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

Connecting the hot water station

1. Connect the station on the storage tank side to the ball valves for the storage tank connections using the corrugated pipes. When using the SolvisMax WP, it is alternatively connected to the T-piece.

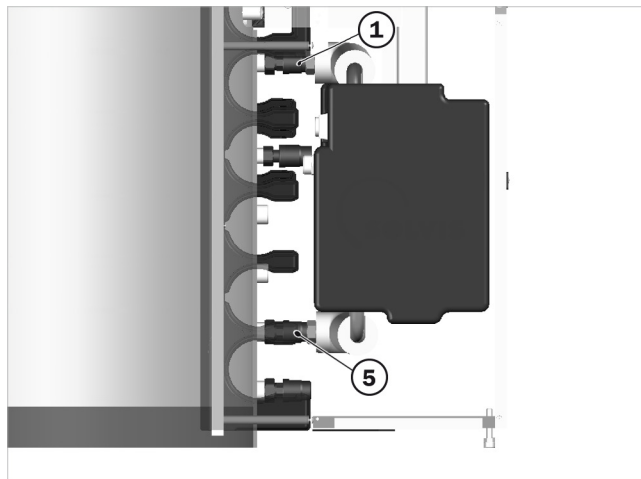


Fig. 101: Connecting the hot water station

- 1 Primary flow (HW flow)
- 5 Primary return (HW return)

2. Screw the cold and hot water pipes onto the station connections using the seals. The lines can be routed on either the left or right; to do so, please use the appropriate pair of pipes from the connection pipe set. The other pair of pipes can be disposed of.
3. Insulate the pipes; if necessary, shorten the supplied pipe insulation to do so.

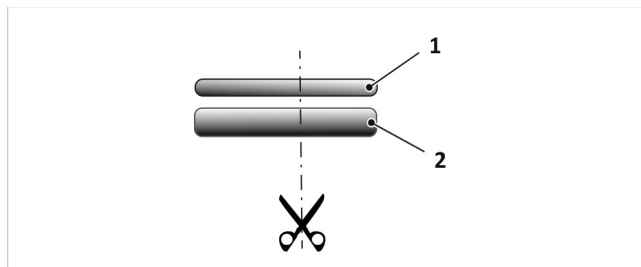


Fig. 102: If necessary, shorten the pipe insulation

- 1 Cold water pipe insulation
- 2 Hot water pipe insulation

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

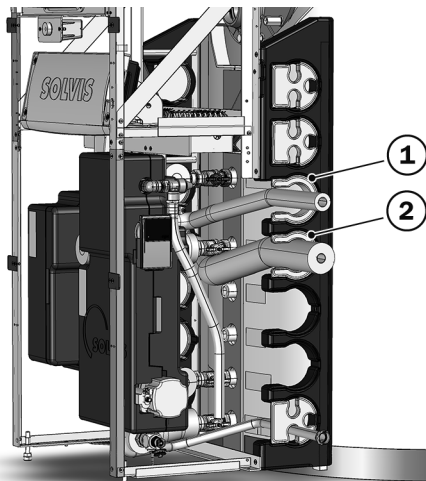


Fig. 103: Hot water station, lead-through for drinking water pipes (right)

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

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

i When combined with a heating pump, the HP flow line is guided out in place of the condensate line (bottom lead-through, see → Fig. 103, P. 42). You can run the condensate line through the lead-through above the cold water, for example.

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

6.12 Solar option

6.12.1 Solar heat transfer station



CAUTION

Avoid excessively high temperature loads.

Otherwise, there may be damage to the solar system.

- The lower edge of the collector field **must not** be below the upper edge of the SolvisMax!

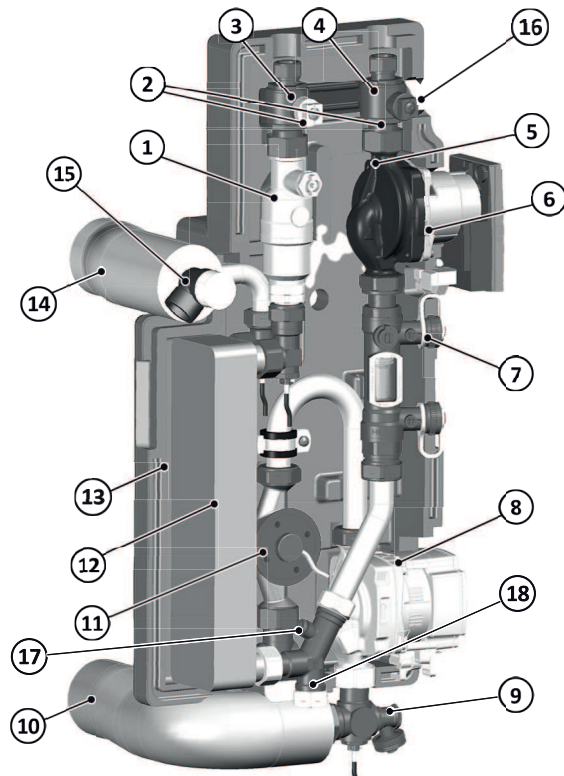


Fig. 104: Overview of the solar heat transfer station parts

- 1 Compressed air cylinder
- 2 Ball valves
- 3 Solar flow (collector side)
- 4 Solar return (collector side)
- 5 Non-return flap
- 6 Primary pump
- 7 Filling and flushing connections
- 8 Secondary pump
- 9 BFD valve (storage tank side)
- 10 Solar return (storage tank side)
- 11 Volume flow encoder
- 12 Plate heat exchanger
- 13 Rear wall insulation shell
- 14 Solar flow (storage tank side)
- 15 Safety valve (storage tank side)
- 16 Pressure sensor (from 02/2023)
- 17 Pressure sensor (predecessor type ETX826) depending on the series version
- 18 If applicable, connector for diaphragm expansion vessel depending on the series version

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

Connecting the solar heat transfer station

1. Remove the cover of the insulation shell and connect the station (connections **10** and **14**) to the ball valves on the storage tank connections using the 2 corrugated pipes.



When connecting a solid fuel boiler, use the RO-FBK-RL connection pipe (see step 2).

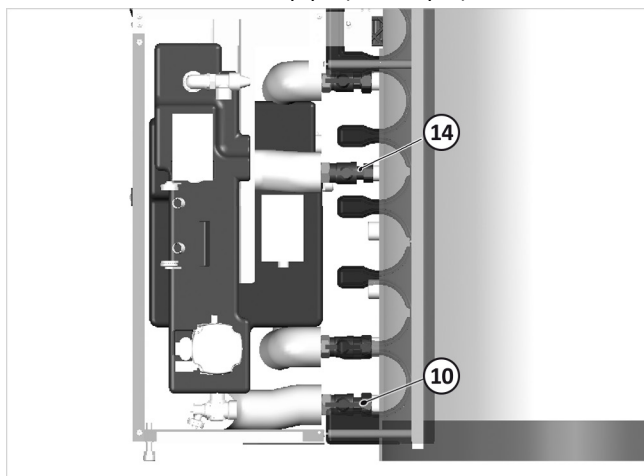


Fig. 105: Connecting the solar heat transfer station

- 10 Solar flow return (storage tank side)
- 14 Solar flow (storage tank side)

2. Only for solid fuel boilers: Attach connection pipe RO-FBK-RL (please order separately) according to drawing.

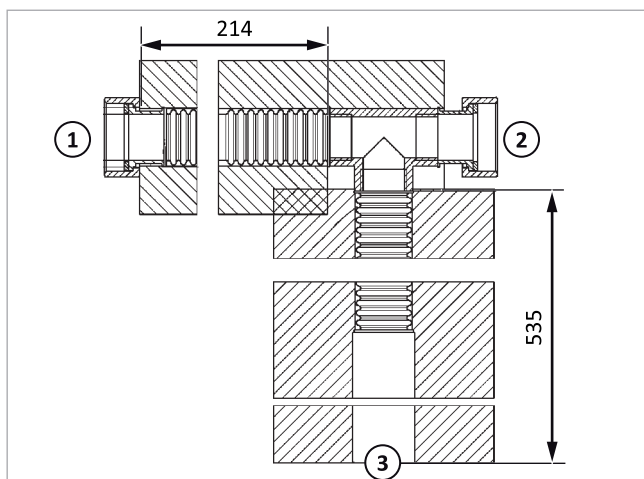


Abb. 106: Connection pipe solid fuel boiler (RO-FBK-RL)

- 1 Solar station connection, return flow
- 2 Connection storage tank, return flow
- 3 Connection solid fuel boiler, return flow

3. Fit the storage tank-side safety valve (**15**) with a blow out tube.
4. Install solar flow and return (collector side).

6.12.2 Connecting the collector(s)

Laying the solar pipes to either the left or the right

In the case of the SolvisMax Gas, lay the solar pipes as follows before installing the cover for the intake chambers:

1. Install the pipe clamp (**1**) and retaining plate (**2**) as required, either on the left (see figure) or right-hand side of the solar station.

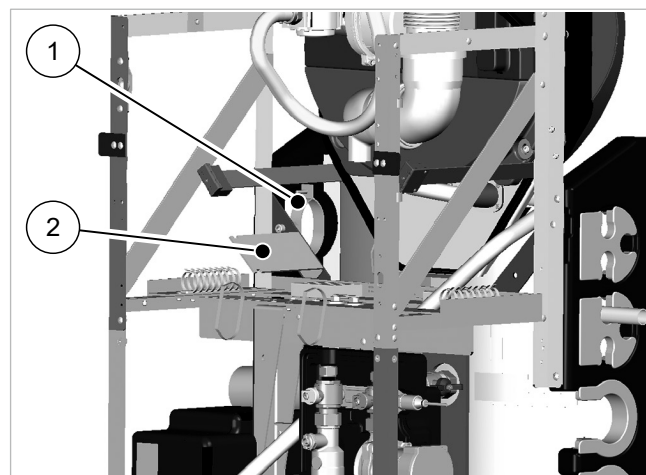


Fig. 107: Installing the pipe clamp and retaining plate

2. Remove the insulation shell from the solar heat transfer station.
3. Bend the flow pipe (**1**) with the red marking as required, assemble on the connection of the solar heat transfer station and lay in the pipe clamp.
4. Install the return flow pipe (**2**) and also guide into the pipe clamp under the flow pipe.
5. Use the cable ties (**3**) to fix the pipes at the intended points.
6. Assemble the clamping ring T-piece (**4**) from the accessory pack at the end of the return flow solar pipe, so that the outlet can be connected to the primary tank using the 1 m long MAG corrugated pipe.

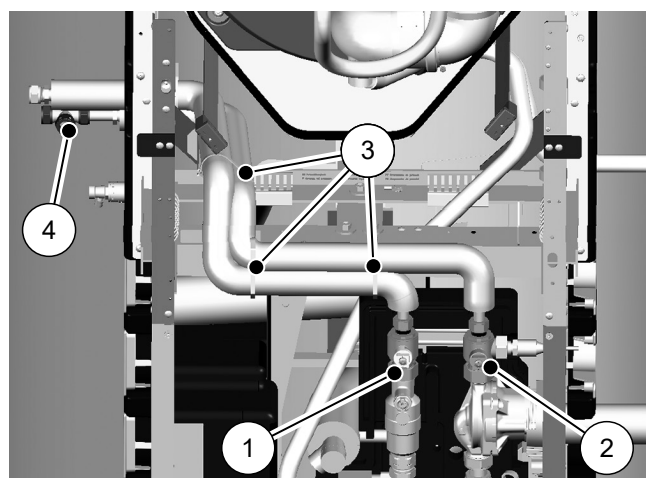


Fig. 108: Laying and fixing the solar cables

6.12.3 Solar expansion vessel



CAUTION

Expansion vessels are required for solar and heating systems

- Expansion vessels must be used with solar and heating systems.
- Neither install nor operate the system until a system-specific design for the expansion vessel has been laid out.



CAUTION

Observe the admission pressure on the expansion vessel

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



- A primary tank protects the membrane in the membrane expansion vessel (MEV) from inadmissibly high temperatures.
- To ensure that the tank can be bled, fit the primary tank vertically so that there is a nozzle at the high point!
- To avoid pressure surges, connect the primary tank to the solar circuit from above!
- Connect the primary tank and expansion vessel to the solar return!



A calculation table sheet for the expansion vessel design (and a primary solar tank where applicable) and for determining the admission pressure and system filling pressure can be downloaded using the following link:



https://extranet.solvis.de/public/user_upload/MAG_Nachdruckhaltung_ab.xls



Contact our Technical Sales department if you have any questions.

Setting the admission pressure on the solar expansion vessel

1. Determine the admission pressure of the solar expansion vessel at system height according to the following formula.
2. Release the admission pressure on the solar expansion vessel valve or refill with nitrogen if necessary

(however, at least to 2.4 bar as for roof installations with a horizontal difference of 0 metres).

$$p_o = \frac{H_{\text{Koll}} - H_{\text{MAG}}}{10} + 2,4 \text{ [bar]} \quad (\text{min. } 2,4 \text{ bar})$$

P_o Solar expansion vessel admission pressure [bar]

H_{Koll} Height of the highest point of the collector [m]

H_{St} Height of the lower edge of the storage tank [m]

Preparing the safety group

Depending on the type and number of collectors and the system height between the MEV and the upper edge of the collector, a safety valve with a reaction pressure of 6 bar or 8 bar must be installed in the collector circuit. The respective maximum system heights for a 6 bar valve are specified in the table below. If the system height exceeds this value, the 8 bar safety valve must be used.

Install the selected safety valve on the safety group (O-ring with locknut).

Type	Pcs.	QFD*	VG-xx	AG-xx	H**
C-254 Control C-254 Eco C-254 EasyCon	2	12	5	35	12
	3	12	8	50	14
	4	12	12	50	10
	5	12	12	80	15
	6	15	18	80	12
LU-304	1	12	8	35	12
	2	12	12	50	10
	3	12	18	80	12

* Quick fit duct with an overall length of up to 50 m

** System height up to which a 6 bar safety valve can still be used



Notes on installing flat seals:

- **Cleaning and inspection:** sealing surfaces and threads must be clean and free from cracks. Flat seals must be dry and must not be damaged.
- **Lubrication:** provide the thread with a suitable lubricant (e.g. Solar Fermit).
- **Applying seals:** hand-tighten the screw connection
- **Tightening:** tighten by a half-turn, while applying counterpressure.



CAUTION

Note in the event of leaks

Damage to seal / connection possible.

- Only retighten at **ambient temperature without pressure!**



Establish pressure-tight joints using hemp and a suitable sealing paste, e.g. Solar Fermit.

Variant with an expansion vessel

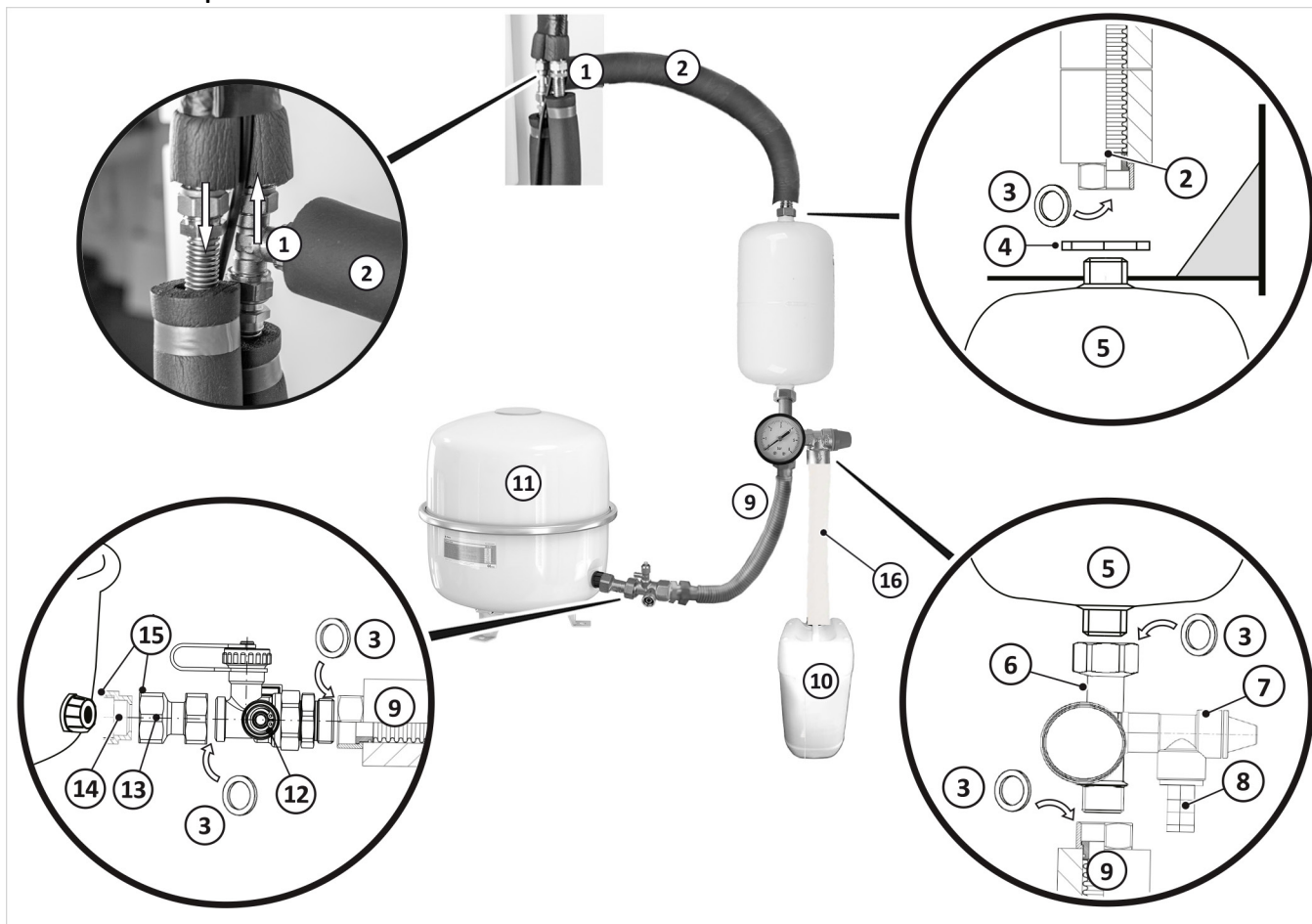


Fig. 109: Connecting the solar MEV

- | | | | |
|---|---|----|--|
| 1 | T-piece on return | 9 | Flexible corrugated pipe, 400 mm (included) |
| 2 | Flexible corrugated pipe, 1m*, can be extended with 31021 and 31022 | 10 | Collecting container (e.g. Tyfocor canister) |
| 3 | Flat seal (included) | 11 | Membrane expansion vessel AG-xx |
| 4 | Wall bracket locknut | 12 | Cap valve |
| 5 | Primary tank VG-xx | 13 | Connector piece, flat sealing (included) |
| 6 | Safety group 31291 | 14 | Socket nipple, 1" / 3/4" (for AG-80/150) |
| 7 | Safety valve, 6 or 8 bar | 15 | Seal male thread with hemp |
| 8 | Hose nozzle 08298 | 16 | Blow-out tube |

* included in the collector installation package.

Installing the primary tank and safety group

1. Select a suitable installation variant based on the size of the tanks and the space available. Note the corrugated hose lengths!
2. Attach the wall bracket for the primary tank (with VSG-5/8/12/18) at the specified height. Position the 35 l primary tank on the wall or floor in a way that ensures it can be bled.
3. Mount the primary tank on the wall bracket using the locknut (4).
4. Install the safety valve (7) with the self-sealing thread on the safety group (6). Follow the instructions provided!
5. Screw the hose nozzle (8) into the safety valve. Connect a blow out tube of a suitable length onto the hose nozzle and fasten it. Guide the tube into a collecting container (e.g. an empty Tyfocor canister (10 l)).
6. Install the safety group (6) with the flat seal on the bottom of the primary tank (5).
7. Establish the connection between the solar return through the T-piece (1) and the primary tank using the supplied 1 m corrugated pipe (2): install the clamp ring screw connection on the solar return, and the flat seal on the primary tank. Hold the pieces in place while tightening them.
8. Attach the flexible 400 mm corrugated pipe (9) with the inserted flat seal to the free end of the safety group.

6 Installation

Installing the cap valve and solar expansion vessel

1. Seal the outer thread of the MEV (**11**) with hemp and brush with Solar Fermit.
 2. With MEV-80 and MEV-150 only: Install the reducer socket nipple (**14**) for converting from 1" to ¾". Seal the connection nipple with hemp and brush with Solar Fermit.
 3. Fit the connector piece (**13**) for the cap valve with the (fixed) internal thread onto the MEV connection.
- Attach the cap valve (**12**) with the inserted flat seal to the connector piece.
4. Position the MEV on the floor or wall (in the case of the MEV-35/50).
 5. Attach the connection pipe (**9**) coming from the primary tank with the flat seal to the free end of the cap valve, while applying counter-pressure.

Variant with two expansion vessels

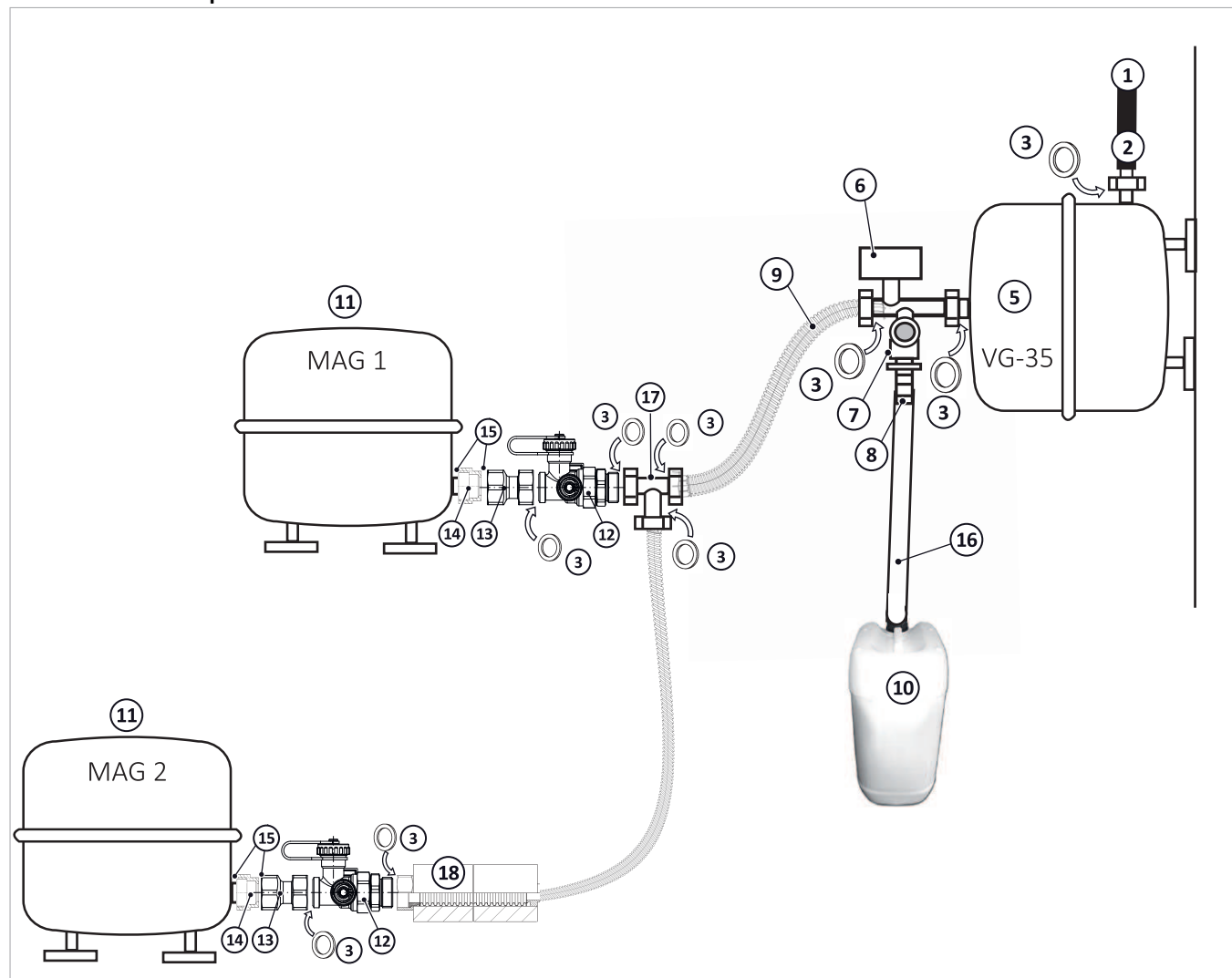


Fig. 110: Connection of two solar MEV by means of extension set expansion vessel (EW-AG)

- | | | | |
|----|---|----|--|
| 1 | T-piece on return | 11 | Membrane expansion vessel AG-xx |
| 2 | Flex. corrugated pipe, 1m (extendable with 31021 and 31022) | 12 | Cap valve |
| 3 | Flat seal (included) | 13 | Connector piece, flat sealing (included) |
| 5 | Primary tank VG-xx | 14 | Socket nipple 1" / 3/4" (for AG-80/-150) |
| 6 | Safety group 31291 | 15 | Seal male thread with hemp |
| 7 | Safety valve, 6 or 8 bar | 16 | Blow out tube |
| 8 | Hose nozzle 08298 | 17 | Expansion kit T-piece |
| 9 | Flexible corrugated pipe, 400 mm (included) | 18 | Flexible corrugated pipe, 1000 mm (included) |
| 10 | Collecting container (e.g. Tyfocor canister) | | |

Installing the two solar expansion vessels

1. Seal the connection nozzles for the expansion vessels with hemp and brush with Solar Fermit.
2. Attach the respective socket nipples (13) to MEV 1 and MEV 2.
3. Attach the T-piece (15) with the inserted flat seal to MEV 1.
4. Establish the connection between the T-piece and MEV 2 using the corrugated pipe (2 x flat seals).
5. Install the connector piece, cap valve and connection to the primary tank as described above.

6.13 Electrical connection

6.13.1 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

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%).



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

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.

6.13.2 Equipotential bonding



DANGER

Be careful of electrically conductive parts

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

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



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

Connect the equipotential bonding

Incorporate the unit into the local equipotential bonding.

1. Lay an equipotential bonding conductor with green and yellow marking and a cable width of at least 6 mm² from the main earthing terminal in the building connection room to the boiler.
2. Fasten the equipotential bonding conductor to the frame as shown in the figure.

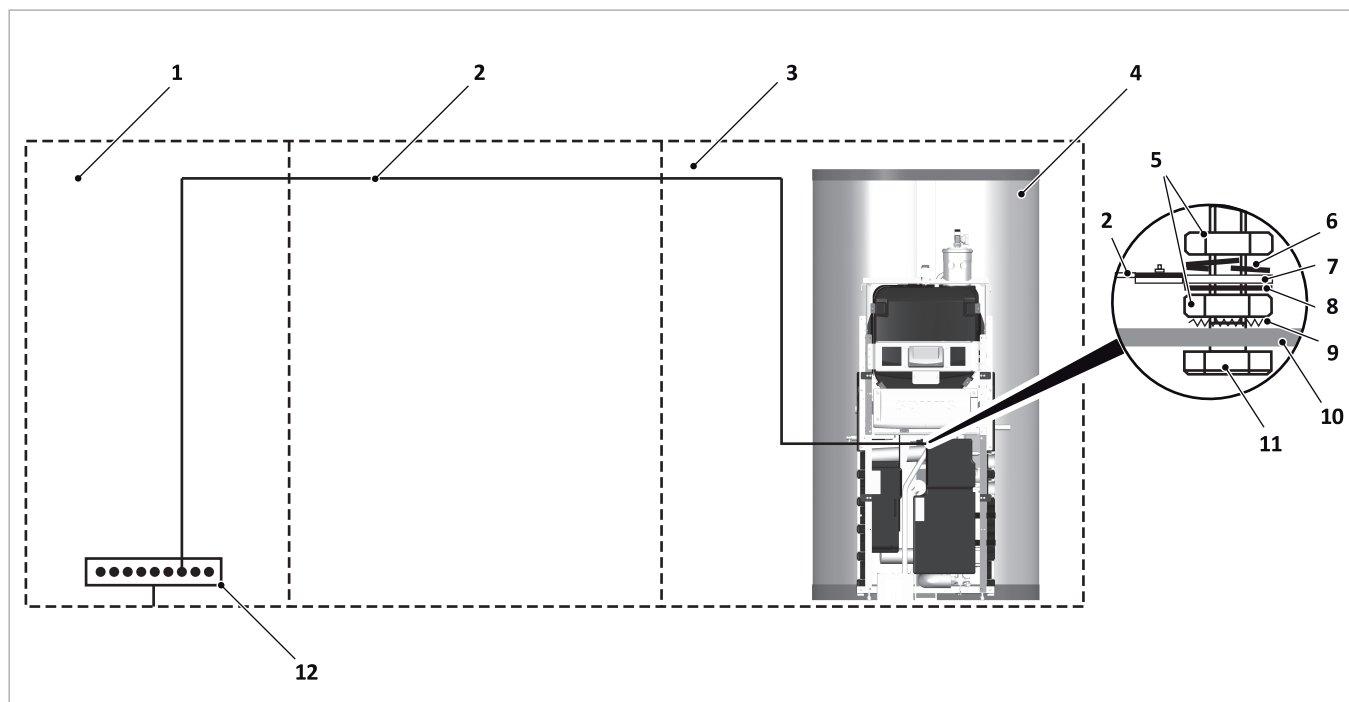


Fig. 111: Equipotential bonding for the SolvisMax

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

6.13.3 Connecting the outdoor sensor

Fitting the outdoor sensor



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

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

1. Lay a suitable sensor line on site.
2. Connect the outdoor sensor (polarity is not important). To do so, use socket board "S10" from the installation pack.

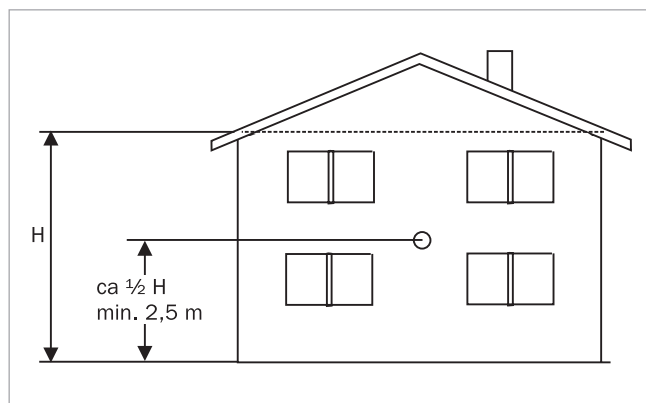


Fig. 112: Position of the outdoor sensor

6.13.4 Connecting the room controller

Fit the housing



DANGER

Risk of electrical shock

Damage to health, cardiac arrest possible.

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

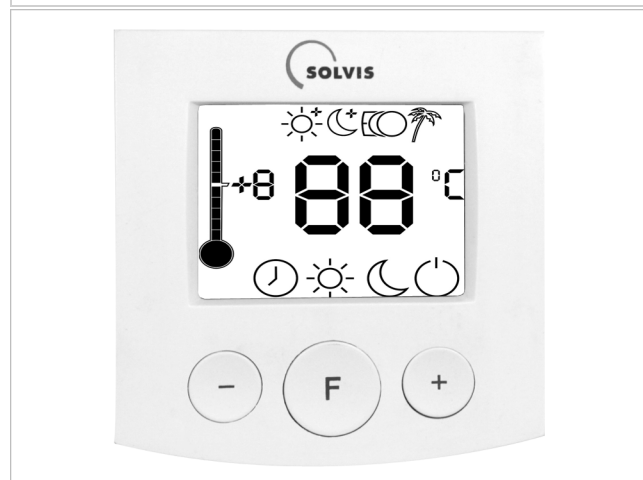


Fig. 113: Room controller BE-SC-2

6 Installation



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

1. Lift the front cover on the lower side with a screw driver.
2. Swing the front plate forward slightly and pull upwards to remove it (see → *Figure 114*).
3. Fix the housing to the wall with the supplied plugs and screws.



Fig. 114: Opening the housing

Connect the room controller

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

1. Connect the connection line to the two-pole terminal of the room controller, observing the polarity (see → *Fig. 115*).



Fig. 115: Connect the room controller

Connect to the mains module

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

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

Close the housing

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

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

2. Close the housing.

6.13.5 Connecting Modbus

Communication between the SolvisControl 3 system controller and the internal heat pump controller takes place via a Modbus connection. To avoid interference, the connection must be established using shielded cables.

only with SolvisLea, SolvisLea Pro, SolvisMia and SolvisPia 13/17



For the Modbus connection, see → *Installation instructions for the buffer charging station (MAL-PLAS-WP-WM)*.

Only with SolvisPia 12

The Modbus interface is already routed from the SolvisControl 3 to a junction box at the factory, which is loosely positioned in the PIA/PIA-SL charging module and must now be installed outside the SolvisMax.

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. Connect the Modbus cable to the SolvisControl 3. The port next to the ribbon cable is used for this connection.
3. Install the junction box at a suitable location.

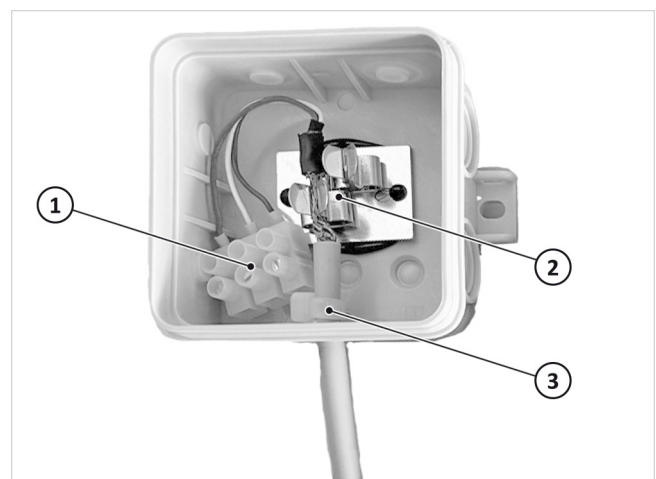


Fig. 116: Attaching the Modbus junction box

- 1 Connection terminals
- 2 Shield clamps
- 3 Strain relief device

Connecting the Modbus cable from the heating pump

1. Open the junction box.
2. Open the cable entry with a knife or something similar.
3. Insert the shielded Modbus cable from the heating pump in the junction box.

- Strip the cable, expose the shielding and fix it in the shield clamp.
- Strip the insulation from the wires and fit wire end sleeves on them.
- Connect the wires according to the colour coding, brown (GND) / white (Modbus A) / green (Modbus B) to the pre-assembled terminals.

Observe the label on the cover of the junction box when completing the connections!

- Use the cable ties supplied for strain relief of the cables to the heating pump as illustrated in *Fig. 116 (3)*.



See also the → *installation instructions (MAL)* for the respective heat pump.

6.13.6 Connecting the PLAS-WP-WM pump

only charging modules LEA/MIA, LEA-SL/MIA-SL and PIA/PIA-SL (only with SolvisPia 13/17)

Connecting the pump

The pump has two connection cables.

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

6.13.7 Connecting switching valve group

SolvisMax with heating pump only

Connecting the switching valve

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

Connecting flow sensor S14

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

6.13.8 Connecting the heating circuit stations

Connecting heating circuit pumps

- Connect the pump cables as follows:
 - Heating circuit 1 on output A3
 - Heating circuit 2 on output A4
 - Heating circuit 3 on output A5

Installing the flow sensor

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

Connecting the actuator drives of the heating circuit mixer

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

Checking the heating circuit mixer

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

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

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

- Switch output A8 (or A10) to "Manual on" for at least 150 s.
- Check the sensor setting; the temperature at S12 (or S13) must correspond to the temperature at S4.



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

6.13.9 Connecting the collector sensor

Connection of the collector sensor



Sensor S8 can only be connected when the quick-fit duct and collectors are installed, see → *sec. "Sensor installation" in the installation instructions of the collector*.

6.13.10 Connecting SmartGrid (optional)

SolvisMax with heating pump only

i 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.

The SmartGrid-Box (3) with the circuit board is on the right-hand side on the frame of the charging module.

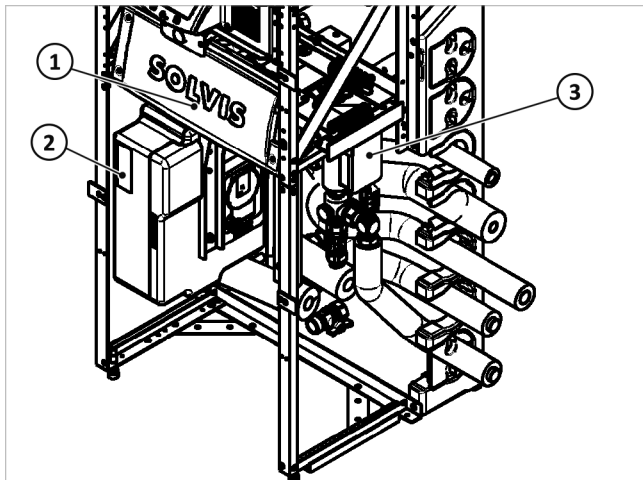


Fig. 117: Charging module with SmartGrid-Box

- | | |
|----------------------------|-----------------|
| 1 SC-3 mains circuit board | 3 SmartGrid-Box |
| 2 Hot water station | |

Connecting the SmartGrid

1. Route the control line(s) of the SmartGrid device to the connection board of the SolvisMax and connect according to the connection diagram.

 For system diagrams and connection diagrams, see the → *SolvisMax 7 system diagram document (ALS-MAX-7)*.

6.13.11 Heating pump voltage supply

SolvisLea voltage supply

Charging modules LEA and LEA-SL only

The power supply for the internal heating pump controller of the SolvisLea heating pump is provided by the mains circuit board of the LEA or LEA-SL charging module.

Connecting the voltage supply for SolvisLea

1. Lay the 3-wire supply line coming from the SolvisLea to the mains circuit board and connect it to a free space on the expansion board, terminals PE/NL.
2. Guide the supply line through the strain relief device and secure it.

 The compressor itself is supplied with voltage separately and not through the SolvisMax (see → *Chapter "Electrical connection" in the installation instructions (MAL-LEA / MAL-LEA-8P / MAL-LEA-E)*).

SolvisLea Pro power supply

Charging modules LEA and LEA-SL only

The power supply for the heat pump control unit and the compressor of the SolvisLea Pro is supplied separately and not via the SolvisMax.

 Establish the power supply to the heat pump in accordance with the installation instructions, see → *section "Electrical connection" in "Installing the SolvisLea Pro" (MAL-LEA-PRO)*.

SolvisMia voltage supply

Charging modules MIA and MIA-SL only

The power supply of the SEC circuit board is realised in the case of the SolvisMia MJ24 (model year 2024) via the mains circuit board of the MIA or MIA-SL charging module.

Connecting the power supply for SolvisMia MJ24

1. Lay the 3-wire supply line coming from the SolvisMia MJ24 to the mains circuit board and connect it to a free space on the expansion board (terminals PE/NL).
2. Guide the supply line through the strain relief device and secure it.

 Establish the power supply to the compressor in accordance with the installation instructions, see → *section "Electrical connection" in "SolvisMia installation instructions" (MAL-MIA)*.

SolvisPia power supply

The power supply for the heat pump control unit and the compressor of the SolvisPia is supplied separately and not via the SolvisMax.

 Establish the power supply to the heat pump in accordance with the installation instructions, see → *chapter "Electrical connection" in "Installing SolvisPia 12" (MAL-PIA) or "Installing SolvisPia 13/17" (MAL-PIA-1317)*.

6.13.12 Voltage supply for heating cartridge

SolvisMia and SolvisPia with SolvisMax Solo only

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 → *chapter "Heating cartridge", p. 86.*

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.

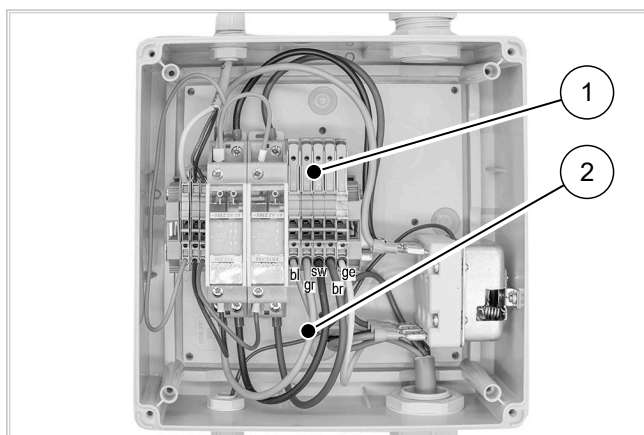


Fig. 118: Connection box, open

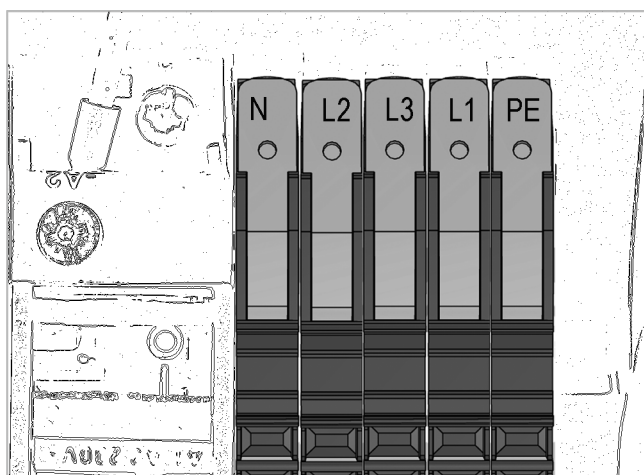


Fig. 119: Connection assignment of (1)

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. 154, p. 86).

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.

6.13.13 Mains connection

Checking the connections on the mains module

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

For connection diagrams, see → *Chapter "Appendix", P.87.*

Connecting the power supply

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



Check that the wiring is correct to prevent unit malfunctions:

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

6.13.14 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).

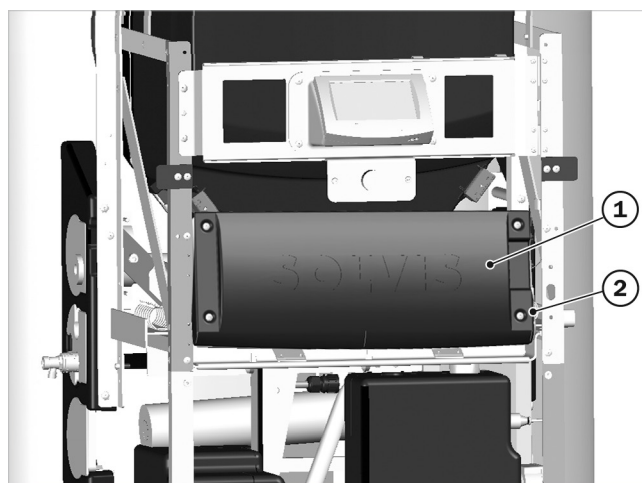


Fig. 120: Attach the cover of the mains circuit board

7 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.

7.1 Thermal mixing valve

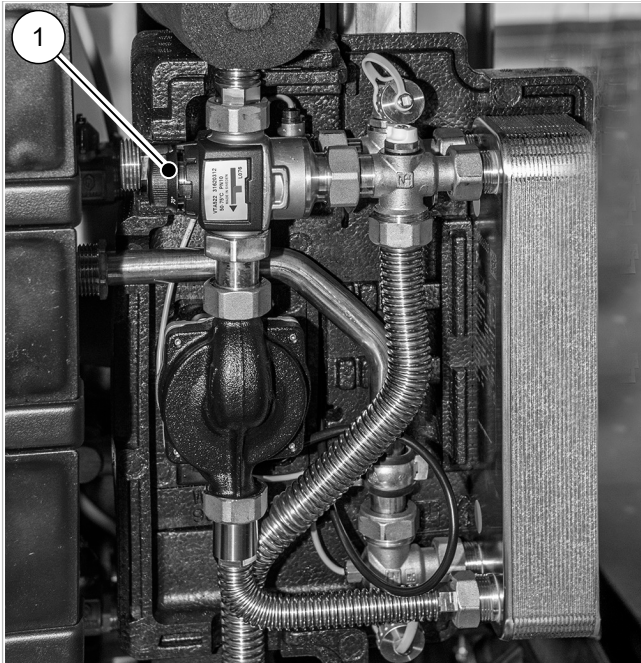


Fig. 121: Thermal mixing valve (1) in a WWS-30, SolvisMax

TMV factory default

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

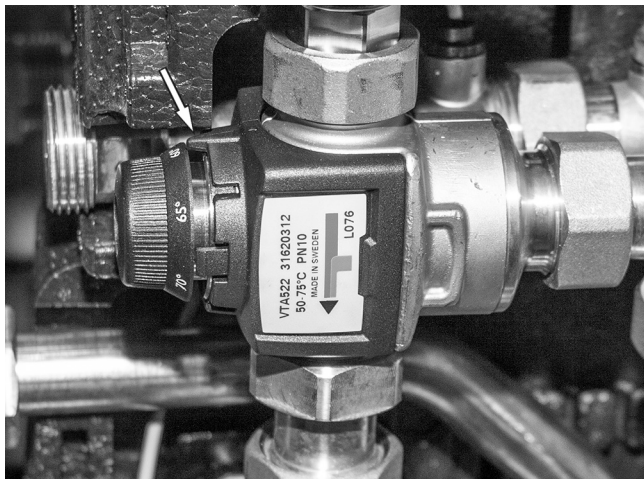


Fig. 122: Setting the TMV

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

- WWS-30: "65 °C"
- WWS-36: From the factory default setting, turn open toward "70 °C" (≈ 65 °C)

E If the drinking water is hard, this higher setting may cause increased lime deposits and energy consumption.

7.2 Filling the storage tank



CAUTION

Observe the quality of the fill water

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

- The fill water 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.

Filling the system (pressure test)

1. Fill the system via the KFE tap (1).

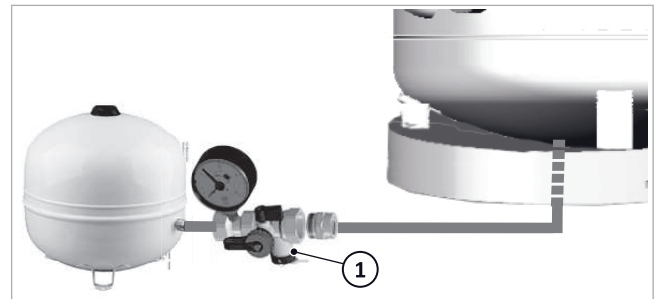


Fig. 123: KFE tap on MAG connection group

2. Vent the system incl. storage tank.
3. Carry out a leak test.

Only for SolvisPia, SolvisLea 8.3 Premium and SolvisLea Pro



CAUTION

Observe the maximum system pressure

The safety valve on the SolvisPia, SolvisLea 8.3 Premium and SolvisLea Pro responds at 2.5 bar

- Do not exceed the maximum system pressure of 2.2 bar.
- Safety valves with at least 3.0 bar are prescribed for heating circuit components inside the building.

All other systems



CAUTION

Observe the pressure in the heating system

Blowing off the safety valve is possible.

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



See → *Installation instructions (MAL)* for the respective heat pump.

4. Set the filling pressure to 0.3 bar above the inlet pressure, i.e. between 1.7 and 2.0 bar.

7.3 Configuration SolvisControl

Configuring the SolvisControl

SolvisControl must be configured.

1. Configure the SolvisControl.

 Carry out all the steps described, see → sec. "Configuration of the SolvisControl" in the operating instructions (BAL-SBSX-3-I-EN).

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-EN).

 For a basic introduction to operat. the system controller, see → Chapter "Operating the SolvisControl" in the operating instructions (BAL-SBSX-3-K-EN).

7.4 Heat generator design

E Correct design of the burner performance is vital for cost-effective, low-emission and durable operation of the burner. In the case of renovation, a simple and practical estimate of the boiler performance can be made based on fuel consumption (Swiss Formula).

 When designing the heating load using the Swiss Formula, be aware of the following:

- The formula generally provides good results with practical relevance.
- For buildings with a very high proportion of glass and/or new buildings (new construction insulation standard), the calculation is only applicable to a limited extent.
- The method may only be used with constant boundary conditions (heated building area, user behaviour).

Design based on the Swiss Formula

To estimate the heating load required for an existing building, the Swiss Formula is applied as follows:

$$\phi_{HL} = \frac{\phi_{\text{Consumption}} \cdot H_o \cdot \eta}{t_{\text{voll}}}$$

ϕ_{HL} Heating load in [kW]

$\phi_{\text{Consumption}}$ Average annual consumption in [l] heating oil / [m³] gas

H_o Upper heating value (calorific value), see table

η Annual efficiency (condensing boiler approx. 0.95)

t_{voll} Full load hours in [h] (for residential buildings with heating and hot water, approx. 2300 h)

The use of heating oil EL or natural gas H results in the following simple correlation:

$$\phi_{HL} = \frac{\phi_{\text{Consumption per year}}}{230}$$

Upper heating value (calorific value)

Fuel	Lower heating value (H _L)
Heating oil EL	10.6 kWh/l
Natural gas H	10.5 kWh/m ³
Natural gas L	9.5 kWh/m ³
Liquid gas	7.4 kWh/m ³

Example:

The annual consumption in a single-family home with oil heating is approx. 3500 l (EL heating oil). Thus, the average heating load is: $\phi_{HL} = 3500 / 230 = 15.2$ kW.

Result: A17 kW burner is sufficient to heat the single-family home.

 For information about the design of hybrid systems, see → Chapter "System planning" in the relevant planning document (PUL-LEA or PUL-MIA).

7.5 Gas burner

SolvisMax Gas and Gas Hybrid only

-  The burner is preset for operation with natural gas "H" and can also be operated with natural gas "L".
- In order to use liquid gas, it is necessary to install the refitting set first, see → "Installing the refitting set for liquid gas" in the section on "Conversion to liquid gas", on page 18.

7.5.1 Burner activation

 Switching the A12 output has no effect on the SX-LN-3 burner.

You can control the burner manually in the "Installer" main menu by going to the "Burner" or "Heating" menu and selecting "Maintenance function".

Switching on the burner

Logging on to the SolvisControl as the installer:

1. Open the maintenance function ("Installer" menu → "Heating" → "Maintenance function"); refer also to the → Chapter "Maintenance" in the operating instructions (BAL-SBSX-3-I-EN).

7.5.2 Settings

Setting the CO₂ value (max. burner performance)

The CO₂ value is set at full load. Please refer to the following table for the CO₂ value to be set for the maximum burner output:

Burner performance	CO ₂ value at max. burner output
10 kW / 18 kW / 25 kW / 30 kW	9.9 - 10.5% (natural gas)
	12.0 - 12.6% (liquid gas)

2. Set the CO₂ value using the adjusting screw (2).
3. Start in maintenance function "Max. burner output".
 - Screw in the adjusting screw = CO₂ value decreases
 - Unscrew the adjusting screw = CO₂ value increases

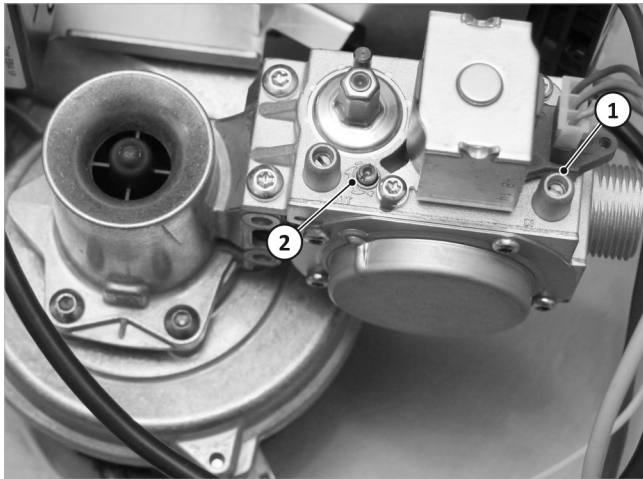


Fig. 124: Setting the burner

- 1 Measuring socket
- 2 CO₂ adjustment screw

Only when moved: presetting the burner

If the adjusting screw for the CO₂ value was roughly displaced during start-up, proceed as follows:

1. Screw in the adjusting screw in the direction of the minus sign (clockwise) until it stops. Then, screw it out in an anticlockwise direction according to the table below:

Burner performance	Turns in an anticlockwise direction with	
	Natural gas	Liquid gas
10 kW	4	3
18 kW	4½	3¼
25 kW	7¼	6
30 kW	7¼	6

Checking the CO₂ value (max. burner performance)

After setting the CO₂ value at full load, check the CO₂ value at minimum load

1. Start "Min. burner performance" in the maintenance function.

The CO₂ value must not drop below the following limit values when operating at minimum burner performance:

Burner performance	CO ₂ value at minimum burner performance
10 kW	up to 2% less CO ₂ than at max. burner performance
18 kW / 25 kW / 30 kW	up to 1% less CO ₂ than at max. burner performance

For the CO₂ value at maximum burner output, see → work instructions "Setting the CO₂ value (max. burner output)", P. 55.

- i** If minimum burner performance drops below these limit values, contact Solvis customer service.
- CO₂ value must not be corrected at minimum burner performance.
- i** Nitrogen is often still in the tank for liquid gas systems when first filling the liquid gas tank.
- The composition of the fuel gas can therefore change again after the second filling.
- The setting of the burner must be checked after filling the tank for a second time (CO₂ content in the exhaust).

- i** If the burner does not ignite at the first attempt at start-up, it may be due to the air still contained in the gas line.
- The ignition process can be repeated several times. After the fifth attempt, a malfunction message will appear on the display of the SolvisControl system controller; see → "Unlocking the automatic firing system", "Troubleshooting" section, page 71.
- In case of burner malfunctions, the flow pressure is checked and should be between 20 and 60 mbar.
- The measurement connection is used to check the gas' flow pressure when the burner is in operation → fig. 124 (1).

7.6 Oil burner

SolvisMax Oil and Oil Hybrid only



CAUTION

Permitted fuel

To fulfil the terms of the warranty

- The SolvisMax / Ben Oil BW may only be operated with low-sulphur heating oil (max. 50 ppm sulphur). This also applies during start-up.
- We strongly recommend using premium-quality, low-sulphur heating oil, as per DIN 51603-1.
- In addition, all oil heating boilers for (low-sulphur) heating oils with an organic content of up to 10 % are approved, as per DIN SPEC 51603-6.



CAUTION

Observe the following information regarding the oil connection

- The oil pipes must always be routed in a single pipe system using 6 x 1 mm copper pipes.
- Always use oil filters with a filter mesh < 20 µm.
- During start-up, do not suck the heating oil into the burner with the oil pump. The oil pump will be damaged if it runs dry.



CAUTION

Use prescribed parts only

Otherwise, failure or damage to the burner is possible.

- For a list of prescribed parts, see the → "Components used" table, P. 81
- Other components are not permitted.

Performance ranges for the burner



Within the specified performance ranges, (see → "Burner performance setting values" table, P. 82) the burner can be adapted to the building heat requirements. The burners are set to the following oil pressures in the factory:

- 10/17 kW burner: 8/18 bar
- 14/23 kW burner: 8/20 bar
- 20/28 kW burner: 10/16 bar.

Check the prerequisites for setting the burner:

1. Burner must run for at least 10 min. before taking the measurement.
2. Operating temperature reached at the top of the heating buffer (sensor S4).

Flue gas values to be aimed for:

- CO₂ 13.3%
- NO_x 30 - 38 ppm (fuel-related)

Set up the burner in the following order

For the set values for burner performance, see → *table "Burner performance setting values", P. 82*

1. Switch to the installer menu.
2. Switch the burner to manual operation with: "Burner" → "Adjust blower – start".
3. Under "Adjust fanspeed for", switch to **Level 2**.
4. Set the pump pressure for level 2 (see the → *work instructions "Setting the pump pressure"*).
5. Set the fan speed for level 2 (see the → *"Setting the fan speed" work instructions*).
6. Under "Adjust fanspeed for", go to **Level 1**.
7. Set the pump pressure to level 1.
8. Set the fan speed to level 1.

Setting the pump pressure

1. Use the pressure adjusting screw to set the pump pressure to the appropriate level.

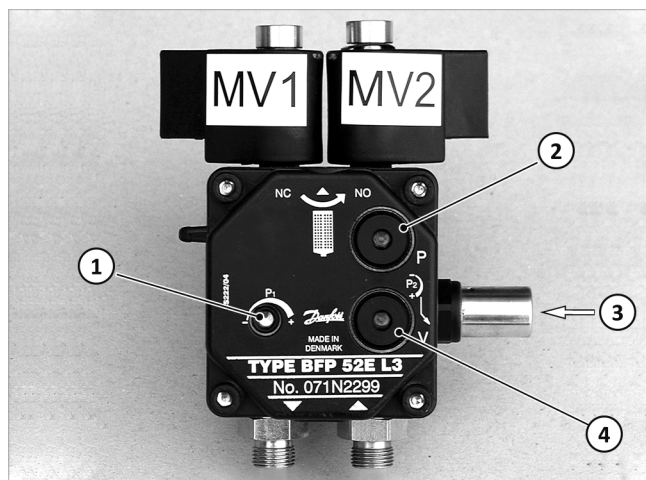


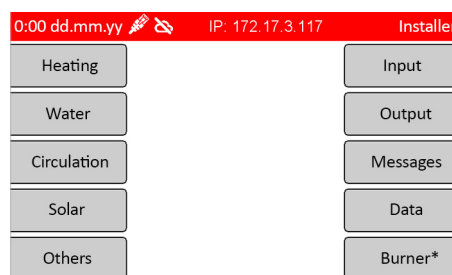
Fig. 125: Setting the pump pressure on the oil pump

- 1 Pressure setting for level 1
- 2 Pressure measurement connection
- 3 Pressure setting for level 2
- 4 Vacuum measurement connection

Setting the blower speed

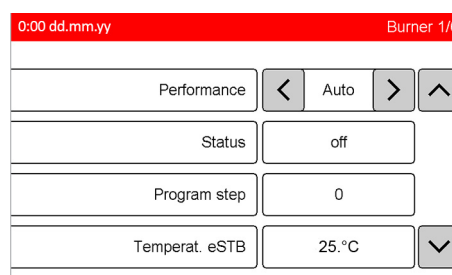
You configure the setting in the menu "Installer" → "Burner" → "Adjust blower – start" in the SolvisControl.

1. In the installer menu, choose "Burner".

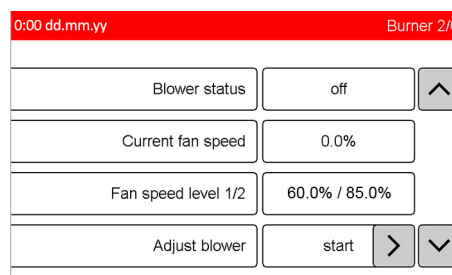


Depending on the system used, the menu option displayed changes from "Burner" to "Heating pump" or "Heat generator". The last choice opens an overview of the heat generators installed.

2. Use the navigation button to move to the next page.



3. Select "start" next to "Adjust blower".

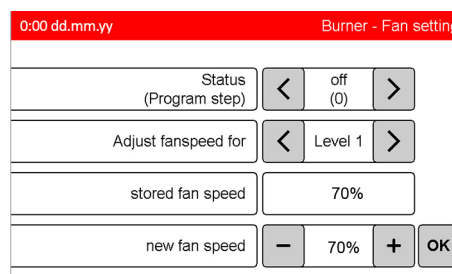


Changes to the blower settings can be made only in

- A: standby (program step 0) or
- B: modulation enable mode (program step 8)

A: setting the blower speed in standby mode

1. Use the rocker switch to set the burner status to "Off".
2. If necessary, wait until the burner switches to standby mode (program step 0).
3. Use the "Adjust blower speed for" rocker switch to select the burner level to be set (here, level 1).



4. Set the new blower speed and choose "OK" to confirm.
5. Wait until the changes have been transferred to "stored blower speed".
6. If necessary, proceed in the same way for the other burner level.
7. Use the "Back" button to leave the menu.

B: setting the blower speed during burner operation

1. Use the rocker switch to set the burner status to "On".
2. If necessary, wait until the burner switches to modulation enable mode (program step 8).
3. Use the "Adjust blower speed for" rocker switch to select the burner level to be set (here, level 2).

0:00 dd.mm.yy		Burner - Fan setting	
Status (Program step)	< off (0) >		
Adjust fanspeed for	< Level 1 >		
stored fan speed	70%		
new fan speed	- 70% + OK		

4. Set the new blower speed and choose "OK" to confirm.
5. Wait until the changes have been transferred to "stored blower speed".
6. Check and log the blower pressure using a pressure gauge. (Observe the minimum pressures and setting data; see → tab. "Burner performance setting values", Page 82).
7. If necessary, proceed in the same way for the other burner level.
8. Use the "Back" button to leave the menu.

7.7 Heating system

i Recommendation: Heat up the whole heating system to approximately 60 °C (observe the permitted temperatures!)

"Thermally inhibit" the heating water

1. To circulate the storage tank volume, switch the hot water pump (output PWM, W) to "Manual" on the SolvisControl while heating up ("Installer" menu → "Outputs" → "More" → "Analogue/PWM" → "HW Pump" → status: "Manual").
2. Set the heat generator to maximum power; see the → chapter "Switching the heat generator on and off for maintenance" in the (installer) operating instructions for the heat generator.
3. If possible, activate the heating circuits (pump, mixer, and thermostat valves).
4. When the target value is reached at S4, the heating process can be finished.
5. Then, check the filling pressure. It should be within a range of 1.5 to 2.5 bar.

7.8 Solar circuit (optional)



WARNING

Risk of hot steam escaping when working on the solar system

Scalding of hands and face possible.

- Carry out work on solar syst. only when there is no direct sunl. or when collect. are covered.



CAUTION

Hot surfaces

Risk of burns without proper attention.

- The solar lines, primary tank and expansion vessel may become hot during operation.



CAUTION

When filling the solar circuit:

- Fill only with original Tyfocor LS-rot ready-mixed heat transfer fluid and flush.
- Using other types of heat transfer fluid in this system is prohibited because it may damage the solar circuit components.
- Use only the Füll-Jet unit to flush and fill the system (please order separately).

7.8.1 Flushing the MEV line

Flushing the MEV line

1. If not performed before: check the admission pressure of the MEV(s) and adjust it according to the system height.
2. Set the flow meter ($\dot{V}$) to flushing position 1.

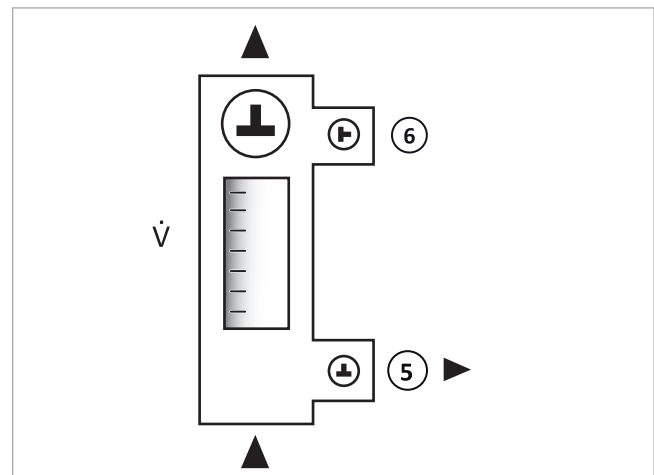


Fig. 126: Flow meter $\dot{V}$ in flushing position 1

3. Fully open the cap valve (3) on the MEV.
4. Connect the pressure hose for the flushing and filling station (FFS) to the BFD valve (4) and open the BFD valve.
5. Connect the FFS flushing hose to the BFD valve (5) and open the BFD valve.
6. Fill the solar circuit with Tyfocor LS-rot antifreeze and flush: FFS → BFD valve (4) → primary tank → collector field → solar heat transfer station to BFD valve (5) → FFS

7. Flush until the solar fluid exits into the FFS container free of bubbles and clear (flush for at least 5 minutes).
8. Close the BFD valve (4) and switch off the FFS pump.
9. Close the cap valve on the MEV.

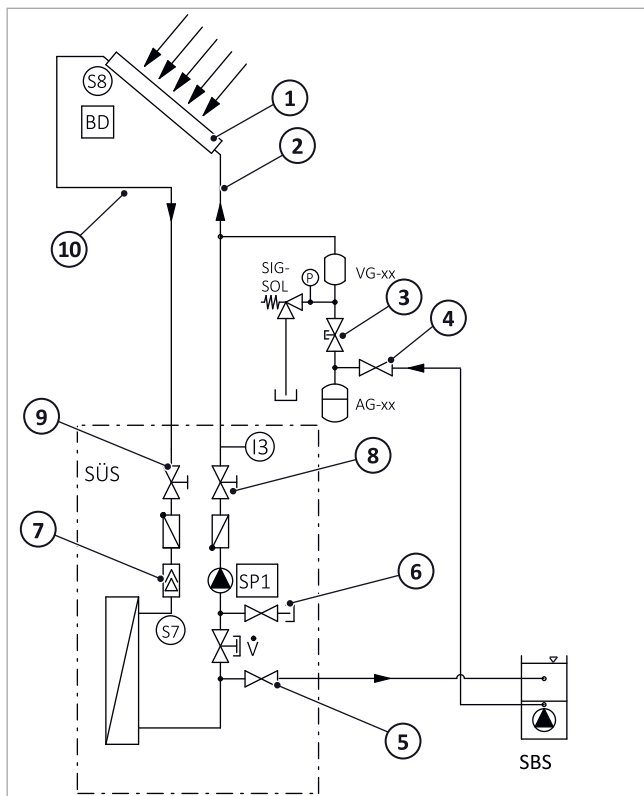


Fig. 127: Solar heat transfer station: Flushing the heat exchanger

- | | |
|-------|--|
| 1 | Solvis collectors |
| 2 | Solar return |
| 3 | Cap valve |
| 4 | BFD valve for pressure hose |
| 5 | BFD valve for flushing hose |
| 6 | BFD valve |
| 7 | Deaerator |
| 8 | Ball valve in the solar return |
| 9 | Ball valve in the solar flow |
| 10 | Solar flow |
| AG-xx | Expansion vessel |
| BD | Lightning protection box |
| FFS | Flushing and filling station FUES-SBS (accessory part) |
| SÜS | Solar heat transfer station (primary circuit) |
| VG-xx | Primary tank (accessories) |
| V | Flow meter |

7.8.2 Flushing the pump line

Flushing the pump line

1. Set the flow meter ($\dot{V}$) to flushing position 2.

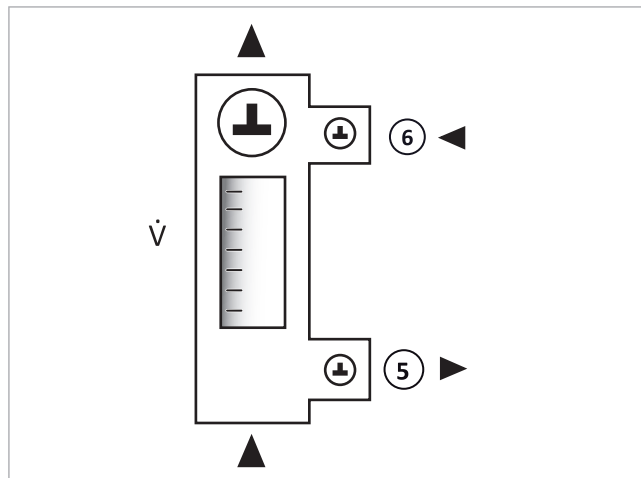


Fig. 128: Flow meter $\dot{V}$ in flushing position 2

2. Connect the pressure hose for the flushing and filling station (FFS) to the BFD valve (6) of the flow meter and open the BFD valve.
3. Switching on and flushing the flushing pump: FFS → BFD valve (6) → primary pump → collector field → solar heat transfer station to BFD valve (5) → FFS
4. Flush until the solar fluid exits into the FFS container free of bubbles and clear (flush for at least 15 minutes).
5. Bleed the solar circuit again by building up and releasing pressure. To do so, close and open the BFD valve (5) two to three times.
6. If Tyfocor exits without any bubbles, close the BFD valve (5) and increase the system pressure to 4 bar.
7. Close the BFD valve (6) and switch off the FFS pump. Check the system to ensure that there are no leaks.
8. Bleed the deaerator (7).
9. Fully open the cap valve (3).
10. Set the system pressure to the calculated operating pressure by slowly opening the BFD valve (5). Rule of thumb: MEV admission pressure + 0.3 bar.
11. Set the flow meter to the flow position (see → Fig. 130, Page 60), close the BFD valves (5) and (6), remove the SBS and screw on the caps.

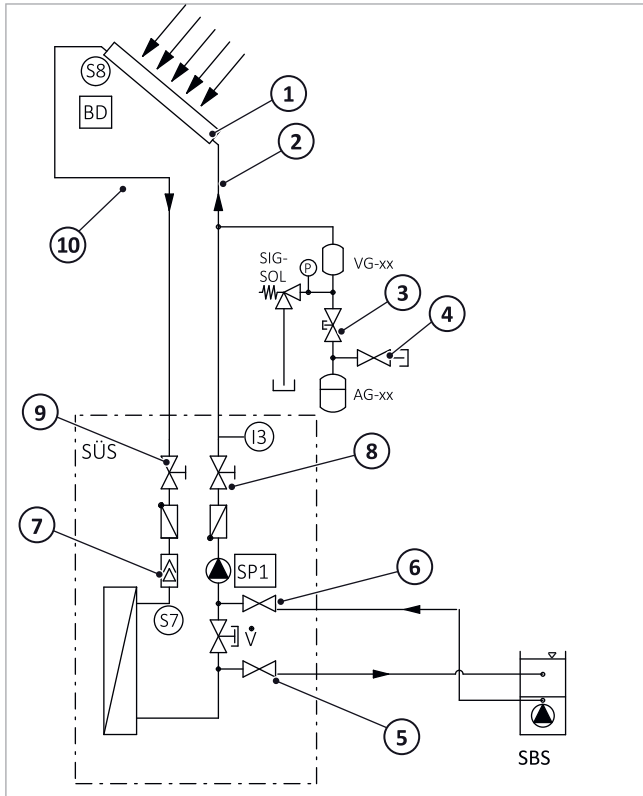


Fig. 129: Solar heat transfer station: Flushing the pump line

- | | |
|-------|--|
| 1 | Solvis collectors |
| 2 | Solar return |
| 3 | Cap valve |
| 4 | BFD valve |
| 5 | BFD valve for flushing hose |
| 6 | BFD valve for pressure hose |
| 7 | Deaerator |
| 8 | Ball valve in the solar return |
| 9 | Ball valve in the solar flow |
| 10 | Solar flow |
| AG-xx | Expansion vessel |
| BD | Lightning protection box |
| FFS | Flushing and filling station FUES-SBS (accessory part) |
| SÜS | Solar heat transfer station (primary circuit) |
| VG-xx | Primary tank (accessories) |
| V | Flow meter |

7.8.3 Completing the solar station

Finishing the solar station

1. Ensure that the solar circuit and the storage tank connections are fully insulated.
2. Attach the insulation shell to the station.



CAUTION

Bleed the solar system after start-up

- Once the solar circuit has been refilled, gas will be emitted during operation, which collects in the station deaerator → Fig. 129, Page 60 (7). The gas emissions decrease as the operation time increases. It is therefore important to bleed the deaerator and check the system pressure every day in the first few days after start-up and then at regular intervals, depending on the amount of air discharged.

Checking the primary volume flow

The SolvisControl uses the speed control on the solar pump to continuously optimise the flows based on the solar energy provided by the sun.

- With the minimum requirement, the value:

$$\dot{V}_{\min} = \frac{A [\text{in m}^2]}{6} \left[\frac{\text{l}}{\text{min}} \right]$$

should not be exceeded in the primary circuit. Regulate the flow meter if required. (A = installed collector surface).

- With the maximum requirement, the value:

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

at minimum should be reached in the primary circuit. Check the pipe dimensions and wiring if necessary. (A = installed collector surface).

- The factory setting for the secondary circuit is the optimum setting.

1. Switch to the "Installer" user mode.
2. Open the "Outputs" submenu.
3. In the "Outputs" menu, open "Analogue/PWM" and select the "Solar pump 1" output.
4. Switch the "Status" from "Auto" to "Manual".
5. Set the "Manual specification" to 100%.

0:00 dd.mm.yy		Output - Solar pump 1 1/2	
Type	< PWM >		
Status	< MAN. >		
Manual specification	- 100% +		
Current measured value	20°C		

6. Read the volume flow on the flow meter (on the upper surface of the float).

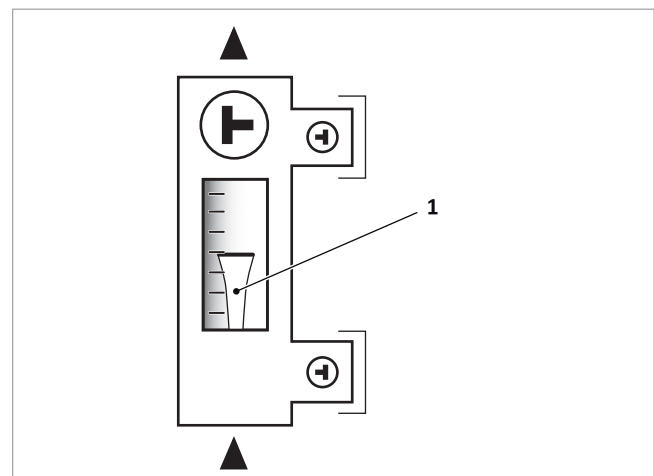


Fig. 130: Read the volume flow at the upper edge of the float (1)

7. Note the value in the start-up report.
8. Set the "Manual specification" to 30 %; this is the factory setting for the minimum requirement.
9. Check the volume flow at the flow meter.

Alternative handling:

- If a flow cannot be read, increase the “**Manual specification**” incrementally until a flow can be detected. Apply the set percentage value from the second page “**Outputs - solar pump 1 2/2**” for “**Min. requirement**”.

0:00 dd.mm.yy		Output - Solar pump 1 2/2	
Stop control	- 0.0% +	^	
Min. control	- 30.0% +		
Max. control	- 90.0% +		
Type of control	normal	> v	

- If the flow is too high (see the energy saving tip), regulate the volume flow accordingly using the flow meter and repeat steps 5 to 7.

10. Set “**Type of control**” to “**normal**”.

Setting up the secondary pump

1. In the “**Outputs**” menu, open “**Analogue/PWM**” and select the “**Solar pump 2**” output.
2. Set “**Type of control**” to “**inverse**”.
3. The “**Min. control**” must be $\geq 20\%$.

0:00 dd.mm.yy		Output - Solar pump 2 2/2	
Stop control	- 0.0% +	^	
Min. control	- 20.0% +		
Max. control	- 90.0% +		
Type of control	inverse	> v	

4. Check the setting of the type of control (PWM-H) on the secondary pump IMP NMT Neo PL 15/40. If the setting is correct, the top and bottom type of control LEDs light up simultaneously (see → Fig. 131).
5. If necessary, correct the type of control using the button.

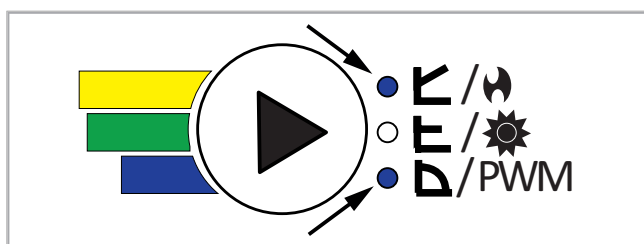


Fig. 131: Operating panel of the IMP NMT Neo PL 15/40 pump (set-up here: PWM-H)

7.9 Hot water station pump

IMP NMT Neo HL pump only

The speed of the pump is regulated within the hot water station via a PWM signal from the SC-3. The pump does not need to be set.

Setting the minimum control

To ensure optimum operation of the pump in the hot water station, make the following settings:

1. Switch to the installer menu.
2. Select “**Output**” and “**More**” from the menu.
3. Select output “**Analogue/PWM**”.
4. Select “**HW pump**” and switch to the second menu.
5. Set “**Min. control**” to “**20**”.
6. Leave “**Type of control**” set to “**inverse**”.

0:00 dd.mm.yy		Output - HW-Pump 2/2	
Stop control	- 0.0% +	^	
Min. control	- 20.0% +		
Max. control	- 100.0% +		
Type of control	inverse	> v	

7.10 Buffer charging station pump

only charging modules LEA/MIA, LEA-SL/MIA-SL and PIA/PIA-SL (only with SolvisPia 13/17)

7.10.1 Adjustment options

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

7.10.2 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**”.

7.11 Heating circuit pumps

Starting up the heating circuit pumps

1. Bleed the heating circuits and heating circuit pumps for the external heating circuit stations.
2. Perform hydraulic balancing on the heating circuits.
3. Set the desired control type and necessary delivery height on the heating circuit pumps (see the heating circuit station installation instructions).

7.12 Basic settings

Carrying out the basic settings

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

1. Perform the SolvisControl basic settings.



- → Chapter "Skid control"
- → Chapter "Plausibility check" and
- → Chapter "Saving the data" in the operating instructions (BAL-SBSX-3-I).

7.13 Final Tasks

7.13.1 Check

Testing the hot water temperature

1. Test the hot water temperature of a tap.



If the water is not warm enough, see also → Chapter "Troubleshooting" in the operating instructions (BAL-SBSX-3-I).

7.13.2 Fitting the protective cover

Attaching the protective cover

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

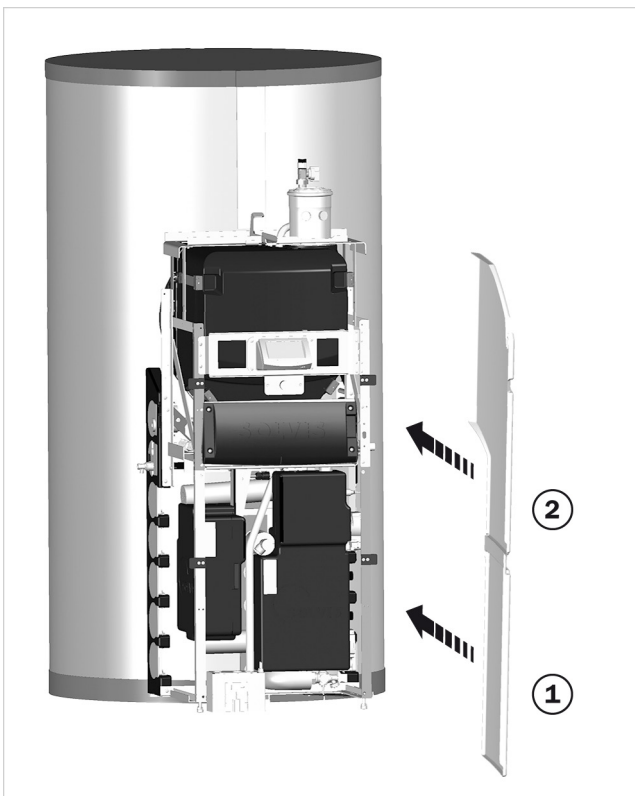


Fig. 132: Insert the lower side part (1) first.

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



Fig.133: Nameplate (1) attached to the insulation

7.13.3 Handover

Handing the system over to the operator

1. Instruct the system operator in the specialist operation of the control.
2. Explain the settings for heating, hot water and circulation.
3. Explain how to work with the room control module.
4. Notify the system operator of the annual maintenance obligation.
5. Hand over the systems folder.

8 Maintenance

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



- Maintenance must be performed by a specialist and documented in the maintenance report.
- Store the maintenance report in the systems folder in the vicinity of the system.

8.1 General maintenance

Checking the general condition (annually)

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

Bleeding the storage tank



WARNING

Sudden steam blasts that occur when bleeding the storage tank can be hazardous.

Risk of scalding hands and face.

- Use a hose and suitable collecting vessel for safe bleeding.

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

Checking the safety functions

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

Testing the admission pressure on the expansion vessel (MEV)

1. Shut off the MEV at the cap valve.
2. Open the boiler filling and emptying valve at the MEV connection group and depressurise the MEV.

The heating water that is discharged from the MEV can be collected for the subsequent pH value measurement.

3. Check the filling pressure at the MEV air valve using a test manometer.

Depending on the system height, the filling pressure should be 1.5 to 2.0 bar (see the start-up report); if necessary, correct the container pressure.

4. Close the boiler filling and emptying valve and open the cap valve.

Checking the pH value of the heating water

1. Check the pH value of the heating water; it must be within a range of 8.2 to 8.5.
2. If it is not within the pH value range, treat the heating water appropriately.

Checking the filling pressure on the heating system

1. If necessary, readjust the filling pressure of the heating system.

The system pressure should be within a range of 2.0 to 2.5 bar.

2. Check all connections for leak tightness (visual inspection).

Flushing the hot water heat exchanger, if necessary

Only flush if contamination or calcification leads to an interruption in the hot water supply. Disconnect the heat exchanger from the mains before flushing it.

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



WARNING

Handling acids and alkalis can be hazardous.

Risk of acid burns on hands and face.

- Observe the safety data sheet.
- Observe the specified safety measures.
- Wear work clothing that covers the body and safety boots.
- Use personal protective equipment (PPE).

8.2 Gas burner maintenance

8.2.1 Condensate siphon

Check the condensate siphon

1. Remove front and side casing.
2. Remove the upper screw connection of the siphon on the flue duct elbow and pull down the siphon.
3. Check and flush the condensate siphon.
4. Fill the siphon with water.
5. Check whether fluid can be discharged without hindrance. The condensate hose must be at a steady incline downward from the siphon to the discharge.

8.2.2 Gas burner

SolvisMax Gas and Gas Hybrid only



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

Removing the burner

1. Shut off the fuel supply.
2. Completely remove the front casing.
3. Remove the front flange insulation.
4. Remove the hoses on the exhaust measuring device.
5. Remove the exhaust line from the exhaust heat exchanger.
6. Disconnect the fuel supply.
7. Pull the eSTL connector out of the immersion tube.
8. Loosen the 3 nuts.
9. Remove burner and hang it in the installation holder.

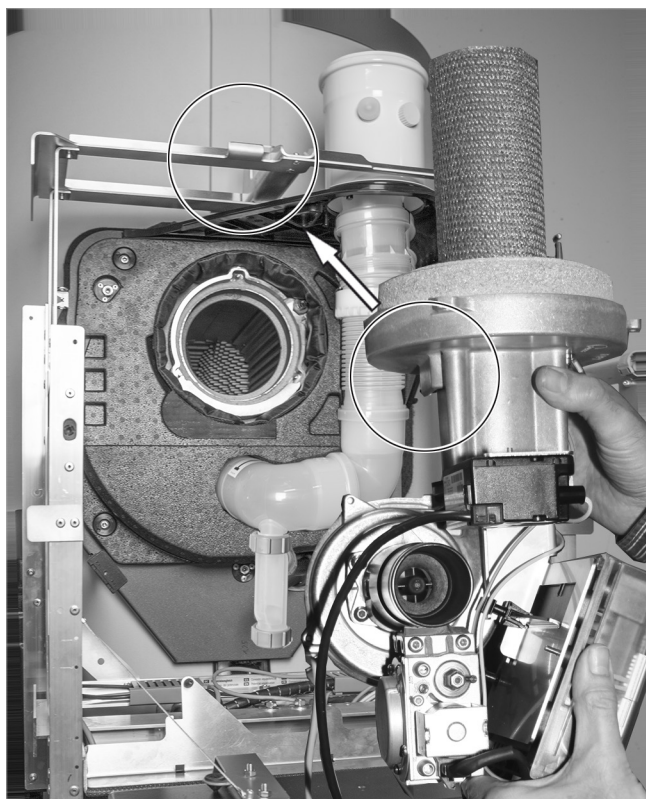


Fig. 134: Burner in maintenance position on the console

Cleaning the combustion chamber and condensation channel

1. Wipe out the combustion chamber without using liquids, or vacuum it.

Cleaning with liquids is not recommended.

2. Clean the condensation channel with a brush.

Checking the ignition and ionisation electrodes

1. Check the clearance of the ionisation electrode using an electrode gauge → Fig. 136 (2) (if necessary,

correct it through careful bending).

Distance to burner fleece:

- Ionisation electrode → Fig. 135 (1): 7.25 mm
- Ignition electrode → Fig. 135 (2): 6.9 mm
- Electrodes below one another → Fig. 136 (1): 3.5 mm

2. Assemble the burner in the reverse order as described above.

3. Switch on the voltage supply.

To carry out the following steps, log on to the SolvisControl as the installer.

4. Open the maintenance function. ("Installer" menu → "Heating" → "Maintenance function"); see → on section "Maintenance" in the BAL-SBSX-3-I operating instructions.
5. Start "Min. burner performance" in maintenance function.

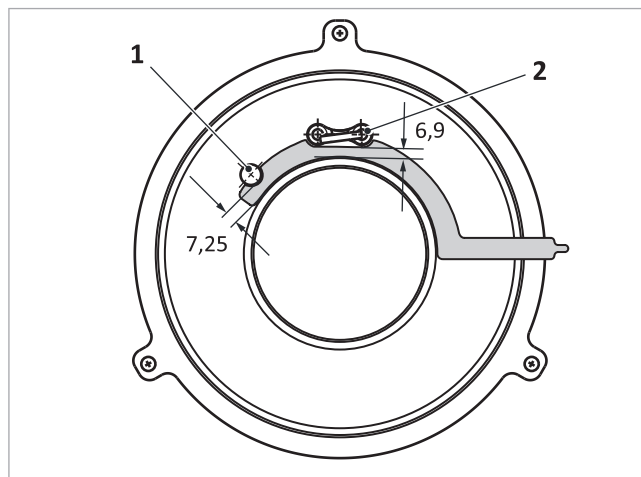


Fig. 135: Clearance from ionisation electrode and ignition electrode to burner tile

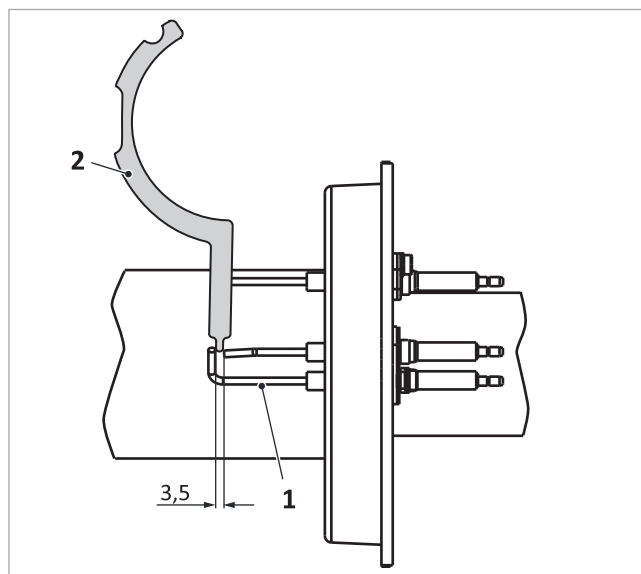


Fig. 136: Clearance from electrode to gauges on the ignition electrode

Fitting the burner

1. Attach the burner to the pre-fitted threaded bolts with the "Top" marking facing up.
2. Fasten the burner flange with the three nuts supplied.
3. Tighten the nuts evenly using an 8 mm socket spanner.

Checking exhaust values

1. Check the exhaust values for the minimum and maximum performance level and adjust, if necessary, see → Chapter "Start-Up", P. 54 or → tab. "Burner performance setting values", P. 82.

Checking the gas supply line

1. Check the gas supply line for leaks.

Checking the exhaust system

1. Check the exhaust system for leak tightness and correct positioning (with the housing closed, measure the annular gap for concentric exhaust systems).
2. Replace the seal on the exhaust connection of the combustion chamber.

Plug the electrical safety temperature limiter (eSTL) into the combustion chamber

The eSTL is connected to the burner by a red cable.

1. Push the screw connection and insert onto the cable.
2. Insert the eSTL into the immersion tube on the top right of the combustion chamber as far as it will go (front tip of the eSTL approx. 15 cm deep).
3. Tighten the screw fitting.



Fig. 137: Inserting the eSTL

8.3 Oil burner maintenance

8.3.1 Condensate siphon

Check the condensate siphon

1. Remove front and side casing.
2. Remove the upper screw connection of the siphon on the flue duct elbow and pull down the siphon.
3. Check and flush the condensate siphon.
4. Fill the siphon with water.
5. Check whether fluid can be discharged without hindrance. The condensate hose must be at a steady incline downward from the siphon to the discharge.

8.3.2 Parking position

Setting down the burner (parking position)

If you have to disassemble the burner for maintenance or repair purposes, proceed as follows to set it down:

1. Hang the supplied support hook onto the side of the frame.

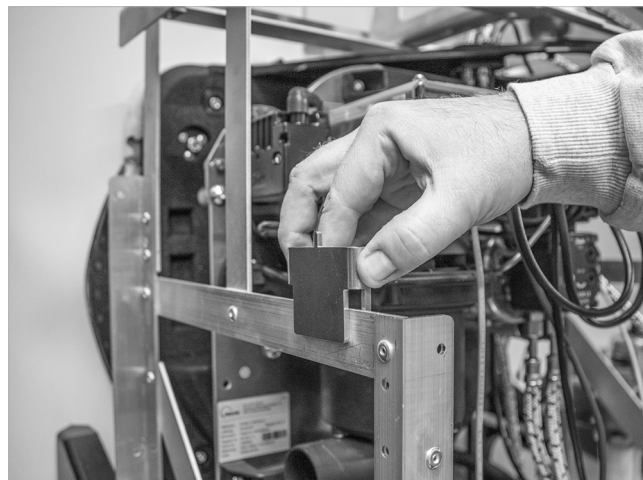


Fig. 138: Hanging the support hook

2. Suspend the burner in the support hook (parking position).

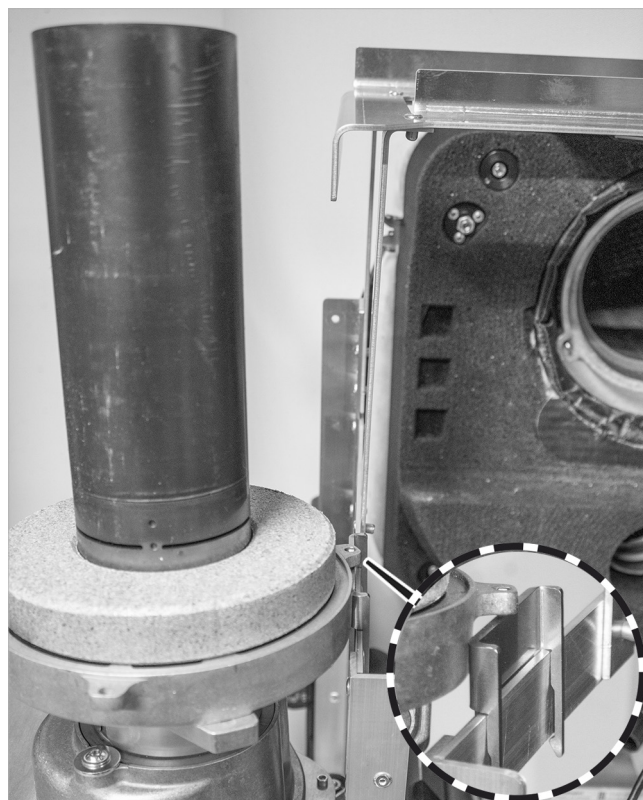


Fig. 139: Burner in parking position

8.3.3 Oil burner

SolvisMax Oil and Oil Hybrid only



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

Removing the burner

1. Shut off the fuel supply.
2. Completely remove the front casing.
3. Remove the front flange insulation.
4. Remove the air supply hose on the burner.
5. Disconnect the burner cable on the SC-3 mains circuit board.
6. Remove the 5 quick release screws on the burner insert.
7. Remove the burner insert and lay it down.

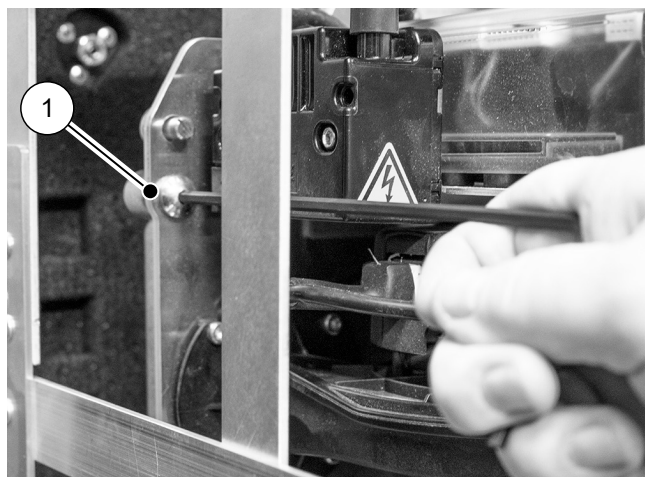


Fig. 140: Quick release screws on the burner insert

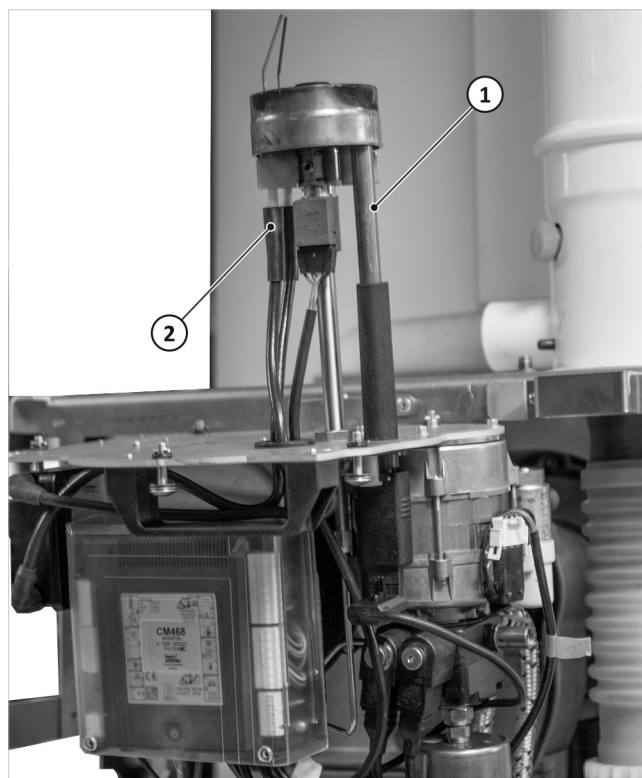


Fig. 141: Attaching the burner to the console

- 1 Viewing sleeve for the flame monitor

Replacing the oil nozzle



- Replace the oil nozzle once a year.
- Only use the specified oil nozzle.

1. Loosen the Allen screw (1) on the mixing head.
2. Pull both ignition cables off of the ignition electrodes.
3. Remove the mixing head (2).
4. Use an open-end wrench to secure the nozzle fitting and prevent it from turning. Use a size 16 **ring spanner** to loosen the oil nozzle.
5. Replace the oil nozzle.

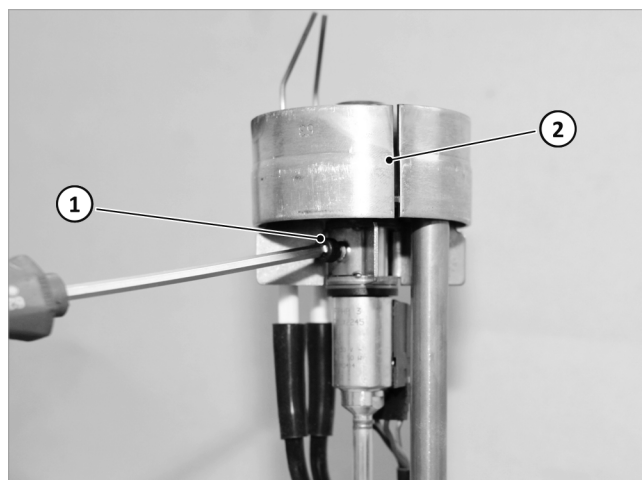


Fig. 142: Mixing head on nozzle fitting

Check the viewing sleeve

1. Remove the viewing sleeve; see → Fig. 141 (1).
2. Check window for contamination; clean if necessary.
3. Attach the sleeve.

Setting the nozzle offset

- Adjust the spacing between the oil nozzle and the front edge of the air nozzle (nozzle offset) to 2.2 mm using the setting gauge.

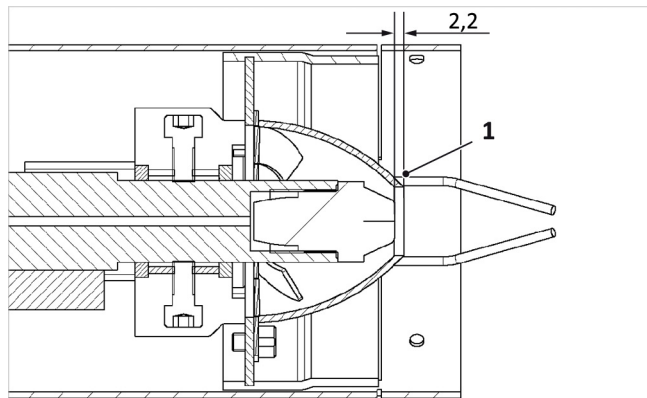


Fig. 143: Cross section of mixer head

1 Nozzle offset (2.2 mm)

1. Attach the setting gauge to the air nozzle.
2. Push the mixer head, including the attached setting gauge, against the oil nozzle and secure it with screws.
3. Afterwards, check the nozzle spacing using the setting gauge.

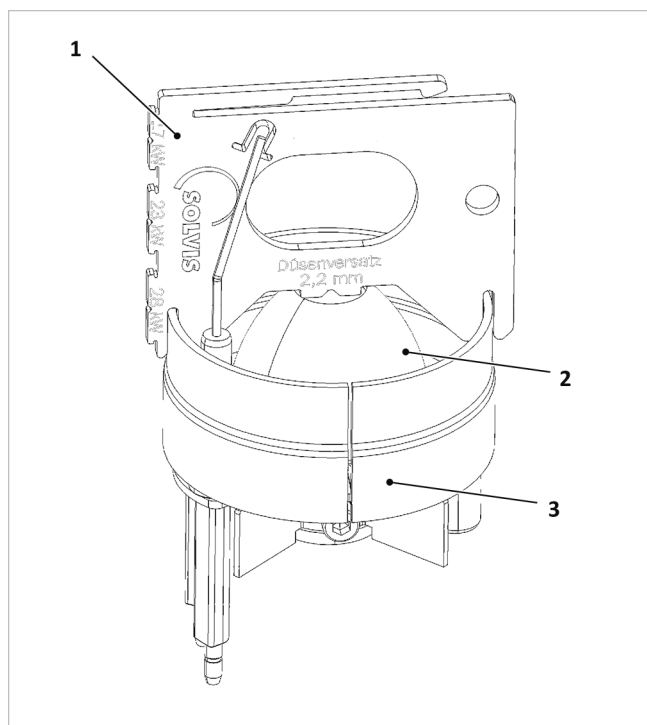


Fig. 144: Mixer head with the setting gauge attached

1 Setting gauge 3 Mixer head
2 Air nozzle

4. Reassemble the nozzle fitting in the reverse order.
5. Remount all the elements in the reverse order.

Check the ignition electrodes

1. Check the position of the electrodes (3) as shown in → Fig. 145 and correct by bending them, if necessary.
2. Check the minimum length. The lower end of the control window (2) of the setting gauge specifies the minimum length of the ignition electrodes. If the electrodes are only slightly longer, they should be replaced.

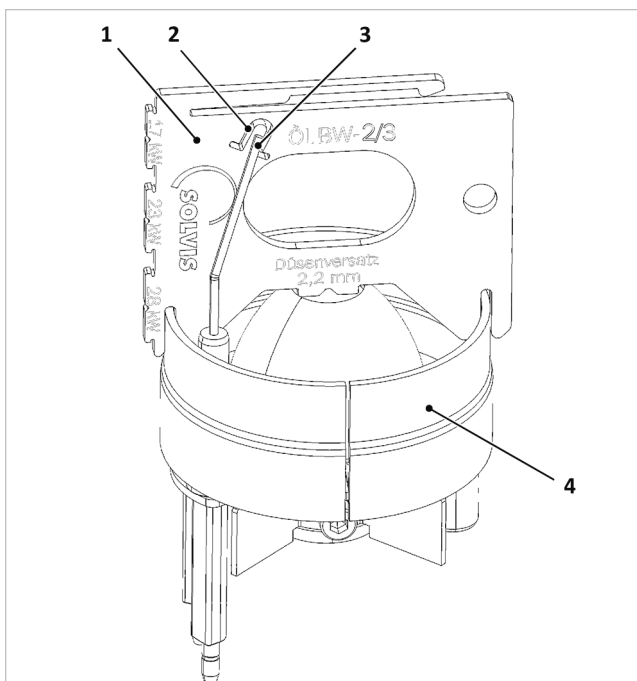


Fig. 145: Check the ignition electrodes

1 Setting gauge 3 Ignition electrodes
2 Control window 4 Mixer head

3. Check the electrode gaps as shown in → Fig. 146 and correct by bending them, if necessary.

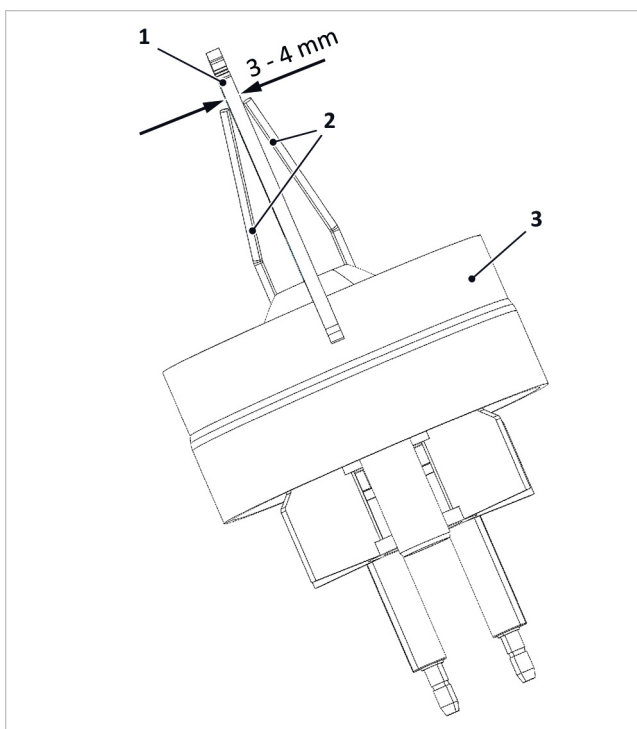


Fig. 146: Checking the ignition electrode gaps

1 Setting gauge 3 Mixer head
2 Ignition electrodes

Checking the flame tube

1. Check the flame tube for contamination and damage, and clean or replace as necessary.

Fitting the burner

1. Slide the burner insert into the combustion chamber.
2. Secure the burner insert with the quick release screws.
3. If the eSTL was removed during maintenance, refit it.

Replacing the oil filter insert**CAUTION**

Pay attention to the oil filter mesh.

- Only use oil filters with a filter mesh < 20 µm.

1. Remove the old oil filter insert.
2. Screw the new oil filter insert in tightly.
3. Before closing, fill the oil filter container with oil.

Check the ignition behaviour of the burner.

1. Open the oil supply and switch on the system.
2. Check that the burner ignites flawlessly.

Checking the oil supply line

1. Check the entire oil supply line for leaks.

Checking exhaust values

1. Check the exhaust values for the minimum and maximum performance level and adjust, if necessary, see → Chapter "Start-Up", P. 54 or → tab. "Burner performance setting values", P. 82.

Checking the exhaust system

1. Check the exhaust system for leak tightness and correct positioning (with the housing closed, measure the annular gap for concentric exhaust systems).
2. Replace the seal on the exhaust connection of the combustion chamber.

8.4 Solar system maintenance



WARNING

Risk of hot steam escaping when working on the solar system

Scalding of hands and face possible.

- Carry out work on solar syst. only when there is no direct sunl. or when collect. are covered.



CAUTION

Hot surfaces

Risk of burns without proper attention.

- The solar lines, primary tank and expansion vessel may become hot during operation.

Checking the solar liquid (annually)

1. Bleed the solar circuit and take a sample at the deaerator at the same time.
2. Perform a visual check and odour check. Replace the solar liquid if there is a pungent odour or dark colour.
3. Check the antifreeze using the antifreeze refractometer. (The antifreeze limit must not exceed -23 °C).
4. Test the pH value with a test strip. (If the pH value is below 8.0, replace the solar liquid.)
5. Check the solar operating pressure.

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

1. Close the cap valve (2, see → Fig. 127, P. 59) on the solar expansion vessel.
2. Open the BFD valve on the cap valve and drain the water supply from the expansion vessel.
3. Check the admission pressure on the valve of the expansion vessel and refill with nitrogen if necessary; see → "Setting the admission pressure on the solar expansion vessel", Chapter "Solar expansion vessel", P. 44.
4. Close the drain valve.
5. Open the drain valve.
6. Refill the water supply.
7. Check the final pressure once heating is complete.

Checking the flow (every 2 years)

1. Switch on the solar pump (manual mode).
2. Check the flow at the flow meter on the primary solar circuit (collector circuit).

Checking the sensor values

1. Check that the temperatures measured at the solar heat transfer station are plausible.
2. Check that temperatures measured on collector sensor the storage tank reference sensor are plausible.

Checking the solar circuit

1. Check all the components and safety valves on the solar station for leaks and ensure that they are functioning properly.
2. Visually check the collector(s), pipe lines, and associated insulation.
3. Check that the collector mounting system is positioned and functioning correctly.

8.5 Cleaning the surfaces



CAUTION

Handle the system surfaces carefully.

Cleaners can damage the surface.

- Do not use caustic or solvent-based cleaners to clean the outer cover.
- Remove dirt with a soft, damp cloth.

Cleaning surfaces

Dampen and wipe off visible surfaces with water and a neutral conventional household cleaner. Regular cleaning prevents dirt from setting and becoming difficult to remove. It is better to wipe the surfaces little and often than to wipe excessively but less often.

9 Troubleshooting

9.1 Pumps

9.1.1 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

9.1.2 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.	

9.1.3 IMP pump error 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

9.1.4 Bleeding

If air problems still occur in a pump even after checking the system pressure (see → *Chapter "Filling the system (pressure test)" on Page 54*), the WWS, PLAS or SÜS PWM pumps can be bled as described in → *Chapter "Bleeding the pump" on Page 61*.

9.2 Gas burner



If the system is behaving illogically, reinitialise the system by switching it off and then back on again at the main switch.

Burner does not start

If the burner does not start despite a heating requirement, a malfunction message appears:

- **"F090 Bus timeout"**: The voltage supply is interrupted. Check whether A12, L and N are connected or whether the fuse between 1 and ST is blown.
- **"F004 No flame" or: "F132 No flame formation, lock-out"**: No flame formation at burner start. L and N are reversed on A12 or directly in the main supply.



If the burner does not start, the automatic firing system may be in the malfunction state.

- The automatic firing system must be unlocked to operate the burner again.
- The malfunction is not only displayed on the system controller but also on the automatic firing system (green flashing LED).

9.3 Unlocking the automatic firing system

Only SolvisMax Oil Hybrid

i You unlock the burner malfunction directly from the automatic firing system on the burner.

All other heat generators

Unlocking the automatic firing system

1. Press the "Reset" button on the SolvisControl.
 - If the malfunction is unlocked: continue with → *tab. "Troubleshooting" at the end of this section.*
 - If the malfunction is not unlocked: Briefly switch the main switch off and on again.
 - If the malfunction is not unlocked, there is a communication error (malfunction message F090):
2. Is communication cable (between mains circuit board and SC-3) connected?
3. Load the factory settings in SolvisControl ("Installer" menu → "Data"); see also the → "Data" section in the *BAL-SBSX-3-I operating instructions.*
4. If this does not correct the problem, please contact our customer service department; see → *tel. no. on page 2.*

i Individual system settings are reset to the delivery state when the factory setting is loaded.



Additional fault tables for room heating can be found in → "Malfunctions with heating and hot water" section in the *BAL-SBSX-3-I operating instructions.*

9.4 Unlocking the heating cartridge

SolvisMia and SolvisPia with SolvisMax Solo only

Unlocking heating cartridge malfunctions

The heating cartridge has a safety temperature limiter (mSTL) that interrupts the voltage in the event of an excessive thermal load. We recommend waiting until the heating cartridge has cooled down before unlocking the malfunction as follows:

1. Remove the front cover.
2. Where applicable, fold down the SolvisControl controller.
3. Press the button on the side of the heating cartridge connection box until it engages.



Fig. 147: Unlock button for the heating cartridge connection box

9.5 Gas burner error codes

Brief reason	Error	Description	Cause	Action by mechanic
Overheating flow	E1 / E129	E1 Safety shutdown temperature exceeded. Automatic firing system blocked for at least 60 s, automatic acknowledgement after cooling E129 Over-temperature switch-off triggered due to overheating. The safety shut-down temperature of the eSTL was exceeded.	Boiler temperature >105°C due to water shortage	Check reason
			eSTL defective or positioned incorrectly	Fully insert eSTL and check whether it works
No flame	E4 / E132	E4 Blower starts, gas solenoid valve opens (clicking), ignition, no flame or only popping	Gas valve is closed or liquid gas tank is empty	Open gas valve or fill up tank
			Gas supply flow pressure is too low	Check admission pressure at "IN" fittings of gas combination valve: must be 20 to 60 mbar
			CO2 value is not set correctly	Correct the setting (see the → "Burner settings" section in the MAL-SX-LN-3 installation instructions)
			Ignition electrode	Incorrect position → "Burner maintenance" section in the MAL-SX-LN-3 installation instructions
			Faulty ignition cable	Check cable
			Ionisation current too low	Ionisation current (→ "Burner maintenance" section in the MAL-SX-LN-3 installation instructions) Check cable and phase direction (L+N reversed), replace ionisation electrode
			Air supply or exhaust gas path blocked	Check the air supply and exhaust gas path, as well as the Venturi nozzle, and clean if necessary
			Condensate discharge not secured	Check the syphon, condensate pump and pipe (water bag)
No flame	E4 / E132	E4 Blower starts, gas solenoid valve does not open (no clicking), ignition, no flame or only popping	Contact between the ignition electrode and the burner head (e.g. fibre from fabric)	Ensure there is no contact
			Faulty gas solenoid valve	Check/replace gas solenoid valve
Flame goes out	E5 / E133	Flame goes out during stabilisation phase or operation. Malfunction message issued during forced ventilation.	Automatic firing system defective	Check/replace automatic firing system
			Deposit on ionisation electrode	Check the ionisation electrode and clean or replace it if necessary
			Condensate discharge not secured	Check the syphon, condensate pump and pipe (water bag)
			Air supply or exhaust gas path blocked	Check the air supply and exhaust gas path, as well as the Venturi nozzle, and clean if necessary
			Gas supply flow pressure is too low	Check admission pressure at "IN" fittings of gas combination valve: must be between 20 and 60 mbar
			Gas flow controller too small or faulty	Replace gas flow controller
Defective sensor	E12 / E140	Temperature sensor eSTL faulty.	Flame extinguishes due to CO in the supply air. Exhaust system leaky.	Annular gap measurement, pressure test the exhaust gas path
Premature flame formation	E139	A flame signal was registered before the burner was started.	Defective sensor	Replace eSTL
			Short circuit of the ionisation electrode	Check the cable and ionisation electrode

9 Troubleshooting

Gas burner error codes (continued)

Brief reason	Error	Description	Cause	Action by mechanic
Fan speed not achieved	E24	Fan speed not achieved in step 6 (control release)	Faulty blower or automatic firing system	Check/replace cable, plug, blower, automatic firing system
	E152	Automatic firing system locked if blower speed is not reached in steps 2, 3, 8.		
Implausible fan speed	E154	Blower did not come to a stop.	Faulty blower or automatic firing system	Check/replace cable, plug, blower, automatic firing system
Defective relay	E198	Defective relay	Defective relay	Replace automatic firing system
Incorrect mains voltage	E32	230 V voltage supply lies outside the permissible range.	Mains voltage is not 230 V or automatic firing system is faulty	If it is not possible to acknowledge the error or if it occurs with the normal mains voltage, replace the automatic firing system. Disconnect the automatic firing system from the mains – error message in message logging with “Installer” → “Messages” → “Heat generator” → “Unlock malfunction – start”
Parameter CRC error	E158, 159	Invalid EEPROM parameter for CM4 settings.	Automatic firing system defective	Replace chip card or automatic firing system
Device error	E89	CM424 did not pass the internal check.	Automatic firing system defective	Disconnect the automatic firing system from the mains, SC-3 factory reset, replace automatic firing system
Bus timeout	E90	Time-out (10s) for the cyclic bus telegram.	Automatic firing system blocked	F90 goes out automatically if communication is present. Check the status LED on the automatic firing system. Illuminated green: Voltage supply and communication present. Flashing green: Voltage supply present but no communication. Not illuminated: no voltage at the automatic firing system.
Programming mode	E95	Automatic firing system is in programming mode.	Automatic firing system blocked	Wait
Reset exceeded	E96	Too many modifications in the 0 to 1 Chipcom K1 mode bit 7 address (remote reset) within a certain period (15 min). Remote unlock deactivated.	Automatic firing system blocked	Disconnect the automatic firing system from the mains, error message in message logging with “Installer” → “Messages” → “Unlock burner malfunction” and replace automatic firing system
Internal error	E99, E227	Internal electronic error	Automatic firing system defective	Automatic firing system Reset
Activate burner chip card	E50	To activate the burner chip card, the reset button must be pushed.	Automatic firing system locked	Automatic firing system Reset
Activating burner chip card	E51	Please wait until the burner chip card has been fully activated.	Automatic firing system blocked	Wait
Cannot read burner chip card	E162, E164	The internal data of the EEPROM or the chip card is not correct.	Cannot read chip card	Replace chip card, reset automatic firing system
Burner chip card missing	E163	The activated burner chip card is no longer inserted in the automatic firing system.	Chip card missing	Insert chip card, reset automatic firing system
Burner chip card incompatible	F165	The firmware for the burner chip card and the automatic firing system are not compatible.	Incorrect chip card	Replace chip card, reset automatic firing system
Updating error	F38	Error during update.	Automatic firing system blocked	Reinitialise the system, leaving the burner disconnected from the mains. Initialise LN-3 manually. Then connect the burner to the power supply, reset the error in message logging and restart programming
Burner chip card could not be activated	E167	Error while activating the burner chip card	Automatic firing system locked	
Communication error	E48	Communication between the automatic firing system and the interface is faulty	Automatic firing system locked	Check the cable and connector between the automatic firing system and the interface, replace if necessary, reset automatic firing system

9.6 Oil burner



If the system is behaving illogically, reinitialise the system by switching it off and then back on again at the main switch.



Additional fault tables for room heating can be found in → “Malfunctions with heating and hot water” section in the BAL-SBSX-3-I operating instructions.



If you would like to receive a comprehensive checklist for systematic troubleshooting, please contact Solvis customer service (extension: 222).



The program sequence is displayed next to “Program step” in “Installer” → “Burner” in the menu.

9.6.1 Program sequence display

Program sequence

Display	Program status	Explanation
0	Standby	Waiting for heating requirement
1	Preheating	Oil preheater is “on”; waiting for oil preheater thermostat
2	Operating contact check	Blower speed check for preaeration
3	Preflushing time	Blower runs at preflushing speed
4	Waiting for ignition speed	Blower speed check for ignition speed
5	Pre-ignition time	Ignition and oil pump motor are “on”; blower runs at ignition speed
6	Safety period	Solenoid valves 1 and 2 are “open”; blower runs at ignition speed
7	Flame stabilisation time	Blower runs at flame stabilisation speed
8	Controller enable	Blower runs at level 1 or 2; independent of the heating requirement
9	Waiting for the post purge	Fan speed check for post-purge speed
10	Post-purge	Fan runs at post-purge speed
11	Waiting for forced purge (only in malfunction mode)	Fan speed check for forced purge speed
12	Forced purge (only in malfunction mode)	Fan runs at forced purge speed

9.6.2 Table of malfunctions by symptom

Malfunction	Cause	Malfunction code	Remedy
Burner does not start	Power supply interrupted		Check fuse and plug
	No BUS communication	F90 F255	Check BUS cable
	Safety thermostat (eSTL) has been triggered	F1 F129	Unlocking the automatic firing system
	No burner requirement from controller		Check requirement signal or controller settings
	Defective oil preheater	F143	Check oil preheater; replace if necessary
Burner switches to fault during preaeration	Stray light / flame detected when there is no flame	F139	Check flame monitoring and solenoid valves
			White deposits on the flame tube. Clean.
	Blower defective / blower speed not achieved	F24 F152 F154	Check blower, power and signal cables, and replace if necessary
Burner starts but no flame is created	Ignition transformer switches off	F4 F132	Check the ignition system and the position of the ignition electrodes, and replace any faulty parts
	Normal function sequence, no burner start		Check nozzle offset and adjust if necessary
			Defective oil nozzle; replace
	Exhaust gas path blocked, condensate does not drain		Check exhaust system for blockages, and clean if necessary
	Clean the syphon and condensate line; check condensate lifting pump		
	Solenoid valve does not open		Replace the solenoid coil or the entire solenoid
	Air in the oil supply, flame pulses		Check oil supply, provide for bubble-free, clean oil
	No oil being supplied		Oil pump defective, coupling sheared off, capacitor defective; replace if needed
			Oil preheater blocked, replace if necessary
			Open/check oil valves (e.g. syphon protection valves)
			Filter or oil pipe blocked, clean or replace if necessary
			Check oil level in tank
Ignition transformer switches off	Replace ignition transformer, check setting		

9 Troubleshooting

Fault table (continued)

Malfunction	Cause	Malfunction code	Remedy
Burner starts but goes out after a short time (flame extinguished)	Incorrect combustion settings	F5 F133	CO2 below 12.5%; calibrate burner according to setting table (see → table "Burner performance setting values", p. 82).
	Burner does not seal to boiler door		Fan speed/oil pressure too high; calibrate burner in setting range according to setting table; see → table "Burner performance setting values", p. 82
	Solenoid valves falling off		Check fastening and seal on combustion chamber
	Flame monitor defective or dirty		Replace the solenoid coil or the entire solenoid
Measured CO value too high	Nozzle dirty or sprays at an angle		Clean or replace flicker detector and viewing tubes
	Air in the oil supply, flame pulses		Replace nozzle
	Exhaust system leaky		Check oil supply, provide for bubble-free, clean oil
	Throughput in the nozzle too high (pump pressure too high)		Measure the annular gap
	Incorrect combustion settings		Check the size of the oil nozzle/air nozzle as per the setting table (see → table "Burner performance setting values", p. 82)
Mechanical noise	Air in the oil pump		CO2 too high, calibrate burner according to setting table, see → table "Burner performance setting values", p. 82
	Bearing damage on blower/motor		Check oil line and filter; seal or replace if needed
Loud combustion noises	Silencers not fitted		Replace motor
	Incorrect combustion settings		Fit the supplied silencers according to the installation instructions
			Oil pressure and blower compression in level 1 too low, observe minimum values according to setting table (see → "Burner performance setting values", p. 82)

9.6.3 Table of malfunctions by error message

Brief reason	Error	Description	Cause	Action by mechanic
Overheating flow	F1	Safety shutdown temperature exceeded. Automatic firing system blocked, automatic acknowledgement after cooling	Boiler temperature above 105° C	Check reason
	F129	Safety shutdown temperature exceeded. Automatic firing system locked.		
			eSTL defective or positioned incorrectly	Fully insert eSTL and check whether it works
No flame	F4	Burner starts up but no flame is formed during safety period. Another attempt to start burner	Various	See the "Table of malfunctions by symptom"
	F132	Burner starts up but no flame is formed. Automatic firing system locked		
Flame loss	F5	Flame goes out during stabilisation phase or operation. Another attempt to start burner	Various	See the "Table of malfunctions by symptom"
	F133	Flame goes out during stabilisation phase or operation. Automatic firing system locked		
No sensor	F12, F170	eSTL defective, automatic firing system locked		Check/replace eSTL
Fan speed not achieved	F24	Fan speed was not reached in program step 7 or 8.	Faulty blower or automatic firing system	Check/replace cable, plug, blower, automatic firing system
	F152	Fan speed not reached in program steps 3, 4, 9, 10, 11, 12. Automatic firing system locked		
Inadmissible mains voltage	F32	230 V voltage supply lies outside the permissible range. Automatic firing system blocked	Mains voltage is not 230 V or automatic firing system is faulty	If it is not possible to acknowledge the error or if it occurs with the normal mains voltage, replace the automatic firing system.
Failure re-update	F38	Error during update. Automatic firing system blocked	Automatic firing system blocked	Power off the burner and then restart it
Product failure	F89	Internal error	Automatic firing system defective	Replace automatic firing system

Fault table (continued)

Brief reason	Error	Description	Cause	Action by mechanic
Bus timeout	F90	Communication between the automatic firing system and SolvisControl disrupted or interrupted. Automatic firing system blocked		extinguishes automatically if communication is present. Check status LED on the automatic firing system. Illuminated green: Voltage supply and communication present. Flashing green: Voltage supply present but no communication. Not illuminated: no voltage at the automatic firing system.
	F255	Communication between the automatic firing system and SolvisControl disrupted or interrupted.		Check BUS communication cable and initialisation
Programming mode	F95	Programming mode active		Wait
Reset exceeded	F96	Remote unlock error: more than 5 remote unlocks in 15 min; remote unlock is deactivated.		Power off the automatic firing system and unlock the malfunction if necessary
Flame simulation	F139	Stray light/flame detected when there is no flame. A flame signal was registered before the burner was started. Automatic firing system locked	Various	See the "Table of malfunctions by symptom"
Oil preheater timeout	F143	Oil preheater timeout	Faulty oil preheater or automatic firing system	Check/replace cable, oil preheater, automatic firing system
Defective relay	F148	Defective relay	Defective relay	Replace automatic firing system
Implausible fan speed	F154	Fan speed not reached in downtime	Faulty blower or automatic firing system	Check/replace cable, plug, blower, automatic firing system
Parameter CRC error	F158, F59	Invalid EEPROM parameter for CM4 settings.	Automatic firing system defective	Replace chip card or automatic firing system
Programming mode	F95	Automatic firing system is in programming mode.	Automatic firing system blocked	Wait
Reset exceeded	F96	Too many modifications in the 0 to 1 Chipcom K1 mode bit 7 address (remote reset) within a certain period (15 min). Remote unlock deactivated.	Automatic firing system blocked	Power off the automatic firing system, unlock the error message in message logging by pressing "start" next to "Unlock burner malfunction" in the menu "Installer" → "Messages" → "Heat generator" and replace the automatic firing system
Internal error	F99, F216, F227	Internal electronic error, automatic firing system locked	Automatic firing system defective	
CRC failure BBC	F162, F164	The internal data of the EEPROM or the chip card is not correct. Automatic firing system locked	Cannot read chip card	Replace chip card, reset automatic firing system
Burner chip card missing	F163	The activated burner chip card is no longer inserted in the automatic firing system. Automatic firing system locked	Chip card missing	Insert chip card, reset automatic firing system
Burner chip card incompatible	F165	The firmware for the burner chip card and the automatic firing system are not compatible. Automatic firing system locked	Incorrect chip card	Replace chip card, reset automatic firing system
BCC system failure	F167	Error while activating the burner chip card	Automatic firing system locked	Power off the burner and reinsert the BCC. Perform a reset after the restart

9.7 Heating pump



For fault messages for the heat pumps, see → *Installation instructions for the respective heat pump*:

- *Installation SolvisLea (MAL-LEA)*
- *Installation SolvisLea 8.3 Premium (MAL-LEA-8P)*
- *Installation SolvisLea Pro (MAL-LEA-PRO)*
- *Installation SolvisMia (MAL-MIA)*
- *Installation SolvisPia (MAL-PIA/MAL-PIA-1317)*

10 Technical Data

10.1 Storage tank

SolvisMax technical data

Name	Abb.	Unit	457	757	957
Rated volume		[litre]	450	750	950
Actual volume		[litre]	470	718	909
Empty weight incl. heat exchanger insert and pallet (as delivered)		[kg]	Approx. 130	Approx. 150	Approx. 165
Overall weight of the solar heating system, filled*		[kg]	Up to 670*	Up to 940*	Up to 1150*
Storage tank distribution					
Hot water standby volume		[litre]	96	171	82 / 212 / 301 Provision re- garding sensor positioning
Heating buffer volume		[litre]	22	34	34
Solar buffer volume		[litre]	352	512	793 / 663 / 574
Tank					
Tank material		–	S235JR, primed exterior, raw interior		
Heating flow/return connection		–	28 mm pipe		
Cold/hot drinking water connection		–	28 mm pipe		
Operating limits					
Maximum operating pressure		[bar]	3		
Maximum operating temperature		[°C]	95		
Maximum heating flow/return volume flow		[m³/h]	2		
Dimensions					
Maximum width (including insulation)	D	[mm]	870	1020	
Maximum depth	T	[mm]	1380	1550	
Maximum height	H	[mm]	1800	1920	2300
Tilt height without insulation	k	[mm]	1670	1760	2140
Diameter without insulation	d	[mm]	650	790	
Exhaust connection height	A	[mm]	1569		
Centre of exhaust elbow to back of insulation	U	[mm]	1064	1210	
Minimum front spacing		[mm]	500		
Minimum side/rear spacing		[mm]	300		

* Weight of the heaviest variant without accompanying heat generator; other variants (SolvisMax Solo, SolvisMax Gas, etc.) may be lighter.

Dimensions of the system

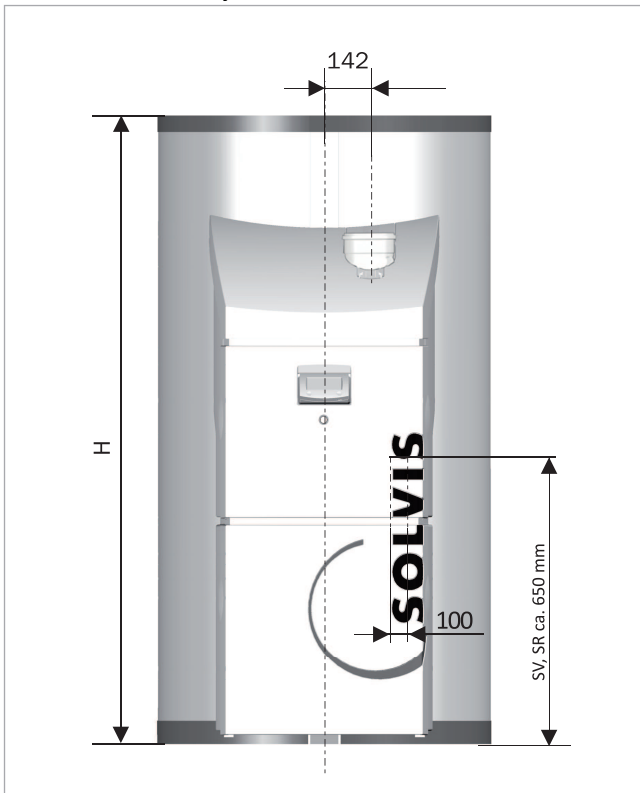


Fig. 148: Front view

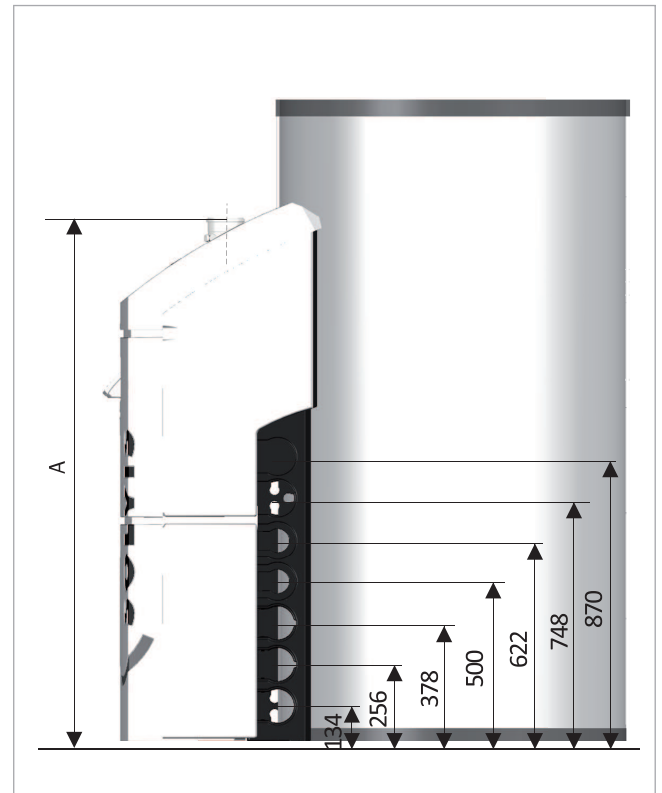


Fig. 150: Side view

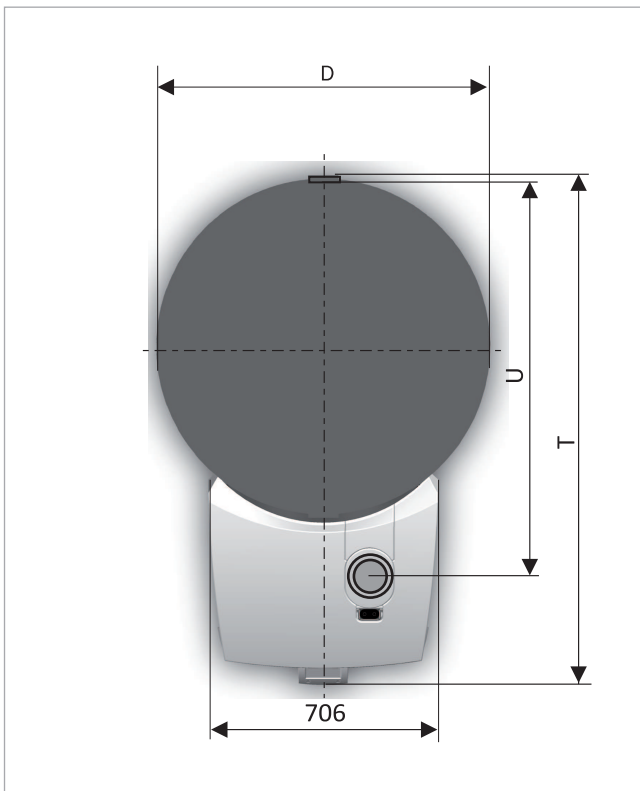


Fig. 149: Top view

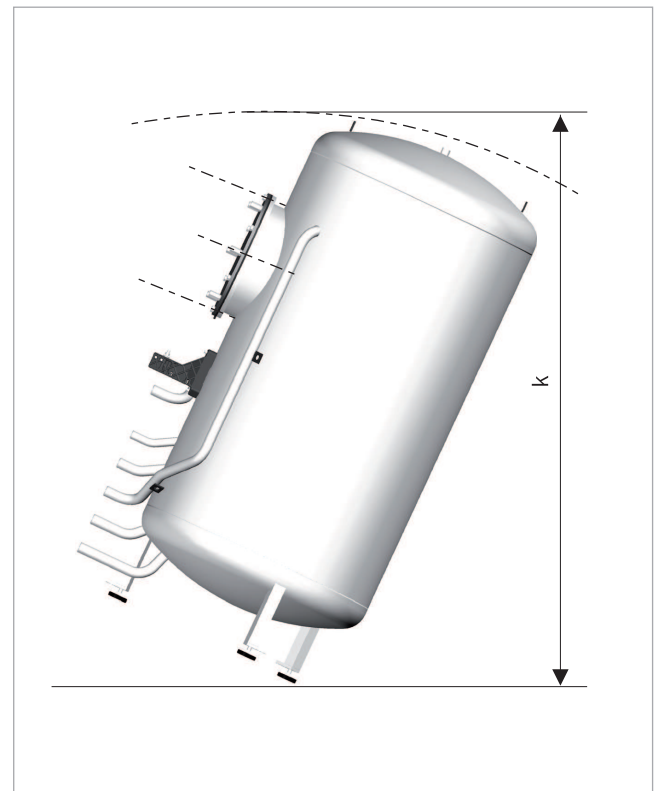


Fig. 151: Tilt height

10.2 Burner

10.2.1 Gas burner

Combustion data

Burner performance	Unit	1.9 to 10 kW	2.9 to 18 kW	4.8 to 25 kW	4.8 to 30 kW
Product ID number	–	CE-0085AS0280			
Fuel	–	Natural gas/liquid gas ⁽¹⁾			
Burner type	–	Blower burner			
Rated heat load (burner performance)	kW	1.9 to 10	2.9 to 18	4.8 to 25	4.8 to 30
Rated heat output (boiler performance) P _n at 80/60°C	kW	1.9 to 9.9	2.9 to 17.8	4.7 to 24.4	4.7 to 29.2
Exhaust temperature at 80/60°C and max. performance	°C	56	67	74	60
Exhaust temperature at 80/60°C and min. performance	°C	51	58	60	60
Exhaust gas mass flow at 80/60°C and max. performance	g/s	4	8	11	13
Exhaust gas mass flow at 80/60°C and min. performance	g/s	1	1	2	2
Max. supply pressure at boiler end	Pa	84	135	125	158
Installation types according to TRGI	–	B ₂₃ / B ₃₃ / C _{13x} / C _{33x} / C _{43x} / C ₅₃ / C _{63x} / C _{83x} / C _{93x}			
CO ₂ content with natural gas at max. performance	%	9,9 - 10,5			
CO ₂ content with liquid gas at max. performance	%	12,0 - 12,6			
CO standard emission factor*	mg/kWh	21.8	6.9	7.4	4.4
NO _x standard emission factor*	mg/kWh	52.3	46	35	42
NO _x class	–	5	5	5	5
Burner noise indoors (distance of 1 m and max. performance**)	dB (A)	45	53	51	58
Burner noise indoors (distance of 1 m and min. performance**)	dB (A)	31	38	34	34
Exhaust support diameter	–	DN 80			
Electrical power consumption at min./max. performance ⁽²⁾	W	18 / 27	17 / 49	19 / 43	19 / 58
Gas flow rate***	m ³ /h	1,01	1,92	2.64	3,18

⁽¹⁾ The UBS-SX-LN-3-xx conversion kit is required for operation with liquid gas; ⁽²⁾ overall current consumption for burner including control (with concentric exhaust system), ^(*) weight in accordance with DIN 15502, ^(**) according to ISO 3744, ^(***) Data for natural gas H

10.2.2 Oil burner

Combustion data

Combustion data

Burner type	10/17 kW		14/23 kW		20/28 kW	
	Level 1	Level 2	Level 1	Level 2	Level 1	Level 2
Product ID number	CE-0085BP0376					
Installation types according to TRGI	B ₂₃ / B ₃₃ / C ₁₃ / C ₃₃ / C ₄₃ / C ₅₃ / C ₆₃ / C ₈₃ / C ₉₃					
Rated heat output (boiler perform. at 50/30 °C)	10.5 kW	17.0 kW	14.4 kW	23.4 kW	20.8 kW	27.0 kW
Rated heat output (boiler perform. at 80/60 °C)	10.0 kW	16.0 kW	13.4 kW	21.7 kW	19.5 kW	25.0 kW
Rated heat load (burner performance)	10 kW	15 to 17 kW	14 kW	20 to 23 kW	20 kW	26 to 28 kW
Standard utilisation ratio ⁽¹⁾	104.6 %	104.6 %	104.1 %	104.1 %	103.1 %	103.1 %
Partial perform. degree of efficiency at 23/21 °C	105.1 %	105.1 %	104.4 %	104.4 %	-	-
Boiler degree of efficiency at 80/60 °C ⁽¹⁾	97.4 %	96.3 %	—	95.8 %	95.2 %	94.6 %
Boiler degree of efficiency at 50/30 °C ⁽¹⁾	103.1 %	102.6 %	—	101.7 %	101.3 %	100.5 %
Exhaust temperature at 80/60 °C ⁽²⁾	62 °C	63 °C	63 °C	64 °C	64 °C	69 °C
CO ₂ for calculating the exhaust routing	13.5 %	13.5 %	13.5 %	13.5 %	13.5 %	13.5 %
CO	9 mg/kWh	10 mg/kWh	14 mg/kWh	15 mg/kWh	23 mg/kWh	36 mg/kWh
CO standard emission factor	3 mg/kWh	3 mg/kWh	5 mg/kWh	5 mg/kWh	12 mg/kWh	12 mg/kWh
NO _x	64 mg/kWh	56 mg/kWh	66 mg/kWh	66 mg/kWh	70 mg/kWh	70 mg/kWh
NO _x standard emission factor	60 mg/kWh	60 mg/kWh	63 mg/kWh	63 mg/kWh	68 mg/kWh	68 mg/kWh
Exhaust gas mass flow	15.7 kg/h	26.1 kg/h	21.5 kg/h	35.1 kg/h	27.8 kg/h	40.7 kg/h
Allowable remaining pump height	70 Pa					
Energy efficiency certification ⁽²⁾	★★★★				★★★	
Soot value	0					
Fuel	EL heating oil (low-sulphur, max. 50 ppm)					
Burner type	with blower					
Exhaust support diameter	DN 80					

Results according to certification test based on DIN 303, 304, EC Efficiency Directive 92/42 EEC. ⁽¹⁾ Degree of efficiency and utilisation ratio incl. losses for water heating. ⁽²⁾ SolvisMax Oil BW thus meets the requirements of EC Efficiency Directive 92/42/EEC.

Sound pressure level

	Burner type 10/17 kW		Burner type 14/23 kW		Burner type 20/28 kW	
	10 kW	17 kW	14 kW	23 kW	20 kW	28 kW
In installation room, 1 m in front of the unit, concentric exhaust system	46 dB (A)	54 dB (A)	47 dB (A)	54 dB (A)	46 dB (A)	55 dB (A)
At exhaust outlet, 1 m away, without silencer	69 dB (A)	77 dB (A)	71 dB (A)	79 dB (A)	71 dB (A)	81 dB (A)
At exhaust outlet, 1 m away, with reflective silencer	63 dB (A)	71 dB (A)	65 dB (A)	72 dB (A)	66 dB (A)	74 dB (A)
At exhaust outlet, 1 m away, with internal pipe silencer and reflective silencer	58 dB (A)	66 dB (A)	60 dB (A)	67 dB (A)	61 dB (A)	68 dB (A)

10 Technical Data

Burner performance setting values

Required rated heat output (boiler performance)		Rated heat load (burner performance)	Oil pressure	Oil throughput	Blower pressure (for checking)
at 80/60 °C	at 50/30 °C				
[kW]	[kW]	[kW]	[bar]	[kg/h]	[mbar]

Burner type 10/17 kW:

2nd level:

16.4	17.4	17.0	19	1.43	20
15.9	16.9	16.5	18	1.39	19
15.4	16.3	16.0	17	1.35	18

1st level:

10.6	11.4	10.9	8	0.92	10*
------	------	------	---	------	-----

Burner type 14/23 kW:

2nd level:

21.7	23.4	23.0	23	1.95	28
21.3	22.9	22.5	22	1.91	26
20.6	22.1	21.9	21	1.85	25
20.3	21.8	21.5	20	1.82	24

1st level:

13.4	14.4	13.8	8	1.20	10*
------	------	------	---	------	-----

Burner type 20/28 kW:

2nd level:

27.0	28.6	28.5	19	2.41	29
26.2	27.8	27.6	18	2.34	27
25.3	26.9	26.8	17	2.26	25
24.5	26.1	25.9	16	2.19	24

1st level:

19.8	21.1	20.9	8	1.76	14*
------	------	------	---	------	-----

* Values must not fall below these minimum values for the blower pressure!

Components used

Burner variant	Oil nozzle	Air nozzle	recirculation duct
10/17 kW:	Danfoss, OD 0.30 gph, 60° S	15.5 mm	1 mm
14/23 kW:	Danfoss, OD 0.40 gph, 60°S	17.0 mm	1 mm
20/28 kW:	Danfoss, OD 0.50 gph, 60°S	18.5 mm	2 mm

10.3 Heating pump



For technical data of the heat pumps, see → *Installation instructions for the respective heat pump:*

- *Installation SolvisLea (MAL-LEA)*
- *Installation SolvisLea 8.3 Premium (MAL-LEA-8P)*
- *Installation SolvisLea Pro (MAL-LEA-PRO)*
- *Installation SolvisMia (MAL-MIA)*
- *Installation SolvisPia (MAL-PIA/MAL-PIA-1317)*

10.4 SolvisControl system controller

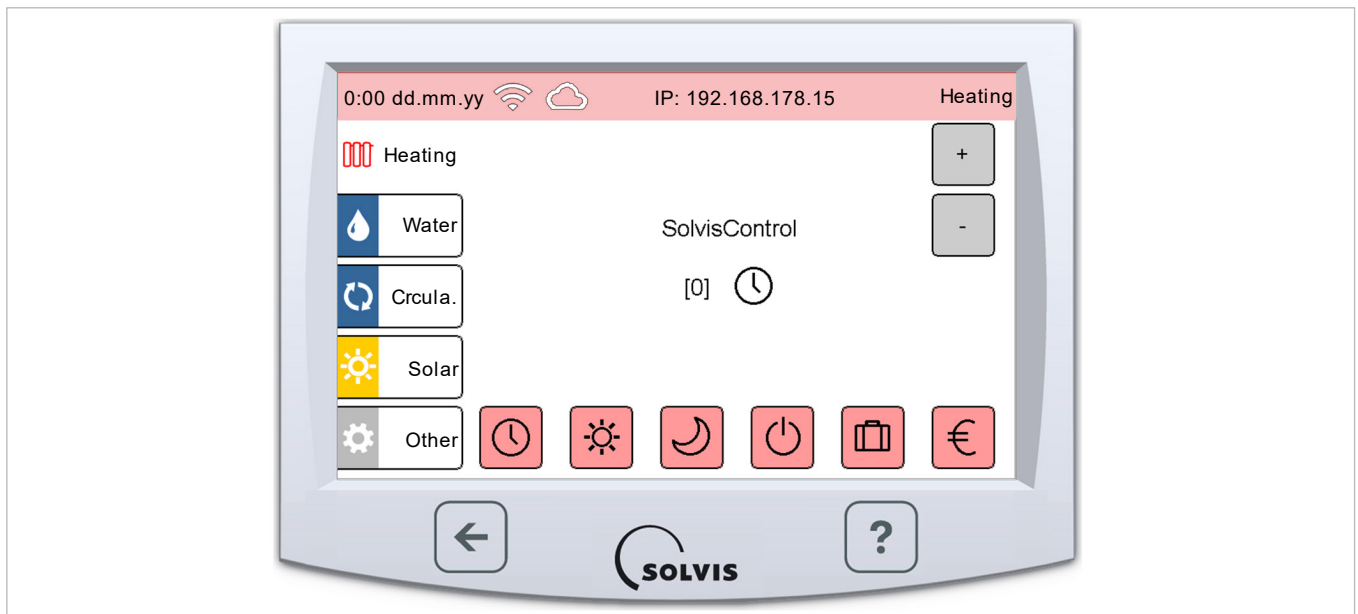


Fig. 152: SolvisControl menu display "Heating" (single heating circuit)

Connection, component, function	Features, values
Mains voltage	230 V~/50 - 60 Hz
Microfuse	M 6.3 A/230 V~ T 1.0 A/230 V~
Ambient temperature	0 - 50 °C
Rated current load	Relay outputs, max. each 230 V~/3 A, sum of currents should not exceed 6.3 A
Power consumption	Approx. 5 W (in slumber mode, without pumps)
Timer function without power supply	Buffered with a battery
Housing protection class	IP 30
Sensor type of temperature sensors	KTY 2 kOhm (except the solar flow and return, collector sensor: Pt 1000)
Sensor type of volume flow encoders	With reed contact (S17) and Sika (open collector, S18)
Temperature display	-35 to +250 °C
Display resolution	0.1 K
Measurement accuracy	± 1 K in a range from 0 - 100 °C
"==" ["=="] displayed	Sensor not connected, sensor or cable breakage
"=X=" displayed	Sensor short circuit
PWM speed control	O-1, SP1 and SP2: PWM or 0–10 V; hot water (HW) and load pump (LP): PWM
Switch output 230 V~	A1 to A13: 230 V~, A14 and ALARM: floating contact
Analogue output 0 - 10 V =	O-1, Solar 1 (SP1) and Solar 2 (SP2)
Alarm output*	Floating contact
Skid control**	Heating circuit pumps (user-defined for A1 – A14, factory setting: off)

* The alarm output only operates if the warning tone has been activated and is triggered due to a malfunction.

** Skid control: the heating circuit pumps can be individually set on the SolvisControl in such a way that they run on specific days for a certain length of time. Time and duration can be changed.

10.5 Hot water station

Hot water station technical data

Name	Unit	WWS-30	WWS-36
Dispensing volume flow			
TWK/TWW/flow = 10/50/65 °C	[l/min]	30	36
TWK/TWW/flow = 10/50/60 °C	[l/min]	25	30
TWK/TWW/flow = 10/60/70 °C	[l/min]	23	24
TWK/TWW/flow = 10/60/65 °C	[l/min]	18	-
Operating limits			
Maximum operating temperature	[°C]	95	
Maximum operating pressure (drinking water side)	[bar]	10	
Ambient temperature	[°C]	50	
Pump			
Manufacturer, type	[-]	Wilo PARA 15/7 or IMP NMT Neo HL 15/90-130	
Min. inflow pressure (heating side)	[mWS]	0.5	
Power consumption	[W]	1.8 to 50	
Power consumption	[A]	0.02 to 0.43	
Energy efficiency index	EEI	≤ 0.20	
Plate heat exchanger			
Manufacturer Danfoss, type	[-]	XB06H-1-40 StS	XB06H+-1-50
Number of plates	[pcs.]	40	50
Capacity per side	[litre]	0.35	0.5

10.6 Solar heat transfer station

Solar heat transfer station technical data

Name	Unit	SUES-Max
Max. recommended collector surface	[m ²]	5-20
Rated flow	[l/(h*m ²)]	10-25
Primary circuit		
Flow meter	[l/min]	0.5-15
Pressure sensor (from approx. Feb 2023)	[bar]	0 to 8
Maximum operating temperature	[°C]	120
Safety valve	[bar]	6
Connection	[mm]	12/15
Primary pump		
Make/type		Wilo PARA ST 15/13
Minimum inflow pressure	[mWS]	0.5
Power consumption	[W]	2-75
Energy efficiency index	EEL	< 0.23
Plate heat exchanger		
Make/type		Danfoss XB05M-1-30
Number of plates		30
Capacity per side	[litre]	0.3
Power		
Primary 75/60 °C and secondary 55/70 °C		14 kW
Primary 65/33 °C and secondary 25/60 °C		7 kW
Secondary circuit		
Volume flow encoder		VSG-SÜS
Maximum operating temperature	[°C]	95
Safety valve	[bar]	4
Secondary pump		
Make/type		IMP NMT Neo PL 15/40
Minimum inflow pressure	[mWS]	0.5
Power consumption	[W]	2-25
Energy efficiency index	EEL	< 0.20

Pressure sensor connector

Sensor		Control	
SolvisBen/SÜS 5.5 or SolvisMax/SÜS-LM		SC2/SC3 (05/15 to 07/21) or SC3 (from 07/21)	
Wire on cable harness	Wire on pressure sensor		(with expansion board)
3 (green)	Red	VCC	12 V (expansion board)
1 (white)	Black	I3-	M (expansion board)
2 (brown)	White	I3+	I3+ (network board)

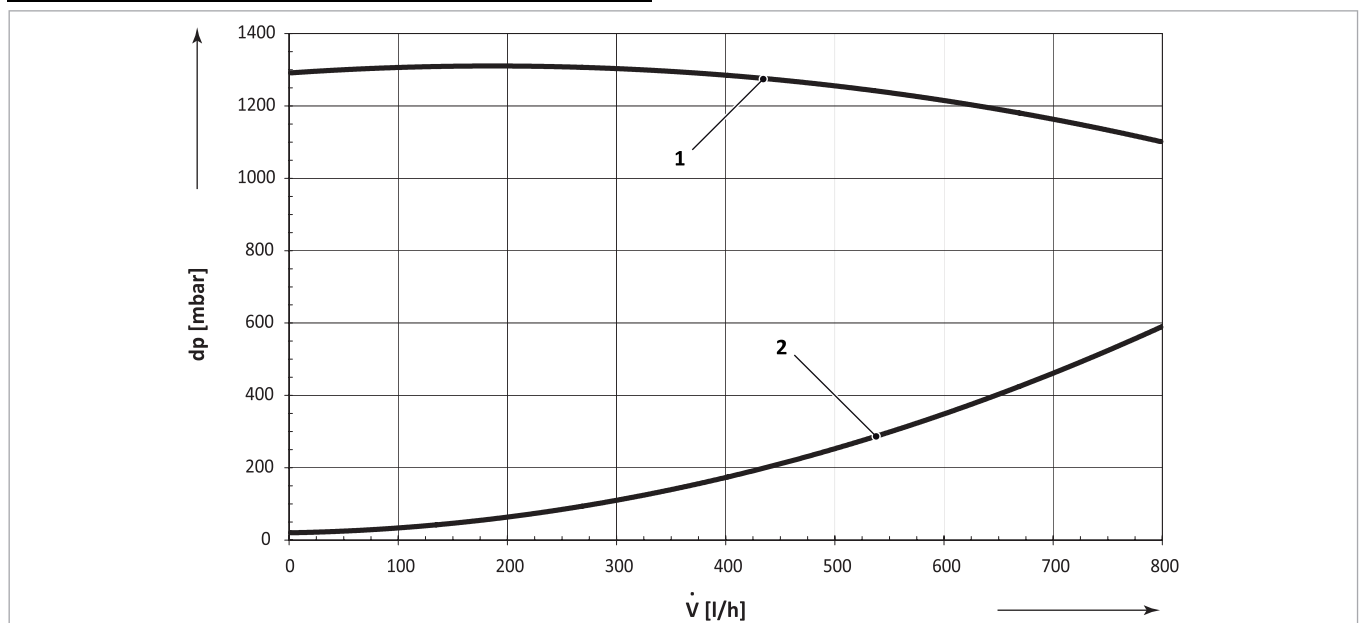


Fig. 153: Pressure loss curve for the primary circuit

1 PARA ST 15/13

2 Primary circuit SÜS-LM

10.7 Heating cartridge

10.7.1 Dimensions

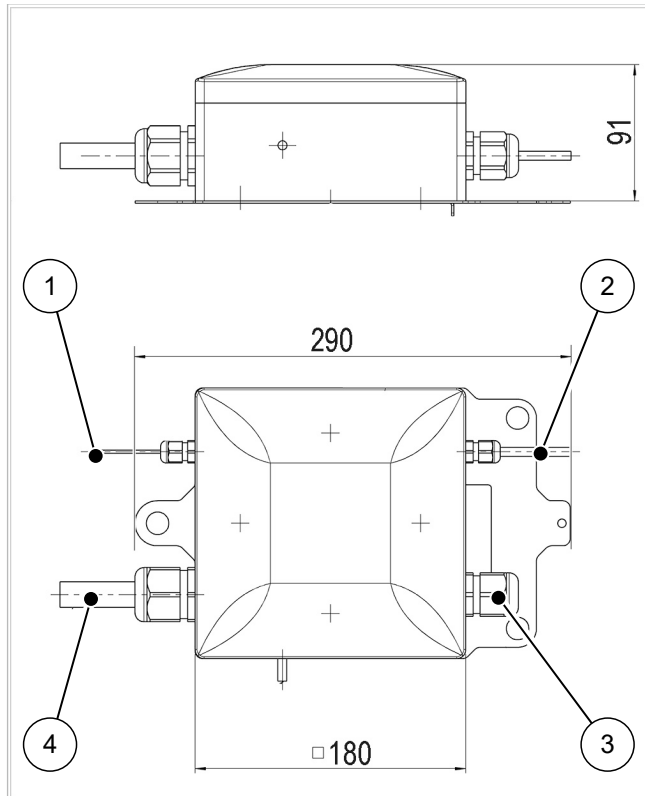


Fig. 154: Connection box dimensions

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

10.7.2 Electrical data

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

Variant	A	B
Electrical power	8.8 kW	6.2 kW
Connection	L1/L2/L3/N/PE	L1/L3/N/PE
Circuit breaker	3x B16 A	2x B16 A

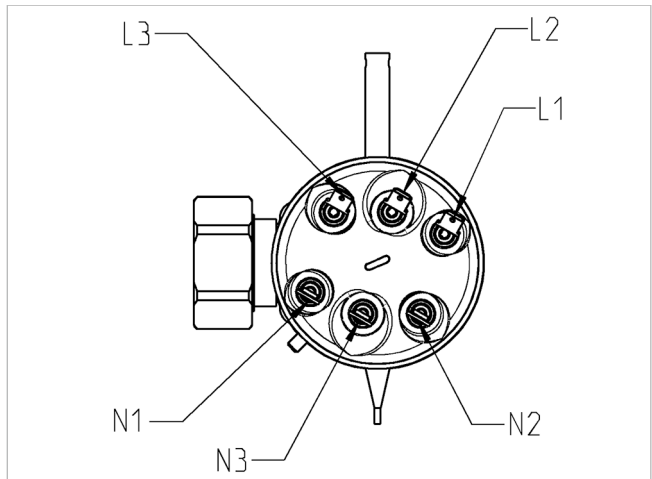


Fig. 155: Heating cartridge connection

SolvisControl 3 switching logic

The SolvisControl 3 controls the heating cartridge fully automatically. If the heating switches to emergency mode, for example, output A12 and thus stage I of the heating cartridge is activated immediately. After a waiting time of 60 minutes, the controller switches A12 off and A13 on (stage II of the heating cartridge) if the heat is not sufficient. If more heat is required, A12 switches on after a further 60 minutes (stage III).

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

Stage	Output	Phase	Output Variant A
I	A12	L1	3.2 kW
II	A13	L2 + L3	5.6 kW
III	A12 + A13	L1 + L2 + L3	8.8 kW

Heat output for heating cartridge with variant A

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

Heat 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.

11 Appendix

11.1 System diagrams and connection diagrams

 For system diagrams and connection diagrams, see the → *SolvisMax 7 system diagram document (ALS-MAX-7)*.

11.2 Sensors and connections on the storage tank

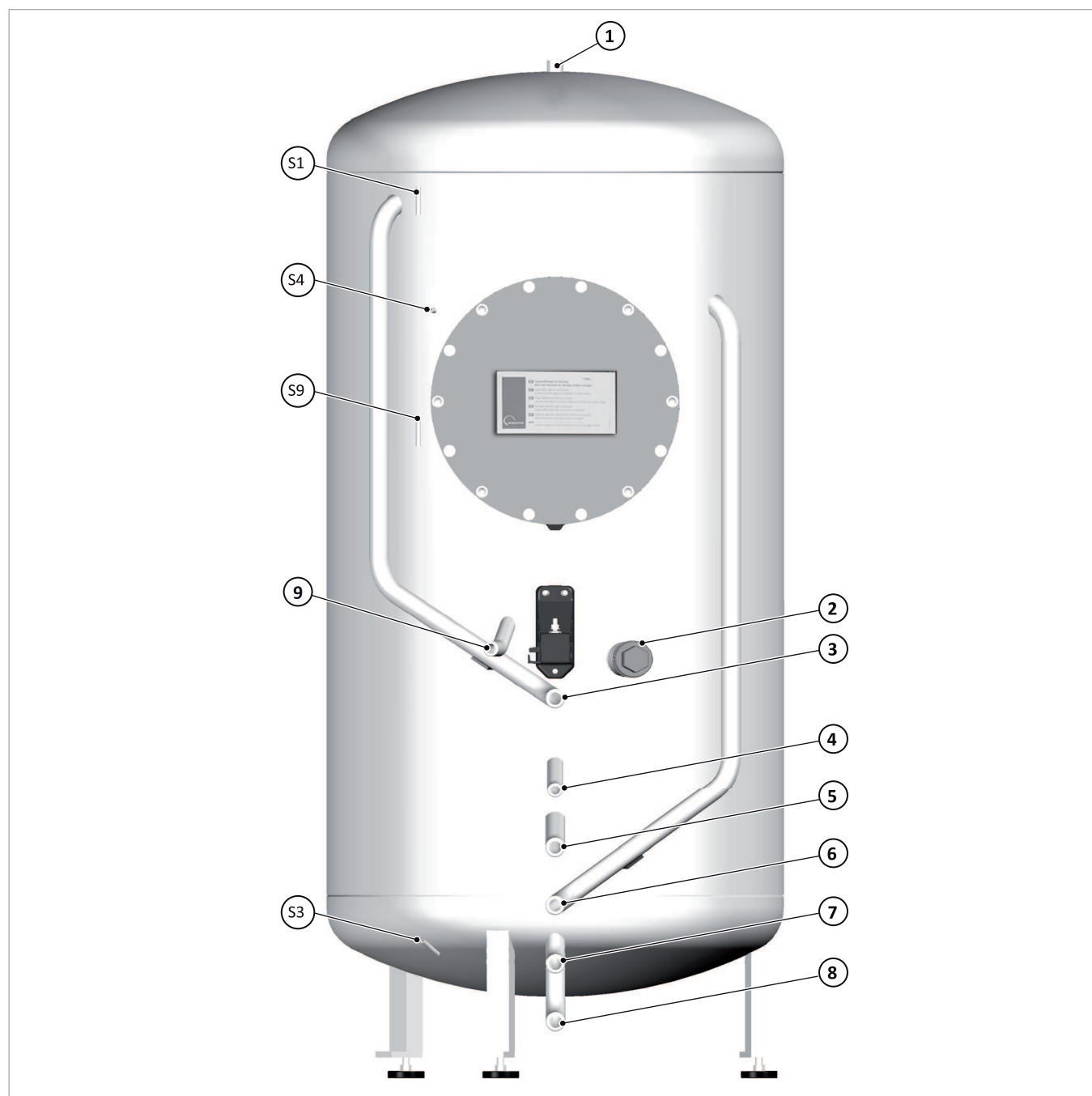
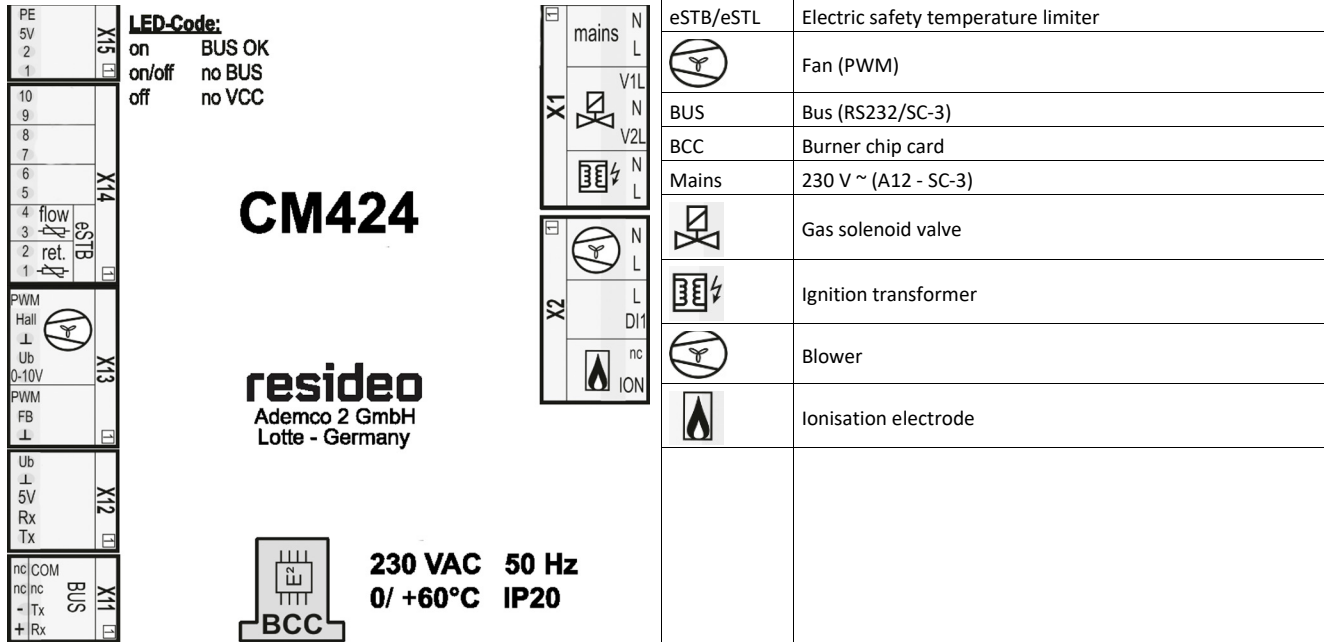


Fig. 156: Front view of the stratified storage tank

- | | | | |
|---|---------------------------------------|----|---|
| 1 | Socket for bleeding | 8 | Solar return (SÜS) |
| 2 | Socket for electrical heating element | 9 | Storage tank bleeder |
| 3 | Hot water flow (WWS) | S1 | Upper storage tank temperature sensor |
| 4 | Solar flow (SÜS) | S3 | Storage tank reference temperature sensor |
| 5 | Heating return | S4 | Upper heating buffer temperature sensor |
| 6 | Heating flow | S9 | Lower heating buffer temperature sensor |
| 7 | Hot water return (WWS) | S9 | Lower heating buffer temperature sensor |

11.3 Burner connection diagram

Burner BR-xx-SX-LN-3



12 Index

3			
3x reducer	15		
A			
acoustic emissions.....	35		
ambient air-dependent	10		
annular gap	32		
antifreeze.....	70		
Assembly pack.....	9		
ASTB.....	23, 29		
B			
ball valve	51, 59, 60		
basic kit	8		
Basic settings.....	62		
bleed connection.....	15		
bleeder connection	12		
burner sealing cable	20, 25		
burner, installation.....	20, 25		
burns	58, 70		
C			
calculation table sheet	44		
cap valve	70		
cap valve	40		
carrying aid.....	11		
Centrotherm exhaust system	34		
Checking the solar liquid	70		
Cleaning	70		
Cleaning the tank	30		
collecting tray.....	10		
Collector sensor	51		
combustion air	10		
condensate hose	34, 38		
condensate lifting pump	38		
Condensate siphon.....	34, 64, 66		
Configuration	55		
corrugated pipe.....	40		
cover base plates	11		
cover strips.....	12		
D			
damp rooms.....	10		
deaerator	59, 60		
Dirt	70		
Door firebrick	26		
Drain valve	70		
draining option.....	10		
drinking water supply.....	42		
E			
electrical connection	48		
electrician.....	71		
energy consumption	54		
equipotential bonding.....	48		
eSTB	9		
exhaust connection piece.....	20, 32		
Exhaust gas safety temperature limiter.....	23, 29		
Exhaust systems	35		
expansion vessel	40		
F			
filling pressure.....	64		
flame tube.....	68		
flange chronicle.....	12		
flange insulation.....	36		
Flexible flue pipe	32		
floor base plates.....	11		
flow meter	59, 60		
Flue elbow.....	33		
Flue gas elbow	32		
Flue gas values	57		
flue pipe	32		
flue pipe connection piece	32		
fuel delivery	30		
Fuel storage	30		
G			
Gas connection	18, 24		
gas line	22		
Gas line	22		
Guarantee	6		
H			
heat conducting paste.....	11		
heating cartridge.....	86		
Installation	17		
power supply	53		
Unlocking malfunctions.....	72		
heating circuit station	51		
Heating oil.....	30, 56		
Heating pump	52		
Electrical connection	50, 52		
Hydraulic connection	39, 42		
System variants	7		
I			
ignition electrode.....	65		
Ignition electrode (gas)	21		
Ignition electrodes	68		
Inner pipe silencer	32		
installation site.....	10		
insulation shell	43		
intake opening	10		
ionisation electrode	65		
ionisation electrodes.....	20		
L			
leakages	10		
lime deposits.....	54		
liquid gas	18		
Locking springs.....	36		
M			
mains module housing	40		
Maintenance	64		
maintenance function.....	55		
Maintenance report.....	64		
MEV connection group	64		
Mixing head	67		
N			
neutral cleaner.....	70		
Nozzle fitting.....	67		
O			
Offset measurements	36		
Oil filter	27, 30, 56, 69		
Oil line.....	27		
oil pipe	30		
oil vapour nipple	25		
Operating temperature.....	57		
P			
performance ranges.....	56		
pH value.....	64		
pipe fixings	11		
pipe insulation	41		
pipe lead-throughs.....	15		
primary tank	44, 59, 60		
Pump pressure	57		
Q			
Qualified electricians	6		
qualified specialist	71		
R			
reducer insert	15, 42		
Reflective silencer	35		
Regulations	48		
room controller.....	49		
S			
Safety temperature limiter	9		
safety temperature limiter, eSTL21,	26, 66		
sensor cable harness.....	11		
sensor immersion tube	51		
Sensor values	70		
Set the admission pressure.....	40		
Setting the admission pressure.....	44		
shaft requirements	34		
socket boards.....	23, 29		
space required	11		
specifications	6		
spirit level	11		
spring clips	37		
Spring lock	33		
start-up report	54		
storage tank insulation	11		
Switching on the burner	55		
switching valve.....	51		
system pressure.....	64		
systems folder.....	54		
T			
Technical Data	78		
The burner	57		
Training course	2		
transporting	10		
U			
union nut	33		
V			
voltage supply.....	53		

Notes



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