fröling

Installation instructions

Firewood boiler S3 Turbo

Translation of original German version of installation instructions for technicians.

Read and follow all instructions and safety instructions.
All errors and omissions excepted.

CE

M1081724_en | Edition 12/06/2024

1 General

Thank you for choosing a quality product from Froling. The product features a state-of-the-art design and conforms to all currently applicable standards and testing guidelines.

Please read and observe the documentation provided and always keep it close to the system for reference. Observing the requirements and safety information in the documentation makes a significant contribution to safe, appropriate, environmentally friendly and economical operation of the system.

The constant further development of our products means that there may be minor differences from the pictures and content. If you discover any errors, please let us know: doku@froeling.com.

Subject to technical change.

Issuing a delivery certificate

The EC Declaration of Conformity is only valid in conjunction with a delivery certificate, which has been filled in correctly and signed as part of the commissioning process. The original document remains at the installation site. Commissioning installers or heating engineers are requested to return a copy of the delivery certificate together with the guarantee card to Froling. On commissioning by FROLING Customer Service the validity of the delivery certificate will be noted on the customer service record.

1.1 About this manual

These installation instructions contain information for the following S3 Turbo boilers:

18[1)], 20, 30, 30 (31 kW)[2)], 40, 45;

1) S3 Turbo 18 only available in Italy; 2) S3 Turbo 30 with 31 kW nominal heat output only available in Austria and Italy;

1.2 Operating principle

The Fröling S3 Turbo is a wood boiler for the non-condensing combustion of firewood. The fuel loading chamber is filled with fuel via the fuel loading door located behind the heat insulated door on the front of the boiler. The combustion grate, through which the combustion gases are sucked into the combustion chamber by the induced draught fan, is located below the fuel loading chamber. When the induced draught fan is used, the combustion air around the pre-heating chamber door is sucked in and channelled to the fuel via regulating flaps on the side air boxes (primary and secondary air). The boiler water and flue gas temperature are regulated by the induced draught fan. The primary air is used to adjust the boiler to the fuel and set the required output. The secondary air is used to set the combustion performance which can be done optionally using the manual adjuster or the Lambda probe and servo-motor. The flue gas travels through the heat exchanger to the flue gas outlet. In order to optimise heat transfer and for cleaning purposes, the heat exchanger pipes are fitted with a manual Efficiency Optimisation System (WOS), which can be operated using a lever on the outside of the boiler. The ash deposits at the bottom of the combustion chamber and below the heat exchanger pipes can be removed via the combustion chamber door on the front of the boiler.

1.3 Disposal of packaging materials

All packaging materials should be disposed of in accordance with the relevant regulations. In addition, check the regulations for correct disposal applicable in your local area.

Data under the identification system of Directive 97/129/EC:

Identification code / Material		Disposal information
	Corrugated cardboard	Paper collection
	Wood	Check the regulations for correct disposal applicable in your local area
	Low Density Polyethylene (LDPE)	Plastics collection
	Expanded polystyrene	Plastics collection

2 Safety

2.1 Hazard levels of warnings

This documentation uses warnings with the following hazard levels to indicate direct hazards and important safety instructions:

⚠ DANGER

The dangerous situation is imminent and if measures are not observed it will lead to serious injury or death. You must follow the instructions!

⚠ WARNING

The dangerous situation may occur and if measures are not observed it will lead to serious injury or death. Work with extreme care.

⚠ CAUTION

The dangerous situation may occur and if measures are not observed it will lead to minor injuries.

NOTICE

The dangerous situation may occur and if measures are not observed it will lead to damage to property or pollution.

2.2 Qualification of assembly staff

⚠ CAUTION

Assembly and installation by unqualified persons:

Risk of personal injury and damage to property

During assembly and installation:

❒ Observe the instructions and information in the manuals

❒ Only allow appropriately qualified personnel to work on the system

Assembly, installation, initial startup and servicing must only be carried out by qualified personnel:

- Heating technicians/building technicians
- Electrical installation technicians
- Froling customer services

The assembly staff must have read and understood the instructions in the documentation.

2.3 Personal protective equipment for assembly staff

You must ensure that staff have the protective equipment specified by accident prevention regulations!

- During transport, erection and installation:
  - wear suitable work wear
  - wear protective gloves
  - wear safety shoes (min. protection class S1P)

3 Design Information

3.1 Overview of standards

Perform installation and commissioning of the system in accordance with the local fire and building regulations. Unless contrary to other national regulations, the latest versions of the following standards and guidelines apply:

3.1.1 General standards for heating systems

EN 303-5	Boilers for solid fuels, manually and automatically fed combustion systems, nominal heat output up to 500 kW
EN 12828	Heating systems in buildings - design of water-based heating systems
EN 13384-1	Chimneys - Thermal and fluid dynamic calculation methods Part 1: Chimneys serving one appliance
ÖNORM H 5151	Planning of central hot water heating systems with or without hot water preparation
ÖNORM M 7510-1	Guidelines for checking central heating systems Part 1: General requirements and one-off inspections
ÖNORM M 7510-4	Guidelines for checking central heating systems Part 4: Simple check for heating plants for solid fuels

3.1.2 Standards for structural and safety devices

ÖNORM H 5170	Heating installation - Requirements for construction and safety engineering, as well as fire prevention and environmental protection

3.1.3 Standards for heating water

ÖNORM H 5195-1	Prevention of damage by corrosion and scale formation in closed warm water heating systems at operating temperatures up to 100°C (Austria).
VDI 2035	Prevention of damage hot water heating systems (Germany)
SWKI BT 102-01	Water quality for heating, steam, cooling and air conditioning systems (Switzerland)
UNI 8065	Technical standard regulating hot water preparation. DM 26.06.2015 (Ministerial Decree specifying the minimum requirements) Follow the instructions of this standard and any related updates. (Italy)

3.1.4 Regulations and standards for permitted fuels

1. BImSchV	First Order of the German Federal Government for the implementation of the Federal Law on Emission Protection (Ordinance on Small and Medium Combustion Plants) in the version published on 26 January 2010, BGBl. JG 2010 Part I No. 4.
EN ISO 17225-3	Solid bio-fuel - Fuel specifications and classes Part 3: Wood briquettes for non-industrial use
EN ISO 17225-5	Solid bio-fuel - Fuel specifications and classes Part 5: Firewood for non-industrial use

3.2 Installation and approval

The boiler should be operated in a closed heating system. The following standards govern the installation:

Note on standards

EN 12828 - Heating Systems in Buildings

IMPORTANT: Every heating system must be officially approved.

The appropriate supervisory authority (inspection agency) must always be informed when installing or modifying a heating system, and authorisation must be obtained from the building authorities:

Austria: report to the construction authorities of the community or magistrate

Germany: report new installations to an approved chimney sweep / the building authorities.

3.3 Installation site

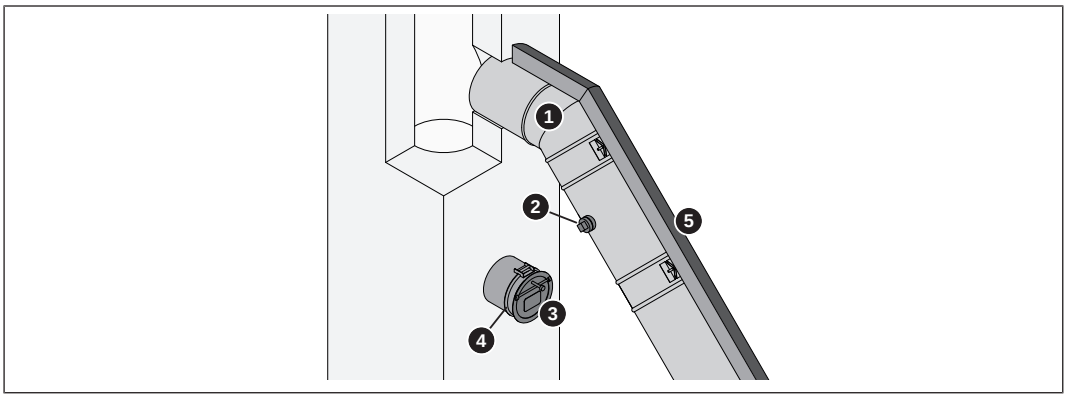
Requirements for the load bearing substrate:

- Flat, clean and dry
- Non-combustible and with sufficient load-bearing capacity

Conditions at the installation site:

- Protecting the system against frost
- Sufficiently well lit
- Free of explosive atmospheres such as flammable substances, hydrogen halides, cleaning agents and consumables
- Installation at altitude higher than 2000 metres above sea level only after consultation with the manufacturer
- The system must be protected against gnawing and nesting by animals (such as rodents)
- No flammable materials in proximity to the system
- Observe national and regional regulations regarding the installation of smoke detectors and carbon monoxide detectors

3.4 Chimney connection/chimney system



1	Connection line to the chimney
2	Measuring port
3	Draught limiter
4	Explosion flap (for automatic boilers)
5	Thermal insulation

NOTICE! The chimney must be authorised by a smoke trap sweeper or chimney sweep.

The entire flue gas system (chimney and connection) must be laid out as per ÖNORM / DIN EN 13384-1 or ÖNORM M 7515 / DIN 4705-1.

The flue gas temperatures (for clean systems) and additional flue gas values can be found in the table in the technical data.

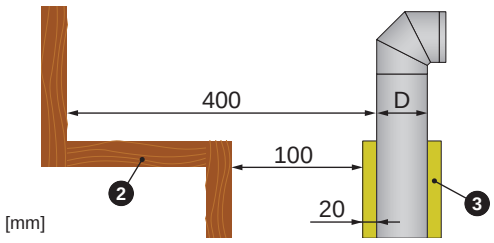
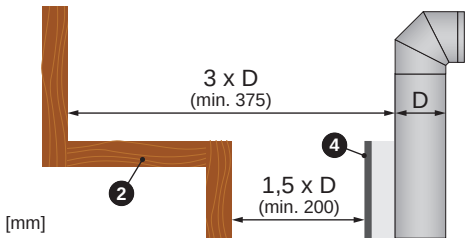
Local regulations and other statutory regulations are also applicable.

EN 303-5 specifies that the entire flue gas system must be designed to prevent, wherever possible, damage caused by seepage, insufficient feed pressure and condensation. Please note within the permissible operating range of the boiler flue gas temperatures lower than 160K above room temperature may occur.

3.4.1 Connection line to the chimney

Requirements for the connection line:

- this should be as short as possible and follow an upward incline to the chimney (30 - 45° recommended)
- thermally insulated

MFeuV[1] (Germany)	EN 15287-1 and EN 15287-2
	

1. Observe the fire regulations of the respective federal state
2. Component made of flammable material
3. Nonflammable insulating material
4. Radiation shield with rear ventilation

Minimum distance from flammable substances as per MFeuV[1] (Germany):

- 400 mm excluding thermal insulation
- 100 mm if at least 20 mm thermal insulation is installed

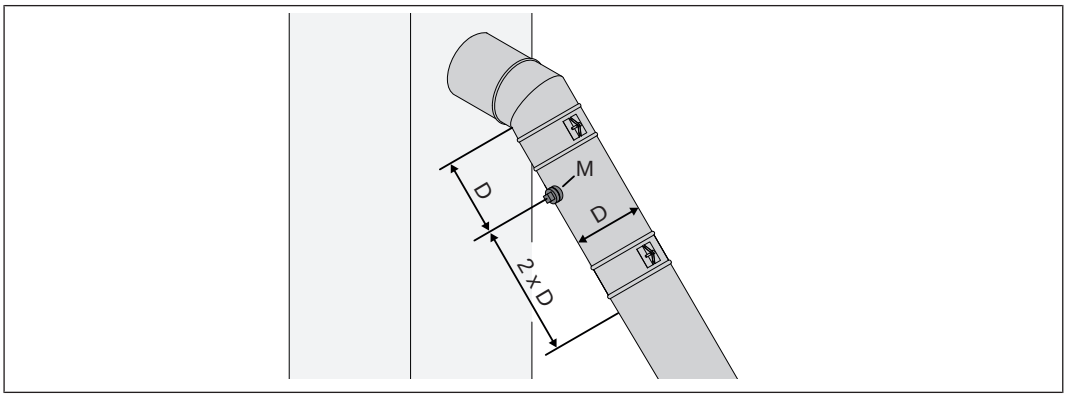
Minimum distance from flammable materials as per EN 15287-1 and EN 15287-2:

- 3 x nominal diameter of connection line, but at least 375 mm (NM)
- 1.5 x nominal diameter of connection line for radiation shield with rear ventilation, but at least 200 mm (NM)

NOTICE! The minimum distances must be observed in accordance with the standards and guidelines applicable in the region

3.4.2 Measuring port

For emissions measurement on the system, a suitable measuring port must be installed in the connection line between the boiler and chimney system.



Upstream of the measuring port (M) there should be a straight run-in section with a length about twice the diameter (D) of the connection line. Downstream of the measuring port (M) there should be a straight run-out section with a length about the diameter (D) of the connection line. The measuring port must remain closed whenever the system is in operation.

The diameter of the measuring probe used by Froling customer service is 14 mm. To avoid measuring errors due to the ingress of false air, the diameter of the measuring port must not exceed 21 mm.

3.4.3 Draught limiter

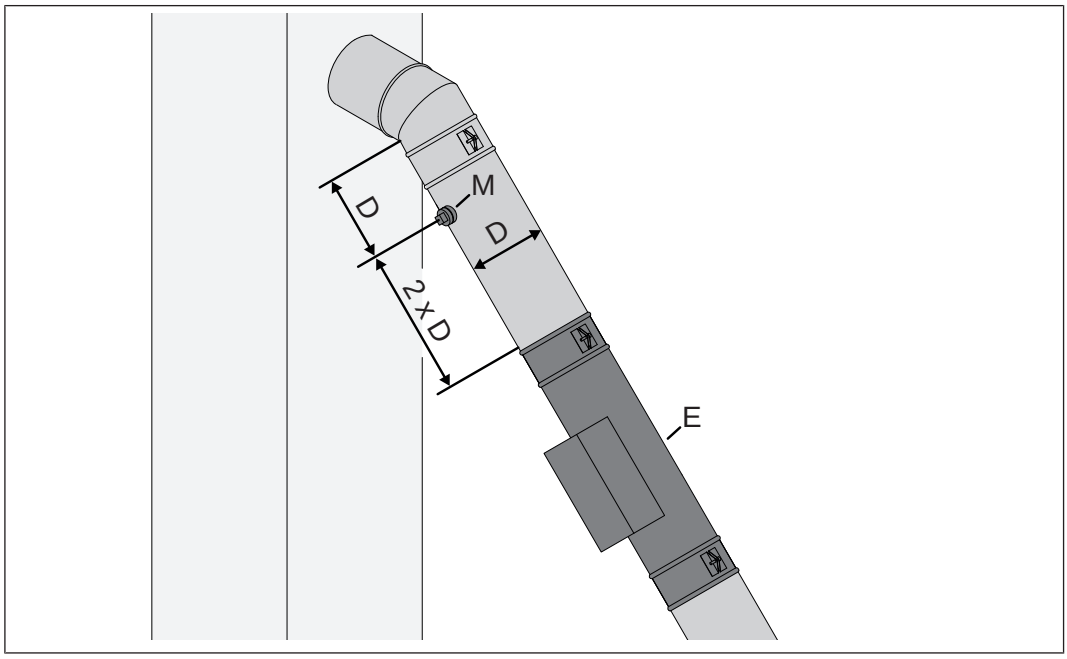
We generally recommend the installation of a draught limiter. If the values for the maximum permissible feed pressure stated in the section “Data for designing the flue gas system” are exceeded, a draught limiter must be installed.

NOTICE! For boilers with an electrostatic particle separator, the installation of a draught limiter is mandatory.

NOTICE! Install the draught limiter directly under the mouth of the flue duct, as there is persistent under-pressure at this point, which largely prevents the escape of dust from the draught limiter.

3.4.4 Electrostatic particle separator

For reduction in the emissions an electrostatic particle separator may optionally be installed in the flue gas line.



For planning and installation, comply with the following points:

- Position the measuring port (M) downstream of the electrostatic particle separator (E) as specified in the instructions
  ➲ "Measuring port" [▸ 12]
- Locate the electrostatic particle separator in accordance with the planning for the flue gas system
- Install the electrostatic particle separator in accordance with the manufacturer's instructions supplied

3.5 Combustion air

3.5.1 General requirement

For safe operation, the boiler requires around 1.5 - 3.0 m³ of combustion air per kW nominal heat output and operating hour. The air supply can be provided by free ventilation (e.g. windows, air shaft), mechanical ventilation from outside or, if necessary, from the group of rooms.

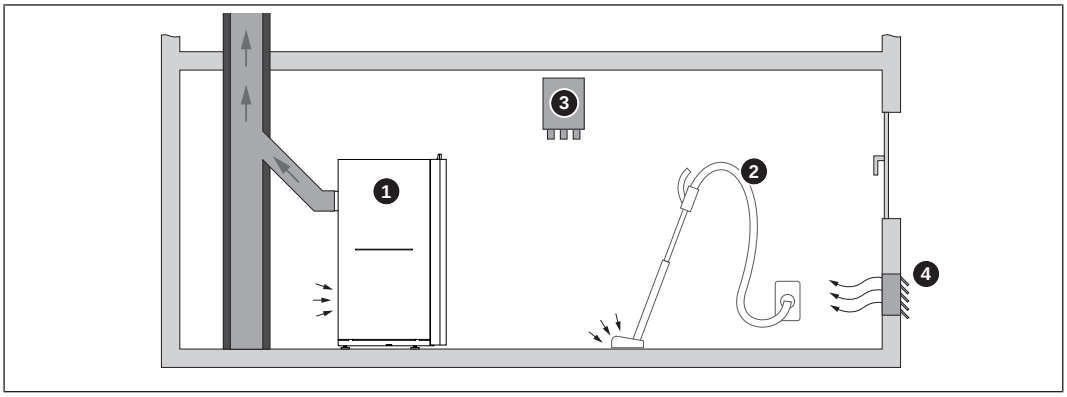
The boiler is operated depending on the room air, whereby the combustion air is taken from the installation site.

A suitable air supply must ensure that no impermissible under-pressure greater than 4 Pa is created at the installation site. The use of safety devices (under-pressure monitoring system) may be necessary, particularly if the boiler is operated concurrently with air-suction systems (such as an extractor fan).

Local **NOTICE! Safety equipment and conditions for the operation of the boiler (room air-dependent / room air-independent) must be clarified with the local authority (authority, chimney sweep, ...).**

3.5.2 Room air-independent operation

The combustion air is taken from the installation site. The unpressurised flow of the required air quantity must be ensured accordingly.



1	Boiler in room air-dependent operation
2	Air extraction system (such as centralised dust extraction system, room ventilation)
3	Under-pressure monitoring system
4	Combustion air supply from outside

The minimum cross-sectional area of the supply air opening from outside depends on the nominal heat output of the boiler.

Austria	400 cm² net minimum cross-sectional area plus 4 cm² for every kW of nominal heat output above 100 kW
Germany	150 cm² net minimum cross-sectional area plus an additional 2 cm² for every further kW of nominal heat output above 50 kW

Examples

Minimum free cross-section [cm²]										
Nominal heat output [kW]	**10**	**15**	**20**	**30**	**50**	**100**	**150**	**250**	**350**	**500**
Austria	400	400	400	400	400	400	600	1000	1400	2000
Germany	150	150	150	150	150	250	350	550	750	1050

Combustion air can also be supplied from other rooms if it can be proven that sufficient combustion air can flow in whilst all mechanical and natural ventilation systems are in operation. The installation site must have a minimum volume in accordance with the applicable regional standards.

Note on standards

Austria:	OIB Guideline 3 - Hygiene, health and environmental protection
Germany:	Model Firing Ordinance (MFeuV)

3.6 Domestic hot water

Unless contrary to other national regulations, the latest versions of the following standards and guidelines apply:

Austria:	ÖNORM H 5195	Switzerland:	SWKI BT 102-01
Germany:	VDI 2035	Italy:	UNI 8065

Observe the standards and also follow the recommendations below:

- ❒ Use prepared water which complies with the standards cited above for filling and make-up water
- ❒ Avoid leaks and use a closed heating system to maintain water quality during operation
- ❒ When filling with top-up water, always vent the filling hose before connecting it, in order to prevent air being drawn into the system
- ❒ Check that the heating water is clear and free of substances that can be deposited as sediments
- ❒ Check that the pH value is between 8.2 and 10.0. If the central heating water comes into contact with aluminium, the pH value must be between 8.2 and 9.0, as specified in VDI 2035
- ❒ The use of fully demineralised filling and top-up water with an electrical conductivity not exceeding 100 µS/cm is recommended by EN 14868
- ❒ After the first 6-8 weeks, check the heating water to ensure that the specified values are being adhered to
- ❒ Unless specified otherwise by regional standards and regulations, perform an annual check on the heating water

Filling and make-up water as well as heating water to VDI 2035 Sheet 1:2021-03:

Total heat output in kW	**Total earth alkalis in mol/m³ (total hardness in °dH)**		
	Specific system volume in l/kW heat output[1)]		
	≤ 20	**20 to ≤40**	**> 40**
≤ 50 specific water content heat generator ≥ 0.3 l/kW[2)]	none	≤ 3.0 (16.8)	< 0.05 (0.3)
≤ 50 specific water content heat generator < 0.3 l/kW[2)] (e.g. circulation water heater) and systems with electric heating elements	≤ 3.0 (16.8)	≤ 1.5 (8.4)	
> 50 to ≤ 200	≤ 2.0 (11.2)	≤ 1.0 (5.6)	
> 200 to ≤ 600	≤ 1.5 (8.4)	< 0.05 (0.3)	
> 600	< 0.05 (0.3)		

1. For calculating the specific system volume, the smallest individual heating capacity is to be used for systems with several heat generators.
2. In systems with several heat generators with different specific water contents, the smallest specific water content is decisive in each case.

Additional requirements for Switzerland

The filling and make-up water must be demineralised (fully purified)

- The water must not contain any ingredients that could settle and accumulate in the system
- This makes the water non-electroconductive, which prevents corrosion
- It also removes all the neutral salts such as chloride, sulphate and nitrate which can weaken corrosive materials in certain conditions

If some of the system water is lost, e.g. during repairs, the make-up water must also be demineralised. It is not enough to soften the water. The heating system must be professionally cleaned and rinsed before filling the units.

Inspection:

- After eight weeks, the pH value of the water must be between 8.2 and 10.0. If the central heating water comes into contact with aluminium, the pH value must be between 8.0 and 8.5
- Annually: values must be recorded by the owner

Advantages of heating water treated in accordance with the standards:

- Less of a drop in output due to reduced limescale build-up
- Less corrosion due to fewer aggressive substances
- Long-term cost savings thanks to improved energy efficiency

Frost protection

When operating the system with frost-protected heat transfer media, the following instructions and ÖNORM H 5195-2 must be observed:

- Antifreeze dosage according to the manufacturer's data sheet
  IMPORTANT: If the medium contains too much or too little antifreeze it becomes highly corrosive
- Adding antifreeze reduces the specific heat capacity of the medium; therefore design components (pumps, pipework, etc.) accordingly
- Add frost protection only to heat transfer medium in those areas that may be affected by frost (TIP: system separation)
- Check the antifreeze dosage regularly according to the manufacturer's instructions
- Dispose of frost-protected heat transfer medium at the end of its shelf life and refill the system

3.7 Pressure maintenance systems

Pressure maintenance systems in hot-water heating systems keep the required pressure within predefined limits and balance out volume variations caused by changes in the hot-water temperature. Two main systems are used:

Compressor-controlled pressure maintenance

In compressor-controlled pressure maintenance units, a variable air cushion in the expansion tank is responsible for volume compensation and pressure maintenance. If the pressure is too low, the compressor pumps air into the tank. If the pressure is too high, air is released by means of a solenoid valve. The systems are built solely with closed-diaphragm expansion tanks to prevent the damaging introduction of oxygen into the heating water.

Pump-controlled pressure maintenance

A pump-controlled pressure maintenance unit essentially consists of a pressure-maintenance pump, relief valve and an unpressurised receiving tank. The valve releases hot water into the receiving tank if the pressure is too high. If the pressure drops below a preset value, the pump draws water from the receiving tank and feeds it back into the heating system. Pump-controlled pressure maintenance systems with **open expansion tanks** (e.g. without a diaphragm) introduce ambient oxygen via the surface of the water, exposing the connected system components to the risk of corrosion. These systems offer no oxygen removal for the purposes of corrosion control as required by VDI 2035 and **in the interests of corrosion protection should not be used**.

3.8 Storage tank

Observe the regional regulations for using a storage tank!

Certain subsidy guidelines prescribe compulsory requirements for the installation of storage tanks. Up-to-date information about individual subsidy guidelines can be found at www.froeling.com.

Channelling the heat generated by the Firewood boiler to a storage tank can bring major advantages, such as

- better utilisation of fuel
- more user-friendly operation in terms of reloading intervals
- maximum independence from instantaneous heating requirements
- minimal dirt in boiler and flue gas system

As the boiler's minimum continuous heat output is 30% above the nominal heat output, we as boiler manufacturer are obliged under EN 303-5:2021, Section 4.4.6 to advise that the Firewood boiler S3 Turbo must always be connected to a storage tank with adequate storage capacity.

The storage tank capacity can be calculated using the following formula according to EN 303-5:2021:

$$V_{Sp} = 15 T_B \times P_N (1 - 0.3 \times P_H / P_{min})$$

V_{Sp}	Storage tank capacity in litres
P_N	Nominal heat output of boiler in kW
T_B	Burn-off period of boiler in hours[1)]
P_H	Heating load of building in kW
P_{min}	Minimum heat output of boiler in kW[2)]

1. Sample combustion times for various fuels are provided in the technical data
2. The boiler's minimum output is the lowest value of the output range in the technical data. If there is no minimum heat output specified, use the nominal heat output ($P_{min} = P_N$)

For the correct dimensions of the storage tank and the line insulation (for instance to ÖNORM M 7510 or guideline UZ37) please consult your installer or Fröling.

Recommended storage tank capacity:

	Unit	S3 Turbo 20 - 30[1)]	S3 Turbo 40 - 45
Recommended storage tank capacity[2)]	[l]	1700	2500

1. Also applies to S3 Turbo 18 (only available in Italy)
2. Values for calculating the capacity can be found in the technical data or the technical data with partial load inspection (if available)

Certain countries have recommended storage capacities; these are listed below. The specified values apply when the nominal heat output of the boiler corresponds to the heating requirements of the building and a maximum of 50% of the nominal heat output can be dissipated to the building being heated under partial load conditions.

The exact design of the storage tank capacity is in accordance with the locally applicable guidelines and regulations:

Austria According to the relevant Austrian laws governing energy technology, which are based on Art. 15a B-VG "Agreement on protective measures for small furnaces" (2012):

No storage tank is required on manually fed biomass boilers that have been positively tested at both nominal load and partial load (below 50% of nominal load) to ensure they adhere to the emissions limits specified in that agreement.

Germany The first BImSchV (Ordinance on small and medium-sized heating plants of 26 January 2010, BGBl. I P. 38) stipulates a minimum water heat storage tank volume of 55 litres per kilowatt of rated heat output; a water heat storage tank with a volume of 12 litres per litre of fuel loading chamber is recommended.

Switzerland In accordance with the Swiss Federal Ordinance on Air Pollution Control (LRV 2018), appendix 3, paragraph 523 “Special requirements for boilers”, hand-fed boilers up to 500 kW rated heat output must be fitted with a minimum heat storage tank volume of 12 litres per litre of fuel loading chamber. The volume may not fall below 55 litres per kW rated heat output.

Hot water tank in accordance with Commission Regulation (EU) 2015/ 1189 (Ecodesign Requirements)

The boiler should be operated with a hot water tank. The storage capacity = 45 x P_r x (1-2.7/P_r) or 300 litres, whichever is greater, where the rated heat output of P_r is given in kW. The resulting storage capacity is below the abovementioned recommended storage tank capacity.

3.9 Return lift

If the hot water return temperature is below the minimum return temperature, some of the hot water outfeed will be mixed in.

NOTICE

Risk of dropping below dew point/condensation formation if operated without return temperature control.

Condensation water forms an aggressive condensate when combined with combustion residue, leading to damage to the boiler.

Take the following precautions:

❒ Regulations stipulate the use of a return temperature control.

↳ The minimum return temperature is 60 °C. We recommend fitting some kind of control device (e.g. thermometer).

3.10 Boiler ventilation

❒ Fit the automatic ventilating valve at the highest point on the boiler or at the ventilation connection (if present).

↳ This ensures that air in the boiler is constantly expelled, thus preventing malfunctions caused by air in the boiler

❒ Check that the boiler ventilation is working properly

↳ After installation and periodically according to manufacturer’s instructions

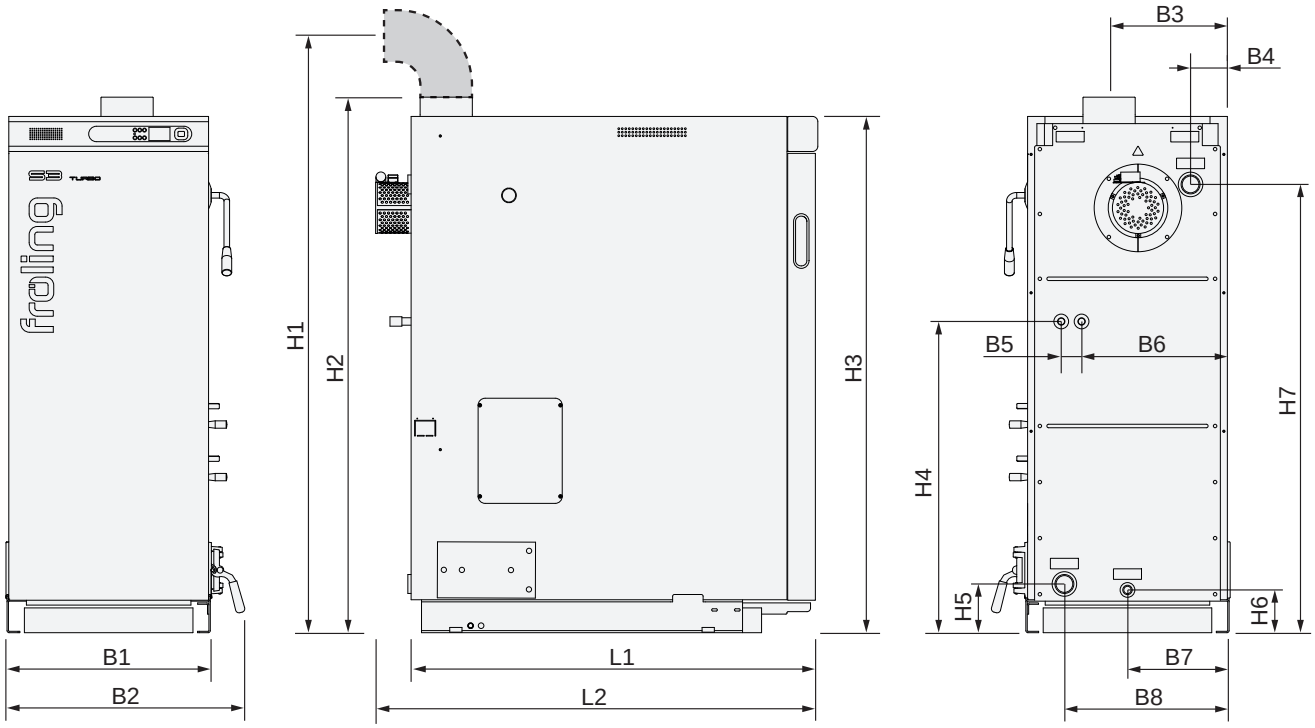
Tip: ❒ Fit a vertical pipe as a calming section in front of the automatic ventilating valve in such a way that the ventilating valve is positioned above the water level in the boiler

Recommendation: ❒ Fit a microbubble separator in the pipes to the boiler

↳ Follow the manufacturer's instructions!

4 Technology

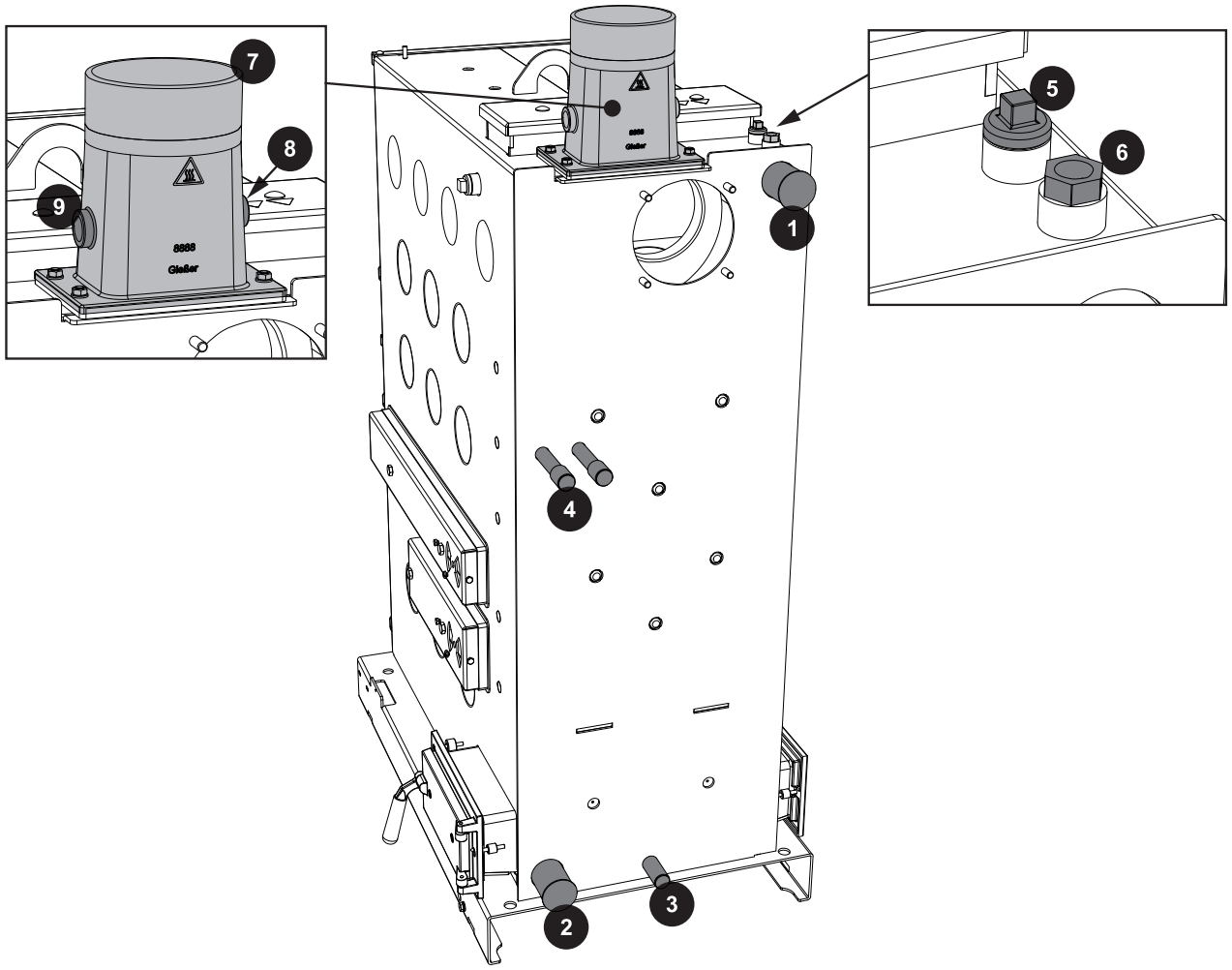
4.1 Dimensions, S3 Turbo



Dimension	Description	Unit	20-30[1)]	40-45
L1	Length of boiler	mm	1160	1250
L2	Total length incl. induced draught fan		1255	1355
B1	Width, boiler		570	670
B2	Total width including side cleaning door		680	780
B3	Distance between flue gas pipe connection and side of boiler		340	390
B4	Distance between flow connection and side of boiler		105	105
B5	Distance between safety heat exchanger connections		60	80
B6	Distance between safety heat exchanger connection and side of boiler		415	500
B7	Distance between drainage connection and side of boiler		285	335
B8	Distance between return connection and side of boiler		465	565
H1	Height of flue gas pipe connection[2)]		1635	1735
H2	Total height incl. flue gas nozzle		1530	1630
H3	Height, boiler		1475	1575
H4	Height, safety heat exchanger connection		890	970
H5	Height, return connection		140	140
H6	Height, drainage connection		120	120
H7	Height, flow connection		1280	1380

1. Also applies to S3 Turbo 18 (only available in Italy)
2. When using the optional flue pipe nozzle for low chimney connections

4.2 Components and connections



Item	Description	S3 Turbo
1	Boiler flow connection	6/4” IT
2	Boiler return connection	6/4” IT
3	Drainage connection	1/2“ IT
4	Safety heat exchanger connection	1/2“ IT
5	Immersion sleeve sensor connection for thermal discharge valve (installed by the customer)	1/2“ IT
6	Position for boiler sensor and STL capillary (internal diameter)	16 mm
7	Flue gas pipe connection (external diameter)	149 mm
8	Position for flue gas temperature sensor	1/2“ IT
9	Position for Lambda probe	3/4" IT

4.3 Technical specifications

4.3.1 S3 Turbo 18-20

Description		S3 Turbo	
		18[1)]	20
Nominal output	kW	22.5	20
Boiler efficiency (NCV)	%	91.1	90.8
Electrical connection		230V / 50Hz / fused C13A	
Weight of boiler incl. insulation and control	kg	520	
Total boiler capacity (water)	l	120	
Water pressure drop (ΔT = 10 / 20 K)	mbar	4.6 / 1.9	
Minimum boiler return temperature	°C	60	
Maximum permitted operating temperature		90	
Permitted operating pressure	bar	3	
Airborne sound level	dB(A)	< 70	
Permitted fuel as per EN ISO 17225		Part 5: Firewood class A2 / D15 L50	
Fuel loading door dimensions (width / height)	mm	330 / 370	
Fuel loading chamber capacity	l	140	
Combustion time [2)] - beech	h	4.3 - 6.3	4.7 - 6.9
Combustion time[2)] - spruce		3.0 - 4.4	3.3 - 4.8
Test book number		PB 031	PB 090
Boiler class as per EN 303-5: 2012		5	

1. S3 Turbo 18 only available in Italy
2. Values specified for combustion time are guideline values at nominal load and will vary depending on water content (15-25%) and fill level (80-100%)

Product data in accordance with the regulations (EU) 2015/1187 and 2015/1189

Model identifier		S3 Turbo	
		18	20
Heating up mode		manual	manual
Condensing boiler		No	No
Solid fuel boiler for combined heat and power		No	No
Combined heating system		No	No
Storage tank volume		➲ "Storage tank" [▸ 19]	
Preferred fuel		Firewood, moisture content ≤ 25 %	
Useful heat delivered at rated heat output (P_n)	kW	22.5	20.0
Fuel efficiency at rated heat output (η_n)	%	82.7	82.4
Auxiliary current consumption at rated heat output (el_{max})	kW	0.060	0.063
Auxiliary current consumption in standby mode (P_{SB})	kW	0.007	0.006
Energy efficiency class of the boiler		A+	A+
Energy efficiency index (EEI) of boiler		116	116
Heating space annual rate of use ηs	79	79	79
Temperature controller used		Lambdatronic S 3200	

Model identifier		S3 Turbo	
		18	20
Class of the temperature controller		II	II
Contribution of the temperature controller to the energy efficiency index of a combined system	%	2	2
Energy efficiency index (EEI) of the combined boiler and controller[1)]		118	118
Energy efficiency class of the combined boiler and controller[1)]		A+	A+
Annual space heating emissions of dust (PM)[2)]	mg/m³	15	15
Annual space heating emissions of gaseous organic compounds (GOC)[2)]	mg/m³	13	14
Annual space heating emissions of carbon monoxide (CO)[2)]	mg/m³	183	202
Annual space heating emissions of nitrogen oxides (NOx)[2)]	mg/m³	184	188

1. The information on the energy efficiency index EEI of the combined boiler and controller and the energy efficiency class of the combined boiler and controller applies only if the Fröling control components supplied as standard with the respective boiler are used.
2. The specified emission values refer to dry flue gas with an oxygen content of 10 % and under standard conditions at 0°C and 1013 millibars.
   The evaluation values reported are rounded to the nearest whole number.
   Values labelled with "<" represent the relative detection limit of the measuring methods or measuring device configurations used.

4.3.2 S3 Turbo 30

Description		S3 Turbo	
		30	30[1)]
Nominal output	kW	30	31
Boiler efficiency (NCV)	%	92.2	92.3
Electrical connection		230V / 50Hz / fused C13A	
Weight of boiler incl. insulation and control	kg	530	
Total boiler capacity (water)	l	120	
Water pressure drop (ΔT = 10 / 20 K)	mbar	6.1 / 2.0	
Minimum boiler return temperature	°C	60	
Maximum permitted operating temperature		90	
Permitted operating pressure	bar	3	
Airborne sound level	dB(A)	< 70	
Permitted fuel as per EN ISO 17225		Part 5: Firewood class A2 / D15 L50	
Fuel loading door dimensions (width / height)	mm	330 / 370	
Fuel loading chamber capacity	l	140	
Combustion time [2)] - beech	h	3.9 - 5.6	
Combustion time[2)] - spruce		2.8 - 3.9	
Test book number		PB 091	PB 091
Boiler class as per EN 303-5: 2012		5	

1. S3 Turbo 30 with 31 kW nominal output only available in Italy
2. Values specified for combustion time are guideline values at nominal load and will vary depending on water content (15-25%) and fill level (80-100%)

Product data in accordance with the regulations (EU) 2015/1187 and 2015/1189

Model identifier	S3 Turbo	
	30	30 (31 kW)
Heating up mode	manual	manual

Model identifier		S3 Turbo	
		30	30 (31 kW)
Condensing boiler		No	No
Solid fuel boiler for combined heat and power		No	No
Combined heating system		No	No
Storage tank volume		➲ "Storage tank" [▸ 19]	
Preferred fuel		Firewood, moisture content ≤ 25 %	
Useful heat delivered at rated heat output (P_n)	kW	30.0	31.0
Fuel efficiency at rated heat output (η_n)	%	83.5	83.5
Auxiliary current consumption at rated heat output (el_{max})	kW	0.051	0.049
Auxiliary current consumption in standby mode (P_{SB})	kW	0.006	0.006
Energy efficiency class of the boiler		A+	A+
Energy efficiency index (EEI) of boiler		117	118
Heating space annual rate of use ηs	%	80	80
Temperature controller used		Lambdatronic S 3200	
Class of the temperature controller		II	II
Contribution of the temperature controller to the energy efficiency index of a combined system	%	2	2
Energy efficiency index (EEI) of the combined boiler and controller[1)]		119	120
Energy efficiency class of the combined boiler and controller[1)]		A+	A+
Annual space heating emissions of dust (PM)[2)]	mg/m³	14	14
Annual space heating emissions of gaseous organic compounds (GOC)[2)]	mg/m³	7	6
Annual space heating emissions of carbon monoxide (CO)[2)]	mg/m³	126	118
Annual space heating emissions of nitrogen oxides (NOx)[2)]	mg/m³	171	171

1. The information on the energy efficiency index EEI of the combined boiler and controller and the energy efficiency class of the combined boiler and controller applies only if the Fröling control components supplied as standard with the respective boiler are used.
2. The specified emission values refer to dry flue gas with an oxygen content of 10 % and under standard conditions at 0°C and 1013 millibars.
The evaluation values reported are rounded to the nearest whole number.
Values labelled with "<" represent the relative detection limit of the measuring methods or measuring device configurations used.

4.3.3 S3 Turbo 40-45

Description		S3 Turbo	
		40	45
Nominal heat output	kW	40	45
Boiler efficiency (NCV)	%	93.5	94.1
Electrical connection		230V / 50Hz / fused C13A	
Weight of boiler incl. insulation and control	kg	610	620
Total boiler capacity (water)	l	190	
Water pressure drop (ΔT = 10 / 20 K)	mbar	7.0 / 2.1	22.0 / 6.3
Minimum boiler return temperature	°C	60	
Maximum permitted operating temperature		90	95
Permitted operating pressure	bar	3	

Description		S3 Turbo	
		40	45
Airborne sound level	dB(A)	< 70	
Permitted fuel as per EN ISO 17225		Part 5: Firewood class A2 / D15 L50	
Fuel loading door dimensions (width / height)	mm	330 / 370	
Fuel loading chamber capacity	l	210	
Combustion time [1] - Beech	h	4.1 - 6.0	3.9 - 5.6
Combustion time[1] - spruce		2.9 - 4.2	2.7 - 4.0
Test book number		PB 092	PB 034
Boiler class as per EN 303-5: 2012		5	

1. Values specified for combustion time are guideline values at nominal load and will vary depending on water content (15-25%) and fill level (80-100%)

Product data in accordance with the regulations (EU) 2015/1187 and 2015/1189

Model identifier		S3 Turbo	
		40	45
Heating up mode		manual	manual
Condensing boiler		No	No
Solid fuel boiler for combined heat and power		No	No
Combined heating system		No	No
Storage tank volume		➲ "Storage tank" [▶ 19]	
Preferred fuel		Firewood, moisture content ≤ 25 %	
Useful heat delivered at rated heat output (P_n)	kW	40.0	45.0
Fuel efficiency at rated heat output (η_n)	%	84.6	85.3
Auxiliary current consumption at rated heat output (el_{max})	kW	0.053	0.066
Auxiliary current consumption in standby mode (P_{SB})	kW	0.007	0.007
Energy efficiency class of the boiler		A+	A+
Energy efficiency index (EEI) of boiler		119	120
Heating space annual rate of use ηs	%	81	82
Temperature controller used		Lambdatronic S 3200	
Class of the temperature controller		II	II
Contribution of the temperature controller to the energy efficiency index of a combined system	%	2	2
Energy efficiency index (EEI) of the combined boiler and controller[1]		121	122
Energy efficiency class of the combined boiler and controller[1]		A+	A+
Annual space heating emissions of dust (PM)[2]	mg/m³	16	19
Annual space heating emissions of gaseous organic compounds (GOC)[2]	mg/m³	3	5
Annual space heating emissions of carbon monoxide (CO)[2]	mg/m³	94	112
Annual space heating emissions of nitrogen oxides (NOx)[2]	mg/m³	165	172

1. The information on the energy efficiency index EEI of the combined boiler and controller and the energy efficiency class of the combined boiler and controller applies only if the Fröling control components supplied as standard with the respective boiler are used.
2. The specified emission values refer to dry flue gas with an oxygen content of 10 % and under standard conditions at 0°C and 1013 millibars.
   The evaluation values reported are rounded to the nearest whole number.
   Values labelled with "<" represent the relative detection limit of the measuring methods or measuring device configurations used.

4.3.4 Boiler data for planning the flue gas system

The flue gas performance values listed below should be used for calculation of the fluid dynamics for flue gas systems as specified in the EN 13384 series of standards. The flue gas performance values for the respective outputs are applicable under typical operating conditions when using fuels consistent with the fuel class specified in EN ISO 17225.

Description		S3 Turbo			
		20[1)]	30	40	45
Flue gas temperature at rated heat output T_{WN} / at the lowest output T_{Wmin}	°C	150 / -	170 / 120	150 / 110	170 / 120
Volumetric concentration of CO_2 in the dry flue gas $\sigma(CO_2)$ at rated heat output	%	11.3			
Flue gas mass flow at rated heat output $\dot{m}_N$ / at the lowest output $\dot{m}_{min}$	kg/h	58 / -	79 / 40	101 / 47	119 / 58
	kg/s	0.016 / -	0.022 / 0.011	0.028 / 0.013	0.033 / 0.016
Feed pressure P_{WN} required at the rated heat output / P_{Wmin} required at the lowest output	Pa	8 / -	8 / 8		
Maximum permissible feed pressure P_{Wmax}	Pa	30			
Feed pressure P_{WO} (blower feed pressure) available at the appliance	Pa	-			
Flue spigot diameter D	mm	149			
Data to be used when for operation independent of the room air					
Supply air connection diameter	mm	-			
Maximum permissible pressure drop P_{Bmax} in the supply air duct	Pa	-			
Combustion air volume at rated heat output	m³/h	-	-	-	-

1. Also applies to S3 Turbo 18 - 22 kW nominal output

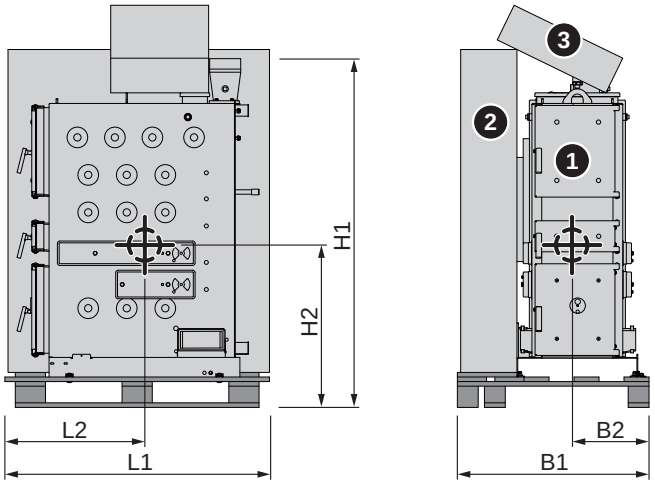
4.3.5 Data for planning a backup power supply

Description		Value
Continuous output (single phase)	VA	2990
Nominal voltage	VAC	230 ± 6%
Frequency	Hz	50 ± 2%

5 Transport and storage

5.1 Delivery configuration

The boiler comes packed in protective casing on a pallet.



Item	Description	Unit	S3 Turbo	
			18-30	40-45
L1	Length	mm	1270	
B1	Width		920	
H1	Height		1680	
-	Weight	kg	690	
Centre of gravity				
L2	Length	mm	625	
B2	Width		390	
H2	Height		780	
Components				
1	Boiler S3 Turbo			
2	Insulation			
3	Controller			

5.2 Temporary storage

If the system is to be assembled at a later stage:

❒ Store components at a protected location, which is dry and free from dust

↳ Damp conditions and frost can damage components, particularly electric ones!

5.3 Positioning

NOTICE

Damage to components if handled incorrectly

- ❒ Follow the transport instructions on the packaging
- ❒ Transport components with care to avoid damage
- ❒ Protect the packaging against damp conditions
- ❒ Pay attention to the pallet's centre of gravity when lifting

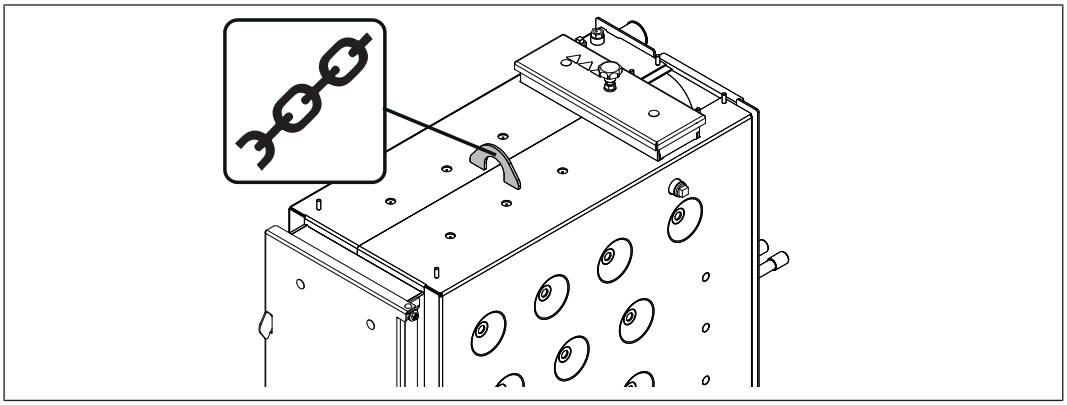
❒ Position a fork-lift or similar lifting device at the pallet and bring in the components

If the boiler cannot be brought in on the pallet:

❒ remove the cardboard and take the boiler off the pallet

➲ "Remove boiler from pallet" [▶ 31]

Positioning using a crane

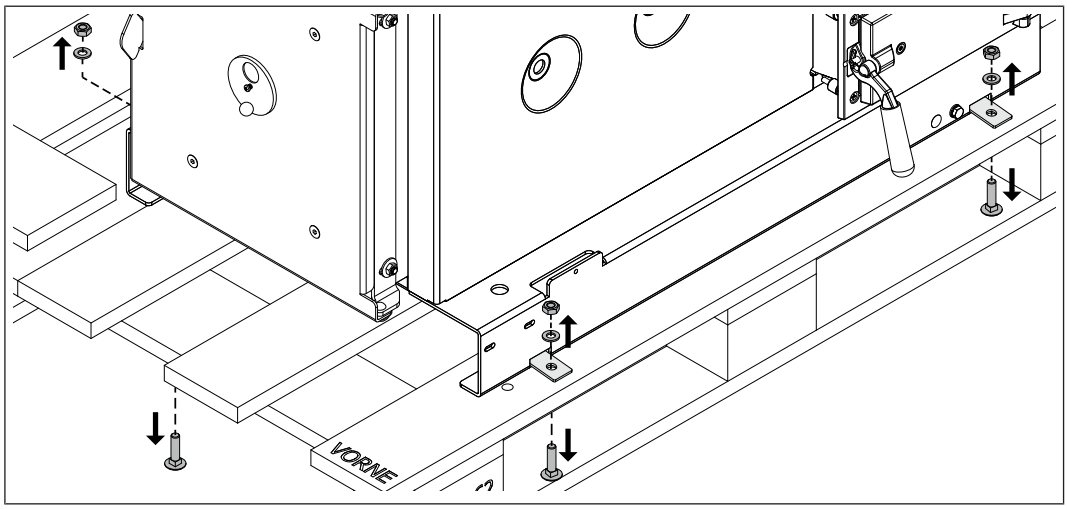


❒ Attach the crane hook to the attachment point correctly and position the boiler

5.4 Positioning at the installation site

5.4.1 Remove boiler from pallet

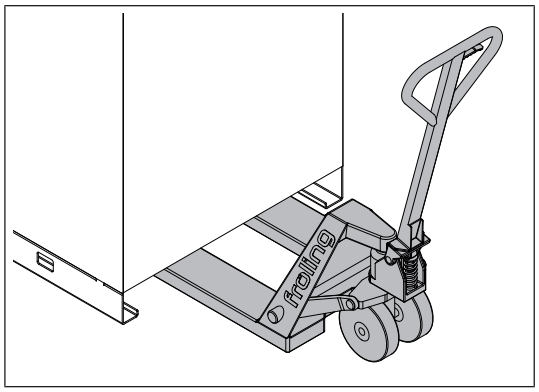
❒ Remove the cardboard box with the insulation and controller from the boiler and put it in a safe place



❒ Remove the transport locks

❒ Lift boiler from pallet

TIP: use Froling's KHV 1400 boiler lifting system to help remove the pallet!



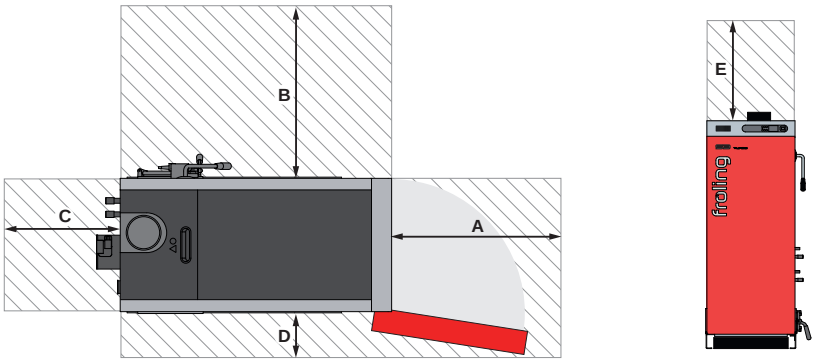
❒ Position a fork-lift or similar lifting device with a suitable load-bearing capacity at the base frame

❒ Lift it and transport it to the intended position

↳ Observe the operating and maintenance areas of the equipment in the process!

5.4.2 Operating and maintenance areas of the equipment

- The system should generally be set up so that it is accessible from all sides to allow quick and easy maintenance!
- Regional regulations regarding necessary maintenance areas for inspecting the chimney should be observed in addition to the specified distances!
- Observe the applicable standards and regulations when setting up the system!
- Comply with additional standards for noise protection!
  (ÖNORM H 5190 - Noise protection measures)



A	800 mm
B	800 mm / 200 mm[1)]
C	500 mm
D	200 mm / 800 mm[1)]
E	500 mm[2)]

1. A maintenance area of at least 800 mm is required on the side of the WOS lever (B or D) to ensure easy access for connecting the device and for maintenance work (e.g. induced draught)
2. Maintenance area to expand the WOS springs upwards

6 Assembly

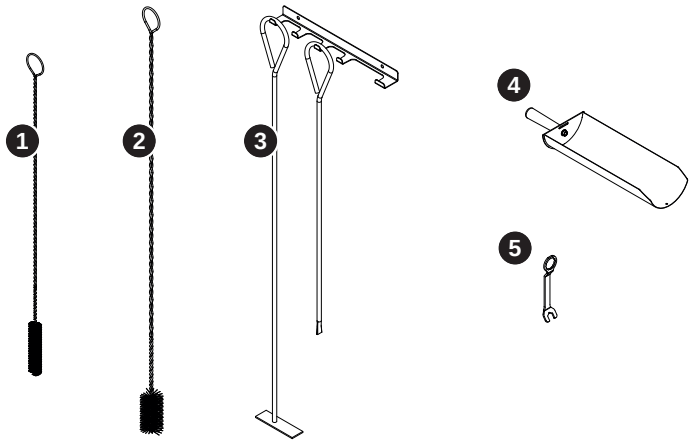
6.1 Required tools and equipment

The following tools and resources are required for assembly:

- ❒ Spanner or box wrench set (widths across flats 8 - 32 mm)
- ❒ Set of Allen keys
- ❒ Flat head and cross-head screwdrivers
- ❒ Hammer
- ❒ Diagonal cutting pliers
- ❒ Half-round file
- ❒ Power drill or cordless screwdriver with Torx bit insert
- ❒ Stepladder

6.2 Accessories supplied

The following accessories are included in the delivery and are necessary exclusively for operation of the boiler.

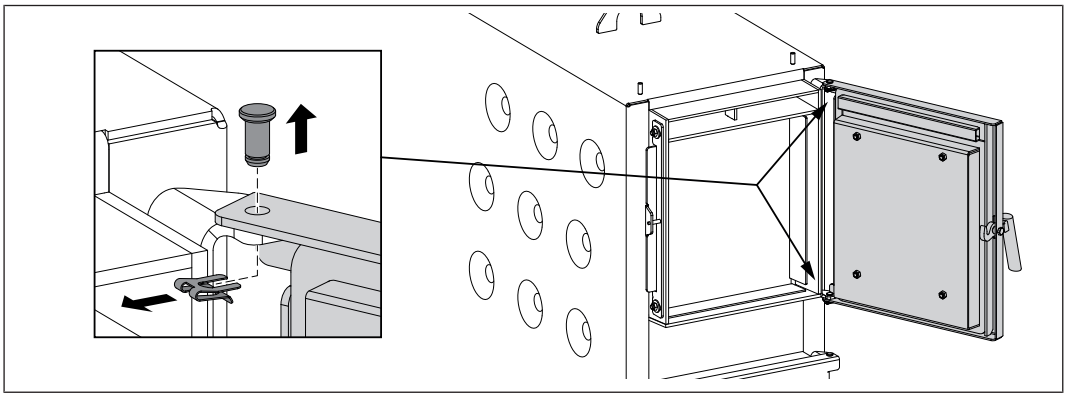


1	Cleaning brush 30 x 20 x 90	**4**	Ash shovel
2	Cleaning brush Ø 54 x 1350	**5**	Spanner for door mountings
3	Furnace tool with bracket		

6.3 Before Installation

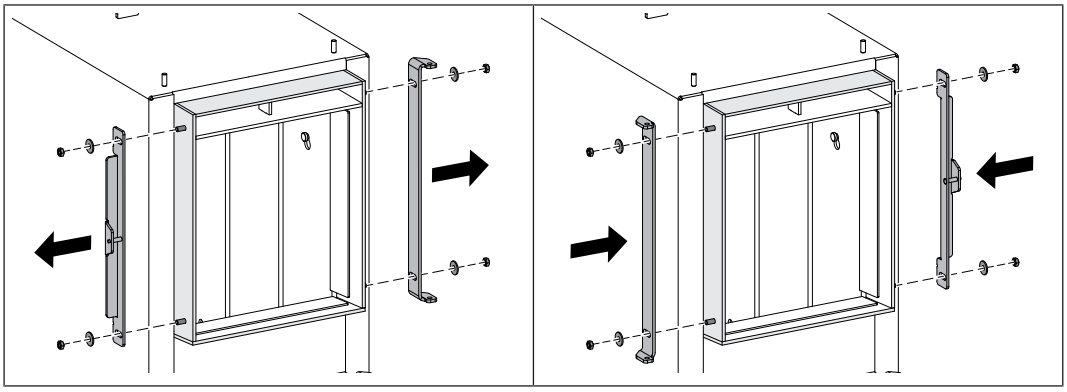
6.3.1 Changing door stops (as needed)

The following steps are illustrated based on changing the fuel loading door from right-hand mounting to left-hand mounting. Perform these steps in the same way for the door of the pre-heating and combustion chamber.

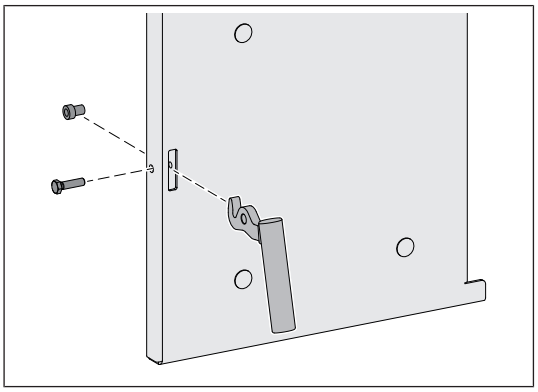


❒ Open the fuel loading door

❒ Remove the shaft retainers, pull out the hinge pins and take off the fuel loading door



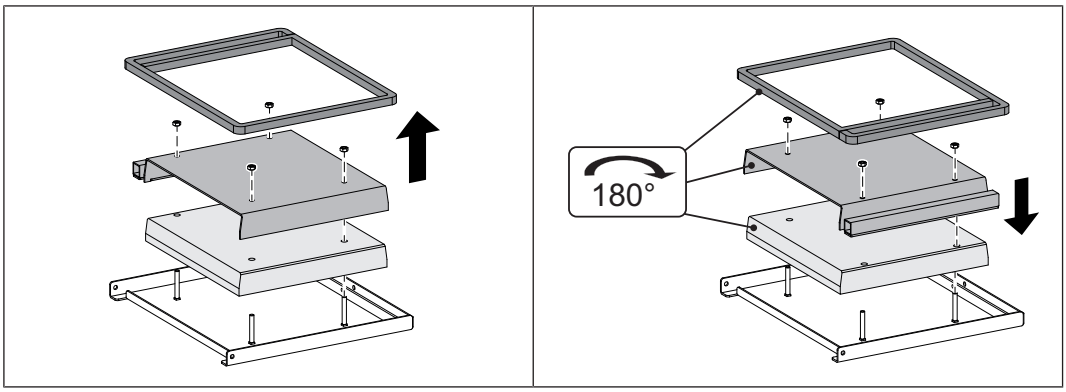
❒ Remove the hinge and locking plate and reinstall them on the opposite side



❒ Undo the hexagon screw on the fuel loading door and remove the door handle and flange sleeve

❒ Turn the door handle through 180°, insert the flange bushing and attach the door handle using a hexagon head screw

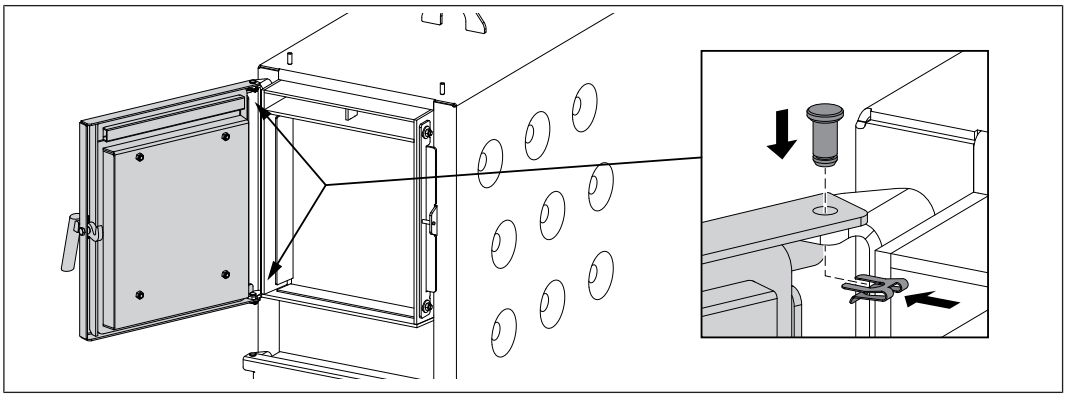
For the fuel loading door



❒ Cautiously remove the seal, protective plate and insulating panel

❒ Turn the components through 180° and reinstall them on the door plate

↳ When doing so, use contact adhesive to fix the seal in place

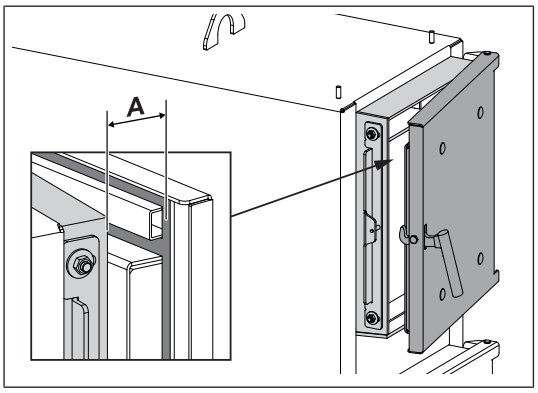


❒ Position the fuel loading door on the hinge and secure it with the top and bottom hinge pins

❒ Slide the shaft retainers on to the hinge pins

6.3.2 Checking the seal on the doors

The following steps are illustrated based on the fuel loading door. Perform these steps in the same way for the door of the pre-heating and combustion chamber.

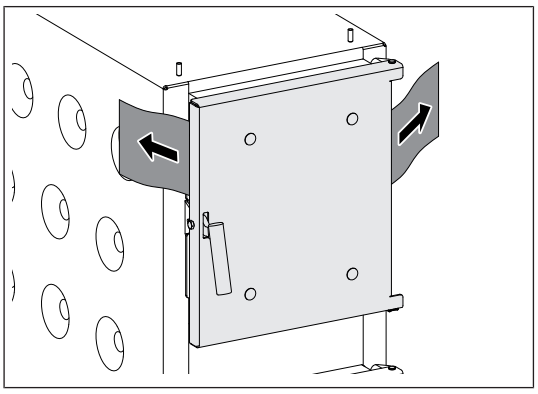


❒ Close the door

↳ Slight resistance noticeable at a door gap (A) of 2-3 cm:
It is acceptable to make an adjustment at the hinge side

↳ No perceptible resistance:
Move the hinge backwards
➲ "Adjusting the doors" [▸ 37]

↳ If a resistance is felt when there is a gap of 3 cm:
Move the hinge plate forwards
➲ "Adjusting the doors" [▸ 37]



❒ Open the door

❒ Place a sheet of paper on both sides of the door and close the door

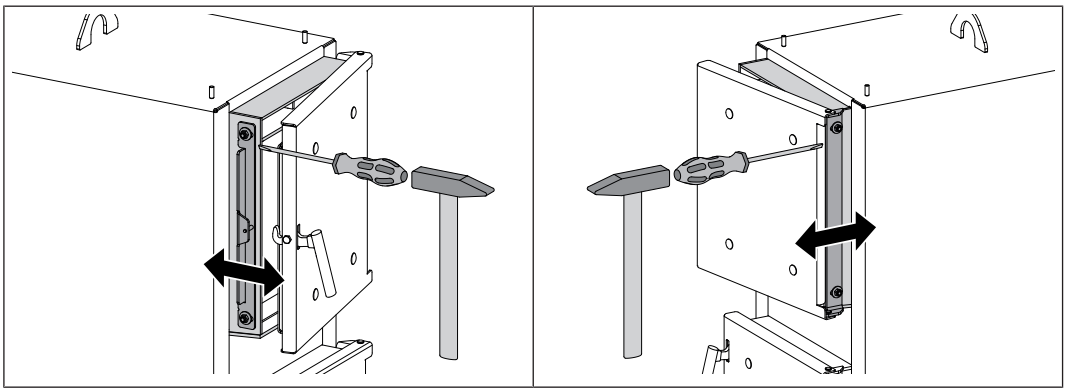
❒ Try to pull out the sheet of paper

↳ If the paper cannot be pulled out:
the door is tightly sealed

↳ If the paper can be pulled out:
the door is not sealed properly – move the hinge or the locking plate backwards slightly
➲ "Adjusting the doors" [▸ 37]

6.3.3 Adjusting the doors

The following steps are illustrated based on the fuel loading door. Perform these steps in the same way for the door of the pre-heating and combustion chamber.



❒ Loosen the nuts on the locking plate and hinge

❒ Using a suitable tool, move the locking plate and hinge forwards or backwards

❒ Tighten the nuts

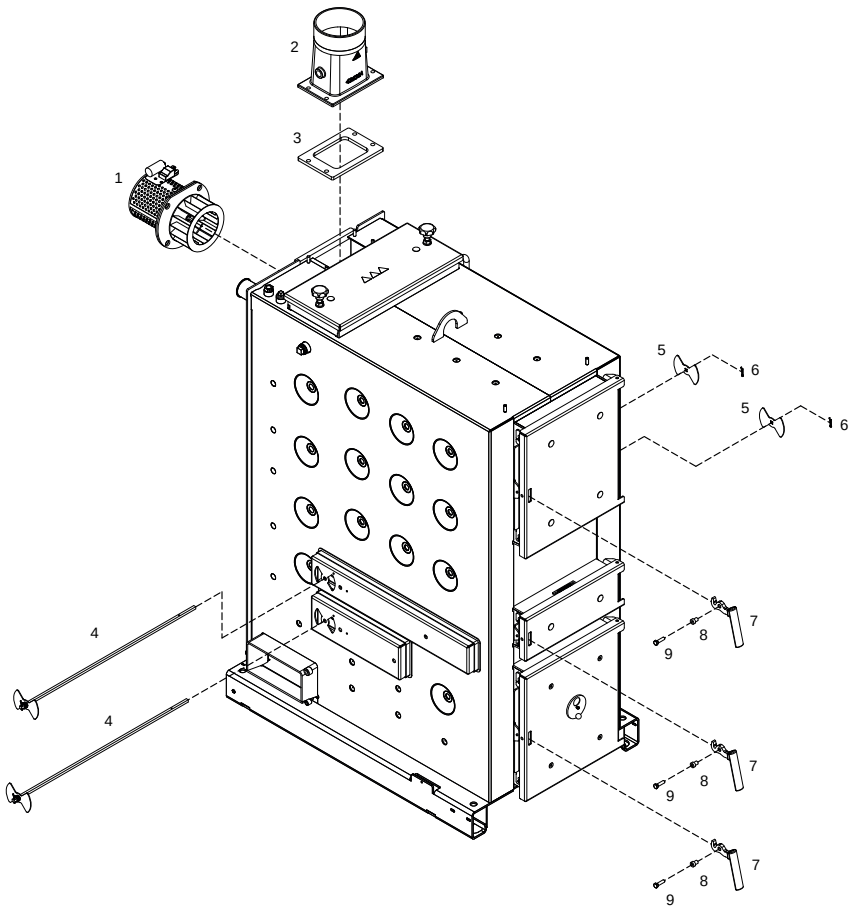
IMPORTANT: Align the locking plate and hinge identically at the top and bottom

❒ Once the doors have been adjusted, check them again for leaks, ➲ "Checking the seal on the doors" [▸ 36]

6.4 Installing the boiler

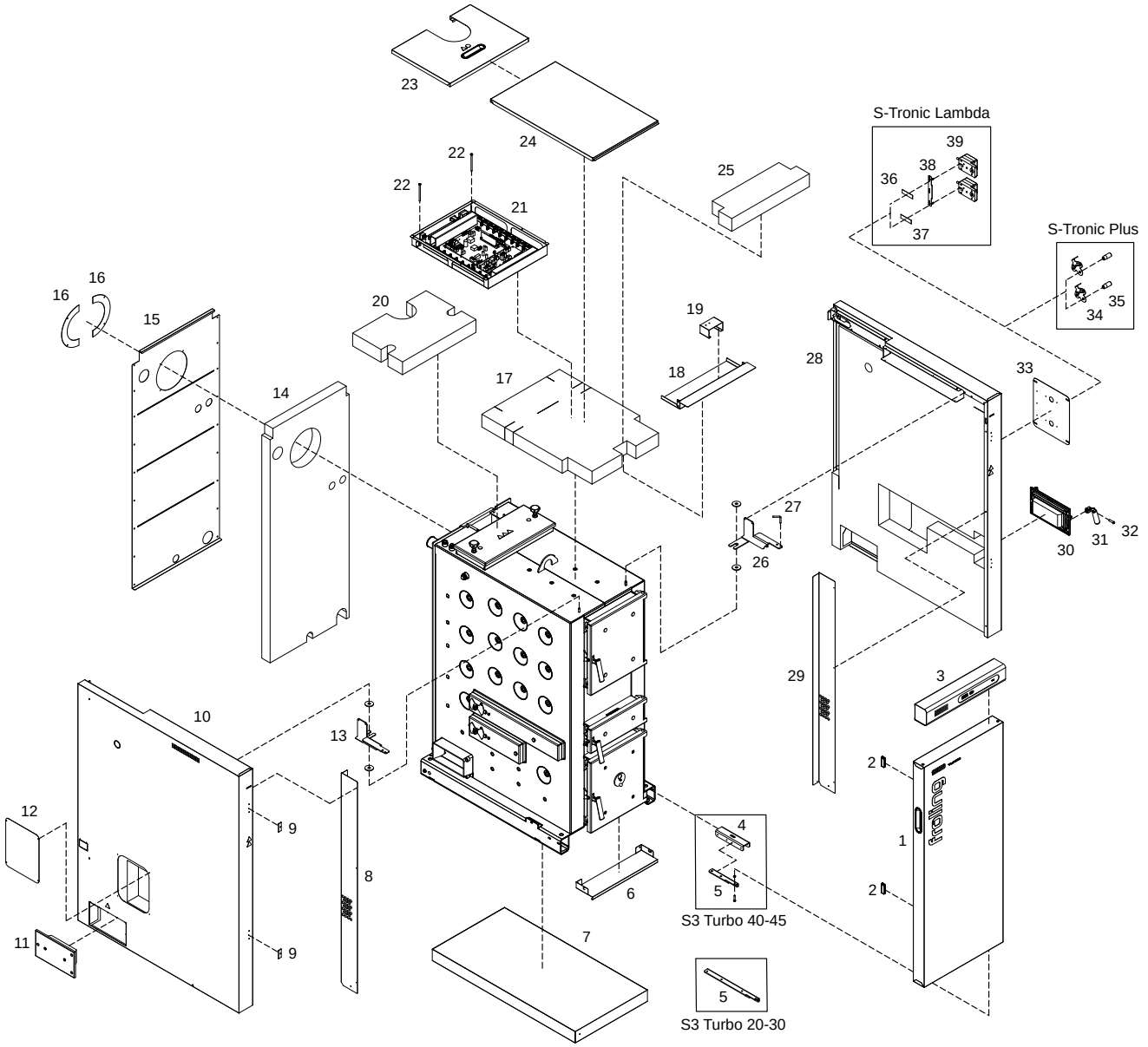
6.4.1 Assembly overview

Air duct system



Item	Quanti ty	Description
1	1	Induced draught fan with rotation speed transducer
2	1	Flue gas nozzle Ø 150
3	1	Ceramic fibre seal 210 x 144 x 12
4	2	Pneumatic rods, complete
5	2	Sliding valve Ø 100
6	2	Split pin Ø 3.2 x 20
7	3	Door handle, black
8	3	Bushing Ø 10 x 20
9	3	Hexagonal screw M8 x 30

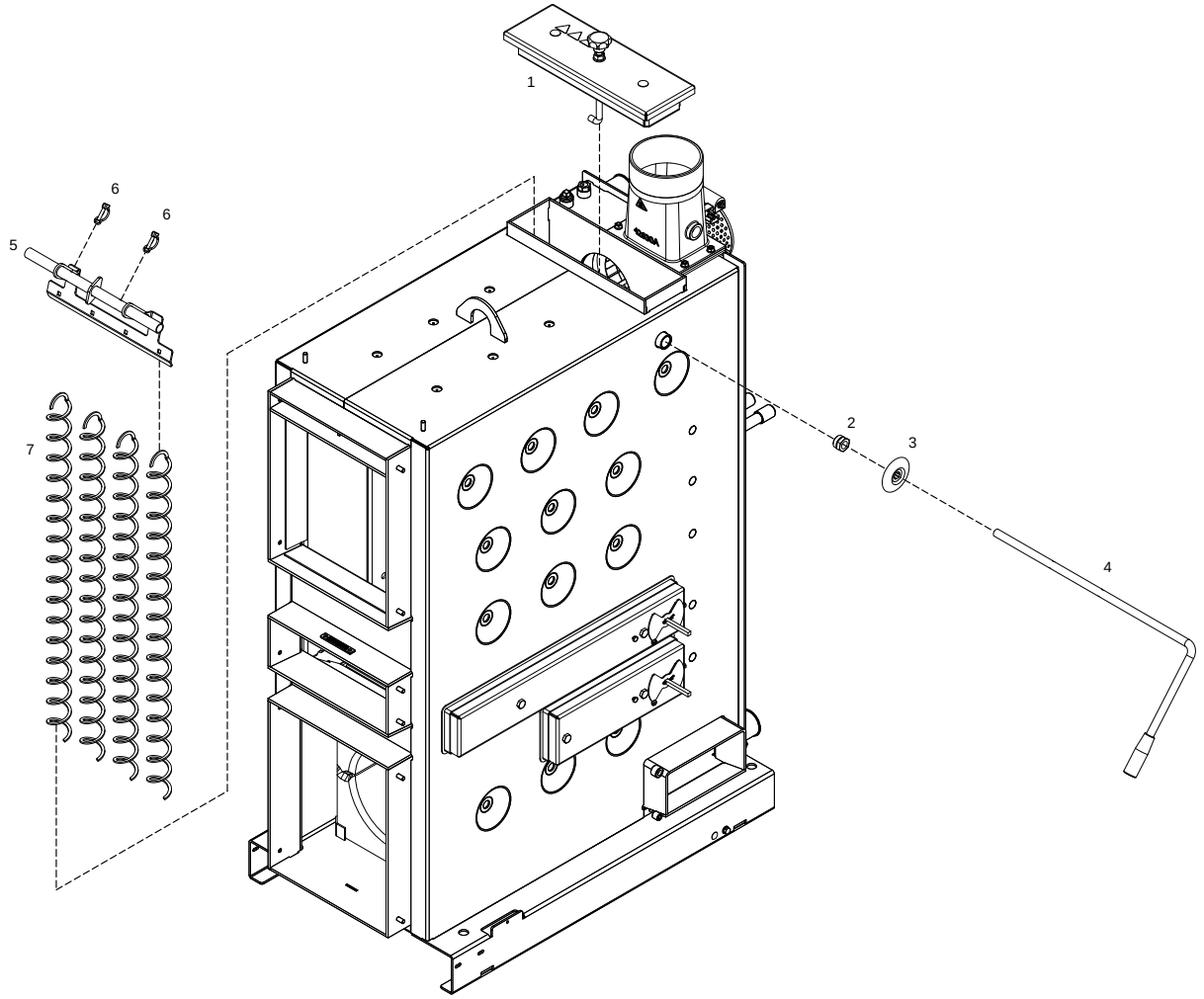
Insulation



Item	Quantity	Description	Item	Quantity	Description
1	1	Insulated door, complete	21	1	Controller box, complete
2	2	Magnetic latches	22	2	Hexagonal screw M6 x 100
3	1	Control, complete	23	1	Insulating cover, back
4	1	U-plate – S3 Turbo 40/45	24	1	Controller cover
5	1	Lower door bracket	25	1	Heat insulation mat, top/front
6	1	Cover plate, insulated door, bottom	26	1	Bracket, right
7	1	Complete floor insulation	27	1	Hinge pin, insulated door
8	1	Insulation cover plate, left	28	1	Insulating side panel, right, complete
9	2	Counter plate for magnetic latches	29	1	Insulation cover plate, right
10	1	Insulating side panel, left, complete	30	1	Side cleaning door, complete
11	1	Blanking plate, side cleaning door	31	1	Door handle, cleaning door
12	1	Cover plate	32	1	Round-head screw M8 x 30

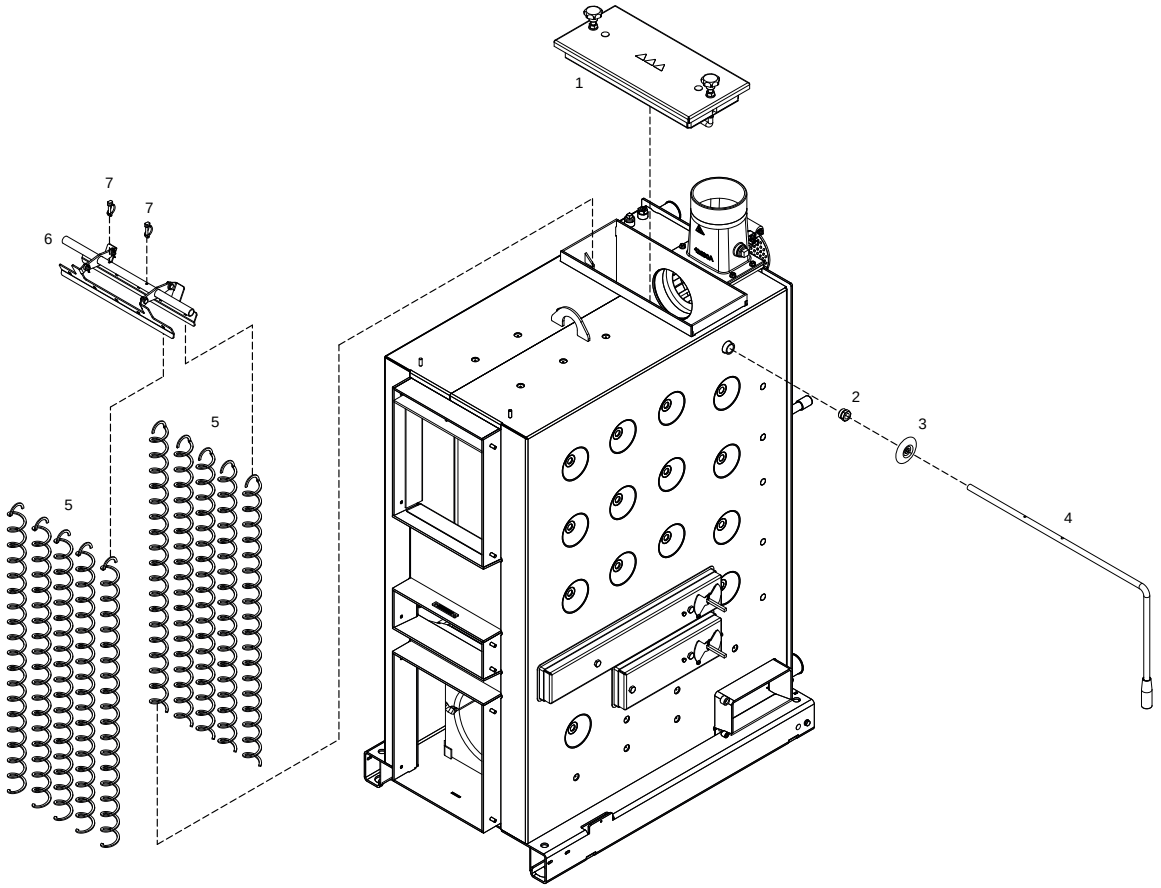
Item	Quantity	Description	Item	Quantity	Description
13	1	Bracket, left	33	1	Cover plate
14	1	Thermal insulation, rear	34	2	Air flap manual controller (only for S-Tronic Plus)
15	1	Back panel, complete	35	2	Air flap handle (only for S-Tronic Plus)
16	2	Cover plate for ID fan	36	1	Sticker, "Primary air actuator" (only with S-Tronic Lambda)
17	1	Heat insulation mat, top	37	1	Sticker, "Secondary air actuator" (only with S-Tronic Lambda)
18	1	Upper spacer plate	38	1	Torque support (only with S-Tronic Lambda)
19	1	Door contact switch incl. cable	39	2	Servo-motor LM 24AP5-F/300.1 (only with S-Tronic Lambda)
20	1	Heat insulation mat, top/rear			

WOS system S3 Turbo 20-30



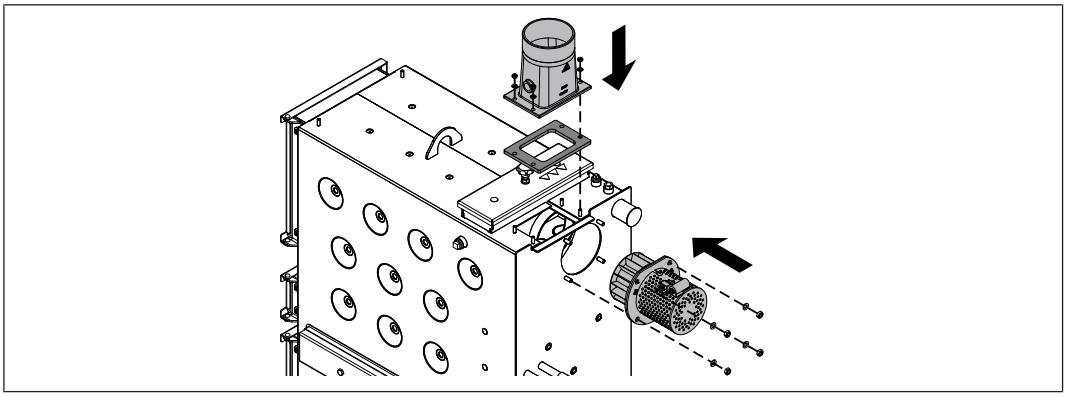
Item	Quantity	Description
1	1	EOS cleaning cover, complete
2	1	Grey cast iron bushing
3	1	Plastic cover
4	1	WOS lever
5	1	EOS bracket, complete 6 x 3
6	2	Pipe locking pin
7	4	EOS turbulator Ø 50 x 6 x 3 x 837

WOS system S3 Turbo 40-45



Item	Quanti ty	Description
1	1	EOS cleaning cover, complete
2	1	Grey cast iron bushing
3	1	Plastic cover
4	1	WOS lever
5	10	EOS turbulator Ø 50 x 6 x 3 x 932
6	1	EOS bracket, complete 6 x 3
7	2	Pipe locking pin

6.4.2 Installing flue gas pipe nozzle and the induced draught fan



❒ Place the ceramic fibre seal in position

❒ Position the flue gas pipe nozzle and attach it using the free issue spacer washers and nuts

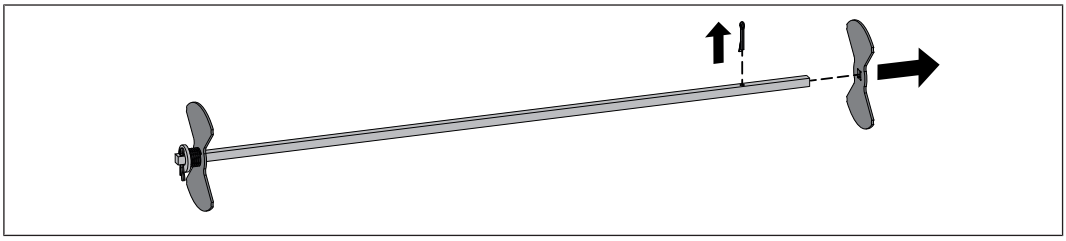
↳ Caution: 1/2” connection must point to the right as seen from behind!

❒ Position the induced draught fan on the back of the boiler and mount it with the four nuts and spacer washers

↳ Caution: do not overstress the flange!

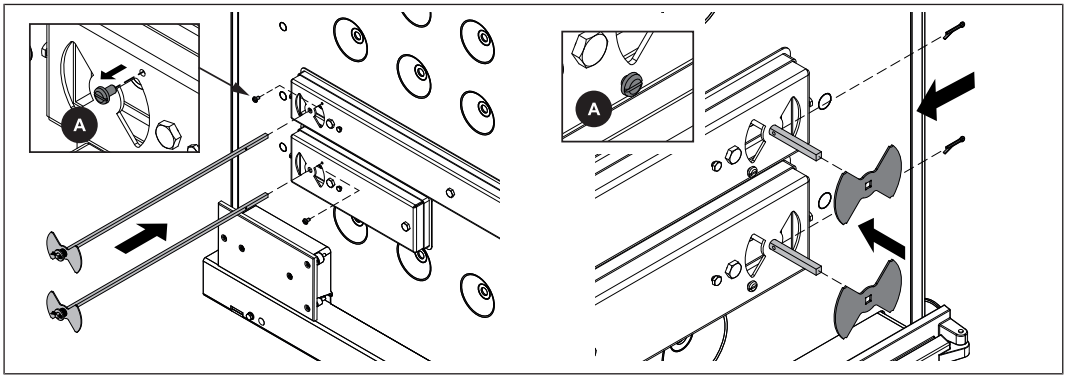
6.4.3 Installing the pneumatic rods for the primary and secondary air

Manual controllers or servo-motors can be mounted on either the left or the right side on the boiler

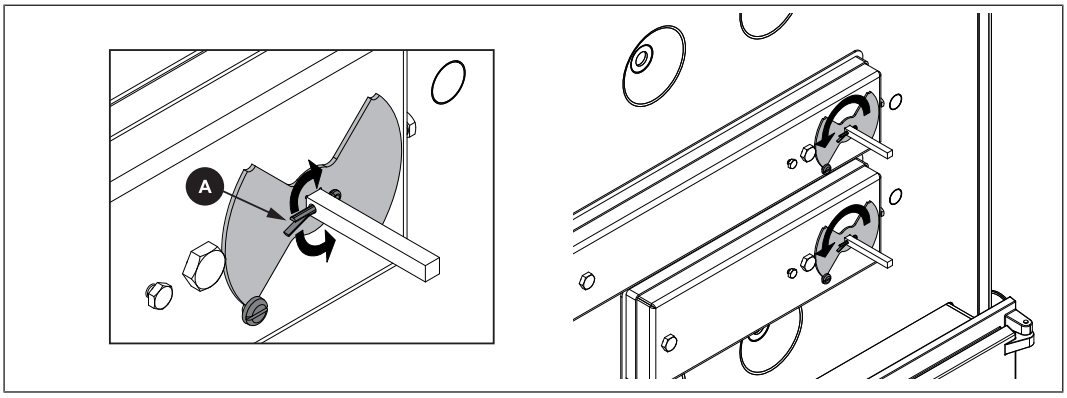


❒ Remove the split pin on both pneumatic rods opposite the spring and pull one of the air flaps off of each

The following procedures are used to mount the pneumatic rod if the manual controller/ servo-motors are mounted on the right side of the boiler. If the manual controller/servo-motors are mounted on the left side of the boiler, complete the following procedures with the sides reversed accordingly.

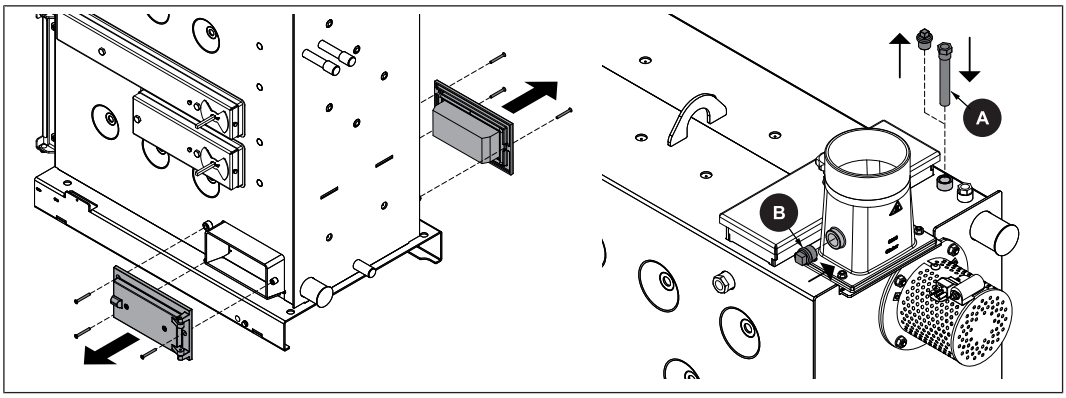


- ❒ Loosen the two screws (A) at the lower and upper air duct on the left side of the boiler
- ❒ Unscrew the screws (A) at the lower and upper air duct on the right side of the boiler far enough to allow the air flap to make contact with the thread
- ❒ Insert both pneumatic rods into the left-hand side of the boiler
  - ↳ The air flaps with springs lie flat on the left-hand air ducts!



- ❒ Insert the air flaps on the pneumatic rods on the right-hand side and secure them with split pins (A)
  - ↳ CAUTION: the air flaps must be situation in the same position as those on the opposite side!
- ❒ Turn both pneumatic rods in an anti-clockwise direction as far as the stop

6.4.4 Final steps before insulating



❒ Remove the side blanking plate and cleaning door

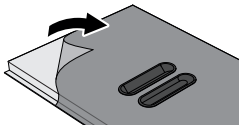
❒ Remove plugs, then seal and screw in the immersion sleeve (A) for thermal discharge safety device sensor

Only for S-Tronic Plus:

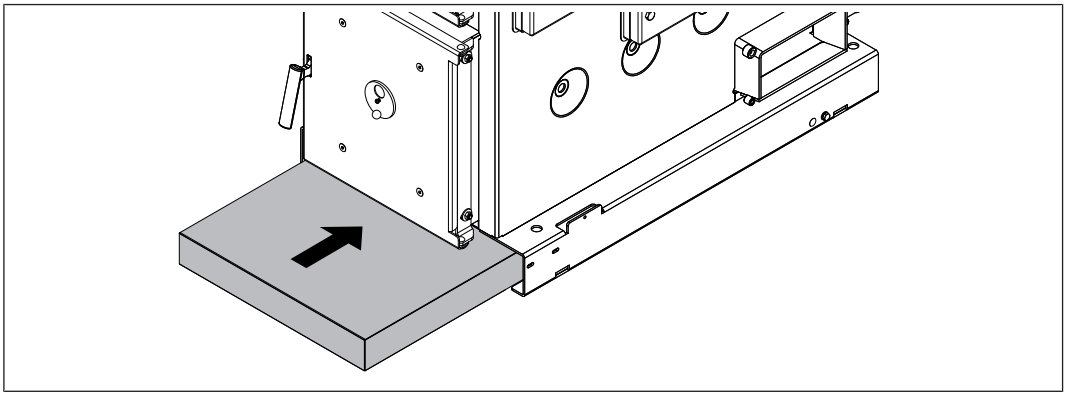
❒ Seal the broadband probe connection with a 3/4" blanking plug (B)

↳ On the S3 Turbo with S-Tronic Lambda, the broadband probe will be mounted here later

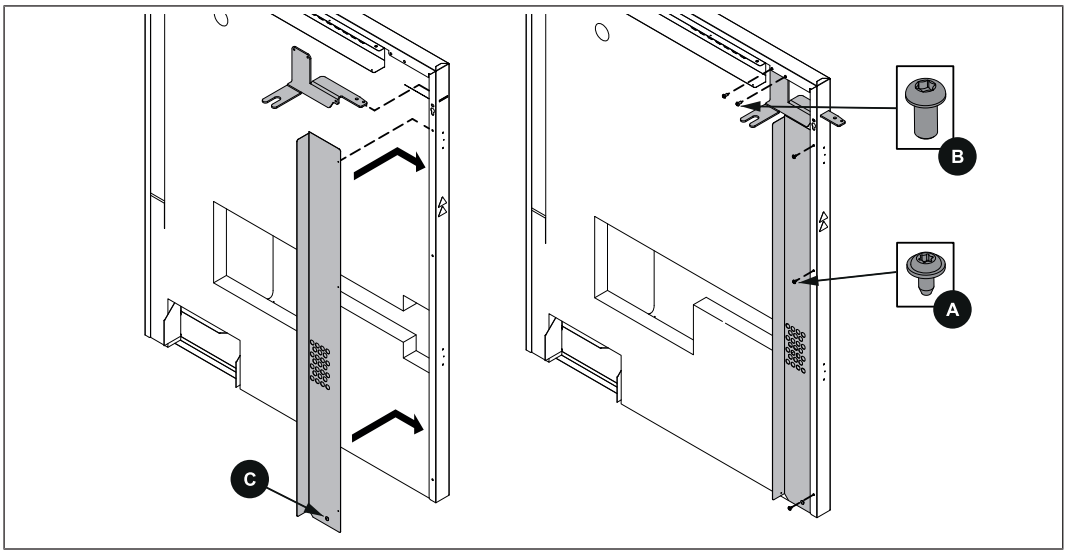
6.4.5 Installing the insulation



IMPORTANT: The individual parts of the boiler insulation covered with a protective film. The protective film must be removed before proceeding with the installation!



❒ Push in the floor insulation

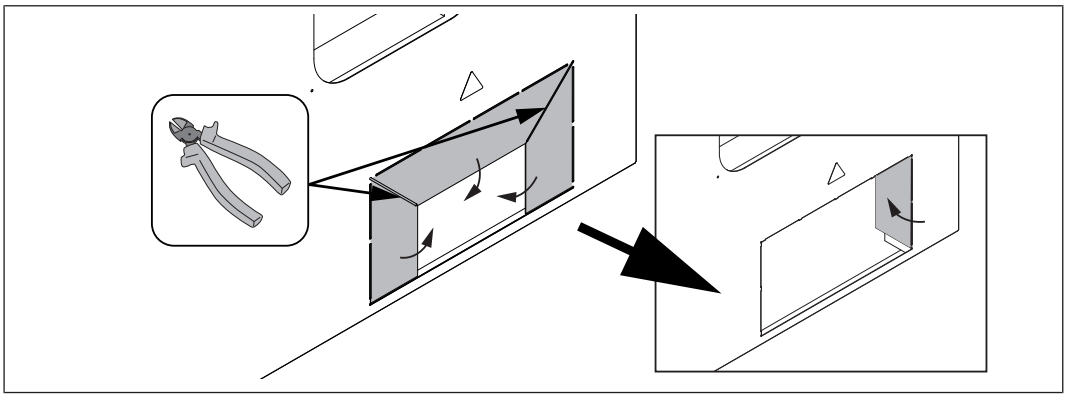


❒ Inset the two L-shaped insulation cover plates at the insulating side panels at left and right and secure them with three thread forming screws (A) each

↳ Insert the cover plates such that the rivet (C) is at the bottom!

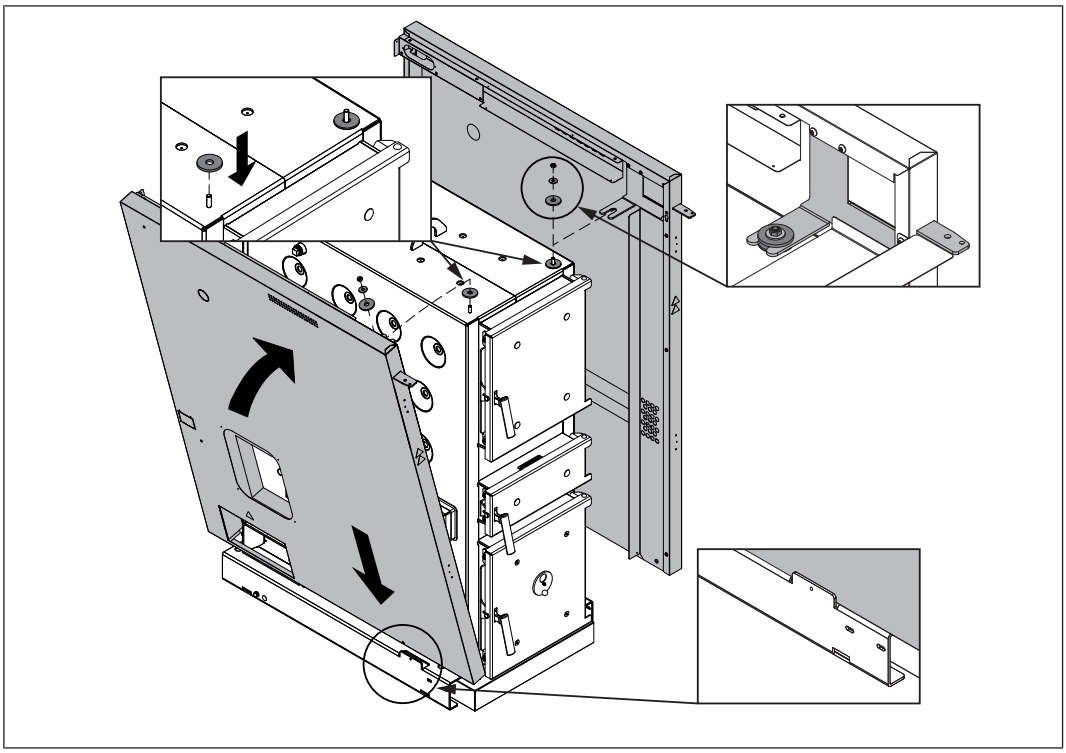
❒ Insert the insulation mounting brackets at both insulating side panels and secure them with the two top thread forming screws (B)

↳ At the front, the bracket will be secured later when the upper spacer plate is inserted!



❒ Cut the perforated flaps for the cleanout opening on both sides and bend them inward

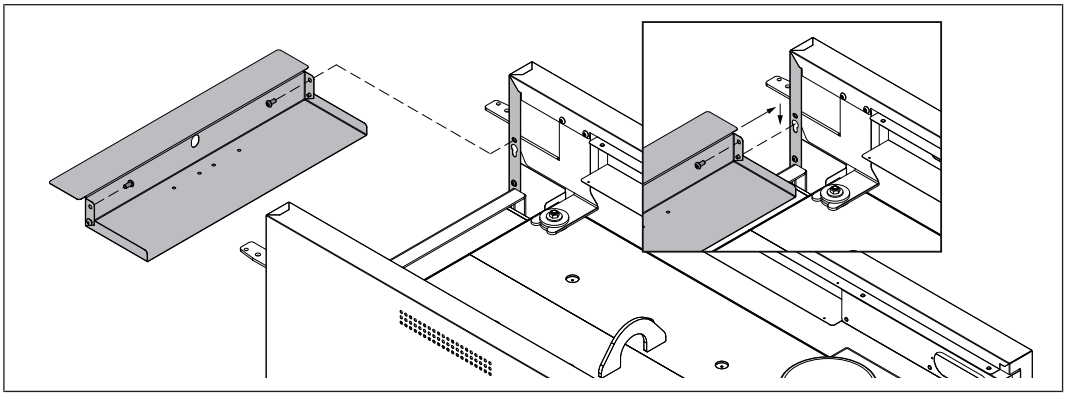
↳ Caution: Bend the flaps > 100° inward!



❒ Place one large spacer washer on each of the threaded bolts to the right and the left above on the boiler

❒ Insert the insulating side panels at the base of the boiler at the flap and push them onto the boiler

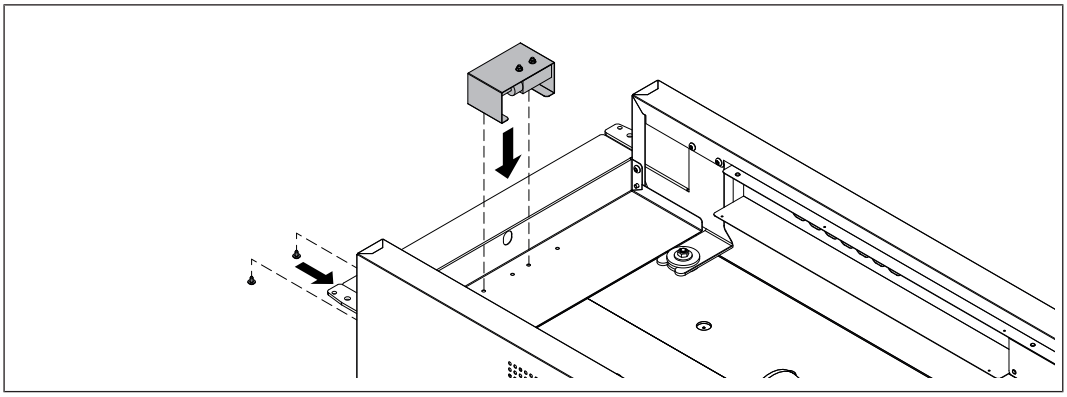
❒ Position the side panels with the door bracket onto the threaded bolts and secure them lightly with a large and a small spacer washer and nut



❒ Hang the upper spacer plate on the rivets between the insulating side panels and attach with thread forming screws

↳ At the same time, this procedure also secures the bracket to the insulating side panels at the front

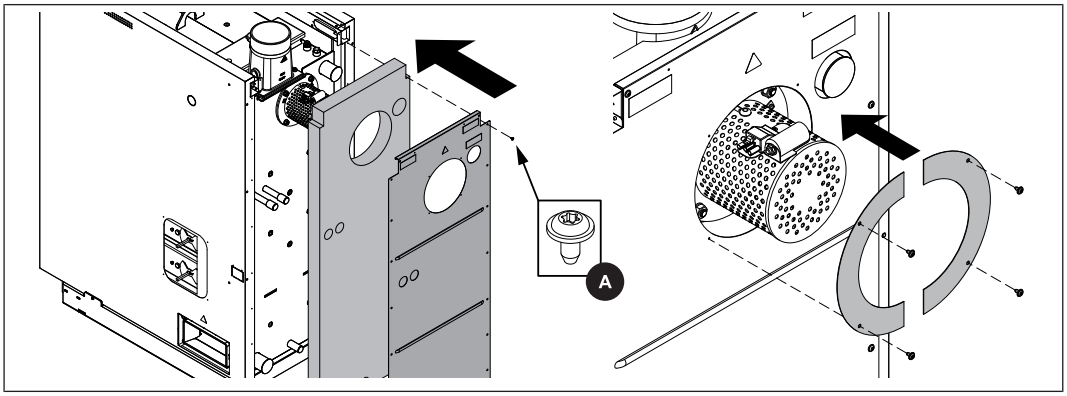
6.4.6 Installing the door switch



❒ Secure the bracket with pre-mounted door switch to the upper spacer plate with two thread forming screws M4 x 8

↳ The reel of the door contact switch must protrude at the front from the opening of the spacer plate.

6.4.7 Installing the back panel



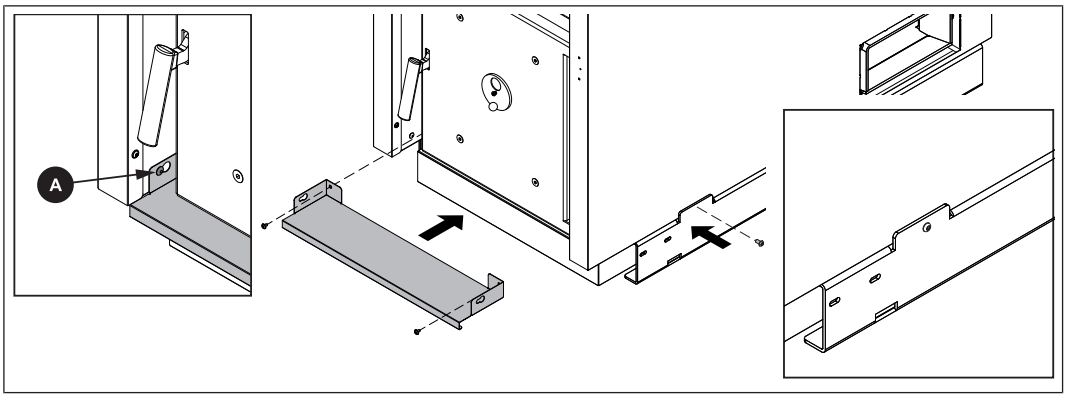
❒ Position the rear thermal insulation on the rear side of the boiler

❒ Insert back panel over induced draught fan

❒ Secure the left and right back panel to the side panel with nine thread forming screws (A) each

❒ Installing the induced draught cover plates

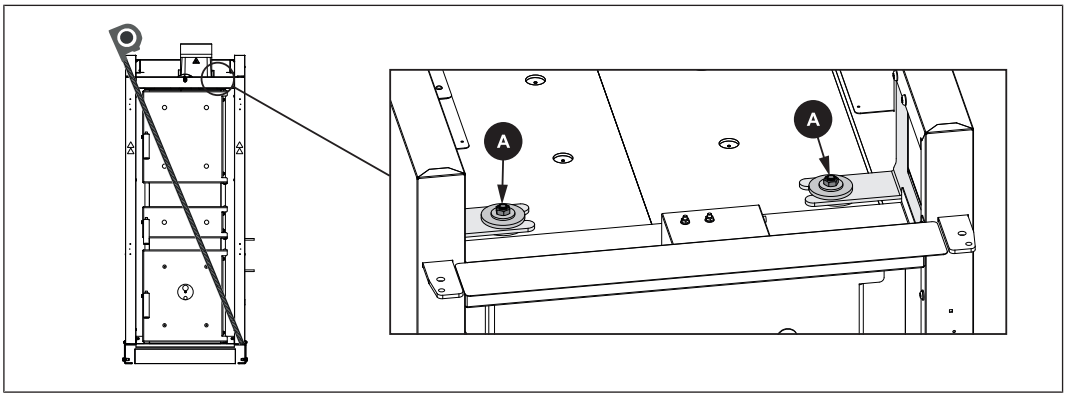
6.4.8 Aligning the insulation and attaching the controller



❒ Hang the lower spacer plate on the rivets (A) between the insulating side panels and attach with one thread forming screw each

❒ Push the insulating side panels toward the rear until the borehole on the flaps corresponds with the borehole on the side panels

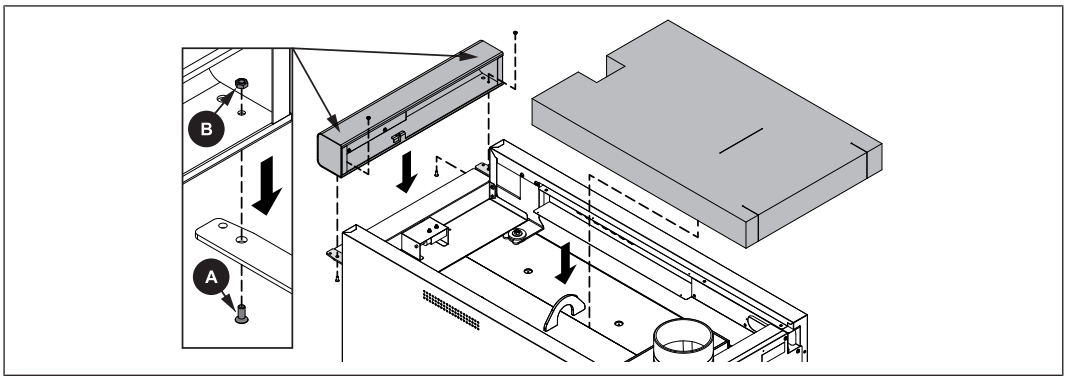
❒ Secure the insulating side panels to the right and left at the flap on the boiler base with thread forming screws



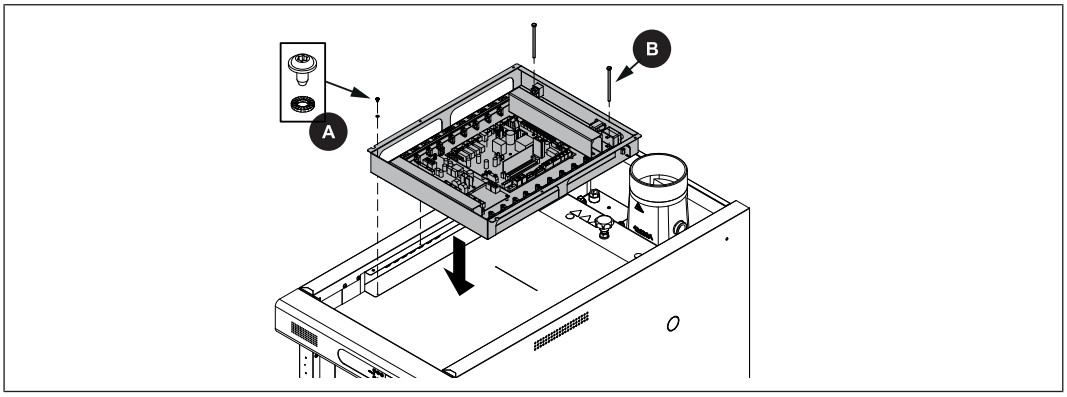
❒ Measure the diagonals and align the insulating side panels so that the two diagonals are the same

↳ Adjust the position of the side panels if necessary

❒ Tighten the nuts (A) on the two brackets of the insulating side panels at the top of the boiler



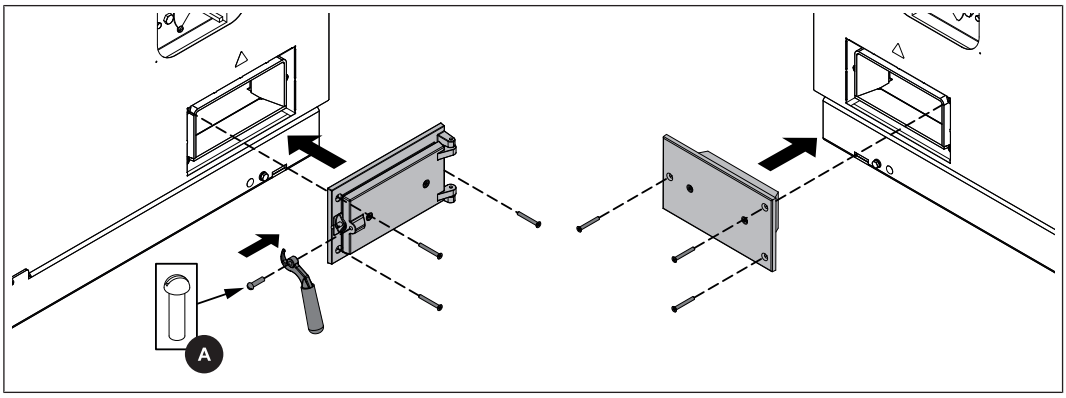
- ❒ Position the control on top
- ❒ Insert one countersunk cross-head screw (A) each to the left and right through the bracket and control from below
- ❒ Use nuts (B) to secure the countersunk cross-head screws from the top
- ❒ Put the top heat insulation mat on
  - ↳ The heat insulation mat must touch the front sheet



- ❒ Place the controller box on the boiler
- ❒ Use eight thread forming screws incl. contact washers (A) to install controller box on the cable duct of the side panels
- ❒ Screw in two carrying bolts (B - hexagonal bolts M6 x 100) to the left and right at the bottom rear side of the controller box far enough to ensure that the controller box and insulation are supported adequately

6.4.9 Installing the cleaning port door and blank cover

NOTICE! Recommendation for easier maintenance: mount the cleaning door on the same side as the WOS lever!



❒ Use three Allen screws to mount the cleaning door on the desired side

↳ Start with the screws at upper right!

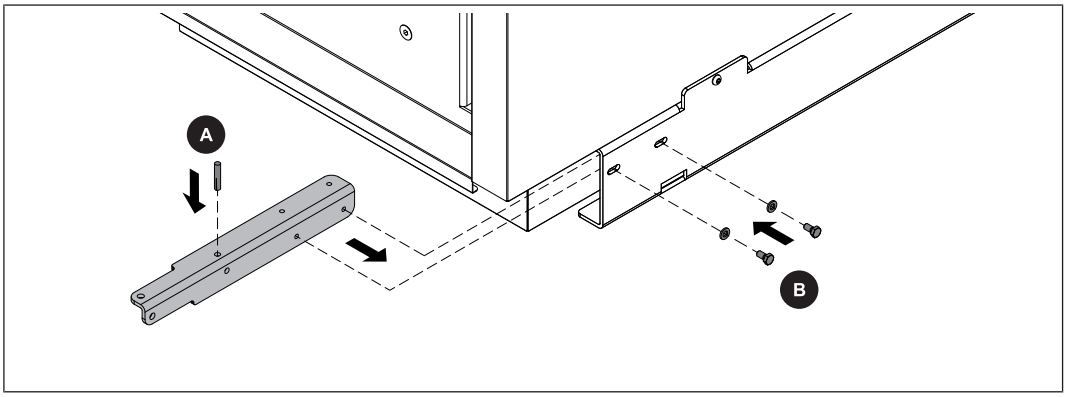
❒ Attach the door handle for the cleaning door using a round headed screw (A)

❒ Install the blank cover for the side cleaning on the opposite side

6.4.10 Installing the insulated door

The illustrations show the assembly for the door stop on the right. If the insulated door is attached on the left, complete the following procedures with the sides reversed accordingly.

S3 Turbo 20/30:



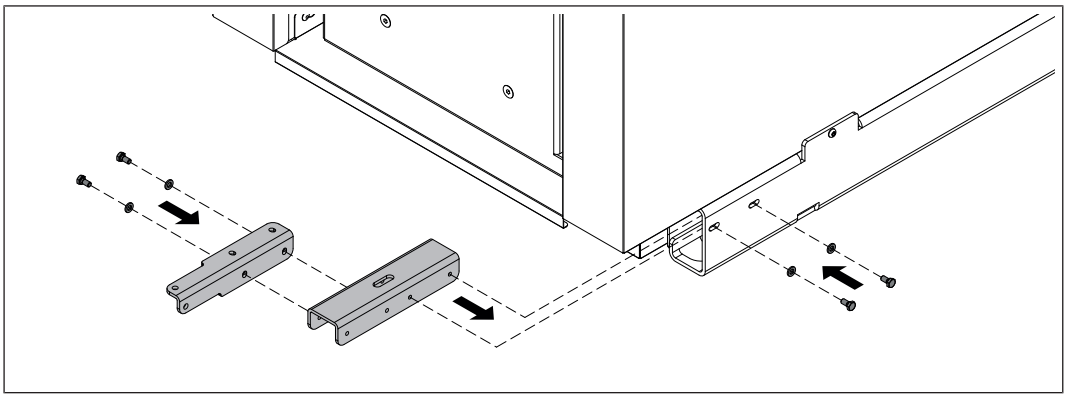
❒ Tap in a fitting grooved pin (A) at the lower door bracket

❒ Slide the lower door bracket into the base of the boiler

↳ Insert the fitting grooved pin (A) into the insulation

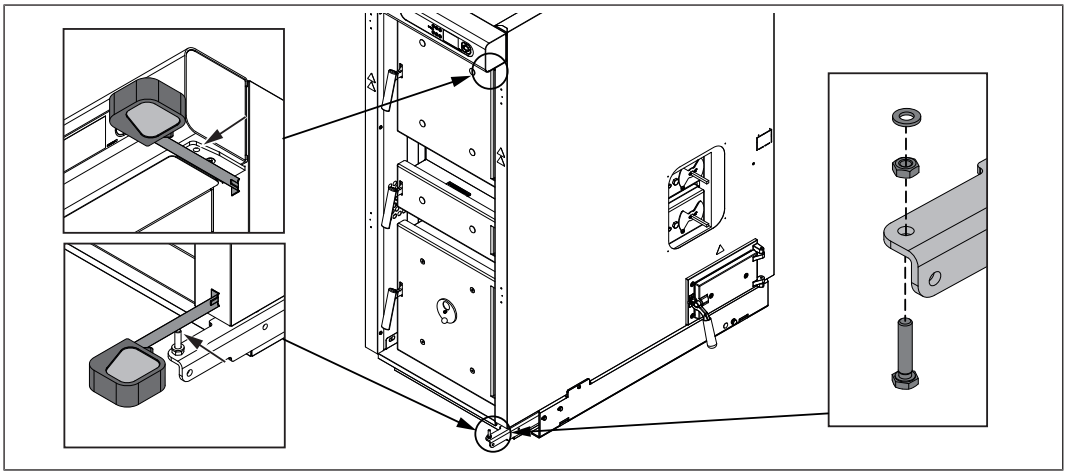
↳ Lightly tighten the two hexagonal screws M6 x 12 (B)

S3 Turbo 40/45:



❒ Mount the lower door bracket with two hexagonal screws M6 x 12 on the U-profile

❒ Insert the door bracket with the U-profile and lightly tighten the two hexagonal screws M6 x 12



❒ Measure the distance from the insulating side panel to the centre of the borehole for the insulated door on the upper bracket

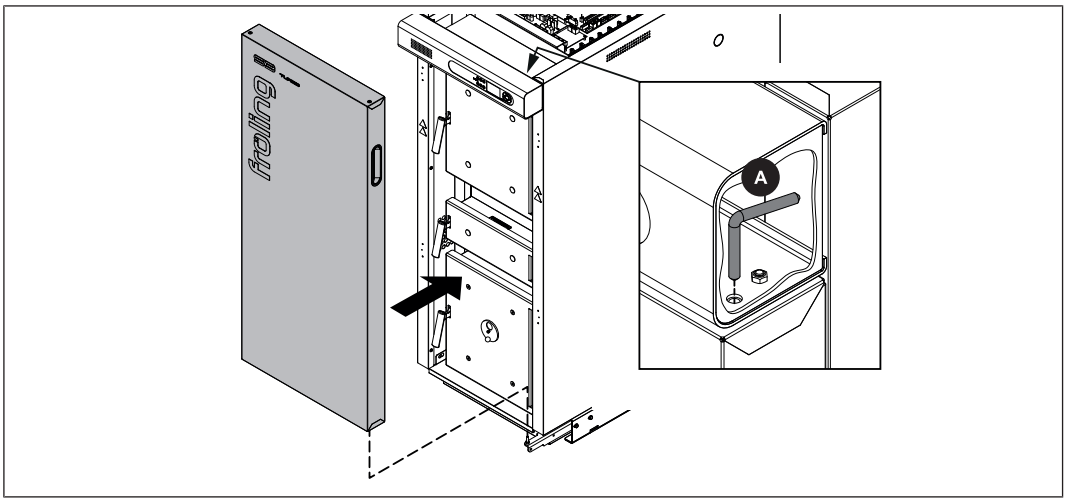
❒ Measure the distance from the insulating side panel to the centre of the borehole on the lower door bracket

↳ The two distances must be equal!

↳ If necessary, correct the position of the lower door bracket

❒ Secure the two hexagonal screws of lower door bracket

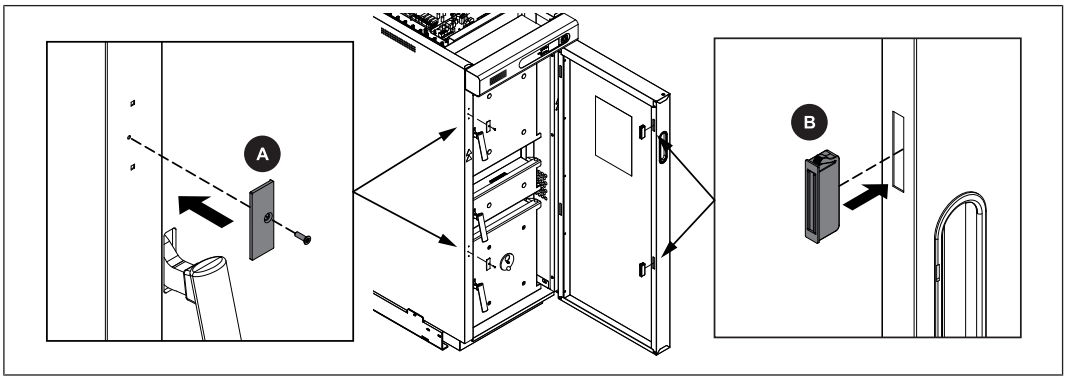
❒ At the front end of the lower door bracket, insert a hexagonal screw M6 x 30 from below, secure it with a nut and place a spacer washer on top



❒ Mount the insulated door onto the lower door bracket using the hexagonal screw

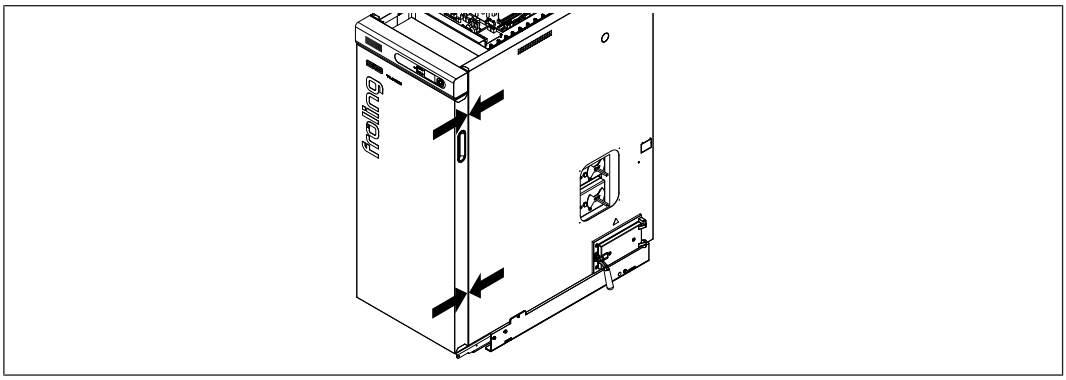
❒ Attach the insulated door to the upper door bracket with hinge pin (A)

↳ Insert the hinge pin through the control and the upper door bracket



❒ Position magnetic latches (B) on the inside of the insulated door at the top and bottom

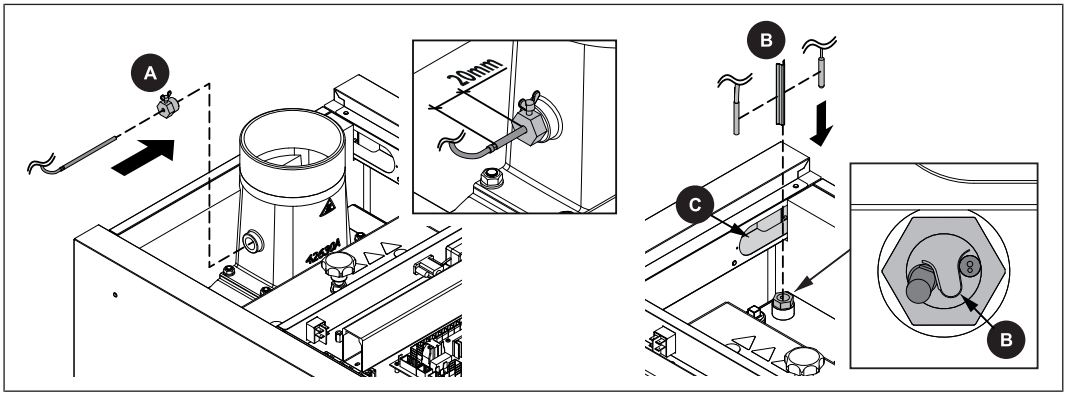
❒ Mount counter plates for the magnetic latches (A) to the left insulation side panel



❒ Check to see if the gap between the insulation side panel and the insulated door is the same size along the entire height of the boiler

↳ If necessary, correct the position of the lower door bracket

6.4.11 Fitting the sensors



❒ Screw in the brass bushing (A) for the flue gas temperature sensor

↳ Make sure that the borehole with the thread is situated at the upper area of the brass bushing

❒ Push the flue gas temperature sensor in so that it protrudes approx. 20 mm from the housing and secure the position with the wing screw

❒ Push the boiler sensor and STL capillary into the pre-installed immersion sleeve with the pressure spring (B) during boiler outfeed

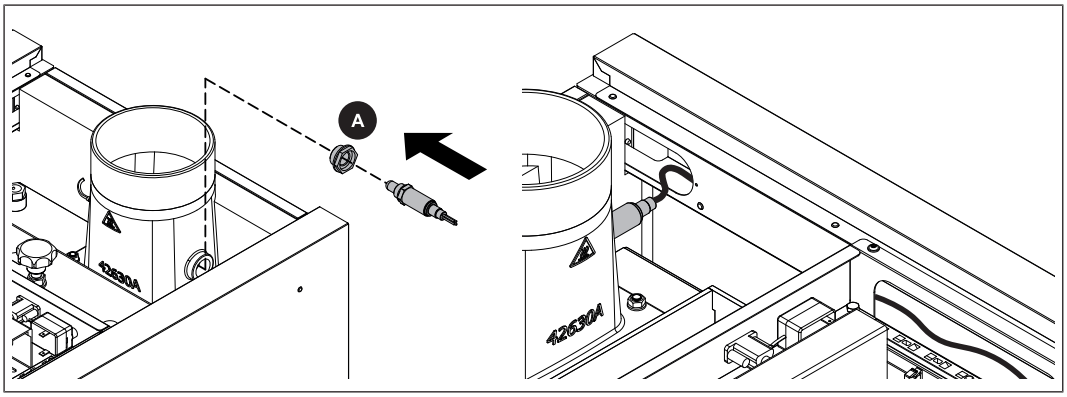
❒ Run the cable through the cable duct (C) to the controller box

↳ Tuck any extra cable into the cable duct

6.4.12 Install the broadband probe (only with S-Tronic Lambda)

❒ Unscrew the pre-installed bushing (A) from the broadband probe

❒ Screw the bushing (A) into the flue gas nozzle and gently tighten

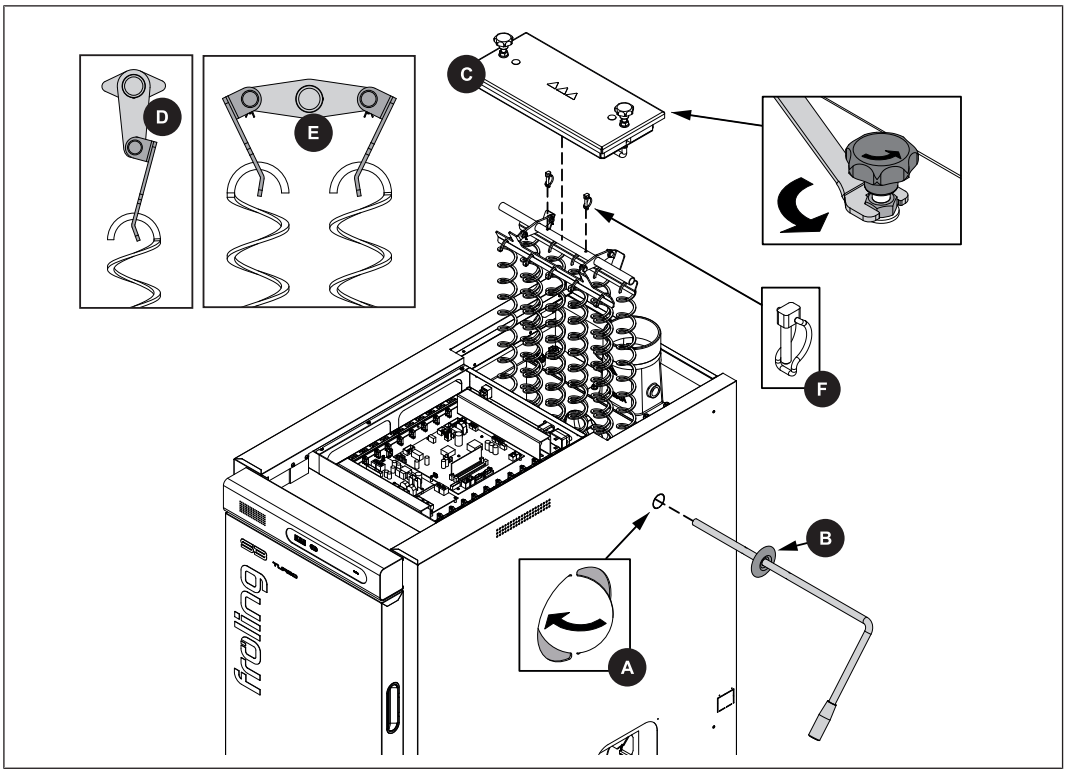


❒ Screw the broadband probe into the bushing (A) and gently tighten using an Allen key (SW 22 mm)

❒ Plug in the extension cable for the Lambda probe and un the cable through the cable duct to the controller box

↳ Tuck any extra cable into the cable duct

6.4.13 Installing the WOS system



❒ Remove the pre-cut perforation (A) from the insulation side panel on the same side as the brass bushing

↳ File rough edges using a half-round file and remove burrs

❒ Slide the plastic cover (B) onto the WOS lever

❒ Remove the heat exchanger cover (C) using the key supplied

↳ Loosen the nut first, then turn the start knob counter clockwise

❒ Hang the WOS turbulators on the linking plate of the stay tube as shown (D - S3 Turbo 20/30, E - S3 Turbo 40/45)

↳ Make sure that you fit the turbulators in the right direction:

↳ Hold the linking plate with the edge toward the top

↳ Hang the WOS turbulators over the edge

❒ Position the WOS turbulators at the heat exchanger pipes

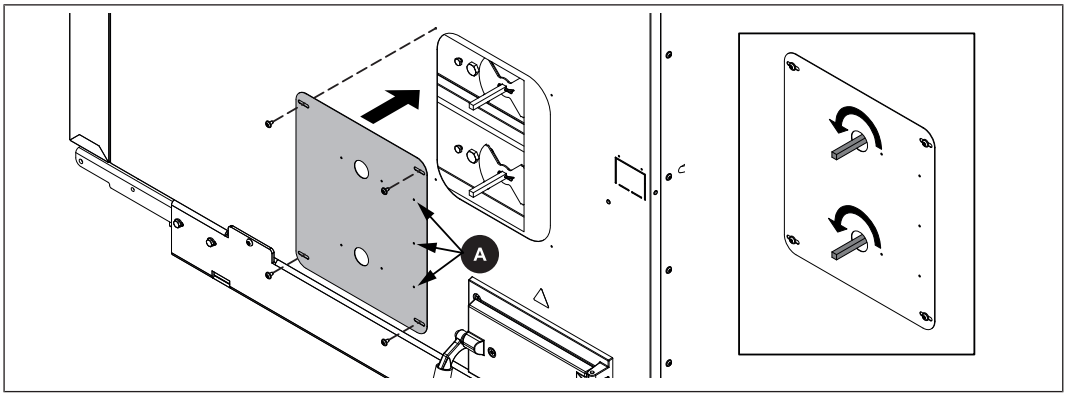
❒ Push the WOS lever through the stay tube from the outside and attach using pipe locking pins (F)

❒ Replace the heat exchanger cover (C)

❒ Turn the knob on the heat exchanger cover clockwise as far as the stop

❒ Tighten the nut below the handle using the key supplied

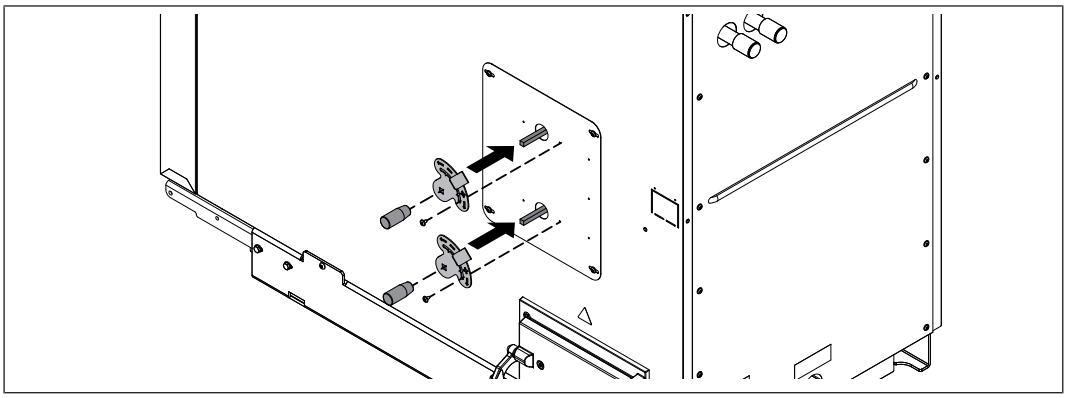
6.4.14 Installing the manual controller/servo-motors



❒ Secure the cover plate on the manual controller/servo-motor side using thread forming screws, ensuring that the three holes (A) are in the direction of the back of the boiler

↳ Check that the air flaps are at the left stop

Mount the manual controller (with S-Tronic Plus control)



❒ Place the air flap manual controllers on the pneumatic rod so that the manual controller is at the left stop and secure them with one thread forming screw each

❒ Place the handle onto the pneumatic rod

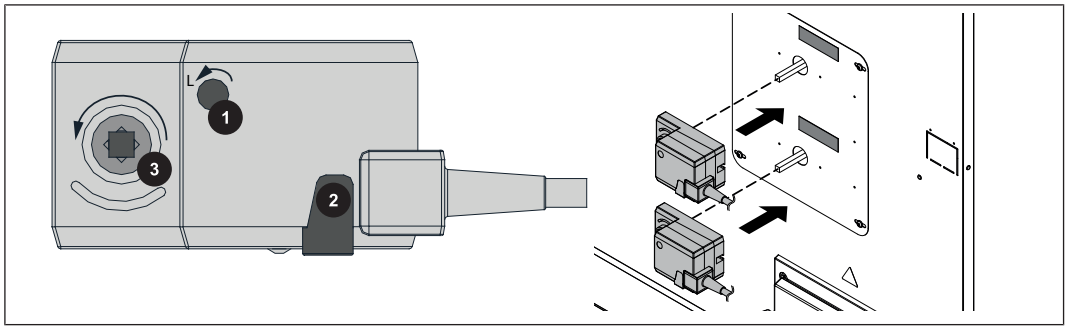
❒ Check to see if the air flaps can be opened to the right

↳ The exact position of the manual controller is set on initial start-up
➲ "Initial start-up using manual controller" [▸ 72]

Mounting the servo-motors (with S-Tronic Lambda control)

❒ Check that the air flaps are at the left stop

↳ All air flaps should be are closed



❒ Set the actuators:

↳ Set the direction of rotation of the actuator (1) to left (L)

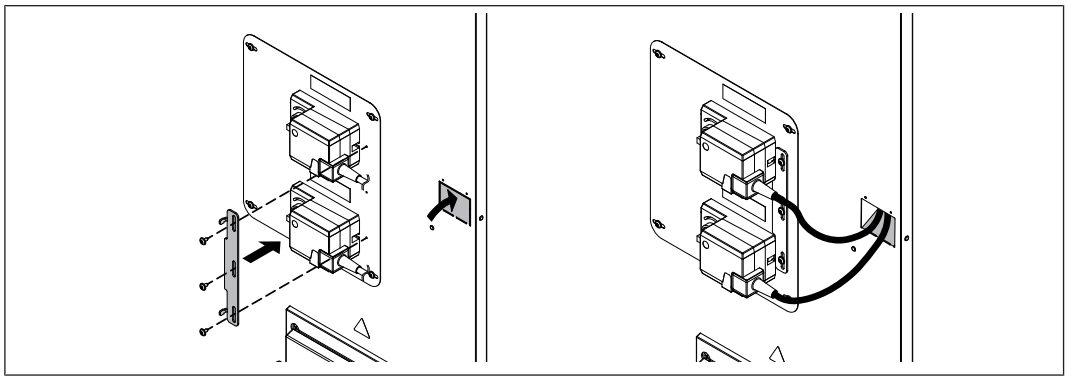
↳ Press the unlock key (2) and turn the drive for the shaft to the air duct (3) in an anti-clockwise direction as far as the stop

❒ Place the actuators onto the pneumatic rod

❒ Attach sticker to cover plate

↳ Primary air: top actuator

↳ Secondary air: bottom actuator



❒ Position the torque support and partially tighten the screws

❒ Align the actuators so that they are straight and tighten the screws

❒ Attach the sticker at the end of the actuator cable

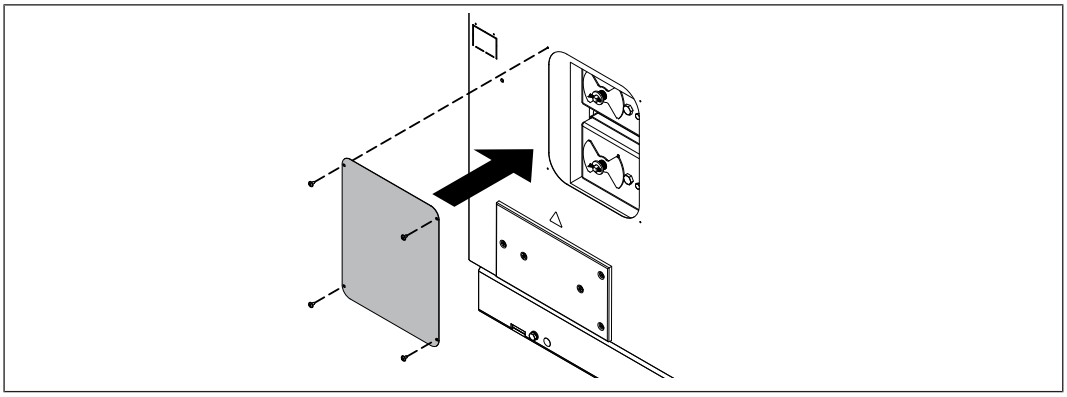
↳ Primary air: top actuator

↳ Secondary air: bottom actuator

❒ Push in the pre-punched opening for the cable duct onto the insulation

❒ Run the cable from the two servo-motors through the cable duct upward to the controller

Fit the cover plate.



❒ Use thread forming screws to secure the cover plate on the opposite side

6.5 Power connection and wiring

⚠ DANGER

When working on electrical components:

Risk of electrocution!

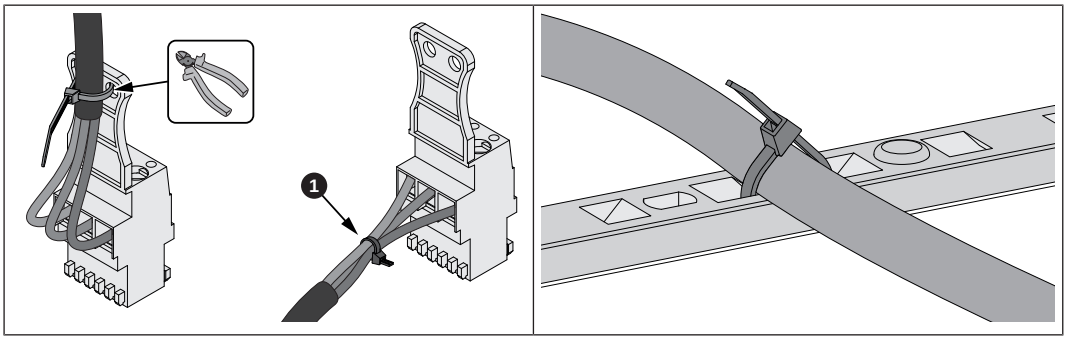
When work is carried out on electrical components:

❒ Always have work carried out by a qualified electrician

❒ Observe the applicable standards and regulations

↳ Work must not be carried out on electrical components by unauthorised persons

Prepare the plug some components come ready to connect with the cable fixed to the tag connector with cable tie.

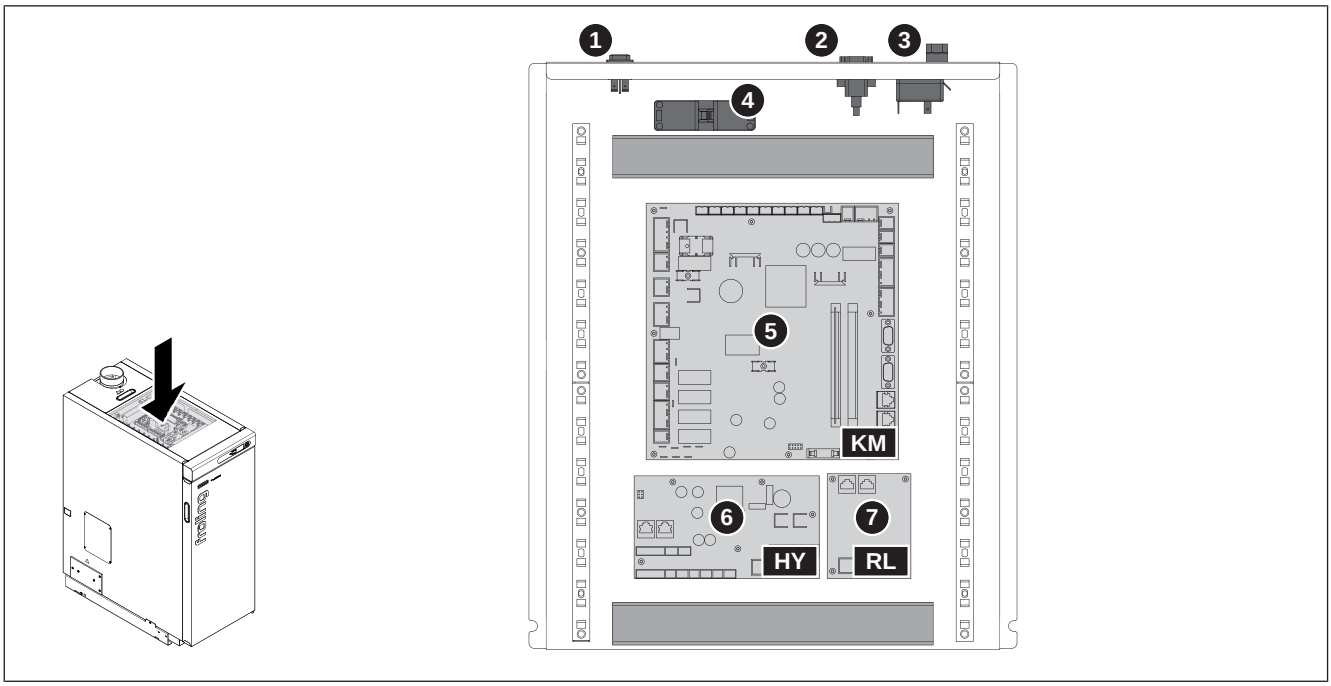


❒ Remove the cable ties from the tag connector

❒ Bind the individual cores together with cable ties (A)

❒ Attach cable and cable ties to the strain reliefs on the boiler

6.5.1 Board overview



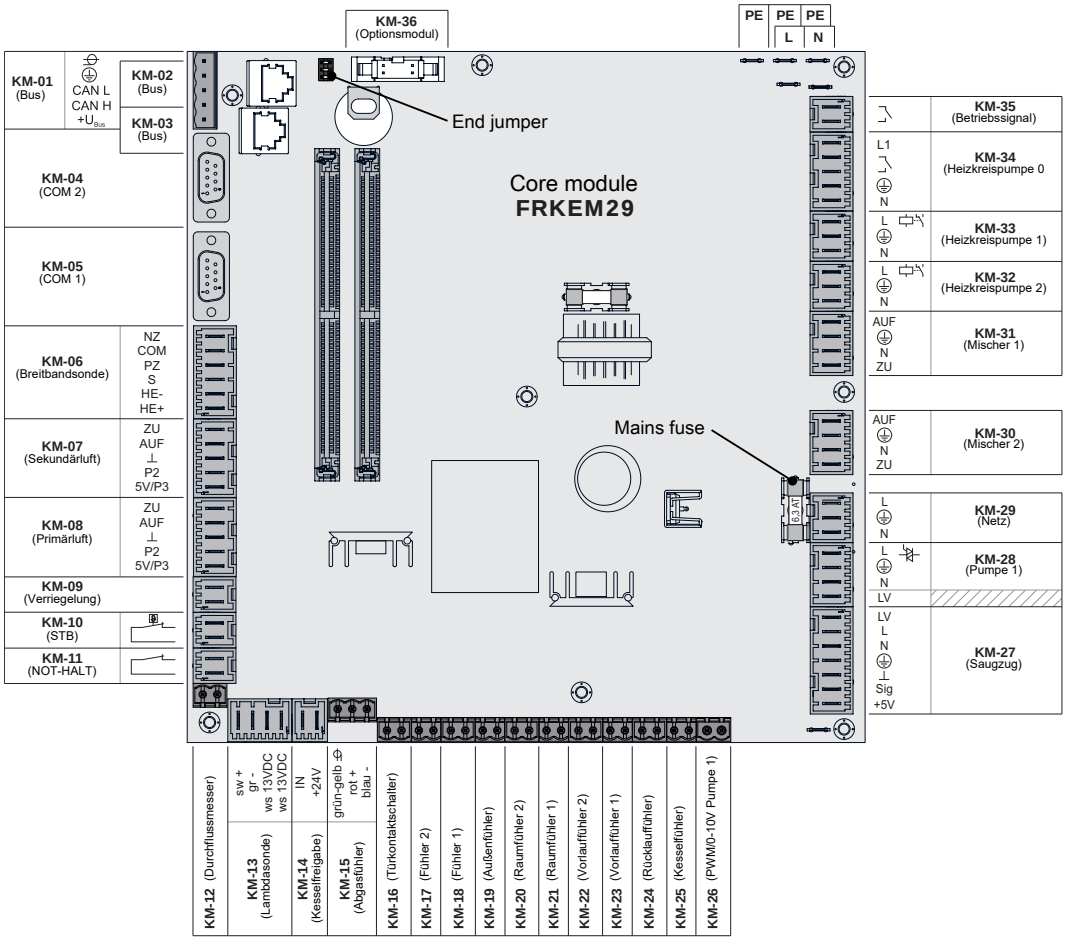
Item	Description	Item	Description
1	Main switch	**5**	Core module
2	Service interface	**6**	Hydraulic module (optional)
3	High-limit thermostat (STL)	**7**	Return mixer module (optional)
4	Mains connection plug		

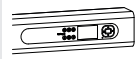
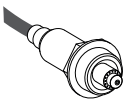
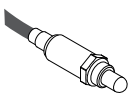
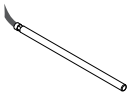
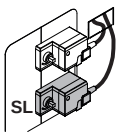
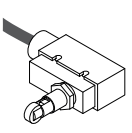
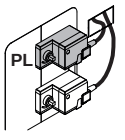
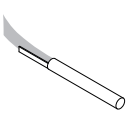
6.5.2 Connecting components

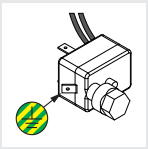
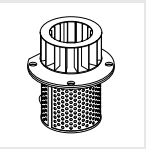
❒ Run the cables of the following components to the boiler controller and connect them to the boards in the controller box

↳ Tuck any extra cable into the cable duct

Core module:

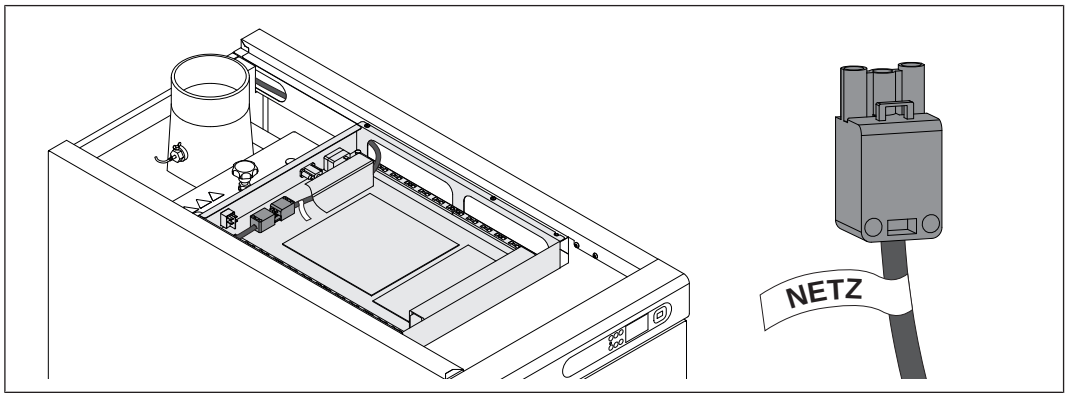


KM-02		Boiler display	**KM-13**		Lambda probe for S-Tronic Lambda
KM-06		Broadband probe for S-Tronic Lambda (alternative to the Lambda probe)	**KM-15**		Flue gas temperature sensor
KM-07		Servo-motor for secondary air for the S-Tronic Lambda	**KM-16**		Door switch
KM-08		Servo-motor for primary air for the S-Tronic Lambda	**KM-25**		Boiler sensor

KM-10		High-limit thermostat	**KM-27**		Induced draught fan

Once the individual components have been wired:

Mains connection:



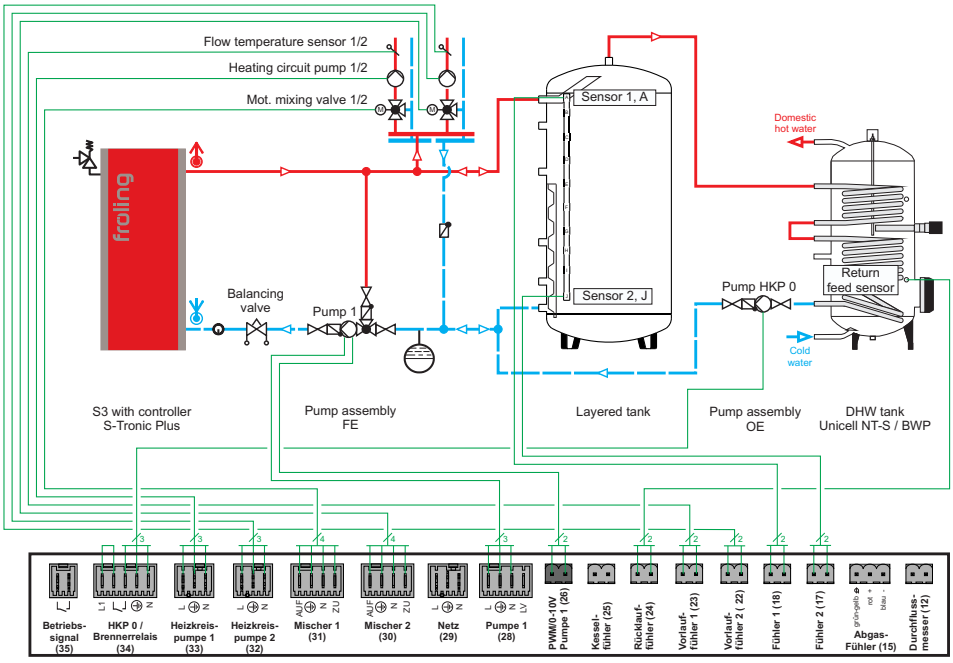
❒ Providing network connection

- The power supply line (network connection) must be fitted with a max. C16A fuse by the customer!
- Observe the circuit diagrams in the boiler controller operating instructions.
- Flexible sheathed cable must be used for the wiring; this must be of the correct size to comply with applicable regional standards and regulations

Hydraulic system for S-Tronic Plus / S-Tronic Lambda

No hydraulic module is included in the standard delivery of facilities with S-Tronic Plus or S-Tronic Lambda (the same as S-Tronic Plus but with Lambda controller for the boiler). The system selection “Hydraulic system for S-Tronic” ensures the sensors are automatically assigned to the following inputs.

S-Tronic Plus / S-Tronic Lambda with layered tanks and water heater



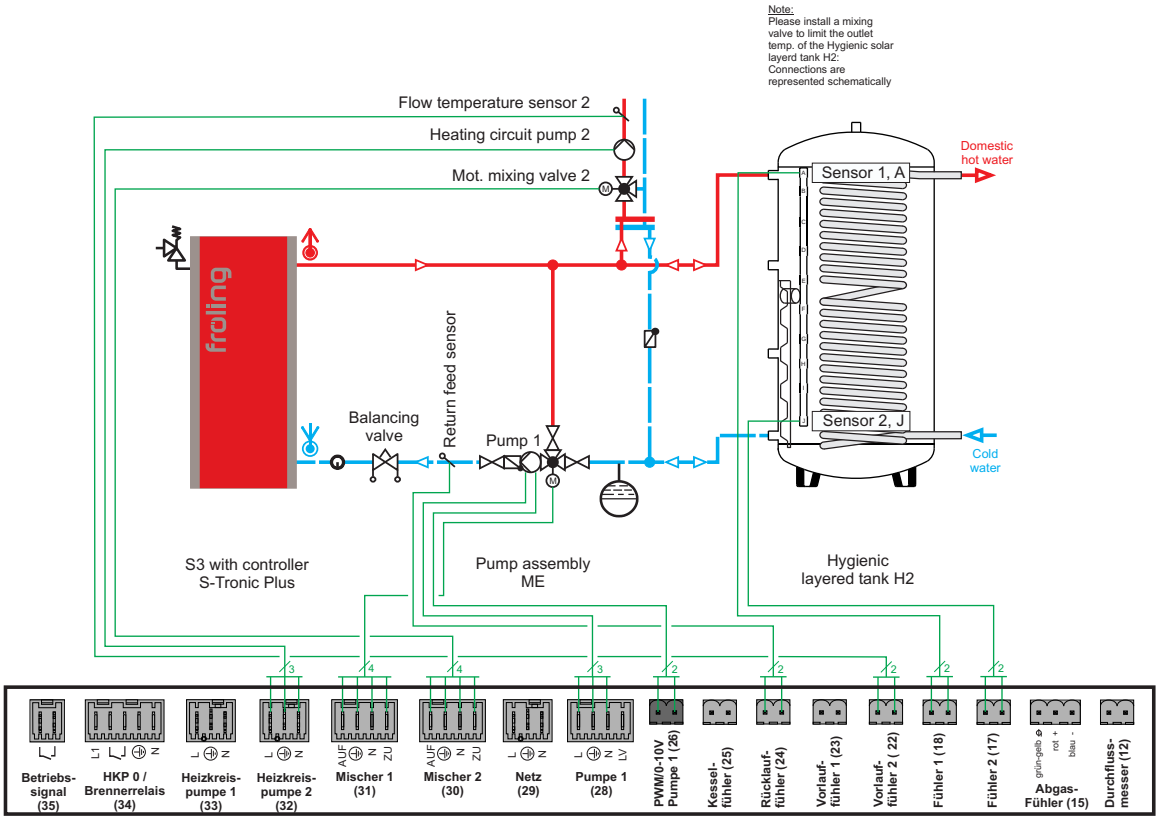
❒ Select “Hydraulic system for S-Tronic” system

↳ Sensor 1 is used for the top storage tank sensor, sensor 2 is used for the bottom storage tank sensor

❒ In the DHW tank service menu, set the “`DHW tank 1 pump will be controlled from HCP0`” parameter to “YES”

↳ The return feed sensor is used for the DHW tank sensor

S-Tronic Plus / S-Tronic Lambda with hygienic layered tanks and return temperature control with mixing valve



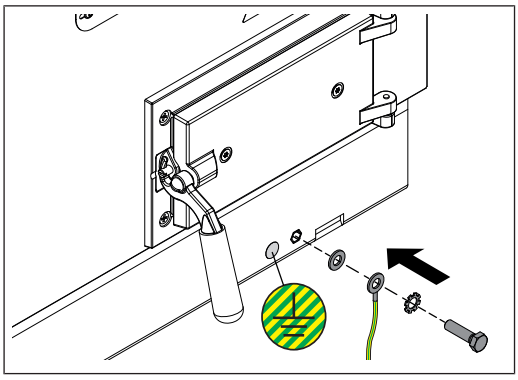
❒ Select “Hydraulic system for S-Tronic” system

↳ Sensor 1 is used for the top storage tank sensor, sensor 2 is used for the bottom storage tank sensor

❒ In the boiler configuration, set “`Return temperature control via HK1`” to “YES”

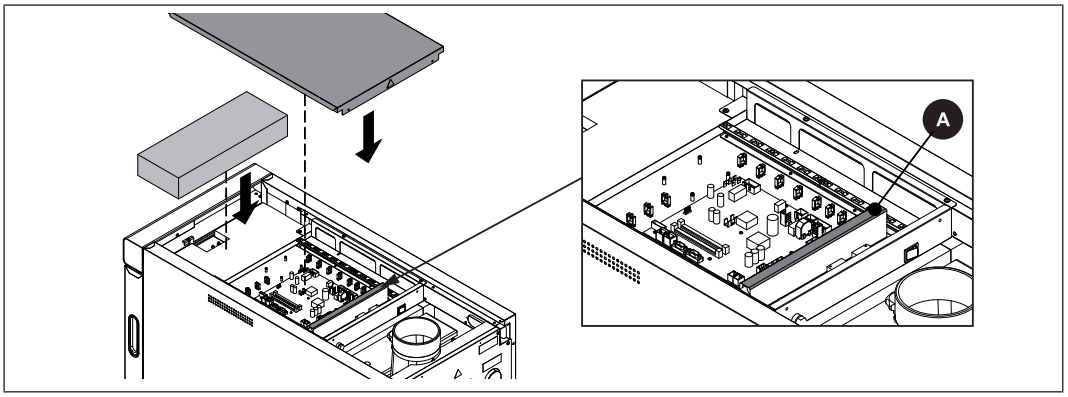
NOTICE! The hot water preparation is implemented via the hygiene element of the layered tank. As no sensor can be assigned, no DHW tank can be parameterised either. We recommend fitting some sort of control device (e.g. thermometer with external sensor) for the domestic hot water temperature.

6.5.3 Potential equalisation



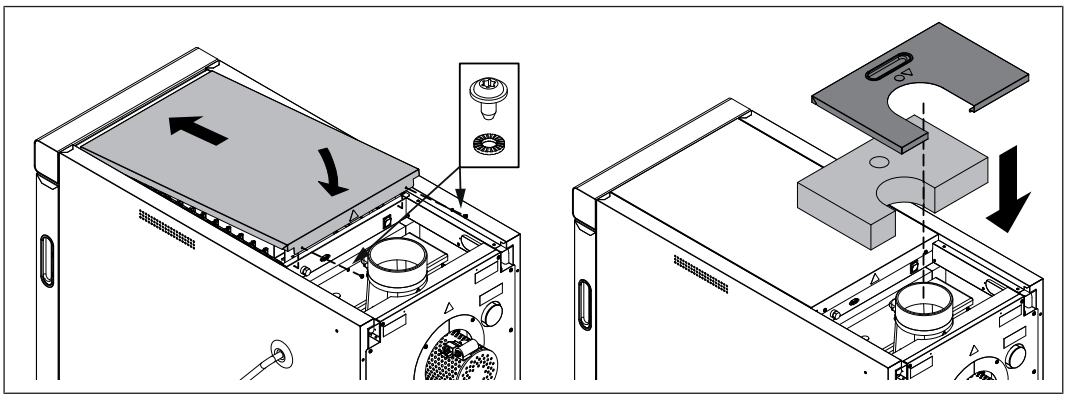
❒ The potential equalisation on the boiler base must comply with current directives, regulations and standards.

6.6 Concluding work



❒ Put the front heat insulation mat on

❒ Attach the covers (A) to the controller cable ducts



❒ Put on the controller cover

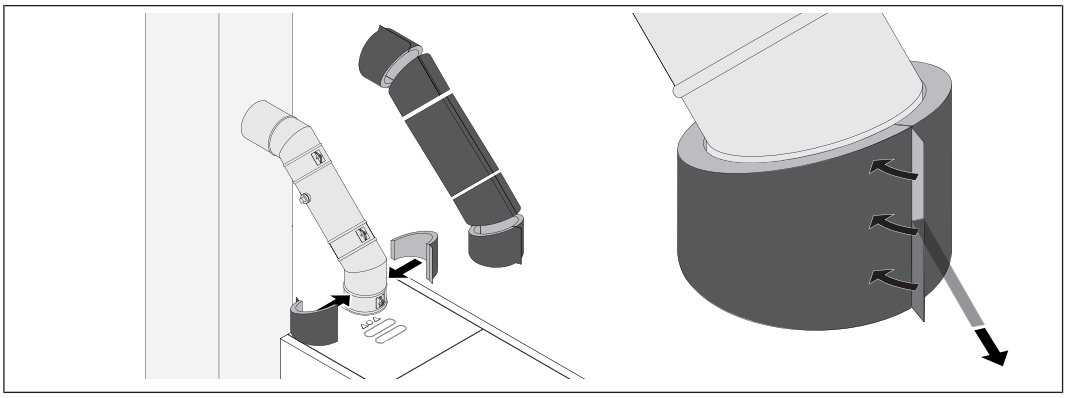
❒ Use the two thread forming screws incl. contact washers to secure the controller cover

❒ Put on the back heat insulation mat

❒ Put on the rear insulating cover

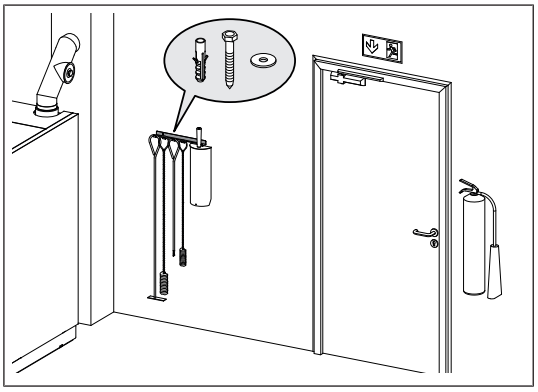
6.6.1 Insulate the connection line

When using the optionally available thermal insulation supplied by Fröling GesmbH, perform the following steps:



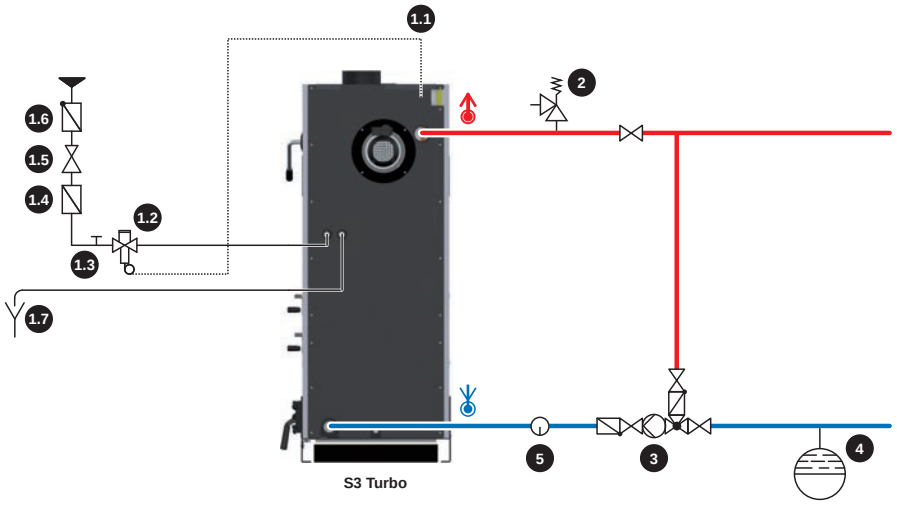
- ❒ Cut the half shells of thermal insulation to length and lay them on the connection line
- ❒ Create an opening for access to the measuring port
- ❒ Apply protective foil at the projecting lugs
- ❒ Glue the half shells to each other

6.6.2 Install the brackets for accessories



- ❒ Using appropriate fasteners, attach the brackets to the wall on the boiler
- ❒ Attach the accessories to the brackets

6.7 Hydraulic connection



1 Thermal discharge valve

- The thermal discharge safety device must be connected in accordance with ÖNORM/ DIN EN 303-5 and as shown in the diagram above
- The discharge safety sensor must be connected to a pressurised cold water mains supply (temperature ≤ 15°C) in such a way that it cannot be shut off
- A pressure reducing valve (1.5) is required for a cold water pressure of ≥ 6 bar Minimum cold water pressure = 2 bar

1.1 Sensor of thermal discharge safety device
1.2 Thermal discharge valve (opens at approx. 95°C)
1.3 Cleaning valve (T-piece)
1.4 Dirt trap
1.5 Pressure reducing valve
1.6 Backflow preventer to prevent stagnation water from entering the drinking water network
1.7 Free outlet without counter pressure with observable flow path (e.g. discharge funnel)

2 Safety valve

- Requirements for safety valves as specified by DIN EN ISO 4126-1
- Minimum diameter for the inlet to the safety valve as specified by EN 12828: DN15 (≤ 50 kW), DN20 (> 50 to ≤ 100 kW), DN25 (> 100 to ≤ 200 kW), DN32 (> 200 to ≤ 300 kW), DN40 (> 300 to ≤ 600 kW), DN50 (> 600 to ≤ 900 kW)
- Maximum pressure setting in terms of the permissible operating pressure of the boiler, see the section “Technical Data”
- The safety valve must be installed in an accessible place on the boiler or in direct proximity in the flow pipe in such a way that it cannot be shut off
- Unhindered and safe escape of the steam or water that is released must be ensured

3 Return temperature control

4 Diaphragm expansion tank

- The diaphragm pressurised expansion tank must conform to EN 13831 and hold at least the maximum expansion volume of the heated water in the system, including a water seal
- Its size must comply with the design information in EN 12828 - Appendix D
- Ideally it should be installed in the return line. Follow the manufacturer’s installation instructions

5 We recommend installing some sort of monitoring device (such as a thermometer)

7 Start-up

7.1 Before commissioning / configuring the boiler

The boiler must be configured to the heating system during initial start-up!

NOTICE

Optimum efficiency and efficient, low-emission operation can only be guaranteed if the system is set up by trained professionals and the standard factory settings are observed.

Take the following precautions:

❒ Initial startup should be carried out with an authorised installer or with Froling customer services

NOTICE

Foreign bodies in the heating system impair its operational safety and can result in damage to property.

As a result:

❒ The whole system should be rinsed out before initial start-up in accordance with EN 14336.

❒ Recommendation: Make sure the hose diameter of the flush nozzles in the flow and return complies with ÖNORM H 5195 and is the same as the hose diameter in the heating system, however not more than DN 50.

❒ Turn on the main switch

❒ Set the boiler controller to the system type.

❒ Load the boiler default values.

NOTICE! For the keypad layout and instructions for modifying the parameters, see the instruction manual for the boiler controller.

❒ Check the system pressure of the heating system.

❒ Check that the heating system is fully ventilated

❒ Check all quick vent valves of the entire heating system for leaks

❒ Check that all water connections are tightly sealed

↳ Pay particular attention to those connections from which plugs were removed during assembly.

❒ Check that all necessary safety devices are in place

❒ Check that there is sufficient ventilation in the boiler room.

❒ Check the seal of the boiler.

↳ All doors and inspection openings must be tightly sealed.

❒ Check all blanking plugs (e.g. drainage) for tightness

❒ Check that the drives and servo motors are working and turning in the right direction

❒ Check that the door contact switch is working efficiently.

NOTICE! Check the digital and analogue inputs and outputs - See the instruction manual for the boiler controller.

7.2 Initial startup

7.2.1 Permitted fuels

Firewood

Firewood up to max. 55 cm long.

Water content

Water content (w) greater than 15% (equivalent to wood moisture u > 17%)

Water content (w) less than 25% (equivalent to wood moisture u < 33%)

Note on standards

EU:	Fuel as per EN ISO 17225 – Part 5: Firewood class A2 / D15 L50
Additional for Germany:	Fuel class 4 (§3 of the First Federal Emissions Protection Ordinance (BimSchV) in the last amended version)

Tips for storing wood

- Use wind-exposed areas where possible for storage (e.g. store at edge of forest instead of in forest)
- Walls of buildings facing the sun are ideal
- Create a dry underlay, where possible with air access (line with round timber, pallets, etc.)
- stack split wood and store in such a way that it is protected from the elements
- If possible, stock fuel for the day in a warm place (e.g. in boiler room) (pre-heats the fuel!)

Storage time dependent upon water content

	Wood type	Water content	
		15 – 25%	less than 15 %
Storage in heated and ventilated room (approx. 20°C)	Soft wood (e.g. spruce)	approx. 6 months	from 1 year
	Hardwood (e.g. beech)	1 – 1.5 years	from 2 years
Outdoor storage (protected from elements, exposed to wind)	Soft wood (e.g. spruce)	2 summers	from 2 years
	Hardwood (e.g. beech)	3 summers	from 3 years

Freshly cut wood has an approximate water content of 50 to 60% depending on when it was harvested. As the above table shows, the water content of the firewood decreases the longer the wood is stored depending on how dry and warm the storage location is. The ideal water content of firewood is between 15 and 25%. If the water content falls below 15%, we recommend you adjust the combustion control to the fuel.

7.2.2 Fuels permitted under certain conditions

Wood briquettes

Wood briquettes for non-industrial use with a diameter of 5-10 cm and 5-50 cm long.

Note on standards

EU:	Fuel as per EN ISO 17225 - Part 3: wood briquettes class B / D100 L500 Form 1 - 3
Additional for Germany:	Fuel class 5a (§3 of the First Federal Emissions Protection Ordinance (BImSchV) - applicable version)

Notes on use

- When burning wood briquettes use the settings for extremely dry fuel
- Wood briquettes must be heated up with firewood as per EN ISO 17225-5 (at least two layers of firewood under the wood briquettes)
- The fuel loading chamber must not be filled more than 3/4 full, as the wood briquettes expand during combustion
- Even when using the settings for dry fuel, burning wood briquettes can cause combustion problems. In such cases, repairs must be carried out by qualified staff. Please contact Froling customer services or your installer.

7.2.3 Non-permitted fuels

The use of fuels other than those defined in the "Permitted fuels" section, and particularly the burning of refuse, is not permitted

NOTICE

In case of use of non-permitted fuels:

Burning non-permitted fuels increases the cleaning requirements and leads to a build-up of aggressive sedimentation and condensation, which can damage the boiler and also invalidates the guarantee! Using non-standard fuels can also lead to serious problems with combustion!

For this reason, when operating the boiler:

❒ Use only the permitted fuels

7.2.4 Heating up for the first time

⚠ CAUTION

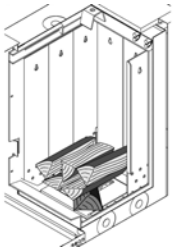
If the boiler heats up too quickly on initial start-up:

If the output during the heating-up process is too great, the combustion chamber may be damaged as a result of drying out too rapidly!

For this reason the following applies the first time you heat up the boiler:

❒ Start the firewood boiler for the first time in accordance with the heating instructions

Heating instructions when starting up a firewood boiler for the first time



❒ Place a piece of wood diagonally across the combustion chamber (see diagram on left)

↳ Load the boiler with a small amount of firewood (max. 10-20% of the fuel loading chamber)

↳ Ignite it and allow it to burn slowly with the central pre-heating chamber door open

NOTICE! Fissures are normal and do not indicate a malfunction

Once the material in the boiler has burnt down, the boiler can be used in accordance with the operating instructions ("Operating the system" section).

NOTICE

If condensation escapes during the initial heat-up phase, this does not indicate a fault.

❒ Tip: If this occurs, clean up using a cleaning rag.

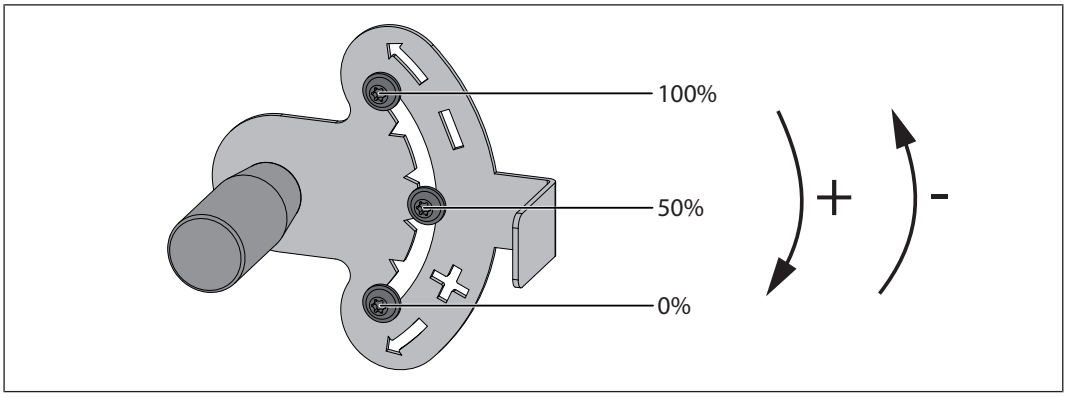
Initial start-up with two servo-motors

❒ Open the insulated door and the fuel loading door

❒ Fill the fuel loading chamber in accordance with the operating instructions for initial start-up and heat up

NOTICE! No other settings are required for boilers with two servo-motors.

Initial start-up using manual controller

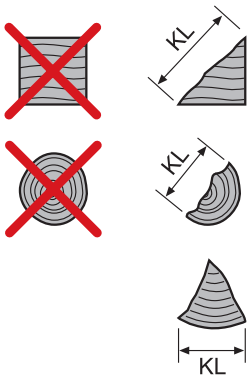


❒ Set the manual controller for the air flap as shown in the table below

NOTICE! The information below only applies to split wood and not for round timber, square timber etc.

Soft wood				Hardwood			
Long split wood		Short split wood		Long split wood		Short split wood	
w > 20%	w < 20%	w > 20%	w < 20%	w > 20%	w < 20%	w > 20%	w < 20%
PL[1] 75-100%	PL[1] 75-100%	PL[1] 75-100%	PL[1] 50%	PL[1] 75-100%	PL[1] 75-100%	PL[1] 75%	PL[1] 50%
SL[2] 25-50%	SL[2] 50-75%	SL[2] 50-75%	SL[2] 50-75%	SL[2] 50%	SL[2] 50-75%	SL[2] 75-100%	SL[2] 75-100%
1. PL = Primary air 2. SL = Secondary air							

If you use wood briquettes for initial start-up (only permitted under certain conditions!), you can use roughly the same settings as for short split hardwood.



The table shows the setting values for the manual controller of the air flap, which ensures a smooth start-up. The setting values for the manual controller may need to be changed during emissions measurements. For this reason, these values should not be used as standard values for operating the boiler!

The terms used, i.e. “long split wood” (edge length EL > 10 cm) and “short split wood” (edge length EL < 10 cm), have been defined in these instructions by Froling; there is no fuel standard or similar guidelines.

❒ Open the insulated door and the fuel loading door

❒ Fill the fuel loading chamber for initial start-up and heat up

NOTICE! See boiler operating instructions

Tip: Line the first 20 cm of the fuel loading chamber with short split wood (edge length EL < 10 cm). This reduces the time taken for a bed of embers to form.

NOTICE! The smaller the wood is cut, the faster a bed of embers forms

Once the bed of embers has fully formed, the combustion air can be readjusted if necessary after measuring the O_2 content:

Setting the primary air (boiler with one or two manual controllers)

The nominal output of the boiler is set via the primary air and adjusted to the fuel used.

Combustion air	Effect	Setting
More primary air	Higher flue gas temperature, greater output	Rotate manual controller clockwise ("plus" direction)
Less primary air	Lower flue gas temperature, lower output	Rotate manual controller counter-clockwise ("minus" direction)

❒ Correct the air flap for primary air (upper air flap) to reach the required flue gas temperature

Boiler data for planning the flue gas system

❒ Once the manual controller has been correctly set, secure it in that position

Setting the secondary air (boiler with two manual controllers)

The secondary air sets the O_2 content of the flue gas and thus the quality of combustion.

Combustion air	Effect	Setting
More secondary air	Greater O_2 content	Rotate manual controller clockwise ("plus" direction)
Less secondary air	Lower O_2 content	Rotate manual controller counter-clockwise ("minus" direction)

❒ Correct the air flap for secondary air (lower air flap) to reach the required O_2 content

NOTICE! The manual controller should be set so that the O2 content is between 7 and 9%.

❒ Once the manual controller has been correctly set, secure it in that position

After starting up for the first time and once the combustion air has been set, the boiler is optimally set to the fuel used.

For further use of the boiler, please note the following:

❒ Use fuels that are consistent in size, type and water content

❒ If a very different type of fuel is used, get a qualified technician to check the air flap setting and adjust if necessary

8 Decommissioning

8.1 Mothballing

The following measures should be taken if the boiler is to remain out of service for several weeks (e.g. during the summer):

❒ Clean the boiler thoroughly and close the doors fully

If the boiler is to remain out of service during the winter:

❒ Have the system completely drained by a qualified technician

↳ Protection against frost

8.2 Disassembly

To disassemble the system, follow the steps for assembly in reverse order.

8.3 Disposal

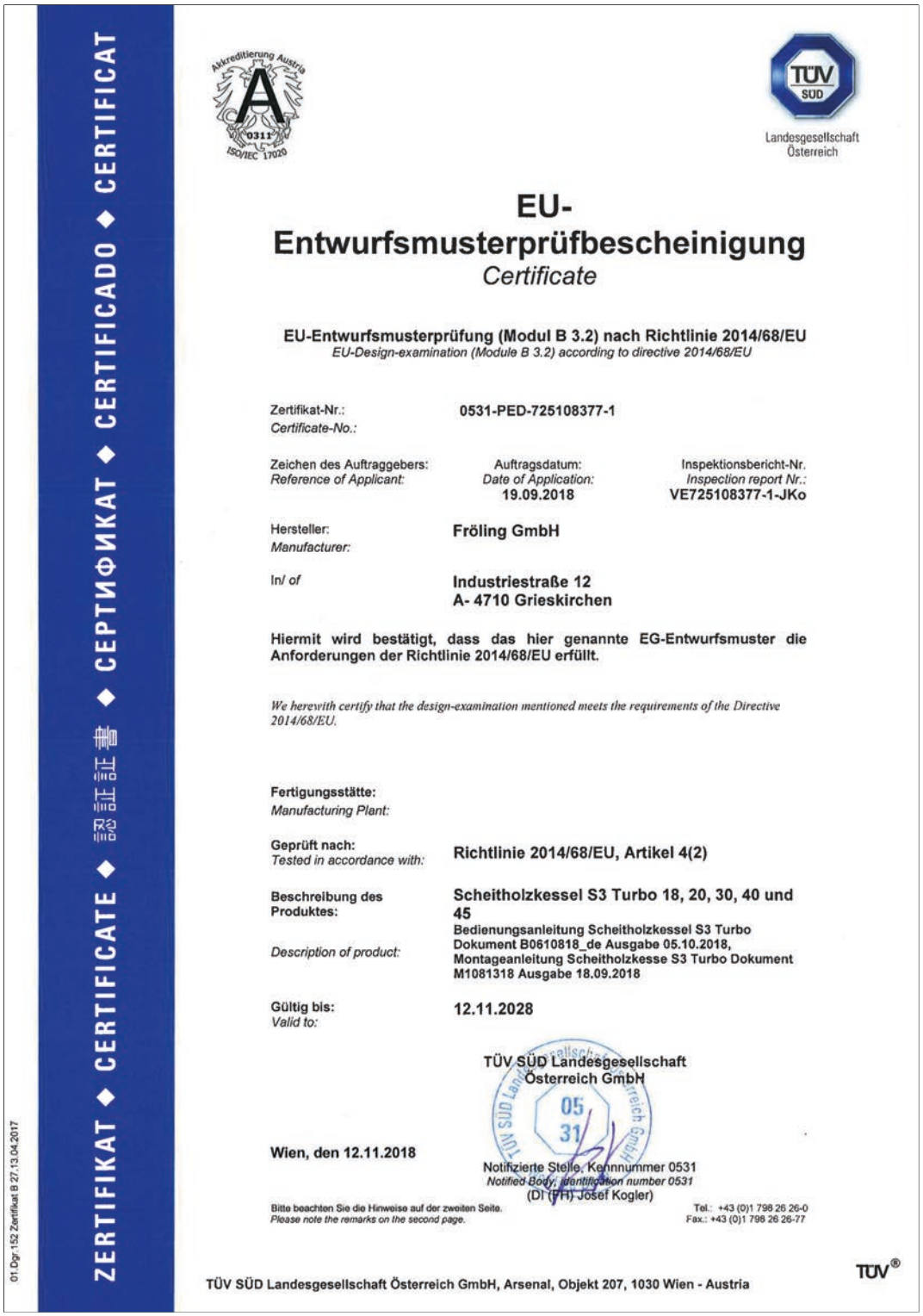
❒ Ensure that they are disposed of in an environmentally friendly way in accordance with waste management regulations in the country (e.g. AWG in Austria)

❒ You can separate and clean recyclable materials and send them to a recycling centre.

❒ The combustion chamber must be disposed of as builders' waste.

9 Appendix

9.1 Pressure equipment regulation



ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

01.Dgr.152 Zertifikat B 27.13.04.2017

Akkreditierung Austria 0311 ISO/IEC 17020

TÜV SÜD Landesgesellschaft Österreich

EU-Entwurfsmusterprüfbescheinigung

Certificate

EU-Entwurfsmusterprüfung (Modul B 3.2) nach Richtlinie 2014/68/EU

EU-Design-examination (Module B 3.2) according to directive 2014/68/EU

Zertifikat-Nr.: *Certificate-No.:* **0531-PED-725108377-1**

Zeichen des Auftraggebers: *Reference of Applicant:*

Auftragsdatum: *Date of Application:* **19.09.2018**

Inspektionsbericht-Nr. *Inspection report Nr.:* **VE725108377-1-JKo**

Hersteller: *Manufacturer:* **Fröling GmbH**

In/ *of* **Industriestraße 12**
A- 4710 Grieskirchen

Hiermit wird bestätigt, dass das hier genannte EG-Entwurfsmuster die Anforderungen der Richtlinie 2014/68/EU erfüllt.

We herewith certify that the design-examination mentioned meets the requirements of the Directive 2014/68/EU.

Fertigungsstätte: *Manufacturing Plant:*

Geprüft nach: *Tested in accordance with:* **Richtlinie 2014/68/EU, Artikel 4(2)**

Beschreibung des Produktes: *Description of product:* **Scheitholzkessel S3 Turbo 18, 20, 30, 40 und 45**
Bedienungsanleitung Scheitholzkessel S3 Turbo Dokument B0610818_de Ausgabe 05.10.2018, Montageanleitung Scheitholzkesse S3 Turbo Dokument M1081318 Ausgabe 18.09.2018

Gültig bis: *Valid to:* **12.11.2028**

TÜV SÜD Landesgesellschaft Österreich GmbH

05
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Wien, den 12.11.2018

Notifizierte Stelle, Kennnummer 0531
Notified Body, identification number 0531
(DI (FH) Josef Kogler)

Bitte beachten Sie die Hinweise auf der zweiten Seite.
Please note the remarks on the second page.

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Installer's address

Stamp

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