fröling

Installation instructions

Firewood boiler S1 Turbo (F)

Translation of original German version of installation instructions for technicians.

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

CE

M1471124_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 sizes of S1 Turbo (F) boilers:

15, 20;

1.2 Operating principle

The Fröling S1 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 in the lower area of the fuel loading door is sucked in and channelled to the fuel via a regulating flap on the front air box (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 an Efficiency Optimisation System (WOS), which can be operated using a lever or activated via a drive. 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

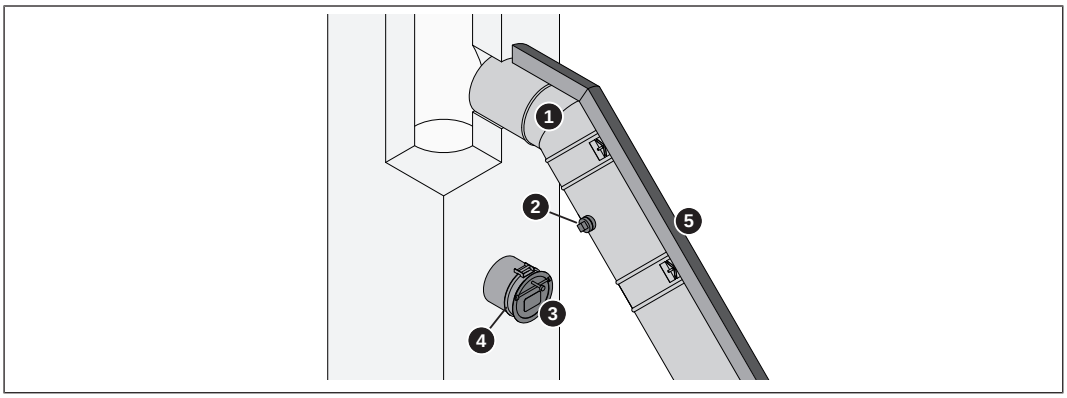
Requirements for the load bearing substrate:

- 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.

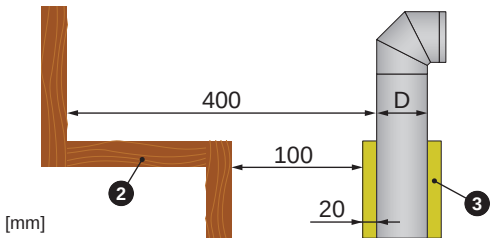
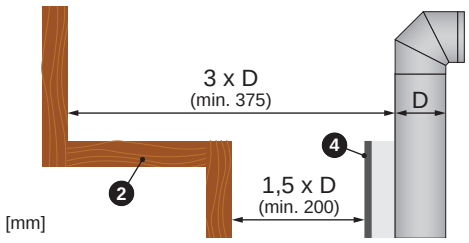
Local regulations and other statutory regulations are also applicable.

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

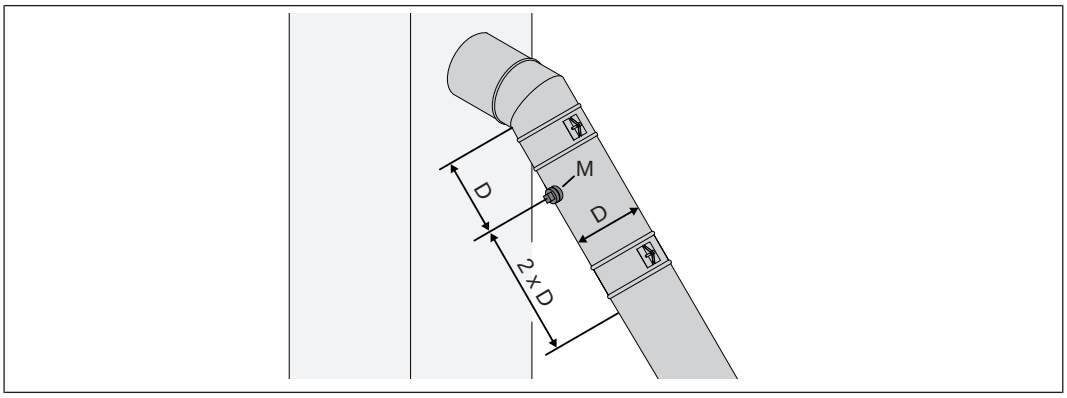
Minimum distance from flammable materials as per EN 15287-1 and EN 15287-2:

- 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

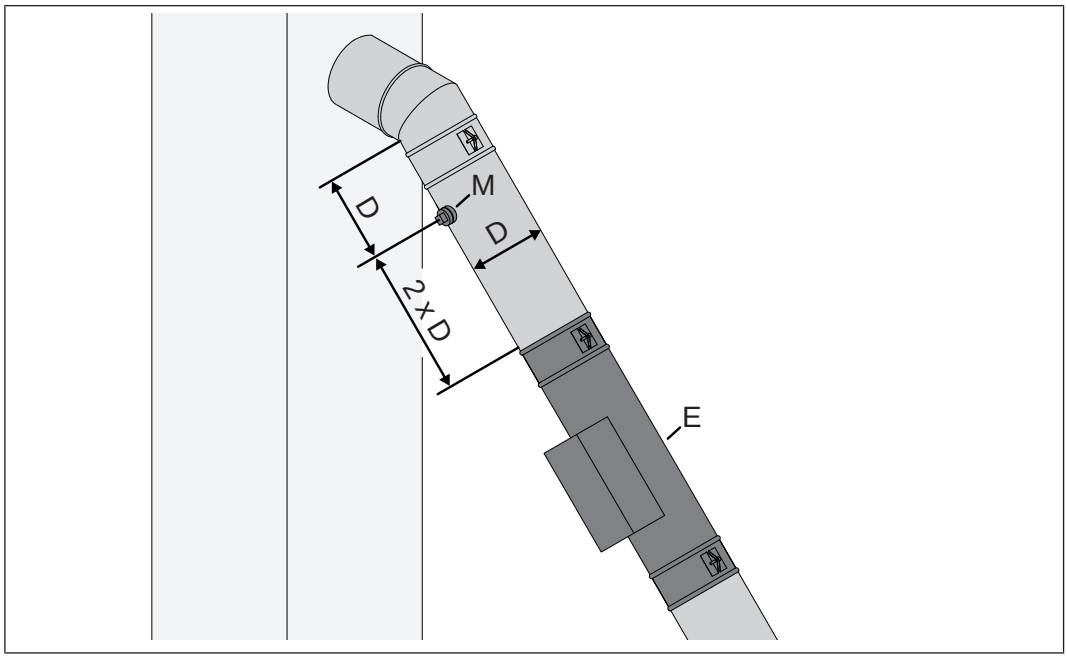
We generally recommend the installation of a draught limiter. If the values for the maximum permissible feed pressure stated in the section “Data for designing the flue gas system” are exceeded, a draught limiter must be installed.

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.

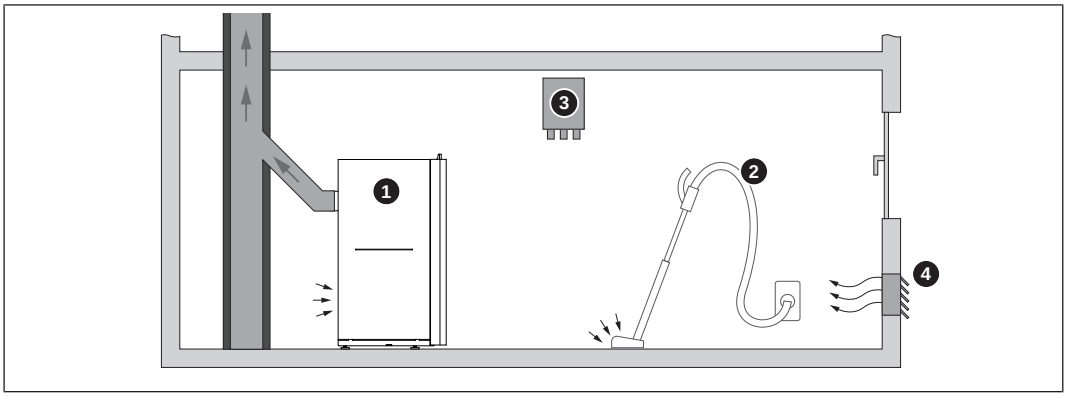
The boiler is operated depending on the room air, whereby the combustion air is taken from the installation site.

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 S1 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	S1 Turbo 15 (F)	S1 Turbo 20 (F)
Recommended storage tank capacity[1)]	[l]	1000	1250

1. 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

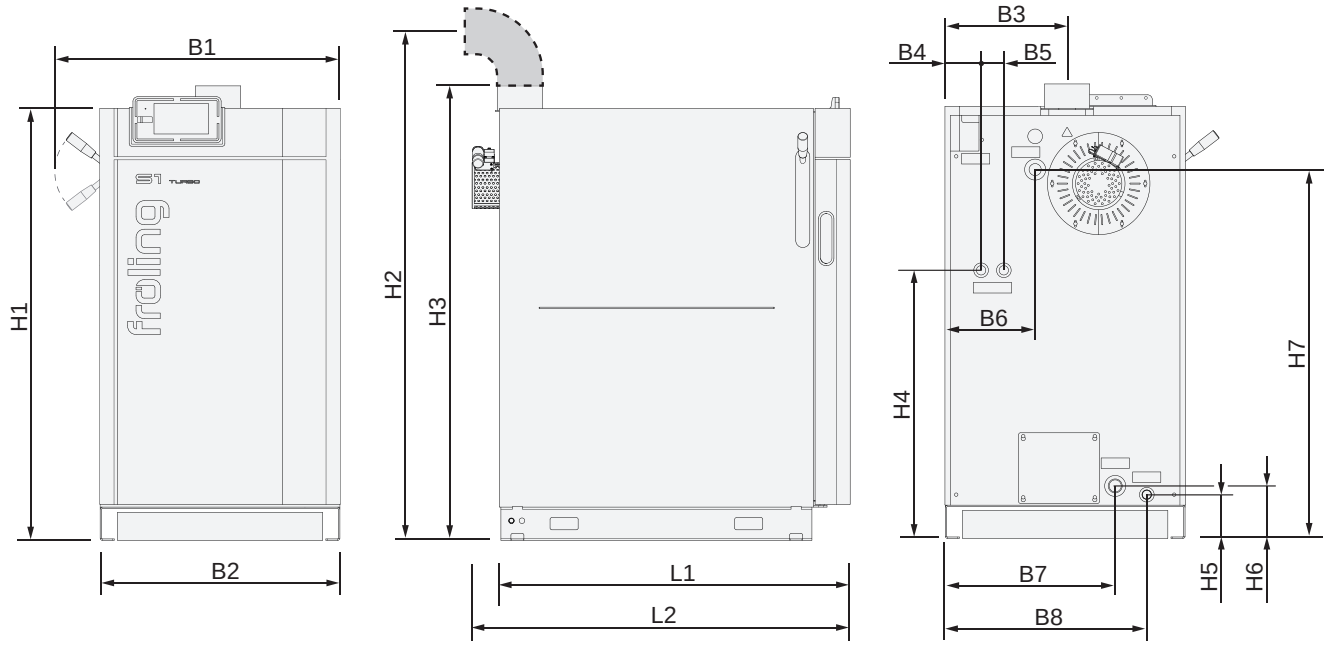
Recommendation:

❒ Fit a microbubble separator in the pipes to the boiler

↳ Follow the manufacturer's instructions!

4 Technology

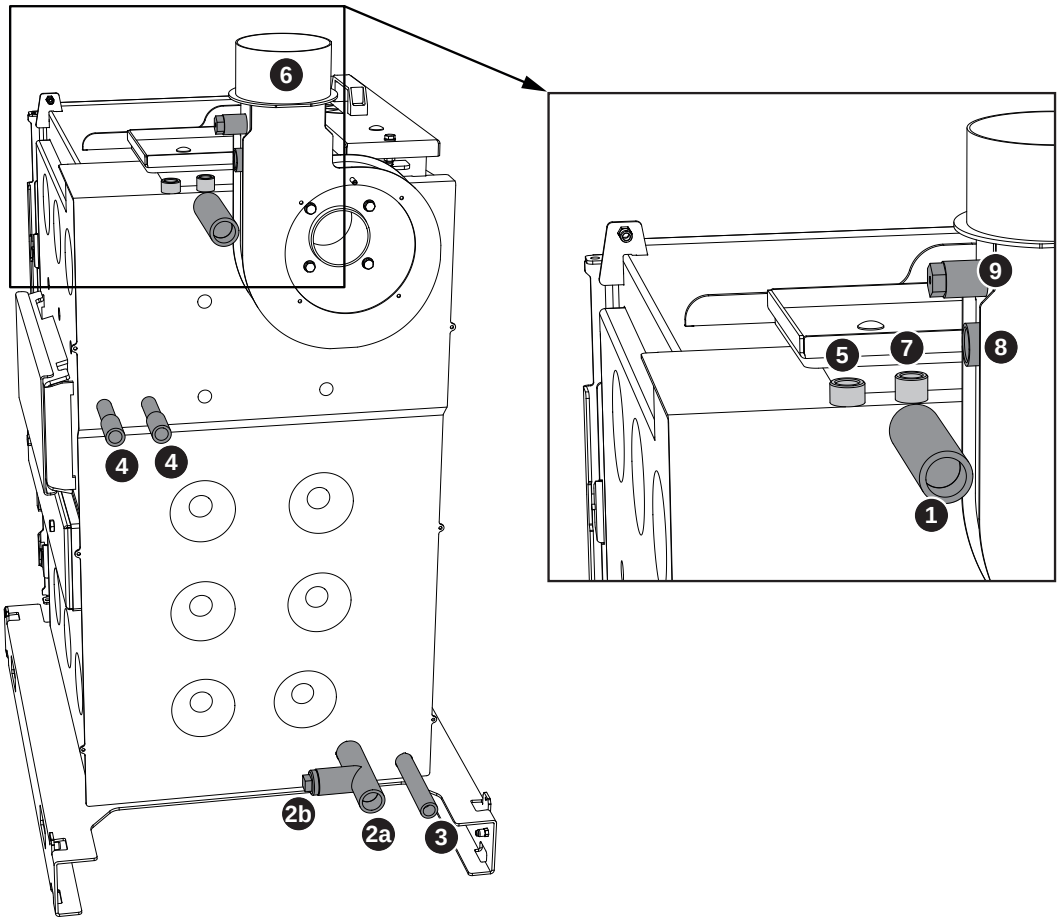
4.1 Dimensions of S1 Turbo (F)



Dimension	Description		15-20
L1	Length of boiler	mm	1000
L2	Total length incl. induced draught fan		1080
B1	Overall width of boiler incl. WOS lever		830
B2	Width, boiler		685
B3	Distance between flue gas pipe connection and side of boiler		350
B4	Distance between safety heat exchanger connection and side of boiler		105
W5	Distance between safety heat exchanger connections		65
B6	Distance between flow connection and side of boiler		255
W7	Distance between return connection and side of boiler		485
W8	Distance between drainage connection and side of boiler		575
H1	Height, boiler		1235
H2	Height of flue gas pipe connection[1)]		1395
H3	Total height incl. flue gas nozzle		1300
H4	Height, safety heat exchanger connection		765
H5	Height, drainage connection		125
H6	Height, return connection		150
H7	Height, flow connection		1055

1. When using the optional flue pipe nozzle for low chimney connections

4.2 Components and connections



Item	Description	S1 Turbo 15-20 (F)
1	Boiler flow connection	1” IT
2a	Boiler return connection on S1 Turbo (F)	1” IT
2b	Boiler return connection – connection to pellet unit outfeed on SP Dual compact	1” 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	Flue gas pipe connection (external diameter)	129 mm
7	Position for boiler sensor and STL capillary (internal diameter)	16 mm
8	Position for Lambda probe	3/4" IT
9	Position for flue gas temperature sensor	1/2“ IT

4.3 Technical specifications

Description		S1 Turbo (F)[1]	
		15	20
Nominal output	kW	15	20
Boiler efficiency (NCV)	%	92,6	92.2
Electrical connection		230V / 50Hz / fused C16A	
Weight of boiler incl. insulation and control	kg	455	465
Total boiler capacity (water)	l	90	90
Water pressure drop (ΔT = 10 / 20 K)	mbar	3.5 / 0.5	8.3 / 1.5
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 17225		Part 5: Firewood class A2 / D15 L50	
Fuel loading door dimensions (width / height)	mm	350 / 360	
Fuel loading chamber capacity	l	80	
Combustion time [2] - beech	h	4.9 - 7.0	3.5 - 5.0
Combustion time[2] - spruce		3.0 - 4.2	2.1 - 3.0
Test book number		PB 057	PB 058
Boiler class as per EN 303-5:2012		5	

1. With regards to the approval of drawings for “S1 Turbo xx F” type boilers, the test results from the heating technology requirements of the “S1 Turbo xx” wood chip boiler according to EN 303-5 can be used.
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		S1 Turbo (F)[1]	
		15	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	15	20
Fuel efficiency at rated heat output (η_n)	%	85.1	84.2
Auxiliary current consumption at rated heat output (el_{max})	kW	0.041	0.042
Auxiliary current consumption in standby mode (P_{SB})	kW	0.003	0.003
Energy efficiency class of the boiler		A+	A+
Energy efficiency index (EEI) of boiler		120	119
Heating space annual rate of use ηs	%	81	81
Temperature controller used		Lambdatronic S 3200	
Class of the temperature controller		II	II

Model identifier		S1 Turbo (F)[1]	
		15	20
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[2]		122	121
Energy efficiency class of the combined boiler and controller[2]		A+	A+
Annual space heating emissions of dust (PM)[3]	mg/m³	18	13
Annual space heating emissions of gaseous organic compounds (GOC)[3]	mg/m³	< 3	6
Annual space heating emissions of carbon monoxide (CO)[3]	mg/m³	57	87
Annual space heating emissions of nitrogen oxides (NOx)[3]	mg/m³	114	133

1. With regards to the approval of drawings for “S1 Turbo xx F” type boilers, the test results from the heating technology requirements of the “S1 Turbo xx” wood chip boiler according to EN 303-5 can be used.
2. 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.
3. 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.

4.3.1 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		S1 Turbo (F) / SP Dual compact	
		15	20
Flue gas temperature at rated heat output T_{WN} / at the lowest output T_{Wmin}	°C	150 / -	170 / 130
Volumetric concentration of CO_2 in the dry flue gas $\sigma(CO_2)$ at rated heat output	%	12.3	
Flue gas mass flow at rated heat output $\dot{m}_N$ / at the lowest output $\dot{m}_{min}$	kg/h	36 / -	47 / 25
	kg/s	0.010 / -	0.013 / 0.007
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	129	129
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	-	-

4.3.2 Data for planning a backup power supply

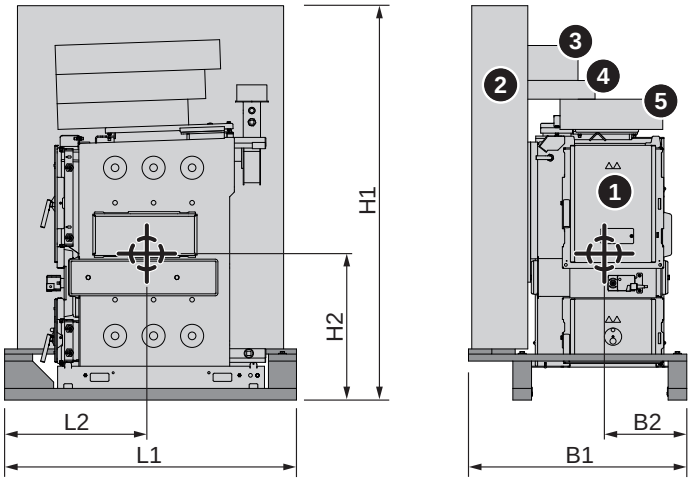
Description		Value
Continuous output (single phase)	VA	3680
Nominal voltage	VAC	230 ± 6%

Description		Value
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	S1 Turbo 15-20 (F)
L1	Length	mm	1250
B1	Width		935
H1	Height		1690
-	Weight	kg	465
Centre of gravity			
L2	Length	mm	625
B2	Width		420
H2	Height		675
Components			
1	S1 Turbo (F) boiler		
2	Insulation		
3	Control		
4	Accessories package		
5	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

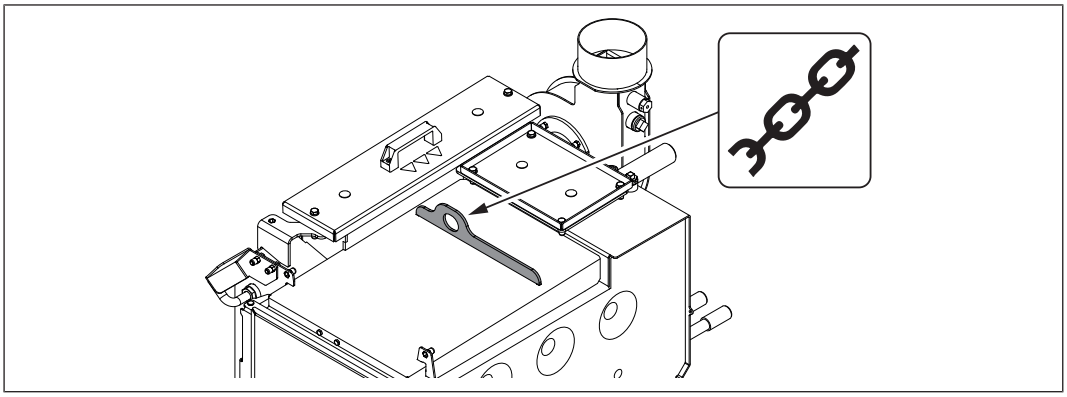
❒ Position a fork-lift or similar lifting device at the pallet and bring in the components

If the firewood boiler cannot be brought in on the pallet:

❒ remove the cardboard and take the boiler off the pallet

➲ "Removing boiler from pallet" [▸ 29]

Positioning using a crane

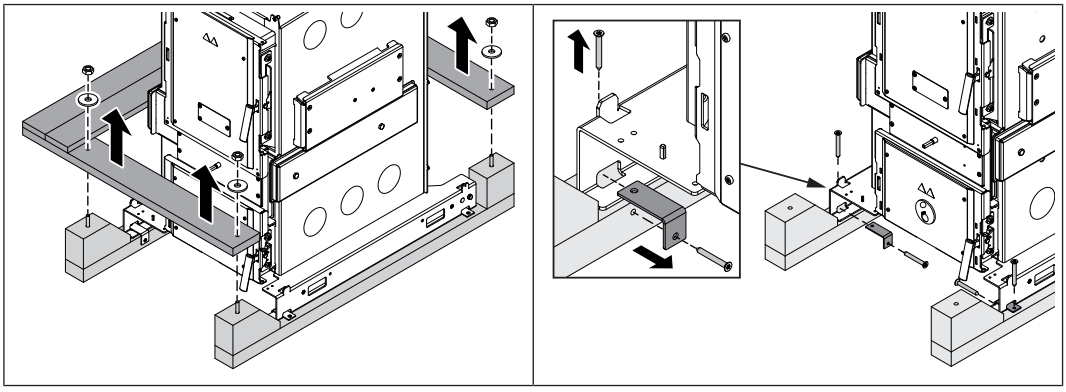


❒ Attach the crane hook to the attachment point correctly and position the boiler

5.4 Positioning at the installation site

5.4.1 Removing boiler from pallet

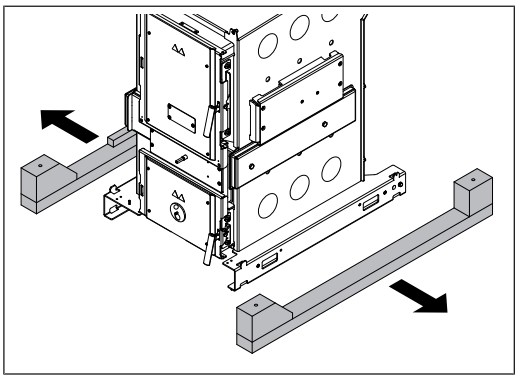
❒ Lift the cardboard boxes for the insulation, controller and control off the pallet



❒ Remove the nuts and washers on the top frame of the pallet

❒ Remove the top frame of the pallet

❒ Remove the wood screws and clamping angles



❒ Lift the boiler using a fork-lift or similar lifting device with the appropriate load-bearing capacity and remove the bottom supports of the pallet

❒ Transport boiler to the intended position at the installation location

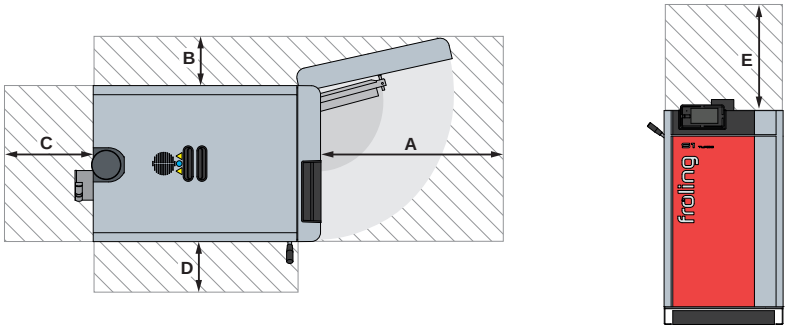
➲ "Positioning at the installation site" [▶ 29]

TIP: To make it easier to fit the cladding, position the boiler in free space in the installation room and only move it to its final position just before connecting it hydraulically.

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)

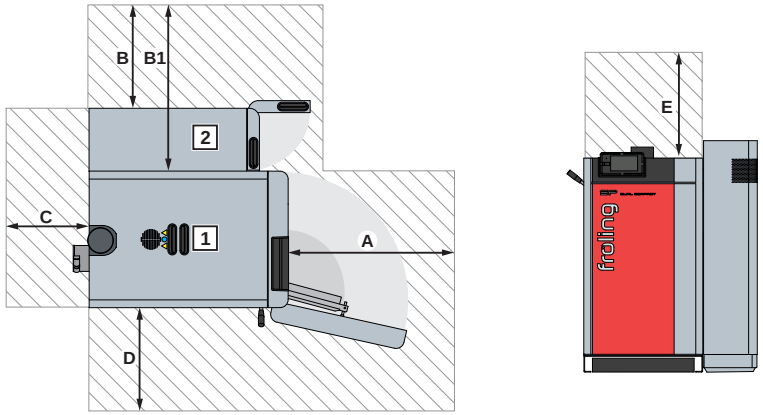
Operating and maintenance areas of the S1 Turbo (F)



A	800 mm
B	200 mm
C	400 mm
D	500 mm / 200[1)] mm
E	500[2)] mm

1. Maintenance work to boiler's heat exchanger only possible from front
2. Maintenance area to expand the WOS springs upwards

Operating and maintenance areas of the SP Dual compact



1 ... Firewood boiler S1 Turbo F | 2 ... Pellet unit

A	800 mm
B	500 mm
B1	815 mm
C	400 mm
D	500 mm / 200[1)] mm
E	500[2)] mm

1. Maintenance work to boiler's heat exchanger only possible from front
2. Maintenance area to expand the WOS springs upwards

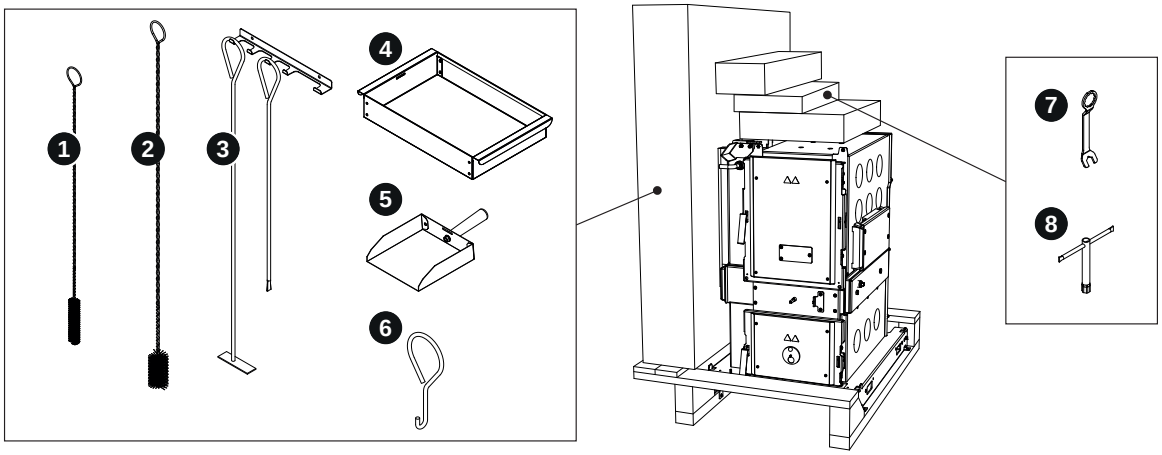
6 Assembly

6.1 Required tools and equipment

The following tools and resources are required for assembly:

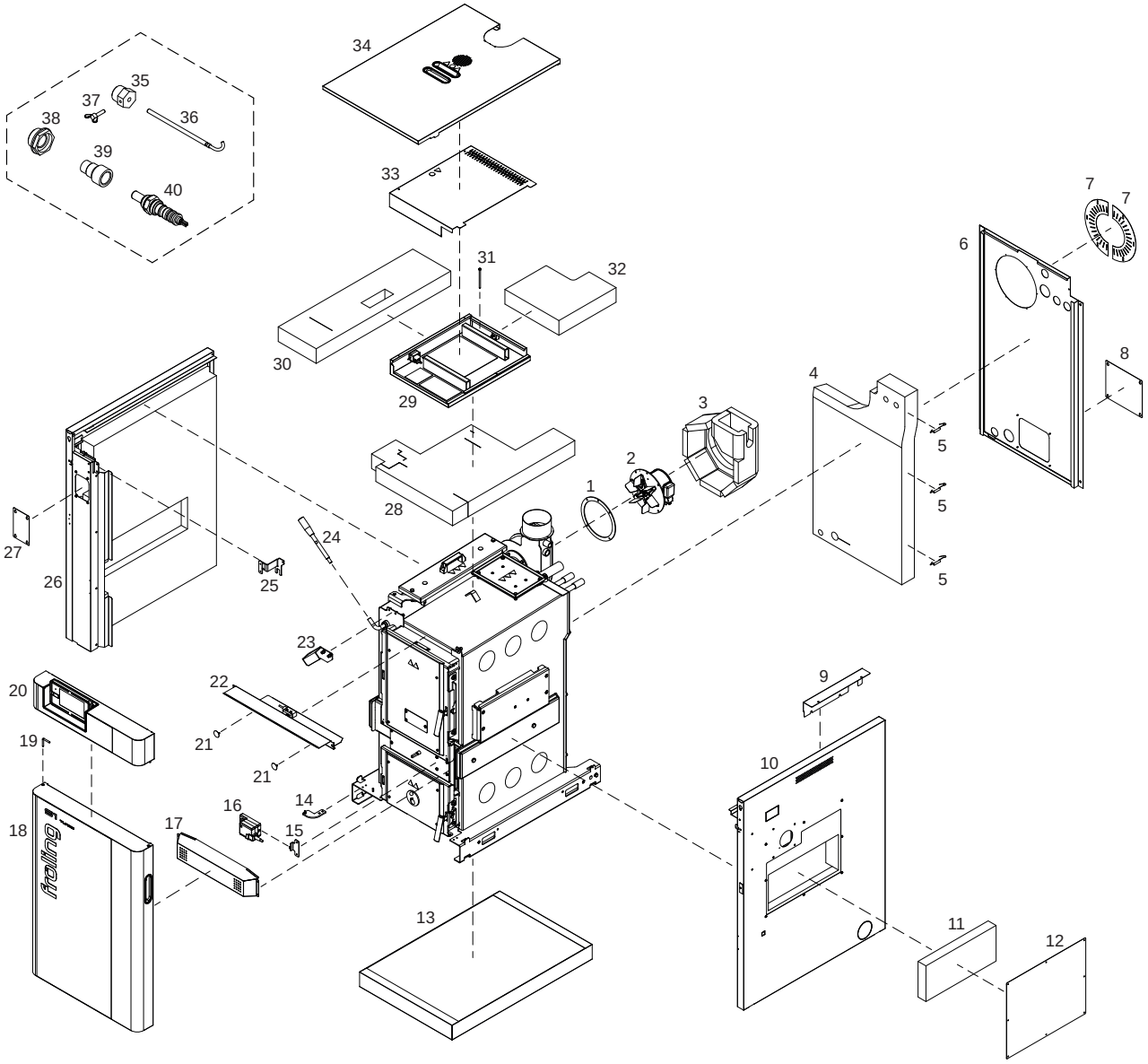
- ❒ Spanner or box wrench set (widths across flats 8 - 32 mm)
- ❒ Set of Allen keys
- ❒ Flat head and cross-head screwdrivers
- ❒ Hammer
- ❒ Diagonal cutting pliers
- ❒ Half-round file
- ❒ Power drill or cordless screwdriver with Torx bit insert
- ❒ Stepladder

6.2 Accessories supplied



1	Cleaning brush 30 x 20 x 90	**5**	Ash shovel
2	Cleaning brush Ø 54 x 1350	**6**	Hook
3	Furnace tool with bracket	**7**	Spanner for door mountings
4	Ash drawer with bracket	**8**	Socket wrench AF 13

6.3 Assembly overview S1 Turbo (F)



Item	Quantity	Description	Item	Quantity	Description
1	1	Fibre-glass seal for induced draught fan	**21**	2	Plugs, plastic
2	1	Induced draught fan Ø 180	**22**	1	Cover plate with door contact switch
3	1	Thermal insulation for induced draught unit housing	**23**	1	Stop for WOS lever
4	1	Thermal insulation for back panel	**24**	1	WOS lever
5	13	Tension spring	**25**	1	Bracket for controller box
6	1	Back panel	**26**	1	Side panel, left
7	2	Cover plate for ID fan	**27**	1	Cover plate WOS lever
8	1	Cover plate, boiler return	**28**	1	Thermal insulation for top of boiler
9	1	Cable duct cover	**29**	1	Controller box, complete
10	1	Side panel, right	**30**	1	Thermal insulation for cleaning cover
11	1	Thermal insulatio pellet flange[1)]	**31**	1	Adjusting screw

Item	Quantity	Description	Item	Quantity	Description
12	1	Cover plate pellet flange[1)]	**32**	1	Thermal insulation for reversing chamber cover
13	1	Floor insulation	**33**	1	Controller cover
14	1	Insulating door mounting	**34**	1	Cover
15	1	Torque support for actuators	**35**	1	Flue gas temperature sensor bushing
16	1	Servo-motor	**36**	1	Flue gas temperature sensor
17	1	Cover plate for air control	**37**	1	Flue gas temperature sensor wing screw
18	1	Insulated door	**38**	1	Lambda probe bushing
19	1	Door pin	**39**	1	Lambda probe adaptor
20	1	7” Touch control	**40**	1	Lambda probe

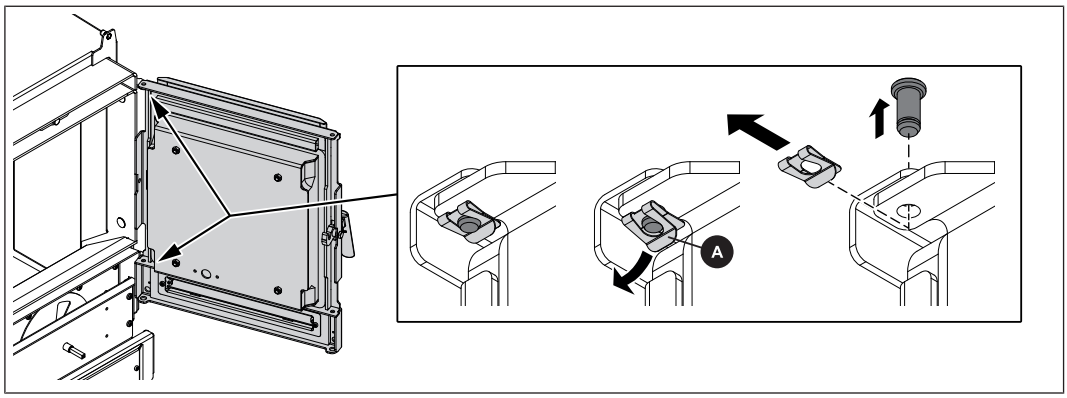
1. For firewood boilers with pellet flange

6.4 Before Installation

6.4.1 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 combustion chamber.

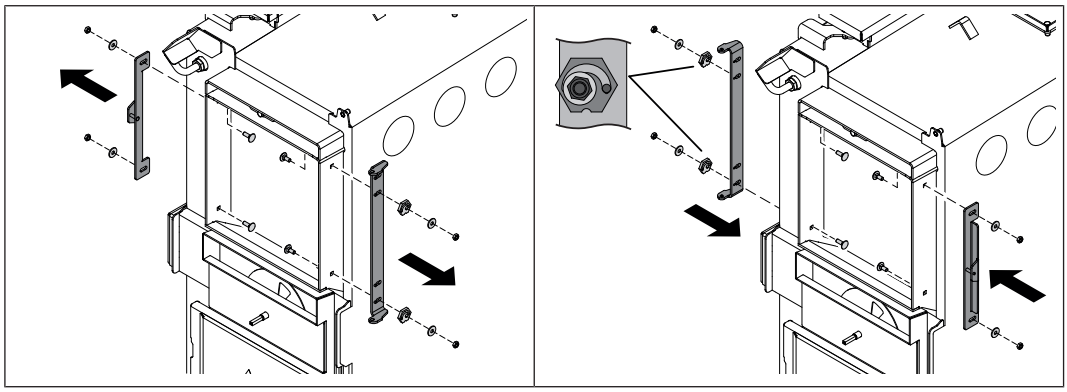
RECOMMENDATION: For easier operability, we recommend that the door stop of the existing pellet unit is positioned on the left side of the boiler.



❒ Open the fuel loading door

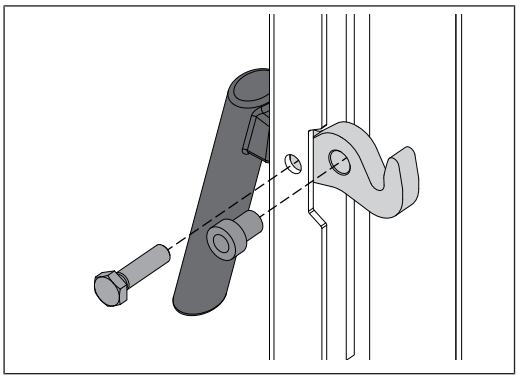
❒ Lift the clip (A) slightly and pull out the shaft retainer

❒ Take out the top and bottom hinge pins and take off the fuel loading door



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

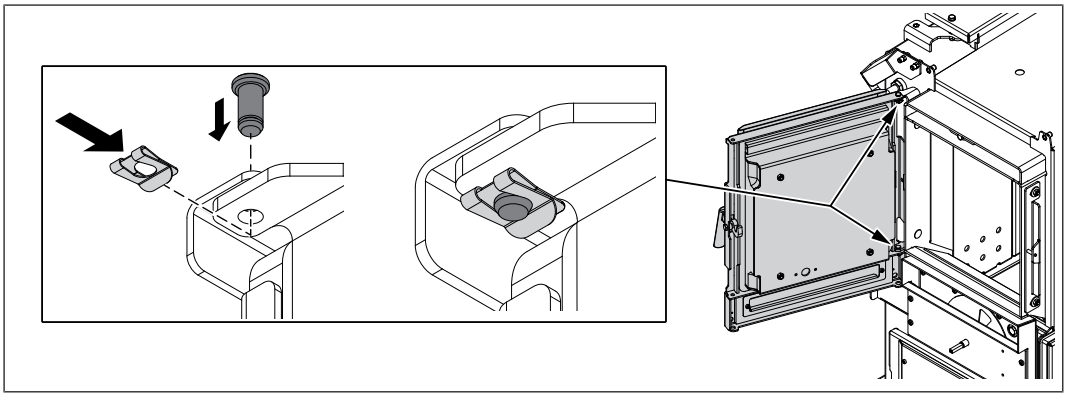
↳ Position the locking cam on the hinge as shown



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

❒ Slide the door handle in on the other side and insert the flange sleeve

❒ Attach the door handle using a hexagon screw



❒ 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

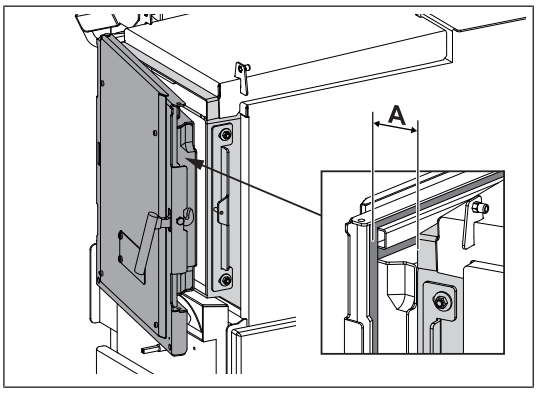
NOTICE! After changing over the door stops, check the seal and adjust it as necessary.

➲ "Checking the seal on the doors" [▸ 37]

➲ "Adjusting the doors" [▸ 38]

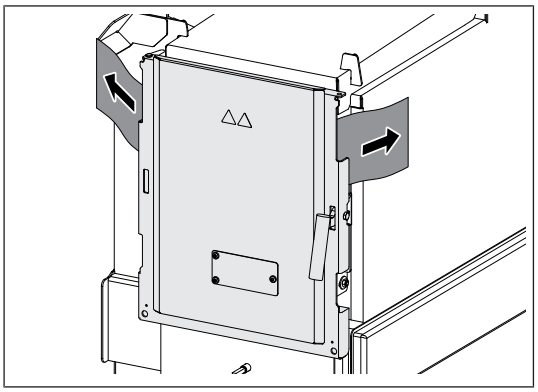
6.4.2 Checking the seal on the doors

The following steps are illustrated based on the fuel loading door. Perform these steps in the same way for the door of the 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" [▶ 38]
- If a resistance is felt when there is a gap of 3 cm:
  Move the hinge plate forwards
  ➲ "Adjusting the doors" [▶ 38]



❒ Open the door

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

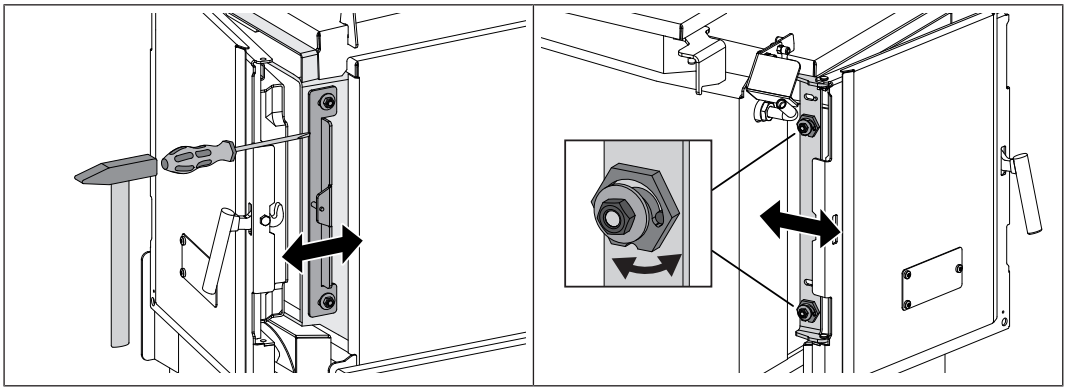
❒ Try to pull out the sheet of paper

↳ 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" [▸ 38]

6.4.3 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 combustion chamber.



❒ Loosen the nuts on the locking plate

❒ Use a suitable tool, to move the locking plate forwards or backwards

❒ Tighten the nuts on the locking plate

❒ Loosen the nuts on the door hinge

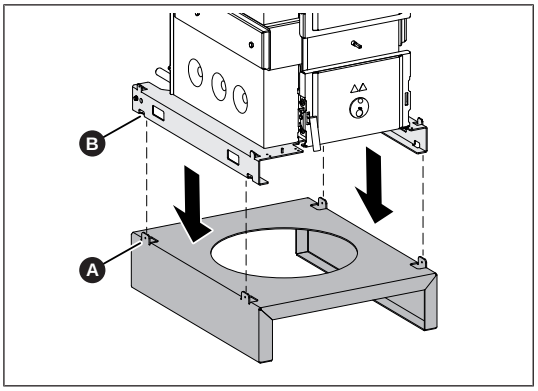
❒ Use a hexagonal wrench (width across flats 32 mm) to move the locking cam (B) forwards or backwards

❒ Tighten the nuts on the hinge

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" [▸ 37]

6.4.4 Positioning the boiler on the boiler base frame (optional)



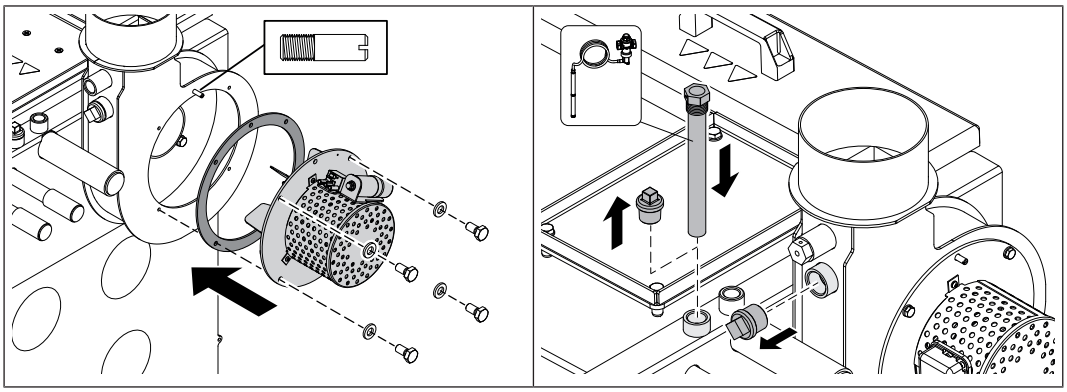
❒ Lift the boiler and position it on the boiler base frame

↳ When doing so, thread the lugs on the boiler base frame (A) into the recesses in the boiler base (B)

↳ The boiler is now raised by 200 mm

6.5 Installing the boiler

6.5.1 Fit the induced draught fan



❒ Fasten a shaft screw to the top hole on the ID fan housing

❒ Mount the seal for the induced draught fan on the shaft screw

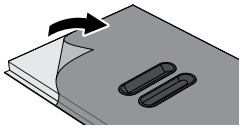
❒ Fasten the induced draught fan using four hexagon screws including washers

❒ Remove the blanking plug from the induced draught unit housing and above the boiler flow

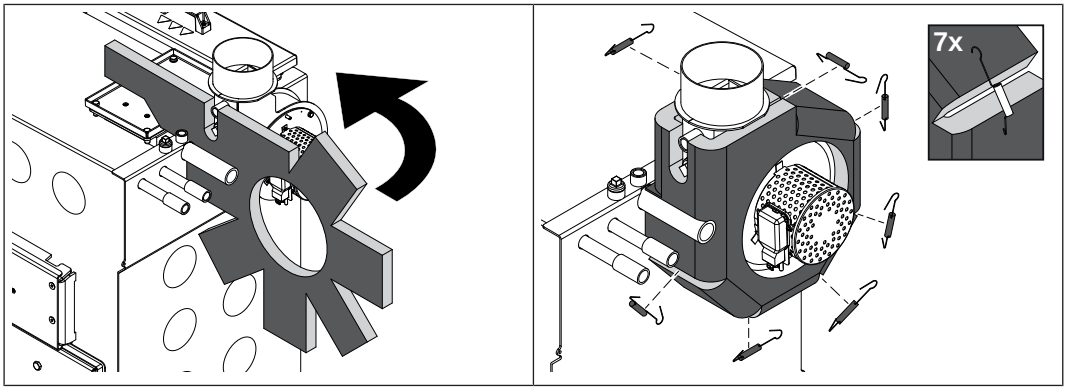
❒ Seal the immersion sleeve of the thermal discharge safety device in the sleeve above the boiler flow

NOTICE! Thermal discharge valve is not included

6.5.2 Installing the insulation



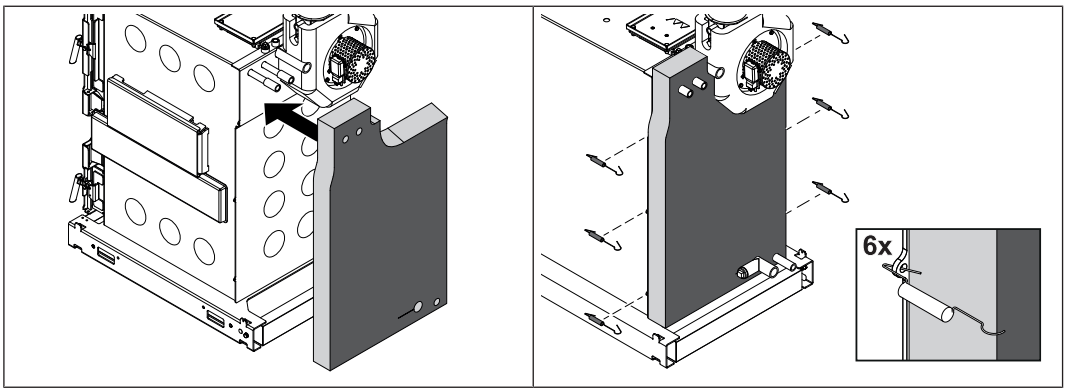
IMPORTANT: The individual parts of the boiler insulation covered with a protective film. The protective film must be removed before proceeding with the installation!



❒ Wrap the thermal insulation around the ID fan housing

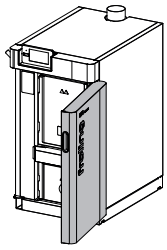
↳ Pay attention to the cutouts for the induced draught fan and Lambda probe

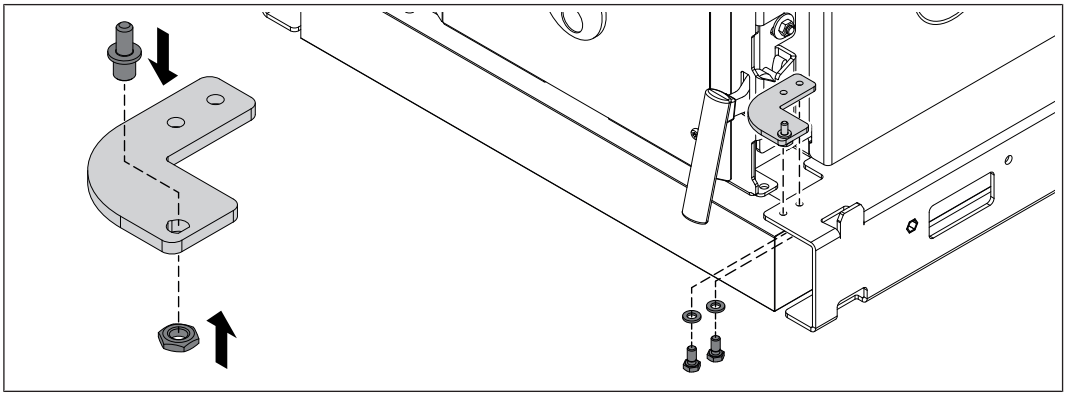
❒ Secure the thermal insulation to the induced draught unit housing with 7 tension springs



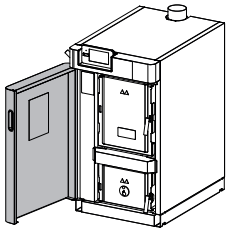
❒ Position the rear thermal insulation on the back wall and attach to the boiler using 6 tension springs

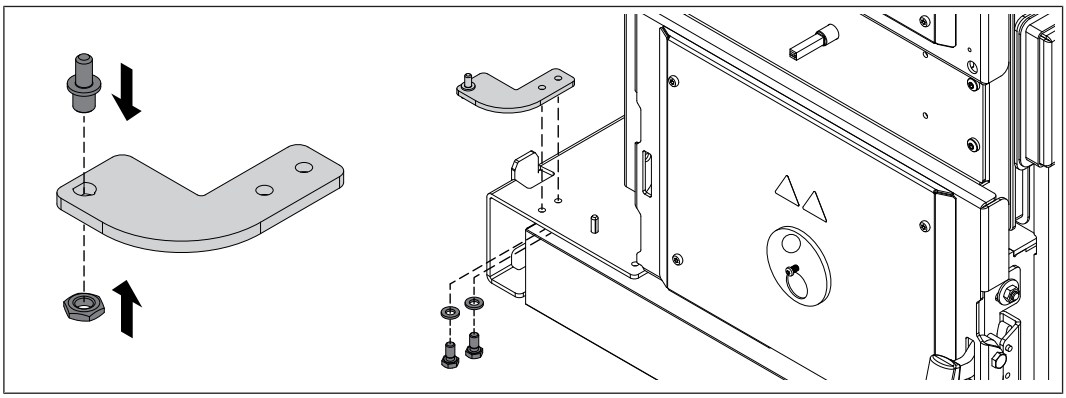
Right door stop





Left door stop

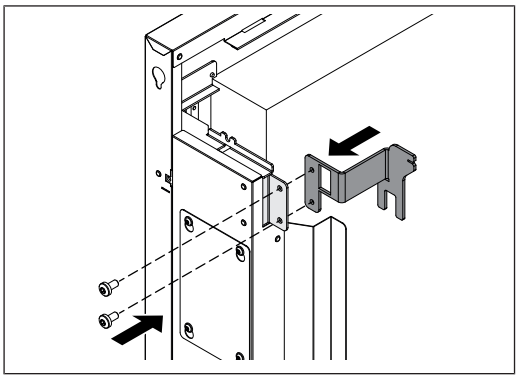




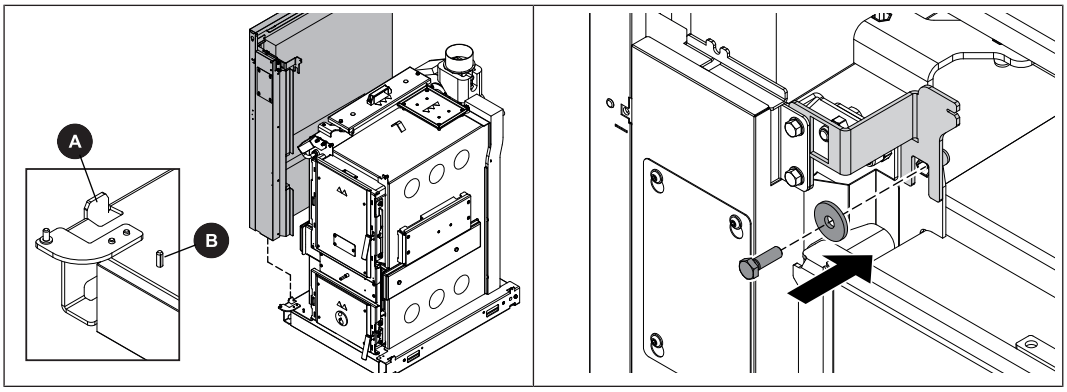
❒ Screw the nuts and bolts as shown on to the supplied door mounting plate

❒ Place the entire door bearing on the bottom of the boiler and attach from below using two screws

TIP: If the boiler has a pellet flange, it is recommended to fit the door stop on the left!



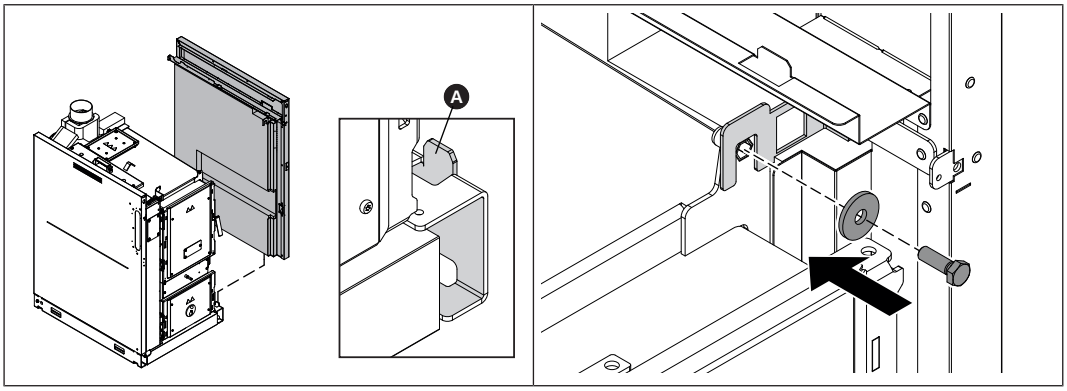
❒ Use two screws to attach the bracket to the left side panel



❒ Fit the left side panel to the side lug (A) and the front safety bolt (B) on the bottom of the boiler

❒ Attach the side panel and bracket to the boiler

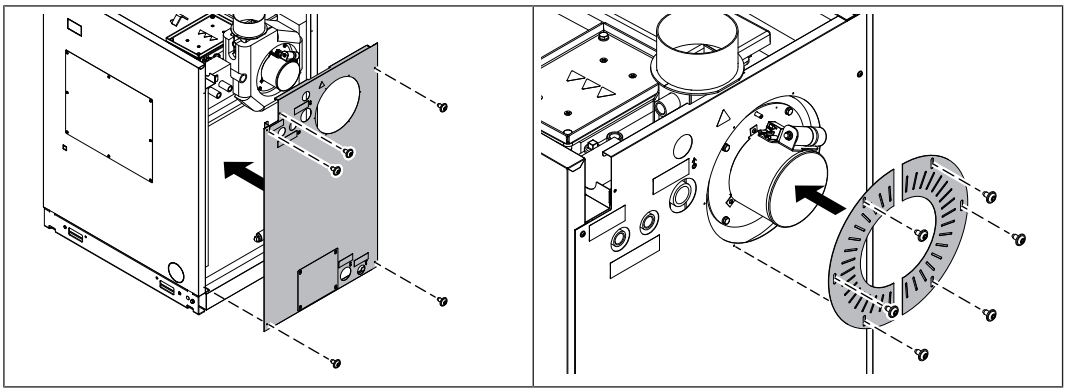
↳ Tighten the screws only slightly so the side panel can be aligned later



❒ Fit the right side panel to the side lugs (B) on the boiler base

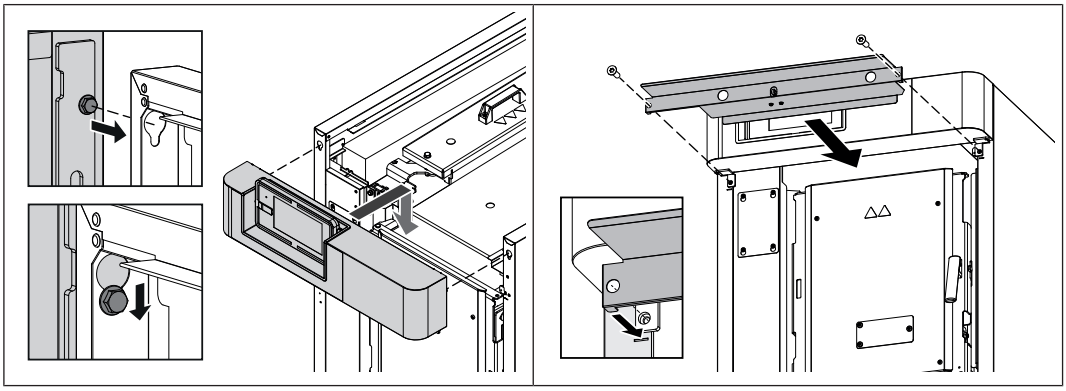
❒ Attach the side panel and bracket to the boiler

↳ Tighten the screws only slightly so the side panel can be aligned later



❒ Attach the rear panel to the side panels

❒ Attach the ID fan cover plate to the back panel



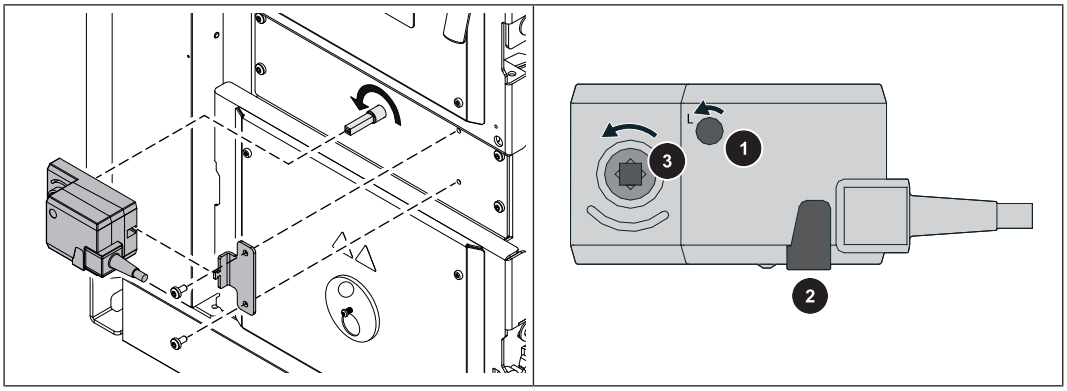
❒ Fit the control screw heads into the cutouts on the side panels

❒ Insert the spacer plate beneath the control

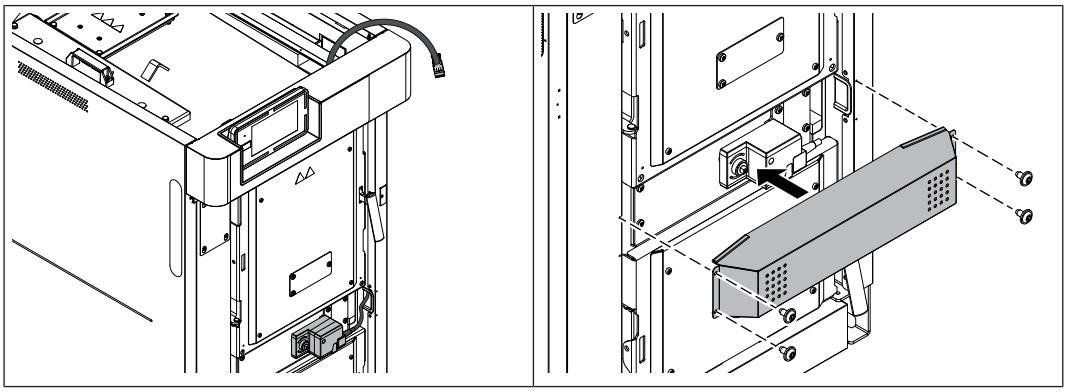
❒ Attach the spacer plate and control to the side panel using two screws

❒ Tighten both screws on the cutouts

6.5.3 Fitting the air control

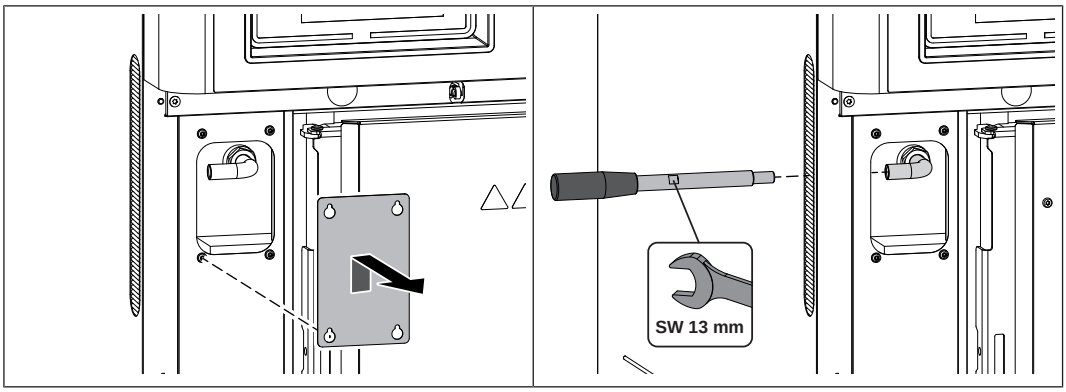


❒ Turn the slide valve for air flow to the left until it stops (anti-clockwise)
❒ Set the direction of rotation of the servo-motor (1) to left (L)
❒ Press the release button (2) and turn the shaft receptacle (3) to the left until it stops
❒ Put the servomotor on the shaft and use two screws to attach torque supports



❒ Run the servo-motor cable via the cable duct and out the top of the right side panel
❒ Use four screws to attach the cover plate for the air control

6.5.4 Installing the WOS lever

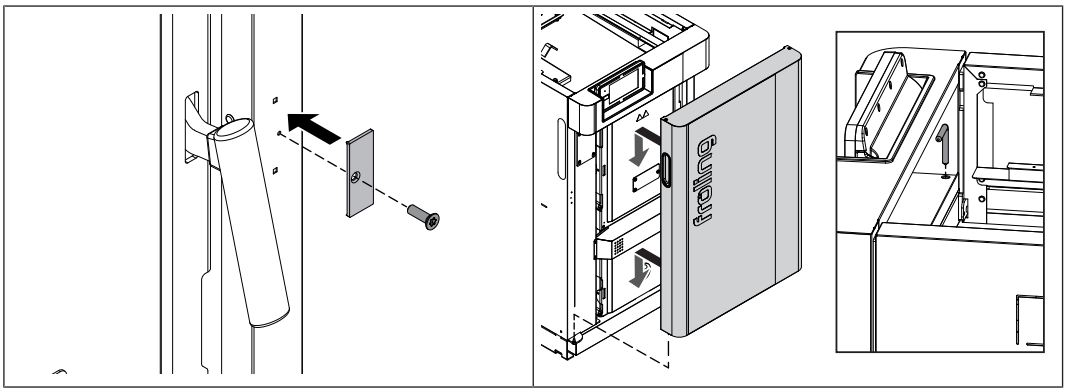


❒ Loosen the screws slightly and unhook the cover plate from the left side panel

❒ Screw the WOS lever into shaft and place the wrench on the flattened area to tighten

6.5.5 Installing the insulated door

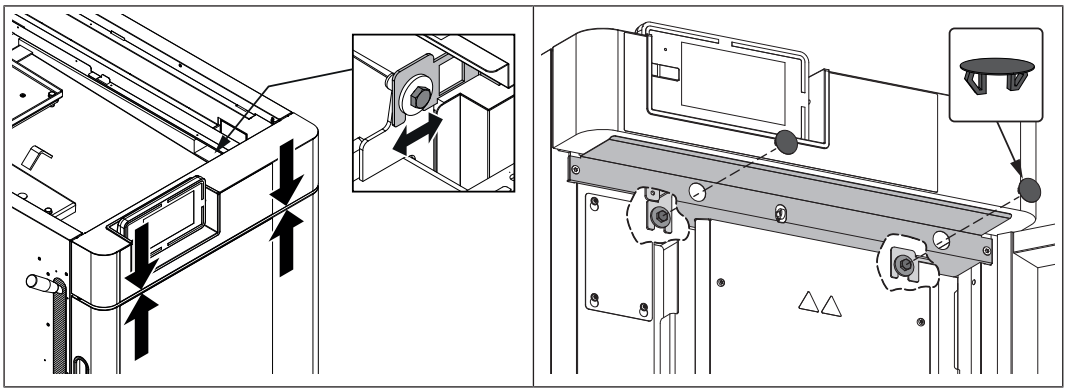
Installation of the insulated door is explained below using the example of the door stop on the left. To mount the insulated door with the door stop on the right, invert and follow the same steps!



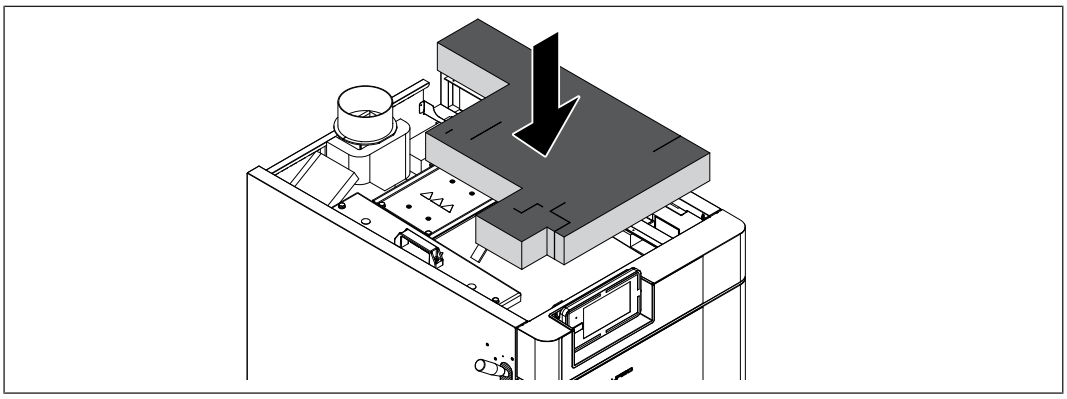
❒ Mount counter plate for magnetic latches on the side panel on the opposite side of the door stop

↳ **NOTE**: counter plate may already be mounted on one side

❒ Hang the insulated door at the bottom onto the half-length taper grooved pin and secure at the top with a door pin

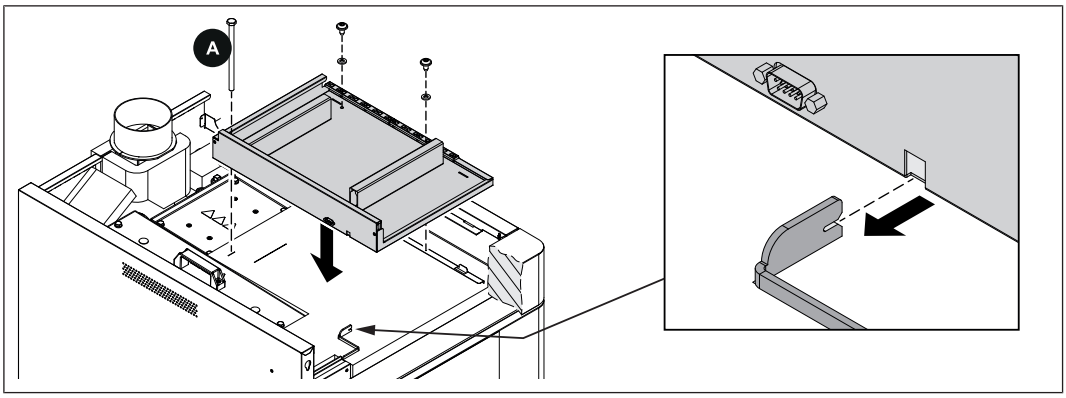


❒ When insulated door is closed:
Measure the distance to the left and right between the insulated door and the control
↳ The two distances must be equal!
↳ If necessary adjust the side panels at the brackets
❒ When the positioning is correct, tighten the screws in the brackets
❒ Close the round cutouts in the front cover plate using plastic plugs



❒ Place the thermal insulation on the boiler as shown

6.5.6 Fitting the controller box

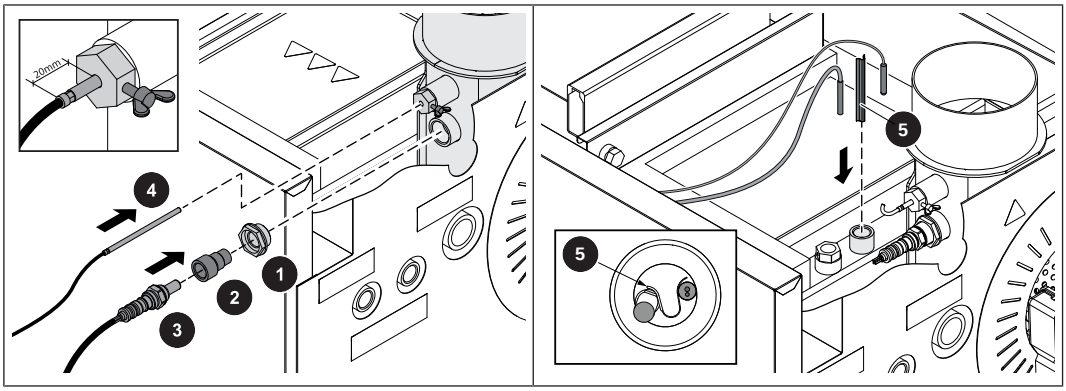


❒ Place the controller box on the boiler

↳ In so doing, fit the cutout next to the service interface into the slit on the bracket

❒ Fasten the controller box with two screws and align it horizontally using the adjusting screw (A)

6.5.7 Installing the Lambda probe, sensor and thermal discharge valve



❒ Screw bushing (1) into flue pipe nozzle and tighten slightly

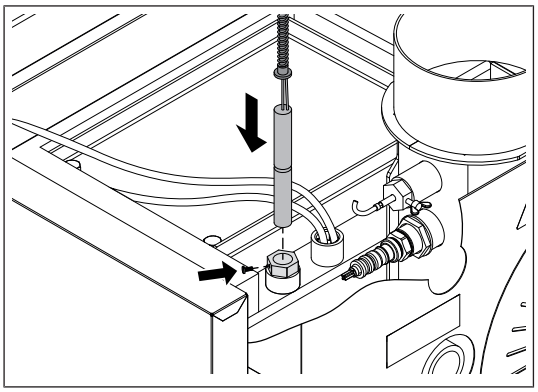
❒ Screw adapter (2) into bushing

❒ Screw the Lambda probe (3) into the adapter on the flue pipe nozzle and tighten slightly using an Allen key (SW 22 mm)

❒ Insert flue gas temperature sensor (4) into brass bushing so that approx. 20 mm protrudes from the sleeve and hold in place using a wing screw

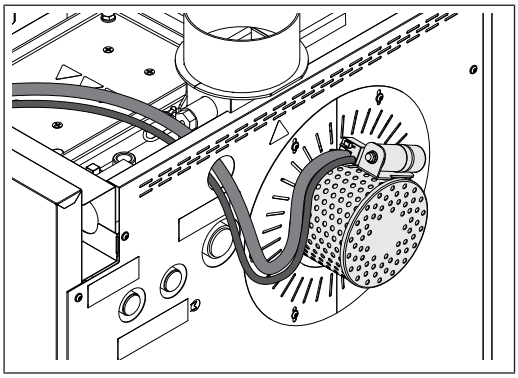
❒ Push the boiler sensor and the STL capillary with the pressure spring (5) into the shrink-wrapped immersion sleeve of the boiler flow

NOTICE! Thermal discharge valve is not included



❒ Slide the sensor and metal tube insulation into the immersion sleeve and secure with slotted screw

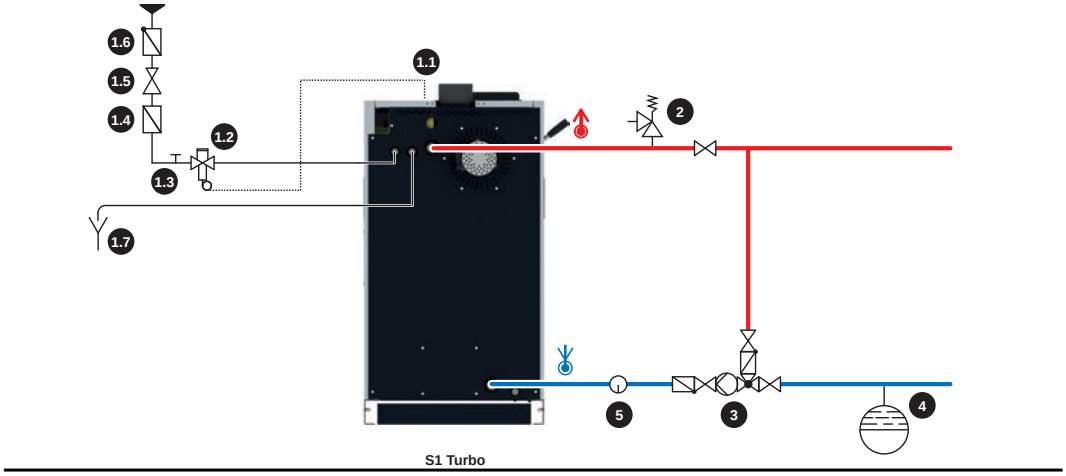
6.5.8 Attaching the induced draught cable



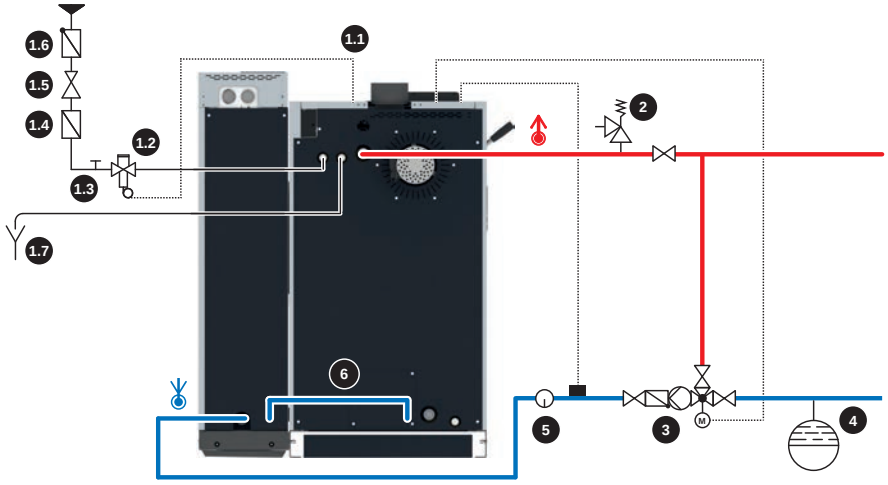
❒ Run the induced draught cable through the round cut-out section in the back panel to the induced draught unit via the cable duct

❒ Plug in both induced draught cables and secure with cable ties

6.6 Hydraulic connection



S1 Turbo



SP Dual compact

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)

6 Internal pipe connection

- Pellet unit outfeed to return firewood boiler (included in delivery)

6.7 Electrical connection and wiring

⚠ DANGER

When working on electrical components:

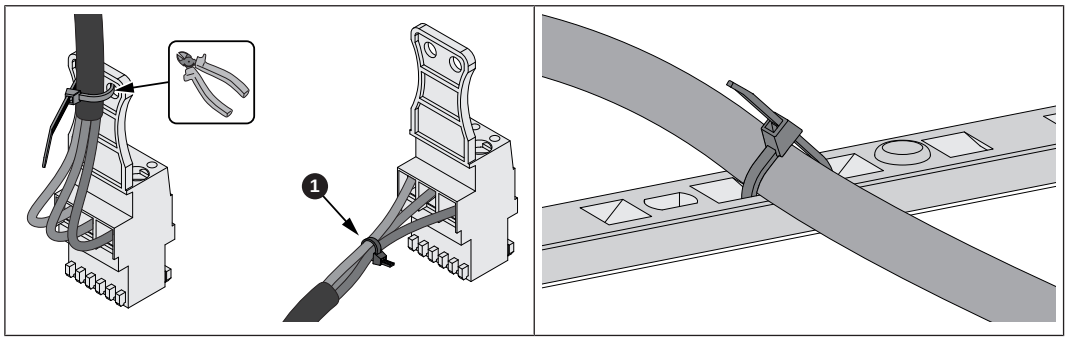
Risk of electrocution!

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

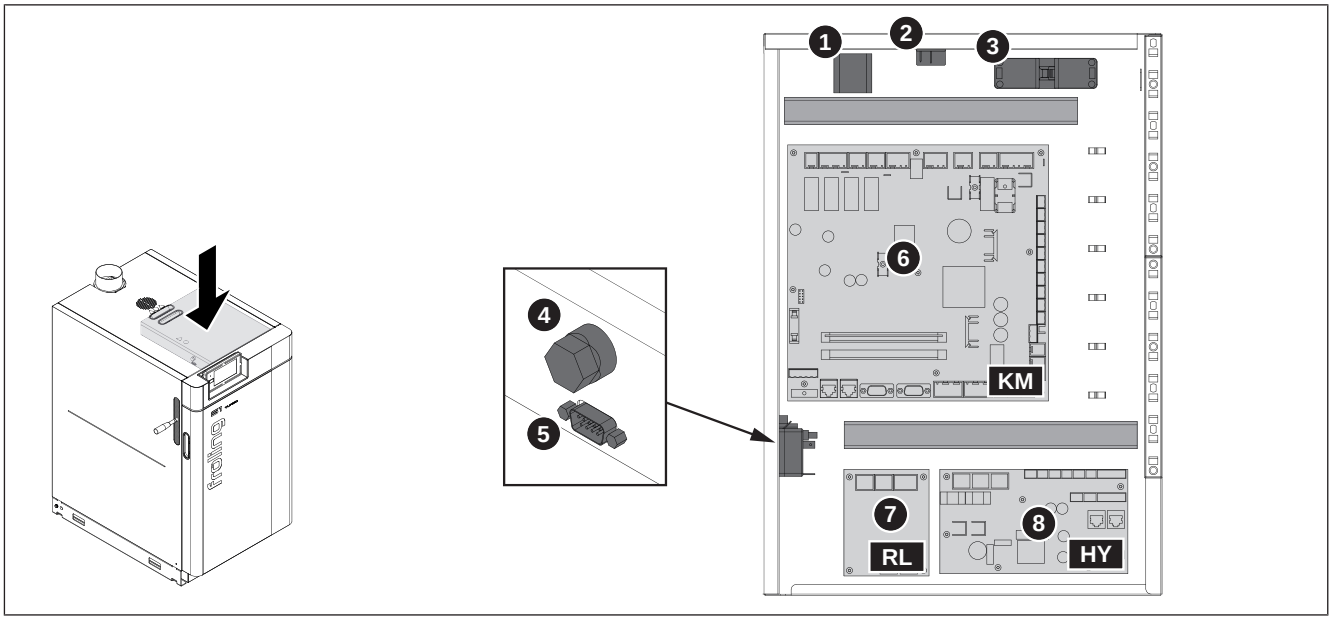
Prepare the plug

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

6.7.1 Board overview



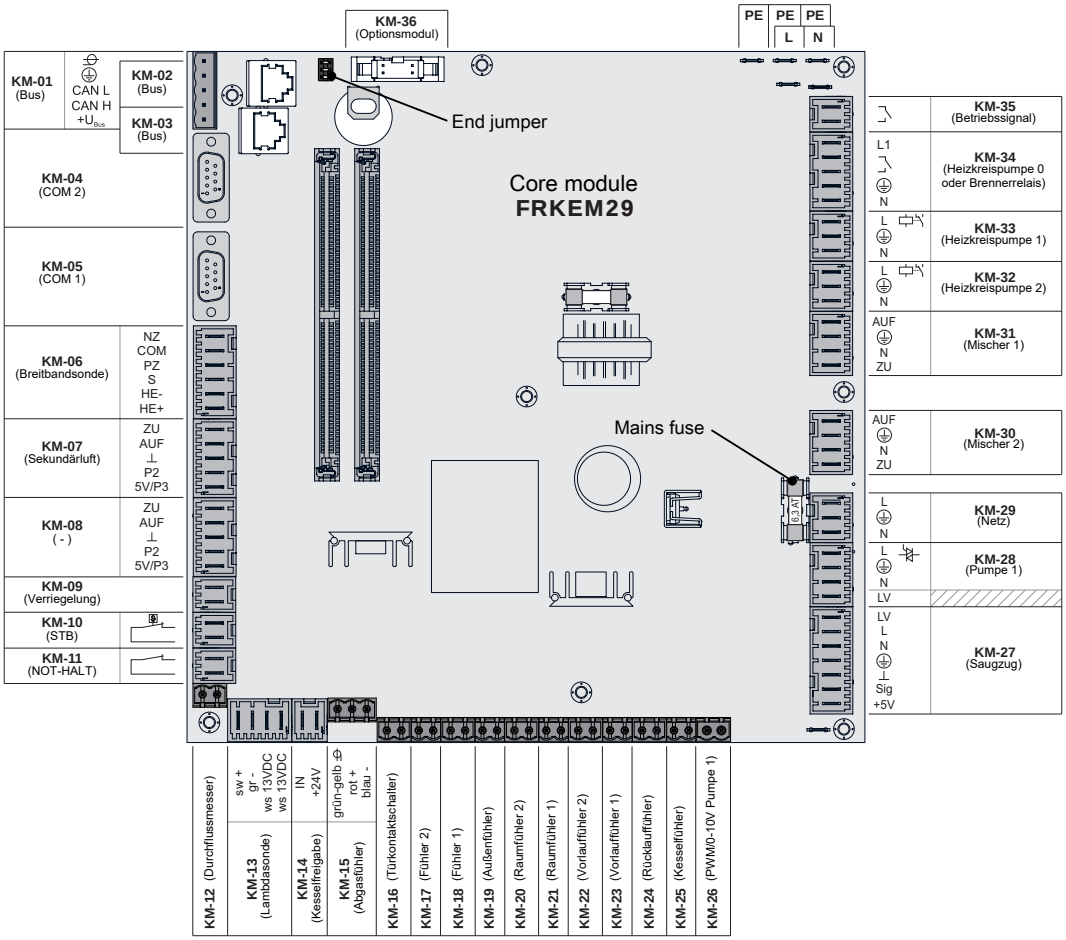
Item	Description	Item	Description
1	Device connection terminal	**5**	Service interface
2	Main switch	**6**	Core module
3	Mains connection plug	**7**	Return mixer module (optional)
4	High-limit thermostat STL	**8**	Hydraulic module

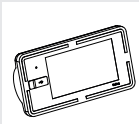
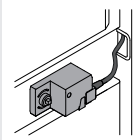
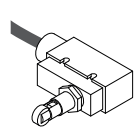
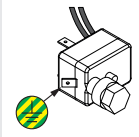
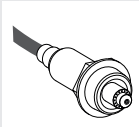
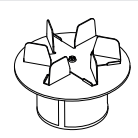
6.7.2 Connecting components

❒ 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

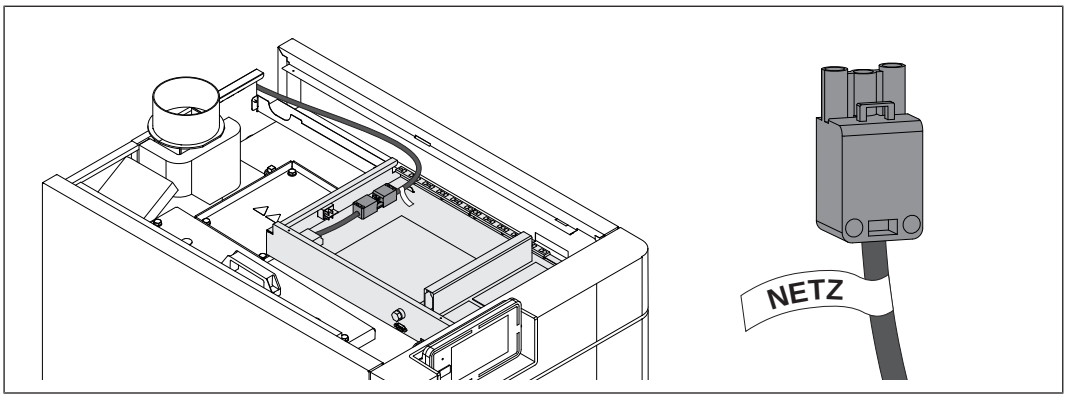
Core module:



KM-02		Boiler display	**KM-15**		Flue gas temperature sensor
KM-07		Servo-motor	**KM-16**		Door switch
KM-10		High-limit thermostat	**KM-25**		Boiler sensor
KM-13		Lambda probe	**KM-27**		Induced draught fan

Once the individual components have been wired:

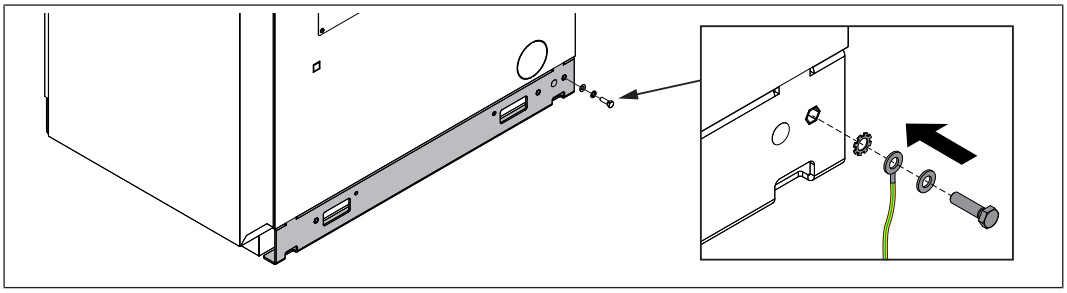
Mains connection:



❒ Providing network connection

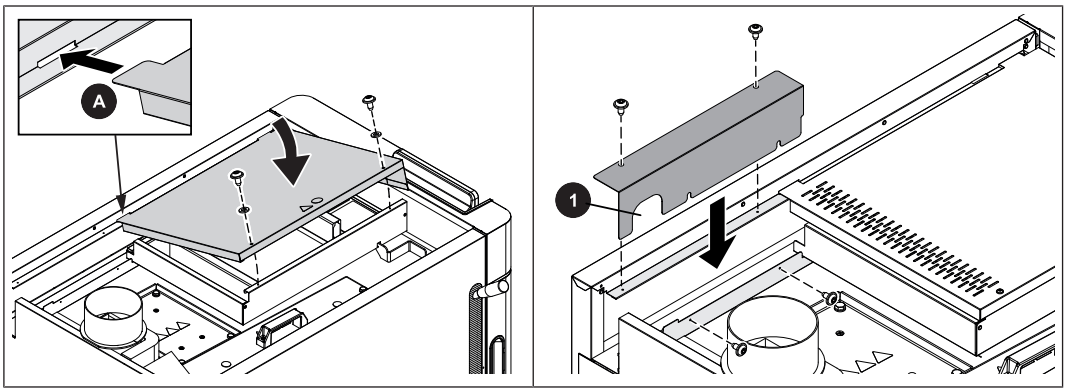
- ↳ The power supply line (network connection) must be fitted with a max. C16A fuse by the customer!
- ↳ Observe the circuit diagrams in the boiler controller operating instructions.
- ↳ Flexible sheathed cable must be used for the wiring; this must be of the correct size to comply with applicable regional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

6.7.3 Potential equalisation



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

6.8 Concluding work

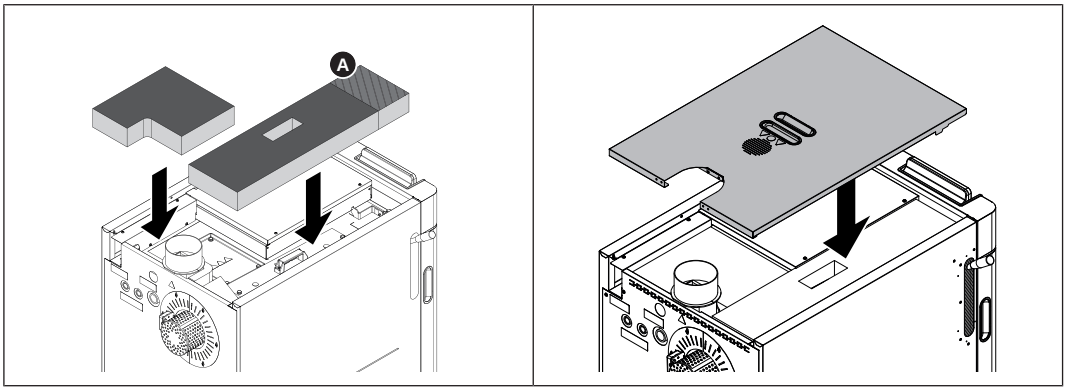


❒ Fit the tabs (A) on the controller cover into the slots on the side panel

❒ Secure the controller cover in place using two screws and contact washers

❒ Install the cover for the cable duct

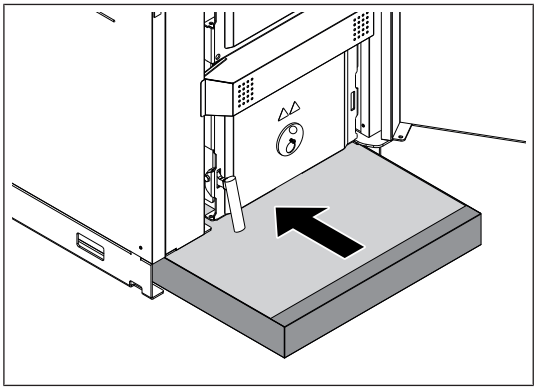
↳ In so doing, position the cable in the cutout (1) of the cover



❒ **For automatic WOS:** Remove the precut area of the thermal insulation (A)

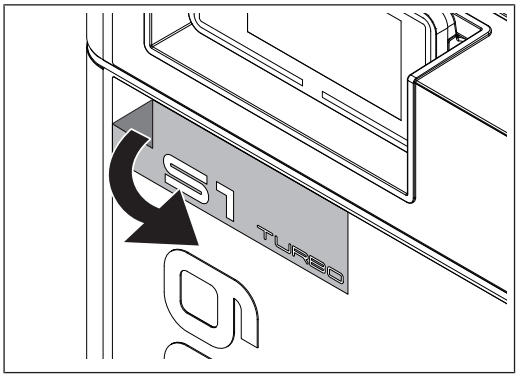
❒ Put on the thermal insulation for the reversing chamber cover and cleaning cover

❒ Put on the top cover



❒ Slide the floor insulation underneath the boiler from the front

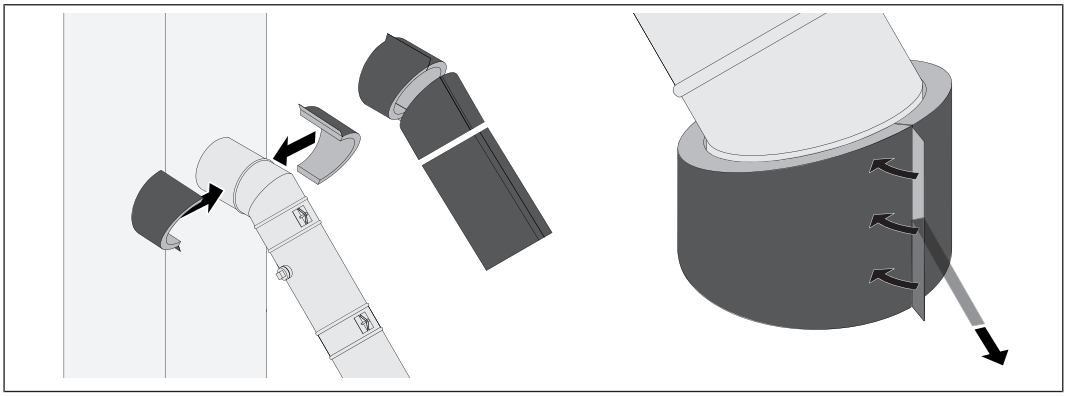
6.8.1 Positioning the boiler stickers



- ❒ Remove the protective film from the sticker
- ❒ Position the backing film featuring “S1 TURBO” in the upper left corner of the insulating door, ensuring all of the air bubbles have been removed
- ❒ Make several passes over the sticker so the writing adheres to the insulated door
- ❒ Carefully pull off the transparent backing film

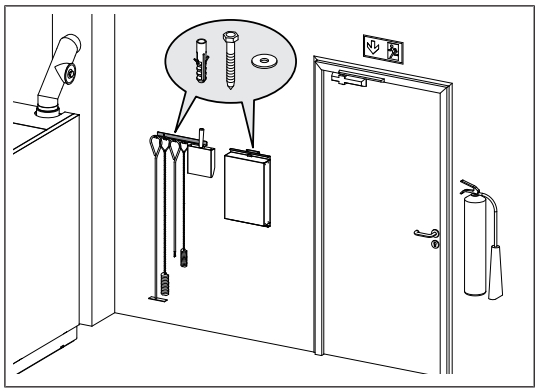
6.8.2 Insulate the connection line

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

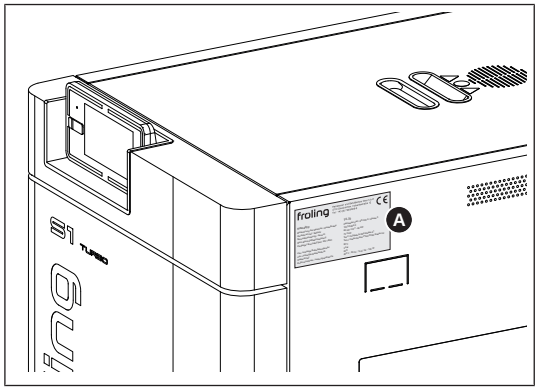
6.8.3 Install the brackets for accessories



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

❒ Attach the accessories to the brackets

6.8.4 Affixing the identification plate



❒ Affix the supplied rating plate (A) where it can easily be seen on the right side panel of the boiler

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 acc. to 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) in the last amended version)

Notes on use

- Wood briquettes must be heated up with firewood as per EN 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
- Burning wood briquettes can cause problems in combustion. 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

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.

⚠ CAUTION

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

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

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

❒ Carry out initial start-up of the firewood boiler with less amount of fuel

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

TÜV AUSTRIA

TÜV AUSTRIA

EG-Entwurfsprüfbescheinigung
EC design-examination certificate

EG-Entwurfsprüfung (Modul B1) nach Richtlinie 97/23/EG
EC design-examination (module B1) according to Directive 97/23/EC

Bescheinigung Nr.: 2015-HST-0059
Certificate No.:

Hersteller / *manufacturer:*

FRÖLING Heizkessel- und Behälterbau GesmbH
A 4710 Grieskirchen

Hiermit wird bescheinigt, dass die Ergebnisse der an dem unten genannten Druckgerät vorgenommenen Prüfungen die Anforderungen der Richtlinie 97/23/EG erfüllen.
This is to certify that the results of the examination of the pressure equipment mentioned below meet the requirements of the directive 97/23/EC.

Objekt: *object:* Baugruppe / *assembly*

Benennung: *description:* Baugruppe zur Erzeugung von Warmwasser gemäß § 7 (2) Druckgeräteverordnung

Inspektionsbericht Nr.: *inspection report no.:* 2015-HA-026 Rev. 0

TÜV AUSTRIA SERVICES GMBH TÜV AUSTRIA

Dipl.-Ing. Dr. Sebastian Schindler
Qualifizierte digitale Signatur
Verifikation der Echtheit unter
https://pruefung.signatur.rtr.at

Wien	05.03.2015	
Ort *place:*	**Datum** *date:*	**Freigegeben durch** *approved by*

QFM-DG-KB-DGVO-004_
Prüfbescheinigung PED
Revision: 03 vom 19.01.2015
Seite 1/1

TÜV AUSTRIA SERVICES GMBH
Benannte Stelle 0408
Auszugsweise Vervielfältigung nur mit Genehmigung der TÜV AUSTRIA SERVICES GMBH gestattet.
Alle Prüf- Inspektions- und Überwachungstätigkeiten erfolgten gemäß QM System der TÜV AUSTRIA SERVICES GMBH

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