fröling

Installation instructions

Turbomat TM 150 - 250

Translation of original German version of installation instructions for technicians.

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

CE

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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.

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
TRVB H 118	Technical directives for fire protection/prevention (Austria)

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 17225-2	Solid bio-fuel - Fuel specifications and classes Part 2: Wood pellets for use in industrial and domestic systems
EN ISO 17225-4	Solid bio-fuel - Fuel specifications and classes Part 4: Wood chips 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

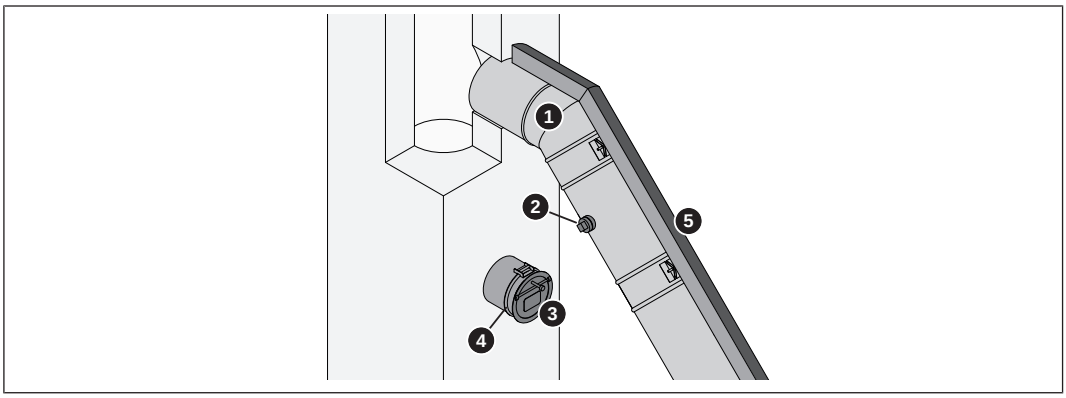
Requirements for the load bearing substrate:

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

Conditions at the installation site:

- Frost-free
- 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

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.

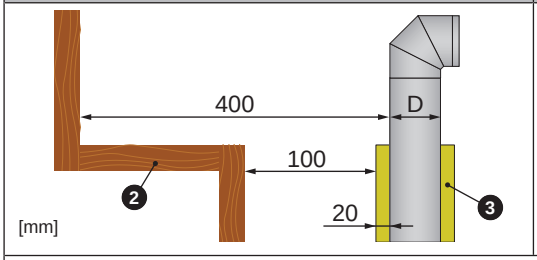
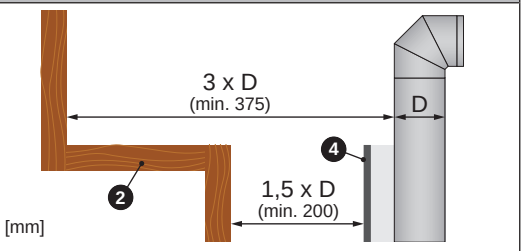
Local regulations and other statutory regulations are also applicable.

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

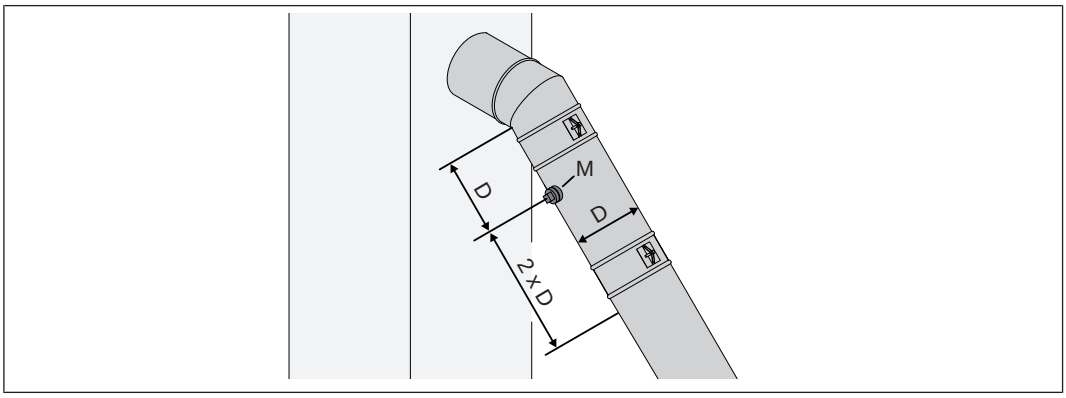
Minimum distance from flammable materials as per EN 15287-1 and EN 15287-2:

- 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. A draught limiter must be installed if the maximum permissible feed pressure as given in the boiler data for planning the flue gas system is exceeded.

NOTICE! Install the draught limiter directly under the mouth of the flue line, as the pressure is constantly low at this point.

3.5 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:

- ❒ Aim for a pH value of 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
- ❒ 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 make-up water, always bleed the filling hose before connecting, in order to prevent air from entering the system
- ❒ The heating water must be clear and free from substances that lead to sediments.
- ❒ With regard to corrosion protection, the use of fully demineralised filling and make-up water with an electrical conductivity of up to 100 µS/cm is recommended in accordance with EN 14868

Advantages of low-salt or fully demineralised water:

- Complies with the applicable 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

Filling and make-up water as well as heating water in accordance with VDI 2035:

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
- Yearly. Values must be recorded by the owner

3.6 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**.

3.7 Storage tank

NOTICE

In principle it is not necessary to use a storage tank for the system to run smoothly. However we recommend that you use the system with a storage tank, as this ensures a continuous supply of fuel in the ideal output range of the boiler.

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

Additional requirements for Switzerland in accordance with LRV Appendix 3, section 523

Automatic boilers with a rated thermal output ≤ 500 kW must be equipped with a heat accumulator of a volume of at least 25 litres per kW rated thermal output.

3.8 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.

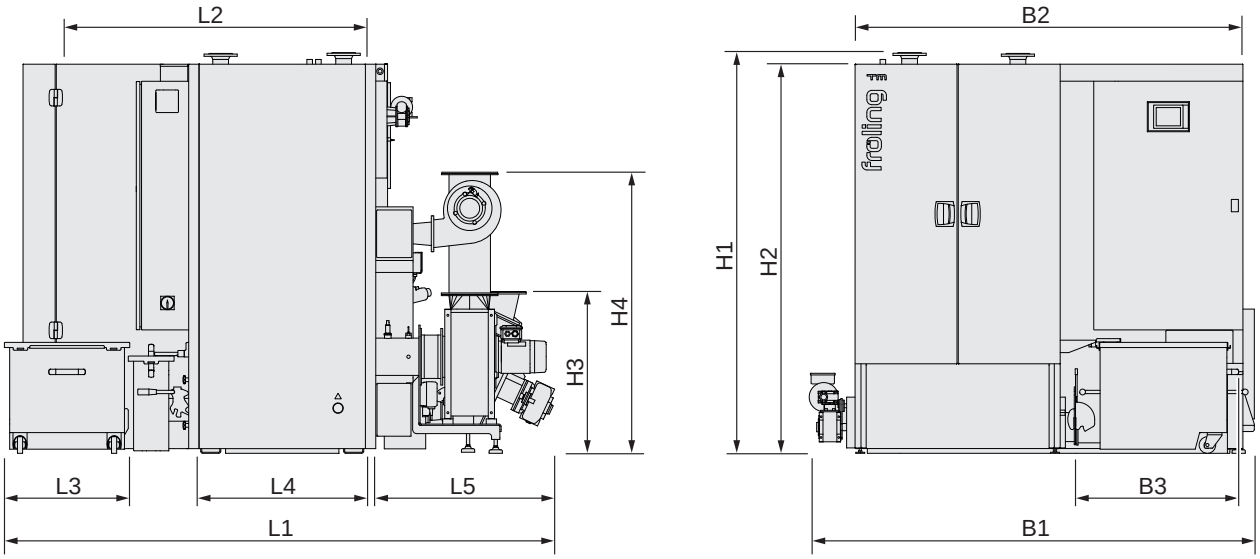
Take the following precautions:

❒ 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).

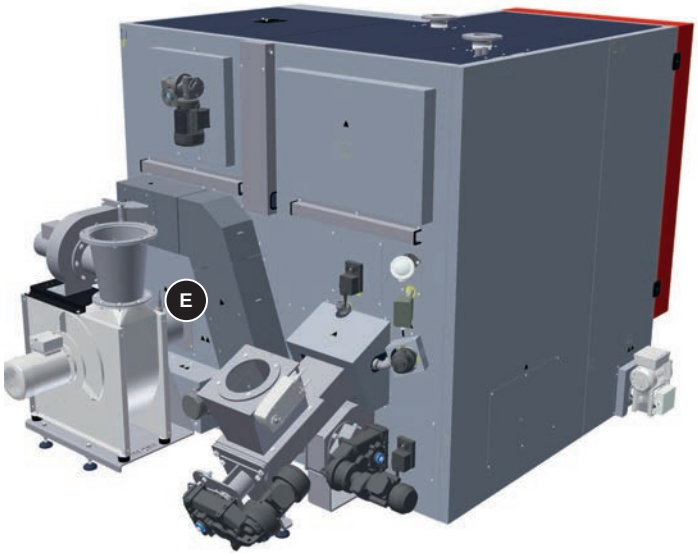
4 Technology

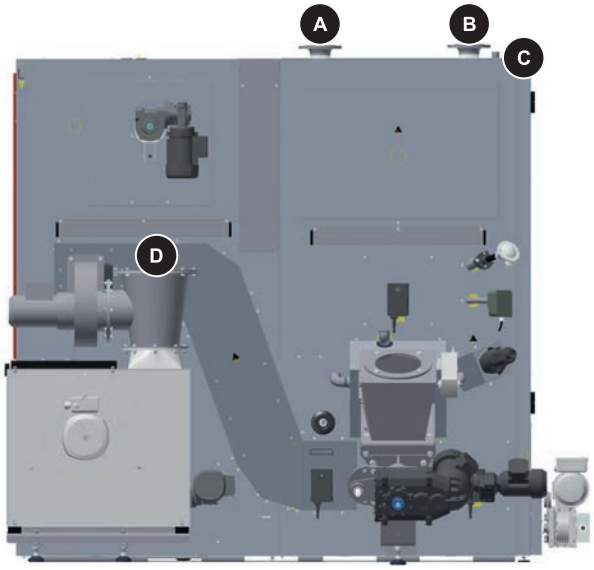
4.1 Dimensions



Dimension	Description	Unit	TM 150	TM 200	TM 250
H1	Height, flow/return connection	mm	1935	1935	1935
H2	Boiler height including insulation		1880	1880	1880
H3	Height of stoker including burn back protection system		790	850	850
H4	Height, flue gas pipe connection		1350	1320	1320
B1	Total width including fittings		2170	2180	2180
B2	Width, boiler including insulation		1870	1930	1930
B3	Width, ash container		870	870	870
L1	Total length including fittings		2630	2860	2860
L2	Length, combustion chamber excl. insulation		1720	1880	1880
L3	Length, ash container		600	600	600
L4	Length, heat exchanger excluding insulation		790	950	950
L5	Length, stoker unit		940	970	970
	Minimum room height		2370	2370	2370
	Minimum size of entrance (WxH)		1000x1950		

4.2 Components and connections





Item	Description	TM 150	TM 200	TM 250
A	Boiler return connection	DN65 / PN 6		
B	Boiler flow connection	DN65 / PN 6		
C	Safety heat exchanger connection	1/2“ IT		
D	Flue gas pipe connection	200 mm	250 mm	
E	Broadband probe connection	-		
	Flue gas temperature sensor connection	-		

4.3 Technical data

4.3.1 Turbomat 150-250

Name		TM 150	TM 200	TM 250
Rated heat output with wood chips	kW	150	199.94	250
Rated heat output with pellets		150	208	250
Heat output range with wood chips		45 – 150	59.98 – 199.94	75 – 250
Heat output range with pellets		45 – 150	62.4 - 208	75 – 250
Nominal fuel heating efficiency with wood chips		164	215	268
Nominal fuel heating efficiency with pellets		166	212	266
Quantity of fuel required at nominal load	kg/h	48	61	76
Electrical connection		400V / 50Hz / fuse protection C35A		
Total weight incl. fittings	kg	3300	3800	3800
Weight - combustion chamber		1300	1470	1470
Weight - heat exchanger		1,020	1320	1320
Heat exchanger water capacity	l	440	570	570
Water pressure drop (ΔT = 10 / 20 K)	mbar	36 / 12	55 / 18	74 / 25
Minimum boiler return temperature	°C	60		
Maximum permitted operating temperature		90		
Permitted operating pressure	bar	4		
Permitted fuel to EN ISO 17225 [1)]		Part 2: Wood pellets class A1 / D06 Part 4: Wood chips class A2 / P16S-P31S		
Airborne sound level	dB(A)	<70		
Test book number		PB 064	PB 0217	PB 218
Boiler class to EN 303-5:2012		5		

1. Detailed information on the fuel can be found in the operating instructions in the section entitled “Permitted fuels”

Regulation (EU) 2015/1189 – ηs in [%]			
Heating space annual rate of use ηs (wood chips)	≥ 77	81	81
Heating space annual rate of use ηs (pellets)	-	81	81

Additional data for regulation (EU) 2015/1189

Name		TM 150	TM 200	TM 250
Heating up mode		automatic		
Condensing boiler		No		
Solid fuel boiler for combined heat and power		No		
Combined heating system		No		
Storage tank volume		➲ "Storage tank" [▸ 14]		
Characteristics when operated exclusively with the preferred fuel				
Useful heat delivered at rated heat output (P_n)	kW	150	199.94	250
Useful heat delivered at 30% of rated heat output (P_p)		45	59.98	75
Fuel efficiency at rated heat output (η_n)	%	82.3	85.5	86.4
Fuel efficiency at 30% of rated heat output (η_p)		81.4	85.3	84.7
Auxiliary current consumption at rated heat output (el_{max})	kW	0.657	0.513	0.597
Auxiliary current consumption at 30% of rated heat output (η_p)		0.332	0.255	0.274
Auxiliary current consumption in standby mode (P_{SB})		0.028	0.026	0.026

Regulation (EU) 2015/1189 – emissions in [mg/m³][1)]	
Annual space heating emissions of dust (PM)	≤ 30
Annual space heating emissions of gaseous organic compounds (GOC)	≤ 20
Annual space heating emissions of carbon monoxide (CO)	≤ 380
Annual space heating emissions of nitrogen oxides (NO_x)	≤ 200

1. The emissions of dust, gaseous organic compounds, carbon monoxide and nitrogen oxides are stated in a standardised form based on dry flue gas with a oxygen content of 10 % and under standard conditions at 0°C and 1013 millibar

4.3.2 Boiler data for planning the flue gas system

Name		TM 150	TM 200	TM 250
Flue gas temperature at nominal load	°C	150		
Flue gas temperature at partial load		110		
CO_2- volume concentration at nominal load / partial load	%	8.3 / 8.3		
Flue gas volume/mass flow with wood chips W30, 9% O_2	m^3/h (kg/h)	495 (410)	660 (545)	825 (680)
Flue gas volume/mass flow with W8 wood pellets 9% O_2		420 (350)	560 (470)	700 (585)
Required feed pressure at outlet of induced draught housing at nominal load	Pa	5		
	mbar	0.05		
Required feed pressure at outlet of induced draught housing at partial load	Pa	2		
	mbar	0.02		
Maximum permissible feed pressure	Pa	50		
	mbar	0.5		
Flue gas pipe diameter	mm	200		

5 Installation

⚠ WARNING

Risk of falling when working at a height

Therefore:

❒ Implement appropriate measures in accordance with the applicable national industrial safety guidelines to protect against the risk of falling (e.g. ladders, platforms, etc.)

5.1 Transport

NOTICE

Possibility of damage to components if handled incorrectly

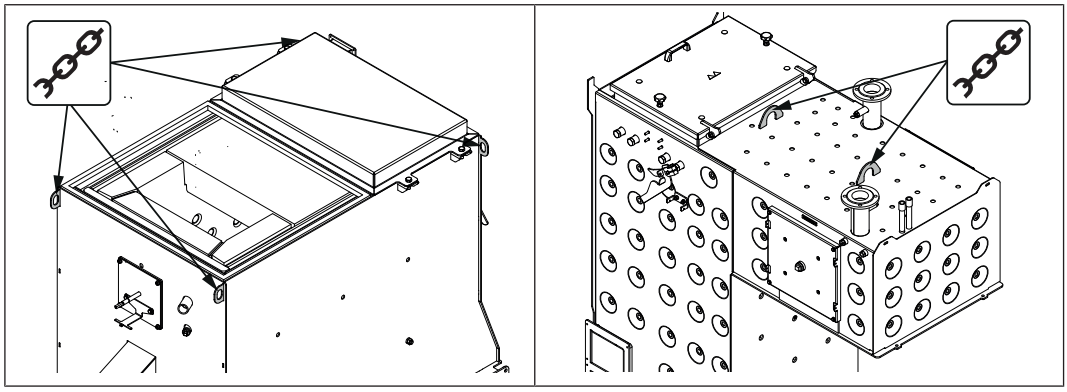
❒ Follow the transport instructions on the packaging

❒ Transport components with care to avoid damage

❒ Protect components against damp

❒ Unloading, positioning and installation should only be performed by trained professionals! Staff must be trained in techniques for moving heavy loads (correct tools and lifting equipment, hooking and slinging points, etc.)

5.2 Positioning



❒ Secure the slings or chains to the hooking point securely and position the boiler

5.3 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!

5.4 Setting up in the boiler room

5.4.1 Moving the boiler in the boiler room

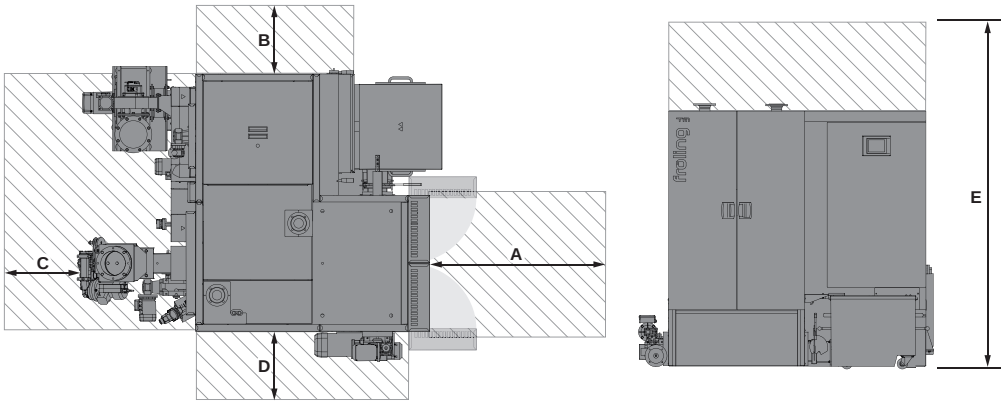
❒ Position a forklift or similar lifting device with a suitable load-bearing capacity at the base frame

❒ Lift and transport to the intended position in the installation room.

↳ Pay attention to 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	300 mm
C	400 mm
D	400 mm
E	2,370 mm

5.5 Installing the boiler

NOTICE

Reduction in performance due to air leakage

The use of flanges without sealing cords can result in a reduction in performance due to air leakage

Therefore:

❒ Sealing cords or the surface sealant provided must be used on all the flanged connections on the following components: loading; ash removal; pressure ducting; air ducts; combustion air fan; flue gas and flue gas return piping.

5.5.1 General information

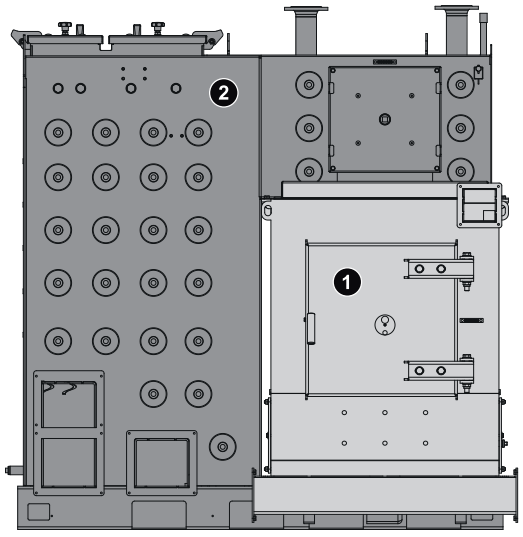
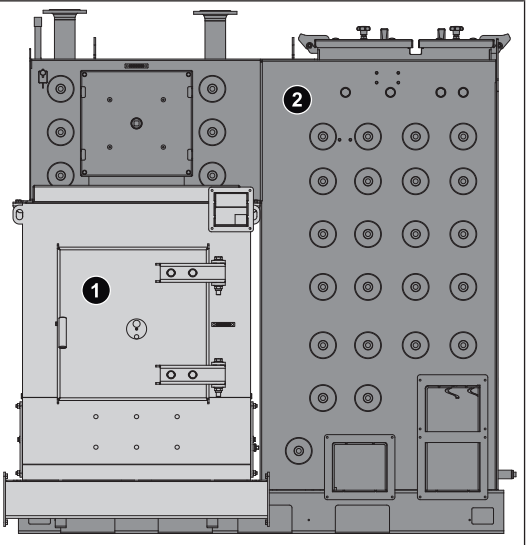
Front and back of boiler

The front of the boiler is its operating side. All of the operating controls for the combustion chamber door, ash can, control cabinet and other components are on the front of the unit.

The back of the boiler is opposite the front The stoker unit, EOS drive and complete flue gas system are on the back of the boiler.

Heat exchanger on the left or right

The heat exchanger of the Turbomat can be on the left or the right (when seen from the front, operator side) of the combustion chamber. Before you start installation, check if the heat exchanger is to be installed on the left or the right. In some cases this is already indicated on the layout drawing.

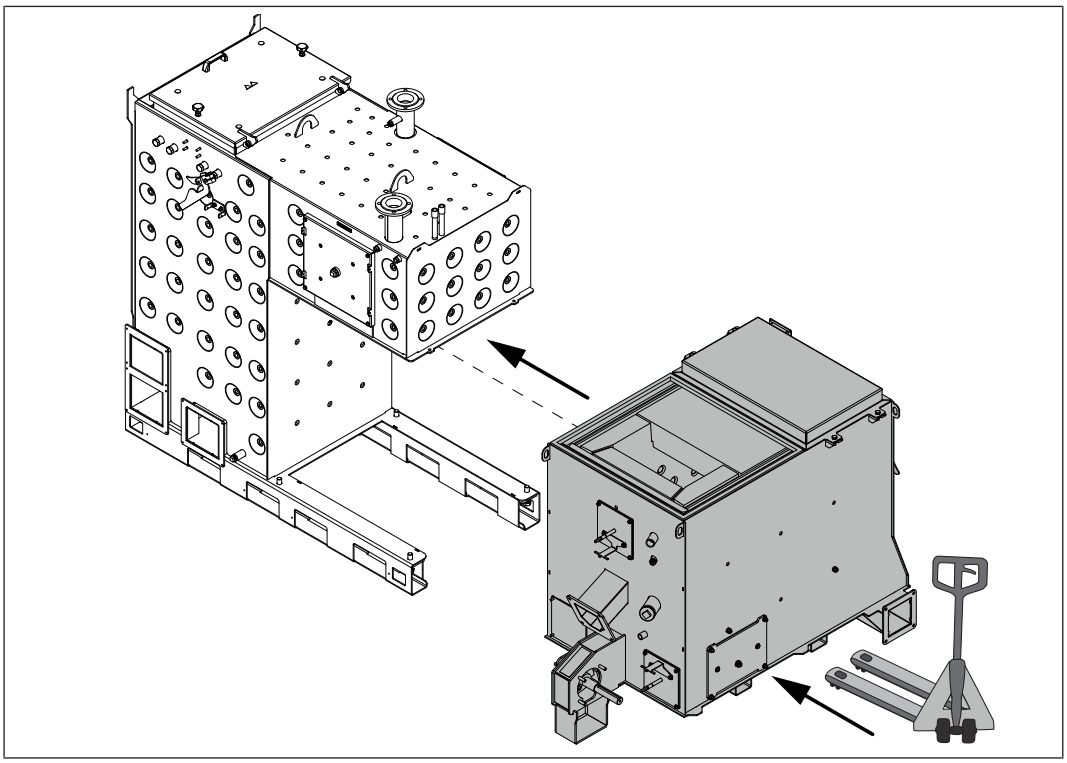
Version: Heat exchanger left	Version: Heat exchanger right
	

1	Combustion chamber	**2**	Heat exchanger

NOTICE! The figures below show the instructions for installing a heat exchanger to the right of the combustion chamber. If the heat exchanger is to be installed to the left, the steps should be carried out in the same way but on the other side.

5.5.2 Bolting together the combustion chamber and heat exchanger

Positioning the combustion chamber

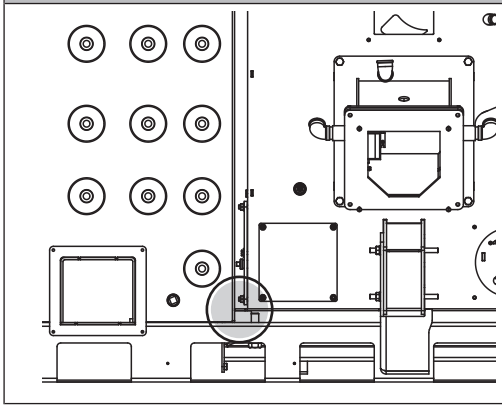
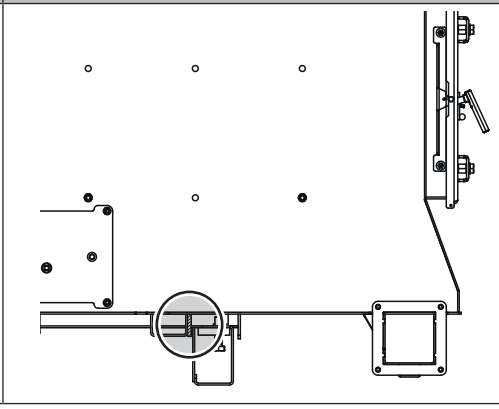


❒ Position the fork-lift under the combustion chamber from the side. Raise the combustion chamber just enough so that it can be positioned in the the heat exchanger without colliding.

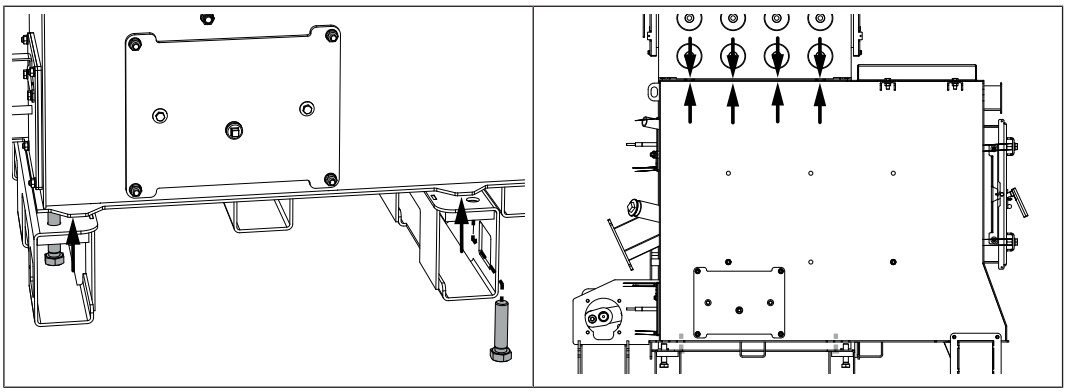
❒ Push the combustion chamber fully home into the side of the heat exchanger and then slowly lower it into position.

Aligning and fixing the combustion chamber

Align the combustion chamber before you fix it to the heat exchanger. Align it with the two referencing stops.

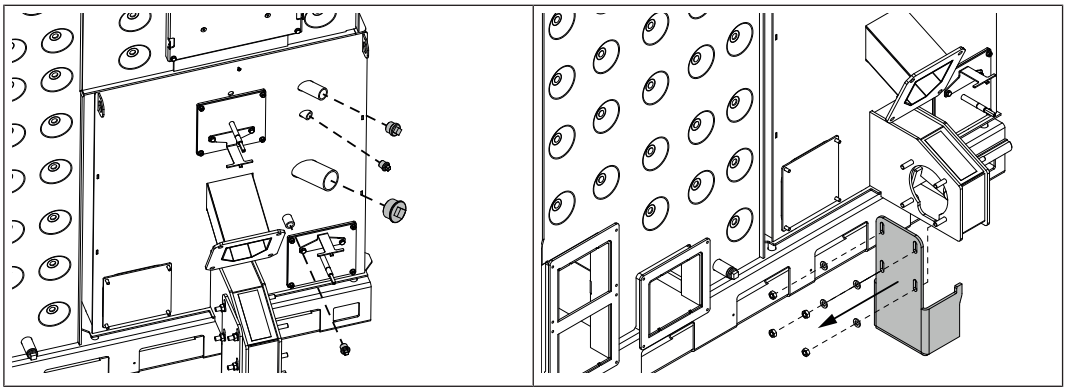
Referencing stop on the heat exchanger	Referencing stop on the base frame
	

After positioning the combustion chamber in the heat exchanger:



❒ Working through the openings in the base frame, insert and tighten the clamping screws until the combustion chamber is tight against the heat exchanger.

↳ Check that the combustion chamber is aligned flush with the heat exchanger and that the seal cord is lying evenly.



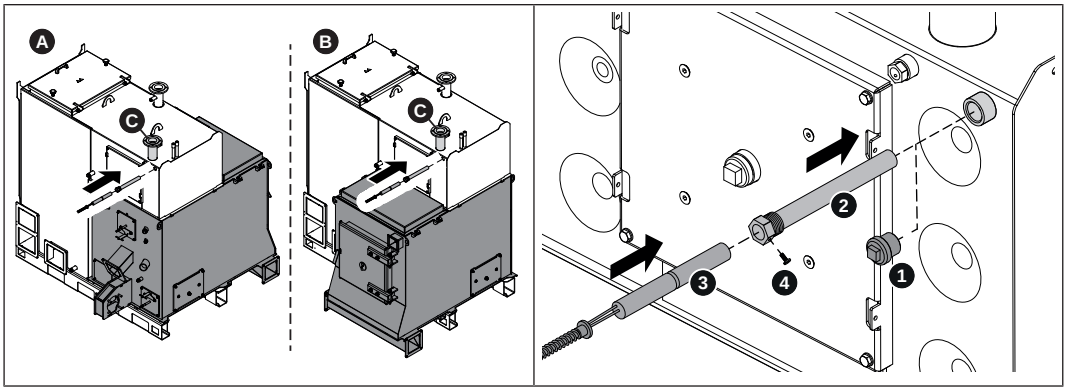
❒ On the back of the combustion chamber, remove the blanking plugs for combustion chamber overpressure sensor, the combustion chamber temperature sensor, the automatic ignition and the underpressure controller.

❒ On the back of the combustion chamber, remove the support.

5.5.3 Fitting the thermal discharge safety sensor

The sleeve for the thermal discharge safety device sensor is located in the following position, depending on the version:

- **Heat exchanger right (A):** Back of the boiler next to the flow connection (C)
- **Heat exchanger left (B):** Front of the boiler next to the flow connection (C)

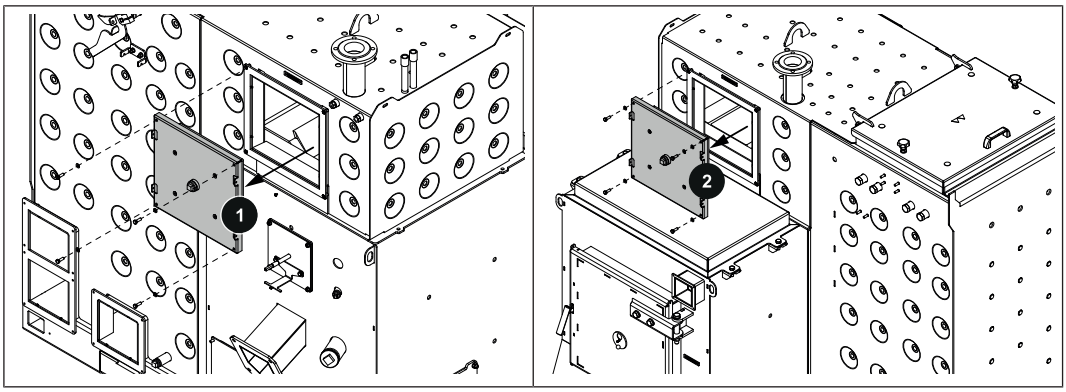


❒ Remove the blanking plug (1) from the right sleeve of the heat exchanger and instead screw in the immersion sleeve (2) so that it is tight.

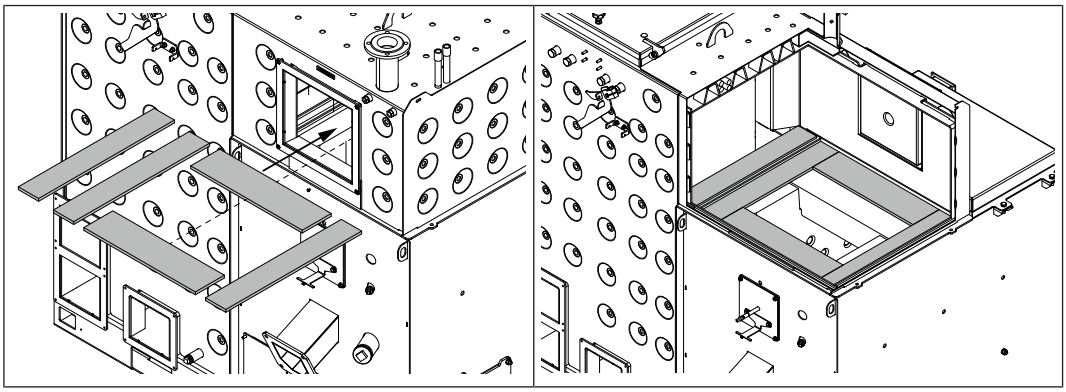
❒ Push the thermal discharge safety sensor (3) into the immersion sleeve (2).

❒ Push the protective tube over the thermal discharge safety sensor and then slightly tighten the fixing screw (4).

5.5.4 Installing the combustion chamber firebricks

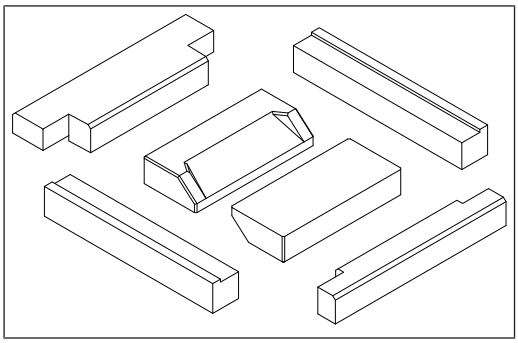


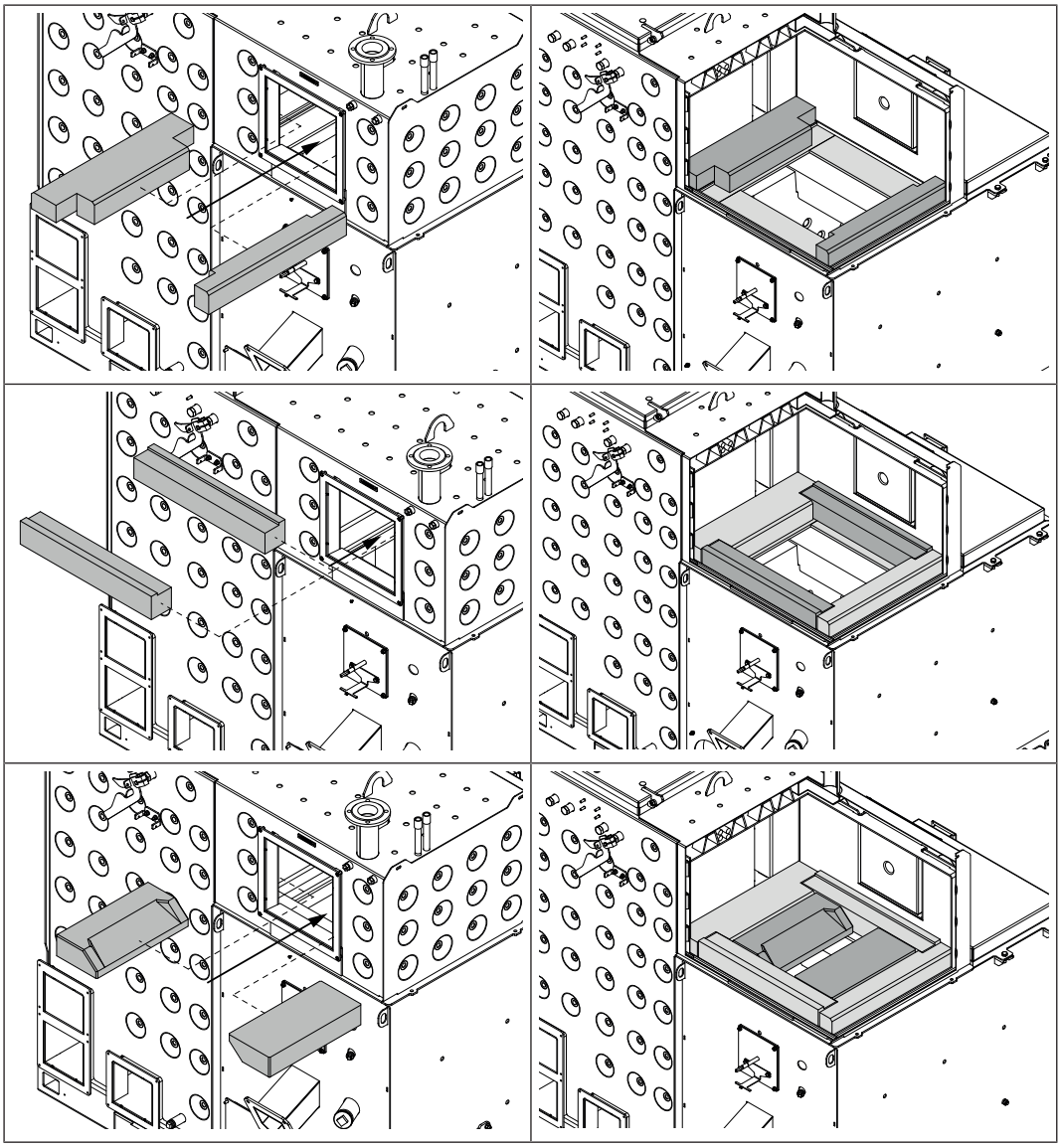
❒ Remove the front cover (1) and the back cover (2) from the heat exchanger.



❒ Pass the ceramic fibre mats through the opening in the heat exchanger and lay them in the combustion chamber as shown in the figure.

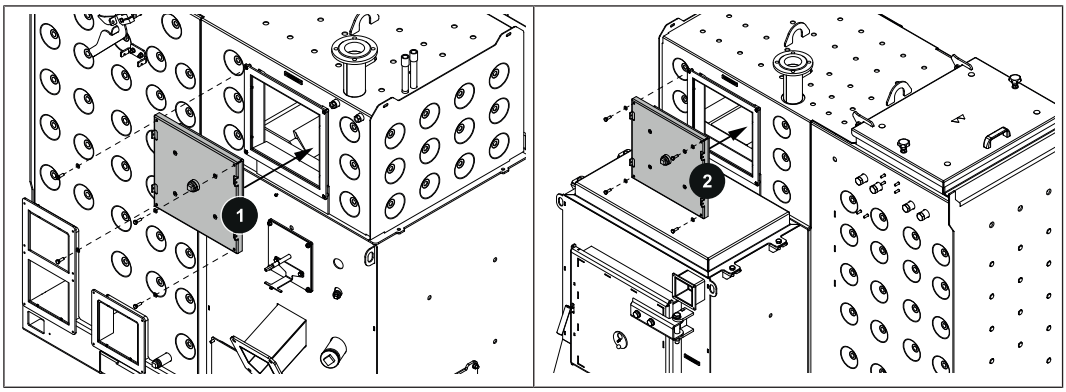
↳ Ensure that you lay two mats alongside each other on the heat exchanger side.



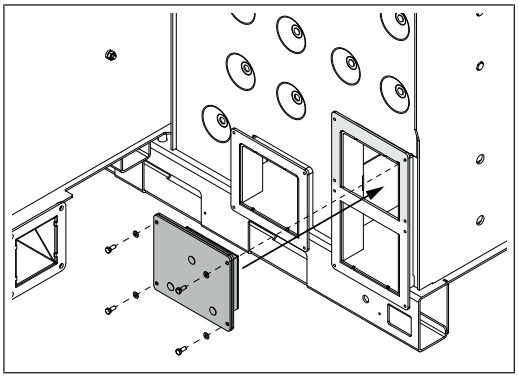


❒ Pass the firebricks through the opening in the heat exchanger and lay them on the ceramic fibre mats as shown in the figure.

↳ Tip: Positioning the firebricks is easier with two people standing on the opposite sides of the chamber.



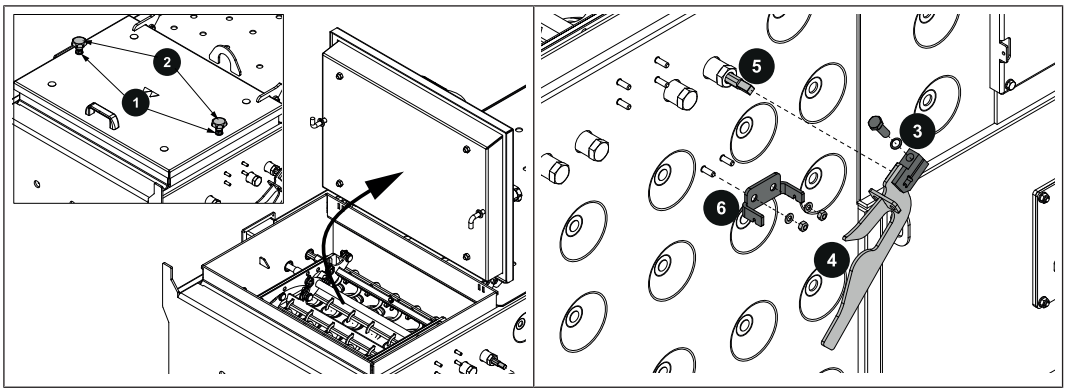
❒ Refit the front cover (1) and the back cover (2) to the heat exchanger.



❒ Fit the blanking cover to the air duct channel on the front of the heat exchanger.

5.5.5 Changing over the WOS rods (where necessary)

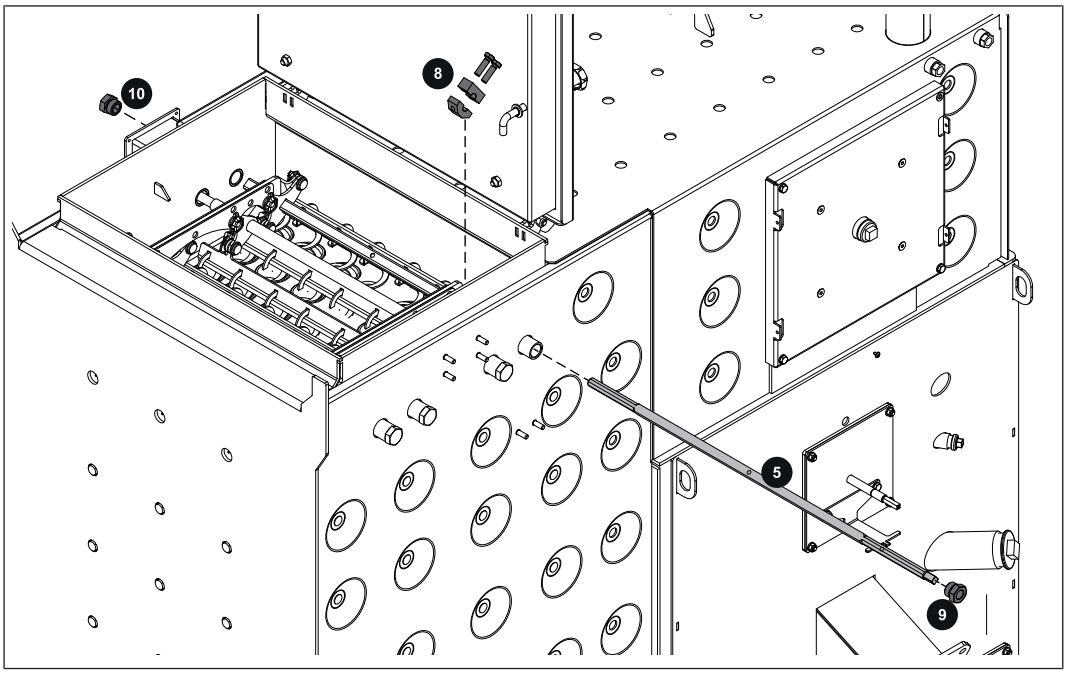
The EOS drive is always fitted to the back of the boiler opposite the control cabinet. If the heat exchanger is installed on the left it will be necessary to change over the EOS rods as follows.



❒ Lock the lock nuts (1) on the knobs (2). Turn the knobs (2) clockwise until they stop and then open the heat exchanger cover.

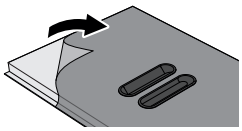
❒ Lock the clamping pad (3) on the EOS lever (4) and pull it out of the EOS shaft (5).

❒ Remove the clamping bracket (6) and fit it on the opposite side.

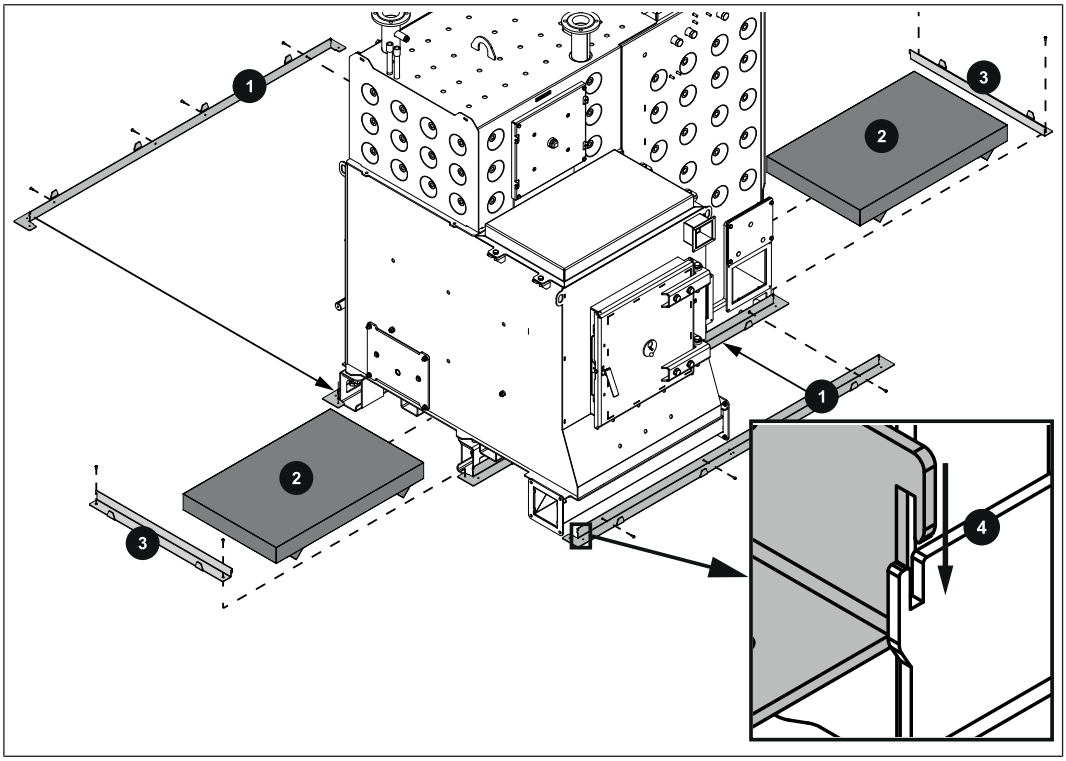


- ❒ Remove the clamping pad (8) from the EOS shaft
- ❒ Unscrew the bearing bush (9) on the shaft.
- ❒ Remove the blanking plug (10) from the opposite side.
- ❒ Insert the EOS shaft (5) on the opposite side and push it through
- ❒ Refit the bearing bush (9) and blanking plug (10) that you removed previously on the opposite side.
- ❒ Attach the EOS shaft (5) and clamping pad (8) to the side of the bearing bush (9)

5.5.6 Fitting the insulation base frame



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

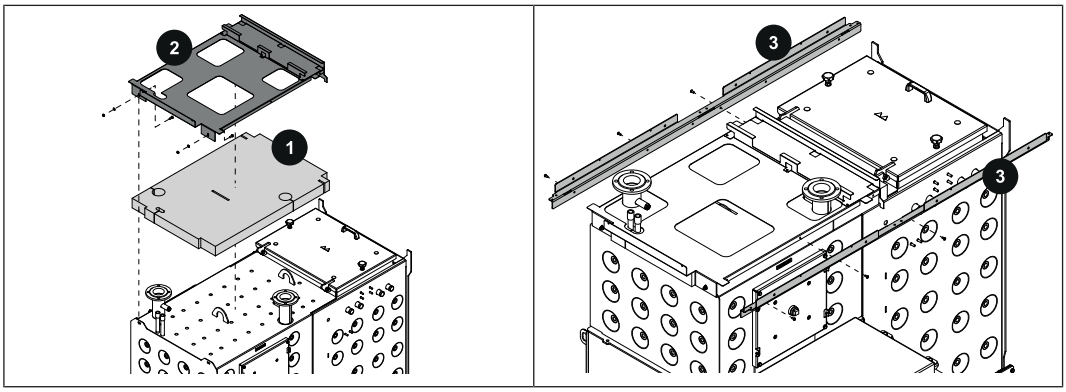


❒ Fit the cross-piece (1) of the lower base frame to the boiler.

❒ Slide a piece of floor insulation (2) under the combustion chamber and another piece under the heat exchanger.

❒ Fit the lengthways strut (3) to the cross-pieces (1).

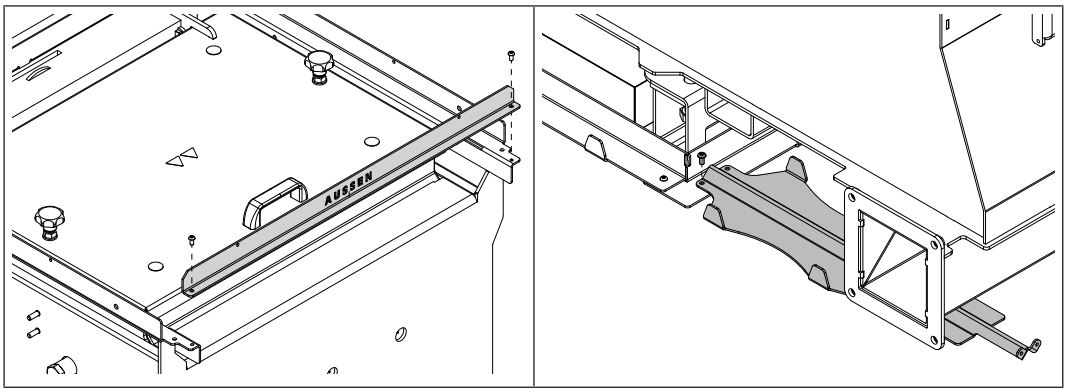
↳ Ensure that the lugs on the cross-pieces and lengthways struts slot into each other correctly (4).



❒ Position the heat insulation mat (1).

❒ Position the cable duct (2) on top and fix it to the heat exchanger.

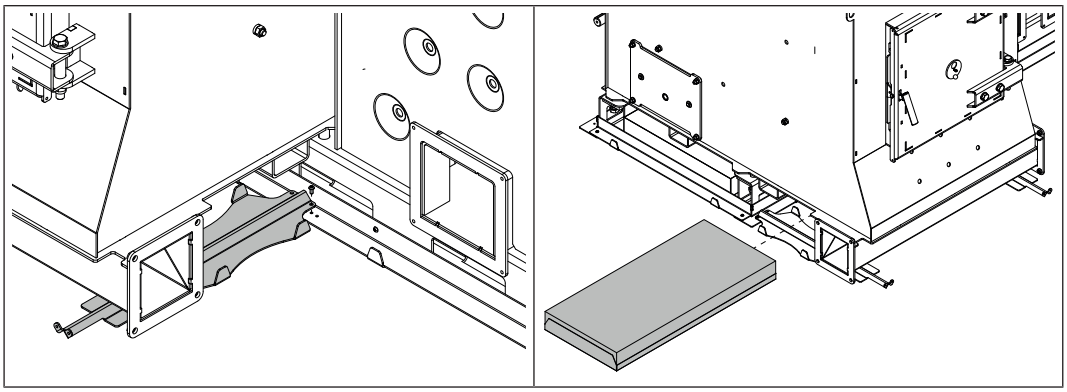
❒ Fit the cross-piece (3) of the upper base frame to the cable duct (2).



❒ Fit the upper right hand part of the lengthways strut to the cross-pieces.

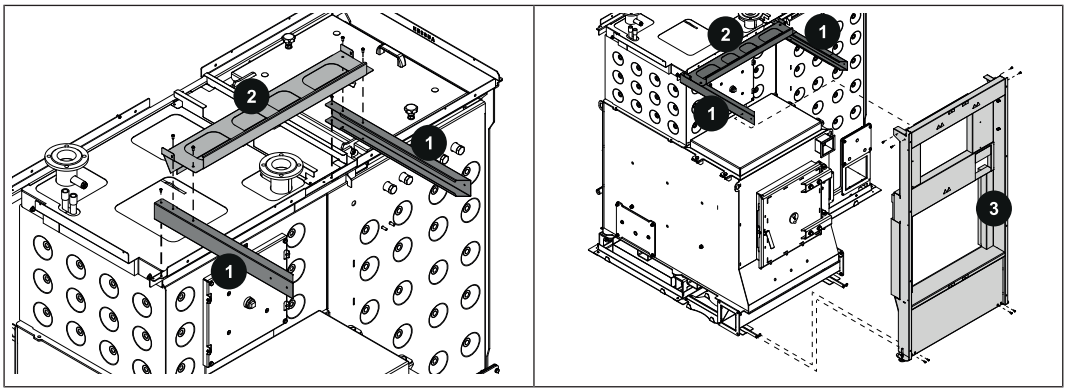
↳ Ensure that the punched marking “OUTSIDE” is legible when seen from the right.

❒ Push the bracket under the heat exchanger on the left and fix in place with the cross-piece.



❒ Push the bracket under the heat exchanger on the right and fix in place with the cross-piece.

❒ Push the floor insulation into the front area under the heat exchanger.

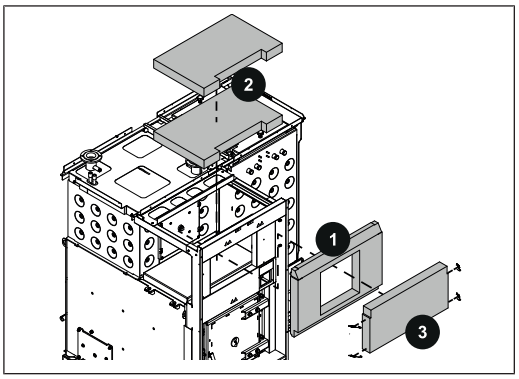


❒ Fit the front lengthways strut (1) to the cable duct on the heat exchanger.

❒ Fit the cable duct (2) to the front lengthways struts (1).

❒ Fit the frame component (3) for the insulation door at the top to the front lengthways strut (1) and at the bottom to the brackets.

❒ Align the frame component (3) with the adjustable feet.



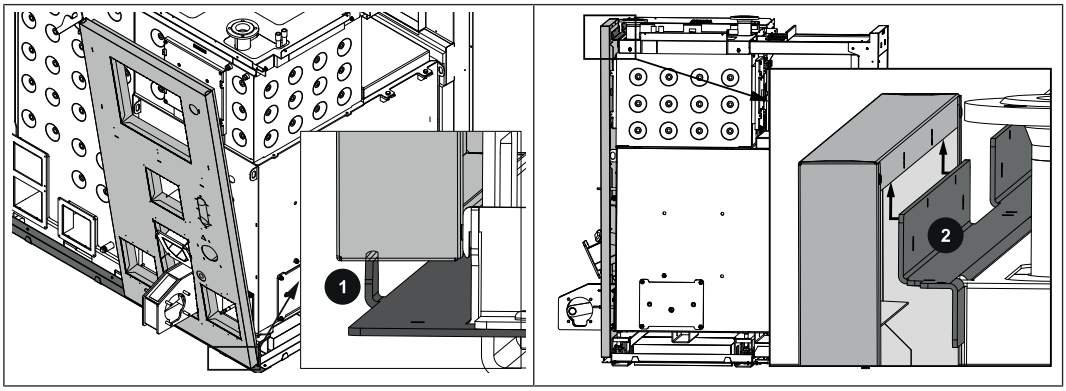
❒ Attach the heat insulation mat with the cut-out (1) to the heat exchanger door.

❒ Position two sections of heat insulation mat (2) on top of the combustion chamber.

❒ Position the heat insulation mat (3) on the front of the heat exchanger door and fix in place with spring clips.

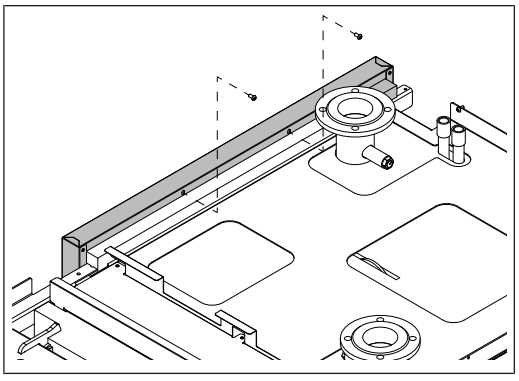
5.5.7 Fitting the insulating side panels

Fit the insulation side panels to the combustion chamber as follows:



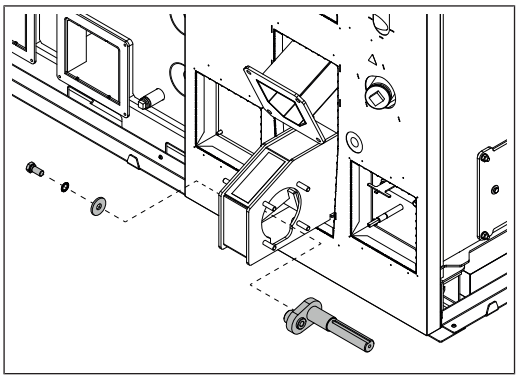
❒ Hang the insulation side panel at the bottom at the bracket (1) of the base frame.

❒ Hang the insulation side panel at the top at the bracket (2) of the base frame.

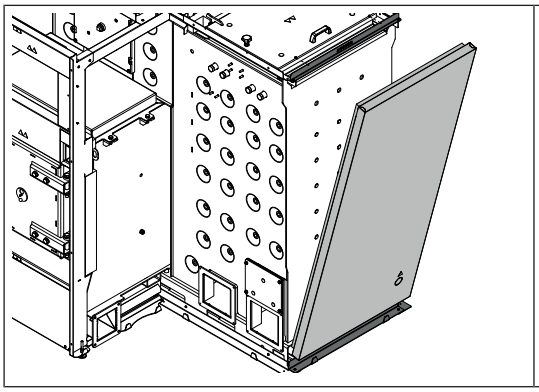


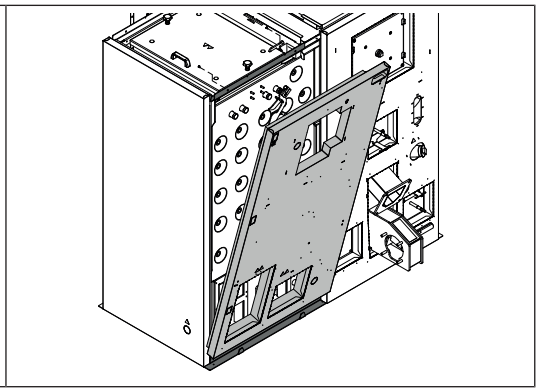
❒ Fix the insulation side panel at the top to the base frame with two screws.

NOTICE! Fit all the other side panels in the same way.



❒ Fit the crank shaft of the moving grate on the heat exchanger side used.

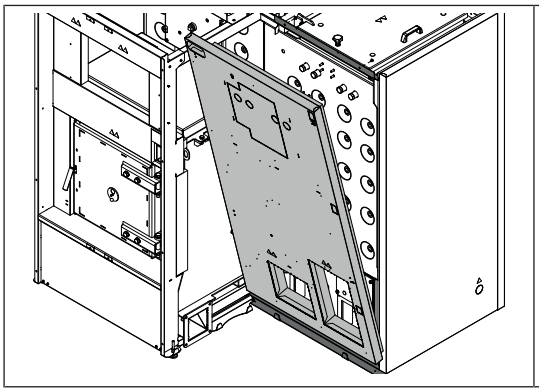


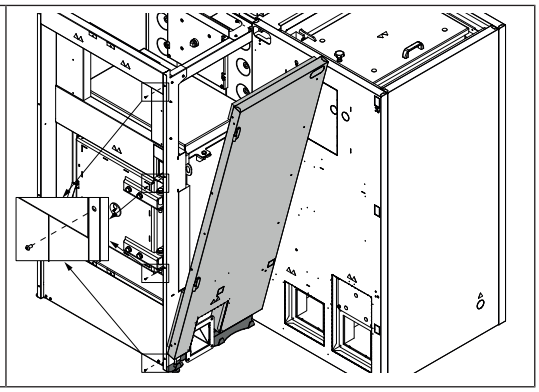


❒ Fit the insulation side panel to the right-hand side of the heat exchanger.

❒ Fit the insulation side panel to the back of the heat exchanger.

↳ Remove the pre-punched cut-out for the WOS from the insulation side panel.

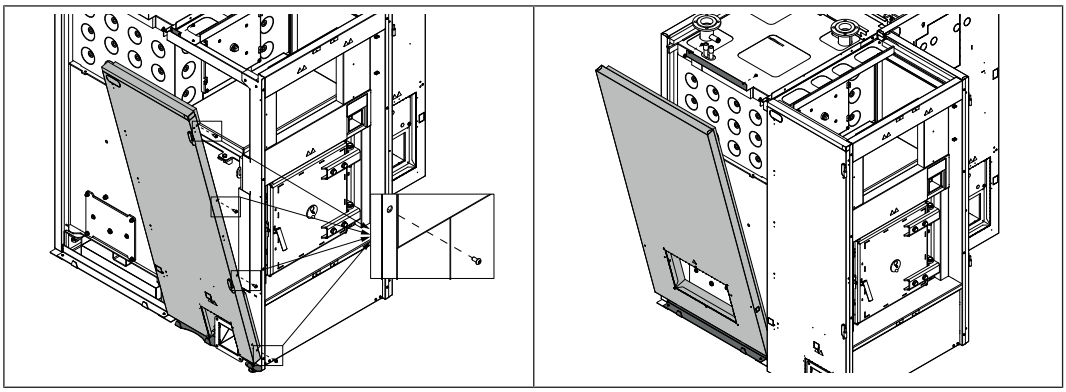




❒ Fit the insulation side panel to the front of the heat exchanger.

❒ Fit the insulation side panel to the right-hand side of the combustion chamber.

↳ Fix it to base frame at the frame with four screws.



❒ Fit the insulation side panel to the front, left hand side of the combustion chamber.

↳ Fix it to base frame at the frame with four screws.

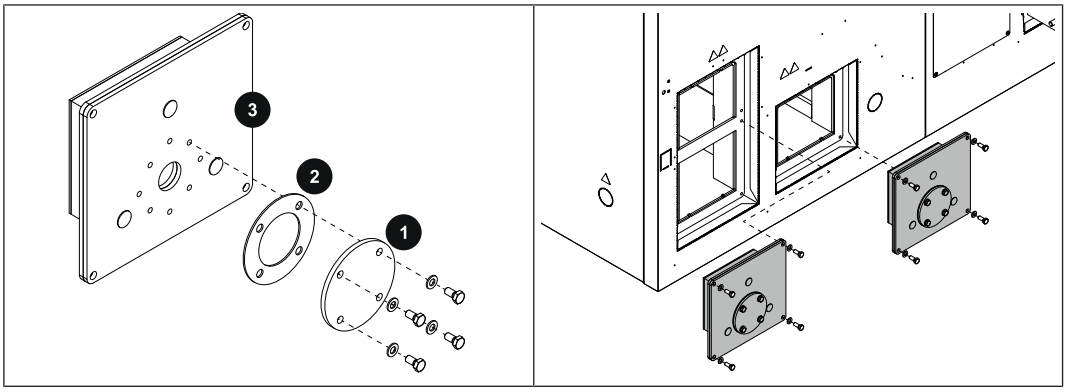
❒ Fit the insulation side panel to the back, left hand side of the combustion chamber.

❒ When you have finished fitting all the side panels, check that they fit correctly.

↳ Check that the insulation side panels are flush and check that there are no gaps between the insulation side panels.

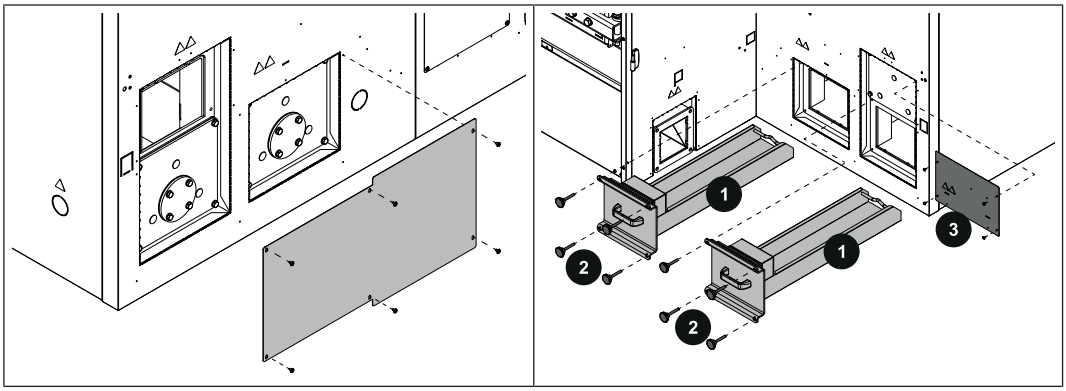
↳ If necessary, slightly loosen the fixing the panels to the base frame, adjust and align the insulation side panels and then re-tighten the screws.

5.5.8 Fitting the ash cans to the heat exchanger ash removal unit



❒ Fit the blanking plate (1) complete with the seal gasket (2) to the flange plate (3).

❒ Fit both flange plates to the back of the heat exchanger.

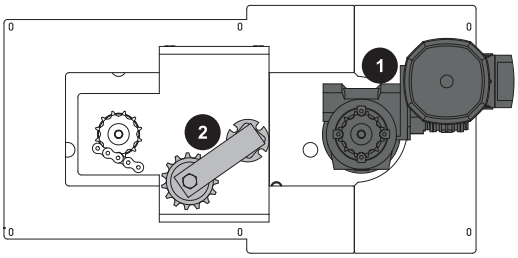
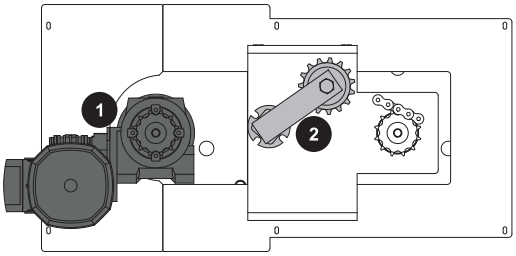


❒ Fitting the cover

❒ Push the ash cans (1) into the front of the heat exchanger and fix in place with the star-grip screws (2).

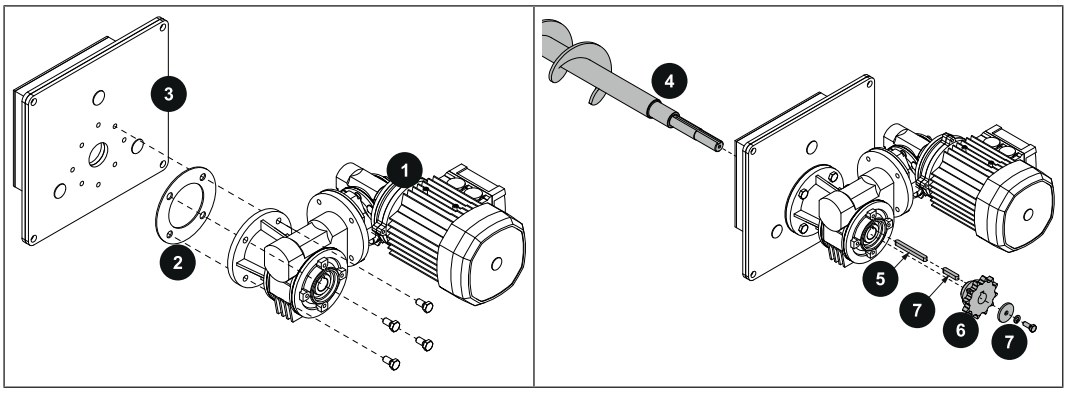
❒ Fit the cover (3) above the ashcan.

5.5.9 Fitting the heat exchanger ash removal unit with ash screw (optional)

Heat exchanger right	Heat exchanger left
	

The following instructions are for fitting the automatic heat exchanger ash removal screw unit to a boiler with the heat exchanger mounted on the right. The instructions also apply to boilers with the heat exchanger mounted on the left. It is important to note that the gear motor (1) must always be mounted on the combustion chamber side. This is to ensure that in the event of a roller chain fault ash removal will take place at the first pull. With the heat exchanger on the right, the chain tensioner (2) is at the bottom. With the heat exchanger on the left, the chain tensioner is at the top.

❒ Grease the shaft stub on both ash screws.



❒ Fit the gear motor (1) complete with the seal gasket (2) to the flange plate (3).

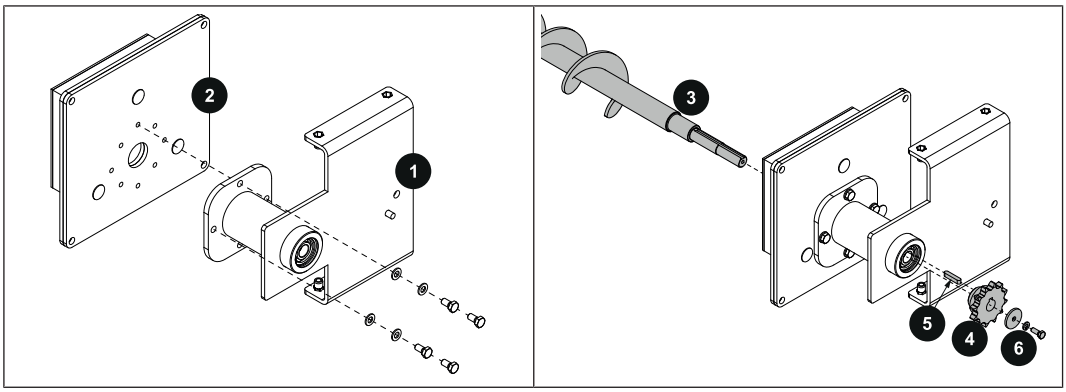
❒ Insert the ash screw (4) through the flange plate and into the gear motor.

↳ The key groove in the ash screw must be aligned with the key groove in the gear motor.

❒ Slide the motor key (5) into the groove.

❒ Fit the sprocket (6).

❒ Slide the sprocket key (7) into the groove and fit the shaft retainer (8).

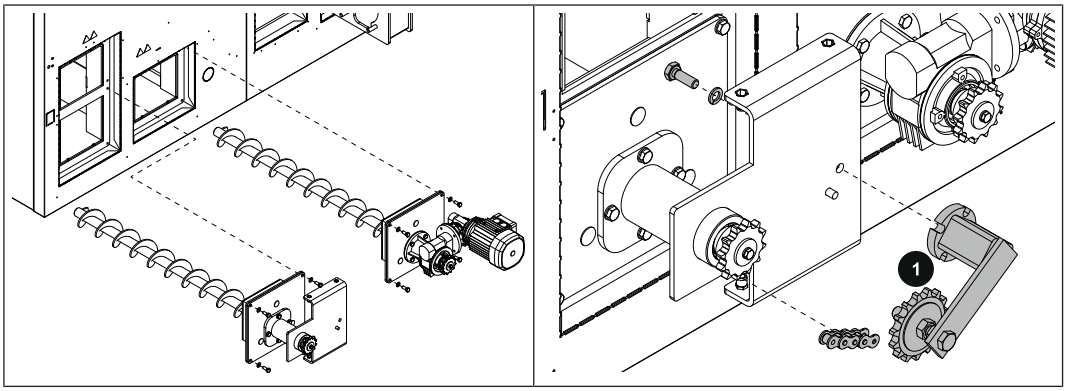


❒ Fit the bearing bracket (1) to the flange plate (2).

❒ Insert the ash screw (3) through the flange plate.

❒ Fit the sprocket (4).

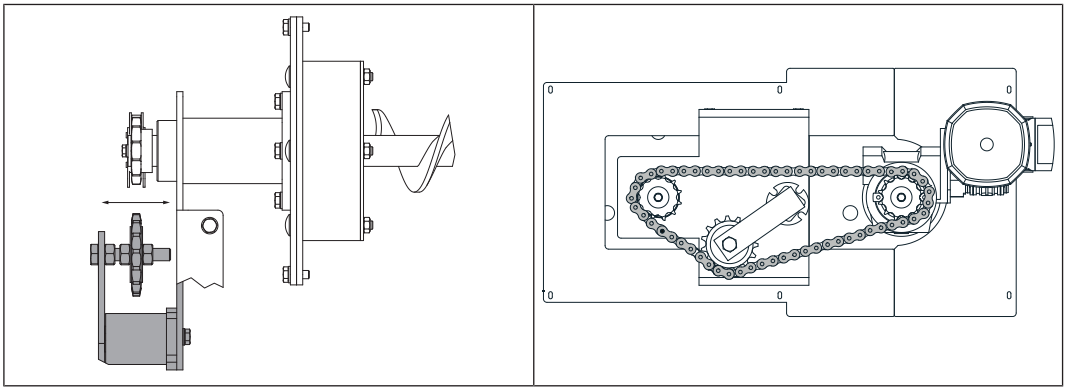
❒ Slide the key (5) into the groove and fit the shaft retainer (6).



❒ Push the flange plates with the ash screw into the back of the boiler as shown in the figure. Fix to the insulation side panel with screws.

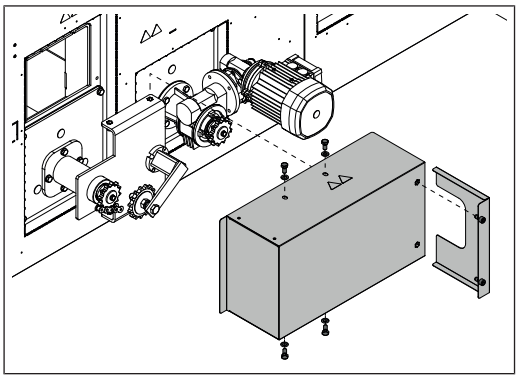
❒ Fit the chain tensioner (1) to the bearing block.

↳ Engage the chain tensioner (1) with the bolts on the bearing block so that the chain is tensioned correctly.



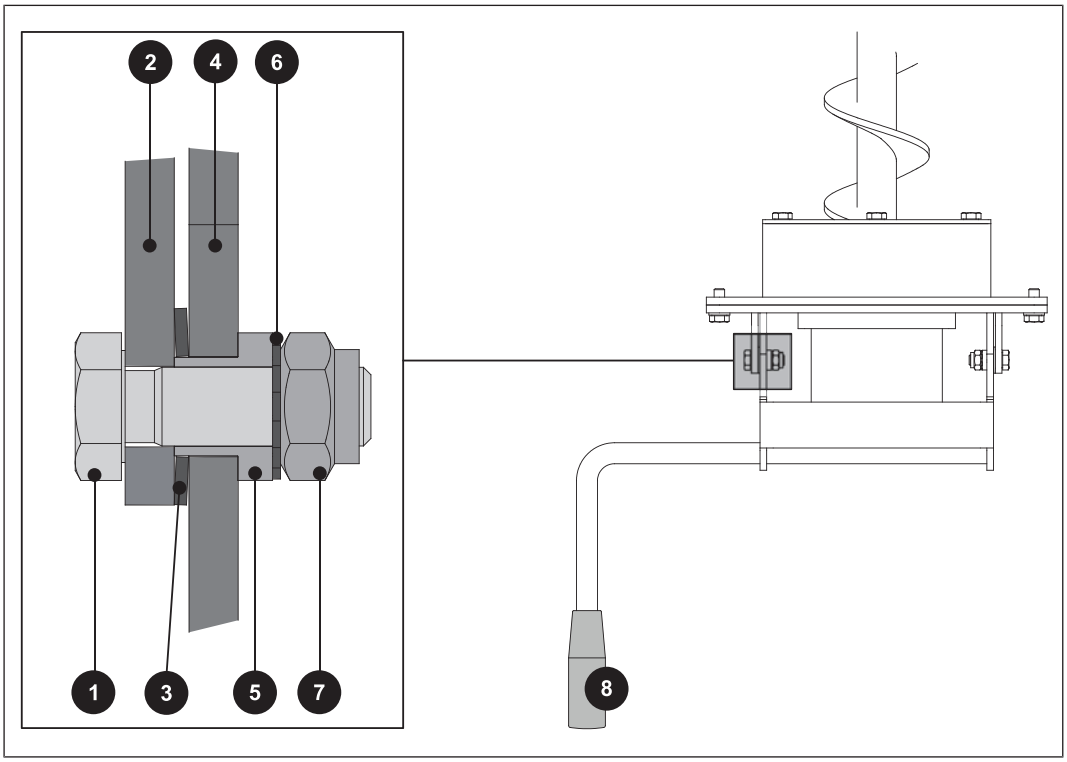
❒ Set the sprocket on the chain tensioner so that all the three sprockets are aligned with each other.

❒ Wind the roller chain onto the motor and bearing bracket sprockets. Tension the chain and fix in place with the spacer sleeve.

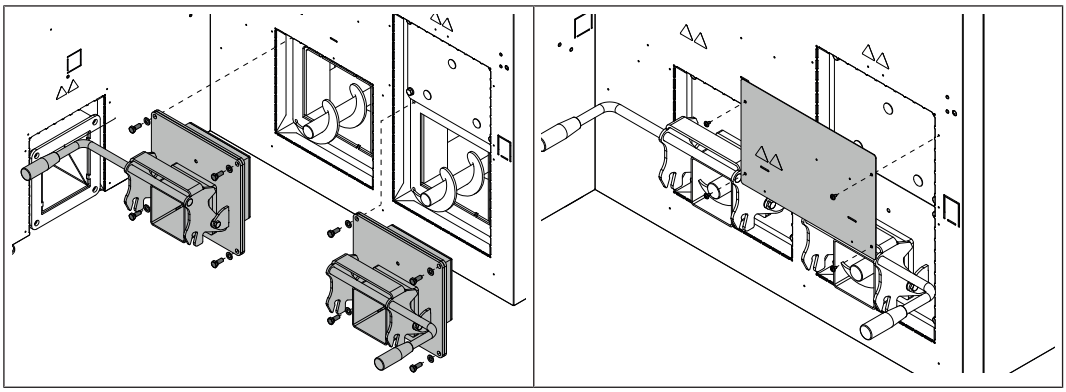


❒ Fitting the cover over the heat exchanger ash removal unit

❒ Assemble the ash removal unit flange as shown in the figure below:



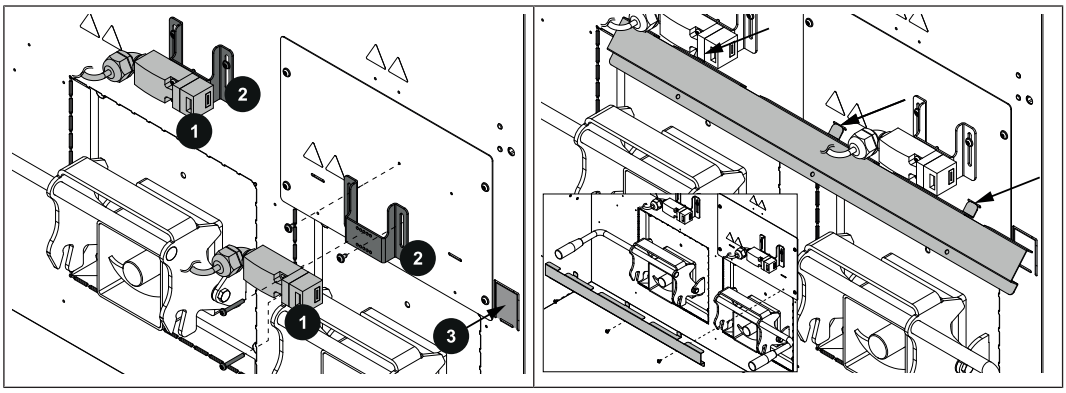
1	M8x25 hexagonal head screw	2	Ash removal flange
3	Spring washer	4	Locking lever
5	Bush	6	M8 toothed washer
7	M8 nut	8	Plastic grip



❒ Fitting the ash removal unit flange to the front of the boiler

↳ Position the flanges so that the levers on the locking mechanism face outwards.

❒ Fit the cover above the outer ash removal unit flange.



❒ Fit the safety switch (1) to the brackets (2).

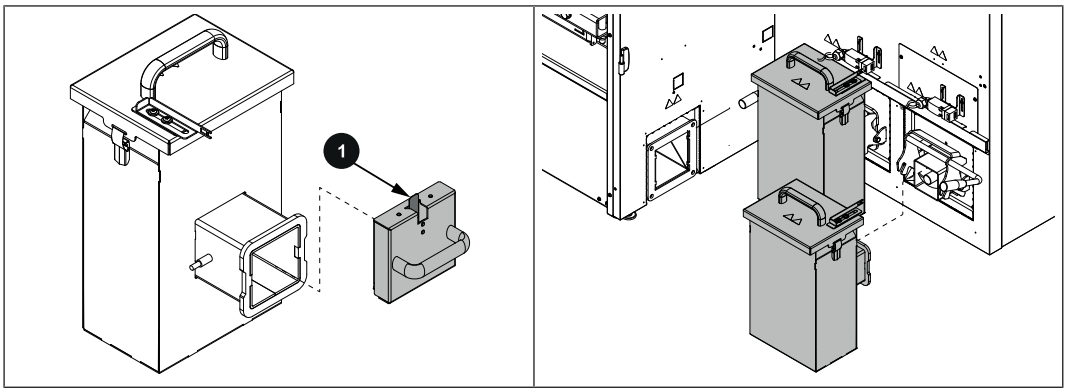
❒ Align and fit both safety switches (1) complete with brackets (2) to the insulation side panel.

↳ Do not fully tighten the screws yet

❒ Bend the clamp (3) over the insulation side panel. Lay the safety switch cable to the control cabinet.

❒ Fit the cable duct under the safety switch.

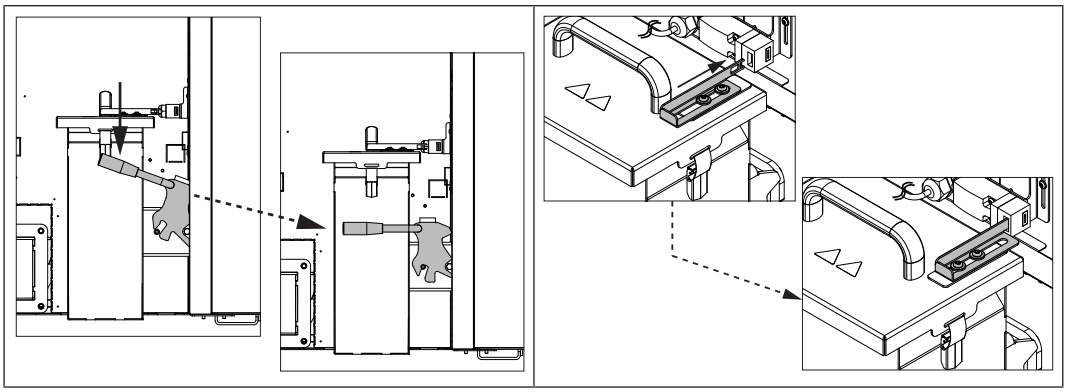
↳ Insert the clamps into the insulation. Fold the cable duct upwards and fasten with screws.



❒ Press the clamp (1) forwards and remove the cover plate of the ash cans.

↳ Store the cover plate in a suitable location where you can find it later. It will be needed when disposing of the ash.

❒ Position both ash cans on the ash removal unit flanges.



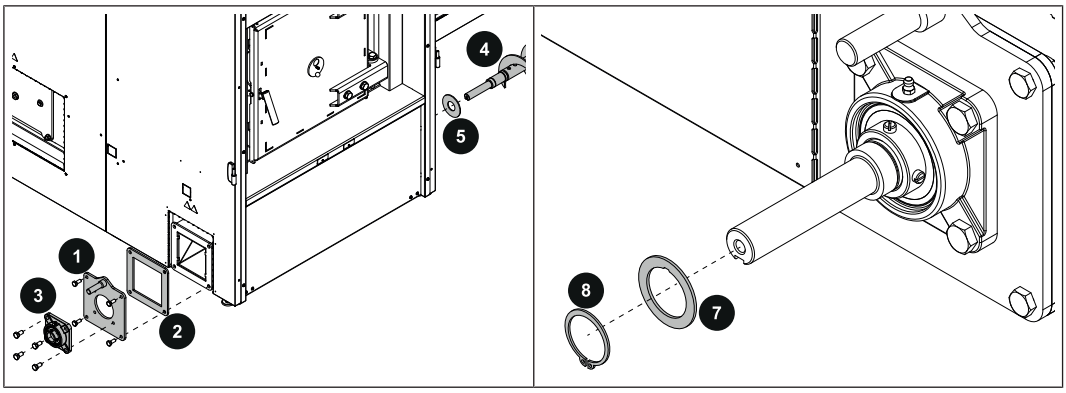
❒ Push the side lever on the ash removal flange downwards to fix the ash can in place.

❒ Push the key plate into the safety switch.

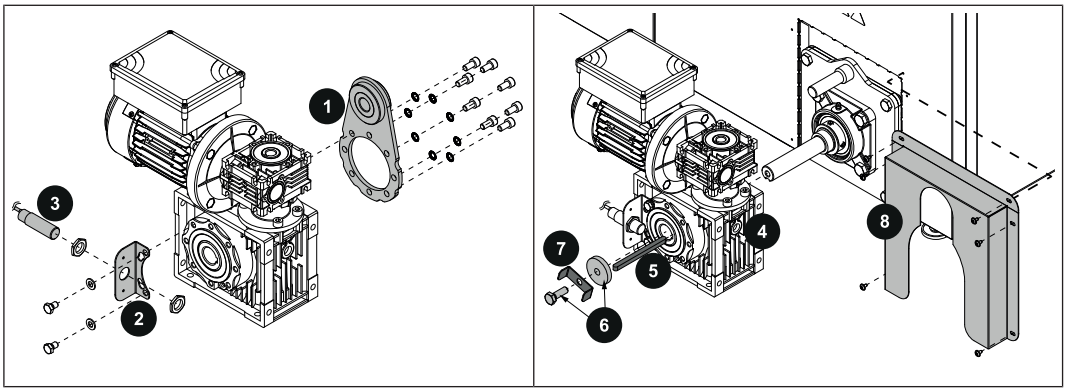
❒ Set the safety switch so that the key plate engages correctly.

❒ Tighten the safety switch screws.

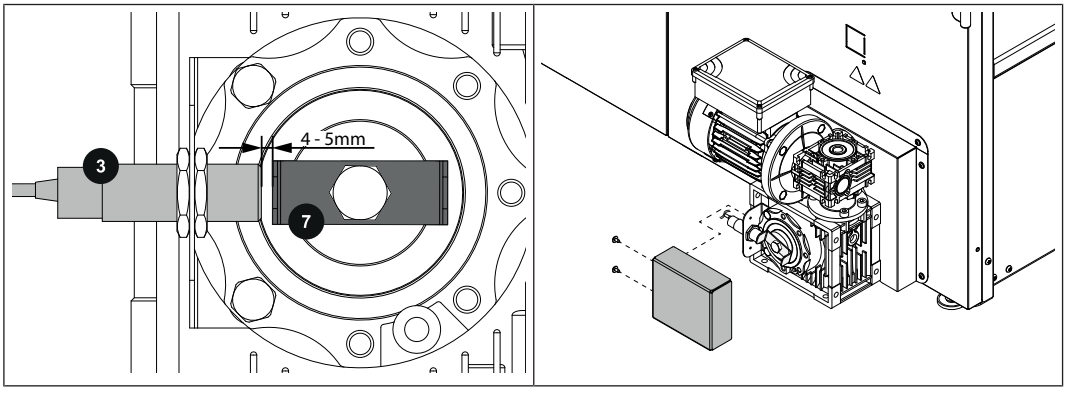
5.5.10 Fitting the combustion chamber ash removal unit



- ❒ Fit the flange plate (1) with the seal (2) and the flange bearing (3) to the combustion chamber on the opposite side of the heat exchanger
- ❒ Push the ash screw (4) with the seal washer (5) into the right hand side of the combustion chamber
- ❒ Fit the spacer (7) and the circlip (8) to the shaft stub



- ❒ Fit the torque support (1) and the sensor bracket (2) to the gear motor as shown in the figure
- ❒ Fix the proximity sensor (3) to the sensor bracket (2)
- ❒ Fit the gear motor (4) onto the shaft stub
  - ↳ Ensure that the key slot the shaft stub is aligned with the key slot in the geared motor
- ❒ Slide the key (5) into the groove
- ❒ First fit the shaft retainer washer (6) followed by the angle bracket (7) and then the screw for the shaft retainer (6)
- ❒ Fit the cover (8) to the insulation side panel



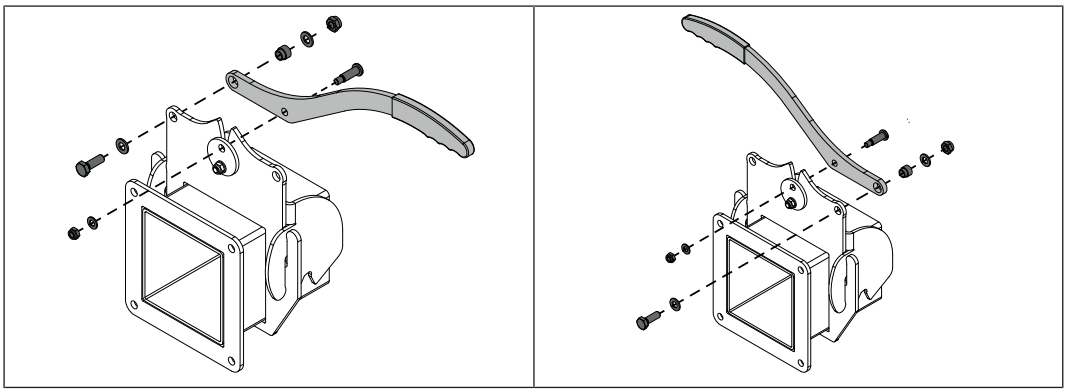
❒ Set the proximity sensor (3):

↳ Distance between sensor (3) and the angle bracket (7): 4 – 5mm

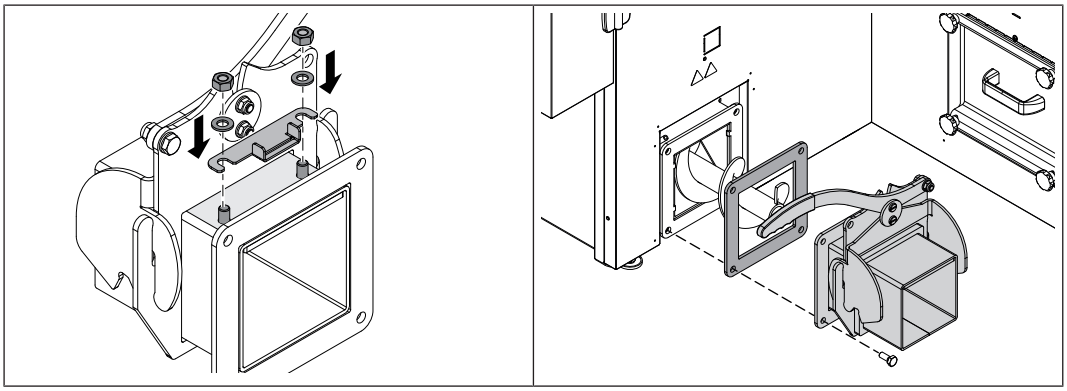
❒ Fitting the sensor cover on the sensor bracket

If the heat exchanger is mounted on the left, before you start assembly modify the ash removal flange as follows:

Version with heat exchanger on the left:

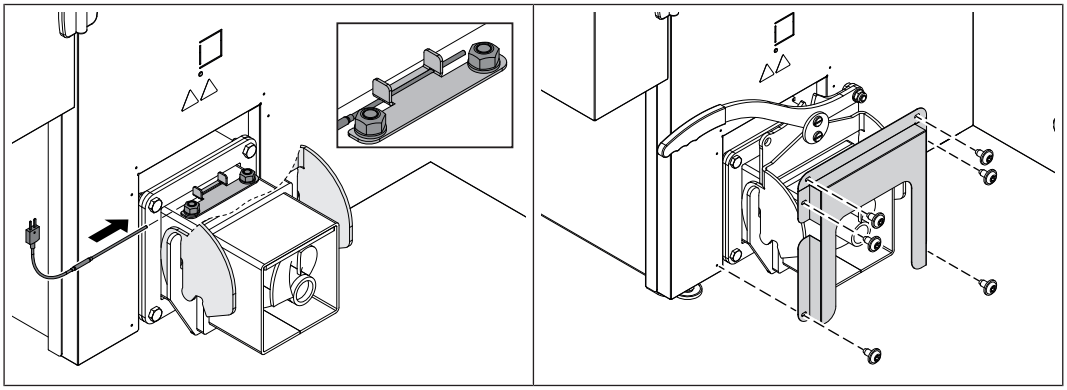


❒ Remove the lever from the ash removal flange, turn it over and then refit it



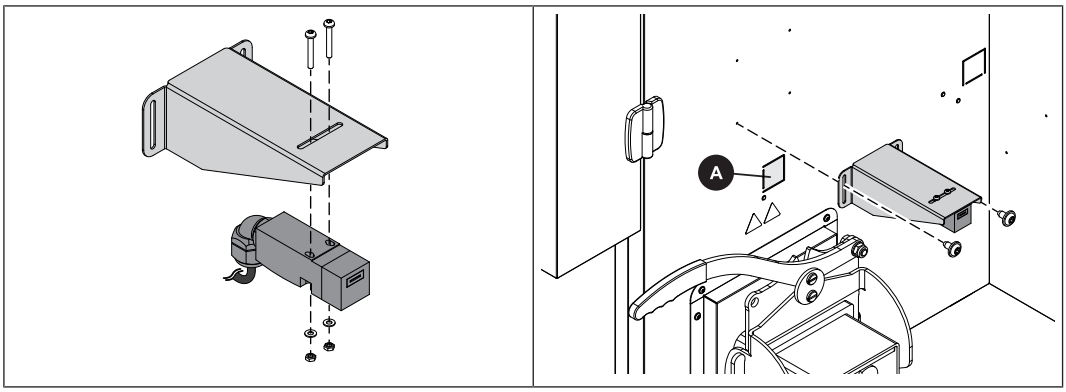
❒ Undo the screws on the ash removal flange and fit the clamping plate

❒ Fit the ash removal unit flange and seal on the right hand side of the combustion chamber



❒ Slide the sensors into the clamping plate

❒ Fit the cover on to the ash removal flange



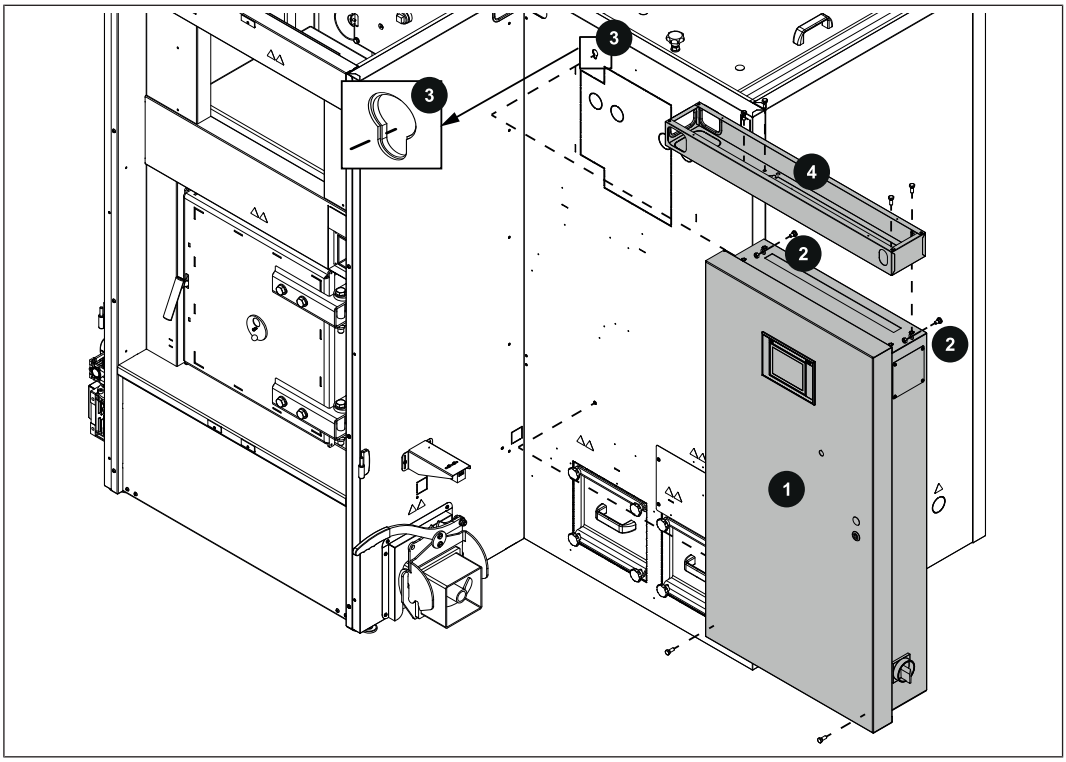
❒ Fit the safety limit switch on the bracket as shown

❒ Fit the bracket on the side panel above the ash removal flange

↳ Adjust the installation height of the ash container

❒ Run the temperature sensor cable and the safety limit switch via the cut-out (A) to the control cabinet

5.5.11 Fitting the control cabinet



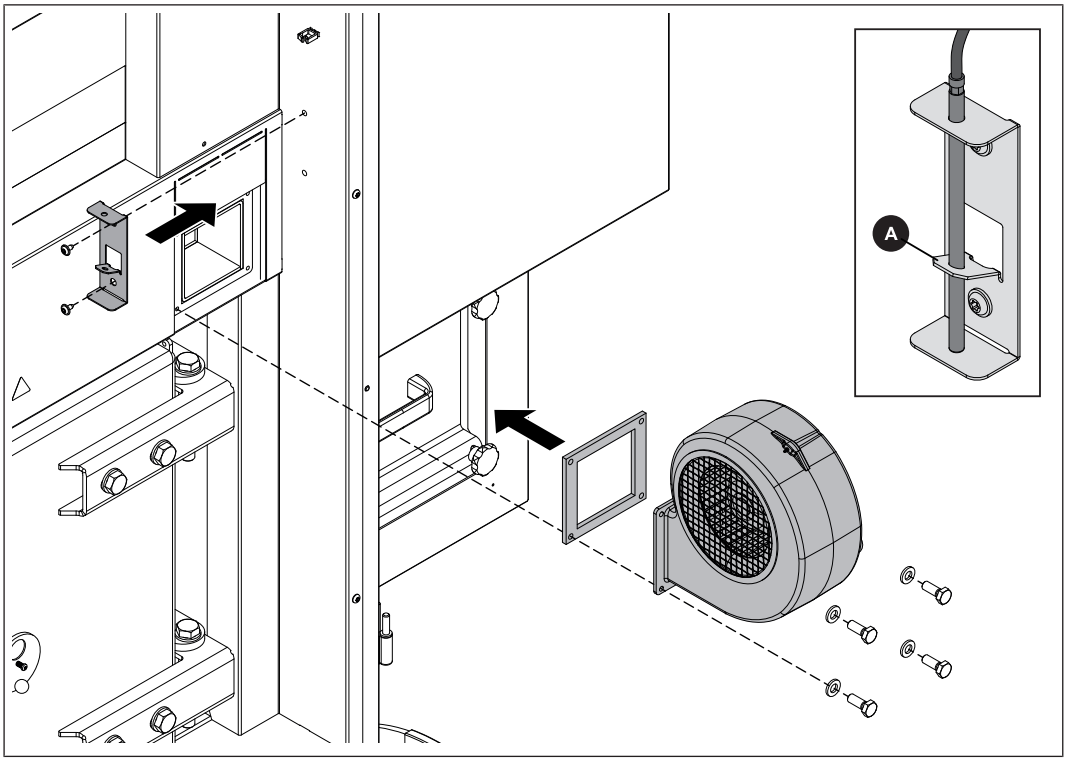
❒ Hang the control cabinet (1), with the fixing bolts (2) provided (flat-head bolts in the control cabinet packaging), in the locating slots (3) in the insulation side panel.

❒ Open the control cabinet door. Fix the bottom corners of the control cabinet to the insulation side panel.

❒ Fit the cable duct (4) on top of the control cabinet.

5.5.12 Fitting the combustion air fan

TM 150



❒ Attach the temperature sensor bracket on the right next to the opening for the combustion air fan

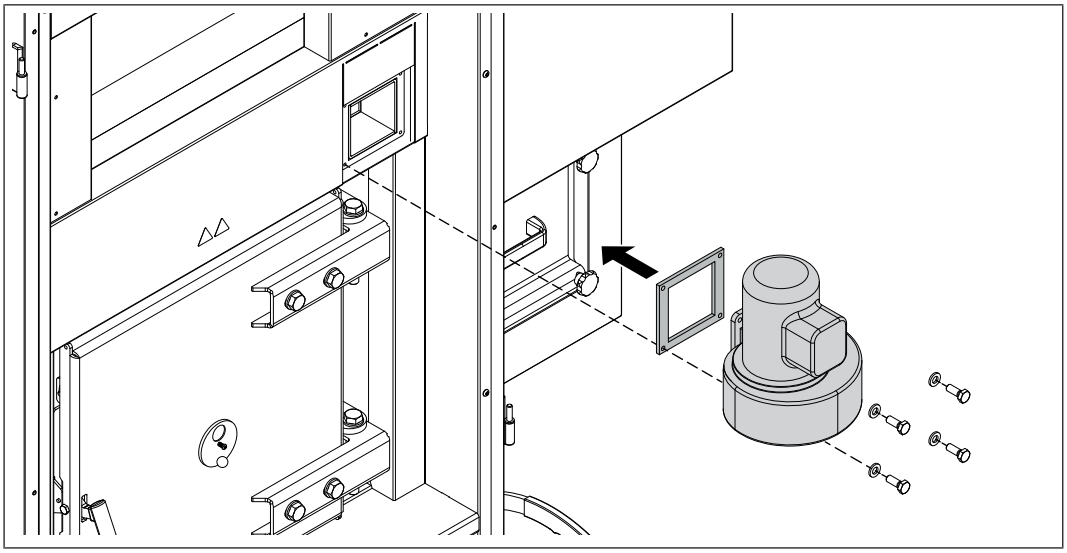
❒ Slide the temperature sensor into the bracket holes from above

↳ Push the lug (A) down slightly

❒ Run the temperature sensor cable to the control cabinet

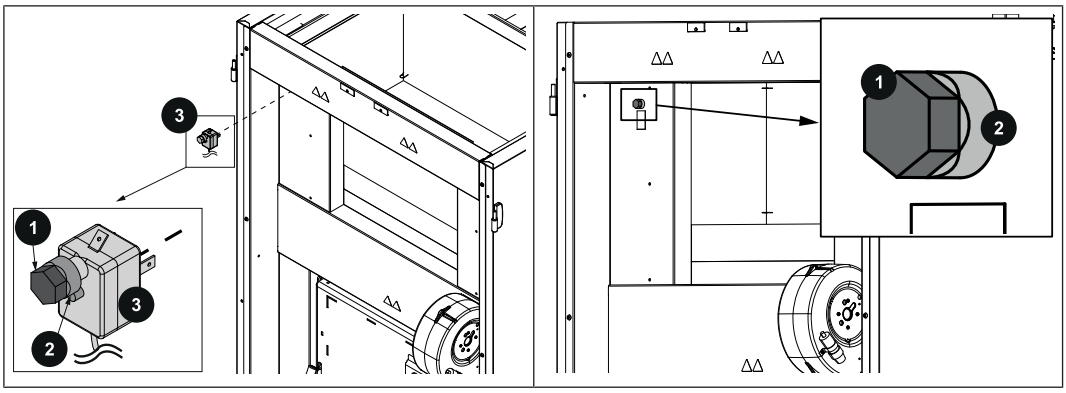
❒ Fit the combustion air fan complete with the ceramic fibre seal.

TM 200-250



❒ Fit the combustion air fan complete with the ceramic fibre seal.

5.5.13 Fitting the safety temperature limiter, boiler sensor and return sensor.

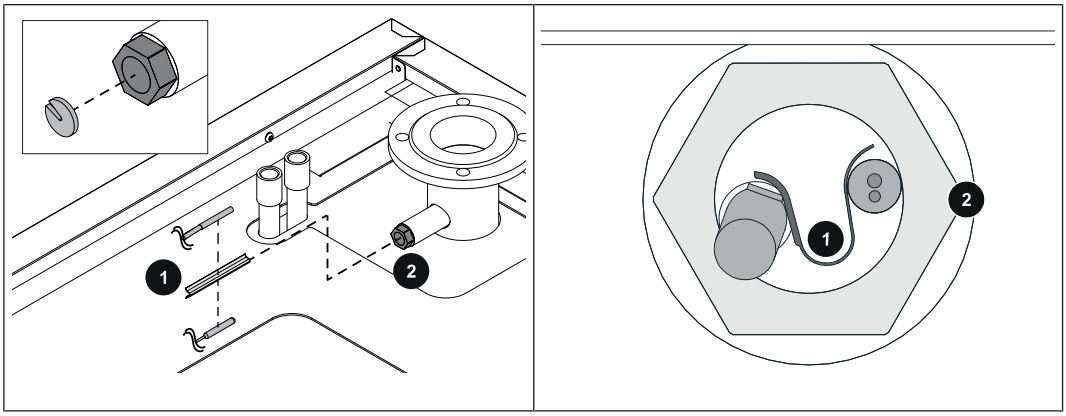


❒ Remove the cap (1) and the lock nut (2) from the safety temperature limiter (STL) (3).

❒ Plug the STL (3) from the back through the frame element.

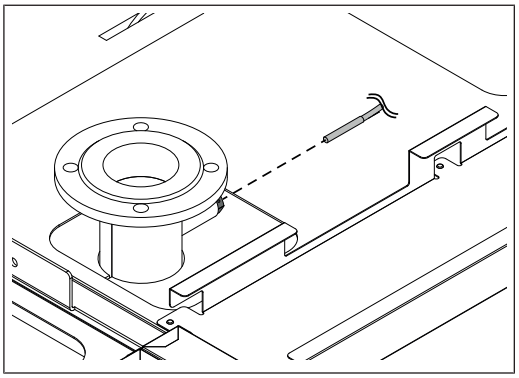
❒ Refit the lock nut (2) to the front of the STL. Refit the cap (1).

❒ Pass the STL capillary through the opening in the frame element and lay it to the immersion sleeve of the boiler flow.



❒ Remove the PVC plug from the immersion sleeve

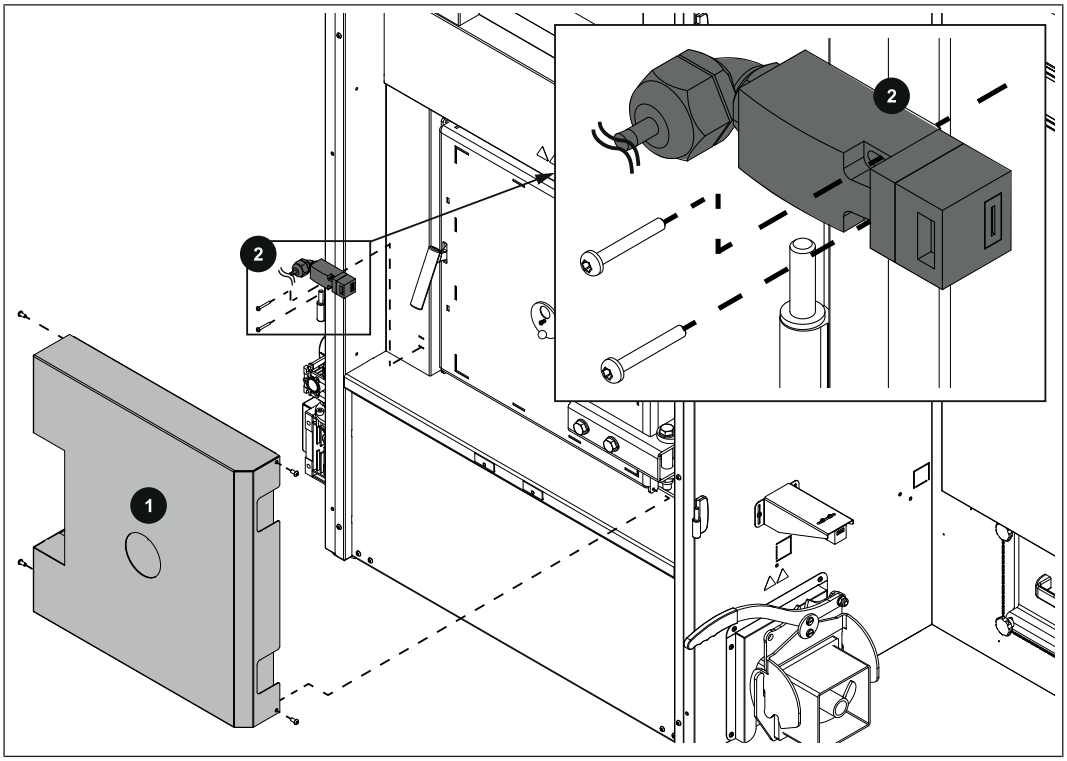
❒ Push the boiler sensor and the STL capillary with the pressure spring (1) into the pre-installed immersion sleeve (2) of the boiler flow



❒ Push the return flow sensor into the immersion sleeve of the boiler return.

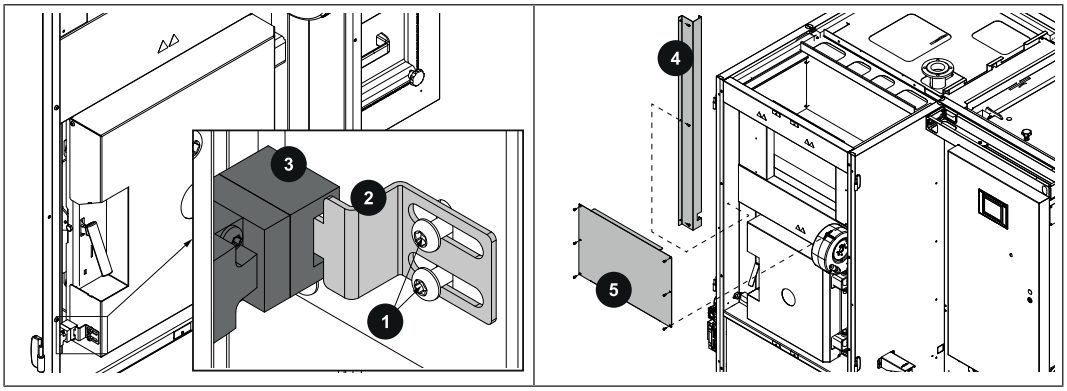
❒ Lay all the sensor cables in the cable duct to the control cabinet.

5.5.14 Fitting the door contact switch



❒ Attach the cover plate (1) to the combustion chamber door and fix it in place on the left and right with self-tapping screws.

❒ Fit the door contact switch (2) to the frame element.



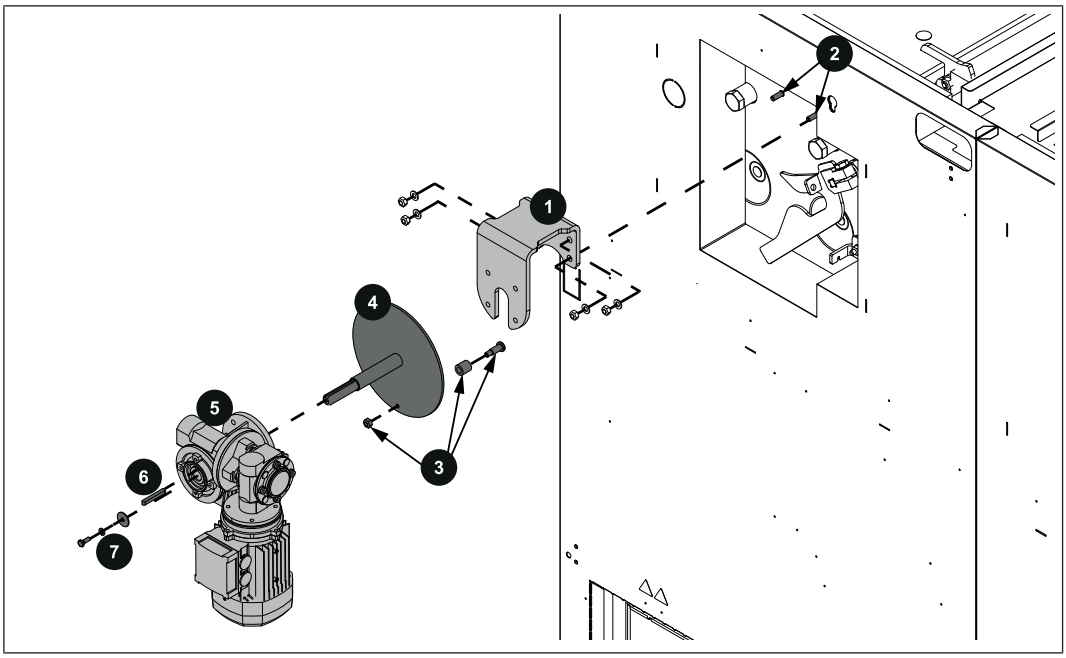
❒ Set the door contact switch as follows:

- Loosen the screws (1) on the key plate (2).
- Close the combustion chamber door and as you are doing this slide the key plate (2) so that it engages smoothly with the door contact switch (3).
- Fix the key plate in position (2). Open and close the combustion chamber door several times and check that the door contact switch (3) is tripped correctly.
- Lay the connecting cable through the opening in the frame element and then onwards to the control cabinet.

❒ Fit the side cable duct (4).

❒ Fit the cover (5).

5.5.15 Fitting the WOS Drive



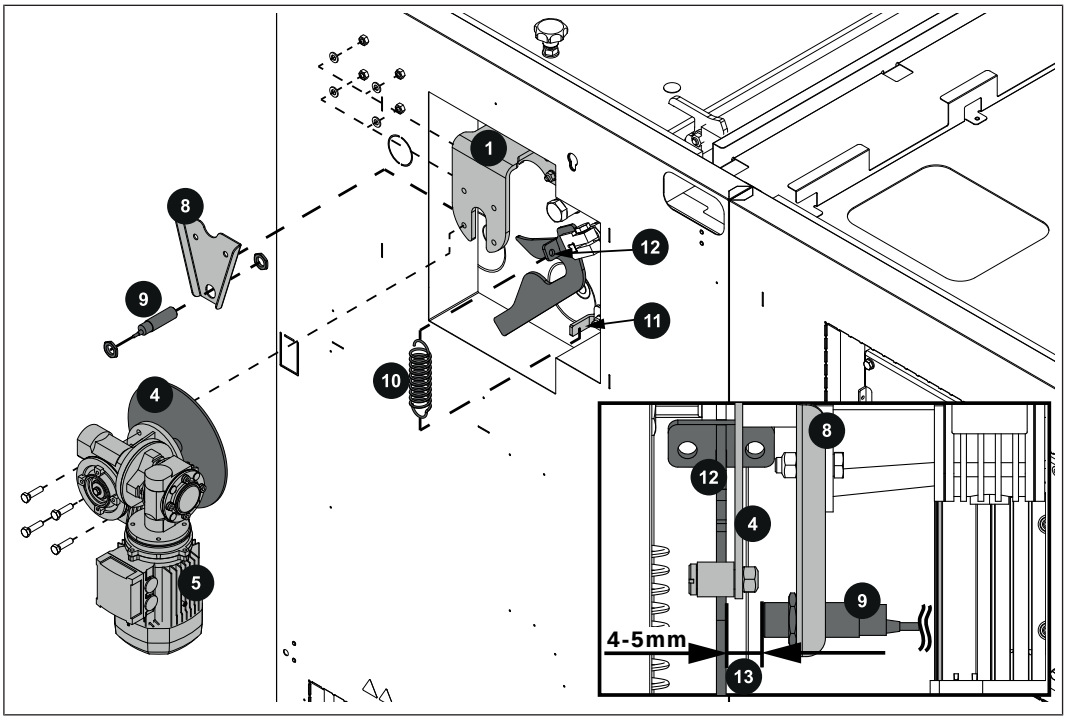
❒ Fix the motor mounting bracket (1) with threaded bolts (2) to the heat exchanger.

❒ Fit the flat head screw, bore bush and nut (3) to the WOS disc (4).

❒ Insert the WOS disc (4) into the gear motor (5).

↳ The key groove in the ash screw WOS disc must be aligned with the key groove in the gear motor.

❒ Slide the key (6) into the groove and fit the shaft retainer (7).



❒ Fit the gear motor (5) complete with the WOS disc (4) to the motor mounting bracket (1) with the two top screws.

↳ The motor must face downwards.

❒ Position the bracket (8) for the function monitor behind the motor mounting bracket (1) and then fix in place together with gear motor (5) with the two bottom screws.

❒ Fix the sensor (9) for the function monitor to the bracket (8).

❒ Attach the spring (10) at the bottom to the clamping bracket (11) and at the top to the WOS lever (12).

❒ Set the sensor (9) for the function monitor as follows:

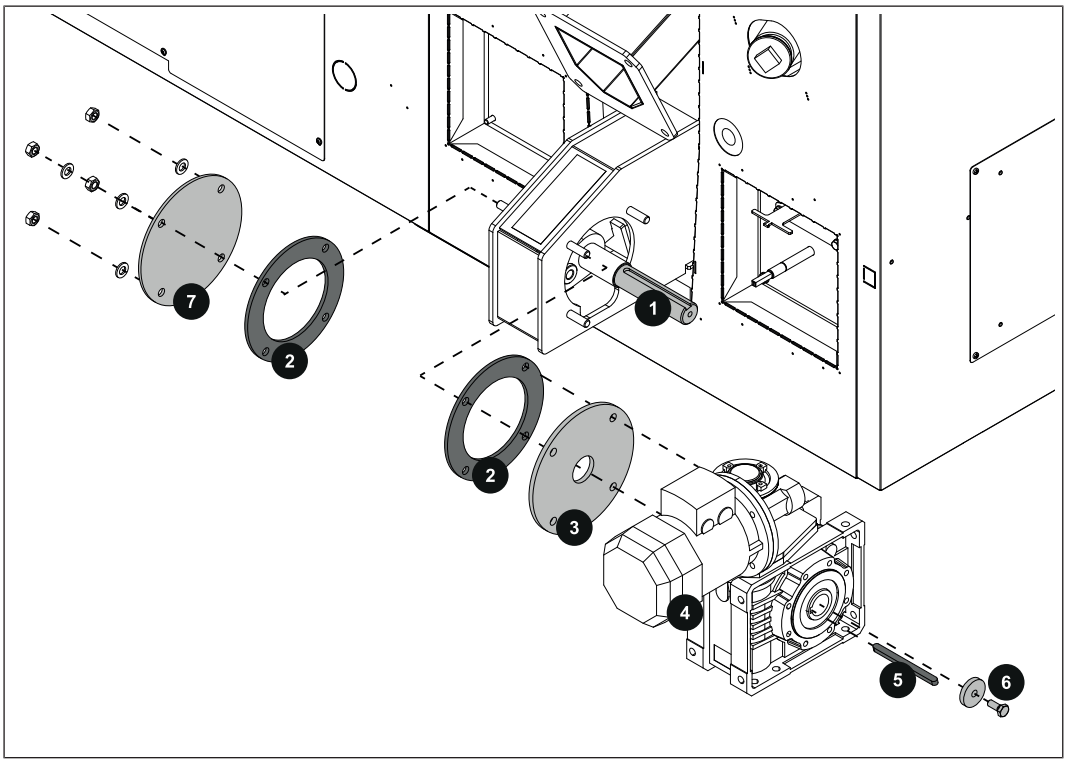
↳ Distance (13) between the sensor (9) and the WOS lever (12): 4-5mm

5.5.16 Installing the grate drive

Prepare the gear motor:

❒ Remove the shipping clamp from the gear motor.

❒ Fit the vent screw (supplied) to the highest point.



❒ Grease the shaft stub (1).

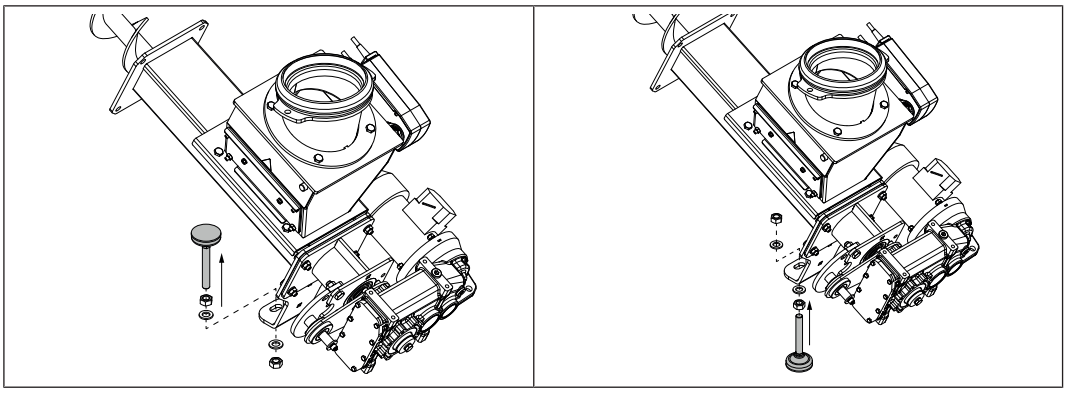
❒ Insert the seal (2) and the cover plate (3) onto the shaft.

❒ Fit the gear motor (4)

❒ Slide the key (5) into the groove and fit the shaft retainer (6).

❒ Fit the seal (2) and the blanking flange (7) on the opposite side to the gear motor (4).

5.5.17 Installing the stoker unit

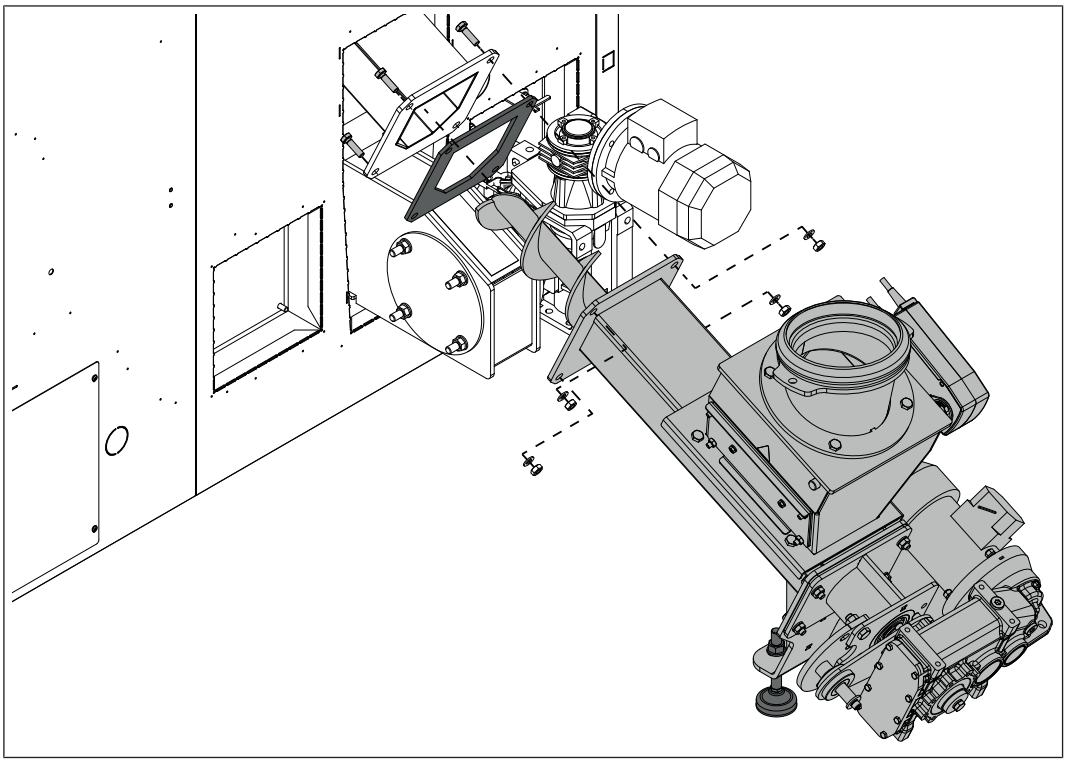


❒ Remove the pre-assembled adjustable foot.

❒ Change the adjustable foot to the other side and then refit it.

↳ Do not fully tighten the screws yet.

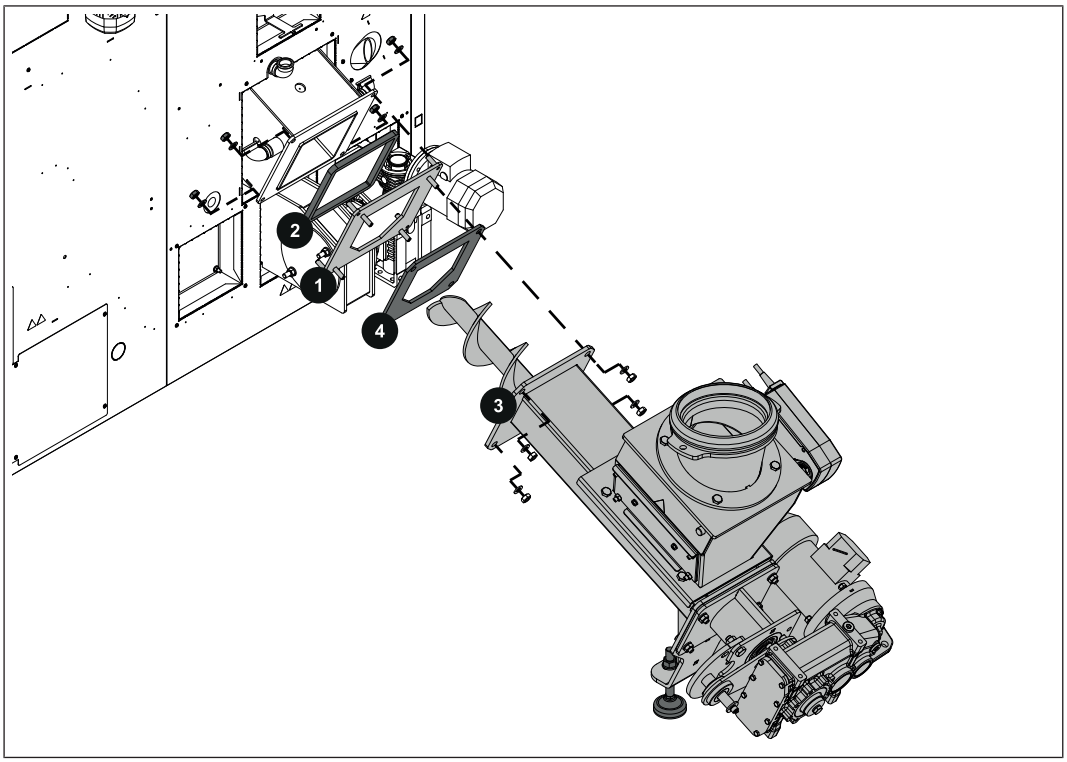
TM 150:



❒ Fit the stocker unit complete with the ceramic fibre seal to the slide-on duct.

❒ Adjust the stoker unit with the adjustable foot and then tighten the screw on the adjustable foot.

TM 200-250:



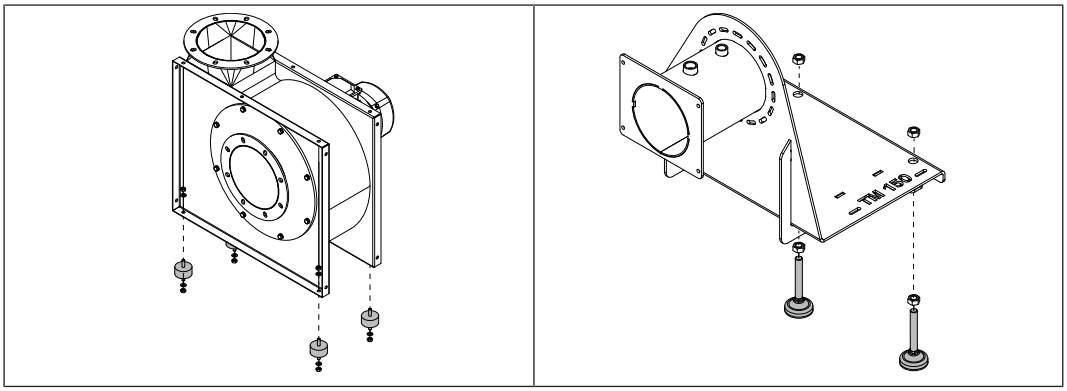
❒ Fit the adapter flange (1) with the seal (2) to the slide-on duct.

❒ Fit the stoker unit (3) with the seal (4) to the adapter flange (1).

❒ Adjust the stoker unit with the adjustable foot and then tighten the screw on the adjustable foot.

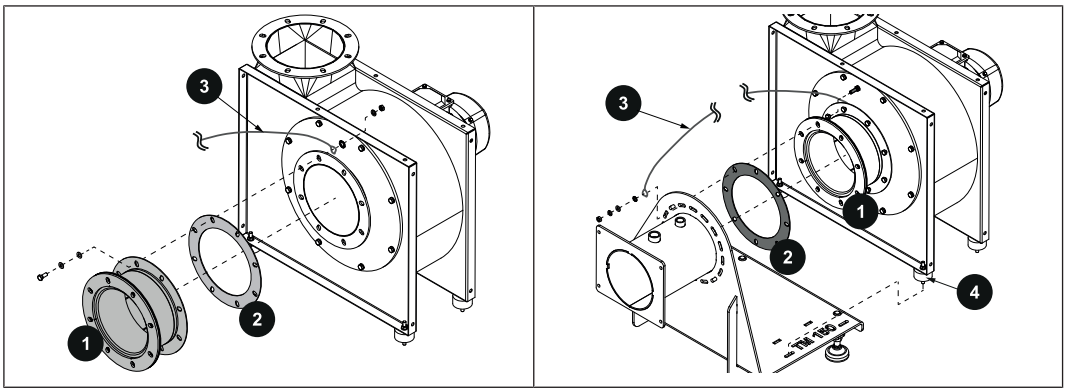
❒ Fit the discharge system (feed screw, etc.) according to the installation instructions enclosed.

5.5.18 Installing the induced draught fan



❒ 4x Fit the rubber buffers to the induced draught fan.

❒ 2x Fit the adjustable feet to the induced draught fan



❒ Fit the flue pipe compensator (1) with its fibreglass seal (2) and screws complete with spring washers and spacer washers to the induced draught fan.

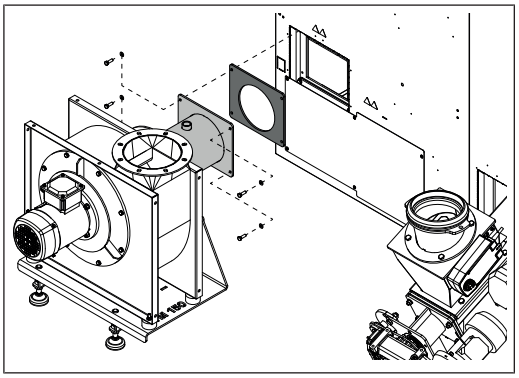
↳ Also screw on the earthing wire (3) (supplied) with the toothed washer as potential equalisation.

❒ Fit the induced draught fan with its fibreglass seal (2) on the flue pipe compensator (1) with the nuts and the spring washers and spacer washers to the induced draught bracket.

↳ Also screw on the earthing wire (3) (supplied) with the toothed washer as potential equalisation.

↳ Position the rubber buffers (4) of the induced draught fan in the slots in the induced draught bracket.

For boilers without electrostatic precipitators:

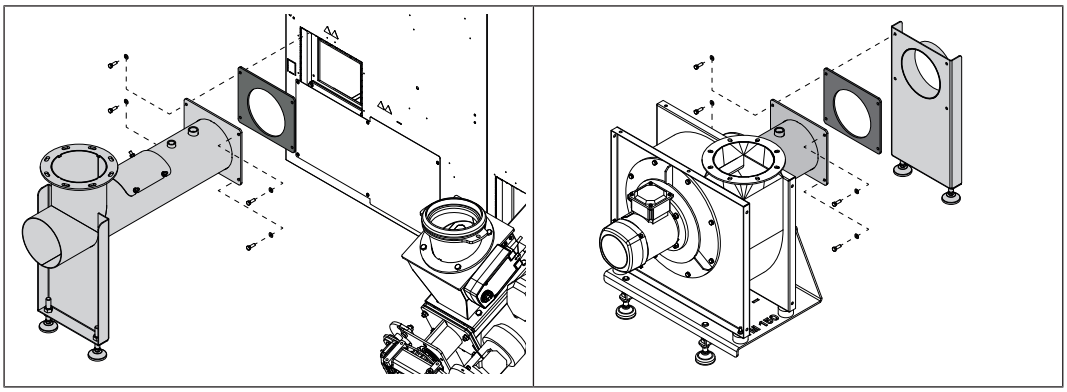


❒ Fit flange of the induced draught bracket complete with the ceramic fibre seal to the back of the heat exchanger.

❒ Adjust the induced draught bracket with the adjustable feet.

NOTICE! The ID fan must be insulated by the customer! Make sure the drive assembly of the induced draught fan can be removed.

For boilers without electrostatic precipitators:



❒ Fit flange of the flue gas bracket complete with ceramic fibre seal to the back of the heat exchanger

❒ Fit the support bracket complete with ceramic fibre seal to the induced draught fan

❒ Adjust the flue gas bracket and support bracket using the adjustable feet

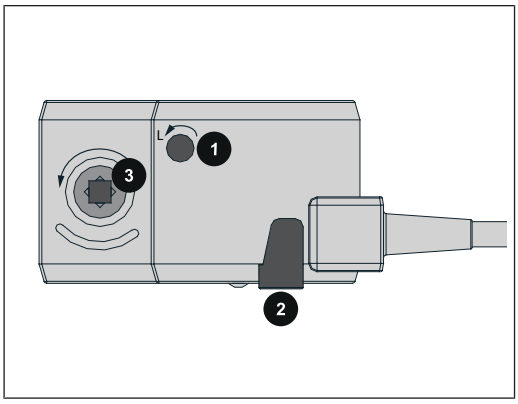
NOTICE! The ID fan must be insulated by the customer! Make sure the drive assembly of the induced draught fan can be removed.

5.5.19 Fitting the primary and secondary air servo motors

❒ Check that the air flaps are at the left stop.

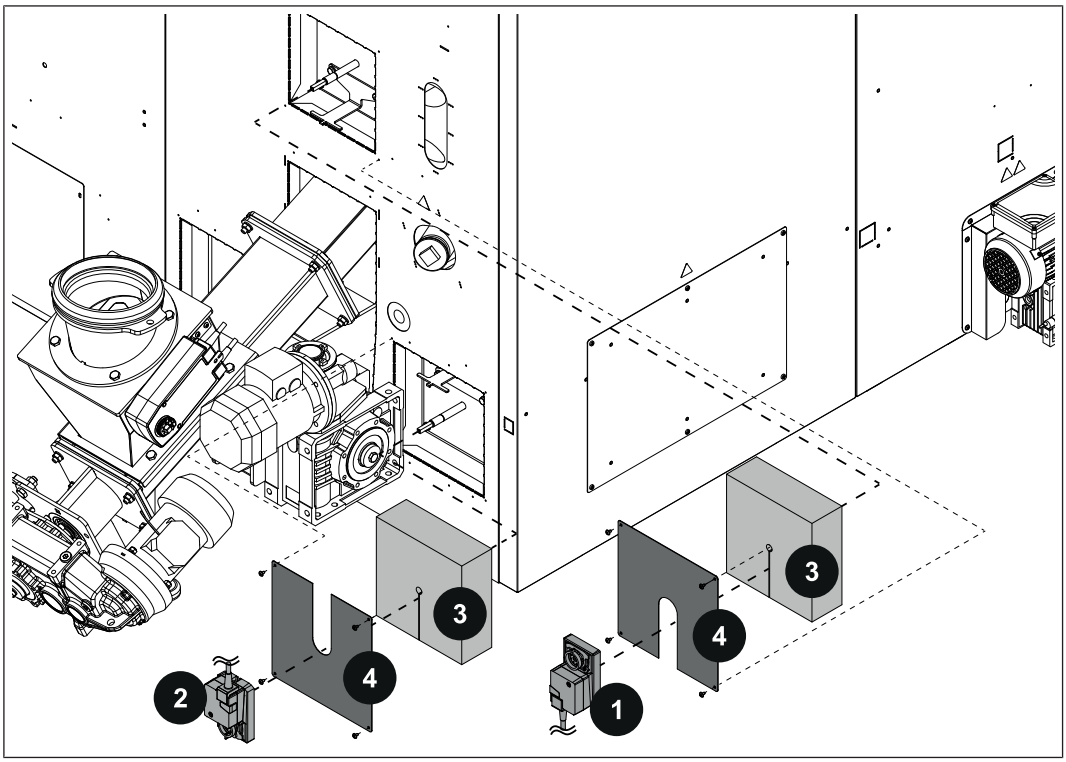
↳ All air flaps are closed.

↳ Where necessary, turn the air flaps to the left stops using a pliers.



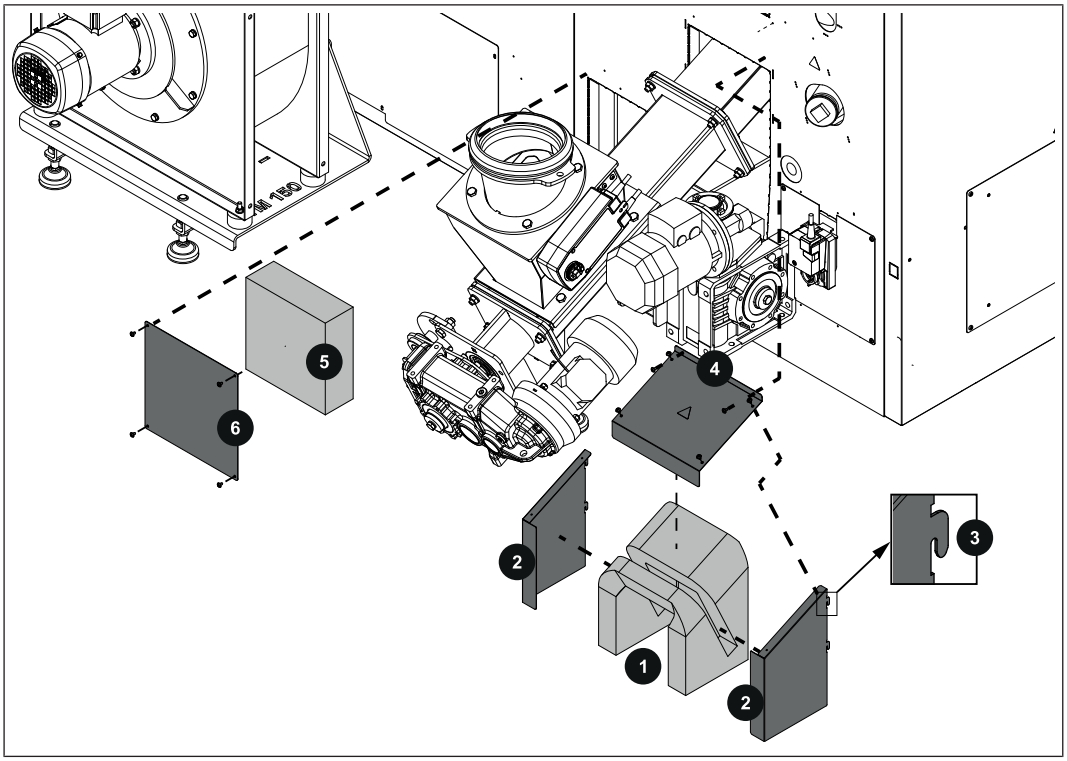
❒ Set the direction of rotation of the servo-motor (1) to left (L).

❒ Press the unlock key (2) and turn the drive for the shaft to the air duct (3) to the left as far as the stop



❒ Mount secondary air servo motor (1) on the pneumatic rods.
  ↳ The connecting cable must face downwards.
❒ Mount primary air servo motor (2) on the pneumatic rods.
  ↳ The connecting cable must face upwards.
❒ Close off the openings with heat insulation mats (3).
❒ Fit the cover plates (4).

5.5.20 Fitting the cover on the slide-on duct



❒ Wrap the heat insulation mat (1) around the slide-on duct.

❒ Attach the cover plates (2) to the insulation side panels using the hooks (3).

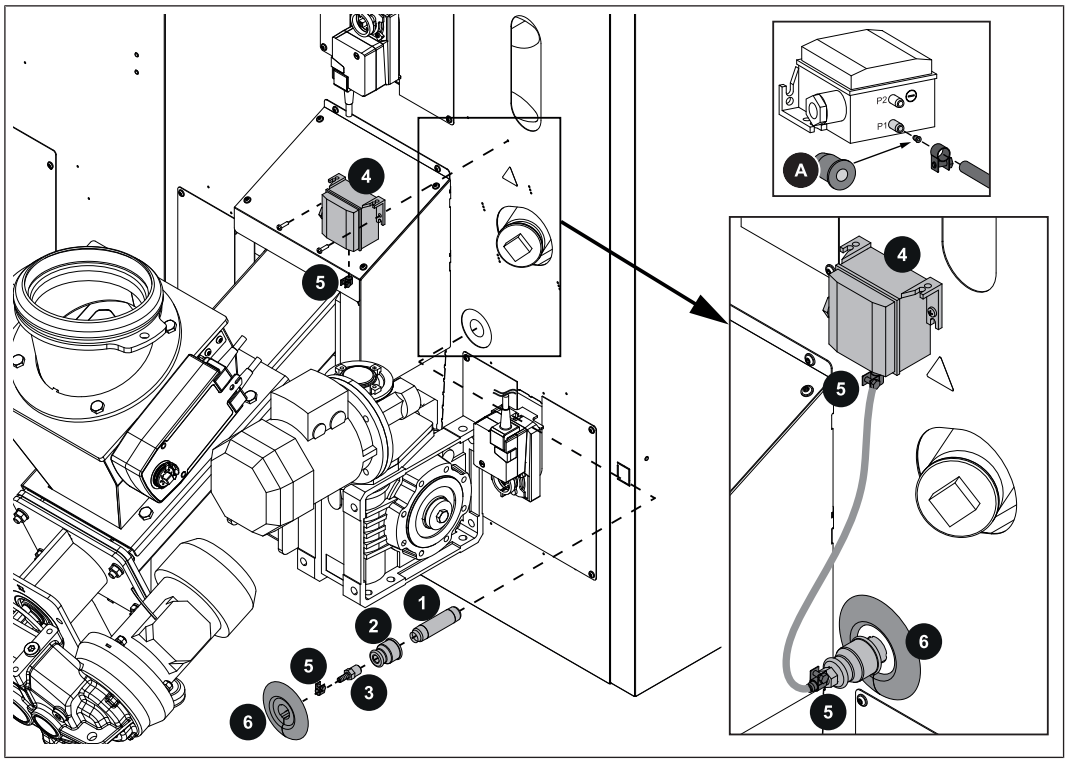
❒ Fit the upper cover plate (4) and screw to the insulation side panel and the side cover plates.

On versions with NO FGR:

❒ Close off the opening for the FGR duct with heat insulation mats (5).

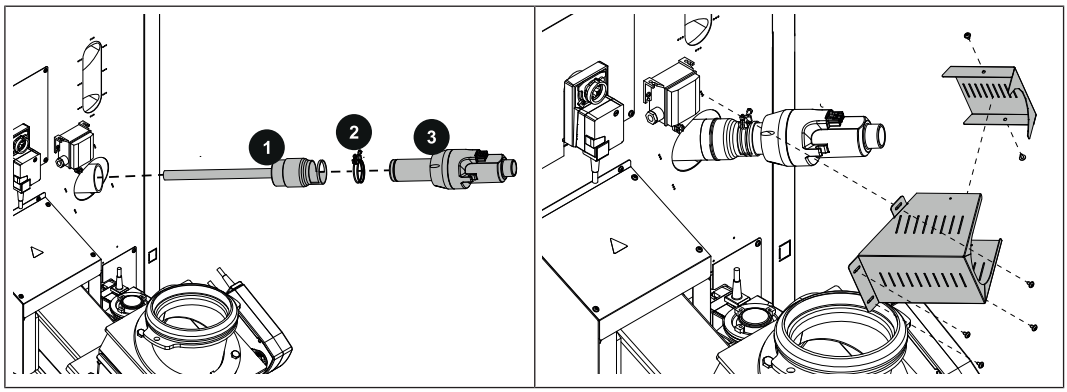
❒ Fit the cover plate (6).

5.5.21 Installing the underpressure controller



- ❒ Assemble the double thread nipple (1), reduction union (2) and hose nipple (3).
- ❒ Screw this assembly into the right of the stoker.
- ❒ Fix the underpressure sensor cartridge (4) to the insulating side panel using two self-tapping screws
- ❒ Thread the hose clamp (5) onto the silicon hose, place on hose nipple (3) and then tighten.
- ❒ Fit the spring washer (6).
- ❒ Fix the other end of the silicon hose to the "P1" nipple of the underpressure sensor cartridge (4) with the hose clamp (5) and tighten
  - ↳ Do not remove the red reduction plug (7).

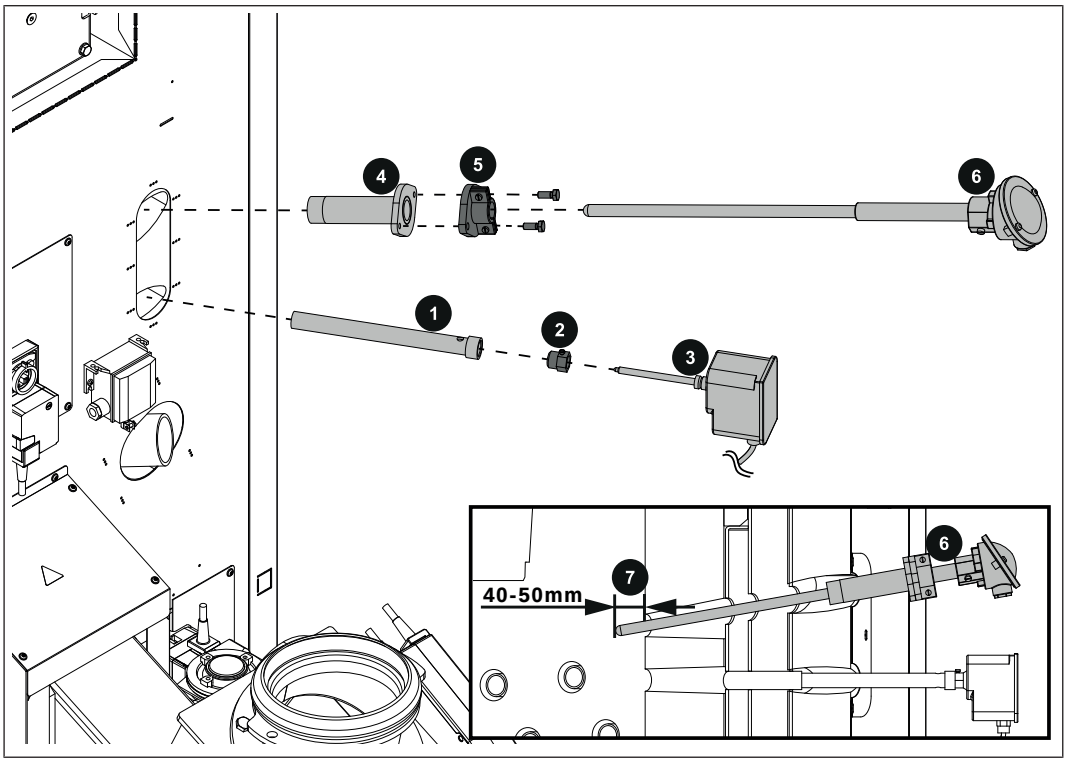
5.5.22 Installing the automatic ignition



- ❒ Screw in the igniter tube (1).
- ❒ Insert the double wire hose clip (2) on the igniter tube (1).
- ❒ Insert the ignition blower (3) into the igniter tube (1) and fix in place using the double wire hose clip (2).

❒ Fit the cover.

5.5.23 Installing the combustion chamber overpressure and temperature sensors



❒ Screw in the spacer tube (1).

❒ Screw the brass bush (2) into the spacer tube (1).

❒ Push in the combustion chamber overpressure sensor (3) and slightly tighten the retaining screw.

❒ Screw in the flanged pipe (4).

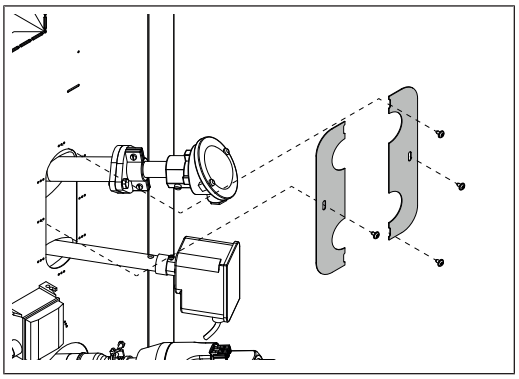
❒ Fit the counter flange (5).

❒ Insert the combustion chamber temperature sensor (6) so that it projects by approx. 40 - 50 mm into the combustion chamber (7).

❒ Fix in position on the counterflange with the clamping screws. Only finger tighten the screw.

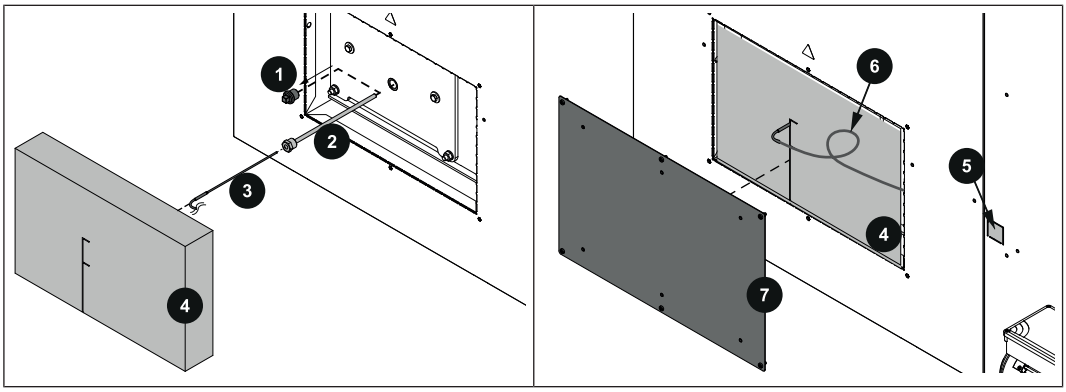
Combustion chamber temperature sensor (6):

❒ Unscrew the connector box cover. Connect up the compensating line as follows:
- green wire to the terminal with the green dot
- white wire to the unmarked terminal
- shield not connected up.



❒ Fit the cover plate.

5.5.24 Fitting the temperature sensor under the moving grate



❒ Removing the blanking plug (1).

❒ Insert the immersion sleeve (2).

❒ Push the sensor (3) into the immersion sleeve.

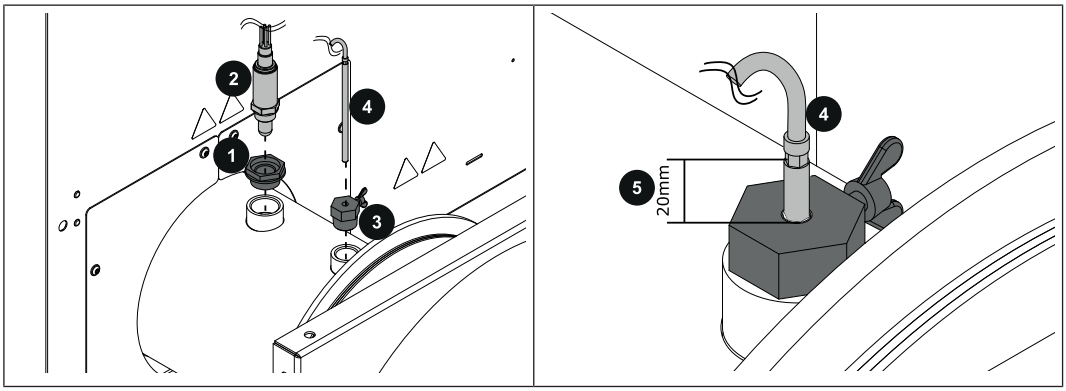
❒ Position the heat insulation mat (4).

❒ Bend the clamp (5) over the insulation side panel.

❒ Lay the compensating wire (6) of the sensor in a loop and then lead it along the cable duct to the control cabinet.

❒ Fit the cover (7).

5.5.25 Fitting the broad band probe and flue gas sensor



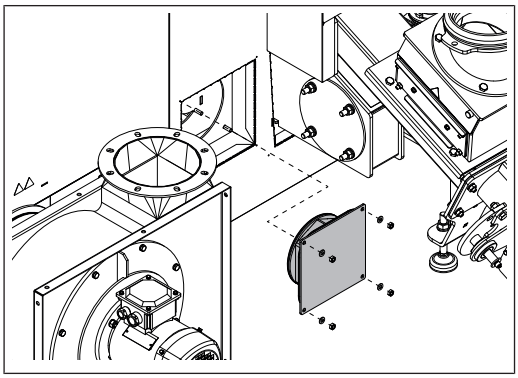
❒ Screw the bushing (1) into the sleeve and gently tighten

❒ Screw the broadband probe (2) into the bushing (1) and tighten slightly using an Allen key (22 mm).

❒ Screw the brass bushing (3) for the flue gas sensor (4) into the sleeve

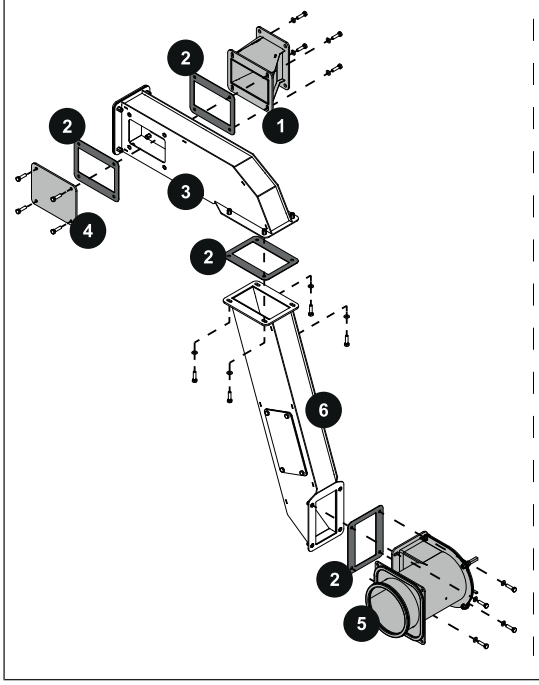
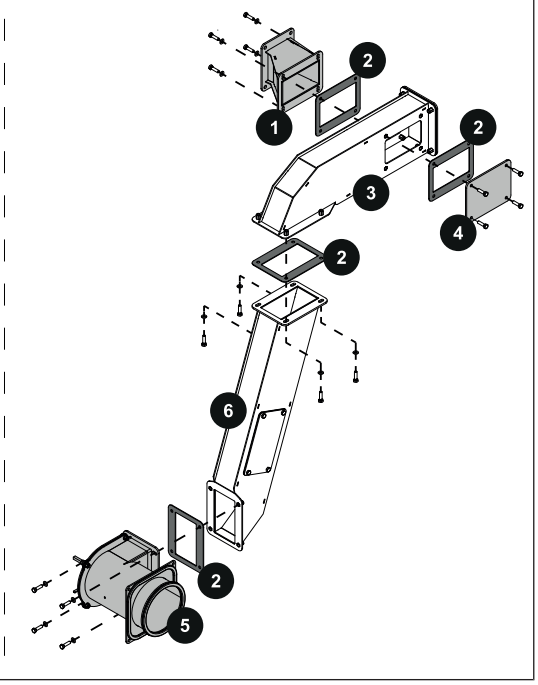
❒ Push the flue gas sensor (4) in so that approx. 20 mm is still projecting from the housing (5). Secure it in this position with the wing screw.

5.5.26 Install the flue gas recirculation (FGR) (optional)



❒ Remove the FGR duct cover (alongside the stoker unit).

Assemble the FGR duct:

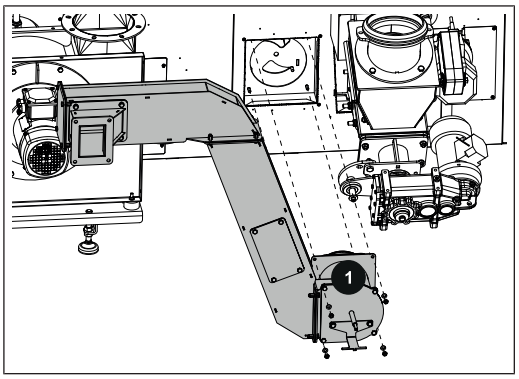
Version with heat exchanger on the right:	Version with heat exchanger on the left:
	

❒ Fit the intermediate flange (1) with the fibreglass seal (2) to the upper FGR duct (3).

❒ Fit the cover (4) with the fibreglass seal (2) to the upper FGR duct (3).

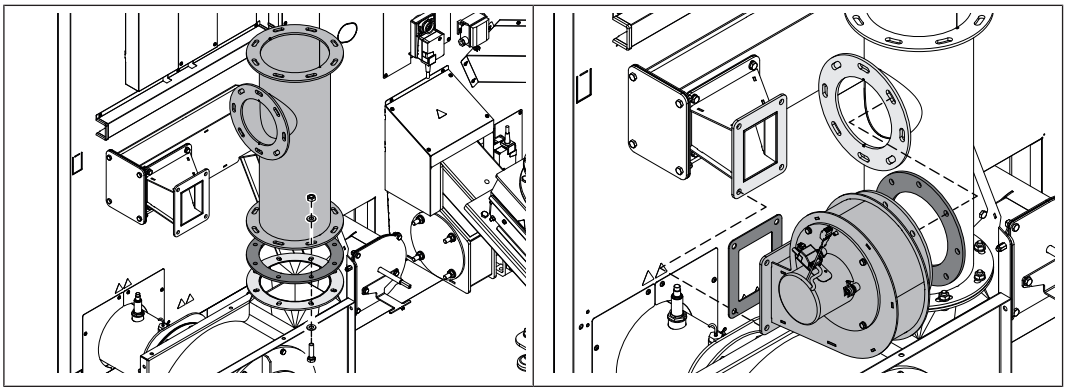
❒ Fit the connecting bracket (5) with the fibreglass seal (2) to the lower FGR duct (6).

❒ Position the fibreglass seal (2) and fit the upper FGR duct (3) and lower FGR duct (6).



❒ Fit the FGR duct with the connecting bracket (1) to the boiler.

For boilers without electrostatic precipitators:

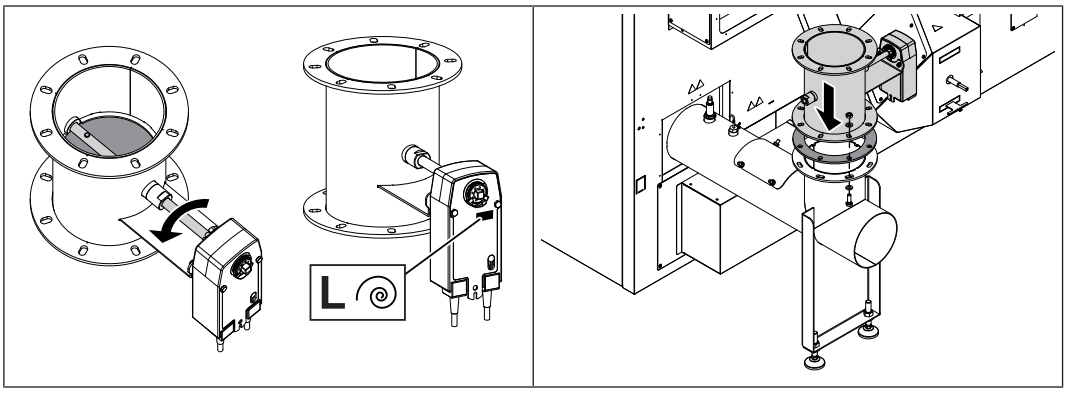


❒ Fit the fan box (5) with its seals to the flange of the induced draught fan.

❒ Fitting the FGR blower fan

NOTICE! The FGR blower fan as well as the connection to the ID fan must be insulated by the customer! Make sure the drive assembly of the FGR blower fan can be removed.

For boilers without electrostatic precipitators:

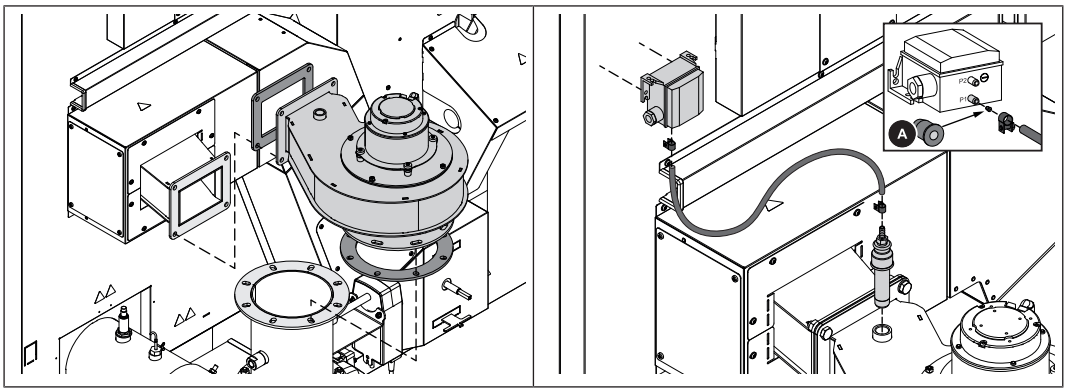


❒ Close the air vane flap

↳ The servo-motor must be on the left stop and mounted so that the direction of rotation left (“L”) is visible

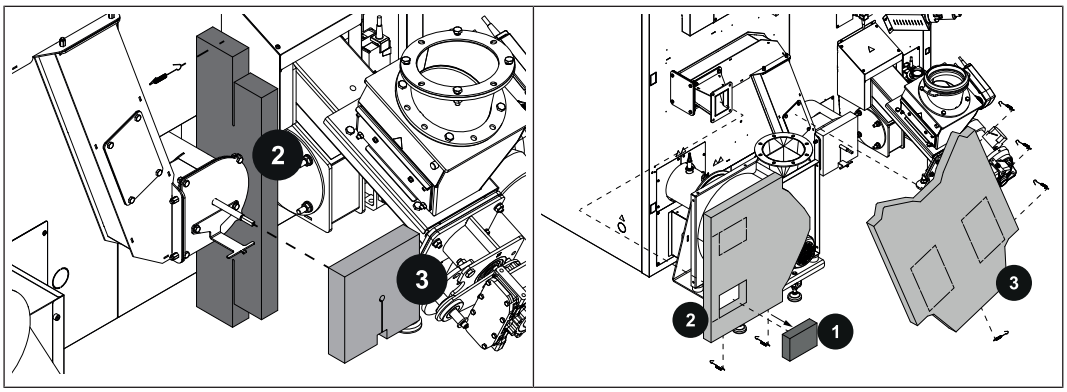
❒ Install the air vane on the flue gas bracket

For boilers without electrostatic precipitators:

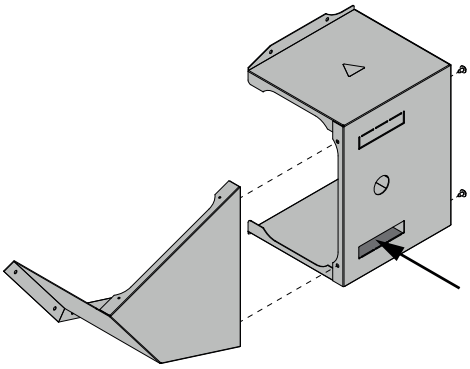
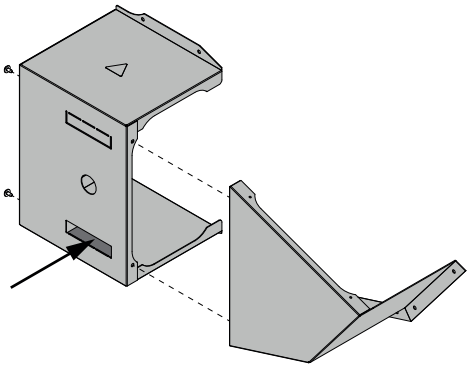


- ❒ Install the induced draught unit housing incl. blower fan on the flue gas bracket and on the adapter flange
- ❒ Install the differential pressure transmitter on the boiler insulation
- ❒ Screw in the measuring nipple on the sleeve of the induced draught unit housing
- ❒ Insert the reducing plug (A) at connection “P1” and fit the hose with the hose clamp
- ❒ Attach the measuring hose with hose clamp to the measuring nipple

NOTICE! The FGR blower fan as well as the connection to the ID fan must be insulated by the customer! Make sure the drive assembly of the FGR blower fan can be removed.

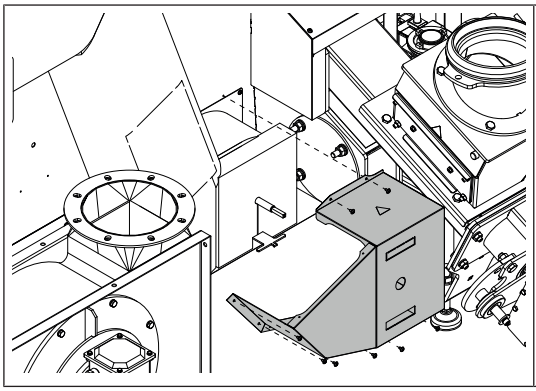


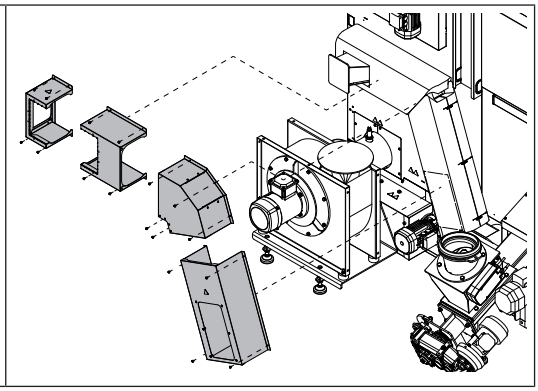
- ❒ Wrap the heat insulation mat (2) around the connecting bracket and fix in place using spring clips.
- ❒ Insert the heat insulation mat (3) on the front of the connecting bracket.
- ❒ Remove the pre-punched cut-out for the flange from the heat insulation (1).
  - ↳ Keep the heat insulation, you will need it later.
- ❒ Wrap the heat insulation mat (2) around the upper FGR duct and fix in place using spring clips at the bottom.
- ❒ Wrap the heat insulation mat (3) around the lower FGR duct and fix in place using spring clips at the top.

Version with heat exchanger on the right:	Version with heat exchanger on the left:
	

❒ Assemble the cover for the connecting bracket.

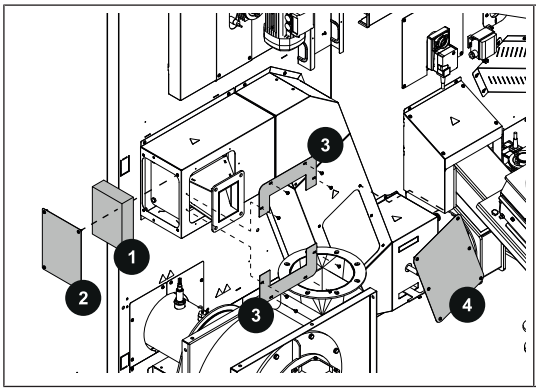
❒ Press in the bottom clamp.

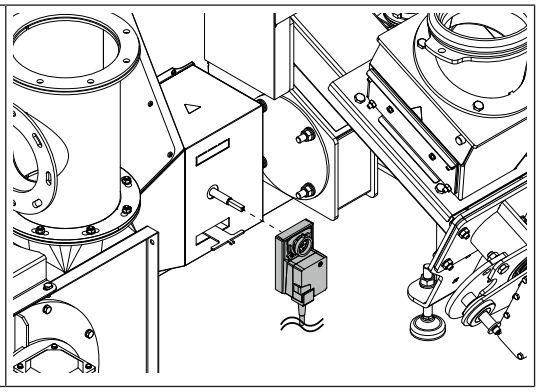




❒ Fit the cover for the connecting bracket.

❒ Fit the cover for the FGR duct.



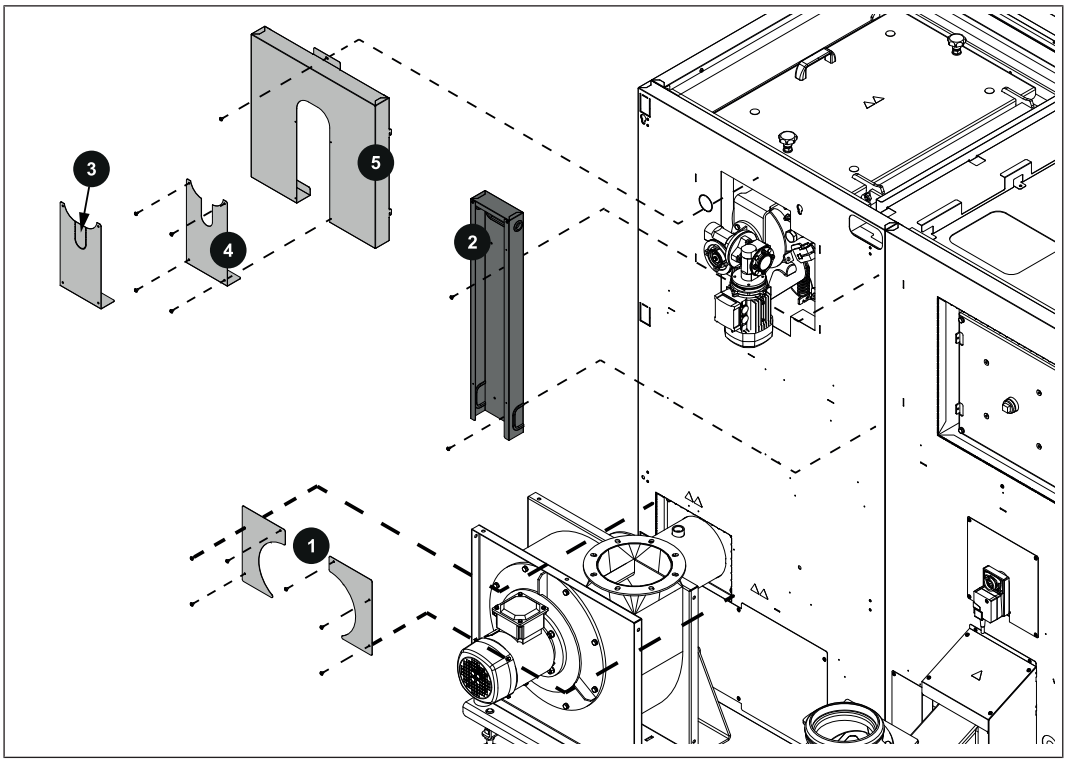


❒ Insert the heat insulation removed previously (1) on the end of the FGR duct and fit the side cover plate (2).

❒ Fit the cover plates on the flange (3) and the lower FGR duct (4).

❒ Fit the servo motor to the connecting bracket.

5.5.27 Fitting the covers to the back of the heat exchanger



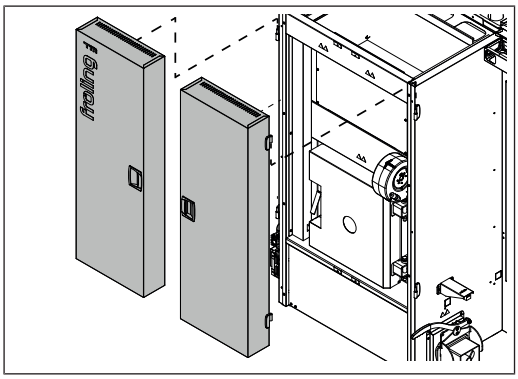
❒ Fit the cover plate (1) to the induced draught duct.

❒ Fit the cable duct (2) to the insulation.

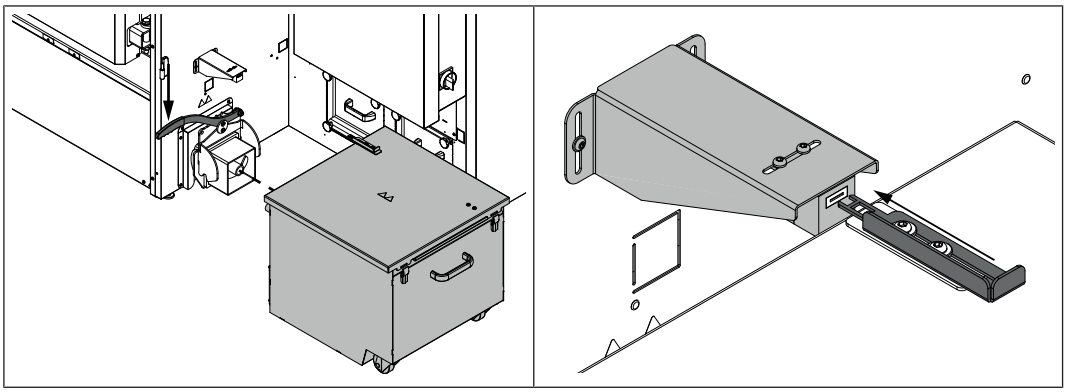
❒ Cut out the pre-punched cut-out (3) from the cover plate (4).

❒ Fit the cover (5) and the cover plate (4) on the WOS drive.

5.5.28 Fitting the insulated doors and the ash container to the combustion chamber



❒ Hang the insulated doors on the hinge pins on the frame



❒ Position the ash container at the ash removal unit flange

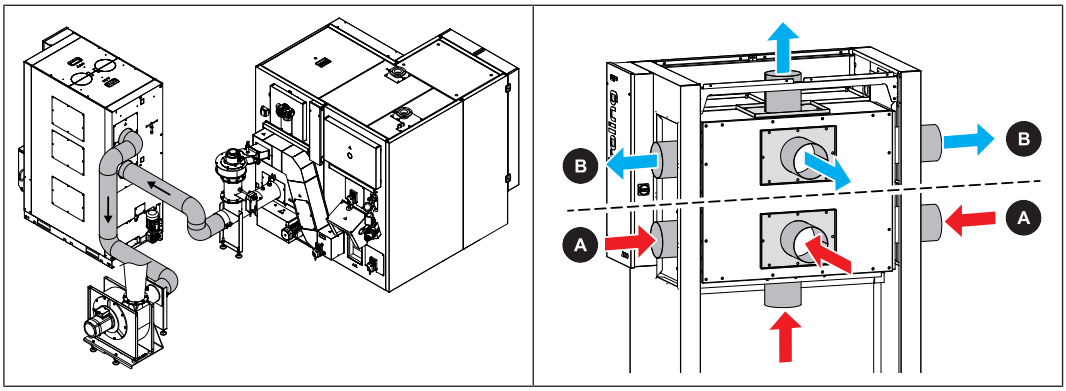
❒ Push the lever on the side of the ash removal unit flange downwards to lock the ash container in place

❒ Push the key plate into the safety switch

❒ Set the safety switch so that the key plate engages correctly

❒ Tighten the screws on the safety switch

5.6 Connect the electrostatic precipitator (optional)



The electrostatic precipitator system is placed between the boiler and the induced draught. The piping must be provided by the customer in compliance with the recommended distances and the installation plan. The pipeline must be as short as possible and insulated with suitable thermal insulation.

Connections:

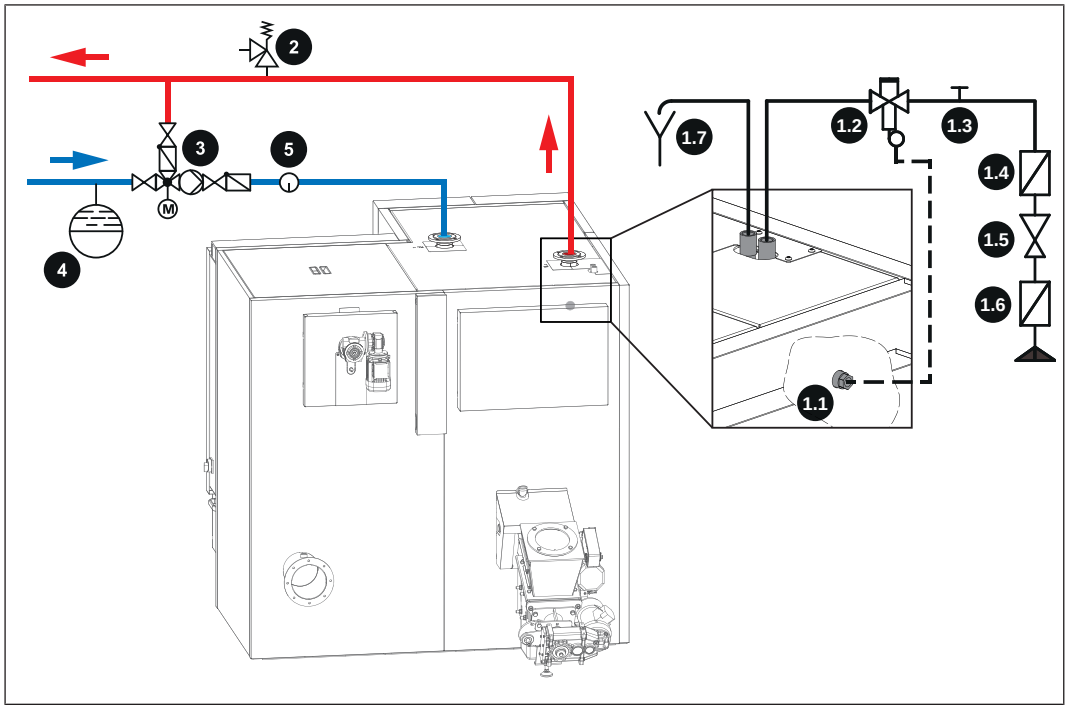
- A – Lower flue gas connection: Raw gas inlet (pipe from boiler)
- B – Upper flue gas connection: Clean gas outlet (pipe to the induced draught)

❒ Refer to the enclosed instructions for the electrostatic precipitator for all steps pertaining to installation and operation

5.7 Hydraulic connection

5.7.1 Connecting up thermal discharge safety sensor connection

- Connect up the thermal discharge safety sensor as per EN 303-5 and the circuit diagram below.
- The discharge safety sensor must be connected to a pressurised mains water supply in such a way that it cannot be shut off.



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)

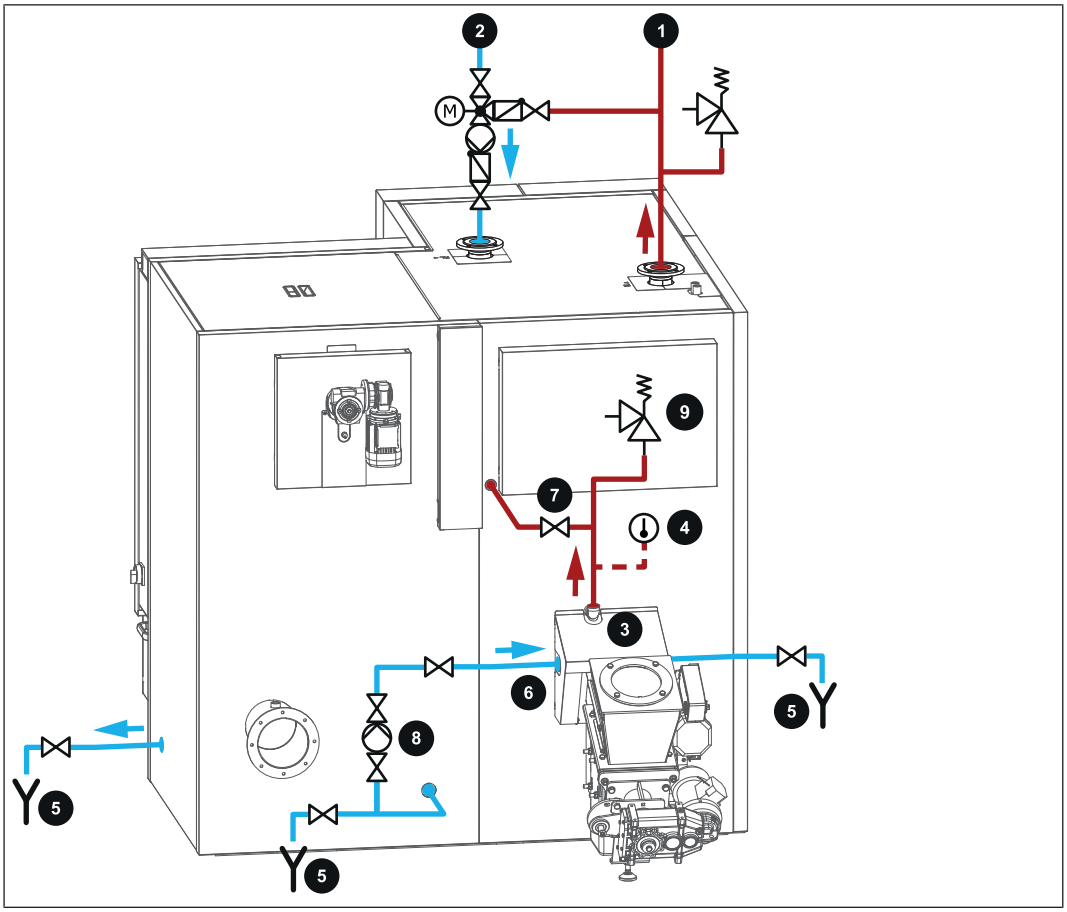
2 Safety valve

- 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)**

5.7.2 Connecting the slide-on duct cooling (from 200 kW)

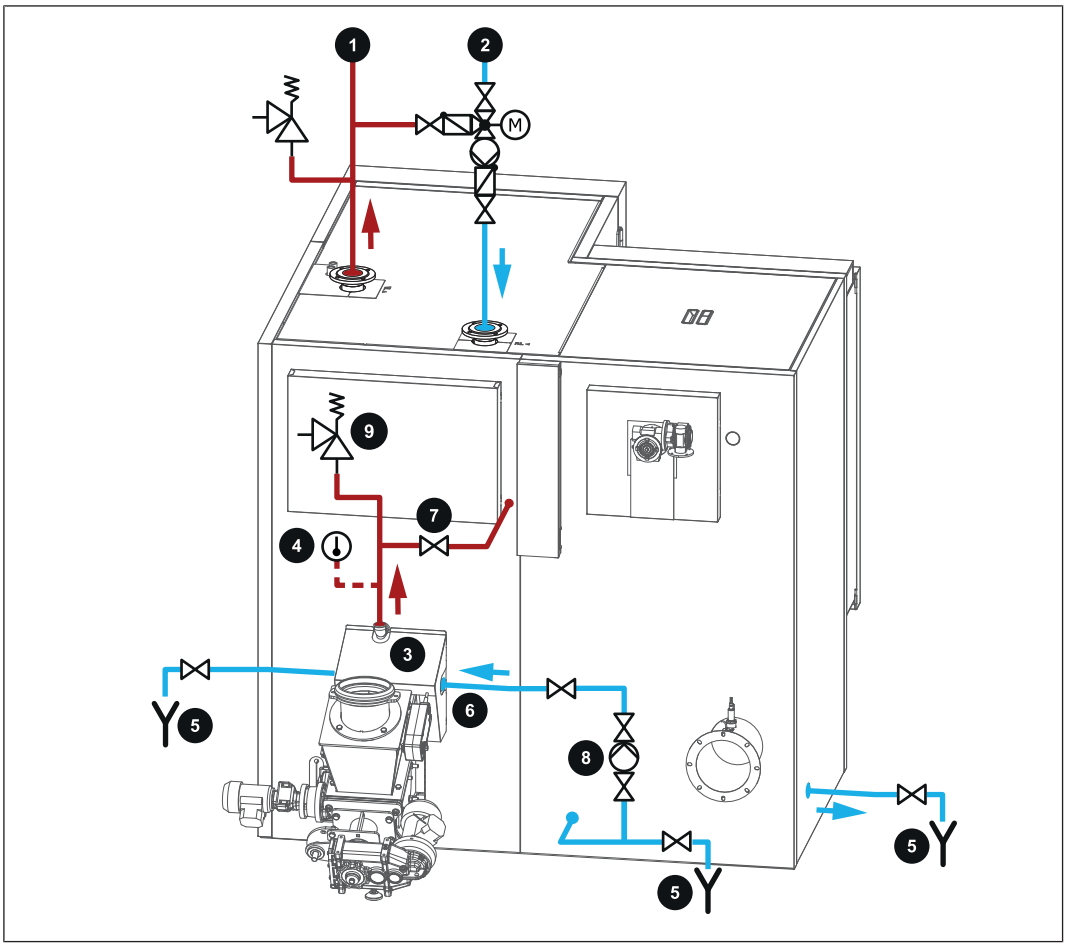
Heat exchanger on the right



1	Boiler flow	**2**	Boiler return
3	Slide-on duct for the flow	**4**	Thermometer (recommended)
5	Drain cock	**6**	Slide-on duct for the return
7	Gate valve / ball valve Caution: close this valve only for working on the slide-on duct. Tip: With the valve in the open position, remove the lever and keep it in a safe place	**8**	Slide-on duct for the loading pump: ▪ no gravitational brake ▪ up to 500 kW rated heat output: flow rate approx. 2 m^3/h ▪ 500 - 1500 kW rated heat output: flow rate approx. 2.5 m^3/h
9	Safety valve DN15		

General requirement: All pipe connections must be capable of being shut off and disassembled for maintenance work. Do not employ any press-fit connections.

Heat exchanger on the left



1	Boiler flow	**2**	Boiler return
3	Slide-on duct for the flow	**4**	Thermometer (recommended)
5	Drain cock	**6**	Slide-on duct for the return
7	Gate valve / ball valve Caution: close this valve only for working on the slide-on duct. Tip: With the valve in the open position, remove the lever and keep it in a safe place	**8**	Slide-on duct for the loading pump: ▪ no gravitational brake ▪ up to 500 kW rated heat output: flow rate approx. 2 m^3/h ▪ 500 - 1500 kW rated heat output: flow rate approx. 2.5 m^3/h
9	Safety valve DN15		

General requirement: All pipe connections must be capable of being shut off and disassembled for maintenance work. Do not employ any press-fit connections.

5.8 Power connection and wiring

⚠ DANGER

When working on electrical components:

Risk of electrocution!

When work is carried out on electrical components:

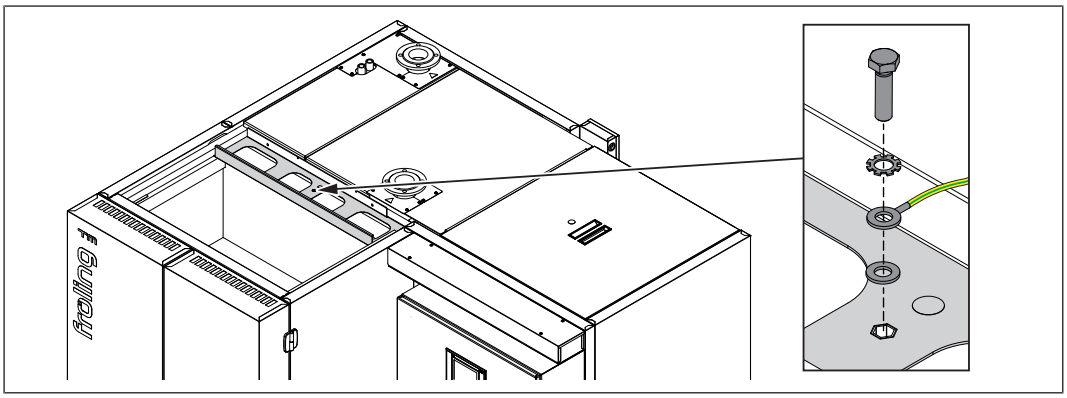
- ❒ Always have work carried out by a qualified electrician
- ❒ Observe the applicable standards and regulations
  - ↳ Work must not be carried out on electrical components by unauthorised persons

- ❒ Lay the cables from the components through the cable ducts to the control cabinet.
- ❒ Wire the connections according to the wiring diagram.
- ❒ Secure the cables in the control cabinet to the terminal strips provided using cable ties (= strain relief).

Notes about laying the cables

- Tie any loose hanging cables to the drive motors using cable ties. The cables must not come into contact with the stoker duct.

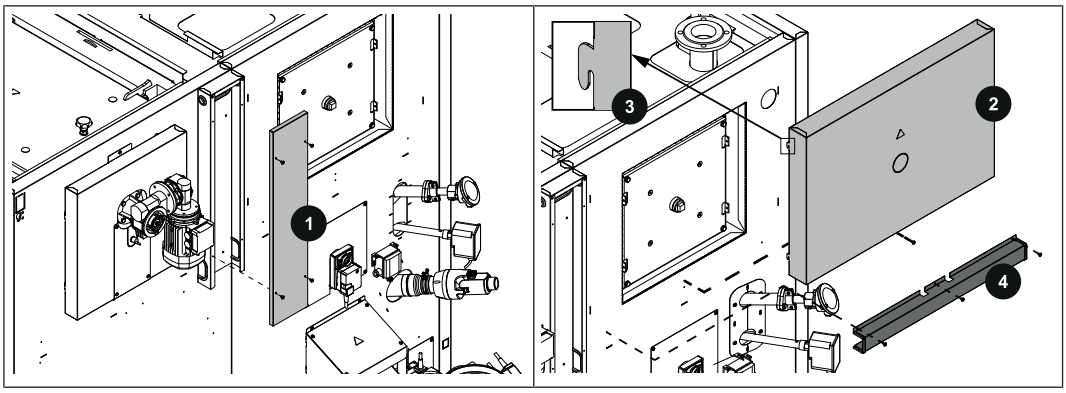
5.8.1 Potential equalisation



- ❒ Connect the potential equalisation to the cable duct above the combustion chamber
- ❒ Establish potential equalisation to all boiler components
  - ↳ Fuel outfeeder, ash removal, induced draught fan, FGR blower fan, flue gas pipe, pipes, control cabinet etc.

IMPORTANT: The potential equalisation must comply with current directives, regulations and standards.

5.8.2 Fitting the insulation cover and the cover plate

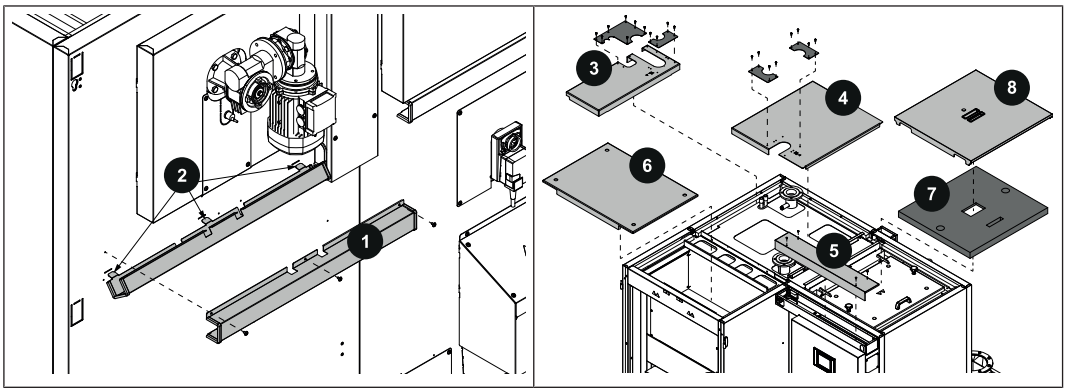


❒ Fit the cover plate (1) to the cable duct.

❒ Fit the cover (2) to the heat exchanger.

↳ Attach the clamps (3) at the side in and fix in place with screws at the bottom.

❒ Fit the cable duct (4) underneath.



❒ Fit the cable duct (1) underneath the WOS drive.

↳ Insert the clamps (2) into the insulation. Fold the cable duct upwards and fasten with screws.

❒ Fit the cover (3) and its cover plate to the left on top of the heat exchanger.

❒ Fit the cover (4) in the middle on top of the heat exchanger and fit its cover plate.

❒ Fit the cable duct cover (5).

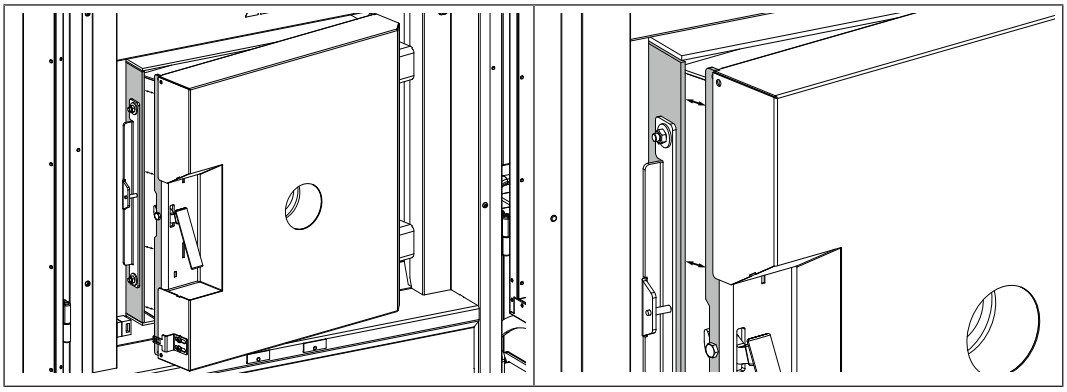
❒ Fit the cover (6) on top of the combustion chamber.

❒ Lay the insulation mat (7) on the right on top of the heat exchanger. Fit the cover (8).

5.9 Final installation steps

5.9.1 Setting and testing the seal on the combustion chamber doors

Checking the settings of the door stop



❒ Close the door.

↳ A slight resistance must be felt when there is a gap of 2 - 3 cm:
Setting OK

↳ No resistance or only very slight resistance felt:
Setting must be corrected - Push the hinge toward the back.
➲ "Setting the combustion chamber door" [▸ 70]

↳ Resistance noticeable at a gap of >3 cm:
Setting must be corrected - Push the hinge toward the front.
➲ "Setting the combustion chamber door" [▸ 70]

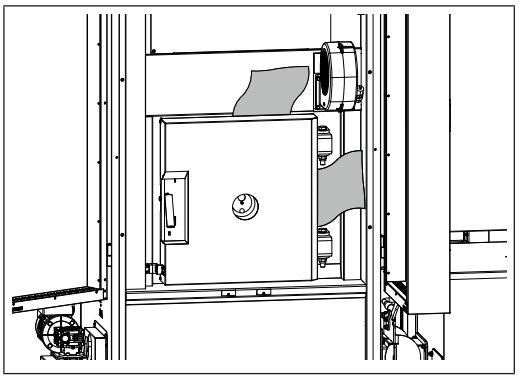
Checking the settings of the door handle

❒ Close the door.

↳ The door can be closed with a normal amount of effort:
Setting OK

↳ The cannot be closed or can only be closed with great effort.
Push the locking plate toward the front.
➲ "Setting the combustion chamber door" [▸ 70]

Checking the door stop seal



❒ Open the door.

❒ Insert a sheet of paper at both the top and the bottom of the door stop between the door and the boiler.

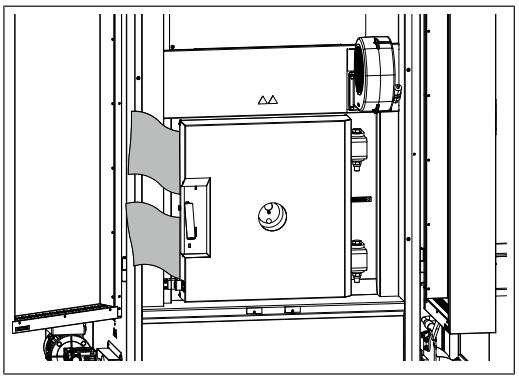
❒ Close the door.

❒ Try to pull out the sheets of paper.

↳ If the paper cannot be removed:
The door is sealed.

↳ If the paper can be removed:
The door is not sealed properly - Push the hinge toward the back.
➲ "Setting the combustion chamber door" [▶ 70]

Checking the door handle seal



❒ Open the door.

❒ Insert a sheet of paper at both the top and the bottom area at the side of the door handle between the door and the boiler.

❒ Close the door.

❒ Try to pull out the sheets of paper.

↳ If the paper cannot be removed:
The door is sealed.

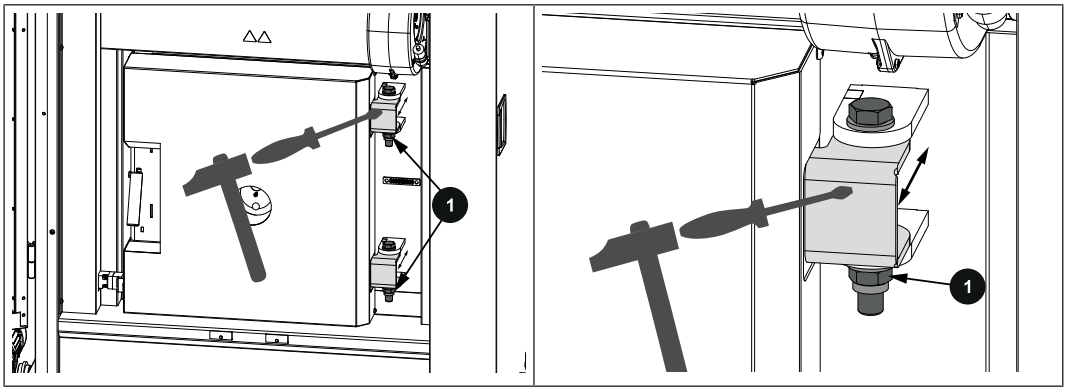
↳ If the paper can be removed:
The door is not sealed properly - Push the locking plate toward the back.

See also

Adjusting the combustion chamber doors [▶ 70]

5.9.2 Adjusting the combustion chamber doors

Door stop side



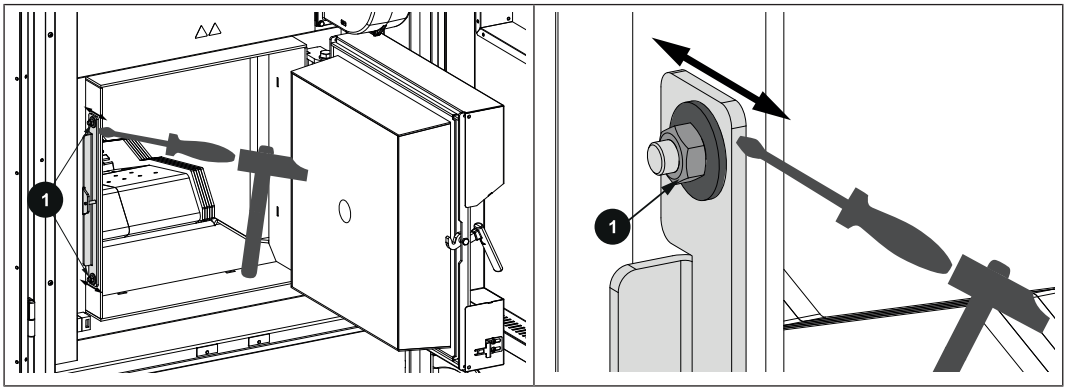
❒ Loosen the lock nuts (1) at the top and bottom of the hinge using an Allen key.

❒ Use suitable tools (e.g. screwdriver and hammer) to move the hinge towards the back or the front as required.

↳ Caution: The hinges must be aligned in the same way at the top and bottom.

❒ Fix the hinge in position with the lock nuts (1) at the top and the bottom.

Door handles



❒ Loosen the lock nuts (1) at the top and bottom of the locking plate.

❒ Use suitable tools (e.g. screwdriver and hammer) to move the locking plate towards the back or the front as required.

↳ Position the locking plate so that the door closes easily.

↳ Caution: The locking plate must be aligned in the same way at the top and bottom.

❒ Fix the locking plate in position at the top and bottom with the lock nuts (1).

6 Commissioning

6.1 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

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

6.2 Initial startup

6.2.1 Permitted fuels

Wood chips

Designation to EN ISO 17225-4	Description
M20	Water content max. 20%
M30	Water content max. 30%
M35	Water content max. 35%
M40[1)]	Water content max. 40%
P16S	Main proportion (at least 60% by mass): 3.15 – 16 mm, max. length of 45 mm, previously referred to as fine wood chips G30
P31S	Main proportion (at least 60% by mass): 3.15–31.5 mm, max. length of 150 mm, used to be medium-sized wood chips G50
1. partial load conditions to only a limited extent	

NOTICE! When using fuels with a water content of more than 35%, a power reduction below 65% of the nominal heat output is not permissible in part-load operation!

Note on standards

EU:	Fuel according to EN ISO 17225 – Part 4: Wood chips class A2 / P16S-P31S
Additional for Germany:	Fuel class 4 (§3 of the 1st Federal Emissions Protection Ordinance (BimSchV) in the latest amended version)

Wood pellets

Wood pellets made from natural wood with a diameter of 6 mm

Note on standards

EU:	Fuel acc. to EN ISO 17225 - Part 2: Wood pellets class A1 / D06
and/or:	EN*plus* / DIN*plus* certification scheme

General note:

Before refilling the store, check for pellet dust and clean if necessary.

TIP: Fit the Froling PST pellet deduster for separating the dust particles contained in the return air

Wood shavings

Wood shavings generally cause problems with combustion. Therefore their use is permitted only with authorisation from Froling. The following additional points also apply:

- Sawdust and carpentry waste should only be used with systems with a rotary valve.
- The store should be fitted with a pressure release device in accordance with regional regulations.
- The same limits apply for the permitted water content of sawdust as for wood chips.

NOTICE

For fuels with a water content < W30 the boiler's rated heat output can only be guaranteed if it is used with a flue gas recirculation system (FGR).

Miscanthus

Switchgrass or elephant grass (Latin name: miscanthus) is a C4 plant. Standards and regulations for burning these plants have not been standardised, so the following applies:

NOTICE! The regional regulations for burning miscanthus should be observed. Operation may only be possible by special permit.

Changing the fuel

⚠ CAUTION

Incorrect fuel parameter settings:

Incorrect parameter settings have a significant adverse effect on the functioning of the boiler, and as a result this will invalidate the guarantee.

Therefore:

❒ If the fuel is changed (e.g. from wood chips to pellets), the system must be reset by Froling customer services.

6.2.2 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

6.3 Heating up for the first time

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

The customer is responsible for ensuring the following prior to initial start-up of the system by Froling customer services:

- Electrical installation
- Installation of water pipes
- Connect flue gas including all insulation work
- Work must comply with local fire protection regulations

The operator must ensure the following conditions are met for initial start-up:

❒ The network can take at least 50% of the boiler's nominal output.

❒ The discharge system must be empty – "dry run" of system.

↳ Fuel must be available, however, so that the discharge system can be filled once the system is released.

❒ It is essential that the electrician who has carried out the installation work is available when starting up the system for the first time to make any changes to the wiring which may become necessary.

❒ Ensure that those responsible for operating the system are present.

↳ During initial start-up, operating staff are shown how to use the boiler. It is imperative for proper handover of the product that those involved are present as this is a one-off opportunity.

If the fireclay in the combustion chamber needs to be screed dried:

❒ Provide the following quantities of dry firewood:

↳ Systems up to 250 kW: ¼ m³

↳ Systems up to 500 kW: ½ m³

↳ Systems up to 1500 kW: 1 m³

The individual steps for initial start-up are explained in the operating instructions for the controller.

NOTICE! See operating instructions for the SPS 4000

NOTICE! Fissures in the fireclay are normal and do not indicate a fault.

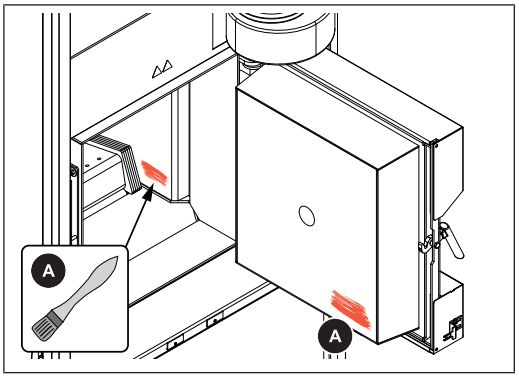
NOTICE

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.

6.3.1 Screed drying

All of the components in the combustion chamber that consist of fireclay are thoroughly tempered in the factory. This is indicated by a coloured marking (A):



- Red marking
  - Fireclay tempered, no need for screed drying
- Yellow marking
  - Fireclay NOT tempered
  - Follow these steps for screed drying:

The combustion chamber must be slowly screed dried as described below when heating up for the first time to dry out the fireclay.

⚠ 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:

❒ Screed dry the boiler in accordance with the following points:

❒ Set the boiler to user level “Service technician” and activate “Baking mode” in the quick selection menu.

❒ Fill combustion chamber with approx. 1/3 of the firewood provided.

❒ Ignite firewood and allow to burn away with the combustion chamber door half open.

Once the first load has burned out, add another approx. 1/3 of the firewood provided.

NOTICE! The combustion chamber temperature should continuously rise but must not exceed 500°C. REMEDY: Only keep the combustion chamber door open a fraction!

After adding the last batch of firewood:

❒ Allow the fire on the grate to burn out.

❒ Close the combustion chamber door.

❒ Leave the boiler in this state for a few hours (ideally overnight).

The boiler can then be used in accordance with the operating instructions ("Operating the system" section).

7 Decommissioning

7.1 Out of service for long periods

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.

❒ Place approx. 5 kg of loose lime in the combustion chamber.

↳ This absorbs moisture and thereby prevents corrosion when the boiler is out of service.

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

❒ Have the system completely drained by a qualified technician.

↳ Protection against frost

7.2 Disassembly

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

7.3 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.

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