Installation Instructions

Firewood boiler S3 Turbo

Translation of the original German installation instructions for technicians

Read and follow the instructions and safety information!

Technical changes, typographical errors and omissions reserved!

M1081217_en | Edition 23/03/2017

CE

Froeling GesmbH | A-4710 Grieskirchen, Industriestraße 12 | www.froeling.at

Table of Contents

1 General

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

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

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

Subject to technical change.

Issuing a delivery certificate

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

1.1 About this manual

These installation instructions contain information for the following S3 boilers:

S3 Turbo 18[1)], S3 Turbo 20, S3 Turbo 30 (31 kW)[2)],
S3 Turbo 40, S3 Turbo 45

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

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 or damage to property.

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 always be carried out by qualified personnel:

- Heating technician / building technician
- Electrical installation technician
- 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.

- For transportation, setup and assembly:
  - suitable work wear
  - protective gloves
  - sturdy shoes (min. protection class S1P)

2.4 Design Information

2.4.1 Notes on standards

The system must be installed and commissioned 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:

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

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

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.

Regulations and standards for permitted fuels

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

2.4.2 Installation and approval of the heating system

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

NOTICE! Each 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.

2.4.3 General information for installation room (boiler room)

Boiler room characteristics

- The floor must be even, clean and dry and have an adequate load-bearing capacity.
- There must not be a potentially explosive atmosphere in the boiler room as the boiler is not suitable for use in potentially explosive environments.
- The boiler room must be frost-free.
- The boiler does not provide any light, so the customer must ensure sufficient lighting in the boiler room in accordance with national workplace design regulations.
- When using the boiler above 2000 metres above sea level you should consult the manufacturer.
- Danger of fire due to flammable materials.
  The floor of the boiler room must not be flammable. No flammable materials should be stored near the boiler. Flammable objects (e.g. clothing) must not be put on the boiler to dry.

- Damage due to impurities in combustion air.
  Do not use any solvents or cleaning agents containing chlorine and hydrogen halides in the room where the boiler is installed (e.g. chlorination units for swimming pools).
- Keep the air suction opening of the boiler free of dust.
- The system must be protected against the chewing or nesting of animals (e.g. rodents etc.).

Ventilation of the boiler room

Ventilation air for the boiler room should be taken from and expelled directly outside, and the openings and air ducts should be designed to prevent weather conditions (foliage, snowdrifts, etc.) from obstructing the air flow.

Unless otherwise specified in the applicable building regulations for the boiler room, the following standards apply to the design and dimensions of the air ducts:

Note on standards

ÖNORM H 5170 - Construction and fire protection requirements

2.4.4 Requirements for central heating 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 8.0 and 8.5
- ❒ Use prepared water which complies with the standards cited above for filling and makeup 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

Advantages of prepared 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

Limit values for filling and make-up water:

	Austria	Germany	Switzerland
Total hardness	≤ 1.0 mmol/L	≤ 2.0 mmol/L	< 0.1 mmol/L
Conductivity	-	< 100µS/cm	< 100 µS/cm

	Austria	Germany	Switzerland
pH value	6.0 – 8.5	6.5 – 8.5	6.0 – 8.5
Chloride	< 30 mg/L	< 30 mg/L	< 30 mg/L

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

2.4.5 Notes for using 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**.

2.4.6 Return lift

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

⚠ CAUTION

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 sort of control device (e.g. thermometer).

2.4.7 Combination with storage tank

Observe the regional regulations for using a storage tank!

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

General information

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

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

As the boiler's minimum continuous heat output is 30% above the nominal heat output, we as boiler manufacturer are obliged under EN 303-5:2012, Section 4.4.6 to advise that the Firewood boiler S3 Turbo must always be connected to a storage tank with adequate storage capacity.

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

The storage tank capacity can be calculated according to EN 303-5:2012 using the following formula:

$$V_{Sp} = 15 T_B \times Q_N (1 - 0.3 \times Q_H / Q_{min})$$

V_{Sp}	Storage tank capacity in [l]
Q_N	Nominal heat output of boiler in [kW]
T_B	Burn-off period of boiler in [h][1)]
Q_H	Heating load of building in [kW]
Q_{min}	Minimum heat output of boiler in [kW] [2)]

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

Austria

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

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

Recommended storage tank capacity:

	Unit	S3 Turbo 20 – 30[1)]	S3 Turbo 40 - 45
Recommended storage tank capacity[2)]	[l]	1700	3000

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

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

Recommended storage tank capacity:

	Unit	S3 Turbo 20 – 30[1)]	S3 Turbo 40 - 45
Recommended storage tank capacity[2)]	[l]	1700	3000

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

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

2.4.8 Chimney connection/chimney system

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 in this respect that flue gas temperatures lower than 160K above room temperature can occur in the permitted operating range of the boiler.

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

The connection between the boiler and the chimney system should be as short as possible. The upward angle of the connection should not exceed 30 - 45°. Insulate the connection. The entire flue gas system - chimney and connection - should be calculated in accordance with EN 13384-1.

Local regulations and other statutory regulations also apply.

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

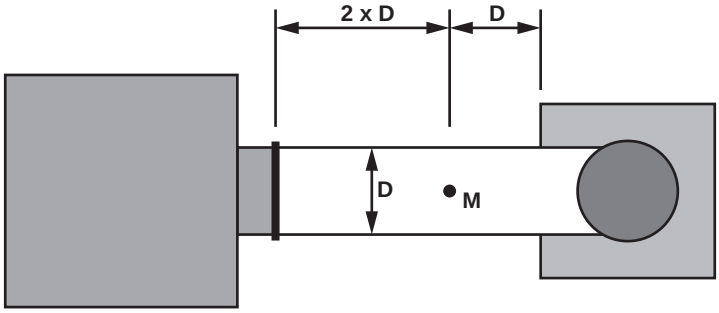
Draught limiter

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.

Measuring port

For measuring the emissions of the system, a suitable measuring port must be installed in the connecting piece between the boiler and chimney system.



In front of the measuring port (M) a straight inlet section should be located at a distance corresponding to about twice the diameter (D) of the connecting piece. A straight outlet section at a distance corresponding to about the single diameter of the connecting piece should be provided after the measuring port. The measuring port must remain closed whenever the system is in operation.

Ensure that the outside diameter of the sampling probes in the measuring port can accommodate up to 13 mm. To avoid the ingress of false air, the diameter of the measuring port must not exceed 21 mm.

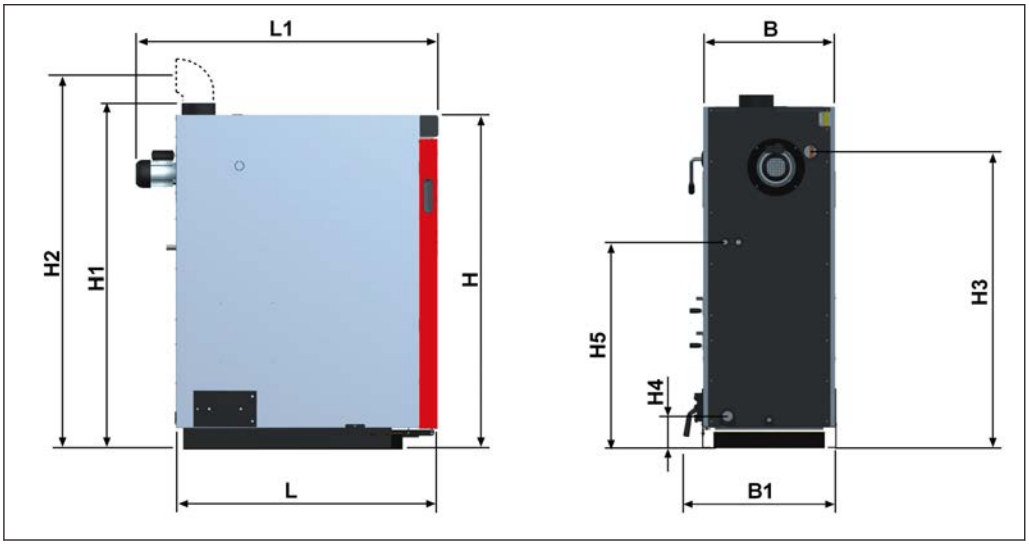
Boiler data for planning the flue gas system

Name		S3 Turbo			
		20[1)]	30	40	45
Flue gas temperature at nominal load	°C	150	170	150	170
Flue gas temperature at partial load		-	120	110	120
Flue gas mass flow at nominal load	kg/s	0.016	0.022	0.028	0.033
Flue gas mass flow at partial load		-	0.011	0.013	0.016
Required feed pressure at nominal load	Pa	8			
	mbar	0.08			
Required feed pressure at partial load	Pa	-	8		
	mbar	-	0.08		
Maximum permissible feed pressure	Pa	30			
	mbar	0.3			
Flue pipe diameter	mm	149			

1. Applies for S3 Turbo 18 as well (only available in Italy)

3 Technology

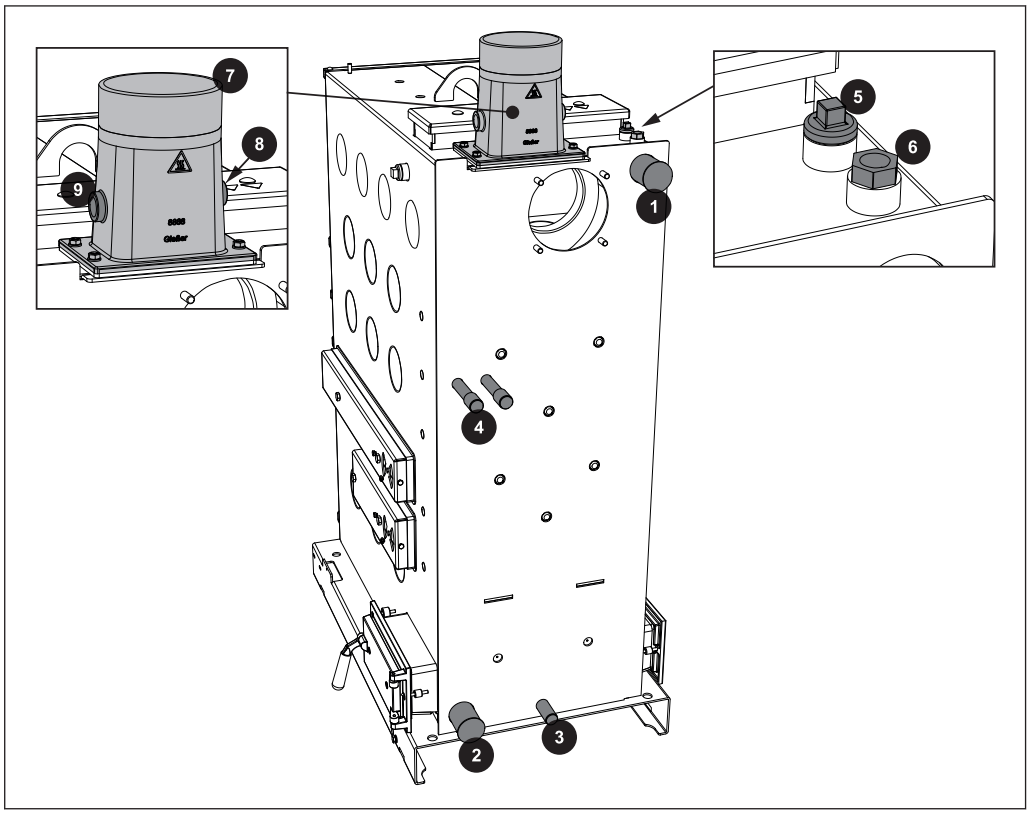
3.1 Dimensions



Dimension	Name	Unit	S3 Turbo 20-30[1)]	S3 Turbo 40-45
L	Length of boiler	mm	1160	1250
L1	Total length including induced draft fan		1260	1350
B	Width of boiler		570	670
B1	Total width inc. side cleaning door		680	780
H	Height of boiler		1470	1570
H1	Total height incl. flue gas nozzle		1530	1630
H2	Height of flue pipe connection		1750	1850
H3	Height of flow connection		1280	1380
H4	Height of return connection		140	140
H5	Height of safety battery connection		890	970
H6	Height of drainage connection		120	120

1. Applies for S3 Turbo 18 as well (only available in Italy)

3.2 Components and connections



Item	Description	Unit	S3 Turbo
1	Boiler flow connection	inches	6/4
2	Boiler return connection	inches	6/4
3	Drainage connection	inches	1/2
4	Safety battery connection	inches	1/2
5	Immersion sleeve for thermal discharge valve (supplied by the customer)	inches	1/2
6	Immersion sleeve for boiler sensor and STL	inches	1/2
7	Flue gas pipe connection	mm	149
8	Flue gas temperature sensor connection	inches	1/2
9	Broadband probe connection	inches	3/4

3.3 Technical specifications

S3 Turbo 18 - 20

Name		S3 Turbo 18[1)]	S3 Turbo 20
Nominal output	kW	22.5	20
Electrical connection	230V / 50Hz / fused C13A		
Power consumption at nominal load	W	60	63
Power consumption in slumber mode		3	
Weight of boiler incl. insulation and control	kg	520	
Total boiler capacity (water)	l	120	
Water pressure drop (ΔT = 10 / 20 K)	mbar	4.6 / 1.9	
Minimum boiler return temperature	°C	60	
Maximum permitted operating temperature		90	
Permitted operating pressure	bar	3	
Airborne sound level	dB(A)	< 70	
Permitted fuel as per EN ISO 17225	Part 5: Firewood class A2 / D15 L50		
Fuel loading door dimensions (width / height)	mm	330 / 370	
Fuel loading chamber capacity	l	140	
Combustion time[2)] - beech	h	4.3 - 6.3	4.7 - 6.9
Combustion time[2)] - spruce		3.0 - 4.4	3.3 - 4.8

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

Regulation (EU) 2015/1187			
Energy efficiency		A+	A+
Rated heat output	kW	23	20
Energy efficiency index of the boiler model		116	116
Seasonal space heating energy efficiency	%	79	79
Energy efficiency index of the boiler in package with temperature control		118	118
Energy efficiency class of the boiler in package with temperature control		A+	A+

S3 Turbo 30

Name		S3 Turbo 30	S3 Turbo 30[1)]
Nominal output	kW	30	31
Electrical connection	230V / 50Hz / fused C13A		
Power consumption at nominal load	W	51	49 - 70
Power consumption in slumber mode		3	
Weight of boiler incl. insulation and control	kg	530	
Total boiler capacity (water)	l	120	
Water pressure drop (ΔT = 10 / 20 K)	mbar	6.1 / 2.0	
Minimum boiler return temperature	°C	60	
Maximum permitted operating temperature		90	
Permitted operating pressure	bar	3	
Airborne sound level	dB(A)	< 70	
Permitted fuel as per EN ISO 17225	Part 5: Firewood class A2 / D15 L50		
Fuel loading door dimensions (width / height)	mm	330 / 370	
Fuel loading chamber capacity	l	140	
Combustion time[2)] - beech	h	3.9 - 5.6	
Combustion time[2)] - spruce		2.8 - 3.9	

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

Regulation (EU) 2015/1187			
Energy efficiency		A+	A+
Rated heat output	kW	30	31
Energy efficiency index of the boiler model		117	115
Seasonal space heating energy efficiency	%	80	78
Energy efficiency index of the boiler in package with temperature control		119	117
Energy efficiency class of the boiler in package with temperature control		A+	A+

S3 Turbo 40 - 45

Name		S3 Turbo 40	S3 Turbo 45
Nominal output	kW	40	45
Electrical connection	230V / 50Hz / fused C13A		
Power consumption at nominal load	W	53 – 73	66
Power consumption in slumber mode		3	
Weight of boiler incl. insulation and control	kg	610	620
Total boiler capacity (water)	l	190	
Water pressure drop (ΔT = 10 / 20 K)	mbar	7.0 / 2.1	22.0 / 6.3
Minimum boiler return temperature	°C	60	
Maximum permitted operating temperature		90	95
Permitted operating pressure	bar	3	
Airborne sound level	dB(A)	< 70	
Permitted fuel as per EN ISO 17225	Part 5: Firewood class A2 / D15 L50		
Fuel loading door dimensions (width / height)	mm	330 / 370	
Fuel loading chamber capacity	l	210	
Combustion time[1)] - Beech	h	4.1 - 6.0	3.9 - 5.6
Combustion time[1)] - Spruce		2.9 - 4.2	2.7 - 4.0

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

Regulation (EU) 2015/1187			
Energy efficiency		A+	A+
Rated heat output	kW	40	45
Energy efficiency index of the boiler model		115	116
Seasonal space heating energy efficiency	%	78	79
Energy efficiency index of the boiler in package with temperature control		117	118
Energy efficiency class of the boiler in package with temperature control		A+	A+

Test report data S3 Turbo 18 - 20

Name		S3 Turbo 18[1)]	S3 Turbo 20
Test book number		PB0310011	PB0900016
Nominal output	kW	22.5	20
Boiler class as per EN 303-5: 2012		5	

1. S3 Turbo 18 only available in Italy

Test data - Emissions in [mg/MJ][1)] (nominal load)			
Carbon monoxide (CO)	mg/MJ	90	100
Nitrogen oxide (NOx)	mg/MJ	91	93
Organic hydrocarbons (OGC)	mg/MJ	6	7
Dust	mg/MJ	7	7
Boiler efficiency	%	91.1	90.8

1. The pollutant concentration is specified as a mass based on the energy content of the fuel fed to the combustion system in mg/MJ

Test data - Emissions in [mg/m³][1)] (nominal load)			
Carbon monoxide (CO)	mg/m³	133	147
Nitrogen oxide (NOx)	mg/m³	134	137
Organic hydrocarbons (OGC)	mg/m³	10	11
Dust	mg/m³	11	11

1. Emissions values based on dry flue gas at standard temperature and pressure (0°C, 1013 mbar) with a volume content of oxygen of 13%

Test report data S3 Turbo 30

Name		S3 Turbo 30	S3 Turbo 30[1)]
Test book number		PB0910016	PB0910016_at
Nominal output	kW	30	31
Boiler class as per EN 303-5: 2012		5	5 4 with partial load inspection

1. S3 Turbo 30 with 31 kW nominal output only available in Austria and Italy

Test data - Emissions in [mg/MJ][1)] (nominal load / partial load)			
Carbon monoxide (CO)	mg/MJ	62 / –	58 / 486
Nitrogen oxide (NOx)	mg/MJ	84 / –	84 / 70
Organic hydrocarbons (OGC)	mg/MJ	3 / –	3 / 20
Dust	mg/MJ	7 / –	7 / 8
Boiler efficiency	%	92.2 / –	93.3 / 92.4

1. The pollutant concentration is specified as a mass based on the energy content of the fuel fed to the combustion system in mg/MJ

Test data - Emissions in [mg/m³][1)] (nominal load / partial load)			
Carbon monoxide (CO)	mg/m³	91 / –	86 / 714
Nitrogen oxide (NOx)	mg/m³	124 / –	124 / 102
Organic hydrocarbons (OGC)	mg/m³	5 / –	4 / 30
Dust	mg/m³	10 / –	10 / 12

1. Emissions values based on dry flue gas at standard temperature and pressure (0°C, 1013 mbar) with a volume content of oxygen of 13%

Test report data S3 Turbo 40 - 45

Name		S3 Turbo 40	S3 Turbo 45
Test book number		PB0920016	PB0340011
Nominal output	kW	40	45
Boiler class as per EN 303-5: 2012		5	

Test data - Emissions in [mg/MJ][1)] (nominal load / partial load)			
Carbon monoxide (CO)	mg/MJ	47 / 296	55 / 190
Nitrogen oxide (NOx)	mg/MJ	82 / 80	85 / 86
Organic hydrocarbons (OGC)	mg/MJ	2 / 12	2 / 7
Dust	mg/MJ	8 / 10	9 / 10
Boiler efficiency (nominal load / partial load)	%	93.5 / 92.6	94.1

1. The pollutant concentration is specified as a mass based on the energy content of the fuel fed to the combustion system in mg/MJ

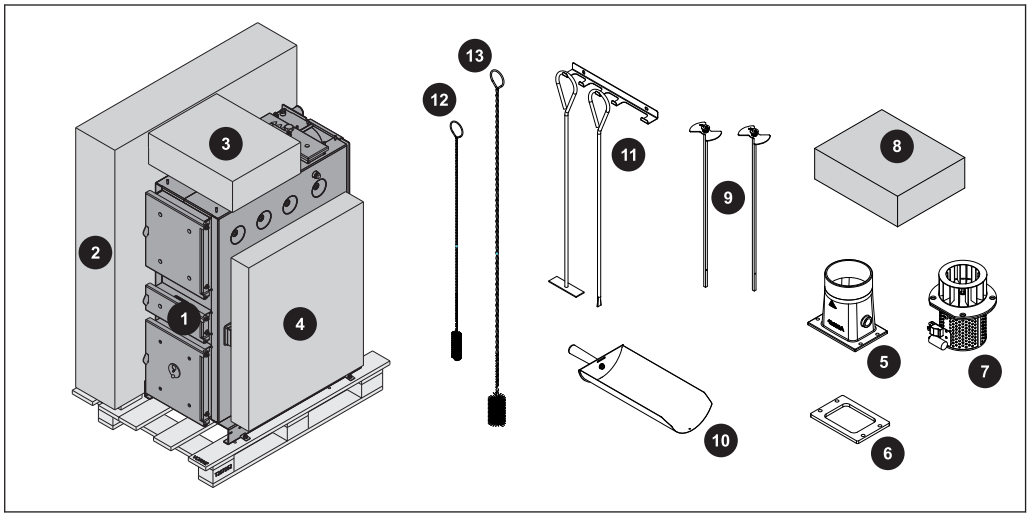
Test data - Emissions in [mg/m³][1)] (nominal load / partial load)			
Carbon monoxide (CO)	mg/m³	69 / 435	81 / 280
Nitrogen oxide (NOx)	mg/m³	120 / 118	125 / 127
Organic hydrocarbons (OGC)	mg/m³	2 / 18	3 / 11
Dust	mg/m³	11 / 14	14 / 15

1. Emissions values based on dry flue gas at standard temperature and pressure (0°C, 1013 mbar) with a volume content of oxygen of 13%

4 Assembly

4.1 Materials supplied

The boiler comes on a pallet together with insulation, controller and accessories. Some of the components come in cardboard packaging.



1	Boiler	8	Cardboard box containing small parts
2	Insulation	9	Pneumatic rods, complete
3	Controller	10	Ash shovel
4	EOS system (heat exchanger optimisation system)	11	Cleaning kit
5	Flue gas pipe nozzle	12	Cleaning brush, small
6	Ceramic fibre seal	13	Cleaning brush, large
7	Induced draft fan		

Not pictured: installation and operating instructions, guarantee certificate, identification plate

4.1.1 Tools required

The following tools are required for assembly:

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

4.2 Positioning

NOTICE

Damage to components if handled incorrectly

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

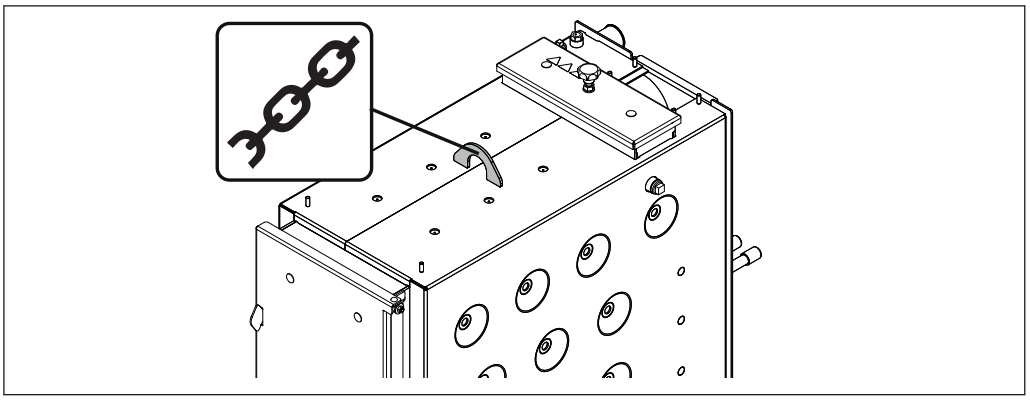
❒ Position a fork-lift or similar lifting device at the pallet and bring in the components

If the boiler cannot be brought in on the pallet:

❒ remove the cardboard and take the boiler off the pallet

⇨ See "Remove boiler from pallet" [page 25]

Positioning using a crane



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

4.2.1 Temporary storage

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

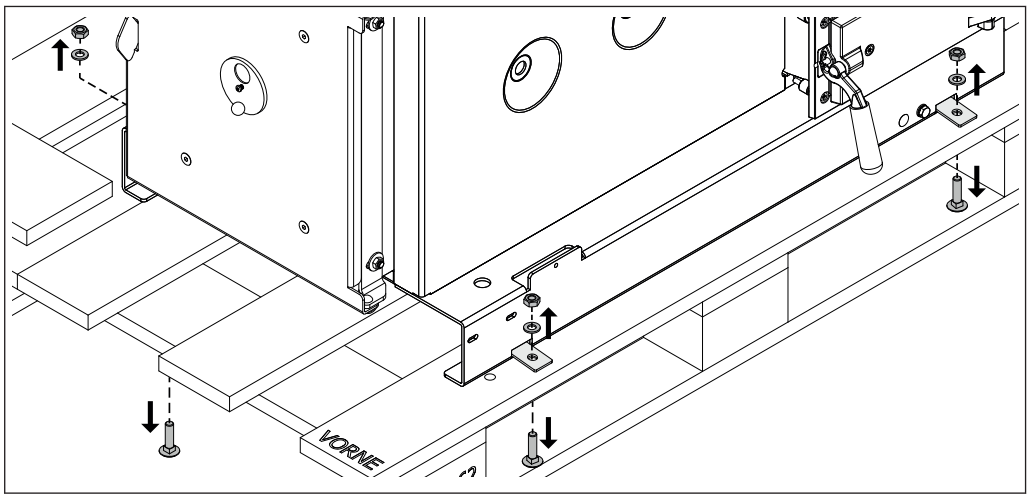
❒ Store components at a protected location, which is dry and free from dust

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

4.3 Setting up in the boiler room

4.3.1 Remove boiler from pallet

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



- ❒ Remove the transport locks
  - ➥ A total of four screws, left/right, front/rear
- ❒ Lift boiler from pallet

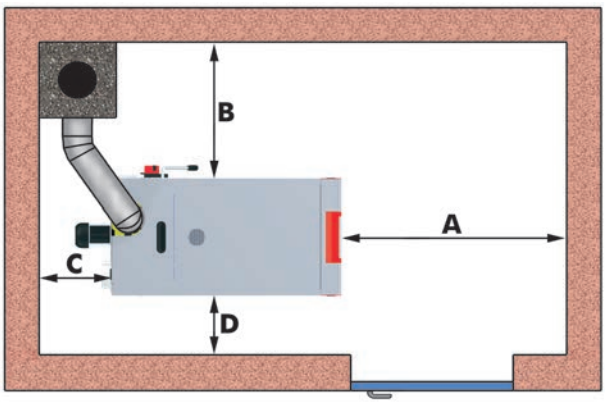
TIP: use Froling's KHV 1400 boiler lifting system to help remove the pallet!

4.3.2 Moving the boiler in the boiler room

- ❒ Position a fork-lift 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
  - ➥ Observe the minimum distances in the boiler room.

4.3.3 Minimum distances in the boiler room

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



Dimension	Description	Unit	S3 Turbo
A	Distance - front of boiler to wall	mm	800
B	Distance – side of boiler to wall		800 (200)[1)]
C	Distance – back to wall		500
D	Distance – side of boiler to wall		200 (800)[1)]

1. The side of the boiler where the WOS lever is located (B or D) should be at least 800 mm from the wall to allow easy access for connecting the appliance and for maintenance work (e.g. induced draught).

4.4 Before Installation

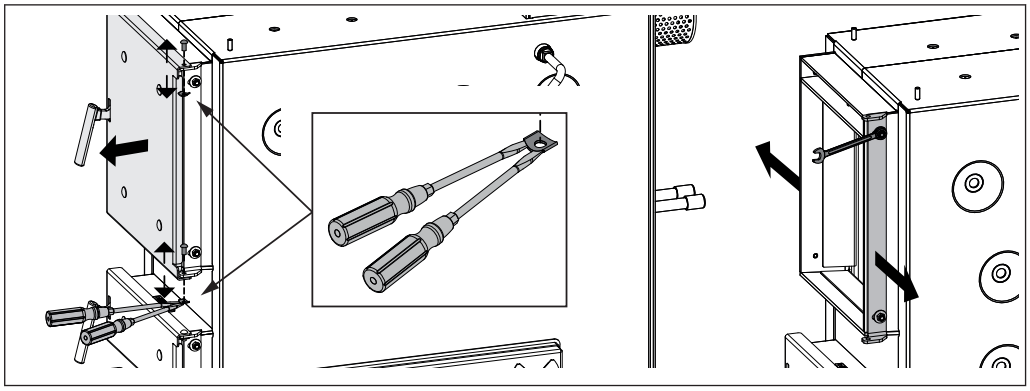
4.4.1 Changing door stops (as needed)

The boiler comes with the door stop on the right. To change the side the door stops are on, proceed as follows.

Changing the stop

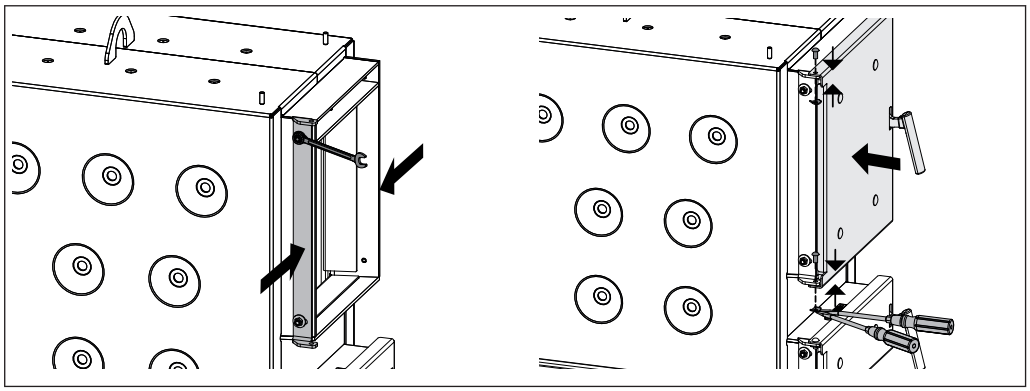
The following example using the fuel loading door shows how to change the door stop. The procedure is the same for changing the stop on the combustion chamber door and pre-heating chamber door!

❒ Open the fuel loading door

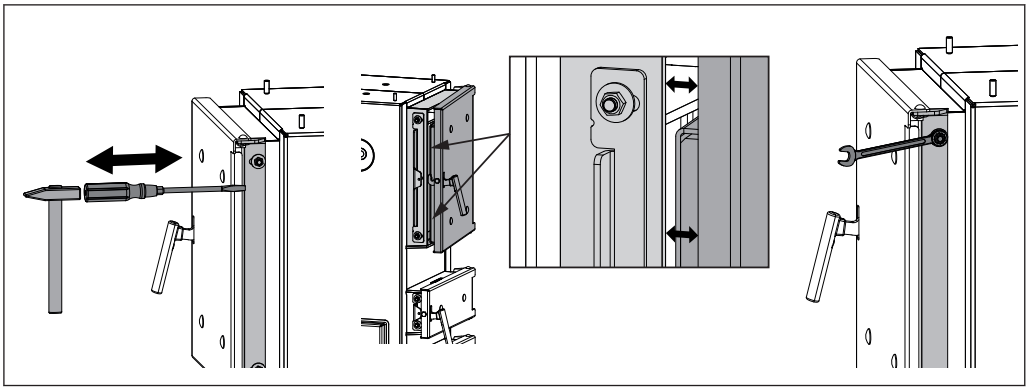


❒ Undo the retainer of the hinge pin at the top and bottom door hinge
  ➥ For example, use two screwdrivers to gently bend the retainer plate out to loosen it
❒ Take out the top and bottom hinge pins and take off the fuel loading door
❒ Remove the locking plate and hinge
  ➥ Loosen the nuts (M8) with Allen wrench (SW 13 mm)
❒ Remount the locking plate and hinge with spacer washers and nuts on the other side
  ➥ Only partially tighten the nuts

NOTICE! At this point, the fuel loading door must be rebuilt if the stop of the door is being changed. ⇨ See "Converting the fuel loading door" [page 28]



❒ Rotate the door and rehang it with the stop on the other side
  ➥ Secure at the top and bottom with the hinge pins
❒ Refit the retainers to the top and bottom hinge pins
  ➥ to do so, we recommend using two screwdrivers



❒ Use suitable tools (e.g. screwdriver and hammer) to push the hinge far enough toward the rear so that when the door is closed, there is slight resistance at a gap of approx. 2-3 cm

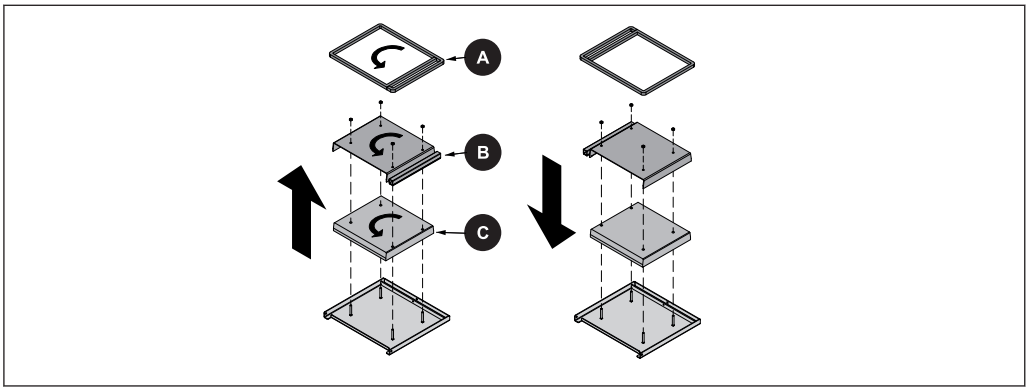
↪ Caution: the hinge must be aligned in the same way at the top and bottom!

❒ Tighten the nuts at the top and the bottom on the side of the door with the stop

NOTICE! When the door stops have been changed, you must check the settings and seal of the door.

⇨ See "Setting and checking the seal on the doors" [page 29]

Converting the fuel loading door



❒ Remove the radiation plate (B) together with the seal (A)

❒ Carefully lift out the insulating plate (C)

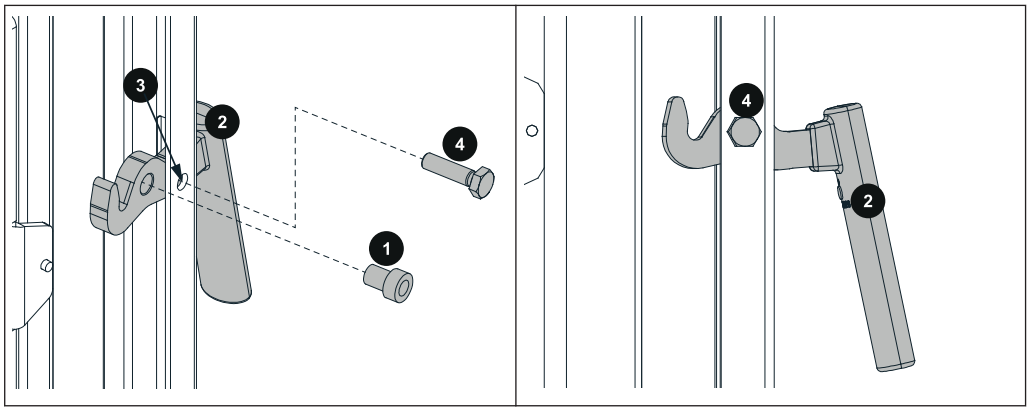
❒ Turn the insulating plate (C), radiation plate (B) and seal (A) by 180° and position them so that they line up with the holes provided

❒ Refit the radiation plate (B) and insulating plate (C)

❒ Use contact adhesive to fix the seal (A) in place

4.4.2 Fitting the door handles

The procedure is the same for all doors.



❒ Insert the flange bushing (1) into the door handle (2) and position it alongside the hole (3) provided

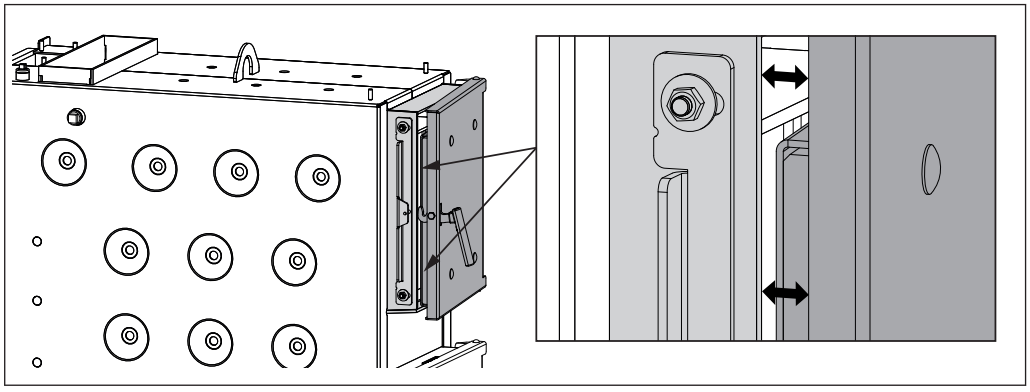
❒ Fix the door handle (2) in place using screws (4)

4.4.3 Setting and checking the seal on the doors

The example below shows how to set and check the seals on the fuel loading doors. The procedure is the same for the combustion chamber door and the pre-heating chamber door!

On the side with the door stop

Checking the setting:



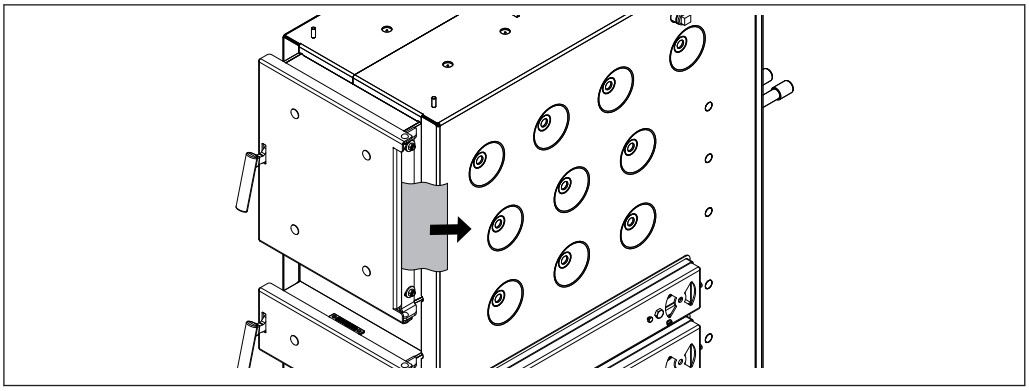
❒ Close the door

➥ 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
⇨ See "Positioning the doors" [page 31]

➥ Resistance noticeable at a gap of >3 cm:
Setting must be corrected - push the hinge toward the front
⇨ See "Positioning the doors" [page 31]

Checking the 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.
⇨ See "Positioning the doors" [page 31]

On the side with the door handle

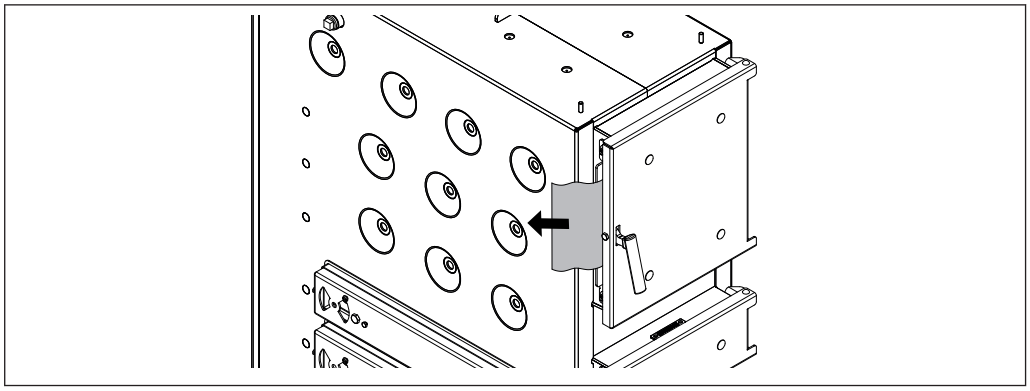
Checking the setting:

❒ Close the door

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

➥ If the door cannot be closed with the usual force or must be forced closed:
Push the locking plate toward the front
⇨ See "Positioning the doors" [page 31]

Checking the 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

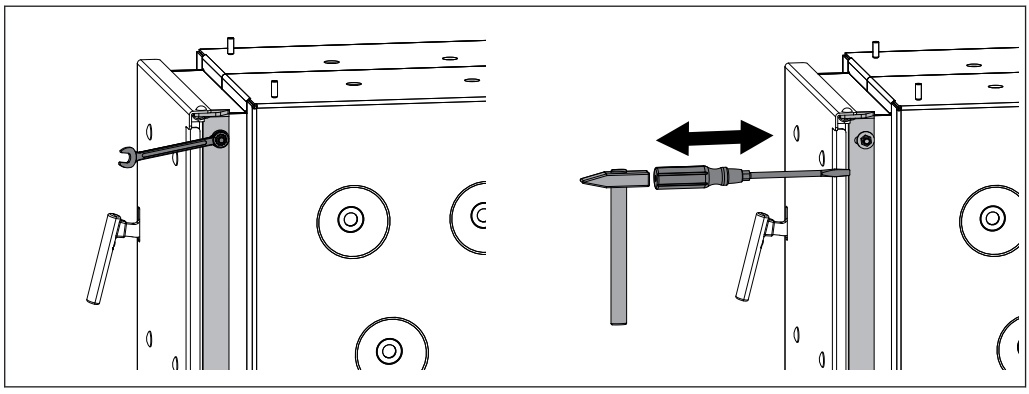
❒ Close the door

❒ 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 "Positioning the doors" [page 31]

Positioning the doors



❒ Using an Allen key (SW 13 mm), loosen the nuts on the locking plate and/or hinge at the top and bottom

❒ Use suitable tools (e.g. screwdriver and hammer) to move the locking plate and/or hinge to the rear or the front as needed

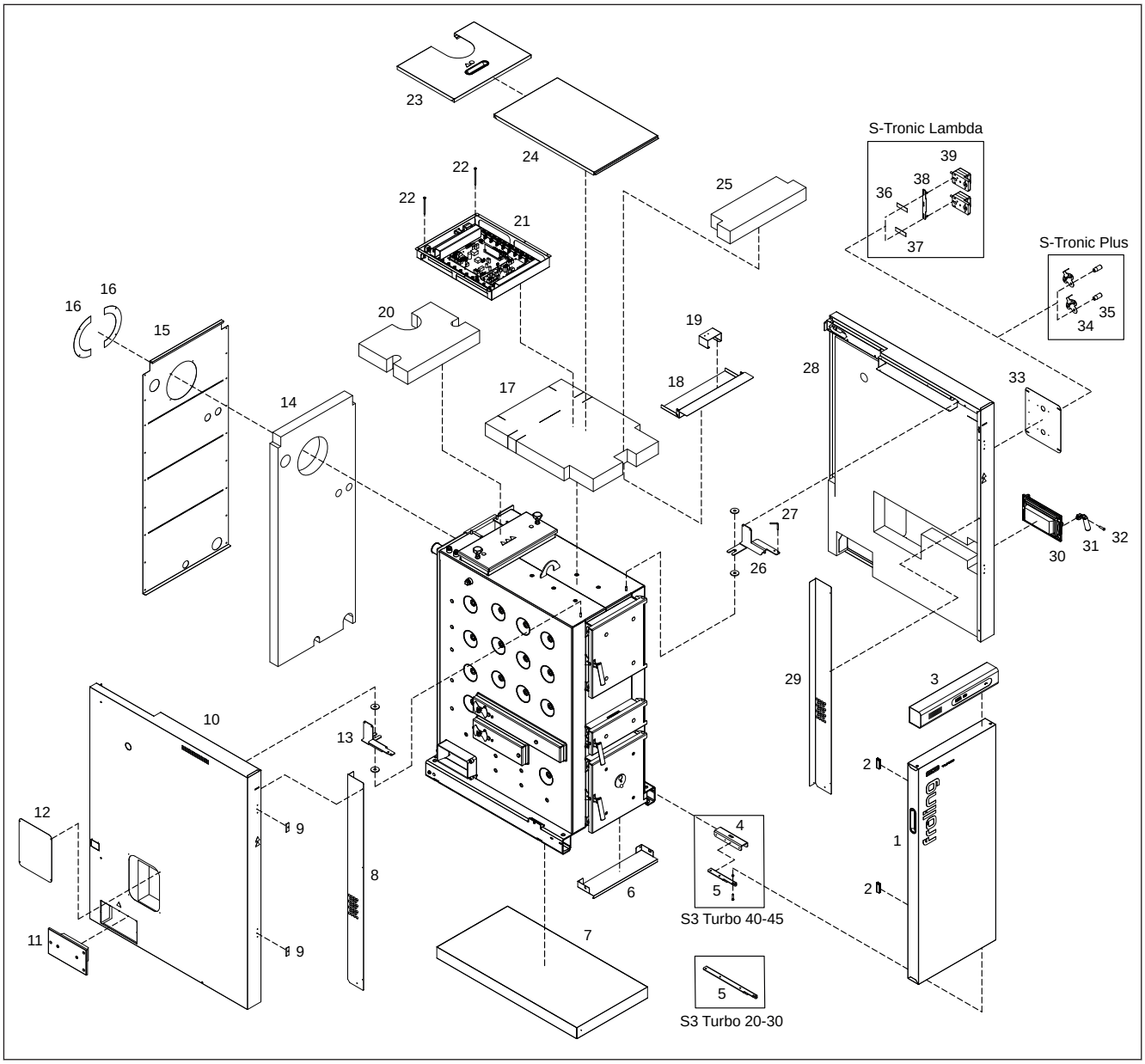
➥ Caution: the locking plate and/or hinge must be aligned in the same way at the top and bottom!

❒ Tighten the nuts at the top and bottom

4.5 Installing the boiler

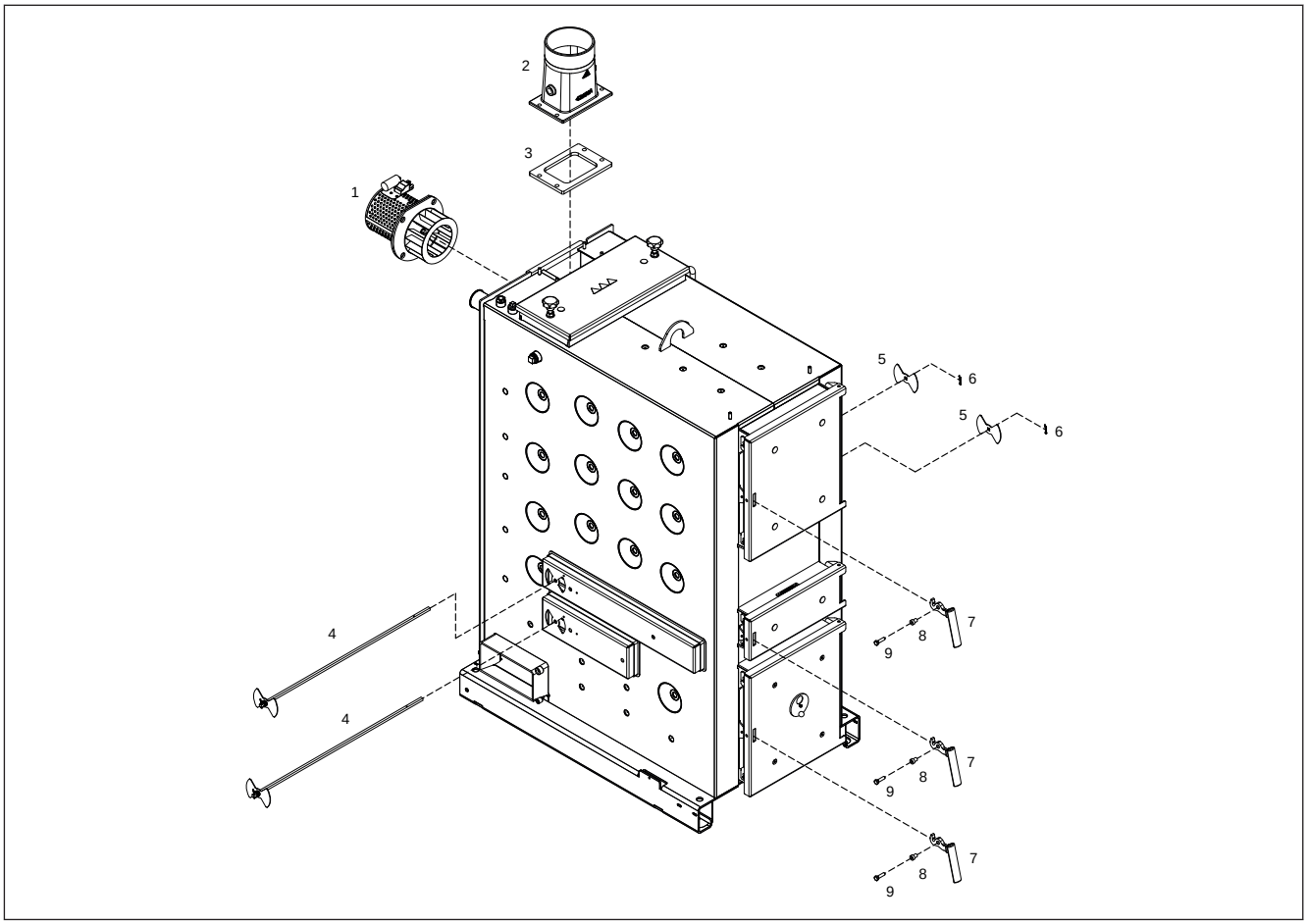
4.5.1 Assembly overview

Insulation



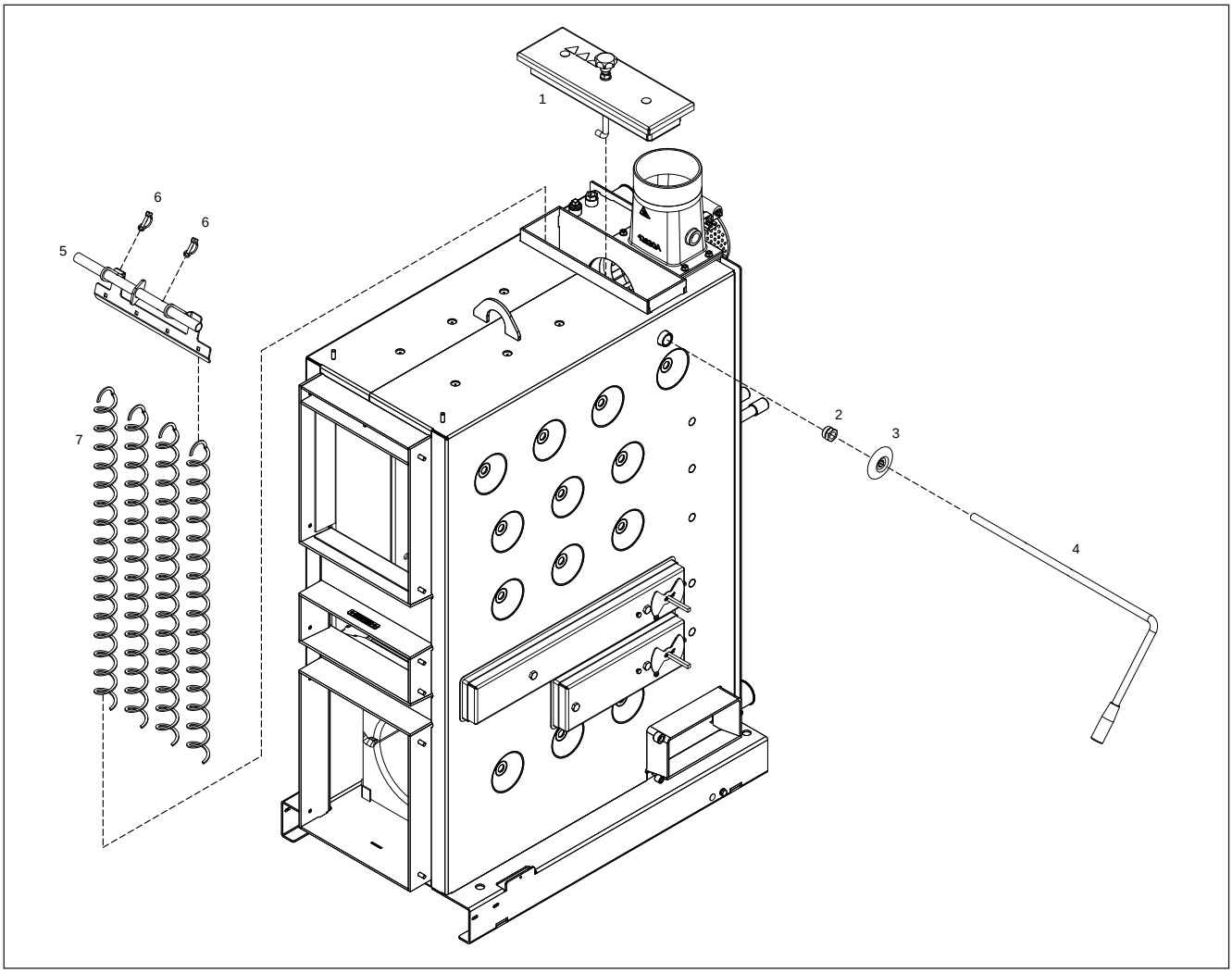
Item	Quantity [units]	Name	Item	Quantity [units]	Name
1	1	Insulated door, complete	21	1	Controller box, complete
2	2	Magnetic latches	22	2	Hexagonal screw M6 x 100
3	1	Control, complete	23	1	Insulating cover, back
4	1	U-plate – S3 Turbo 40/45	24	1	Controller cover
5	1	Lower door bracket	25	1	Heat insulation mat, top/front
6	1	Cover plate, insulated door, bottom	26	1	Bracket, right
7	1	Complete floor insulation	27	1	Hinge pin, insulated door
8	1	Insulation cover plate, left	28	1	Insulating side panel, right, complete
9	2	Counter plate for magnetic latches	29	1	Insulation cover plate, right
10	1	Insulating side panel, left, complete	30	1	Side cleaning door, complete
11	1	Blanking plate, side cleaning door	31	1	Door handle, cleaning door
12	1	Cover plate	32	1	Round-head screw M8 x 30
13	1	Bracket, left	33	1	Cover plate
14	1	Thermal insulation, rear	34	2	Air flap manual controller (only for S-Tronic Plus)
15	1	Back panel, complete	35	2	Air flap handle (only for S-Tronic Plus)
16	2	Cover plate for ID fan	36	1	Sticker, "Primary air actuator" (only with S-Tronic Lambda)
17	1	Heat insulation mat, top	37	1	Sticker, "Secondary air actuator" (only with S-Tronic Lambda)
18	1	Upper spacer plate	38	1	Torque support (only with S-Tronic Lambda)
19	1	Door contact switch incl. cable	39	2	Servo-motor LM 24AP5-F/300.1 (only with S-Tronic Lambda)
20	1	Heat insulation mat, top/rear			

Air duct system



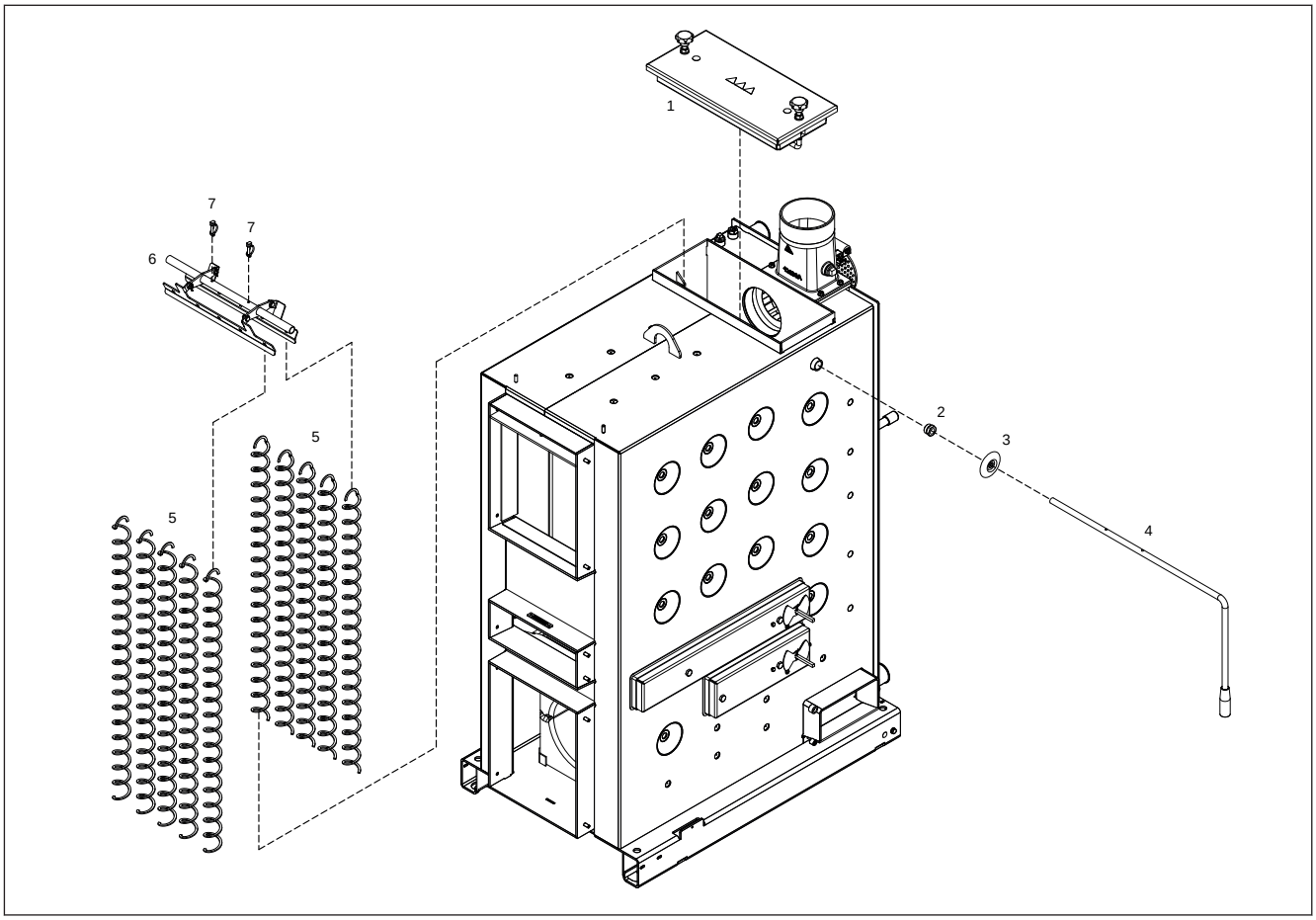
Item	Quantity [units]	Description
1	1	Induced draught fan 2800U, complete, with rotation speed transducer
2	1	Flue gas pipe nozzle Ø 150
3	1	Ceramic fibre seal 210 x 144 x 12
4	2	Pneumatic rods, complete
5	2	Sliding valve Ø 100
6	2	Split pin Ø 3.2 x 20
7	3	Door handle, black
8	3	Bushing Ø 10 x 20
9	3	Hexagonal screw M8 x 30

WOS system S3 Turbo 20-30



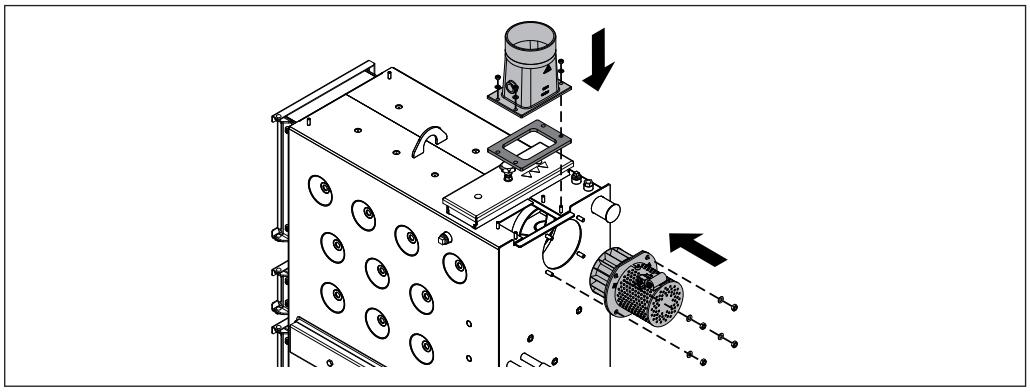
Item	Quantity [units]	Name
1	1	WOS cleaning cover, complete
2	1	Grey cast iron bushing
3	1	Plastic cover
4	1	WOS lever
5	1	WOS bracket, complete 6 x 3
6	2	Pipe locking pin
7	4	WOS turbulator Ø 50 x 6 x 3 x 837

WOS system S3 Turbo 40-45



Item	Quantity [units]	Name
1	1	WOS cleaning cover, complete
2	1	Grey cast iron bushing
3	1	Plastic cover
4	1	WOS lever
5	10	WOS turbulator Ø 50 x 6 x 3 x 932
6	1	WOS bracket, complete 6 x 3
7	2	Pipe locking pin

4.5.2 Fit flue gas pipe nozzle and the induced draught fan



❒ Place the ceramic fibre seal in position

❒ Position the flue gas pipe nozzle and attach it using the pre-installed spacer washers and nuts

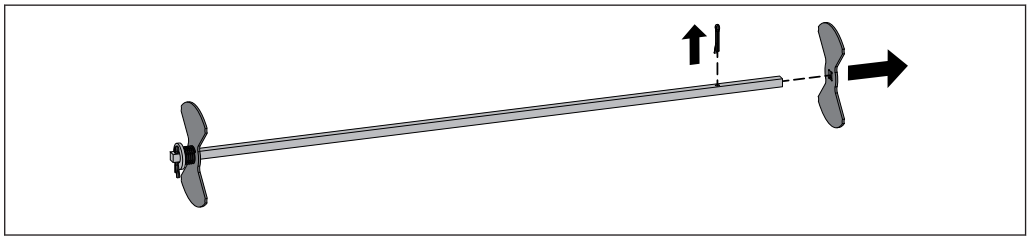
➥ Caution: 1/2” connection must point to the right as seen from behind!

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

➥ Caution: do not overstress the flange!

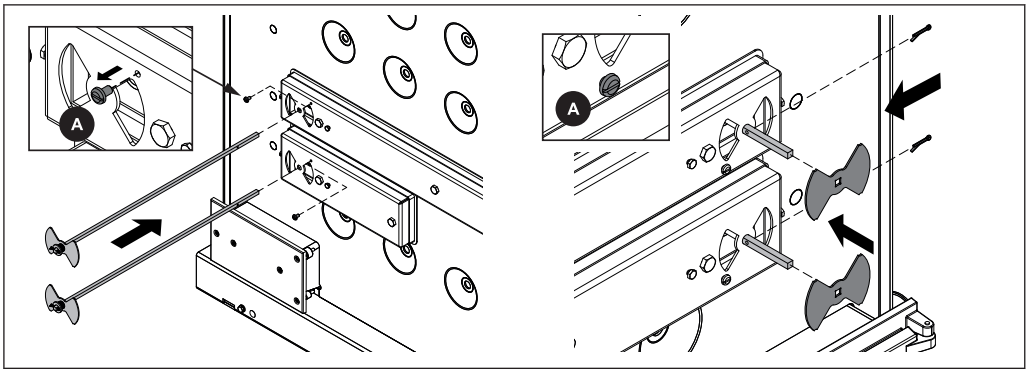
4.5.3 Installing the pneumatic rods for the primary and secondary air

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



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

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

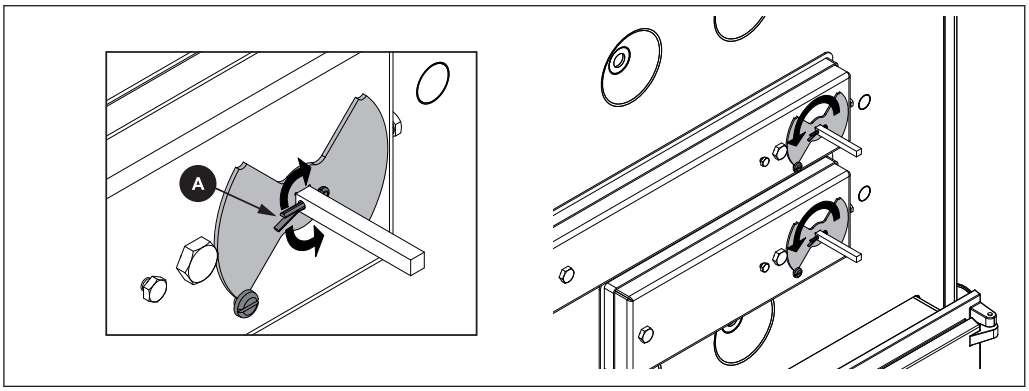


❒ Loosen the two screws (A) at the lower and upper air duct on the left side of the boiler

❒ Unscrew the screws (A) at the lower and upper air duct on the right side of the boiler far enough to allow the air flap to make contact with the thread

❒ Insert both pneumatic rods into the left-hand side of the boiler

➥ The air flaps with springs lie flat on the left-hand air ducts!

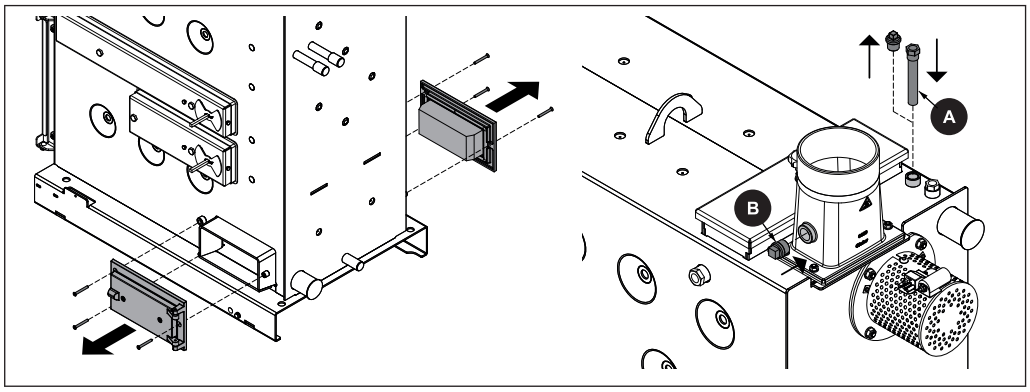


❒ Insert the air flaps on the pneumatic rods on the right-hand side and secure them with split pins (A)

➥ CAUTION: the air flaps must be situation in the same position as those on the opposite side!

❒ Turn both pneumatic rods in an anti-clockwise direction as far as the stop

4.5.4 Final steps before insulating



❒ Remove the side blanking plate and cleaning door

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

Only for S-Tronic Plus:

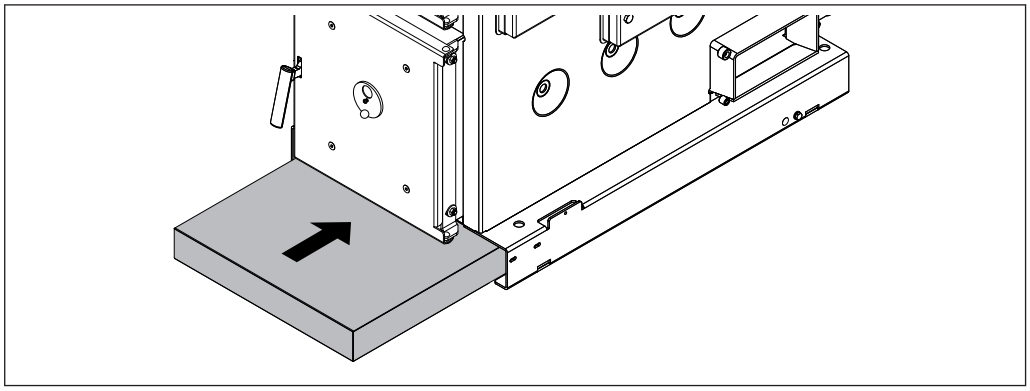
❒ Seal the broadband probe connection with a 3/4" blanking plug (B)

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

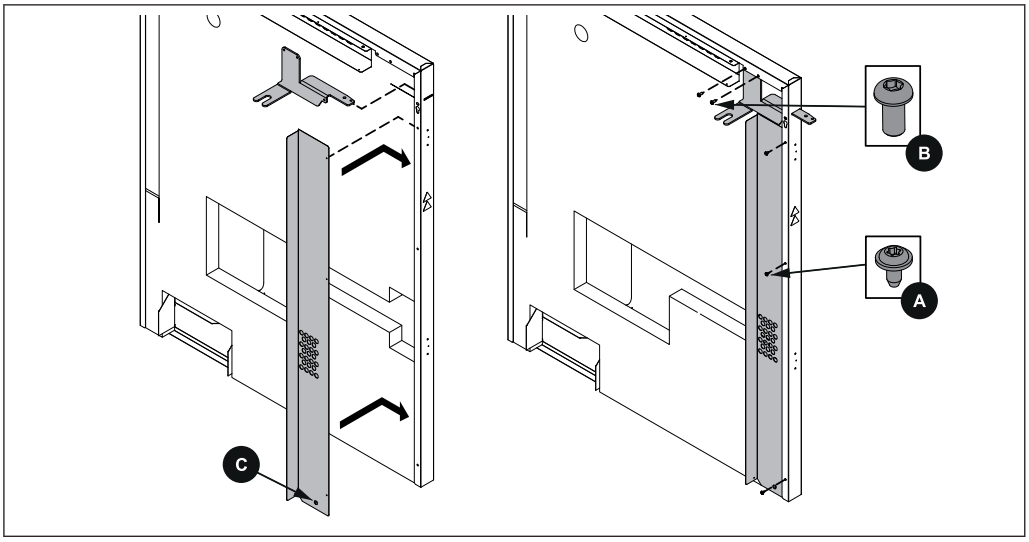
4.5.5 Installing the insulation

NOTICE

The individual parts of the boiler insulation covered with a protective film. You must remove the protective film before proceeding with installation.



❒ Push in the floor insulation

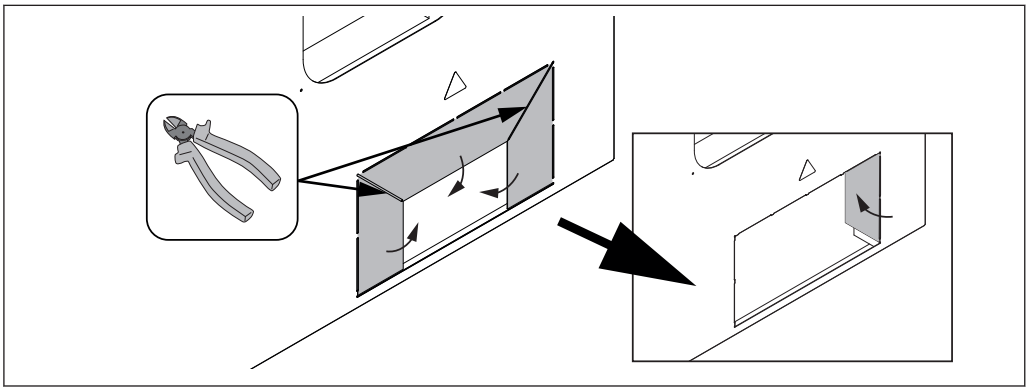


❒ Inset the two L-shaped insulation cover plates at the insulating side panels at left and right and secure them with three thread forming screws (A) each

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

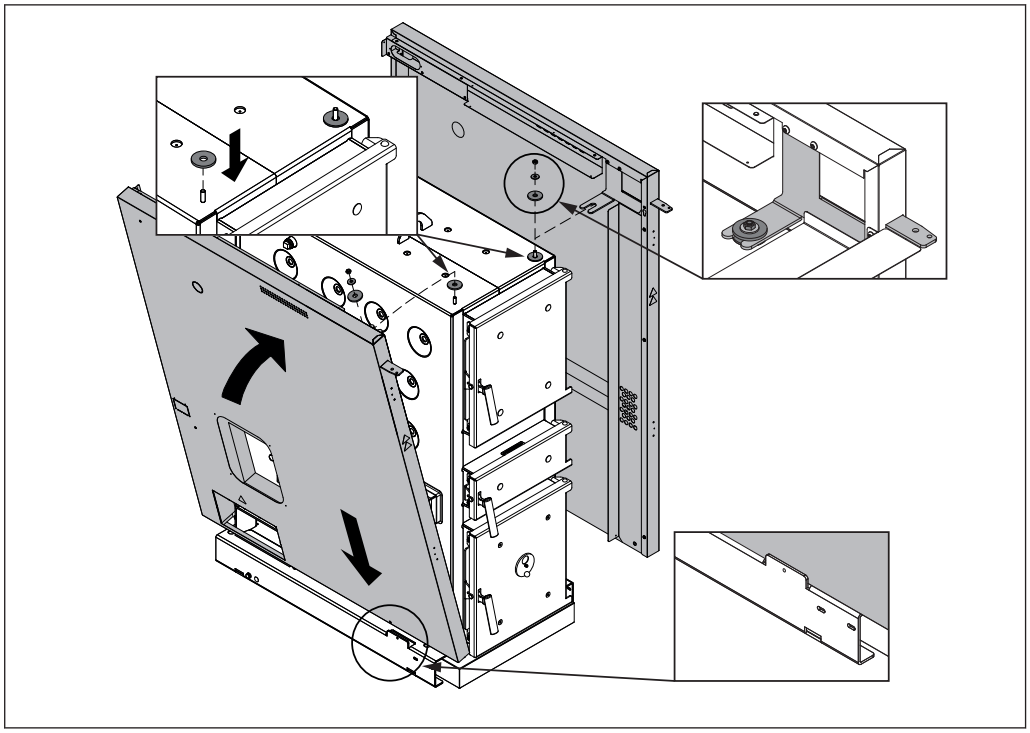
❒ Insert the insulation mounting brackets at both insulating side panels and secure them with the two top thread forming screws (B)

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



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

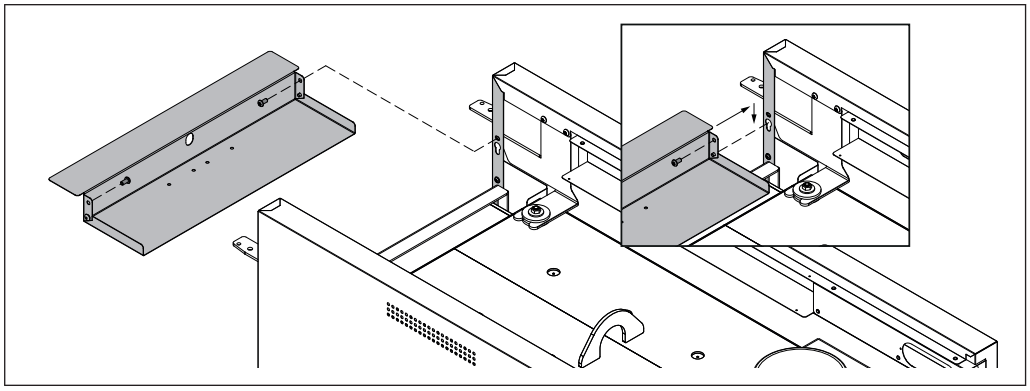
➥ Caution: Bend the flaps > 100° inward!



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

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

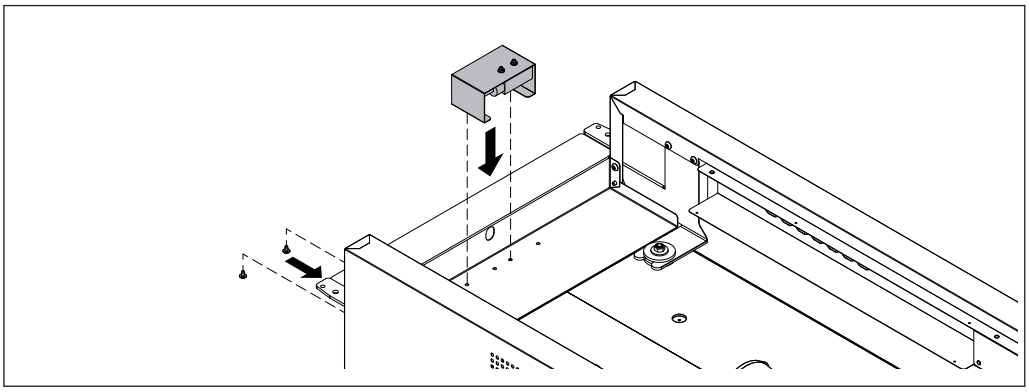
❒ Position the side panels with the door bracket onto the threaded bolts and secure them lightly with a large and a small spacer washer and nut



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

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

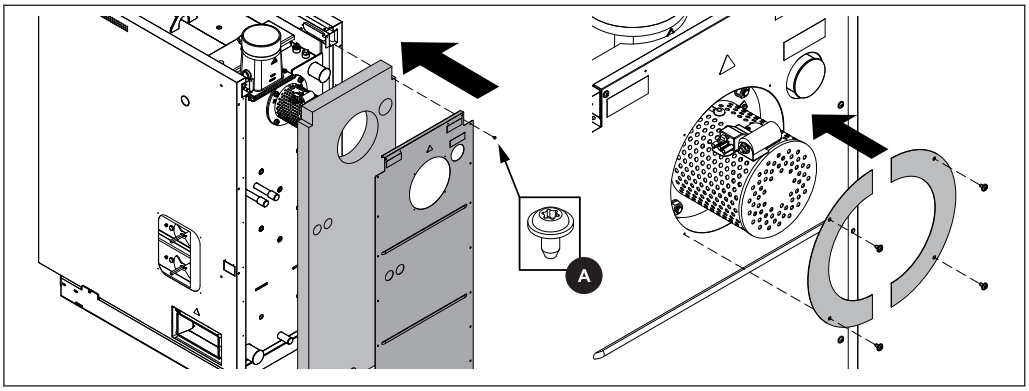
4.5.6 Installing the door switch



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

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

4.5.7 Installing the back panel



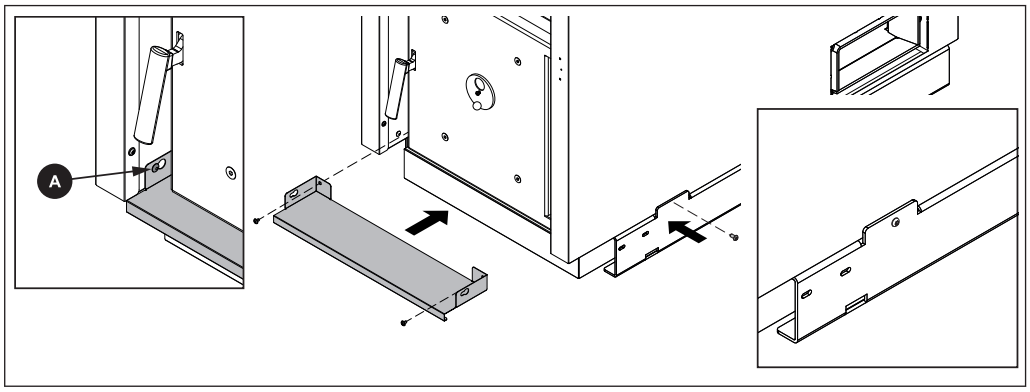
❒ Position the rear thermal insulation on the rear side of the boiler

❒ Insert back panel over induced draught fan

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

❒ Installing the induced draught cover plates

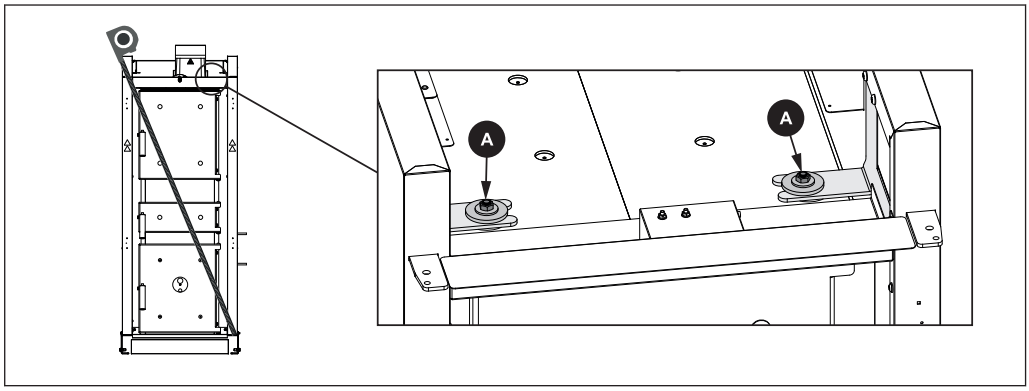
4.5.8 Aligning the insulation and attaching the controller



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

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

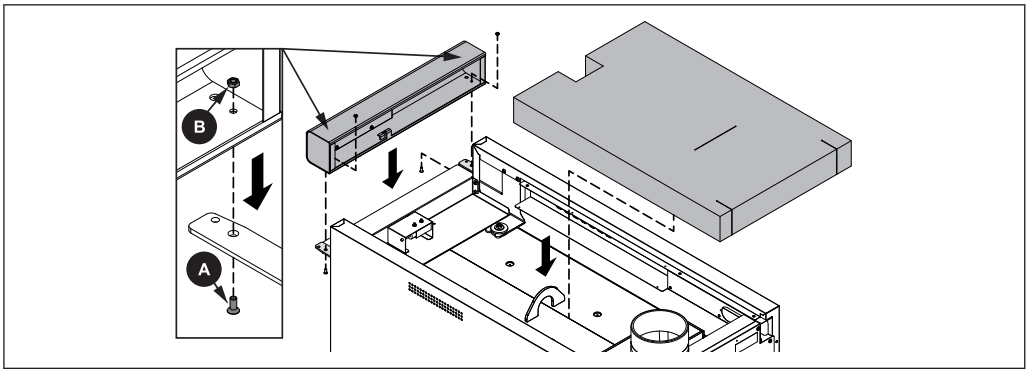
❒ Secure the insulating side panels to the right and left at the flap on the boiler base with thread forming screws



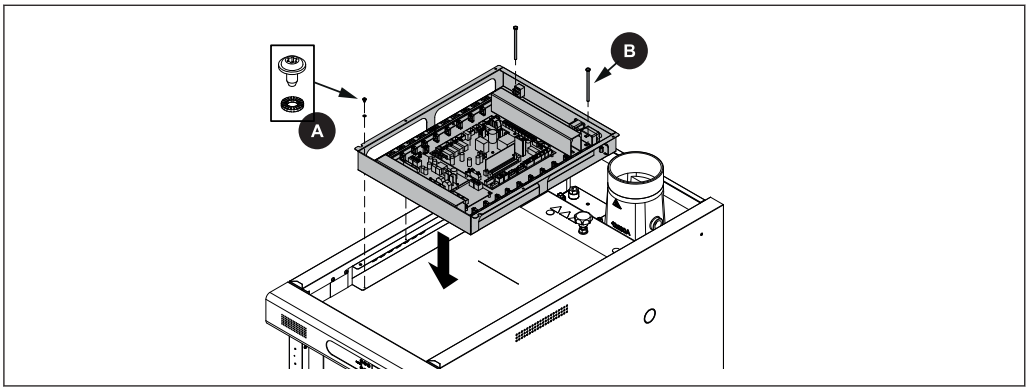
❒ Measure the diagonals and align the insulating side panels so that the two diagonals are the same

➥ Adjust the position of the side panels if necessary

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



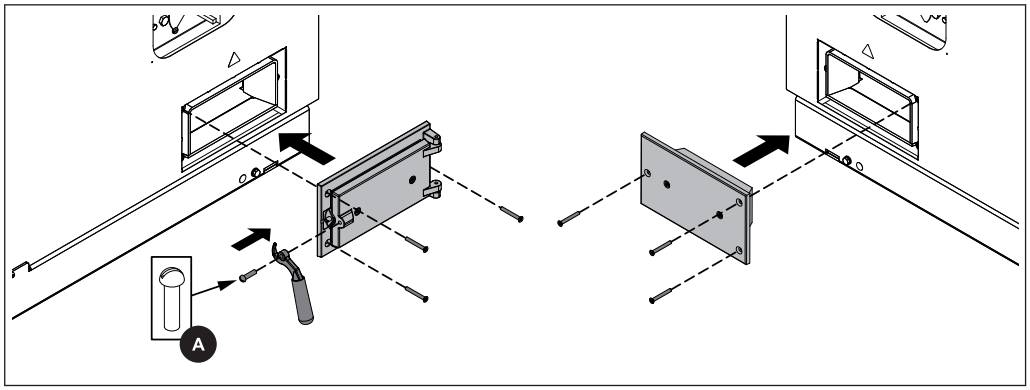
- ❒ Position the control on top
- ❒ Insert one countersunk cross-head screw (A) each to the left and right through the bracket and control from below
- ❒ Use nuts (B) to secure the countersunk cross-head screws from the top
- ❒ Put the top heat insulation mat on
  - ➥ The heat insulation mat must touch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



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

4.5.9 Installing the cleaning port door and blank cover

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

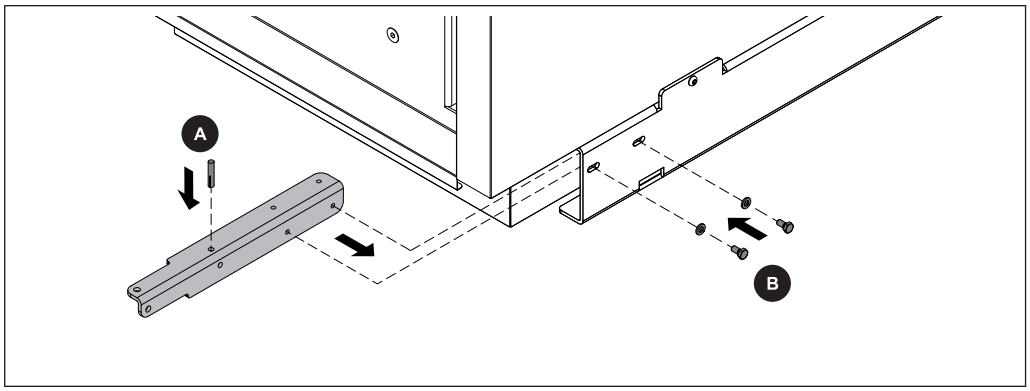


❒ Use three Allen screws to mount the cleaning door on the desired side
  ➥ Start with the screws at upper right!
❒ Attach the door handle for the cleaning door using a round headed screw (A)
❒ Install the blank cover for the side cleaning on the opposite side

4.5.10 Installing the insulated door

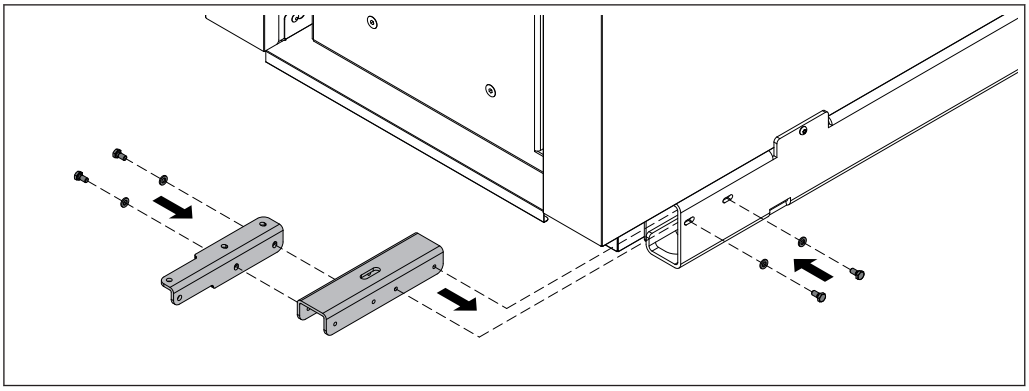
The illustrations show the assembly for the door stop on the right. If the insulated door is attached on the left, complete the following procedures with the sides reversed accordingly.

S3 Turbo 20/30:



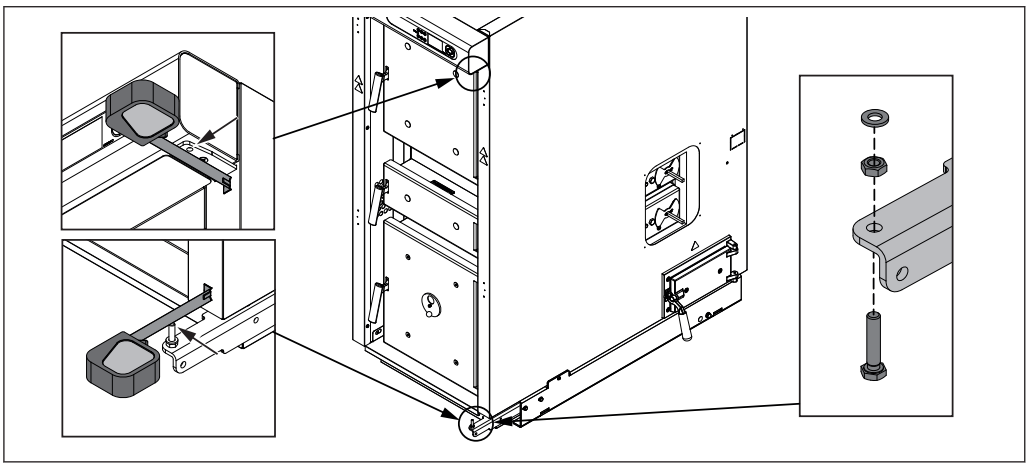
❒ Tap in a fitting grooved pin (A) at the lower door bracket
❒ Slide the lower door bracket into the base of the boiler
  ➥ Insert the fitting grooved pin (A) into the insulation
  ➥ Lightly tighten the two hexagonal screws M6 x 12 (B)

S3 Turbo 40/45:



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

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



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

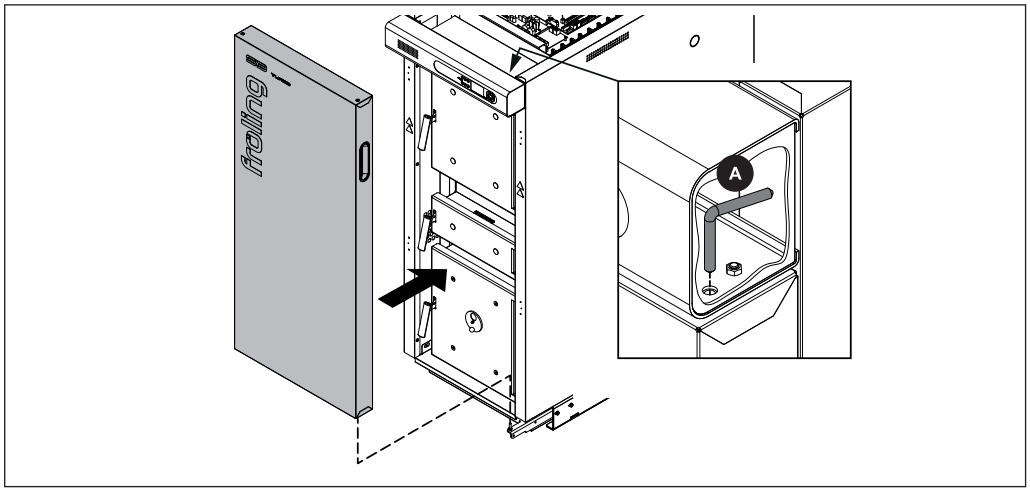
❒ Measure the distance from the insulating side panel to the centre of the borehole on the lower door bracket

↪ The two distances must be equal!

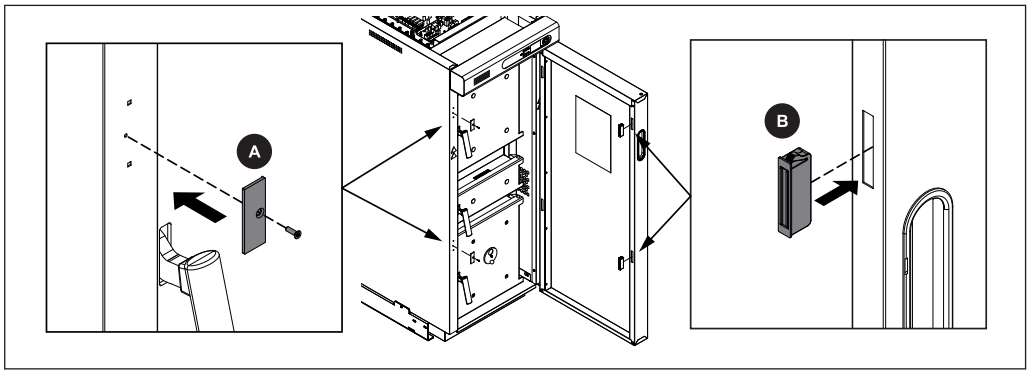
↪ If necessary, correct the position of the lower door bracket

❒ Secure the two hexagonal screws of lower door bracket

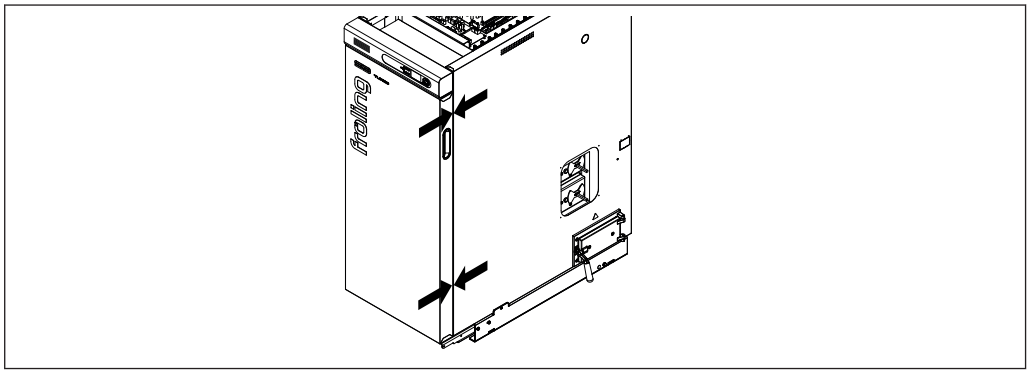
❒ At the front end of the lower door bracket, insert a hexagonal screw M6 x 30 from below, secure it with a nut and place a spacer washer on top



❒ Mount the insulated door onto the lower door bracket using the hexagonal screw
❒ Attach the insulated door to the upper door bracket with hinge pin (A)
➥ Insert the hinge pin through the control and the upper door bracket

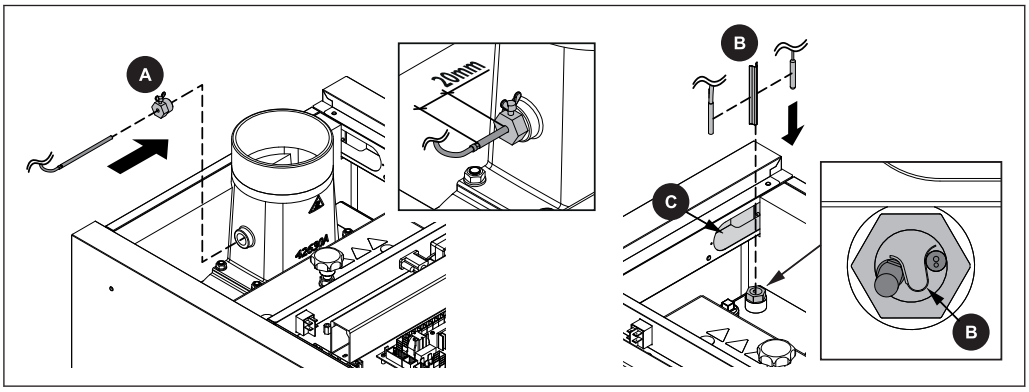


❒ Position magnetic latches (B) on the inside of the insulated door at the top and bottom
❒ Mount counter plates for the magnetic latches (A) to the left insulation side panel



❒ Check to see if the gap between the insulation side panel and the insulated door is the same size along the entire height of the boiler
➥ If necessary, correct the position of the lower door bracket

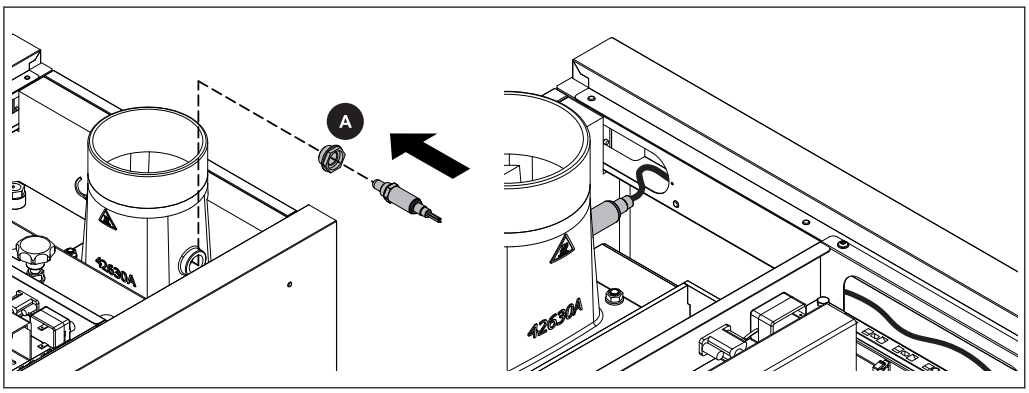
4.5.11 Fitting the sensors



❒ Screw in the brass bushing (A) for the flue gas temperature sensor
  ➥ Make sure that the borehole with the thread is situated at the upper area of the brass bushing
❒ Push the flue gas temperature sensor in so that it protrudes approx. 20 mm from the housing and secure the position with the wing screw
❒ Push the boiler sensor and STL capillary into the pre-installed immersion sleeve with the pressure spring (B) during boiler outfeed
❒ Run the cable through the cable duct (C) to the controller box
  ➥ Tuck any extra cable into the cable duct

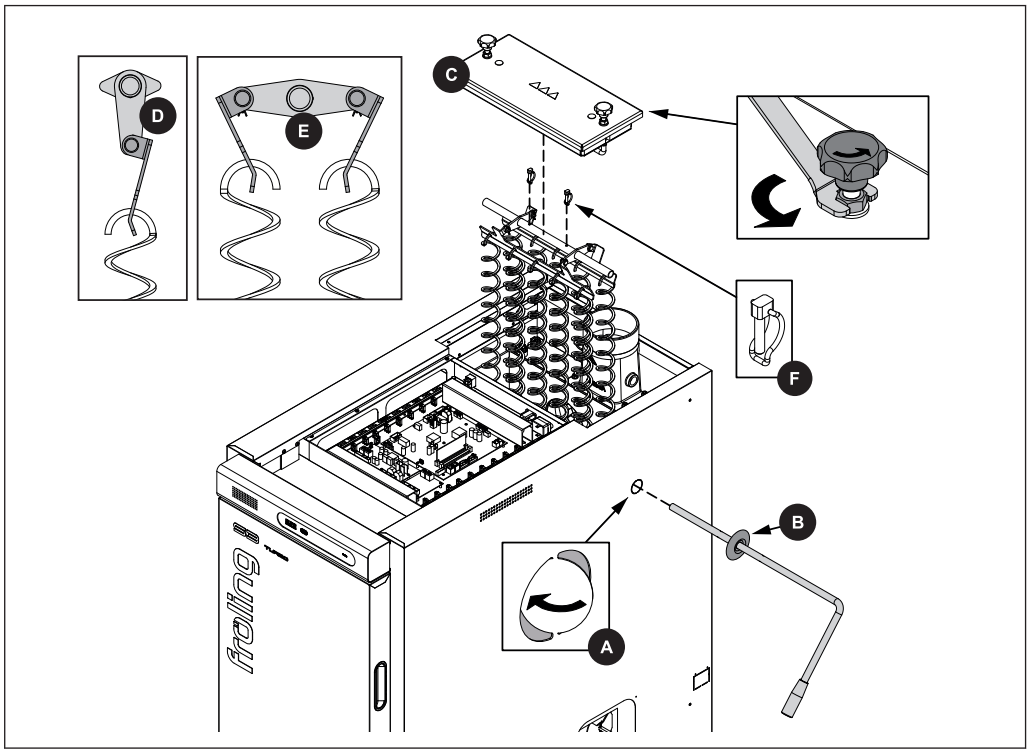
4.5.12 Install the broadband probe (only with S-Tronic Lambda)

❒ Unscrew the pre-installed bushing (A) from the broadband probe
❒ Screw the bushing (A) into the flue gas nozzle and gently tighten



❒ Screw the broadband probe into the bushing (A) and gently tighten using an Allen key (SW 22 mm)
❒ Plug in the extension cable for the Lambda probe and un the cable through the cable duct to the controller box
  ➥ Tuck any extra cable into the cable duct

4.5.13 Installing the WOS system



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

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

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

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

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

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

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

➥ Hold the linking plate with the edge toward the top

➥ Hang the WOS turbulators over the edge

❒ Position the WOS turbulators at the heat exchanger pipes

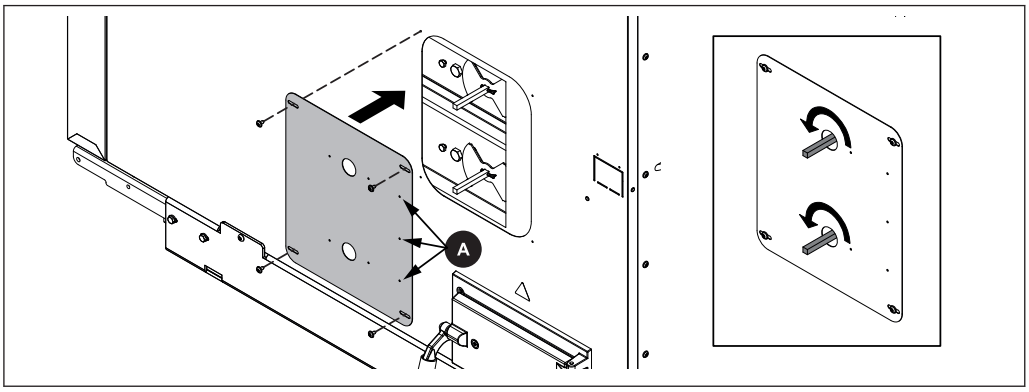
❒ Push the WOS lever through the stay tube from the outside and attach using pipe locking pins (F)

❒ Replace the heat exchanger cover (C)

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

❒ Tighten the nut below the handle using the key supplied

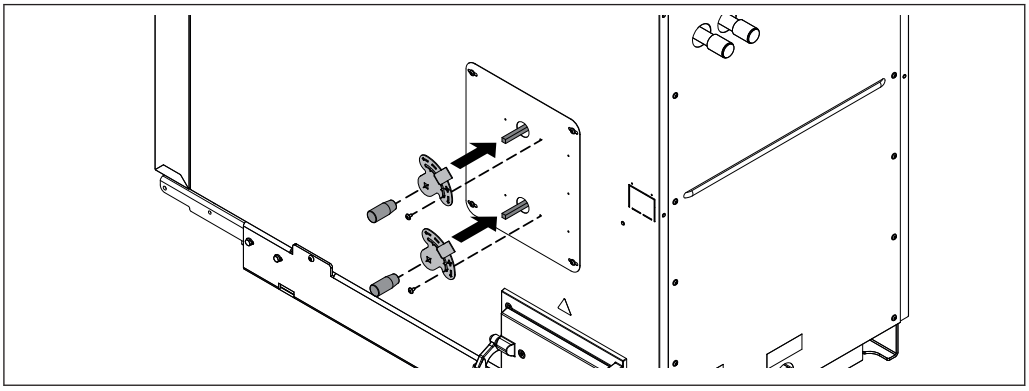
4.5.14 Installing the manual controller/servo-motors



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

➥ Check that the air flaps are at the left stop

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



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

❒ Place the handle onto the pneumatic rod

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

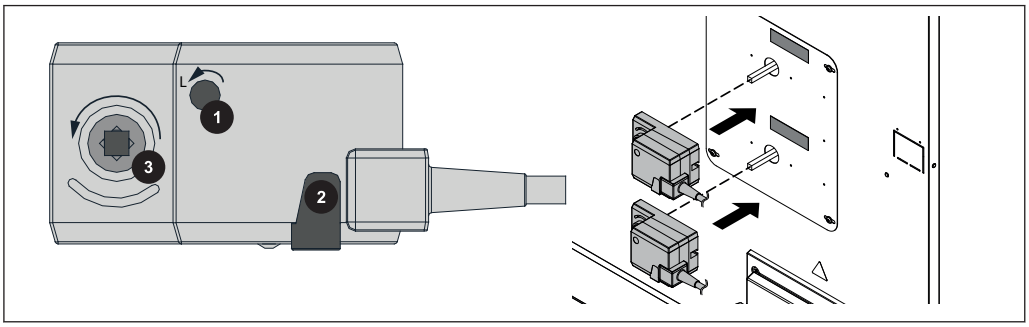
➥ The exact position of the manual controller is set on initial start-up

⇨ See "Boiler with manual controller" [page 62]

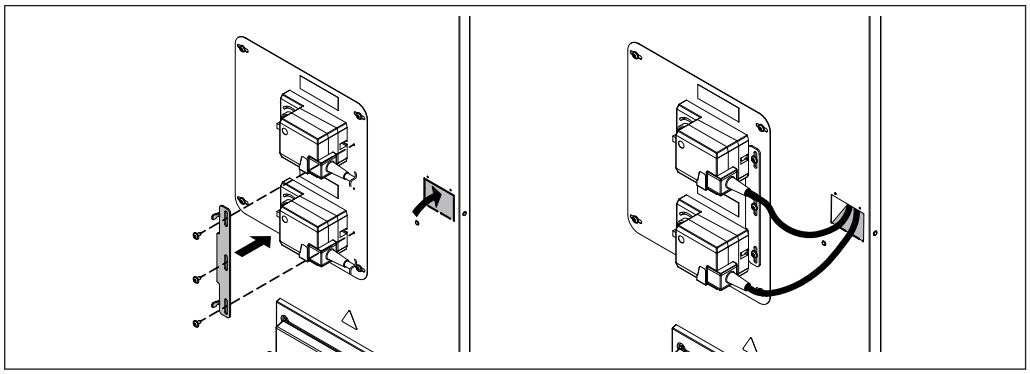
Mounting the servo-motors (with S-Tronic Lambda control)

❒ Check that the air flaps are at the left stop

➥ All air flaps should be are closed

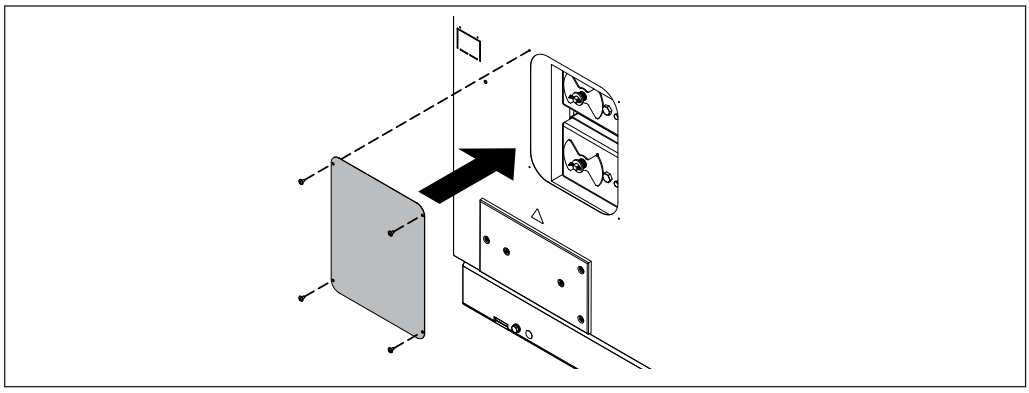


❒ Set the actuators:
  ➥ Set the direction of rotation of the actuator (1) to left (L)
  ➥ Press the unlock key (2) and turn the drive for the shaft to the air duct (3) in an anti-clockwise direction as far as the stop
❒ Place the actuators onto the pneumatic rod
❒ Attach sticker to cover plate
  ➥ Primary air: top actuator
  ➥ Secondary air: bottom actuator



❒ Position the torque support and partially tighten the screws
❒ Align the actuators so that they are straight and tighten the screws
❒ Attach the sticker at the end of the actuator cable
  ➥ Primary air: top actuator
  ➥ Secondary air: bottom actuator
❒ Push in the pre-punched opening for the cable duct onto the insulation
❒ Run the cable from the two servo-motors through the cable duct upward to the controller

Fit the cover plate.



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

4.6 Power connection and wiring

DANGER

When working on electrical components:

Risk of electrocution!

When work is carried out on electrical components:

- ❒ Only 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

4.6.1 S-Tronic Plus / S-Tronic Lambda control

Power connection

S-Tronic Plus:

- ❒ Run the cable of the flue gas temperature sensor, boiler sensor, induced draught, STL, display and door switch to the controller and connect the wiring in accordance with the operating instructions of the boiler control
  - ➥ Tuck any extra cable into the cable duct

S-Tronic Lambda:

- ❒ Run the cable of the broadband probe, servo-motors, flue gas temperature sensor, boiler sensor, induced draught, STL, display and door switch to the controller and connect the wiring in accordance with the operating instructions of the boiler control
  - ➥ Tuck any extra cable into the cable duct

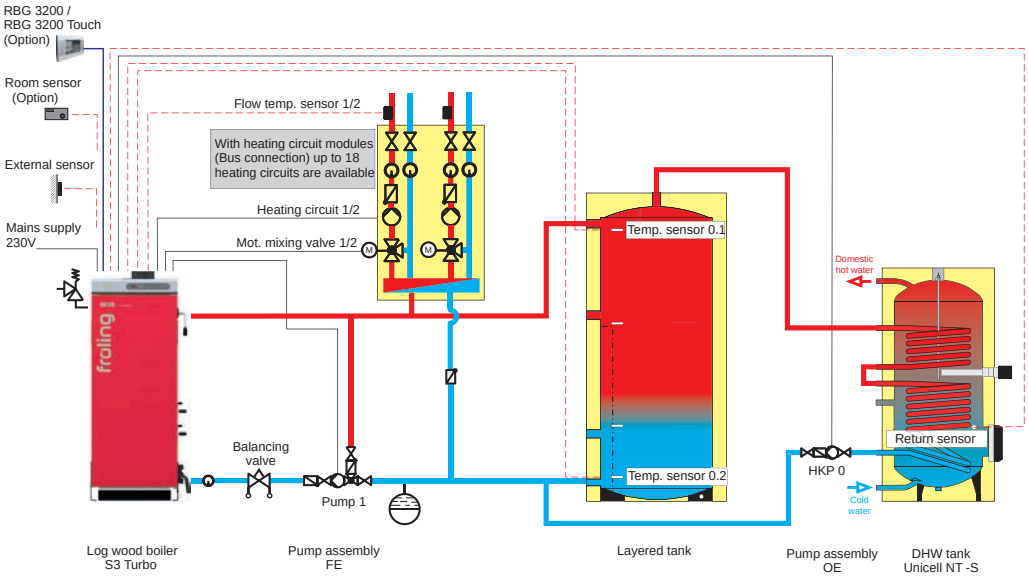
- ❒ Connect the components according to the power connection diagram
  - ➥ The flexible sheathed cable must be used for the wiring; this must be of the correct size to comply with applicable regional standards and regulations!

Once the individual components have been wired:

- ❒ Wire the mains connection in the controller box
  - ➥ The power supply line (mains connection) must be fitted with a max. C13A fuse by the customer!
  - ➥ Observe the circuit diagrams in the boiler controller operating instructions.

Hydraulic system

Possible, non-binding planning suggestion:



Note: Controller S-Tronic Plus

NOTICE! It is not possible to combine the control of a return mixer with the control of a boiler!

4.6.2 Information on circulating pumps

Connecting a high efficiency pump

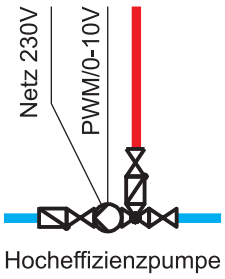
NOTICE

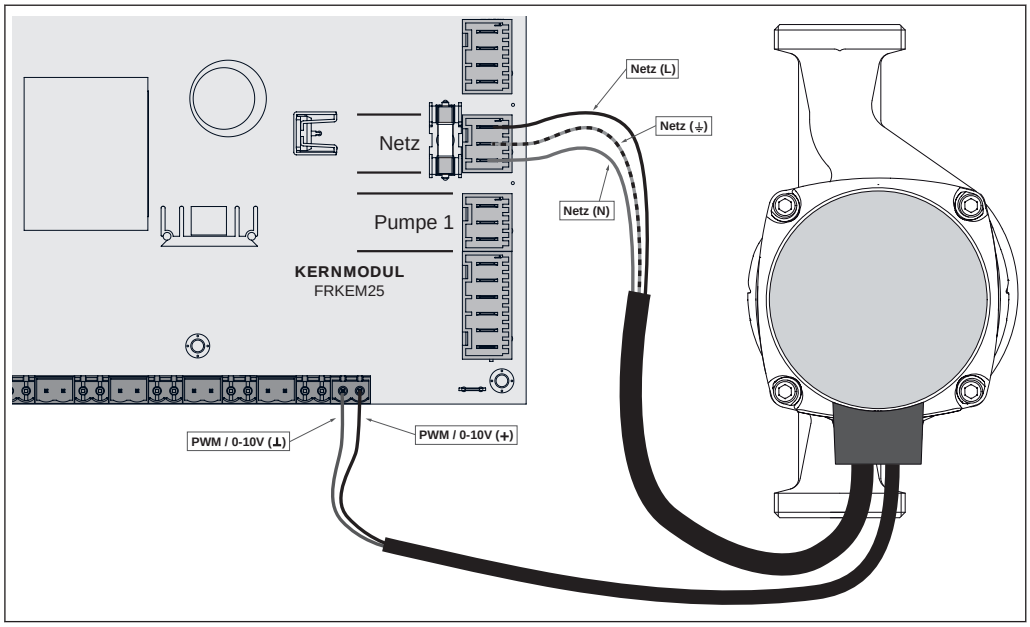
According to 2012/622/EU external, wet running circulating pumps must comply with the following limit values of the Energy Efficiency Index (EEI):

- Effective from 01.01.2013: wet running circulating pumps with EEI ≤ 0.27
- Effective from 01.08.2015: wet running circulating pumps with EEI ≤ 0.23

Pumps which do not comply with this EEI are referred to as squirrel cage standard pumps and were distributed until the end of 2012.

If a high efficiency pump with additional control unit is used as a store loading pump, this must be connected according to the following connection diagram:





⚠ CAUTION

When using a high efficiency pump on the speed-controlled pump output of the core module (pump 1):

Malfunctions of the boiler, the pump and the hydraulic system may occur!

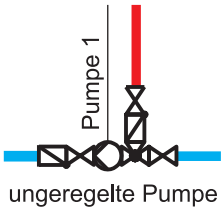
Therefore:

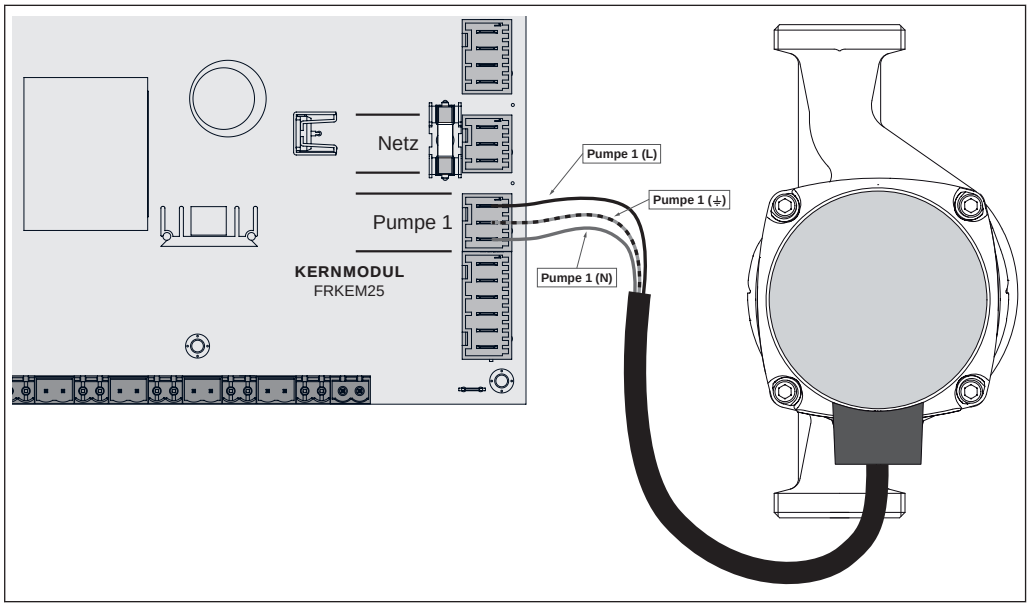
❒ EC motor pumps must not be connected to speed-controlled pump outputs (pump 1)

➥ When using the S3 Turbo firewood boiler in conjunction with the S-Tronic Plus or S-Tronic Lambda controller, the connection diagram above must be followed for using a high efficiency pump with control line!

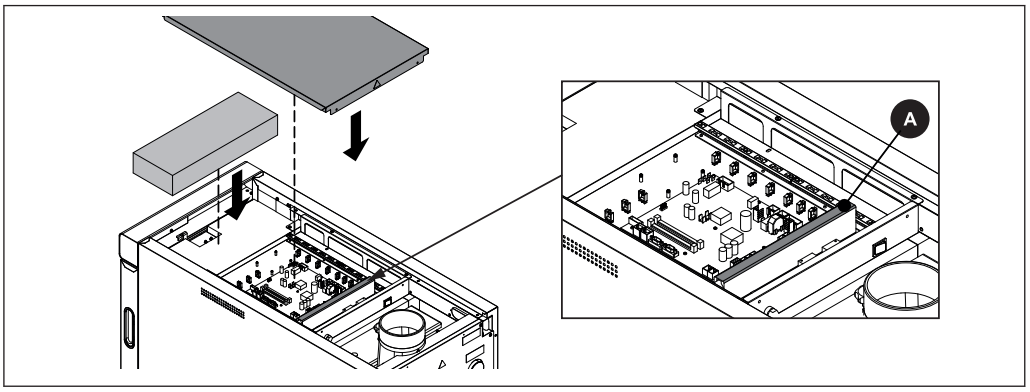
Connecting a squirrel cage standard pump

If a squirrel cage standard pump (e.g. existing installation) is used as a store loading pump, this must be connected according to the following connection diagram:



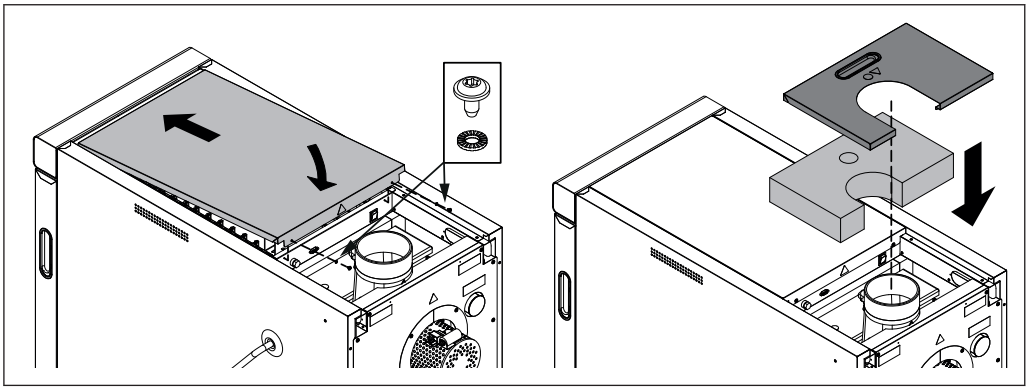


4.6.3 Concluding work



❒ Put the front heat insulation mat on

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



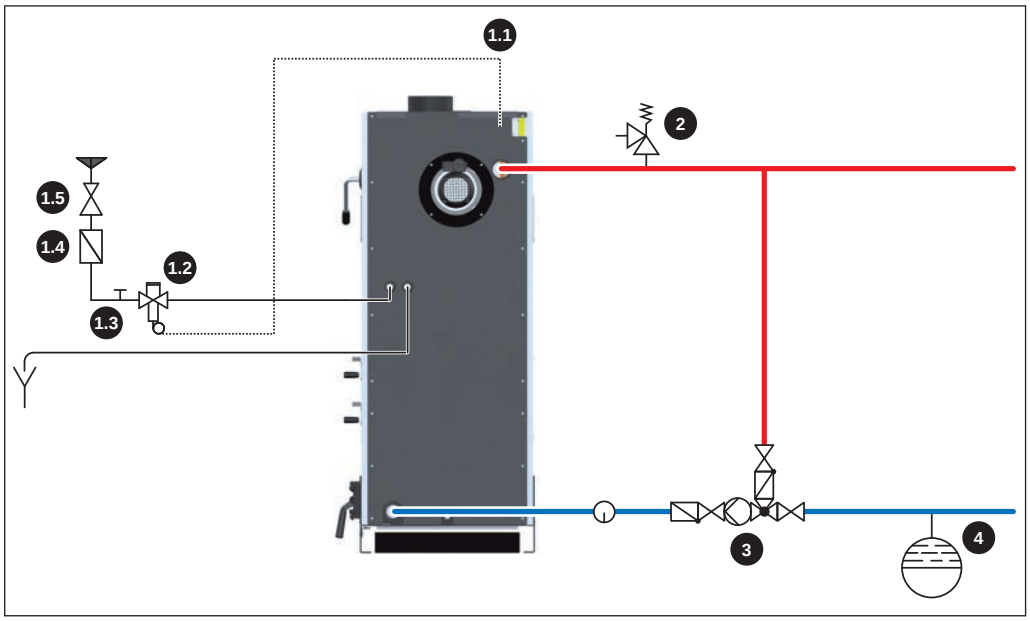
❒ Put on the controller cover

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

❒ Put on the back heat insulation mat

❒ Put on the rear insulating cover

4.7 Connecting the hydraulic safety devices



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 Free outlet without counter pressure

2 Safety valve

- Safety valve as per ÖNORM EN ISO 4126-1, diameter as per EN 12828 or national regulations
- The safety valve must be installed in an accessible place on the heat generator or in direct proximity in the flow pipe in such a way that it cannot be shut off

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 system's heated water 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 Start-up

5.1 Before commissioning / configuring the boiler

The boiler must be configured to the heating system on 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 vented.

❒ Check that all water connections are tightly sealed

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

❒ Check that the safety devices are present and working efficiently.

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

❒ Check that the door contact switch is working efficiently.

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

5.2 Initial startup

5.2.1 Permitted fuels

Firewood

Firewood up to max. 55 cm long.

Water content

Water content (w) greater than 15% (equivalent to wood moisture u > 17%)
Water content (w) less than 25% (equivalent to wood moisture u < 33%)

Note on standards

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

Tips for storing wood

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

Storage time dependent upon water content

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

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

5.2.2 Fuels permitted under certain conditions

Wood briquettes

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

Note on standards

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

Notes on use

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

5.2.3 Non-permitted fuels

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

⚠ CAUTION

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:

❒ Only use permitted fuels

5.2.4 Heating up for the first time

⚠ CAUTION

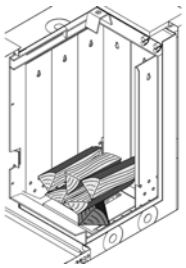
If the boiler heats up too quickly on initial start-up:

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

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

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

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



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

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

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

NOTICE! Fissures are normal and do not indicate a malfunction

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

NOTICE

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

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

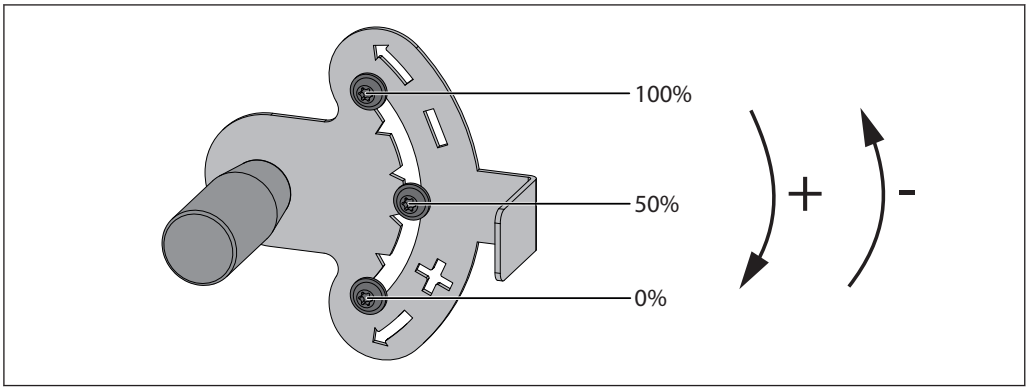
Boiler with Lambda control

❒ Open the insulated door and the fuel loading door

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

NOTICE! See boiler operating instructions

Boiler with manual controller



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

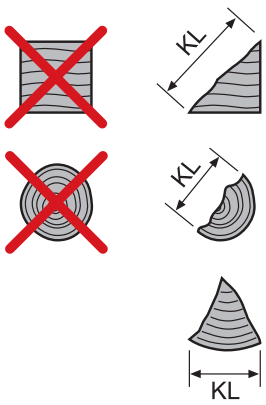
NOTICE! The information below only applies to split wood and not for round timber, square timber etc.

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

1. PL = Primary air
2. SL = Secondary air

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

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



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

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

NOTICE! See boiler operating instructions

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

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

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

Setting the primary air

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

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

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

⇨ See "Boiler data for planning the flue gas system" [page 15]

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

Setting the secondary air

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

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

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

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

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

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

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

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

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

6 Decommissioning

6.1 Mothballing

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

❒ Clean the boiler thoroughly and close the doors fully

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

❒ Have the system completely drained by a qualified technician
  ➥ Protection against frost

6.2 Disassembly

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

6.3 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.

7 Appendix

7.1 Pressure equipment regulation

EG-Entwurfsprüfbescheinigung
EC design-examination certificate

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

Bescheinigung Nr.: 2009-HST-0433
Certificate No.:

Hersteller / *manufacturer:*
Fröling Heizkessel- und Behälterbau GmbH
Industriestraße 12
A-4710 Grieskirchen

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

Objekt: Baugruppe / *assembly*
object:

Benennung: Baugruppe zur Erzeugung von Warmwasser gem. Art. 3 Abs. 2.3 der Druckgeräterichtlinie Scheitholzkessel Typ S3 Turbo
description:

Prüfbericht Nr.: 2009-SCW-005
test report no.:

TÜV AUSTRIA SERVICES GMBH Benannte Stelle 0408 TÜV AUSTRIA

Wien
Ort / *place:*

07.10.2009
Datum / *date:*

DI Martin TESCH
Benannte Stelle 0408
Notified Body, No. 0408

QFM-DG/BS-75-BM_EP / Rev. 12/2008
EP-0433-Fröling.doc

TÜV AUSTRIA Services GmbH
Krugerstraße 16
A-1015 Wien
AUSTRIA

Tel.: +43 (0)1/514 07-6133
Fax: +43 (0)1/514 07-6145
eMail: dg@tuv.at

7.2 Addresses

7.2.1 Address of manufacturer

FRÖLING
Heizkessel- und Behälterbau GesmbH

Industriestraße 12
A-4710 Grieskirchen
AUSTRIA

TEL 0043 (0)7248 606 0
FAX 0043 (0)7248 606 600
INTERNET www.froeling.com

7.2.2 Address of the installer

Stamp