

Assembly Instructions



S3 Turbo



Read and follow the operating instructions and safety information!
Subject to technical change!

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Supplementary instructions

These instructions ensure safe and efficient use of the S3 Turbo (hereinafter referred to as the “system”). These instructions are a component part of the system and must be kept next to the system and within the immediate reach of staff at all times.

Staff must carefully read and understand these instructions before commencing all work. All the safety instructions and operating guidelines specified in this manual must be observed to ensure safety at work. In addition, the local accident prevention regulations and general safety regulations apply to the area of application of the system.

Images in these instructions are intended solely to aid understanding and may differ from the actual design.

NOTICE

SAVE THESE INSTRUCTIONS!

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1 Safety

1.1 Explanation of symbols

Safety information

Safety information in these instructions is indicated by symbols. The safety information is preceded by signal words which reflect the extent of the risk.

DANGER

This symbol and signal word combination indicates a hazardous situation which will lead to death or serious injury if it is not avoided.

WARNING

This symbol and signal word combination indicates a hazardous situation which could lead to death or serious injury if it is not avoided.

CAUTION

This symbol and signal word combination indicates a hazardous situation which could lead to slight or minor injuries if it is not avoided.

NOTICE

This signal word indicates important, but not safety-related information e.g. damage to property or pollution

Safety information in operating instructions

Safety information can refer to certain, individual operating instructions. To avoid disrupting the flow of the text when you are performing the action, this safety information is not incorporated in the operating instruction. The signal words set out above are used.

Example:

- Undo screw
- CAUTION!** Pinching hazard at cover
Take care when closing the cover.
- Tighten the screw

Special safety information

The following symbols are used to draw your attention to particular hazards

Tips and recommendations

Italics indicate useful tips and recommendations as well as information for efficient and smooth running.

Other markers

The following markers are used in these instructions to highlight operating guidelines, results, lists, references, and other elements:

Marker	Explanation
□	Step-by-step operating instructions
↪	Results of actions
▪	Lists without a specified order
<i>[Button]</i>	Operating elements (e.g. button, switch), display elements (e.g. signal lights)
“Display“	Screen elements (e.g. buttons, assignment of function keys)

Units used

All units of measure are specified in these operating instructions in both SAE units and SI units. The SAE unit appears first, followed by the SI unit in brackets.

Example using information about heat output: 17 (5) BTU/h (kW) equals 17 BTU/h (SAE system) or 5 kW (SI system).

1.2 Permitted Uses

The S3 Turbo boiler is designed exclusively for heating domestic water. Only use those fuels specified in the “Permitted fuels” section.

Permitted use includes compliance with all the specifications in this instruction manual.

Any use other than or above and beyond the permitted use is considered misuse.

WARNING

Danger of misuse

- Do not install the system in a mobile home.
 - Do not operate the system in an explosive atmosphere.
 - Keep the air inlet to the boiler room clear at all times.
 - Only use fuels permitted by the manufacturer.
 - Never store flammable materials close to the boiler.
 - Never set flammable objects on the boiler to dry (e.g. clothing).
 - Do not use any hydrogen halides or cleaning agents containing chlorine in the boiler installation room.
 - Keep covers and doors closed during operation.
 - The chimney is only to be used as an outlet for one heating system.
 - Do not use the hot water directly in swimming pools or thermal baths and do not use as drinking water.
 - Do not alter the boiler controller.
 - DO NOT BURN GARBAGE, GASOLINE, NAPHTA, ENGINE OIL OR OTHER INAPPROPRIATE MATERIALS.
 - DO NOT USE CHEMICALS OR FLUIDS TO START THE FIRE.
 - DO NOT OPERATE WITH FLUE DRAFT EXCEEDING 0.12 INCHES WATER COLUMN (30 Pa).
 - UNSAFE TO ADJUST FLUE DRAFT HIGHER THAN 0.12 INCHES WATER COLUMN (30 Pa).
 - THE HEAT EXCHANGER, DRAFT INDUCES, FLUE PIPE, AND CHIMNEY MUST BE CLEANED REGULARLY TO REMOVE ACCUMULATED CREOSOTE AND ASH. ENSURE THAT THE HEAT EXCHANGER, FLUE PIPE, AND CHIMNEY ARE CLEANED AT THE END OF HEATING SEASON TO MINIMIZE CORROSION DURING THE SUMMER MONTHS. THE APPLIANCE, FLUE PIPE, AND CHIMNEY MUST BE IN GOOD CONDITION. THESE INSTRUCTIONS ALSO APPLY TO A DRAFT INDUCER IF USED.
- ➔ Misuse of the boiler can create hazardous situations.

1.3 Requirements at the place of installation

1.3.1 Approval for the heating system

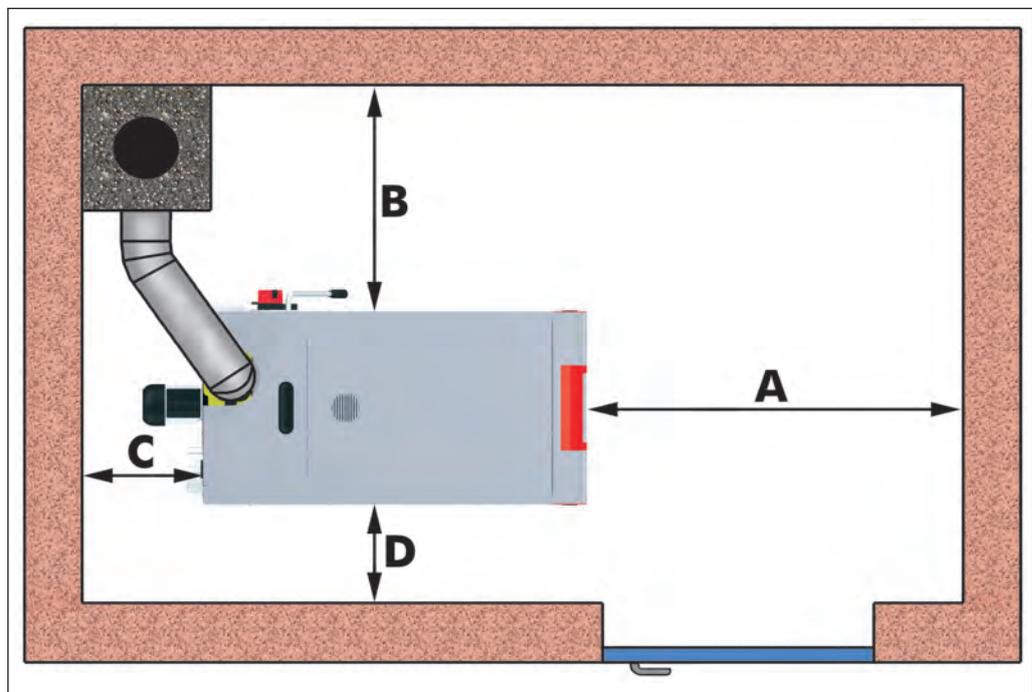
The appropriate supervisory authority (inspection agency) must always be informed when installing or modifying a heating system, and authorization must be obtained from the building authorities. Also observe ANSI/NFPA 211 and CAN/CSA B365 for the installation.

1.3.2 Space required

FOR SAFE INSTALLATION AND OPERATION CLEARANCES TO COMBUSTIBLES MUST BE MAINTAINED.

The diagram below shows how much space is required for the system in the boiler room.

The boiler may only be installed on non-combustible floors with these clearances.



Dimension	Name	S3 Turbo
A	Distance - front of boiler to wall	36" (900 mm)
B	Distance – side of boiler to wall	32" (800 mm)
C	Distance – back to wall	14" (350 mm)
D	Distance – side of boiler to wall	9" (250 mm)
Distance between ceiling and boiler		18" (460 mm)

1.3.3 Requirements for central heating water

Water quality

Water of the following quality is required for the first fill:

- The water must be clean, pure or purified as well as odorless and must not contain suspended matter.
- The water hardness must not exceed 190 grain/fl.oz. or 100 ppm CaCO₃ (100 mg/L), i.e. soft water is required.
- The chlorine concentration in the water must not exceed 58 grain/fl.oz. (30 mg/L).
- The pH value in the heating system must be between 8.0 and 8.6.
- If the water quality is too poor, use additives to prepare the water. If you are topping up with small amounts, always use clean water.

NOTICE

The hot water must not be used directly in swimming pools or thermae. Use a heat consumer of the right size to consume the heat. Do not use the heating water as drinking water.

To ensure good water quality during operation, avoid leaks and use a closed heating system. If necessary, use a return temperature control.

First fill

To prevent air from getting into the heating system during the first fill, fill the filling hose with water.

Frost protection

You can add anti-freeze to the heating water, however, this can reduce the heating efficiency. Always follow the manufacturer's dosing instructions when using anti-freeze, as using the incorrect amount can cause corrosion. Check the concentration of the anti-freeze at regular intervals.

1.3.4 Ventilation requirement for boiler room

Introduction

The external combustion air must meet certain requirements to ensure that adequate combustion air is supplied to the boiler and no by-products from the combustion get into the boiler room.

Ventilation air for the boiler room must be taken from and expelled directly outside, and the openings and air ducts must be designed to prevent weather conditions (e.g. from foliage or snowdrifts), plants or animals from obstructing the air flow. Permanent ventilation is required to ensure that the boiler runs smoothly.

In North America there are several regulations which govern the minimum requirements of combustion air for chimneys.

The boiler must be installed in such a way that it receives adequate ventilation and combustion air and that the fuel in the boiler burns. The exhaust air must be expelled safely outside via the chimney and maintained within a safe temperature range.

Boiler rooms are usually so small that normal ventilation does not provide enough air and air must be brought in from outside. External air openings and air channels must be of an appropriate size to supply adequate combustion air. The design must comply with NFPA 211.

Consult your local chimney inspector for the installation and install the boiler in accordance with the applicable local regulations.

Recommended size of air openings according to NFPA 54 and NFPA 211:

The boiler requires a fresh air supply of between 1 sq.in. per 2,500 BTU/h and 1 sq.in. per 4,000 BTU/h (550 mm²/kW and 880 mm²/kW), depending on local conditions and the climate zone. Local conditions may necessitate an additional air supply.

1.3.5 Requirements for the heating system

- The whole heating system must be designed in accordance with relevant national and local regulations.
- The boiler's nominal load must be adjusted to the calculated heating requirements of all the consumer loads connected in the heating circuit in summer and winter.
- The heating system must be big enough to transport the heat generated by the boiler and an additional heat source (if present). The pressure throughout the whole system including all heating zones must be even.
- Special equipment must be available for filling and ventilating the heating circuit. Flow valves and zone valves must be fitted to set the correct water flow volume.
- All fitted pipes must be water-tight and air-tight and safely insulated.
- If there is a risk of parts of the heating system freezing, add anti-freeze to the water in these heat zones.

1.3.6 Requirements for the boiler room

- 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.

- There is no lighting on the boiler. Therefore, the customer must provide sufficient lighting in the boiler room in accordance with national workplace design regulations.
- Always consult the manufacturer when using the boiler at more than 2000 meters above sea level.
- Always keep the air suction opening of the boiler free from dust.
- The boiler room must be at least (mm) high.

1.3.7 Combination with thermal storage

Your S3 Turbo boiler must be installed with a Thermal Storage System. The purpose of the thermal storage system is to absorb heat produced by the boiler if the building load cannot use all of the heat being produced. This means that the boiler will be batch fired. Batch firing requires that the boiler only be loaded with fuel and ignited when the thermal storage temperature is depleted adequately so that it can absorb the energy produced from the next fire. There may be some instances when the heating load will use all of the heat being produced by the boiler. In such cases, the boiler may be loaded continuously.

Your boiler is equipped with a timer that provides feedback about how many hours of run time (active burning) or slumber time (boiler is stopped because no heat is being taken from it) are accumulating. Slumber hours should be minimized as much as possible. If you find slumber hours increasing, it is likely that you are over-filling the boiler with wood and it is cycling on and off rather than having continuous run times.

Over filling the boiler may result in corrosion of the firebox wall, damage to the combustion chamber, damage to the firebox aprons, soot accumulation in the heat exchange and dirty emissions.

Your thermal storage system may require periodic maintenance. Please review the periodic maintenance requirements of your thermal storage system with your installer.

1.3.8 Return temperature control

It is recommended you fit a return temperature control when installing the heating system. If the hot water return is below the minimum return temperature, some of the hot water outflow will be mixed in via the return temperature control.

NOTICE

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

The manufacturer stipulates using a return temperature control. The minimum return temperature is 140°F (60°C). It is recommended you fit some kind of control device (e.g. thermometer). The controller of the return temperature control can be integrated in the boiler controller.

- Condensation water forms an aggressive condensate when combined with combustion residue, leading to damage to the boiler. If the outside temperature is low, condensation water can freeze at the chimney outlet, which can result in inadequate chimney escape, limited boiler output and a system breakdown.

1.3.9 Requirements for the chimney connection

The chimney connection must be big enough to channel flue gases from the building. The whole flue gas system must be designed to prevent possible seepage, insufficient feed pressure and condensation.

The manufacturer recommends fitting a draft regulator to limit the pressure to 0.12 inch WC (30 Pa). The draft regulator should be fitted directly on the chimney connection where the pressure is very low.

The boiler must be connected to a brick chimney or a shop-made chimney in accordance with UL 103 HT (ULC S629 in Canada). The chimney must be clean and in good condition at the time of installation.

The pipe unions within the chimney must be made of stainless special steel (with 304, 316 or 321 alloys). The flue gas connection pipe must be made of untreated steel or stainless steel with a thickness of 24 Gauge. The minimum rise of the pipe must be ¼" per foot for the progression towards the chimney. The chimney and the flue gas connection pipe must have a diameter of at least 6" (150 mm). The individual pipe sections must be joined together with at least three self-tapping screws and the joints sealed using high-temperature silicone. The flue gas pipe must not contain more than two 90° bends.

All connections must conform to NFPA 211. Consult your local chimney sweep for the installation and install the boiler in accordance with the applicable local regulations.

The chimney connection, ventilation ducts and fresh air openings must not be closed over or blocked.

The flue gas pipe must not be displaced by an attic, loft, fuel store or similar areas.

Basic data for designing the chimney connection

Description		S3 Turbo	
		30	50
Flue gas temperature at nominal load	°C	220	220
	°F	430	430
Flue gas temperature at partial load	°C	150	150
	°F	300	300
Flue gas mass flow at nominal load	kg/h	76	122
	lb/h	167	270
Flue gas mass flow at partial load	kg/h	43	65
	lb/h	95	143
Required feed pressure at nominal load	Pa	8	8
	in WC	0.03	0.03
Maximum permissible feed pressure	Pa	30	30
	in WC	0.12	0.12
Flue pipe diameter	mm	150	150
	inches	6	6

CAUTION

ADJUSTMENT OF THE FLUE DRAFT HIGHER THAN 0.12 INCHES WATER COLUMN (30 Pa) COULD CAUSE A FIRE TO BURN OUT OF CONTROL AND AN UNSAFE CONDITION!

- Maximum permitted setting: 0.12 inches WC (30 Pa)
Ideal setting: 0.04 inches WC (10 Pa)

1.4 Safety markers

WARNING

Danger if signage is illegible!

- Ensure that all safety, warning and operating instructions are always in a clearly legible condition.
- Replace damaged stickers and signs immediately.
 - Over time stickers and signs can get dirty or otherwise unrecognizable which means that dangers cannot be identified and the necessary operating information cannot be observed. This poses a risk of injury.

The following stickers are located in the work area. They refer to the area immediately surrounding where they are affixed.

1.4.1 Mandatory signs



Refer to the operating instructions

Only use the indicated system once you have read the operating instructions.



Wear hearing protection

This sign indicates that hearing protection must be worn in the area concerned.



Wear protective gloves

This sign indicates that protective gloves must be worn in the area concerned.



Wear safety shoes

This sign indicates that safety shoes must be worn in the area concerned.



Wear a dust mask

This sign indicates that a dust mask must be worn in the area concerned.



Keep the doors closed

Keep the doors closed during operation.



Turning off the main switch

Switch off the main switch and take precautions to prevent accidental switching on before carrying out work to the system

Switch off the main switch for the fuel infeed and take precautions to prevent accidental switching on before entering the fuel storage room.



Securing the main switch

Switch off the main switch and secure with a padlock when carrying out maintenance work to the boiler.

1.4.2 Prohibitions



Unauthorized access prohibited

Only persons authorized by the operator may enter the danger zone and fuel storage room. Keep children away! Keep the fuel storage room locked and keep the access key in a safe place. Protect the fuel from moisture.



No fire, open flames or smoking

Areas marked with this are at risk of fire or explosion. Keep ignition sources away from these areas.

1.4.3 Warning signs



Automatic start-up

This sign indicates that there is a risk of the system starting up automatically. Work may only be carried out in areas with this marking if the system has been secured.



Electric current

Only licensed electricians may work in workspace with this marking. Unauthorized persons are not permitted to enter work areas with this marking or open the cabinet with this marking.



Harmful or irritant materials

These materials can be irreparably harmful to health, trigger allergic reactions or irritate the mucous membranes.

Observe the information on the packaging and containers.



Danger from carbon monoxide

There is a risk of poisoning from a possible concentration of carbon monoxide in the fuel storage room and boiler room. Ventilate the fuel storage room for at least 15 minutes before entering. Two people must always be present when working in the fuel storage room. The access door must be kept open at all times. Also wear a dust mask because of the high dust levels.



Hand injuries

Keep hands away from areas bearing this warning.

There is a risk that your hands could get trapped, pulled in or otherwise injured.



Hot surfaces

Hot surfaces, such as hot system parts, may not always be obvious. Do not touch these parts without protective gloves.



Risk of falling

There is a risk of falling in the fuel store because of slippery surfaces or fuel lying about. Take extreme care and wear personal protective equipment.



Risk of injury at fans

Keep hands away from areas bearing this warning.

There is a risk that your hands could get trapped, pulled into or otherwise injured in automatic fans.

1.4.4 Signage on the boiler

Notice of risks during installation

S3 Turbo - WOOD FIRED GASIFICATION HYDRONIC FURNACE

INSTALLATION HAZARDS

Install, modify and use only in accordance with manufacturer's manuals. Refer to authorities having jurisdiction for proper installation. Contact local building and fire officials about restrictions and installation inspection in your area. If there are no applicable local codes, follow ANSI/NFPA 211 and CAN/CSA B365. Special precautions are required for passing the chimney through a combustible wall or ceiling.

Inspect and clean exhaust system, loading chamber, burning chamber, ash-pits, and heat exchanger frequently in accordance with owner's manual.

Basic boiler data for layout of chimney system

Quantity	Unit	S3 Turbo	
		30	50
Flue gas temperature	°C	220 / 150	220 / 150
Rated / partial load	°F	430 / 300	430 / 300
Flue gas mass flow	kg / h	76 / 43	122 / 65
Rated / partial load	lb / h	167 / 95	270 / 143
Minimum draft at boilers flue gas connection		8 Pa (0.03 inches water column)	
Maximum draft at boilers flue gas connection		30 Pa (0.12 inches water column)	
Flue gas connector Diameter		150 mm (6 inches)	
Maximum water temperature		88 °C (190 °F)	
Maximum allowable working pressure		2 bar (30 psi)	
Test Pressure		4.5 bar (67.27 psi)	
Mimumum Pressure Relief Valve Capacity		155 kW (535,000 Btu/h)	

For detailed design information please refer to Installation Manual!

For unit specifications, see the plaque located directly on the boiler!

DANGER!

- ▲ Working on electrical components may cause severe injuries from electric shocks!

WARNING!

- ▲ The electrical system of the boiler shall be supplied from a double 115 V 60 Hz (nominal 230 V AC) 15 amp branch circuit including neutral and earth connection. For wiring instructions please refer to installation Manual!
- ▲ Chimney must be 6" (150 mm) diameter listed UL-103 HT or ULC-S629 residential all-fuel type or tile-lined masonry. Flue connector pipe must be 6" (150 mm) diameter made of a minimum 24 MSG black steel.
- ▲ Inadequate design, installation and maintenance of the flue gas system will lead to insufficient chimney draft and could result in Danger of Life or Severe Injury caused by serious faults in combustion, e.g. explosively combustion of carbonization gases and flash fires!
- ▲ This boiler requires fresh air for safe operation and must be installed so there are provision for adequate combustion and ventilation air!

CAUTION!

- ▲ DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE!
- ▲ LOAD FUEL CAREFULLY OR DAMAGE WILL RESULT.
- ▲ REFER TO OWNER'S MANUAL. DO NOT ALTER THIS EQUIPMENT IN ANY WAY.
- ▲ UNSAFE TO ADJUST FLUE DRAFT HIGHER THAN 0.12 INCHES WATER COLUMN (30 Pa).
- ▲ MAY BE CONNECTED TO AN EXISTING BOILER SYSTEM.
- ▲ Flooring must be a minimum 3/8" (10 mm) non-combustible material covering the installation clearance area! The base shall be horizontally, planar and reinforced if required. For construction of base please mind the weight of boiler, water content and wood fuel according Installation Manual!
- ▲ This boiler is not for use with an automatic stoker
- ▲ Connection to an existing boiler system in combination with heat storage only!
- ▲ Use original spare parts only. Installation of non-licensed replacement parts will void the warranty!

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Notice of risks during operation**S3 Turbo - WOOD FIRED GASIFICATION HYDRONIC FURNACE****OPERATION HAZARDS**

NOTICE! Burn Wood only, max. length 21" (51cm)!

Load fuel carefully or damage will result!

Build the wood fire directly on the boiler Fuel Loading Chamber refractory floor!

Do not use small pieces or wood waste that could fall through the center slot in the refractory.

DANGER! Risk of Fire or Explosion!

- ▲ Do not burn garbage, gasoline, drain oil or other flammable liquids.
- ▲ DO NOT BURN GARBAGE, GASOLINE, NAPHTA, ENGINE OIL, OR OTHER INAPPROPRIATE MATERIALS!
- ▲ Do not use chemicals to start up unit firing.
- ▲ DO NOT USE CHEMICALS OR FLUIDS TO START THE FIRE.
- ▲ Use of inappropriate fuels can result in Danger of Life or Severe Injury caused by explosive combustion and flash fires!
- ▲ Burning fuels other than designated will void the warranty!

DANGER! Explosive Gases!

- ▲ Never open Combustion Chamber Door, Ash-Pit Door, Ash-Pit Cask Cover or Heat Exchanger Cask Cover during operation or refueling!
- ▲ Faulty operation of boiler system will cause Danger of Life or Severe Injury and Material Damage!
- ▲ Flue gases can cause fatal poisoning! In case of strong smell of flue gas:
 1. For safety keep all boiler doors and ash-pit doors tightly closed!
 2. Air the room where boiler is installed!
 3. Close the door of the boiler room and doors to living areas!

WARNING! Risk of Fire!

- ▲ KEEP ALL BOILER DOORS, FUEL STORAGE DOOR AND ALL COVERS TIGHTLY CLOSED DURING OPERATION!
- ▲ AFTER OPENING BOILER DOORS OR COVERS CLOSE ALL DOORS, COVERS AND CASING TIGHTLY!
- ▲ DO NOT OPERATE WITH FLUE DRAFT EXCEEDING 0.12 INCHES WATER COLUMN (30 Pa)!
- ▲ UNSAFE TO ADJUST FLUE DRAFT HIGHER THAN 0.12 INCHES WATER COLUMN (30 Pa)!
- ▲ THE HEAT EXCHANGER, DRAFT INDUCER, FLUE PIPE, AND CHIMNEY MUST BE CLEANED REGULARLY TO REMOVE ACCUMULATED CREOSOTE AND ASH. ENSURE THAT THE HEAT EXCHANGER, FLUE PIPE, AND CHIMNEY ARE CLEANED AT THE END OF HEATING SEASON TO MINIMIZE CORROSION DURING THE SUMMER MONTHS. THE APPLIANCE, FLUE PIPE, AND CHIMNEY MUST BE IN GOOD CONDITION. THESE INSTRUCTIONS ALSO APPLY TO A DRAFT INDUCER IF USED.
- ▲ Do not store fuel, clothing, furniture or other combustible material within marked installation clearances!
- ▲ Faulty operating conditions not complying with Owner's Manual, such as insufficient combustion air, incorrect or insufficient cleaning and maintenance or non-permitted fuel could result in Danger of Life or Severe Injury caused by serious faults in combustion (e.g. spontaneous combustion of carbonization gases or flash fires)!
- ▲ Inspect and clean appliance, flues and chimney regularly!
- ▲ First firing during start-up of boiler system shall be carried out in accordance to Instruction Label at Fuel Loading Chamber Door and in attendance of an authorized installer or manufacturer's representative only! Disregarding of warning may cause damage or explosion of combustion chamber and severe injuries unfavorably!
- ▲ Gas performed during solid-fuel combustion may cause a small explosion when the boiler is refueled!

CAUTION! Hot surfaces!

- ▲ Hot parts and the flue pipe can cause serious burns!
- ▲ Do not touch during operation!
- ▲ Maximum draft marked on nameplate!
- ▲ Unauthorized access to the boiler room could result in personal injury and damage to property!
- ▲ FOR SAFETY KEEP FIRING AND ASHPIT DOORS TIGHTLY CLOSED.
- ▲ Keep children away!
- ▲ Always use protective gloves while loading boiler or carry out other work on boiler! Also mind the risk of injuries by splinters of fire wood!
- ▲ Always use control handles when open boiler doors!
- ▲ Insulate flue pipe or do not touch during operation!
- ▲ Do not carry out maintenance when the boiler is hot!
- ▲ Do not touch hot surfaces behind Insulation Door!

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Notice regarding procedures in an emergency**S3 Turbo - WOOD FIRED GASIFICATION HYDRONIC FURNACE****HAZARDS DURING REFUELING AND EMERGENCY PROCEDURES****▲ DANGER! In case of strong smell of flue gas!**

Flue gases can cause fatal poisoning!

1. For safety keep all boiler doors and ash-pit doors tightly closed!
2. Air the room where boiler is installed!
3. Close the door off the boiler room and doors to living areas!

▲ DANGER! In the event of loss of electrical power!

- Do not open any Boiler or Ash-pit Door!!
- Do not load fuel into the boiler!
- Boiler Control automatically restarts after power fail restart
- One hour after power has returned, check system for normal operation and compare manometer reading to initial settings. If system pressure is below, replenish water to the hydronic system according plumber's instructions.

▲ DANGER! In the event of runaway fire!

- Turn off Emergency Switch, if installed.
- Do not open any Boiler or Ash-pit Door!
- **DO NOT SWITCH OFF MAIN ISOLATOR AT CONTROL SYSTEM!**
- In case no Emergency Switch is installed:
 1. Open Insulation Door slightly and keep it opened
 2. Push Arrow-Down Key at Boiler Control to switch off ID-Fan
 3. Keep Insulation Door opened
 4. Do not open Ash-pit Door or any Boiler Door behind Insulation Door
- When there is no more risk of runaway fire, turn on Emergency Switch and close Insulation Door and resume to normal operation of the system.

To cool overheated boiler (over 220°F / 105°C)!

- Do not open any Boiler or Ash-pit Door!
- Turn all thermostats in your house to their highest temperature settings and open all windows.
- Open all hot water faucets.
- When boiler temperature has dropped below 180°F (82°C), reverse the above steps.
- In case Safety Temperature Limit Switch automatically has been activated please refer to Owner's Manual.

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1.5 Residual risks

1.5.1 Basic risks

Incorrect operation

WARNING

Risk of injury from operating the system incorrectly!

- Modifications to the boiler controller must only be undertaken in consultation with the manufacturer.
- Modifying parameters on the boiler controller can cause malfunctions.

1.5.2 Risks from electricity

Electric current

DANGER

Risk of death from electrocution!

- Only allow licensed electricians to carry out electrical work to the electrical system.
- If the isolation gets damaged, switch off the power supply immediately and have it repaired.
- Prior to commencing work to active parts, shut off electrical systems and equipment so that they are no longer live and secure so that they remain off for the duration of the work. Follow the five safety rules:
 - Disconnect.
 - Secure against switching back on.
 - Check the system is no longer live.
 - Earth and short circuit.
 - Cover or shield any adjacent live parts.
- Never bypass or disable fuses. When replacing fuses, use the correct amperage.
- Always lay lines and cables far away from hot surfaces.
- Use shielded cables when using frequency converters.
- Ensure that the system is properly earthed with a protective earth system. Have all component assemblies checked at regular intervals to ensure the correct earthing.
- Keep moisture away from live parts. This can cause short circuits.
 - Touching live parts can cause immediate death by electrocution. Damage to the isolation or individual components can be perilous.

1.5.3 Danger from fire and explosion

Risk of fire and explosion

WARNING

Risk of fire and explosion around the boiler!

- DO NOT BURN GARBAGE, GASOLINE, NAPHTHA, ENGINE OIL OR OTHER INAPPROPRIATE MATERIALS.
- DO NOT USE CHEMICALS OR FLUIDS TO START THE FIRE.
- DO NOT OPERATE WITH FLUE DRAFT EXCEEDING 0.12 INCHES WATER COLUMN (30 Pa).
- UNSAFE TO ADJUST FLUE DRAFT HIGHER THAN 0.12 INCHES WATER COLUMN (30 Pa).
- THE HEAT EXCHANGER, DRAFT INDUCER, FLUE PIPE, AND CHIMNEY MUST BE CLEANED REGULARLY TO REMOVE ACCUMULATED CREOSOTE AND ASH.
- DO NOT INSTALL IN A MOBILE HOME.
- Keep covers on the boiler and the access door to the storeroom closed during operation.
- Smoking, fire and naked flames are not permitted in the store and boiler room.
- Do not store flammable materials in the boiler room.
- Do not set flammable objects on the boiler to dry (e.g. clothing).
- Always ensure that the boiler room is adequately ventilated.
- Maintain and inspect the heating system at the prescribed intervals. Ensure that the chimney vent is cleaned regularly.
- Do not use any hydrogen halides or cleaning agents containing chlorine in the boiler room.
- Observe the safety signs around the system.
 - ➔ Using the boiler incorrectly can cause fire or explosions.

Fire protection

WARNING

Risk of injury from limited or incorrect firefighting!

- Ensure that all fire extinguishers provided are suitable for the fire class.
- Test that the fire extinguishers are fit for use every two years or in accordance with the regulations set out by the fire authorities.
- Refill the fire extinguisher after each use.
- Only use approved extinguishing agents and spare parts that match the prototype on the fire extinguisher.
- When using the fire extinguisher, follow the safety and operating instructions on it.
- Note the operating temperature range when using the extinguisher.
 - If, in the event of a fire, the fire extinguisher is not fit for use or unsuitable for the specific fire class, this can result in serious injuries or even death and significant damage to property.

Flue gas system

WARNING

Risk of injury and damage to property from obstructing the flue gas system!

- The chimney is only to be used as an outlet for one heating system.
- Optimum performance can only be guaranteed if the flue gas system is functioning correctly. It is, therefore, important to have the flue gas system cleaned regularly to ensure that the flue gas can escape properly.
- Arrange for the chimney sweep to check the chimney connection and chimney for tar oil deposits twice a month during the heating period.
 - Problems with the flue system, such as poor cleaning of the flue pipe or insufficient chimney escape can cause serious faults in combustion (such as spontaneous combustion of carbonization gases/explosion).

1.5.4 Danger from high temperatures

Hot surfaces

WARNING

Risk of injury from hot surfaces!

- FOR SAFETY REASONS, KEEP ALL DOORS TIGHTLY CLOSED.
- Before all work on the boiler, burn out the fuel-loading chamber and let the boiler cool.
- Protective gloves must generally be worn for work on the boiler. Only touch the boiler using the handles provided.
- Insulate the flue gas pipes and do not touch them during operation.
- Keep children and unauthorized persons away from the boiler.
- Allow the boiler to cool before carrying out any maintenance work.
 - Touching hot surfaces on the boiler, on the flue gas pipe and on heating pipes can cause serious burns.

Hot media

WARNING

Risk of scalding from hot media!

- Temperature adjustments on the boiler controller must only be undertaken in consultation with the manufacturer.
- Do not touch heating pipes and consumer loads in the heating circuit (radiator etc.) during operation.
- Allow the system to cool before carrying out any maintenance work. Always wear protective gloves when working on the system.
- Keep children and unauthorized persons away from the heating system.
 - Heating pipes and consumer loads in the heating circuit can heat up considerably from the hot water. An incorrect setting at the boiler controller means that the water obtained can be extremely hot. Contact with hot water or hot surfaces can cause scalding to skin.

Hot ashes

WARNING

Risk of injury from hot ashes!

- Always wear protective clothing and protective gloves when working on the system.
- Before handling ash, check whether or not it is still hot. Allow to cool if necessary.
 - Ash is extremely hot after the combustion process. Contact can cause serious burns.

1.5.5 Risks from flue gases, lubricants and other equipment

Proposition 65

WARNING

CALIFORNIA Proposition 65

This product may contain chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Tar oil

WARNING

Health risk from tar oil!

- Always proceed with caution and wear personal protective equipment (protective clothing, safety shoes, protective gloves) when cleaning the boiler.
- Have a chimney sweep regularly clean tar oil deposits from the chimney connection and chimney.
- Regularly check the air inlet to the boiler room to ensure a controlled combustion process in the boiler.
 - ➔ The combustion of firewood can cause tar oil deposits in the boiler and chimney. Skin contact can be seriously harmful to health.

Leaking flue gas

WARNING

Risk of poisoning from flue gases in the boiler room!

- If you smell flue gas keep all the doors on the boiler closed.
- Ventilate the boiler room.
- Close the fire door and doors to living areas.
 - ➔ Contact with flue gases can cause perilous situations.

Explosive dusts **WARNING****Risk of death from fire and explosion due to dispersed dust deposits!**

- Do not smoke within or close to the danger zone or boiler. Do not work with any kind of naked flame, fire or ignition sources.
- Keep the danger zone free from dust. Dust deposits over 5 mm thick are not permitted and must be removed.
- Stop work immediately in the event of a fire. Leave the danger zone until you get the all-clear and notify the fire brigade.
 - Dust deposits could catch fire or form an explosive compound if dispersed with the ambient air. This can result in serious and even fatal injuries.

Incorrect fuel **WARNING****Risk of injury and damage to the boiler if the incorrect fuel is added!**

- Only use fuels permitted by the manufacturer in the boiler.
- Never burn corn, cereal, coal, coke, garbage, painted or treated wood, bark, petrol, oil or other flammable liquids in the boiler.
- Never store fuel or other flammable materials in the boiler room.
- Never use chemicals, kerosene, charcoal, spirits or other flammable liquids to start or reignite the combustion process in the boiler.

1.6 What to do in the case of danger

What to do if the system overheats (at temperatures above 220°F (105°C)) **WARNING****Risk of injury from switching the system off prematurely at the main switch!**

- The system must only be switched off at the main switch once the boiler has cooled down sufficiently (operating status "Fire Off").
 - Switching off the main switch when the boiler is in heating mode can cause major combustion faults leading to serious accidents.

If the system overheats, proceed as follows:

- Keep all the doors on the boiler closed.
- Open all mixing valves; switch on all pumps. The Froling heating circuit control takes on this function in automatic operation.
- Leave the boiler room and close the access door.
- Ensure that heat is being consumed. To do this, activate all consumer loads.
- Once the boiler temperature has fallen to 185°F (85°C), return the heating circuit to normal status.
- If the temperature does not drop:

- Inform the installer or Froling customer service.

In the event of a power failure proceed as follows:

- Keep all the doors on the boiler closed.
- The boiler controller will start again automatically after the restart.
 - Half an hour after the boiler restart, compare the values in the boiler controller and the values on the pressure gauges with the original values. If the pressure level is too low, add water to the heating system in accordance with the heating installer's instructions.

In the event of excessive temperature the high-limit thermostat may have triggered. You may have to release this to allow the boiler to restart.

What to do if there is a smell of flue gas

If you smell flue gas, proceed as follows:

- Keep all the doors on the boiler closed.
- Ventilate the boiler room where the boiler is located.
- Close the fire door and doors to living areas.

What to do in the event of fire

In the event of a fire proceed as follows:

- Keep all the doors on the boiler closed.
- Leave the main switch switched on.
- Close the fire door
- Leave the boiler room and the building.
- Inform the fire department.

1.7 Staff requirements

Risk of injury from inadequate qualification of staff!

WARNING

Risk of injury from inadequate qualification of staff!

If unqualified staff work on the system, or are within the danger zone of the system, this creates hazards which could cause serious injuries and considerable damage to property.

- All such activities should be carried out only by suitably qualified staff.
- Keep unqualified staff away from danger zones.

Definition of staff qualifications

The staff qualifications listed here for the United States are based on the descriptions of professional qualifications in the Occupational Outlook Handbook 2011-12 edition of the United States Department of Labor, Bureau of Labor Statistics.

Operator

The operator is the person who operates the heating system for commercial or economic purposes by himself or cedes use/application to a third party and bears the legal responsibility concerning the product for the protection of the user or third parties during the operation.

He has been trained by the manufacturers and the suppliers in dealing with the system and its components and can independently detect potential hazards and avoid the associated risks.

Froling customer service or an authorized partner

The Froling customer service or its authorized partner is able to perform the tasks assigned to it and recognize and avoid possible dangers thanks to its professional, product-related training, knowledge and experience as well as its knowledge of the relevant local regulations.

Heating system installer

The heating system installer has demonstrably received specific instructions by the manufacturer regarding the tasks entrusted to him and potential dangers associated with improper conduct. The heating system installer must have read and understood these instructions. The heating system installer must have undertaken training and have professional experience of at least one year in his field of application.

The skills of the heating system installer include:

- Understanding technical contexts
- Reading and understanding technical drawings and diagrams
- Installing system components
- Installing and connecting of heating lines
- Performing maintenance work
- Dismantling and repairing or replacing system components, if a problem occurs

Licensed electrician

Thanks to his training, knowledge, experiences and knowledge of relevant standards and provisions the licensed electrician is capable of performing the following tasks on electrical systems professionally and according to safety requirements:

- Planning and connecting electrical systems based on circuit and current flow diagrams
- Assembling pipes and connecting electric components
- Analyzing, measuring and testing electrical systems and functions
- Performing safety checks on electrical systems, components and devices
- Troubleshooting electrical systems

The licensed electrician is able to independently recognize and avoid hazards associated with these works.

Chimney sweep

The chimney sweep is able to perform the tasks assigned to him and recognize and avoid possible dangers thanks to his professional training, knowledge and experience as well as his knowledge of the relevant standards and regulations.

The skills of the chimney sweep include:

- Understanding technical contexts
- Reading and understanding technical drawings and diagrams
- Checking heating, flue gas and ventilation systems as well as fuel stores for proper operation and fire safety
- Cleaning heating plants, smoke ducts and ventilation systems

- Knowledge of provisions under building law and environmental protection law, as well as knowledge in the field of energy efficiency, fire protection and climate protection
- Performing seal checks

Basic requirements

Only persons expected to carry out their work reliably are admitted as staff. Persons, whose responsiveness is influenced e.g. by drugs, alcohol or medicine are not admitted.

When choosing staff, observe the applicable age and profession-specific regulations on site.

Unauthorized

WARNING

Risk of death for unauthorized persons due to hazards in the danger zone and work area!

- Keep unauthorized persons away from the danger zone and work area.
- In case of doubt, address the persons and direct them to leave the danger zone and work area.
- Suspend the work as long as there are unauthorized persons in the danger zone and work area.
 - Unauthorized persons that do not meet the requirements described here, do not know the dangers in the work area. Therefore, unauthorized persons are exposed to risk of serious injury and even death.

Instruction

The operator must regularly instruct the staff. For the purposes of traceability, you must create a training log containing the following at minimum:

- Date of training
- Name of the trainees
- Contents of the training
- Name of the instructor
- Signatures of the trainees and the instructor

1.8 Personal protective equipment

Description of the personal protective equipment

The personal protective equipment is as follows:



Protective workwear:

Protective workwear is tight-fitting work clothing with low tear resistance, narrow sleeves and without any protruding parts.



Protective goggles

Protective goggles are used to protect the eyes from flying parts when cleaning the system.

**Protective gloves**

Protective gloves are used to protect the hands against friction, abrasion, puncture, or deeper injuries and contact with hot surfaces.

**Safety shoes**

Safety shoes protect feet from crushing and falling parts as well as from sliding on slippery surfaces.

**Dust mask**

The dust mask is used for protection against dust when cleaning the system and when working in the fuel store.

1.9 Replacement parts

Incorrect replacement parts

**WARNING****Danger of injury when using incorrect replacement parts!**

- Use only original Froling replacement parts or spare parts approved by Froling.
- In case of doubt, always contact our customer service.
 - Hazards for the staff can arise through the use of incorrect or faulty spare parts and cause damage, malfunction or total failure.

Spare parts can be obtained from the manufacturer or importer.

1.10 Environmental protection

NOTICE

Danger to the environment resulting from incorrect handling of environmentally hazardous substances!

- Always follow the instructions below when handling hazardous substances and their disposal.
- If hazardous substances are accidentally released into the environment, take appropriate measures immediately. In case of doubt, inform the competent authority about the damage and request that proper measures be taken.
 - Incorrect handling of environmentally hazardous substances, in particular incorrect disposal, can cause significant damage to the environment.

The following hazardous substances are used:

Ash

Ashes should be placed in a steel container with a tight-fitting lid. The closed container of ashes should be placed on a non-combustible floor on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until all cinders have thoroughly cooled. For the disposal of ash from the heat exchanger, consult the local chimney sweep or waste disposal service of the municipality or province. Other waste should not be placed in this container.

Firebricks

The combustion chamber must be disposed of as construction waste.

1.11 The operator's responsibilities

Operator

The operator is the person who operates the system for commercial or economic purposes by himself or cedes use to a third party and bears the legal responsibility concerning the product for the protection of the user, staff or third parties during the operation.

Operator duties

The system operator is subject to the legal obligations for safety at work.

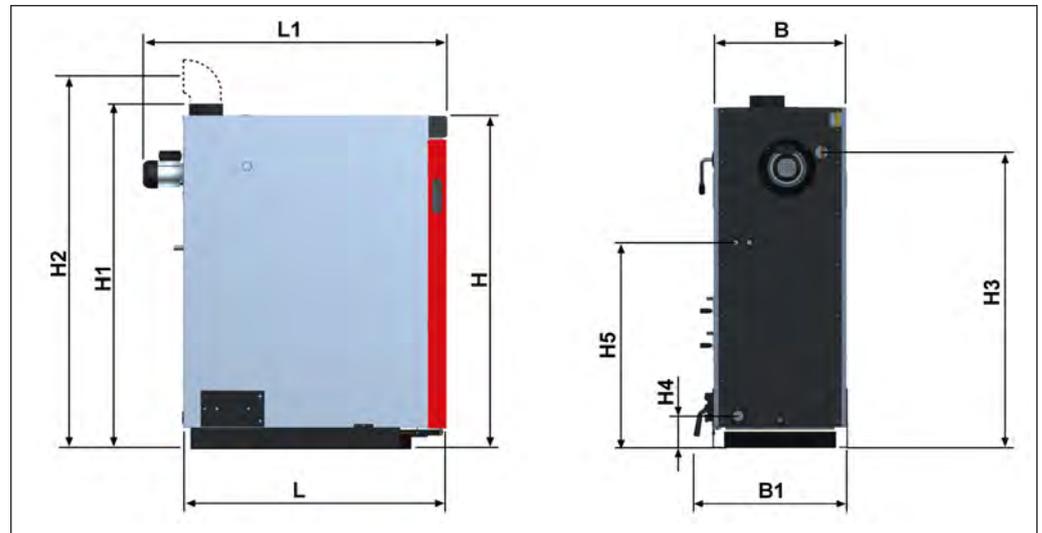
In addition to the safety instructions in this manual, the applicable regulations on safety, safety at work and environmental protection must be observed.

Therefore, in particular, the following applies:

- The "Occupational Safety and Health Act" of 1970 lays down that a safe workplace must be provided at all times during the execution of work.
- The operator must be aware of the applicable occupational safety regulations. Additionally, he must perform a risk assessment to determine hazards arising from special working conditions at the site where the system is used. He must implement these in the form of operating instructions for system operation.
- The operator must check throughout the entire period of use of the system whether the operating instructions created by him correspond to the current version of the regulations, and, if necessary, adjust them.
- The operator must clearly manage and determine the responsibilities for operation, troubleshooting, maintenance and cleaning.
- The operator must ensure that all persons who deal with the system have read and understood this manual. In addition, he must train the staff at regular intervals and inform them about possible dangers. Moreover, the operator must ensure that unauthorized persons do not get close to the system.
- The operator must provide the required protective equipment to staff and instruct them that it is obligatory to wear the necessary protective equipment.
- The operator must ensure that only fuels approved by the manufacturer are used.
- The operator must ensure that the prescribed safety tests are performed.
- The operator must ensure that the regulatory approval requirements are respected.
- The operator must ensure compliance with the requirements of the installation site and the safety measures when working in the storeroom.
- Furthermore, the operator is responsible for ensuring that the system is always in full working order. Therefore the following applies:
 - The operator must ensure that the maintenance intervals described in these instructions are respected.
 - The operator must ensure that the safety devices are regularly checked for proper functioning and completeness.

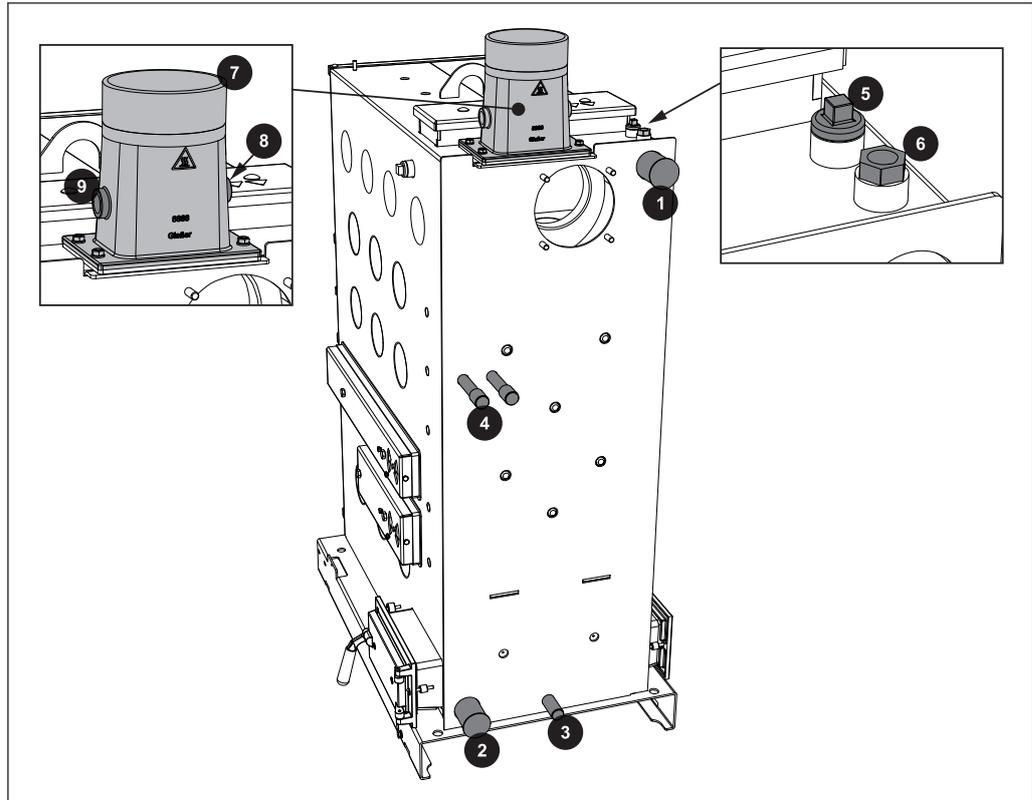
2 Technology

2.1 Dimensions



Dim.	Description	Unit	S3 Turbo 30	S3 Turbo 50
L	Length of boiler	mm inches	1160	1250
			45 ³ / ₄	49 ¹ / ₄
L1	Total length including induced draft fan		1260	1350
			49 ¹ / ₂	53 ¹ / ₄
B	Width of boiler		570	670
			22 ¹ / ₂	26 ¹ / ₃
B1	Total width inc. side cleaning door		680	780
			26 ³ / ₄	30 ³ / ₄
H	Height of boiler		1470	1570
			58	62
H1	Total height incl. flue gas nozzle		1530	1630
			60 ¹ / ₄	64 ¹ / ₄
H2	Height of flue pipe connection		1750	1850
			69	73
H3	Height of flow connection		1280	1380
			50 ¹ / ₂	54 ¹ / ₃
H4	Height of return connection		140	140
			5 ¹ / ₂	5 ¹ / ₂
H5	Height of safety battery connection		890	970
			35	38 ¹ / ₄
H6	Height of drainage connection		120	120
			4 ³ / ₄	4 ³ / ₄

2.2 Components and connections



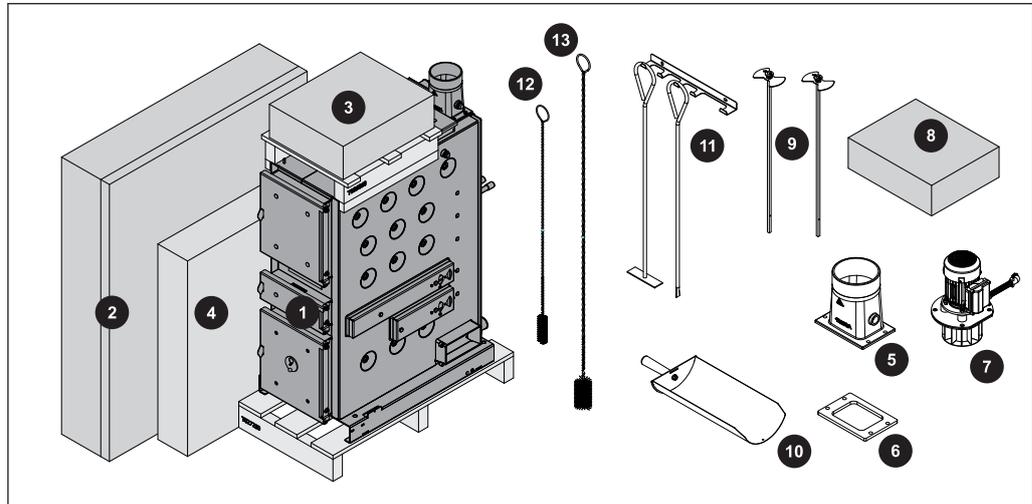
Item	Description	Unit	S3 Turbo
1	Boiler flow connection	inches	6/4
2	Boiler return connection	inches	6/4
3	Drainage connection	inches	1/2
4	Safety battery connection	inches	1/2
5	Immersion sleeve for thermal discharge valve (supplied by the customer)	inches	1/2
6	Immersion sleeve for boiler sensor and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

2.3 Technical data

Description		S3 Turbo 30	S3 Turbo 50
Nominal heat output	kW	30	50
	Btu/h	102,500	170,000
Electrical connection		230V / 60Hz / fused 15A	
Power consumption at nominal load	W	120	180
	Btu/h	410	615
Weight of boiler incl. insulation and control	kg	530	620
	lbs	1170	1370
Total boiler capacity (water)	l	120	190
	gal	32	50
Minimum boiler return temperature	°C	60	
	°F	140	
Maximum permitted operating temperature		88	
		190	
Permitted operating pressure	bar	2	
	psi	30	
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	330 / 370
	inches	13 / 14.5	13 / 14.5
Fuel loading chamber capacity	l	140	210
	gal	37	55
Combustion time ¹⁾ – hardwood	h	3.9 - 5.6	3.9 - 5.6
Combustion time ¹⁾ – soft wood		2.8 - 3.9	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%)			

3 Assembly

3.1 Materials supplied



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 fiber seal	13	Cleaning brush, large
7	Induced draft fan		

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

3.1.1 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

3.2 Positioning

NOTICE



Damage to components if handled incorrectly

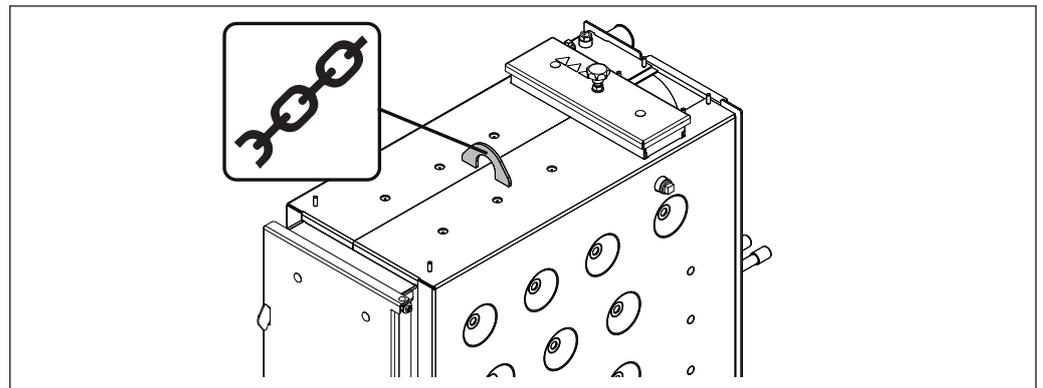
- Follow the transport instructions on the packaging
 - Transport components with care to avoid damage
 - Protect the packaging against damp conditions
 - Pay attention to the pallet's centre of gravity when lifting
- Position a fork-lift or similar lifting device at the pallet and bring in the components

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 36]

Positioning using a crane



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

3.2.1 Temporary storage

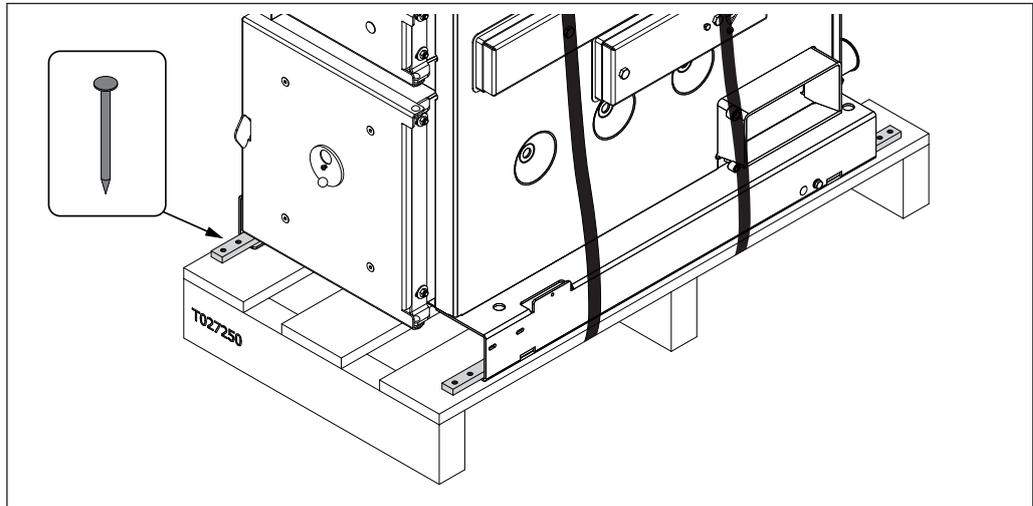
If the system is to be assembled at a later stage:

- Store components at a protected location, which is dry and free from dust
 - Damp climate conditions and frost can damage components, particularly electric ones!

3.3 Setting up in the boiler room

3.3.1 Remove boiler from pallet

S3 Turbo 30/50



- Cut through and remove tension bars with diagonal cutting pliers
- Remove the wooden slats which are fixed with nails
 - In total 8 nails left/right, front/rear
- Lift boiler off pallet

3.3.2 Moving the boiler in the boiler room

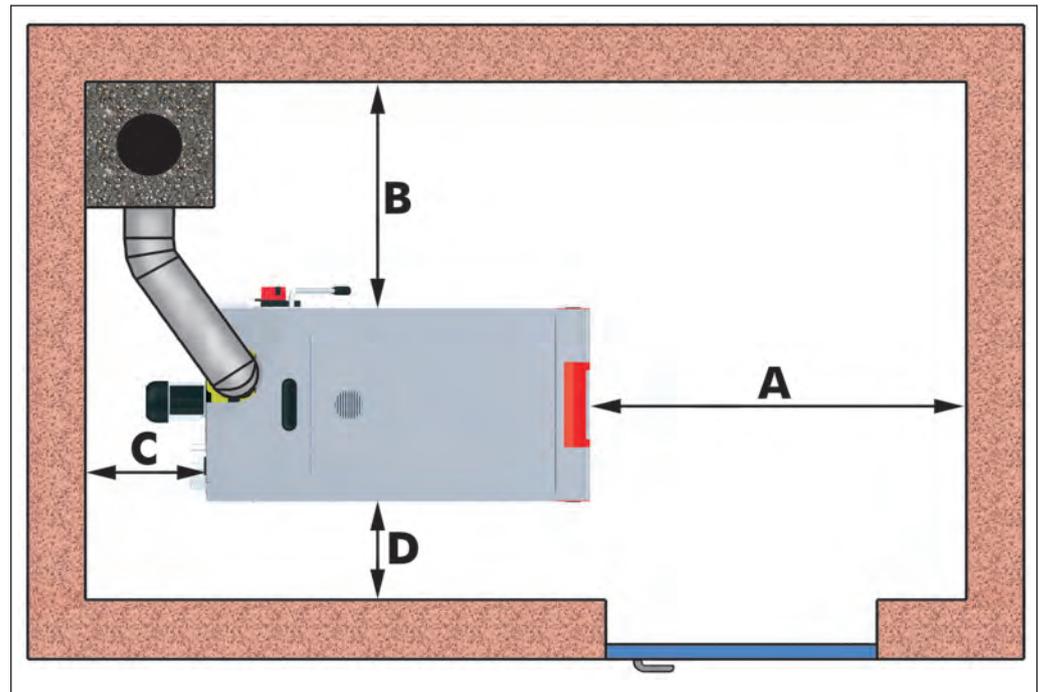
- Position a fork-lift or similar lifting device with a suitable load-bearing capacity at the base frame
- Lift and transport to the intended position in the installation room
 - Observe the minimum distances in the boiler room.

3.3.3 Space required

FOR SAFE INSTALLATION AND OPERATION CLEARANCES TO COMBUSTIBLES MUST BE MAINTAINED.

The diagram below shows how much space is required for the system in the boiler room.

The boiler may only be installed on non-combustible floors with these clearances.



Dimension	Name	S3 Turbo
A	Distance - front of boiler to wall	36" (900 mm)
B	Distance – side of boiler to wall	32" (800 mm)
C	Distance – back to wall	14" (350 mm)
D	Distance – side of boiler to wall	9" (250 mm)
Distance between ceiling and boiler		18" (460 mm)

3.4 Before Installation

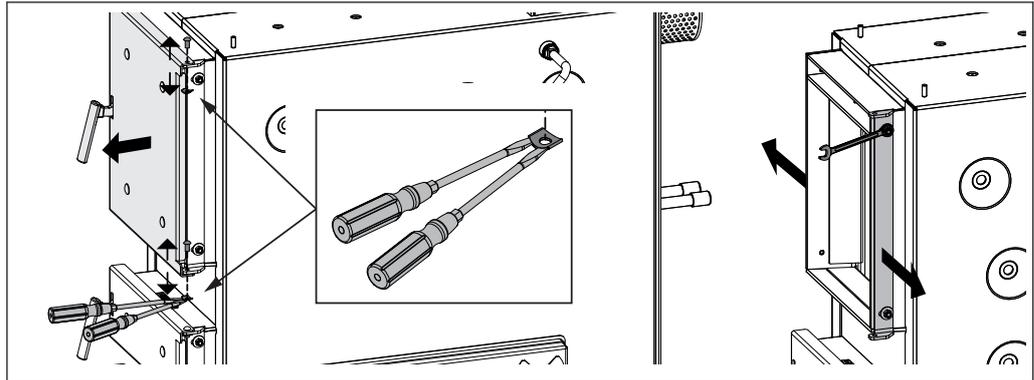
3.4.1 Changing door stops (as needed)

The boiler comes with the door stop on the right. If you want to change the side the door stops are on, proceed as follows.

Changing the stop

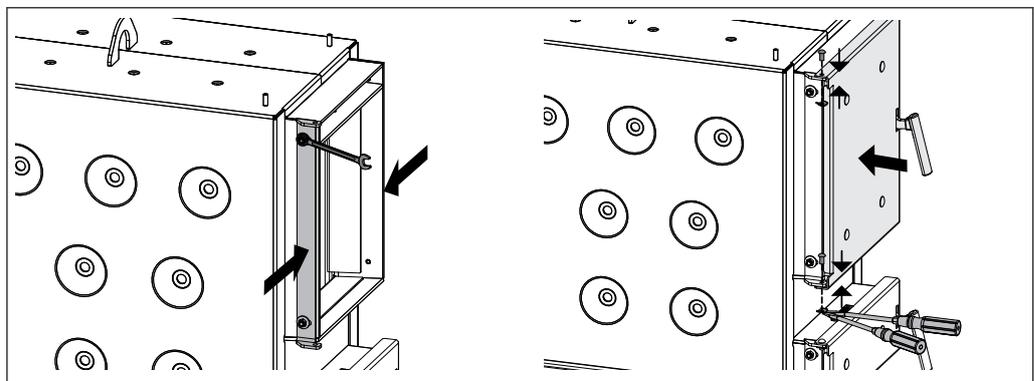
The following example using the fuel loading door shows how to change the door stop. The procedure is the same for changing the stop on the combustion chamber door and pre-heating chamber door!

- Open the fuel loading door

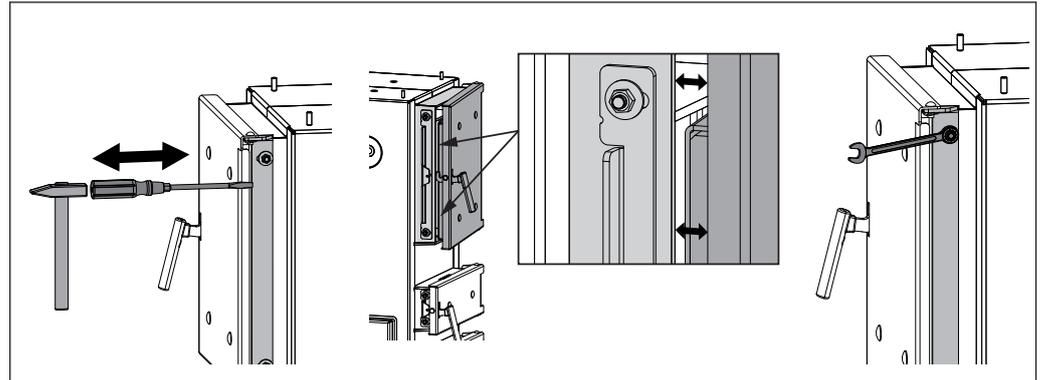


- Undo the retainer of the hinge pin at the top and bottom door hinge
 - ↳ For example, use two screwdrivers to gently bend the retainer plate out to loosen it
- Take out the top and bottom hinge pins and take off the fuel loading door
- Remove the locking plate and hinge
 - ↳ Loosen the nuts (M8) with 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 39]



- 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

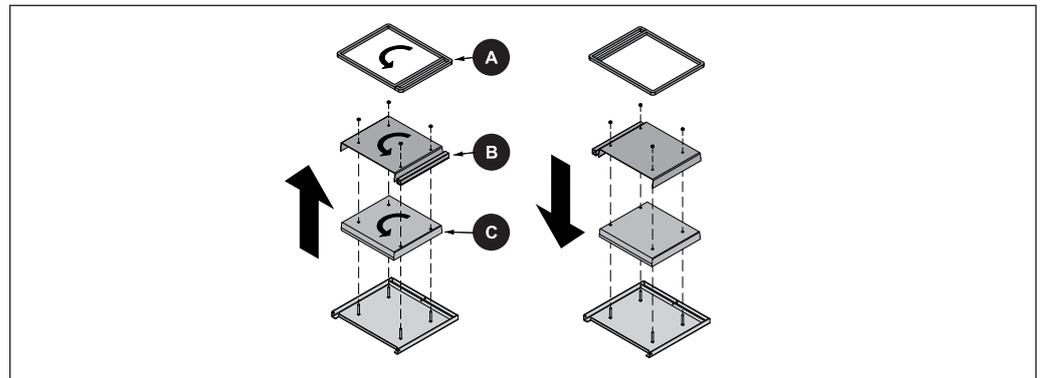


- Use suitable tools (e.g. screwdriver and hammer) to push the hinge far enough toward the rear so that when the door is closed, there is slight resistance at a gap of approx. 2-3 cm
 - Caution: the hinge must be aligned in the same way at the top and bottom!
- Tighten the nuts at the top and the bottom 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 "Set and check the seal on the doors" [page 40]

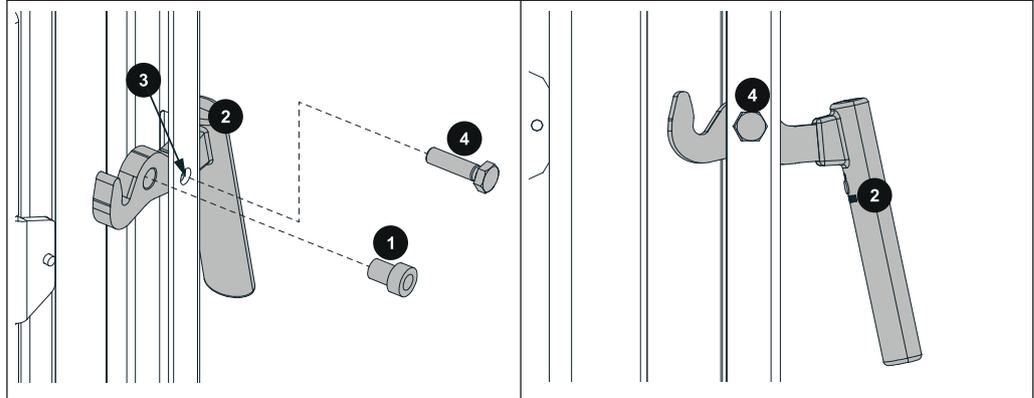
Converting the fuel loading door



- 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

3.4.2 Fitting the door handles

The procedure is the same for all doors.



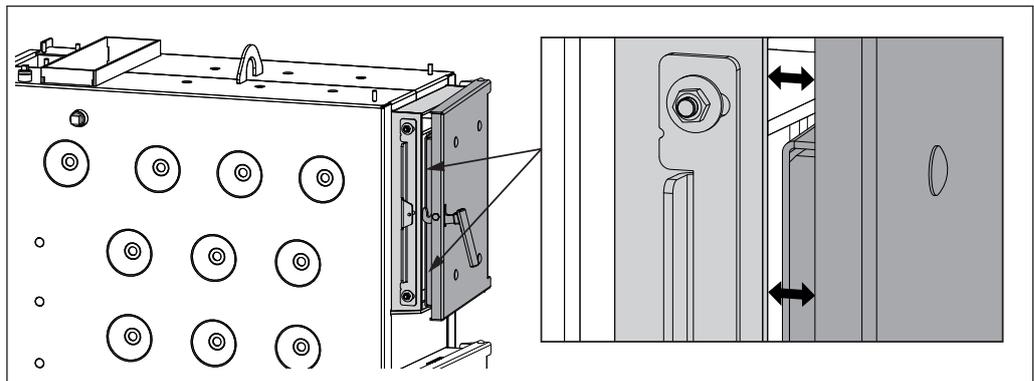
- Insert the flange bushing (1) into the door handle (2) and position it alongside the hole (3) provided
- Fix the door handle (2) in place using screws (4)

3.4.3 Set and check 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:



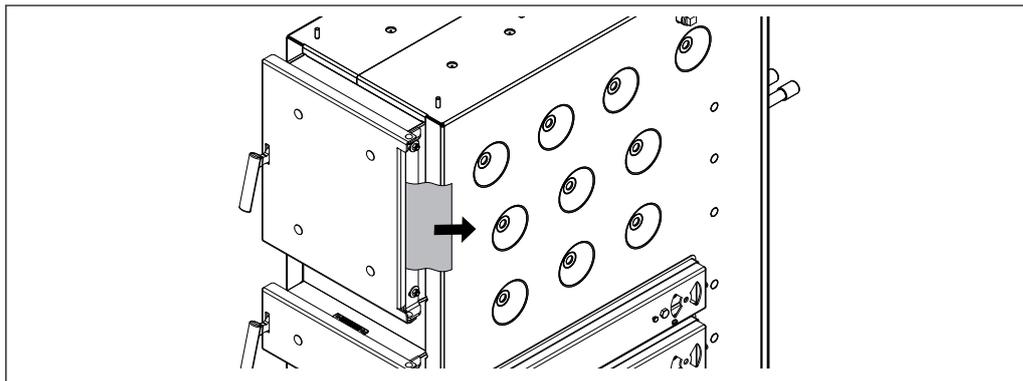
- Close the door
 - A slight resistance must be felt when there is a gap of 2 - 3 cm:
Setting OK
 - No resistance or only very slight resistance felt:
setting must be corrected - push the hinge toward the back
⇒ See "Adjusting the doors" [page 42]
 - Resistance noticeable at a gap of >3 cm:
Setting must be corrected - push the hinge toward the front
⇒ See "Adjusting the doors" [page 42]

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 "Adjusting the doors" [page 42]

On the side with the door stop

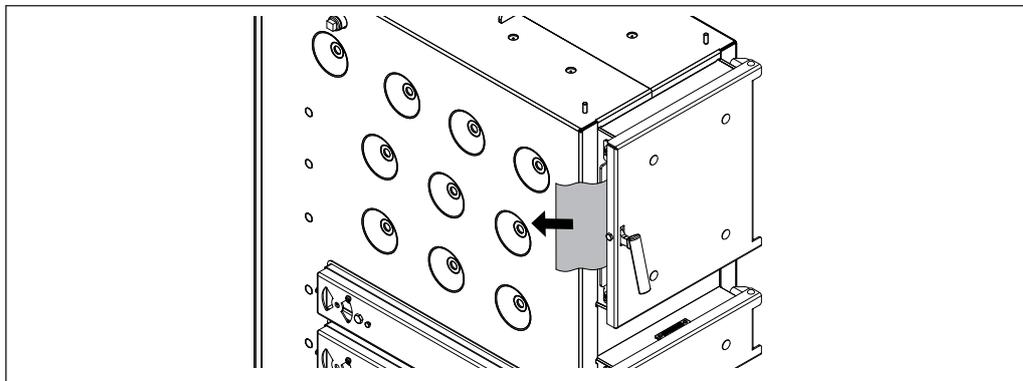
Checking the seal:



- 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 "Adjusting the doors" [page 42]

On the side with the door stop

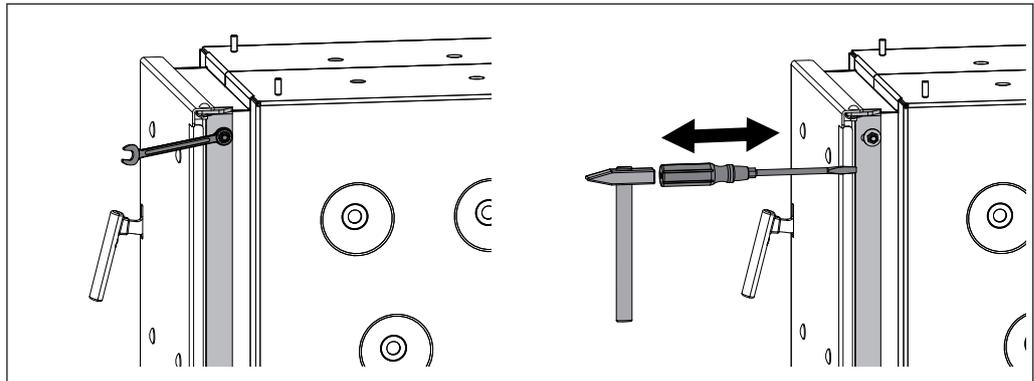
Checking the seal:



- 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 "Adjusting the doors" [page 42]

Adjusting the doors

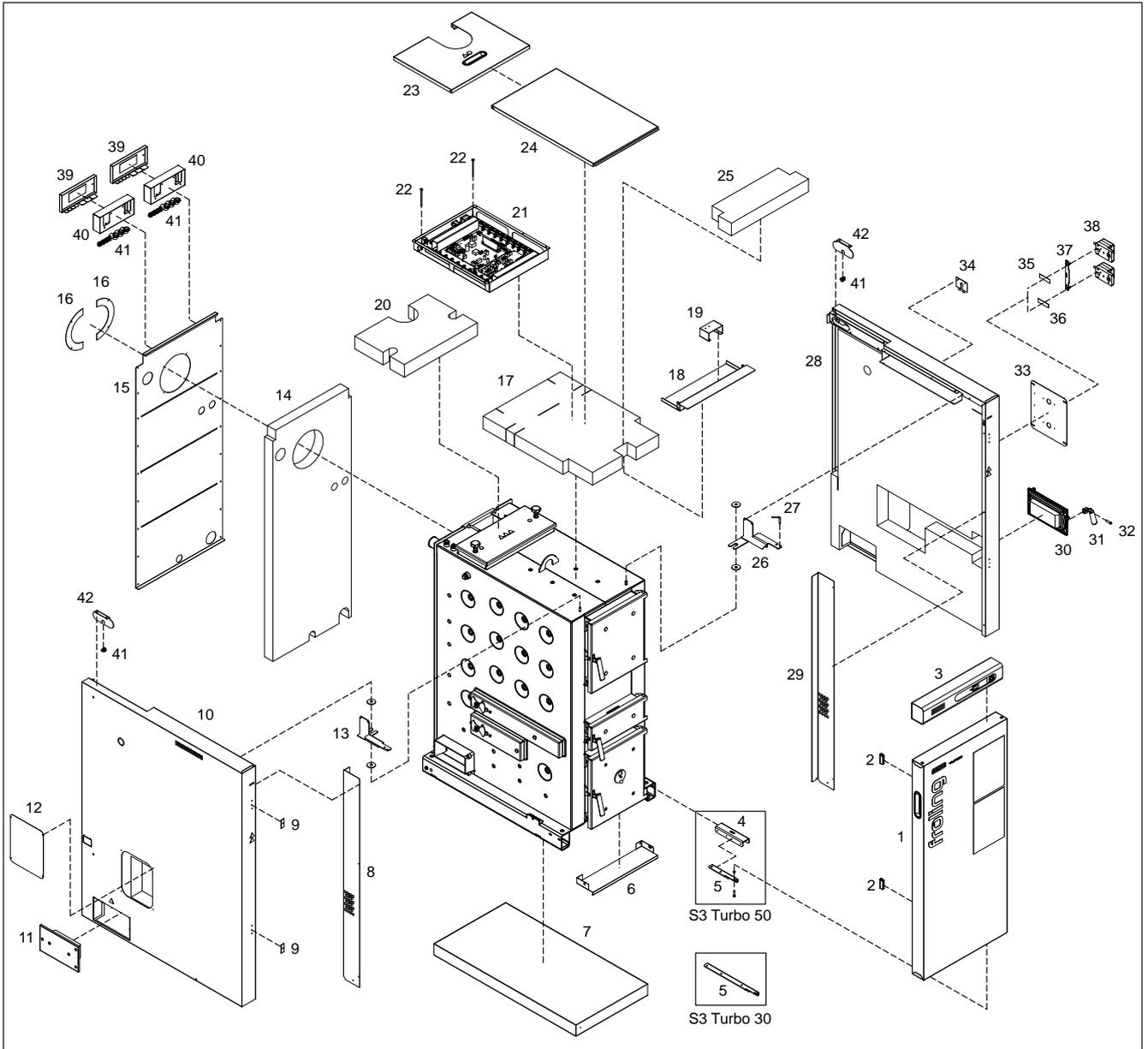


- Using an Allen key (SW 13 mm), loosen the nuts on the locking plate and/or hinge at the top and bottom
- Use suitable tools (e.g. screwdriver and hammer) to move the locking plate and/or hinge to the rear or the front as needed
 - Caution: the locking plate and/or hinge must be aligned in the same way at the top and bottom!
- Tighten the nuts at the top and bottom

3.5 Installing the boiler

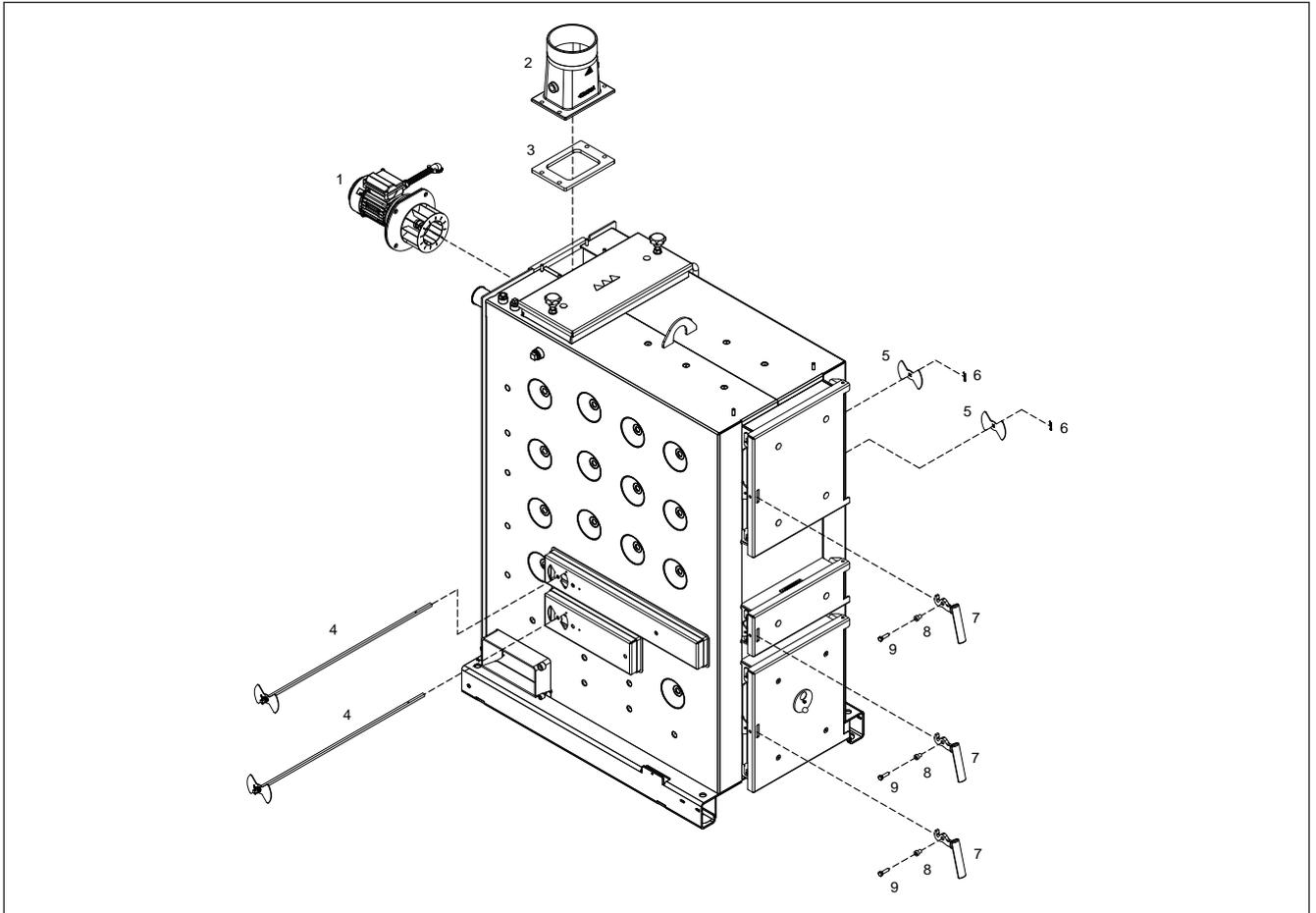
3.5.1 Assembly overview

Insulation

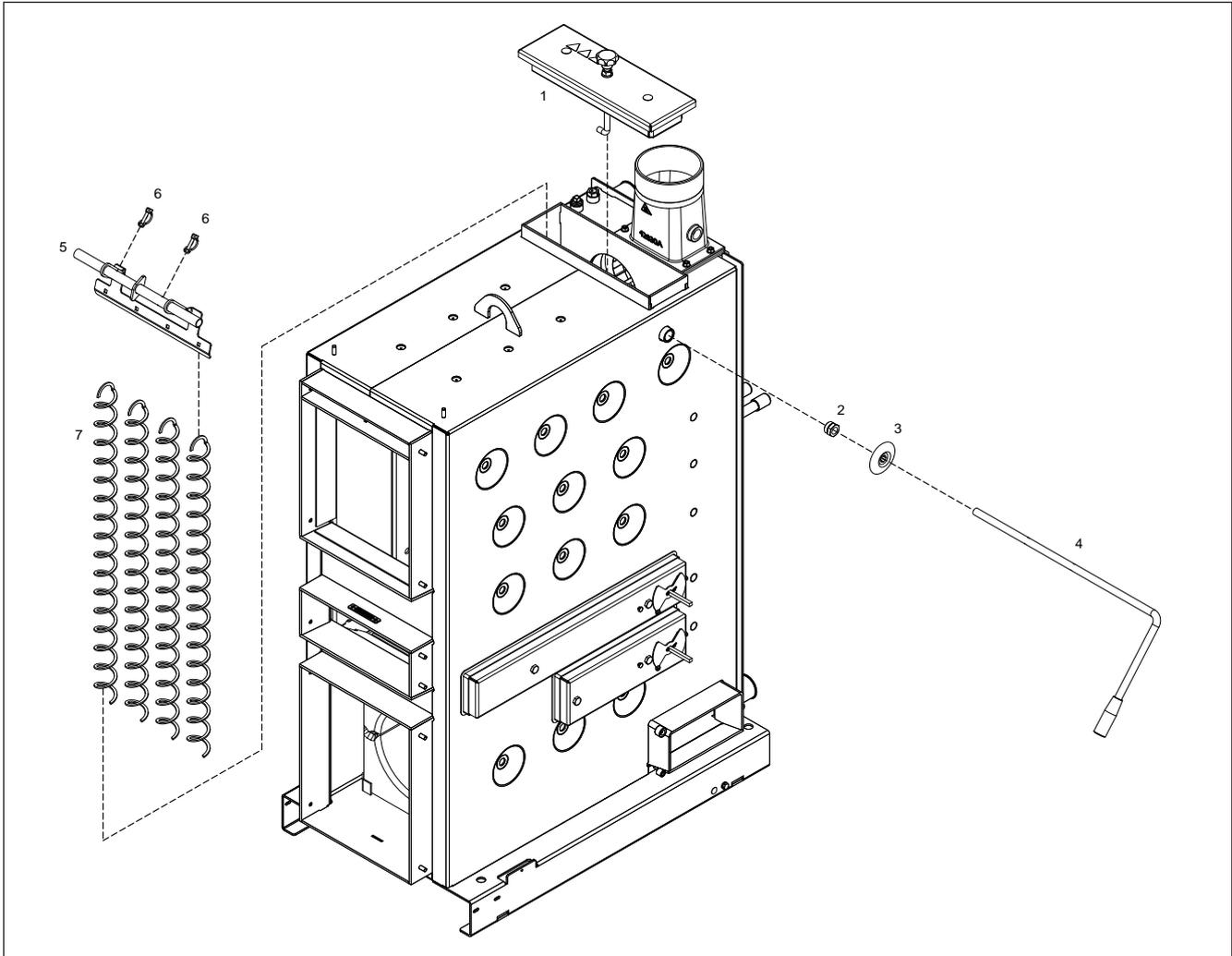


Item	Quantity [units]	Description	Item	Quantity [units]	Description
1	1	Insulated door, complete	22	2	Hexagonal screw M6 x 100
2	2	Magnetic latches	23	1	Insulating cover, back
3	1	Control, complete	24	1	Controller cover
4	1	U-plate – S3 Turbo 36/45	25	1	Heat insulation mat, top/front
5	1	Lower door bracket	26	1	Bracket, right
6	1	Cover plate, insulated door, bottom	27	1	Hinge pin, insulated door
7	1	Complete floor insulation	28	1	Insulating side panel, right, complete
8	1	Insulation cover plate, left	29	1	Insulation cover plate, right
9	2	Counter plate for magnetic latches	30	1	Side cleaning door, complete
10	1	Insulating side panel, left, complete	31	1	Door handle, cleaning door
11	1	Blanking plate, side cleaning door	32	1	Round-head screw M8 x 30
12	1	Cover plate	33	1	Cover plate
13	1	Bracket, left	34	1	Cover plate, actuator cable
14	1	Thermal insulation, rear	35	1	“Primary air actuator” label
15	1	Back panel, complete	36	1	“Secondary air actuator” label
16	2	Cover plate for ID fan	37	1	Torque support
17	1	Heat insulation mat, top	38	2	Servo-motor LM 24AP5-F/300.1
18	1	Upper spacer plate	39	2	Cover, terminal block
19	1	Door contact switch incl. cable	40	2	Terminal block
20	1	Heat insulation mat, top/rear	41	16	Cable leadthrough
21	1	Controller box, complete	42	2	Cover plate, cable duct

Air duct system

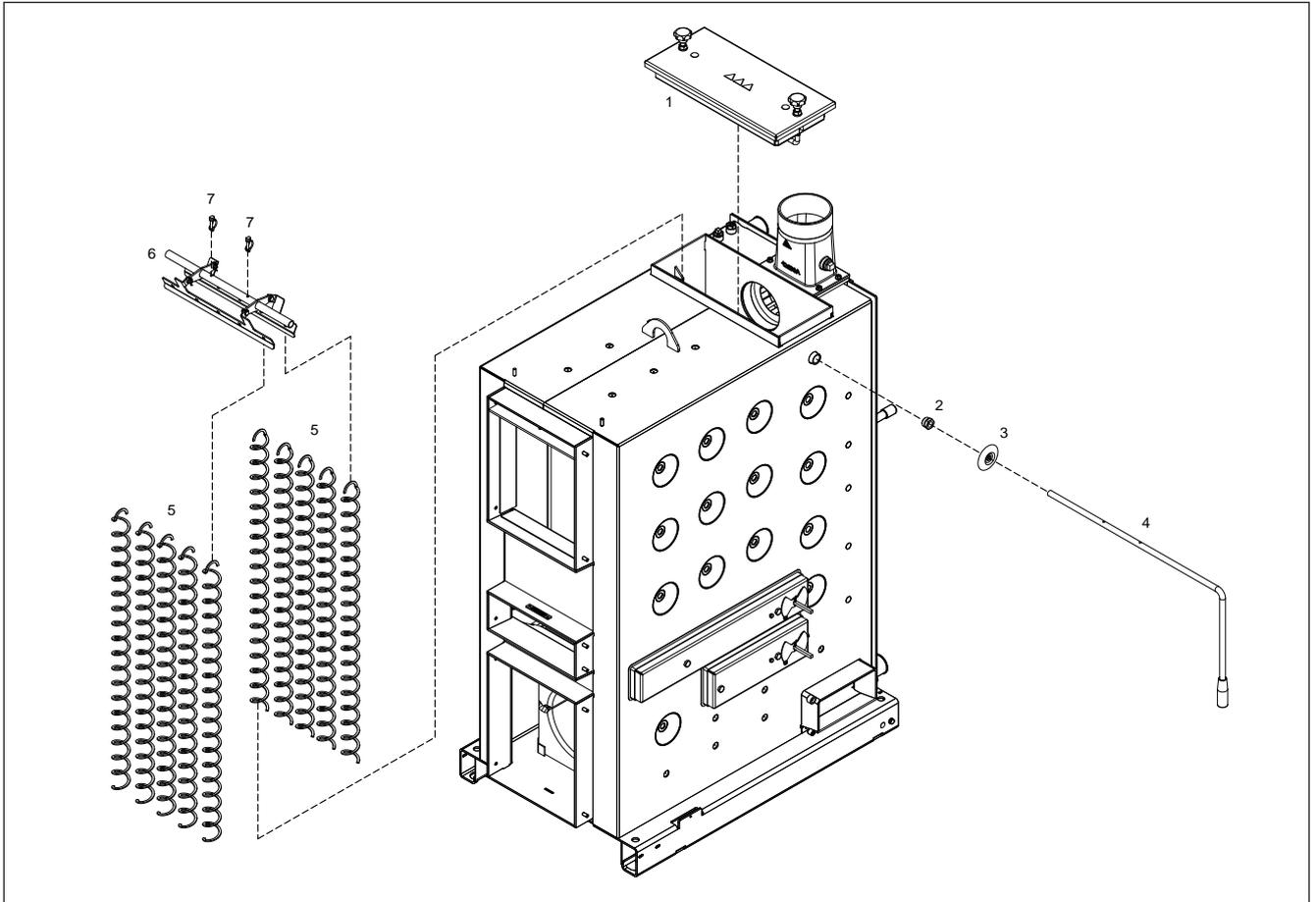


Item	Quantity [units]	Description
1	1	Induced draught fan 3360U, complete, with rotation speed transducer
2	1	Flue gas pipe nozzle Ø 150
3	1	Ceramic fiber seal 210 x 144 x 12
4	2	Pneumatic rods, complete
5	2	Sliding valve Ø 100
6	2	Split pin Ø 3.2 x 20
7	3	Door handle, black
8	3	Bushing Ø 10 x 20
9	3	Hexagonal screw M8 x 30

WOS system S3 Turbo 30


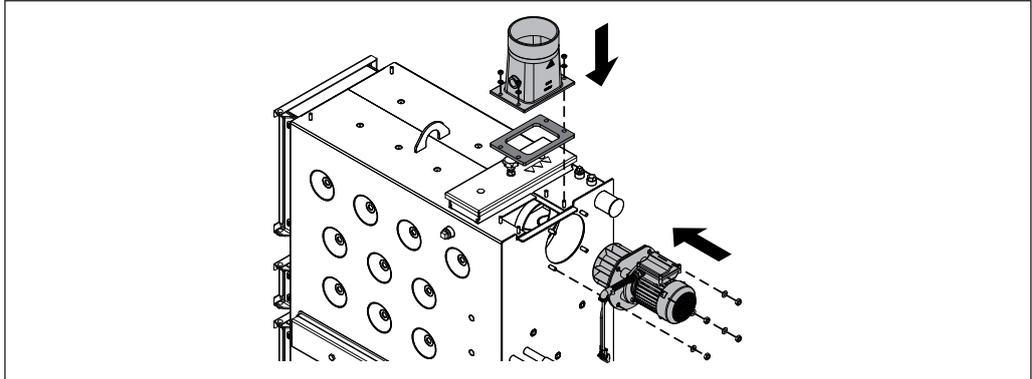
Item	Quantity [units]	Description
1	1	EOS cleaning cover, complete
2	1	Brass bushing
3	1	Plastic cover
4	1	WOS lever
5	1	EOS bracket, complete 6 x 3
6	2	Pipe locking pin
7	4	EOS turbulator \varnothing 50 x 6 x 3 x 837

EOS system S3 Turbo 50



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

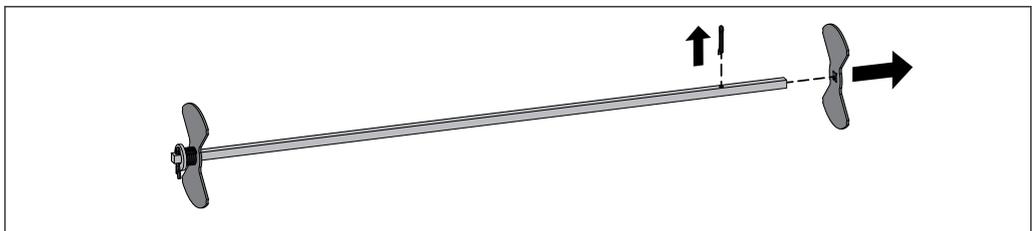
3.5.2 Fit flue gas pipe nozzle and the induced draught fan



- Place the ceramic fiber 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!

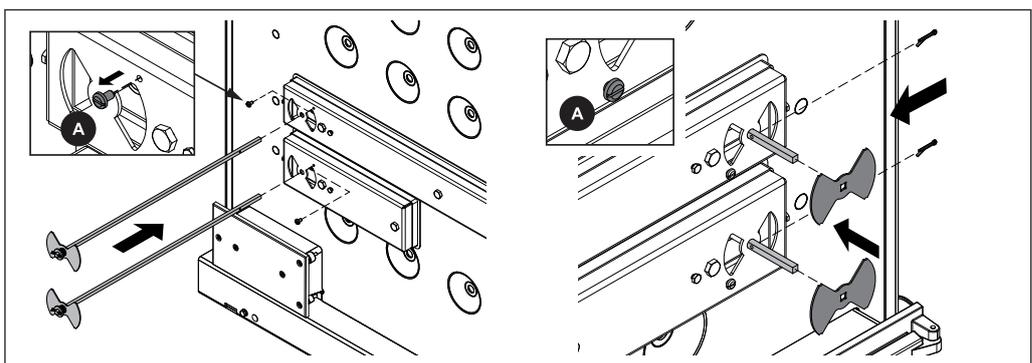
3.5.3 Installing the pneumatic rods for the primary and secondary air

Servo-motors can be mounted on either the left or the right side on the boiler.

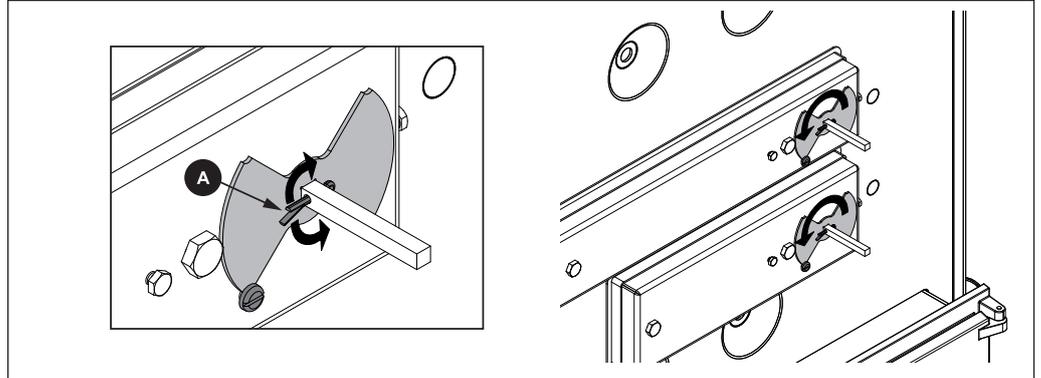


- Remove the split pin on both pneumatic rods opposite the spring and pull one of the air flaps off of each

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

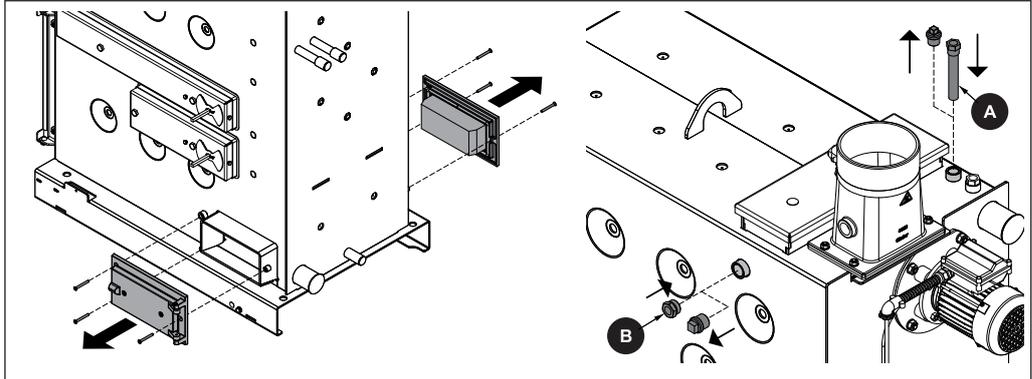


- Loosen the two screws (A) at the lower and upper air duct on the left side of the boiler
- Unscrew the screws (A) at the lower and upper air duct on the right side of the boiler far enough to allow the air flap to make contact with the thread
- Insert both pneumatic rods into the left-hand side of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

3.5.4 Final steps before insulating

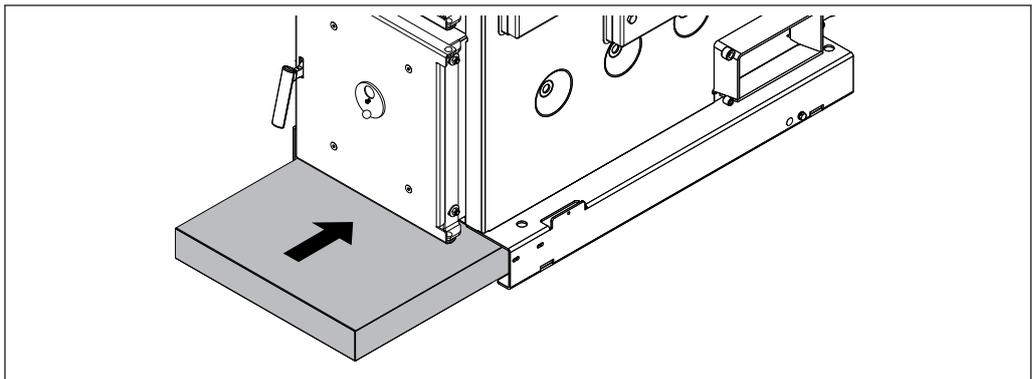


- Remove the side blanking plate and cleaning door
- Remove plugs, then seal and screw in the immersion sleeve (A) for thermal discharge safety device sensor
- Remove the screw cap from the side on which the heat-exchanger lever will be mounted later and replace it with a brass bushing (B)
 - ↳ Tighten the brass bushing (B) with Allen wrench (SW 27 mm)

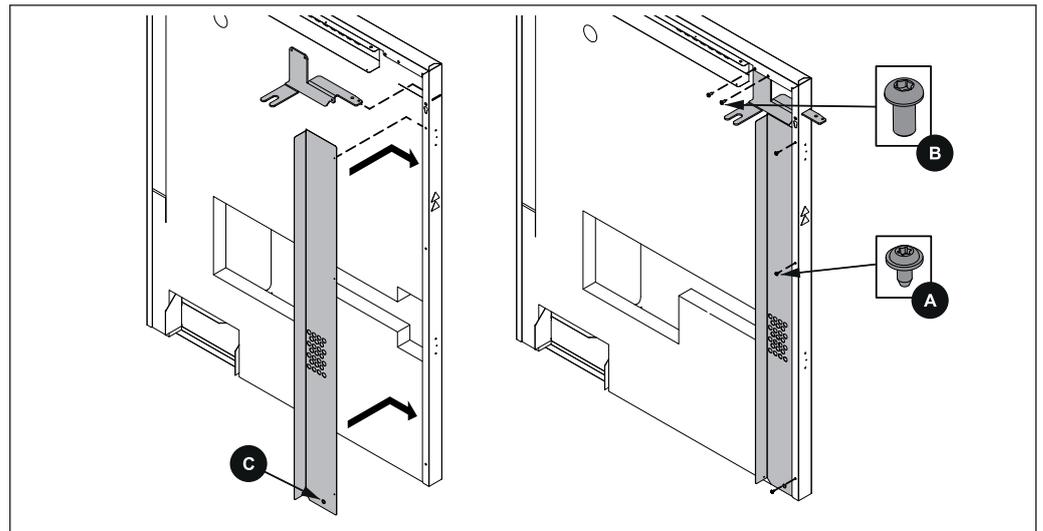
3.5.5 Installing the insulation

NOTICE

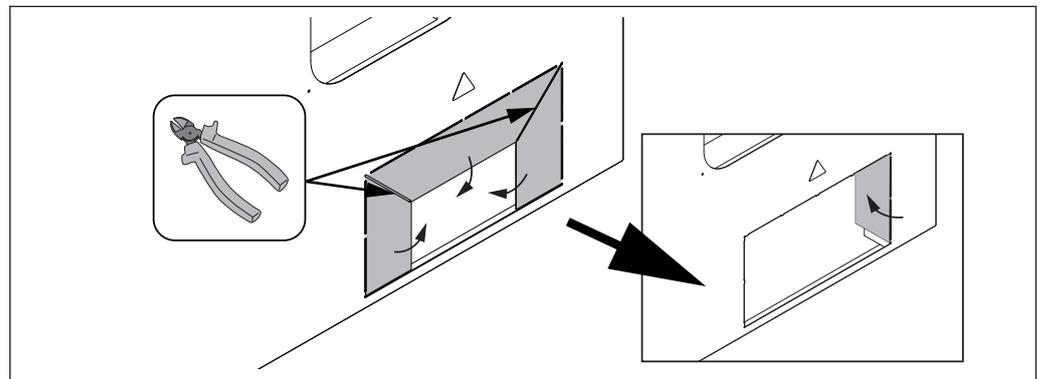
Several parts of the boiler are covered with a protective film. This film **MUST** be removed before assembly!



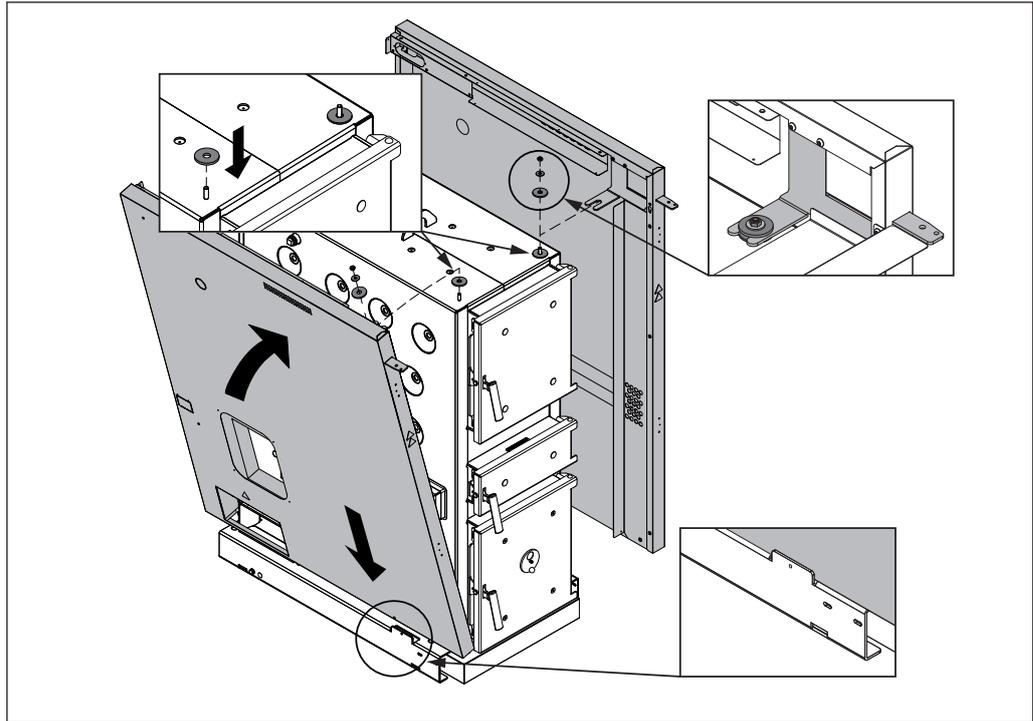
- Push in the floor insulation



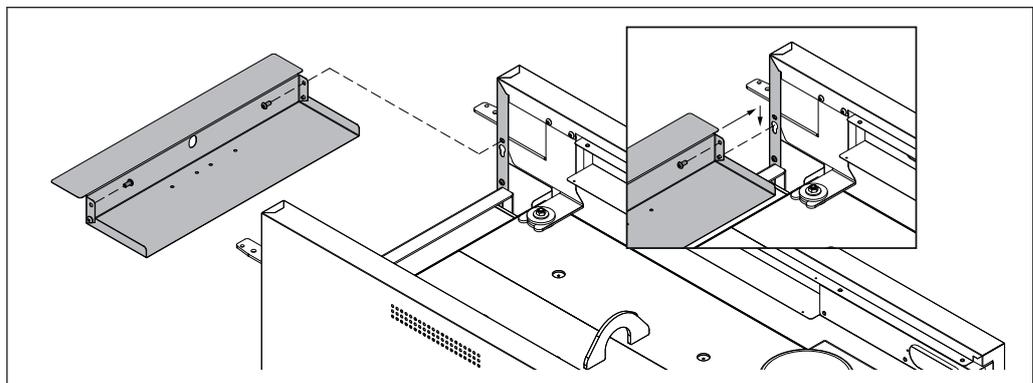
- ❑ Inset the two L-shaped insulation cover plates at the insulating side panels at left and right and secure them with three thread forming screws (A) each
 - Insert the cover plates such that the rivet (C) is at the bottom!
- ❑ Insert the insulation mounting brackets at both insulating side panels 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 $> 100^\circ$ inward!

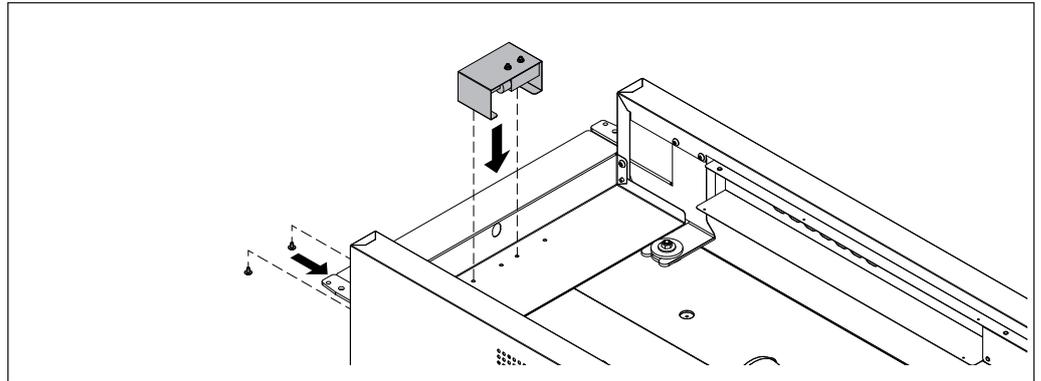


- ❑ Place one large spacer washer on each of the threaded bolts to the right and the left above on the boiler
- ❑ Insert the insulating side panels at the base of the boiler at the flap and push them onto the boiler
- ❑ Position the side panels with the door bracket onto the threaded bolts and secure them lightly with a large and a small spacer washer and nut



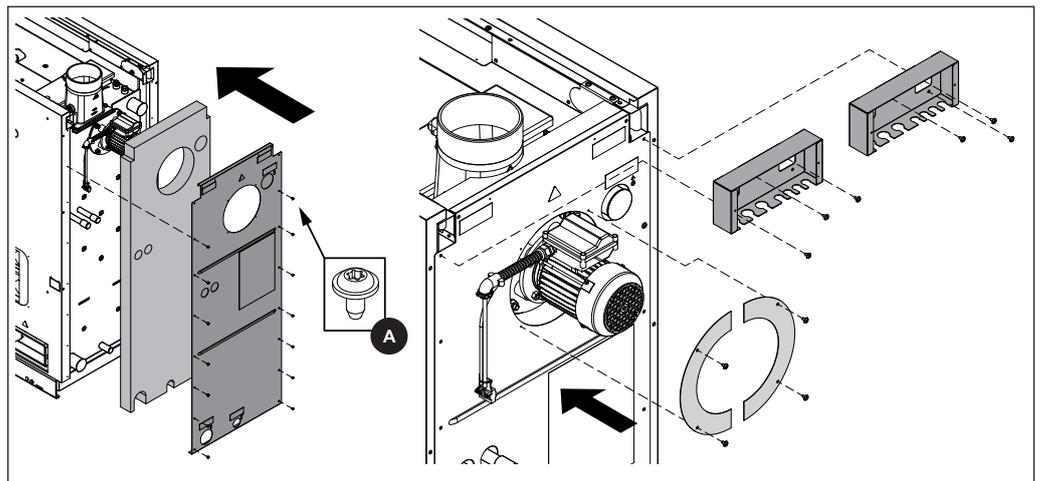
- ❑ Hang the upper spacer plate on the rivets between the insulating side panels and attach with thread forming screws
 - At the same time, this procedure also secures the bracket to the insulating side panels at the front

3.5.6 Fitting the door contact switch



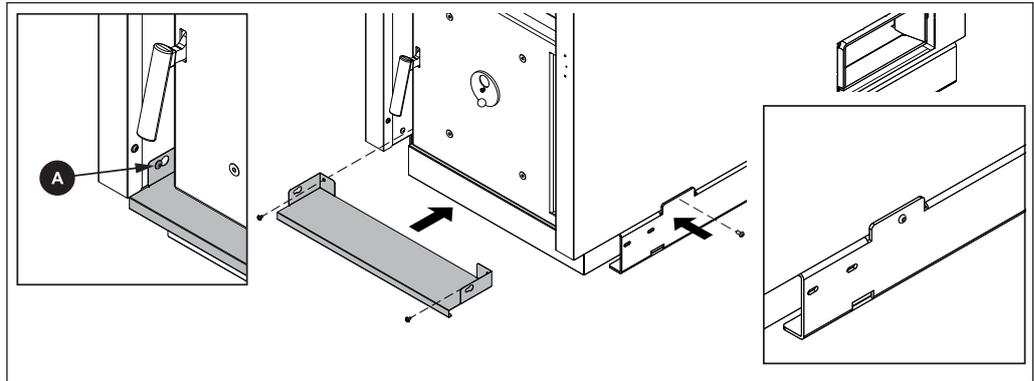
- ❑ Secure the bracket with pre-mounted door switch to the upper spacer plate with two thread forming screws M4 x 8
 - The reel of the door contact switch must protrude at the front from the opening of the spacer plate.

3.5.7 Installing the back panel

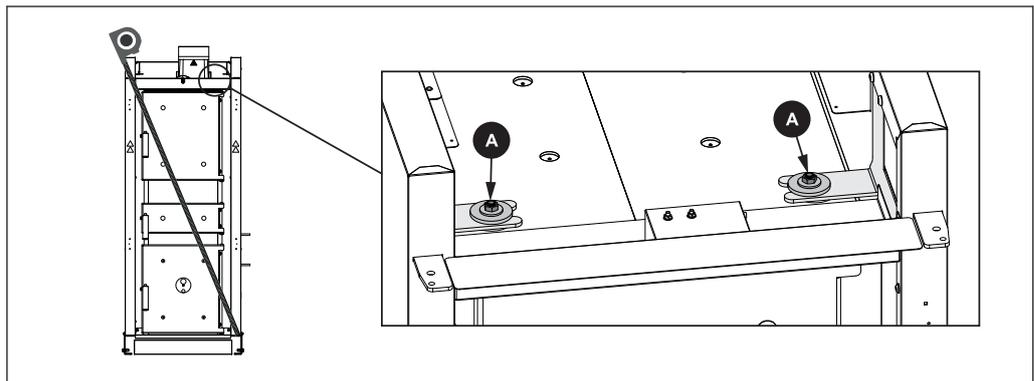


- ❑ Position the rear thermal insulation on the rear side of the boiler
- ❑ Insert back panel over induced draught fan
- ❑ Secure the left and right back panel to the side panel with seven thread forming screws (A) each
 - Leave the top three holes free
- ❑ Installing the induced draught cover plates
- ❑ Secure both terminal blocks to the back pane with the three thread forming screws

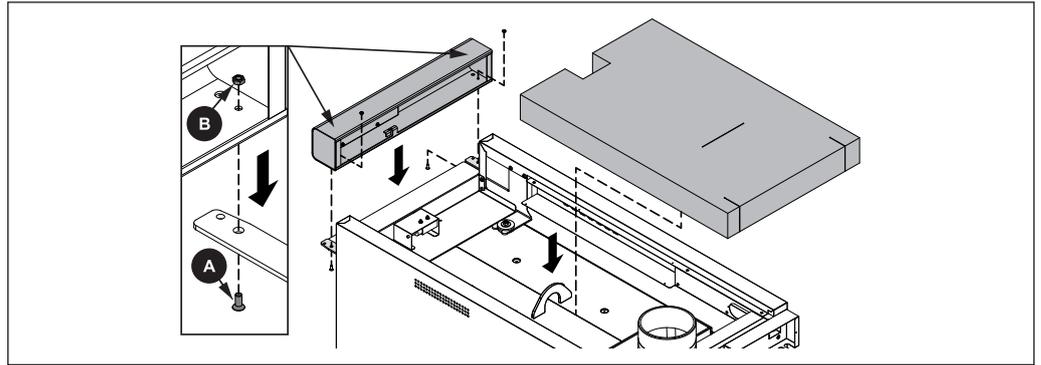
3.5.8 Aligning the insulation and attaching the controller



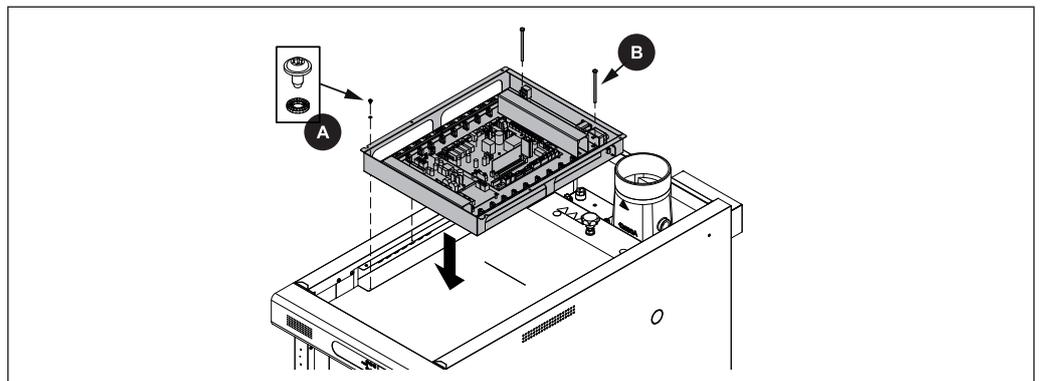
- Hang the lower spacer plate on the rivets (A) between the insulating side panels and attach with one thread forming screw each
- Push the insulating side panels toward the rear until the borehole on the flaps corresponds with the borehole on the side panels
- Secure the insulating side panels to the 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



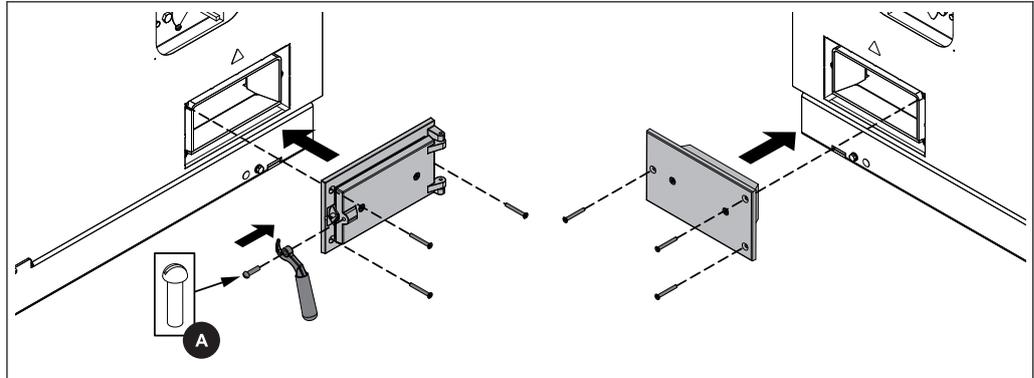
- Position the control on top
- Insert one countersunk cross-head screw (A) each to the left and right through the bracket and control from below
- Use nuts (B) to secure the countersunk cross-head screws from the top
- Put the top heat insulation mat on
 - The heat insulation mat must be fully on the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

3.5.9 Installing the cleaning door and blank cover

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

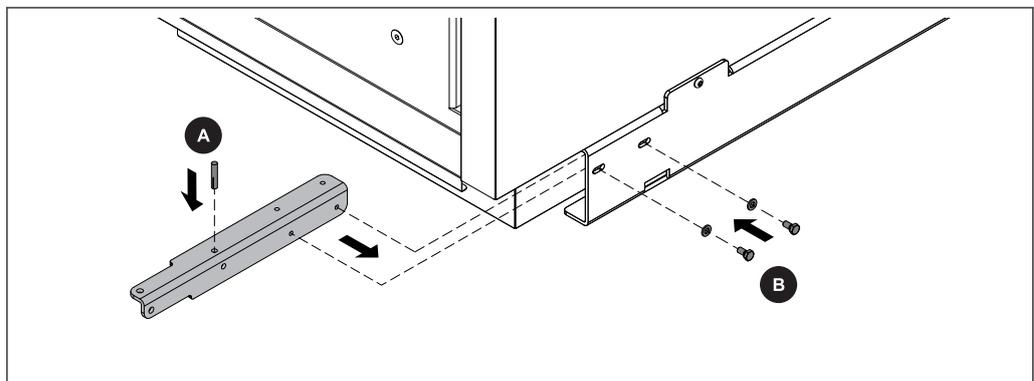


- Use three Allen screws to mount the cleaning door on the desired side
 - On the left side, start with the screws at upper right
 - On the right side, start with the screws at upper left
- Attach the door handle for the cleaning door using a round headed screw (A)
- Install the blank cover for the side cleaning on the opposite side

3.5.10 Installing the insulated door

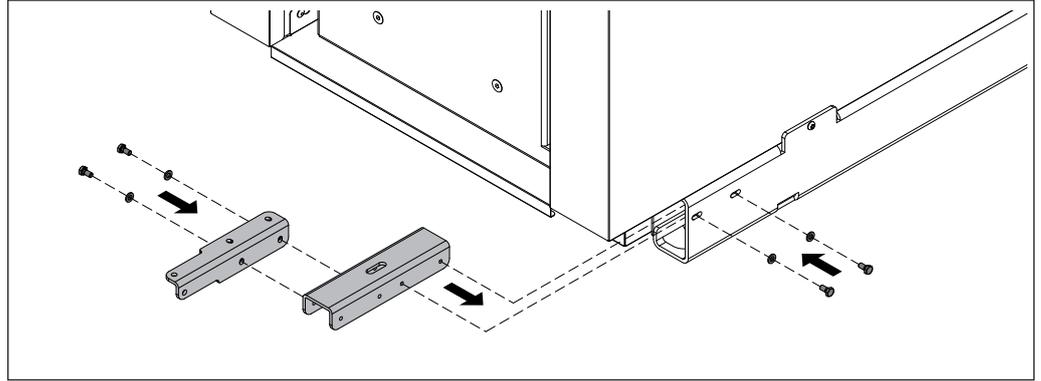
The illustrations show the assembly for the door stop on the right. If the insulated door is attached on the left, complete the following procedures with the sides reversed accordingly.

S3 Turbo 30:

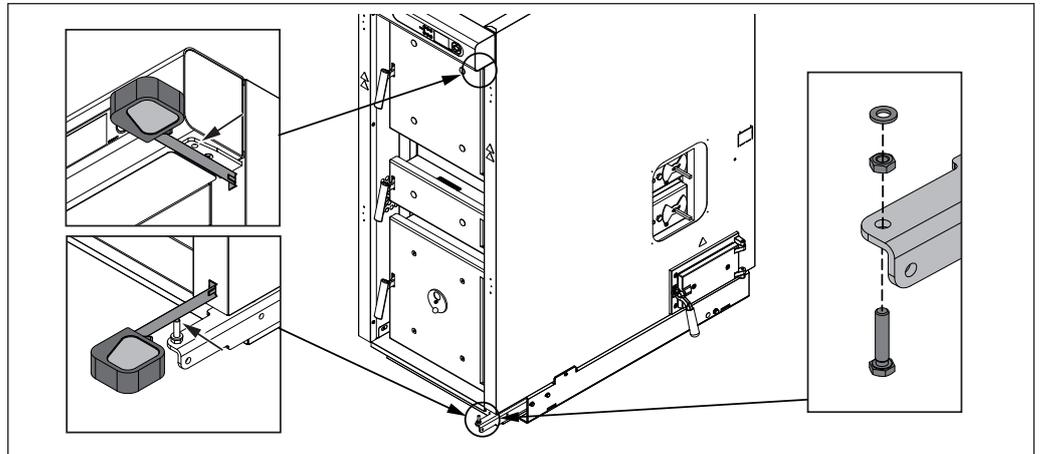


- Tap in a fitting grooved pin (A) at the lower door bracket
- Slide the lower door bracket into the base of the boiler
 - Insert the fitting grooved pin (A) into the insulation
 - Lightly tighten the two hexagonal screws M6 x 12 (B)

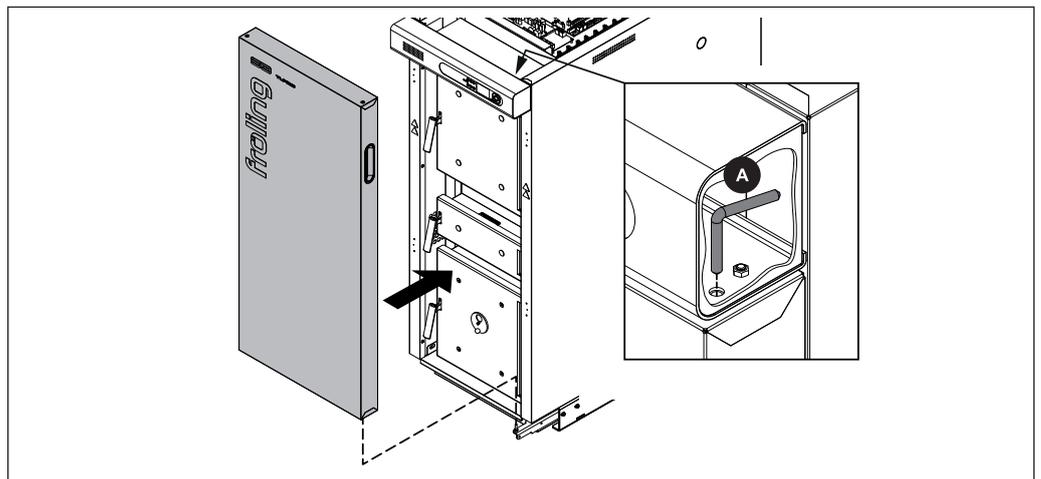
S3 Turbo 50:



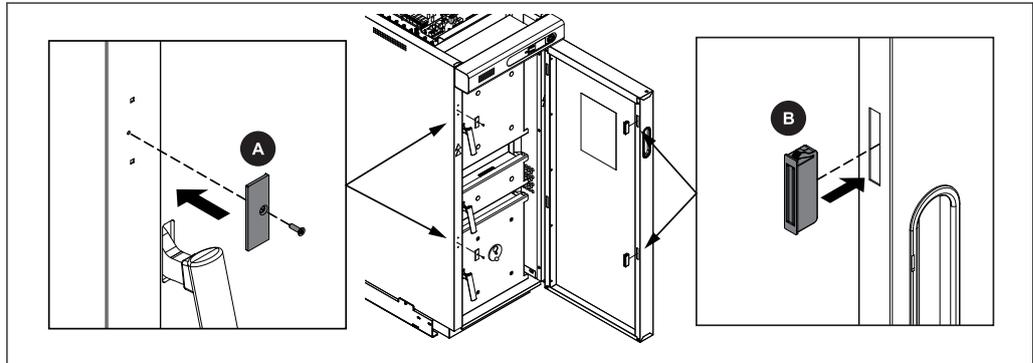
- Mount the lower door bracket with two hexagonal screws M6 x 12 on the U-profile
- Insert the door bracket with the U-profile and lightly tighten the two hexagonal screws M6 x 12



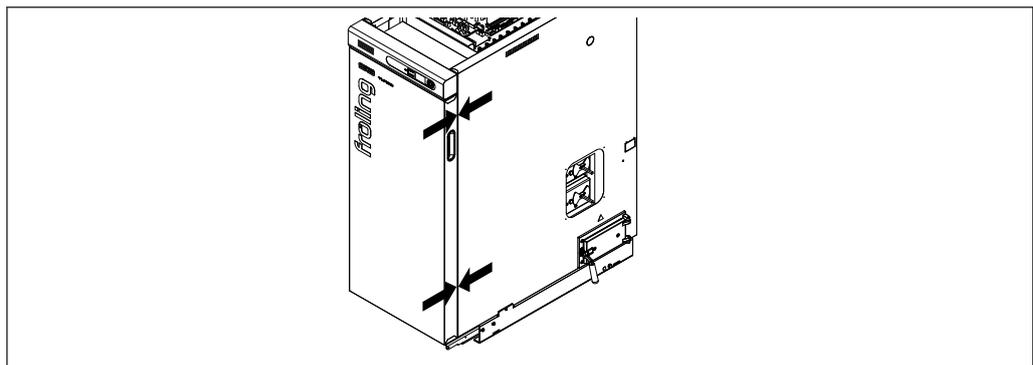
- Measure the distance from the insulating side panel to the centre of the borehole for the insulated door on the upper bracket
- Measure the distance from the insulating side panel to the centre of the borehole on the lower door bracket
 - The two distances must be equal!
 - If necessary, correct the 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

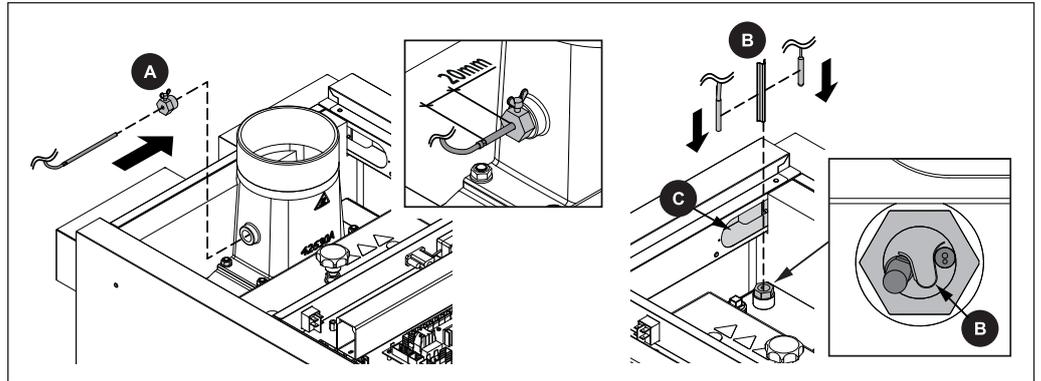


- Position magnetic latches (B) on the inside of the insulated door at the top and bottom
- Mount counter plates for the magnetic latches (A) to the left insulation side panel

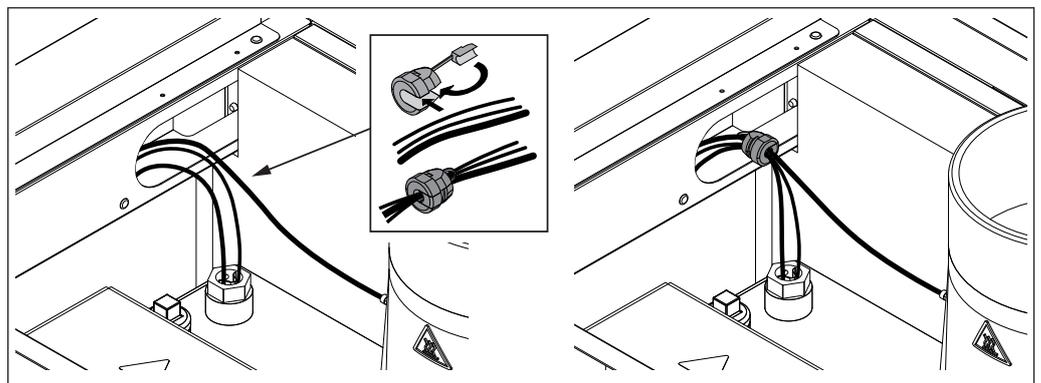


- Check to see if the gap between the insulation side panel and the insulated door is the same size along the entire height of the boiler
 - ↳ If necessary, correct the position of the lower door bracket

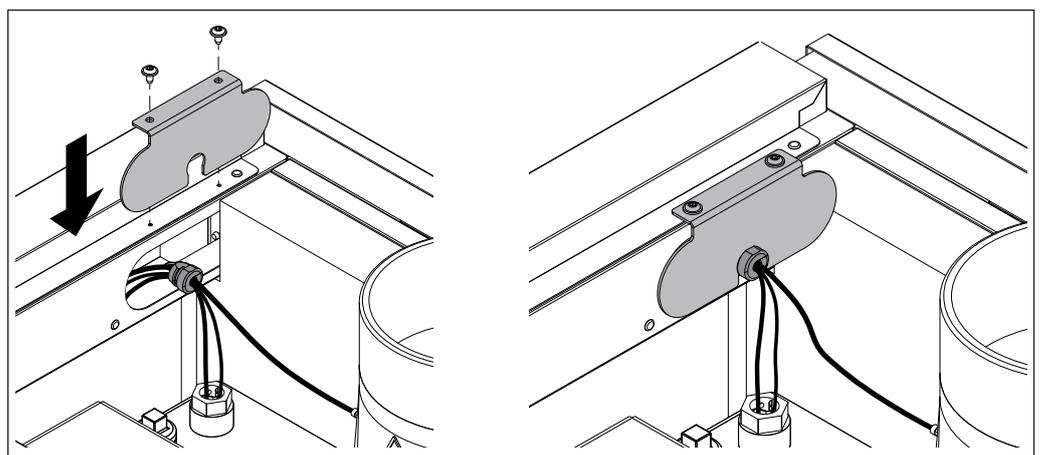
3.5.11 Fitting the sensors



- 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



- Fit the cables for the flue gas sensor, the STL capillary and the boiler sensor in the cable duct with a strain relief.

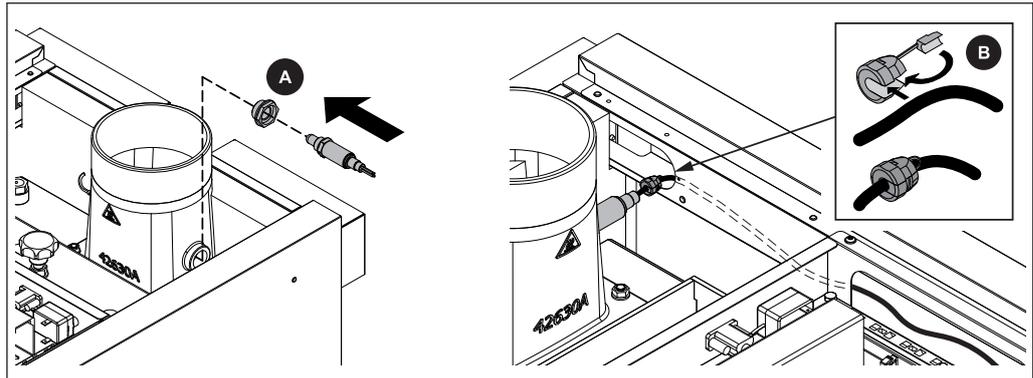


- Push the strain relief into cut-out on the cover plate.

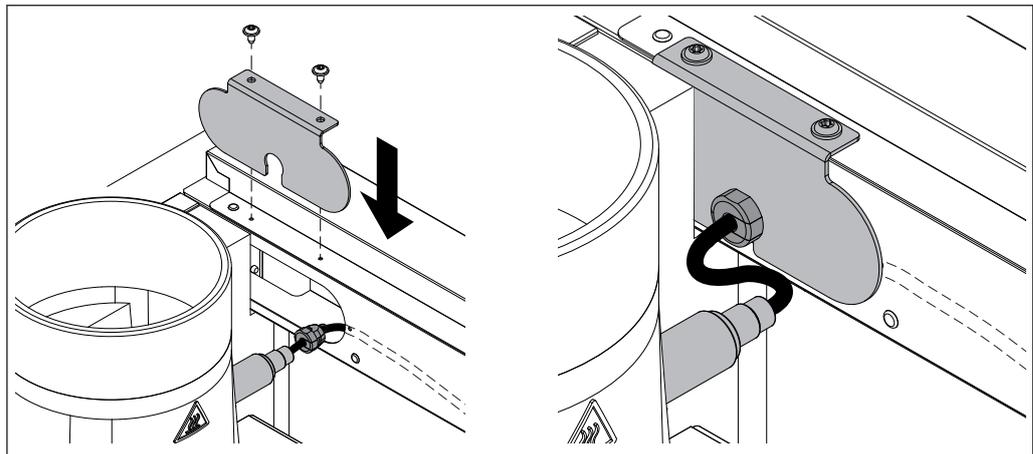
- Close the opening of the cable duct with cover plate and secure the cover plate with two thread forming screws

3.5.12 Fit the broadband probe

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

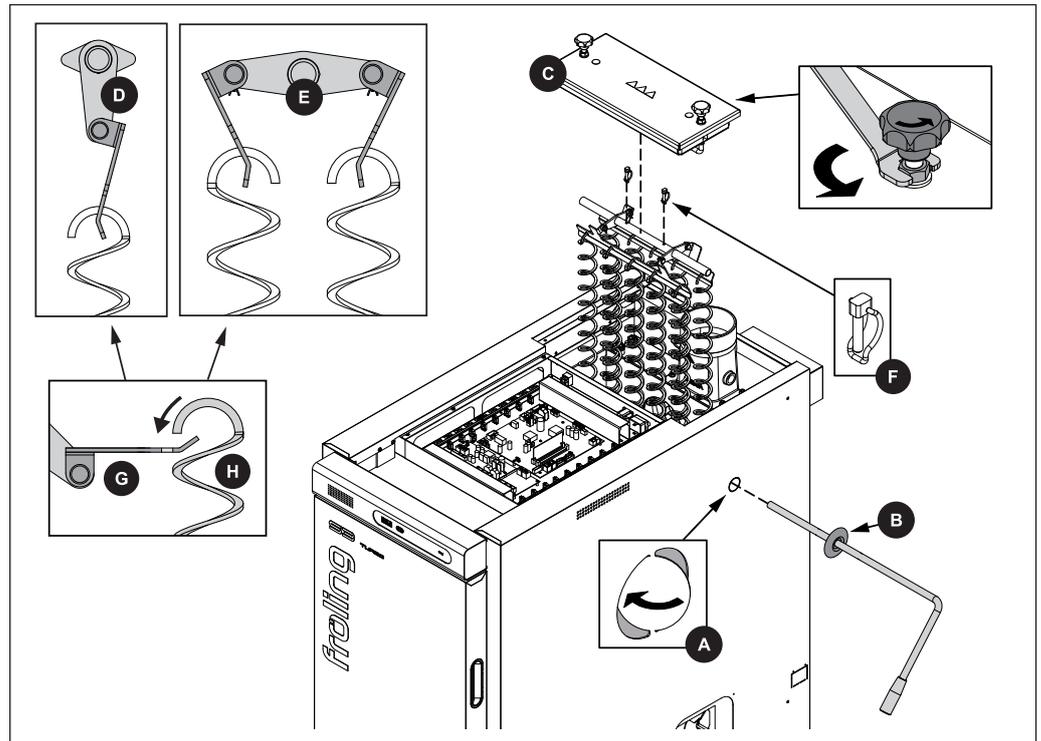


- Screw the broadband probe into the bushing (A) and gently tighten using an Allen key (SW 22 mm)
- Plug in the extension cable for the broadband probe and run the cable through the cable duct to the controller box
 - Tuck any extra cable into the cable duct
- Fit the cable in the cable duct with a strain relief.



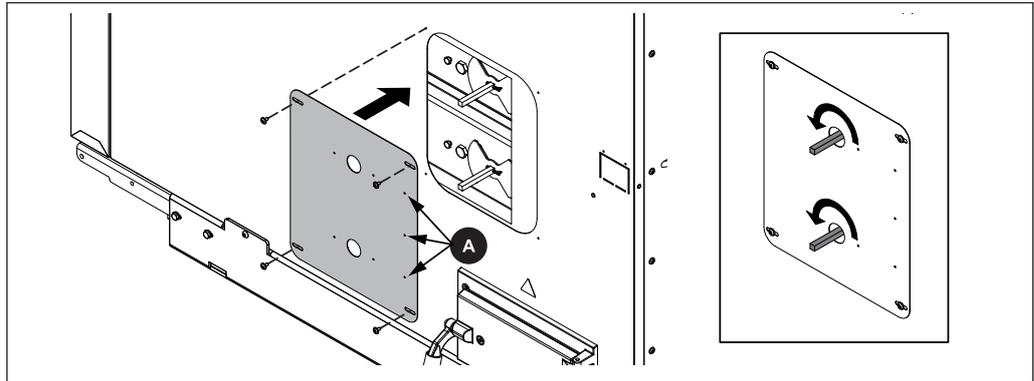
- Push the strain relief into cut-out on the cover plate.
- Close the opening of the cable duct with cover plate and secure the cover plate with two thread forming screws

3.5.13 Installing the WOS system

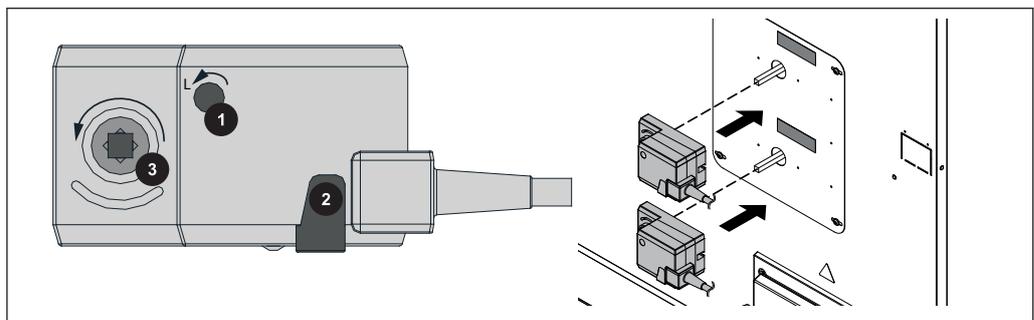


- Remove the pre-cut perforation (A) from the insulation side panel on the same side as the brass bushing
 - File rough edges using a half-round file and remove burrs
- Slide the plastic cover (B) onto the EOS lever
- Remove the heat exchanger cover (C) using the key supplied
 - Loosen the nut first, then turn the start knob counter clockwise
- Hang the WOS turbulators on the linking plate of the stay tube as shown (D - S3 Turbo 30, E - S3 Turbo 50)
 - Make sure that you fit the turbulators in the right direction:
 - Hold the linking plate with the edge (G) toward the top
 - Hang the WOS turbulators (H) over the edge
- Position the WOS turbulators at the heat exchanger pipes
- Push the EOS 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

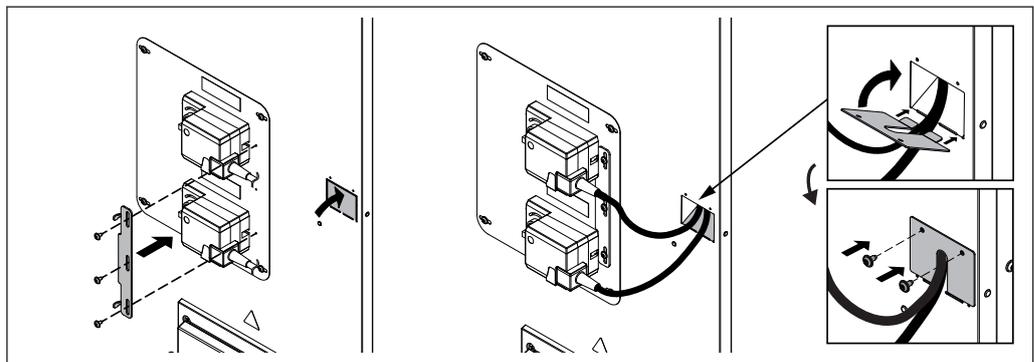
3.5.14 Installing the servo-motors



- Secure the cover plate on the 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
 - All air flaps should be closed

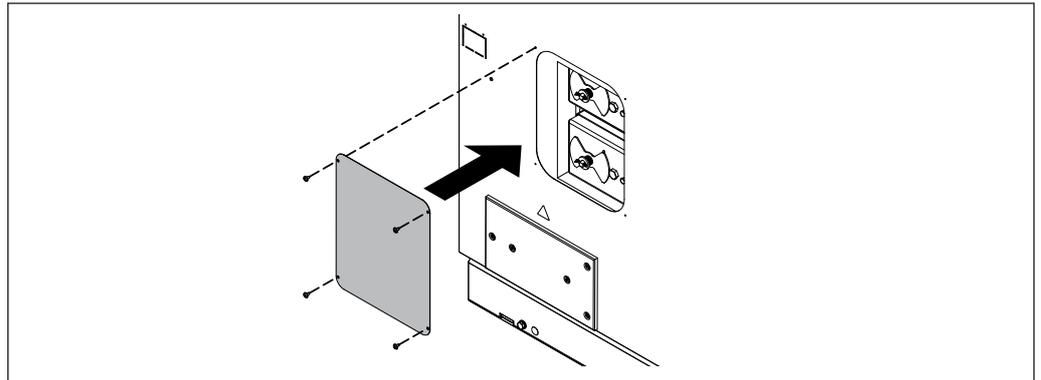


- Set the actuators:
 - Set the direction of rotation of the actuator (1) to left (L)
 - Press the unlock key (2) and turn the drive for the shaft to the air duct (3) in an anti-clockwise direction as far as the stop
- Place the actuators onto the pneumatic rod
- Attach sticker to cover plate
 - Primary 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
- Push the cover plate of the servo-motor cable into the slots on the pre-punched area and flip it upwards
 - Both cables of the servo-motors must be located in the cut-out section of the cover plate
- Secure the cover plate with two thread forming screws



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

3.6 Power connection and wiring

DANGER



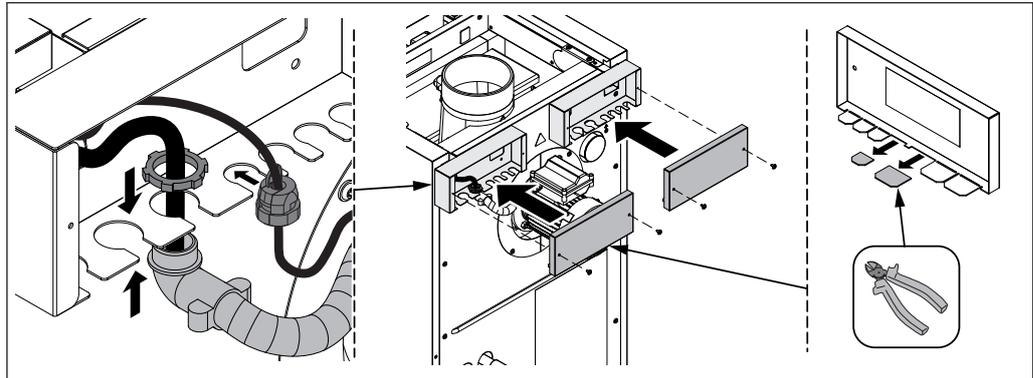
When working on electrical components:

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

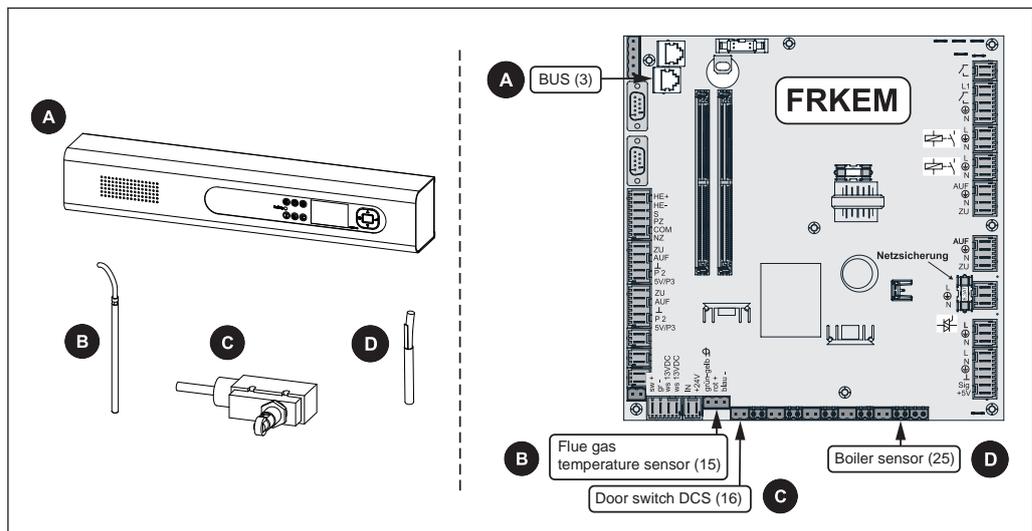
3.6.1 Wiring the ID fan



- Secure the cable leadthrough with a nut in one of the free cut-outs on the terminal block
- Remove lugs on the cover on the occupied positions with a suitable tool
- Secure cover to the terminal block

3.6.2 Wiring

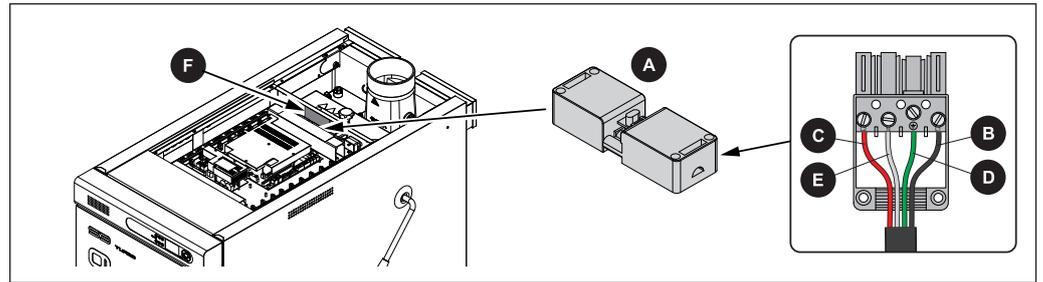
- Run the cable of the flue gas temperature sensor, boiler sensor, induced draught, STL, display and door switch to the controller
 - Tuck any extra cable into the cable duct
- Connect the components according to the power connection diagram
 - The flexible sheathed cable must be used for the wiring; this must be of the correct size to comply with applicable regional standards and regulations!



Connect the following components on core module:

- A: Display (3)
- B: Flue gas temperature sensor (15)
- C: Door switch DCS (16)
- D: Boiler sensor (25)

Mains connection



Connect the mains connection at plug (A) as follows:

- B: Cable black → L1
- C: Cable red → L2
- D: Cable green → earth
- E: Cable white → N

The power supply line (mains connection) must be fitted with a max. 15A fuse by the customer!

120/240 Volts AC single phase
60 hertz power conductors from
15 amp circuit breaker or fuse.
Main disconnect and overcurrent
protection by others.
Connect black power conductor
to terminal L1, red power
conductor to terminal L2, white
neutral conductor to terminal N,
and green ground conductor to
ground terminal.

For supply connections use
No. 14 AWG (2.1 mm²) or larger
wires acceptable for at least
194°F (90°C). Use Copper.

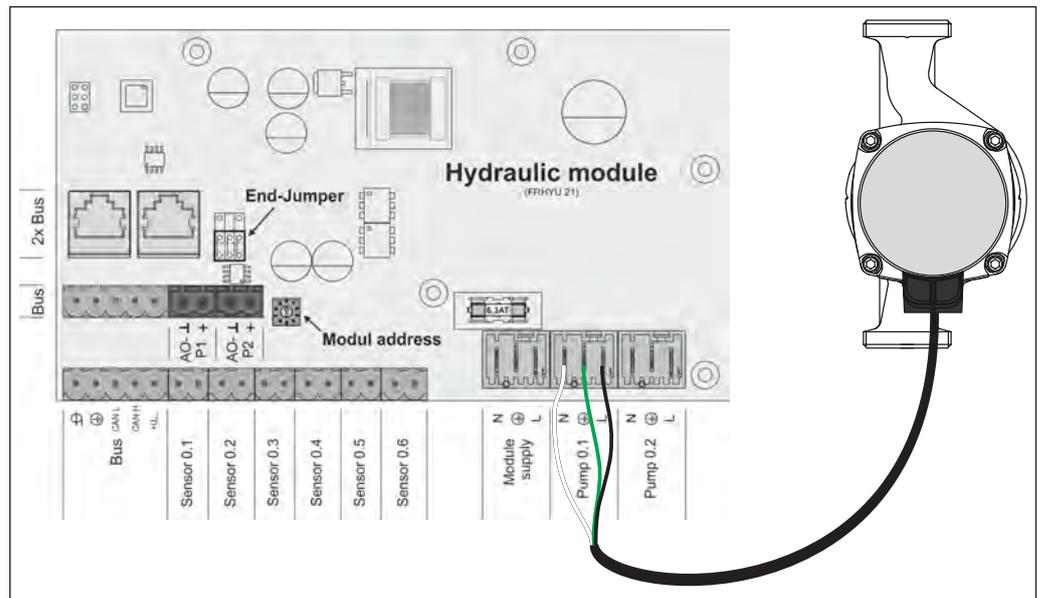
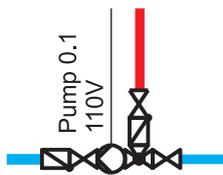
Regular overcurrent Protection
15 AMP, two Phases (L1 & L2)

A 990 01 09	MAINS			
	IN			
	230V / 60Hz			
L1		N	L2	

3.6.3 Information on circulating pumps

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:



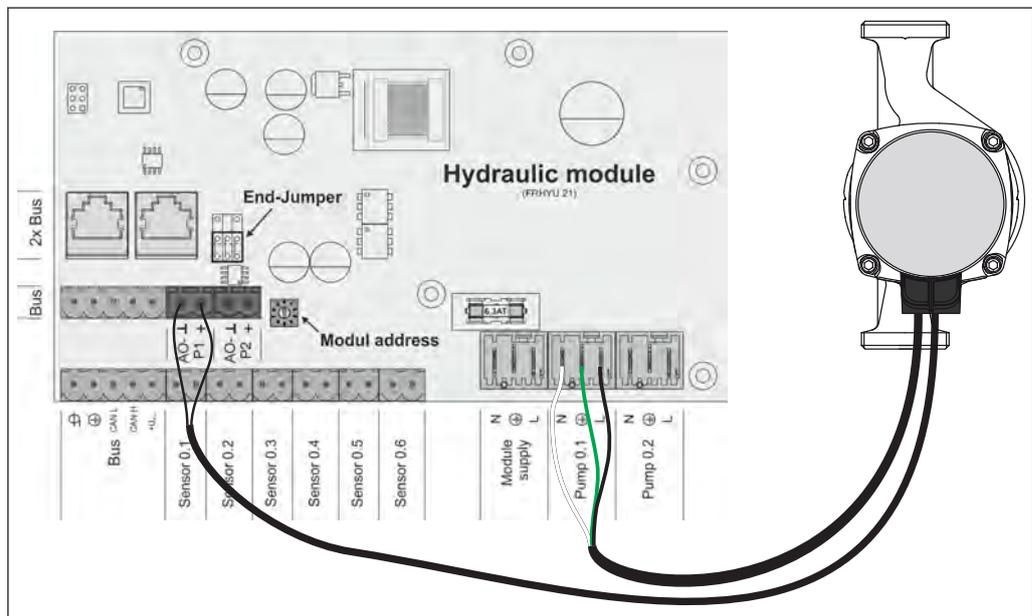
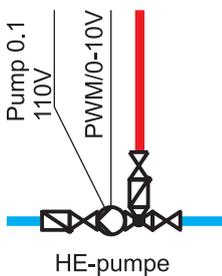
*Connecting a high efficiency pump***NOTICE**

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 $EEI \leq 0.27$
- Effective from 01.08.2015: wet running circulating pumps with $EEI \leq 0.23$

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 without additional control unit on the speed-controlled pump output of the core module:

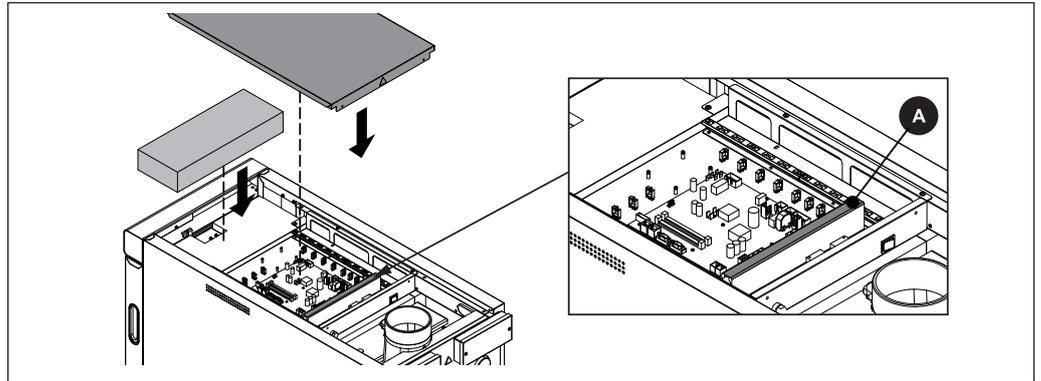
Malfunctions of the boiler, the pump and the hydraulic system may occur!

Therefore:

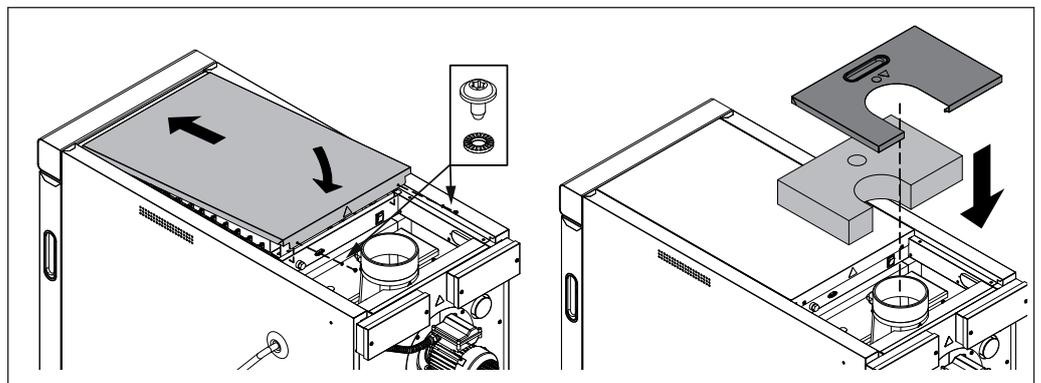
- EC motor pumps must not be connected to speed-controlled pump outputs without additional control signal
 - When using the S3 Turbo firewood boiler in conjunction with the "S-Tronic Lambda" controller, the wiring diagram above must be followed for using a high efficiency pump with control line.



3.6.4 Final installation steps



- 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 Start-up

4.1 Before commissioning / configuring the boiler

The boiler must be adjusted to the heating system during commissioning.

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 authorized installer or with Froling customer services.

- Adjust the boiler controller to the system type.
- Apply boiler standard values.

NOTICE! Detailed instructions for keypad assignment and the steps required for modifying the parameters can be found in the operating instructions for the boiler control unit.

- Check the heating system pressure.
- Ensure that the heating system is fully ventilated (free of air).
- Ensure that the safety devices are present and working correctly.
- Ensure that there is sufficient ventilation in the boiler room.
- Check the boiler seals
 - All doors and inspection openings must be tightly sealed!

- Ensure that drives and actuators are working and turning in the right direction.

NOTICE! For information about checking the analog and digital outputs, see the operating instructions for the boiler controller.

- Ensure that the door contact switch is working correctly.

NOTICE! For information about checking the digital inputs, see the operating instructions for the boiler controller.

4.2 Initial startup

4.2.1 Permitted fuels

- Burn natural, seasoned, hard or soft firewood or wood-only manufactured wood bricks in this appliance only, length between 18" (46 cm) and maximum 21" (52 cm)

Chemically treated or painted wood is unsuitable as fuel. The S3 Turbo boiler is designed for burning fire wood only. Wood briquettes or manufactured pure wood logs can also be used as fuel provided they have a minimum cross section of 2.5 sq in (16 cm²). The fuel loading chamber can be filled to the top. Excessively small and compact pieces of wood or wood pellets are not suitable. Coal cannot be used as it destroys the combustion chamber!

The S3 Turbo is made to burn natural forest wood. Both hardwood and softwood are suitable, but oak should not be burned as the only source of wood for long periods because of its high acid content.

For effective gasification, the wood must be dry, i.e. moisture content 15-20%. Please follow the instructions included with the moisture meter provided to correctly determine wood moisture content. In addition to increasing the likelihood of generating creosote in the boiler, burning wet wood uses a substantial amount of the wood energy to evaporate the water present in the wood, reducing the available energy for heat. Using non-approved fuels will result in lower efficiency, higher emissions and may cause boiler components to fail prematurely and/or operate incorrectly.

The wood will dry out most quickly if it is cut into the appropriate length and split into pieces 4 – 5" (10 – 12 cm) thick. The best length is 21" (52 cm) for the S3 Turbo boiler. The wood is best stored in the open air under cover. Wood will dry most quickly if it is carefully stacked alternatively lengthwise and crosswise so that air can penetrate into the stack. Ideally the wood should be stored for at least one and a half years (two summer seasons). Do not burn small pieces of wood or wood chips in the boiler as they can block the combustion slot. Also, it can be difficult to control the combustion process with small wood pieces and chips.

4.2.2 Non-permitted fuels



DANGER

Non-permitted fuels

Burning non-permitted fuels increases cleaning requirements and leads to a build-up of aggressive sedimentation and condensation, which can result in damage to the boiler and void the warranty! Using non-standard fuels can result in severe combustion malfunctions.

Only use the fuels specified in the section "Permitted Uses" in these operating instructions!

- Do not burn corn, grain, coal, fuel coke, garbage or other residual materials, painted or treated wood, bark, gasoline, diesel, fuel oil, naphtha, engine oil, drain oil or other flammable liquids, or any other organic or inappropriate materials!
- Do not store fuel or other combustible material within marked installation clearances. Keep away from boiler while it is in operation!
- Do not use chemicals, gasoline, gasoline-type lantern fuel, kerosene, charcoal lighter fuel or similar liquids, or any other combustible fluids to start or rekindle the fire in this boiler.

5 Decommissioning

5.1 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 completely.

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

- Have the system completely drained by a qualified technician.
 - Protection against frost

5.2 Disassembly

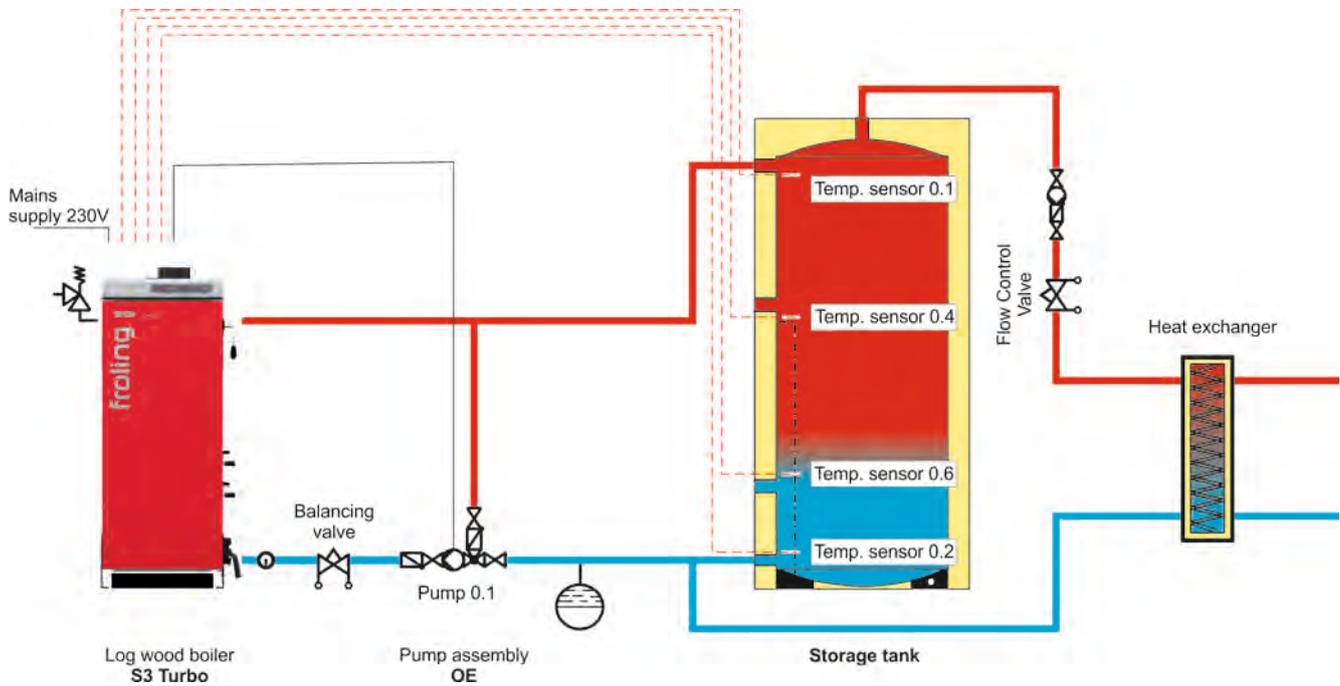
To disassemble the system, follow the steps for assembly in reverse order.

5.3 Disposal

- Ensure that the system is disposed of in an environmentally sensitive way in accordance with waste management regulations.
- You can separate and clean recyclable materials and send them to a recycling center.
- The combustion chamber must be disposed of as construction waste.

6 Appendix

6.1 Hydraulic diagram



6.2 Addresses

6.2.1 Address of manufacturer

FROLING
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

6.2.2 Address of importer

STAMP

6.2.3 Address of Local Dealer

STAMP