

Operating Instructions
Turbomat TM 300 - 500



Translation of the original German operating instructions for operators

Read and follow the instructions and safety information!

Technical changes, typographical errors and omissions reserved!

B0340313_en | Edition 29/11/2013



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1 General

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

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

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

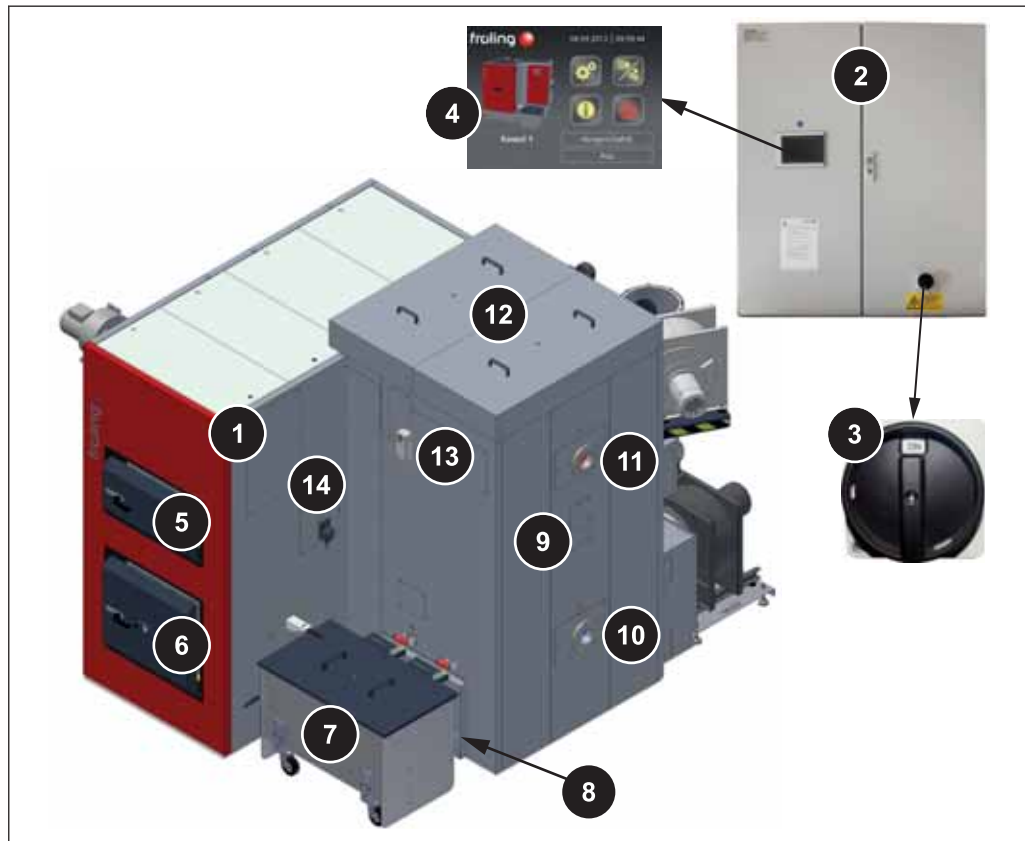
Subject to technical change.

Guarantee conditions

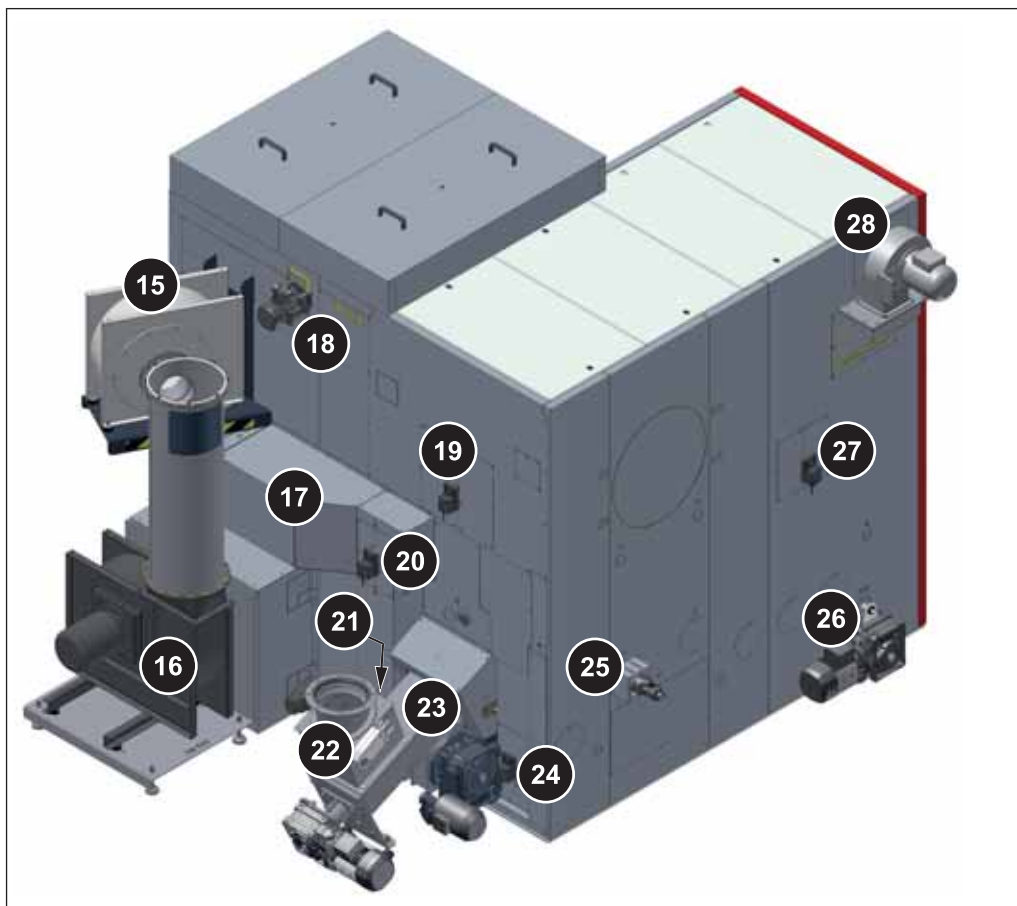
Our sale and delivery conditions generally apply. These conditions have been made available to customers, and customers have been made aware of them at the time of order completion.

You can also find the guarantee conditions on the enclosed guarantee certificate.

1.1 Product overview



- | | |
|----|---|
| 1 | Wood chip boiler - Froling Turbomat |
| 2 | Control cabinet with integrated controller |
| 3 | Main switch: switches the power supply on and off for the entire system |
| 4 | SPS 4000 control panel |
| 5 | Combustion chamber door |
| 6 | Burning chamber door |
| 7 | Combustion chamber ash container |
| 8 | Ash container heat exchanger (2) |
| 9 | Safety temperature limiter (STL) |
| 10 | Boiler return connection |
| 11 | Boiler flow connection |
| 12 | Heat exchanger insulating covers
Underneath: Efficiency Optimisation System (EOS) with turbulators |
| 13 | Servo-motor case cooling |
| 14 | Servo-motor I tertiary air |



- | | |
|----|--|
| 15 | Flue gas recirculation (FGR) |
| 16 | Induced draught fan |
| 17 | Flue gas recirculation (FGR) duct |
| 18 | Drive for automatic heat exchanger cleaning |
| 19 | Secondary air servo-motor |
| 20 | Secondary air servo-motor flue gas recirculation (FGR) |
| 21 | Primary air servo-motor flue gas recirculation (FGR) |
| 22 | Burn back protection system (shown here: burn back flap; optional: rotary valve) |
| 23 | Stoker duct |
| 24 | Primary air servo-motor |
| 25 | Automatic ignition |
| 26 | Drive for combustion chamber ash removal |
| 27 | Servo-motor II tertiary air |
| 28 | Combustion air fan |

2 Safety

2.1 Hazard levels of warnings

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

DANGER

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

WARNING

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

CAUTION

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

2.2 Pictograms used

The following symbols are used in the documentation and/or on the boiler to show what is required and forbidden and to give warnings.

In accordance with the Machinery Directive, signs fitted directly within the danger area of the boiler indicate immediate hazards or safety procedures. These stickers must not be removed or covered.

	Refer to the operating instructions		Wear safety shoes
	Always wear protective gloves		Wear hearing protection
	Keep the doors closed		Turn off the main switch
	Unauthorised access prohibited		No not walk on the surface
	Warning - hot surface		Warning - hazardous electrical voltage
	Warning - hazardous or irritant materials		Warning - automatic boiler start-up
	Hand injury warning		Warning of injury to fingers or hands, automatic fan
	Cutting injury warning		Warning of injury to fingers or hands, automatic screw

2.3 General safety information



DANGER

If the device is used incorrectly:

Incorrect use of the system can cause severe injury and damage.

When operating the system:

- Observe the instructions and information in the manuals.
- Observe the details on procedures for operation, maintenance and cleaning, as well as troubleshooting in the individual manuals.
- Any work above and beyond this should be carried out by authorised heating engineers or by Fröling customer services.



WARNING

External influences:

Negative external influences, such as insufficient combustion air or non-standard fuel, can cause serious faults in combustion (e.g. spontaneous combustion of carbonisation gases or flash fires) which can in turn cause serious accidents!

When operating the boiler, please note the following:

- Instructions and information regarding versions and minimum values, as well as standards and guidelines for heating components in the instructions must be observed.

WARNING

Severe injuries and damage can be caused by an inadequate flue gas system.

Problems with the flue gas system, such as poor cleaning of the flue pipe or insufficient chimney draught, can cause serious faults in combustion (such as spontaneous combustion of carbonisation gases or flash fires).

Take the following precautions:

- Optimum boiler performance can only be guaranteed if the flue gas system is functioning correctly.

2.4 Permitted uses

The Froling Turbomat TM is designed exclusively for heating domestic water. Only use fuels specified in the "Permitted fuels" section.

⇒ See "Permitted fuels" [page 11]

The boiler should only be operated when it is in full working order. It should be operated in accordance with the instructions, observing safety precautions, and you should ensure you are aware of the potential hazards. The inspection and cleaning intervals in these operating instructions should be observed. Ensure that any malfunctions which might impact safety are traced and removed immediately. The manufacturer and supplier are not liable for any damage resulting from non-permitted uses.

2.4.1 Permitted fuels

Wood chips

Criterion	ÖNORM M 7133	CEN/TS 14961	Description as per ÖNORM M 7133
Water content	W20	M20	air-dried
	W30	M30	suitable for storage
	W35	-	limited suitability for storage
	W40 ¹⁾	M40	high-moisture wood chips
	W50 ¹⁾	-	freshly-harvested wood chips
Size	G30	P16A / P16B	fine wood chip
	G50	P45A	medium-sized wood chip
	G100	P63/100	coarse wood chips ²⁾
1. partial load conditions only to a limited extent 2. for hydraulic feeders only			

NOTICE! In case of operating under partial load conditions and fuels with a water content of >W35, power consumption of less than 65% of the nominal output is not permitted!

Note on standards

EU: Fuel as per EN 14961 - Part 4: Wood chips class A2 / P16A-P63/100

Additional for Germany: Fuel class 4 (§3 of the First Federal Emissions Protection Ordinance [BimSchV] - applicable version)

Wood pellets

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

Note on standards

EU: Fuel acc. to EN 14961 - Part 2: Wood pellets class A1 / D06

and/or: Certification program EN^{plus} or DIN^{plus}

General note:

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

Wood shavings

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

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

NOTICE

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

Changing the fuel **CAUTION**

Incorrect fuel parameter settings:

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

Therefore:

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

2.4.2 Non-permitted fuels

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

CAUTION

In case of use of non-permitted fuels:

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

For this reason, when operating the boiler:

- Only use permitted fuels

2.4.3 Qualification of operating staff

CAUTION



If unauthorised persons enter the boiler room:

Risk of personal injury and damage to property

- The operator is responsible for keeping unauthorised persons, in particular children, away from the system.

Only trained operators are permitted to operate the unit. The operator must also have read and understood the instructions in the documentation.

2.4.4 Protective equipment for operating staff

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



- For inspection and cleaning:
 - suitable workwear
 - protective gloves
 - sturdy shoes



- Additional for operating:
 - Hearing protection (sound level > 70 dB)
 - Protective goggles

2.5 Design information

Carrying out modifications to the system and changing or deactivating safety equipment is prohibited.

Always comply with all fire, building, and electrical regulations when installing or operating the system, in addition to following the operating instructions and mandatory regulations that apply in the country in which the tank is operated.

2.5.1 Installation and approval of the heating system

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

Note on standards

ÖNORM / DIN EN 12828 Heating Systems in Buildings

NOTICE! Each heating system must be officially approved.

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

Austria: Inform the civic/municipal building authorities.

Germany: Notify an approved chimney sweep and the building authorities.

2.5.2 General information for installation room (boiler room)

Boiler room characteristics

- There must not be a potentially explosive atmosphere in the boiler room as the boiler is not suitable for use in potentially explosive environments.
- The boiler room must be frost-free.
- The boiler does not provide any light, so the customer must provide sufficient lighting in the boiler room in accordance with national workplace design regulations.
- When using the boiler over 2000 metres above sea level you should consult the manufacturer.
- Danger of fire due to flammable materials.
No flammable materials should be stored near the boiler. Flammable objects (e.g. clothing) must not be put on the boiler to dry.
- Damage due to impurities in combustion air.
Do not use any solvents or cleaning agents containing chlorine in the room where the boiler is installed.
- Keep the air suction opening of the boiler free from dust.

Ventilation of the boiler room

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

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

Note on standards

ÖNORM H 5170 - Construction and fire protection requirements
TRVB H118 - Technical directives on fire protection/prevention

2.5.3 Requirements for central heating water

The following standards and guidelines apply:

Note on standards

Austria:	ÖNORM H 5195-1
Germany:	VDI 2035
Switzerland:	SWKI 97-1
Italy:	D.P.R. no. 412

NOTICE! Note on filling with make-up water: always bleed the filling hose before connecting, in order to prevent air from entering the system.

Observe the standards and also follow the recommendations below:

- Max. cumulative value for alkaline earth: 1.0 mmol/l or 100 mg/l (corresponds to 5.6 dH)
- Use softened water as the make-up water
- Avoid leaks and use a closed heating system to maintain water quality during operation

2.5.4 Return lift

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

 **CAUTION**

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

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

Take the following precautions:

- Regulations stipulate the use of a return temperature control.
 - ➔ The minimum return temperature is 65 °C. We recommend fitting some sort of control device (e.g. thermometer).

2.5.5 Use with storage tank**NOTICE**

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

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

⇒ See "Addresses" [page 64]

2.5.6 Chimney connection/chimney system

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

NOTICE! Please see the technical data contained in the assembly instructions for further information about standards and regulations as well as the flue gas temperatures when clean and the other flue gas values!

2.6 Safety devices



1 BOILER OFF (*switches off the boiler to prevent overheating*)

- Tap "Boiler off"
 - Automatic mode is switched off
 - Control system follows the boiler shutdown procedure
 - The pumps continue to run

NOTICE! Never use the main switch!

2 MAIN SWITCH (*switches off the power supply*)

Before carrying out work on the boiler:

- Tap "Boiler off"
 - Automatic mode is switched off
 - Control system follows the boiler shutdown procedure
- Switch off the main switch and let the boiler cool down

3 SAFETY OVERLOAD SWITCHES, MOTOR PROTECTION SWITCHES, RESIDUAL CURRENT PROTECTIVE DEVICES (RCD)

Switch off the related component in the event of fault currents or overloads.

4 SAFETY TEMPERATURE LIMITER (STL) (*protection against overheating*)

The STL switches off the combustion system when the boiler reaches 95 - 100°C. The pumps continue to run. Once the temperature falls to below approx. 85°C, the STL can be reset mechanically.

5 DOOR SWITCH

Switches the induced draught fan to full speed if the door is opened while the boiler is running and disconnects simultaneously the combustion air and FGR blower fan.

TA THERMAL DISCHARGE VALVE (*protection against overheating*)

The thermal discharge valve opens at approx. 100°C and feeds cold water to the safety heat exchanger to lower the boiler temperature

SAFETY VALVE (*not shown, supplied by the customer*)

When the boiler pressure reaches a maximum of 6 bar, the safety valve opens and the heated water is blown off in the form of steam.

2.6.1 External safety devices



Safety cut-out switch for sliding floor hydraulic chamber

Before starting any maintenance work in the hydraulic chamber of the sliding floor:

- Turn the safety cut-out switch to the "0" position
 - The boiler follows the shutdown procedure and the discharge system is deactivated
- Turning the selector switch past the "0" position engages the locking lever
 - The switch can be locked with a padlock to prevent it from being switched on again

On completion of the maintenance work:

- Remove the padlock
- Turn the selector switch past the "0" position to automatically release the locking switch. The selector switch can now be turned back to the "1" position.
- Acknowledge the fault and press the Start button to activate the boiler

2.7 Residual risks

WARNING

When touching hot surfaces:

Severe burns are possible on hot surfaces and the flue gas pipe!

When work is carried out on the boiler:

- Shut down the boiler in a controlled way (operating status "Switched off OFF") and allow it to cool down
- Protective gloves must generally be worn for work on the boiler, and it should only be operated using the handles provided
- Insulate the flue pipes or simply avoid touching them during operation.



 **WARNING**

Opening the door to the combustion or burning chamber, or the cleaning door or lids during operation

may result in injury or damage or flue gas generation!

Therefore:

- do not open any doors or lids while the boiler is in operation!

 **WARNING**

If non-permitted fuel types are used:

Non-standard fuels can cause serious faults in combustion (e.g. spontaneous combustion of carbonisation gases / flash fires) which can lead to serious accidents!

Take the following precautions:

- Only use fuels specified in the "Permitted fuels" section of these operating instructions.

 **WARNING**

Inspection and cleaning work on a system which is operational:

risk of serious injuries from automatic startup of the system and severe burns from hot parts and the flue gas pipe!

When working on the system:

- always wear protective gloves
- only operate the boiler using the handles provided
- switch off the boiler by tapping "Boiler off" at the mode icon
 - The boiler follows the shutdown procedure and switches to "Switched off Off" status
- switch off the main switch and take precautions to prevent accidental switching on
- allow the boiler to cool off for at least 1 hour
- once all of the tasks have been completed, turn the main switch back on and switch the boiler on in the desired mode



2.8 Emergency procedure

2.8.1 Overheating of the system

If the system overheats and the safety devices fail, proceed as follows:

NOTICE! Do not under any circumstances switch off the main switch or disconnect the power supply.

- Keep all the doors on the boiler closed
- Open all mixing valve taps, switch on all pumps.
 - ➔ The Froling heating circuit control performs this function in automatic operation.
- If a third-party controller is used, carry out the appropriate measures to activate the mixer taps and pumps manually.
- Leave the boiler room and close the door
- Increase heat consumption by turning on all radiators and other appliances
- Open any available radiator thermostat valves

If the temperature does not drop:

- Contact the installer or Froling customer services
 - ⇒ See "Addresses" [page 64]

2.8.2 Smell of flue gas



DANGER

If you smell flue gas in the boiler room:

Inhaling toxic flue gas can be fatal!

If you smell flue gas in the room where the boiler is installed:

- Keep all the doors on the boiler closed
- Shut down the boiler according to procedure
- Ventilate the room where the boiler is installed
- Close the fire door and doors to living areas

2.8.3 Fire in the system



DANGER

In case of fire in the system:

Risk of death by fire and poisonous gases

Emergency procedure in case of fire:

- Leave the boiler room
- Close the doors
- Inform the fire department

3 Operating the system

3.1 Assembly and initial startup

Assembly, installation and initial startup of the boiler must only be carried out by qualified staff, and these procedures are described in the accompanying assembly instructions.

NOTICE! See assembly instructions for the Turbomat TM

NOTICE

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

Take the following precautions:

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

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

NOTICE! See operating instructions for the SPS 4000

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

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

- The operator must ensure that at least 50% of the boiler's rated heat output can be extracted from the network on commissioning.
- The necessary "dry run" of the system means that the discharge system must be empty at the start of initial startup. Fuel must be available, however, so that the discharge system can be filled once the system is released.
- When heating up the boiler for the first time to dry out the fireclay concrete, the customer must provide approx. 1 m³ of dry firewood.
- It is essential that the electrician who has carried out the installation work is available when starting up the system for the first time to make any changes to the wiring which may become necessary.
- During initial start-up, operating staff are shown how to use the boiler. It is imperative for proper handover of the product that those involved are present as this is a one-off opportunity.

NOTICE

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

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

3.2 Filling the store space with fuel

Note the following when loading the machine with fuel:

- only use permitted fuels!
 - ⇒ See "Permitted fuels" [page 11]
- remove foreign bodies in the store space before filling

NOTICE! Systems in which the fuel is delivered by tanker and is blown into the store space must be fitted with a rotary valve.

CAUTION

Entering the store space when the system is switched on

Risk of injury due to automatic startup of system, particularly the discharge system!

Therefore, before entering the fuel store space:

- switch off the boiler by tapping "Boiler off" at the mode icon
 - The boiler follows the shutdown procedure and switches to "Switched off Off" status
- turn off the boiler's main switch
- turn off the main switch on the expansion switch cabinet (if installed)

For blowing in fuel the following precautions also apply:

CAUTION

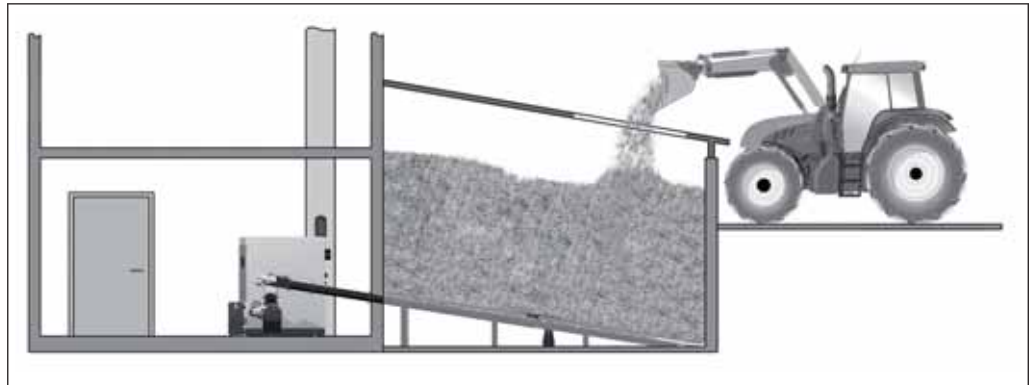
Blowing in fuel when the boiler is switched on:

The negative pressure resulting from blowing in fuel can lead to smoke being sucked back into the store if the boiler is operational. Possible excess pressure could cause smoke to escape into the installation room, possibly resulting in injury and damage!

Therefore, before blowing in the fuel:

- switch off the boiler by tapping "Boiler off" at the mode icon
 - The boiler follows the shutdown procedure and switches to "Switched off Off" status
- leave to cool for **at least two hours** in "Switched off Off" mode.

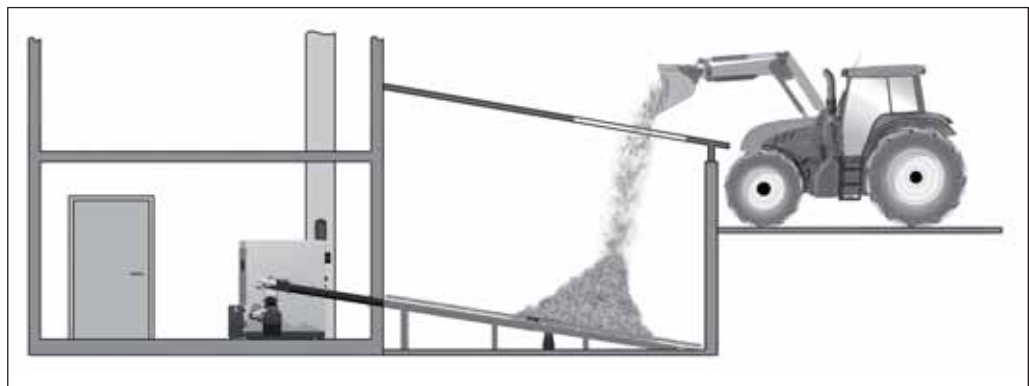
3.2.1 Loading of fuel for a partially emptied store with rotary agitator



If there is still sufficient fuel in the store (the head of the rotary agitator is completely covered with fuel and the rotary agitator arms are not extended), the store can be filled:

- Load the fuel at the filling opening

3.2.2 Loading fuel in an empty store space with a rotary agitator



NOTICE

Filling an empty store space with a rotary agitator:

With the store space completely empty or almost empty, the rotary agitator arms / spring blades are fully extended. If the rotary agitator arms / spring blades are covered in this position with a large amount of fuel, the weight of the fuel will stop them from working properly.

Therefore, when filling an empty store space or when the rotary agitator arms are extended:

- First of all place a small amount of fuel (approx. 2 – 3 m³) on and around the head of the rotary agitator
- Only add the rest of the fuel once the rotary agitator arms are back on the head of the rotary agitator
- It is important you follow the procedure given below!

- Switch off the boiler by tapping “Boiler off” at the mode icon and allow to cool for at least two hours
- Disconnect the boiler’s main switch
- Turn off the main switch on the expansion switch cabinet (if installed)

- Pile up the residual fuel (in the corners and on the walls) in the fuel store on and around the head of the rotary agitator and on the discharge screw by hand.
 - The head of the rotary agitator should be completely covered.
- Follow the instructions on working in the fuel store!

NOTICE! Refer to the notice (supplied with the boiler) at the entrance to the store



If the head of the rotary agitator is not adequately covered by the remaining fuel:

- Load a small amount of fuel (approx. 2-3 m³)
 - Pile it up on and around the head of the rotary agitator
 - The head of the rotary agitator should be completely covered

Rotary agitator with combined drive system

After working in the store:

- Turn on the boiler’s main switch
- Turn on the main switch on the expansion switch cabinet (if installed)
- Switch on the boiler by tapping “Boiler on” at the mode icon

- For the highest possible heat consumption
 - the storage tank must be able to store enough heat
- Wait until the rotary agitator arms / spring blades are touching the head of the rotary agitator (approx. 2 revolutions)
- Add the rest of the fuel

Rotary agitator with separate drive system (optional)

In the case of rotary agitators with a separate drive system, the head of the rotary agitator can be operated separately from the discharge screw.

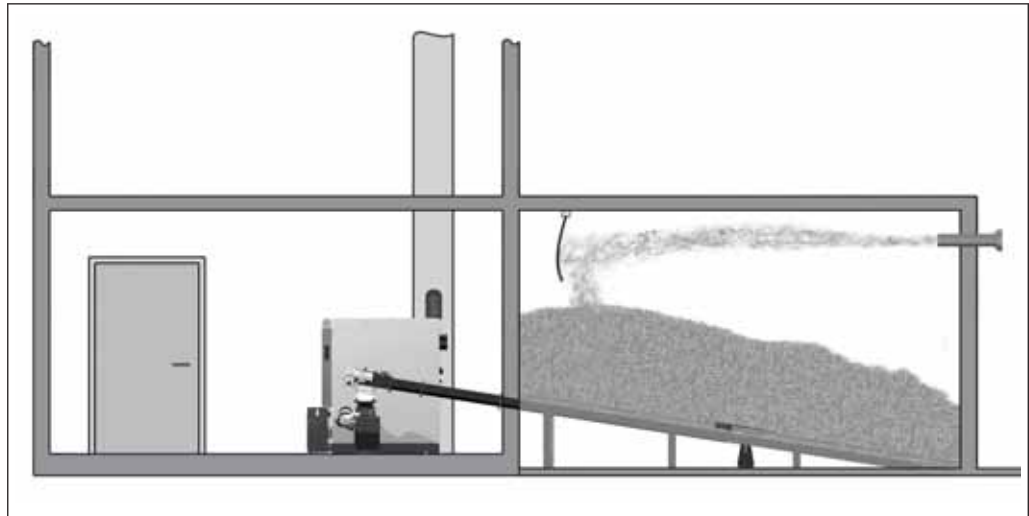
After working in the store:

- Turn on the boiler’s main switch
- Turn on the main switch on the expansion switch cabinet (if installed)

- Tap “Manual” in “Bunker filling rotary agitator” during manual operation
 - The rotary agitator runs for approx. 3 minutes
- Wait until the rotary agitator arms / spring blades are touching the head of the rotary agitator (approx. 2 revolutions)
- Add the rest of the fuel



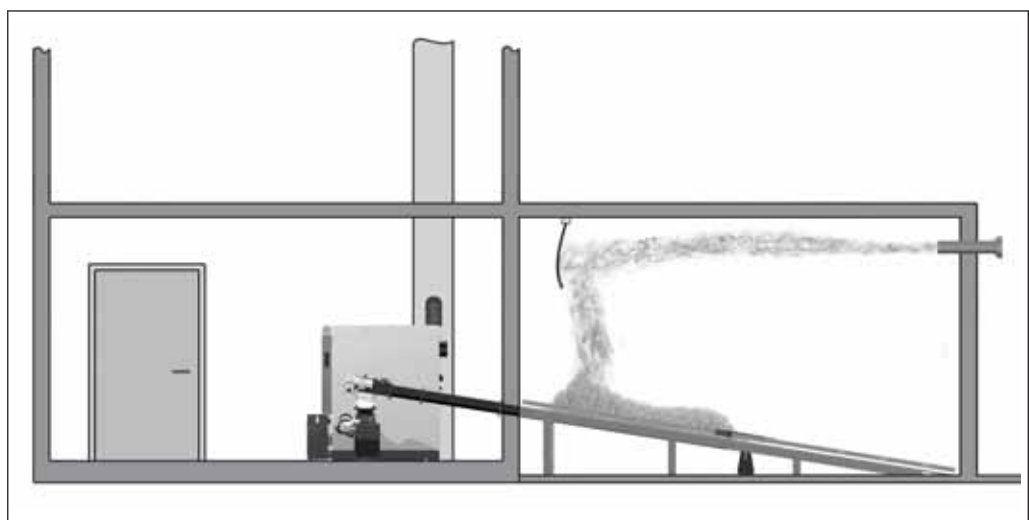
3.2.3 Blowing in fuel for a partially emptied store with rotary agitator



If there is still sufficient fuel in the store (the head of the rotary agitator is completely covered with fuel and the rotary agitator arms are not extended), the store can be filled as follows:

- Switch off the boiler by tapping “Boiler off” at the mode icon and allow to cool for at least two hours
- Close all openings to the store to seal out dust
- Blow the fuel into the store

3.2.4 Blowing in fuel for an empty store with rotary agitator



NOTICE

Filling an empty store space with a rotary agitator:

With the store space completely empty or almost empty, the rotary agitator arms / spring blades are fully extended. If the rotary agitator arms / spring blades are covered in this position with a large amount of fuel, the weight of the fuel will stop them from working properly.

Therefore, when filling an empty store space or when the rotary agitator arms are extended:

- First of all place a small amount of fuel (approx. 2 – 3 m³) on and around the head of the rotary agitator
- Only add the rest of the fuel once the rotary agitator arms are back on the head of the rotary agitator
- It is important you follow the procedure given below!

- Switch off the boiler by tapping “Boiler off” at the mode icon and allow to cool for at least two hours
- Disconnect the boiler’s main switch
- Turn off the main switch on the expansion switch cabinet (if installed)
- Pile up the residual fuel (in the corners and on the walls) in the fuel store on and around the head of the rotary agitator and on the discharge screw by hand.
 - The head of the rotary agitator should be completely covered.
- Follow the instructions on working in the fuel store!

NOTICE! Refer to the notice (supplied with the boiler) at the entrance to the store



If the head of the rotary agitator is not adequately covered by the remaining fuel:

- Close all openings to the store to seal out dust
- Load a small amount of fuel (approx. 2-3 m³)
 - Pile it up on and around the head of the rotary agitator
 - The head of the rotary agitator should be completely covered

Rotary agitator with combined drive system

After working in the store:

- Turn on the boiler’s main switch
- Turn on the main switch on the expansion switch cabinet (if installed)
- Switch on the boiler by tapping “Boiler on” at the mode icon
- For the highest possible heat consumption
 - the storage tank must be able to store enough heat
- Wait until the rotary agitator arms / spring blades are touching the head of the rotary agitator (approx. 2 revolutions)
- Switch off the boiler by tapping “Boiler off” at the mode icon and allow to cool for at least two hours
- Close all openings to the store to seal out dust
- Add the rest of the fuel

Rotary agitator with separate drive system (optional)

In the case of rotary agitators with a separate drive system, the head of the rotary agitator can be operated separately from the discharge screw.

After working in the store:

- Turn on the boiler's main switch
- Turn on the main switch on the expansion switch cabinet (if installed)
- Tap "Manual" in "Bunker filling rotary agitator" during manual operation
 - The rotary agitator runs for approx. 3 minutes
- Wait until the rotary agitator arms / spring blades are touching the head of the rotary agitator (approx. 2 revolutions)
- Close all openings to the store to seal out dust
- Add the rest of the fuel



3.2.5 Blowing in pellets for a store with pellet screw

- Switch off the boiler by tapping "Boiler off" at the mode icon and allow to cool for at least two hours
- Close all openings to the store to seal out dust
- Blow the fuel into the store

3.2.6 Loading fuel in a store space with a sliding floor discharge unit

- The maximum dumping height (depending on the fuel density) as specified in the operating instructions for the sliding floor must not be exceeded.
- Driving over the fuel in the store can cause the material to be compacted.
 - This may stop the slide rods from running smoothly.

Filling the store by driving over the slide rods

Slide rods can be driven over, provided the following precautions are taken:

- The slide rods must be covered by a residual fuel layer approx. 30 cm deep so that the truck does not drive directly over the sliding floor keyways.
- On no account may the truck drive over the longitudinal support for the slide rods. (Provide guidance systems for driving the truck into the store, or position gates appropriately)
- While the truck is on the sliding floor, the hydraulic unit must be switched off
- While it is on the sliding floor the truck should be manoeuvred as little as possible

Filling the store by tipping fuel onto or next to the slide rods

- If the fuel can be tipped out without driving over the slide rods, the store can be filled while the boiler is running

3.2.7 Loading fuel in a store space with a horizontal screw discharge unit

- When the boiler system is running, fuel can be tipped into the store at any time.
 - CAUTION: fuel may only be blown in if the pressure conditions in the store are suitable and the water content of the fuel does not exceed a maximum of W30.

3.2.8 Loading fuel in a store space with an inclined screw discharge unit

The inclined screw must always be moved into an upright position in order to fill the store.

This can be done as follows:

- If the store is filled while the boiler system is running, the screw moves automatically into an upright position.
 - If the store is empty, the screw must be moved by hand into an upright position and wedged with fuel.
- If the feed system is not running when the store is filled, the screw can be held upright using string.
 - TIP: the string should be thin enough for it to break as the store is filled.

3.3 Heating up the boiler

NOTICE

Do not modify the factory settings!

Changing the system's factory settings can be detrimental to efficiency and emissions of the system.

3.3.1 Switching on the power supply



- Turn on the main switch
 - There is voltage at all of the boiler's components
 - When the control has completed the system start, the boiler is ready for operation

3.3.2 Switching on the boiler

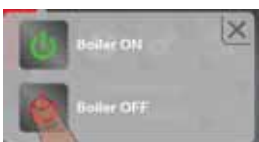


- Switch the boiler on by tapping "Boiler ON"
 - Automatic mode is active
 - The heating system is controlled via the controller according to the selected mode in automatic mode
- For other modes press the relevant function key
 - Information on function keys in the relevant operating instructions for the "SPS 4000" boiler controller

3.3.3 Controlling the boiler

Please see the relevant operating instructions for the "SPS 4000" boiler controller for the necessary control steps, as well as displaying and modifying parameters

3.3.4 Switching off the boiler



- Switch boiler off by tapping "Boiler OFF"
 - The boiler follows the shutdown program and switches to "Switched off Off" status
 - The combustion unit is switched off, the chamber discharge unit and the entire hydraulic system remain active

3.3.5 Switching off the power supply

WARNING

When turning off the main switch in automatic mode:

Serious combustion faults leading to serious accidents are possible.

Before turning off the main switch:

- Switch boiler off by tapping "Boiler OFF"
 - The boiler follows the shutdown procedure and switches to "Switched off OFF" status after the cleaning cycle



- Turn off the main switch
 - Boiler controller is switched off
 - The components powered via the control cabinet are powered down
 - CAUTION: the expansion switch cabinet, which has its own power supply, is still live.

NOTICE! Frost protection function is no longer active!

4 Servicing

4.1 General information on servicing



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



WARNING

Inspection and cleaning work on a system which is operational:

risk of serious injuries from automatic startup of the system and severe burns from hot parts and the flue gas pipe!

When working on the system:

- always wear protective gloves
- only operate the boiler using the handles provided
- switch off the boiler by tapping "Boiler off" at the mode icon
 - The boiler follows the shutdown procedure and switches to "Switched off Off" status
- switch off the main switch and take precautions to prevent accidental switching on
- allow the boiler to cool off for at least 1 hour
- once all of the tasks have been completed, turn the main switch back on and switch the boiler on in the desired mode



WARNING

Incorrect inspection and cleaning:

Incorrect or insufficient inspection and cleaning of the boiler can cause serious faults in combustion (e.g. spontaneous combustion of carbonisation gases / flash fires) and this can lead to serious accidents and damage!

Take the following precautions:

- Clean the boiler following the instructions in the instruction manual. Follow the boiler operating instructions.

NOTICE

We recommend that you keep a maintenance book in accordance with ÖNORM M7510 of the Technical Directive for Fire Prevention (TRVB)

NOTICE

As well as the cleaning and maintenance tasks explained in these instructions, also refer to the specifications according to TRVB H 118 given in the enclosed inspection book.

NOTICE! The boiler must be cleaned and inspected at appropriate intervals depending on the service hours and fuel quality.

Cleaning kit provided:

- Chamber plate (triangular plate)
- Flat scraper
- Brush (Ø 53 mm)

- Regular cleaning of the boiler extends its life and is a basic requirement for smooth running.
- Recommendation: use an ash vacuum for cleaning.

4.2 Inspection

4.2.1 Checking the system pressure



- Check the system pressure on the pressure gauge
 - The value must be 20% above the pre-stressed pressure of the expansion tank
- NOTICE! Check that the position of the pressure gauge and rated pressure of the expansion tank match your installer's specifications!**

If the system pressure decreases:

- Top up with water
 - NOTICE! If this happens frequently, the seal of the heating system is faulty! Inform your installer**

If large pressure fluctuations are observed:

- Ask an expert to inspect the expansion tank

4.2.2 Checking the thermal discharge safety device



- Check the seal of the discharge valve
 - The discharge pipe must not drip
- NOTICE! Exception: Boiler temperature > 100 °C**

If water is dripping from the discharge pipe:

- Clean the discharge safety device in accordance with the manufacturer's instructions or have it checked/replaced by the installer if necessary

4.2.3 Checking the safety valve



- Check the seal of the safety valve regularly and ensure that the valve is not dirty
 - NOTICE! Inspection work must be carried out in accordance with the manufacturer's instructions.**

4.2.4 Checking the geared motors

- Carry out a visual inspection of the seal on the geared motors in the system
 - There should be no significant leakage of lubricant
- NOTICE! The presence of a few drops of lubricant may be normal. If there is significant loss of lubricant, inform your installer or Fröling customer services**

4.2.5 General visual inspection

Regular general visual and functional inspections should be carried out on all the components making up the boiler.

- Clean components wherever necessary
- Immediately change or have someone exchange defective components

Pay particular attention to the following components when carrying out the inspections:

- Combustion chamber
- Burning chamber
- Heat exchanger
- ID fan
- Flue gas recirculation (FGR)
- Combustion air fan
- Burn back flap
 - Check function and seal
- Screw drives
 - Loading and ash removal
- Door switch
 - When the door is opened, the induced draught unit must operate at full speed
 - The combustion air and FGR blower fan must stop when the door is opened
- Igniter tube
 - must not be obstructed!
- Safety temperature limiter (STL)
- Loading system water sprinkler system
 - Note the manufacturer's specifications
- Emergency stop switch

4.3 Cleaning

The frequency at which the following cleaning work is carried out depends on energy requirements, fuel quality and number of operating hours.

WARNING

When removing the ash container cover during operation:

False air infiltration via the ash screw duct can lead to uncontrolled combustion and the risk of accidents.

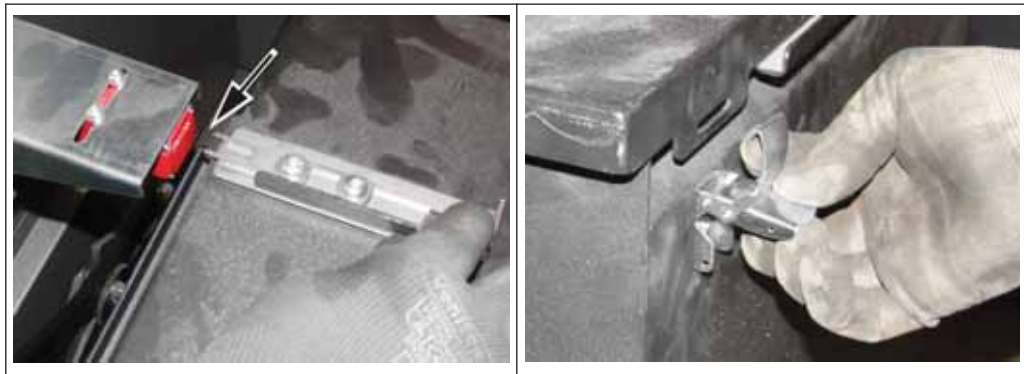
Before checking the ash level / emptying the ash container:

- Switch off the boiler by tapping "Boiler off"
 - The boiler follows the shutdown procedure and switches to "Switched off OFF" status.

4.3.1 Emptying the combustion chamber ash container

NOTICE! The current fill level of the combustion chamber ash container can also be checked while the boiler is in operation. Important:

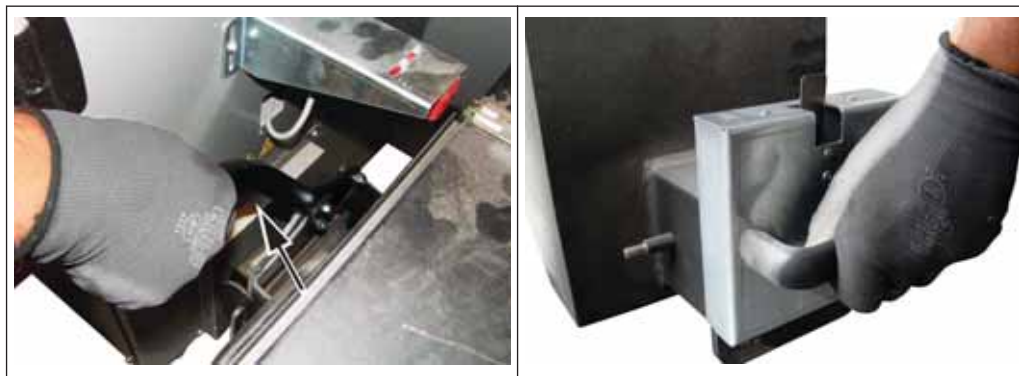
- the ash container cover must be closed again within 15 seconds
- Caution: if the cover remains open for more than 15 seconds, the boiler is switched off automatically.



- Remove the key plate from the safety switch
- Open the side fasteners on the ash container
- Remove the ash container cover and check the level
- Replace the cover and close the side fasteners
 - If the container does not need emptying, slide the key plate back into the safety switch

If the container needs emptying, proceed as follows:

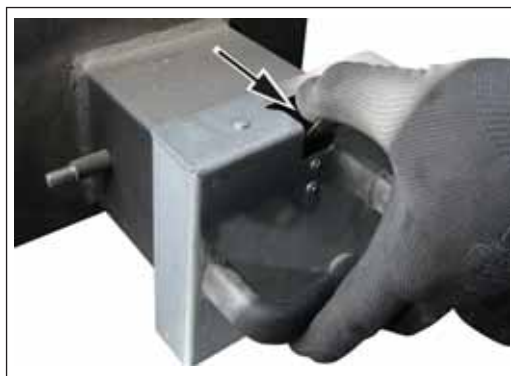
- switch off the boiler by tapping "Boiler off" at the mode icon



- Push the side lever up to release the ash container
- Pull out the ash container
- Push the coupling cap onto the ash container
- Take the ash container to the emptying point and empty it

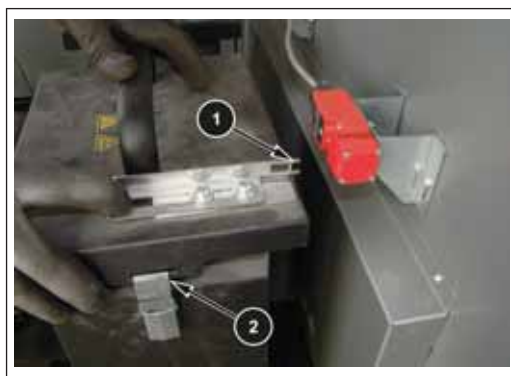
- Check the fill level of the ash container in the heat exchanger and empty if required, ⇒ See "Emptying the ash container in the heat exchanger" [page 37]

To replace the ash container:



- Remove the coupling cap
 - Slide the upper flap forwards
 - To replace the ash container, follow the steps in reverse order

4.3.2 Emptying the ash container in the heat exchanger



- Remove the key plate (1) from the safety switch
- Open the side fasteners (2) on the ash container
- Remove the ash container cover and check the level

- Replace the cover and close the side fasteners
 - If the container does not need emptying, slide the key plate back into the safety switch

If the container needs emptying, proceed as follows:



- Push the side lever up to release the ash container
- Pull out the ash container
- Push the coupling cap onto the ash container
- Take the ash container to the emptying point and empty it

To replace the ash container:



- Remove the coupling cap
 - Slide the upper flap forwards
- To replace the ash container, follow the steps in reverse order

4.3.3 Cleaning the combustion and burning chamber

WARNING



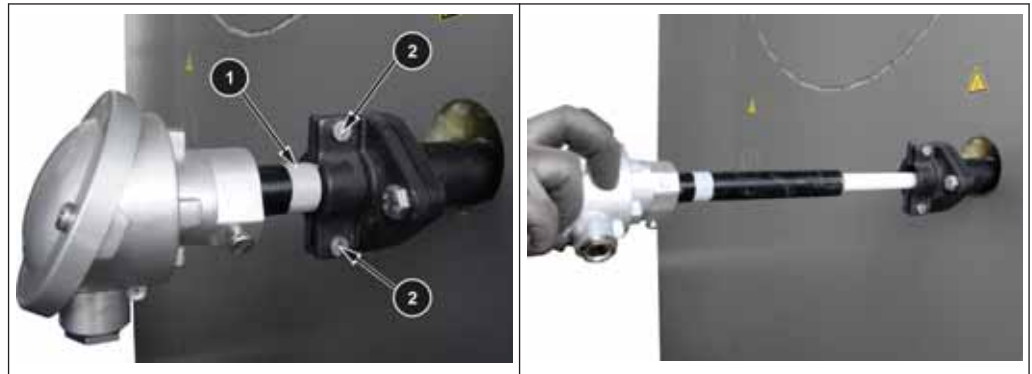
Inspection and cleaning work on a system which is operational:

risk of serious injuries from automatic startup of the system and severe burns from hot parts and the flue gas pipe!

When working on the system:

- always wear protective gloves
- only operate the boiler using the handles provided
- switch off the boiler by tapping “Boiler off” at the mode icon
 - The boiler follows the shutdown procedure and switches to “Switched off Off” status
- switch off the main switch and take precautions to prevent accidental switching on
- allow the boiler to cool off for at least 1 hour
- once all of the tasks have been completed, turn the main switch back on and switch the boiler on in the desired mode

NOTICE! In order to avoid damage to the combustion chamber temperature sensor, it should be removed before starting work in the combustion chamber



- Note the position of the combustion chamber temperature sensor (1)
 - e.g. with the help of sticky tape
- Loosen the screws on the bracket (2)
- Carefully remove the combustion chamber temperature sensor
 - if necessary, clean carefully
- When all tasks have been completed, replace the combustion chamber temperature sensor

Cleaning the burning chamber

- Open the combustion chamber door
- Pull the ash deposits on the upper side of middle vault towards you using a flat scraper
- Using a flat scraper, carefully push the ash on the upper side of the lower vault towards the rear
 - The ash will fall down into the combustion chamber

Cleaning the combustion chamber

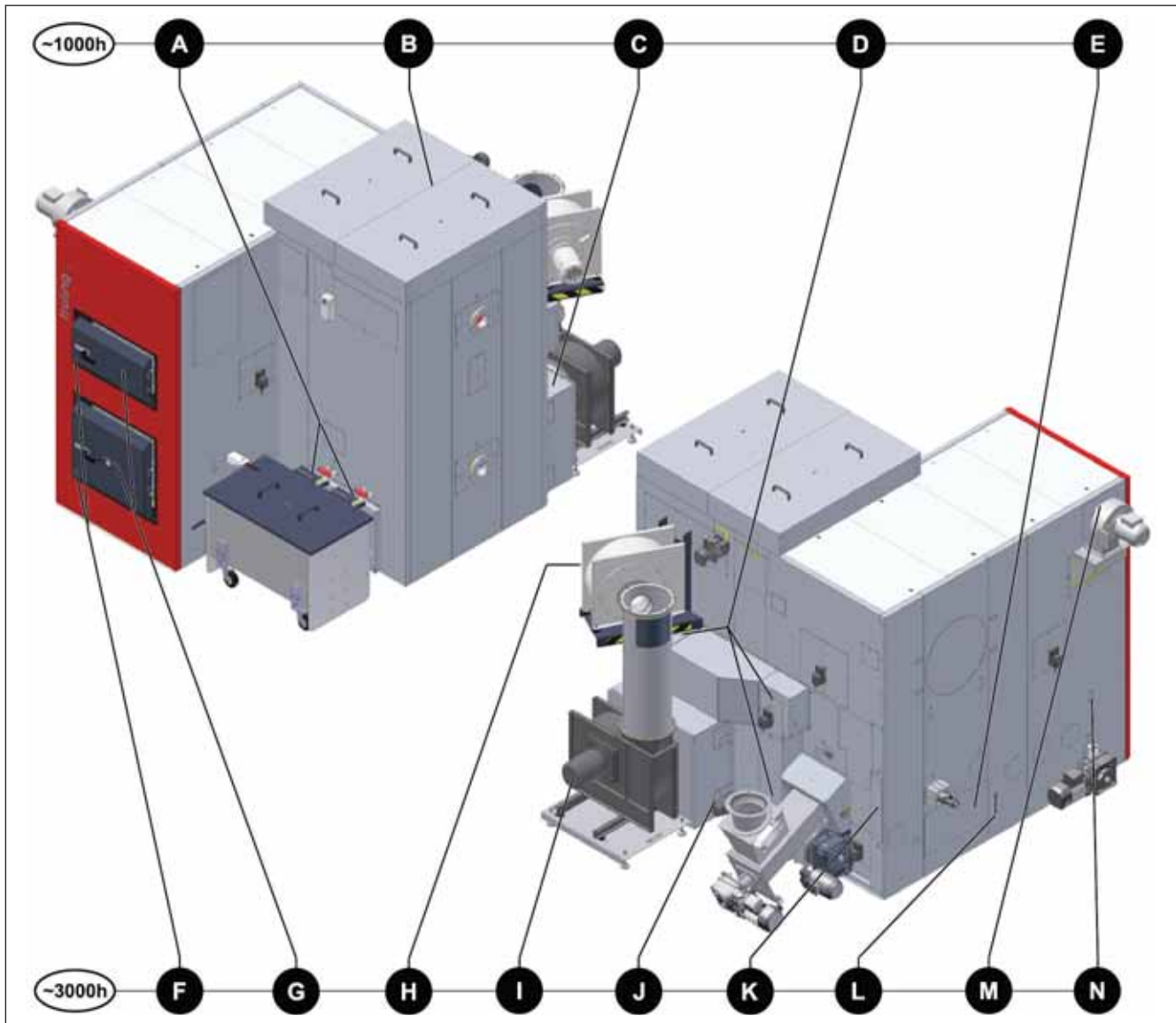
- Open the combustion chamber door
- Remove unburned material and foreign bodies from the combustion chamber
- Using a flat scraper, move the ash on the combustion chamber grate towards the ash shaft



- Remove any dirt (nails, stones, slag, etc.) from the moving grate
- Clean the primary air slot with a suitable tool (e.g. screwdriver)
 - The primary air slots must be free from obstructions!

- Turn on the main switch
- Activating the moving grate and ash removal screws in manual mode
 - Falling ash is moved into the ash container
- Empty the ash container whenever necessary
 - ⇒ [See "Emptying the combustion chamber ash container" \[page 36\]](#)

4.4 Periodic inspection and cleaning



A ⇒ See "Cleaning the ash from the heat exchanger" [page 43]

B ⇒ See "Cleaning the heat exchanger" [page 44]

C ⇒ See "Clean the broadband probe" [page 46],
⇒ See "Cleaning the flue gas temperature sensor" [page 47]

F ⇒ See "Setting and checking the seal on the doors" [page 50]

G ⇒ See "Cleaning the fireclay elements" [page 52]

H ⇒ See "Cleaning the FGR blower fan" [page 53]

I ⇒ See "Cleaning the induced draught fan" [page 53]

J ⇒ See "Checking the heat exchanger ash removal drive" [page 54]

D ⇒ See "Cleaning the flue gas recirculation (FGR) duct" [page 47]

E ⇒ See "Cleaning the area under the moving grate" [page 49]

K ⇒ See "Cleaning the secondary air duct" [page 54]

L ⇒ See "Checking the underpressure controller" [page 55]

M ⇒ See "Cleaning the combustion air blower fan" [page 56]

N ⇒ See "Checking the combustion chamber overpressure sensor" [page 56]

4.5 Periodic inspection and cleaning (approx. 1,000 hrs)

For fuels with a low ash content, cleaning and inspection after approx. 1,000 service hours is usually sufficient (under normal use conditions, approximately every quarter). For less efficient fuels and fuels with a high ash content (indicated by short emptying intervals for the ash container), the work should be carried out correspondingly more frequently.

WARNING



Inspection and cleaning work on a system which is operational:

risk of serious injuries from automatic startup of the system and severe burns from hot parts and the flue gas pipe!

When working on the system:

- always wear protective gloves
- only operate the boiler using the handles provided
- switch off the boiler by tapping "Boiler off" at the mode icon
 - ➔ The boiler follows the shutdown procedure and switches to "Switched off Off" status
- switch off the main switch and take precautions to prevent accidental switching on
- allow the boiler to cool off for at least 1 hour
- once all of the tasks have been completed, turn the main switch back on and switch the boiler on in the desired mode

4.5.1 Cleaning the ash from the heat exchanger

(Pos. A ⇒ See "Periodic inspection and cleaning" [page 42])

- Remove both ash containers from the heat exchanger and clean where necessary
- ⇒ See "Emptying the ash container in the heat exchanger" [page 37]



- Remove the lower bracket from the insulation
- Loosen the screws at the top of the insulation and remove it



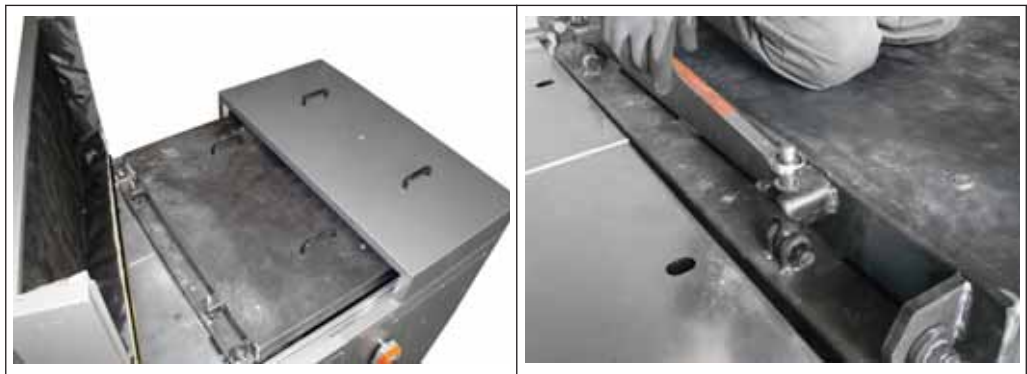
- Remove both ash removal flanges



- Remove dirt and deposits from the sloping plate and from the ash screws.
 - Always ensure there is a slight ash cover on the screws to protect them against the high temperatures to which they are exposed.
- Check the ash removal seal and replace if necessary
- Check the heat exchanger for damage (cracks, etc.)

4.5.2 Cleaning the heat exchanger

(Pos. B ⇨ See "Periodic inspection and cleaning" [page 42])



- Remove both heat exchanger insulating covers
- Loosen the six screws on the heat exchanger covers



- Open both heat exchanger covers



- Remove the cover from the combustion pipe.
- Clean the cover, the pipe and the burn-out opening between the combustion chamber and the heat exchanger
- Refit the cover



- Check that the automatic heat exchanger cleaning system operates smoothly (stroke: approx. 5 cm)
- Vacuum bearings where necessary
- If necessary, pull the entire system out of the heat exchanger pipes and then clean the pipes and the turbulators with a brush and/or an ash vacuum.

4.5.3 Clean the broadband probe

(Pos. C ⇒ See "Periodic inspection and cleaning" [page 42])



- Loosen the screws and remove the cover plate
 - ↳ Pos 1: Broadband probe
 - ↳ Pos. 2: Flue gas temperature sensor

- Unscrew the broadband probe
 - ↳ CAUTION: broadband probe may be hot!



- Remove dirt with a soft brush
 - ↳ Tip: to remove all the dirt, use an ash vacuum afterwards
 - ↳ CAUTION: Do not use sharp objects or compressed air to clean the broadband probe
- Screw in the broadband probe once more by hand

4.5.4 Cleaning the flue gas temperature sensor

(Pos. C ⇒ See "Periodic inspection and cleaning" [page 42])



- Loosen the retaining screw and pull out the flue gas temperature sensor
- Wipe the flue gas temperature sensor with a clean cloth
- Insert the flue gas sensor back into the flue gas temperature gas pipe and finger-tighten the retaining screw

4.5.5 Cleaning the flue gas recirculation (FGR) duct

(Pos. D ⇒ See "Periodic inspection and cleaning" [page 42])



- Remove the side cover plate from the FGR duct
- Push the thermal insulation to the side



- Remove the cleaning cover from the FGR duct
- Check the FGR duct and clean if necessary
 - Tip: use an ash vacuum!

There are two cleaning openings on the FGR duct at the back of the boiler. The following steps explain how to clean the lower opening. Carry out the cleaning of the upper opening in the same manner.

Tip: carry out cleaning work on the upper cleaning opening first.



- Remove the back cover plate from the FGR duct
- Push the thermal insulation to the side and remove the servo-motor



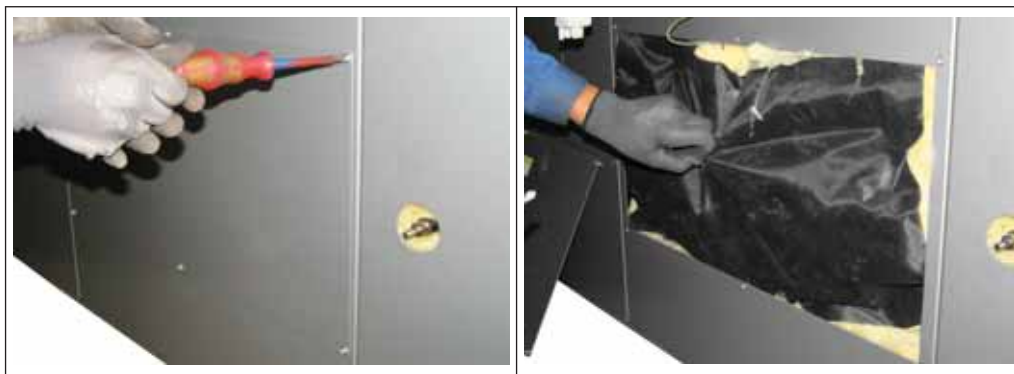
- Remove the torque support
- Remove the cleaning cover



- Check the FGR duct and clean if necessary
 - Tip: use an ash vacuum!

4.5.6 Cleaning the area under the moving grate

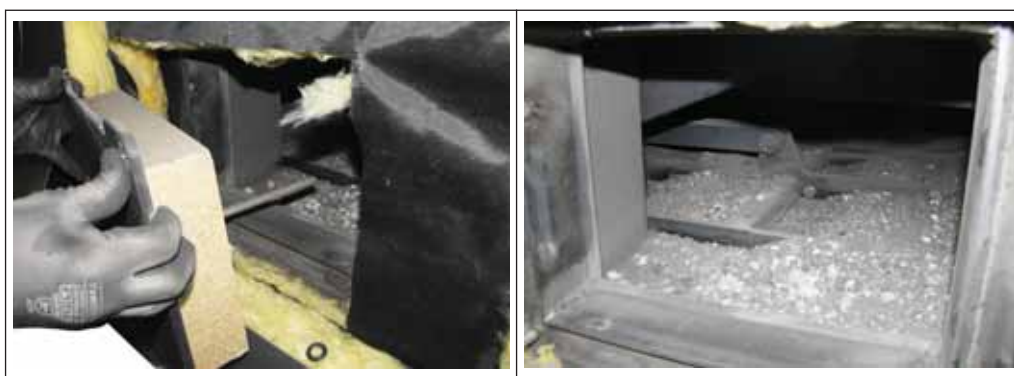
(Pos. E ⇒ See "Periodic inspection and cleaning" [page 42])



- Remove the cover plate
- Remove the thermal insulation



- Loosen the screws on the sensor and take out the sensor
- Loosen the nuts on the cleaning cover



- Remove the cleaning cover
- Check the moving grate area and ash rakes for dirt and deposits. Clean where necessary
- Check the grate, grate shafts and grate bearings for wear and deformation
 - Exchange components wherever necessary
- Check the grate drive for dirt and deposits and ensure it operates smoothly
- Check the seal on the cleaning cover

4.6 Periodic inspection and cleaning (approx. 3,000 hrs)

For fuels with a low ash content, cleaning and inspection after approx. 3,000 service hours is usually sufficient (under normal use conditions, approximately once a year). For less efficient fuels and fuels with a high ash content (indicated by short emptying intervals for the ash container), the work should be carried out correspondingly more frequently.

WARNING



Inspection and cleaning work on a system which is operational:

risk of serious injuries from automatic startup of the system and severe burns from hot parts and the flue gas pipe!

When working on the system:

- always wear protective gloves
- only operate the boiler using the handles provided
- switch off the boiler by tapping “Boiler off” at the mode icon
 - The boiler follows the shutdown procedure and switches to “Switched off Off” status
- switch off the main switch and take precautions to prevent accidental switching on
- allow the boiler to cool off for at least 1 hour
- once all of the tasks have been completed, turn the main switch back on and switch the boiler on in the desired mode

4.6.1 Setting and checking the seal on the doors

(Pos. F ⇒ See "Periodic inspection and cleaning" [page 42])

Setting and checking the seal are shown using the example of the combustion chamber doors. The procedure is the same for checking the seal on the burning chamber door!

NOTICE! The seals must be replaced if they have turned black!

Checking the setting

- Close the door
 - If the door can be opened with the usual force: correct setting
 - If the door cannot be opened with the usual force or must be forced open: unscrew the locking hook
 - ⇒ See "Adjusting the doors" [page 51]

Checking the seal



- Open the door
- Insert a sheet of paper at both the top and the bottom between the door and the boiler
- Close the door
- Try to pull out the sheets of paper
 - If the paper cannot be removed: the seal is correct
 - If the paper can be removed: the door is not sealed properly - tighten the locking hook!
 - ⇒ See "Adjusting the doors" [page 51]

4.6.2 Adjusting the doors

The example below shows how to position the combustion chamber door. The procedure is the same for checking the seal on the burning chamber door!

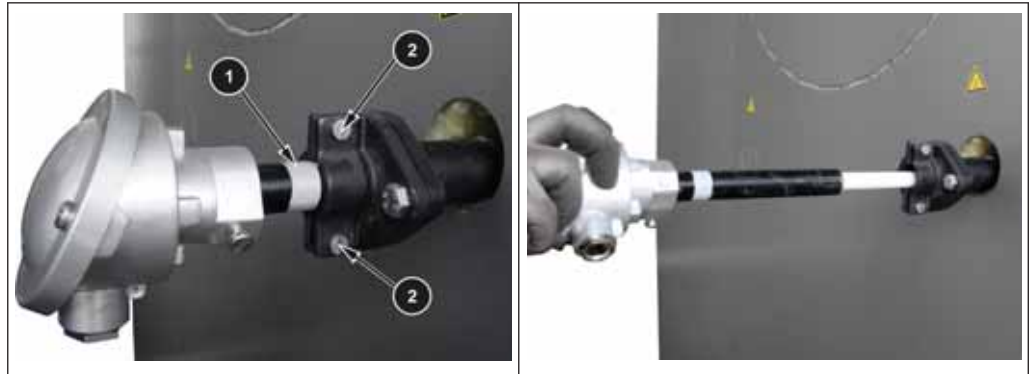


- Loosen the nut on the locking hook
- Tighten or loosen the locking hook as required
- Fix in place using lock-nuts

4.6.3 Cleaning the fireclay elements

(Pos.G ⇒ See "Periodic inspection and cleaning" [page 42])

NOTICE! In order to avoid damage to the combustion chamber temperature sensor, it should be removed before starting work in the combustion chamber



- Note the position of the combustion chamber temperature sensor (1)
 - ↳ e.g. with the help of sticky tape
- Loosen the screws on the bracket (2)
- Carefully remove the combustion chamber temperature sensor
 - ↳ if necessary, clean carefully
- When all tasks have been completed, replace the combustion chamber temperature sensor



- Open the combustion chamber door
- Carefully clean the upper vault with the cleaning brush
- Carefully clean the lower side of the middle vault with the cleaning brush



- Open the combustion chamber door
- Carefully clean the lower side of the lower vault with the cleaning brush
- Carefully clean the side walls of the combustion chamber with the flat scraper
- Check the fireclay elements for wear
- Remove any ash which has fallen down

⇒ See "Emptying the combustion chamber ash container" [page 36]

4.6.4 Cleaning the FGR blower fan

(Pos. H ⇒ See "Periodic inspection and cleaning" [page 42])

Cleaning the FGR blower fan should be carried out in the same way as cleaning of the induced draught fan

⇒ See "Cleaning the induced draught fan" [page 53]

4.6.5 Cleaning the induced draught fan

(Pos. I ⇒ See "Periodic inspection and cleaning" [page 42])



- Mark the position of the flange
- Loosen the screws on the flange



- Take out the blower fan and clean the blower wheel with a brush
- Check the seal and replace if necessary
- Replace the blower fan
 - Check the marking on the flange!

4.6.6 Checking the heat exchanger ash removal drive

(Pos. J ⇒ See "Periodic inspection and cleaning" [page 42])

- Remove the cover
- Grease the chain drive and check for wear
- Check the chain tension and adjust where necessary

4.6.7 Cleaning the secondary air duct

(Pos. K ⇒ See "Periodic inspection and cleaning" [page 42])



- Loosen the screws and remove the cover plate to the secondary air duct



- Remove the thermal insulation
- Loosen the screws on the cleaning cover



- Remove the cleaning cover
- Check the secondary air duct and clean if necessary
 - ➔ Tip: use an ash vacuum!

4.6.8 Checking the underpressure controller

(Pos. L ⇒ See "Periodic inspection and cleaning" [page 42])



- Disconnecting the silicone hose from the differential pressure transducer
- Using compressed air, blow out the hose in the direction of the combustion space to remove any deposits
- Connect the silicone hose to "Minus"

4.6.9 Cleaning the combustion air blower fan

(Pos. M ⇒ See "Periodic inspection and cleaning" [page 42])



- Remove the front insulating cover from above the combustion chamber
- Check the combustion air blower fan on the inside of the insulation and clean if necessary

4.6.10 Checking the combustion chamber overpressure sensor

(Pos. N ⇒ See "Periodic inspection and cleaning" [page 42])



- Loosen the retaining screw
- Pull the combustion chamber excess pressure sensor out of the spacer tube
- Clean the sensor with a fine cloth
- Check that the spacer tube is clear
- Insert the combustion chamber excess pressure sensor and fix loosely with fixing screws

4.6.11 Lubricating the bearings

- Grease the bearings of the screws and the drives at the correct points.

4.6.12 Checking the flue gas pipe

- Check the flue gas pipe and chimney
- Where necessary, remove any deposits using a cleaning brush
 - Always use stainless steel brushes to clean stainless steel flue pipes, chimney pipes and connections!

4.7 Maintenance instructions for hydraulic system



WARNING

Do not use unskilled personnel for hydraulic system maintenance

Risk of injury and damage to property!

Take the following precautions:

- Only allow trained professionals to carry out servicing and maintenance work on the hydraulic system. Follow the manufacturer's operating instructions.

NOTICE! Do not allow the oil temperature to exceed +50°C or fall below -30°C.

The interval at which oil should be changed depends on a variety of factors including the age of the oil and the amount of dirt contained in it. As a general rule, the oil should be changed at the following intervals:

Interval [service hours]	Component / Maintenance Operation
50 – 100	ONE-TIME maintenance after first commissioning: <input type="checkbox"/> Change the oil and the filter
50	<input type="checkbox"/> Check the oil level ↳ The oil must show no visible signs of foaming <input type="checkbox"/> Check the tightness of screw connectors
200	<input type="checkbox"/> Check the return filter for dirt (pressure gauge on filter) <input type="checkbox"/> Change the filter cartridge if necessary
5,000 (or yearly)	<input type="checkbox"/> Change the oil <input type="checkbox"/> Change the return filter and the vent filter sets

Recommended procedure for oil change:

- Move all hydraulic cylinders to the end stop
 ↳ This will expel all the oil
- Drain off or pump off the oil from the hydraulic unit
- Remove the unit cover or open the inspection cover
- Thoroughly clean the oil tank (make sure you remove all oil sludge)
- Change the return filter and the vent filter sets
- Refit the unit cover or close the inspection cover
- Fill the tank with hydraulic oil to the level mark shown on the inspection glass
 ☞ Use the hydraulic oil grade specified by the manufacturer
- At the other end of the cylinder plunger (relative to its current position), disconnect the hydraulic cylinder hose on the fixed piping side. Place a container under the disconnected hose.
- Using the hydraulic unit move the cylinders to the other end position
 ↳ The remaining old oil will be pushed out of the hose and into the container
- Refit the hydraulic hoses and check the seal
- Bleed the hydraulic system and check the oil level

4.8 Emissions measurement by chimney sweep or regulatory body

Various legal regulations stipulate that heating systems must be inspected periodically. In Germany this is regulated by the First Federal Emissions Protection Ordinance (BimSchV) in the last amended version, and in Austria by various state laws.

4.8.1 Preparing to test emissions

- Clean the whole system thoroughly 2-3 heating days before the testing
- The storage tank must be able to store enough heat on the day of testing
- Ensure enough high-quality fuel is available
 - Max. water content 30%!
 - Fuel size class - ⇒ See "Permitted fuels" [page 11]
- Ensure that the flue gas piping has a built-in DN100 test flange between the dust remover and chimney according to the stipulations of Austrian standard ÖNORM M 5861-1.

Recommendations:

- Have Froling service technicians check the function and settings 1-2 days before testing
- For optimum measuring results, consult a Froling service technician

4.8.2 Measurement at nominal load

- To ensure sufficient heat consumption
 - The storage tank must be able to store enough heat during testing
 - If required, maximise the nominal boiler temperature

Requirements for measurement:

- Constant combustion chamber temperature of >900°C
- O₂ content of the flue gas 8 - 10%
(corresponds to a CO₂ content of 13 - 11%)

4.8.3 Measurement at partial load (if necessary)

- To ensure sufficient heat consumption
 - The storage tank must be able to store enough heat during testing
- Force partial load:
 - Set the boiler temperature setpoint to 3°C below the actual boiler temperature at nominal load

Requirements for measurement:

- Constant combustion chamber temperature of >900°C
- O₂ content of the flue gas 10 - 12%
(corresponds to a CO₂ content of 7 - 11%)

- Return all changed parameters to the original setting after measurement

4.9 Maintenance agreement / Customer service

NOTICE! We recommend a yearly inspection by Froling customer services or an authorised partner (third party maintenance).

Regular maintenance and servicing by a heating specialist will ensure a long, trouble-free service life for your heating system. It will ensure that your system stays environmentally-friendly and operates efficiently and cost-effectively.

In the course of this maintenance the entire system is inspected and optimised, particularly regulation and control of the boiler. The emission measurement carried out can also be used to draw conclusions about the combustion performance of the boiler.

For this reason, FROLING offers a service agreement, which optimises operating safety. Please see the details in the accompanying guarantee certificate.

Your Froling customer service office will also be happy to advise you.

NOTICE

All national and regional regulations relating to regular testing of the system must be observed. Please be advised that, in Austria, commercial systems with a rated heat output of 50 kW or more must be regularly tested at yearly intervals in accordance with the Heating Plant Regulations (Feuerungsanlagen-Verordnung).

4.10 Replacement parts

With Froling original replacement parts in your boiler, you are using parts that match perfectly. As the parts fit together so well, installation times are shortened and a long service life is maintained.

NOTICE

Installing non-original parts will invalidate the guarantee.

- Only replace components or parts with original replacement parts

4.11 Disposal information

4.11.1 Disposal of the ash

- The ash should be disposed of in accordance with waste management regulations.

4.11.2 Disposal of system components

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

5 Troubleshooting

5.1 General faults in the power supply

Error characteristics	Cause of error	Elimination of error
Nothing is shown on the display	General power failure	
No power to the controller	Main switch is turned off FI-protective circuit breaker, power line protection or SPS power line protection tripped	Turn on the main switch Switch on the protective circuit breaker

5.1.1 Behaviour of system after a power failure

When the power supply has been restored, the boiler returns to the previous mode and is controlled according to the specified program.

- After a power failure, check whether the STL (high-limit thermostat) has tripped.
- Keep the doors of the boiler closed during and after the power failure, at least until the induced draught fan automatically starts up again.

5.2 Excessive temperature

The high-limit thermostat (STL) shuts down the boiler when it reaches a temperature of 95 - 100°C. The pumps continue to run.

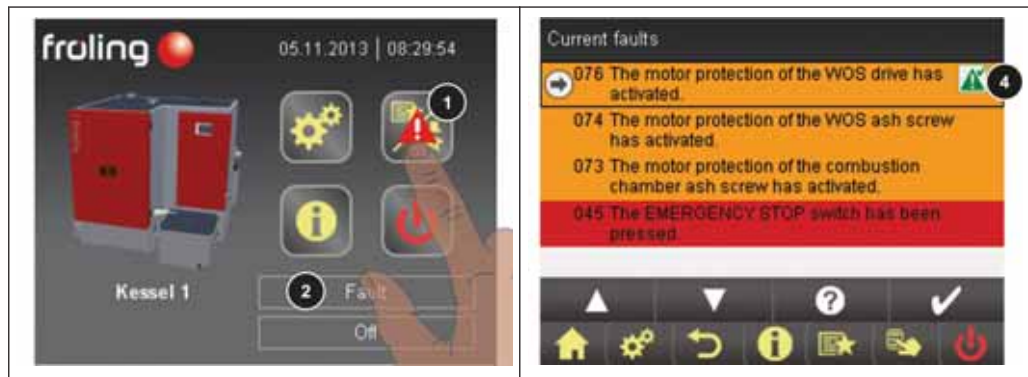


Once the temperature falls to below approx. 85°C, the STL can be reset mechanically.

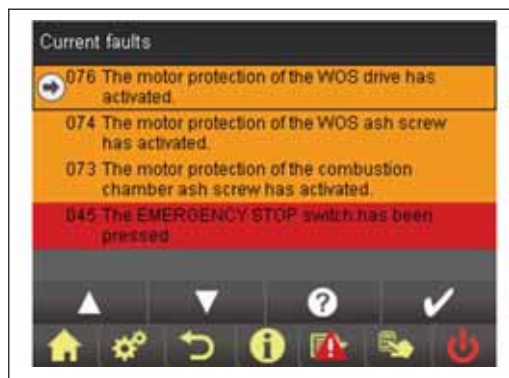
- Unscrew the cap on the STL
- Unlock the STL by pressing with a screwdriver

5.3 Faults with fault message

If a fault has occurred and has not yet been cleared:



- A warning symbol (1) flashes in the Quick menu
- In case of a fault/alarm, the operating status "Fault Off" (2) is displayed
- Navigate to the error display using the Quick menu
 - The current fault list is displayed:



The term "fault" is a collective term for warnings, errors and alarms. The boiler reacts differently to the three types of message:

Type of fault	Character	Boiler behaviour
WARNING	<ul style="list-style-type: none"> ▪ YELLOW warning sign ▪ Message with YELLOW background 	In case of warnings the boiler initially continues controlled operation, giving the option of resolving the error quickly to prevent a shutdown.
ERROR	<ul style="list-style-type: none"> ▪ ORANGE warning sign ▪ Message with ORANGE background 	The boiler follows the shutdown procedure and remains in "Switched off Off" status until the problem is resolved.
ALARM	<ul style="list-style-type: none"> ▪ RED warning sign ▪ Message with RED background 	An alarm triggers a system emergency stop. The boiler shuts down immediately, the heating circuit controller and pumps remain active.

5.3.1 Procedure for fault messages

Troubleshooting and fault messages
See operating instructions SPS 4000

5.3.2 Acknowledging a fault message

Trace and remove the fault and then:

- Call up the current fault list (Quick menu / Error display)



- Use the up/down arrow (1) to navigate to the current fault
 - The selected fault is indicated by an arrow symbol (2)
- Acknowledge the current fault by tapping the check mark (3)
- A symbol (4) appears once the fault has been acknowledged
 - Once all faults have been fixed and acknowledged, all warning symbols disappear from the starting page

6 Appendix

6.1 Addresses

6.1.1 Address of manufacturer

FRÖLING
Heizkessel- und Behälterbau GesmbH

Industriestraße 12
A-4710 Grieskirchen
AUSTRIA

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

6.1.2 Address of the installer

Stamp