

Operating Instructions  
**Turbomat TM 320 - 550**



**Translation of the original German operating instructions for operators**

Read and follow the instructions and safety information!

Technical changes, typographical errors and omissions reserved!

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# Contents

<b>1</b>	<b>General</b>	<b>5</b>
1.1	Product overview	6
<b>2</b>	<b>Safety</b>	<b>8</b>
2.1	Hazard levels of warnings	8
2.2	Pictograms used	9
2.3	General safety information	10
2.4	Permitted uses	11
2.4.1	The Clean Air Act 1993 and Smoke Control Areas	11
2.4.2	Permitted fuels	11
	<i>Wood chips</i>	11
	<i>Wood pellets</i>	13
	<i>Wood shavings</i>	13
	<i>Miscanthus</i>	13
	<i>Changing the fuel</i>	14
2.4.3	Non-permitted fuels	14
2.4.4	Qualification of operating staff	14
2.4.5	Protective equipment for operating staff	14
2.5	Safety devices	16
2.5.1	External safety devices	17
	<i>Hydraulic chamber safety switch</i>	17
	<i>Guardrail</i>	17
2.6	Residual risks	18
2.7	Emergency procedure	20
2.7.1	Overheating of the system	20
2.7.2	Smell of flue gas	20
2.7.3	Fire in the system	20
<b>3</b>	<b>Notes for operating a heating system</b>	<b>21</b>
3.1	Installation and approval of the heating system	21
3.2	General information for installation room (boiler room)	21
3.3	Requirements for central heating water	22
3.4	Notes for using pressure maintenance systems	24
3.5	Return lift	24
3.6	Use with storage tank	25
3.7	Chimney connection/chimney system	25
<b>4</b>	<b>Operating the system</b>	<b>26</b>
4.1	Assembly and initial startup	26
4.2	Filling the store space with fuel	27
4.2.1	Loading of fuel for a partially emptied store with rotary agitator	28
4.2.2	Loading fuel in an empty store space with a rotary agitator	28
	<i>Rotary agitator with combined drive system</i>	29
	<i>Rotary agitator with separate drive system (optional)</i>	30
4.2.3	Blowing in fuel for a partially emptied store with rotary agitator	30
4.2.4	Blowing in fuel for an empty store with rotary agitator	31

	<i>Rotary agitator with combined drive system</i>	32
	<i>Rotary agitator with separate drive system (optional)</i>	32
4.2.5	Blowing in pellets for a store with pellet screw	32
4.2.6	Loading fuel in a store space with a sliding floor discharge unit	33
4.2.7	Loading fuel in a store space with a horizontal screw discharge unit	34
4.2.8	Loading fuel in a store space with an inclined screw discharge unit	34
4.2.9	Drainage of fuel store	34
<b>4.3</b>	<b>Heating up the boiler</b>	<b>35</b>
4.3.1	Switching on the power supply	35
4.3.2	Switching on the boiler	35
4.3.3	Regulating the boiler	35
4.3.4	Switching off the boiler	35
4.3.5	Switching off the power supply	36
<b>5</b>	<b>Servicing the System</b>	<b>37</b>
<b>5.1</b>	<b>General information on servicing</b>	<b>37</b>
<b>5.2</b>	<b>Required tools</b>	<b>39</b>
<b>5.3</b>	<b>Maintenance work by the operator</b>	<b>40</b>
5.3.1	Inspection	40
	<i>Checking the system pressure</i>	40
	<i>Checking the thermal discharge safety device</i>	40
	<i>Checking the safety valve</i>	40
	<i>Checking the geared motors</i>	40
	<i>Checking the quick vent valve</i>	41
	<i>Checking the draught controller flap</i>	41
	<i>General weekly inspection</i>	41
5.3.2	Cleaning	42
	<i>Emptying the combustion chamber ash container</i>	42
	<i>Emptying the ash container in the heat exchanger</i>	43
	<i>Cleaning the combustion and burning chamber</i>	45
5.3.3	Periodic inspection and cleaning	48
5.3.4	Periodic inspection and cleaning (approx. 1,000 hrs)	49
	<i>Cleaning the ash from the heat exchanger</i>	50
	<i>Cleaning the flue gas temperature sensor</i>	51
	<i>Cleaning the heat exchanger</i>	51
	<i>Cleaning the flue gas recirculation (FGR) duct</i>	52
	<i>Lubricate the stoker bearings</i>	54
	<i>Cleaning the area under the moving grate</i>	54
5.3.5	Periodic inspection and cleaning (approx. 3,000 hrs)	55
	<i>Cleaning the fireclay elements</i>	56
	<i>Setting and checking the seal on the doors</i>	57
	<i>Adjusting the doors</i>	58
	<i>Cleaning the FGR blower fan</i>	58
	<i>Cleaning the induced draught fan</i>	58
	<i>Checking the heat exchanger ash removal drive</i>	59
	<i>Check the igniter tube</i>	59
	<i>Cleaning the secondary air duct</i>	60
	<i>Checking the underpressure controller</i>	60
	<i>Cleaning the combustion air blower fan</i>	61
	<i>Checking the combustion chamber overpressure sensor</i>	61
	<i>Lubricating the bearings</i>	62
	<i>Checking the flue gas pipe</i>	62
<b>5.4</b>	<b>Maintenance work by technicians</b>	<b>62</b>
5.4.1	Cleaning the Lambda probe	63
<b>5.5</b>	<b>Maintenance instructions for hydraulic system</b>	<b>64</b>

<b>5.6</b>	<b>Emissions measurement by chimney sweep or regulatory body</b>	<b>65</b>
5.6.1	Switch on the system	65
5.6.2	Start emissions measurement	65
<b>5.7</b>	<b>Replacement parts</b>	<b>66</b>
<b>5.8</b>	<b>Disposal information</b>	<b>66</b>
5.8.1	Disposal of the ash	66
5.8.2	Disposal of system components	66
<b>6</b>	<b>Troubleshooting</b>	<b>67</b>
<b>6.1</b>	<b>General faults in the power supply</b>	<b>67</b>
6.1.1	Behaviour of system after a power failure	67
<b>6.2</b>	<b>Excessive temperature</b>	<b>67</b>
<b>6.3</b>	<b>Faults with fault message</b>	<b>68</b>
6.3.1	Procedure for fault messages	68
<b>7</b>	<b>Notes</b>	<b>69</b>
<b>8</b>	<b>Appendix</b>	<b>72</b>
<b>8.1</b>	<b>Addresses</b>	<b>72</b>
8.1.1	Address of manufacturer	72
	<i>Customer service</i>	72
8.1.2	Address of the installer	72

## 1 General

Thank you for choosing a quality product from Froeling. 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](mailto:doku@froeling.com).

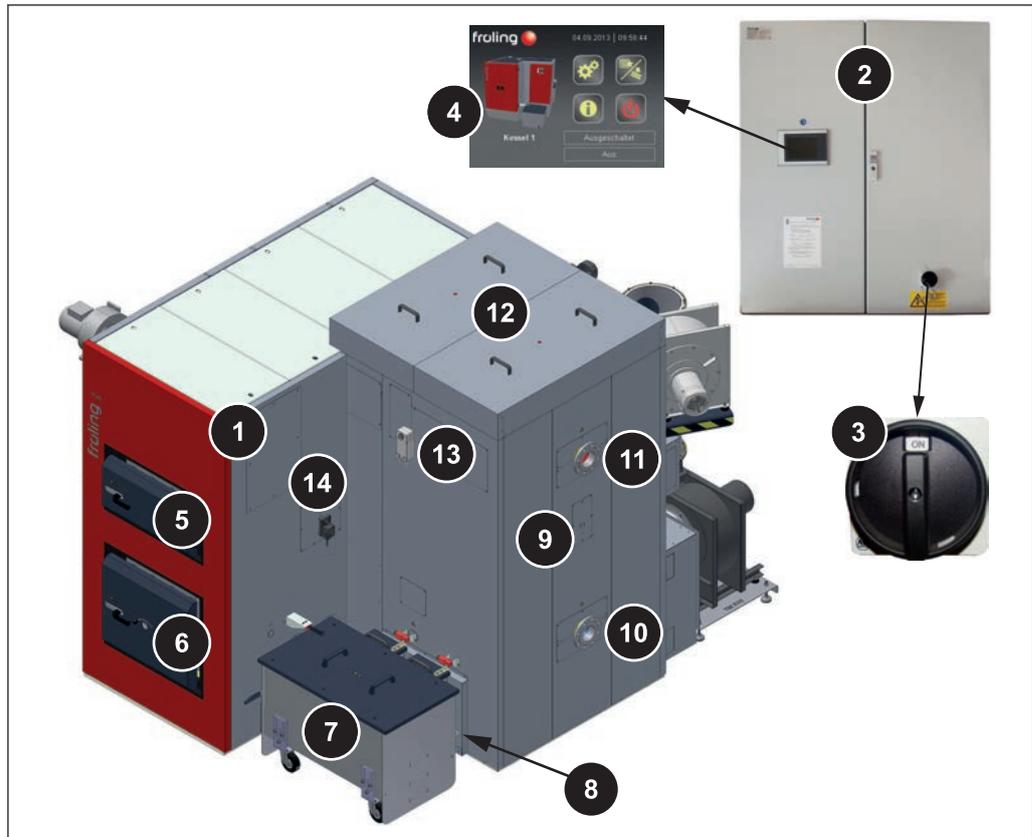
Subject to technical change.

### ***Warranty and Guarantee Conditions***

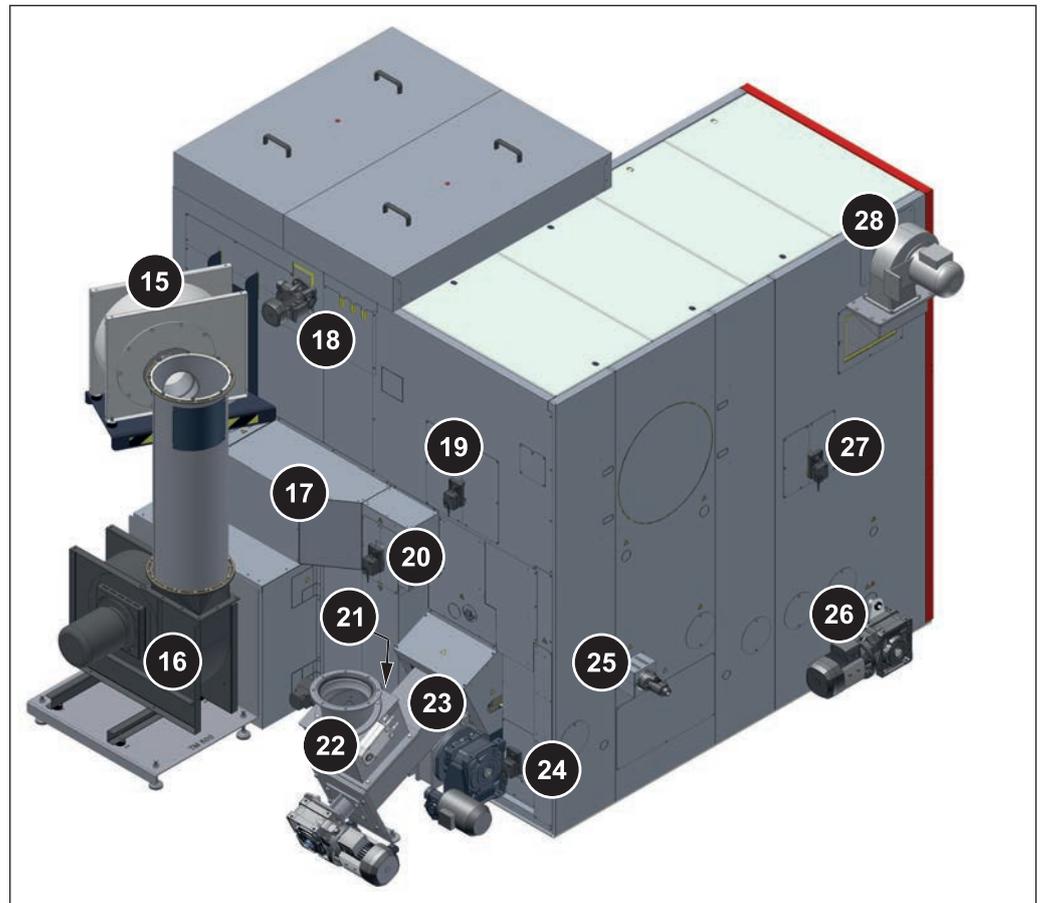
Our sale and delivery conditions will be applicable. These conditions have been made available to customers, and customers have been made aware of them at the time of order completion.

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<br>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.*

#### NOTICE

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

## 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 startup
	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 unit should only be operated when it is in full working order. It must 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 the operating instructions must be observed. Ensure that any faults which might impair safety are rectified immediately.

The manufacturer or supplier is not liable for any damage resulting from non-permitted uses.

Only original spare parts or specific alternative spare parts authorised by the manufacturer may be used. Any kind of change or modification made to the product will invalidate the manufacturer's conformity with the applicable guideline(s). In such cases, the product will need to undergo new hazard evaluation procedures by the operator. The operator will then be fully responsible for the declaration of conformity according to the valid guideline(s) for the product and will need to issue a corresponding declaration for the device. This person will then assume all of the rights and responsibilities of a manufacturer.

### 2.4.1 The Clean Air Act 1993 and Smoke Control Areas

In England appliances are exempted by publication on a list by the Secretary of State in accordance with changes made to sections 20 and 21 of the Clean Air Act 1993 by section 15 of the Deregulation Act 2015. In Scotland appliances are exempted by publication on a list by Scottish Ministers under section 50 of the Regulatory Reform (Scotland) Act 2014. Similarly, In Northern Ireland appliances are exempted by publication on a list by the Department of Agriculture, Environment and Rural Affairs under Section 16 of the Environmental Better regulation Act (Northern Ireland) 2016. In Wales appliances are exempted by regulations made by Welsh Ministers.

Your local authority is responsible for implementing the Clean Air Act 1993 including designation and supervision of smoke control areas and you can contact them for details of Clean Air Act requirements.

### 2.4.2 Permitted fuels

#### *Wood chips*

Criterion	ÖNORM M 7133	EN ISO 17225	Description acc. to ÖNORM M 7133
Water content	<b>W20</b>	<b>M20</b>	air-dried
	<b>W30</b>	<b>M30</b>	suitable for storage
	<b>W35</b>	-	limited suitability for storage
	<b>W40<sup>1)</sup></b>	<b>M40<sup>1)</sup></b>	high-moisture wood chips
	<b>W50<sup>1)</sup></b>	-	freshly-harvested wood chips
Size	<b>G30</b>	<b>P16S</b>	Fine wood chip

Criterion	ÖNORM M 7133	EN ISO 17225	Description acc. to ÖNORM M 7133
	<b>G50</b>	<b>P31S</b> from 400 kW: <b>P45S</b>	Medium-sized wood chip
	<b>G100</b> <sup>2)</sup>	<b>P63</b> <sup>2)</sup>	Coarse wood chips
<small>1. partial load conditions only to a limited extent 2. for hydraulic feeders only</small>			

**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 acc. to EN ISO 17225 - Part 4: Wood chips class A1 / P16S-P45S

Additional for Germany: Fuel class 4 (§3 of the First Federal Emissions Protection Ordinance (BimSchV) in the last amended version)

**Wood pellets**

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

**Note on standards**

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

**General note:**

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

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

**Wood shavings**

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

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

**NOTICE**

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

**Miscanthus**

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

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

### Changing the fuel

#### CAUTION

Incorrect fuel parameter settings:

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

Therefore:

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

### 2.4.3 Non-permitted fuels

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

#### CAUTION

In case of use of non-permitted fuels:

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

For this reason, when operating the boiler:

- Only use permitted fuels

### 2.4.4 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.

### 2.4.5 Protective equipment for operating staff

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

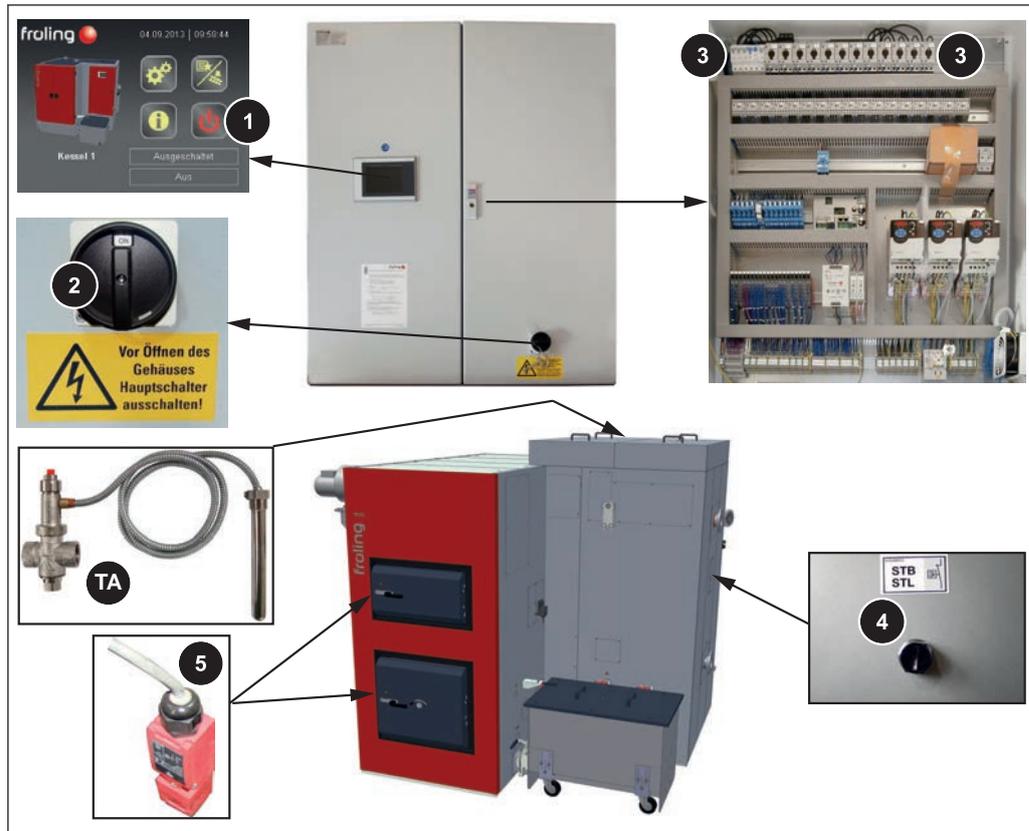


- For inspection and cleaning:
  - suitable workwear
  - protective gloves
  - sturdy shoes



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

## 2.5 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 CONTACT SWITCH

When the door is opened, the induced draught is kept at a constant speed and the combustion air and FGR blower fan stops.

**TV 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.

## 2.5.1 External safety devices

### *Hydraulic chamber safety switch*



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

- Turn the safety switch to the "0" position
  - The boiler follows the shutdown procedure and the discharge 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

### *Guardrail*

When working at a height, appropriate measures must be taken in accordance with the applicable national industrial safety guidelines to protect against the risk of falling (e.g. ladders, platforms, etc.). It is the responsibility of the operator to select and provide these means.

Alternatively, a railing can be fitted to the top of the boiler as per EN ISO 14122.

## 2.6 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 according to procedure ("Switched off OFF" operating status) and allow it to cool down
- Protective gloves must usually be worn for work on the boiler, and it should only be operated using the handles provided
- Insulate the flue gas pipes and do not touch 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

## 2.7 Emergency procedure

### 2.7.1 Overheating of the system

If the system overheats and the safety devices fail to operate, 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 takes on 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 thermostatic valves on the radiator and ensure sufficient heat dissipation from the rooms

**If the temperature does not drop:**

- Contact the installer or Froling customer services
  - ⇒ See "Addresses" [page 72]

### 2.7.2 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

**Recommendation:** Do not install smoke alarms and carbon monoxide detectors near the system.

### 2.7.3 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 Notes for operating a heating system

Carrying out modifications to the system and changing or disabling 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.

### 3.1 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*

EN 12828 - Heating Systems in Buildings

**NOTICE! Each heating system must be officially approved.**

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

**Austria:** report to the construction authorities of the community or magistrate

**Germany:** report new installations to an approved chimney sweep / the building authorities.

### 3.2 General information for installation room (boiler room)

#### Boiler room characteristics

- The floor must be even, clean and dry and have an adequate load-bearing capacity.
- There must not be a potentially explosive atmosphere in the boiler room as the boiler is not suitable for use in potentially explosive environments.
- The boiler room must be frost-free.
- The boiler does not provide any light, so the customer must ensure sufficient lighting in the boiler room in accordance with national workplace design regulations.
- When using the boiler above 2000 metres above sea level you should consult the manufacturer.
- Danger of fire due to flammable materials.  
The floor of the boiler room must not be flammable. No flammable materials should be stored near the boiler. Flammable objects (e.g. clothing) must not be put on the boiler to dry.
- Damage due to impurities in combustion air.  
Do not use any solvents or cleaning agents containing chlorine and hydrogen halides in the room where the boiler is installed (e.g. chlorination units for swimming pools).
- Keep the air suction opening of the boiler free of dust.
- The system must be protected against the chewing or nesting of animals (e.g. rodents etc.).

## Ventilation of the boiler room

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

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

### *Note on standards*

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

## 3.3 Requirements for central heating water

Unless contrary to other national regulations, the latest versions of the following standards and guidelines apply:

Austria:	ÖNORM H 5195	Switzerland	SWKI BT 102-01
Germany:	VDI 2035	:	UNI 8065
		Italy:	

Observe the standards and also follow the recommendations below:

- Aim for a pH value of between 8.2 and 10.0. If the central heating water comes into contact with aluminium, the pH value must be between 8.0 and 8.5
- Use prepared water which complies with the standards cited above for filling and make-up water
- Avoid leaks and use a closed heating system to maintain water quality during operation
- When filling with make-up water, always bleed the filling hose before connecting, in order to prevent air from entering the system

**Advantages of prepared water:**

- Complies with the applicable standards
- Less of a drop in output due to reduced limescale build-up
- Less corrosion due to fewer aggressive substances
- Long-term cost savings thanks to improved energy efficiency

**Permitted water hardness for the fill and make-up water in accordance with VDI 2035:**

Overall heat output	Total hardness at <20 l/kW minimum individual heat output <sup>1)</sup>		Total hardness at >20 ≤50 l/kW minimum individual heat output <sup>1)</sup>		Total hardness at >50 l/kW minimum individual heat output <sup>1)</sup>	
	kW	°dH	mol/m <sup>3</sup>	°dH	mol/m <sup>3</sup>	°dH
≤50	no demand or		11.2	2	0.11	0.02
	<16.8 <sup>2)</sup>	<3 <sup>2)</sup>				
>50 ≤200	11.2	2	8.4	1.5	0.11	0.02
>200 ≤600	8.4	1.5	0.11	0.02		
>600	0.11	0.02				

1. From specific system volume (litres nominal capacity/heat output; for multi-boiler systems use the smallest individual heat output)  
2. In the case of systems with central heating boilers and for systems with electric heating elements

**Additional requirements for Switzerland**

The filling and make-up water must be demineralised (fully purified)

- The water must not contain any ingredients that could settle and accumulate in the system
- This makes the water non-electroconductive, which prevents corrosion
- It also removes all the neutral salts such as chloride, sulphate and nitrate which can weaken corrosive materials in certain conditions

If some of the system water is lost, e.g. during repairs, the make-up water must also be demineralised. It is not enough to soften the water. The heating system must be professionally cleaned and rinsed before filling the units.

**Inspection:**

- After eight weeks, the pH value of the water must be between 8.2 and 10.0. If the central heating water comes into contact with aluminium, the pH value must be between 8.0 and 8.5
- Yearly. Values must be recorded by the owner

### 3.4 Notes for using pressure maintenance systems

Pressure maintenance systems in hot-water heating systems keep the required pressure within predefined limits and balance out volume variations caused by changes in the hot-water temperature. Two main systems are used:

#### *Compressor-controlled pressure maintenance*

In compressor-controlled pressure maintenance units, a variable air cushion in the expansion tank is responsible for volume compensation and pressure maintenance. If the pressure is too low, the compressor pumps air into the tank. If the pressure is too high, air is released by means of a solenoid valve. The systems are built solely with closed-diaphragm expansion tanks to prevent the damaging introduction of oxygen into the heating water.

#### *Pump-controlled pressure maintenance*

A pump-controlled pressure maintenance unit essentially consists of a pressure-maintenance pump, relief valve and an unpressurised receiving tank. The valve releases hot water into the receiving tank if the pressure is too high. If the pressure drops below a preset value, the pump draws water from the receiving tank and feeds it back into the heating system. Pump-controlled pressure maintenance systems with **open expansion tanks** (e.g. without a diaphragm) introduce ambient oxygen via the surface of the water, exposing the connected system components to the risk of corrosion. These systems offer no oxygen removal for the purposes of corrosion control as required by VDI 2035 and **in the interests of corrosion protection should not be used**.

### 3.5 Return lift

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

#### CAUTION

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

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

Take the following precautions:

- Regulations stipulate the use of a return temperature control.
  - The minimum return temperature is 60 °C. We recommend fitting some sort of control device (e.g. thermometer).

### 3.6 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 Froling.

⇒ [See "Addresses" \[page 72\]](#)

### 3.7 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!

## 4 Operating the system

### 4.1 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 Fröling customer services

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

**NOTICE!** See operating instructions for boiler controller!

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

- Electrical installation
- Installation of water pipes
- Connect flue gas including all insulation work
- Work must comply with local fire protection regulations
  
- The operator must ensure 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 m<sup>3</sup> 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.

## 4.2 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

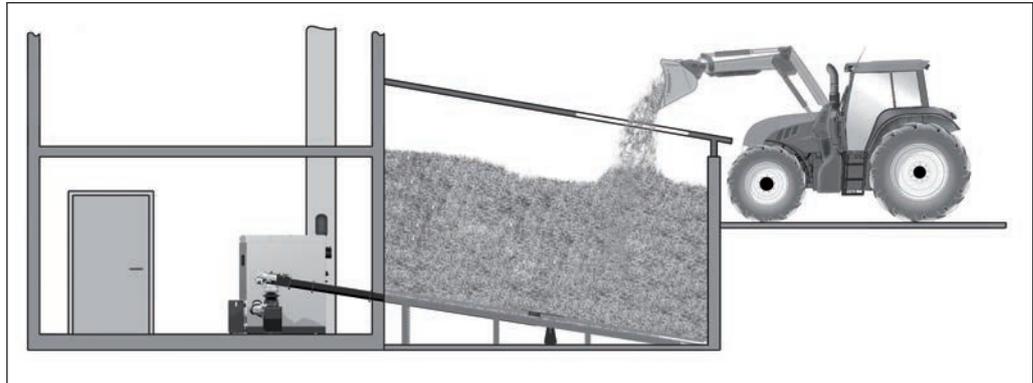
Blowing in fuel when the boiler is switched on:

*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.

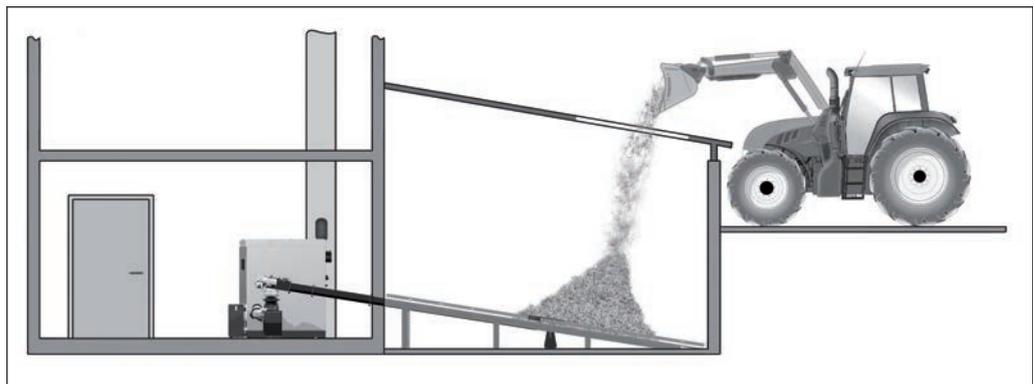
#### 4.2.1 Loading of fuel for a partially emptied store with rotary agitator



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

#### 4.2.2 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 m<sup>3</sup>) 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 m<sup>3</sup>)
  - 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)*

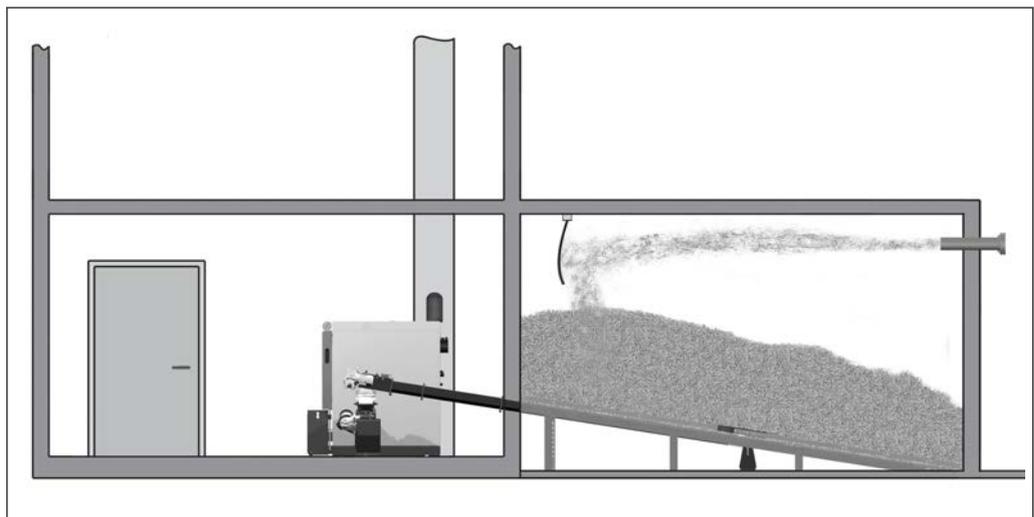
In the case of rotary agitators with a separate drive system, the head of the rotary agitator can be operated separately from the discharge screw.

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



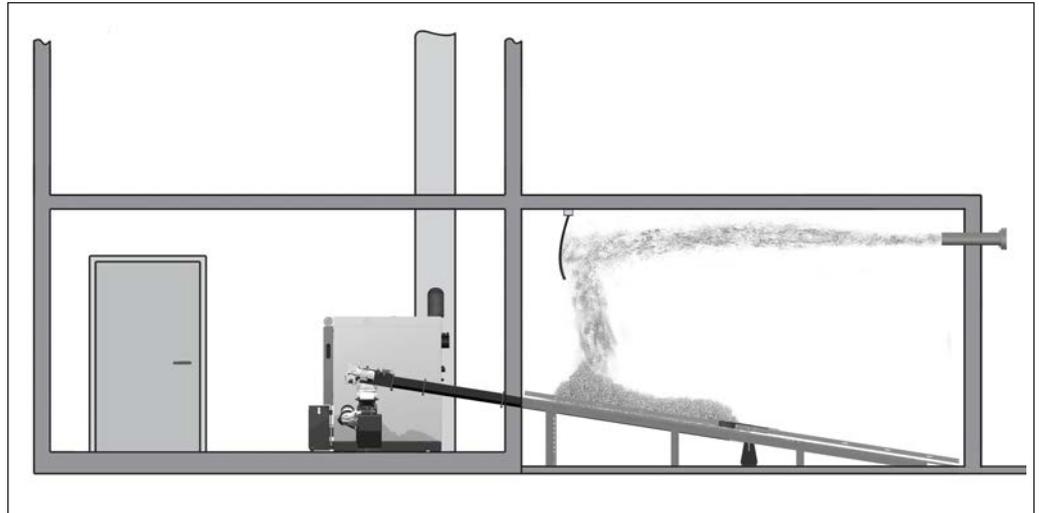
### 4.2.3 Blowing in fuel for a partially emptied store with rotary agitator



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

#### 4.2.4 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 m<sup>3</sup>) 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 m<sup>3</sup>)
  - 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



### **4.2.5 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

#### 4.2.6 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

#### 4.2.7 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.

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

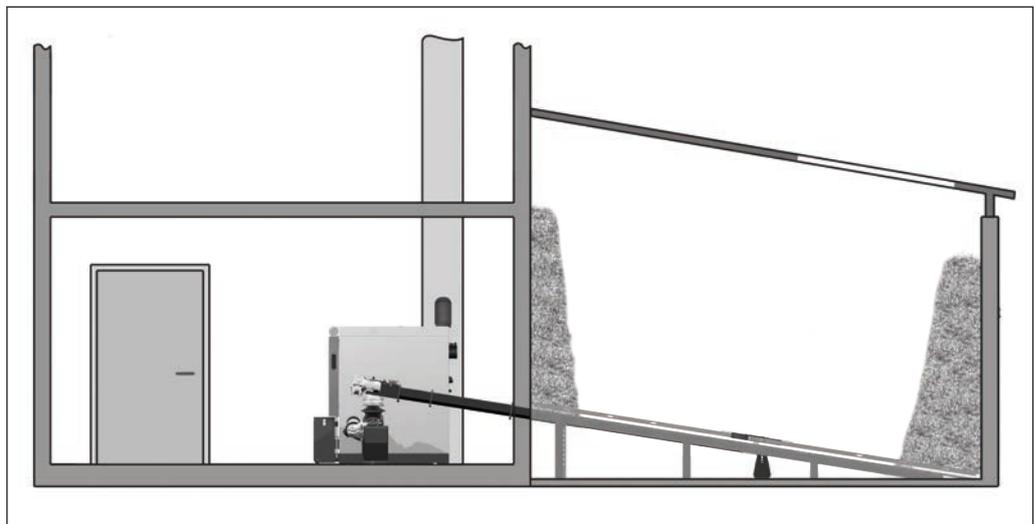
The inclined screw must always be moved into an upright position in order to fill the store.

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.

#### 4.2.9 Drainage of fuel store

When the fuel store is emptied, a certain amount of fuel remains and is not removed by the rotary agitator. This is not a malfunction but occurs due to the nature of the system. This effect is amplified when the wood chips are compressed.



Tips for better emptying:

- Use suitable wood chips in terms of moisture content, size etc.
- Reduce the dumping height onto the rotary agitator
- Avoid compressing the wood chips, e.g. by carefully adding to the fuel store
- Design the walls in the bunker so they are as smooth as possible

## 4.3 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.*

### NOTICE

It is not permitted to manually feed fuel into the boiler!!

### 4.3.1 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

### 4.3.2 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 of the boiler controller

### 4.3.3 Regulating the boiler

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

### 4.3.4 Switching off the boiler



- Switch off the boiler 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

### 4.3.5 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!**

## 5 Servicing the System

### 5.1 General information on servicing



#### DANGER

When working on electrical components:

*Risk of electrocution!*

When work is carried out on electrical components:

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



#### DANGER

**Risk of falling when working at a height**

Therefore:

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



#### 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**

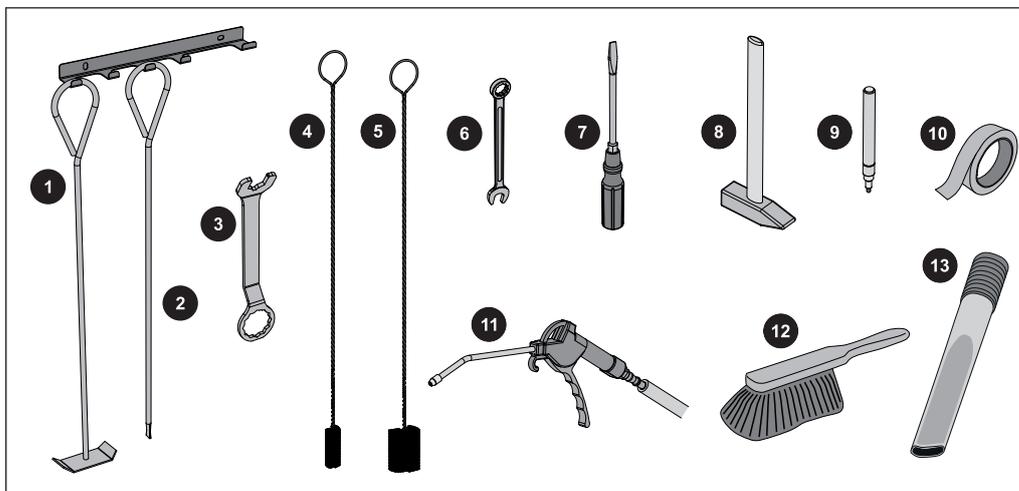
We recommend that you keep a maintenance book in accordance with ÖNORM M7510 of the Technical Directive for Fire Prevention (TRVB)

**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.*

### 5.2 Required tools

The following tools are required for carrying out cleaning and maintenance work:



**Included in delivery:**

1	Flat scraper
2	Stoking rod
3	Key for Lambda probe / door mountings
4	Cleaning brush (Ø54)
5	Cleaning brush (Ø83)

**Not included:**

6	Spanner or box wrench AF 13
7	Screwdriver set (Philips, flat head, Torx T20, T25, T30)
8	Hammer
9	Marker for metal
10	Sticky tape
11	Air gun and compressed air supply
12	Small brush or cleaning brush
13	Ash vacuum

## 5.3 Maintenance work by the operator

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

### 5.3.1 Inspection

#### *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

#### *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

#### *Checking the safety valve*

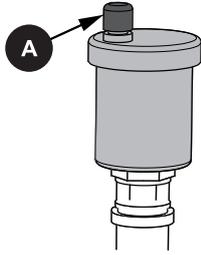


- Check the seal of the safety valve regularly and ensure that the valve is not dirty
- NOTICE! Inspection work must be carried out in accordance with the manufacturer's instructions.**

#### *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**

### *Checking the quick vent valve*



- Regularly check all the quick vent valves on the entire heating system for leaks
  - ➔ If any liquid is leaking, replace the quick vent valves

**NOTICE!** The vent cap (A) must be loose (screw on approx. two revolutions) to ensure correct functioning.

### *Checking the draught controller flap*

- Check that the draught controller flap moves freely

### *General weekly inspection*

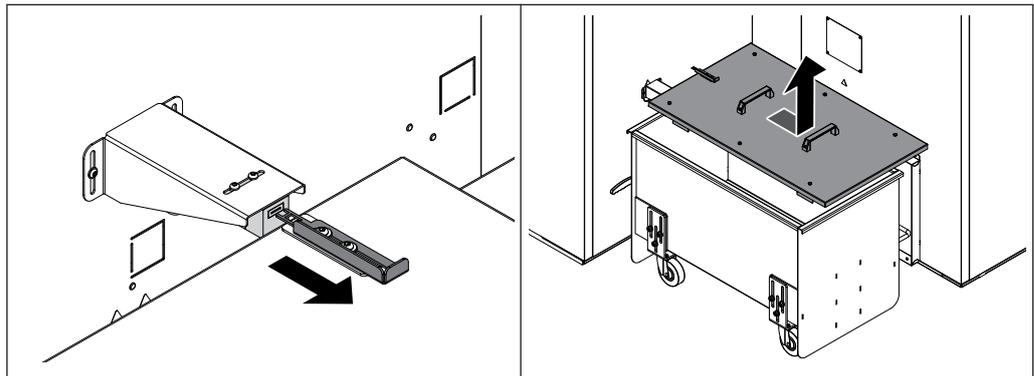
- Check all components of the boiler for cleanliness and clean if necessary
- Carry out acoustic testing and functional checks of all components
- Immediately change or have someone exchange defective components

## 5.3.2 Cleaning

### *Emptying the combustion chamber ash container*

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

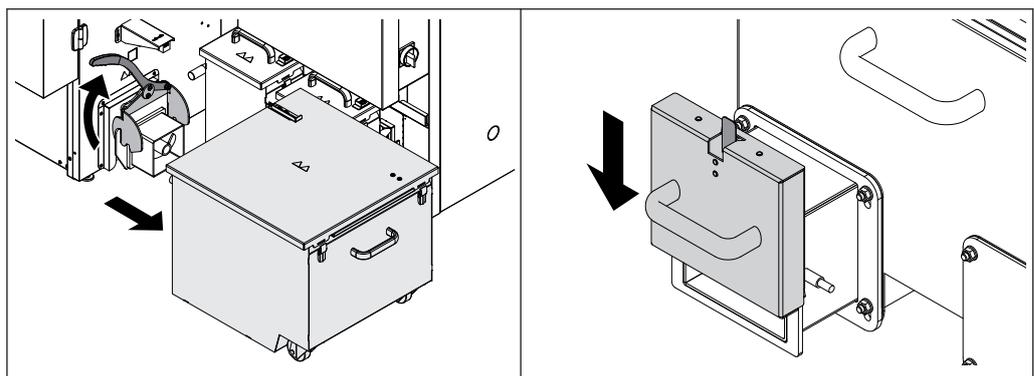
- The ash container cover must be closed again within 15 seconds
- Caution: if the cover remains open for more than 15 seconds, the boiler switches off automatically.



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

If the container needs emptying, proceed as follows:

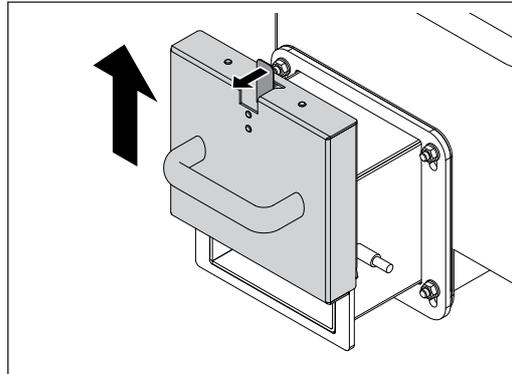
- switch off the boiler by tapping “Boiler off” at the mode icon



- 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

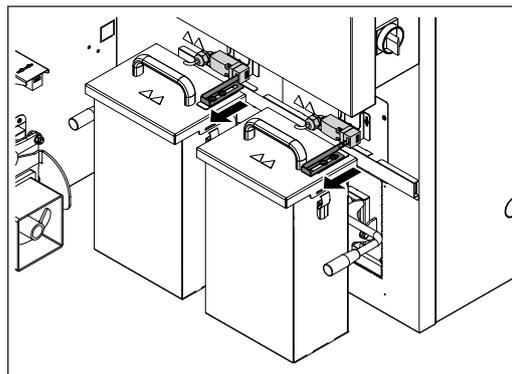
- Check the fill level of the ash container in the heat exchanger and empty if required, ⇒ See "Emptying the ash container in the heat exchanger" [page 43]

Replace the ash container:



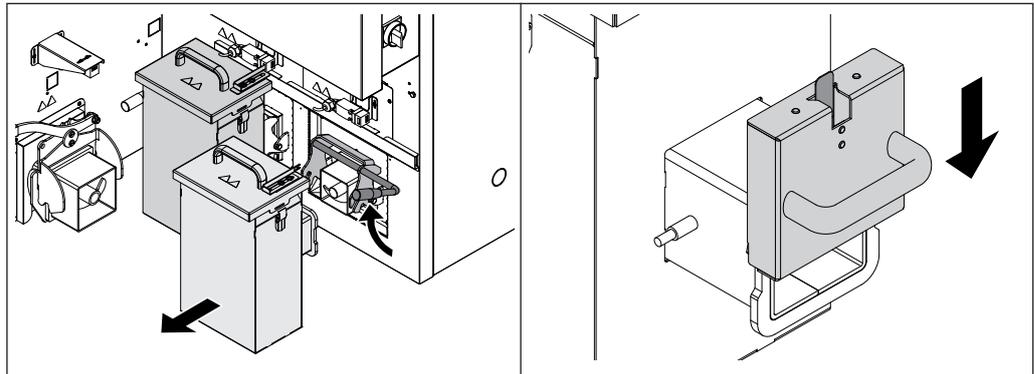
- Remove the coupling cap
  - Slide the upper flap forwards
  - To replace the ash container, follow the steps in the reverse order

### *Emptying the ash container in the heat exchanger*



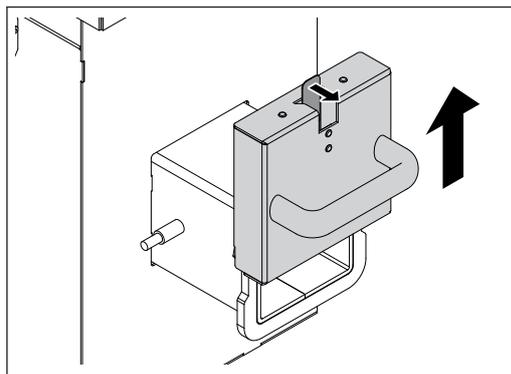
- Remove the key plate from the safety switch
- Open the side fasteners on the ash container
- Remove the ash container cover and check the fill level
- Replace the cover and close the side fasteners
  - If the container does not need emptying, slide the key plate back into the safety switch

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

Replace the ash container:



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

## Cleaning the combustion and burning chamber

### WARNING



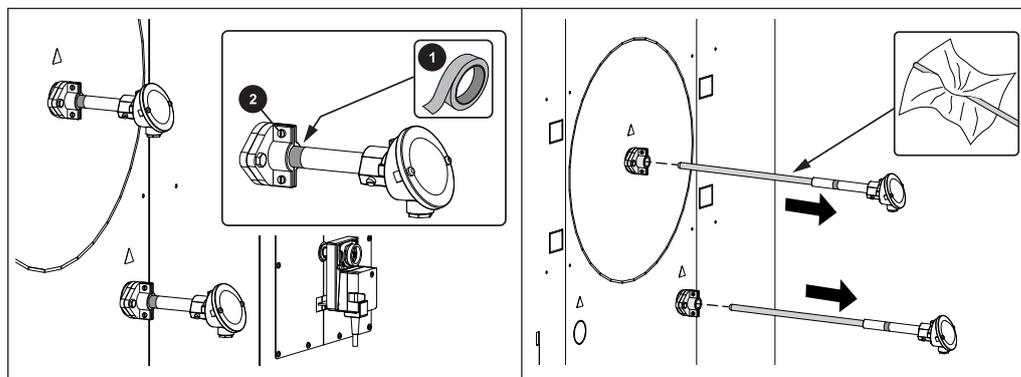
Inspection and cleaning work on a system which is operational:

*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:

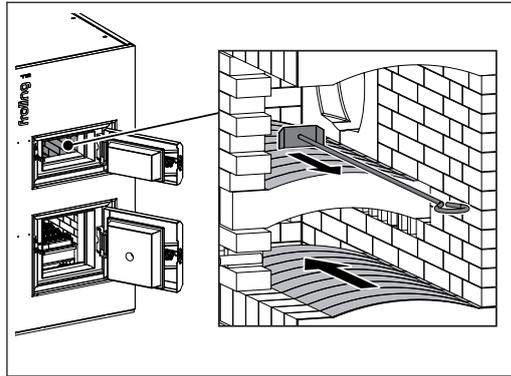
- always wear protective gloves
- only operate the boiler using the handles provided
- switch off the boiler by tapping “Boiler off” at the mode icon
  - The boiler follows the shutdown procedure and switches to “Switched off Off” status
- switch off the main switch and take precautions to prevent accidental 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 burning chamber temperature sensor, it should be removed before starting work in the combustion chamber



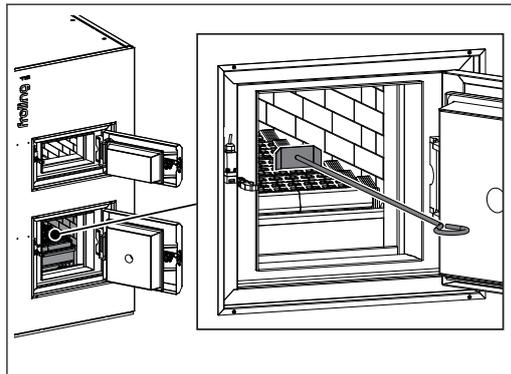
- Note the position of the burning chamber temperature sensor
  - Use sticky tape (1) for example
- Loosen the screws on the bracket (2)
- Carefully remove the burning chamber temperature sensor
  - if necessary, clean carefully
- When all tasks in the burning chamber have been completed, replace the burning chamber temperature sensor
  - Note the marking (e.g. sticky tape)

### Cleaning the burning chamber

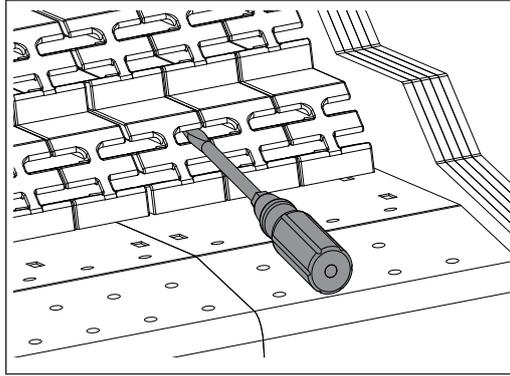


- Open the combustion chamber door
- Pull the ash deposits on the upper side of middle vault towards you using a flat scraper
- Using a flat scraper, carefully push the ash on the upper side of the lower vault towards the rear
  - The ash will fall down into the burning chamber

### Cleaning the combustion chamber

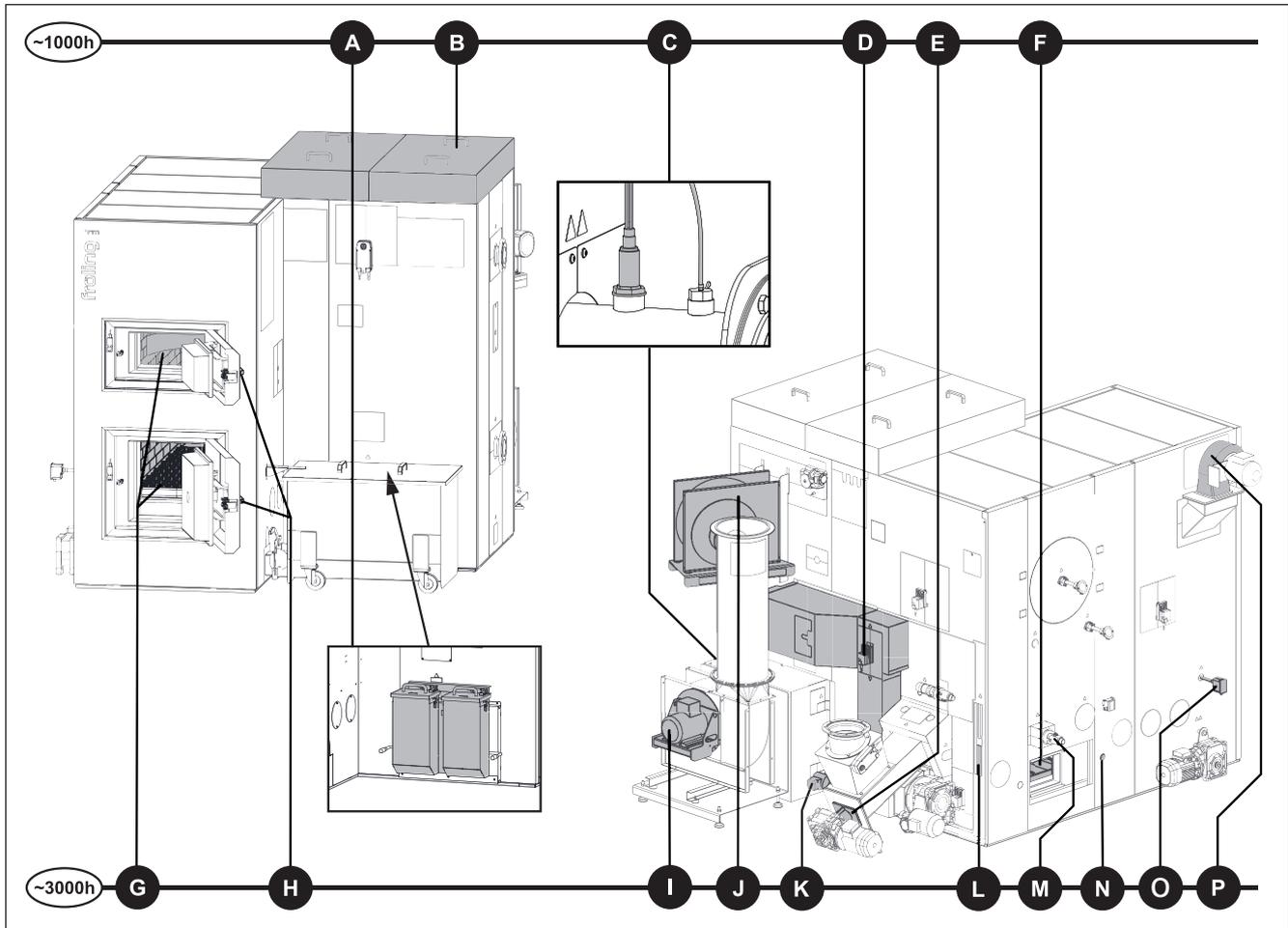


- Open the burning chamber door
- Remove unburned material and foreign bodies from the burning chamber
- Using a flat scraper, move the ash on the combustion chamber grate towards the ash shaft



- 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
    - Ash that gathers is moved into the ash container
  - Empty the ash container whenever necessary
- ⇒ See "Emptying the combustion chamber ash container" [page 42]

## 5.3.3 Periodic inspection and cleaning



### approx. 1000h:

- A** ⇒ See "Cleaning the ash from the heat exchanger" [page 50]
- B** ⇒ See "Cleaning the heat exchanger" [page 51]
- C** ⇒ See "Cleaning the Lambda probe" [page 63],  
⇒ See "Cleaning the flue gas temperature sensor" [page 51]
- D** ⇒ See "Cleaning the flue gas recirculation (FGR) duct" [page 52]
- E** ⇒ See "Lubricate the stoker bearings" [page 54]
- F** ⇒ See "Cleaning the area under the moving grate" [page 54]

### approx. 3000h:

- G** ⇒ See "Cleaning the fireclay elements" [page 56]
- H** ⇒ See "Setting and checking the seal on the doors" [page 57]
- I** ⇒ See "Cleaning the induced draught fan" [page 58]
- J** ⇒ See "Cleaning the FGR blower fan" [page 58]
- K** ⇒ See "Checking the heat exchanger ash removal drive" [page 59]
- L** ⇒ See "Cleaning the secondary air duct" [page 60]
- M** ⇒ See "Check the igniter tube" [page 59]
- N** ⇒ See "Checking the underpressure controller" [page 60]
- O** ⇒ See "Checking the combustion chamber overpressure sensor" [page 61]
- P** ⇒ See "Cleaning the combustion air blower fan" [page 61]

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

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

Inspection and cleaning must be repeated after not more than 1000 operating hours (approx. quarterly with average operation). For less efficient fuels (e.g. high ash content) this work needs to be carried out more frequently.

### WARNING



Inspection and cleaning work on a system which is operational:

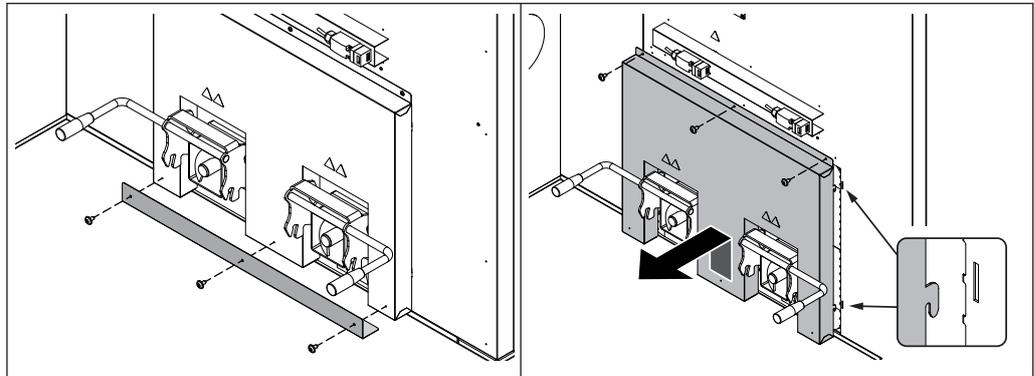
*Risk of serious injuries from automatic startup of the system and severe burns from hot parts and the flue gas pipe!*

When working on the system:

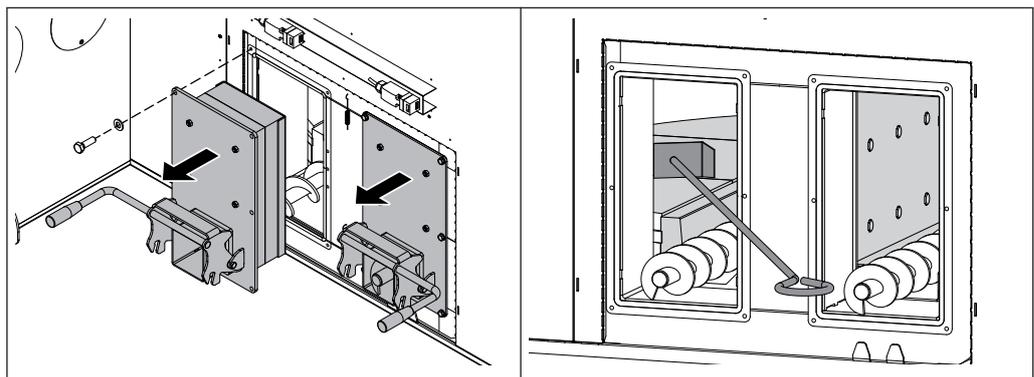
- always wear protective gloves
- only operate the boiler using the handles provided
- switch off the boiler by tapping “Boiler off” at the mode icon
  - The boiler follows the shutdown procedure and switches to “Switched off Off” status
- switch off the main switch and take precautions to prevent accidental 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

## Cleaning the ash from the heat exchanger

- Remove the two ash containers from the heat exchanger and empty where necessary
- ⇒ See "Emptying the ash container in the heat exchanger" [page 43]

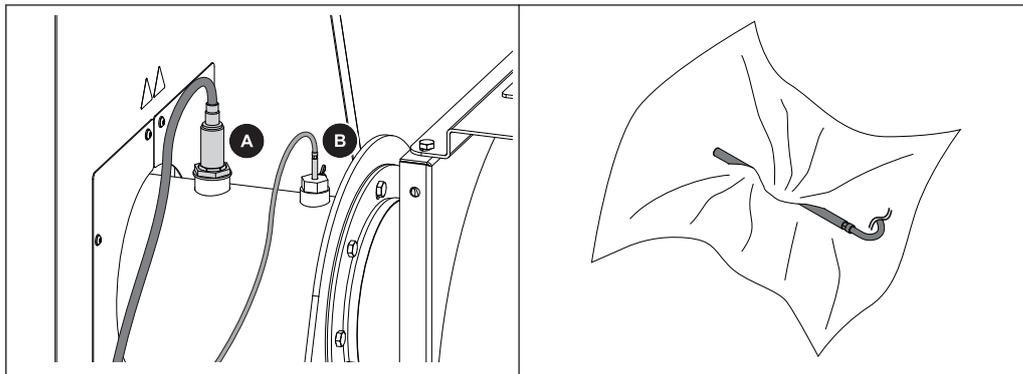


- Remove the lower bracket from the insulation
- Loosen the screws at the top of the insulation and remove it



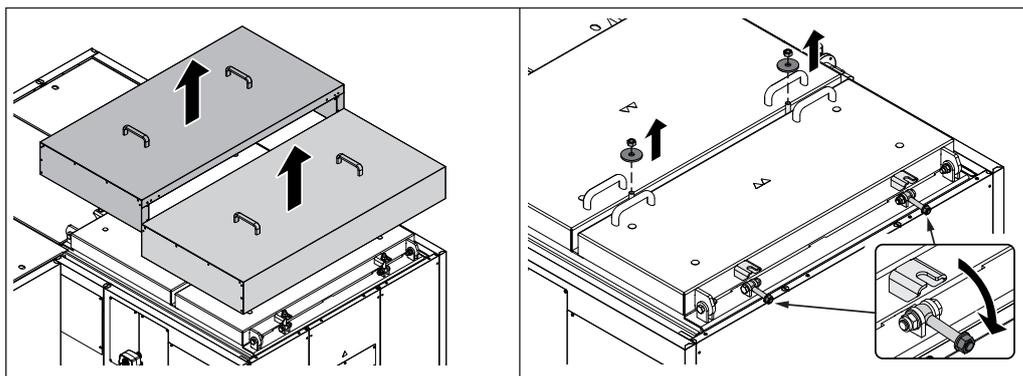
- Remove the two ash removal flanges
- Remove dirt and deposits from the sloping plate and from the ash screws.
  - Always ensure there is a slight ash cover on the screws to protect them against the high temperatures to which they are exposed.
- Check the ash removal seal and replace if necessary
-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

## Cleaning the flue gas temperature sensor

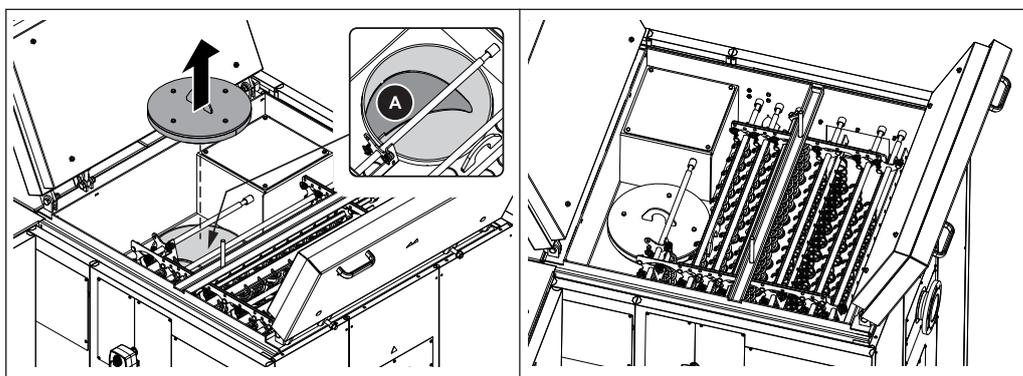


- Loosen the retaining screw and pull out the flue gas temperature sensor (B)
- Wipe the flue gas temperature sensor with a clean cloth
- Insert the flue gas temperature sensor back into the flue gas pipe and finger-tighten the retaining screw

## Cleaning the heat exchanger



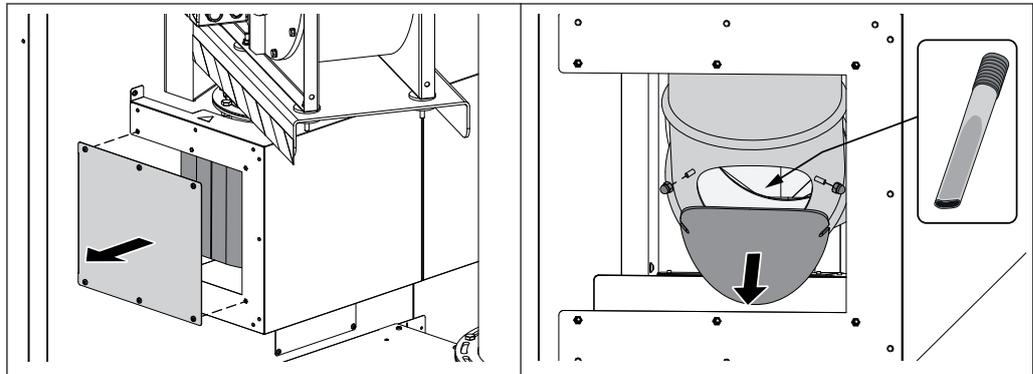
- Remove both insulating covers from the heat exchanger
- Loosen the six screws on the heat exchanger covers and open the covers



- Open both heat exchanger covers
- Remove the cover from the combustion pipe
- Clean the cover, the pipe and the burn-out opening between the burning 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.

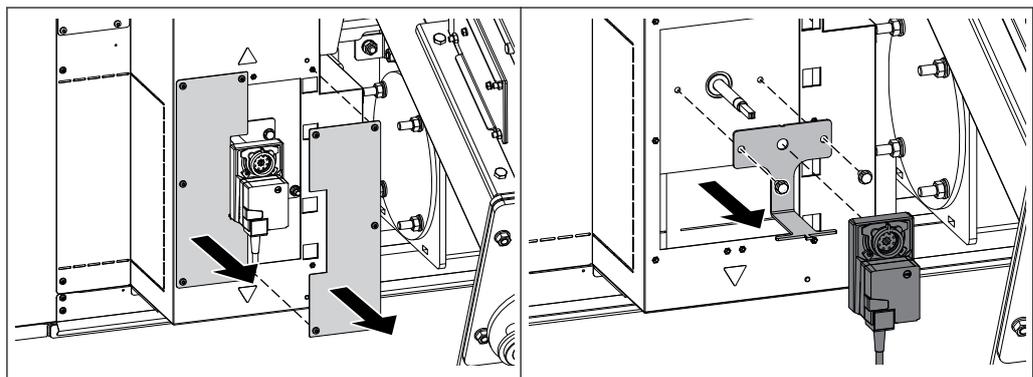
### *Cleaning the flue gas recirculation (FGR) duct*



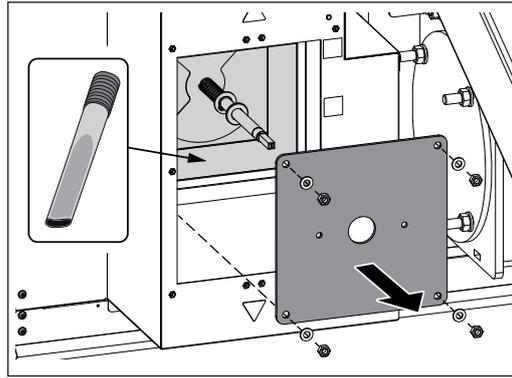
- Remove the side cover plate from the FGR duct below the FGR blower fan
- Push the thermal insulation (behind the cover plate) to the side
- Remove the cleaning cover from the FGR duct
- Check the FGR duct and clean if necessary
  - Tip: use an ash vacuum!

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 top cleaning opening first.

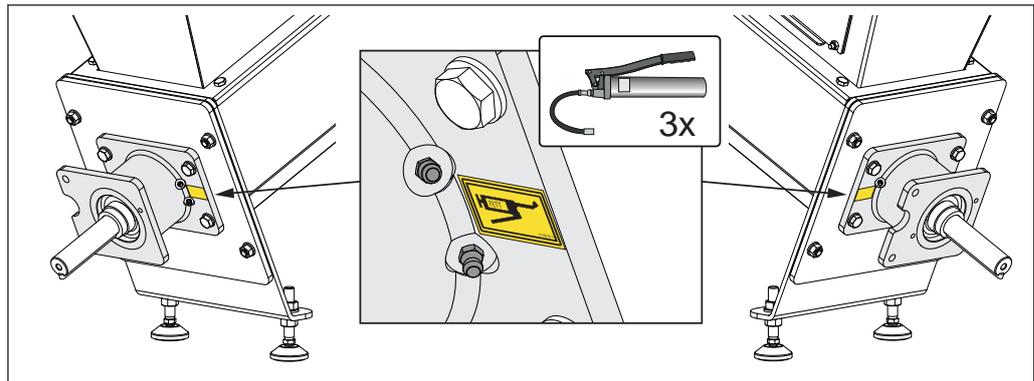


- Remove the back cover plate from the FGR duct
- Push the thermal insulation to the side and remove the servo-motor
- Remove the torque support



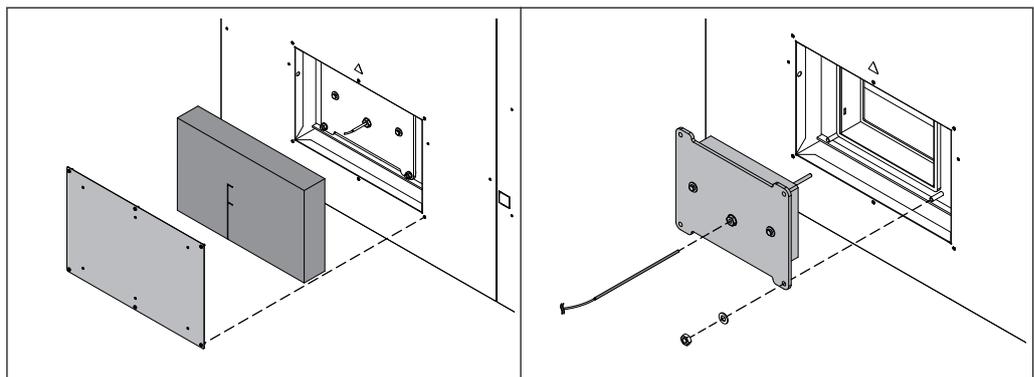
- Remove the cleaning cover
- Check the FGR duct and clean if necessary
  - ↳ Tip: use an ash vacuum!

## Lubricate the stoker bearings

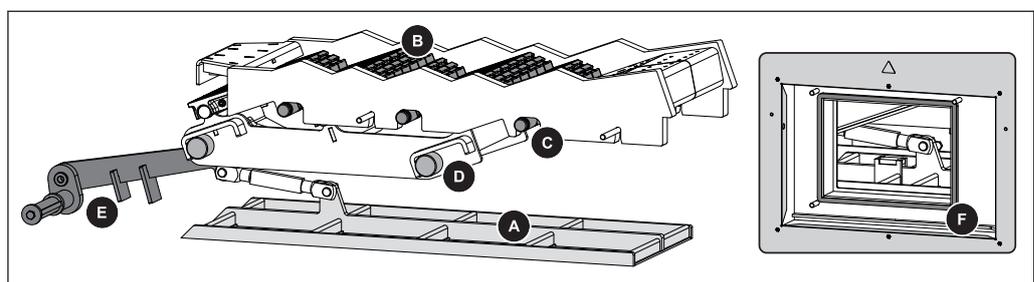


- Lubricate stoker bearings with three grease gun strokes per grease nipple
  - **IMPORTANT!** Carry out the lubrication process slowly to avoid damage to the bearing seals

## Cleaning the area under the moving grate



- Remove the cover plate and thermal insulation from the side
- Loosen the screws on the sensor and take out the sensor
- Loosen the nuts on the cleaning cover



- Check the area under the moving grate and ash rake (A) for deposits. Clean where necessary
- Check the grate (B), grate shafts (C) and grate bearings (D) for wear and deformation
  - Replace components wherever necessary
- Check the grate drive and crank mechanism (E) for wear and ease of movement
- Check the seal on the cleaning cover, check seal (F)

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

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

Inspection and cleaning must be repeated after not more than 3000 operating hours (approx. once a year with average operation). For less efficient fuels (e.g. high ash content) this work needs to be carried out more frequently.

### WARNING



Inspection and cleaning work on a system which is operational:

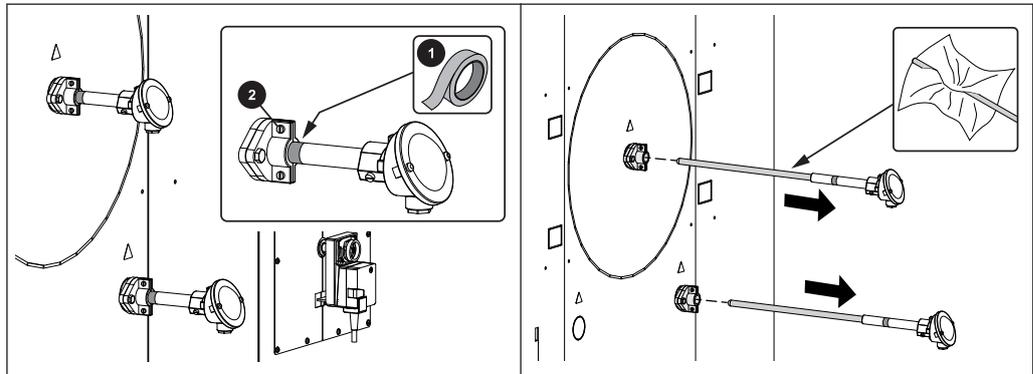
*Risk of serious injuries from automatic startup of the system and severe burns from hot parts and the flue gas pipe!*

When working on the system:

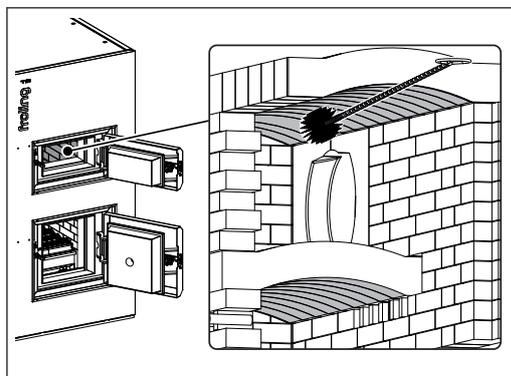
- always wear protective gloves
- only operate the boiler using the handles provided
- switch off the boiler by tapping “Boiler off” at the mode icon
  - The boiler follows the shutdown procedure and switches to “Switched off Off” status
- switch off the main switch and take precautions to prevent accidental 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

## Cleaning the fireclay elements

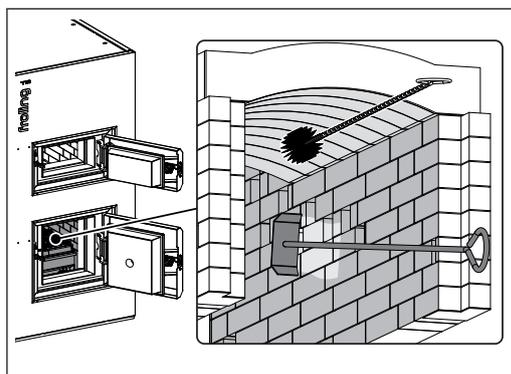
**NOTICE!** In order to avoid damage to the burning chamber temperature sensor, it should be removed before starting work in the combustion chamber



- Note the position of the burning chamber temperature sensor
  - Use sticky tape (1) for example
- Loosen the screws on the bracket (2)
- Carefully remove the burning chamber temperature sensor
  - if necessary, clean carefully
- When all tasks in the burning chamber have been completed, replace the burning chamber temperature sensor
  - Note the marking (e.g. sticky tape)



- 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 burning chamber door

- Carefully clean the lower side of the lower vault with the cleaning brush
  - Carefully clean the side walls of the burning 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 42]

### ***Setting and checking the seal on the doors***

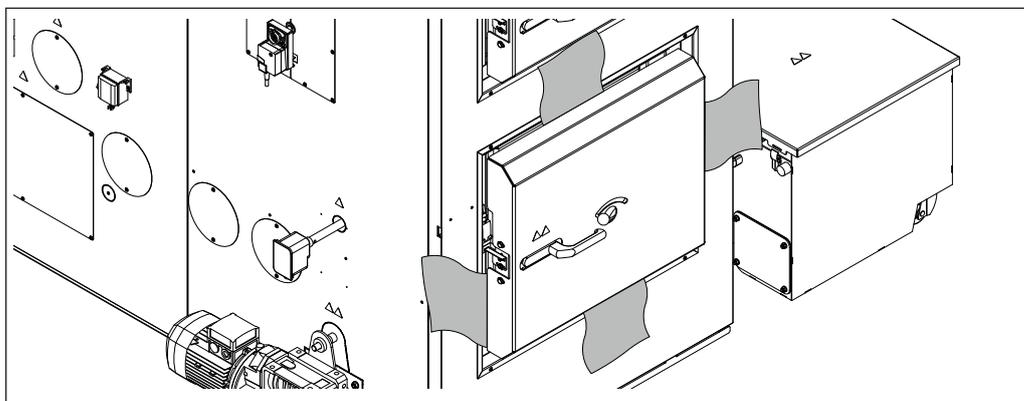
The example below of the burning chamber door shows how to check the position and seal. The procedure is the same for checking the seal on the combustion chamber door.

**NOTICE! Replace the seals immediately 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 58]

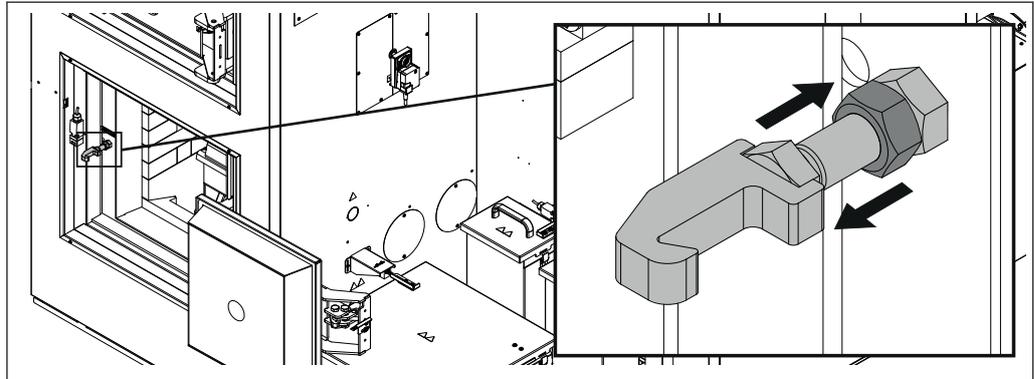
#### **Checking the seal**



- 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 door is sealed.
    - If the paper can be removed: the door is not sealed properly - tighten the locking hook!
- ⇒ See "Adjusting the doors" [page 58]

## 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 combustion chamber door.



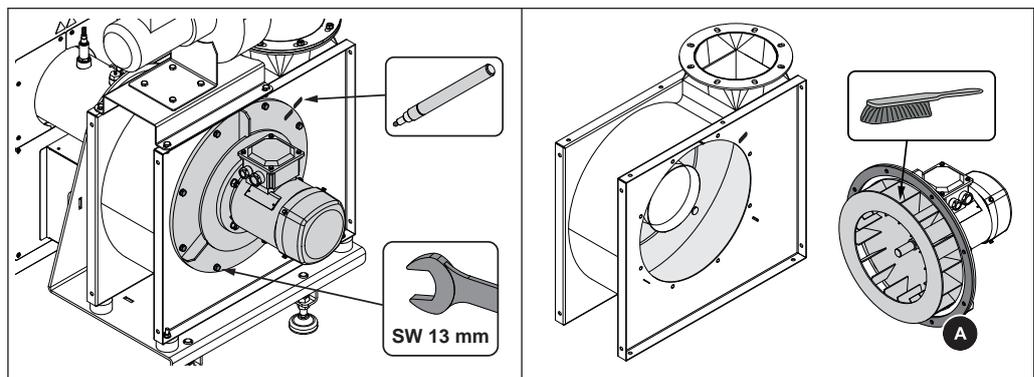
- Loosen the nut on the locking hook
- Tighten or loosen the locking hook as required
- Fix in place using lock-nuts

## Cleaning the FGR blower fan

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 58]

## Cleaning the induced draught fan

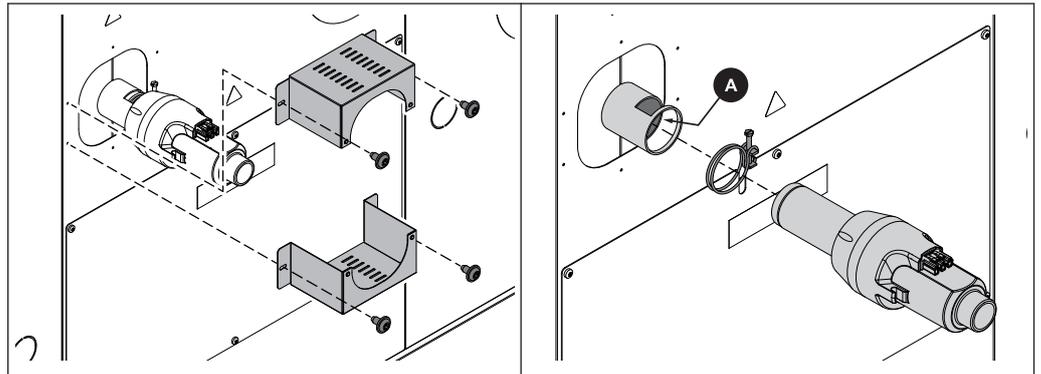


- Mark the position of the flange
- Loosen the screws on the flange
- Take out the blower fan and clean the blower wheel with a brush
- Check the seal (A) and replace if necessary
- Replace the blower fan
  - ↳ Note the marking on the flange!

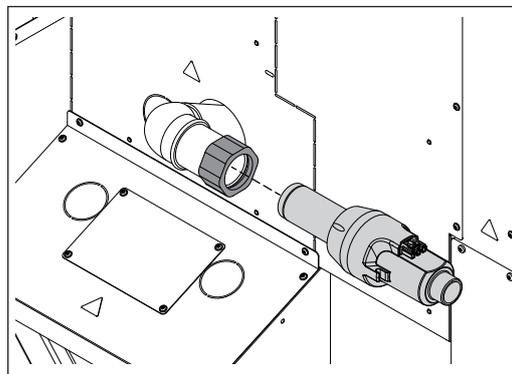
## Checking the heat exchanger ash removal drive

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

## Check the igniter tube

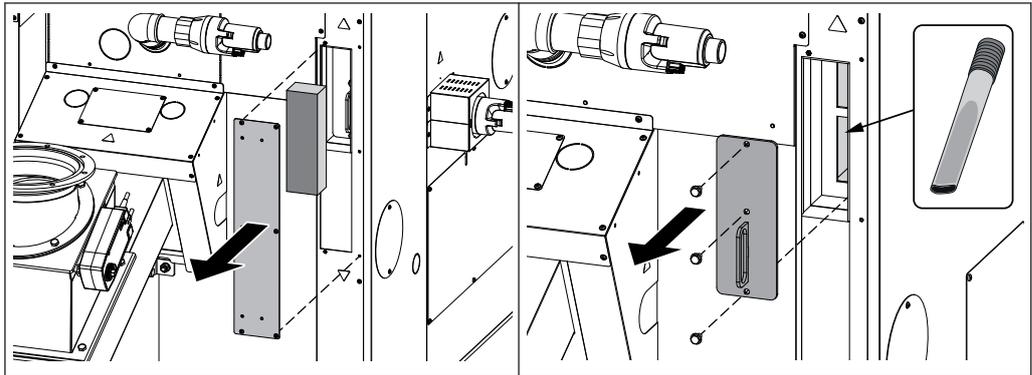


- Remove the protective plates on side ignition
- Loosen the double wire hose clip and pull the ignition out of the igniter tube
- Check the igniter tube (A) for dirt and deposits and clean if necessary



- Loosen the cap on the ignition above the fuel feed-in
- Pull the ignition out of the igniter tube
- Check the igniter tube for dirt and deposits and clean if necessary

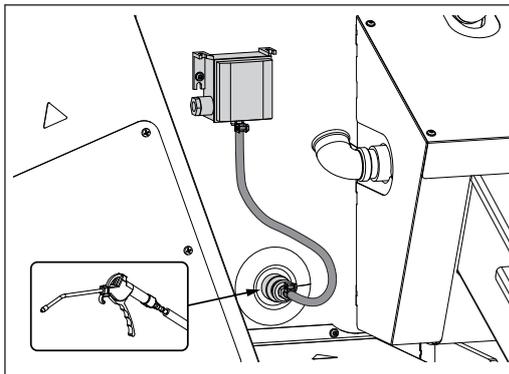
### *Cleaning the secondary air duct*



- Loosen the screws and remove the cover plate to the secondary air duct
- Remove the thermal insulation
- Loosen the screws on the cleaning cover and remove the cleaning cover
- Check the secondary air duct and clean if necessary
  - Tip: Use an ash vacuum!

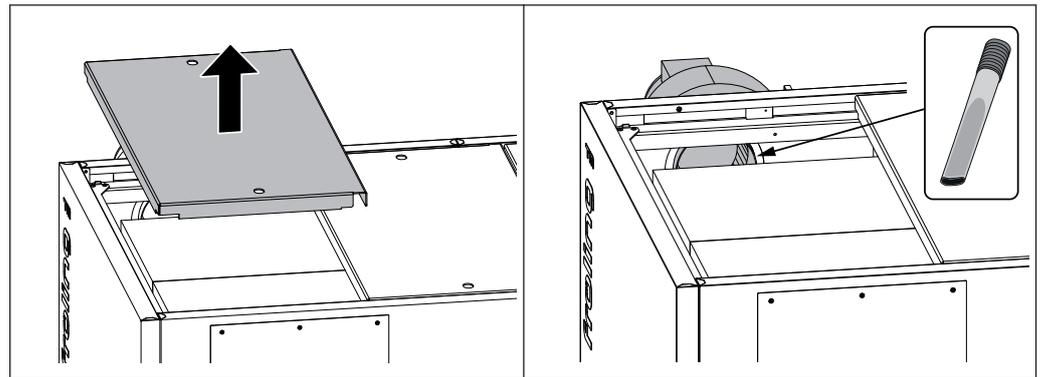
### *Checking the underpressure controller*

(Item L Periodic inspection and cleaning)



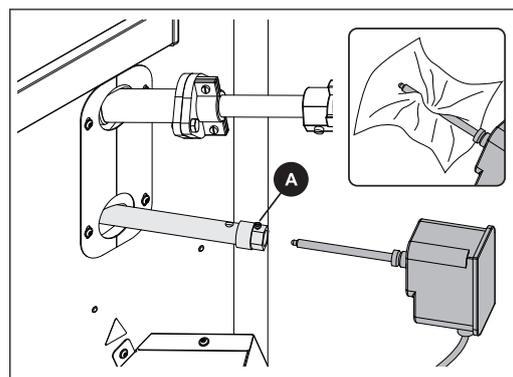
- Disconnecting the silicone hose from the differential pressure transducer
- Using compressed air, blow out the hose in the direction of the burning chamber to remove any deposits
- Connect the silicone hose to "Minus"

## *Cleaning the combustion air blower fan*



- 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

## *Checking the combustion chamber overpressure sensor*



- Loosen fixing screw (A) and pull the burning chamber overpressure monitor out of the spacer tube
- Clean the sensor with a fine cloth
- Check that the spacer tube is clear
- Insert the burning chamber overpressure monitor and secure loosely with fixing screws

***Lubricating the bearings***

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

***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!

**5.4 Maintenance work by technicians**** CAUTION**

**If maintenance work is carried out by untrained personnel:**

***Risk of personal injury and damage to property!***

The following applies for maintenance:

- Observe the instructions and information in the manuals
- Only allow appropriately qualified personnel to work on the system

Only qualified staff are permitted to carry out maintenance work in this chapter:

- Heating technicians / building technicians
- Electrical installation technicians
- Froling customer services

The maintenance staff must have read and understood the instructions in the documentation.

**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.

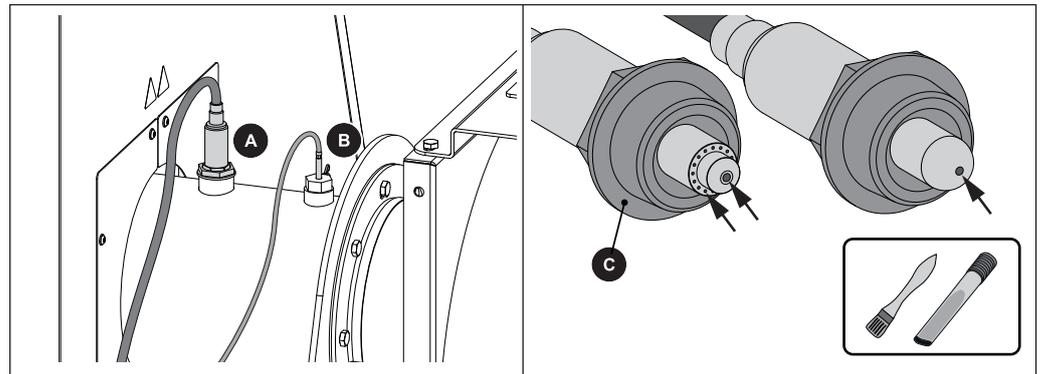
In the course of this maintenance the entire system is inspected and optimised, particularly regulation and control of the boiler. The emission measurement carried out can also be used to draw conclusions about the combustion performance of the boiler. For this reason, FROLING offers a service agreement, 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).**

## 5.4.1 Cleaning the Lambda probe



- ❑ Unscrew the Lambda probe (A)
  - CAUTION: Lambda 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 Lambda probe
- ❑ Screw the Lambda probe back on again by hand
  - IMPORTANT: The seal surface of the bushing (C) must lie flat on the sleeve after assembly

## 5.5 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), remove the hydraulic cylinder hose fitted to the fixed piping side.
- 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

**NOTICE! Dispose of hydraulic oil in accordance with local regulations!**

## 5.6 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.

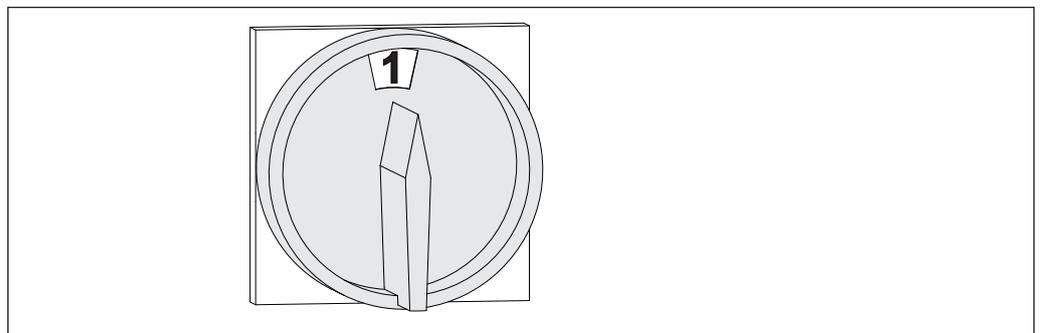
The following minimum requirements must be met by the operator of the system for a successful measurement:

- Ensure there is adequate fuel
  - Only use fuels of high quality which meet the requirements as stipulated in the boiler operating instructions (“Permitted fuels” chapter)
- Ensure that there is adequate heat consumption on the day of the measurement (e.g. storage tank must be able to take heat for the duration of the measurement)
- There must be a suitable measuring port in the straight flue gas pipe for the measurement. The measuring port must be twice the flue gas pipe diameter away from the last upstream bend.
  - If the measuring port is not correctly positioned, the measuring result will be distorted

### 5.6.1 Switch on the system

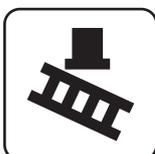
When the cleaning is complete:

- Reassemble all dismantled components in reverse order and check for tightness and correct installation



- Turn on the main switch
  - When the control has completed the system start, the boiler is ready for operation
- 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

### 5.6.2 Start emissions measurement



- Activate the “Chimney-sweep mode” icon
- Select the desired time from the menu:

immediately	<input type="checkbox"/> Specify the type of measurement (nominal load / partial load) <ul style="list-style-type: none"> <li>↳ The flue gas temperature and residual oxygen content should have stabilised approximately 20 minutes after activation</li> <li>↳ The display will indicate that the boiler is ready for measurement as soon as all the conditions for the measurement are fulfilled</li> </ul>
-------------	--

## 5.7 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

## 5.8 Disposal information

### 5.8.1 Disposal of the ash

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

### 5.8.2 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.

## 6 Troubleshooting

### 6.1 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

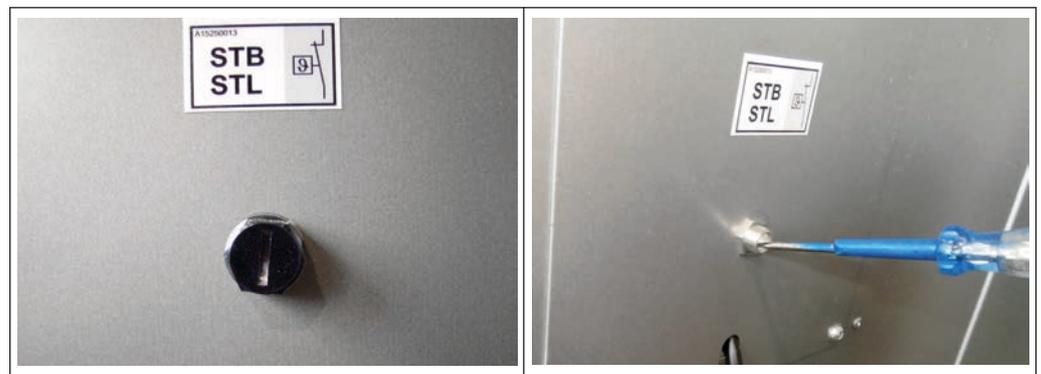
#### 6.1.1 Behaviour of system after a power failure

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.

### 6.2 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.

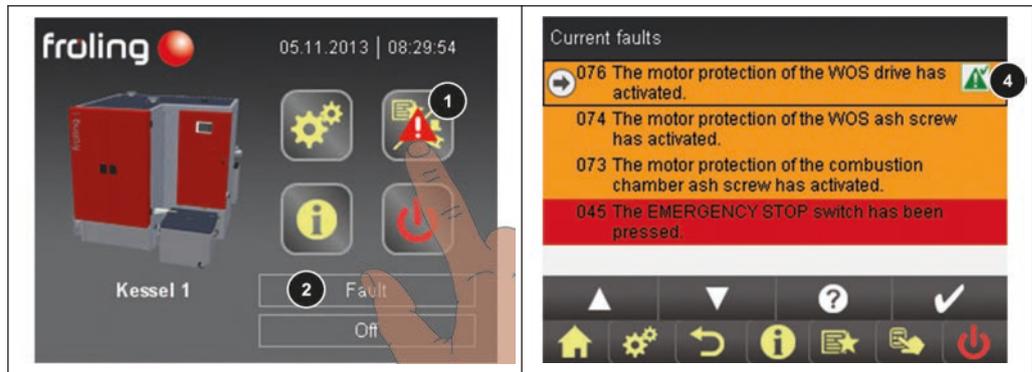


Once the temperature falls below approx. 75°C, the STL can be unlocked mechanically:

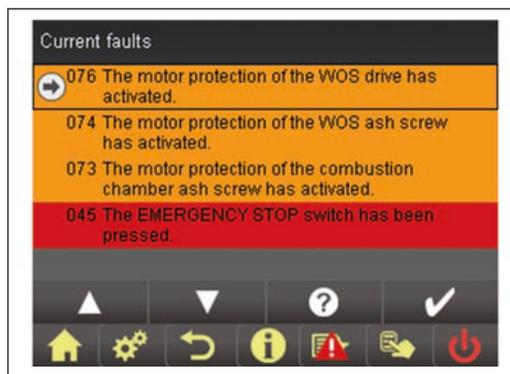
- Unscrew the cap on the STL (high-limit thermostat)
- Unlock the STL by pressing with a screwdriver

## 6.3 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:



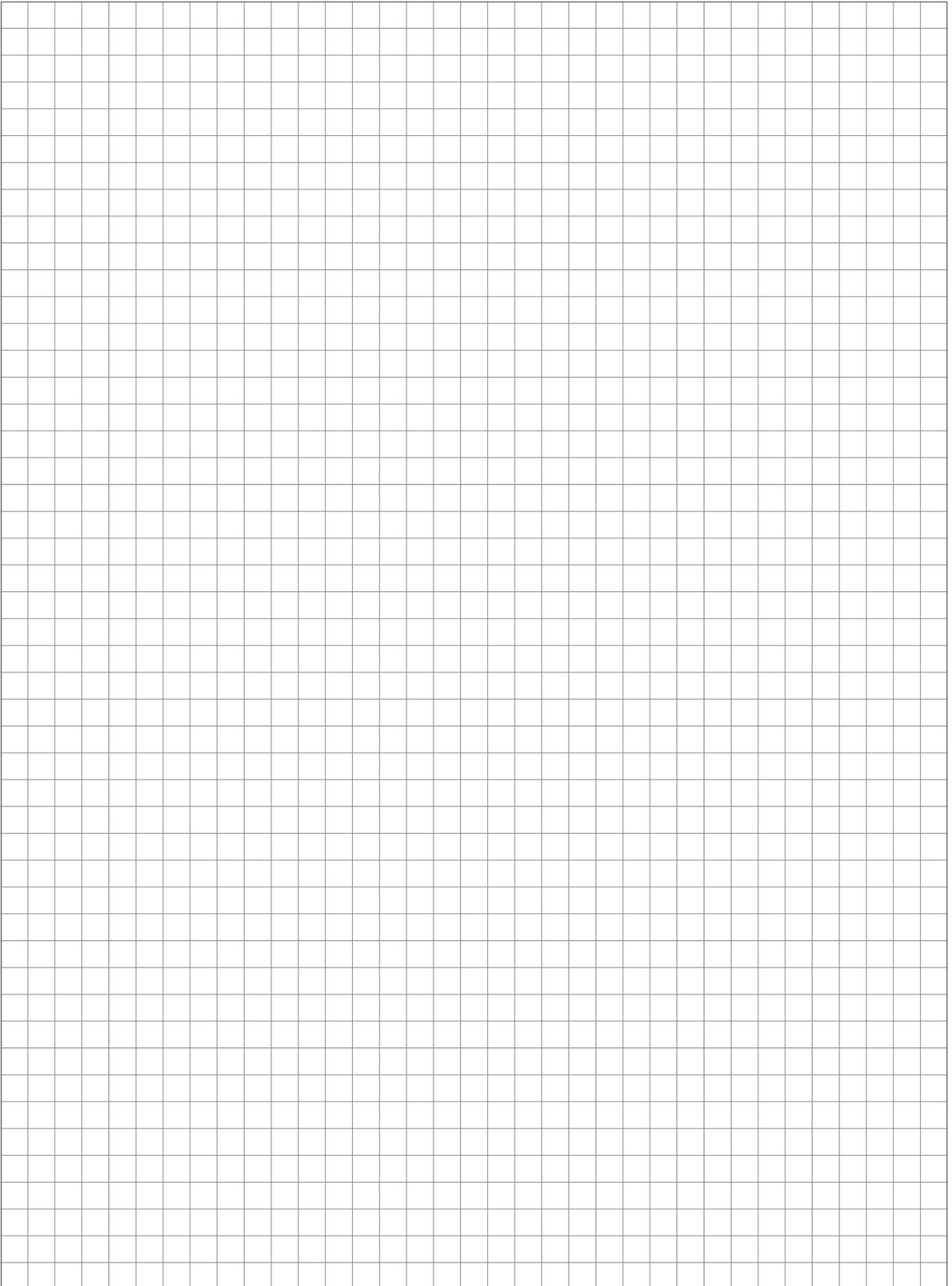
The term “fault” is a collective term for warnings, errors and alarms. The boiler reacts differently to the three types of message:

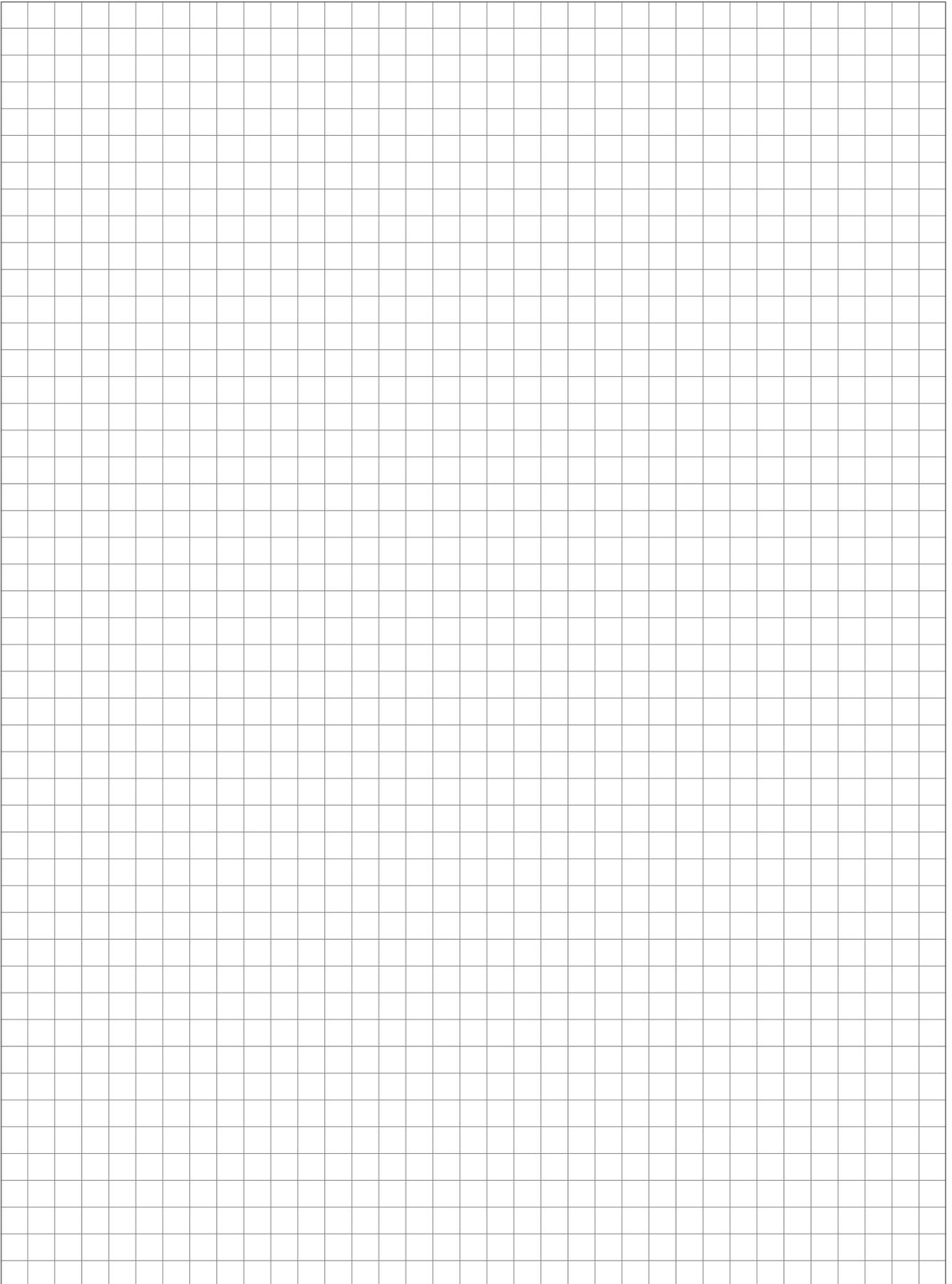
Type of fault	Character	Boiler behaviour
WARNING	<ul style="list-style-type: none"> <li>▪ YELLOW warning sign</li> <li>▪ Message with YELLOW background</li> </ul>	In case of warnings the boiler initially continues controlled operation, giving the option of resolving the error quickly to prevent a shutdown.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

### 6.3.1 Procedure for fault messages

Troubleshooting and fault messages  
See operating instructions SPS 4000







## 8 Appendix

### 8.1 Addresses

#### 8.1.1 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  
EMAIL [info@froeling.com](mailto:info@froeling.com)  
INTERNET [www.froeling.com](http://www.froeling.com)

#### *Customer service*

Austria	0043 (0)7248 606 7000
Germany	0049 (0)89 927 926 400
Worldwide	0043 (0)7248 606 0

#### 8.1.2 Address of the installer

Stamp
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