Operating Instructions

Wood chip boiler T4e

Translation of the original German operating instructions for the operator

Read and follow the instructions and safety information!

Technical changes, typographical errors and omissions reserved!

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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.

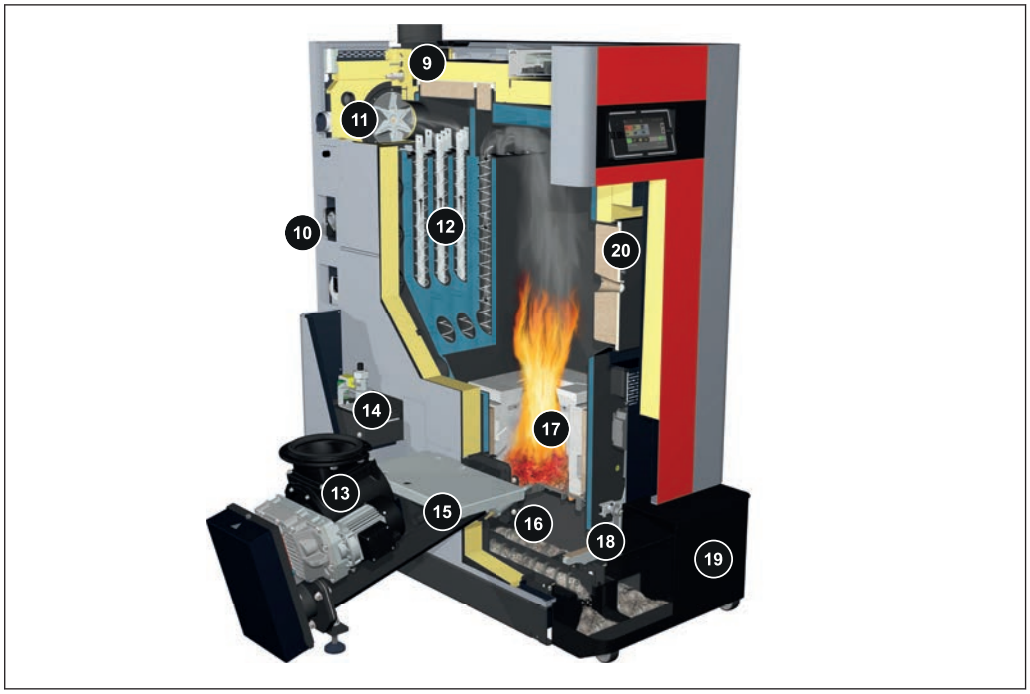
Warranty and Guarantee Conditions

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 T4e

1	Wood chip boiler – Fröling T4e
2	Main switch: switches the power supply on and off for the entire system
3	High-limit thermostat STL
4	Mains connection
5	Lambdatronic H 3200 boiler controller, ⇨ See "Overview of the touch display" [page 29]
5.1	Status display (operating status), ⇨ See "Status display" [page 30]
5.2	Large touch screen for displaying and changing operating statuses and parameters
5.3	Brightness sensor to automatically adjust the display brightness
5.4	USB port for connecting a USB stick for software updates
6	Insulating cover
7	Heat exchanger cover
8	Service port



9	Lambda probe for fuel adjustment
10	Integrated return temperature control with pump, mixing valve and ball valve
11	Speed regulated EC induced draught fan
12	WOS system with turbulators and automatic drive for heat exchanger cleaning of the second and third draught
13	Twin-chamber rotary valve (Ø 200 mm) as burn back protection system (RSE)
14	Integrated electrostatic particle separator (optional)
15	Stoker screw (Ø 100 mm)
16	Ceramic igniter with function monitoring
17	Silicon carbide combustion chamber with automatic tipping grate
18	Tipping grate with drive (rotation angle 110°)
19	Ash box for combined automatic ash removal from combustion chamber and heat exchanger
20	Combustion chamber door with inspection glass

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
	Wear protective gloves		Turn off the main switch
	Keep the doors closed		
	Unauthorised access prohibited		
	Warning - hot surface		Warning - hazardous electrical voltage
	Warning - hazardous or irritant materials		Warning - automatic boiler startup
	Warning of injury to fingers or hands, automatic fan		Warning of injury to fingers or hands, automatic screw
	Warning of injury to fingers or hands, gear/chain drive		Warning of injury to fingers or hands, cutting edge

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 respective manuals.
- ❒ Any work above and beyond this (e.g. servicing) must be carried out by a heating engineer approved by Fröling Heizkessel- und Behälterbau GesmbH or by Froling 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 Wood chip boiler T4e is designed solely for heating domestic water. Only the fuels specified in the "Permitted fuels" section may be used.

⇨ See "Permitted fuels" [page 12]

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

Under the Clean Air Act local authorities may declare the whole or part of the district of the authority to be a smoke control area. It is an offence to emit smoke from a chimney of a building, from a furnance or from any fixed boiler if located in a designated smoke control area. It is also an offence to acquire an „unauthorised fuel“ for use within a smoke control area unless it is used in an „exempt“ appliance („exempted“ from the controls which generally apply in the smoke control area). The Secretary of State for Environment, Food and Rural Affairs has powers under the Act to authorise smokeless fuels or exempt appliances for use in smoke control areas in England. In Scotland and Wales this power rests with Ministers in the devolved administrations for those countries. Separate legislation, the Clean Air (Northern Ireland) Order 1981, applies in Northern Ireland. Therefore it is a requirement that fuels burnt or obtained for use in smoke control areas have been „authorised“ in Regulations and that appliances used to burn solid fuel in those areas (other than „authorised“ fuels) have been exempted by an Order made and signed by the Secretary of State or Minister in the devolved administrations.

Further information on the requirements of the Clean Air Act can be found here: http://smokecontrol.defra.gov.uk

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.

The Froling T4e 20, T4e 25, T4e 30, T4e 35, T4e 45, T4e 50, T4e 60, T4e 80, T4e 90, T4e 100, T4e 110, T4e 130, T4e 140, T4e 150, T4e 160, T4e 170, T4e 180, T4e 200, T4e 250, T4e 300 and T4e 350 have been recommended for use in smoke control areas when burning wood chip and wood pellets only.

2.4.2 Permitted fuels

Wood chips

Criterion	Designation as per		Description as per ÖNORM M 7133
	ÖNORM M 7133	EN ISO 17225	
Water content	**W20**	**M20**	air-dried
	W30	**M30**	suitable for storage
	W35	**M35**	limited suitability for storage
Size	**G30**	**P16S**	Fine wood chip
	G50	**P31S**	Medium-sized wood chip

Note on standards

EU:	Fuel as per EN 17225 – Part 4: Wood chips class A2 / P16S-P31S M35
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*plus* / DIN*plus* certification scheme

General note:

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

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.

2.4.3 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

2.5 Qualification of operating staff

⚠ CAUTION

If unauthorised persons enter the Installation room / 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.

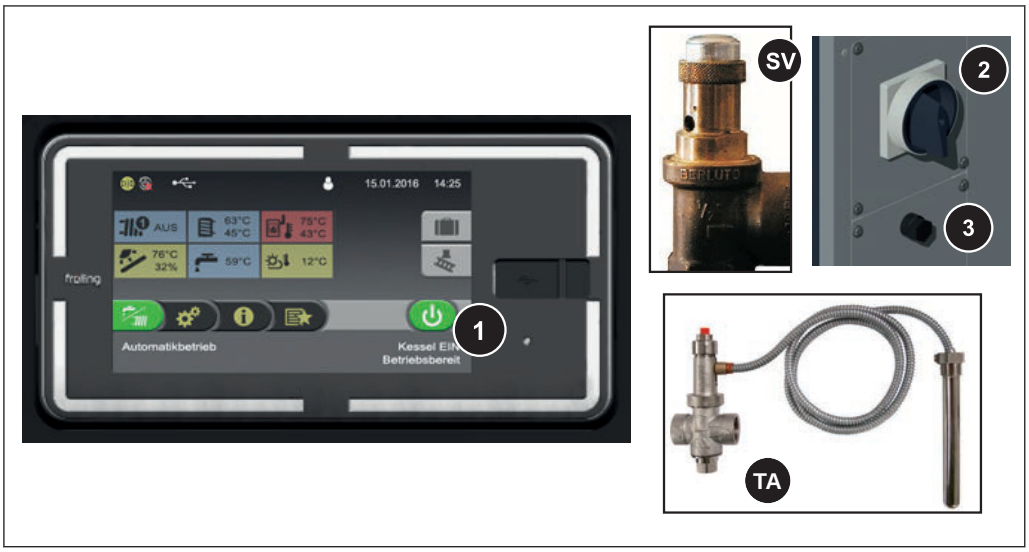
Only trained operators are permitted to operate the unit. The operator must also have read and understood the instructions in the documentation.

2.6 Protective equipment for operating staff

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

- For operation, inspection and cleaning:
  - Suitable work wear
  - Protective gloves
  - Sturdy shoes
  - Dust mask
    When working with dust from the electrostatic particle separator, use dust masks in filter class FFP2 or higher

2.7 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
  - ➥ Pumps continue to run

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

Before carrying out work on/in 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 TEMPERATURE LIMITER (STL)** *(protection against overheating)*

The STL (high-limit thermostat) switches off the combustion system when the boiler reaches 100°C. The pumps continue to run. Once the temperature falls below approx. 75°C, the STL can be reset mechanically.

On site:

SV **SAFETY VALVE** *(protection against overheating/excess pressure)*

When the boiler pressure reaches a maximum of 3 bar, the safety valve opens and the heated water is blown off in the form of steam.

For T4e 130-350:

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

2.8 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 (“Boiler 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

When inspecting and cleaning the boiler with the main switch on:

Serious injuries possible due to automatic boiler startup!

Before inspection and cleaning work in/on the boiler:

- ❒ Switch the boiler off by tapping “Boiler off”
  The boiler follows the shutdown procedure and switches to "Boiler off“ mode
- ❒ Allow the boiler to cool for at least 1 hour
- ❒ Switch off the main switch and take precautions to prevent accidental switching on

⚠ 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.

DANGER

If maintenance work is performed when the system is in operation:

Risk to life from high voltage electrodes!

Before carrying out work on/in the electrostatic precipitator:

- ❒ Switch off the power supply and take precautions to prevent accidental switching on
- ❒ Earth and short circuit HV electrodes
- ❒ 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

Persons using pacemakers whilst in the immediate vicinity of the electrostatic particle separator:

Interference of the pacemaker by electromagnetic fields of the particle separator is possible!

Therefore:

- ❒ Maintain a safety distance of at least one metre from the electrostatic particle separator
- ❒ Perform work only when the electrostatic particle separator is switched off

2.9 Emergency procedure

2.9.1 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
- ❒ Switch boiler off by tapping “Boiler OFF”
- ❒ Open all mixing valve taps, switch on all pumps.
  - ➥ The Froling heating circuit control takes on this function in automatic operation.
- ❒ Leave the boiler room and close the door
- ❒ 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

2.9.2 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.

2.9.3 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	Italy:	UNI 8065

Observe the standards and also follow the recommendations below:

- ❒ Aim for a pH value of between 8.2 and 10.0. If the central heating water comes into contact with aluminium, the pH value must be between 8.0 and 8.5
- ❒ Use prepared water which complies with the standards cited above for filling and 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 [1]		Total hardness at >20 ≤50 l/kW minimum individual heat output [1]		Total hardness at >50 l/kW minimum individual heat output [1]	
kW	°dH	mol/m³	°dH	mol/m³	°dH	mol/m³
≤50	no demand or		11.2	2	0.11	0.02
	<16.8 [2]	<3 [2]				
>50 ≤200	11.2	2	8.4	1.5		
>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 temperature control

If the hot water return is below the minimum return temperature, some of the hot water outfeed will be mixed in. This is done by the return temperature control, which is integrated in the hydraulics on the side panel of the boiler.

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 76]

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 theT4e

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 boiler controller!

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

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

- 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.

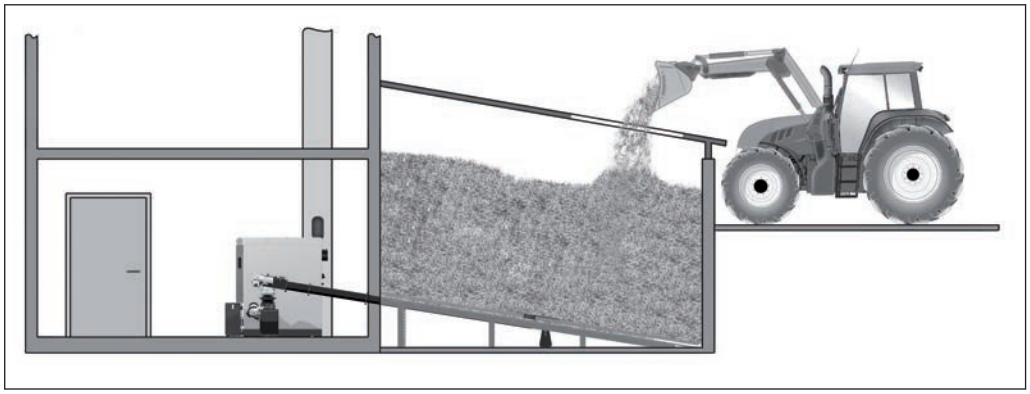
❒ Tip: If this occurs, clean up using a cleaning rag.

4.2 Filling/refilling the store with fuel

When filling the store you should always ensure that you are using the right fuel:

Permitted fuels

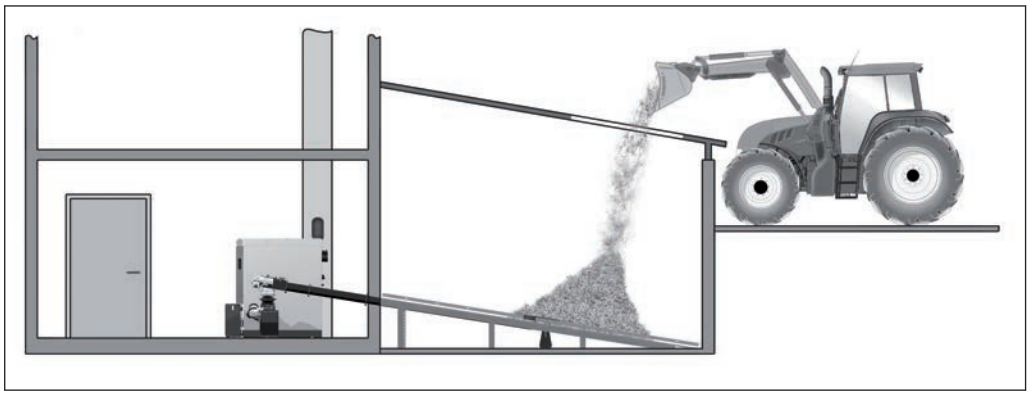
4.2.1 Loading of fuel for a partially emptied store with rotary agitator



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 wood chips in an empty store (not under pressure)



NOTICE! If the head of the rotary agitator is already free of material and the arms / spring blades are extended, the feeder unit must be active during the filling process.

❒ Activate “Extra heating” mode in the quick selection menu

Exception in the case of a separate drive:

❒ Tap “On” in “Bunker filling rotary agitator” during manual operation

➥ The rotary agitator head runs for approx. 3 minutes

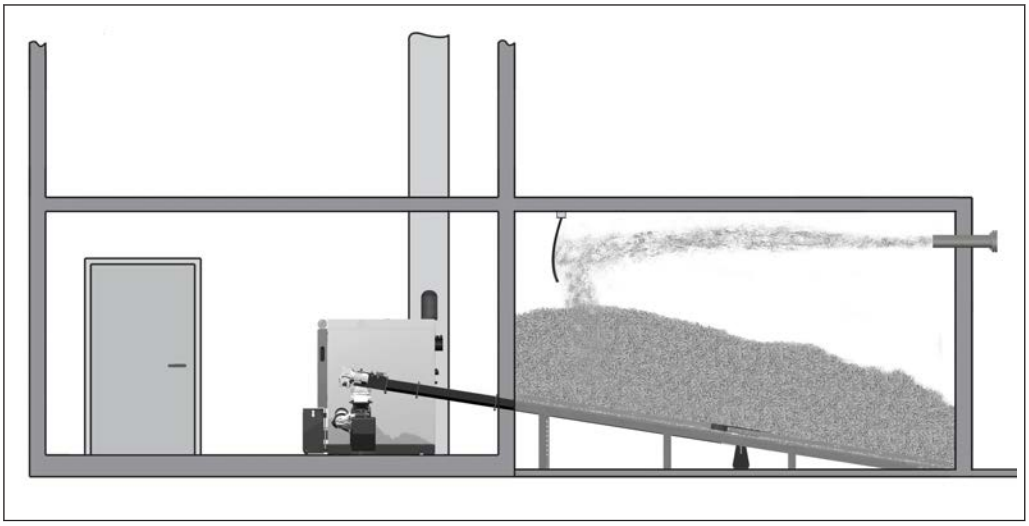
❒ Load a small quantity of wood chips and wait until the arms / spring blades are touching the head of the rotary agitator (approx. 2 revolutions)

❒ Only then should you load the remaining material

4.2.3 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

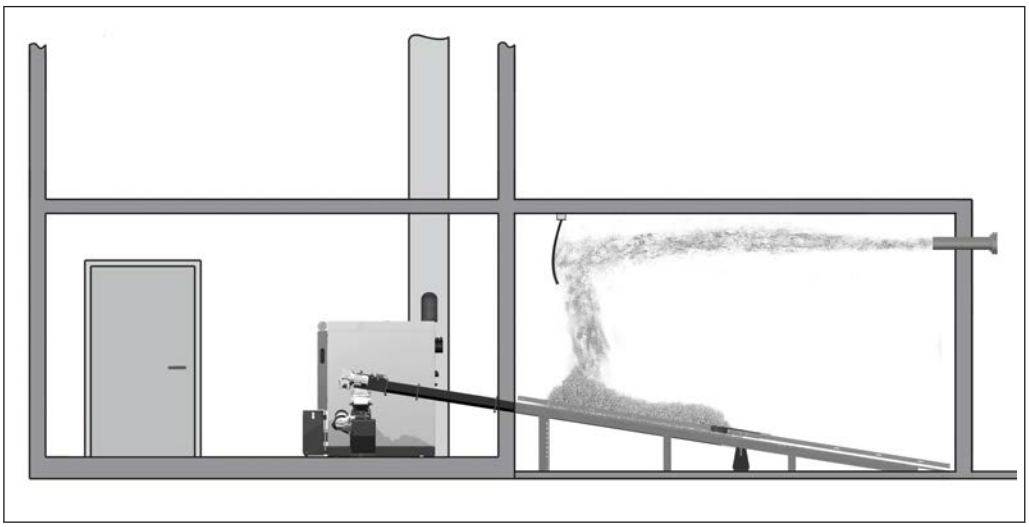
4.2.4 Blowing in fuel for a partially emptied store with rotary agitator



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

4.2.5 Blowing in fuel for an empty store with rotary agitator



NOTICE! If the head of the rotary agitator is already free of material and the arms / spring blades are extended, the store must not be filled until the following actions have been taken:

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

- ❒ Distribute any fuel remaining in the store (in corners, against walls) over the head of the rotary agitator with your hands
  - ➥ Follow the instructions on working in the fuel store!

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

After working in the store:

- ❒ Turn on the main switch on the boiler and on the expansion switch cabinet (if installed)
- ❒ Activate “Extra heating” mode in the quick selection menu

Exception in the case of a separate drive:

- ❒ Tap “On” in “Bunker filling rotary agitator” during manual operation
  - ➥ The rotary agitator head runs for approx. 3 minutes

- ❒ Wait until the 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
- ❒ Blow the fuel into the store

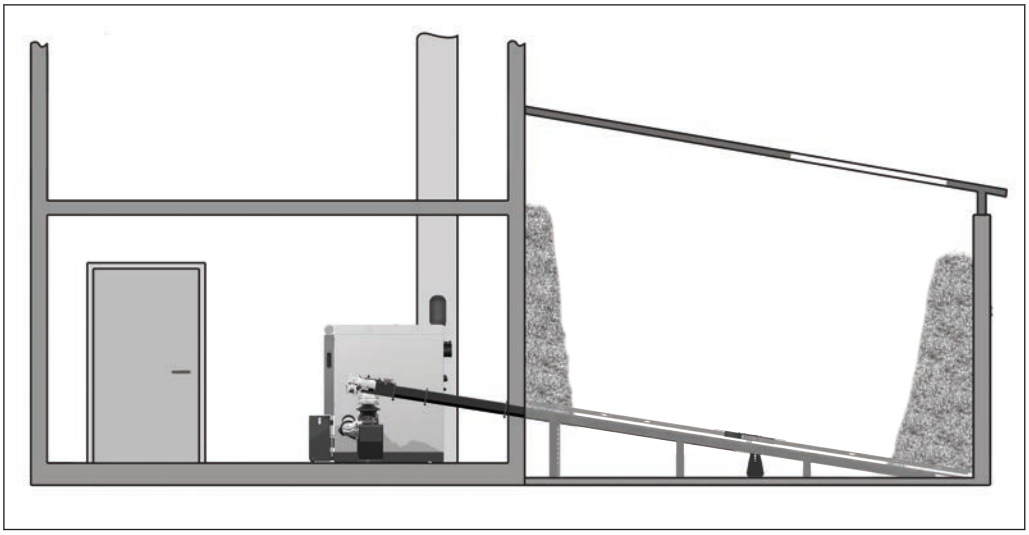
If the fuel store is completely empty and there is no residual fuel to redistribute:

- ❒ Contact Froling and seek advice before filling the fuel store

⇨ See "Address of manufacturer" [page 76]

4.2.6 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 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

4.4 Operate the boiler using the touch display

4.4.1 Overview of the touch display

A	Display of freely selectable information ⇨ See "Select information displays" [page 35]
B	Display and change the current user level ⇨ See "Lock display/switch user level" [page 42]
C	Display and change the current date/time ⇨ See "Change date and time" [page 38]
D	Holiday program ⇨ See "Configure the holiday program" [page 43]
E	Chimney sweeper function ⇨ See "Emissions measurement by chimney sweep or regulatory body" [page 69]
F	Display of current operating status, boiler ON/OFF ⇨ See "Switch boiler ON/OFF" [page 37]
G	View available functions in the quick menu ⇨ See "Quick menu" [page 34]

H	Access all system information. No parameters may be changed in the info menu.
I	System menu for opening the system settings. All parameters can be displayed and/or edited depending on the user level. ⇨ See "Navigation within the system menu" [page 32]
J	Display and change the current boiler mode ⇨ See "Change boiler mode" [page 37]
K	Display icons for using froeling-connect ⇨ See "Display icons for froeling-connect/remote control" [page 31]
L	Brightness sensor for automatically adjusting the brightness of the display
M	LED frame to display the current system status ⇨ See "Status display" [page 30]
N	USB interface for software update (⇨ see operating instructions for the boiler controller) **NOTICE! USB interface is for service purposes only and must not be used to load devices or for PC connections!**

Status display

The status display indicates the system's operating status:

- Constant in the set colour: **SWITCHED ON**
  Boiler in an error-free operating state (standby, heating, …)
  Set colour can be changed using the setting wizard "Switching on for the first time"
- ORANGE flashing: **WARNING**
- RED flashing: **FAULT**

Control icons

	Confirms values entered; activates parameters
	Discards any values entered without saving; and closes messages
	Back to basic display
	Accesses all system information
	Opens quick menu. Selection of functions depending on user level, configuration and current status.
	Tap to change parameters (dropdown menu or numeric keypad)

	Opens system menu. Menu display depends on user level and configuration
	Back to higher menu level.

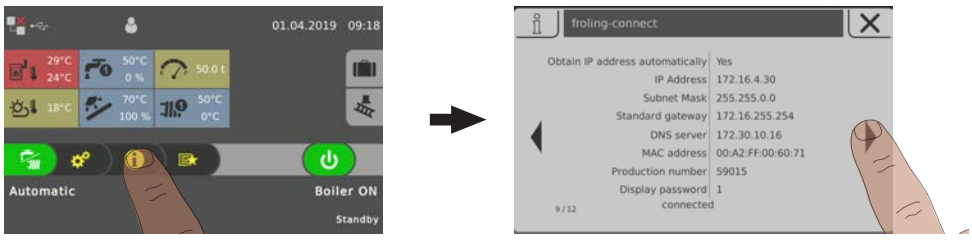
Display icons for froeling-connect/remote control

The icons for connection status and remote control are displayed at the top left of the touch display. Tap on these icons to open the “Connection Centre”. In the menu, the connection to froeling-connect as well as the remote control (switching on and off by external users) is activated/deactivated

Status to froeling-connect		Remote control of the boiler	
	froeling-connect is deactivated or not in use		Remote control of the boiler is permitted
	Establishes connection to froeling-connect		Remote control of the boiler is not permitted
	Connection to the froeling-connect server		
	No network connection to froeling-connect		
	No connection to froeling-connect server, ⇨ See "Connection status to "froeling-connect"" [page 31]		

Connection status to "froeling-connect"

The connection status to “froeling-connect” is displayed in the info menu.



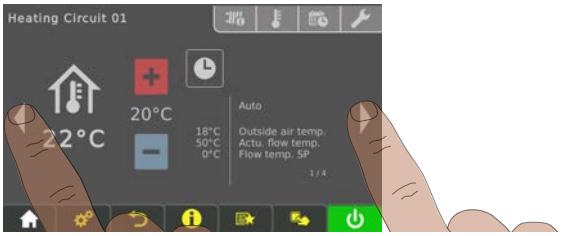
❒ Tap the info menu in the basic display and navigate to the “froeling-connect” menu

➥ The connection status is displayed in the lower range (connected, deactivated, …)

NOTICE! Consult the “froeling-connect” operating instructions for a detailed description of the connection status as well as troubleshooting

Navigation within the system menu

The system menu shows the menus available depending on the user level and the system configuration. Use the right and left arrows to navigate to the individual menus. Tap the corresponding icon to open the menu. Within the individual menus, the status display is shown with current values. If, for example, several heating circuits are installed, you can use the right and left arrows to navigate to the desired heating circuit.

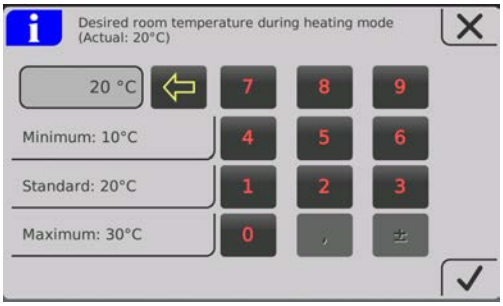
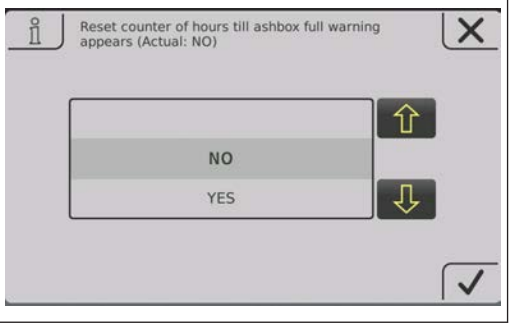


Tap the respective tab to carry out settings in the menus.

Icon	Tab	
	Status	
	Temperatures	
	Times	
	Service	
	General settings	
	Solar heat meter	

Changing parameters

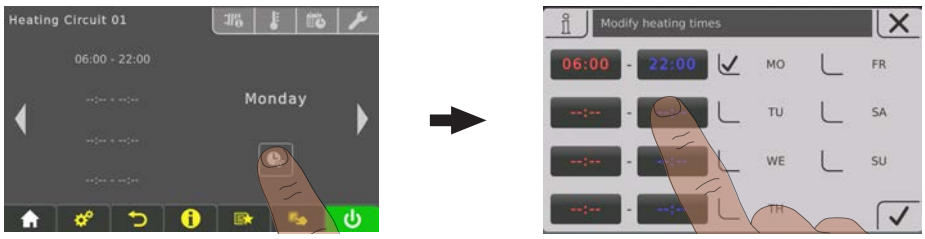
If there is a “pencil” symbol next to a parameter text, the parameter can be edited. Depending on the type of parameter, it can be edited using the numeric keypad or by selecting from a list and then tapping on the “Confirm” symbol.

Numeric keypad	Dropdown list
	

Change time window

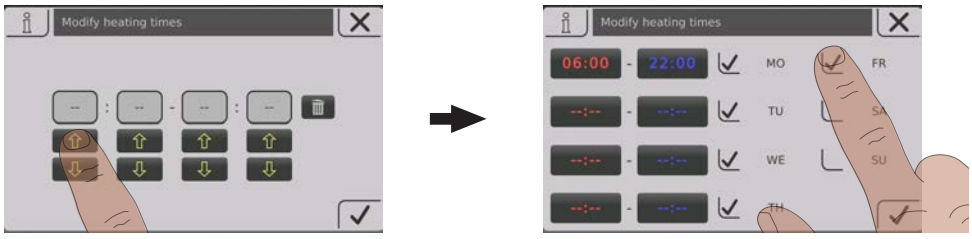
The desired time window can be set in the “Times” tab in the menus of the heating components (heating, water, …). Up to four time windows are possible per day.

- ❒ Use the left or right arrow to navigate to the desired day of the week
- ❒ Tap the time window or icon under the day of the week
- ❒ Tap on the time window to be changed

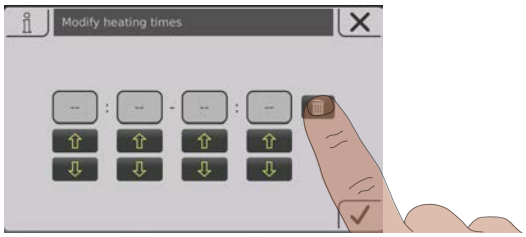


- ❒ Use the up and down arrows to set the start and end time and save by tapping on the “Confirm” icon

The time window set is saved for all selected days of the week.



To delete a saved time window, tap on the “Recycle bin” icon next to it.



Quick menu

The quick menu provides different functions depending on the system configuration and system status.

Icon	Description
	**Language selection** Sets the desired system language: Deutsch – English – Francais – Italiano – Slovenski – Cesky – Polski – Svenska – Espanol – Magyar – Suomi – Dansk – Nederlands – Русский – Srpski – Hrvatski
	**Clean the touch display** The touch display is locked for 10 seconds, during which time it is possible to clean it without inadvertently changing the settings.
	**User level** Changes the current user level **Code “0”** … Child lock/Lock **Code “1”** … Customer
	**Extra heating** Boiler starts, heating and domestic hot water tank are activated for 6 hours. The mode setting is ignored. CAUTION: The external temperature heating limit set in the "Heating" menu is active and can prevent release of the heating circuits.
	**Extra loading** One-time extra loading of all available DHW tanks. Afterwards the mode that was previously set becomes active again.
	**Error display** List of all pending boiler faults and how to eliminate them.
	**Setting wizard** **Switching on for the first time:** Setting the language, production number, date and time **Connect:** Setting parameters required for the boiler to use the “froeling-connect.com” (IP address, display password, …)

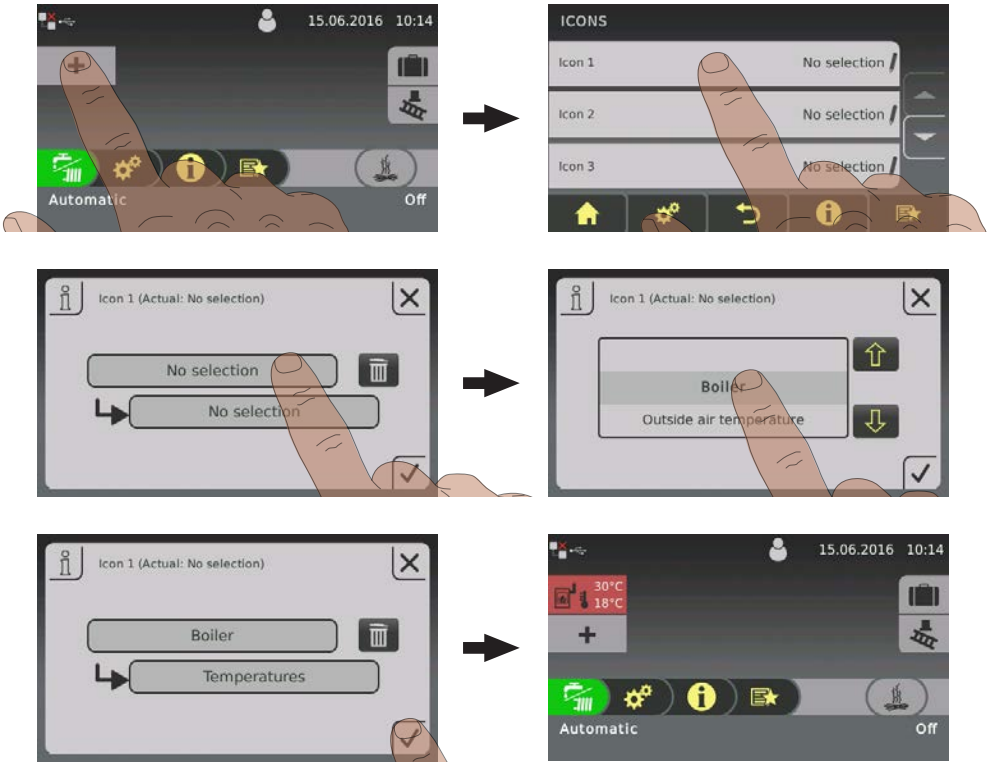
4.4.2 Select information displays

Tapping on the freely selectable information displays in the basic display opens the respective menu. The following options are available depending on the system configuration:

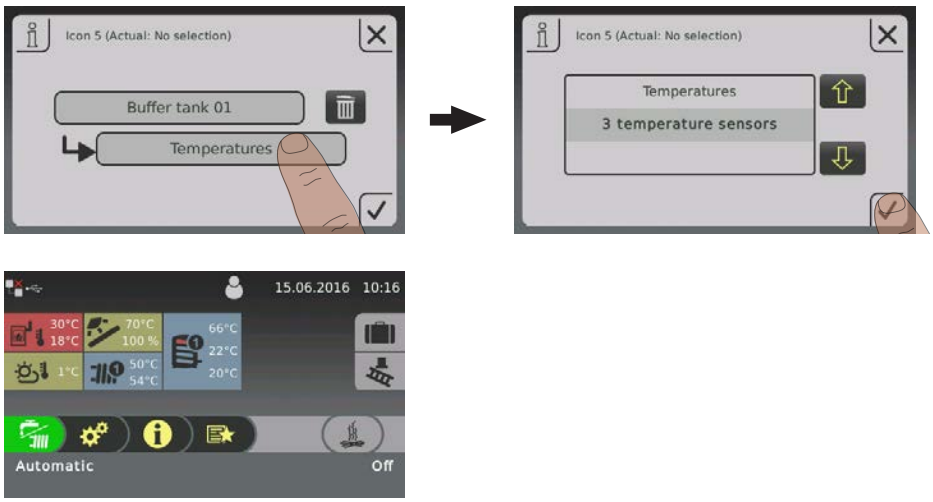
Menu	Selection	Icon	Description
Boiler	Empty ash in		Display of the remaining heating hours until the message “Ash box full, please empty” appears.
	Temperatures		Display of boiler und flue gas temperature
	Calorific value heat exchanger[1)]		Display of boiler and flue gas temperature before or after the calorific value heat exchanger.
	Operation hours		Display of the operating hours and the operating hours since last maintenance.
Outside air temperature	Temperatures		Display of the current outside air temperature.
Boiler 2	Temperatures		Display of the temperature of the secondary boiler and the status of the burner relay
Solar	Temperatures		Display of the collector temperature and control of the collector pump.
Pellets	Remaining pellet amount in store room		Display of the remaining amount of pellets in storeroom.
Heating circuit 01 – 18	Temperatures		Display of the actual flow temperature and flow temperature setpoint of the respective heating circuit.
DHW tank 01 – 08	Temperatures		Display of the current DHW tank temperature and control of DHW tank pump of the respective DHW tank.
Storage tank 01 – 04	Temperatures		Display of storage tank temperature, top and bottom
	3 temperature sensors[1)]		Display of storage tank temperature, top, middle and bottom.
	4 temperature sensors[1)]		Display of storage tank temperature top, store sensor 2, store sensor 3 and bottom.
Circulation pump	Temperatures		Display of the status at the flow sensor (if present) and the current circulation return temperature.

Menu	Selection	Icon	Description
Differencial controller	Temperatures		Display of the current temperature from source and recess of the differential regulator
System	CPU/RAM capacity	CPU RAM	Display of the CPU and RAM capacity in percent

1. This selection merges two tiles together, reducing the maximum number of information displays!



When using more than two store sensors, it is possible to have an information display with storage tank temperatures in accordance with the number of sensors. An information display that spans two areas is used.



4.4.3 Switch boiler ON/OFF

The hydraulic system is controlled in accordance with the mode that is set, regardless of boiler status, ⇨ See "Change boiler mode" [page 37]

	**Boiler ON** The boiler is activated and starts following a command from the hydraulic system. (Storage tank, heating circuit, domestic hot water…). Heating circuits and domestic hot water tanks are controlled according to the programs and times set.
	**Boiler OFF** The control follows the boiler shutdown procedure and starts the cleaning cycle. The boiler switches to “Boiler OFF” status. All boiler units are deactivated, heating circuits and domestic hot water tanks are controlled according to the programs and times set, the chamber discharge system remains active.

4.4.4 Change boiler mode

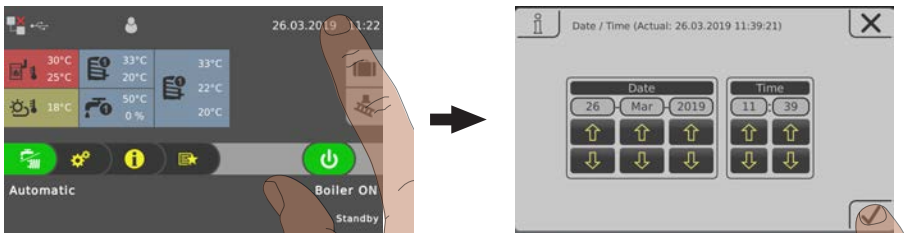
	Depending on the type of boiler, there are several modes available which can be changed directly in the basic display of the touch display.

Mode	Icon	Description
Automatic		Supply heating circuits and domestic hot water tanks with heat according to the selected heating times.
Domestic hot water		The domestic hot water tank is supplied with heat within the selected loading times. Heating circuits are switched off, frost protection remains active.
Continuous load		The boiler continuously maintains the selected boiler temperature setpoint and only shuts down for cleaning purposes. Supply heating circuits and domestic hot water tanks with heat according to the selected heating times.

NOTICE! Consult the enclosed operating instructions for the boiler controller for a detailed description of the boiler modes.

4.4.5 Change date and time

Tap on the displayed date and time to change the date and time in the basic display. Use the up and down arrows to adjust the settings and tap on the “Confirm” icon to save.



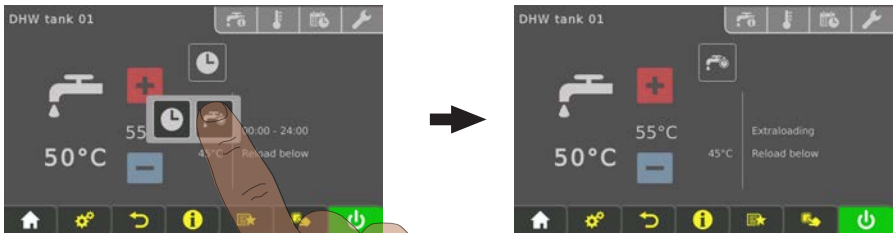
4.4.6 Change desired DHW tank temperature

- ❒ Tap the information display for the desired DHW tank
- ❒ Adjust the temperature setpoint by tapping on “+” or “-”

NOTICE! If this selection is not configured in the information display in the basic display, open the components in the system menu.

4.4.7 One-time extra loading of an individual DHW tank

❒ Tap the information display for the desired DHW tank
❒ Tap the mode icon for the DHW tank



❒ Tap the “extra loading” icon
➥ One-time loading of DHW tank starts. Once the selected DHW tank temperature setpoint has been reached, loading stops and the icon switches to “automatic”.

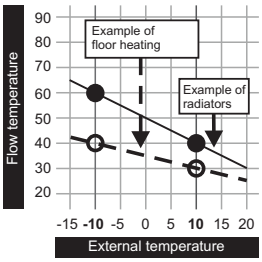
NOTICE! If this selection is not configured in the information display in the basic display, open the components in the system menu.

4.4.8 One-time extra loading of all existing DHW tanks.

In the case of several DHW tanks, the “extra loading” function in the quick menu is used to start a one-time extra loading of all existing DHW tanks.

⇨ See "Quick menu" [page 34]

4.4.9 Set the heating curve of a heating circuit



A flow temperature is calculated using the heating curve of the heating circuit depending on the outside air temperature and the two adjustable parameters “`flow temperature at -10°C outside air temperature`” and “`flow temperature at +10 °C outside air temperature`“.

Example:
The heating curve is defined with 60°C (at -10°C outside air temperature) and 40°C (at +10°C outside air temperature). If the current outside air temperature is -2°C, the flow temperature is calculated as 52 °C.

Heating circuits without measuring the room temperature are operated using the calculated values. The heating curve must be adapted to influence the room temperature, ⇨ See "Change room temperature (heating circuit without room temperature sensor)" [page 40]

When using a room temperature sensor (analogue remote control FRA, room console RBG 3200, room console RBG 3200 Touch, room temperature sensor) it is not necessary to interfere with the heating curve. Any deviation of the actual room temperature to the room temperature setpoint is automatically compensated by increasing/reducing the flow temperature.

When starting up the system it is defined whether the heating circuit is operating as a “high temperature circuit” or a “low temperature circuit”. The following values are set:

High temperature circuit
▪ Desired flow temperature at -10°C outside air temperature: **60 °C** ▪ Desired flow temperature at +10 °C outside air temperature: **40 °C**

Low temperature circuit
▪ Desired flow temperature at -10°C outside air temperature: **40 °C** ▪ Desired flow temperature at +10 °C outside air temperature: **30 °C**

Reduction of flow temperature

Outside of the set heating times (⇨ See "Change time window" [page 33]), the setback mode is active and the calculated flow temperature is reduced by the adjustable value `“Reduction of flow temperature in setback mode”`.

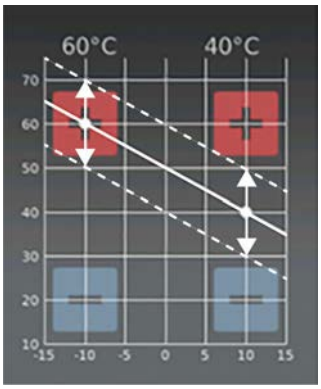
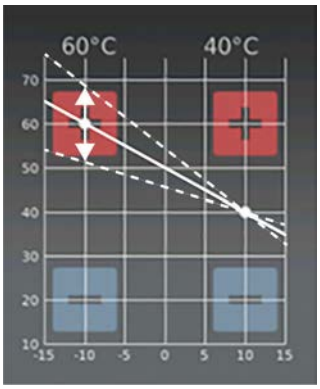
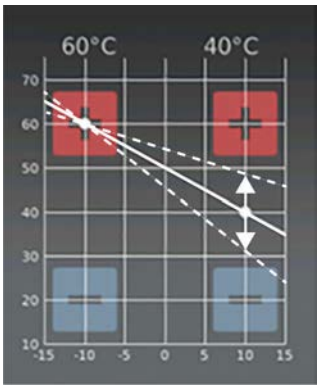
Heating limits

The outside air temperature heat limits are set in the “Temperatures” tab and they activate/deactivate the heating circuit depending on the outside air temperature or time period.

Parameter	Effect
Outside air temperature, at which heating circuit pump switches off in heating mode (default: 18°C)	If the outside air temperature difference rises above the set value, the heating circuit is deactivated. (Pump off, mixing valve closes)
Outside air temperature, at which heating circuit pump switches off in setback mode (default: 7°C)	If the outside air temperature in setback mode (default: 22:00 – 06:00) falls below the set value, the heating circuit is activated (pump on, mixing valve regulated as per heating curve)

4.4.10 Change room temperature (heating circuit without room temperature sensor)

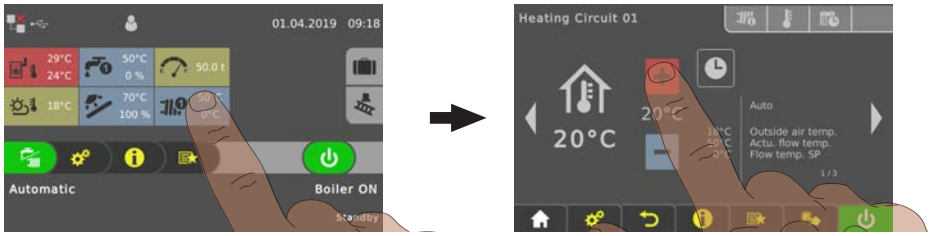
Situation	Effect
Room temperature generally too low	Move heating curve up in parallel. Increase both points on the heating curve by the same temperature level. (see figure 1)
Room temperature on warm days too low, OK on cold days	Change the slope of the heating curve. Increase the temperature level of the heating curve at -10°C (see figure 2)
Room temperature on warm days too high, OK on cold days	Change the slope of the heating curve. Reduce the temperature level of the heating curve at +10 °C (see figure 3)

Figure 1	Figure 2	Figure 3
		

Depending on the situation, the heating curve an be adapted by tapping “+” or “-” at +/-10°C outside air temperature.

If the heating curve is to be changed, never change the desired point for a high temperature circuit more than 5°C, and never more than 3°C for a low temperature circuit. Once the changes have been made, wait a few days and assess comfort levels before carrying out additional changes.

4.4.11 Change room temperature (heating circuit with room temperature sensor)



- ❒ Tap information display of the desired heating circuit
- ❒ Tap “+” or “-” to adjust the desired room temperature

NOTICE! If this selection is not configured in the information display in the basic display, open the components in the system menu.

Otherwise, the room temperature can be adjusted directly on the remote control/room console.

4.4.12 Switch heating circuit mode

Tap on the mode icon in the menu of the respective heating circuit to change the mode.

Procedure	Icon	Description	
		OFF	The heating circuit is switched off. Frost protection remains active!
		Auto	The heating circuit is controlled according to the set time program.
		Party	The heating circuit is regulated before the start of the next heating time. To cancel this function prematurely, activate another mode/function.
		Setback mode	The heating circuit is regulated to the set setback temperature until the start of the next heating time. To cancel this function prematurely, activate another mode/function.
		Extra heating	The heating circuit is regulated to the set room temperature with no time limitation. To cancel this function prematurely, activate another mode/function.
		Continuous setback mode	The heating circuit is regulated to the set setback temperature until activation of another mode/function.

4.4.13 Lock display/switch user level

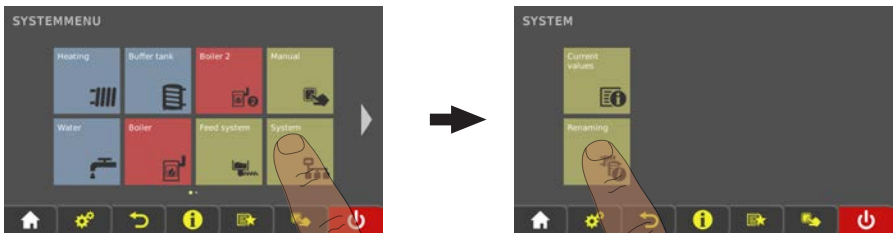
For safety reasons individual parameters are only visible at specific operating levels. To change to another level it is necessary to enter the relevant user code.

❒ Tap on the icon for the user level in the upper area of the basic display and enter the code.

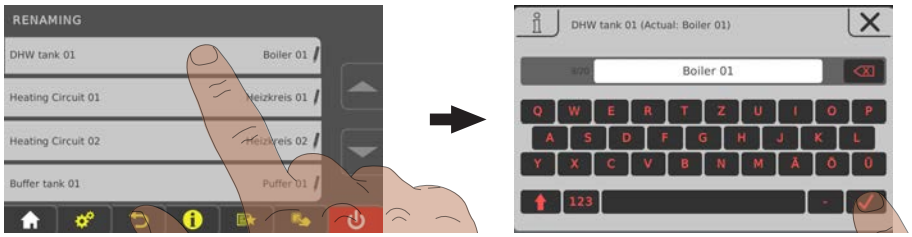
User level	Icon	Description
Lock (Code “0”)		At “Lock” level, only the basic display appears. It is not possible to change parameters.
Customer (Code “1”)		Standard user level for normal operation of the controller. All customer-specific parameters are displayed and can be changed.
Installer		Releases parameters to adjust the controller to the system components (if configured). All parameters are available.
Service		

4.4.14 Change the name of the components

The names of the DHW tank, storage tank and heating circuits can be freely selected. A maximum of 20 characters are available for the name.



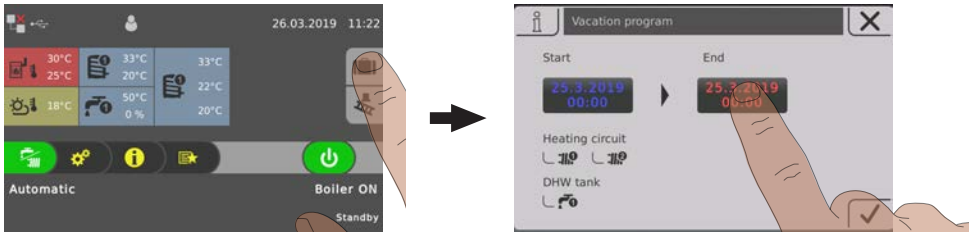
❒ Navigate to the “System” menu and open the “Renaming” sub-menu

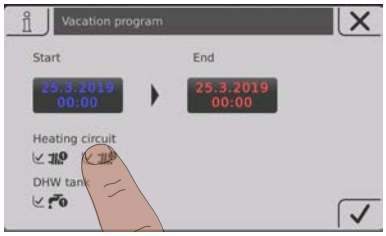


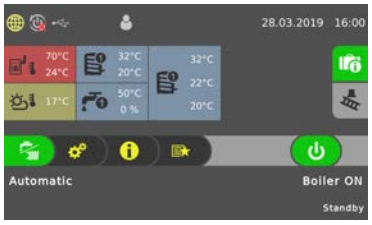
❒ Tap the desired component and use the keyboard to rename it

4.4.15 Configure the holiday program

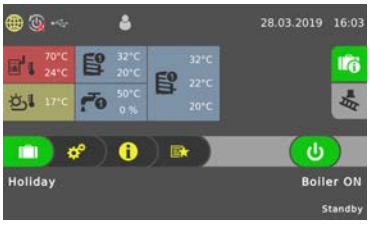
Setting a start and end date in the holiday program determines a time period in which an active heating circuit is regulated for the set setback temperature and in which an activated boiler is not loaded. If Legionella heating is set, it remains active.





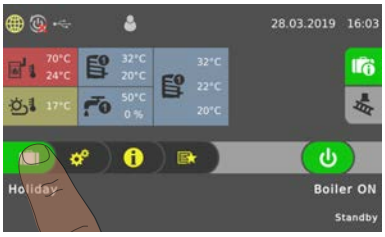


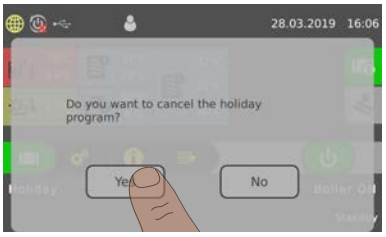
If the start date is set in the future, the “suitcase” icon will be highlighted in green.

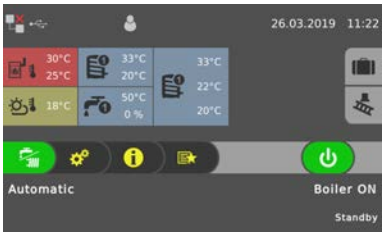


Once the set start time of the holiday program has been reached, the boiler switches to “holiday” mode

Tap the “suitcase” icon to prematurely end the holiday program. The boiler then switches to the previously activated mode (“water tap” symbol = domestic hot water, “water tap/radiator” symbol = automatic).





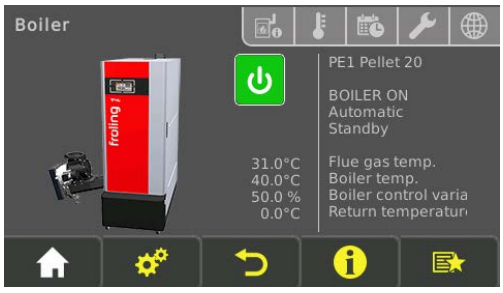


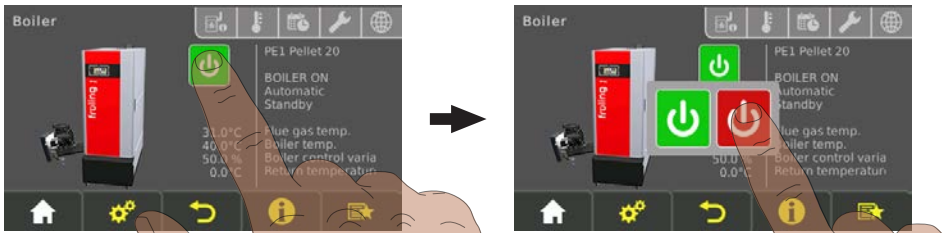
4.5 Switch the boiler ON/OFF on the room console

Prerequisite:

- Boiler access rights configured for the room console

If the boiler remote control is also activated (⇨ See "Display icons for froeling-connect/ remote control" [page 31]), the boiler can be switched on and off on the room console.

	
Boiler remote control deactivated	Boiler remote control activated



❒ Switch the boiler ON/OFF by tapping on the current operating status

4.6 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 "Boiler 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!

4.7 Checking the fill level of the ash container and emptying if required

⚠ WARNING

When removing the ash container cover during operation:

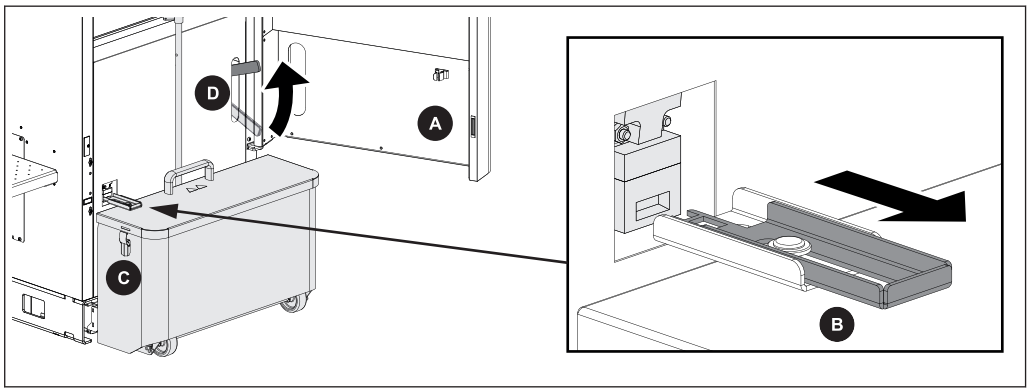
False air infiltration via the ash screw duct can lead to uncontrolled combustion and the risk of accidents.

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 "Boiler off" status.

Up to boiler type 180:



In “Boiler off” status:

❒ Open the insulated door (A)

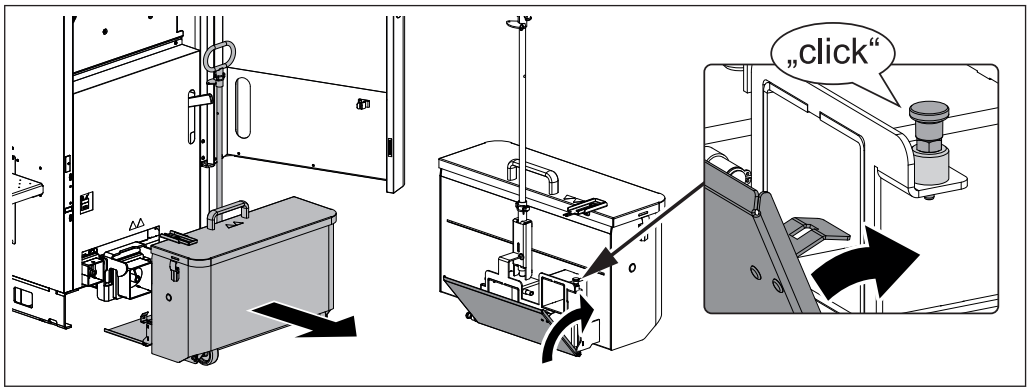
❒ Remove the key plate (B) from the safety limit switch

❒ Open the side clamps (C), remove the ash container cover and check the ash level in the two chambers

➥ If either of the two chambers is more than two thirds full, empty the ash container

❒ Put the cover on the ash container and use the side clamps (C) to close it again

❒ Open the ash container clamp using the locking lever (D)

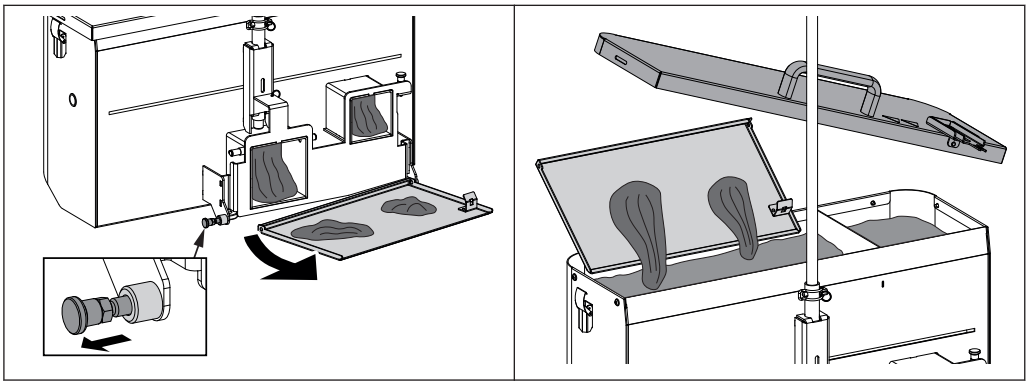


❒ Remove the ash container from the boiler

❒ Close the hinged lid on the ash container

➥ Make sure that the hinged lid snaps into place!

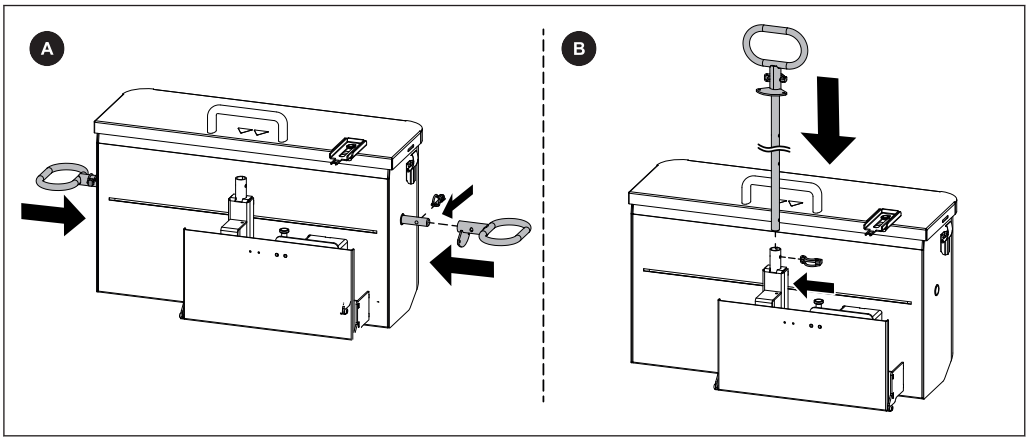
If any ash falls out of the ash container as you are removing it:



❒ Pull out the locking bolt and take out the hinged lid

❒ Remove the top ash container cover and empty the ash in the container

❒ Secure the carrying bar with handles as desired and transport the ash container to the emptying point



Option A:

❒ Insert the carrying bar with handles on the side of the ash container

❒ Secure the second handle to the opposite side of the carrying bar using a pipe locking pin

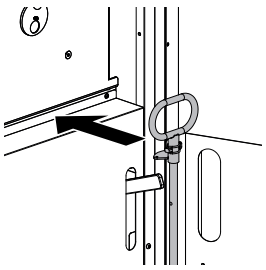
➥ The ash container can now be carried to the emptying point.

Option B:

❒ Insert the carrying bar with handles on the back of the ash container and secure it with a pipe locking pin

➥ The ash container can now be moved to the emptying point.

After emptying the ash container:



❒ Put the cover on the ash container and use the side clamps to close it again

❒ Remove the locking bolt and open the hinged lid

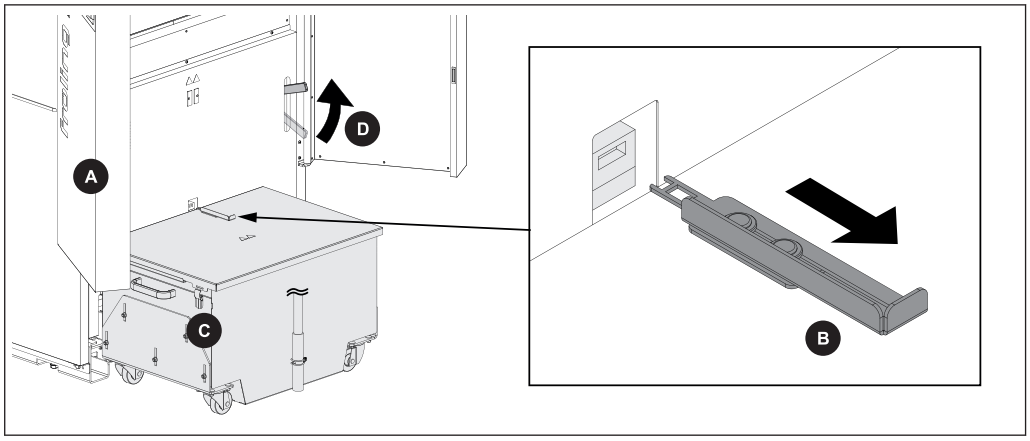
❒ Replace the ash container in the boiler and clamp with the locking lever

➥ The crescent of the carrying bar should be pointing towards the boiler!

❒ Push the key plate into the safety switch

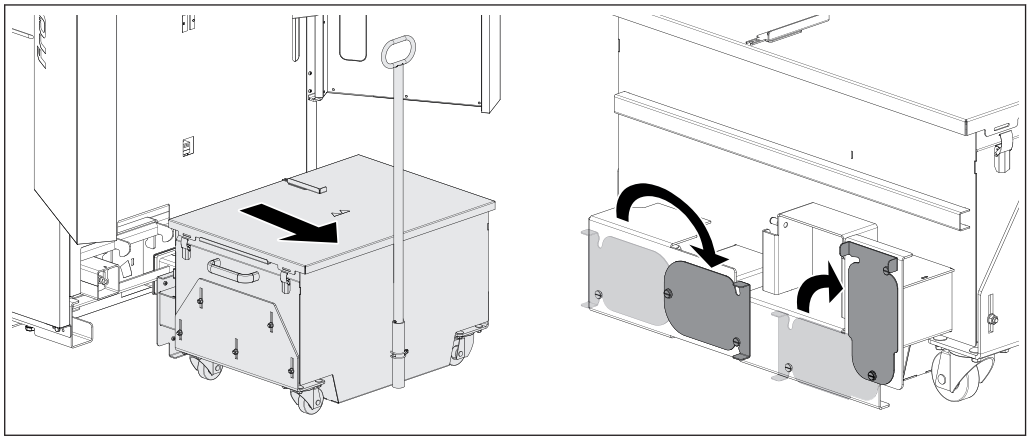
❒ Close the insulating door

Starting at boiler type 200:



In “Boiler off” status:

- ❒ Open the insulated door (A)
- ❒ Remove the key plate (B) from the safety limit switch
- ❒ Open the side clamps (C), remove the ash container cover and check the ash level in the two chambers
  - ➥ If either of the two chambers is more than two thirds full, empty the ash container
- ❒ Put the cover on the ash container and use the side clamps (C) to close it again
- ❒ Open the ash container clamp using the locking lever (D)



- ❒ Remove the ash container from the boiler
- ❒ Close the two openings at the back of the ash container with the slide plates

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

WARNING

When inspecting and cleaning the boiler with the main switch on:

Serious injuries possible due to automatic boiler startup!

Before inspection and cleaning work in/on the boiler:

- ❒ Switch the boiler off by tapping “Boiler off”
  The boiler follows the shutdown procedure and switches to "Boiler off“ mode
- ❒ Allow the boiler to cool for at least 1 hour
- ❒ Switch off the main switch and take precautions to prevent accidental switching on

WARNING

During inspection and cleaning work on the hot boiler:

Hot parts and the flue gas pipe can cause serious burns!

Take the following precautions:

- ❒ It should be standard practice to wear protective gloves when working on the boiler.
- ❒ Only operate the boiler using the handles provided
- ❒ Before starting work, switch off the boiler and allow it to cool down for at least 1 hour

NOTICE

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

⚠ WARNING

Incorrect inspection and cleaning:

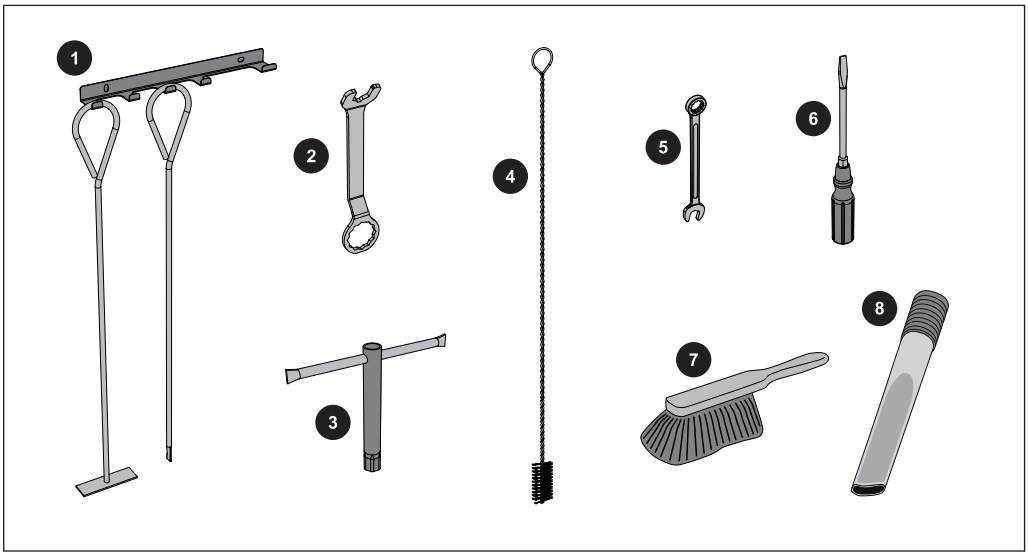
Incorrect or insufficient inspection and cleaning of the boiler can cause serious faults in combustion (e.g. spontaneous combustion of carbonisation gases / flash fires) and this can lead to serious accidents and damage!

Take the following precautions:

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

5.2 Required tools

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



Included in delivery:	
1	Furnace tool with bracket
2	Spanner for door mountings
3	Socket wrench AF 13
4	53x53x110 cleaning brush to clean the WOS springs

Not included:	
5	Spanner or box wrench AF 13
6	Screwdriver set (Philips, flat head, Torx T20, T25, T30)
7	Small brush or cleaning brush
8	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 Weekly 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

Check the thermal discharge valve (from T4e 130)

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

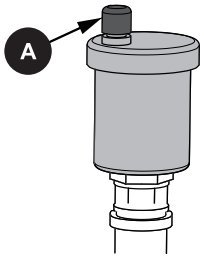
If water is dripping from the discharge pipe:

- ❒ 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 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 geared motors

❒ Carry out a visual inspection of the seal on all 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 Froling customer services.

5.3.2 Recurrent check and cleaning

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

Depending on the activity, inspection and cleaning must be repeated after 1000 operting hours or at least every six months or no later than 2500 operating hours or at least once a year. For less efficient fuels (e.g. high ash content) this work needs to be carried out more frequently.

⚠ WARNING

Inspection and cleaning work with the boiler switched on

Serious injuries from automatic startup of the boiler and severe burns from hot parts and the flue gas pipe are possible.

Therefore:

- ❒ Only carry out work on the boiler when the main switch is turned off
- ❒ Always wear protective gloves when working on the boiler
- ❒ Only operate the boiler using the handles provided
- ❒ Follow the procedure below when starting and finishing inspection and cleaning work

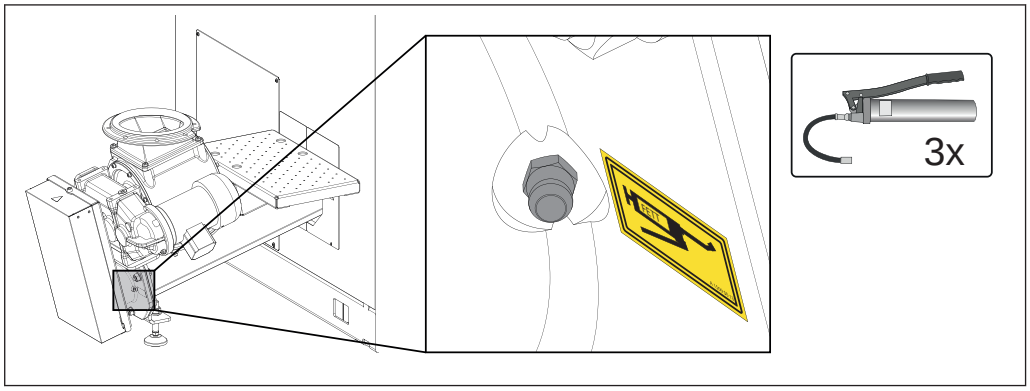
Before starting inspection and cleaning work

- ❒ Switch off the boiler by tapping “Boiler off”
  - ➥ Boiler shuts down and switches to "Boiler off” status
- ❒ Allow the boiler to cool for at least 1 hour
- ❒ On the control, go to the “Manual operation” menu
  NOTICE! See operating instructions for boiler controller
- ❒ Use the DOWN arrow to navigate to the “`Tip drive`” parameter
- ❒ Set parameter to “`ON`”
  - ➥ Combustion grate tips
- ❒ Turn off the main switch

After inspection and cleaning work

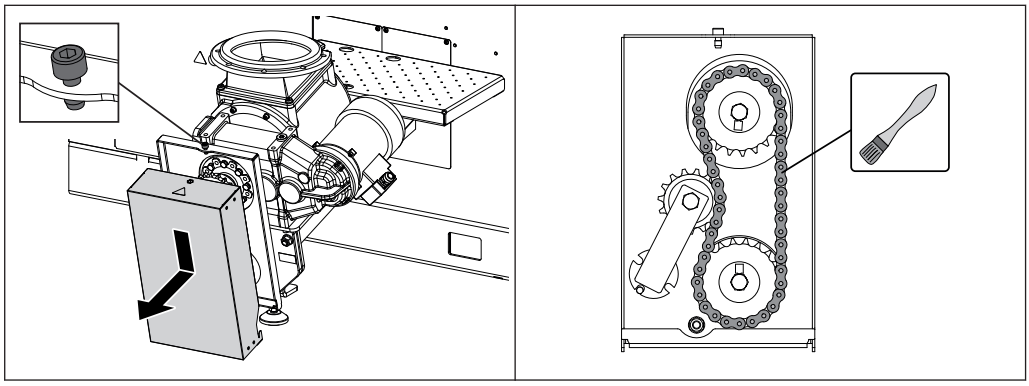
- ❒ Turn on the main switch
  - ➥ Combustion grate previously opened manually now closes automatically and the boiler switches to “Boiler off” status
- ❒ Activate “service mode” in the quick menu
  - ➥ The boiler starts the cleaning module and removes any remaining ash in the combustion chamber
  - ➥ Once self-cleaning is finished the boiler switches to "Boiler off" status.

Lubricate the stoker bearings [~1000 B/every six months]



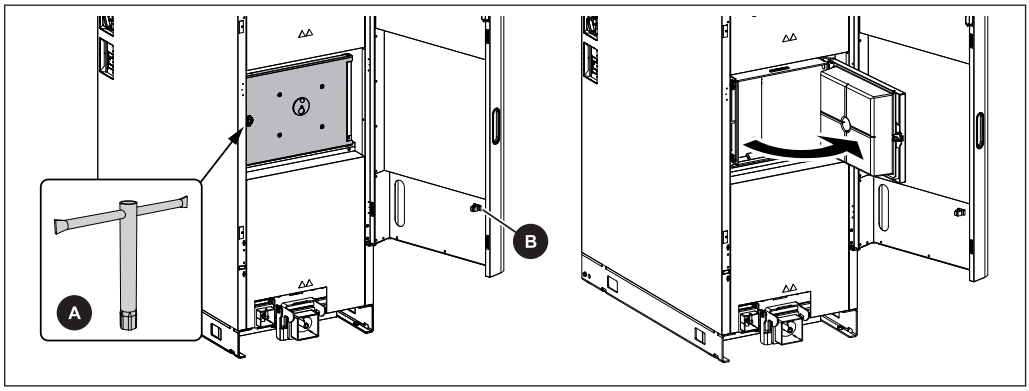
❒ Lubricate stoker bearings with three grease gun strokes per grease nipple

Check chain and sprockets [~1,000 operating hours / every six month]

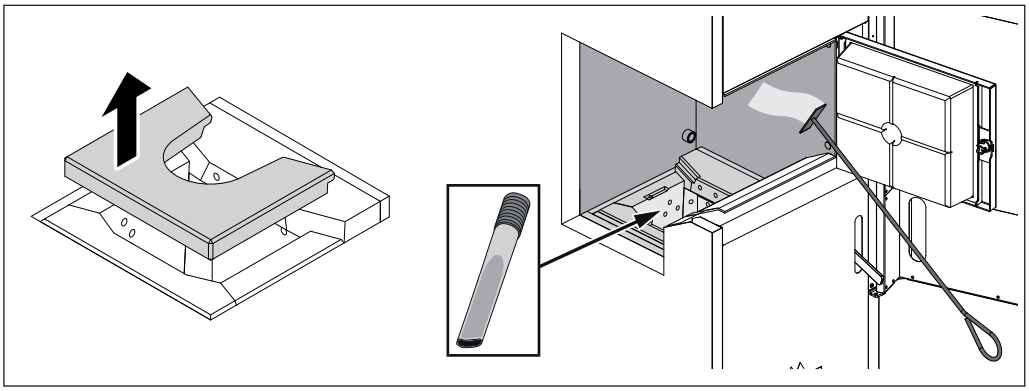


❒ Loosen the screw at the top of the cover and remove the cover by pulling it downwards
❒ Check chain and sprockets for wear, replace if necessary
❒ Grease chain and sprockets using suitable lubricant
❒ Check chain for tension

Clean the combustion chamber [~2500 Bh /yearly]



❒ Open the insulated door
❒ Pull out the ash container
❒ Open the combustion chamber door by turning the Allen wrench (90°)
  ➥ Use the Allen wrench included (A – AF 13 mm)
  ➥ Allen wrench stored in tool clip (B)



❒ Remove the burn-out ring

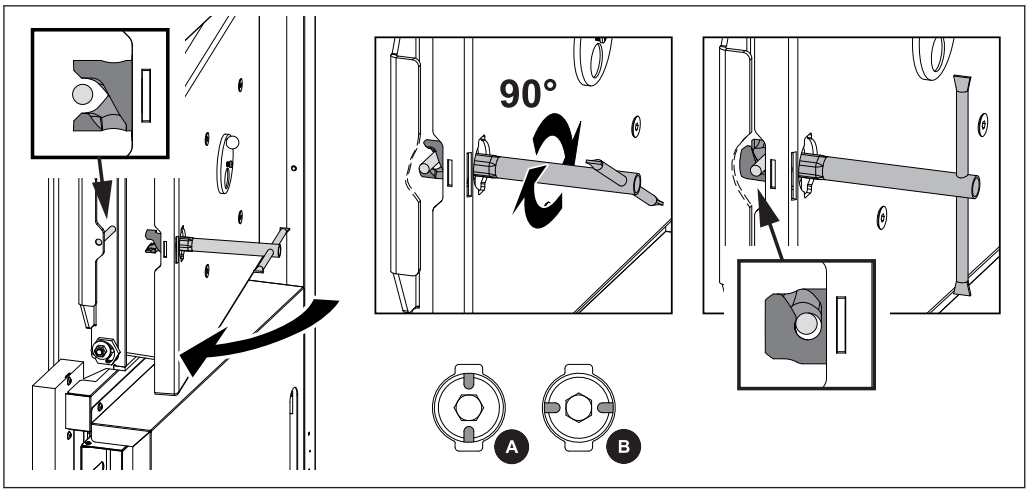
❒ Remove the ash deposits from the walls of the entire combustion chamber (top, side, back) using an ash scraper or broom

❒ Use a small shovel or similar to remove any ash from the combustion chamber

↳ Ash vacuum recommended

↳ Do not throw the ash onto the grate

❒ Check the firebricks and combustion grate for dirt and deposits and clean if necessary

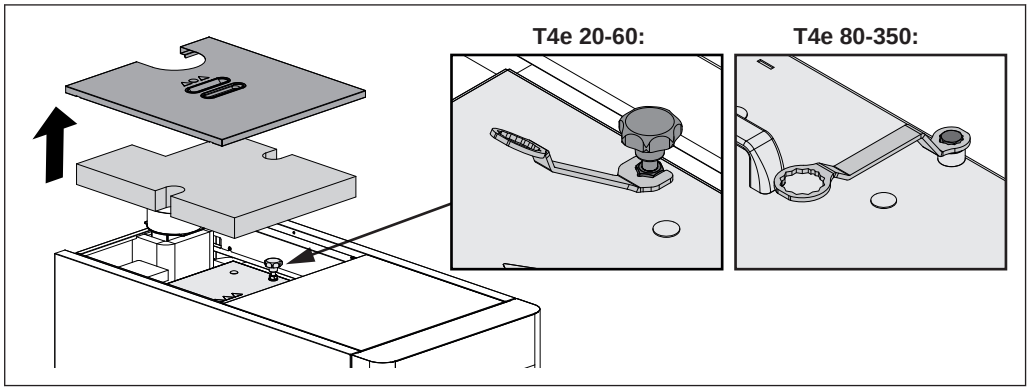


❒ Close the combustion chamber door by turning the Allen wrench (90°)

↳ A – Notch in screw cap vertical: Door open

↳ B – Notch in screw cap horizontal: Door closed

Clean heat exchanger and flue gas collection chamber [~2500 Bh/yearly]



❒ Remove the insulating cover and thermal insulation

T4e 20-60:

❒ Loosen the lock nuts on both star-shaped screw knobs

➥ Use the spanner provided

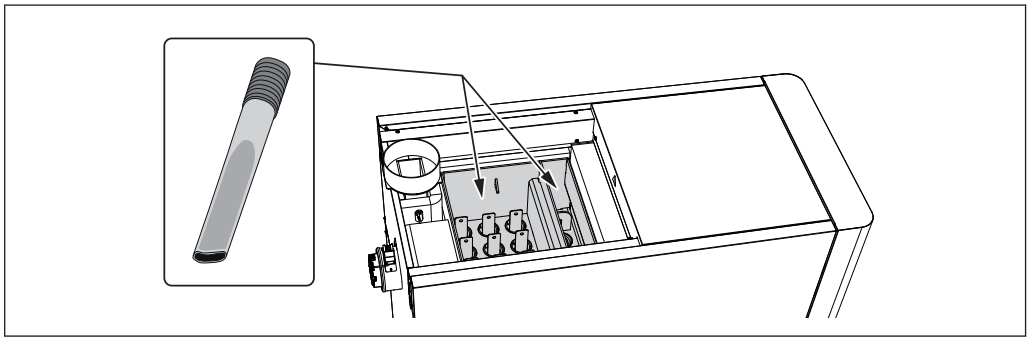
❒ Unlock the cover by turning the star-shaped screw knob and remove

T4e 80-350:

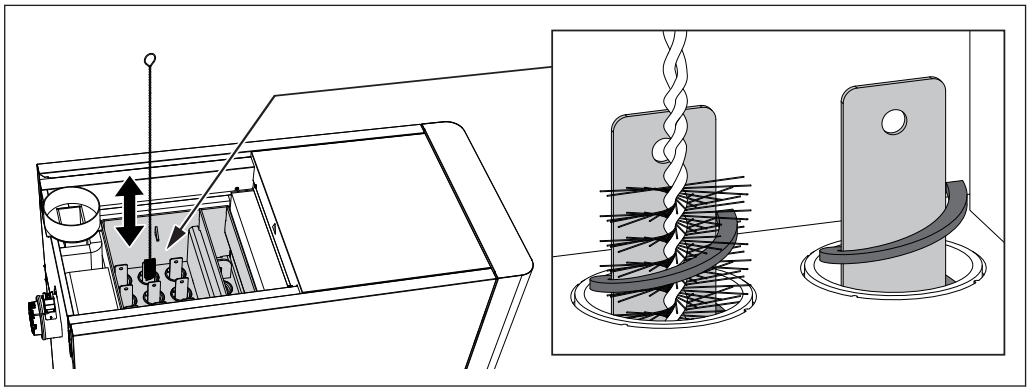
❒ Connect the extension cable to the broadband probe

❒ Remove the spring bolt and lift the cover

➥ Use the spanner provided



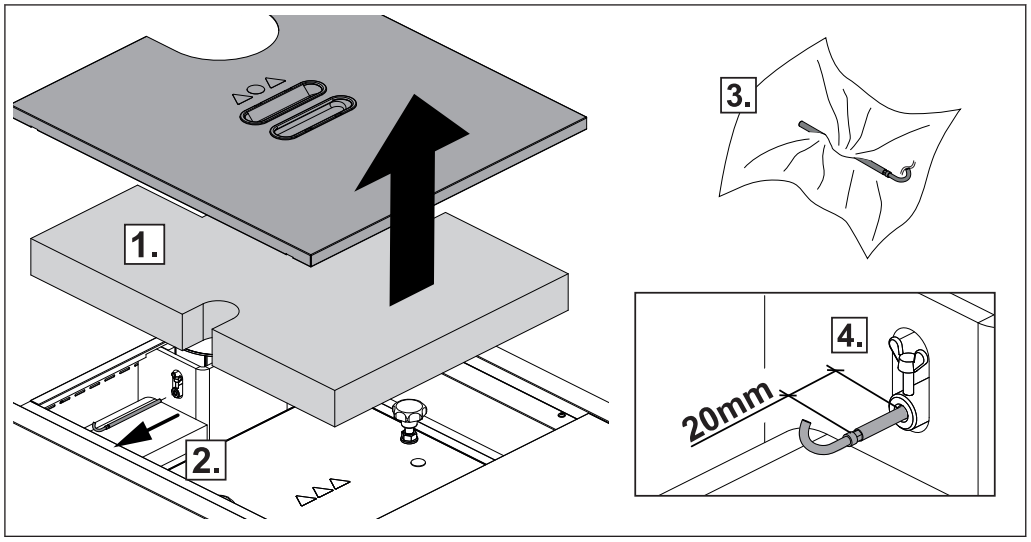
❒ Clean the entire flue gas collection chamber using an ash vacuum



❒ Clean the WOS springs using a cleaning brush on both sides of the inner panel

NOTICE! WOS springs do not have to be removed for cleaning!

Clean the flue gas temperature sensor [~2500 Bh/yearly]



1. Remove the insulating cover and thermal insulation
2. Release the retaining screw and remove the flue gas temperature sensor from the flue gas pipe
3. Wipe the flue gas temperature sensor with a clean cloth
4. Push in the flue gas temperature sensor until about 20 mm of the sensor remains protruding from the bushing and secure with fixing screw

Clean the flue gas pipe [~2500 Bh /yearly]

❒ Unplug the connection cable of the induced draught fan
↪ This prevents damage to the fan from the cleaning brush
❒ Remove the inspection cover on the connecting pipe
❒ Clean the connecting pipe between the boiler and chimney with a chimney sweeping brush
↪ Depending on the layout of the flue gas pipes and the chimney draught, cleaning once a year may not be enough!
❒ Plug in the connection cable of the induced draught fan

Check the draught regulation damper [~2500 Bh/yearly]

❒ Check that the draught controller flap moves freely

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).

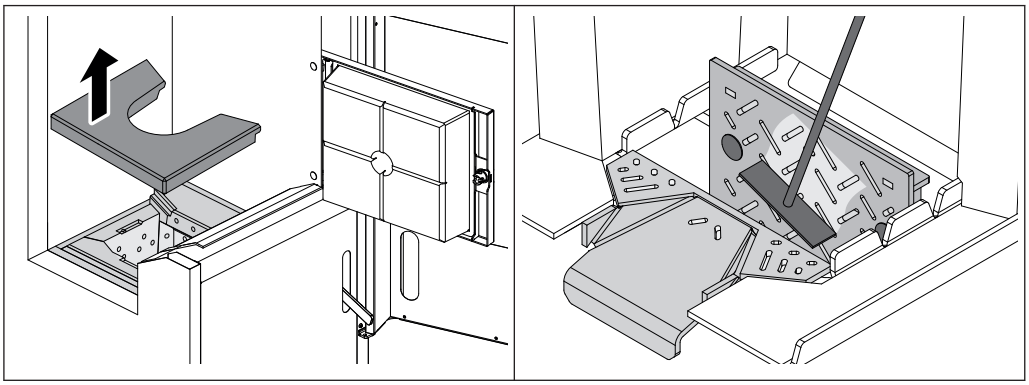
Regular maintenance and servicing by a heating specialist will ensure a long, trouble-free service life for your heating system. It will ensure that your system stays environmentally-friendly and operates efficiently and cost-effectively.
In the course of this maintenance the entire system is inspected 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).

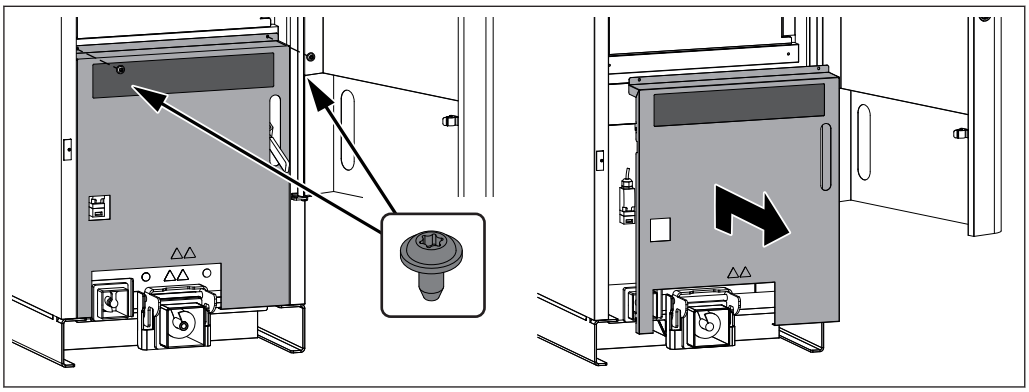
5.4.1 Checking and cleaning the combustion grate



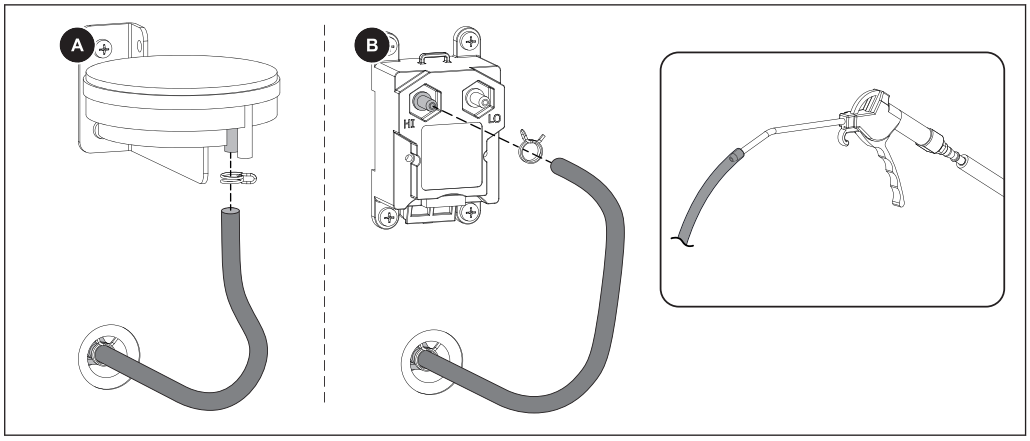
❒ Open the insulating door and combustion chamber door
❒ Remove the firebrick from the burn-out opening
❒ Remove any dirt from the tilted grate using the furnace tool

5.4.2 Cleaning the measurement line of the underpressure controller

❒ Open the insulated door and remove the ash container from the boiler
➥ ⇨ See "Checking the fill level of the ash container and emptying if required" [page 47]



❒ Remove the left and right screws on the front cover plate
❒ Slide the cover plate up and remove



❒ Loosen the twin wire clamp with pliers and remove the measurement line from the under-pressure sensor cartridge

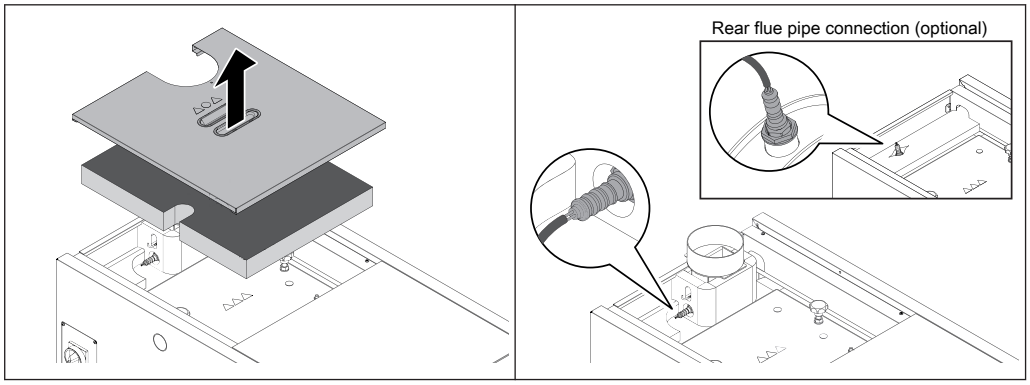
❒ Clean the measurement line with gentle compressed air

➥ WARNING! Do not direct compressed air into under-pressure sensor cartridge! This could damage it!

❒ After cleaning, refit the measurement line
Depending on the design, port “-” (A) or “HI” (B)

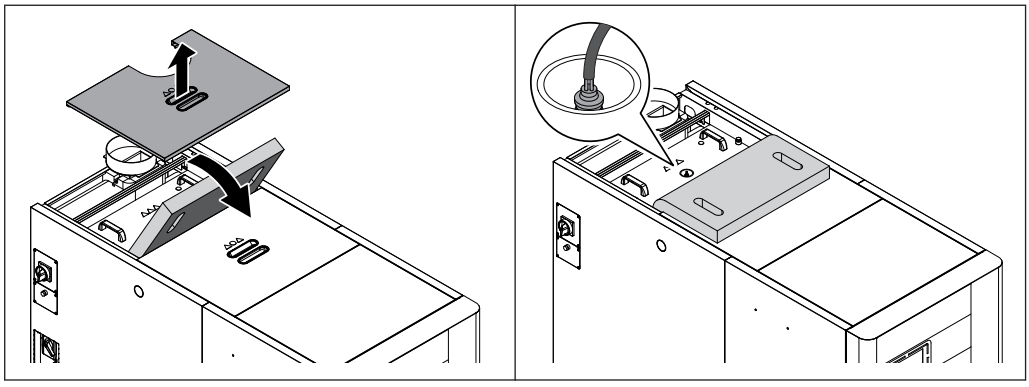
5.4.3 Cleaning the Lambda probe

Up to boiler type 60:



❒ Remove the back insulating cover and thermal insulation upwards

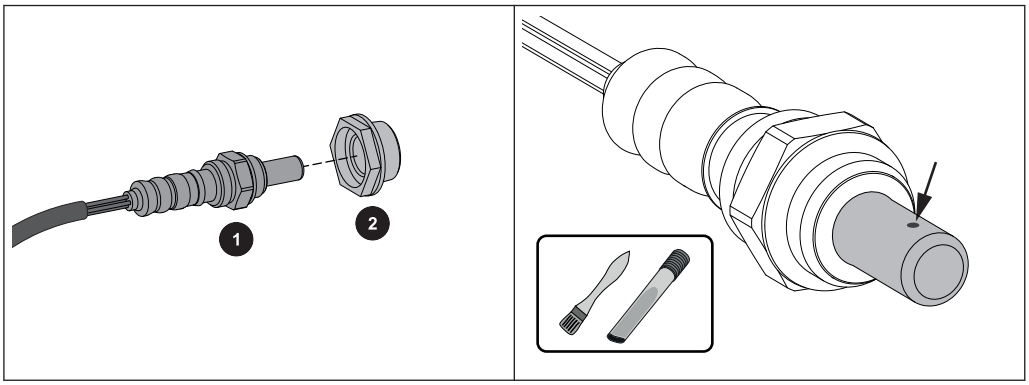
Starting at boiler type 80:



❒ Remove the back insulating cover by pulling it up and fold the thermal insulation down

❒ Loosen the spring bolts and open the front cover of the heat exchanger

NOTICE! If the lambda probe is installed in the heat exchanger cover of the boiler, the plastic bushing is omitted. Moreover, the lambda probe can be cleaned in this position whilst mounted.



❒ Carefully remove the Lambda probe (1) and plastic bushing (2)
  ➥ Pay attention to the cables of the Lambda probe!
❒ Carefully remove impurities from the measuring ports with a fine brush and ash vacuum
  ➥ Hold the Lambda probe with the tip downwards so that deposits can fall out of the measuring ports
❒ Check the plastic bushing (2) for dirt and cracks, replace if necessary
  ➥ IMPORTANT: The seal surface of the plastic bushing must lie flat after assembly

CAUTION:

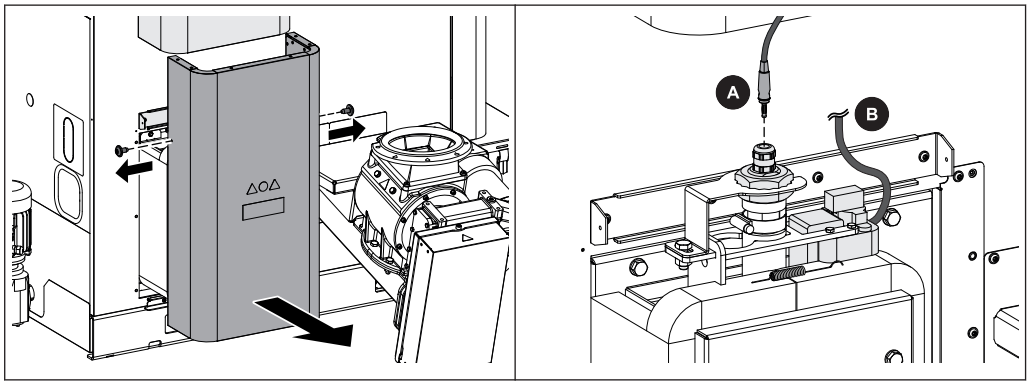
- Do not clean the Lambda probe with compressed air
- Do not use chemical cleaning agents (brake cleaner, etc.)
- Careful handling of the Lambda probe, no “tapping” or cleaning with a wire brush

5.4.4 Clean the particle filter (optional) and heat exchanger pipes

NOTICE! Remove the particle filter before cleaning the heat exchanger.

Remove and clean the particle filter (optional)

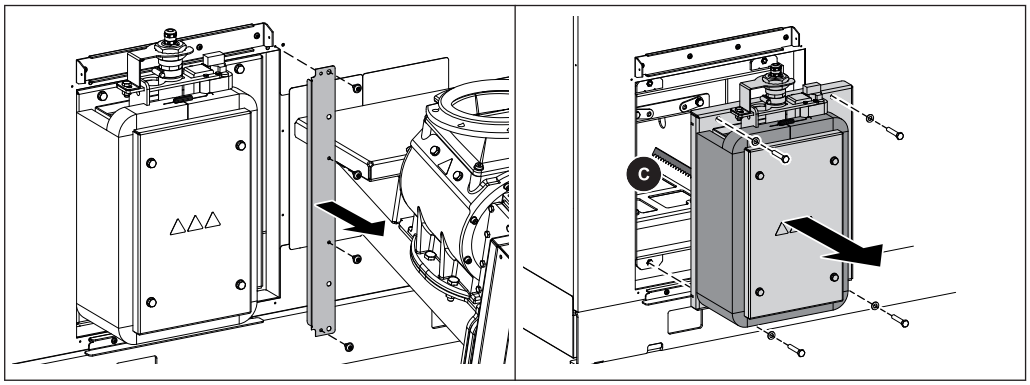
For all electrodes and housings of the particulate filter compliance with the following steps is mandatory:



❒ Undo two screws and remove the lower cover

❒ Unplug the high-voltage cable (A) from the isolator and disconnect the vibration motor plug connection (B)

Up to boiler type 60:

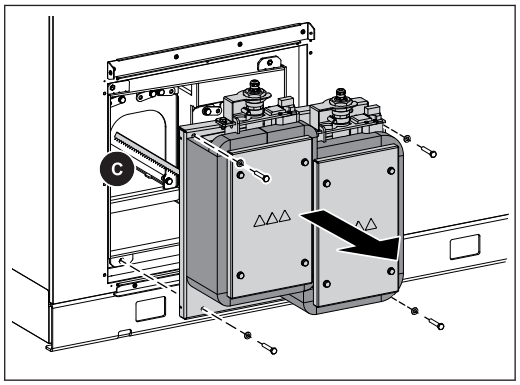


❒ Remove the cover plate between the e-filter and the stoker

❒ Undo the external screws on the cover and carefully remove the entire unit

➥ **CAUTION: In so doing, pay special attention to electrode (C).**

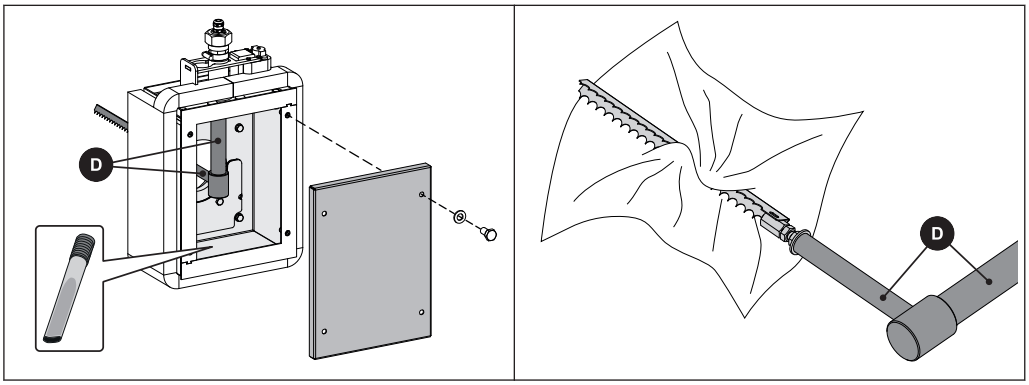
Starting at boiler type 80:



❒ Undo the external screws on the cover and carefully remove the entire unit

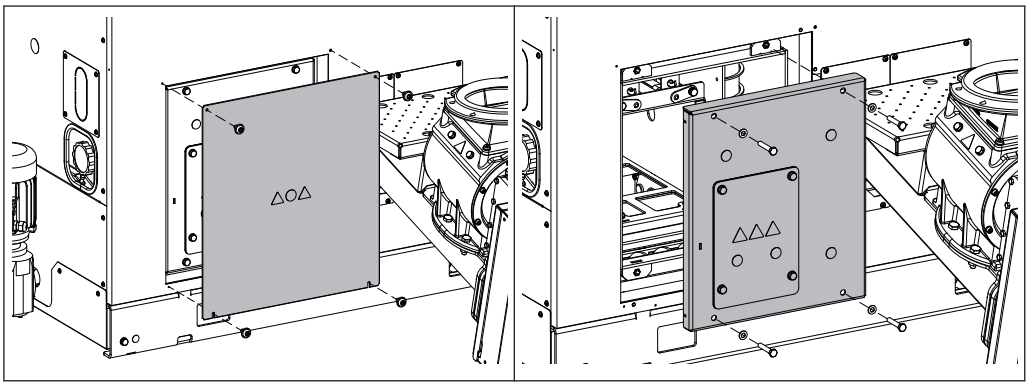
➥ **CAUTION: The electrodes (C) require special attention!**

The following steps apply to all boxes and electrodes:



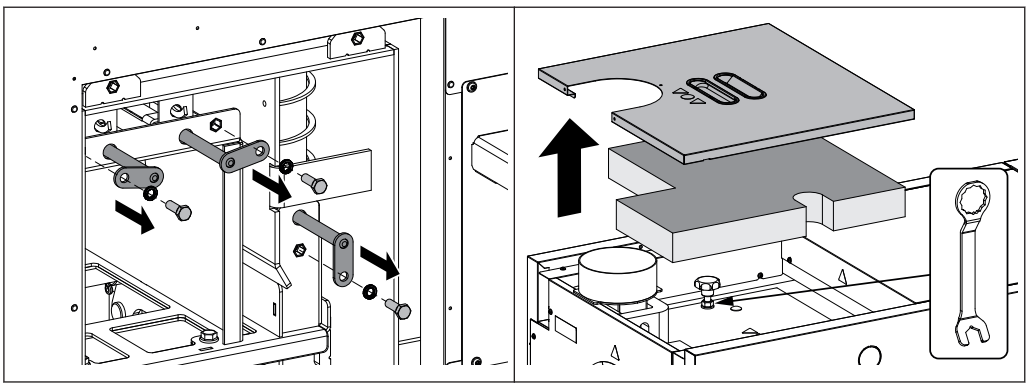
- ❒ Remove the cover and use the ash vacuum to remove deposits on the inside
- ❒ Carefully clean the isolator (D) and electrode with a soft cloth

Cleaning the heat exchanger pipes

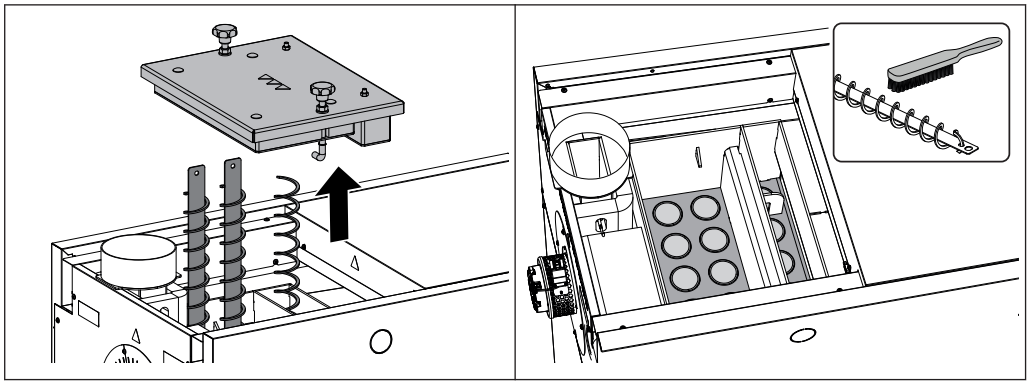


For boilers without electrostatic precipitators:

- ❒ Remove the lower cover plate from the reversing chamber on the stoker side
- ❒ Remove the cover located behind it



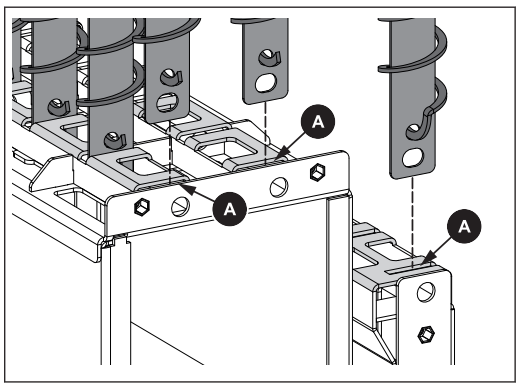
- ❒ Undo the screw connections on the WOS shaft and pull out all shafts
- ❒ Take off the rear cover from the flue gas nozzle and remove the thermal insulation
- ❒ Loosen the locking screws using the enclosed spanner



❒ Remove the cleaning cover
❒ **For existing e-filter:** Remove the earthing bracket from the WOS springs
❒ Pull out the WOS springs
❒ Clean the heat exchanger pipes and WOS springs

❒ Assemble all of the components in reverse order

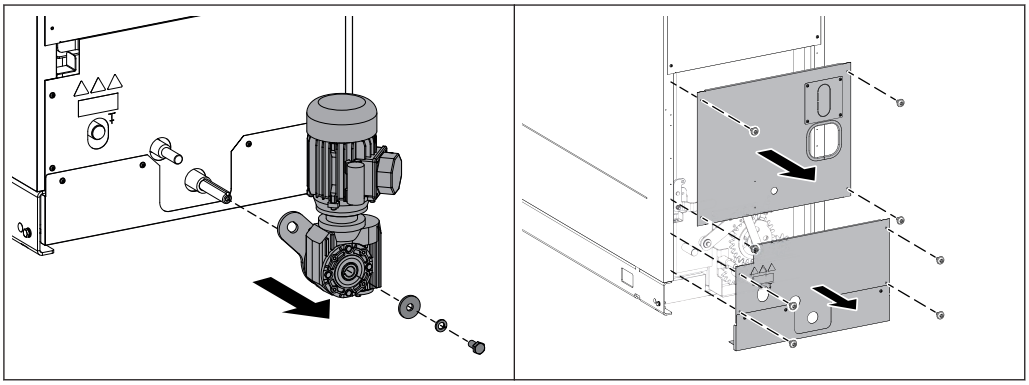
Caution when installing WOS springs:



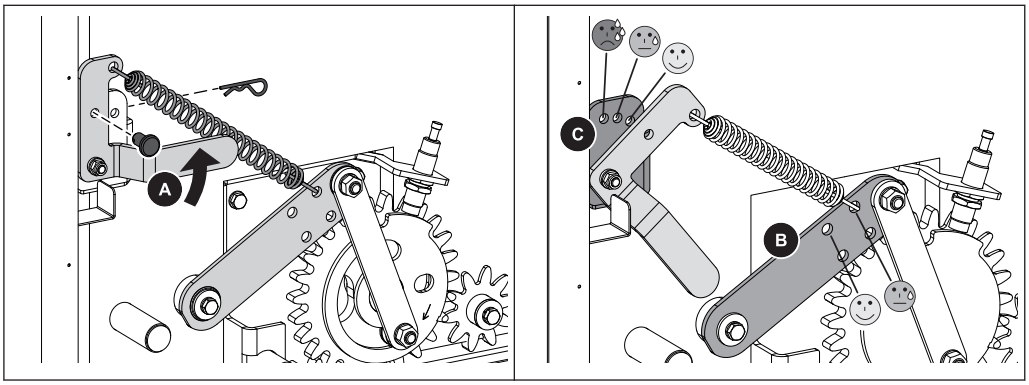
❒ Push the WOS springs with round cutouts down into the heat exchanger pipes
➥ In so doing, press the inside panel of the spring into the slot (A) until it stops

5.4.5 Adjust the power of the WOS system

T4e 20-60



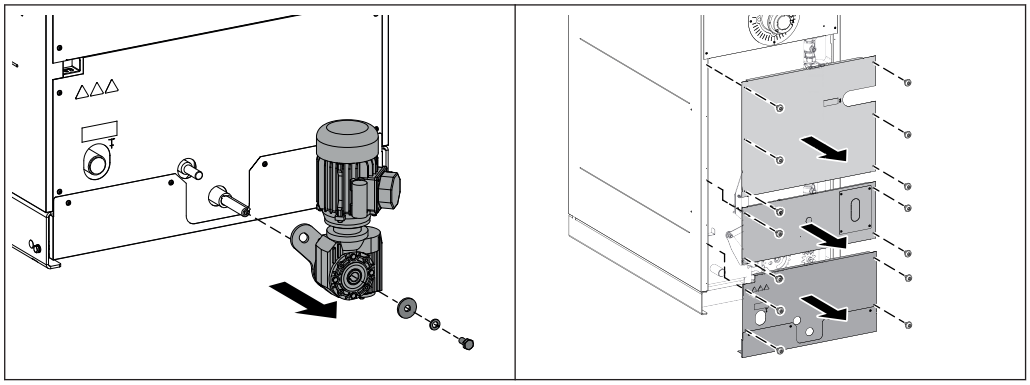
❒ Remove the geared motor from the back of the boiler
❒ Remove middle and lower back panel



❒ Push the clamping lever (A) up, against the spring's force, and remove the non-threaded stud and spring cotter pin
❒ Carefully guide the clamping lever (A) downwards
❒ Hook the tension spring into the applicable hole on the carrier plate (B)
❒ Push the lever up and attach it at the applicable hole of the console (C) using the non-threaded stud and spring cotter pin

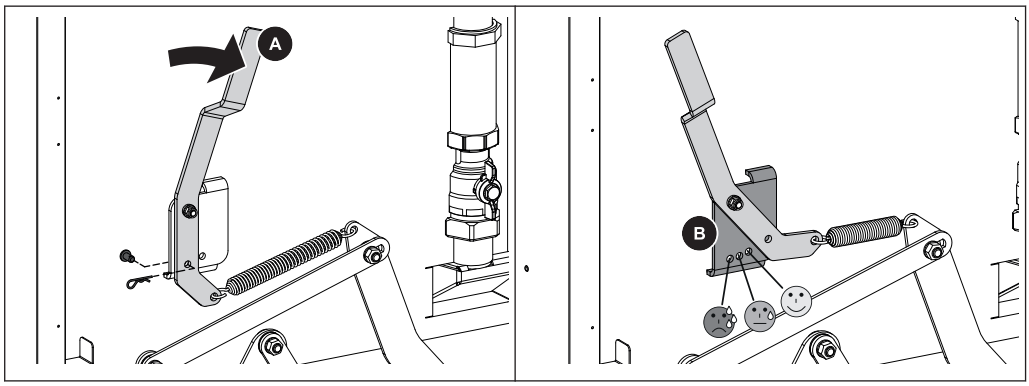
EFFECT: The more tension is applied to the spring, the less force is required to clean the WOS pipes, and the more the impact is damped.

T4e 80-180



❒ Remove the geared motor from the back of the boiler

❒ Remove the three back panels

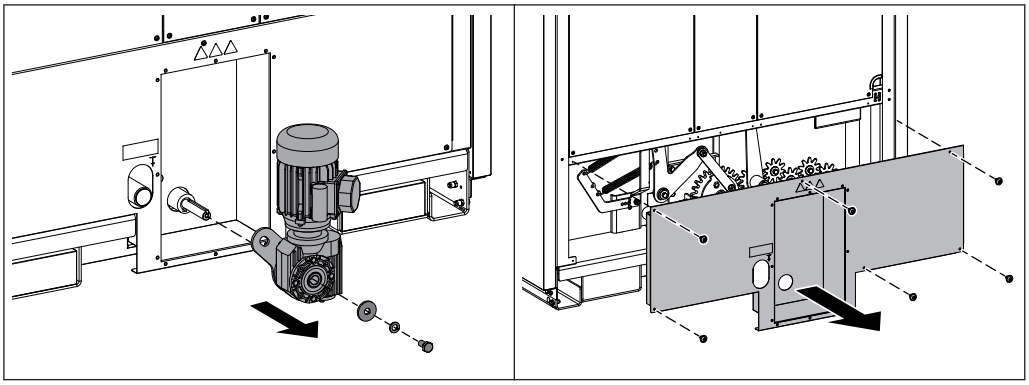


❒ Push the clamping lever (A) to the right, against the spring's force, and remove the spring cotter pin and the non-threaded stud

❒ Use the spring cotter pin and non-threaded stud to attach the clamping lever (A)

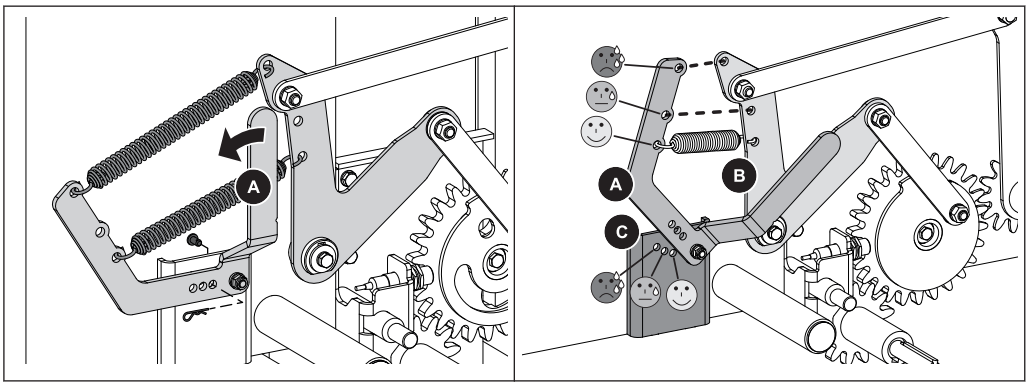
EFFECT: The more tension is applied to the spring, the more force is applied to clean the WOS pipes, and the impact is increased.

T4e 200-350



❒ Remove the geared motor from the back of the boiler

❒ Remove lower back panel



❒ Push the clamping lever (A) to the left, against the spring's force and remove the spring cotter pin and non-threaded stud

❒ Hook the tension springs into the applicable holes on the clamping lever (A) and the carrier plate (B)

❒ Use the spring cotter pin and non-threaded stud to attach the clamping lever to the applicable hole of console (C)

EFFECT: The more tension is applied to the springs, the more force is applied to clean the WOS pipes, and the impact is increased.

5.5 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.

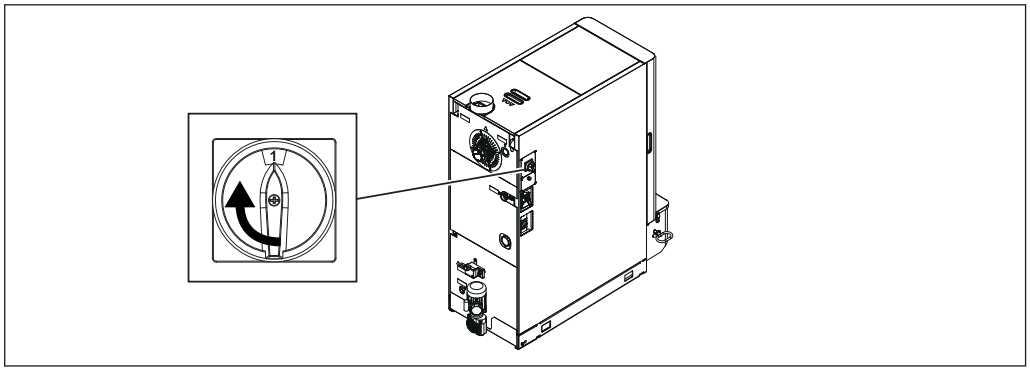
The following minimum requirements must be met by the operator of the system for a successful measurement:

- ❒ Thoroughly clean the boiler immediately before the 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

5.5.1 Switch on the system

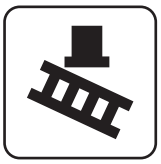
When the cleaning is complete:

- ❒ 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

5.5.2 Start emissions measurement



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

immediately	❒ Specify the type of measurement (`nominal load` / `partial load`) ↪ The flue gas temperature and residual oxygen content should have stabilised approximately 20 minutes after activation ↪ The display will indicate that the boiler is ready for measurement as soon as all the conditions for the measurement are fulfilled
Enter target date	❒ Enter the time of measurement (date and time) ↪ The boiler will follow the shutdown procedure before the start of the measurement according to the time lock and will not start up again until the set time ↪ **NOTICE! The boiler starts 30 minutes before the start of the measurement and is already ready for measurement at the set time!**

5.6 Replacement parts

With Froling original replacement parts in your system, 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.

5.7 Disposal information

5.7.1 Disposal of the ash

Austria: ❒ dispose of ash in accordance with the Waste Management Act (AWG)
Other countries: ❒ dispose of ash in accordance with local regulations

5.7.2 Disposal of system components

❒ Ensure that they are disposed of in an environmentally friendly way in accordance with waste management regulations in the country (e.g. AWG in Austria)
❒ You can separate and clean recyclable materials and send them to a recycling centre.
❒ The combustion chamber must be disposed of as builders' waste.

6 Troubleshooting

6.1 General fault with 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

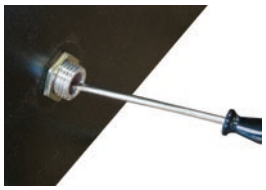
6.1.1 Behaviour of system after a power failure

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:

- ❒ Status LED indicates the nature of the fault
  - Orange flashing: Warning
  - Red flashing: Error or alarm
- ❒ A fault message is shown on the display

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

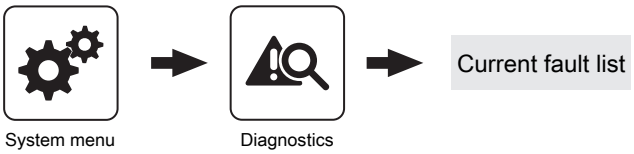
WARNING	In case of warnings the boiler initially continues controlled operation, giving the option of resolving the error quickly to prevent a shutdown.
ERROR	The boiler follows the shutdown procedure and remains in "Boiler off" status until the problem is resolved.
ALARM	An alarm triggers a system emergency stop. The boiler shuts down immediately, the heating circuit controller and pumps remain active.

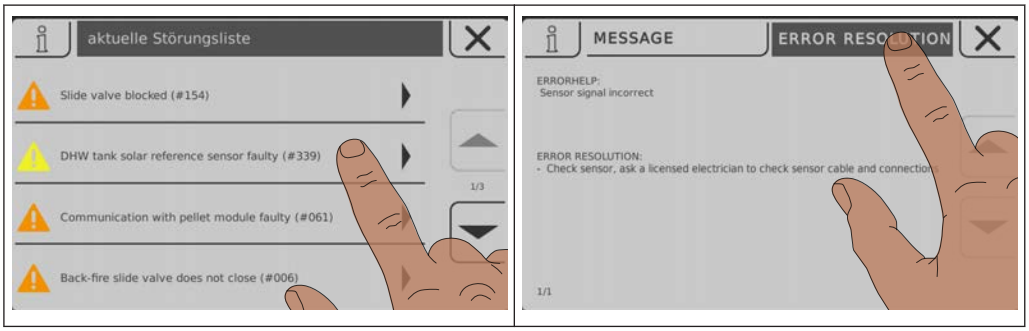
6.3.1 Procedure for fault messages

If a fault occurs on the boiler, it will be shown on the display.

If the fault is acknowledged, although it has not been rectified, the window with the associated fault can be reopened as follows:

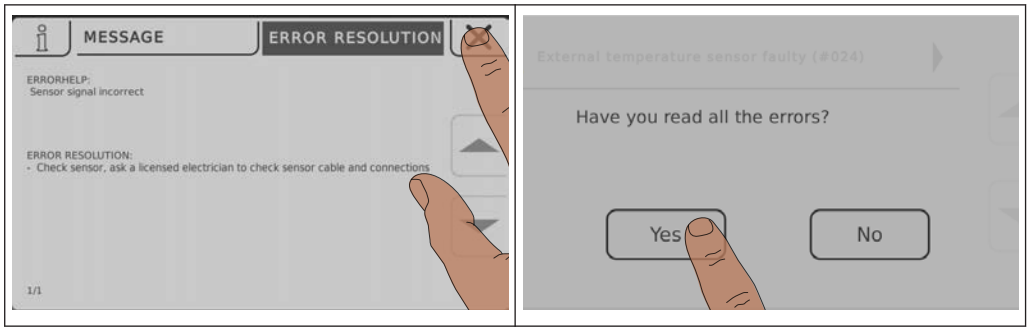
Open error display





The error display lists all current faults

- ❒ Open by tapping the listed fault
- ❒ The “Message” tab displays the current fault.
- ❒ Press the “Error resolution” tab to view possible causes and troubleshooting procedures



❒ Tap the Cancel icon to close the current fault and display the fault list

❒ Tap the Cancel icon again and confirm that you have read all of the errors to return to the basic display

➥ The boiler is in the previously set mode

7 Notes

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
INTERNET 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