FRÖLING
WARMTH FROM WOOD

Operating Instructions

FHG Turbo 3000

Read and follow the operating instructions and safety information.

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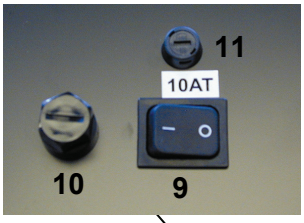
Dear Customer,

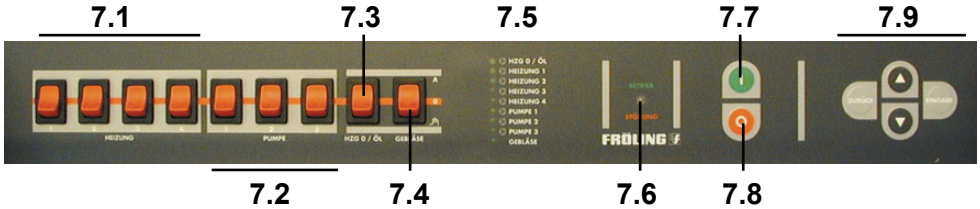
Congratulations on choosing a quality product from FRÖLING.

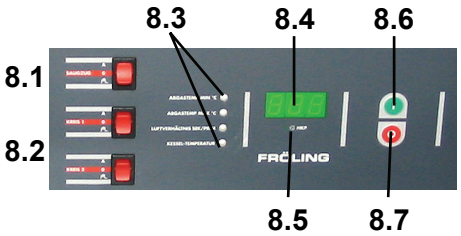
The FRÖLING FHG Turbo 3000 is a state-of-the-art design that conforms to all currently applicable standards and testing guidelines.

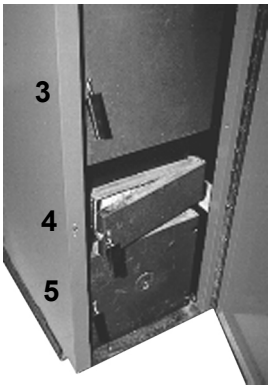
Please read and observe the operating instructions and always keep them available in close proximity to the boiler. They contain safety information and all the operation and maintenance specifications needed to operate the boiler safely, properly, and economically.

1 Overview









Pos.	Component
1	FHG Turbo 3000 Firewood Boiler
2	Insulating door for reduced heat radiation
3	Fuel loading door
4	Pre-heating chamber door
5	Combustion chamber door
6	Side cleaning port door
7	Lambdatronic S3100 Control System
7.1	**HEATING 1-4** (Auto/Off/Manual)
7.2	**PUMP 1-3** (Auto/Off/Manual)
7.3	**HTG 0 / OIL** (Auto/Off/Manual)
7.4	**BLOWER FAN** (Auto/Off/Manual)
7.5	The respective LED illuminates when Pos. 7.1 – 7.4 are active
7.6	Status LED (Operating Status): - long, green blinking light: Boiler activated - short, green blinking light: Boiler deactivated - red blinking light: Malfunction
7.7	START key: Switch on boiler
7.8	STOP key: Switch off boiler (not possible during heating operation)
7.9	MENU keys: Manipulate the program menus
7.10	Two-line display for indicating the operating statuses
8	Digitronic S3100 Control System
8.1	**INDUCED DRAUGHT UNIT** (Automatic/Off/Manual)
8.2	**CIRCUIT 1-2** (Automatic/Off/Manual)
8.3	Controller for adjusting: flue gas temperatures, air status, boiler temperature
8.4	3-digit display for indicating: boiler temperature, flue gas temperature, Pos. 8.3 controller settings
8.5	Heating circuit pump (HKP) status LED: illuminates on reaching the release temperature for the heating circuit pump
8.6	START key: Switch on boiler
8.7	STOP key: Switch off boiler (not possible during heating operation)
9	Main switch: switches the system on and off
10	STB – Safety Temperature Limiter
11	Power network fusing of the controller (glass-tube fusing 20 x 5mm 10AT)

2 Safety

2.1 Permitted uses

The boiler should only be operated when it is fully efficient. The boiler should be operated in accordance with the instructions given in this manual. Implement all the necessary safety precautions. Before you start using the boiler, make sure that you are aware of the potential hazards involved. Ensure that any malfunctions, which might impact safety are traced and removed immediately.

The FHG Turbo 3000 series of heating boilers is intended exclusively for heating domestic hot water. Only use the fuels specified below 2.1.1.

The manufacturer or supplier are not liable for any damages resulting from non-permitted uses.

2.1.1 Permitted fuels

For Austria:

Firewood with a max. length of 55cm (w < 25%)
Waste-wood as per ÖNORM M 7133 – G100 (w < 25%)
Saw-mill waste, dry (w < 25%)

Values in practice:	Hardwood	2 years in dry storage
	Soft wood	1 year in dry storage
	Coarse waste-wood	1 year in dry storage

For Germany:

Fuel class 4 (1. BimSchV i. d. g. F.)

IMPORTANT

Caustic sediment layers or condensation in the boiler as the result of burning unauthorized fuels!

This will void your guarantee. Damage or corrosion in the combustion chamber and boiler may result!

2.1.2 Who May Operate the Boiler

Only trained operators are permitted to operate the boiler.

IMPORTANT

No unauthorized access to the boiler room.

Possible personal injury and damage to property!

☞ It is the responsibility of the operator to ensure that unauthorized persons, especially children, are kept away from the boiler.

2.2 Safety Information

As a rule, the operator is not authorized to modify or disable the safety equipment.

In addition to the operating instructions and the applicable regulations for the country in which the boiler will be operated, all fire, police, and electrical regulations must be observed.

2.2.1 Official approval and reporting obligations

NOTE

☞ **Each heating system must be officially approved.**

In Austria:
- Report to the construction authorities of the community or magistrate

In Germany:
- Report to the chimney sweep or the construction authorities

2.2.2 Domestic hot water requirements

If the system is topped up or refilled:

❒ Prepare (soften) the water in order to counteract boiler scaling.

Applicable standards:

Austria:	ÖNORM H 5195
Germany:	VDI 2035

2.2.3 Ventilating the Boiler Room

The supply and exhaust air openings should be arranged as nearly opposite each other as possible to achieve a good thermal draught effect.

☞ Draw in the supply air directly from outside. Expel the exhaust air directly to the outside.

Applicable standards:
- TRVB H 118
- ÖNORM H 5170

Unless otherwise directed by local regulations:

☞ Provide an exhaust air cross-section of 2 cm^2 per kW of boiler rated output, however, a total cross-section of at least 200 cm^2

2.2.4 Heating System Installation/Standards

ÖNORM/DIN EN 12828 governs the installation of the heating system:

Return feed lift

If the heated water return feed is under the minimum return temperature, a portion of the heated water outfeed will be mixed in.

IMPORTANT

Operating without return feed lift!

Damage may result from dropping below the dew point or the formation of condensation!

In combination with combustion residues, the condensation forms a caustic condensate which shortens the service life of the boiler!

Take the following precautions:

☞ **A return feed lift is a regulatory requirement!**

2.2.5 Chimney Connection / Chimney System

As per EN 303-5, the entire flue gas system is to be designed in such a way as to prevent possible seepage damage, insufficient feed pressure, and condensation.

In relation to this, it's necessary to point out that flue gas temperatures of less than 160 K above room temperature can occur within the permitted operating range of the boiler.

The flue gas temperatures in the cleaned state as well as additional flue gas values can be found in the table "*Boiler Data for Configuring the Chimney*" in the assembly instructions.

Design information

Make a connection using the shortest path rising between 30 – 45° to the chimney and insulate the connecting piece.

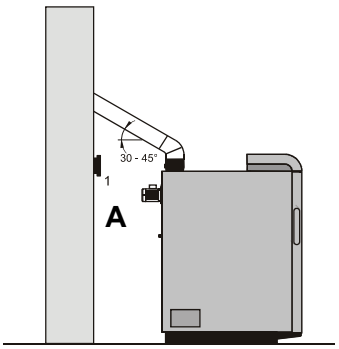
The entire flue gas system, the chimney and its connection, must be laid out as per ÖNORM/DIN EN13384-1.

In addition, local and other lawful regulations apply!

☞ The chimney must be approved by a smoke trap sweeper or chimney sweep!

☞ As per TRVB H 118, an explosion flap must be installed in the flue gas pipe or in the chimney!

Draught limiter

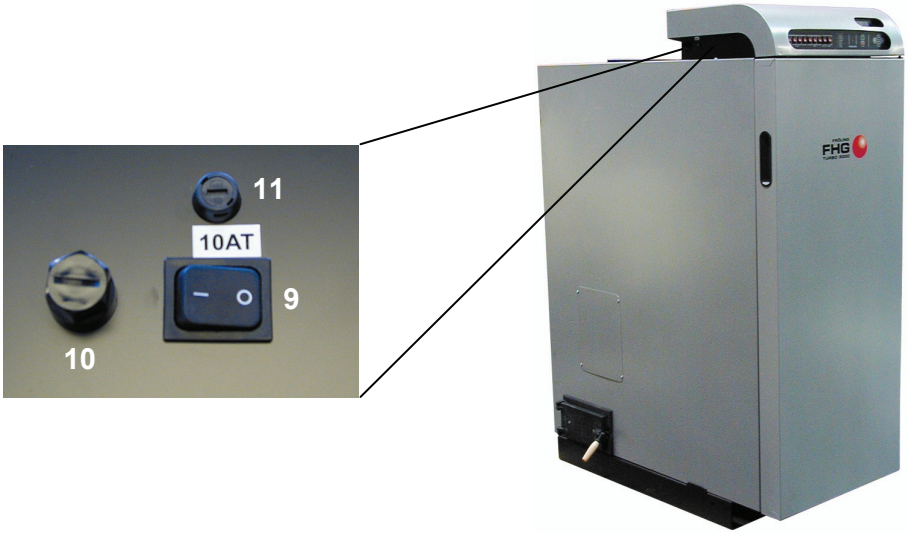


☞ Recommended: Installing a draught limiter **A**

Attaching the draught limiter:

❒ Directly under the mouth of the flue gas line, since an under-pressure condition can always be found there!

2.3 Safety devices



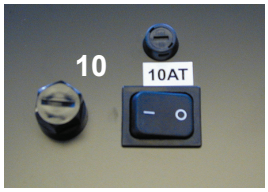
9	Main switch	For shutting down the entire system ➥ All components are switched off and powered down
10	Safety Temperature Limiter	➲ Devices for Preventing the Boiler from Over-heating.
11	Fusing	Properly fuse the control system and any electronic components ☞ When changing fuses, ensure the fuses are rated for the rated current (10AT).

Devices for Preventing the Boiler from Over-heating

1. Thermal Discharge Safety Device

When 100 °C is reached, this device opens a valve and sends cold water to the safety heat-exchanger in order to decrease the temperature.

2. Safety Temperature Limiter



Switches off the blower fan at the maximum boiler temperature of 105 °C. The pumps continue to run.

☞ Once the temperature has fallen to under approx. 95 °C, the safety temperature limiter **10** can be unlocked mechanically.

3. Safety valve

Protection against over-heating:

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

2.4 Residual risks

IMPORTANT

Do not touch hot surfaces and flue gas pipes.

Burns hazard

- ❒ Only operate the boiler using the handles provided for this purpose.
- ❒ Insulate the flue gas pipes or simply avoid touching them during operation.

IMPORTANT

Opening the combustion chamber door (**5**) during operation.

Property damage may result and smoke and gas may accumulate!

The chimney draught is interrupted when the combustion chamber door (**5**) is opened during operation

➥ Flue gas escapes into the boiler room!

Thermal stressing when the combustion chamber door is opened

- ❒ Do not open the doors behind the insulating door under any circumstances while the system is operating

IMPORTANT

Do not use unauthorized fuel types.

Equipment damage hazard.

- ❒ Only use permitted fuels.

➲ See 2.1.1 Permitted fuels

2.5 Emergency actions

If the system over-heats and the safety devices fail to operate, proceed as follows:

- ❒ Keep all the doors on the boiler closed.
  ☞ **Do not switch off the main switch under any circumstances!**
- ❒ Open all mixer taps. Switch on all pumps.
  ☞ Fröling's heating circuit control takes over this function!
- ❒ Exit the boiler room and close the door
- ❒ Open any available radiator thermostat valves

If the temperature does not drop, inform the installer or Fröling's customer service office.

➲ See 6.1.1 Manufacturer's Address

3 Operating the system

3.1 Initial start-up

NOTE

☞ **Conduct the initial start-up with an authorized installer or Fröling's customer service department!**

NOTE

☞ **Escaping condensation during the initial heat-up phase does not indicate a malfunction.**

➥ Clean up later using a cleaning rag

IMPORTANT

Heating up the boiler too rapidly during initial start-up.

Equipment damage hazard.

If the output during the heating-up process is too great, the combustion chamber may become damaged due to drying too rapidly!

☞ Drying fissures, on the other hand, are normal and do not indicate a malfunction!

❒ Load the boiler with a small amount of waste-wood (max. 10-20% of the fuel loading chamber)
❒ Ignite it and allow it to burn up with the central pre-heating chamber door open
❒ Repeat the procedure several times until the combustion chamber is dried out

3.1.1 Checking the heating system

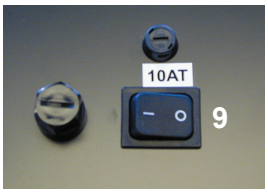
Observe local regulations, but at the very least:

❒ Check that there is sufficient water in the heating system.
➲ See page 16, Checking the system pressure
❒ Check to see whether the heating system has been completely vented.
❒ Check that all the safety devices are correctly fitted and are fully efficient.
➲ See 2.3 Safety devices
❒ Check that there is sufficient ventilation and venting.
➲ See 2.2.3 Ventilating the Boiler Room

3.2 Heating up the boiler

3.2.1 Switching on the system

- ❒ Switch on the main switch **9** at the control system
  - ➥ After the system check, the control system is ready for operation



3.2.2 Switching on the boiler

Lambdatronic S3100

- ❒ Set the INDUCED DRAUGHT FAN selector switch **7.4** or **8.1** to “OFF”
- ❒ Press the START key **7.7** or **8.6**

Digitronic S3100

3.2.3 Load the boiler with fuel and fire it up

- ❒ Open the insulating door and the fuel loading door
- ❒ Fill the fuel loading chamber in accordance with the output
  - ☞ Use firewood with a length of approximately 50 cm and arrange it lengthwise
  - ☞ The flame slot must not be obscured!
- ❒ Close the fuel loading door
- ❒ It is recommended that you do not remove the ash on the combustion chamber during each heating-up process, to protect the combustion chamber.
  - ➲ See page 15, Removing the ash

- ❒ Open the central pre-heating chamber door
- ❒ Place some cardboard and crumpled paper under the wood

Lambdatronic S3100

Digitronic S3100

- ❒ Set the INDUCED DRAUGHT FAN selector switch **7.4** or **8.1** to “Automatic”

- ❒ Leave the pre-heating chamber door open for approximately 5 minutes
  - ➥ A bed of embers forms
- ❒ Close the pre-heating chamber door and the insulating door
  - ☞ The flue gas temperature must be > 130°C!

3.2.4 Controlling the boiler

Necessary control steps. Displaying or modifying parameters:

➲ See the operating instructions for the “Digitronic S 3100” or “Lambdatronic S 3100”

3.2.5 Refilling the fuel

- ❒ Open the central pre-heating chamber door and check the fuel

If the fuel in the boiler has burned up:

- ❒ Open the upper fuel loading door and refill the chamber with fuel

Operating with a storage tank

The reloading intervals should depend exclusively on the storage tank!

If the temperature of the storage tank above has dropped to a certain temperature (floor heating: ca. 30-40 °C, radiator heating: ca. 50 °C), reload fuel.

The amount of fuel should be measured so as to ensure that the storage tank is continuously warmed to the maximum storage temperature (max. 80-90 °C).

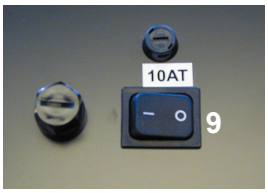
☞ The amount to reload also depends on the type of fuel!

Operating without a storage tank

Feed based on output
☞ **Only replenish the fuel if energy is needed!** If too much fuel is loaded: ➥ The boiler drops below its minimum output limit and switches over to so-called low-temperature operation (fan switches off) ☞ During low-temperature operation, the efficiency drops, the emissions increase and the boiler tars up (pitch formation!)

3.2.6 Switching off the system

☞ **IMPORTANT! Only switch off when the boiler has cooled down.**



Switch off the main switch 9 at the control system

➥ The controller is switched off.

➥ All the system components are powered down.

4 Boiler maintenance

IMPORTANT

Maintenance when the boiler is hot.

Burn hazard from hot parts or in extreme cases, poisonous smoke inhalation due to smouldering wood!

Before starting maintenance on the boiler:

- ❒ Allow the fuel to burn completely
- ❒ Allow boiler to cool off and shut down

IMPORTANT

Working on electrical components.

Hazard - Risk of electric shock

- ❒ Work on electrical components must only be carried out by authorised skilled electricians.

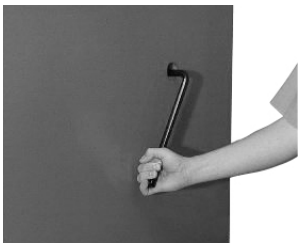
4.1 Inspection, Cleaning and Maintenance

☞ **Recommended:** When cleaning, use an ash vacuum.

4.1.1 Daily Maintenance

Cleaning the heat-exchanger pipes (with heat-exchanger technology)

- ❒ Activate the lever of the cleaning system several times before the heating-up process (5-10 times up and down)



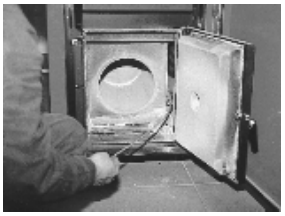
4.1.2 Weekly Maintenance

Removing the ash

- ❒ Open the insulating door and the central pre-heating chamber door
- ❒ Using the ash scraper, scrape the ash located above the combustion chamber into the combustion chamber

- ❒ Open the combustion chamber door
- ❒ Remove the ash using the rounded ash shovel
- ❒ Shovel the ash into the container intended to receive it
  ☞ Fire-proof container with a cover!

Cleaning the passage to the side of the combustion chamber



- ❒ Open the insulating door and combustion chamber door
- ❒ Check the passage to the left and right of the combustion chamber for ash deposits
  - ☞ The amount of ash will depend on the type of fuel used!
- ❒ Clean the passages with a small brush and remove any fallen ash

Checking the thermal discharge safety device

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

If water is dripping from the discharge pipe:

- ❒ Clean the discharge safety device or have the installer replace it if necessary

Checking the system pressure

- ❒ Read off the system pressure on the pressure gauge
  - ➥ The value must be over the pre-stressed pressure of the expansion tank by 20%
  - ➲ See the expansion tank's operating instructions

If the system pressure is less:

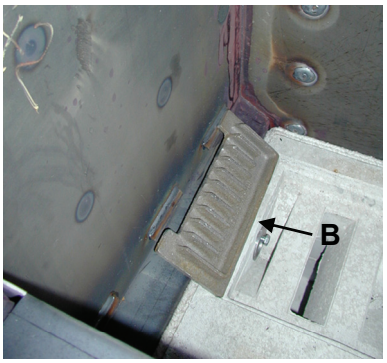
- ❒ Top up the water
  - ☞ If this occurs frequently, the heating system does not have a good seal!
    Inform your installer!

If large pressure fluctuations are observed:

- ❒ Have the expansion tank checked

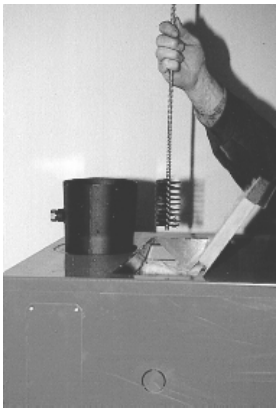
4.1.3 Monthly Maintenance

Cleaning the grating



- ❒ Open the insulating door and fuel loading chamber door
- ❒ Remove the grating **B**
- ❒ Remove the ash deposits under the grating to ensure trouble-free intake of secondary air!

Cleaning the heat-exchanger pipes (without heat-exchanger technology)



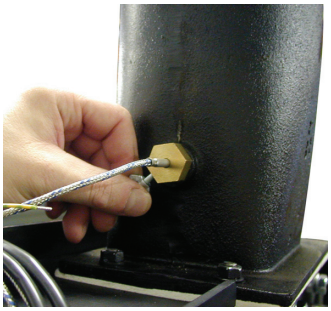
- ❒ Remove the upper insulating cover and the cleaning access cover
- ❒ Using the cleaning brush, remove the ash build-up in the pipes

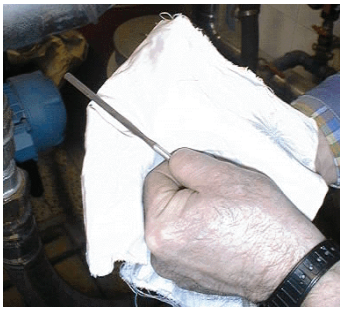
  ☞ The cleaning brush must be pushed all the way through before pulling it up!

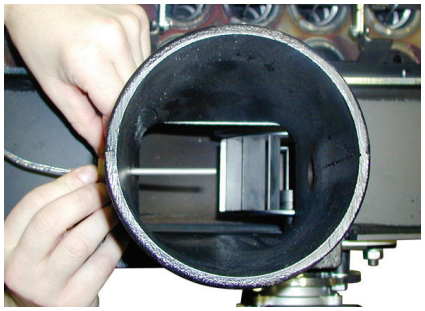
  ☞ The bristles cannot be turned in the pipe!

- ❒ Open the side cleaning access door and remove the ash

Cleaning the flue gas sensing elements



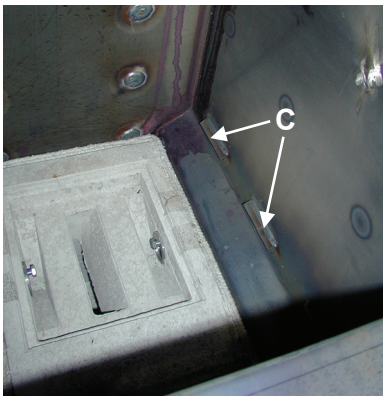




- ❒ Release the retaining screw and remove the sensing element from the flue gas pipe
- ❒ Wipe off the sensing element with a clean cloth
- ❒ Slide in the flue gas sensing element to the middle of the flue gas pipe and secure it gently with a retaining screw

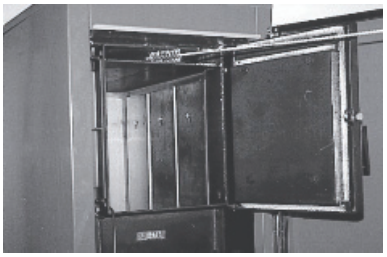
4.1.4 Annual Maintenance

Checking the primary air openings



- ❒ Open the insulating door and fuel loading chamber door
- ❒ Unhinge the cladding plates
- ❒ Check the primary air openings **C** for unobstructed air-flow
- ❒ If necessary, clean the openings

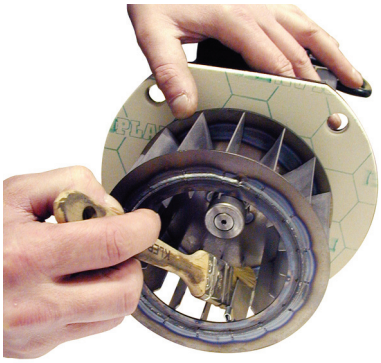
Cleaning the carbonization gas duct



- ❒ Open the insulating door and fuel loading chamber door
- ❒ Clean the carbonization gas duct with a small brush

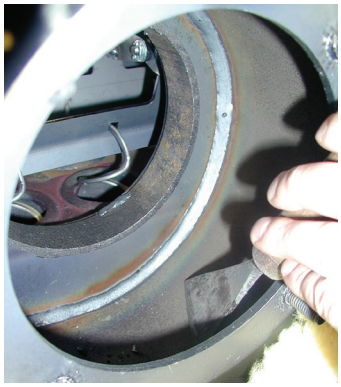
  ☞ Carbonization gases are sucked out when the insulating door is opened!

Cleaning the induced draught ventilator



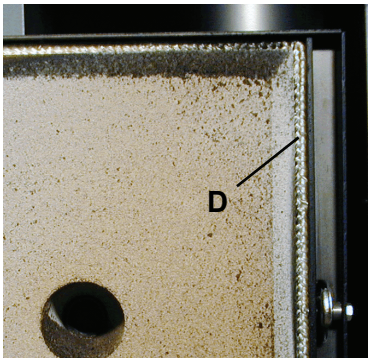
- ❒ Detach the induced draught ventilator on the back side of the boiler
- ❒ Check for dirt and damage
- ❒ Clean the blower wheel inside and out using a soft brush or paint brush

  ☞ **Don't move the balancing weights on the blower wheel!**



- ❒ Remove dirt and deposits from the induced draught housing using a trowel
- ❒ Remove any fallen ash using the ash vacuum

Checking the soundness of door seals



- ❒ Close the respective door and check its seal
- ❒ Check seal **D** for perfect alignment on the door frame
  - ➥ Imprint in the seal

If the seal is coloured black at several points or the imprint is interrupted:

- ➥ The seal is no longer efficient.
- ➥ Tighten the door latches or replace the seal

Cleaning the flue gas pipe

- ❒ Clean the connecting pipe between the boiler and the chimney with a chimney sweep's brush
  - ☞ Very important for flat flue gas pipes!

Checking the draught controller flap and explosion flap

- ❒ Check the draught controller flap and explosion flap for ease of operation
  - ☞ Maximum allowable setting: 30 Pa
    Ideal setting: 20 Pa

4.2 Service Agreement

☞ Guarantee a long service-life with a service agreement!

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

For this reason, FRÖLING offers a service agreement that guarantees trouble-free functioning of the boiler and the safety systems. Please see the details in the accompanying guarantee pass. Your Fröling customer service office is also glad to provide consultation.

4.3 Instructions for Measuring Emissions

- ❒ Clean the system 2 – 5 days before the measurement
- ❒ Use fuel that the system is set up for
- ❒ Do not make any changes to the system before the measurement (up to approx. 10 minutes prior) (Open the doors, ..)
- ❒ During the measurement, the boiler must be at least half full and a bed of embers must be present
- ❒ The boiler temperature must be > 60 °C, the flue gas temperature must be > 160 °C
- ❒ CO_2 values should be between 10 – 14%
- ❒ Conduct a partial load measurement (for systems without a storage tank lt. BimSchV. obligation)
- ❒ Partial load operation is evident from the flue gas temperature
  - ➥ Conduct a partial load measurement at the beginning or at the end of the emissions measurement!
- ❒ Throttle the heat emission during the measurement

  ☞ Under no circumstances should you shut down the fan or reduce its speed!

	Typical values			
Boiler variants	without heat-exchanger technology		with heat-exchanger technology	
Operating phase	Rated load	Partial load	Rated load	Partial load
Flue gas temperature [°C]	190 – 220	150 – 180	160 – 190	130 – 160
CO_2 – value [%]	12 – 14	10 – 14	12 – 14	10 – 14
CO [mg/Nm³] relative to 13% O_2	100 – 1000	100 – 1000	100 – 1000	100 – 1000
Dust [mg/Nm³] relative to 13% O_2	50	50	50	50

5 Troubleshooting

There are two main types of fault: internal and external.

5.1 External faults

- ❒ The heating EMERGENCY STOP switch has been pressed.
- ❒ A house fuse (FI-protective circuit breaker) or a fuse in the control system has tripped
- ❒ The safety temperature limiter has triggered.

5.2 Internal boiler faults

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

- Status LED **7.6** or **8.5** blinks red
- A fault message is displayed on the display

Internally, a distinction is made between a fault and a warning. A fault has the same effect as an “EMERGENCY STOP” and shuts down the system immediately. A warning, on the other hand, shuts down the system in a controlled manner.

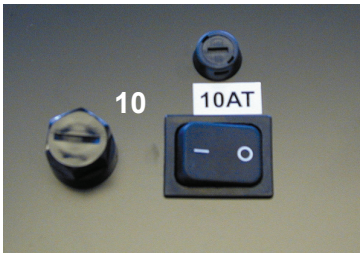
Fault message list:

➲ See the operating instructions for the “Digitronic S 3100” or “Lambdatronic S 3100”

5.2.1 Resetting the safety temperature limiter (STB)

The safety temperature limiter shuts down the boiler when it reaches a maximum temperature of 105°C.
After the boiler has cooled down, the safety temperature limiter **10** must be manually unlocked:

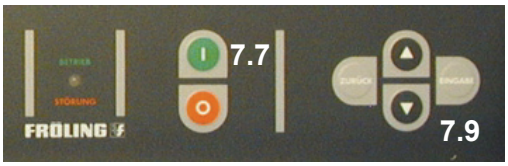
- ❒ Unscrew the cap on the safety temperature limiter
- ❒ Release the safety temperature limiter by pressing with a thin rod.



5.2.2 Acknowledging a fault message

Trace and remove the fault and then:

- ❒ Press enter key **7.9**
- ❒ Press start key **7.7**



6 Appendix

6.1 Addresses

6.1.1 Manufacturer's Address

FRÖLING
Heizkessel- und Behälterbau GesmbH

Industriestraße 12
A-4710 Grieskirchen
Österreich

TEL 0043 (0)7248 606 0
FAX 0043 (0)7248 606 600
E-MAIL info@froeling.com
INTERNET www.froeling.com

6.1.2 Your Installer's Address

Stamp

6.2 Conformity Certificate

EC - DECLARATION OF CONFORMITY

Product:	**Special wood boiler** with induced draught fan and high-temperature combustion chamber
Types:	**FHG Turbo 3000 20-70**

EU Directives:

89/392/EWG	Legal Regulations for **Machinery**
73/23/EWG	Legal Regulations for Electrical Equipment: **Low Voltage Directive**
89/336/EWG	Legal Regulations on **Electromagnetic Compatibility**

Applied harmonized standards:

ÖNORM – EN 303-5	Boilers for solid fuels, manually and mechanically fed combustion systems; rated heat output up to 300 kW Concepts, requirements, tests, and designation

We hereby certify that the series production version of the product designated above meets the directives, guidelines and standards specified.

Grieskirchen, dated 23.03.2005

Quality Assurance Office

Management

6.3 Pressure equipment regulation

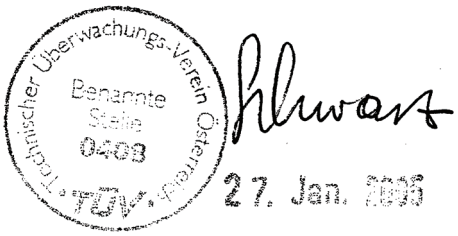
When assembling the safety equipment and components necessary for operation, observe the following standards and instructions:

Safety valve

Tested:	DVGW in accordance with TRD 721; DIN EN 12828
Installation in accordance with:	ÖNORM EN 12828 or DIN EN 12828
Rated cut pressure:	3 bar

Thermal Discharge Safety Device

Tested:	DIN 3440
Installation in accordance with:	EN 303-5
Response temperature:	100 °C



System for compensating the water volume fluctuation

Configuration and installation:	ÖNORM EN 12828 or DIN EN 12828

When assembling the boiler, the assembly instructions must be followed without fail. The assembly of the entire system, in which the boiler is mounted, is to be conducted in accordance with ÖNORM EN 12828 or DIN EN 12828. The operation and servicing of the boiler and its safety devices are to be carried out in accordance with the operating instructions. Subsequent checks required by law are to be carried out in accordance with the country's regulations.

This assembly produces hot water with a temperature not higher than 110 °C and is manually fed with solid fuels.

It was subjected to a design test as per §7 Section 2 and as per the note for diagram 4 of regulation 426: pressure equipment regulation (DGVO) or 97/23/EC by site:

TÜV Österreich 0408

as per module B1.

6.4 Space for Notes