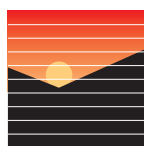
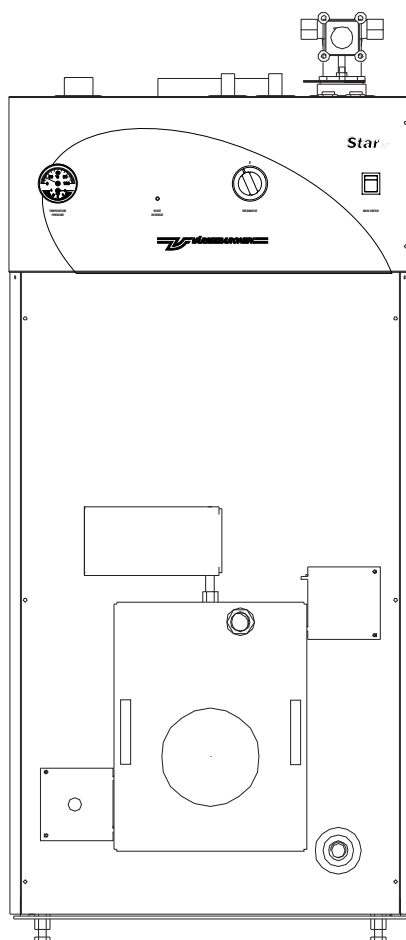


# *Installation, operation and maintenance*

*Pellet boiler*

# **Star** NE



**RVR**

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VB THL product N°

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## Function

### Combi boiler

STAR is a boiler for pellet operation.

### Control

The temperature is controlled by a thermostat.

### Water heating

A heat exchanger produces domestic hot water instantly as it is required. The heat exchanger does not have a tank – instead, the domestic hot water is heated as it passes through the heat exchanger on the way to the tap, so that the hot water is always fresh.

The domestic hot water capacity depends on the power supplied. STAR complies with Boverket standards applicable to hot water capacity.

The hot water capacity is impaired by deposits in the heat exchanger. Check your water for substances that could produce deposits.

### Easy to service

The electrical system is easy to access under the hinged control panel.

The circulation pump and heat exchanger are easily accessible behind the hinged automation cabinet.

To make boiler cleaning easier, the combustion chamber hatch is mounted on a swivel arm allowing it to be hinged to the right or left.

### Easy to transport and install

Weighing just 150 kg, its compact dimensions make it easy to handle.

### Product contents

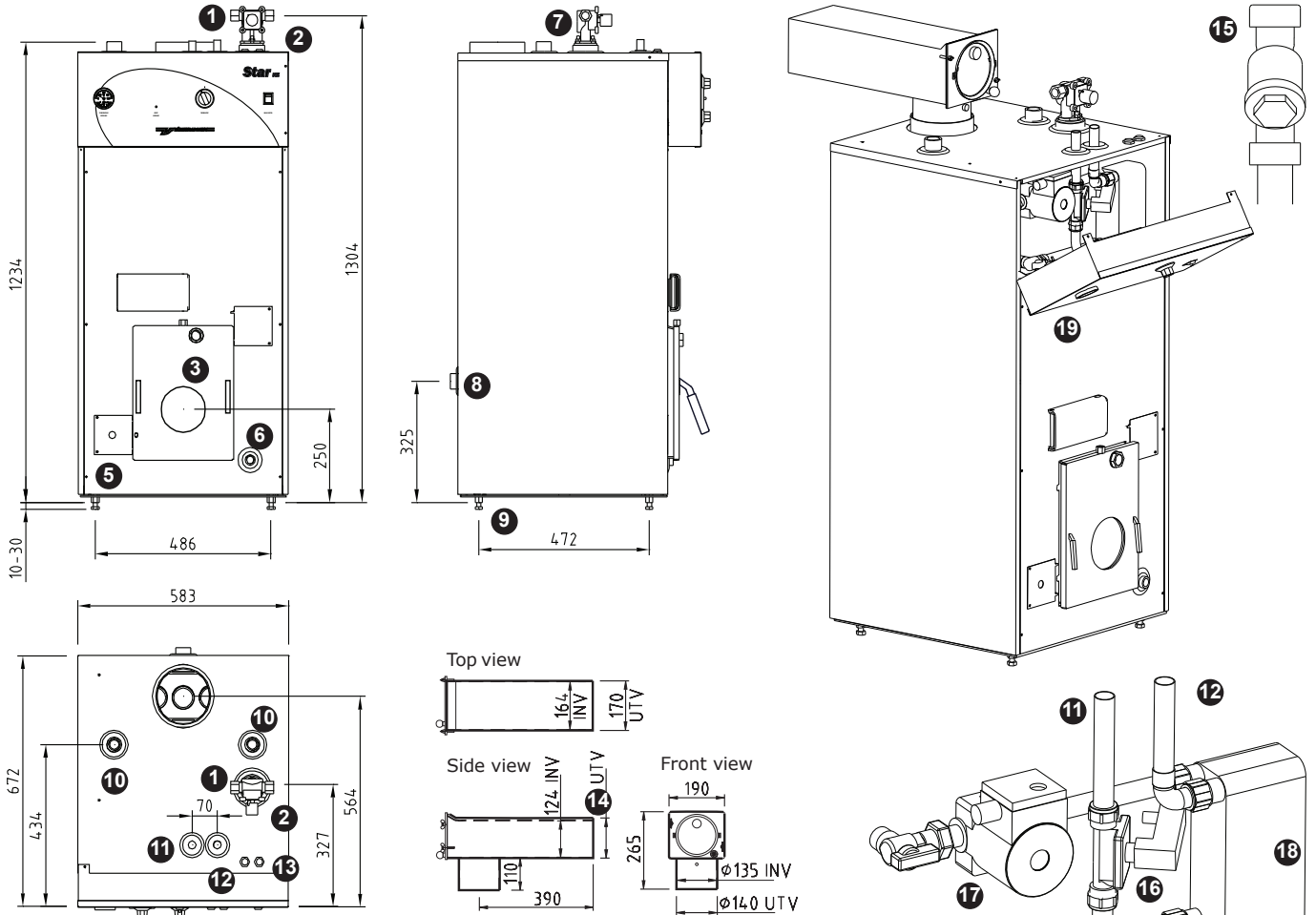
- Angled flue pipe with damper.
- Dirt filter.
- Drain valve.
- Flue gas turbulators.
- Flue pipe cleaner.

### Accessories

- Straight flue pipe, product no. 2936
- Pellet hatch, other pellet burner manufacturer, product no. 902 77

*The manufacturer reserves the right to make design changes without notice*

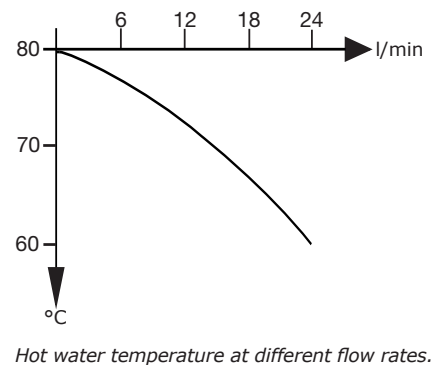
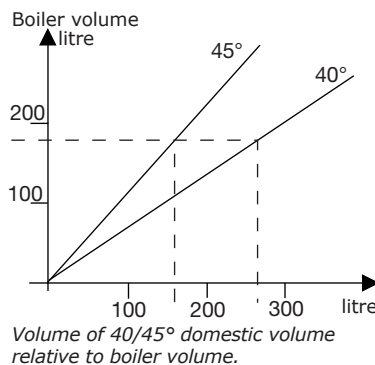
<b>Weight</b>	empty	150 kg	<b>Max temp</b>	100 °C	Boiler class 3, according to EN 303-5.
	filled	330 kg		<b>Power</b>	
<b>Volume</b>	boiler	175 litre	<b>Draught required</b>		0.05 mbar
	heat exchanger	2 litre		<b>Voltage</b>	230 V~, 50 Hz
<b>Design pressure</b>	boiler	3 bar	<b>Current</b>		0,1 A
	heat exchanger	10 bar		<b>Protection class</b>	IP21
<b>Test pressure</b>	boiler	2.15 bar	Manufactured to 97/23/EC Article 3.3		
	heat exchanger	41.6 bar	*11 kW if the immersion heater is replaced.		



- 1. Supply, 22 mm compression ring / R20.
- 2. Return, 22 mm compression ring / R20.
- 3. Burner hatch with swivel arm.
- 5. Cable duct for burner cable.
- 6. Drain valve.
- 7. Four-way shunt.
- 8. High-temperature hot water outlet, R25 int.
- 9. Adjustable base bolts.
- 10. Expansion outlet, R25 int.
- 11. Cold water supply, 22 mm Cu.
- 12. Domestic hot water, 22 mm Cu.
- 13. Cable penetrations.
- 14. Flue pipe with cleaning hatch and damper.
- 15. Dirt filter for domestic hot water.
- 16. Flow switch.
- 17. Circulation pump, internal.
- 18. Heat exchanger.
- 19. Automation cabinet.
- 20. Control panel on automation cabinet.

### Hot water capacity

When a large amount of domestic hot water is drawn with a high flow rate, the temperature may fall too low after a while. You can counteract this by reducing the flow rate slightly. Usually, lower flow rates mean that more domestic hot water is available. If the high-temperature hot water has a low temperature, the domestic hot water temperature will be low, and vice versa. The diagram here relates to a boiler temperature of 80 °C.



The boiler must be installed by a qualified and competent person, in accordance with the relevant clauses of all applicable standards and recommendations. These include but may not be limited to the following:

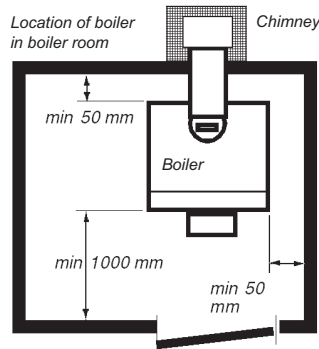
All relevant building regulations, Local water by laws, IEE wiring regulations and Health and Safety legislation.

Failure to install the appliance correctly could lead to prosecution. It is in your own interest and that of safety to insure that the law is complied with.

Manufactures instructions must not be taken in any way as overriding statutory obligations.

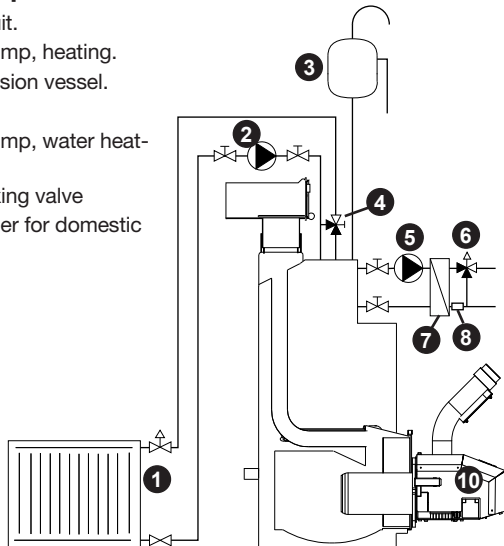
The boiler must be installed indoors in a cellar or on the ground floor. The installation site must be designed for the boiler weight of 330 kg including water. Make sure that the flue pipe cleaning arrangements meet the applicable regulations. The boiler can support up to 300 kg of the weight of the flue. The installation site must be able to support this additional weight.

The fresh air intake of the boiler room must have at least the same cross sectional area as the flue duct.



### System principle

1. Radiator circuit.
2. Circulation pump, heating.
3. Vented expansion vessel.
4. Shunt valve.
5. Circulation pump, water heating.
6. Hot water mixing valve
7. Heat exchanger for domestic hot water.
8. Flow switch.
10. Pellet burner.



### Flue pipe

The gap between the flue pipe and the flue pipe connection to the boiler is packed with glass fibre cord (supplied). The flue gas damper is adjusted using a lever on the front of the flue pipe.

### Expansion system

**Vented:** The expansion vessel is connected in an unisolatable and continuous rise from the connection at the top of the boiler. The distance between the top of the highest radiator and the expansion vessel must be at least 2.5 metres in order to prevent oxygen saturation of the water.

**Unvented:** The boiler must be fitted with a type approved safety valve, 3 bar, connected using an unisolatable pipe from the top of the boiler, as well as a venting valve and manometer.

### Shunt

The shunt is controlled manually by turning the dial to a suitable temperature. A motor can be fitted to the shunt for automatic shunt control.

The shunt dial is marked 0-10, from no heat to full heat.

The shunt is fitted with compression joints, Ø22 mm.

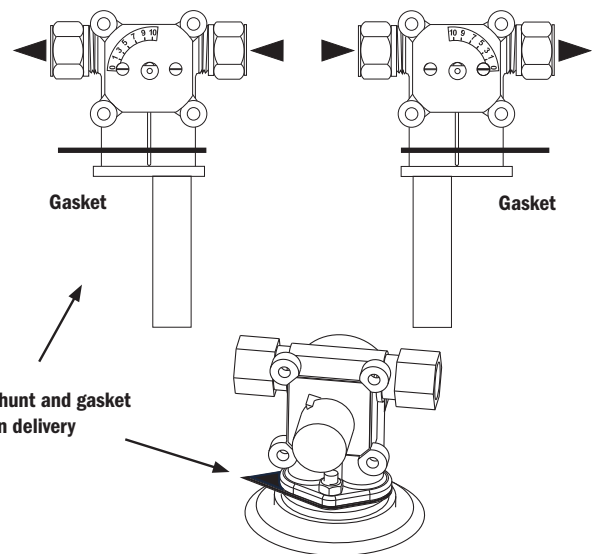
The shunt must be fully open while the heating system is being filled.

On delivery, the supply side is to the left and the return side is to the right. The direction can be changed by following these steps:

A. Remove the shunt from the boiler and move the plastic pipe from the right port to the left port. Rotate the gasket so the arrow points in the supply direction. Replace the shunt.

B. Remove the dial and turn the scale back to front. Replace.

Automatic shunt control can be added to the shunt.



### Heating system circulation pump

The circulation pump of the heating system is dimensioned according to the size, pipe dimensions and design of the system. Circulation pump installed in the return pipe of the boiler.

### Hot water outlet

There is a high-temperature hot water outlet on the rear of the boiler. Do not forget to seal this outlet if it will not be used.

### Filling

The boiler must be fitted with valves for filling and draining. It is a good idea to connect a permanent filling pipe to the expansion outlet. For filling, the shunt must be fully open, position 10.

### Water heating

Water is heated in a heat exchanger, using a flow-controlled circulation pump.

The dirt filter is installed on the cold water side.

The installation must include a mixing valve.

No safety valve is needed because the volume of the heat exchanger does not exceed two litres.

If a non-return valve is used, the installation must include a 9-bar type approved safety valve.

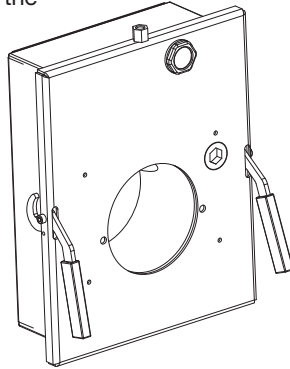
### Pellet burner

The burner hatch of the boiler is designed for operation of the Viking Bio pellet burner.

The hatch can also be modified to fit pellet burners from other manufacturers – follow the instructions of the relevant burner manufacturer. The output of the burner must be compatible with the output range of the boiler.

The hatch can be opened easily using the two handles on each side of the pellet burner. If the hatch can be opened without removing the pellet feed tube or disconnecting the electricity supply to the burner, a safety switch must be fitted to the hatch. This is to prevent the burner starting with the hatch open.

For the most efficient operation, a modern burner should be used that can work with a low draught,  $\leq 0.05$  mbar. Instruments must be used for initial adjustment. Pay attention to the flue gas temperature. Otherwise, follow the applicable installation instructions and the instructions of the burner manufacturer.



**If the hatch can be opened without removing the pellet feed tube or disconnecting the electricity supply to the burner, a safety switch must be fitted to the hatch.**

### Flue

The flue must produce a draught strong enough to overcome resistance in the flue duct. The draught requirement of the boiler is 0.05 mbar.

The cross sectional area should be  $\text{Ø}100\text{-}160$  mm,  $\frac{1}{2} \times \frac{1}{2}$  brick.

Combustion produces water vapour, which rises with the flue gases into the flue, where it can condense for form water, potentially damaging the inside of the flue.

To prevent condensation, the flue gas temperature must be at least  $70^\circ\text{C}$  one meter down from the top of the flue. A low flue gas temperature does improve efficiency, but this must be balanced against the risk of condensation.

Steps to reduce the risk of condensation:

- remove any turbulators
- use the draught regulator
- insulate the flue in cold spaces
- increase the burner capacity
- install a flue liner.

### Draught regulator

The flue draft is influenced by the temperature and by weather and wind conditions, and because the efficiency of combustion depends on the draught, we should aim to achieve a stable draught.

The draught regulator is used to allow ambient air from the boiler room into the flue duct, which has the following benefits:

- more stable draught and flue gas temperature
- reduced downtime losses

- flue duct ventilation
- drier flue gases, reducing the risk of condensation

The draught regulator setting depends on the design of the flue – the damper is usually adjusted so it is open around 10 mm when the burner has just stopped.

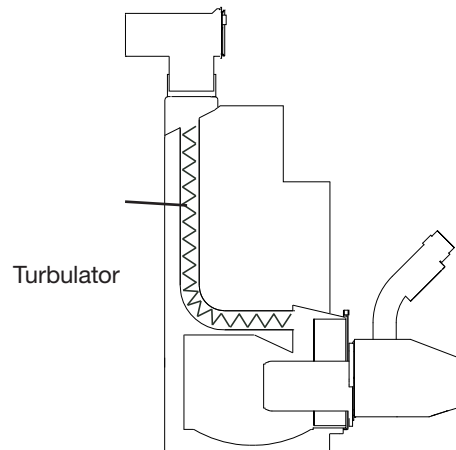
### Turbulators

The boiler is supplied with long turbulators designed for pellet operation. The purpose of the turbulators is to introduce turbulence to the flue gases and so extract more heat from them, thereby improving efficiency. The turbulators increase the flue gas resistance in the boiler.

If the burner output is low, the flue gas temperature is also low, with an increased risk of condensation in the flue. Experiment by shortening the turbulators to obtain a suitable flue gas temperature.

The flue gas temperature must always be checked near the boiler and at the top of the flue.

If a turbulator tends to slide out, bend it slightly to brace it against the tube wall.



The electrical installation must be carried out by a qualified and competent electrician, in accordance with IEE regulations. All other relevant standards and codes of practise must also be adhered to.

An all-pole main circuit breaker must be installed ahead of the boiler.

The circuit breaker must not be set to position "1" before the boiler has been filled with water.

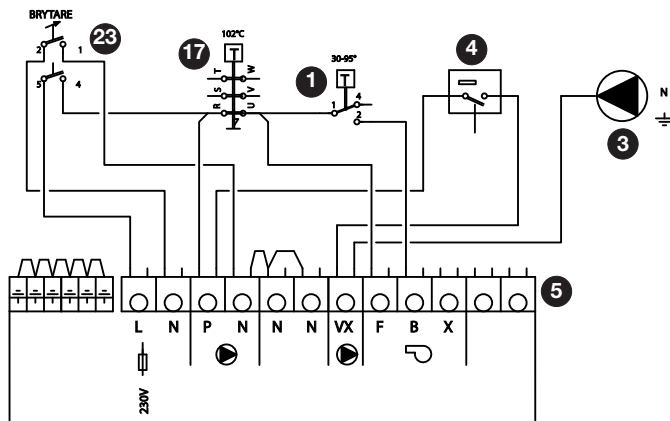
The minimum cross sectional area of cable for external units connected to the boiler is 1.5 mm<sup>2</sup>.

The terminal block is below the hinged front panel, accessible after removing the two screws on the front and the dial of the electric thermostat.

The internal connections of the boiler are already made in the factory, and external connections are made according to the wiring diagram.

All cables running to the boiler run from the back in a cable duct along the left of the boiler. The cable penetrations to the automation cabinet are located at its rear, which you can access by removing the two screws on the front top of the boiler and allowing the automation cabinet to hinge forward.

### Wiring diagram

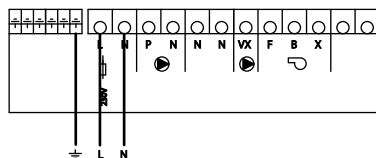


1. Burner thermostat.
3. Water heating circulation pump.
4. Flow switch for water heating.
5. Terminal block for internal and external connections.
17. Overheating protection.
23. Control switch for boiler.

### Supply cable

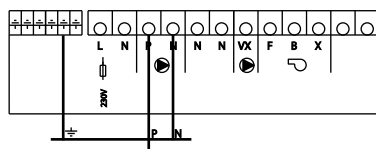
The cross sectional area of the supply cable is selected according to the installation method as defined in the IEE Regulations.

The boiler is protected with 10 A.



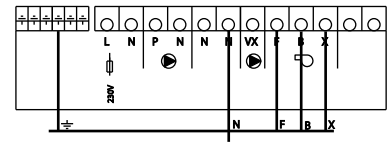
### Circulation pump

The boiler has an output for a heating system circulation pump. The cable enters through the top panel of the boiler.



### Pellet burner

Most pellet burners require a phase supply, terminal F, and a control phase from a thermostat, terminal B. Both are disconnected by the overheating protection if overheating occurs.

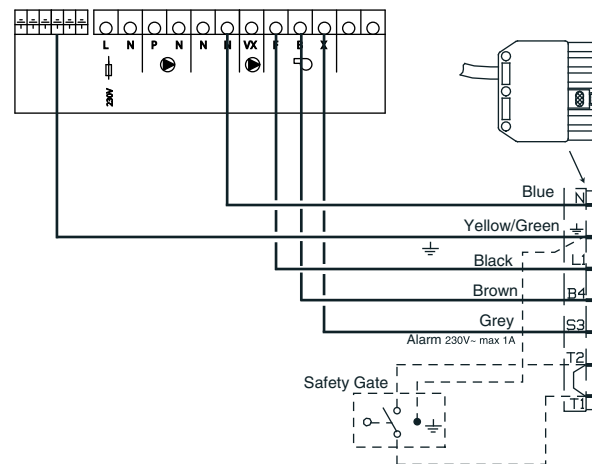


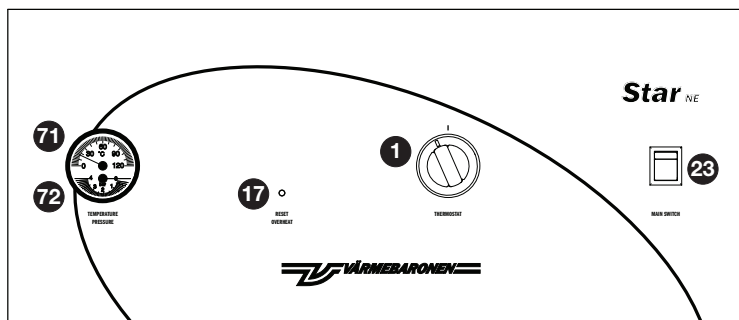
The cable is laid from the terminal block to the strain relief, through the cable duct on the rear of the automation cabinet, and down to the burner. Otherwise, follow the instructions of the burner manufacturer.

### Pellet burner - Viking Bio

See also Pellet burner above.

The terminal X is only a terminal to connect the grey cable, alarm, from Viking Bio. It has no further connection.





1. Thermostat. Setting of boiler temperature during burner operation. Recommended setting min 70 °C.
23. Main switch, which breaks the control current to the boiler, as well as units powered by the boiler.
52. Resetting, overheating protection. Resetting may take place when the boiler temperature has fallen to approx. 80 °C.
71. Thermometer, shows the boiler temperature.
72. Pressure gauge, shows the water pressure in the heating system.

## Operation and care

After installation, check with the installer that the system is in perfect condition. Ask the installer to demonstrate the settings and functions so you know how to operate and care for the system. The pressure varies with the temperature, do not add water unnecessarily. For filling, the shunt must be fully open, position 10.

Always disconnect the power supply to the boiler before:  
 opening the burner hatch  
 draining the boiler water  
 accessing the automation cabinet or units powered by the boiler.

### Commissioning and checks

Before putting the system into operation, check that:

- the system is filled with water.
- all connections are watertight.
- flue gas connections to the boiler and to the flue are tight.
- the filling/drain valve has been closed properly.
- the safety valves are working properly.
- the necessary valves are open.
- the circulation pump is working and the direction of flow is correct.

### Water pressure in the system

The pressure in the heating system depends on the distance between the highest and lowest points in the system, the static head. If the difference is 5 metres, the pressure is 0.5 bar, if it is 10 metres, the pressure is 1.0 bar.

The volume of water changes with the temperature, affecting the pressure in the heating system. Higher temperatures increase the volume and pressure. The expansion vessel takes up the changes in volume in the system.

### Bleeding/topping up

Regularly check that there is enough water in the heating system. The pressure gauge should indicate 0.5- 1 bar. Air may remain in the heating system for a while after installation, so bleeding should be repeated a few times. After bleeding, check the pressure and add water if necessary.

### Dirt filter

There is a dirt filter in the cold water pipe leading to the heat exchanger, preventing impurities getting into the water in the heat exchanger. If the filter becomes clogged, the pressure of the hot water will fall. You can clean the filter – after shutting off the water – by removing the plug next to the filter.

### Circulation pump

If the boiler is shut down for a long time, there is a risk that the heating and hot water circulation pumps might seize up. You can prevent this by running the pumps from time to time.

### Safety valves

The safety valves in the system must be operated regularly, around four times a year, in order to preserve the safety function.

### Boiler temperature

The boiler temperature should not fall below 70 °C in pellet operation.

### Pellet operation

In burner operation, the draught must be  $\leq 0.05$  mbar. The boiler temperature is controlled by the burner thermostat – for the various options, see the energy source selector on page 8. For optimum reliability and efficiency, it is essential to check and adjust the burner regularly.

### Overheating protection

The boiler overheating protection is triggered when the boiler temperature exceeds around 95 °C. The protection can be reset on the front panel once the boiler temperature has fallen to around 80 °C.

### If there is a risk of freezing

In severe cold weather, no part of the heating system should be turned off as this would involve a risk of burst pipes. The boiler must not be put into operation if any part of the heating system is suspected of being frozen. Call the installer.

### If the water boils

Disconnect the power supply to the boiler, then fully open the nearest hot water tap.

### Flue cleaning

Ash and soot are formed in pellet operation, so the boiler must be regularly cleaned, if possible when the flue gas temperature has risen by around 50 °C compared to when the boiler is clean.

The turbulators must be checked every time the boiler is cleaned. Damaged turbulators should be replaced. With a correctly adjusted burner, flue cleaning will not be necessary between the regular visits of the flue sweep.

### Boiler cleaning

Keep the boiler clean and tidy. Alkaline cleaning agents are useful for removing soot marks from the boiler.

Low room temperature	
Shunt valve incorrectly set.	Check and adjust the setting.
Main and/or control switch in position 0.	Set the switches to position "1".
Overheating protection triggered.	Reset the overheating protection. <b><i>This is a warning sign – if it happens more than once, call the service engineer.</i></b>
Boiler temperature too low.	Check the thermostat settings, adjust the temperature.
Burner malfunction.	Check, correct.
Circuit breaker triggered.	Check where the short circuit is, correct the problem and reset the circuit breaker.
Air in boiler or heating system.	Bleed and top up the heating system as necessary.
Closed valves in heating system.	Open the valves.
Circulation pump switched off or seized up.	Check, assisted start of pump.

Low hot water capacity	
Domestic hot water flow too high.	Reduce the tap flow, see the technical data.
Mixing valve set too low.	Check, adjust temperature.
Switch set to position 0.	Set the switches to position "1".
Fully or partly closed valves to heat exchanger.	Open the valves.
Overheating protection triggered.	Reset the overheating protection. <b><i>This is a warning sign – if it happens more than once, call the service engineer.</i></b>
Boiler temperature too low.	Check the thermostat settings, adjust the temperature.
Burner malfunction.	Check, correct.
Circuit breaker triggered.	Check where the short circuit is, correct the problem and reset the circuit breaker.
Air in boiler, pipes or hot water system.	Bleed and top up the heating system as necessary.
Circulation pump does not start.	Assisted start of pump.
Circulation pump capacity set too low.	Check the capacity setting of the pump.
Dirt filter clogged.	Clean.
Heat exchanger blocked.	Replace the heat exchanger, check the water.

## Components

Product no	Component	qty			
12 00 06	Thermostat, burner 1-pole	1	44 01 90	Inspection glass 1"	1
12 00 07	Dial for above	1	38 00 06	Thermometer/pressure gauge	1
12 00 25	Overheating protection	1	23 22 24	Turbulator	3
13 00 32	Rocker circuit breaker 2-pole	1	44 00 01	Tube cleaner 57 mm	1
14 00 42	Strain relief	6	44 00 10	Spring steel shaft	1
24 03 50	Drain valve	1	24 50 81	Dirt filter	1
26 00 05	Shunt valve	1	24 60 01	Circulation pump	1
23 22 01	Combustion plate	1	35 01 00	Heat exchanger	1
29 55 13	Burner pipe	1	24 05 50	Angled ball valve	2
30 00 34	Hatch gasket	1	26 02 11	Flow switch	1
37 00 61	Plastic dial M6	2			

