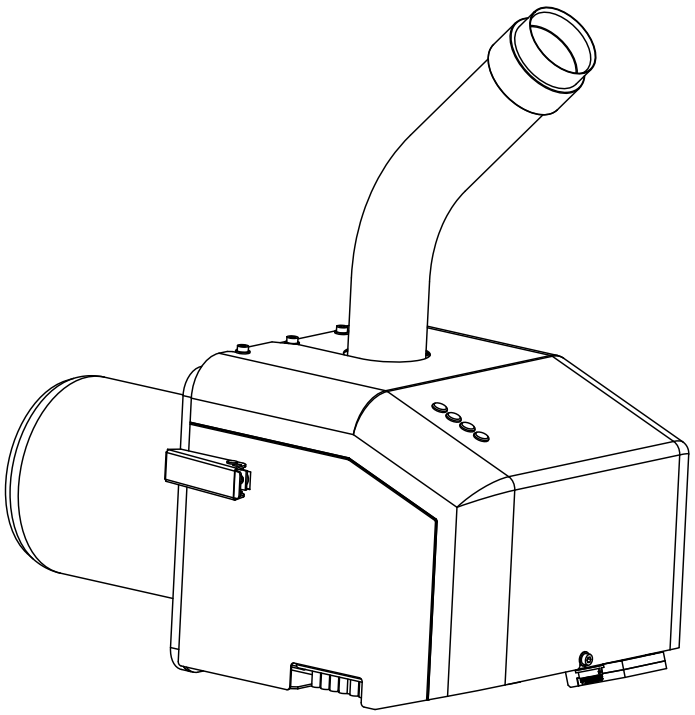
Installation and maintenance

Viking Bio 35 - pellet burner



VÄRMEBARONEN

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Notes

To be completed by the installation engineer when the Viking Bio 35 is installed.

Add a printout from the flue gas analysis instrument.

Serial number: .....

Installation date: .....

Installed in boiler,
make/type/power: .....

Installation engineer: .....

Tel.: .....

Other: .....

.....

.....

.....

.....

.....

Safety and handling

Read these instructions carefully before installation, adjustment or service is carried out. Keep the instructions close to the burner.

Check that the burner has not been damaged during transport. Report any transport damage to the carrier.

Check that the delivery is complete.

The Viking Bio 35 is designed to fire 0.24 or 0.31 in wood pellets after it has been installed on a boiler in a boiler room that meets the standards of the Swedish National Board of Housing, Building and Planning. The Viking Bio 35 may not be fired with any other combustible material.

A chimney-sweep must be contacted before a different type of fuel is used. No building permit or notification is normally required if the existing boiler can be fired with pellets. Contact your municipality regarding restrictions on burning solid fuel in a densely built-up area.

All installation must be performed by an authorised person in accordance with the existing regulations.

Correct installation in combination with correct adjustment and continuous service will produce high operational reliability and good heating economy.

Correct settings are important for good heating economy and the service life of the parts in contact with flames. Optimum adjustment is possible only using flue gas analysis instruments.

The burner's parts in contact with flames are wearing parts that need replacement as required. Use only original spare parts. Spare parts that do not meet Värmebaronen's specifications may have an impact on safety.

Always contact your installation engineer for service. The type and serial number of the burner must always be specified when ordering spare parts. See the rating plate.

The burner must not be modified, changed or converted in any way.

Värmebaronen AB reserves the right to change the specification, in accordance with its policy of continuous improvement and development, without prior notice.

Subject to amendments and printing and proofreading errors.

Before service and maintenance work are started, the system must be disconnected from the main power supply.

Only authorised persons may work on the system.

The burner may not be used by children or people with physical or mental impairments. Nor by children/people who lack knowledge about the boiler.

Children may not play with the burner and connected accessories.

Risk of crushing! Never touch the feed auger when the burner is switched on.

Never disable the safety equipment!

When the burner is in operation, the feed auger's plug, the power supply, must never be removed from the burner!

The following icons are used in these instructions to indicate important information:

Information that is important for optimum operation.

STOP *Tells you what you should or should not do to avoid personal injury.*

Tells you what you should or should not do to avoid a component, the boiler, a process or the environment from being damaged or destroyed.

Electrical hazard!

Key to symbols

< means less than

≤ means less than or equal to

> means greater than

0,0015 Psi = 0.04 in H_2O

Operation - Technical data

The Viking Bio 35 is a forward-burning pellet burner for wood pellets.

Fuel and air are mixed in a controlled fashion in the burner. This is the basis for environmentally-friendly combustion and high efficiency.

The Viking Bio 35 can be installed on most boilers with a power range that matches the power of the burner.

The Viking Bio is fully automatic and controlled by the boiler thermostat. A temperature sensor is available as an accessory. This causes the burner to control the boiler temperature. This function is advantageous in boilers in which hot water is produced in a heat exchanger.

The safety system in the pellet system with the Viking Bio consists of overheating protection, a thermal relay on the downpipe, a non-combustible hose between the feed auger and the downpipe, a fan with a fan guard, flame monitoring and blocking if the ambient temperature is high.

Different operating modes can be selected: high power, low power or two power stages.

The burner can have a start delay, which extends the running time and thus increases the efficiency.

There are indicators on the burner. By flashing in different ways, they provide information about operating phases and alarms.

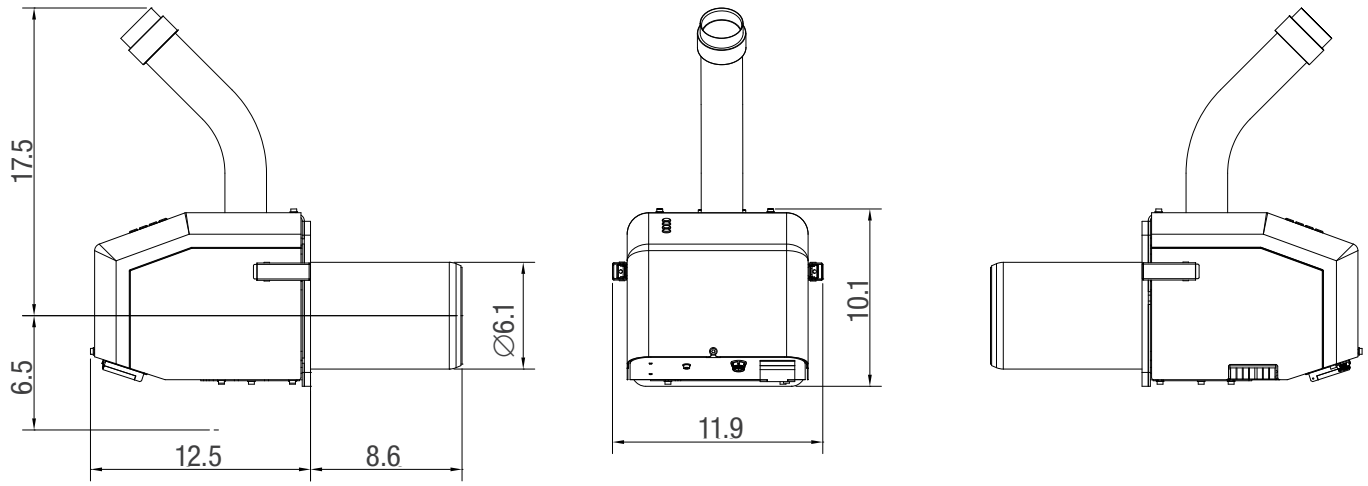
Pellets are fed to the burner automatically from the fuel store via a feed auger controlled by the burner. The safety in the feed system consists of overheating protection on the down duct, a meltable hose between the feed auger and the burner and overload protection for the feed auger motor.

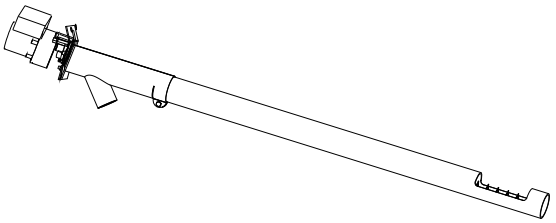
To simplify installation and maintenance, the burner has quick attachments that make it easy to attach the burner to the boiler and remove it. All electrical connections have quick couplers.

The burner is supplied with a connection cable, flue gas thermometer and ash rake.

Type	Viking Bio 35	
Art. no.	3351	
Weight	33	lb
Ambient temperature	50 - 86	°F
Heat supplied low power	75067	BTU/h
supplied high power	119425	BTU/h
Voltage	230 V~, ±10%, 50 or 60 Hz	
Fuse protection	10	A
Power consumption high power	25	W
low power	16	W
standby	3.5	W
start/ignition	150	W
Enclosure protection class	IPx1	

Draught requirements	0.1 - 0	inH_2O
Chimney height	>9,8	ft
diameter	>4	in
Combustion chamber, min h x w x d	12 x 12 x 20.3	in
Pressure in combustion chamber	-0.1 - 0	inH_2O
Sound pressure	65	dBA
Fuel, quality wood pellet in accordance with EN 14961:2 cl. A1		
Pellet size	Ø 0.24-0.31	in
Emission class in accordance with EN 15270	4	
Feed auger	230 V~ / 15 W	





Screw 4.9 ft art. no. 33 01

Screw 8.2 ft art. no. 33 02

Installation

Installation must take place according to existing regulations. The installer must familiarise himself with the existing rules.

Boiler

The boiler's power range must match the burner's power so that the flue gases are cooled sufficiently.

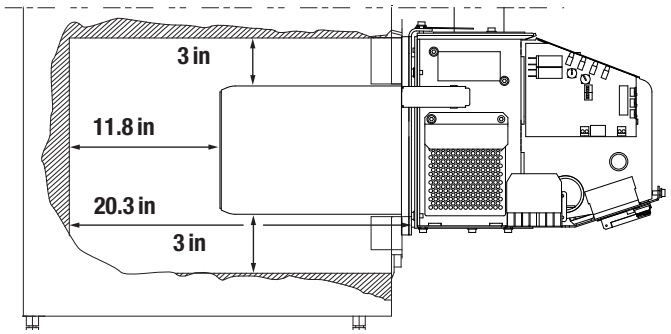
The boiler's flues may not be so narrow that they can easily be clogged by ash.

Pellet firing produces a fair amount of ash which needs space. It must also be easy to remove it from the boiler. The distance to the base of the combustion chamber should be high enough for there to be space for the quantity of ash formed during a weeks' firing in winter.

The boiler's hatches and dampers must be tightly sealed. For simple maintenance, it should be possible to open the hatch without the burner needing to be removed.

The burner is installed so that there is space for service and maintenance, at least 2 ft. free space to the rear and 1 ft. on the sides from the burner.

The flame must not touch the walls of the combustion chamber.



Supply air to boiler room

There must be a supply air valve to the boiler room. The valve's free surface must correspond to the cross-sectional area of the chimney.

There must not be any mechanical ventilation if it affects the operation of the burner.

Draught damper

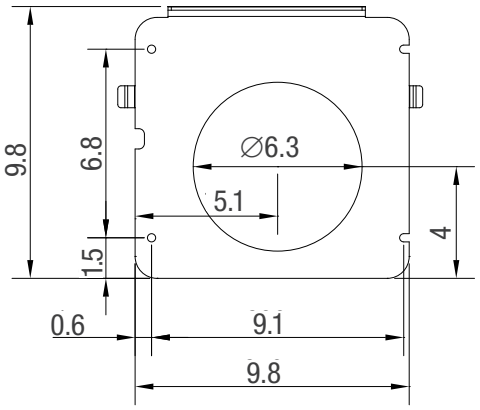
The chimney must be fitted with a draught damper that is appropriate for the chimney.

The combustion is affected by the draught. Therefore, stable draught conditions are the objective.

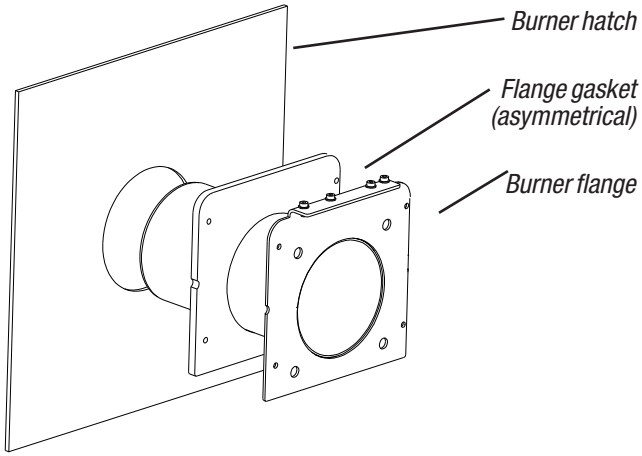
Installation of burner

The burner hatch must be well insulated from the burner.

A. Unscrew the screws holding the burner cover in place and remove the cover.
Open the quick attachments and release the burner from the outer burner pipe.
Mark out where the burner will be located and make holes as shown in the drawing.



B. Fit the burner flange and flange gasket on the burner hatch and screw it in place with four M6 screws.

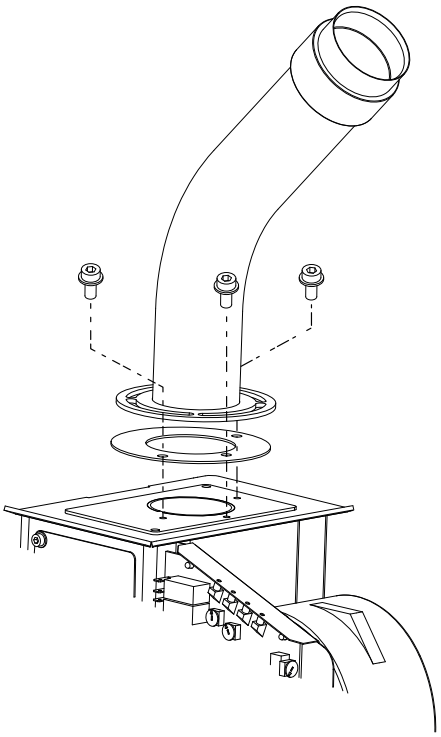


C. Fit the burner on the burner flange and lock the quick attachments. Check that the burner is tight against the silicone gasket on the burner flange.

Installation

Downpipe

The downpipe is screwed to the body of the burner. The downpipe can be rotated to obtain a suitable angle to the feed auger.



Pellet store

Wood pellets must be stored in a dry, airy place protected from the weather. Ready-made pellet stores are available on the market. These are preferable to homemade stores.

It should be possible to remove the feed auger for cleaning without having to empty the store.

The size of a weekly store depends on the building's heating requirements. However, we recommend that the store have a volume of at least 132 gal.

Feed auger

To guarantee that the correct quantity of pellets is supplied, the burner must have one of the appropriate feed augers.

Fit the feed auger motor on the feed auger. Tighten the locking screw well so that the motor does not slip on the feed auger shaft.

The feed auger must be well anchored with the chain as it will work its way into the store.

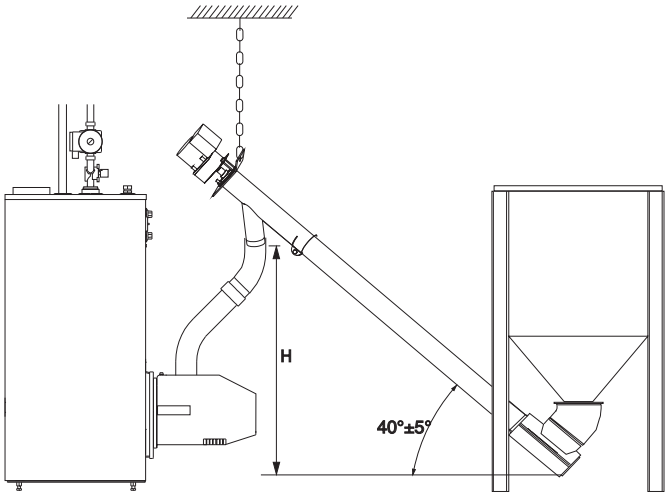
Check the position of the feed auger before the store is filled with pellets. Use tape or similar to mark on the feed auger's pipe how far it extends into the store. This makes it easy to see whether the feed auger has worked its way into the store and it becomes easier to refit the feed auger when it has been taken out of a full store.

Use the enclosed hose to connect the feed auger to the burner's quick coupler on the downpipe. The hose must have a straight fall without sudden bends and the hose connections must be slightly displaced from each other. Secure the hose at both ends with hose clips.

Connect the feed auger's power cable to the power socket on the burner.

Before starting the feed auger and the burner, the feed auger must be filled with pellets. See 'Startup'.

The inclination of the feed auger from the horizontal plane must be 40°±5°.



H dimension at 40° inclination:

4.9 ft. feed auger: 2.5 ft

8.2 ft feed auger: 4.6 ft

Risk of entrapment!
Before any work is done on the feed auger, its power cable must be disconnected from the burner.

Flue gas thermometer

The enclosed flue gas thermometer is fitted to the usual connection on the boiler's flue pipe.

Electrical installation

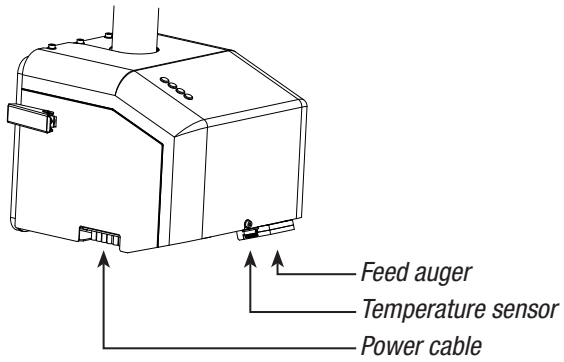
Electrical connection

The electrical installation must be carried out according to existing rules under the supervision of a qualified electrician.

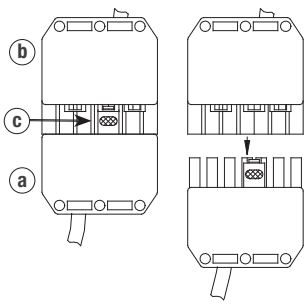
The burner must be preceded by an all-pole main breaker.

The design depends on which boiler the burner is installed on, whether the boiler has existing electrical equipment and whether the burner is to control the boiler temperature.

Connections to burner



Connector - 240 V~ power cable



The septuple-pole plug, a, is inserted in the socket, b, located on the burner until the catch on the pushbutton, c, engages and locks the plug in place.

For disconnection, the power to the burner must be switched off first. Then press the pushbutton while pulling the plug out of the socket.

L2: Phase 2 conductor.
⏚: Earth conductor.
L1: Black, supply via overheating protection.
B4: Brown, connected to the boiler thermostat.
S3: Grey, alarm signal, 240 V~, from burner, max. load 1 A.
T1, T2: To any safety switch on the combustion chamber hatch.

Alarm

In the event of an alarm, the burner generates a 240 V~ signal. The signal can be used for a visual/acoustic presentation. If the function is not used, the cable end must be insulated.

Hatch safety switch

A hatch switch must be installed if the combustion chamber hatch can be opened without tools.

Safety can also be guaranteed if the supply hose is made so short that it has to be detached before the hatch can be opened and the burner's connection cable is attached in such a way that it has to be disconnected from the burner to allow the hatch to be opened.

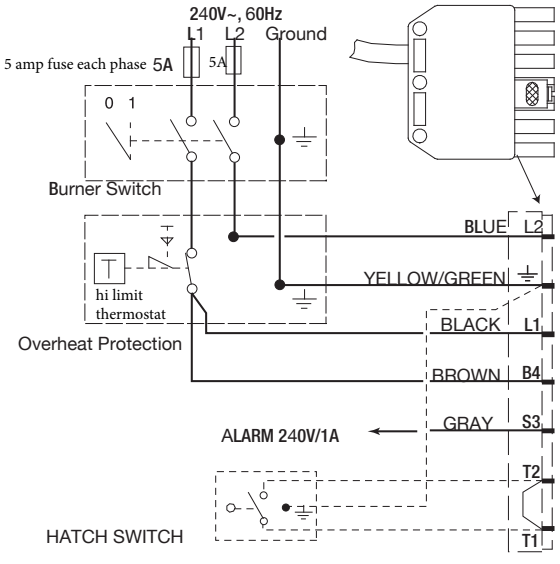
The jumper, T1 - T2, in the power cable's contact part must be removed when a hatch switch is connected.

Boiler temperature control via the burner

The boiler temperature sensor (accessory) is connected to a contact on the burner.

It is advantageous to have the burner control the boiler temperature if hot service water is heated in a heat exchanger.
The temperature sensor should preferably be placed in an immersion pocket high up on the boiler. If there is no immersion pocket, the sensor is glued to the body of the boiler with epoxy glue. The sensor must have good thermal contact. In an exchanger boiler, the sensor is placed so that it senses the exchanger's return flow, but not on the return pipe.

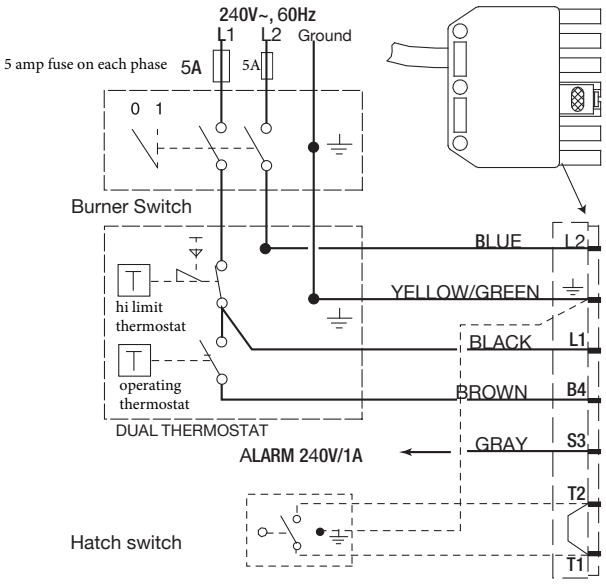
When the burner is to control the boiler temperature, the phase supply and control phase must be preceded by overheating protection.



Electrical installation

Boiler thermostat controls boiler temperature

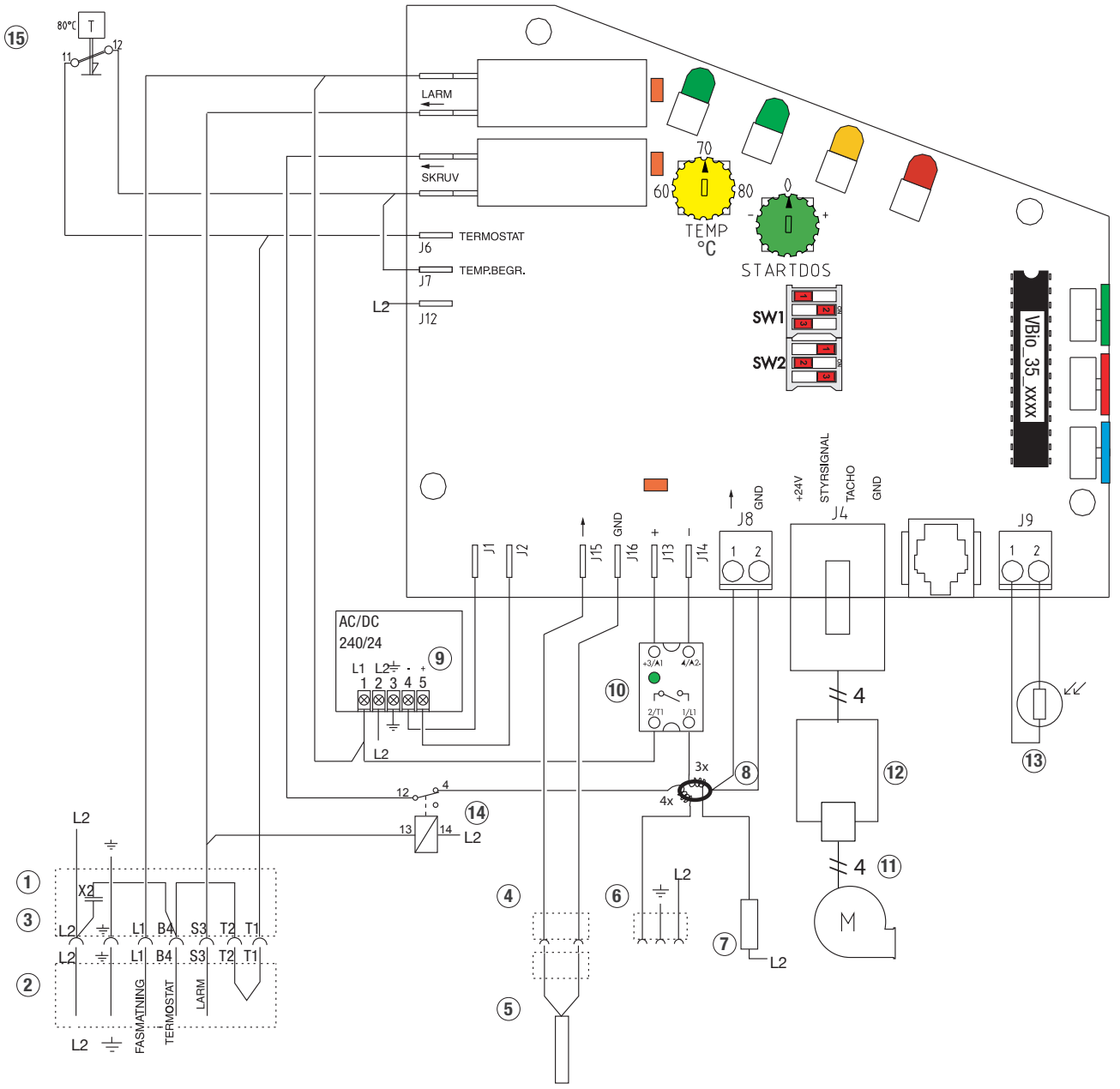
The burner's phase supply must be preceded by overheating protection and the control phase by a thermostat.



Electrical connection check.

1. ***The power switch and thermostat must be in the position '0'***
2. ***Switch the power switch to 'I'; all the burner's indicators should light up briefly. Subsequently, only 'OPERATION' should light up.***
3. ***Turn the thermostat so that it requires heat; the 'FLAME' indicator should start to flash. If this does not happen, the connection must be checked.***

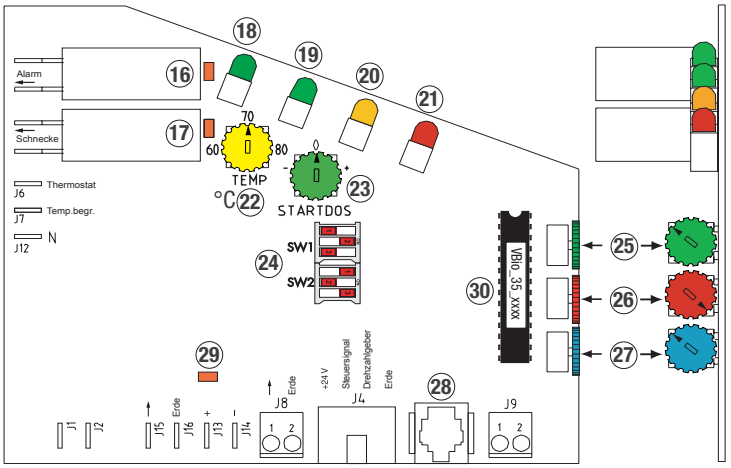
Wiring diagram

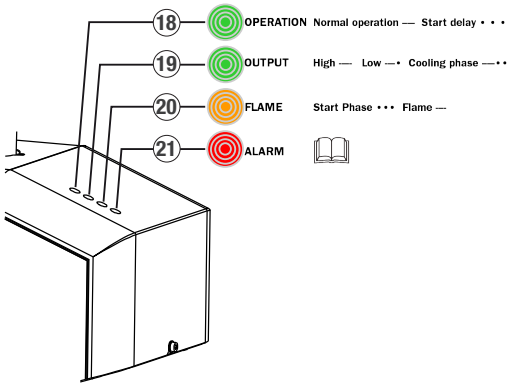


1. Connector for power supply, thermostat, etc. See electrical installation. ***240V~ in all conductors***.
   L1: supply to burner via overheating protection.
   B4: connected to boiler thermostat.
   S3: alarm signal from burner.
   T1: to any safety switch on the combustion chamber hatch.
   T2: from any safety switch on the combustion chamber hatch.
2. Cable part of connector. See 1.
3. Suppression capacitor.
4. Connector for boiler temperature sensor.
5. Boiler temperature sensor (accessory).
6. Connector for feed auger, ***240V~***.
7. Ignition element
8. Current transformer.
9. Power supply unit, 240 VAC/24 VDC, to supply the electronics and fan motor.
10. Semiconductor relay with indicator, to control the ignition element.
11. Fan.
12. Adapter circuit board for fan.
13. Flame monitoring, photoresistor.
14. Safety relay for pellet supply.
15. Thermal relay in downpipe.

Check that the burner has been disconnected from the power supply before working on it! Any intervention in the boiler's electrical equipment that requires tools must be carried out under the supervision of a qualified electrician. Disconnect the plug before service or if the burner is removed from the boiler.

Indicators and settings





16. Alarm relay with indicator.
17. Relay with indicator for feed auger.
18. **OPERATION:** (green)
    - On constantly: there is power supply to the burner.
    - Flashing: start delay.
19. **POWER:** (green)
    - On constantly: high power.
    - One long + one short flash: low power.
    - One long + two short flashes: cooling.
20. **FLAME:** (orange)
    - On constantly: photoresistor senses flame.
    - Flashing: start phase.
    - One long + four short flashes synchronously with ALARM: low fan RPM in operating phase.
21. **ALARM:** (red)
    - On constantly: high temperature, downpipe.
    - One long + one short flash: monitoring of feed auger motor.
    - One long + two short flashes: three failed starts.
    - One long + three short flashes: high ambient temperature.
    - One long + four short flashes: fan not working.
    - One long + four short flashes synchronously with FLAME: low fan RPM in operating phase.
    - Flashing: low element current.
22. **TEMP:** temperature setting, in °C, when burner controls boiler temperature. Requires temperature sensor (accessory).
23. **START DOSE:** pellet dose setting at start.
24. Switches for setting operating parameters:

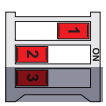
Power mode, switches SW1/1 and SW1/2

Two power modes
switch from 75 to 119.4 kBtu/h when the burner has burned at 75 kBtu/h for 20 min.



OFF (SW1/1)
OFF(SW1/2)

Low power,75 kBtu/h



ON (SW1/1)
OFF(SW1/2)

High power, 119.4 kBtu/h



OFF(SW1/1)
ON (SW1/2)

Feed auger supply feed time, switch SW1/3

OFF = Long



ON = Short

Pellet diameter, switch SW2/1

OFF = Ø0.24 in



ON = Ø0.31 in

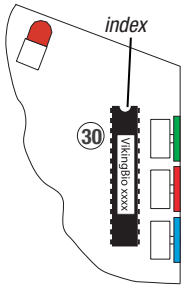
Switch SW2/2 - no function

Switch SW2/3 - *Always 'ON'!*



Always 'ON'!

25. **Fuel:** fuel volume setting for high power operation.
26. **Start delay:** 0 - 135 minutes. See 'Start delay' under Pellet firing.
27. **Air, LOW Power:** air flow rate setting for low power.
28. Serial interface for reading off the burner's settings, operating times and operating parameters. Requires serial cable or read unit (accessories).
29. Indicator. Lights up when the ignition element is connected.
30. Single-chip computer, which controls and monitors the burner.
    With any change of circuit board, it is important for the new circuit board to be installed correctly. The index marking must be upwards. See figure. The burner must be disconnected from the power supply.



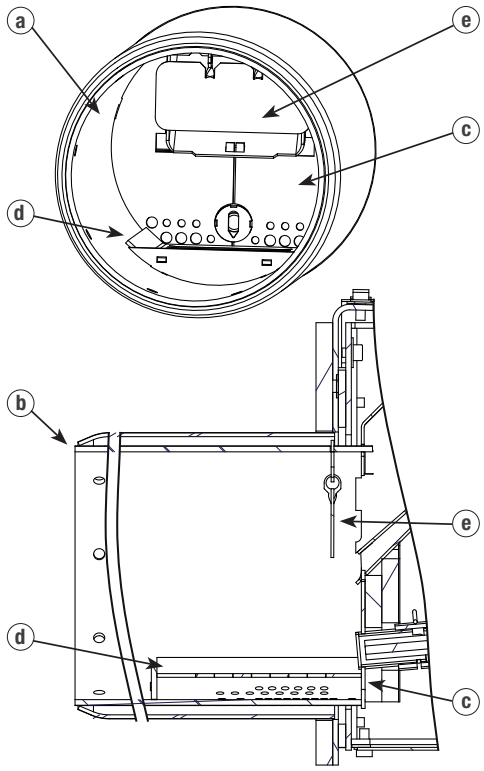
Startup

Before starting the burner for the first time, check that:

- it has been installed according to the instructions.
- the feed auger's inclination is 40 ±5°.
- there is a draught damper and it is adjusted to 0.02 inH_2O.
- all control units are correctly set.
- the burner has sufficient combustion air.
- there are pellets up to the burner.
- the grate is in the correct position and the lip is in place.

Position of grate

The grate must be positioned as shown in the figures below.



a. Inner burner pipe
b. Cross-section, burner pipes in their longitudinal direction.
c. End wall.
d. Grate. Must be in contact with end wall and burner pipe.
e. Lip. Prevents pellets from bouncing out into the combustion chamber/reduces heat radiation.

Feed auger

Risk of crushing. Do not insert hands or objects in the feed auger.

The feed auger must be filled before the burner is started. Connect the feed auger to an earthed power point. Place a collection receptacle below the hose and operate the feed auger so that 1.3-2.6 gallons of pellets pass through.

When the burner is in operation, the feed auger's plug, the power supply, must never be removed from the burner!

The chimney must be fitted with a draught damper that is appropriate for the chimney.

Flue gas temperature

Condensation damage can be avoided if the flue gas temperature is minimum 158 °F, 3.3 ft below the top of the chimney.

A low flue gas temperature results in higher efficiency but this must be weighed up against the risk of condensation. The temperature is measured when the boiler is at its normal operating temperature no earlier than five minutes after the burner was started and with the draught damper closed.

Measures to increase the flue gas temperature:

- remove any turbulators or baffle plates in the boiler.
- insulate the boiler's flue pipe and the chimney in cold rooms.
- increase the capacity of the burner
- install flue lining tubes

To avoid damage to the chimney, the flue gas temperature must be checked.

Turbulators

Certain boiler types have or can be fitted with flue gas turbulators. Their task is to make the flue gases turbulate to extract more heat and thus increase efficiency.
At low burner power, the flue gas temperature is low and there is a risk of condensation forming in the chimney. Try to shorten the turbulators until a suitable flue gas temperature is obtained.

Combustion

The correct adjustment is important for good heating economy, high efficiency and low emissions of environmentally harmful substances.

Optimum adjustment is possible only using flue gas analysis instruments.

The boiler room door must be closed during measurement.

Target values:

Flue gas temperature:	320	°F (depending on chimney type)
Soot number:	1 - 3	
CO content:	<300	ppm
CO_2 content, mean:	12,5 ± 2,5	%
Efficiency:	>90	%

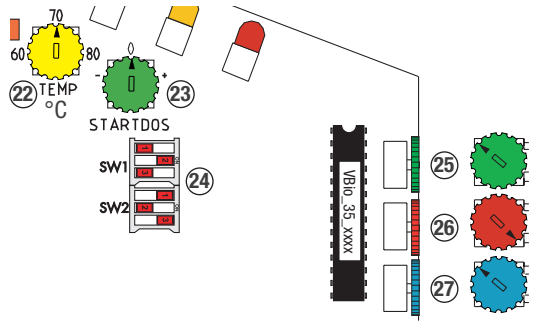
Adjustment

The burner's factory settings allow it to start in most boilers. These are not operating settings. They must be adapted in each case. Optimum adjustment is possible only using flue gas analysis instruments.
The correct adjustment is important for good firing economy, high efficiency and low environmental impact.

On account of irregular supply from the feed auger in the first few days, the burner should be adjusted after roughly one week of operation.
For access to the burner's adjustment knob/switch, the burner cover must be detached.

1. Check the settings

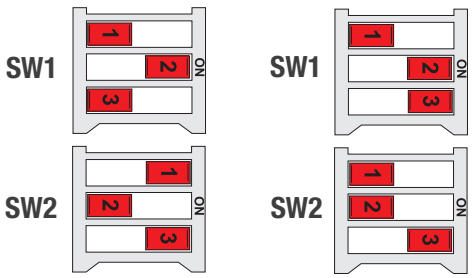
23, 25, 26 and 27 must be as shown in the figure.



Adjust setting 24 for the pellet diameter:

Factory setting: Ø0.3 in. pellet / high power, 119.4 kBtu/h.

Ø0.3 in pellet: **Ø0.24 in pellet**



2. High power setting, 119.4 kBtu/h

Start the burner and let it burn for at least 10 minutes.
a. Take a soot sample. The soot number should be 1 - 3.
b. Perform a CO_2 measurement.
If the CO_2 value is:
- too low: increase 'Fuel'.
- too high: reduce 'Fuel'.

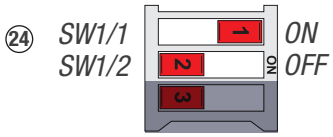
Repeat this test several times.

Fuel green 25



3. Low power setting, 75 kBtu/h

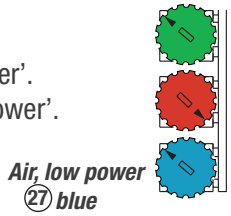
With the burner in operation, set the switches as shown in the figure:



Let the burner burn for at least 5 minutes.
The fuel setting may not be changed.

a. Take a soot sample. The soot number should be 1 - 3.

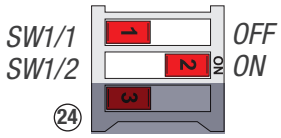
b. Perform a CO_2 measurement.
Adjust with 'Air, LOW Power'.
If the CO_2 value is:
- too low: reduce 'Air, LOW Power'.
- too high: increase 'Air, LOW Power'.



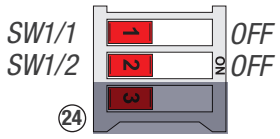
Repeat this test several times.

4. Select the operating mode.

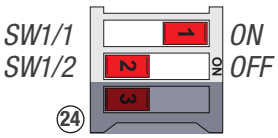
High power, 119.4 kBtu/h



Two power modes
switch from 75 to 119.4 kBtu/h when the burner has burned at 75 kBtu/h for 20 min.



Low power, 75 kBtu/h



5. Also set:

- the boiler temperature on 22 if the burner has a boiler temperature sensor.
- the start delay on 26.

°C	°F
60	= 140
70	= 158
80	= 176

See 'Boiler temperature control' and 'Start delay' under Pellet firing.

Adjustment has now been completed. Refit the burner's cover.

Pellet firing

The burner's parts in contact with flames are wearing parts that need replacement as required. To extend the burner's service life and maintain good combustion with high efficiency, the following points should be observed:

- The burner must be adjusted with a flue gas analysis instrument for the pellet quality used.
- If the quality and/or supplier of pellets is changed, adjustment must be repeated. Pellets may have different contents that may affect combustion.
- A draught damper must be fitted between the boiler and the chimney.
- It is important for the grate to be placed correctly in the burner pipe.
- Replace damaged parts as soon as possible.
- Follow these instructions.

Pellet quality

Use only wood pellets that meet the requirements of standard EN 14961-2, class A1.

Minimum pellet requirements under EN 14961-2

Length:	≤1.5	in class A1
Fines content < 3 mm:	≤ 1.0	% (by weight)
Calorific value:	≥ 7.3	kBTU/lb
Ash content:	≤ 0.7	%
Total moisture content:	≤ 10	% (by weight)

The melting point of the ash should be high, >2462 °F, as molten (sintered) ash is a problem. Molten ash is very difficult to remove and increases the cleaning required.

Handling and storing pellets

Wood pellets must be stored in a dry, airy place protected from the weather.

Handling pellets may entail health hazards. Contact your pellet supplier for more information on how pellets should be handled and stored.

Ventilate the store well before entering it and switch off the feed auger.

Being in an unventilated store may entail a risk of death.

Ensure that children are unable to enter the store.

Naked flames are prohibited near the store.

Combustion

The ash sinters if the combustion temperature is too high. If this occurs, the combustion temperature is too high or the pellets are of poor quality with a high ash content with a low melting point. The melting point of the ash should be >2462 °F. Check the adjustment of the burner. Do not confuse sintered ash with the easily removable ash cakes or ash balls that may be found in the combustion chamber. The correct adjustment is important for reliability, heating economy, efficiency and emission levels of environmentally harmful substances.

If the burner hatch is fitted with a sight glass, it is possible to study the flame. A few minutes after the burner has been started, the flame must have a yellow-white colour. It is normal for the colour to vary a little between white and yellow. The colour of the flame is an indication of the quality of combustion:

Light yellow:	good combustion, invisible smoke at normal temperature.
Reddish:	too little air or too much fuel, low efficiency, the boiler's heat-absorbing surfaces are covered in soot.
Whitish:	short flame, depending on whether there is too much air or too little fuel, low efficiency, high flue gas temperature.

If the flame cannot be studied, the colour of the soot/dust coating on the walls of the combustion chamber shows how good combustion has been.

If combustion is good, the coating is light greyish brown.

If the coating is black, it contains a lot of soot on account of too little air or too much fuel.

If the walls of the combustion chamber are white, this is on account of too much air or too little fuel.

Flue gas temperature

A high flue gas temperature may be because the boiler is full of soot or there is too much combustion air. This produces low efficiency and unnecessarily high pellet consumption.

A low flue gas temperature may be because of poor combustion on account of too little air or because the boiler is overdimensioned. There is then a risk of condensation in the chimney, which will cause damage.
During combustion, water is formed as steam, which accompanies the flue gases out into the chimney. Depending on the cooling in the chimney, the steam may condense as water. A low flue gas temperature results in higher efficiency but this must be weighed up against the risk of condensation.
Measures to increase the flue gas temperature:

- remove any turbulators or baffle plates in the boiler
- insulate the boiler's flue pipe and the chimney in cold rooms
- increase the capacity of the burner
- install flue lining tubes

Turbulators

Certain boiler types have or can be fitted with flue gas turbulators. Their task is to make the flue gases turbulate to extract more heat and thus increase efficiency.
At low burner power, the flue gas temperature is low and there is a risk of condensation forming in the chimney. Try to shorten the turbulators until a suitable flue gas temperature is obtained.

Pellet firing

Draught damper

The chimney must be fitted with a draught damper.

The draught is affected by temperature, weather and wind. As the combustion is affected by the draught, stable draught conditions should be the objective. The hatch lets boiler room air into the flue. The advantages of this are:

- more stable draught and flue gas temperature
- reduced stoppage losses
- ventilation of the flue
- drier flue gases, which reduces the risk of condensation

Smoke from the chimney

The colour of the smoke reveals the quality of combustion:

Greyish-brown:	smoking combustion on account of too little air.
Invisible:	heat shimmer. When the outdoor temperature is above zero or down to a few degrees below zero, the smoke must be invisible.
White:	when the outdoor temperature is lower, only a weak white smoke of steam must be visible.

If the boiler was previously fired with wood, the smoke may be dark and malodorous because tar on the boiler and chimney walls is being burned off. This may last for a week.

Efficiency

The aim is to achieve high efficiency, which means extracting as much heat as possible from the pellets. In fact, this involves reducing losses. The losses that should be minimised are:

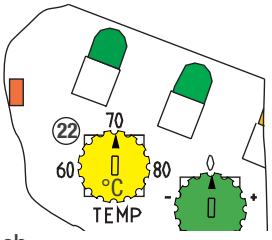
Flue gas loss:	The heat in the flue gases that escape via the chimney.
Stoppage losses:	While the burner is not operating, the chimney draught sucks cold air through the boiler, thus cooling it. This loss can be reduced by means of a draught damper.
Insulation losses:	Heat leakage via the boiler's insulation. A small part of this is recovered by the combustion air being heated. In some cases, some of it benefits the building.

The burner can be set to different power levels. It is a good rule not to use a higher power level than is required to meet the prevailing heat requirements.
A lower power for the burner results in a longer operating time and lower stoppage losses, which produces higher boiler efficiency.

The system must always have an alternative energy source to reduce vulnerability.

Boiler tempreature control

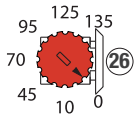
Boiler temperature control via the burner can be used in all operating modes. The temperature sensor must be connected to the burner.
The temperature control controls the boiler temperature with a connection difference of 50 °F.
The temperature is set on the circuit board. See 22.
When it is idle, the burner senses a rapid decrease in temperature, which may occur in an 'exchanger boiler' when hot water is drawn off. The burner then starts before the temperature has fallen to the normal start value. The temperature control is also suitable when the burner has been installed in a wood-fired boiler with accumulator tanks.



60°C = 140°F
70°C = 158°F
80°C = 176°F

If the burner is preceded by a boiler thermostat, this must be set to its maximum value. The setting on the burner must be 50 - 59 °F lower.

Start delay



The setting 26 allows the start to be delayed by 0 - 135 minutes.
This function extends the burner's operating time, which increases its efficiency. This function can be used with all operating modes but is not suitable for boilers with hot water heating via a heat exchanger.

Smoke in boiler room

If the system's hatches and dampers are not airtight, there is a risk of smoke entering the boiler room. A smoke detector is a good way of discovering whether flue gases are leaking out into the boiler room.

The boiler hatches must be closed when the burner is in operation.

Safety

From the point of view of fire safety, it is important for the boiler room to be clean and free of dust.

Flammable substances must not be stored in the boiler room.

The door to the boiler room must be closed.

In the event of fire or any other hazard, cut the power to the burner and take the necessary action.

Operation, start to stop

Operation, start to stop

Under normal conditions it takes four to five minutes until the flame is established.

The burner's operating cycle from start to stop is divided into four phases:

I. Start
II. Establish flame
III. Operation
IV. Cooling/blowing clean

Start

Start conditions:

- Overheating protection, thermostat and any hatch switch closed.
- Any alarm reset.
- The burner receives pellets.
- The thermostat requests heat.
  If start delay is selected, the 'OPERATION' indicator will flash during the time for which the delay is set.
- The fan starts and operates at maximum speed for twenty seconds to ventilate the boiler and flue gas duct.
- The fan stops. A start dose of pellets is supplied and the ignition element begins to heat. With the factory-set start dose, the feed auger turns approximately three turns, producing a pellet dose of approximately 0.2 qt.
- The fan operates periodically at low speed. The 'FLAME' indicator flashes. When the photoresistor senses that there is a flame, 'FLAME' lights up constantly.
  The burner has three attempts to start. The first attempt is described above. If no flame is established during the first attempt, the fan will stop for a brief time and then operate at low speed while the ignition element is also in operation. The third attempt to start is identical to the second.
  If there is no flame after the third attempt to start, the fan stops for a brief time and then speeds up in three steps to high speed.
  The burner normally ignites during the first attempt to start and the flame is established after four to five minutes.
  If the burner fails to create a flame as described above, it will stop and produce the 'Failed start' alarm. The most probable causes of this are excessive draught or the burner not receiving pellets.

Establish flame

- The burner is in operation with a flame.
- The fan speed increases in steps to establish a stable bed of embers on the grate.
- Pellets are supplied. The feed auger's pause time depends on the power set.

If the flame disappears during this phase, the control switches to the start phase but no pellets will be supplied.

Operation

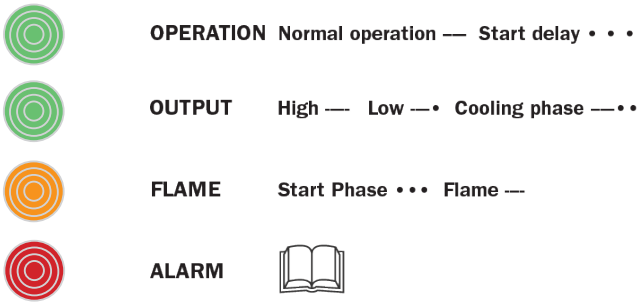
- The fan speed is determined by the power set. The 'POWER' indicator lights up constantly or flashes, depending on the operating mode. The 'FLAME' indicator lights up constantly.
- Pellets are supplied.
  If the flame disappears during operation, a smaller volume of pellets is supplied and the ignition element attempts to create a flame. 'FLAME' flashes and lights up constantly when there is a flame.
  The burner then switches to 'establish flame' to create a stable bed of embers in steps and then switches to the operation phase.
  If the attempt to create a flame fails, the burner will stop and produce a 'Failed start' alarm.
  The reason why the flame disappears may be high draught, no or uneven pellet supply or a clogged grate.

Cooling/blowing clean

- Stoppage by thermostat.
- Pellet supply ceases.
- 'POWER' indicator flashes, one long + two short.
- The fan operates at maximum speed and continues at this speed for 90 seconds after the flame has gone out. This is so that all pellets on the grate are combusted. The 'FLAME' indicator goes out.
- For four cycles, the fan is in operation at maximum speed, blowing clean, to blow away the ash from the grate and to cool the burner.
- The burner stops. Only the 'OPERATION' indicator is on.

Long operating time

When the heating requirements are high in relation to the burner's power, the burner's operating time is extremely long. To retain good combustion and reliable operation, after around eight hours of operation the burner switches automatically to its cooling/blowing clean phase to blow away the ash residue that is formed on the grate. The burner starts operating again automatically.



Operation and maintenance

Cleaning and sweeping

Switch off the power to the burner and detach the plug before cleaning or service or before the burner is detached from the boiler.

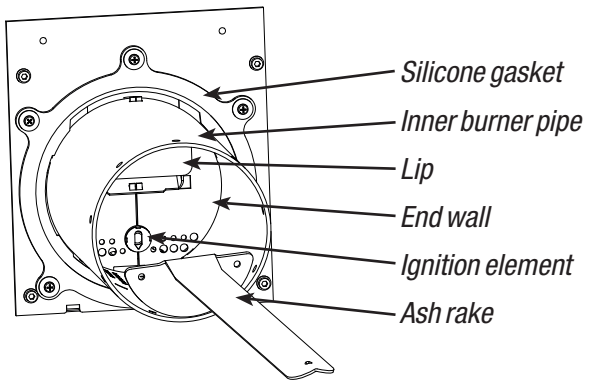
The interval between cleaning, ash removal and sweeping depends on the space available for ash in the combustion chamber and the quality, size and consumption of the pellets. You will quickly learn how often the burner needs to be cleaned.

The flue gas thermometer is a good way of knowing when it is time to sweep and clean the boiler. To retain good efficiency, the boiler should be swept and cleaned when the flue gas temperature has risen by approximately 122°F in relation to when the boiler was last swept.

Risk of burn injuries.
Always let the burner finish burning before starting to clean it. Otherwise there may be burning pellets in the burner.

The burner is cleaned after approximately 1100 lb of pellets have been consumed. Ash and dust that accumulate between the burner pipes must be removed.

- Detach the power supply and quick coupler on the hose from the feed auger.
- Open the quick attachments and separate the burner, with the inner burner pipe, from the outer burner pipe.
- Brush the grate clean. During cleaning, the grate's bars must not be pressed together, opening 0.06 – 0.08 in.
- Each time cleaning takes place, check the condition of the parts in contact with the flame, the grate, the inner burner pipe, the end wall and the lip. Replace damaged parts as soon as possible.
- When you refit the burner, check that the silicone gasket is in place and is airtight. Otherwise, the inner burner pipe may be damaged.

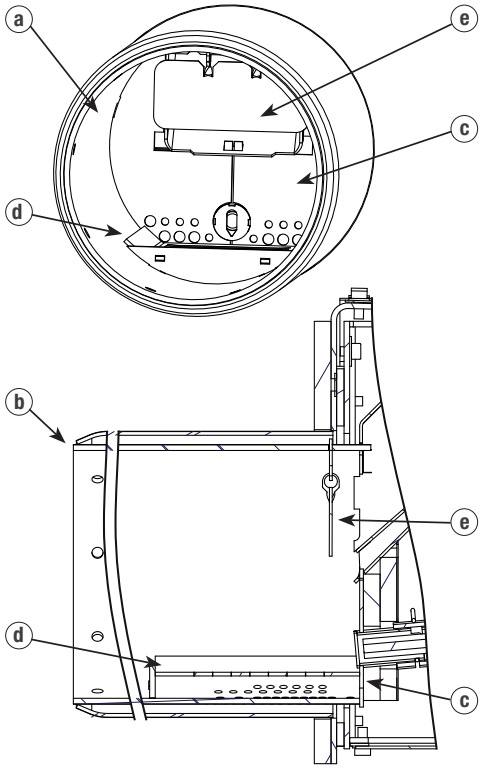


- Blow any dust that has collected in and on the burner away carefully with compressed air or brush it away with a soft brush.

Always be careful with ash as it may be smouldering.
Ash must be stored in an ash bucket made of sheet metal with a tight lid.
The bucket must be placed on non-flammable material.

Position of grate

The grate must be positioned as shown in the figures below.



a. Inner burner pipe

b. Cross-section, burner pipes in their longitudinal direction.

c. End wall.

d. Grate. Must be in contact with end wall and burner pipe.

e. Lip. Prevents pellets from bouncing out into the combustion chamber/reduces heat radiation.

Check that:
- the grate is correctly refitted.
- the lip is correctly suspended.

Cleaning the pellet store

Over time, there will be fine fractions of pellets in the base of the pellet store. If their volume is so high that the pellet supply to the burner is impeded, the store must be cleaned.

Handling pellets may entail health hazards. Contact your pellet supplier for more information on how pellets should be handled and stored.

Ventilate the store well before entering it and switch off the feed auger.

Being in an unventilated store may entail a risk of death.

Ensure that children are unable to enter the store.

Naked flames are prohibited near the store.

Operation and maintenance

Safety system

The pellet system's safety system consists of:

- overheating protection against excessive boiler temperature.
- thermal relay.
- non-combustible hose (melts) between feed auger and downpipe.
- fan with fan guard.
- photoresistor for flame monitoring.
- blockage if the ambient temperature is too high.

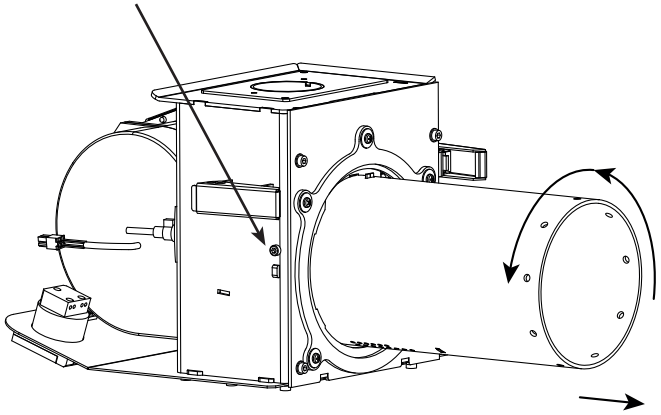
The majority of the functions cannot be influenced by the user and require no special control.

Check regularly that the hose between the feed auger and the downpipe is intact.

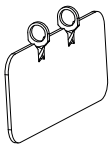
Changing the inner burner pipe

Detach the burner from the outer burner pipe.

Unscrew this screw. Turn the inner burner pipe anticlockwise and pull the pipe out.



Move the lip suspended in the pipe to the new burner pipe.



Refit in reverse order.

Check the condition of the outer burner pipe as well.

Check that the burner has been disconnected from the power supply before working on it! Any intervention in the boiler's electrical equipment that requires tools must be carried out under the supervision of a qualified electrician. Disconnect the plug before service or if the burner is removed from the boiler.

Resetting the thermal relay

When the thermal relay has been triggered, the 'ALARM' indicator lights up constantly.

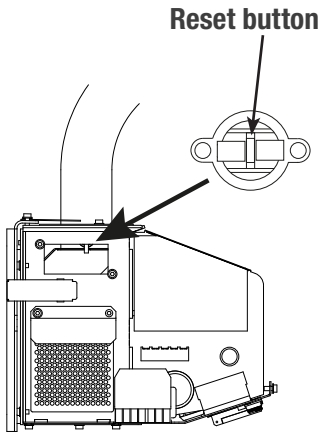
Investigate and remedy the cause of the increased temperature.

The burner must be disconnected from the power supply when the thermal relay is reset.

Remove the cover of the burner and detach the cover plate in front of the thermal relay.

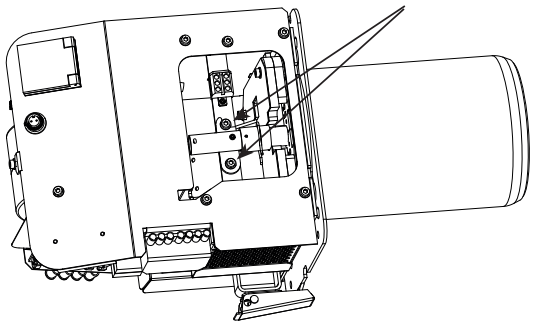
Reset it by pressing the button on the thermal relay.

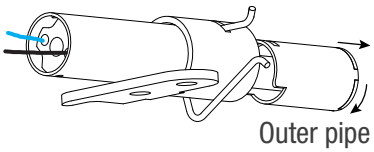
Refit the enclosure and restart the burner.



Changing ignition element

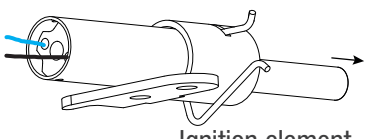
Unscrew the screws that hold the ignition unit





Turn the outer pipe half a turn and remove it.

Outer pipe



Pull out the broken ignition element and replace it with a new one.

Ignition element

Refit in reverse order.

Troubleshooting

Troubleshooting

In the event of a problem, first check all the conditions required for the burner to work:

- Does the burner have power? Is the operation indicator lit up?
- Are all control units, thermostats, etc. set correctly?
- Are all safety devices, overheating protection, hatch switches, etc. in normal operating mode?
- Is the burner receiving pellets?

Look at the grate after a failed start. If there are unburned or slightly singed pellets there, the most probable cause is that the draught is too high.
If all the pellets have burned up, the most probable cause is that there is a problem with the pellet supply.

External fault sources

Common circumstances that give rise to operating problems:

- the inclination of the feed auger from the horizontal plane is not 40°±5°.
- the pellets do not meet the requirements under the standard.
- draught >0.06 inH_2O.
- no draught damper, or it is incorrectly dimensioned.
- large area in flue.
- irregular fuel supply because the feed auger has not travelled far enough, the pellet store is of poor quality or there are a lot of crushed pellets in the store.
- grate in incorrect position.

Checking the feed auger's capacity

A. Detach the quick coupler at the downpipe and hold your hand over the quick coupler part that is attached to the hose.

B. Connect the feed auger to a wall outlet and let it rotate through 3.5-4 revolutions.

C. The quick coupler part on the hose must be filled with pellets. If this is not the case, check the inclination of the feed auger and its insertion into the pellet store.

Resetting the alarm

Switch off the power to the burner for approximately 10 seconds. In the event of a fault that requires intervention in the burner, the power must always be switched off before work begins. After action has been taken, the alarm is reset automatically when the power to the burner is switched on.



ALARM

21

High temperature in downpipe	**-**
Monitoring of feed auger motor	**- •**
Failed start	**- • •**
High ambient temperature	**- • • •**
Fan not working	**- • • • •**
Starter element not working	**• • • • • •**



Risk of entrapment.
Do not insert hands or objects in the feed auger.
Before any work is done on the feed auger, the power cable must be disconnected from the burner.

Temperature sensor's resistance (accessory)

Temp °F	Resistance kΩ	Voltage V	Temp °F	Resistance kΩ	Voltage V
68	12.5	4.2	131	3	2.9
77	10	4.1	140	2.5	2.7
86	8.1	3.9	149	2.1	2.4
95	6.5	3.7	158	1.8	2.2
104	5.3	3.5	167	1.5	2.0
113	4.4	3.3	176	1.3	1.8
122	3.6	3.1	185	1.1	1.6

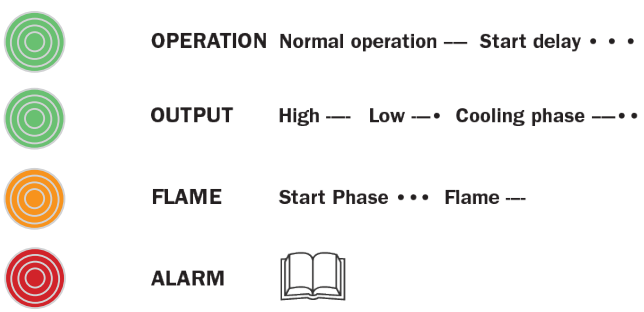
The voltage is measured in the sensor's connection points on the circuit board when the burner is live. During resistance measurement, the sensor must not be connected.



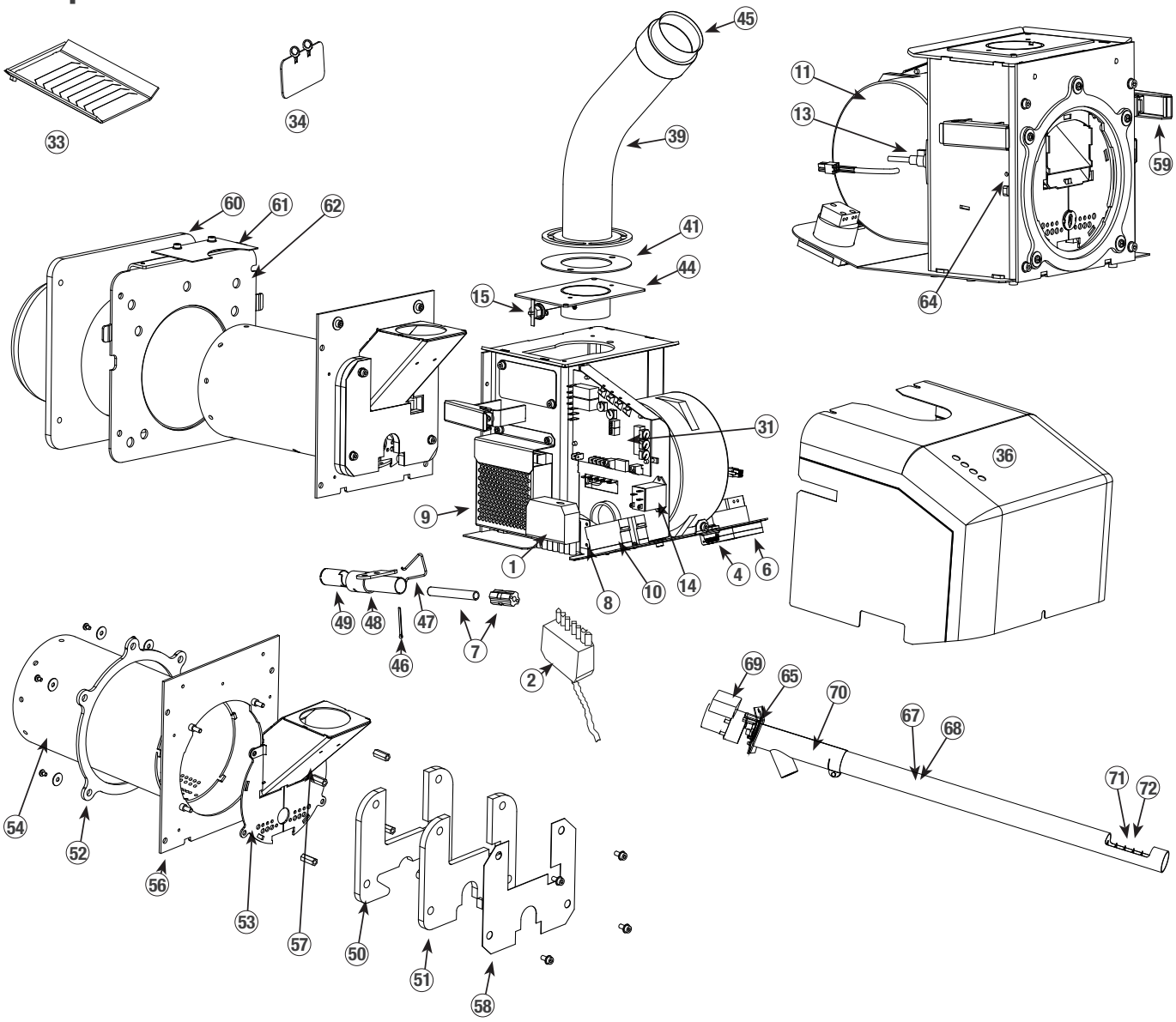
Switch off the power to the burner and detach the plug before cleaning or service or before the burner is detached from the boiler.

Troubleshooting

Alarm indicator/alarm	Probable cause	Action
On constantly. High temperature in downpipe.	Clogged chimney.	Check the draught. Sweep if necessary.
	Too much ash and soot in the burner and combustion chamber.	Clean the burner and boiler. Reset the thermal relay.
One long + one short flash. Monitoring of feed auger motor.	The power supply for the feed auger is from a power point. Relay fault or defective circuit board.	Check. Take action. ***SW2 / 3 always 'ON', see 'Indicators and settings'.***
One long + two short flashes. Failed start. The burner stops 13 minutes after the thermostat requested heat.	Draught too high or area in flue too large.	Check. Take action.
	No pellets are reaching the burner.	Check that there are pellets in the store, that the feed auger is working and that pellets are falling down into the burner.
	Too much ash on the grate.	Clean the burner.
	Photoresistor dirty/faulty.	Clean/replace the photoresistor.
One long + three short flashes. High ambient temperature.	Too much ash and soot in the burner and combustion chamber.	Clean the burner and boiler. Check the draught.
	High ambient temperature, possibly because the combustion chamber hatch is poorly insulated.	Check the ambient temperature. Should be max. 86 °F. Take action.
	Faulty temperature sensor on circuit board.	Change circuit board.
One long + four short flashes. Fan not working.	Dirt in fan. Fan faulty.	Clean and check that the fan operates smoothly. Replace fan if the alarm recurs.
Continuous flashing. Starter element not working.	Semiconductor relay or circuit board faulty. Green indicator on semiconductor relay does not light up at start.	Check that the relay has power, 3V=, from the circuit board. Replace circuit board or relay.
	Ignition element faulty. Green indicator on semiconductor relay lights up at start.	Measure the resistance in the ignition element. Replace in the event of failure. The resistance of the ignition element varies with the temperature. At room temperature, the resistance is approximately 80 Ω.
ALARM and FLAME flashing synchronously ***One long + four short flashes.*** Low fan RPM in operating phase.	Dirt in fan.	Clean and check that the fan operates smoothly.
	Fan faulty.	Replace fan if the alarm recurs.



Components



1	440163	Electrical intake, septuple-pole	1
2	440164	Plug, septuple-pole	1
3	440090	Capacitor X2 0.1 uF	1
4	700510	Connector, 2-pole	1
6	440165	Power point with cover	1
7	440121	Ignition element with cable	1
8	360020	Current transformer	1
9	218002	Power supply unit, 230 V~/24 V=	1
10	170090	Semicondutor relay	1
11	500021	Fan	1
12	219998	Adapter circuit board	1
13	500003	Photoresistor	1
	370048	Masking cover	1
14	170006	Relay, single-pole vx	
15	120090	Thermal relay	1
31	210019	Circuit board	1
32	160001	Terminal block, triple-pole	1
	160006	End plate, terminal block	1
33	711597	Grate	1
36	190010	Lamp lens	
39	711615	Downpipe	1
41	700506	Packing	1
44	711614	Spacer	1
45	710044	Reducer	1
	300047	O-ring, 2.3 in	1
46	100740	Split pin	1
47	700503	Hairpin	1
48	711610	Ignition element holder	1
49	711616	Ignition element male part	1
50	700501	Insulating sheet, inner	1
51	700502	Insulating sheet, outer	1
52	700505	Packing, pipe	1
53	711591	Rear end wall	2
54	711592	Inner burner pipe	1
34	711603	Lip	1
56	711605	Bracket, inner, complete	1
57	711618	Shaft	1
58	720457	Insulation protection	1
59	440212	Eccentric lock	2
60	700207	Insulation, boiler hatch	1
61	90761	Cap	1
62	711606	Outer burner pipe	1
63	711619	Complete inner burner pipe	1
64	100404	Screw, M5 x 40	1
65	440097	Flange bearing	1
67	450102	Pipe, 49.1 in	1
68	450103	Pipe, 88.5 in	1
69	500001	Motor	1
70	500007	Y-pipe	1
71	710136	Coil, 4.9 ft	1
72	710137	Coil, 8.2 ft	1
	710054	Shaft	1
	710095	Hook	1
	440061	Carabiner	1
	440060	Chain, 4.9 ft	1
	390258	Polyurethane hose	1
	240481	Hose clip	2
	100520	Hook screw	1
	380030	Flue gas thermometer	1

Accessories

		Art. no.
Boiler temperature sensor	temperature control via the burner	
Draught damper	5.9 x 5.1 in, for flue pipe 90351 (standard VB wood-fired boilers)	2924
Draught damper	for cleaning hatch in chimney b: 5.2 in	2925
Draught damper	large, with adapter	2926

VÄRMEBARONEN

Värmebaronen AB
Arkelstorpsvägen 88
SE-291 94 Kristianstad
Tel. +46 44 22 63 20
Fax +46 44 22 63 58
www.varmebaronen.se
www.varmebaronen.com
info@varmebaronen.se