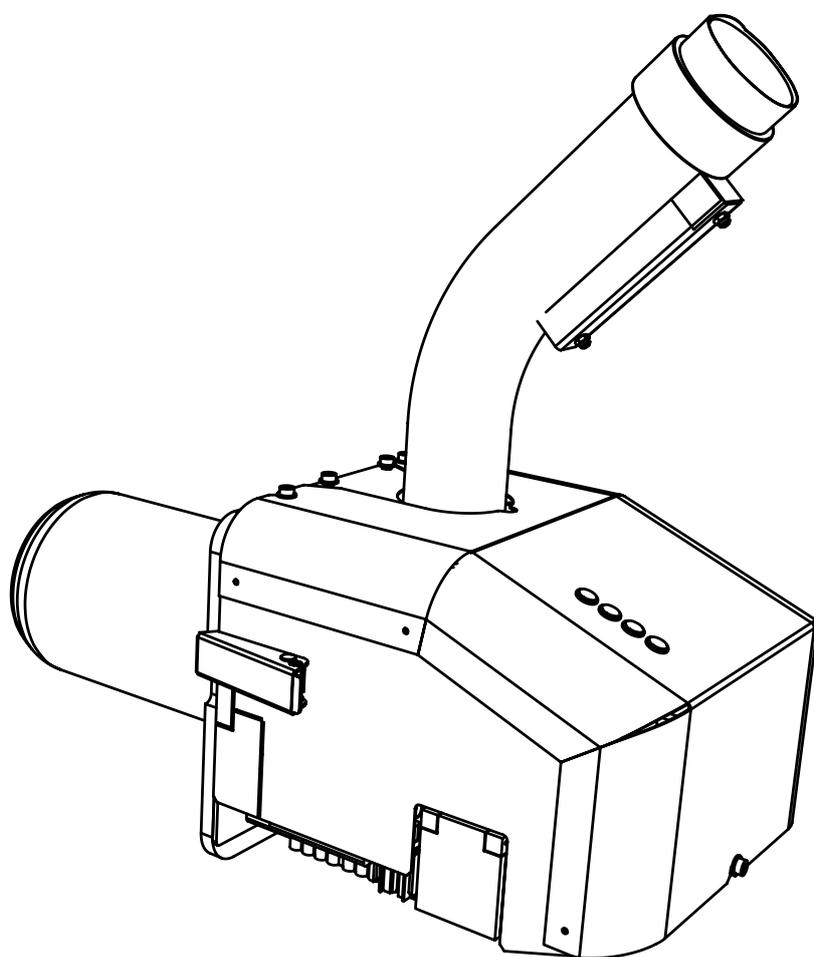


*Installation, operation and care*

# VIKING BIO

*Pellet burner*



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# General

**Read these instructions carefully before carrying out any installation, adjustment or service. Follow the instructions.**

- Keep these instructions close to the burner.
- Värmebaronen AB retains the right to change the specification without prior notice, as part of its policy of continuous improvement and development.
- The burner must not be modified, changed or rebuilt.
- To guarantee that the burner works reliably, installation, adjustment and ongoing service must be carried out correctly.
- You must contact the chimney sweep before changing the form of energy.
- Building permits or notifications are not normally necessary if the existing boiler can be fired with pellets. Contact your municipality to find out about restrictions on the use of solid fuels in built-up areas.
- The correct settings are important in achieving economical burning and a long service life for parts that are exposed to flames. Optimum adjustment is only possible if a flue gas analysis instrument is used.
- The parts that are exposed to flames, the grate and the inner burner tube are wearing parts that will have to be replaced over time.
- Only use original spare parts. Spare parts not meeting the specifications of Värmebaronen may impair safety.
- The type and serial number of the burner must be quoted when ordering spare parts, see the rating plate.
- For service issues, contact your installer.

These instructions use the following icons to identify important information:



Information that is important for optimum function.



Tells you what you must – or must not – do in order to avoid personal injury.



Tells you what you must – or must not – do in order to prevent damage or disturbance to the component, the burner, the process or the surroundings.

## Legend

< means less than.

≤ means less than or equal to

> means greater than.

≥ means greater than or equal to

10 Pa = 1 mm water column

**To be completed when the Viking Bio is installed**

Serial number: .....

Installation date: .....

Installed in boiler,  
manufacturer/type: .....

Installer: .....

Tel: .....

Other: .....

.....

.....

.....

.....

.....

**Combustion values**

1		2		3		4	
Date	_____	Date	_____	Date	_____	Date	_____
Draught	_____ Pa						
Soot value	_____						
O <sub>2</sub>	_____ %						
CO	_____ ppm						
CO <sub>2</sub>	_____ %						
T.gas	_____ °C						
T.air	_____ °C						
T.diff	_____ °C						
Eta	_____ %						
qA	_____ %						

The Viking BIO is a forward burning pellet burner for 8 mm wood pellets. Fuel and air are mixed within the burner in a controlled way, and this is the reason for the environmentally-friendly combustion and the high efficiency. The burner is designed for installation on a conventional oil or firewood boiler.

The Viking BIO works in a similar way to an oil burner – it is fully automatic and controlled by the boiler thermostat. A temperature sensor is available as an accessory, allowing the burner to control the boiler temperature – this is especially useful in boilers in which the hot water is produced in a heat exchanger.

To prevent it operating when the conditions are unsuitable – for example the wrong boiler type, a lack of maintenance or poor draught conditions – the burner monitors back pressure in the combustion chamber, and shuts down/fails to start if the back pressure is too high. The safety system of the burner also includes flame monitoring and a fan sensor.

Different operating modes can be selected: high power, low power or modulating. The burner can control the boiler

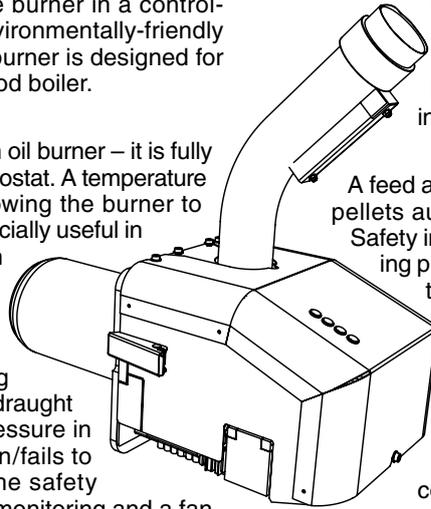
temperature, accessory. It is also possible to delay the start, which extends the running time and therefore improves efficiency.

The cover of the burner has four indicator lights, which flash in different patterns to provide information about operating phases and alarms.

A feed auger, controlled by the burner, is used to supply pellets automatically to the burner from the fuel store. Safety in the feed system is guaranteed by an overheating protection on the downpipe, a fusible hose linking the feed auger and the burner, and an overload protection fitted to the auger motor.

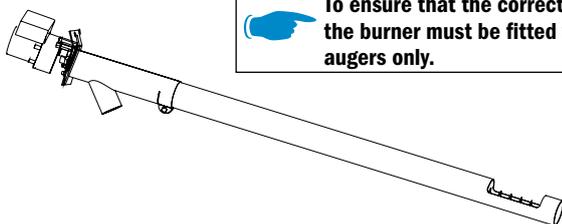
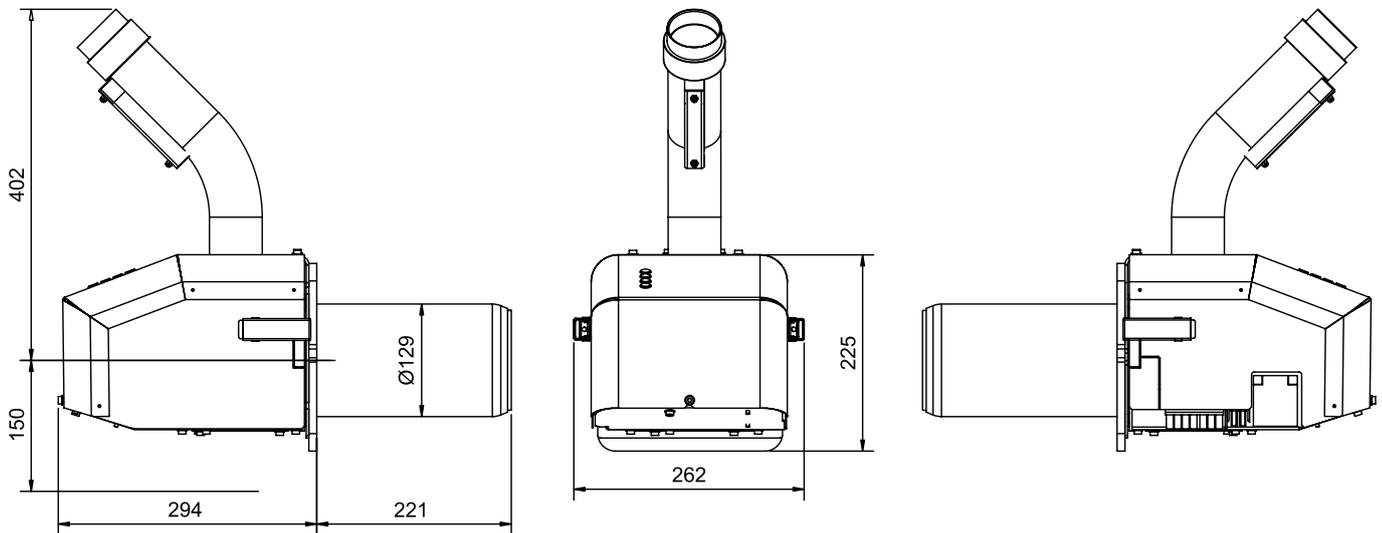
To facilitate installation and care, the burner has quick-release fastenings, making it easy to attach to/remove from the boiler. All electrical connections are fitted with instant connectors.

The burner is supplied with feed auger, connecting cable, flue gas thermometer and ash rake. Accessories include boiler temperature sensor, extension part, installation plate, conversion kits for firewood hatches, etc.



## Technical data

<b>Weight:</b>	12 kg	<b>Current:</b>	2.8 A	<b>Pressure in combustion chamber:</b>	±15 Pa
<b>Ambient temperature:</b>	10- 30°C	<b>Power consumption in operation:</b>	<50 W	<b>Pellet quality:</b>	SS 187120, Group 1 or equiv.
<b>Rated output, low/high:</b>	15/20 kW	<b>Fuse:</b>	6 A	<b>Pellet size:</b>	Ø8 mm
<b>Power supply:</b>	230 V~, ±10 %	<b>Protection class:</b>	IP21	<b>Feed auger 1500/2500 mm:</b>	230 V~/15 W
<b>Frequency:</b>	50 Hz	<b>Draught required:</b>	0- 5 Pa	<b>Weight:</b>	10 kg



 To ensure that the correct quantity of pellets is dispensed, the burner must be fitted with one of the following feed augers only.

VIKING BIO  
 VIKING BIO with auger 1500 mm  
 VIKING BIO with auger 2500 mm  
 Auger 1500 mm  
 Auger 2500 mm

prod. no. RSK  
 33 00 639 07 46  
 33 03 639 07 64  
 33 04 639 07 65  
 33 01 639 07 47  
 33 02 639 07 48

**STOP** Installation must be carried out in accordance with the applicable regulations. Installers are responsible for familiarising themselves with the applicable rules.

## Installing the burner

**!** The burner hatch must be well insulated from the burner.

### Boiler

The Viking Bio can be fitted to more domestic boilers. The output range of the boiler must match the output of the boiler so that the flue gases are cooled sufficiently.

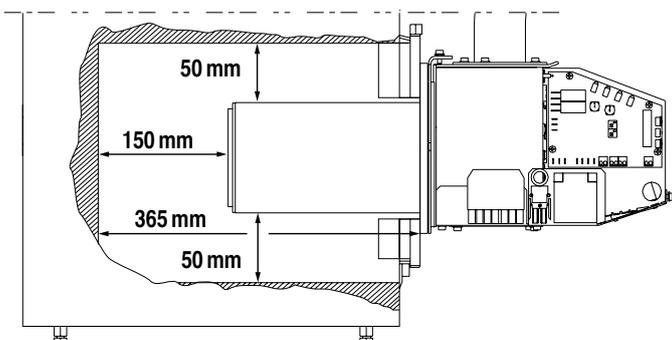
The flue ducts in the boiler must not be so narrow that they can easily become blocked by ash. Pellet burning produces quite a lot of ash that needs to be accommodated by the boiler. It must also be easy to clean the ash from the boiler.

The boiler hatches and dampers must have strong seals, preventing air leaks into the boiler.

For easy care, it should be possible to open the hatch without having to remove the burner.

Firewood boilers have more space for the ash and are usually easier to clean. An old firewood boiler is not normally a good choice, as the heat exchanging surfaces are too small to cool the flue gases sufficiently.

In a dual-fuel boiler, the burner should be fitted to the oil hatch. If the pellet burner is fitted to the oil side, the boiler can also be used to burn firewood.



The flame must not touch the walls of the combustion chamber. The minimum dimensions of the combustion chamber are 230 x 230 x 365 mm (h x w x d).

If the combustion chamber is not deep enough, an extension can be added to position the burner further away from the hatch, or a number of gaskets can be inserted between the hatch and the burner. Spacers are available as accessories.

The distance to the bottom of the combustion chamber must be large enough to leave space for the quantity of ash created during a week's use in winter. Most of the ash will collect at the far end of the combustion chamber.

### Chimney

A chimney used for oil burning is normally also suitable for pellet burning. A chimney for firewood burning may have a flue duct that is too large. Requirement:

- Min: height 2 m, Ø100 mm or equivalent.
- Max: draught <15 Pa.

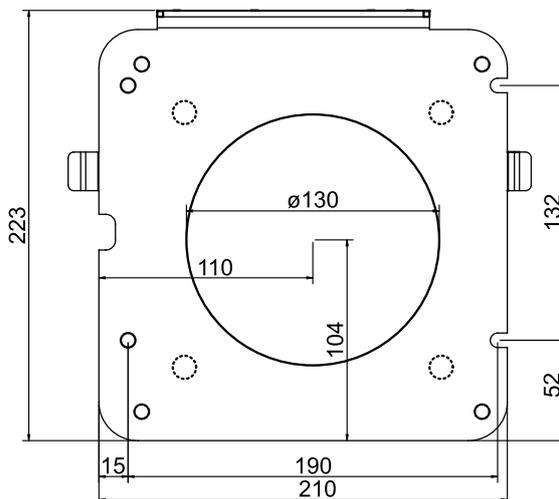
The draught is measured when the chimney is hot and during normal operation.

**!** A draught regulator must always be fitted.

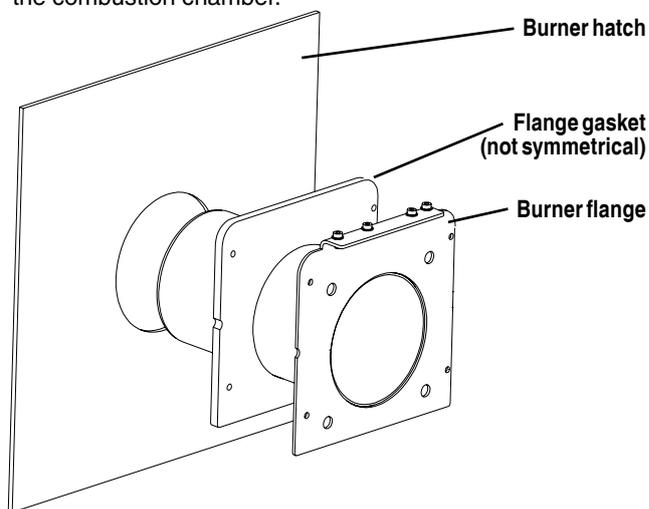
### Boiler room ventilation

The boiler room must have an air supply vent capable of delivering enough air to the burner. The open area of the vent must be the same as the cross-sectional area of the chimney.

- A. Loosen the three screws securing the cover of the burner and remove them. Open the quick-release fastenings, release the outer burner tube and flange from the burner. Mark where the burner will be positioned and create holes as indicated below.



- B. Fit the burner flange and flange gasket to the burner hatch and fasten using four M6 screws. The burner must be installed level or pointing downwards one or two degrees in the combustion chamber.

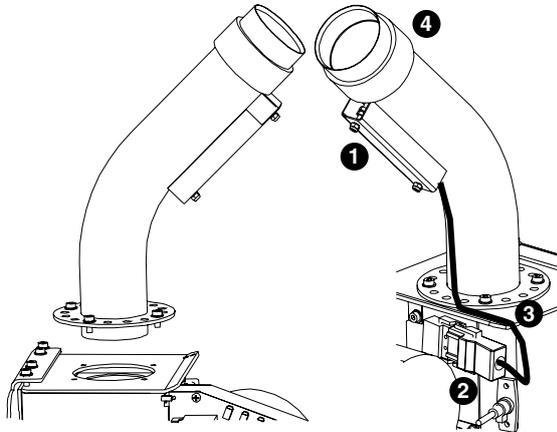


- C. Fit the burner to the burner flange and lock the quick-release fastenings. Check that the burner forms a tight seal against the silicone gasket on the burner flange.

## Downpipe

The downpipe is fastened to the body of the burner. The downpipe can be rotated in steps of 22° to line it up with the feed auger.

The downpipe has a temperature limiter, with a cable to be connected as shown in the diagram.

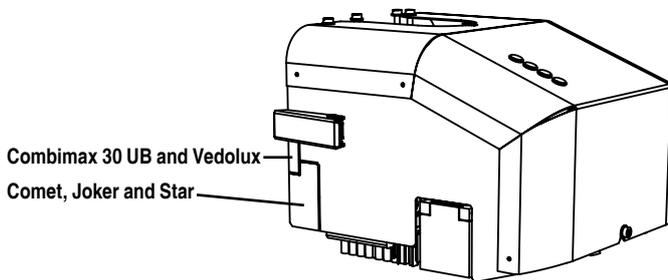


1. Temperature limiter with cable on downpipe.
2. Plug the cable connector here.
3. Use a cable tie to secure the cable to the body of the burner after laying it as shown in the diagram.
4. Quick connector, adaptor.

**Check that the contacts are properly seated.**

## Knockouts

The body of the burner has knockouts on the side, which can be removed when the boiler is installed on Värmebaronen boilers.



## Feed auger

**To ensure that the correct quantity of pellets is measured out, the burner must be fitted with one of the compatible augers. There is a setting in the electronic control to specify whether the auger pipe is metal or plastic.**

Fit the auger motor to the auger and fully tighten the locking screw, making sure the motor does not slide against the auger shaft.

The feed auger must be securely fastened, because it will tend to work its way into the pellet store. Suspend the auger using a chain fixed to the ceiling – the chain must be vertically in line with the auger hanger.

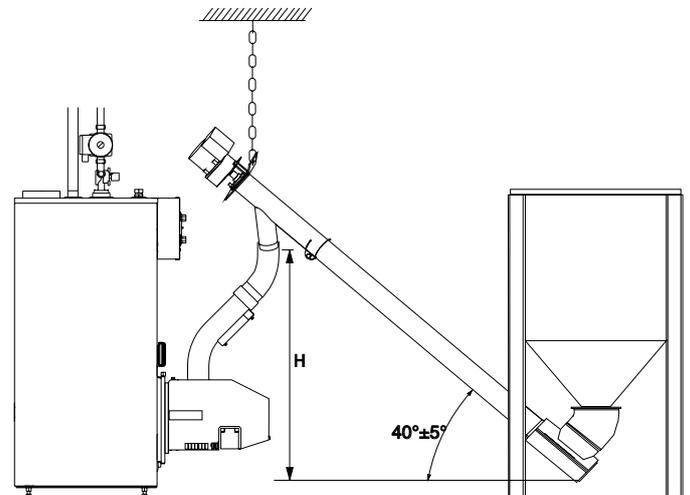
The inlet to the feed auger must be at least 50 mm, and it is important for the inlet to be completely clear. Check the position of the auger before filling the store with pellets. Use tape on the auger pipe to mark how far it extends into the store. This will make it easier to check whether the auger has worked its way further into the store, and also to replace the auger if it is removed from a full store.

Use the included hose to connect the auger to the burner's quick connector on the downpipe. Secure the hose at both ends with hose clips.

Connect the cable of the feed auger to the electrical outlet on the burner. Before starting the auger and the burner, the auger must be filled with pellets, see Feed auger on page 12.

A flexible feed auger may be used with the burner, but with an intermediate store, used by some Viking Bio augers to supply the burner with pellets.

**The auger must be inclined from the horizontal by 40° ± 5°.**



H dimensions with 40° angle: auger 1500 mm: 750 mm  
auger 2500 mm: 1400 mm



### Risk of trapping.

**Before doing any work on the feed auger, ensure that its power supply cable is disconnected from the burner.**

## Pellet store

Ready-made stores designed for pellets are available on the market. These are preferable to building your own store. It should be possible to remove the feed auger for cleaning without the need to empty the store first.

The size of a weekly store depends on the heating requirement of the building, but a capacity of at least 300 litres is recommended.

## Flue gas thermometer

Install the supplied flue gas thermometer in a suitable place on the flue pipe.

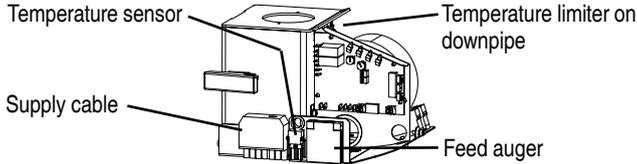
## Electrical connection

**STOP** Electrical installation must be in accordance with the High Current Regulations [Starkströmsföreskrifterna], under the supervision of an authorised electrical installer.

An all-pole circuit breaker with 6 A fuse must be installed ahead of the burner.

The wiring depends on which boiler is being used with the burner, whether the boiler has its own electrical system and whether the burner will control the boiler temperature. The principle is illustrated in the example below.

### Connections on burner



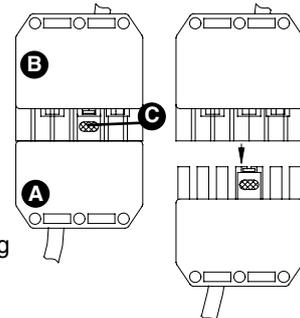
Push the contacts together firmly.

### Connection – power supply cable NB. 230V~, see wiring diagram

- N: Neutral.
- ⊕: Earth.
- L1: Black, supplied via an overheating protection.
- B4: Brown, connected to boiler thermostat.
- S3: Grey, alarm signal, 230V~, from burner, max load 1A.
- T1, T2: For any safety switch on the combustion chamber hatch.

Push the 7-pin plug-in contact, A, into the socket, B, on the burner, until the notch on the button, C, engages and locks the contact.

To disconnect, first switch off the power supply to the burner and then press the button while pulling the contact out of the socket.



## Alarm

When the burner generates an alarm, there is a 230V~ signal on S3, grey cable. The signal can be used for any kind of visual or audible indication. **If the alarm function is not used, insulate the end of the cable.**

## Hatch safety switch

A hatch switch must be installed if the combustion chamber hatch can be opened without tools. Another way of guaranteeing safety is to make the hose between the feed auger and the burner so short that it has to be removed from the burner before the hatch can be opened. Remove the jumper, T1 - T2, in the power supply connector if a hatch switch is connected.

## Boiler temperature control via burner

A temperature sensor, accessory, is required to allow the burner to control the boiler temperature. Connect the sensor to a contact on the burner, see "Connections on burner". The wiring is as shown in the diagram below.

The burner temperature control has a wide switching spread, ±8°C, reducing the number of start-ups and prolonging the running time. It is also a good idea to allow the burner to control the boiler temperature if the domestic hot water is heated in a heat exchanger.

The best place for the temperature sensor is in an immersion tube or at the top of the boiler under the insulation. If there is no immersion tube, the sensor can be attached to the boiler using a two-part epoxy adhesive. It is important to obtain a good thermal contact for accurate and stable temperature control.

In a heat exchanger boiler, position the sensor so it senses the return side of the heat exchanger, but not on the return pipe. See opposite for details of Star, the heat exchanger boiler from Värmebaronen.

**Checking the electronic connections.**

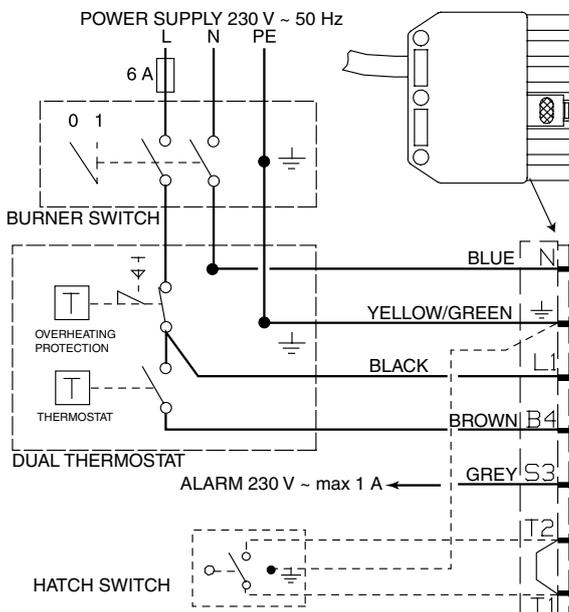
1. The switch and thermostat must be in position "0"
2. Set the switch to position "I". All the indicators should light for a while, then only the "OPERATION" light should be lit.
3. Turn the thermostat so that it calls for heat. The "FLAME" indicator should start flashing.

**If this does not happen, check the connection.**

## Boiler thermostat controls boiler temperature

**STOP** The phase supply to the burner must be preceded by an overheating protection, and the control phase must be preceded by a thermostat.

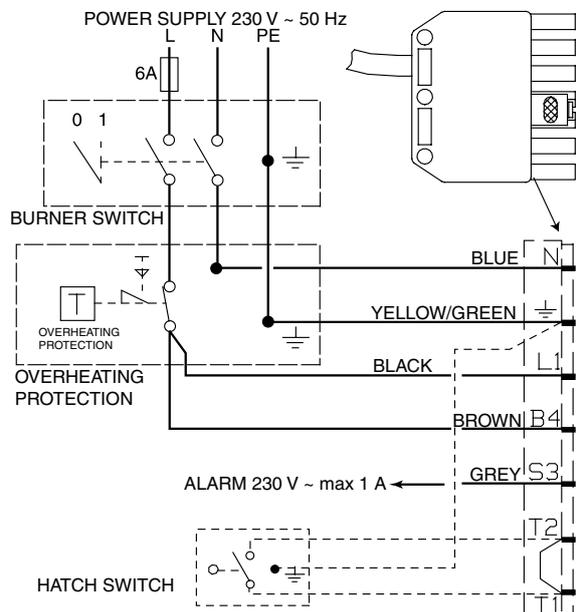
The burner is wired so it has a separated power supply and control phase, but the same phase must be used.



## Boiler temperature control via burner

**STOP** The phase supply and control phase to the burner must be preceded by an overheating protection.

Requires a temperature sensor, accessory, see "Boiler temperature control via burner".



## Connection to Värmebaronen boilers

The diagrams below illustrate how to connect some Värmebaronen boilers. See also the instructions for installation, operation and care of the boiler.

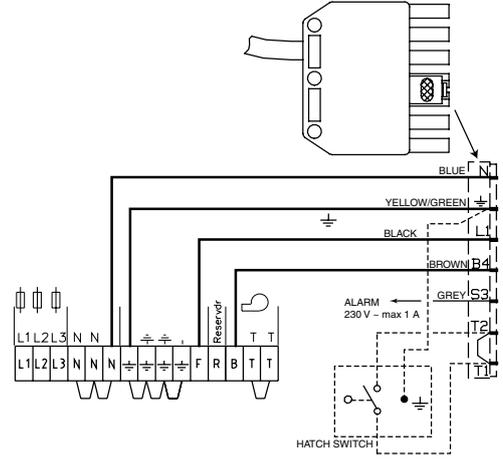
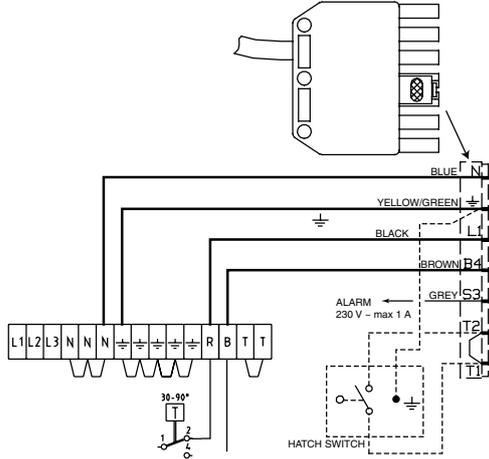
**There are cables, etc. behind the front panel of the boiler. Check for their exact location before drilling for cable grips.**

### COMET

*The boiler is available in two versions – compare the boiler terminal block with the diagrams below.*

The pellet receives its phase supply from terminal “R” in the terminal block. Ahead of this there is a thermostat, which must be set to the highest temperature. The boiler temperature setting for oil/pellets must not be set so high that the temperature goes above this thermostat setting.

The pellet receives its phase supply from terminal “F” in the terminal block.

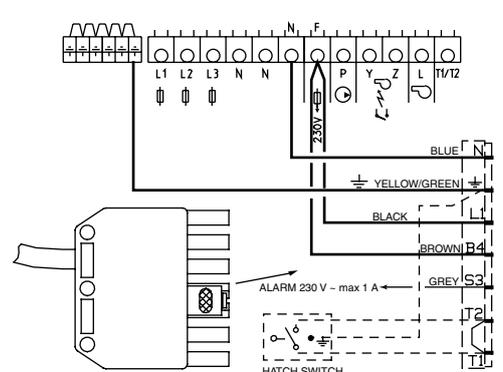
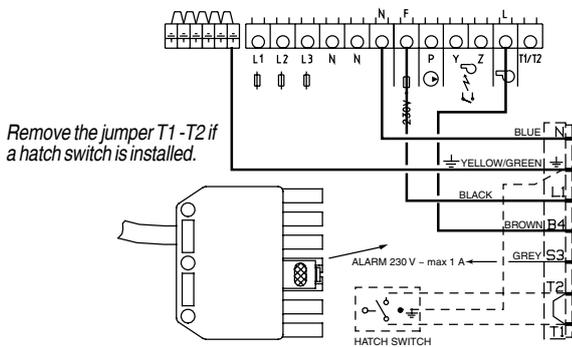


### STAR, JOKER and BIOMAX

*Boiler thermostat controls boiler temperature*

*Boiler temperature control via burner*

In Star, a heat exchanger boiler, the temperature sensor fits into an immersion tube on the left behind the hinged control box.

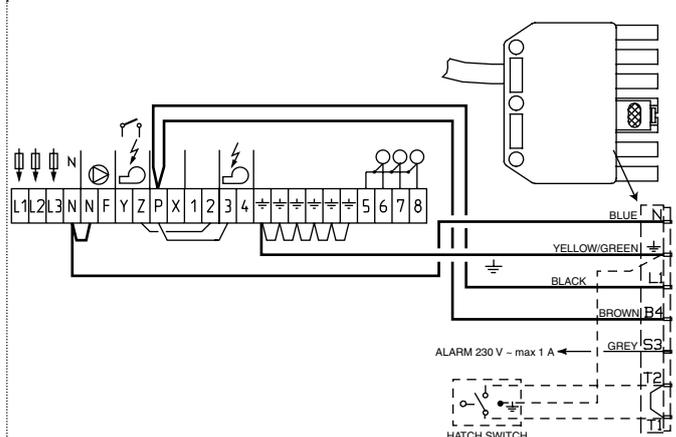
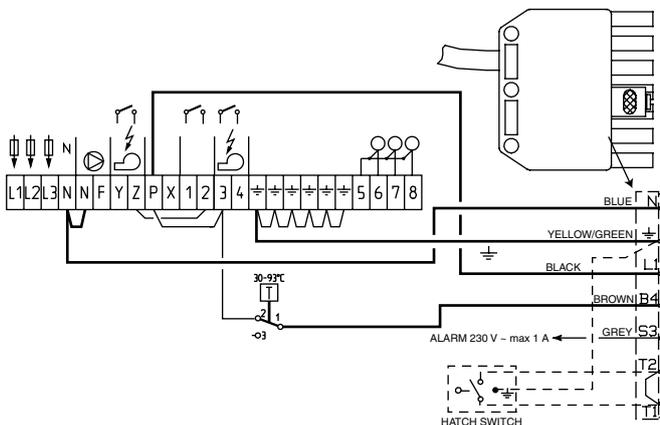


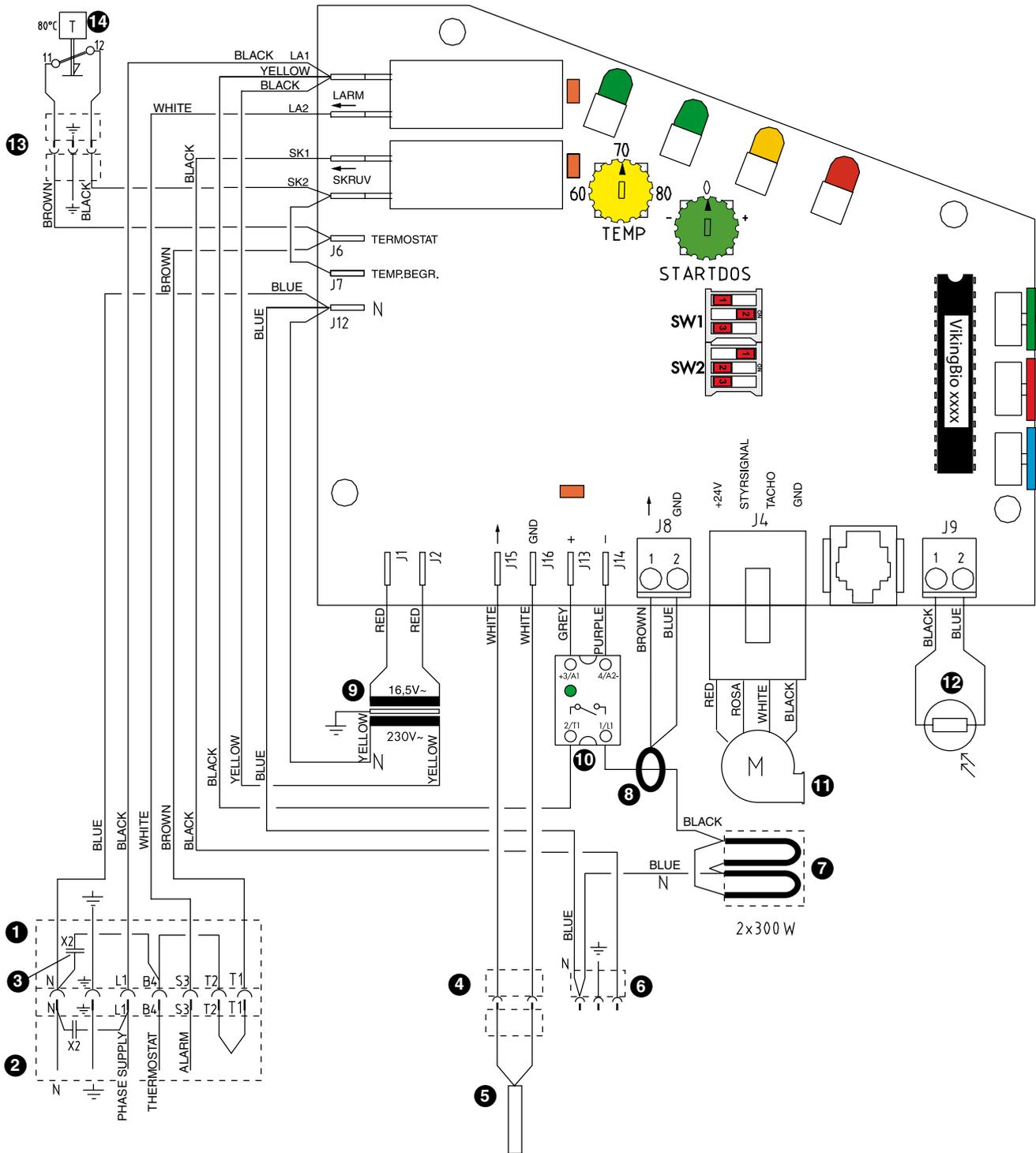
### COMBIMAX CU and TRIOMAX

*Boiler thermostat controls boiler temperature*

Connect the control phase, B4, brown wire, to the oil thermostat. Make the other connections to the terminal block as shown.

*Boiler temperature control via burner*



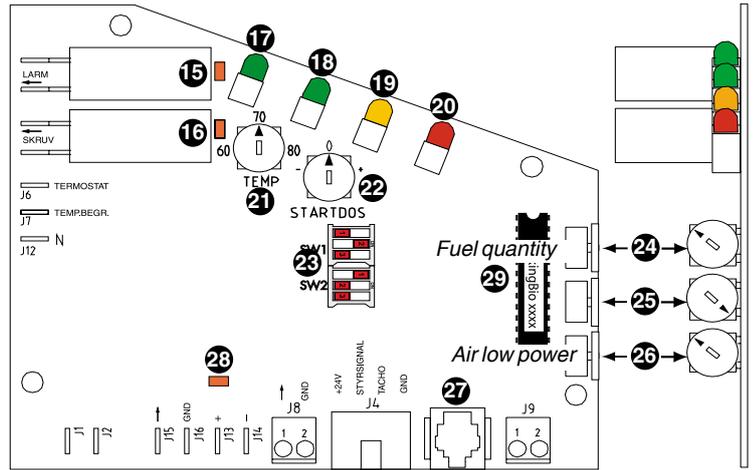


1. Connector for power supply, thermostat, etc., see Electrical installation.  
NB. 230V~ on all wires.  
L1: power supply to burner, via an overheating protection.  
B4: connected to the boiler thermostat.  
S3: alarm signal from burner.  
T1: to safety switch (if there is one) on the combustion chamber hatch.  
T2: from safety switch on the combustion chamber hatch.  
On delivery, the terminals T1 - T2 are jumpered in the cable end of the connector.
2. Cable end of connector, see no 1.
3. Suppressor capacitor.
4. Connector for boiler temperature sensor.

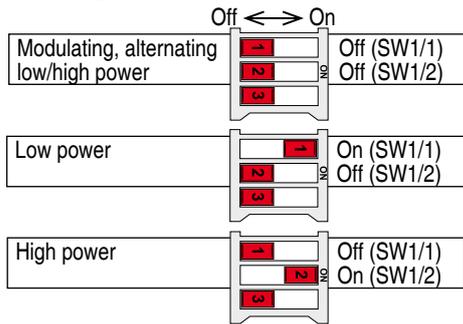
5. Boiler temperature sensor, accessory.
6. Connector for feed auger, NB! 230V~.
7. Igniter.
8. Current transformer.
9. Transformer supplying the PCB and fan motor.
10. Semiconductor relay with indicator, controlling the igniter.
11. Fan motor.
12. Flame monitoring, light dependent resistor (LDR).
13. Connector for temperature limiter on downpipe.
14. Temperature limiter on downpipe.

 **Remove the plug before service or before detaching the burner from the boiler.**

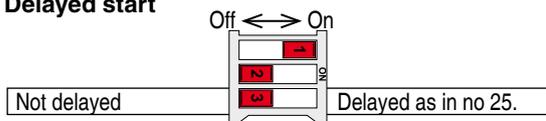
- 15. Alarm relay with indicator.
- 16. Relay with indicator for feed auger.
- 17. **On/off indicator (green)**  
Constant: power on to the burner.  
Slow flashing: delayed start.
- 18. **Power indicator (green)**  
Constant: high power.  
One long + one short flash: low power.  
One long + two short flashes: cooling down.
- 19. **Flame (orange)**  
Constant: LDR detects flame starting up.
- 20. **Alarm indicator (red)**  
Constant: High temperature in downpipe  
One long + two short flashes: three failed attempts to start.  
One long + three short flashes: high ambient temperature.  
One long + four short flashes: fan not working.  
One long + five short flashes: excess pressure in combustion chamber.  
Rapid flashing: faulty igniter.
- 21. **TEMP**, boiler temperature setting, requires a temperature sensor, accessory. Used when the burner will control the boiler temperature.
- 22. **STARTING MEASURE**, quantity of pellets dispensed at start-up.
- 23. Switch for setting operating parameters:



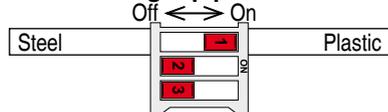
**SW1/1 and SW1/2 - Power mode**



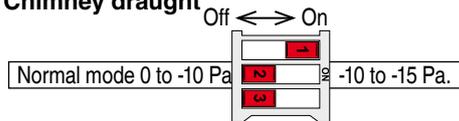
**SW1/3 - Delayed start**



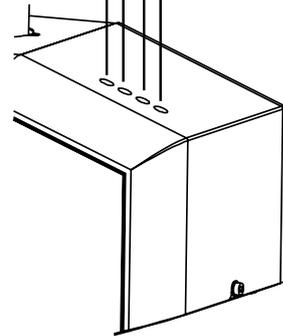
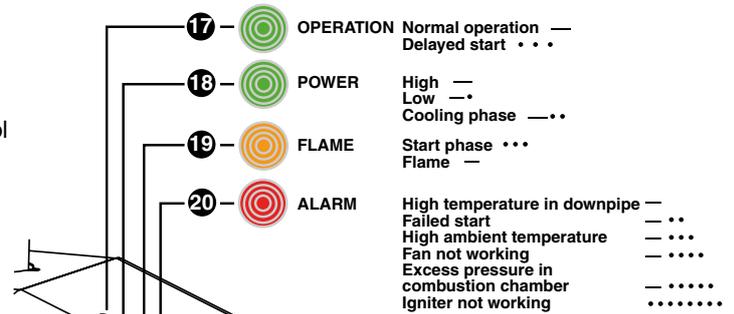
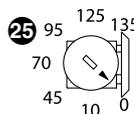
**SW2/1 - Material for feed augur pipe.**



**SW2/2 - Chimney draught**



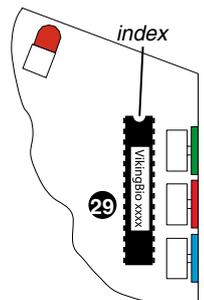
- 24. Fuel, fuel setting in high power mode.
- 25. Delayed start, 0- 135 min, the switch SW1/3, no. 23, must be set to the ON position.
- 26. Air LOW power, air setting in low power mode.
- 27. Serial interface, for exporting the burner settings, operating times and operating parameters. Requires a serial cable or reading unit, accessory.



All the indicators light up for a few seconds after the power to the burner is switched on.  
All the indicators flash if the boiler temperature is controlled by the burner, and the boiler thermostat is set to a lower temperature than the temperature setting on the burner, see "Boiler temperature control via burner" page 13.

**The factory settings as shown in the diagram will allow the burner to start in most boilers. The factory settings are not the operating settings, which must be changed individually. The adjustment must be done using a flue gas analysis instrument.**

- 28. Indicator, lights when the igniter is connected.
- 29. One-chip computer containing the software that controls and monitors burner operation and functions. If the chip has to be replaced, make sure the new one is installed correctly. The index mark is at the top, see the diagram. Switch off the power supply to the burner.



**The dials for changing settings have a groove for a screwdriver. To avoid damaging them when changing the settings, you should turn the dials using the supplied screwdriver or by hand.**

### Checks before starting for the first time

Before putting the burner into operation, check that:

- the chimney is intact and has the correct dimensions.
- the boiler is in good working order.
- the equipment has been installed correctly.
- the incline of the auger is 40°.
- all control units are correctly adjusted.
- the burner has an adequate supply of combustion air.
- there are pellets in the system all the way to the burner.
- the grate is correctly seated.

### Feed auger

The feed auger must be filled with pellets before start-up – the easiest way to do this is to connect the auger to an earthed wall outlet. Place a bucket under the hose and leave the auger running until 25- 30 litres of pellets have passed through.



**Risk of injury.**  
Do not put your hand or other objects into the feed auger.

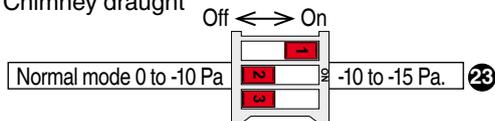
### Draught required

For efficient operation, the chimney draught must be <math>< 5 \text{ Pa}</math>. A stronger draught may cause problems with ignition. You should take one or more of these steps:

- install a draught regulator.
- install a throttle plate at the top of the chimney.
- adjust any flue gas dampers.

It can be difficult to adjust the draught in certain conditions. The chimney draught affects the time taken for the burner to establish a flame. Use the switch, SW2/2, see point 23 on page 11, to specify the applicable conditions.

#### SW2/2 - Chimney draught



**Only use the correct setting for the current conditions.**

### Draught regulator

If a pellet burner is installed, a system should be equipped with a draught regulator. The draught regulator is essential for chimneys higher than 5 m or with a strong and/or variable draught.

Because the combustion performance is affected by the draught, you should try to achieve a stable draught. The easiest way to do this is to install a draught regulator in the flue duct.

### Flue gas temperature

To prevent damage from condensation, the flue gas temperature must be at least 70°C one meter down from the top of the chimney. A low flue gas temperature does improve efficiency, but this must be balanced against the risk of condensation. The temperature is measured when the boiler is at the normal operating temperature, at least five minutes after the burner has started and with the draught regulator closed.

To increase the flue gas temperature:

- remove any turbulators or baffle plates in the boiler.
- install a draught regulator.
- insulate the chimney in cold spaces.
- increase the burner capacity
- install a flue liner.



**To prevent damage to the chimney, the flue gas temperature must be monitored.**

### Turbulators

Some boilers are or can be equipped with flue gas turbulators. The purpose of the turbulators is to introduce turbulence to the flue gases and so extract more heat from them, thereby improving efficiency. If the burner output is low, the flue gas temperature is also low, with a risk of condensation in the chimney. Experiment by shortening the turbulators slightly to obtain a suitable flue gas temperature.

### Smoke entering the room

If the hatches and dampers in the system are not airtight, there is a risk of smoke entering the room, especially if there is excess pressure in the combustion chamber. The burner will stop automatically if the pressure is too high. A smoke detector is a useful tool for finding out whether flue gases are leaking out into the boiler room.

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

### Combustion values



**The factory settings of the burner are not the operating settings, which must be changed individually. The adjustment must be done using a flue gas analysis instrument.**

The correct settings are important in achieving economical burning, high efficiency, low emissions of environmentally harmful substances and a long service life for parts that are exposed to flames. Optimum adjustment is only possible if a flue gas analysis instrument is used. The values are ideal values for combustion, but note that the values vary slightly during the burning cycle:

**Flue gas temperature:** 160°C (depending on chimney type)

**Efficiency:** >90 %

**CO content:** <300 ppm

**CO2 content, average:** 12.5 % (±2.5 %)

**Boiler temperature:** 60- 80°C

**Soot value:** 1 - 3

The feed auger does not work evenly in the first few days, so the burner should not be adjusted until it has been operating for about a week.  
The burner is always adjusted in high power mode.



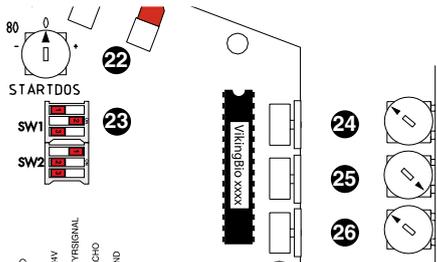
The correct settings are important in achieving economical burning, high efficiency, low emissions of environmentally harmful substances and a long service life for parts that are exposed to flames. Optimum adjustment is only possible if a flue gas analysis instrument is used.

## Adjustment

Carry out the following steps in this order:

### 1. Check the settings

The settings, 22, 23, 24, 25 and 26, should be as shown in the diagram.



### 2. High power adjustment

Start the burner and leave it running for around 10 minutes.

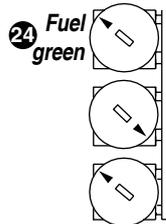
Take a soot sample – the soot value should be 1 - 3.

Take a CO<sub>2</sub> measurement.

Adjust with "Fuel".

If the CO<sub>2</sub> reading is:

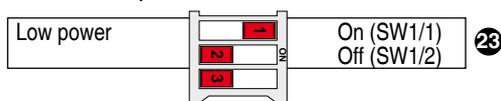
- too low: increase "Fuel".
- too high: reduce "Fuel".



Variations occur, so the test should be repeated several times.

### 3. Low power adjustment

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



Leave the burner running for around 5 minutes.

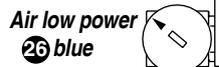
Take a soot sample. **The "Fuel" setting cannot be changed.**

Take a CO<sub>2</sub> measurement.

Adjust with "Air LOW Power".

If the CO<sub>2</sub>-reading is:

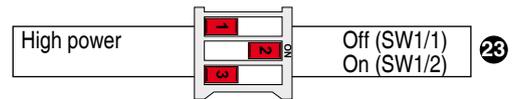
- too low: reduce "Air LOW Power".
- too high: increase "Air LOW Power".



Variations occur, so the test should be repeated several times.

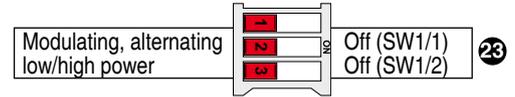
### 4. Select the operating mode.

#### High power, 20 kW

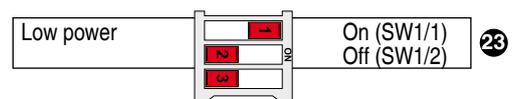


#### Modulating, two power modes, 15/20 kW

Switches from low to high power after the burner has been in low power mode for 20 minutes.



#### Low power, 15 kW



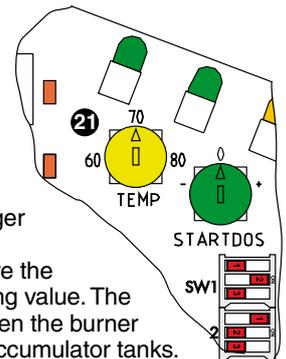
The adjustment is complete.

### Boiler temperature control via burner

Boiler temperature control via the burner is possible in all operating modes. A boiler temperature sensor, accessory, must be connected to the burner.

The burner temperature control controls the boiler temperature with a switching spread of  $\pm 8^\circ\text{C}$ . The temperature is set on the PCB, see point 21.

While the burner is not running, it can detect a rapid temperature drop, which can happen in a "heat exchanger boiler" when hot water is drawn from the taps. The burner then starts before the temperature falls to the normal starting value. The temperature control is also useful when the burner is installed in a firewood boiler with accumulator tanks.



The electrical connections for the burner are as shown in "Boiler temperature control via burner", see page 8.

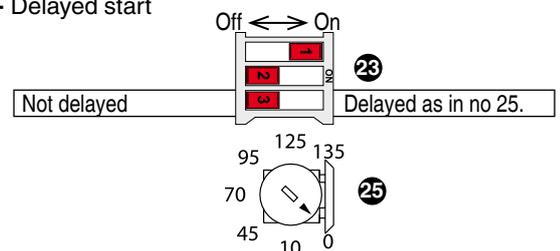
If there is a boiler thermostat ahead of the burner, all the indicators on the burner will flash if the boiler thermostat reading is lower than the burner temperature setting.

If the boiler thermostat breaks during operation, the burner switches to the cooling phase and then stops, with all indicators flashing. To restart, the alarm must be acknowledged, see Resetting an alarm on page 19. If there is a boiler thermostat ahead of the burner, it must be set to its highest value, with the burner setting 10-15°C lower.

### Delayed start

With switch SW1/3 in the "ON" position, the start-up is delayed by 0-135 minutes, as set using dial 25. This function extends the running time of the burner, which increases efficiency. The function can be used in all modes, but is not suitable for boilers that use a heat exchanger for water heating.

#### SW1/3 - Delayed start



## Operation, start to finish

The burning cycle of the Viking Bio is very similar to an oil burner, except that the start and stop phases take longer. In normal conditions, it takes four to five minutes before the flame is established.

The burning cycle of the burner, from start to stop, is divided into four phases:

1. Start
2. Establish flame
3. Operation
4. Cooling/cleaning

Requirements for start-up:

- Overheating protection, thermostat and any hatch switches must be closed.
- Any alarms must be reset.
- The burner is supplied with pellets.

## Start

- The thermostat calls for heat. If delayed start-up is selected, the "OPERATION" indicator flashes for the time set for the delay.
- The fan starts and runs at maximum speed for 20 seconds in order to ventilate the boiler and the flue gas duct. Meanwhile, the back pressure in the combustion chamber is measured. If the results of five measurements show that the pressure is too high, the burner stops running and generates the "Excess pressure in combustion chamber" alarm.
- The fan stops. An initial measure of pellets is dispensed and the igniter starts to heat up. With the factory setting for the initial measure, the auger makes about two turns to dispense around a one tenth of a litre of pellets.
- The fan runs periodically at low speed, and the "FLAME" indicator flashes. When the light dependent resistor detects a flame, "FLAME" changes to a constant light.

The burner has three attempts to start. The first attempt is described above. If no flame is established on the first attempt, the fan stops for a while, then runs at low speed while the igniter is working. The third attempt to start is identical to the second.

If there is no flame after the third attempt, the fan stops running for a while and then speeds up in three stages to a high speed. The burner usually starts on the first attempt, and there is a flame after four to five minutes. If the burner fails to create a flame as described above, it will stop and generate the alarm "Start failed". The most likely reasons for this are excessive draught, an incorrectly positioned grate or a problem with pellet feed to the burner.

## Establish flame

- The burner is running with a flame.
- The fan speed increases in stages in order to create a layer of stable embers on the grate.
- Pellets are dispensed. The auger makes approximately one turn for each measure. The delay between measures depends on the installed power.

If the flame disappears during this phase, the control system switches back to the start phase, but no new pellets are dispensed.

## Operation

- The fan speed depends on the installed power. The "POWER" indicator is constantly lit or flashes, depending on the operating mode. The "FLAME" indicator is constantly lit.
- Pellets are dispensed. The auger makes approximately one turn for each measure.

If the flame disappears during operation, a small measure of pellets is dispensed and the igniter attempts to create a flame. "FLAME" flashes, changing to constant when there is a flame. The burner then switches to "establish flame" to gradually create a layer of stable embers, followed by the operating phase. If the attempt to create a flame fails, the burner will stop and generate an alarm for "Start failed".

The reasons why the flame disappears may include excessive draught, no pellet feed or uneven pellet feed, or a blocked grate.

## Cooling/cleaning

- The thermostat stops the burner.
- No more pellets are dispensed.
- The "POWER" indicator flashes, one long + two short.
- The fan runs at maximum speed and continues for 90 seconds after the flame is extinguished. This is to make sure all the pellets on the grate are burned. The "FLAME" indicator goes out.
- For four cycles, the fan runs at maximum speed, cleaning, to blow the ash away from the grate and to cool down the burner.
- The burner stops, and only the "OPERATION" indicator is lit.

## Long running time

When the heating requirement is high or the burner output is too small for the current heating requirement, the running time of the burner will be very long. In order to maintain effective combustion and safe operation, the burner switches automatically, after around three hours of operation, to its cooling/cleaning phase in order to blow away the ash residues on the grate. The restart takes place automatically.

	<b>OPERATION</b>	Normal operation — Delayed start . . .
	<b>POWER</b>	High — Low —• Cooling phase —••
	<b>FLAME</b>	Start phase ••• Flame —
	<b>ALARM</b>	High temperature in downpipe — Failed start —•• High ambient temperature —••• Fan not working —•••• Excess pressure in combustion chamber —••••• Igniter not working ••••••••

## Remember the following

The parts that are exposed to flames, the grate and the inner burner tube are wearing parts that will have to be replaced over time.

To increase the efficiency and service life of the grate and the inner burner tube, follow these instructions:

- The burner must be adjusted using an instrument designed for the pellet quality being used.
- A draught regulator must be fitted between the boiler and the chimney.
- The store must be specifically designed for pellets – this makes the supply more even.
- If you change pellet manufacture, you must adjust the burner again. The content of the pellets may differ, affecting combustion.
- Only use Swedish Standard Group 1 pellets, or equivalent.
- It is important for the grate to be correctly positioned in the burner tube.

## Pellet quality

Wood pellets are an environmentally friendly fuel, with low emissions of environmentally harmful substances. Because each pellet is small, the flow of fuel can be adjusted for the installed power, allowing effective combustion and high efficiency.

The Viking Bio is designed for Ø8 mm wood pellets. The ash content of wood pellets is approx. 0.5 %. Bark pellets produce more ash than wood pellets.

The ash melting point should be >1350°C. A high ash melting point is a good thing because melted (sintered) ash can cause problems. Melted ash is very difficult to remove.

 **Only use wood pellets that satisfy the standard SS 18 71 20, Group 1 or equivalent.**

Some of the pellet requirements in SS 18 71 20 Group 1:

<b>Length:</b>	max 4 times the diameter. (max 32 mm for Ø8 mm pellets)
<b>Bulk density:</b>	≥ 600 kg/m <sup>3</sup>
<b>Fines content &lt; 3 mm:</b>	≤ 0.8 % by weight
<b>Calorific value:</b>	≥ 4.7 kWh/kg
<b>Ash content:</b>	≤ 0.7 %
<b>Total moisture content:</b>	≤ 10 by weight

Other pellet qualities may require a readjustment of the burner and may cause operating problems.

## Handling and storing pellets

There are various ways to handle pellets depending on the space available, the workload and the cost. Wood pellets must be stored under cover, but do not require a heated space – the important thing is that the space is dry.

Ready-made stores designed for pellets are available on the market. These are preferable to building your own store.

 **The auger must be inclined from the horizontal by 40°±5°.**

## Incineration

If the combustion temperature is too high, the ash melts, or sinters. If this happens, the combustion temperature is too high for the particular pellet quality, or the pellets are of poor quality with a high ash content and low melting point. The ash melting point should be >1350°C. Check the burner adjustment. Be careful not to confuse sintered ash with the easily-removed caked ash or clumps of ash that may be deposited in the combustion chamber.

The correct settings are important for reliability, economical burning, efficiency, low emissions of environmentally harmful substances and a long service life for parts that are exposed to flames. Optimum adjustment is only possible if a flue gas analysis instrument is used.

## Flame

A few minutes after start-up, the flame must have a yellow-white shade. It is normal for the flame to vary between white and yellow.

The colour is an indicator of the effectiveness of combustion:

**Light yellow:** good combustion, smoke invisible at normal temperature.

**Reddish:** not enough air or too much fuel, low efficiency, the heat exchanging surfaces of the boiler will get sooty.

**Whitish:** short flame, caused by excess air or not enough fuel, low efficiency, high flue gas temperature.

## Flue gas temperature

A high flue gas temperature may be caused by a boiler that needs cleaning, or by too much combustion air. The result is low efficiency and unnecessarily high pellet consumption. An older boiler often has higher flue gas temperatures than a modern boiler under the same conditions.

A low flue gas temperature may result from poor combustion caused by not enough air or an oversize boiler, especially if the burner is set to low power. There is a risk of condensation in the chimney, causing possible damage.

Combustion produces water in the form of water vapour, which rises with the flue gases into the chimney. Depending on the temperature drop in the chimney, the vapour may be condensed into water.

To prevent damage from condensation, the flue gas temperature must be at least 70 °C one meter down from the top of the chimney. A low flue gas temperature does improve efficiency, but this must be balanced against the risk of condensation.

The temperature is measured when the boiler is at the normal operating temperature, at least five minutes after the burner has started and with the draught regulator closed.

To increase the flue gas temperature:

- remove any turbulators or baffle plates in the boiler.
- install a draught regulator.
- insulate the chimney in cold spaces.
- increase the burner capacity
- install a flue liner.

 **Clean the boiler when the flue gas temperature has risen by around 50°C compared to a cleaned boiler .**

## Turbulators

Some boilers are or can be equipped with flue gas turbulators. The purpose of the turbulators is to introduce turbulence to the flue gases and so extract more heat from them, thereby improving efficiency.

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

## Draught regulator

If a pellet burner is installed, a system should be equipped with a draught regulator. The draught regulator is essential for chimneys higher than 5 m or with a strong and/or variable draught.

The draft is influenced by the temperature and by weather and wind conditions. Because the combustion performance is affected by the draught, you should try to achieve a stable draught. The easiest way to stabilise the draught is to install a draught regulator in the flue duct. 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.

### Smoke from the chimney

The colour of the smoke reveals the effectiveness of combustion:

**Grey-brown:** smoky combustion caused by insufficient air.

**Invisible:** heat haze, at temperatures above zero and down to several degrees below zero, the smoke must be invisible.

**White:** at lower outside temperatures, only a thin white trail of water vapour should be visible.

If the boiler previously burned firewood, the smoke may be dark and smelly as the tar on the sides of the boiler and chimney burns away. This may continue for a week or so.

### Efficiency

The aim is to achieve high efficiency, which means getting as much heat as possible out of the pellets. In reality, this is a question of minimising losses. The following losses should be minimised:

**Flue gas losses:** The heat in the flue gases escaping through the chimney.

**Idle losses:** When the burner is idle, the chimney draught sucks cold air through the boiler, cooling it down. These losses can be minimised using a draught regulator.

**Insulation losses:** Leakage of heat through the boiler insulation. A small part of these losses is recovered because the combustion air is heated. Sometimes, a proportion of the losses can benefit the building by heating it.

With the burner at low power, running times are longer, which minimises the idle losses and increases the boiler efficiency.

### Smoke entering the room

If the hatches and dampers in the system are not airtight, there is a risk of smoke entering the room, especially if there is excess pressure in the combustion chamber. The burner will stop automatically if the pressure is too high. A smoke detector is a useful tool for finding out whether flue gases are leaking out into the boiler room.

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

### Water heating in the summer

The coldest months of the year account for approximately 80 % of the annual energy requirement. During this period, the heating requirement should be met by burning pellets.

When the heating requirement is low, consisting primarily of producing hot water, the use of pellets is usually inappropriate. During this period, the running times of the burner are short, resulting in high idle losses and lower efficiency.

The burner can be adjusted to different power settings. A good rule to remember is not to use a higher power than necessary for the current heating requirement.

When the heating requirement is low, it is a good idea to use an immersion heater in the boiler, or to use a separate electric water heater. The boiler's flue gas damper should be closed during periods when pellets are not being burned.

Take care to close down your pellet system when spring arrives, and not to start it up again until absolutely necessary.

 **The system should always have an alternative energy source in order to reduce vulnerability.**

### Savings

If you take an active interest in your system and fine-tune it regularly, you will consume less fuel than someone who does not.

If the heating requirement on a cold winter's day is 145 kWh, around 35 kg of pellets are used if the boiler efficiency is 85-90%. If the burner is incorrectly adjusted, consumption can reach 45 kg. The difference can amount to several tonnes per year.

Check the following on a regular basis:

- the flame is light yellow.
- the smoke is invisible.
- the flue gas temperature is correct.
- the boiler is free of ash and soot.
- the burner is running at the lowest possible power.

### Boiler temperature control via burner

A boiler temperature sensor, accessory, must be connected to the burner.

The burner temperature control controls the boiler temperature with a switching spread of  $\pm 8^{\circ}\text{C}$ . The temperature is set on the PCB, see point 21.

While the burner is not running, it can detect the rapid temperature drop that can happen in a "heat exchanger boiler" when hot water is drawn from the taps. The burner then starts before the temperature falls to the normal starting value. The temperature control is also useful when the burner is installed in a firewood boiler with accumulator tanks.

**If there is a boiler thermostat ahead of the burner, all the indicators on the burner will flash if the boiler thermostat reading is lower than the burner temperature setting.**

**If the boiler thermostat breaks during operation, the burner switches to the cooling phase and then stops, with all indicators flashing. To restart, the alarm must be acknowledged, see Resetting an alarm on page 19. If there is a boiler thermostat ahead of the burner, it must be set to its highest value, with the burner setting 10- 15°C lower.**

### Safety

For safety reasons it is important to keep the boiler room clean and dust-free.

Fire-hazardous substances should not be kept in the boiler room. The door to the boiler room must be kept closed.



**In the event of fire or other hazard: disconnect the power to the burner and take the necessary steps.**

## Boiler cleaning



**Disconnect the power supply to the burner and remove the plug before cleaning, service or before detaching the burner from the boiler.**

The supplied flue gas thermometer is a useful tool for finding out when it is time to clean the boiler and sweep the flue. To maintain high efficiency, the boiler should be cleaned and swept when the flue gas temperature has risen by around 50°C compared to a cleaned boiler.

Ash attachments are available for vacuum cleaners, making it easier to clean ash from the boiler and burner.

## Cleaning the burner



**Risk of burns. Always leave the burner to stop burning until you start cleaning, otherwise the burner may contain burning pellets.**

The burner must be cleaned regularly. When you clean the boiler, it is a good time to remove the ash from the inner burner tube. If the burner hatch can be opened with the burner installed, this is an easy job. Otherwise you will have to remove the burner from the hatch. Open the quick-release fastenings to detach the burner, with the inner burner tube, from the outer burner tube. Start by loosening the quick connector on the hose from the feed auger, and remove the power supply.

Clean the inner burner tube using the supplied ash rake. Then remove the grate and rake out the ash that has collected there.

If the burner is operated at low power or in modulating mode, the inner burner tube will have to be cleaned more frequently, around twice a week.

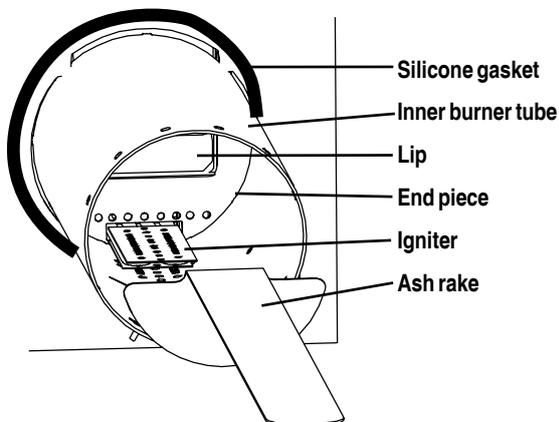
Every two or three times you clean the boiler, remove the ash and dust that has collected between the outer and inner burner tube.

Brush the grate clean using a stiff brush, but do not remove the oxide layer that is created on the grate. When cleaning do not push the slits on the grate together – the opening must be at least 1 mm. Also check the lip when you clean the burner.

When replacing the burner, check that the silicone gasket is in position and that it forms a tight seal – otherwise the inner burner tube may be damaged.

The burner parts that are exposed to flames, the grate, the inner burner tube, the end piece and the lip are all wearing parts. Check the condition of these parts every time you clean the burner. Replace damaged parts as soon as possible.

Use compressed air or a soft brush to carefully remove dust that has collected in and on the components inside the cover of the burner. Also clean the light dependent resistor.



## Ash and soot

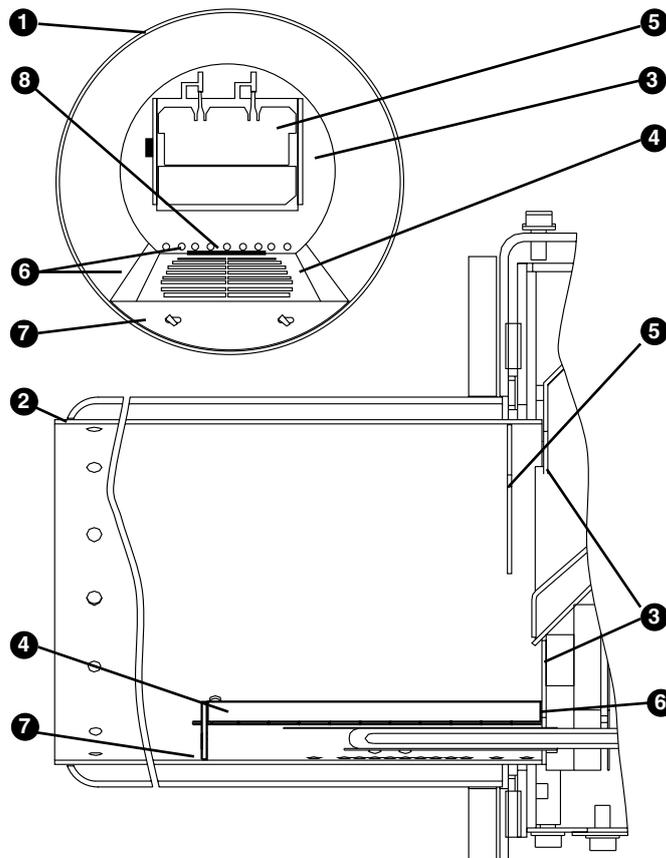
Ash and soot must be kept in a metal bucket with a tight lid. The ash may contain hot embers for several days, so the ash bucket must be placed on non-flammable material.



**Always be careful with ash, as it may contain hot embers.**

## Position of grate

The grate must be positioned as shown in the figures below. If the grate is incorrectly positioned, ignition can take longer or fail completely, and the igniter may be damaged.



1. Cross section of inner burner tube at the front of the grate.
2. Longitudinal cross section of burner tubes.
3. End piece.
4. Grate.
5. Lip, preventing pellets being pushed into the combustion chamber and reducing radiated heat.
6. The grate must be positioned against the inner wall, with a small gap along the rear edge of the grate.
7. The grate must be positioned against the inner burner tube.
8. Gap.



**Check carefully that the grate is correctly positioned when you replace it.**

## Cleaning the pellet store

Over time, small fragments from the pellets start collecting at the bottom of the pellet store. They can prevent the feed auger taking up pellets, causing unevenness in the supply.

The pellet store should be cleaned regularly – the exact interval depends on the quantity of pellets used and their quality.

**Safety system**

The safety system of the pellet equipment consists of:

- overheating protection to prevent excessive boiler temperature.
- temperature limiter on downpipe.
- a hose that melts, but is non-flammable, linking the feed auger and the downpipe.
- powerful fan with fan sensor and back pressure monitoring of combustion chamber.
- light dependent resistor to monitor the flame.
- blocking if the ambient temperature is too high.

Most of the functions cannot be influenced by the user, so no special checks are necessary.

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

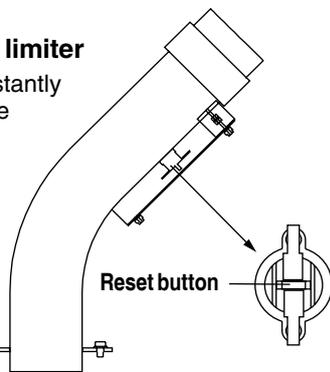
Check the light dependent resistor as follows:

- switch on power to the burner, make sure the fixed boiler thermostat is not calling for heat.
- remove the light dependent resistor, see point 13 page 20, from the burner and shine a light on it, after approx. 15 seconds the "FLAME" indicator should light up.

**Resetting the temperature limiter**

If the "ALARM" indicator is constantly lit, the temperature limiter on the downpipe has been triggered. The temperature limiter must be reset manually before the burner can be operated again. Investigate and correct the reason why the temperature limiter was triggered.

The temperature limiter can only be reset with the power supply to the burner switched off. Remove the cover of the temperature limiter on the downpipe. To reset, press the button on the temperature limiter. Replace the cover and restart the burner.

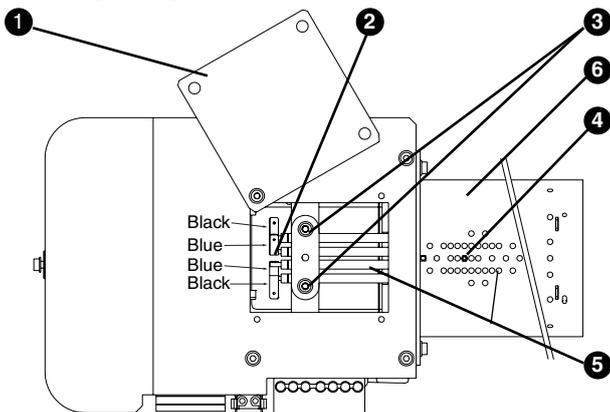


**Disconnect the power supply to the burner before removing the cover of the temperature limiter.**

**Checking the capacity of the feed auger**

1. Loosen the quick connector to the downpipe and hold the part of the quick connector attached to the hose.
2. Start the auger and leave it running for 3.5-4 turns.
3. The part of the quick connector attached to the hose should fill with pellets. If this does not happen, check the incline of the auger and how far it extends into the pellet store.

**Replacing the igniter**



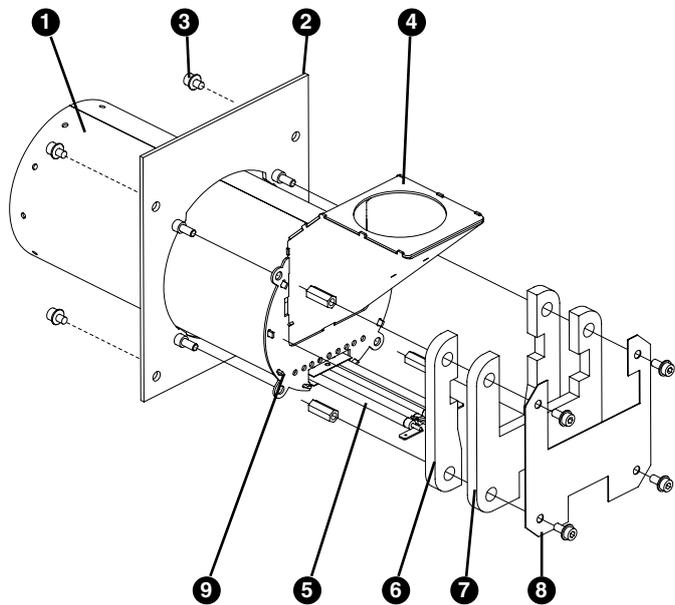
1. Cover
2. Electrical connections
3. Hex bolts
4. Nut and tabbed washer for igniter
5. Igniter
6. Inner burner tube



**Disconnect the power supply to the burner before starting any work**

- A. Detach the burner from the boiler, remove the cover from the burner, open the quick-release fastenings and release the burner tube with flange from the burner.
- B. Turn the burner up and down to make the underside accessible. Loosen the screws holding cover no. 1.
- C. Remove the cables to the electrical connections no 2.
- D Loosen the screws no. 3 and nut no. 4. Push the screw the nut was attached to into the burner tube.
- E Pull the igniter out through the hole. Alternatively, cut the electrical connections to the igniter and then pull it out through the burner tube.
- F. Fit a new igniter by reversing the steps above, do not tighten nut no. 4 too much, max 0.5 Nm. Pay attention to how the igniter will be connected electrically, see also point. 7 in Wiring diagram page 10.'

**Replacing the inner burner tube**



1. Inner burner tube
2. Flange
3. Bolt
4. Down shaft with end piece
5. Igniter
6. Gasket, inner, x 2, right/left.
7. Gasket, outer
8. Plate.
9. Lug.

- A. Detach the burner from the outer burner tube.
- B. Loosen the four screws, 3, on the flange to the burner housing. Pull out all the parts from the burner housing as shown in the diagram above.
- C. Separate the parts as shown. Notice how gaskets 6 and 7 are fitted. The inner burner tube is fastened to the end piece with nine lugs. Rotate the lugs to remove the inner burner tube.
- D Replace. See the section on replacing the igniter for details of how to attach the cables.

## Troubleshooting

For every kind of fault, you must start by verifying the basic operating conditions of the burner:

- Is the on/off indicator lit, is the burner main switch set to on?
- Is the burner fuse intact?
- Is there a power supply to the burner?
- Are all control units, thermostats, etc. correctly adjusted?
- Are all safety devices, overheating protection, hatch switches, etc. in the normal operating state?
- Is there a pellet supply to the burner?

Look at the grate after a failed start – if there are unburned or lightly scorched pellets the most likely cause is excessive draught. If all the pellets are burnt the most likely cause is a problem with the pellet feed.

If the fault is not caused by either of the problems above, you will need to check all the functions of the burner. If the burner is in the alarm state with the alarm indicator lit, the alarm must be reset.

Check the function of the burner. Measuring instruments may be useful in the troubleshooting process.



**Disconnect the power supply to the burner and remove the plug before cleaning, service or before detaching the burner from the boiler.**

## External faults

Common situations causing operating problems:

- the incline of the auger from the horizontal is not  $40^{\circ} \pm 5^{\circ}$ .
- the pellets do not comply with the standard.
- draught  $>15$  Pa.
- lack of draught regulator.
- flue duct has a large area.
- uneven fuel feed because the feed auger does not run for long enough, the pellet store is badly designed or the store contains a high proportion of pellet fragments.
- the grate is incorrectly positioned.

## Resetting an alarm

Disconnect the power supply to the burner for about 10 seconds.

If the fault requires work to be carried out in the burner, you must always disconnect the power supply to the burner before starting any work. After finishing work, the alarm is reset automatically when the burner is switched on again.



**ALARM**

High temperature in downpipe —  
 Failed start — ••  
 High ambient temperature — •••  
 Fan not working — ••••  
 Excess pressure in combustion chamber — •••••  
 Igniter not working •••••••



**Risk of trapping.**

**Do not put your hand or other objects into the feed auger. Before doing any work on the feed auger, ensure that the power supply cable is disconnected from the burner.**

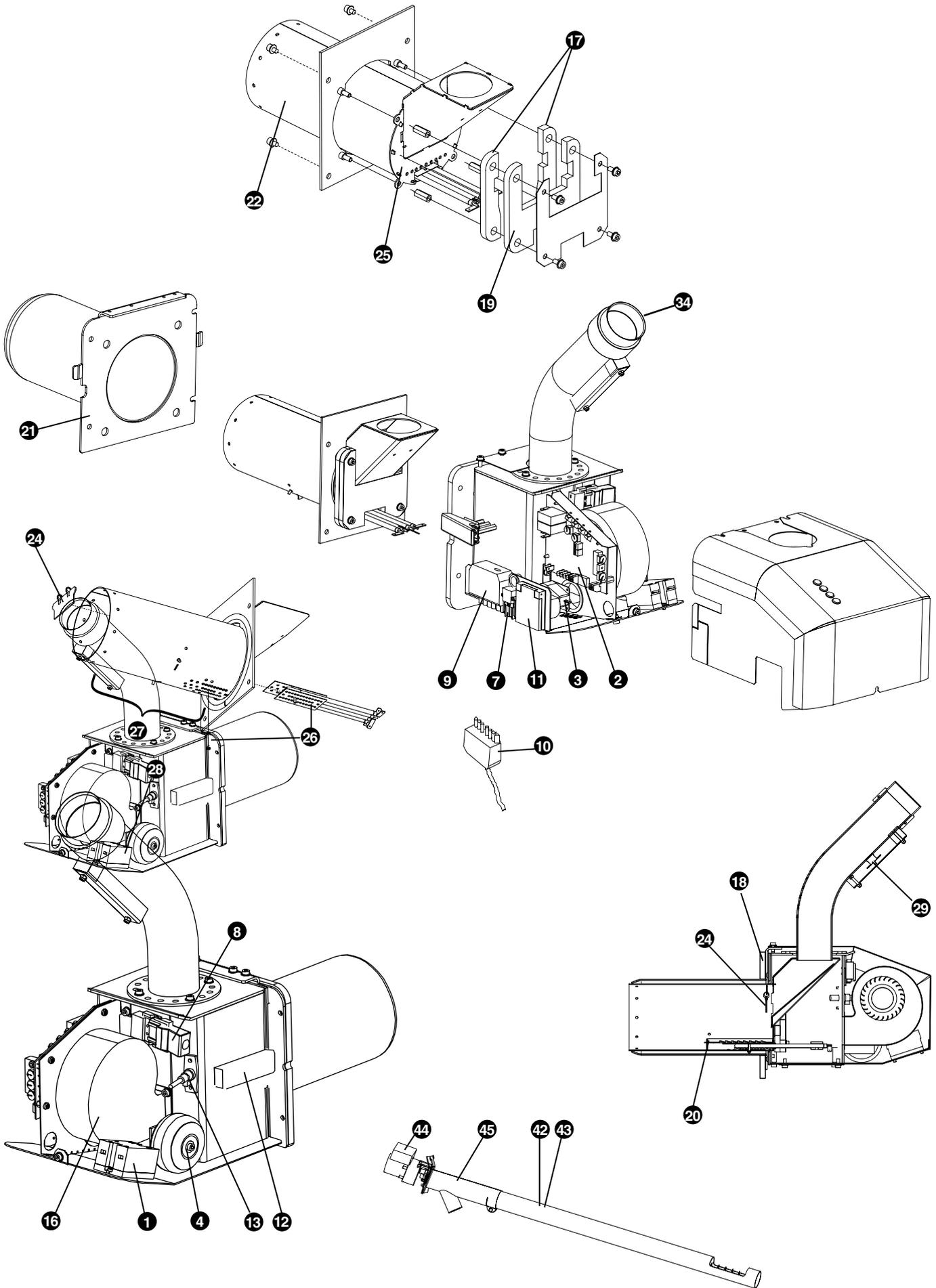
## Resistance of temperature sensor (accessory)

Temp °C	Resistance kΩ	Voltage V	Temp °C	Resistance kΩ	Voltage V
20	12.5	2.76	55	3	1.98
25	10	2.67	60	2.5	1.84
30	8.1	2.58	65	2.1	1.70
35	6.5	2.48	70	1.8	1.57
40	5.3	2.36	75	1.5	1.44
45	4.4	2.24	80	1.3	1.31
50	3.6	2.11	85	1.1	1.19

The voltage is measured at the connection points on the PCB with the burner switched on.

When you measure the resistance, the sensor must not be connected to the PCB.

Alarm indicator/alarm	Likely cause	Remedy
<b>Constant.</b> High temperature in downpipe	Blocked chimney. Too much ash and soot in the burner and combustion chamber.	Check the draught, clean if necessary. Clean the burner and boiler, reset the temperature limiter.
<b>One long + two short flashes.</b> Failed start. The burner stops 13 minutes after the thermostat calls for heat.	Excessive draught, or flue duct has a large area. No pellets entering the burner. Too much ash on the grate.	Check, correct. Check that there are pellets in the store, that the auger is working and that pellets are falling into the burner. Clean the burner.
<b>One long + three short flashes.</b> High ambient temperature, $>50^{\circ}\text{C}$ .	Light dependent resistor dirty/not working. Too much ash and soot in the burner and combustion chamber. High ambient temperature, possibly caused by a poorly insulated combustion chamber hatch. Faulty temperature sensor.	Clean/replace the LDR. Clean the burner and boiler, check the draught. Check the ambient temperature, max $30^{\circ}\text{C}$ , correct. Replace the PCB.
<b>One long + four short flashes.</b> Fan not working.	Dirt in fan. Fan faulty.	Clean and check that the fan is running smoothly. Replace the fan if the alarm occurs again.
<b>One long and five short flashes.</b> Excess pressure in combustion chamber.	Too much ash and soot in the burner and combustion chamber. Blockage in chimney/damper closed.	Clean the burner and boiler. Check the draught, clean the chimney, open the damper.
<b>Continuous flashing.</b> Igniter not working.	Semiconductor relay or PCB faulty, green indicator on the semiconductor relay does not light on start-up. Igniter faulty, green indicator on the semiconductor relay lights on start-up.	Check that the relay is receiving a voltage, $3\text{V}=-$ , from the PCB. Replace the PCB or relay. Measure the resistance of the igniter, approx. $176\Omega$ /winding. Replace the igniter if broken.
<b>All indicators flashing.</b> Boiler thermostat set lower than the burner	The burner has a temperature sensor.	Increase the temperature of the boiler thermostat, or adjust the burner temperature setting so it is lower than the boiler thermostat setting.



1	17 00 90	Static relay	1	28	71 00 37	Downpipe, compl	1
2	21 00 19	PCB	1	29	12 00 90	Temperature limiter	1
3	36 00 20	Current transformer	1		30 00 47	O-ring	1
4	36 00 22	Transformer	1		39 02 60	Silicone sleeve (m)	0.35
5	38 00 30	Flue gas thermometer 50-500°	1	32	44 01 59	Plug 3-pole	1
6	44 00 90	Capacitor	1		70 00 64	Seal for downpipe	1
7	44 01 56	Inlet 2-pole	1	34	71 00 44	Adapter/quick connector	1
8	44 01 58	Inlet 3-pole	1				
9	44 01 63	Inlet 7-pole	1		10 05 20	Clip bolt	1
10	44 01 64	Plug 7-pole	1		24 04 81	Hose clip	2
11	44 01 65	Outlet with cover	1		39 02 58	Polyurethane hose (m)	1
12	44 02 12	Eccentric lock	2		44 00 60	Chain 1500mm	1
13	50 00 03	Light dependent resistor	1		44 00 61	Carbine hook	1
	50 00 04	Flange for LDR	1		4400 97	Flanged bearing	1
	50 00 05	Retaining ring for LDR	1		45 01 00	Spiral (m)	1.5/2.5
16	50 00 20	Fan	1	42	45 01 02	PVC pipe 1248 mm	1
17	70 00 59	Insulating sheet, inner	2	43	45 01 03	PVC pipe 2248 mm	1
18	70 00 60	Gasket for boiler hatch	1	44	50 00 01	Motor	1
19	70 00 62	Insulating sheet, outer	1	45	50 00 07	Y pipe	1
20	71 00 60	Grate	1		71 00 54	Shaft	1
					71 00 95	Hook	1
21	71 00 31	Outer burner tube	1				
22	71 03 78	Inner burner tube					
	70 02 04	Silicone gasket	1				
24	71 00 50	Lip	1				
25	71 00 65	End piece for inner burner tube	1				
26	71 00 99	Igniter, nut and tabbed washer	1				
27	71 03 79	Inner burner tube, without end piece	1				

## Accessories

**Boiler temperature sensor**, temperature control via burner. Prod. no. 3310

**Installation plate**, 300 x 300 mm, with holes to fit the Viking BIO Prod. no. 3320

**Conversion kit for large firewood hatch**, combustion plates and insulation, Vedolux 40/50/CU, Combimax UB. Prod. no. 3321

**Conversion kit for small firewood hatch**, combustion plates and insulation, Triomax, Combimax CU and older Combimax UB.

Prod. no. 3322

**Installation case for pellets**, measuring instruments, etc. Product no. 3315

**Spacer**, to extend the Viking Bio 105 mm from the hatch. Prod. no. 3323

**Draught regulator**, 150 x 130 mm, for flue pipe 90351 (standard VB firewood boilers). Prod. no. 2924

**Draught regulator**, for cleaning hatch in chimney w: 132 mm. Prod. no. 2925

**Draught regulator**, for Värmebaronen angled flue pipe, older model. Prod. no. 2910

**Draught regulator**, for Värmebaronen straight flue pipe, older model. Prod. no. 2915

**Pellet hatch**, hatch, spacer and boiler temperature sensor, CTC 1100, 1200, 2200. Product no. 3324





Värmebaronen AB retains the right to change the specification of included components without prior notice, as part of its policy of continuous improvement and development.

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