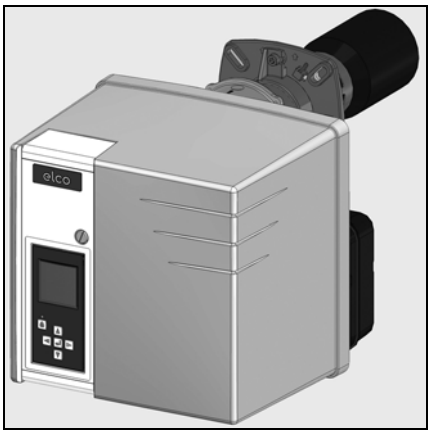
VB 2.. VD

elco

Operating instructions
For specialist installation engineers
Fuel oil burners

en



de, fr.....	**4200 1046 8002**
it, nl.....	**4200 1046 8102**
en.....	**4200 1046 8202**

de, fr, it, nl, en.....	**4200 1046 7903**

.....	**420 110 084 400**

.....	**4200 1068 3900**

02/2016 - Art. Nr. 4200 1046 8202A

Overview

Contents

Important information
VB2.. VD blue-flame burners are designed for the low-pollution combustion of extra light fuel oil in accordance with the following standards:
AT: ÖNORM C1109: standard and low sulphur
BE: NBN T52.716: standard and NBN EN 590: low sulphur
CH: SN 181160-2: standard and low sulphur
DE: DIN 51603-1 : standard and low sulphur
DINV 51603-6 ELA BIO 10
The design and function of the burners meet standard EN 267.
Assembly, start-up and maintenance must only be carried out by authorised specialists and all applicable guidelines and regulations complied with. This device is not designed for use by individuals (including children) whose physical, sensory, or mental abilities are reduced, or by persons lacking in experience and/or knowledge, unless supervised by a person responsible for their safety or if they are following the latter's recommendations concerning the use of the device.
Children must be supervised to ensure they do not play with the device.

Burner description
VB2.. VD blue-flame burners are 2-stage monoblock type devices. The special design of the burner head with internal recirculation of the combustion gases provides highly efficient, low-polluting combustion. According to tests as defined by EN267, the values produced comply with emissions class 3, the most stringent standard, and with the requirements of following national legislation relating to the environment:
AT: KFA 1995, FAV 1997
CH: OPAir 2005
DE: 1.BImSchV

They are suitable for use with all heat generators complying with standard EN 303 or for use by hot air generators complying with DIN 4794 or DIN 30697 within their respective performance range. Any other type of application requires the approval of ELCO.

Packaging
The following are included in the burner packaging:
1 connecting flange with insulating gasket
1 bag containing fittings
1 bag containing technical documentation
1 blast tube
1 setting template

The following standards should be observed in order to ensure safe, environmentally sound and energy-efficient operation:

EN 226
Connection of fuel oil and gas burners with blast air to the heat generator

EN 60335-1, -2-102
Safety of electrical equipment for domestic use

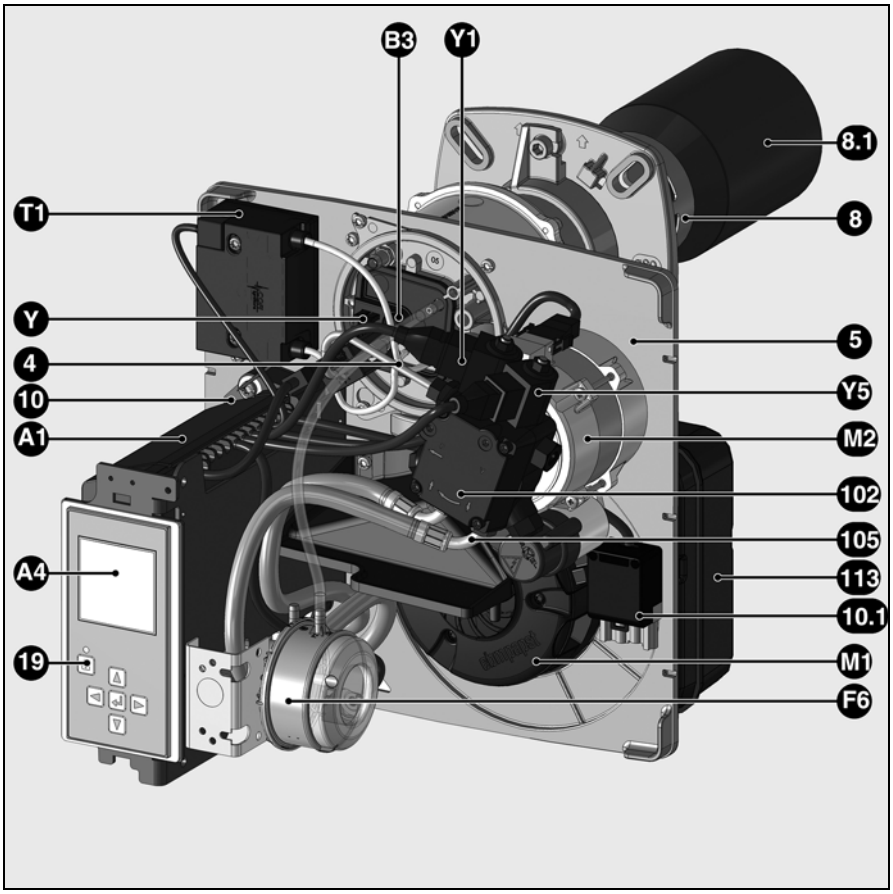
Place of installation
The burner must not be operated in rooms with aggressive vapours (e.g. hair spray, tetrachloroethylene, carbon tetrachloride), high levels of dust or high air humidity (e.g. laundry rooms).
If no connection to an air exhaust system is provided for the air supply, a supply air inlet with the specifications set out below must installed:
DE: up to 50 kW: 150 cm^2
for every further kW: + 2.0cm^2
CH: Calorific power [kW] x 6 = … cm^2; but at least 200 cm^2
Variations may arise as a result of local regulations.

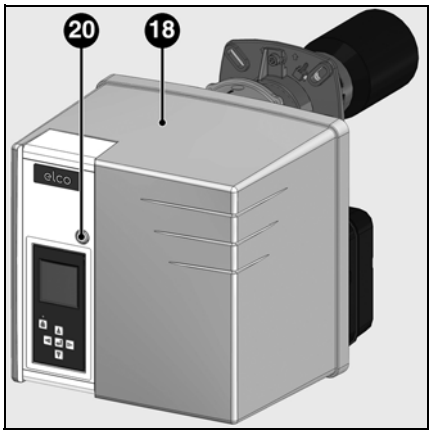
We cannot be held liable for any damage caused by the following situations:
- unauthorised use
- incorrect installation and/or repair on the part of the buyer or any third party, including the fitting of non-original parts.

Final delivery and instructions for use
The firing system fitter must supply the operator of the system with operating and maintenance instructions on or before final delivery. These instructions should be displayed in a prominent location at the point of installation of the heat generator. They should include the address and telephone number of the nearest customer service centre.

Advice to the user
The system should be inspected by a specialist at least once a year. Depending on the type of installation, shorter maintenance intervals may be necessary! The system operator is advised to take out a maintenance contract to guarantee regular servicing.

Burner description





A1 Control and safety unit
A4 Display
B3 Flame detector
M1 Fan motor
M2 Pump motor
T1 Igniter
Y Adjusting screw dimension Y (recirculation)
4 Nozzle line tube
5 Base plate
8 Burner pipe
8.1 Flame tube (supplied disassembled)
10 7-pin connector (hidden)
10.1 4 pin connector
18 Cover
19 Release knob
20 Hood securing screw
102 Fuel oil pump
105 Fuel oil hoses
113 Silencer
Y1, Y5Solenoid valves

Operation
Safety function

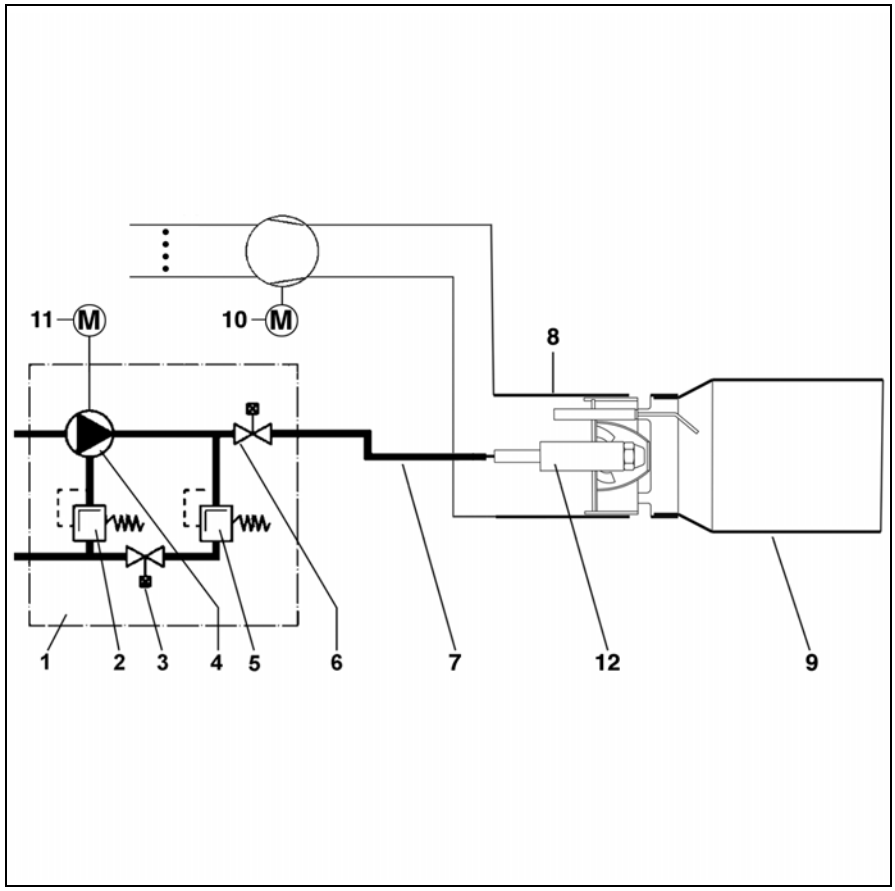
Heating function
If the system demands heat, the pre-heater is switched on first.
When the oil preheating temperature is reached, a thermostat in the pre-heater activates the program sequence. The heating time with cold start is approximately 2 minutes.

Starting the burner
- If heat is requested by the boiler regulator, the automatic oil combustion control unit starts the program sequence.
- The fan motor starts, air pressure is checked.
- Pre-ventilation
- The pump motor and ignition are on.
- Solenoid valve **6** opens, the pressure is regulated via the pressure controller **5**.
- Flame formation.
- The ignition is switched off.

Burner mode, control between partial and full load
The burner is equipped with a nozzle and operates at two different fuel oil pressures (partial load and full load). These pressures are controlled independently by two regulators fitted in the pump. If an increase in load is requested by the boiler regulator, the burner switches from partial load mode to full load mode after a delay of approximately 13 seconds.
- The fan motor **10** reaches the speed for full load mode.
- If the fan speed (quantity of air) is adjustable, the solenoid valve **3** closes, the partial load pressure controller **5** is deactivated and the full load pressure controller **2** regulates the pressure.
- The fan motor continues to run at the maximum load speed, and maximum load mode is active.

Safety function
A lockout occurs on the device:
- if a flame signal is present during pre-ventilation (stray light monitoring)
- if, when the burner starts up (fuel release), no flame is produced after 5 seconds (safety time)
- if no flame is produced in the event of flame failure during operation after repeated unsuccessful attempts to run the program.

A safety shutdown is indicated by the fault indicator lamp lighting up; the fault can then be acknowledged by pressing the reset button after the cause of the fault has been rectified.



Schematic diagram

1 Two-stage pump
2 Oil pressure regulator, full load
3 Solenoid valve, full load (NO)
4 Pump
5 Oil pressure regulator, partial load
6 Solenoid valve (NC)
7 Nozzle line
8 Burner pipe
9 Flame tube
10 Blower motor
11 Pump motor
12 Oil preheating

TCH 24x control unit

The TCH 24x fuel oil automatic combustion control and safety unit controls and monitors the forced draught burner. The microprocessor-controlled program sequence ensures maximum stability of time periods, regardless of fluctuations in the power supply or ambient temperature. The control and safety unit is equipped with a device to protect against the effects of brownouts. Whenever the supply voltage drops below its rated minimum level (< 185V), the control unit shuts down - even in the absence of a malfunction signal. The control unit switches itself back on again once the voltage has returned to normal levels (> 195V).

Pressing and holding the unlocking button for...	… causes ….
... 1 second ...	the control and safety unit to unlock.
... 2 seconds ...	the control and safety unit to lock
... 9 seconds ...	Deleting the control unit statistics

Locking and unlocking
The control unit can be locked using the release knob or unlocked as long as the unit is powered on.

Always switch off the power supply before installing or removing the control unit. Do not attempt to open or carry out repairs on the control unit.

Moves the cursor upwards

Moves the cursor downwards

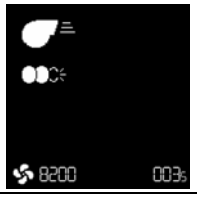
Increases the marked value

Reduces the marked value

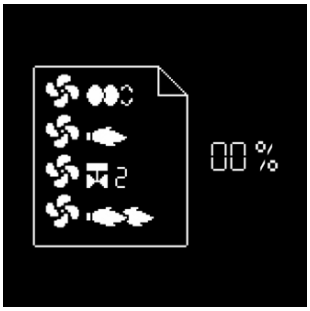
Modifies/confirms the value shown

Unlocks the control and safety unit

Red LED (flashes if failure occurs)

Display	Description	Display	Description
	Waiting for boiler heating request		The ventilation speed decreases until it reaches the setting value for the ignition position
	Waits for pre-heater		Oil valve is opened, safety time
	The ventilation speed increases until it reaches the setting value for pre-ventilation		Flame is present, awaiting authorisation of regulation
	Pre-ventilation and pre-ignition		Burner in operation. The lower line shows the strength of the flame signal and the operating time of the burner

TCH 24x control unit



In parallel with its control and safety functions, the TCH 24x control unit allows the following to be set:
- the ventilation speed during ignition
- the 1st stage ventilation speed
- the ventilation speed by opening the 2nd stage valve (for switching from 1st to 2nd stage)
- the 2nd stage ventilation speed
- the ventilation speed by closing the 2nd stage valve (for switching from 2nd to 1st stage)

The parameters for the control and safety unit are set using the display and 5 keys. Operating values are shown in real time on the display.

Pressing the keys gives access to 9 menus:

- Ventilation speed setting menu in the setting points

- Ventilation speed display menu in the setting points

- Fault diagnosis menu

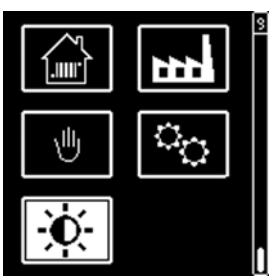
- Operating statistics menu

- Setting/modification menu for standard configurations*

- Industrial applications setting menu*

- Manual control menu*

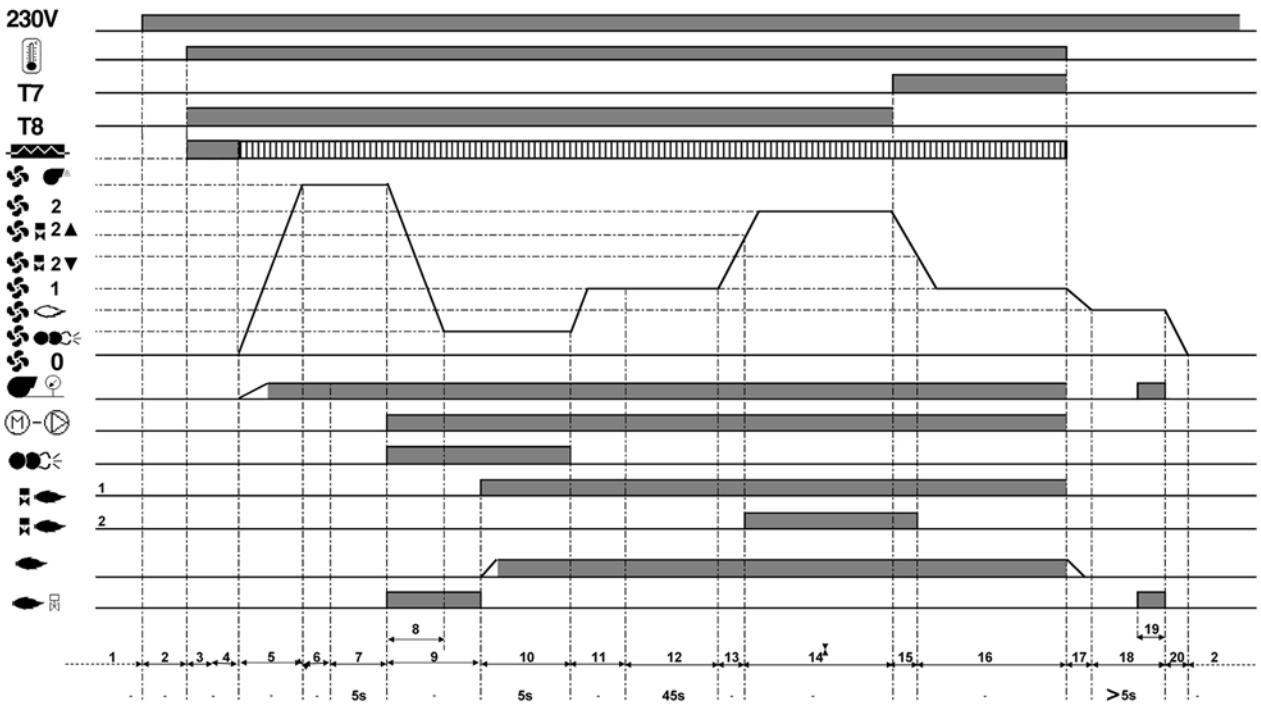
- Configuration mode menu*



- Screen brightness and contrast setting menu

* In these menus, it is possible to adjust the control unit's standard configurations. These are pre-set in the factory. No modifications may be carried out on-site without prior consultation with ELCO. The access code and the setting setpoints for these menus are available on request.

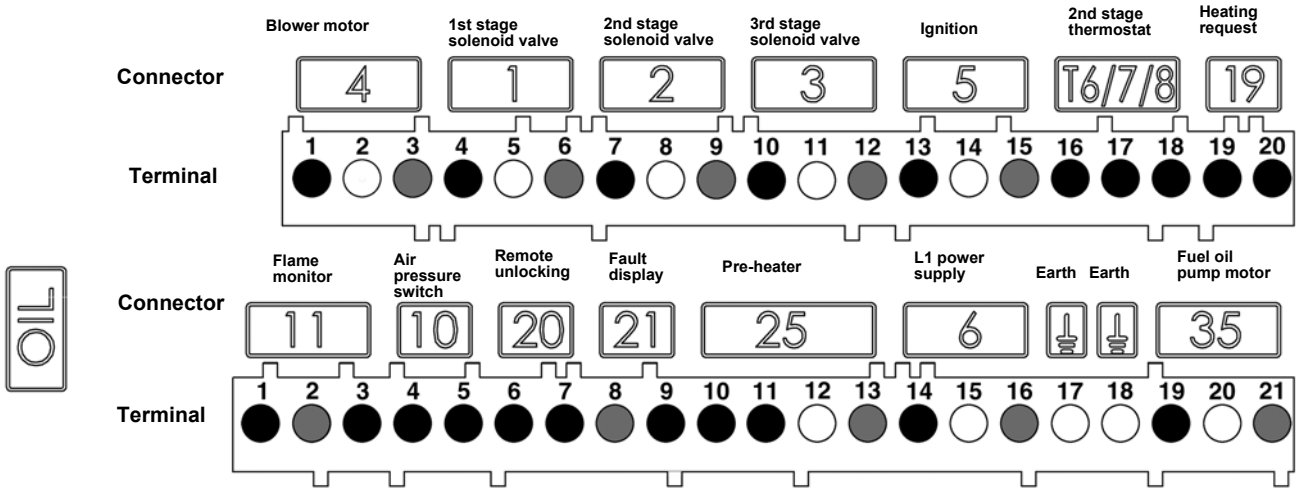
TCH 24x control unit



Program sequence phases:

1: No voltage
2: Powering up, no heating request
3: Heating request, Verification of fan zero speed, pre-heater on
4: Checking the rest status of the air pressure switch
5: Fan speed is increased to the pre-ventilation position
6: Checking the air pressure
7: Pre-ventilation
8: The fan speed is decreased to the ignition position, pre-ignition and switching on of the pump motor
9: Stray light monitoring
10: Burner start-up: opening of the 1st stage solenoid valve, flame formation
11: Stabilisation time, the fan speed is increased to the 1st stage
12: Awaiting authorisation for regulation
13: The fan speed is increased to the 2nd stage valve opening value
14: Operation in 2nd stage
15: The fan speed is decreased to the 2nd stage valve closing value
16: Operation in 1st stage
17: Regulation cut-out, fan speed is decreased to the post-ventilation position
18: Post-ventilation time
19 : Stray light and air pressure monitoring at the end of the post-ventilation time
20: The fan speed is reduced to 0
\- Awaiting a new heating request

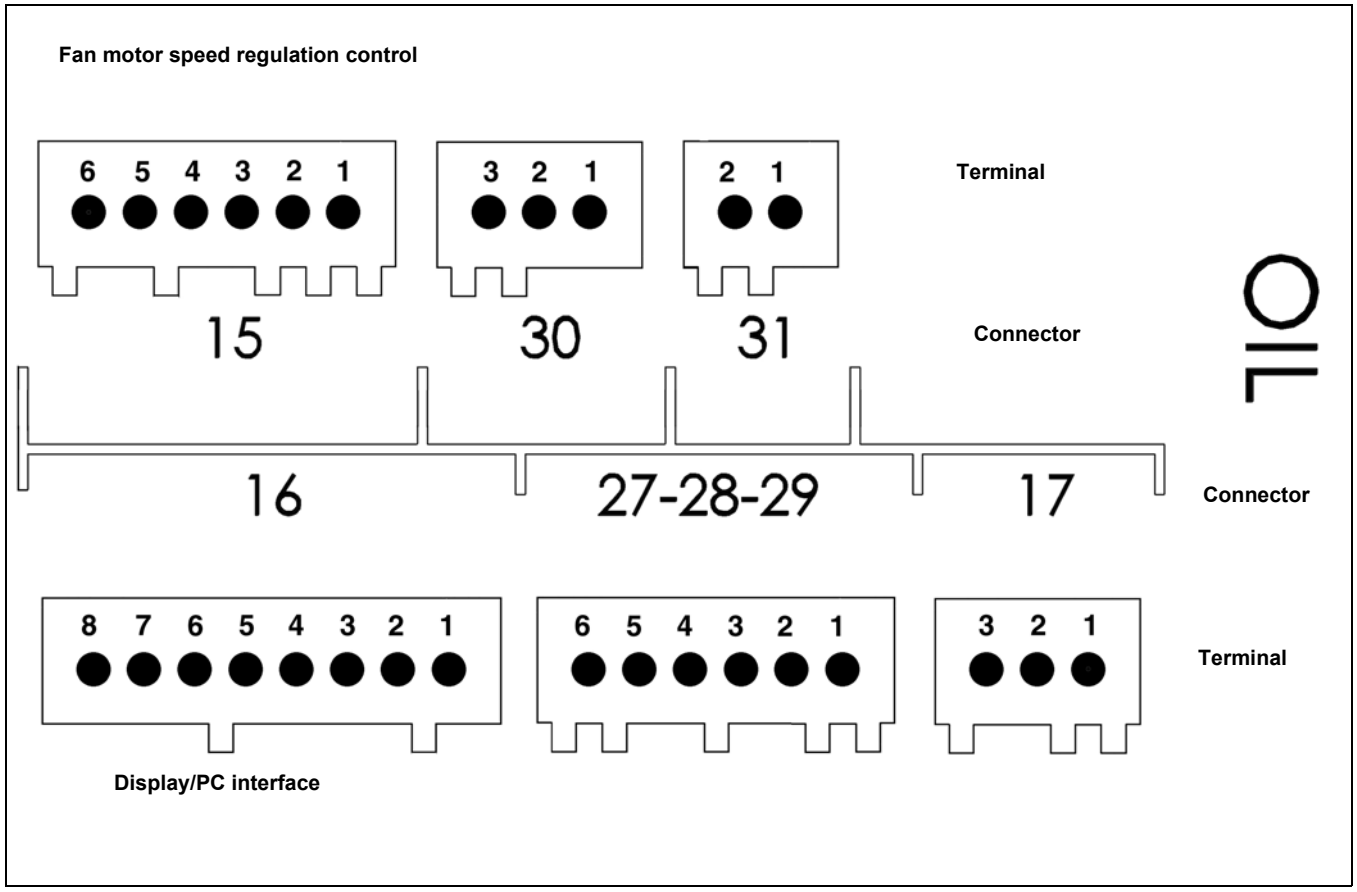
Terminal allocation chart
230 Volt connection



Terminal	Description	Connector
1	Burner motor live	4
2	Earth	
3	Neutral conductor	
4	1st stage solenoid valve live	1
5	Earth	
6	Neutral conductor	
7	2nd stage solenoid valve live	2
8	Earth	
9	Neutral conductor	
10	3rd stage solenoid valve live	3
11	Earth	
12	Neutral conductor	
13	Ignition transformer live	5
14	Earth	
15	Neutral conductor	
16	2nd stage thermostat live (T6)	T6/7/8
17	Signal T7	
18	Signal T8	
19	1st stage thermostat live (T1)	19
20	Heating request signal (option T2)	

Terminal	Description	Connector
1	Flame detector signal	11
2	Neutral conductor	
3	Live	
4	Live	10
5	Air pressure switch signal	
6	Live	20
7	Remote unlocking signal	
8	Neutral conductor	21
9	Malfunction signal live	
10	Live	25
11	Pre-heater/authorisation contact	
12	Earth	
13	Neutral conductor	
14	Live L1	6
15	Earth	
16	Neutral conductor	
17	Earth	
18	Earth	
19	Fuel oil pump live	35
20	Earth	
21	Neutral conductor	

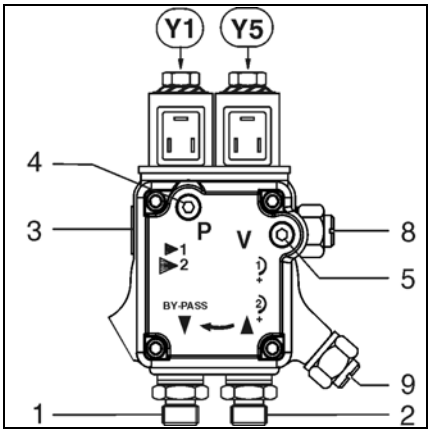
Terminal allocation chart
Low voltage connections



Terminal	Description	Connector
1	Not used	17
2	Not used	
3	Not used	
1	Not used	27 28 29
2	Not used	
3	Not used	
4	Not used	
5	Not used	
6	Not used	
1	Display or PC interface	16
2		
3		
4		
5		
6		
7		
8		

Terminal	Description	Connector
1	Not used	31
2	Not used	
1	Fan motor speed regulation control	30
2		
3		
1		15
2		
3		
4		
5		
6		

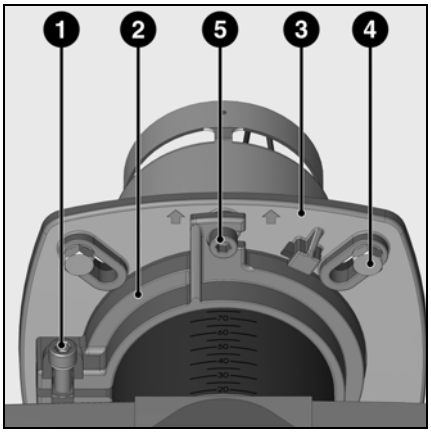
Pump



This is a gear pump. It must be connected as a two-line pump via a bleed filter. For the connection of the fuel oil tank and the bleed filter, it is better to use the single line option. An intake filter and two oil pressure regulators are integrated in the pump. Pressure gauges for pressure measurements **4** and negative pressure measurements **5** must be connected before the equipment is commissioned.

1	Return connection	G1/4
2	Vacuum connection	G1/4
3	Nozzle supply line connection	G1/8
4	Pressure gauge connector	
5	Vacuum gauge connector	
8	1st stage pressure setting	
9	2nd stage pressure setting	
Y1	Solenoid valve, 1st stage	
Y5	Solenoid valve, 2nd stage	

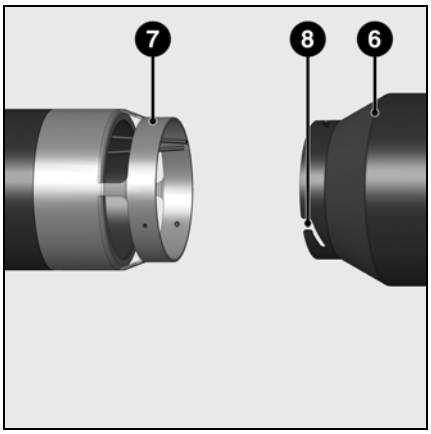
Burner installation
Burner installation location



Burner installation
The burner flange **3** features three elongated slots and can be used for a drilling Ø of 150 to 170 mm (VB2.38/54 VD) and/or of 150 to 184mm (VB2.66/95 VD). These dimensions comply with EN 226.
Sliding pipe bracket **2** on the burner pipe makes it possible to adjust the installed depth of the combustion components to the respective geometry of the combustion chamber. The installed depth remains the same during fitting and removal.
Pipe bracket **2** secures the burner to the connecting flange and therefore to the boiler. This completely seals off the combustion chamber.

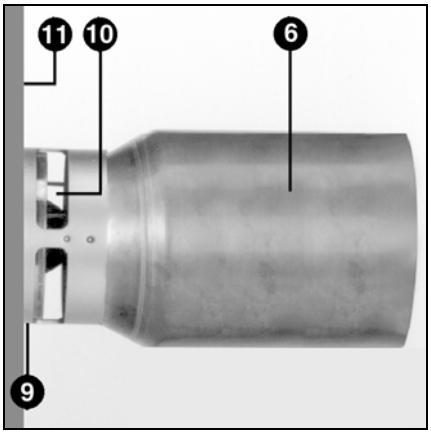
Installation:
- Secure connecting flange **3** to the boiler using screws **4**.
- Fit pipe bracket **2** to the burner pipe and secure using screw **1**. Tighten screw **1** to a maximum torque of 6 Nm.
- Turn the burner slightly, guide it into the flange and secure using screw **5**.

Removal:
- Unscrew screw **5**.
- Turn the burner out of the bayonet socket and pull it out of the flange.



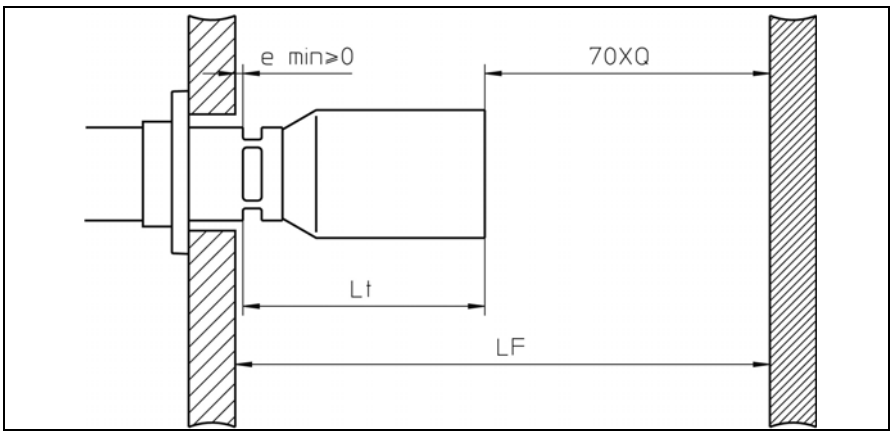
Fitting the flame tube
- After installing the burner, open the boiler door.
- Fit the flame tube **6** on the burner pipe **7** and turn clockwise until the bayonet joint **8** is securely in place.

Installed depth of the burner
The installed depth of the burner must be set so that the rear edge **9** of the recirculation orifice **10** is set at the same level as the boiler door insulation **11**. Carefully close the boiler door. **Ensure that the pivoting clearance radius of flame tube 6 is respected.**
If necessary, move the burner back slightly and then cut the insulation as needed.



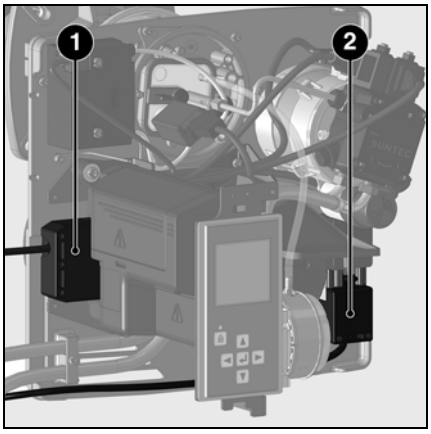
The recirculation orifice must be positioned in the furnace so that it is completely unobstructed and easy to access, to allow flue gases to return unhindered. This orifice must never be obstructed by insulating material.

Exhaust system
To prevent unpleasant noise emissions, right-angled connectors should not be used on the flue gas side of the boiler.



The minimum distance between the front edge of the flame tube and the bottom of the furnace can be calculated using the following formula:
70 x Q (Q=quantity of fuel oil in kg/h).
For a minimum length of the furnace of L_F, the result is:
$L_F = e + L_t + 70 \times Q$
L_t (VB 2.38...45) = 164
L_t (VB 2.54...95) = 204

Electrical connection
Fuel oil connection

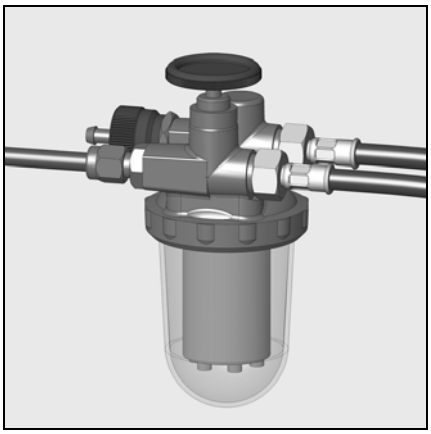


All electrical installation and connection work must only be carried out by a suitably qualified service engineer. All applicable regulations and directives must be observed.
Electrical connection
- Check to ensure that the power supply is as specified (230V, 50 Hz single phase with neutral and earth).

Boiler fuse: > 6.3A

Electrical connection

⚠ It must be possible to disconnect the burner from the mains using an omnipolar shutdown device complying with the standards in force. The burner and heat generator (boiler) are connected by a 7-pin Wieland connector **1** and a 4-pin Wieland connector **2** (**not supplied**).



Fuel oil connection
The fuel oil connection must be made via a bleed filter. The filter must be located to ensure that it does not impair the correct hose routing.
The hoses must not kink.
The fuel oil pipes used must be in DN6 or DN8 copper pipe.
CH: Polyamide fuel oil line DN6, DIN 16773.
For the maximum values of the suction lengths and heights, see the directive for carrying out and sizing installations with suction. This directive forms an integral part of the elements on which ELCO planning is based.

The suction line is passed up to 5 cm above the tank floor in cubic tanks, and up to 10 cm above the tank floor in cylindrical tanks.

Fuel oil connection
To ensure the operating safety of the system, the fuel oil supply must be installed carefully in compliance with local regulations.

Important:
- Maximum pressure at the pump intake < 1.5 bar
- Maximum vacuum pressure at the pump < 0.4 bar

- Before commissioning, draw oil in using a hand pump and check the oil lines for leaks.

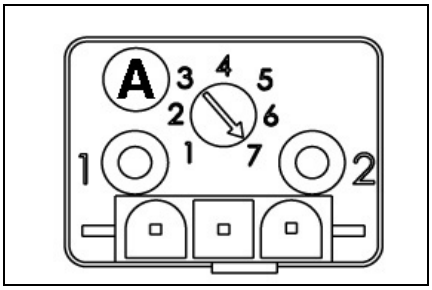
Checks before commissioning
Setting data

Checks before commissioning
The following must be checked before initial commissioning:
- That the burner is assembled in accordance with the instructions given here.
- That the burner is pre-set in accordance with the values in the adjustment table.
- Setting the combustion components.
- The heat generator must be ready for operation, and the operating regulations for the heat generator must be observed.
- All electrical connections must be carried out line with currently accepted practices.
- The heat generator and heating installation must be filled with water and the circulating pumps must be in operation.
- The temperature regulator, pressure regulator, low water detectors and any other safety or limiting devices that might be fitted must be connected and operational.
- The exhaust gas duct must be unobstructed and the secondary air system, if available, must be operational.
- An adequate supply of fresh air must be guaranteed.
- The heating request must be available.
- Fuel storage tanks must be full.
- The fuel supply lines must be assembled correctly, bled and checked for leaks.
- A standard-compliant measuring point must be available for measuring the exhaust gas, the exhaust gas duct up to the measuring point must be free of leaks to prevent anomalies in the measurement results.

Burner	Burner output kW		Diameter of the air nozzle (mm)	Fuel oil flow kg/h		Nozzle 80°S Gph (Danfoss)	Pump pressure bar		Air regulation of the nominal motor speed in %				Recirculation adjustment scale Y (mm)	Nozzle - air nozzle dimension (mm)
	1st stage	2nd stage		1st stage	2nd stage		1st stage	2nd stage	Ignition	1st stage	Switching stages	2nd stage		
	21	31	24	1,8	2,6	0,50	10	21	34	39	51	62	4	2,5
VB 2.38 VD	**25**	**35**	**24**	**2,1**	**3,0**	**0,50**	**12**	**23**	**43**	**48**	**65**	**82**	**4**	**2,5**
	27	38	24	2,2	3,2	0,60	9	19	47	52	76	100	4	2,5
	23	35	24	2,0	2,9	0,55	9	20	23	28	40	45	4	2,5
VB 2.45 VD	**26**	**37**	**24**	**2,2**	**3,1**	**0,60**	**10**	**20**	**26**	**31**	**40**	**48**	**4**	**2,5**
	32	44	24	2,7	3,7	0,60	14	24	35	40	65	100	4	2,5
	30	42	24	2,6	3,6	0,65	10	20	27	32	42	50	4	2,5
VB 2.54 VD	**32**	**45**	**24**	**2,7**	**3,8**	**0,65**	**11**	**22**	**30**	**35**	**45**	**55**	**4**	**2,5**
	36	52	24	3,0	4,4	0,75	11	23	35	40	70	90	4	2,5
	40	54	27	3,4	4,6	0,85	11	22	27	32	41	50	4	4,5
VB 2.66 VD	**45**	**64**	**27**	**3,8**	**5,4**	**1,00**	**11**	**22**	**33**	**38**	**51**	**65**	**4**	**4,5**
	48	66	27	4,1	5,6	1,10	11	19	36	42	61	80	4	4,5
	45	64	27	3,8	5,4	1,00	11	22	28	32	43	55	4	4,5
VB 2.77 VD	**52**	**72**	**27**	**4,4**	**6,0**	**1,10**	**11**	**22**	**30**	**38**	**49**	**60**	**4**	**4,5**
	55	77	27	4,6	6,4	1,25	11	20	38	45	62	80	5	4,5
	52	72	29	4,4	6,0	1,10	11	22	30	36	45	55	5	4,5
VB 2.85 VD	**54**	**79**	**29**	**4,6**	**6,7**	**1,25**	**11**	**22**	**32**	**40**	**52**	**65**	**5**	**4,5**
	59	84	29	5,0	7,1	1,35	10	21	28	43	64	86	5	4,5
	52	72	31	4,4	6,1	1,10	11	22	27	32	41	50	5	4,5
VB 2.95 VD	**59**	**84**	**31**	**5,0**	**7,0**	**1,35**	**10**	**21**	**33**	**38**	**49**	**61**	**5**	**4,5**
	64	93	31	5,3	7,8	1,35	12	24	35	40	60	80	5	4,5

Highlighted: Delivered from the factory; 1kg of fuel oil at 10°C = 11.86kWh

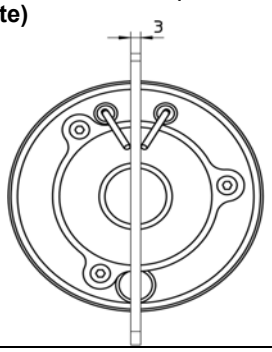
The adjustment data above are **basic adjustment values**. The factory settings appear on a grey background within a black box. These adjustment values are normally suitable for commissioning the burner. Check the settings values carefully. In most cases, depending on the installation, corrections must be made.



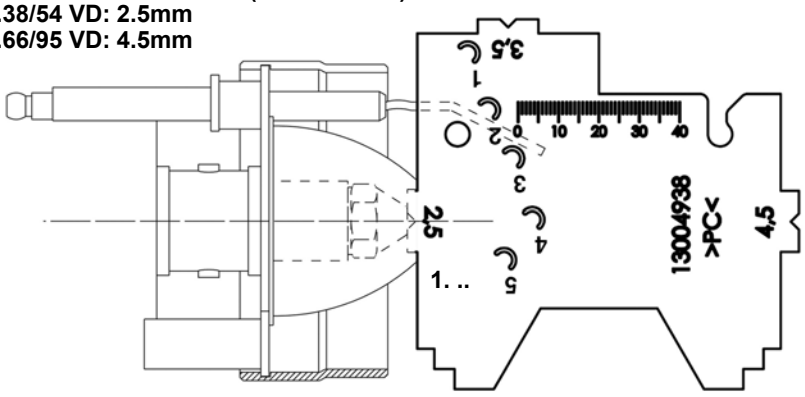
Adjusting the IRD cell
The burner must be running.
- Turn the potentiometer **A** until DEL 1 disappears.
- Increase the potentiometer setting by 2 graduations. (the flame signal shown on the display must remain >13µA).

Checking the combustion components
Recirculation

Ignition electrode gap
VB2.38/54 VD: 3mm
VB2.66/95 VD: 4-5mm (without template)

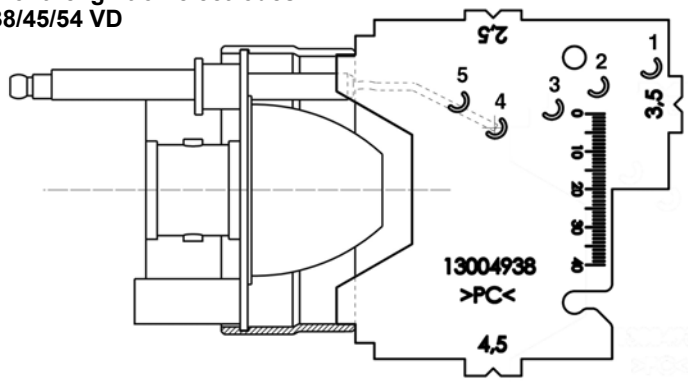


nozzle/air nozzle distance (dimension Y)
VB2.38/54 VD: 2.5mm
VB2.66/95 VD: 4.5mm

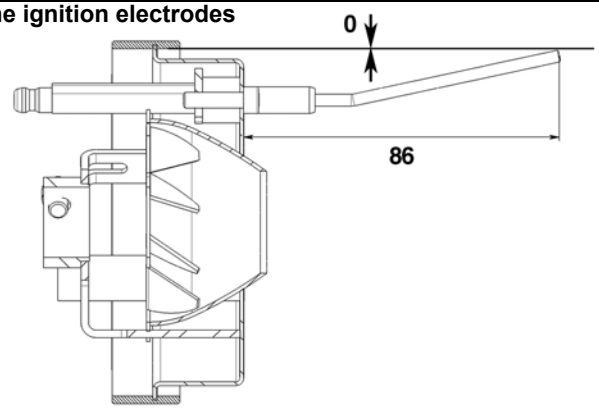


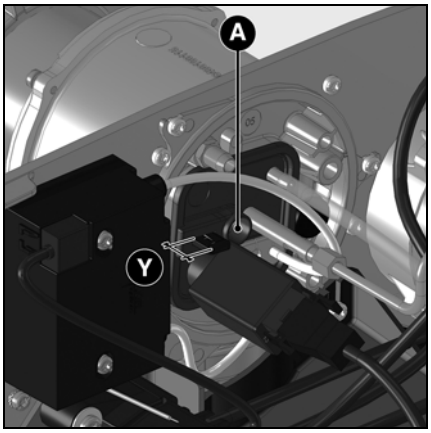
Setting the ignition electrodes
The setting template supplied with the burner may be used for the following functions.

Position of the ignition electrodes
4: VB2.38/45/54 VD



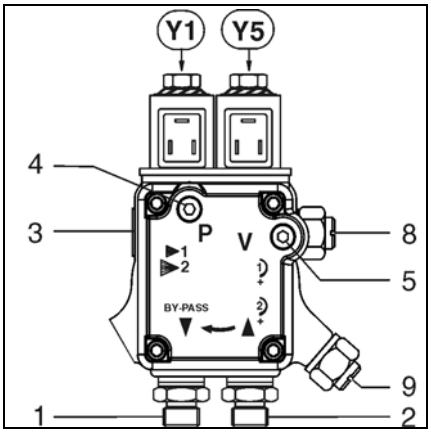
Position of the ignition electrodes
VB2.66/95 VD





Setting the recirculation
An NO and CO measuring device may be connected to obtain the correct setting of the recirculation volume.
The width of the recirculation orifice can be adjusted by axial movement of the burner head in the burner pipe. The positioning is adjusted with the setting screw **A**, in accordance with the value given in the setting data table. This value can be read on the graduated scale **Y**.
Once the recirculation has been set, a new start-up attempt may be made after a rest time of 5 minutes. If the burner does not start, or the start is delayed, recirculation must be set using smaller values on the scale, until a reliable start-up can be ensured (cold start-up). Alternatively, it is possible to reduce the ventilation speed ignition position.
Do not operate the burner with a recirculation orifice which is too small or obstructed. This will cause a significant increase in temperature within the burner head, and risks causing damage to the system.

Fuel oil pressure regulation
Air regulation

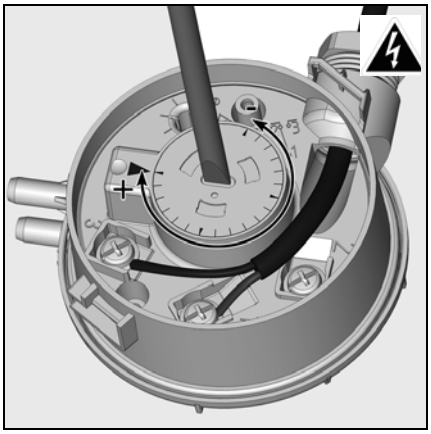


1	Return connection	G1/4
2	Vacuum connection	G1/4
3	Nozzle supply line connection	G1/8
4	Pressure gauge connector	
5	Vacuum gauge connector	
8	1st stage pressure setting	
9	2nd stage pressure setting	
Y1	Solenoid valve, 1st stage	
Y5	Solenoid valve, 2nd stage	

Air regulation
The combustion air regulation is carried out on the control unit by setting the ventilation speed.

Setting the fuel oil pressure
The fuel oil pressure is adjusted using fuel oil pressure regulator **8** for the 1st stage and fuel oil pressure regulator **9** for the 2nd stage. To check the pressure, connect a R1/8" pressure gauge to connector **4**.
Turn:
- to the right to increase the pressure
- to the left to reduce the pressure

Checking the vacuum pressure
To check the negative pressure, the vacuum meter must be connected to point **5**, R1/8". Maximum permissible vacuum pressure is 0.4 bar. At higher vacuum pressures, the fuel oil gasifies, which causes scraping noises in the pump and risks damaging it.



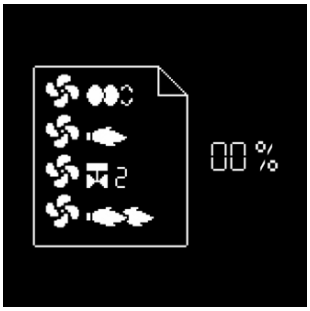
Air pressure switch adjustment
- Remove the transparent cover.
- Provisionally set to 1 mbar.

Pre-setting without flame

Setting is carried out in two phases:
- Pre-setting without flame
- Setting the flame, to fine tune the settings based on the combustion results

When the burner is switched on, the screen displays the image below.

Important
At this point, no setting position has been defined, therefore the burner cannot be started under these conditions.



• Press any key to go on to the next step.

The overview of the menus is displayed, and the ventilation speed settings menu is selected.

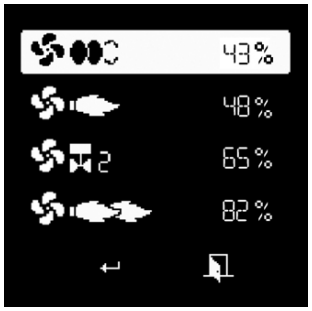
• Open the setting menu using the ↵ key.

Now enter the access code (see the label on the back of the display)

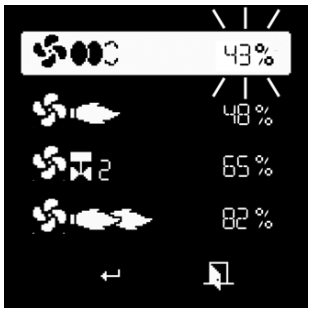
• Increase or decrease the value in increments by pressing ▼ or ▲.
• When the first figure has been set, move the cursor to the right by pressing ►.
• Repeat the process until you reach the last figure.
• Confirm the access code by pressing the ↵ key.

The control unit then opens the settings mode. The screen displays the factory settings for the different ventilation speeds (here, for example: VB 2.38 VD).

The following positions for the air flap are presented:



- ignition position (when the menu is opened, the curser goes to this position)
- 1st stage ventilation speed
- ventilation speed by opening the 2nd stage fuel-oil valve
- 2nd stage ventilation speed



Modify the setting value for a ventilation speed:
- To modify the value of a position, move the cursor to the corresponding location with the ▲ or ▼ key.
- Select the value to be modified using the ↵ key, the selected value will flash.
- Increase or decrease the value (in increments of 0.1%) by repeatedly pressing ◄ or ►. For large modifications, press and hold the ◄ or ► key, the value will scroll quickly up or down.
- Confirm the new value using the ↵ key. The value stops flashing.

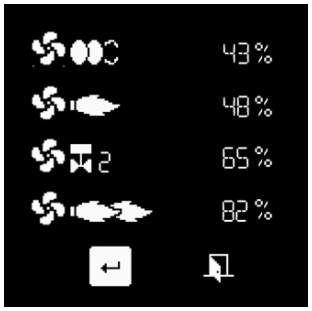
Note:
The values for the different speeds can be set freely. However, for safety reasons, the control unit enforces a minimum difference of 2° between the different speeds (except between the ignition position and the 1st stage).

Pre-setting without flame
General advice before starting the burner

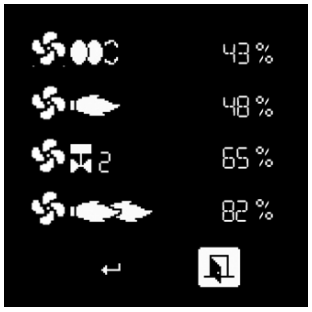
End of the setting without flame menu

When all the ventilation speed setting positions have been determined according to the required presetting, it is then possible to move on to the next section for commissioning - "Setting the flame".

To do this, place the cursor in the lower part of the screen on the ↵ symbol and press the ↵ key.



If it is necessary to quit the menu without saving the pre-settings, position the cursor on the symbol and confirm with the ↵ key.



Preparing the burner start-up
Before starting the burner, draw oil in using a hand pump until the filter is completely filled. Then start the burner by switching on the boiler regulator. Open the bleed screw on the oil filter to allow the oil line to bleed fully during the pre-ventilation phase. In this situation, the vacuum pressure must not exceed 0.4 bar. Close the bleed screw when the filter is completely filled with fuel oil and fuel oil is flowing out without bubbles.

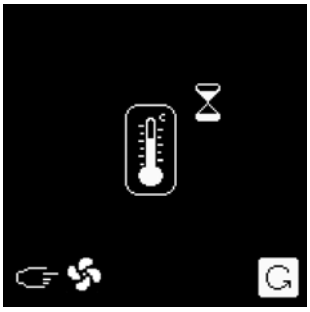
Optimising combustion values
If required, optimise the combustion values by setting the ventilation speed or pump pressure.
For 1st stage and 2nd stage, the C02 level obtained must be between 13.0% - and 13.5%. To optimise burner start-up, the ignition speed can be reduced to a value which corresponds to a CO2 level of between 14% and 14.5% (inclusive).

Warning: To avoid condensation, observe the minimum required flue gas temperature which complies with the boiler manufacturer's instructions and with the requirements for flue gas ducts.

⚠ **Risk of deflagration**
Continuously check CO, CO_2 and soot emissions when adjusting the output of the burner. Improve combustion values in the event of CO emissions. The CO level must not exceed 50 ppm.

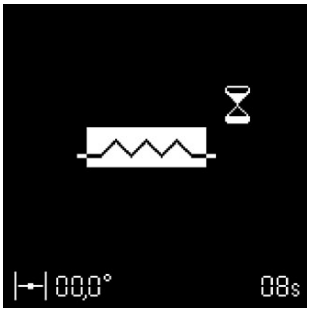
Function check
Flame monitoring must be checked to ensure that it is fully functional as part of initial commissioning and also after servicing or if the system has been out of operation for any significant period of time.
- Starting attempt with flame detection cell obscured:
  at the end of the safety time, the control and safety unit must switch to malfunction mode.
- Start-up with the flame detector cell lit:
  after pre-ventilation, the control and safety unit must switch to malfunction mode.
- Normal start-up; if the burner is operational, the flame detection cell should be obscured: after restarting and at the end of the safety time, the control and safety unit must switch to malfunction mode.

Setting with flame



- **If the boiler heating request is not present**, the burner remains on standby.

It is still possible to return to the precious setting menu "Pre-setting without flame". To do this, position the cursor on the G symbol and confirm with the ↵ key.



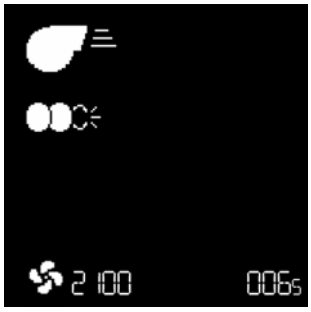
Waiting for preheater

- **If there is a boiler heating request** (T1-T2 contact closed), the burner starts.

The fan speed is increased to the pre-ventilation speed.

Pre-ventilation and pre-ignition

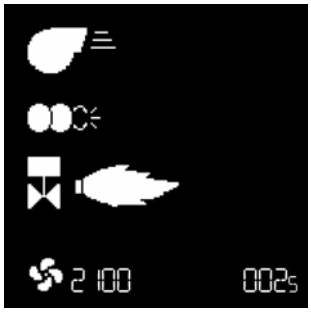
The fan speed is decreased to the ignition speed.



The fuel valve opens.

Awaiting flame signal

If no flame is detected at the end of the safety time, the control and safety unit switches to malfunction mode.

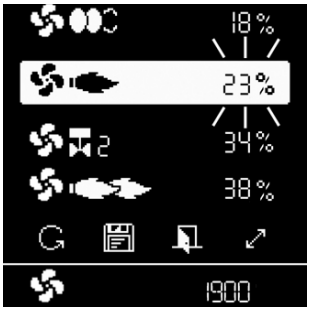


Flame detected

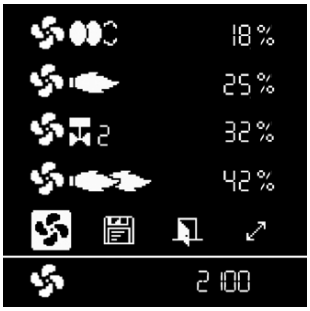
Flame stabilisation
The fan speed is increased to the 1st stage speed.

The control unit awaits the regulation authorisation.

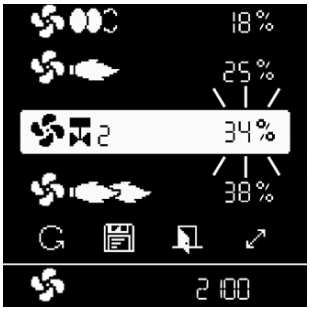
Setting with flame



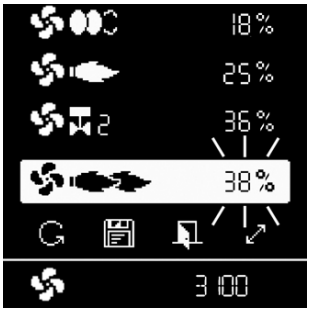
1st stage adjustment
If the flame has been detected and stabilised, the control and safety unit switches the burner to the 1st stage.
- Depending on the required output, set the fuel oil pressure to 1st stage using regulator **8** on the pump. Monitor the combustion values continuously as you do so (CO, CO_2, soot). If necessary, adjust the dimension **Y** and/or adapt the airflow.
- To do this, modify the 1st stage ventilation speed. Proceed as described on page 16 in the paragraph **"Modifying the value of a servomotor position setting"**.
- Warning: when modifying the setting value, the speed changes in real time. Therefore, the combustion values must be constantly checked.



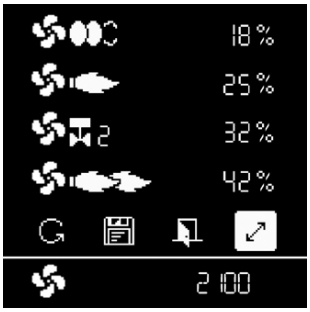
Special function: ignition checking
If the ignition speed has been modified, it is possible to carry out a new burner start-up to check the new ignition speed, without having to exit the settings menu.
To do this, after modifying the ignition speed, position the cursor on the G symbol, and initiate the new start-up using the ↵ key.



Setting the opening position of the 2nd stage fuel oil valve
After the 1st stage is set, it is possible to set the opening value for the 2nd stage fuel oil valve. Proceed once more as described in the paragraph **"Modifying the value of a speed setting"**.
- Warning: in this case the speed does not change immediately, but first remains in the 1st stage position (the actual speed is always displayed in the lower part of the display). The 2nd stage solenoid valve also remains closed. It is first possible to modify the 2nd stage speed.

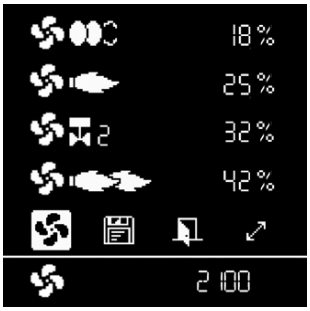


Adjustment for stage 2
To set the 2nd stage speed, position the cursor on the corresponding line on the display using the ▼ key. If necessary, modify the setting value. Proceed as described in the paragraph **"Modifying the value of a speed setting"**.
- To make the burner actually switch to the 2nd stage, press the ↵ key again. The speed reaches the set position. At the same time, the 2nd stage fuel oil valve will open, as soon as the set speed for the fan motor is exceeded.
- Depending on the required output, set the fuel oil pressure to stage 2 using regulator **9** on the pump. Monitor the combustion values continuously as you do so (CO, CO_2, soot). If necessary, adjust the dimension **Y** and/or adapt the airflow.
- To do this, modify the 2nd stage speed. Proceed as described on page 16 in the paragraph **"Modifying the value of a speed setting"**.
- Warning: when modifying the setting value, the speed changes in real time. Therefore, the combustion values must be constantly checked.



Special function: positioning the opening and closing of the 2nd stage fuel oil valve differently
The control unit makes it possible to set the opening of the 2nd stage valve, when switching from the 1st stage to the 2nd stage, at a different position to that for closing when the 2nd stage drops back to the 1st stage.
- To do this, as described earlier, first set the opening position of the 2nd stage oil valve.
- Lastly, position the cursor on the ⤢ symbol and confirm with the ↵ key. The selected symbol will then appear like this ⤡.
- Using the ▲ key, position the cursor on the setting value for the 2nd stage fuel oil valve, and set the new closure position, as described in the paragraph **"Modifying the value of a speed setting"**.

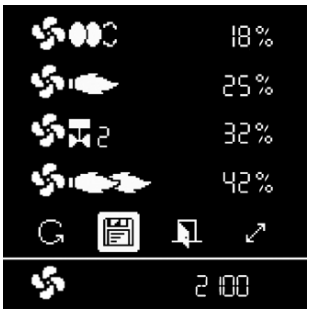
Setting with flame
Operating mode



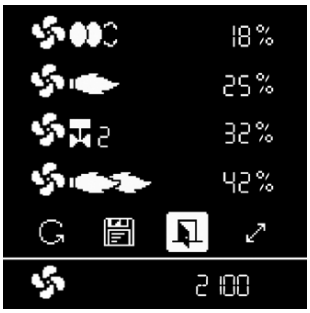
End of the "Setting with flame" menu
The burner setting is now complete. If necessary, it is possible to again correct each of the settings values. To do this, position the cursor on the value to be modified, using the ▲ or ▼ key.

Otherwise, the **"Setting the flame"** menu can be closed using any of the methods below, at any time:

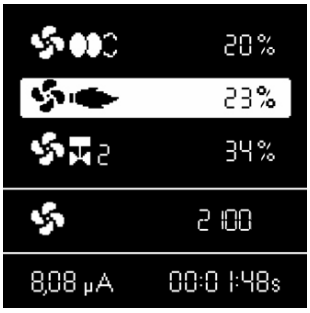
- Restart the burner setting procedure, passing through the presetting phase (without entering a password). To do this, position the cursor on the G symbol and confirm with the ↵ key. All the settings values saved before this time remain available.



- Saving the fixed values and ending the setting procedure. To do this, position the cursor on the 💾 symbol and confirm with the ↵ key. The burner is now ready to operate and can be controlled by the boiler regulation.



- Exiting the settings menu without reaching the end of the setting procedure. To do this, position the cursor on the ⤡ symbol and confirm with the ↵ key. All the speed settings saved at the time will be recovered when the setting menu is next called up.



Operating mode - Display of the operating status, the flame signal and the operating time

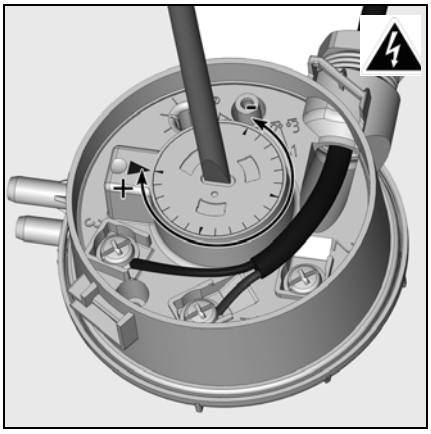
After setting of the burner has been completed, it switches to operating mode.

The current operation of the burner (Operation in 1st or 2nd stage) is indicated by the light bar.

The lower left cell shows the intensity of the flame signal. The display range is from 0 µA to 13 µA. A good quality signal is above 3µA.
The following limit values are valid:
- During the unauthorised flame test, the signal must be < 0.7µA
- During the safety time, the signal must be > 1.3 µA
- During operation, the signal must be > 1.1µA

The cell at the bottom right displays the burner's current operating time.

Setting the air pressure switch
Menu 5: Configuration for domestic use



Setting the air pressure switch
- Start the burner in the 1st stage.
- Increase the air pressure switch setting value until the burner cuts out.
- Set the switch-off point to approximately 20% below the switch-off pressure read.

Menu 5: Configuration for domestic use

To be used by ELCO-qualified technicians only!

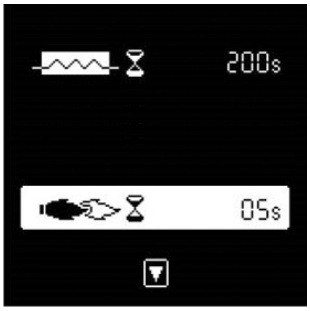
The menu lets you set the following parameters:
- Fuel oil burners: fuel oil heater on / off as well as max heating time.
- Adjustment release waiting time.
- Fan speed when the burner is off.
- Fan speed during the pre-ventilation phase.

- Activate the option **"Configuration for domestic use"** from the menu overview. Enter the access code (only available to an ELCO-qualified technician). Access is possible only when the burner is off.

Fuel oil heater
If no time indication is displayed next to the heater symbol, the heater is off.
- Activate the heater setting using the ↵ key. The time starts to flash.
- Heater on/off switch using keys ▲ ▼
- Changing max heating time with ◄, ► (1 press = 10 s)

Note: for VB2..VD: 400 s

Menu 5: Configuration for domestic use

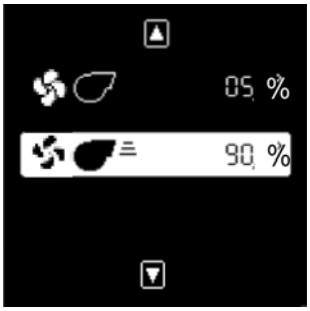


Adjustment release waiting time
- Activate the setting mode using the ↵ key. The time starts to flash.
- Use keys ◄, ► to decrease or increase the adjustment release waiting time by 1s steps. Adjustment range 0s-255s.
- Confirm the setting by pressing the ↵ key.

Note: Set the adjustment release to a value of 180s in the boiler STRATON L.

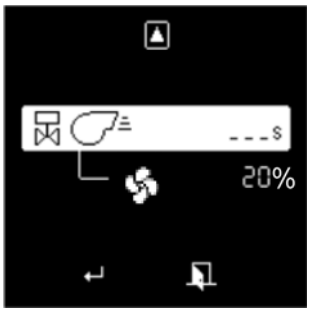
Fan speed when the burner is off (= permanent ventilation)**
- Activate the setting mode using the ↵ key. The setting value starts to flash.
- Use keys ◄, ► to decrease or increase the setting value by 1% steps. Setting value 20%-100%.
- Confirm the setting by pressing the ↵ key.

Note: Do not adjust fan speed higher than 2d stage.

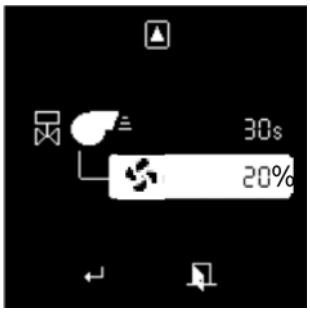


Fan speed during the pre-ventilation phase
As with the fan speed, the setting is carried out when the burner is off. But the set speed should never be lower than the speed of the 2nd stage.

Note: Same setting as for 2d stage.



Post-ventilation => only accessible if permanent ventilation is deactivated
- Activate the setting mode using the ↵ key. The cursor starts to flash.
- Start or stop post-ventilation using the ▲, ▼ keys. Time indication at initial start = 5s (= min value).
- Set post-ventilation time using the ◄, ► keys (max 255s**).
- Confirm the setting by pressing the ↵ key.

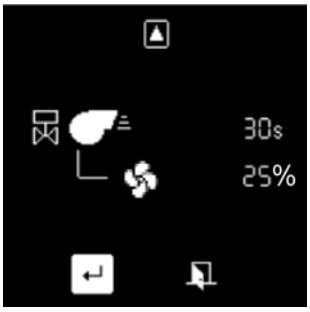


Fan speed during the post-ventilation phase
During the post-ventilation phase air pressure is monitored. Therefore set post-ventilation speed ≥ speed of 1st stage.
A value < 20% causes a lockout, because the fan stops.
- Activate the setting mode using the ↵ key.
- Decrease or increase the speed using the ◄, ► keys.
- Confirm the setting by pressing the ↵ key.

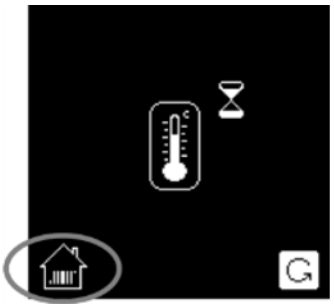
Note: In the boiler STRATON L set post-ventilation to a value of 30s. This setting also applies to the other types of condensation boilers.

⚠ **** As the fuel-pump motor is not in operation during the permanent ventilation and post-ventilation phases, there is no need to install an additional fuel-oil solenoid valve.**

Menu 5: Configuration for domestic use



Complete the settings with a test phase
- Confirm the setting with symbol ↵. The burner enters into standby mode and starts a test phase as soon as there is a heating request, or:
- Undo all the changes made with symbol . The burner goes back to its previous state.



Test phase
If there is no heating request, the screen displays the image opposite.

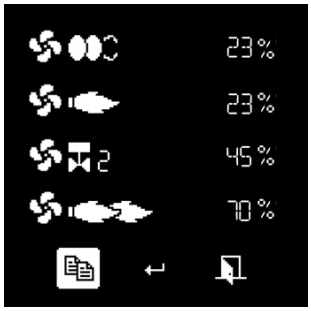
During the following heating request, the burner starts with the new setting values.

After starting, the burner stays in the 1st stage and displays the image opposite from the “commissioning” menu. To review the setting values, you can switch manually from 1st to 2nd stage. Position the cursor on the corresponding line and confirm the switch using the ↵ key.

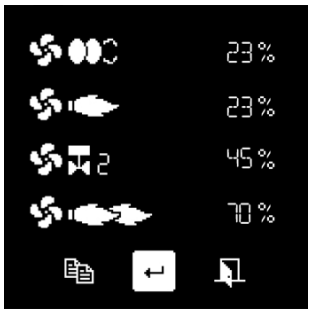
Exit the menu:
- via the symbol: repeat the setting phase from the start
- via the symbol: confirm the settings; the burner is ready to operate
- via the symbol: invalidate all the new settings; the burner goes back to its previous state

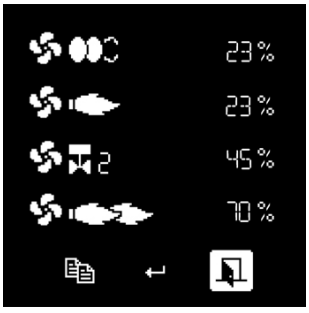
Displaying the setting data from the manual control display

Displaying the setting data from the manual control display
Once the burner setting procedure has been successfully completed in menu 1, the settings for all the operating states are stored in the control unit.
At the same time, a back-up copy of the setting values is saved in the display at the end of menu 1. If the control unit is subsequently changed, the setting data stored in the display can be consulted to enable the new control unit to be set.
To do this, call up the menu overview using the ↵ key.
Using the ► key select the menu **"Displaying the setting data"** and confirm with the ↵ key.



The screen opposite appears. It is not possible to automatically transfer the data to the new control unit. Note down the setting data and enter it manually into the control unit via menu 1.





Exit the menu using the symbol.

Caution: the values shown in this menu correspond with the values that were last successfully set with the current manual control display using menu 1 (menu 1 must have been completed in its entirety).

Maintenance

Burner and boiler servicing must only be carried out by an approved, qualified heating engineer. The system operator is advised to take out a maintenance contract to guarantee regular servicing. Depending on the type of installation, shorter maintenance intervals may be necessary.

⚠

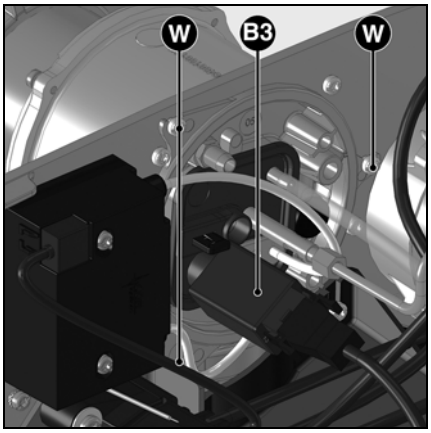
- Switch off the power supply before all maintenance and cleaning work.
- Use original spare parts.

Work recommended as part of annual burner maintenance:

- Burner test run, input measurement in the boiler room
- Clean the combustion components and replace defective parts if necessary
- Clean the fan wheel and blower and check the pump coupling
- Check the fuel oil nozzle, replace if necessary
- Check or replace the fuel oil filters (pump, feed lines)
- Visual inspection of oil hoses, replace if necessary
- Visual inspection of the burner's electrical components; eliminate malfunctions if necessary
- Check burner start characteristics
- Check the oil pressure and vacuum at the burner pump with the burner in operation
- Flame detector and control unit function check
- Correct the adjustment values if necessary
- Creation of a measurement report

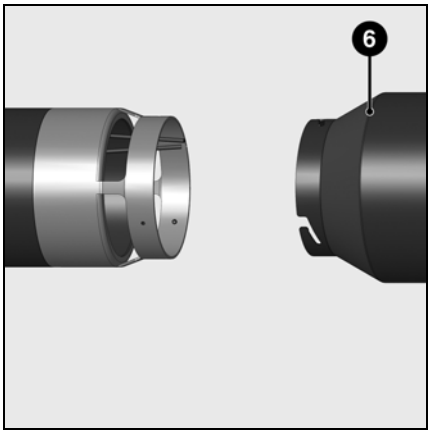
General checks

- Emergency stop button function check
- Visual inspection of oil lines in the boiler room



Checking the combustion components

- Take out the flame detector **B3**.
- Detach the flexible hose from the air pressure switch.
- Remove the three screws **W** from the cover.
- Remove the combustion components.
- Check the nozzle size and replace in accordance with the table on page 13 if necessary.
- Check the ignition electrodes; correct if necessary.
- Check the gap between the fuel oil nozzle and the air nozzle; adjust if necessary.



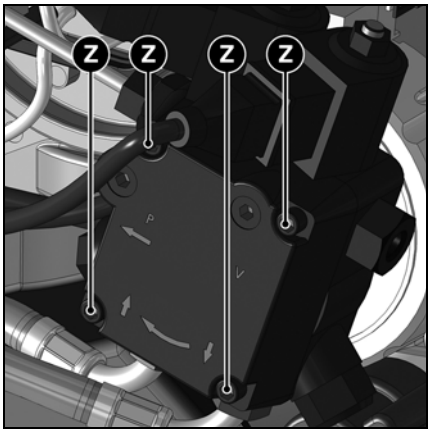
Checking the flame tube

This operation requires the boiler door to be opened.

- Turn off the power supply.
- When the boiler door is open, turn the flame tube 6 and take it out (bayonet mounting).
- Check the flame tube **6** and replace if necessary.
- Fit and secure the flame tube.

⚠ **The flame tube may be hot**

Maintenance



Cleaning the pump filter
The filter is located in the pump housing. It must be cleaned each time the equipment is serviced. To do so:
- Close the oil shut-off valve.
- Place a container under the pump to catch the fuel oil.
- Remove the screws **Z** and cover.
- Remove, clean or replace the filter.
- Refit the filter, close the cover again and use a new gasket.
- Tighten securely.
- Reopen the oil shut-off valve.
- Check pressure and tightness.

Cleaning the cover
- Do not use abrasive products or products containing chlorine.
- Clean the cover with water and a suitable cleaning product.
- Refit the cover.

Important
After every operation: check the combustion parameters and real operating condition (doors closed, cover fitted etc.). Record the results in the relevant documents.

Checking the flue gas temperature
- Check the flue gas temperature at regular intervals.
- Clean the boiler if the flue gas temperature is more than 30 °C above the value measured at the time of commissioning.
- Use a flue gas temperature gauge to make the check easier.

Resetting the maintenance indicator

The maintenance symbol  appears on the control unit display after 30,000 start-ups. This is why it is necessary to reset the maintenance counter after each service. To do this, press the control unit unlocking button for at least 9 seconds.

Fault repair

Cause of faults and troubleshooting
In the event of a fault, first check that the prerequisites for correct operation are fulfilled:

1. Is there any current?
2. Is there fuel oil in the tank?
3. Are all shut-off valves open?
4. Are all control and safety devices, such as the boiler thermostat, low-water detector, limit switch, etc. correctly set?

If the fault cannot be remedied by the checks described above, check the functions of the various burner components.

Components which fulfil an important safety function must not be repaired. These components must be replaced by parts with the same reference number.

⚠ **Only use original spare parts. Switch off the power supply before carrying out maintenance or cleaning.**

After every operation: check the combustion parameters and real operating condition (doors closed, cover fitted etc.). Record the results in the relevant documents.

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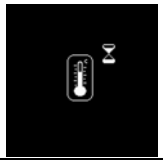
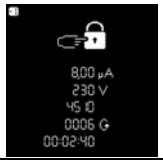
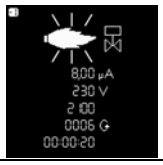
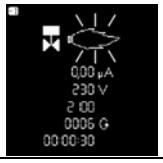
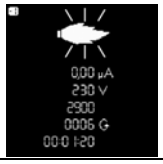
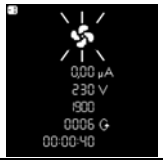
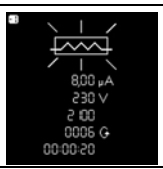
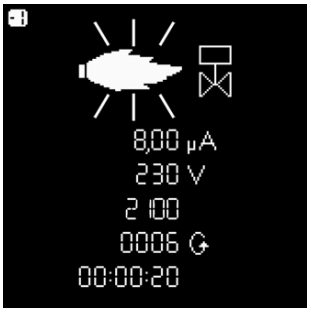
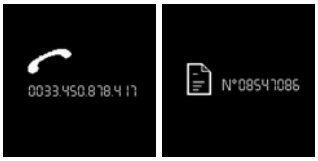
Symbol	Malfunction	Cause	Remedy
	The thermostat no longer starts the burner.	No heat requested by thermostats. Defective control unit.	Check/replace the thermostat. Replace the control unit.
	The burner starts up briefly when the power supply is switched on and then stops.	The control and safety unit has been manually locked.	Unlock the unit.
	The burner starts then stops after pre-ventilation.	Stray light detected during the pre-ventilation/pre-ignition period.	Check for the ignition spark/adjust or replace the electrodes. Check/replace the fuel oil solenoid valve. Check/Replace the flame detector tube.
	The burner starts and stops after the solenoid valves have opened.	No flame at the end of the safety time	Check the fuel oil level in the tank. Top up tank as required. Open the valves. Check the oil pressure and the operation of the pump, coupling, filter, solenoid valve. Check the ignition circuit, electrodes and their settings. Clean the electrodes. Clean the flame detector, or replace. Replace the following parts as required: ignition electrodes/ignition cables/ igniter/nozzle/pump/solenoid valve/safety unit.
	Flame extinguishing during operation.	The flame goes out during operation.	
	Fan motor fault.	Fan blockage. Internal fault with the fan motor.	Replace the fan motor.
	Burner does not start.	Air pressure switch: not in rest position. Incorrect adjustment. Contact welded.	 Readjust the pressure switch. Check the wiring. Replace the pressure switch.
	Burner does not start.	Heater defective.	Replace the heater.

Fault diagnosis menu
Operating statistics menu

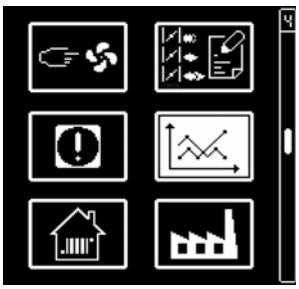


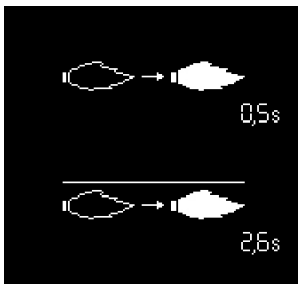


Fault diagnosis menu
To access the fault diagnosis menu, press any key when the burner is ready to operate, already operating, or in malfunction mode. It is not possible to access the fault diagnosis menu during the start-up phase.
The general menu screen will appear. Using the ▲, ▼, ►, or ◄ keys, place the cursor on the fault diagnosis menu symbol, and confirm using the ↵ key.

The details of the last fault to appear are indicated by the flashing symbol. The flame intensity, network voltage, the fan speed, number of burner start-ups as well as the operating time of the burner at the time it switched to malfunction mode are displayed underneath.
Using the ▼ and ▲ keys, it is possible to call up the details of the last 5 faults to have appeared (the fault number is displayed in the upper left corner of the display).
After the details of the last 5 faults, the telephone number of the after-sales department as well as the maintenance contract number are shown (no values are entered in the factory).
• Exit the menu using the ↵ key.

Entering a telephone number for the maintenance company and the maintenance contract number
When the corresponding symbol appears on the display:
• Keep the ↵ key held down until the first figure starts to flash (a short press will exit the menu).
• Using the ▲ or ▼ keys, change the figure to the value required (underscore = empty field)
• Using the ► key, move on to the next figure.
• When the number is complete, save using the ↵ key.





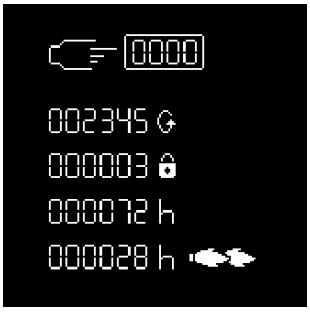
Operating statistics menu
To access the statistics menu, press any key when the burner is ready to operate, already operating, or malfunctioning. It is not possible to access the statistics menu during the start-up phase.
The general menu screen will appear. Using the ▲, ▼, ►, or ◄ keys, place the cursor on the statistics menu symbol, and confirm using the ▲ key.
The statistical data menu comprises 7 screens. You can navigate between the different screens using the ▲ and ▼ keys.

- Flame detection time for last burner start-up

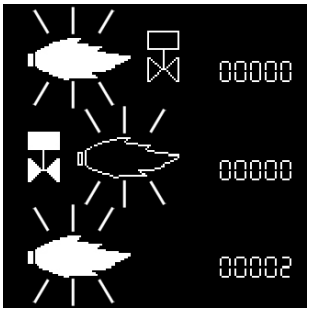
- Average flame detection time for the last 5 burner start-ups

- Total number of burner start-ups
- Total number of faults
- Total number of operating hours
- Total number of operating hours in 2nd stage

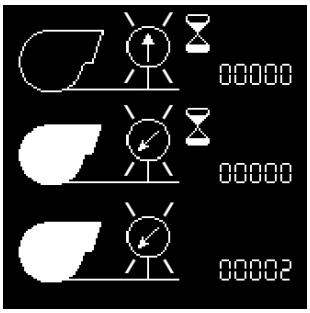
Operating statistics menu



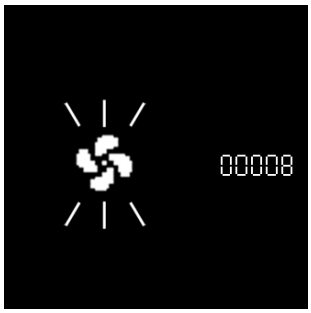
- Total number of burner start-ups since the last meter reset
- Number of faults since the last meter reset
- Total operating time since the last meter reset
- Operating time in 2nd stage since the last meter reset



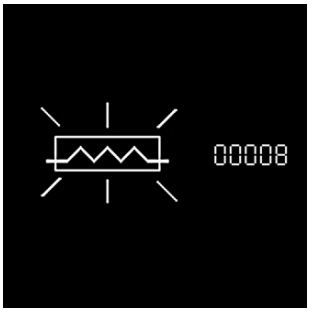
- Number of "Unauthorised flame" faults
- Number of "No flame after safety time" faults
- Number of "Flame extinguishing during operation" faults



- Number of "Air pressure switch stuck" faults
- Number of "Air pressure switch does not close during operation" faults
- Number of "Air pressure switch switching over" faults



- Number of "Fan motor" faults



- Number of "Heater" faults

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