

VG 2.120 D
VG 2.160 D
VG 2.210 D

elco

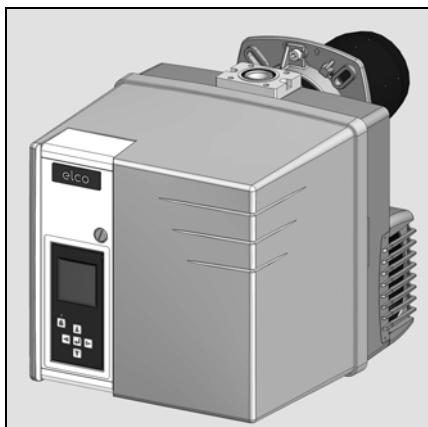


Operating instructions

For specialist installation engineers

Gas burners 2-28

en



de, fr 4200 1029 5000

it, nl 4200 1029 5100



..... 4200 1029 4901

Overview

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Important information

VG 2.120/160/210 D burners are designed for the low-pollutant combustion of natural gas and propane gas. The design and function of the burners meet standard EN 676. They are suitable for use with all heat generators complying with standard EN 303 or for use by hot air generators complying with standard DIN 4794 or DIN 30697 within their respective performance range. Any other type of application requires the approval of ELCO.

Installation, commissioning and maintenance must only be carried out by authorised specialists and all applicable directives and regulations must be complied with.

Burner description

VG 2.120/160/210 D burners are two-stage fully automatic monoblock devices. The special design of the combustion head enables combustion with low levels of nitrogen oxide and increased output. Class 3 type-approval in accordance with EN676 certifies that the lowest emission values have been achieved and means that the national environmental regulations have been met
AT: KFA 1995, FAV 1997
CH: LRV 2005
DE: 1.BImSchV

Emissions values may differ, depending on combustion chamber dimensions, combustion chamber load and the firing system (three-pass boilers, boilers with reverse firing). For specifying warranty values, the conditions for the measuring equipment, tolerances and humidity must be observed.

Packaging

The burner packaging also contains:

- 1 Gas connection flange
- 1 Compact gas train with gas filter
- 1 Burner flange with insulation
- 1 Bag containing mounting parts
- 1 Bag containing Technical Documentation

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

EN 226

Connection of fuel oil and forced-draught gas burners to a heat generator

EN 60335-1, -2-102

Specification for safety of household and similar electrical appliances, particular requirements for gas burning appliances

Gas lines

When installing the gas lines and trains, the general directives and guidelines, as well as the following national regulations, must be observed:

- CH: - G1 instruction text from SSIGE
- EKAS form no. 1942, liquefied gas directive, part 2
- Cantonal authority guidelines (e.g. directives for the pilot valve)
DE: - DVGW-TRV/TRGI

Installation location

The burner must not be used 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, there must be a supply air inlet measuring:

- DE: up to 50 kW: 150 cm²
per additional kW: + 2.0 cm²
CH: QF [kW] x 6= ...cm²; but at least 150 cm².

Variations may arise as a result of local regulations.

Declaration of conformity for gas burners

We, certified company No. AQF030, F-74106 ANNEMASSE Cedex, declare under our sole responsibility that the products
VG 2.120 D
VG 2.160 D
VG 2.210 D

conform to the following standards

EN 50165
EN 55014
EN 60335-1
EN 60335-2-102
EN 60555-2
EN 60555-3
EN 676
Belgian royal decree dated 08/01/2004

These products bear the CE mark in accordance with the stipulations of the following directives

2006/ 42/EC Machinery directive
2004/108/EC EMC directive
2006/ 95/EC Low voltage directive
92/ 42/EEC EEC Working efficiency directive

Annemasse, 25th March 2010
M. SPONZA

We accept no responsibility for damage arising from:

- inappropriate 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

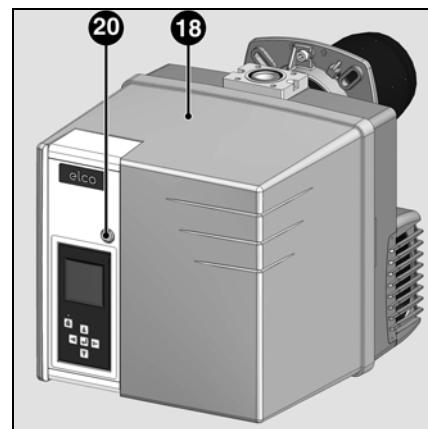
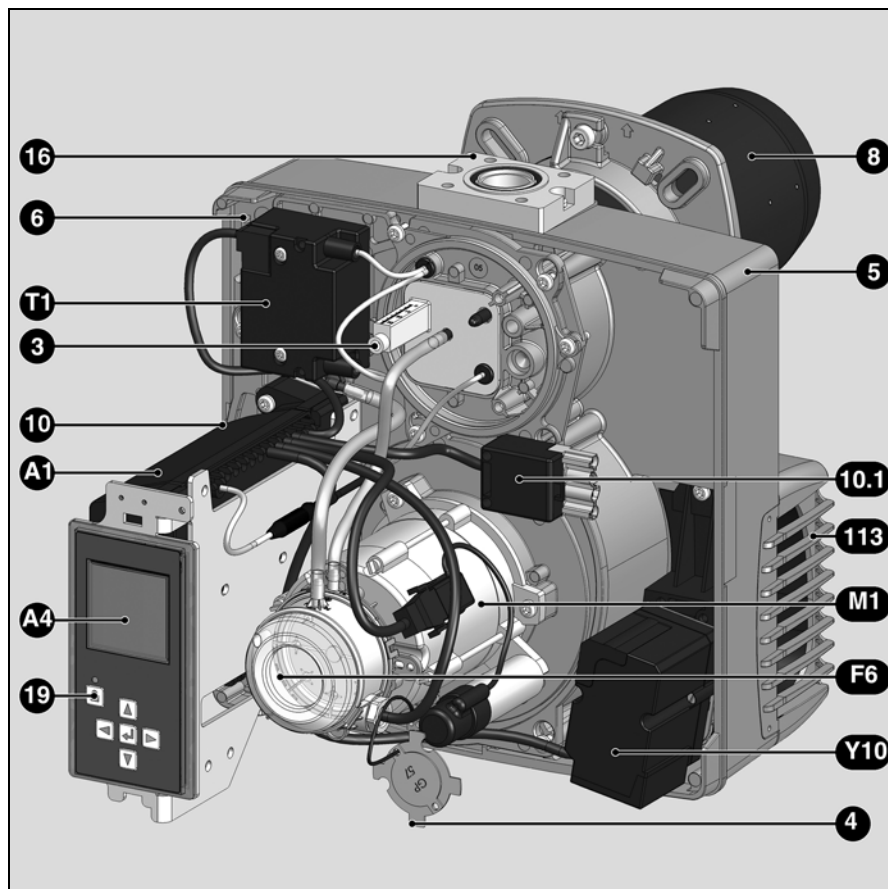
The firing system fitter must supply the operator of the system with operating and maintenance instructions on or before final delivery. These instructions should be displayed in a prominent location at the point of installation of the heat generator. They should include the address and telephone number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

Notes for the operator

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! It is advisable to take out a maintenance contract to guarantee regular servicing.

Overview

Burner description



en

- A1 Control and safety unit
- A4 Display
- F6 Air pressure switch
- M1 Blower motor
- T1 Igniter
- Y10 Air flap servomotor
- 3 Adjusting screw for dimension Y
- 4 Sealing washer for Liquefied Petroleum Gas
- 5 Housing
- 6 Plate hanging device (Maintenance)
- 8 Burner tube
- 10 7-pin connector
- 10.1 4-pin connector
- 16 Gas train connecting flange
- 18 Cover
- 19 Release knob
- 20 Hood securing screw
- 113 Air intake box

Operation

Safety function

Description of the function

A pre-ventilation time of 24 seconds begins when first powering up, after a power cut or a lockout, after the gas supply has been cut or after a shutdown for 24 hours.

During the pre-ventilation time

- the air pressure is monitored
- the combustion chamber is monitored to detect any flame signals.

At the end of the pre-ventilation time

- the ignition is switched on
- the main and safety solenoid valves are opened.
- burner start-up

Monitoring

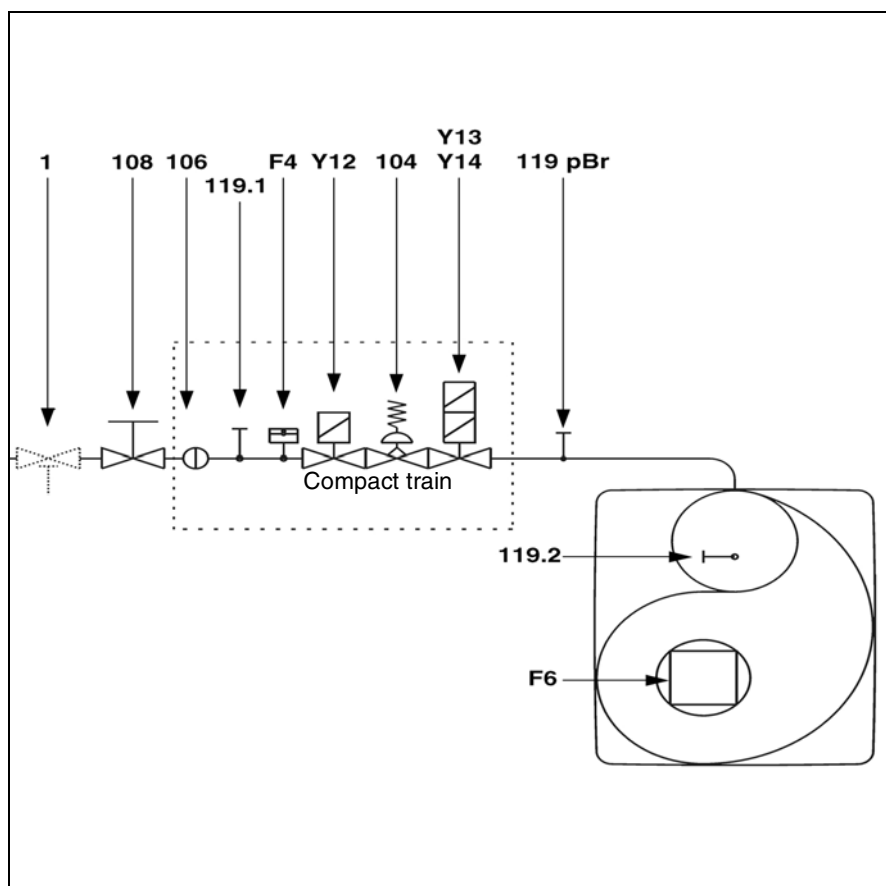
The flame is monitored by an ionisation probe. The probe is fitted with insulation to the gas head and is routed through the turbulator into the flame zone. The probe must not have any electrical contact with earthed parts. The burner switches to malfunction if a short circuit occurs between the probe and the burner earth. During burner operation, an ionised zone is produced in the gas flame through which a rectified current flows from the probe to the burner tip. The 2nd stage ionisation current must be at least 7 μ A.

Safety functions

- If no flame is produced when the burner is started (gas release), the burner is switched off at the end of the safety time which lasts no more than 3 seconds and the gas valve closes.
- If the flame is lost during operation, the gas supply is cut within a second. A new start-up sequence is activated. If the burner starts, the operating cycle starts running. Otherwise a lockout occurs.
- If there is an air failure during pre-ventilation or operation, a lockout occurs.
- If there is a gas failure, the burner either stops or will not start. As soon as the gas pressure recovers a sufficient value, burner starts again.

During the regulator shutdown

- The control thermostat interrupts the heat request.
- The gas valves close
- The flame goes out
- The burner is ready for operation



- F4 Gas pressure switch
- F6 Air pressure switch
- Y12 Safety solenoid valve
- Y13 Solenoid valve, 1st stage
- Y14 Solenoid valve, 2nd stage
- 1 Thermal shut-off valve (to be installed by the installer)
- 104 Gas pressure regulator
- 106 Screen
- 108 Gas cut-out valve (to be installed by the installer)
- 119pBrGas pressure measuring point at the valve outlet
- 119.1 Gas pressure measuring point upstream of the valves
- 119.2 Air pressure measuring point

CH note

In accordance with SSIGE instructions, it is compulsory to install a gas safety valve (mark 1) in the pipe

DE Note

In compliance with the reference layout applicable to boiler rooms, sites with gas furnaces must be fitted with a thermal gas shut-off valve (mark 1).

TCG 2xx control unit



The TCG 2xx 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 voltage or the ambient temperature. The automatic combustion control unit is designed to cope with 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 ($> 195V$).

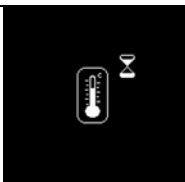
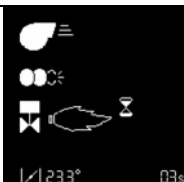
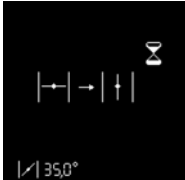
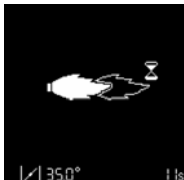
Pressing the unlocking button on the unit for	... causes ...
... 1 second ...	the control unit to unlock.
... 2 seconds ...	the control unit to lock.
... 9 seconds ...	the statistics to be deleted

Locking and unlocking

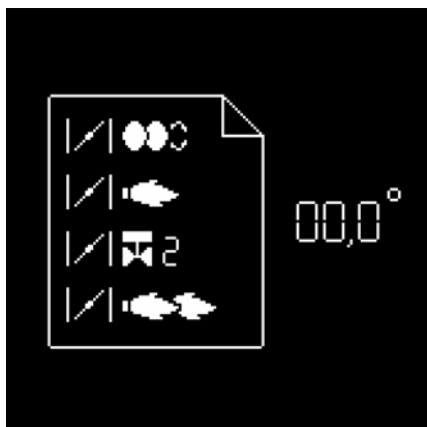
The control unit can be locked (switched to malfunction mode) by pressing the unlocking button  and unlocked (fault deleted), provided the unit is connected to the mains power supply.

 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 unit.
-  Red LED (flashes if a fault is present).

Screen	Description	Screen	Description
	Awaiting the heat request from the boiler		Opening the gas valve and safety time
	Air flap is forced open for pre-ventilation.		Flame is present, awaiting authorisation of regulation
	Pre-ventilation		Burner in operation. The lower cell shows the strength of the signal and the operating time of the burner.
	Closing the air flap to the ignition position, pre-ignition		

TCG 2xx control unit



In parallel with its control and safety functions, the TCG2xx control unit allows the following to be set: (see illustration)

- the position of the air flap during ignition
- the position of the air flap during the 1st stage
- the opening position of the stage 2 valve (for switching from 1st to 2nd stage)
- the position of the air flap during the 2nd stage
- the closing position of the stage 2 air flap (for switching from 2nd to 1st stage).

The parameters for the control 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 7 menus:

(The menu on the bottom right is not activated in VG 2.120 D, VG 2.160 D and VG 2.210 D)



- menu for setting the servomotor,



- menu for storing the servomotor setpoints in the display



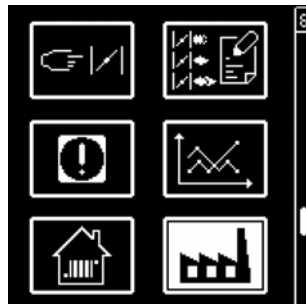
- menu for consulting faults



- menu for statistical data



- menu for setting / adjusting the standard configurations.



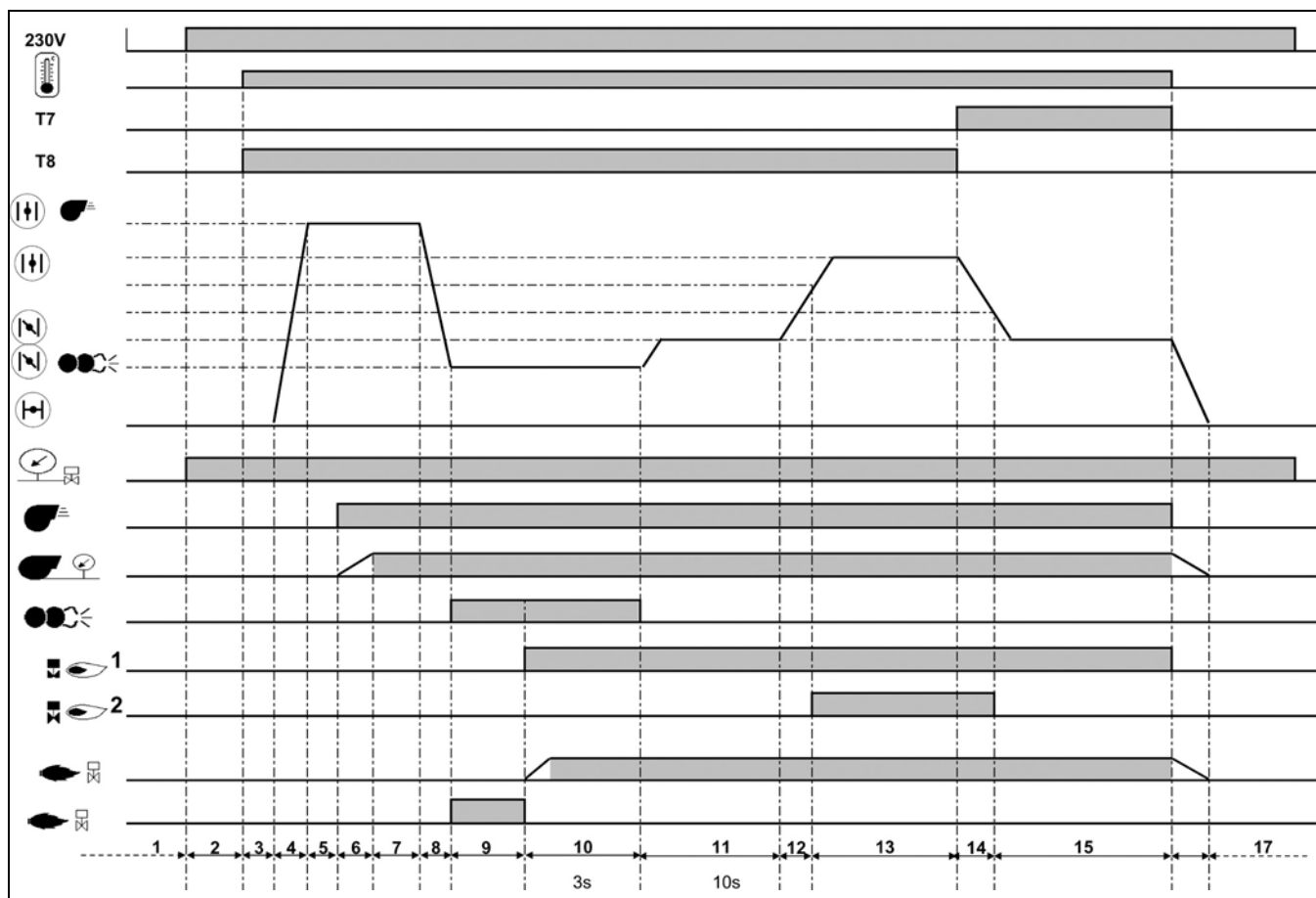
- menu for setting industrial applications



- menu for manual control

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 this menu are available on request.

TCG 2xx control unit



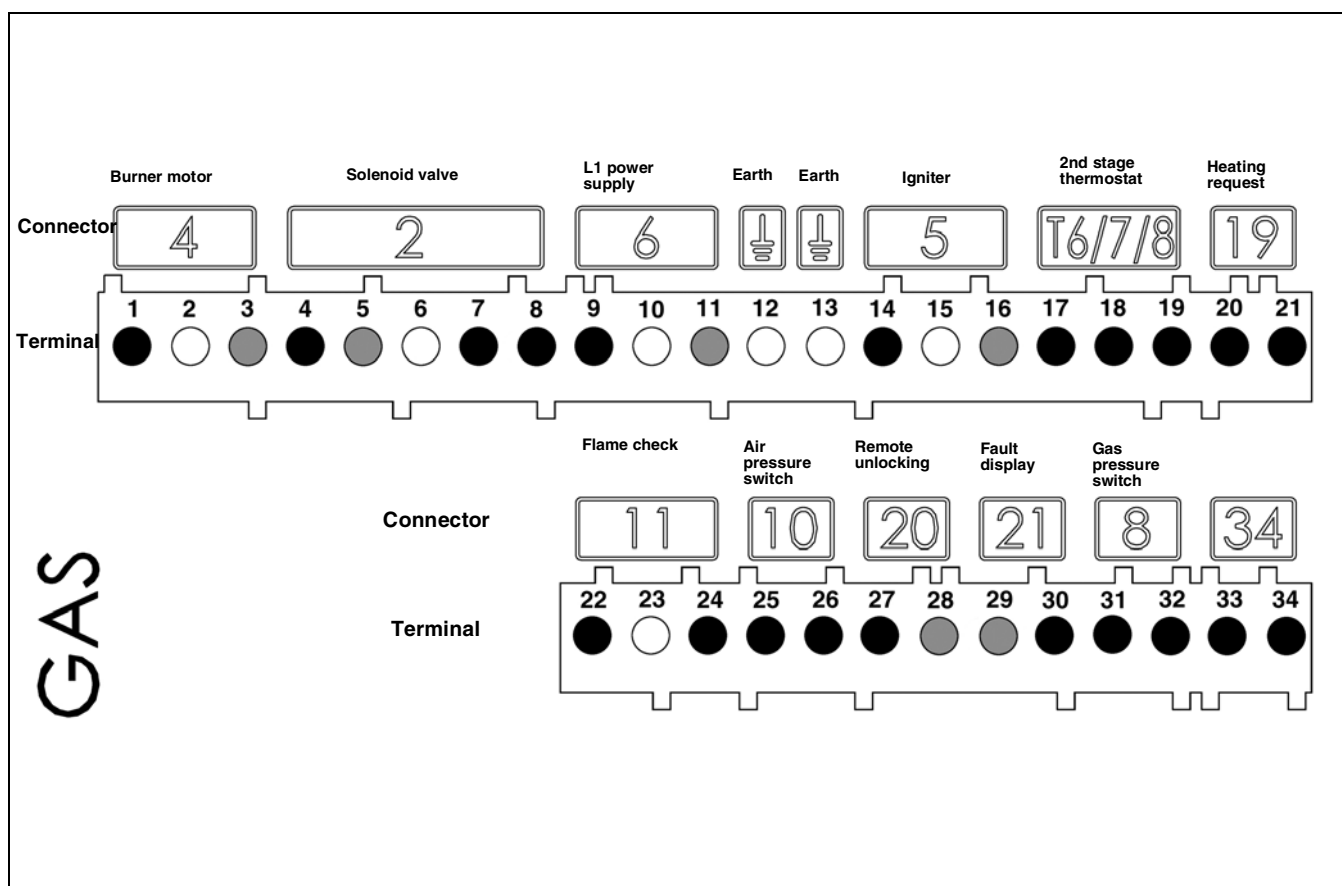
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Operating cycle phases:

- | | |
|--|--|
| 1: No voltage | solenoid valve, flame formation, safety time: max. 3 s. |
| 2: Powering up, no heat request | 11: Awaiting regulator release |
| 3: Checking the air flap is closed | 12: Opening the air flap, until the opening position of the 2 nd stage valve is reached |
| 4: Opening an air flap, arrival in pre-ventilation position | 13: Operation in 2 nd stage |
| 5: Checking the rest status of the air pressure switch | 14: Closing the air flap, until the 2 nd stage valve reaches the closed position |
| 6: Pre-ventilation: energizing of the motor, checking the air pressure | 15: Operation in 1 st stage |
| 7: End of pre-ventilation | 16: Regulator shutdown, closure of the air flap to 0° |
| 8: Air flap closes to the ignition position | 17: Awaiting a new heating request |
| 9: Switching on the igniter, unauthorised flame monitoring | |
| 10: Starting the burner: Opening of the | |

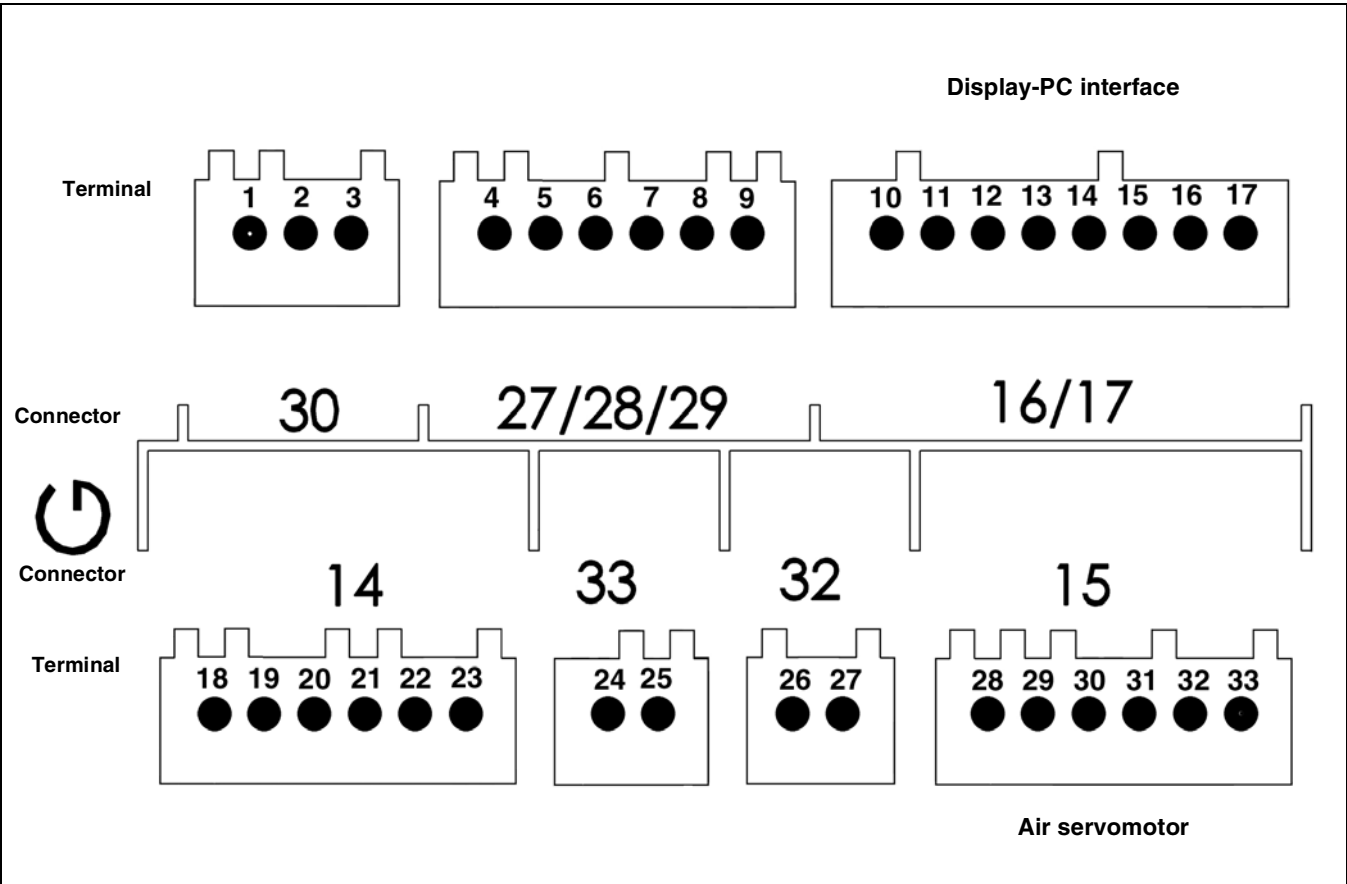
Operation

Terminal allocation chart 230 Volt connection



Terminal	Description	Connector	Terminal	Description	Connector
1	Burner motor phase	4	20	1 st stage thermostat live (T1)	19
2	Earth		21	Heating request signal (option T2)	
3	Neutral		22	Flame monitoring signal	11
4	1 st stage solenoid valve live	2	23	Earth	
5	Neutral		24	Live	
6	Earth		25	Air pressure switch signal	10
7	Live		26	Live	
8	2 nd stage solenoid valve live	6	27	Live	20
9	Live L1		28	Remote unlocking signal	
10	Earth		29	Neutral	
11	Neutral		30	Signal fault live	21
12	Earth	5	31	Live	
13	Earth		32	Live	8
14	Igniter live		33	Not used	
15	Earth		34	Not used	
16	Neutral	T6/7/8			34
17	Live for the 2 nd stage thermostat				
18	Signal T7				
19	Signal T8				

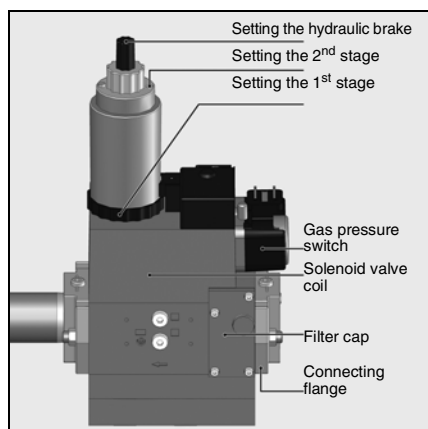
Terminal allocation chart
Low voltage connections



Terminal	Description	Connector	Terminal	Description	Connector
1	not used	30	18	not used	14
2	not used		19	not used	
3	not used		20	not used	
4	not used		21	not used	
5	not used		22	not used	
6	not used		23	not used	
7	not used		24	not used	33
8	not used		25	not used	
9	not used		26	not used	32
10	Display or PC interface	27 28 29	27	not used	
11			28	Air servomotor	15
12			29		
13			30		
14			31		
15			32		
16			33		
17					

Operation

MB-ZRDLE gas train



MBZRDLE... B01S.. (dual-stage)

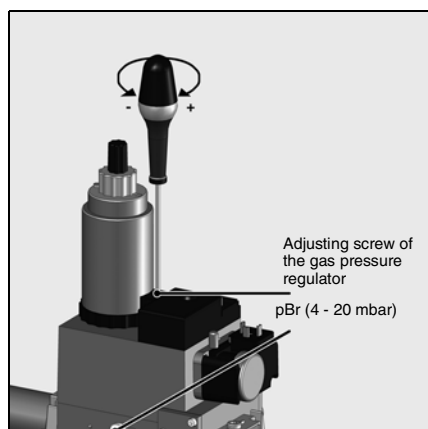
Compact unit consisting of: filter, adjustable pressure switch, non-adjustable rapid opening and closing safety valve, adjustable pressure regulator, main valve (first and second stage) with adjustable throughput and hydraulic brake, plus rapid closing.

Default setting:

- Flow rate 1st stage and 2nd stage, set to maximum.
- Ignition flow rate and pressure regulator set to minimum.

Technical data

Input pressure	360 mbar max.
Ambient temperature	-15 to +70 C°
Voltage	230 V/ 50 Hz
Absorbed output	60 VA
Protection level	IP 54
Gas connection	3/4" Rp or 1" 1/4 Rp
Assembly position:	
- Vertical with coil facing upwards	
- Horizontal with coil hidden	

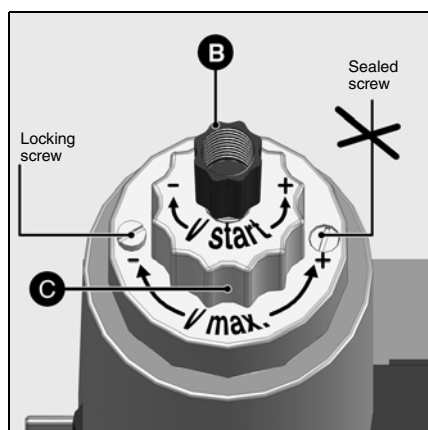


Pressure regulator setting

The adjusting screw has a path of 60 turns for adjusting the output pressure. Three turns clockwise or anticlockwise increases or reduces pressure by 1 mbar respectively.

At commissioning:

- Turn the screw at least 10 turns clockwise (+)
- Then fine tune the adjustment (more or less pressure)
- Checking the gas pressure on the pressure tap **119pBr**.



Setting the ignition throughput

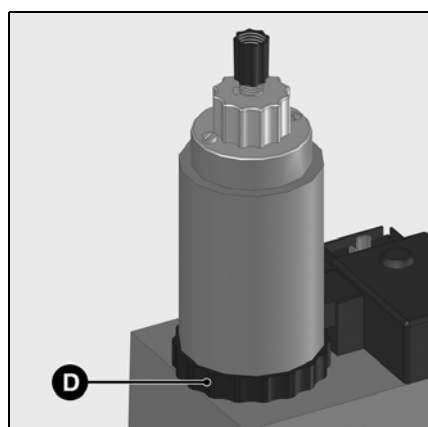
- Unscrew plastic cap **B**.
- Turn it over and use it as a tool for turning the adjusting screw (three turns to adjust from minimum to maximum throughput)
- Reduce the ignition throughput by turning the screw clockwise, reduce it by turning it anti-clockwise.

Adjusting the nominal flow rate

- Unscrew the locking screw (the sealed screw must not, however, be unscrewed)

Setting the gas throughput for the 2nd stage

- Reduce nominal gas throughput by turning adjusting knob **C**, anti-clockwise (located on the upper section of the solenoid coil). Turning clockwise increases throughput.

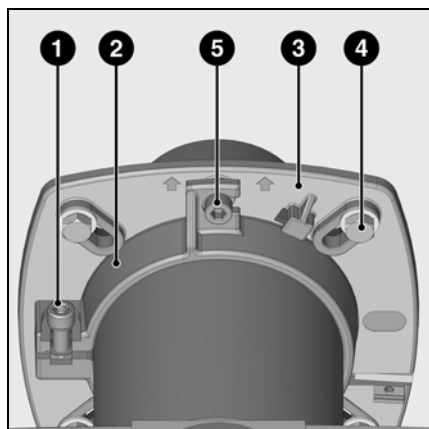


Setting the gas throughput for the 1st stage

By hand (not tool).

- Reduce gas throughput by turning ring **D** clockwise (located on the lower section of the solenoid coil). Turn anti-clockwise to increase gas throughput.

Burner assembly



Burner assembly

Burner flange **3** is equipped with elongated holes and can be used with a hole circle diameter of 150 - 184mm. These dimensions comply with EN 226. Sliding pipe bracket **2** on the burner pipe makes it possible to adjust the installed depth of the mixing unit to the geometry of the combustion chamber concerned. 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.

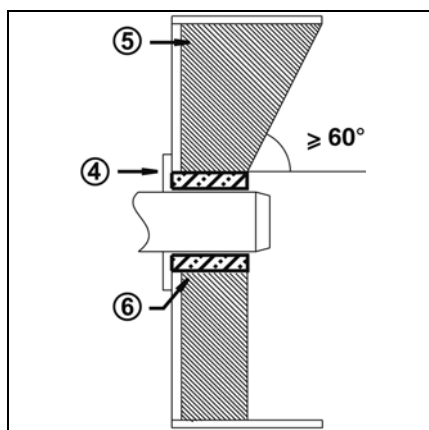
Installation:

- 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:

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

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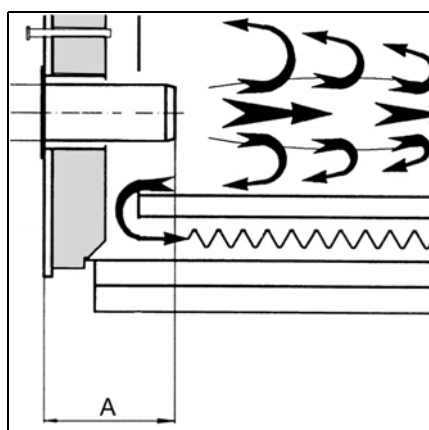
Burner tube installation depth and brickwork surround

Unless otherwise specified by the boiler manufacturer, heat generators without a cooled front wall require brickwork or insulation **5** as shown in the illustration opposite. The brickwork must not protrude beyond the leading edge of the flame tube, and should have a maximum conical angle of 60°. Space **6** must be filled with an elastic, non-flammable insulation material.

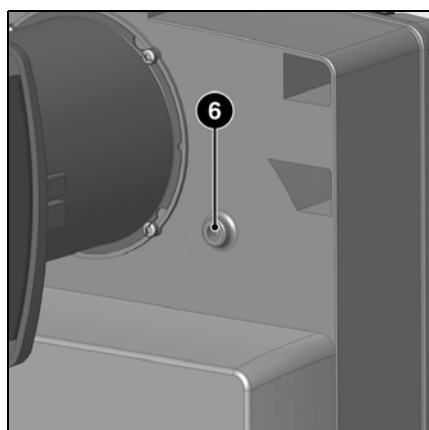
! For assembly in the position with the volute facing upwards, unclip the display, turn it over 180°, and refit it.

Exhaust gas evacuation system

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



On boilers with reverse firing, minimum flame tube insertion depth **A** should be observed as per the boiler manufacturer's instructions.



Inspection glass cooling

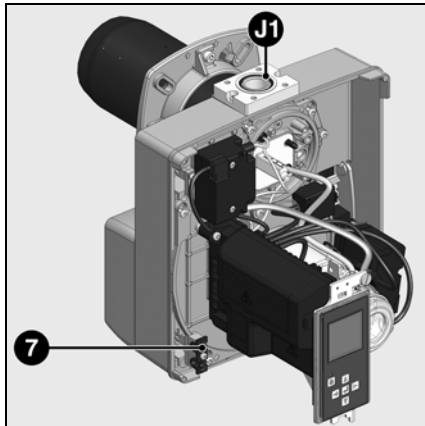
The burner housing can be equipped with an R1/8" connection to support a line for cooling the inspection glass of the boiler.

- To do this, drill through boss **6** and cut an 1/8" thread.

Use accessories article No. 12 056 459 for the connecting nipple and connection hose.

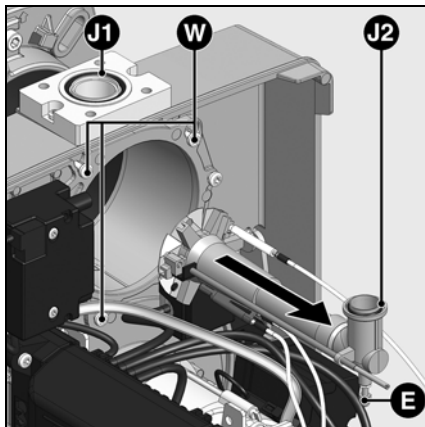
Assembly

Gas train Checking/setting the mixing unit



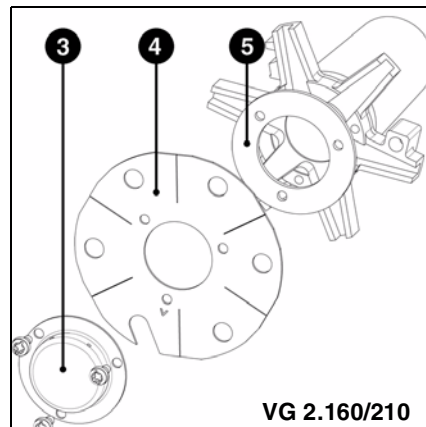
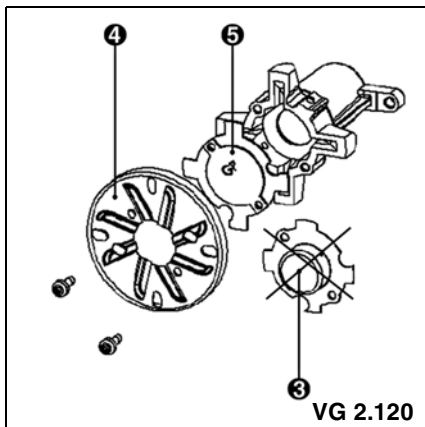
Gas train assembly

- Check the correct position of the O-ring **J1** in the gas connecting flange.
- Secure the gas train on the burner head so that the gas train coils are in the upper vertical position.
- Pay attention to the direction of circulation.
- Route the connection cable for the gas train through clamp **7** and connect it to the gas train.



Checking the mixing unit

- Loosen the three cover screws **W**.
- Remove the cover.
- Loosen lock nut **E** on the gas pipe bracket
- Loosen the retaining bolt.
- Remove the mixing unit.

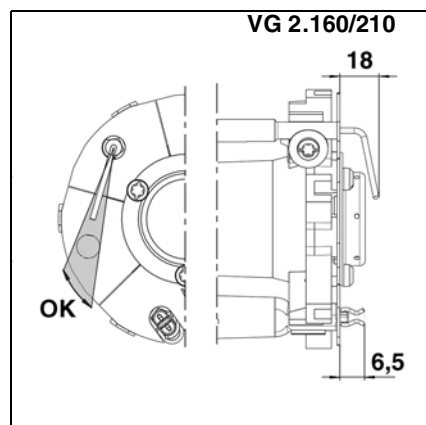
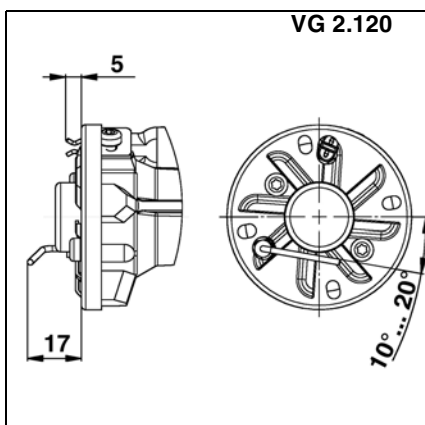


Setting to liquid gas operation Burner VG 2.160/210

- Remove stabilising gas stop **3** and baffle plate **4**.
- Fit adaptor **5** (supplied with the housing).
- Refit baffle plate **4** and stabilising gas stop **3**.

Setting to liquid gas operation Burner VG 2.120

- Remove stabilising gas stop **3** and baffle plate **4**.
- Fit adaptor **5** (supplied with the housing).
- Refit baffle plate **4** without stabilising gas stop 3.



Checking the mixing unit

- Check the adjustment of the ionisation sensor and the ignition electrode in accordance with the illustrations.

Assembly

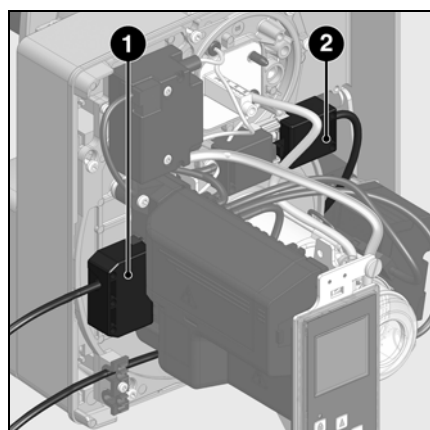
Gas connection Electrical connection Checks before commissioning

General regulations applying to the gas connection

- The gas train must only be connected to the gas mains by a recognised specialist.
- The cross-section of the gas line should be of a size designed to guarantee that the gas flow pressure does not drop below the specified level.
- A manual shut-off valve (not supplied) must be fitted upstream of the gas train.
- In Germany, a thermally triggered shut-off valve (to be installed by the customer side) must be fitted as

specified by the draft combustion ordinance.

It is the responsibility of the fitter or his representative to obtain approval for the system at the same time as the burner is commissioned. Only the fitter or his representative can guarantee that the system meets applicable standards and regulations. The fitter should be in possession of the corresponding official permit, and should carry out the corresponding sealing tests and purge the system of air.



Electrical installation and connection work must only be carried out by a suitably qualified electrician. All applicable regulations and directives must be observed.



The applicable guidelines and directives must be observed, as well as the electrical circuit diagram supplied with the burner!

Electrical connection

- Check to ensure that the power supply is as specified (230V, 50 Hz single phase with neutral and earth)
- Boiler fuse: 10 A

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**). The diameter of the cables connected to these connectors must be between 8.3 and 11 mm.

Connecting the gas train

Connect the gas train to the plugs on the burner (black to black, grey to grey).

Checks before commissioning

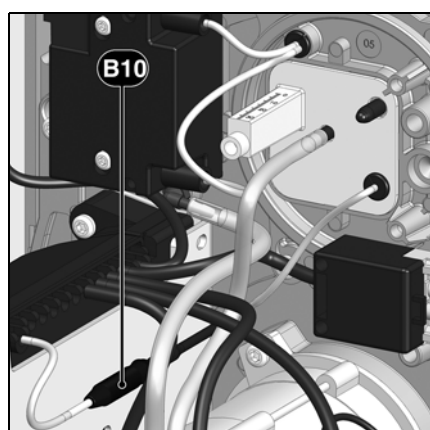
The following must be checked before initial commissioning:

- 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 correct.
- The heat generator and heating

system 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 heat request must be available.
- Sufficient gas pressure must be available.

- The fuel supply lines must be assembled correctly, checked for leaks and bled.
- A standard-compliant measuring point must be available, the exhaust gas duct up to the measuring point must be free of leaks to prevent anomalies in the measurement results.



Ionisation current measurement

To measure the ionisation current, disconnect connector B10 and connect a multimeter with a measuring range of 0-100 μ A.

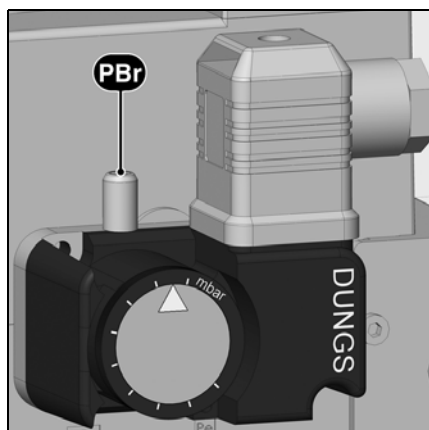
The 2nd stage ionisation current must be at least 7 μ A. It is also possible to read the ionisation current on the display.

Commissioning

Adjustment data

	Burner power		Dimension Y (m m)	Air flap setting			2 ^d stage valve opening
	1 st stage	2 nd stage		Ignit.	1 st stage	2 nd stage	
V G 2.120 D	50	80	15	12	12	30	20
	55	110	20	17	17	80	30
	60	120	20	20	20	90	30
V G 2.160 D	60	110	5	15	15	40	25
	70	140	10	18	18	50	30
	90	160	35	20	20	60	40
V G 2.210 D	80	150	10	20	20	52	35
	90	170	25	22	22	70	45
	90	180	35	25	25	82	45
	110	210	35	25	25	90	45

The adjustment values above are **guide values** and facilitate commissioning. The factory settings are in bold set against a grey background. The final settings are essential in ensuring that the burner functions as well as possible.

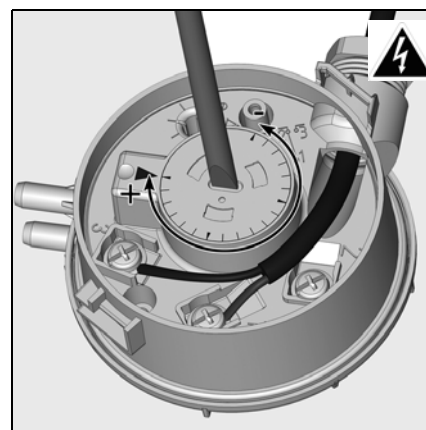


Setting the gas pressure switch

- Remove the transparent cover.
- Provisionally set to 15mbar.

Setting the air pressure switch

- Remove the transparent cover.
- Provisionally set to 1 mbar.

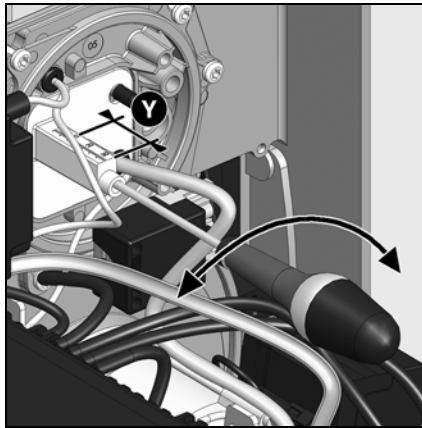


Air regulation

Air regulation

Combustion air is regulated at two points:

- on the pressure side, using the gap between the baffle plate and the burner tube.
- on the vacuum side, by the air flap driven by servomotor **Y10**.

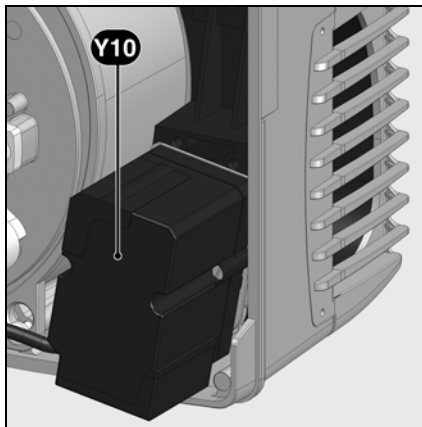


The regulation of air in the burner head affects not only the air flow but also the mixing zone and the air pressure in the burner tube. Turning screw **A**

- right: more air
- left: less air

- Adjust dimension **Y** in accordance with the settings table.

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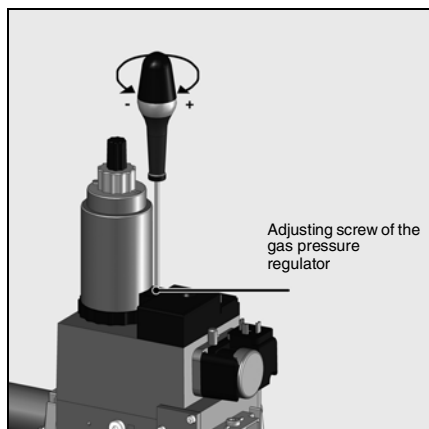


Air regulation by air flap

Air is regulated on the vacuum side by an air flap. This is driven by servomotor **Y10**.

Commissioning

Setting the MB-ZRDLE gas train



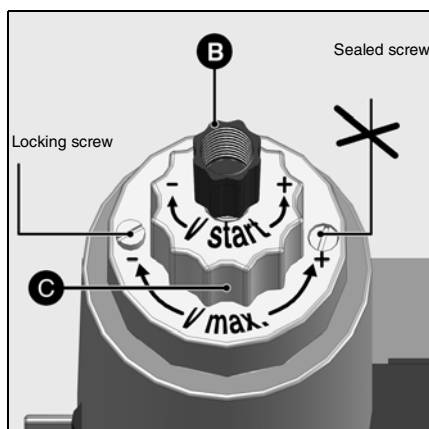
General adjustment procedure

The 2nd stage can only be adjusted via the pressure regulator. Set the 2nd stage valve (button **C**) to fully open. The incremental advance setting on ignition and on switching stages is performed using button **B**. The 1st stage setting is performed using ring **D**.

Adjusting the regulator:

The pressure in the regulator is measured at **pBr**.

The set pressure supplies the required flow rate.



Incremental advance setting on ignition

This hydraulic function affects the gas valve opening characteristics during ignition and when switching stages.

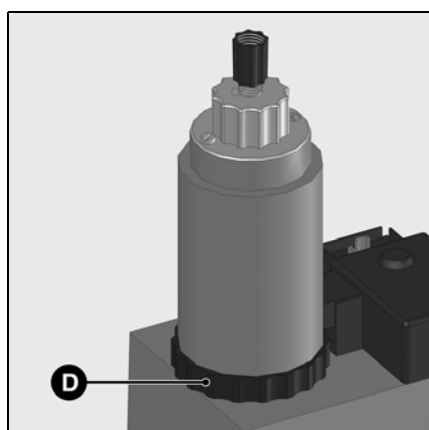
- Unscrew plastic cap **B**.
- Turn it around and use it as a key.
- Turn in the direction of:
 - arrow to -**: the incremental advance increases
 - arrow to +**: the incremental advance decreases

Setting the 2nd stage using the adjusting knob **C**.

This operation is only required when the burner power is too high with a pressure of 5 mbar between the valves, or when the burner is tending to pulse.

Proceed as follows:

- Unscrew the locking screw without touching the painted screw on the other side. The cap **C** is turned 4.5 times.
- Rotate clockwise **arrow to -**: the flow is reduced, and vice-versa. The pressure may need to be corrected.



Adjusting the flow of the 1st stage

By hand (not tool).

- Reduce gas throughput by turning ring **D** clockwise (located on the lower section of the solenoid coil). Turn anti-clockwise to increase gas throughput. (there is a difference of 3 whole turns between the minimum and the maximum).

Note

Adjusting the gas throughput for the 2nd stage may also alter the throughput for the 1st stage. If this is the case, the 1st stage must be readjusted.

- Afterwards, retighten the locking screw.

Pre-setting without flame

Setting is carried out in 2 phases:

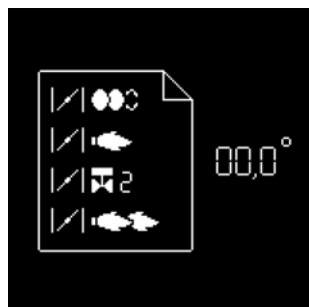
- pre-adjustment without flame
- setting the flame, to fine tune the settings based on the combustion results

When the burner is switched on, the control unit displays the screen below.

Important

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

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- For the next step, press any button.



The overall view of the menus is displayed, and the air flap positions settings menu is selected.

- Open the settings menu by pressing the button

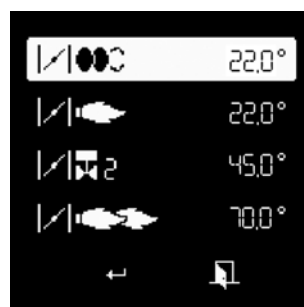


You must now enter the access code (see the label on the back of the display)

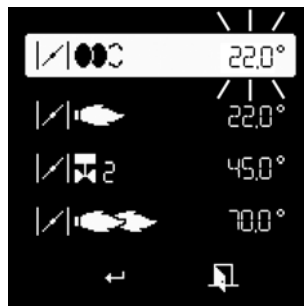
- Increase or decrease the value in increments by repeatedly pressing or .
- When the first figure has been set, move the cursor to the right by pressing .
- Repeat the operation until you reach the last figure.
- Confirm the access code by pressing

The control unit then opens the settings mode. The screen displays the factory pre-settings for the different positions of the air flap (here for example: for a VG2.210 D).

The following positions for the air flap are presented:



- ignition position (when the menu is opened, the cursor goes to this position)
- position of the air flap during the 1st stage
- position of the air flap when the 2nd stage fuel oil valve is opened
- position of the air flap during the 2nd stage



Modifying a settings value for the servomotor position:

- To modify the value of a position, move the cursor to the corresponding location with the button or .
- Select the value to be modified using the button , 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 button or , the value will scroll quickly up or down.
- Confirm the new value using the button . The value stops flashing.

N.B.:

It is possible to set different positions within a large range of values. However, for safety reasons, the control unit enforces a minimum interval of 2° between the different positions (except between the ignition position and the 1st stage).

Commissioning

Pre-setting without flame General advice before starting the burner

End of settings menu without flame

When all the positions of the servomotor have been determined according to the required settings, 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 confirm by pressing the button .

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



Optimising combustion values

Optimum combustion values can be achieved by adjusting the position of the baffle plate (dimension Y) if necessary. Doing this can have an effect on starting characteristics, pulsation and combustion values. Any reduction in dimension Y increases the CO₂ value. However, starting characteristics become harsher. Compensate for the change in airflow if necessary by adjusting the air flap position.

Precautions: To avoid condensation, observe the minimum required flue gas temperature specified by the boiler manufacturer and comply with the requirements for flue gas ducts.



Risk of deflagration
Continuously check CO, CO₂ and soot emissions when adjusting. Optimise combustion values if CO is present. The CO level must not exceed 50 ppm.

Function check

Flame monitoring must be checked for safety as part of initial commissioning and also after servicing or if the system has been out of operation for any significant period of time.

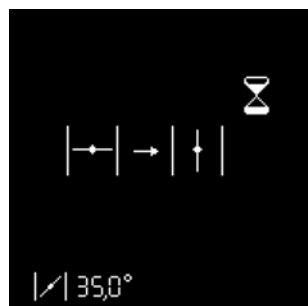
- Starting attempt with gas valve closed: once the safety time has elapsed, the control and safety unit should indicate a lack of gas or switch to malfunction mode.
- Starting with the air pressure switch closed: after an 8-second test period, the burner switches to malfunction mode.
- Starting attempt with air pressure switch open: after a 60-second waiting period, the control and safety unit locks.
- Starting attempt with brief opening of the air pressure switch during pre-ventilation: the control and safety unit restarts the pre-ventilation programme (air pressure detected again within 60 seconds) ; otherwise a lockout occurs.

Commissioning

Setting the flame



- **If the boiler heating request is not present**, the boiler remains on standby.
In this case, it is still possible to return to the previous setting menu "Pre-setting without flame". To do this, position the cursor on the symbol and confirm with the button .

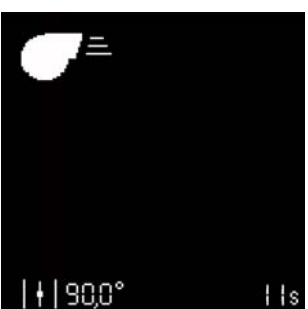


- **If a boiler heating request is present** (T1-T2 contact closed), the burner starts.

The air flap is opened to move to the pre-ventilation position.



Air pressure switch test



Pre-ventilation

The air flap switches to the ignition/pre-ignition position.



The fuel valve opens.
Awaiting flame signal



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



Flame detected
Flame stabilisation



The control unit awaits the regulation authorisation.



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Setting the flame



Setting the 1st stage

If the flame has been detected, the control unit sets the burner to the 1st stage as soon as it receives the regulation authorisation.

- Adjust the gas pressure for the 1st stage depending on the required output, using the regulator on the gas valve. Monitor the combustion values continuously as you do so (CO, CO₂, soot test). If necessary, adjust the dimension **Y** and/or adapt the airflow.
- To do this, modify the position of the servomotor in 1st stage. Proceed as described on page 17, in the paragraph **"Modifying the value of a servomotor position setting"**
- Precautions: when modifying the setting value, the servomotor will move in real time. As a consequence, the combustion values must be constantly checked.



Specific function: ignition checking

If the ignition position has been modified, it is possible to carry out a new burner start-up to check the new ignition position, without having to quit the settings menu.

To do this, after modifying the ignition position, position the cursor on the symbol , and initiate the new start-up using the button .



Setting the opening position of the 2nd stage gas valve

After the 1st stage is set, it is possible to set the opening value for the 2nd stage gas valve.

Proceed as described in the paragraph **"Modifying the value of a servomotor position setting"**

- Precautions: in this case the servomotor does not move immediately, but first remains in the 1st stage position (the actual position of the servomotor is always displayed in the lower part of the display). The 2nd stage valve also remains closed.



Setting the 2nd stage

To set the position of the air flap in the 2nd stage, position the cursor on the corresponding line on the display using the button .

- To make the burner actually switch to the 2nd stage, press the button  again. The servomotor will then move the air flap to the set position. At the same time, the 2nd stage gas valve will open, as soon as the opening position set for the servomotor is passed.
- Adjust the gas pressure for the 2nd stage depending on the required output, using the regulator on the gas valve. Monitor the combustion values continuously as you do so (CO, CO₂, soot test). If necessary, adjust the dimension **Y** and/or adapt the airflow. To do this, modify the position of the servomotor in the 2nd stage. Proceed as described on page 17, in the paragraph **"Modifying the value of a servomotor position setting"**
- Precautions: when modifying the setting value, the servomotor will move in real time. As a consequence, the combustion values must be constantly checked.

Specific function: position the opening and closing of the 2nd stage gas valve differently

The control unit has the possibility of setting the opening of the 2nd stage valve, when the 1st stage changes to the 2nd stage, at a different position to that for closing when the 2nd stage drops to the 1st stage.

- To do this, position the cursor on the symbol  and confirm with the button . The selected symbol will change like this one .
- Using the button , position the cursor on the setting value of the 2nd stage gas valve. It is possible to adjust to different values resp. during 1st stage operation the opening position, and during 2nd stage operation the closing position.



Commissioning

Setting the flame Operating mode



Closing the "Setting the 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 button or .

Otherwise, at all times, the following possible ways of closing the "Setting the flame" menu are available:

- Either restart the burner setting procedure, passing through the presetting phase (without entering a password). To do this, position the cursor on the symbol and confirm with the button . All the settings values already saved therefore remain available. This is essential for testing a new ignition position.
- Saving the fixed values and ending the setting procedure. To do this, position the cursor on the symbol and confirm with the button . The burner is then ready to operate and can now be controlled by the boiler regulation.
- Quitting the settings menu without reaching the end of the setting procedure. To do this, position the cursor on the symbol and confirm with the button . All the servomotor positions saved up to this point are recovered by calling up the settings menu again.



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 cursor.

The lower cell shows the intensity of the signal. The display range is from 0 µA to 7 µA. For the 2nd stage, a good quality signal is one above 7µA.

The following limit values are valid:

- When checking an unwanted flame: the signal must be < 0.7µA
- During the safety time: the signal must be > 1.0µA
- During operation: the signal must be > 8µA

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

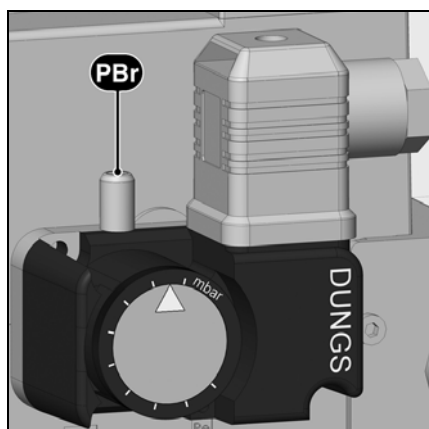
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Commissioning

Setting the gas pressure switch

Setting the air pressure switch

Saving the adjustment values in the display



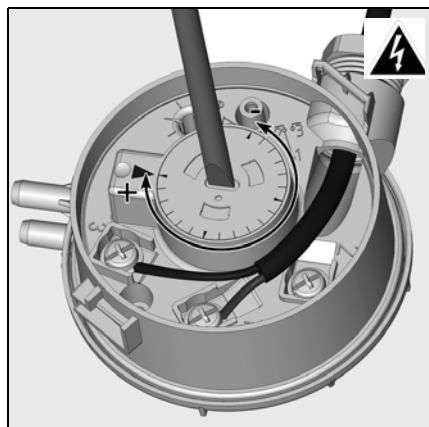
Setting the gas pressure switch

- To set the switch-off pressure: remove the cover from the gas pressure switch.
- Install a gas pressure **pBr** measuring instrument.
- Start the burner. Switch to 2nd stage.
- Reduce the pressure upstream of the gas train by gradually closing the manual valve, until
 - the gas pressure **pBr** downstream of the train drops
 - the flame becomes less stable
 - the CO level increases
 - or the flame signal deteriorates considerably

- Turn the dial clockwise until the gas pressure switch shuts down the burner.
- Continue turning the dial clockwise to set the gas pressure switch to 10% above the shutdown value determined above.

Checking the switch-off pressure

- Open the manual shut-off valve
 - Start the burner
 - Close the manual shut-off valve
- The gas failure procedure should start without the control unit locking.



Setting the air pressure switch

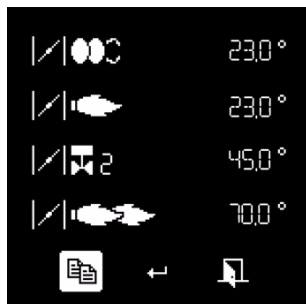
- Install a pressure measuring device. To do this, install a T union in the air tube.
- Start the burner running in the 1st stage.
- Set the switch-off point to approximately 15% below the switch-off pressure read.



Saving the adjustment values in the display

If the burner setting procedure has been successfully completed, the servomotor positions for all the operating states will be fixed in the control unit. It is possible to store a backup copy of the values in the display.

To do this, press the button , the screen opposite is displayed. Using the button  select the menu "Save adjustment values" and confirm with the button .



The screen opposite appears. Place the cursor on the symbol , press the button  to begin loading the adjustment values from the control unit to the display.



At this point, it is possible to:

- store the values in the display; to do this place the cursor on the symbol  and confirm with button .
- quit the menu without storing the data, with the symbol .

Maintenance

Burner and boiler servicing must only be carried out by a professionally 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.

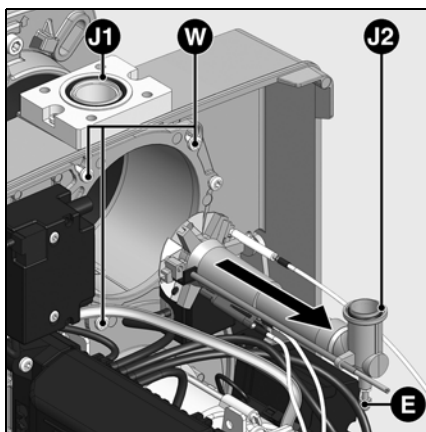
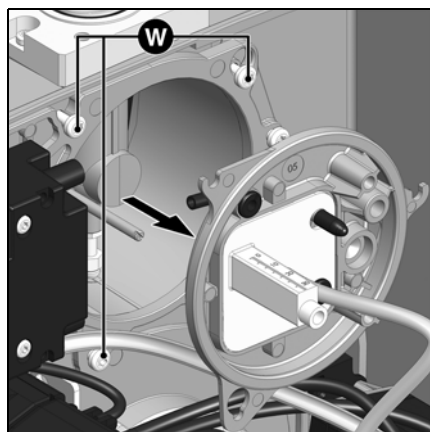
Work recommended as part of annual burner maintenance:

- Burner test run, input measurement in the boiler room
- Clean the combustion components and replace defective parts if necessary
- Clean the fan wheel and the blower
- Clean the gas filter; replace it if necessary
- Visual inspection of the burner's electrical components; eliminate malfunctions if necessary
- Check burner start characteristics
- Leakage test
- Burner safety devices function check (air pressure/gas pressure switches)

- Flame monitor and automatic combustion control unit function check
- Commissioning the burner
- Check the gas flow
- Correct the adjustment values if necessary
- Draw up a measurement report

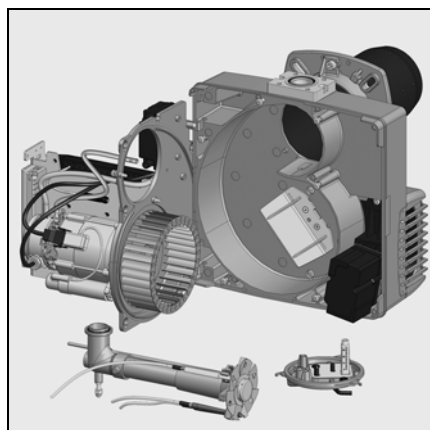
General checks

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



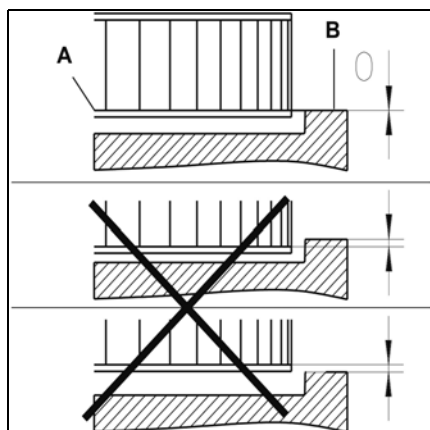
Checking the mixing unit

- Remove the burner hood.
- Disconnect the ignition cable on the transformer side.
- Loosen the three cover screws **W**.
- Remove the cover.
- Loosen lock nut **E** on the gas pipe bracket
- Loosen the retaining bolt.
- Remove the mixing unit.
- Check the condition of the baffle plate.
- Check the position of the ignition electrode and the ionisation sensor.
- When refitting, make sure that the cable is routed correctly and that O-ring **J2** is correctly seated.
- Check for leaks.



Cleaning the fan wheel

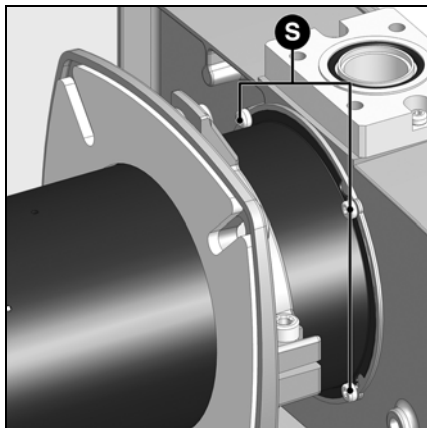
- Remove the equipment plate and attach it in the service position (see illustration).
- Remove and clean the fan wheel and replace it if necessary. Reassemble in the reverse order.



Fitting the fan wheel

When changing the motor or the fan wheel, refer to the positioning diagram opposite. The internal flange **A** of the fan wheel must be aligned with plate **B**. Insert a ruler between the vanes of the fan wheel and bring **A** and **B** to the same height. Tighten the cone-point screw on the fan wheel.

Maintenance



Replacing the flame tube

It is necessary to remove the burner for this work.

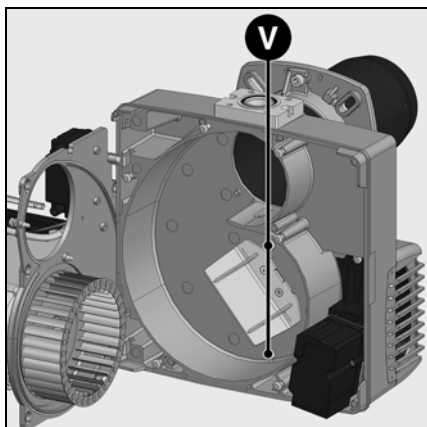
- Loosen the clamping screw on the connecting flange.
- Turn the burner out of the bayonet socket, lift it slightly and pull it out of the connecting flange.
- Place the burner on the floor.
- Loosen the 4 screws **S** on flame tube.
- Pull the flame tube out towards you.
- Fit and secure the flame tube.



The flame tube may be very hot

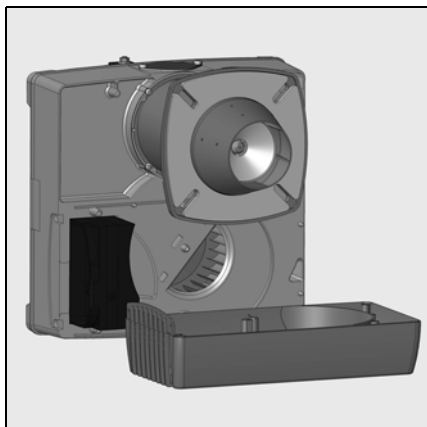
Filter replacement

- The filter element of the multiblock must be checked at least once a year and replaced if clogged.
- Loosen the screws of the filter cap on the multiblock.
- Remove the filter element and clean its housing.
- Do not use any pressurised cleaning products.
- Replace the filter element with a new element.
- Screw the cover back into place.
- Reopen the manual shut-off valve.
- Check it is airtight.
- Check the combustion values.



Cleaning the air intake box

- Unscrew securing screws **V** on the air intake box.
- Remove and clean the air intake box. Reassemble in the reverse order.
- Note the correct position of the air flap and the servomotor.



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.



Precautions

After any operation: check the combustion performance under real operating conditions (doors shut, 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.

Troubleshooting

Malfunction diagnosis and repair

In the event of a malfunction, first check that the prerequisites for correct operation are fulfilled:

1. Is there any current?
2. Is there gas pressure?
3. Is the gas shut-off valve open?
4. Are all control and safety devices, such as the boiler thermostat, low water detector, limit switches, etc. correctly set?

If the fault is still present, check that each of the burner components is operating.

Important safety components must not be repaired; these components must be replaced by parts with the same part number.



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

After any work on the system:

- Under normal operating conditions (doors closed, cover fitted, etc.), check combustion and check the individual lines for leaks.
- Record the results in the relevant documents.



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Symbol	Observation	Cause	Corrective action
	Burner does not start after thermostatic closure. No malfunction indicated on the control and safety unit.	Drop in supply voltage or power failure. Control unit malfunction.	Check the cause of the drop in voltage or the power failure. Replace the control unit.
	No heat requested.	Thermostats defective or incorrectly adjusted	Adjust the thermostats, replace if necessary.
	The burner starts briefly when switched on, then switches off and the red indicator light comes on.	The control unit has intentionally been manually locked.	Unlock the unit.
	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. Gas pressure normal	Insufficient gas pressure. Gas pressure switch wrongly set or defective	Check the gas lines. Clean the filter. Check the gas pressure switch or replace the compact gas unit.

Troubleshooting

Symbol	Observation	Cause	Corrective action
	Burner blower starts up. Burner does not start.	Air pressure switch: Contact does not close.	Readjust the pressure switch. Check the wiring. Replace the pressure switch.
	Burner blower starts up. Burner does not start.	Flaring during pre-ventilation or pre-ignition.	Check the valve. Check flame monitoring.
	The burner starts, the ignition switches on, then failure	No flame at the end of the safety time. Gas throughput set incorrectly. Malfunction in flame monitoring system Incorrect polarisation (live/neutral position) of the power supply on the 7P connector/socket No ignition sparks. Electrode(s) short-circuited. Ignition cable(s) damaged or defective. Igniter defective. Control and safety unit Solenoid valves do not open. Valves jamming.	Adjust the gas flow stage Check the condition and position of the ionisation probe in relation to earth. Check the condition and connections of the ionisation circuit (cables and measurement bridge). Check that the polarisation of the 7P connector is correct. Adjust, clean or replace the electrodes. Connect or replace the cable(s). Replace the igniter. Replace the control unit. Check the cabling between the control unit and external components. Replace the compact gas unit. Replace the valves.
	The burner switches off during operation.	Air pressure switch: contact opens during start-up or during operation. Flame failure during operation.	Adjust or replace the pressure switch. Check the ionisation probe circuit Check or replace the control and safety unit.
	Servomotor fault	Clogging of the air flap Locking of the air flap Internal fault with the servomotor	Replace the servomotor

Fault diagnosis menu Operating statistics menu



Fault diagnosis menu

To access the fault diagnosis menu, press any button when the burner is ready to operate, when the burner is in operation, or when it is 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 buttons , , , or , place the cursor on the fault diagnosis menu symbol, and confirm using the button .

The details of the last fault to appear are indicated by the flashing symbol. The flame intensity, network voltage, air flap position, 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 buttons and , 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).

- Quit the menu using the button .

Entering a telephone number for the maintenance company and the maintenance contract number

When the corresponding symbol appears on the display:

- Keep the button held down until the first figure starts to flash (a short press will exit the menu).
- Using the buttons or , change the figure to the value required (underscore = empty field)
- Using the button , move on to the next figure.
- When the number is complete, save using the button .

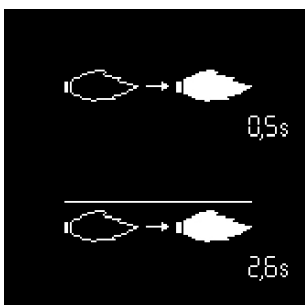


Operating statistics menu

To access the operating statistics menu, press any button, when the burner is ready to operate, when the burner is in operation, or when it is in malfunction mode. It is impossible to access the operating statistics diagnosis menu during the start-up phase.

The general menu screen will appear. Using the buttons , , , or , place the cursor on the operating statistics menu symbol, and confirm using the button .

The operating statistics menu comprises 7 screens. Navigation between the different screens is done using the buttons and .



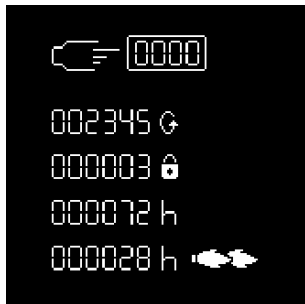
- Flame detection time for last start-up

- Average flame detection time for the latest 5 start-ups

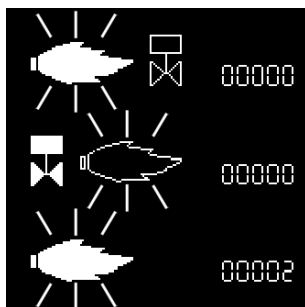


- Total number of burner start-ups
- Total number of faults
- Total number of operating hours
- Total number of operating hours in 2nd stage

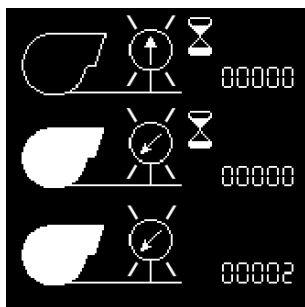
Operating statistics menu



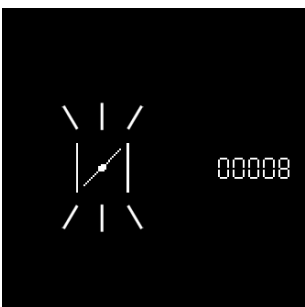
- Total number of burner start-ups since the last meter reset
- Total number of faults since the last meter reset
- Total operating time since the last meter reset
- Total operating time in 2nd stage since the last meter reset



- Number of "unwanted flame" faults
- Number of "No flame after safety time" faults
- Number of "Flame loss 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 "servomotor" faults

- Quit the menu using the button .

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	ELCO Burners B.V. Amsterdamsestraatweg 27 1411 AW Naarden	035-6957350
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