CR00264 178 086 72-3 2021-06-10

Installation- and maintenance instruction

BG 300 M J/K IP40

BP230UVFR-S2

MB-VEF 407

Translation of the original instructions.

Bentone®

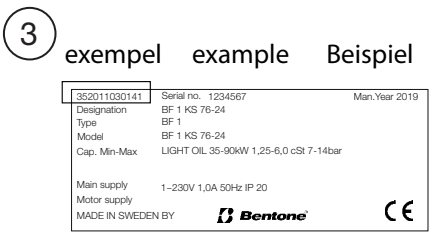

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Table of contents

1. General Information

This Installation and Maintenance manual:

- is to be regarded as part of the burner and must always be kept near the installation site.
- is intended for use by authorised personnel.
- must be read prior to installation.
- must be observed by all who work with the burner and associated system components.
- work with the burner may only be carried out by certified installers/ personnel.

Enertech AB is not liable for any typographical errors and reserves the right to make design changes without prior notice.

Safety instructions

- The burner may only be used for its intended purpose in accordance with the product's technical data.
- The burner may only be installed and operated by authorised personnel.
- The product is packaged to prevent damage from occurring during handling. Handle the product with care. Lifting equipment must be used to lift larger packages.
- The products must be transported/stored on a level surface in a dry environment, max. 80% relative humidity, no condensation. Temperature -20 to +60 °C.
- Check that the burner is compatible with the boiler's output range.
- All components must be installed without being bent, twisted or subjected to mechanical or thermal forces which can affect the components.
- The burner must be installed so that it complies with local regulations for fire safety, electrical safety, and fuel distribution.
- The gas outlet from the pressure regulator shall be configured in accordance with applicable regulations and lead to a safe area.
- Make sure when installing the equipment that there is enough space to service the burner.
- Permitted temperature during operation -10 to +60 °C. Max 80% relative humidity, no condensation.
- The installer must ensure that the room has adequate air supply.
- The room must comply with local regulations pertaining to its intended use.
- The installation site must be free of chemicals.
- Burner pipes, fan wheels and air dampers may contain sharp edges.
- The surface temperature of the burner's components can exceed 60 °C.
- Caution: The burner has moving parts, and there is risk of crushing injuries.

- The electrical installation must be professionally carried out in accordance with applicable high voltage regulations, as per Enertech's recommendations.
- Before servicing, shut off the fuel supply and turn off the power to the burner.
- Seal inspections must be performed during installation and servicing to prevent gas leakage.
- Care should be taken by the installer to ensure that no electrical cables or fuel lines are crushed or otherwise damaged during installation or servicing.
- If the boiler is equipped with an access hatch, this must be equipped with a hatch opening switch connected to the burner's safety system.
- When in operation, the burner's noise level can exceed 85 dBA. Use hearing protection.
- The burner must not be put into operation without proper safety and protection devices.
- A Class BE fire extinguisher is recommended.
- It is forbidden to alter thedesign or use accessories which have not been approved by Enertech in writing.
- Prior to operation, the following points must be checked:
- fitting and installation work has been completed and approved
- electrical installation has been correctly performed
- flue gas ducts and combustion air ducts are not blocked
- all actuators and control and safety devices are in working order and correctly set

Actions to take if you smell gas

Turn off the equipment and the boiler. Open windows and doors. Prevent open flames or sparking, e.g. do not turn lights on or off, do not use any electrical appliances, do not use mobile phones. Open windows and doors. Close the gas ball valve. Warn residents; do not use doorbells. Evacuate the building. Notify the installer or gas supplier once the building has been evacuated.

Burner servicing schedule

Servicing must be carried out once a year or after 3 000 hours of operation.

Burner	1 year	3 000 hrs
Inspection of electrical installation	1 year	3 000 hrs
Leakage check	1 year	3 000 hrs
Filter	1 year replacement at Δp>10 mbar	3 000 hrs replacement at Δp>10 mbar
Electrodes	Replacement/Cleaning 1 year	Replacement/Cleaning 3 000 hrs
Brake disc	Replacement/Cleaning 1 year	Replacement/Cleaning 3 000 hrs
Motor	1 year	3 000 hrs
Fan wheel	1 Year Replacement when cleaning needed/imbalance	3 000 hrs Replacement when cleaning needed/imbalance

Component replacement intervals

Control system	10 years	250 000 starts
Valve control system	10 years	250 000 starts
Pressure switch	10 years	250 000 starts
Ignition system with flame guard	10 years	250 000 starts
UV flame sensor	10 000 hrs	N/A
Gas pressure regulators	15 years	N/A
Gas valve without seal testing	10 years	250 000 starts
Gas valve with seal testing	Replacement upon fault detection	N/A
Gas pressure switch	10 years	250 000 starts
Safety blow-off system	10 years	N/A
Damper motor	N/A	500 000 starts
Contactor	10 years	500 000 starts

The burner and its components must be recycled according to applicable regulations.

Delivery check

- Make sure everything is delivered and the goods have not been damaged during transit.
- If something is wrong with a delivery, report it to the supplier.
- Transport damage must be reported to the shipping company.

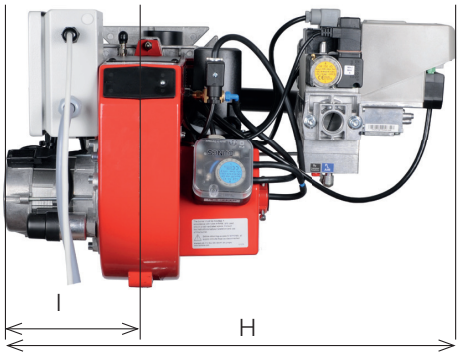
2. Technical data

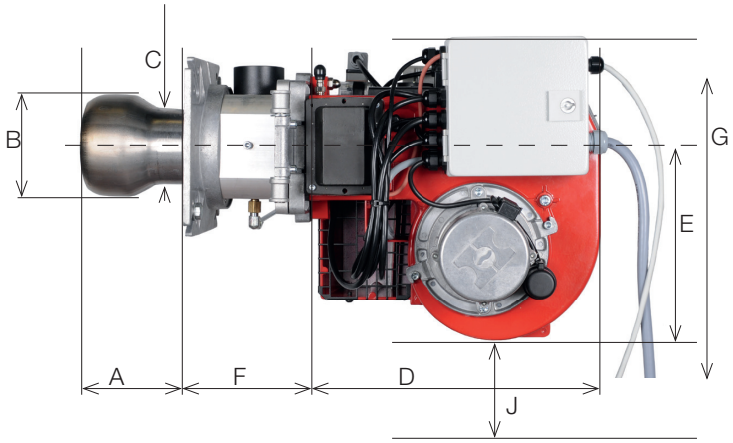
The burner is intended for use with:

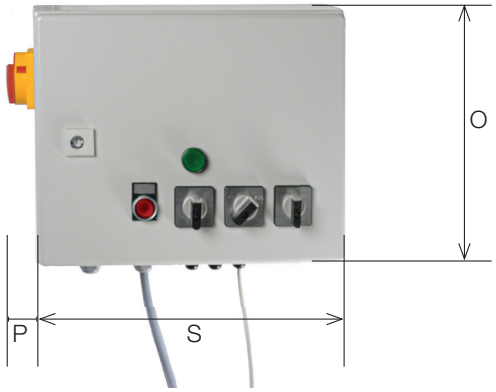
- Hot water boilers
- Steam boilers
- Industrial applications

2.1 Dimensions BG 300 M J/K IP40

- Gas connection ¾-2"







Type		Burner tube length	Flange measurement A	Burner tube measurement B	Burner pipe measurement C
BG 300	Standard 1	145	128	ø120	ø110
	Standard 2	245	228	ø120	ø110

	D	E	F	G	H	I	J	O	P	S
BG 300	330	225	130	*340	585	175	**200	300	35	380

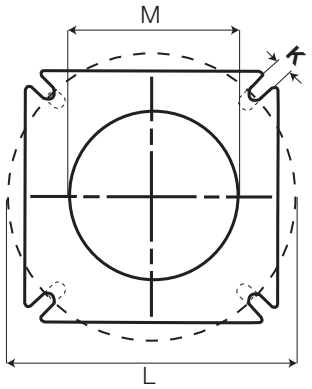
*The above measurements are maximum measurements. The measurements may vary depending on which components are used.

**Minimum recommended measurements to the floor.

2.1.1 Measurements for connection to the boiler

	K	L	M
BG 300	10	ø175-240	ø125 (***115)

***Measurements when installing burner tubes from inside the boiler.



2.2 Capacity range

Capacity kW	Gas quantity at min. power Nm³/h ¹)	Gas quantity at max. power Nm³/h ¹)	Max. connection pressure mbar	Min connection pressure mbar
BG 300				
G20 50-200	5.2	21	360	See data plate
G25 50-170	6,1	20,7	360	
G30 65-200	2,0	6,1	360	
G31 50-200	2,0	8,1	360	

¹) Lower heat value Hu at normal state 15°C and 1013.25 mbar EN676				
Grade of gas		kWh/Nm³	MJ/Nm³	kcal/Nm³
Natural gas	G20	9.5	34.02	8126
Natural gas	G25	8.2	29.25	6986
Butane	G30	32.5	116.09	27728
Propane	G31	24.6	88.00	21019

Gas quantity and capacity vary according to grade of gas and connection pressure.

2.3 Gas categories approved gases

Only the use of dry gas is permitted.

Category	Country of destination	Supply pressure
II_{2R3R}	AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE IS, IT, LT, LU, LV, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, TR	20 mbar
$II_{2H3B/P}$	AT, CH, CY, DK, FI, LT, RO, SE, SK	20 mbar
II_{2H3P}	GB, IE	20 mbar
$II_{2L3B/P}$	NL, RO	20 mbar
$II_{2E3B/P}$	PL	20 mbar
$I_{2E(R)B}$	BE	20 mbar
I_{3P}	BE	20 mbar

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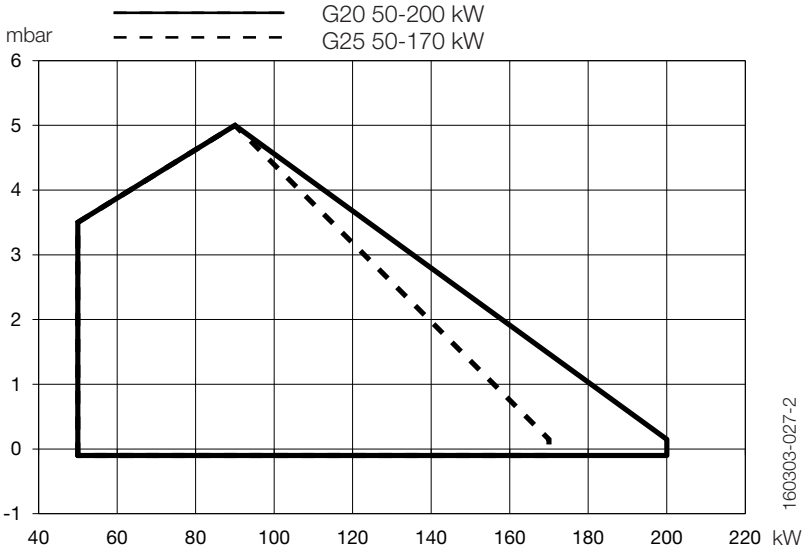
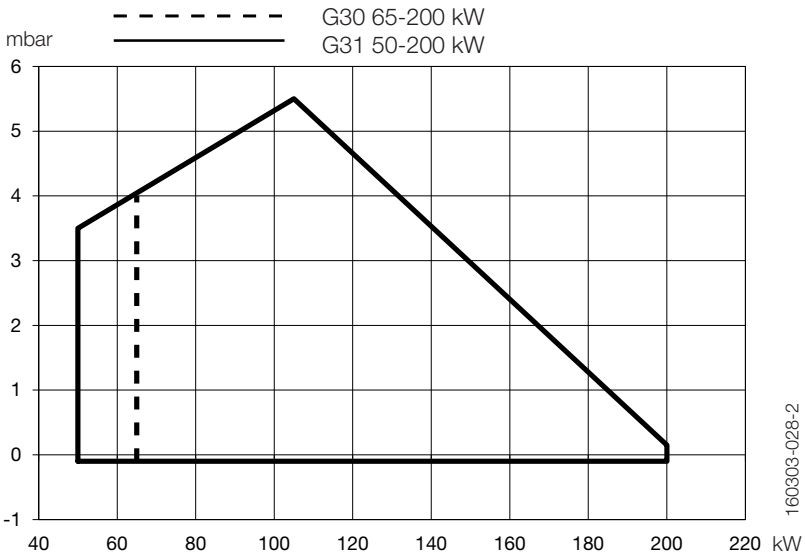
2.4 Working area





Do not exceed the working area

2.5 Electrical specification EN 60335-2-102

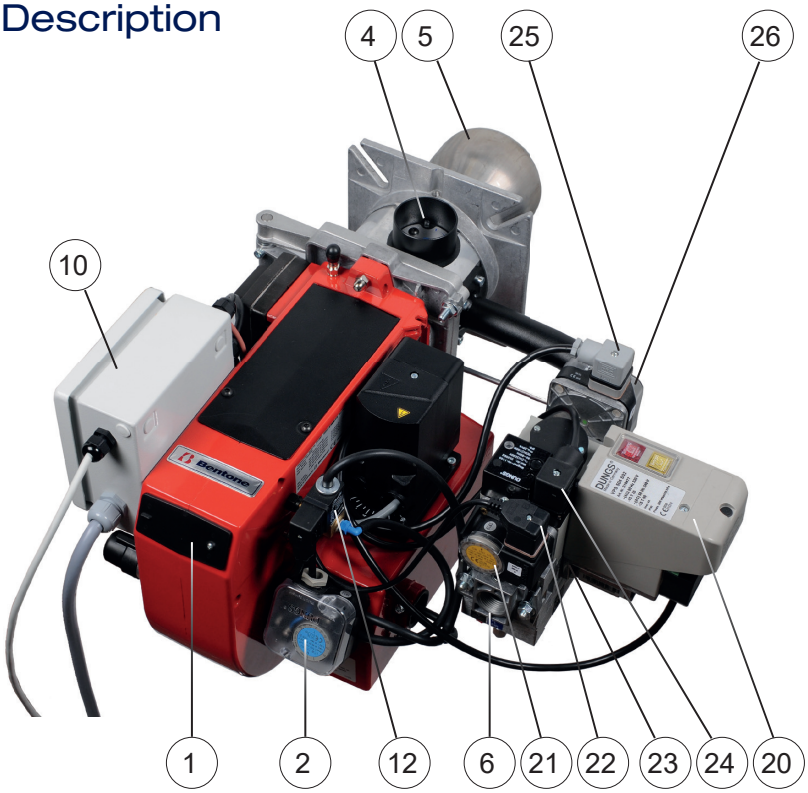
Type	BG 300
Motor	180W 230V 1.3A 50Hz
Recommended main fuse motor	C10A
Operating supply	230V 2.1A 50Hz
Sound	82 dBA ± 0.5 dBA

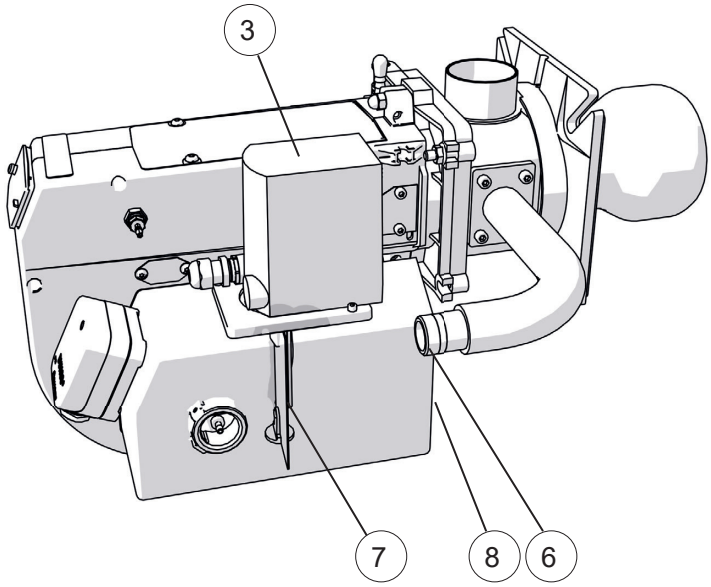
Measures according to EN 3746:2010

Option 1 The burner's noise level can be reduced by equipping a sound damper. Installation must not affect the air supply to the burner.

Option 2 The burner's noise level can be reduced by connecting the burner's air intake to an air duct with a suitable purge point. Installation must not affect the air supply to the burner.

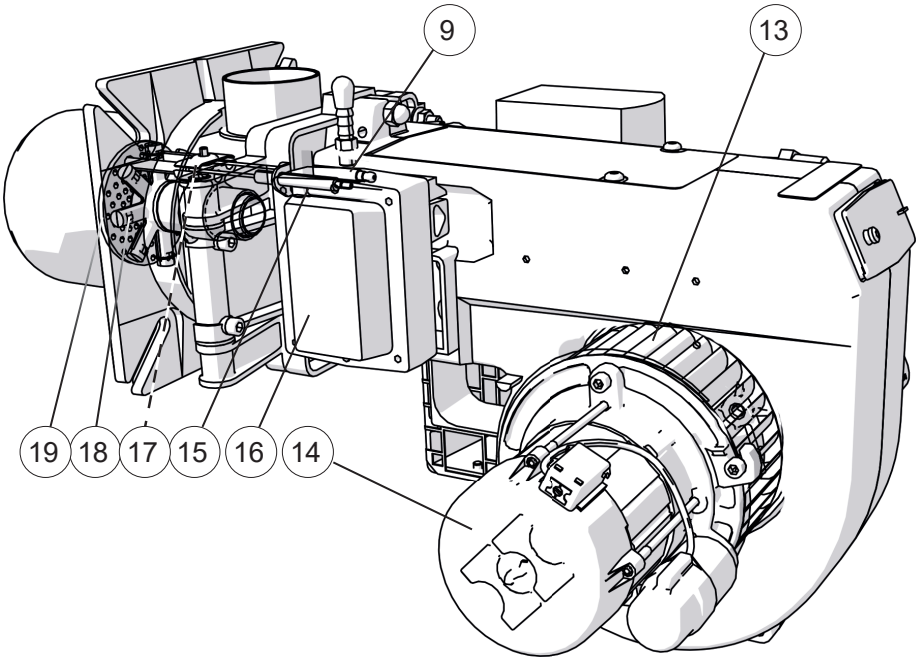
2.6 Description

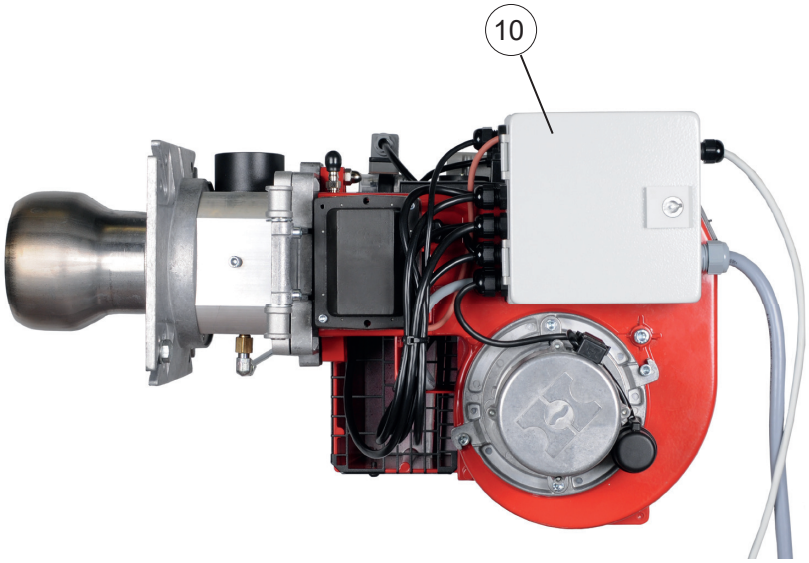


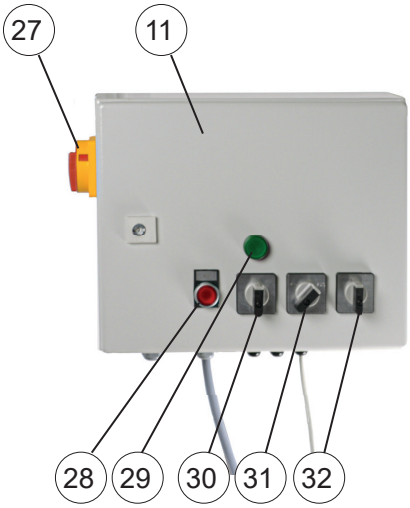


Components

1. Inspection cover
2. Air pressure monitor
3. Damper motor
4. Nozzle control
5. Flame cone
6. Connection gas fixture
7. Air damper
8. Air intake
9. Ignition electrode
10. Electrical panel 2
11. Electrical panel 1
12. Valve continuous fan (Option)
13. Fan wheel
14. Motor
15. Ionisation electrode
16. Transformer
17. Insert
18. Nozzle
19. Brake disc
20. VPS / Leakage control
21. Gas pressure switch, Min.
22. Gas pressure switch, Min. Electrical connection







23. MultiBloc
24. Solenoid, MultiBloc
25. Gas pressure switch, Max. Electrical connection
26. Gas pressure switch, Max.
27. Main switch
28. Indicator light triggered relay / reset relay
29. Indicator lamp operation
30. Operating switch
31. Automatic/Manual mode
32. Increase/decrease

3. General instructions

3.1 General instructions

The installation of the gas burner must be carried out in accordance with current regulations and standards. The installers of gas burners should therefore be acquainted with all regulations and ensure that the installation complies with the requirements. The installation, mounting and adjustment should be made with the greatest care and only the correct gas should be used.

3.2 Installation and maintenance instructions

The maintenance instructions supplied with the burner must be kept at an easily accessible location in the boiler room.

3.3 Instructions

The user should be thoroughly in-structed in the function of the gas burner and the whole installation. The supplier must instruct the user.

3.4 Inspection and maintenance

The unit must be serviced and maintained at the interval specified in the service schedule. If the burner is in a dirty environment, service should be done at more frequent intervals than specified.

3.5 Start up

After the burner has been fitted to the boiler and the electric connection, the leakage control, the venting and the electric function test have been carried out, the burner will be ready for start-up.

Howerer, study the sections dealing with adjustments of multi-bloc, combustion air and combustion head. Open the ball valve and switch on the main switch. If the burner starts the actual adjustment can be made.

3.6 Commissioning of installation

Control of the combustion. The combustion quality is checked by means of a flue gas analysis device. Adjust the burner to appr. 20% excess air in accordance with the table. Check the flue gas temperature. Calculate the efficiency. Check also the actual gas volume on the gas meter so that the correct input is achieved.

4. Installation

4.1 Delivery check

Check that all has been delivered and that the goods have not been damaged during transport. If that is not the case, please notify the delivery company. Transport damages should be reported to the forwarding agency.

4.2 Preparations for installation

Check that the measurements and capacity range of the burner are compatible with the boiler. The power ratings on the type plate refer to the min. and max. power of the burner.

4.3 Gas supply

For good operating safety, it is important that the gas supply system is installed correctly.
Consider the following:

1. Check that the burner is approved for the gas quality of the installation. If not, please contact the supplier.
2. Check that the gas components of the burner are approved for indicated gas pressure.
3. The gas supply system should be installed in accordance with current standards.
4. Pipe lines should be run so that service on boiler and burner is facilitated.
5. Pipe lines should be run so that eventual contaminants cannot come into contact with the gas components.
6. Gas discharge system must be installed prior to local regulations.

4.4 Electric connection

Before starting the electric installation, the main switch must be turned off. If the boiler has a 7-pole and a 4-pole Eurostecker connector, these usually fit directly to the burner. If not, use the connectors included, (see connection under Electric equipment).

4.5 Setting brake plate and air flow

Before the placing into service, the burner should be initially set according to diagram, (see Basic settings). Note that it is only a basic setting which should be adjusted once the burner has been started.

If an electric connection other than the one recommended by Enertech is used, a risk of damage and injury can arise.

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4.6 Mounting on the boiler

Remove the combustion unit from the burner. Fit the enclosed flange and gasket to the boiler. If new fixing holes must be drilled, use the fixing flange as a pattern.

Removal of valve unit from burner

Remove the plug-in contact from the multi-bloc. Loosen the union nut.

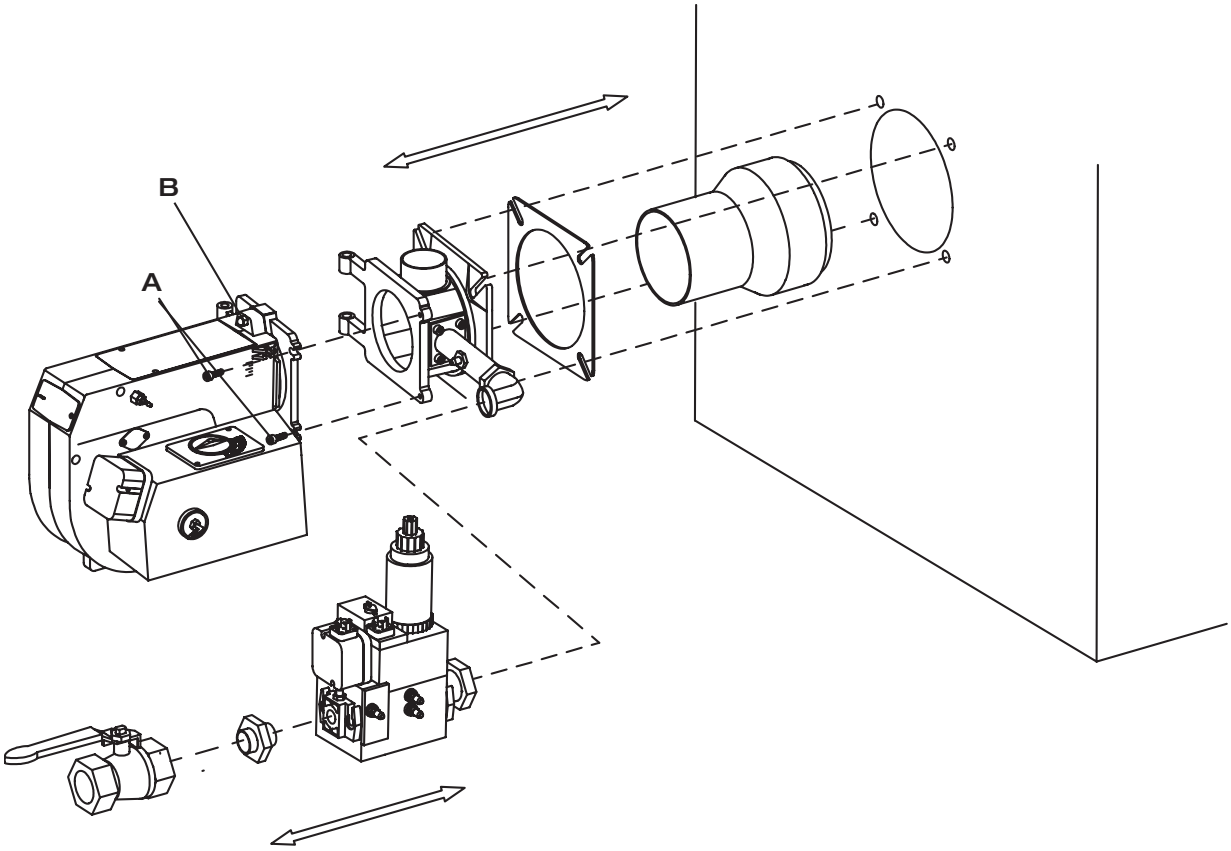
Removal of fan house unit from burner.

Remove the screws (A). Swing out the fan housing. Remove the ionisation and ignition wires from the electrodes. Remove the bolt (B) on the spectacle flange. Lift away the fan housing.

Installation example

Connect the gas to the burner by means of the ball valve. Ensure that the union nut, ball valve and tubing make it easy to remove the burner for inspection and service.

> **!** Check the gas tightness.



4.7 Inspection of gas nozzle before commissioning

General rules

Care should be taken by the installer to ensure that no electrical cables or fuel/gas pipes are trapped or damaged during installation or service/ maintenance.

> ! If the burner is directly connected, ensure that all components on the burner are without power.

Gas nozzle

Check that the ignition and ionisation electrodes are correctly set. In the figure (see the gas nozzle chapter), the dimensions are specified for adjustment of the ignition and ionisation electrodes.

Gas quality

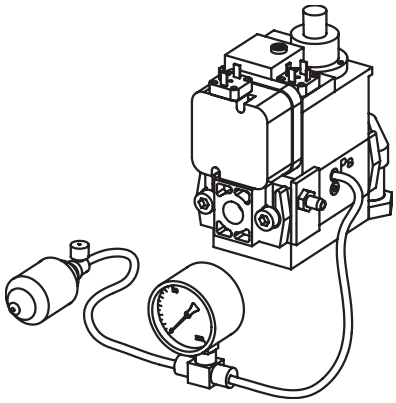
Ensure that the burner head is meant for the gas quality to be used (see capter gas nozzle).

De-aerating

De-aerating of the gas line is conducted, for example, by unscrewing the screw on the measuring nipple for the connection pressure. Connect a plastic hose and release the gas in a safe place. Once de-aerating is completed, be sure to refit the screw on the measuring nipple.

Leakage control

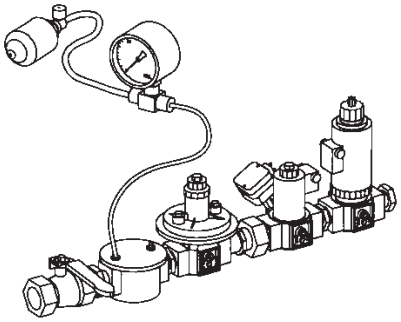
When making a leakage control of the gas supply system the solenoid valve should be closed. Connect a pressure gauge to the test nipple Pa, see fig. The test pressure in the system should be 1,5x max. inlet pressure or min. 150 mbar. If any leakage, locate the source by means of soapy water or a leak location spray. After tightening repeat the test.



Electric function test:

Ensure that phase and neutral are not reversed. The gas shut-off cock should be closed.To prevent the gas pressure switch from locking out it should be linked temporarily.

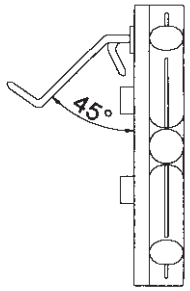
After the main switch has been switched on and the thermostats have been adjusted the pre-purging period begins (30-35sec.). At the end of this period the pre-ignition period starts (0,5-2,5 sec. dependent on the design of the gas control). The gas valve is energized and opens and flame is established. At the end of the safety time (2-3 sec.) the gas control locks out. The solenoid valve and the motor will be "dead". Remove the link from the gas pressure switch after the test is finished.



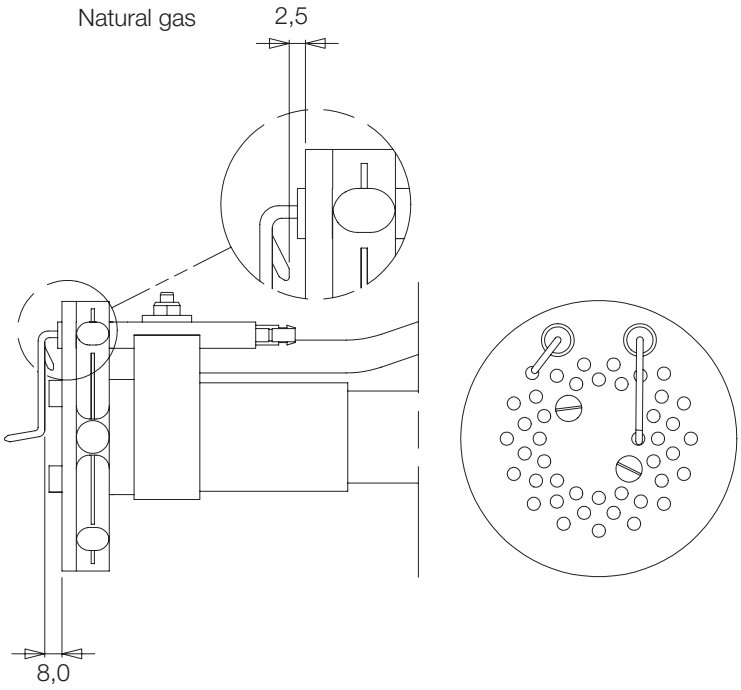
Note on 2-stage and modulating burners that during the pre-purging period the damper opens to the set value for air on stage 2 and just before the end of the pre-purging period it goes down to the air setting for stage 1. On some burners under 350kW the pre-purging mainly takes place with the air damper set for stage 1.

4.8 Gas nozzle

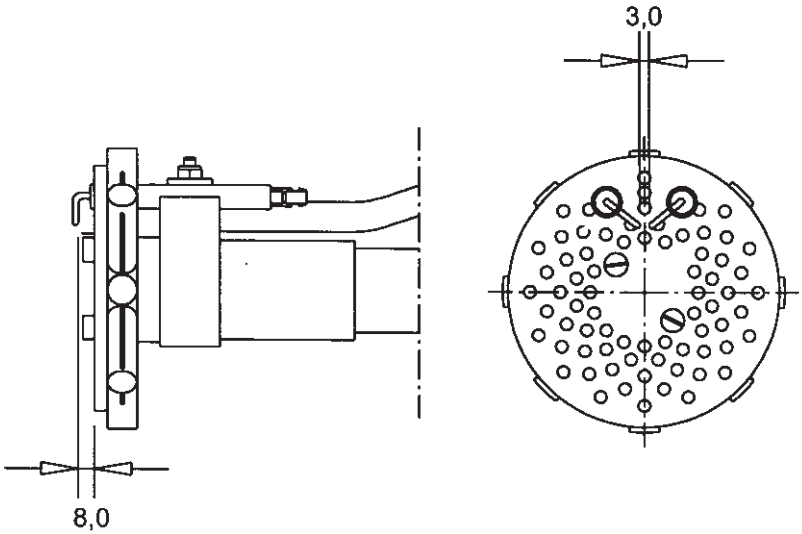
Propan



Natural gas



Biogas (UV detector)



4.9 Setting Damper motor, modulating operation

Air adjustment

The damper motor rotates the air damper between three preset positions: completely closed, low load and high load. These positions are controlled in the motor by colored cam discs:

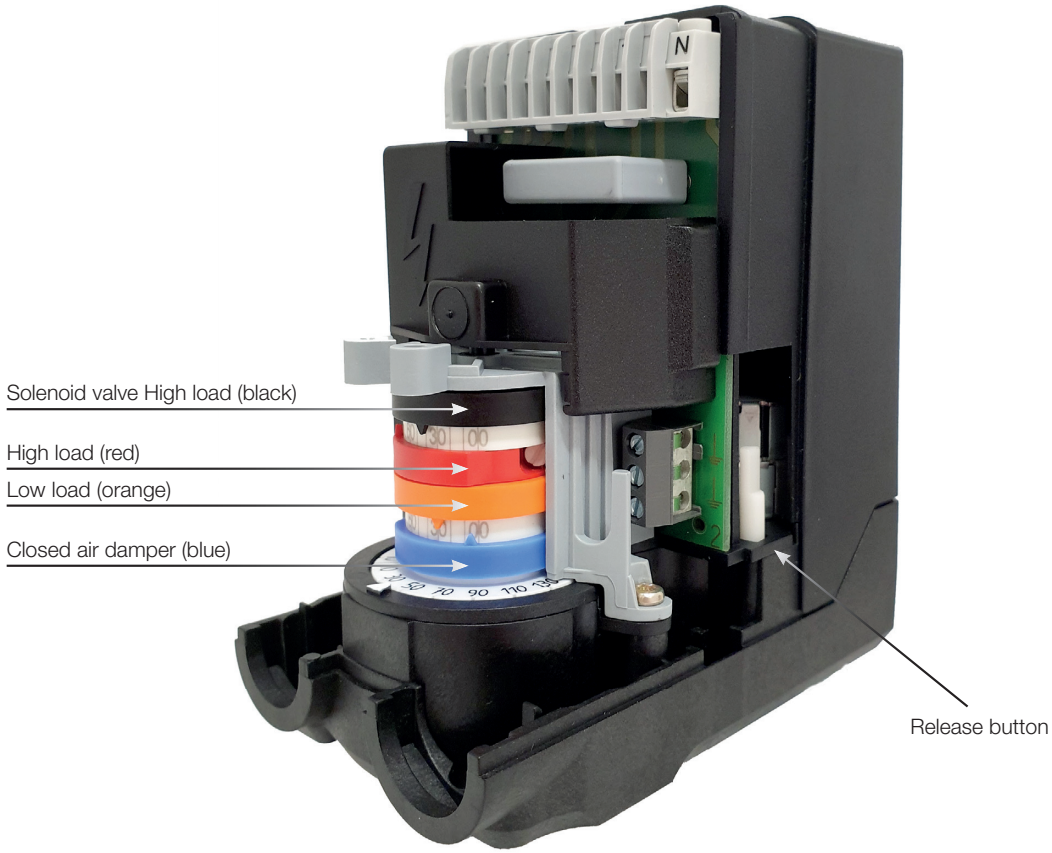
- Orange cam disc is adjusted for low load (approx. 5-10°).
- Red cam disc is adjusted for high load (approx. 90°).
- Blue cam disc is factory set for closed air damper during standstill.
- Black cam disc has no function during sliding and modulating operation.

Setting amount of gas

- Before starting the burner, vent the line so that gas is safely available at the multi-block.
- Connect a manometer for measuring outlet pressure (PBr).
- Set the control switch to the MAN position.
- Set gas pressure switch min and air pressure switch in position MIN and (if mounted) gas pressure switch max in position MAX.
- Start burner. If no flame is formed and the manometer does not give a reading, adjust the amount of gas by increasing with screw N on the multi-block. Check combustion values.
- Set high load by pressing ”+” control switch (increase). Adjust the amount of gas with screw V on the multi-block and check the combustion values.
- Return to low load ”-”, check combustion value and adjust if necessary.
- If necessary, repeat the setting on low (N) and high load (V).
- Adjust the orange and red cam discs to obtain the desired effect on low and high loads. Check the amount of gas on the system’s gas meter.
- Adjust air and gas pressure switches after adjustment, see special instructions.
- Set the control switch to the AUTO position.

Release

By pressing the button, the motor is disengaged and the air damper can be turned. The function is used when servicing air dampers.



5. Setting the burner

5.1 Setting the brake plate

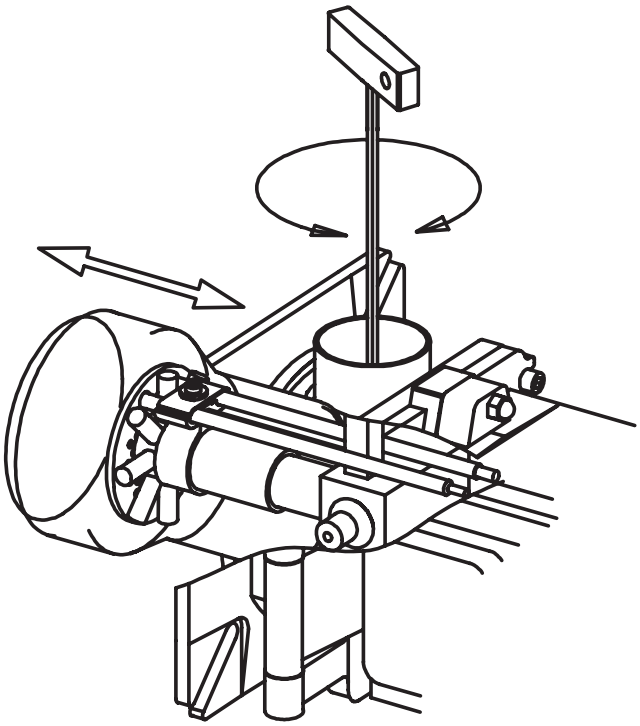
- Loosen the screw on the lever.

- Small column: turn the knob left.

- Large column: turn the knob right.

Setting the brake plate position affects airflow. Therefore, it is always necessary to fine-tune airflow using the burner's airflow regulator.

Setting the brake plate



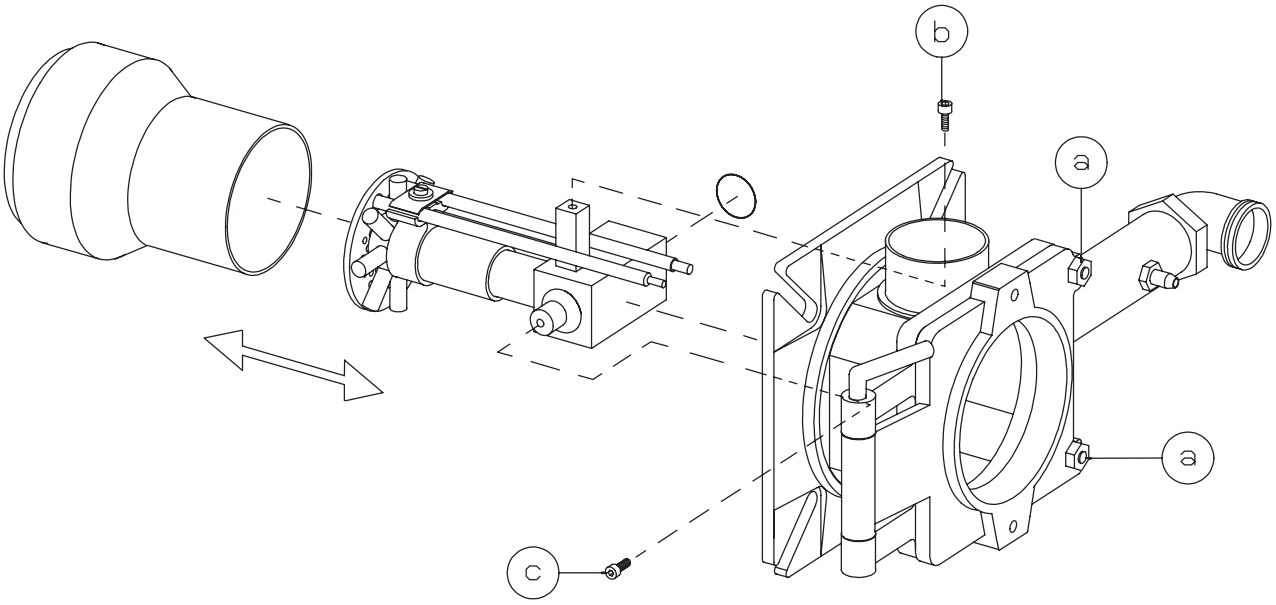
5.2 Checking the combustion head

Check the combustion head, brake plate and electrodes as follows:

Loosen the nuts (a). Swing the burner out.

Remove the screw (b) and knob for setting the combustion head. Loosen the fixing screw (c) until the burner insert is released.

Pull out the insert from the gas manifold.



Combustion head

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General instructions

The gas firing system must be installed in accordance with applicable regulations and directives. The supplier/installer of such systems therefore has a duty to understand all applicable regulations in order to ensure that the installation complies with national requirements. The installation, mounting and initial adjustments must be carried out with the utmost care, and only gas intended for the gas burner may be used.

User manual

The installation and maintenance instructions supplied with the burner must be kept at an easily accessible location in the boiler room.

Instructions

The user must be comprehensively instructed in the operation of the gas burner and entire system. It is the responsibility of the supplier to instruct the user.

Inspection and maintenance

Inspection as needed, preferably daily. Maintenance per service schedule.

Start-up

Once the burner is mounted to the boiler, the electrical connection is complete, the gas piping is seal-tested and vented, and the electrical function test has been carried out, the burner is ready for start-up.

However, read through the sections on setting the gas piping, combustion air and combustion heads.

Open the ball valve and close the main switch. If the burner starts, initial adjustments can be carried out.

Setting the combustion head

The burner is equipped with a lever that changes the position of the brake plate in the combustion head. This is used to set the correct pressure drop across the combustion assembly and thereby obtain good combustion without pulsation.

The position to be used depends on, among other things, the firing output and overpressure in the boiler.

A general rule of thumb is that the smaller the capacity, the smaller the column should be between the brake plate and the combustion assembly.

Fine-tuning the system

Checking the combustion. Checking the quality of the combustion is done using a flue gas analyser. Set the burner to about 20% excess air according to the adjacent table. Check the flue gas temperature. Calculate the combustion efficiency. Also check the current volume of gas on the gas meter to ensure that the correct firing output is achieved.

Servicing

The person/company carrying out service and maintenance on the burner must be authorised to do so. If components need to be replaced, the replacements must be of the same make and type and be approved according to national regulations. If the burner is to be used for a different grade of gas, readjustment must be carried out.

Gas quality	CO_2% lambda 1,2	0_2%	max. CO_2%
Natural gas Propane/ LPG	10,0 11,5	4±1 4±1	11,9 13,9

5.3 Setting the air pressure switch

The air pressure switch should block the burner if the air volume supplied for combustion is insufficient. The air pressure switch must be set so that, in the event of incorrect air supply at the burner's max. or min. capacity, it reacts before the monitored pressure falls excessively and results in poor combustion.

Setting range approx.:		
LGW 10	1-10	mbar
LGW 50	2,5-50	mbar

Setting the air pressure switch

1. Remove the protective cover, screw (Y).

> **!** Be careful when adjusting the air pressure switch; it contains a live component.

2. Start the burner.
3. Carefully turn the scale on the air pressure switch clockwise until the air pressure switch stops the burner. **Is the tolerance on the scale for the air pressure switch minimum approx. ±15%?**
4. Try to find the pressure at which the burner stops for both the minimum and maximum output by turning the scale. Make a note of the values and then set the air pressure switch on the basis of the highest pressure noted at which the burner stopped.
5. The air pressure switch should be set to a pressure approx. 10-15% lower than the highest noted pressure at which the burner stopped.
6. After setting the air pressure switch, repeat start-up several times and run through the burner's set output range several times. This is to ensure that the burner functions reliably. If breakdowns or interruptions occur, the setting of the air pressure switch is probably too narrow.
7. Fit the protective cover, screw (Y).

5.4 Setting the min. gas pressure switch

The min. gas pressure switch should react to a burner connection pressure that is too low and, in such cases, prevent the burner from starting. If the connection pressure to the burner is too low during operation, the min. gas pressure switch should stop the burner. The burner can start again once the connection pressure has risen above the pressure set for the min. gas pressure switch.

Setting the min. gas pressure switch

1. Remove the protective cover, screw (Y).
2. Open the pressure outlet (X) and connect a pressure gauge to measure the connection pressure.
3. Start the burner.
4. Measure and make a note of the connection pressure to the burner during normal operation at the highest output.
5. Based on the desired connection pressure, determine the connection pressure at which the gas pressure switch should stop the burner. The connection pressure at which the burner is stopped must be set to a level that stops the burner before poor combustion occurs.
6. Set the min. gas pressure switch to this value by turning the scale.
7. Check the setting by carefully closing the ball valve while measuring the connection pressure.
8. When the min. gas pressure switch stops the burner, the value measured should then approximately correspond to the setting on the min. gas pressure switch. The tolerance on the scale for the gas pressure switch minimum is approx. ±15%.
9. Open the ball valve.
10. Remove the pressure gauge and close the pressure outlet (X)

> **!** Check the gas tightness.

11. Fit the protective cover, screw (Y).

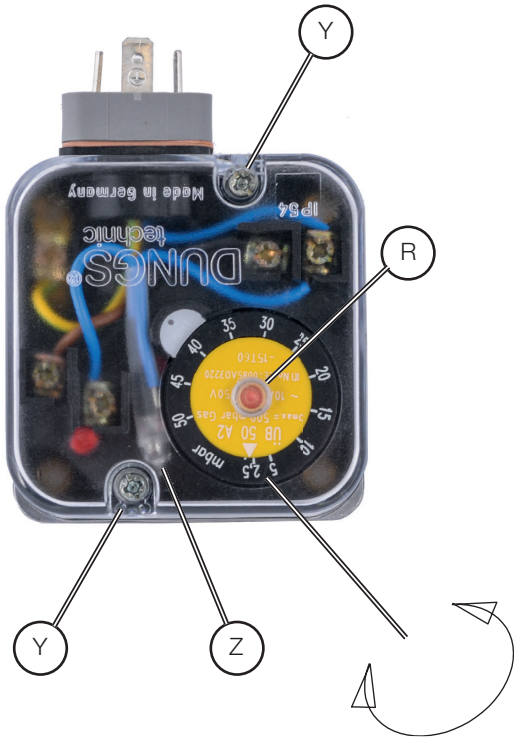
5.5 Setting the max. gas pressure switch

The burner is equipped with a max. gas pressure switch. It should block the burner if the gas pressure exceeds the set value. Starting can then only take place through a manual reset (burner control or gas pressure switch).

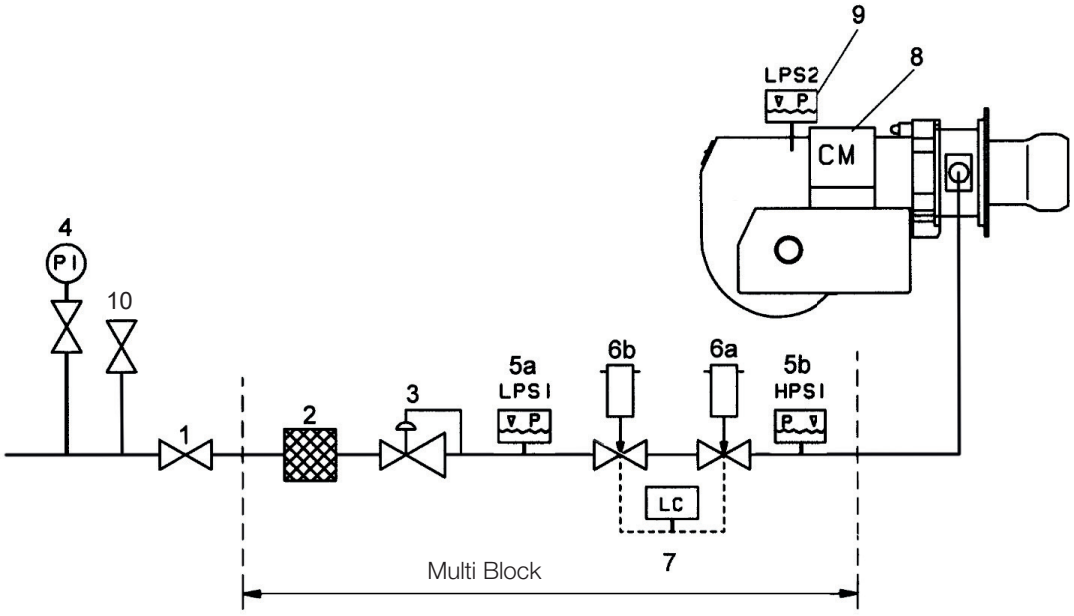
Setting the max. gas pressure switch

1. Remove the protective cover, screw (Y).
2. Open the pressure outlet and connect a pressure gauge to measure the pressure downstream of the gas valve.
3. Connect the pressure gauge to the block (PBR or PA) or on the VPS
4. Start the burner.
5. Measure and make a note of the highest pressure downstream of the gas valve within the range of the set output when the burner is operating under normal conditions.
6. Based on the highest pressure measured downstream of the gas valve, the desired pressure at which the burner must be stopped is set downstream of the gas valve.
7. Set the max. gas pressure switch to this value by turning the scale. The tolerance on the scale for the max. gas pressure switch is approx. ±15%.
8. Remove the pressure gauge and close the pressure outlet.
9. Fit the protective cover, screw (Y).
10. Alarm diode (Z)
11. Alarm reset button (R)

! Check the gas tightness.



5.6 Piping diagram



1. Ball valve
2. Filter
3. Pressure regulator
4. Pressure gauge with stop cock (optional extra)

5a. Min. gas pressure switch

5b. Max. gas pressure switch

6a. Main valve, 2-way. For modulating operation, this valve is equipped for ratio control.

6b. Safety valve

7. Tightness check *
8. Control motor
9. Air pressure switch
10. Ventilation pipe for releasing gas

Pos. 5b, 7: Components not required as per EN 676.

* Required for over 1200 kW as per EN 676.

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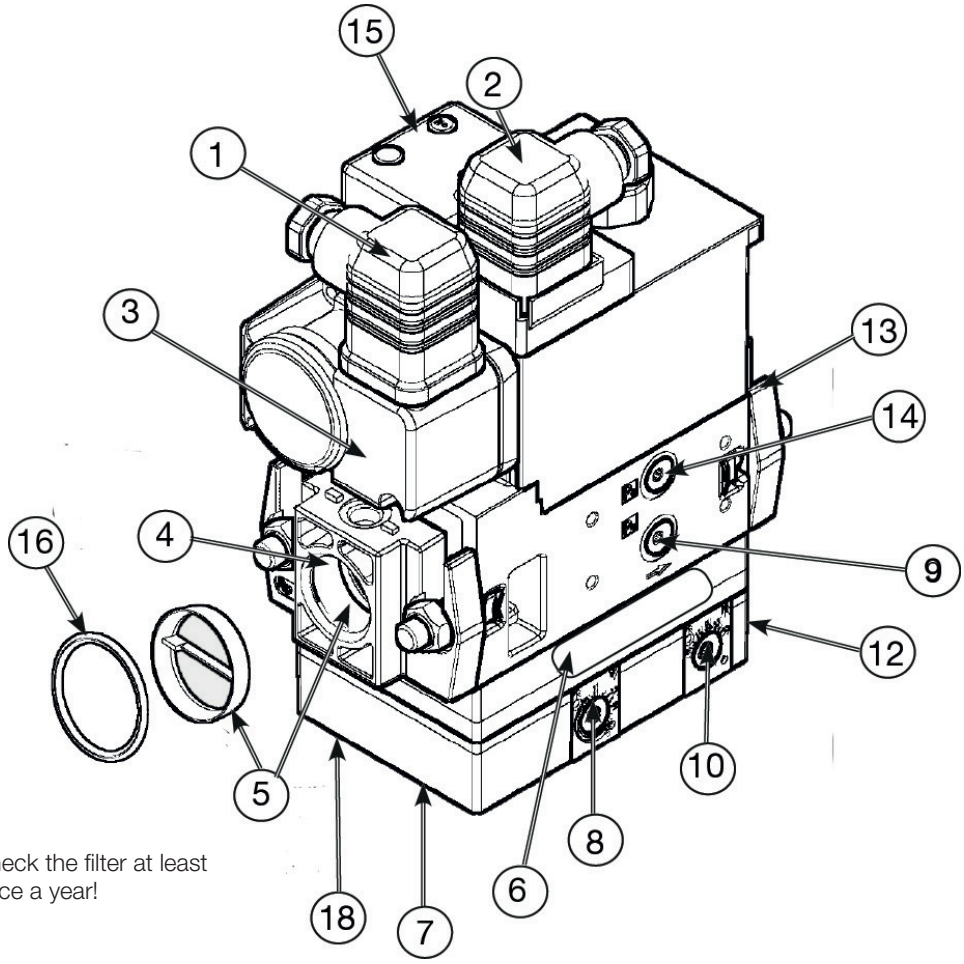
6. Multibloc MB-VEF 407-412

> **!** All gasline components shall be assembled and mounted without bending, torque and outher mechanical or thermal stress.



Check the filter at least once a year!

6.1 Components

1. Electrical connection gas pressure switch mini
2. Electrical connection gas valve
3. Pressure switch mini
4. Flange connection inlet
5. Filter
6. Data plate
7. Connection 1/8" P_L
8. Adjustment screw V for ratio P_{Br}: P_L (max. load)
9. Test point connection 1/8" before V1 (before governor)
10. Adjustment screw for zero point adjustment N (min. load)
11. Test point connection 1/8" P_F
12. Test point connection 1/8" P_{Br}
13. Flange connection, outlet
14. Test point connection 1/8" Pa before V2 (after governor)
15. Indication of V1 and V2 in operation (not standard)
16. O-ring

It is possible to connect a leakage control VPS 504 and a gas pressure switch maxi.

1) **NB.** The impulse line P_{Br} can be replaced by an impulse flange on the multibloc. The impulse line P_{Br} is then placed inside this flange.

6.2 Technical data

- Max inlet pressure 360 mbar
- Valves V1+V2 class A group 2 in accordance with EN 161
- Governor class A group 2 in accordance with EN88-1
- Ratio V PBr:PL 0,75:1-3:1
- Filter according to DIN 3386
- Ambient temperature -15°C- +70°C
- Protection standard type IP54 (according to IEC 529, DIN 40050)
- Gas family 1 +2 +3
- Outlet pressure 0,5 - 100 mbar
- Zero point adjustment N ±2 mbar
- Pressure switch DIN3398 TI
- Fan pressure PL0,4-100 mbar
- Fire room pressure PF -2 -+5mbar
- Burner pressure PBr 0,5 - 100 mbar

6.3 Mounting instruction - impulse lines PL,PF och PBr

- Impulse lines should preferably be made of steel. Inside diametre >ø 4 mm (steel tube ø 6/4).
- For P_L other material can be used.
- Impulse lines P_L and P_{BR} are ready from factory.
- Impulse lines shall be mounted in such a way that no conden sate can flow back into the multibloc. This is especially important when P_F is concerned.
- Impulse lines shall be mounted in such a way that they are protected against rupture and damage.
- Impulse lines shall be as short as possible.

6.4 Adjustment possibilities

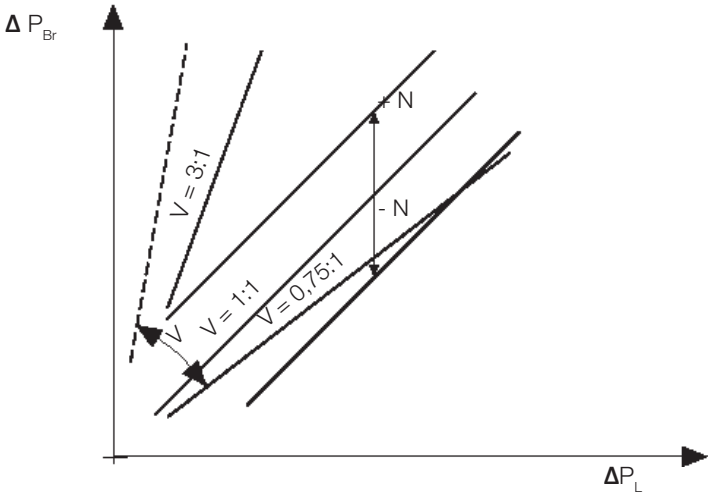
Effective burner pressure

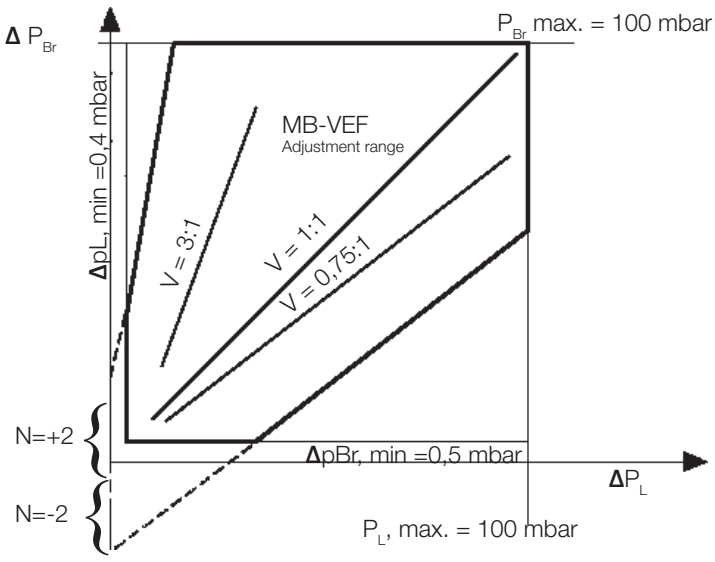
$$\Delta P_{Br} = P_{Br} - P_F$$

Effective fan pressure

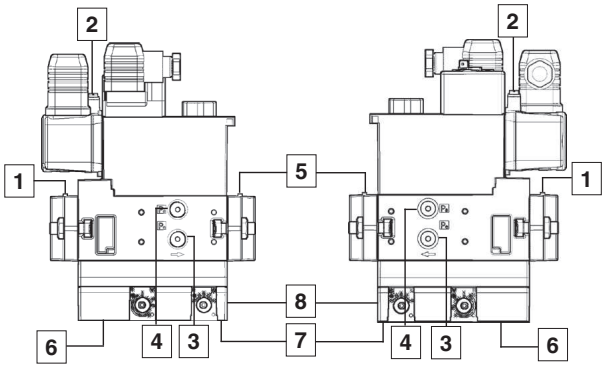
$$\Delta P_L = P_L - P_F$$

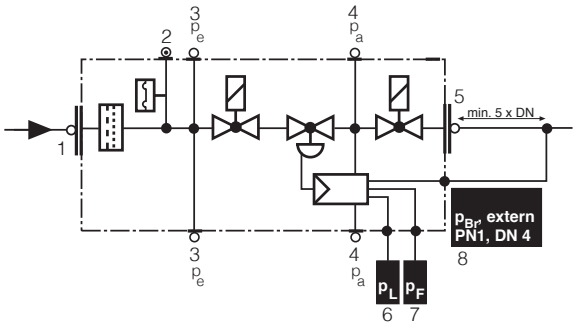
Adjustment range





6.5 Pressure taps





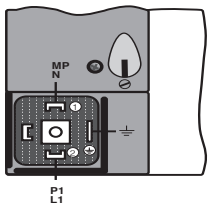
1,3,4,5 G 1/8 screwed sealing plug

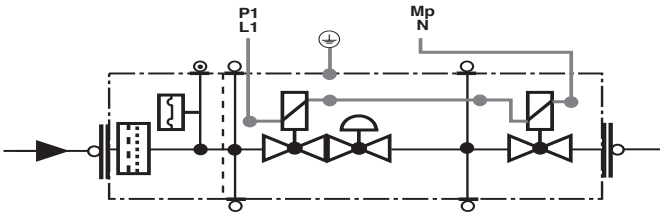
2 Measuring nozzle

6,7,8 G 1/8 female thread for pL ,pF ,pBr pulse lines

6.6 Electrical connection

S 10/S 30





7. Calculating the aeration time

Parameter 225 is used to set the aeration time.

V =	Hearth volume	m^3
Q =	Burner output	[kW]
X =	Aeration time in seconds	Hot Water Boilers and Steam Boilers
		100% airflow Minimum aeration time 20 sec
		50% airflow Minimum aeration time 40 sec
		33% airflow Minimum aeration time 60 sec
X =	Aeration time in seconds	Industrial applications
		The aeration time must correspond to at least 5 full air circulations in the hearth and connected spaces.
		Local regulations must be followed.

Calculation example:

Example A: V = 2 m3 Q = 200 kW

Example B: V = 9.5 m3 Q = 500 kW

Example C: V = 25 m3 Q = 2200 kW

Exemple A $X = \frac{V \cdot 5}{((Q \cdot 1{,}2) / 3600)} = \frac{2 \cdot 5}{((200 \cdot 1{,}2)/3600)} =$ 150 seconds

Exemple B $X = \frac{V \cdot 5}{((Q \cdot 1{,}2) / 3600)} = \frac{9{,}5 \cdot 5}{((500 \cdot 1{,}2)/3600)} =$ 285 seconds

Exemple C $X = \frac{V \cdot 5}{((Q \cdot 1{,}2) / 3600)} = \frac{25 \cdot 5}{((2200 \cdot 1{,}2)/3600)} =$ 170 seconds

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7.1 Recommended excess air when using default setting

Grade of gas	Excess air flue gases		Max. % CO_2
	% O_2	% CO_2 Lambda 1.2	
Natural gas	3–5	≈10	11.9
Propane	3–5	≈11.5	13.9
Butane	3–5	≈11,5	14,1

7.2 Determining the gas quantity for the system

The heat values indicated are normal values; the heat value varies according to the origin of the gas. For more exact information on values, contact the gas distributor.

Lower heat value Hu at normal state 15°C and 1013.25 mbar EN676				
Grade of gas		kWh/Nm^3	MJ/Nm^3	kcal/Nm^3
Natural gas	G20	9.5	34.02	8126
Natural gas	G25	8.2	29.25	6986
Propane	G31	24.6	88.00	21019
Butane	G30	32.5	116.09	27728

7.3 Example of how to calculate the gas quantity (natural gas G20):

V_0 =	Desired quantity of gas	[Nm^3/h]
Q =	Boiler output	[kW]
H_U =	Gas heat value	[kWh/Nm^3] or [MJ/Nm^3] or [kcal/Nm3]
η=	Boiler efficiency	[%]

Calculation example:

Q = 160 kW

H_U = Example A: 34020 MJ/Nm^3

Example B: 9.5 kWh/Nm^3

Example C: 8126 $kcal/Nm^3$

η = 90%

$$\text{Example A } V_{0A} = \frac{Q \cdot 3600}{H_u \cdot \eta} = \frac{160 \cdot 3600}{34020 \cdot 0.90} \approx 18.8\ Nm^3/h$$

$$\text{Example B } V_{0B} = \frac{Q}{H_u \cdot \eta} \approx \frac{160}{9.5 \cdot 0.90} \approx 19\ Nm^3/h$$

$$\text{Example C } V_{0C} = \frac{Q}{H_u \cdot 0{,}00116 \cdot \eta} = \frac{160}{8126 \cdot 0.00116 \cdot 0.90} \approx 19\ Nm^3/h$$

If the barometer reading (altitude), pressure and temperature of the gas deviate significantly from normal values, this must be taken into account as follows:

T =	Temperature of gas at the gas meter	[°C]
B =	Barometer reading	[mbar]
P =	Pressure of gas at the gas meter	[mbar]
f =	Factor calculated for multiplication with flow in Nm^3/h to arrive at actual flow in Nm^3/h.	
V =	Actual flow	[m^3/h]

$$f = \frac{273}{273+T} \cdot \frac{B+P}{1013.25}$$

Calculation example:

T = 15°C

B = 945 mbar

P = 15 mbar

$$f = \frac{273}{273+15} \cdot \frac{945+15}{1013.25} \approx 0.90\ Nm^3/h$$

This means that the quantity of gas read from the gas meter should actually be read off as 1.11 . the calculated flow in a normal state.

$$V = V_0 \cdot f$$

$$V_A = V_{0A} \cdot f = 18.8 \cdot 0.90 \approx 17\ m^3/h$$

$$V_B = V_{0B} \cdot f = 19 \cdot 0.90 \approx 17\ m^3/h$$

$$V_C = V_{0C} \cdot f = 19 \cdot 0.90 \approx 17\ m^3/h$$

7.4 Calculating the quantity of gas supplied

The quantity of gas supplied can be calculated if the system is equipped with a gas flow meter of some type. The procedure here is usually to measure how long it takes for the burner to consume a certain quantity of gas.

To measure:

t = Time for a certain quantity of gas consumed by the burner. [h]

M = Quantity of gas consumed. [m^3]

V = Actual gas flow [m^3/h]

$$V = \frac{M}{t}\ [m^3/h]$$

Calculation example:

t = 1 min 10 s

M = 330 dm^3 (litre)

$$M = \frac{330}{1000} = 0.33\ m^3$$

$$t = \frac{1}{60} + \frac{10}{3600} = 0.0194\ h$$

$$V = \frac{M}{t} = \frac{0,33}{0.0194} \approx 17\ m^3/h$$

8. Service

Whoever carries out service and maintenance on the burner must be authorised to do so. If components need to be replaced, the replacements must be of the same make and type and be approved by the authorities. If the burner is to be used for a different grade of gas, a new adjustment must be carried out. If town gas is to be used, it is also necessary to convert the combustion assembly; in some cases the multi-block or valves and gas train may also need to be changed to a larger type.

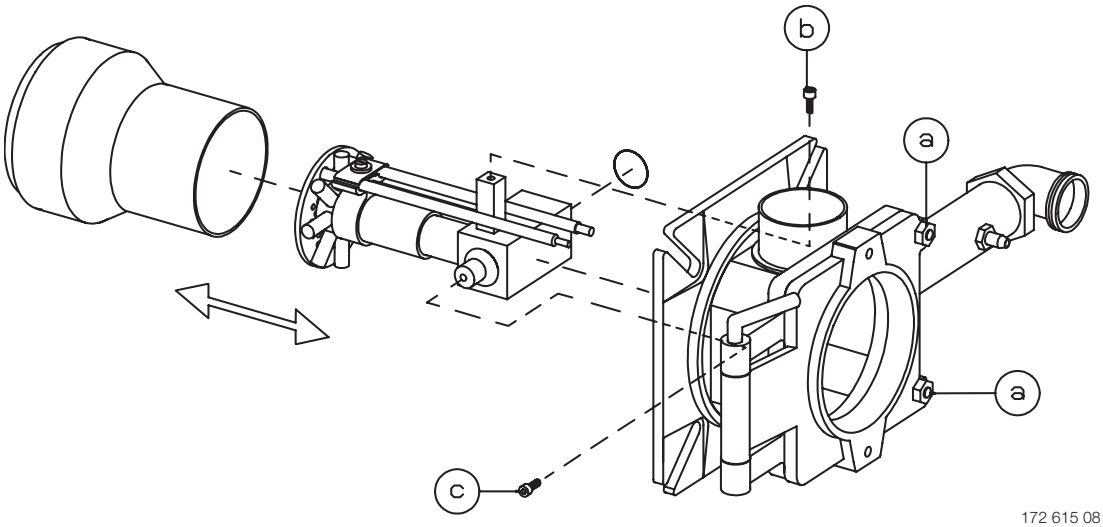
8.1 Servicing the combustion assembly

Removal and installation

1. Switch off the main power supply and disconnect the Euro plugs from the burner.

> **!** If the burner is directly connected, ensure that all components on the burner are without power.

2. Remove the screws (A), turn off the burner Remove the ignition and ionisation cables
3. Check the combustion device's position. Remove the screw (B) to remove the adjustment device.
4. Remove the screw (C), remove the combustion device.
5. Check and clean the brake plate and gas inlet. If necessary, replace the worn parts.
6. Check the ignition electrode (see chapter Gas nozzle). Replace if necessary.
7. Check the ionisation electrode (see chapter Gas nozzle). Replace if necessary.
8. Fit the combustion assembly in reverse order.
9. Press the burner together and lock using the nuts (B).
10. Fit the Euro plugs and turn on the main power supply.
11. Check/adjust the combustion.



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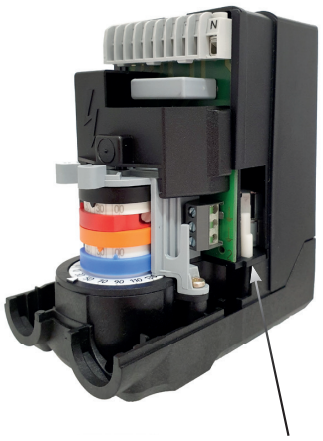
8.2 Replacement of damper motor, air

Removal and installation

1. Break the main current and disconnect the Euro plugs from the burner.

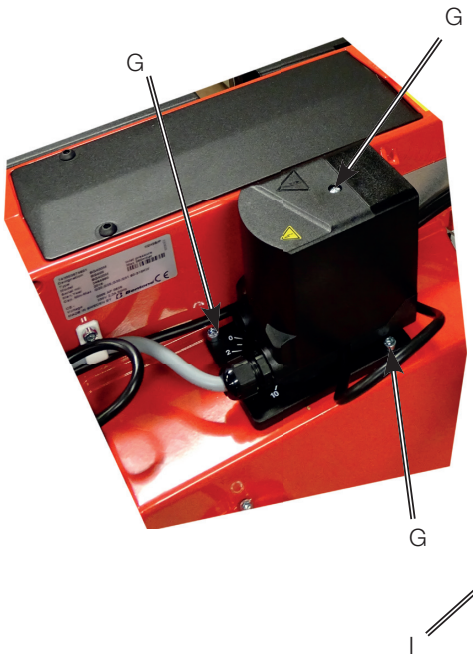
> **!** If the burner is directly connected, ensure that all components on the burner are without power.

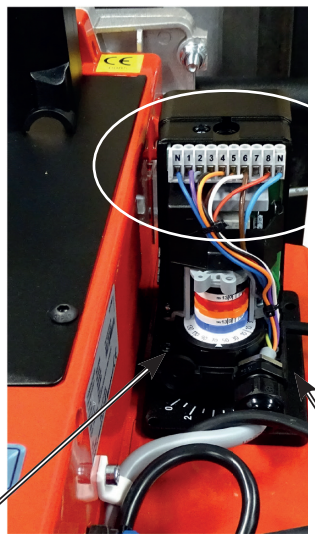
2. Note the connection position of the cables on the damper motor.
3. Disconnect the damper motor cable from the damper motor.
4. Loosen the screws (G) to the damper motor mounting plate.
5. Decouple the damper motor and rotate to approx. 70°.
6. Lift up the damper motor.
7. Loosen the screw (H) and remove the damper from the motor shaft
8. Remove the screws (I) securing the damper motor to the mounting plate.
9. Remove the damper motor from the mounting plate (I).
10. Install the new damper motor on the mounting plate.
11. Mount the damper to the damper motor's shaft. Ensure that the screw is perpendicular to the plane of the shaft.
12. Re-install the damper motor and mounting plate on the air intake. Ensure that the damper shaft and control arm are connected correctly.
13. Connect the damper motor cable.
14. Fit the Euro plugs and turn on the mains power.
15. Check/adjust the combustion.

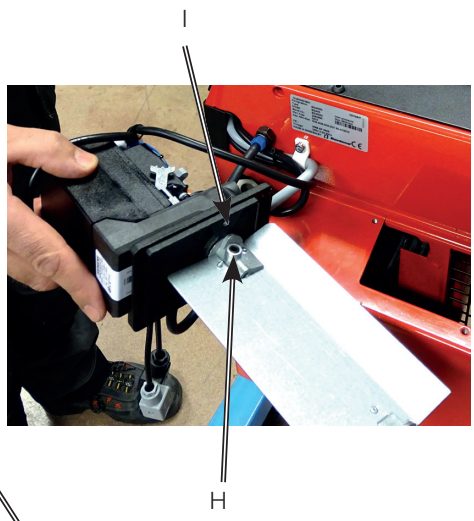


Releasing button

By pressing the button and snapping it down, the motor will be released and the damper can easily be turned. This function facilitates an exchange of damper motor.







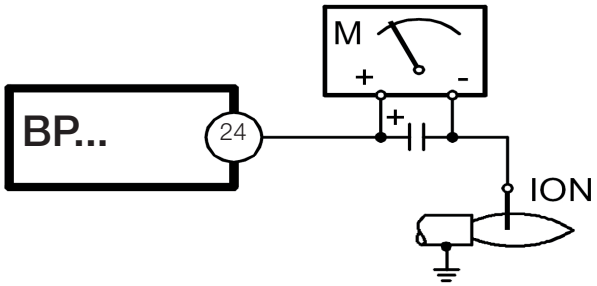
8.3 Flame monitoring and ionisation current check (Continuous operation)

The standard version of the burner is monitored according to the ionisation principle. The ionisation current should be checked on initial start-up and at each service visit.
The cause of low ionisation current can be leakage current, poor connection to earth, fouling, or the angle of the ionisation electrode may need to be adjusted. Occasionally, an incorrect gas/air mix may result in poor ionisation current. Ionisation current is measured using a micro ammeter (µA) connected in series with the ionisation electrode and gas burner control. Connect the µ ammeter according to the diagram. The minimum required ionisation current is shown in the table. In practice, this current must be significantly higher, preferably more than 10 µA. Connection of the µA instrument is made easier by the fact that all gas burners are equipped with a divisible ionisation cable.

Technical data

For continuous operation!

Idle voltage at ION-terminals	AC 330 V
! Protect the ionisation electrode from electric shock!	
Short-circuit current	Max 0,5mA
Min. current for flame detection	Min 3 µA
Required current to ensure detection	Min 3 µA
Possible detection current	Max 10 µA



8.4 UV-5 (only intermittent operation)

This should not be exposed to temperatures higher than 60°C. The signal running through the UV probe when it is illuminated cannot be measured. To check the flame, perform the following:
The LEDs can show the flame strength in Control mode by pressing the reset button for 3 seconds when the Flame LED flashes during start-up. In Control mode, the Status LED shines yellow, the Fan LED flashes, and LEDs 2-6 show the flame signal strength. Each LED corresponds to 20% of the total flame signal. 5 lit LEDs correspond to 100% and 2 LEDs correspond to 40%.

9. Handing over of the installation

- Make repeated start attempts to ensure that the adjustments function.
- Close the ball valve during operation to check that the gas switch switches off at the set value.
- Remove the hose for the air pressure switch to check that the burner locks out.
- Check that all protective covers and measurement nipples are mounted and fastened.
- Fill out necessary test reports.
- Instruct the persons in charge of the operation on the service and maintenance of the installation and what to do should any troubles occur.
- Inspection and service must be carried out by authorized personnel.

! Review and service should be performed by authorised personnel only.

10. Fault location, functional troubles

Trouble free operation is dependent on three factors: electricity, gas and air supply. Should there be any changes in the ratio between these three factors there is a risk of break downs. It has been proved that most break downs are caused by simple faults. Before calling the service engineer, the following should therefore be checked:

- Is the gas cock open?
- Are all fuses in order and the current switched on?
- Are the thermostats correctly set?
- Are pressostats, overheating protection etc. in operating position and not locked-out?
- Is the gas pressure sufficient?
- Is the gas burner control in start position?
- Has the gas control or the motor protector locked out? - Reset.
- Is the circulation pump in operation?
- Is there a supply of fresh air to the installation?
- If integral components are of a different make from what is stated in this manual, see the enclosed loose-leaf.

11. Electric equipment

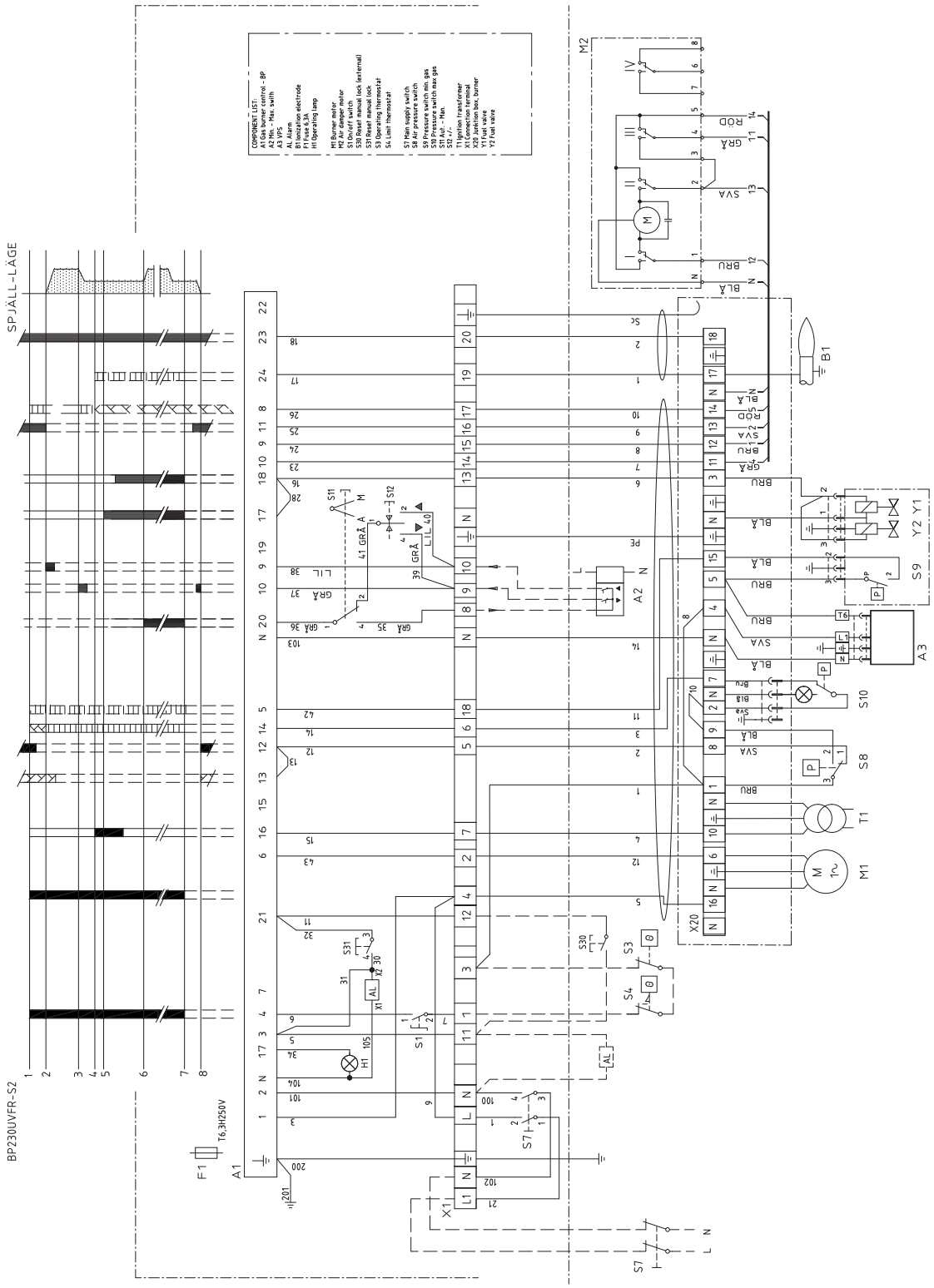
11.1 Safety system

Safety systems must be installed in accordance with regulations that are applicable for the appliance. This may differ according to the process burner are installed in to, see local regulations for information.

The cables of the safety system must be separated so that the outgoing signal is not in the same cable as the incoming signal. Signals must be in different harnesses for safety reasons.

Safety system as door switches, water level, pressure, temperature and other safety limiters must be installed in safety loop according to process.

11.2 Wiring diagram BG300/BG400 BP JK IP 40



11.3 Component list wiring diagram

A1	Gas firing device-BP
A2	Power control- Min. - Max swith
A3	Valve, leak tester, Dungs VPS 504
AL	Alarm
B1	Ionisation electrode
F1	Fuse 6.3A
H1	Lamp, low load
M1	Burner motor
M2	Damper motor
	L&S SQN75.294A21B
S1	Operating switch
S3	Control thermostat
S4	Temperature limiter
S7	Main switch
S8	Air pressure switch
S9	Min. gas pressure switch
S10	Max. gas pressure switch
S11	Change-over switch, Aut.-Man.
S12	Change-over switch, Increase-Decrease
S30	External reset
S31	Manual reset
T1	Ignition transformer
X1	Connection block
X20	Terminal block, burner
Y1	Solenoid valve 1
Y2	Solenoid valve 2
Y4	Solenoid valve, luft (optional extra)

The system must be connected to mains and fused in accordance with applicable regulations.

12. Control

12.1 Technical data

	BP230UVFR-S2	BP230UVFR-S3	BP230UVFR-S4
Pre-purge time (t1)	30.7 s	37.2 s	60 s
Pre-ignition time (t3)	6 s	2.5 s	2.5 s
Safety time (TSA)	3 s	5 s	5 s
Post-purge time (t6)	16.8 s	14.9 s	15 s
Reaction time for low interrupt	1 s	1 s	1 s
Ambient temperature BP	-40 to +60 °C	-40 to +60 °C	-40 to +60 °C
Ambient temperature UV5	-20 to +60 °C	-20 to +60 °C	-20 to +60 °C
Max. current, terminals 6-7	2 A	2 A	2 A
Max. current, other terminals	1 A	1 A	1 A
Ionisation current	3-10 µA	3-10 µA	3-10 µA

12.2 LED indicator lamps

BurnerPRO's burner control has seven LEDs which indicate the operating status of the control unit and the cause of the lockouts.

Each LED has an icon describing its function.

	FAN	Lights up when voltage is supplied to the fan motor (terminal 6)
	OPEN DAMPER 6	Flashes when the damper motor runs to maximum position. When the switch for the maximum damper motor position closes, this LED will light continuously.
	CLOSE DAMPER 5	Flashes when the damper motor runs to minimum position. When the switch for the minimum damper motor position closes, this LED will light continuously.
	AUTO 4	Lights up when the Burner control is in normal operating mode.
	IGNITION 3	Indicates ignition
	FLAME 2	Lights up when a flame is detected by the flame detector.
	ALARM/STATUS	In lockout mode, the Alarm lamp lights up and the other LEDs light up to indicate lockout. Refer to "Fault codes".

The LEDs can show the flame strength in Control mode by pressing the reset button for 3 seconds when the Flame LED flashes during start-up. In Control mode, the Status LED shines yellow, the Fan LED flashes, and LEDs 2-6 show the flame signal strength. Each LED corresponds to 20% of the total flame signal. 5 lit LEDs correspond to 100% and 2 LEDs correspond to 40%.

12.3 Explanation of the different sequence modes

1. **Operation**
   This is the control unit voltage supply.
2. **System test**
   In this status mode, the control unit undergoes an internal test to verify correct functionality of the hardware and software.
3. **Preconditions for burner start-up**
   The control unit verifies that the air pressure switch is in the depressurised position and a test of the fuel cut-off valve is carried out.
4. **Heating requirement**
   The operating thermostat closes and voltage is supplied to connection 5 so that the control unit can start the burner.
5. **Pre-purge begins**
   The control unit starts the fan.
   Connections 6 and 7.
6. **Damper motor opens**
   Control unit connection 9 sends a command to the damper motor to run at Max. mode. The control unit detects that the damper motor's end position switch indicates successful transition to the Max. load mode by supplying voltage to the connection 8 input. The control unit also performs a test to ensure that the air sensor detects airflow by monitoring connection 14.
7. **Pre-purge**
   The combustion chamber is ventilated.
8. **Damper motor closes**
   Following pre-purge, the control unit closes connection 10. The control unit detects that the damper motor is in the Low Load mode by supplying voltage to connection 8 on the control unit.
9. **Ignition on**
   The control unit supplies voltage to the ignition transformer by activating connection 16.
10. **Fuel on** The control unit activates the fuel valve by supplying voltage to connections 17 and 18 as well as to direct ignition systems.
11. **Flame indication**
    Ignition transformer turns off. The flame signal is tested during this stage. If no flame is detected, the burner enters Lockout mode.
12. **Operating mode**
    Once a flame is stable, the control unit transitions to Operating mode. There must be a flame signal. Voltage is supplied to connection 20.
13. **Shutdown**
    Shutdown occurs when the heating requirement is met and power is cut off to the operating thermostat connection 5 . The control unit closes the fuel valves by cutting off power to outputs 18 and 20. The fan post-purges the combustion chamber.
14. **Lockout**
    The control unit enters lockout mode when an internal or external fault is detected. The reset button and the remote-reset connection can be used to disable Lock mode. However, the control unit will revert to lockout mode if the fault is not rectified.

Burner Lockout

When lockout occurs, the LEDs indicate the cause. The control unit status is saved in the memory, even in the event of a power outage. By pressing the manual reset button on the control unit or remote reset.

12.4 BurnerPro LED fault/lock code table

NO.	FAULT	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7	POSSIBLE SOLUTION
	OPERATION LED ● = ON	Fan	Open damper	Closed damper	Auto	Ignition	Flame	Status	
	ICON								
1	DIAGNOSTIC ERROR, MAIN MCU INLET	●						RED	Initial diagnostic error. Ensure correct status of inputs and outputs when the unit is turned on.
2	LOCAL RESET		●					RED	User-initiated manual reset/lockout or defective reset switch.
3	AIR SENSOR	●	●					RED	Air sensor signal [connection 14] could not be detected by the end of the safety time, or loss of the air sensor signal during burner operation
4	DIAGNOSTIC ERROR			●				RED	“The system detected voltage at terminal 16, 17, 18, or 19 at the incorrect time, or no voltage detected when necessary. Check cabling and makes sure the system is running on a single line phase (50/60Hz)”
5	IONISATION FLAME LOSS	●		●				RED	Flame loss. Inspect the system, check the gas pressure, flame detector, cabling, etc.
6	IONISATION CIRCUIT FAULT		●	●				RED	Replace the control unit. Contact reseller/distributor.
7	INTERNAL COMMUNICATION ERROR	●	●	●				RED	Reset the system to continue normal operation. Contact reseller/ distributor if the fault persists.
8	REMOTE RESET				●			RED	The user has pressed Remote Reset or the remote controller has short-circuited.
9	IONISATION FAULT	●			●			RED	Replace the control unit. Contact reseller/distributor.
10	MAIN PROGRAM SEQUENCE ERROR		●		●			RED	Replace the control unit. Contact reseller/distributor.
11	RAM TEST	●	●		●			RED	Replace the control unit. Contact reseller/distributor.
12	PROGRAM SEQUENCE ERROR			●	●			RED	Replace the control unit. Contact reseller/distributor.
13	READING ERROR INPUT	●		●	●			RED	Check cabling and makes sure the system is running on a single phase (50/60Hz)
14	TIMER2 ERROR		●	●	●			RED	Replace the control unit. Contact reseller/distributor.
15	CPU TEST FAILED	●	●	●	●			RED	Replace the control unit. Contact reseller/distributor.
16	FLAME LOSS	●				●		RED	Visually inspect the flame detector and confirm that the pilot light was lit during start-up. Check the fuel supply system.

NO.	FAULT	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7	POSSIBLE SOLUTION
17	CABLE FAULT		●			●		RED	The system detected voltage at terminal 16, 17, 18, or 19 at the incorrect time, or no voltage detected when necessary. Check cabling and makes sure the system is running on a single phase (50/60Hz)
18	SAFETY RELAY FAULT	●	●			●		RED	Replace the control unit. Contact reseller/distributor
19	FUEL VALVE OPEN			●		●		RED	Check fuel valve cabling. The valves may not be fully closed.
20	FLAME LOSS	●		●		●		RED	Visually inspect the flame detector and confirm that the main flame was lit during start-up. Check the fuel supply system.
21	WELDED SAFETY RELAY		●	●		●		RED	Replace the control unit. Contact reseller/distributor.
22	SELF TEST	●	●	●		●		RED	Replace the control unit. Contact reseller/distributor.
23	ROM ERROR				●	●		RED	Replace the control unit. Contact reseller/distributor.
24	FLAME LOSS DURING OPERATION	●			●	●		RED	Check the cabling. Check the flame detector. Check the fuel supply system.
25	RAM ERROR		●		●	●		RED	Replace the control unit. Contact reseller/distributor.
26	INTERNAL FAULT	●	●		●	●		RED	Replace the control unit. Contact reseller/distributor.
27	NOT USED								
28	NOT USED								
29	AMBIENT TEMPERATURE		●	●	●	●		RED	Ambient temperature below -40 °C or above 70 °C
30	ROM ERROR	●	●	●	●	●		RED	Replace the control unit. Contact reseller/distributor.
31	IONISATION SHORT-CIRCUIT						●	RED	Possible external short-circuit between terminals 23 and 24. Contact reseller/distributor if the fault persists.
32	TIME LIMIT EXCEEDED FOR CONTROL MODE	●					●	RED	30-minute activation time passed.
33	STANDBY FALSE FLAME		●					RED	False flame detected in Standby mode.
34	NOT USED							RED	
35	INTERNAL RESET			●			●	RED	Internal software reset of control unit. Contact reseller/distributor if the fault persists.
36	SOFTWARE RESET	●		●			●	RED	Internal software reset of control unit. Contact reseller/distributor if the fault persists.
37	WAITING TIME INPUTS		●	●			●	RED	The system was unable to perform airflow sensor test and/or valve closure test. Check the cabling. Check the air sensor and/or fuel valve switch.
38	INTERNAL RESET	●	●	●			●	RED	Internal software reset of control unit. Contact reseller/distributor if the fault persists.
39	SOFTWARE RESET				●		●	RED	Internal software reset of control unit. Contact reseller/distributor if the fault persists.

NO.	FAULT	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7	POSSIBLE SOLUTION
40	HARDWARE RESET	●			●		●	RED	Replace the control unit. Contact reseller/distributor if the fault persists.
41	HARDWARE RESET		●		●		●	RED	Replace the control unit. Contact reseller/distributor if the fault persists.
42	CONTROL PROGRAM FROZEN	●	●		●		●	RED	Replace the control unit. Contact the distributor/factory.
43	CONTROL PROGRAM FROZEN			●	●		●	RED	Replace the control unit. Contact reseller/distributor.
44	TIMER2 ERROR	●		●	●		●	RED	Replace the control unit. Contact reseller/distributor.
45	LOW VOLTAGE ERROR		●	●	●		●	RED	Check mains power. Contact reseller/distributor if the fault persists.
46	LOW VOLTAGE ERROR	●	●	●	●		●	RED	Check mains power. Contact reseller/distributor if the fault persists.
47	UV DETECTION FAULTY					●	●	RED	Replace the control unit. Contact reseller/distributor.
48	INTERNAL FAULT	●				●	●	RED	Replace the control unit. Contact reseller/distributor.
49	INTERNAL FAULT		●			●	●	RED	Replace the control unit. Contact reseller/distributor.
50	IGNITION FEEDBACK	●	●			●	●	RED	The system detected voltage at terminal 16 at the incorrect time, or no voltage. Check cabling and ensure sufficient earthing.
51	PILOT FEEDBACK			●		●	●	RED	The system detected voltage at terminal 17 at the incorrect time, or no voltage. Check cabling and ensure sufficient earthing.
52	MAINP FEEDBACK	●		●		●	●	RED	The system detected voltage at terminal 19 at the incorrect time, or no voltage. Check cabling and ensure sufficient earthing.
53	WAITING TIME FEEDBACK LIMIT EXCEEDED		●	●		●	●	RED	Loss of feedback from the damper motor for more than 10 minutes. Check the cabling. Check the damper motor.
54	MAIND FEEDBACK	●	●	●		●	●	RED	The system detected voltage at terminal 18 at the incorrect time, or no voltage. Check cabling and ensure sufficient earthing.
55	DIAGNOSTICS INTERRUPTED				●	●	●	RED	Replace the control unit. Contact reseller/distributor.
56	UV FALSE FLAME			●	●	●	●	RED	False flame detected prior to ignition. Check the cabling. Check the flame detector. Ensure sufficient earthing.
57	IONISATION FALSE FLAME			●	●	●	●	RED	False flame detected prior to ignition. Check the cabling. Check the flame detector. Ensure sufficient earthing.
58	OPEN FEEDBACK READING		●	●	●	●	●	RED	The system detected voltage at terminal 8 at the incorrect time, or no voltage. Check cabling and ensure sufficient earthing.
59	ADJACENT POLE SHORT-CIRCUIT	●			●	●	●	RED	Replace the control unit. Contact reseller/distributor.
60	LOCAL RESET	●	●	●	●	●	●	RED	The local reset button has been pressed in for more than 10 seconds, or the reset button is stuck.
61	FUEL VALVE OPEN		●		●	●	●	RED	Fuel valve open at incorrect time.
62	STRONG UV FLAME	●	●		●	●	●	RED	Flame detector too close to the flame. Increase the distance between the flame detector and the flame.
63	INTERNAL FAULT					●		RED	Replace the control unit. Contact reseller/distributor.

12.5 Leakage control Dungs VPS 504

Technical data

Test volume	≤	4,0 l
Pressurre increase using motor pumps	≈	20 mbar
Backup (customer supply)		10A fast or 6.3A slow
Fuse integrated in housing, replaceable		T6, 3L 250V (IEC 127-2/111) (DIN41662)
Switching capacity		Operating outputs SO1, SO2, SO4: 4A Faul output T7: 1A Faul output SO4 1, 2, 3, T7: 1A
Release time	≈	10 - 30 s Dependent on test volume and input pressure.
Sensitivity limit		50 l/h
Max. number of test cycles		20 /h

Program sequence

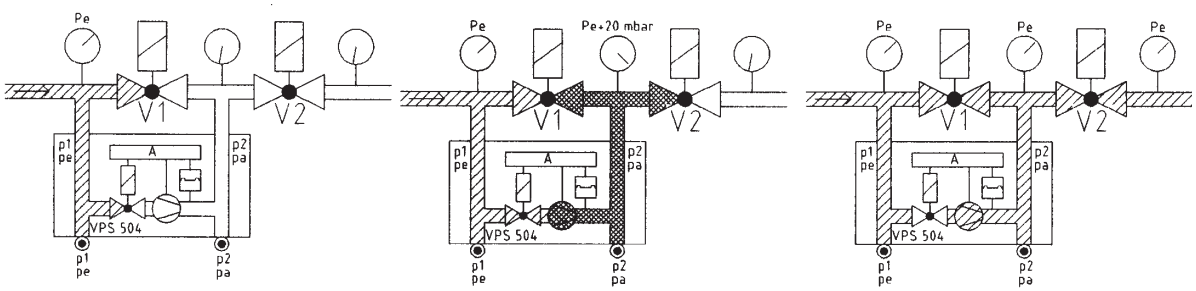
Idle state: Valves 1 and 2 are closed. Pressure buildup: The internal motor pump increases the gas pressure p_e in the section by approx. 20 mbar compared with the input pressure at valve V1. During the test time, the integrated diffferential pressure sensor monitors the test section for leaks. When the test pressure is attained, the motor pump switches off (end of test period). The release time (10-30 s) is dependent on the test volume (max. 4.0 l).

If the test section has no leaks, the contact is released to the control box after approx. 30 s and the yellow LED lights up.

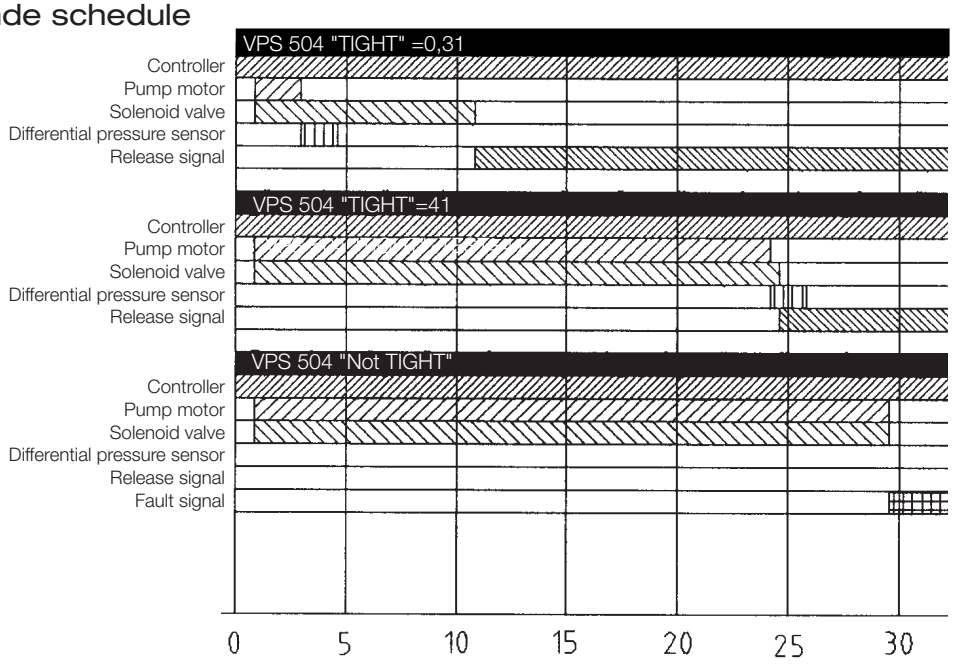
If the test section is leaky or if the pressure increase by + 20 mbar is not attained during the test period (max. 26 s), the VPS 504 generates a fault. The red LED is lit as long as the contact is released by the regulator (heat requirement).

After a short voltage drop during testing or during burner operation, an automatic restart is performed.

Programmer Idle state | Pressure buildup | Operation



Program sequende schedule



Electrical connection

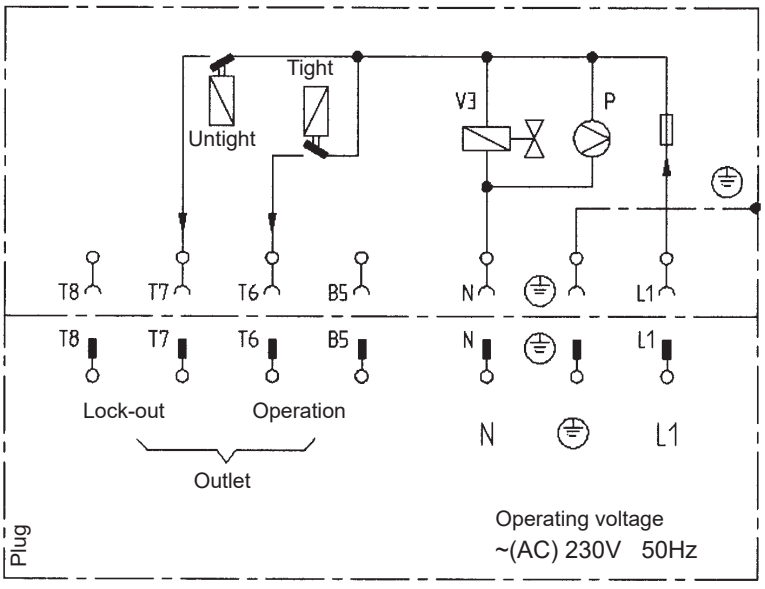
VPS 504 series 02

The VPS 504 is connected in series between the temperature regulator and the control box via a 7-pin plug connector.

Connect the boiler connector to the connector socket of the VPS 504.

For contact assignment of VPS 504 connector and heat generator connector, refer to wiring diagram.

Switching feature: No isolation between operating voltage circuit and control circuit.



13. Troubleshooting

Gas Burner

Conditions favourable to disruption-free operation of the system can only be guaranteed through the interaction between three factors – electricity, gas flow and combustion air. A change in any of these factors may cause disruptions.

It has been shown that a large proportion of disruptions can be attributed to relatively small things. Therefore, before requesting servicing, you should ascertain the following:

1. Are the system's gas taps open?
2. Are the fuses intact and is the power on?
3. Are control devices (room thermostat, boiler thermostat, etc.) correctly set?
4. Is gas pressure to the burner sufficient?
5. Are the burner controls on standby and not locked?
6. Is air supply to the burner adequate?

Cause of fault	Action
Burner does not start:	
No gas.	Make sure all gas taps are open.
No power.	Check the fuse, thermostat and electrical connections.
Burner motor does not start.	Motor protection has tripped. Motor faulty.
Burner control faulty.	Replace.
Burner motor running, no ignition spark at the end of pre-aeration:	
No power in the terminals.	Check the connector. Replace faulty burner controls.
Ignition electrodes in contact with each other or earth.	Adjust.
Ignition electrode porcelain damaged.	Replace the electrodes.
Poor connection to cable connectors.	Adjust connection.
Ignition cables damaged.	Replace.
Transformer damaged, no power to secondary winding.	Replace the transformer.
Ignition cable and ionisation cable swapped around.	Reconnect.
No flame propagation:	
Gas solenoid valve faulty.	Replace.
Gas solenoid valve does not open despite having power.	Replace solenoid valve terminals, or entire valve.
No power to solenoid valve.	Check the connection.
No electrical connection through air pressure gauge.	Check the air pressure gauge's settings and functions.
Ignition load incorrectly set.	Increase/decrease gas supply Reduce airflow.
Burner control faulty	Replace
Air pressure gauge incorrectly set or faulty	Check the settings and reset, or replace
No acknowledgement signal due to incorrect adjustment or misalignment of the control motor cams.	Check the settings and realign.

Cause of fault	Action
Burner trips after safety time limit despite flame propagation:	
No ionisation current or UV cell incorrectly positioned.	Adjust ionisation electrode and UV cell Check cables and connectors.
Burner control monitor faulty.	Replace burner control.
Voltage lower than 185 V.	Contact an electrician.
Ignition electrodes disrupting ionisation current.	Adjust ignition electrodes. Re-polarise the transformer.
Poor earth connection.	Ensure adequate earth connection.
Phase and neutral swapped around.	Check wiring diagram and change accordingly.
Burner trips during pre-aeration:	
Air sensor faulty or incorrectly set.	Increase/decrease air setting. Reduce air volume.
Ignition load incorrectly set.	Increase/decrease gas supply Reduce airflow.
Gas pressure too low.	Increase pressure. If necessary, contact gas supplier.
Pulsations at start-up:	
Ignition electrodes incorrectly set.	Adjust .
Gas pressure too high.	Check and adjust using pressure gauge and pressure control valve.
Flue gas side blocked.	Check the chimney flue.
Burner pulsates during operation:	
Burner incorrectly set.	Adjust.
Burner dirty.	Clean the burner.
Incorrect chimney.	Check and modify dimensions if necessary.
Burner functioning properly but with occasional blockage:	
Ionisation current too low.	Check. Must be at least 6 µA, but should ideally lie between 8 and 20 µA.
UV cell incorrectly positioned.	Adjust.
Voltage drop at certain times.	Must not drop below 15% of rated voltage. Contact an electrician if necessary.
Incorrectly set or faulty air sensor.	Check the settings and reset, or replace.
Ignition electrode overload.	Replace.
Burner control ambient temperature too high.	Insulate for heat, Max. 60 °C.
Ignition spark too weak.	Check the transformer.
Poor combustion:	
Poor draught conditions.	Check the chimney.
Flue gas temperature too high.	Boiler overloaded Decrease the gas volume, sweep the chimney if necessary.
CO_2 content too low.	Choke the air supply. Check the boiler for any leakages. Choke the draught if too high.

Cause of fault	Action
CO content too high:	
Surplus air when using natural gas and liquefied petroleum (propane, butane).	Choke the air supply.
Poor air supply.	Open the air supply. Check flue gas damper.
Holes in gas nozzle clogged.	Clean.
Poor fresh air intake.	Check and increase.
Flame at incorrect angle due to combustion head out of position.	Check the combustion head and readjust.
Condensation build up in boiler and chimney:	
Flue gas temperature too low or gas volume too low.	Raise the flue gas temperature by increasing gas volume Insulate the chimney.

14. General instructions for gasburners

14.5.1 Installation

1. Follow standards and instructions applicable to the installation of gas burners.
2. Ensure that the electric installation is made in accordance with existing regulations.
3. Check that the fresh air intake of the boiler room is sufficiently dimensioned.
4. Check by studying the data plate that the efficiency of the burner is adapted to the boiler output.
5. Check that the burner is adapted to the gas quality in question.
6. Check that the input pressure of the gas is correct.
7. Check that the dampers of the boiler are open.
8. Check that there is water in the system.
9. Check that thermostats etc. are correctly adjusted.
10. Read the instructions and follow the directions given for the burner as to starting-up and service.

14.5.2 Maintenance

General instructions

1. Keep the boiler room clean.
2. Ensure that the fresh air intake of the boiler room is not restricted.
3. Switch off the current and shut off the gas supply if the burner must be withdrawn from the boile.r
4. Do not use the boiler for burning paper and waste if there is no special arrangement (fire room) for this.

Normal operation

1. Ensure that the air supply to the burner is not obstructed by dust and dirt.
2. Have the installer make a yearly overhaul of the installation so that safety is not jeopardized.
3. Have the installer at the yearly overhaul also adjust the burner to ensure optimal combustion economy.
4. Check periodically that there is water in the system (fill up if necessary) and that thermostats etc. are normally adjusted.
5. Ensure that there is no water or dampness in contact with the burner.

14.5.3 If the burner has stopped

1. Press the reset button of the relay.
2. Check that the max. thermostat has not cut out.
3. Check other thermostats for example room ther mostat, if any.
4. Check that the gas pressure to the burner is sufficient.
5. Check that the electric fuses have not blown.
6. Make a new attempt to start the burner and check the counter of the gas meter to find out whether the solenoid valve opens.
7. If the burner does not start in spite of repeated starting attempts call the installer.

14.5.4 Shut-Off

1. Switch off the current with the main switch.
2. Shut-off the gas supply with the shut-off cock on the burner.

14.5.5 Warning

1. Never keep your face in front of the fire room door when starting up the burner.
2. Do not use naked flame when inspecting the fire room.

Authorized installer::

Address: ---

Telephone: ---

Bentone®

Service- and inspection card

Installation	Boiler	
Name:	Type:	Efficiency kW:
Address:	Burner	
	Type:	Efficiency kW:
Installed by:	Date:	

Date		Governor		CO_2	CO	Fluegas temp	Ionisation current	Pressure		Efficiency
	Nm^3 gas/h							Fire room	Chimney	
Measu-rement		Before	After	%	%	°C	µ A	mbar	mbar	%
	Small Flame									
	Large Flame									
	Measures									

Date		Governor		CO_2	CO	Fluegas temp	Ionisation current	Pressure		Efficiency
	Nm^3 gas/h							Fire room	Chimney	
Measu-rement		Before	After	%	%	°C	µ A	mbar	mbar	%
	Small Flame									
	Large Flame									
	Measures									

Date		Governor		CO_2	CO	Fluegas temp	Ionisation current	Pressure		Efficiency
	Nm^3 gas/h							Fire room	Chimney	
Measu-rement		Before	After	%	%	°C	µ A	mbar	mbar	%
	Small Flame									
	Large Flame									
	Measures									

EU Declaration of conformity

CE

Bentone Gas Burners

Certificate No.	Type	Certificate No.	Type
CE-0123CT1269	BFG 1	CE-0123CT1326	BG 550
CE-0123CT1270	STG 120	CE-0123CT1337	BG 600
CE-0123CT1281	STG 146	CE-0123CT1348	BG 650
CE-0123CT1292	BG 300	CE-0123CT1359	BG 700
CE-0123CT1304	BG 400	CE-0123CT1360	BG 800
CE-0123CT1315	BG 450	CE-0123CT1371	BG 950

This declaration of conformity is issued under the sole responsibility of the manufacturer. The object of the declaration described above is in conformity with:

Gas Appliance Regulation 2016/426/EU

Machinery Directive 2006/42/EC

EMC 2014/30/EU

Restriction of the use of certain hazardous substances (RoHS) Directive 2011/65/EU

References to the relevant harmonised standards used or references to the other technical specifications in relation to which conformity is declared:

EN 676+A2:2008	Fullfiels the requirements of Annex J/K. Automatic forced draught burners for gaseous fuels.

Additional information can be downloaded at:

www.bentone.com

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Ljungby, January 26th 2021

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