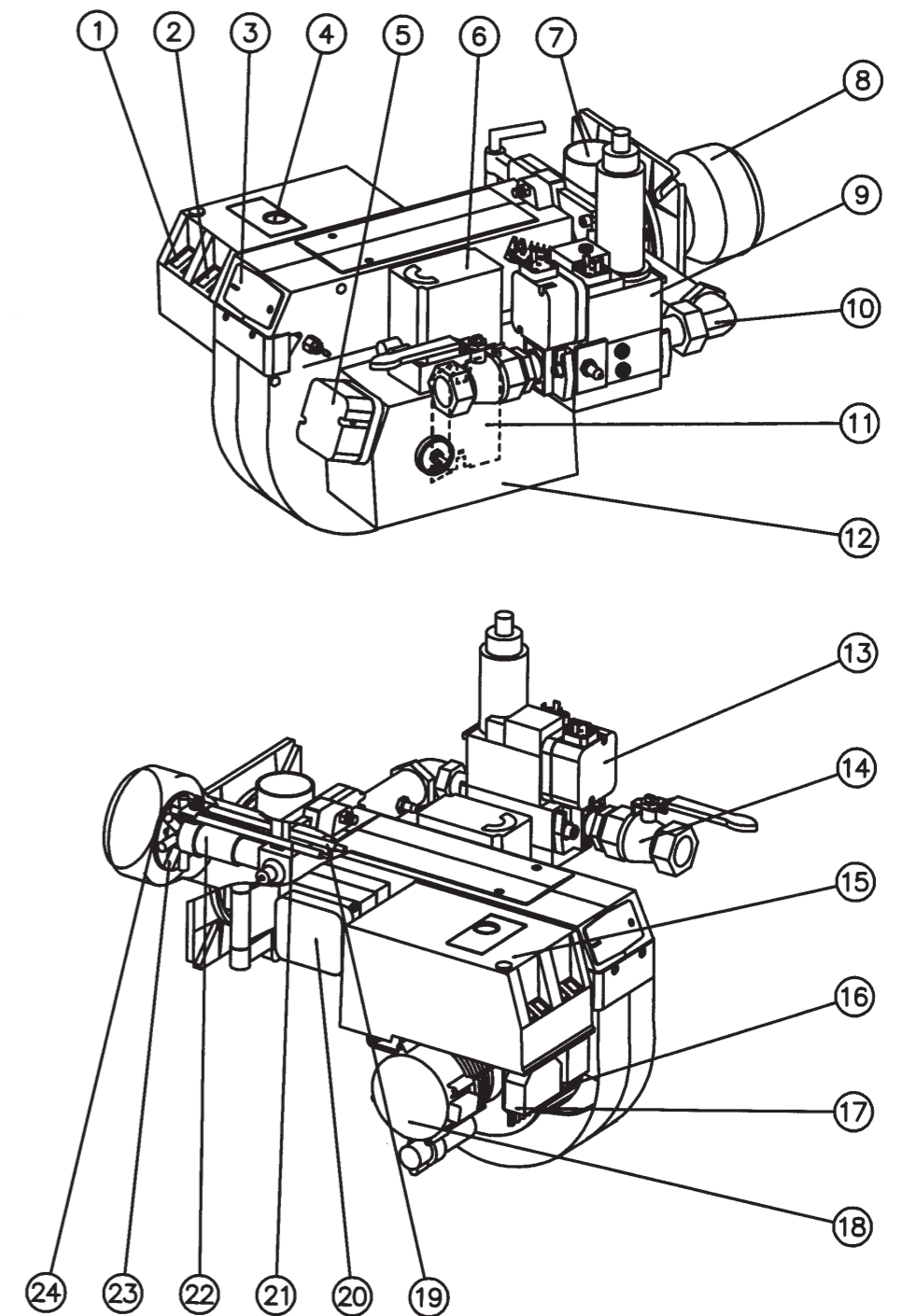


Installation- and maintenance instruction
BG 400 M

DESCRIPTION

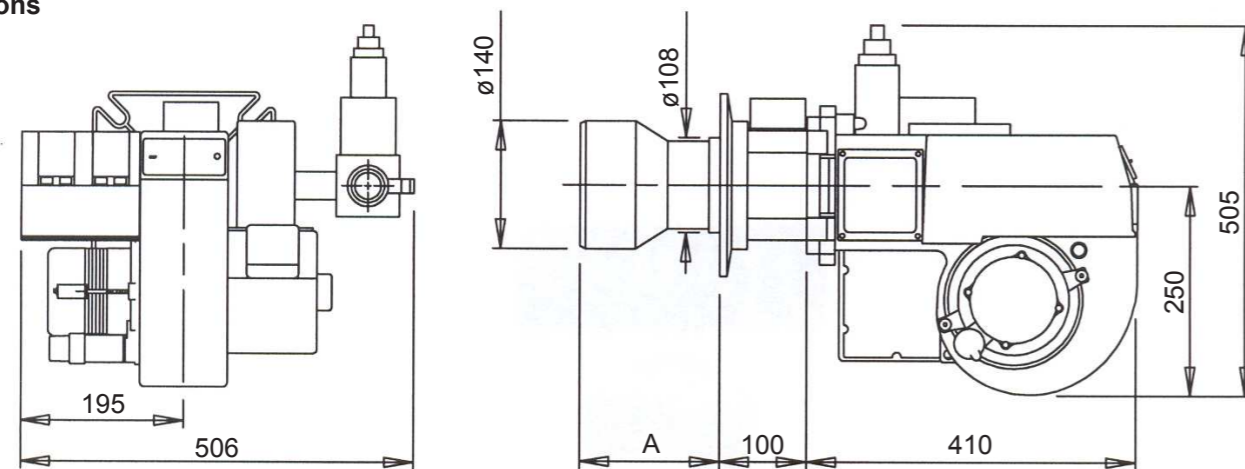


Components

- | | | |
|--|-------------------------|---------------------------|
| 1. Switch 0-I | 9. Multibloc | 17. Electrical connection |
| 2. Switch I-II | 10. Connecting pipe | 18. Motor |
| 3. Cover, inspection glass | 11. Air damper | 19. Ignition electrode |
| 4. Reset button | 12. Air intake | 20. Transformer |
| 5. Air pressure switch | 13. Gas pressure switch | 21. Ionization electrode |
| 6. Damper motor | 14. Ball valve | 22. Inner assembly |
| 7. Inner assembly adjustment
(not for town gas) | 15. Electrical panel | 23. Nozzle |
| 8. Flame cone | 16. Fan wheel | 24. Brake plate |

TECHNICAL DATA

Type designation BG 400
Dimensions



	Length of burner tube	Flange Measure A
Standard	172	155
Long design	272	255
Town gas	172	155

The above dimensions are max. measurements. Depending on the components used, the measurements may vary.

Output range

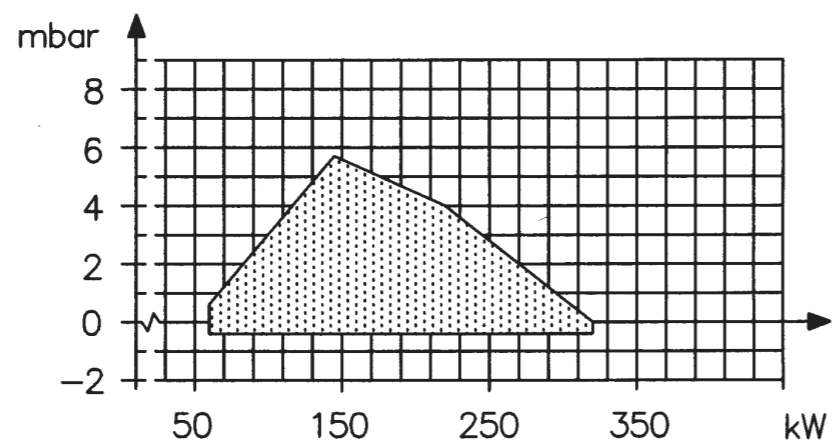
Type	Capacity kW	Gas volume at a min. output Nm ³ /h ¹⁾		Gas volume at a max. output Nm ³ /h ¹⁾		Max. inlet pressure mbar	Rated inlet pressure mbar	
		Natural gas	LPG	Natural gas	LPG		Natural gas	LPG
400	60-318	6	2,3 (5,0 kg/h)	31,8	12,2 (24,8 kg/h)	100	20	20
	²⁾ Town gas	²⁾ Town gas		²⁾ Town gas			²⁾ Town gas	

Connection ²⁾	Motor	Ignition transformer
Natural gas/LPG 1"	1-phase, 0,25 kW 2800 r/m, 230V	Primary 230 V, 1 A Secondary 8 000 V
²⁾ Town gas		

¹⁾ Calorific value:
Natural gas 10 kWh/Nm³
LPG 26 kWh/Nm³

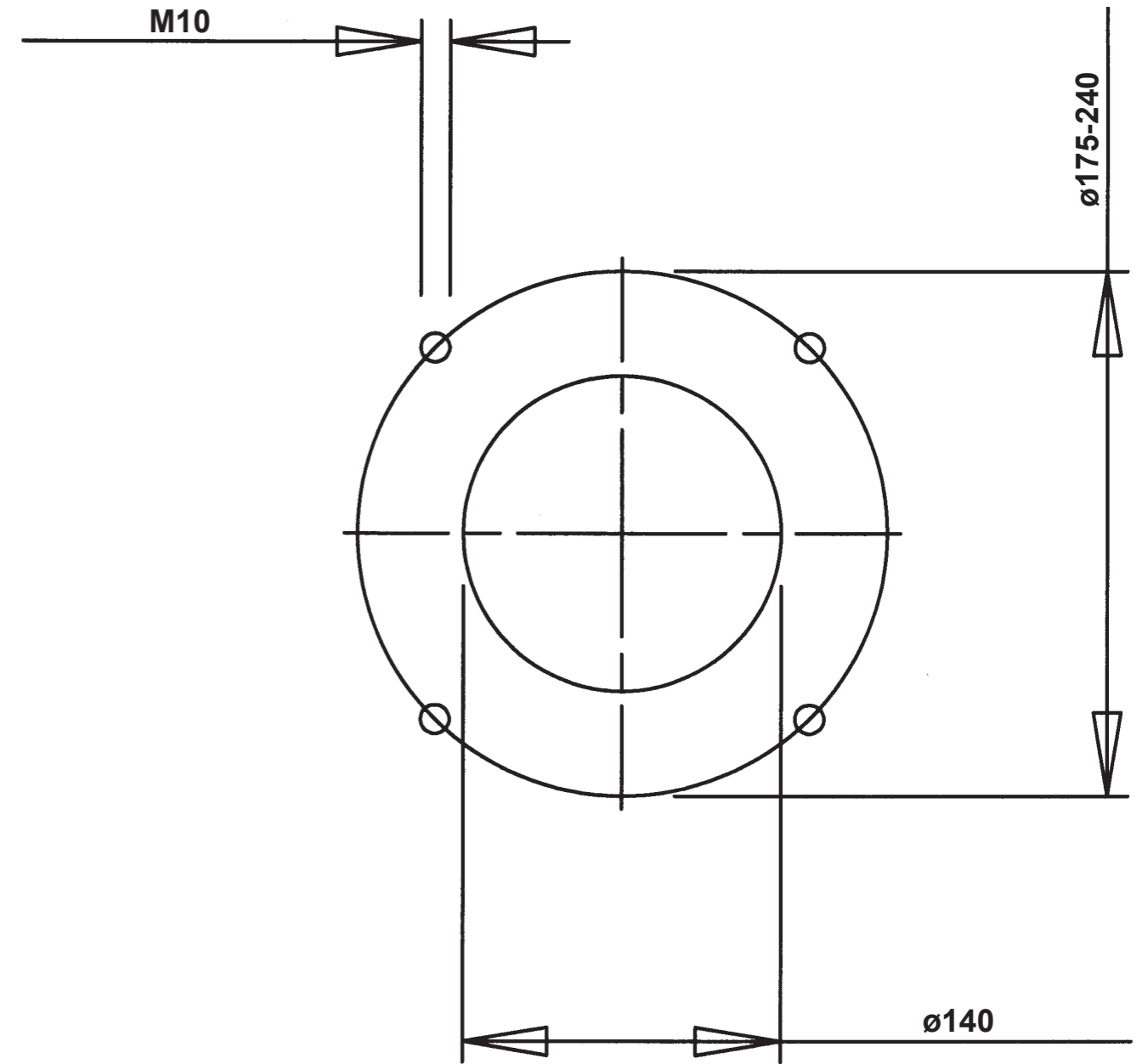
²⁾ Dimension and capacity depending on gas quality and available pressure

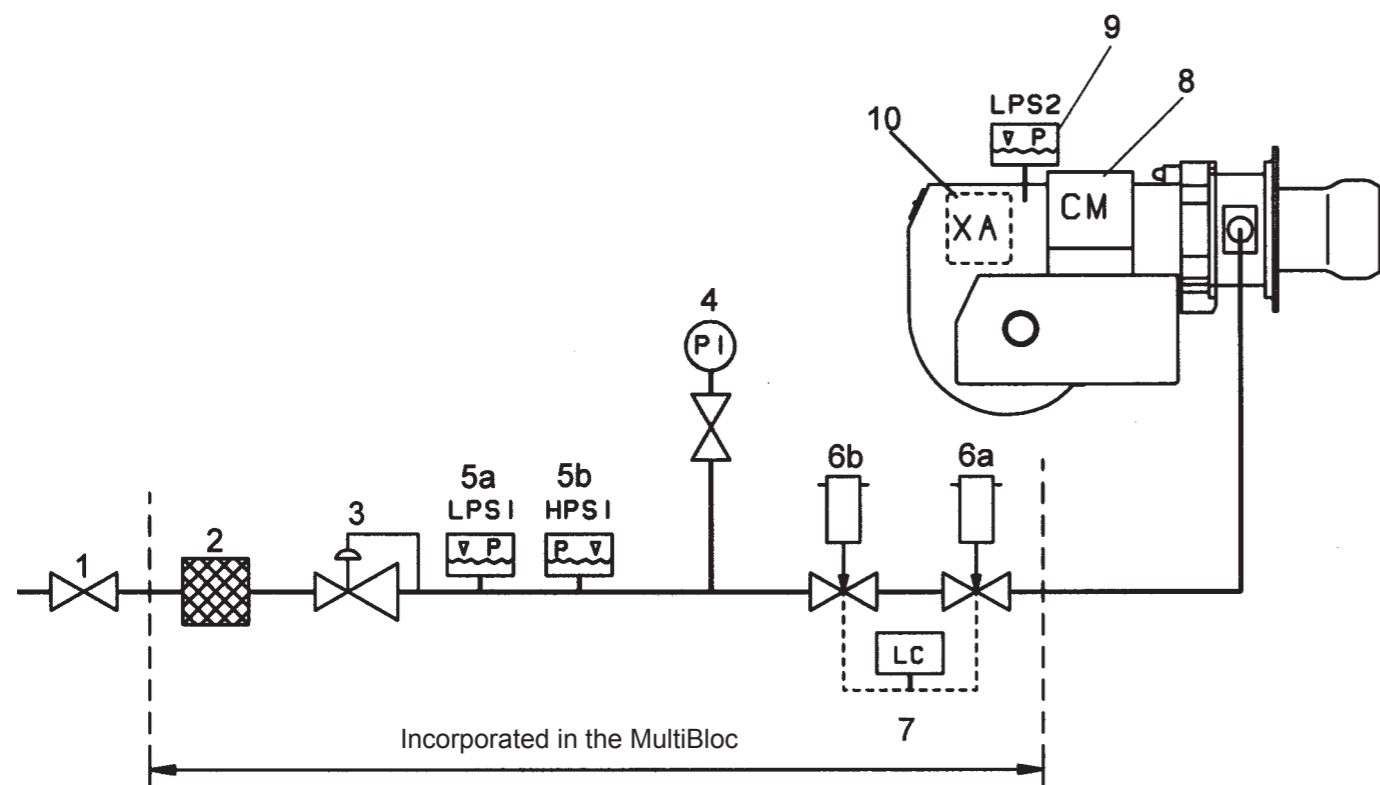
Capacity chart according to EN 676



TECHNICAL DATA

Dimensions of flange





- | | | |
|--|---------------------------------------|--|
| 1. Ball valve | 6b. Safety valve | Pos. 5b, 7: Components not required according to EN 676. |
| 2. Filter | ¹⁾ 7. Valve proving system | |
| 3. Governor | 8. Air damper motor | ¹⁾ Required over 1200 kW according to EN 676. |
| 4. Pressure gauge with shut-off cock | 9. Air pressure switch | |
| 5a. Gas pressure switch, mini | 10. Gas burner control | |
| 5b. Gas pressure switch, maxi | | |
| 6a. Main valve, 2 -stage. When modulating operation is required this valve is equipped with controls for variable opening. | | |



When Bio gas is used, Bentone shall always be contacted.

We
 (supplier's name)
ENERTECH AB
 (Address)
Box 309, S-341 26 Ljungby, Sverige

declare under our sole responsibility that the product
 (name, type or model, batch or serial number, possibly sources and number of items)
BG100, BG150, BG200, STG120, STG146, BG300, BG300LN, BG400, BG400LN, BG450, BG450LN, BG500, BG550, BG550LN, BG600, BG600LN, BG650, BG700, BG 700LN, BG800, BG800LN and BG950
all fan gas burners

to which this declaration relates is in conformity with the following standard(s) or the normative document(s)
 (title and/or number and date of issue of the standard(s) or other normative document(s))
EN 676, DIN 4788

following the provisions of Directive
 (if applicable)
Gas directive 90 / 396 / EEC, EMC directive 89 / 336 / EEC och Low voltage directive 73 / 23 / EEC

Ljungby 090126
 (Place and date of issue)
ENERTECH AB
Sven-Olov Lövgren

(name and signature of equivalent marking of authorized person)

CAUSE

The ambient temperature of the gas relay is too high

The ignition spark is too weak

Bad combustion

Bad draught conditions

The flue gas temperature is too high

The CO₂-content is too low

The CO-content is too high

Excess air when using natural gas and gasoil (propane, butane)

Air shortage

The holes in the gas nozzle are clogged

The fresh air intake is too small

The flame is not burning straight because the burner head is out of position

Condensation in boiler and chimney

The flow gas temperature is too low or the quantity of gas is not sufficient

REMEDY

Heat insulate, max. 60° C.

Check the transformer

Check the chimney

The boiler is overloaded. Reduce the quantity of gas.

Check the boiler with regard to leaks. Choke the draught if it is too high.

Choke the air.

Open the air supply. Check the flue gas damper.

Clean.

Check and enlarge.

Check the burner head and readjust.

Increase the flue gas temperature by increasing the gas supply. Insulate the chimney

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.

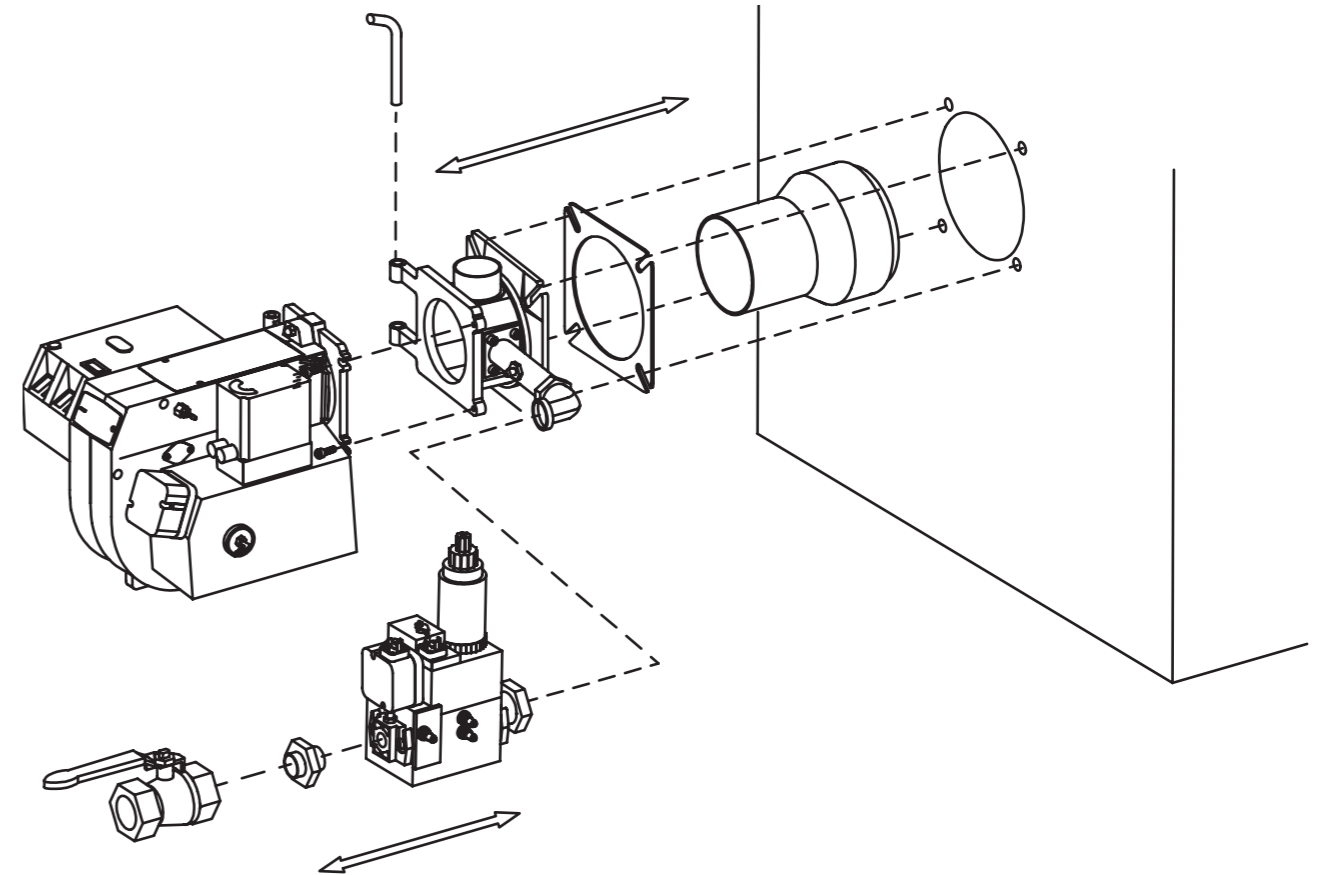
Removal of valve unit from burner
Remove the plug-in contact from the multi-bloc. Loosen the union nut. absolutely straight.

Removal of fan house unit from burner.

Loosen the screws. Swing out the fan house. Remove the ionisation and ignition cables from the electrodes. Remove the bolt on the flange.

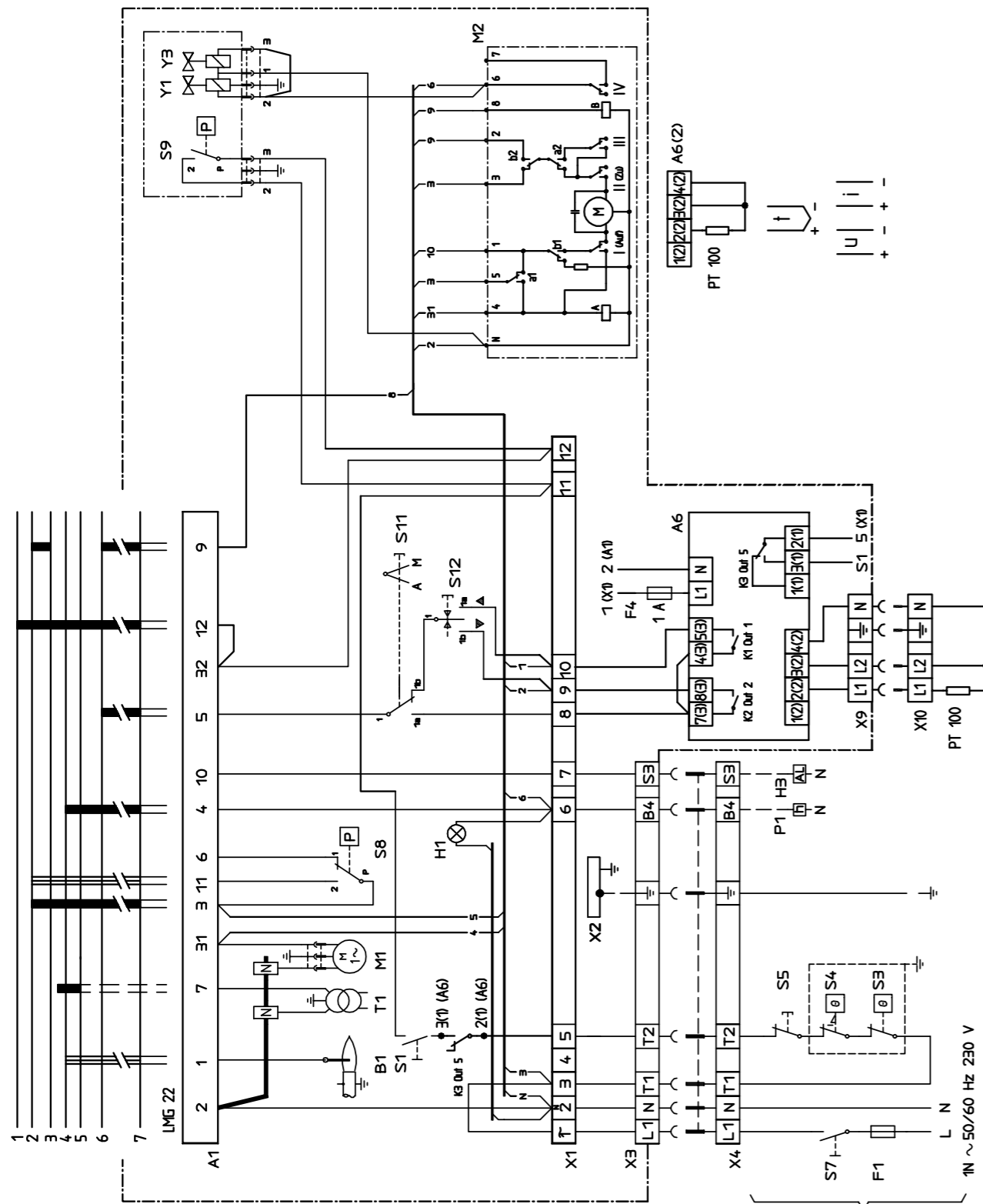
Installation example

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.



ELECTRIC EQUIPMENT

Gas burner control: LMG22.../LME22... Wiring diagram



If there is no Plug-in contact (X4) on the boiler, connect to the contact enclosed.

CAUSE

Voltage lower than 185 V

The ignition electrodes are disturbing the ionisation current

Bad earthing

Phase and neutral transposed

The burner locks out during pre-purge

Air pressure switch defective or incorrectly adjusted

The starting load is not correctly adjusted

The gas pressure is too low

Pulsations at start

The ignition electrodes are wrongly adjusted

The gas pressure is too high

The flue gas side is blocked

Pulsations during operation

The burner is not correctly adjusted

The burner is dirty

Defective chimney

The burner is operating correctly but locking out now and then

The ionisation current is too low

The UV-cell is in a wrong position

Voltage drop at certain times

Air pressure switch defective or incorrectly adjusted

Spark-over in ignition electrodes

REMEDY

Contact the electricity authorities.

Adjust the ignition electrodes, repole the ignition transformer if necessary.

Arrange for proper earthing.

See wiring diagram and change.

Reduce or increase the gas supply. Reduce the quantity of air.

Increase the pressure. Contact the gas supply company if necessary.

Readjust.

Check and adjust by means of a pressure gauge and a pressure adjustment valve.

Check the chimney flue.

Readjust

Clean the burner.

Check and change the dimensions if necessary.

Check. Must be at least 4 μ A according to the relay manufacturer but should be 8-20 μ A.

Adjust.

Must not drop more than 15% of the rated current. Contact the electricity authorities if necessary.

Replace the electrodes

CAUSE

REMEDY

The cable shoes have bad contact	Improve the contact
The ignition cables are damaged	Replace
The ignition transformer is damaged, no voltage on the secondary side	Replace the transformer
The ignition cable and the ionisation cable have been transposed.	Change
No flame establishment in spite of a trouble free start	
The gas solenoid valve defective	Replace
The gas solenoid valve does not open in spite of its obtaining voltage	Replace coil or the whole valve if necessary.
No voltage to the solenoid valve	Check the contact
No electrical connection through the air pressure switch	Test the adjustment and the function of the air pressure switch
The starting load is not correctly adjusted	Reduce or increase the gas supply, reduce the quantity of air
Gas relay defective	Replace
Air pressure switch incorrectly adjusted or defective	Check the adjustment and readjust.
No reponse as the cams of the servomotor are not correctly adjusted or out of position.	
The burner locks out after the safety time has elapsed in spite of flame establishment	
No ionisation current or the UV-cell in wrong position	Adjust the ionisation electrode and the UV-cell, examine cables and connections.
The supervision part of the gas relay is defective	Replace the relay

ELECTRIC EQUIPMENT

Gas burner control: LMG22.../LME22...

List of components

A1	Gas burner control	S7	Main switch
A6	Power control R316	S8	Air pressure switch
A6(2)	PT 100-sensor, Thermocouple, current/voltage	S9	Gas pressure switch
B1	Ionization electrode	S11	Change-over switch, Aut.-Man.
F1	Operating fuse	S12	Change-over switch, Increase-Decrease
F4	Operating fuse 1A	T1	Ignition transformer
H1	Operating lamp	X1	Connection terminal board
H3	Alarm signal 230 V	X2	Earth terminal
M1	Burner motor	X3	Plug-in contact, burner
M2	Damper Motor L&S SQN75.624A21B	X4	Plug-in contact, boiler
P1	Time meter, total operating time	X9	Plug-in contact, power controller R316 burner
S1	Operating switch	X10	Plug-in contact, power controller R316
S3	Control thermostat	Y1	Gas solenoid valve 1
S4	Temperature limiter	Y3	Safety solenoid valve
S5	Micro switch for hinged door		

Mains connection in fuse in accordance with local regulations.

Function

1. Operating switch ON-Thermostat ON-Gas pressure switch ON-Air damper closed.

A control is made that the air pressure switch does **not** indicate fan pressure Then the burner motor starts.

2. Air damper motor opens.

The air damper motor opens the damper to max. position. A control is made that the air pressure switch indicates sufficient fan pressure.

3. Air damper motor closes.

The air damper motor closes to min. load position. Then the ignition spark is formed.

4. Main and safety valves open

The gas is ignited. The ionization electrode indicates a flame.

5. The safety time expires.

The ignition spark goes out. The safety time expires. If there is no flame or if for some reason the flame disappears after this time limit, the burner control locks out.

6. Operating position.

The burner is in operating position and can now change over to the capacity controlled by the regulator.

7. Stop.

The operation of the burner can now be interrupted by means of the operating switch or the thermostat.

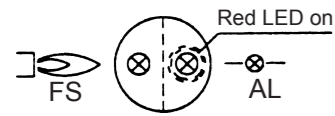
8. The control locks out.

The red lamp in the control is lit. Restart the burner by pressing the reset button.

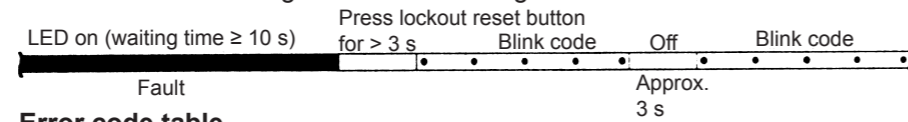
ELECTRIC EQUIPMENT

Control diagnosis under fault conditions and lockout indication LMG

Diagnosis of cause of fault



After lockout, the red fault LED is steady on. For reading the cause of fault, refer to the blink code given in the following table:



Error code table

Blink code	Possible cause
2 x ••	<ul style="list-style-type: none"> No establishment of flame at the end of «TSA» Faulty or soiled detector electrode Faulty or soiled fuel valves Poor adjustment of burner
3 x •••	<ul style="list-style-type: none"> Air pressure monitor does not close «LP» faulty «LP» incorrectly adjusted Fan motor does not run
4 x ••••	<ul style="list-style-type: none"> Air pressure monitor does not open or extraneous light on burner startup «LP» faulty «LP» incorrectly adjusted
5 x •••••	<ul style="list-style-type: none"> Extraneous light during pre-purging Or internal device fault
6 x ••••••	Free
7 x •••••••	<ul style="list-style-type: none"> Loss of flame during operation Poor adjustment of burner Faulty or soiled fuel valves Short-circuit between detector electrode and ground
8...17 x •••••••• •••••••• ••••••••	Free
18x •••••••• ••••••••	<ul style="list-style-type: none"> Air pressure monitor opens during pre-purging or operation «LP» incorrectly adjusted Four times loss of flame during operation(LMG25)
19 x •••••••• ••••••••	<ul style="list-style-type: none"> Faulty output contact Wiring error External power supply on output terminal
20 x •••••••• ••••••••	Internal device fault

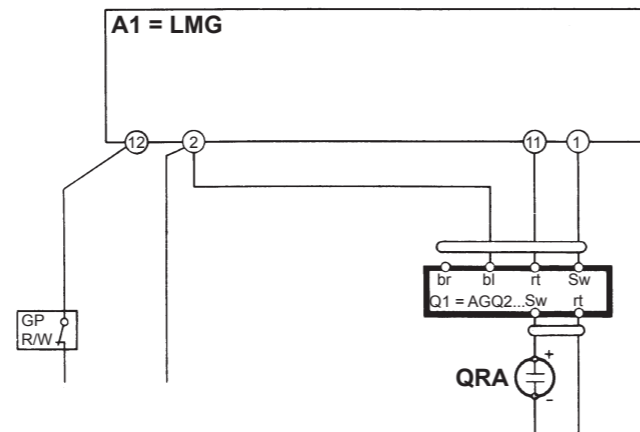
During the time the cause of the fault is diagnosed, the control outputs are deactivated.

- The burner remains shut down
- Exception: fault status signal «AL» at terminal 10

The burner is switched on only after a reset is made.

- Press lockout reset button for 0.5...3 seconds

Connecting signal amplifier



3(5)

172 435 88 08-01

FAULT LOCATION GUIDE

Gas burner

The basis for trouble free operation can only be ensured by the correct combined effect of the three factors: electricity, gas flow and combustion air. Should any of these factors change troubles may arise.

To facilitate fault location we have drawn up a scheme showing the most frequent faults in a gas burner installation and the remedies.

It has been proved that many troubles have rather simple causes. Before calling the serviceman the following checks should be made:

1. Are the gas cocks of the installation open?
2. Are the fuses in order and the current switched on?
3. Are the controls (room thermostat, boiler thermostat etc.) correctly adjusted?
4. Is the gas pressure to the burner sufficient?
5. Is the gas relay of the burner ready for start and not locked out?
6. Is the air supply to the burner sufficient?

CAUSE

REMEDY

The burner does not start

No gas

Check that all gas cocks are open.

No voltage

Check fuses, thermostats and electrical connections

The burner motor fails to start

The thermal protection has locked out. Motor defective.

The gas relay is defective

Replace

Burner motor is running but no ignition after the prepurge time has elapsed

No voltage on the terminals

Check the contact. Replace faulty relay

The ignition electrodes in contact with each other or with earth

Adjust

The porcelain of the electrodes is broken

Replace the electrodes

1(4)

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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 only be carried out by authorized people.

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.

ELECTRIC EQUIPMENT

Control program when disruption; disruption display LME

Colour codes

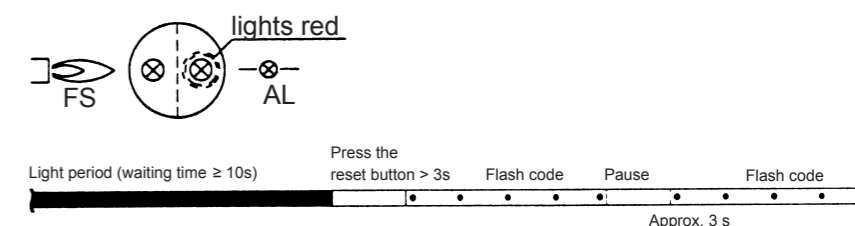
Colour code table for multi-coloured signal lamps (Light diodes)		
Status	Colour codes	Colours
Waiting time «tw», other waiting times	○.....	Off.
Ignition phase, ignition checked	•○•○•○•○•	Flashing yellow.
Normal operation	□.....	Green.
Operation, poor flame signal	□○□○□○□○□○	Flashing green.
Prohibited flame signal during start up	□▲□▲□▲□▲□▲	Green-Red.
Undervoltage	●▲●▲●▲●▲	Yellow-Red.
Disruption, alarm	▲.....	Red.
Flashing code for fault codes	▲○▲○▲○▲○	Flashing red.
Interface diagnostics	▲▲▲▲▲▲▲▲	Red flickering.

..... Continuous
 ○ Off

▲ Red
 ● Yellow
 □ Green

Diagnostics alarm trigger

The red alarm signal lamp lights continuously after the alarm is disconnected. Diagnostics for alarm triggers can be read as specified by the following sequence:



Limit on start attempts

LME 11 ... limits the number of start attempts if the flame does not ignite on start-up or goes out during operation. LME 11 ... permits a maximum of three start attempts if the start cycle is uninterrupted.

Alarm control table LME

Red flashing code on signal lamp (LED))	Possible causes
Flashing 2 x ••	No flame at End of «TSA». - Defective or obscured flame monitor. - Defective or obscured fuel valves. - Poor burner installation. - Defective ignition unit.
Flashing 3 x •••	«LP» defective. - No air monitor signal after «t10». - «LP» is welded in the open position.
Flashing 4 x ••••	Prohibited flame signal during start up.
Flashing 5 x •••••	Time out «LP» - «LP» is welded in the closed position.
Flashing 6 x ••••••	Free
Flashing 7 x •••••••	Too many loss of flame during operation. - Poor burner installation. - Defective or obscured fuel valves. - Defective or obscured flame monitor.
Flashing 8x ••••••••	Free
Flashing 9x •••••••••	Free
Flashing 10 x ••••••••••	Connection fault or internal fault, outgoing contacts or other fault.
Flashing 14 x ••••••••••••	CPI contact not closed.

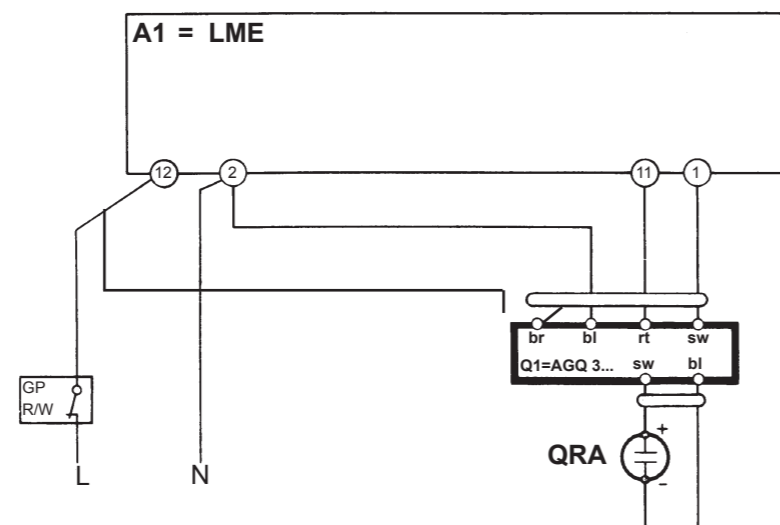
During alarm trigger diagnostics, control outputs are to be disconnected from all power.

- The burner is disconnected.
- Exception, the «AL» alarm signal at connection block 10. The burner is only to be reconnected after it is reset.
- Press the reset button 0.5...3 s.

Interface diagnostics

To switch to interface mode, hold the reset button depressed for more than 3 s. To return to normal mode, hold the reset button depressed for more than 3 s. If the firing unit is in the alarm mode, it is reset by pressing the reset button 0.5...3 s.

Connecting signal amplifier



5(5)

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Flame monitoring and measurement of ionisation current

The burner is monitored according to the ionisation principle. Check the ionisation current on start-up and on each service call.

The reason for a low ionisation current may be leaking currents, bad connection to earth, dirt or a faulty position of the flame electrode in the burner head. Sometimes also a faulty gas/air mixture may cause too weak a ionisation current.

The ionisation current is measured by means of a microampere meter (μA) connected in series with the flame electrode and the gas burner control.

Connect the μA -meter, see figure. Min. required ionisation current according to table. In practice this current must be considerably higher, preferably more than 10 μA . All the gas burners are equipped with a ionisation cable that can be slit which facilitates the connection of the μA -device.

Gas pressure switches:

- Adjustment range:
2,5-50 mbar GW 50
5-150 mbar GW 150

Adjustment of min. gas pressure switch

The min. pressure switch should react if the gas pressure is too low and prevent the burner from starting. Too low a gas pressure during operation should stop the burner. The burner may start again when the rated gas pressure has been reached.

Remove the protective cover. Connect a pressure gauge for measuring the rated pressure. Decide on pressure at which the gas switch should switch off. Set this pressure by means of the valve. Carefully turn the knob (see figure) until the gas pressure switch switches off. The value shown on the scale should then approximately correspond with the value shown on the pressure gauge. Tolerance on scale appr. $\pm 15\%$. Open the ball valve.

Adjustment of max. gas pressure switch

The burner is equipped with a max. gas pressure switch only on request. It should stop the burner if the gas pressure exceeds the set value. The burner can then only be re-started manually (gas burner control or overpressure switch).

Remove the protective cover. Connect a pressure gauge for measuring the rated gas pressure. Decide on pressure at which the gas pressure switch should switch off. Turn the adjustment knob to this value. Tolerance on the scale $\pm 15\%$.

Adjustment of air pressure switch

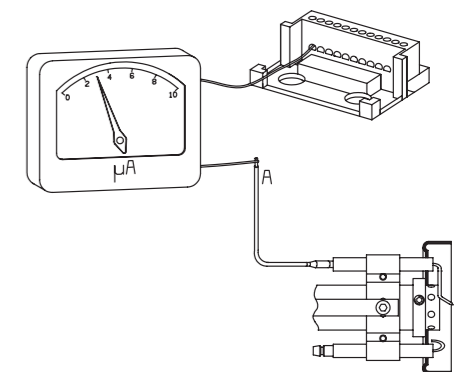
The air pressure switch should stop the burner if the air volume is reduced. The air proving device shall be adjusted in such a way that if there is insufficient air supply at the highest or lowest burner operating stage, the device operates before the supervised pressure is less than 80% of the pressure at the controlled stage and the CO content of the combustion products exceeds 1% by volume.

Air pressure switch:

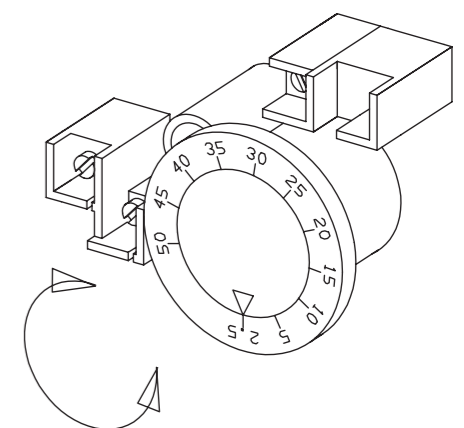
- Adjustment range ca:
1-10 mbar LGW 10
2,5-50 mbar LGW 50

Gas control	Connection to terminal in gas control	Min. ionisation current required
LME	1	5 μA
LGB	1	10 μA
LFL	24	10 μA
MMI 810	2	5 μA
TMG 740-3	1	5 μA

Flame monitoring



Gas pressure switch, air pressure switch



GENERAL INSTRUCTIONS

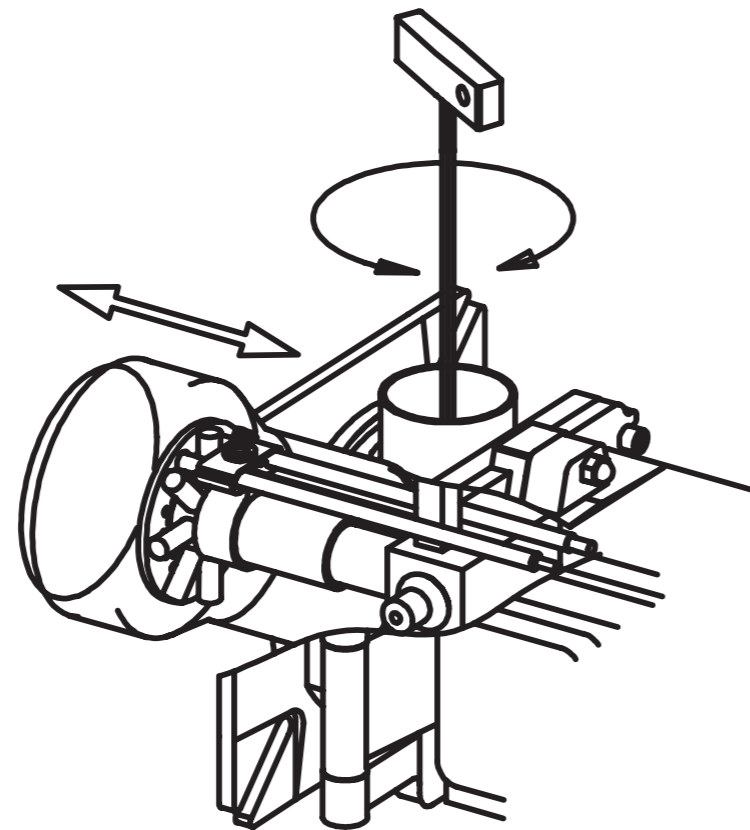
Adjustment of brake plate

- Loosen the screw on the adjustment device.
- To reduce the opening: turn the knob to the left.
- To increase the opening: turn the knob to the right.

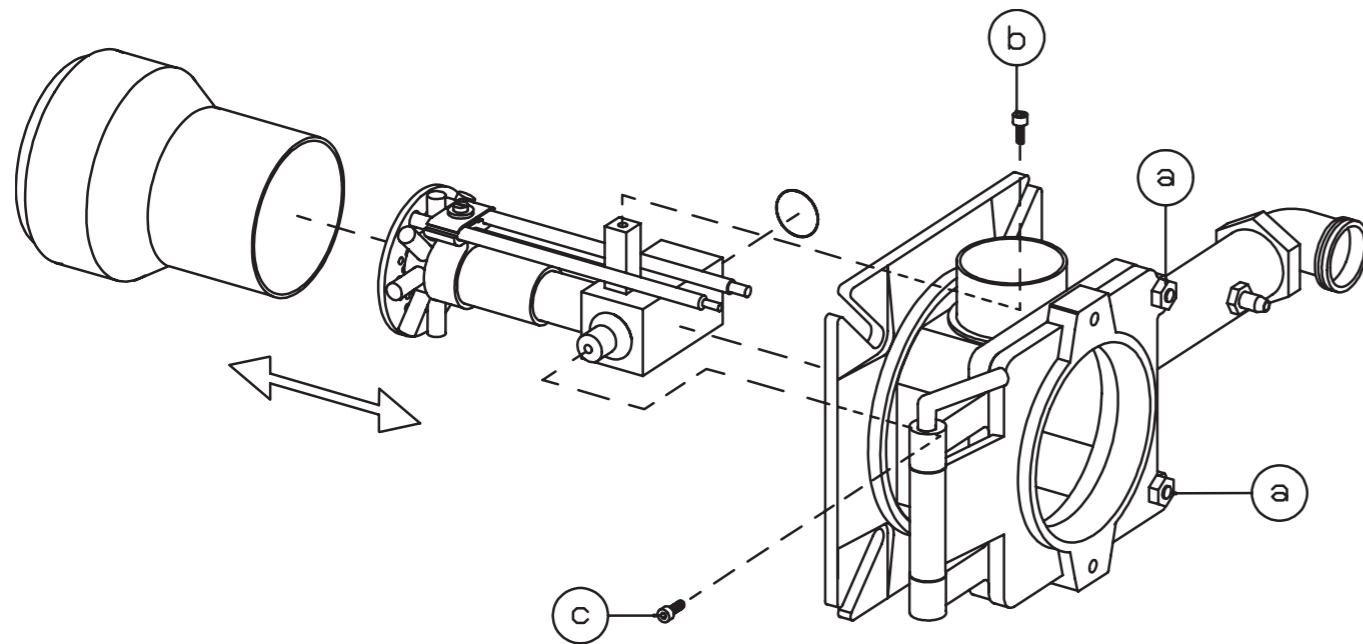
The adjustment of the position of the brake plate affects the air flow. It is therefore always necessary to make a fine adjustment of the air by means of the air adjustment device of the burner.

Control of burner head

To check the burner head, brake plate and electrodes proceed as follows: Loosen the nuts a. Swing out the burner. Remove the screw b and the knob for adjustment of burner head. Loosen the screw c so much so that the inner assembly can be pulled out.



Adjustment of inner assembly



Control of burner head

MEASURES AND CHECKS BEFORE START-UP,

2-STAGE- OR MODULATING BURNERS

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.

Inner assembly

Ensure that the ignition and ionisation electrodes are correctly adjusted. The sketch shows the correct measurements.

Gas quality

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

Venting

The gas line is vented by loosening the screw on the test nipple for the inlet pressure. Connect a plastic hose and conduct the gas into the open. **After having vented the gas line tighten the screw again.**

Leakage control

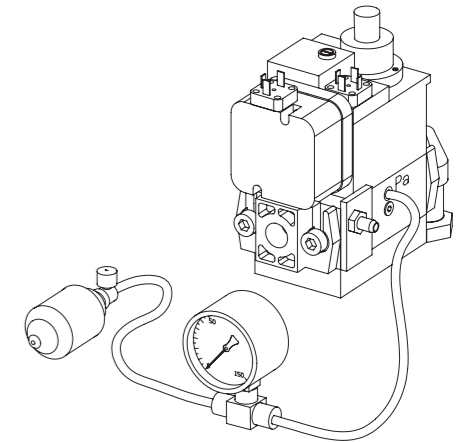
When making a leakage control of the gas supply system the solenoid valve should be closed. Connect a pressure gauge to the test nipple Pa, see fig. The test pressure in the system should be 1,5x max. inlet pressure or min. 150 mbar. If any leakage, locate the source by means of soapy water or a leak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

Electric function test:

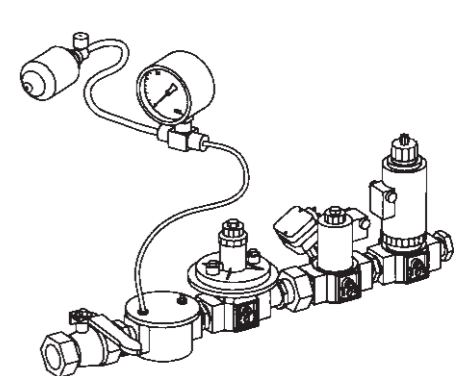
Ensure that phase and neutral are not reversed. The gas shut-off cock should be closed. To prevent the gas pressure switch from locking out it should be linked temporarily. After the main switch has been switched on and the thermostats have been adjusted the pre-purging period begins (30-35sec.). At 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.

Leakage control

MultiBloc



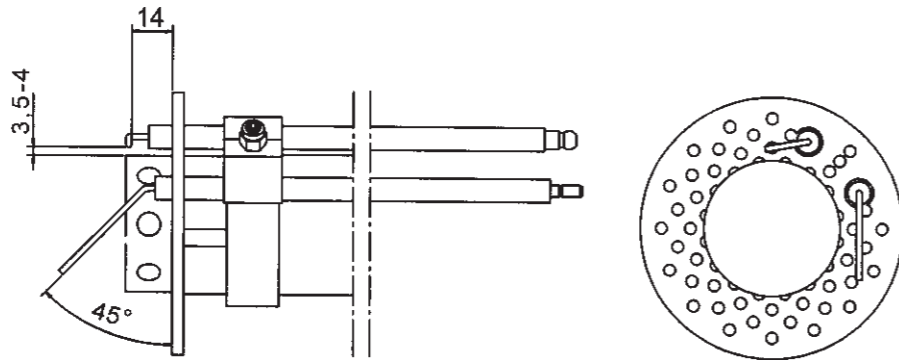
Gas train



MEASURES AND CHECKS BEFORE START-UP

INNER ASSEMBLY

Town gas

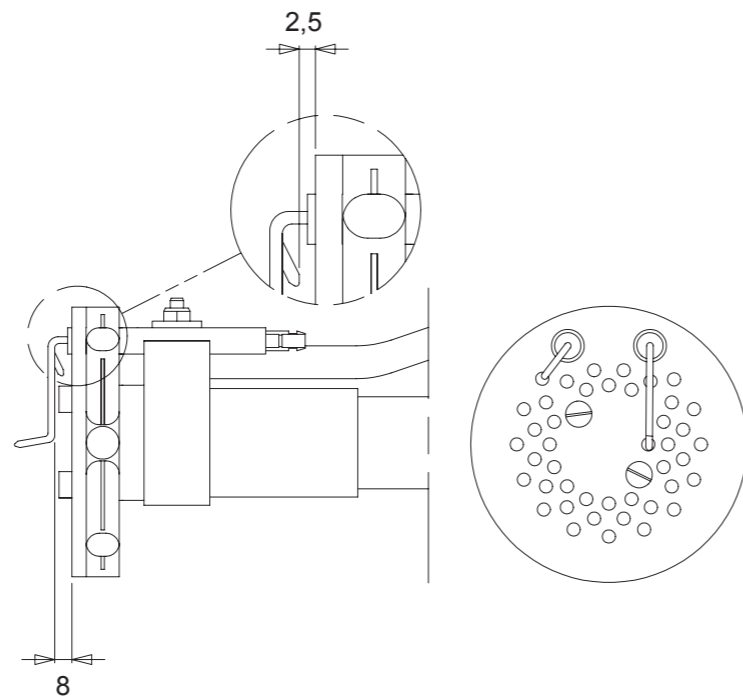
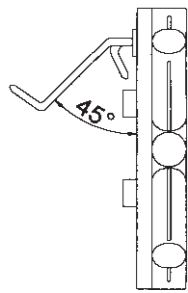


INNER ASSEMBLY

Natural gas, LPG

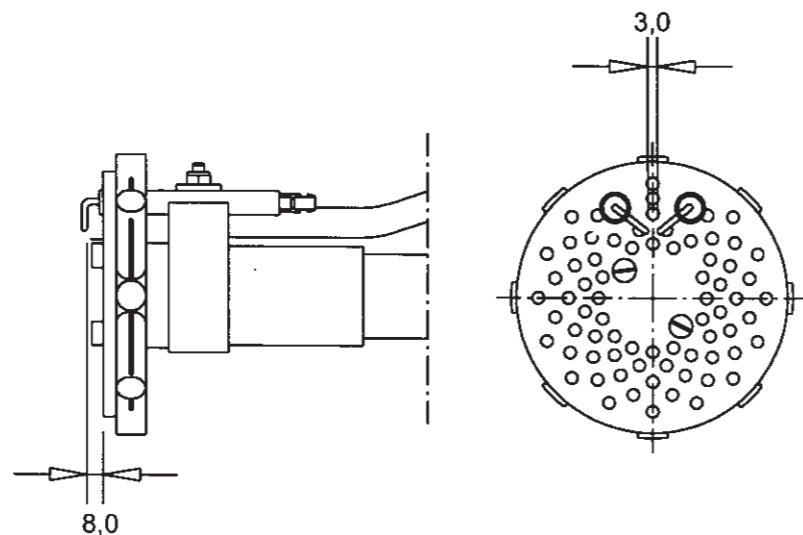
LPG

Natural gas



INNER ASSEMBLY

Biogas (UV-detector)



GENERAL INSTRUCTIONS

Adjustment of burner

The burner is from the factory pre-set to an average value that must then be adjusted to the boiler in question. All burner adjustments must be made in accordance with boiler manufacturer's instructions. These must include the checking of flue gas temperatures, average water temperature and CO₂ or O₂ concentration.

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.

Operating instructions

The operating instructions accompanying the burner should be left in a prominent position in the boiler room.

Instructions

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

Inspection and maintenance

Daily inspection is advisable.

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.

However, 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.

Adjustment of burner head

The burner is equipped with an adjustment device changing the position of the brake plate in the burner head. This is used to adjust the correct pressure drop over the combustion device in order to obtain a good pulsation free combustion.

Which position to use depends on input and overpressure in the boiler.

A general rule is that the lower capacity the smaller the opening between brake plate and combustion device.

Commissioning of installation

Control of the combustion. The combustion quality is checked by means of a flue gas analysis device. Adjust the burner to approx. 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.

Service

Service should only be carried out by qualified personnel. Replacement parts should be of the same make and approved by the same authorities as the original. If the burner is converted to fire another gas quality it must be re-commissioned. If town gas is to be fired the combustion head must be converted and the gas train adjusted to suit (e.g. a larger gas armature or a different spring in the governor may be required).

Gas quality	CO ₂ % lambda 1,2	O ₂ %	max. CO ₂ %
Natural gas	10,0	3,5	11,9
LPG	11,5	3,5	13,9

ADJUSTMENT OF GAS FLOW

Damper motor, air volume

Adjust the orange cam for min. load (about 5-10 on scale)

Adjust the red cam for max. load (90°)

The blue cam is factory set for closed position during standstill

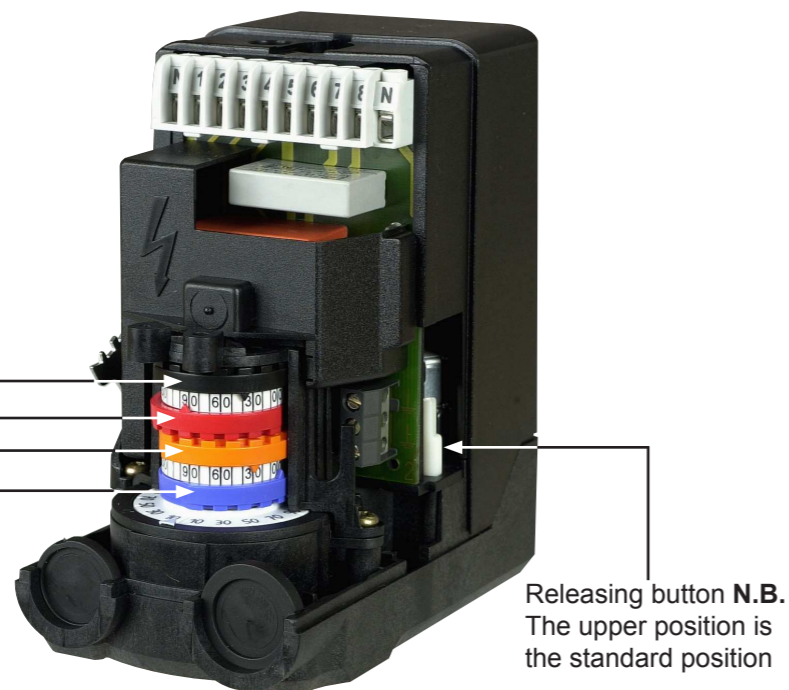
The black cam has no function at modulating operation

Gas valve (black)

Max. load (red)

Min. load (orange)

Closed damper (blue)



Releasing button **N.B.**
The upper position is the standard position

Adjustment of gas flow

- Before the burner starts vent the lines to make sure that there is gas available at the multibloc
- Use an allen key size 2,5 mm for adjusting N and V.
- Connect a pressure gauge for measuring P_{Br} (advisable to find out if the valves are open)
- Set the switch in position MAN.
- Set the gas pressure switch min. and air pressure switch on min. adjustment. Set the gas pressure switch max, if any, on max. adjustment.
- Start the burner, observe the pressure gauge, if no flame is established and the pressure gauge needle does not flicker, increase N. When the flame is established adjust the gas flow by means of the screw N. Use a flue gas instrument.
- Change over to max. load, press the switch "increase"
- Adjust the gas flow with V and check at the same time the combustion values.
- Go back to min. load and check the combustion value. Adjust if necessary.
- If necessary repeat the controls of the adjustment made on min. (N) and max. load(V).
- The desired gas flow on min. and max. has now been adjusted by changing the orange and the red cams. Check the gas flow on the gas meter available on the installation.
- Note! Do not forget to set the air and gas pressure switches after the adjustment, see special instructions.

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.

DETERMINATION OF GAS VOLUME FOR THE INSTALLATION

Specifications on natural gas, town gas and bio gas vary. For more exact information please contact the gas distributor.

Gas quality	Net calorific value		
	kWh/Nm ³	kJ/Nm ³	kcal/Nm ³
Natural gas	10,3	37 144	8 865
Propane	26,0	93 647	22 350
Butane	34,3	123 571	29 492
Town gas	4,9	17 653	4 213
Bio gas	7,0	25 219	6 019

Example how to calculate the gas volume (natural gas)

V = Gas volume Nm³/h

Q = Boiler output 120 kW

H_u = Calorific value of the gas A. 37 144 kJ/Nm³, B. 10.3 kWh/Nm³

η = Expected efficiency 90%

$$\text{Ex. A } v = \frac{Q \cdot 3\,600}{H_u \cdot \eta} = \frac{120 \cdot 3\,600}{37\,144 \cdot 0,90} \approx 12,9 \text{ Nm}^3/\text{h}$$

$$\text{Ex. B } v = \frac{120}{10,3 \cdot 0,90} \approx 12,9 \text{ Nm}^3/\text{h}$$

If the barometer height, pressure and temperature of the gas deviate very much from the normal values this must be taken into account as follows:

$$f = \frac{273+t}{273} \cdot \frac{1013,25}{B+P_u}$$

t = Temperature of the gas at the gas meter (15°C)

B = Barometer height (945 mbar)

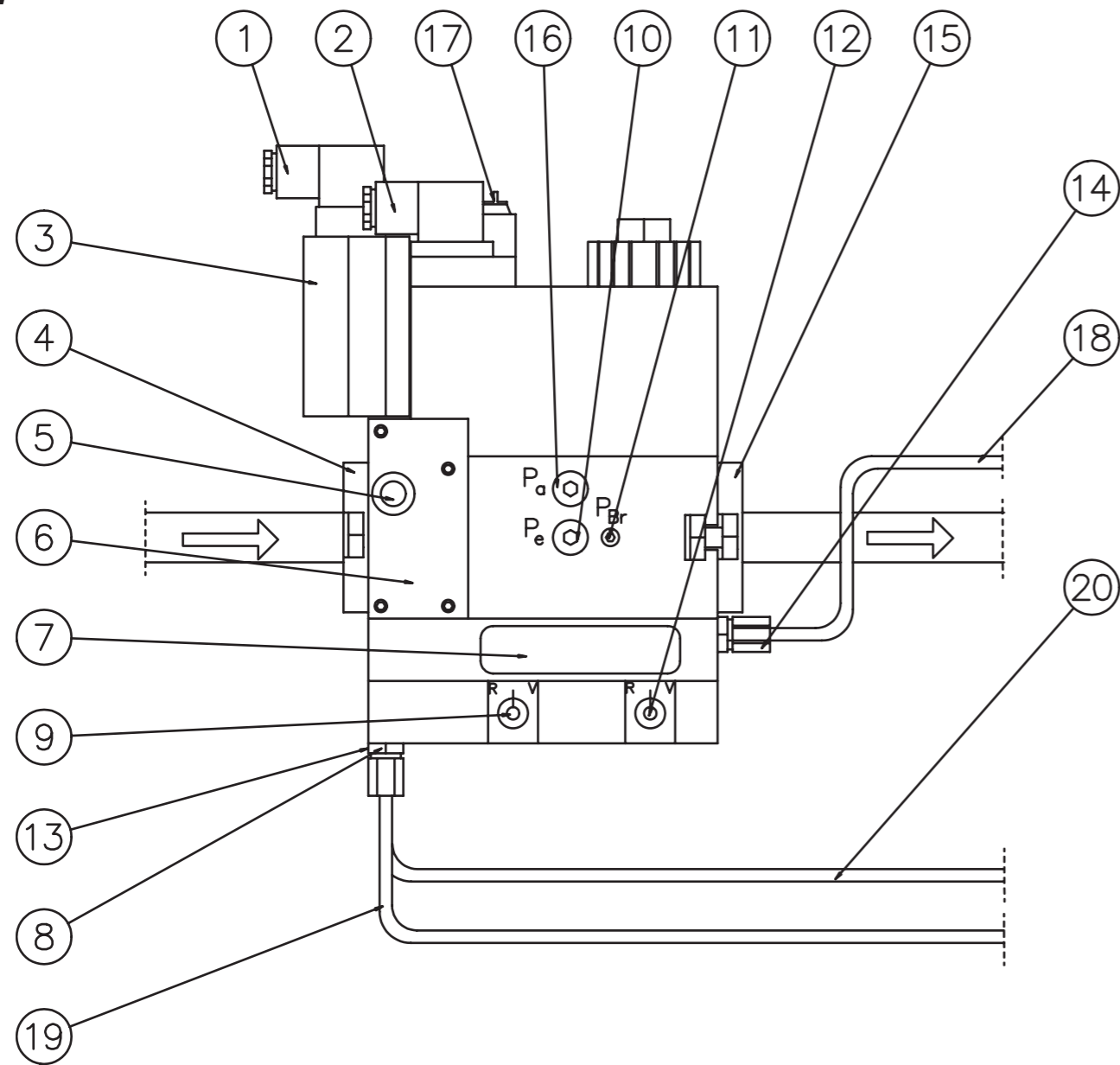
P_u = Pressure of the gas at the gas meter (15,0 mbar)

$$f = \frac{273+15}{273} \cdot \frac{1013,25}{945+15}$$

$$f = 11,1$$

The gas volume read on the gas meter actually reads $1,11 \cdot 12,9 = 14,4 \text{ m}^3/\text{h}$.

VIEW



- 1. Electrical connection gas pressure switch mini
- 2. Electrical connection gas valve
- 3. Pressure switch mini
- 4. Flange connection inlet
- 5. Test point connection 1/8" before V₁
- 6. Filter
- 7. Data plate
- 8. Connection 1/8" P_L
- 9. Adjustment screw V for ratio P_{Br}: P_L (max. load)

- 10. Test point connection 1/8" before V₁ (before governor)
- 11. Connection M4 for measurement of burner pressure after V₂
- 12. Adjustment screw for zero point adjustment N (min. load)
- 13. Test point connection 1/8" P_F
- 14. Test point connection 1/8" P_{Br}
- 15. Flange connection, outlet

- 16. Test point connection 1/8" P_a before V₂ (after governor)
- 17. Indication of V₁ and V₂ in operation (not standard)
- 18. Impulse line P_{Br} (gas pressure)
- 19. Impulse line P_L (air pressure)
- 20. Impulse line (fire room)

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.

- 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
- Ratio V P_{Br}:P_L 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 T1
- Fan pressure P_L 0,4-100 mbar
- Fire room pressure PF -2 -+5mbar
- Burner pressure P_{Br} 0,5 - 100 mbar

Mounting instruction - impulse lines P_L, P_F and P_{Br}

- Impulse lines should preferably be made of steel. Inside diameter >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 condensate 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

Adjustment possibilities

Adjustment range

Effective burner pressure
 $\Delta P_{Br} = P_{Br} - P_F$

Effective fan pressure
 $\Delta P_L = P_L - P_F$

Adjustment range

