GB

Forced draught gas burner

Progressive two-stage or modulating operation

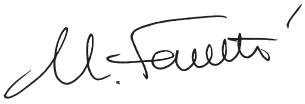
CODE	MODEL	TYPE
3753781	GAS 7 P/M	537 T80

2915245 (5) - 05/2018

Declaration of conformity in accordance with ISO / IEC 17050-1		
Manufacturer:	RIELLO S.p.A.	
Address:	Via Pilade Riello, 7 37045 Legnago (VR)	
Product:	Forced draught gas burner	
Model:	GAS 7 P/M	
These products are in compliance with the following Technical Standards:		
EN 676		
EN 12100		
and according to the European Directives:		
MD	2006/42/EC	Machine Directive
LVD	2014/35/UE	Low Voltage Directive
EMC	2014/30/UE	Electromagnetic Compatibility

The quality is guaranteed by a quality and management system certified in accordance with UNI EN ISO 9001.

Mr. U. Ferretti



Mr. F. Comencini

TECHNICAL DATA

Thermal power	400 - 1760 kW - 344.000 - 1.513.600 kcal/h
Operation	• Two stages progressive • Modulating (kit with controller available upon request)
Fuel	Natural gas Pci 8 - 10 kWh/m^3 = 7000 - 8600 kcal/m^3
Minimum gas pressure	For maximum output 14.5 mbar are needed measured at the coupling with nil pressure in the combustion chamber and gas with calorific value of 8600 kcal/m^3
Maximum gas pressure	150 mbar

ELECTRICAL DATA

Electrical supply	Three-phase 220V +10% -10% ~ 60Hz without neutral 380V +10% -10% ~ 60Hz with neutral
Motor	10A / 230V - 5.8A / 400V
Ignition transformer	Primary: 1.8A / 220V - Secondary: 1 x 8 kV - 30 mA
Absorbed electrical power	4.1 kW

BURNER DESCRIPTION

1 Servomotor controlling air and gas
2 Adjustment cam
3 Power controller (for modulating to be required separately)
4 Control box re-set button
5 Servomotor connection
6 Fair leads
7 Wiring terminal block
8 Re-set push-button of the motor overload relay
9 Air pressure switch
10 Gas pressure test-point

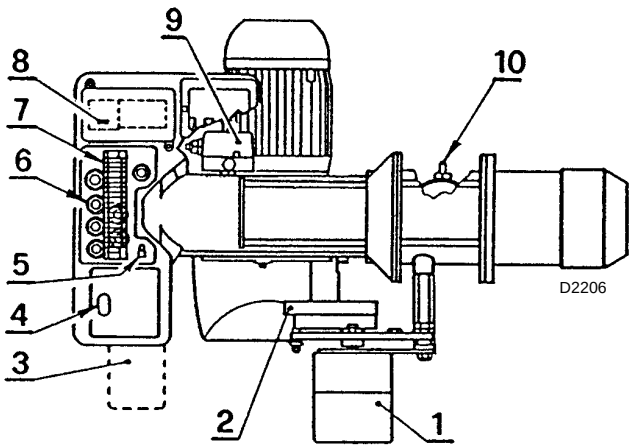


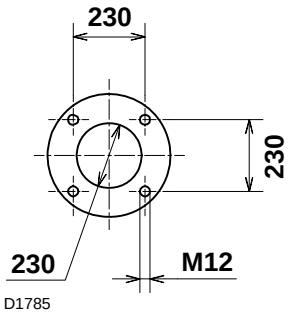
Fig. 1

BURNER EQUIPMENT

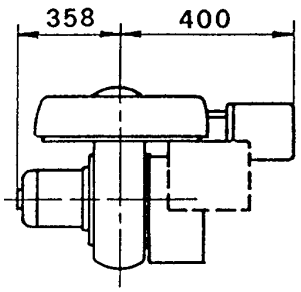
Quantity	Burner accessories
1	Flange
1	Gasket
8	Screws
1	Flange gasket

MAXIMUM DIMENSIONS

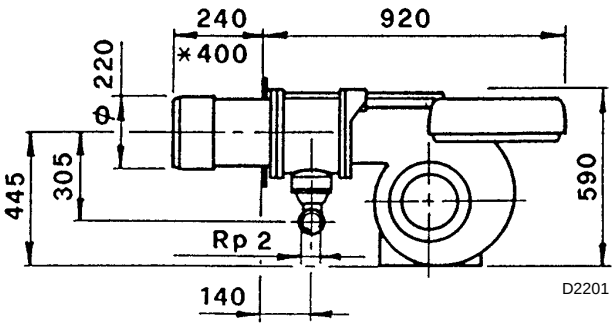
Boiler front-plate drilling



D1785



Burner

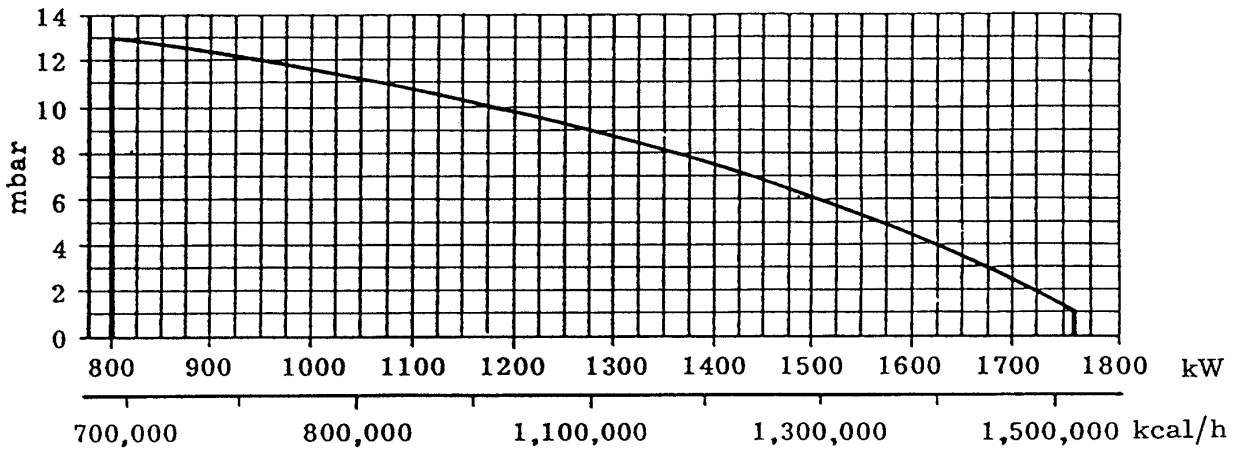


D2201

*Length available with special blast tube to be separately required.

COMBUSTION CHAMBER PRESSURE - MAXIMUM OUTPUT

(in compliance with DIN 4788)



D2202

Min. output: 400 kW - 344.000 kcal/h.

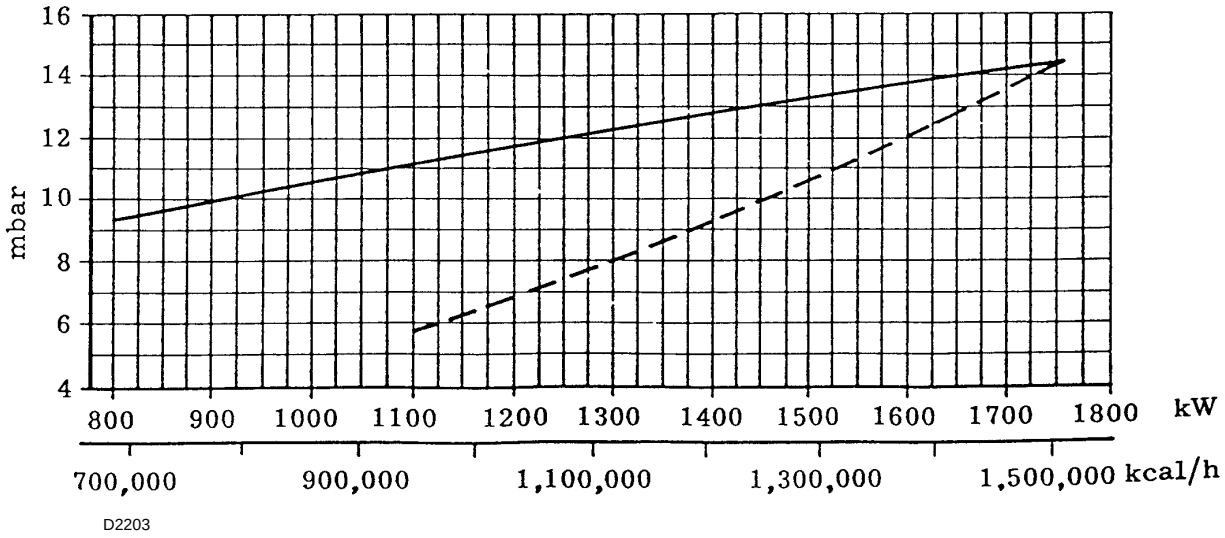
MINIMUM GAS PRESSURE - OUTPUT

Pressure: detected at the pressure test-point 10) (fig. 1) with nil mbar into the combustion chamber.
Should the combustion chamber be pressurized, the pressure necessary will be that of the graph plus the pressurization value.

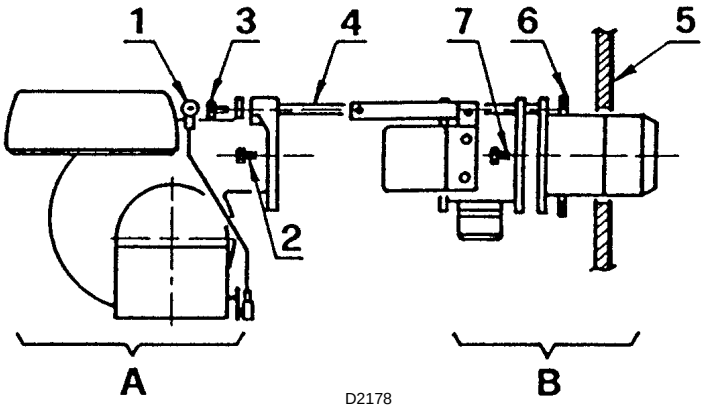
Example: to obtain 1250 kW it is necessary a gas pressure of 12 mbar and the combustion head set as indicated at page 8.
If the combustion chamber is pressurized at 2 mbar, the pressure detected at the test-point 9) is: 12 + 2 = 14 mbar.
If this value is too high, for very low gas pipework pressures, the gas gear 6) (page 8) could be more open.
Do not decrease the pressure at the coupling under the values shown in the diagram.

Output: the maximum value is obtainable with gas Pci 8600 kcal/m^3.

CORRELATION BETWEEN GAS PRESSURE AND BURNER OUTPUT

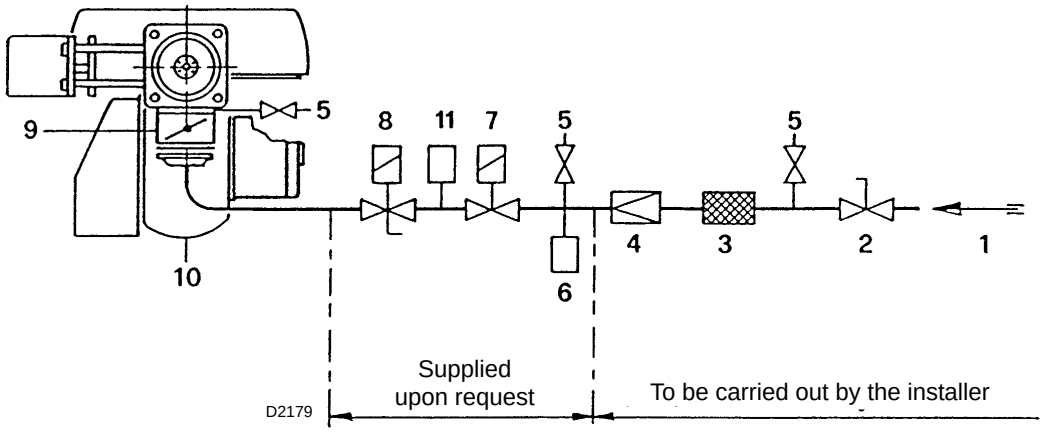


FIXING TO THE BOILER



Separate the blast tube from the burner body by loosening the screws 7) and 3), fix the blast tube to the boiler front plate 5) using the gasket 6) provided.
Insert the burner on the holding bars 4) and fasten the screws 7) and 3).
The combustion head adjustment should be carried out as follows:
Loosen the screws 2) **unhook the tension rod of the air damper 1)** remove the connecting lead of the servomotor, withdraw the group A) from the group B).
After the setting, re-assemble and verify that the tension rod of the air damper was locked.

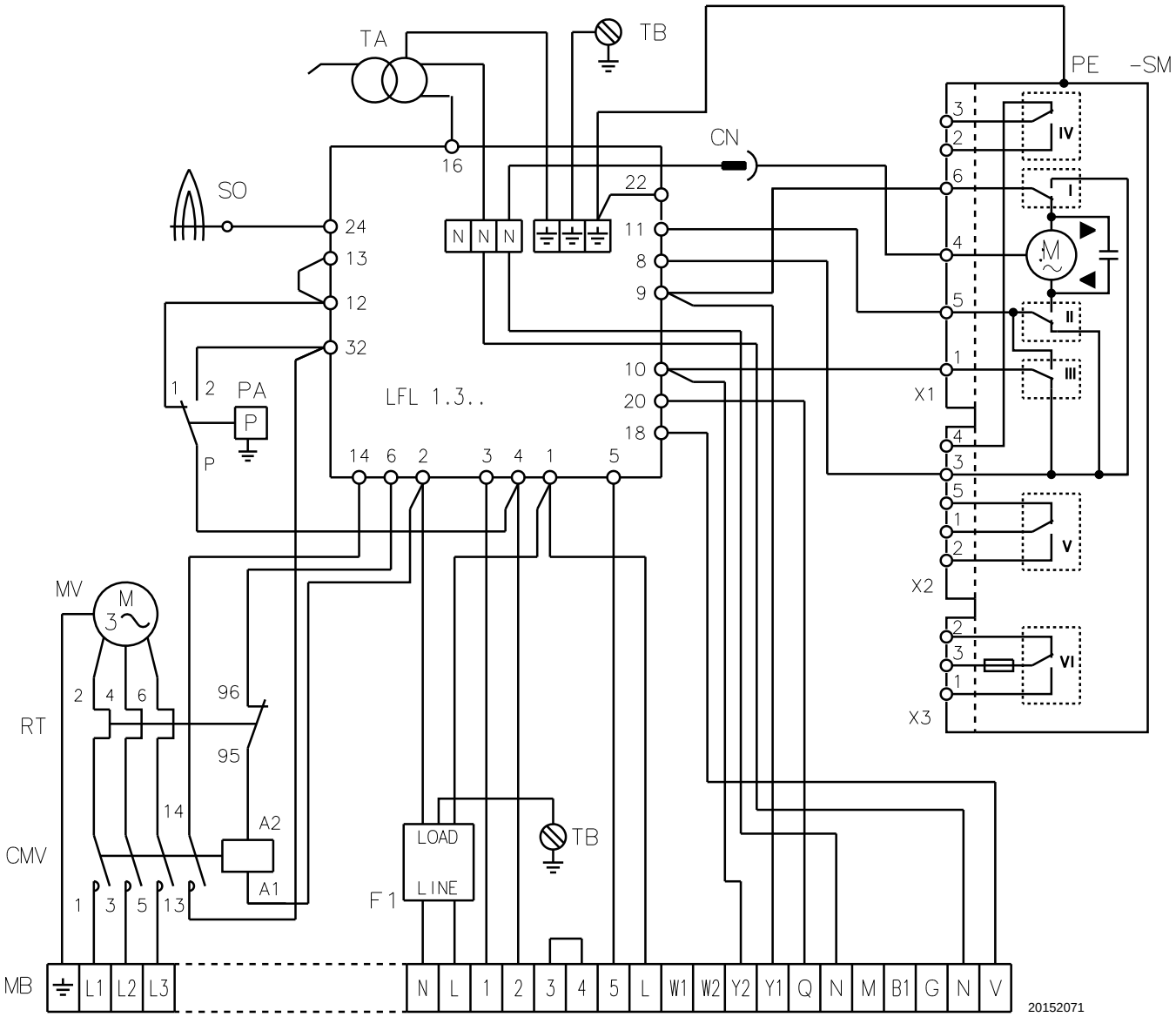
GAS SUPPLY



1 - Gas pipe line
2 - Cock valve
3 - Filter
4 - Pressure stabilizer
5 - Pressure test-point
6 - Minimal gas pressure switch
7 - Safety valve
8 - Adjustment valve
9 - Adjusting throttle valve
10 - Burner
11 - Gas leak control device

BURNER ELECTRICAL WIRING

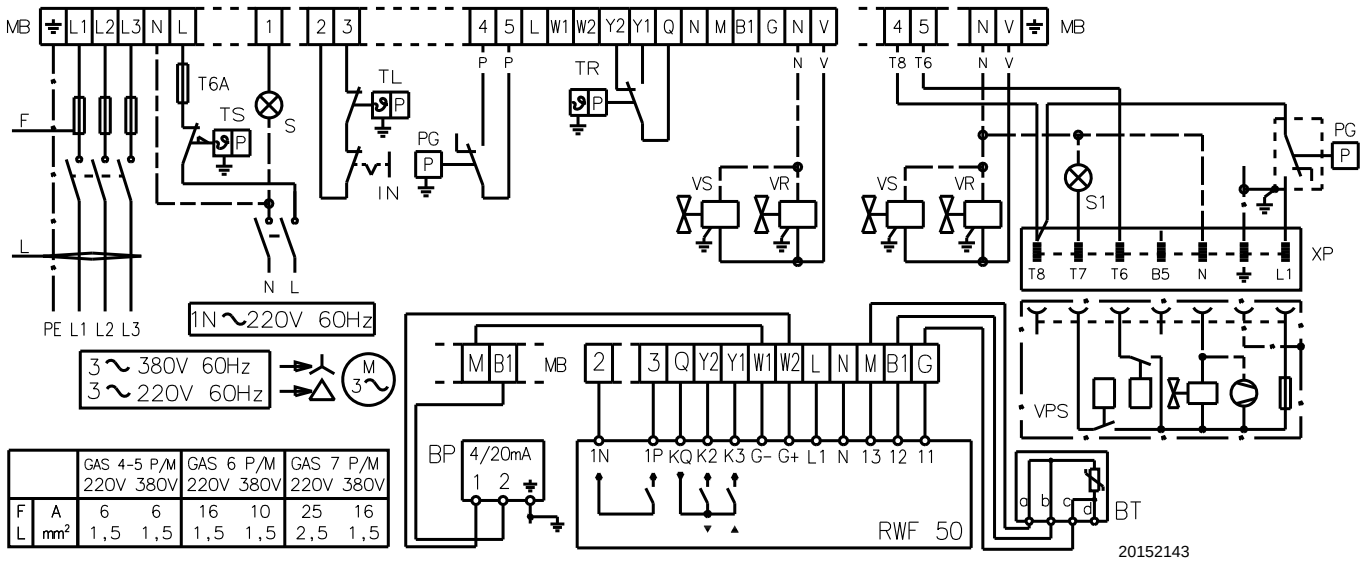
(carried out y the factory)



Key to layout

CMV	Motor contactor
LFL...	Control box
MB	Burner terminal strip
MV	Fan motor
PA	Air pressure switch
RT	Thermal cut-out
SM	Servomotor
SO	Ionisation probe
SP	Plug-socket
TA	Ignition transformer
TB	Burner ground

ELECTRICAL CONNECTIONS TO THE WIRING TERMINAL BLOCK
(to be carried out by the installer)



		GAS 4-5 P/M 220V	380V	GAS 6 P/M 220V	380V	GAS 7 P/M 220V	380V
F	A	6	6	16	10	25	16
L	mm²	1,5	1,5	1,5	1,5	2,5	1,5

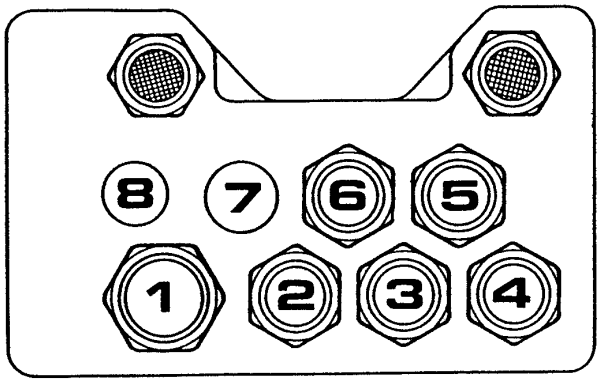
Key to layout

BP - Pressure probe
BT - Temperature probe
MB - Burner terminal strip
PC - Check pressure switch
PG - Min. gas pressure switch
RWF50 - Power controller
TR - High-low mode load remote control system: controls operating stages 1 and 2
TL - Load limit remote control system: shuts down the burner when the boiler temperature or pressure reaches the preset value.
TS - Safety load control system: operates when TL is faulty
VR - Adjustment valve
VS - Safety valve

NOTICE
- The electric wiring carried out by the installer must be in compliance with the rules in force in the Country.
- Leads minimal section 1 mm^2.
- Adjustment for the motor thermal relay:
  • at the beginning of the scale for **380 V**;
  • at the end of the scale for **220 V**.
- Burners with non-stop operation.
  For safety reasons, this type of burner must be stopped every 24 hours of operation, by means of an hours-counter to be connected in series with the adjustment devices.

FIXING OF THE ELECTRICAL WIRES

All the electrical wires, which are to be connected to the terminal block 7) (fig. 1) shall pass through the fair leads 6) (fig. 1) as per this scheme.



1	- Three phase supply	: fair lead Pg 21
2	- Single phase supply	: fair lead Pg 13.5
3	- Adjustment thermostat	: fair lead Pg 13.5
4	- Safety thermostat	: fair lead Pg 13.5
5	- Gas train	: fair lead Pg 13.5, sheath ø 13
6	- 2nd stage thermostat	: fair lead Pg 13.5 (probe for modulating version)
7	- Pre-sheared holes	: fair lead Pg 13.5 (for power controller - modulating version)
8	- Pre-sheared holes	

Further prospective signals or controls can be connected to the burner wiring terminal board by removing the metal weldnuts from the pre-sheared holes and inserting a commun fair lead for the passage and the clamping of the leads.

NOTES

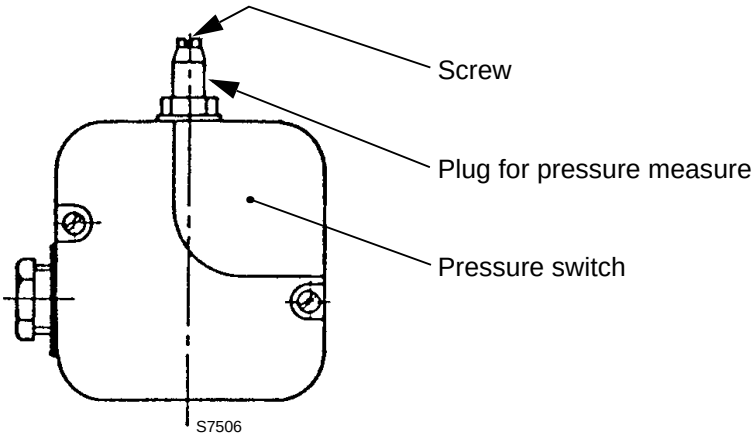
- Do not exchange the neutral wire with the phase (avoid the plug-pin connection).
- Carry out a safe earth connection.
- Check the stop of the burner, by opening the boiler thermostat and the burner lock-out, by disconnecting the lead from the flame probe.

WARNING

When closing the burner on its slide-bars, pull towards the outside the high voltage cable and the cable of the flame detection probe, till to little tension.

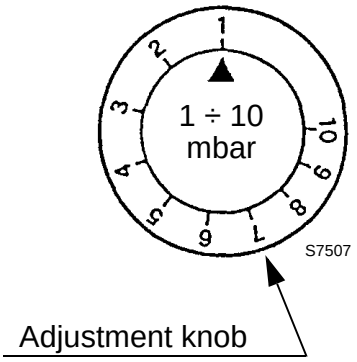
BURNER START-UP CYCLE

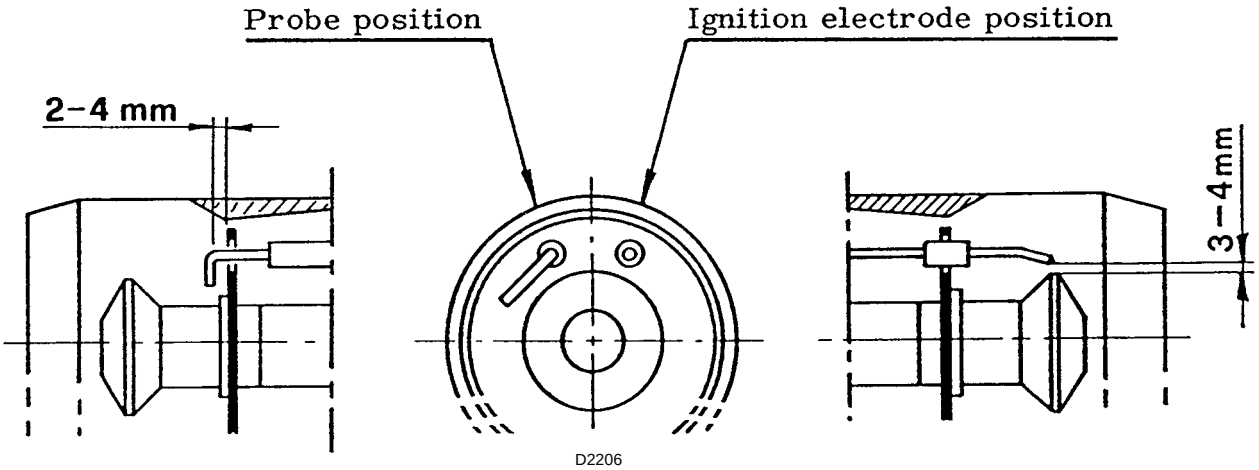
Air-purge: loosen the screw placed on the minimal gas pressure switch mounted on the gas train.



AIR PRESSURE SWITCH

The air pressure switch setting shall be carried out after having set all other adjustments of the burner and the air pressure switch shall be at its lowest set-point.
When the burner is operating, increase the adjustment pressure by turning - slowly - clockwise the knob till reaching the burner lock-out.
Thereafter, turn the knob anticlockwise for 1 mbar and repeat the burner start-up for checking the regularity: if lock-out intervenes turn the knob anticlockwise for 0.5 mbar.





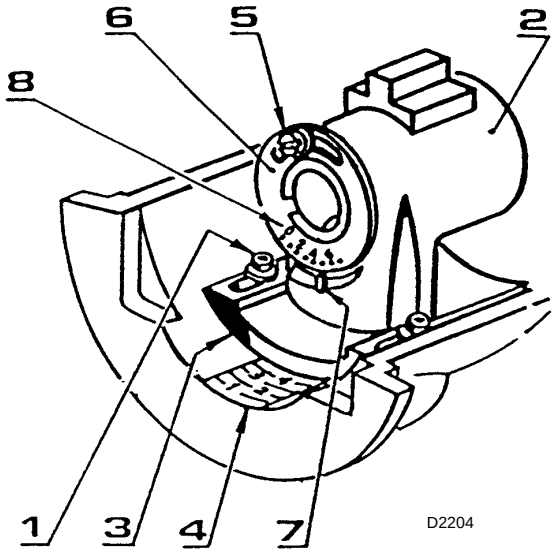
CAUTION:
do not turn the ionization probe, maintain the drawing position; should it be close to the ignition electrode, damage may occur to the control box amplifier.

COMBUSTION HEAD ADJUSTMENT

Two separate adjustments have to be made: air and gas.
These adjustments can be carried out when the burner is still open, during the installation (see page 2 - Fixing to the boiler).

Air setting

Loosen the two screws 1) and move the internal part of the combustion head 2) so that its rear edge 3) is coincident with the desired set-point on the plate 4). Tighten the screws 1).



Gas setting

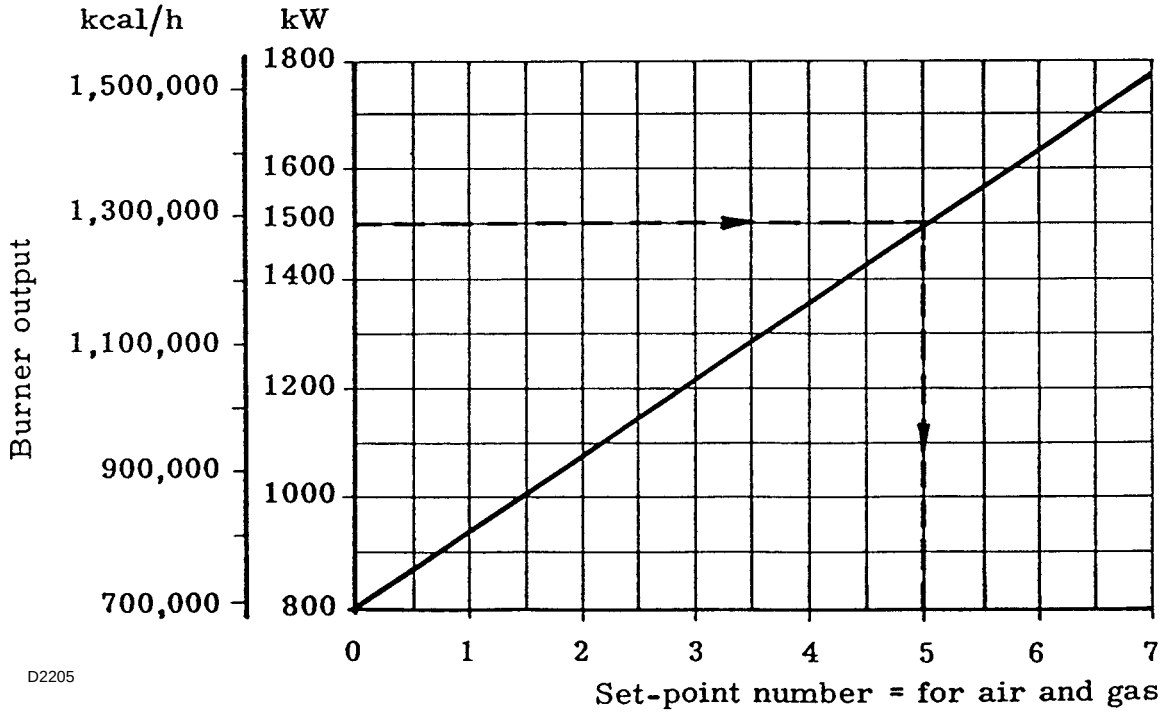
Loosen the screw 5), move the ring 6) so that the pointer 7) is coincident with the desired set-point 8). Tighten the screw 5).

Attention:

the set-point number is the same for air and gas setting and is given by the following diagram.

Example:

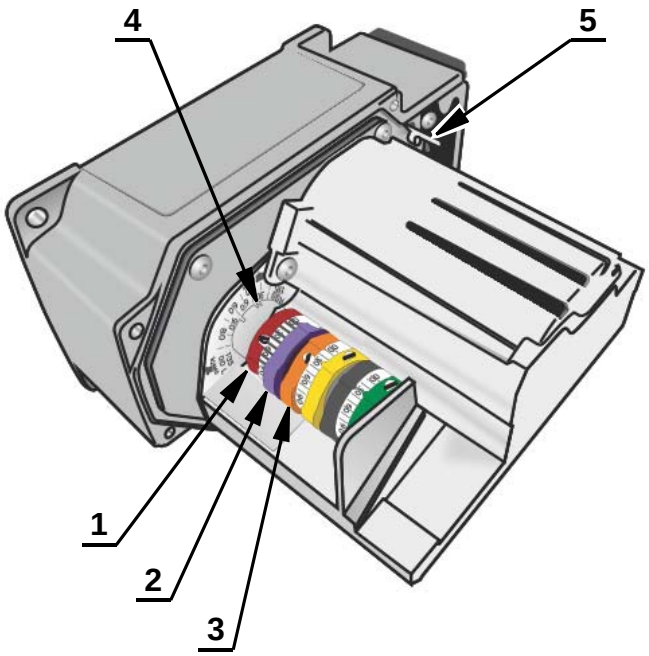
the burner is installed on a boiler of 500 kW, assuming an efficiency of 90% the burner output should be 560 kW.
From the diagram it can be seen that the air and gas settings for this rating should be no. 5.



ADJUSTMENT OF THE SERVOMOTOR

The servomotor controls the air damper and the gas throttle valve.
It is provided with three adjustable cams controlling the related change-over switches.

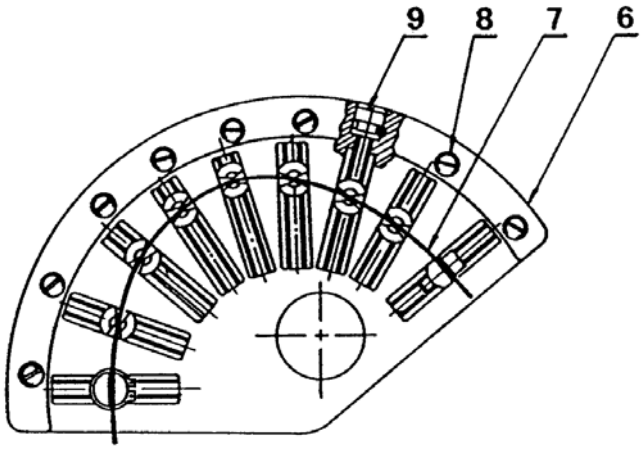
1) Red cam
2) Blue cam
3) Orange cam
4) Pointer
5) Servomotor releasing lever



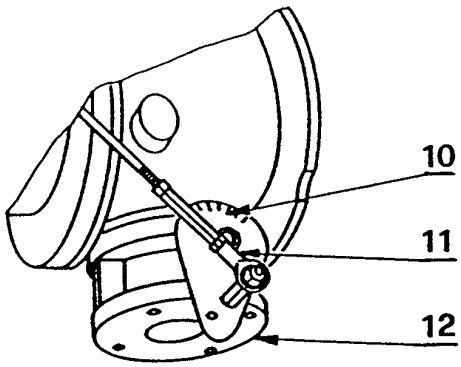
Red cam: it controls the max. stroke, generally it is positioned on 130°.

Blue cam: it controls the min. stroke and remains always positioned on 0°, in this way, when the burner is off the air damper is totally closed.

Orange cam: it controls the minimal modulating power. It is set by the factory on 30°: normally this position is the most suitable for the first ignition.
Thereafter the installer may vary this setting accordingly with the installation requirements.



6) Cam with adjustable profile
7) Adjustable profile
8) Fastening screws
9) Adjusting screws
10) Throttle valve control sector
11) Tension rod
12) Gas adjustment shutter



COMBUSTION CHECKS

For the combustion adjustment we suggest to proceed in this way:

- Let the burner starts and after the flame ignites at the minimum output, disconnect the servomotor by opening the connection 5)(page 1) placed on the panel.
- Thereafter proceed successively to the adjustment of the maximum, minimal outputs and to the intermediate output.

MAXIMUM OUTPUT SETTING

Gas

- Disjoin the cam with adjustable profile 6) from the servomotor by re-setting the button 5).
- Turn manually clockwise the cam 6) till to reach the position of 130° (on the edge of the servomotor) in corrispondence of the pointer 4). In this way the gas throttle valve 12) is at the max. opening 90°.
- Join again the cam with adjustable profile 6) to the servomotor by pushing the button 5).

Now set the gas rate by acting on the gas setting valve.

Air

- Move the adjustable profile 7) of the cam by gradually acting on the screws 9).

MINIMAL OUTPUT SETTING

Gas

- Disjoin the cam with adjustable profile 6) by means of the button 5).
- Turn manually anticlockwise the cam till to reach the position of 30°.
- Lock it again and measure the gas rate.

If a different minimal output is desired, set free the cam with adjustable profile and turn it anticlockwise; for a higher output turn it clockwise. When the minimal value is satisfying, set on the cam 3) the opening value signed on the pointer 4).

Air

- Vary the profile of the cam 7) by gradually acting on the screws 9).

Be careful to not modify the part of profile controlling the air shutter at the maximum output, previously set.

INTERMEDIATE OUTPUTS SETTING

Gas

No setting is required.

Air

It is carry out by acting on the screws 9) of the cam profile, being careful to not move those for the minimum and maximum outputs.

When the combustion setting is ended re-connect the electrical wiring of the servomotor by plugging the connector 5) (page 1); then lock the screws 9) by means of the cross-screws 8).

RATIO BETWEEN THE MINIMUM AND MAXIMUM OUTPUT

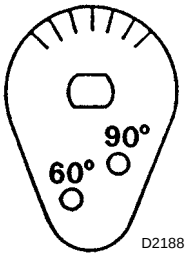
For a better explanation we suppose to have a burner with an adjustable output between the range 25 - 100.
The ratio between the minimum and maximum output is generally included between 1 : 4 (25 - 100) and 1 : 3 (25 - 75); our burners leave the factory set for these ratio.
If the ratio should be reduced at 1 : 2 (25 - 50 or 50 - 100) it is advisable to re-adjust the tension rods for the air and gas and the controlling sector of the gas throttle valve.

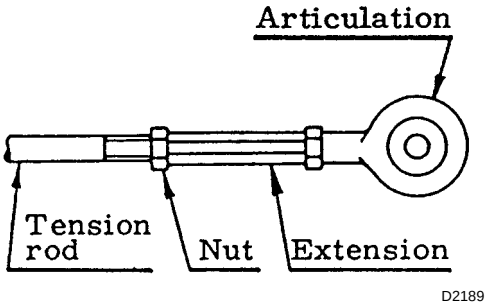
CONTROL OF THE GAS THROTTLE VALVE

The tension rod 11) moving the control sector of the throttle valve is positioned - by the factory - on the hole marked 90° (90° is the moving angle of the throttle valve when the cam with adjustable profile 6) covers the complete angle of 130°).
When the ratio between the minimum and maximum output is approximately 1 : 2, the tension rod shall be positioned on the hole marked 60° (60° is the moving angle of the throttle valve when the cam covers 130°).
If the ratio 1 : 2 is in the lower outputs range (25 - 50) the change from 90° to 60° of the tension rod will be sufficient. Should this ratio be in higher range (50 - 100) in this case, further to position the tension rod on 60° it shall be shortened.
Proceed as follows:
- Disjoint the articulation from the control sector.
- Screw down the tension rod on the extension.
- Reassemble the articulation on the control sector.

In this way the gas throttle valve - servomotor at 0° - is partially open.
The shortening of the tension rod shall permit the gas flow without setting the 3rd cam of the servomotor too forward, because in this way the turn of the cam with adjustable profile would be limited.

Throttle valve control sector

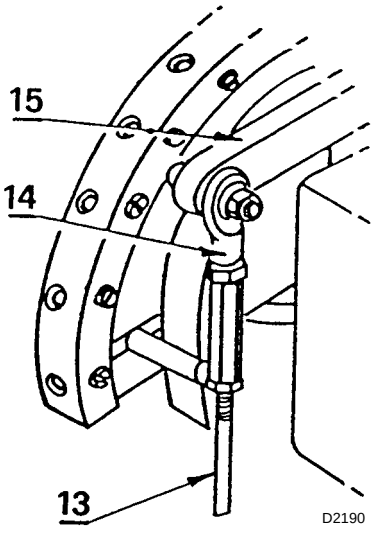




WARNING **The data of thermal output and combustion head gas pressure are related to full open (90°) gas butterfly valve.**

CONTROL OF THE AIR DAMPER

The lenght of the tension rod 13) adjusting the air damper can be varied too.
If the air damper is moving, during the operation, into a reduced angle (ratio 1 : 2 lower outputs range) it is necessary to extend the tension rod.
In this way the cam profile is not too much bent.
When the burner is off proceed in this way:
- Disjoint the articulation 14) of the tension rod 13) from the lever 15).
- Extend the tension rod.
- Manually position the servomotor on 0°.
- Join the tension rod to the lever.
- Move the cam profile till the pointer placed on the air damper shaft is at 0°.

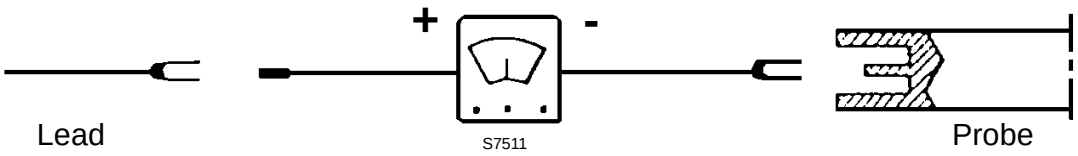


COMBUSTION CHECKS

CO2
It is advisable to not exceed 10% of CO_2 (gas with calorific value of 8600 kcal/m^3), in order to avoid the risk that small changes of the adjustments due, for instance, at draught variation, may cause combustion with insufficient air and consequently formation of CO.

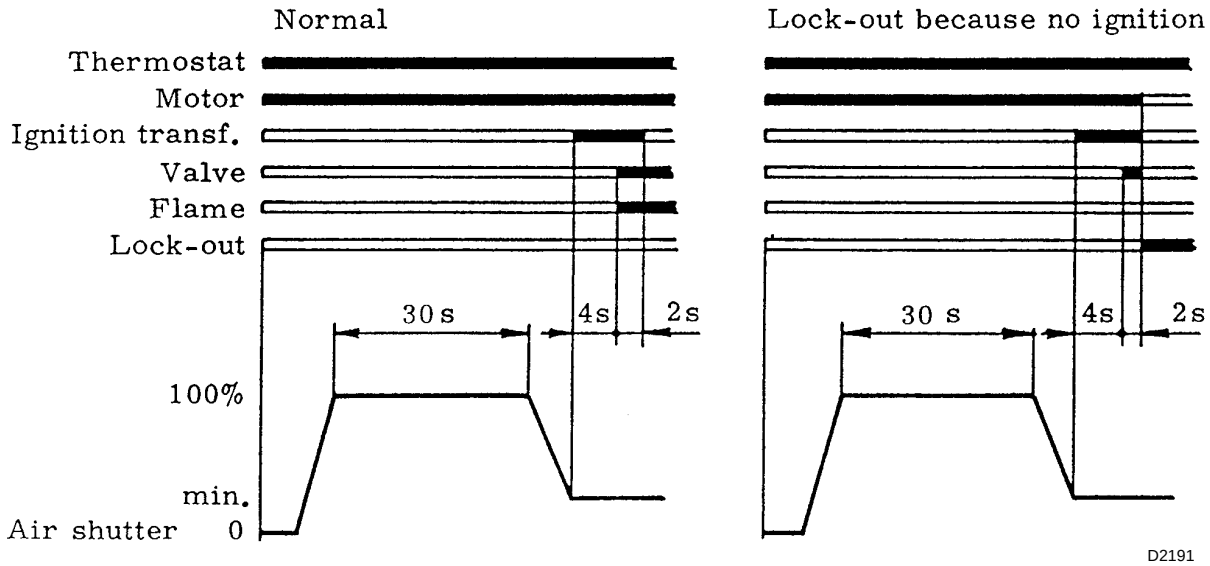
CO
For safety reason the value of 0.1% (one thousand p.p.m.) must not be exceeded.

IONIZATION CURRENT
The minimum current necessary for the control box operation is 6 µA.
The burner normally supplies a higher current value, so that no check is needed.
However, if a measurement of the ionization current is required, it is necessary to disconnect the probe lead and insert a d.c. microamperometer.



MOTOR LOCK-OUT
This is caused by the terminal protector relay, in case of overloading, or by the lacking of the phase.
To clear, pushdown the appropriate knob, after having removed the protective cover.

BURNER START-UP



If during operation the flame shuts off, lock-out occurs within 1 sec.

BURNER STARTING DIFFICULTIES AND THEIR CAUSES

The symbol, visible on the reading disc of the pointer, shows the kind of problem.

▲ The control box does not start at the thermostats closing, because of:
- lack of gas;
- the gas pressure switch does not close the contact: bad set;
- the air pressure switch changed over in operation position;
- the control box fuse is broken;
- the servomotor does not totally change over the closing circuit in being between the terminals 11 and 8 of the control box.

▲ Stop at the start-up, because of:
- the servomotor does not change over the max. opening circuit in being between the terminals 9 and 8 of the control box.

▲ Lock-out

The air pressure switch does not change over, because of:
- defective contact;
- insufficient pressure of the air.

▲ Lock-out

Unperfect operation of the flame detecting circuit, because of:
- probe to earth;
- defective internal amplifier.

▲ Stop during pre-purge phase, because of:

The servomotor does not change over the minimal opening circuit in being between the terminals 10 and 8 of the control box.

▲ Lock-out due to flame signal lack; if:
- the ionisation probe is not inside of the flame;
- the probe connection to the control box is disconnected;
- the ionization current is insufficient (min. 6 µA).

▲ Lock-out during operation due to:
- flame signal lack;
- no air pressure.

NOTICE
- If lock-out occurs between the start-up and the pre-ignition phase without that a symbol comes out, the cause is the flame simulation.
- If the burner repeats continuously the start-up cycle without lock-out occurring, this is due to the “oscillation” of the gas pressure switch caused by a setting very near to the gas network pressure, therefore the pressure decreasing at the burner start-up is sufficient to actuate the gas pressure switch causing a new start-up.

SAFETY TEST - WITH GAS BALL VALVE CLOSED

It is fundamental to ensure the correct execution of the electrical connections between the gas solenoid valves and the burner to perform safely the commissioning.

For this purpose, after checking that the connections have been carried out in accordance with the burner's electrical diagrams, an ignition cycle with closed gas ball valve -dry test- must be performed.

1 The manual ball gas valve must be closed
2 The electrical contacts of the burner limit switch need to be closed
3 Ensures closed the contact of the low gas pressure switch
4 Make a trial for burner ignition

The start-up cycle must be as follows:
– Starting the fan for pre-ventilation
– Performing the gas valve seal control, if provided
– Completion of pre-ventilation
– Arrival of the ignition point
– Power supply of the ignition transformer
– Electrical Supply of solenoid gas valves

Since the manual gas ball valve is closed, the burner will not light up and its control box will go to a safety lockout condition.

The actual electrical supply of the solenoid gas valves can be verified by inserting a tester. Some valves are equipped with light signals (or close/open position indicator) that turn on at the same time as their power supply.

IF THE ELECTRICAL SUPPLY OF THE GAS VALVES OCCURS AT UNEXPECTED TIMES, DO NOT OPEN MANUAL GAS BALL VALVE, SWITCH OFF POWER LINE; CHECK THE WIRES; CORRECT THE ERRORS AND REPEAT THE COMPLETE TEST.

SAFETY COMPONENTS

The safety components must be replaced at the end of their life cycle indicated in the table. The specified life cycles do not refer to the warranty terms indicated in the delivery or payment conditions.

Safety component	Life cycle
Flame control	10 years or 250,000 operation cycles
Flame sensor	10 years or 250,000 operation cycles
Gas valves (solenoid)	10 years or 250,000 operation cycles
Pressure switches	10 years or 250,000 operation cycles
Pressure adjuster	15 years
Servomotor (electronic cam) (if present)	10 years or 250,000 operation cycles
Oil valve (solenoid) (if present)	10 years or 250,000 operation cycles
Oil regulator (if present)	10 years or 250,000 operation cycles
Oil pipes/ couplings (metallic) (if present)	10 years
Flexible hoses (if present)	5 years or 30,000 pressurised cycles
Fan impeller	10 years or 500,000 start-ups

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