

Forced draught gas burners

Code	Model	Type
3751960	GAS 3	519T55
3751961	GAS 3	519T55

DECLARATION

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 3

These products are in compliance with the following Technical Standards:

EN 676

EN 292

and according to the European Directives:

MD	2006/42/EC	Machine Directive
LVD	2006/95/EC	Low Voltage Directive
EMC	2004/108/EC	Electromagnetic Compatibility

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

Legnago, 10.10.2013

Executive Director
RIELLO S.p.A. - Burner Department
Mr. G. Conticini

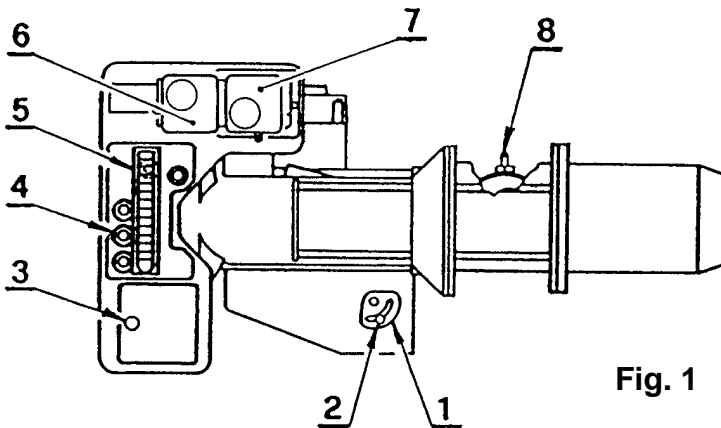
Research & Development Director
RIELLO S.p.A. - Burner Department
Mr. R. Cattaneo



TECHNICAL DATA

Thermal output	150 ÷ 350 kW - 130,000 ÷ 300,000 kcal/h
Fuel	Natural gas Pci 8 - 10 kWh/m ³ = 7000 - 8600 kcal/m ³
Minimum gas pressure	For maximum output 11.1 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	35 mbar
Electrical supply	Single phase 230 V ±10% ~ 50Hz
Motor	2 A / 230 V
Capacitor	450V - 6.3µF
Ignition transformer	Primary: 2A/230V - Secondary: 1 x 9 kV - 33 mA
Absorbed electrical power	0.4 kW

BURNER DESCRIPTION



- 1 - Air shutter control
- 2 - Air shutter lock-out
- 3 - Control box reset button
- 4 - Fair leads
- 5 - Wiring terminal block
- 6 - Over pressure switch (2)
- 7 - Air pressure switch (1)
- 8 - Gas pressure test-point

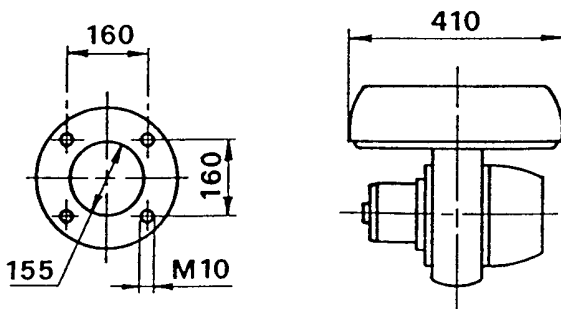
Fig. 1

STANDARD EQUIPMENT

Quantity	Description
1	Flange
1	Gasket
8	Screws
1	Flange gasket

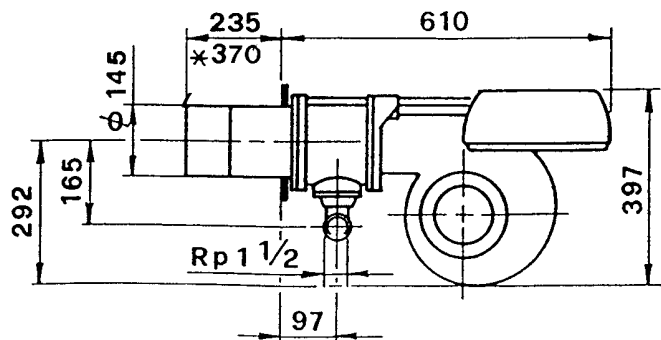
OVERALL DIMENSIONS

Boiler front-plate drilling

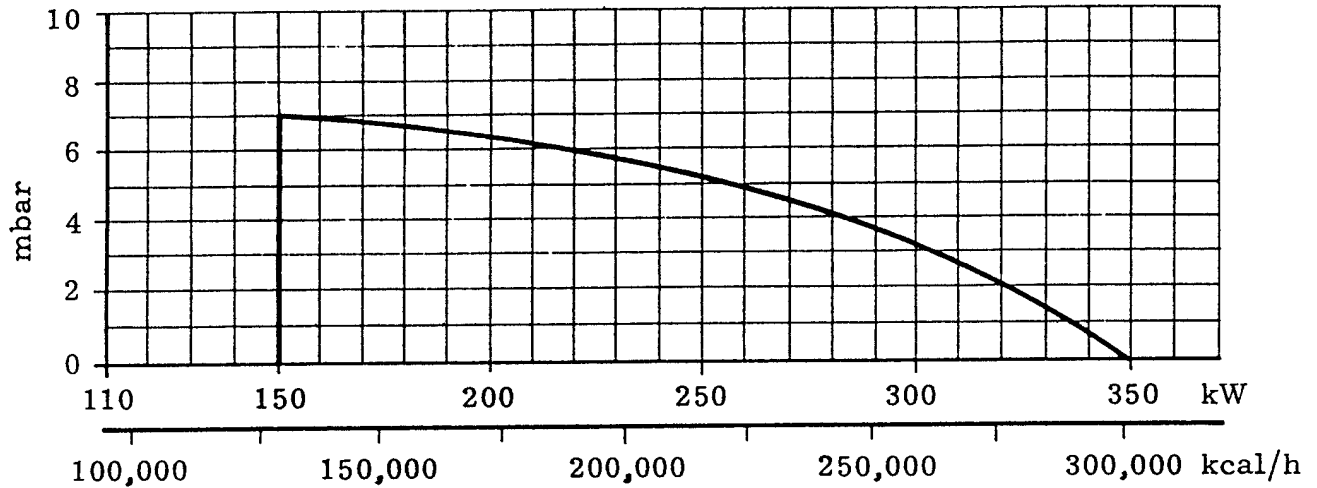


* Long combustion head.

Burner



COMBUSTION CHAMBER PRESSURE - OUTPUT



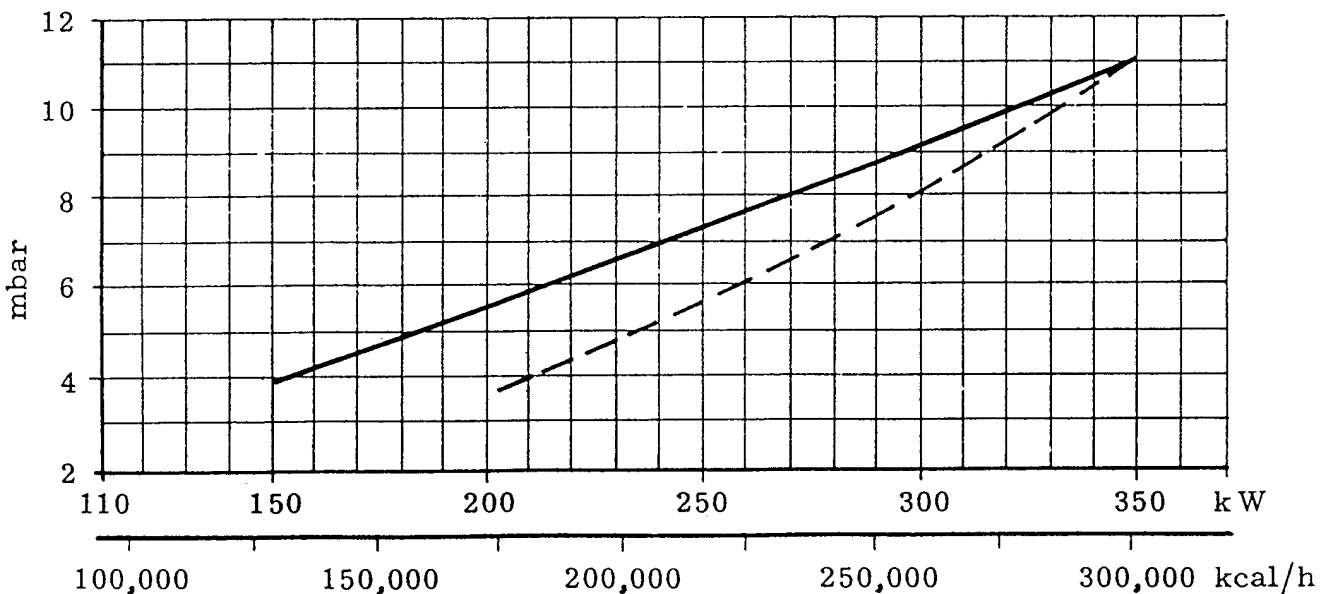
MINIMUM GAS PRESSURE - OUTPUT

Pressure: Detected at the pressure test-point 8) (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.

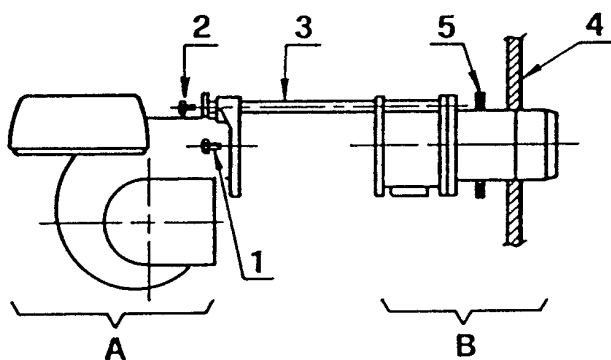
Example: To obtain 270 kW it is necessary a gas pressure of 8 mbar and the combustion head set as indicated at page 9. If the combustion chamber is pressurized at 2 mbar, the pressure detected at the test-point 8) is: $8 + 2 = 10$ mbar.

If this value is too high, for very low gas pipework pressures, the gas gear 6) (page 9) 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/m³.

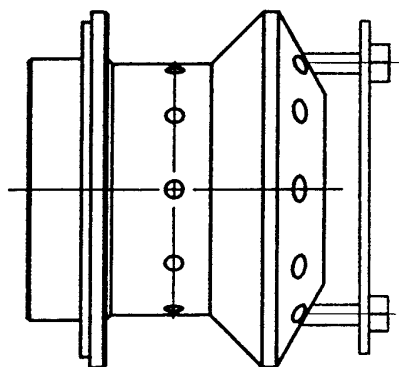


FIXING TO THE BOILER

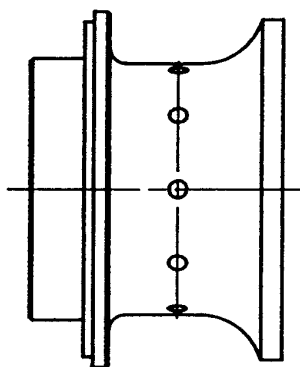


Separate the combustion head from the burner body by loosening the screws 1) and 2) and withdrawing the group **A**) from the holding bars 3). Fix the group **B**) to the boiler front plate 4) using the gasket 5) provided as accessory.

GAS DISTRIBUTORS



NATURAL GAS DISTRIBUTOR



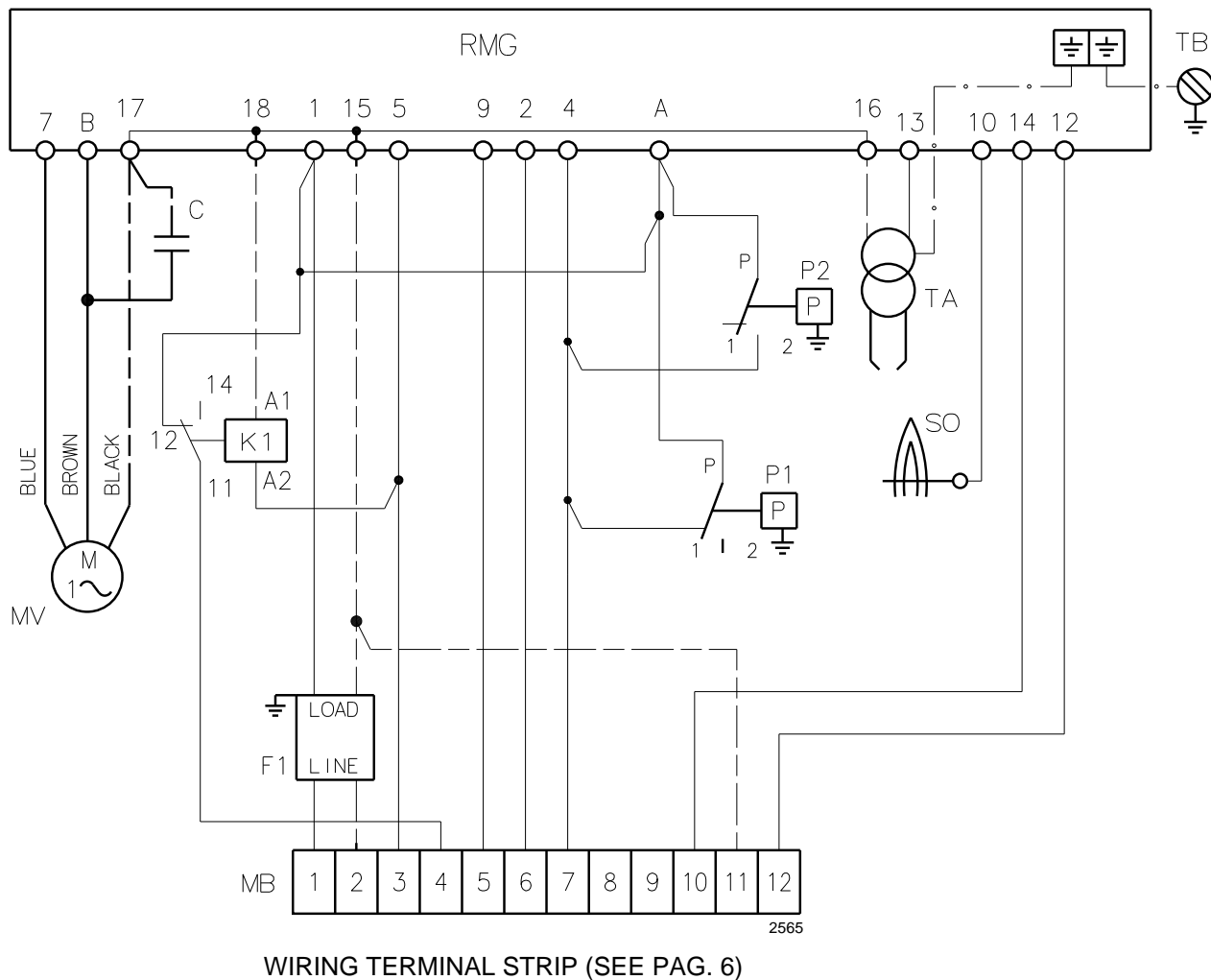
LPG DISTRIBUTOR

GAS SUPPLY

Please refer to Appliance Technical Instruction for Gas train details.

BURNER ELECTRICAL WIRING

(carried out by the factory)



KEY TO LAYOUT

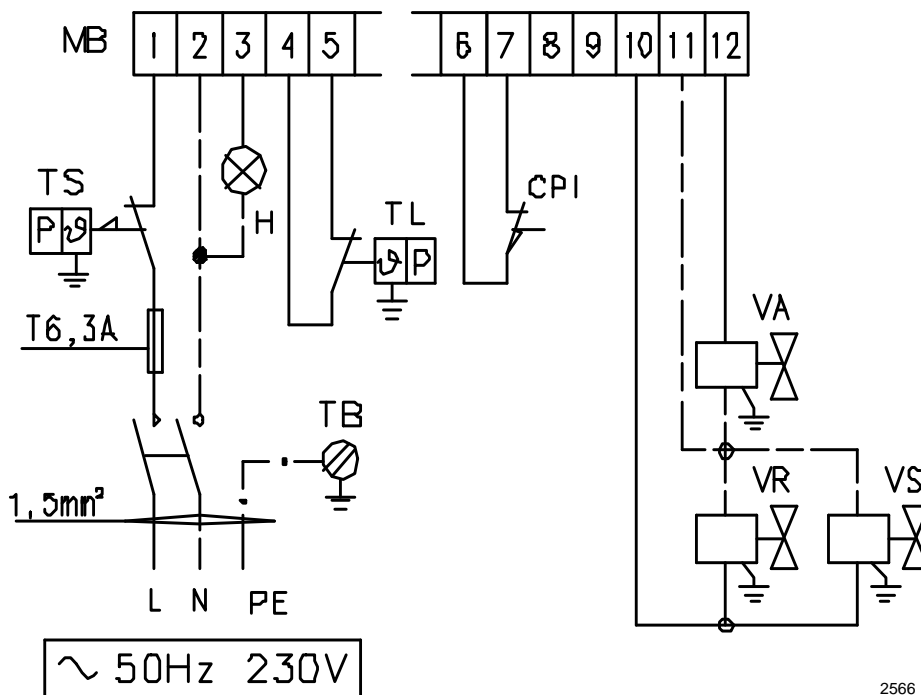
- P1** Air pressure switch
- P2** Over pressure switch
- C** Capacitor
- F1** RFI Suppressor
- K1** Relay
- MB** Burner terminal strip
- MV** Fan motor
- RMG** Control box
- SO** Ionisation probe
- TA** Ignition transformer
- TB** Burner earth

ATTENTION

In the case of phase-phase feed, a bridge must be fitted on the control box terminal board between terminal 6 and the earth terminal.

ELECTRICAL CONNECTIONS TO THE WIRING TERMINAL STRIP

(to be carried out by the installer)



2566

Warning

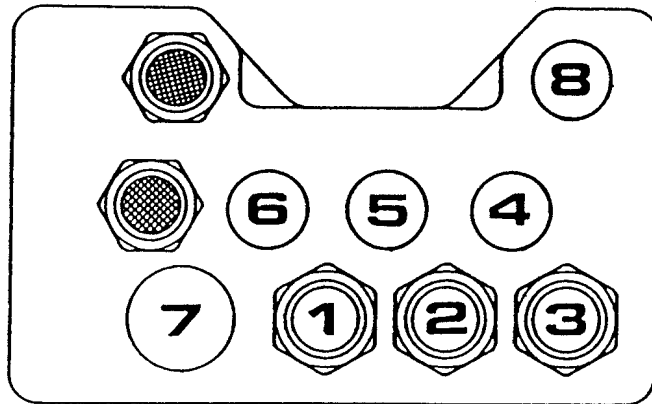
Connect gas valves to terminals 10-11-12 only, exactly as shown on the diagram.

KEY TO LAYOUT

- MB** Terminal strip
- CPI** Valve position switch
- H** Remote lock out signal
- TB** Burner earth
- TL** Limit load control system
- TS** Safety load control system
- VA** Ignition valve
- VR** Adjustment valve
- VS** Safety valve

FIXING OF THE ELECTRICAL WIRES

All the electrical wires, which are to be connected to the terminal block 5) (fig. 1) shall pass through the fair leads 4) (fig. 1) as for this scheme.



- | | |
|---------------------------------------|-------------------|
| 1 - Single phase supply: | fair lead Pg 13.5 |
| 2 - Adjustment thermostat: | fair lead Pg 13.5 |
| 3 - Safety thermostat: | fair lead Pg 13.5 |
| 4 - 5 - 6 - 7 - 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 common 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.

START-UP

For Gas train settings, please refer to Appliance Technical Instructions.

AIR PRESSURE SWITCH "1"

The air pressure switch is set after adjustment have been made. Begin with the switch at the lowest setting. With the burner working at the minimum output, adjust the dial clockwise, increasing its value until the burner locks out. Now reduce the value by one set point, turning the dial anti-clockwise.

Check for reliable burner operation. If the burner locks out, reduce the value by a further set point.

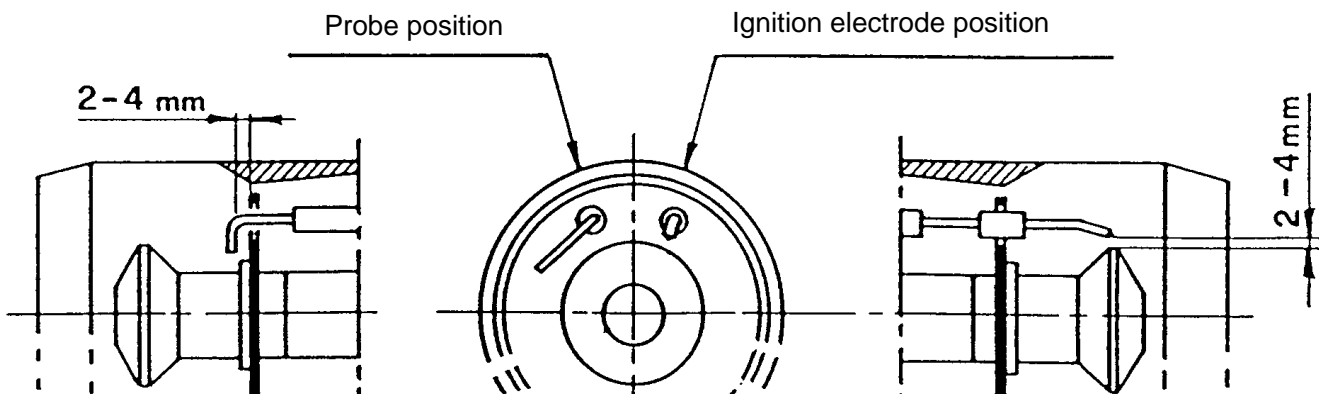
OVER PRESSURE SWITCH "2"

The over pressure switch must be set after all other adjustments have been made. its purpose is to cause the burner to shut down if the combustion chamber pressure increases above normal operational values.

Begin with the switch at the highest setting, with the burner working at the maximum output, adjust the dial anti-clockwise, decreasing its value until the burner shuts down. Now increase the value by one set point and re-start the burner. If the burner shuts down due to the pressure surge in the combustion chamber caused by the ignition gas, check that the start gas rate is less than 25% of the main gas rate. If it is, increase the value on the over pressure switch by a further half a set point and repeat the test.

NOTE

To comply with the Appliance Standard PREN 1020, the CO value must not exceed 0.1% under normal operational conditions.



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.

The right positions of the ionisation probe and of the ignition electrode (as shown in the drawing) is obtainable by coinciding their insulators planes with sloping planes of the fastening support.

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 4 - Fixing to the boiler).

Air setting

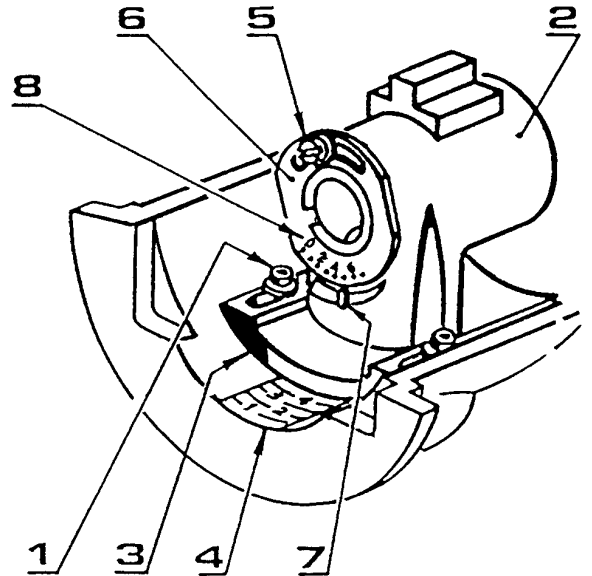
Loosen the two screws 1) and move the internal part of the combustion head 2) so that its rear edge 3) is coincident with the desired set-point on the plate 4).

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).

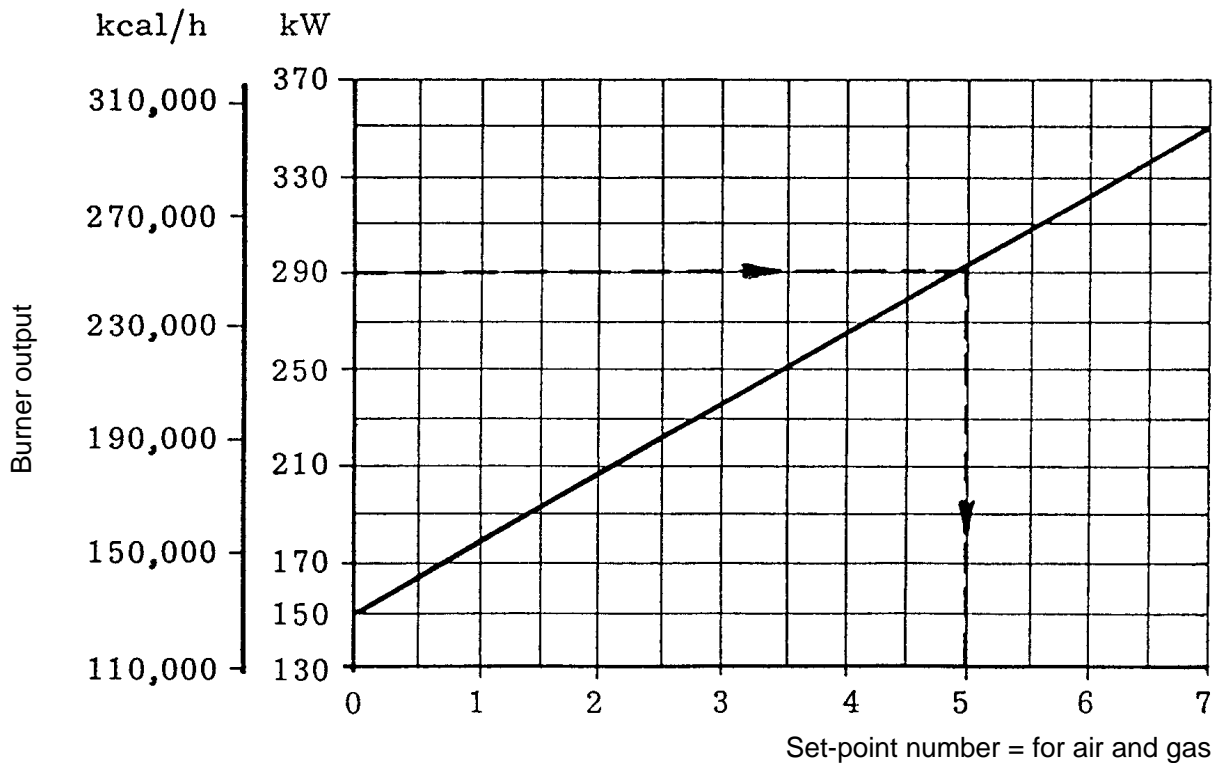
Tighten the screw 5).



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 260 kW, assuming an efficiency of 90% the burner output should be 290 kW.

From the diagram it can be seen that the air and gas settings for this rating should be no. 5.



COMBUSTION CHECKS

CO₂

It is advisable to not exceed 10% of CO₂ (gas with calorific value of 8600 kcal/m³), 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

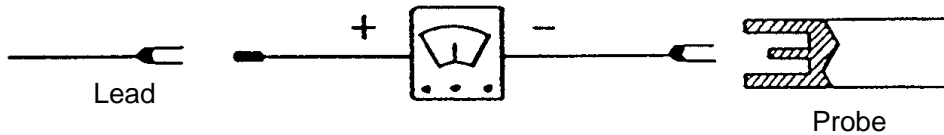
For safety reason the value of 93 p.p.m. must not be exceeded under normal operating conditions.

IONIZATION CURRENT

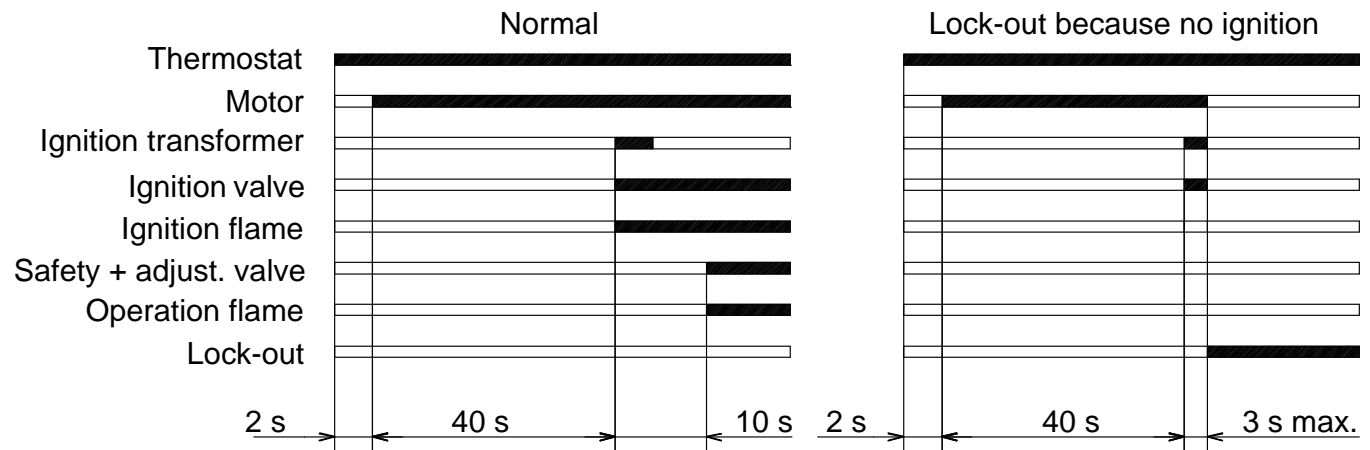
The minimum current necessary for the control box operation is 3 μA.

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.



BURNER START-UP



D1799

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

BURNER STARTING DIFFICULTIES AND THEIR CAUSES

1. The burner goes through the purge period normally, the flame ignites, but the burner goes to lock-out, within two seconds after the ignition if:
 - the ionization probe is earthed or not in contact with the flame, or its wiring to the control box is broken, or there is a fault on its insulation to earth;
 - the ionization current is weak (lower than 3 μ A).

2. The burner goes to lock-out, after the purge period, because the flame does not ignite; the causes may be:
 - the valve is passing too little gas (Low pressure in the gas pipework);
 - the valve is defective;
 - the pipe has not been purged from the air;
 - the ignition arc is irregular or has failed.

3. The burner does not pass through the pre-purge period and the control box goes to lock-out:
 - air pressure switch failure;
 - flame simulation exists (or the flame really lights).

4. The burner does not start at the thermostat closing, because of:
 - the fuse of the control box is broken.

OPERATING FAULTS

- Lock-out may occur, because of:
- Flame failure.
 - Ionization probe earthed.
 - Air pressure switch failure

BURNER STARTING DIFFICULTIES AND THEIR CAUSES

Signal	Problem	Possible cause	Recommended remedy
2 blinks ● ●	Once the pre-purging phase and safety time have passed, the burner goes into lockout without the appearance of the flame	1 - The operation solenoid lets little gas through 2 - One of the two solenoid valves does not open. 3 - Gas pressure too low. 4 - Ignition electrode incorrectly adjusted 5 - Electrode grounded due to broken . . insulation 6 - High voltage cable defective 7 - High voltage cable deformed by high temperature 8 - Ignition transformer defective 9 - Incorrect valve or transformer electrical wiring 10 - Defective control box. 11 - A closed valve upline the gas train . . 12 - Air in pipework 13 - Gas valves unconnected or with interrupted coil	Increase Replace Increase pressure at governor Adjust Replace Replace and protect Replace Check Replace Open Bleed air Check connections or replace coil
3 blinks ● ● ●	The burner does not switch on, and the lockout appears	14 - Air pressure switch in operating position	Adjust or replace
	The burner switches on, but then stops in lockout	- Air pressure switch inoperative due to insufficient air pressure: 15 - Air pressure switch incorrectly adjusted. 16 - Pressure switch pressure test point . pipe blocked 17 - Poorly adjusted head. 18 - High pressure in the furnace	Adjust or replace Clean Adjust Connect air pressure switch to fan suction line
	Lockout during pre-purging phase	19 - Defective motor control contactor . . . (only three-phase version) 20 - Defective electrical motor 21 - Motor lockout (defective electrical motor)	Replace Replace Replace
4 pulses ● ● ● ●	The burner switches on, but then stops in lockout	22 - Flame simulation	Replace the control box
	Lockout when burner stops	23 - Permanent flame in the combustion . head or flame simulation	Eliminate persistence of flame or replace control box
7 blinks ● ● ● ● ● ● ●	The burner goes into lockout immediately following the appearance of the flame	24 - The operation solenoid lets little gas through 25 - Ionisation probe incorrectly adjusted. 26 - Insufficient ionisation (less than 5 A). 27 - Earth probe 28 - Burner poorly grounded. 29 - Phase and neutral connections inverted 30 - Defective flame detection circuit	Increase Adjust Check probe position Withdraw or replace cable Check grounding Invert them Replace the control box
	Burner goes into lockout during operation	31 - Probe or ionisation cable grounded. .	Replace worn parts

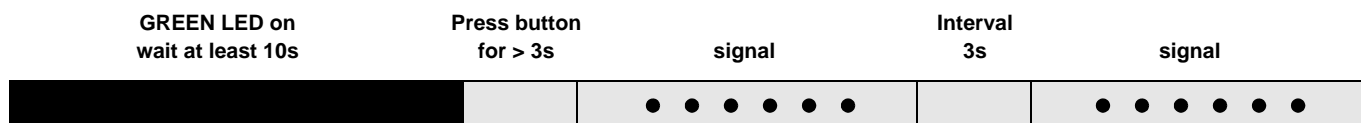
Signal	Problem	Possible cause	Recommended remedy
10 blinks ●●●●● ●●●●●	The burner does not switch on, and the lockout appears	32 - Incorrect electrical wiring	Check
	The burner goes into lockout	33 - Defective control box 34 - Presence of electromagnetic disturbances in the thermostat lines 35 - Presence of electromagnetic disturbance	Replace Filter or eliminate Use the radio disturbance protection kit
No blink	The burner does not start	36 - No electrical power supply 37 - A limiter or safety control device is open 38 - Line fuse blocked 39 - Defective control box 40 - No gas supply 41 - Mains gas pressure insufficient 42 - Minimum gas pressure switch fails to close	Close all switches - Check connections Adjust or replace Replace Replace Open the manual valves between contactor and train Contact your GAS COMPANY Adjust or replace
	The burner continues to repeat the start-up cycle, without lockout	43 - The gas pressure in the gas mains lies very close to the value to which the minimum gas pressure switch has been set. The sudden drop in pressure after valve opening causes temporary opening of the pressure switch itself, the valve immediately closes and the burner comes to a halt. Pressure increases again, the pressure switch closes again and the ignition cycle is repeated. And so on	Reduce the minimum gas pressure switch intervention pressure. Replace the gas filter cartridge.
	Ignition with pulsations	44 - Poorly adjusted head 45 - Ignition electrode incorrectly adjusted 46 - Incorrectly adjusted fan air damper: too much air 47 - Output during ignition phase is too high	Adjust Adjust Adjust Reduce

NORMAL OPERATION / FLAME DETECTION TIME

The control box has a further function to guarantee the correct burner operation (signal: **GREEN LED** permanently on).

To use this function, wait at least ten seconds from the burner ignition and then press the control box button for a minimum of 3 seconds.

After releasing the button, the GREEN LED starts flashing as shown in the figure below.



The pulses of the LED constitute a signal spaced by approximately 3 seconds.

The number of pulses will measure the probe DETECTION TIME since the opening of gas valves, according to the following table:

SIGNAL	FLAME DETECTION TIME
1 blink ●	0.4s
2 blinks ● ●	0.8s
6 blinks ● ● ● ● ● ●	2.8s

This is updated in every burner start-up. Once read, the burner repeats the start-up cycle by briefly pressing the control box button.

WARNING

If the result is > 2s, ignition will be retarded. Check the adjustment of the hydraulic brake of the gas valve, the air damper and the combustion head adjustment.

KIT INTERFACE ADAPTER RMG TO PC Code 3002719

BURNER START UP CYCLE DIAGNOSTICS

During start-up, indication is according to the following table:

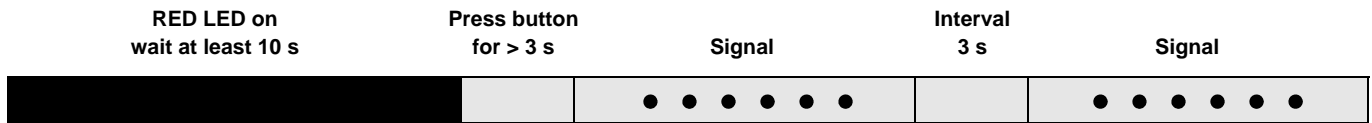
COLOUR CODE TABLE	
Sequences	Colour code
Pre-purging	● ● ● ● ● ● ● ● ● ● ● ●
Ignition phase	● ○ ● ○ ● ○ ● ○ ● ○ ●
Operation, flame ok	□ □ □ □ □ □ □ □ □ □ □ □
Operating with weak flame signal	□ ○ □ ○ □ ○ □ ○ □ ○
Electrical supply lower than ~ 170V	● ▲ ● ▲ ● ▲ ● ▲ ● ▲ ●
Lock-out	▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲
Extraneous light	▲ □ ▲ □ ▲ □ ▲ □ ▲ □ ▲
Key:	○ Off ● Yellow □ Green ▲ Red

OPERATING FAULT DIAGNOSTICS

The control box has a self-diagnostic system, which easily allows identifying the operating faults (**RED LED** signal).

To use this function, wait at least ten seconds from the safety lock out, and then press the reset button for a minimum of 3 seconds.

After releasing the button, the RED LED starts flashing as shown in the diagram below.



The pulses of the LED constitute a signal spaced by approximately 3 seconds.

The number of pulses will provide the information on the possible faults, according to the table below:

SIGNAL	PROBABLE CAUSE
2 flashes ● ●	The flame does not stabilise at the end of the safety time: – faulty ionisation probe; – faulty or soiled gas valves; – neutral/phase exchange; – faulty ignition transformer; – poor burner regulation (insufficient gas).
3 flashes ● ● ●	Min. air pressure switch does not close: – air pressure switch faulty; – air pressure switch incorrectly regulated; – max. air pressure switch triggered (if installed).
4 flashes ● ● ● ●	Min. air pressure switch does not open or light in the chamber before firing: – air pressure switch faulty; – air pressure switch incorrectly regulated.
7 flashes ● ● ● ● ● ● ●	Loss of flame during operations: – poor burner regulation (insufficient gas); – faulty or soiled gas valves; – short circuit between ionisation probe and earth.
8 flashes ● ● ● ● ● ● ● ●	– Not used.
10 flashes ● ● ● ● ● ● ● ● ● ●	– Wiring error or internal fault.

ACCESSORIES

- **RADIO DISTURBANCE PROTECTION KIT code 3010386**

If the burner is installed in places particularly subject to radio disturbance (emission of signals exceeding 10 V/m) owing to the presence of an INVERTER, or in applications where the length of the thermostat connections exceeds 20 metres, a protection kit is available as an interface between the control box and the burner.

RIELLO

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