

# Forced draught gas burner

One stage operation

CODE	MODEL	ТҮРЕ
3751782	GAS 5	517T80

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 5

These products are in compliance with the following Technical Standards:

EN 676 EN 12100

Legnago, 21.05.2015

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.

**Executive General Manager** RIELLO S.p.A. - Burner Department

M. Fautt

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

Mr. U. Ferretti

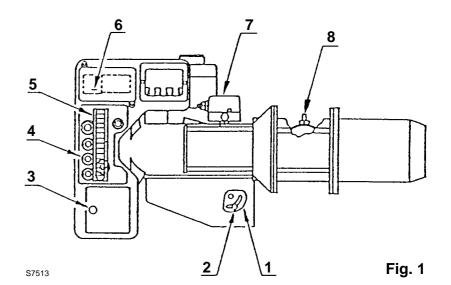
Mr. F. Comencini

## **TECHNICAL DATA**

Thermal output	320 - 660 kW 275.200 - 567.600 kcal/h
Fuel	Natural gas Pci 8 - 10 kWh/m <sup>3</sup> = 7000 - 8600 kcal/m <sup>3</sup>
Minimum gas pressure	For maximum output 9.8 mbar are needed measured at the coupling with nil pressure in the combustion chamber and gas with calorific value of 8600 kcal/m <sup>3</sup>
Maximum gas pressure	150 mbar
Electrical supply	Three phase 380 V + 10% - 10% ~ 60Hz with neutral
Motor	1.9 A / 380 V
Ignition transformer	Primary: 1.8A / 220V - Secondary: 1 x 8 kV - 30 mA
Absorbed electrical power	1.1 kW

## **BURNER DESCRIPTION**

- 1 Air shutter control
- 2 Air shutter lock-nut
- 3 Control box re-set button
- 4 Fair leads
- 5 Wiring terminal block
- 6 Re-set push-button of the motor overload relay
- 7 Air pressure switch
- 8- Gas pressure test-point



## **BURNER EQUIPMENT**

Quantity	Burner accessories
1	Flange
1	Gasket
8	Screws
1	Flange gasket
1	Pipe fitting for gas train

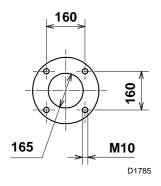
## **ACCESSORY**

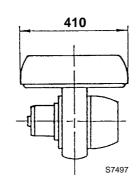
### **RADIO DISTURBANCE PROTECTION KIT: code 3010386**

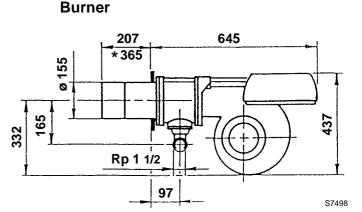
If the burner is installed in places particularly subject to radio disturbance (emission of signals exceeding 10 V/m) owing to the presence of an INVERTER, or in applications where the length of the thermostat connections exceeds 20 metres, a protection kit is available as an interface between the control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

## **OVERALL DIMENSIONS**

# Boiler front-plate drilling

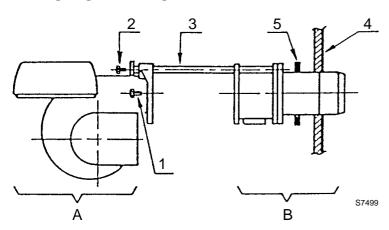






\*Length available with special blast tube to be separately required.

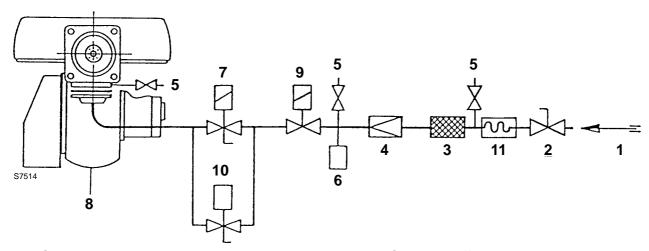
## **FIXING TO THE BOILER**



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 SUPPLY**



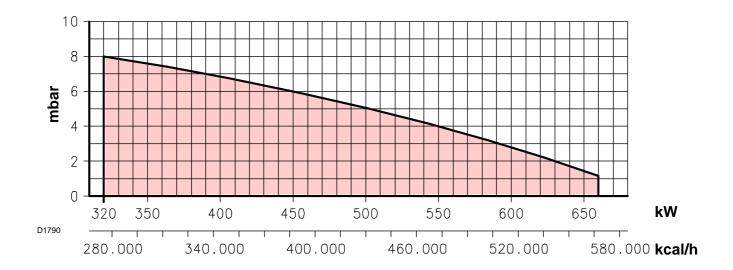
- 1 Gas pipe line
- 2 Cock valve
- 3 Filter
- 4 Pressure stabilizer
- 5 Pressure test-point
- 6 Minimal gas pressure switch

- 7 Gas shut off valve
- 8 Burner
- 9 Gas safety shut off valve
- 10 Gas leak control device
- 11 Isolator joint

## **WORKING RANGE**

# COMBUSTION CHAMBER PRESSURE - MAXIMUM OUTPUT

(in compliance with DIN 4788)



#### 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 550 kW it is necessary a gas pressure of 9 mbar and the combustion head set as indicated at page 7.

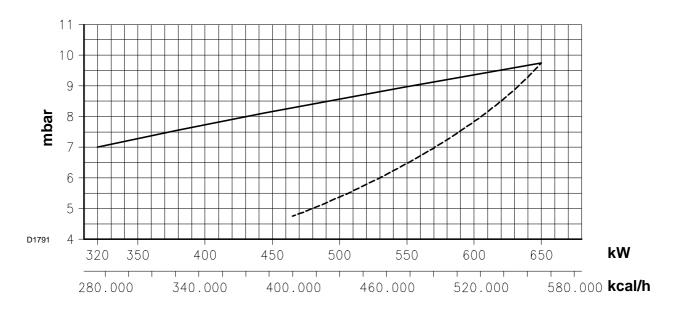
If the combustion chamber is pressurized at 2 mbar, the pressure detected at the test-point 8) is: 9 + 2 = 11 mbar.

If this value is too high, for very low gas pipework pressures, the gas gear 6) (page 7) could be more open.

Do not decrease the pressure at the coupling under the values shown in the diagram.

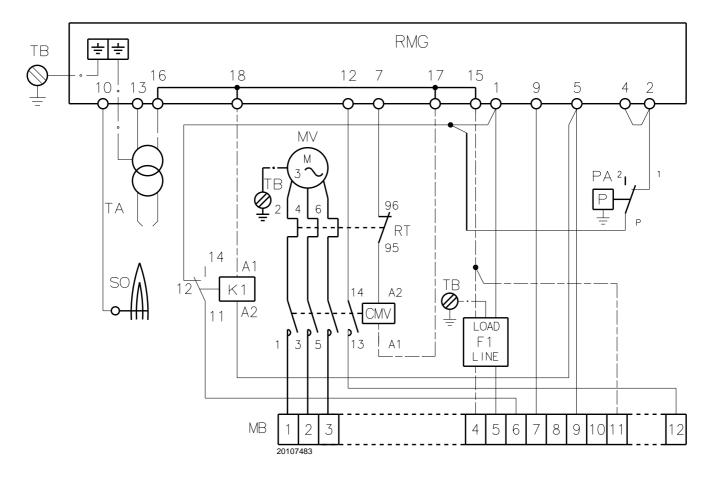
**Output**: the maximum value is obtainable with gas Pci 8600 kcal/m<sup>3</sup>.

## CORRELATION BETWEEN GAS PRESSURE AND BURNER OUTPUT



## **BURNER ELECTRICAL WIRING**

(carried out in the factory)



CMV Fan motor contactor

F1 Protection against radio interference

K1 Relay

MB Burner terminal strip

MV Fan motor

PA Air pressure switch

RMG Control box

RT Overload

S Suppressor

SO Ionisation probe

TA Ignition transformer

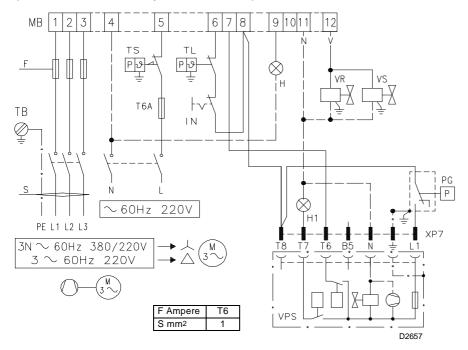
TB Burner earth

## **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 BLOCK

(to be carried out by the installer)



**H** Remote lock-out signal

**H1** Remote lock-out signal of leak

detection control device

**IN** Burner manual stop switch

MB Burner terminal strip

PG Min. gas pressure switch

**TS** Safety control device system

**TL** Limit control device system

VPS Leak detection control device

VR Adjustement valve

VS Gas safety valve

**XP7** Plug for leak detection control

device

#### **Notice**

- -Leads minimal section 1 mm<sup>2</sup>.
- The electric wiring carried out by the installer must be in compliance with the rules in force in the Country.

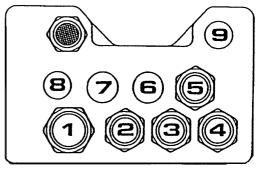
## FIXING OF THE ELECTRICAL WIRES

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.

Three phase supply : fair lead Pg 21
Single phase supply : fair lead Pg 13.5
Adjustment thermostat : fair lead Pg 13.5
Safety thermostat : fair lead Pg 13.5

sheath ø 13

: fair lead Pg 13.5,



S7529

### 6/7/8/9 - Pre-sheared holes

- Gas train

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**

5

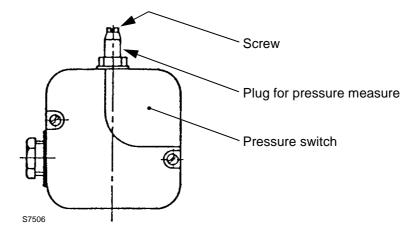
- Do not exchange the neutral wire with the phase (avoid the plug-pin connection).
- Carry out a safe earth connection.
- Check the stop of the burner, by opening the boiler thermostat and the burner lock-out, by disconnecting the lead from the flame probe.

#### 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.

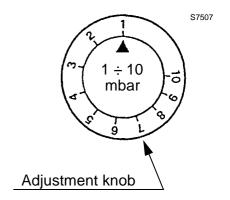


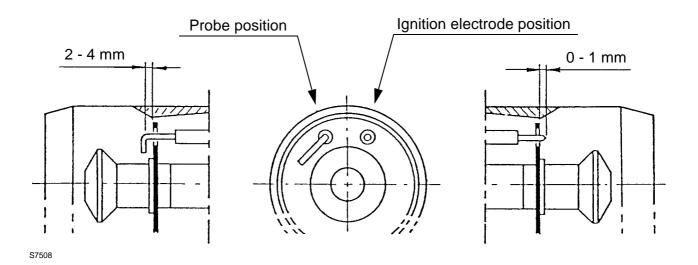
## **AIR PRESSURE SWITCH 7) (fig.1)**

The air pressure switch setting shall be carried out after having set all other adjustment 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

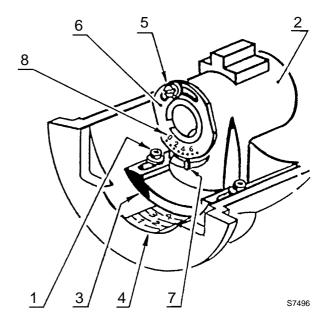
Loosen the two screws 1) and move the internal part of the combustion head 2) so that its rear edge 3) is coincident with the desired set-point on the plate 4). <u>Tighten the screws 1</u>).

## Gas setting

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

## Attention:

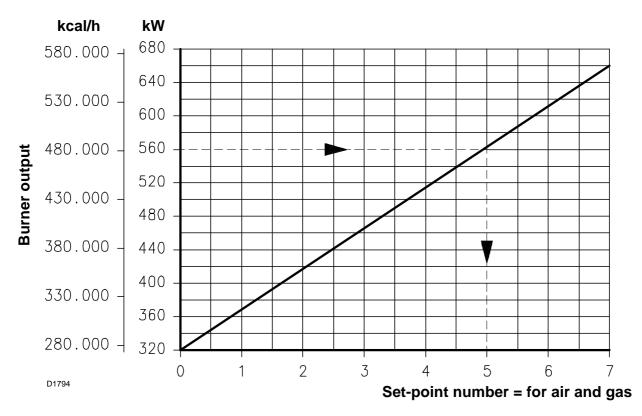
the set-point number is the same for air and gas setting and is given by the following diagram.



## **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.



## **COMBUSTION CHECKS**

### CO<sub>2</sub>

It is advisable to not exceed 10% of CO<sub>2</sub> (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

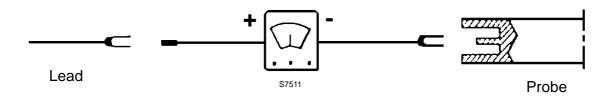
For safety reason the value of 0.1% (one thousand p.p.m.) must not be exceeded.

## **IONIZATION CURRENT**

The minimum current necessary for the control box operation is 3  $\mu$ A.

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.

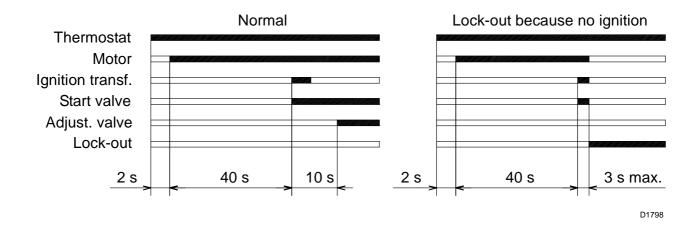


## **MOTOR LOCK-OUT**

This is caused by the thermal 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**

flame  4 - Ignition electrode incorrectly adjusted 5 - Electrode grounded due to broken insulation 6 - High voltage cable defective Replace 7 - High voltage cable defective Replace 8 - Ignition transformer defective Replace 9 - Incorrect valve or transformer Check electrical wiring 10 - Defective control box Replace 11 - A closed valve upline the gas train Open 12 - Air in pipework Bleed air 13 - Gas valves unconnected or with Check connections or replace coil 3 blinks 1 The burner does not switch on, and the lockout appears 1 - Air pressure switch in operating position  1 - Air pressure switch in operative due to insufficient air pressure: 1 - Air pressure switch incorrectly adjusted. 1 - Pressure switch incorrectly adjusted head Adjust or replace coil 1 - Pressure switch incorrectly adjusted head Adjust or replace coil 1 - Pressure switch or pressure test point Clean Adjust or replace adjusted. 1 - Poorly adjusted head Adjust or replace Adjust or replace	Signal	Problem	Possible cause	Recommended remedy
time have passed, the burner goes into lockout without the appearance of the flame  2 - One of the two solenoid valves does not open.  3 - Gas pressure too low	2 blinks	Once the pre-purg-		Increase
appearance of the flame  3 - Gas pressure too low	• •	time have passed, the burner goes into	2 - One of the two solenoid valves does	Replace
flame  4 - Ignition electrode incorrectly adjusted 5 - Electrode grounded due to broken insulation 6 - High voltage cable defective			3 - Gas pressure too low	Increase pressure at governor
insulation 6 - High voltage cable defective			4 - Ignition electrode incorrectly adjusted	Adjust, see page 6
7 - High voltage cable deformed by high temperature 8 - Ignition transformer defective				Replace
temperature  8 Ignition transformer defective				Replace
9 - Incorrect valve or transformer				Replace and protect
electrical wiring 10 - Defective control box				· ·
11 - A closed valve upline the gas train 12 - Air in pipework				Check
12 - Air in pipework				Replace
3 blinks				1 -
interrupted coil  The burner does not switch on, and the lockout appears  The burner switches on, but then stops in lockout  The burner switches on, but then stops in lockout  The burner switches on, but then stops in lockout  The burner switches on, but then stops in lockout  The burner switches on, but then stops in lockout  The burner switches on, but then stops in lockout  The burner switches on, but then stops in lockout  The burner switches on, but then stops in lockout  The burner switches on, but then stops in lockout  The burner switches on, but then stops in lockout  The burner switches on, but then stops in lockout  The burner switches on, but then stops in lockout  The burner switches on, but then stops in lockout  The burner switches on, but then stops in lockout  The burner switches on, but then stops in lockout  The burner switches on on but then stops in lockout  The burner switches on, but then stops in lockout  The burner switches on difference switch in operating position operating position  The burner does not the furnace on on switch in operating position  The burner switches on difference switch in operating position of its operative due to on switch in operative du			1	
switch on, and the lockout appears  The burner switches on, but then stops in lockout  15 - Air pressure switch incorrectly adjusted.  16 - Pressure switch pressure test point pipe blocked  17 - Poorly adjusted head			interrupted coil	coil
on, but then stops in lockout  15 - Air pressure switch incorrectly adjusted.  16 - Pressure switch pressure test point . pipe blocked  17 - Poorly adjusted head	3 blinks ● ● ●	switch on, and the		Adjust or replace
Adjust of replace  adjusted.  16 - Pressure switch pressure test point . pipe blocked  17 - Poorly adjusted head		on, but then stops in		
pipe blocked 17 - Poorly adjusted head				Adjust or replace
18 - High pressure in the furnace Connect air pressure switch to fan suction line  Lockout during prepurging phase  19 - Defective motor control contactor (only three-phase version)  20 - Defective electrical motor Replace  21 - Motor lockout (defective electrical motor)  4 pulses  on, but then stops in lockout				Clean
Lockout during prepurging phase  19 - Defective motor control contactor (only three-phase version) 20 - Defective electrical motor Replace 21 - Motor lockout (defective electrical motor)  4 pulses on, but then stops in lockout  fan suction line  Replace Replace Replace Replace Replace Replace			17 - Poorly adjusted head	Adjust
purging phase (only three-phase version) 20 - Defective electrical motor Replace 21 - Motor lockout (defective electrical motor)  4 pulses on, but then stops in lockout  (only three-phase version) 22 - Flame simulation Replace Replace Replace the control box				Connect air pressure switch to fan suction line
21 - Motor lockout (defective electrical motor)  4 pulses on, but then stops in lockout  21 - Motor lockout (defective electrical motor)  Replace Replace the control box			(only three-phase version)	Replace
motor)  4 pulses				-
4 pulses on, but then stops in lockout  The burner switches on, but then stops in lockout  Replace the control box				Replace
lockout	4 pulses		,	Replace the control box
I salandada haman 100 Damanan Maria I da a a a la Elizabara de Constantina de Con		lockout		
stops head or flame simulation replace control box			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 through	7 blinks • • • • • • •	lockout immediately	through	
following the appear- 25 - Ionisation probe incorrectly adjusted . Adjust, see page 6				
26 - Insufficient ionisation (less than 5 A).   Check probe position			,	1
27 - Earth probe			•	•
28 - Burner poorly grounded Check grounding				
29 - Phase and neutral connections inverted Invert them			inverted	
30 - Defective flame detection circuit Replace the control box		D		
Burner goes into lockout during operation all states and the states are states as a second state of the states		lockout during opera-	31 - Probe or ionisation cable grounded	Replace worn parts

Signal	Problem	Possible cause	Recommended remedy
10 blinks	switch on, and the lockout appears	32 - Incorrect electrical wiring	Check
		33 - Defective control box	Replace
	lockout	<ul> <li>34 - Presence of electromagnetic disturbances in the thermostat lines</li> <li>35 - Presence of electromagnetic disturbance</li> </ul>	Filter or eliminate  Use the radio disturbance protection kit
No blink		36 - No electrical power supply	Close all switches - Check connections
	start	37 - A limiter or safety control device is open	Adjust or replace
		38 - Line fuse blocked	Replace
		39 - Defective control box	Replace
		40 - No gas supply	Open the manual valves between contactor and train
		41 - Mains gas pressure insufficient	Contact your GAS COMPANY
		42 - Minimum gas pressure switch fails to close	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 pulsa-	44 - Poorly adjusted head	Adjust. See page 7
	tions	45 - Ignition electrode incorrectly adjusted	Adjust, see page 6
		46 - Incorrectly adjusted fan air damper: too much air	Adjust
		47 - Output during ignition phase is too high	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.

GREEN LED on wait at least 10s	Press button for > 3s	signal	Interval 3s	signal
		• • • • •		• • • • •

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 followin table:

COLOUR CODE TABLE				
Sequences				Colour code
Pre-purging				•••••
Ignition phase	9			•0•0•0•0•
Operation, fla	me ok			
Operating with	h weak flame signal			
Electrical sup	ply lower than ~ 170V			
Lock-out				
Extraneous liç	ght			
Key:	O Off	<ul><li>Yellow</li></ul>	☐ Green	▲ Red

## **OPERATING FAULT DIAGNOSTICS**

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

ITo 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.

RED LED on	Press button		Interval	
wait at least 10 s	for > 3 s	Signal	3 s	Signal
		• • • • •		• • • • •

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;
	<ul><li>neutral/phase exchange;</li></ul>
	- 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.



RIELLO S.p.A. I-37045 Legnago (VR) Tel.: +39.0442.630111 http:// www.riello.it http:// www.riello.com