

## **GB** Forced draught gas burners

One stage operation

CE

UK  
CA

EAC

| CODE - CÓDIGO     | MODEL - MODELO | TYPE - TIPO |
|-------------------|----------------|-------------|
| 3788510 - 3788511 | RS 34/1 MZ     | 886 T       |
| 3788610 - 3788611 | RS 44/1 MZ     | 873 T       |

**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: RS 34/1 MZ - RS 44/1 MZ

These products are in compliance with the following Technical Standards:

EN 676

EN 12100

and according to the European Directives:

|     |             |                               |
|-----|-------------|-------------------------------|
| GAR | 2016/426/EU | Gas Appliances Regulation     |
| MD  | 2006/42/CE  | Machine Directive             |
| LVD | 2014/35/UE  | Low Voltage Directive         |
| EMC | 2014/30/UE  | Electromagnetic Compatibility |

Such products are marked as follows:



CE-0085BR0380

**The quality is guaranteed by a quality and management system certified in accordance with ISO 9001:2015.**

Legnago, 03.05.2021

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

Mr. F. Maltempi

**Manufacturer's Declaration**

**RIELLO S.p.A.** declares that the following products comply with the NOx emission limits specified by German standard "1. BImSchV release 26.01.2010".

| Product                   | Type  | Model      | Power     |
|---------------------------|-------|------------|-----------|
| Forced draught gas burner | 873 T | RS 44/1 MZ | 86-550 kW |

**Declaration of Conformity A.R. 8/1/2004 & 17/7/2009 – Belgium**

Manufacturer: RIELLO S.p.A.  
 37045 Legnago (VR) Italy  
 Tel. ++39.0442630111

Distributed by: RIELLO NV  
 VAN MARCKE HQ  
 LAR Blok Z 5,  
 B-8511 Kortrijk (Aalbeke) BE  
 Tel. +32 56 23 7511

It is hereby certified that the apparatuses specified below conform with the model of the type described in the CE conformity declaration and they are produced and placed in circulation in conformity with the provisions defined in L.D. dated January 8, 2004 and July 17, 2009.

Type of product: Forced draught gas burner  
 Model: RS 34/1 MZ - RS 44/1 MZ  
 Regulation applied: EN 676 and A.R. dated January 8, 2004 - July 17, 2009  
 Control body: TÜV Industrie Service GmbH  
 TÜV SÜD Gruppe  
 Ridlerstrasse, 65  
 80339 München DEUTSCHLAND

|                 |                     |                    |
|-----------------|---------------------|--------------------|
| Measured value: | RS 34/1 MZ          | RS 44/1 MZ         |
|                 | CO max: 9 mg/kWh    | CO max: 8 mg/kWh   |
|                 | NOx max: 100 mg/kWh | NOx max: 95 mg/kWh |

|                                                      |               |
|------------------------------------------------------|---------------|
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**N.B.**

Figures mentioned in the text are identified as follows:

- 1)(A) =Part. 1 of figure A, same page as text;
- 1)(A)p.3 =Part .1 of figure A, page number 3.

## TECHNICAL DATA

| MODEL                              |                      | RS 34/1 MZ                                                          |      | RS 44/1 MZ            |      |
|------------------------------------|----------------------|---------------------------------------------------------------------|------|-----------------------|------|
| TYPE                               |                      | 886 T                                                               |      | 873 T                 |      |
| OUTPUT <sup>(1)</sup>              | kW<br>Mcal/h         | 70 - 390<br>60 - 336                                                |      | 100 - 550<br>86 - 473 |      |
| FUEL                               |                      | NATURAL GAS: G20 - G21 - G22 - G23 - G25                            |      |                       |      |
|                                    |                      | G20                                                                 | G25  | G20                   | G25  |
| - net calorific value              | kWh/Sm <sup>3</sup>  | 9.45                                                                | 8.13 | 9.45                  | 8.13 |
|                                    | Mcal/Sm <sup>3</sup> | 8.2                                                                 | 7.0  | 8.2                   | 7.0  |
| - absolute density                 | kg/Sm <sup>3</sup>   | 0.71                                                                | 0.78 | 0.71                  | 0.78 |
| - max. delivery                    | Sm <sup>3</sup> /h   | 35                                                                  | 40   | 49                    | 57   |
| - pressure at maximum delivery (2) | mbar                 | 13,1                                                                | 18,4 | 16,7                  | 23,2 |
| OPERATION                          |                      | • On-Off (1 stop min each 24 hours).<br>• One stage (all - nothing) |      |                       |      |
| STANDARD APPLICATIONS              |                      | Boilers: water, steam, diathermic oil                               |      |                       |      |
| AMBIENT TEMPERATURE                | °C                   | 0 - 40                                                              |      |                       |      |
| COMBUSTION AIR TEMPERATURE         | °C max               | 60                                                                  |      |                       |      |
| ELECTRICAL SUPPLY                  | V<br>Hz              | 230 ~ +/-10%<br>50/60 - single-phase                                |      |                       |      |
| ELECTRIC MOTOR                     | rpm                  | 2800/3400                                                           |      | 2820/3400             |      |
|                                    | W                    | 300                                                                 |      | 420                   |      |
|                                    | V                    | 220 - 240                                                           |      | 220 - 240             |      |
|                                    | A                    | 2.4                                                                 |      | 3                     |      |
| ACCELERATION CURRENT               | A                    | 15                                                                  |      | 17                    |      |
| WORKING CURRENT                    | A                    | 3.2                                                                 |      | 3.5                   |      |
| MOTOR CAPACITOR                    | µF/V                 | 12.5/400                                                            |      | 12.5/450              |      |
| IGNITION TRANSFORMER               | V1 - V2<br>I1 - I2   | 230 V - 1 x 15kV<br>1 A - 25mA                                      |      |                       |      |
| ELECTRICAL OUTPUT CONSUMPTION      | W max                | 600                                                                 |      | 760                   |      |
| PROTECTION LEVEL                   |                      | IP 40                                                               |      |                       |      |
| NOISE <sup>(3)</sup>               | SOUND PRESSURE       | 68                                                                  |      | 70                    |      |
|                                    | SOUND POWER          | 79                                                                  |      | 81                    |      |

(1) Reference conditions: Ambient temperature 20°C - Gas temperature 15°C - Barometric pressure 1013 mbar - Altitude 0 m a.s.l.

(2) Pressure at the socket 8)(A)p.4 with zero pressure in the combustion chamber, at the maximum output of the burner.

(3) Sound pressure measured in manufacturer's combustion laboratory, with burner operating on test boiler and at maximum rated output. The sound power is measured with the "Free Field" method, as per EN 15036, and according to an "Accuracy: Category 3" measuring accuracy, as set out in EN ISO 3746.

## STRUCTURAL VERSIONS

| Model      | Blast tube length (mm) |
|------------|------------------------|
| RS 34/1 MZ | 216                    |
|            | 351                    |
| RS 44/1 MZ | 216                    |
|            | 351                    |

## GAS CATEGORIES

| COUNTRY                     | CATEGORY                                                                                  |
|-----------------------------|-------------------------------------------------------------------------------------------|
| IT - AT - GR - DK - FI - SE | II <sub>2H3B</sub> / P                                                                    |
| ES - GB - IE - PT           | II <sub>2H3P</sub>                                                                        |
| NL                          | I <sub>2L</sub> - I <sub>2E</sub> - I <sub>2</sub> (43,46 ÷ 45,3 MJ/m <sup>3</sup> (0°C)) |
| FR                          | II <sub>2Er3P</sub>                                                                       |
| DE                          | II <sub>2ELL3B</sub> / P                                                                  |
| BE                          | I <sub>2E(R)B</sub> , I <sub>3P</sub>                                                     |
| LU - PL                     | II <sub>2E 3B/P</sub>                                                                     |

## ACCESSORIES (optional):

### • RADIO DISTURBANCE PROTECTION KIT

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.

| BURNER | RS 34-44/1 MZ |
|--------|---------------|
| Code   | 3010386       |

### • KIT LONG HEAD

| BURNER | RS 34/1 MZ | RS 44/1 MZ |
|--------|------------|------------|
| Code   | 3010428    | 3010429    |

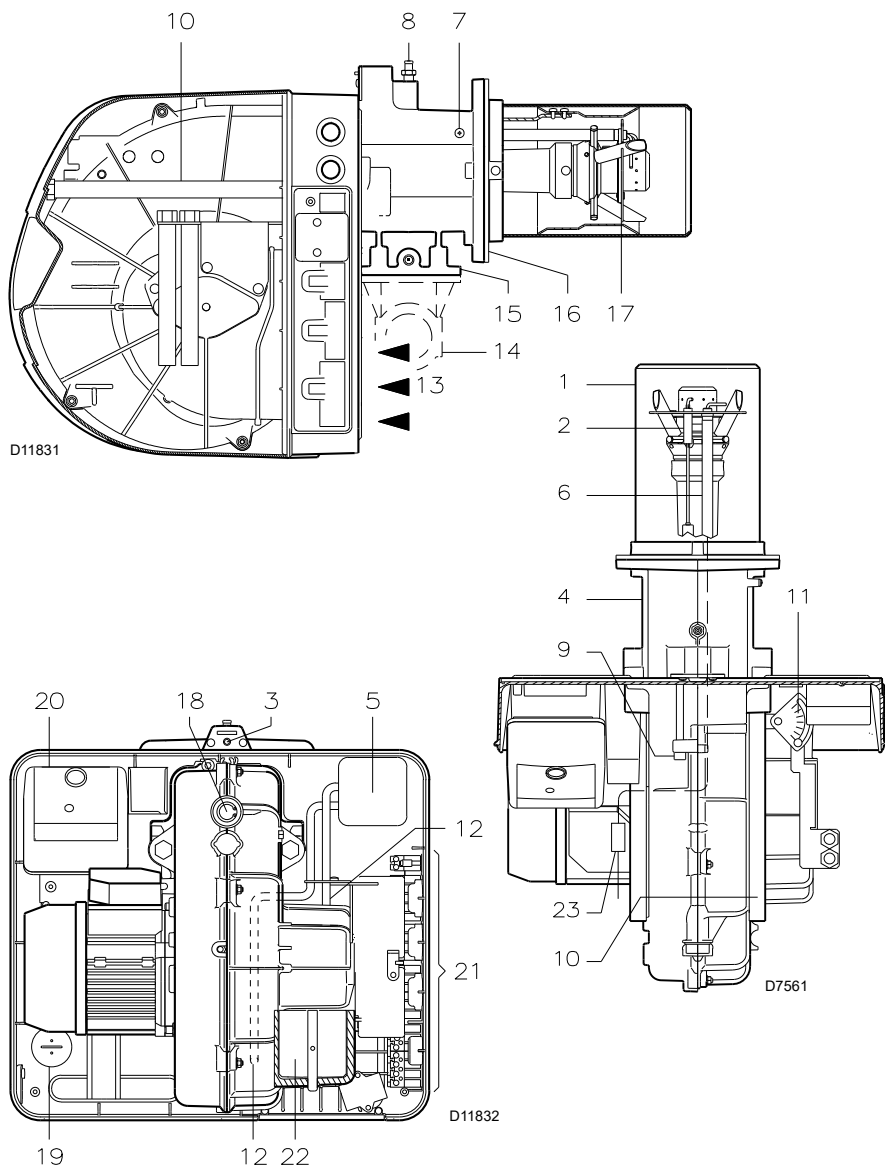
### • KIT FOR LPG OPERATION: the kit allows the RS 34-44/1 MZ burners to burn LPG.

| BURNER               | RS 34/1 MZ  | RS 44/1 MZ   |
|----------------------|-------------|--------------|
| Output kW            | 80 - 390 kW | 120 - 530 kW |
| Blast tube length mm | 216 - 351   | 216 - 351    |
| Code                 | 3010423     | 3010424      |

| BURNER                            | RS 34-44/1 MZ |
|-----------------------------------|---------------|
| • KIT MAXIMUM GAS PRESSURE SWITCH | Code 3010418  |
| • KIT CLEAN CONTACTS              | Code 3010419  |
| • KIT POST-PURGING                | Code 3010452  |
| • KIT GROUND FAULT INTERRUPTER    | Code 3010448  |
| • KIT CONTINUOUS PURGING          | Code 3010449  |
| • KIT HOURCOUNTER                 | Code 3010450  |
| • KIT INTERFACE ADAPTER RMG TO PC | Code 3002719  |

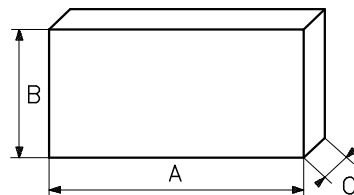
### • GAS TRAIN ACCORDING TO EN 676 (with valves, pressure governor and filter): see page 10.

**NOTE:** The installer is responsible for the addition of any safety device not foreseen in this manual.



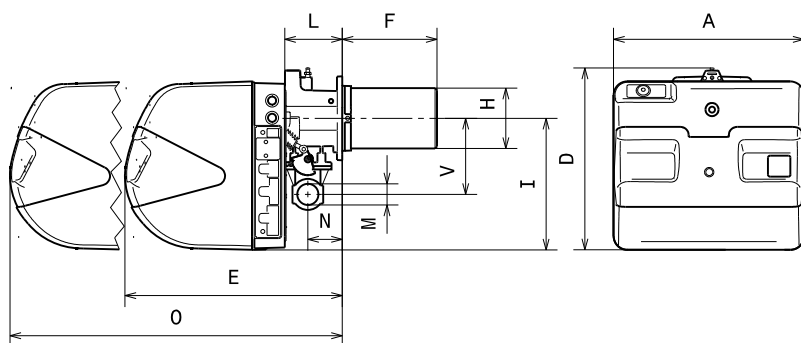
(A)

| mm         | A    | B   | C   | kg |
|------------|------|-----|-----|----|
| RS 34/1 MZ | 1000 | 500 | 485 | -  |
| RS 44/1 MZ | 1000 | 500 | 485 | -  |



(B)

D88



| mm         | A   | D   | E   | F (1)   | H   | I   | L   | O   | N  | V   | M     |
|------------|-----|-----|-----|---------|-----|-----|-----|-----|----|-----|-------|
| RS 34/1 MZ | 442 | 422 | 508 | 216-351 | 140 | 305 | 138 | 780 | 84 | 177 | 1"1/2 |
| RS 44/1 MZ | 442 | 422 | 508 | 216-351 | 152 | 305 | 138 | 780 | 84 | 177 | 1"1/2 |

(1) Blast tube: short-long

(C)

D3831

## BURNER DESCRIPTION (A)

- 1 Combustion head
- 2 Ignition electrode
- 3 Screw for combustion head adjustment
- 4 Sleeve
- 5 Minimum air pressure switch (differential operating type)
- 6 Flame sensor probe
- 7 Air pressure test point
- 8 Gas pressure test point and head fixing screw
- 9 Screw securing fan to pipe coupling
- 10 Slide bars for opening the burner and inspecting the combustion head
- 11 Indexed selector.  
Opens the fan gate to the value needed by the burner delivery.
- 12 Pressure test point of
- 13 Air inlet to fan
- 14 Gas input pipework
- 15 Gas train connection flange
- 16 Boiler fixing flange
- 17 Flame stability disc
- 18 Flame inspection window
- 19 Motor capacitor (RS 34/1 MZ)
- 20 Control box with lockout pilot light and lock-out reset button
- 21 Plugs for electrical wiring
- 22 Air damper
- 23 Plug-socket on ionisation probe cable

## Note

If the control box 20)(A) pushbutton (**red led**) lights up, it indicates that the burner is in lock-out.

To reset, hold the pushbutton down for between 1 and 3 seconds.

## PACKAGING - WEIGHT (B) - approximate measurements

- The burner are shipped in cardboard boxes with the maximum dimensions shown in Table (B).
- The weight of the burner complete with packaging is indicated in Table (B).

## MAX. DIMENSIONS (C) - approximate measurements

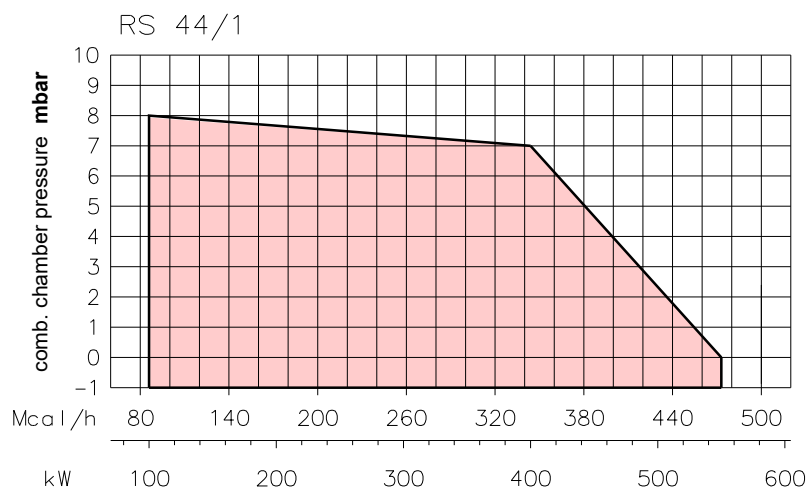
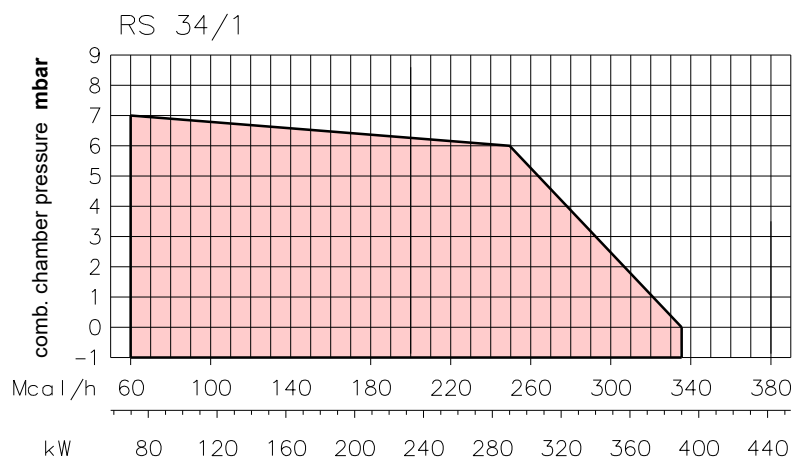
The maximum dimensions of the burner are given in fig. (C).

Note that if you need to examine the combustion head, the burner must be pulled backward on the slide bars.

The maximum dimension of the burner, without the cover, when open is given by measurement H.

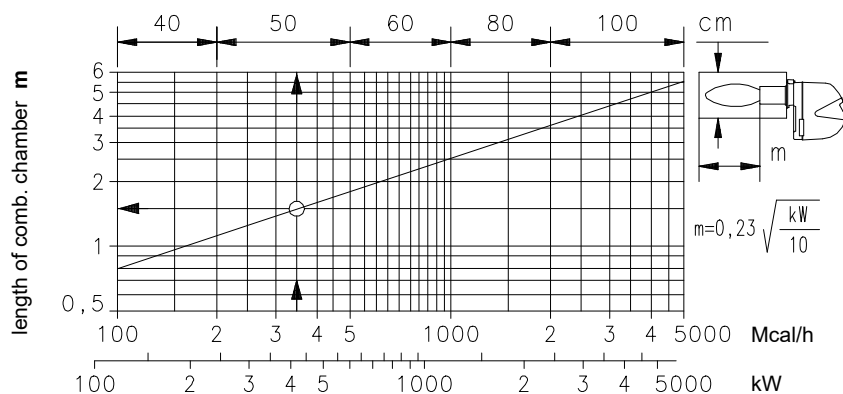
## BURNER EQUIPMENT

- 1 - Gas train flange
- 1 - Flange gasket
- 4 - Flange fixing screws M 8 x 25
- 4 - Screws to secure the burner flange to the boiler: M 8 x 25
- 1 - Thermal insulation screen
- 3 - Plugs for electrical connection
- 1 - Instruction
- 1 - Spare parts list



(A)

D8589



(B)

D497

## FIRING RATES (A)

The burner output must be selected within the area of the adjacent diagrams.

### Attention

the FIRING RATE value range has been obtained considering an ambient temperature of 20 °C, and an atmospheric pressure of 1013 mbar (approx. 0 m a.s.l.) and with the combustion head adjusted as shown on page 9.

## TEST BOILER (B)

The firing rates were set in relation to special test boilers, according to EN 676 regulations.

Figure (B) indicates the diameter and length of the test combustion chamber.

**Example:** Output 350 Mcal/h:

diameter = 50 cm - length 1.5 m.

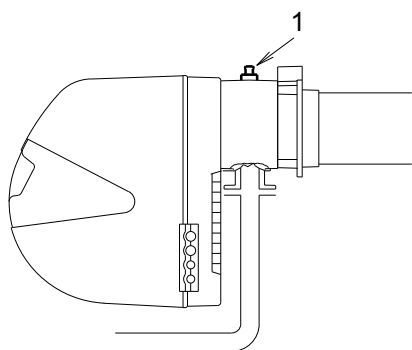
## COMMERCIAL BOILERS

The burner/boiler combination does not pose any problems if the boiler is CE approved and its combustion chamber dimensions are similar to those indicated in diagram (B).

If the burner must be combined with a commercial boiler that has not been CE type-approved and/or its combustion chamber dimensions are clearly smaller than those indicated in diagram (B), consult the manufacturer.

|            |     | 1 Δp (mbar) |      |      |     |
|------------|-----|-------------|------|------|-----|
|            |     | kW          | G20  | G25  | G31 |
| RS 34/1 MZ | 70  | 0.6         | 0.9  | 1    |     |
|            | 106 | 0.9         | 1.3  | 1.4  |     |
|            | 141 | 2           | 2.9  | 2.6  |     |
|            | 177 | 3.5         | 5.2  | 4.3  |     |
|            | 212 | 5.2         | 7.7  | 6.3  |     |
|            | 248 | 6.9         | 10.2 | 8.6  |     |
|            | 283 | 8.4         | 12.5 | 10.9 |     |
|            | 319 | 10          | 14.8 | 13.5 |     |
|            | 354 | 11.4        | 16.9 | 16.4 |     |
|            | 390 | 13.1        | 19.5 | 20   |     |
| RS 44/1 MZ | 100 | 0.2         | 0.3  | 0.5  |     |
|            | 150 | 1.4         | 2.1  | 2.5  |     |
|            | 200 | 3           | 4.4  | 4.5  |     |
|            | 250 | 4.9         | 7.3  | 6.7  |     |
|            | 300 | 6.9         | 10.2 | 9.1  |     |
|            | 350 | 8.9         | 13.3 | 11.5 |     |
|            | 400 | 10.9        | 16.1 | 14   |     |
|            | 450 | 12.8        | 19.1 | 16.6 |     |
|            | 500 | 14.7        | 21.7 | 19.3 |     |
|            | 550 | 16.7        | 24.9 | 22.1 |     |

(A)



(B)

S9525

## GAS PRESSURE

The adjacent tables show minimum pressure losses along the gas supply line depending on the burner output.

### Column 1

Pressure loss at combustion head.

Pressure of the gas at the socket 1)(B), with combustion chamber at 0 mbar.

The values shown in the various tables refer to:  
natural gas G 20 PCI 9.45 kWh/Sm<sup>3</sup>  
(8.2 Mcal/Sm<sup>3</sup>)

Calculate the approximate maximum output of the burner in this way:

- subtract the combustion chamber pressure from the gas pressure measured at test point 1)(B).
- Find, in the table relating to the burner concerned, the pressure value closest to the result of the subtraction.
- Read the corresponding output on the left.

### Example - RS 34/1 MZ:

- Maximum output operation
- Natural gas G 20 PCI 9.45 kWh/Sm<sup>3</sup>
- Gas pressure at test point 1)(B) = 8.9 mbar
- Pressure in combustion chamber = 2 mbar  
8.9 - 2 = 6.9 mbar

An output of 248 kW shown in table RS 34/1 corresponds to 6.9 mbar pressure, column 1. This value serves as a rough guide; the effective delivery must be measured at the gas meter.

To calculate the required gas pressure at test point 1)(B), set the output required from the burner:

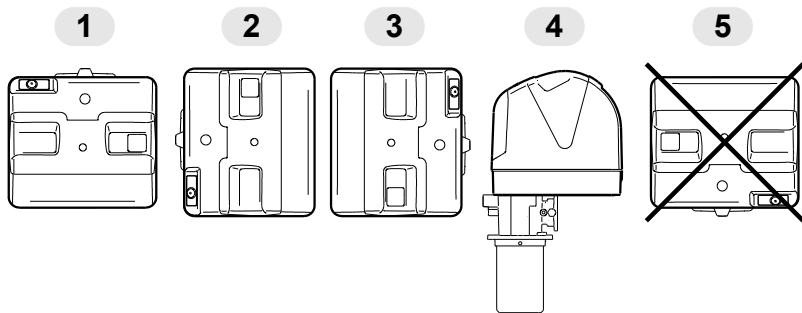
- Find the nearest output value in the table for the burner in question.
- Read, on the right (column 1) the socket pressure 1)(B).
- Add this value to the estimated pressure in the combustion chamber.

### Example - RS 34/1 MZ:

- Required burner output: 248 kW
- Natural gas G 20 PCI 9.45 kWh/Sm<sup>3</sup>
- Pressure of the gas at an output of 248 kW, from the table RS 34/1 MZ, column 1 = 6.9 mbar
- Pressure in combustion chamber = 2 mbar  
6.9 + 2 = 8.9 mbar  
pressure required at test point 1)(B).



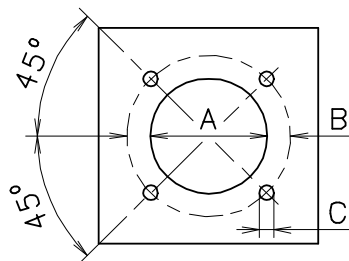
**The heat output and gas pressure in the head data refer to operating with the gas butterfly valve fully open (90°).**



(A)

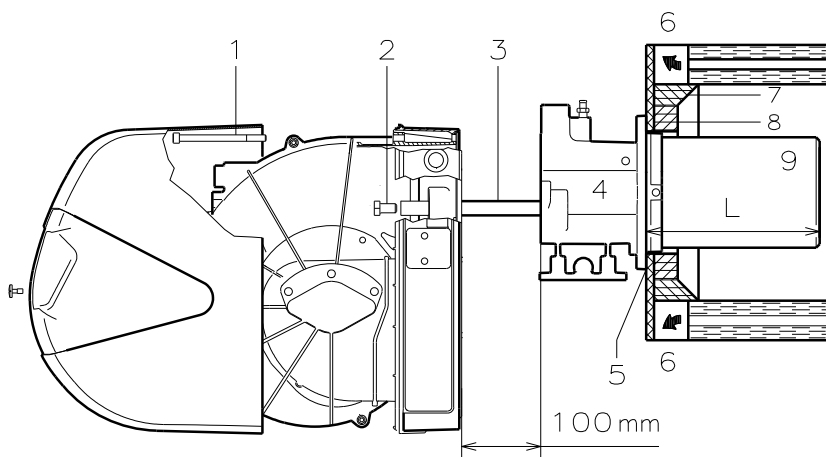
D3928

| mm         | A   | B   | C   |
|------------|-----|-----|-----|
| RS 34/1 MZ | 160 | 224 | M 8 |
| RS 44/1 MZ | 160 | 224 | M 8 |



(B)

D455



(C)

D7564

## INSTALLATION



**THE BURNER MUST BE INSTALLED IN CONFORMITY WITH LEGISLATION AND LOCAL STANDARDS.**

### WORKING POSITION (A)



The burner is designed to work only in the positions **1, 2, 3 and 4**.

Installation **1** is preferable, as it is the only one that allows the maintenance operations as described in this manual.

Installations **2, 3 and 4** allow the working, but make the operations of maintenance and checking of the combustion head more difficult page 15.

Any other position could compromise the correct working of the appliance.

Installation **5** is forbidden, for safety reasons.

### BOILER PLATE (B)

Pierce the closing plate of the combustion chamber, as in (B). The position of the threaded holes can be marked using the thermal screen supplied with the burner.

### BLAST TUBE LENGTH (C)

The length of the blast tube must be selected according to the indications provided by the manufacturer of the boiler, and in any case it must be greater than the thickness of the boiler door complete with its fettling.

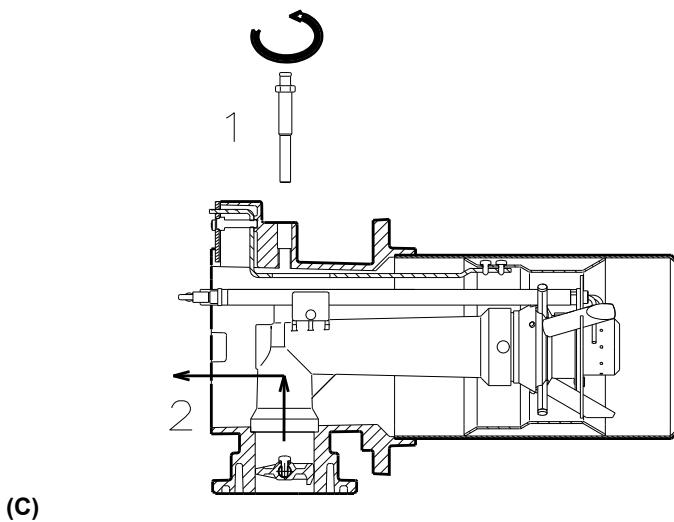
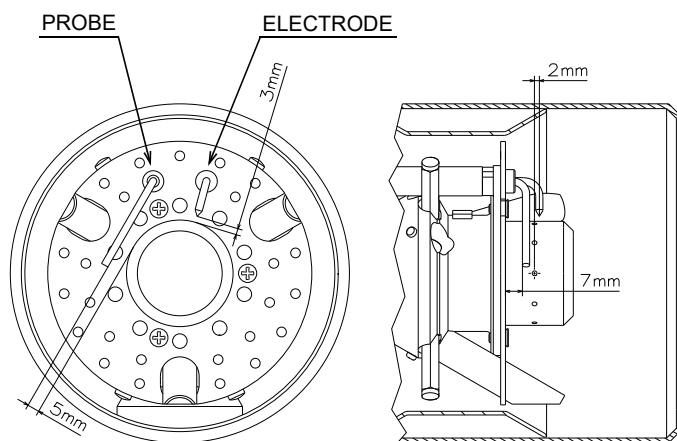
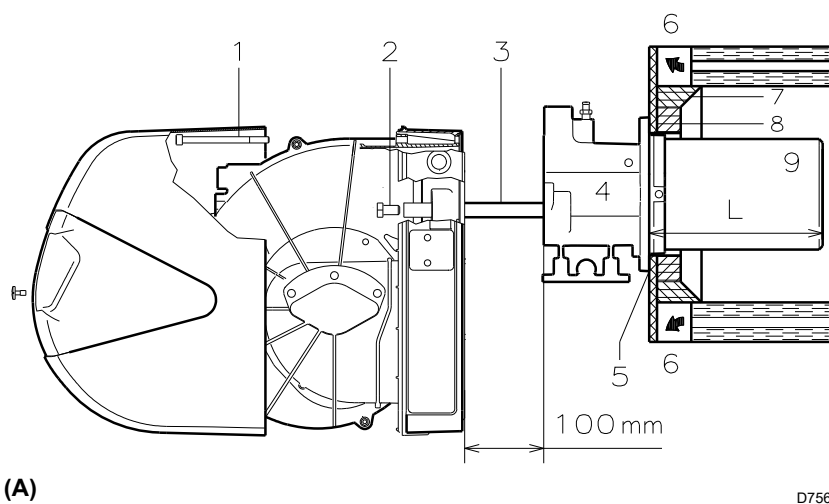
The range of lengths available, L (mm), is as follows:

|               |            |            |
|---------------|------------|------------|
| Blast tube 9) | RS 34/1 MZ | RS 44/1 MZ |
| • short       | 216        | 216        |
| • long        | 351        | 351        |

For boilers with front flue passes 6) or flame inversion chambers, protective fettling in refractory material 8), must be inserted between the boiler fettling 7) and the blast tube 9).

This protective fettling must not compromise the extraction of the blast tube.

For boilers with a water-cooled frontpiece, a heat-resistant cover is not necessary 7)-8)(C), unless expressly requested from the boiler manufacturer.



### FIXING THE BURNER TO THE BOILER (A)

Before fixing the burner to the boiler, check (from the opening of the blast tube) that the probe and the electrode are correctly positioned, as in (B).

Separate the combustion head from the rest of the burner, fig. (A):

- remove the screws 2) from the two slide bars 3);
- remove screw 1) and pull the burner back on slide bars 3) by about 100 mm;
- disconnect the probe and electrode leads, then unthread the burner completely from the guides.

Fix the unit 4)(A) to the boiler plate, inserting the supplied insulating gasket 5)(A).

Use the 4 screws, also supplied with the unit, after first protecting the thread with an anti-locking product. The seal between burner and boiler must be airtight.

If, in the previous check, the position of the probe or electrode was not correct, remove the screw 1)(C), extract the inner part 2)(C) of the head, and adjust them.

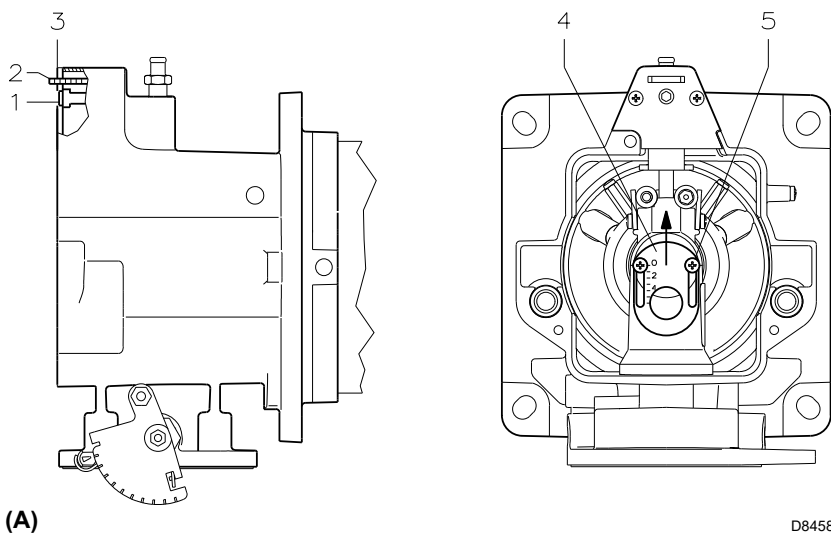
Do not rotate the probe: leave it as in (B).

If it is located too close to the ignition electrode, the control box amplifier may be damaged.



### ATTENTION

Proceed with the assembly of the inner part 2)(C) of the combustion head, tightening the screw 1)(C) with a tightening torque of  $4 \pm 6 \text{ Nm}$ .



## COMBUSTION HEAD SETTING

Installation operations are now at the stage where the blast tube and sleeve are secured to the boiler as shown in fig. (A). It is therefore particularly easy to adjust the combustion head.

### Air adjustment (A - B)

Rotate the screw 1)(A) until the notch on the lamina 2)(A) corresponds with the surface of the plate 3)(A).

### Example:

RS 44/1 MZ burner, output = 300kW.

From diagram (B) you can see that, for the MAX output of 300 kW, the air should be adjusted at notch 4, subtracted from the value of the pressure in the chamber. In this case, the loss of pressure in the combustion head is shown in column 1 on page 6 - 7.

### Note

If the pressure in the chamber is equal to 0 mbar, the air is adjusted with reference to the broken line of the diagram (B).

### Central air adjustment (A - C)

In case the application needs a particular setup, it is possible to modify the central air delivery using the ring nut 4)(A) up to the notch indicated in diagram (C).

In order to carry out this operation, unscrew the screws 5)(A) and lift up the ring nut 4)(A). At the end, tighten the screws 5)(A) again.

Once you have finished adjusting the head, reassemble the burner 4)(D) on the guides 3)(D) at about 100mm from the pipe coupling 5)(D) - burner in the position shown in fig. (C)p.8 - insert the cable of the probe and the cable of the electrode, then slide the burner as far as the pipe coupling, burner in the position shown in fig. (D).

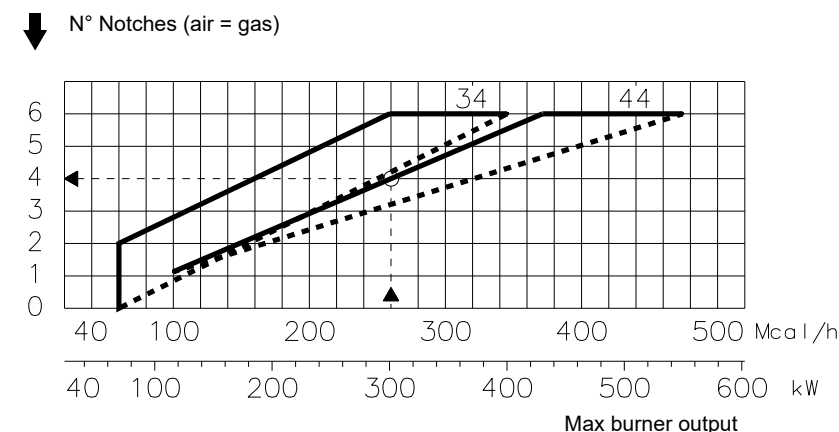
Refit the screws 2) on the guides 3).

Fix the burner to the pipe coupling with the screw 1).

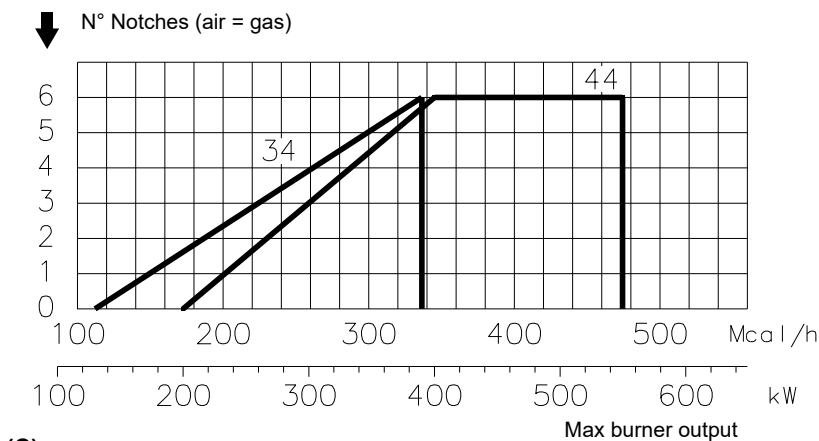


### Attention

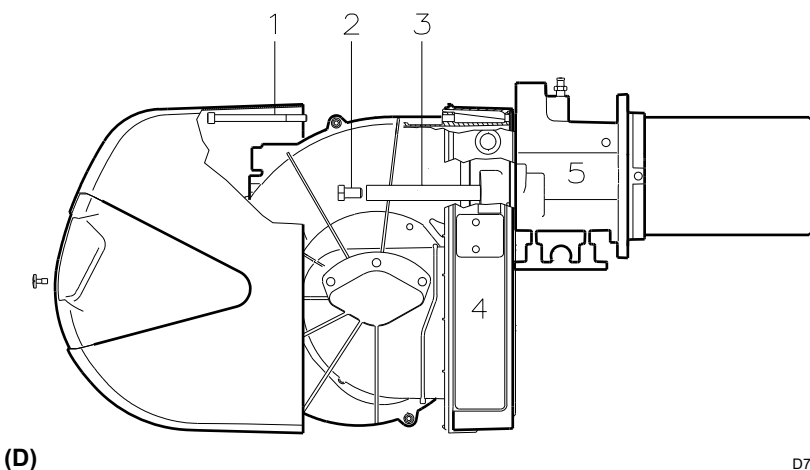
When fitting the burner on the two slide bars, it is advisable to gently draw out the high tension cable and flame detection probe cable until they are slightly stretched.



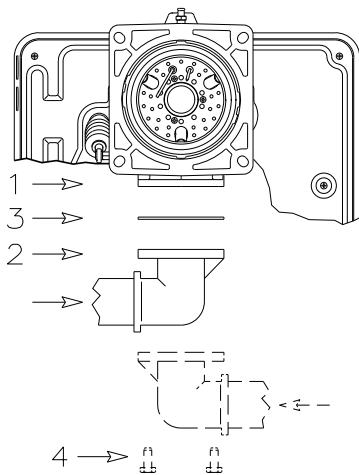
(B) D7565



(C) D8577



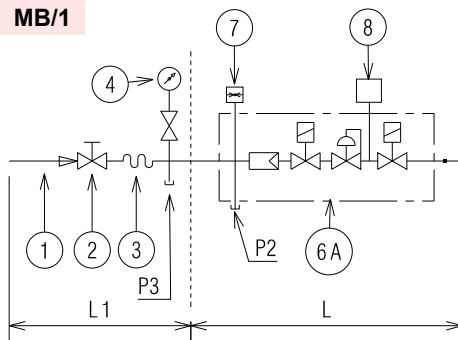
(D) D7566



(A)

D3839

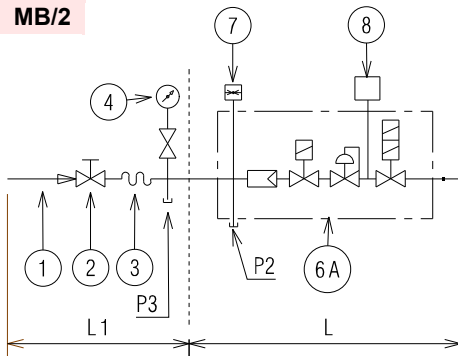
#### MB/1



(B)

20057264

#### MB/2



(C)

20123607

### GAS FEEDING LINE

- The gas train must be connected to the gas attachment 1)(A), using the flange 2), gasket 3) and screws 4) supplied with the burner.
- The gas train can enter the burner from the right or left side, depending on which is the most convenient, see fig. (A).
- The gas solenoids must be as close as possible to the burner, to ensure that the gas reaches the combustion head within the safety time of 3s.

### GAS TRAIN (B-C)

It has been type-approved, together with the burner, according to EN 676, and is supplied separately from the burner.

It is possible to use the one-stage gas train (B) up to an output of 550 kW, limiting the ignition delivery according to the norm, with the aid of just the brake, as specified on page 12.

Alternatively, use the two stage trains (C), referring to the **"Burner - gas train combination"** booklet supplied.

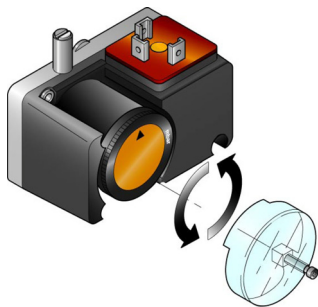
### KEY TO LAY-OUT (B)

- 1 Gas input pipe
- 2 Manual valve
- 3 Vibration damping joint
- 4 Pressure gauge with pushbutton cock
- 5 Filter
- 6A Includes:
  - Filter
  - working valve
  - safety valve
  - pressure adjuster
- 6C Includes
  - safety valve
  - working valve
- 6D Includes:
  - safety valve
  - working valve
- 7 Minimum gas pressure switch
- 8 Leak detection device, supplied as an accessory or incorporated, based on the gas train code. In compliance with the EN 676 standard, the leak detection control is compulsory for burners with maximum outputs over 1200 kW.
- 9 Gasket, for "flanged" versions only
- 10 Pressure adjuster
- 11 Train-burner adaptor, supplied separately
- P2 Upstream pressure of valves/adjuster
- P3 Upstream pressure of the filter
- L Gas train supplied separately
- L1 The responsibility of the installer

### Note

See the accompanying instructions for the adjustment of the gas train.

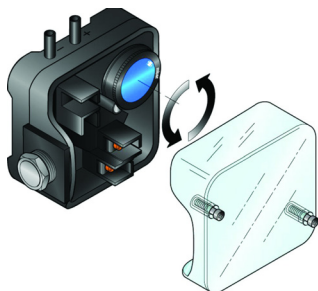
## MIN GAS PRESSURE SWITCH



(A)

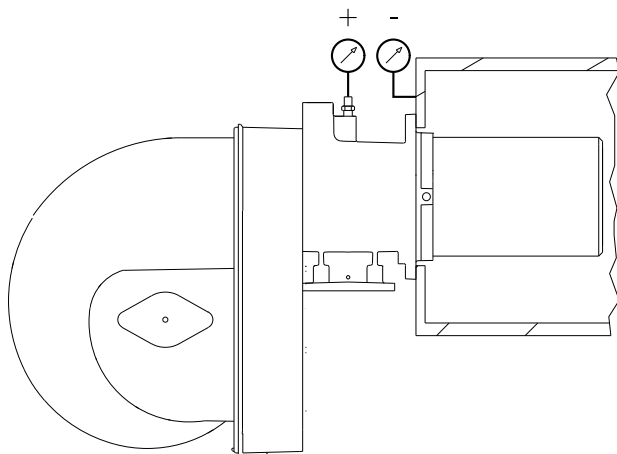
D3855

## AIR PRESSURE SWITCH



(B)

D3854



(C)

D3841

## ADJUSTMENTS BEFORE FIRST FIRING



### ATTENTION

THE FIRST FIRING MUST BE CARRIED OUT BY QUALIFIED PERSONNEL WITH THE RIGHT INSTRUMENTS.

Adjustment of the combustion head, and air and gas deliveries has been illustrated on page 9. In addition, the following adjustments must also be made:

- open manual valves up-line from the gas train.
- Adjust the minimum gas pressure switch to the start of the scale (A).
- Adjust the air pressure switch to the start of the scale (B).
- Purge the air from the gas line.  
Continue to purge the air (we recommend using a plastic tube routed outside the building) until gas is smelt.
- Assemble a pressure gauge (C) on the gas pressure socket of the pipe coupling.  
The manometer readings are used to calculate burner power using the tables on page 6.
- Connect two lamps or testers to the two gas line solenoid valves VR and VS, to check the exact moment at which voltage is supplied.  
This operation is unnecessary if each of the two solenoid valves is equipped with a pilot light that signals voltage passing through.
- Fan air damper: leave at the factory setting.

Before starting up the burner, it is good practice to adjust the gas train so that firing takes place in conditions of maximum safety, i.e. with gas delivery at the minimum.

### BURNER START-UP

Close the control devices.

As soon as the burner starts check the direction of rotation of the fan blade, looking through the flame inspection window 18)(A)p.4.

Make sure that the lamps or testers connected to the solenoids, or pilot lights on the solenoids themselves, indicate that no voltage is present. If voltage is present, then **immediately** stop the burner and check electrical connections.

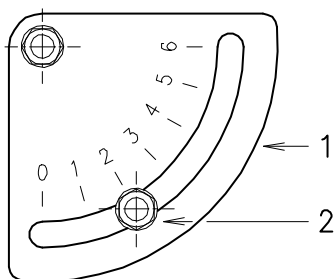
### BURNER FIRING

Having completed the checks indicated in the previous heading, ignition of the burner should be achieved. If the motor starts but the flame does not appear and the control box goes into lockout, reset and wait for a new firing attempt. If firing is still not achieved, it may be that gas is not reaching the combustion head within the safety time period of 3 seconds. In this case increase gas firing delivery.

The arrival of gas to the pipe coupling is shown by the pressure gauge (C).

Once firing has taken place, proceed with global burner calibration operation.

(A)



D593

## BURNER CALIBRATION

The optimum calibration of the burner requires an analysis of the exhaust gases at the boiler outlet.

Adjust successively:

- 1 - Maximum output;
- 2 - Air pressure switch;
- 3 - Minimum gas pressure switch.

## DETERMINATION OF OUTPUT UPON FIRING (MINIMUM)

According to the regulation EN 676.

### Burners with MAX output up to 120 kW

Firing can be performed at the maximum operation output level. Example:

- max. operation output : 120 kW
- max. firing output : 120 kW

### Burners with MAX output above 120 kW

Firing must be performed at a lower output than the max. operation output.

If firing output does not exceed 120 kW, no calculations are required. If firing output exceeds 120 kW, the regulations prescribe that the value be defined according to the control box "ts" safety time:

for "ts" = 3s, firing output must be equal to, or lower than, 1/3 of max. operation output.

### **Example**

MAX operation output of 450 kW.

The firing output must be equal to, or less than, 150 kW with ts = 3s

In order to measure the firing output:

- disconnect the plug-socket 23)(A)p.4 on the ionisation probe cable (the burner will fire and then go into lockout after the safety time has elapsed).
- Perform 10 firings with consecutive lockouts.
- Read, on the meter, the quantity of gas burned.

This quantity must be equal to, or lower than, the quantity given by the formula, for ts = 3s:

$$Vg = \frac{Qa \text{ (max. burner output)} \times n \times ts}{3600}$$

**Vg:** volume supplied upon firings carried out (Sm<sup>3</sup>)

**Qa:** firing output (Sm<sup>3</sup>/h)

**n:** number of firings (10)

**ts:** safety time (sec)

**Example** for gas G 20 (9.45 kWh/Sm<sup>3</sup>):  
firing output 150 kW

corresponding to 15.87 Sm<sup>3</sup>/h.

After 10 firings with lockout, the output indicated on the meter must be equal to, or less than:

$$Vg = \frac{15,87 \times 10 \times 3}{3600} = 0,132 \text{ Sm}^3$$

## 1 - MAXIMUM OUTPUT

The maximum output of the burner must be set within the firing rate range shown on page 5.

### Adjusting gas delivery

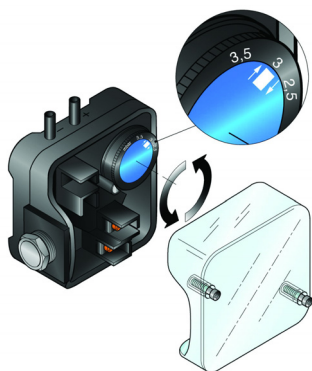
Measure the delivery of gas from the gas meter. A guideline indication can be calculated from the tables on page 6, simply read off the gas pressure on the manometer, see fig.(C) on page 11, and follow the instructions on pages 6 - 7.

- If delivery needs to be reduced, diminish outlet gas pressure and, if it is already very low, slightly close adjustment valve VR2.
- If delivery needs to be increased, increase outlet gas pressure.

### Adjusting air delivery

Adjust the fan air damper by using the indexed selector 1)(A) after having loosened the screw 2)(A).

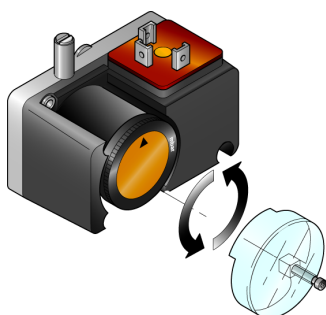
## AIR PRESSURE SWITCH



(A)

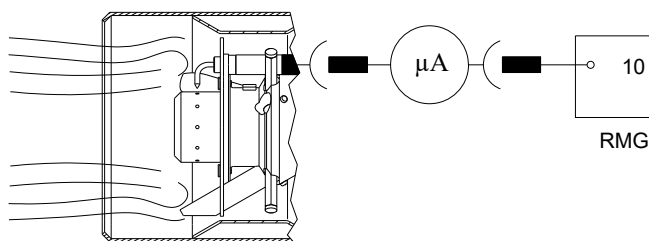
D3951

## MINIMUM GAS PRESSURE SWITCH



(B)

D3855



(C)

D3843

### Note

Once you have finished adjusting maximum output, check firing once again: noise emission at this stage must be identical to the following stage of operation. If you notice any sign of pulsations, reduce the firing stage delivery.

### 2 - AIR PRESSURE SWITCH (A)

Adjust the air pressure switch after having performed all other burner adjustments with the air pressure switch set to the start of the scale (A).

With the burner working insert a combustion analyser in the stack, slowly close the suction inlet of the fan (for example, with cardboard) until the CO value does not exceed 100 ppm.

Then slowly turn the appropriate knob clockwise until the burner reaches the lockout position.

Check the indication of the arrow pointing upwards on the graduated scale (A). Turn the knob clockwise again, until the value shown on the graduated scale corresponds with the arrow pointing downwards (A), and so recovering the hysteresis of the pressure switch (shown by the white mark on a blue background, between the two arrows).

Now check the correct start-up of the burner.

If the burner locks out again, turn the knob anti-clockwise a little bit more.

### 3 - MINIMUM GAS PRESSURE SWITCH (B)

Adjust the minimum gas pressure switch (B) after having adjusted the burner, the gas valves and the gas train stabiliser. With the burner operating at maximum output:

- install a pressure gauge downstream of the gas train stabiliser (for example at the gas pressure test point on the burner combustion head);
- choke slowly the manual gas cock until the pressure gauge detects a decrease in the pressure read of about 0.1 kPa (1 mbar). In this phase, verify the CO value which must always be less than 100 mg/kWh (93 ppm).
- Increase the adjustment of the gas pressure switch until it intervenes, causing the burner shutdown;
- remove the pressure gauge and close the cock of the gas pressure test point used for the measurement;
- open completely the manual gas cock.



1 kPa = 10 mbar

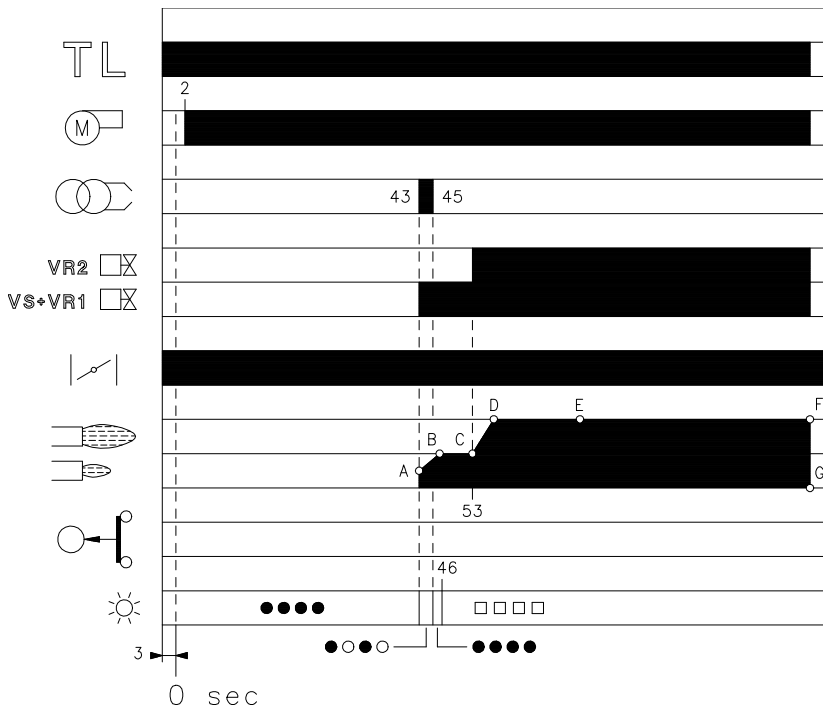
WARNING

### FLAME PRESENCE CHECK (C)

The burner is fitted with an ionisation system which ensures that a flame is present. The minimum current necessary for the control box operation is 5  $\mu$ A. The burner supplies a significantly higher current value, so that no check is usually needed. However, if it is necessary to measure the ionisation current, disconnect the plug-socket 23)(A)p.4 on the ionisation probe cable and insert a direct current micro-amperometer with a base scale of 100  $\mu$ A. Carefully check polarities.

## STANDARD FIRING

(n° = seconds from the moment 0)

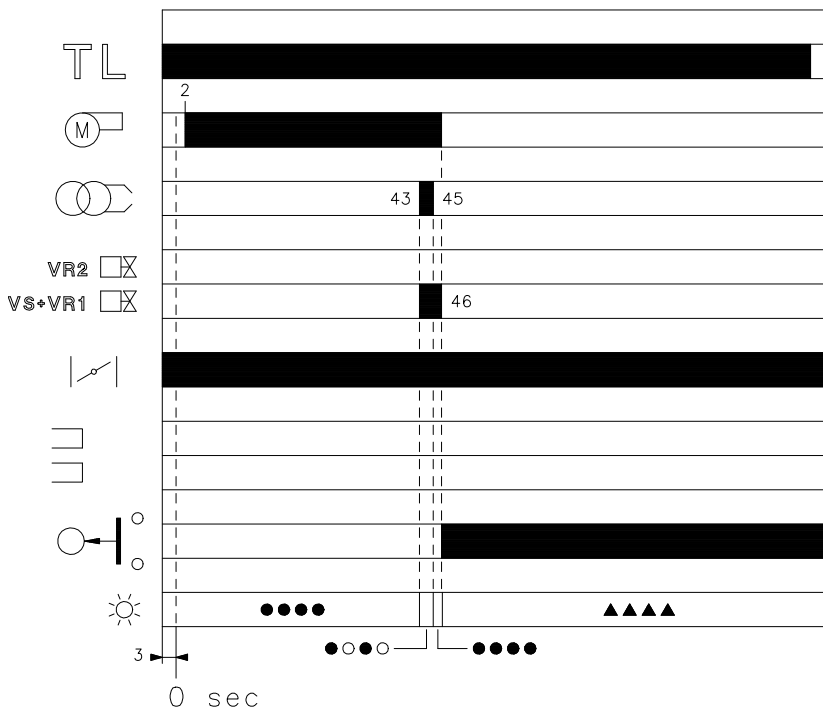


\* ○ Off ● Yellow □ Green ▲ Red  
For further details see page 16.

(A)

D3024

## NO FIRING



\* ○ Off ● Yellow ▲ Red  
For further details see page 16.

(B)

D3025

## BURNER OPERATION

### BURNER START-UP (A)

- Control device TL closes.  
After about 3s:
- 0 s : The control box starting cycle begins.
- 2 s : Fan motor starts.  
The air gate valve is set on maximum adjustment output.  
The pre-purge stage follows.
- 43 s : Ignition electrode strikes a spark.
- Safety valve VS and the 1<sup>st</sup> stage VR1 of the adjustment valve VR open. The shutter of valve VR1 has a first rapid run that determines a low output firing, point A, which is followed by a slow run. The output increases progressively up to a 1<sup>st</sup> stage value, section A-B.
- 45 s : The spark goes out.
- 53 s : The 2<sup>nd</sup> stage VR2 of valve VR opens and the output passes slowly from the 1<sup>st</sup> stage to the maximum adjustment valve, section C-D.
- The control value box starting cycle ends.

### STEADY STATE OPERATION (A)

At the end of the starting cycle, the control box continues to check that the flame is present and that the air pressure switch is in the correct position.

The burner continues to operate at constant output.

If the temperature or pressure in the boiler continues to rise, and opens load control TL, the burner will stop, section F-G.

### FIRING FAILURE (B)

If the burner does not fire, it goes into lockout within 3 s of the opening of the gas solenoid valve and 49 s after the closing of control device TL.

The red led of the control box comes on.

### UNDESIED SHUTDOWN DURING OPERATION

If the flame should accidentally go out during operation, the burner will lock out within 1s.

**FINAL CHECKS** (with the burner working):

- disconnect a wire of the minimum gas pressure switch;
- switch on the thermostat/pressure switch TL;
- switch on the thermostat/pressure switch TS;  
the burner must stop.
- Disconnect the air adduction tube of the pressure switch;
- disconnect the wire of the ionisation probe;  
the burner must stop in lockout.

Make sure that the mechanical locking systems on the various adjustment devices are fully tightened.

---

**MAINTENANCE**

The burner requires periodic maintenance carried out by a qualified and authorised technician **in conformity with legislation and local standards.**

Periodic maintenance is essential for the reliability of the burner, avoiding the excessive consumption of fuel and consequent pollution.

Before carrying out any cleaning or control, always switch off the electrical supply to the burner, using the main switch of the system.

**Combustion**

The optimum calibration of the burner requires an analysis of the exhaust gases. Significant differences with respect to the previous measurements indicate the points where more care should be exercised during maintenance.

**Gas leaks**

Make sure there are no gas leaks on the pipe-work between the gas meter and the burner.

**Gas filter**

Substitute the gas filter when dirty (see train instructions).

**Combustion head**

Open the burner and make sure that all components of the combustion head are in good condition, not deformed by the high temperatures, free of impurities from the surroundings and correctly positioned. If in doubt, disassemble the elbow.

**Burner**

Check for excess wear or loose screws in the mechanisms that control the air damper and the gas butterfly valve. In addition, the screws that fix the cables in the terminal board must be blocked, along with the burner sockets.

Clean the outside of the burner.

**Combustion**

Adjust the burner if the combustion values found at the beginning of the operation do not comply with the regulations in force, or at any rate, do not correspond to good combustion.

Use the appropriate card to record the new combustion values; they will be useful for subsequent controls.

| 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        |

(A)

## 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 Tab, (A). The specified life cycles do not refer to the warranty terms indicated in the delivery or payment conditions.

## BURNER START-UP PROGRAMME DIAGNOSTICS

During start-up, the indications are explained in the following table:

| COLOUR CODE TABLE                                                 |                     |
|-------------------------------------------------------------------|---------------------|
| Sequences                                                         | Colour code         |
| Pre-purging                                                       | ● ● ● ● ● ● ● ● ● ● |
| Firing phase                                                      | ● ○ ● ○ ● ○ ● ○ ●   |
| Operation, flame OK                                               | □ □ □ □ □ □ □ □ □ □ |
| Operation with weak flame signal                                  | □ ○ □ ○ □ ○ □ ○ □   |
| Electrical supply lower than ~ 170V                               | ● ▲ ● ▲ ● ▲ ● ▲ ●   |
| Lockout                                                           | ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲   |
| Extraneous light                                                  | ▲ □ ▲ □ ▲ □ ▲ □ ▲   |
| <b>Key to layout:</b> ○ Off      ● Yellow      □ Green      ▲ Red |                     |

## RESET OF CONTROL BOX AND DIAGNOSTICS USE

The control box supplied features a diagnostics function, through which any causes of malfunctioning can be easily identified (indicator: **RED LED** signal).

To use this function, wait at least 10 seconds from when the safety condition has been set (**lockout**), then press the reset button.

The control box generates a sequence of led pulses (1 second apart) that is repeated at constant intervals of 3 seconds.

Once the number of LED pulses has been visualised, and the possible cause identified, it is necessary to reset the system, keeping the button pressed for 1-3 seconds.

| RED LED illuminated<br>wait at least 10s | Lockout | Press reset<br>for > 3 s | LED pulses          | Interval<br>3 s | LED pulses          |
|------------------------------------------|---------|--------------------------|---------------------|-----------------|---------------------|
|                                          |         |                          | ● ● ● ● ● ● ● ● ● ● |                 | ● ● ● ● ● ● ● ● ● ● |

Below, a list of the possible methodologies for carrying out the resetting of the control box and for using the diagnostics.

## CONTROL BOX RESET

To reset the control box, proceed as follows:

- Press and hold the button for 1-3 seconds.

The burner starts up again, 2 seconds after the button is released.

If the burner does not restart, make sure the limit thermostat is closed.

## VISUAL DIAGNOSTICS

Indicate the type of burner fault that leads to the lockout.

To display the diagnostic, proceed as follows:

- Keep the button pressed for more than 3 seconds from when the red led (burner lockout) switches on.

The end of the operation will be shown by a yellow led pulse.

Release the button when you see the flashing. The number of times it pulses tells you the cause of the malfunction, according to the coding system indicated in the table on page 18.

## SOFTWARE DIAGNOSTICS

Gives an analysis of the life of the burner, through optical connections with a PC showing the working hours, number and types of lockout, control box serial number etc.

To display the diagnostic, proceed as follows:

- Keep the button pressed for more than 3 seconds from when the red led (burner lockout) switches on.

The end of the operation will be shown by a yellow LED pulse.

Release the button for 1 second, then press it again for more than 3 seconds, until you see another yellow flash.

When you release the button, the red led will flash intermittently with high frequency: only then is it possible to insert the optical connection.

When the operation is completed, it is necessary to reset the start-up condition of the control box, using the reset procedure described above.

| PRESSURE ON THE BUTTON                                                 | STATE OF CONTROL BOX                                                                                                                  |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| From 1 to 3 seconds                                                    | Reset of the control box without visualisation of the visual diagnostics.                                                             |
| More than 3 seconds                                                    | Visual diagnostics of the lockout condition:<br>(led flashes at 1 second intervals).                                                  |
| More than 3 seconds, starting from the condition of visual diagnostics | Software diagnostics, with the help of optical interface and PC<br>(possibility to visualise the working hours, irregularities, etc.) |

The sequence of pulses issued by the control box identifies the possible types of malfunction, which are listed in the table on page 18.

| Signal                       | Problem                                                                                                                                                 | Possible cause                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Recommended remedy                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 blinks<br>● ●              | 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 .....<br>2 - One of the two solenoid valves does not open. ....<br>3 - Gas pressure too low. ....<br>4 - Ignition electrode incorrectly adjusted .....<br>5 - Electrode grounded due to broken insulation .....<br>6 - High voltage cable defective .....<br>7 - High voltage cable deformed by high temperature ....<br>8 - Ignition transformer defective. ....<br>9 - Incorrect valve or transformer electrical wiring .....<br>10 - Defective control box .....<br>11 - A closed valve upline the gas train .....<br>12 - Air in pipework .....<br>13 - Gas valves unconnected or with interrupted coil .....                                                                                                                                                                                                                                                                          | Increase<br>Replace<br>Increase pressure at governor<br>Adjust, see fig. (D) page 8<br>Replace<br>Replace<br>Replace and protect<br>Replace<br>Check<br>Replace<br>Open<br>Bleed air<br>Check connections or replace coil                                                                                                                                                    |
| 3 blinks<br>● ● ●            | The burner does not switch on, and the lockout appears<br><br>The burner switches on, but then stops in lockout<br><br>Lockout during pre-purging phase | 14 - Air pressure switch in operating position .....<br><br>- Air pressure switch inoperative due to insufficient air pressure:<br>15 - Air pressure switch incorrectly adjusted. ....<br>16 - Pressure switch pressure test point pipe blocked .....<br>17 - Poorly adjusted head .....<br>18 - High pressure in the furnace .....<br><br>19 - Defective motor control contactor ..... (only three-phase version)<br>20 - Defective electrical motor. ....<br>21 - Motor lockout (defective electrical motor) .....                                                                                                                                                                                                                                                                                                                                                                                                                          | Adjust or replace<br><br>Adjust or replace<br>Clean<br>Adjust<br>Connect air pressure switch to fan suction line<br><br>Replace<br>Replace<br>Replace                                                                                                                                                                                                                        |
| 4 pulses<br>● ● ● ●          | The burner switches on, but then stops in lockout<br><br>Lockout when burner stops                                                                      | 22 - Flame simulation .....<br><br>23 - Permanent flame in the combustion head or flame simulation .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Replace the control box<br><br>Eliminate persistence of flame or replace control box                                                                                                                                                                                                                                                                                         |
| 7 blinks<br>● ● ● ● ● ● ●    | The burner goes into lockout immediately following the appearance of the flame<br><br>Burner goes into lockout during operation                         | 24 - The operation solenoid lets little gas through .....<br>25 - Ionisation probe incorrectly adjusted .....<br>26 - Insufficient ionisation (less than 5 A) .....<br>27 - Earth probe .....<br>28 - Burner poorly grounded. ....<br>29 - Phase and neutral connections inverted .....<br>30 - Defective flame detection circuit .....<br><br>31 - Probe or ionisation cable grounded .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Increase<br>Adjust, see fig. (D) page 8<br>Check probe position<br>Withdraw or replace cable<br>Check grounding<br>Invert them<br>Replace the control box<br><br>Replace worn parts                                                                                                                                                                                          |
| 10 blinks<br>● ● ● ● ● ● ● ● | The burner does not switch on, and the lockout appears<br><br>The burner goes into lockout                                                              | 32 - Incorrect electrical wiring .....<br><br>33 - Defective control box .....<br>34 - Presence of electromagnetic disturbances in the thermostat lines .....<br>35 - Presence of electromagnetic disturbance .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Check<br><br>Replace<br>Filter or eliminate<br>Use the radio disturbance protection kit                                                                                                                                                                                                                                                                                      |
| No blink                     | The burner does not start<br><br>The burner continues to repeat the start-up cycle, without lockout<br><br>Ignition with pulsations                     | 36 - No electrical power supply .....<br>37 - A limiter or safety control device is open .....<br>38 - Line fuse blocked .....<br>39 - Defective control box .....<br>40 - No gas supply .....<br><br>41 - Mains gas pressure insufficient .....<br>42 - Minimum gas pressure switch fails to close. ....<br><br>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<br><br>44 - Poorly adjusted head .....<br>45 - Ignition electrode incorrectly adjusted .....<br>46 - Incorrectly adjusted fan air damper: too much air .....<br>47 - Output during ignition phase is too high. .... | Close all switches - Check connections<br>Adjust or replace<br>Replace<br>Replace<br>Open the manual valves between contactor and train<br>Contact your GAS COMPANY<br>Adjust or replace<br><br>Reduce the minimum gas pressure switch intervention pressure. Replace the gas filter cartridge.<br><br>Adjust. See page 9<br>Adjust, see fig. (D) page 8<br>Adjust<br>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<br>●            | 0.4s                 |
| 2 blinks<br>● ●         | 0.8s                 |
| 6 blinks<br>● ● ● ● ● ● | 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.

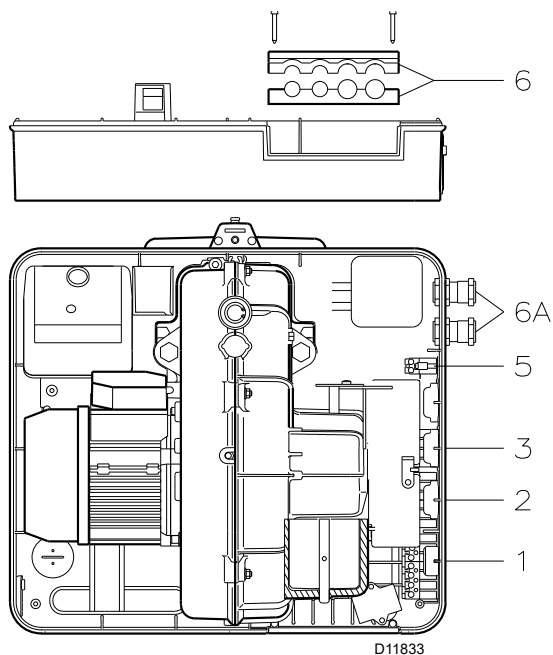
### WARNING

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**

## APPENDIX



### Electrical connections



#### NOTES

The electrical wirings must be carried out in conformity with the regulations in force in the countries of destination, and by qualified personnel.

Riello S.p.A. cannot accept any responsibility for modifications or connections other than those shown in these diagrams.

Use flexible cables, in accordance with the regulation EN 60335-1.

All the cables to be connected to the burner must pass through cable grommets.

The use of cable grommets can take various forms; the following way is just one possible solution:

- 1- 7-pole socket for single-phase power supply, thermostat/pressure switch TL
- 2- 6-pole socket for gas valves, gas pressure switch or device for checking the valve seal
- 3- 4-pole socket for thermostat/pressure switch TR
- 5- 2-pole socket for max gas pressure switch accessory
- 6 - 6A Fittings for pipe unions  
(Pierce, if it is necessary to use the pipe unions 6A)

### NOTE

The RS 34-44/1 MZ -burners have been type-approved for intermittent operation. This means they should be "Compulsorily" stopped at least once every 24 hours to enable the control box to perform a check of its own efficiency at start-up. Normally, the stopping of the burner is guaranteed by the boiler's thermostat/pressure switch. If this is not the case, a time switch should be fitted in series to IN to provide for burner shut-down at least once every 24 hours.



#### ATTENTION:

- Do not invert the neutral with the phase in the electrical supply line. An inversion would lead to lockout due to firing failure.
- Replace the components only with original spare parts.