

## **GB** Forced draught gas burners

Two stage operation



| CODICE - CODE<br>CÓDIGO    | MODELLO - MODEL<br>MODELE - MODELO | TIPO - TYP<br>TYPE |
|----------------------------|------------------------------------|--------------------|
| 3761558                    | BS1D                               | 915 T1             |
| 3761658 - 20064478         | BS2D                               | 916 T1             |
| 3761716 3761758<br>3761771 | BS3D                               | 917 T1             |
| 3761816 - 3761858          | BS4D                               | 918 T1             |

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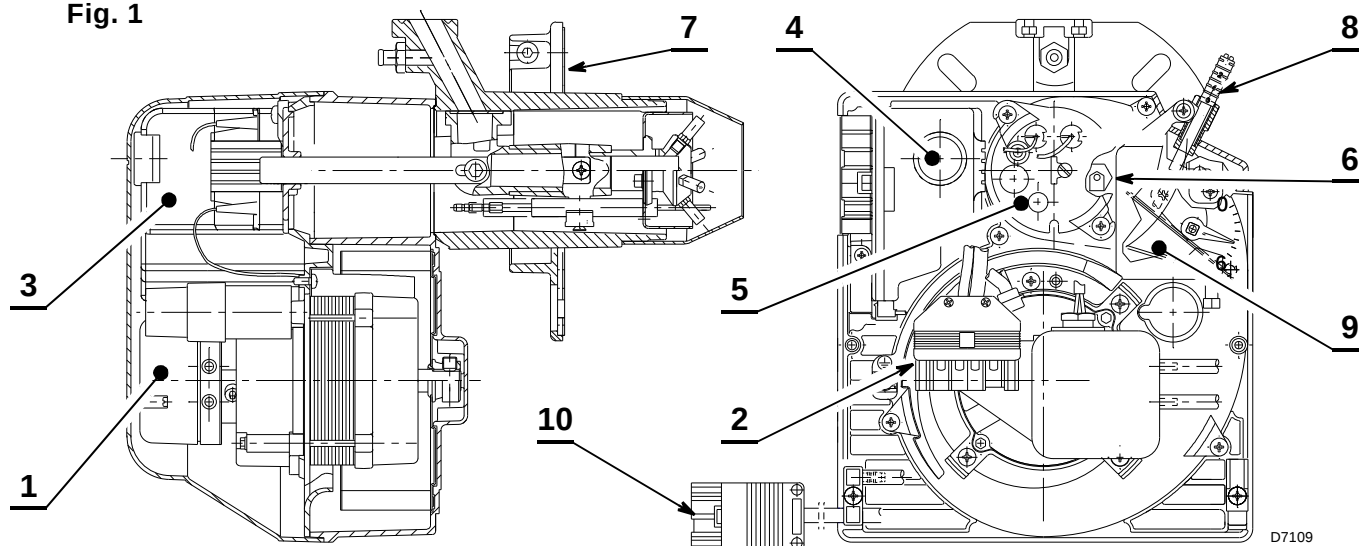
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## 1. BURNER DESCRIPTION

Two stage gas burner.

- The burner meets protection level of IP X0D (IP 40) as EN 60529.
- CE marking according to Gas Appliance Directive 90/396/EEC; PIN **0085AQ0409**.  
According to Directives: Machine Directive 2006/42/EC, Low Voltage Directive 2014/35/UE, Electromagnetic Compatibility 2014/30/UE.
- Gas train according to EN 676.
- The burner is approved for intermittent operation as per Directive EN 676.
- **Note for Switzerland.** Swiss provisions, local and cantonal provisions, the provisions of the SVGW authorities for the use of gas, as well as those of the Fir Brigade (VKF), must all be complied with.

Fig. 1



- |                                     |                                         |
|-------------------------------------|-----------------------------------------|
| 1 – Air pressure switch             | 6 – Pressure test point                 |
| 2 – 6 pole socket for gas train     | 7 – Flange with insulating gasket       |
| 3 – Control box with 7 pole socket  | 8 – Air damper adjustment assembly      |
| 4 – Reset button with lock-out lamp | 9 – Servomotor                          |
| 5 – Head holder assembly            | 10 – 4 pole socket for 2nd stage burner |

### 1.1 BURNER EQUIPMENT

Flange with insulating gasket. . . . . No. 1  
Screw and nut for flange . . . . . No. 1  
4 pin plug . . . . . No. 1

Screws and nuts for flange to be fixed to boiler . . . No. 4  
7 pin plug. . . . . No. 1  
Remote reset connection . . . . . No. 1

### 1.2 ACCESSORIES

#### SOFTWARE DIAGNOSTIC KIT

A special kit is available that, by an optical link to a PC, shows the burner life together with operating hours, type and number of failures, serial number, etc.

To visualise the diagnostics proceed as follows:

- Connect the kit supplied separately to the control box socket.

Reading of the information begins when the software programme included in the kit starts.

#### REMOTE RESET KIT

The burner has a remote reset kit (**RS**) consisting of a connection and a push-button operating at a distance of 20 metres max. In order to install it remove the protective lock-out installed at the factory and insert the lock-out supplied with the burner (see electrical diagram on page 8).

#### MULTIBLOC ROTATION KIT

There is a special kit available that can be used to install the burner turned 180°, as illustrated on page 5 in position 5 in the section entitled "**3.1 WORKING POSITION**". This kit is designed to ensure the gas train valve works properly. The kit must be installed in conformity with laws and local regulations.

## 2. TECHNICAL DATA

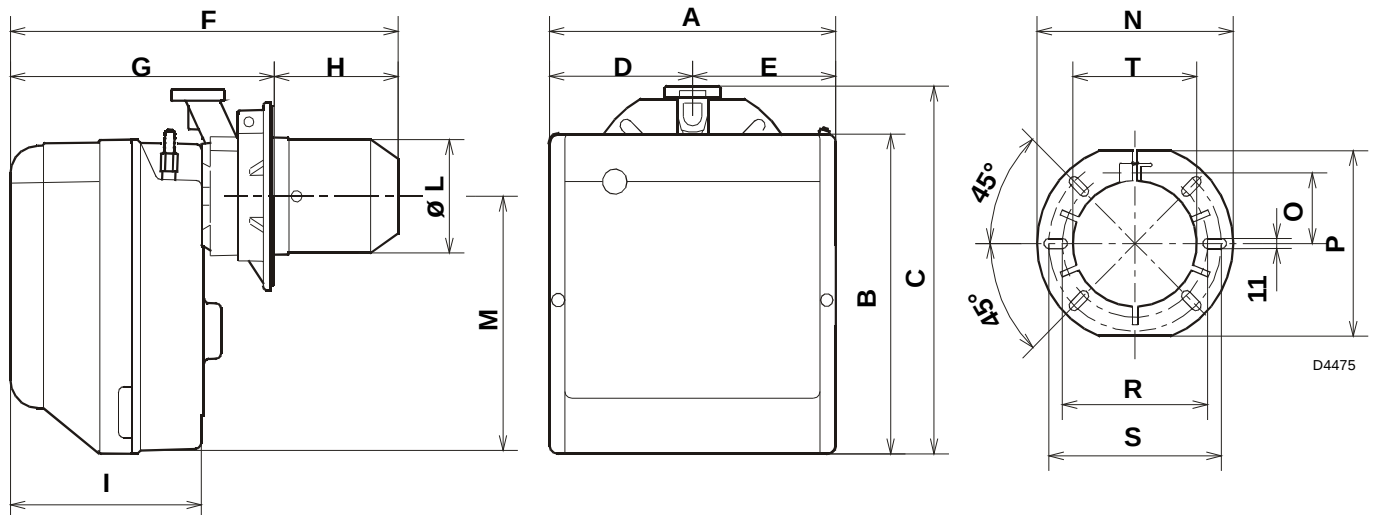
### 2.1 TECHNICAL DATA

| TYPE                                                                                                 |        | 915 T1                                                                        | 916 T1           | 917 T1                                    | 918T1                                     |
|------------------------------------------------------------------------------------------------------|--------|-------------------------------------------------------------------------------|------------------|-------------------------------------------|-------------------------------------------|
| Thermal power (1)                                                                                    | kW     | 16/19 – 52                                                                    | 35/40 – 91       | 65/75 – 189                               | 110/140 – 250                             |
|                                                                                                      | Mcal/h | 13.8/16.3 – 44.7                                                              | 30.1/34.4 – 78.2 | 55.9/64.5 – 162.5                         | 94.6/120.4 – 215                          |
| Natural gas (Family 2)                                                                               |        | Net heat value: 8 – 12 kWh/m <sup>3</sup> = 7000 – 10,340 kcal/m <sup>3</sup> |                  |                                           |                                           |
|                                                                                                      |        | Pressure: min. 20 mbar – max. 100 mbar                                        |                  |                                           |                                           |
| Electrical supply                                                                                    |        | Single phase, 230V ± 10% ~ 50Hz                                               |                  |                                           |                                           |
| Motor                                                                                                |        | Run current 0.8A<br>2750 rpm<br>288 rad/s                                     |                  | Run current 1.8A<br>2800 rpm<br>294 rad/s | Run current 1.9A<br>2720 rpm<br>288 rad/s |
| Capacitor                                                                                            |        | 4 µF                                                                          |                  | 6.3 µF                                    | 8 µF                                      |
| Ignition transformer                                                                                 |        | Primary 230V / 0.2A – Secondary 8 kV / 12 mA                                  |                  |                                           |                                           |
| Absorbed electrical power                                                                            |        | 0.15 kW                                                                       | 0.18 kW          | 0.35 kW                                   | 0.53 kW                                   |
| (1) Reference conditions: Temp. 20°C - Barometric pressure 1013 mbar – Altitude 0 m above sea level. |        |                                                                               |                  |                                           |                                           |

For gas family 3 (LPG) ask for separate kit.

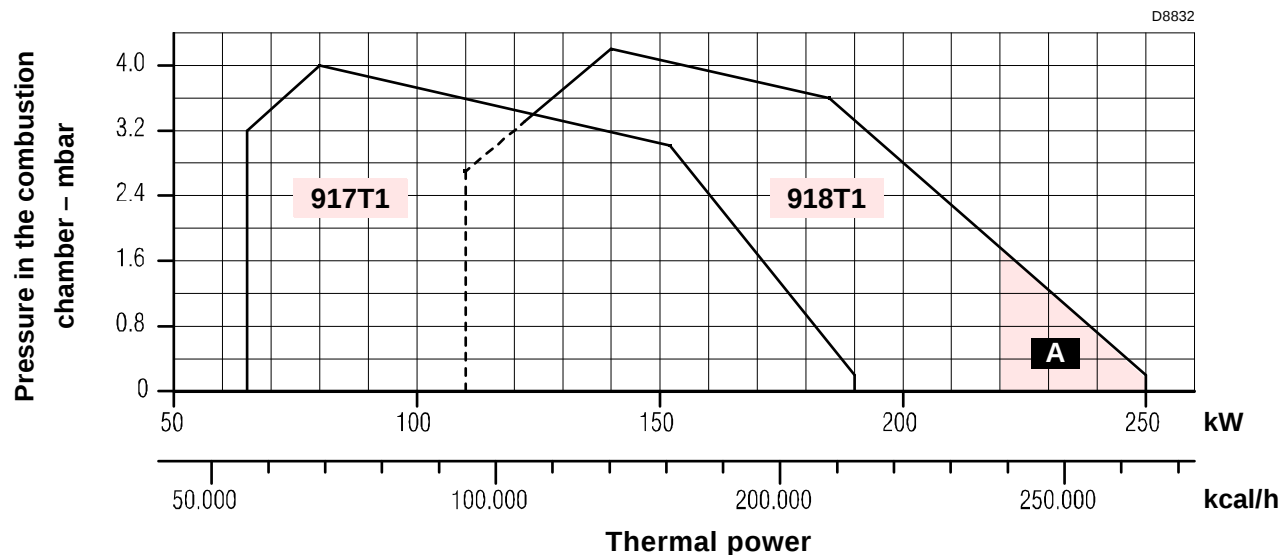
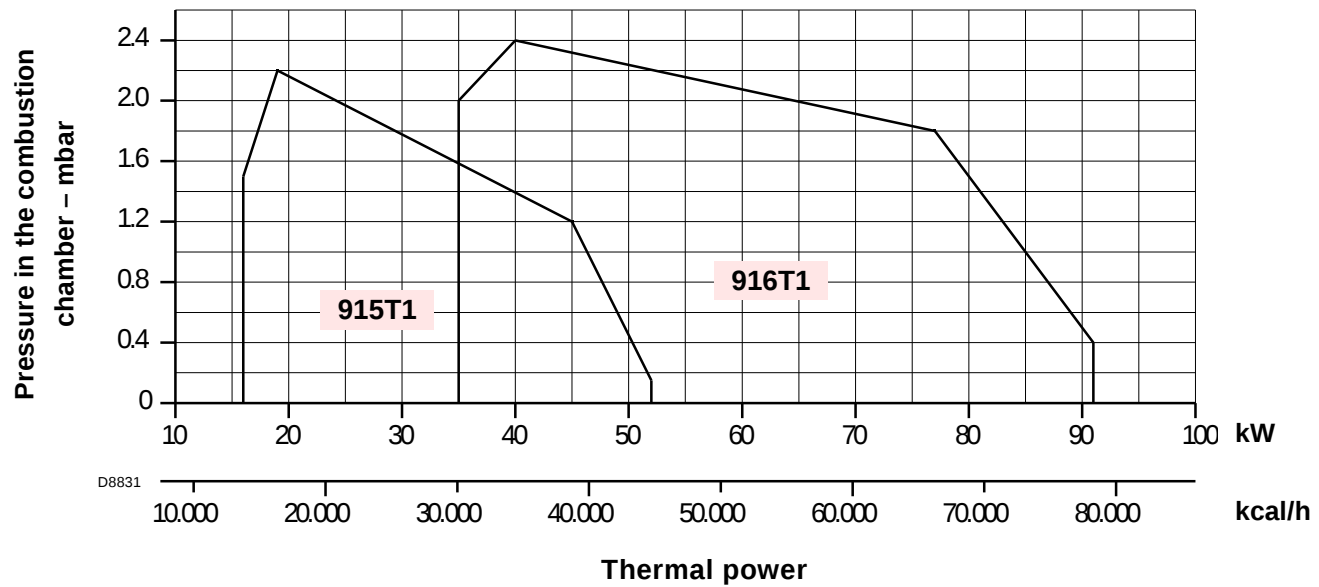
| COUNTRY      |     |   | AT - IT - DK - CH | GB - IE | DE         | FR      | NL       | LU - PL  | BE           |
|--------------|-----|---|-------------------|---------|------------|---------|----------|----------|--------------|
| GAS CATEGORY |     |   | I12H3B/P          | I12H3P  | I12ELL3B/P | I12Er3P | I12L3B/P | I12E3B/P | I2E(R)B, I3P |
| GAS PRESSURE | G20 | H | 20                | –       | –          | –       | –        | –        | –            |
|              | G25 | L | –                 | 25      | 20         | –       | 25       | 25       | –            |
|              | G20 | E | –                 | –       | 20         | 20/25   | –        | –        | 20/25        |

### 2.2 OVERALL DIMENSIONS



| TYPE  | A   | B   | C   | D     | E     | F   | G         | H         | I   | L - T | M   | N   | O    | P   | R   | S   |
|-------|-----|-----|-----|-------|-------|-----|-----------|-----------|-----|-------|-----|-----|------|-----|-----|-----|
| 915T1 | 234 | 254 | 295 | 122.0 | 112.0 | 346 | 230 – 276 | 116 – 70  | 174 | 89    | 210 | 192 | 66   | 167 | 140 | 170 |
| 916T1 | 255 | 280 | 325 | 125.5 | 125.5 | 352 | 238 – 252 | 114 – 100 | 174 | 106   | 230 | 192 | 66   | 167 | 140 | 170 |
| 917T1 | 300 | 345 | 391 | 150.0 | 150.0 | 390 | 262 – 280 | 128 – 110 | 196 | 129   | 285 | 216 | 76.5 | 201 | 160 | 190 |
| 918T1 | 300 | 345 | 392 | 150.0 | 150.0 | 446 | 278 – 301 | 168 – 145 | 216 | 137   | 286 | 218 | 80.5 | 203 | 170 | 200 |

## 2.3 FIRING RATES



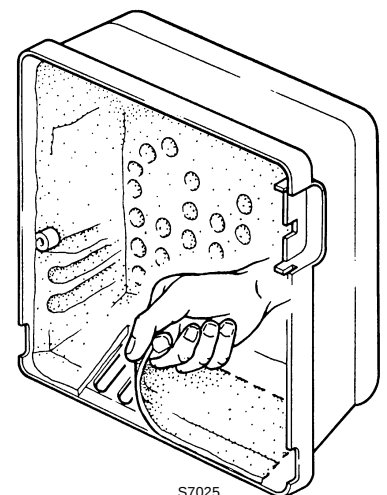
**A** In the BS4D model type 918T1, in order to guarantee the working with an output of 220 - 250 kW, remove the blank deadening to free the supplementary slits of the air inlet on the cover.

### TEST BOILER

The firing rate has been defined according to EN 676 standard.

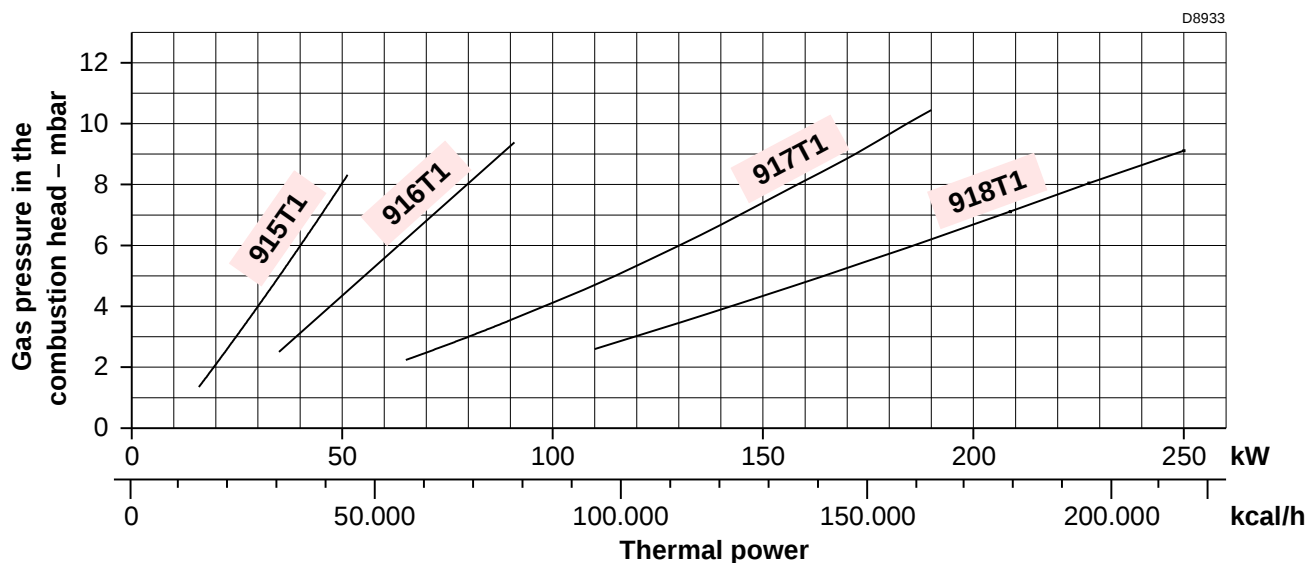
### COMMERCIAL BOILERS

The burner-boiler matching is assured if the boiler conforms to EN 303 and the combustion chamber dimensions are similar to those shown in the diagram EN 676. For applications where the boiler does not conform to EN 303, or where the combustion chamber is much smaller than the dimensions given in EN 676, please consult the manufacturers.



## CORRELATION BETWEEN GAS PRESSURE AND BURNER OUTPUT

To obtain the maximum output, a gas head pressure of 9.3 mbar, relatively to 916T1 model, is measured (M2, see chapter 3.6, page 7) with the combustion chamber at 0 mbar using gas G20 with a net heat value of 10 kWh/m<sup>3</sup> (8.570 kcal/m<sup>3</sup>).



## 3. INSTALLATION

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

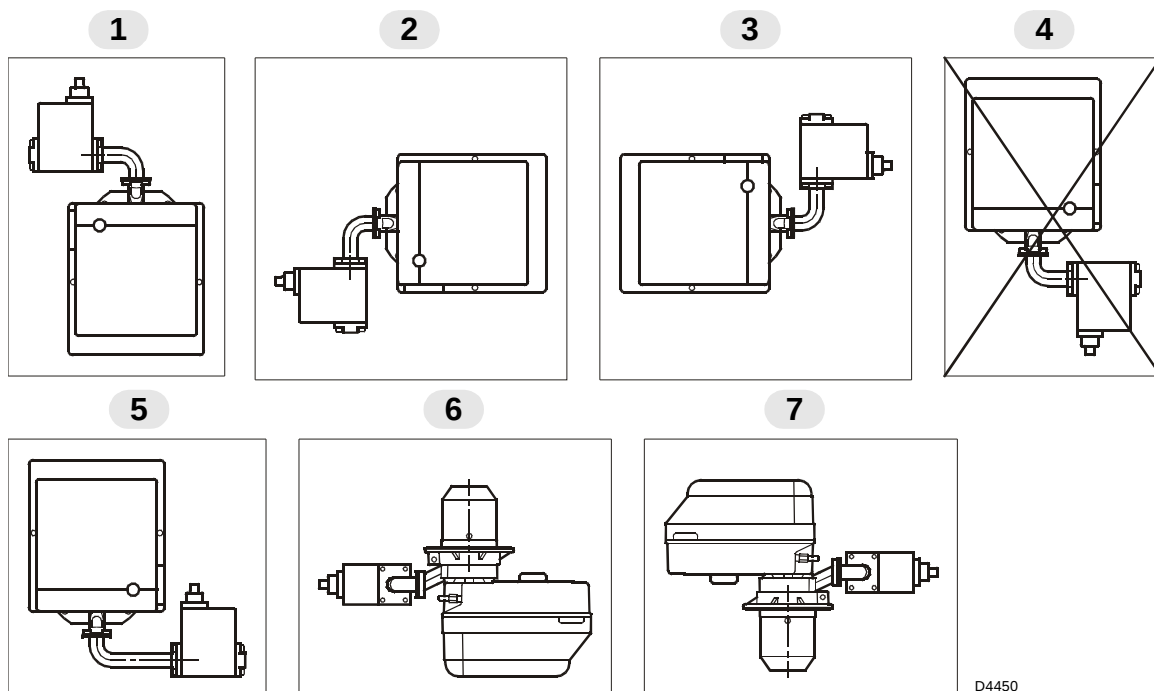
### 3.1 WORKING POSITION

The burner is designed for operation in position **1** only.

Installation in positions **2, 3, 5, 6** and **7** is not recommended as it is likely to hinder the unit's proper operation since air damper closure cannot be guaranteed when the burner is on standby.

Installation in position **5** is only possible using the "MULTIBLOC rotation kit", to be ordered separately.

Installation **4** is prohibited as safety is compromised.

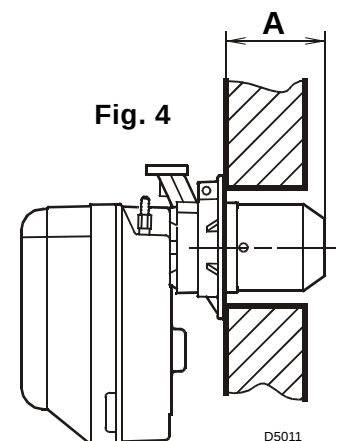
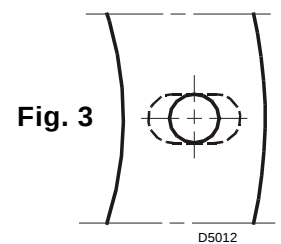
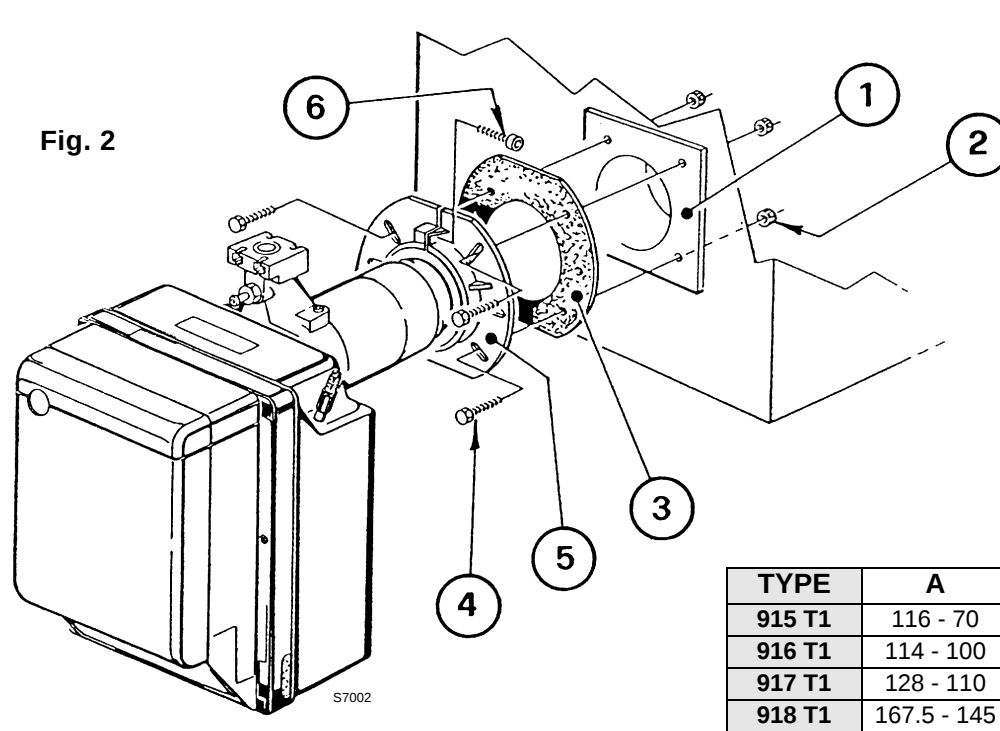


### 3.2 BOILER FIXING

To fit the burner to the boiler it is necessary to carry out the following:

- Widen, if necessary, the insulating gasket holes (3, fig. 3).
- Fix the flange (5) to the boiler door (1) using four screws (4) and (if necessary) the nuts (2) **interposing the insulating gasket (3)** but keep unloosening one of the two upper screws (4) (see fig. 2).
- Put on the flange (5) the burner combustion head, tighten the flange with the screws (6) and lock the loose screw (4).

**N.B.:** The burner can be fixed with the variable dimension **(A)** (see fig. 4). Anyway, make sure that the combustion head crosses completely the boiler door thickness.



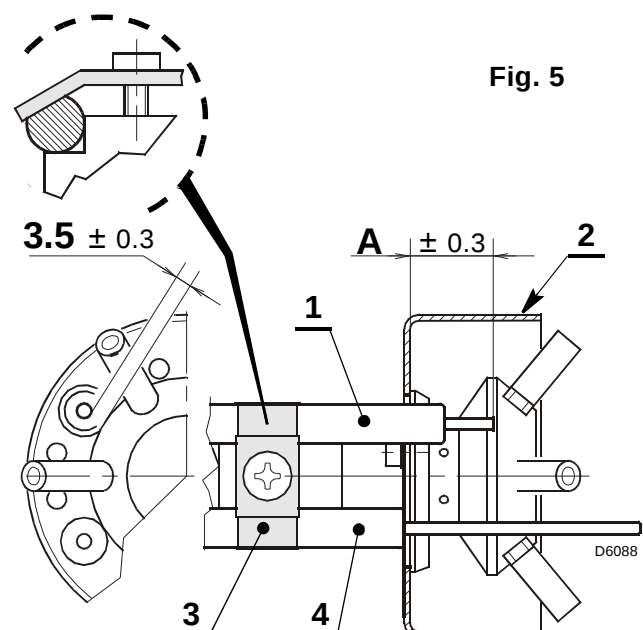
| TYPE   | A           |
|--------|-------------|
| 915 T1 | 116 - 70    |
| 916 T1 | 114 - 100   |
| 917 T1 | 128 - 110   |
| 918 T1 | 167.5 - 145 |

### 3.3 PROBE-ELECTRODE POSITIONING

#### ATTENTION

- Ensure that the plate (3, fig. 5) is always inserted in the flattening of the electrode.
- Lean the probe insulator (4) against the cup (2).

| TYPE | 915T1 | 916T1 | 917T1 | 918T1 |
|------|-------|-------|-------|-------|
| A    | 17    | 30    | 31    | 31    |



### 3.4 GAS TRAIN, (as EN 676)

The gas train is supplied separately, for its adjustment see the enclosed instructions.

| GAS TRAIN        |         | MATCHED<br>BURNER | CONNECTIONS |          | USE                         |
|------------------|---------|-------------------|-------------|----------|-----------------------------|
| TYPE             | CODE    |                   | INLET       | OUTLET   |                             |
| MB ZRDLE 405 B01 | 3970539 | BS1D              | Rp 1/2      | Flange 1 | Natural gas and LPG         |
| MB ZRDLE 405 B01 | 3970540 | BS2D              | Rp 3/4      | Flange 2 | Natural gas and LPG         |
| MB ZRDLE 407 B01 | 3970538 | BS2D              | Rp 3/4      | Flange 2 | Natural gas and LPG         |
| MB ZRDLE 407 B01 | 3970541 | BS3D - BS4D       | Rp 3/4      | Flange 3 | Natural gas ≤ 150kW and LPG |
| MB ZRDLE 410 B01 | 3970542 | BS3D - BS4D       | Rp 1 1/4    | Flange 3 | Natural gas and LPG         |
| MB ZRDLE 412 B01 | 3970543 | BS3D - BS4D       | Rp 1 1/4    | Flange 3 | Natural gas                 |

### 3.5 GAS TRAIN ELECTRICITY SUPPLY

The gas train's power cables can be fed to the right or left of the burner, as illustrated in figure 6.

Depending on the entry point, the cable clamp with pressure test point (1) and simple cable clamp (2) may need swapping over.

Consequently, you must make sure:

- cable clamp (1) is positioned correctly;
- the tube is positioned correctly so that there are no restrictions likely to impede air flowing to the pressure switch.

#### WARNING

If necessary, cut the tube to the right size.

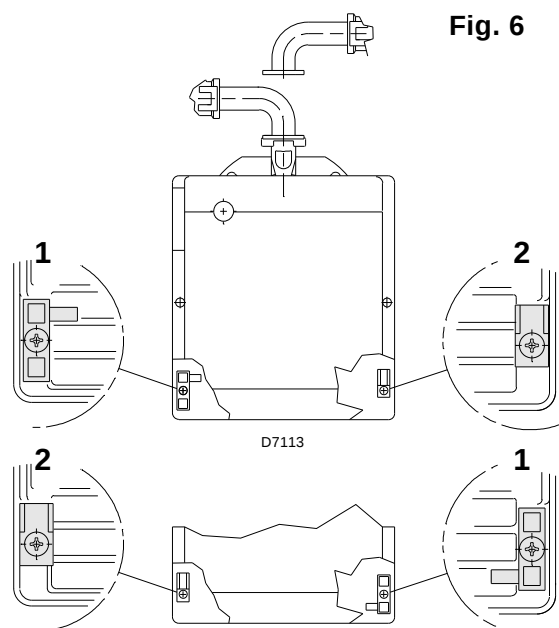


Fig. 6

### 3.6 GAS FEEDING LINE

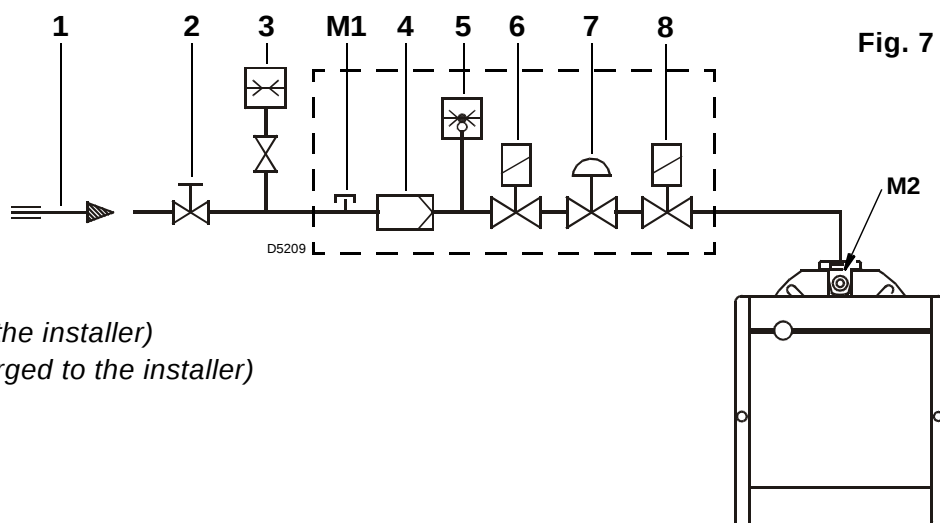


Fig. 7

- 1 – Gas supply pipe
- 2 – Manual cock (*charged to the installer*)
- 3 – Gas pressure gauge (*charged to the installer*)
- 4 – Filter
- 5 – Gas pressure switch
- 6 – Safety valve
- 7 – Pressure governor
- 8 – 1<sup>st</sup> and 2<sup>nd</sup> adjusting valve
- M1 – Gas-supply pressure test point
- M2 – Pressure coupling test point

### 3.7 ELECTRICAL WIRING

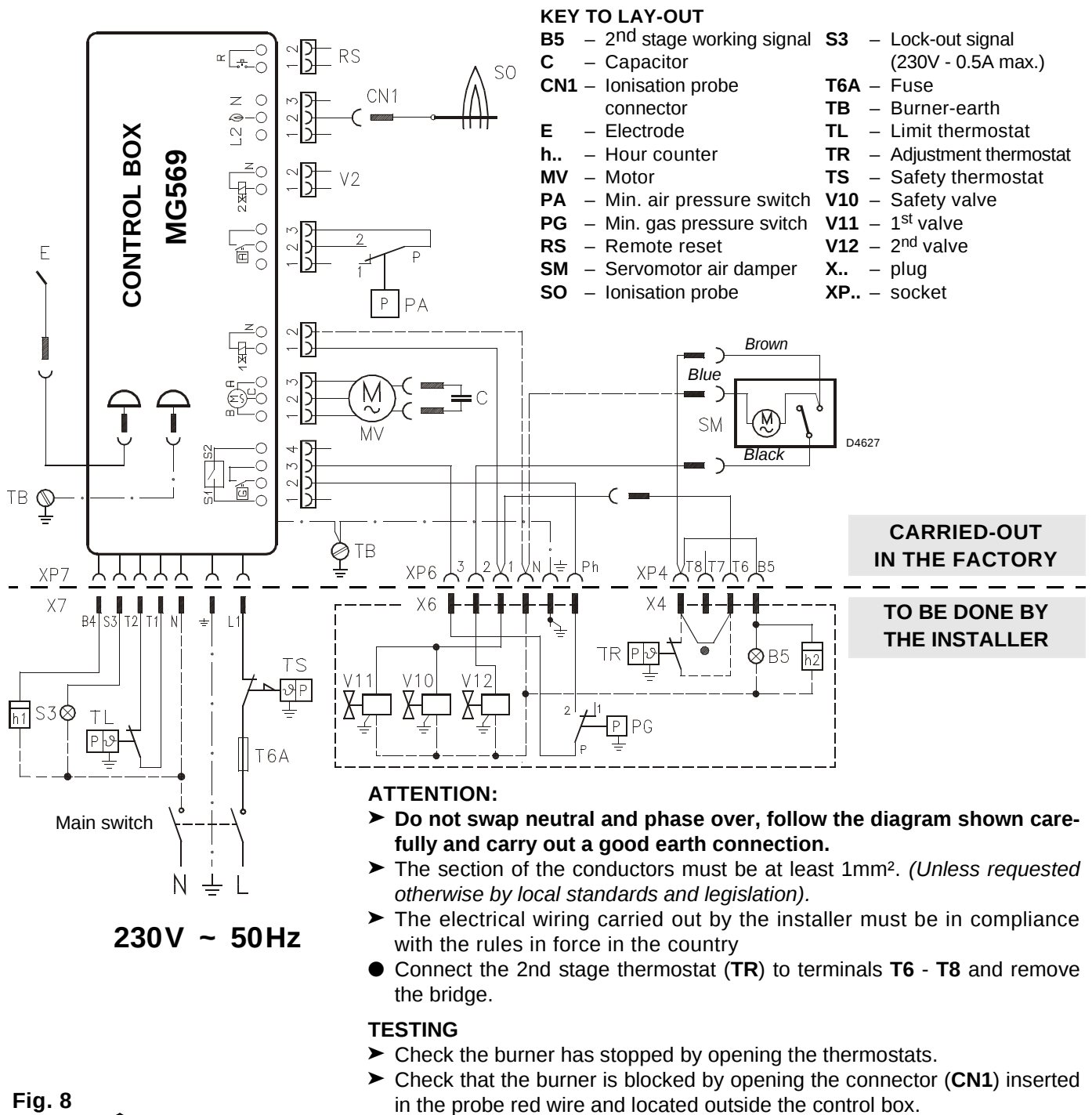
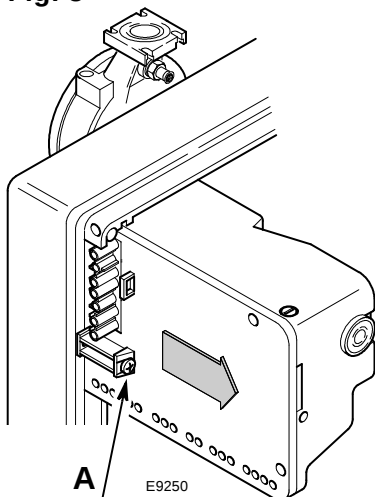


Fig. 8



#### CONTROL BOX, (see fig. 8)

To remove the control box from the burner it is necessary to:

- disconnect all the connectors, the 7-pin plug, the high voltage cables and the earth wire (**TB**);
- unscrew the bolt (**A**, fig. 8) and pull the control box in the direction of the arrow.

To install the control box it is necessary to:

- screw the bolt (**A**) in at a torque of 1 - 1.2 Nm;
- reconnect all the connectors previously disconnected.

#### NOTES

The burners have been type-approved for intermittent operation. This means they must stop at least once every 24 hours in order to allow the electrical control box to check its efficiency on start-up. The boiler limit thermostat (**TL**) normally ensures the burner halts. If this does not happen a time switch halting the burner at least once every 24 hours must be applied in series to limit thermostat (**TL**).

## 4. WORKING

### 4.1 COMBUSTION ADJUSTMENT

In conformity with Efficiency Directive 92/42/EEC the application of the burner on the boiler, adjustment and testing must be carried out observing the instruction manual of the boiler, including verification of the CO and CO<sub>2</sub> concentration in the flue gases, their temperatures and the average temperature of the water in the boiler. To suit the required appliance output, choose the proper setting of the combustion head, and the air damper opening.

### 4.2 COMBUSTION HEAD SETTING, (see fig. 9)

Setting depends on the output of the burner. Rotate the setting screw (6) in a clockwise or anticlockwise direction until set point marked on the regulating rod (2) is level with the outside plane of the head assembly (1). Figure 9 shows the head regulating rod set on set point 3.

#### Example for BS3D burners:

The burner is installed in a 100 kW boiler. Taking an efficiency level of 90% the burner should give an output of app. 110 kW with the regulating rod set at set point 3 as shown in the diagram.

The diagram is for indication purposes: to assure good working from the burner we suggest adjusting the combustion head according to the boiler.

#### REMOVING THE HEAD ASSEMBLY

Proceed as follows to remove the head assembly:

- Disconnect the connections (3 and 5).
- Extract the small tube (4) and loosen the screws (10).
- Unscrew and remove the screws (7), pull out the head assembly support (1) turning it slightly to the right.

**Take care not to change the setting position on the elbow-bracket (2) during dismantling.**

#### REASSEMBLING THE HEAD ASSEMBLY

Follow the above instructions in reverse, returning the head assembly (1) to its original position.

#### WARNING

- Tighten the screws (7) completely (without locking them); then lock them with a torque wrench setting of 3-4 Nm.
- Check there are no gas leaks from the screws during these operations.
- If the pressure test point (13) should work loose, it must be correctly fixed ensuring that the hole (F) inside the head assembly (1) is facing downwards.

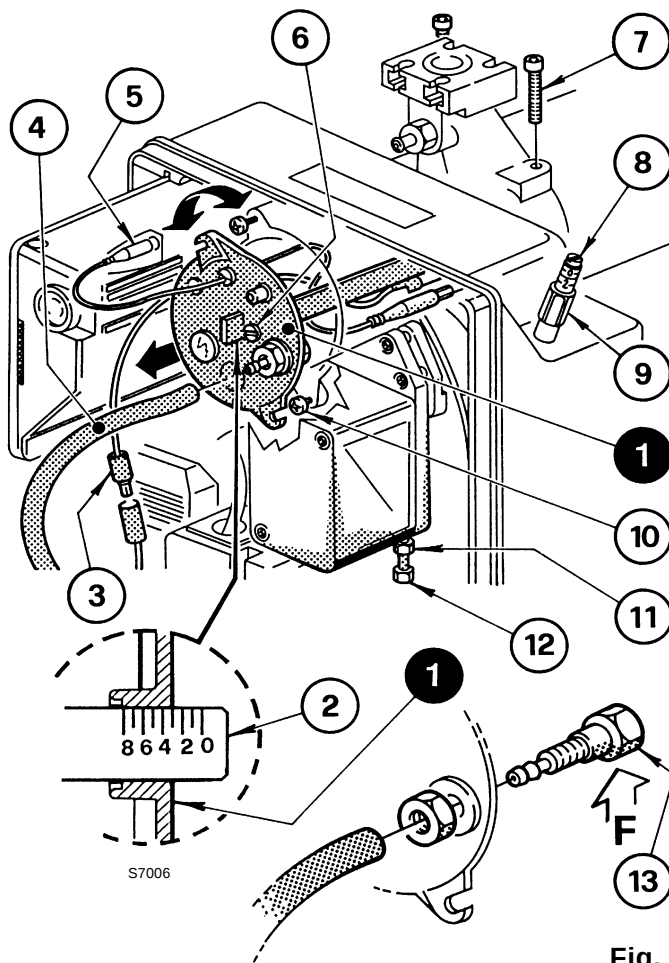
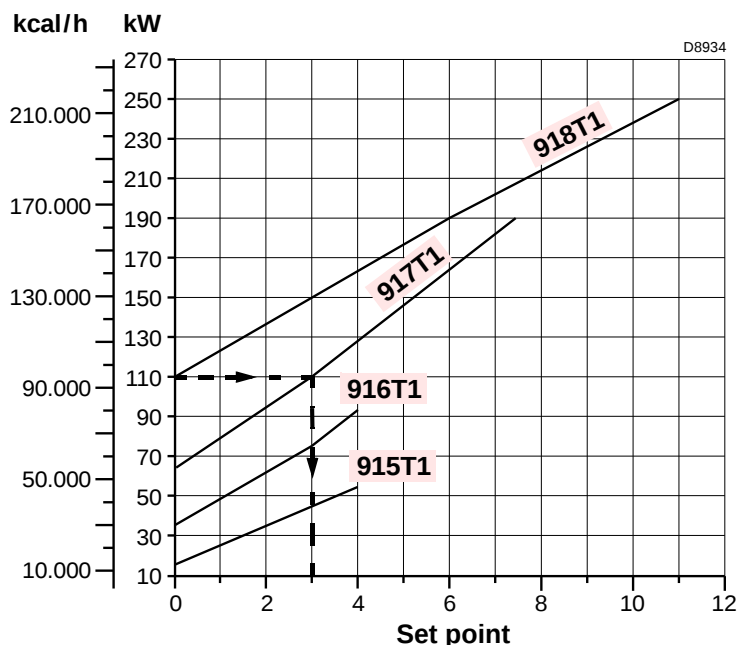


Fig. 9



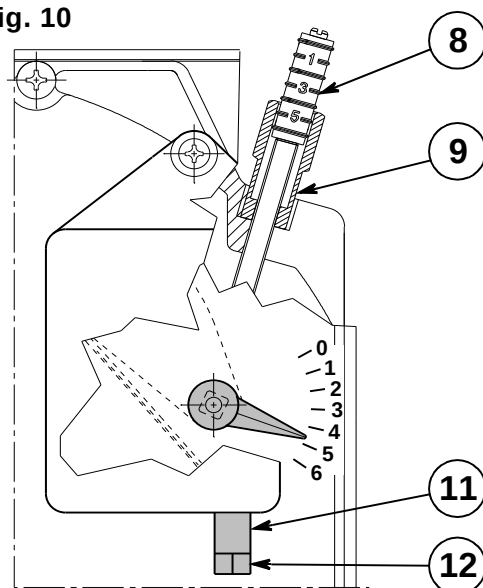
### 4.3 AIR DAMPER ADJUSTMENT, (fig. 10)

First start-up must always be performed, adjusting screw (12), so that the 1<sup>st</sup> stage air damper position pointer is beyond mark 1, (factory setting mark 1).

To adjust, proceed as follows:

- Take the burner to 2<sup>nd</sup> stage by closing the **T6-T8** connection found in the 4-pin plug (**X4**, wiring on page 8).
- Fan thrust causes the air damper to go to the 2<sup>nd</sup>-stage position with reference to the factory setting (screw 8 on mark 3).
- Loosen nut (9) and turn screw (8) to adjust 2<sup>nd</sup>-stage air flow (see CO<sub>2</sub> values given in the table below).
- Take the burner to 1<sup>st</sup> stage by opening the **T6-T8** connection found in the 4-pin plug (**X4**, page 8).
- Adjust 1<sup>st</sup> stage by turning screw (12), loosening (*clockwise*) nut (11) first, referring to the table below for CO<sub>2</sub> values.
- Once you have achieved the optimal setting, tighten (*anticlockwise*) nut (11). When the burner stops, the air damper closes automatically under its own weight until maximum negative flue pressure is 0.5 mbar.

Fig. 10



#### ATTENTION

To adjust 1<sup>st</sup> and 2<sup>nd</sup> stage output, follow the instructions below:

**Output ratio between 1<sup>st</sup> and 2<sup>nd</sup> stage must be no more than 1:2.**

Example for BS3D: 2<sup>nd</sup> stage output required 140 kW;

Minimum 1<sup>st</sup> stage output no less than 70 kW.

**Whatever the case, the burner's minimum 1<sup>st</sup> stage output must not be lower than the value indicated in the operating range.**

Example for BS3D: 2<sup>nd</sup> stage output required 110 kW;

Minimum 1<sup>st</sup> stage output no less than 65 kW (minimum in operating range page 4).

### 4.4 COMBUSTION CHECK

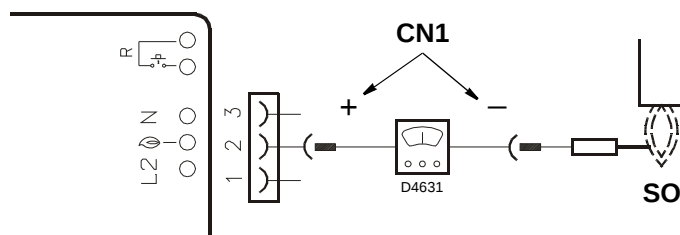
It is advisable to set the burner according to the type of gas used and following the indications of the table:

| EN 676 |                                                        | AIR EXCESS: max. output $\lambda \leq 1.2$ – min. output $\lambda \leq 1.3$ |                                      |              |                           |
|--------|--------------------------------------------------------|-----------------------------------------------------------------------------|--------------------------------------|--------------|---------------------------|
| GAS    | Theoretical max. CO <sub>2</sub><br>0 % O <sub>2</sub> | Setting<br>$\lambda = 1.2$                                                  | CO <sub>2</sub> %<br>$\lambda = 1.3$ | CO<br>mg/kWh | NO <sub>x</sub><br>mg/kWh |
|        |                                                        |                                                                             |                                      |              |                           |
| G 20   | 11.7                                                   | 9.7                                                                         | 9.0                                  | $\leq 100$   | $\leq 170$                |
| G 25   | 11.5                                                   | 9.5                                                                         | 8.8                                  | $\leq 100$   | $\leq 170$                |
| G 30   | 14.0                                                   | 11.6                                                                        | 10.7                                 | $\leq 100$   | $\leq 230$                |
| G 31   | 13.7                                                   | 11.4                                                                        | 10.5                                 | $\leq 100$   | $\leq 230$                |

#### IONIZATION CURRENT

The minimum current necessary for the control box operation is 5  $\mu$ A.

The burner normally supplies a higher current value, so that no check is needed. Anyway, if you want to measure the ionization current, you have to open the connector (**CN1**) (see electrical scheme page 8) fitted on the wire and insert a microammeter.



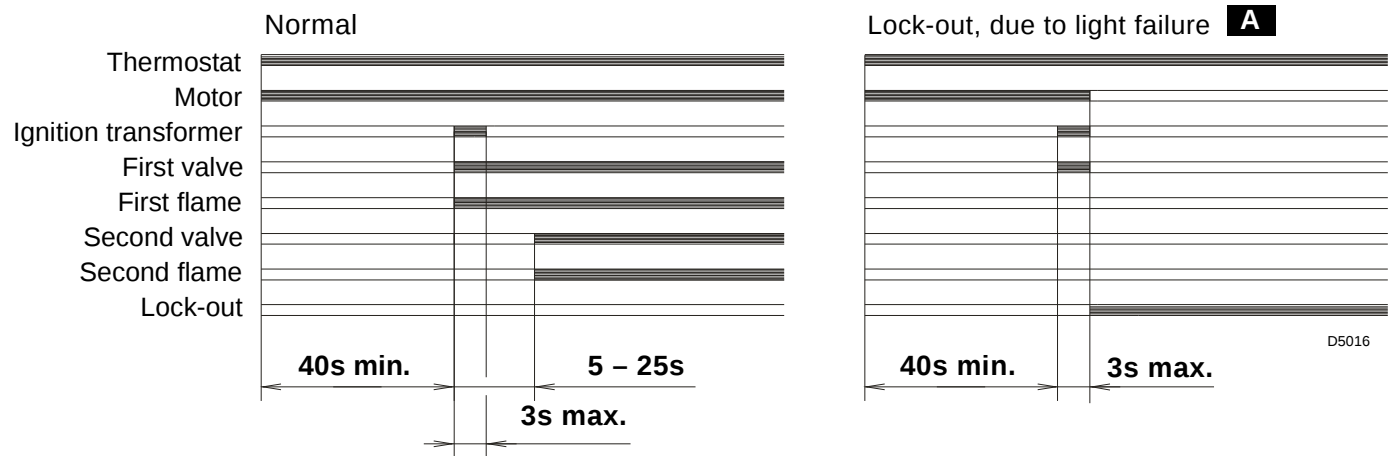
## 4.5 AIR PRESSURE SWITCH

The air pressure switch is set after all other adjustments have been made. Begin with the switch at the lowest setting. With the burner working at the required output, adjust the dial clockwise, increasing its value until the burner shuts down. Now reduce the value by one set point, turning the dial anti-clockwise. Check for reliable burner operation, if the burner shuts down, reduce the value by a half set point.

### ATTENTION:

To comply with the standard, the air pressure switch must operate when the CO value exceeds 1% (10,000 ppm). To check this, insert a combustion analyser in the flue, slowly reduce the burner air setting and verify that the burner shuts down by the action of the air pressure switch before the CO value exceeds 1%.

## 4.6 BURNER START-UP CYCLE



**A** Lock-out is indicated by a lamp on the control box (4, fig. 1, page 2).

## 4.7 RE-CYCLE FUNCTION

The control box allows re-cycling, i.e. the complete repetition of the starting programme, for 3 attempts maximum, in the event the flame goes out during operation.

## 4.8 POST-VENTILATION FUNCTION

Post-ventilation is a function that maintains air ventilation even after the burner is switched off. The burner switches off when the limit thermostat (TL) opens, cutting off the fuel supply to the valves.

To use this function the reset button must be pressed when the limit thermostat is not switched over (**BURNER SWITCHED OFF**).

Post-ventilation time can be set to a maximum of 6 minutes. Proceed as follows:

- Press and hold the reset button for at least 5 seconds till the LED indicator changes to red.
- Set the desired time pressing the button repeatedly: **once = post-ventilation for 1 minute.**
- After 5 seconds the control box automatically shows the minutes set by the red LED flashing:  
**1 pulse = post-ventilation for 1 minute.**

To reset this function, press and hold the button for at least 5 seconds the LED indicator changes to red then release it without carrying out any operation, then wait for 20 seconds for the burner to start.

If during post-ventilation there is a new request for heat, post-ventilation time is halted and a new operating cycle starts when the limit thermostat (TL) switches over.

The control box leaves the factory with the following setting: **0 minutes = no post-ventilation.**

## 4.9 CONTROL BOX RESET

To carry out the control box reset, proceed as follows:

- Press the reset button for at least 1 second.

In the event of the burner not restarting it is necessary to check if the limit thermostat (TL) is closed.

## 5. MAINTENANCE

**Disconnect the electric supply to the burner by switching off the main power switch and close the gas shut-off valve before maintaining or checking the system.**

The burner requires scheduled maintenance that must be carried out by qualified personnel and in compliance with local legislation.

Scheduled maintenance is vital for the smooth operation of the burner; it avoids waste of fuel and reduces harmful emissions into the atmosphere.

### THE FUNDAMENTAL OPERATIONS TO CARRY OUT ARE AS FOLLOWS:

- Check at regular intervals that the holes of the gas head are not obstructed. If they are, clean them with a suitable tool as shown in the figure 11.
- Check there are no occlusions or obstructions in the inlet or return pipes, in the air suction areas and in the combustion product waste pipe.
- Check that the burner and gas train electrical connections are correct.
- Check that the positioning of the air pressure test point (6, fig. 1, page 2) is correct.
- Check that the gas train is suited to the burner capacity, the type of gas used and the network gas pressure.
- Check that the positioning of the combustion head is correct and that it is properly fixed to the boiler.
- Check that the air damper is positioned correctly.
- Check that the ionisation probe and the electrode are positioned correctly (see fig. 5, page 6).
- Check that the air pressure switch and the gas pressure switch are set correctly.

Leave the burner operating in steady state for approx. ten minutes, checking to ensure that all elements indicated herein have the proper settings for 1<sup>st</sup> and 2<sup>nd</sup> stage.

**Then carry out the analysis of the combustion by checking:**

- CO<sub>2</sub> percentage (%);
- CO content (ppm);
- NO<sub>x</sub> content (ppm);
- Ionisation current (μA);
- Flue gases temperature at the stack.

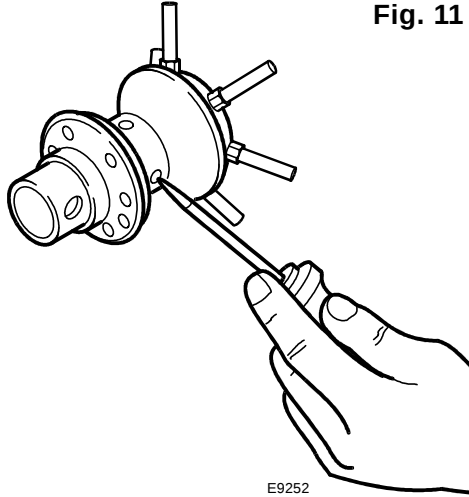


Fig. 11

### 5.1 VISUAL DIAGNOSTIC CONTROL BOX

The control box has a diagnostic function that can identify the likely causes of any malfunctions (indicator: **RED LED**).

In order to be able to use this function, press and hold the reset button for at least 3 seconds from when the appliance is made safe (**lock-out**).

The control box sends a sequence of pulses that are repeated at 2-second intervals.

| RED LED illuminated<br>press reset for 3 sec. | Pulses    | Interval<br>2s | Pulses    |
|-----------------------------------------------|-----------|----------------|-----------|
|                                               | • • • • • |                | • • • • • |

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

| SIGNAL          | PROBABLE CAUSE                                                                                                                                                                                                                                                                                             |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 pulses<br>• • | The flame does not stabilise at the end of the safety time: <ul style="list-style-type: none"><li>– faulty ionisation probe;</li><li>– faulty or soiled gas valves;</li><li>– neutral/phase exchange;</li><li>– faulty ignition transformer</li><li>– poor burner regulation (insufficient gas).</li></ul> |

| SIGNAL                    | PROBABLE CAUSE                                                                                                                                                                                                                                                                 |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3 pulses<br>● ● ●         | Min. air pressure switch does not close or is already closed before the limit thermostat closed:<br>– air pressure switch faulty;<br>– air pressure switch incorrectly regulated.                                                                                              |
| 4 pulses<br>● ● ● ●       | Light present in the chamber before the burner's switching on or off:<br>– presence of a strange light before or after the limit thermostat switching over;<br>– presence of a strange light during pre-ventilation;<br>– presence of a strange light during post-ventilation. |
| 6 pulses<br>● ● ● ● ● ●   | Loss of ventilation air:<br>– air loss during pre-ventilation;<br>– air loss during and after safety time.                                                                                                                                                                     |
| 7 pulses<br>● ● ● ● ● ● ● | Loss of flame during operations:<br>– poor burner regulation (insufficient gas);<br>– faulty or soiled gas valves;<br>– short circuit between ionisation probe and earth.                                                                                                      |

**ATTENTION** To reset the control box after the diagnostics display, press the lockout-reset button.

## 6. FAULTS / SOLUTIONS

Here below you can find some causes and the possible solutions for some problems that could cause a failure to start or a bad working of the burner.

A fault usually makes the lock-out lamp light which is situated inside the reset button of the control box (4, fig. 1, page 2).

When lock out lamp lights the burner will attempt to light only after pushing the reset button. After this if the burner functions correctly, the lock-out can be attributed to a temporary fault.

If however the lock out continues the cause must be determined and the solution found.

### 6.1 START-UP PROBLEMS

| FAULTS                                                     | POSSIBLE CAUSES                                                      | SOLUTION                                                                                    |
|------------------------------------------------------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| The burner doesn't start when the limit thermostat closes. | Lack of electrical supply.                                           | Check presence of voltage in the L1 - N clamps of the 7 pin plug.                           |
|                                                            |                                                                      | Check the condition of the fuses.                                                           |
|                                                            |                                                                      | Check that safety thermostat is not lock out.                                               |
|                                                            | Lack of gas.                                                         | Check the manual cock opening.                                                              |
|                                                            |                                                                      | Check that the valves charge over to the opening position and there are not short circuits. |
|                                                            | The gas pressure switch does not close its contact.                  | Adjust them.                                                                                |
|                                                            | The connections in the control box are wrongly inserted.             | Check and connect all the plugs.                                                            |
|                                                            | The air pressure switch is changed over to the operational position. | Replace the pressure switch.                                                                |

| FAULTS                                                                                                  | POSSIBLE CAUSES                                                                                                                                                   | SOLUTION                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Burner tends to pull the flame when switching from 1<sup>st</sup> to 2<sup>nd</sup> stage.</b>       | Output ratio between 1 <sup>st</sup> and 2 <sup>nd</sup> stage greater than 1:2.                                                                                  | Restore correct maximum ratio of 1:2, making sure 1 <sup>st</sup> stage output is no less than the operating range's minimum.            |
|                                                                                                         | High air excess in 1 <sup>st</sup> stage.                                                                                                                         | Restore the correct air excess value ( $\lambda$ min. = 1.3) see section "4.4 combustion control".                                       |
| <b>The burner runs normally in the prepurge and ignition cycle and locks out after about 3 seconds.</b> | Phase and neutral connection is inverted.                                                                                                                         | Invert them.                                                                                                                             |
|                                                                                                         | The earth connection lacks or is inefficient.                                                                                                                     | Make the earth connection efficient.                                                                                                     |
|                                                                                                         | 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 the earth. | Check the right position and if necessary set it according to the instructions of this manual.                                           |
|                                                                                                         |                                                                                                                                                                   | Reset the electrical connection.                                                                                                         |
|                                                                                                         |                                                                                                                                                                   | Replace the faulty connection.                                                                                                           |
| <b>The burner starts with an ignition delay.</b>                                                        | The ignition electrodes is wrongly positioned.                                                                                                                    | Adjust it according to the instructions of this manual.                                                                                  |
|                                                                                                         | Air output is too high.                                                                                                                                           | Set the air output according to the instructions of this manual.                                                                         |
|                                                                                                         | Valve brake is too close with insufficient gas output.                                                                                                            | Adjust it.                                                                                                                               |
| <b>The burner doesn't change over the 2<sup>nd</sup> stage.</b>                                         | The air damper is locked.                                                                                                                                         | Check the right working.                                                                                                                 |
|                                                                                                         |                                                                                                                                                                   | Check the right electrical connection.                                                                                                   |
|                                                                                                         | The 2 <sup>nd</sup> stage gas valve doesn't pull in.                                                                                                              | Failed valve: replace it.                                                                                                                |
|                                                                                                         |                                                                                                                                                                   | The air damper doesn't close completely and therefore it doesn't pull in the 2 <sup>nd</sup> stage valve micro: check the micro working. |
| <b>The burner locks out after the prepurge phase due to flame-failure.</b>                              | The solenoid valves is passing too little gas.                                                                                                                    | Check the pressure in the network and/or adjust the solenoid valve according to the instructions of this manual.                         |
|                                                                                                         | The solenoid valves are defective.                                                                                                                                | Change them                                                                                                                              |
|                                                                                                         | The ignition arc is irregular or has failed.                                                                                                                      | Check the right insertion of the connectors.                                                                                             |
|                                                                                                         |                                                                                                                                                                   | Check the right position of the electrode according to the instructions of this manual.                                                  |
|                                                                                                         | The pipe has not been purged from the air.                                                                                                                        | Carry out a complete breathing of the line of gas-supply.                                                                                |

| FAULTS                                                                              | POSSIBLE CAUSES                                                                                                                                                                                                                                                                                                                                                                                                         | SOLUTION                                                                                            |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <b>The burner locks out during the prepurge phase.</b>                              | The air pressure switch does not change over to the operational position.                                                                                                                                                                                                                                                                                                                                               | The pressure switch is faulty, change it.                                                           |
|                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                         | The air pressure is too low, (the head is bad adjusted).                                            |
|                                                                                     | The flame exists.                                                                                                                                                                                                                                                                                                                                                                                                       | Faulty valves: replace them.                                                                        |
|                                                                                     | The pressure test point (13, fig. 9, page 9) is badly positioned.                                                                                                                                                                                                                                                                                                                                                       | Place it in the right position according to the instructions of this manual on page 9, chapter 4.2. |
| <b>The burner continues to repeat the starting cycle without going on lock-out.</b> | The gas pressure in the gas-mains lies very close to the value to which the gas pressure switch has been set. The sudden falling-off pressure at the opening of the valve causes the opening of the pressure switch. However this only temporarily, because the valve immediately closes again, so then does the pressure switch, because the pressure builds-up again, causing the cycle to be repeated over and over. | Lower and set the pressure switch.                                                                  |

## OPERATING IRREGULARITIES

| FAULTS                                        | POSSIBLE CAUSES               | SOLUTION                                                                                                             |
|-----------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>The burner locks out during operation.</b> | Earth probe.                  | Check the right position and if necessary set it according to the instructions of this manual.                       |
|                                               |                               | Clean or replace the ionization probe.                                                                               |
|                                               | The flame disappears 4 times. | Check the gas pressure in the network and/or adjust the solenoid valve according to the instructions of this manual. |
|                                               | Air pressure switch opening.  | The air pressure is too low, (the head is bad adjusted).                                                             |
|                                               |                               | The air pressure switch is faulty, change it.                                                                        |
| <b>Burner shut down.</b>                      | Gas pressure switch opening.  | Check the pressure in the network and/or adjust the solenoid valve according to the instructions of this manual.     |



**WARNING**

In the event of a burner lockout, more than two consecutive burner reset operations could cause damage to the installation. On the third lockout, contact the Aftersales Service.



**DANGER**

If further lockouts or burner faults occur, interventions must only be made by qualified, authorised personnel (as indicated in this manual, and in compliance with the laws and regulations currently in force).

## 7. SAFETY WARNINGS

The dimension of the boiler's combustion chamber must respond to specific values, in order to guarantee a combustion with the lowest polluting emissions rate.

The Technical Service Personnel will be glad to give you all the information for a correct matching of this burner to the boiler.

This burner must only be used for the application it was designed for.

The manufacturer accepts no liability within or without the contract for any damage caused to people, animals and property due to installation, adjustment and maintenance errors or to improper use.

### 7.1 BURNER IDENTIFICATION

The Identification Plate on the product gives the serial number, model and main technical and performance data. If the Identification Plate is tampered with, removed or missing, the product cannot be clearly identified thus making any installation or maintenance work potentially dangerous.

### 7.2 BASIC SAFETY RULES

- Children or inexperienced persons must not use the appliance.
- Under no circumstances must the intake grids, dissipation grids and ventilation vents in the installation room be covered up with cloths, paper or any other material.
- Unauthorised persons must not attempt to repair the appliance.
- It is dangerous to pull or twist the electric leads.
- Cleaning operations must not be performed if the appliance is not disconnected from the main power supply.
- Do not clean the burner or its parts with inflammable substances (e.g. petrol, alcohol, etc.). The cover must be cleaned with soapy water.
- Do not place anything on the burner.
- Do not block or reduce the size of the ventilation vents in the installation room.
- Do not leave containers and inflammable products in the installation room.