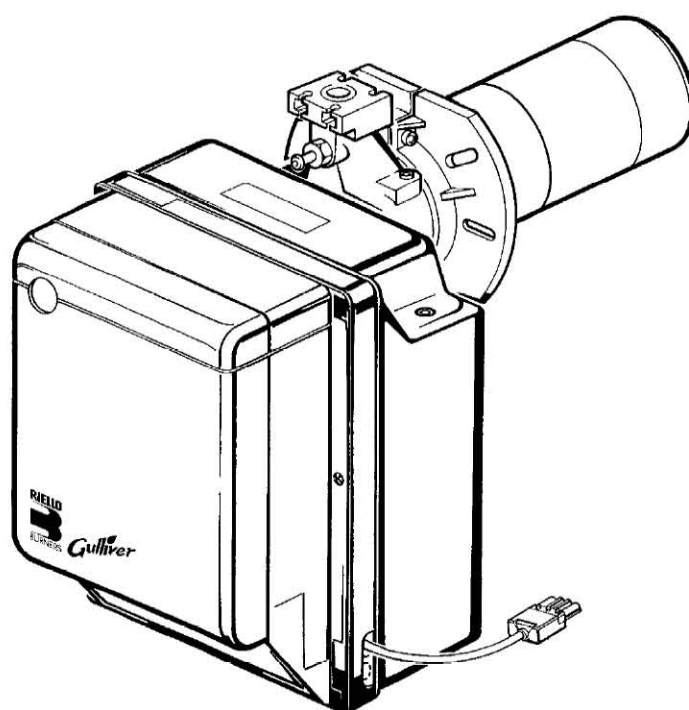


- I** Bruciatore di gas ad aria soffiata
- D** Gas-Gebläsebrenner
- F** Brûleur gaz à air soufflé
- GB** Forced draught gas burner

Funzionamento bistadio
Zweistufiger Betrieb
Fonctionnement à 2 allures
Two stage operation



Gulliver

CODICE CODE	MODELLO - MODELL MODELE - MODEL	TIPO - TYP TYPE
3762050	RS5D	922 T1

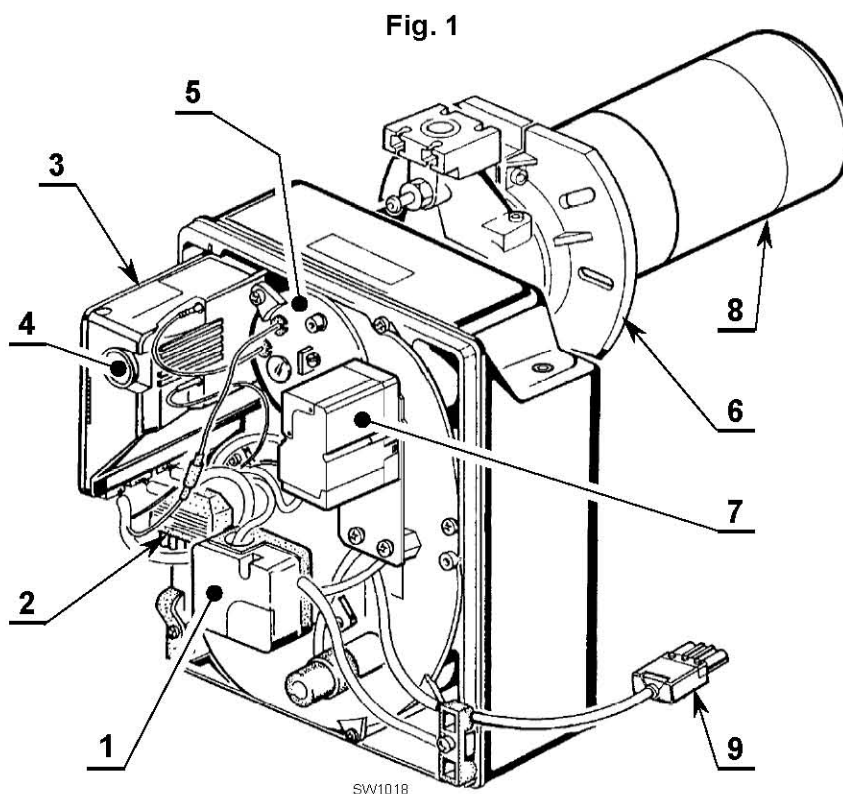
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1. BURNER DESCRIPTION

Two stage gas burner.

- 1 – Pressure switch
- 2 – 6 pole socket for gas train
- 3 – Control box with 7 pole socket
- 4 – Reset button with lock-out lamp
- 5 – Head holder assembly
- 6 – Flange with insulating gasket
- 7 – Air damper actuator
- 8 – Blast tube
- 9 – 4 pole socket for 2nd stage burner



- ◆ The burner meets protection level of IP 40, EN 60529.
- ◆ CE marking according to Gas Appliance directive 90/396/EEC; PIN **0085BN0325**.
- ◆ According to directives: EMC 89/336/EEC, Low Voltage 73/23/EEC, Machines 98/37/EEC and Efficiency 92/42/EEC.
- ◆ Gas train according to EN 676.

1.1 BURNER EQUIPMENT

Flange with insulating gasket No. 1
 Screw and nut for flange No. 1
 Capacitor No. 1

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

2. TECHNICAL DATA

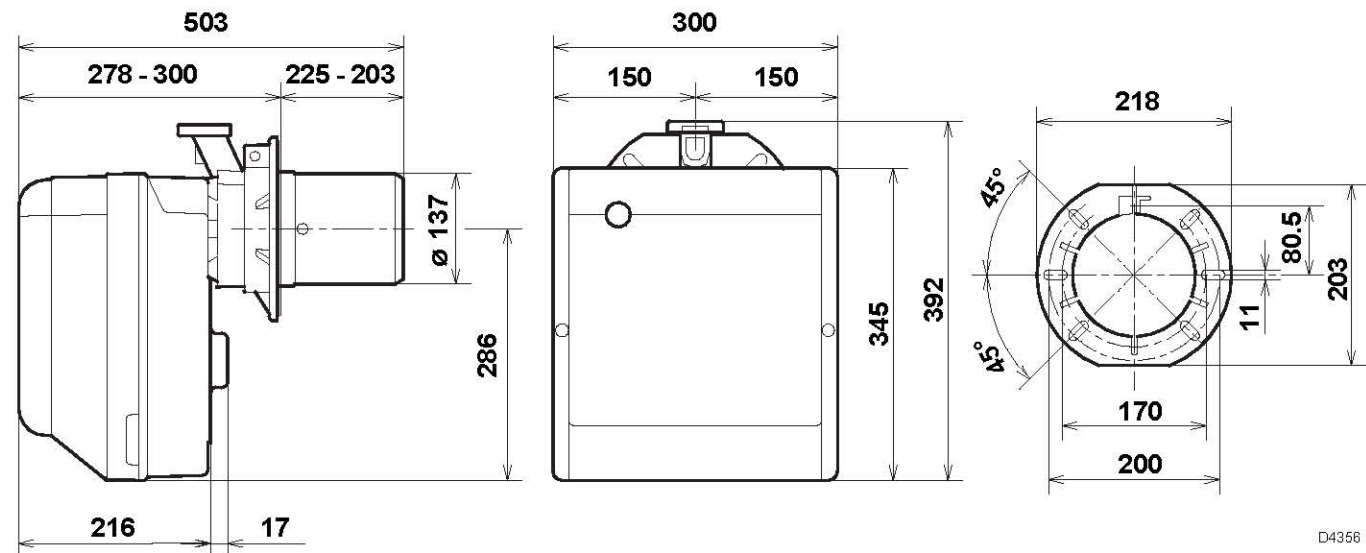
2.1 TECHNICAL DATA

TYPE	922 T1
Thermal power (1)	160/208 - 345 kW – 137,600/178,800 - 296,700 kcal/h
Natural gas (Family 2)	Net heat value: 8 – 12 kWh/Nm ³ = 7000 – 10,340 kcal/Nm ³
	Pressure: min. 20 mbar - max. 100 mbar
Electrical supply	Single phase, 230V ± 10% ~ 50Hz
Motor	Run current 2 A - 2750 rpm - 289 rad/s
Capacitor	8 µF
Ignition transformer	Primary 230V / 0.2A – Secondary 8 kV / 12 mA
Absorbed electrical power	0.45 kW
(1) Reference conditions: Temp. 20°C - Barometric pressure 1013 mbar – Altitude 0 m above sea level.	

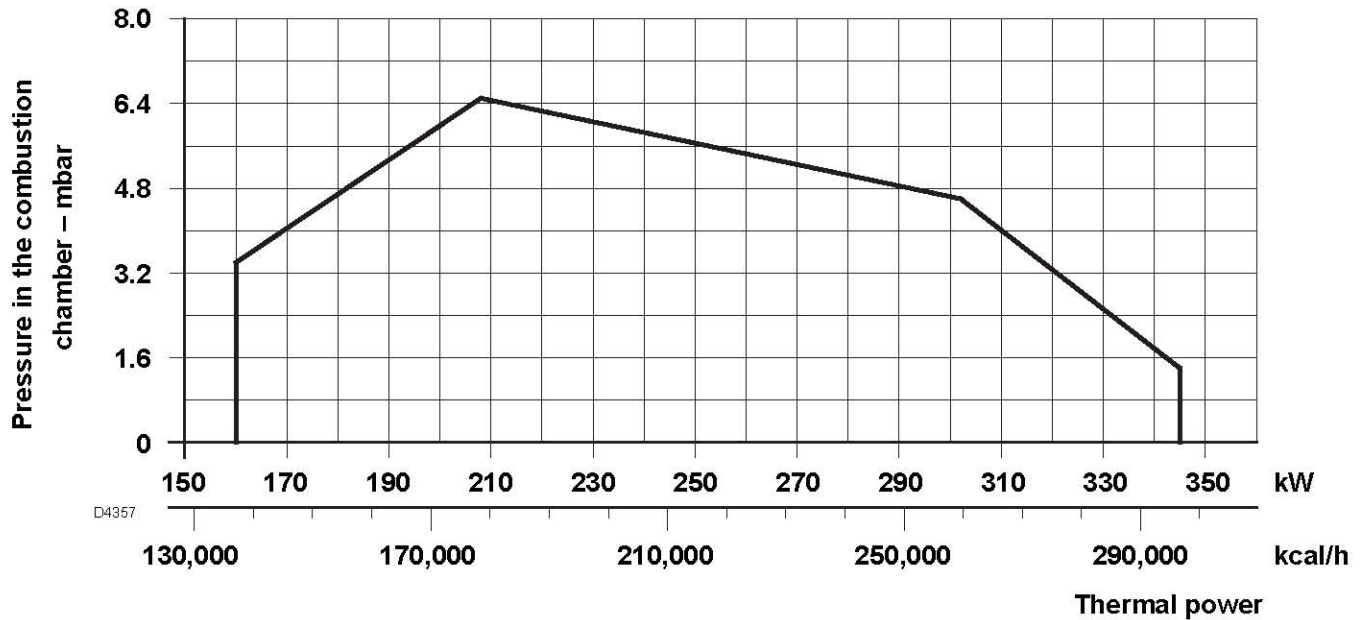
For gas family 3 (LPG) ask for separate kit.

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

2.2 OVERALL DIMENSIONS



2.3 WORKING FIELD (as EN 676)



TEST BOILER

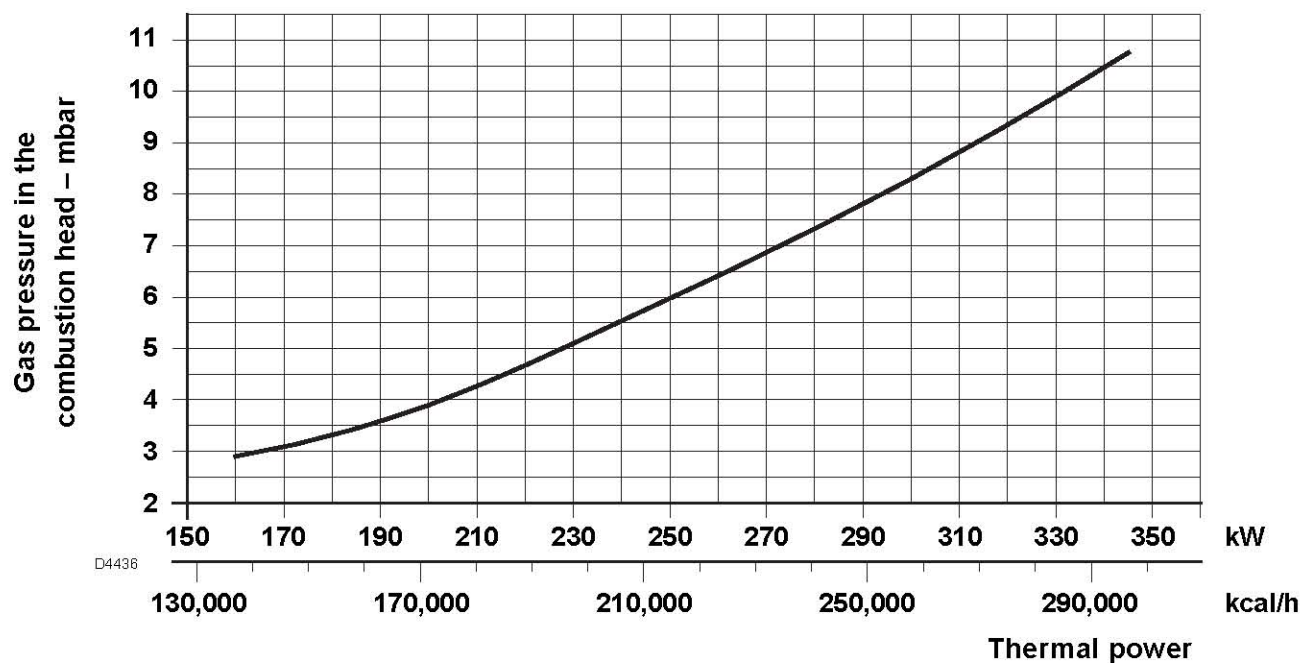
The working field has been defined according to EN 676 standard.

COMMERCIAL BOILERS

The burner-boiler matching is assured if the boiler is according to EN 303 and the combustion chamber dimensions are similar to those shown in the diagram EN 676. For applications where the boiler is not according to EN 303, or where the combustion chamber dimensions differ from those shown in EN 676, please consult the manufacturers.

CORRELATION BETWEEN GAS PRESSURE AND BURNER OUTPUT

To obtain the maximum output, a gas head pressure of 10.7 mbar is measured (M2, see chapter 3.3, page 5) with the combustion chamber at 0 mbar using gas G20 with a net heat value of 10 kWh/m³ (8.570 kcal/m³).



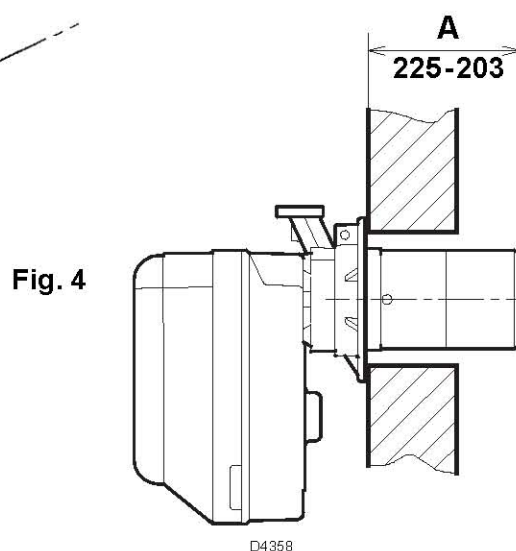
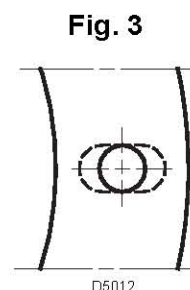
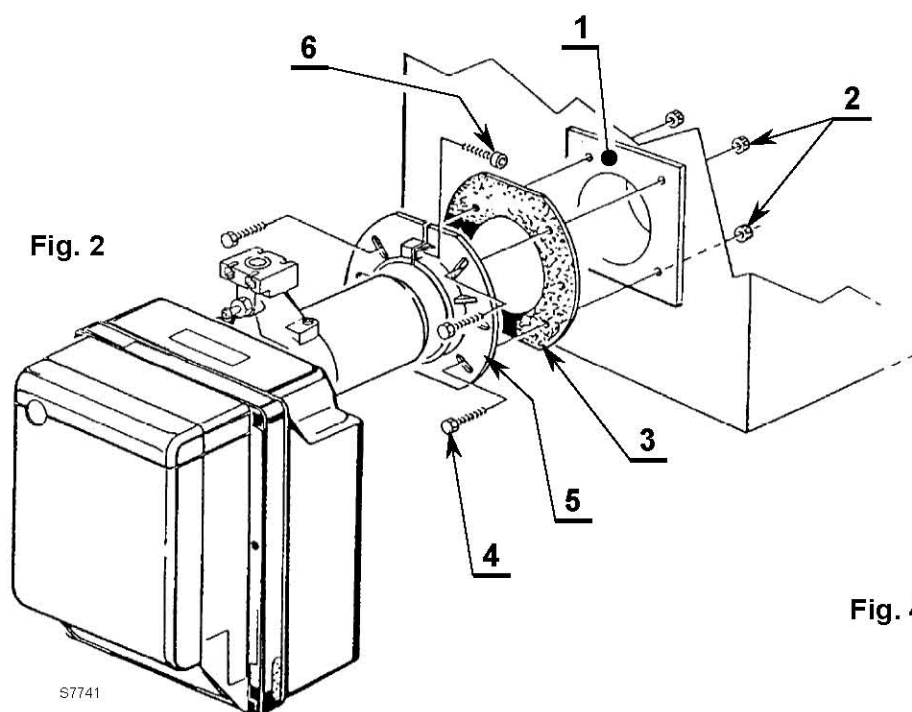
3. INSTALLATION

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

3.1 BOILER FIXING

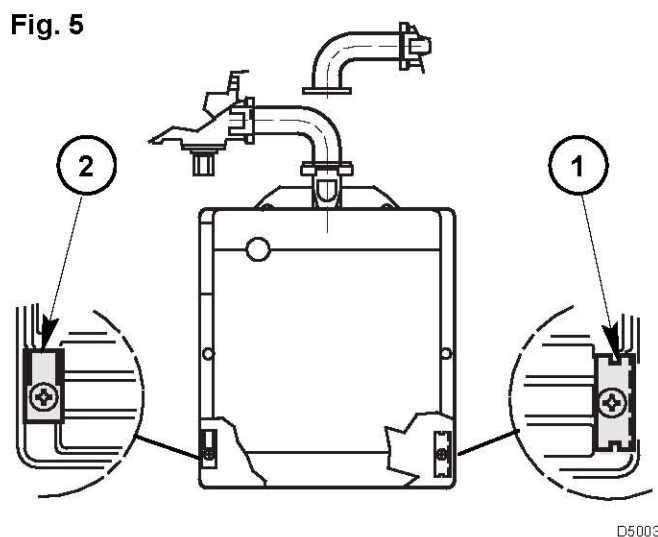
- ♦ Widen, if necessary, the insulating gasket holes (3) (see fig. 3).
- ♦ Fix the flange (5) to the boiler door (1) using four screws (4) and (if necessary) the nuts (2) **interposing the insulating gasket (3)** but keep unloosening one of the two upper screws (4) (see fig. 2).
- ♦ Put on the flange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



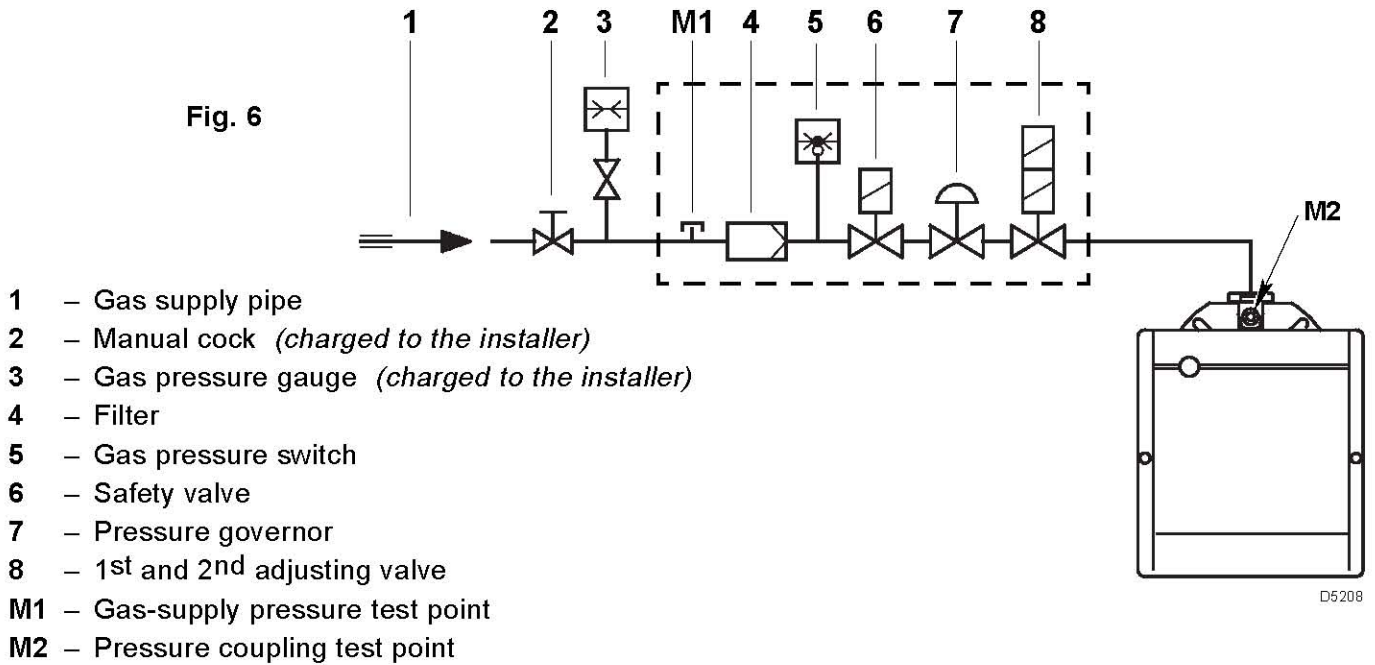
3.2 GAS FEEDING

According to the gas-train cables position on the right or left side of the burner, reverse the 2 cable wrenches (1) and (2), (see fig. 5).



3.3 GAS FEEDING LINE

Fig. 6



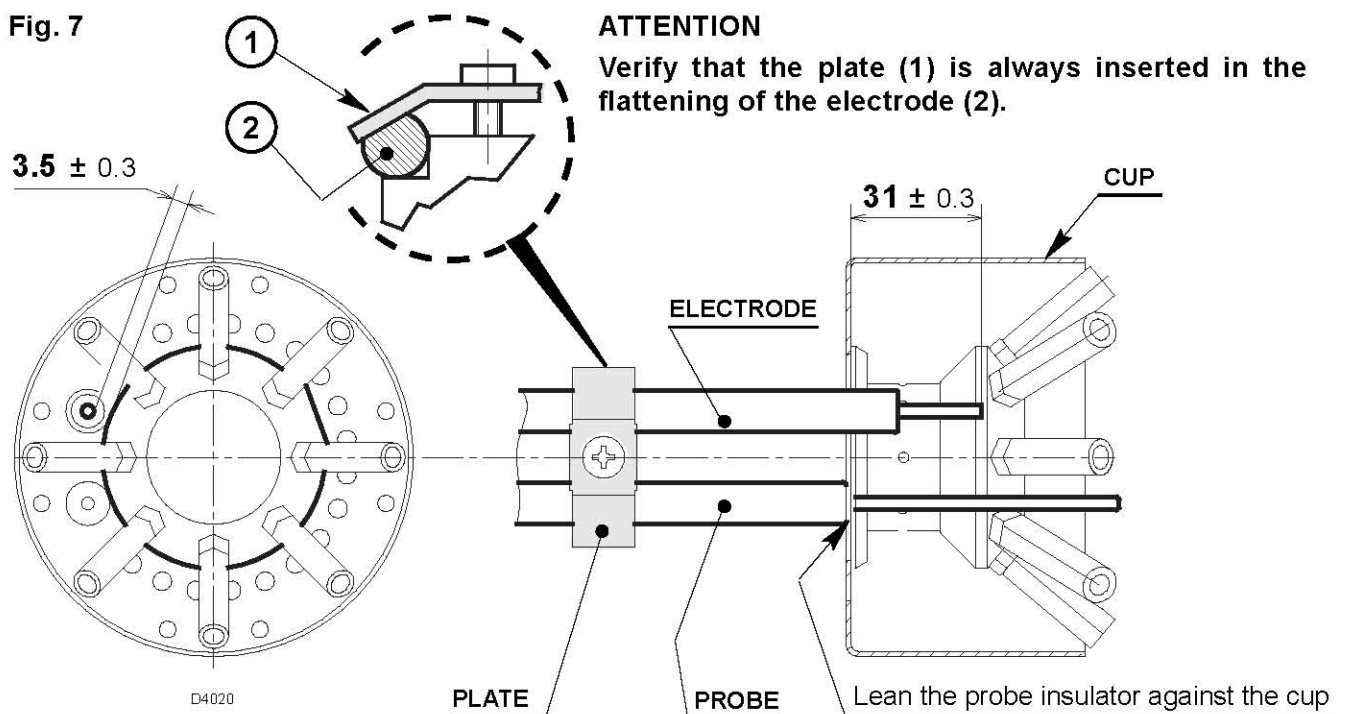
GAS TRAIN ACCORDING TO EN 676

GAS TRAIN		CONNECTIONS		USE
TYPE	CODE	INLET	OUTLET	
MB-ZRDLE 410 B01	3970542	Rp 1" 1/4	Flange 3	Natural gas ≤ 200 kW and LPG 160 – 345 kW
MB-ZRDLE 412 B01	3970543	Rp 1" 1/4	Flange 3	Natural gas ≤ 300 kW
MB-ZRDLE 415 B01	3970582	Rp 1" 1/2	Flange 3	Natural gas ≥ 300 kW

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

3.4 PROBE - ELECTRODE POSITIONING, (see fig. 7)

Fig. 7



3.5.1 STANDARD ELECTRICAL WIRING



NOTE:

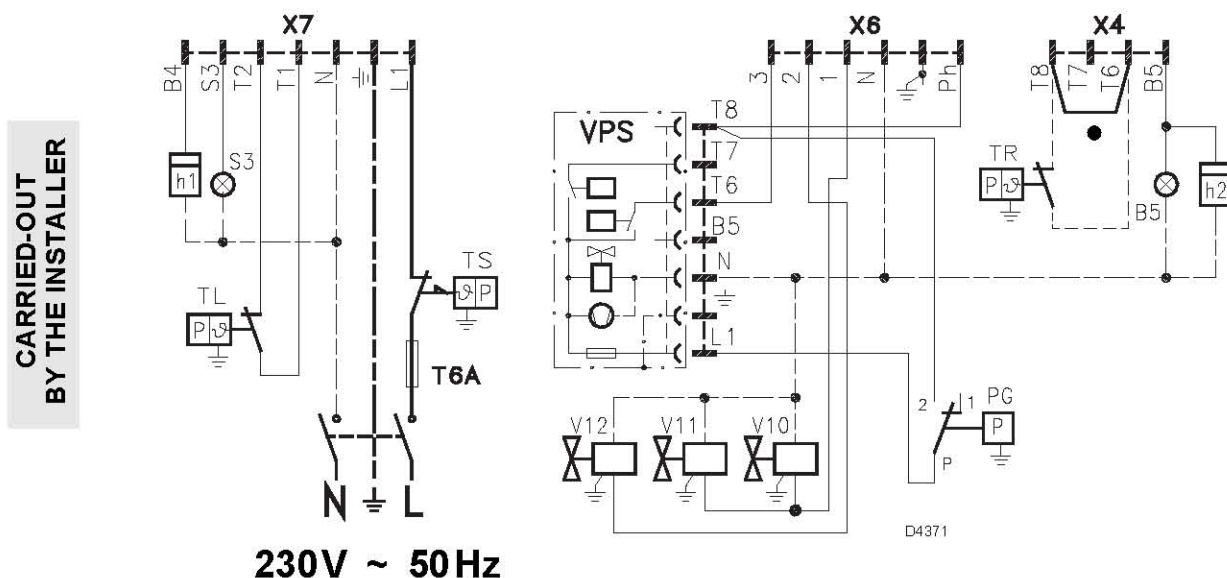
- Wires of min. 1 mm² section.
(Unless requested otherwise by local standards and legislation).
- Carry out a safe earth connection.
- The electrical wiring carried out by the installer must be in compliance with the rules in force in the country.

*** The capacitor has to be connected to the L1 and N clamps of the 7 pin plug, supplied with the burner, or the 7 pin plug of the boiler.**

KEY TO LAY-OUT

B5	– 2nd stage working signal
C	– Capacitor
CN1	– Connector ionization probe
E	– Electrode
h1	– 1st stage hour counter
h2	– 2nd stage hour counter
M	– Motor
PA	– Air pressure switch
PG	– Min. gas pressure switch
SM	– Air damper actuator
SO	– Ionization probe
S3	– Remote lock-out signal (230V - 0,5 A max.)
T6A	– Fuse
TB	– Burner earth
TL	– Limit thermostat
TR	– 2nd stage thermostat
TS	– Safety thermostat
V10	– Safety valve
V11	– 1st stage valve
V12	– 2nd stage valve
X4	– 4 pin plug
XP4	– 4 pole socket
X6	– 6 pin plug
XP6	– 6 pole socket

3.5.2 ELECTRICAL WIRING WITH GAS LEAK CONTROL DEVICE (DUNGS VPS 504)



- Connect 2nd stage thermostat between clamps **T6** and **T8** removing the bridge.

KEY TO LAY-OUT

B5 – 2nd stage working signal
h1 – 1st stage hour counter
h2 – 2nd stage hour counter
PG – Min. gas pressure switch
S3 – Remote lock-out signal
 (230V - 0.5 A max.)

T6A – Fuse
TL – Limit thermostat
TR – 2nd stage thermostat
TS – Safety thermostat
V10 – Safety valve
V11 – 1st stage valve

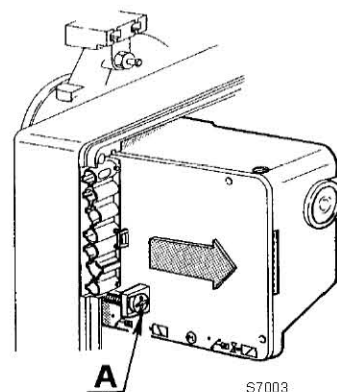
V12 – 2nd stage valve
X4 – 4 pin plug
X6 – 6 pin plug
X7 – 7 pin plug

CONTROL BOX (see fig. 8)

To remove the control-box from the burner, loosen the screw **(A)** after removing all components, the 7 pin plug, the connector **(CN1)**, the high tension cables and the earth wire **(TB)**.

In case of disassembly of the control box, retighten the screw **(A)** with a torque wrench setting of 1 – 1.2 Nm.

Fig. 8



4. WORKING

FIRING OUTPUT

The firing must occur at reducer output and not higher than 120 kW.

In order to measure the firing output:

- Disconnect the connector (CN1) on the ionization probe cable (see *electrical wiring* at page 6); the burner will fire and then go into lock-out after the safety time (3s) has elapsed.
- Perform 10 firings with consecutive lock-outs.
- On the meter read the total quantity of gas burned. This quantity must be equal to or lower than the quantity here given:
 0.10 Nm^3 for G20 (natural gas H)
 0.10 Nm^3 for G25 (natural gas L)
 0.03 Nm^3 for G31 (LPG).

4.1 COMBUSTION ADJUSTMENT

(See fig. 9)

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 CO₂ 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.

The burner leaves the factory set for the minimum output.

4.2 COMBUSTION HEAD SETTING

It depends on the output of the burner and is carried out by rotating clockwise or counterclockwise the setting screw (6) until the set-point marked on the regulating rod (2) is level with the outside plane of the head assembly (1).

In the sketch of fig. 9 the combustion head is set for an output of 230 kW.

The set point 4 marked of the regulating rod is at the same level with the outside plane of the head-assembly as indicated in the diagram.

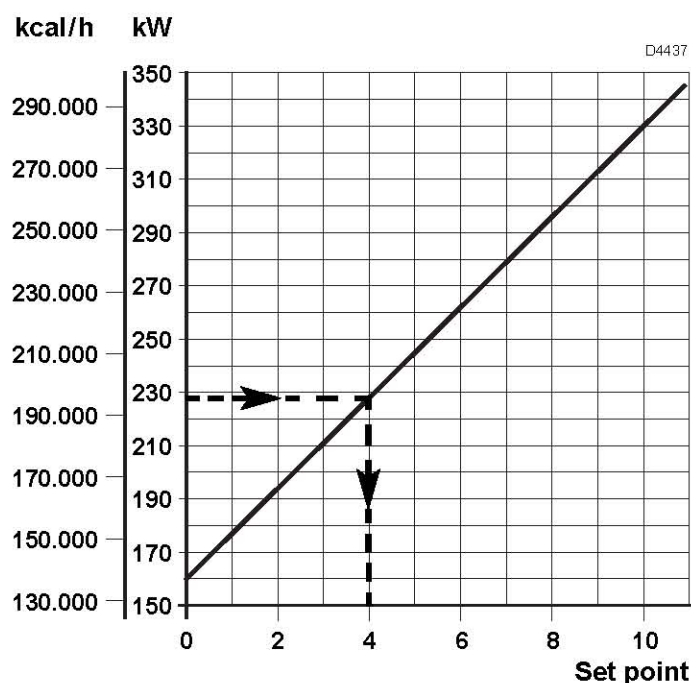
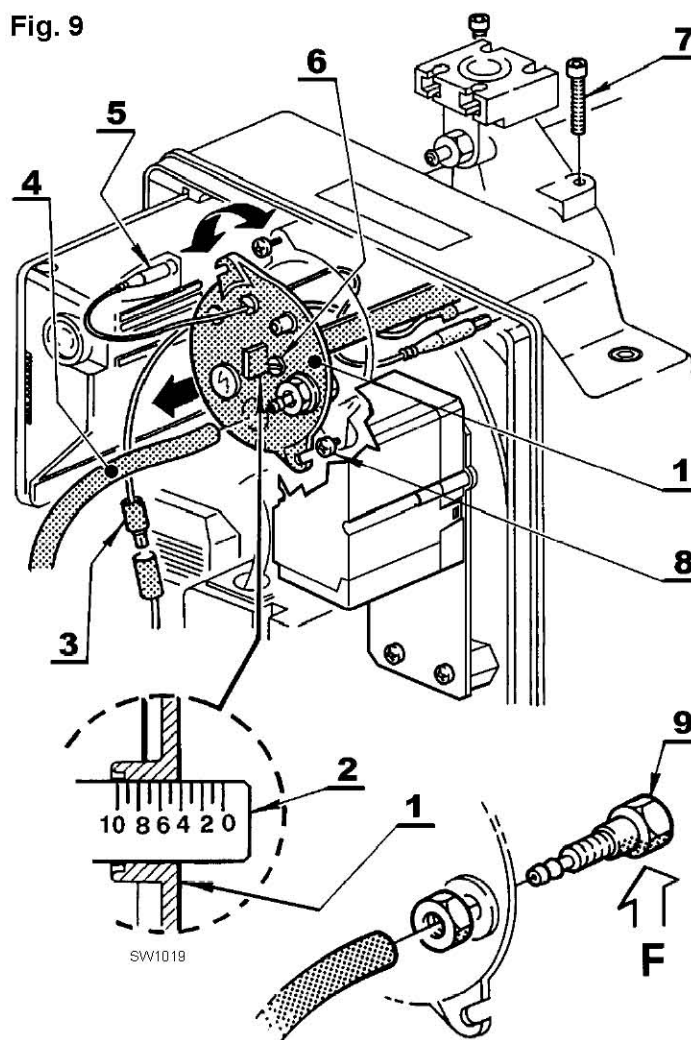
Example:

The burner is installed in a 210 kW boiler.
The burner will have to deliver about 230 kW, considering an efficiency of 90%.
The diagram indicates, that for this efficiency the adjustment has to be effected on the set-point 4.

NOTE

The diagram is orientative; to assure a good working of the burner, we suggest to adjust the combustion head according to the boiler.

Fig. 9



REMOVING HEAD ASSEMBLY, (see fig. 9, page 8)

To remove the head assembly, carry out the following operations:

Remove the head-holder assembly (1), after taking away the screws (7), disconnect the connections (3 and 5), extract the small tube (4) and loosen the screws (8).

Do not modify the setting position of the bracket-elbow during the disassembly.

REASSEMBLY OF THE HEAD SYSTEM, (see fig. 9, page 8)

Warning

- During the reassembly of the system, tighten the screws (7) completely (*without locking them*); then lock them with a torque wrench setting of 3 - 4 Nm.
- Control that, during the working, there are not gas losses coming from the screws.
- If casually the pressure test point (9) looses, fix correctly and be sure that the hole (F), placed in the external side of the head-assembly (1) turns towards the lower part.

4.3 SETTING OF THE AIR DAMPER ACTUATOR

FIRST STAGE CAM I

By adjusting the micrometric screw, cam I regulates the position of the 1st stage air damper (factory setting reference value 25°).

SECOND STAGE CAM II and III

Cam II regulates the position of the 2nd stage air damper (factory setting reference value 60°, do not exceed 65°).

Cam III is used to open the 2nd stage valve (factory setting reference value 45°).

It must always be at least 15° in front of cam II.

CAM V

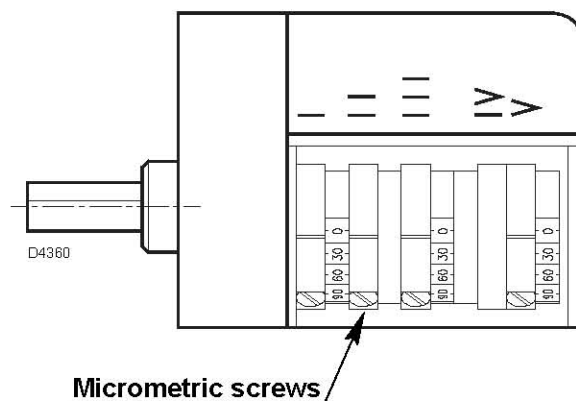
Cam V is factory set (factory setting reference value 90°).

Do not modify this setting for any reason.

Warning:

For power adjustment at 1st and 2nd stage, apply the following indications:

- the power ratio between 1st and 2nd stage must be 1 : 2 at a maximum, if the above ratio is exceeded, valve seal control must be used;
- in any case, the minimum burner power at 1st stage must not be less than the firing rate range.



4.4 COMBUSTION CHECK

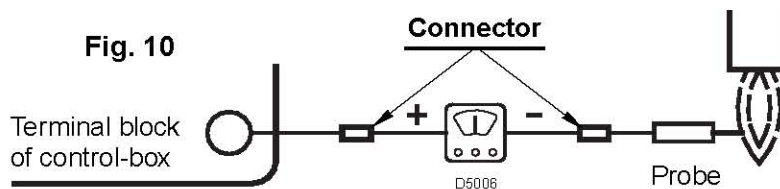
It is advisable to set the burner according to the type of gas used and following the indications of the table:

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

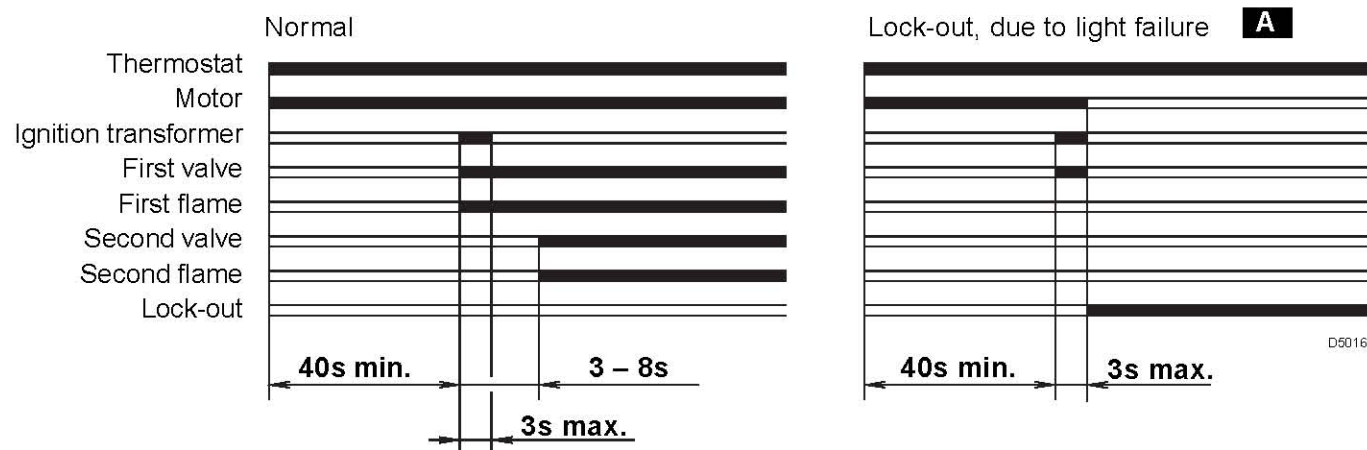
IONIZATION CURRENT

The minimum current necessary for the control box operation is 5 μ 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 6) fitted on the wire and insert a microammeter, (see fig. 10).



4.5 BURNER START-UP CYCLE



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

When the flame-failure occurs during working, shut down takes place within one second.

4.6 AIR PRESSURE SWITCH

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

With the burner operating at the required power, slowly turn knob clockwise until burner locks out.

Then turn the knob anti-clockwise by about 20% of the set point and subsequently check to see if burner has started correctly. If the burner locks out again, turn the knob anti-clockwise a little bit more.

The burner leaves the factory with the pressure switch set at the beginning of the scale.

Attention:

As a rule, the air pressure switch must prevent the air pressure from lowering below 80 % of the adjustment value as well as preventing the CO in the fumes from exceeding 1% (10,000 ppm).

To check this, insert a combustion analyser into the chimney, slowly close the fan suction inlet (*for example with cardboard*) and check that the burner locks out, before the CO in the fumes exceeds 1 %.

5. MAINTENANCE

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

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 first switch off the electrical supply to the burner acting on the main switch of the system.

THE BASIC CHECKS ARE:

Leave the burner working without interruption for 10 min., checking the right settings of all the components stated in this manual. Then carry out a combustion check verifying:

- CO₂ (%) content
- Smoke temperature at the chimney
- CO content (ppm).

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 (pos. 4, fig. 1, page 1).

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.

BURNER STARTING DIFFICULTIES

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.
The burner runs normally in the prepurge and ignition cycle and locks out after about 3 seconds.	The air damper actuator is locked.	Check the right electrical connection.
		The air damper actuator doesn't close completely and therefore it doesn't pull in the burner ignition micro: check the micro working.
	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.

FAULTS	POSSIBLE CAUSES	SOLUTION
The burner starts with an ignition delay.	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.
The burner locks out after the prepurge phase due to flame-failure.	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.
The burner locks out during the prepurge phase.	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 (pos. 9, fig. 9, page 8) is badly positioned.	Place it in the right position according to the instructions of this manual on page 8, chapter 4.1.
The burner continues to repeat the starting cycle without going on lock-out.	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 FAULTS

Burner lock-out due to :

- Flame failure
- Earth probe
- Air pressure switch opening

Burner shut down due to :

- Gas pressure switch opening.