

GB Forced draught gas burners

CN 强制通风燃气燃烧器

One stage operation
一段火运行

Gulliver



CODE - 编码	MODEL - 型号	TYPE - 类型
20024292	BS1	911 T1
20024322	BS2	912 T1
20024331	BS3	913 T1
20024335	BS4	914 T1

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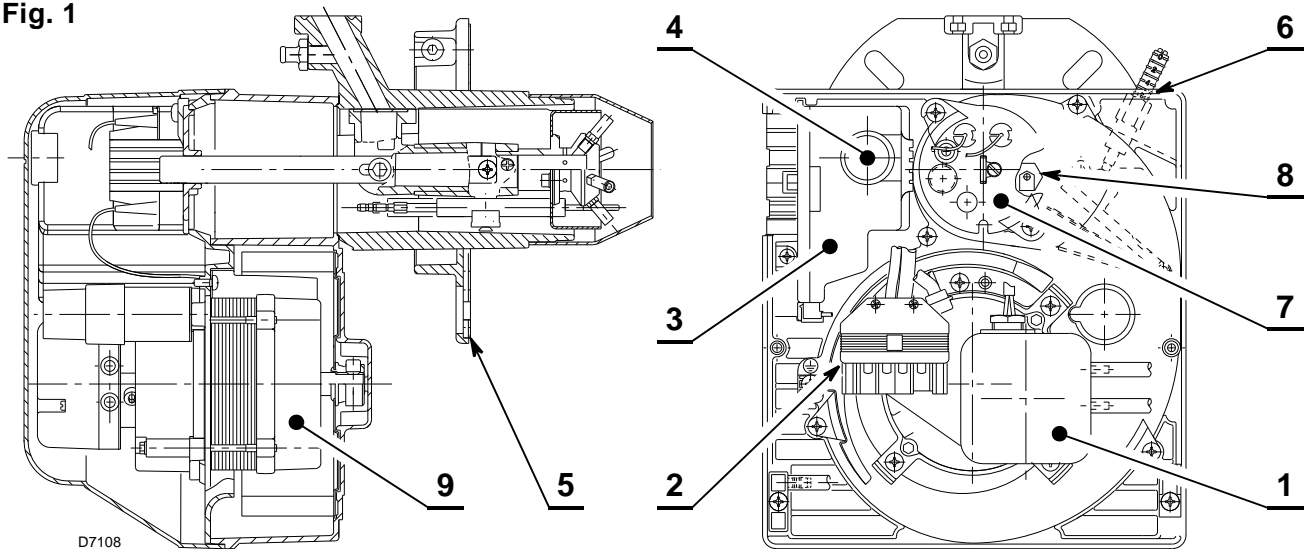
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1. BURNER DESCRIPTION

One stage gas burner.

- The burner meets protection level of IP X0D (IP 40), EN 60529.
According to Directives: EMC 89/336/EEC - 2004/108/EC, Low Voltage 73/23/EEC - 2006/95/EC and Machines 98/37/EEC - 2006/42/EC.
- 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 – Air damper adjustment assembly |
| 2 – 6 pole socket for gas train | 7 – Head holder assembly |
| 3 – Control box with 7 pole socket | 8 – Pressure test point |
| 4 – Reset button with lock-out lamp | 9 – Motor |
| 5 – Flange with insulating gasket | |

1.1 BURNER EQUIPMENT

Flange with insulating gasket.	No. 1	Screws and nuts for flange to be fixed to boiler . . .	No. 4
Screw and nut for flange	No. 1	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

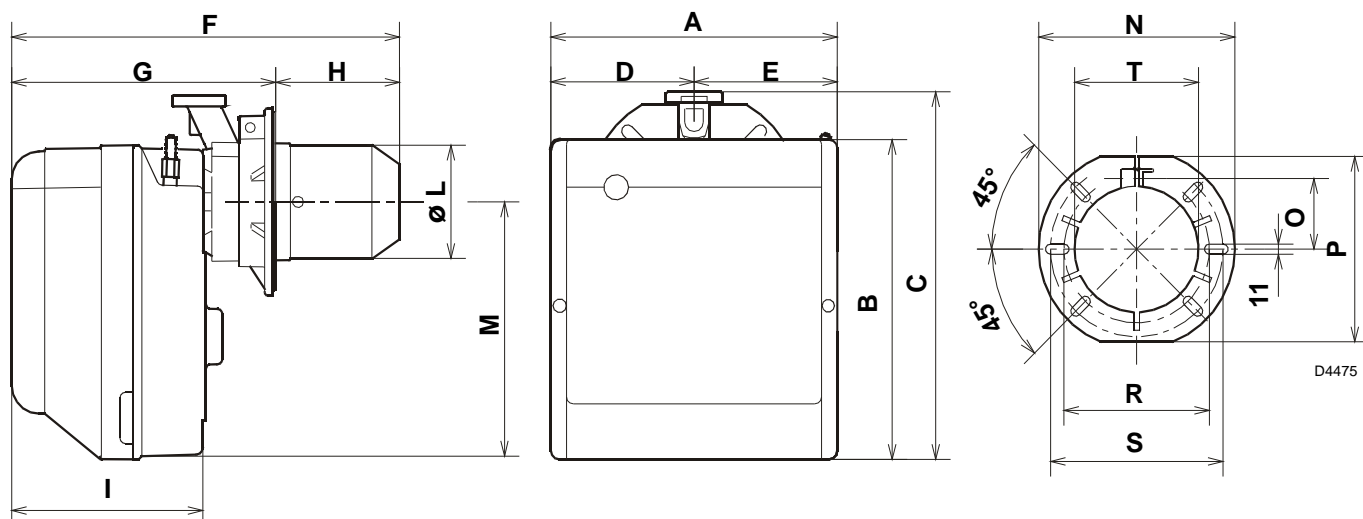
2.1 TECHNICAL DATA

TYPE		911 T1	912 T1	913 T1	914T1
Thermal power (1)	kW	16 – 52	35 – 91	65 – 200	110 – 250
	Mcal/h	13.8 – 44.7	30.1 – 78.2	55.9 – 172	94.6 – 215
Natural gas (Family 2)		Net heat value: 8 – 12 kWh/m ³ = 7000 – 10,340 kcal/m ³			
		Pressure: min. 20 mbar – max. 100 mbar			
Electrical supply		Single phase, 230V ± 10% ~ 50Hz			
Motor		Run current 0.8A 2750 rpm 288 rad/s		Run current 1.8A 2800 rpm 294 rad/s	Run current 1.9A 2720 rpm 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.

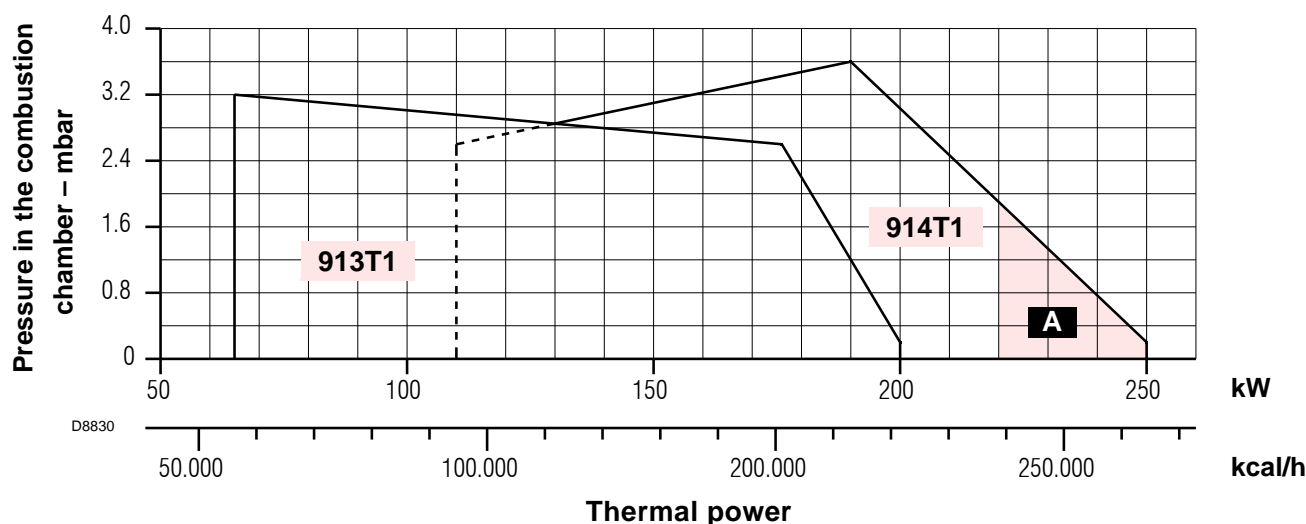
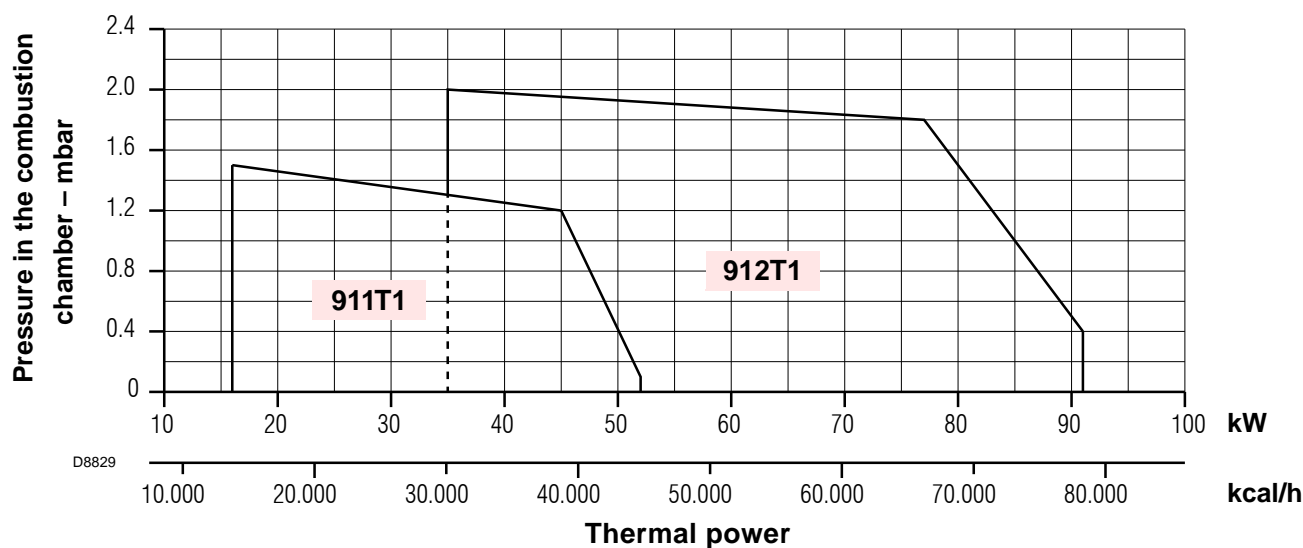
COUNTRY			AT - IT - DK - CH	GB - IE	DE	FR	NL	LU	BE
GAS CATEGORY			I12H3B/P	I12H3P	I12ELL3B/P	I12Er3P	I12L3B/P	I12E3B/P	I2E(R)B, I3P
GAS PRESSURE	G20	H	20	–	–	–	–	–	–
	G25	L	–	25	20	–	25	25	–
	G20	E	–	–	20	20/25	–	–	20/25

2.2 OVERALL DIMENSIONS



TYPE	A	B	C	D	E	F	G	H	I	L - T	M	N	O	P	R	S
911T1	234	254	295	122.0	112.0	346	230 – 276	116 – 70	174	89	210	192	66	167	140	170
912T1	255	280	325	125.5	125.5	352	238 – 252	114 – 100	174	106	230	192	66	167	140	170
913T1	300	345	391	150.0	150.0	390	262 – 280	128 – 110	196	129	285	216	76.5	201	160	190
914T1	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 BS4 model type 914T1, 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.

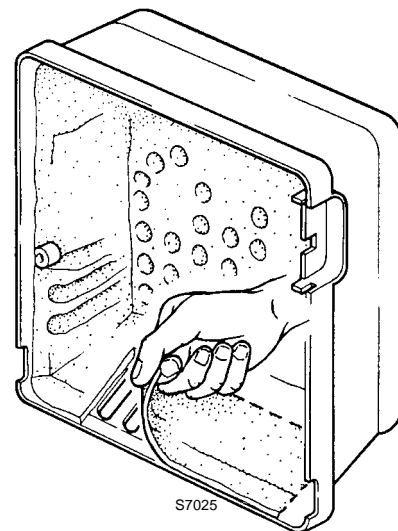
TEST BOILER

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

COMMERCIAL BOILERS

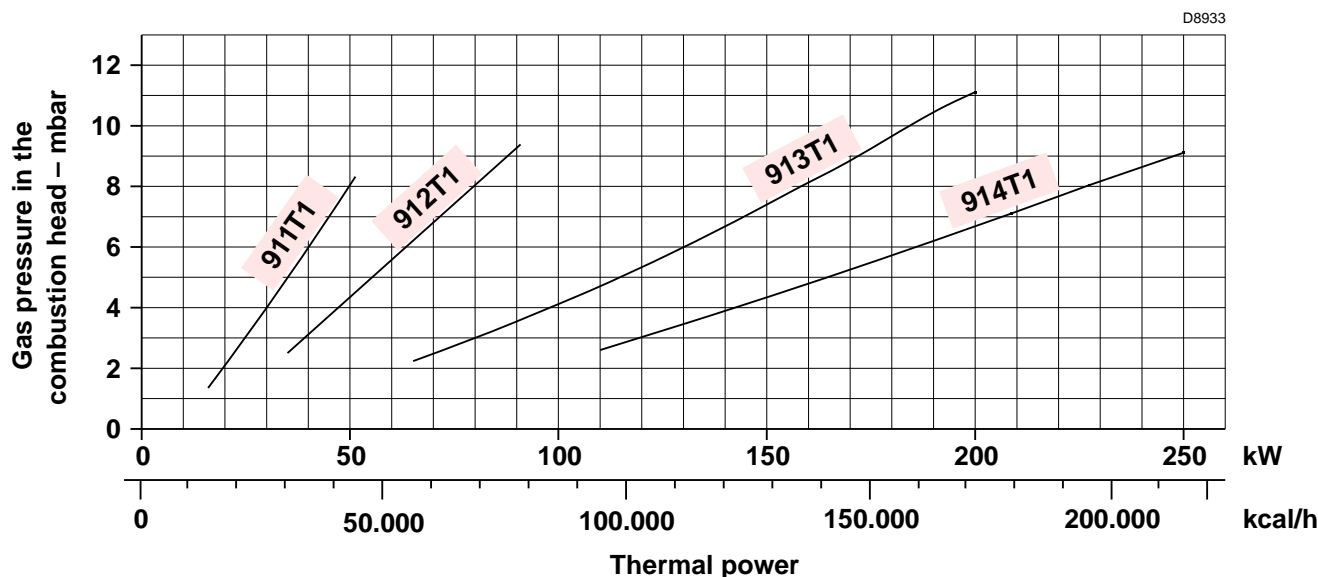
The burner-boiler matching is assured if the boiler conforms to EN 303 and the combustion chamber dimensions are similar to those shown in the diagram EN 676.

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 912T1 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/m³ (8.570 kcal/m³).



3. INSTALLATION

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

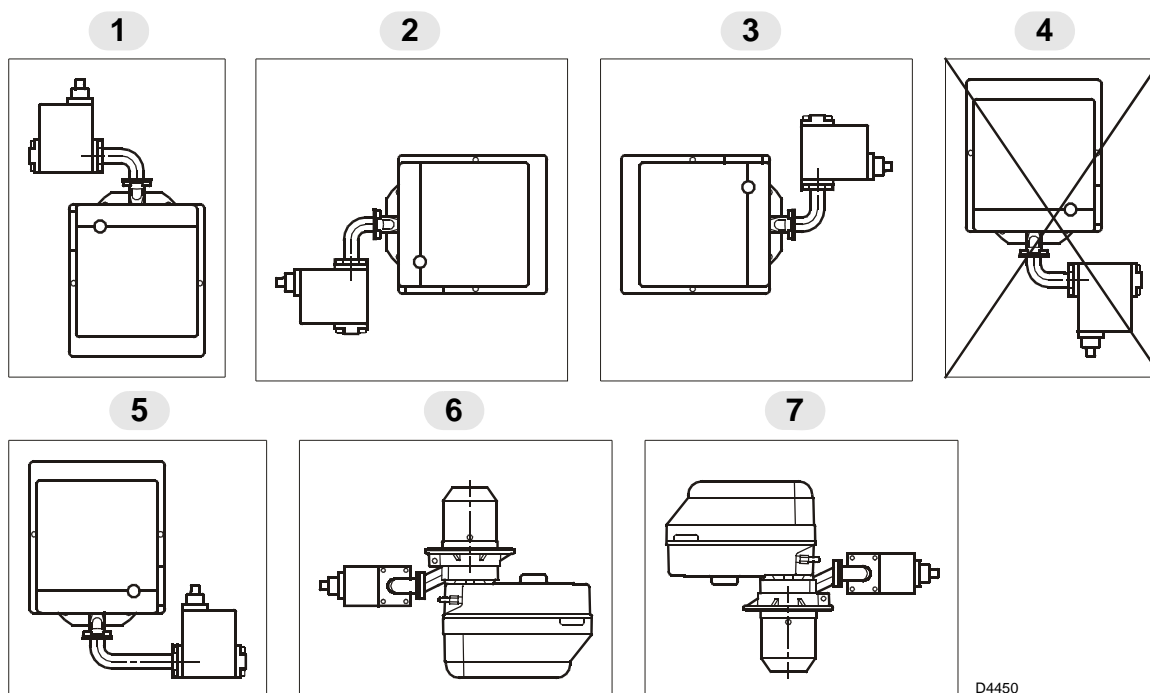
3.1 WORKING POSITION

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.



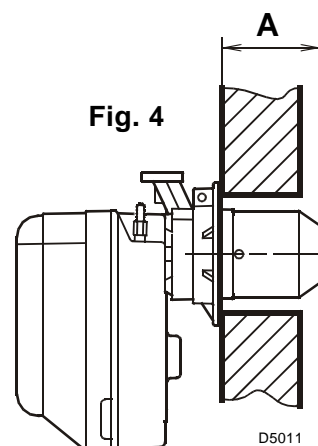
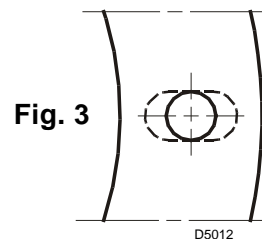
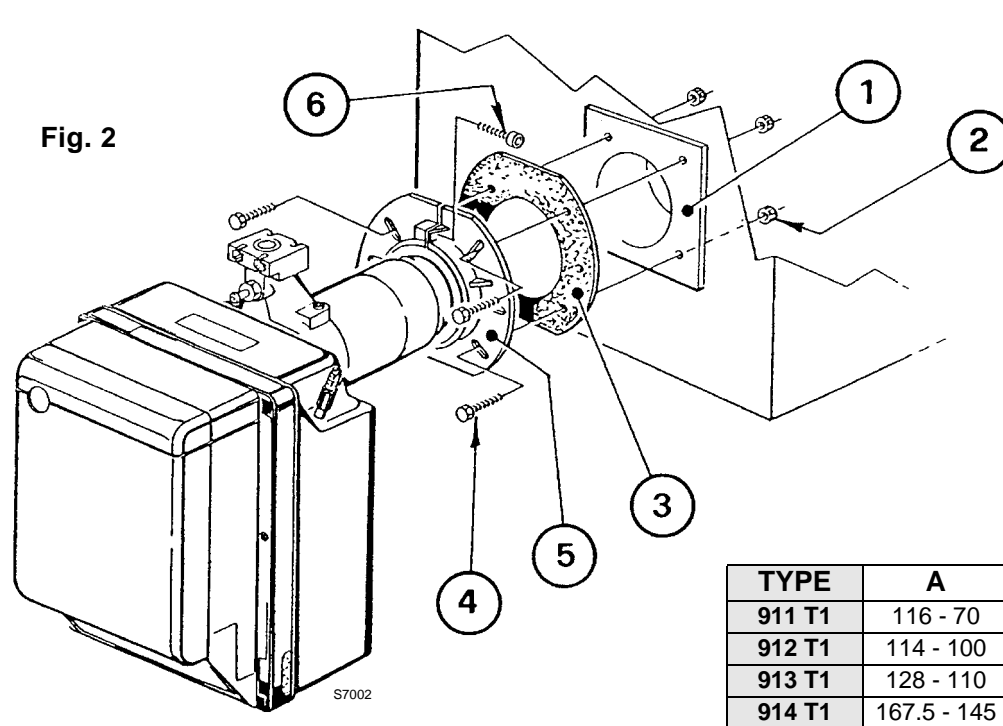
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3.2 BOILER FIXING

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.



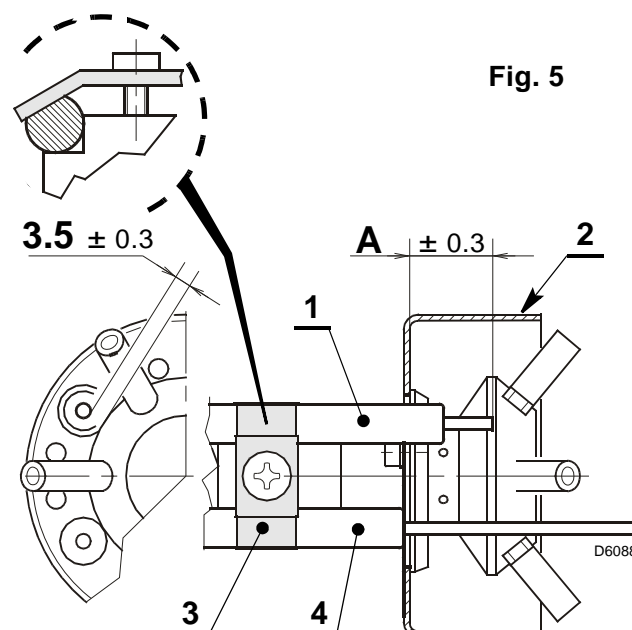
TYPE	A
911 T1	116 - 70
912 T1	114 - 100
913 T1	128 - 110
914 T1	167.5 - 145

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	911T1	912T1	913T1	914T1
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 BURNER	CONNECTIONS		USE
TYPE	CODE		INLET	OUTLET	
MBC 65 DLE	3970570	BS1	Rp 1/2	Flange 1	Natural gas and LPG
MBDLE 405 B01	3970546	BS1	Rp 1/2	Flange 1	Natural gas and LPG
MBDLE 405 B01	3970547	BS2	Rp 3/4	Flange 2	Natural gas and LPG
MBDLE 407 B01	3970544	BS2	Rp 3/4	Flange 2	Natural gas and LPG
MBDLE 407 B01	3970548	BS3 - BS4	Rp 3/4	Flange 3	Natural gas ≤ 150kW and LPG
MBDLE 410 B01	3970549	BS3 - BS4	Rp 1 1/4	Flange 3	Natural gas and LPG
MBDLE 412 B01	3970550	BS3 - BS4	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:

- the 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.

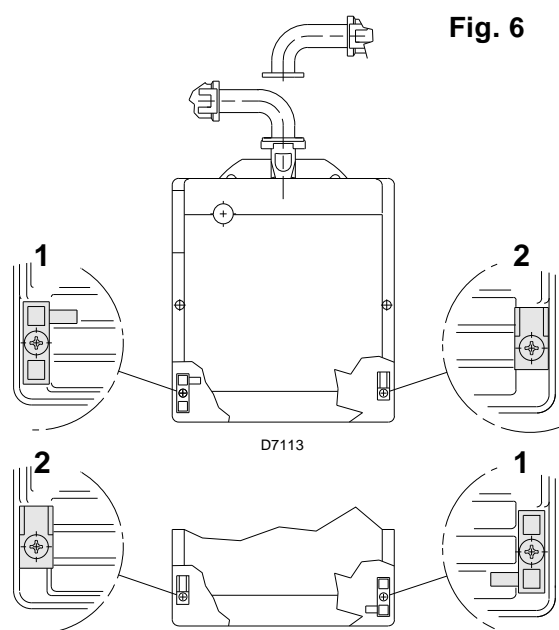


Fig. 6

3.6 GAS FEEDING LINE

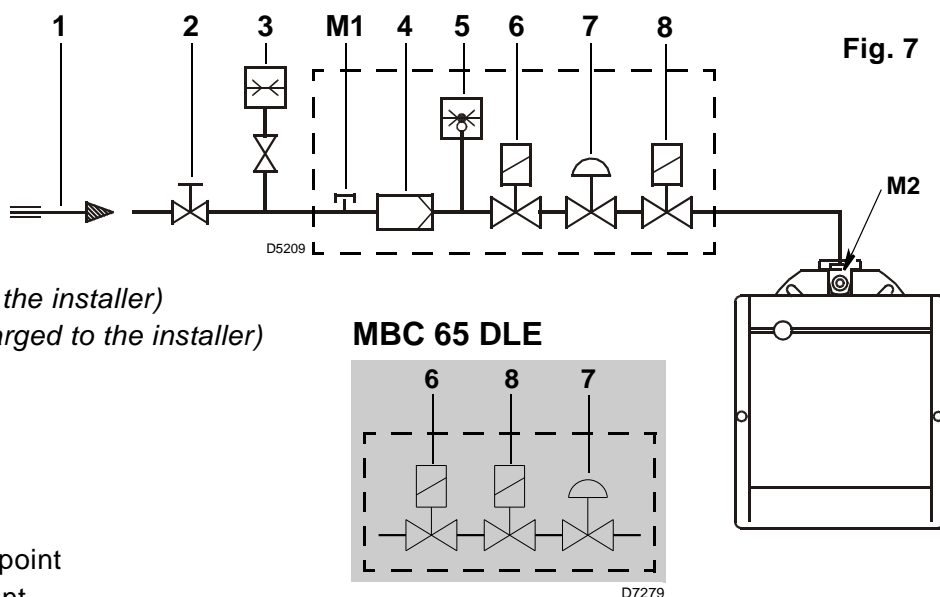


Fig. 7

- 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 – Adjusting valve
- M1 – Gas-supply pressure test point
- M2 – Pressure coupling test point

3.7 ELECTRICAL WIRING

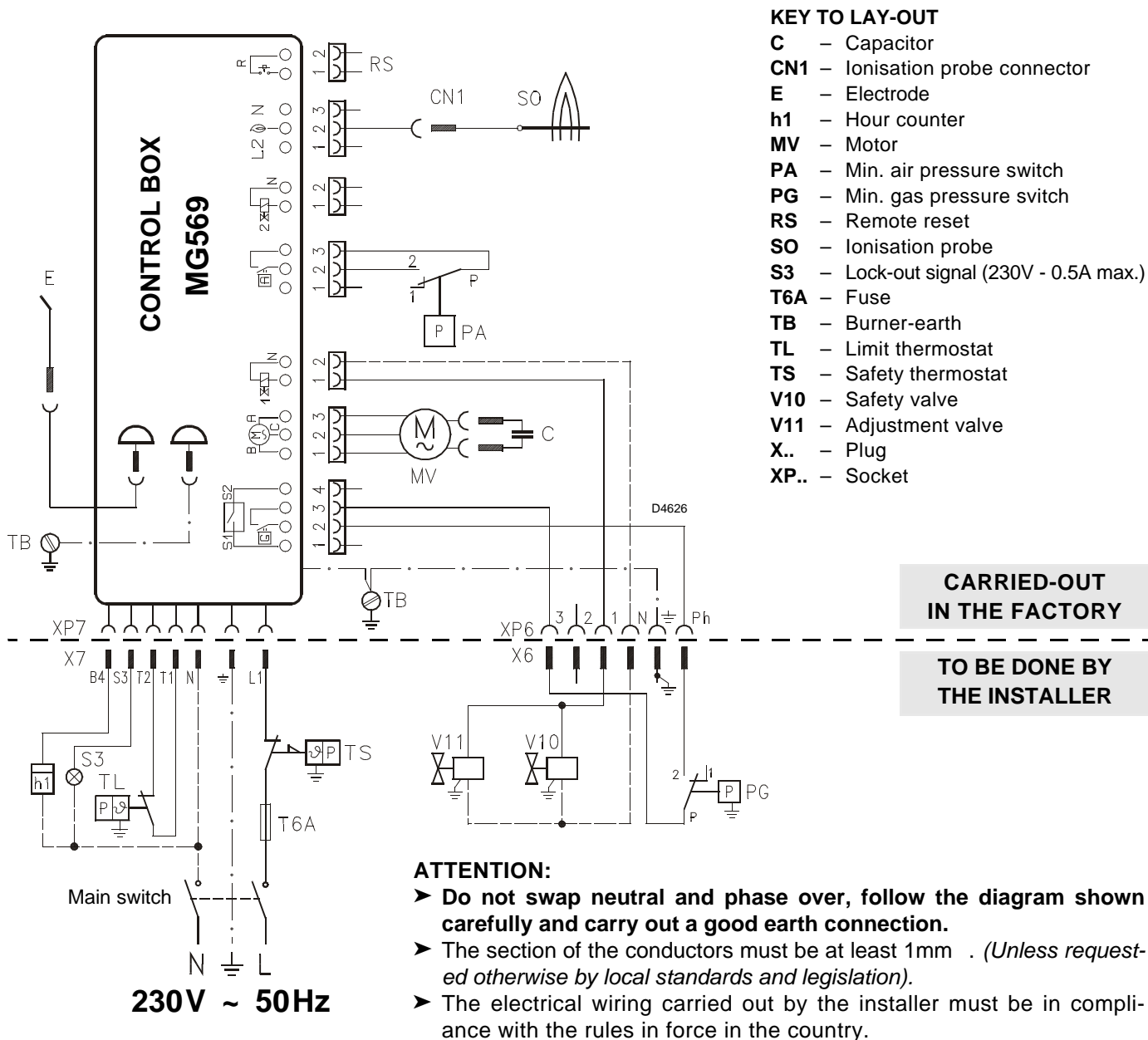
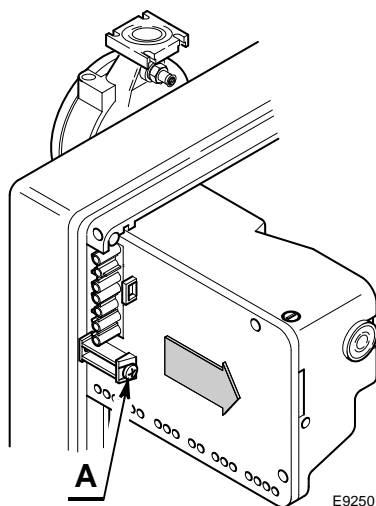


Fig. 8



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 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.

4.2 COMBUSTION HEAD SETTING, (see fig. 9)

The combustion head leaves the factory set for the minimum output.

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 BS3 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.

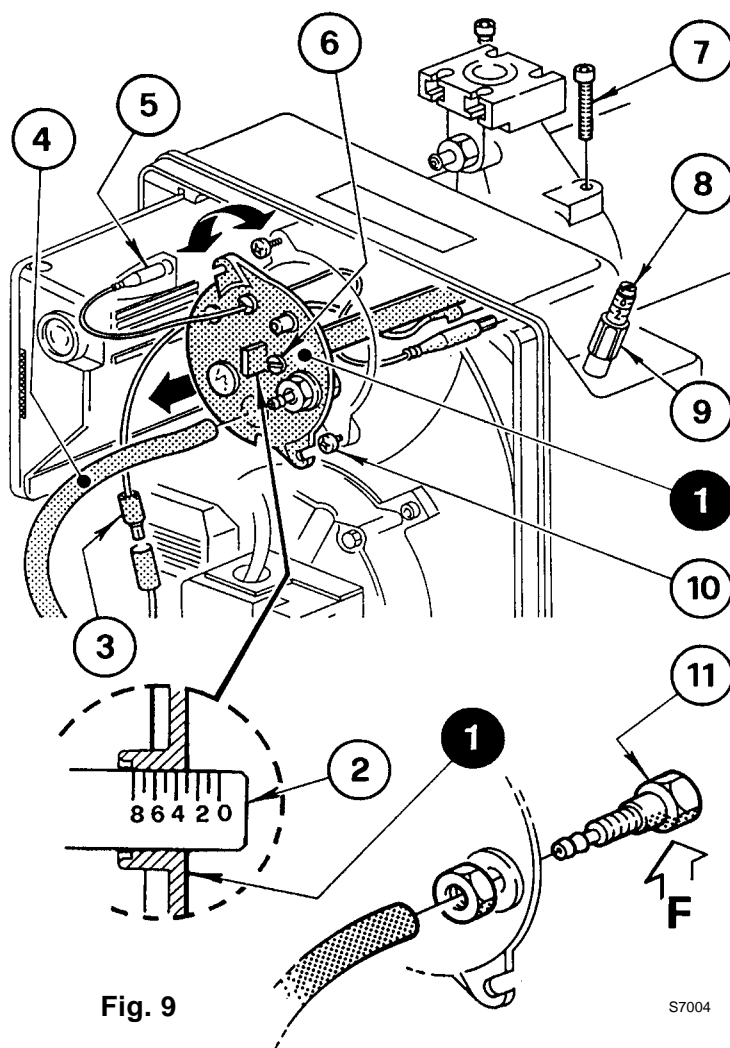


Fig. 9

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REMOVING THE HEAD ASSEMBLY

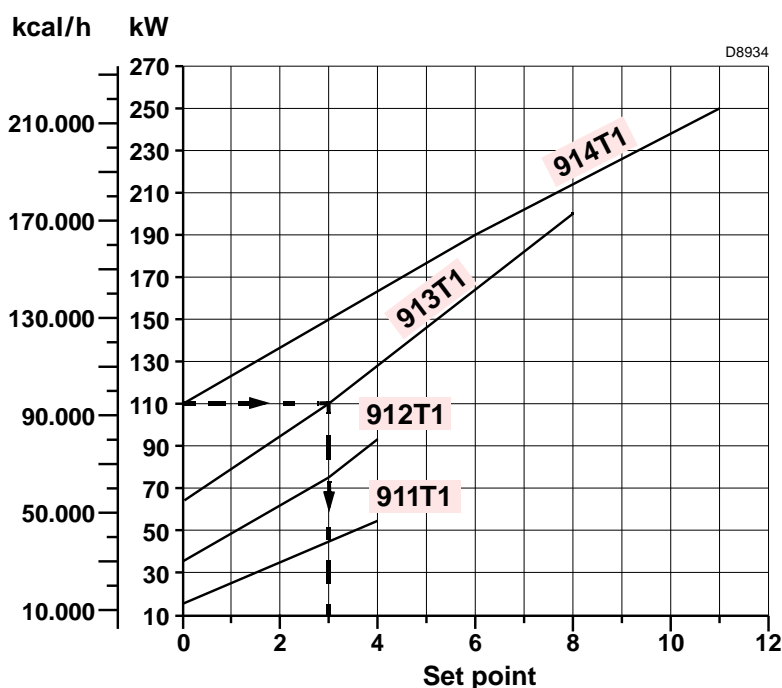
Proceed as follows to remove the head assembly:

- 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.



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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 (11) should work loose, it must be correctly fixed ensuring that the hole (F) inside the head assembly (1) is facing downwards.

4.3 AIR DAMPER SETTING, (see fig. 9, page 9)

WARNING

Do not carry out the first ignition with the air damper lower than set point 1.

The air damper leaves the factory set for minimum output.

To vary the setting proceed as follows:

- Loosen the nut (9) and the screws (8).
- When the burner shuts down the air damper closes automatically until a max. chimney depression of 0.5 mbar is reached.

4.4 COMBUSTION CHECK

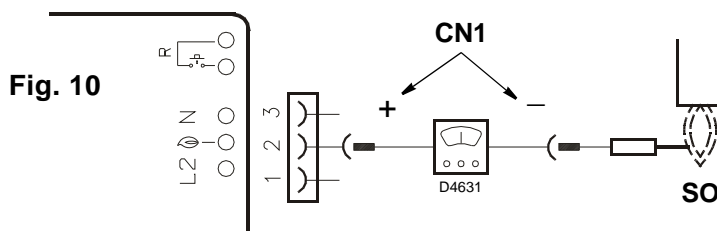
It is advisable to set the burner according to the type of gas used and following the indications of the table:

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 8) fitted on the wire and insert a microammeter.



4.5 AIR PRESSURE SWITCH

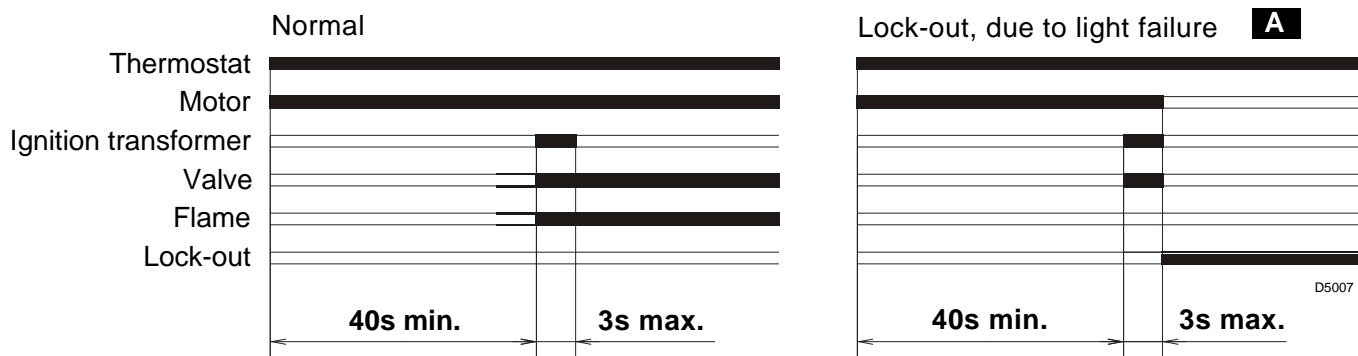
Adjust the air pressure switch after having performed all other burner adjustments with the air pressure switch set to the start of the scale. With the burner operating at the required power, slowly turn knob clockwise until burner locks out. Then turn the knob anti-clockwise by about 20% of the set 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.

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%.

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 at least, till 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 (8, 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.

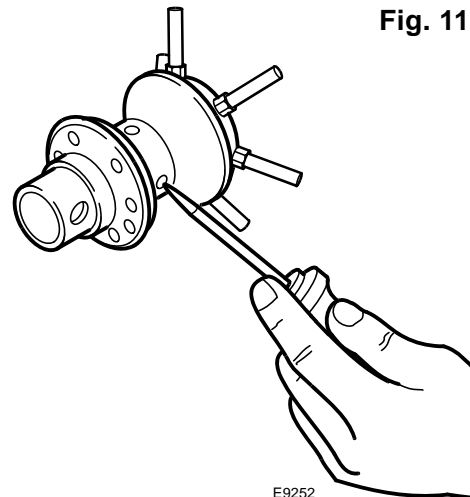


Fig. 11

Let the burner run at full capacity for about ten minutes, setting all the elements correctly as explained in this manual.

Then carry out the analysis of the combustion by checking:

- CO₂ percentage (%); ● CO content (ppm); ● NO_x content (ppm); ● Ionisation current (μA);
- Flue gases temperature at the stack.

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 press reset for 3 sec.	Pulses	Interval 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 ● ●	<p>The flame does not stabilise at the end of the safety time:</p> <ul style="list-style-type: none"> – faulty ionisation probe; – faulty or soiled gas valves; – neutral/phase exchange; – faulty ignition transformer – poor burner regulation (insufficient gas).

SIGNAL	PROBABLE CAUSE
3 pulses ● ● ●	Min. air pressure switch does not close or is already closed before the limit thermostat closed: – air pressure switch faulty; – air pressure switch incorrectly regulated.
4 pulses ● ● ● ●	Light present in the chamber before the burner's switching on or off: – presence of a strange light before or after the limit thermostat switching over; – presence of a strange light during pre-ventilation; – presence of a strange light during post-ventilation.
6 pulses ● ● ● ● ● ●	Loss of ventilation air: – air loss during pre-ventilation; – air loss during and after safety time.
7 pulses ● ● ● ● ● ● ●	Loss of flame during operations: – poor burner regulation (insufficient gas); – faulty or soiled gas valves; – 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 change 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
The burner runs normally in the prepurge and ignition cycle and locks out after about 3 seconds.	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.
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 (11, 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.
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.

6.2 OPERATING IRREGULARITIES

FAULTS	POSSIBLE CAUSES	SOLUTION
The burner locks out during operation.	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.
Burner shut down.	Gas pressure switch opening.	Check the pressure in the network and/or adjust the solenoid valve according to the instructions of this manual.

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.

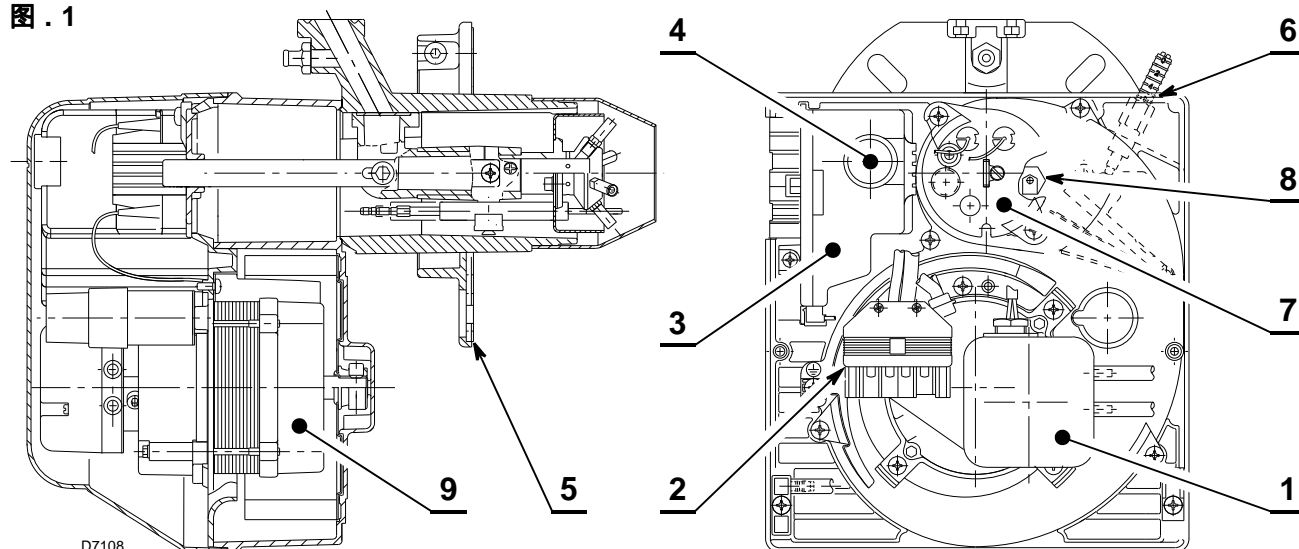
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1. 燃烧器描述

一段火燃气燃烧器

- ▶ 燃烧器符合 IP 40, EN 60529 电气保护等级。
符合标准：EMC 89/336/CEE - 2004/108/CE, 低电压 73/23/CEE - 2006/95/CE, 机械 98/37/EEC - 2006/42/EC。
- ▶ 阀门组符合 EN 676 标准。
- ▶ 燃烧器符合 EN 676 标准的间断运行。
- ▶ 对瑞士用户的提示。 瑞士国家规定，地方和州规定以及 SVGW 权威机构有关燃气使用的相关规定，和 Fir Brigade (VKF) 的所有规则均符合。

图 . 1



- | | |
|-------------------|--------------|
| 1 - 空气压力开关 | 6 - 风门挡板调节组件 |
| 2 - 连接燃气阀组的 6 孔插座 | 7 - 燃烧头组件 |
| 3 - 带 7 孔插座的控制盒 | 8 - 压力测点 |
| 4 - 带锁定指示灯的复位按钮 | 9 - 马达 |
| 5 - 带绝热垫的法兰 | |

1.1 燃烧器装备

带绝热垫的法兰	No. 1	将法兰安装到锅炉上的螺栓和螺母.....	No. 4
法兰用螺栓和螺母	No. 1	7 针插头.....	No. 1
远程复位连接件	No. 1		

1.2 燃烧器附件

软件诊断组件

可选用一个特殊的组件与 PC 机通过红外线连接，可以显示燃烧器的运行状态，如运行小时数，故障的类型和次数，系列号等等。

按如下步骤实现诊断功能：

- ▶ 将单独供货的组件和控制盒的插座连接。
组件附带的软件开始运行时就可读出相关的燃烧器的信息。

远程复位组件

燃烧器有远程复位组件 (RS) 由连接线和按钮组成 (最长的运行距离为 20 米)。

取下在工厂安装的锁定保护套，将附带的远程复位组件插入即可连接该组件。(详见第 8 页的电气接线图)。

旋转安装组件

该特殊组件能使燃烧器的安装位置旋转 180°，参见第 5 页的 "3.1 安装位置"。该组件能确保燃气阀组工作正常。该组件的安装和使用必须符合法律和地方的规定。

2.技术参数

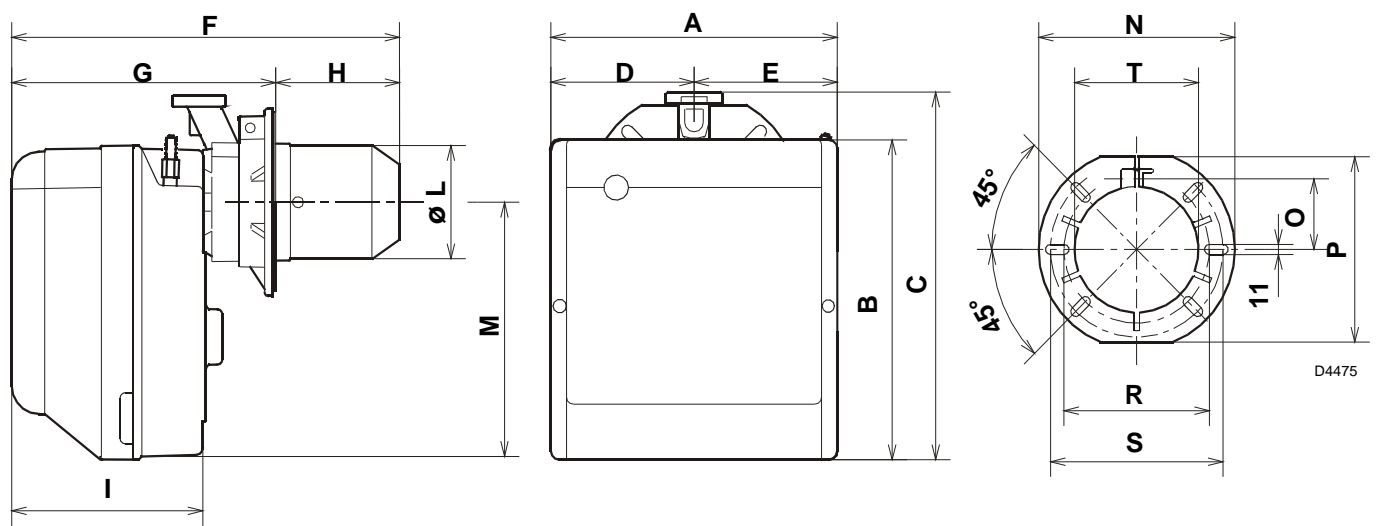
2.1 技术参数

类型		911 T1	912 T1	913 T1	914T1
燃烧器出力 (1)	kW	16 – 52	35 – 91	65 – 200	110 – 250
	Mcal/h	13.8 – 44.7	30.1 – 78.2	55.9 – 172	94.6 – 215
天然气 (品种 2)		净热值：8 – 12 kWh/Nm³ = 7000 – 10,340 kcal/Nm³			
		压力： 最小 . 20 mbar – 最大 . 100 mbar			
电源		单相， 230V ± 10% ~ 50Hz			
马达	运行电流 0.8A			运行电流 1.8A	运行电流 1.9A
	2750 rpm 288 rad/s			2800 rpm 294 rad/s	2720 rpm 288 rad/s
马达启动电容		4 μF		6.3 μF	8 μF
点火变压器		初级 230V / 0.2A – 次级 8 kV / 12 mA			
1) 参考条件： 温度 . 20°C - 大气压力 1013 mbar – 海拔 0 m .					

燃用 LPG (品种 3) 必须配置的特殊附件。

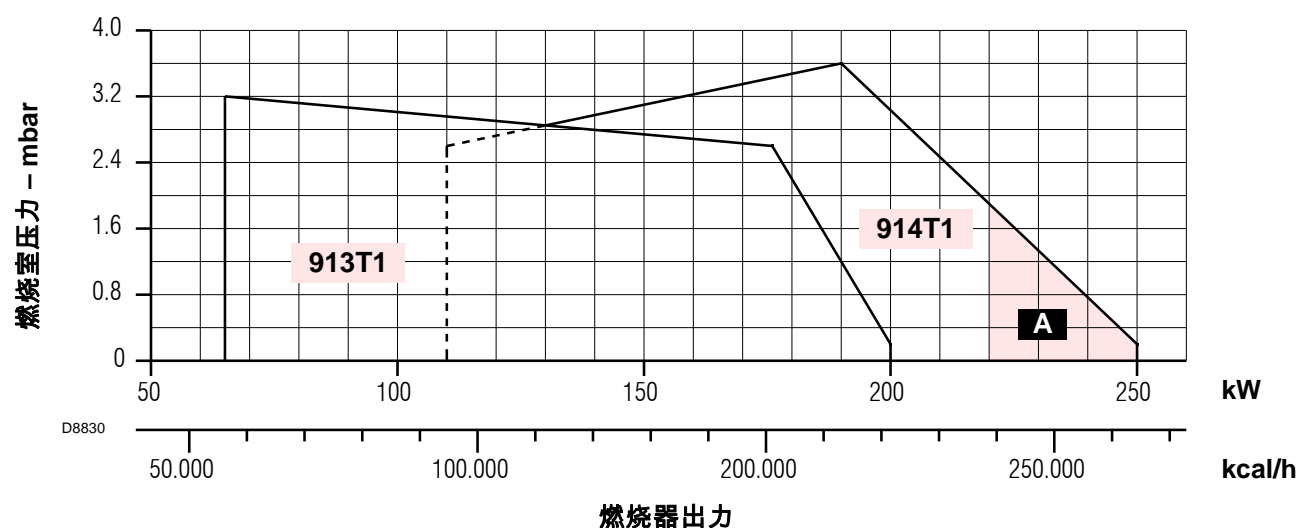
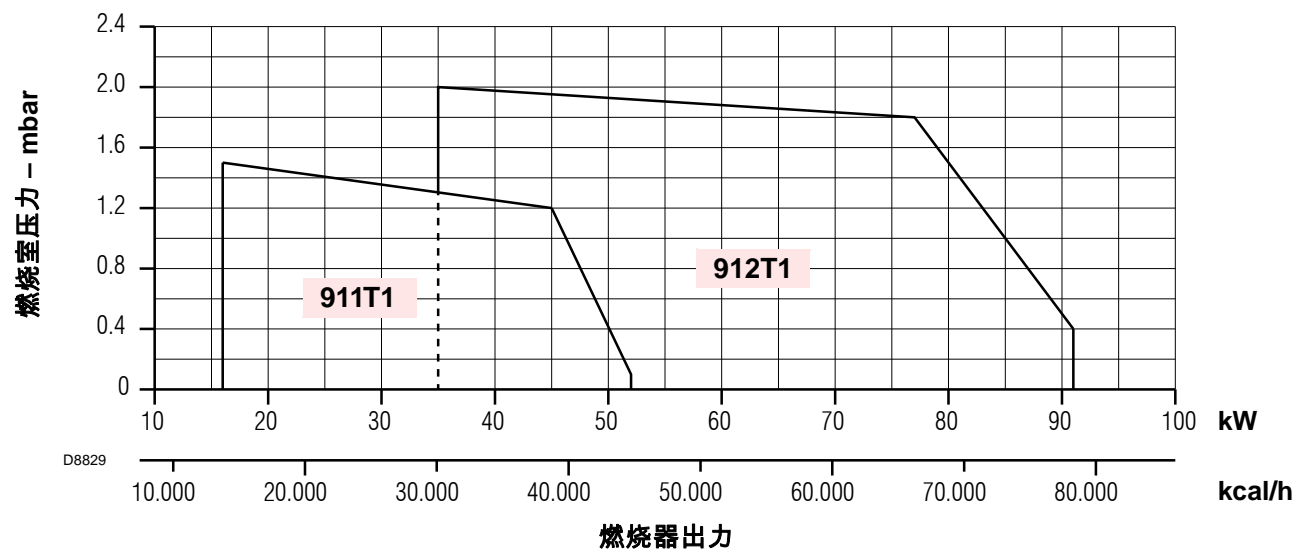
国家			AT - IT - DK - CH	GB - IE	DE	FR	NL	LU	BE
燃气种类			II2H3B/P	II2H3P	II2ELL3B/P	II2Er3P	II2L3B/P	II2E3B/P	I2E(R)B, I3P
燃气压力	G20	H	20	–	–	–	–	–	–
	G25	L	–	25	20	–	25	25	–
	G20	E	–	–	20	20/25	–	–	20/25

2.2 外观尺寸



类型	A	B	C	D	E	F	G	H	I	L - T	M	N	O	P	R	S
911T1	234	254	295	122.0	112.0	346	230 – 276	116 – 70	174	89	210	192	66	167	140	170
912T1	255	280	325	125.5	125.5	352	238 – 252	114 – 100	174	106	230	192	66	167	140	170
913T1	300	345	391	150.0	150.0	390	262 – 280	128 – 110	196	129	285	216	76.5	201	160	190
914T1	300	345	392	150.0	150.0	446	278 – 301	168 – 145	216	137	286	218	80.5	203	170	200

2.3 工作范围



A 若使用 BS4 型燃烧器 (914T1), 为了保证燃烧器的出力能达到 220 - 250 kW, 必须移去隔音材料露出外壳上附带的空气入口。

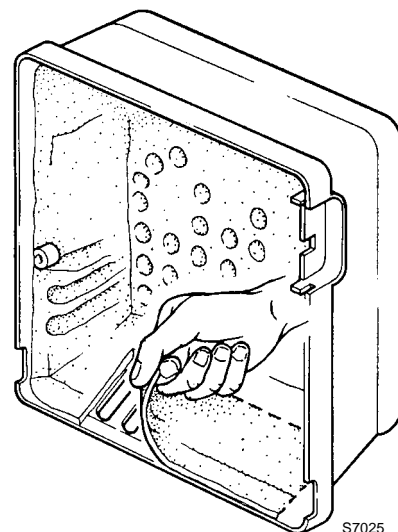
实验锅炉

以上工作曲线是用符合 EN 676 标准的锅炉测量得到。

商用锅炉

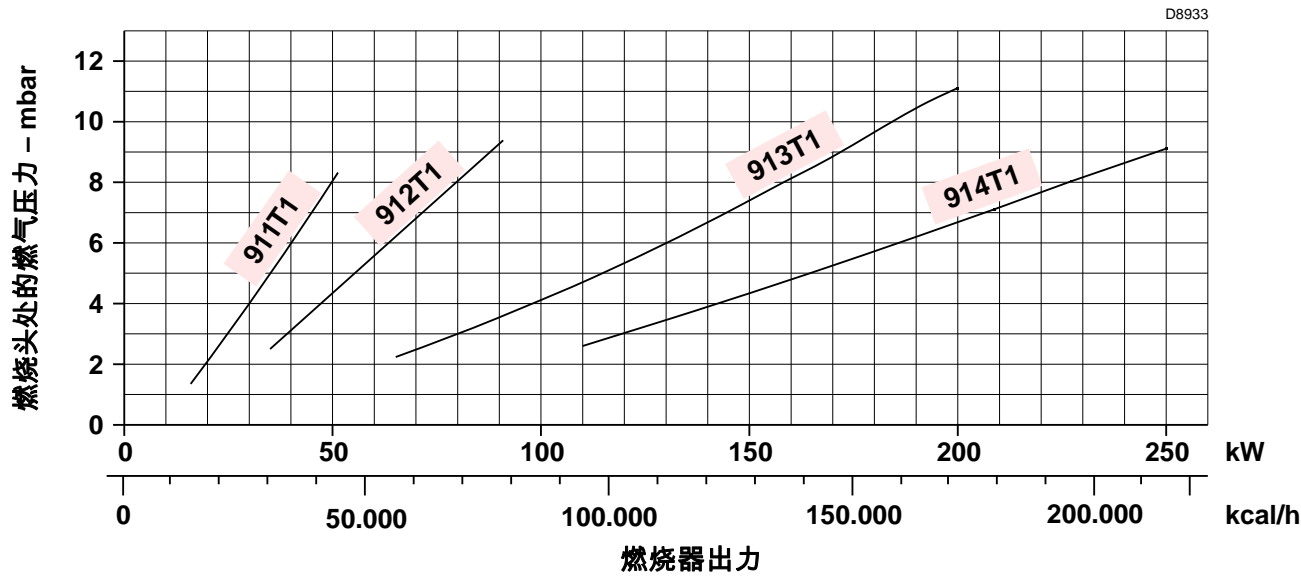
如果锅炉的设计和制造是符合 EN 303 标准, 且燃烧室尺寸与 EN 676 标准中图表所示相近时, 则燃烧器与锅炉是匹配的。

如果锅炉的设计和制造不符合 EN 303 标准, 且燃烧室尺寸比 EN 676 标准中图表所示的尺寸更小, 请咨询生产厂家。



燃气压力与燃烧器出力的关系

在用净热值为 10 kWh/m³ (8.570 kcal/m³) 的 G20 燃气和锅炉背压为 0 mbar 进行测试时 ,912T1 型燃烧器最大出力时燃烧器头的压降为 9.3 mbar(M2, 参见节 3.6, P.7)。



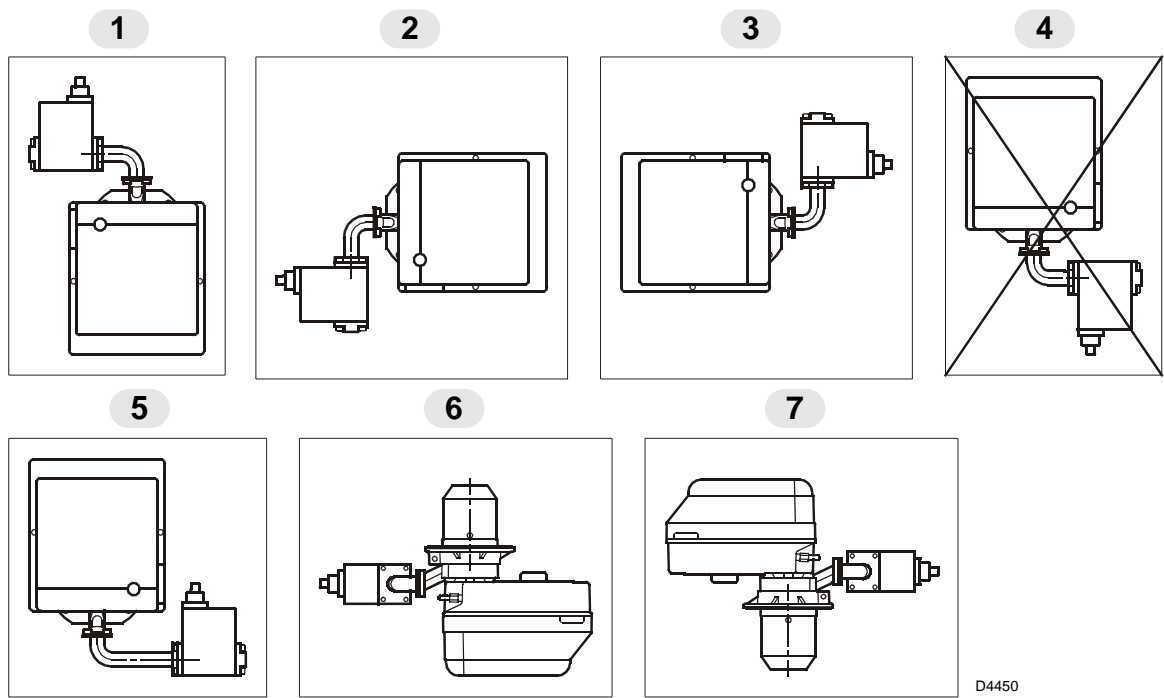
3. 安装

燃烧器的安装必须符合当地法规和标准。

3.1 安装位置

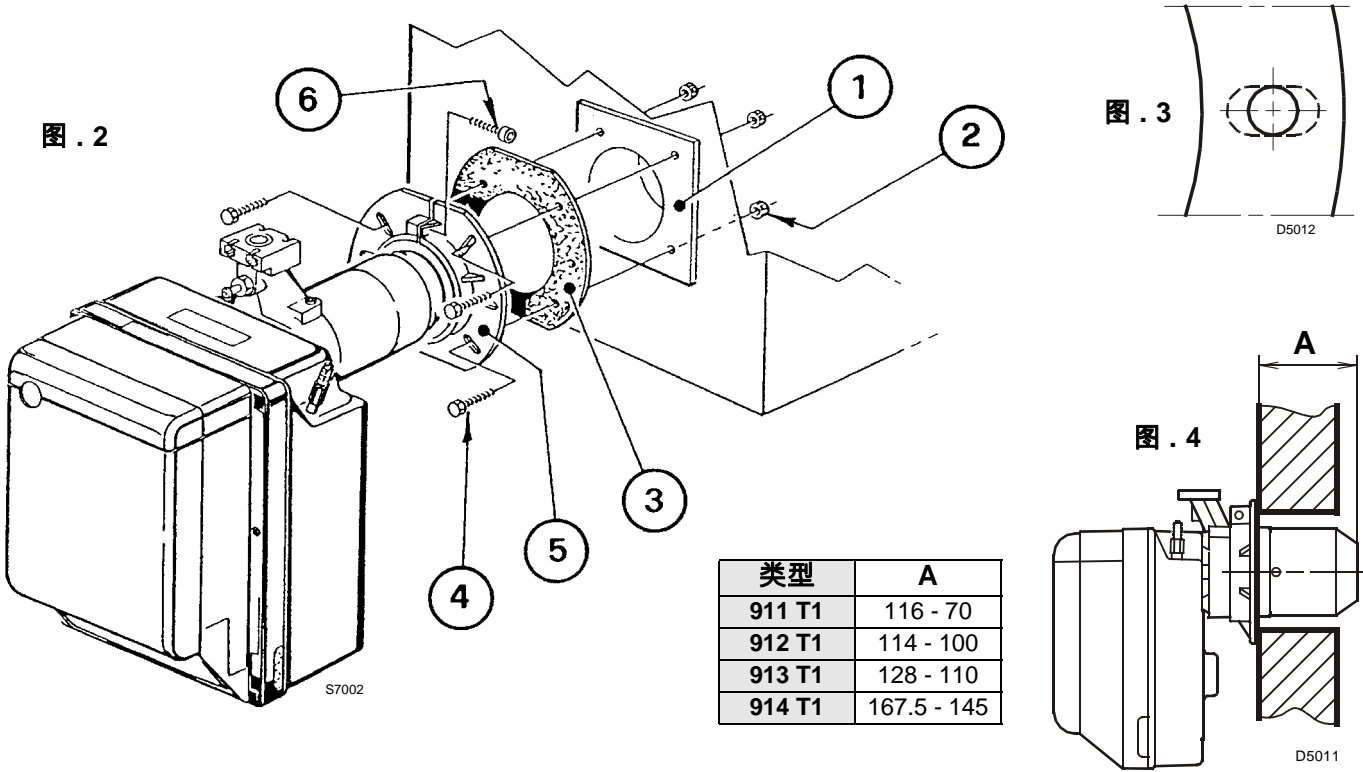
图 1 所示的安装位置是燃烧器的最佳安装方式。
不推荐使用如图 2, 3, 6 和 7 的安装方式，这些方式有可能妨碍燃烧器的正常运行，因为当燃烧器停止时不能保证风门完全关闭。
安装方式 5 仅在使用 单独定货的“MULTIBLOC 旋转组件”。

安装方式 4 由于安全原因是被禁止使用。



3.2 燃烧器安装

- 如有必要，对绝热垫进行扩孔操作 (3) (参见图 . 3)。
 - 用4个螺钉 (4) 和螺母 (2) 将法兰(5)安装到炉门(1)上. **必须将绝热垫 (3) 放在中间**，但应保持上部两颗螺钉中的一颗松动 (4) (参见图 . 2)。
 - 将法兰 (5) 与燃烧头放好，用螺钉 (6) 紧固，拧紧松动的螺钉 (4) 。
- 注意 .:** 燃烧器具有可调的燃烧头安装长度 (A) (参见图 . 4). 总之，要保证燃烧头完全穿过锅炉前墙。

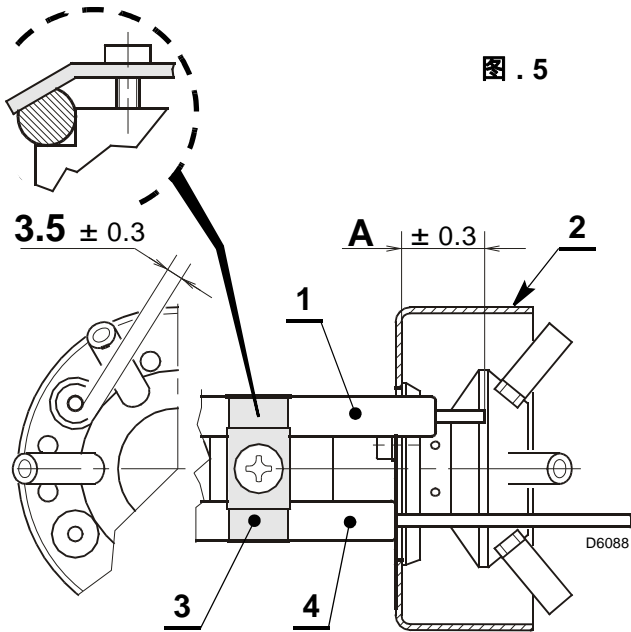


3.3 离子探针 - 点火电极定位

注意

- 确认固定板 (3，图 .5) 总在 电极的固定面上。
- 使探针绝缘体 (4) 稍微倾斜靠着护罩 (2)。

类型	911T1	912T1	913T1	914T1
A	17	30	31	31



3.4 燃气阀组 (参照 EN 676)

燃气阀组单独提供，它的调整参考附带的说明书。

燃气阀组		匹配的 燃烧器	连接方式		应用
类型	编码		入口	出口	
MBC 65 DLE	3970570	BS1	Rp 1/2	法兰 1	天然气和 LPG
MB DLE 405 B01	3970546	BS1	Rp 1/2	法兰 1	天然气和 LPG
MB DLE 405 B01	3970547	BS2	Rp 3/4	法兰 2	天然气和 LPG
MB DLE 407 B01	3970544	BS2	Rp 3/4	法兰 2	天然气和 LPG
MB DLE 407 B01	3970548	BS3 - BS4	Rp 3/4	法兰 3	天然气 (出力 ≤ 150kW) 和 LPG
MB DLE 410 B01	3970549	BS3 - BS4	Rp 1 1/4	法兰 3	天然气和 LPG
MB DLE 412 B01	3970550	BS3 - BS4	Rp 1 1/4	法兰 3	天然气

3.5 燃气阀组电气连接

燃气阀组连接电线可从左边或右边进入燃烧器，如图 6 所示。

根据进入燃烧器的方向，带压力测试点的电缆孔堵 (1) 和简易电缆孔堵 (2) 可能需要互换。

因此，必须确认：

- 电缆孔堵 (1) 位置正确；
- 气管位置应正确，以保证空气通畅，不对空气压力开关造成阻塞。

警告

如有必要，可将气管切换到正确的位置。

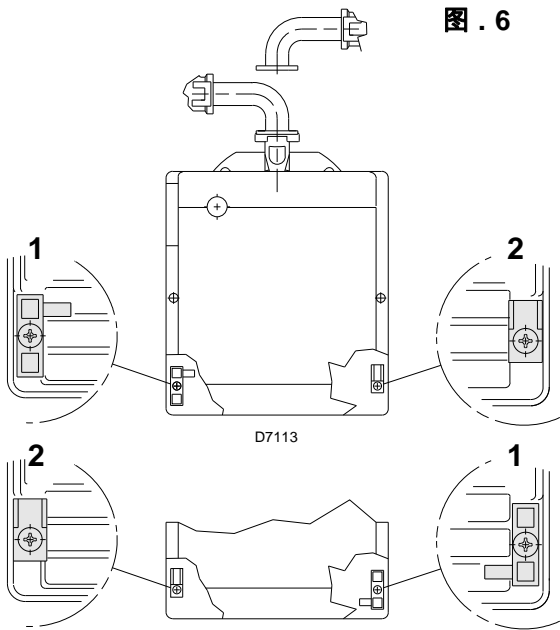


图 . 6

3.6 燃气管线

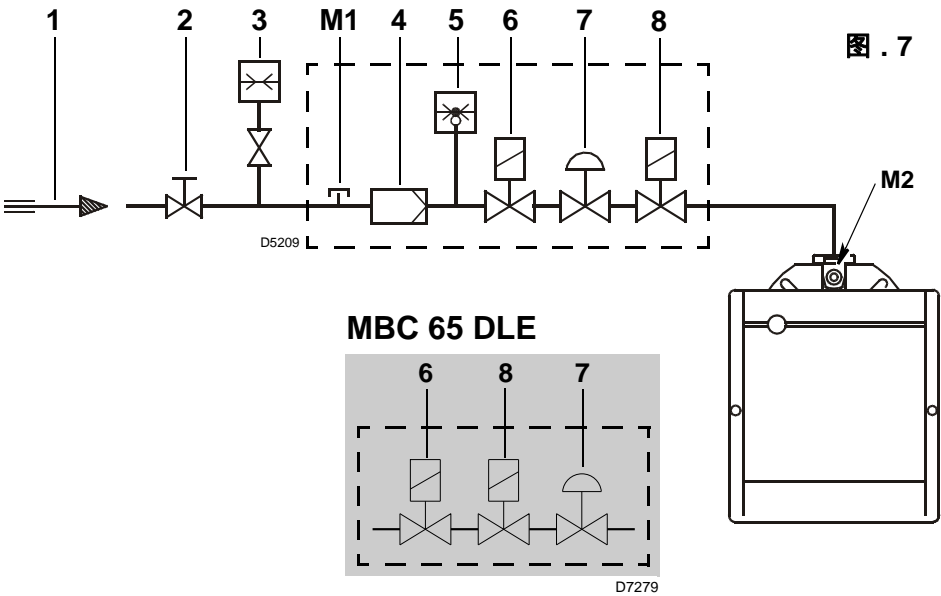
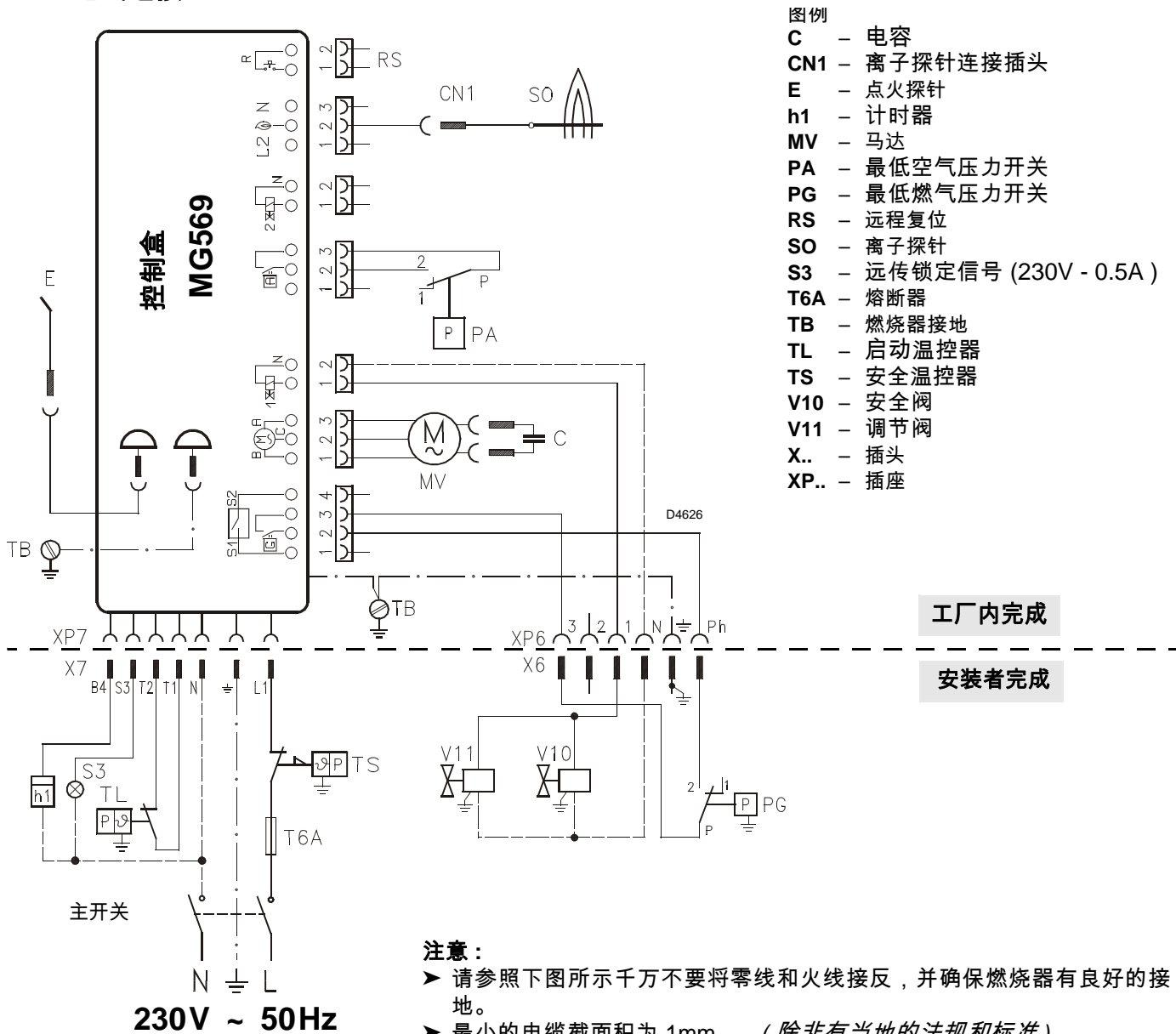


图 . 7

- 1 - 供气管
- 2 - 手动球阀 (安装者负责)
- 3 - 燃气压力表 (安装者负责)
- 4 - 过滤器
- 5 - 燃气压力开关
- 6 - 安全阀
- 7 - 稳压器
- 8 - 调节阀
- M1 - 供气压力测试点
- M2 - 燃气阀组后压力测点

3.7 电气连接



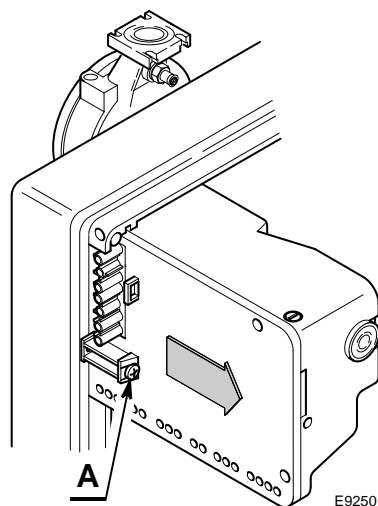
注意：

- ▶ 请参照下图所示千万不要将零线和火线接反，并确保燃烧器有良好的接地。
- ▶ 最小的电缆截面积为 1mm²。(除非有当地的法规和标准)。
- ▶ 电缆连接必须符合所在国家的强制规定。

测试

- ▶ 断开温控器开关，检查燃烧器是否停机。
- ▶ 断开连接插头 (CN1) 与控制盒的连接，检查燃烧器是否锁定。

图 . 8



控制盒，(见 图 . 8)

将控制盒从燃烧器上拆下必须注意如下的步骤：

- ▶ 断开所有的连接件：7 针插头，高压电缆和地线 (TB)；
- ▶ 取下螺钉 (A, 图 . 8) 然后顺箭头所示的方向拔下控制盒。

将控制盒装在燃烧器上必须注意如下的步骤：

- ▶ 用力矩为 1 - 1.2 Nm 的扭矩拧紧螺钉 (A)；
- ▶ 连接好刚才拆下来的所有连接件。

注意

燃烧器设计成间断运行。这就意味燃烧器每 24 小时必须停机一次以便电子控制盒检查在燃烧器启动时的功效。通常锅炉的温控器 (TL) 能控制燃烧器的这种常规停机。若该温控器没有该功能，则在燃烧器的启动温控器 (TL) 回路上必须串连一个计时器来确保燃烧起每 24 小时停机一次。

警告

- 拧紧螺钉 (7) (不要拧太紧); 然后用力矩扳手 (3 - 4 Nm) 锁紧。
- 如上操作确保燃烧器在运行时螺钉处不会有燃气泄露。
- 如压力测点 (11) 松动，应正确固定并确保燃烧头组件 (1) 外部的孔 (F) 安装在正确的位置上。

4.3 风门挡板设置 , (参见图 . 9, p 8)

警告

- 在首次点火时风门设定不应小于 1。
- 风门挡板在出厂时设定在最小出力 。
- 如要改变设置按下列步骤进行：
- 在拧松螺母 (9) 后对调节螺钉 (8) 进行调整。
 - 燃烧器停机时风门会自动关闭，除非烟囱处最大压降大于 0.5 mbar。

4.4 燃烧状况检查

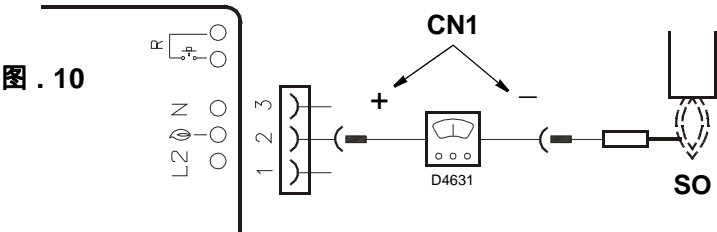
建议根据燃气种类和下表所示参数来初步设定燃烧器：

EN 676		空气过剩系数：最大出力 ≤ 1.2 – 最小出力 ≤ 1.3			
燃气	理论最大值 CO ₂ 0 % O ₂	Setting CO ₂ %		CO mg/kWh	NO _x mg/kWh
		λ = 1.2	λ = 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

离子探针电流

燃烧器正常运行时控制器所需最小离子探针电流为 5 μA。

一般情况下离子探针电流会远大于该值，不必检查。如需要检查时，可断开离子探针连接插头 (CN1) (参见 P. 7 的电气接线图) 串入微安电流表。



4.5 空气压力开关

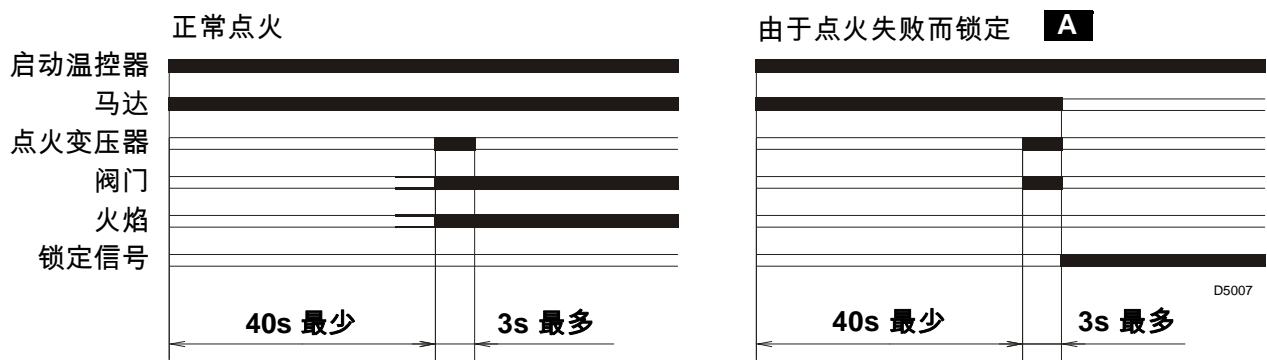
空气压力开关的调整工作应在燃烧器的上述调整工作完成后进行，此时空气压力开关的设定值在初始位置。燃烧器工作在额定出力时，缓慢顺时针加大设定值，直至燃烧器锁定。然后将设定值逆时针旋转减少设定值的 20%，并再次检查燃烧器是否能正常启动。如燃烧器锁定，应再少量减少空气压力开关的设定值。

注意：

作为标准条例，当排烟中的 CO 超过 1% (10,000 ppm) 时空气压力开关应动作。

如要检查这一点，请在烟囱中插入烟气分析仪，缓慢关闭风机的进气口 (例如用纸板) 并检查燃烧器在排烟中的 CO 超过 1% 之前是否会锁定。

4.6 燃烧器启动程序



A 控制盒上的信号灯指示燃烧器是否锁定 (4, 图 . 1, P. 2)。

4.7 重复启动功能

该控制盒允许在燃烧起正常运行中火焰消失时重新自动进行完整的启动程序，最大的自动启动次数为 3 次。

4.8 后吹扫功能。

后吹扫功能使燃烧器即使在停机时也能保持通风。当启动温控器 (TL) 断开时燃烧器停止运行，切断燃料的供应。

要使用该功能必须在启动温控器转换前按燃烧器的复位按钮。(燃烧器停止运行)。

后吹扫的最大吹扫时间为 6 分钟，按如下步骤操作：

- 按住复位按钮至少 5 秒，直到 LED 只是其变为红色。
- 重复按复位按钮设定所需的后吹扫时间。按一次 = 设定后吹扫时间为 1 分钟。
- 控制盒在 5 秒后自动通过红色的 LED 指示器的闪烁来现实的后吹扫时间：
1 闪烁 = 后吹扫时间为 1 分钟。

此时按住复位按钮至少 5 秒直到 LED 指示器变成红色以复位该功能。然后松开复位按钮并不进行任何别的操作等待 20 秒燃烧器重新启动。

若在后吹扫阶段燃烧器需要启动，则后吹扫马上停止，启动温控器 (TL) 闭合，燃烧器立即进入启动程序。

控制盒的出厂设置是：0 分钟 = 没有后吹扫。

4.9 控制盒复位

按如下的步骤复位控制盒：

- 按复位按钮至少 1 秒。
此时若燃烧器不启动则必须检查启动温控器 (TL) 是否闭合。

5. 维护

燃烧器的维护和系统检查前必须将主电源开关和燃气手动阀关闭。
燃烧器的定期维护工作必须由有资格的专业技术人员来完成并遵守相关的地方法规。
定期维护对燃烧器的正常运行起到至关重要的作用，能避免能源浪费和减少污染物的排放。

按如下的步骤进行维护工作的基本操作：

- 定期检查燃烧头的燃气喷口是否堵塞，如果有堵塞的现象，请参照图 .11 所示用合适的工具清理。
- 检查燃烧器的空气流通部分和烟气流通部分是否有堵塞。
- 检查燃烧器和阀组的电气连接是否正确。
- 检查空气压力测试点 (8, 图 . 1, 页 2) 的位置是否正确。
- 检查燃气阀组是否和燃烧器的负荷相匹配，燃气的种类和燃气管网的燃气压力。
- 检查燃烧头的位置是否正确并确认与锅炉连接正常。
- 检查空气挡板的位置是否正确。
- 检查离子探针和点火探针 (见 图 . 5, 页 6) 的位置是否正确。
- 检查空气压力开关和燃气压力开关的设定值是否正确。

将燃烧器满负荷运行10分钟，检查并正确设定本说明书内所有的设定值。

然后检查如下的烟气成分：

- CO₂ (%);
- CO (ppm);
- NO_x (ppm);
- 电离电流 (μA);
- 排烟温度

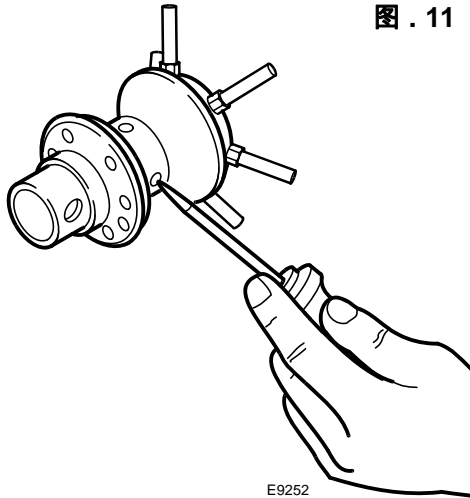


图 . 11

5.1 控制盒的可视诊断

控制盒带有故障诊断功能显示燃烧器的运行故障的信息（指示器：红色 LED ）。

当燃烧器进入锁定状态，按住控制盒的复位按钮至少 3 秒钟，以启动该功能。

控制盒每 2 秒的间隔后重复给出一串闪烁的故障信号。

红色 LED 亮 按住复位按钮 3 sec.	闪烁	间隔 2s	闪烁
	● ● ● ● ●		● ● ● ● ●

该闪烁的信号显示可能的故障信息，参见如下的故障表。

信号	可能的原因
2 次闪烁 ● ●	在安全时间后没有稳定的火焰： – 离子探针故障； – 燃气阀组故障或需要清理； – 零线 / 火线接反； – 点火变压器故障 – 燃烧器调整不当。(燃气不足)。
3 次闪烁 ● ● ●	最低空气压力开关没有闭合或在启动温控器闭合前就已经闭和： – 空气压力开关故障； – 空气压力开关调整不当。
4 次闪烁 ● ● ● ●	在燃烧器启动前锅炉炉膛有亮光： – 在启动温控器闭合的前或后存在可疑的自然光； – 在预吹扫阶段存在自然光； – 在后吹扫阶段存在自然光。

信号	可能的原因
6 次闪烁 ● ● ● ● ● ●	吹扫风量不足： - 在预吹扫阶段风量不足； - 在安全时间的前或后风量不足。
7 次闪烁 ● ● ● ● ● ● ●	运行期间火焰消失： - 燃烧器调整不当（燃气不足）； - 燃气阀组故障或需要清理； - 离子探针和地线短路。

注意 按复位按钮来复位控制盒的故障诊断状态。

6. 故障 / 可能的解决方法

下表是造成燃烧器启动故障或非正常运行等问题的原因及相应的解决方法。

故障通常会造成控制盒 (4, 图 . 1, P. 2) 复位按钮键中的锁定指示灯亮。

当锁定灯亮时，只有按复位按钮燃烧器才会重新启动，此后如果燃烧器运行正常，锁定可以归因于偶然故障。如果继续锁定，一定要查找原因，并加以解决。

6.1 启动故障

故障	可能原因	解决方法
当温控器闭合时，燃烧器不启动。	没有电源供应。	检查 7 针插头中的 L1-N 线之间的电压是否存在。
		检查保险丝的状况。
		检查安全温控器是否锁定。
	没有燃气供应。	检查手动球阀是否打开。
		检查阀组是否打开并且是否有短路。
	燃气压力开关不闭合。	调整。
	控制盒中的连接错误。	检查并连接插头。
在预吹扫及点火周期时燃烧器运行正常，但 3 秒后锁定。	空气压力开关在运行位置。	更换压力开关。
	火线与零线接反。	重接。
	没有地线或接地不良。	确保接地良好。
	离子探针接地，离子探针未与火焰接触，离子探针与控制盒连线断开，与地短路。	按说明书检查离子探针的位置。
		重新电气连接。
		更换损坏的接线。

故障	可能原因	解决方法
燃烧器点火延迟。	点火电极位置不对。	按说明书进行调整。
	空气太多。	按说明书进行调整。
	阀门开度太小，燃气量不够。	调整。
燃烧器在预吹扫后因火焰故障而锁定。	电磁阀过气量较小。	检查管网压力 / 按说明书调整电磁阀。
	电磁阀损坏。	更换。
	点火脉动或失败。	检查接头。
		按说明书检查电极的位置。
	管道内空气未排空。	用燃气排空空气。
燃烧器在预吹扫时锁定。	空气压力开关不切换。	压力开关故障，更换。
		空气压力过低，(燃烧头调整不当)。
	火焰出现。	阀门故障：更换。
	压力测试点 (11, 图 . 9, 页 .8) 位置不对	按说明书 P. 8, 节 4.2 调整好位置。
燃烧器不锁定，重复启动。	主燃气压力接近于最低燃气压力开关所设定的数值。 燃气阀组开启后造成压力降低从而引起压力开关的断开。 燃气阀组立刻关闭，燃烧器停机。压力又升高，压力开关再次闭合，又重复点火周期，该过程没有休止地进行。	减小最低燃气压力开关的设定值。

6.2 运行故障

故障	可能原因	解决方案
燃烧器运行期间闭锁。	离子探针	检查其正确的安装为止，若有必要按说明书所示的位置重新调整。
		清理或更换离子探针。
	火焰消失 4 次。	检查燃气管网的压力和 / 或按说明书的指示重新调整燃气阀组。
	空气压力开关断开。	空气压力太低，(燃烧头调整不当)。 空气压力开关故障，更换。
燃烧器停机。	燃气压力开关断开。	检查燃气管网的压力和 / 或按说明书的指示重新调整燃气阀组。

7. 安全警告

锅炉炉膛的尺寸必须达到一定的数值，以确保燃烧污染物的排放最低。
专业技术服务人员随时应你的要求提供正确的燃烧器和锅炉匹配的相关的技术数据和资料。
该燃烧器只能运用于其设计的使用范围。
燃烧器的不当安装，调整和维护而造成的任何事故致使人员，动物和财产损失，无论有无合同制造厂家概不负责。

7.1 燃烧器鉴定

产品的铭牌清楚地标示出如下的信息：产品的系列号，型号和主要的技术和性能参数。如果铭牌被篡改，移动或丢失而造成燃烧器不能被清楚地辨认，此时任何的安装或维护工作均有潜在的危险。

7.2 基本安全规则

- 小孩或非专业人员不能对燃烧器进行操作。
- 在设备房间的通风口不能有衣物，纸等其它杂物遮挡以免影响通风。
- 未经授权的人员不能对燃烧器进行修理。
- 拉伸或缠绕电源线是十分危险的。
- 如燃烧器没有断开主电源不能进行清理。
- 不要用易燃物品清洗燃烧器或其组件 (如汽油或酒精等)。
- 不要在燃烧器上放置任何东西。
- 不要堵塞或减小设备间通风口的大小。
- 不要将容器和易燃物品放在设备间内。



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