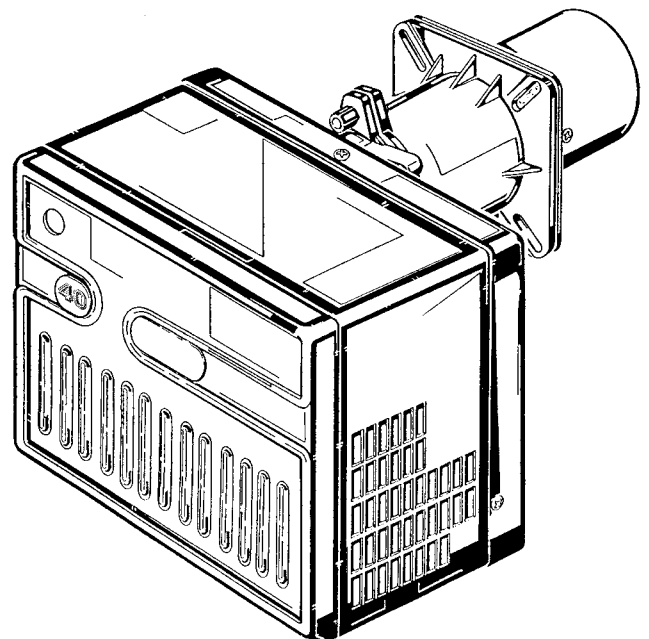


**GB** **Forced draught gas burner**

**CN** **强制通风燃气燃烧器**

One stage operation

一段火运行



**RIELLO 40**

CODE - 编码	MODEL - 型号	TYPE - 类型
20013621	FS20	569T30

## INFORMATION ABOUT THE INSTRUCTION MANUAL

### INTRODUCTION

The instruction manual supplied with the burner:

- is an integral and essential part of the product and must not be separated from it; it must therefore be kept carefully for any necessary consultation and must accompany the burner even if it is transferred to another owner or user, or to another system. If the manual is lost or damaged, another copy must be requested from the Technical Assistance Service **RIELLO** of the area;
- is designed for use by qualified personnel;
- offers important indications and instructions relating to the installation safety, start-up, use and maintenance of the burner.

### DELIVERY OF THE SYSTEM AND THE INSTRUCTION MANUAL

When the system is delivered, it is important that:

- The instruction manual is supplied to the user by the system manufacturer, with the recommendation to keep it in the room where the heat generator is to be installed.
- The instruction manual shows:
  - the serial number of the burner;

.....

- the address and telephone number of the nearest Assistance Centre;

.....  
.....  
.....

- The system supplier carefully informs the user about:
  - the use of the system,
  - any further tests that may be necessary before the system is started up,
  - maintenance and the need to have the system checked at least once a year by the manufacturer or another specialised technician.

To ensure a periodic check, **RIELLO** recommends the drawing up of a Maintenance Contract.

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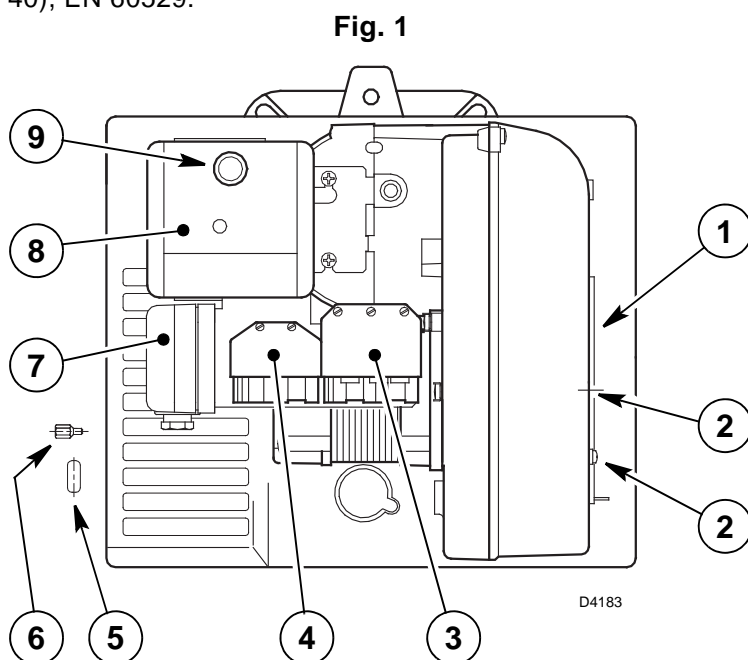
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**1. BURNER DESCRIPTION**

Gas burner with one stage working.

- According to Directives: EMC 89/336/EEC - 2004/108/EC, Low Voltage 73/23/EEC - 2006/95/EC and Efficiency 92/42/EEC.
- The burner is approved for intermittent operation as per Directive EN 676.
- The burner meets protection level of IP X0D (IP 40), EN 60529.
- Gas train according to EN 676.

- 1 – Air damper
- 2 – Screws for fixing the air-damper
- 3 – 7 pole socket for electrical supply and control
- 4 – 6 pole socket for gas train
- 5 – Cable grommet
- 6 – Screw for fixing the cover
- 7 – Air pressure switch
- 8 – Control box
- 9 – Reset button with lock-out lamp



**NOTES:**

- The cable grommet (5) supplied with the burner, must be fitted to the same side of the gas train.
- After having installed the burner verify the access to the fixing screws of the cover. If necessary replace them with the fixing screws (6, fig. 1) supplied as equipment.

**1.1 BURNER EQUIPMENT**

Insulating gasket . . . . .	No. 1	Screws and nuts for flange to be fixed to boiler . . . . .	No. 4
Cable grommet. . . . .	No. 1	Screws for fixing the cover. . . . .	No. 3
Hinge . . . . .	No. 1	7 pin plug. . . . .	No. 1

## 2. TECHNICAL DATA

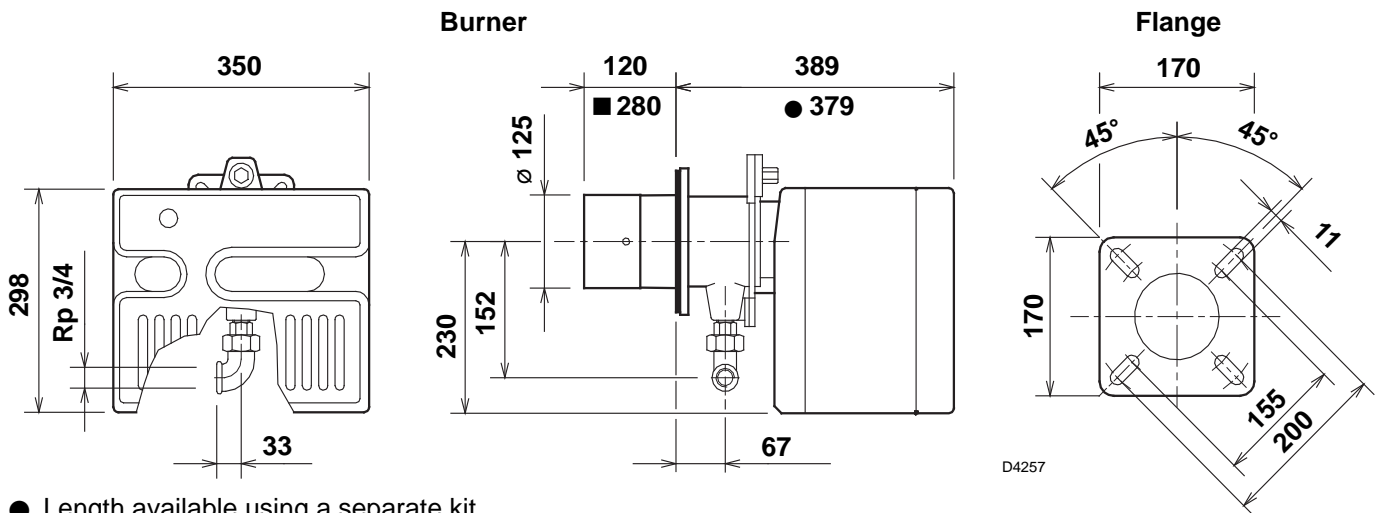
### 2.1 TECHNICAL DATA

Thermal power (1)	81 – 220 kW - 70,000 – 189,000 kcal/h
Natural gas (Family 2)	Net heat value: 8 – 12 kWh/Nm <sup>3</sup> - 7,000 – 10,340 kcal/Nm <sup>3</sup>
	Pressure: min. 20 mbar - max. 100 mbar
Electrical supply	Single phase, 230V ± 10% ~ 50Hz
Motor	230V / 1.4A
Capacitor	5 µF
Ignition transformer	Primary 230V / 1.8A - Secondary 8 kV / 30 mA
Absorbed electrical power	0.25 kW
<b>(1) Reference conditions:</b> Temp. 20°C - Barometric pressure 1013 mbar – Altitude 0 m above sea level.	

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

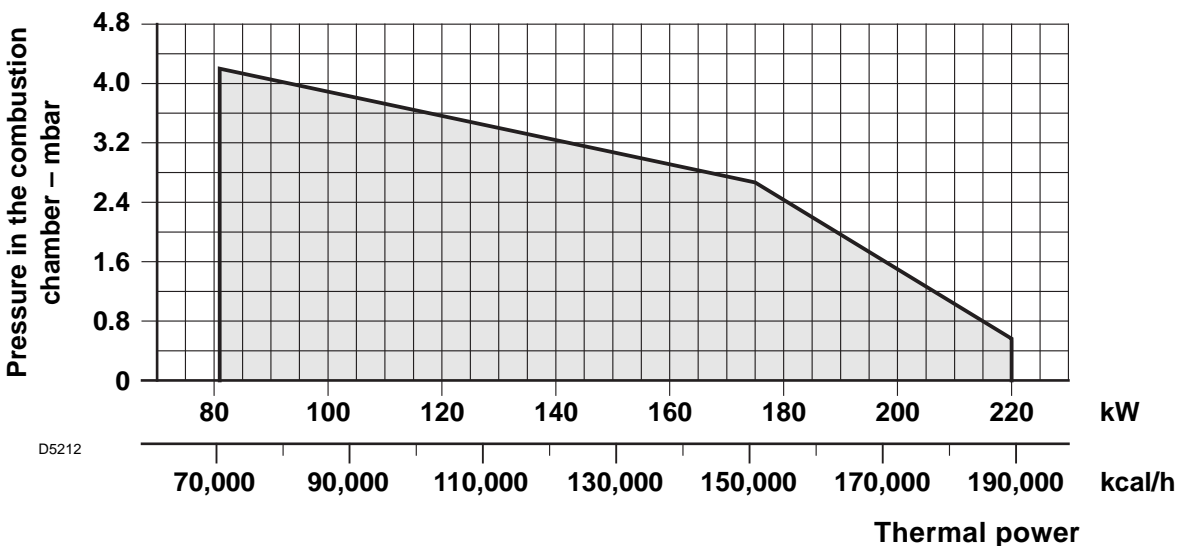
COUNTRY	DE	AT - GR	FR	ES - GB - IE	LU	NL
GAS CATEGORY	II2ELL3B/P	II2H3B/P	II2Er3P	II2H3P	II2E3B/P	II2L3B/P

### 2.2 OVERALL DIMENSIONS



- Length available using a separate kit.
- Combustion head extension, supplied separately.

### 2.3 WORKING FIELD (as EN 676)



**TEST BOILER**

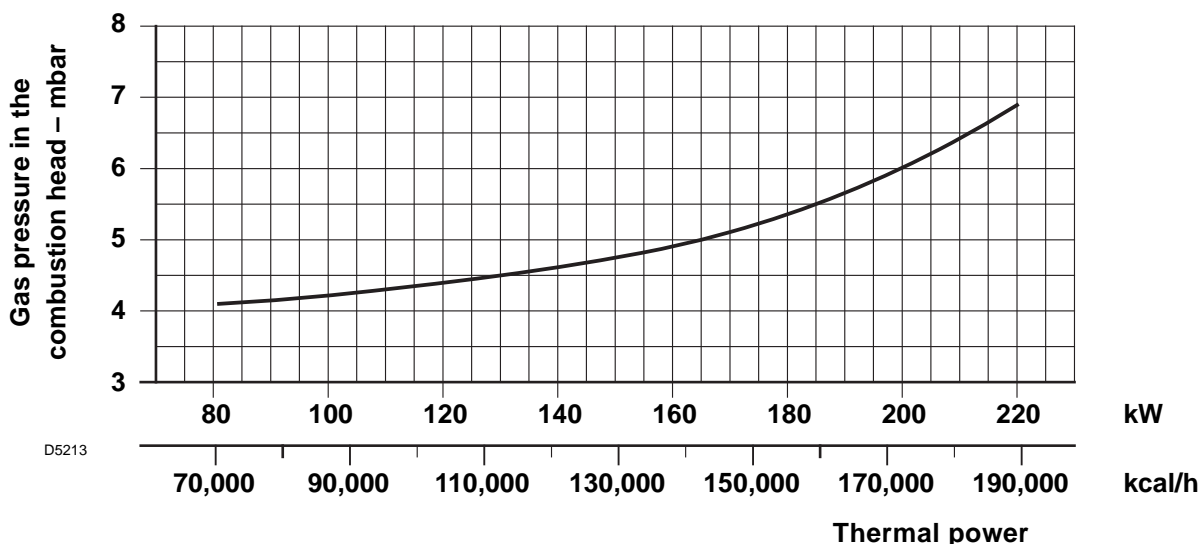
The working field has been defined according to EN 676 standard.

**COMMERCIAL BOILERS**

The burner-boiler matching is assured if the boiler 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 6.9 mbar is measured (M2, see chapter 3.3, page 4) with the combustion chamber at 0 mbar using gas G20 with a net heat value of 10 kWh/Nm<sup>3</sup> (8,570 kcal/Nm<sup>3</sup>).



**3. INSTALLATION**

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

**3.1 BOILER FIXING**

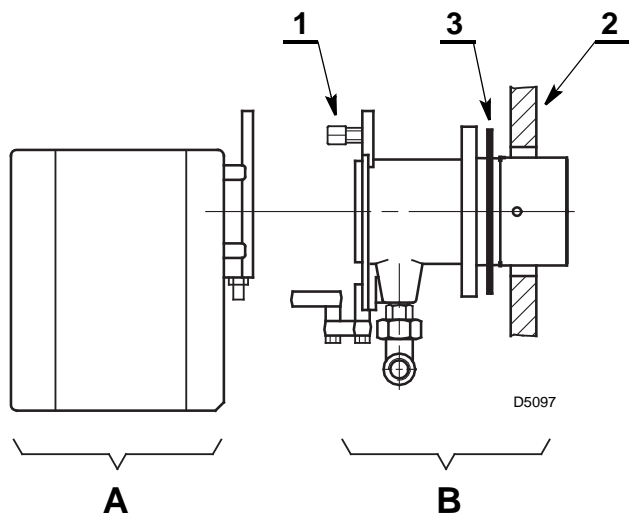
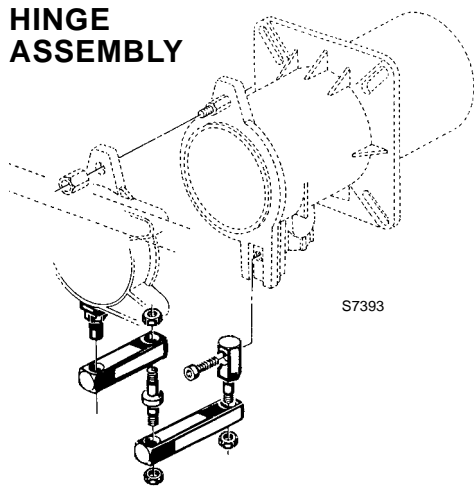
**IMPORTANT**

Boiler door must have a max. thickness of **100 mm**, refractory lining included.

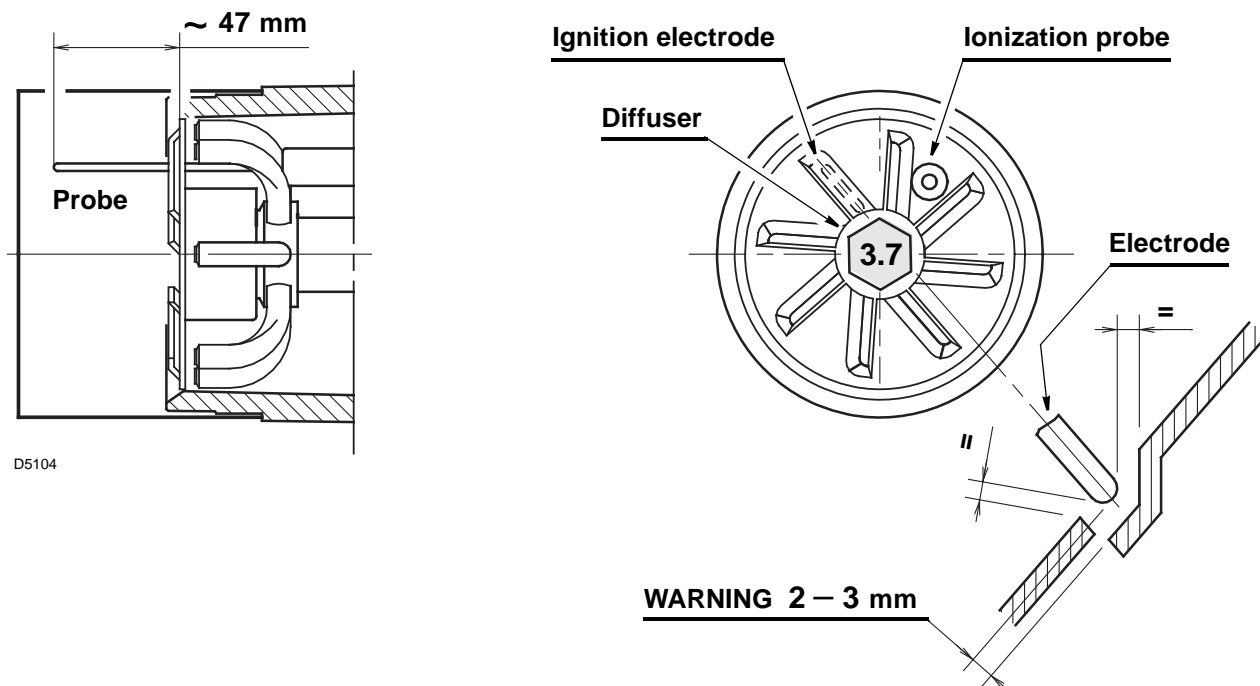
If thickness is greater (**max. 260 mm**), a combustion head extension must be fitted, which is supplied separately.

- Separate the combustion-head assembly from the burner body by removing nut (1) and removing group (A).
- Fix the head assembly group (B) to the boiler (2) insert the supplied insulating gasket (3).

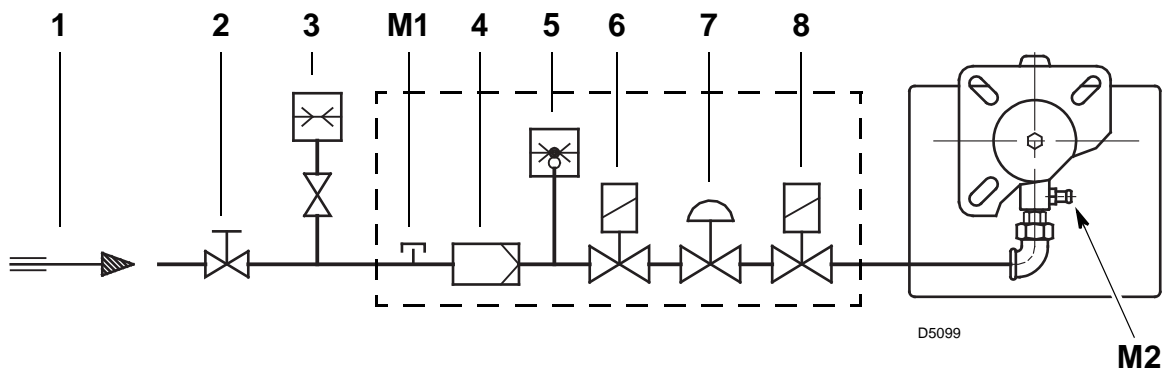
**HINGE ASSEMBLY**



## 3.2 PROBE - ELECTRODE POSITIONING



## 3.3 GAS FEEDING LINE



- 1 – Gas supply pipe
- 2 – Manual cock (supplied by the installer)
- 3 – Gas pressure gauge (supplied by the installer)
- 4 – Filter
- 5 – Gas pressure switch
- 6 – Safety valve
- 7 – Pressure governor
- 8 – Adjustment valve

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

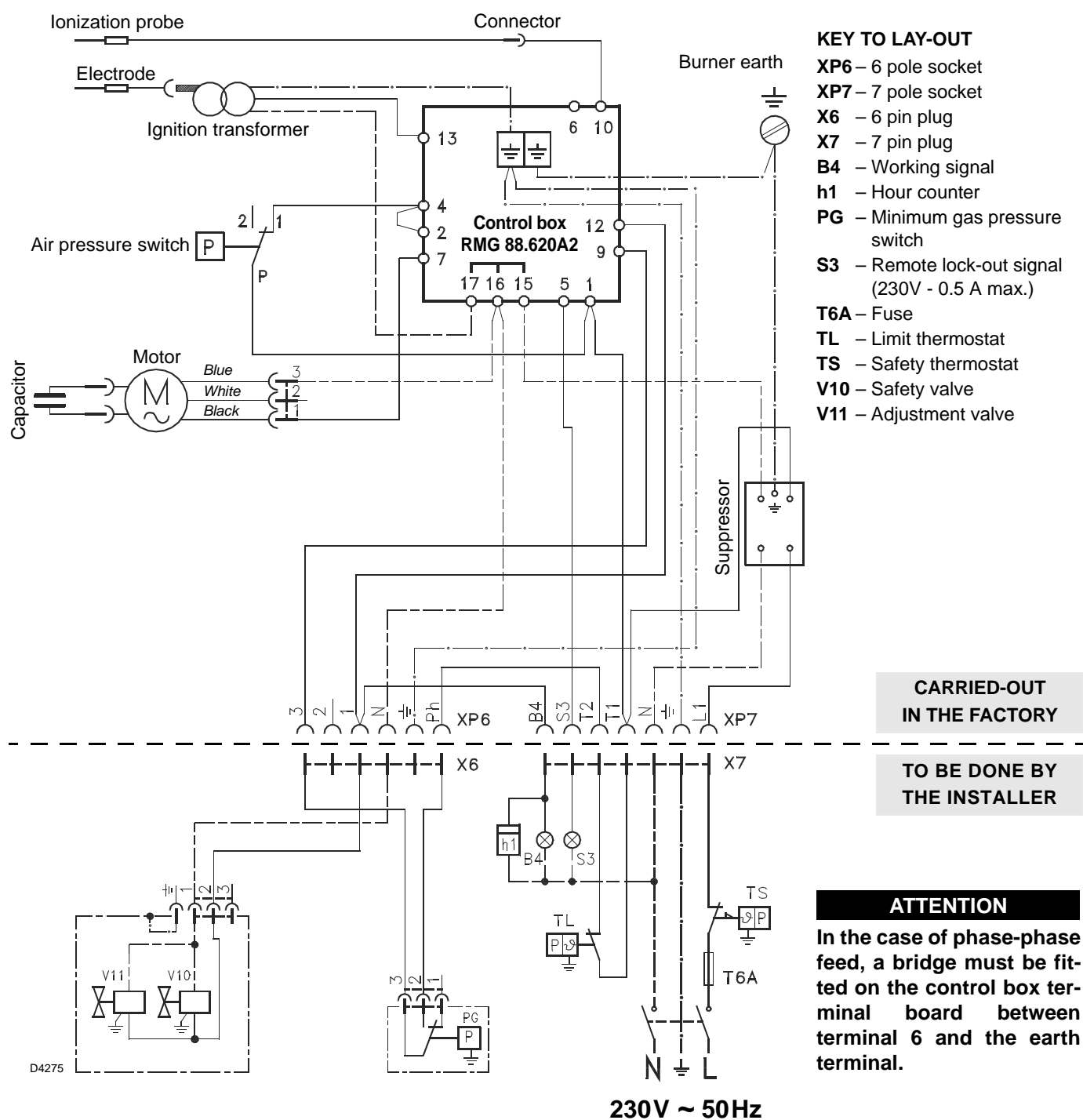
## GAS TRAIN ACCORDING TO EN 676

GAS TRAIN		CONNECTIONS		USE
TYPE	CODE	INLET	OUTLET	
MBDLE 407 B01	3970531	Rp 3/4	Rp 3/4	Natural gas ≤ 180 kW and LPG
MBDLE 410 B01	3970532	Rp 1	Rp 3/4	Natural gas and LPG

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

### 3.4 ELECTRICAL WIRING

#### 3.4.1 STANDARD ELECTRICAL WIRING



**ATTENTION:**

- Do not swap neutral and phase over, follow the diagram shown carefully and carry out a good earth connection.
- The section of the conductors must be at least 1mm . (Unless requested otherwise by local standards and legislation).
- The electrical wiring carried out by the installer must be in compliance with the rules in force in the country.
- Verify that the burner stops by operating the boiler control thermostats and that the burner locks out by separating the red ionisation probe lead connector.

**NOTES**

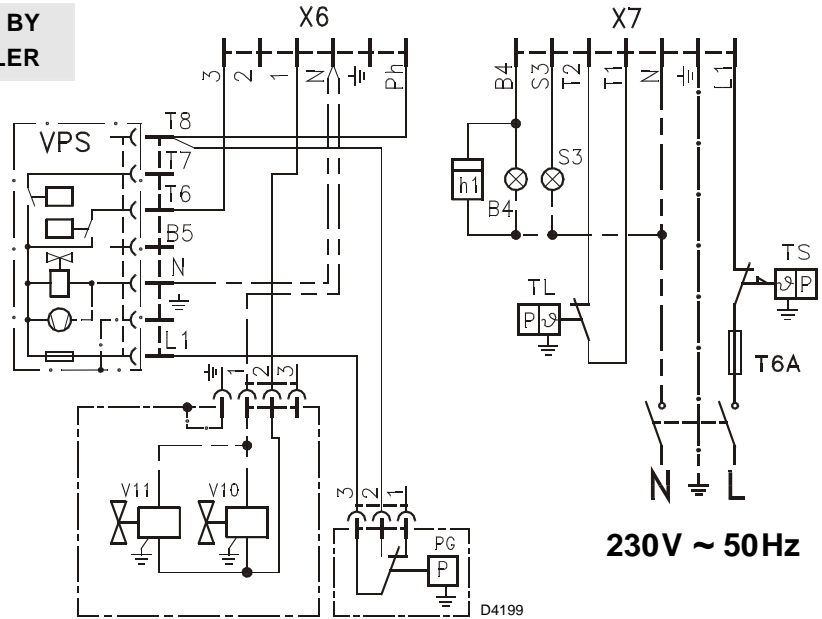
The burners have been type-approved for intermittent operation. This means they must stop at least once every 24 hours in order to allow the electrical control box to check its efficiency on start-up. The boiler limit thermostat (TL) normally ensures the burner halts. If this does not happen a time switch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

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

### KEY TO LAY-OUT

- X6** – 6 pin plug
- X7** – 7 pin plug
- B4** – Working signal
- h1** – Hour counter
- PG** – Minimum gas pressure switch
- S3** – Remote lock-out signal (230V - 0.5 A max.)
- T6A** – Fuse
- TL** – Limit thermostat
- TS** – Safety thermostat
- V10** – Safety valve
- V11** – Adjustment valve

**TO BE DONE BY THE INSTALLER**



## 4. WORKING

### 4.1 COMBUSTION ADJUSTMENT

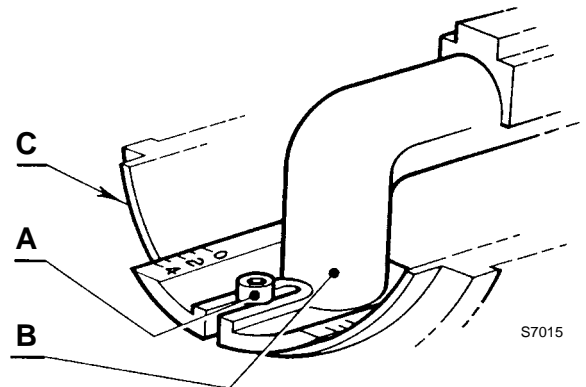
In conformity with Efficiency Directive 92/42/EEC the application of the burner on the boiler, adjustment and testing must be carried out observing the instruction manual of the boiler, including verification of the CO and CO<sub>2</sub> concentration in the flue gases, their temperatures and the average 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

Loose the screw (A), move the elbow (B) so that the rear plate of the coupling (C) coincides with the set point.

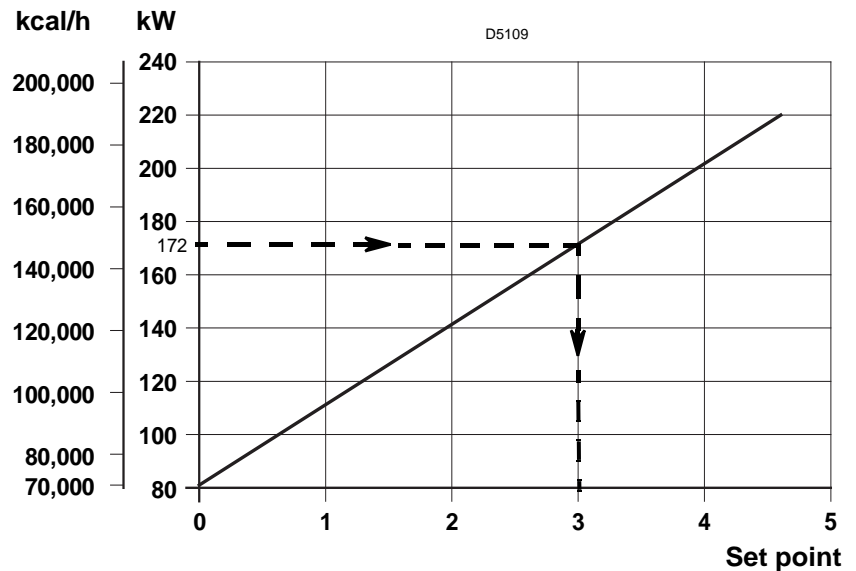
**Tighten the screw (A).**



### Example:

The burner is installed on a 155 kW boiler with an efficiency of 90%, the burner input is about 172 kW using the diagram, the combustion set point is **3**.

The diagram is to be used only for initial settings, to improve air pressure switch operation or improve combustion, it may be necessary to reduce this setting (*set point toward position 0*).

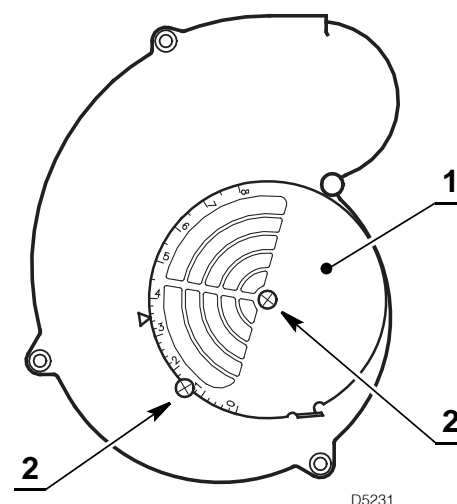




### 4.3 AIR DAMPER SETTING

The regulation of the air-rate is made by adjusting the air damper (1), after loosening the screws (2).

When the optimal regulation is reached, **screw tight the screws (2)**.



### 4.4 COMBUSTION CHECK

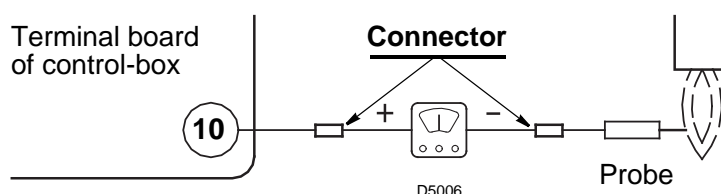
It is advisable to set the burner according to the type of gas used and following the indications of the table:

EN 676		AIR EXCESS: max. output $\lambda \leq 1.2$ – min. output $\lambda \leq 1.3$			
GAS	Theoretical max. CO <sub>2</sub> 0 % O <sub>2</sub>	Setting CO <sub>2</sub> %		CO mg/kWh	NO <sub>x</sub> 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 3  $\mu$ A.

The burner normally supplies a higher current value, so that no check is needed. However, if you want to measure the ionization current, you must open the connector fitted to the red 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 minimum 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 EN 676 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%.



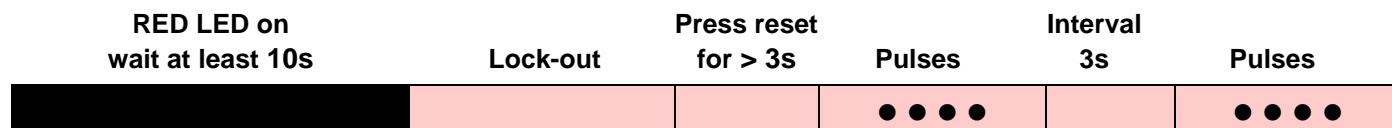
## 4.8 RESETTING THE CONTROL BOX AND USING DIAGNOSTICS

The control box features a diagnostics function through which any causes of malfunctioning are easily identified (indicator: **RED LED**).

To use this function, you must wait at least 10 seconds once it has entered the safety condition (**lock-out**), and then press the reset button.

The control box generates a sequence of pulses (1 second apart), which is repeated at constant 3-second intervals.

Once you have seen how many times the light pulses and identified the possible cause, the system must be reset by holding the button down for between 1 and 3 seconds.



The methods that can be used to reset the control box and use diagnostics are given below.

### RESETTING THE CONTROL BOX

To reset the control box, proceed as follows:

- Hold the button down for between 1 and 3 seconds.  
The burner restarts after a 2-second pause once the button is released.  
If the burner does not restart, you must make sure the limit thermostat is closed.

### VISUAL DIAGNOSTICS

Indicates the type of burner malfunction causing lock-out.

To view diagnostics, proceed as follows:

- Hold the button down for more than 3 seconds once the red LED (burner lock-out) remains steadily lit.  
A yellow light pulses to tell you the operation is done.  
Release the button once the light pulses. The number of times it pulses tells you the cause of the malfunction, indicated in the table below.

### SOFTWARE DIAGNOSTICS

Reports the life of the burner by means of an optical link with the PC, indicating hours of operation, number and type of lock-outs, serial number of control box etc ...

To view diagnostics, proceed as follows:

- Hold the button down for more than 3 seconds once the red LED (burner lock-out) remains steadily lit.  
A yellow light pulses to tell you the operation is done.  
Release the button for 1 second and then press again for over 3 seconds until the yellow light pulses again.  
Once the button is released, the red LED will flash intermittently with a higher frequency: only now can the optical link be activated.

Once the operations are done, the control box's initial state must be restored using the resetting procedure described above.

BUTTON PRESSED FOR	CONTROL BOX STATUS
Between 1 and 3 seconds	Control box reset without viewing visual diagnostics.
More than 3 seconds	Visual diagnostics of lock-out condition: (LED pulses at 1-second intervals).
More than 3 seconds starting from the visual diagnostics condition	Software diagnostics by means of optical interface and PC (hours of operation, malfunctions etc. can be viewed)

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 ● ●	The flame does not stabilise at the end of the safety time: – faulty ionisation probe; – faulty or soiled gas valves; – neutral/phase exchange; – faulty ignition transformer – poor burner regulation (insufficient gas).
3 pulses ● ● ●	Minimum air pressure switch does not close: – make sure VPS trips to produce lockout; – air pressure switch faulty; – air pressure switch incorrectly regulated; – fan motor does not run; – maximum air pressure switch operating.
4 pulses ● ● ● ●	Min. air pressure switch does not open or light in the chamber before firing: – air pressure switch faulty; – air pressure switch incorrectly regulated.
7 pulses ● ● ● ● ● ● ●	Loss of flame during operations: – poor burner regulation (insufficient gas); – faulty or soiled gas valves; – short circuit between ionisation probe and earth.
10 pulses ● ● ● ● ● ● ● ● ● ● ● ●	– Wiring error or internal fault.

## 5. WARNINGS TO AVOID BURNOUT OR BAD COMBUSTION OF THE BURNER

- 1 – When the burner is stopped, the smoke pipe must be opened and effect a natural draught in the combustion chamber. If the smoke pipe is closed, the burner must be drawn back till the extraction of blast tube from the furnace. Before operating in this way take the voltage off.
- 2 – The place, where the burner works, must have same openings suitable for the passage of air necessary for combustion. To be sure about this, you have to control CO<sub>2</sub> and CO in the exhaust gases with all the windows and doors closed.
- 3 – If in the place, where the burner works, there are air-breathings, check the existence of air-input openings with dimensions suitable for the necessary air-exchange. In any case check that, when the burner is stopped, the air-breathings do not draw warm smokes from pipes through the burner.

## 6. 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:

- CO<sub>2</sub> (%) content
- Smoke temperature at the chimney
- CO content (ppm).

## 7. 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 (9, 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

Signal	Problem	Possible cause	Recommended remedy	
2 blinks ● ●	Once the pre-purging phase and safety time have passed, the burner goes into lockout without the appearance of the flame	1 - The operation solenoid lets little gas through	Increase	
		2 - One of the two solenoid valves does not open.	Replace	
		3 - Gas pressure too low . . . . .	Increase pressure at governor	
		4 - Ignition electrode incorrectly adjusted	Adjust, see page 4	
		5 - Electrode grounded due to broken . insulation	Replace	
		6 - High voltage cable defective . . . . .	Replace	
		7 - High voltage cable deformed by high temperature	Replace and protect	
		8 - Ignition transformer defective . . . . .	Replace	
		9 - Incorrect valve or transformer . . . . . electrical wiring	Check	
		10 - Defective control box . . . . .	Replace	
		11 - A closed valve upline the gas train .	Open	
		12 - Air in pipework . . . . .	Bleed air	
		13 - Gas valves unconnected or with . . . interrupted coil	Check connections or replace coil	
3 blinks ● ● ●	The burner does not switch on, and the lockout appears	14 - Air pressure switch in operating position	Adjust or replace	
	The burner switches on, but then stops in lock-out	- Air pressure switch inoperative due to insufficient air pressure:	Adjust or replace	
		15 - Air pressure switch incorrectly adjusted.		
		16 - Pressure switch pressure test point pipe blocked		Clean
		17 - Poorly adjusted head . . . . .		Adjust
	18 - High pressure in the furnace . . . . .	Connect air pressure switch to fan suction line		
Lockout during pre-purging phase	19 - Defective motor control contactor . . (only three-phase version)	Replace		
	20 - Defective electrical motor . . . . .	Replace		
	21 - Motor lockout (defective electrical motor)	Replace		
4 pulses ● ● ● ●	The burner switches on, but then stops in lock-out	22 - Flame simulation . . . . .	Replace the control box	
	Lockout when burner stops	23 - Permanent flame in the combustion head or flame simulation	Eliminate persistence of flame or replace control box	

Signal	Problem	Possible cause	Recommended remedy
7 blinks ● ● ● ● ● ● ●	The burner goes into lockout immediately following the appearance of the flame	24 - The operation solenoid lets little gas through 25 - Ionisation probe incorrectly adjusted 26 - Insufficient ionisation (less than 5 A) 27 - Earth probe. . . . . 28 - Burner poorly grounded . . . . . 29 - Phase and neutral connections inverted 30 - Defective flame detection circuit. . .	Increase  Adjust, see page 4 Check probe position Withdraw or replace cable Check grounding Invert them  Replace the control box
	Burner goes into lockout during operation	31 - Probe or ionisation cable grounded	Replace worn parts
10 blinks ● ● ● ● ● ● ● ● ● ●	The burner does not switch on, and the lockout appears	32 - Incorrect electrical wiring . . . . .	Check
	The burner goes into lockout	33 - Defective control box . . . . . 34 - Presence of electromagnetic . . . . . disturbances in the thermostat lines	Replace Filter or eliminate
No blink	The burner does not start	35 - No electrical power supply . . . . .	Close all switches - Check connections
		36 - A limiter or safety control device is open	Adjust or replace
		37 - Line fuse blocked . . . . .	Replace
		38 - Defective control box . . . . .	Replace
		39 - No gas supply. . . . .	Open the manual valves between contactor and train
	40 - Mains gas pressure insufficient . . .	Contact your GAS COMPANY	
	41 - Minimum gas pressure switch fails to close	Adjust or replace	
	The burner continues to repeat the start-up cycle, without lockout	42 - The gas pressure in the gas mains lies very close to the value to which the minimum gas pressure switch has been set. The sudden drop in pressure after valve opening causes temporary opening of the pressure switch itself, the valve immediately closes and the burner comes to a halt. Pressure increases again, the pressure switch closes again and the ignition cycle is repeated. And so on	Reduce the minimum gas pressure switch intervention pressure. Replace the gas filter cartridge.
	Ignition with pulsations	43 - Poorly adjusted head . . . . .	Adjust. See page 6
44 - Ignition electrode incorrectly adjusted		Adjust, see page 4	
45 - Incorrectly adjusted fan air damper: too much air		Adjust	
46 - Output during ignition phase is too high		Reduce	

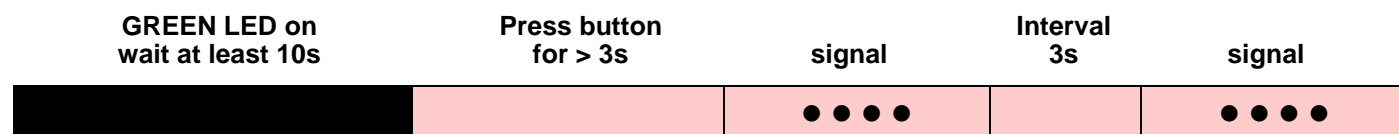
**N.B.:** If problems still occur after all of the above checks have been made, check the electrical connections on the plug and sockets, the damper and burner motor, gas control wiring ignition transformer and external interlocks, if the burner still fails to function, replace the control box.

**NORMAL OPERATION / FLAME DETECTION TIME**

The control box has a further function to guarantee the correct burner operation (signal: **GREEN LED** permanently on).

To use this function, wait at least ten seconds from the burner ignition and then press the control box button for a minimum of 3 seconds.

After releasing the button, the GREEN LED starts flashing as shown in the figure below.



The pulses of the LED constitute a signal spaced by approximately 3 seconds.

The number of pulses will measure the probe DETECTION TIME since the opening of gas valves, according to the following table:

SIGNAL	FLAME DETECTION TIME
1 blink ●	0.4s
2 blinks ● ●	0.8s
6 blinks ● ● ● ● ● ●	2.8s

This is updated in every burner start-up. Once read, the burner repeats the start-up cycle by briefly pressing the control box button.

**WARNING**

If the result is > 2s, ignition will be retarded. Check the adjustment of the hydraulic brake of the gas valve, the air damper and the combustion head adjustment.

**KIT INTERFACE ADAPTER RMG TO PC Code 3002719**

## 说明书的相关信息

### 引言

说明书随燃烧器一起提供：

- 说明书是产品不可或缺的组成部分，不得将其与产品分离；因此必须小心保存以便查阅，如果将燃烧器转给另一个用户或转移至另一个系统，则说明书必须跟随燃烧器一起转移。如果说明书损坏或丢失，则必须从您就近的 **RIELLO** Technical Assistance Centre（技术支持中心）索取说明书的复印件；
- 说明书只能由有资格的人员使用；
- 说明书提供了有关燃烧器安装、启动、使用和维护的重要指示和安全警告。

### 系统和说明书的交付

一旦交付系统：

- 系统制造商也必须将说明书交付给用户，并建议其将说明书保存在热发生器的安装区域附近。
- 说明书上显示：
  - 燃烧器的序列号：

.....

- 最近 Assistance Centre（支持中心）的地址和电话号码：

.....  
.....  
.....

- 系统制造商必须告知用户有关以下内容的准确信息：
  - 系统的使用；
  - 启动系统前需要进行的测试；
- 必需的维护和检查（每年必须由制造商代表或别的专业技术人员至少检查系统一次）。  
要保证定期检查，**RIELLO** 建议遵照 Maintenance Contract（维护合同）的规定。



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**1. 燃烧器描述**

一段火燃气燃烧器。

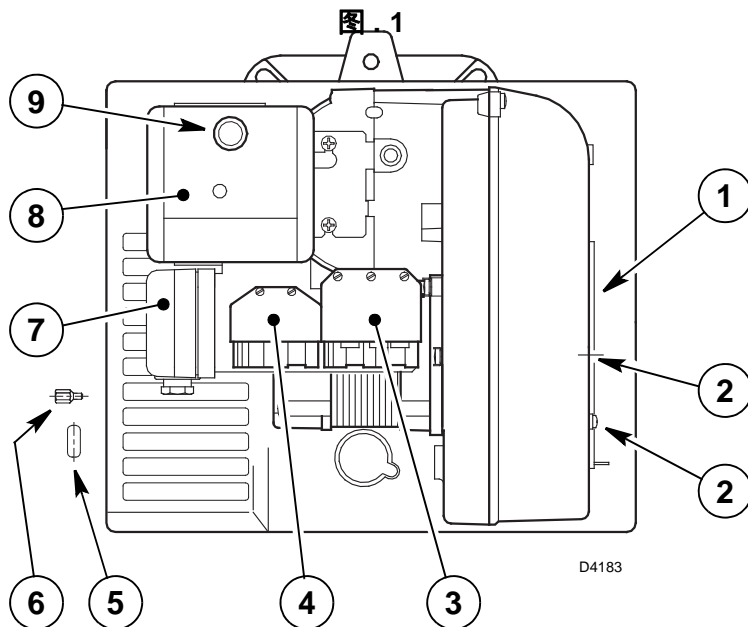
符合下列指令：EMC89/EEC-2004/108/EC，低电压 73/23/EEC-2006/95/EC 及效率 92/42/EEC。

根据 EN676 标准，燃烧器用于间歇运行。

燃烧器满足 EN60529 的 IP X0D (IP40) 保护等级。

燃气阀组符合 EN676 标准。

- 1- 风门挡板
- 2- 用于固定风门挡板的螺钉
- 3- 供电和控制用的 7- 孔插座
- 4- 燃气阀组的 6- 孔插座
- 5- 电缆护套
- 6- 用于固定机盖的螺钉
- 7- 风压开关
- 8- 控制盒
- 9- 带锁定指示灯的复位按钮



注意：

- 与燃烧器一起提供的电缆护套（5），必须固定到燃气阀组的同侧。
  - 燃烧器安装后，检查固定机盖的螺丝孔。
- 如果必要，用随设备提供的固定螺钉（6，图 .1）替换它们。

**1.1 燃烧器附件**

隔热垫.....	数量 1	固定到锅炉的法兰的螺钉和螺母 .....	数量 4
电缆护套.....	数量 1	用于固定机盖的螺钉 .....	数量 3
铰链 .....	数量 1	7 针插头.....	数量 1

## 2. 技术数据

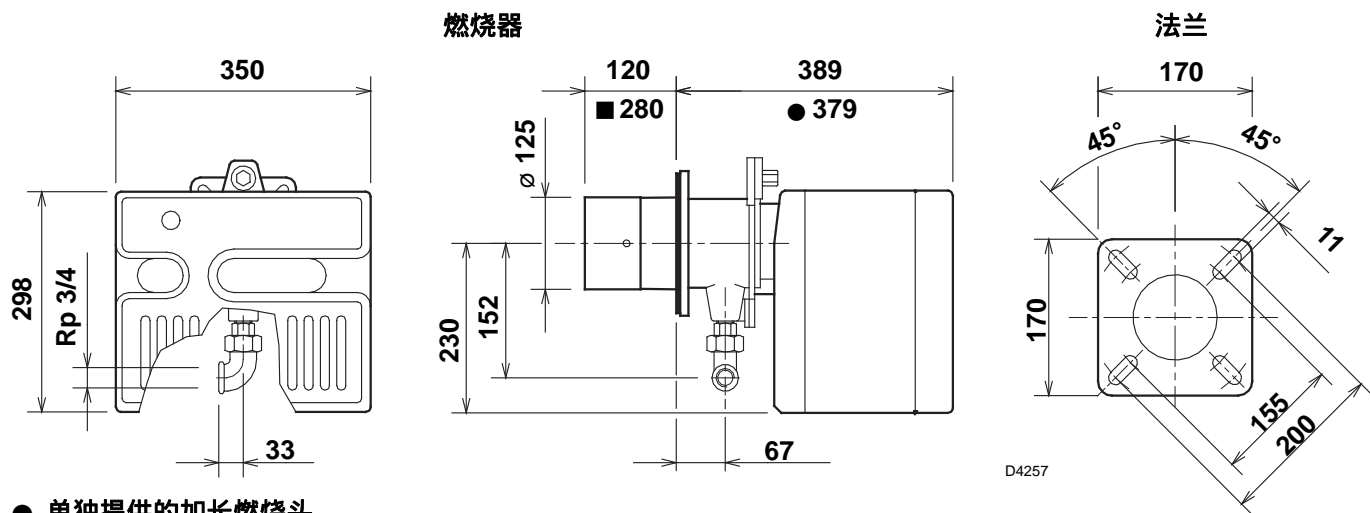
### 2.1 技术数据

热功率	(1)	81 – 220 kW - 70,000 – 189,000 kcal/h
天然气	(2类)	净热值：8 – 12 kWh/Nm <sup>3</sup> - 7,000 – 10,340 kcal/Nm <sup>3</sup>
		压力：最小 20 mbar - 最大 100 mbar
电源		单相，230V ± 10% ~ 50Hz
电机		230V / 1.4A
电容器		5 μF
点火变压器		初级 230V / 1.8A - 次级 8 kV / 30 mA
电功消耗		0.25 kW
(1) 参考条件：温度 20°C - 气压 1013 mbar - 海拔 0 m。		

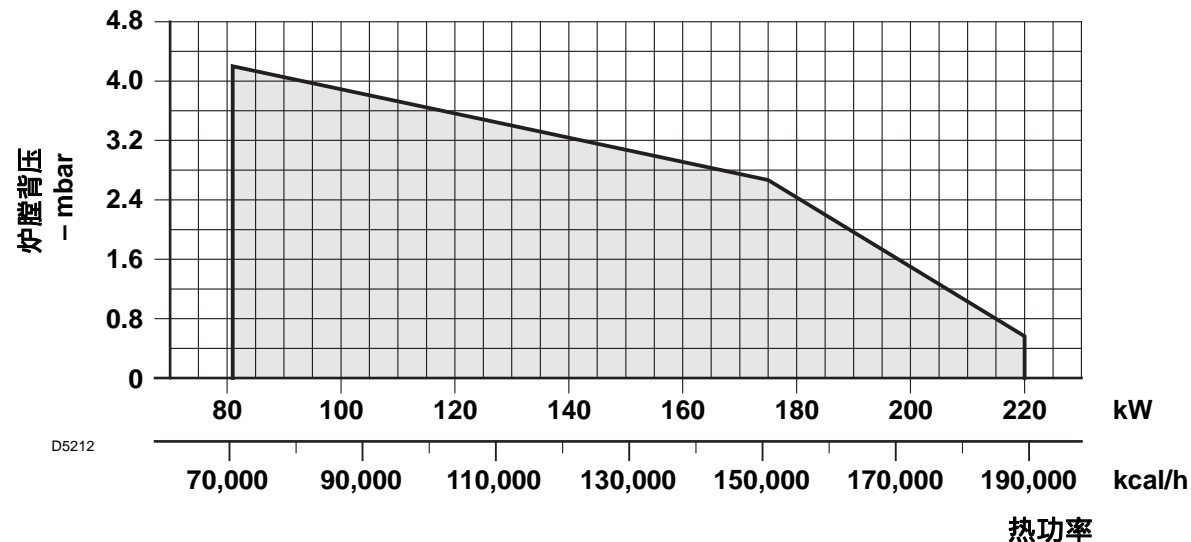
对于 3 类燃气 (LPG) 适用的组件

国家	DE	AT - GR	FR	ES - GB - IE	LU	NL
燃气类别	II2ELL3B/P	II2H3B/P	II2Er3P	II2H3P	II2E3B/P	II2L3B/P

### 2.2 外观尺寸



### 2.3 负荷图 (参照 EN 676 标准)



**测试锅炉**

负荷图依据 EN676 标准测试得到。

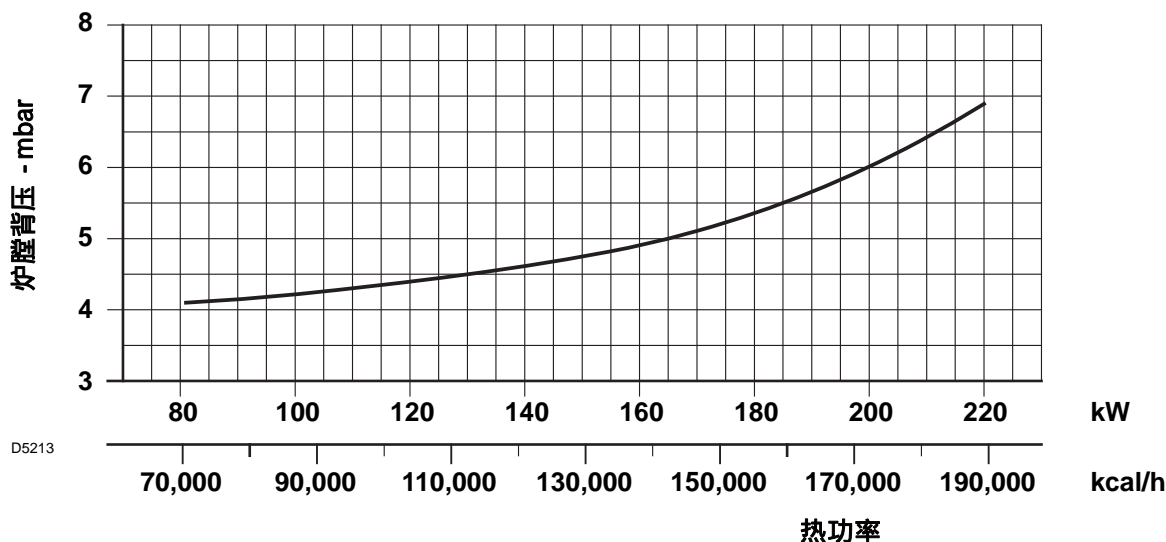
**商用锅炉**

如果锅炉的设计和制造符合 EN303 标准，并且炉膛尺寸与 EN676 标准中的图表尺寸接近，那么燃烧器 - 锅炉匹配没问题。

如果锅炉的设计和制造不符合 EN303 标准或者炉膛尺寸大大小于 EN676 标准中的图表尺寸，请咨询生产商。

**燃气压力与燃烧器出力的关系**

用净热值为 10KWh/m<sup>3</sup> (8.570kcal/m<sup>3</sup>) 的 G20 燃气进行测试，在锅炉背压为 0mbar，燃烧器出力最大时，燃烧头处测量压力为 5.8mbar(M2，见第 4 页，章节 3.3)。



**3. 安装**

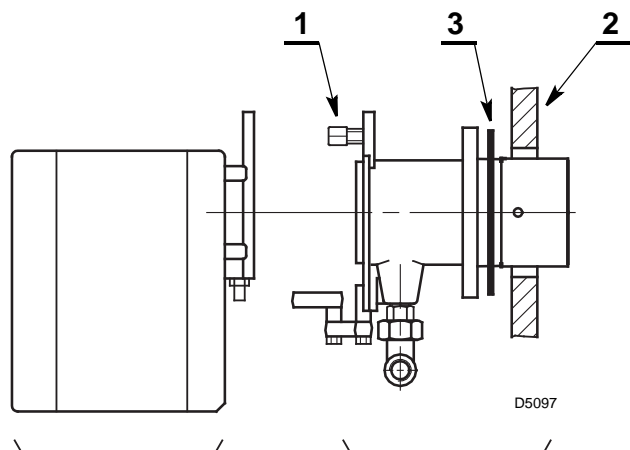
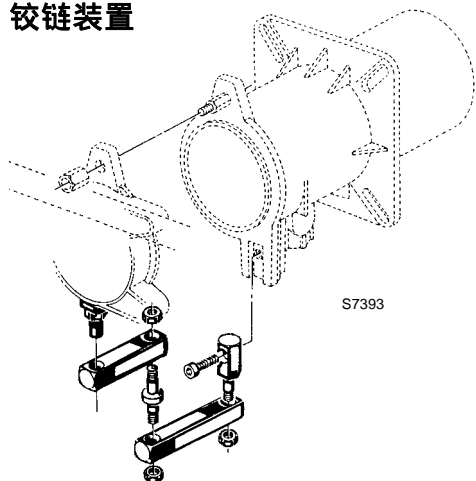
燃烧器安装必须依据法令以及本地标准规定。

**3.1 燃烧器安装**

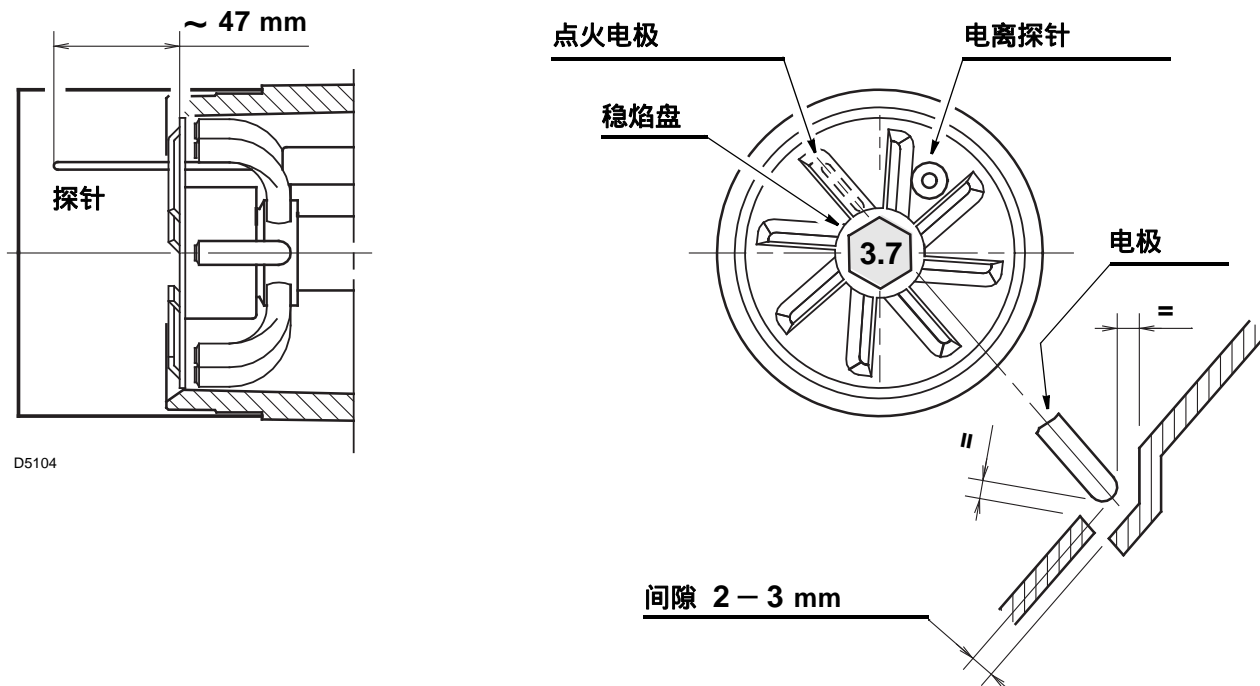
炉门的最大厚度必须小于 90mm，包括耐火衬里。如果厚度较大（最大不超过 150mm），必须选用单独供应的加长燃烧头。

- 拆下螺母（1）和（A）组，将燃烧头组件从燃烧器本体上分离。
- 固定燃烧头组件（B）到锅炉（2），插入随机提供的隔热垫（3）。

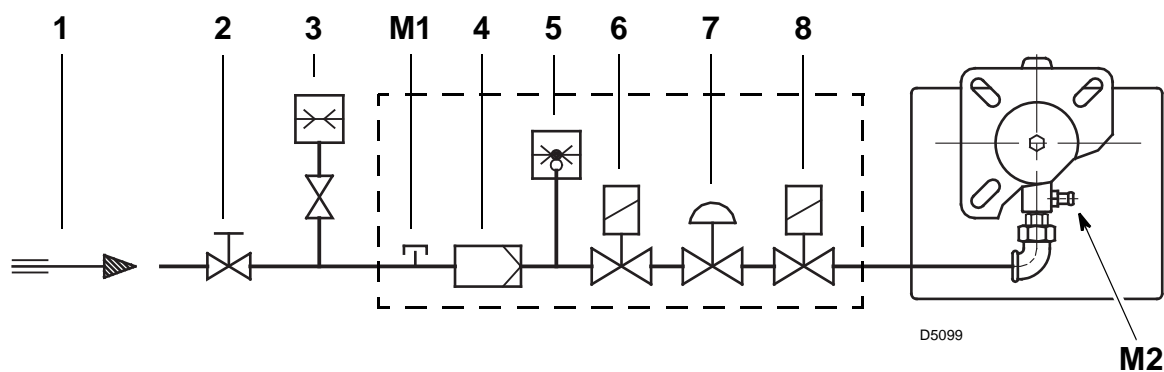
**铰链装置**



## 3.2 探针 - 电极定位



## 3.3 燃气供气管路



- 1- 燃气供气管路
- 2- 手动阀 (由安装者提供)
- 3- 气压计 (由安装者提供)
- 4- 过滤器
- 5- 燃气压力开关
- 6- 安全阀
- 7- 调压器
- 8- 调节阀

- M1- 供气压力测试点
- M2- 阀门组后压力测试点

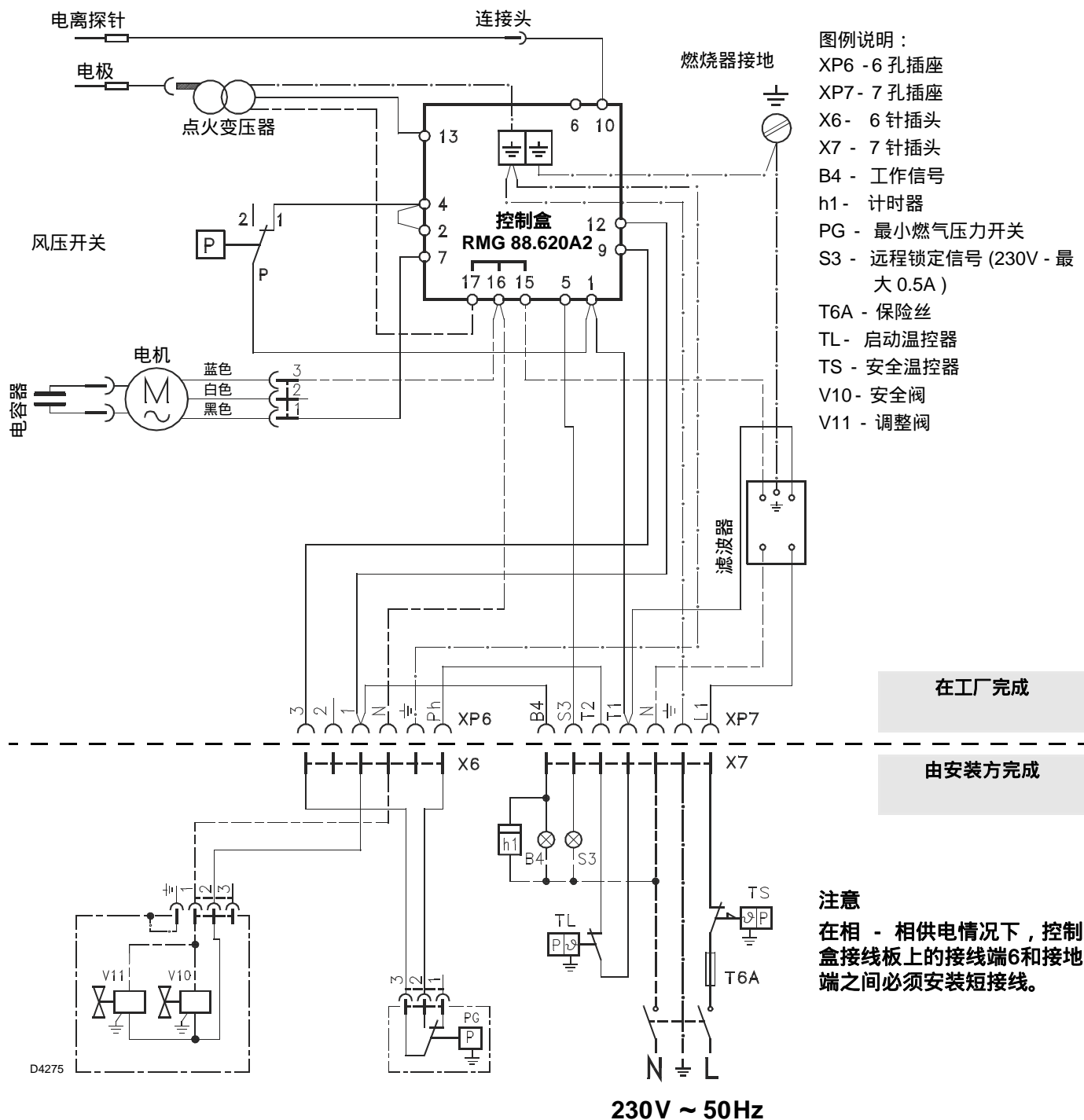
## 符合 EN 676 标准的燃气阀组

燃气阀组		接口		应用
类型	代码	入口	出口	
MBDLE 407 B01	3970531	Rp 3/4	Rp 3/4	天然气 ≤ 180 kW and LPG
MBDLE 410 B01	3970532	Rp 1	Rp 3/4	天然气及 LPG

燃气阀组是单独提供的，其调整见阀组所附说明书。

### 3.4 电气接线

#### 3.4.1 标准电气接线



**注意：**

不要将零线和火线接反，遵照图示仔细操作，保证良好接地。  
 电缆的横截面必须不小于 1m<sup>2</sup>（除非当地规范和法规另有要求）。  
 安装工人进行的电气接线必须符合该国的规则。  
 当断开锅炉温控开关时，验证燃烧器是否停机，断开红色的电离子探针接头验证燃烧器是否锁定。

**注意：**

燃烧器用于间歇运行。这意味着它们必须每个 24 小时至少停机一次，便于控制盒能够检验其有效性，通常锅炉启动温控器（TL）能够确保燃烧器停机。如果没有停机，必须串联一个定时开关到启动温控器（TL）线路中，保证燃烧器每 24 小时至少停机一次。

## 3.4.2 带有泄露检测装置的电气接线(DUNGS VPS 504)

图例说明：

X6-6 针插头

X7-7 针插头

B4- 工作信号

h1- 计时器

PG- 最小燃气压力开关

S3- 远程锁定信号 (230V - 最大 0.5A)

T6A - 保险丝

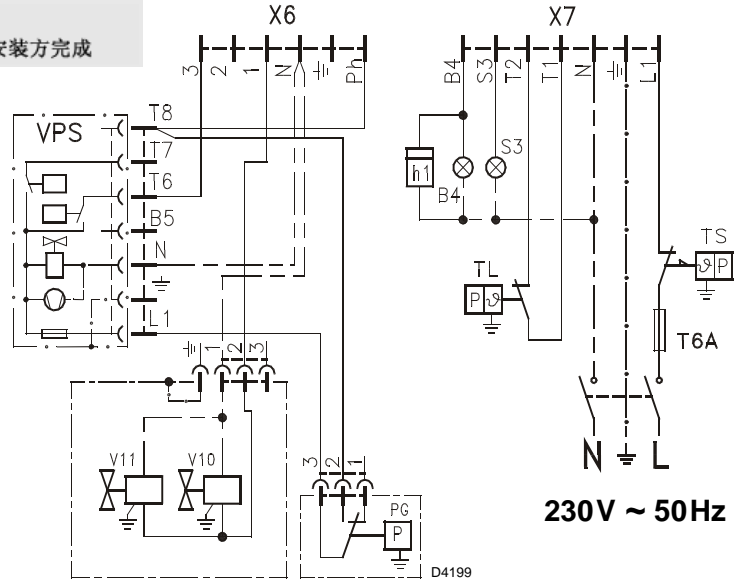
TL- 启动温控器

TS - 安全温控器

V10- 安全阀

V11 - 调整阀

由安装方完成



## 4. 作业

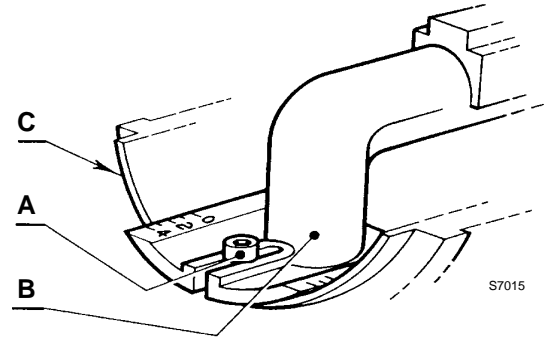
### 4.1 燃烧调整

根据效率指令 92/42/EEC，燃烧器应用在锅炉上时，调整和测试必须按照锅炉说明书进行操作，包括确认烟气中 CO 以及 CO<sub>2</sub> 的浓度，温度以及锅炉中水的平均温度。

为达到额定的出力，应正确设置燃烧头以及风门挡板的位置。

### 4.2 燃烧头设置

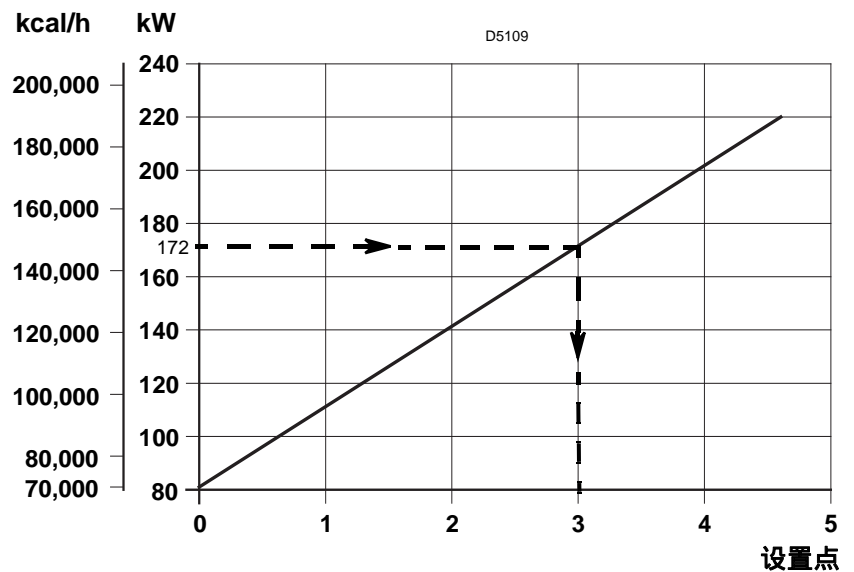
将螺栓 (A) 旋至松动，移动肘型弯 (B) 使之与联轴器 (C) 的断面对齐在相应的刻度位置。  
拧紧螺栓 (A)。



示例：

燃烧器安装在出力为 155 kW，效率为 90% 的锅炉上，燃烧器输入功率为 172 kW，按图表所示，燃烧头设置为 3。

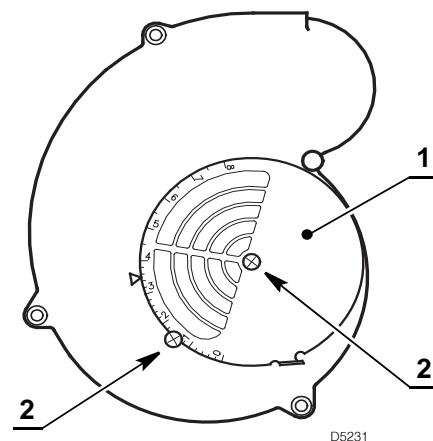
此图表一般在初期设置时参照设置，为了适当提高风压或改善燃烧时可以降低本设置值 (将设置点调向 0 位置)。



### 4.3 风门挡板设置

通过松开螺栓（2）后，调节风门挡板（1）来调节风量。

当调节至理想状态后，旋紧螺丝（2）。



### 4.4 燃烧检查

建议根据使用燃气的类型并按照下表的参数来设置燃烧器。

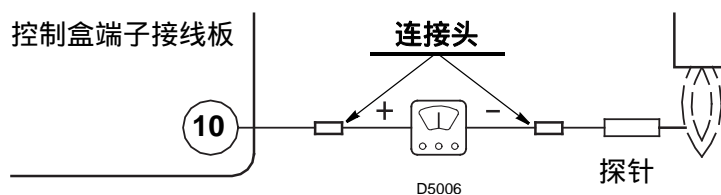
EN 676		过量空气系数： 最大出力 $\lambda \leq 1.2$ – 最小出力 $\lambda \leq 1.3$			
燃气	理论最大值 CO2 0% O2	设置 CO2 %		CO mg/kWh	NOx mg/kWh
		$\lambda = 1.2$	$\lambda = 1.3$		
G 20	11.7	9.7	9.0	$\leq 100$	$\leq 170$
G 25	11.5	9.5	8.8	$\leq 100$	$\leq 170$
G 30	14.0	11.6	10.7	$\leq 100$	$\leq 230$
G 31	13.7	11.4	10.5	$\leq 100$	$\leq 230$

### 电离子探针电流

控制盒正常运行所需的最小电流为  $3 \mu A$ 。

通常离子探针会产生更高的电流，因此不需要检测。

然而如果需要测量电离电流，断开红色电缆上的连接头，并串入微安表。



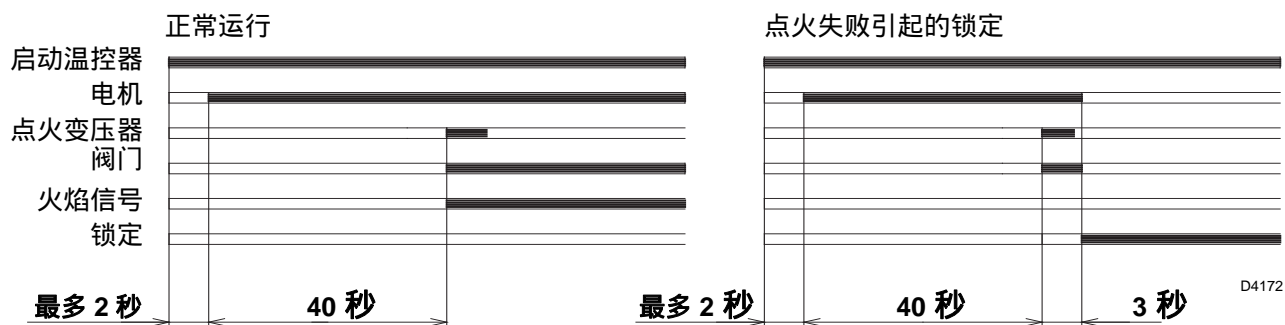
### 4.5 风压开关

风压开关的设置所有调整完成后进行，从风压开关设置在最低设置值处开始。使燃烧器处于最小出力的工作状态，顺时针旋转转盘，增加设置值直至燃烧器锁定。然后逆时针转动转盘将设置值减少 1 个刻度值。检查并确保燃烧器可靠运行，如燃烧器再次锁定，将设置值再减小半个刻度值。

#### 注意：

根据 EN676 标准，当 CO 超过 1%（10,000ppm）时，风压开关必须动作。在烟道中插入一个烟气分析仪，慢慢减少进风量，检查并确认在 CO 超过 1% 之前，风压开关是否动作锁定燃烧器。

## 4.6 燃烧器启动循环



如果在运行中发生失火，应在 1 秒内燃烧器停机。

## 4.7 启动循环诊断

启动过程中运行进程指示如下表所示：

色码表	
顺序	色码
预吹扫	●●●●●●●●●●●●
点火阶段	●○●○●○●○●○●
运行，火焰正常	□□□□□□□□□□□□
运行，火焰较弱	□○□○□○□○□○
电压低于 ~ 170V	●▲●▲●▲●▲●▲●
锁定	▲▲▲▲▲▲▲▲▲▲▲
外部光线	▲□▲□▲□▲□▲□▲
图例：	○ 不亮      ● 黄色      □ 绿色      ▲ 红色



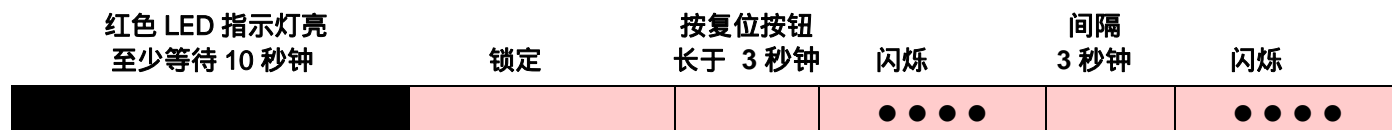
## 4.8 控制盒复位和使用诊断功能

控制盒具有诊断功能，能够轻松识别故障原因（指示器：红色 LED 灯）。

要使用此功能，待燃烧器进入安全状态（锁定状态）后，至少等待 10 秒，按下复位按钮。

控制盒指示灯产生一连串的闪烁（间隔 1 秒），每隔 3 秒钟重复一次。

待观测到闪烁次数并识别出故障原因后，应按住复位按钮 1-3 秒钟来复位。



复位控制盒和故障诊断操作方法如下：

### 复位控制箱

按下列步骤复位控制盒：

- 按下按钮 1-3 秒钟。  
松开按钮 2 秒钟的脉冲之后燃烧器重新启动。  
如果燃烧器没有重启，必须确保启动温控开关处于闭合状态。

### 可视诊断

显示引起锁定的燃烧器故障类型。

按下列步骤显示诊断：

- 如 LED 指示灯亮（燃烧器锁定），按下按钮超过 3 秒钟。  
黄灯闪烁显示操作已经完成。  
闪烁开始后松开按钮，闪烁的次数指示出可能的故障原因，如下表所列。

### 软件诊断

通过红外线连接 PC，显示燃烧器的相关参数，显示运行时间，锁定次数及类型，控制盒序列号等。

要实现软件诊断，按如下方法操作：

如 LED 指示灯亮（燃烧器锁定），按下按钮超过 3 秒钟。

黄灯闪烁显示操作已经完成。

松开按钮 1 秒钟后，重新按下，超过三秒钟，直到再次出现黄灯闪烁。

松开按钮后，红灯将以高频率闪烁，只有在此时才可以激活红外线连接。

操作完成后，必须按照上述复位程序对控制盒复位。

按住按钮持续时间	控制盒状态
1 秒 - 3 秒	复位控制盒但不进入可视诊断。
超过 3 秒	可视诊断： (红色 LED 指示灯以 1 秒频率闪烁)
从进入可视诊断状态后再次超过 3 秒	通过红外线和 PC 连接的软件诊断 (可浏览运行时间，故障等)

控制盒发出一连串闪烁表明故障的可能类型，列在下表中。

闪烁次数	可能故障
闪烁 2 次 ● ●	安全时间过后火焰不稳定： - 电离子探子故障； - 燃气阀组故障或脏； - 火线与零线接反； - 点火变压器故障； - 燃烧器调整较差（燃气量不足）。
闪烁 3 次 ● ● ●	最低风压开关没有闭合： - 确定 VPS 已经锁定； - 风压开关故障； - 风压开关调整不当； - 风机电机没有运行； - 风压开关处于运行状态。
闪烁 4 次 ● ● ● ●	出现火焰 - 启动温控器闭合后 - 预吹扫期间。
闪烁 7 次 ● ● ● ● ● ● ●	运行过程中火焰熄灭： - 燃烧器调整不当（燃气量不足）； - 燃气阀组故障或脏； - 电离子探针对地短路。
闪烁 10 次 ● ● ● ● ● ● ● ● ● ● ● ●	- 接线错误或内部故障。

## 5. 避免燃烧器损坏或燃烧效果变差的警告

- 1 - 燃烧器停机后，保持烟道通畅并让燃烧室形成自然通风，如果关闭烟道，应该拉出燃烧器，直到从炉膛取出送风管为止。操作前，关掉电源。
- 2 - 燃烧器工作场所必须保证良好的空气流通，检验时，关闭所有门窗后检测烟气中的 CO<sub>2</sub> 以及 CO 含量确保含量不超标准。
- 3 - 如果燃烧器工作场所有排风设备，检查场所的通风口尺寸是否满足排风设备的需要。不管怎么样，燃烧器停机时，排风设备不会通过燃烧器从烟道抽走热烟气。

## 6. 维护

燃烧器需要由授权的有资质合格技术人员按当地法规和标准定期维护。

维护可以保证燃烧器的可靠运行，避免燃料浪费和排放污染物增加。

进行清扫或者维护之前，必须切断燃烧器主电源开关。

**一般检查包括：**

燃烧器连续工作 10 分钟后，检查所有说明书中提到的部件设置。然后进行燃烧检测：

- CO<sub>2</sub> (%) 含量
- 烟囱烟气温
- CO 含量 (ppm)。

## 7. 故障 / 解决方案

从下表可以找到导致燃烧器不能启动或不正常工作的一些问题的原因和相应的解决方案。发生故障后，位于控制盒的复位按钮内的锁定指示灯通常亮起红色灯（第 1 页图 1 部件 9）。

当锁定指示灯亮时，仅在按下复位按钮后，燃烧器才会重新启动点火。如果燃烧器正常运行，锁定可归因于暂时故障。

如果继续锁定，必须分析原因并找到解决方法。

信号	故障	可能原因	建议的补救措施
闪烁 2 次 ● ●	预吹扫和安全时间后燃烧器锁定并且没有火焰出现	1 - 燃气阀组过气量太少 2 - 两个电磁阀中的一个未打开 3 - 燃气压力太低..... 4 - 点火电极的位置不正确 5 - 点火电极因为绝缘损坏而接地 6 - 高压电缆有缺陷..... 7 - 高压电缆因为高温而变形 8 - 点火变压器故障..... 9 - 阀组或变压器接线错误 10 - 控制盒故障..... 11 - 燃气阀组上游手动阀未开..... 12 - 燃气管中有空气..... 13 - 燃气阀组没有接线或电磁线圈故障 ..	增加燃气量 更换 增加调压器后的压力 调整，见第 4 页 更换 更换 更换和保护 更换 检查 更换 打开 排气 检查接线或更换线圈
闪烁 3 次 ● ● ●	燃烧器没有启动就出现锁定	14 - 风压开关处于运行状态	调整或更换
	燃烧器启动，然后锁定停机	- 风压开关由于气压不足而不动作 15 - 风压开关调整不正确 16 - 风压开关气压测试点管道被阻塞 17 - 燃烧头调整不当..... 18 - 炉膛中出现的高压.....	调整或更换 清洁 调整 连接风压开关到风机进气口
	预吹扫期间锁定	19 - 电机控制接触器故障（仅 3 相型）.. 20 - 电机故障 21 - 电机锁定（电机故障）.....	更换 更换 更换
闪烁 4 次 ● ● ● ●	燃烧器启动，但之后锁定	22 - 模拟火焰	更换控制盒
	在燃烧器停机时锁定	23 - 燃烧头的残留火焰或虚假火焰	消除残留的火焰或更换控制盒
闪烁 7 次 ● ● ● ● ● ● ● ●	燃烧器在出现火焰之后立即锁定	24 - 燃气阀组过气量太少 25 - 电离子探针的调整不当..... 26 - 电离子电流太小（小于 5 A）..... 27 - 离子探针接地..... 28 - 燃烧器接地不好..... 29 - 相线和中线接反 30 - 火焰探测电路故障.....	增加燃气量 调整，见第 4 页 检查探针位置 拉出或更换电缆 检查接地 调换 更换控制盒
	燃烧器在运行期间锁定	31 - 离子探针或电缆接地.....	更换磨损部分
闪烁 10 次 ● ● ● ● ● ● ● ● ● ●	燃烧器不启动，但出现锁定	32 - 接线错误.....	检查
	燃烧器直接锁定	33 - 控制盒故障..... 34 - 启动温控器线路中出现电磁干扰	更换 过滤或消除干扰

信号	故障	可能原因	建议的补救措施
不闪烁	燃烧器不启动	35 - 没有电源..... 36 - 启动或安全温控开关断开 37 - 保险丝熔断..... 38 - 控制盒故障..... 39 - 没有燃气供应..... 40 - 供气压力不足..... 41 - 最低燃气压力开关没有闭合.....	闭合所有开关 - 检查电气接线 调整或更换 更换 更换 打开阀组前的手动阀 联系燃气公司 调整或更换
	燃烧器不断重复启动，而不锁定。	42 - 燃气供气气压非常接近最低燃气压力开关的设定值，阀门打开之后压力的突然下降造成压力开关临时断开，阀门会立即关闭且燃烧器停机。压力增加，最低燃气压力开关会重新闭合而重复点火过程等等。	降低最小燃气压力开关设定值。 更换滤芯。
	脉冲点火	43 - 燃烧头调整不当..... 44 - 点火电极位置不当..... 45 - 风门挡板调整不当，风量太大..... 46 - 点火出力太大.....	调整，见第 6 页 调整，见第 4 页 调整 降低点火出力

**注意：**如果经过上面所有的检查后故障依然存在，检查插头和插座间的连接、风门挡板的驱动电机、风机电机、点火变压器和外部互锁装置，如果故障依然存在，更换控制盒。

**正常运行 / 检测到火焰的时间**

控制盒有保证燃烧器的正确运行的进一步功能（信号：绿色 LED 指示灯长亮）。

使用这个功能，从燃烧器点着火后至少等待十秒钟，然后按住控制盒复位按钮至少 3 秒钟。

在放开按钮之后，绿色 LED 指示灯开始闪烁，如下图所示。



闪烁大约间隔 3 秒。

闪烁次数代表从阀组打开到检测到火焰的检测时间，如下表所示：

闪烁次数	检测到火焰的时间
闪烁 1 次 ●	0.4 秒
闪烁 2 次 ● ●	0.8 秒
闪烁 6 次 ● ● ● ● ● ●	2.8 秒

这个参数在每次燃烧器启动时更新。一旦读取，需要按一下复位按钮来使燃烧器重新启动。

**警告**

如果结果大于 2 秒，属于点火延迟。需要检查燃气阀组的调整，风门挡板的调整和燃烧头的调整是否正确。

连接 RMG 控制盒和 PC 的组件编码：3002719





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