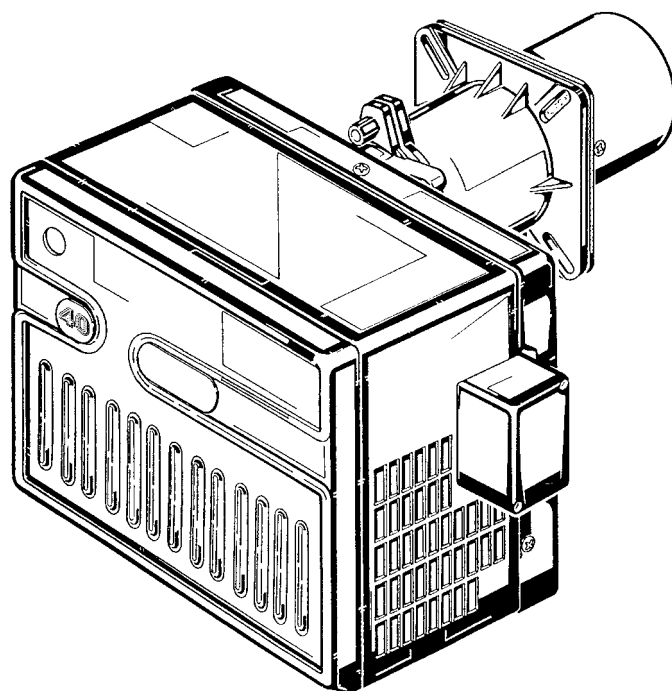


**GB** **Forced draught gas burner**

**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
20013630	GS20	556T1

## 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;

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

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- 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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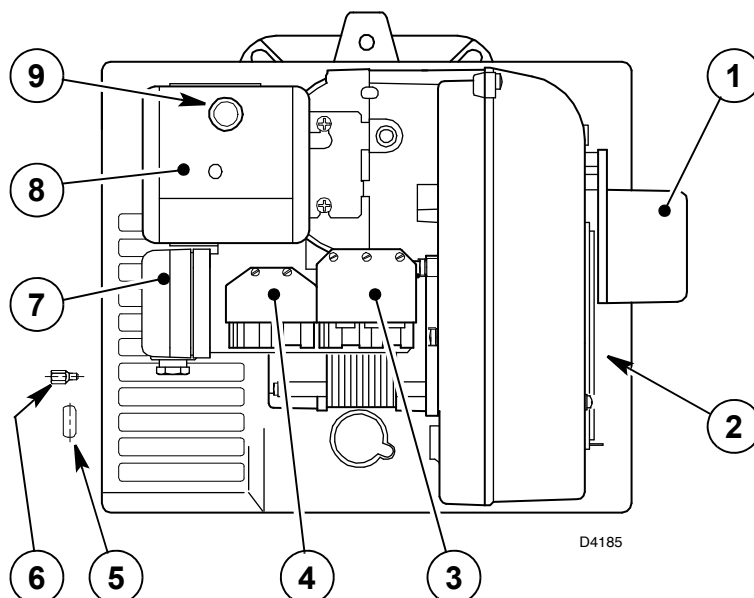
## 1. BURNER DESCRIPTION

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.

**Fig. 1**

- 1 – Air damper actuator
- 2 – Air dampers
- 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



### NOTE

The cable grommet (5) and the screw for fixing the cover (6) supplied with the burner, must be fitted to the same side of the gas train.

### 1.1 BURNER EQUIPMENT

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

## 2. TECHNICAL DATA

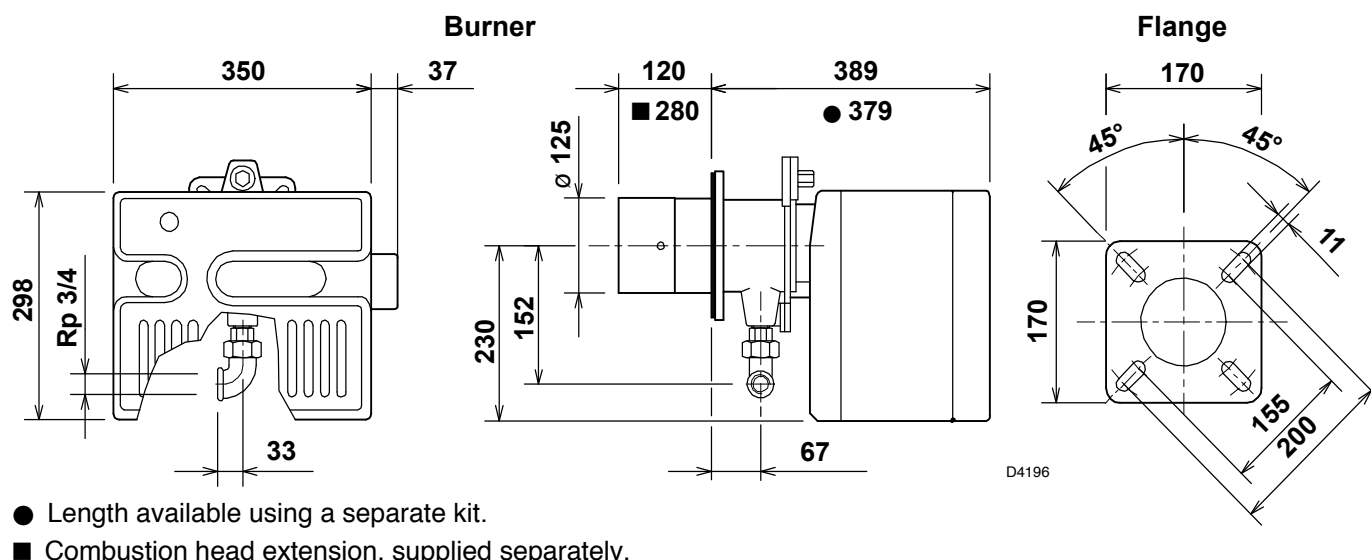
### 2.1 TECHNICAL DATA

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 / 1.4 A
Capacitor	5 µF
Ignition transformer	Primary 230V / 1.8A - Secondary 8 kV / 30 mA
Absorbed electrical power	0.25 kW
(1) Reference conditions: Temp. 20°C - Barometric pressure 1013 mbar – Altitude 0 m above sea level.	

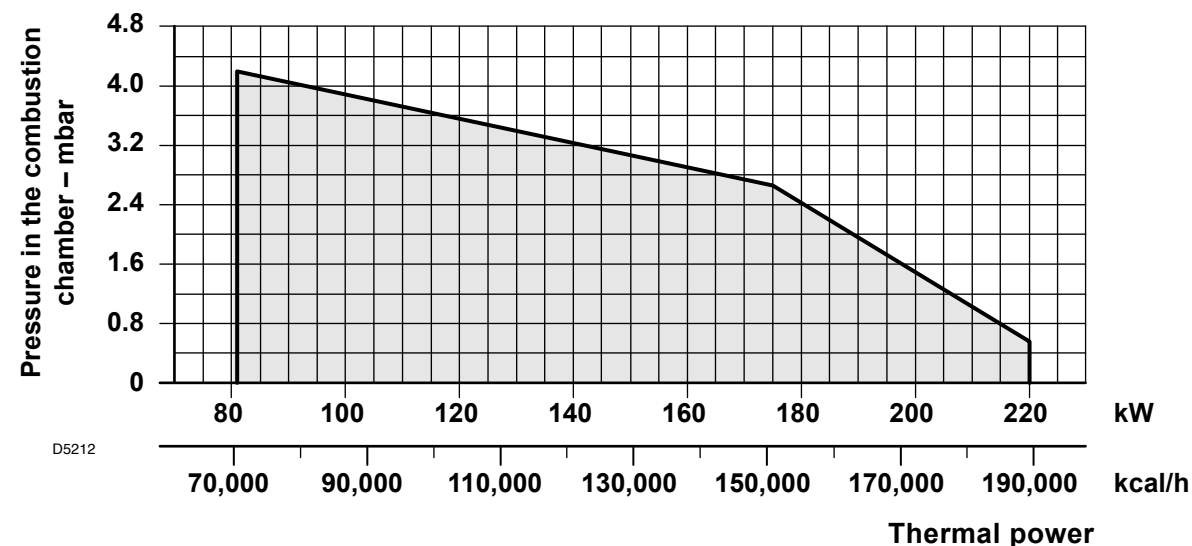
For gas family 3 (LPG) ask for separate kit.

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

### 2.2 OVERALL DIMENSIONS



### 2.3 WORKING FIELD (as EN 676)



## TEST BOILER

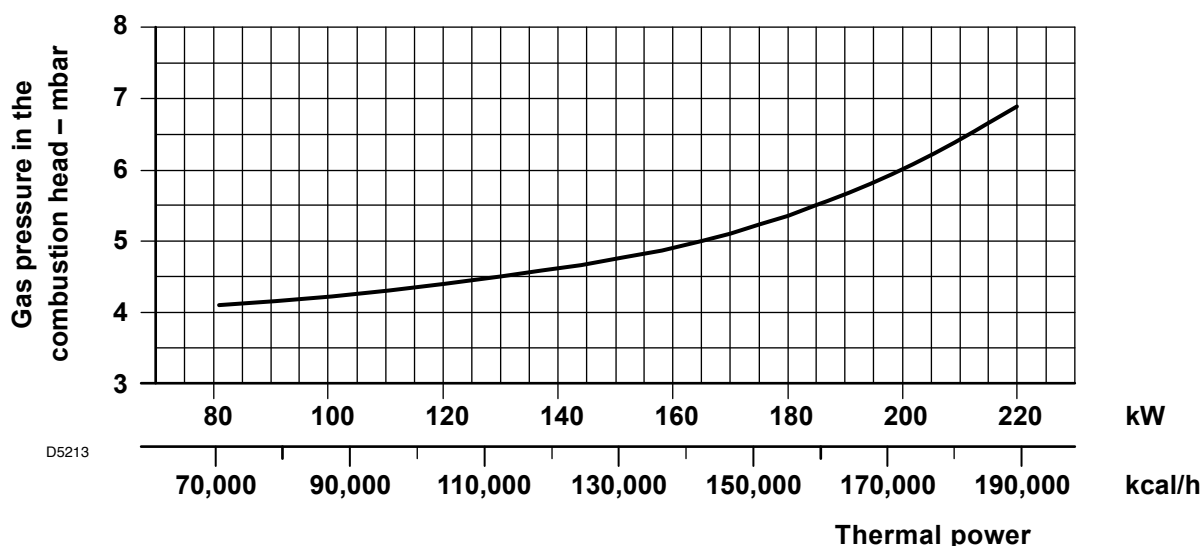
The working field has been defined according to EN 676 standard.

## COMMERCIAL BOILERS

The burner-boiler matching is assured if the boiler 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

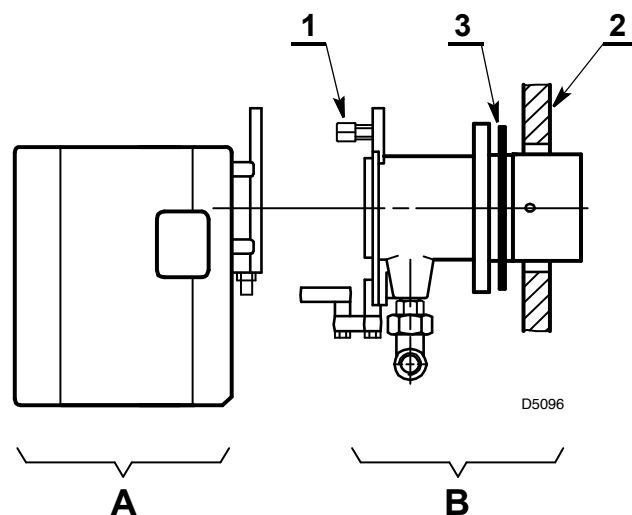
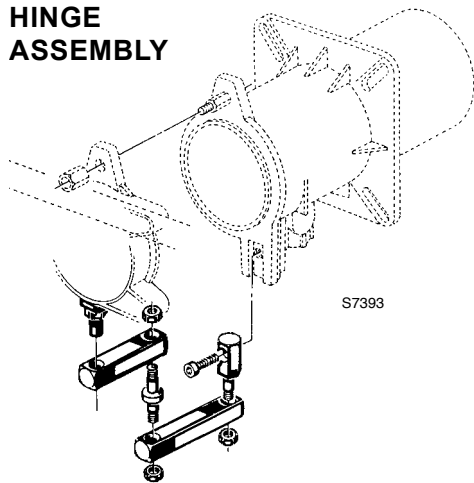
#### IMPORTANT

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

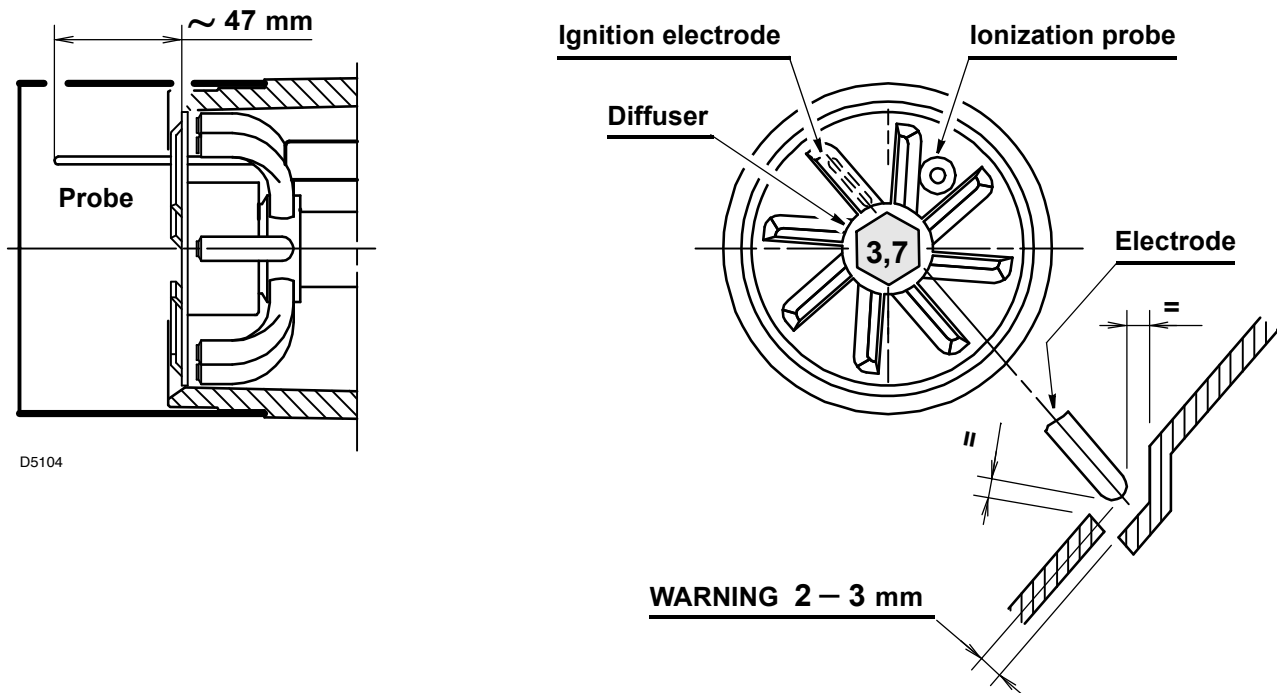
If thickness is greater (**max. 260 mm**), a combustion head extension must be fitted, which is supplied separately.

- 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).

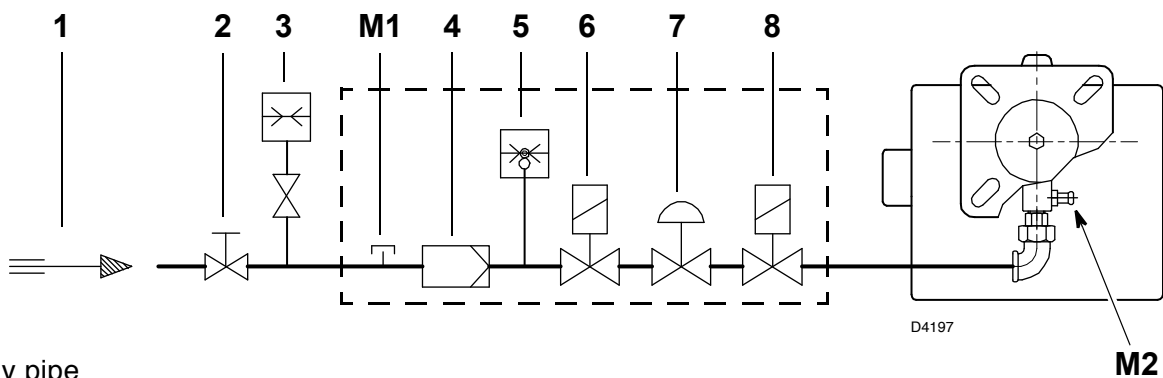
#### HINGE ASSEMBLY



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

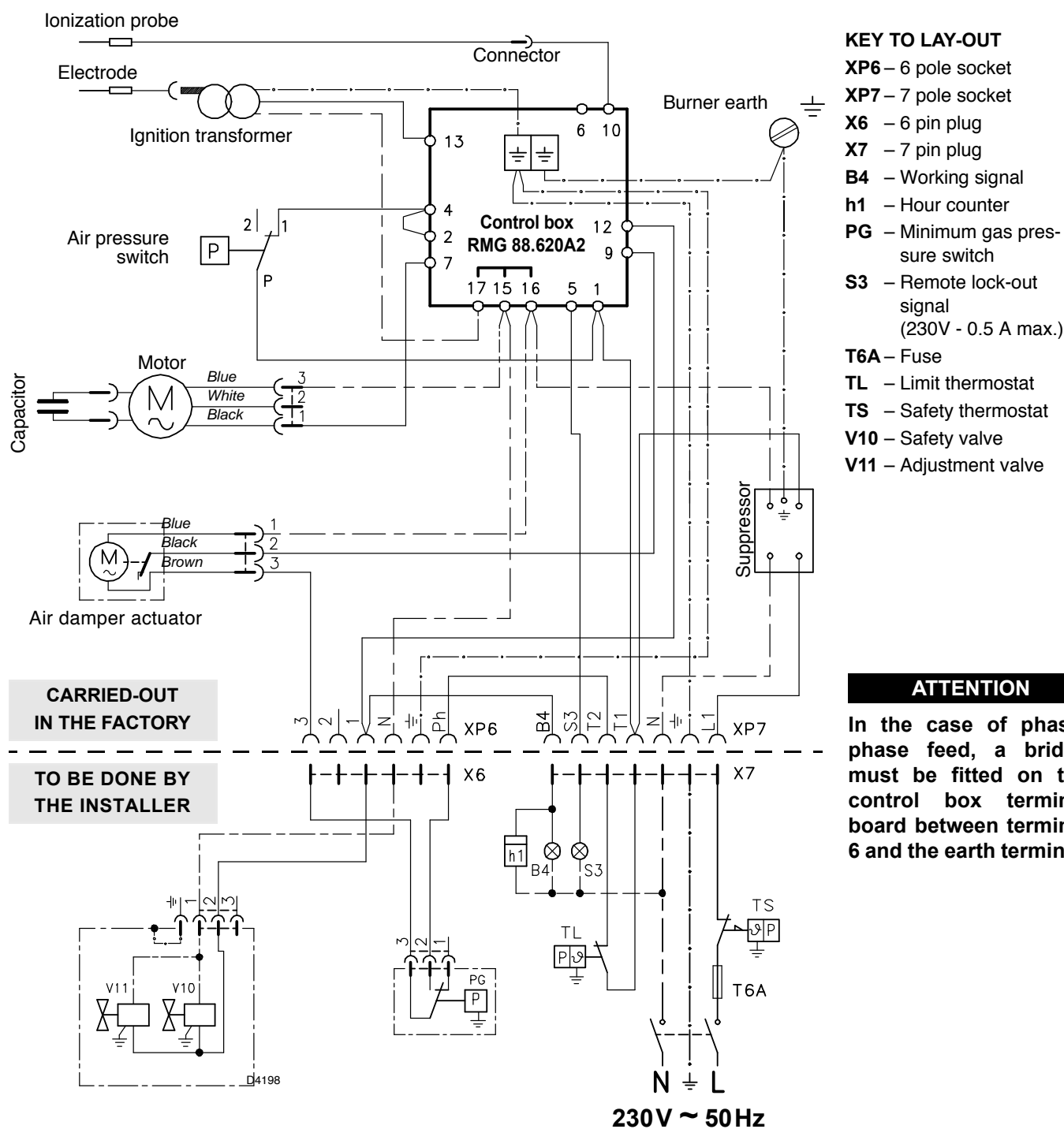
GAS TRAIN ACCORDING TO EN 676

GAS TRAIN		CONNECTIONS		USE
TYPE	CODE	INLET	OUTLET	
MBDLE 407 B01	3970531	Rp 3/4	Rp 3/4	Natural gas ≤ 80 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<sup>2</sup>. (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

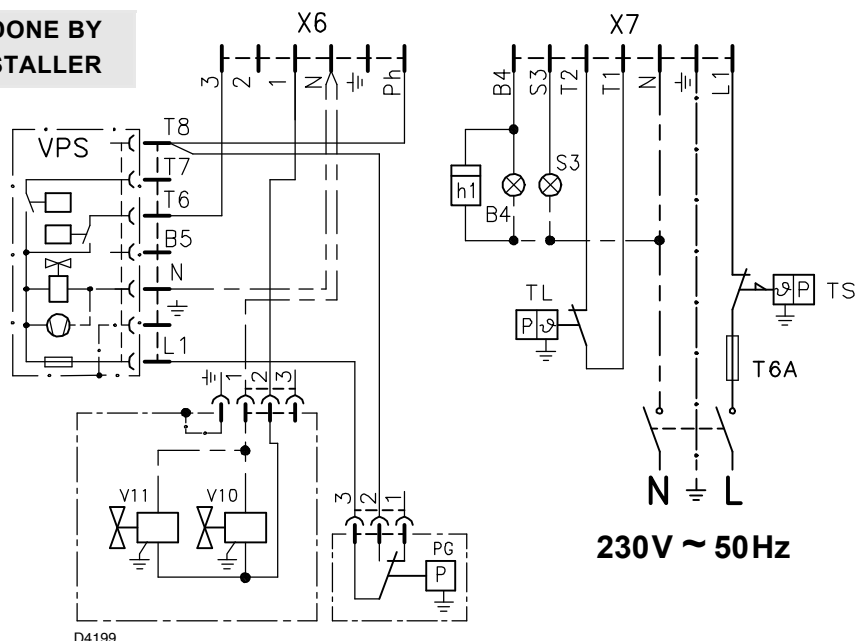
The burners have been type-approved for intermittent operation. This means they must stop at least once every 24 hours in order to allow the electrical control box to check its efficiency on start-up. The boiler limit thermostat (TL) normally ensures the burner halts. If this does not happen a time switch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

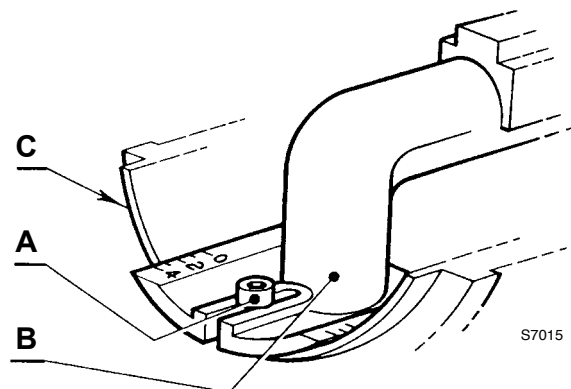
In conformity with Efficiency Directive 92/42/EEC the application of the burner on the boiler, adjustment and testing must be carried out observing the instruction manual of the boiler, including verification of the CO and CO<sub>2</sub> concentration in the flue gases, their temperatures and the average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

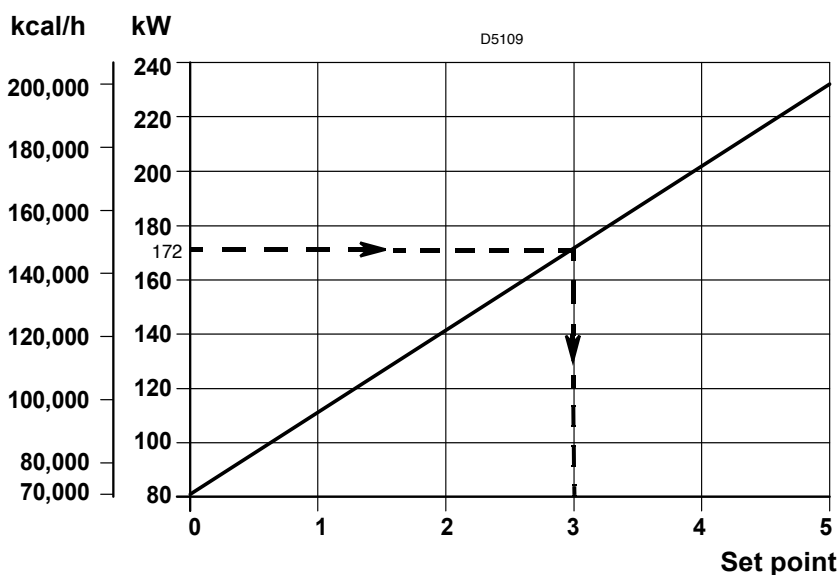
**Tighten the screw (A).**



### 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*).



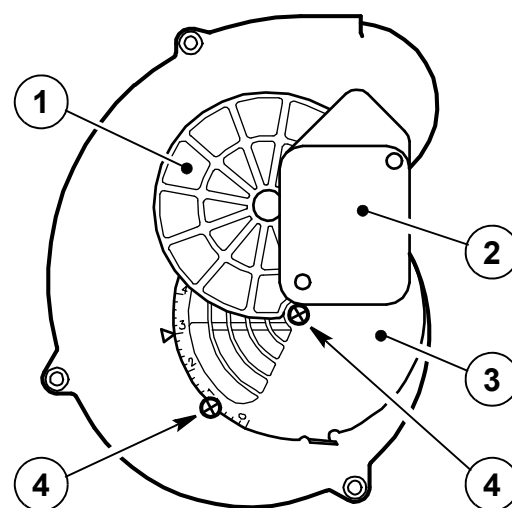


### 4.3 AIR DAMPER SETTING

The air damper (1) is operated by the actuator (2) and assures that the air damper is fully open before the burner start cycle begins .

The regulation of the air-rate is made by adjusting the fixed air damper (3), after loosening the screws (4).

When the optimal regulation is reached, **screw tight the screws (4)** to assure a free movement of the mobile air damper (1).



### 4.4 COMBUSTION CHECK

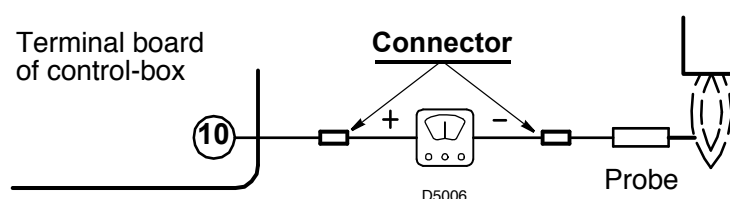
It is advisable to set the burner according to the type of gas used and following the indications of the table:

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 $\lambda = 1.2$	CO <sub>2</sub> % $\lambda = 1.3$	CO mg/kWh	NO <sub>x</sub> mg/kWh
G 20	11.7	9.7	9.0	$\leq 100$	$\leq 170$
G 25	11.5	9.5	8.8	$\leq 100$	$\leq 170$
G 30	14.0	11.6	10.7	$\leq 100$	$\leq 230$
G 31	13.7	11.4	10.5	$\leq 100$	$\leq 230$

### IONIZATION CURRENT

The minimum current necessary for the control box operation is 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%.



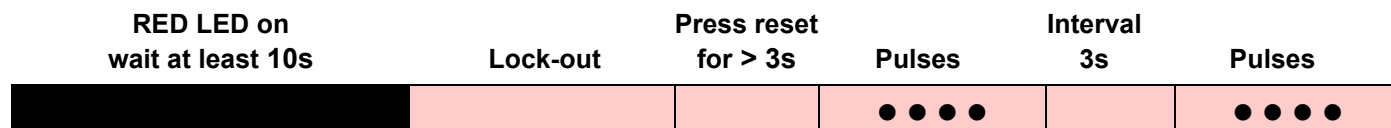
## 4.8 RESETTING THE CONTROL BOX AND USING DIAGNOSTICS

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. 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).

## 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 (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 pulses ● ●	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 pulses ● ● ●	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:	
		15 - Air pressure switch incorrectly adjusted.	Adjust or replace
		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 pulses ● ● ● ● ● ● ● ● ● ●	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 pulses	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 . . . 41 - Minimum gas pressure switch fails to close 42 - Servomotor fails to move to min. . . ignition position	Contact your GAS COMPANY Adjust or replace Replace
	The burner continues to repeat the start-up cycle, without lockout	43 - The gas pressure in the gas mains lies very close to the value to which the minimum gas pressure switch has been set. The sudden drop in pressure after valve opening causes temporary opening of the pressure switch itself, the valve immediately closes and the burner comes to a halt. Pressure increases again, the pressure switch closes again and the ignition cycle is repeated. And so on	Reduce the minimum gas pressure switch intervention pressure. Replace the gas filter cartridge.
	Ignition with pulsations	44 - Poorly adjusted head . . . . .	Adjust. See page 6
		45 - Ignition electrode incorrectly adjusted	Adjust, see page 4
		46 - Incorrectly adjusted fan air damper: too much air	Adjust
	Burner stops with air damper open	47 - Output during ignition phase is too high	Reduce
		48 - Defective servomotor . . . . .	Replace

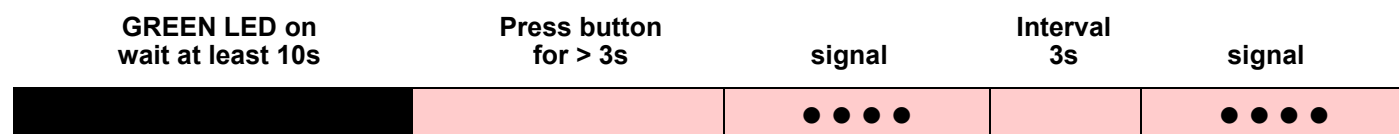
**N.B.:** If problems still occur after all of the above checks have been made, check the electrical connections on the plug and sockets, the damper and burner motor, gas control wiring ignition transformer and external interlocks, if the burner still fails to function, replace the control box.

## 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 pulse ●	0.4s
2pulses ● ●	0.8s
6 pulses ● ● ● ● ● ●	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：
- 它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 Technical Assistance Centre（技术支持中心）索取说明书的复本 **RIELLO**；
  - 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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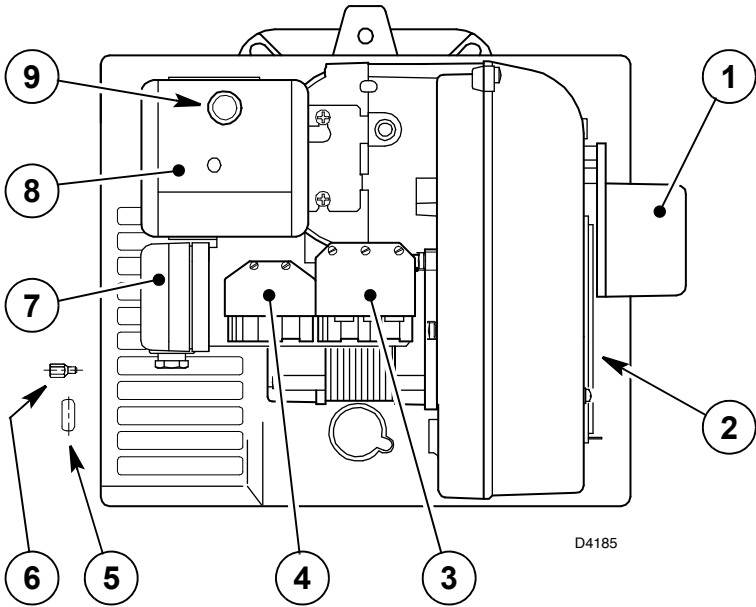
1. 燃烧器描述

一段火运行燃烧器 .

- 燃烧器符合下列标准 : EMC 89/336/EC - 2004/108/EC, 低电压 73/23/EC - 2006/95/EC 和效率 92/42/EEC.
- 燃烧器已经按照 EN 676 规程的规定进行间歇性运行的检验。
- 燃烧器保护等级为 IP X0D (IP 40), EN 60529.
- 燃气阀组符合 EN 676 标准 .

图 . 1

- 1 - 风门挡板伺服马达
- 2 - 风门
- 3 - 供电及控制用 7 孔插座
- 4 - 连接燃气阀组的 6 孔插座
- 5 - 电缆垫圈
- 6 - 固定外壳的螺钉
- 7 - 空气压力开关
- 8 - 控制盒
- 9 - 带锁定指示灯的复位按钮



注意

电缆垫圈 (5) 和外壳固定螺钉 (6) 必须与阀门组在同一侧 .

1.1 燃烧器随机附件

绝热垫.....	1	将法兰安装到锅炉上的螺栓和螺母 .....	4
电缆垫圈.....	1	固定外壳的螺钉.....	1
铰链 .....	1	7 针插头 .....	1

2. 技术参数

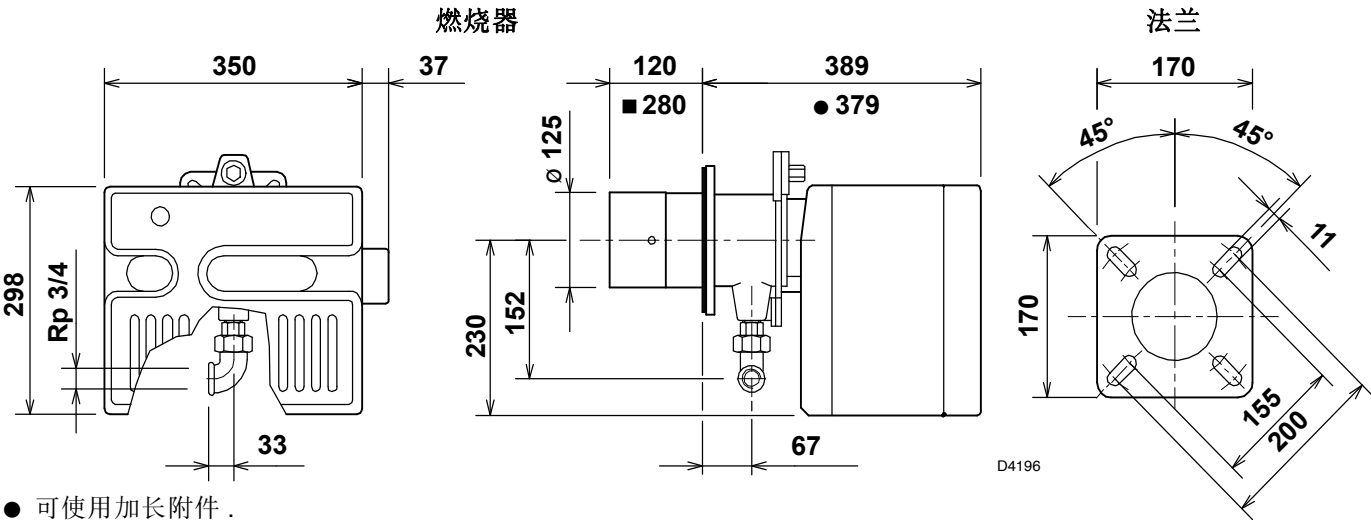
2.1 技术参数

燃烧器出力	(1)	81 – 220 kW - 70,000 – 189,000 kcal/h
天然气	(品种 2)	净热值：8 – 12 kWh/Nm <sup>3</sup> - 7,000 – 10,340 kcal/Nm <sup>3</sup>
		压力： min. 20 mbar - max. 100 mbar
电源		单相，230 V ± 10% ~ 50Hz
马达		230V / 1.4 A
马达启动电容		5 µF
点火变压器		初级 230V / 1.8A - 次级 8 kV / 30 mA
电功耗		0.25 kW
(1) 参考条件：温度 . 20°C - 大气压力 1013 mbar – 海拔 0 m .		

对燃用 LPG (品种 3) 可选特殊附件 .

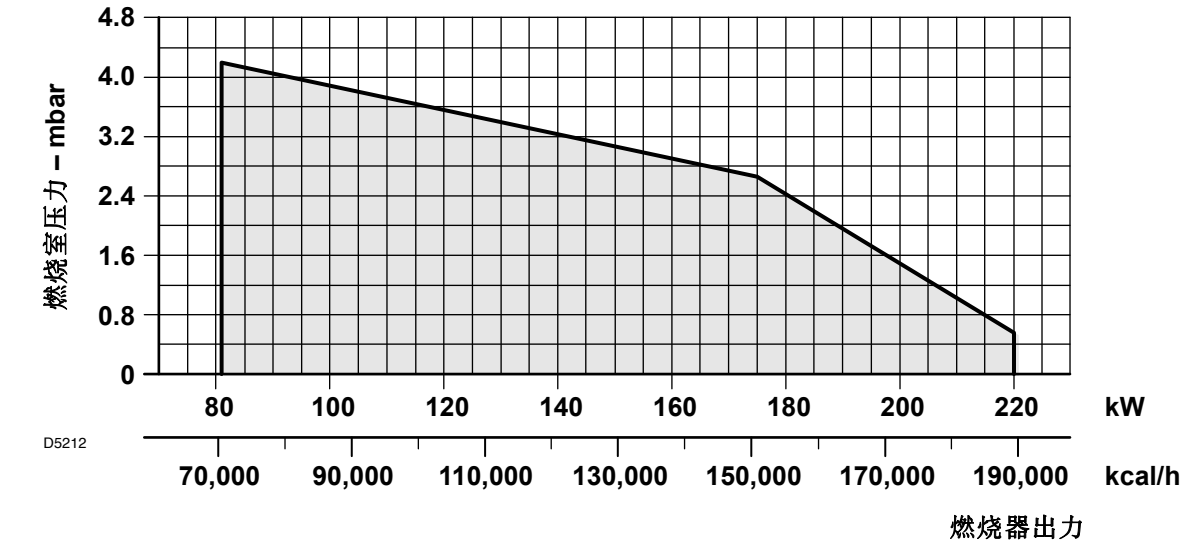
国家	AT	DE	ES - GB - IE	LU	NL
燃气种类	II2H3B/P	II2ELL3B/P	II2H3P	II2E3B/P	II2L3B/P

2.2 外观尺寸



- 可使用加长附件 .
- 加长燃烧头，单独定货 .

2.3 工作范围，( 参照 EN 676)



## 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。

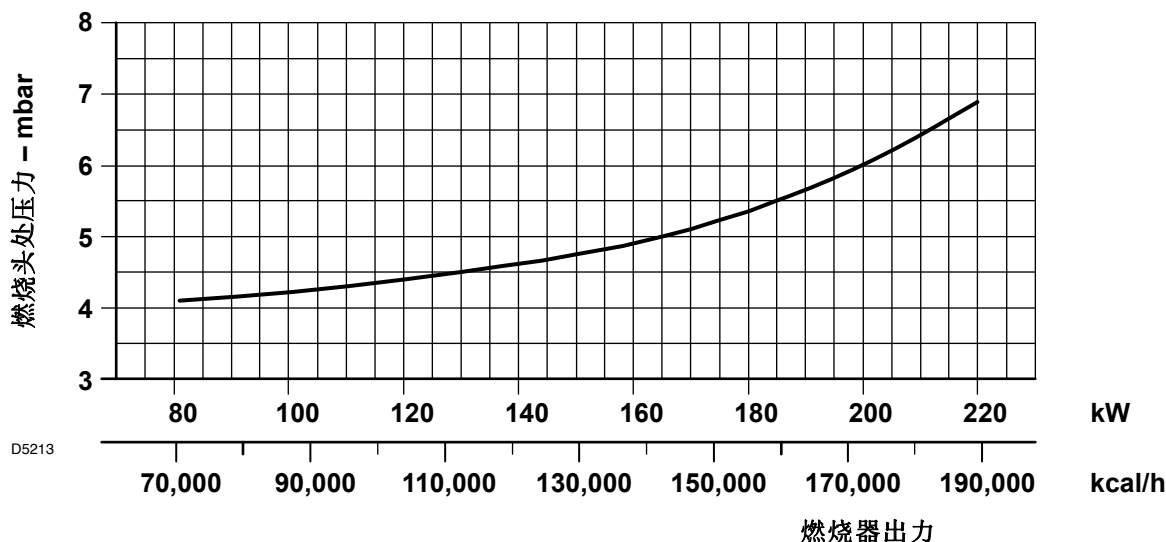
## 商用锅炉

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/m<sup>3</sup> (8.570 kcal/m<sup>3</sup>) 的 G20 燃气和锅炉背压为 0 mbar 进行测试时，燃烧器最大出力时燃烧头的压降为 6.9 mbar(M2, 参见节 3.3, P. 4)。



## 3. 安装

燃烧器的安装必须符合当地法规 and 标准。

### 3.1 燃烧器安装

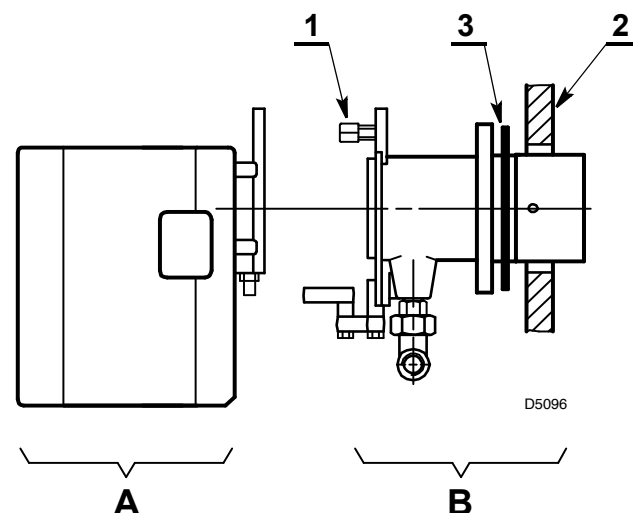
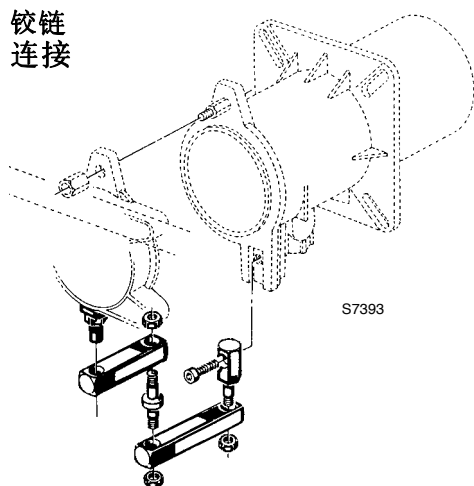
#### 重要

锅炉炉门至少有 100 mm 的厚度，其中 包括耐火材料的厚度。

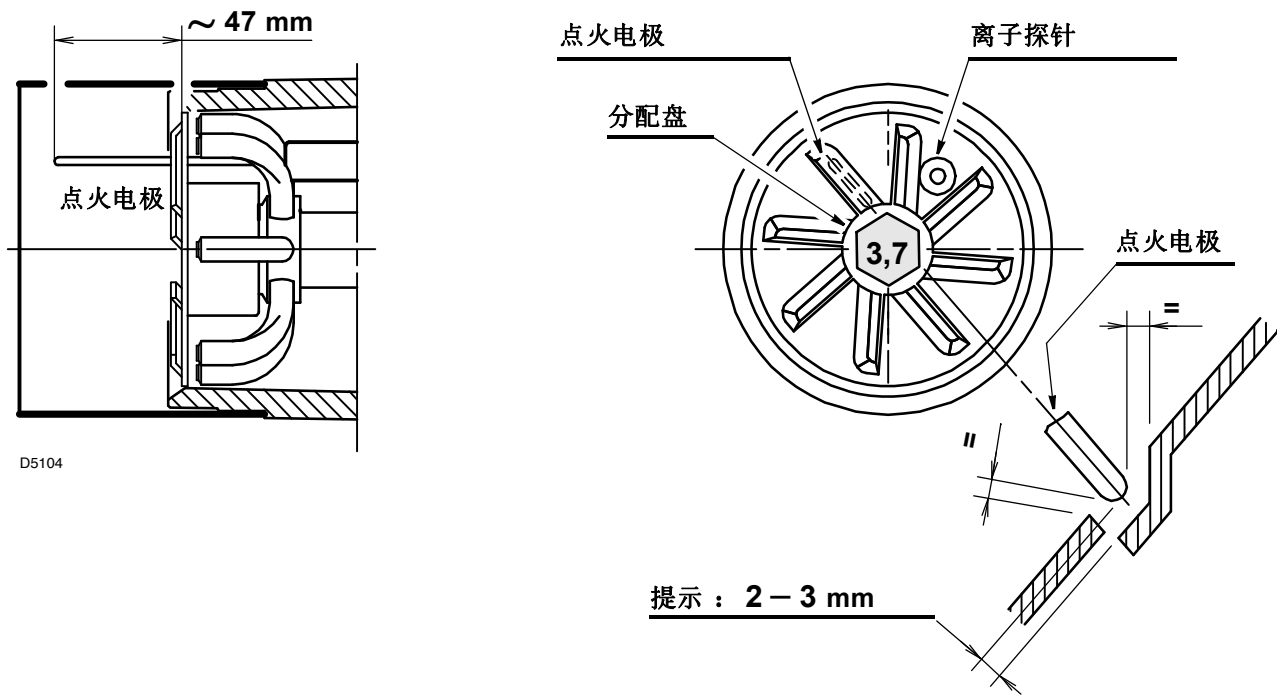
若厚度大于 260 mm，可安装单独供货的加长燃烧头。

- 移开螺母 (1) 及移开 (A) 部分后将燃烧头组件从燃烧器上移开。
- 在燃烧器头部 (B) 安装上绝热垫 (3) 后与锅炉 (2) 紧固连接。

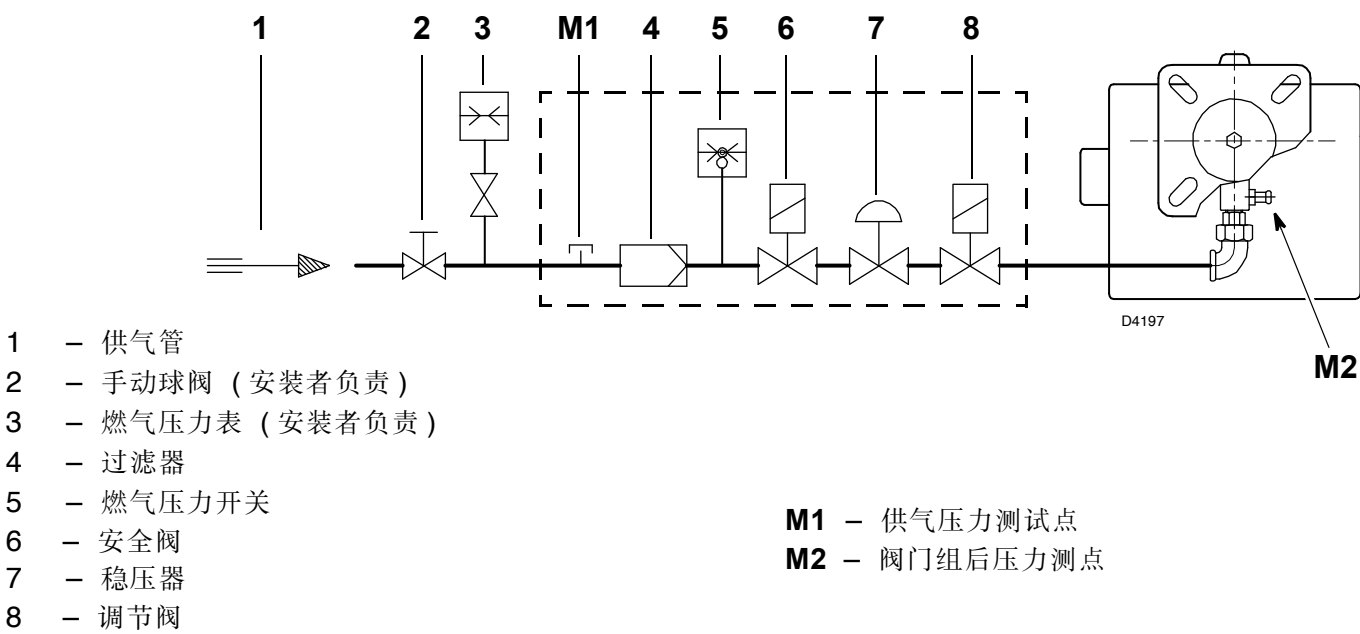
铰链  
连接



3.2 离子探针 - 点火电极定位



3.3 燃气管线



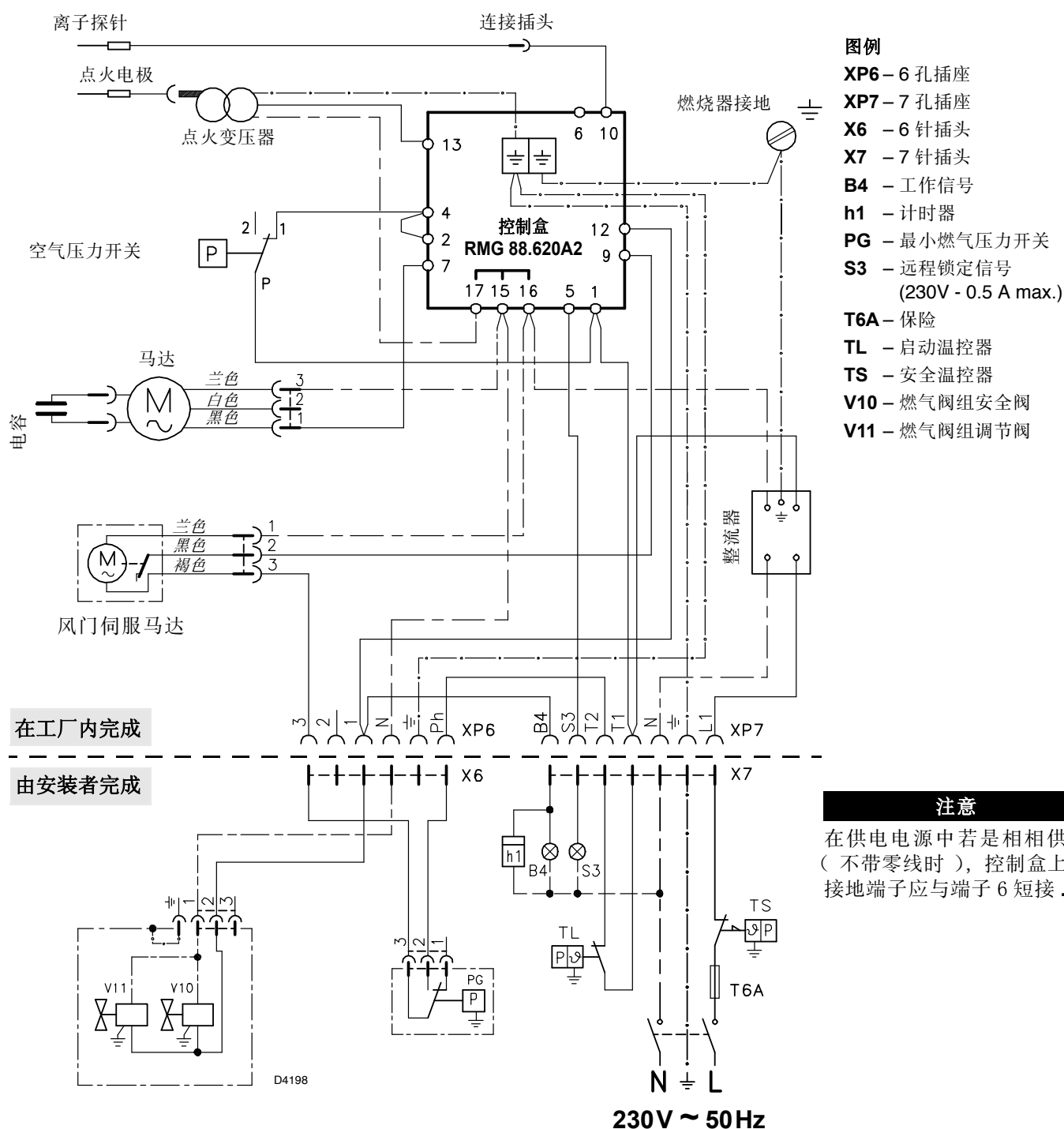
符合 EN 676 的燃气阀组

燃气阀组		连接方式		应用
类型	编码	入口	出口	
MBDLE 407 B01	3970531	Rp 3/4	Rp 3/4	天然气（出力 ≤180 kW）和 LPG
MBDLE 410 B01	3970532	Rp 1	Rp 3/4	天然气 和 LPG

燃气阀组单独提供，它的调整参考附带的说明书。

## 3.4 电气连接

### 3.4.1 标准电气连接



#### 注意：

- 不要将零线和火线接反，应该按照图示接线并接地良好。
- 导体截面不可小于 1 平方毫米（除特殊要求外，否则按照当地的标准执行）。
- 由安装人员执行的电线安装必须与所在国家和地区的规定相符合。
- 应该证实操作锅炉控制恒温器可以停止燃烧器运行，还应证实将红色电离探针铅接头分离后，燃烧器是否锁定。

#### 说明：

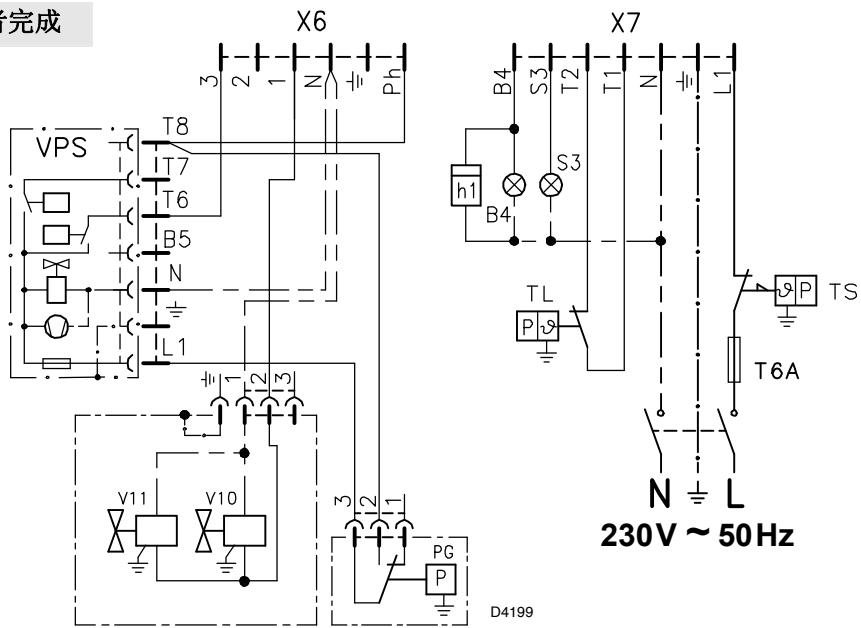
燃烧器已经进行了规定的间歇性运行的检验，这意味着每 24 小时运行必须停机一次，以便让电气控制箱检验其启动性能。通常，锅炉限制恒温器（TL）可以确保燃烧器停止运行。一旦该功能不起作用，每 24 小时运行必须动作一次的开关将替代限制恒温器（TL）而停止燃烧器的运行。

3.4.2 泄露检测仪的电气连接 (DUNGS VPS 504)

由安装者完成

图例

- X6 - 6 孔插头
- X7 - 7 孔插头
- 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 - 0.5 A max.)
- T6A - 保险
- TL - 启动温控器
- TS - 安全温控器
- V10 - 安全阀
- V11 - 调节阀



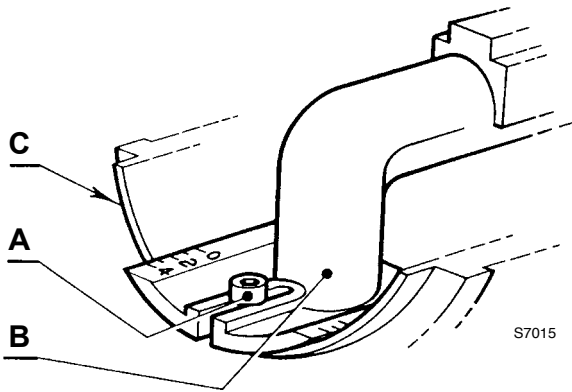
4. 工作

4.1 燃烧调节

根据燃烧器运用于锅炉上的效率标准 92/42/EEC，调试燃烧器必须参考锅炉的使用说明书，这一工作包括调整烟气中的 CO 和 CO2 含量，烟温及锅炉的平均水温。  
要达到所需要的出力，须选择正确的燃烧头设定值和风门设定值。

4.2 燃烧头设定

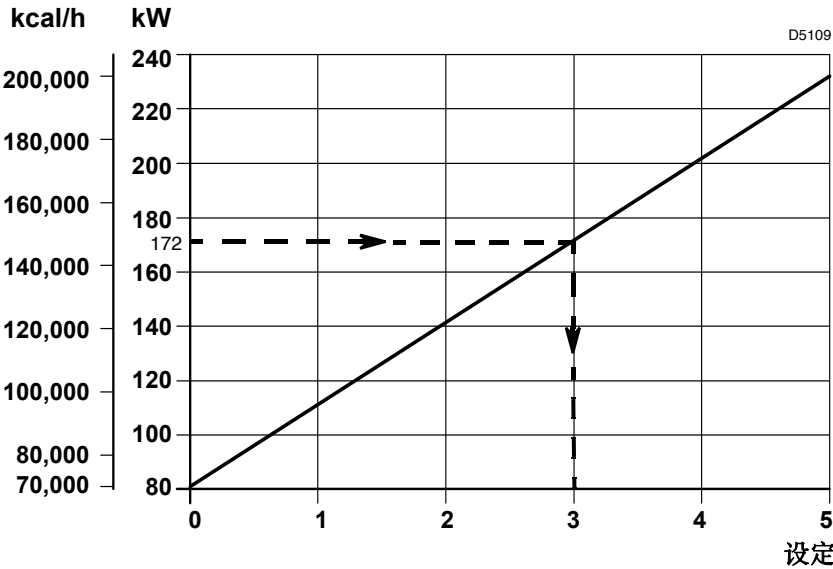
拧松螺钉 (A), 移动肘型弯管 (B) 使之与连接器 (C) 的端面对齐到相应的刻度。  
拧紧螺钉 (A).



示例：

燃烧器安装在出力为 155 kW 的锅炉。  
锅炉效率为 90%，燃烧器出力应为 172 kW. 如图所示，燃烧器燃烧头应设在 刻度 3.

此图表一般只在初期设定时参照，为了改变空气压力开关 或改善燃烧，如需要可减少该设置（向 0 的位置方向调节）.

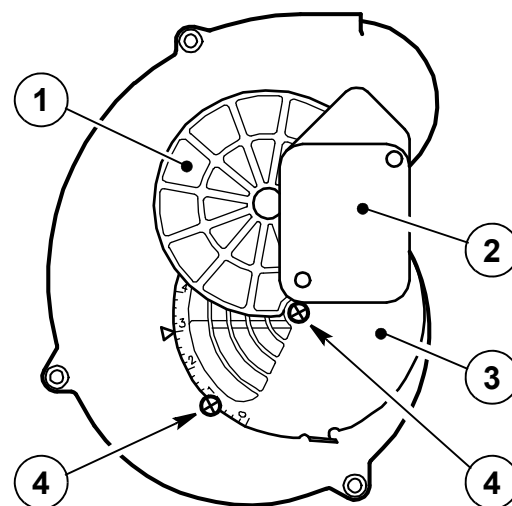


### 4.3 风门挡板调节

风门挡板 (1) 是由伺服马达 (2) 控制并确保在燃烧器启动程序开始时风门完全打开。

拧松螺钉 (4) 后，通过调整调节盘 (3) 来控制风门的开度。

当达到最佳调整时，**拧紧螺钉 (4)** 以保证风门 挡板 (1) 的正常行程。



### 4.4 燃烧检查

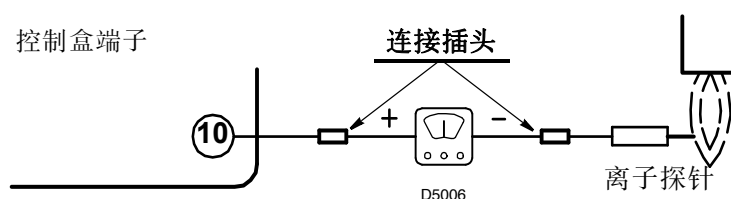
建议根据燃气种类和下表所示参数来初步设定燃烧器：

EN 676		过量空气系数： 最大输出 $\lambda \leq 1.2$ - 最小输出 $\lambda \leq 1.3$			
燃气	最大 . CO <sub>2</sub> 0 % O <sub>2</sub>	设定 $\lambda = 1.2$	CO <sub>2</sub> % $\lambda = 1.3$	CO mg/kWh	NO <sub>x</sub> mg/kWh
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 3  $\mu$ A.

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应在初始位置。

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半个刻度值，并再次检查燃烧器是否能正常启动如燃烧器锁定，应再减少半个刻度值。

#### 注意：

作为标准条例，当排烟中的 CO 值 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。





## 4.8 控制盒复位和诊断

控制盒的诊断功能是通过红色的 LED 来显示的，很容易确定故障原因。

在应用这一功能时，燃烧器须进入安全状态（锁定状态）10 秒后，再按复位按钮。

控制盒产生一系列闪烁（1 秒的间隔），它会在 3 秒的间隔后重复。

闪烁的次数对应可能的故障原因，控制盒必须按复位按钮 1-3 秒进行复位。

红灯后至少 等待 10s	锁定	按复位按钮 超过 3s	闪烁	间隔 3s	闪烁
			● ● ● ●		● ● ● ●

控制盒复位及故障诊断如下所示。

### 控制盒复位

控制盒复位，按以下步骤进行：

- 按复位按钮保持 1-3 秒。  
松开按钮 2 秒后燃烧器会重新启动。  
如燃烧器不能启动，必须检查温控器接点是否闭合。

### 显示诊断

指示出燃烧器锁定的故障原因。

按以下步骤进行诊断：

- 如 LED 红灯常亮，按住复位按钮保持 3 秒以上。  
黄灯亮表示控制盒进入诊断状态。  
开始闪烁时松开复位按钮。  
闪烁的次数分别对应不同的故障原因，见 P10 的故障表。

### 软件诊断

通过 PC 机可下载燃烧器的运行报告，其中包括运行时间，锁定的原因和次数及控制盒序列号等...

按以下步骤进行诊断：

- LED 红灯常亮，按住复位按钮保持 3 秒以上。  
黄灯亮表示控制盒进入诊断状态。  
松开按钮 1 秒，再按复位按钮 3 秒以上直到黄灯再闪。  
再次松开按钮后，红灯高频闪烁：说明与计算机的连接已经接通。

诊断工作结束后，控制盒必须通过复位程序恢复到初始状态。

按按钮时间	控制盒状态
按 1-3 秒	控制盒复位，没有显示诊断。
按住超过 3 秒	锁定状态下的显示诊断： (LED 闪烁有 1 秒的间隔)。
显示诊断后按住超过 3 秒	通过接口与 PC 机连接进行软件诊断（运行时间，故障等的监视）

根据下表所示，闪烁的次数就代表各自的故障原因。

信号	可能原因
闪两次 ● ●	安全时间过后火焰不稳： – 离子探针故障； – 燃气阀组故障或堵塞； – 火线与零线接反； – 点火变压器故障； – 燃烧器调整不当（燃气量不足）。
闪三次 ● ● ●	最低空气压力开关不闭合 – 确认 VPS 断开将造成闭锁； – 空气压力开关故障； – 空气压力开关调整不当； – 风扇马达不运转； – 最大空气压力开关运行。
闪四次 ● ● ● ●	点火前空气压力开关没断开 或燃烧室内有虚假火焰： – 空气压力开关故障； – 空气压力开关调整不当。
闪七次 ● ● ● ● ● ● ●	运行中火焰消失： – 燃烧器调整不当（燃气量不足）； – 燃气阀组故障或堵塞； – 离子探针接地。
闪十次 ● ● ● ● ● ● ● ● ● ●	– 接线错误或内部故障。

## 5. 维护

燃烧器必须由授权的和有资格的技术人员**按照当地法规和标准**进行定期性的维护。

维护对于燃烧器运行的可靠性是必要的，可避免燃料的过量消耗以及随之而来的污染。

**在进行维护清理之前，必须将系统的主电源开关关掉，以切断燃烧器的电源。**

**基本的检查有：**

让燃烧器不间断地运行 10 分钟，按本说明书检查所有组件的设置。 然后进行燃烧测试以检查以下各项：

- CO<sub>2</sub> (%) 的含量
- 排烟温度
- CO (ppm) 的含量。

## 6. 故障 / 解决方法

下表所示是造成启动故障或燃烧器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 (9, 图 . 1, P. 1) 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。

### 燃烧器启动故障

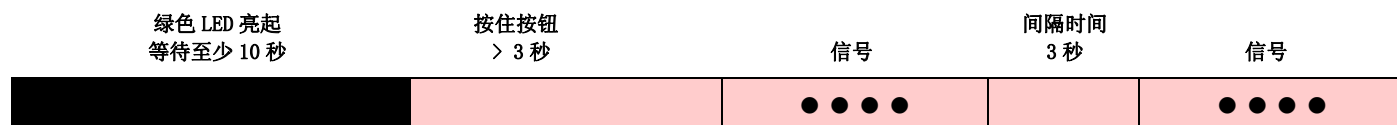
信号	故障	故障起因	推荐的纠正措施
闪烁 2 次 ● ●	一旦预净化阶段和安全时间已过，燃烧器就进入锁止状态，不会出现火焰。	1 - 操作电磁阀只让少量气体通过 . . 2 - 两个电磁阀中的其中一个不打开。 3 - 气体压力过低 . . . . . 4 - 点火电极调整不正确 . . . . . 5 - 由于绝缘层破裂，导致电极接地 . 6 - 高压电缆有故障 . . . . . 7 - 因高温导致高压电缆已变形 . . . 8 - 点火变压器有故障 . . . . . 9 - 阀门或变压器电线不正确 . . . . 10 - 控制箱有故障 . . . . . 11 - 气体燃烧系上行线路中的阀关闭 . 12 - 管道中存在空气 . . . . . 13 - 气体阀未连接或其线圈中断 . . .	增加 更换 在调节器处增大压力 有关调整，请参见第 4 页 更换 更换 更换和保护 更换 检查 更换 打开 排出空气 检查连接情况或更换线圈
闪烁 3 次 ● ● ●	燃烧器未接通，出现锁止 燃烧器接通，但随后停止在锁止状态 在预净化阶段出现锁止	14 - 空气压力开关处于工作位置 . . . - 空气压力开关因空气压力不足而停止工作： 15 - 空气压力开关调节不正确。对其进行调节 16 - 空气压力开关测试点管路堵塞 . . 17 - 燃烧头调整不良 . . . . . 18 - 火炉中的压力过高 . . . . . 19 - 电机控制接触器有故障 . . . . . (仅适用于三相型) 20 - 电机有故障 . . . . . 21 - 电机锁止 (电机有故障) . . . . .	调节或更换 调节或更换 清洁 调整 将空气压力开关连接至风扇吸入管路 更换 更换 更换
闪烁 4 次 ● ● ● ●	燃烧器接通，但随后停止在锁止状态 当燃烧器停止时锁止	22 - 火焰模拟 . . . . . 23 - 燃烧头或火焰模拟中持续存在火焰	更换控制箱 排除火焰持续存在现象或更换控制箱
闪烁 7 次 ● ● ● ● ● ● ●	在出现火焰后，燃烧器立即进入锁止状态 燃烧器在工作期间进入锁止状态	24 - 操作电磁阀只让少量气体通过 . 25 - 电离探针调整不正确 . . . . . 26 - 电离不足 (少于 5 A) . . . . . 27 - 探针接地 . . . . . 28 - 燃烧器接地不良 . . . . . 29 - 相位和中性连接颠倒 . . . . . 30 - 火焰检测电路有故障 . . . . . 31 - 探针或电离电缆接地 . . . . .	增加 有关调整，请参见第 4 页 检查探针位置 抽出或更换电缆 检查接地 将它们纠正过来 更换控制箱 更换磨损部件
闪烁 10 次 ● ● ● ● ● ● ● ● ● ●	燃烧器未接通，出现锁止 燃烧器进入锁止状态	32 - 电线不正确 . . . . . 33 - 控制箱有故障 . . . . . 34 - 恒温器线路中出现电磁干扰 . . .	检查 更换 进行滤波或消除

信号	故障	故障起因	推荐的纠正措施
无闪烁	燃烧器不启动	35 - 无供电电源. . . . .	关闭所有开关 - 检查连接情况 调整或更换 更换 更换 打开接触器和气体燃烧系之间的 手控阀 请联系您的气体供应公司 调整或更换 更换
		36 - 限制器或安全控制装置打开. . . . .	
		37 - 线路保险丝熔断. . . . .	
		38 - 控制箱有故障. . . . .	
	燃烧器继续重复启动循环，未锁止	39 - 无气体供应. . . . .	减小最低气体压力开关干预压力。更换气体过滤器滤芯。
		40 - 主气体压力不足. . . . .	
		41 - 最低气体压力开关不能关闭. . . . .	
		42 - 伺服电机不能移动至最小点火位置	
	脉动点火	43 - 气体主管路中的气体压力非常接近于在气体压力开关上设定的值。阀门打开后的压力突然下降导致压力开关本身暂时打开，致使阀门立即关闭且燃烧器停止工作。随后压力再次增加，压力开关再次关闭，并重复点火循环。等等	进行调整。参见第 6 页 有关调整，请参见第 4 页 调整 减小 更换
		44 - 燃烧头调整不良. . . . .	
		45 - 点火电极调整不正确. . . . .	
		46 - 风扇空气阻尼器调整不正确：太多空气	
	燃烧器在空气阻尼器打开时停止	47 - 点火阶段期间的输出过高. . . . .	
		48 - 伺服电机有故障. . . . .	

**注意 .:** 如进行完上述检查后仍存在问题，请检查插头及插座的电气连接，风门及燃烧器马达，点火变压器及外部锁定的电气连接，如燃烧器仍不能正常工作，更换控制盒。

## 正常工作 / 火焰检测时间

控制箱还带有一个保证燃烧器正常工作的功能（信号：绿色 LED 持续亮起）。若要使用该功能，可在燃烧器点火后等待至少十秒钟，然后按住控制箱按钮至少 3 秒钟。在释放按钮后，绿色 LED 开始闪烁，如下图所示。



LED 的脉冲形成了一个间隔约为 3 秒的信号。根据下表，脉冲数可用于测量自气体阀打开后的探针“检测时间”：

信号	火焰检测时间
闪烁 1 次 ●	0.4 秒
闪烁 2 次 ● ●	0.8 秒
闪烁 6 次 ● ● ● ● ● ●	2.8 秒

这将在每次燃烧器启动时更新。一旦读取到数据，可通过短暂按下控制箱按钮重复燃烧器启动循环。

### 警告

若结果大于 2 秒，则将延迟点火。检查气体阀液压制动器的调整情况，以及空气阻尼器和燃烧头的调整情况。

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