

## **GB** Forced draught gas burner

Progressive two-stage or modulating operation

**UK  
CA**

CODE	MODEL
20190698	RS 250/M MZ



**Translation of the original instructions**

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## 1 Information and general warnings

### 1.1 Information about the instruction manual

#### 1.1.1 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 Centre 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.

#### Symbols used in the manual

In some parts of the manual you will see triangular DANGER signs. Pay great attention to these, as they indicate a situation of potential danger.

#### 1.1.2 General dangers

The **dangers** can be of **3 levels**, as indicated below.



**DANGER**

Maximum danger level!

This symbol indicates operations which, if not carried out correctly, cause serious injury, death or long-term health risks.



**ATTENTION**

This symbol indicates operations which, if not carried out correctly, may cause serious injury, death or long-term health risks.



**CAUTION**

This symbol indicates operations which, if not carried out correctly, may cause damage to the machine and/or injury to people.

#### 1.1.3 Other symbols



**DANGER**

#### **DANGER: LIVE COMPONENTS**

This symbol indicates operations which, if not carried out correctly, lead to electric shocks with lethal consequences.



#### **DANGER: FLAMMABLE MATERIAL**

This symbol indicates the presence of flammable materials.



#### **DANGER: BURNING**

This symbol indicates the risks of burns due to high temperatures.



#### **DANGER: CRUSHING OF LIMBS**

This symbol indicates the presence of moving parts: danger of crushing of limbs.



#### **WARNING: MOVING PARTS**

This symbol indicates that you must keep limbs away from moving mechanical parts; danger of crushing.



#### **DANGER: EXPLOSION**

This symbol signals places where an explosive atmosphere may be present. An explosive atmosphere is defined as a mixture - under atmospheric conditions - of air and flammable substances in the form of gases, vapours, mist or dust in which, after ignition has occurred, combustion spreads to the entire unburned mixture.



#### **PERSONAL PROTECTION EQUIPMENT**

These symbols indicate the equipment that must be worn and kept by the operator for protection against threats against safety and/or health while at work.



#### **OBLIGATION TO ASSEMBLE THE COVER AND ALL THE SAFETY AND PROTECTION DEVICES**

This symbol signals the obligation to reassemble the cover and all the safety and protection devices of the burner after any maintenance, cleaning or checking operations.



#### **ENVIRONMENTAL PROTECTION**

This symbol gives indications for the use of the machine with respect for the environment.



#### **IMPORTANT INFORMATION**

This symbol indicates important information that you must bear in mind.

- This symbol indicates a list.

#### **Abbreviations used**

Ch.	Chapter
Fig.	Figure
Page	Page
Sec.	Section
Table	Table

### 1.1.4 Delivery of the system and the instruction manual

When the system is delivered, it is important that:

- the instruction manual is delivered 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 must carefully inform the user about:
  - the use of the system;
  - any further tests that may be required before activating the system;
  - maintenance, and the need to have the system checked at least once a year by a representative of the manufacturer or another specialised technician.
 To ensure a periodic check, the manufacturer recommends the drawing up of a Maintenance Contract.

## 1.2 Guarantee and responsibility

The manufacturer guarantees its new products from the date of installation, in accordance with the regulations in force and/or the sales contract. At the moment of the first start-up, check that the burner is integral and complete.



**ATTENTION**

Failure to observe the information given in this manual, operating negligence, incorrect installation and carrying out of non authorised modifications will result in the annulment by the manufacturer of the guarantee that it supplies with the burner.

In particular, the rights to the guarantee and the responsibility will no longer be valid, in the event of damage to things or injury to people, if such damage/injury was due to any of the following causes:

- incorrect installation, start-up, use and maintenance of the burner;
- improper, incorrect or unreasonable use of the burner;
- intervention of unqualified personnel;
- carrying out of unauthorised modifications on the equipment;
- use of the burner with safety devices that are faulty, incorrectly applied and/or not working;
- installation of untested supplementary components on the burner;
- powering of the burner with unsuitable fuels;
- faults in the fuel supply system;
- continuation of use of the burner when a fault has occurred;
- repairs and/or overhauls incorrectly carried out;
- modification of the combustion chamber with inserts that prevent the regular development of the structurally established flame;
- insufficient and inappropriate surveillance and care of those burner components most likely to be subject to wear and tear;
- use of non-original components, including spare parts, kits, accessories and optional;
- force majeure.

**The manufacturer furthermore declines any and every responsibility for the failure to observe the contents of this manual.**

## 2 Safety and prevention

### 2.1 Introduction

The burners have been designed and built in compliance with current regulations and directives, applying the known technical safety rules and envisaging all the potential danger situations.

It is necessary, however, to bear in mind that the imprudent and clumsy use of the equipment may lead to situations of death risk for the user or third parties, as well as the damaging of the burner or other items. Inattention, thoughtlessness and excessive confidence often cause accidents; the same applies to tiredness and sleepiness.

It is a good idea to remember the following:

- The burner must only be used as expressly described. Any other use should be considered improper and therefore dangerous.

Specifically:

it can be applied to boilers operating with water, steam, diathermic oil, and to other uses expressly named by the manufacturer;

the type and pressure of the fuel, the voltage and frequency of the electrical power supply, the minimum and maximum deliveries for which the burner has been regulated, the pressurisation of the combustion chamber, the dimensions of the combustion chamber and the ambient temperature must all be within the values indicated in the instruction manual.

- Modification of the burner to alter its performance and destinations is not allowed.
- The burner must be used in exemplary technical safety conditions. Any disturbances that could compromise safety must be quickly eliminated.
- Opening or tampering with the burner components is not allowed, apart from the parts requiring maintenance.
- Only those parts envisaged by the manufacturer can be replaced.



ATTENTION

The manufacturer guarantees safety and proper operation only if all burner components are intact and correctly positioned.

### 2.2 Personnel training

The user is the person, body or company that has acquired the machine and intends to use it for the specific purpose. He is responsible for the machine and for the training of the people working around it.

The user:

- undertakes to entrust the machine exclusively to suitably trained and qualified personnel;
- undertakes to inform his personnel in a suitable way about the application and observance of the safety instructions. With that aim, the user undertakes to ensure that everyone knows the use and safety instructions for his own duties;
- Personnel must observe all the danger and caution indications shown on the machine.
- Personnel must not carry out, on their own initiative, operations or interventions that are not within their province.
- Personnel must inform their superiors of every problem or dangerous situation that may arise.
- The assembly of parts of other makes, or any modifications, can alter the characteristics of the machine and hence compromise operating safety. The manufacturer therefore declines any and every responsibility for any damage that may be caused by the use of non-original parts.

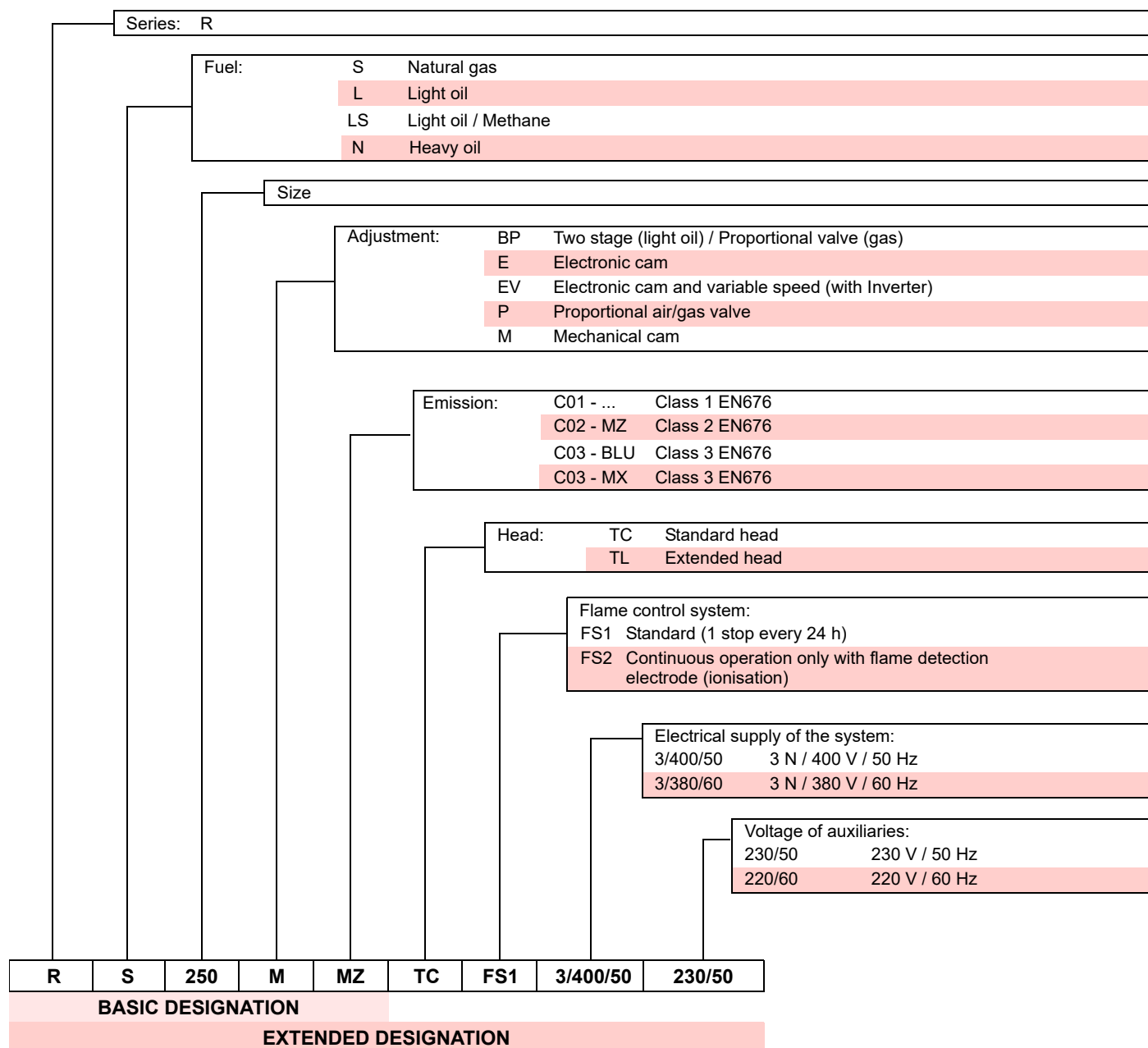
In addition:



- must take all the measures necessary to prevent unauthorised people gaining access to the machine;
- the user must inform the manufacturer if faults or malfunctioning of the accident prevention systems are noticed, along with any presumed danger situation;
- personnel must always use the personal protective equipment envisaged by legislation and follow the indications given in this manual.

### 3 Technical description of the burner

#### 3.1 Burner designation



#### 3.2 Models available

Designation	Voltage	Start-up	Code
RS 250/M MZ	3 ~ 400 V - 50 Hz	Direct	20190698

Tab. A



## 3.3 Technical data

Model			RS 250/M MZ
Power <sup>(1)</sup>	Max.	kW Mcal/h	1250 - 2650 1075 - 2279
	Min.	kW Mcal/h	600 516
Fuels			Natural gas: G20 (methane gas) - G25
Gas pressure at max. output <sup>(2)</sup> Gas: G20/G25		mbar	35/50.7
Operation			<ul style="list-style-type: none"> <li>On-Off (1 stop min each 24 hours)</li> <li>Progressive two-stage or modulating by kit (see Accessoires)</li> </ul>
Standard applications			Boilers: water, steam, diathermic oil
Ambient temperature		°C	0 - 40
Combustion air temperature		°C max	60
Noise levels <sup>(3)</sup>	Sound pressure	dB(A)	83
	Sound power		94
Weight complete with its packaging		kg	101
Approval			GB/T 36699

**Tab. B**

- (1) Reference conditions: Ambient temperature 20°C - Gas temperature 15°C - Barometric pressure 1013 mbar - Altitude 0 m a.s.l.  
 (2) Pressure at test point 11)(Fig. 4 on page 10) with zero pressure in combustion chamber and at maximum burner output.  
 (3) Sound pressure measured in manufacturer's combustion laboratory, with burner operating on test boiler and at maximum output. The sound power is measured using the "Free Field" method, required by EN 15036 standard, and according to an "Accuracy: Category 3" measurement, as described in EN ISO 3746.

## 3.4 Electrical data

Model			RS 250/M MZ
Main electrical supply			3 ~ 400 V +/-10% 50 Hz
Fan motor IE3	rpm		2935
	V		230/400
	kW		5.5
	A		17.7/10.2
Ignition transformer	V1 - V2		230 V - 1 x 8 kV
	I1 - I2		1 A - 20 mA
Absorbed electric power		kW max	5500
Protection level			IP 44

**Tab. C**

3.5 Maximum dimensions

The dimensions of the burner are given in Fig. 1.

Bear in mind that inspection of the combustion head requires the burner to be opened and the rear part turned on the hinge.

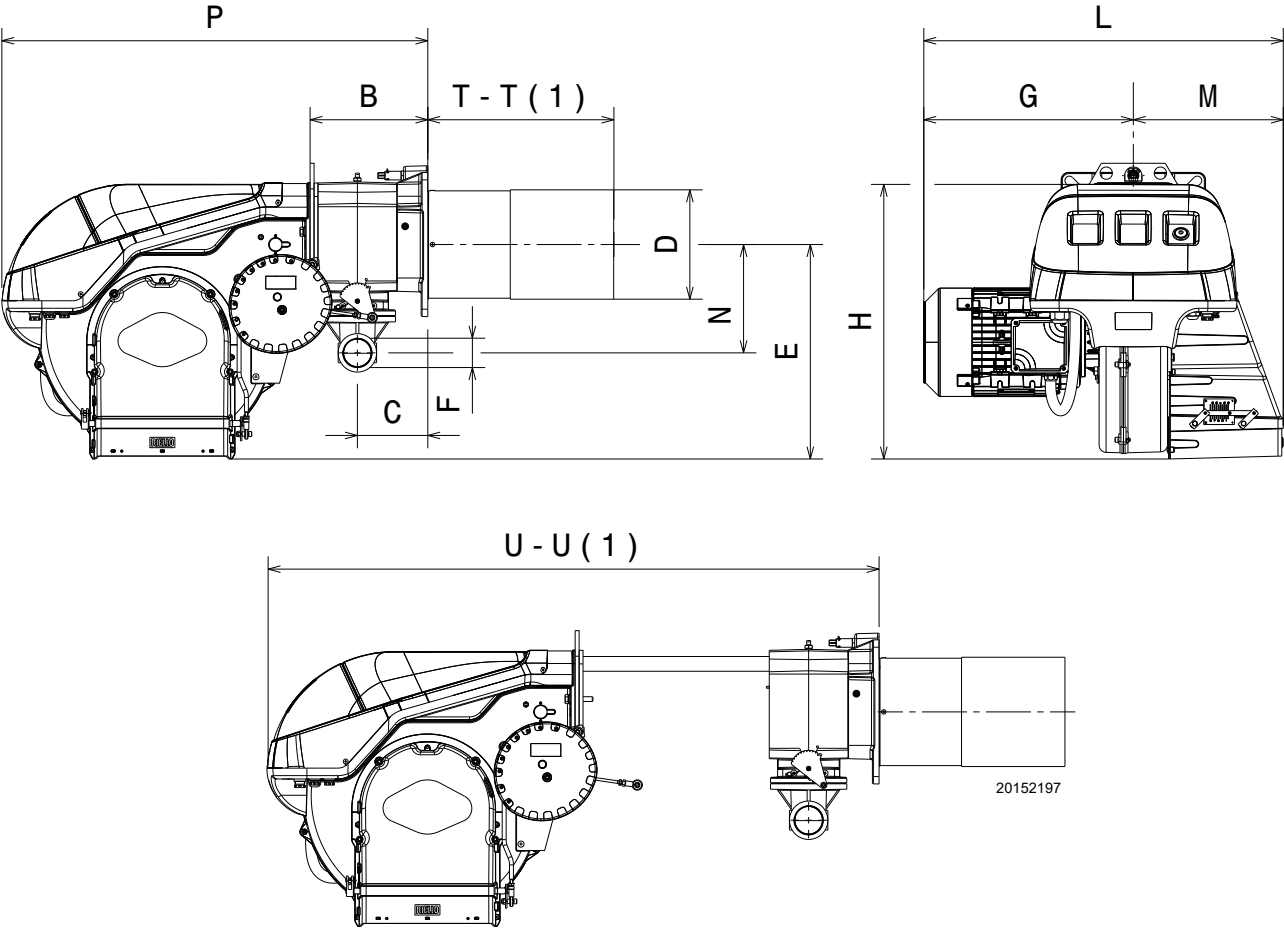


Fig. 1

mm	B	C	D	E	F	G	H	L	M	N	P	T - T (1)	U - U (1)
RS 250/M MZ	237	141	222	435	2"	427	558	732	305	261	863	378 - 522	1243 - 1388

Tab. D

(1) Blast tube: short-long

3.6 Burner equipment

Flange for gas train	No. 1
Gasket for gas train	No. 1
Flange fixing screws M 10 x 40	No. 6
Screws M 16 x 50 to fix the burner flange to the boiler	No. 4
Thermal flange gasket	No. 1
Disc	No. 1
Small disc.	No. 1
Instruction.	No. 1
Spare parts list.	No. 1

## 3.7 Firing rates

The **MAXIMUM OUTPUT** must be selected within area A.(Fig. 2).

The **MINIMUM OUTPUT** must not be lower than the minimum limit of the diagram: **600 kW**



The firing rate value (Fig. 2) has been obtained considering an ambient temperature of 20 °C, an atmospheric pressure of 1013 mbar (approx. 0 m a.s.l.), and with the combustion head adjusted as shown on page 18.

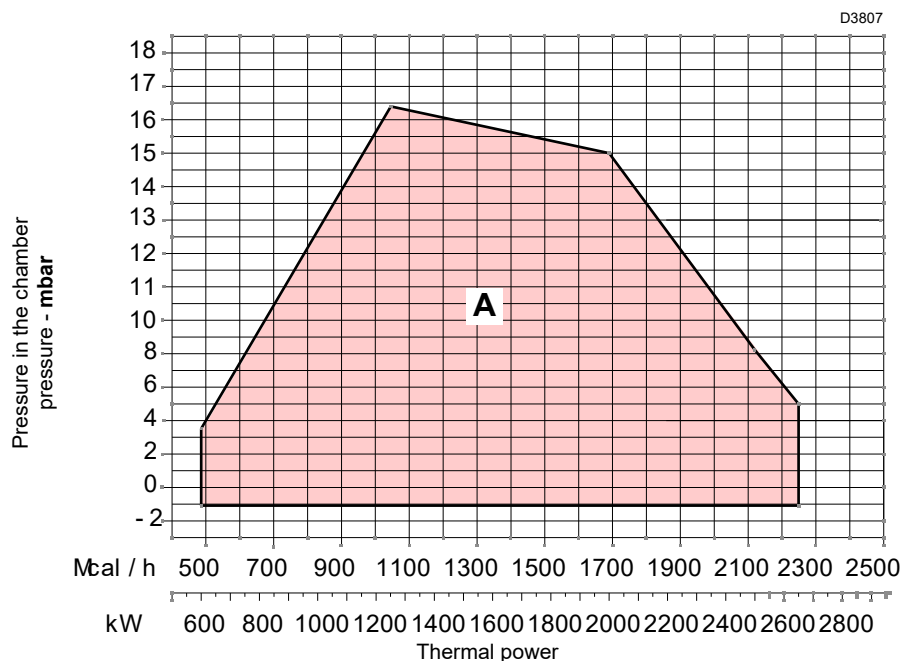


Fig. 2

## 3.8 Test boiler

The burner/boiler combination does not pose any problems if the boiler is EC approved and its combustion chamber dimensions are similar to those indicated in the diagram (Fig. 3).

If the burner must be combined with a boiler that has not been EC approved and/or its combustion chamber dimensions are clearly smaller than those indicated in the diagram, consult the manufacturer.

The firing rates were obtained in special test boilers, according to EN 676 standard.

In Fig. 3 you can see the diameter and length of the test combustion chamber.

**Example:**

Output 650 Mcal/h - diameter 60 cm - length 2 m

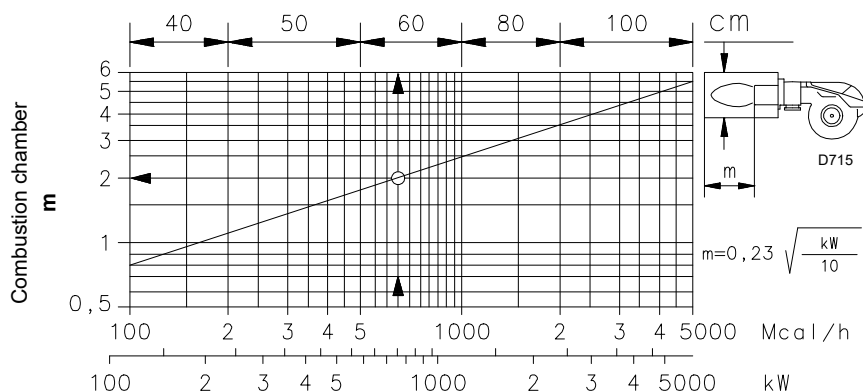
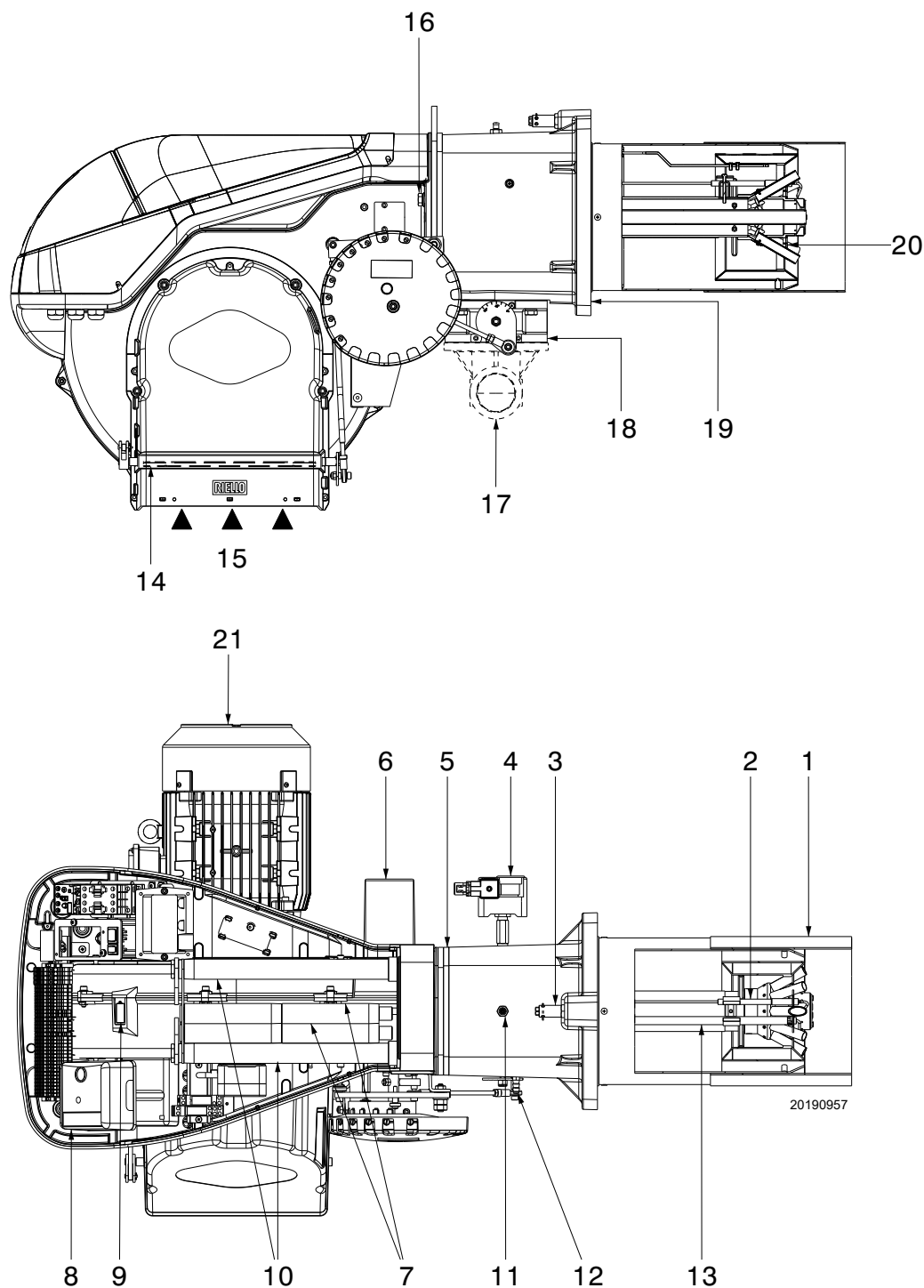
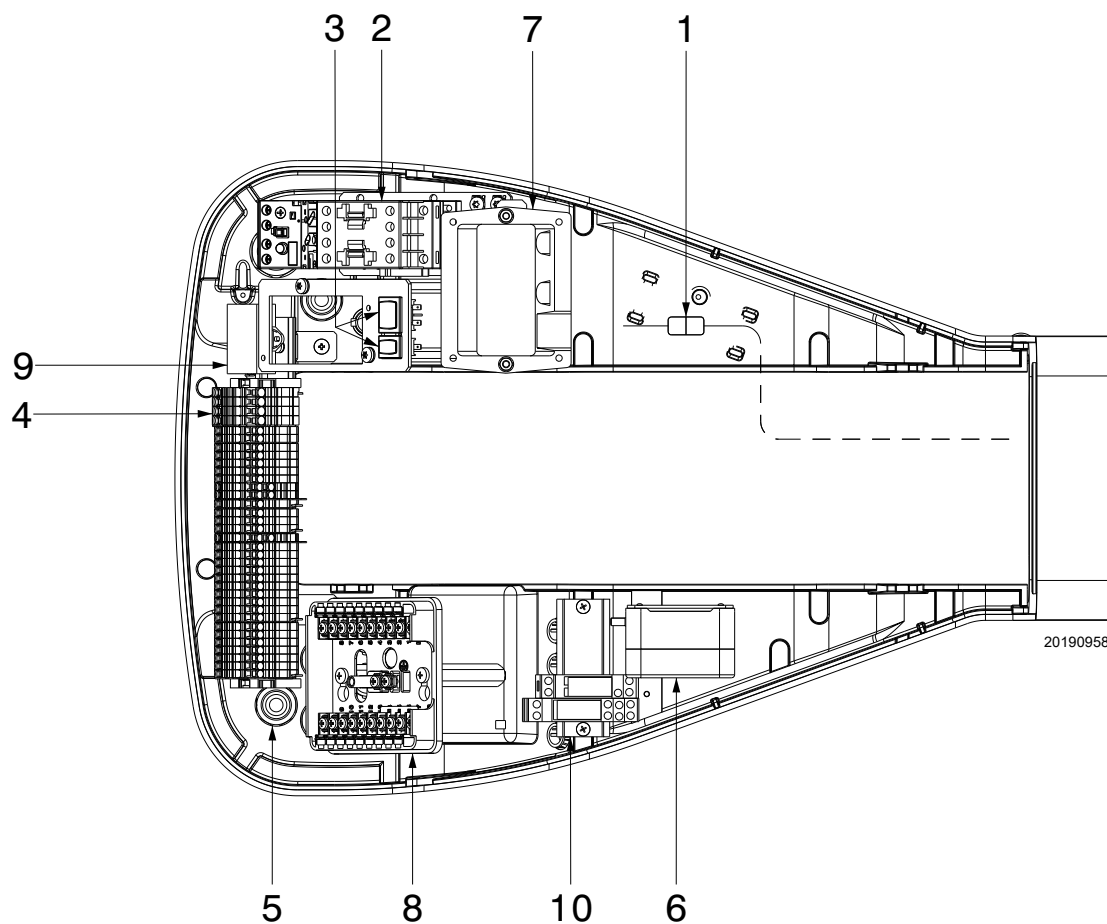


Fig. 3

**3.9 Burner description**

**Fig. 4**

- |  |   |
|--|---|
| 1 Combustion head  | 10 Slide bars for opening the burner and inspecting the combustion head |
| 2 Ignition electrode   | 11 Gas pressure test point and head fixing screw                        |
| 3 Screw for combustion head adjustment   | 12 Air pressure test point  |
| 4 Maximum gas pressure switch  | 13 Flame sensor probe   |
| 5 Pipe coupling  | 14 Air damper   |
| 6 Servomotor controlling the gas butterfly valve and the air damper, by means of a variable profile cam mechanism.   | 15 Air inlet to fan   |
| When the burner is not operating the air damper is fully closed in order to reduce heat dispersion from the boiler due to the flue draught, which draws air from the fan suction inlet | 16 Screws to secure fan to pipe coupling                                |
| 7 Extensions for slide bars 10)  | 17 Gas input pipe   |
| 8 Electrical control box with lockout pilot light and reset button   | 18 Gas butterfly valve  |
| 9 Flame inspection window  | 19 Boiler fixing flange   |
|  | 20 Flame stability disc   |
|  | 21 Fan motor  |

### 3.10 Electrical panel description



20190958

**Fig. 5**

- 1 Plug-socket on ionisation probe cable
- 2 Motor contactor and thermal relay with reset button
- 3 Switch for automatic-manual-off operation;  
a button for output increase-decrease
- 4 Main terminal supply board
- 5 Cable grommets for electrical wiring (to be carried out by the installer)
- 6 Minimum air pressure switch (differential type)
- 7 Ignition transformer
- 8 Control box base
- 9 Filter to protect against radio disturbance
- 10 Dry contact relay

**3.11 Control box RMG88...**
**Important notes**

**ATTENTION**

To avoid accidents, material or environmental damage, observe the following instructions!

The control box RMG88... is a safety device! Avoid opening or modifying it, or forcing its operation. Riello S.p.A. cannot assume any responsibility for damage resulting from unauthorised interventions!

- All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- Before modifying the wiring in the control box connection area, fully disconnect the system from the power supply (omnipolar separation). Check the system is not powered and cannot be accidentally reconnected. Failure to do this will lead to the risk of electrocution.
- Protection against electrocution from the control box and all connected electric components is obtained with the correct assembly.
- Before any intervention (assembly and installation operations, assistance, etc.), ensure the wiring is in order and that the parameters are correctly set, then make the safety checks.
- Falls and collisions can negatively affect the safety functions.  
In this case, the control box must not be operated, even if it displays no evident damage.
- Press the reset button of the burner lockout command or the reset button (by applying a force of not more than 10 N), without the aid of tools or sharp objects.

For the safety and reliability of the control box, comply with the following instructions:

- avoid conditions that can favour the development of condensate and humidity. Otherwise, before switching on again, make sure that the entire control box is perfectly dry!
- Static charges must be avoided since they can damage the control box's electronic components when touched.



S8906

**Fig. 6**
**Technical data**

Mains voltage	AC 220...240 V +10 % / -15 %
Mains frequency	50 / 60 Hz ±6%
Power absorption	20 VA
Protection level	IP20
Safety class	I
Weight	approx. 260g
Cable length	
Thermostat cable	Max. 20 m at 100 pF/m
Air pressure switch	Max. 1 m at 100 pF/m
Gas pressure switch	Max. 20 m at 100 pF/m
Remote reset	Max. 20 m at 100 pF/m
CPI	Max. 1 m at 100 pF/m
Environmental conditions:	
Operation	DIN EN 60721-3-3
Climatic conditions	Class 3K3
Mechanical conditions	Class 3M3
Temperature range	-20...+60°C
Humidity	< 95 % r.h.

**Mechanical structure**

The control box is made of plastic to resist knocks, heat and flame propagation.

The control box contains the following components:

- a microprocessor that controls the program sequence, and a relay for controlling the load;
- an electronic flame signal amplifier;
- a built-in reset button with 3 signalling colours (LED) for status and error messages.

## 3.12 Servomotor (SQN31...)

### Important notes



**ATTENTION**

To avoid accidents, material or environmental damage, observe the following instructions!

Avoid opening, modifying or forcing the actuators.

- All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- Before modifying the wiring in the connection area of the servomotor, fully disconnect the burner control device from the power supply (omnipolar separation).
- To avoid the risk of electrocution, protect the connection terminals in a suitable manner and correctly fix the cover.
- Check the wiring is in order.
- Falls and collisions can negatively affect the safety functions. In this case, the servomotor must not be operated, even if it displays no evident damage.

### Assembly notes

- Check the relevant national safety standards are respected.
- When assembling the servomotor and connecting the damper, the gears can be disengaged by means of a lever, allowing the drive shaft to be easily adjusted in both directions of rotation.



20160309

**Fig. 7**

### Technical data

Operating voltage	AC 220...240 V - 15% / +10% AC 100...110 V - 15% / +10%
Mains frequency	50...60 Hz $\pm$ 6%
Angle positioning	up to 160° (full scale)
Assembly position	option
Protection level	IP 40, in accordance with DIN 40050
Weight	approx. 0.8 kg
Actuator motor	synchronous motor
Power absorption	6.5 VA
Environmental conditions:	
Operation	DIN EN 60 721-3-3
Climatic conditions	Class 3K5
Mechanical conditions	Class 3M2
Temperature range	-20...+60°C
Humidity	< 95% RH

**Tab. E**

## 4 Installation

#### 4.1 Notes on safety for the installation

After carefully cleaning all around the area where the burner is to be installed, and arranging for the environment to be illuminated correctly, proceed with the installation operations.



All the installation, maintenance and disassembly operations must be carried out with the electricity supply disconnected.



The installation of the burner must be carried out by qualified personnel, as indicated in this manual and in compliance with the standards and regulations of the laws in force.



The combustion air inside the boiler must be free from hazardous mixes (e.g.: chloride, fluoride, halogen); if present, it is highly recommended to carry out cleaning and maintenance more frequently.

## 4.2 Handling

The burner packaging includes a wooden platform, it is therefore possible to handle the burner (still packaged) with a pallet truck or fork lift truck.



After positioning the burner near the installation point, correctly dispose of all residual packaging, separating the various types of material.



Before proceeding with the installation operations, carefully clean all around the area where the burner will be installed.



Burner handling operations can be highly dangerous if not carried out with the greatest attention: distance unauthorised personnel, check integrity and suitability of the means available. Check also that the area in which you are working is empty and that there is an adequate escape area (i.e. a free, safe area to which you can quickly move if the burner should fall). During handling, keep the load at no more than 20-25 cm from the ground.

### 4.3 Preliminary checks


## Checking the consignment



After removing all the packaging, check the integrity of the contents. In the event of doubt, do not use the burner; contact the supplier.



The packaging elements (wooden cage or cardboard box, nails, clips, plastic bags, etc.) must not be abandoned as they are potential sources of danger and pollution; they should be collected and disposed of in the appropriate places.

R.H.E.	A			B		
	D			C		
E			F			
GAS-KAASU	<input checked="" type="checkbox"/> FAM.2			G		H
GAZAEPIO	<input type="checkbox"/> FAM.3			G		H
I						
I	I	I	I	I	I	
I	I	I	I	I	I	
						CE
						

**Fig. 8**

### Checking the characteristics of the burner

Check the identification label of the burner (Fig. 8), showing:

- A the burner model;
- B the burner type;
- C the cryptographic year of manufacture;
- D the serial number;
- E the data for electrical supply and the protection level;
- F the electrical power consumption;
- G the types of gas used and the relative supply pressures;
- H the data of the burner's possible minimum and maximum output (see Firing rate).

**Warning:** The burner output must be within the boiler's firing rate;

- the category of the appliance/countries of destination.



A burner label, or any other component, that has been tampered with, removed or is missing, prevents the definite identification of the burner and makes any installation or maintenance work difficult



#### 4.4 Operating position



- The burner is designed to operate only in positions 1, 2, 3 and 4 (Fig. 9).
- Installation 1 is preferable, as it is the only one that allows the maintenance operations as described in this manual.
- Installations 2, 3 and 4 allow operation but make maintenance and inspection of the combustion head more difficult.



- Any other position could compromise the correct operation of the appliance.
- Installation 5 is forbidden for safety reasons.

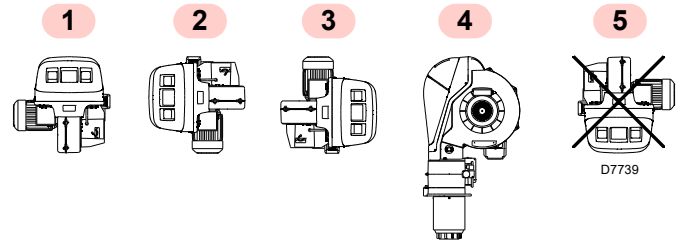


Fig. 9

#### 4.5 Opening the burner



Disconnect the electrical supply from the burner by means of the system main switch.



Wait for the components in contact with heat sources to cool down completely.



Close the fuel shut-off valve.

#### 4.6 Preparing the boiler

##### 4.6.1 Boring the boiler plate

Pierce the closing plate of the combustion chamber, as in Fig. 10. The position of the threaded holes can be marked using the thermal insulation screen supplied with the burner.

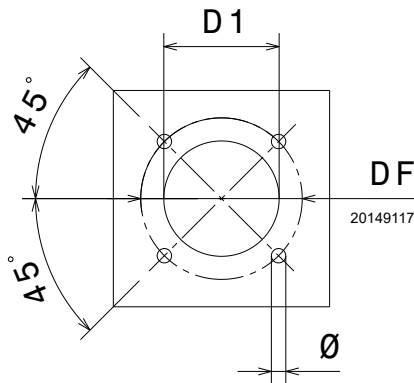


Fig. 10

Model	D1	DF	Ø
RS 250/M MZ	230	325 - 368	M16

Tab. F

##### 4.6.2 Blast tube length

The length of the blast tube must be selected according to the indications provided by the manufacturer of the boiler, and in any case it must be greater than the thickness of the boiler door complete with its fettling.

The available length L (mm) is 376 mm.

For boilers with front flue passes 15)(Fig. 11), or flame inversion chamber, a protection in refractory material 13)(Fig. 11) must be inserted between the boiler fettling 14) and the blast tube 12)(Fig. 11).

This protection must not compromise the extraction of the blast tube.

For boilers with water-cooled front piece, the refractory protection 13-14)(Fig. 11) is not necessary, unless specifically requested by the boiler manufacturer.

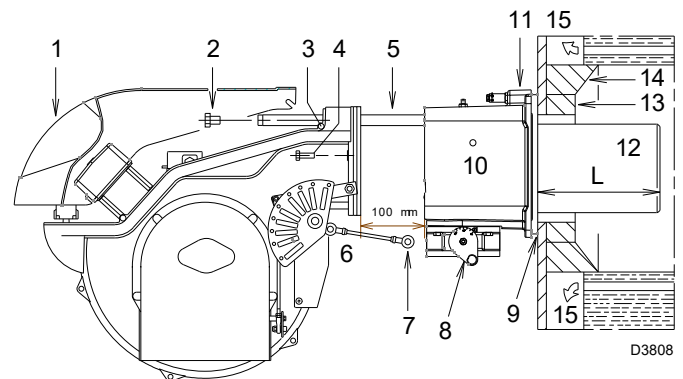


Fig. 11

### 4.7 Securing the burner to the boiler



Provide an adequate lifting system of the burner.

Before securing the burner to the boiler, check (through the opening of the blast tube) that the probe and electrode are correctly positioned, as in Fig. 16.

Separate the combustion head from the rest of the burner, (Fig. 12):

- loosen the 4 screws 3) and remove the cover 1).
  - Disengage the articulated coupling 7) from the graduated sector 8).
  - Remove the screws 2) from the two slide bars 5).
  - Remove the two screws 4) and pull the burner back on slide bars 5) by about 100 mm.
  - Disconnect the probe and electrode cables, then completely unthread the burner from the slide bars.
  - Fix the flange 11) to the plate of the boiler interposing the insulating gasket 9) supplied.
- Use the 4 screws, also supplied, after protecting their thread with an anti-locking product.



The burner-boiler seal must be hermetic; after burner start-up check there is no leakage of flue gases into the external environment.

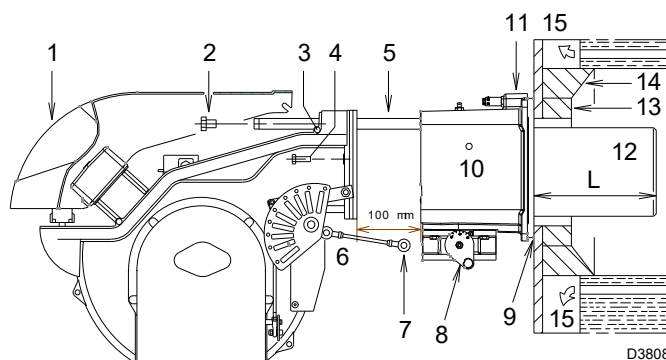


Fig. 12

### 4.8 Calibration of the thermal relay

The thermal relay serves to avoid damage to the motor due to an excessive absorption increase or if a phase is missing.

For calibration 2), see the table in the wiring diagram.

To reset, in case of an intervention of the thermal relay, press the "RESET" button 1) of Fig. 13.

The red "TEST" button 3) opens the NC (95-96) contact and stops the motor.



The automatic reset can be dangerous. This operation is not foreseen in the burner operation. Therefore, do not position the "RESET" button 1) on "A".

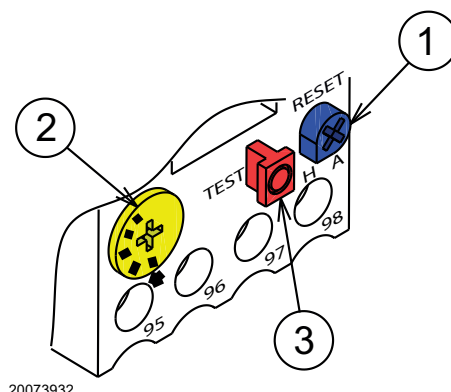


Fig. 13

### 4.9 Motor rotation

As soon as the burner starts, place yourself in front of the cooling fan of the fan motor and check that it turns anticlockwise (Fig. 14).

If this is not the case:

- put the switch of the burner to "0" (off) and wait until the control box carries out the switching off phase.



Disconnect the electrical supply from the burner by means of the system main switch.

- Invert the phases on the three-phase motor power supply.

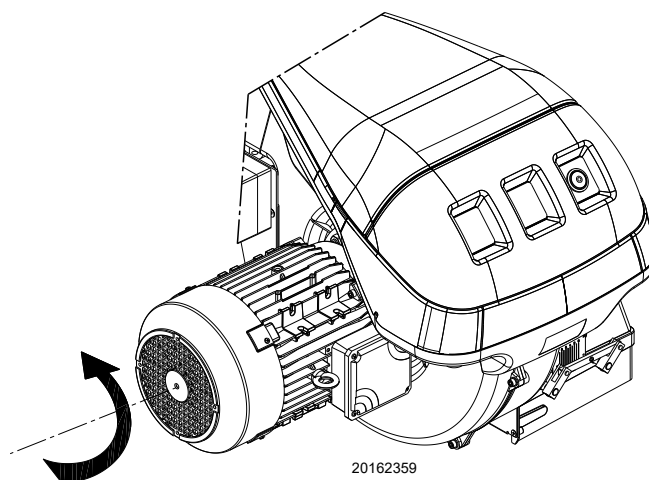


Fig. 14

#### 4.10 Positioning the probe - electrode



**ATTENTION**

Check that the probe and the electrode are placed as in Fig. 16, according to the dimensions indicated.

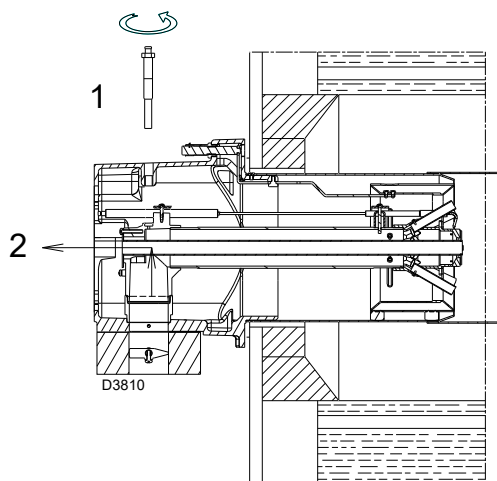
If the probe or electrode is not correctly positioned, you must:

- remove the screw 1)(Fig. 15)
- take out the inner part 2)(Fig. 15) of the head and then calibrate them.

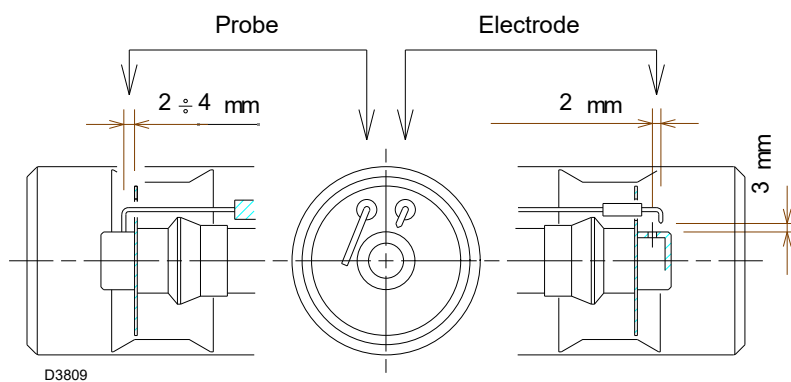


**ATTENTION**

Do not rotate the probe but leave it as in Fig. 15; if it is too close to the ignition electrode, it could damage the control box amplifier.



**Fig. 15**



**Fig. 16**

### 4.11 Combustion head adjustment

At this stage of installation the blast tube and the pipe coupling are secured to the boiler as shown in Fig. 17.

Therefore the adjustment of the combustion head is particularly easy, an adjustment that depends solely on the maximum power of the burner.

Therefore, this value must be set before adjusting the combustion head.

Two adjustments of the combustion head are available.

#### Air adjustment Fig. 17

See diagram Fig. 18.

Rotate the screw 4)(Fig. 17) until the notch you have found corresponds with the front surface 5)(Fig. 17) of the flange.

#### Gas adjustment Fig. 17

When the burner is installed for maximum output 1300 Mcal/h (about 1500 kW), fit discs 1) and 2)(Fig. 17) supplied as standard by removing the inner tube 3)(Fig. 17).

If the mains gas pressure is low, the head can be left in standard configuration, limiting the modulation minimum to 450 Mcal/h (about 520 kW).

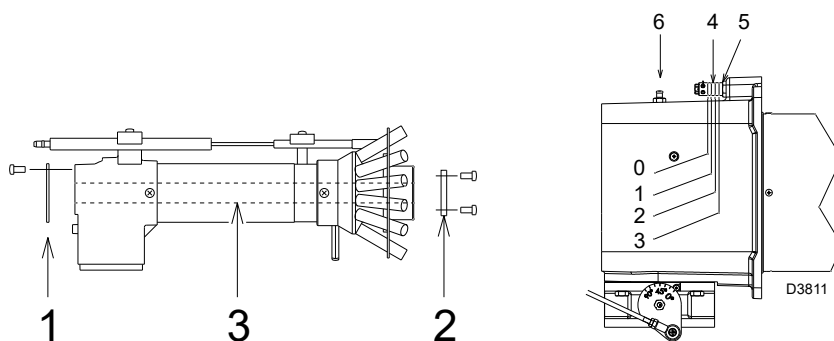


Fig. 17

Example: MAX burner output = 1370 Mcal/h.

The diagram (Fig. 18) shows that for this burner output, the air adjustment should be made on notch 3, as in Fig. 17.

The example on page 21 shows that a burner with an output of 1370 Mcal/h (1593 kW) requires about 8 mbar of pressure at test point 6)(Fig. 17).

Before starting the burner, carry out the adjustments for the output required and indicated in the diagram (Fig. 18).

#### NOTE:

Depending on the specific application, the adjustment can be modified.

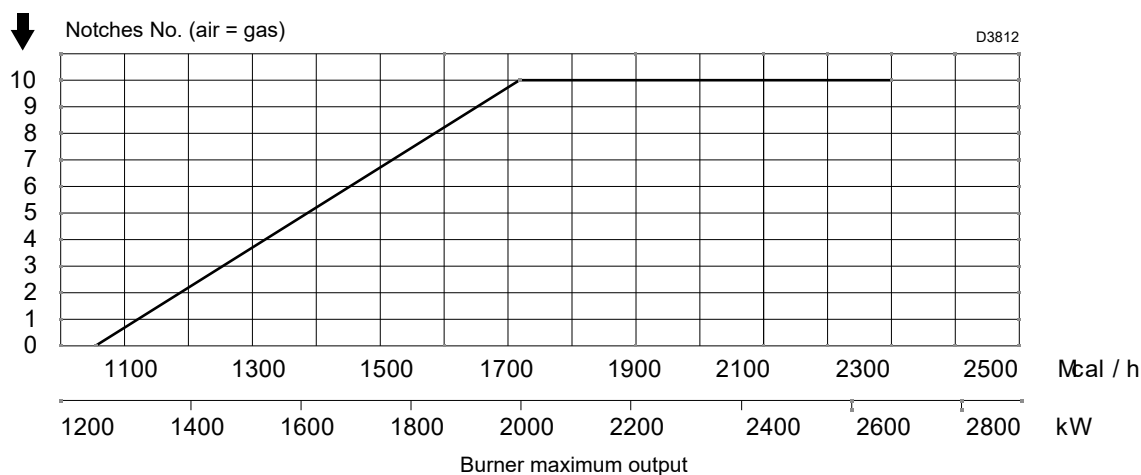


Fig. 18

#### 4.12 Closing the burner

Once the combustion head adjustment is completed:

- reassemble the burner on slide bars 3)(Fig. 19), about 100 mm from the pipe coupling 4)(Fig. 19);
- insert the probe cable and the electrode cable, then slide the burner as far as the pipe coupling.
- Refit screws 2) on slide bars 3).
- Fix the burner to the pipe coupling with screws 1)(Fig. 19).
- Reconnect the articulated coupling 7) to the graduated sector 6)(Fig. 19).

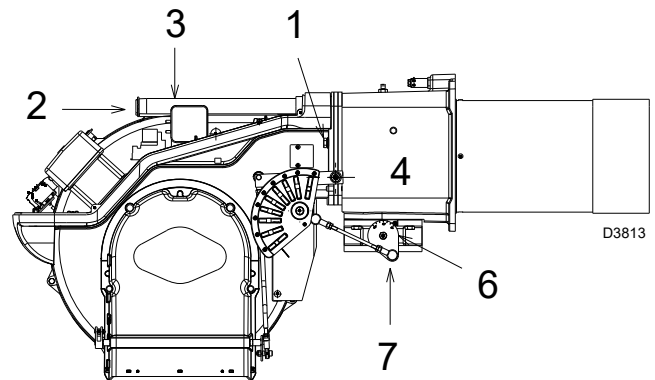


**ATTENTION**

When fitting the burner on the two slide bars, it is advisable to gently draw out the high voltage cable and the flame detection probe cable until they are slightly stretched.



After carrying out maintenance, cleaning or checking operations, reassemble the cover and all the safety and protection devices of the burner.



**Fig. 19**

### 4.13 Gas supply



Explosion danger due to fuel leaks in the presence of a flammable source.

Precautions: avoid knocking, attrition, sparks and heat.

Make sure the fuel shut-off valve is closed before performing any operation on the burner.



ATTENTION

The fuel supply line must be installed by qualified personnel, in compliance with current standards and laws.

#### 4.13.1 Gas feeding line

Key (Fig. 20 - Fig. 21 - Fig. 22 - Fig. 23)

- 1 Gas input pipe
- 2 Manual valve
- 3 Vibration damping joint
- 4 Pressure gauge with button cock
- 5 Filter
- 6A Includes:
  - filter
  - safety valve
  - pressure adjuster
  - working valve
- 6C Includes:
  - safety valve
  - working valve
- 6D Includes:
  - safety valve
  - working valve
- 7 Minimum gas pressure switch
- 8 Leak detection control, supplied as an accessory or built-in, based on the gas train code. In compliance with the EN 676 standard, gas valve leak detection control devices are compulsory for burners with maximum outputs over 1200 kW.
- 9 Gasket, for “flanged” versions only
- 10 Pressure adjuster
- 11 Train-burner adaptor, supplied separately
- P2 Pressure upstream of valves/adjuster
- P3 Pressure upstream of the filter
- L Gas train, supplied separately
- L1 Responsibility of the installer

MB

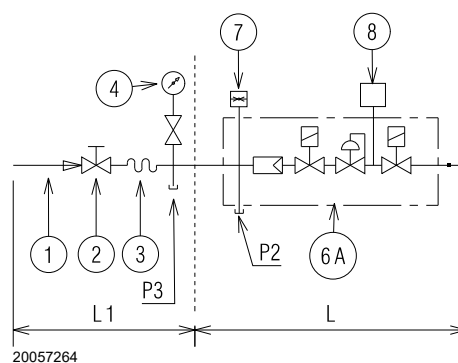


Fig. 20

MBC - VGD

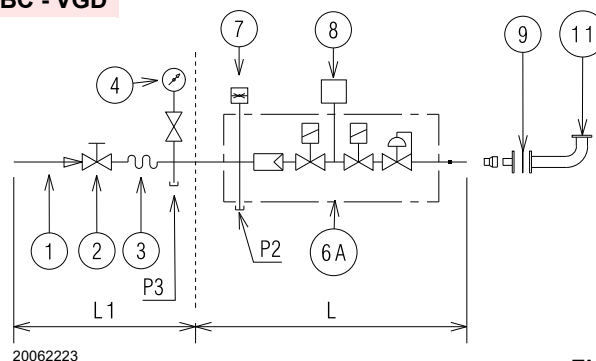


Fig. 21

DMV

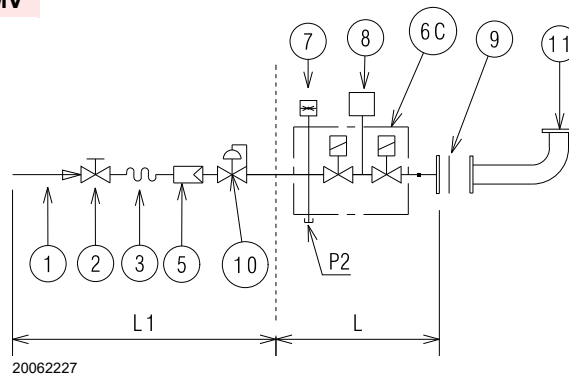


Fig. 22

CB

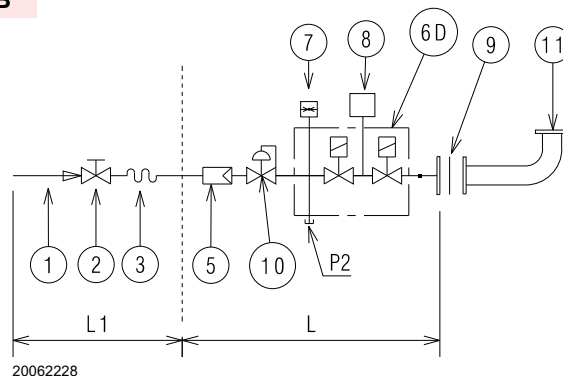


Fig. 23

## 4.13.2 Gas train

Type-approved in accordance with EN 676 and supplied separately from the burner.

## 4.13.3 Gas train installation



Disconnect the power supply using the system main switch.



Check that there are no gas leaks.



Pay attention when handling the train: danger of crushing of limbs.



Make sure that the gas train is properly installed by checking for any fuel leaks.



The operator must use the required equipment during installation.

The train can enter the burner from the right or left side, depending on which is the most convenient, see Fig. 24.

The gas train must be connected to the gas connection 1)(Fig. 24), using the flange 2), seal 3) and screws 4) supplied with the burner.



The gas solenoids must be as close as possible to the burner to ensure that the gas reaches the combustion head within the safety time of 3s.

Make sure that the maximum pressure necessary for the burner is within the calibration range of the pressure regulator.

See the accompanying instructions for the adjustment of the gas train.

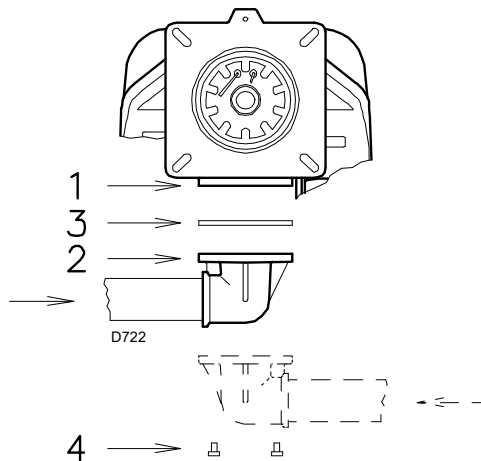


Fig. 24

## 4.13.4 Gas pressure

Tab. G indicates the pressure drops of the combustion head and gas butterfly valve depending on the burner operating output.

kW	1 Δp (mbar)	2 Δp (mbar)
1250	5.2	4.4
1400	6.4	5.5
1550	7.6	6.7
1700	8.8	8.1
1850	10.1	9.6
2000	11.3	11.2
2150	13.0	12.9
2300	14.7	14.8
2450	16.4	16.8
2600	18.1	18.9
2650	35	19.7

Tab. G

The values shown in Tab. G refer to:

- Natural gas G 20 NCV 9.45 kWh/Sm<sup>3</sup> (8.2 Mcal/Sm<sup>3</sup>)
- Natural gas G 25 NCV 8.13 kWh/Sm<sup>3</sup> (7.0 Mcal/Sm<sup>3</sup>)



Data of head thermal power and gas pressure refer to operation with gas butterfly valve fully open (90°).

### Column 1

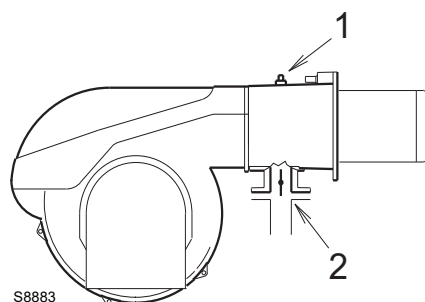
Combustion head pressure drop.

Gas pressure measured at test point 1)(Fig. 25), with:

- combustion chamber at 0 mbar
- burner working at maximum output

### Column 2

Pressure drop at gas butterfly valve 2)(Fig. 25) with maximum opening: 90°.



**Fig. 25**

To calculate the approximate output at which the burner operates:

- subtract the combustion chamber pressure from the gas pressure measured at test point 1)(Fig. 25).
- Find in Tab. G related to the burner concerned, the pressure value closest to the result of the subtraction.
- Read the corresponding output on the left.

### Example with G 20 natural gas:

Maximum output operation

Gas pressure at test point 1)(Fig. 25)	=	11.8 mbar
Pressure in combustion chamber	=	3.0 mbar
11.8 - 3.0	=	8.8 mbar

A pressure of 8.8 mbar, column 1, corresponds in the table Tab. G to an output of 1700 kW.

This value serves as a rough guide; the effective output must be measured at the gas meter.

To calculate the required gas pressure at test point 1)(Fig. 25), set the maximum modulating output required from the burner operation:

- find the nearest output value in Tab. G for the burner in question.
- Read, on the right (column 1), the pressure at the test point 1)(Fig. 25).
- Add this value to the estimated pressure in combustion chamber.

### Example with G 20 natural gas:

Operating at the desired maximum output: 1700 kW

Gas pressure at an output of 1700 kW	=	8.8 mbar
Pressure in combustion chamber	=	3.0 mbar
8.8 + 3.0	=	11.8 mbar

pressure required at test point 1)(Fig. 25).



## 4.14 Electrical wiring

### Notes on safety for the electrical wiring



DANGER

- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be made in accordance with the regulations currently in force in the country of destination and by qualified personnel. Refer to the wiring diagrams.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the wiring diagrams.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The burner has been type-approved for intermittent use.  
This means they should compulsorily be stopped at least once every 24 hours to enable the control box to perform checks of its own start-up efficiency. Normally, burner stopping is guaranteed by the boiler's thermostat/pressure switch.
- If this is not the case, a time switch should be fitted in series to TL to stop the burner at least once every 24 hours. Refer to the wiring diagrams.
- The electrical safety of the device is obtained only when it is correctly connected to an efficient earthing system, made according to current standards. It is necessary to check this fundamental safety requirement. In the event of doubt, have the electrical system checked by qualified personnel. Do not use the gas tubes as an earthing system for electrical devices.
- The electrical system must be suitable for the maximum power absorption of the device, as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for that level of power absorption.
- For the main power supply of the device from the electricity mains:
  - do not use adapters, multiple sockets or extensions;
  - use a multiple pole switch with at least a 3 mm gap between the contacts (over voltage category III), as envisaged by the present safety standards.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.

Before carrying out any maintenance, cleaning or checking operations:



DANGER

Disconnect the electrical supply from the burner by means of the system main switch.



DANGER

Close the fuel shut-off valve.



DANGER

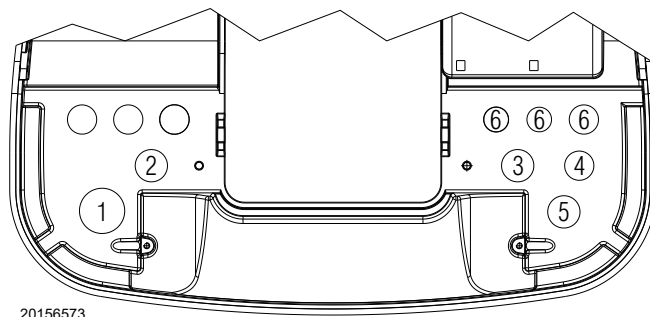
Avoid condensate, ice and water leaks from forming.

If the cover is still present, remove it and proceed with the electrical wiring according to the wiring diagrams.

Use flexible cables according to EN 60 335-1 standard.

### 4.14.1 Supply cables and external connections passage

All the cables to be connected to the burner should be routed through cable grommets. The use of the cable grommets can be done in different manners; for example, see Fig. 26.



20156573

Fig. 26

Key (Fig. 26)

- 1 Three-phase power supply
- 2 single-phase power supply
- 3 gas valves
- 4 Gas pressure switch or valve leak detection device
- 5 consent/safety
- 6 Available



After carrying out maintenance, cleaning or checking operations, reassemble the cover and all the safety and protection devices of the burner.

### 5 Start-up, calibration and operation of the burner

#### 5.1 Notes on safety for the first start-up



ATTENTION

The first start-up of the burner must be carried out by qualified personnel, as indicated in this manual and in compliance with the standards and regulations of the laws in force.



ATTENTION

Before starting up the burner, refer to section "Safety test - with no gas supply" on page 30.



ATTENTION

Check the correct working of the adjustment, command and safety devices.

#### 5.2 Adjustments prior to ignition

Combustion head adjustment is already described on page 18.

In addition, the following adjustments must also be made:

- open the manual valves upstream of the gas train.
- Adjust the minimum gas pressure switch to the start of the scale.
- Adjust the maximum gas pressure switch to the end of the scale.
- Adjust the air pressure switch to the start of the scale.
- Purge the air from the gas line.  
We recommend using a plastic tube routed outside the building and to purge air until gas is smelt.
- Fit a U-type pressure gauge or a differential pressure gauge (Fig. 27), with socket (+) on the gas pressure of the pipe coupling and (-) in the combustion chamber.  
The manometer readings are used to calculate MAX burner output using the Tab. G.
- Connect two lamps or testers to the two gas line solenoid valves to check the exact moment in which voltage is supplied.

This operation is not required if each of the two solenoid valves is equipped with a pilot light that signals voltage

passing through.



CAUTION

Before starting up the burner, it is good practice to adjust the gas train so that ignition takes place in conditions of maximum safety, i.e. with gas delivery at the minimum.

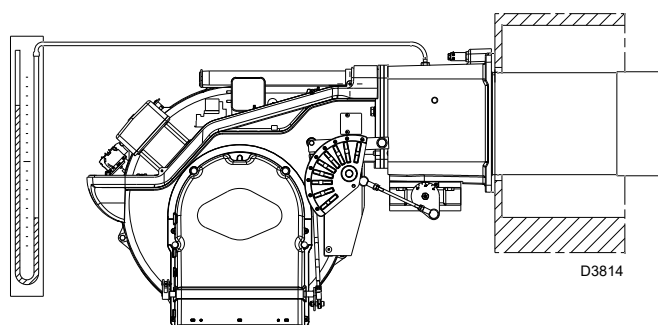


Fig. 27

#### 5.3 Servomotor adjustment

The servomotor provides simultaneous adjustment of the air damper, by means of the variable profile cam and the gas butterfly valve. The servomotor rotates by 130° in 33 s.



ATTENTION

Do not alter the factory setting for the 5 cams; just check that they are as specified below:

- |                 |   |
|-----------------|---|
| <b>Cam I:</b>   | <b>130°</b><br>Limits rotation toward maximum position.<br>When the burner is operating at MAX output, the gas butterfly valve must be fully open: 90°. |
| <b>Cam II:</b>  | <b>0°</b><br>Limits rotation toward minimum position.<br>When the burner is shut down, the air damper and gas butterfly valve must be closed: 0°.       |
| <b>Cam III:</b> | <b>65°</b><br>Adjusts the ignition position and the MIN output.   |
| <b>Cam V:</b>   | Integral with cam III.  |

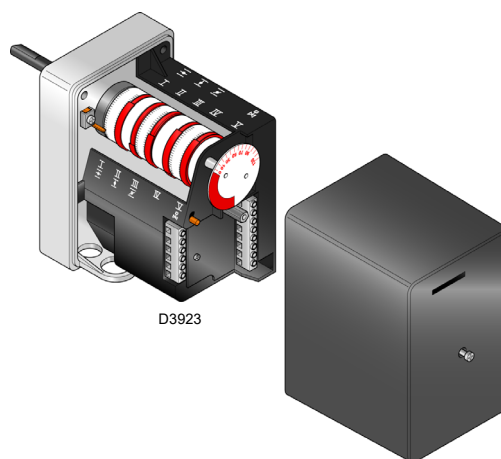


Fig. 28

## 5.4 Burner start-up

Feed electricity to the burner via the disconnecting switch on the boiler panel.

Close the thermostats/pressure switches and turn the switch in Fig. 29 to position "MAN".

As soon as burner starts, check the fan rotation direction through the flame inspection window.



Check that the lamps or testers connected to the solenoid valves, or the pilot lights on the solenoid valves, indicate that no voltage is present. If they indicate the presence of voltage, stop the burner **immediately** and check the electric connections.

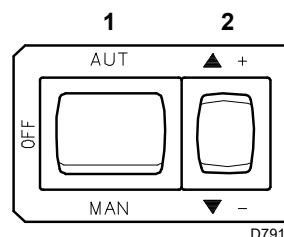


Fig. 29

## 5.5 Burner ignition

If the motor starts up, but the flame does not appear and the control box goes into lockout, reset it and wait for a new ignition attempt.

If ignition is still not achieved, it may be that gas is not reaching the combustion head within the safety time period of 3 seconds. In this case, increase gas ignition delivery.

The arrival of gas to the sleeve is indicated by the U-type pressure gauge (Fig. 27 on page 24).

Once ignition has taken place, proceed with burner global calibration operations.

In order to measure the ignition output:

- disconnect the plug-socket 1)(Fig. 5 on page 11) on the ionisation probe cable (the burner will ignite and then go into lockout after the safety time has elapsed);
- perform 10 consecutive ignitions with lockouts;
- read the quantity of burned gas on the meter: this quantity must be equal to, or lower than, the quantity given by the formula:

$$\frac{\text{Sm}^3/\text{h (max. burner delivery)}}{360}$$

### 5.5.1 Burner adjustment

The optimum adjustment of the burner requires an analysis of flue gases at the boiler outlet.

Adjust in sequence:

- 1 Ignition output
- 2 Maximum output
- 3 Minimum output
- 4 Intermediate outputs between the two
- 5 Air pressure switch
- 6 Maximum gas pressure switch
- 7 Minimum gas pressure switch

### 5.5.2 Ignition output

According to standard EN 676.

#### Burners with MAX output up to 120 kW

Ignition can occur at the maximum operation output level.

Example:

- max. operation output: 120 kW
- max. ignition output: 120 kW

#### Burners with MAX output above 120 kW

Ignition must occur at a lower output than the max. operation output.

If ignition output does not exceed 120 kW, no calculations are required. If ignition output exceeds 120 kW, the regulatory standard sets that the value be defined according to the control box safety time "ts":

for "ts" = 3s, ignition output must be equal to or lower than 1/3 of max. operation output.

#### Example

MAX operation output of 600 kW.

Ignition output must be equal to or lower than:

- 300 kW with ts = 2 s.
- 200 kW with ts = 3 s.

**Example** for G 20 gas (9.45 kWh/Sm<sup>3</sup>):

Max. operation output: 600 kW corresponding to 63.5 Sm<sup>3</sup>/h.

After 10 ignitions with a lockout, the delivery indicated on the meter must be equal to or lower than:  $63.5 : 360 = 0.176 \text{ Sm}^3$

### Air adjustment

The air is adjusted by changing the angle of cam III)(Fig. 28 on page 24) and by using the selector 2)(Fig. 29 on page 25).

To adjust the cam of the servomotor, see Fig. 31.

### 5.5.3 Maximum output

The MAX output must be set within the firing rate indicated in Fig. 2 on page 9.

In the above instructions we left the burner running at the MIN output.

Now press the "increase output" button 2)(Fig. 29 on page 25), and keep it pressed until the servomotor has opened the air damper and the gas butterfly valve.

### Adjustment of gas delivery

Measure the gas delivery on the meter.

A rough indication can be obtained from Tab. G on page 21, just read the gas pressure on the "U" pressure gauge (see Fig. 27 on page 24) and follow the indications.

- If delivery needs to be reduced, diminish outlet gas pressure; if it is already very low, slightly close the VR adjustment valve.
- If delivery needs to be increased, increase the adjuster outlet gas pressure.

### Air adjustment

The air is adjusted by varying the angle of cam I) (Fig. 28 on page 24) and by using the selector 2)(Fig. 29 on page 25). To adjust the cam of the servomotor, see Fig. 31.

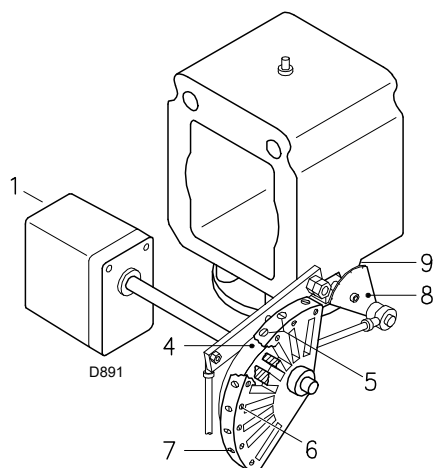


Fig. 30

Key (Fig. 30)

- 1 Servomotor
- 2 Servomotor 1) - cam 4): fastened
- 3 Servomotor 1) - cam 4): unfastened
- 4 Variable profile cam
- 5 Screws for adjusting the adjustable profile
- 6 Screws for fixing adjustment
- 7 Screws for adjusting the end profile
- 8 Gas butterfly valve graduated sector
- 9 Index of graduated sector 8

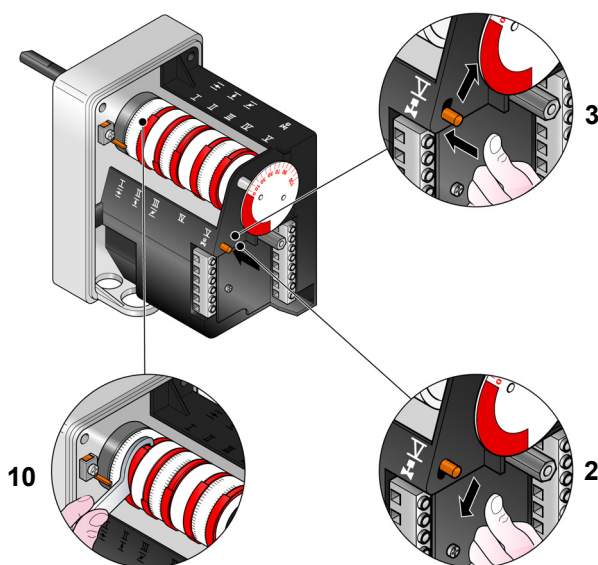


Fig. 31

### 5.5.4 Minimum output

MIN output must be selected within the firing rate range indicated on Fig. 2 on page 9. Press button 2)(Fig. 29 on page 25) "Output decrease" and keep it pressed until the servomotor reaches (Fig. 31) the factory adjustment.

### Air adjustment

Progressively adjust the end profile of the mechanical cam 4)(Fig. 30), using the screws 5).

For example, calibrate the minimum output to 800 kW, check the emissions and if necessary increase or decrease the opening of the air damper (see "Air adjustment" page 26).

Bring the output to 800 kW using the screws 5) of the mechanical cam (Fig. 28 on page 24) and check the emissions.

### Adjustment of gas delivery

The regulation of the air is carried out using the angle of the cam III) of the servomotor (Fig. 28 on page 24) and by using the selector 2)(Fig. 29 on page 25).

To adjust the cam of the servomotor, (Fig. 31).

### NOTE:

**The servomotor follows the adjustment of cam III only when the angle of the cam is reduced. If it is necessary to increase the angle of the cam, you must first increase the angle of the servomotor by means of the "output increase" key, then increase the angle of cam III, and finally bring the servomotor to the position of MIN output, with the "Output reduction" key.**

To adjust cam III) (Fig. 31).

### 5.5.5 Intermediate outputs

#### Adjustment of gas delivery

No adjustment is required

#### Air adjustment

After adjusting the maximum and minimum output of the burner, carry out air adjustment on higher intermediate positions of the servomotor.

The passage from one position to the next one is obtained by pressing the button 2) on the symbol (+) or (-) (Fig. 29 on page 25). Press button 2)(Fig. 29 on page 25) "Output increase" briefly so that the servomotor rotates by about 20°, see servomotor graduated index (Fig. 31) and air damper graduated index 5)(Fig. 30).

Screw or unscrew the screw 5) of the mechanical cam (Fig. 30) to increase or decrease the gas output so as to adjust it to the corresponding air output, to obtain optimal combustion.

Proceed in the same way with the other screws.



ATTENTION

Take care that the cam profile variation is progressive.

Switch off the burner using switch 1)(Fig. 29 on page 25), OFF position, release the mechanical cam I) (Fig. 28 on page 24) to separate the gears of the servomotor, pressing and moving downwards button 3)(Fig. 31), then manually rotate the mechanical cam I) (Fig. 31) backwards and forwards a few times to check that the movement is smooth and without any hindrance.



ATTENTION

It is recommended that the mechanical cam 5)(Fig. 30 on page 26) be bound again to the servomotor by shifting button 3)(Fig. 31) upwards.

As far as is possible, try not to move those screws at the ends of the mechanical cam that were previously adjusted for the opening of the gas butterfly valve to MAX and MIN output.

### NOTE:

**Once "MAX - MIN - INTERMEDIATE" outputs have been adjusted, recheck the ignition: its noise must be equal to the one of the following operation.**

**If you notice any sign of pulsations, reduce the ignition stage delivery.**

## 5.6 Pressure switch adjustment

### 5.6.1 Air pressure switch

Adjust the air pressure switch (Fig. 32) after performing all other burner adjustments with the air pressure switch set to the start of the scale.

With the burner operating at MIN output, increase adjustment pressure by slowly turning the relevant knob clockwise until the burner locks out.

Then turn the knob anticlockwise by about 20% of the set point and repeat burner start-up to ensure it is correct.

If the burner locks out again, turn the knob slightly anticlockwise.



**ATTENTION**

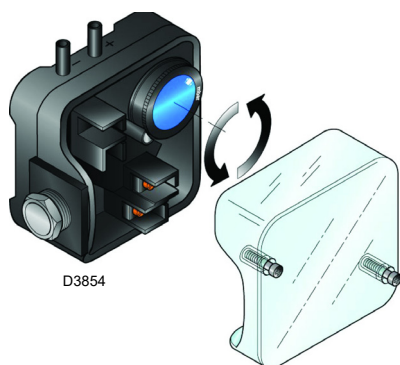
In conformity with the standard, the air pressure switch must prevent the air pressure falling below 80% of the adjusted value and the CO in the flue gases exceeding 1% (10,000 ppm).

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%.

The incorporated air pressure switch can work in a 'differential' mode if connected with two pipes.

If a strong depression in the combustion chamber during the pre-purging phase does not allow the air pressure switch to switch, this can be obtained by applying a second tube between the air pressure switch and the suction inlet of the fan.

In this way, the pressure switch will work in differential mode.



**Fig. 32**



**ATTENTION**

**1 kPa = 10 mbar**

### 5.6.2 Maximum gas pressure switch

Adjust the maximum gas pressure switch (Fig. 33) after making all other burner adjustments with the maximum gas pressure switch set to the end of the scale.

To calibrate the maximum gas pressure switch, open the tap and then connect a pressure gauge to its pressure test point.

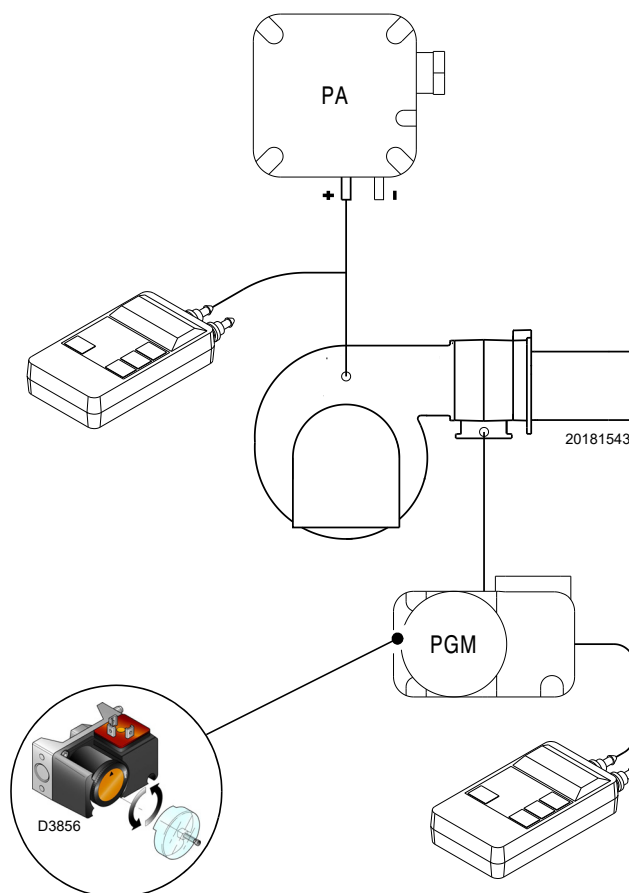
The maximum gas pressure switch must be regulated to a value no higher than 30% of the measurement read on the gauge when the burner is working at maximum output.

After making the adjustment, remove the pressure gauge and close the tap.



**ATTENTION**

**Adjust the maximum gas pressure switch to 30 mbar**



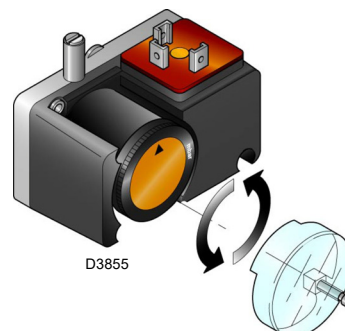
**Fig. 33**

### 5.6.3 Minimum gas pressure switch

The purpose of the minimum gas pressure switch is to prevent the burner from operating in an unsuitable way due to too low gas pressure.

Adjust the minimum gas pressure switch (Fig. 34) after having adjusted the burner, the gas valves and the gas train stabiliser. With the burner operating at maximum output:

- install a pressure gauge downstream of the gas train stabiliser (for example at the gas pressure test point on the burner combustion head);
- choke slowly the manual gas cock until the pressure gauge detects a decrease in the pressure read of about 0.1 kPa (1 mbar). In this phase, verify the CO value which must always be less than 100 mg/kWh (93 ppm).
- Increase the adjustment of the gas pressure switch until it intervenes, causing the burner shutdown;
- remove the pressure gauge and close the cock of the gas pressure test point used for the measurement; open completely the manual gas cock.



**Fig. 34**

#### 5.6.4 Flame present check

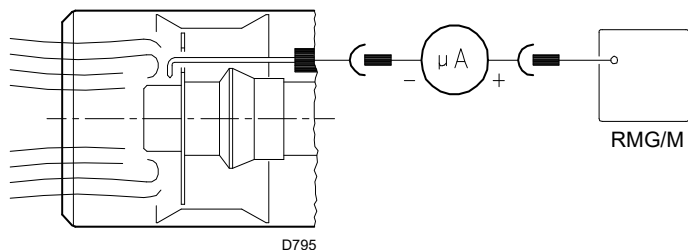
The burner is fitted with an ionisation system which ensures that a flame is present.

The minimum current for plant operation is 6  $\mu\text{A}$ .

The burner provides a much higher current, so that controls are not normally required.

However, if it is necessary to measure the ionisation current, disconnect the plug-socket 1)(Fig. 5) on the ionisation probe cable and insert a direct current microamperometer with a base scale of 100  $\mu\text{A}$ .

Carefully check polarities.



**Fig. 35**



## 5.7 Burner operation

### 5.7.1 Burner start-up

- 0s: TL closes.
- 2s: The control box starting cycle starts. Servomotor starts: 130° rotation to right, until contact is made on cam I (Fig. 28).
- 35s: The air gate valve is positioned to MAX. output. Fan motor starts. Start of the pre-purging phase.
- 60s: The servomotor turns to the left to reach the angle set on cam III (Fig. 28 on page 24) for the MIN output.
- 77s: The air gate valve and the gas butterfly are positioned to MIN. output (with cam III)(Fig. 28 at 65°).
- 92s: Ignition electrode strikes a spark. Safety valve VS and adjustment valve VR (rapid opening) open. The flame is ignited at a low output level, point A. Output is then progressively increased, with the valve VR opening slowly up to MIN. output, point B.
- 95s: The spark goes out.
- 102s: The control box starting cycle ends.

The control box starting cycle ends. When heat demand (TL) is satisfied, the post-purging phase (\*20s) starts.

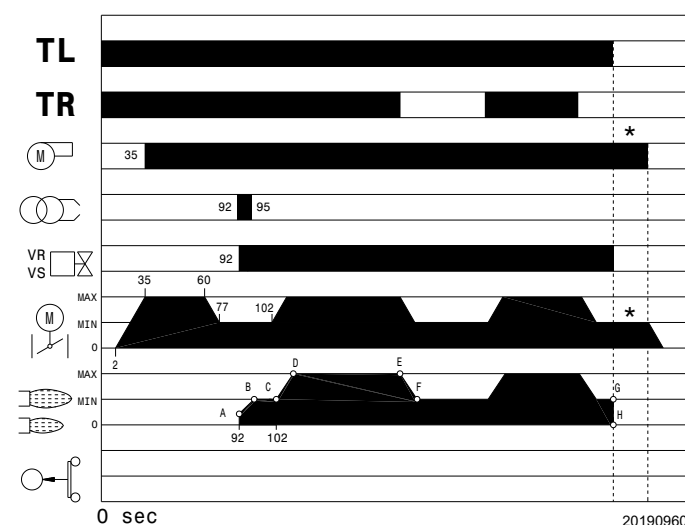


Fig. 36

### 5.7.2 Steady state operation

#### Burner without modulating operation kit

At the end of the start-up cycle, the servomotor control switches to TR remote control that controls the pressure or temperature in the boiler, point C.

(The electric control box carries on checking the presence of the flame and the correct position of the air and gas maximum pressure switches).

- If the temperature or pressure is low (so the TR remote control is closed), the burner progressively increases the output up to the MAX value (section C-D).
- If the temperature or pressure then increases until the TR opens, the burner progressively decreases its output to the MIN value (section E-F). And so on.

- The burner locks out when the heat request is less than the heat supplied by the burner at MIN output, (section G-H). The TL remote control opens, the servomotor returns to angle 0° limited by the contact of cam II (Fig. 28) page 24. The air damper closes completely to reduce heat losses to a minimum.

#### Burner with modulating operation kit

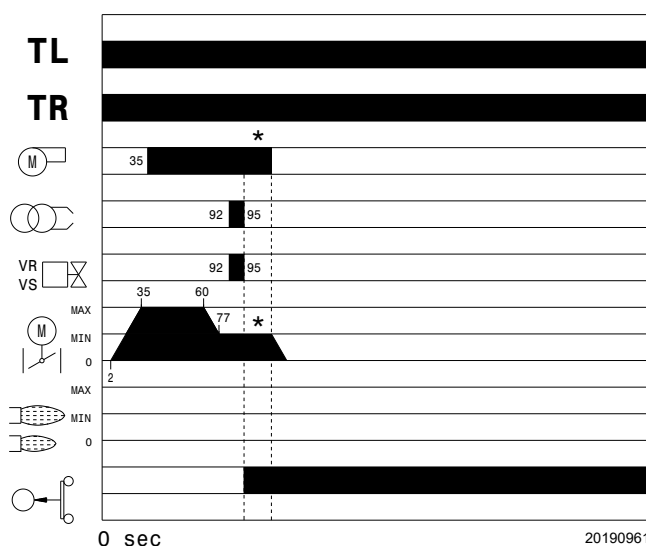
See the manual supplied with the adjuster.

### 5.7.3 Ignition failure

If the burner does not fire, it goes into lock-out within 3s of the opening of the gas solenoid valve and 95s s after the closing of control device TL.

#### Burner flame goes out during operation

If the flame goes out during operation, the burner will lock out within 1s.



20190961

Fig. 37

## 6 Maintenance

### 6.1 Notes on safety for the maintenance

The periodic maintenance is essential for the good operation, safety, yield and duration of the burner.

It allows you to reduce consumption and polluting emissions and to keep the product in a reliable state over time.



The maintenance interventions and the calibration of the burner must only be carried out by qualified, authorised personnel, in accordance with the contents of this manual and in compliance with the standards and regulations of current laws.

Before carrying out any maintenance, cleaning or checking operations:



Disconnect the electrical supply from the burner by means of the system main switch.



Close the fuel shut-off valve.



Wait for the components in contact with heat sources to cool down completely.

### 6.2 Maintenance programme

#### 6.2.1 Maintenance frequency



The gas combustion system should be checked at least once a year by a representative of the manufacturer or another specialised technician.

#### 6.2.2 Safety test - with no gas supply

To perform commissioning in safety conditions, it is very important to check correct wiring between gas valves and burner.

For this purpose, after checking that connections comply with the burner wiring diagrams, it is necessary to carry out a start-up cycle with gas cock closed (dry test).

- 1 The manual gas valve must be closed using the locking/unlocking device ("Lock-out / tag out" procedure).
- 2 Ensure that burner limit electrical contacts are closed
- 3 Ensure that minimum gas pressure switch contact is closed
- 4 Try to start the burner

**The start-up cycle must occur according to the following steps:**

- Fan motor start-up for pre-purging
- Gas valve leak detection control, if applicable
- Pre-purging completion
- Achievement of the ignition point
- Power supply of the ignition transformer
- Supply of gas valves

As gas is closed, the burner cannot ignite and its control box will switch to stop or safety lockout condition.

The actual supply of gas valves can be checked by inserting a tester; some valves are equipped with lights (or closing/opening position indicators) that activate as soon as they are powered.



**IF POWER SUPPLY OF GAS VALVES OCCURS IN UNEXPECTED MOMENTS, DO NOT OPEN THE MANUAL VALVE, DISCONNECT POWER SUPPLY, CHECK WIRINGS, CORRECT THE ERRORS AND CARRY OUT THE WHOLE TEST AGAIN.**

#### 6.2.3 Checking and cleaning



The operator must use the required equipment during maintenance.

##### Servomotor

Release cam Fig. 30 on page 26 from the servomotor, by pressing and shifting button Fig. 31 on page 26 to the right. Manually rotate it backwards and forwards to make sure it moves smoothly. Now engage the cam again by shifting button Fig. 31 on page 26 to the left.

##### Burner

Check that there are not excess wear or loosen screws.  
Clean the outside of the burner.

##### Fan

Check to make sure that no dust has accumulated inside the fan or on its impellers, as this condition will cause a reduction in the air flow rate and provoke polluting combustion.

##### Boiler

Clean the boiler as indicated in its accompanying instructions in order to maintain all the original combustion characteristics intact, especially: the flue gas temperature and combustion chamber pressure.

##### Gas leaks

Make sure that there are no gas leaks on the pipe between the gas meter and the burner.



**Combustion head**

Open the burner and make sure that all components of the combustion head are in good condition, not deformed by the high temperatures, free of impurities from the surroundings and correctly positioned.

If in doubt, disassemble the elbow 5)(Fig. 38).

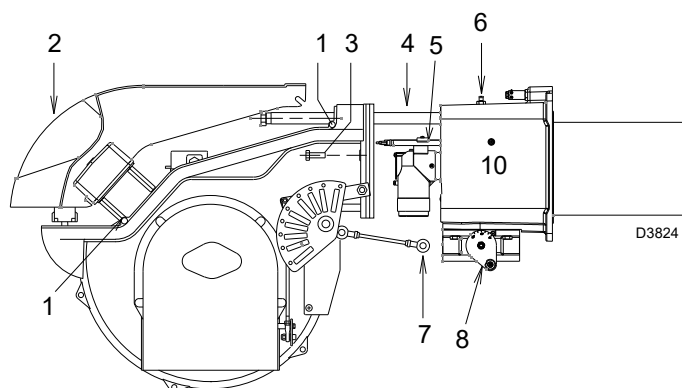


Fig. 38

**Gas filter**

Change the gas filter when it is dirty.

**Flame inspection window**

Clean the glass of the flame inspection window (Fig. 39).

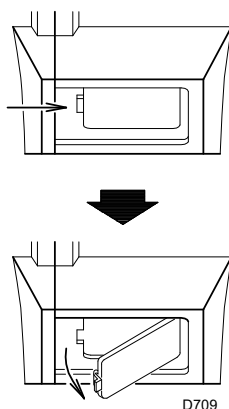


Fig. 39

**Combustion**

Carry out an analysis of the combustion flue gases.

Significant differences with respect to the previous measurements indicate the points where most care should be exercised during maintenance.

If the combustion values measured before starting maintenance do not comply with applicable Standards or do not indicate efficient combustion, consult the Tab. H or contact our Technical Support Service to implement the necessary adjustments.

It is advisable to set the burner according to the type of gas used and following the indications in Tab. H.

EN 676		Air excess			
		Max. output $\lambda \leq 1.2$		Min. output $\lambda \leq 1.3$	
		CO <sub>2</sub> % Calibration		CO	NO <sub>x</sub>
GAS	CO <sub>2</sub> theoretic al max. 0% O <sub>2</sub>	$\lambda = 1.2$	$\lambda = 1.3$	mg/kWh	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 31	13.7	11.4	10.5	$\leq 100$	$\leq 230$

Tab. H

**6.2.4 Safety components**

The safety components should be replaced at the end of their life cycle indicated in the following table.



ATTENTION

The specified life cycles do not refer to the warranty terms indicated in the delivery or payment conditions.

Safety component	Life cycle
Flame control	10 years or 250.000 operation cycles
Flame sensor	10 years or 250.000 operation cycles
Gas valves (solenoid)	10 years or 250.000 operation cycles
Pressure switches	10 years or 250.000 operation cycles
Pressure adjuster	15 years
Servomotor (electronic cam)(if any)	10 years or 250.000 operation cycles
Oil valve (solenoid)(if any)	10 years or 250.000 operation cycles
Oil regulator (if present)	10 years or 250.000 operation cycles
Oil pipes/ couplings (metallic) (if present)	10 years
Flexible hoses (if present)	5 years or 30.000 pressurised cycles
Fan impeller	10 years or 500.000 start-ups

Tab. I

**7 LED indicator and special function**

**ATTENTION**

In the event the burner stops, in order to prevent any damage to the installation, do not unblock the burner more than twice in a row. If the burner locks out for a third time, contact the customer service.


**DANGER**

In the event there are further lockouts or faults with the burner, the maintenance interventions must only be carried out by qualified, authorised personnel, in accordance with the contents of this manual and in compliance with the standards and regulations of current laws.

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.	The operation solenoid lets little gas through.	Increase
		One of the two solenoid valves does not open	Replace
		Gas pressure too low	Increase pressure at governor
		Ignition electrode incorrectly adjusted	Adjust it
		Electrode grounded due to broken insulation	Replace
		High voltage cable defective	Replace
		High voltage cable deformed by high temperature	Replace and protect
		Ignition transformer defective	Replace
		Incorrect valve or transformer electrical wiring	Check
		Defective control box	Replace
		A closed valve upline the gas train	Open
		Air in pipework	Bleed air
		Gas valves unconnected or with interrupted coil	Check connections or replace coil
3x flashes ● ● ●	The burner does not switch on, and the lockout appears	Air pressure switch in operating position	Adjust or replace
	The burner switches on, but then stops in lockout	Air pressure switch does not switch owing to lack of air pressure:	
		Air pressure switch poorly adjusted	Adjust or replace
		Pressure switch pressure point pipe blocked	Clean
		Poorly adjusted head	Adjust
		High pressure in the furnace	Connect air pressure switch to fan suction line
	Lockout during pre-purging phase	Defective motor control contactor (only three-phase version)	Replace
		Defective electrical motor	Replace
		Motor lockout (only three-phase version)	Replace
4 blinks ● ● ● ●	The burner switches on, but then stops in lockout	Flame simulation	Replace the control box
	Lockout when burner stops	Permanent flame in the combustion head or flame simulation	Eliminate persistence of flame or replace control box
6 blinks ● ● ● ● ● ●	The burner switches on, but then stops in lockout	Defective or incorrectly adjusted servomotor	Adjust or replace
7 blinks ● ● ● ● ● ● ●	The burner goes into lockout immediately following the appearance of the flame	The operation solenoid lets little gas through	Increase
		Ionisation probe incorrectly adjusted	Adjust
		Insufficient ionisation (less than 5 A)	Check probe position
		Earth probe	Withdraw or replace cable
		Burner poorly earthed	Check earthing
		Phase and neutral connections inverted	Invert them
	Burner locks out when shifting from minimum to maximum output and vice versa	Defective flame detection circuit	Replace the control box
		Too much air or too little gas	Adjust air and gas
	Burner goes into lockout during operation	Probe or ionisation cable grounded	Replace worn parts

Signal	Problem	Possible cause	Recommended remedy
10 blinks ●●●●●● ●●●●●●	The burner does not switch on, and the lock-out appears	Incorrect electrical wiring	Check
	The burner goes into lockout	Defective control box	Replace
		Presence of electromagnetic disturbances in the thermostat lines	Filter or eliminate
		Presence of electromagnetic disturbance	Use the radio disturbance protection kit
No blink	The burner does not start	No electrical power supply	Check connections
		A limiter or safety control device is open	Adjust or replace
		Line fuse blocked	Replace
		Defective control box	Replace
		No gas supply	Open the manual valves between contactor and train
		Mains gas pressure insufficient	Contact your gas company
		Minimum gas pressure switch fails to close	Adjust or replace
		Servomotor fails to move to min. ignition position	Replace
	The burner continues to repeat the start-up cycle, without lockout	The gas pressure in the gas mains lies very close to the value to which the 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	Poorly adjusted head	Adjust
		Ignition electrode incorrectly adjusted	Adjust it
		Incorrectly adjusted fan air damper: too much air	Adjust
		Output during ignition phase is too high	Reduce
	Burner does not reach maximum output	Remote control device TR fails to close	Adjust or replace
		Defective control box	Replace
		Defective servomotor	Replace
	Burner stops with air damper open	Defective servomotor	Replace

Tab. J

## A Appendix - Accessories

### Output regulator kit for modulating operation

With modulating operation, the burner continuously adjusts its output to the heat request, thereby ensuring a great stability of the controlled parameter: temperature or pressure.

The parts to be ordered are two:

- output regulator to be installed to the burner;
- probe to be installed to heat generator.

Parameter to be controlled		Probe		Output regulator	
	Adjustment field	Type	Code	Type	Code
Temperature	- 100 ÷ 500° C	PT 100	3010110	RWF50.2 RWF55.5	20099869 20099905
Pressure	0 ÷ 2.5 bar	4 ÷ 20 mA	3010213		
	0 ÷ 16 bar	4 ÷ 20 mA	3010214		
	0 ÷ 25 bar	4 ÷ 20 mA	3090873		

### Soundproofing box kit

Burner	Type	dB(A)	Code
RS 250/M MZ	C4/5	10	3010404

### Extended head kit

Burner	Standard head length (mm)	Extended head length (mm)	Code
RS 250/M MZ	370	520	3010412

### LPG kit

Burner	Code
RS 250/M MZ	3010411

### Gas flange kit DN80

Burner	Code
RS 250/M MZ	3010439

### Town gas kit

Burner	Code
RS 250/M MZ	3010472

### PC interface kit

Burner	Code
RS 250/M MZ	3002719

### Continuous purging kit

Burner	Code
RS 250/M MZ	3010094

### Spacer kit

Burner	Thickness (mm)	Code
RS 250/M MZ	102	3000722

### Signal converter kit

Burner	Code
RS 250/M MZ	3010415

### Radio disturbance protection kit

If the burner is installed in places particularly subject to radio disturbance (emission of signals exceeding 10 V/m) due to the presence of an INVERTER, or in applications where the length of thermostat connections exceeds 20 metres, a protection kit is available as an interface between the control box and the burner.

### Potentiometer kit

Burner	Code
RS 250/M MZ	3010416

Burner	Code
RS 250/M MZ	3010386

### Differential circuit breaker kit

Burner	Code
RS 250/M MZ	3010329

### Gas trains in compliance with EN 676

Please refer to manual.



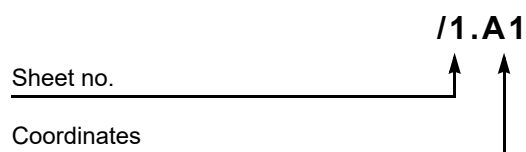
ATTENTION

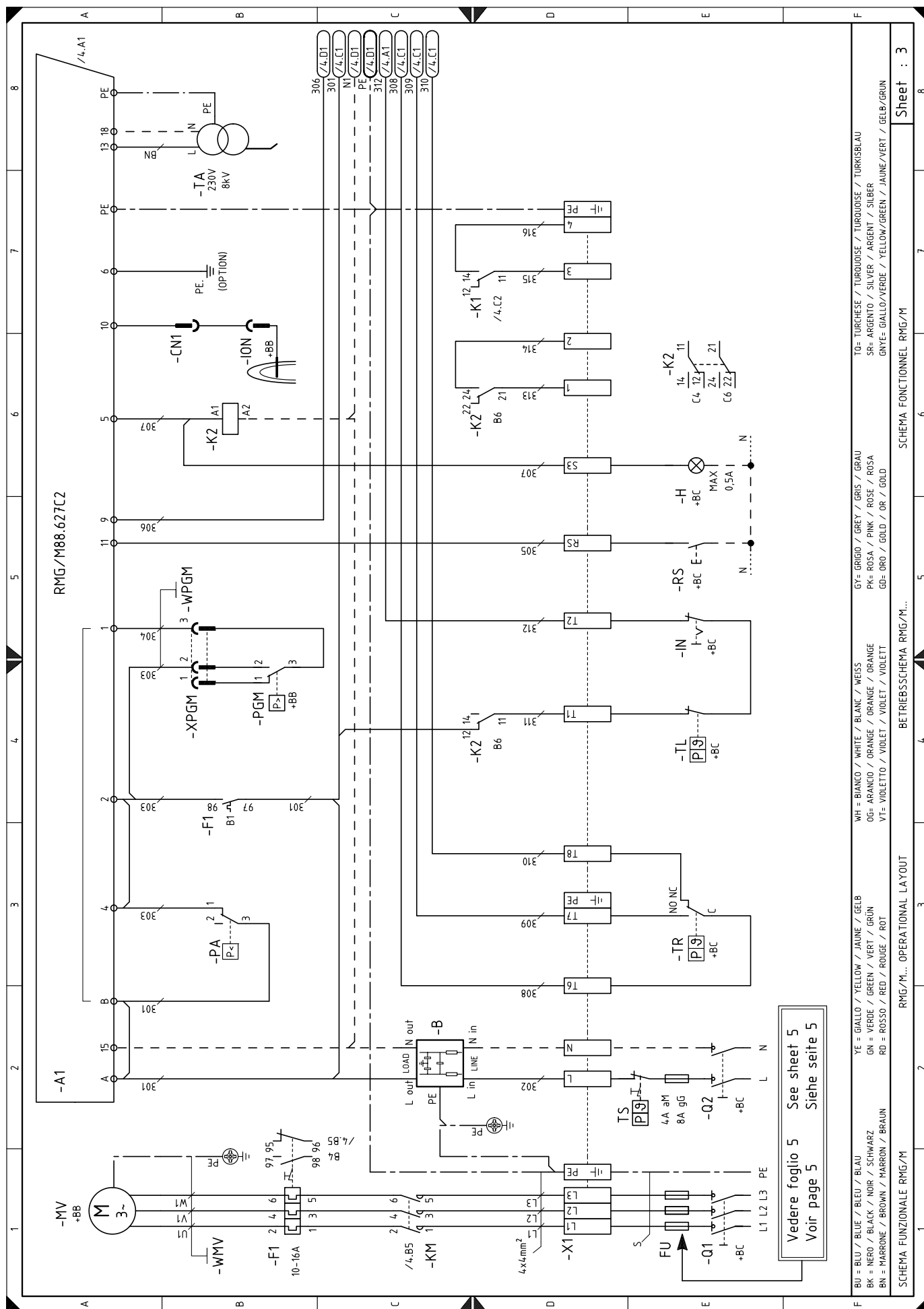
The installer is responsible for the addition of any safety device not foreseen in this manual.

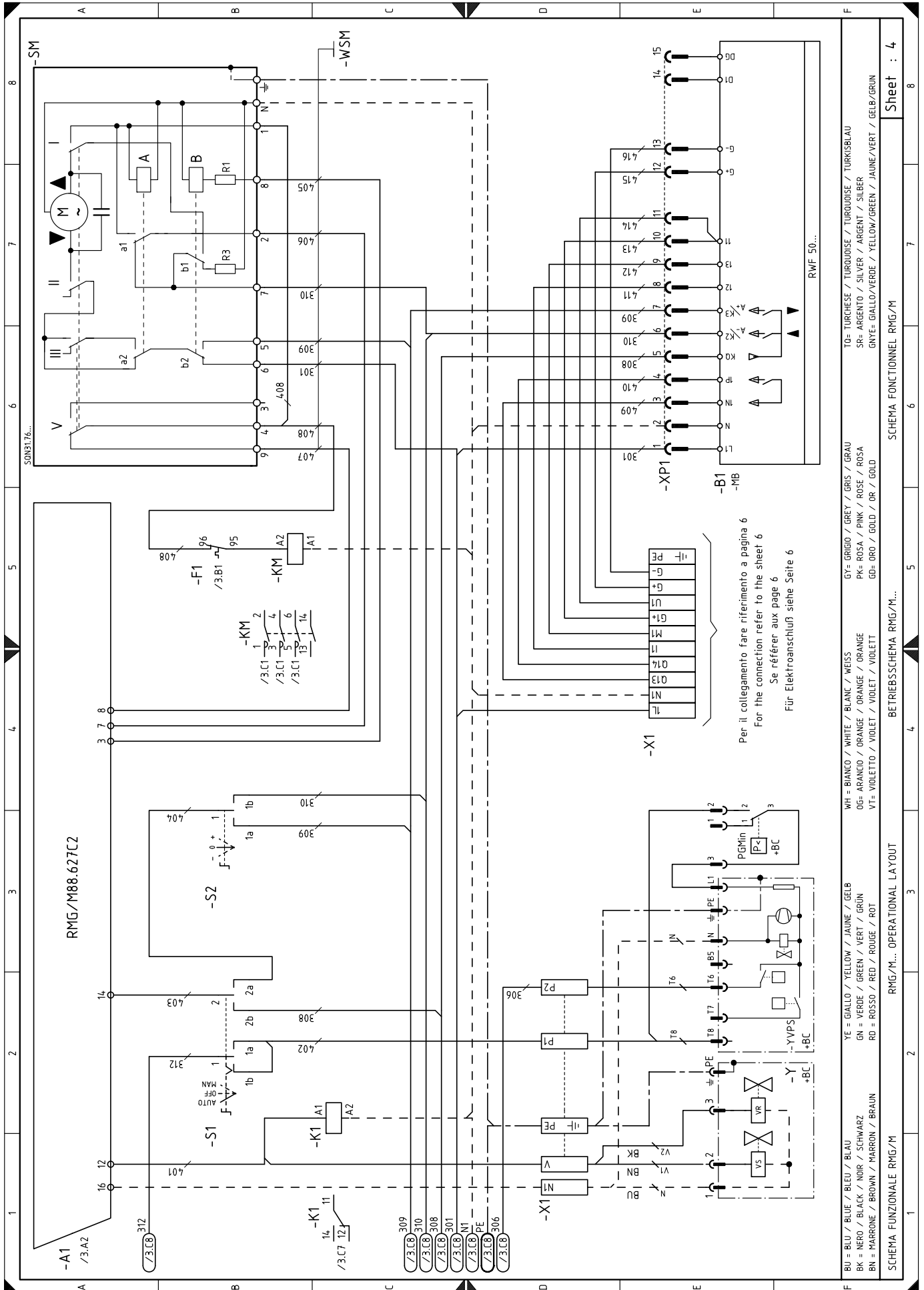
**B Appendix - Electrical panel layout**

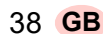
<b>1</b>	<b>Contents</b>
<b>2</b>	Indication of references
<b>3</b>	Functional layout RMG/M
<b>4</b>	Functional layout RMG/M
<b>5</b>	Electrical wiring that is the responsibility of the installer
<b>6</b>	Functional layout RWF50

**2 Indication of references**

Sheet no.  **/1.A1**  
Coordinates











**Wiring layout key**

<b>A1</b>	Electrical control box
<b>B</b>	Filter against radio disturbance
<b>B1</b>	RWF50 output regulator
<b>BA</b>	Current input DC 4...20 mA
<b>BA1</b>	Current input DC 4...20 mA for remote setpoint modification
<b>BP</b>	Pressure probe
<b>BP1</b>	Pressure probe
<b>BR</b>	Remote setpoint potentiometer
<b>BT1</b>	Thermocouple probe
<b>BT2</b>	Probe Pt100, 2 wires
<b>BT3</b>	Probe Pt100, 3 wires
<b>BT4</b>	Probe Pt100, 3 wires
<b>BTEXT</b>	External probe for climatic compensation of the setpoint
<b>BV</b>	Voltage input DC 0...10 V
<b>BV1</b>	Voltage input DC 0...10 V for remote setpoint modification
<b>CN1</b>	Ionisation probe connector
<b>F1</b>	Fan motor thermal relay
<b>H</b>	Remote lockout signal
<b>IN</b>	Burner manual stop electric switch
<b>ION</b>	Ionisation probe
<b>K1</b>	Clean contacts output relay, burner ON
<b>K2</b>	Clean contacts output relay, burner lockout
<b>KM</b>	Fan motor contactor
<b>MV</b>	Fan motor
<b>PA</b>	Air pressure switch
<b>PE</b>	Burner earth
<b>PGMin</b>	Minimum gas pressure switch
<b>PGM</b>	Maximum gas pressure switch
<b>Q1</b>	Three-phase disconnecting switch
<b>Q2</b>	Single-phase disconnecting switch
<b>RS</b>	Remote reset button
<b>S1</b>	Off / automatic / manual selector
<b>S2</b>	Output increase / decrease selector
<b>SM</b>	Servomotor
<b>TA</b>	Ignition transformer
<b>TL</b>	Limit thermostat/pressure switch
<b>TR</b>	Adjustment thermostat/pressure switch
<b>TS</b>	Safety thermostat/pressure switch
<b>X1</b>	Burner terminal strip
<b>XPGM</b>	Maximum gas pressure switch connector
<b>XP1</b>	Socket for kit
<b>XRWF</b>	Terminal strip for RWF50 output regulator
<b>Y</b>	Gas adjustment valve + gas safety valve
<b>YVPS</b>	Leak detection control device





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