GB

Forced draught gas burners

CN

强制通风燃气燃烧器

Progressive two-stage or modulating operation
平滑两段火或比例调节运行

CODE - 代码	MODEL - 型号	TYPE - 类型
20042322	RS 70/M	828T1
20044401	RS 100/M	829T1
20044402	RS 130/M	830T1

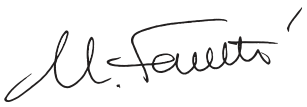
20044206 (4) - 01/2016

Declaration of conformity in accordance with ISO / IEC 17050-1		
Manufacturer:	RIELLO S.p.A.	
Address:	Via Pilade Riello, 7 37045 Legnago (VR)	
Product:	Forced draught gas burners	
Model:	RS 70/M RS 100/M RS 130/M	
These products are in compliance with the following Technical Standards:		
EN 676		
EN 12100		
and according to the European Directives:		
MD	2006/42/EC	Machine Directive
LVD	2014/35/UE	Low Voltage Directive
EMC	2014/30/UE	Electromagnetic Compatibility

The quality is guaranteed by a quality and management system certified in accordance with UNI EN ISO 9001.

Legnago, 01.12.2015

Executive General Manager
RIELLO S.p.A. - Burner Department
Mr. U. Ferretti



Research & Development Director
RIELLO S.p.A. - Burner Department
Mr. F. Comencini

1.1 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.

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.

GENERAL DANGERS

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

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

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

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

DANGER: LIVE COMPONENTS

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

Other symbols

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

➤ This symbol indicates a list.

Abbreviations used

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

Delivery of the system and the instruction manual
When the system is delivered, it is important that:

- ➤ The instruction manual is consigned 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 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.

1.2 Guarantee and responsibility

RIELLO guarantees its new products from the installation date, 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.

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 RIELLO 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 non authorised 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 power supply system;
- ➤ use of the burner even following an error and/or an irregularity;
- ➤ 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 RIELLO components, including spare parts, kits, accessories and optionals;
- ➤ force majeure.

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

2.1 Introduction

The RIELLO burners have been designed and built in compliance with current regulations and directives, applying the known technical rules of safety 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.

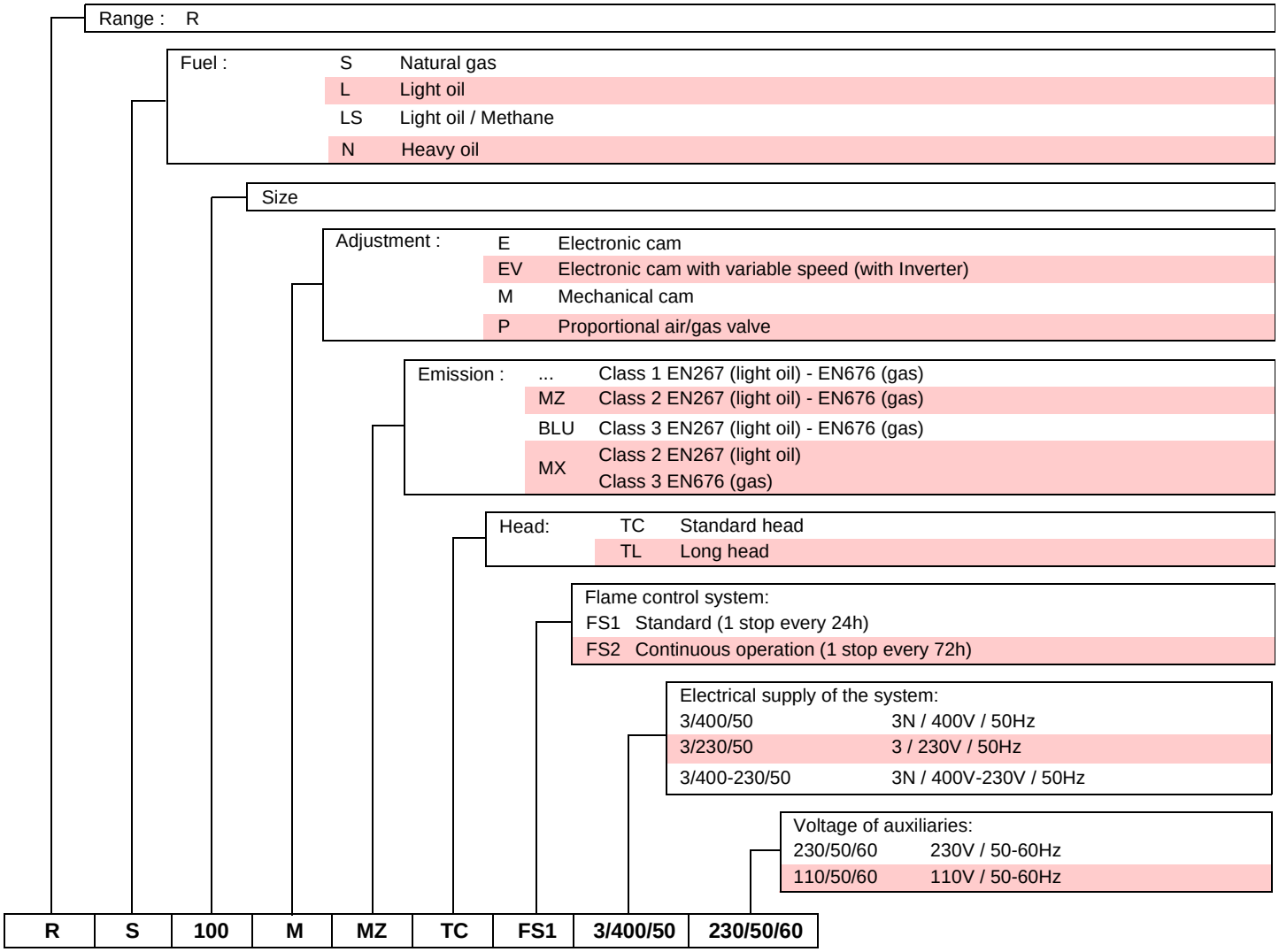
It is a good idea to remember the following:
- ➤ The burner must only be used as expressly described. Any other use should be considered improper and therefore dangerous.

In particular:
it can be applied to boilers operating with water, steam, diathermic oil, and to other users 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 room 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.

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;
- ➤ must take all the measures necessary to prevent unauthorised people gaining access to the machine;
- ➤ undertakes to inform his personnel in a suitable way about the application and observance of the safety instructions. With that aim, he undertakes to ensure that everyone knows the use and safety instructions for his own duties;
- ➤ 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.
- ➤ Personnel must follow 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.

3.1 Burner designation



3.2 Models available

Designation		Voltage	Diagnostic
RS 70/M	TC	3 ~ 400 / 230V - 50Hz	20042322
RS 100/M	TC	3 ~ 400 / 230V - 50Hz	20044401
RS 130/M	TC	3 ~ 400 / 230V - 50Hz	20044402

3.3 Burner categories - Countries of destination

Country of destination	Gas category
BE	I2E(R) - I3
CY - CZ - MT	I3B/P
LU - PL	II2E3B/P
DE	II2ELL3B/P
FR	II2Er3P
IT	II2H3
ES - GB - IE - PT	II2H3
AT - CH - CZ - DK - EE - FI - GR - HU - IE IS - LT - NO - SE - SI - SK - TR	II2H3B/P
NL	II2L3B/P

3.4 Technical data

Model			RS 70/M	RS 100/M	RS 130/M
Type			828T1	829T1	830T1
Output (1)	maximum	kW Mcal/h	470 - 930 404 - 800	700 - 1340 602 - 1152	920 - 1600 791 - 1376
	minimum	kW Mcal/h	150 129	150 129	254 218
Fuel			Natural gas: G20 - G23 - G25		
Gas pressure at max. output (2) - Gas: G20/G25		mbar	15.7/22.9	15.5/21.9	12.7/18.9
Operation			Intermittent (min. 1 stop in 24 hours)		
Standard applications			Boilers: water. steam. diathermic oil		
Ambient temperature		°C	0 - 40		
Combustion air temperature		°C max	60		
Electrical supply			3 ~ 400V / 230 V 1N ~ 230V +/-10% 50 Hz (See Chap. 3.2)		
Fan motor (rating)		rpm V kW	2800 220/240 - 380/415 1.1	2800 220/240 - 380/415 1.5	2800 220/240 - 380/415 2.2
Operating current		A	4.8 - 2.8	5.9 - 3.4	8.8 - 5.1
Acceleration current		A	33 - 19	48 - 28	68 - 39
Ignition transformer		V1 - V2 I1 - I2	230V - 1 x 8 kV 1A - 20mA		
Absorbed electrical power		kW max	1.4	1.8	2.6
Protection level			IP 44		
Noise level (3)		dBA	75	77	78.5

(1) Reference conditions: Ambient temperature 20°C - Gas temperature 15°C - Barometric pressure 1013 mbar - Altitude 0m above sea level.
(2) Pressure upstream of the gas ramp 1)(Fig. 19) as declared by norm EN676, with 0 mbar in the combustion chamber and with the burner at full power.
(3) Sound pressure measured in manufacturer's combustion laboratory, with burner operating on test boiler and at maximum output.

3.5 Burner weight

The weight of the burner complete with its packaging is shown in table.

Model	kg
RS 70/M	70
RS 100/M	73
RS 130/M	76

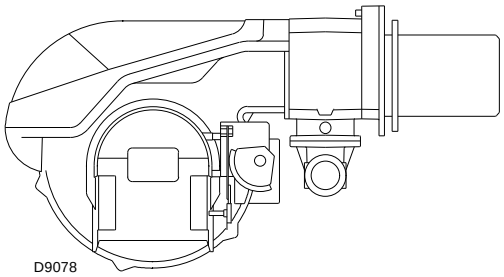


Fig. 1

3.6 Overall dimensions

The dimensions of the burner are shown in Fig. 2.
Bear in mind that inspection of the combustion head requires the burner to be opened and the rear part drawn back on the guides.
The dimensions of the open burner are indicated by position I.

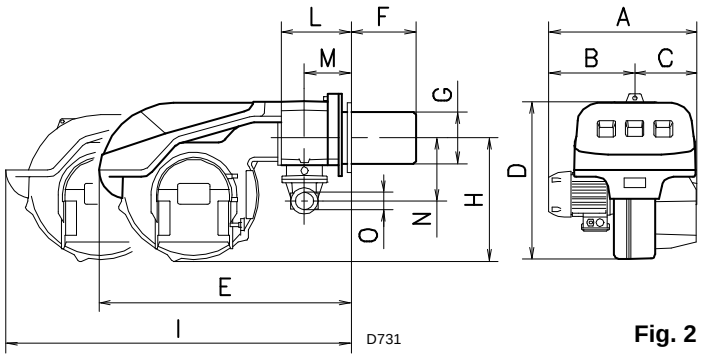


Fig. 2

mm	A	B	C	D	E	F	G	H	I	L	M	N	O
RS 70/M	511	296	215	555	840	250	179	430	1161	214	134	221	2”
RS 100/M	527	312	215	555	840	250	179	430	1161	214	134	221	2”
RS 130/M	553	338	215	555	840	280	189	430	1161	214	134	221	2”

3.7 Firing rates

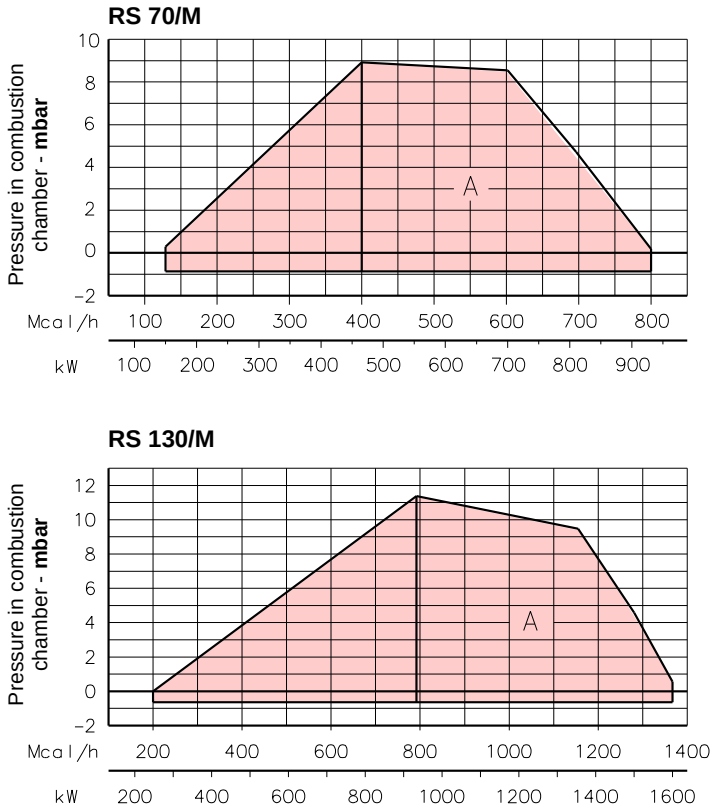


Fig. 3

The **maximum output** is chosen within area **A** of the diagram.

The **minimum output** must not be lower than the minimum limit of the diagram.

Warning
The firing rate was obtained considering an ambient temperature of 20°C and an atmospheric pressure of 1013 mbar (approx. 0 m above sea level), with the combustion head adjusted as shown in Ch. 4.6.

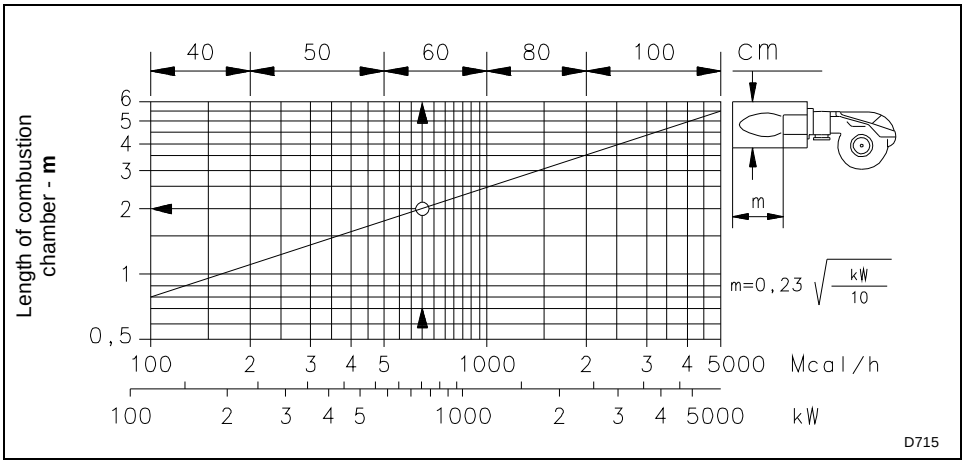


Fig. 4

The firing rates were obtained in special test boilers, according to EN 676 regulations.
Fig. 4 indicates the diameter and length of the test combustion chamber.

Example
Output 756 kW (650 Mcal/h):
diameter 60 cm,
length 2m.

The coupling is ensured when the boiler is EC type-approved; for boilers or ovens with combustion chambers of very different dimensions compared to those shown in the diagram of Fig. 4, preliminary checks are recommended.

3.8 Burner components

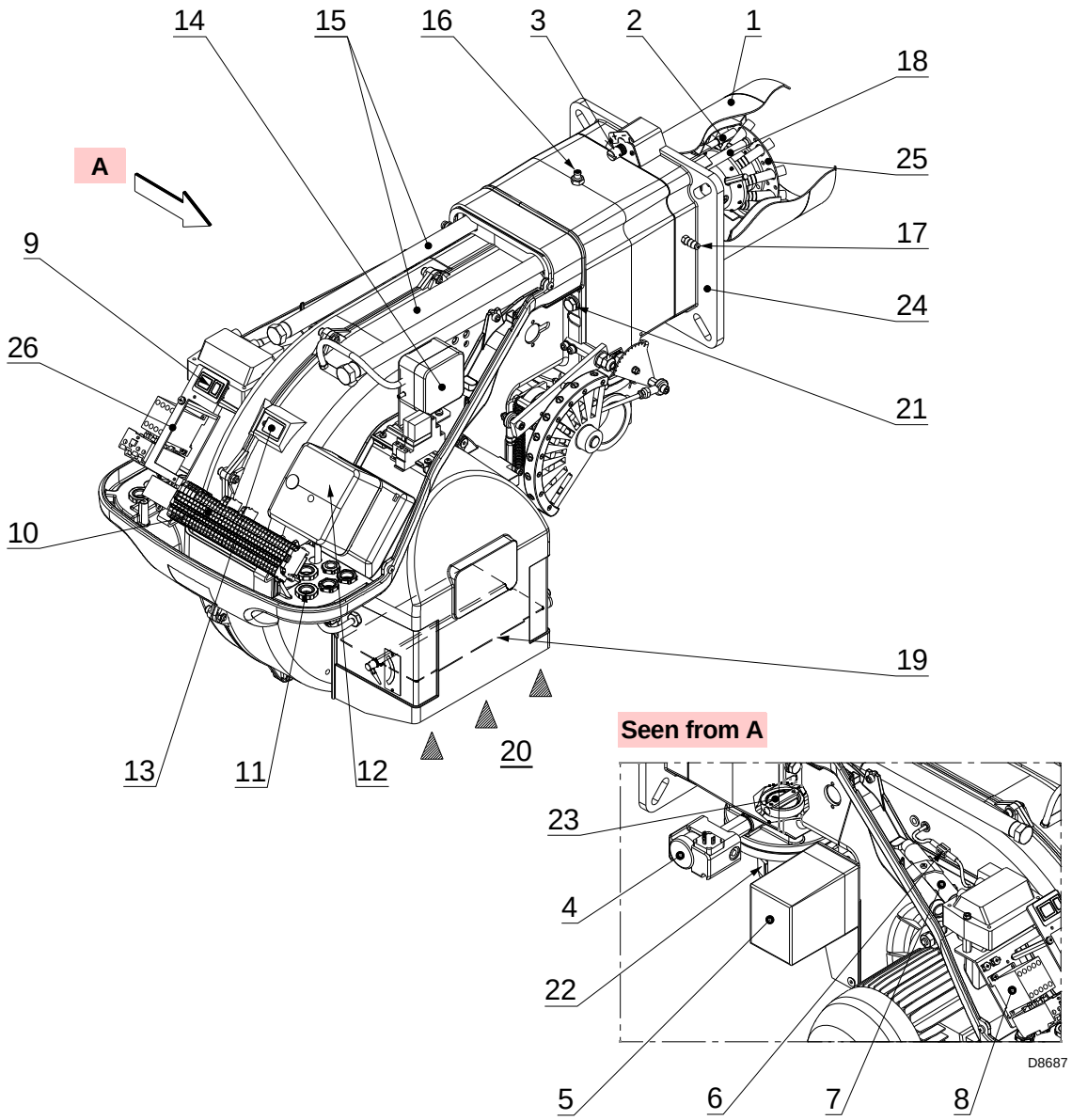


Fig. 5

1 Combustion head
2 Ignition electrode
3 Screw for combustion head adjustment
4 Maximum gas pressure switch
5 Servomotor controlling the gas butterfly valve and the air damper valve (by means of an adjustable profile cam mechanism).
When the burner is not operating the air gate valve 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.
6 Plug-socket on ionisation probe cable
7 Extensions for slide bars 15)
8 Motor contact maker and thermal relay with reset button
9 Power switch for:
automatic - manual - off
Button for:
power increase - power reduction
10 Terminal board for electrical wiring
11 Cable grommets for electrical wiring (to be carried out by the installer)
12 Control box with lockout pilot light and lockout reset button
13 Flame inspection window
14 Air pressure switch (differential operating type)
15 Slide bars for opening the burner and inspecting the combustion head
16 Gas pressure test point and head fixing screw
17 Air pressure socket
18 Flame sensor probe
19 Air damper
20 Fan air inlet
21 Screws to secure fan to pipe coupling
22 Gas input pipe
23 Gas butterfly valve
24 Boiler fixing flange
25 Flame stability disc
26 Bracket for application of output power regulator RWF40

3.9 Burner equipment

The burner is supplied complete with:
- ➤ Gas train flange
- ➤ Flange gasket
- ➤ 4 screws to fix the M8x25 flange
- ➤ Thermal insulation screen
- ➤ Extensions 7) per guides 15): only TL versions
- ➤ 4 screws to fix the M12x35 burner flange to the boiler
- ➤ Instruction manual
- ➤ Spare parts list

3.10 Control box for the air/fuel ratio

Introduction
The RMG/M 88.62... control box included in burners of **RS** range is designed to control and start up forced draught gas burners with intermittent operation.
In compliance with:
- Technical Standard EN676 (gas burners)
- Technical Standard EN298 (gas appliances)

Fig. 6

DANGER

All the installation, maintenance and disassembly operations must be carried out with the electricity supply disconnected.
To avoid damaging things or injuring people, do not open or alter the control box.

WARNING

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

Technical Data

Electrical supply	AC 220.....240V +10% / -15%
Frequency	50.....60 Hz +/- 6%
Internal fuse	T6,3H250V
Operation below the nominal value of electrical supply	
Minimum operation value on reduction of electrical supply below nominal value	approx. AC 160 V
Minimum operation value on increase in electrical supply towards nominal value	approx. AC 175 V
Maximum load of the contacts:	
Alarm exit Nominal power supply Maximum current	 AC 230V, 50/60 Hz 0.5 A
Allowed cable length Thermostat Air pressure switch CPI Gas pressure switch Flame detector Remote reset	 max. 20 m at 100 pF/m max. 1 m at 100 pF/m max. 1 m at 100 pF/m max. 20 m at 100 pF/m max. 1 m max. 20 m at 100 pF/m
M4 screws tightening torque	max. 0.8 Nm

3.11 Servomotor

The servomotor provides simultaneous adjustment for the air damper, by means of the adjustable profile cam and the gas butterfly valve. The servomotor rotates by 130° in 42 seconds.

WARNING

Do not alter the factory setting for the 5 cams; simply check that they are set as indicated below:

Cam I: 130°
Limits rotation toward maximum position.
When the burner is at MAX output, the gas butterfly valve must be fully open: 90°.

Cam II: 0°
Limits rotation toward minimum position.

When the burner is shut down, the air damper and gas butterfly valve must be closed: 0°.

Cam III: 65°
Adjusts the ignition position and the MIN output.

Cam V: integrated to cam III.

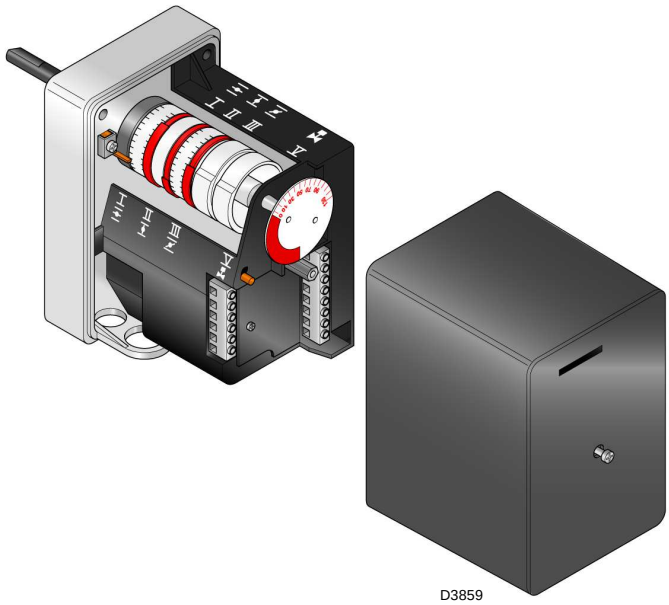


Fig. 7

4.1 Notes on safety for the installation

After carefully cleaning all around the area where the burner will be installed, and arranging the correct lighting of the environment, proceed with the installation operations.

DANGER

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

WARNING

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.

4.2 Handling

The packaging of the burner includes a wooden platform, so it is possible to move the burner (still packaged) with a transpallet truck or fork lift truck.

WARNING

The handling operations for the burner can be highly dangerous if not carried out with the greatest attention: keep any unauthorised people at a distance; check the integrity and suitableness of the available means of handling.
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 the handling, keep the load at not more than 20-25 cm from the ground.

CAUTION

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.

4.3 Preliminary checks

Checking the consignment

CAUTION

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.

Checking the characteristics of the burner

Check the identification label of the burner, showing:

- the model (see **A** in Fig. 8) and type of burner (**B**);
- the year of manufacture, in cryptographic form (**C**);
- the serial number (**D**);
- the data for electrical supply and the protection level (**E**);
- the electrical input power (**F**);
- the types of gas used and the relative supply pressures (**G**);
- the data of the burner's minimum and maximum output possibilities (**H**) (see Firing rate)
  Warning. The burner output must be within the boiler's firing rate;
- the category of the device/countries of destination (**I**).

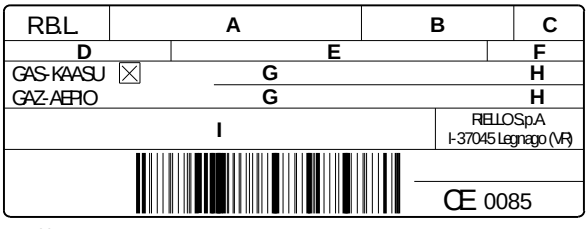


Fig. 8

WARNING

A burner label that has been tampered with, removed or is missing, along with anything else that 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 the positions **1**, **2**, **3 and 4**.
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** permit 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 prohibited for safety reasons.

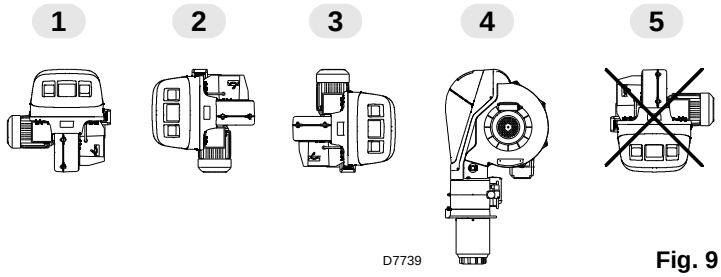


Fig. 9

4.5 Securing the burner to the boiler

Preparing the boiler

Boring the boiler plate
Make holes in the plate shutting off the combustion chamber, as illustrated in Fig. 10.
The position of the threaded holes can be marked using the thermal insulation screen supplied with the burner.

mm	A	B	C
RS 70/M	185	275 - 325	M 12
RS 100/M	185	275 - 325	M 12
RS 130/M	185	275 - 325	M 12

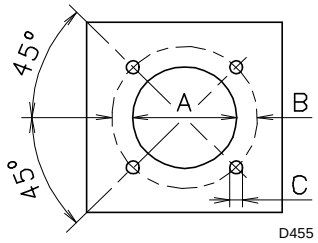


Fig. 10

Length of the blast tube
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 refractory.
The available lengths L are those indicated in the table below.

Blast tube	mm
RS 70/M	250
RS 100/M	250
RS 130/M	280

For boilers with front flue passes 15) or flame inversion chamber, a protection in refractory material 13) must be inserted between the boiler fettling 14) and the blast tube 12).
This protection must not compromise the extraction of the blast tube. See Fig. 11.
For boilers with a water-cooled frontal, a refractory lining 13)-14) is not necessary unless expressly requested by the boiler manufacturer.

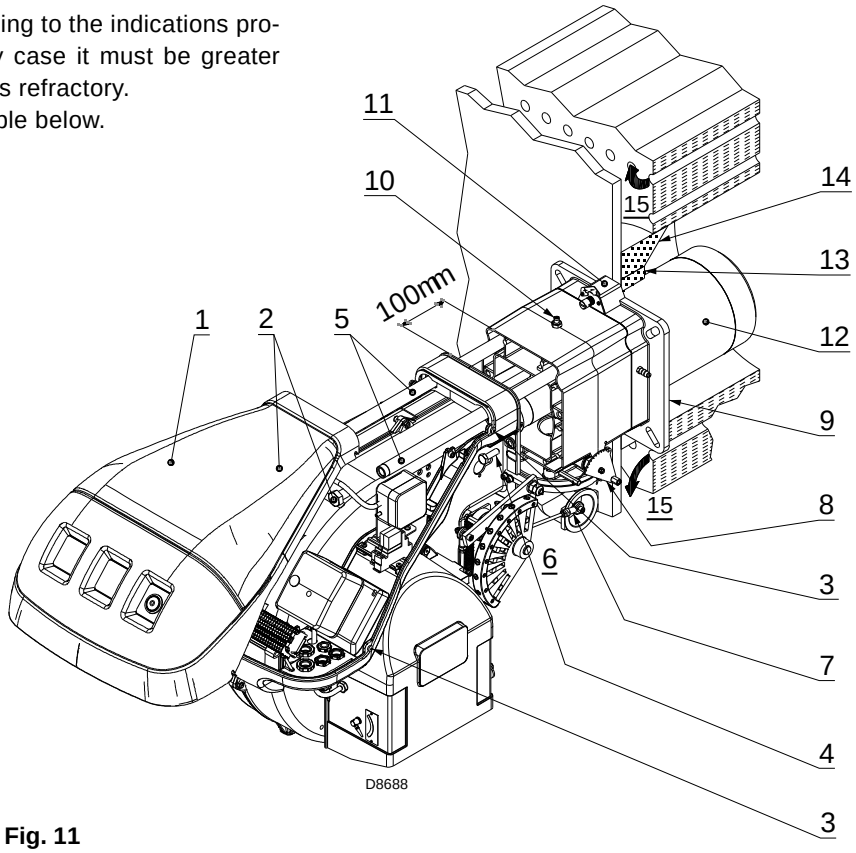


Fig. 11

Securing the burner to the boiler

Before fixing the burner to the boiler, check from the opening of the blast tube that the probe and the electrode are correctly positioned, as in Fig. 12.

If, in the previous check, the position of the probe or electrode was not correct, remove the screw 1)(Fig. 13), extract the inner part 2)(Fig. 13) of the head, and adjust them.

Do not rotate the probe: leave it as in Fig. 12 since if it is located too close to the ignition electrode, the control box amplifier may be damaged.

Separate the combustion head from the rest of the burner, Fig. 11.

To do this, proceed as follows:

- loosen the 4 screws 3) and remove the hood 1);
- disengage the articulated coupling 7) from the graduated sector 8);
- remove screws 2) from the two slide bars 5);
- remove the 2 screws 4) and pull the burner back on slide bars 5) by about 100 mm;
- disconnect the probe and electrode cables, then slide off the burner completely from the slide bars.

Once this operation has been carried out, fix the flange 11)(Fig. 11) to the boiler plate, interposing the insulating gasket 9)(Fig. 11) supplied.

Use the 4 screws supplied, with a tightening torque of 35 - 40 Nm, after protecting their thread with anti-seize products.

The seal between burner and boiler must be airtight. After the start-up (see Ch. 5.3), check there is no leakage of flue gases into the external environment.

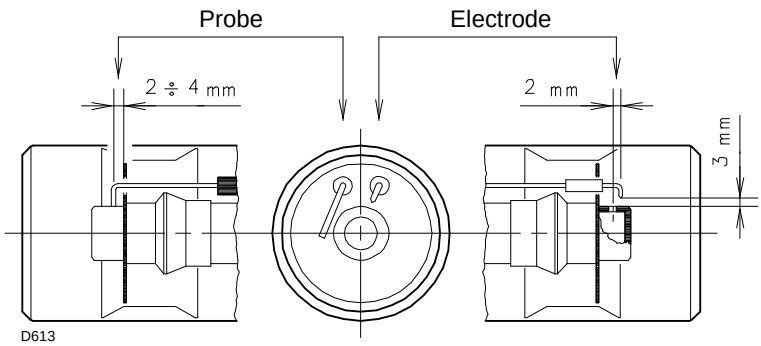


Fig. 12

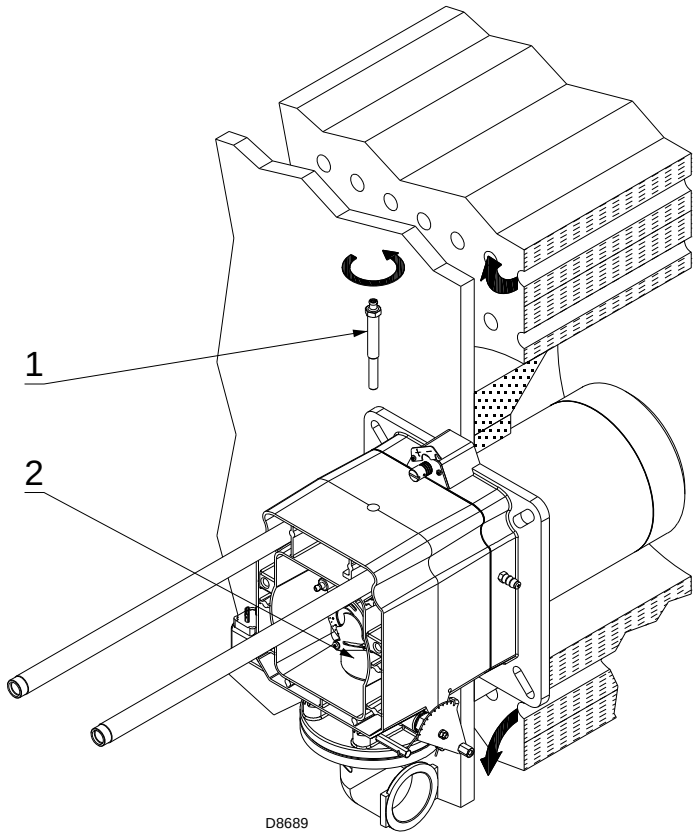


Fig. 13

4.6 Combustion head adjustment

At this point of the installation, the combustion head is fixed to the boiler as shown in Fig. 13.
Its adjustment is therefore particularly easy, which depends solely on the maximum burner output.

Two adjustments of the head are foreseen:
➤ the air adjustment;
➤ the gas adjustment.

In the diagram of Fig. 16, find the notch at which to adjust both air and central gas/air.

Air adjustment
Rotate the screw 2) until the notch you have found corresponds with the front surface 1) of the flange.

CAUTION

Important
To facilitate adjustment, loosen the screw 3) (Fig. 14), adjust and then lock.

Gas adjustment
Loosen the 4 screws) and rotate the ring nut 5) until the notch you have found corresponds with the index 3) (Fig. 14).
Block the 3 screws 4).

Fig. 14

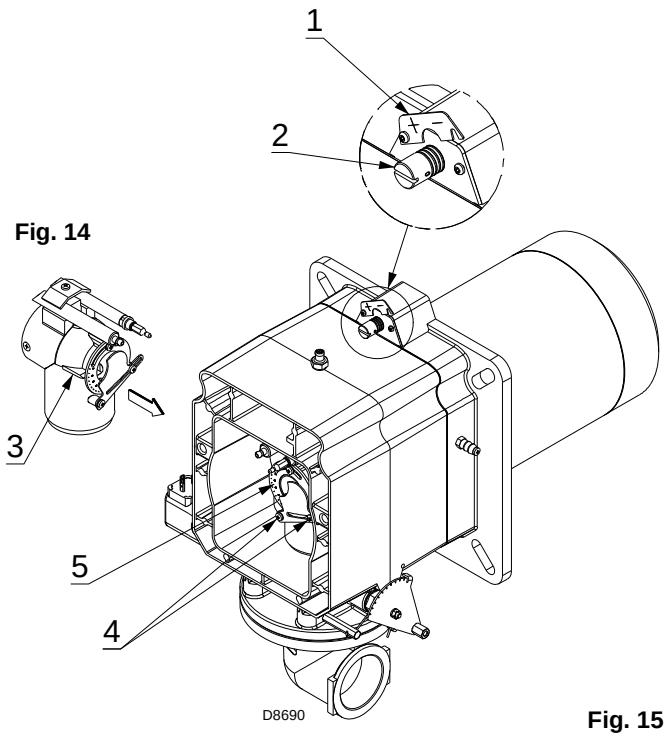
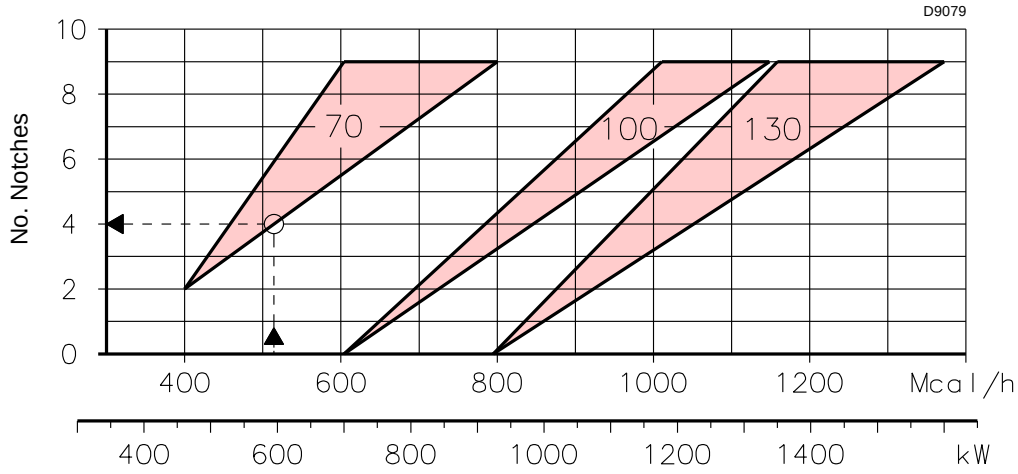


Fig. 15

Example
RS 70/M, burner output = 600 kW.
According to diagram Fig. 16 the gas and air adjustments for this output are carried out on notch 4.



Maximum burner output

Fig. 16

NOTE
The diagram indicates the optimum adjustment for a type of boiler according to Fig. 4.
The adjustments indicated can be modified during the initial start-up.

Once the combustion head adjustment is completed:

- ➤ reassemble the burner on the guides 3) at about 100 mm from the pipe coupling 4) - burner in the position shown in Fig. 11;
- ➤ insert the probe and electrode cables, then slide the burner as far as the pipe coupling - burner in the position shown in Fig. 17;
- ➤ connect the socket of the maximum gas pressure switch;
- ➤ refit the screws 2) on the slide bars 3);
- ➤ fix the burner to the pipe coupling with the screws 1).
- ➤ re-couple the articulated coupling 7) to the graduated sector 6).

CAUTION

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

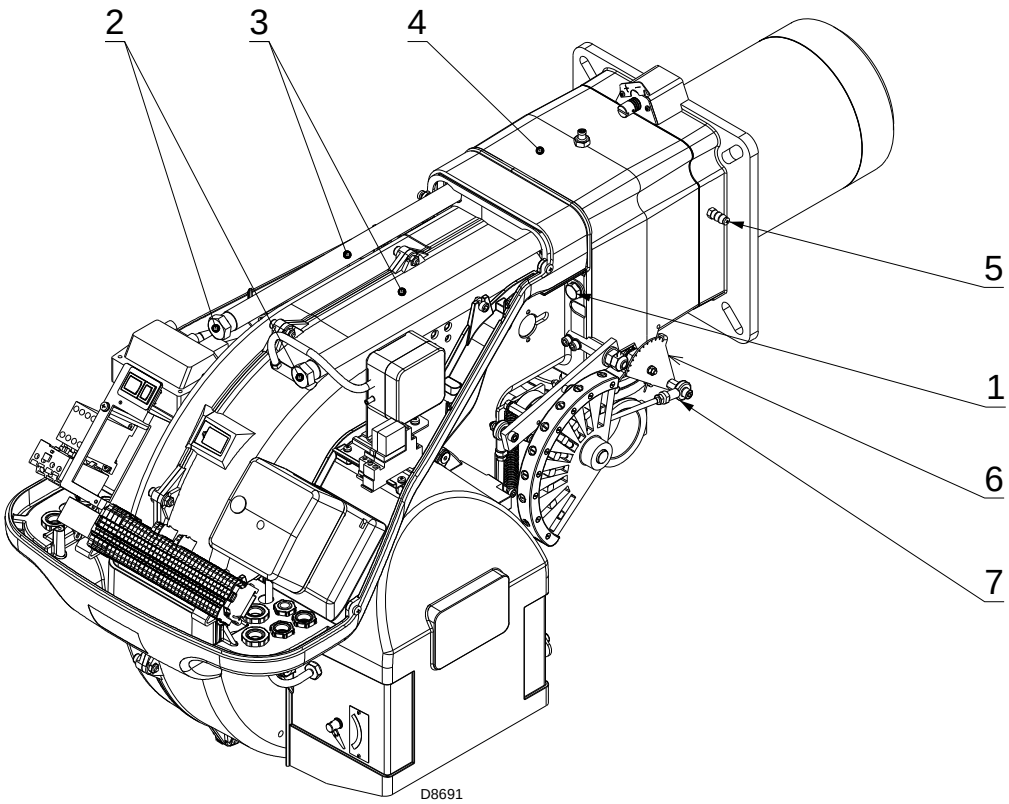


Fig. 17

4.7 Assembly of the gas train

- ➤ The gas train is type-approved according to standard EN 676 and is supplied separately from the burner.
- ➤ The gas train can enter the burner from the right or left side, depending on which is the most convenient, see Fig. 18.
- ➤ The gas train must be connected to the gas attachment 1)(Fig. 18) with the flange 2), the gasket 3) and the 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 3 s.
- ➤ Ensure that the maximum pressure necessary for the burner is included in the calibration field of the pressure adjuster.

WARNING

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

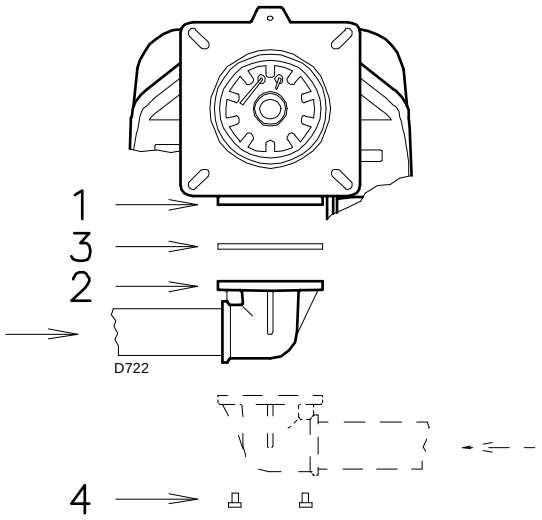


Fig. 18

4.8 Gas feeding line

WARNING

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

Precautions: avoid knocking, attrition, sparks and heat.

Make sure that the fuel interception tap is closed before performing any operation on the burner.

WARNING

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

Key (Fig. 19)

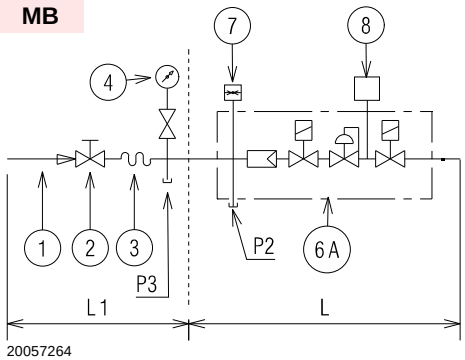
1 Gas input pipe
2 Manual valve
3 Vibration damping joint
4 Pressure gauge with pushbutton cock
5 Filter
6A Includes:
- Filter
- working valve
- safety valve
- pressure adjuster

6C Includes
- safety valve
- working valve

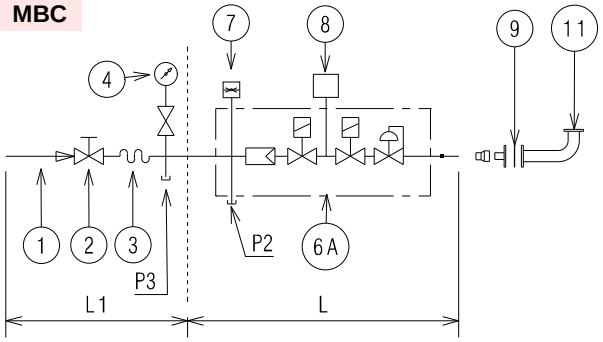
6D Includes:
- safety valve
- working valve
- pressure adjuster
- filter

7 Minimum gas pressure switch
8 Leak detection device, supplied as an accessory or incorporated, based on the gas train code. In compliance with the EN 676 standard, the leak detection control is 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 Upstream pressure of valves/adjuster
P3 Upstream pressure of the filter
L Gas train supplied separately
L1 The responsibility of the installer

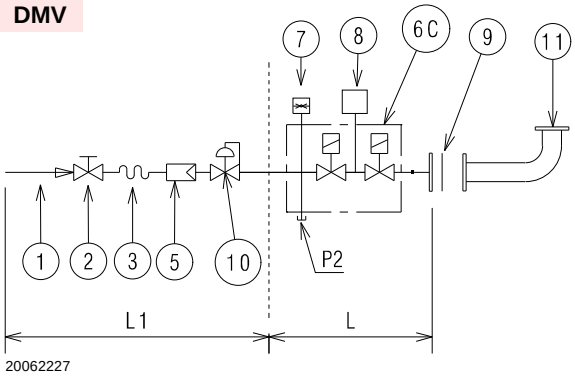
MB



MBC



DMV



CB

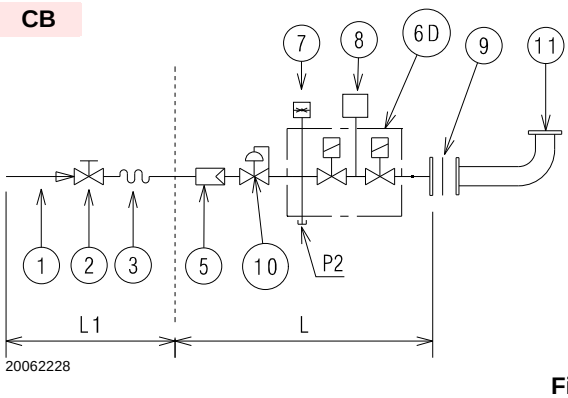


Fig. 19

4.9 Electrical wiring

Notes on safety for the electrical wiring

- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be carried out by qualified personnel and in compliance with the regulations currently in force in the country of destination. Refer to the electrical layouts given in Appendix A.
- RIELLO declines all responsibility for modifications or connections different from those shown in the electrical layouts.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual. See Fig. 8.
- Do not invert the neutral with the phase in the electrical supply line. Any inversion would cause a lockout due to firing failure.
- The burners RS 70-100-130/M have been type-approved for intermittent operation. 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 IN to provide for burner shutdown at least once every 24 hours. Refer to the electrical layouts given in Appendix A.

DANGER

- 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 input power of the device,as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for the input power of the appliance.
- For the main power supply of the device from the electricity mains:
  - do not use adapters, multiple sockets or extensions;
  - use an omnipolar switch with an opening of at least 3 mm between the contacts, as indicated by the current safety standards.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.

If the hood is still present, remove it and proceed with the electrical wiring according to the layouts shown in Appendix A.

Use flexible cables in compliance with the EN 60 335-1 standard.

All the cables to be connected to the burner must be threaded through cable grommets.
See Fig. 20.
The use of the cable grommets can take various forms. By way of example we indicate the following mode:

1 - Three-phase power supply
2 - Single phase power supply
3 - Gas valves
4 - Gas pressure switch or the valve leak detection device
5 - Consents/safety
6 - Available

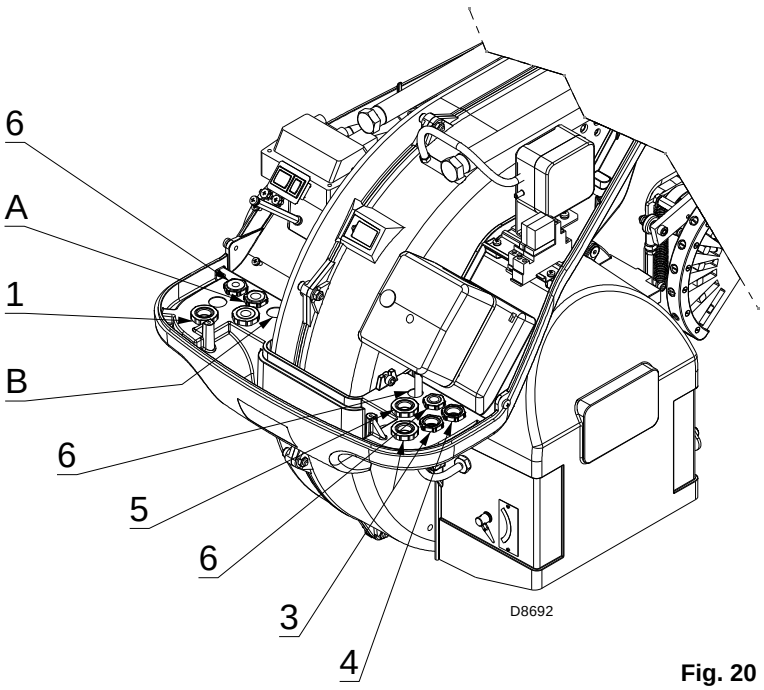


Fig. 20

4.10 Calibration of the thermal relay

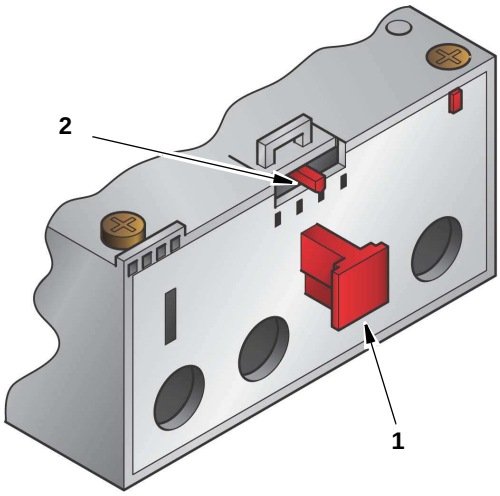
The thermal relay serves to avoid damage to the motor due to an excessive absorption increase or if a phase is missing.

Refer to the table in wiring diagram No. 5 of Appendix A for the calibration.

The protection is in any case ensured even if the minimum value of the thermal relay scale is over the rating absorption of the motor.
This occurs when the motor power supply is 400 V / 460V.
To reset, in case of an intervention of the thermal relay, press button 1) of Fig. 21.

Voltage 3 ~ 400 / 230V - 50Hz

The RS 70-100-130/M models leave the factory pre-set for **400 V** power supply.
If **230 V** power supply is used, change the motor connection from star to delta and change the setting of the thermal relay as well.



D8267

Fig. 21

5.1 Notes on safety for the first start-up

WARNING

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.

WARNING

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

5.2 Operations before start-up

- ➤ Ensure that the gas supply company has carried out the supply line vent operations, eliminating air or inert gases from the piping.
- ➤ Slowly open the manual valves situated upstream the gas train.
- ➤ Adjust the minimum gas pressure switch (Fig. 22) to the start of the scale.
- ➤ Adjust the maximum gas pressure switch (Fig. 23) to the end of the scale.
- ➤ Adjust the air pressure switch (Fig. 24) to the start of the scale.

Minimum gas pressure switch

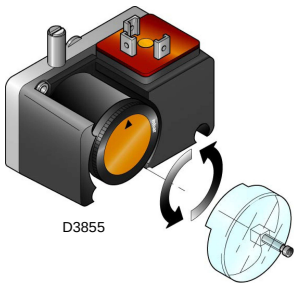


Fig. 22

Maximum gas pressure switch

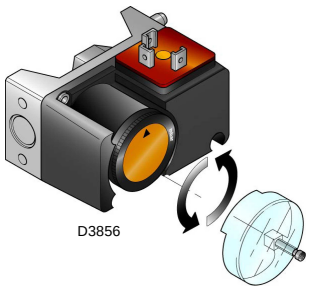


Fig. 23

Air pressure switch

Fig. 24

- ➤ Check the gas supply pressure by connecting a pressure gauge to the pressure test point 1)(Fig. 25) of the minimum gas pressure switch: it must be lower than the maximum allowed pressure of the gas train, as shown on the characteristics label.

DANGER

An excessive gas pressure can damage the components of the gas train and lead to a risk of explosion.

- ➤ Bleed the air from the piping of the gas train, connecting a plastic tube to the pressure test point 1)(Fig. 25) of the minimum gas pressure switch.
  Take the vent tube outside the building so you can notice the smell of gas.
- ➤ Connect two lamps or testers to the two gas line solenoids to check the exact moment at which voltage is supplied.
  This operation is unnecessary if each of the two solenoids is equipped with an indicator light that signals voltage passing through.

WARNING

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.

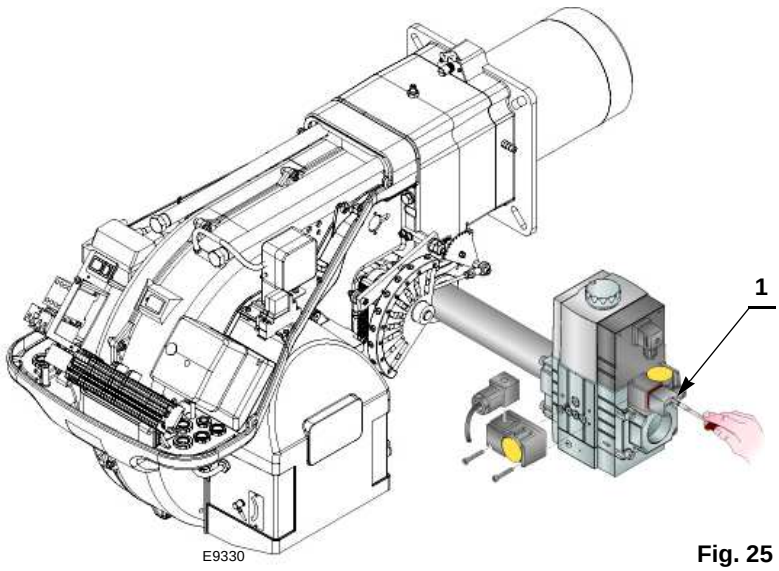


Fig. 25

5.3 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 of Fig. 27 to position **"MAN"**.

DANGER

Make sure that the lights or testers connected to the solenoids, or the pilot lights on the solenoids themselves, indicate that no voltage is present.
If voltage is present, stop the burner **immediately** and check the electrical wiring.

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

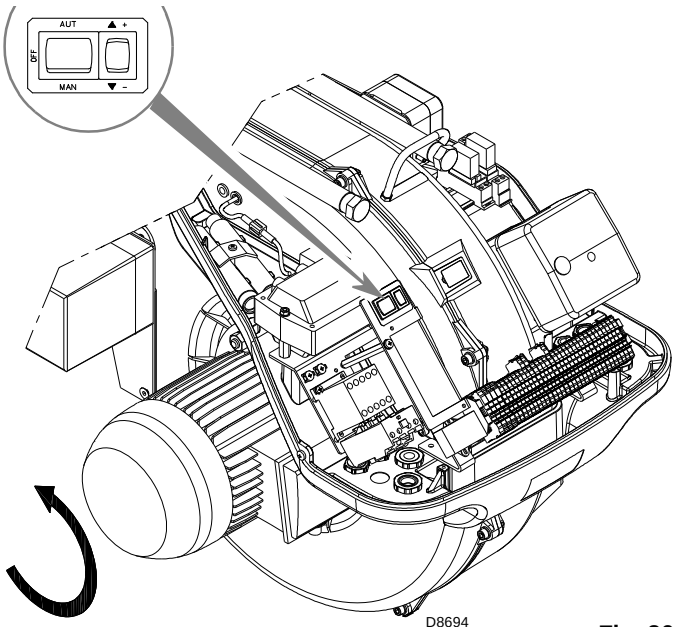


Fig. 26

5.4 Burner ignition

Having completed the checks indicated in the previous heading, ignition of the burner should be achieved. If the motor starts but the flame does not appear and the control box goes into lockout, reset 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 pipe coupling is shown by the pressure gauge.
Once the burner has ignited, proceed with the global adjustment of the burner.

5.5 Burner adjustment

The optimum adjustment of the burner requires an analysis of flue gases at the boiler outlet.
Adjust in sequence:
- ➤ Ignition output
- ➤ Maximum output
- ➤ Minimum output
- ➤ Intermediate outputs between Min. and Max
- ➤ Air pressure switch
- ➤ Maximum gas pressure switch
- ➤ Minimum gas pressure switch

Ignition output

According to EN 676 standard:
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 less than 1/3 of the max. operation output.

Example
MAX operation output of 450 kW.
The ignition output must be equal to or less than 150 kW with ts = 3s.

In order to measure the ignition output:
- ➤ disconnect the plug-socket 6)(Fig. 5) on the ionisation probe cable (the burner will fire and then go into lockout after the safety time has elapsed);
- ➤ perform 10 ignitions with consecutive lockouts;
- ➤ on the meter, read the quantity of gas burned:
  this quantity must be equal to, or lower than, the quantity given by the formula, for ts = 3s:

$$Vg = \frac{\textbf{Qa} \text{ (max. burner delivery) } \textbf{x n x ts}}{\textbf{3600}}$$

Vg: volume supplied in ignitions carried out (Sm^3)
Qa: ignition delivery (Sm^3/h)
n: number of ignitions (10)
ts: safety time (sec)

Example for gas G 20 (9.45 kWh/Sm^3):
ignition output 150 kW
corresponding to 15.87 Sm^3/h.
After 10 ignitions with their lockouts, the delivery indicated on the meter must be equal to or less than:

$$Vg = \frac{\textbf{15.87 x 10 x 3}}{\textbf{3600}} = \textbf{0.132 Sm}^3$$

Maximum output

The maximum burner output must be set within the firing rate range shown on page 7. In the above instructions we left the burner running at the MIN output.
Now press the button 2)(Fig. 27) "output increase", and keep it pressed until the servomotor has opened the air damper and the gas butterfly valve.

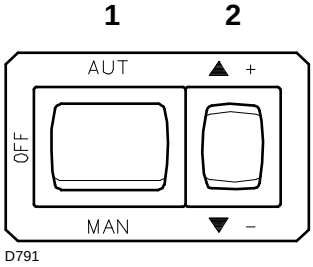


Fig. 27

Adjustment of gas delivery

Measure the gas delivery on the meter.

A guideline indication can be calculated from the table on page 38, simply read off the gas pressure on the pressure gauge, see Fig. 30 on page 21, and follow the instructions on page 38.

- 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.

Adjusting air delivery

Progressively adjust the end profile of cam 4)(Fig. 28) by turning the cam adjustment screws 7).

- Turn the screws clockwise to increase air delivery.
- Turn the screws anticlockwise to reduce air delivery.

Minimum output

Min output must be selected within the firing rate range shown on page 7.

Press the button 2)(Fig. 27) “output reduction”, and keep it pressed until the servomotor has closed the air damper and the gas butterfly valve at 65° (adjustment made in the factory).

Adjustment of gas delivery

Measure the gas delivery on the meter.

- If it is necessary to reduce it, reduce slightly the angle of cam III (Fig. 29) with small, regular movements, i.e. bring it from an angle of 65° to 63° - 61°....
- If it is necessary to increase it, press slightly the button “output increase” 2)(Fig. 27) (open by 10-15° the gas butterfly valve), increase the cam III angle (Fig. 29) with small, regular movements, i.e. bring it from an angle of 65° a 67° - 69°....
  Then press the button “output reduction” until the servomotor is in the position of minimum opening position and measure gas delivery.

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.

For any necessary adjustment of cam III, mainly for small movements, the specific key 10) can be used.

Adjusting air delivery

Progressively adjust the end profile of cam 4) by turning the cam adjustment screws 5). It is preferable not to turn the first screw since this is used to set the air damper to its fully closed position.

Intermediate outputs

Adjustment of gas delivery

No adjustment of gas delivery is required.

Adjusting air delivery

Press slightly the button “output increase” 2)(Fig. 27) so that the servomotor rotates by 15°. Adjust the screws until optimal combustion is obtained. Proceed in the same way with the other screws. Take care that the cam profile variation is progressive.

Switch the burner off with switch 1)(Fig. 27), OFF position. Release cam 4 from the servomotor by pressing and shifting button 3) to the right, and check several times that by rotating cam 4 forwards and backwards by hand, the movement is soft and smooth, without jamming.

Now engage cam 4) again to the servomotor by shifting button 2) to the left.

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

Once optimum adjustment has been reached, fix it with the screws 6).

NOTE

Once you have finished adjusting outputs MAX - MIN - INTERMEDIATE, check ignition once again: noise emission at this stage must be identical to the following stage of operation. If you notice any sign of pulsations, reduce the ignition stage delivery.

6 Servomotor
7 Servomotor 1) - cam 4): constrained
8 Servomotor 1) - cam 4): released
9 Adjustable profile cam
10 Screws for adjusting the adjustable profile
11 Screws for fixing adjustment
12 Screws for adjusting the end profile
13 Graduated sector for gas butterfly valve
14 Index for graduated sector 8
15 Spanner to adjust cam III

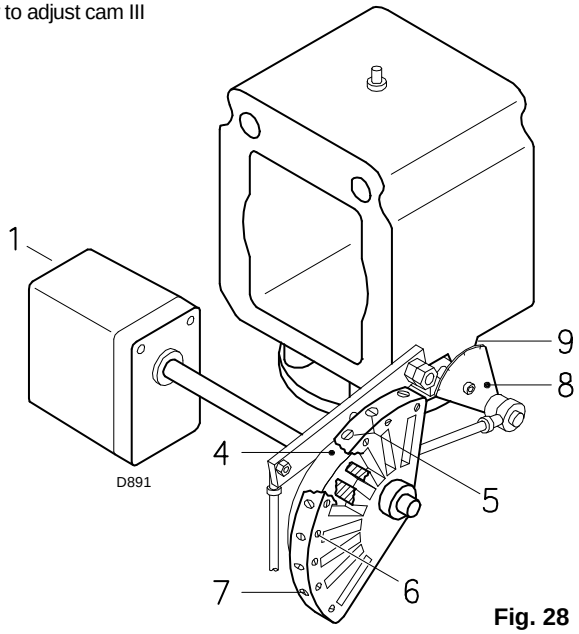


Fig. 28

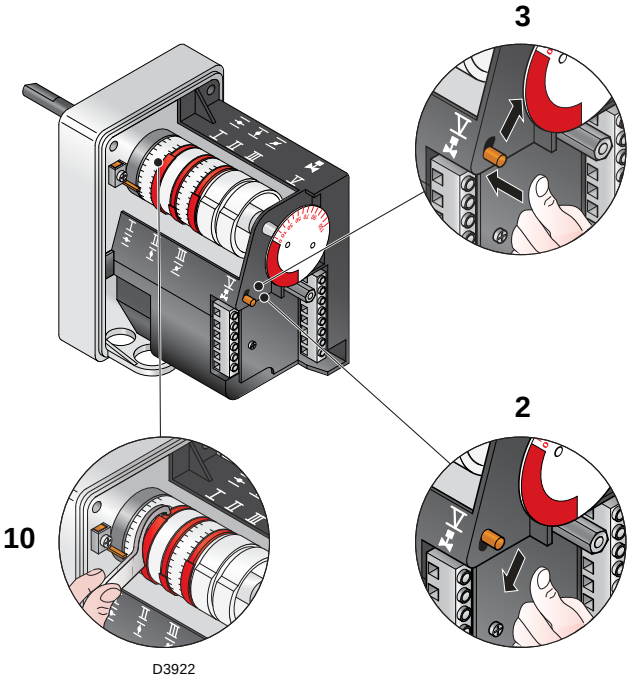
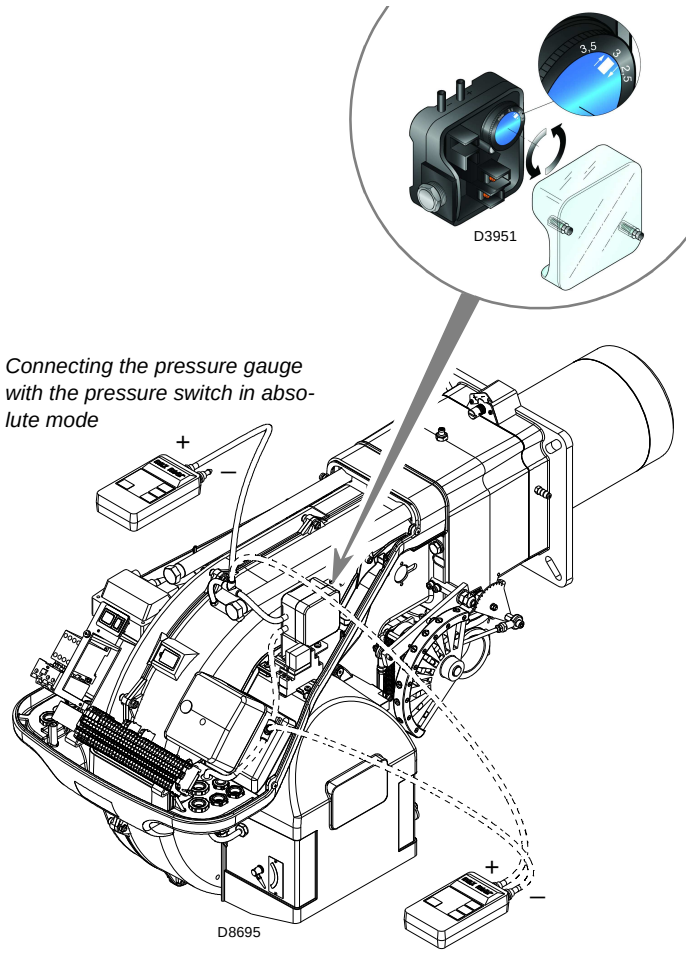


Fig. 29

Air pressure switch

Adjust the air pressure switch after having performed all other burner adjustments with the air pressure switch set to the start of the scale (Fig. 30).
With the burner working at MIN output, insert a combustion analyser in the stack, slowly close the suction inlet of the fan (for example, with a piece of cardboard) until the CO value does not exceed 100 ppm.
Slowly turn the appropriate knob clockwise until the burner goes into lockout.
Check the indication of the arrow pointing upwards on the graduated scale. Turn the knob clockwise again, until the value shown on the graduated scale corresponds with the arrow pointing downwards, and so recovering the hysteresis of the pressure switch (shown by the white mark on a blue background, between the two arrows).
Now check the correct start-up of the burner.
If the burner locks out again, turn the knob anticlockwise a little bit more.
During these operations it may be useful to measure the air pressure with a pressure gauge.
The connection of the pressure gauge is shown in Fig. 30.
The standard configuration is that with the air pressure switch connected in absolute mode. Note the presence of a “T” connection, not supplied. In certain applications in strong depression situations, the connection of the pressure switch does not allow it to change over. In this case it is necessary to connect the pressure switch in differential mode, applying a second tube between the air pressure switch and the fan suction line mouth. In this case also, the pressure gauge must be connected in differential mode, as shown in Fig. 30.



Connecting the pressure gauge with the pressure switch in absolute mode

Connecting the pressure gauge with the pressure switch in differential mode

Fig. 30

Maximum gas pressure switch

Adjust the maximum gas pressure switch after having performed all other burner adjustments with the maximum gas pressure switch set to the end of the scale (Fig. 31).
With the burner operating at maximum output, lower adjustment pressure by slowly turning the relative knob anticlockwise until the burner locks out.
Turn the knob clockwise by 0,2 kPa (2 mbar) and repeat the start-up of the burner.
If the burner locks out again, turn the knob clockwise again by 0,1 kPa (1 mbar).

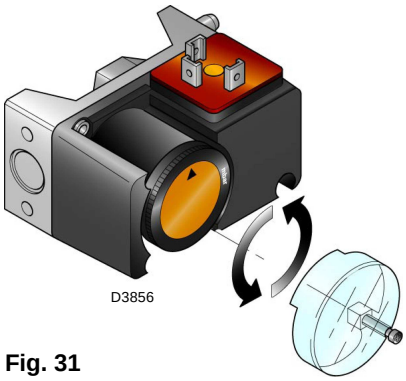


Fig. 31

Minimum gas pressure switch

Adjust the minimum gas pressure switch after having performed all other burner adjustments with the pressure switch set to the start of the scale (Fig. 32).
With the burner operating at maximum output, increase adjustment pressure by slowly turning the relative knob clockwise until the burner locks out.
Then turn the knob anticlockwise by 0,2 kPa (2 mbar) and repeat burner start-up to ensure it is uniform.
If the burner locks out again, turn the knob anticlockwise again by 0,1 kPa (1 mbar).

WARNING

1 kPa = 10 mbar

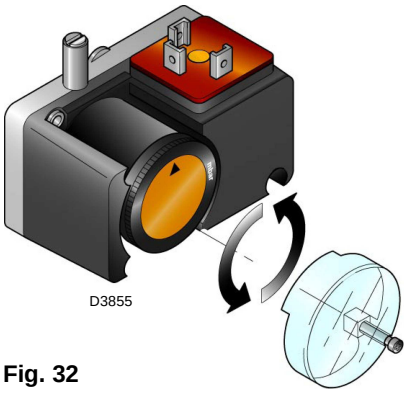


Fig. 32

5.6 Operation sequence of the burner

Burner start-up

- 0s: TL closed.
- 5s : Start of electrical control box programme. Servomotor starts: 130° rotation to right, until contact is made on cam I (Fig. 7).
- 35s : The air damper arrives to the MAX. output position.
  The fan motor starts up.
  Start of the pre-purging phase.
- 75s : The servomotor rotates towards the left as far as the angle set on cam III (Fig. 7) for the MIN output.
- 95s : The air damper and the gas butterfly valve adopt the MIN output position (with cam III Fig. 7 at 65°).
- 105s : Ignition electrode strikes a spark.
  The safety valve VS opens, along with the adjustment valve VR, quick opening. The flame is ignited at a low output level, point A.
  Delivery is then progressively increased, with the valve VR opening slowly up to MIN. output, point B.
- 108s : The spark goes out.
- 115s : The starting cycle comes to an end.

STANDARD IGNITION

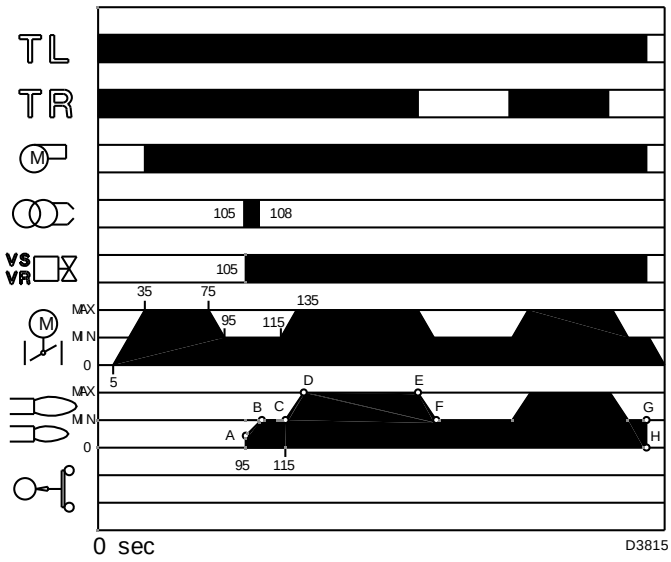


Fig. 33

Steady state operation

Burner without the modulating operation kit

Once the start-up cycle is completed, the servomotor command moves on to the TR that controls the pressure or the temperature in the boiler, point C.

(The electrical control box still continues to check the presence of the flame and the correct position of the air and gas maximum pressure switches).

- If the temperature is low, so the remote control TR is closed, the burner progressively increases the output up to the MAX value (tract C-D).
- If subsequently the temperature or pressure increases until TR opens, the burner progressively decreases its output to the MIN. value (section E-F). The sequence repeats endlessly.
- 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 opens, and the servomotor returns to angle 0°. The air damper closes completely to reduce heat losses to a minimum.

Burner with modulating operation kit

See the handbook enclosed with the adjuster.

Ignition failure

If the burner does not switch on, there is a lockout within 3s of the electrical supply reaching the gas valve.

It may be that the gas does not arrive at the combustion head within the safety time of 3s.

In this case increase gas ignition delivery.

The arrival of the gas at the pipe coupling is shown on the pressure gauge of Fig. 36.

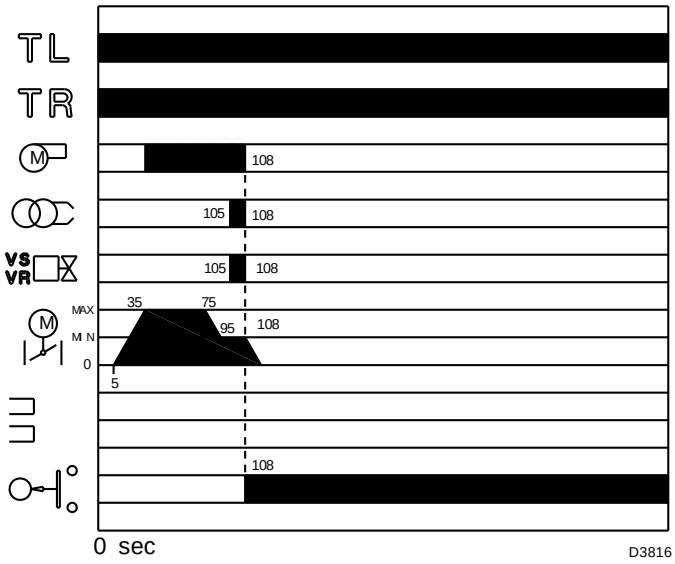


Fig. 34

5.7 Burner flame goes out during operation

If the flame should accidentally go out during operation, the burner will lock out within 1s.

5.8 Stopping of the burner

The burner can be stopped by:

➤ intervening on the disconnecting switch of the electrical supply line, located on the boiler panel;

➤ removing the hood and working on the “AUT/MAN” switch of Fig. 27.

5.9 Measuring the ionisation current

The burner is fitted with an ionisation system to check that a flame is present. The minimum current for control box operation is 6 µA.
The burner provides a much higher current, so controls are not normally required.
However, if it is necessary to measure the ionisation current, disconnect the plug-socket (2)(Fig. 35) on the ionisation probe cable and insert a direct current microammeter (1)(Fig. 35) with a base scale of 100 µA.
Carefully check the polarities!

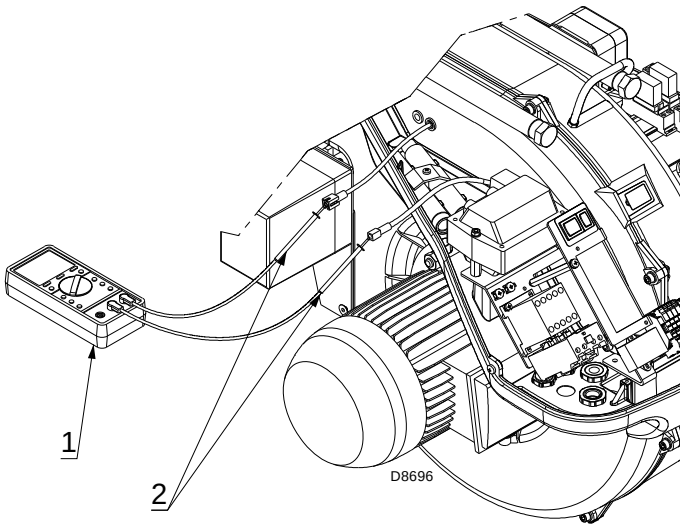


Fig. 35

5.10 Checking the air and gas pressure on the combustion head

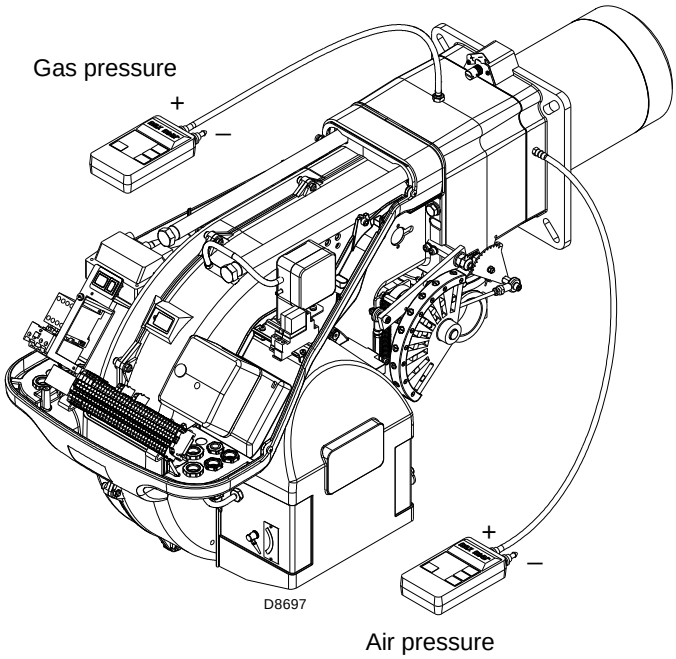


Fig. 36

5.11 Final checks (with burner operating)

➤ Open the thermostat/pressure switch TL:
➤ Open the thermostat/pressure switch TS:

the burner must stop

➤ Rotate the maximum gas pressure switch knob to the minimum end-of-scale position.
➤ Rotate the air pressure switch knob to the maximum end-of-scale position.

the burner must stop in lockout

➤ Switch off the burner and disconnect the voltage.
➤ Disconnect the minimum gas pressure switch connector.

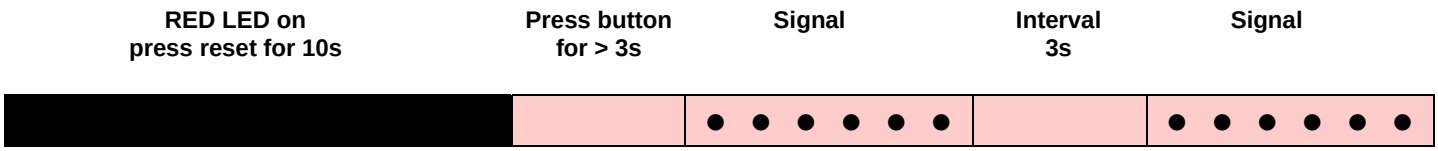
the burner must not start

➤ Disconnect the ionisation probe wire.

the burner must stop in lockout due to ignition failure

➤ Make sure that the mechanical locking systems on the different adjustment devices are fully tightened.

The control box has a self-diagnostic system, which easily allows identifying the operating faults (signal: **RED LED**).
To use this function, wait at least ten seconds from the safety lock out, and then press the reset button for a minimum of 3 seconds.
After releasing the button, the RED LED starts flashing as shown in the diagram below.



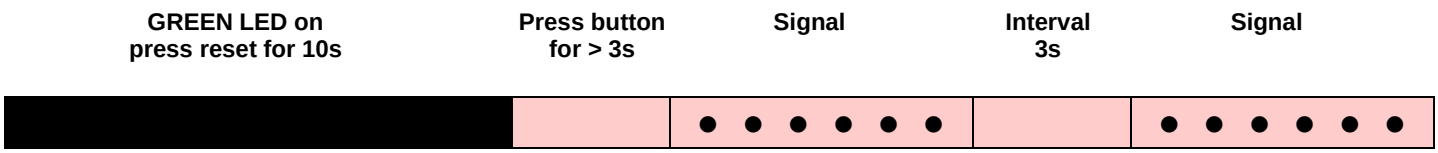
The pulses of the LED constitute a signal spaced by approximately 3 seconds.
The number of pulses will provide the information on the possible faults, according to the table below.

SIGNAL	FAULT	PROBABLE CAUSE	SUGGESTED REMEDY
2 x blinks ● ●	Once the pre-purging phase and safety time have passed, the burner goes into lock-out without the appearance of the flame	1 - The operation solenoid lets little gas through 2 - One of the two solenoid valves does not open 3 - Gas pressure too low 4 - Ignition electrode incorrectly adjusted 5 - Electrode grounded due to broken insulation 6 - High voltage cable defective 7 - High voltage cable deformed by high temperature 8 - Ignition transformer defective 9 - Incorrect valve or transformer electrical wiring 10 - Defective control box 11 - A closed valve upline the gas train 12 - Air in pipework 13 - Gas trains not connected or with coil blocked	Increase Replace Increase pressure at regulator Adjust, see Fig. 12 Replace Replace Replace and protect Replace Check Replace Open Bleed air Check connections or replace coil
3 x blinks ● ● ●	The burner does not switch on, and the lockout appears	14 - Air pressure switch in operating position	Adjust or replace
	The burner switches on, but then stops in lockout	Air pressure switch inoperative due to insufficient air pressure: 15 - Air pressure switch incorrectly adjusted 16 - Pressure switch pressure test point pipe blocked 17 - Head incorrectly adjusted 18 - High pressure in the furnace	 Adjust or replace Clean Adjust Connect air pressure switch to fan suction line
	Lockout during pre-purging phase	19 - Defective motor control contactor (only three-phase version) 20 - Defective electrical motor 21 - Motor lockout (only three-phase version)	Replace Replace Replace
4 pulses ● ● ● ●	The burner switches on, but then stops in lockout	22 - Flame simulation	Replace the control box
	Lockout when burner stops	23 - Permanent flame in the combustion head or flame simulation	Eliminate permanency of flame or replace control box
6 x blinks ● ● ● ● ● ●	The burner switches on, but then stops in lockout	24 - Defective or incorrectly adjusted servomotor	Replace or adjust
7 pulses ● ● ● ● ● ● ●	The burner goes into lockout immediately following the appearance of the flame	25 - The operation solenoid lets little gas through 26 - Ionisation probe Incorrectly adjusted 27 - Insufficient ionisation (less than 5 µA) 28 - Probe earthed 29 - Burner poorly grounded 30 - Phase and neutral connections inverted 31 - Defective flame detection circuit	Increases Adjust it, see Fig. 12 Check probe position Withdraw or replace cable Check grounding Invert them Replace control box
	Burner locks out when shifting from minimum to maximum output and vice versa	32 - Too much air or too little gas	Adjust air and gas
	Burner goes into lockout during operation	33 - Probe or ionisation cable earthed	Replace worn parts

SIGNAL	FAULT	PROBABLE CAUSE	SUGGESTED REMEDY
10 blinks ● ● ● ● ● ● ● ● ● ●	The burner does not switch on, and the lockout appears	34 - Erroneous electrical wiring	Check connections
	The burner goes into lockout	35 - Defective control box	Replace
		36 - Presence of electromagnetic disturbances in the thermostat lines	Filter or eliminate
		37 - Presence of electromagnetic disturbance	Use the radio disturbance protection kit
No blink	The burner does not start	38 - No electrical power supply	Close all switches - Check connections
		39 - A limiter or safety control device is open	Adjust or replace
		40 - Line fuse blocked	Replace
		41 - Defective control box	Replace
		42 - No gas supply	Open the manual valves between contactor and train
		43 - Mains gas pressure insufficient	Contact your GAS COMPANY
		44 - Minimum gas pressure switch fails to close	Adjust or replace
		45 - Servomotor fails to move to min. ignition position	Replace
	The burner continues to repeat the start-up cycle, without lockout	46 - The gas pressure in the network is near the value on which the min. gas pressure switch gas is adjusted The sudden drop in pressure when the valve is opened causes the 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 and the ignition cycle is repeated. And so on	Reduce the cut-in pressure of the min. gas pressure switch Replace the gas filter cartridge
	Ignition with pulsations	47 - Head poorly adjusted	Adjust, see Fig. 15
		48 - Ignition electrode incorrectly adjusted	Adjust it, see Fig. 12
		49 - Incorrectly adjusted fan air damper: too much air	Adjust
		50 - Output during ignition phase is too high	Reduce
	Burner does not reach maximum output	51 - Control device TR does not close	Adjust or replace
		52 - Defective control box	Replace
		53 - Defective servomotor	Replace
	Burner stops with air damper open	54 - Servomotor defective	Replace

6.1 Normal operation / flame detection time

The control box has a further function to guarantee the correct burner operation (signal: **GREEN LED** permanently on).
To use this function, wait at least ten seconds from the burner ignition and then press the control box button for a minimum of 3 seconds.
After releasing the button, the GREEN LED starts flashing as shown in the figure below.



The pulses of the LED constitute a signal spaced by approximately 3 seconds.
The number of pulses will measure the probe DETECTION TIME since the opening of gas valves, according to the following table:

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

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

7.1 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.

DANGER

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:

DANGER

disconnect the electricity supply from the burner by means of the main switch of the system;

DANGER

close the fuel interception tap;

7.2 Maintenance programme

Maintenance frequency

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

Checking and cleaning

Combustion
Carry out an analysis of the flue gases. Significant differences with respect to the previous measurements indicate the points where more care should be exercised during maintenance.

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

Gas filter
Replace the gas filter when it is dirty.

Flame inspection window
Clean the glass of the flame inspection window, (Fig. 37).

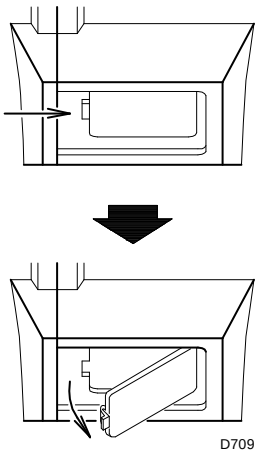


Fig. 37

Combustion head
Open the burner and make sure that all the components of the combustion head are:
- undamaged;
- not deformed due to high temperature;
- free of ambient dirt or dust;
- free of rusted materials;
- adequately positioned.

Make sure that the gas outlet holes for the start-up, on the combustion head distributor, are free of dirt or rust deposits.
If in doubt, disassemble the elbow 5)(Fig. 38).

Servomotor
Disengage cam 4)(Fig. 28) from the servomotor, by pressing and shifting button 3)(Fig. 29) to the right, and cause it to turn it backwards and forwards by hand to make sure it moves smoothly. Now engage the cam again by shifting button 2)(Fig. 28) to the left.

Burner
Check for excess wear or loose screws in the mechanisms controlling the air damper and the gas butterfly valve. Also make sure that the screws securing the electrical leads in the burner connections are fully tightened.
Clean the outside of the burner, taking special care with the articulated couplings and cam 4)(Fig. 28).

Combustion
Adjust the burner if the combustion values found at the beginning of the operation do not comply with the regulations in force or, at any rate, do not produce good combustion.
Use the appropriate card to record the new combustion values; they will be useful for subsequent controls.

7.3 Opening the burner

- ➤ **Disconnect the electrical supply from the burner**.
- ➤ Loosen the screws 1) and remove the hood 2).
- ➤ Disengage the articulated coupling 7) from the graduated sector 8).
- ➤ Assemble the two extensions on the sliding bars 4).
- ➤ Remove the screws 3) and move the burner backwards some 100 mm on the guides 4). Disconnect the probe and electrode leads and then pull the burner fully back.

Now extract the gas distributor 5) after having removed the screw 6).

7.4 Closing the burner

- ➤ Push the burner up to approximately 100 mm from the pipe coupling.
- ➤ Reconnect the cables and slide the burner as far as the stop.
- ➤ Replace the screws 3) and carefully pull the probe and electrode cables outwards until they are slightly taut.
- ➤ Re-couple the articulated coupling 7) to the graduated sector 8).
- ➤ Disassemble the two extensions from the guides 4).

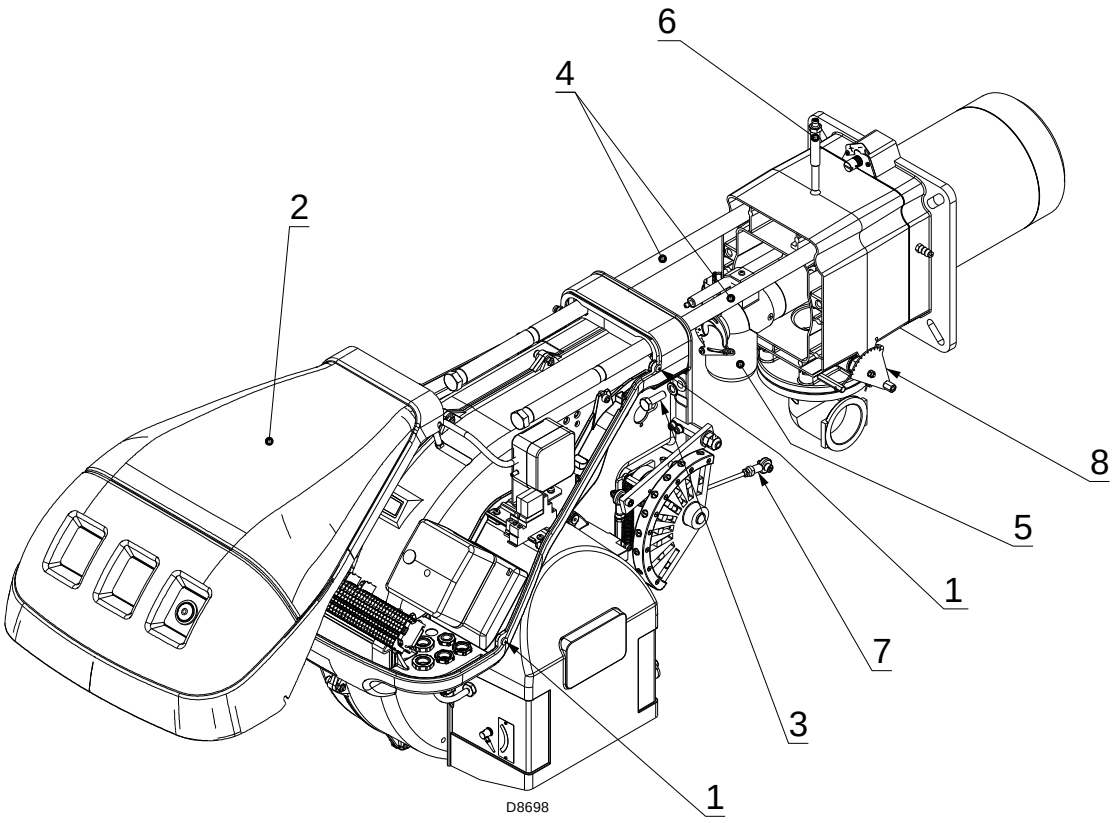
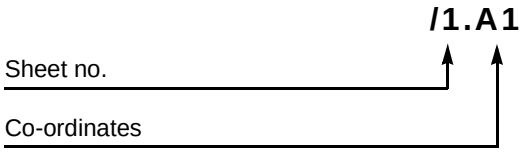


Fig. 38

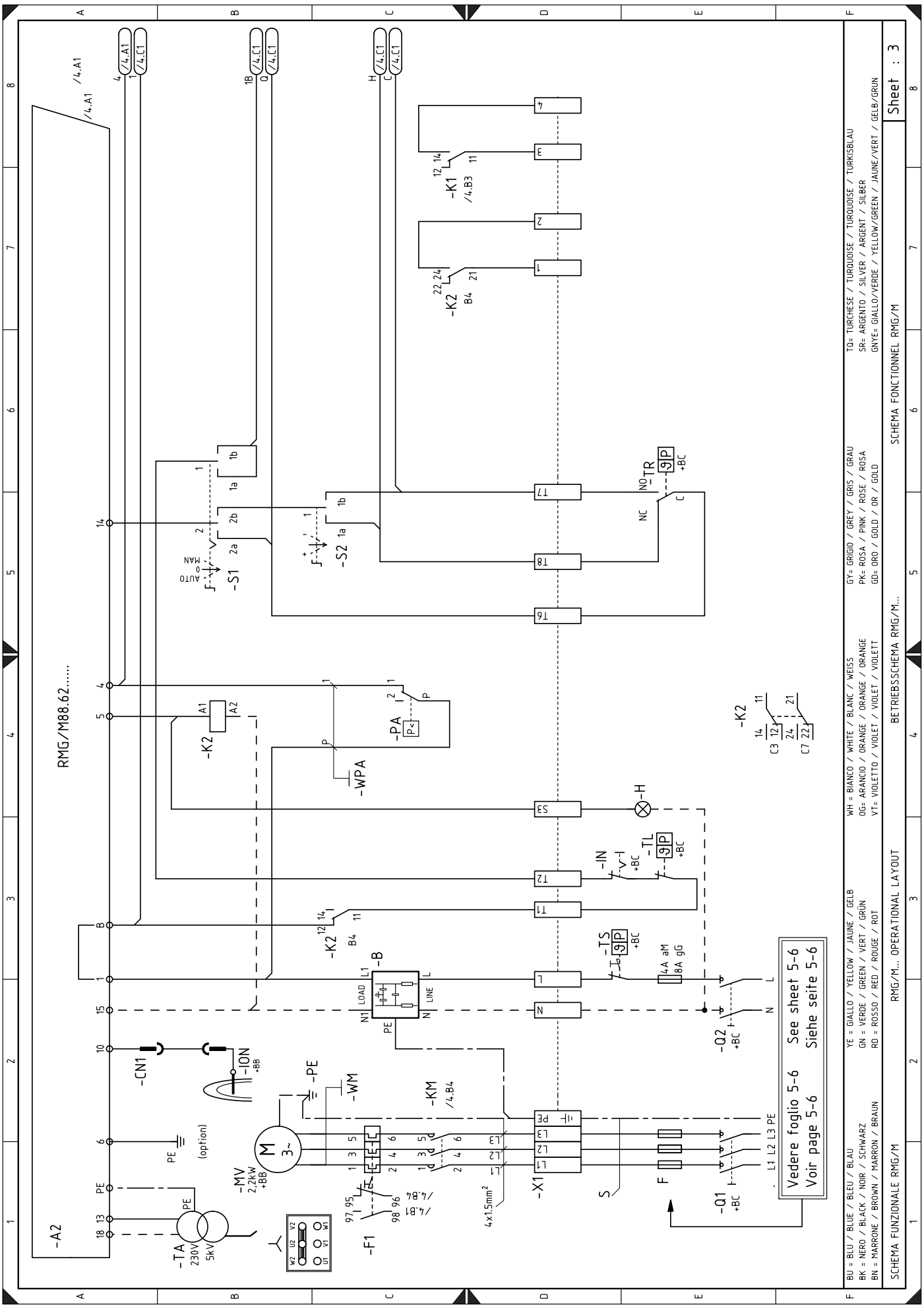
1 Index of layouts

2 Indication of references



Wiring layout key

A - Electrical control box
B - Filter to protect against radio disturbance
B1 - Output regulator RWF40
BA - Input in current DC 4...20 mA
BA1 - Input in current DC 4...20 mA to modify remote set-point
BP - Pressure probe
BP1 - Pressure probe
BR - Remote setpoint potentiometer
BT1 - Thermocouple probe
BT2 - Probe Pt100, 2 wires
BT3 - Probe Pt100, 3 wires
BT4 - Probe Pt100, 3 wires
BTEXT - External probe for climatic compensation of the set-point
BV - Input in voltage DC 0...10V
BV1 - Input in voltage DC 0...10V to modify remote setpoint
CN1 - Ionisation probe connector
F1 - Fan motor thermal relay
H - Remote lockout signal
IN - Burner manual stop switch
ION - Ionisation probe
K1 - Clean contacts output relay burner switched on
K2 - Clean contacts output relay burner lockout
KM - Motor contact maker
MV - Fan motor
PA - Air pressure switch
PE - Burner earth
PGMin - Minimum gas pressure switch
PGM - Maximum gas pressure switch
Q1 - Three-phase disconnecting switch
Q2 - Single phase disconnecting switch
RS - Remote reset switch
S1 - Off / automatic / manual selector
S2 - Power increase - power reduction selector
SM - Servomotor
TA - Ignition transformer
TL - Limit thermostat/pressure switch
TR - Adjustment thermostat/pressure switch
TS - Safety thermostat/pressure switch
X1 - Main terminal supply board
XPGM - Maximum gas pressure switch connector
XP1 - Socket for kit
XRWF - Terminal board RWF40
Y - Gas adjustment valve + gas safety valve
YVPS - Valve leak detection device


RMG/M88.62.....
SCHEMA FUNZIONALE RMG/M
RMG/M... OPERATIONAL LAYOUT
BETRIEBSSCHEMA RMG/M...
SCHEMA FONCTIONNEL RMG/M
Sheet : 3
Vedere foglio 5-6 See sheet 5-6
Voir page 5-6 Siehe seite 5-6
-A2
-TA 230V 5kV
-F1
-MV 2.2kW
-CN1
-ION
-PE
-WM
-KM
-B
-K1
-K2
-S1
-S2
-WPA
-PA
-TR
-H
-IN
-TL
-TS
-Q1
-Q2
-X1
S
F
(option)
4x1.5mm²
BU = BLU / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
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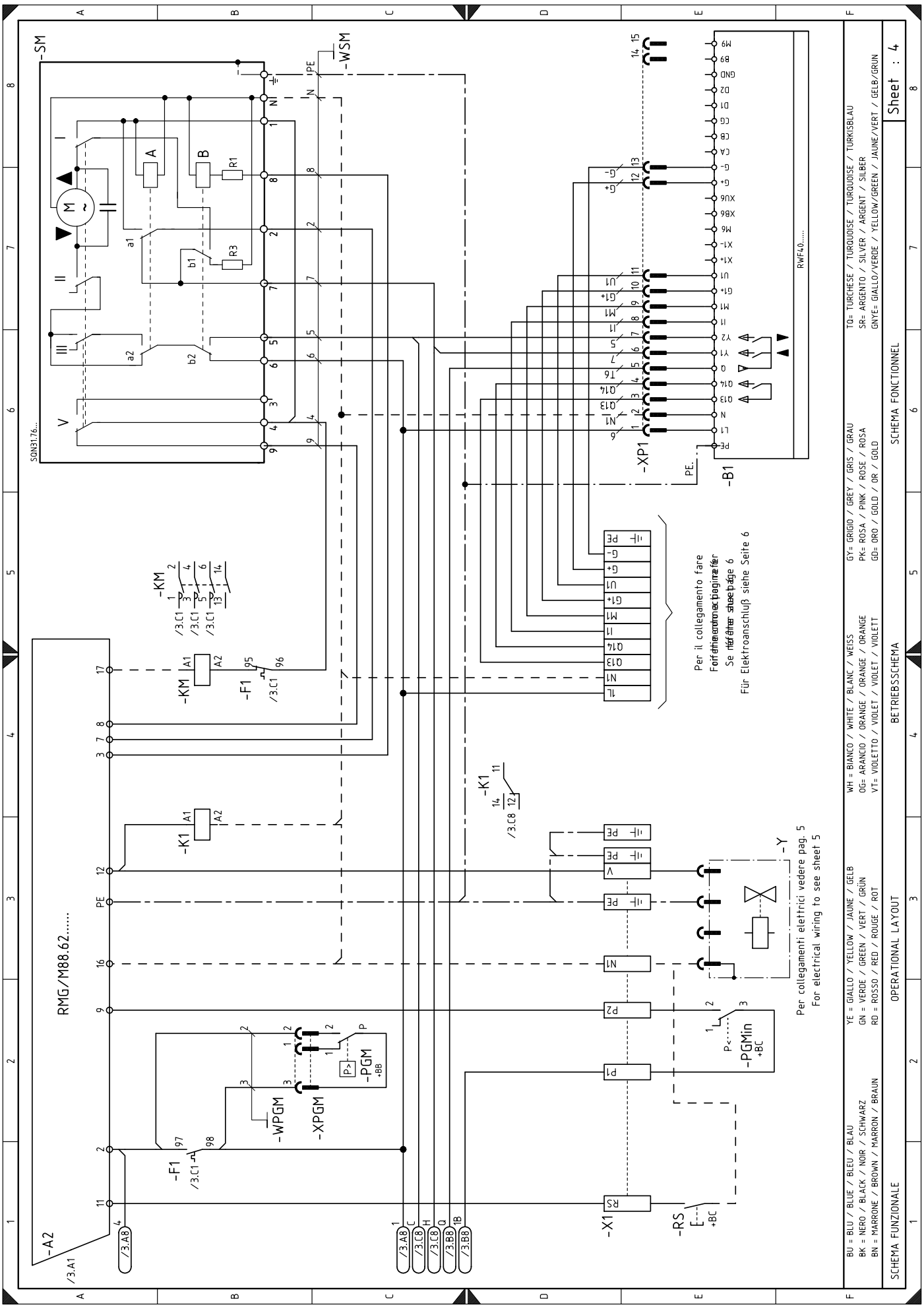
-SM
-WSM
SQN31.76...
RMG/M88.62.....
-A2
-K1
-KM
-F1
-XP1
-B1
-PGM
-WPGM
-XPGM
-PGMin
-Y
-X1
-RS
Per il collegamento fare
Für Elektroanschluß siehe Seite 6
Per collegamenti elettrici vedere pag. 5
For electrical wiring to see sheet 5
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
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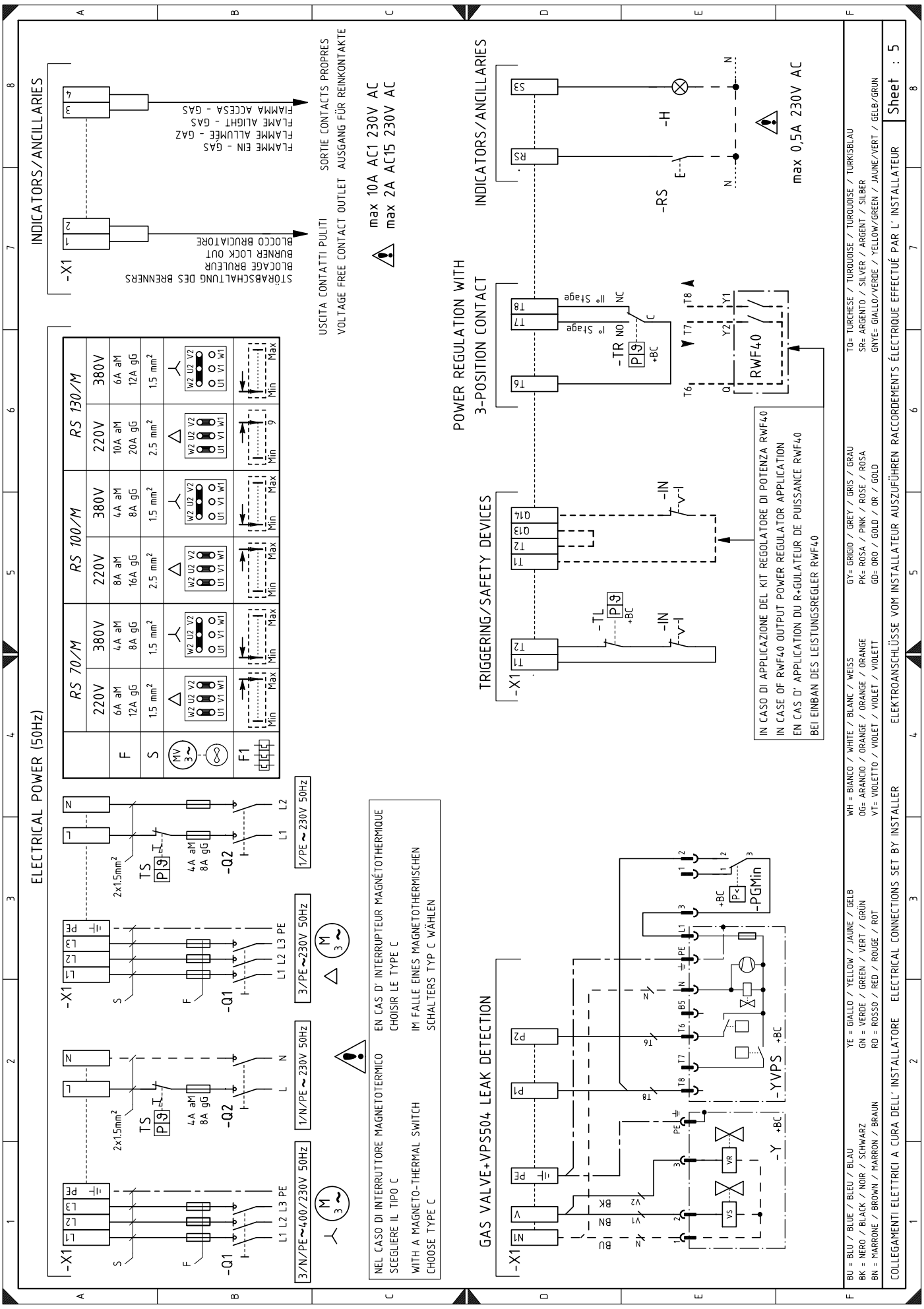
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
SCHEMA FUNZIONALE
OPERATIONAL LAYOUT
BETRIEBSSCHEMA
SCHEMA FONCTIONNEL
Sheet : 4


ELECTRICAL POWER (50Hz)
INDICATORS/ANCILLARIES
STÖRABSCHALTUNG DES BRENNERS
BLOCAGE BRULEUR
BURNER LOCK OUT
BLOCCO BRUCIATORE
FLAMME EIN - GAS
FLAMME ALLUMÉE - GAZ
FLAME ALIGHT - GAS
FIAMMA ACCESA - GAS
USCITA CONTATTI PULITI
SORTIE CONTACTS PROPRES
VOLTAGE FREE CONTACT OUTLET
AUSGANG FÜR REINKONTAKTE
max 10A AC1 230V AC
max 2A AC15 230V AC
RS 70/M
RS 100/M
RS 130/M
220V
380V
F
S
F1
3/N/PE~400/230V 50Hz
1/N/PE ~ 230V 50Hz
3/PE ~230V 50Hz
1/PE ~ 230V 50Hz
2x1.5mm²
2x1.5mm²
4A aM
8A gG
TS
-Q1
-Q2
-X1
NEL CASO DI INTERRUTTORE MAGNETOTERMICO SCEGLIERE IL TIPO C
EN CAS D' INTERRUPTEUR MAGNÉTOTHERMIQUE CHOISIR LE TYPE C
WITH A MAGNETO-THERMAL SWITCH CHOOSE TYPE C
IM FALLE EINES MAGNETOTHERMISCHEN SCHALTERS TYP C WÄHLEN
GAS VALVE+VPS504 LEAK DETECTION
TRIGGERING/SAFETY DEVICES
POWER REGULATION WITH 3-POSITION CONTACT
INDICATORS/ANCILLARIES
-TL
-TR
-IN
-H
-RS
-PGMin
-YVPS
-Y
RWF40
max 0,5A 230V AC
IN CASO DI APPLICAZIONE DEL KIT REGOLATORE DI POTENZA RWF40
IN CASE OF RWF40 OUTPUT POWER REGULATOR APPLICATION
EN CAS D' APPLICATION DU R+GULATEUR DE PUISSANCE RWF40
BEI EINBAN DES LEISTUNGSREGLER RWF40
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
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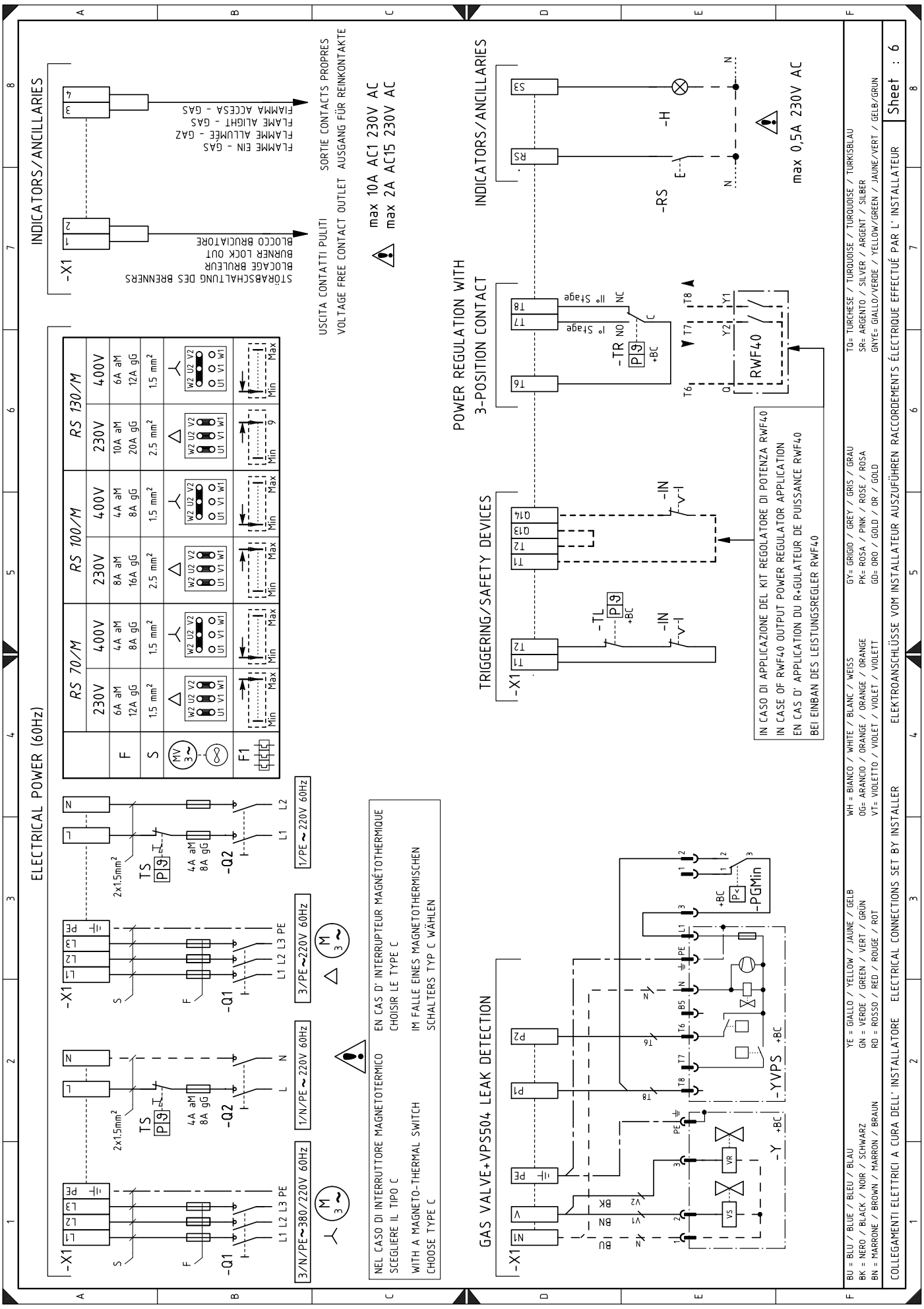
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE
ELECTRICAL CONNECTIONS SET BY INSTALLER
ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 5


ELECTRICAL POWER (60Hz)
INDICATORS/ANCILLARIES
-X1
STÖRABSCHALTUNG DES BRENNERS
BLOCAGE BRULEUR
BURNER LOCK OUT
BLOCCO BRUCIATORE
FLAMME EIN - GAS
FLAMME ALLUMÉE - GAZ
FLAME ALIGHT - GAS
FIAMMA ACCESA - GAS
USCITA CONTATTI PULITI
VOLTAGE FREE CONTACT OUTLET
SORTIE CONTACTS PROPRES
AUSGANG FÜR REINKONTAKTE
max 10A AC1 230V AC
max 2A AC15 230V AC
RS 70/M
RS 100/M
RS 130/M
230V
400V
F
S
F1
3/N/PE~380/220V 60Hz
1/N/PE ~ 220V 60Hz
3/PE~220V 60Hz
1/PE ~ 220V 60Hz
TS
-Q1
-Q2
NEL CASO DI INTERRUTTORE MAGNETOTERMICO SCEGLIERE IL TIPO C
WITH A MAGNETO-THERMAL SWITCH CHOOSE TYPE C
EN CAS D' INTERRUPTEUR MAGNÉTOTHERMIQUE CHOISIR LE TYPE C
IM FALLE EINES MAGNETOTHERMISCHEN SCHALTERS TYP C WÄHLEN
GAS VALVE+VPS504 LEAK DETECTION
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-YVPS +BC
-PGMin
TRIGGERING/SAFETY DEVICES
POWER REGULATION WITH
3-POSITION CONTACT
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-TR
-IN
-H
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RWF40
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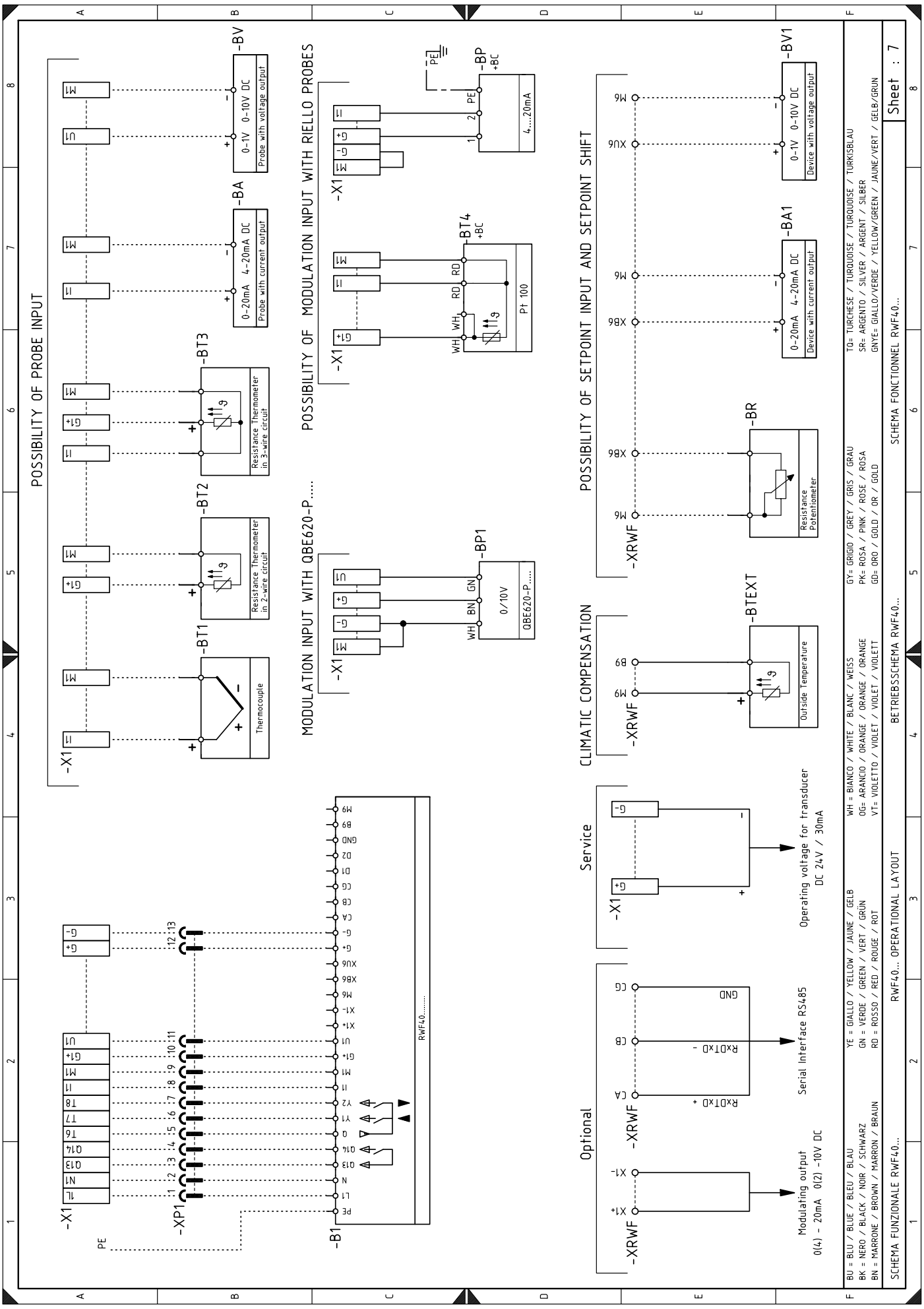
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE
ELECTRICAL CONNECTIONS SET BY INSTALLER
ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 6


POSSIBILITY OF PROBE INPUT
-BV
0-1V 0-10V DC
Probe with voltage output
-BA
0-20mA 4-20mA DC
Probe with current output
-BT3
Resistance Thermometer in 3-wire circuit
-BT2
Resistance Thermometer in 2-wire circuit
-BT1
Thermocouple
-X1
POSSIBILITY OF MODULATION INPUT WITH RIELLO PROBES
-BP
4...20mA
-BT4
Pt 100
MODULATION INPUT WITH QBE620-P.....
-BP1
0/10V
QBE620-P.....
POSSIBILITY OF SETPOINT INPUT AND SETPOINT SHIFT
-BV1
0-1V 0-10V DC
Device with voltage output
-BA1
0-20mA 4-20mA DC
Device with current output
-BR
Resistance Potentiometer
-XRWF
CLIMATIC COMPENSATION
-BTEXT
Outside Temperature
-XRWF
Service
Operating voltage for transducer DC 24V / 30mA
Optional
Serial Interface RS485
Modulating output 0(4) - 20mA 0(2) -10V DC
-XP1
-B1
RWF40.....
PE
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
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GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
SCHEMA FUNZIONALE RWF40... RWF40... OPERATIONAL LAYOUT BETRIEBSSCHEMA RWF40... SCHEMA FONCTIONNEL RWF40...
Sheet : 7

Output power regulator kit for modulating operation

With the modulating operation, the burner continually adapts the power to the request for heat, ensuring great stability for the parameter controlled: temperature or pressure.
Two components should be ordered:
• the output power regulator to install on the burner;
• the probe to install on the heat generator.

Parameter to be checked		Probe		Output Regulator	
	Adjustment field	Type	Code	Type	Code
Temperature	- 100...+ 500°C	PT 100	3010110	RWF40	3010414
Pressure	0...2.5 bar 0...16 bar	Output probe 4...20mA	3010213 3010214		

Output power regulator with signal 4-20 mA, 0-10V

Two components should be ordered:
• the analogue signal converter;
• the potentiometer.

Burner	Potentiometer		Analogue Signal Converter	
	Type	Code	Type	Code
RS 70-100/M - RS 130/M	ASZ...	3010416	E5202	3010415

Potentiometer kit for the indication of load position

Burner	Kit code
RS 70-100/M - RS 130/M	3010416

RMG to PC interface adapter kit

Burner	Kit code
RS 70-100/M - RS 130/M	3002719

Soundproofing chamber

Burner	Kit code	Type	Reduction of noise average
RS 70-100/M - RS 130/M	3010404	C4/5	10 [dB(A)]

Long Head Kit

Burner	Kit code	Standard head length	Head length obtained with the kit
RS 70/M	3010117	250 mm	385 mm
RS 100/M	3010118	250 mm	385 mm
RS 130/M	3010119	280 mm	415 mm

Kit for LPG operation

Burner	Combustion head	Kit code	Obtainable output with the Kit
RS 70/M	TC	20008175	200/470 ÷ 930 kW
	TL	20008176	
RS 100/M	TC	20008177	300/700 ÷ 1340 kW
	TL	20008178	
RS 130/M	TC	20008179	300/920 ÷ 1600 kW
	TL	20008180	

Kit for TOWN GAS operation - not EC type-approved

Burner	Combustion head	Kit code
RS 70/M	TC	3010286
	TL	
RS 100/M	TC	3010287
	TL	
RS 130/M	TC	3010288
	TL	

Spacer kit

Burner	Kit code	Thickness
RS 70-100/M - RS 130/M	3010129	135 mm

Continuous purging kit

Burner	Kit code
RS 70-100/M - RS 130/M	3010094

Vibration reduction kit (for flame inversion boilers)

Burner	Combustion head	Kit code
RS 70/M	TC	3010201
	TL	
RS 100/M	TC	3010202
	TL	
RS 130/M	TC	3010373
	TL	3010374

Radio disturbanceprotection kit

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

Burner	Kit code
RS 70-100/M - RS 130/M	3010386

Gas trains in compliance with EN 676

Please refer to manual.

The table show minimum load losses along the gas supply line depending on the maximum burner output operation.

The values shown in the tables refer to:
- Natural gas G 20 PCI 9.45 kWh/Sm^3 (8.2 Mcal/Sm^3)
- Natural gas G 25 PCI 8.13 kWh/Sm^3 (7.0 Mcal/Sm^3)

Column 1
Load loss at combustion head.
Gas pressure measured at the test point 1)(Fig. 39), with:
- Combustion chamber at 0 mbar;
- Burner working at maximum output;
- Combustion head adjusted according to the diagram of Fig. 16.

Column 2
Load loss at gas butterfly valve 2)(Fig. 39) with maximum opening: 90°.

NOTE
To know the approximate output at which the burner is operating at its maximum:
- Subtract the combustion chamber pressure from the gas pressure measured at test point 1)(Fig. 39).
- Find, in the table relating to the burner concerned, column 1, the pressure value closest to the result you want.
- Read off the corresponding output on the left.

Example with natural gas G 20 - RS 100/M
- Maximum output operation
- Ring nut 2)(Fig. 15) adjusted as in the diagram of (Fig. 16)
- Gas pressure at test point 1)(Fig. 39) = 8 mbar
- Pressure in combustion chamber = 2.5 mbar

8 - 2.5 = 5.5 mbar

A pressure of 5.5 mbar, column 1, corresponds in the table to an output of 900 kW.
This value serves as a rough guide; the effective output must be measured at the gas meter.

NOTE
To know the required gas pressure at test point 1)(Fig. 39), set the MAX output required from the burner operation:
- Find the nearest output value in the table for the burner in question.
- Read, on the right, column 1, the socket pressure 1)(Fig. 39).
- Add this value to the estimated pressure in the combustion chamber.

Example with natural gas G 20 - RS 100/M
- Required burner maximum output operation: 900 kW
- Ring nut 2)(Fig. 15) adjusted as in the diagram of (Fig. 16)
- Gas pressure at output of 900 kW = 5.5 mbar
- Pressure in combustion chamber = 2.5 mbar

5.5 + 2.5 = 8 mbar

pressure required at test point 1)(Fig. 39).

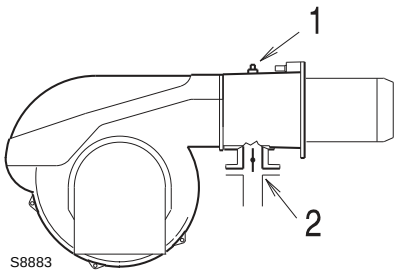


Fig. 39

Mod.	kW	1 Δp (mbar)		2 Δp (mbar)	
		G 20	G 25	G 20	G 25
RS 70/M	470	4.2	5.7	0.4	0.5
	500	4.6	6.3	0.5	0.5
	550	5.3	7.2	0.6	0.7
	600	6.0	8.2	0.7	0.8
	650	6.7	9.1	0.8	0.9
	700	7.4	10.1	0.9	1.1
	750	8.5	11.8	1.0	1.2
	800	9.6	13.4	1.2	1.4
	850	10.8	15.1	1.3	1.6
	900	12.1	16.9	1.5	1.8
	930	12.9	17.9	1.6	1.9
RS 100/M	700	3.1	4.6	0.7	1.0
	750	3.7	5.5	0.8	1.1
	800	4.3	6.4	0.9	1.2
	850	4.9	7.3	1.0	1.4
	900	5.5	8.2	1.1	1.6
	950	6.2	9.0	1.2	1.8
	1000	6.8	9.9	1.3	1.9
	1050	7.3	10.7	1.5	2.1
	1100	7.9	11.6	1.6	2.4
	1150	8.4	12.4	1.8	2.6
	1200	9.1	13.5	1.9	2.8
	1250	9.9	14.8	2.1	3.0
	1300	10.8	16.1	2.3	3.3
	1340	11.4	17.1	2.4	3.5
RS 130/M	920	4.5	7.0	1.3	2.0
	950	4.7	7.4	1.4	2.1
	1000	5.1	7.9	1.5	2.3
	1050	5.5	8.5	1.7	2.5
	1100	5.9	9.1	1.8	2.8
	1150	6.2	9.6	2.0	3.1
	1200	6.6	10.2	2.2	3.3
	1250	7.0	10.8	2.4	3.6
	1300	7.4	11.3	2.6	3.9
	1350	7.8	11.9	2.8	4.2
	1400	8.2	12.8	3.0	4.5
	1450	8.6	13.8	3.2	4.9
	1500	9.0	14.7	3.4	5.2
	1550	10.2	15.6	3.6	5.6
	1600	11.4	16.6	3.9	5.9
	1605	11.5	16.7	3.9	6.0

The firing rate of the burner shown in the manual is valid for a room temperature of 20°C and an altitude of 0m above sea level (barometric pressure around 1013 mbar).

It may be that a burner has to operate with combustive air at a higher temperature and/or higher altitudes.

The heating of the air and the increase in altitude produce the same effect: the expansion of the air volume (i.e. the reduction of its density).

The delivery of the burner fan remains essentially the same, but the oxygen per m^3 of air, and the thrust (discharge head) of the fan are reduced.

It is therefore important to know if the maximum output requested from the burner at a determinate combustion chamber pressure remains within the firing rate of the burner even with the changed temperature and altitude conditions.
To check it, proceed as follows:

1 -Find the corrective factor F (relating to the air temperature and altitude of the system) in the table alongside.
2 -Divide the output Q required from the burner by F to obtain the equivalent output Qe:

Qe = Q : F (kW)

3 -In the firing rate of the burner, mark the work point identified by:
Qe = equivalent output
H1 = pressure in combustion chamber
point A that must remain within the firing rate (Fig. 40).
4 -Trace a vertical line from point A, Fig. 40, and find the maximum pressure H2 of the firing rate.
5 -Multiply H2 by F to obtain the maximum lowered pressure H3 of the firing rate

H3 = H2 x F (mbar)

If H3 is greater than H1, as in Fig. 40, the burner can produce the delivery requested.
If H3 is less than H1, it is necessary to reduce the burner output. The reduction in output is accompanied by a reduction in the combustion chamber pressure:
Qr = reduced output
H1r = reduced pressure

$$H1r = H1 \times \left(\frac{Qr}{Q}\right)^2$$

Example, 5% reduction in output:

Qr = Q x 0.95

$H1r = H1 \times (0.95)^2$

With the new values - Qr and H1r - repeat steps 2 - 5.

Warning:
the combustion head should be adjusted in relation to the equivalent output Qe.

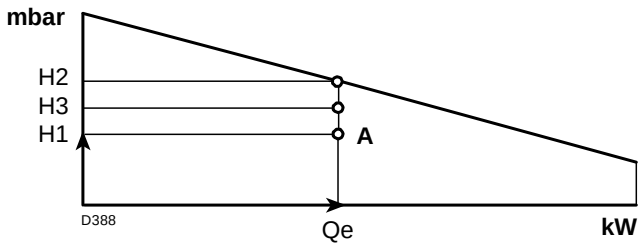


Fig. 40

Altitude	Average barometric pressure	F							
		Air temperature °C							
m. above sea level	mbar	0	5	10	15	20	25	30	40
0	1013	1.087	1.068	1.049	1.031	1.013	0.996	0.980	0.948
100	1000	1.073	1.054	1.035	1.017	1.000	0.983	0.967	0.936
200	989	1.061	1.042	1.024	1.006	0.989	0.972	0.956	0.926
300	978	1.050	1.031	1.013	0.995	0.978	0.962	0.946	0.916
400	966	1.037	1.018	1.000	0.983	0.966	0.950	0.934	0.904
500	955	1.025	1.007	0.989	0.972	0.955	0.939	0.923	0.894
600	944	1.013	0.995	0.977	0.960	0.944	0.928	0.913	0.884
700	932	1.000	0.982	0.965	0.948	0.932	0.916	0.901	0.872
800	921	0.988	0.971	0.954	0.937	0.921	0.906	0.891	0.862
900	910	0.977	0.959	0.942	0.926	0.910	0.895	0.880	0.852
1000	898	0.964	0.946	0.930	0.914	0.898	0.883	0.868	0.841
1200	878	0.942	0.925	0.909	0.893	0.878	0.863	0.849	0.822
1400	856	0.919	0.902	0.886	0.871	0.856	0.842	0.828	0.801
1600	836	0.897	0.881	0.866	0.851	0.836	0.822	0.808	0.783
1800	815	0.875	0.859	0.844	0.829	0.815	0.801	0.788	0.763
2000	794	0.852	0.837	0.822	0.808	0.794	0.781	0.768	0.743
2400	755	0.810	0.796	0.782	0.768	0.755	0.742	0.730	0.707
2800	714	0.766	0.753	0.739	0.726	0.714	0.702	0.690	0.668
3200	675	0.724	0.711	0.699	0.687	0.675	0.664	0.653	0.632
3600	635	0.682	0.669	0.657	0.646	0.635	0.624	0.614	0.594
4000	616	0.661	0.649	0.638	0.627	0.616	0.606	0.596	0.577

符合 ISO / IEC 17050-1 - 符合性声明		
制造商：	RIELLO S.p.A.	
地址：	Via Pilade Riello, 7 37045 Legnago (VR)	
产品：	强制通风燃气燃烧器	
型号：	RS 70/M RS 100/M RS 130/M	
这些产品符合以下技术标准：		
EN 676		
EN 12100		
并符合欧洲指令：		
MD	2006/42/EC	机器指令
LVD	2014/35/UE	低压指令
EMC	2014/30/UE	电磁兼容性

通过按照 UNI EN ISO 9001 认证的质量管理体系确保质量。

Legnago, 01.12.2015

总经理
RIELLO S.p.A. - 燃烧器部门
U. Ferretti 先生

研发总监
RIELLO S.p.A. - 燃烧器部门
F. Comencini 先生

1.1 关于本手册

介绍

操作手册随燃烧器附带：

➤ 是产品必不可少的组成部分，因此需妥善保管此手册以备查阅；若燃烧器易主，也需随附此手册。若此手册丢失或损毁，需向本地区 RIELLO 技术服务部索取；

➤ 专为有资质的操作人员编写；

➤ 内容包括燃烧器的安全安装、启动、使用及维护等重要操作的说明。

本手册使用标识

在手册某些部分会出现带有 DANGER 标记的三角形。请特别注意此符号，警示潜在危险。

一般危险提示

危险 可分为 **3 个等级，**如下所示。


危险

最高危险等级！
此标识表示如果操作不当，将会造成严重伤害、死亡或长期健康危害。


警告

此标识表示如果操作不当，可能会造成严重伤害、死亡或长期健康危害。


小心

此标识表示如果操作不当，可能会造成机器损毁和／或人身伤害。

危险：带电元件


危险

此标识表示如果操作不当，将会造成电击，导致伤亡事故

其它标识

环境保护
此符号代表机器的使用符合环保要求。

➤ 此符号表示列表信息。

缩略语使用

Ch.	章
Fig.	图
Page	页
Sec.	节
Tab.	表

系统的运输和操作手册

运输时，需注意：

➤ 应由系统制造商将操作手册送达至用户手中，并建议用户将操作手册存放在燃烧器安装室内。

➤ 手册信息包括：
燃烧器的序列号；
最近的技术支持中心的地址和电话；

➤ 系统供应商应特别提示用户以下内容：
- 系统的使用；
- 系统启动前可能需要进行进一步测试；
- 系统需由制造商或其它专业技术员进行至少每年一次的维护和检修。

为了保证对燃烧器进行定期检查，RIELLO 建议制定维护维修合同。

1.2 保证及责任

根据当地强制标准和／或销售合同，RIELLO 从机器安装之日起对新产品进行保证。首次启动时，检查确认燃烧器各部件齐全。


警告

由于未按照手册所述进行操作造成操作失败以及由于操作疏忽、错误安装和未经授权对燃烧器进行改动造成的严重后果不在 RIELLO 提供的随燃烧器所附保证书所保证内容之列。

如果由于以下原因发生损害 / 伤害，造成人员财产损失的，保证书将失效，制造商将不承担任何责任。

➤ 对燃烧器进行了不正确的安装、启动、使用和维护
➤ 非正常、不正确或不合理使用燃烧器；
➤ 由不具备资质的人员操作燃烧器；
➤ 未经授权对设备进行改动；
➤ 保证燃烧器安全的安全设备损坏、使用不当和/或发生运行故障
➤ 在燃烧器上安装未经测试的零部件
➤ 使用不适当的燃料运行燃烧器
➤ 燃料供应系统故障；
➤ 燃烧器发生运行故障和/或运行不稳定时，仍继续使用燃烧器；
➤ 维修和／或彻底检修时操作不当；
➤ 为防止火焰生成不稳定，使用添加剂改变炉膛；
➤ 对易磨损部件监管及维护不足或不当；
➤ 使用非 RIELLO 原厂零配件，包括各种零件、组件、配件以及其它可选配件；
➤ 不可抗力因素。

因未遵守本手册进行操作导致的后果，RIELLO 将不承担任何责任。

2.1 介绍

RIELLO燃烧器的设计运用了成熟的安全技术，同时考虑到所有可能的危险情况，符合目前技术规范和标准。

但须注意，对设备粗心和不当的操作可能会对使用者或第三方造成死亡伤害的后果，同时会损坏燃烧器或其它物体。疏忽、轻率以及过度自信常常会导致事故发生；疲劳和困倦同样可造成事故。
需牢记：

➤ 必须按照功能描述使用燃烧器。用于其它用途均属不当操作，会导致危险发生。

需特别注意：
燃烧器可以应用于热水锅炉、蒸汽发生器、导热油炉以及制造商指明的其它产品上；
调节燃烧器用的各类参数，如燃料类型及压力，电压及电源频率，最小和最大出力，以及炉膛耐压性、尺寸和温度必须在手册所列 值的范围之内。

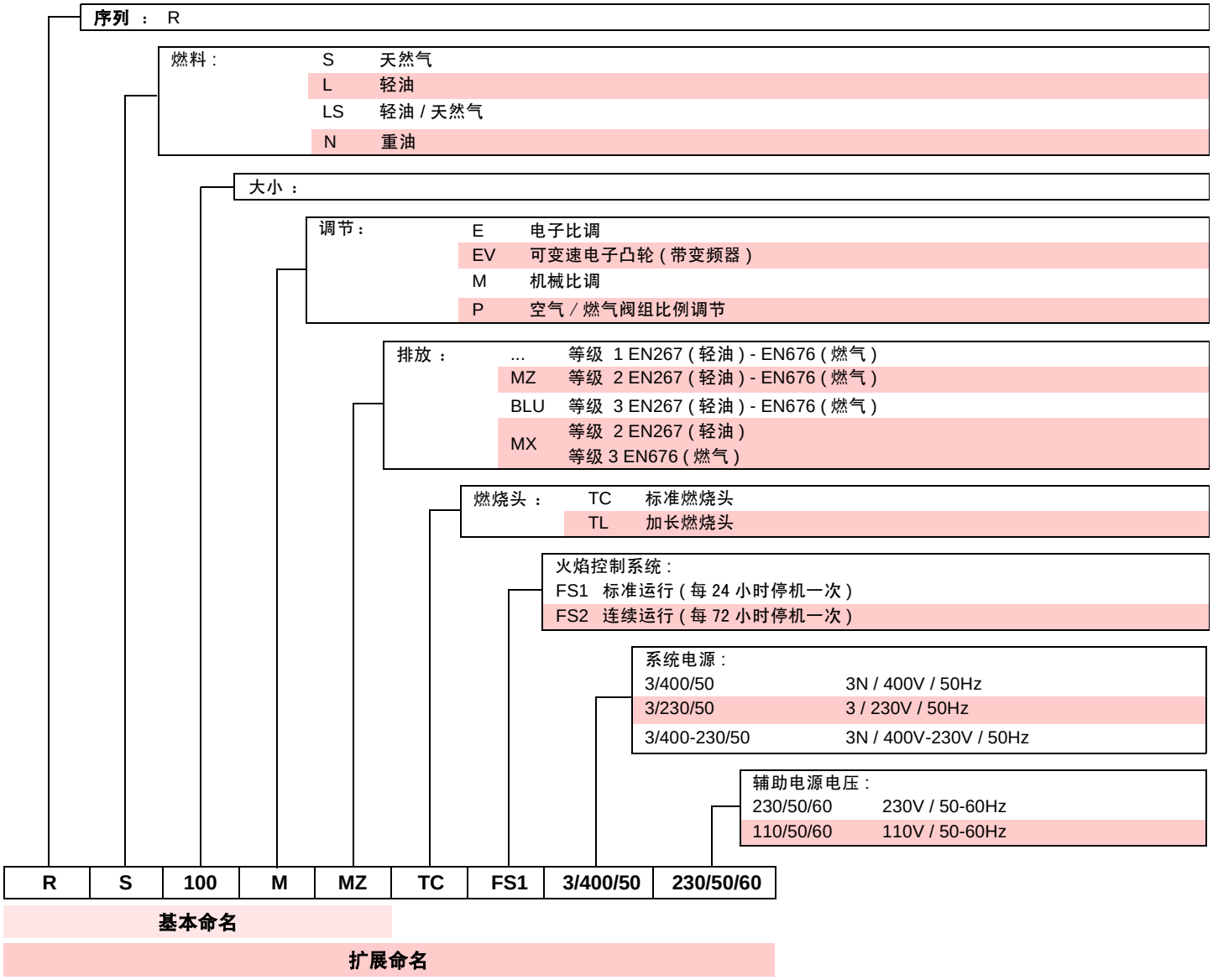
➤ 禁止因想改变燃烧器性能和安装地而对燃烧器进行改动。
➤ 燃烧器必须在绝对安全的环境中使用。任何可能对安全造成威胁的情况都必须立即予以消除。
➤ 除需检修的零部件外，不得打开或破坏燃烧器内部零件。
➤ 更换燃烧器零部件时必须使用制造商认可的配件。

2.2 人员培训

用户指已经购买了设备并且准备将其用于特定目的的个人、团体或公司。用户需对设备负责，并对设备操作人员做好培训。
用户：

➤ 必须请接受过正规培训有资质的人员操作设备；
➤ 必须采取一切措施防止非认证人员操作设备；
➤ 需采取适当方式告知操作人员安全注意事项的使用和规定。因此用户有责任保证每个人都了解安全注意事项。
➤ 如果设备发生故障或运行失灵，同时有任何危险预兆时，必须通知制造商。
➤ 操作人员必须使用法律所规定的防护设备，并且按照手册进行操作。
➤ 操作人员必须遵守设备上所有危险及警告提示。
➤ 操作人员不得私自进行超出其职责范围的操作。
➤ 操作人员必须将设备产生的任何问题或发生的危险情况报告给其上级主管。
➤ 使用其它制造商的零部件，或对设备的任何改动，都会造成设备性能的改变，因此会降低其安全性能。因此因使用非原厂零配件而造成的设备损坏，制造商将不承担任何责任。

3.1 燃烧器命名说明



3.2 可选型号

规格		电压	编码
RS 70/M	TC	3 ~ 400 / 230V - 50Hz	20042322
RS 100/M	TC	3 ~ 400 / 230V - 50Hz	20044401
RS 130/M	TC	3 ~ 400 / 230V - 50Hz	20044402

3.3 燃烧器分类 - 适用国家

适用国家	燃气分类
BE	I2E(R) - I3
CY - CZ - MT	I3B/P
LU - PL	II2E3B/P
DE	II2ELL3B/P
FR	II2Er3P
IT	II2H3
ES - GB - IE - PT	II2H3
AT - CH - CZ - DK - EE - FI - GR - HU - IE IS - LT - NO - SE - SI - SK - TR	II2H3B/P
NL	II2L3B/P

3.4 技术数据

型号			RS 70/M	RS 100/M	RS 130/M
类型			828T1	829T1	830T1
出力 (1)	最大	kW Mcal/h	470 - 930 404 - 800	700 - 1340 602 - 1152	920 - 1600 791 - 1376
	最小	kW Mcal/h	150 129	150 129	254 218
燃料			天然气 : G20 - G23 - G25		
最大出力时的燃气压力 (2) - 燃气：G20/G25		mbar	15.7/22.9	15.5/21.9	12.7/18.9
运行			间歇式运行 (每 24 小时至少停机一次)		
标准应用			热水炉、蒸汽锅炉、导热油炉		
环境温度		°C	0 - 40		
助燃空气温度		°C 最高	60		
电源			3 ~ 400V / 230 V 1N ~ 230V +/-10% 50 Hz (见第 3 章第 2 节)		
风机马达 (额定) 运行电流 启动电流		rpm V kW A A	2800 220/240 - 380/415 1.1 4.8 - 2.8 33 - 19	2800 220/240 - 380/415 1.5 5.9 - 3.4 48 - 28	2800 220/240 - 380/415 2.2 8.8 - 5.1 68 - 39
点火变压器		V1 - V2 I1 - I2	230V - 1 x 8 kV 1A - 20mA		
吸收电功率		kW 最大	1.4	1.8	2.6
电气保护等级			IP 44		
噪音水平 (3)		dBA	75	77	78.5

(1) 参考条件 : 环境温度 20°C - 燃气温度 15°C - 大气压力 1013 mbar - 海拔 0 m a.s.l.
(2) 在燃烧室为 0 mbar 且燃烧器全功率运行状态下，符合 EN676 标准的气体调节板上游压力 1)(图 19)。
(3) 噪声值于制造商实验室内的测试锅炉上测得，且燃烧器处于最大额定出力状态。

3.5 燃烧器重量

燃烧器带外包装的总重量如 表所示。 .

型号	kg
RS 70/M	70
RS 100/M	73
RS 130/M	76

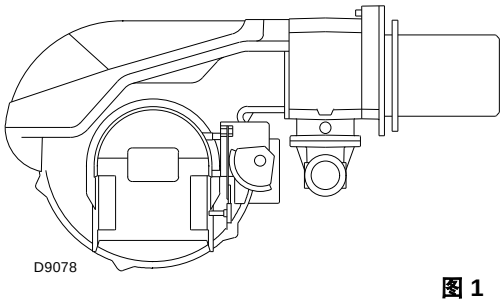


图 1

3.6 外观尺寸

燃烧器的外观尺寸见 图 2。
注意，要检查燃烧头，必须从燃烧器后部的铰链处旋转打开燃烧器。
燃烧器打开时的最大尺寸用位置 I 指示。

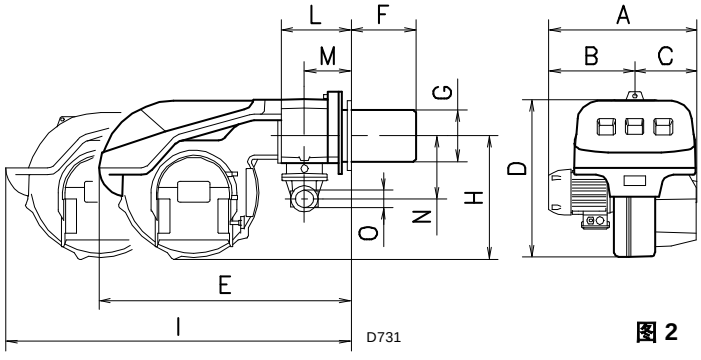


图 2

mm	A	B	C	D	E	F	G	H	I	L	M	N	O
RS 70/M	511	296	215	555	840	250	179	430	1161	214	134	221	2”
RS 100/M	527	312	215	555	840	250	179	430	1161	214	134	221	2”
RS 130/M	553	338	215	555	840	280	189	430	1161	214	134	221	2”

3.7 出力范围

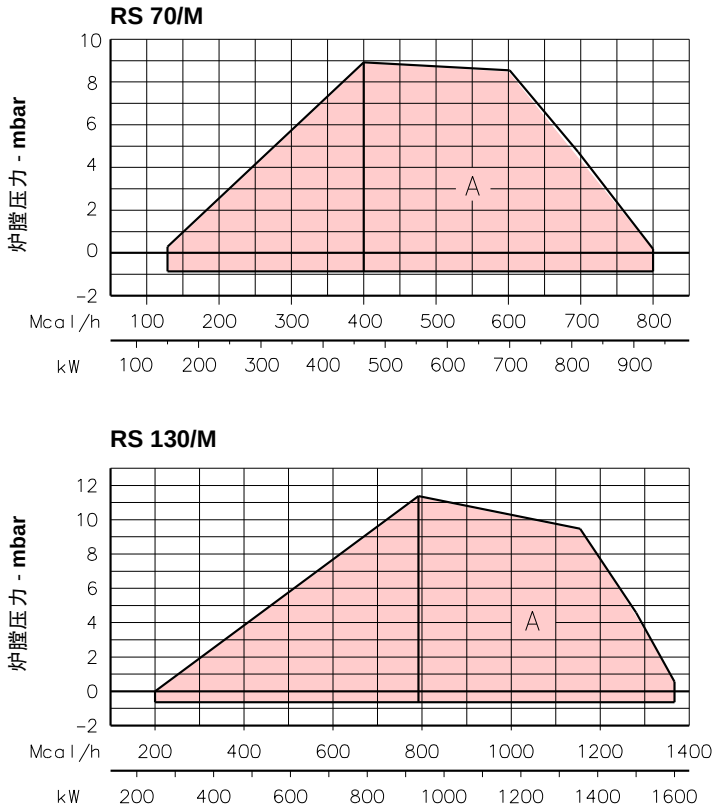


图 3

最大出力必须在图中 **A** 区内选择。

最小出力不得低于图中所示最小极限。

警告
点火出力范围数值在环境温度为 20°C 时测得，大气压力为 1013 mbar (海拔约为 0 m a.s.l.)，燃烧头如第 4 章第 6 节所示进行调整。

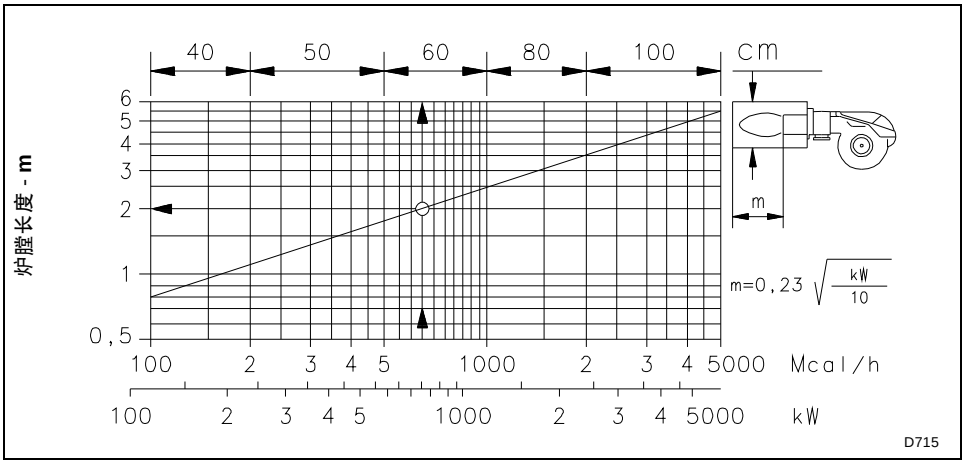


图 4

根据 EN 676，出力范围以特殊锅炉为基础获得。
图 4 显示测试锅炉炉膛的直径和长度。

举例
出力 756 kW (650 Mcal/h):
直径 60 cm,
长度 2m。

若锅炉符合 CE 类的认证标准，则燃烧器和锅炉均会匹配；如果燃烧器必须安装于未经 CE 类标准认证或炉膛尺寸与图 4 所示尺寸差别很大时，请做进一步校核。

3.8 燃烧器部件

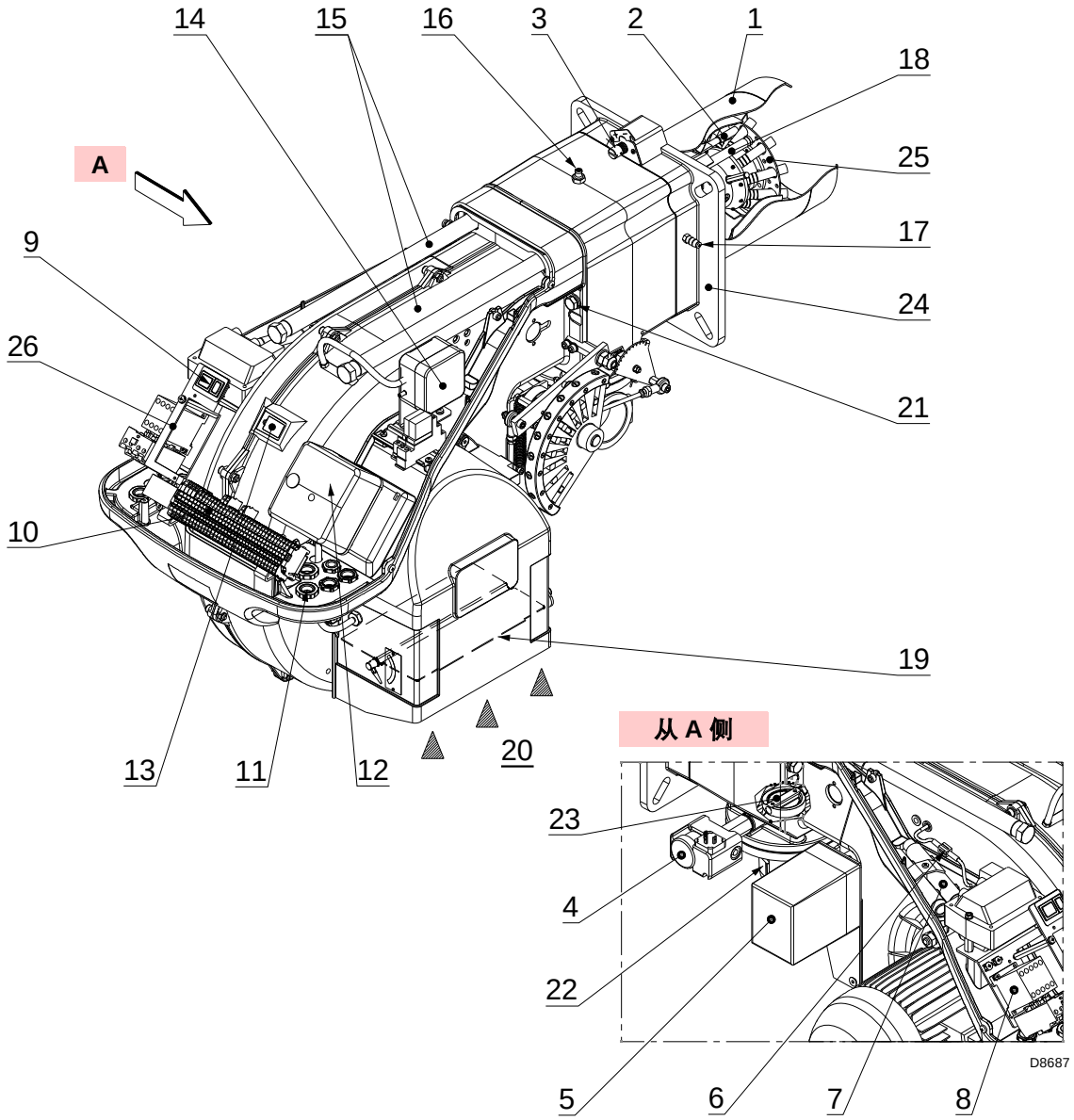


图 5

1 燃烧头
2 点火电极
3 燃烧头调节螺丝
4 最大燃气压力开关
5 伺服马达控制燃气蝶阀以及风门挡板 (通过可变凸轮进行调节)
燃烧器停机时，风门挡板完全关闭以减少因通风，即风机进气口吸入空气，而造成的热量损失。
6 离子探针电缆上的插接组件
7 滑杆 15) 的延伸段
8 马达接触器和带有复位键的热继电器
9 出力模式转换开关 :
自动 - 手动 - 停机
按钮 :
增大 - 降低 出力
10 接线端子
11 接线孔，由安装人员操作
12 带锁定指示灯和复位按钮的控制盒
13 观火孔
14 风压开关 (“ 差动 ” 型)
15 打开燃烧器及检查燃烧头的滑杆
16 燃气压力测试点和燃烧头固定螺丝
17 风压插座
18 火焰探测器
19 风门挡板
20 风机进风口
21 将风机固定到套筒上的螺丝
22 燃气进气管路
23 燃气蝶阀
24 锅炉安装用法兰
25 稳焰盘
26 固定比调仪 RWF40 的支架

3.9 燃烧器配置

随燃烧器附带 :
➤ 燃气阀组法兰
➤ 法兰垫片
➤ 4 个法兰安装螺丝 M8x25
➤ 隔热垫
➤ 导杆 15) 上的延长部 7)：只适用于 TL 型
➤ 固定燃烧器法兰到锅炉上的 4 个螺丝： M12x35
➤ 操作手册
➤ 备件目录

3.10 空气 / 燃料比例调节控制盒

介绍
RS 系列燃烧器所配 RMG/M 88.62... 型控制盒专为间歇式运行的强制通风燃气燃烧器所设计。
其设计符合 :
- EN676 技术标准 (燃气燃烧器)
- EN298 技术标准 (燃气用具)

图 6

危险
所有安装、维护及拆卸操作必须在主电源断电之后进行。
为了避免损毁设备及造成人员伤害，禁止打开或改变控制盒。

警告
燃烧器的安装必须由具有资质的人员进行，且符合安装地的强制标准。

技术数据

电源	AC 220.....240V +10% / -15%
频率	50.....60 Hz +/- 6%
内部保险丝	T6,3H250V
在额定电压条件下运行	
最小运行电压 降低电压至 低于额定值	约 AC 160 V
最小运行值 提高电压至 接近额定值	约 AC 175 V
触点最大负荷 :	
报警退出 额定电压 最大电流	 AC 230V, 50/60 Hz 0.5 A
允许电缆长度 温控器 风压开关 CPI 燃气压力开关 火焰探测器 远程复位	 最长 20m， 100 pF/m 最长 1 m， 100 pF/m 最长 1 m， 100 pF/m 最长 20 m， 100 pF/m 最长 1 m 最长 20 m， 100 pF/m
M4 螺丝的拧紧力矩	最大 0.8 Nm

3. 11 伺服马达

伺服马达通过可变轮廓凸轮和燃气蝶阀，同步调节风门挡板。伺服马达可在 42 秒内旋转 130°。

警告
不得改变工厂对 5 个凸轮的设定值，只需检查其是否按如下所述进行设定即可 :

凸轮 I: 130°
最大开启角度。
当燃烧器处于最大出力运行时，燃气蝶阀必须全开，至 90°。
凸轮 II: 0°
最小开启角度。
燃烧器停机时，风门挡板和燃气蝶阀必须关闭，至 0°。
凸轮 III: 65°
调节点火位置及最小出力。
凸轮 V: 集成于凸轮 III 上。

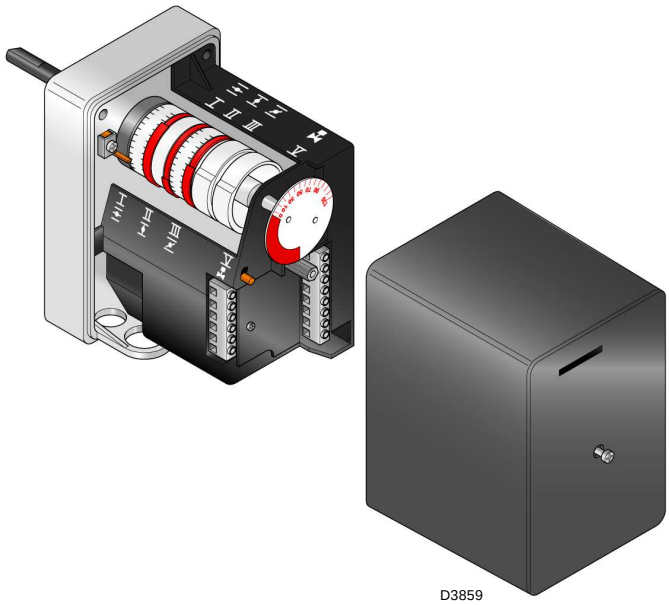


图 7

4.1 安装安全注意事项

将锅炉安装区域打扫干净，环境照明良好，然后开始进行安装操作。

危险

所有的安装、维护和拆卸操作都必须在切断电源的情况下进行。

警告

燃烧器的安装必须由具有资质的人员操作，如本手册所要求，且符合安装地的强制标准。

4.2 操作

燃烧器包装包括木质托盘，因此可以用移动托盘和叉车搬运燃烧器（带包装）。

警告

搬运燃烧器的操作非常危险，所以要特别小心：一切无关人员均应远离搬运现场；检查确认搬运方法的连贯性和可行性。同时检查确认安装区域无杂物，且有足够的逃生空间（如一旦燃烧器掉落，操作人员有一个自由安全的空间避险）。
搬运期间，确保载重物离地面不超过 20-25 cm。

小心

将燃烧器放置在安装位置附近后，正确拆卸所有剩余的包装，取出各类材料。
在进行安装操作前，请仔细将安装燃烧器的区域打算干净。

4.3 初步检查

检查货物

小心

拆开包装后，检查包装内物品的完整性。如有疑问，请勿使用燃烧器；联系供货商。

包装材料（木箱或硬纸箱，钉子，别针、塑料袋等）不得随意丢弃，造成潜在危险和污染；应将拆下的包装材料收集好，在适当的地方处理掉。

检查燃烧器性能

检查燃烧器上的铭牌，应显示如下信息：

- 燃烧器型号（见 **A**，图 8）和燃烧器类型 (**B**);
- 制造年份加密代码 **C**);
- 序列号 (**D**);
- 电源数据及电气保护等级 (**E**);
- 电源输入功率 (**F**);
- 所使用燃气类型和相关输送压力 (**G**);
- 燃烧器最小和最大出力数据 (**H**) (见“出力范围”一节)
  警告 . 燃烧器的出力必须在锅炉出力范围内。
- 设备 / 安装国家类型 (**I**)。

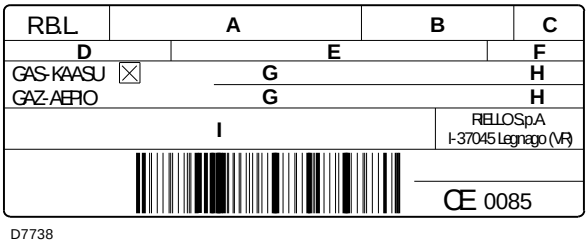


图 8

警告

篡改、移除或丢失燃烧器铭牌或其它部件，会造成无法辨认燃烧器型号，给燃烧器的安装和维护带来困难。

4.4 安装位置

燃烧器被设计为只能在 **1**, **2**, **3** 和 **4** 位置运行。
最好安装于位置 **1**，因为此位置是唯一能使燃烧器维护时按照手册描述进行操作的位置。燃烧器安装在 **2**, **3** 和 **4** 位置也可以运行，但不利于维护和燃烧头检修。

安装在其它位置可能会损害设备的正常运行。为确保安全，禁止将燃烧器安装在位置 **5**。

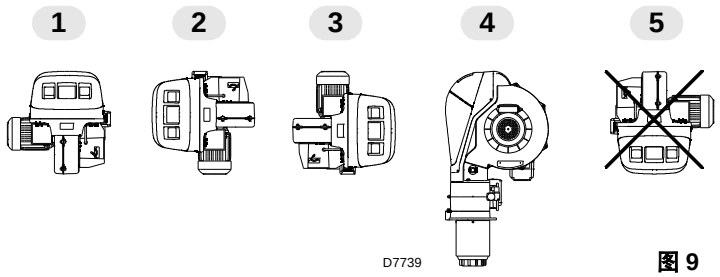


图 9

4.5 安装燃烧器到锅炉

准备工作

在锅炉钢板上钻孔

按 Fig. 10. 所示，在炉膛锁板上钻孔。
可以用随燃烧器附带的隔热垫定位螺纹孔的位置。

mm	A	B	C
RS 70/M	185	275 - 325	M 12
RS 100/M	185	275 - 325	M 12
RS 130/M	185	275 - 325	M 12

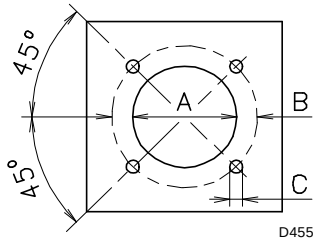


图 10

燃烧筒长度

燃烧筒的长度的选择必须符合锅炉制造商的要求，在任何情况下都应长于锅炉炉门安装炉补后的厚度。
可选长度 L 如下表所示。

燃烧筒	mm
RS 70/M	250
RS 100/M	250
RS 130/M	280

带前烟道 15) 或中心回焰炉膛的锅炉，其使用耐火材料制成的保护性炉补 13) 必须装于锅炉炉补 14) 和燃烧筒 12) 之间。

此保护性炉补不得妨碍取下燃烧筒。见图 11。
对于带水冷却前板的锅炉，则不需要耐火材料制成的炉补 13)-14) ，除非锅炉制造商另有要求。

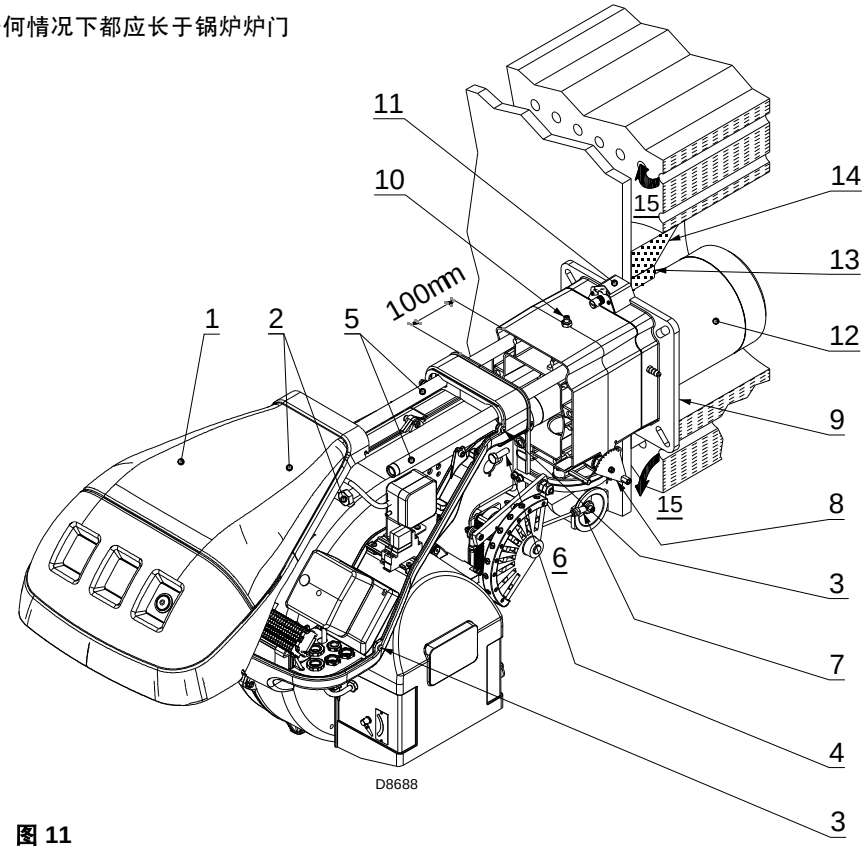


图 11

安装燃烧器到锅炉

将燃烧器安装到锅炉之前，需通过燃烧筒的开口检查确认探针及电极连接位置正确，如图 12。

如果，此前的检查发现探针或电极位置不正确，则需拆下螺丝1)(图13)，取出燃烧筒的内部部件2)(图13)，并进行调整。

不要转动探针：其状态应如图 12，因为探针位置离电极很近，可能会对控制盒造成损坏。

从燃烧器上拆下燃烧头，图 11。

按如下步骤进行操作：

- 拧松 4 个螺丝 3)，取下保护罩 1);
- 从刻度指示盘 8) 解开铰链 7) 的连接；
- 从滑杆 5) 上取下螺丝 2) ；
- 取下 2 个螺丝 4)，沿滑杆 5) 将燃烧器拉出大约 100 mm;
- 断开探针及电极电缆，然后沿滑杆将燃烧器全部滑出。

进行完上述操作后，将法兰 11)(图 11) 固定到锅炉钢板上，中间插入随附的隔热垫 9)(图 11)。

用拧紧力矩为 35 - 40 Nm 的扳手将随附的 4 个螺丝固定。

燃烧器和锅炉之间的密封必须达到气密标准。启动燃烧器后 (见章节：5.3)，检查是否有烟气泄漏到外部。

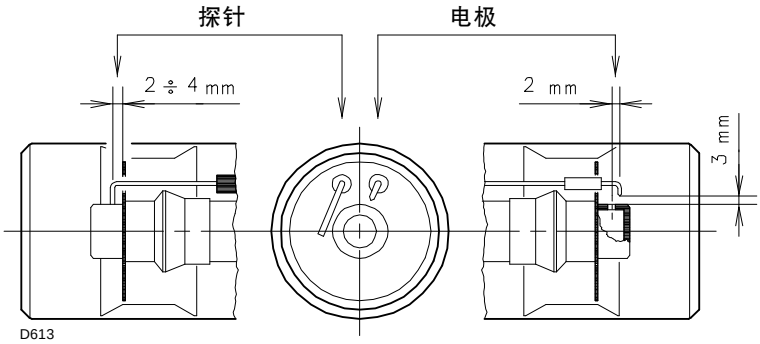


图 12

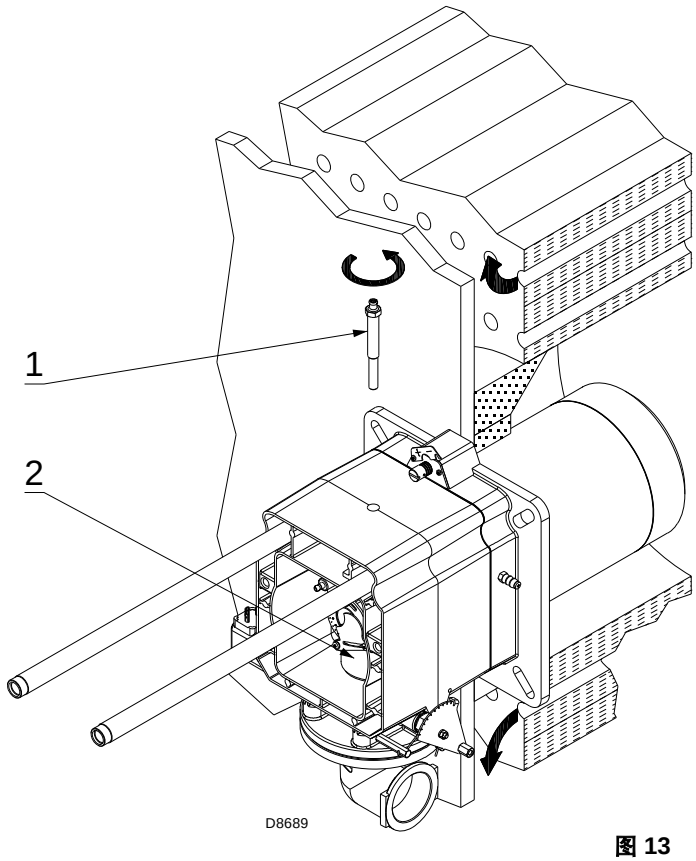


图 13

4.6 燃烧头设定

在安装的这一阶段，如图 13 所示，将燃烧头安装到锅炉上。
这样可以很容易的调节燃烧头，因为此设置只取决于燃烧器运行时的最大出力。

有两种调节燃烧头的方式：
➤ 空气调节
➤ 燃气调节

根据图 16, 查找相应刻度，调整空气以及中央燃气 / 空气。

空气调节
旋转螺丝 2) 直至刻槽与法兰前表面 1) 对齐。

> **小心**
> **重要**
> 为了便于调节，先拧松螺丝 3) (图 14)，进行调节，然后再拧紧螺丝。

燃气调节
拧松 4 个螺丝，旋转环形螺母 5) 直至刻槽与指标 3) 相符 (图 14)。
拧紧 3 个螺丝 4)。

举例
RS 70/M, 燃烧器出力 = 600 kW
根据图 16，燃烧器在此出力时，燃气和空气应设定在刻槽 4。

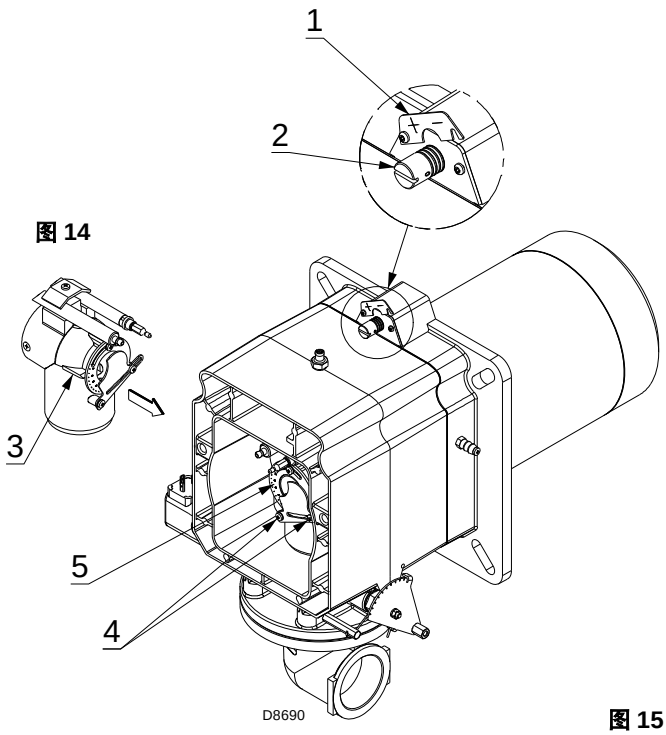


图 14

图 15

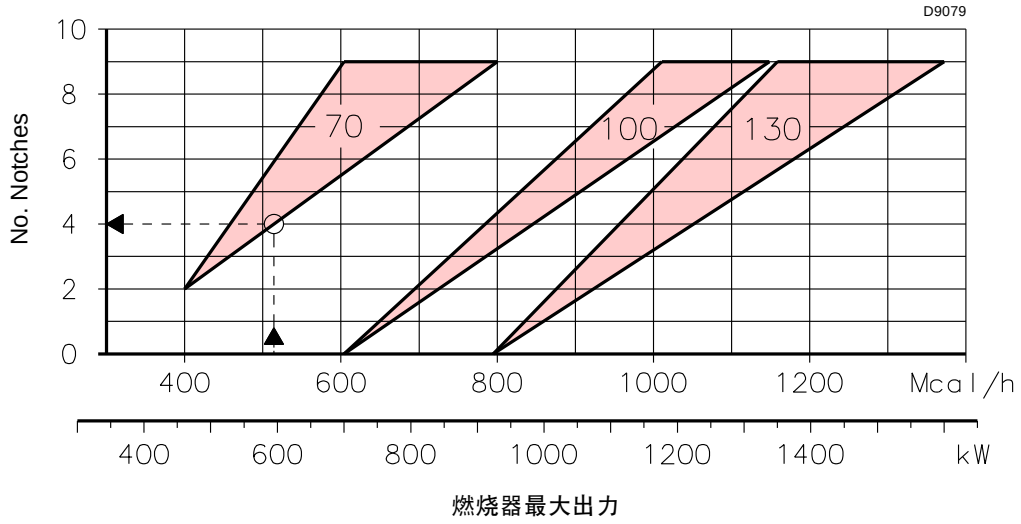


图 16

注意
图中所示为图 4 中锅炉型号的最优设定。
此设定可在启动初期进行调整。

完成燃烧头调整后：

➤ 从管路连接处 4)，沿滑杆 3) 推进燃烧器剩余约 100 mm，直至达到图 11 所示位置；
➤ 连接探针和电极电缆，然后将燃烧器滑动至离管路连接点最远处，直至达到图 17 所示位置；
➤ 连接最大燃气压力开关插座；
➤ 将螺丝 2) 重新固定在滑杆 3) 上；
➤ 用螺丝 1) 将燃烧器与管路连接处固定。
➤ 重新连接铰链 7) 到刻度盘 6)。

小心

当安装燃烧器到滑杆上时，最好将富裕电缆和离子探针电缆拉出，直到他们被轻轻拉紧。

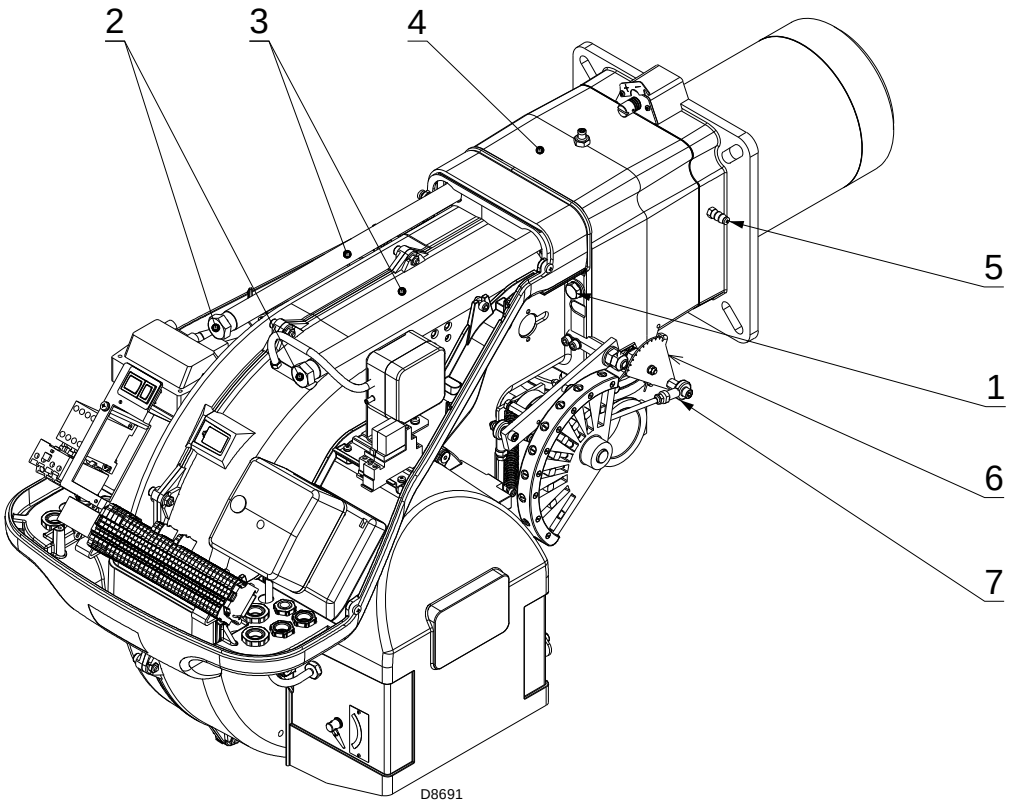


图 17

4. 7 燃气阀组安装

➤ 燃气阀组已通过 EN 676 标准的型式认证，不随燃烧器一起提供，需单独订购。

➤ 燃气阀组可从燃烧器的左边或右边进行安装，视具体情况，以方便安装为宜，见图 18。

➤ 燃气阀组必须用燃烧器随附的法兰2)，垫片3)以及螺丝4)与燃气附件 1)
(图 18) 相连接。

➤ 燃气电磁阀必须尽可能靠近燃烧器以确保燃气在3秒的安全时间内达到燃烧头。

➤ 确保燃烧器所需最大压力包含在压力调节器的校准范围之内。

警告

燃气阀组调节，参见所附手册。

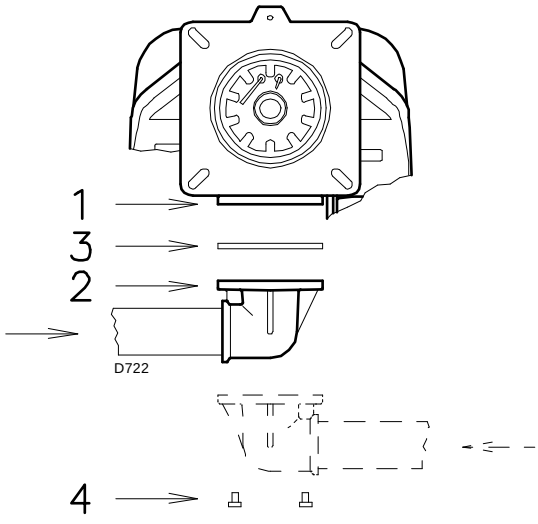


图 18

4.8 燃气供应管路

警告

燃料泄漏在存在易燃源的地方会有爆炸危险。

预防措施：避免敲击、摩擦、火花和高温。

确保在燃烧器上执行任何操作前，燃气截断旋阀为关闭状态。

警告

燃料供应管路必须由具备相应资格的人员来安装，且需符合当前标准和法律。

符号说明（ 图 19 ）

1 气体输入管

2 手动阀

3 减振接头

4 带按钮旋塞的压力表

5 过滤器

6A 包括：
- 过滤器
- 工作阀
- 安全阀
- 压力调节器

6C 包括
- 安全阀
- 工作阀

6D 包括：
- 安全阀
- 工作阀
- 压力调节器
- 过滤器

7 最低燃气压力开关

8 泄漏检测装置，根据输气装置代码作为附件或集成件提供。根据 EN 676 标准，必须为最大输出功率大于 1200 KW 的燃烧器提供泄漏探测控制装置。

9 仅适用于 “ 带法兰 ” 版本的衬垫

10 压力调节器

11 气体吸入式燃烧器适配器，单独提供

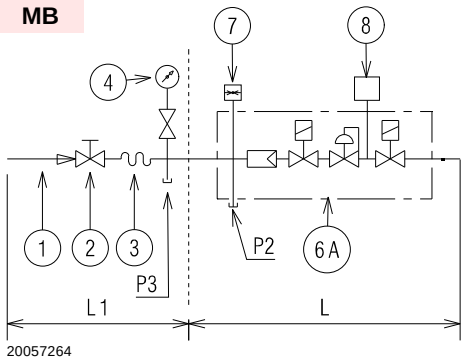
P2 阀 / 调节器上游压力

P3 过滤器上游压力

L 输气装置，单独提供

L1 安装者职责

MB



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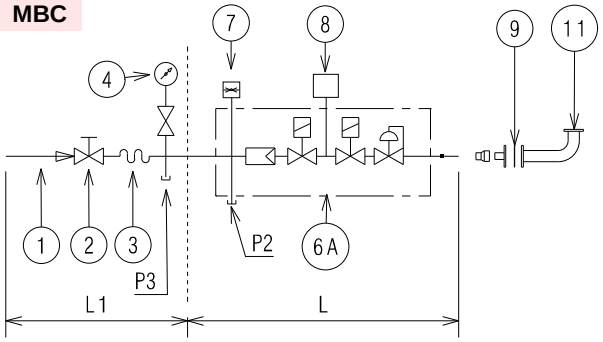
MBC



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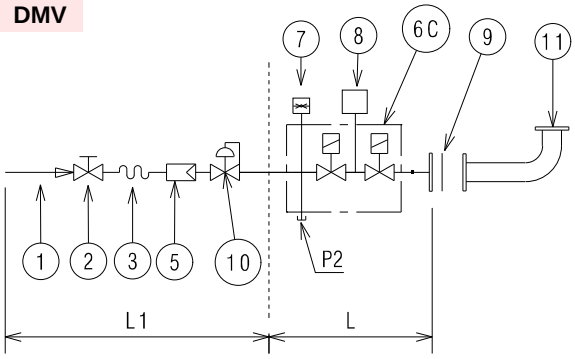
DMV



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CB

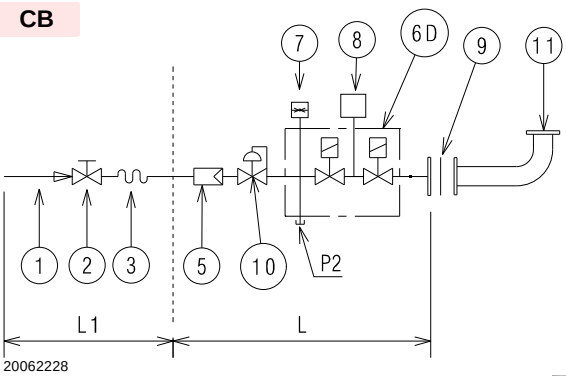

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图 19

4.9 电气连接

电气连接安全注意事项

危险

- 电气连接时必须切断电源。
- 电气连接必须由具有资质的技术人员进行操作，且符合安装地的强制标准。电气连接图参见附录 A。
- 因改变本手册电气连接图或电气连接与图不符而造成的后果，RIELLO 将不承担任何责任。
- 电气系统必须适合设备铭牌和技术手册所示的标准。见图 8。
- 不得将零线和相线反接，否则燃烧器会因点火故障而锁定。
- RS 70-100-130/M 型 燃烧器为间歇式运行，即每 24 小时至少强制停机一次以便对控制盒进行自诊断，确保其功能的有效性。正常情况下，锅炉负荷控制系统会自动将燃烧器停机。
  如果不是这样，则需在 IN 上串联一个定时器以保证燃烧器至少每 24 小时停机一次。电气连接图参见附录 A。
- 必须有符合目前标准的有效的接地系统才能保证设备的电气安全。必须检查基本的安全要求。如果有任何疑问，须由电气专业人员检查电气系统。不要使用燃气管作为电气设备的接地系统。
- 电气系统必须适合设备铭牌和技术手册所示的设备的最大输入功率，特别需要检查确认所用电缆是否与设备吸收功率匹配。
- 连接主输电线的设备主电源：
  - 不要使用适配器、多功能插座或接线板；
  - 使用一个多极开关，触点间至少间隔 3 mm (超电压类)，如安全标准中所示。
- 不要用潮湿的身体和 / 或光脚时接触设备。
- 不得拉拽电缆。

如果仍有保护罩，取下保护罩，根据附录 A 的电气接线图进行电气连接。

根据 EN 60 335-1 标准使用柔性电缆。

所有连接到燃烧器插座的电缆必须穿过引线管。
见图 20.
导缆孔有多种用途，例如：

1 - 三相电源
2 - 单相电源
3 - 燃气阀组
4 - 燃气压力开关或泄漏检测装置
5 - 触发 / 安全装置
6 - 备用

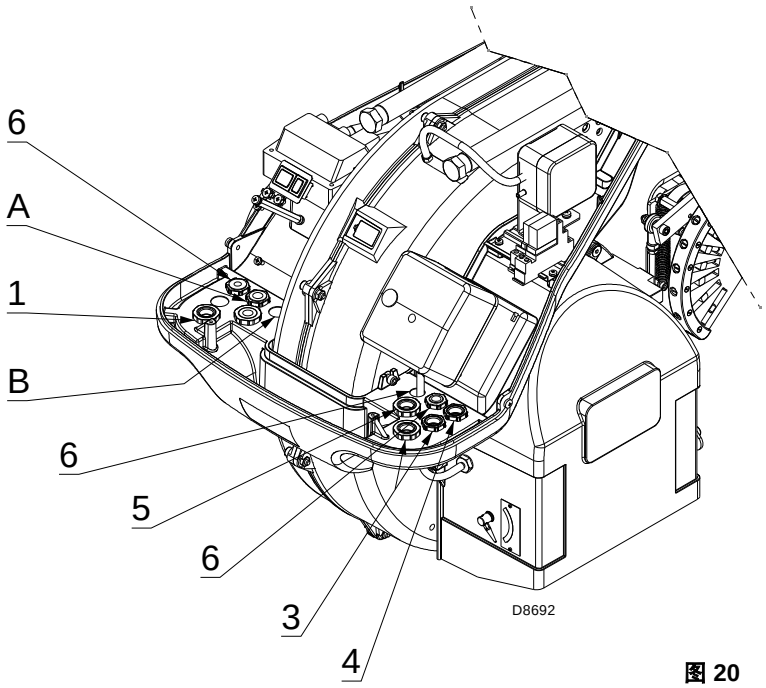

图 20

4.10 热继电器校准

热继电器用于避免因吸收功率的过度增大或缺相所造成的风机电机损坏。

校准热继电器，请参看附录 A 图 5 电气连接图中的表格。

即使热继电器的最低值超过马达的额定吸收，也可提供保护。
此种情况会在马达电源为 400 V / 460V 时出现。
要复位热继电器，按按钮 1)，见图 21。

电压 3 ~ 400 / 230V - 50Hz

RS 70-100-130/M 型燃烧器出厂时预设使用 **400 V** 电源。
如果使用 **230 V** 电源，将马达连接有星形改为角形，同时改变热继电器的设置。

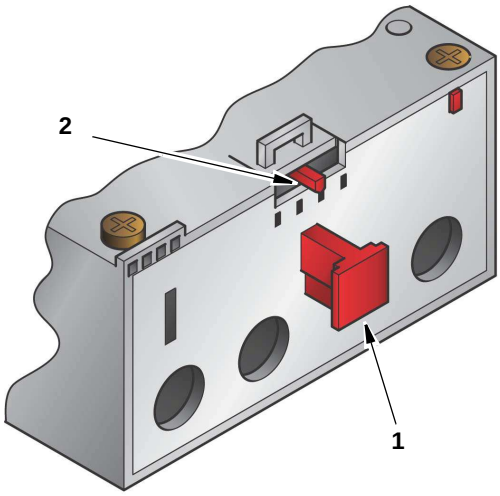

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图 21

5.1 首次启动安全注意事项

警告

首次启动燃烧器必须由具有资质的技术人员操作，如本手册所要求，且符合安装地的强制标准。

警告

检查确认调节装置、指令装置以及安全装置工作正常。

5.2 启动前调节

- ➤ 确认燃气公司已经可以供应燃气，排净管路中的空气或惰性气体。
- ➤ 缓慢打开燃气阀组上游的手动阀。
- ➤ 调整最小燃气压力开关 (图 22) 到量程的开始位置。
- ➤ 调整最大燃气压力开关 (图 23) 到量程的终止位置。
- ➤ 调整风压开关 (图 24) 到量程的开始位置。

最小燃气压力开关

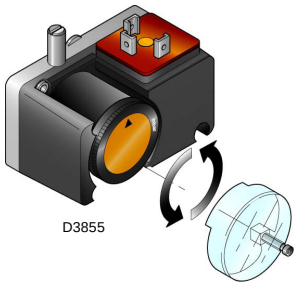


图 22

最大燃气压力开关

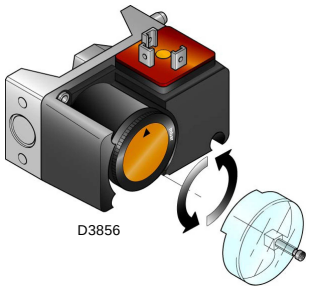


图 23

风压开关

图 24

- ➤ 将压力表连接到最小燃气压力开关的压力测试点 1) (图 25)，以检查燃气供应压力，此压力必须低于燃气阀组所允许的最大压力，详见燃气阀组铭牌。

危险

燃气压力过高会损坏燃气阀组部件，并会导致爆炸危险。

- ➤ 排尽燃气管路中的空气，连接一根塑料管到最小燃气压力开关的压力测试点 1)(图 25) 处。
  将排气管接到室外，以便闻到燃气的味道。
- ➤ 连接两个灯泡或测试仪到燃气管路的两个电磁阀上，用以检查何时供电。
  如果两个电磁阀已安装了指示灯显示何时通过电流，则无需进行此步骤。

警告

启动燃烧器前，最好先调整燃气阀组以便燃烧器能在最安全的情况下点火，如使燃气流量最小。

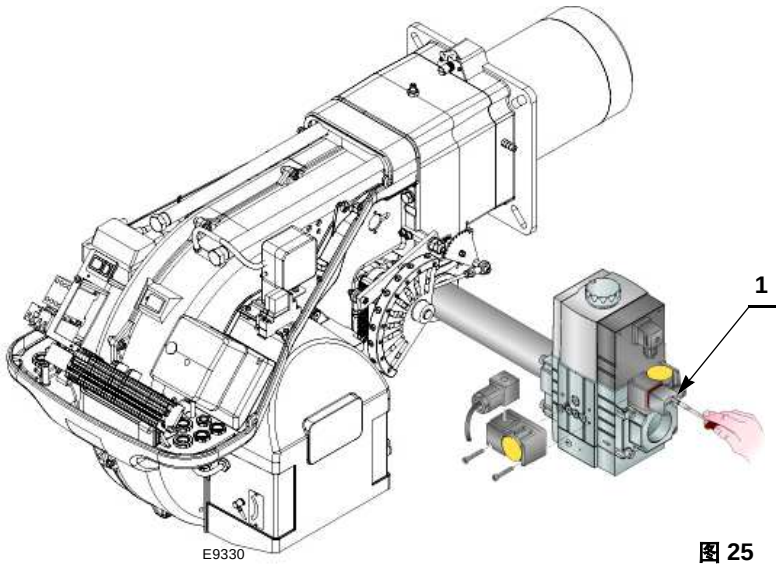


图 25

5.3 燃烧器启动

通过锅炉面板上的隔离开关给燃烧器供电。
闭合温控 / 压力开关，将图 27 中所示开关置于 **“MAN”** 位置。

危险

确认连接到电磁阀上的灯泡或测试仪，或电磁阀自带的指示灯，显示电磁阀未通电。如果显示电磁阀通电，则应**立即**将燃烧器停机，并检查电气连接。

一旦燃烧器启动，通过火焰检查窗检查风机叶片的旋转方向。

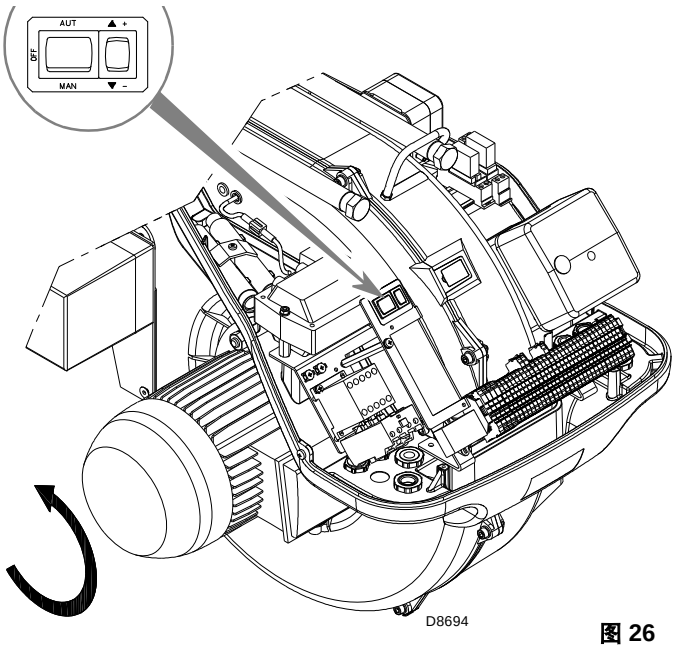


图 26

5.4 燃烧器点火

完成以上检查步骤后，可进行燃烧器点火。如果电机启动，但未产生火焰，且控制盒锁定，则复位并等待下一次点火。
如果点火仍未成功，有可能是燃气在 3 秒的安全时间内未到达燃烧头。在此情况下，应增加点火燃气量。
燃气到达管路接口时，可通过压力表查看。
一旦点火成功，即可进行全面的校准工作。

5.5 燃烧器调节

燃烧器的优化校准需要在锅炉排烟口安装烟气分析仪。
顺次调节：
- ➤ 点火出力
- ➤ 最大出力
- ➤ 最小出力
- ➤ 中间出力
- ➤ 风压开关
- ➤ 最大燃气压力开关
- ➤ 最小燃气压力开关

点火出力

根据 EN 676 标准：
燃烧器最大出力为 120 kW 时
点火出力可以为燃烧器运行最大出力。举例：
- ➤ 最大运行出力：120 kW
- ➤ 最大点火出力：120 kW

燃烧器最大出力高于 120 kW 时
点火出力必须低于燃烧器运行最大出力。
若点火出力低于 120 kW，无需进行另外计算。若点火出力高于 120 kW，根据标准规定，点火出力应根据控制盒所标明的安全时间 "ts" 进行调整：
当"ts"=3秒时，点火出力必须小于等于燃烧器运行最大出力的1/3。

举例
燃烧器最大运行出力为 450 kW
点火出力必须小于等于 150 kW， ts = 3 秒。

测定点火出力：
- ➤ 将电离探针电缆上的插头−插座 6)(图 5) 断电 (燃烧器点火，安全时间后进入锁定状态) ；
- ➤ 在持续的锁定状态下进行点火 10 次；
- ➤ 在燃气表上读出消耗的燃气量：
  此燃气量应小于或等于根据以下公式所计算出的数值， ts = 3 秒：

$$Vg = \frac{Qa\ (\text{燃烧器最大出力}) \times n \times ts}{3600}$$

Vg: 点火时的燃气体积 (Sm^3)
Qa: 点火时燃气流量 (Sm^3/h)
n: 点火次数 (10)
ts: 安全时间 (秒)

举例：天然气 G 20 (9.45 kWh/Sm^3):
点火出力 150 kW
对应 15.87 Sm^3/h.
点火锁定 10 次后，燃气表上显示的供气量必须等于或小于：

$$Vg = \frac{15.87 \times 10 \times 3}{3600} = 0.132\ Sm^3$$

最大出力

燃烧器最大出力必须按照第 7 页所示的出力范围进行设置。 按上述说明操作时，燃烧器处于最小出力运行。
现按按钮 2)(图 27)，增大出力直至服马达开启风门阀，同时开启燃气蝶阀。

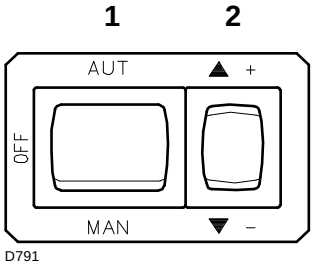


图 27

燃气量调节

根据燃气表测定燃气量。

可根据第 38 页上的表格计算出合理的供气量，在压力表上读出燃气压力，见第 21 页图 30，然后按第 38 页上说明进行计算。

- 如需减小供气量，则可降低燃气气压；如果此时压力已经较低，则可关小调节阀 VR。
- 如需增大供气量，增大燃气压力。

空气量调节

通过调节螺丝 7) 逐步调整凸轮 4)(图 28) 的外廓线。

- 顺时针调节螺丝增大空气量。
- 逆时针调节螺丝减小空气量。

最小出力

燃烧器的最小出力必须设定在第 7 页所示出力范围内。

将按钮2)(A)(图 27)，降低出力直至伺服马达关闭风门阀及燃气蝶阀至 65° 角（ 工厂预设位置 ）。

燃气量调节

根据气量计测定燃气供气量。

- 如需减小供气量，可依次逐步减小凸轮 III(图 29) 的角度 65° 至 63° 至 61°.... 。
- 如需增加供气量，按按钮 2)(A)(图 27) ，增大出力（ 如将燃气蝶阀角度增大 10-15° ），逐步增大凸轮 III (图 29) 的角度至如 65° −67° - 69°...。

  此时，可降低出力，直至伺服马达至最小开启位置，并测量供气量。

注意

当凸轮角度减小时，伺服马达随着凸轮 III 的调节而调节。如需增大凸轮角度，先调节 “ 增大出力 ” 按钮增大伺服马达角度，然后增大凸轮 III 的角度，最后将调节 “ 降低出力 ” 按钮将伺服马达调回至最小出力位置。

要调节凸轮 III，特别是需要进行微调时，可使用专用工具 10)。

空气量调节

通过调节螺丝 5) 逐步调整凸轮 4) 的末端廓线。最好不要调节第一个螺丝，因为此螺丝用于将风门挡板完全关闭。

中间出力

燃气量调节

此时无需调整燃气供应量。

空气量调节

按下按钮 2)(图 27) 增大出力直至伺服马达旋转 15°。调节螺丝至最优燃烧状态。接着以同样的方式调节其它螺丝。注意要逐渐改变凸轮廓线。

用开关 1)(图 27) 置于 “OFF” 位置，将燃烧器停机，按下按钮 3) 并将其向右移动，使伺服马达和凸轮 4 脱开，同时手动前后旋转凸轮 4，检查确认整个滑动过程平稳无阻滞。

将按钮 2) 向左移动，再次使伺服马达和凸轮 4) 结合。

尽量不要移动凸轮末端的那些螺丝，这些螺丝已经预先调整至最小及最大出力风门挡板调节位置。

最后拧紧螺丝 6) 将调节值固定。

注意

一旦完成对 “ 最大 − 最小 − 中间 ” 出力的调整，再次检查点火：此时的噪音水平应与燃烧器点火后运行时的噪音水平相当。如果燃烧器出现任何震动，应减小点火时的燃气供应量。

1 伺服马达
2 伺服马达 1) - 凸轮 4)：结合
3 伺服马达 1) - 凸轮 4)：脱开
4 可变轮廓凸轮
5 凸轮起始廓线调节螺丝
6 紧固螺丝
7 凸轮末端廓线调节螺丝
8 燃气蝶阀开启角度刻度盘
9 刻度盘 8 的刻度
10 凸轮 III 的调节扳手

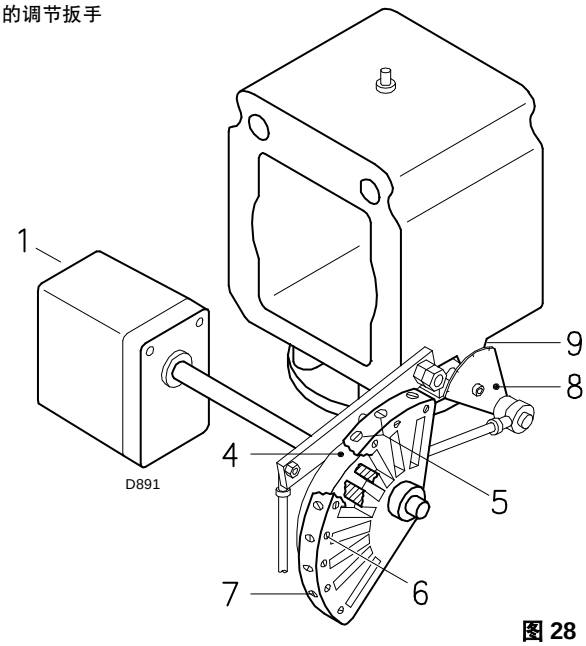


图 28

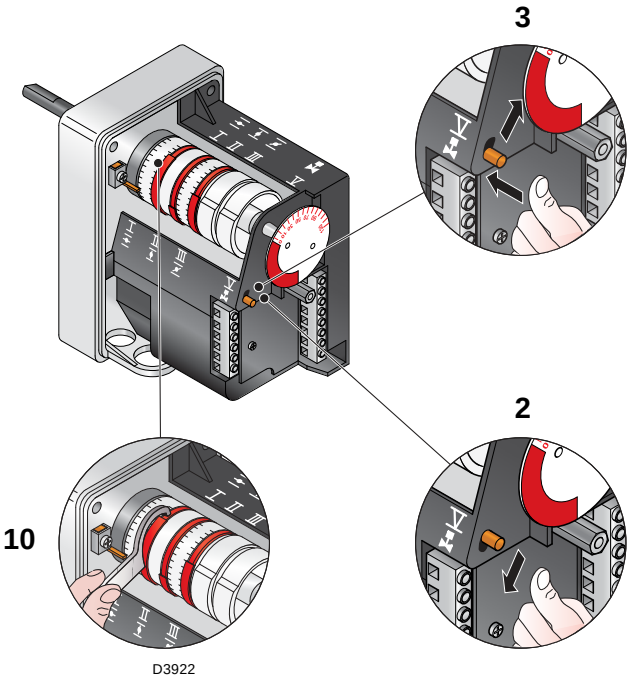


图 29

风压开关

完成上述燃烧器各部分调节后，调节风压开关，此前已将其置于量程的开始位置 (图 30)。
当燃烧器处于最小出力运行时，在锅炉烟囱内安装烟气分析仪，慢慢关小风机进风口 (如可使用厚纸遮挡)，直至 CO 值不超过 100 ppm。
顺时针慢慢转动风压开关的调节旋钮，直至燃烧器锁定。
检查向上的箭头指示的刻度值。再次旋转调节旋钮，直至该刻度值对准向下的箭头，这样可以消除压力开关的滞后 (显示为在蓝色背景上的白色标志，位于两个箭头之间)。
现在检查燃烧器是能否正常启动。
如果燃烧器再次锁定，则沿逆时针方向调节旋钮。
在此阶段的操作中，可使用压力计来测量空气压力。
压力计的连接件图 30。
压力计与压力开关的标准连接为绝对模式。注意出现一个未提供的 “T” 型接头。在某些强负压应用中，压力开关不能转换。在此情况下，必须以差压模式连接压力开关，在风压开关和风机入风口中间连接另外一软管。这样，必须以差压模式连接压力计，见图 30。

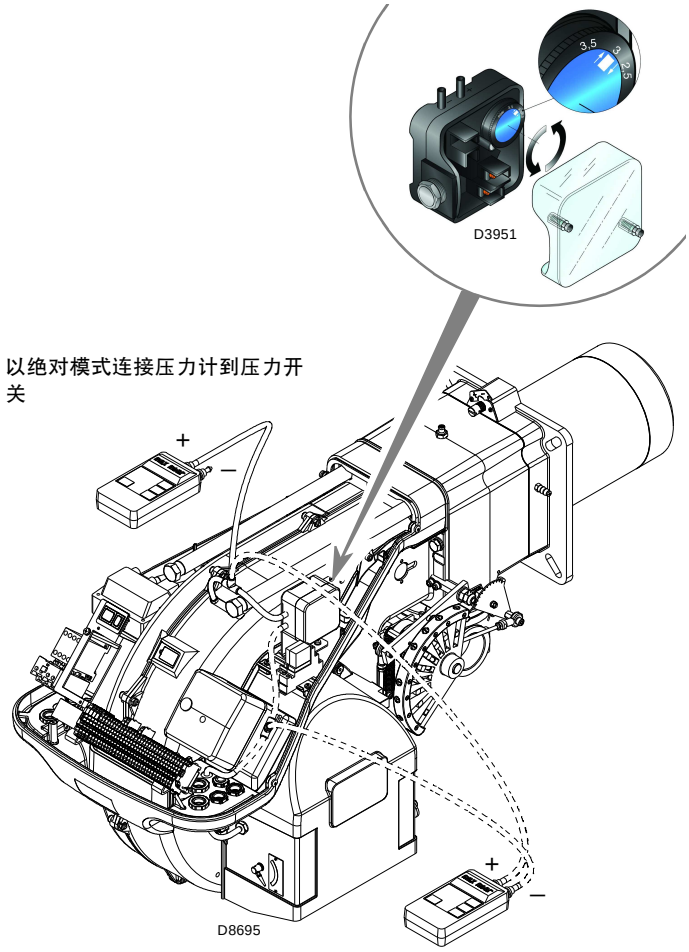


图 30

最大燃气压力开关

上述调整结束后，开始调节最大燃气压力开关，此前压力开关应置于量程的终止位置 (图 31)。
当燃烧器以最大出力运行时，通过逆时针旋转调节旋钮降低压力直至燃烧器锁定。
之后，顺时针旋转旋钮调节 0,2 kPa (2 mbar)，使燃烧器重新点火。
若此时燃烧器再次锁定，继续沿顺时针方向旋转旋钮 1 mbar。

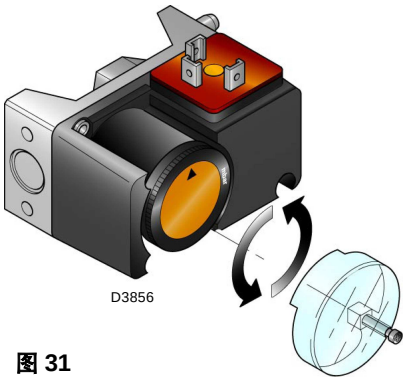


图 31

最小燃气压力开关

上述调整结束后，开始调节最小燃气压力开关，此前压力开关位置应置于量程开始位置 (图 32)。
当燃烧器以最大出力运行时，通过顺时针旋转调节旋钮，增大压力直至燃烧器锁定。
之后，逆时针旋转旋钮调节 0,2 kPa (2 mbar)，使燃烧器重新启动以确保燃烧器运行平稳。
此时燃烧器如果再次锁定，继续沿逆时针方向旋转旋钮 1 mbar。

警告

1 kPa = 10 mbar

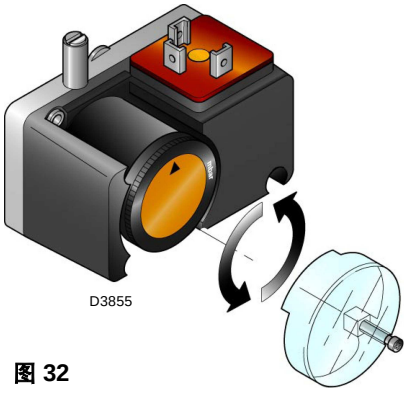


图 32

5.6 燃烧器的启动顺序

燃烧器启动

- 0 秒： TL 闭合。
- 5 秒： 控制盒开始启动周期。伺服马达启动：向右旋转 130°，直至接触凸轮 I (图 7)。
- 35 秒： 风门挡板处于最大出力位置。
  风机马达启动。
  预吹扫阶段开始。
- 75 秒： 伺服马达向左旋转直至接触凸轮 III (Fig. 7) 此时为最小出力。
- 95 秒： 风门挡板和燃气蝶阀位于最小出力位置 (此时凸轮 III 图 7 角度为 65°)。
- 105 秒 :点火电极产生火花。
  安全阀 VS 和调节阀 VR 快速开启。火焰在低出力水平（A 点）时点燃。
  之后，随着阀门缓慢开启至最小出力位置（B 点），燃烧器的出力水平也随之逐渐平稳增加。
- 108 秒 :火花熄灭。
- 115 秒 :控制盒启动阶段结束。

正常点火

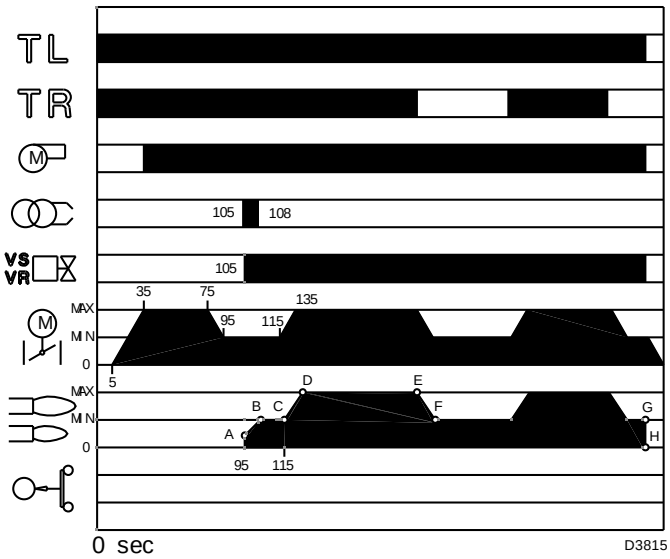


图 33

稳态运行

不带比调组件的燃烧器

启动周期结束后，伺服马达的控制转移到控制锅炉温度或压力的控制装置 TR， C 点。
(但控制盒会继续检测火焰状态，以及空气和燃气压力开关位置是否正确)。

- 如果温度或压力低，随后控制装置 TR 闭合，燃烧器逐渐增大出力至最大，(C-D 部分)。
- 如果随后温度或压力升高至控制装置 TR 断开，燃烧器会逐渐降低出力至最小出力，(E-F 部分)。此过程会循环往复。
- 如热量需求小于燃烧器在最小出力时提供的热量时，燃烧器停机。(G - H 部分，)控制装置 TL 断开，伺服马达回到角度 0°。风门挡板完全关闭以将热量损失降至最低。

带比调运行组件的燃烧器

参见随调节器附带的手册。

点火失败

如果燃烧器点火失败，会在燃气阀开启后 3 秒内锁定。
这有可能是由于燃气在安全时间 3 秒内未到达燃烧头。
在此情况下，增大点火燃气量。
可查看压力表，图 36，以确认燃气到达管路连接处。

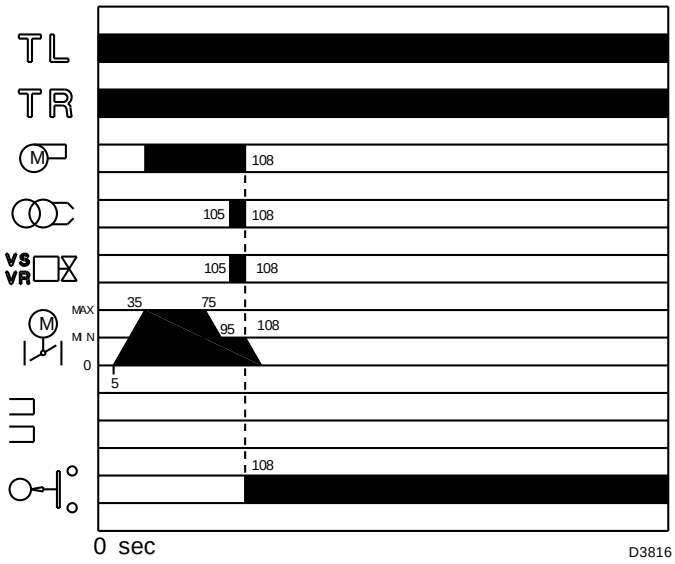


图 34

5.7 燃烧器运行中火焰熄灭

如果燃烧器运行时火焰意外熄灭，则燃烧器会在 1 秒内锁定。

5.8 燃烧器停机

如下操作可使燃烧器停机 :

➤ 断开锅炉控制盘上的电源开关；

➤ 移去保护罩，用图 27 的 “AUT/MAN” 开关停机。

5.9 离子电流测量

燃烧器安装有离子探针系统，用以检查火焰状态。控制盒运行的最小电流为 6 µA。
燃烧器提供的电流要大得多，所以一般不会要求对电流进行控制。
但是，如果有必要对离子电流进行测量时，断开离子探针电缆上的插头 – 插座 (2)(图 35)，插入一个量程为 100 µA 的微安计 (1)(图 35)。
仔细检查电极连接！

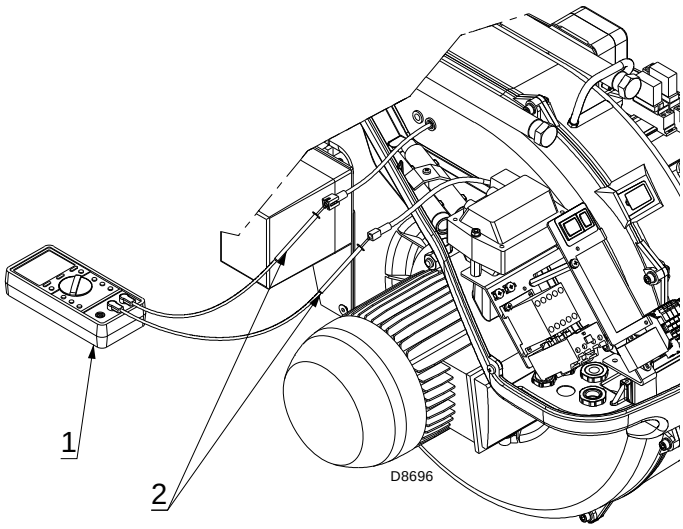


图 35

5.10 燃烧头处空气和燃气压力检查

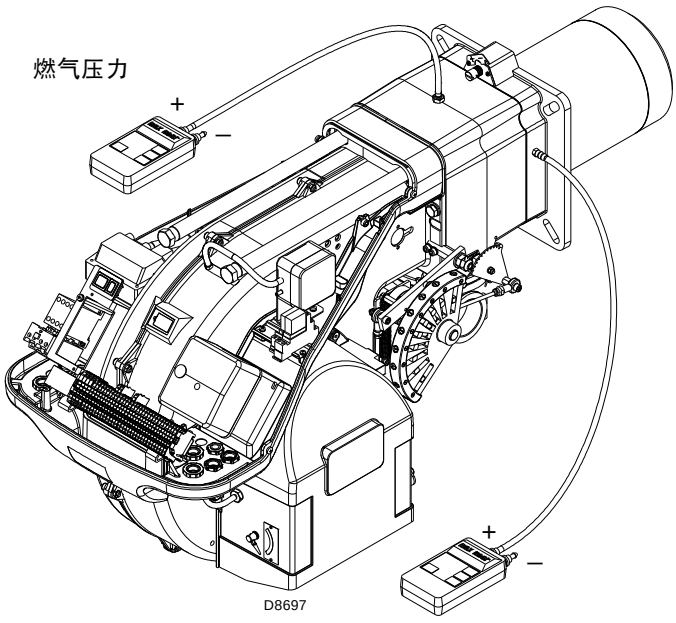


图 36

5.11 最终检查 (燃烧器运行时)

➤ 断开温控 / 压力开关 TL:
➤ 断开温控 / 压力开关 TS:

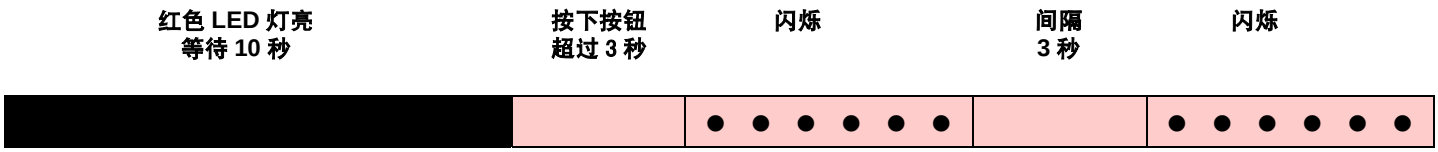
燃烧器必须停机
➤ 将最大燃气压力开关调至量程位置的最小处。
➤ 将风压开关调至量程位置的最大处。

燃烧器应该锁定
➤ 将燃烧器停机，并断开电源。
➤ 断开最小燃气压力开关连接器。

燃烧器不得启动
➤ 断开离子探针电缆。

因点火失败，燃烧器锁定并停机
➤ 确保各调节装置上的机械锁定系统锁紧。

控制盒具有故障诊断功能，因此能很容易确定故障原因（ 指示器：**红色 LED 指示灯** ）。
要使用这一功能，须等进入安全保护状态至少 10 秒之后再按下锁定复位按钮至少 3 秒。
一旦释放该按钮，红色 LED 灯将开始闪烁，指示内容如下。



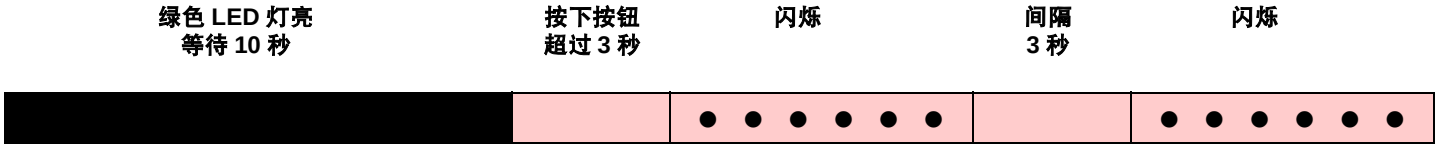
每组 LED 闪烁间隔大约 3 秒。
根据下表，闪烁的次数可提示故障原因。

信号	故障	可能的原因	解决方案
闪烁 2 次 ● ●	预吹扫及安全时间过后，燃烧器未产生火焰进入锁定状态	1 - 电磁阀组，通过燃气量过小 2 - 两个电磁阀至少有一个 未打开 3 - 燃气压力过低 4 - 点火电极调节不当 5 - 由于绝缘损坏导致电极接地 6 - 高压电缆故障 7 - 由于高温高压电缆变形 8 - 点火变压器故障 9 - 阀组或变压器电气连接错误 10 - 控制盒故障 11 - 燃气阀组前手动阀门关闭 12 - 燃气管路中有空气 13 - 燃气阀组未接线或线圈损坏	增大 更换 增大压力 调整，见第 12 页 更换 更换 更换或采取保护措施 更换 检查 更换 开启 排出空气 检查连接或更换线圈
闪烁 3 次 ● ● ●	燃烧器启动前出现锁定	14 - 风压开关处于运行位置	调整或更换
	燃烧器启动后因锁定停机	由于没有足够的空气压力导致空气压力开关失效： 15 - 空气压力开关调节不当 16 - 压力开关的压力测试点处的管路堵塞 17 - 燃烧头调节不当 18 - 锅炉炉膛负压过高	 调整或更换 清洁 调整 连接风压开关至风机进风口的软管
	在预吹扫阶段锁定	19 - 马达控制器触点故障 (仅三相供电时) 20 - 马达故障 21 - 马达锁定 (仅三相供电时)	更换 更换 更换
闪烁 4 次	燃烧器启动后，锁定停机	22 - 虚假火焰	更换控制盒
	燃烧器停机时锁定	23 - 燃烧头处持续火焰或虚假火焰	消除持久性的火焰或更换控制盒
闪烁 6 次 ● ● ● ● ● ●	燃烧器启动后，锁定停机	24 - 伺服马达故障或调节不当	更换或调整
闪烁 7 次 ● ● ● ● ● ● ●	燃烧器出现火焰后立即锁定	25 - 电磁阀通过燃气量过小 26 - 离子探针调节不当 27 - 电离不足 (小于 5µA) 28 - 探针接地 29 - 燃烧器接地不良 30 - 零线 – 火线 接反 31 - 火焰检查回路故障	增大 调整，见第 12 页 检查探针位置 撤回或更换电缆 检查接地 更正 更换控制盒
	燃烧器在 1 段火和 2 段火之间转换时燃烧器锁定。	32 - 空气过多或燃气过少	调节空气及燃气
	燃烧器运行时锁定	33 - 探头或电离电缆接地	更换磨损零件
闪烁 10 次 ● ● ● ● ● ● ● ● ● ●	燃烧器启动前锁定	34 - 电气连接错误	检查连接
	燃烧器锁定	35 - 控制盒故障 36 - 温控回路出现电磁干扰 37 - 存在电磁干扰	更换 过滤或消除 使用抗电磁干扰保护组件

信号	故障	可能的原因	解决方案
无闪烁	燃烧器不能启动	38 - 电源没电	闭合所有开关 – 检查所有连接
		39 - 一个限制器或安全控制装置断开	调整或更换
		40 - 线路保险丝熔断	更换
		41 - 控制盒故障	更换
		42 - 没有燃气供应	打开阀组之前的手动阀
		43 - 主管路燃气压力不足	联系燃气公司
		44 - 最小燃气压力开关断开	调整或更换
		45 - 伺服马达未能运行至最小点火位置	更换
	燃烧器不断重复启动周期，未出现锁定	46 - 燃气管路中的燃气压力接近最小燃气压力开关的设定值。阀门开启后，压力突然下降会造成暂时性的压力开关自动断开，阀门立即关闭，导致燃烧器停机。压力增大后，压力开关再次闭合，点火周期重复。以此类推。	降低最小燃气压力开关的设定值 更换燃气过滤器
	脉冲点火	47 - 燃烧头调节不当	调整，见第 15 页
		48 - 点火电极调节不当	调整，见第 12 页
		49 - 风门挡板调节不当：风量过大	调整
		50 - 点火阶段出力过大	降低
	燃烧器不能进入最大出力运行	51 - 远程控制装置 TR 断开	调整或更换
		52 - 控制盒故障	更换
		53 - 伺服马达故障	更换
	风门挡板开启时燃烧器停机	54 - 伺服马达故障	更换

6.1 正常运行 / 火焰检测时间

控制盒还有一个功能可以保证燃烧器的正确运行 (信号：**绿色 LED 灯** 常亮)。
要使用这一功能，需在燃烧器点火后等待至少 10 秒，然后按下控制盒按钮至少 3 秒。
释放该按钮后，绿色 LED 灯开始闪烁，如下图所示：



每组 LED 闪烁间隔 3 秒。
闪烁次数指示燃气阀开启后的探针检测到火焰的时间，如下表：

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

燃烧器每次启动，时间都会更新。
一旦显示读数，可短暂按下控制盒按钮使燃烧器重复启动周期。

警告
如果检测时间超过 2 秒，点火延迟。
检查燃气阀的液压闸的调整以及风门挡板和燃烧头的调整。

7.1 维护安全注意事项

定期维护对保持燃烧器良好的运行状态、安全性、燃烧效率以及耐用性都非常重要。
定期维护可以降低燃料消耗和污染物排放，并且能保证产品的耐用性。

危险

燃烧器的维护和校准必须由具有资质的专业技术人员操作，且符合本手册要求和安装地的强制标准。

在进行任何维护、清洁及检查之前，需做到：

危险

通过切断系统主开关切断燃烧器电源。

危险

关掉燃料截止阀。

7.2 维护计划

维护频率

燃气燃烧系统应每年由制造商代表或其它专业技术人员至少检查一次。

检查和清洁

燃烧状态
对燃烧排放气体进行分析。如果任何参数与之前测量数值出入较大，则需在维护时特别注意这些参数的校准。

燃气泄漏
确认燃气表和燃烧器之间的连接管路没有燃气泄漏。

燃气过滤器
过滤器脏时请更换。

火焰检查窗
清洁火焰检查窗 (Fig. 37).

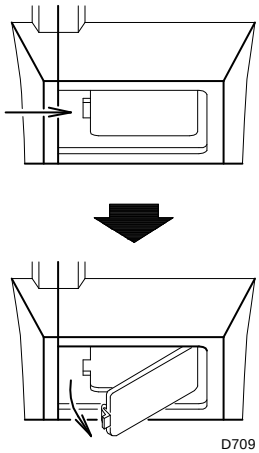


图 **37** D709

燃烧头
打开燃烧器，确认燃烧头所有部件：
- 状态良好；
- 没有出现因高温变形；
- 没有污物附着其上；
- 没有生锈部件；
- 燃烧头位置正确。

确认位于燃烧头分流盘上的燃气出口没有任何污物及锈斑。
如有疑问， 拆下弯头 5)(Fig. 38) 检查。

伺服马达
按下按钮3)(Fig. 29)，并将其向右移动，断开伺服马达凸轮4)(Fig. 28)，用手前后转动确认其旋转时无阻滞。现在将按钮 2)(Fig. 28) 向左移动，重新装上凸轮。

燃烧器
检查以确认控制风门挡板及燃气蝶阀的系统是否有磨损或螺丝松动的情况。同时确认固定燃烧器接线端子板电气导线的各螺丝没有任何松动。
清洁燃烧器外部，清洁时需特别注意接头和凸轮 4)(Fig. 28)。

燃烧状态
如果在燃烧器运行的初始阶段获得的燃烧数据不符合当地强制标准，或者在任意出力下燃烧效果不好，则需调整燃烧器。
用卡片记录新产生的燃烧数据，可作为以后对燃烧器进行维护调试的参考信息。

7.3 打开燃烧器

➤ **断开燃烧器电源。**
➤ 拆下螺栓 1)，同时 取下保护盖 2)。
➤ 从刻度指示盘 8) 处取下铰链 7)。
➤ 移除螺栓 3)，沿滑杆 4) 将燃烧器拉出约 100 mm。 断开探头电缆和电极电缆，然后将燃烧器完全拉出。

取下螺丝 6) 后，可接着取下燃气分配盘 5)。

7.4 闭合燃烧器

➤ 将燃烧器推到距过渡套筒大约 100 mm 处。
➤ 重新连接上述各电缆，并且将燃烧器滑进去直到停止为止。
➤ 重新拧紧螺丝 3)，将探针和电极电缆轻轻拉紧。
➤ 重新将铰链 7) 与刻度盘 8) 相连。
➤ 从滑杆 4) 上取下两个延长杆。

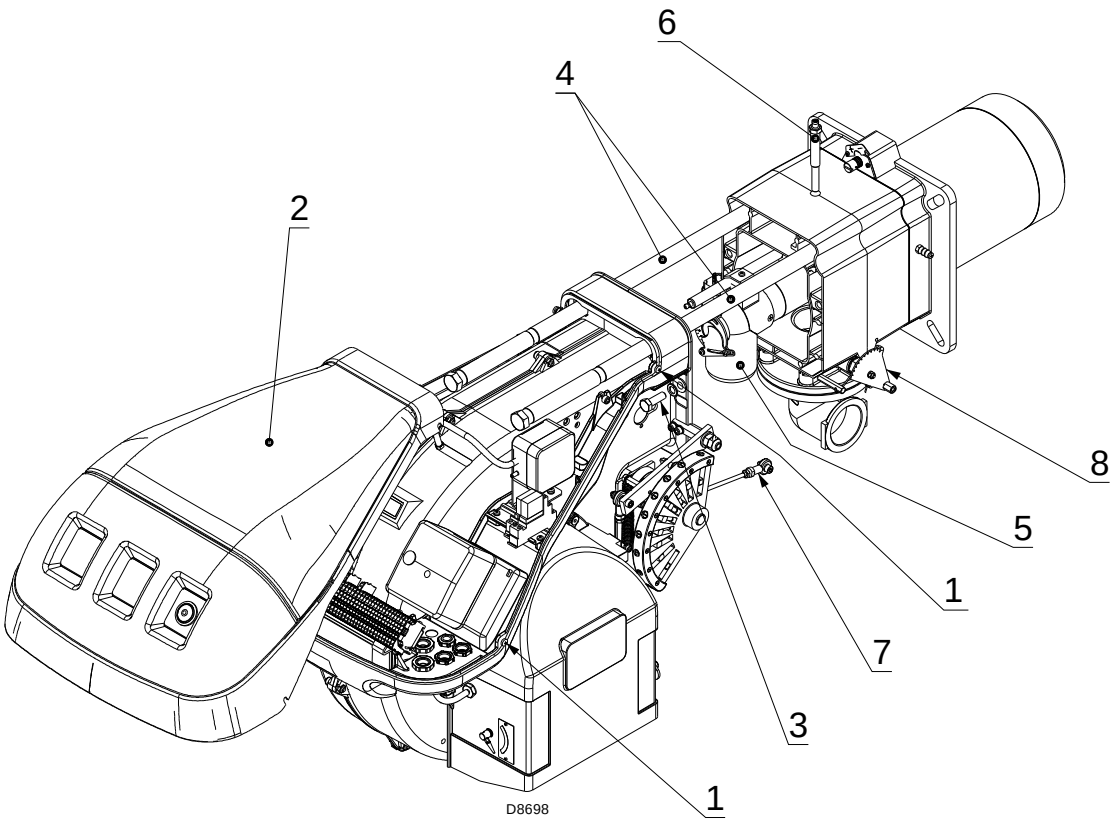
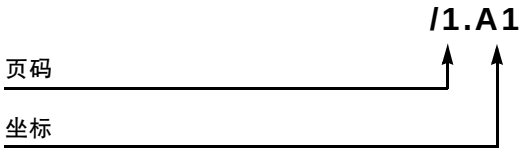


图 38

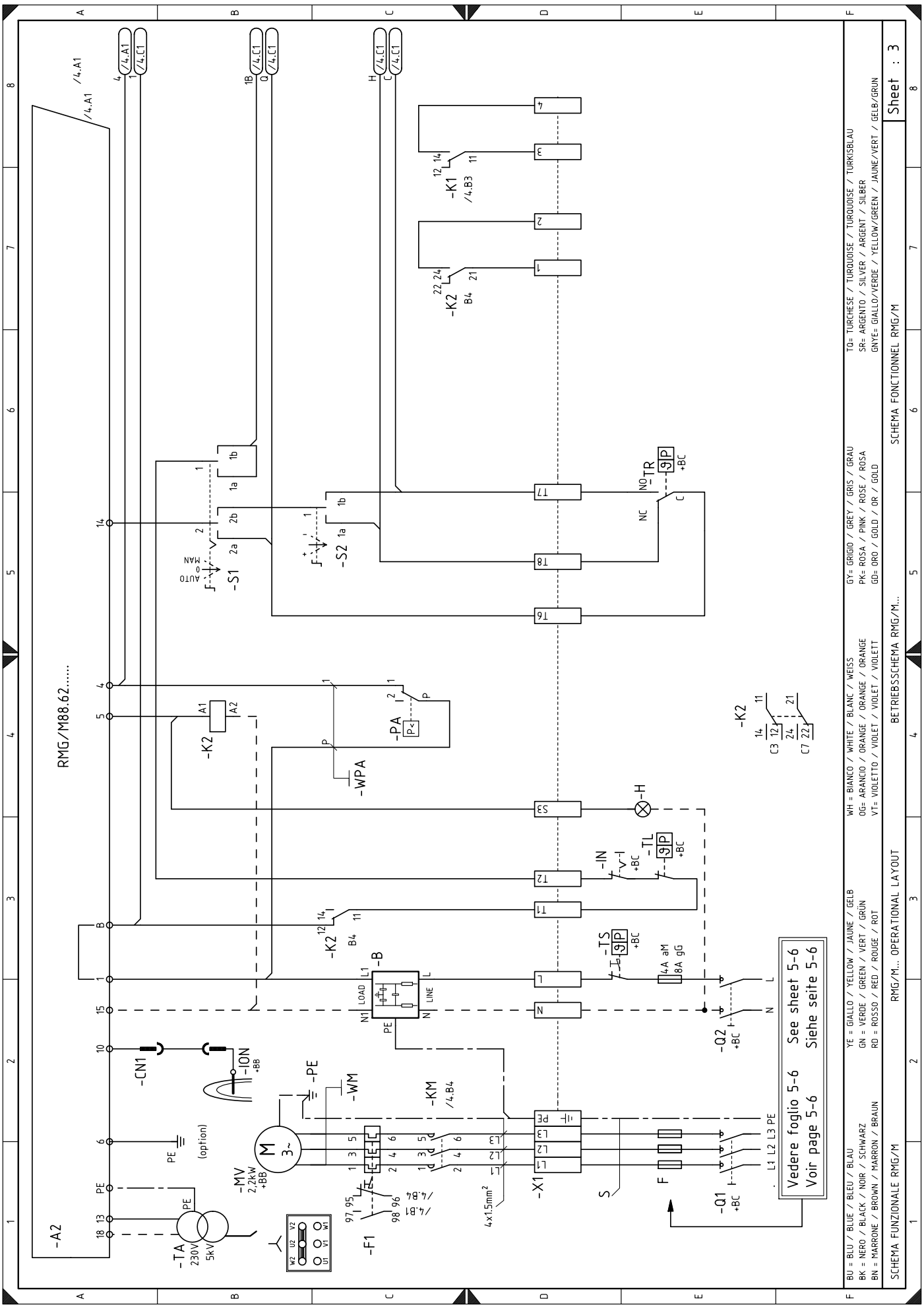
1 目录

2 参考图例



配电盘接线图

A - 控制盒
B - 抗电磁干扰过滤器
B1 - 出力比调仪 RWF40
BA - 电流输入 DC 4...20 mA
BA1 - 电流输入 DC 4...20 mA 用以远程调节设定
BP - 压力探针
BP1 - 压力探针
BR - 远程设定电位计
BT1 - 热耦探针
BT2 - 探针 Pt100, 2 线
BT3 - 探针 Pt100, 3 线
BT4 - 探针 Pt100, 3 线
BTEXT - 设定点温度补偿外部探针
BV - 电压输入 DC 0...10V
BV1 - 电压输入 DC 0...10V 用以调节远程设定点
CN1 - 离子探针连接器
F1 - 风机马达热继电器
H - 远程锁定信号
IN - 燃烧器手动启停开关
ION - 离子探针
K1 - 燃烧器运行无源触点输出继电器
K2 - 燃烧器锁定无源触点输出继电器
KM - 马达接触器
MV - 风机马达
PA - 风压开关
PE - 燃烧器接地
PGMin - 最小燃气压力开关
PGM - 最大燃气压力开关
Q1 - 三相隔离开关
Q2 - 单相隔离开关
RS - 远程复位开关
S1 - 停机 / 自动 / 手动 转换开关
S2 - 增大 - 降低 出力转换开关
SM - 伺服马达
TA - 点火变压器
TL - 限位温度 / 压力开关
TR - 调节温度 / 压力开关
TS - 安全温度 / 压力开关
X1 - 主电源接线端子板
XPGM - 最大燃气压力开关连接器
XP1 - 组件插座
XRWF - RWF40 接线端子板
Y - 燃气调节阀 + 燃气安全阀
YVPS - 燃气泄漏检测装置


RMG/M88.62.....
SCHEMA FUNZIONALE RMG/M
RMG/M... OPERATIONAL LAYOUT
BETRIEBSSCHEMA RMG/M...
SCHEMA FONCTIONNEL RMG/M
Sheet : 3
Vedere foglio 5-6 See sheet 5-6
Voir page 5-6 Siehe seite 5-6
-A2
-TA 230V 5kV
-MV 2.2kW +BB
-F1
-B
-K1 /4.B3
-K2 /4.B4
-S1
-S2
-TR +BC
-WPA
-PA
-H
-IN +BC
-TL +BC
-TS +BC
-Q1 +BC
-Q2 +BC
-CN1
-ION +BB
-PE
-WM
-KM /4.B4
-X1
S
F
4x1.5mm²
4A aM
8A gG
(option)
BU = BLU / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
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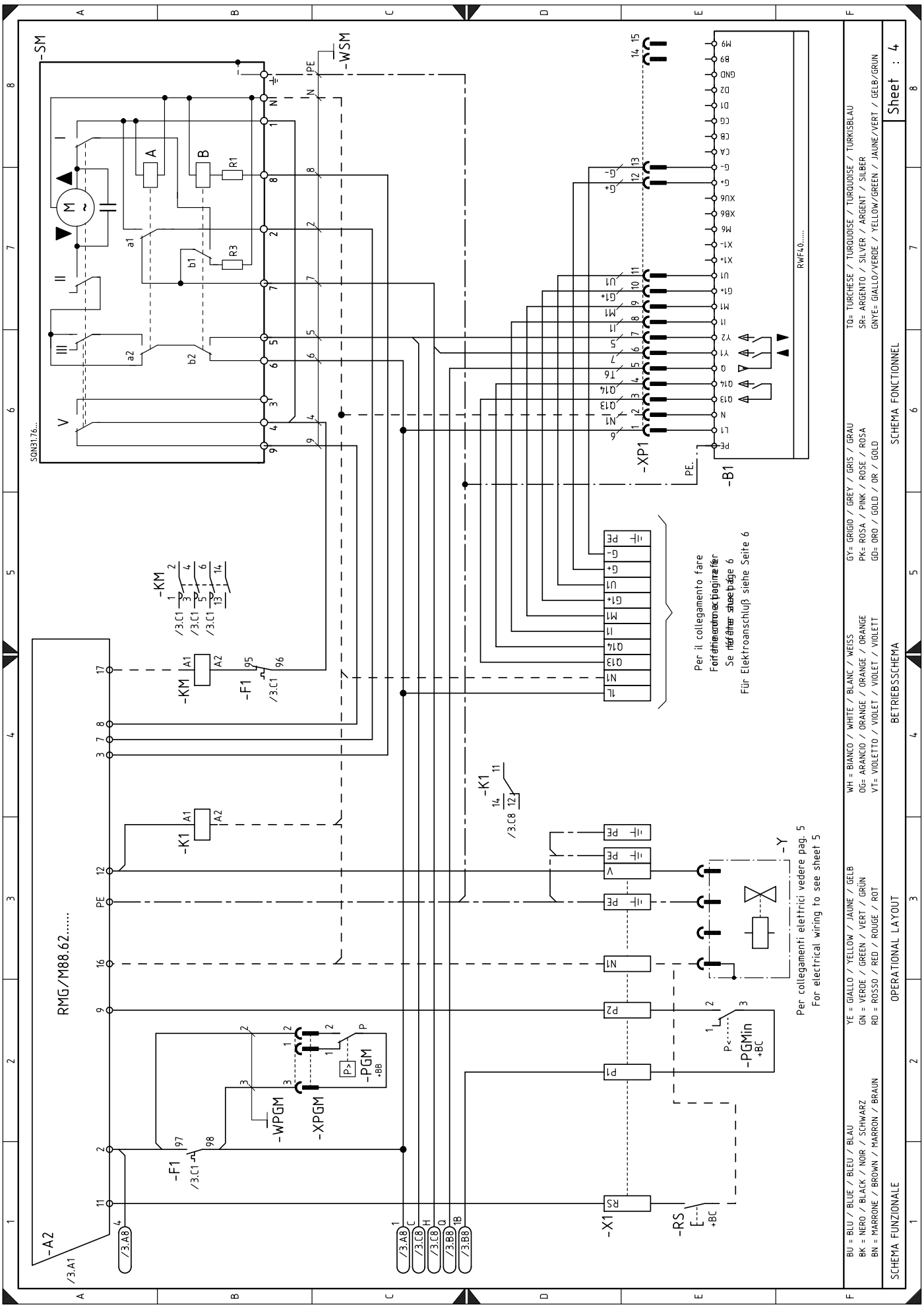
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN


-SM
-WSM
SQN31.76...
RMG/M88.62.....
-A2
-B1
-XP1
-KM
-K1
-F1
-WPGM
-XPGM
-PGM
-PGMin
-Y
-X1
-RS
RWF40.....
Per il collegamento fare
Für Elektroanschluß siehe Seite 6
Per collegamenti elettrici vedere pag. 5
For electrical wiring to see sheet 5
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
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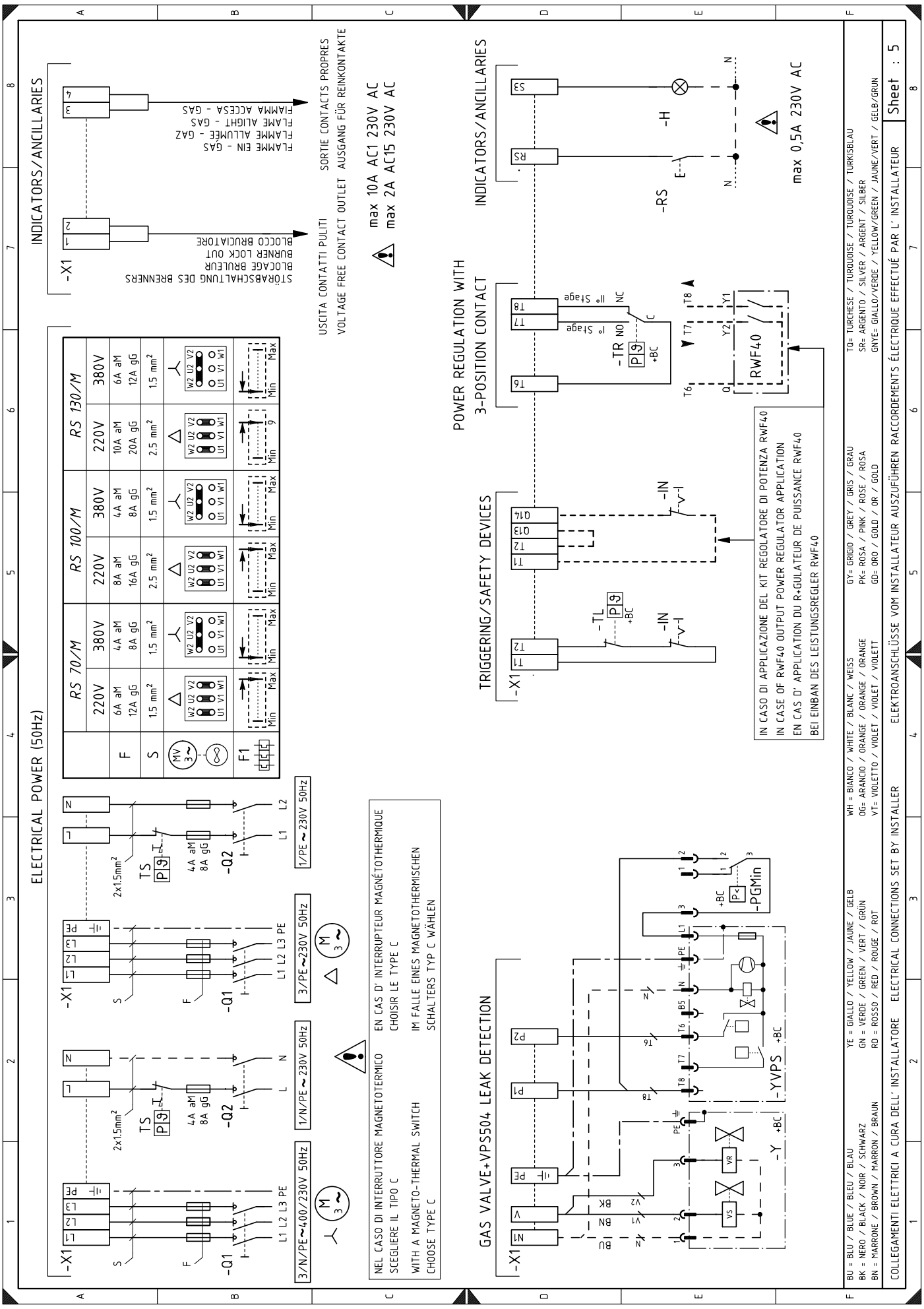
SCHEMA FUNZIONALE
OPERATIONAL LAYOUT
BETRIEBSSCHEMA
SCHEMA FONCTIONNEL
Sheet : 4


ELECTRICAL POWER (50Hz)
INDICATORS/ANCILLARIES
-X1
STÖRABSCHALTUNG DES BRENNERS
BLOCAGE BRULEUR
BURNER LOCK OUT
BLOCCO BRUCIATORE
FLAMME EIN - GAS
FLAMME ALLUMÉE - GAZ
FLAMME ALIGHT - GAS
FLAMMA ACCESA - GAS
USCITA CONTATTI PULITI
VOLTAGE FREE CONTACT OUTLET
SORTIE CONTACTS PROPRES
AUSGANG FÜR REINKONTAKTE
max 10A AC1 230V AC
max 2A AC15 230V AC
RS 70/M
RS 100/M
RS 130/M
220V
380V
F
S
F1
3/N/PE~400/230V 50Hz
1/N/PE ~ 230V 50Hz
3/PE ~230V 50Hz
1/PE ~ 230V 50Hz
-Q1
-Q2
TS
2x1.5mm²
4A aM
8A gG
NEL CASO DI INTERRUTTORE MAGNETOTERMICO SCEGLIERE IL TIPO C
EN CAS D' INTERRUPTEUR MAGNÉTOTHERMIQUE CHOISIR LE TYPE C
WITH A MAGNETO-THERMAL SWITCH CHOOSE TYPE C
IM FALLE EINES MAGNETOTHERMISCHEN SCHALTERS TYP C WÄHLEN
GAS VALVE+VPS504 LEAK DETECTION
-Y +BC
-YVPS +BC
-PGMin
TRIGGERING/SAFETY DEVICES
POWER REGULATION WITH 3-POSITION CONTACT
-TL
-IN
-TR
1° Stage
II° Stage
NO
NC
RWF40
-H
-RS
max 0,5A 230V AC
IN CASO DI APPLICAZIONE DEL KIT REGOLATORE DI POTENZA RWF40
IN CASE OF RWF40 OUTPUT POWER REGULATOR APPLICATION
EN CAS D' APPLICATION DU R+GULATEUR DE PUISSANCE RWF40
BEI EINBAN DES LEISTUNGSREGLER RWF40
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
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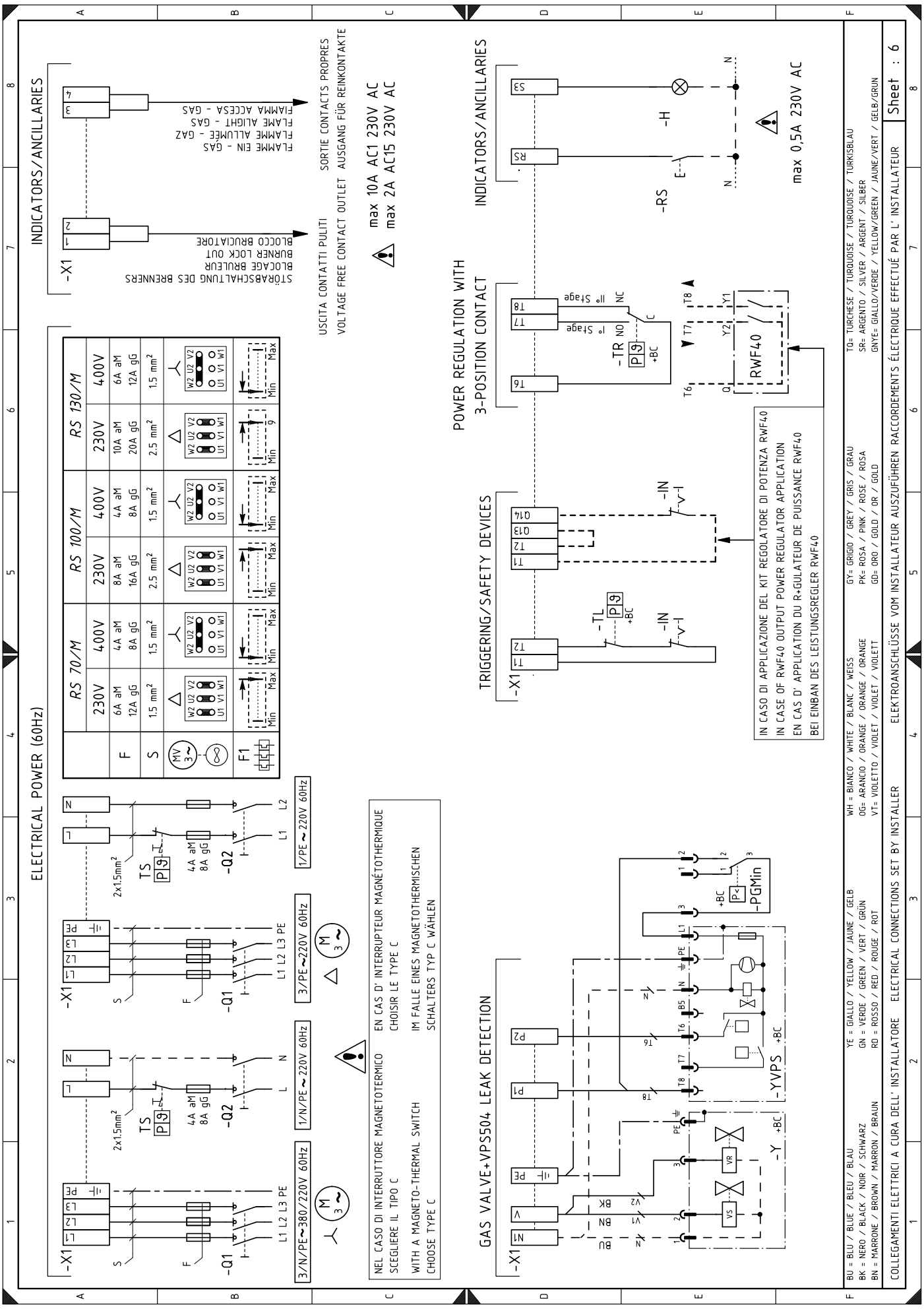
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE ELECTRICAL CONNECTIONS SET BY INSTALLER ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 5


ELECTRICAL POWER (60Hz)
INDICATORS/ANCILLARIES
-X1
STÖRABSCHALTUNG DES BRENNERS
BLOCAGE BRULEUR
BURNER LOCK OUT
BLOCCO BRUCIATORE
FLAMME EIN - GAS
FLAMME ALLUMÉE - GAZ
FLAME ALIGHT - GAS
FIAMMA ACCESA - GAS
USCITA CONTATTI PULITI
SORTIE CONTACTS PROPRES
VOLTAGE FREE CONTACT OUTLET
AUSGANG FÜR REINKONTAKTE
max 10A AC1 230V AC
max 2A AC15 230V AC
RS 70/M
RS 100/M
RS 130/M
230V
400V
F
S
F1
3/N/PE~380/220V 60Hz
1/N/PE ~ 220V 60Hz
3/PE~220V 60Hz
1/PE ~ 220V 60Hz
2x1.5mm²
2x1.5mm²
4A aM
8A gG
TS
-Q1
-Q2
NEL CASO DI INTERRUTTORE MAGNETOTERMICO
SCEGLIERE IL TIPO C
WITH A MAGNETO-THERMAL SWITCH
CHOOSE TYPE C
EN CAS D' INTERRUPTEUR MAGNÉTOTHERMIQUE
CHOISIR LE TYPE C
IM FALLE EINES MAGNETOTHERMISCHEN
SCHALTERS TYP C WÄHLEN
GAS VALVE+VPS504 LEAK DETECTION
TRIGGERING/SAFETY DEVICES
POWER REGULATION WITH
3-POSITION CONTACT
INDICATORS/ANCILLARIES
-TL
-TR
-IN
-RS
-H
-PGMin
-YVPS
-Y
RWF40
max 0,5A 230V AC
IN CASO DI APPLICAZIONE DEL KIT REGOLATORE DI POTENZA RWF40
IN CASE OF RWF40 OUTPUT POWER REGULATOR APPLICATION
EN CAS D' APPLICATION DU R+GULATEUR DE PUISSANCE RWF40
BEI EINBAN DES LEISTUNGSREGLER RWF40
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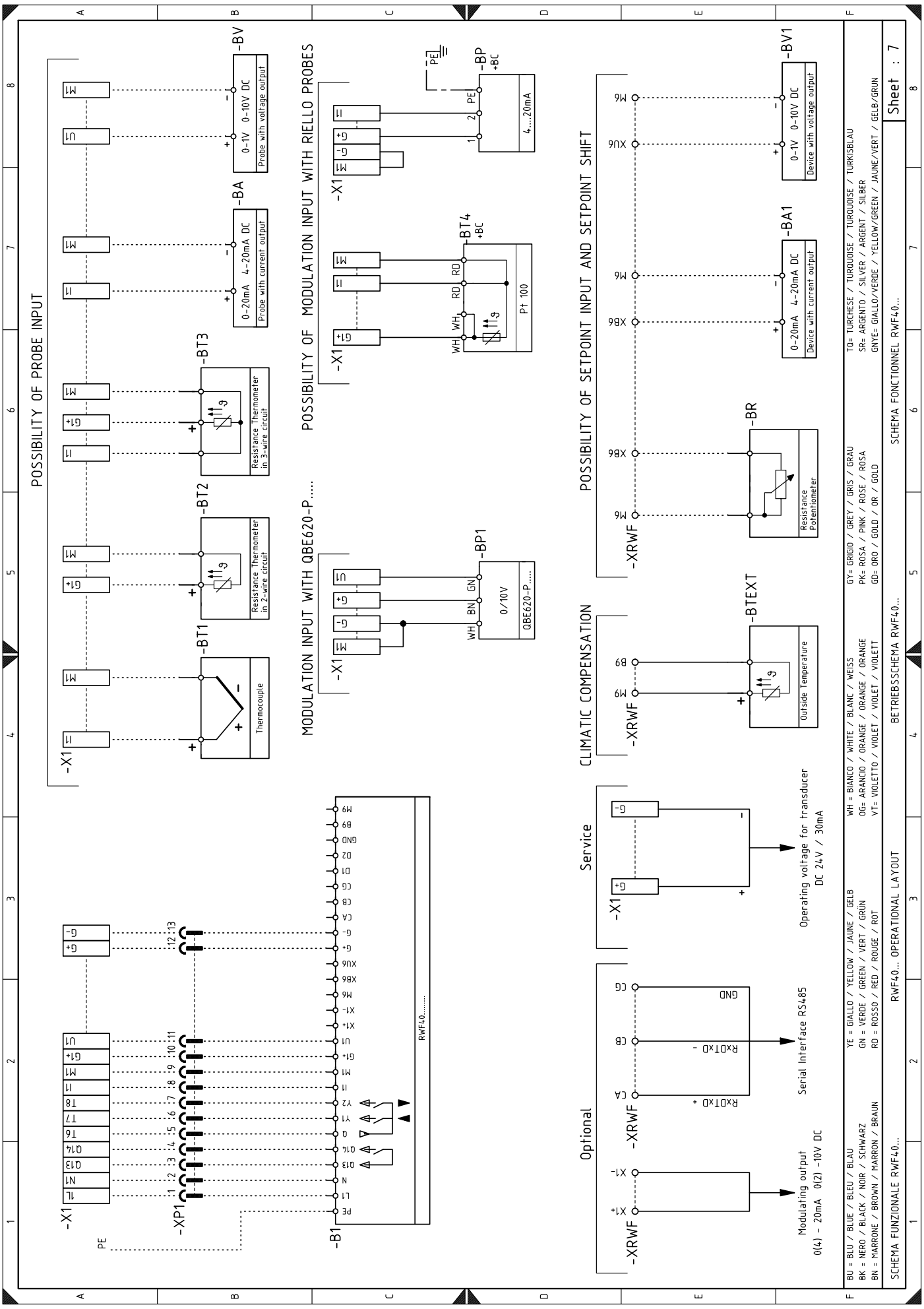
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE
ELECTRICAL CONNECTIONS SET BY INSTALLER
ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 6


POSSIBILITY OF PROBE INPUT
-BV
0-1V 0-10V DC
Probe with voltage output
-BA
0-20mA 4-20mA DC
Probe with current output
-BT3
Resistance Thermometer in 3-wire circuit
-BT2
Resistance Thermometer in 2-wire circuit
-BT1
Thermocouple
-X1
POSSIBILITY OF MODULATION INPUT WITH RIELLO PROBES
-BP
4...20mA
-BT4
Pt 100
MODULATION INPUT WITH QBE620-P.....
-BP1
0/10V
QBE620-P.....
POSSIBILITY OF SETPOINT INPUT AND SETPOINT SHIFT
-BV1
0-1V 0-10V DC
Device with voltage output
-BA1
0-20mA 4-20mA DC
Device with current output
-BR
Resistance Potentiometer
-XRWF
CLIMATIC COMPENSATION
-BTEXT
Outside Temperature
-XRWF
Service
Operating voltage for transducer DC 24V / 30mA
Optional
Serial Interface RS485
Modulating output 0(4) - 20mA 0(2) -10V DC
-XP1
-B1
RWF40.....
PE
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
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GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
SCHEMA FUNZIONALE RWF40... RWF40... OPERATIONAL LAYOUT BETRIEBSSCHEMA RWF40... SCHEMA FONCTIONNEL RWF40...
Sheet : 7

出力比调仪组件

要实现比例调节运行，燃烧器需根据所需热量不断调整出力，以保证控制参数（ 温度及压力 ）的稳定性。
需订购以下两个部件：
• 安装到燃烧器上的出力比调仪；
• 安装到锅炉上的探针。

控制参数		探针		出力比调仪	
	调节范围	型号	代码	型号	代码
温度	- 100...+ 500°C	PT 100	3010110	RWF40	3010414
压力	0...2.5 bar 0...16 bar	输出探针 4...20mA	3010213 3010214		

出力比调仪，接受 4-20 mA, 0-10V 输入信号

需订购以下两个部件：
• 模拟信号转换器；
• 电位计 .

燃烧器	电位计		模拟信号转换器	
	型号	代码	型号	代码
RS 70-100/M - RS 130/M	ASZ...	3010416	E5202	3010415

负荷位置指示用电位计组件

燃烧器	组件代码
RS 70-100/M - RS 130/M	3010416

连接到 RMG 的 PC 界面适配器组件

燃烧器	组件代码
RS 70-100/M - RS 130/M	3002719

消音柜

燃烧器	组件代码	型号	平均降噪水平
RS 70-100/M - RS 130/M	3010404	C4/5	10 [dB(A)]

加长燃烧头组件

燃烧器	组件代码	标准燃烧头长度	加长燃烧头长度
RS 70/M	3010117	250 mm	385 mm
RS 100/M	3010118	250 mm	385 mm
RS 130/M	3010119	280 mm	415 mm

LPG 运行组件

燃烧器	燃烧头	组件代码	安装组件后的出力
RS 70/M	TC	20008175	200/470 ÷ 930 kW
	TL	20008176	
RS 100/M	TC	20008177	300/700 ÷ 1340 kW
	TL	20008178	
RS 130/M	TC	20008179	300/920 ÷ 1600 kW
	TL	20008180	

煤气运行组件 - 未获 EC 认证

燃烧器	燃烧头	组件代码
RS 70/M	TC	3010286
	TL	
RS 100/M	TC	3010287
	TL	
RS 130/M	TC	3010288
	TL	

垫片

燃烧器	组件代码	厚度
RS 70-100/M - RS 130/M	3010129	135 mm

持续吹扫组件

燃烧器	组件代码
RS 70-100/M - RS 130/M	3010094

减震器组件 (适用于中心回焰锅炉)

燃烧器	燃烧头	组件代码
RS 70/M	TC	3010201
	TL	
RS 100/M	TC	3010202
	TL	
RS 130/M	TC	3010373
	TL	3010374

抗电磁干扰组件

如果由于附近有变频器，使燃烧器受到电磁干扰（ 电磁信号强度大于 10 V/m ），或温控器的连接线长度超过 20 米时，需要在电气控制与燃烧器之间安装电磁干扰防护装置。

燃烧器	组件代码
RS 70-100/M - RS 130/M	3010386

符合 EN 676 标准的燃气阀组

参见手册。

表格中所示为燃气供应管路的最小负载损失，具体取决于燃烧器运行的最大输出功率。

表格中显示的数值指的是：
- 天然气 G 20 PCI 9.45 kWh/Sm^3（ 8.2 Mcal/Sm^3 ）
- 天然气 G 25 PCI 8.13 kWh/Sm^3（ 7.0 Mcal/Sm^3 ）

第 1 列
燃烧头处的负载损失。
在测试点 1)(图 39)处测得的燃气压力，同时：
- 燃烧室压力为 0 mbar ；
- 燃烧器以最大输出功率运行；
- 燃烧头已按照图 16 中的图表进行调节。

第 2 列
燃气蝶阀 2)(图 39)达到最大开度（ 90°)时的负载损失。

注意：
要获得燃烧器以其最大输出功率运行时的近似输出功率：
- 从测试点 1)(图 39)处测得的燃气压力中减去燃烧室压力。
- 在所示燃烧器的相关表格的第 1 列中找到与您的期望结果最接近的压力值。
- 在左侧读取相应的输出功率。

天然气 **G 20 - RS 100/M** 的示例
- 最大输出功率操作
- 环形螺母 2)(图 15)已按照图 16 中的图表进行调节
- 测试点 1)(图 39)处的燃气压力 = 8 mbar
- 燃烧室压力 = 2.5 mbar

8 - 2.5 = 5.5 mbar

第 1 列中的压力 5.5 mbar 与表格中的输出功率 900 KW 相对应。
该值仅可作为粗略参考；必须采用煤气表计算有效输出功率。

注意：
要获得测试点 1)(图 39)处所需的燃气压力，请设定燃烧器运行所需的最大输出功率：
- 在表格中找到与相关燃烧器最接近的输出功率值。
- 在右侧的第 1 列读取套筒压力 1)(图 39)。
- 将该值增加到燃烧室内的压力估值上。

天然气 **G 20 - RS 100/M** 的示例
- 所需燃烧器最大输出功率：900 kW
- 环形螺母 2)(图 15)已按照图 16 中的图表进行调节
- 输出功率 900 kW 对应的燃气压力 = 5.5 mbar
- 燃烧室压力 = 2.5 mbar

5.5 + 2.5 = 8 mbar

测试点 1)(图 39)处所需的压力。

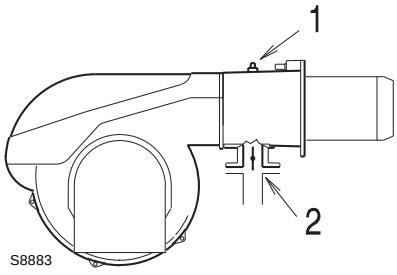

图 **39**

Mod.	kW	1 Δp (mbar)		2 Δp (mbar)	
		G 20	G 25	G 20	G 25
RS 70/M	470	4.2	5.7	0.4	0.5
	500	4.6	6.3	0.5	0.5
	550	5.3	7.2	0.6	0.7
	600	6.0	8.2	0.7	0.8
	650	6.7	9.1	0.8	0.9
	700	7.4	10.1	0.9	1.1
	750	8.5	11.8	1.0	1.2
	800	9.6	13.4	1.2	1.4
	850	10.8	15.1	1.3	1.6
	900	12.1	16.9	1.5	1.8
	930	12.9	17.9	1.6	1.9
RS 100/M	700	3.1	4.6	0.7	1.0
	750	3.7	5.5	0.8	1.1
	800	4.3	6.4	0.9	1.2
	850	4.9	7.3	1.0	1.4
	900	5.5	8.2	1.1	1.6
	950	6.2	9.0	1.2	1.8
	1000	6.8	9.9	1.3	1.9
	1050	7.3	10.7	1.5	2.1
	1100	7.9	11.6	1.6	2.4
	1150	8.4	12.4	1.8	2.6
	1200	9.1	13.5	1.9	2.8
	1250	9.9	14.8	2.1	3.0
	1300	10.8	16.1	2.3	3.3
	1340	11.4	17.1	2.4	3.5
RS 130/M	920	4.5	7.0	1.3	2.0
	950	4.7	7.4	1.4	2.1
	1000	5.1	7.9	1.5	2.3
	1050	5.5	8.5	1.7	2.5
	1100	5.9	9.1	1.8	2.8
	1150	6.2	9.6	2.0	3.1
	1200	6.6	10.2	2.2	3.3
	1250	7.0	10.8	2.4	3.6
	1300	7.4	11.3	2.6	3.9
	1350	7.8	11.9	2.8	4.2
	1400	8.2	12.8	3.0	4.5
	1450	8.6	13.8	3.2	4.9
	1500	9.0	14.7	3.4	5.2
	1550	10.2	15.6	3.6	5.6
	1600	11.4	16.6	3.9	5.9
	1605	11.5	16.7	3.9	6.0

此手册中所指的燃烧器出力范围是在室温 20°C，海拔高度 0m (即大气压力约为 1013 mbar) 时获得的。

一般燃烧器运行时的助燃空气温度及 / 或海拔高度要更高。

空气温度升高以及提高海拔高度可以达到同样效果：空气体积的膨胀 (空气的密度减小)。

燃烧器风机送风量基本相同，但是每立方米空气中氧气量以及风机推力（ 风机压头 ）会降低。

因此，必须了解：在温度以及海拔条件改变的情况下，在特定炉膛压力下燃烧器所需最大出力是否仍在燃烧器的出力范围内。
要检查此项，按如下操作：

1 -在表中找出修正系数 F (与系统的空气温度及海拔高度相关)。
2 -用燃烧器所需出力 Q 除以 F，得到等效出力 Qe:

Qe = Q : F (kW)

3 -在燃烧器的出力范围中标出所确定的工作点：即
Qe = 等效出力
H1 = 炉膛压力
点 A 必须在出力范围内 (图 40)。
4 -从点 A 画一条垂直线，图 40，在出力范围内找到最大压力 H2。
5 -用 H2 乘以 F，得出 出力范围内最大压力降 H3。

H3 = H2 x F (mbar)

如果 H3 大于 H1，如图 40，燃烧器可达到所需出力。
如果 H3 小于 H1，则有必要降低燃烧器出力。降低燃烧器出力的同时，也需降低炉膛压力：
Qr = 降低的出力
H1r = 降低的压力

$$H1r = H1 \times \left(\frac{Qr}{Q}\right)^2$$

举例，出力降低 5%:

Qr = Q x 0.95

$H1r = H1 \times (0.95)^2$

得到新的数值 - Qr 和 H1r - 重复步骤 2 - 5。

警告：
燃烧头需根据等效出力 Qe 进行调整。

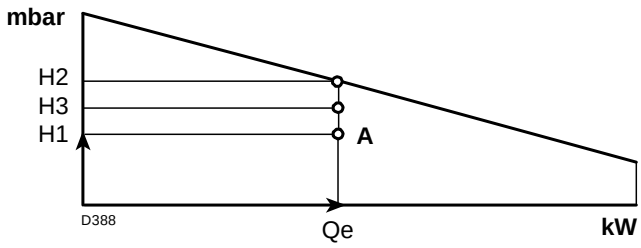

图 40

海拔 高于海平面（ 米 ）	平均大气压力 mbar	F 空气温度 °C 0	5	10	15	20	25	30	40
0	1013	1.087	1.068	1.049	1.031	1.013	0.996	0.980	0.948
100	1000	1.073	1.054	1.035	1.017	1.000	0.983	0.967	0.936
200	989	1.061	1.042	1.024	1.006	0.989	0.972	0.956	0.926
300	978	1.050	1.031	1.013	0.995	0.978	0.962	0.946	0.916
400	966	1.037	1.018	1.000	0.983	0.966	0.950	0.934	0.904
500	955	1.025	1.007	0.989	0.972	0.955	0.939	0.923	0.894
600	944	1.013	0.995	0.977	0.960	0.944	0.928	0.913	0.884
700	932	1.000	0.982	0.965	0.948	0.932	0.916	0.901	0.872
800	921	0.988	0.971	0.954	0.937	0.921	0.906	0.891	0.862
900	910	0.977	0.959	0.942	0.926	0.910	0.895	0.880	0.852
1000	898	0.964	0.946	0.930	0.914	0.898	0.883	0.868	0.841
1200	878	0.942	0.925	0.909	0.893	0.878	0.863	0.849	0.822
1400	856	0.919	0.902	0.886	0.871	0.856	0.842	0.828	0.801
1600	836	0.897	0.881	0.866	0.851	0.836	0.822	0.808	0.783
1800	815	0.875	0.859	0.844	0.829	0.815	0.801	0.788	0.763
2000	794	0.852	0.837	0.822	0.808	0.794	0.781	0.768	0.743
2400	755	0.810	0.796	0.782	0.768	0.755	0.742	0.730	0.707
2800	714	0.766	0.753	0.739	0.726	0.714	0.702	0.690	0.668
3200	675	0.724	0.711	0.699	0.687	0.675	0.664	0.653	0.632
3600	635	0.682	0.669	0.657	0.646	0.635	0.624	0.614	0.594
4000	616	0.661	0.649	0.638	0.627	0.616	0.606	0.596	0.577

Registered Office - 公司注册所在地 :
RIELLO S.p.A.
I-37045 Legnago (VR)
Tel.: +39.0442.630111
http:// www.riello.it
http:// www.rielloburners.com

Manufacturing site:
Riello Heating Equipment (Shanghai) CO., LTD
No. 388, Jinbai Road - Jinshan Industrial Zone
201506 - Shanghai
CHINA

生产场所 :
Riello Heating Equipment (Shanghai) CO., LTD
利雅路热能设备（上海）有限公司
上海市金山工业区金百路 388 号