

GB **Forced draught gas burners**
CN **强制通风燃气燃烧器**

Two-stage operation
两段火运行

CODE - 代码	MODEL - 型号	TIPO - 类型
20023689	BS3D	917T1
20023768	BS4D	918T1



Translation of the original instructions

说明书原文翻译

1	Declarations	3
2	Information and general warnings.....	4
2.1	Information about the instruction manual	4
2.1.1	Introduction.....	4
2.1.2	General dangers.....	4
2.1.3	Other symbols	4
2.1.4	Delivery of the system and the instruction manual	5
2.2	Guarantee and responsibility.....	5
3	Safety and prevention.....	6
3.1	Background	6
3.2	Personnel training	6
4	Technical description of the burner	7
4.1	Burner designation	7
4.2	Models available.....	7
4.3	Burner categories - Countries of destination	7
4.4	Technical data	8
4.5	Electrical data.....	8
4.6	Maximum dimensions.....	9
4.7	Firing rates	10
4.8	Test boiler.....	11
4.8.1	Commercial boilers.....	11
4.9	Burner description	12
4.10	Burner equipment.....	12
4.11	Electrical control box	13
5	Installation	14
5.1	Notes on safety for the installation	14
5.2	Instructions to avoid burnout or bad combustion of the burner	14
5.3	Handling	14
5.4	Preliminary checks	14
5.4.1	Control of the supply	14
5.4.2	Control of burner characteristics	15
5.5	Operating position	15
5.6	Securing the burner to the boiler	16
5.7	Combustion head adjustment.....	17
5.7.1	Removing the head assembly	17
5.7.2	Reassembling the head assembly	17
5.8	Positioning the probe - electrode.....	18
5.9	Air damper adjustment	18
5.10	Gas feeding	19
5.10.1	Gas feeding line	19
5.10.2	Gas train electrical power.....	19
5.10.3	Gas train.....	20
5.10.4	Gas pressure	20
5.11	Electrical wiring	21
5.11.1	Electrical system carried out by the factory.....	22
5.12	Operating programme	23
5.13	Table of times.....	24
5.13.1	Operations status indication	24
5.13.2	Fault diagnostics - lockouts	25
5.13.3	Checking the gas pressure switch.....	26
5.13.4	Checking the air pressure switch	26
5.13.5	Shut-down test	26
5.13.6	Intermittent operation	26
5.13.7	Recycle and limit of repetitions.....	26
5.13.8	Presence of an extraneous light or parasite flame	26
5.13.9	Duration of ignition transformer discharge	27
5.13.10	Reset by push-button and remotely of the burner	27

5.13.11	Protection reset	27
5.13.12	Reset push-button anomaly	27
5.13.13	External lockout signal (S3)	27
5.13.14	Hour counter functioning (B4)	27
5.13.15	Monitoring the power supply voltage	27
5.13.16	Frequency supply error	27
5.13.17	Internal voltage anomaly	27
5.13.18	Checking the fan motor	27
5.13.19	Checking the faults of the 1st and 2nd stage valve and the motor	28
5.13.20	EEprom check	28
5.13.21	Ionisation current	28
5.13.22	Post-purging	28
5.13.23	Continuous purging	28
5.13.24	Lockout log	29
5.13.25	Logging of burner operating parameters	29
5.13.26	Admissible lengths of the external connections to the burner	29
5.13.27	Long pre-purging	29
5.14	Programming menu	30
5.14.1	General notes	30
5.14.2	Block diagram for entering the menu	30
5.14.3	Shut-down test	31
5.14.4	Post-purging and continuous purging	31
5.14.5	Intermittent operation	31
5.14.6	Setting the opening delay of the 2nd stage	31
5.14.7	Setting a long pre-purging	31
5.14.8	Displaying the lockout log	32
5.14.9	Resetting the programming menu parameters and the lockout log	32
5.15	Lockout types	33
6	Start-up, calibration and operation of the burner	34
6.1	Notes on safety for the first start-up	34
6.2	Adjustments prior to ignition	34
6.3	Gas pressure switch	34
6.4	Air pressure switch	34
6.5	Combustion adjustment	34
7	Maintenance	35
7.1	Notes on safety for the maintenance	35
7.2	Maintenance programme	35
7.2.1	Maintenance frequency	35
7.2.2	Safety test - with gas ball valve closed	35
7.2.3	Checking and cleaning	35
7.2.4	Safety components	36
7.3	Opening the burner	36
8	Faults - Possible causes - Solutions	37
8.1	Start-up problems	37
8.2	Operating faults	38
A	Appendix - Accessories	39

1 Declarations**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 burner

Model: BS3D - BS4D

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 ISO 9001:2015.

Legnago, 03.05.2021

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

Mr. F. Maltempi



2 Information and general warnings

2.1 Information about the instruction manual

2.1.1 Introduction

The instruction manual supplied with the burner:

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

Symbols used in the manual

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

2.1.2 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.

2.1.3 Other symbols



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



DANGER: FLAMMABLE MATERIAL
This symbol indicates the presence of flammable materials.



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



DANGER: CRUSHING OF LIMBS
This symbol indicates the presence of moving parts: danger of crushing of limbs.



WARNING: MOVING PARTS

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



DANGER: EXPLOSION

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



PERSONAL PROTECTION EQUIPMENT

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



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

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



ENVIRONMENTAL PROTECTION

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



IMPORTANT INFORMATION

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



This symbol indicates a list.

Abbreviations used

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

2.1.4 Delivery of the system and the instruction manual

When the system is delivered, it is important that:

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

.....

- the address and telephone number of the nearest Assistance Centre

.....

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

2.2 Guarantee and responsibility

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



WARNING

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

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

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

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

3 Safety and prevention

3.1 Background

The 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 uses expressly named by the manufacturer;

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

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



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

3.2 Personnel training

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

The user:

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

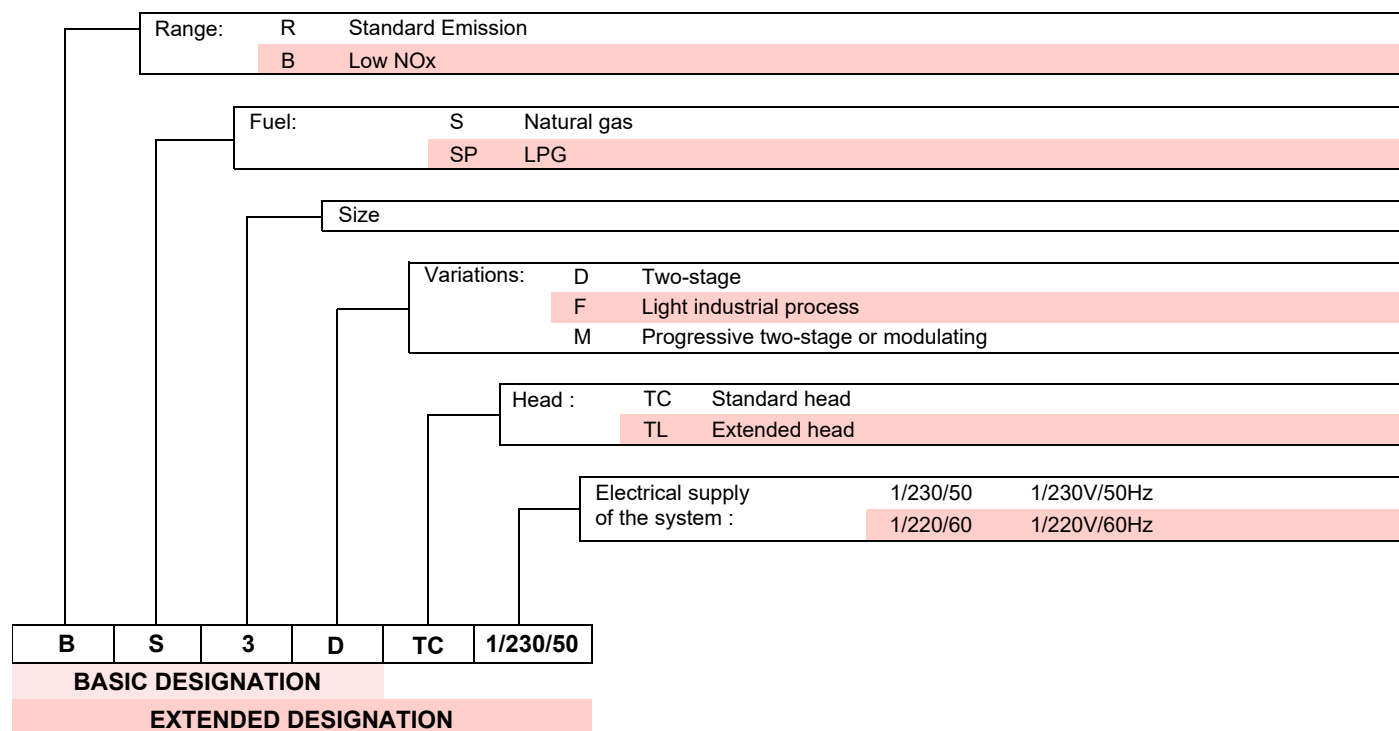
In addition:



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

4 Technical description of the burner

4.1 Burner designation



4.2 Models available

Designation	Combustion head	Voltage	Code
GULLIVER BS3D	TC	1/230/50	20023689
GULLIVER BS4D	TC	1/230/50	20023768

Tab. A

4.3 Burner categories - Countries of destination

Country of destination	Gas category
SE - FI - AT - GR - DK - ES - GB - IT - IE - PT - IS - CH - NO	I _{2H}
DE	I _{2ELL}
NL	I _{2E} - I ₂ (43.46 - 45.3 MJ/m ³ (0°C))
FR	I _{2Er}
BE	I _{2E(R)B}
LU - PL	I _{2E}

Tab. B

4.4 Technical data

Model		BS3D	BS4D
Heat output ⁽¹⁾	kW Mcal/h	65/75 - 197 55.9/68.8 - 162.5	110/140 - 249 94.6/120.4 - 215
Fuel	G20 Gas	NCV: 8 - 12 kWh/Nm ³ = 7000 - 10,340 kcal/Nm ³ Pressure: min. 20 mbar – max. 100 mbar ⁽²⁾	
Operation		Intermittent (FS1)	
Use		Boilers: water and diathermic oil	
Ambient temperature	°C	0 - 40	
Combustion air temperature	°C max	40	
Noise levels ⁽³⁾	Sound pressure Sound power	65 76	67 78
Weight	kg	16	20

Tab. C

- (1) Reference conditions: Ambient temperature 20°C - Gas temperature 15°C - Barometric pressure 1,013 mbar - Altitude 0 m a.s.l.
 (2) Δp between the input pressure and output pressure max. 50 mbar.
 (3) Sound pressure measured in manufacturer's combustion lab, with burner operating on test boiler, at maximum output. The sound power is measured with the "Free Field" method, as per EN 15036, and according to an accurate "Accuracy: Category 3" measurement, as described in EN ISO 3746.

4.5 Electrical data

Model		BS3D	BS4D
Electrical supply			
Fan motor	rpm	2800	2720
	V	230	230
	W	150	250
	A	1.8	1.9
Capacitor	μF	6.3	8
Ignition transformer		Primary 230V Secondary 1 x 18 kV - 11 mA	
Absorbed electric power	kW	0.35	0.53
Protection level			

Tab. D

4.6 Maximum dimensions

The maximum dimensions of the flange and burner are given in Fig. 1.

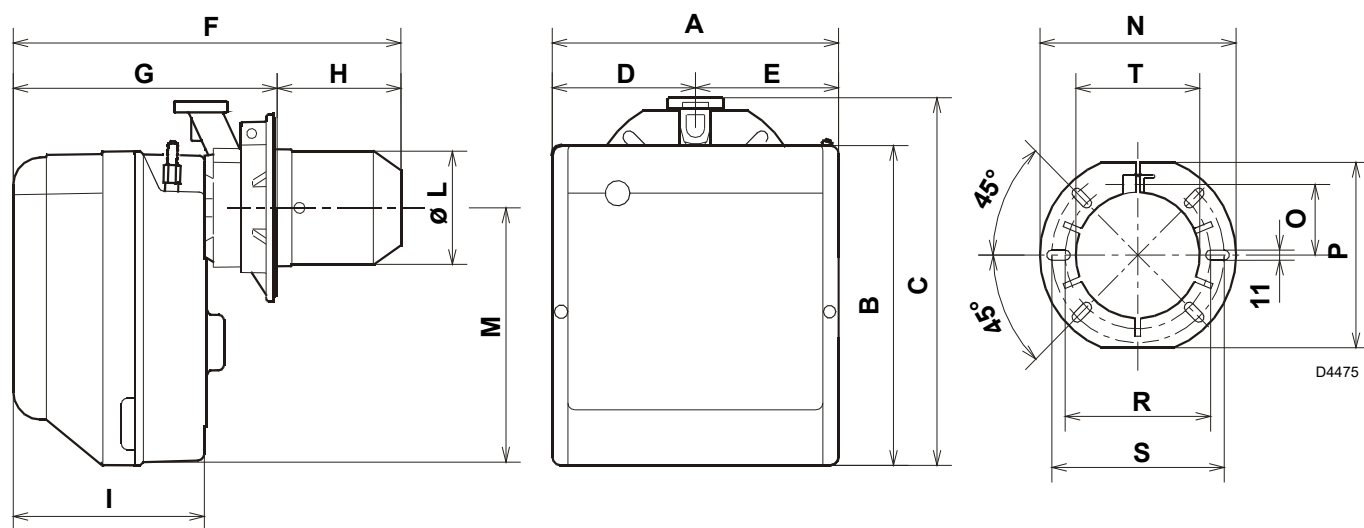


Fig. 1

Model	A	B	C	D	E	F	G	H	I	L-T	M	N	O	P	R	S
BS3D	300	345	391	150	150	390	262-280	128-110	196	129	285	216	76.5	201	160	190
BS4D	300	345	392	150	150	446	278-301	168-145	216	137	286	218	80.5	203	170	200

Tab. E

4.7 Firing rates

The burner output is chosen from within the diagram area (Fig. 3).



WARNING

The firing rates (Fig. 3) were obtained at an ambient temperature of 20 °C, at a barometric pressure of 1013 mbar (about 0 m a.s.l.) and with the combustion head regulated as indicated on page 16.



WARNING

Only for the BS4D model

To ensure operation with a burner output from 220 ÷ 249 kW, remove the pre-cut soundproofing to free the additional air input slots on the cover (see A Fig. 3).

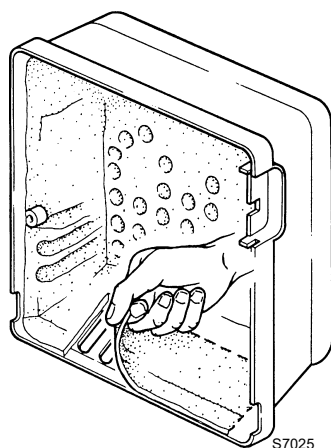
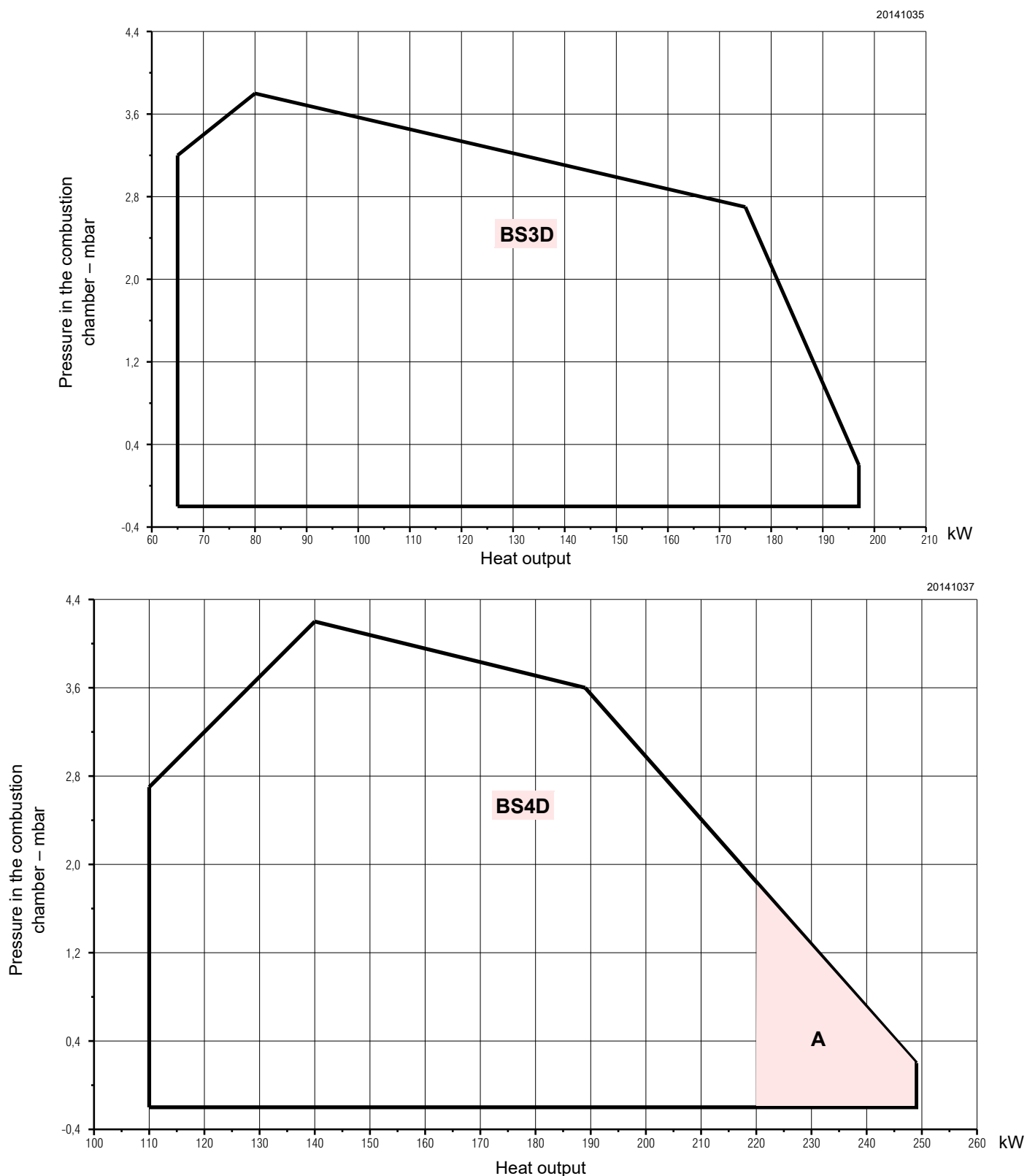


Fig. 2


Fig. 3

4.8 Test boiler

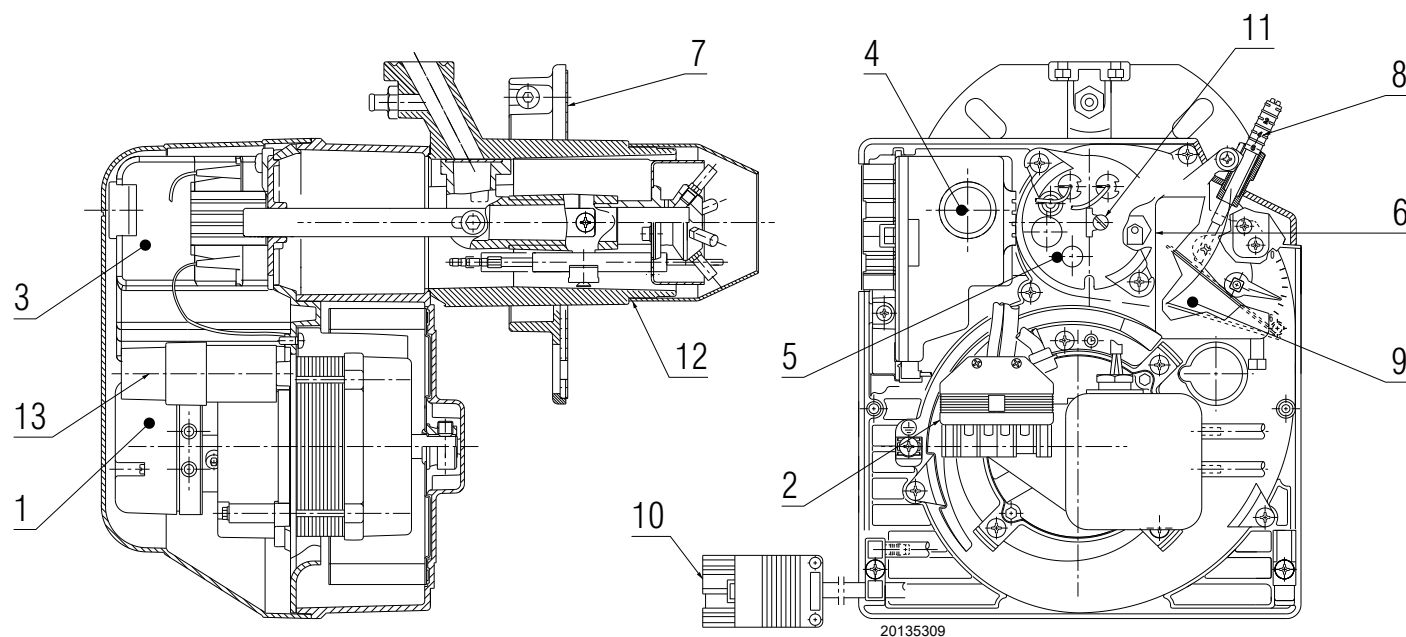
The firing rate has been defined on test boilers according to EN 676 standard.

For applications where the boiler does not conform to EN 303, or where the combustion chamber is much smaller than the dimensions given in EN 676, please consult the manufacturers.

4.8.1 Commercial boilers

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

4.9 Burner description


Fig. 4

- | | | | |
|---|---|----|----------------------------------|
| 1 | Air pressure switch | 8 | Air damper adjustment assembly |
| 2 | 6-pole socket for train connection | 9 | Air damper servomotor |
| 3 | Control box with built-in 7-pole socket | 10 | 4-pole socket for 2nd stage |
| 4 | Reset button with lockout lamp | 11 | Combustion head adjustment screw |
| 5 | Head assembly support | 12 | Combustion head |
| 6 | Pressure test point | 13 | Capacitor |
| 7 | Flange with insulating gasket | | |

4.10 Burner equipment

Flange with insulating gasket	No. 1
Screws and nuts for fixing the flange to the boiler	No. 4
7-pin plug	No. 1
Screw and nut for flange	No. 1
4-pin plug	No. 1
Remote reset connection	No. 1
Instructions	No. 1
Spare parts list	No. 1

Remote reset kit

The burner has a remote reset kit (**RS**) consisting of a connection and a push-button operating at a distance of 20 metres max.

In order to install it, remove the safety lockout device installed at the factory and insert the lockout supplied with the burner (see electrical diagram).

4.11 Electrical control box

The control box is a control and supervision system for forced draught burners, for intermittent operation (at least one controlled shutdown every 24 hours).

Important notes



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

The control box is a safety device! Avoid opening or modifying it, or forcing its operation. The Manufacturer cannot assume any responsibility for damage resulting from unauthorised work!

- All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- Before modifying the wiring in the control box connection area, fully disconnect the system from the power supply (omnipolar separation).
- Protection against electrocution from the control box and all connected electric components is obtained with the correct assembly.
- Before any intervention (assembly and installation operations, assistance, etc.), ensure the wiring is in order and that the parameters are correctly set, then make the safety checks.
- Falls and collisions can negatively affect the safety functions. In this case, the control box must not be operated, even if it displays no evident damage.

For safety and reliability, comply with the following instructions:

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

Installation notes

- Check the electric wiring inside the boiler complies with the national and local safety regulations.
- Install switches, fuses, earth connection etc. in compliance with local regulations.
- Do not confuse the powered conductors with the neutral ones.
- Ensure that spliced wires cannot get into contact with neighbouring terminals. Use adequate ferrules.
- Arrange the H.V. ignition cables separately, as far as possible from the control box and the other cables.
- When wiring the unit, make sure the 230V AC mains voltage cables are run strictly separate from extra low-voltage cables, to avoid the risk of electrocution.

To remove the control box from the burner it is necessary to (Fig. 5):

- disconnect all the connectors connected to it, all the plugs, the high voltage cables, and the earth wire (TB);
- unscrew the screw (A) and pull the control box in the direction of the arrow.

To install the control box it is necessary to:

- tighten the screw A) with a tightening torque of 1 - 1.2 Nm;
- reconnect all previously disconnected connectors, making sure to connect the 7 pin power plug as the final step.

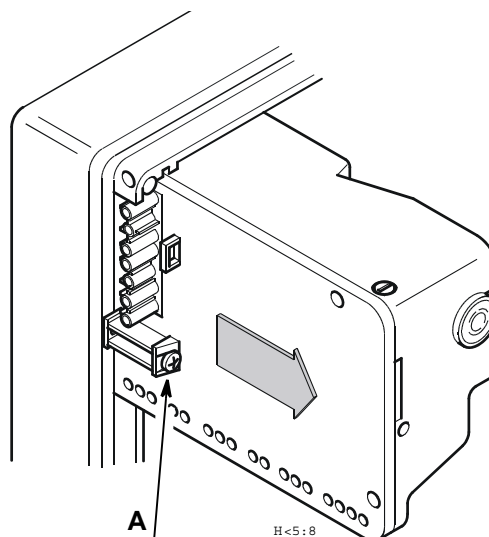


Fig. 5

NOTE:

The burners have been approved for intermittent operation. This means that they must stop once every twenty four hours to permit the electrical control box to check its efficiency at start up. The boiler limit thermostat (TL) normally ensures the stopping of the burner. If this is not the case, it is necessary to apply a timer switch in series to the limit thermostat (TL) that turns off the burner at least once every 24 hours.

Electrical wiring of ionisation probe

It is important for signal transmission to be almost totally free of any disturbances or loss:

- Always separate the probe cables from the other cables:
 - the line capacity reduces the magnitude of the flame signal;
 - use a separate cable.
- The cable length must not exceed 1 m.
- Respect the polarity
- Insulation resistance:
 - must be at least 50 MΩ between the ionisation probe and the earth;
 - a dirty detector reduces the insulation resistance, fostering leakage currents.
- The ionisation probe is not protected against the risk of electrocution. When connected to the electricity supply, the ionisation probe must be protected against any accidental contact.
- Position the ionisation probe so that the ignition spark cannot form an arc on the probe (risk of electric overcharge).

Technical data

Mains voltage	AC 210...230 V -15 % / +10 %
Mains frequency	50/60 Hz ±5 %
Built-in fuse	T4A 250V
Energy consumption	40 VA
Protection level	IP00

Tab. F

5 Installation

5.1 Notes on safety for the installation

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



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



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



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

5.2 Instructions to avoid burnout or bad combustion of the burner

- 1 The burner can not be installed outside as it is suitable for operation in closed rooms only.
- 2 The premises the burner operates in must have openings for the air need for the combustion.
To be sure about this, you have to control CO₂ and CO in the exhaust gases with all the windows and doors closed.
- 3 If there are air extractors in the premises the burner works, make sure that there are openings for air to be taken in that are big enough to ensure the required air change; In any case, check that when the burner stops the extractors do not draw hot fumes from pipes through the burner.
- 4 When the burner is stopped, the flue must be kept open and a natural draft created in the combustion chamber.
If the smoke pipe is closed, the burner must be drawn back till the extraction of blast tube from the furnace. Before operating in this way take the voltage off.

5.3 Handling

The transport weight is given in chapter Technical data on page 8.

Observe the permissible ambient temperatures for storage and transport: -20... + 70 °C, with max. relative air humidity 80%.



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.



The operator must use the required equipment during installation.

5.4 Preliminary checks

5.4.1 Control of the supply



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 (cardboard box, 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.

5.4.2 Control of burner characteristics

Check the identification label of the burner (Fig. 6), showing:

- A the burner model
- B the burner type
- C the cryptographic year of manufacture
- D the serial number
- E the data for electrical supply and the protection level
- F the electrical power consumption
- G the data of the burner's minimum and maximum output possibilities (see Firing rate)

Warning. The burner output must be within the boiler's firing rate.



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 makes any installation or maintenance work difficult.



WARNING

The figure of the label (Fig. 6) is indicative. Some of the data may be arranged in a different position.

R.B.L.		A				TIPO TYP TYPE		B	B	C
I12ELL 3B/P DE		D				E			F	
I12H3B/P AT,CH,IS		I12H3 GB,IE,IT N2L3B/P LU		GAS GAZ		<div><input checked="" type="checkbox"/> FAM.2</div> <div><input type="checkbox"/> FAM.3</div> <div>G</div>				
I2E(P)B.I3 BE I12L3B/P NL I12Er3P FR		Icc A Imax A		PESO kg		RIELLO S.p.A. I-37048 Legnago (VR)		<div>CE</div>		

20098188

20098188

Fig. 6

5.5 Operating position



WARNING

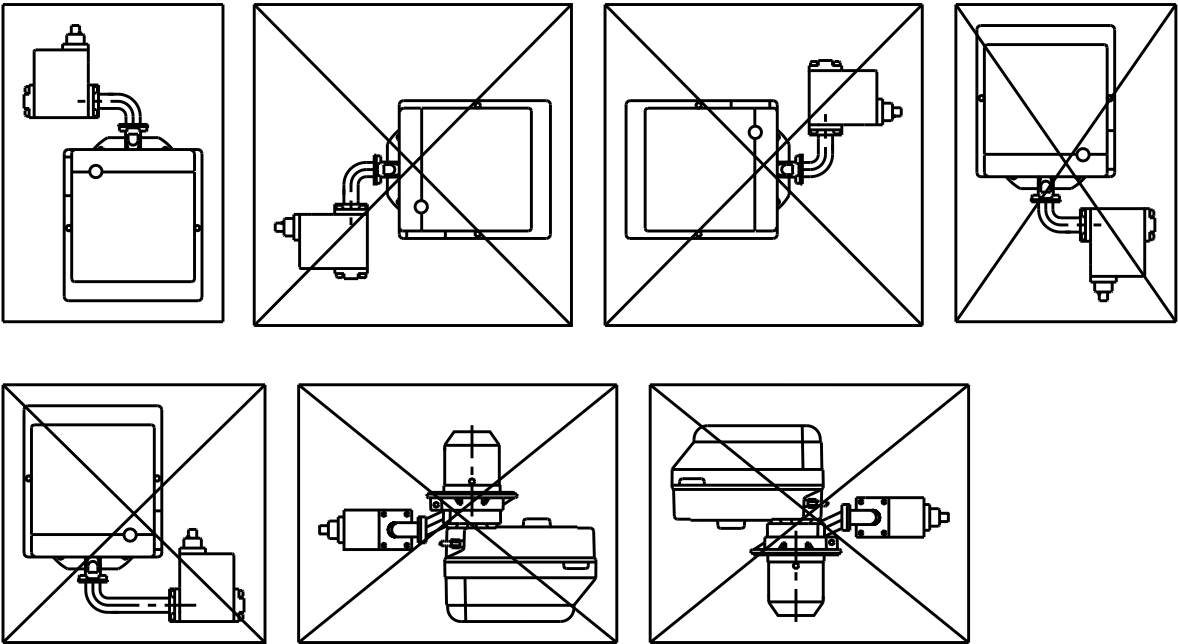
The burner is set up to operate only in position 1 (Fig. 7).



DANGER

Any other position could compromise the correct operation of the appliance.

1



20178598

Fig. 7

5.6 Securing the burner to the boiler



Provide an adequate lifting system of the burner.

To install the burner on the boiler, do the following:

- if necessary, widen the insulating gasket holes (Fig. 8), taking care not to damage them.

The burner can be fixed with the variable position A) as shown in Fig. 9.

Model	A (mm)
BS3D	128 ÷ 110
BS4D	167.5 ÷ 145

Tab. G

- Fix the flange 5) to the door of the boiler 1)(Fig. 10) placing the insulating gasket 3) in between using the screws 4) and (if necessary) the nuts 2), but keeping one of the two top screws 4) loose.
- Insert the combustion head of the burner in the flange 5), tighten the flange with the screw 6), then lock the screw 4) which was loose.



WARNING

In any event, make sure that the combustion head crosses the entire thickness of the boiler door.



WARNING

The seal between burner and boiler must be airtight.

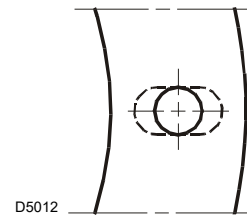


Fig. 8

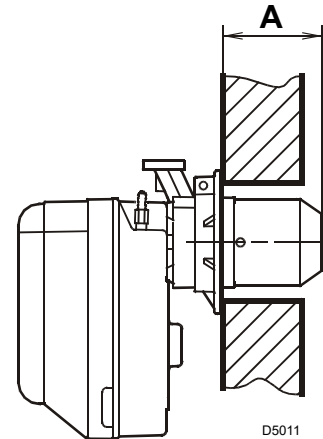


Fig. 9

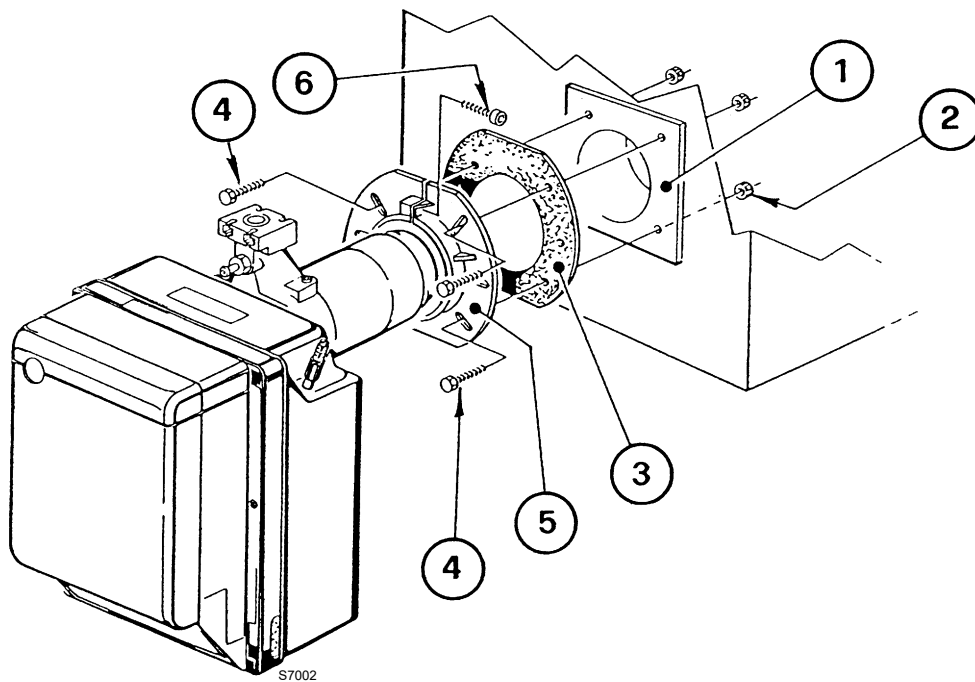


Fig. 10

5.7 Combustion head adjustment

The adjustment of the combustion head varies depending on the burner output.

This is carried out by turning the adjustment screw 6)(Fig. 11) clockwise or anti-clockwise until the notch on the regulating rod 2) lines up with the outside surface of the head assembly 1).

In Fig. 11 the head regulating rod is set to notch 3.

Example for the BS3D burner

The diagram (Fig. 12) is indicative and shows the calibration of the combustion head in relation to the burnt output.

To ensure the burner works efficiently, we suggest adjusting the combustion head according to the requirements of the specific boiler.

The burner is installed in a 100 kW boiler. Considering an efficiency of 90%, the burner must supply around 110 kW; for this burner output the adjustment should be on notch 3.

5.7.1 Removing the head assembly

To remove the head assembly, it is necessary to:

- disconnect the connections 3) and 5)(Fig. 11);
- remove the tube 4) and loosen the screws 10)(Fig. 11);
- unscrew and remove the screws 7), remove the head holder assembly 1)(Fig. 11) slight rotation to the right.



Take care not to change the setting position on the elbow-bracket 2)(Fig. 11) when dismantling.

5.7.2 Reassembling the head assembly

Reverse the procedure above to put back the head assembly 1)(Fig. 11) as it was before.



Tighten the screws 7)(Fig. 11), without fully locking them. Lock them with a tightening torque of 3 - 4 Nm.



Check that when operating there are no gas leaks from the screw housings.

If the pressure test point 13)(Fig. 11) should become slack accidentally, we recommend fixing it correctly ensuring that the hole (F) in the head assembly 1)(Fig. 11) is facing downwards.

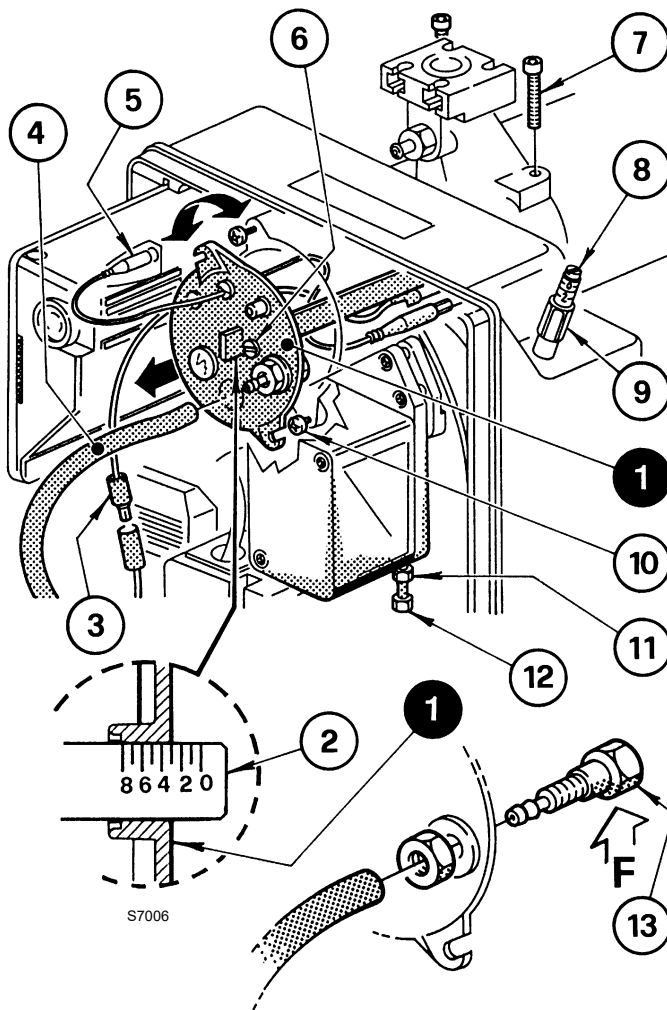


Fig. 11

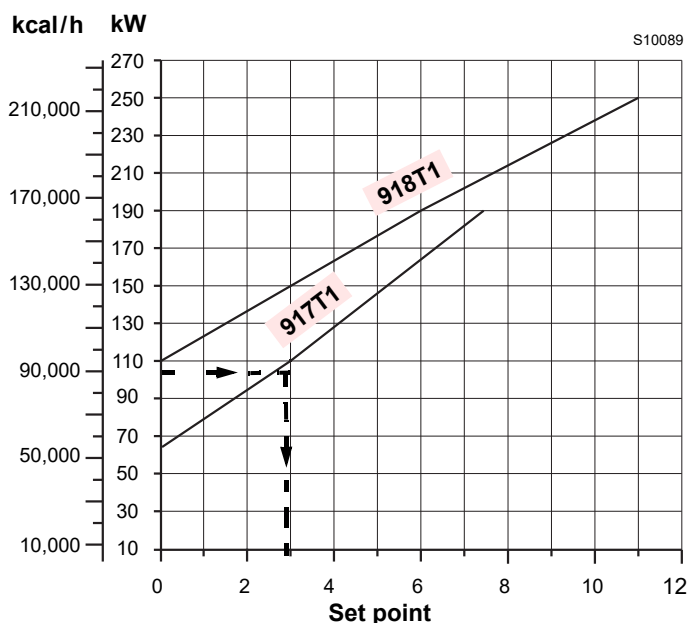


Fig. 12

5.8 Positioning the probe - electrode

- Make sure that the plate 3)(Fig. 13) is always inserted in the flattening of the electrode 1).
- Rest the probe insulator 4) against the air diffuser 2).



Respect the positions shown in Tab. H.

Model	A (mm) ± 0.3
BS3D	31
BS4D	31

Tab. H

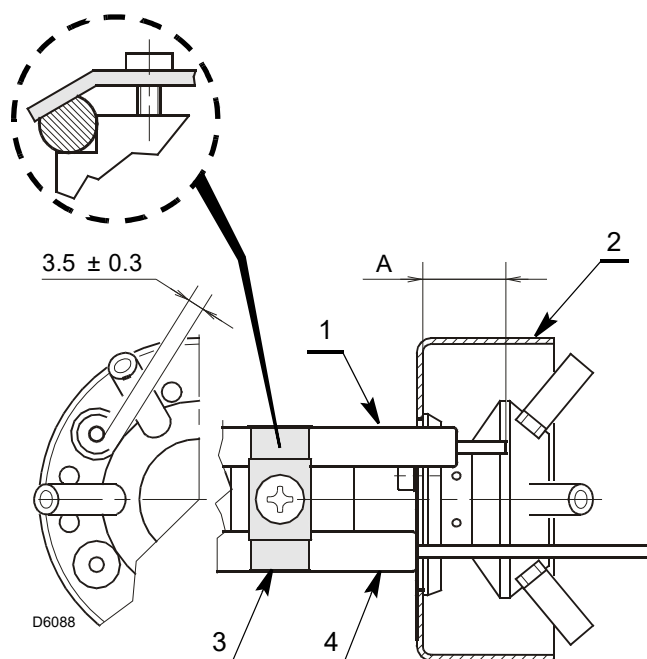


Fig. 13

5.9 Air damper adjustment

The first start up should always be carried out using the screw 12)(Fig. 14), so that the 1st stage air damper position indicator is greater than notch 1, (factory setting notch 1).

To vary the setting proceed as follows:

- Bring the burner to the 2nd stage closing the connection **T6-T8** in the 4 pin plug (**X4**, electrical wiring of page 21).
- The air damper, due to the thrust of the fan, is brought to the 2nd stage position relative to the factory calibration (screw 8 on notch 3).
- Loosen the nut 9) and use the screw 8)(Fig. 14) to adjust the 2nd stage air flow (see CO₂ values in the Tab. T).
- Bring the burner to the 1st stage opening the connection **T6-T8** in the 4 pin plug (**X4**, electrical wiring of page 21).
- Adjust the 1st stage using the screw 12) after loosening (clockwise) the nut 11)(Fig. 14) referring to the table below for the CO₂ values.
- Once the ideal setting has been reached, block (anti-clockwise) the nut 11)(Fig. 14). When the burner stops, the air damper, due to the pressure of its weight, automatically closes, up to a max. flue depression of 0.5 mbar.



To adjust the burner output of the 1st and 2nd stage, follow the instructions below.

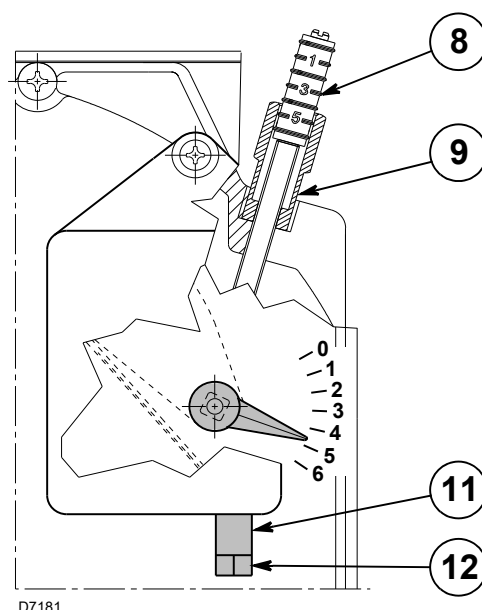


Fig. 14

The burner output ratio between the 1st and 2nd stage should be a maximum of 1:2.

Example for BS3D: 2nd stage output required 140 kW;

Minimum 1st stage output not less than 70 kW.

In any event, the minimum burner output in the 1st stage should not be less than the value indicated in the firing rate.

Example for BS3D: 2nd stage output required 110 kW;

Minimum 1st stage output not less than 65 kW (minimum of the firing rate page 9).

5.10 Gas feeding



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

Precautions: avoid knocking, attrition, sparks and heat.

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



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

5.10.1 Gas feeding line

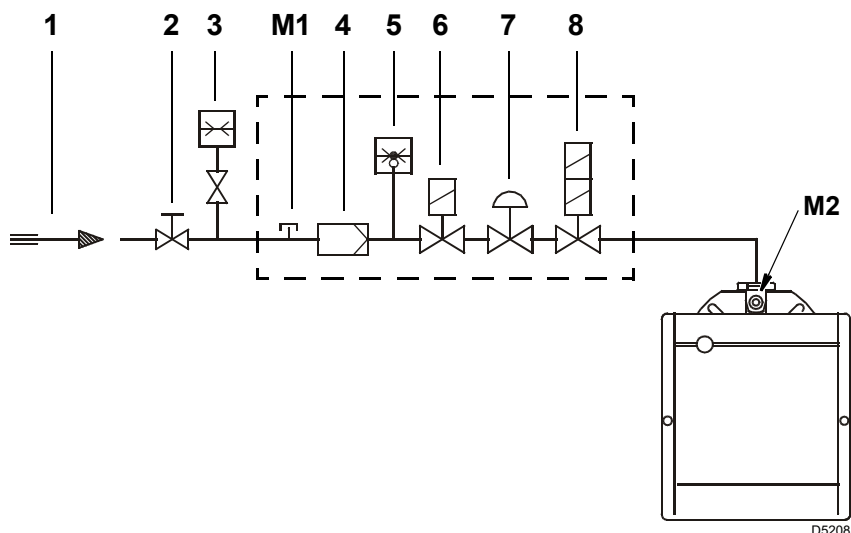


Fig. 15

Key (Fig. 15)

- 1 Gas input pipe
- 2 Manual gate (*under the responsibility of the installer*)
- 3 Gas pressure gauge (*under the responsibility of the installer*)
- 4 Filter
- 5 Gas pressure switch
- 6 Electromagnetic safety valve
- 7 Pressure stabiliser
- 8 1st and 2nd stage adjustment valve
- M1 Gas supply pressure test point
- M2 Gas supply pressure test point at the combustion head

5.10.2 Gas train electrical power

The gas train's input power cables can be on the right or left of the burner, as illustrated in Fig. 16.

Depending on the entry point, the cable clamp with pressure test point 1) and simple cable clamp 2) may need swapping over.

Consequently, you must make sure:

- the cable clamp 1) is positioned correctly;
- the tube is positioned correctly so that there are no restrictions likely to impede air flowing to the pressure switch.

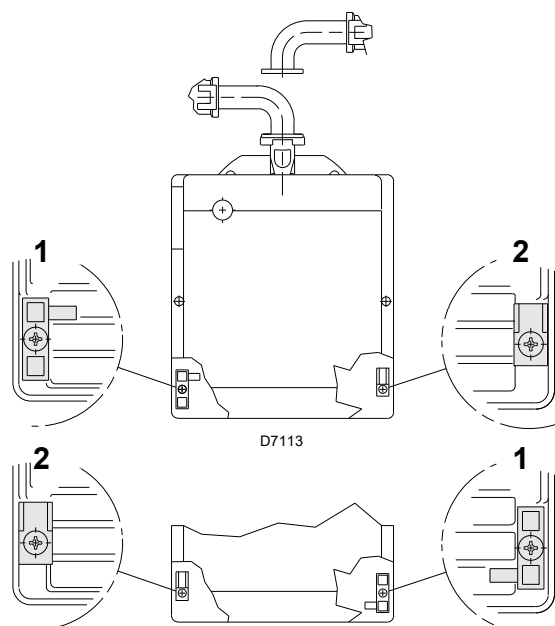


Fig. 16



If necessary, cut the tube to the right size.

5.10.3 Gas train

Approved according to standard EN 676 and provided separately from the burner. For its adjustment see the enclosed instructions.



Disconnect the electrical power using the main switch.



Check that there are no gas leaks.



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



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



The operator must use the required equipment during installation.

5.10.4 Gas pressure

Tab. I indicates the pressure drops of the combustion head and gas butterfly valve, on the basis of the burner operating output.

The values shown in Tab. I refer to:

- Natural gas G 20 NCV 9.45 kWh/Sm³ (8.2 Mcal/Sm³)
- Natural gas G 25 NCV 8.13 kWh/Sm³ (7.0 Mcal/Sm³)

Column 1

Combustion head pressure drop.

Gas pressure measured at test point M2)(Fig. 15 on page 18), with:

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

To calculate the approximate output at which the burner operates:

- subtract the pressure in the combustion chamber from the pressure of the gas at test point M2)(Fig. 15 on page 18).
- Find, in Tab. I related to the burner concerned, the pressure value closest to the result of the subtraction.
- Read the corresponding output on the left.

Example with G 20 natural gas for BS3D:

Maximum output operation

Gas pressure at test point M2)(Fig. 15 on page 18)= 10.9 mbar

Pressure in combustion chamber = 2.2 mbar

10.9 - 2.2 = 8.7 mbar

A pressure of 8.7 mbar, column 1, corresponds in Tab. I to an output of 169 kW.

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

		Δp (mbar)		
		G 20	G 25	G 31
BS3D	kW	79	2.0	2.8
	92	2.6	3.64	4.6
	105	3.3	4.62	5.6
	118	4.2	5.88	6.6
	131	5.1	7.14	7.7
	143	6.1	8.54	8.7
	156	7.3	10.22	9.9
	169	8.7	12.18	11.1
	182	10.2	14.28	12.3
	195	11.9	16.66	13.5
BS4D	140	4.1	5.74	3.5
	152	4.6	6.44	3.9
	164	5.2	7.28	4.3
	177	5.9	8.26	4.6
	189	6.6	9.24	4.9
	201	7.3	10.22	5.3
	213	8.1	11.34	5.8
	226	9.0	12.6	6.6
	238	9.8	13.72	7.6
	250	10.8	15.12	9

Tab. I

To calculate the required gas pressure at test point M2)(Fig. 15 on page 18), with the maximum modulating output at which you want the burner to operate having been fixed:

- find the nearest output value in Tab. I for the burner in question.
- Read on the right, column 1, the pressure at the socket M2)(Fig. 15 on page 18).
- Add this value to the estimated pressure in combustion chamber.

Example with G 20 natural gas for BS3D:

Operating at the desired maximum output: 169 kW

Gas pressure at an output of 91 kW = 8.7 mbar

Pressure in combustion chamber = 2.2 mbar

8.7 + 2.2 = 10.9 mbar

pressure required at the test point M2)(Fig. 15 on page 18).



The data of thermal output and combustion head gas pressure are related to full open (90°) gas butterfly valve.

5.11 Electrical wiring

Notes on safety for the electrical wiring



DANGER

- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be made in accordance with the regulations currently in force in the country of destination and by qualified personnel. Refer to the wiring diagrams.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the wiring diagrams.
- Do not invert the neutral with the phase in the electrical supply line.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The burner has been type-approved for intermittent use.
In the event of continuous operation, a cycle arrest must be ensured within 24 hours with the use of a time switch positioned in series with the thermostatic line. Refer to the wiring diagrams.
- The electrical safety of the device is obtained only when it is correctly connected to an efficient earthing system, made according to current standards. It is necessary to check this fundamental safety requirement. In the event of doubt, have the electrical system checked by qualified personnel. Do not use the gas tubes as an earthing system for electrical devices.
- The electrical system must be suitable for the maximum power absorption of the device, as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for that level of power absorption.
- For the main power supply of the device from the electricity mains:
 - do not use adapters, multiple sockets or extensions;
 - use a multiple pole switch with at least a 3 mm gap between the contacts (overvoltage category III), as envisaged by the present safety standards.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.
- Check proper insertion of connection connectors according to the symbols shown on the bottom of the flame control equipment: make sure that the connectors are fully inserted by pushing them all the way in, each in its relevant position. All connectors must have the connection cables facing towards the inside of the burner (see Fig. 18).

Before carrying out any maintenance, cleaning or checking operations:



DANGER

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



DANGER

Close the fuel shut-off valve.



DANGER

Condensation, the formation of ice and the entry of water are prohibited!



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

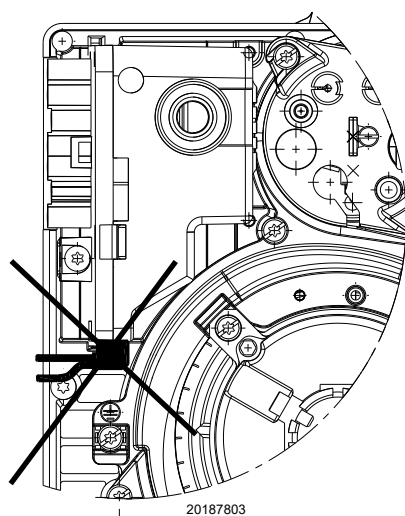


Fig. 17

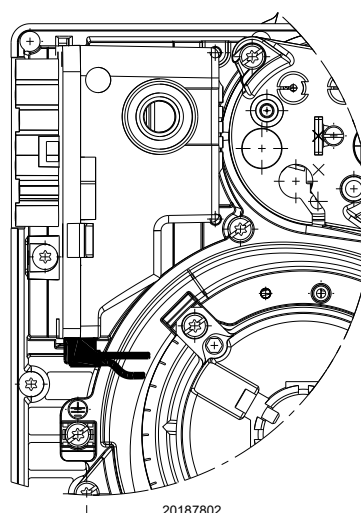


Fig. 18



WARNING

Connectors inserted with the cables facing outwards the burner can damage the flame control equipment!



WARNING

Insert connectors with the cables facing towards the inside of the burner.

5.11.1 Electrical system carried out by the factory

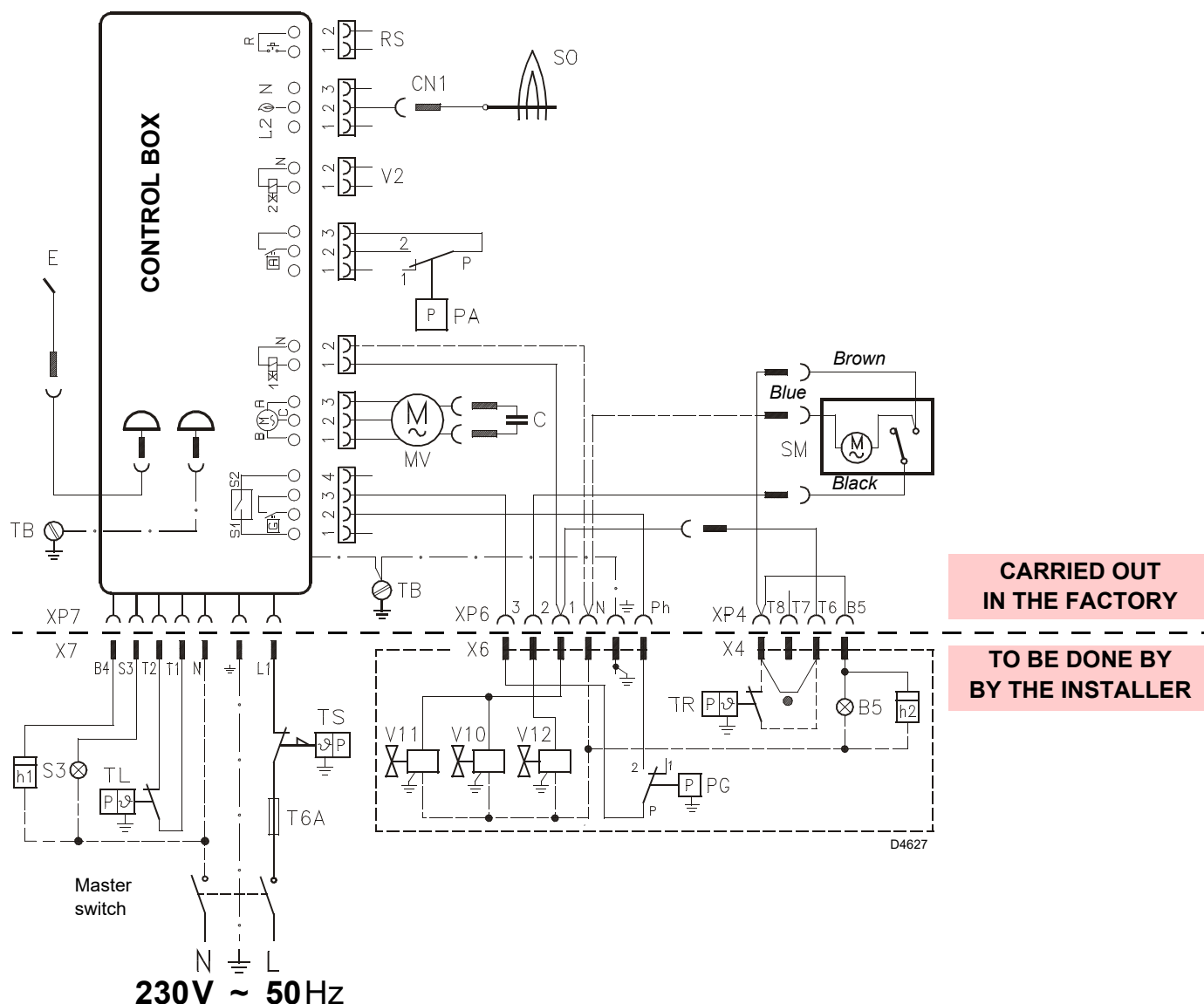


Fig. 19

Key to layout

- B5 Signal 2nd stage operating
- C Capacitor
- CN1 Probe connector
- E Electrode
- h.. Hour counter
- MV Motor
- PA Minimum air pressure switch.
- PG Minimum gas pressure switch
- RS Remote reset
- SM Air damper servomotor
- SO Ionisation probe
- S3 Lockout signal (230V - 0.5A max.)
- T6A Fuse
- TB Burner earth
- TL Heat request thermostat
- TR Adjustment thermostat 1st and 2nd stage
- TS Safety thermostat
- V10 Safety valve
- V11 1st stage valve
- V12 2nd stage valve
- X.. Plug
- XP.. Socket



- Do not invert the neutral with the phase in the electrical supply line.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The section of the conductors must be at least 1mm². (Unless requested otherwise by local standards and legislation).
- Connect the 2nd stage thermostat (TR) to the terminals T6 - T8 removing the jumper.



Check the burner stops by opening the thermostats and check it locks out by opening the connector (CN1) (Fig. 19) inserted in the probe's red wire, located on the outside of the control box.



If the cover is still on, remove it and proceed with the electric wiring following the wiring diagrams. Use flexible cables in compliance with EN 60 335-1 standards.

5.12 Operating programme

Normal operation

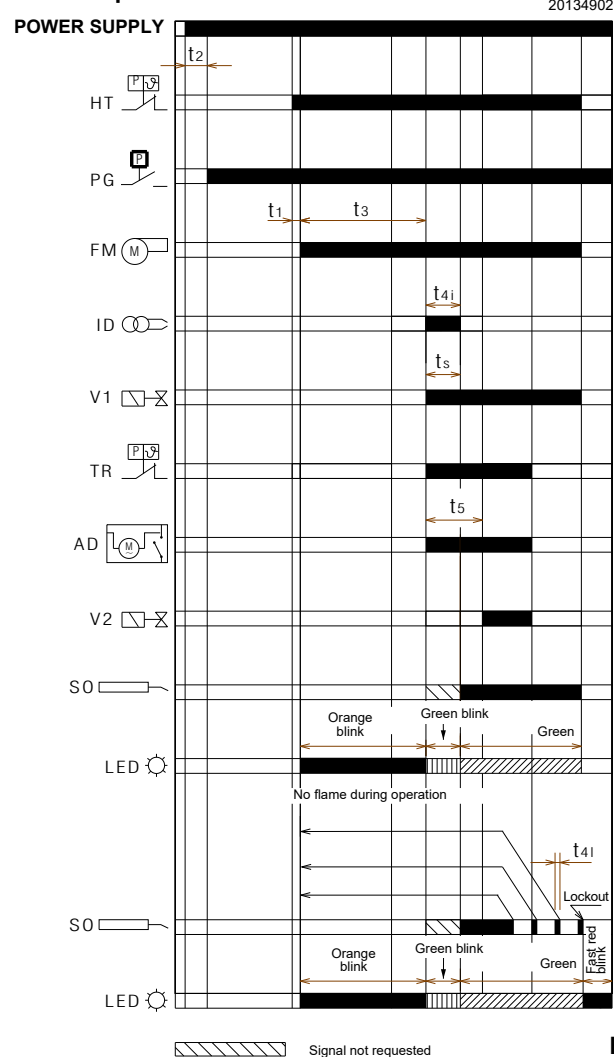


Fig. 20

Lockout due

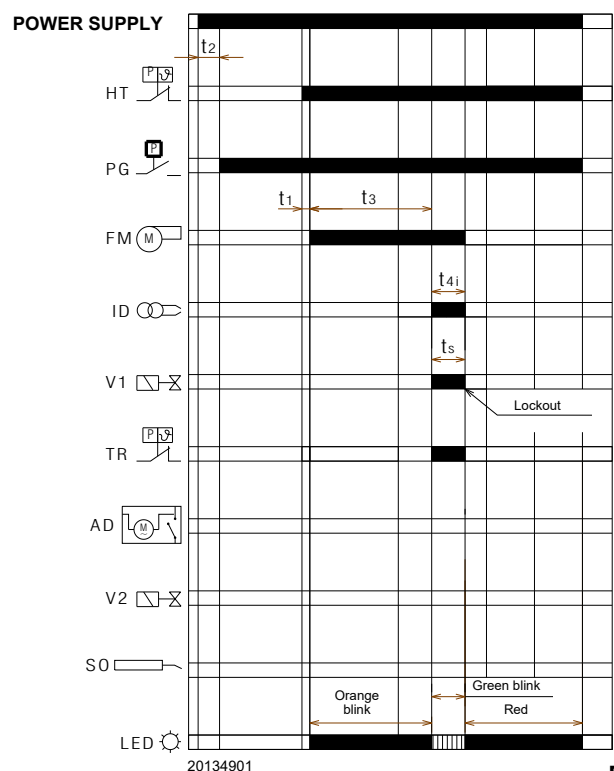


Fig. 21

Lockout due to extraneous light during pre-purging

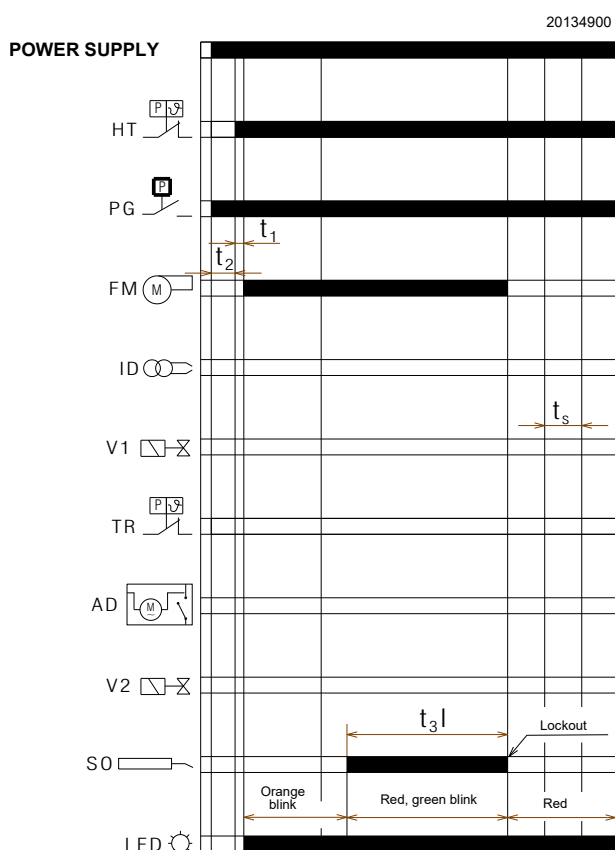


Fig. 22

Key

- AD – Electric air damper opener
- FM – Fan motor
- HT – Heat request
- ID – Ignition device
- LED – LED colour inside the button
- PG – Low gas pressure switch
- S0 – Ionisation probe
- TR – Adjustment thermostat
- t1 – Standby time
- t2 – Initialisation time for checking
- t3 – Pre-purging time
- t3l – Checks for presence of extraneous light during pre-purging phase
- t4i – Total ignition time
- t4l – Reaction time to achieve safety lockout due to lack of failure
- t5 – Delay time between the 1st and 2nd stage
- ts – Safety time
- V1 – 1st stage valve
- V2 – Valve 2nd stage

5.13 Table of times

Symbol	Description	Value (sec.)
t0	Standby: the burner is waiting for a heat request, the gas pressure switch closure, the air pressure switch opening	-
t1	Standby time for an input signal: reaction time, control box remains in waiting mode for t1	2
t1l	Flame or flame simulation detected before demand for heat: the control box remains idle.	25
t2	Initialisation standby time: checking time following the main power start-up	< 4.5
t2l	Checks extraneous light or parasite flame during t2: waiting mode for t2l, then lockout: the motor does not start	25
t2a	Check whether the air pressure switch has already been moved to the work position before the required heat: the control box remains in standby status, a lockout follows if the air pressure switch remains switched for the T2a time.	max 120
t3	Pre-purging time: the fan motor is running, then the gas valve is activated	40
t3l	Checks extraneous light or parasite flame during pre-purging: control box goes into lockout at the end of t3l	1
t3a	Time for checking the switching of the air pressure switch in the operating position during the pre-purging time: if the pressure switch does not change over within t3a there is a lockout.	max 15
t3r	A recycle attempt is made if there is an air pressure drop during the pre-purging stage: there is then a lockout in the event of a second loss of air pressure between the 16th second and the 29th; is a loss of pressure between the 30th second and the 40th, the control box goes immediately into lockout mode.	-
ts	Safety time	3
t4i	Total spark ignition time	3
t4a	Air pressure drop checking time during the ts time and the normal operation: the control box locks out immediately.	< 1
t4l	Reaction time to achieve safety deactivation due to flame loss	< 1
t5	Delay time between the 1st and 2nd stage: opening time of 2nd stage valve after opening of 1st stage, depends on the opening time of the air damper servomotor	5 ÷ 25
-	Minimum time to reset the control box using push-button reset	0.4
-	Minimum time to reset the control box using remote reset	0.8
tr	Re-cycles: max. 3 repeats of the complete start-up sequence in the case of flame loss during operation; the final action at the last attempt following flame failure is a lockout	3 re-cycles

Tab. J

5.13.1 Operations status indication

Status	Reset button colour	Seconds		Colour code
Awaiting heat demand, awaiting gas pressure switch closure, awaiting air pressure switch opening	-	-	-	-
Awaiting heat demand with continuous purging	ORANGE Blink	0.5	2.5	● ○ ● ○ ● ○ ● ○ ● ○
Pre-purging, or awaiting air pressure switch closure, or long pre-purging	ORANGE Blink	0.5	0.5	● ○ ● ○ ● ○ ● ○ ● ○
Safety time without flame	GREEN Blink	0.5	0.5	■ □ ■ □ ■ □ ■ □ ■ □
Safety time with flame	GREEN	-	-	■ ■ ■ ■ ■ ■ ■ ■ ■ ■
Normal operating position	GREEN	-	-	■ ■ ■ ■ ■ ■ ■ ■ ■ ■

Tab. K

Key

ON	OFF	Colour code
▲	△	RED
●	○	ORANGE
■	□	GREEN

Tab. L

5.13.2 Fault diagnostics - lockouts

Fault description	Reset button colour	Seconds		Colour code
Extraneous light (false flame signal)	GREEN, RED blinking alternately	0.5	0.5	■▲■▲■▲■▲■▲■▲
Gas pressure switch not opening fault or contact open of the electric air damper opener, after 2 minutes from the heat request	ORANGE blinking inverted	2.5	0.5	●○●○●○●○●○●○
Electrical power voltage fault	ORANGE slow blinking	2.5	2.5	●○●○●○●○●○●○
Electrical power frequency fault	ORANGE	-	-	●●●●●●●●●●●●
Flame control voltage fault	ORANGE, GREEN fast blinking alternately	0.2	0.2	●■●■●■●■●■●■
Reset push-button / Remote reset anomaly	GREEN, RED fast blinking alternately	0.2	0.2	■▲■▲■▲■▲■▲■▲
Lockout for no flame after Ts	RED	-	-	▲▲▲▲▲▲▲▲▲▲▲▲
Lockout for extraneous light signal or for parasite flame	RED blink	0.5	0.5	▲△▲△▲△▲△▲△▲△
Lockout for maximum number of cycle repetitions (flame loss during operation)	RED fast blinking	0.2	0.2	▲△▲△▲△▲△▲△▲△
Lockout due to a drop in air pressure after the pre-purging was repeated due to a previous lack of air, or 10 sec before the end of the pre-purging, or during the safety time, or during normal operation	RED Blink	0.5	2.5	▲△▲△▲△▲△▲△▲△
Lockout for fan motor error	RED, ORANGE blinking inverted	2.5	0.5	▲●▲●▲●▲●▲●▲●
Lockout for fault with the circuit within the 1st stage valve control	RED, GREEN blinking inverted	2.5	0.5	▲■▲■▲■▲■▲■▲■
Lockout for fault with the circuit within the 2nd stage valve control	RED blinking inverted	2.5	0.5	▲△▲△▲△▲△▲△▲△
Lockout for eeprom error	ORANGE, GREEN blinking alternately	0.5	0.5	●■●■●■●■●■●■
Lockout due to air pressure switch not closing after a heat request or after a recycle due to flame loss during operation	RED, GREEN slow blinking	2.5	2.5	▲■▲■▲■▲■▲■▲■
Lockout due to air pressure switch already switched to closing of the heat request thermostat or after a recycle due to flame loss during operation	RED, ORANGE slow blinking	2.5	2.5	▲●▲●▲●▲●▲●▲●
Lockout for maximum number of cycle repetitions due to gas pressure switch intervention during flame operation	ORANGE	2.5	0.5	●○●○●○●○●○●○

Tab. M

Key

ON	OFF	Colour code
▲	△	RED
●	○	ORANGE
■	□	GREEN

Tab. N

5.13.3 Checking the gas pressure switch

When the gas pressure switch is open the motor is not powered. If, after a heat request, the gas pressure switch opens, the motor stops and:

- if the gas pressure switch stays open for more than 2 minutes, the fault is displayed by the diagnostic LEDs.
- if the gas pressure switch stays open for less than 2 minutes, the fault is not displayed.
- when the gas pressure switch closes again, the motor is restarted if also the air pressure switch is open.
- when the gas pressure switch is closed the motor is powered for about one second (to acknowledge the signal) and then it is shut off for 2 seconds to be then restarted and start the operation cycle.

If the gas pressure switch opens during normal flame operation, the motor stops immediately, the gas valves are closed and the full ignition cycle is repeated.

Up to 3 attempts are possible, at the fourth opening of the gas pressure switch, the burner reaches the lockout condition.

The number of possible attempts to open the gas pressure switch during flame operation is reset at every heat request, every lockout, every power supply fault (see paragraph **"Monitoring the power supply voltage"** on page 26) and every shut-down test.

If the gas pressure switch opens during post-purging or during continuous purging (if set), the motor stops and stays off for the whole time that the gas pressure switch is open and the fault is displayed immediately by the diagnostic LEDs.

5.13.4 Checking the air pressure switch

When the burner receives the heat request the air pressure switch is checked and if it is closed (bonded) the motor does not start and after 2 minutes the lockout condition is reached.

If the motor starts after a heat request, the air pressure switch does not close within 15 seconds of pre-purging, the burner reaches the lockout condition.

If there is a loss of air pressure after the first 15 seconds of pre-purging but before the last 10 seconds, a recycle occurs (the pre-purging time starts from when the air pressure switch closes in a stable manner).

If after a recycle after a loss of air pressure there is a new loss, the burner reaches an immediate lockout condition due to lack of air.

If the loss of the air pressure switch occurs in the last 10 seconds of the pre-purging time (before the start of the safety time) the burner reaches an immediate lockout condition due to lack of air.

If there is a loss of the air pressure switch after the opening of the first stage valves or during normal operation with flame, the burner reaches a lockout condition within 1s.

The state of the air pressure switch does not influence the post-purging time.

Se If continuous purging is set, the motor is powered even if the air pressure switch is sealed but only in a condition without a heat request or after 2 minutes if the lockout occurred after the heat request.

5.13.5 Shut-down test

If the reset push-button or the remote reset is pressed during operations for more than 5 seconds and less of 10 seconds, (to not go to the successive menu) the burner switches off, the gas valve closes, the flame goes out and the start-up sequence restarts.

If the switch off test is enabled, the number of repetitions of the start up sequence (see paragraph **"Recycle and limit of repetitions"** on page 25) and the number of possible resets (see paragraph **"External lockout signal (S3)"** on page 26), are reset.

5.13.6 Intermittent operation

After 24 hours of continuous operation, the control box starts the automatic switch-off sequence, followed by a restart, in order to check for a possible fault with the ionisation probe.

This automatic switch-off can be fixed at 1 hour, (see paragraph **"Programming menu"** on page 29).

The modification of the parameter setting for intermittent operation takes effect if:

- during the heat request, the switching off test function is enabled;
- there is a flame loss;
- the heat request switches off and then later restarts;
- the control box switches off and restarts;
- the automatic restarting of the intermittent function occurs (1hour/24hours).

5.13.7 Recycle and limit of repetitions

The control box allows a recycle function, i.e. complete repetition of the start-up sequence, making up to 3 attempts, in the event the flame failure during operation.

If the flame failure 4 times during operations, this will cause a burner lockout. If there is a new heat request during the recycle, the 3 attempts are reset when the limit thermostat (TL) switches.

By disconnecting the power supply, when a new heat request occurs (power supply is applied to the burner) all possible attempts at re-ignition are reset (maximum 3).

5.13.8 Presence of an extraneous light or parasite flame

The presence of a parasite flame or extraneous light can be detected in the stand-by state after a heat request.

If the presence of a flame or extraneous light is detected also in the "t2" stage, the motor does not start until the flame signal has disappeared or until lockout has been reached.

If after the fan motor starts, during the pre-purging, an extraneous light or parasite flame is detected, the burner reaches the lockout condition in 1 second.

If, during the recycle due to flame disappearance while operating and the consequent repetition of the start-up sequence, the parasite flame or the extraneous light is detected before the motor starts, the 25 seconds control countdown starts (for checking for the presence of the parasite flame or the extraneous light) otherwise the lockout occurs within 1 second.

The fault is indicated by the blinking LED (see paragraph **"Fault diagnostics - lockouts"** on page 24).

When the heat request is finished, if the parasite flame stays on the burner reaches the lockout condition due to parasite flame after 25 seconds (regardless of the presence or otherwise of the post-purging or the continuous purging).

The parasite flame control is active even when there is a fault with the mains voltage, the frequency, the internal voltage, the condition with gas pressure switch open.

The parasite flame control is not active only in lockout conditions.

5.13.9 Duration of ignition transformer discharge

The spark ignition is present during all safety time.



WARNING

In the event of continuous recycling or heat requests that are close together, the maximum allowed number of cycle repetitions for the ignition transformer is one every minute.

5.13.10 Reset by button and remotely of the burner

The burner can be released by pressing, for at least 0.4 seconds, the reset button integrated in the control box and the unlocking occurs only when the button is released.

The burner can also be reset using an external button (remote reset) connected to the R terminals (see RS connector wiring diagram) on the burner by pressing for at least 0.8 seconds.



WARNING

If the reset button is pressed for more than 5 seconds, the control box will not be reset.

5.13.11 Protection reset

The burner can be reset only 5 times consecutively, then power supply has to be disconnected for a new 5 reset possibilities. The burner can only be reset if power supply is applied to the control box.

5.13.12 Reset push-button anomaly

If the reset button is faulty or is kept pressed for more than 60 seconds, the fault is indicated by the blinking of the LED (see paragraph **"Fault diagnostics - lockouts"** on page 24) as long as it is present.

- This fault is only displayed and the LED stops blinking when the fault disappears.
- If the fault is detected during pre-purging or safety time, the burner does not stop (the start-up sequence will continue).
- If the fault is detected during operation, the burner does not stop.
- If the fault is detected during a lockout, the fault is not signalled and the burner cannot be reset.

5.13.13 External lockout signal (S3)

The burner is equipped with an external locking signal function, i.e. to signal (together with the integrated reset button) a burner locking alarm.

The control box provides a command of an external lamp using the S3 output (230Vac-0.5Amp max).

5.13.14 Hour counter functioning (B4)

The burner has an hour counter function that is active as long as the 1st stage oil valve is open and therefore as long as fuel is being consumed.

The control box provides an external meter through the Hour_Counter output (230V AC-0.1Amp max.) of the control box connected to pin B4 of the 7-pole socket coming from the boiler power supply connection at the burner.

5.13.15 Monitoring the power supply voltage

The control box automatically measures the mains voltage.

If the voltage is less than 170V or more than 280V, the burner stops, interrupts the operating cycle and remains in stand-by, signalling a fault. The fault is indicated by the blinking LED (see paragraph **"Fault diagnostics - lockouts"** on page 24).

The burner restarts when the voltage exceeds approx. 180V or if it goes below 270V.

- If the fault is detected with flame operation, the valve is immediately closed and the motor stops.
- If the anomaly is detected during pre-purging, the motor stops.
- If the mains voltage stays within the intermediate values (170÷180V or 270÷280V) when the main power supply switch is closed or after a power failure, the burner does not start.
- If the burner is in lockout, the mains voltage is monitored but not signalled as there is a lockout signal and cannot be reset.

During the ignition time the mains voltage monitoring is deactivated.

5.13.16 Frequency supply error

The control box automatically detects the value of the frequency of the main supply in the range of 50 - 60 Hz, in both cases working times are verified. The fault is indicated by way of the blinking LED (see paragraph **"Fault diagnostics - lockouts"** on page 24).

- If the anomaly is detected before heat demand the burner does not start.
 - If the fault is detected during the pre-purging, the burner remains in purge condition and the fault is appropriately signalled.
 - The fault is not detected during normal running, the burner remains in this state.
- When the fault disappears, the burner restarts.

5.13.17 Internal voltage anomaly

The control box automatically detects if the internal voltage works correctly. The fault is indicated by way of the blinking LED (see paragraph **"Fault diagnostics - lockouts"** on page 24).

- If the anomaly is detected during the initialisation check time, the burner does not start.
 - If the anomaly is detected after a lockout the burner does not start.
 - If the anomaly is detected after a shut-down test, the burner does not start.
 - The fault is not detected during normal running, the burner remains in this state.
- When the fault disappears, the burner restarts.

5.13.18 Checking the fan motor

The control box automatically detects the presence of the fan motor and, if disconnected, it performs a lockout. The lockout is indicated by the blinking of the LED (see paragraph **"Fault diagnostics - lockouts"** on page 24).

5.13.19 Checking the faults of the 1st and 2nd stage valve and the motor

The control box detects the presence of a fault in the controls of the valves and the motor, the fault is indicated by the blinking LED (see paragraph **"Fault diagnostics - lockouts"** on page 24):

- if the anomaly is detected during the initialisation, the burner goes into lockout.
- if the anomaly is detected during the pre-purging, the burner goes into lockout.
- During a recycling, if the fault is detected, the burner does not start and goes into lockout.

The fault is not detected if the burner is in lockout.

The sealing of the contact of the relay inside the motor's control box is intercepted if the gas pressure switch is closed and the motor is connected to the board.

The sealing of the contact of the relay inside the 1st stage valve control is intercepted only with the motor running.

The sealing of the contact of the relay inside the 2nd stage valve control can only be intercepted when the motor is on and the 1st stage valve is controlled.

5.13.20 EEprom check

The control box automatically detects if EEprom memory of micro-controller has failed and will perform a lockout. The lockout is indicated by the blinking of the LED (see paragraph **"Fault diagnostics - lockouts"** on page 24).

5.13.21 Ionisation current

The recommended minimum for operating the burner is 5 μ A. The burner normally supplies a higher current value, so that no check is needed.

In any event, if you want to measure the ionisation current, you need to open the connector (CN1)(Fig. 23) on the red wire and insert a microammeter.

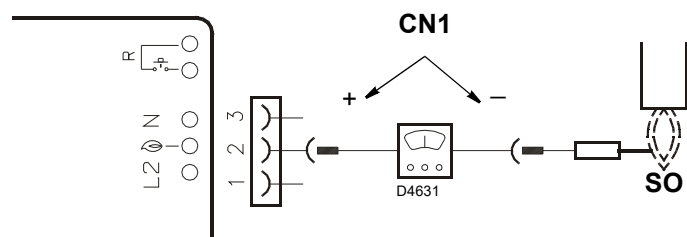


Fig. 23

5.13.22 Post-purging

Post-purging is a function that allows you to maintain the air purging even after the burner is switched off in the absence of the heat request for a pre-set time. The burner switches off the flame when the heat request thermostat opens, cutting off the fuel supply to the valves.

The post-purging function is not performed:

- after a lockout of the motor or valves;
- if the heat request is interrupted during pre-purging.

Post-purging occurs:

- if the heat request is interrupted during the safety time;
- if the heat request is interrupted during normal operation;
- with all types of lockout.

NOTE:

If during post-purging there is an extraneous light or a parasite flame the burner goes into lockout after 25 seconds and post-purging is not stopped.

If during post-purging there is a new heat request, the post-purging time is halted, the fan motor stops and a new burner operating cycle starts.

5.13.23 Continuous purging

Continuous purging is a function that maintains the air ventilation independently of the request for burner ignition.

From the moment when it is set, the motor remains in operation both when the limit thermostat (TL) is not switched over (burner switched off), and when the burner is in lockout.

With the commutation of the limit thermostat (TL) the motor stops for the standby time of 2 seconds, the successive control of the air pressure switch and the start of a new burner operation cycle.

- If during continuous purging when there is no heat request a parasite flame is detected, the motor stays on and a fault is signalled. The burner reaches the lockout condition after 25 seconds.
- If during continuous purging a parasite flame is detected, the motor stays on but if a heat request occurs the motor is switched off, the motor is not started after the standby (2sec) if the parasite flame persists; the burner reaches the lockout condition after 25 seconds. After the lockout has been reset the motor is restarted.
- The motor stays on even in a lockout.
- The continuous purging is interrupted if an internal fault is detected that brings the burner to the lockout condition (eprom, motor, 1st and 2nd stage valves).

5.13.24 Lockout log

The control box allows the logging of the type and number of lockouts that have occurred and keeps them even without the electrical power supply.

The logs of the lockouts allows you to access the last 10 lockouts (see paragraph “**Programming menu**” on page 29).

Once the programming menu page has been reached by push-button the last lockout is displayed, pressing 10 times displays the least recent lockout (each time the burner reaches the lockout condition the oldest one is removed).

5 seconds after the last pressing of the buttons, the type of lockout is displayed, see paragraph “**Fault diagnostics - lockouts**” on page 24).

5.13.25 Logging of burner operating parameters

The control box allows you to log the operating time of the opening of the first stage gas valve.

That way, you can determine how much fuel has been consumed during operation.

The frequency of the count is 1 second.

Saving to memory (eeprom) of the data occurs every 30 minutes if the burner is on.

Saving to memory is carried out even if in the previous 30 minutes the control box was operating only for a short period of time.

If the control box is cut off from the mains power supply between one saving and the next (after 30 minutes) the information about this interval is lost.

If in the interval between one saving and the next a lockout is set, there is writing to memory that involves also the logging of the operating hours.

Together with the operating hours also the number of the burner's first stage valve openings is saved.

In the menu (see paragraph “**Programming menu**” on page 29) it is possible to independently reset both the operating hours meter and the meter for the number of openings of the first stage valve that occurred.

- The number of openings of the first stage valve is a maximum: 16.777.215 (after which it is reset).
- The meter for the number of openings of the first stage valve is a maximum: 65,535 days (after which it is reset).

5.13.26 Admissible lengths of the external connections to the burner

Outlet cables of the burner	Identification	Maximum length permitted (metres)
Mains electric power supply	L1 (L), N	20
GAS pressure switch	PG	1
Heat request thermostat	TL (T1,T2)	20
1st - 2nd stage adjustment thermostat	TR	1
Hour counter	B4	3
External lockout indicator	S3	20
Remote reset	R (RS)	20

Tab. O



In the event of burner applications with remote control commands greater than those indicated in Tab. O, insert the relay command devices (230Vac) with contacts placed near or not more than the maximum indicated lengths.

5.13.27 Long pre-purging

If a long pre-purging is enabled, an initial pre-purging of 1min and 20 sec beyond the default pre-purging time (40 sec) is carried out.

In recycles due to flame loss when operating, the long pre-purging is not carried out but only the pre-purging with the default time (40 sec).

If there is a loss of air pressure during the long pre-purging, the recycle involves a repetition of the pre-purging that in this case is 1 min and 20 sec added to 40 sec.

5.14 Programming menu

5.14.1 General notes

The programming menu can be accessed via the integrated reset push-button, or by remote reset during OPERATION and in STAND-BY.

If in page menu the reset push-button or remote reset button is not pressed within 10 seconds the page will be automatically be exited and there will be a green led blinking for the time set.

If the number of presses on the reset push-button or remote reset button exceeds the maximum allowable, the value that stays in memory will be the maximum one.

If the reset or remote reset button is pressed for more than 60 seconds, a reset button error will be displayed.

5.14.2 Block diagram for entering the menu

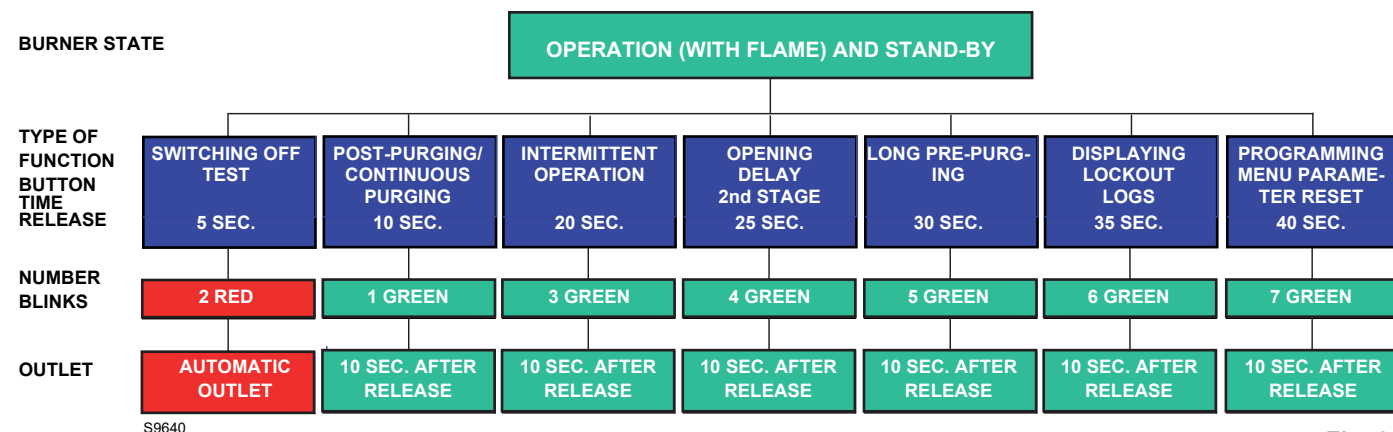


Fig. 24

Function	Button release time	No. of blinks of the led per menu page	No. of pressings of the reset button	No. of blinks of the LED (green)	Quitting the menu
Switching off test	$5s \leq t < 10s$	2 blinks RED	/ none	/ none	Automatic, at the end of the blink
Post-purging/ Continuous purging	$10s \leq t < 15s$	1 GREEN blink	1 = 1 minute 2 = 2 minutes 3 = 3 minutes 4 = 4 minutes 5 = 5 minutes 6 = 6 minutes 7 = continuous purging 8 = 0 m (deactivated) (default)	1 blink 2 blinks 3 blinks 4 blinks 5 blinks 6 blinks 7 blinks 8 blinks	10 sec. after the release of the button
Intermittent operation	$20s \leq t < 25s$	3 blinks GREEN	1 = 1 hour 2 = 24 hours (default)	1 blink 2 blinks	10 sec. after the release of the button
Opening delay 2nd stage	$25s \leq t < 30s$	4 blinks GREEN	1 = 8 sec (default) 2 = 20 sec 3 = 35 sec	1 blink 2 blinks 3 blinks	10 sec. after the release of the button
Long pre-purging	$30s \leq t < 35s$	5 blinks GREEN	1 = activated 2 = deactivated (default)	1 blink 2 blinks	10 sec. after the release of the button
Displaying lockout logs	$35s \leq t < 40s$	6 blinks GREEN	1 = last lockout 2 = 9th lockout 3 = 8th lockout 4 = 7th lockout 5 = 6th lockout 6 = 5th lockout 7 = 4th lockout 8 = 3rd lockout 9 = 2nd lockout 10 = less recent lockout	Displaying the type of lockout according to Tab. M	10 sec after the release of the button (if at level 1). When at level 2, 10 sec after the display of the type of lockout or else pressing the button again before 10 sec you return to level 1 from where, 10 seconds after nothing has been done to the buttons, you exit the menu
Parameter reset programming menu	$40s \leq t < 45s$	7 blinks GREEN	1 = reset of the lockout logs 2 = reset of the no. of lockouts 3 = reset of hours of operation 4 = reset of the no. of heat requests 5 = restoration of default values of the menu parameters	/	10 sec. after the release of the button

Tab. P

5.14.3 Shut-down test

Sequence for shut-down test programming

- Programming allowed in OPERATING mode and in STAND-BY.
- Press the button for 5 sec. $\leq t < 10$ sec.
- The RED LED blinks twice (0.2 sec. ON; 0.2 sec. OFF)
- Release the button.
- The burner will begin a shutdown, followed by a restart.

After shut-down, the burner restarts automatically and the no. of attempts of recycle are restored.

At the exit of shut-down test page menu there are no blinking led.

5.14.4 Post-purging and continuous purging

The post-purging time can be set for a maximum of **6 minutes**, proceeding as follows:

Sequence for programming

- Programming allowed in OPERATING mode and in STAND-BY.
- Press the button for 10 sec. $\leq t < 15$ sec.
- GREEN led blinking 1 time
- Release the button
- GREEN led OFF
- Press the button from 1 - 6 times (*) = 1 ÷ 6 minutes
7 times = continuous purging
- GREEN led ON and OFF every time press and release
- After 10 sec., the GREEN LED will blink for the number of times programmed (0.5 sec. ON; 0.5 sec. OFF)

Sequence for disable

- Reset allowed in OPERATING mode and in STAND-BY.
- Press the button for 10 sec. $\leq t < 15$ sec.
- GREEN led blinking 1 time
- Release the button
- GREEN led OFF
- Press the button 8 times (*)
- GREEN led ON and OFF every time press and release
- After 10 sec. the GREEN led blinks for 8 times (0.5s ON; 0.5s OFF)

If heat request stops during programming of post-purging function, occur exit menu without save the setting value.

If heat request stops during the led blinking occur exit menu, but the setting value is stored.

5.14.5 Intermittent operation

Sequence for enable/disable

- Programming allowed in OPERATING mode and in STAND-BY.
- Press the button for 20 sec. $\leq t < 25$ sec.
- GREEN led blinking 3 times
- Release the button
- GREEN led OFF
- Press the button 1 time to enable a shut-down every hour (*)
- Press the button 2 times to enable a shut-down every 24 hours (*)
- GREEN led ON and OFF every time press and release
- After 10 sec., the GREEN LED will blink for the number of times programmed (0.5 sec. ON; 0.5 sec. OFF)

The modification of the parameter setting for Intermittent operation takes effect:

- after the next heat request by the thermostat (HT)
- after the activation of a switch-off test
- after flame disappearance during operation
- after disconnecting and reconnecting the electrical supply

5.14.6 Setting the opening delay of the 2nd stage

The control box allows you to set the opening delay of the 2nd stage from the 1st stage, see paragraph **“Block diagram for entering the menu”** on page 29.

Sequence for setting the opening delay of the 2nd stage

- Programming allowed in OPERATING mode and in STAND-BY.
- Press the button for 25 sec. $\leq t < 30$ sec.
- The GREEN led blinks 4 times.
- Release the button.
- GREEN led OFF
- Press the button 1 time to enable a delay of 8 sec (*)
- Press the button 2 times to enable a delay of 20 sec (*)
- Press the button 3 times to enable a delay of 35 sec (*)
- GREEN led ON and OFF every time press and release
- After 10 sec., the GREEN Led will blink for the number of programmed times (0.5 sec. ON; 0.5 sec. OFF)

5.14.7 Setting a long pre-purging

The control box allows you to set the long pre-purging, see paragraph **“Block diagram for entering the menu”** on page 29.

Sequence for setting a long pre-purging

- Programming allowed in OPERATING mode and in STAND-BY.
- Press the button for 30 sec. $\leq t < 35$ sec.
- The GREEN led blinks 5 times.
- Release the button.
- GREEN led OFF
- Press the button 1 time to enable the long pre-purging (*)
- Press the button 2 times to disable the long pre-purging (*)
- GREEN led ON and OFF every time press and release
- After 10 sec., the GREEN LED will blink for the number of times programmed (0.5 sec. ON; 0.5 sec. OFF)

5.14.8 Displaying the lockout log

The control box allows you to display the last 10 lockouts that occurred and were logged, accessing the Programming menu on page 29.

Access to this page is possible both in STAND-BY, as well as in the OPERATING status.

Display sequence of the last lockout that occurred

- Keep the button pressed for 35 sec. = $t < 40$ sec.
- The GREEN led blinks 6 times.
- Release the button.
- Displaying the type of lockout memorised for 10 sec.

The time displaying the type of lockout can be extended by re-pressing the reset button during the display of the lockout (the lockout display continues for another 10s).

NOTE:

(*) Always wait 1 sec. with each pressing and release of the button to ensure the command is logged correctly.

5.14.9 Resetting the programming menu parameters and the lockout log

The control box allows you to reset the log and the number of lockouts, the operating hours, the number of ignitions and recover the menu's default, see paragraph "**Block diagram for entering the menu**" on page 29.

Sequence for setting and restoring the parameters

- Programming allowed in OPERATING mode and in STAND-BY.
- Press the button for 40 sec. $\leq t < 45$ sec.
- The GREEN led blinks 7 times.
- Release the button.
- GREEN led OFF
- Press the button 1 time to reset the lockout log (*)
- Press the button 2 times to reset the number of lockouts (*)
- Press the button 3 times to reset the number of hours operating with flame (*)
- Press the button 4 times to reset the number of heat requests (*)
- Press the button 5 times to reset all the default values of the parameters of the PROGRAMMING MENU (*)
- GREEN led ON and OFF every time press and release
- After 10 sec., the GREEN LED will blink for the number of times programmed (0.5 sec. ON; 0.5 sec. OFF).

5.15 Lockout types

Whenever a lockout occurs, the control box shows the reasons for the fault (and the reasons can be identified by the reset button colour).

The sequence of pulses issued by the control box of the LED in the reset button identifies the possible types of fault, which are listed in the table below:

Lockout description	Lockout time	Led colour (*)	Possible cause
Presence of parasite flame during stand-by or the post-purging	After 25 seconds	▲ ▲ ▲ ▲	- presence of a false flame after heat request or during post-purging
Detection of parasite flame during pre-purging	After 1 second	▲ ▲ ▲ ▲	- presence of false flame signal during pre-purging
The flame is not detected after the safety time	3 seconds after the activation of the gas valve	▲ ▲ ▲ ▲	- ionisation probe faulty or not connected - gas valve - faulty ignition transformer - badly regulated burner
Flame failure during operation	After 3 recycles	▲ ▲ ▲ ▲	- burner not calibrated correctly - ionisation probe faulty
Fan motor error	Immediate	▲ ● ▲ ●	- faulty fan motor - fan motor not connected
Fault with the internal control of the 1st stage gas valve	Immediate	▲ ■ ▲ ■	- gas valve - internal control circuit of the 1st stage gas valve faulty
Eeprom error	Immediate	● ■ ● ■	- faulty internal memory
Lockout due to air pressure switch not closing after a heat request or after a recycle due to flame loss during operation	After 15 seconds	▲ ■ ▲ ■	- the air pressure is too low, (the head has been poorly adjusted) - The air pressure switch is defective: change it
Lockout for loss of air pressure or after repetition of the pre-purging due to loss of air, or 10 sec before the end of the pre-purging, or during the safety time, or during normal operation	After 1 second	▲ ▲ ▲ ▲	- the air pressure is too low, (the head has been poorly adjusted) - the air pressure switch is defective: change it
Lockout due to air pressure switch already switched to closing of the heat request thermostat or after a recycle due to flame loss during operation	After 120 seconds	▲ ● ▲ ●	- the air pressure switch is changed over to the operational position, change the pressure switch - the fan motor continues to be powered, check the lockout of the flame control
Fault with the internal control circuit of the 2nd stage gas valve	Immediate	▲ ▲ ▲ ▲	- internal control circuit of the 2nd stage gas valve faulty

Tab. Q

(*) For the blinking frequency of the reset button see paragraph “Fault diagnostics - lockouts” on page 24.



To reset the control box after visual diagnostics have been displayed, you must press the reset button.



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



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

6 Start-up, calibration and operation of the burner

6.1 Notes on safety for the first start-up



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.



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



Refer to paragraph “Safety test - with gas ball valve closed” on page 34 before the first start-up.

6.2 Adjustments prior to ignition

- Check the adjustment of the head as shown in page 16.
- Check the adjustment of the air damper servomotor.
- Slowly open the manual valves situated upstream from the gas train.
- Adjust the air pressure switch to start of the scale.
- Purge the air from the gas line.

We recommend using a plastic tube routed outside the building and to purge air until gas is smelt.



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.

6.3 Gas pressure switch



To calibrate the gas pressure switch, refer to the gas train manual.

6.4 Air pressure switch

The air pressure switch is set after all other adjustments have been made. Begin with the switch at the start of the scale.

With the burner function at the required output, turn the knob slowly in a clockwise direction until burner lockout.

Now turn the knob one notch anti-clockwise and repeat the burner start-up to check everything is regular.

If the burner locks out again, turn the knob again by half a notch.



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

To check this, insert a combustion analyser in the flue, slowly reduce the fan air setting (for example with a piece of cardboard) and verify that the burner locks out before the CO value in the flue gases exceeds 1%.

6.5 Combustion adjustment

In conformity with Efficiency Directive EN 676, the application of the burner on the boiler, the adjustment and testing must be carried out in compliance with the instruction manual of the boiler, including control of the CO and CO₂ concentration in the flue gases, their temperature and the average temperature of the water in the boiler.

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

EN 676		Excess air: max. output $\lambda \leq 1.2$ – min. output $\lambda \leq 1.3$			
GAS	Theoretical max CO ₂ 0 % O ₂	Setting CO ₂ %		CO mg/kWh	NOx mg/kWh
		$\lambda = 1.2$	$\lambda = 1.3$		
G 20	11.7	9.7	9.0	≤ 100	≤ 170
G 25	11.5	9.5	8.8	≤ 100	≤ 170
G 30	14.0	11.6	10.7	≤ 100	≤ 230
G 31	13.7	11.4	10.5	≤ 100	≤ 230

Tab. R

7 Maintenance

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.



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

Before carrying out any maintenance, cleaning or checking operations:



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



Close the fuel interception tap.



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

7.2 Maintenance programme

7.2.1 Maintenance frequency



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

7.2.2 Safety test - with gas ball valve closed

It is fundamental to ensure the correct execution of the electrical connections between the gas solenoid valves and the burner to perform safely the commissioning.

For this purpose, after checking that the connections have been carried out in accordance with the burner's electrical diagrams, an ignition cycle with closed gas ball valve -dry test- must be performed.

- 1 The manual ball gas valve must be closed
- 2 The electrical contacts of the burner limit switch need to be closed
- 3 Ensures closed the contact of the low gas pressure switch
- 4 Make a trial for burner ignition

The start-up cycle must be as follows:

- Starting the fan for pre-ventilation
- Performing the gas valve seal control, if provided
- Completion of pre-ventilation
- Arrival of the ignition point
- Power supply of the ignition transformer
- Electrical Supply of solenoid gas valves

Since the manual gas ball valve is closed, the burner will not light up and its control box will go to a safety lockout condition.

The actual electrical supply of the solenoid gas valves can be verified by inserting a tester. Some valves are equipped with light signals (or close/open position indicator) that turn on at the same time as their power supply.



IF THE ELECTRICAL SUPPLY OF THE GAS VALVES OCCURS AT UNEXPECTED TIMES, DO NOT OPEN MANUAL GAS BALL VALVE, SWITCH OFF POWER LINE; CHECK THE WIRES; CORRECT THE ERRORS AND REPEAT THE COMPLETE TEST.

7.2.3 Checking and cleaning



The operator must use the required equipment during maintenance.

Combustion

Check there are no occlusions or obstructions in the fuel supply or return lines, in the air suction areas, and in the combustion product waste pipe.

Carry out an analysis of the combustion flue gases.

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

Combustion head

Check that the positioning of the combustion head is correct and that it is properly fixed to the boiler.

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

Burner

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

Fan

Check that the air damper is positioned correctly.

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

Gas distributor

Check at regular intervals that the holes of the gas head are not obstructed. If they are, clean them with a pointed tool as shown in Fig. 25.

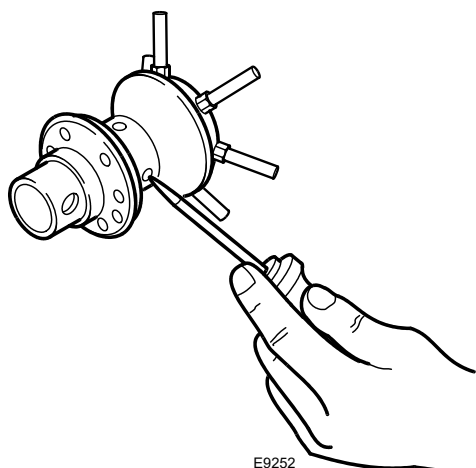


Fig. 25

Boiler

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

Gas train

Check that the gas train is suited to the burner capacity, the type of gas used and the mains gas pressure.

Electrode-probe

Checking the proper positioning of the ionisation probe and electrode as shown in Fig. 13 on page 17.

Pressure switches

Check that the air pressure switch and the gas pressure switch are set correctly.

Gas leaks

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

Gas filter

Change the gas filter when it is dirty.

Combustion

If the combustion values measured before starting maintenance do not comply with applicable legislation or do not indicate efficient combustion, consult the Tab. R on page 33 or contact our Technical Support Service to implement the necessary adjustments.

Leave the burner working without interruption for about 10 min, checking the right settings in the 1st and 2nd stage of all the components stated in this manual

- Percentage of CO₂ (%);
- CO content (ppm)
- NOx content (ppm)
- Ionisation current (μA)
- Smoke temperature at the flue

7.2.4 Safety components

The safety components must be replaced at the end of their life cycle indicated in Tab. S. The specified life cycles do not refer to the warranty terms indicated in the delivery or payment conditions.

Safety component	Life cycle
Flame control	10 years or 250,000 operation cycles
Flame sensor	10 years or 250,000 operation cycles
Gas valves (solenoid)	10 years or 250,000 operation cycles
Pressure switches	10 years or 250,000 operation cycles
Pressure adjuster	15 years
Servomotor (electronic cam) (if present)	10 years or 250,000 operation cycles
Oil valve (solenoid) (if present)	10 years or 250,000 operation cycles
Oil regulator (if present)	10 years or 250,000 operation cycles
Oil pipes/ couplings (metallic) (if present)	10 years
Flexible hoses (if present)	5 years or 30,000 pressurised cycles
Fan impeller	10 years or 500,000 start-ups

Tab. S

7.3 Opening the burner

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



Close the fuel interception tap.



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

If maintenance of the combustion head is required, refer to the instructions given in Operating position on page 14.

For accessing to the interior of the burner, loosen the screws that secure the cover and proceed with the maintenance operation.

**Operating safety hazards**

Repairs to the following components may only be carried out by the respective manufacturers or by personnel instructed by them:

- fan motor
- actuator
- air damper servomotor
- electromagnetic valves
- burner programmer

Check the operation

- Burner start-up with sequence of the functions
- Ignition device
- Air pressure switch
- Flame monitoring
- Seal test of components to the passage of fuel



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

8 Faults - Possible causes - Solutions

Here below you can find some causes and the possible solutions for some problems that could cause a failure to start or a bad working of the burner.

In most cases, an operation irregularity leads to the lighting up of the signal inside the reset button of the control box (Fig. 4 on page 11).

When lock out lamp lights the burner will attempt to light only after pushing the reset button. If ignition is then normal, the lockout can be attributed to a temporary fault.

However, if lockout continues, you must determine the cause of the problem and take the action illustrated in Tab. T and Tab. U.



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



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

8.1 Start-up problems

Faults	Possible Causes	Solution
The burner does not start when the heat request thermostat closes.	Lack of electrical supply.	Check presence of voltage in the L1-N clamps of the 7 pin plug. Check the conditions of the fuses. Check that safety thermostat (TS) is not in lockout.
	Lack of gas.	Check the gate opening. Check that the valves change over to the opening position and there are not short circuits.
	The gas pressure switch does not close its contact.	Adjust them.
	The connections in the control box are wrongly inserted.	Check and connect completely all the plugs.
	The air pressure switch is changed over to the operational position.	Replace the pressure switch.
Burner runs normally in pre-purging and ignition cycle and locks out after the safety time.	The phase-neutral connection is inverted.	Invert them.
	The earth connection lacks or is inefficient.	Make the earth connection efficient.
	The ionisation probe is earthed or not in contact with the flame, or its wiring to the control box is broken, or there is a fault on its insulation to the earth.	Check the right position and if necessary set it according to the instructions of this manual. Reset the electrical connection.
		Replace the faulty connection.
Burner starts with an ignition delay.	The ignition electrodes is wrongly positioned.	Adjust it according to the instructions of this manual.
	Air flow rate is too high.	Set the air output according to the instructions of this manual.
	Valve brake is too close with insufficient gas output.	Adjust it.
The burner does not switch to the 2nd stage.	The air damper opener is jammed.	Check that it is working properly. Check the precise electrical connection.
	The 2nd stage gas valve does not energise.	Valve broken: replace it. Check the air damper opener works properly.
The burner locks out after the pre-purge phase due to flame-failure.	The solenoid valves is passing too little gas.	Check the pressure in the network and/or adjust the solenoid valve according to the instructions of this manual.
	The solenoid valves are defective.	Change them.
	The ignition arc is irregular or has failed.	Check the right insertion of the connectors. Check the right position of the electrode according to the instructions of this manual.
	The pipe has not been purged from the air.	Carry out a complete breathing of the line of gas-supply.

Faults	Possible Causes	Solution
The burner locks out during the pre-purge phase.	The air pressure switch does not change over to the operational position.	The pressure switch is faulty, replace it. The air pressure is too low, (the head is bad adjusted).
	The flame exists.	Faulty valves: replace them.
The burner continues to repeat the starting cycle without going on lockout.	The gas pressure in the gas-mains lies very close to the value to which the gas pressure switch has been set.	Lower and set the pressure switch.
	The sudden drop in pressure when the valve is opened provokes the opening of the pressure switch itself, so the valve closes again immediately and the motor stops. The pressure then starts to increase again, the pressure switch closes, the start-up cycle begins again and so on.	

Tab. T

8.2 Operating faults

Fault	Possible Causes	Solution
The burner locks out during operation.	Earth probe.	Check the right position and if necessary set it according to the instructions of this manual. Clean or replace the ionisation probe.
	The flame disappears 4 times.	Check the gas pressure in the network and/or adjust the solenoid valve according to the instructions of this manual .
	Air pressure switch opening.	The air pressure is too low, (the head is bad adjusted). The air pressure switch is defective: change it.
The burner tends to lose the flame in the passage from the 1st to 2nd stage.	Burner output ratio between the 1st and 2nd greater than 1:2.	Restore the correct maximum ratio of 1:2 checking that the burner output of the 1st stage is not less than the minimum of the firing rate.
	High air excess in 1st stage.	Reset the correct air excess value (I min. = 1.3).
Burner shut down.	Gas pressure switch opening.	Check the pressure in the network and/or adjust the solenoid valve according to the instructions of this manual.

Tab. U

A Appendix - Accessories**Extended head kit**

Burner	Standard length (mm)	Extended head length (mm)	Code
BS3D	110 - 128	267 - 282	3001009
BS4D	145 - 168	302 - 317	3001016

LPG kit

Burner	Kit code for standard head and Extended head	Code
BS3D	3001005	3002736
BS4D	3001011	3002737

Town gas kit

Burner	Kit Code for standard head	Kit Code for extended head
BS3D	3002729	3002729

Vibration damper flame funnel kit

Burner	Code
BS3D	3001060
BS4D	3001070

Differential circuit breaker kit

Burner	Code
All models	3001180

Multibloc rotation kit

Burner	Code
BS3D - BS4D	3001178

PC interface kit

Burner	Code
All models	3002731

7-pin plug kit

Burner	Code
All models	3000945

Gas trains in compliance with EN 676

Please refer to manual.

1	声明	3
2	信息和一般警告	4
2.1	有关说明手册的信息	4
2.1.1	介绍	4
2.1.2	一般危险	4
2.1.3	其它符号	4
2.1.4	系统和说明手册的交付	5
2.2	保证和责任	5
3	安全性和预防措施	6
3.1	背景	6
3.2	人员培训	6
4	燃烧器的技术描述	7
4.1	燃烧器名称	7
4.2	可提供型号	7
4.3	燃烧器类别 - 目的地国家	7
4.4	技术数据	8
4.5	电气数据	8
4.6	最大尺寸	9
4.7	点火率	10
4.8	试验锅炉	11
4.8.1	商用锅炉	11
4.9	燃烧器说明	12
4.10	燃烧器设备	12
4.11	电气控制箱	13
5	安装	14
5.1	安装安全性说明	14
5.2	避免燃烧器燃料烧尽或燃烧不良的指示	14
5.3	搬运	14
5.4	预检	14
5.4.1	控制供给	14
5.4.2	控制燃烧器特性	15
5.5	操作位置	15
5.6	将燃烧器固定到锅炉上	16
5.7	燃烧头调整	17
5.7.1	拆卸燃烧头总成	17
5.7.2	安装燃烧头总成	17
5.8	放置探头 - 电极	18
5.9	风门调整	18
5.10	燃气供给	19
5.10.1	燃气供给管路	19
5.10.2	燃气阀组电源电缆	19
5.10.3	燃气阀组	20
5.10.4	燃气压力	20
5.11	电气布线	21
5.11.1	出厂配备的电气系统	22
5.12	运转程序	23
5.13	时间表	24
5.13.1	运转状态显示	24
5.13.2	故障诊断 - 停机	25
5.13.3	检查燃气压力开关	26
5.13.4	检查空气压力开关	26
5.13.5	关机测试	26
5.13.6	间歇工作	26
5.13.7	再循环与次数限制	26
5.13.8	存在外部光线或寄生火焰	26
5.13.9	点火变压器放电期间	27
5.13.10	按钮和远程释放燃烧器	27
5.13.11	保护复位	27

5.13.12	复位按钮异常	27
5.13.13	外部停机信号 (S3)	27
5.13.14	小时计数器功能 (B4)	27
5.13.15	监测电源电压	27
5.13.16	电源频率错误	27
5.13.17	内部电压异常	27
5.13.18	检查风扇电机	27
5.13.19	检查第一级和第二级阀与电机故障	28
5.13.20	EEPROM 检查	28
5.13.21	电离电流	28
5.13.22	后净化	28
5.13.23	连续净化	28
5.13.24	停机记录	29
5.13.25	记录燃烧器运行参数	29
5.13.26	燃烧器外部连接的允许长度	29
5.13.27	长时间预净化	29
5.14	编程菜单	30
5.14.1	一般说明	30
5.14.2	进入菜单框图	30
5.14.3	关机测试	31
5.14.4	后净化	31
5.14.5	间歇工作	31
5.14.6	设置第二级开启延迟	31
5.14.7	设置长时间预净化	31
5.14.8	显示停机记录	32
5.14.9	复位编程菜单参数和停机记录	32
5.15	停机类型	33
6	燃烧器起动、校准和工作	34
6.1	首次起动安全性说明	34
6.2	点火前的调整	34
6.3	燃气压力开关	34
6.4	空气压力开关	34
6.5	燃烧调整	34
7	维护	35
7.1	维护安全性说明	35
7.2	维护计划	35
7.2.1	维修次数	35
7.2.2	安全性测试 - 燃气管阀关闭	35
7.2.3	检查和清洁	35
7.3	打开燃烧器	36
7.3.1	安全部件	36
8	故障 - 可能的原因 - 解决方案	37
8.1	起动问题	37
8.2	工作故障	38
A	附录 - 附件	39

1 声明

合规性声明符合 ISO / IEC 17050-1

厂商：	RIELLO S.p.A. (利雅路公司)		
地址：	Via Pilade Riello , 7 37045 Legnago (VR)		
产品：	强制通风式燃气燃烧器		
型号：	BS3D - BS4D		
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	低电压指令	
EMC	2014/30/UE	电磁兼容性	

由符合 ISO 9001:2015 认证的品质管理系统保证质量。

Legnago , 03.05.2021

研究与开发主任
RIELLO S.p.A. - 燃烧器部
Eng. F. Maltempì



2 信息和一般警告

2.1 有关说明手册的信息

2.1.1 介绍

说明手册随燃烧器一起提供：

- 是产品的一个不可缺少的组成部分，不可与产品分开；因此必须妥为保管以备查询，即使燃烧器转给新业主或新用户或另一系统，也不得与燃烧器分开。如果手册遗失或损坏，必须向当地的技术支持中心索要副本。
- 本手册应由合格人员使用；
- 手册中提供了有关燃烧器安装安全性、启动、使用和维护的重要说明。

手册中使用的符号

在手册中的有些地方可以看到三角形危险标志。对此要给予极大的注意，它们表示有潜在的危险。

2.1.2 一般危险

危险有 3 个级别，如下所示。



危险

最大危险级！

该符号指示如果不正确操作，会造成严重伤害、死亡或长期健康风险。



警告

该符号指示如果不正确操作，可能造成严重伤害、死亡或长期健康风险。



小心

该符号指示如果不正确操作，可能造成机器损坏和 / 或人身伤害。

2.1.3 其它符号



危险

危险：带电部件

该符号指示不正确操作会导致有致命后果的电击。



危险：可燃材料

该符号指示有可燃材料。



危险：烧伤

该符号指示有高温烧伤的风险。



危险：挤压肢体

该符号指示有运动机件：可能造成挤压肢体的危险。



警告：运动机件

该符号指示必须将自己的肢体避开运动的机件；以免受到挤压。



危险：爆炸

该符号指示此处可能有爆炸性气氛。爆炸性气氛的定义是在大气条件下，空气与以气体、蒸气、雾气或粉尘形式的可燃物质的混合物，发生点燃后，燃烧会传播到整个未燃烧的混合物。



个人防护装备

这些符号指示操作者为避免操作时受到安全或健康的威胁所应穿戴或保有的防护装备。



安装防护罩与所有安全保护装置的责任

该符号指示在维护、清洁或检查运转后，有责任安装防护罩与所有安全保护装置。



环境保护

该符号指示使用机器时要保护环境。



重要信息

该符号指示应该牢记在心的重要信息。



该符号指示一个列表。

2.1.4 系统和说明手册的交付

交付系统时，一定要：

- 系统厂商要将说明手册交付给用户，同时建议用户将手册保存在热发生器安装的房间内。
- 说明手册载有：
 - 燃烧器的序号；

- 最近支持中心的地址和电话号码

- 系统供应商必须认真向用户说明：
 - 系统的使用；
 - 启用系统前可能要求的进一步测试；
 - 进行维护，并需要由厂家代表或其它专业技术人员每年至少对系统检查一次。为确保进行定期检查，厂家推荐拟定一份维护合同。

2.2 保证和责任

厂家保证其新产品自安装之日起符合现行法规和/或销售合同。在首次起动时，检查燃烧器是否完好和齐全。



警告

未遵守本手册所提供的资料、操作疏忽、不正确的安装和进行未经授权的改装，将致使燃烧器随附的制造商保修失效。

尤其是以下原因而造成的物品损坏或人员伤害将导致质保权利与责任永久失效：

- 不正确的安装、启动、使用和维护燃烧器；
- 不恰当、不正确或不合理的使用燃烧器；
- 不具备相应资格的人员的介入；
- 对设备进行未经授权的修改；
- 将燃烧器与有故障、不正确应用和/或不工作的安全设备一起使用；
- 在燃烧器上安装未经测试的辅助组件；
- 燃烧器使用不合适的燃料；
- 燃料供给系统中有故障；
- 发生故障后继续使用燃烧器；
- 进行过不正确的维修和/或大修；
- 使用会妨碍结构性火焰正常燃烧的插件修改燃烧室；
- 对燃烧器的易损件和易耗件监测与养护不足或不当；
- 使用非原厂部件，包括备件、套件、附件和选装件；
- 不可抗力。

此外，制造商对因未遵守本手册内容而导致的任何以及所有责任概不负责。

3 安全性和预防措施

3.1 背景

燃烧器应用了已知安全技术规则，并考虑了所有潜在的危险情况，其设计与制造均符合当前法规与指示。

但是，仍有必要牢记，轻率或不适当的使用设备可能会导致使用者或第三方面临死亡风险，并损坏燃烧器或其他物品。粗心、疏忽和过于自信常常会导致事故；疲劳和困倦同样会导致事故的发生。

最好牢记以下内容：

- 必须谨遵明确说明使用燃烧器。任何其他使用方法均为不当，因此是极为危险的。

特别是：

该内容适用于采用水、蒸汽、导热油运转的锅炉和制造商明确说明的其他用户。

3.2 人员培训

用户为已购买该机器且打算将其用作特定用途的人员、组织或公司。用户需对机器以及相关工作人员的培训负责。

用户：

- 应确保仅由受过适当培训且具备相应资格的人员使用该机器；
- 应告知其工作人员以恰当的方式使用该机器并遵守安全说明。为此目的，他/她的职责应是确保每个人都已熟悉使用及安全说明。
- 操作人员必须遵守机器上显示的所有危险和警示说明。
- 操作人员严禁进行超出其职责范围的个人计划、操作或干预。
- 操作人员必须告知其上级任何可能出现的问题或危险情况。
- 装配其他品牌产品或任何修改都可能改变机器特性，从而损害操作安全。因此，对于因使用非原装部件而造成的任何损坏，制造商概不负责。

燃料的类型和压力、电力供应的电压与频率、燃烧器规定的最小和最大输送量、燃烧室的增压、燃烧室的尺寸和环境温度均必须在说明手册中的规定值内。

- 修改燃烧器以改变其性能和目标的做法是不允许的。
- 燃烧器必须用于示范的技术安全环境中。任何可能损害安全性的障碍都必须尽快清除。
- 不允许打开或改动燃烧器组件，需要维护的部件除外。
- 只可更换制造商指定的部件。



警告

制造商仅对所有完好无损且正确安装的燃烧器组件的安全性和正常运转提供保证。

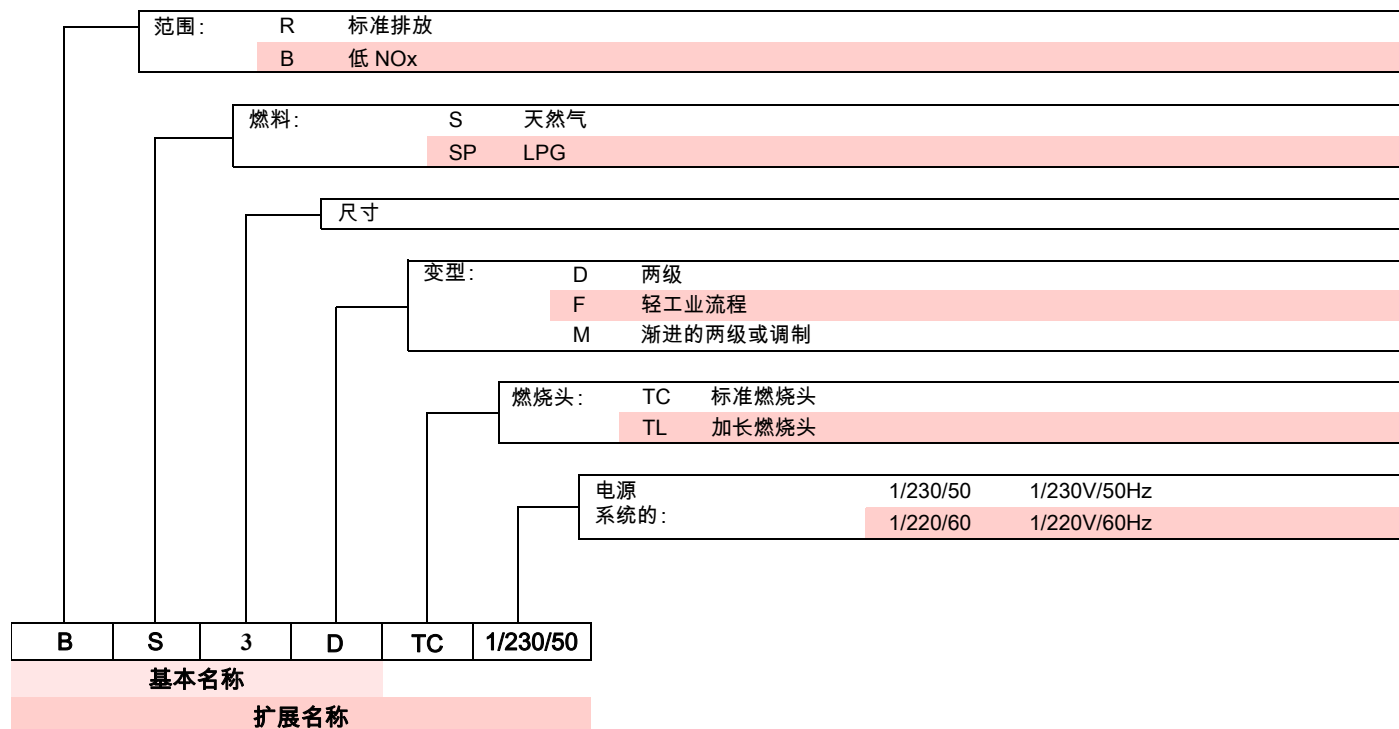
此外：



- 用户必须采取所有必要措施，以防止未经授权的人员使用该机器；
- 如果用户注意到事故预防系统有故障或失灵及想到的任何险情，必须向厂家通报。
- 操作人员必须始终使用法律规定的个人防护设备，并遵守本手册中给出的指示。

4 燃烧器的技术描述

4.1 燃烧器名称



4.2 可提供型号

名称	燃烧头	电压	代码
GULLIVER BS3D	TC	1/230/50	20023689
GULLIVER BS4D	TC	1/230/50	20023768

表 A

4.3 燃烧器类别 - 目的地国家

目的地国家	燃气类别
SE - FI - AT - GR - DK - ES - GB - IT - IE - PT - IS - CH - NO	I _{2H}
DE	I _{2ELL}
NL	I _{2E} - I ₂ (43.46 - 45.3 兆焦 / 米 ³ (0°C))
FR	I _{2Er}
BE	I _{2E} (R) B
LU - PL	I _{2E}

表 B

4.4 技术数据

型号		BS3D	BS4D
热输出量 (1)	千瓦 兆卡 / 小时	65/75 - 197 55.9/68.8 - 162.5	110/140 - 249 94.6/120.4 - 215
燃料	气 G20	NCV : 8 - 12 千瓦时 / 牛米 ³ = 7000 - 10,340 千卡 / 牛米 ³ 压力 : 最小 20 毫巴 – 最大 100 毫巴 (2)	
运转		间歇式 (FS1)	
用途		锅炉 : 水和导热油	
环境温度	°C	0 - 40	
燃烧空气温度	°C 最大	40	
噪声级 (3)	声压	65	67
	声功率	76	78
重量	公斤	16	20

表 C

(1) 参考条件 : 环境温度 20°C - 燃气温度 15°C - 大气压力 1,013 毫巴 - 海拔高度 0 米 a.s.l.
(2) 输入压力和输出压力之间 Δp 最大 50 毫巴。
(3) 厂家燃烧试验室测量的声压，燃烧器配试验锅炉，以最大输出工作。依据 EN 15036，声功率以“自由场”法按精确“精度测量：类别 3”测量，如 EN ISO 3746 标准中所述。

4.5 电气数据

型号		BS3D	BS4D
电源			
风扇电机	转速	2800	2720
	V	230	230
	W	150	250
	A	1.8	1.9
电容器	µF	6.3	8
点火变压器		初级 230V 次级 1 x 18 kV - 11 mA	
吸收电功率	千瓦	0.35	0.53
防护等级			

表 D

4.6 最大尺寸

法兰和燃烧器的最大尺寸见 图 1。

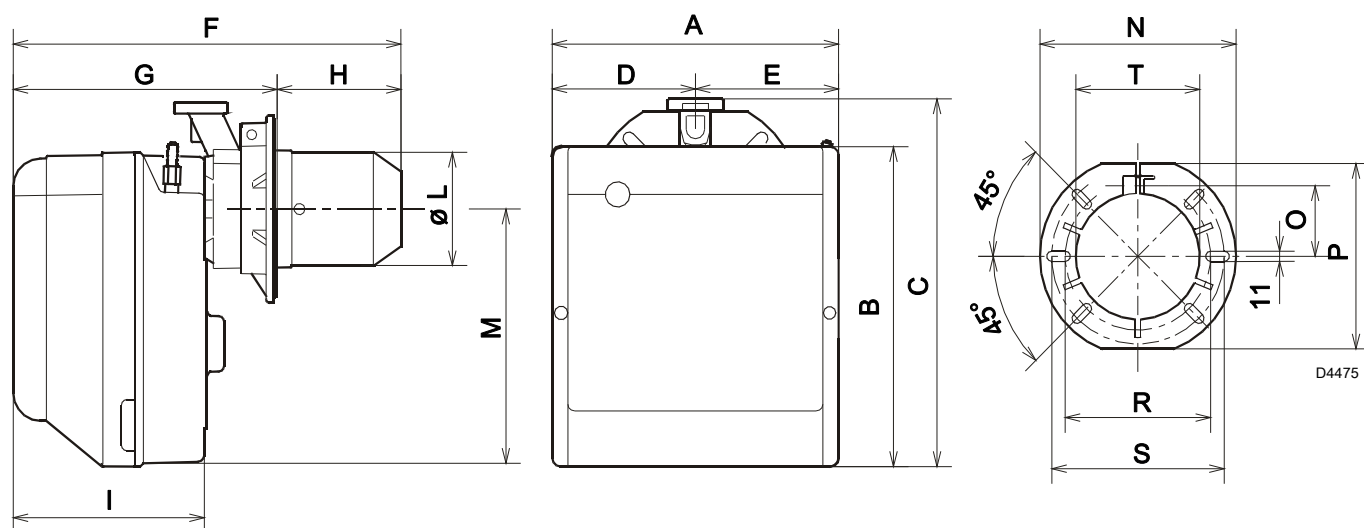


图 1

型号	A	B	C	D	E	F	G	H	I	L-T	M	N	O	P	R	S
BS3D	300	345	391	150	150	390	262-280	128-110	196	129	285	216	76.5	201	160	190
BS4D	300	345	392	150	150	446	278-301	168-145	216	137	286	218	80.5	203	170	200

表 E

4.7 点火率

(图 3) 燃烧器输出由图表区中选择。



警告

点火率 (图 3) 在环境温度 20 °C、大气压力 1013 毫巴 (约 0 m a.s.l.) 且燃烧头按页 16 指示调节的条件下获取。



警告

仅对 BS4D 型号

燃烧器输出从 220 ÷ 249 千瓦, 为确保运转, 拆下预切割的隔音层释放罩面上的附加空气输入槽口 (见 A 图 3)。

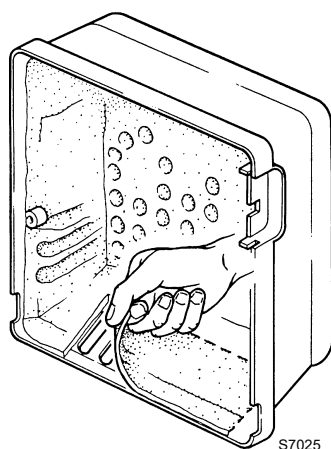


图 2

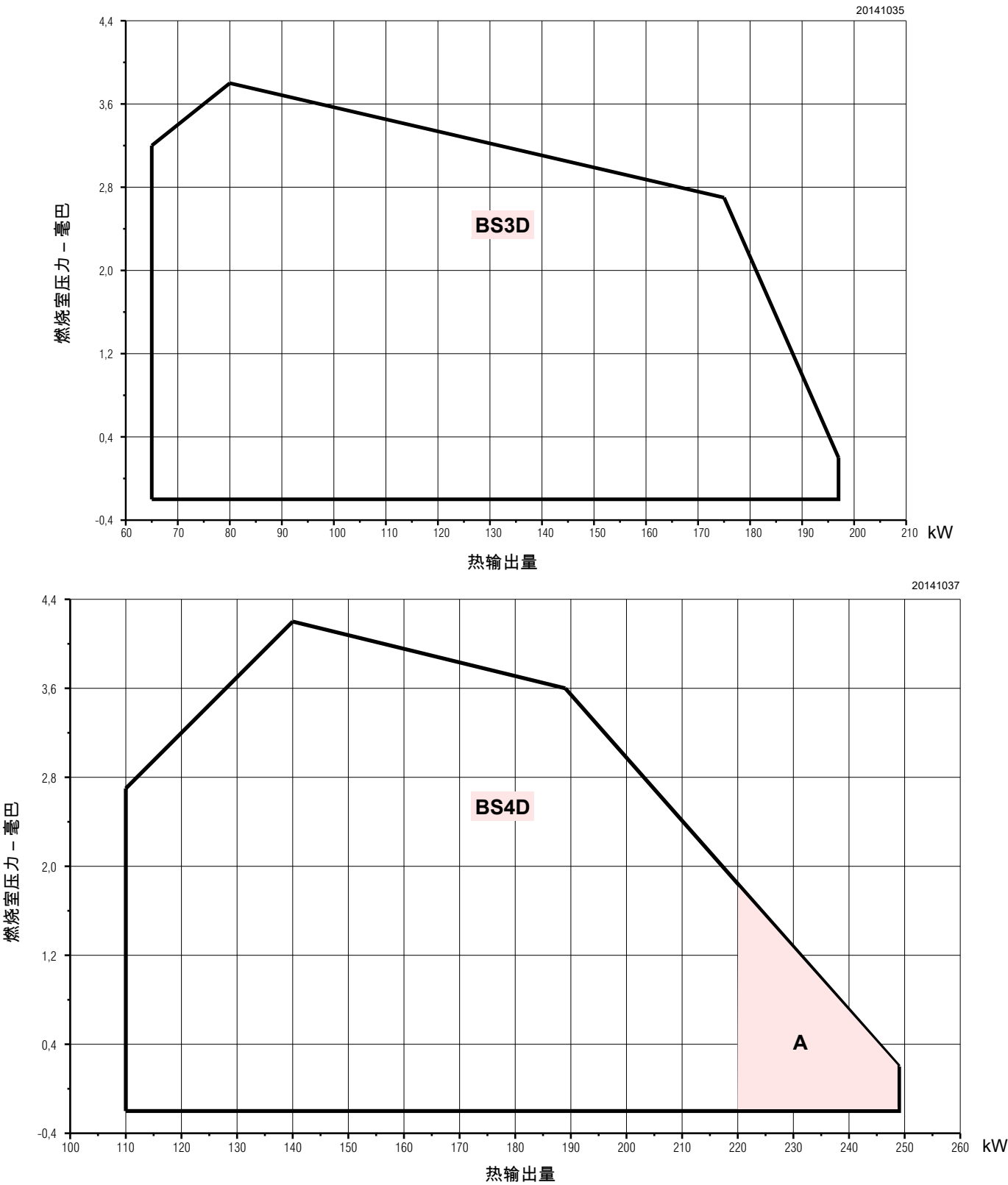


图 3

4.8 试验锅炉

在试验锅炉上根据 EN 676 标准确定点火率。

4.8.1 商用锅炉

如果锅炉符合 EN 303 且燃烧室尺寸如图 EN 676 中所示，可以保证燃烧器 - 锅炉匹配。

对于锅炉不符合 EN 303 或燃烧室尺寸比 EN 676 小很多的应用，
请向厂家咨询。

4.11 电气控制箱

控制箱是强制通风式燃烧器的一个控制和监测系统，用于间歇工作（每 24 小时至少进行一次受控停机）。

重要说明



为避免事故、材料或环境损坏，请遵守以下指示！
控制箱是一个安全装置！避免打开或改动或强制其工作。对于未授权的工作导致的损坏，厂家不承担任何责任！

- 所有干预（装配和安装运转、支持等）必须由合格人员进行。
- 改动控制箱连接区的布线前，要将系统与电源完全断开（地线火线全断）。
- 正确装配可获得保护，防止受到控制箱和所有连接电气部件的电击。
- 进行任何干预前（装配和安装运转、支援等），确保线路布置有序，参数设置正确，然后进行安全性检查。
- 坠落和碰撞可能对安全性功能造成负面影响。在这种情况下不得操作控制箱，即使控制箱未显示明显的损坏。

为了安全性和可靠性，请遵守以下指示：
- 避免处于易凝结和潮湿的环境下。否则，再次接通前，确保控制箱完全干燥。
- 必须避免出现静电，因为接触时，静电会损坏控制箱的电器组件。

安装说明

- 检查锅炉内的电气线路是否符合国家和本地的安全规定。
- 安装符合当地规定的开关、保险和地线等。
- 不要将带电导体与不带电导体混淆。
- 确保分接线不接触到相邻端子。使用合适的套管。
- 单独布置高压点火电缆，尽可能远离控制箱和其它电缆。
- 进行装置布线时，为避免电击危险，确保 230V 交流电源电缆与超低压电缆严格分开。

要从燃烧器拆下控制箱需要（图 5）：

- 分断所有与之相连的连接器、所有的垃圾、高压电缆和地线（TB）；
- 拧松螺钉（A），朝箭头方向牵拉控制箱。

要安装控制箱需要：

- 以 1 - 1.2 牛米拧紧力矩拧紧螺钉 A）；
- 重新连接前面断开的的所有连接器，确保连接 7 脚电源插头是最后一步。

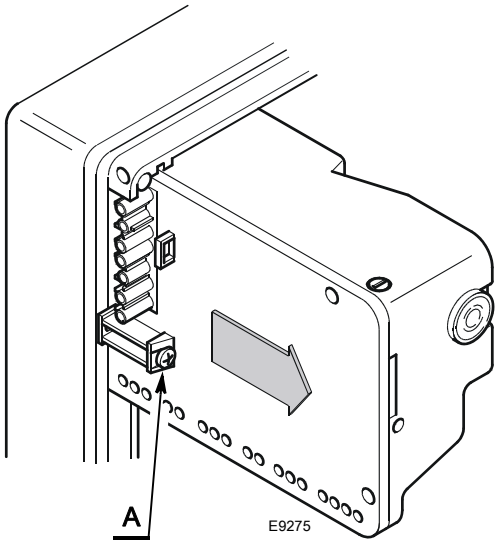


图 5

注意：

燃烧器已经通过用于间歇运转的型式认证。这意味着每 24 小时必须停机一次，让电气控制箱检查它在起动时的效率。锅炉限制温控器（TL）一般可以确保燃烧器停机。如果出现异常，需要给限制温控器串接一个定时开关，至少每 24 小时让燃烧器停机一次。

电离探头的电气布线

信号传输中几乎完全避免任何干扰或损失是非常重要的：

- 一定要将探头电缆与其它电缆分开：
 - 线路电容会降低火焰信号的幅值；
 - 使用单独的电缆。
- 电缆长度不得超过 1 米。
- 注意遵守极性的要求
- 绝缘电阻：
 - 探头和接地之间应至少 50 兆欧 Ω ；
 - 探头脏污会降低绝缘电阻，形成漏电流。
- 电离探头未进行防电击保护。连接电源前，必须防止误接触电离探头。
- 布置电离探头时要让点火火花不能在探头上形成电弧（避免过充电）。

技术数据

电源电压	AC 210...230 V -15 % / +10 %
电源频率	50/60 Hz \pm 5 %
内置保险	T4A 250V
能量消耗	40 VA
防护等级	IP00

表 F

5 安装

5.1 安装安全性说明

将燃烧器即将安装的区域周围认真清理完毕，并正确安排环境照明后，请继续进行安装操作。



所有安装、维护和拆卸操作必须断电进行。



本燃烧器的安装必须由合格人员遵照本手册和适用的标准和法规进行。



锅炉内的燃烧气体必须远离有害混合物（如：氯化物、氟化物、卤素）；如有此种有害混合物，强烈建议更为频繁地进行清洁与维修。

5.2 避免燃烧器燃料烧尽或燃烧不良的指示

- 1 燃烧器不能安装在室外，只适合在密闭的房间中工作。
- 2 燃烧器的安装房间必须设有进气开口供燃烧使用。确保这一点，在关闭门窗时必须控制排气中的 CO_2 和 CO 。
- 3 如果燃烧器工作的房间中有排风器，确保进气口足够大以保证所需的换气；在任何情况下，燃烧器停机时都要检查是否

- 4 从燃烧器管道中抽出热烟气。
燃烧器停机时，烟道必须保持开通，在燃烧室中形成自然通风。如果排烟管关闭，燃烧器必须回缩，直到送风管退出炉膛。进行这种运转前要断开电源。

5.3 搬运

运输重量见章节“技术数据”页 8。

遵守储藏和运输容许的环境温度：-20... + 70 °C，最大空气相对湿度 80%。



将燃烧器放到安装点附近后，正确处置所有残留的包装，将包装材料按类别分开。



继续进行安装操作之前，请将燃烧器即将安装的区域周围认真清理完毕。



安装时操作者必须使用要求的设备。

5.4 预检

5.4.1 控制供给



去除所有包装后，检查设备的完整性。

如果对此有疑问，不要使用燃烧器；联系供应商。



不要丢弃包装元件（纸板箱、卡子、塑料袋等）以免形成潜在的污染源和污染；应将它们收集起来并在合适的地点进行处置。

5.4.2 控制燃烧器特性

检查燃烧器铭牌（图 6），是否载有：

- A 燃烧器型号
- B 燃烧器类型
- C 制造年份代码
- D 序号
- E 电源数据和防护等级
- F 电功率消耗
- G 燃烧器最小和最大输出可能性数据（见点火率）警告。燃烧器输出必须在锅炉的点火率范围之内。



燃烧器标签如受到擅自改动、拆除或丢失，或添加了可能干扰燃烧器标识识别的其它标签，将会令燃烧器的安装和维护工作变得困难。



标签上的数据（图 6）供参考。有些数据可能标注在其它位置。

R.B.L.		A				TIPO TYP TYPE		B	B	C
II2ELL 3B/P DE		D				E				F
II2H3B/P AT,CH,IS		II2H3 GB,IE,IT N2L3B/P LU		GAS GAZ		<div><input checked="" type="checkbox"/> FAM.2</div> <div><input type="checkbox"/> FAM.3</div> <div>G</div>				
I2E(P)B.I3 BE II2L3B/P NL II2Er3P FR		Icc A I max A		PESO kg		RIELLO S.p.A. I-37048 Legnago (VR)		<div>CE</div>		
20098188										

图 6

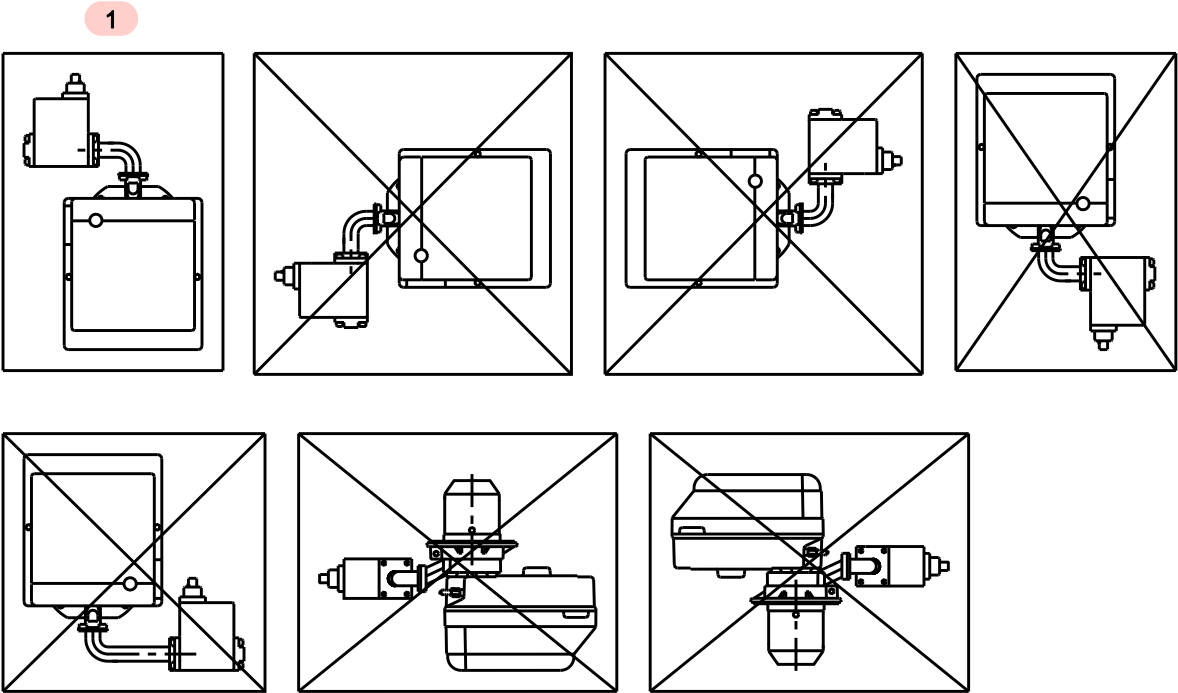
5.5 操作位置



燃烧器设置为只能在位置 1（图 7）操作。



任何其他位置都将有损于燃烧器的正确运转。



20178598

图 7

5.6 将燃烧器固定到锅炉上



提供一个适当的燃烧器提升系统。



警告

燃烧器和锅炉之间的密封必须是气密的。

向锅炉上安装燃烧器时，进行以下操作：

- 必要时，加宽绝缘衬垫孔（图 8），注意不要损坏孔。

燃烧器可以固定在不同的位置 A），如图图 9 中所示。

型号	A (毫米)
BS3D	128 ÷ 110
BS4D	167.5 ÷ 145

表 G

- 使用螺钉 4）和（必要时）螺母 2）将法兰 5）固定到锅炉 1 的门上）（图 10），之间放上隔热衬垫 3），但上面的两个螺钉 4）之一不要拧紧。
- 将燃烧器的燃烧头插入法兰 5），用螺钉 6）拧紧法兰，然后锁紧松着的螺钉 4）。



警告

一定要确保燃烧头跨过锅炉门的整个厚度。

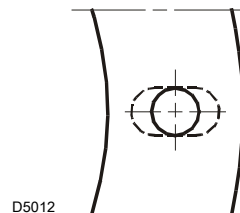


图 8

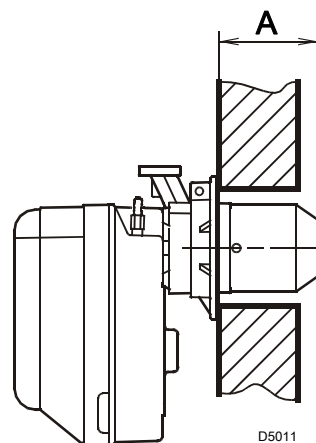


图 9

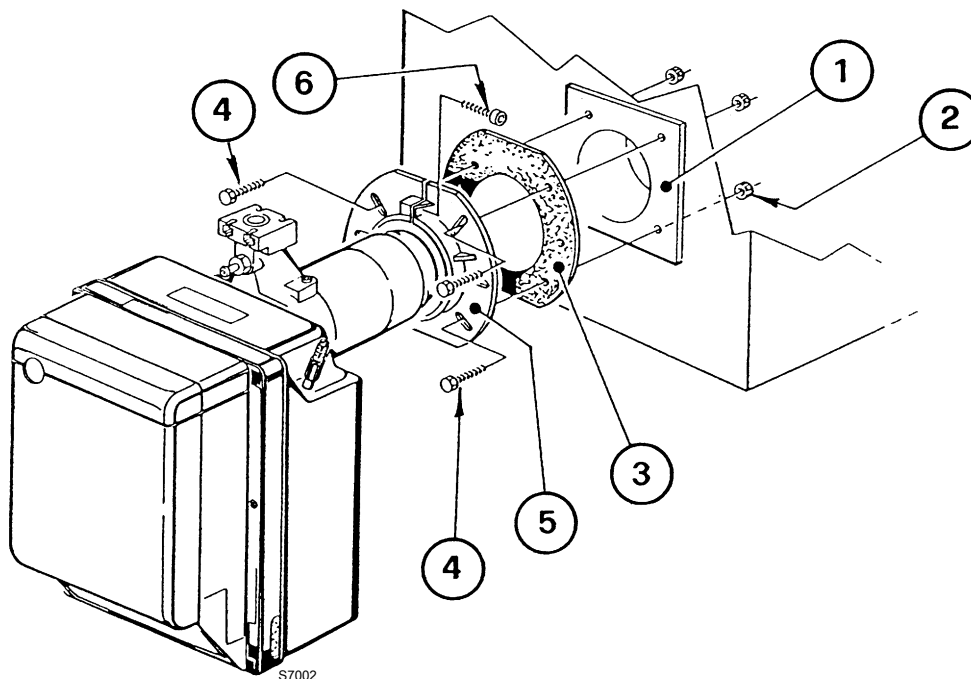


图 10

5.7 燃烧头调整

燃烧头的调整取决于燃烧器输出。
通过顺时针或反时针转动调节螺丝 6) (图 11) 进行调整，直到调节杆 2) 上的刻痕与与燃烧头总成 1) 的外表面对齐。
在 图 11 中，燃烧头调节杆设定在刻痕 3。

BS3D 燃烧器示例

图 (图 12) 仅供参考，显示了如何按燃烧器输出校准燃烧头。为确保燃烧器有效工作，建议根据具体锅炉的要求调整燃烧头。燃烧器安装在一个 100 千瓦的锅炉内。假定效率为 90%，燃烧器功率须在 110 千瓦左右；为此燃烧器输出应设定在刻痕 3。

5.7.1 拆卸燃烧头总成

- 要拆卸燃烧头总成，需要：
- 分断连接 3) 和 5) (图 11) ；
 - 拆卸管 4) 并拧松螺钉 10) (图 11) ；
 - 拧松并取下螺钉 7) ，略向右转动拆下燃烧头座总成 1) (图 11)。



小心

拆卸时注意不要改变在弯头 - 支架 2) (图 11) 上的设定位置。

5.7.2 安装燃烧头总成

以相反次序重复上述程序将燃烧头总成 1) (图 11) 装回到原来位置。



小心

拧紧螺钉 7) (图 11) ，但不完全锁紧。以拧紧力矩 3 - 4 牛米锁紧。



警告

检查运转中是否有燃气从螺钉壳体泄漏。
如果压力测试点 13) (图 11) 意外松动，建议加以正确固定，确保燃烧头总成 1) (图 11) 上的孔 (F) 朝下。

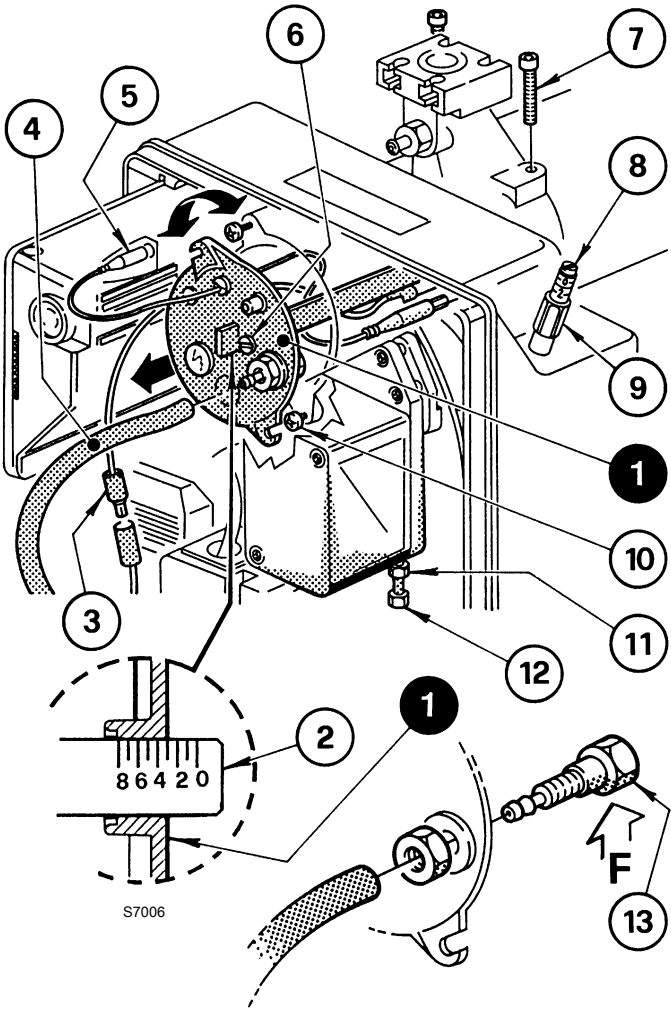


图 11

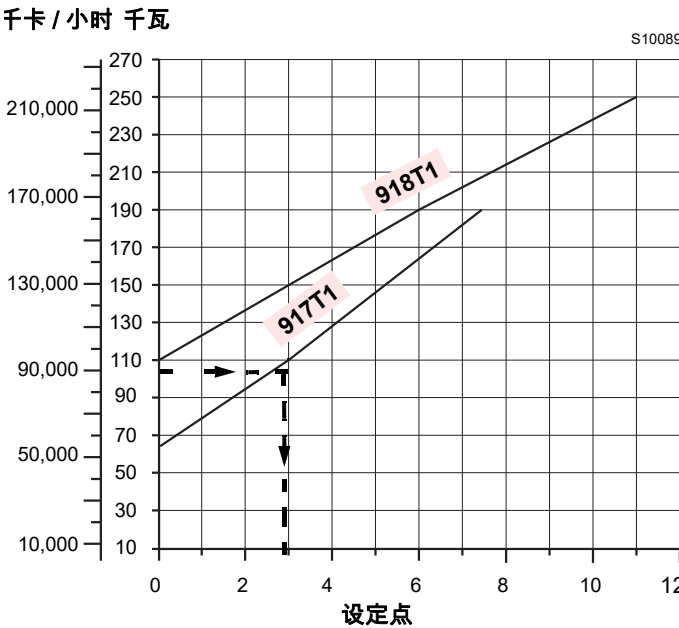


图 12

5.8 放置探头 - 电极

- 确保板 3) (图 13) 始终插在电极 1) 的平坦位置。
- 让探头绝缘体 4) 靠在空气扩散器 2) 上。



警告

位置如表 H. 所示。

型号	A (毫米) ± 0.3
BS3D	31
BS4D	31

表 H

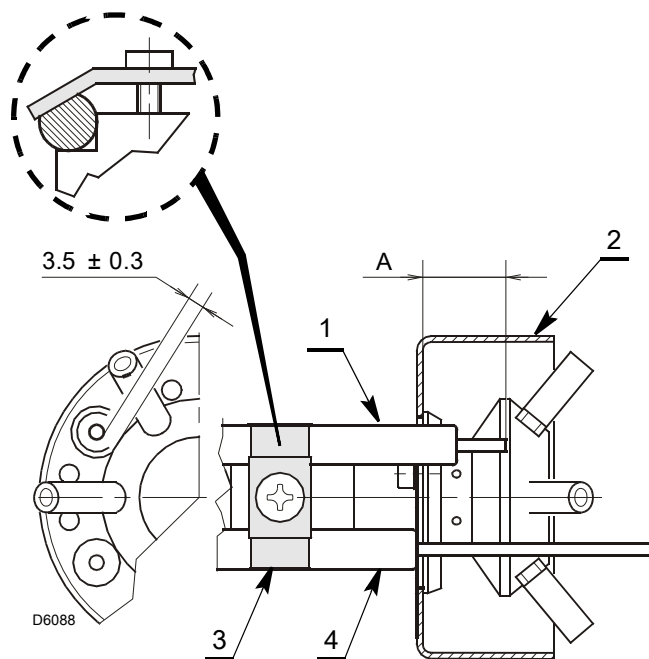


图 13

5.9 风门调整

首次起动一定要用螺钉 12) (图 14) 进行，使第一级风门位置指示器超过刻痕 1) (出厂设定在刻痕 1)。

要改变设置可按如下进行：

- 接合电气线束 4 针脚插头 (X4 中的连接 T6-T8 , 页 21) , 使燃烧器进入第二级。
- 风门在风扇推力作用下进入相对原厂标定的第二级位置 (螺钉 8 在刻痕 3)。
- 拧松螺母 9) , 使用螺钉 8) (图 14) 调整第二级气流 (见表中的 CO₂ 值 表 T)。
- 接合电气线束 4 针脚插头 (X4 中的连接 T6-T8 , 使燃烧器进入第一级开度 页 21)。
- 拧松 (顺时针) 螺母 11) (图 14) 后使用螺钉 12) 调整第一级，参照下表中的 CO₂ 值。
- 达到理想设置后，锁紧 (反时针) 螺母 11) (图 14)。燃烧器停机时，风门在自身重量作用下自动关闭，烟道低气压最大可达 0.5 毫巴。



警告

调整燃烧器第一级和第二级的输出时，请遵照以下说明。

燃烧器第一级和第二级输出之间比值最大应为 1 : 2。

BS3D 示例：第二级输出要求为 140 千瓦；

第一级输出最低不小于 70 千瓦。

在任何情况下，燃烧器第一级最小输出不得低于点火率中所显示的值。

BS3D 示例：第二级输出要求为 110 千瓦；

第一级最小输出不低于 65 千瓦 (点火率最小值 页 9)。

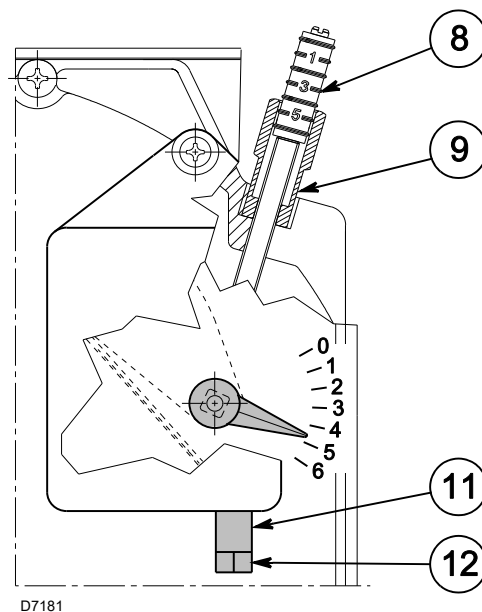


图 14

5.10 燃气供给



存在可燃物源时，燃气泄漏有爆炸危险。
防范措施：避免敲击、摩擦、火花和高热。
对燃烧器执行任何操作之前，确保燃气截断旋阀已关闭。



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。

5.10.1 燃气供给管路

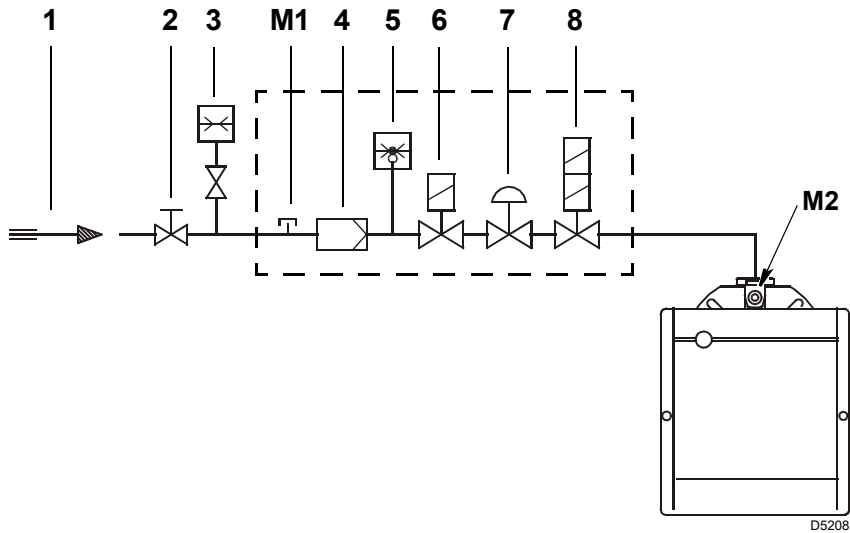


图 15

- 图例（图 15）
- 1 燃气输入管
 - 2 手动门（安装方负责）
 - 3 燃气压力表（安装方负责）
 - 4 过滤器
 - 5 燃气压力开关
 - 6 电磁安全阀
 - 7 压力稳定器
 - 8 第一级和第二级调整阀
 - M1 燃气供应压力测试点
 - M2 燃烧头燃气供应压力测试点

5.10.2 燃气阀组电源电缆

燃气阀组输入电源电缆可在燃烧器右侧或左侧，如图 图 16 中所示。

取决于进入点，带压力测试点的电缆夹 1) 和普通电缆夹 2) 可能需要互换 。

因此，必须确保：

- 电缆夹（1）正确定位；
- 将管路正确定位，以使空气毫无阻碍地流入压力开关。



警告

必要时，将管路切至正确的尺寸。

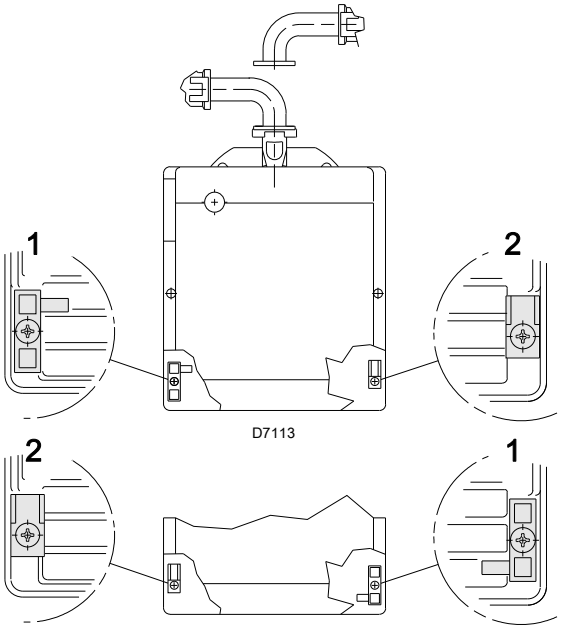


图 16

5.10.3 燃气阀组

已通过 EN 676 标准认证，不随燃烧器一起提供，需单独购买。其调整见所附的说明书。



危险

使用主开关分断电源。



检查有无燃气泄漏。



操作燃气阀组时应注意：可能造成挤压肢体的危险。



检查并确认没有任何燃料泄漏，以确保燃气阀组安装正确。



安装时操作者必须使用要求的设备。

5.10.4 燃气压力

表 I 指示了在燃烧器工作输出基础上的燃烧头和燃气蝶阀的压降。

表 I 中所示值适用于：

- 天然气 G 20 NCV 9.45 千瓦时 /Sm³ (8.2 兆卡 /Sm³)
- 天然气 G 25 NCV 8.13 千瓦时 /Sm³ (7.0 兆卡 /Sm³)

栏 1

燃烧头压降。

测试点 M2) 测量的燃气压力 (图 15) , 此时：

- 燃烧室为 0 毫巴；
- 燃烧器工作于最大输出

要计算燃烧器运行的近似输出功率：

- 从测试点 M2) 压力减去燃烧室中压力 (图 15)。
- 在与所示燃烧器相关的表格 表 I 中，查找出最接近于减法结果的压力值。
- 在左侧读取相应的输出。

BS3D G 20 天然气示例：

最大输出工作

测试点 M2) 燃气压力 (图 15) = 10.9 毫巴

燃烧室内压力 = 2.2 毫巴

10.9 - 2.2 = 8.7 毫巴

栏 1 的 8.7 毫巴压力在表 I 中对应输出 169 千瓦。

该值仅可作为粗略参考；必须在燃气表处测量有效输出功率。

		Δp (毫巴)			
		千瓦			
			G 20	G 25	G 31
BS3D		79	2.0	2.8	3.8
		92	2.6	3.64	4.6
		105	3.3	4.62	5.6
		118	4.2	5.88	6.6
		131	5.1	7.14	7.7
		143	6.1	8.54	8.7
		156	7.3	10.22	9.9
		169	8.7	12.18	11.1
		182	10.2	14.28	12.3
		195	11.9	16.66	13.5
BS4D		140	4.1	5.74	3.5
		152	4.6	6.44	3.9
		164	5.2	7.28	4.3
		177	5.9	8.26	4.6
		189	6.6	9.24	4.9
		201	7.3	10.22	5.3
		213	8.1	11.34	5.8
		226	9.0	12.6	6.6
		238	9.8	13.72	7.6
		250	10.8	15.12	9

表 I

在所要的燃烧器工作的最大调制输出已经固定的情况下计算 测试点 M2) 所需的燃气压力 (图 15)：

- 在表 I 对相应燃烧器查最接近的输出值。
- 在右边的栏 1，读取插口 M2) 处的压力 (图 15)。
- 将该值增加至燃烧室内的压力估值。

G 20 天然气 BS3D 示例：

以所需的最大输出功率运转：169 千瓦

输出 169 千瓦的燃气压力 = 8.7 毫巴

燃烧室内压力 = 2.2 毫巴

8.7 + 2.2 = 10.9 毫巴

测试点 M2) 所需的压力 (图 15)。



警告

主要数据中的热输出和燃气压力是指燃气蝶阀全开 (90° 的数据)。

5.11 电气布线

电气布线安全性说明



- 电气布线必须在切断电源的条件下进行。
- 电气布线必须遵照目的地国家现行规定且必须由合格人员进行。参见电路图。
- 对于不按照电路图所示进行的改动或连接，厂家不承担任何责任。
- 不要颠倒供电线路中的中线与相线。
- 对照铭牌和本手册中所示检查燃烧器的电源。
- 该燃烧器经过型式认证，可间歇使用。如果进行连续运转，必须确保用与温控线路串接的定时开关在 24 小时内周期性停机一次。参见电路图。
- 只有根据当前标准将设备正确安装至有效的接地系统时，才能保证电气安全。必须检查本基础安全要求。如果存有疑问，应由合格人员检查电气系统。不要将燃气管用作电气设备的接地系统。
- 如同标签和手册中所示，电气系统必须适合设备的最大功率消耗，特别要检查该部分电缆是否适合此水平的功率消耗。
- 对于接自电源设备的主电源：
 - 不要使用适配器、复式插座或接长线；
 - 应按照现行安全标准，使用多级开关，且各接触点之间距离至少为 3 毫米（过电压类别 III）。
- 身体部位潮湿和 / 或赤足时切勿触摸设备。
- 不要拉扯电缆。
- 按照火焰控制设备底部的符号检查连接器是否正确插入：请将连接器推至底部，确保连接器完全插入，且每个连接器都处于其所属位置。所有连接器的连接电缆都必须朝向燃烧器内部（见图 18）。

进行任何维护、清洁或检查运转前：



使用主系统开关分断燃烧器电源。



关闭燃气截断旋阀。



禁止有冷凝水、结冰和进水！



进行维护、清洁或检查运转后，重新装配燃烧器盖罩以及所有安全和防护设备。

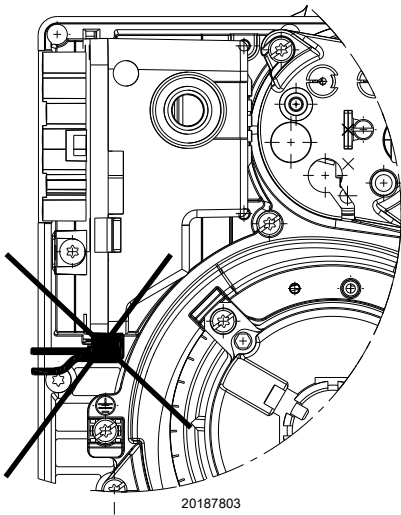


图 17

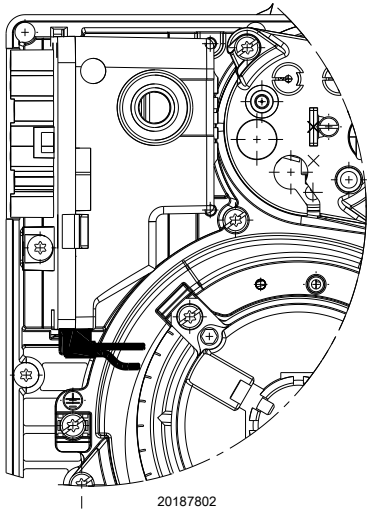


图 18



如果已插入连接器的电缆朝向燃烧器外部，则有可能损坏火焰控制设备！

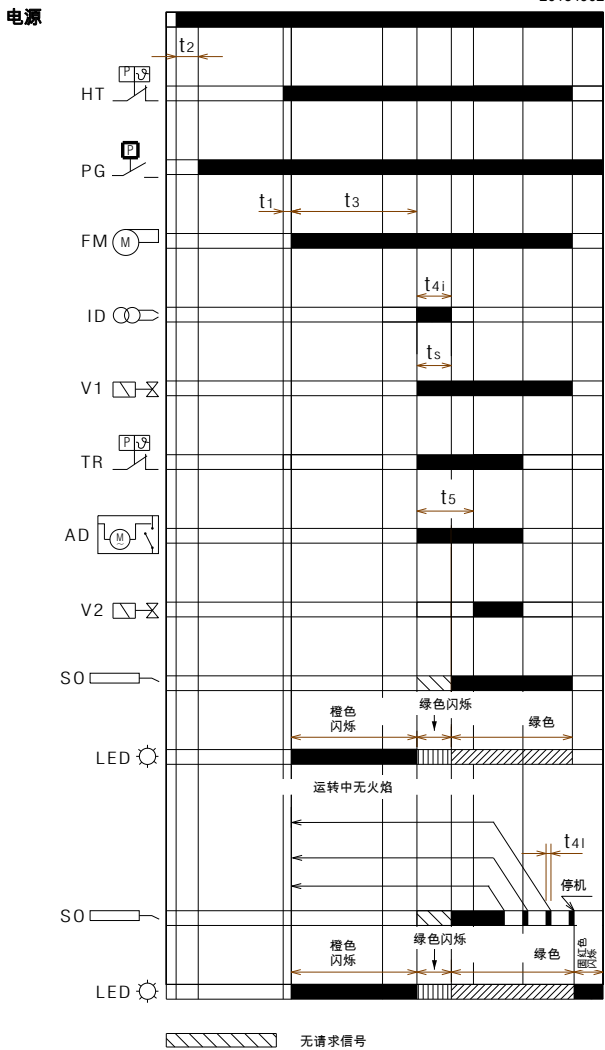


在插入连接器时，请使线缆朝向燃烧器内部。

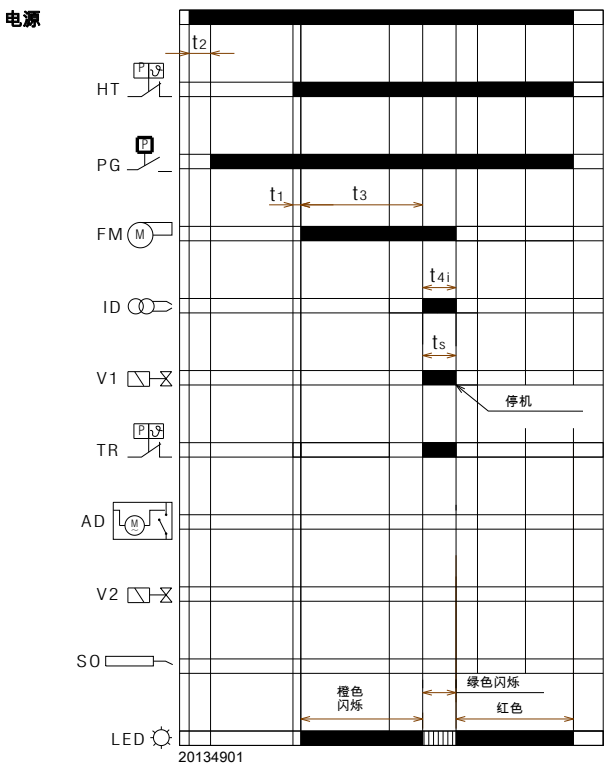
20135744

5.12 运转程序

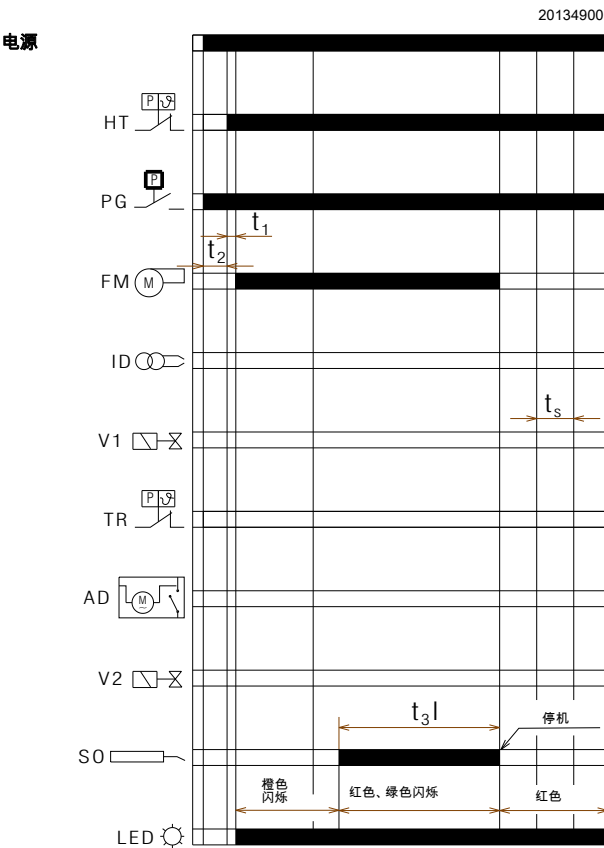
正常工作



因点火失败故障停



预净化时因外部光线停机



图例

- AD – 风门电动开启装置
- FM – 风扇电机
- HT – 加热请求
- ID – 点火装置
- LED – 按钮内彩色 LED
- PG – 低燃气压力开关
- SO – 电离探头
- TR – 调整温控器
- t1 – 待机时间
- t2 – 检查初始化时间
- t3 – 预净化时间
- t3l – 检查预净化阶段有无外部光线
- t4i – 总点火时间
- t4l – 因无故障实现安全停机的反应时间
- t5 – 第一级与第二级之间的延迟时间
- ts – 安全时间
- V1 – 第一级阀
- V2 – 第二级阀

5.13 时间表

符号	描述	值 (秒)
t0	待机：燃烧器等待加热请求，关闭气压开关，打开气压开关	-
t1	输入信号待机时间：反应时间，控制箱保持 t1 的等待模式	2
t1l	加热请求前的火焰或火焰仿真探测：控制箱保持空闲。	25
t2	初始化待机时间：检查主电源起动后的时间	< 4.5
t2l	检查 t2 期间有无外部光线或寄生火焰：t2l 等待模式，然后停机：电机不起动	25
t2a	在进行所要求的加热前，检查空气压力开关是否已移入工作位置：控制箱保持待机状态，如果空气压力开关仍处于 T2a 时间内接着会停机。	最大 120
t3	预净化时间：风扇电机运转，然后燃气阀启用	40
t3l	检查预净化期间有无外部光线或寄生火焰：t3l 结束时控制箱进入停机	1
t3a	在预净化时间中检查空气压力开关在工作位置的切换时间：如果在 t3a 内压力开关不切换，会停机。	最大 15
t3r	在预净化阶段如果有空气压力下降，会试图进行再次循环：在第 16 秒和 29 秒之间如果再次出现空气压力下降，之后会停机。如果在第 30 秒和第 40 秒之间有压力下降，控制箱会立即进入停机模式。	-
ts	安全时间	3
t4i	总点火时间	3
t4a	在 ts 时间和正常工作中的空气压力下降检查时间：控制箱立即停机。	< 1
t4l	因缺火实现安全关闭的反应时间	< 1
t5	在第一级和第二级之间的延迟时间：第一级开启后第二级阀的开启时间，取决于风门伺服马达的开启时间	5 ÷ 25
-	使用复位按钮使控制箱复位的最小时间	0.4
-	使用远程复位使控制箱复位的最小时间	0.8
tr	再次循环：运转中如发生缺火，最多可重复完整起动程序三次；缺火后再后一次起动尝试的最后动作是停机	3 再次循环

表 J

5.13.1 运转状态显示

状态	复位按钮 颜色	秒		颜色代码
等待热量需求，等待气体压力开关关闭，等待空气压力开关打开	-	-	-	-
要求加热连续通风	橙色 闪烁	0,5	2,5	●○●○●○●○●○
预净化，或等待空气压力开关关闭，或长时间预净化	橙色 闪烁	0.5	0.5	●○●○●○●○●○
无火焰的安全时间	绿色 闪烁	0.5	0.5	■□■□■□■□■□
有火焰的安全时间	绿色	-	-	■ ■ ■ ■ ■ ■ ■ ■ ■ ■
正常运转位置	绿色	-	-	■ ■ ■ ■ ■ ■ ■ ■ ■ ■

表 K

图例

ON	OFF	颜色代码
▲	△	红色
●	○	橙色
■	□	绿色

表 L

5.13.2 故障诊断 - 停机

故障描述	复位按钮颜色	秒		颜色代码
外部光线（伪火焰信号）	绿色，红色 交替闪烁	0.5	0.5	■▲■▲■▲■▲
收到加热请求 2 分钟后，燃气压力开关不断开故障或风门电动开启装置触点断开	橙色 闪烁颠倒	2.5	0.5	●○●○●○●○
电源电压故障	橙色 缓慢闪烁	2.5	2.5	●○●○●○●○
电源频率故障	橙色	-	-	●●●●●●●●
火焰控制电压故障	橙色，绿色 快速交替闪烁	0.2	0.2	●■●■●■●■
复位按钮 / 远程复位异常	绿色，红色 快速交替闪烁	0.2	0.2	■▲■▲■▲■▲
Ts 后因无火焰停机	红色	-	-	▲▲▲▲▲▲▲▲
因外部光线信号或寄生火焰停机	红色 闪烁	0.5	0.5	▲△▲△▲△▲△
因最大重复循环次数停机（运转中熄火）	红色 快速闪烁	0.2	0.2	▲△▲△▲△▲△
因空气压力下降或因空气压力下降重复预净化、或预净化结束前 10 秒、或在安全时间内或在正常工作期间的停机	红色 闪烁	0.5	2.5	▲△▲△▲△▲△
因风扇电机错误停机	红色，橙色 闪烁颠倒	2.5	0.5	▲●▲●▲●▲●
因第一级阀控制线路故障停机	红色，绿色 闪烁颠倒	2.5	0.5	▲■▲■▲■▲■
因第二级阀控制线路故障停机	红色 闪烁颠倒	2.5	0.5	▲△▲△▲△▲△
因 eeprom 错误停机	橙色，绿色 交替闪烁	0.5	0.5	●■●■●■●■
因加热请求后或运转中熄火再循环后空气压力开关未关闭停机	红色，绿色 缓慢闪烁	2.5	2.5	▲■▲■▲■▲■
因加热请求温控器关闭或运转中因熄火重复循环后空气压力开关已切换停机	红色，橙色 缓慢闪烁	2.5	2.5	▲●▲●▲●▲●
在火焰运行状态下，由于压力开关干预造成循环重复次数超过最大限制导致的停机	橙色	2.5	0.5	●○●○●○●○

表 M

图例

ON	OFF	颜色代码
▲	△	红色
●	○	橙色
■	□	绿色

表 N

5.13.3 检查燃气压力开关

燃气压力开关断开时电机断电。

如果，加热请求后，燃气压力开关断开，电机停机且：

- 如果燃气压力开关保持断开 2 分钟以上，通过诊断 LED 显示故障。
- 如果燃气压力开关保持断开的不足 2 分钟，不显示故障。
- 燃气压力开关再次闭合时，如果空气压力开关也断开，电机重新启动。
- 当燃气压力开关闭合时，电机通电约一秒（确认信号）然后关机 2 秒钟，之后再次启动。

如果燃气压力开关在火焰正常工作时打开，则电机立即停机，燃气阀关闭，并且完整重复点火循环。

最多可尝试 3 次，燃气压力开关第四次打开时，燃烧器将到达停机锁定状态。

在每次加热请求、每次停机锁定、每次电压异常（“**监测电源电压**”页 26）以及每次关机测试的情况下，火焰运行状态下燃气压力开关的打开尝试次数会进行重置。

如果燃气压力开关在后净化或连续净化（如果设置）期间断开，电机停机并在燃气压力开关断开的整个时间内保持关机，诊断 LED 立即显示故障。

5.13.4 检查空气压力开关

燃烧器收到加热请求后检查空气压力开关，如果开关闭合（粘住）电机不起动，2 分钟后达到停机条件。

如果在加热请求后电机起动机，空气压力开关不在预净化 15 秒钟内关闭，燃烧器达到停机条件。

如果预净化第一个 15 秒后空气压力下降，但在最后 10 秒前发生再循环（预净化时间始于空气压力开关稳定关闭时）。

如果空气压力下降后再循环后又出现新的空气压力下降，燃烧器会因缺少空气立即停机。

如果空气压力下降出现在预净化时间的最后 10 秒内（安全时间开始前），燃烧器会因缺少空气立即达到停机条件。

如果在第一级阀打开后或在火焰正常工作期间空气压力下降，燃烧器会在 1 秒内达到停机条件。

空气压力开关的状态不影响后净化时间。

如果设置了连续净化，即使空气压力开关封闭，电机也会通电，但只有一个条件，无加热请求，或在加热请求后出现停机 2 分钟后。

5.13.5 关机测试

如果在工作按下复位按钮或远程复位 5 秒钟以上且不到 10 秒钟，（未进入下面的菜单）燃烧器关闭，燃气阀关闭，火焰熄灭，启动程序再次启动。

如果启用关机测试，启动程序的重复次数（见章节“**再循环与次数限制**”，页面 25）和可能的复位次数（见章节“**外部停机信号（S3）**”，页面 26），被重置。

5.13.6 间歇工作

连续运转 24 小时后，控制箱启动自动关机程序，接着重新启动，以检查电离探针是否有故障。这一自动关机可固定为 1 小时，（见章节“**编程菜单**”，页面 29）。

在以下情况间歇工作的参数设置改动生效：

- 加热请求时，关机测试功能启用；
- 发生熄火；
- 加热请求关闭后再启动；
- 控制箱关闭并再启动；
- 发生间歇功能自动重启（1 小时 / 24 小时）。

5.13.7 再循环与次数限制

工作中如出现火焰故障，控制箱允许再循环功能启用，即完全重复启动程序，可进行三次。

如果工作中出现 4 次火焰故障，将造成燃烧器停机。如果在再循环理有新的加热请求，限制温控器切换时 3 次尝试复位。

出现新加热请求时，通过断开电源（电源加给燃烧器）重新点火的所有可能尝试均复位（最多 3 次）。

5.13.8 存在外部光线或寄生火焰

收到加热请求后可在待机状态中探测是否存在寄生火焰或外部光线。如果在“t2”级也探测到存在火焰或外部光线，电机将不起动直到火焰信号消失或达到停机为止。

预净化时，如果之后风扇电机起动机，探测到外部光线或寄生火焰，燃烧器在一秒内达到停机条件。

如果，在工作中因火焰消失进行再循环及随后的重复启动程序时，电机起动机前探测到寄生火焰或外部光线，便开始 25 秒倒计时（检查是否存在寄生火焰或外部光线），否则在一秒内停机。

通过闪烁 LED 指示故障（见章节“**故障诊断 - 停机**”，页面 24）。

加热请求结束时，25 秒后如果仍有寄生火焰，燃烧器会因寄生火焰达到停机条件（无论是否存在后净化或连续净化）。

即使电源电压、频率、内部电压有故障也会启寄生火焰控制，条件是燃气压力开关断开。

寄生火焰控制仅在停机条件下不启用。

5.13.9 点火变压器放电期间

在整个安全时间内均存在火花点火。



警告

在连续再循环或一起关闭的加热请求中，点火变压器最大容许重复循环次数是每分钟一次。

5.13.10 按钮和远程释放燃烧器

燃烧器可通过按下控制箱中的复位按钮至少 0.4 秒释放，且只在松开按钮时才能解锁。

燃烧器还可使用连接到燃烧器 R 端子（见 RS 连接器电气图）的外部按钮（远程复位）复位，至少按下 0.8 秒。



警告

如果按住复位按钮超过 5 秒钟，则命令与控制设备将不会解锁。

5.13.11 保护复位

燃烧器仅可接连复位 5 次，之后须断开电源才能再有 5 次复位机会。只有在控制箱加有电源时燃烧器才能复位。

5.13.12 复位按钮异常

如果复位按钮有故障或保持按下 60 秒以上，在故障存在期间会通过 LED 闪烁显示故障（见章节“故障诊断 - 停机”，页面 24）。

- 这种异常情况仅供查看，LED 灯将在异常信息消失时停止闪烁。
- 如果在预净化或安全时间中探测到故障，燃烧器不会停机（启动程序将继续）。
- 如果在运行期间探测到异常，则燃烧器不停止运行。
- 如果停机时探测到故障，将不发出故障信号，燃烧器不能复位。

5.13.13 外部停机信号（S3）

燃烧器配备有外部锁闭信号功能，即发出燃烧器锁闭报警信号（与集成的复位按钮一起）。

控制箱使用 S3 输出（最大 230Vac-0.5 安）提供一个外部灯指令。

5.13.14 小时计数器功能（B4）

燃烧器带小时计数器功能，随第一级油阀开启激活，因而只要在消耗燃料便有该功能。控制箱通过小时计数器输出（最大 230V AC-0.1 安）给连接至来自燃烧器处的锅炉电源接口的 7 眼插座针脚 B4 的控制箱外接表。

5.13.15 监测电源电压

控制箱自动测量电源电压。

如果电压小于 170V 或大于 280V，燃烧器停机，中断工作循环，保持待机状态，同时发出故障信号。通过闪烁 LED 指示故障（见章节“故障诊断 - 停机”，页面 24）。

当电压近似超过 180 伏或返回到 270 伏以下时，燃烧器将重启。

- 如果火焰工作时探测到故障，阀立即关闭，电机停机。
- 如果预净化时探测到异常，则电机停机。
- 如果主电源开关关闭或在无电源后，电源电压保持在中间值内（170÷180V 或 270÷280V）燃烧器不起动。
- 如果燃烧器处于锁定状态，则电网电压仅进行监控而不提示信号，因为存在停机信号，并且无法启动。

在点火时间内，电源电压监测停用。

5.13.16 电源频率错误

控制箱自动探测电源的频率值是否在 50 - 60 Hz 范围内，在两种情况下均验证工作时间。通过闪烁 LED 指示故障（见章节“故障诊断 - 停机”，页面 24）。

- 如果在收到加热请求前探测到异常，燃烧器不起动。
- 如果在预净化期间探测到故障，燃烧器保持处于净化状态，同时适当给出故障信号。
- 在正常运转未探测到故障，燃烧器会保持这一状态。当故障消失时，燃烧器重新启动。

5.13.17 内部电压异常

控制箱自动探测内部电压是否工作正常。通过闪烁 LED 指示故障（见章节“故障诊断 - 停机”，页面 24）。

- 如果在初始化检查期间探测到异常，燃烧器不起动。
- 如果在停机后探测到异常，燃烧器不起动。
- 如果停机测试后探测到异常，燃烧器不起动。
- 在正常运转未探测到故障，燃烧器会保持这一状态。当故障消失时，燃烧器重新启动。

5.13.18 检查风扇电机

控制箱自动探测有无风扇电机，如已断开连接，则控制箱将执行停机。通过 LED 闪烁显示停机（见章节“故障诊断 - 停机”，页面 24）。

5.13.19 检查第一级和第二级阀与电机故障

控制箱探测阀和电机的控制有无故障，故障通过闪烁 LED 显示（见章节“故障诊断 - 停机”，页面 24）：

- 如果初始化时探测到异常，燃烧器进入停机。
- 如果预净化时探测到异常，燃烧器进入停机。
- 再循环时，如果探测到故障，燃烧器不启动并进入停机。

燃烧器停机时不探测故障。

如果燃气压力开关关闭且板上接有电机，电机控制箱内继电器触点的密封会被拦截。

第一级阀控制内的继电器触点的密封仅在电机运转时被拦截。

第二级阀控制内的继电器触点的密封只能在电机运转且第一级阀受控时被拦截。

5.13.20 EEprom 检查

控制箱自动探测微控制器 EEprom 存储器是否有故障，如有故障执行停机。通过 LED 闪烁显示停机（见章节“故障诊断 - 停机”，页面 24）。

5.13.21 电离电流

运转燃烧器的推荐最小值为 5 微安。燃烧器通常供给更高的电流值，因而不需要检查。

在任何情况下，如果要测量电离电流，需要断开红色导线上的连接器（CN1）（图 23）并插入微安计。

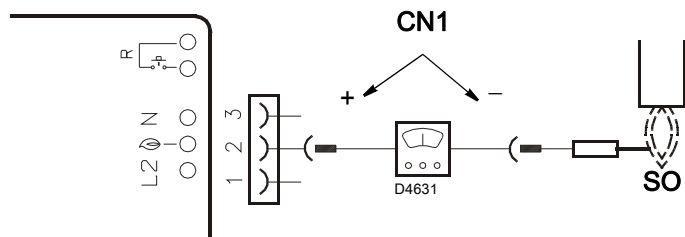


图 23

5.13.22 后净化

后净化是一种功能，可在燃烧器关机后无加热请求时保持一段预设时间的空气净化。加热请求温控器断开时燃烧器关闭火焰，切断阀的燃料供给。

在以下情况下不执行后净化功能：

- 电机或阀关闭后；
- 预净化时加热请求中断。

后净化发生在：

- 如果在安全时间中断加热请求；
- 如果在正常运行时中断加热请求；
- 各种类型的停机。

注意：

如果在后净化期间有外部光线或寄生火焰，燃烧器将在 25 秒后停机，且后净化不会中断。

如果在后净化期间有新的加热请求，后净化时间中止，风扇电机停机，开始新的燃烧器工作循环。

5.13.23 连续净化

连续净化是一种功能，可独立于燃烧器点火请求维持空气通风。

从设置连续净化的那一刻起，在限制温控器（TL）未切换（燃烧器关闭）和燃烧器停机时电机都保持工作。

随着限制温控器（TL）的切换，电机停机 2 秒的待机时间，接下来控制空气压力开关，开始新的燃烧器工作循环。

- 如果在无加热请求时的连续净化期间探测到寄生火焰，电机保持接通，同时发出故障信号。25 秒后燃烧器达到停机条件。
- 如果在连续净化时探测到寄生火焰，电机保持接通，但如果出现加热请求，电机将关闭，如果寄生火焰仍存在，在 2 秒待机时间后电机不再启动。25 秒后燃烧器达到停机条件。停机复位后，电机重新启动。
- 即使在停机时电机也保持接通。
- 如果探测到可形成燃烧器停机条件的内部故障（eprom、电机、第一级和第二级阀），连续净化中断。

5.13.24 停机记录

控制箱让您记录已发生的停机的类型和次数并加以保存，即使在没有电源的情况下。

通过停机记录可以访问上 10 次的停机（见章节“编程菜单”，页面 29）。

按复位按钮，进到编程菜单页面后，就会显示上次停机，按 10 次可显示记录中的最早一次停机（每次燃烧器达到停机条件便去掉记录中最早的一次）。

按住按钮 5 秒后，显示停机的类型，见章节“故障诊断 - 停机”，页面 24）。

5.13.25 记录燃烧器运行参数

控制箱让您记录第一级燃气阀开启的工作时间。

这样，就可以确定工作中消耗了多少燃料。

计数的频率为 1 秒。

如果燃烧器接通，每 30 分钟向数据存储器（eeprom）保存一次。即使在前 30 分钟控制箱只工作了很短的时间，也向存储器保存数据。

如果在两次保存之间（30 分钟后）控制箱断电，有关这一间隔的信息便丢失了。

如果在两次保存之间设置了停机，写入存储器的信息还包括工作小时的记录。

与工作小时一起还保存了燃烧器第一级燃气阀的开启次数。

在菜单（见章节“编程菜单”，页面 29）中，可以独立复位工作小时表和第一级阀所发生的开启次数表。

- 第一级阀开启次数最大值为：16.777.215（之后复位）。
- 第一级阀开启次数表的最大值为：65,535 天（之后复位）。

5.13.26 燃烧器外部连接的允许长度

燃烧器出口电缆	标识	最大长度 许可（米）
电源供电	L1（L），N	20
燃气压力开关	PG	1
加热请求温控器	TL（T1,T2）	20
第一 - 第二级调整温控器	TR	1
小时计数器	B4	3
外部停机指示器	S3	20
远程复位	R（RS）	20

表 O



警告

如果燃烧器应用设备所用的远程控制命令大于表 O 中所示，可插入触点位于接近或不大于最大指示长度的继电器命令装置（230Vac）。

5.13.27 长时间预净化

如果启用了长时间预净化，在默认的预净化时间（40 秒）之外，还执行 1 分 20 秒的初始预净化。

在因工作中缺火执行的再循环中，不进行长时间预净化，只进行默认时间（40 秒）的预净化。

如果在长时间预净化时出现空气压力下降，再循环包括重复进行预净化，此时的预净化时间为 1 分 20 秒加 40 秒。

5.14 编程菜单

5.14.1 一般说明

在工作和待机模式下，编程菜单可通过集成的复位按钮或远程复位访问。如果在页面菜单中，未在 10 秒内按下复位或远程复位按钮，页面会自动退出，一个 led 灯会闪烁设定的时间。

如果按下复位或远程复位按钮的次数超过最大容许值，保存在存储器中的值将成为最大值。

如果按下复位按钮或远程按钮的时间超过 60 秒，将显示复位按钮的故障异常。

5.14.2 进入菜单框图

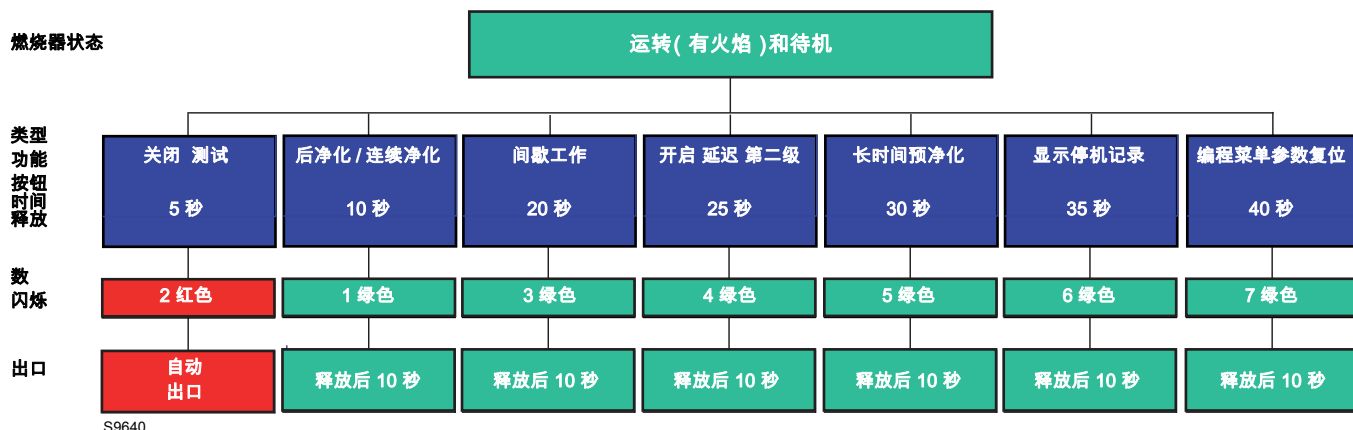


图 24

功能	按钮释放时间	每一菜单页面的 LED 闪烁数	复位按钮按下次数	LED (绿色) 闪 烁次数	退出菜单
关闭 测试	5 秒 $\leq t < 10$ 秒	2 次闪烁 红色	/ 无	/ 无	自动， 在闪烁结束时
后净化 / 连续净 化	10 秒 $\leq t < 15$ 秒	1 次绿色闪烁	1 = 1 分钟 2 = 2 分钟 3 = 3 分钟 4 = 4 分钟 5 = 5 分钟 6 = 6 分钟 7 = 连续净化 8 = 0 分钟 (关闭) (默认)	1 次闪烁 2 次闪烁 3 次闪烁 4 次闪烁 5 次闪烁 6 次闪烁 7 次闪烁 8 次闪烁	松开按钮后 10 秒
间歇 运转	20 秒 $\leq t < 25$ 秒	3 次闪烁 绿色	1 = 1 小时 2 = 24 小时 (默认)	1 次闪烁 2 次闪烁	松开按钮后 10 秒
开启延迟 第二级	25 秒 $\leq t < 30$ 秒	4 闪烁 绿色	1 = 8 秒 (默认) 2 = 20 秒 3 = 35 秒	1 次闪烁 2 次闪烁 3 次闪烁	松开按钮后 10 秒
长时间 预净化	30 秒 $\leq t < 35$ 秒	5 次闪烁 绿色	1 = 激活 2 = 关闭 (默认)	1 次闪烁 2 次闪烁	松开按钮后 10 秒
显示 停机记录	35 秒 $\leq t < 40$ 秒	6 次闪烁 绿色	1 = 上次停机 2 = 第 9 次停机 3 = 第 8 次停机 4 = 第 7 次停机 5 = 第 6 次停机 6 = 第 5 次停机 7 = 第 4 次停机 8 = 第 3 次停机 9 = 第 2 次停机 10 = 更早以前的一次停机	显示停机的类型 根据表 表 M	松开按钮后 10 秒 (如果在级别 1)。 在级别 2 时，显示停机类型 10 秒 后或由此回到级别 1 的 10 秒前再 次按下按钮，未动按钮 10 秒后， 退出菜单。
参数复位编程菜 单	40 秒 $\leq t < 45$ 秒	7 次闪烁 绿色	1 = 复位 停机记录 2 = 复位停机次数 3 = 复位工作小时数 4 = 复位加热请求数 5 = 复原 菜单参数默认值	/	松开按钮后 10 秒

表 P

5.14.3 关机测试

停机测试编程程序

- 程序允许处于运行模式和待机模式。
- 按下按钮 $5 \text{ 秒} \leq t < 10 \text{ 秒}$
- 红色 LED 闪烁两次（0.2 秒点亮；0.2 秒熄灭）
- 松开按钮。
- 燃烧器将开始关闭，然后重新启动。

停机后，燃烧器自动重新启动，恢复再循环次数。

退出停机测试页面菜单，无 LED 闪烁。

5.14.4 后净化

后净化时间最大可设置为 **6 分钟**，按如下进行：

编程程序

- 程序允许处于运行模式和待机模式。
- 按下按钮 $10 \text{ 秒} \leq t < 15 \text{ 秒}$
- 绿色 LED 闪烁 1 次
- 松开按钮
- 绿色 LED 灯熄灭
- 按下按钮 1 - 6 次 (*) = $1 \div 6 \text{ 分钟}$
7 次 = 连续净化
- 每次按下和松开时绿色 LED 灯点亮和熄灭
- 10 秒后，绿色 LED 闪烁编程的次数（0.5 秒点亮；0.5 秒熄灭）

残疾的序列

- 复位允许处于运行模式和待机模式。
- 按下按钮 $10 \text{ 秒} \leq t < 15 \text{ 秒}$
- 绿色 LED 闪烁 1 次
- 松开按钮
- 绿色 LED 灯熄灭
- 按下按钮 8 次 (*)
- 每次按下和松开时绿色 LED 灯点亮和熄灭
- 10 秒后绿色 LED 闪烁 8 次（0.5 秒点亮；0.5 秒熄灭）

如果在后净化功能编程时加热请求停止，会退出菜单不保存设定值。如果加热请求在 LED 闪烁时停止，会退出菜单但保存设定值。

5.14.5 间歇工作

启用 / 停用程序

- 程序允许处于运行模式和待机模式。
- 按下按钮 $20 \text{ 秒} \leq t < 25 \text{ 秒}$
- 绿色 LED 闪烁 3 次
- 松开按钮
- 绿色 LED 灯熄灭
- 按下按钮 1 次每小时启用停机一次 (*)
- 按下按钮 2 次，每 24 小时启用停机一次 (*)
- 每次按下和松开时绿色 LED 灯点亮和熄灭
- 10 秒后，绿色 LED 闪烁编程的次数（0.5 秒点亮；0.5 秒熄灭）

在以下情况间歇工作的参数设置改动生效：

- 温控器（HT）下次加热请求之后
- 启用关机测试之后
- 工作中火焰消失之后
- 分断和重新连接电源之后

5.14.6 设置第二级开启延迟

控制箱允许设置第二级从第一级的开启延迟，见章节“进入菜单框图”，页面 29。

设置第二级开启延迟的程序

- 程序允许处于运行模式和待机模式。
- 按下按钮 $25 \text{ 秒} \leq t < 30 \text{ 秒}$
- 绿色 LED 闪烁 4 次。
- 松开按钮。
- 绿色 LED 灯熄灭
- 按下按钮 1 次启用 8 秒延迟 (*)
- 按下按钮 2 次启用 20 秒延迟 (*)
- 按下按钮 3 次启用 35 秒延迟 (*)
- 每次按下和松开时绿色 LED 灯点亮和熄灭
- 10 秒后，绿色 LED 闪烁编程的次数（0.5 秒点亮；0.5 秒熄灭）

5.14.7 设置长时间预净化

控制箱允许设置长时间预净化，见章节“进入菜单框图”，页面 29。

设置长时间预净化的程序

- 程序允许处于运行模式和待机模式。
- 按下按钮 $30 \text{ 秒} \leq t < 35 \text{ 秒}$
- 绿色 LED 闪烁 5 次。
- 松开按钮。
- 绿色 LED 灯熄灭
- 按下按钮 1 次启用长时间预净化 (*)
- 按下按钮 2 次停用长时间预净化 (*)
- 每次按下和松开时绿色 LED 灯点亮和熄灭
- 10 秒后，绿色 LED 闪烁编程的次数（0.5 秒点亮；0.5 秒熄灭）

5.14.8 显示停机记录

控制箱允许显示所发生并记录的前 10 次停机，读取 "编程菜单" 页 29。

在待机状态和运转状态下均可访问该页面。

显示所发生的上次停机的程序

- 按住按钮 35 秒 $= t < 40$ 秒
- 绿色 LED 闪烁 6 次。
- 松开按钮。
- 显示所记录的停机类型 10 秒

显示停机时再按下复位按钮可以延长停机类型的显示时间（停机显示再继续 10 秒）。

注意：

(*) 每次按下与松开按钮时一定要等待 1 秒确保命令得到正确记录。

5.14.9 复位编程菜单参数和停机记录

控制箱允许复位停机记录和次数、工作小时、点火次数并恢复菜单默认值，见章节“进入菜单框图”，页面 29。

设置和复原参数的程序

- 程序允许处于运行模式和待机模式。
- 按下按钮 40 秒 $\leq t < 45$ 秒
- 绿色 LED 闪烁 7 次。
- 松开按钮。
- 绿色 LED 灯熄灭
- 按下按钮 1 次复位停机记录 (*)
- 按下按钮 2 次复位停机数 (*)
- 按下按钮 3 次复位火焰的工作小时数 (*)
- 按下按钮 4 次复位加热请求数 (*)
- 按下按钮 5 次复位编程菜单参数的所有默认值 (*)
- 每次按下和松开时绿色 LED 灯点亮和熄灭
- 10 秒后，绿色 LED 闪烁编程的次数（0.5 秒点亮；0.5 秒熄灭）。

5.15 停机类型

每当发生停机时，控制箱都会显示故障的原因（原因可通过复位按钮颜色识别）。控制箱发布的复位按钮中 LED 的脉冲顺序可识别故障的可能类型，如下表所示：

停机描述	停机时间	LED 颜色 (*)	可能原因
待机时有寄生火焰或换气后	25 秒后	▲ ▲ ▲ ▲	- 加热请求后或在后净化时出现伪火焰
预净化时探测到寄生火焰	1 秒后	▲ ▲ ▲ ▲	- 预净化时出现伪火焰信号
安全时间后未探测到火焰	燃气阀接通后 3 秒	▲ ▲ ▲ ▲	- 电离探头有故障或未连接 - 燃气阀 - 点火变压器有故障 - 燃烧器调节不当
运转中火焰故障	3 次再循环后	▲ ▲ ▲ ▲	- 燃烧器未正确校准 - 电离探头有故障
风扇电机错误	立即	▲ ● ▲ ●	- 风扇电机有故障 - 风扇电机未连接
第一级燃气阀内部控制故障	立即	▲ ■ ▲ ■	- 燃气阀 - 第一级燃气阀内部控制线路有故障
Eeprom 错误	立即	● ■ ● ■	- 内存存储器有故障
因加热请求后或运转中缺火再循环后 空气压力开关未关闭停机	15 秒后	▲ ■ ▲ ■	- 空气压力过低，（燃烧头调整不当） - 空气压力开关有故障：予以更换
因空气压力下降或因空气压力下降重 复预净化、或预净化结束前 10 秒、或 在安全时间内或在正常工作期间的停 机	1 秒后	▲ ▲ ▲ ▲	- 空气压力过低，（燃烧头调整不当） - 空气压力开关有故障：予以更换
因加热请求温控器关闭或运转中因缺 火重复循环后空气压力开关已切换停 机	120 秒后	▲ ● ▲ ●	- 空气压力开关切换到工作位置，更换压力开关 - 风扇电机继续通电，检查火焰控制是否停止
第二级燃气阀内部控制故障	立即	▲ ▲ ▲ ▲	- 第二级燃气阀内部控制线路有故障

表 Q

(*) 关于解锁按钮的闪烁频率见章节“故障诊断 - 停机”，页面 24。



警告

直观诊断显示后要复位控制箱必须按下复位按钮。



警告

在燃烧器停机时，为了防止装置损坏，不要连续两次以上解锁燃烧器。如果燃烧器第三次停机，请联系客户服务。



危险

燃烧器如果再次停机或有进一步的故障，只能由授权的合格人员进行维护干预，遵照本手册所述并遵守标准与现行法规的规定。

6 燃烧器起动、校准和工作

6.1 首次起动安全性说明



警告

燃烧器的首次起动必须由合格人员进行，遵照本手册的指示并符合标准与现行法规的规定。



警告

在点燃燃烧器之前，请参阅“安全性测试 - 在气源关闭状态下”页 34 段落。



警告

检查调整、命令和安全装置是否正确无误。

6.2 点火前的调整

- 如页 16 图所示检查燃烧头的调整。
- 检查风门伺服马达的调整。
- 慢慢打开燃气阀组上游的手控阀。
- 将空气压力开关调到标尺的开始位置。
- 净化燃气管路的空气。推荐使用在建筑物外铺设的塑料管，清

除燃气管路的空气直到闻到燃气的味道。



小心

起动燃烧器前，最好调整燃气阀组使点火发生在最安全的条件下，即燃气输送量最小时。

6.3 燃气压力开关



警告

要标定燃气压力开关，参见燃气阀组手册。

6.4 空气压力开关

进行完所有其它调整后，设置空气压力开关。首先让开关处于标尺的开始位置。

将燃烧器的功能调到所要的输出后，顺时针方向缓慢转动旋钮直到燃烧器停机。

现在反时针方向将旋钮转一个刻度，重复燃烧器起动，检查一切是否正常。

如果燃烧器再次停机，再转动旋钮半个刻度。



警告

依照标准，空气压力开关必须能防止空气压力降到调整值的 80% 以下和烟气中的 CO 超过 1% (10,000 ppm)。为检查这一点，将一台燃烧分析仪插入烟道，慢慢减小风扇空气设置（例如用一块纸板）验证烟气中的 CO 值超过 1% 前燃烧器停机。

6.5 燃烧调整

依照效率指令 EN 676，燃烧器在锅炉上的应用、调整和测试必须遵守锅炉说明手册中的指示，包括控制烟气中的 CO 和 CO₂ 浓度、温度和锅炉里水的平均温度。

推荐根据所使用的燃气类型并遵照表 R 中所示设置燃烧器。

EN 676		过量空气：最大输出 $\lambda \leq 1.2$ - 最小输出 $\lambda \leq 1.3$			
燃气	理论最大 CO ₂ 0 % O ₂	设置 CO ₂ %		CO 毫克 / 千瓦吋	NO _x 毫克 / 千瓦吋
		$\lambda = 1.2$	$\lambda = 1.3$		
G 20	11.7	9.7	9.0	≤ 100	≤ 170
G 25	11.5	9.5	8.8	≤ 100	≤ 170
G 30	14.0	11.6	10.7	≤ 100	≤ 230
G 31	13.7	11.4	10.5	≤ 100	≤ 230

表 R

7 维护

7.1 维护安全性说明

为保证燃烧器的正常工作、安全、输出量和耐用性，定期维护是不可缺少的。

定期维护可降低消耗和污染排放，使产品长时间保持可靠状态。



危险

燃烧器的维护干预和校准只能由授权的合格人员进行，遵照本手册所述并遵守标准与现行法规的规定。

进行任何维护、清洁或检查运转前：



危险

使用主系统开关分断燃烧器电源。



危险

关闭燃气截断旋阀。



等待接触热源的部件完全冷却。

7.2 维护计划

7.2.1 维修次数



燃气燃烧系统应由厂家代表或其它专业技术人员每年至少检查一次。

7.2.2 安全性测试 - 在气源关闭状态下

为了安全地进行调试，一定要确认燃气阀和燃烧器之间的电气连接是否正确。

为此，在确认燃烧器的连接符合电气图后，必须在燃气塞闭合的状态下执行一个启动周期（干式实验）。

- 1 燃气的手动阀门必须通过锁定 / 解锁设备进行关闭（“锁定 / 标记”程序）。
- 2 请确保燃烧器极限电触点闭合
- 3 请确保最小燃气压力开关的触点闭合
- 4 请进行一次燃烧器启动尝试

启动循环必须根据以下步骤进行：

- 用于预净化的风扇电气启动
- 执行燃气阀密封检查（如提供）
- 完成预净化
- 达到点火点
- 为点火变压器供电
- 为燃气阀供电

由于燃气已关闭，燃烧器将无法点燃，其控制箱将进入停机状态或安全停机状态。

可以插入一个测试仪来检验是否真正为燃气阀供电；部分阀门配备了灯光信号（或关闭 / 打开位置指示器），会在其通电情况下激活。



警告

在燃气阀意外供电的情况下，请勿打开手动阀，断开电源并检查布线情况；修正错误并重新执行整个测试。

7.2.3 安全性测试 - 燃气球阀关闭

确保燃气电磁阀与燃烧器间电气连接的正确对接非常重要，这是安全执行试运行的关键。

为此，在根据燃烧器电气图执行连接检查之后，还必须在燃气球阀关闭的情况下执行点火循环，即干测试。

- 1 手动燃气球阀必须关闭
- 2 燃烧器限位开关的电触点应被关闭

- 3 确保关闭低燃气压力开关的触点
- 4 测试一下燃烧器点火。

开始循环必须按照如下进行：

- 打开风扇进行预通风
- 执行燃气阀密封控制（如果配备）
- 完成预通风
- 到达点火点
- 点火变压器电源
- 燃气电磁阀电源

由于手动燃气球阀关闭，燃烧器将不会点燃且其控制箱将处于安全锁上状态。

可以通过接入一个测试仪检验燃气电磁阀的实际电源。某些阀门配有光信号（或关闭 / 打开位置的指示器），可在电源接通的同时点亮。



警告

如果燃气阀电源在非正常时间接通，不要打开手动燃气球阀，断开电源线；检查电缆；校正错误并重新完成测试。

7.2.4 检查和清洁

维护时操作者必须使用要求的设备。



燃烧

检查燃料供给或回流管路、产品废物管中有无阻塞。

进行燃烧烟气分析。

与之前测量值的明显不同表明此处为维护时须格外加以注意。

燃烧头

检查燃烧器定位是否正确，是否可靠固定到锅炉上。

打开燃烧器，确认燃烧头的所有部件状态良好，无高温变形，无环境杂质且位置正确。

燃烧器

检查有无过度磨损，螺钉松动。
清洁燃烧器外部。

风扇

检查风门位置是否正确。
检查确认风扇内部或叶轮上无积尘，积尘会减小空气流量并引发污染燃烧。

燃气分配器

定期检查燃烧头的孔有无阻塞。如有，用图 25 中所示尖头工具清洁。

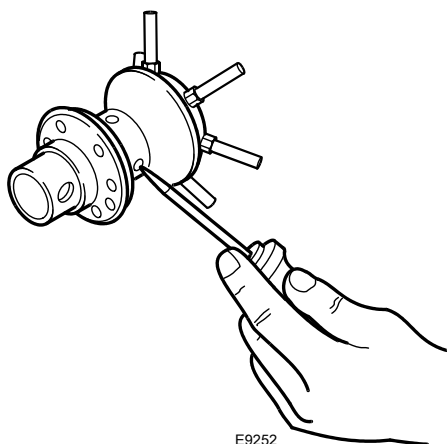


图 25

锅炉

按随供的说明书中的指示清洁锅炉以保持原有的燃烧特性完好，特别是：烟气温度和燃烧室压力。

燃气阀组

检查燃气阀组是否与燃烧器容量、所用燃气的类型及主燃气压力相适合。

电极 - 探头

如图 13 页 17 图所示检查电离探头和电极的位置是否正确。

压力开关

检查空气压力开关和燃气压力开关的设置是否正确。

燃气泄漏

要确保燃气表和燃烧器之间管路无燃气泄漏。

燃气过滤器

更换脏污的燃气过滤器。

燃烧

如果开始维护前测量的燃烧值与适用法规不符或指示燃烧效率不高，可查阅表 R 页 33 或联系我们的技术支持服务进行必要的调整。

让燃烧器连续工作约 10 分钟，检查本手册中所述的所有部件的第一级和第二级设置是否正确

- 百分率 CO₂ (%) ;
- CO 含量 (ppm)
- NOx 含量 (ppm)
- 电离电流 (μA)
- 烟道排烟温度

7.2.5 安全部件

安全部件必须在其使用寿命结束时进行更换（见表 S）。右表所列安全部件名称及其使用寿命。所列明的使用寿命不是指交付或付款条件中的保修期。

安全部件	使用寿命
火焰控制	10 年或 250.000 个运行周期
火焰传感器	10 年或 250.000 个运行周期
燃气阀 (电磁阀)	10 年或 250.000 个运行周期
压力开关	10 年或 250.000 个运行周期
压力调节器	15 年
伺服马达 (电子控制系统) (如配备)	10 年或 250.000 个运行周期
油阀 (电磁阀) (如配备)	10 年或 250.000 个运行周期
燃油调节器 (如配备)	10 年或 250.000 个运行周期
燃油管路 / 管路接口 (金属质地) (如配备)	10 年
软管 (如配备)	5 年 30.000 个压力周期
风机叶轮	10 年或 500.000 次启动

表格 S

7.3 打开燃烧器

危险

使用主系统开关分断燃烧器电源。



危险

关闭燃气截断旋阀。



等待接触热源的部件完全冷却。

如果需要维护燃烧头，参见 " 操作位置 " 页 14 中给出的指示。
要接近燃烧器内部，拧松盖罩的固定螺钉进行维护操作。



危险

操作安全风险

以下部件只能由相应厂家或其指定的人员修理：

- 风扇电机
- 执行器
- 风门伺服马达
- 电磁阀
- 燃烧器编程器

检查运转

- 燃烧器以功能程序启动
- 点火装置
- 空气压力开关
- 火焰监测
- 燃料通道相关部件的密封测试



进行维护、清洁或检查运转后，重新装配燃烧器盖罩以及所有安全和防护设备。

8

故障 - 可能的原因 - 解决方案

下面给出可能造成燃烧器启动故障或工作不良的一些问题的原因和可能的解决方案。

大多数情况下，工作异常会造成控制箱复位按钮中的信号灯亮起 (图 4 页 11)。

停机指示灯亮起时，只有按下复位按钮燃烧器才会尝试重启，如果之后点火正常，可将该停机归为暂时故障。

但如果继续停机，必须如 表 T 和 表 U 和 中所述，确定问题的原因并采取措施。



警告



危险

在燃烧器停机时，为了防止装置损坏，不要连续两次以上解锁燃烧器。如果燃烧器第三次停机，请联系客户服务。

燃烧器如果再次停机或有进一步的故障，只能由授权的合格人员进行维护干预，遵照本手册所述并遵守标准与现行法规的规定。

8.1

启动问题

故障	可能的原因	解决方案
加热请求温控器闭合情况下，燃烧器不启动。	无电力供给	检查 7 针脚插头 L1-N 卡子中是否有电压。 检查保险状态。 检查安全温控器 (TS) 是否停止作用。
	无燃气	检查挡板开度。 检查阀是否切换到开启位置且无短路。
	燃气压力开关触点不闭合。	予以调整。
	控制箱中连接器插错。	检查并连接所有插头。
	空气压力开关切换到工作位置。	更换压力开关。
燃烧器在预净化和点火循环中运行正常，安全时间后停机。	相线与中线连接颠倒。	予以纠正。
	未接地线或地线低效。	使地线有效。
	电离探头接地或未接触火焰，或至控制箱的线路断路，或对地绝缘有故障。	检查位置是否正确，必要时按本手册说明进行设置。 复位电气连接。 更换有故障的连接。
燃烧器启动时有点火延迟。	点火电极定位不正确。	按照本手册说明调整。
	空气流量过高。	按照本手册说明设置空气输出。
	阀制动过密，燃气输出不足。	予以调整。
燃烧器不切换至第二级。	风门开启装置卡住。	检查其工作是否正常。 检查电气连接是否准确。
	第二级燃气阀不接通	阀损坏：予以更换。 检查风门开启装置工作是否正常。
燃烧器在预净化阶段后因火焰故障停机	电磁阀通过的燃气太少。	检查管网压力和 / 或根据本手册说明调整电磁阀。
	电磁阀故障。	予以更换。
	点火弧异常或失效。	检查连接器是否正确插入。 根据本手册说明检查电极位置是否正确。
	管路空气未净化。	对燃气供给管进行完全吹清。
燃烧器在预净化阶段停机。	空气压力开关不切换到工作位置。	压力开关有故障，予以更换。 空气压力过低，(燃烧头调整不当)。
	火焰存在。	阀有故障：予以更换。
燃烧器继续重复启动循环未停机。	燃气总管中的燃气压力非常接近燃气压力开关的设定值。 阀开启时压力突然下降引起压力开关本身断开，使阀立即重新关闭和电机停止。 然后压力开始再次增加，压力开关闭合，重新开始启动循环等等。	降低并设置压力开关。

表 T

8.2 工作故障

故障	可能的原因	解决方案
燃烧器在运行时停机。	接地探针。	检查位置是否正确，必要时按本手册说明进行设置。 清洁或更换电离探头。
	火焰消失 4 次。	检查管网燃气压力和 / 或根据本手册说明调整电磁阀。
	空气压力开关断开。	空气压力过低，(燃烧头调整不当)。 空气压力开关有故障：予以更换。
燃烧器从第一级向第二级过渡时易失去火焰。	燃烧器第一级和第二级之间输出比大于 1 : 2。	恢复 1 : 2 正确的最大比值，检查燃烧器第一级输出是否不小于最小点火率。
	第一级空气过量大。	复位正确的空气过量值 (I 最小 = 1.3)。
燃烧器停机。	燃气压力开关断开	检查管网压力和 / 或根据本手册说明调整电磁阀。

表 U

A 附录 - 附件

加长燃烧头套件

燃烧器	标准长度 (毫米)	燃烧头加长长度 (毫米)	代码
BS3D	110 - 128	267 - 282	3001009
BS4D	145 - 168	302 - 317	3001016

LPG 套件

燃烧器	标准燃烧头和加长燃烧头套件代码	代码
BS3D	3001005	3002736
BS4D	3001011	3002737

民用燃气套件

燃烧器	套件代码 适用标准燃烧头	套件代码 适用加长燃烧头
BS3D	3002729	3002729

减振器火焰烟囱套件

燃烧器	代码
BS3D	3001060
BS4D	3001070

差动断路器套件

燃烧器	代码
所有型号	3001180

PC 接口套件

燃烧器	代码
所有型号	3002731

Multibloc 轮换套件

燃烧器	代码
BS3D - BS4D	3001178

7 针插头套件

燃烧器	代码
所有型号	3000945

燃气阀组，符合 EN 676

请参见手册。



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.riello.it)
[http:// www.riello.com](http://www.riello.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