GB

Forced draught gas burner

Progressive two-stage or modulating operation

CE

CODE	MODEL	TYPE
20145799	RS 200/M BLU	1106T

20152093 (2) - 10/2020

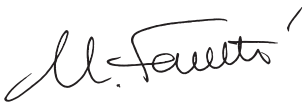
Translation of the original instructions

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) Italy	
Product:	Forced draught gas burners	
Model:	RS 200/M BLU	
These products are in compliance with the following Technical Standards:		
EN 676		
EN 12100		
and according to the European Directives:		
GAR	2016/426/EU	Gas Devices Regulation
MD	2006/42/EC	Machine Directive
LVD	2014/35/EU	Low Voltage Directive
EMC	2014/30/EU	Electromagnetic Compatibility
Such products are marked as follows:		
CE	CE-0085BT0414	RS 200/M BLU

The quality is guaranteed by a quality and management system certified in accordance with ISO 9001:2015.

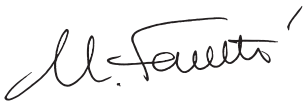
Manufacturer's Declaration			
RIELLO S.p.A. declares that the following products comply with the NOx emission limits specified by German standard "1. BImSchV revision 26.01.2010".			
Product	Type	Model	Output
Forced draught gas burners	1106T	RS 200/M BLU	500 - 2400 kW
Legnago, 21.04.2018	General Manager RIELLO S.p.A. - Burners Department		Research and Development Director RIELLO S.p.A. - Burners Department
	Eng. U. Ferretti		Eng. F. Comencini



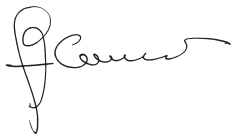
Declaration of Conformity A.R. 8/1/2004 & 17/7/2009 – Belgium	
Manufacturer:	RIELLO S.p.A. 37045 Legnago (VR) Italy Tel. ++39.0442630111 www.riellobumers.com
Distributed by:	RIELLO NV Waverstraat 15 9310 Moorsel (Aalst) Tel. (053) 769 030 Fax. (053) 789 440 e-mail. info@riello.be URL. www.riello.be
This document certifies that the series of devices specified below is in compliance with the model described in the EC Declaration of Conformity and has been manufactured and distributed in compliance with the requirements defined in the Legislative Decree of January 8th 2004 and July 17th 2009.	
Type of product:	Forced draught gas burners
Model:	RS 200/M BLU
Regulation applied:	EN 676 and A.R. of January 8th 2004 - July 17th 2009
Controlling organisation:	TÜV Industrie Service GmbH TÜV SÜD Gruppe Ridlerstrase, 65 80339 München DEUTSCHLAND
Values measured:	Max. CO: 5 mg/kWh Max. NOx: 61 mg/kWh

Legnago, 21.04.2018

General Manager
RIELLO S.p.A. - Burners Department
Eng. U. Ferretti



Research and Development Director
RIELLO S.p.A. - Burners Department
Eng. F. Comencini



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 important information that you must bear in mind.

➤ This symbol indicates a list.

Abbreviations used

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

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 sale contract. At the moment of the first start-up, check that the burner is integral and complete.

ATTENTION

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

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

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

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

3 Safety and prevention

3.1 Introduction

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

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

It is a good idea to remember the following:

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

Specifically:

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

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

➤ Modification of the burner to alter its performance and destinations is not allowed.

➤ The burner must be used in exemplary technical safety conditions. Any disturbances that could compromise safety must be quickly eliminated.

➤ Opening or tampering with the burner components is not allowed, apart from the parts requiring maintenance.

➤ Only those parts envisaged by the manufacturer can be replaced.

ATTENTION

The manufacturer guarantees safety and proper 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, the user undertakes to ensure that everyone knows the use and safety instructions for his own duties;

➤ Personnel must observe all the danger and caution indications shown on the machine.

➤ Personnel must not carry out, on their own initiative, operations or interventions that are not within their province.

➤ Personnel must inform their superiors of every problem or dangerous situation that may arise.

➤ The assembly of parts of other makes, or any modifications, can alter the characteristics of the machine and hence compromise operating safety. The manufacturer therefore declines any and every responsibility for any damage that may be caused by the use of non-original parts.

In addition:

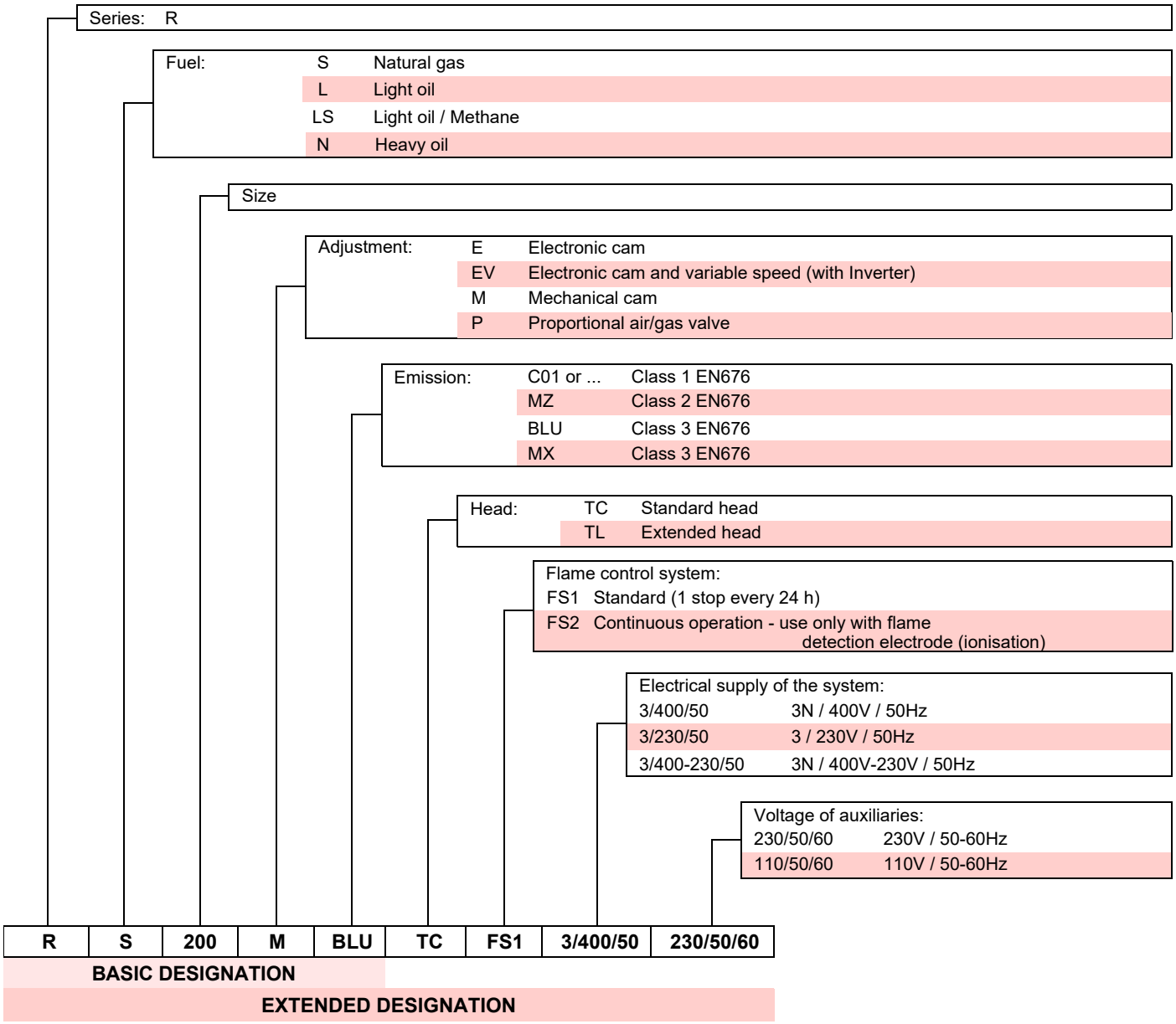
➤ must take all the measures necessary to prevent unauthorised people gaining access to the machine;

➤ the user must inform the manufacturer if faults or malfunctioning of the accident prevention systems are noticed, along with any presumed danger situation;

➤ personnel must always use the personal protective equipment envisaged by legislation and follow the indications given in this manual.

4 Technical description of the burner

4.1 Burner designation



4.2 Burner categories

Country of destination	Gas category
BE	I2E(R)
LV	I2H
CY, MT	I3B/P
BE	I3P
LU, PL	II2E3B/P
DE	II2ELL3B/P
FR	II2Er3P
AT, CH, CZ, DK, EE, FI, GR, HU, IS, IT, LT, NO, SE, SI, SK	II2H3B/P
ES, GB, IE, PT	II2H3P
NL	I_{2E} - I_2 (43.46 ÷ 45.3 MJ/m^3 (0°C))

Tab. A

4.3 Models available

Designation		Power supply voltage	Start-up	Code
RS 200/M BLU	TL	3 ~ 230 / 400V - 50Hz	Direct	20145799

Tab. B

4.4 Technical data

Model			RS 200/M BLU
Type			1106T
Output (1)	Max.	kW Mcal/h	1380 ÷ 2400 1187 ÷ 2064
	Min.	kW Mcal/h	550 473
Fuel			Natural gas: G20 (methane) G21 - G22 - G23 - G25 - G31
Gas pressure at max. output (2) - Gas: G20 / G25 / G31		mbar	28 / 35.6 / 19.6
Operation			– Intermittent (min. 1 stop in 24 hours) – Progressive two-stage or modulating by kit (see ACCESSORIES).
Standard applications			Boilers: water, steam, diathermic oil
Ambient temperature		°C	0 - 40
Combustion air temperature		°C max	60
Noise levels (3)	Sound pressure Sound power	dB(A)	80.5 91.5

Tab. C

(1) Reference conditions: Ambient temperature 20°C - Gas temperature 15°C - Barometric pressure 1013 mbar - Altitude 0 m a.s.l.
(2) Pressure at the test point of the pressure switch (Fig. 29 on page 29) with zero pressure in the combustion chamber and at maximum burner output.
(3) Sound pressure measured in manufacturer's combustion laboratory, with burner operating on test boiler and at maximum output.
The sound power is measured using the "Free Field" method, required by the EN 15036 standard, and according to an “Accuracy: Category 3” measurement, as described in EN ISO 3746.

4.5 Electrical data

Model		RS 200/M BLU
Type		1106T
Main electrical supply Auxiliary circuit electrical supply		3 ~ 400V +/-10% 50Hz 1N ~ 230V +/-10% 50Hz
Fan motor IE3	Hz rpm V kW A	50 2935 400 5.5 10.2
Ignition transformer	V1 - V2 I1 - I2	230 V - 1 x 8 kV 1 A - 20 mA
Absorbed electric power	kW max	5.9
Protection level		IP 44

Tab. D

4.6 Maximum dimensions

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

Bear in mind that inspection of the combustion head requires the burner to be opened and the rear part drawn back on the slide bars.

The maximum dimensions of the open burner are indicated by the value I.

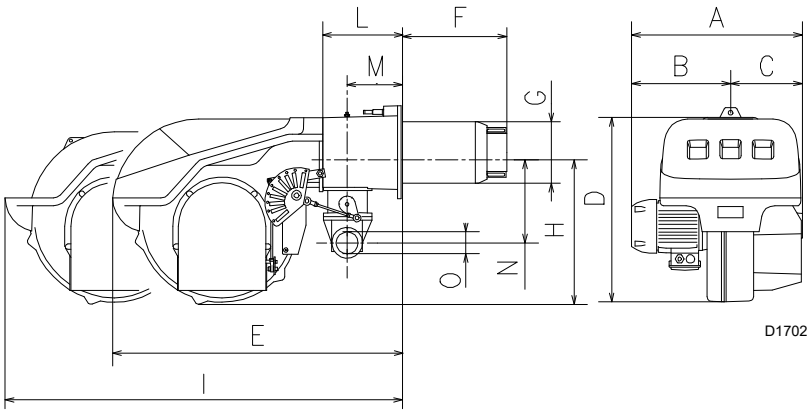


Fig. 1

mm	A	B	C	D	E	F (1)	G	H	I (1)	L	M	N	O
RS 200/M BLU	732	427	329	573	863	373-503	221	430	1442-1587	228	141	261	Rp2

Tab. E

(1) Blast tube: short-long

4.7 Firing rates

The **maximum output** is to be chosen within area A of the diagram (Fig. 2).

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

CAUTION

Model firing rate (Fig. 2) refers to operation on G20 - G25.

If using G31, the minimum output goes from 550 to 630 kW.

ATTENTION

The firing rate value (Fig. 2) has been obtained considering an ambient temperature of 20 °C, an atmospheric pressure of 1013 mbar (approx. 0 m a.s.l.), and with the combustion head adjusted as shown on page 21.

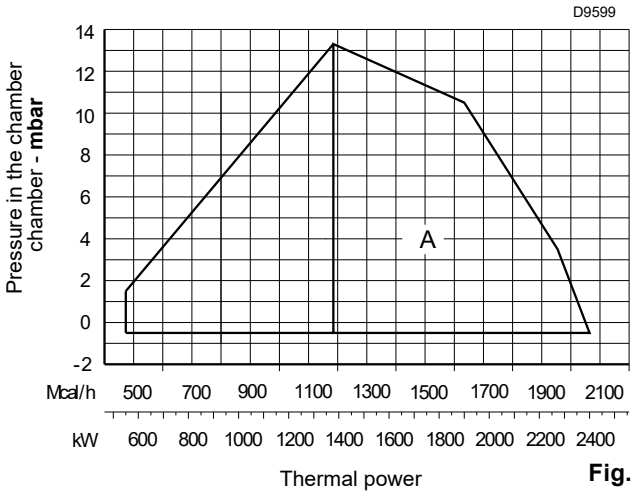


Fig. 2

4.7.1 Firing rate according to air density

The burner firing rate specified in the manual applies for an ambient temperature of 20 °C and an altitude of 0 m a.s.l. (barometric pressure of approx. 1013 mbar).

The burner may have to operate at a higher altitude and/or with combustion air at a higher temperature.

Both air heating and increased altitude cause air volume expansion, i.e. air density is reduced.

Burner fan flow rate remains basically the same but oxygen content per cu. m of air is reduced as well as the fan push (head).

Therefore, it is important to know whether burner required maximum output at a certain pressure in the combustion chamber remains within the burner firing rate also under different temperature and altitude conditions.

To check this, proceed as follows:

1 find the correction factor F concerning air temperature and altitude for the system in Tab. F.

2 Divide output Q requested from the burner by F to obtain the equivalent output Qe:

Qe = Q : F (kW)

3 Within burner firing rate, mark the point identified by:
Qe = equivalent output
H1= pressure in combustion chamber
point A that must remain within the firing rate.

4 Draw a vertical line from point A)(Fig. 3), and calculate the maximum pressure H2 of the firing rate.

5 Multiply H2 by F to obtain the reduced maximum pressure H3 of the firing rate:

H3 = H2 x F (mbar)

If H3 is higher than H1)(Fig. 3), the burner can output the requested flow rate.

If H3 is lower than H1, burner output must be reduced. Output reduction is also combined with a reduction of the pressure in the combustion chamber:
Qr = reduced output
H1r = reduced pressure

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

Example, 5% output reduction:

Qr = Q x 0.95
H1r = H1 x (0.95)2

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

ATTENTION

The combustion head must be adjusted according to equivalent output Qe.

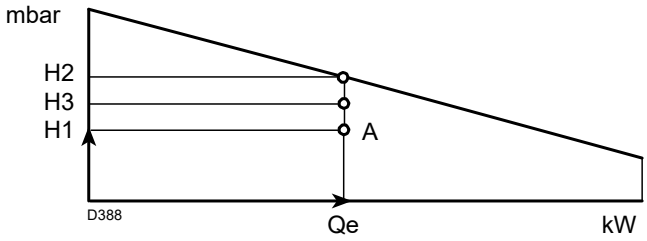


Fig. 3

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

Tab. F

4.8 Test boiler

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

In Fig. 4 you can see the diameter and length of the test combustion chamber.

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

Although combination is guaranteed when boiler has a CE type-approval, preliminary tests are recommended for boilers or furnaces having a combustion chamber size much different than the one specified in Fig. 4.

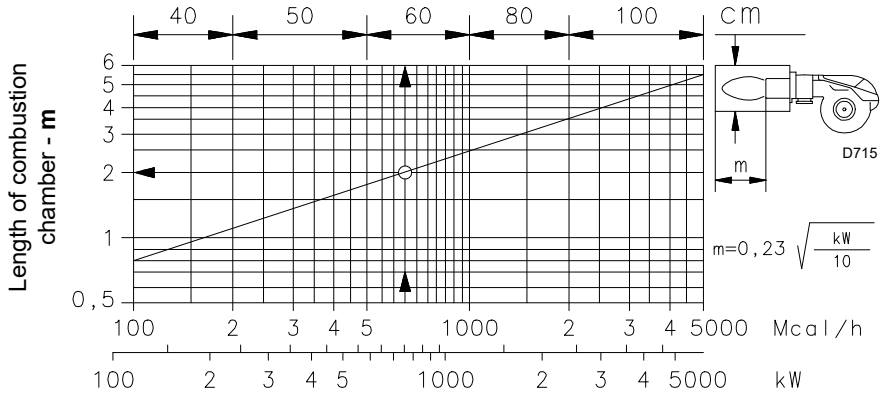


Fig. 4

4.9 Burner equipment

The burner is supplied complete with:

Flange for gas train	No. 1
Seal for flange	No. 1
Flange fixing screws M10 x 40	No. 4
Thermal flange gasket	No. 1
Stud bolts to fix the burner flange to the boiler: M16 x 55	No. 4
M16 nuts	No. 4
Washers	No. 4
Extensions for slide bars 16)(Fig. 5 on page 13) (models having a long blast tube)	No. 2
Instructions	No. 1
Spare Parts List	No. 1

4.10 Burner description

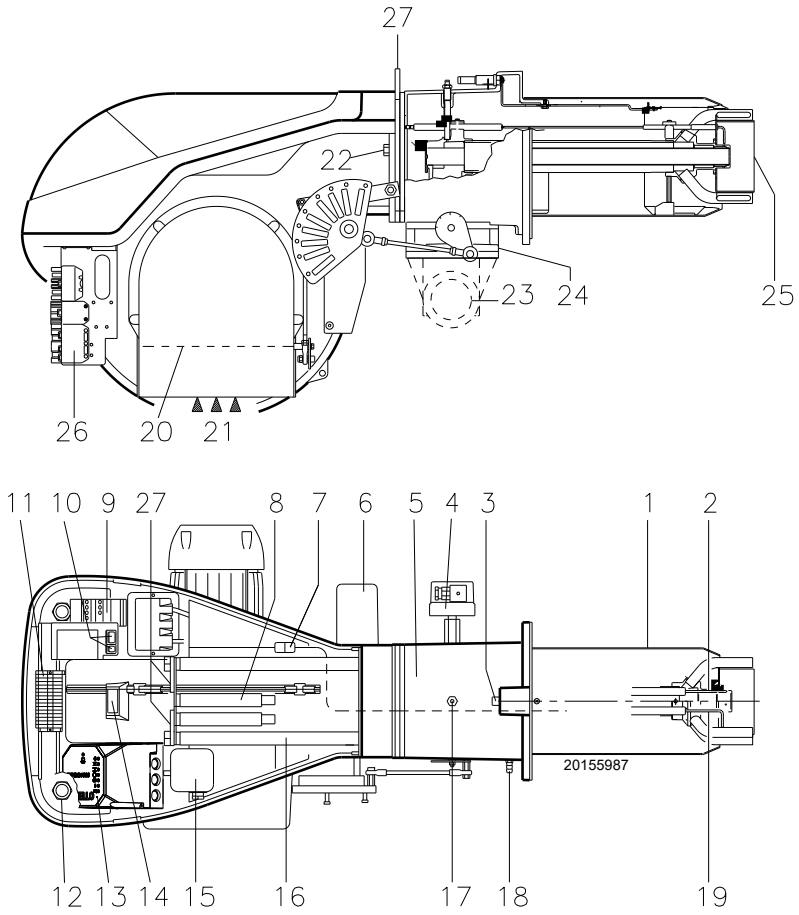


Fig. 5

1 Combustion head
2 Ignition electrode
3 Screw for combustion head adjustment
4 Maximum gas pressure switch
5 Pipe coupling with flange for boiler fixing
6 Servomotor controlling the gas butterfly valve and the air damper, by means of a variable profile cam mechanism.
When the burner is not operating the air damper is fully closed in order to reduce heat dispersion from the boiler due to the flue draught, which draws air from the fan suction inlet
7 Plug-socket on ionisation probe cable
8 Extensions for slide bars 16)
9 Motor contact maker and thermal relay with reset button
10 A switch for:
automatic-manual-off operation
A button for:
output increase - decrease
11 Terminal board
12 Cable grommets for electrical wiring (to be carried out by the installer)
13 Electrical control box with lockout pilot light and reset button
14 Flame inspection window
15 Minimum air pressure switch (differential type)
16 Slide bars for opening the burner and inspecting the combustion head
17 Gas pressure test point and head fixing screw
18 Air pressure test point
19 Flame sensor probe
20 Air damper
21 Air inlet to fan
22 Screws to secure fan to pipe coupling
23 Gas input pipe
24 Gas butterfly valve
25 Flame stability disc
26 Sockets for electric connections
27 Lifting rings

4.11 Electrical panel description

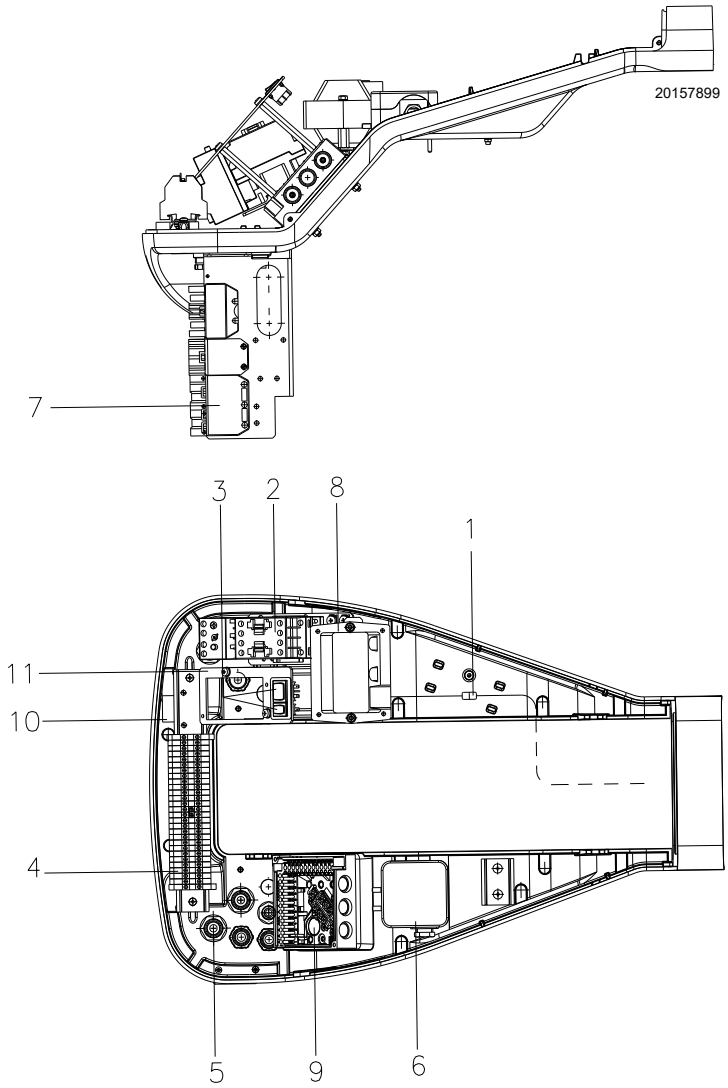


Fig. 6

1 Plug-socket on ionisation probe cable
2 Motor contact maker and thermal relay with reset button
3 A switch for: automatic-manual-off operation
A button for: output increase - decrease
4 Terminal board for electrical connection
5 Cable grommets for electrical wiring (to be carried out by the installer)
6 Air pressure switch (differential type)
7 Sockets for electric connections
8 Ignition transformer
9 Control box base
10 Filter to protect against radio disturbance
11 Bracket to apply the RWF kit for modulating operation

4.12 Control box RFG0-A22

Important notes

ATTENTION

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 that the entire control box is perfectly dry!
– Static charges must be avoided since they can damage the control box's electronic components when touched.

Use

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

Installation notes

- Check that the electrical wiring inside the boiler complies with the national and local safety regulations.
- Do not confuse the powered conductors with the neutral ones.

Electrical wiring of the flame detector

It is important for signal transmission to be almost totally free of any disturbances or loss:
- Always separate the detector cables from the other cables:
  – The capacitive reactance of the line reduces the size of the flame signal.
  – Use a separate cable.
- Respect the allowed cable lengths.
- 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 ignition electrode and the ionisation probe so that the ignition spark cannot form an arc on the probe (risk of electric overcharge).
- 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 that AC 230 V mains voltage cables are run strictly separate from extra low-voltage cables to avoid risks of electrical shock hazard.

Fig. 7

Technical data

Mains voltage	AC 230 V -15 % / +10 %
Mains frequency	50 / 60 Hz
Primary fuse (external)	Refer to the electric system
Weight	approx. 1.1 kg
Power absorption	approx. AC 7 VA
Protection level	IP40
Safety class	II
Environmental conditions	
Operation	DIN EN 60721-3-1
Climatic conditions	Class 1K2
Mechanical conditions	Class 1M2
Temperature range	-40...+60 °C
Humidity	< 90% RH (non-condensing)

Tab. G

4.13 Servomotor (SQN31...)

Important notes

ATTENTION

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

Avoid opening, modifying or forcing the actuators.

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

Assembly notes

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

Fig. 8

Technical data

Operating voltage	AC 220...240V, 50 Hz –15 % / +10 % AC 220 V, 60 Hz –15 % / +10 %
Switching capacity of auxiliary devices and limit switches	10 (3) A, AC 24...250 V
Angle positioning	up to 160° (full scale)
Assembly position	option
Protection level	IP 54, DIN 40050
Safety class	I
Weight	approx. 0.8 kg
Actuator motor	synchronous motor
Power absorption	6.5 VA
Environmental conditions:	
Operation	DIN EN 60 721-3-1
Climatic conditions	Class 1K2
Mechanical conditions	Class 1M2
Temperature range	-20...+60 °C
Humidity	< 95% RH

Tab. H

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.

DANGER

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

ATTENTION

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.

DANGER

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

5.2 Handling

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

ATTENTION

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

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

CAUTION

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

5.3 Preliminary checks

Checking the consignment

CAUTION

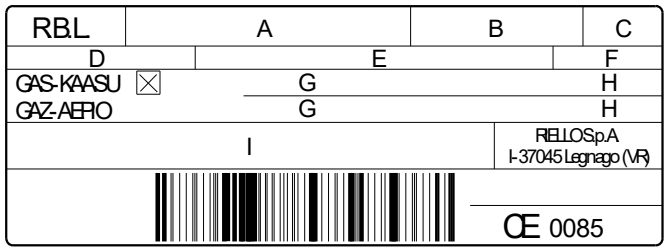
After removing all the packaging, check the integrity of the contents. In the event of doubt, do not use the burner; contact the supplier.

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

Checking the characteristics of the burner

Check the identification label of the burner (Fig. 9), showing:

A the burner model;
B the burner type;
C the cryptographic year of manufacture;
D the serial number;
E the data for electrical supply and the protection level;
F the electrical power consumption;
G the types of gas used and the relevant supply pressures;
H the data of the burner possible minimum and maximum output (see Firing rate).
Warning. The burner output must be within the firing rate of the boiler;
I the category of the appliance/countries of destination.



D7738

Fig. 9

ATTENTION

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

5.4 Operating position

ATTENTION

- The burner is designed to operate only in positions **1**, **2**, **3** and **4** (Fig. 10).
- Installation **1** is preferable, as it is the only one that allows the maintenance operations as described in this manual.
- Installations **2**, **3** and **4** permit operation but make maintenance and inspection of the combustion head more difficult.

DANGER

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

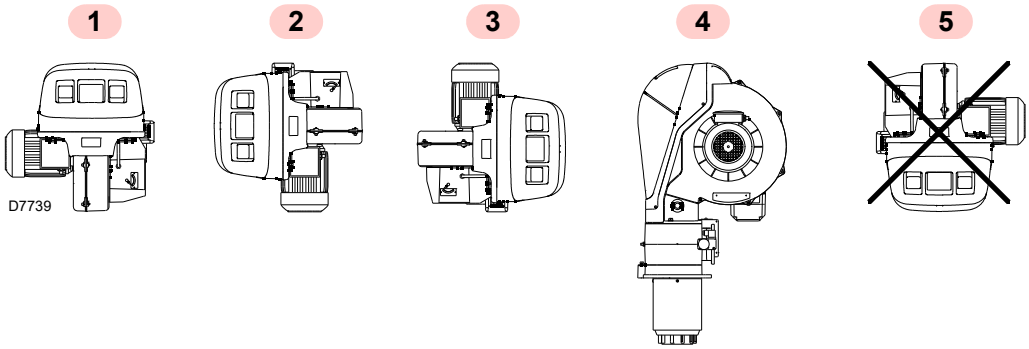


Fig. 10

5.5 Preparing the boiler

5.5.1 Introduction

The burners are suitable for operating both on boilers with flame inversion chambers (*) (the long head model being recommended in this instance) and on boilers having a combustion chamber with bottom outflow (three passes), on which the lowest NOx emissions are obtained.

(*) A kit for reducing CO is available for boilers with flame inversion chambers, if necessary See Accessories.

The kit includes 5 gas tubes, identical to another 5 already present in the burner head.
In standard conditions, burner head is equipped with a second set of tubes, letting gas out in a different direction compared to the previous tubes.
Using the kit, this second set of tube is replaced so that in the end all tubes are the same.
After installing the kit, check its effectiveness by measuring flue gas and CO.

5.5.2 Boring the boiler plate

Pierce the closing plate of the combustion chamber, as in Fig. 12.

The position of the threaded holes can be marked using the thermal insulation screen supplied with the burner.

The boiler front door maximum thickness A)(Fig. 11), complete with refractory, must not exceed:

Blast tube	A (mm)
RS 200/M BLU	250

Tab. I

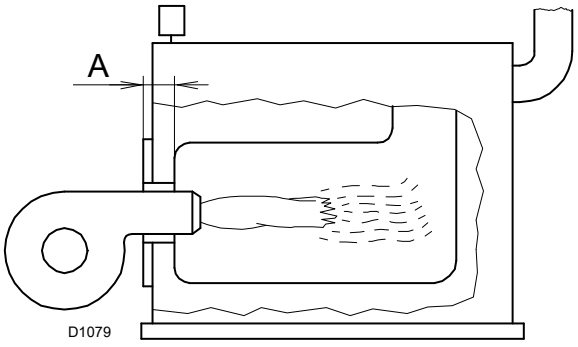


Fig. 11

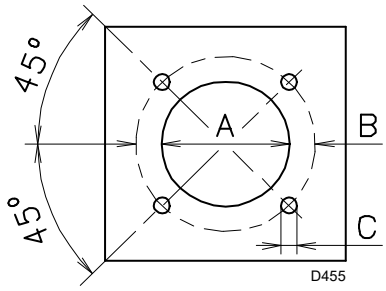


Fig. 12

mm	A	B	C
RS 200/M BLU	230	325-368	M 16

Tab. J

5.5.3 Blast tube length

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

The range of available lengths L, is as follows:

Blast tube	Short (mm)	Long (mm)
RS 200/M BLU	373	503

Tab. K

For boilers with front flue passes 13)(Fig. 15) or flame inversion chambers, a protection in heat-resistant material 11) must be inserted between the boiler refractory 12) and the blast tube 10).

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

For boilers with a water-cooled front piece, a refractory lining 11)-12)(Fig. 15) is not necessary, unless expressly requested by the boiler manufacturer.

5.6 Positioning the probe - electrode

ATTENTION

Before securing the burner to the boiler, check (through the opening of the blast tube) that the probe and electrode are correctly positioned, as in Fig. 14.

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

- ➤ remove the screw 1)(Fig. 13)
- ➤ take out the inner part 2)(Fig. 13) of the head and then calibrate them.

ATTENTION

Do not rotate the probe but leave it as in Fig. 14; if it is too close to the ignition electrode, it could damage the control box amplifier.

ATTENTION

Respect the dimensions shown in Fig. 14.

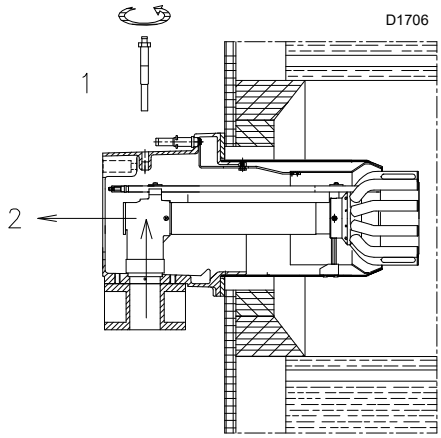


Fig. 13

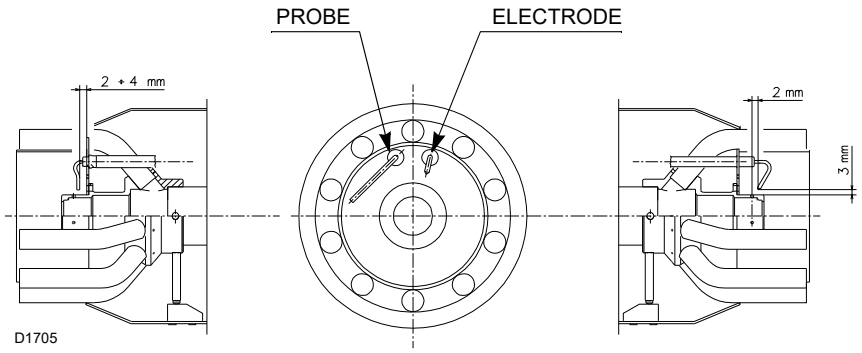


Fig. 14

5.7 Securing the burner to the boiler

Provide an adequate lifting system of the burner.

Divide the combustion head from the rest of the burner, as shown in Fig. 15; you have to:
- ➤ loosen the 4 screws 3) and remove the cover 1);
- ➤ remove screws 2) from the two slide bars 5);
- ➤ disconnect plug 14), unscrew cable grommet 15);
- ➤ disconnect the socket of the maximum gas pressure switch;
- ➤ remove the 2 screws 4);
- ➤ draw the burner back on the slide bars 5) by about 100 mm;
- ➤ disconnect the probe and electrode cables, then completely unthread the burner from the slide bars.

ATTENTION

Before fastening the burner to the boiler, check whether the maximum output for the model concerned is included in area A or in area B of the firing rate (Fig. 2 on page 10).

If it is in area A, no intervention is required.

If it is included in area B, the combustion head must be pre-calibrated, as described in **"Combustion head pre-calibration"** on page 21.

As soon as this operation is completed (if necessary):
- ➤ fix the flange 9) to the plate of the boiler interposing the insulating flange gasket 8) supplied with the unit.
- ➤ Use the 4 screws supplied, with a tightening torque of 35-40 Nm, after protecting their thread with anti-seizing products.

ATTENTION

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

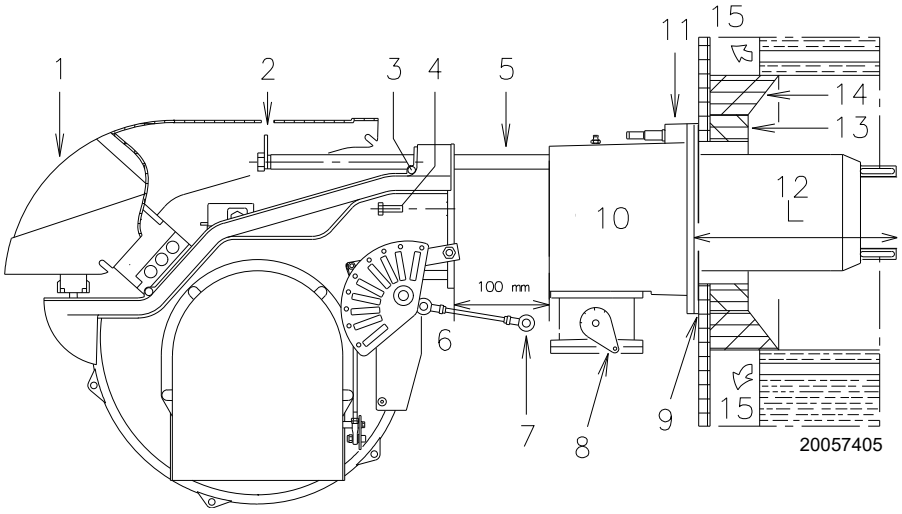


Fig. 15

5.8 Combustion head pre-calibration

ATTENTION

Combustion head must be pre-calibrated exclusively for the model concerned, if its maximum output is included in area B of the firing rate (Fig. 2 on page 10).

Proceed as follows:

➤ remove the 8 screws 2)(Fig. 16);

➤ remove the 4 round blocks 1) fastened behind the stability disc.

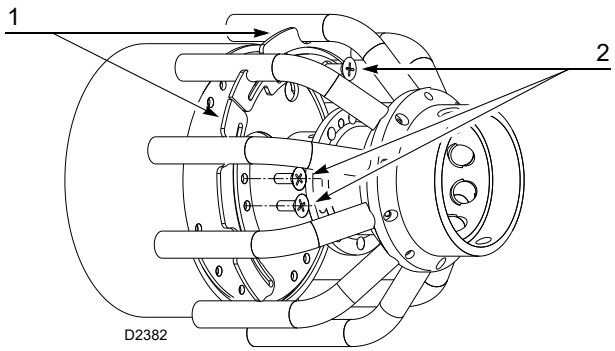


Fig. 16

5.9 Combustion head adjustment

At this point of the installation, the combustion head is fixed to the boiler as shown in Fig. 13. It is therefore especially easy to adjust, and this adjustment depends only on the maximum output of the burner.

Two combustion head adjustments are available:

– external air R1

– central gas/air R2

In the diagram of Fig. 17, find the notch at which both air and central gas/air should be adjusted.

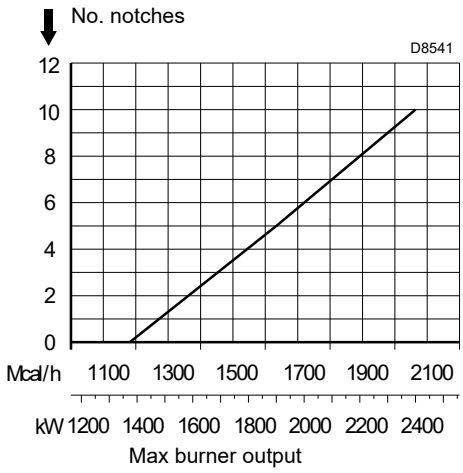


Fig. 17

External air R1 adjustment

➤ Turn the screw 4)(Fig. 18) until the notch found lines up with the front surface 5) of the flange.

ATTENTION

To facilitate the adjustment, loosen the screw 6), adjust, then block.

Central gas/air R2 adjustment

➤ Loosen the 3 screws 1)(Fig. 18) and rotate the ring nut 2) until the notch you have found corresponds with the indicator 3).

➤ Block the 3 screws 1).

Example:

RS 200/M BLU, burner output = 2400 kW.

The diagram (Fig. 17) shows that for this output the settings are:

– air R1 = notch 10

– central gas/air R2 = notch 10

ATTENTION

The burner leaves the factory with the ring nut 2) set to notch 0.

Do not change this value.

NOTE:

the diagram (Fig. 17) indicates the optimum adjustment for a type of boiler according to Fig. 4 on page 12.

ATTENTION

The adjustments indicated can be modified during the initial start-up.

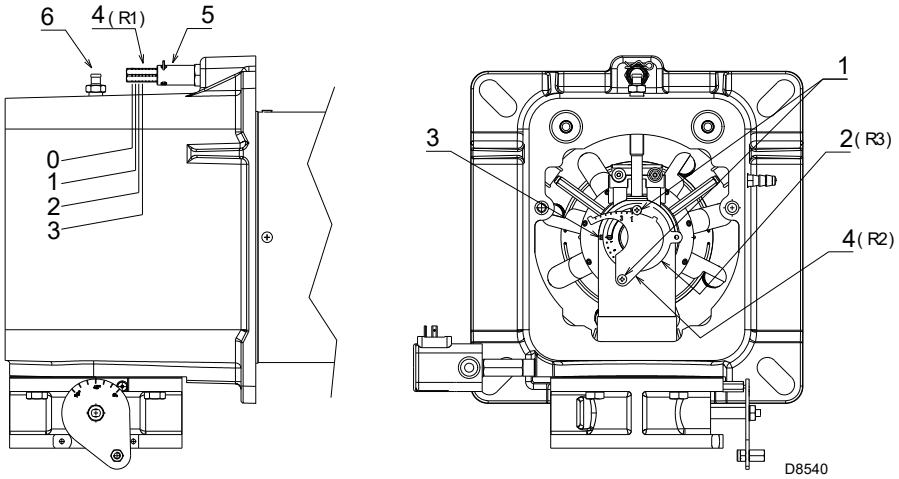


Fig. 18

If gas pressure allows it, NOx reduction can be obtained by closing ring nut 2)(Fig. 18).

Continuing the example above, you understand that for RS 200/M BLU burner having a power of 2400 kW, pressure must be 28 at outlet 6)(Fig. 18).

If this pressure is not available, open ring nut 2) to 4 - 5 notches.

Check that combustion is fine and with no pulsations/knocking.

5.10 Closing the burner

Once the combustion head adjustment is completed:

➤ reassemble the burner on the slide bars 3)(Fig. 19) at about 100 mm from the pipe coupling 4);

➤ insert the cables of the probe and electrode, then slide the burner as far as the pipe coupling, the burner in the position indicated in Fig. 19;

➤ for burners featuring a long blast tube, remove slide bar extensions;

➤ refit the screws 2) on the slide bars 3);

➤ fix the burner to the pipe coupling with the screw 1);

➤ reconnect the articulated coupling 7) to the graduated sector 6).

ATTENTION

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

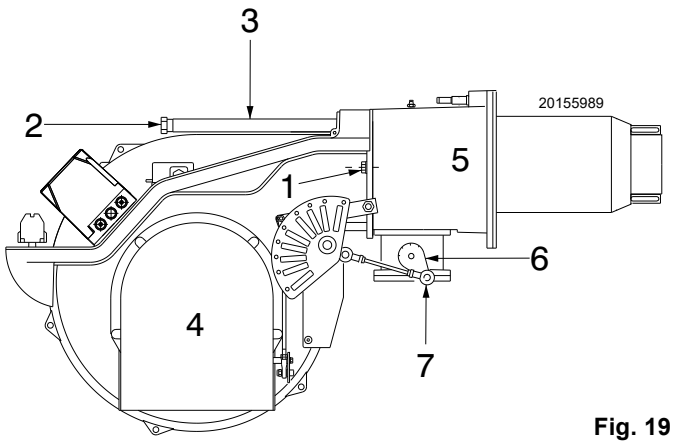


Fig. 19

5.11 Gas supply

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

Precautions: avoid knocking, attrition, sparks and heat.

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

ATTENTION

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

5.11.1 Gas feeding line

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

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

MBC “threaded”

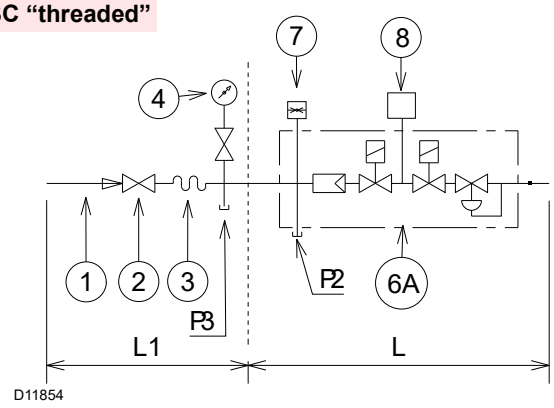


Fig. 20

MBC “flanged”

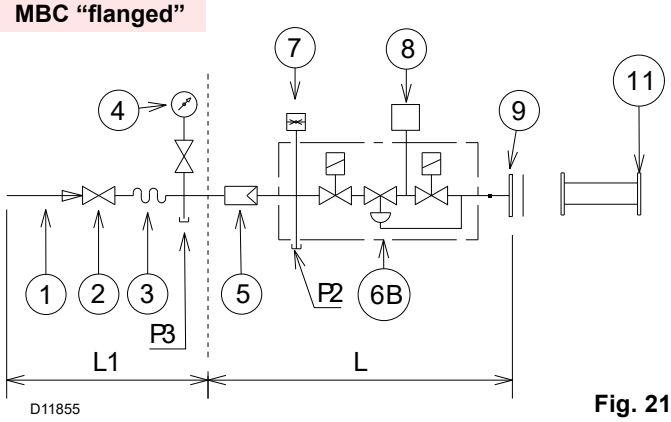


Fig. 21

DMV “flanged or threaded”

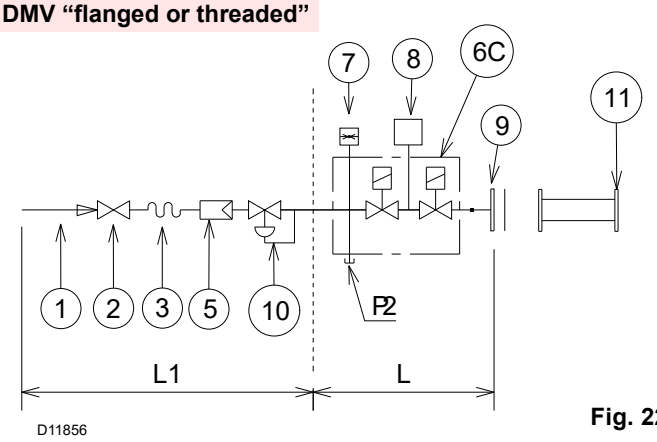


Fig. 22

CB “flanged or threaded”

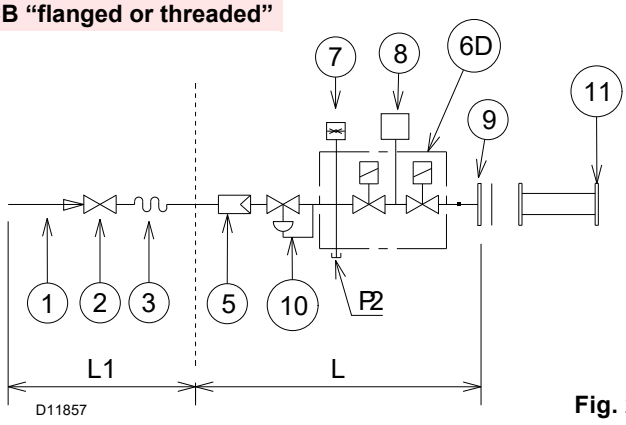


Fig. 23

5.11.2 Gas train

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

To select the correct gas train model, refer to the manual "Burner-gas train combination" supplied with the unit.

5.11.3 Gas train installation


DANGER

Disconnect the electrical power supply using the system main switch.

Check that there are no gas leaks.

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

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

The operator must use the required equipment during installation.

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

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


ATTENTION

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

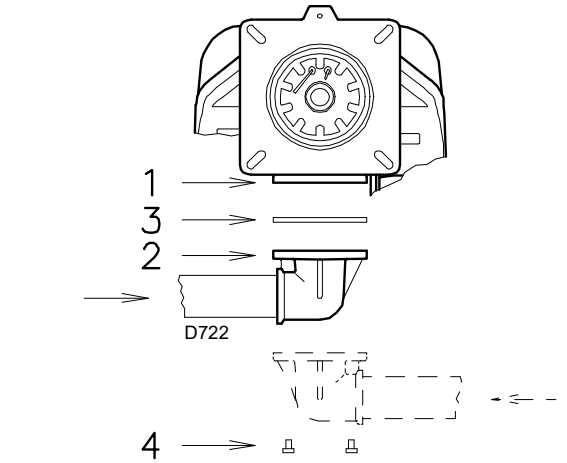
The values shown in Tab. L refer to:
– Natural gas G 20 NCV 9.45 kWh/Sm^3 (8.2 Mcal/Sm^3)
– Natural gas G 25 NCV 8.13 kWh/Sm^3 (7.0 Mcal/Sm^3)
– LPG G31 NCV 26.3 kWh/Sm^3 (22.6 Mcal/Nm^3)

Column 1

Combustion head pressure drop.
Gas pressure measured at test point 1)(Fig. 25), with:
- combustion chamber at 0 mbar
- burner working at maximum output

Column 2

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


ATTENTION

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

Make sure the maximum pressure necessary for the burner is included in the calibration range of the pressure regulator.

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

Fig. 24

5.11.4 Gas pressure

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

kW	1 Δp (mbar)		2 Δp (mbar)	
	G 20	G 25	G 20	G 25
1383	9.0	13.4	3.1	4.7
1500	10.7	16.0	3.7	5.5
1800	14.7	21.9	5.3	7.9
2100	20.3	30.3	7.2	10.7
2400	28.0	41.8	9.4	14.0

Tab. L

To calculate the approximate output at which the burner operates:
– subtract the combustion chamber pressure from the gas pressure measured at test point 1)(Fig. 25).
– Find in Tab. L related to the burner concerned, the pressure value closest to the result of the subtraction.
– Read the corresponding output on the left.

Example with natural gas G 20 for:
Maximum output operation

Gas pressure at test point 1)(Fig. 25)	=	17.7 mbar
Pressure in combustion chamber	=	3.0 mbar
17.7 - 3.0	=	14.7 mbar

A pressure of 14.7 mbar, column 1, corresponds in Tab. L to an output of 1800 kW.

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

To calculate the required gas pressure at test point 1)(Fig. 25), set the maximum modulating output required from the burner operation:
– find the nearest output value in Tab. L for the burner in question.
– Read, on the right (column 1), the pressure at the test point 1)(Fig. 25).
– Add this value to the estimated pressure in combustion chamber.

Example with natural gas G 20 for:
Operating at the desired maximum output: 1800 kW

Gas pressure at an output of 1800 kW	=	14.7 mbar
Pressure in combustion chamber	=	3.0 mbar
14.7 + 3.0	=	17.7 mbar

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

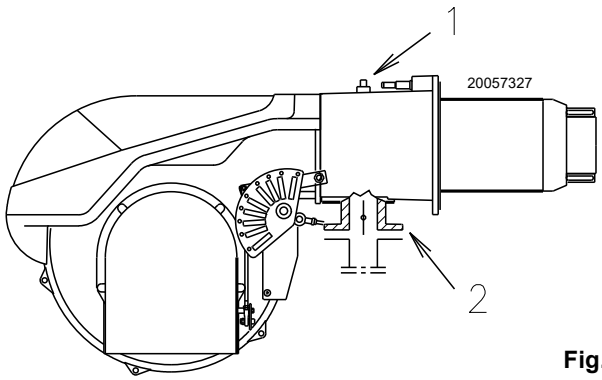


Fig. 25

5.12 Electrical connections

Notes on safety for the electrical wiring


DANGER

- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be made in accordance with the regulations currently in force in the country of destination and by qualified personnel. Refer to the wiring diagrams.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the wiring diagrams.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The burner has been type-approved for intermittent operation (FS1). However, burner FS2 has also been approved for operation with the only use of the flame detection electrode (ionisation).
- The RFGO safety device features two built-in flame amplifiers which allow using it for applications with UV sensor only, FR sensor only or with both sensors (UV+FR). The FR amplifier circuit is subject to constant auto-control, which allows to use it for applications requiring a burner operating cycle longer than 24 hours. When it is used as a UV control, the system is considered as non-permanent, requiring one burner recycle every 24 hours.
  Normally, burner stopping is guaranteed by the boiler's thermostat/pressure switch.
  If this is not the case, you must apply a time switch to L-N in series, to stop the burner at least once every 24 hours. Refer to the wiring diagrams.
- The electrical safety of the device is obtained only when it is correctly connected to an efficient earthing system, made according to current standards. It is necessary to check this fundamental safety requirement. In the event of doubt, have the electrical system checked by qualified personnel. Do not use the gas tubes as an earthing system for electrical devices.
- The electrical system must be suitable for the maximum power absorption of the device, as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for that level of power absorption.
- For the main power supply of the device from the electricity mains:
  - do not use adapters, multiple sockets or extensions;
  - make provisions for an omnipolar switch with a gap between the contacts of at least 3 mm (over-voltage category III), as required by current safety regulations.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.

Before carrying out any maintenance, cleaning or checking operations:


DANGER

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


DANGER

Close the fuel shut-off valve.


DANGER

Avoid condensate, ice and water leaks from forming.

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

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

5.12.1 Supply cables and external connections passage

All the cables to be connected to the burner should be passed through cable grommets, as shown in Fig. 26.

The use of the cable grommets and the pre-blanked holes can be done in different manners; for example:

1 Pg 13.5 Three-phase power supply
2 M20 7-pole socket input
3 M20 4-pole socket input
4 M20 6-pole socket input
5 Available
6 Drill, if you wish to add a union
7 6-pole socket for gas valves, gas pressure switch or the valve leak detection device
8 Terminal board
9 4-pole socket for TR thermostat/pressure switch
10 Single phase power supply 7-pole socket for TR thermostat/ pressure switch

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

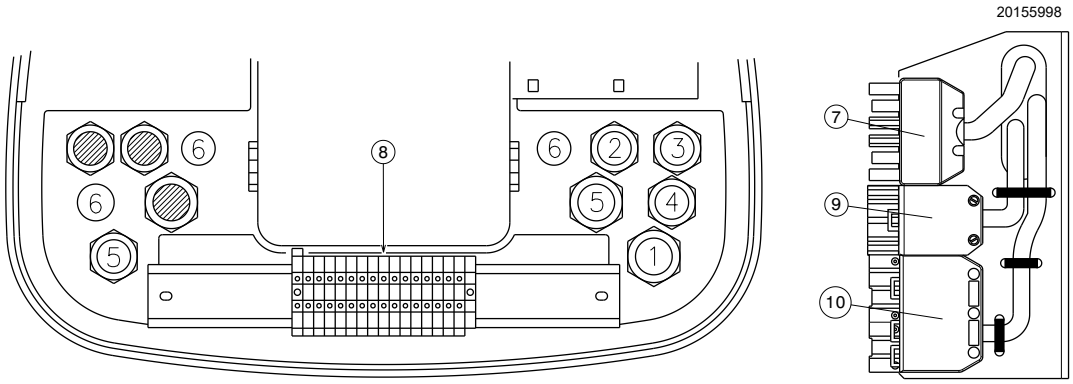


Fig. 26

5.13 Calibration of the thermal relay

The thermal relay (Fig. 27) serves to avoid damage to the motor due to an excessive absorption increase or if a phase is missing.

For calibration 2), refer to the table indicated in the electrical layout (electrical wiring by the installer).

To reset, in case of thermal relay activation, press the "RESET" button 1).

The button “STOP” 3) opens the NC contact (95-96) and stops the motor.

Insert a screwdriver in the window “TEST/TRIP” 4) and move it in the arrow direction (to the right) to carry out the thermal relay test.

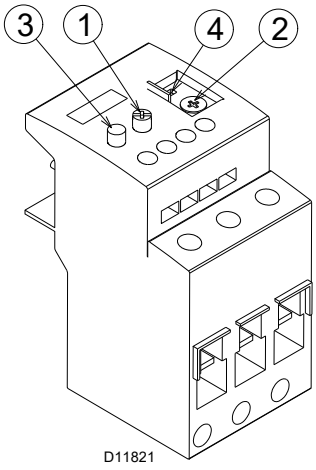


Fig. 27

ATTENTION

The automatic reset can be dangerous.

This operation is not foreseen in the burner operation.

5.14 Motor rotation

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

If this is not the case:

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

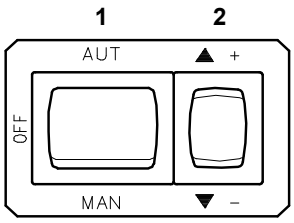


Fig. 28

DANGER

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

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

6 Start-up, calibration and operation of the burner

6.1 Notes on safety for the first start-up

ATTENTION

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

ATTENTION

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

ATTENTION

Before starting up the burner, refer to section "Safety test - with no gas supply" on page 35.

6.2 Adjustments prior to ignition

The following adjustments must be carried out:

- ensure that the gas supply company has carried out the supply line vent operations, eliminating air or inert gases from the piping.
- Slowly open the manual valves situated upstream from the gas train.
- Adjust the minimum gas pressure switch (Fig. 37 on page 33) to the start of the scale.
- Adjust the maximum gas pressure switch (Fig. 36 on page 33) to the end of the scale.
- Adjust the air pressure switch (Fig. 35 on page 33) to the start of the scale.
- Bleed the air from the piping of the gas train, connecting a plastic tube to the pressure test point 1)(Fig. 29) of the minimum gas pressure switch.
  Take the vent tube outside the building so you can notice the smell of gas.
- Fit a U-type pressure gauge (Fig. 29) to the gas pressure test point on the pipe coupling.
  It is used to calculate approximate MAX burner output using the Tab. L on page 24.
- Connect two lamps or testers to the two gas line solenoid valves to check the exact moment in which voltage is supplied.
  This operation is not required if each of the two solenoid valves is equipped with a pilot light that signals voltage passing through.

CAUTION

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

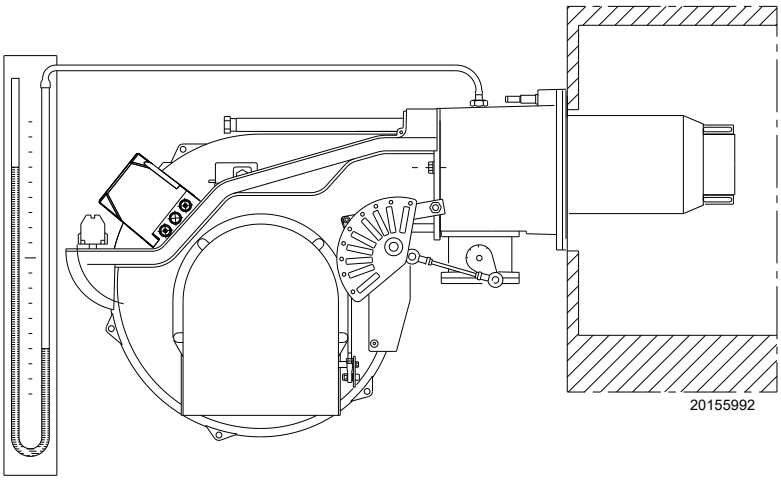


Fig. 29

6.3 Servomotor adjustment

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

ATTENTION

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

Cam I:	**130°**. Limits rotation toward maximum position. When the burner is operating at MAX output, the gas butterfly valve must be fully open: 90°.
Cam II:	**0°**. Limits rotation toward minimum position. When the burner is shut down, the air damper and gas butterfly valve must be closed: 0°.
Cam III:	**30°**. Adjusts the ignition position and the MIN output.
Cams IV and V:	Not used.

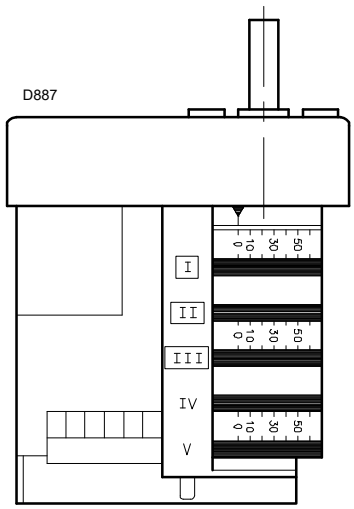


Fig. 30

6.4 Burner start-up

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

Close the thermostats/pressure switches and turn the switch in Fig. 31 to position "**MAN**".

DANGER

Check that the lamps or the testers connected to the solenoid valves or the pilot lights on the solenoid valves indicate that no voltage is present.

If they indicate the presence of voltage, stop the burner **immediately** and check the electric connections.

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

6.5 Burner ignition

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

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

The arrival of gas to the sleeve is indicated by the U-type pressure gauge (Fig. 29 on page 29).

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

6.6 Adjusting the burner

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

Ignition output
According to standard EN 676.
Burners with MAX output up to 120 kW
Ignition can occur at the maximum operation output level. Example:
➤ max. operation output: 120 kW
➤ max. ignition output: 120 kW

Burners with MAX output above 120 kW
Ignition must occur at a lower output than the max. operation output.
If ignition output does not exceed 120 kW, no calculations are required. If ignition output exceeds 120 kW, the regulatory standard sets that the value be defined according to the control box safety time "ts":
for "ts" = 3s, ignition output must be equal to or lower than 1/3 of max. operation output.

Example
MAX operation output of 600 kW.
Ignition output must be equal to or lower than:

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

In order to measure the ignition output:
➤ disconnect the plug-socket 7)(Fig. 5) on the ionisation probe cable (the burner will fire and then go into lockout after the safety time has elapsed);
➤ perform 10 consecutive ignitions with lockouts;
➤ read the quantity of burned gas on the meter:
this quantity must be equal to, or lower than, the quantity given by the formula, for ts = 3s:

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

Example for G 20 gas (10 kWh/Nm^3):
ignition output 600 kW
corresponding to 60 Nm^3/h.
After 10 ignitions with a lockout, the delivery indicated on the meter must be equal to or less than:
60: 360 = 0.166 Nm^3.

MAXIMUM OUTPUT
Maximum output must be selected within the firing rate range shown on page 10. In the above instructions we left the burner running at the MIN output.
Now press the “increase output” button 2)(Fig. 32 on page 32), and keep it pressed until the servomotor has opened the air damper and the gas butterfly valve.

Adjustment of gas delivery
Measure the gas delivery on the meter.
A rough indication can be obtained from table Tab. F on page 11; just read the gas pressure on the pressure gauge (see Fig. 35 on page 33) and follow the indications given on page 11.
– If it needs to be reduced, decrease outlet gas pressure; if it is already very low, slightly close the VR adjustment valve.
– If it needs to be increased, increase the regulator outlet gas pressure.

Adjustment of air delivery
Progressively adjust the end profile of cam 4)(Fig. 33 on page 32) by turning the screws 7).
Turn the screws clockwise to increase air delivery.
Turn the screws anticlockwise to reduce air delivery.

MINIMUM OUTPUT
MIN output must be selected within the firing rate range shown on page 10.
Press and hold the “output reduction” button 2)(Fig. 32 on page 32) until the servomotor closes the air damper and the gas butterfly valve is at 65° (factory setting).

Adjustment of gas delivery
Measure the gas delivery on the meter.
– If it is necessary to reduce it, slightly decrease the angle of cam III) (Fig. 34) with small, regular movements, i.e. bring it from an angle of 65° to 63° - 61°...
– If it is necessary to increase it, lightly press the “output increase” button 2)(Fig. 32) (open the gas butterfly valve by 10-15°), and increase cam III angle (Fig. 34) with a series of small movements, i.e. move from angle 65° to 67° - 69°... Now press the “power reduction” button until the servomotor returns to the minimum opening position, and measure the gas delivery.

NOTE:
The servomotor follows the adjustment of cam III only when the angle of the cam is reduced. If it is necessary to increase the angle of the cam, you must first increase the angle of the servomotor by means of the “output increase” key, then increase the angle of cam III, and finally bring the servomotor to the position of MIN output, with the “output reduction” key. For any necessary adjustment of cam III, especially for small movements, use the specific key 10).

Adjustment of air delivery
Progressively adjust the initial profile of cam 4)(Fig. 33) by turning the screws 5). If possible, do not turn the first screw, since this is used to set the air damper to its fully closed position.

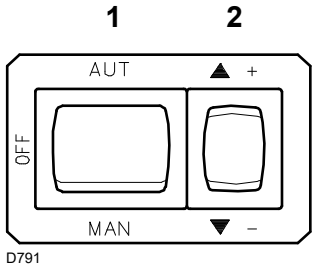


Fig. 32

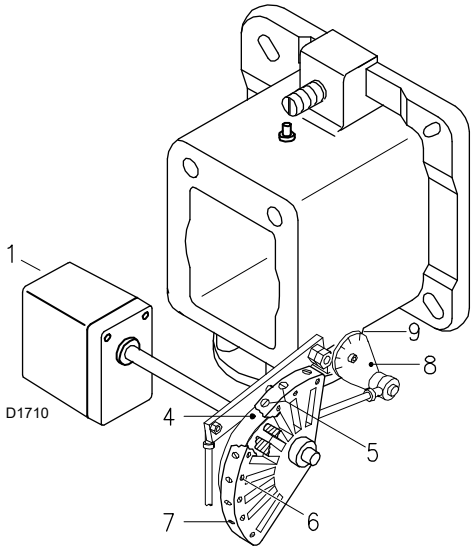


Fig. 33

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

INTERMEDIATE OUTPUTS

Adjustment of gas delivery
No adjustment of gas delivery is required.

Adjustment of air delivery
Lightly press the “increase output” button 2)(Fig. 32) so the servomotor rotates by about 15°. Adjust the screws until optimal combustion is obtained. Proceed in the same way with the other screws. Take care that the cam profile variation is progressive.
Switch the burner off with switch 1)(Fig. 32), OFF position. Release cam 4) from the servomotor by pressing and shifting button 3) to the right, and check several times that by rotating cam 4) forwards and backwards by hand, the movement is soft and smooth, without jamming.
Engage cam 4) to the servomotor again by shifting button 2) to the left.
As far as is possible, try not to move those screws at the ends of the cam that were previously adjusted for the opening of the air damper to MAX and MIN output.
Once optimum adjustment has been reached, fix it with the screws 6).

NOTE:
Once adjustment of “MAX - MIN - INTERMEDIATE” outputs has been completed, recheck the ignition: its noise must be equal to the one of the following operation. If you notice any sign of pulsations, reduce the ignition stage delivery.

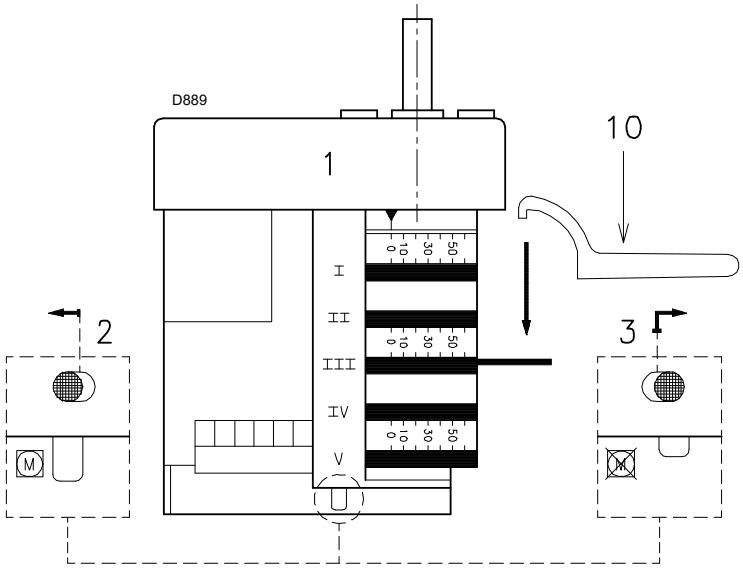


Fig. 34

6.7 Final adjustment of the pressure switches

6.7.1 Air pressure switch

Adjust the air pressure switch (Fig. 35) after performing all other burner adjustments with the air pressure switch set to the start of the scale.

With the burner operating at minimum output, insert a combustion analyser in the stack, slowly close the suction inlet of the fan (for example, with a piece of cardboard) until the CO value does not exceed 100 ppm.

Then slowly turn the appropriate knob clockwise until the burner goes into lockout.

Check the indication of the arrow pointing upwards on the graduated scale. Turn the knob clockwise again, until the value shown on the graduated scale corresponds with the arrow pointing downwards, and so recovering the hysteresis of the pressure switch (shown by the white mark on a blue background, between the two arrows).

Now check the correct start-up of the burner. If the burner locks out again, turn the knob anticlockwise a little bit more. During these operations it may be useful to measure the air pressure with a pressure gauge.

The connection of the pressure gauge is shown in Fig. 35. The standard configuration is that with the air pressure switch connected in absolute mode. Note the presence of a “T” connection, not supplied.

In certain applications in strong depression situations, the connection of the pressure switch does not allow it to change over.
In this case it is necessary to connect the pressure switch in differential mode, applying a second tube between the air pressure switch and the fan suction line mouth.
In this case also, the pressure gauge must be connected in differential mode, as shown in Fig. 35.

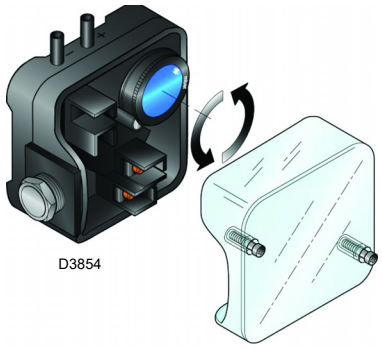


Fig. 35

6.7.2 Maximum gas pressure switch

Adjust the maximum gas pressure switch (Fig. 36) after making all other burner adjustments with the maximum gas pressure switch set to the end of the scale.

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

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

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

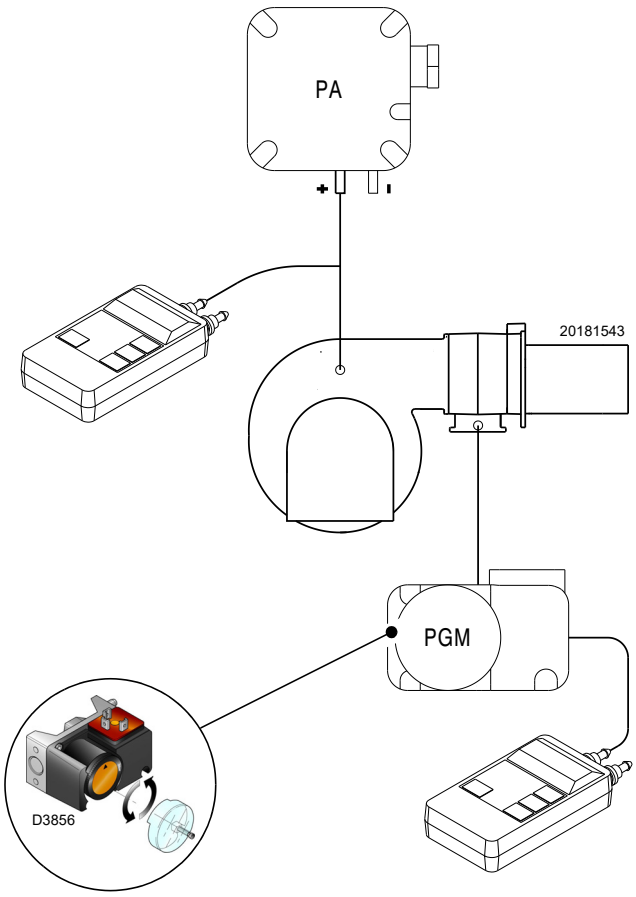


Fig. 36

6.7.3 Minimum gas pressure switch

Adjust the minimum gas pressure switch (Fig. 37) after performing all the other burner adjustments with the pressure switch set to the start of the scale.

With the burner operating at maximum output, increase adjustment pressure by slowly turning the relative knob clockwise until the burner stops.

Then turn the knob anticlockwise by 0.2 kPa (2 mbar) and repeat burner start-up to ensure it is operating regularly.

If the burner locks out again, turn the knob again anticlockwise by 0.1 kPa (1 mbar).

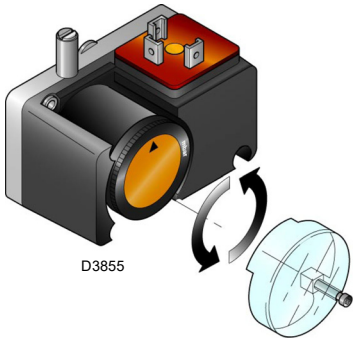


Fig. 37

ATTENTION

1 kPa = 10 mbar

6.8 Burner operation

6.8.1 Burner start-up

- 0s:Control remote control TL closes.
  Fan motor start-up.
- 6s:Servomotor start-up: turn to the right by 130°, i.e. until the contact intervenes on cam I (Fig. 30 on page 30).
  The air damper is positioned to MAX output.
- 48s:Pre-purging stage with MAX output air delivery.
  Duration 32 s.
- 80s:The servomotor turns to the left to reach the angle set on cam III (Fig. 30 on page 30) for the MIN output.
- 112s:The air damper and gas butterfly valve assume the MIN output position (with cam III)(Fig. 30 on page 30) at 15°.
- 113s:Ignition electrode strikes a spark.
- 119s:The safety valve VS opens, along with the adjustment valve VR, (quick opening). The flame ignites with a small output - point A.
  The output gradually increases, and the VR valve slowly opens, until MIN output is reached - point B.
- 122s:The spark goes out.
- 135s:The start-up cycle ends.

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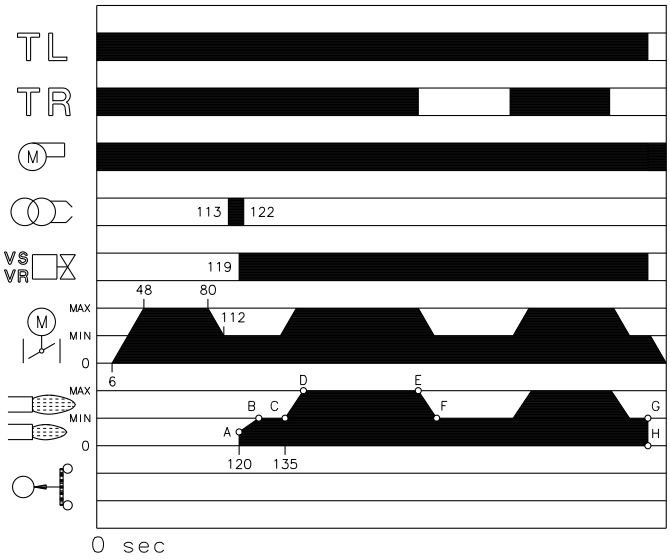

Fig. 38

6.8.2 Steady state operation

At the end of the start-up cycle, the servomotor control switches to TR remote control that controls the pressure or temperature in the boiler, point C. (The electric control box carries on checking the presence of the flame and the correct position of the air and gas maximum pressure switches).

- If the temperature or pressure is low (so the TR remote control is closed), the burner progressively increases the output up to the MAX value (section C-D).
- If the temperature or pressure then increases until the TR opens, the burner progressively decreases its output to the MIN value (section E-F). And so on.
- The burner locks out when the heat request is less than the heat supplied by the burner at MIN output, (section G-H). The TL remote control opens, and the servomotor returns to angle 0° limited by the contact of cam II (E) page 12. The air damper closes completely to reduce heat losses to a minimum.

With each change of output, the servomotor automatically modifies the gas output (butterfly valve) and the air flow rate (fan damper).

6.8.3 Ignition failure

If the burner does not ignite, it locks out within 3s after the gas valve opens, and the post-purging phase starts lasting 17s, i.e. 122s from TL closure.

Burner flame goes out during operation

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

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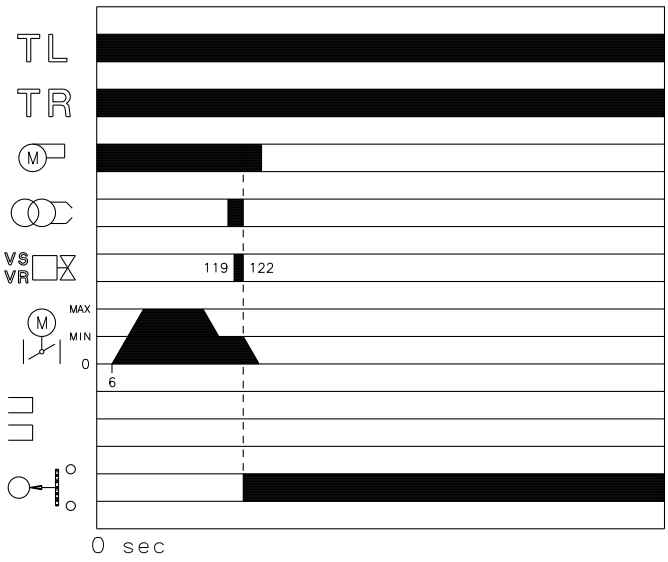


Fig. 39

6.8.4 Final checks (with burner operating)

- Disconnect a wire of the minimum gas pressure switch:
- Open TL remote control:
- Open TS remote control:

the burner must stop

- Disconnect the P shared wire of the maximum gas pressure switch:
- Disconnect the P shared wire of the air pressure switch:
- Disconnect the electrical connections of the ionisation probe:

the burner must stop in lockout

- Make sure that the mechanical locking systems on the various adjustment devices are fully tightened.

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.


DANGER

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

Before carrying out any maintenance, cleaning or checking operations:


DANGER

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


DANGER

Close the fuel shut-off valve.

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 no gas supply

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

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

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

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

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

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

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


ATTENTION

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

7.2.3 Checking and cleaning

The operator must use the required equipment during maintenance.

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

Make sure the gas outlet holes for the ignition phase (in the distributor of the combustion head) are free of impurities or rust. If in doubt, remove the elbow (Fig. 42 on page 37).

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

Burner
Clean the outside of the burner.

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.

Flame inspection window
Clean the glass of the flame inspection window (Fig. 40).

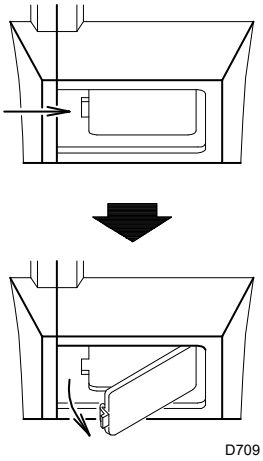


Fig. 40

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.

Flame presence check
Check the level of the flame detection signal with the “Check mode” function from the flame control: the LEDs from 2 to 6 indicate the flame signal level, respectively. See “LED indicator and special function” on page 38.

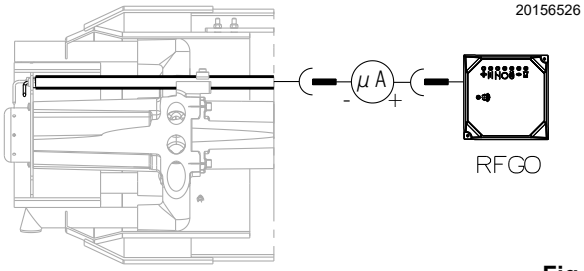


Fig. 41

Check Mode
With burner flame on:
- ➤ hold the reset button on the flame control pressed for at least 3 sec.;
- ➤ the button colour will change from green to yellow;
- ➤ each operating status signalling LED will be compared to 20% of the maximum brightness;
- ➤ press the reset button again (<0.5sec) to reset the standard operation of the signalling LEDs.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.

Combustion
Carry out an analysis of the combustion flue gases.
Significant differences with respect to the previous measurements indicate the points where most care should be exercised during maintenance.
If the combustion values measured before starting maintenance do not comply with applicable Standards or do not indicate efficient combustion, consult the table below or contact our Technical Support Service to implement the necessary adjustments.

EN 676		Air excess		CO
		Max. output $\lambda \leq 1.2$	Max. output $\lambda \leq 1.3$	
GAS	Theoretical max CO_2 0 % O_2	CO_2 % Calibration		mg/kWh
		$\lambda = 1.2$	$\lambda = 1.3$	
G 20	11.7	9.7	9	≤ 100
G 25	11.5	9.5	8.8	≤ 100
G 30	14.0	11.6	10.7	≤ 100
G 31	13.7	11.4	10.5	≤ 100

Tab. M

7.2.4 Safety components

The safety components must be replaced at the end of their life cycle indicated in Tab. N. 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. N

7.3 Opening the burner

DANGER

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

DANGER

Close the fuel shut-off valve.

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

- ➤ Loosen the 4 screws 1)(Fig. 42) and remove the cover 2).
- ➤ Disengage the articulated coupling 7) from the graduated sector 8).
- ➤ Install the two supplied extensions to the slide bars 4) (models with 390 mm blast tube).
- ➤ Turn upwards the lifting rings fastened to the end of slide bars 4).
- ➤ Remove the screws 3) and move the burner backwards by about 100 mm on the slide bars 4). Disconnect the probe and electrode leads and then pull the burner fully back.
- ➤ Now extract the gas distributor 5) after having removed the screw 6).

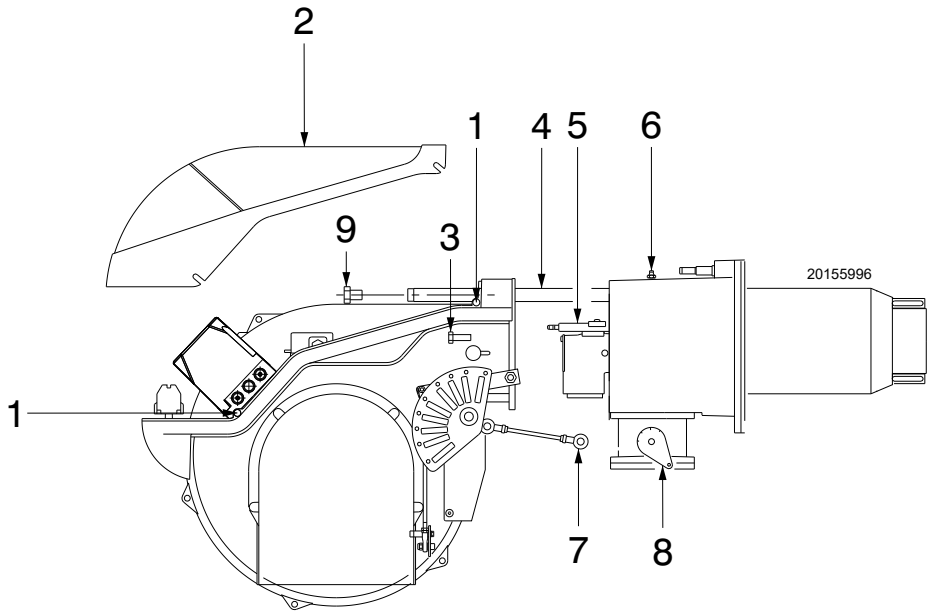


Fig. 42

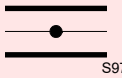
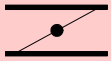
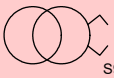
7.4 Closing the burner

- ➤ Push the burner to approximately 100 mm from the pipe coupling.
- ➤ Reconnect the cables and slide in the burner until it comes to a stop.
- ➤ Replace the screws 3)(Fig. 42) and carefully pull the probe and electrode cables outwards until they are slightly taut.
- ➤ Reconnect the articulated coupling 7) to the graduated sector 8).
- ➤ Remove the two extensions from the slide bars 4).
- ➤ Connect the power plug, the signal and adjustment plug and the gas train plug that were previously disconnected.

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

8 LED indicator and special function

8.1 Description of LED lamps

 S9740	Fan	It turns on when the fan motor is powered (T6) and blinks when RUN/CHECK switch is set to “CHECK” during damper movement phases, PTFI AND MTFI.
 S9741	Damper open	It blinks when the air damper is moving towards the maximum opening position until the position-reached feedback sent by the servomotor is received, then it stays steadily on for the time set by the flame control.
 S9742	Damper closed	If blinks when the air damper is moving towards the minimum opening position until the position-reached feedback sent by the servomotor is received, then it stays steadily on until the end of the pre-purging time.
 S9743	Auto	It indicates that the burner is ready for the output modulation.
 S9744	Ignition	It blinks during the ignition phase (1st safety time) and stays steadily on during the MTFI.
	Flame	It blinks during the first safety time and stays steadily on if the flame detection has been correctly performed.
 S9746	Alarm	It turns on in red when a lock-out condition occurs. Together with the other indicators, it indicates the type of fault during the lock-out phase. Together with the other LEDs, it indicates the operating status during the normal cycle.

Tab. O

8.2 Check mode function

By means of the reset button on-board the flame control, it is possible to use a control function during start-up phases. (pre-purging, ignition, 1st safety time and 2nd safety time).
This function, indicated as CHECK MODE, is designed to facilitate checking the phases of the burner and of the safety devices monitored by the flame control.
This function is particularly useful during the burner first commissioning or during maintenance.

To enable the check mode function:

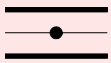
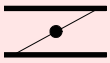
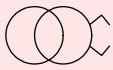
- keep the reset button pressed, see chapter 8 for more details, for at least 3 seconds, the status LED changes from green to yellow to signal that the control device is in check mode.
- the control device locks out during pre-purging, after a timeout of max 30 minutes the flame control will automatically exit the check mode function.
- check mode has a 2 minute timeout during the 2nd safety time. When it ends, the flame control goes back to the normal operating status.
- check mode has a 2 minute timeout during the MTFI status. When it ends, the flame control goes back to the normal operating status.
- During the check mode 1st or 2nd safety time, the flame signal level can be indicated by the 5 central LEDS on the flame control central panel, which turn on proportionally.
  Each lit LED (starting from the flame LED) represents 20% of the signal power.
  To exit the check mode function, press the reset button; the flame control will go back to the normal operating mode.

8.3 Flame control lock-out or emergency stop condition

The RFGO control device can be locked out (emergency stop) at any time during the operating cycle and unlocked when already locked (lock-out) by simply pressing the key on the front panel or by means of the terminal T21 on the support base.

8.4 LED lamps: burner operating status

OPERATING STATUSES INDICATED BY LEDS DURING NORMAL OPERATION AND CHECK MODE

Operation LED ● = ON	Fan	Damper open	Damper closed	Modulation	Ignition	Flame	Status
Icon	 S9740	 S9741	 S9742	 S9743	 S9744	 S9745	 S9746
Power OFF/ON							OFF
Not ready/ Diagnostics							Green
Standby			●				Green
Servomotor movement (Note 3)	●	OFF Flashing ●	● Flashing OFF				Green
Waiting for closing	Green blinking						Green
OPEN (before ignition)	●	●					Green
Minimum (before ignition)	●		●				Green
Ignition	●		●		●		Green
PTFI	●		●		●	Green blinking	Green
MTFI	●		●			●	Green
Active modulation	●			●		●	Green
Minimum output position	●		●			●	Green
With flame present	●	●				●	Green
Economy mode	●		●				Green
Check during maximum opening phase	Flashing	●					Yellow
Check during minimum closing phase	Flashing		●				Yellow
Check during ignition phase with pilot PTFI	Flashing	● Note 1	● Note 1	● Note 1	● Note 1	● Note 1	Yellow
Check during ignition phase with main fuel valve MTFI	Flashing	● Note 1	● Note 1	● Note 1	● Note 1	● Note 1	Yellow
Fault/lock-out	● Note 2	● Note 2	● Note 2	● Note 2	● Note 2	● Note 2	Red
End of the cycle	●		●	●			Green

Tab. P

1. LEDs form a progress bar which indicates the Flame Signal Power in order to orientate the sensors during commissioning (LEDs “Grow” upwards, moving away from the Status at 20% intervals of flame power.)
2. LEDs indicate the error or lock-out code for troubleshooting.
3. LEDs change from ON to BLINKING to OFF showing the servomotor movement control until the position-reached feedback is received see paragraph **“Problems - Causes - Remedies signalled by LED indicators”** on page 40“.

9 Problems - Causes - Remedies signalled by LED indicators

When an emergency stop occurs, the control device LEDs indicate the cause of the stop.
The terminal T3 is not powered.
The device operating status is internally memorised in case of any lack of power supply.

The device lock-out condition can be caused by pressing (<1sec.) the reset button on the flame control front side or through the remote reset - terminal T21 on the base.
Since the reset button is very sensitive, do not press it strongly during the reset operation.

Unlocking the control device

The RFGO control device can be reset in two ways: reset button and remote reset terminal.
The remote reset must be a normally open connected button between T21 and flame control power supply voltage (see illustrative diagrams):

- the reset is performed when a faulty condition is detected by the flame control.
- Press the reset button to reset the system after a lock-out.
- Pressing the reset button during operation will cause an emergency stop.
- The reset or emergency stop condition can be obtained also by using the remote reset with the same modalities.
- The number of reset attempts is limited to a maximum of 5 within 15 minutes.

Error / RFGO LED lock-out Codes

During an alarm condition, the status LED becomes steady red.
The remaining LEDs turn on according to a coded sequence which identifies the lock-out cause.
The following table shows the different LED Lock-out codes.


ATTENTION

The device described in this manual can cause material problems, severe injuries or death.

It is the owner or user's responsibility to make sure that the equipment described is installed, used and commissioned in compliance with the requirements provided both by national and local law. The lock-out condition indicates the presence of a fault which occurred during the operating cycle or during stand-by mode.
Before performing an unlock attempt, it is necessary to restore the original optimal operating conditions.


ATTENTION

Thermal unit's operation, maintenance and troubleshooting interventions must be carried out by trained personnel.
The persons who solve lock-out problems or reset the control device must observe the error codes to solve the problems described in this product technical data sheet.

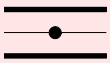
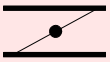
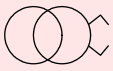
It is not admitted to tamper with or act on the system or control in a way that could compromise the product safety or warranty.
Any tests on safety devices or on loads, such as fan motor, valves, igniter, flame sensors, must be performed with the shut-off valves closed and by qualified personnel.

Do not by-pass nor exclude the safety devices connected to the flame control.
Failure to observe these guidelines will exclude any liability.


ATTENTION

The regulation prohibits the system from allowing more than 5 remote reset attempts within a 15 minute time window.
If more than 5 attempts are performed without solving the lock-out, the system will prevent the user to perform further remote resets and force him/her to wait for the 15 minutes to elapse.
The remote reset operation will be restored at the end of the waiting time.
It is recommended that qualified personnel evaluate the lock-out condition and implement the solution which is suitable for the fault to be solved.

Error / RFGO LED lock-out codes

No	Faults	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7
	Operation LED ● = ON	Fan	Open damper	Closed damper	Auto	Ignition	Flame	Status
	Icon	 S9740	 S9741	 S9742	 S9743	 S9744	 S9745	 S9746
1	Post-diagnostics fault	●						Red
2	Local reset		●					Red
3	Combustion air fan fault	●	●					Red
4	Supervisor processor diagnostics fault			●				Red
5	FR- NO Flame at the end of the 2nd safety time (MTFI)	●		●				Red
6	FR: internal circuit fault		●	●				Red
7	Internal communication fault	●	●	●				Red
8	Remote reset				●			Red
9	FR: internal fault	●			●			Red
10	Main processor fault		●		●			Red
11	Data memory test fault	●	●		●			Red
12	Data memory test fault			●	●			Red
13	Mains voltage or frequent fault	●		●	●			Red
14	Internal processor fault		●	●	●			Red
15	Internal processor fault	●	●	●	●			Red
16	No flame: 1st safety time (PTFI)	●				●		Red
17	Wiring fault		●			●		Red
18	Safety relay fault	●	●			●		Red
19	Combustion airflow switch fault in the rest position			●		●		Red
20	UV: no flame at the end of the 2nd safety time (MTFI)	●		●		●		Red
21	Safety relay fault		●	●		●		Red
22	Supervisor processor fault	●	●	●		●		Red
23	Supervisor memory test fault				●	●		Red
24	Flame loss during the operation (AUTO)	●			●	●		Red
25	Supervisor processor data memory fault		●		●	●		Red
26	Supervisor processor internal fault	●	●		●	●		Red
27	Not used							
28	Not used							
29	Operating temperature out of range		●	●	●	●		Red
30	Code memory fault	●	●	●	●	●		Red
31	FR: external short circuit						●	Red
32	Check mode timeout (manual)	●					●	Red
33	False flame in stand-by mode		●				●	Red
34	Not used							
35	Internal processor timeout			●			●	Red
36	Internal processor timeout	●		●			●	Red
37	Combustion air check timeout		●	●			●	Red
38	Internal processor timeout	●	●	●			●	Red
39	Internal processor timeout				●		●	Red
40	Internal hardware fault	●			●		●	Red
41	Internal hardware fault		●		●		●	Red
42	Main processor fault	●	●		●		●	Red
43	Supervisor processor fault			●	●		●	Red
44	Supervisor processor timeout	●		●	●		●	Red
45	Off-specification mains voltage		●	●	●		●	Red
46	Off-specification mains voltage	●	●	●	●		●	Red

No	Faults	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7
47	UV: Internal fault					●	●	Red
48	Supervisor processor fault	●				●	●	Red
49	Main processor fault		●			●	●	Red
50	Ignition feedback fault	●	●			●	●	Red
51	Pilot feedback fault			●		●	●	Red
52	Piloted valve feedback fault	●		●		●	●	Red
53	Actuator feedback waiting time expired		●	●		●	●	Red
54	Direct ignition valve feedback fault	●	●	●		●	●	Red
55	Internal processor fault				●	●	●	Red
56	UV: false flame during operation			●	●	●	●	Red
57	FR: false flame during operation	●		●	●	●	●	Red
58	T8 inlet fault		●	●	●	●	●	Red
59	Internal hardware fault	●			●	●	●	Red
60	Local reset fault	●	●	●	●	●	●	Red
61	Open POC fault		●		●	●	●	Red
62	UV: strong UV flame fault	●	●		●	●	●	Red
63	Internal hardware fault					●		Red

Tab. Q

Fault explanation

No	Faults	Cause	Solution
1	Post-diagnostics fault	Initial power diagnostics fault Make sure that the status of inlets and outlets is correct upon ignition	Check T12, T13 and T14
2	Local reset	The user started the manual reset or the reset switch is faulty	Check T21 inlet or reset for normal operation
3	Combustion air fan fault	No Air Check signal (T14) during the bleed cycle or Air Check signal loss during the burner operation	Check the fan or the air pressure switch
4	Supervisor processor diagnostics fault	The system detected the presence of voltage on T16, T17, T18 or T19 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the system is operating on a single-phase line (50/60Hz)
5	FR- No flame at the end of the 2nd safety time (MTFI)	No flame at the end of the second safety time	Inspect the system, check the gas pressure, inspect the flame detection electrode, check the wiring, etc.
6	FR: internal circuit fault	Internal fault	Replace the control device
7	Internal communication fault	Internal fault	Replace the control device
8	Remote reset	The user pressed the remote reset button or the reset switch is discontinuous/dynamic	Check the remote switch
9	FR: internal fault	Internal fault	Replace the control device
10	Main processor fault	Internal fault	Replace the control device
11	Data memory test fault	Internal fault	Replace the control device
12	Data memory test fault	Internal fault	Replace the control device
13	Mains voltage or frequent fault	Off-specification power supply voltage and/or frequency	Check the input power supply
14	Internal processor fault	Internal fault	Replace the control device
15	Internal processor fault	Internal fault	Replace the control device
16	No flame: 1st safety time (PTFI)	No flame at the end of the first safety time	Inspect the system, check the gas pressure, check the flame sensor, check the wiring, etc.
17	Wiring fault	The system detected the presence of voltage on critical terminals (T16, T17, T18 or T19) at the wrong moment or there is no voltage when necessary	Inspect the wiring and make sure that the system is operating on a single-phase line (50/60Hz)
18	Safety relay fault	Internal fault	Replace the control device
19	Combustion airflow switch fault in the rest position	Open the circuit upon T13 start-up	Check the wiring for the air pressure switch

No	Faults	Cause	Solution
20	UV: no flame at the end of the 2nd safety time (MTFI)	No flame at the end of the 2nd safety time	Inspect the system, check the gas pressure, check the flame sensor, check the wiring, etc.
21	Safety relay fault	Internal fault	Replace the control device
22	Supervisor processor fault	Internal fault	Replace the control device
23	Supervisor memory test fault	Internal fault	Replace the control device
24	Flame loss during the operation (AUTO)	Loss of flame	Check the flame sensor or the fuel flow line
25	Supervisor processor data memory fault	Internal fault	Replace the control device
26	Supervisor processor internal fault	Internal fault	Replace the control device
27	Not used		
28	Not used		
29	Operating temperature out of range	Operating temperature below -40°C or above 70°C	Bring the control device within the specified temperature nominal values
30	Code memory fault	Internal fault	Replace the control device
31	FR: external short circuit	External short circuit between T24 and EARTH	Inspect the flame detection electrode
32	Check mode timeout (manual)	The interval for the manual mode (30 minutes) to end has elapsed	Exit the manual mode correctly to avoid timeout
33	False flame in stand-by mode	Unexpected flame (false or parasitic flame) detected during the Stand-by status	Check flame sensor or interference
34	Not used		
35	Internal processor timeout	Internal fault	Replace the control device
36	Internal processor timeout	Internal fault	Replace the control device
37	Combustion air check timeout	The system could not perform verification tests of the combustion air during the burner sequence	Check the wiring or the air pressure switch
38	Internal processor timeout	Internal fault	Replace the control device
39	Internal processor timeout	Internal fault	Replace the control device
40	Internal hardware fault	Internal fault	Replace the control device
41	Internal hardware fault	Internal fault	Replace the control device
42	Main processor fault	Internal fault	Replace the control device
43	Supervisor processor fault	Internal fault	Replace the control device
44	Supervisor processor timeout	Internal fault	Replace the control device
45	Off-specification mains voltage	Off-specification mains voltage/frequency	Check the mains voltage level or the frequency. Contact the factory if the problem persists
46	Off-specification mains voltage	Off-specification mains voltage/frequency	Check the mains voltage level or the frequency. Contact the factory if the problem persists
47	UV: Internal fault	Internal fault	Replace the control device
48	Supervisor processor fault	Internal fault	Replace the control device
49	Main processor fault	Internal fault	Replace the control device
50	Ignition feedback fault	The system detected the presence of voltage on T16 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the earthing is appropriate If the problem persists, contact the distributor/factory
51	Pilot feedback fault	The system detected the presence of voltage on T17 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the earthing is appropriate. If the problem persists, contact the distributor/factory
52	Piloted valve feedback fault	The system detected the presence of voltage on T19 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the earthing is appropriate If the problem persists, contact the distributor/factory
53	Actuator feedback waiting time expired	No actuator feedback on T8 for more than 10 minutes	Check the wiring Check the modulation equipment
54	Direct ignition valve feedback fault	The system detected the presence of voltage on T18 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the earthing is appropriate. If the problem persists, contact the distributor/factory
55	Internal processor fault	Internal fault	Replace the control device

No	Faults	Cause	Solution
56	UV: false flame during operation	False flame detected before ignition	Check the flame sensor
57	FR: false flame during operation	False flame detected before ignition	Check the wiring Check the flame sensor Make sure that earthing is appropriate
58	T8 inlet fault	The system detected the presence of voltage on T8 at the wrong moment or there is no voltage when necessary	Check the wiring Check the actuator
59	Internal hardware fault	Internal fault	Replace the control device
60	Local reset fault	Local reset button pressed for more than 10 seconds or reset button locked	If the problem persists, replace the control device
61	Open POC fault	The fuel valve is open at the wrong moment	Check the wiring
62	UV: strong UV flame fault	The flame sensor is too close to the flame	Increase the distance between the flame sensor and the flame OR use an orifice to reduce the view field
63	Internal hardware fault	Internal fault	Replace the control device

Tab. R

A Appendix - Accessories

Extended head kit

Burner	Standard head length (mm)	Extended head length (mm)	Code
RS 200/M BLU	373	503	3010442

LPG kit

Burner	Code
RS 200/M BLU	20008971

Output regulator kit for modulating operation

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

The parts to be ordered are two:
– output regulator to be installed to the burner;
– probe to be installed to heat generator.

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

Head kit for boilers with flame inversion

Burner	Code
RS 200/M BLU	3010249

Spacer kit

Burner	Thickness (mm)	Code
RS 200/M BLU	102	3000722

Continuous purging kit

Burner	Code
RS 200/M BLU	3010094

Soundproofing box kit

Burner	Type	dB(A)	Code
RS 200/M BLU	C4/5	10	3010404

Signal converter kit

Burner	Code
RS 200/M BLU	3010415

Potentiometer kit

Burner	Code
RS 200/M BLU	3010416

UV sensor kit

Burner	Code
RS 200/M BLU	20144943

Differential circuit breaker kit

Burner	Code
RS 200/M BLU	3010329

Gas flange kit DN80

Burner	Code
RS 200/M BLU	3010439

Gas trains in compliance with EN 676

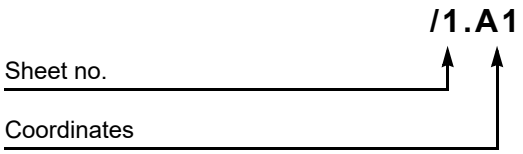
Please refer to manual.

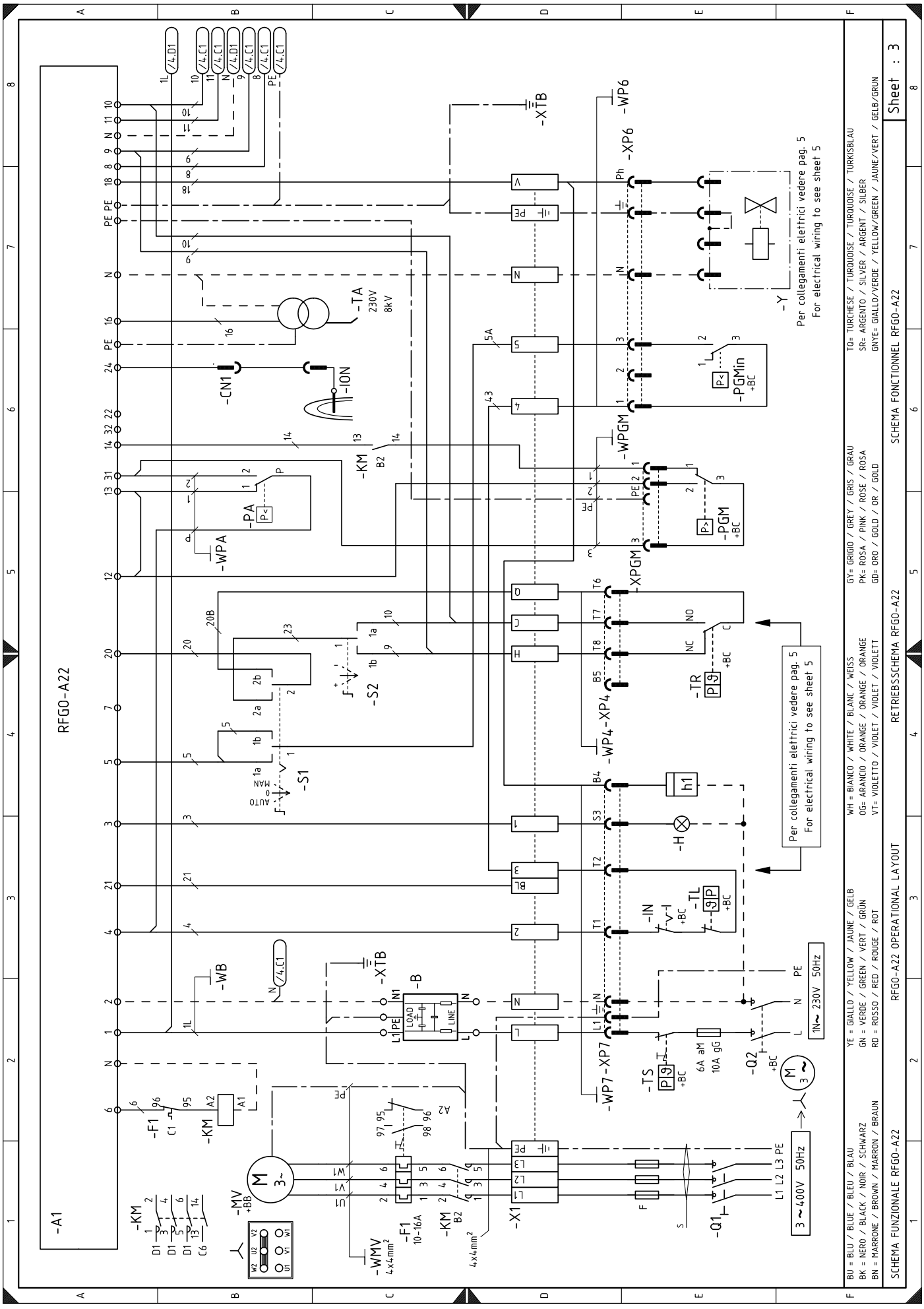
ATTENTION

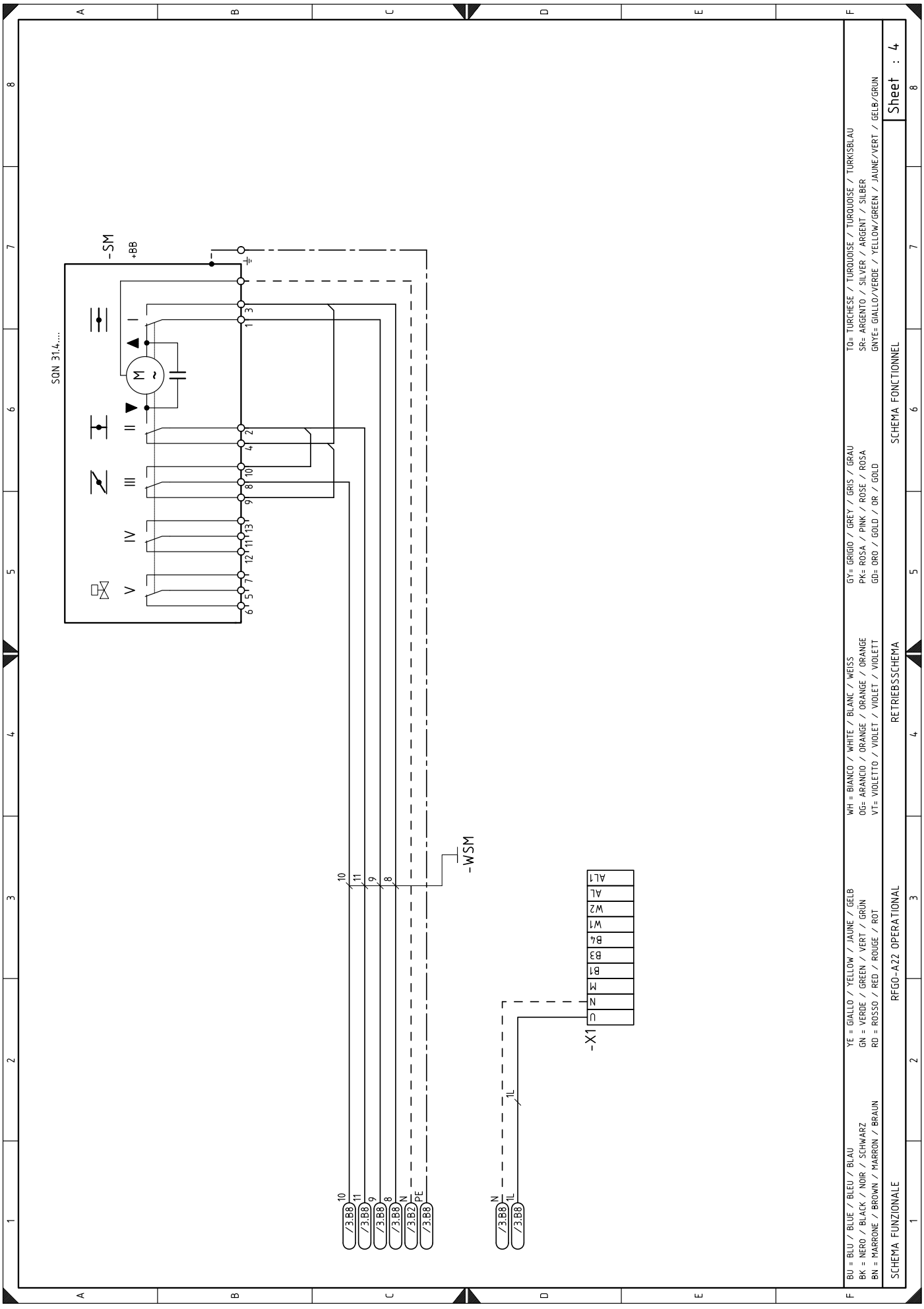
The installer is responsible for the addition of any safety device not foreseen in this manual.

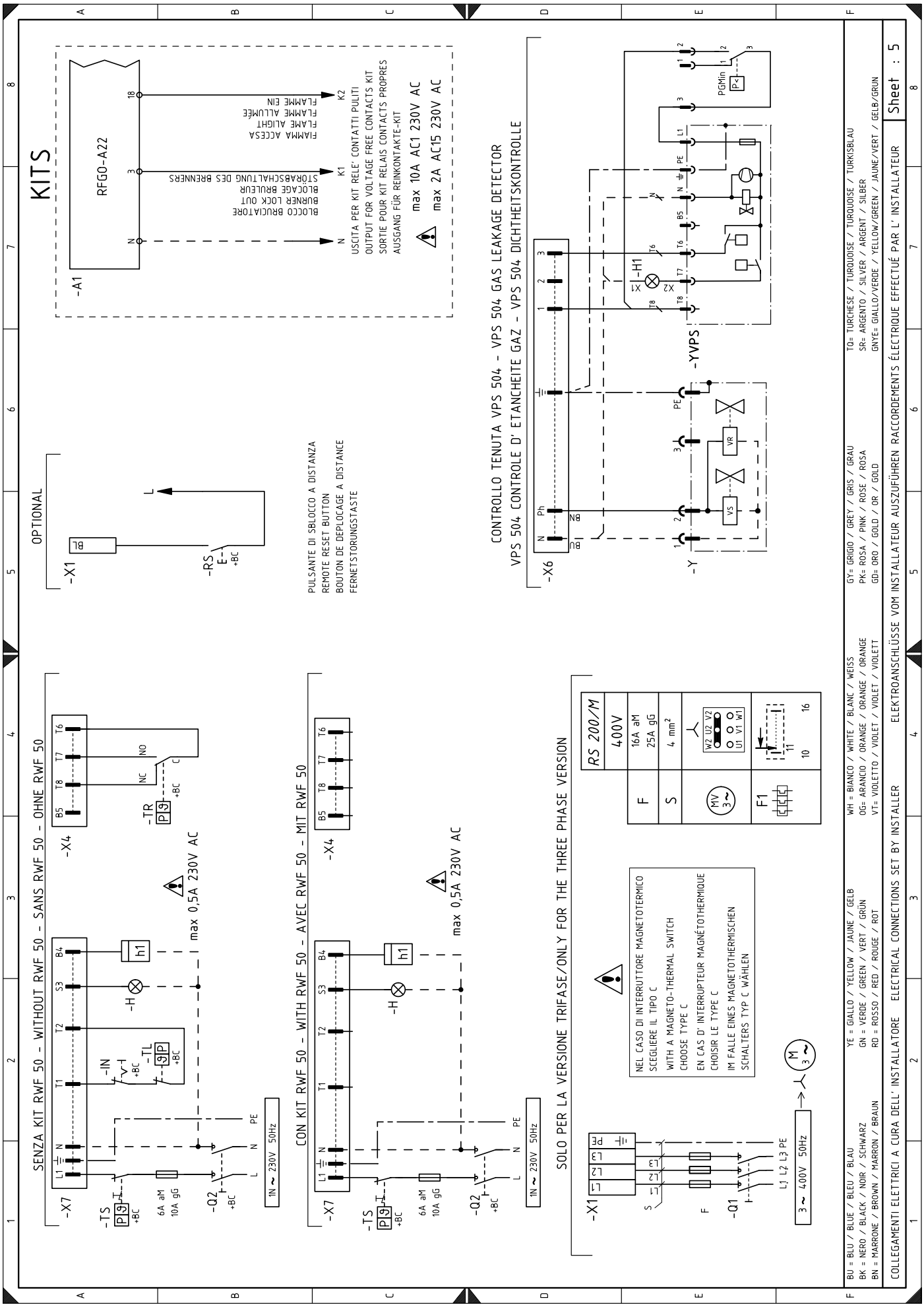
B Appendix - Electrical panel layout

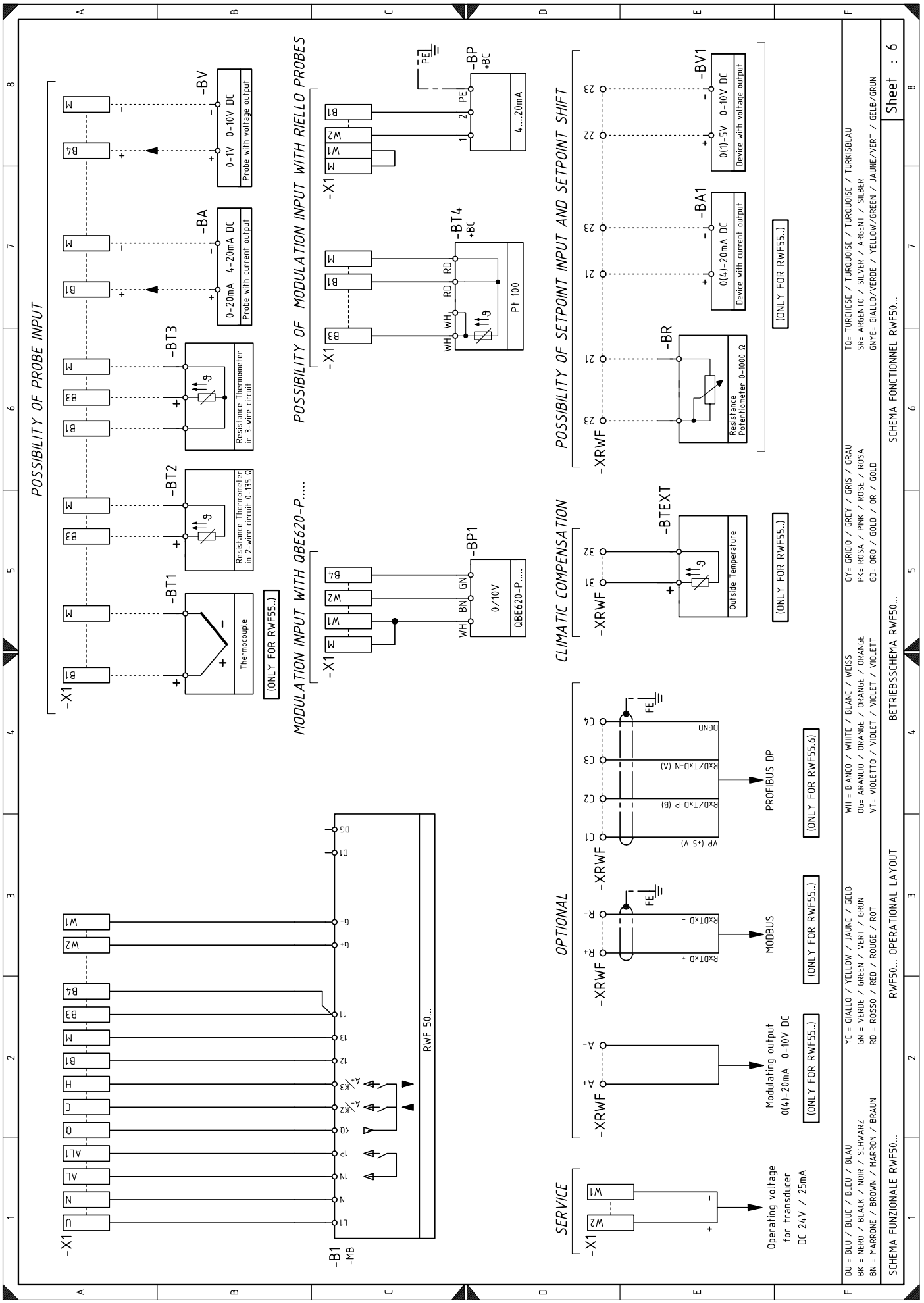
2 Indication of references




RFGO-A22
-A1
SCHEMA FUNZIONALE RFGO-A22
RFGO-A22 OPERATIONAL LAYOUT
RETRIEBSSCHEMA RFGO-A22
SCHEMA FONCTIONNEL RFGO-A22
Sheet : 3
Per collegamenti elettrici vedere pag. 5
For electrical wiring to see sheet 5
3 ~400V 50Hz
1N~ 230V 50Hz
-TA 230V 8kV
-CN1
-IGN
-KM
-PA
-WPA
-S1
-S2
-WB
-XTB
-B
-F1
-MV
-WMV
-X1
-Q1
-Q2
-TS
-TR
-IN
-TL
-H
-WP4-XP4
-WP6
-XP6
-WP7-XP7
-WPGM
-XPGM
-PGMin
-PGM
-Y
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN


-SM
+B8
SQN 31.4....
-WSM
-X1
/3.B8
/3.B2
PE
N
1L
SCHEMA FUNZIONALE
RFGO-A22 OPERATIONAL
RETRIEBSSCHEMA
SCHEMA FONCTIONNEL
Sheet : 4
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN


KITS
RFGO-A22
-A1
BLOCCO BRUCIATORE
BURNER LOCK OUT
BLOCAGE BRULEUR
STÖRABSCHALTUNG DES BRENNERS
FIAMMA ACCESA
FLAME ALIGHT
FLAMME ALLUMÉE
FLAMME EIN
USCITA PER KIT RELE' CONTATTI PULITI
OUTPUT FOR VOLTAGE FREE CONTACTS KIT
SORTIE POUR KIT RELAIS CONTACTS PROPRES
AUSGANG FÜR REINKONTAKTE-KIT
max 10A AC1 230V AC
max 2A AC15 230V AC
OPTIONAL
-X1
-RS
PULSANTE DI SBLOCCO A DISTANZA
REMOTE RESET BUTTON
BOUTON DE DEPLOCAGE A DISTANCE
FERNETSTORUNGSTASTE
CONTROLLO TENUTA VPS 504 - VPS 504 GAS LEAKAGE DETECTOR
VPS 504 CONTROLE D' ETANCHEITE GAZ - VPS 504 DICHTHEITSKONTROLLE
-X6
-Y
-YVPS
-H1
PGMin
SENZA KIT RWF 50 - WITHOUT RWF 50 - SANS RWF 50 - OHNE RWF 50
-X7
-X4
-IN
-TL
-TS
-TR
-H
-Q2
max 0,5A 230V AC
1N ~ 230V 50Hz
CON KIT RWF 50 - WITH RWF 50 - AVEC RWF 50 - MIT RWF 50
SOLO PER LA VERSIONE TRIFASE/ONLY FOR THE THREE PHASE VERSION
RS 200/M
400V
F
S
16A aM
25A gG
4 mm²
-X1
-Q1
F1
MV
3 ~ 400V 50Hz
NEL CASO DI INTERRUTTORE MAGNETOTERMICO
SCEGLIERE IL TIPO C
WITH A MAGNETO-THERMAL SWITCH
CHOOSE TYPE C
EN CAS D' INTERRUPTEUR MAGNÉTOTHERMIQUE
CHOISIR LE TYPE C
IM FALLE EINES MAGNETOTHERMISCHEN
SCHALTERS TYP C WÄHLEN
BU = BLU / BLUE / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE ELECTRICAL CONNECTIONS SET BY INSTALLER ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 5


POSSIBILITY OF PROBE INPUT
-X1
-BT1
Thermocouple
(ONLY FOR RWF55..)
-BT2
Resistance Thermometer in 2-wire circuit 0-135 Ω
-BT3
Resistance Thermometer in 3-wire circuit
-BA
0-20mA 4-20mA DC
Probe with current output
-BV
0-1V 0-10V DC
Probe with voltage output
MODULATION INPUT WITH QBE620-P.....
-BP1
0/10V
QBE620-P.....
POSSIBILITY OF MODULATION INPUT WITH RIELLO PROBES
-BP
4....20mA
-BT4
Pt 100
CLIMATIC COMPENSATION
-BTEXT
Outside Temperature
POSSIBILITY OF SETPOINT INPUT AND SETPOINT SHIFT
-BR
Resistance Potentiometer 0-1000 Ω
-BA1
0(4)-20mA DC
Device with current output
-BV1
0(1)-5V 0-10V DC
Device with voltage output
OPTIONAL
MODBUS
PROFIBUS DP
SERVICE
Operating voltage for transducer DC 24V / 25mA
Modulating output 0(4)-20mA 0-10V DC
-B1 -MB
RWF 50...
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
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GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
SCHEMA FUNZIONALE RWF50...
RWF50... OPERATIONAL LAYOUT
BETRIEBSSCHEMA RWF50...
SCHEMA FONCTIONNEL RWF50...
Sheet : 6

Wiring layout key

A1	Electrical control box
B	Filter to protect against radio disturbance
B1	RWF50 output power regulator
BA	Current input DC 4...20mA
BA1	Current input DC 4...20mA for remote setpoint change
BP	Pressure probe
BP1	Pressure probe
BR	Remote setpoint potentiometer
BT1	Thermocouple probe
BT2	Probe Pt100, 2 wires
BT3	Probe Pt100, 3 wires
BT4	Probe Pt100, 3 wires
BTEXT	External probe for climatic compensation of the setpoint
BV	Voltage input DC 0...10V
BV1	Voltage input DC 0...10V for remote setpoint change
CN1	Ionisation probe connector
F	Three-phase line fuses
F1	Thermal relay
H	Lockout signalling light
h1	Hour counter
IN	Burner manual stop switch
ION	Ionisation probe
KM	Motor contactor
MV	Fan motor
PA	Air pressure switch
PGM	Maximum gas pressure switch
PGmin	Minimum gas pressure switch
Q1	-Three-phase disconnecting switch
Q2	Single-phase disconnecting switch
RS	Remote reset
S1	Operating mode switch: MAN = manual AUT = automatic OFF = off
S2	Button for - = output reduction + = output increase
SM	Servomotor
TA	Ignition transformer
TL	Limit thermostat/pressure switch
TS	Safety thermostat/pressure switch
X1	Burner terminal strip
XP1	Connector for kit RWF50
XP4	3-point control socket
XP6	Gas train socket
XP7	Control and power supply socket
XRWF	Terminal board for RWF50 output power regulator
XTB	Burner earth
Y	Gas adjustment valve + gas safety valve
YVPS	Leak test

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