

GB **Forced draught gas burners**

Progressive two-stage or modulating operation

CE

**UK
CA**

EAC

CODE	MODEL	TYPE
3866211 - 3897406	RS 68/M BLU	846 T
3866212 - 3897407	RS 68/M BLU	846 T
3866213 - 3897606	RS 120/M BLU	847 T
3897607	RS 120/M BLU	847 T



Translation of the original instructions

1	Declarations	3
2	Information and general warnings	4
2.1	Information about the instruction manual	4
2.1.1	Introduction	4
2.1.2	General dangers	4
2.1.3	Other symbols	4
2.1.4	Delivery of the system and the instruction manual	5
2.2	Guarantee and responsibility	5
3	Safety and prevention	6
3.1	Introduction	6
3.2	Personnel training	6
4	Technical description of the burner	7
4.1	Burner designation	7
4.2	Models available	8
4.3	Burner categories	8
4.4	Technical data	9
4.5	Electrical data	9
4.6	Burner equipment	9
4.7	Maximum dimensions	10
4.8	Firing rates	10
4.9	Test boiler	11
4.9.1	Commercial boilers	11
4.9.2	Firing rate according to air density	12
4.10	Burner description	13
4.11	Electrical panel description	14
4.12	Servomotor (SQN31...)	15
5	Installation	16
5.1	Notes on safety for the installation	16
5.2	Handling	16
5.3	Preliminary checks	16
5.4	Operating position	17
5.5	Preparing the boiler	17
5.5.1	Boring the boiler plate	17
5.5.2	Blast tube length	17
5.6	Positioning the probe - electrode	18
5.7	Securing the burner to the boiler	19
5.8	Combustion head adjustment	20
5.9	Closing the burner	21
5.10	Gas supply	21
5.10.1	Gas feeding line (Example) - Please refer to the gas train documentation for more information	21
5.10.2	Gas train	22
5.10.3	Gas train installation	22
5.10.4	Gas pressure	22
5.11	Electrical connections	24
5.11.1	Calibration of thermal cut-out	24
5.11.2	Supply cables and external connections passage (burner with plug and socket)	25
5.11.3	Supply cables and external connections passage (burner with terminal board)	25
6	Start-up, calibration and operation of the burner	26
6.1	Notes on safety for the first start-up	26
6.2	Adjustments prior to ignition	26
6.3	Servomotor adjustment	27
6.4	Burner start-up	27
6.5	Burner ignition	27
6.6	Adjusting the burner	28
6.6.1	Ignition output	28
6.6.2	Maximum output	28
6.6.3	Minimum output	28

6.6.4	Intermediate outputs	29
6.7	Final adjustment of the pressure switches	30
6.7.1	Air pressure switch.....	30
6.7.2	Maximum gas pressure switch.....	30
6.7.3	Minimum gas pressure switch.....	30
6.8	Burner operation	31
6.8.1	Burner start-up	31
6.8.2	Steady state operation	31
6.8.3	Ignition failure.....	31
6.8.4	Final checks (with burner operating).....	31
7	Maintenance	32
7.1	Notes on safety for the maintenance	32
7.2	Maintenance programme	32
7.2.1	Maintenance frequency.....	32
7.2.2	Safety test - with no gas supply	32
7.2.3	Checking and cleaning.....	32
7.2.4	Safety components	33
7.3	Opening the burner	34
7.4	Closing the burner.....	34
A	Appendix - Accessories	35
B	Appendix - Electrical panel layout (burner with plug and socket)	36
C	Appendix - Electrical panel layout (burner with terminal strip).....	42

1 Declarations**Declaration of Conformity A.R. 8/1/2004 & 17/7/2009 – Belgium**

Manufacturer: RIELLO S.p.A.
Distributed by: 37045 Legnago (VR) Italy
Tel. ++39.0442630111
www.riello.com

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 burner
Model: RS 68/M BLU
Regulation applied: EN 676 and A.R. of January 8th 2004 - July 17th 2009
Controlling organisation: Kiwa Cermet Italia S.p.A.
Via Treviso 32-34
I-31020 San Vendemiano (TV) Italy
Values measured: Max. CO: 5 mg/kWh
Max. NOx: 61 mg/kWh

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.



DANGER

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



ATTENTION

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



CAUTION

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

2.1.3 Other symbols



DANGER

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



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



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



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



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



DANGER: EXPLOSION

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



PERSONAL PROTECTION EQUIPMENT

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



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

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



ENVIRONMENTAL PROTECTION

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



IMPORTANT INFORMATION

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



IMPORTANT

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.

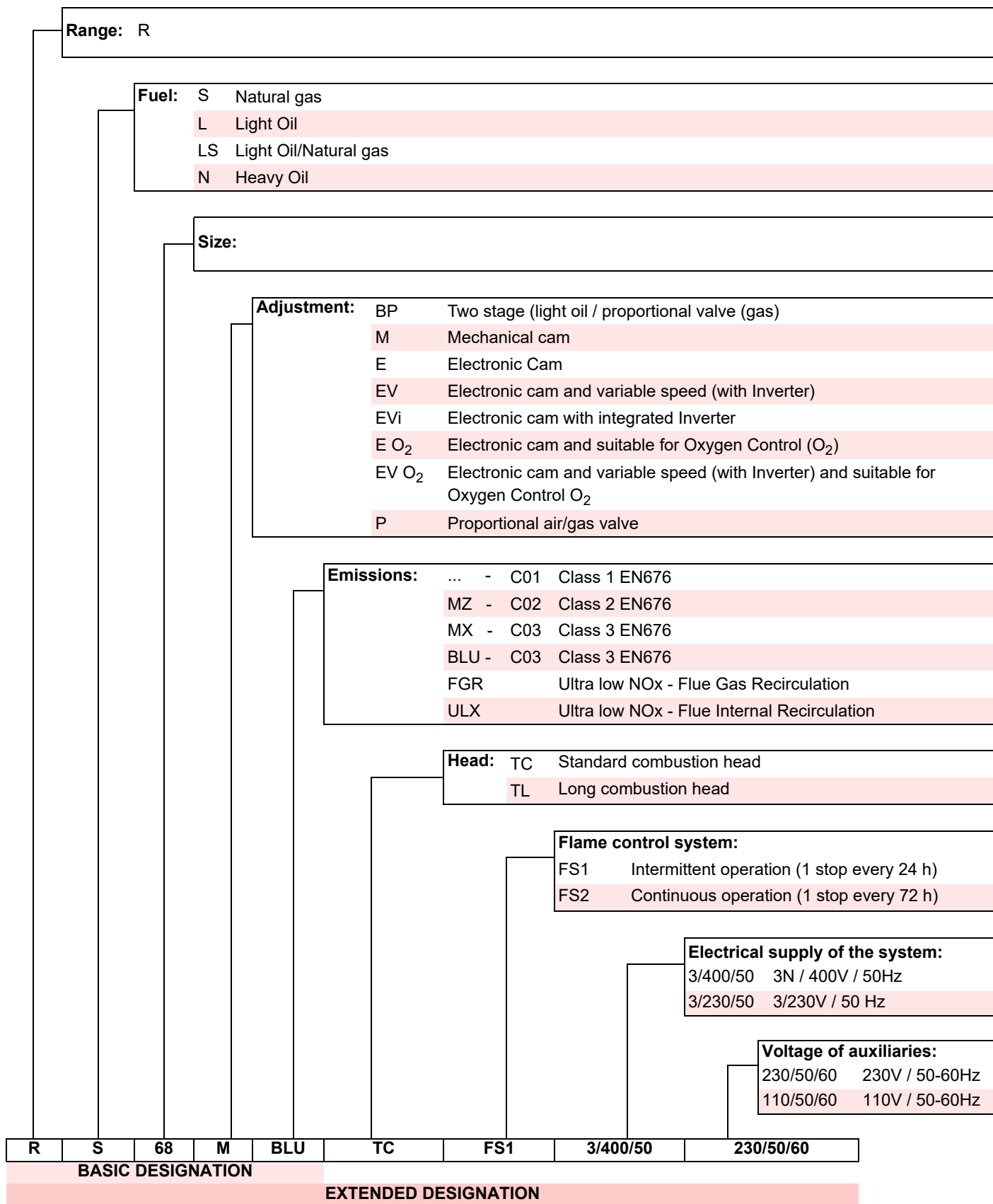
In addition:



- 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 Models available

Designation			Power supply voltage	Start-up	Code with plug and socket	Code with terminal board
RS 68/M BLU	TC	FS1	3 /230-400V - 50Hz	Direct	3866211	3897406
RS 68/M BLU	TL	FS1	3 /230-400V - 50Hz	Direct	3866212	3897407
RS 120/M BLU	TC	FS1	3 /230-400V - 50Hz	Direct	3866213	3897606
RS 120/M BLU	TL	FS1	3 /230-400V - 50Hz	Direct	-	3897607

Tab. A

4.3 Burner categories

Country of destination	Gas category
I2H	AT, BG, CH, CZ, DK, EE, ES, FI, GB, GR, HU, IE, IS, IT, LT, LV, NO, PT, RO, SE, SI, SK, TR
I2E(R)	BE
I2E	LU, PL
I2ELL	DE
I2EK	NL
I2Er	FR

Tab. B

4.4 Technical data

Model			RS 68/M BLU	RS 120/M BLU
Type			846T	847T
Output ⁽¹⁾	Max.	kW	350 ÷ 880	600 ÷ 1230
		Mcal/h	301 ÷ 740	516 ÷ 1118
	Min.	kW	150	260
		Mcal/h	130	224
Fuel			Natural gas: G20 (methane) - G25	
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 ⁽²⁾		Sound pressure	77	78,5
		Sound power	88	89,5
CE			CE-0476DP3335	

Tab. C

(1) Reference conditions: Ambient temperature 20°C - Gas temperature 15°C - Barometric pressure 1013 mbar - Altitude 0 m a.s.l.

(2) 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 68/M BLU	RS 120/M BLU
Main electrical supply			3 ~ 230/400V +/-10% 50Hz	
Absorbed electric power		kW max	1.5	2.2
Protection level			IP 44	

Tab. D

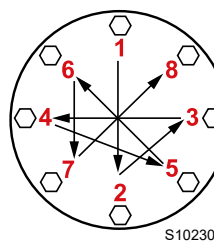
4.6 Burner equipment

The burner is supplied complete with:

Flange for gas train	No. 1
Seal for flange	No. 1
Flange fixing screws M10x35	No. 4
Thermal flange gasket	No. 1
Stud bolts to fix the burner flange to the boiler: M12x35	No. 4
Instructions	No. 1
Spare Parts List	No. 1



It is recommended to tighten the screws of the gas flange with a tightening torque of **30 Nm ±10%**.



Tighten the nuts gradually (first to 30%, then to 60% up to 100%) according to the cross pattern shown in the figure.

4.7 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-I.

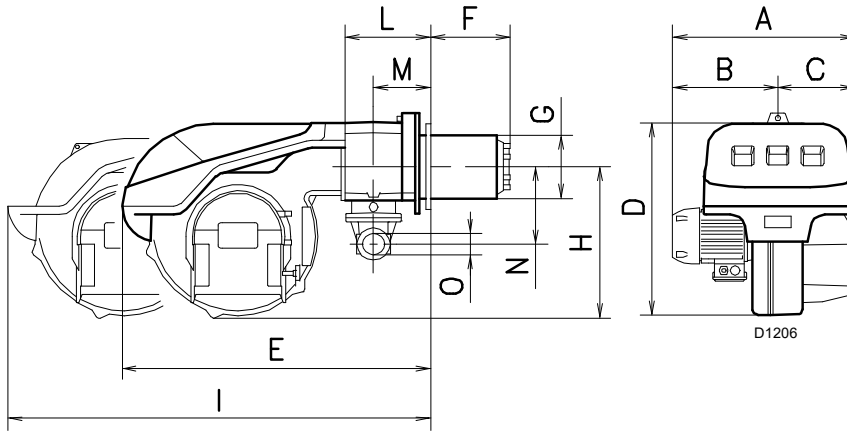


Fig. 1

mm	A	B	C	D	E	F - F (1)	G	H	I - I (1)	L	M	N	O
RS 68/M BLU	511	312	215	555	840	255 - 390	189	430	1161 - 1296	214	134	221	2"
RS 120/M BLU	553	338	215	555	840	255 - 390	189	430	1161 - 1296	214	134	221	2"

Tab. E

(1) Blast tube: short-long

4.8 Firing rates

The **maximum output** is to be chosen within area A of the diagram (and B for RS 120/M BLU model).

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



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 20.

NOTE:

In order to utilize also area B (RS 120/M BLU) it is necessary to perform the calibration of the combustion head as explained on page 20.

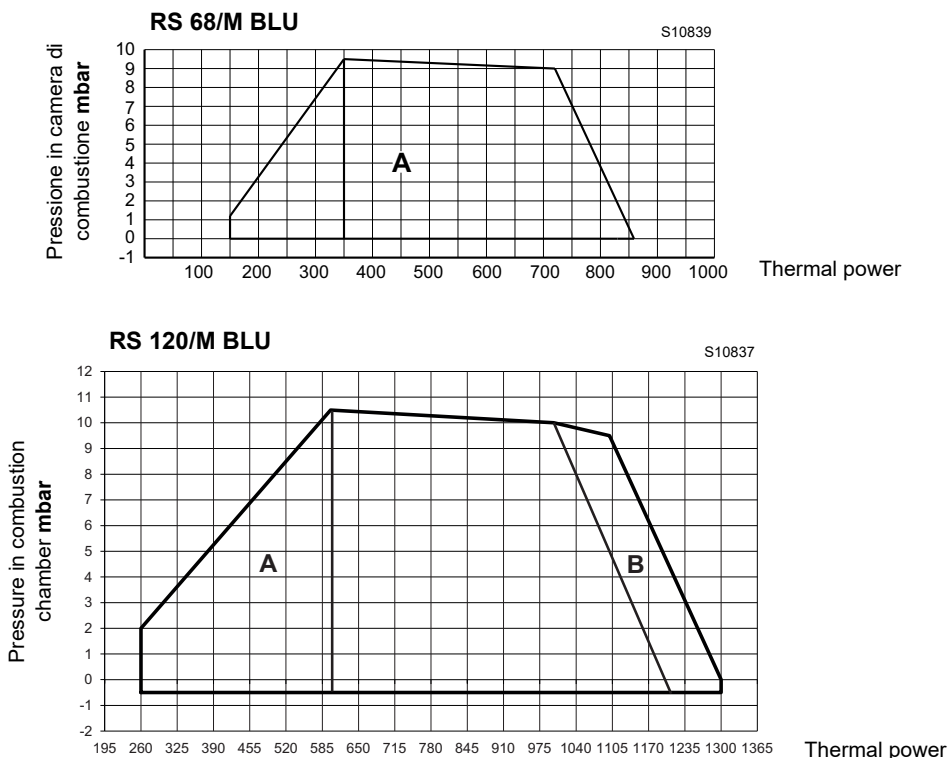


Fig. 2

4.9 Test boiler

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

In Fig. 3 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. 3.

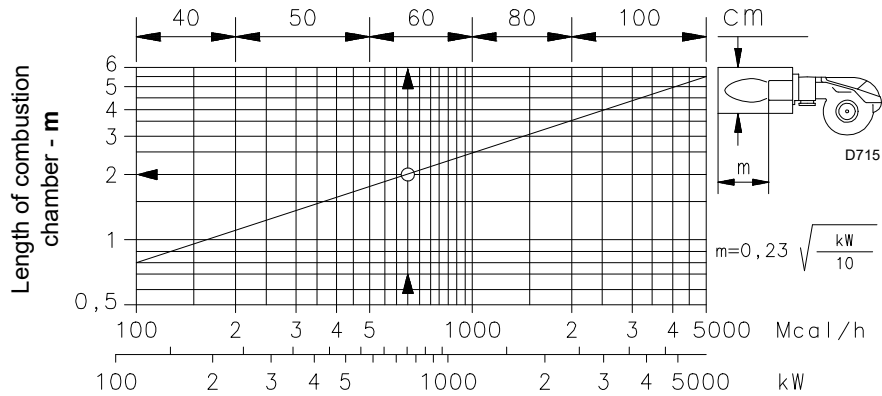


Fig. 3

4.9.1 Commercial boilers

The burners are suitable for operation on either flame-inversion boilers or boilers with combustion chambers featuring flow from the base (three flue passes) on which the best results are obtained in terms of low NOx emissions.

The maximum thickness of the boiler's front door must not exceed 200 mm (Fig. 4).

The burner-boiler match is assured where the boiler is EC type-approved; for boilers and furnaces with combustion chambers featuring dimensions differing considerably from those given in the diagram (Fig. 3), it is advisable to perform preliminary tests.

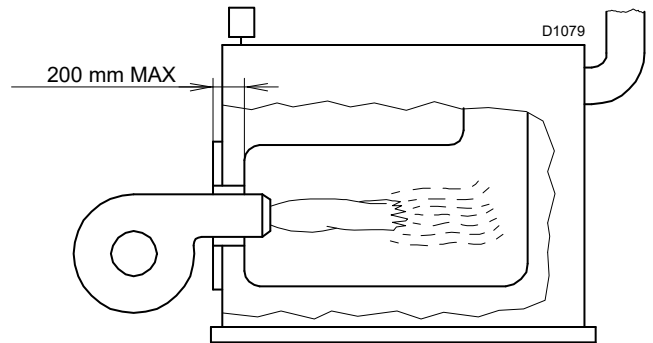


Fig. 4

4.9.2 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:

$$Q_e = Q : F \text{ (kW)}$$

- 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. 5), 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:

$$H_3 = H_2 \times F \text{ (mbar)}$$

If H3 is higher than H1)(Fig. 5), 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

$$H_{1r} = H_1 \times \left(\frac{Q_r}{Q} \right)^2$$

Example, 5% output reduction:

$$Q_r = Q \times 0.95$$

$$H_{1r} = H_1 \times (0.95)^2$$

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



ATTENTION

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

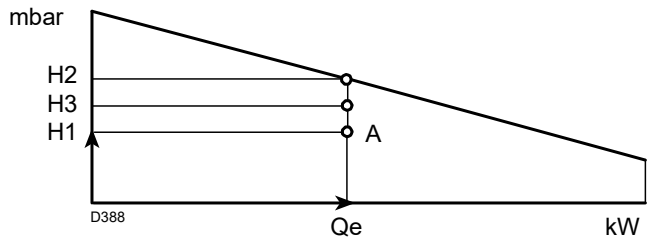
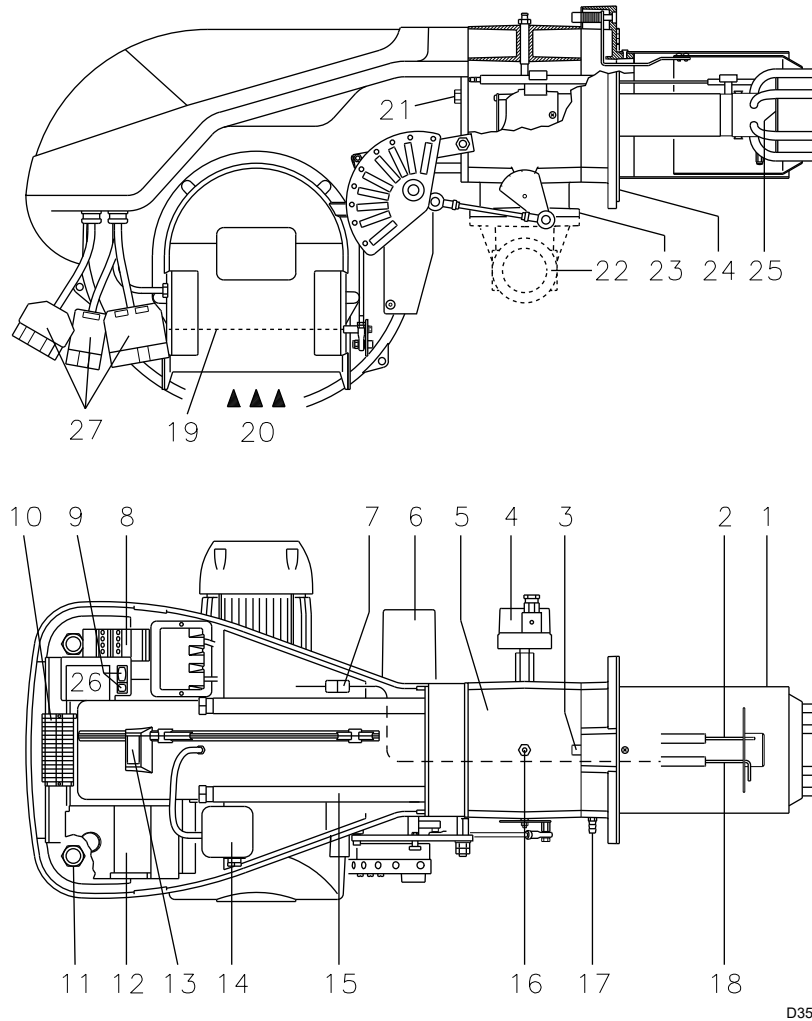


Fig. 5

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

4.10 Burner description



D3567

Fig. 6

- | | |
|---|---|
| <ul style="list-style-type: none"> 1 Combustion head 2 Ignition electrode 3 Screw for combustion head adjustment 4 Maximum gas pressure switch 5 Sleeve 6 Servomotor controlling the gas butterfly valve and of air gate valve (by means of a variable profile cam mechanism). 7 Plug-socket on ionisation probe cable 8 Motor contactor and thermal cut-out with reset button 9 Power switch for different operations:
automatic - manual - off
Button for:
Power increase - power reduction 10 Terminal strip 11 Fairleads for electrical connections by installer 12 Flame control with lock-out pilot light and lock-out reset button 13 Flame inspection window 14 Air pressure switch
(differential operating type) 15 Slide bars for opening the burner and inspecting the combustion head 16 Gas pressure test point and head fixing screw 17 Air pressure test point 18 Flame sensor probe | <ul style="list-style-type: none"> 19 Air gate valve 20 Air inlet to fan 21 Screws securing fan to sleeve 22 Gas input pipework 23 Gas butterfly valve 24 Boiler mounting flange 25 Flame stability disk 26 Bracket for mounting the power regulator RWF 27 Socket for electrical connections (if present) |
|---|---|

Two types of burner failure may occur:

Flame control Lock-out: if the flame control 12)(Fig. 6) push-button lights up, it indicates that the burner is in lock-out. To reset, press the push-button.

Motor trip: release by pressing the push-button on thermal relay 8)(Fig. 6).

4.11 Electrical panel description

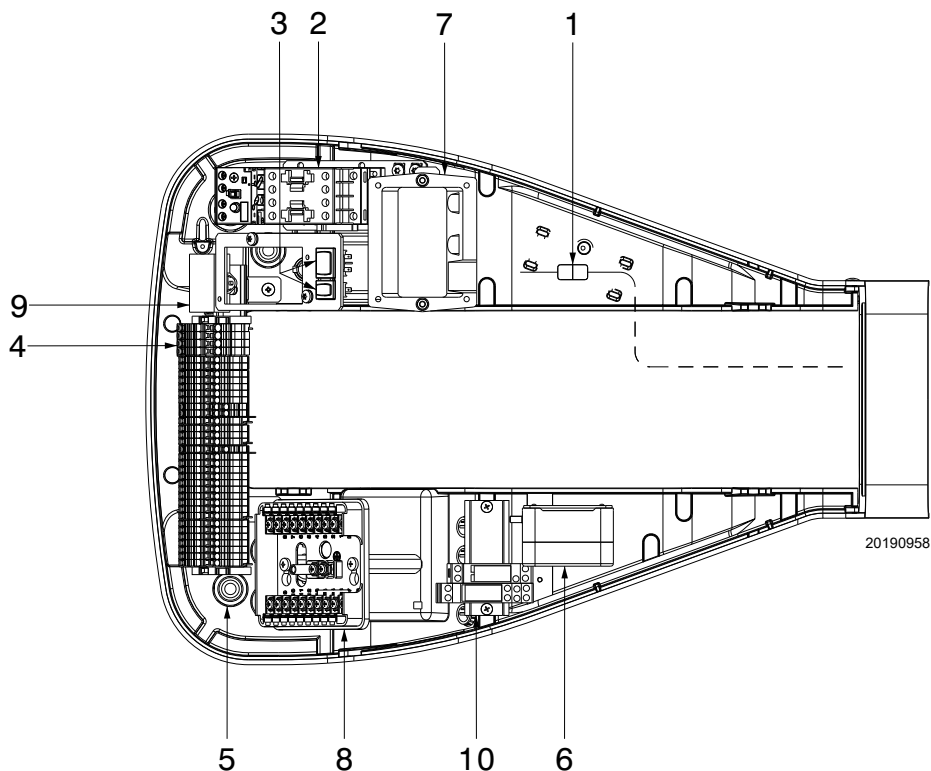


Fig. 7

- 1 Plug-socket on ionisation probe cable
- 2 Motor contactor and thermal relay with reset button
- 3 Switch for different operations:
automatic - manual - off
Button for:
output increase - decrease
- 4 Terminal board for electric connection
- 5 Cable grommets for electrical wiring (to be carried out by the installer)
- 6 Air pressure switch (differential type)
- 7 Ignition transformer
- 8 Flame control base
- 9 Filter to protect against radio disturbance
- 10 Relay

4.12 Servomotor (SQN31...)

Important notes



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.



The servomotor contains electric and electronic components that must not be disposed of with normal domestic waste.

Respect all current local legislation.

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.

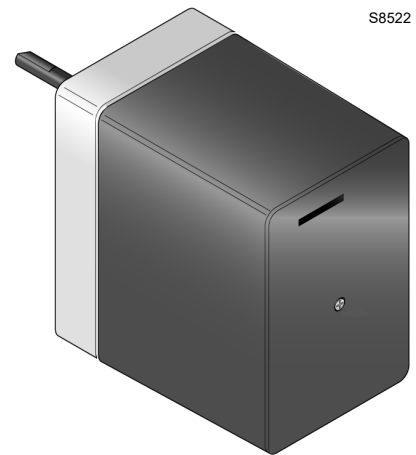


Fig. 8

Technical data

Operating voltage	AC 220 V -15 %...AC 240 V +10 % AC 100 V -15 %...AC 110 V +10 %
Mains frequency	50/60 Hz ±6%
Energy consumption	6.5 VA
Angular positioning	up to 160° (base scale)
Assembly position	optional
Protection level	IP 40, in accordance with DIN 40050
Switching voltage	24...250V AC
Type of motor	synchronous
Environmental conditions:	
Operation	DIN EN 60 721-3-3
Climatic conditions	Class 3K3
Mechanical conditions	Class 3M3
Temperature range	-20...+60°C
Humidity	< 95% RH

Tab. G

5 Installation

5.1 Notes on safety for the installation

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



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



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



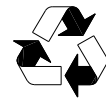
The combustion air inside the boiler must be free from hazardous mixes (e.g.: chloride, fluoride, halogen); if present, it is highly recommended to carry out cleaning and maintenance more frequently.

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.



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.



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



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.

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

20187902

Fig. 9

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.



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



- 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.



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

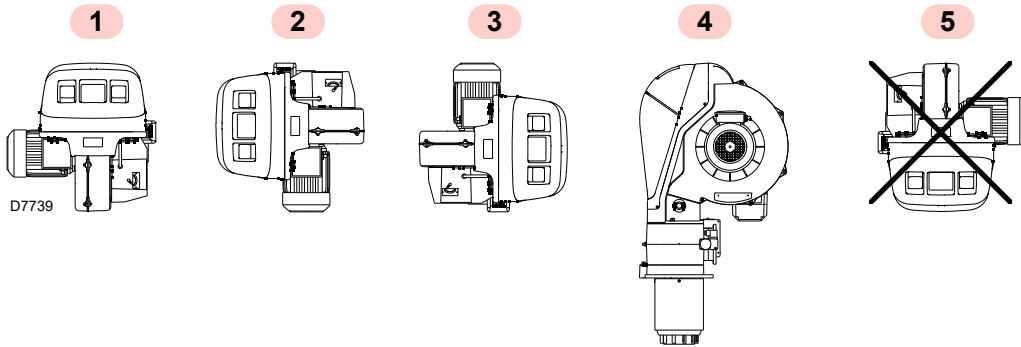


Fig. 10

5.5 Preparing the boiler

5.5.1 Boring the boiler plate

Pierce the closing plate of the combustion chamber, as in Fig. 11. The position of the threaded holes can be marked using the thermal insulation screen supplied with the burner.

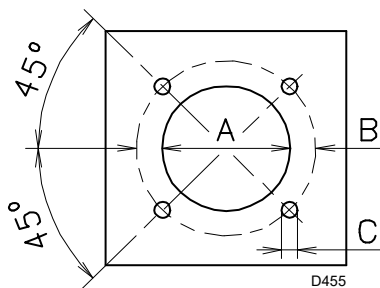


Fig. 11

mm	A	B	C
RS 68-120/M BLU	195	275 - 325	M 12

Tab. H

5.5.2 Blast tube length

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

The range of available lengths L, is as follows:

Blast tube	Short (mm)	Long (mm)
RS 68-120/M BLU	255	390

Tab. I

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

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

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. 13.

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

- remove the screw 1)(Fig. 12)
- take out the inner part 2)(Fig. 12) of the head and then calibrate them.



ATTENTION

Do not rotate the probe but leave it as in Fig. 13; if it is too close to the ignition electrode, it could damage the flame control amplifier.



ATTENTION

Respect the dimensions shown in Fig. 13.

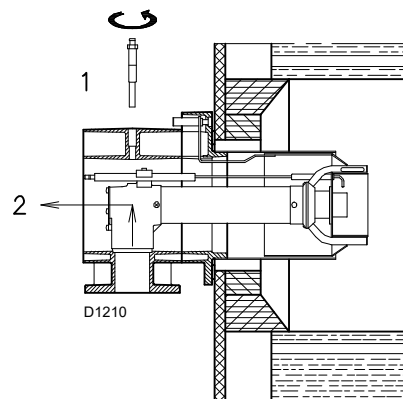


Fig. 12

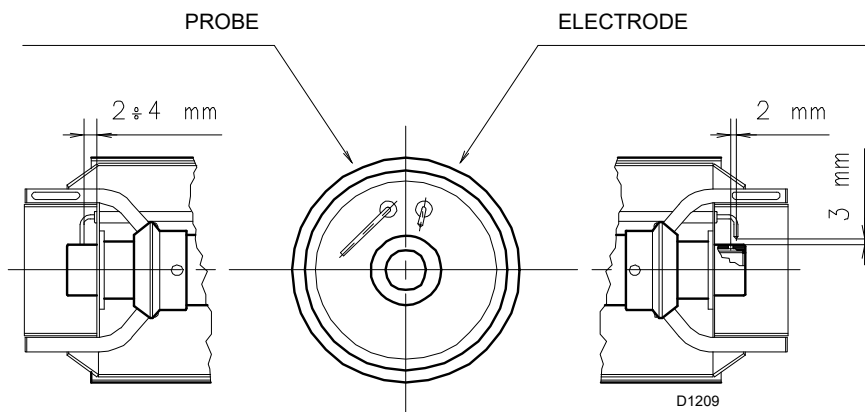


Fig. 13

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);
- disengage the articulated coupling 7) from the graduated sector 8);
- remove screws 2) from the two slide bars 5);
- 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

At this point check, for model RS 120/M BLU, whether the maximum delivery of the burner in 2nd stage operation is contained in area A or in area B of the firing rate on page 10.

If it is in area A then no operation is required.

If, on the other hand, it is in area B, before starting the burner remove the 4 circular sectors 1)(Fig. 14) fastened behind the stabilizing disc by removing the 8 screws 2)(Fig. 14).

As soon as this operation is completed (if necessary):

- fix the flange 11) to the plate of the boiler interposing the insulating flange gasket 9) supplied with the unit.
- Use the 4 screws supplied, 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.

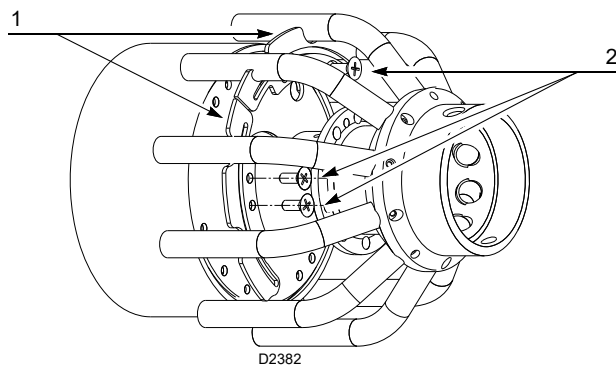


Fig. 14

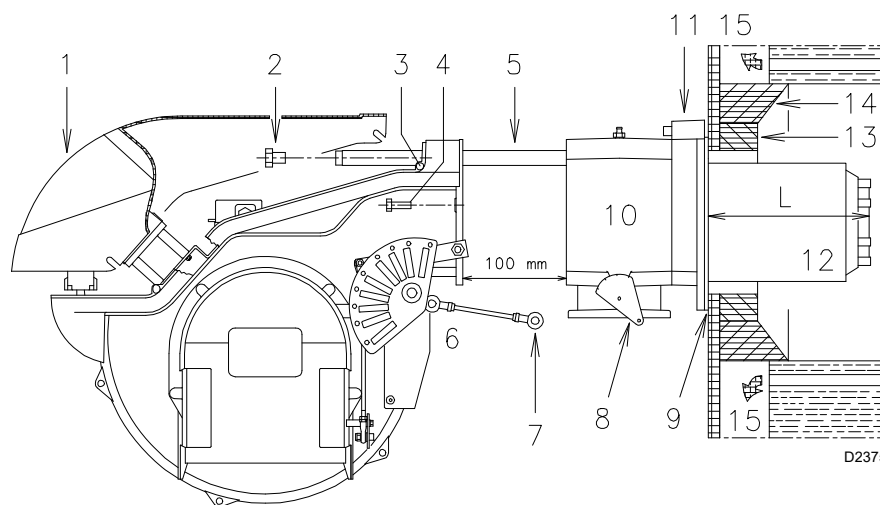


Fig. 15

5.8 Combustion head adjustment

At this point of the installation, the combustion head is fixed to the boiler as shown in Fig. 12.

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:

- air R1
- gas R2

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

Air adjustment (Fig. 16)

- Turn the screw 4)(Fig. 16) 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.

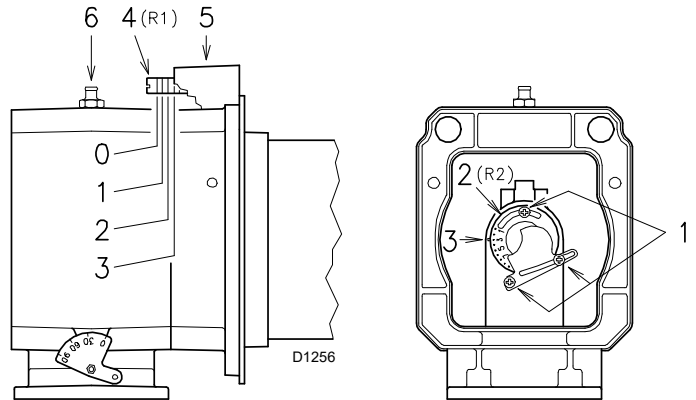


Fig. 16

Gas adjustment (Fig. 16)

- Loosen the 3 screws 1)(Fig. 16) and rotate the ring nut 2) until the notch you have found corresponds with the indicator 3).
- Block the 3 screws 1).

Example:

RS 68/M BLU, burner output = 500 kW.

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

- air R1 = notch 6
- gas R2 = notch 2

NOTE:

the diagram (Fig. 17) indicates the optimum adjustment for a type of boiler according to Fig. 3 on page 11.

If gas pressure allows it, NOx reduction can be obtained by closing ring nut 2)(Fig. 16).

Continuing the example above, you understand that for RS 68/M BLU burner having a power of 500 kW, pressure must be 5.0 at outlet 6)(Fig. 16).

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

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

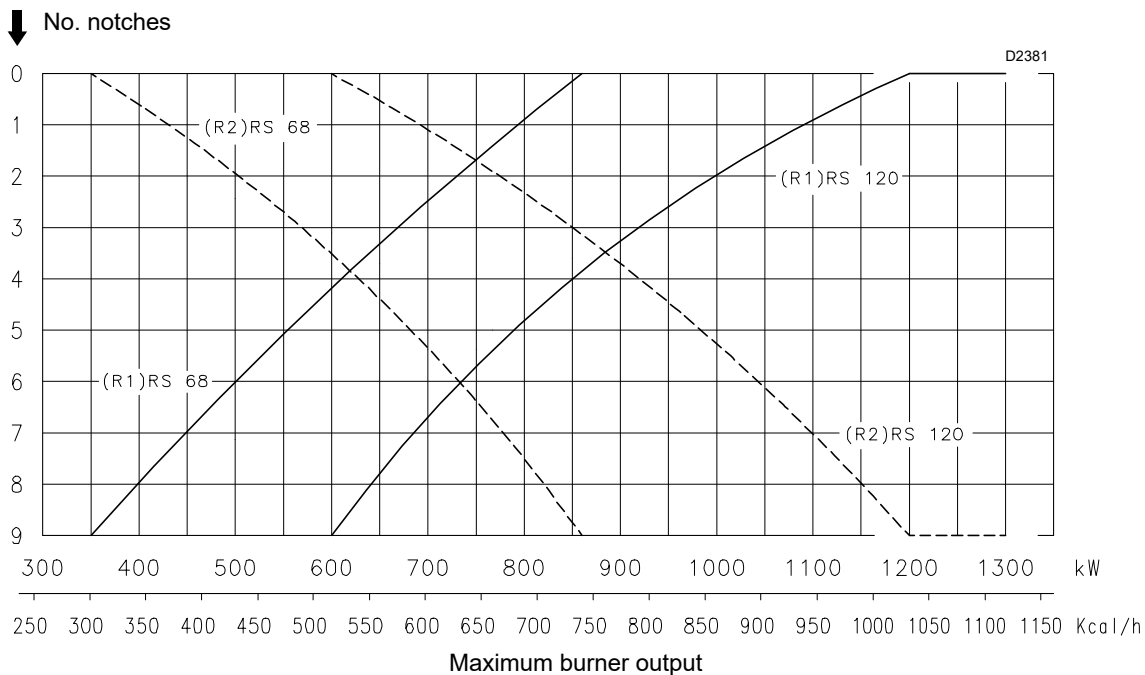


Fig. 17

5.9 Closing the burner

Once the combustion head adjustment is completed:

- reassemble the burner on the slide bars 3)(Fig. 18) 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. 18;
- 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).

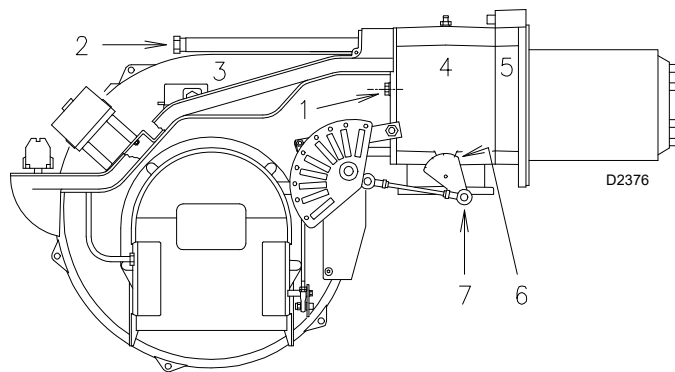


Fig. 18



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.

5.10 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.

5.10.1 Gas feeding line (Example) - Please refer to the gas train documentation for more information

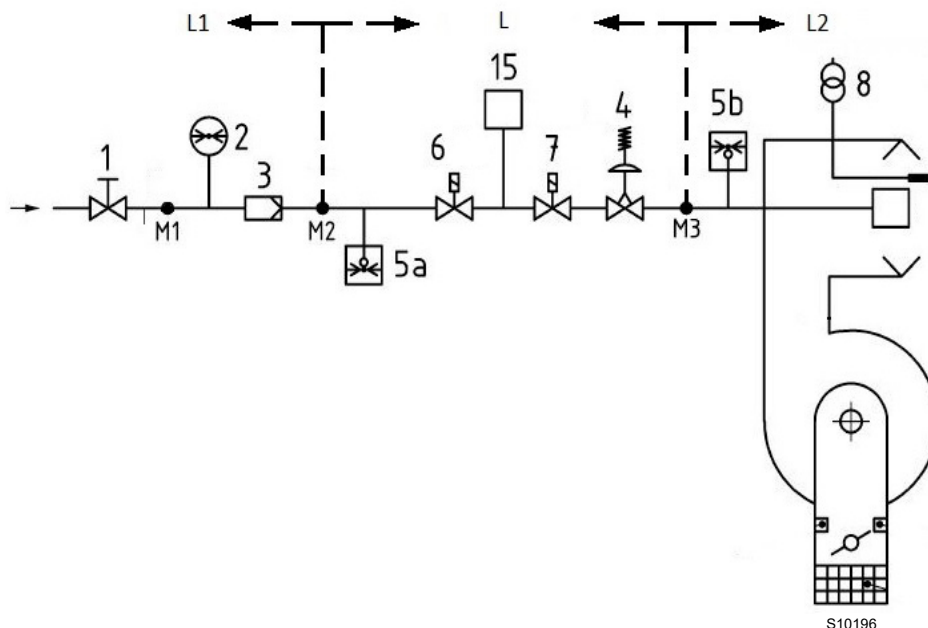


Fig. 19

Key (Fig. 19)

- 1 Manually operated shut-off valve
- 2 Pressure gauge
- 3 Filter
- 4 Governor
- 5a Low pressure protection device
- 5b Maximum gas pressure switch
- 6 1st safety shut-off device
- 7 2nd safety shut-off device
- 8 Ignition device
- 15 Valve leak detection control system

- L Gas train (supplied separately)
- L1 Responsibility of the installer
- L2 Burner
- M1 Pressure test point
- M2 Pressure test point
- M3 Pressure test point

5.10.2 Gas train

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

5.10.3 Gas train installation



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. 20.

The gas train must be connected to the gas connection 1)(Fig. 20), using the flange 2), seal 3) and screws 4) supplied with the burner.



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.

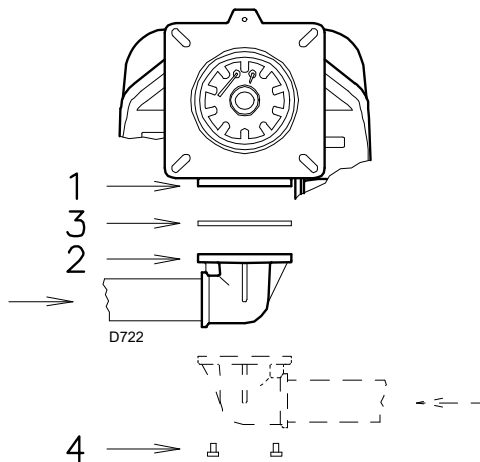


Fig. 20

5.10.4 Gas pressure

Tab. J 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
RS 68/M BLU	350	2,0	3,0	0,1	0,1
	500	5,0	7,5	0,2	0,3
	650	7,7	11,5	0,3	0,4
	750	9,7	14,5	0,4	0,6
	860	11,7	17,5	0,5	0,7
RS 120/M BLU	600	4,4	6,6	0,3	0,4
	760	9,2	13,7	0,4	0,6
	955	14,0	20,9	0,6	0,9
	1170	18,7	27,9	0,8	1,2
	1300	22,5	33,6	1,2	1,8

Tab. J



ATTENTION

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

The values shown in Tab. J refer to:

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

Column 1

Combustion head pressure drop.

Gas pressure measured at test point 1)(Fig. 21 on page 23), with:

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

Column 2

Pressure loss at gas butterfly valve 2)(Fig. 21 on page 23) with maximum opening: 90°.

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. 21 on page 23).
- Find in Tab. J related to the burner concerned, the pressure value closest to the result of the subtraction.
- Read the corresponding output on the left.

Example (RS 120) with natural gas G 20 for:

Maximum output operation

Gas pressure at test point 1)(Fig. 21) = 17.0 mbar

Pressure in combustion chamber = 3.0 mbar

$$17,0 - 3,0 = 14,0 \text{ mbar}$$

A pressure of 14.0 mbar, column 1, corresponds in Tab. J to an output of 955 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. 21), set the maximum modulating output required from the burner operation:

- find the nearest output value in Tab. J on page 22 for the burner in question.
- Read, on the right (column 1), the pressure at the test point 1)(Fig. 21).
- Add this value to the estimated pressure in combustion chamber.

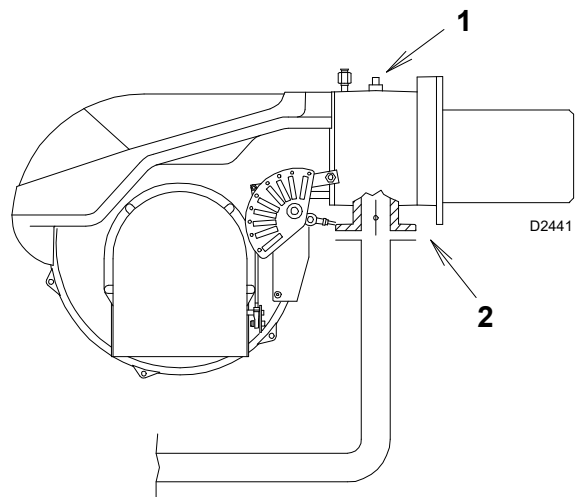


Fig. 21

Example (RS 120) with natural gas G 20 for:

Operating at the desired maximum output: 955 kW

Gas pressure at an output of 955 kW = 14.0 mbar

Pressure in combustion chamber = 3.0 mbar

$$14,0 + 3,0 = 17,0 \text{ mbar}$$

pressure required at test point 1)(Fig. 21).

5.11 Electrical connections

Notes on safety for the electrical wiring



- 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 burners have been set for intermittent operation. This means it should compulsorily be stopped at least once every 24 hours to enable the flame control to check its own efficiency at start-up. Normally the boiler's thermostat/pressure switch ensures that the burner stops. If this is not the case, a time switch (IN) should be fitted in series to provide for burner shut-down at least once every 24 hours. Refer to the wiring diagrams.
- The electrical safety of the device is obtained only when it is correctly connected to an efficient earthing system, made according to current standards. It is necessary to check this fundamental safety requirement. In the event of doubt, have the electrical system checked by qualified personnel. Do not use the gas tubes as an earthing system for electrical devices.
- The electrical system must be suitable for the maximum power absorption of the device, as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for that level of power absorption.
- For the main power supply of the device from the electricity mains:
 - do not use adapters, multiple sockets or extensions;
 - use a multiple pole switch with at least a 3 mm gap between the contacts (overvoltage category III), as envisaged by the present safety standards.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.

Before carrying out any maintenance, cleaning or checking operations:



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



Close the fuel shut-off valve.



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.



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

5.11.1 Calibration of thermal cut-out

This is required to avoid motor burn-out in the event of a significant increase in power absorption caused by a missing phase.

- If the motor is star-powered, **400 V**, the cursor should be positioned to "MIN".
- If the motor is delta-powered, **230 V**, the cursor should be positioned to "MAX".

Even if the scale of the thermal cut-out does not include rated motor absorption at 400V, protection is still ensured in any case.

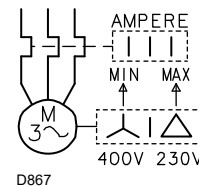


Fig. 22

5.11.2 Supply cables and external connections passage (burner with plug and socket)

All the cables to be connected to the burner should be passed through cable grommets, as shown in Fig. 23.

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

Key (Fig. 23)

- 1 Pg 13,5 Three-phase power supply
- 2 Socket XP6
- 3 Socket XP7
- 4 Socket XP4
- 5 Pg 11 Open the hole, if a pipe union is to be added

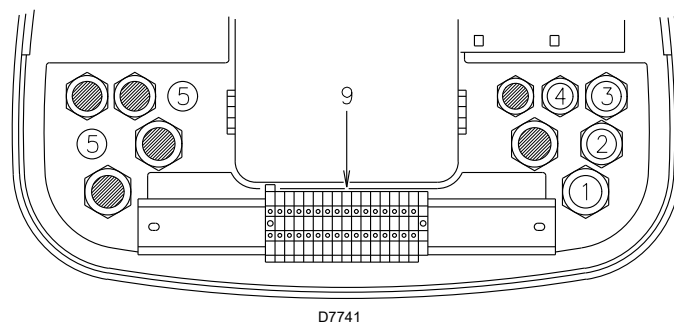


Fig. 23

5.11.3 Supply cables and external connections passage (burner with terminal board)

All the cables to be connected to the burner should be passed through cable grommets, as shown in Fig. 24.

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

Key (Fig. 24)

- 1 Pg 13,5 Three-phase power supply
- 2 Pg 11 Single-phase power supply
- 3 Pg 11 Remote control device TL
- 4 Pg 9 Remote control device TR or probe RWF
- 5 Pg 13,5 Gas valves
- 6 Pg 13,5 Gas pressure switch or gas valve leak detection control device
- 7 Pg 11 Open the hole, if a pipe union is to be added

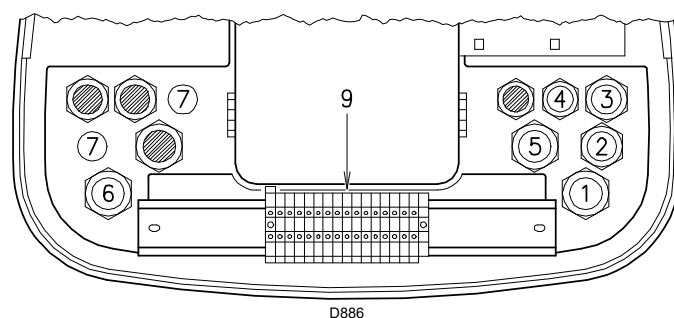


Fig. 24

6 Start-up, calibration and operation of the burner

6.1 Notes on safety for the first start-up



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



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



Before starting up the burner, refer to section “Safety test - with no gas supply” on page 32.

6.2 Adjustments prior to ignition

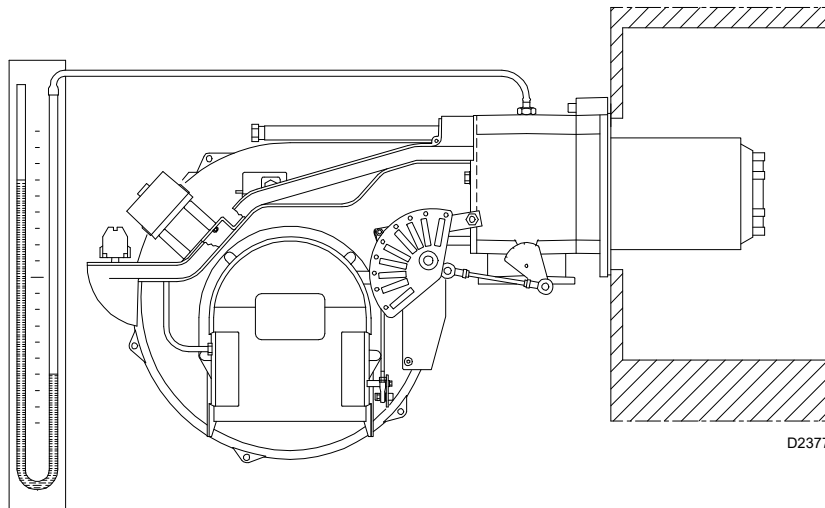
The following adjustments must be carried out:

- 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. 33 on page 30) to the start of the scale.
- Adjust the maximum gas pressure switch (Fig. 32 on page 30) to the end of the scale.
- Adjust the air pressure switch (Fig. 31 on page 30) 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. 25 on page 26) 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. 25) to the gas pressure test point on the pipe coupling. It is used to calculate approximate MAX burner output using the Tab. J on page 22.
- 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.



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.



D2377

Fig. 25

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 33 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 - V:** integral with cam III

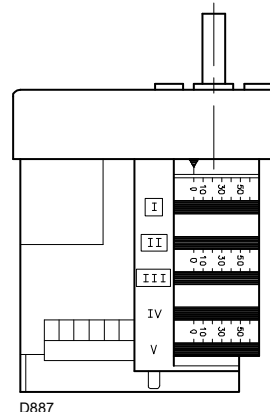


Fig. 26

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. 27 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.

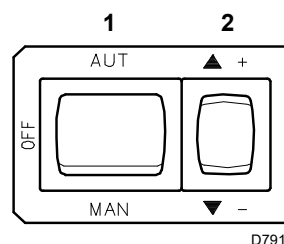


Fig. 27

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 flame control 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. 25 on page 26).

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

6.6.1 Ignition output



ATTENTION

For safety purposes and correct product operation, the ignition output, if it is adjustable, must be carried out by authorized personnel and in compliance with the standards and regulations of the laws in force.

6.6.2 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. 29 on page 29), 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 12; just read the gas pressure on the pressure gauge (see Fig. 31 on page 30) and follow the indications given on page 12.

- 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. 28) by turning the screws 7).

Turn the screws clockwise to increase air delivery.

Turn the screws anticlockwise to reduce air delivery.

6.6.3 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. 29 on page 29) until the servomotor closes the air damper and the gas butterfly valve is at 20° (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. 30 on page 29) with small, regular movements, i.e. bring it from an angle of 20° to 18° - 16°...
- If it is necessary to increase it, lightly press the “output increase” button 2)(Fig. 29 on page 29) (open the gas butterfly valve by 10-15°), and increase cam III angle (Fig. 30 on page 29) with a series of small movements, i.e. move from angle 20° to 22° - 24°...

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) by turning the screws 5)(Fig. 28). If possible, do not turn the first screw, since this is used to set the air damper to its fully closed position.

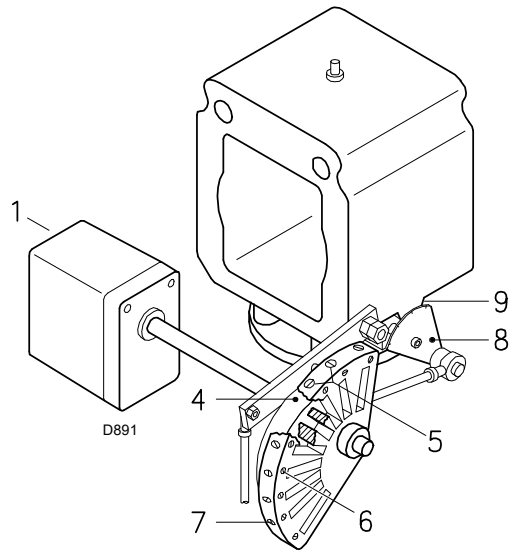


Fig. 28

- 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

6.6.4 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. 29) 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. 29), OFF position.

Release cam 4)(Fig. 28) from the servomotor by pressing and shifting button 3)(Fig. 30) to the right, and check several times that by rotating cam 4)(Fig. 28) forwards and backwards by hand, the movement is soft and smooth, without jamming.

Engage cam 4)(Fig. 28) to the servomotor again by shifting button 2)(Fig. 30) 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)(Fig. 27).

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.

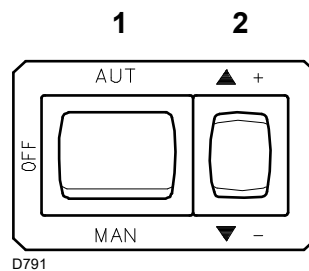


Fig. 29

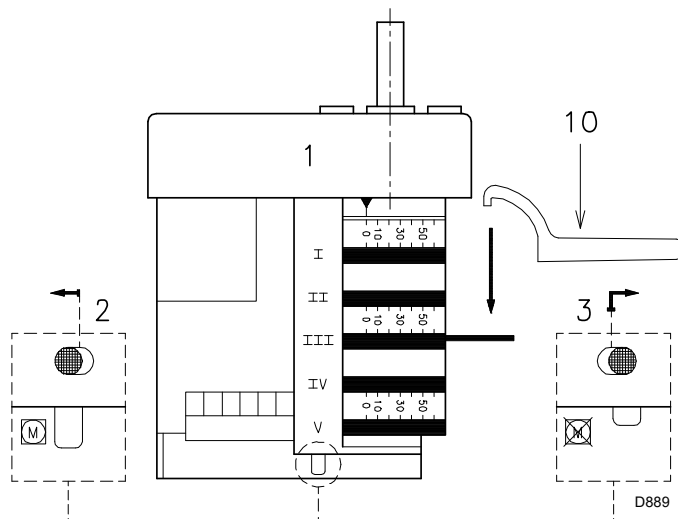


Fig. 30

6.7 Final adjustment of the pressure switches

6.7.1 Air pressure switch

Adjust the air pressure switch (Fig. 31) 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. 31. 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. 31.



Fig. 31

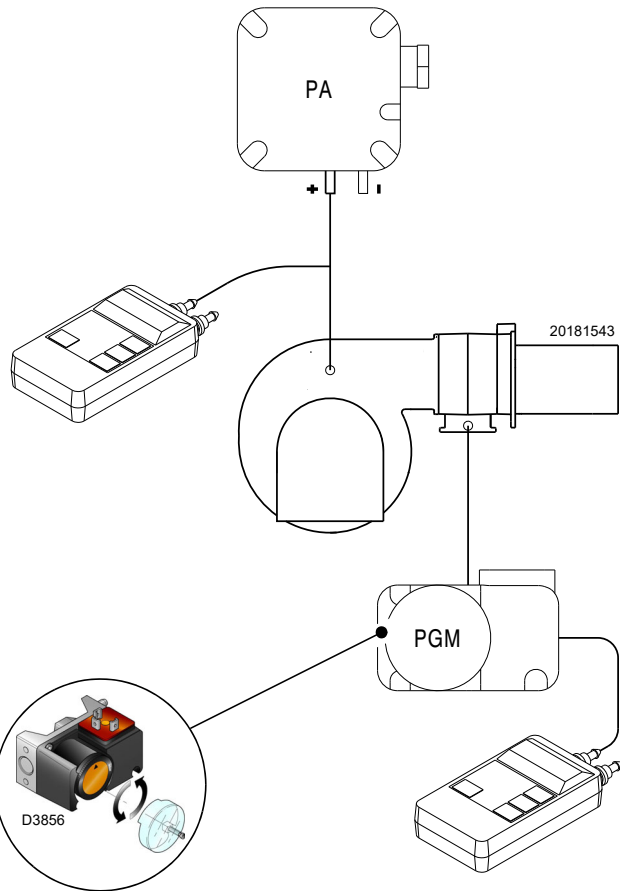


Fig. 32



Connecting the air pressure switch in differential mode, the burner will no longer be certified according to the EN 676 standard.

6.7.2 Maximum gas pressure switch

Adjust the maximum gas pressure switch (Fig. 32) 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.

6.7.3 Minimum gas pressure switch

The purpose of the minimum gas pressure switch is to prevent the burner from operating in an unsuitable way due to too low gas pressure. Adjust the minimum gas pressure switch (Fig. 33) after having adjusted the burner, the gas valves and the gas train stabiliser. With the burner operating at maximum output:

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

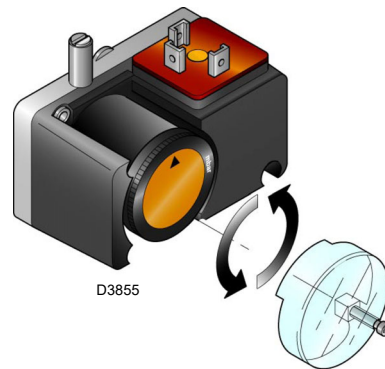


Fig. 33



1 kPa = 10 mbar

6.8 Burner operation

6.8.1 Burner start-up

- 0 s.** TL closes.
- 2 s.** Start of electrical flame control programme. Servomotor starts: rotate to the left by 90°, i.e. until the contact intervenes with cam I (Fig. 26 on page 27)
- 26 s.** The air gate valve is positioned to maximum output. Fan motor starts. Start of the pre-purging phase.
- 57 s.** Servomotor rotates to right up to the angle set on cam III (Fig. 26 on page 27) p.20 for MIN, output.
- 77 s.** The air gate valve and the gas butterfly are positioned to MIN, output (with cam III)((Fig. 26 on page 27) at 65°.
- 92 s.** Ignition electrode strikes a spark. Safety valve VS and adjustment valve VR (rapid opening) open. The flame is ignited at a low output level, point A. Output is then progressively increased, with the valve VR opening slowly up to MIN, output, point B.
- 94 s.** The spark goes out.
- 118 s.** The flame control starting cycle ends.

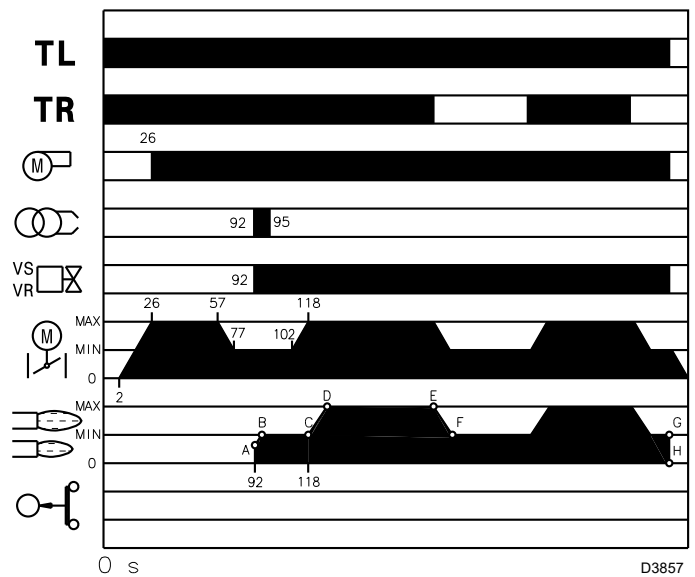


Fig. 34

6.8.2 Steady state operation

Burner without modulating operation kit

At the end of the start-up cycle, the servomotor control switches to TR remote control that controls the pressure or temperature in the boiler, point C. (The electric flame control 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°. The air damper closes completely to reduce heat losses to a minimum.

Burner with modulating operation kit

See the handbook enclosed with the regulator.

6.8.3 Ignition failure

If the burner does not fire, it goes into lock-out within 3s of the opening of the gas solenoid valve.

Burner flame goes out during operation

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

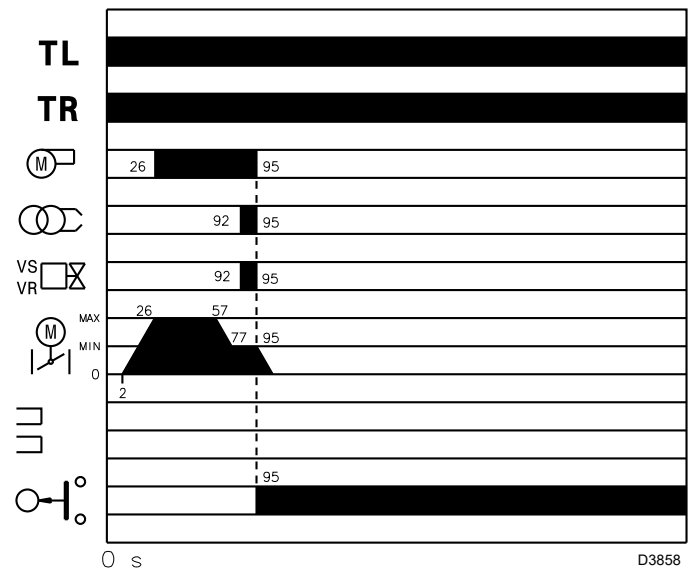


Fig. 35

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.



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

Before carrying out any maintenance, cleaning or checking operations:



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



Close the fuel shut-off valve.



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

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 flame control will switch to stop or safety lockout condition.

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



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

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.

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. 36).

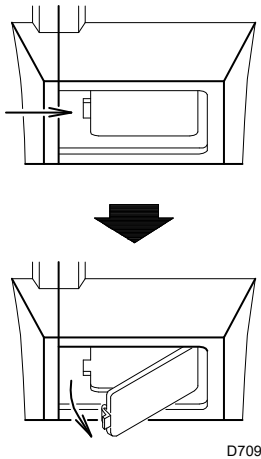


Fig. 36

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

The burner is fitted with an ionisation system to check that a flame is present (Fig. 37). The minimum current for flame control operation is 6 µA. The burner provides a much higher current, so controls are not normally required. However, if it is necessary to measure the ionisation current, disconnect the plug-socket on the ionisation probe cable and insert a direct current microammeter with a base scale of 100 µA.



Carefully check polarities!

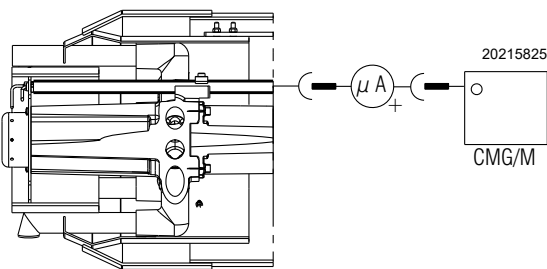


Fig. 37

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. K

7.2.4 Safety components

The safety components must be replaced at the end of their life cycle indicated in Tab. L. 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
Fan impeller	10 years or 500,000 start-ups

Tab. L

7.3 Opening the burner



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



Close the fuel shut-off valve.



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

- Loosen the 4 screws 1)(Fig. 38) 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).

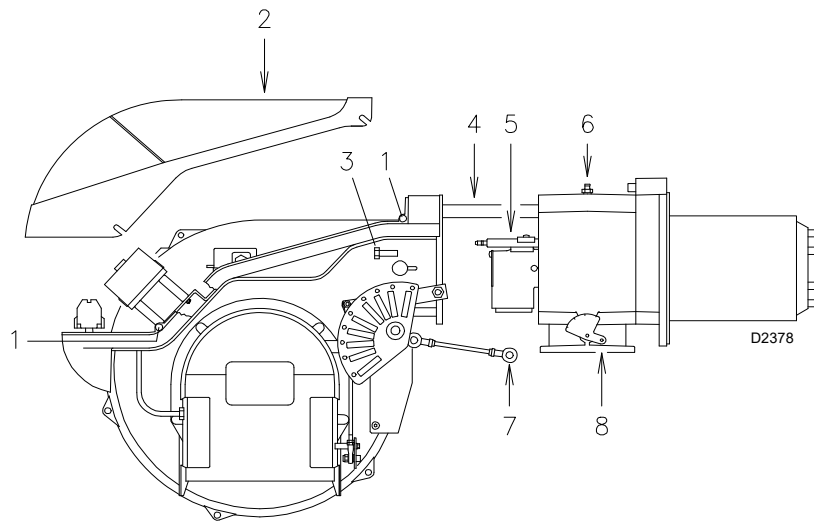


Fig. 38

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. 38) 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.

A Appendix - Accessories

Output regulator kit for modulating operation

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

The parts to be ordered are two:

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

Parameter to be controlled		Probe		Output regulator	
	Adjustment field	Type	Code	Type	Code
Temperature	- 100 ÷ 500° C	PT 100	3010110	RWF50	20082208
Pressure	0 ÷ 2,5 bar	4 ÷ 20 mA	3010213		
	0 ÷ 16 bar	4 ÷ 20 mA	3010214	RWF55	20099657

Extended head kit

Burner	Standard head length (mm)	Extended head length (mm)	Code
RS 68-120/M BLU	255	390	3010177

Soundproofing box kit

Burner	Type	dB(A)	Code
RS 68-120/M BLU	C4/5	10	3010404

Spacer kit

Burner	Thickness (mm)	Code
RS 68-120/M BLU	135	3010129

Continuous purging kit

Burner	Code
RS 68-120/M BLU	3010094

Signal converter kit

Burner	Code
RS 68-120/M BLU	20091960

Relay interface kit

Burner	Code
RS 68-120/M BLU	3010386

Potentiometer kit

Burner	Code
RS 68-120/M BLU	3010416

Differential circuit breaker kit

Burner	Code
RS 68-120/M BLU	3010329

Gas trains in compliance with EN 676

Please refer to manual.



ATTENTION

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

Tubes kit

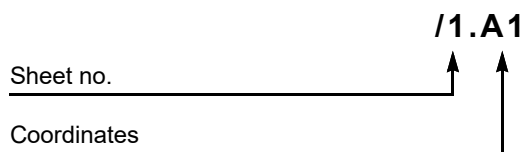
Burner	Code
RS 68/M BLU	3010247
RS 120/M BLU	3010248

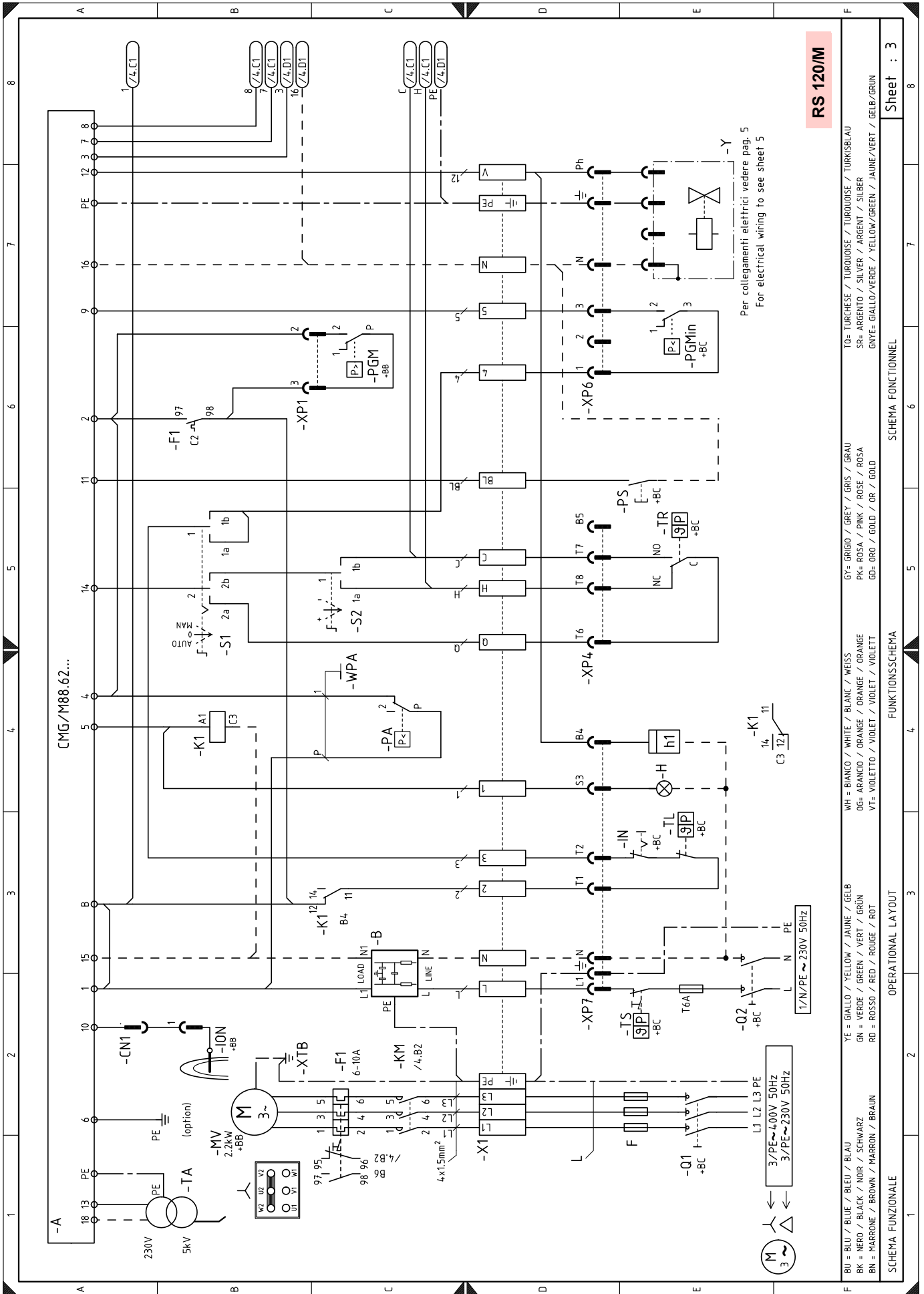
Gas flange kit DN80

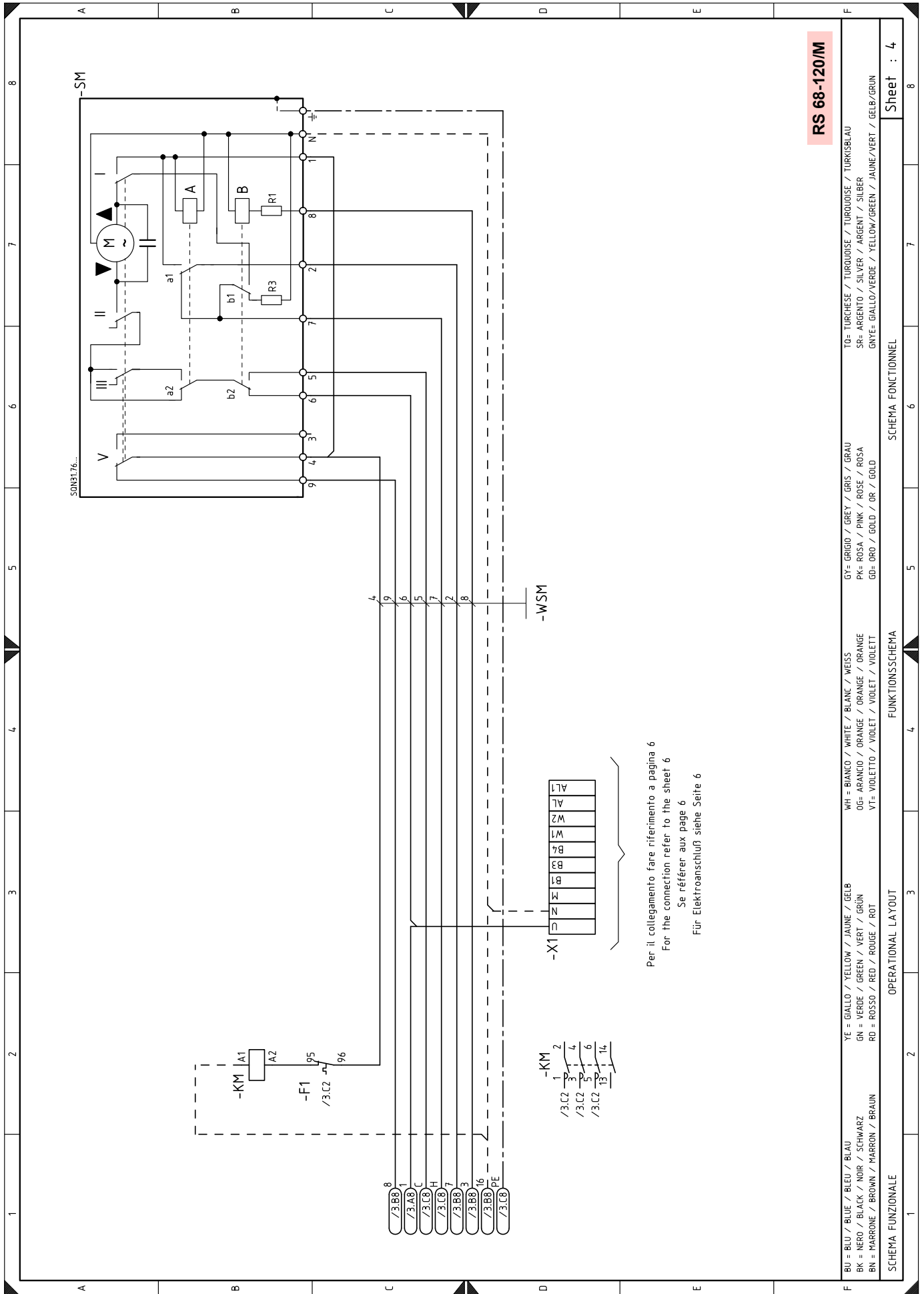
Burner	Code
RS 68-120/M BLU	3010439

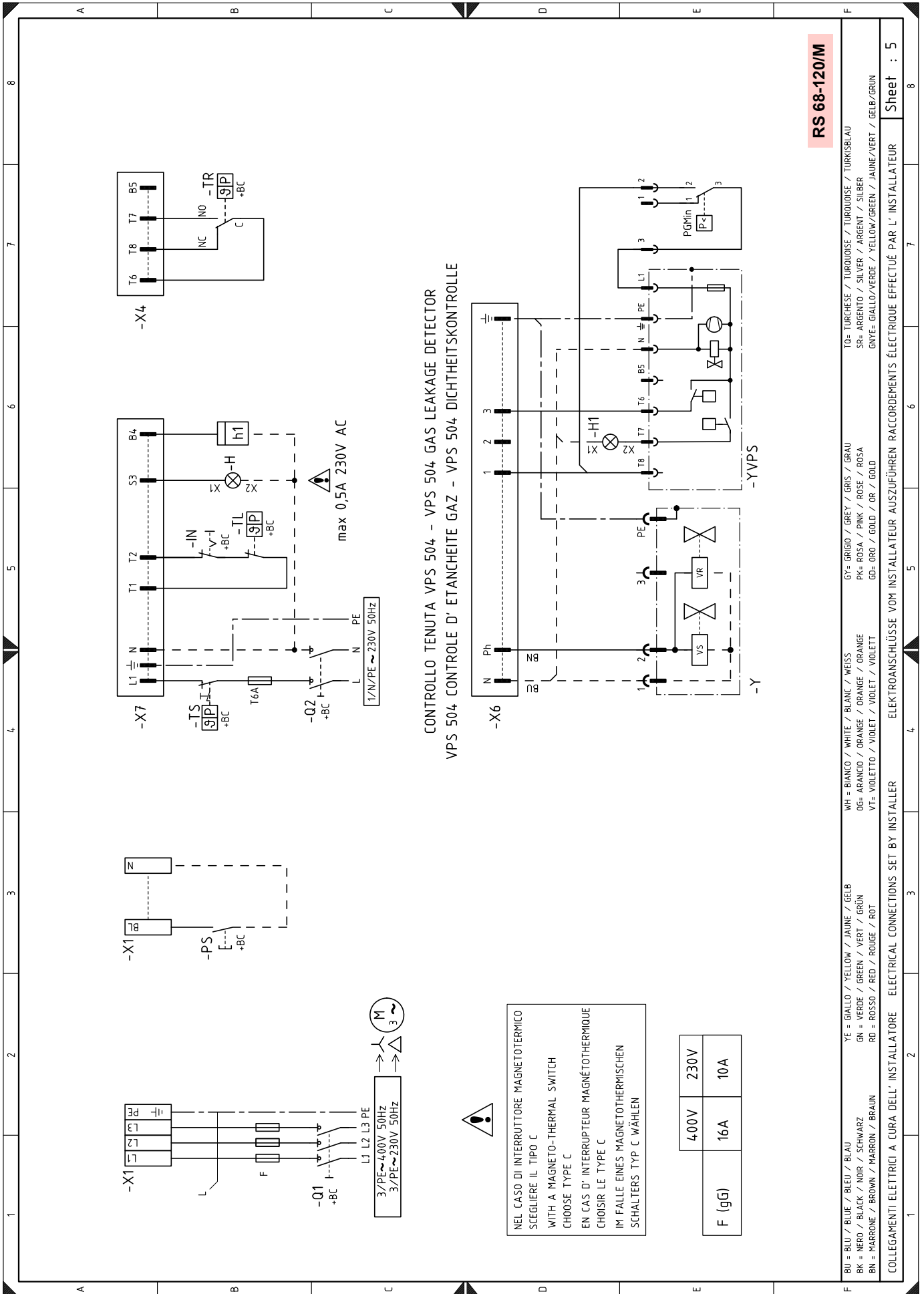
B Appendix - Electrical panel layout (burner with plug and socket)

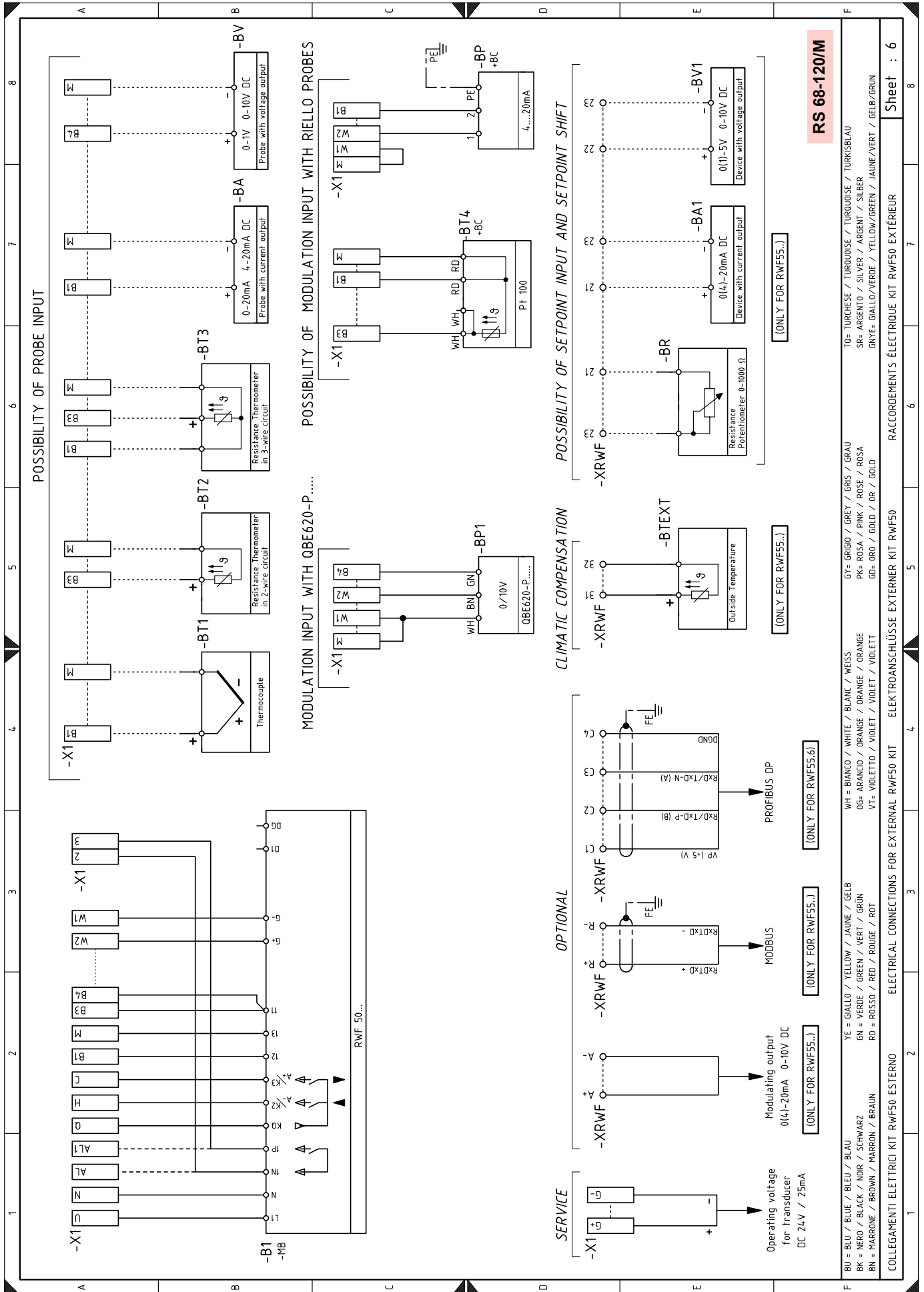
1	Index of layouts
2	Indication of references
3	Functional layout
4	Functional layout
5	Electrical wiring that the installer is responsible for
6	RWF50 functional layout

2 Indication of references



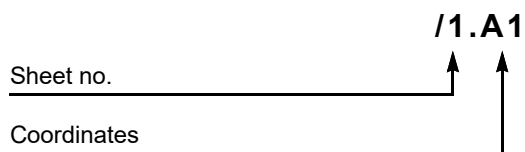


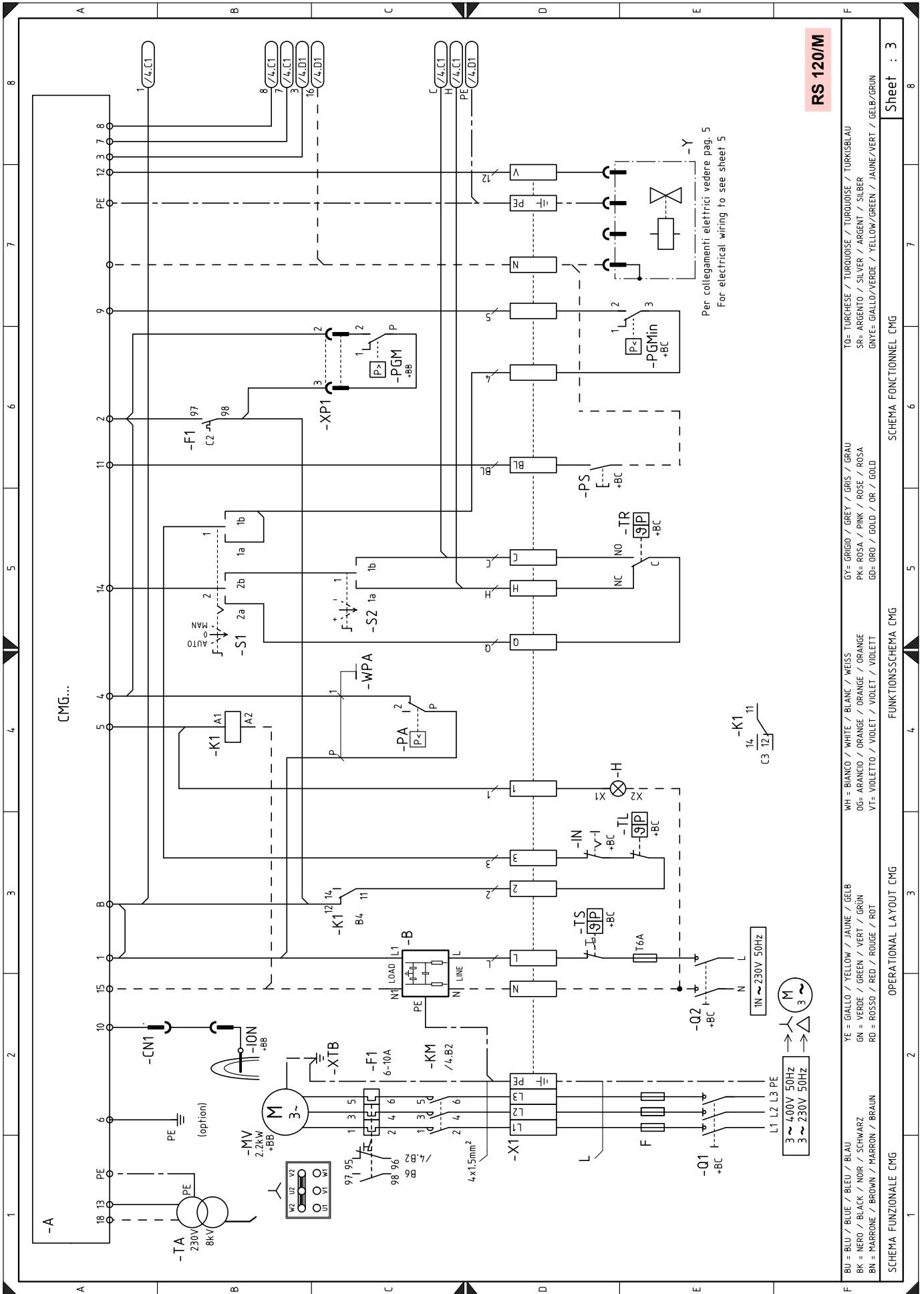


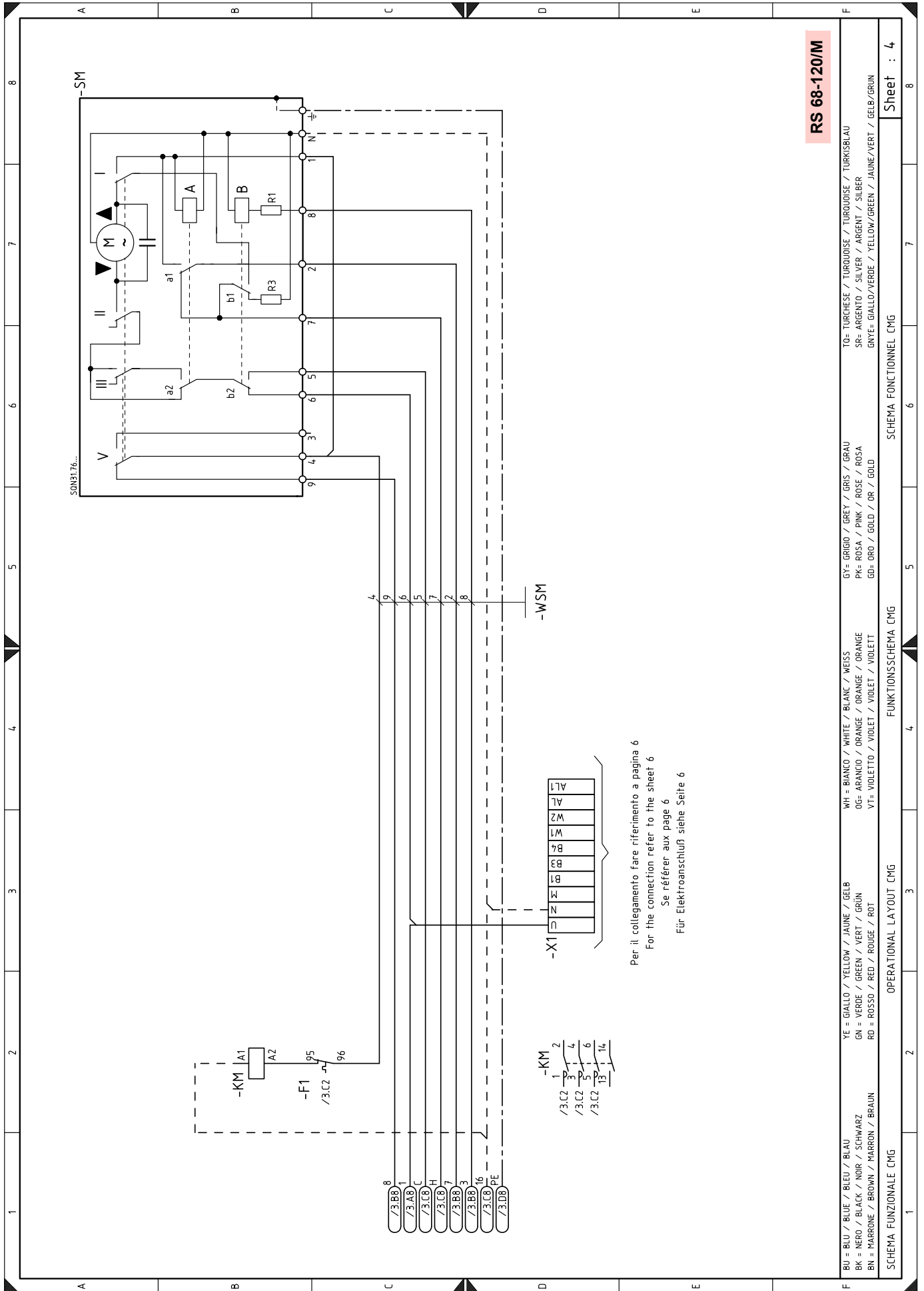


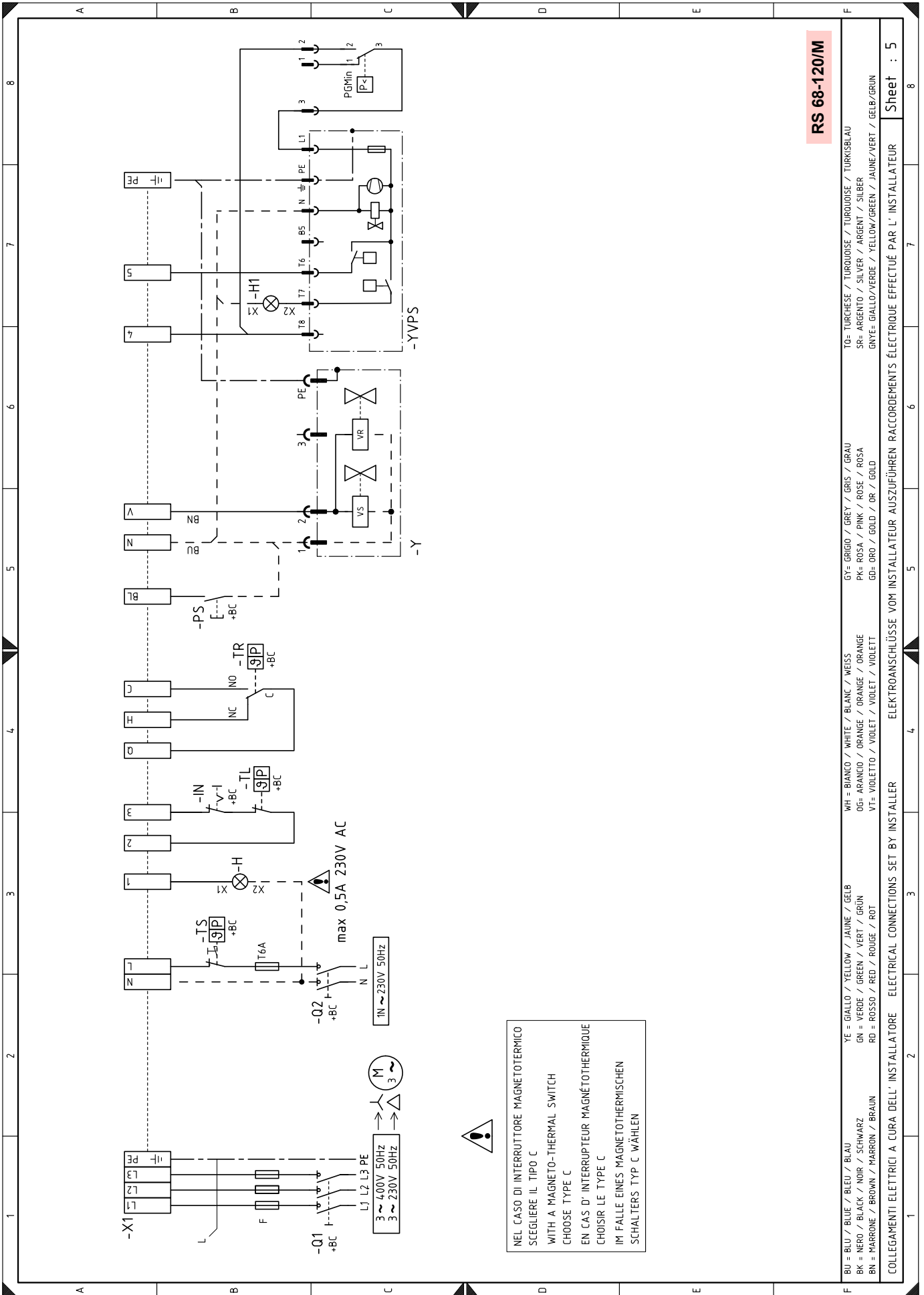
C Appendix - Electrical panel layout (burner with terminal strip)

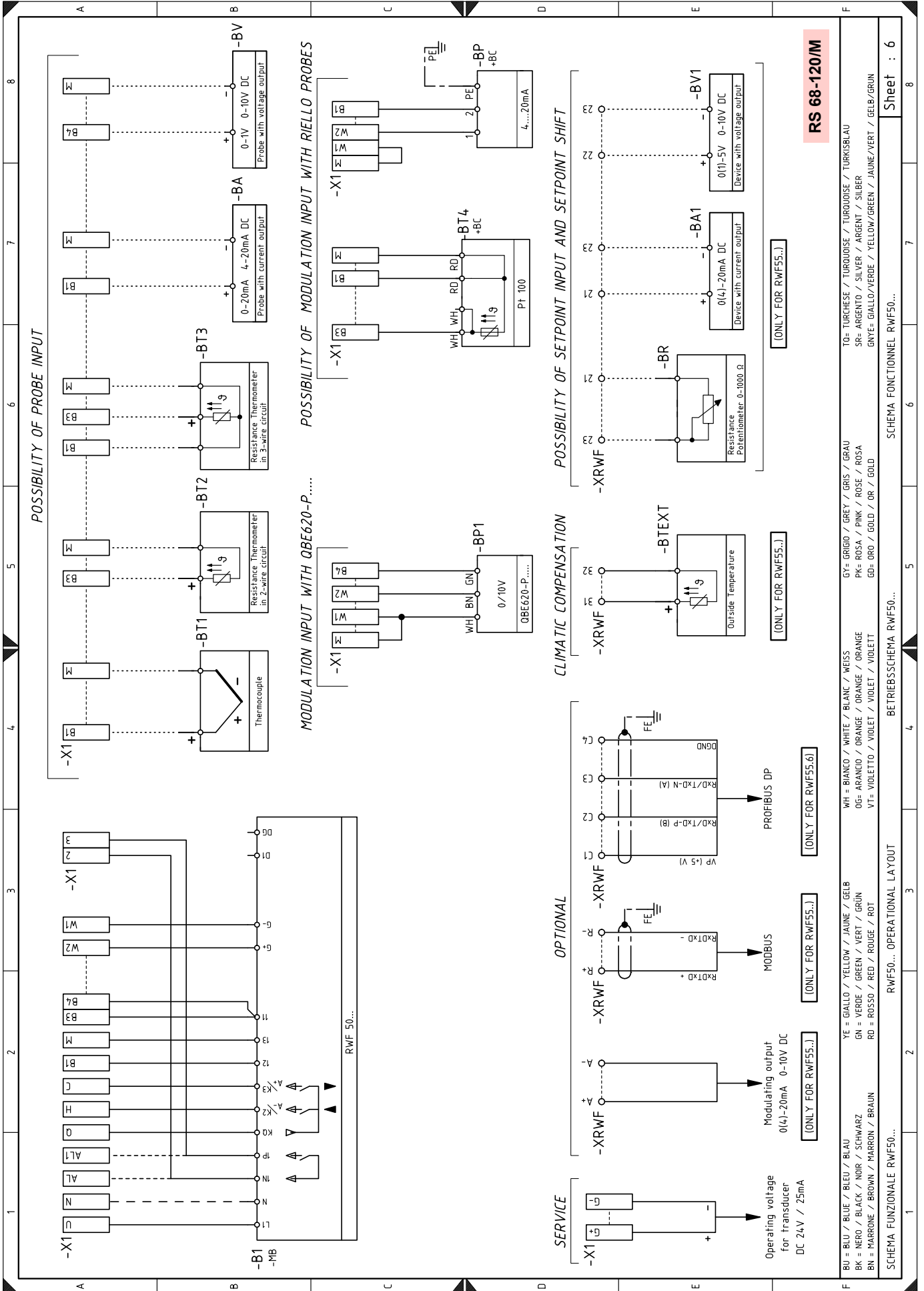
1	Index of layouts
2	Indication of references
3	Functional layout
4	Functional layout
5	Electrical wiring that the installer is responsible for
6	RWF50 functional layout

2 Indication of references









Wiring layout key

A	Flame control
B	Radio noise filter
B1	Output power regulator RWF
BA	Probe with voltage output DC 4...20mA
BA1	Device with current output for editing remote setpoint
BP	Pressure probe
BP1	Pressure probe
BR	Remote setpoint potentiometer
BT1	Thermocouple probe
BT2	Two-wire probe Pt100
BT3	Three-wire probe Pt100
BT4	Three-wire probe Pt100
BTEXT	External probe for climatic setpoint compensation
BV	Input under voltage 0...10 V DC
BV1	Input under voltage 0...10 V DC to modify the remote setpoint
CN1	Ionisation probe connector
F1	Fan motor thermal relay
h1	Hour counter
H	Remote lockout signalling
H1	YVPS lockout
IN	Manual burner stop switch
ION	Ionisation probe
K1	Relay
KM	Relay motor contact make
MV	Fan motor
PA	Air pressure switch
PGM	Maximum gas pressure switch
PGMin	Low gas pressure switch
PS	Lock-out reset button
Q1	Switch/breaker
Q2	Switch/breaker
S1	Burner ON/OFF switch
S2	Unlit / automatic/ manual selector switch
SM	Servomotor
TA	Ignition transformer
TL	Limit thermostat/pressure switch
TR	Adjustment thermostat/pressure switch
TS	Safety thermostat/pressure switch
X1	Burner terminal strip
X4	4 pin plug
X6	6 pin plug
X7	7 pin plug
XP1	Contact for power regulator RWF kit
XP4	4 pole socket
XP6	6 pole socket
XP7	7 pole socket
XRWF	Output power regulator RWF terminal strip
XTB	Shelf earth
Y	Gas regulation valve + gas safety valve
YVPS	Gas valve leak detection control device

RIELLO

RIELLO S.p.A.
I-37045 Legnago (VR)
Tel.: +39.0442.630111
[http:// www.riello.it](http://www.riello.it)
[http:// www.riello.com](http://www.riello.com)