

GB **Forced draught gas burners**

Progressive two-stage or modulating operation



CODE	MODEL	TYPE
20145840	RS 1000/M BLU	1133 T
20145867	RS 1200/M BLU	1134 T



Translation of the original instructions

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1 Declarations

Declaration of conformity in accordance with ISO / IEC 17050-1		
Manufacturer:	RIELLO S.p.A.	
Address:	Via Pilade Riello, 7 37045 Legnago (VR)	
Product:	Forced draught gas burners	
Model:	RS 1000/M BLU RS 1200/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 Appliances Regulation
MD	2006/42/EC	Machine Directive
LVD	2014/35/EU	Low Voltage Directive
EMC	2014/30/EU	Electromagnetic Compatibility
PED	2014/68/EU (only FS2)	Pressure Equipment Directive
Such products are marked as follows:		
	RS 1000/M BLU	CE-0085CN0119 Class 3 (EN 676)
	RS 1200/M BLU	CE-0085CN0120 Class 3 (EN 676)

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	1133 T	RS 1000/M BLU	1100 - 10100 kW
	1134 T	RS 1200/M BLU	1500 - 11100 kW

Legnago, 03.05.2021

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

Mr. F. Maltempi

2 Information and general warnings

2.1 Information about the instruction manual

2.1.1 Introduction

The instruction manual supplied with the burner:

- is an integral and essential part of the product and must not be separated from it; it must therefore be kept carefully for any necessary consultation and must accompany the burner even if it is transferred to another owner or user, or to another system. If the manual is lost or damaged, another copy must be requested from the Technical Assistance Service 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 HOOD AND ALL THE SAFETY AND PROTECTION DEVICES
This symbol signals the obligation to reassemble the hood and all the safety and protection devices of the burner after any maintenance, cleaning or checking operations.



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



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

- This symbol indicates a list.

Abbreviations used

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

2.1.4 Delivery of the system and the instruction manual

When the system is delivered, it is important that:

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

.....

- the address and telephone number of the nearest Assistance Centre;

.....

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

2.2 Guarantee and responsibility

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



WARNING

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

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

- incorrect installation, start-up, use and maintenance of the burner;
- improper, incorrect or unreasonable use of the burner;
- intervention of unqualified personnel;
- carrying out of unauthorised modifications on the equipment;
- use of the burner with safety devices that are faulty, incorrectly applied and/or not working;
- installation of untested supplementary components on the burner;
- powering of the burner with unsuitable fuels;
- faults in the fuel supply system;
- use of the burner even following an error and/or an irregularity;
- repairs and/or overhauls incorrectly carried out;
- modification of the combustion chamber with inserts that prevent the regular development of the structurally established flame;
- insufficient and inappropriate surveillance and care of those burner components most likely to be subject to wear and tear;
- the 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 technical rules of safety and envisaging all the potential danger situations.

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

It is a good idea to remember the following:

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

In particular:

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

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

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



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

3.2 Personnel training

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

The user:

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

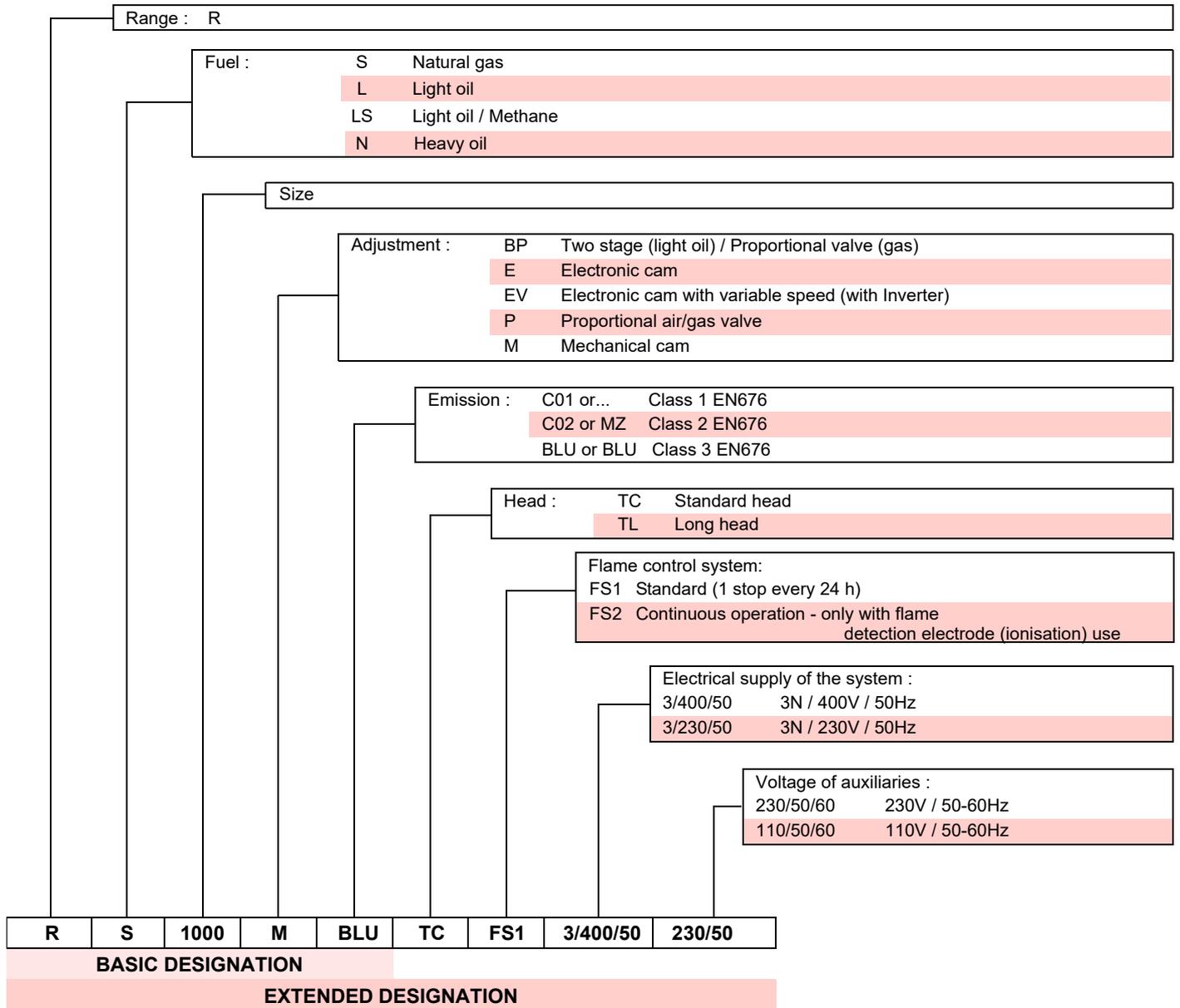
In addition:



- the user 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		Voltage	Start-up	Code
RS 1000/M BLU	TC	3/400/50	Star/Triangle	20145840
RS 1200/M BLU	TC	3/400/50	Star/Triangle	20145867

Tab. A

4.3 Technical data

Model			RS 1000/M BLU	RS 1200/M BLU
Type			1133 T	1134 T
Output (1)	min - max	kW	1100/4000 - 10100	1500/5500 - 11100
Fuels			Natural gas: G20 (methane gas) - G21 - G22 - G23 - G25	
Gas pressure at max. output (2) - Gas: G20/G25		mbar	67.1/101.2	97.2/145
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 - 50	
Combustion air temperature		°C max	60	
Noise levels (3)	Sound pressure	dB(A)	85	89.3
	Sound power		99	99.7
Weight		Kg	460	500

Tab. B

- (1) Reference conditions: Ambient temperature 20°C - Gas temperature 15°C - Barometric pressure 1013 mbar - Altitude 0 m a.s.l.
 (2) Pressure on the socket 5)(Fig. 4 on page 11) 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 rated output. The sound power is measured with the "Free Field" method, as per EN 15036, and according to an "Accuracy: Category 3" measuring accuracy, as set out in EN ISO 3746.

4.4 Electrical data

Model			RS 1000/M BLU	RS 1200/M BLU
Electrical supply			3N ~ 400V +/-10% 50 Hz	
Fan motor IE3	rpm		2950	2930
	Hz		50	50
	V		400/690	400/690
	kW		22	25
	A		39,4/22,7	44/25,4
Ignition transformer		V1 - V2 I1 - I2	230 V - 2 x 5 kV 1,9 A - 35 mA	
Absorbed electrical power		kW max	25	28
Protection level			IP 54	

Tab. C

4.5 Burner categories - Countries of destination

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

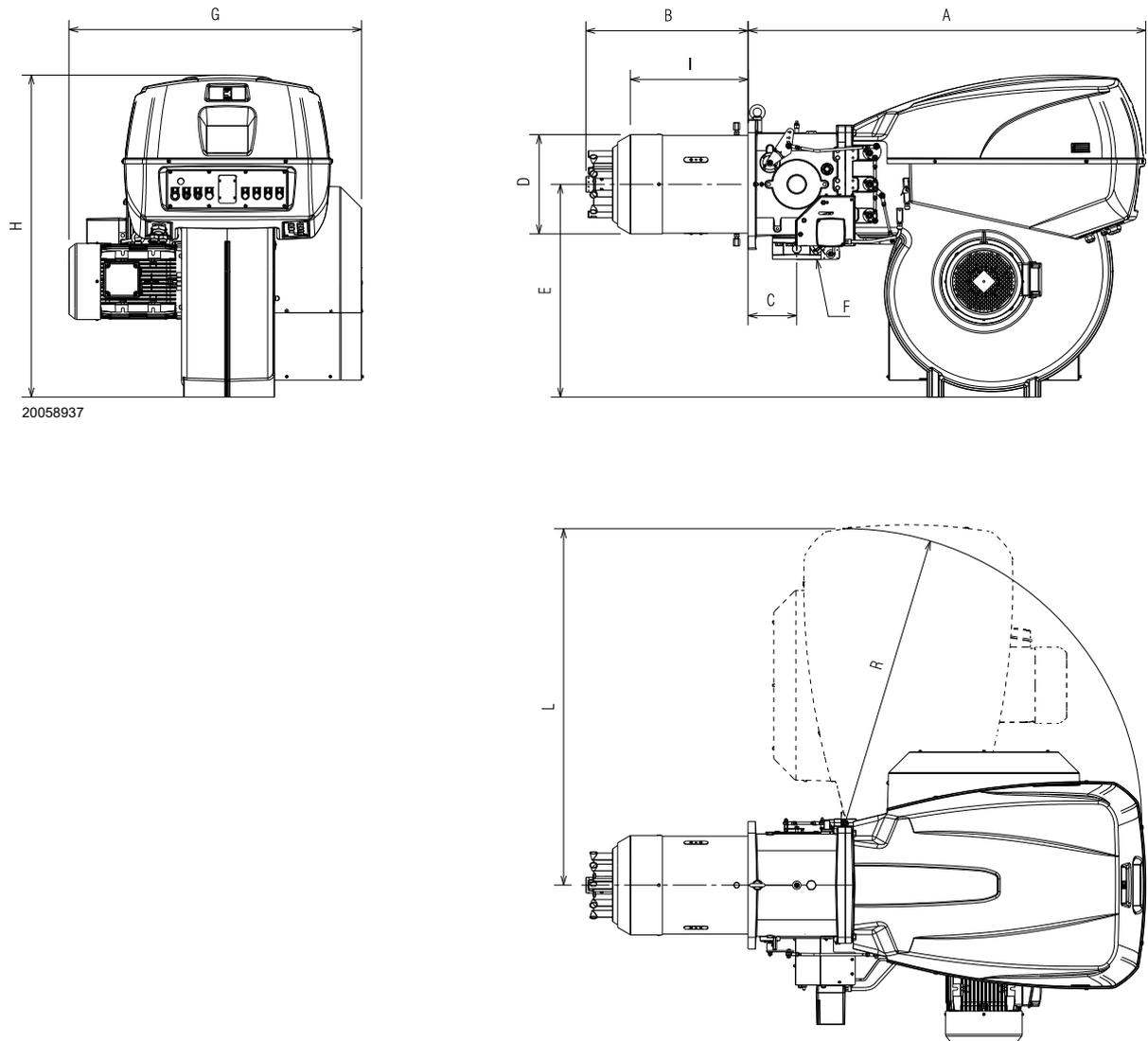
Tab. D

4.6 Maximum dimensions

The maximum dimensions of the burner are shown in Fig. 1. Bear in mind that inspection of the combustion head requires the burner to be opened and the rear part turned on the hinge.

The maximum dimensions of the open burner are indicated by the L and R positions.

The I position is reference for the refractory thickness of the boiler door.



20058937

Fig. 1

mm	A	B	C	D	E	F	G	H	I	L	R
RS 1000/M BLU	1637	669	200	413	885	DN80	1206	1338	485	1493	1350
RS 1200/M BLU	1637	670	200	456	885	DN80	1250	1338	485	1493	1350

Tab. E

4.7 Firing rates

The **MAXIMUM OUTPUT** is chosen from within the continuous diagram area (Fig. 2).

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

- RS 1000/M BLU = 4000 kW
- RS 1200/M BLU = 5500 kW



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

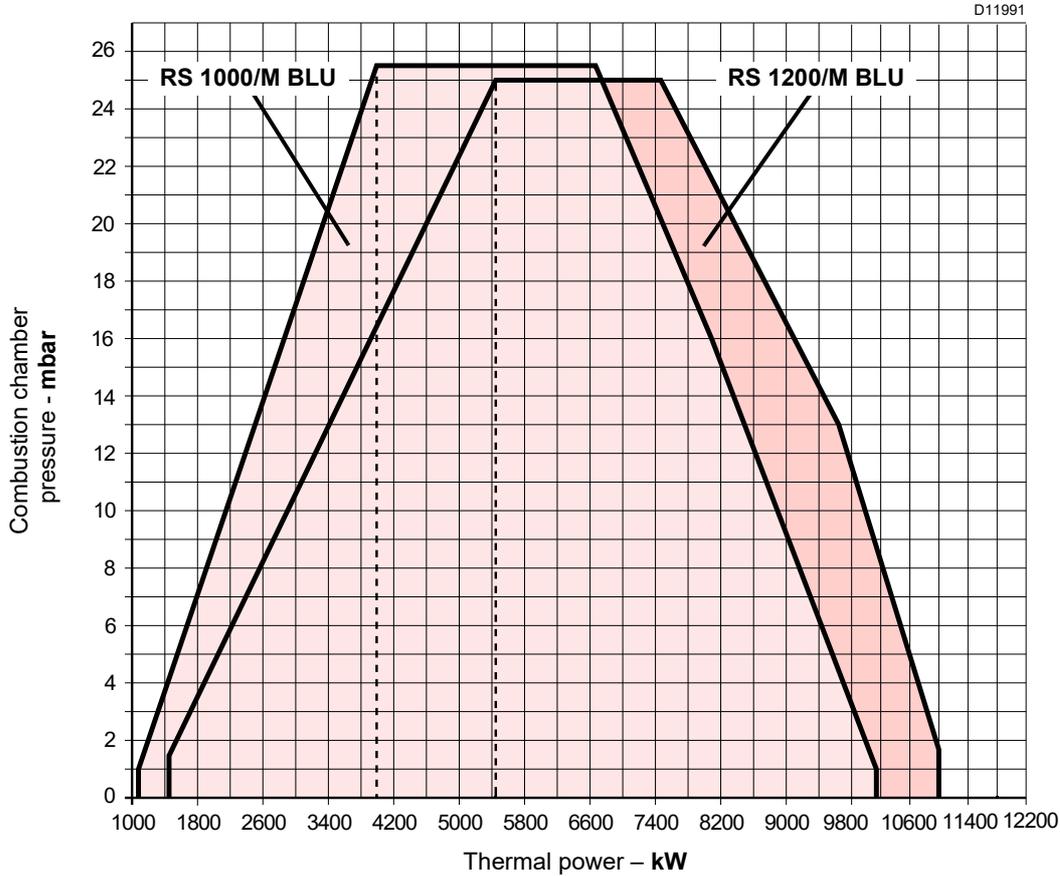


Fig. 2

4.8 Test boiler

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

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

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

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

Example:

Output 7000 kW - diameter 120 cm - length 6 m.

MODULATING RATIO

The modulating ratio, obtained in test boilers in accordance with standard EN 676, is 2.5:1.

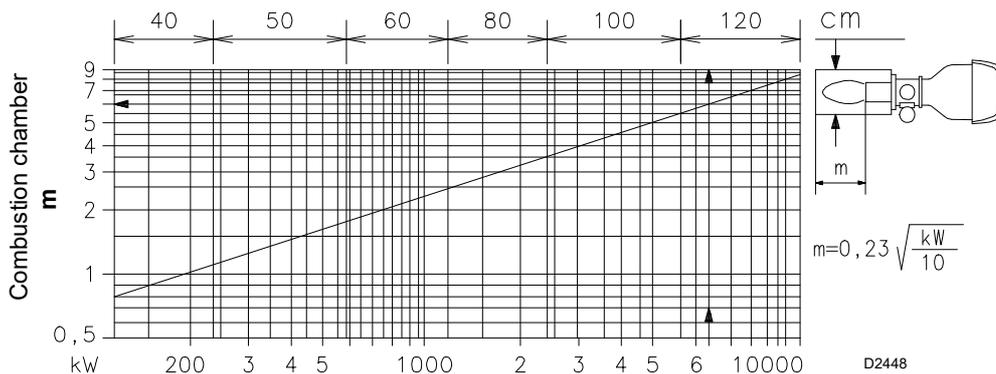


Fig. 3

4.9 Burner description

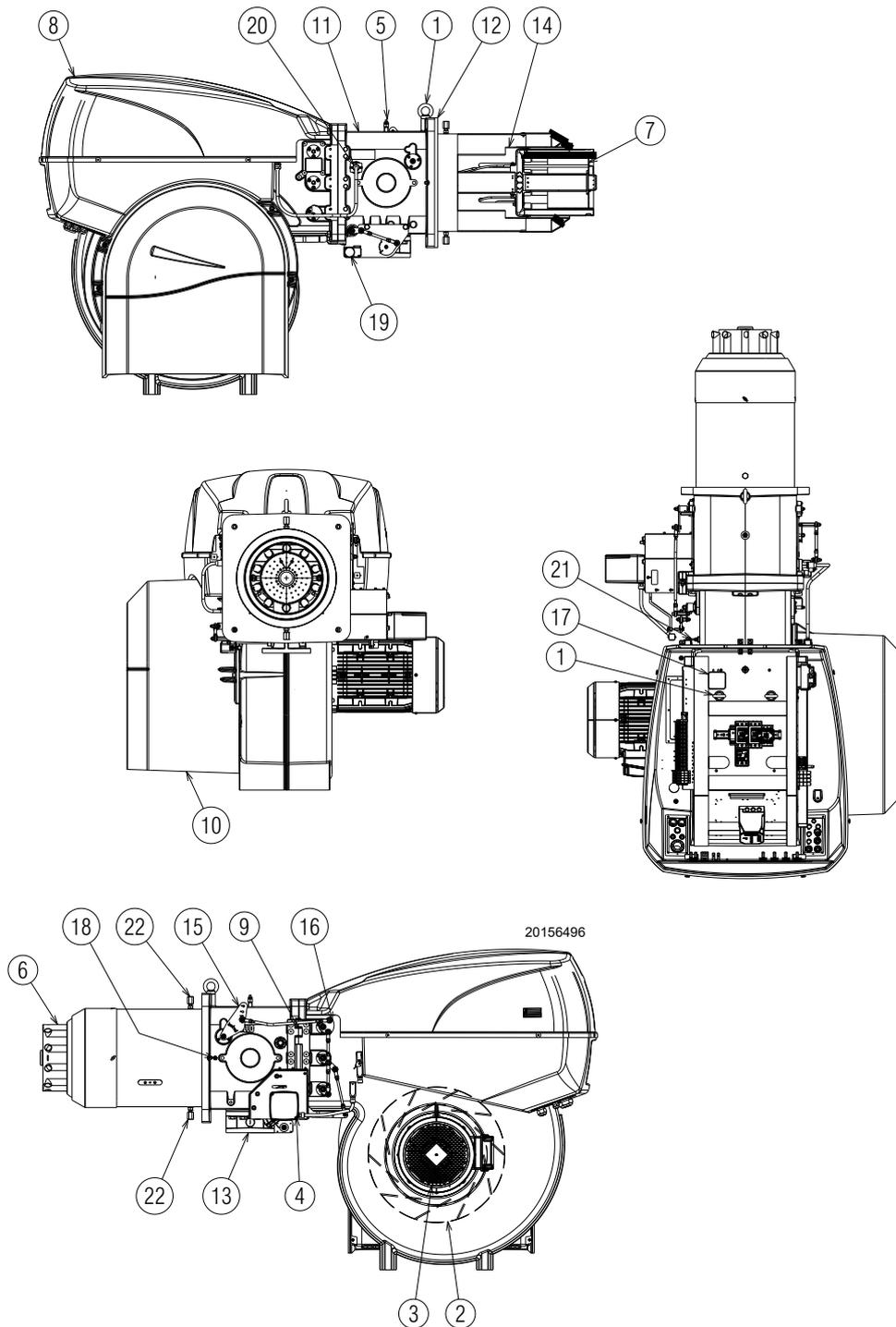


Fig. 4

- | | |
|---|---|
| <ul style="list-style-type: none"> 1 Lifting rings 2 Fan 3 Fan motor 4 Servomotor 5 Combustion head gas pressure test point 6 Combustion head 7 Flame stability disc 8 Electrical panel casing 9 Hinge for opening the burner 10 Fan air inlet 11 Pipe coupling 12 Gasket for boiler fixing 13 Gas train flange 14 Shutter 15 Combustion head movement lever | <ul style="list-style-type: none"> 16 Air damper movement leverage 17 Air pressure switch (differential operating type) 18 Combustion head air pressure test point 19 Maximum gas pressure switch with pressure test point 20 Flame sensor 21 Pressure test point for air pressure switch “+” 22 Locking screws of the shutter during the transport (replace them with the screws M12x25 supplied with the burner) |
|---|---|

4.10 Electrical panel description

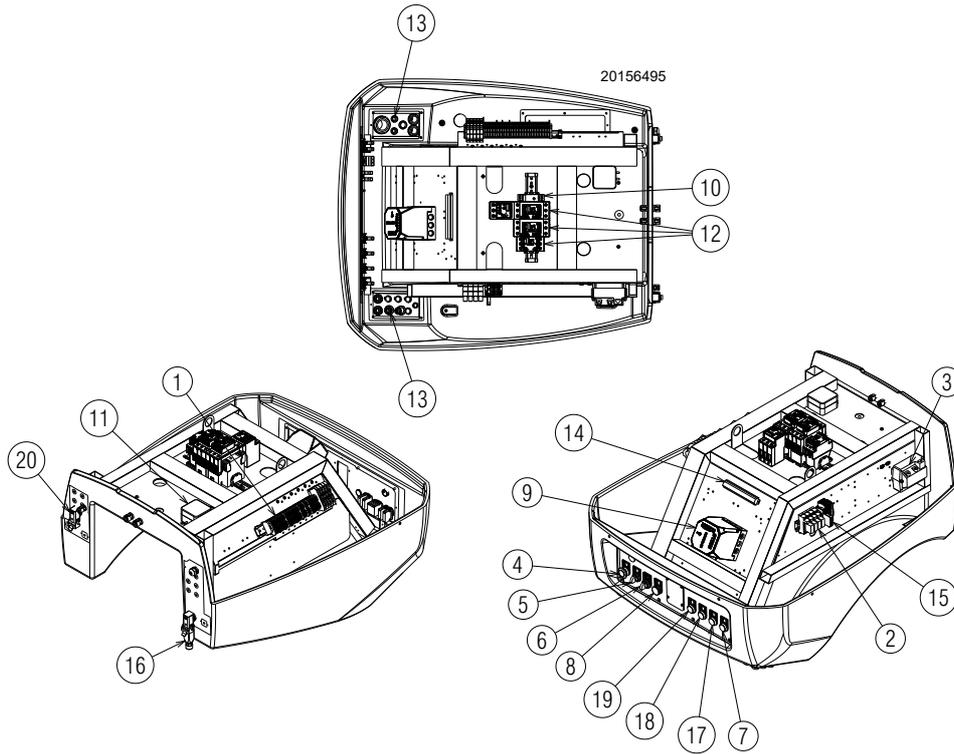


Fig. 5

- 1 Main terminal supply board
- 2 Clean contacts output relay
- 3 Ignition transformer
- 4 Stop push-button
- 5 OFF-automatic-manual selector
- 6 Power increase - power reduction selector
- 7 Light signalling of motor - fan thermal relay operation
- 8 Light signalling of burner lockout and reset switch
- 9 Electrical control box
- 10 Timer
- 11 Air pressure switch
- 12 Fan motor contactor and thermal relay, star-triangle starter
- 13 Supply cables, external connections and kits
- 14 Terminal board for kit RWF
- 15 Auxiliary circuits fuse

- 16 Plug/socket servomotor
- 17 Light signalling of main fuel valve open
- 18 Heat request light signalling
- 19 Light signalling of mains live state
- 20 Flame sensor plug/sensor socket

NOTE

Two types of burner lockout may occur:

- **Control box lockout:** if the pushbutton (**red led**) of the control box 9)(Fig. 5) and the pushbutton with light 8) light up, this indicates that the burner is in lockout. Release by pressing the pushbutton 8).
- **Motors lockout:** release by pressing the button on the relevant thermal relay.

4.11 Burner equipment

Gasket for gas train flange	No. 1
Thermal insulation screen	No. 1
Screws M12x25	No. 2
Gas flange fixing screws M16x70	No. 8
Screws M20x70 to secure the burner flange to the boiler ..	No. 4
Cable grommets kit for optional electrical wiring input. . .	No. 1
Instructions.	No. 1
Spare parts list.	No. 1

4.12 RFGO-A22 control box

Warnings



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. Riello S.p.A. cannot assume any responsibility for damage resulting from unauthorised interventions!

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

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

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



Fig. 6

Technical data

Mains voltage	AC 230 V -15 % / +10 %
Mains frequency	50 / 60 Hz
Primary fuse (external)	max. 10 A
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
Mechanical conditions	Class 1K2
Temperature range	Class 1M2
Humidity	-40...+60 °C < 95 % r.h. (without condensing)

Tab. F

Mechanical structure

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

The electronic flame signal amplifier is integrated into the control box.

4.13 Servomotor (SQM10.1....)

Warnings



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.
- During the assembly of the servomotor and the connection of the damper, the gears can be disengaged by means of a lever, allowing the drive shaft to be easily adjusted in both rotation directions.



Fig. 7

Technical data

Operating voltage	AC 220...240V, 50 Hz -15 % / +10 % AC 220 V, 60 Hz -15 % / +10 %
Auxiliary and limit switches switching capacity	10 (3) A, AC 24...250 V
Angular positioning	up to 160 ° (base scale)
Assembly position	optional
Protection level	IP 54, DIN 40050
Safety class	GB
Weight	approx. 1.7 kg
Actuator motor	synchronous motor
Power absorption	9 VA
Environmental conditions:	
Operation	DIN EN 60 721-3-1
Climatic conditions	Class 1K3
Mechanical conditions	Class 1M2
Temperature range	-20...+70°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 will be installed, and arranging the correct lighting of the environment, proceed with the installation operations.



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



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



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

5.2 Handling

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



The handling operations for the burner can be highly dangerous if not carried out with the greatest attention: keep any unauthorised people at a distance; check the integrity and suitability of the available means of handling. Check also that the area in which you are working is empty and that there is an adequate escape area (i.e. a free, safe area to which you can quickly move if the burner should fall). When handling, keep the load at not 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.

RBL	A	B	C
D	E		F
GAS-KAASU	<input checked="" type="checkbox"/>	G	H
GAZ-AERIO		G	H
I			RIELLO SpA 1-37045 Legnago (VR)
			CE

D10411

Fig. 8

Checking the characteristics of the burner

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

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



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

5.4 Operating position



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



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

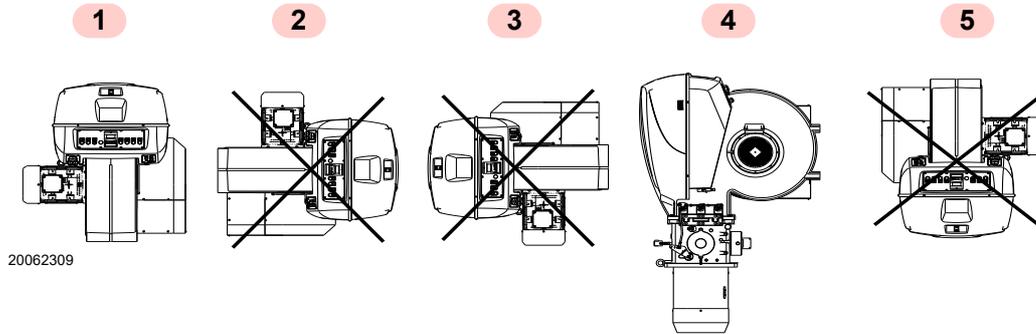


Fig. 9

5.5 Removal of the locking screws from the shutter



Remove the screws and the nuts 1)- 2)(Fig. 10), before installing the burner on the boiler.

Replace them with the screws 3) M12x25 supplied with the burner.

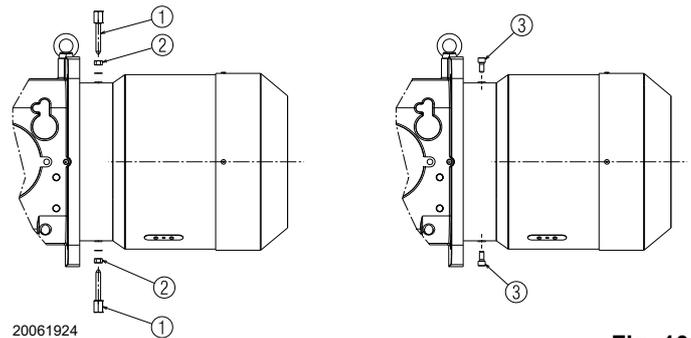


Fig. 10

5.6 Preparing the boiler

5.6.1 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.

5.6.2 Blast tube length

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

For boilers with front flue passes 1)(Fig. 12) or flame inversion chamber, a protection in refractory material 5) must be inserted between the boiler fettling 2) and the blast tube 4).

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

For boilers with a water-cooled frontpiece, a refractory lining 2)-5)(Fig. 12) is not necessary, unless expressly requested by the boiler manufacturer.

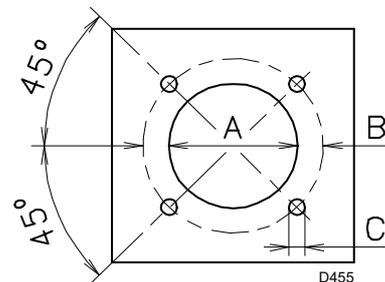


Fig. 11

mm	A	B	C
RS 1000/M BLU	460	608	M 20
RS 1200/M BLU	500	608	M 20

Tab. H

5.7 Securing the burner to the boiler



Prepare a suitable lifting system using rings 3)(Fig. 12).



WARNING

The seal between burner and boiler must be airtight.

- Insert the thermal protection supplied with the blast tube 4).
- Insert the entire burner on the boiler hole, previously fitted, as in Fig. 11, and fix it with the screws supplied.

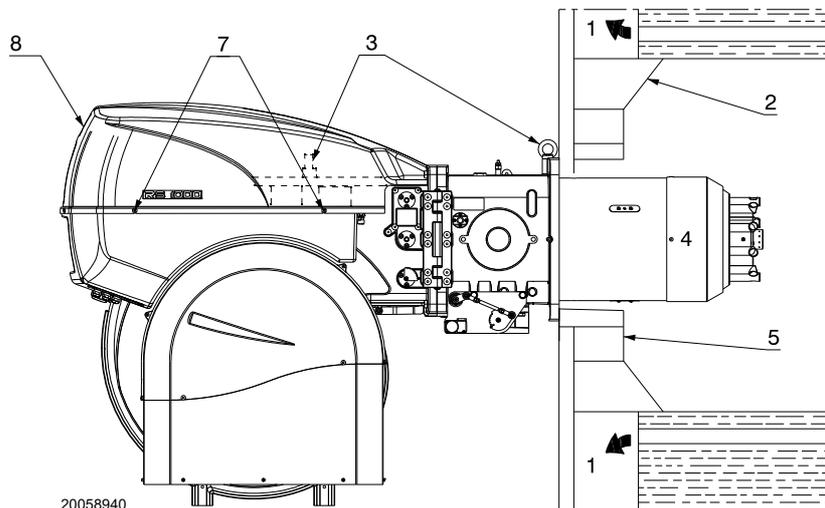


Fig. 12

5.8 Access to head internal part

In order to reach inside the combustion head (Fig. 13) proceed as follows:

- disconnect the electrical wiring from the servomotor;
- disconnect the leverage 3) of the cam and movement of the head 12);
- unscrew the 4 fixing screws 1) and open the burner on the hinge;
- disconnect the cables 14) from the electrodes 2);
- remove the screw/gas pressure socket 6) of the head;
- pull out the inner part of the head 5).

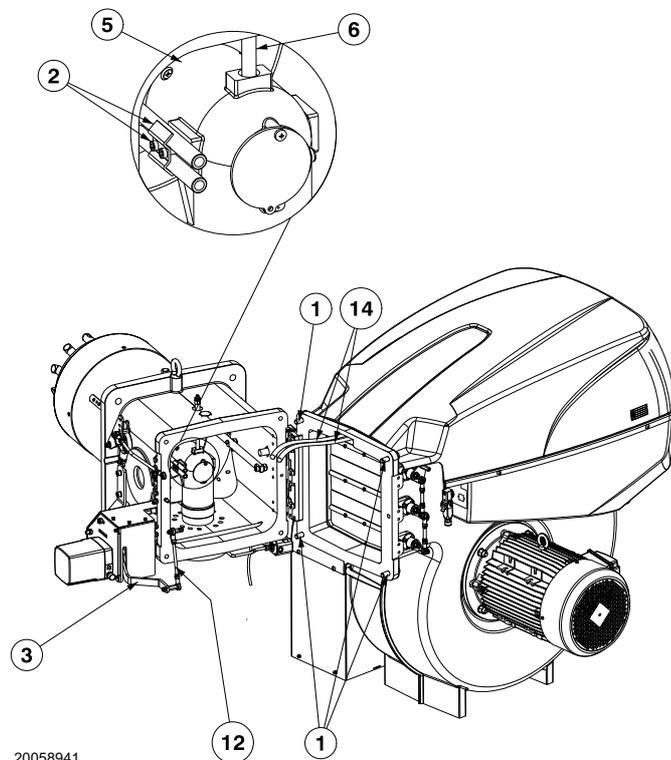


Fig. 13

5.9 Electrodes adjustment



Position the electrodes according to the dimensions shown in Fig. 14.

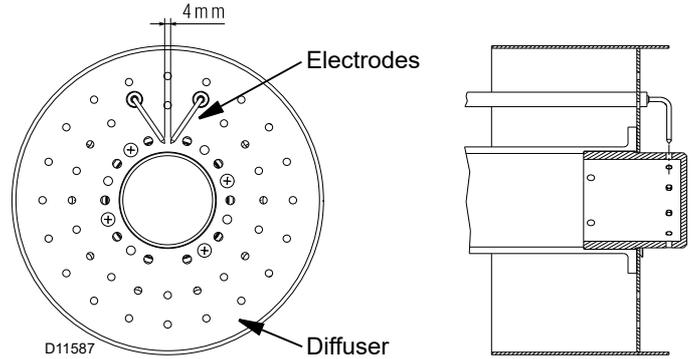


Fig. 14

5.10 Combustion head adjustment

The air damper servomotor 4)(Fig. 4), beyond varying the air output according to the output demand, through a leverage varies the combustion head adjustment.

This system allows an optimum adjustment also at minimum firing rate. Similarly to servomotor rotation, it is possible to vary the opening of the combustion head moving the tie-rod on the holes (5-6-7-8-10)(Fig. 15).

The selection of the hole to be used is determined based on the maximum output requested, as illustrated in Tab. I.

In the factory, the adjustment is adjusted for the maximum stroke (hole 10, Fig. 15).

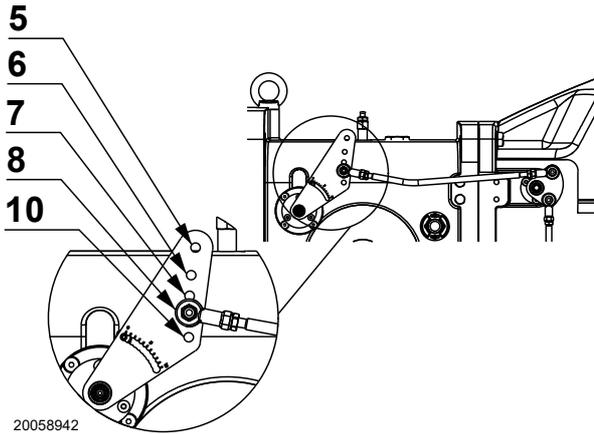


Fig. 15

Leverage hole **Output (kW)**

		From	A
RS 1000	5	1100	4000
	5	4000	6600
	6	6600	8100
	8	8100	10100
RS 1200	5	1500	5500
	6	5500	7500
	8	7500	9650
	10	9650	11100

Tab. I



The gas pipes leave the factory calibrated at notch 1.

The adjustment shown in Fig. 16 allows the gas pipes to be positioned in the best way for the application on which the burner is installed (e.g. boilers with flame inversion chamber).

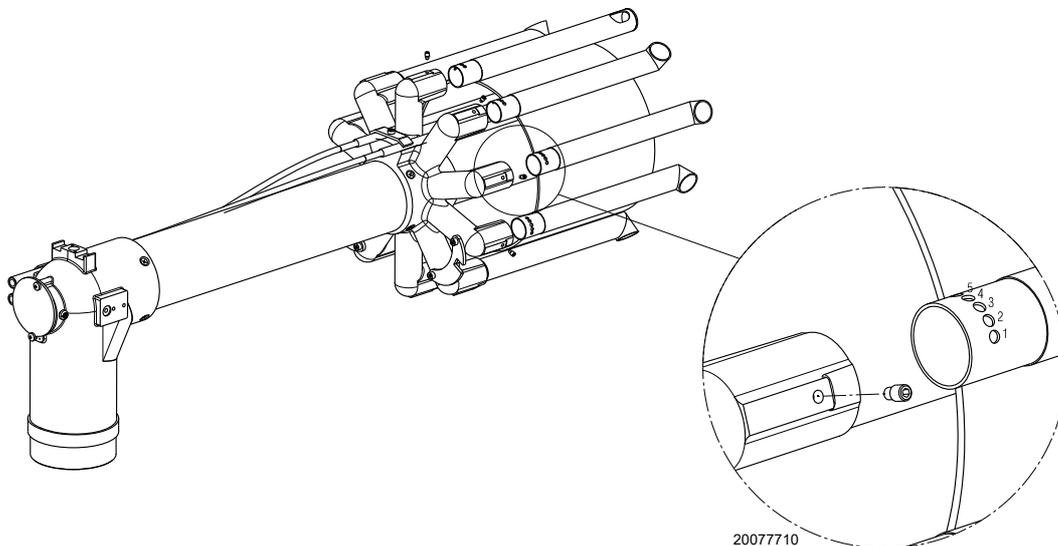


Fig. 16

5.11 Gas feeding



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

Precautions: avoid knocking, attrition, sparks and heat.

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



WARNING

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

5.11.1 Gas feeding line

Key (Fig. 17 - Fig. 18 - Fig. 19 - Fig. 20)

- 1 Gas input pipe
- 2 Manual valve
- 3 Vibration damping joint
- 4 Pressure gauge with pushbutton cock
- 5 Filter
- 6A Includes:
 - filter
 - working valve
 - safety valve
 - pressure adjuster
- 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 device, supplied as an accessory or incorporated, based on the gas train code. In compliance with the EN 676 standard, the leak detection control is compulsory for burners with maximum outputs over 1200 kW.
- 9 Gasket
- 10 Pressure adjuster
- 11 Train-burner adaptor, supplied separately
- P2 Upstream pressure of valves/adjuster
- P3 Upstream pressure of the filter
- L Gas train supplied separately
- L1 The responsibility of the installer

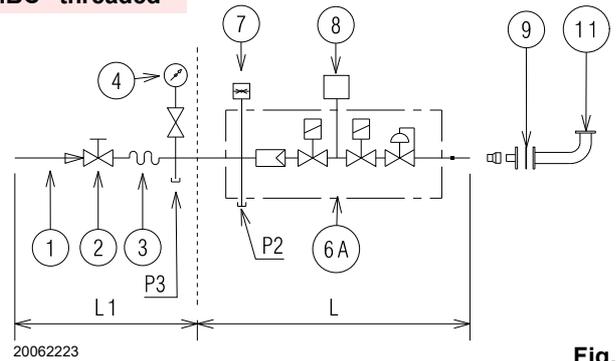


WARNING

For applications according to the Pressure Equipment Directive PED 2014/68/EU, the installer is required to provide:

- suitable means for draining and venting as defined in clause K.10 of DIN EN 676;
- valve proving system as defined in clause K.14.4 of DIN EN 676.

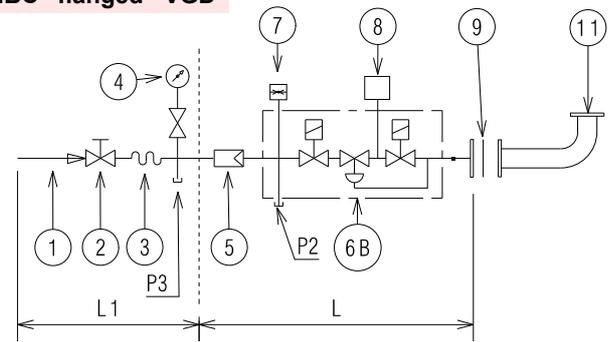
MBC "threaded"



20062223

Fig. 17

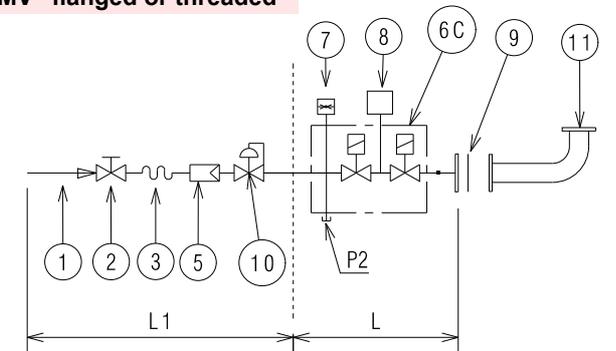
MBC "flanged"-VGD



20062225

Fig. 18

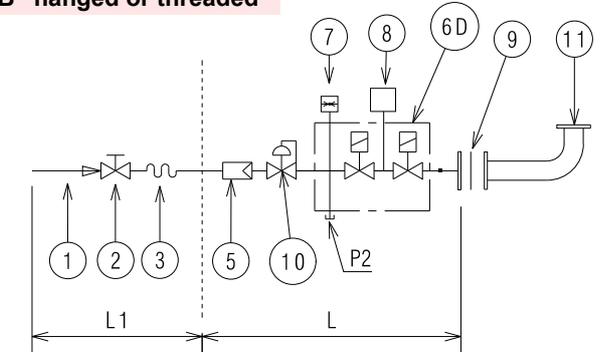
DMV "flanged or threaded"



20062227

Fig. 19

CB "flanged or threaded"



20062228

Fig. 20

5.11.2 Gas train

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

5.11.3 Gas train installation



Disconnect the electrical supply by means of the system's main switch.



Make sure 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 gas train is prearranged to be connected to the burner with the flange 1)(Fig. 21).

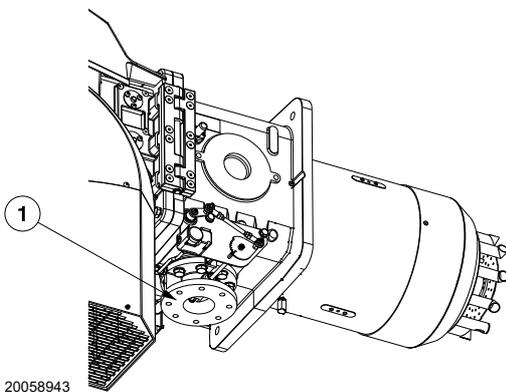


Fig. 21



The heat output and gas pressure data in the head refer to operation with gas butterfly valve fully open (90°).

5.11.4 Gas pressure

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

	kW	1 Δp (mbar)		2 Δp (mbar)	
		G 20	G 25	G 20	G 25
RS 1000/M BLU	4000	9.9	14.4	1.2	1.7
	4500	13.0	18.8	1.5	2.2
	5000	16.0	23.2	1.8	2.7
	5500	19.1	27.6	2.2	3.3
	6000	22.1	32.0	2.6	3.9
	6500	25.2	36.3	3.1	4.6
	7000	28.9	41.6	3.6	5.3
	7500	32.9	47.2	4.1	6.1
	8000	36.9	52.7	4.7	7.0
	8500	41.5	59.4	5.3	7.9
	9000	46.4	66.3	5.9	8.8
RS 1200/M BLU	9500	51.2	73.3	6.6	9.8
	10000	56.0	80.2	7.3	10.9
	10100	57.0	81.6	7.5	11.1
	5500	18.2	26.6	2.2	3.3
	6000	22.1	32.1	2.6	3.9
	6500	26.0	37.6	3.1	4.6
	7000	29.9	43.2	3.6	5.3
	7500	33.8	48.7	4.1	6.1
	8000	38.6	55.4	4.7	7.0
	8500	43.4	62.1	5.3	7.9
	9000	48.2	68.8	6.0	8.8
9500	53.1	75.5	6.6	9.8	
10000	58.6	83.1	7.4	10.9	
10500	64.4	91.0	8.1	12.0	
11000	70.2	99.0	8.9	13.2	
11100	71.4	100.6	9.1	13.4	

Tab. J

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

Pressure drop on combustion head.

Gas pressure measured at the test point 1)(Fig. 22), with:

- combustion chamber at 0 mbar;
- burner working at maximum modulating output;
- combustion head adjusted as in page 18.

Column 2

Pressure loss at gas butterfly valve 2)(Fig. 22) 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. 22).
- Find, in the table Tab. J related to the burner concerned, the pressure value closest to the result of the subtraction.
- Read off the corresponding output on the left.

Example RS 1000/M BLU with natural gas G20:

Maximum modulating output operation

Gas pressure at test point 1)(Fig. 22) = 41.9 mbar

Pressure in combustion chamber = 5 mbar

41.9 - 5 = 36.9 mbar

A pressure of 36.9 mbar, column 1, corresponds in the table Tab. J to an output of 8000 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. 22), set the maximum modulating output required from the burner operation:

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

Example RS 1000/M BLU with natural gas G20:

Maximum modulating output operation

Gas pressure at an output of 8000 kW = 36.9 mbar

Pressure in combustion chamber = 5 mbar

36.9 + 5 = 41.9 mbar

Pressure required at test point 1)(Fig. 22).

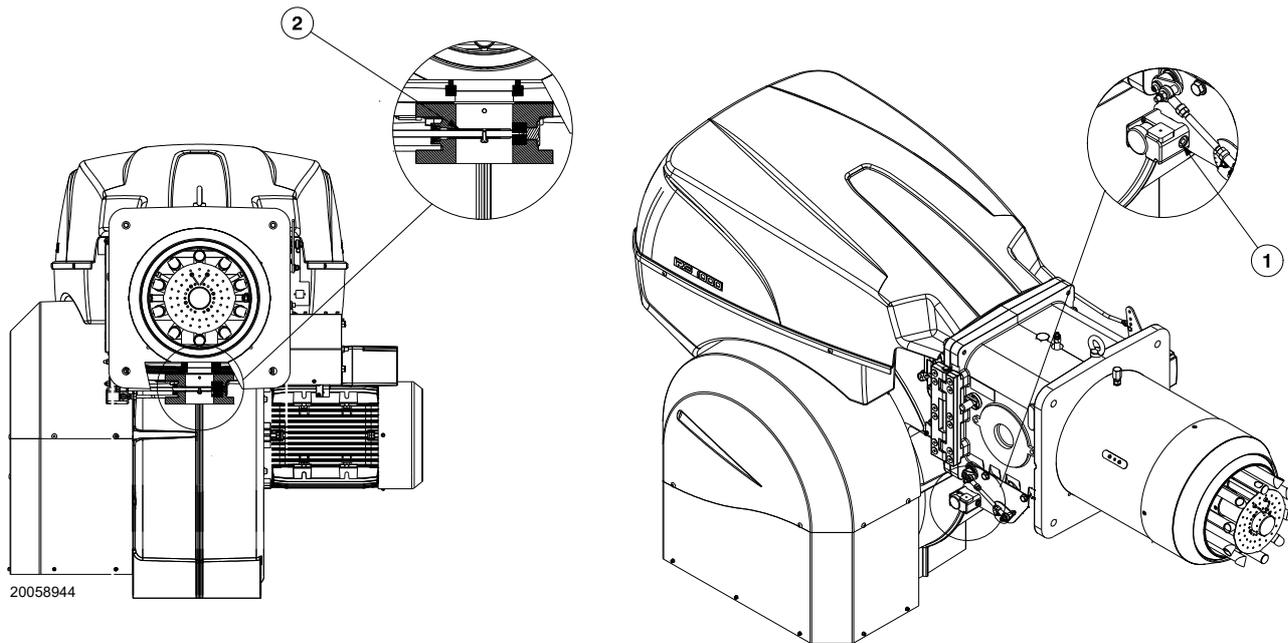


Fig. 22

5.12 Electrical wiring

Notes on safety for the electrical wiring



- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be 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 set for intermittent operation (FS1), however with the only use of the electrode for the flame detection (ionization), the burner can also operate FS2.
- 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 input power of the device, as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for the input power of the device.
- For the main power supply of the device from the electricity mains:
 - do not use adapters, multiple sockets or extensions;
 - use an omnipolar switch, in compliance with the current safety standards.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.

Before carrying out any maintenance, cleaning or checking operations:



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



Close the fuel interception tap.



Avoid condensate, ice and water leaks from forming.

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

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

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. 23.



To guarantee the protection level of the burner, it is necessary to close any holes that are still free, using the plugs supplied.

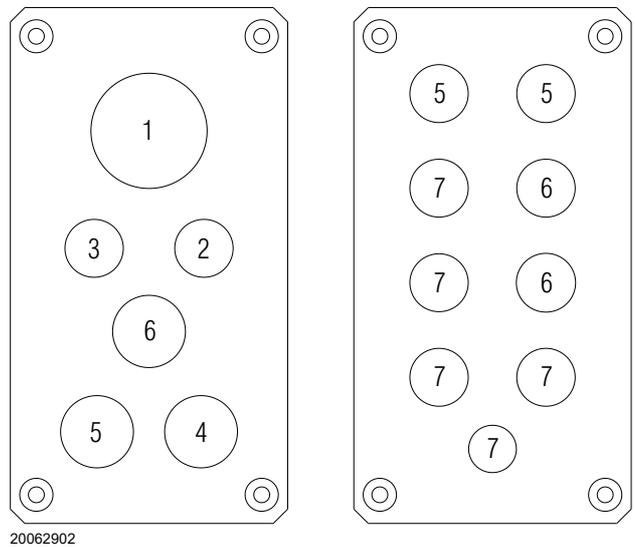


Fig. 23

Key (Fig. 23)

- 1 Electrical supply
- 2 minimum gas pressure switch
- 3 Pressure switch for VPS gas valve leak detection
- 4 Gas train
- 5 Consents/Safety
- 6 Available
- 7 Plug



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

5.13 Calibration of the thermal relay

The thermal relay (Fig. 24) 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 in charge of the installer).

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

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

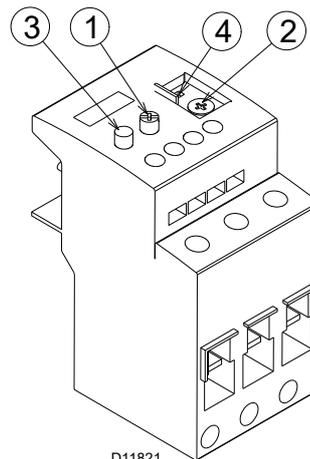
Insert a screwdriver in the window "TEST/TRIP" 4) and move it in the arrow direction (to the right) to carry out the thermal relay test.



WARNING

The automatic reset can be dangerous.

This operation is not foreseen in the burner operation.



D11821

Fig. 24

5.14 Motor rotation

As soon as the burner starts up, go in front of the cooling fan of the fan motor and check it is rotating anticlockwise (Fig. 25).

If this is not the case:

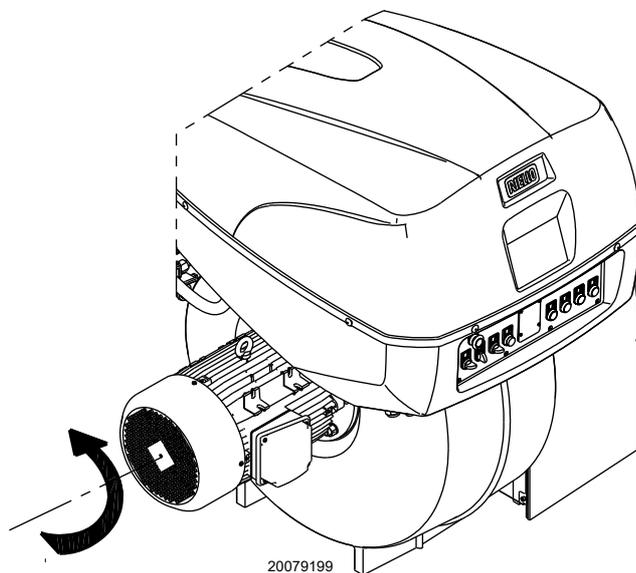
- set the burner switch to "0" (off) and wait for the control box to carry out the switch-off phase.



DANGER

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

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



20079199

Fig. 25

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.



Before igniting the burner, see the paragraph "Safety test - with gas feeding closed" on page 30.



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

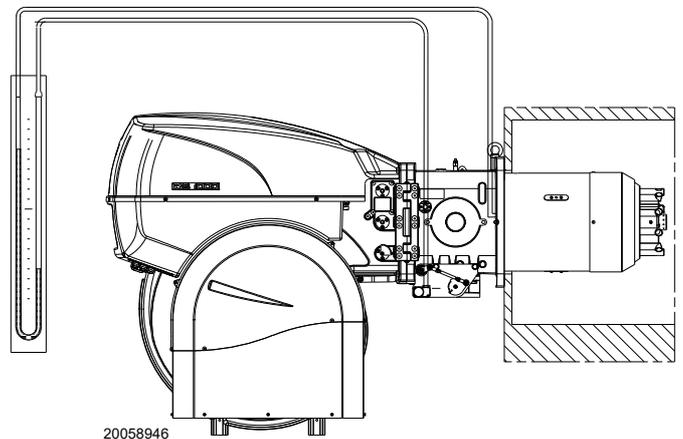
6.2 Adjustments prior to ignition

The adjustments to be carried out are:

- slowly open the manual valves situated upstream from the gas train.
- Adjust the minimum gas pressure switch (Fig. 33 on page 27) to the start of the scale.
- Adjust the maximum gas pressure switch (Fig. 32 on page 27) to the end of the scale.
- Adjust the air pressure switch (Fig. 31 on page 27) to the start of the scale.
- Purge the air from the gas line.
We recommend using a plastic tube routed outside the building and to purge air until gas is smelt.
- Fit a U-type pressure gauge or a differential pressure gauge (Fig. 26), with socket (+) on the gas pressure of the pipe coupling and (-) in the combustion chamber. Used to approximately calculate the MAX burner output.
- Connect two lamps or testers to the two gas line solenoids to check the exact moment in which voltage is supplied. This operation is unnecessary 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.



20058946

Fig. 26

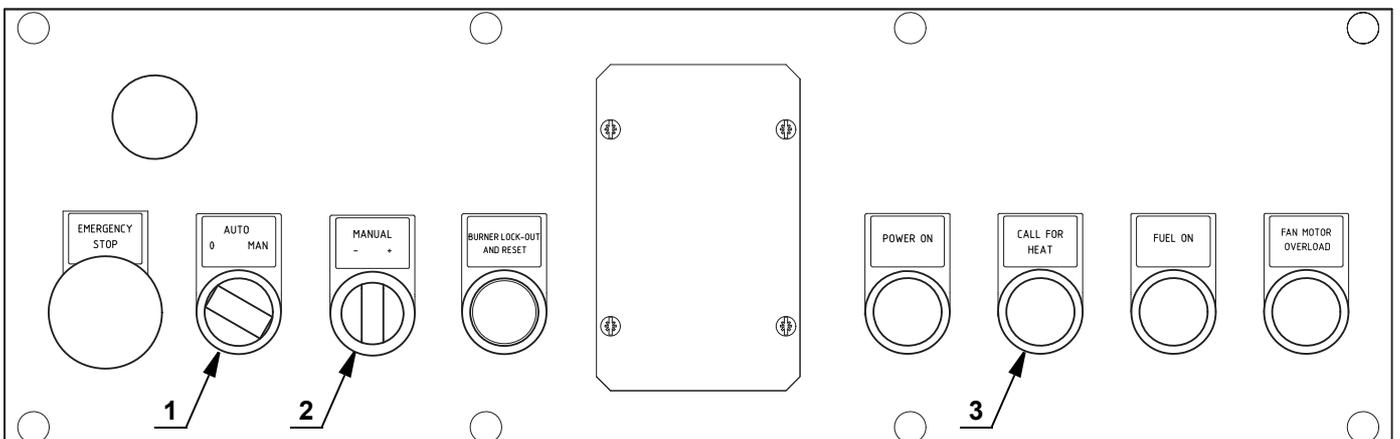
6.3 Burner start-up

Close the remote controls and position the selector 1)(Fig. 27) to "AUTO".

Make sure that the lights or testers connected to the solenoids, or the pilot lights on the solenoids themselves, indicate that no voltage is present.

If voltage is present, stop the burner immediately and check the electrical connections.

When the limit thermostat (TL) is closed, the "HEAT REQUEST" 3)(Fig. 27) signal must be on and the burner starts the starting cycle.



S8428

Fig. 27

6.4 Burner ignition

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

If ignition does not occur, it may be that the gas is not reaching the combustion head within the safety time of 3 seconds; therefore, the gas ignition delivery must be increased.

The arrival of gas at the pipe coupling is indicated by the U-type pressure gauge (Fig. 26).

If lockout of the burner occurs again, see chapter **"Problems - Causes - Remedies signalled by LED indicators"** on page 35. Once the burner has ignited, proceed with the global adjustment of the burner.

6.5 Servomotor adjustment

The servomotor (Fig. 28) adjusts simultaneously, by cross-referencing, the flow rate and pressure of the air and flow rate of the fuel in use.

It is equipped with adjustable cams which operate the same number of switches.

- Cam I:** not used
- Cam II:** limits the limit switch of the servomotor on position 0. With the burner off, the air damper is completely closed.
- Cam III:** not used
- Cam IV:** limits the limit switch of the servomotor on position max (approx. 130°).
- Cam V:** regulates the minimum modulation output; factory set at 45°.
- Remaining cam:** not used
- Lever 7:** servomotor reset

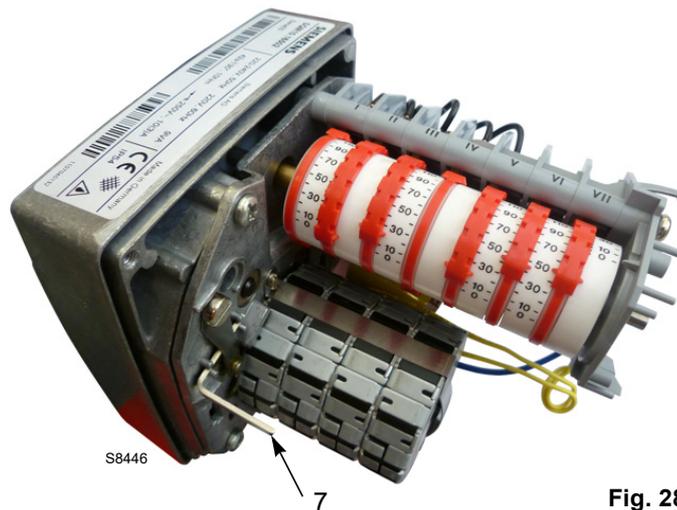


Fig. 28

6.6 Burner adjustment and output modulation

6.6.1 Maximum output

The servomotor (Fig. 28) must be adjusted to the maximum opening so that the air dampers are completely open.

6.6.2 Minimum output

The MIN output must be set within the firing rate indicated on page 10.

Turn the selector 2)(Fig. 27) "output reduction", and keep it turned to - until the servomotor has closed the air damper and the gas butterfly valve at 45° (adjustment made in the factory).

Air adjustment

The starting profile of cam 1)(Fig. 29) must be progressively adjusted by turning screws 2)(Fig. 29).

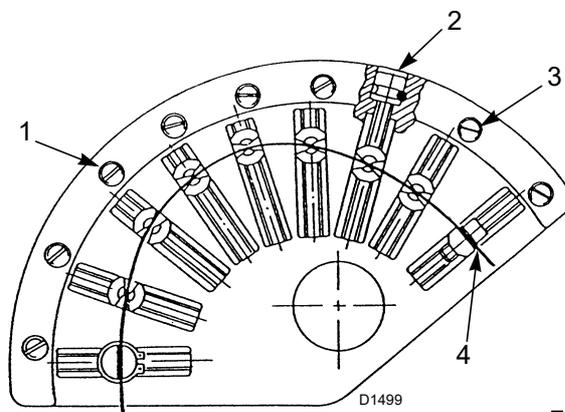


Fig. 29

- Key (Fig. 29)
- 1 Cam
 - 2 Adjustment screws
 - 3 Locking screws
 - 4 Adjustable profile



It is preferable not to turn the first screw since this is used to set the air damper to its fully closed position.

6.6.3 Intermediate outputs

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

The passage from one position to the next one is obtained by pressing the selector 2)(Fig. 27 on page 24) on the symbol + or -.

For better adjustment repeatability, take care to stop the rotation of the cam unit when the upper bearing that slides on the profile 4)(Fig. 29 on page 25) is aligned with one of the adjustment screws 2).

Screw or unscrew the preset screw 2) to increase or decrease the air output so as to adjust it to the corresponding gas output.



After output adjustment (maximum, minimum and intermediate), it is important to lock all the air adjustment screws 2) by the locking screws 3) so as to avoid possible movements from the position of air - gas calibration.

6.7 Combustion air adjustment

The air/fuel synchronisation is carried out by means of a servomotor 1)(Fig. 30) that, connected to a variable profile cam 2), operates on the delivery air dampers and, through proper leverage, on the combustion head and on the gas butterfly valve.



**WARNING!
MOVING PARTS**



**WARNING!
DANGER: CRUSHING OF LIMBS**

It is advisable, to reduce the loss and for a wide calibration field, to adjust the servomotor to the maximum of the output used, the nearest possible to the maximum opening (130°).

On the gas butterfly valve, fuel step according to the burner output required, with servomotor completely open, is carried out by the pressure stabilizer placed on the train.

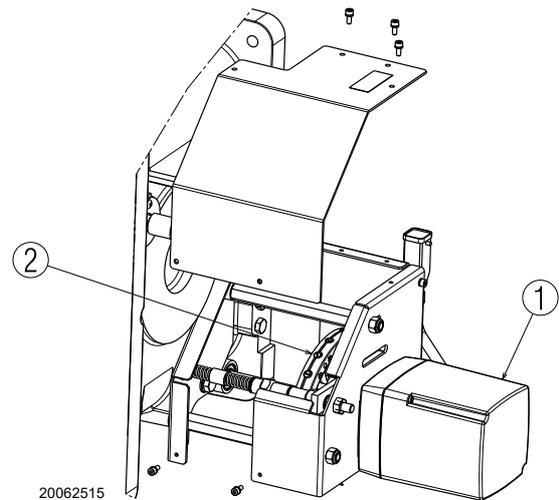


Fig. 30

The values in the Tab. K can be useful as reference for a good fuel calibration.

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

6.8 Air / fuel adjustment

During the calibration of the air / fuel ratio the following adjustments must be performed:

- **Air cam:**
turn the adjustment screws 2)(Fig. 29) after having loosened the screws 3).
- **Gas cam:**
turn the adjustment screws 2)(Fig. 29) after having loosened the screws 3).

6.8.1 Burner calibration procedure

After making a first ignition, verify the correct operation at the desired output. If this is not so, calibrate the gas cam.

With the optimal adjustment obtained, remember to lock the adjustment screws of the cam profiles by means of screws 3)(Fig. 29).



During the calibration of the cam, do not exceed the travel limits of the servomotor 0 ± 130 to avoid sticking.

Check, again with a manual operation 0-130 of the cam, there are no mechanical stops before the activation of the micro-switches 1-2 of the servomotor.

6.9 Pressure switch adjustment

6.9.1 Air pressure switch - check CO

Adjust the air pressure switch after performing all other burner adjustments with the air pressure switch set to the start of the scale (Fig. 31).

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

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

If the burner locks out again, turn the knob anticlockwise a little bit more.



WARNING

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

To check this, insert a combustion analyser into the chimney, slowly close the fan suction inlet (for example with cardboard) and check that the burner locks out, before the CO in the fumes exceeds 1%.

The air pressure switch is installed in "absolute" position, that is connected only to the pressure test point "+" 21)(Fig. 4).

6.9.2 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.

6.9.3 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. 31

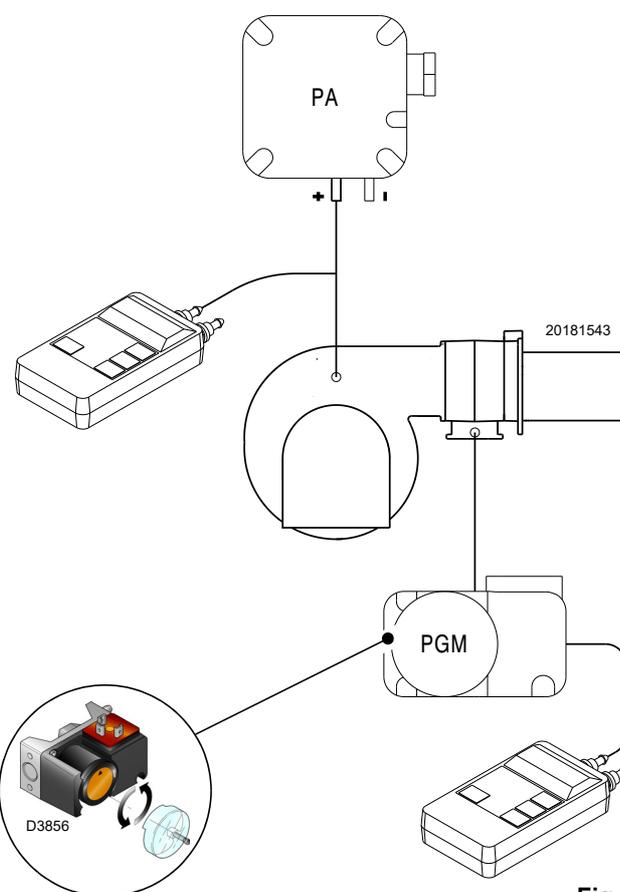


Fig. 32

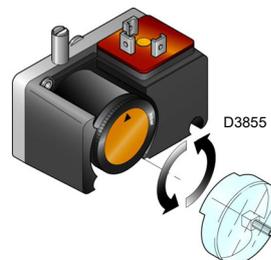


Fig. 33



1 kPa = 10 mbar

6.10 Operation sequence of the burner

6.10.1 Burner start-up

- 0s TL thermostat/pressure switch closes.
- 6s Fan motor starts up. Servomotor starts: 130 rotation to the right, until contact is made on cam 4).
- 48s The air damper is positioned to MAX output.
- 48s Pre-purging stage with MAX output air delivery. Duration 32 seconds.
- 80s The servomotor rotates to the left up to the angle set on the cam 2)(Fig. 29 on page 25).
- 112s The air damper and the gas butterfly valve adopt the MIN output position (with cam 2).
- 113s Ignition electrode strikes a spark.
- 130s The safety valve VS opens, along with the adjustment valve VR (quick opening).
The flame is ignited at a low output level, point A (Fig. 34). Output is then progressively increased, with the valve opening slowly up to MIN output, point B (Fig. 34).
- 122s The spark goes out.
- 143s The starting cycle ends.

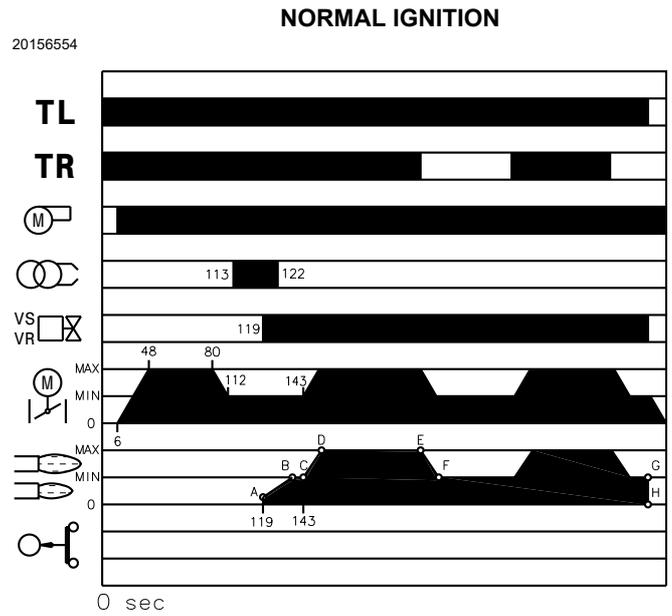


Fig. 34

6.10.2 Operation

➤ Burner without the output power regulator RWF40

Once the start-up cycle is completed, the servomotor command moves on to the TR thermostat/pressure switch that controls the pressure or the temperature in the boiler, point C (Fig. 34). (The electrical control box continues to check the presence of the flame and the correct position of the air and gas maximum pressure switches).

- If the temperature or the pressure is low so the thermostat/pressure switch TR is closed, the burner progressively increases the output up to the MAX value (section C-D).
- If subsequently the temperature or pressure increases until TR opens, the burner progressively decreases its output to the MIN. value (section E-F). The sequence repeats endlessly.
- The burner locks out when the heat request is less than the heat supplied by the burner at MIN. output, (section G-H). The TL thermostat/pressure switch opens, and the servomotor returns to angle 0 limited by the contact of the cam 2). The air damper closes completely to reduce heat losses to a minimum.

For every change of output, the servomotor will automatically change the gas flow rate (butterfly valve), the airflow (fan damper) and the air pressure (2 shutters in the combustion head).

➤ Burner with the output power regulator RWF40
See manual enclosed with the adjuster.

NO IGNITION

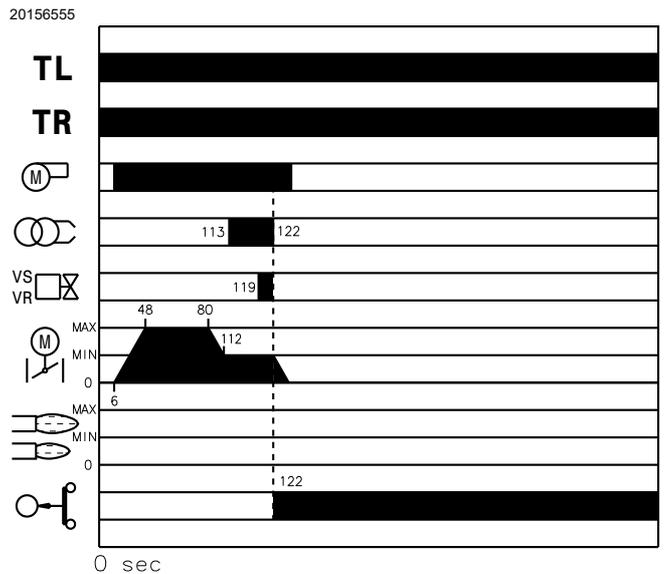


Fig. 35

6.10.3 Burner flame goes out during operation

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

6.10.4 Ignition failure

If the burner does not fire (Fig. 35), it goes into lockout within 3 sec. after the gas valve opens, 122 seconds after the control device TL closes and the pre-purging phase starts and lasts 17 seconds.

6.11 Final checks (with burner operating)

<ul style="list-style-type: none"> ➤ Open the thermostat/pressure switch TL ➤ Open the thermostat/pressure switch TS 		The burner must stop
<ul style="list-style-type: none"> ➤ Turn the gas maximum pressure switch knob to the minimum end of scale position ➤ Turn the air pressure switch to the maximum end of scale position 		The burner must stop in lockout
<ul style="list-style-type: none"> ➤ Turn off the burner and cut off the power ➤ Disconnect the minimum gas pressure switch connector 		The burner must not start
<ul style="list-style-type: none"> ➤ Disconnect electrically the sensor for the flame detection 		The burner must stop in lockout due to ignition failure

Tab. L



WARNING

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 main system switch.



Close the fuel interception tap.



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

7.2 Maintenance programme

7.2.1 Maintenance frequency



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

7.2.2 Safety test - with gas feeding closed

For its safe commissioning it is very important to make sure that the electrical wiring has been carried out correctly between the gas valves and the burner.

To this end, after checking that the connections have been made in conformity with the burner's wiring diagram, a starting cycle should be carried out with the gas tap closed (dry test).

- 1 The manual gas valve should be closed with the locking/releasing device ("lock-out / tag out" procedure).
- 2 Make sure the limit electric contacts of the burner close
- 3 Make sure the contact of the minimum gas pressure switch closes
- 4 Proceed with a tentative start up of the burner.

The starting cycle should occur with the following phases:

- Starting the fan motor for pre-purging
- Carrying out the gas valve leak detection control, if applicable
- Completing the pre-purging
- Reaching the ignition point
- Power supply of the ignition transformer
- Power supply the gas valves.

Since the gas is closed, the burner will not be able to start and its control box will stop or go into a safety lockout.

The effective supplying of the gas valves can be checked with the insertion of a tester; some valves are fitted with light signals (or closure/opening position indicators) that are activated when the electrical supply arrives.



IF THE ELECTRICAL SUPPLY OF THE GAS VALVES OCCURS AT AN UNEXPECTED MOMENT, DO NOT OPEN THE MANUAL VALVE, DISCONNECT THE ELECTRICAL SUPPLY, CHECK THE WIRING; CORRECT THE ERRORS AND CARRY OUT THE ENTIRE TEST AGAIN.

7.2.3 Checking and cleaning



The operator must use the required equipment during maintenance.

Combustion

Carry out an analysis of the combustion discharge gases. Significant differences with respect to the previous check indicate the points where more care should be exercised 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 and correctly positioned.

Burner

Check that there are not excess wear or loose screws, especially on the cam 3)(Fig. 29).

Clean the outside of the burner.

Clean and grease the adjustable profile of the cams.

Fan

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

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 33.

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.

Boiler

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

Gas leaks

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

Gas filter

Replace the gas filter when it is dirty.

Combustion

If the combustion values found at the start of the intervention do not satisfy current standards or anyway indicate a poor state of combustion (consult the table below), contact the Technical Assistance Service for 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 should be replaced at the end of their life cycle indicated in the following table.



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



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



Close the fuel interception tap.



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

- Remove the tie-rods 1) and 4)(Fig. 36) of the head movement and damper opening lever, loosening the nuts 2);
- disconnect the socket 3) of the servomotor;
- remove the screws 5).

At this point, it is possible to open the burner on the hinge.

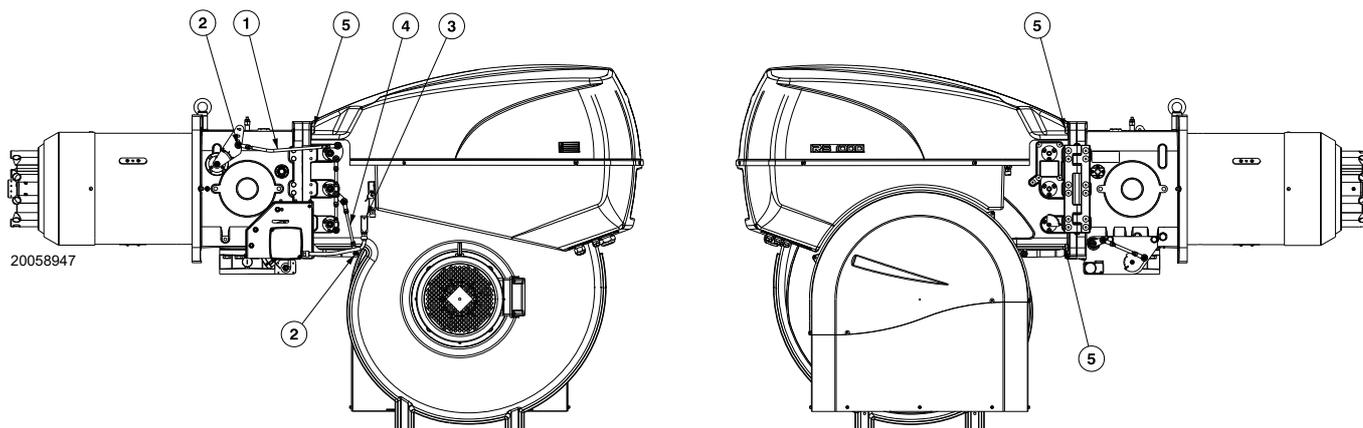


Fig. 36

7.4 Closing the burner

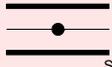
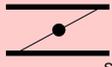
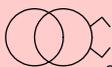
Refit following the steps described but in reverse order; refit all burner components as they were originally assembled.



Carry out all maintenance work and mount the casing again.

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	Open damper	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	Closed damper	It 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

T = Terminal

PTFI = Pilot ignition attempt

MTFI = Ignition attempt with main fuel valve

8.2 Check mode function

By the reset push button on the main panel of the control flame the check mode functions are available (prepurging, ignition, 1st safety time and 2nd safety time).

The CHECK MODE is designed to facilitate the checking of the working phase of the burner.

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;

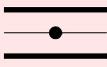
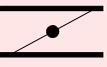
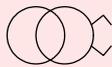
- check mode has a 2 minute timeout during the 2nd safety time. When the time out is expired, the flame control goes back to the normal operating status;
- check mode has a 2 minute timeout during the MTFI status. When the time out is expired, the flame control goes back to the normal operating status;
- 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 (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	Open damper	Closed damper	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	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 "Problems - Causes - Remedies signalled by LED indicators" on page 35.°.

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 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.

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.



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.



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.



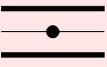
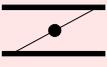
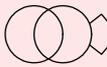
The regulation prohibits the system from allowing more than 5 remote reset attempts within a 15 minute time window.

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 2 nd 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
o. 16	No flame: 1 st 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 2 nd 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

No	Faults	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7
46	Off-specification mains voltage	•	•	•	•		•	Red
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 diagnostics fault processor	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 2 nd 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
o. 16	No flame: 1 st safety time (PTFI)	No flame at the end of the first safety time	Inspect the system, check the gas pressure, check the UV 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
20	UV: no flame at the end of the 2 nd safety time (MTFI)	No flame at the end of the 2 nd safety time	Inspect the system, check the gas pressure, check the UV 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

No	Faults	Cause	Solution
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
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

Output power regulator kit for modulating operation

With the modulating operation, the burner continually adapts the power to the request for heat, ensuring great stability for the parameter controlled: temperature or pressure.

Two components should be ordered:

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

Parameter to be checked		Probe		Output regulator	
	Adjustment field	Type	Code	Type	Code
Temperature	- 100...+ 500°C	PT 100	3010110	RWF50	20101190
Pressure	0...2.5 bar	Output probe 4...20 µA	3010213	RWF55	20101191
	0...16 bar		3010214		

Output power regulator with signal µ4-20 A, 0-10V

Two components should be ordered:

- the analogue signal converter;
- the Potentiometer

Burner	Potentiometer		Analogue Signal Converter	
	Type	Code	Type	Code
RS 1000/M BLU	ASZ...	3013532	E5202	3010390
RS 1200/M BLU				

Continuous purging kit

Burner	Code
RS 1000/M BLU RS 1200/M BLU	3010094

Soundproofing box kit

Burner	Code
RS 1000/M BLU RS 1200/M BLU	3010401

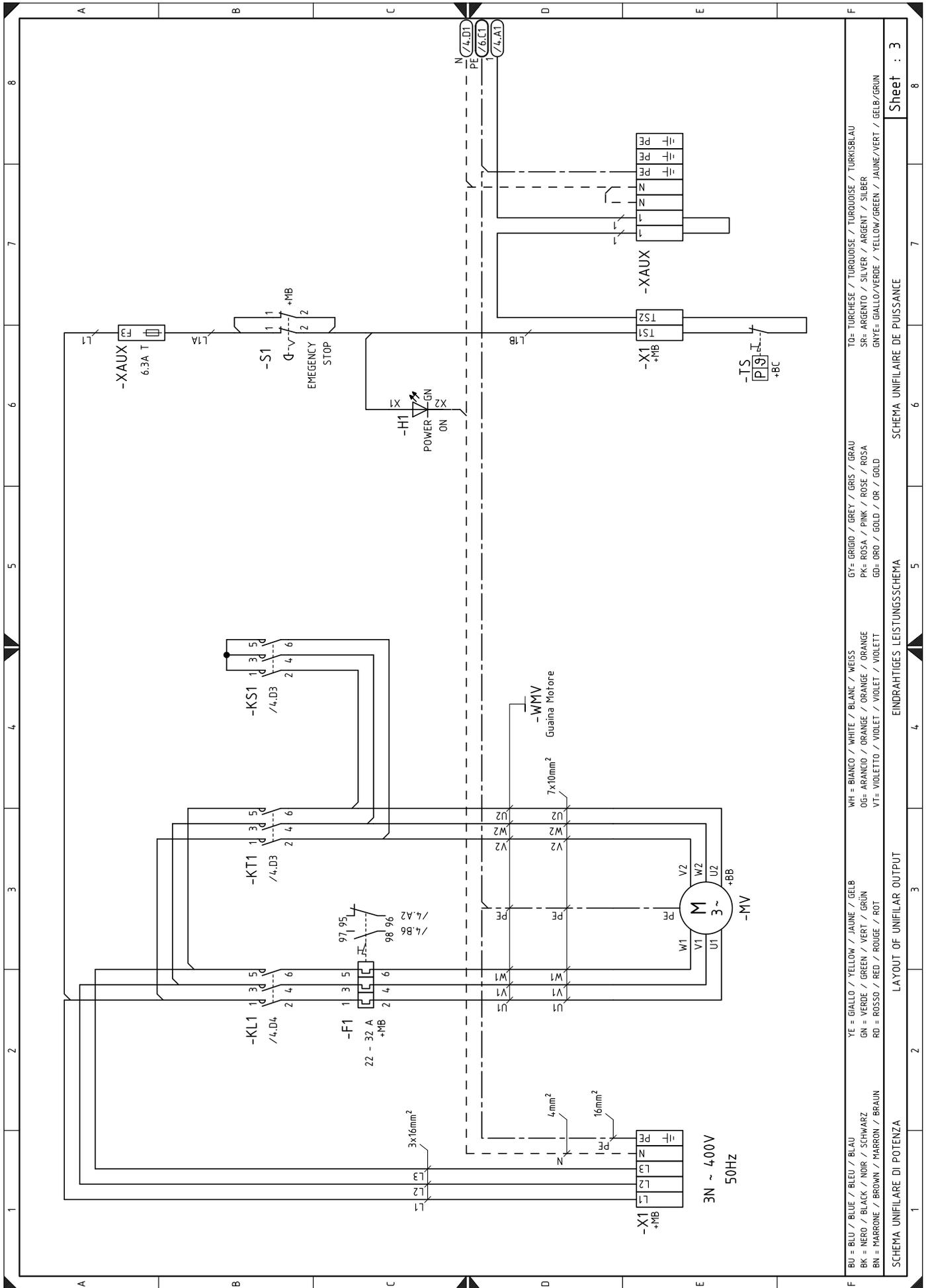
Gas trains in compliance with EN 676

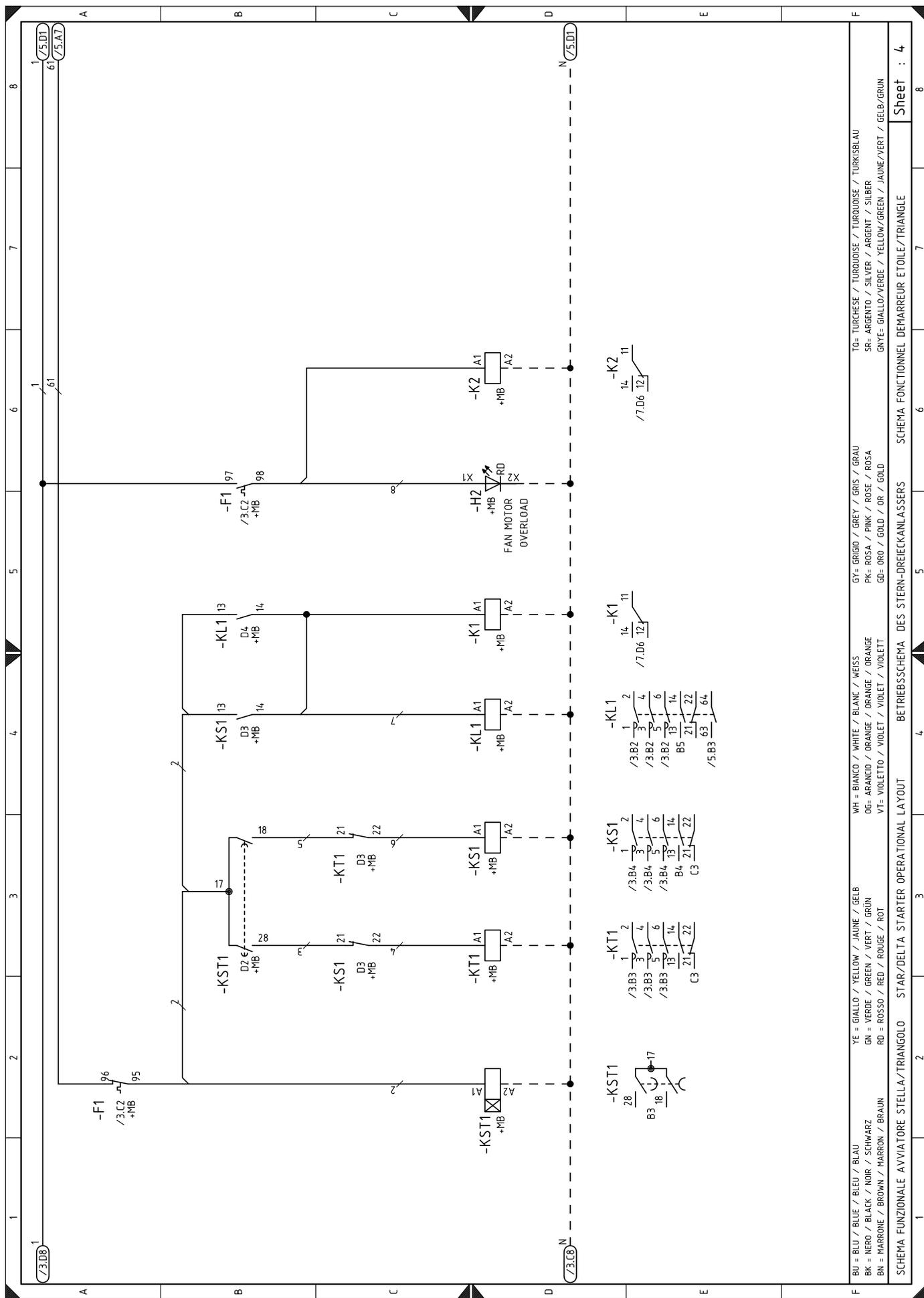
Please refer to manual.

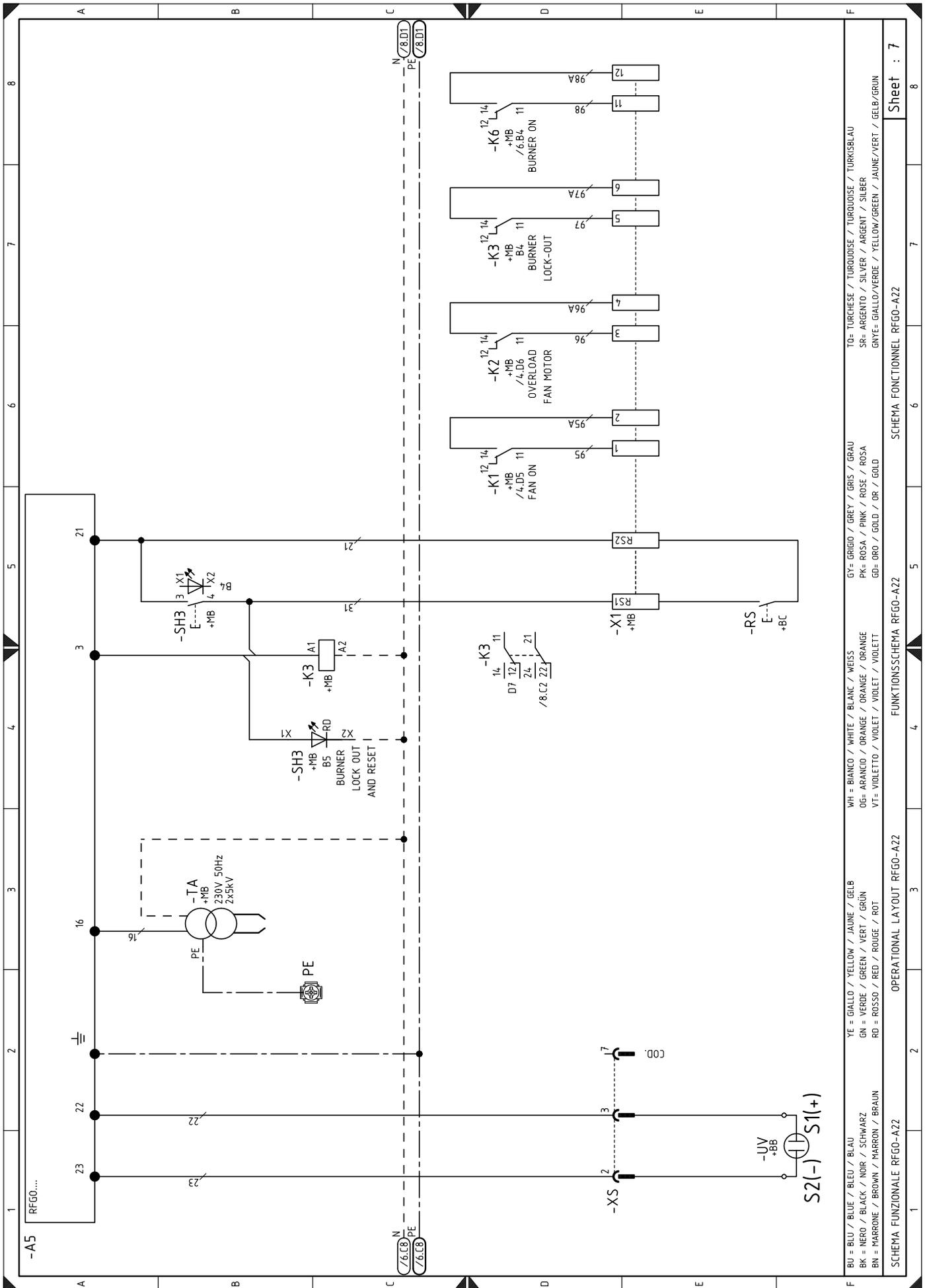
B Appendix - Electrical panel layout

1	Index of layouts
2	Indication of references
3	Single-wire output layout
4	Operational layout star/triangle starter
5	Operational layout RFGO-A22
6	Operational layout RFGO-A22
7	Operational layout RFGO-A22
8	Operational layout RFGO-A22
9	Electrical wiring kit RWF50 internal
10	Electrical connections set by installer
11	Electrical connections set by installer
12	Operational layout RWF50
13	Electrical wiring kit RWF50 external

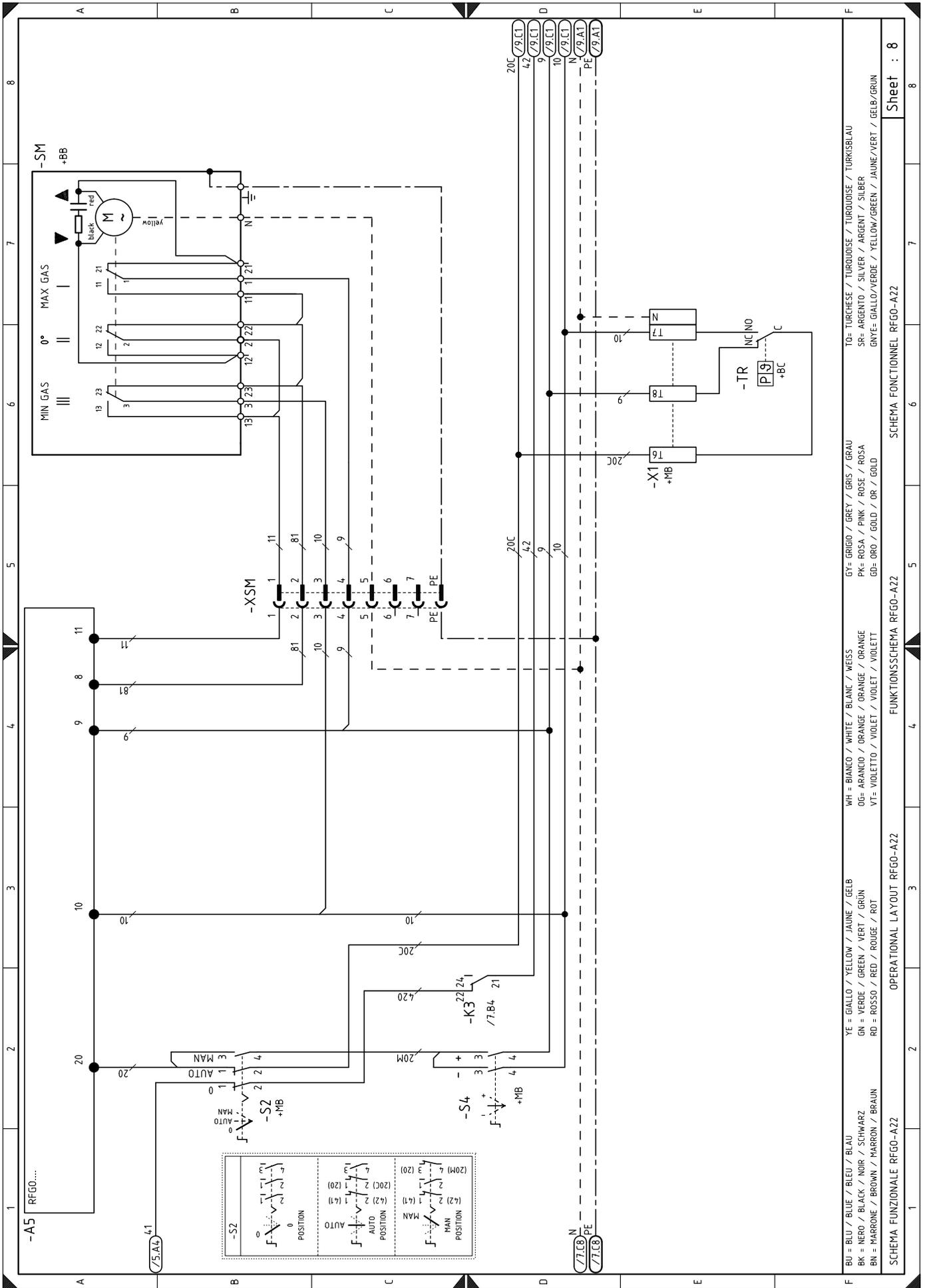
2 Indication of references

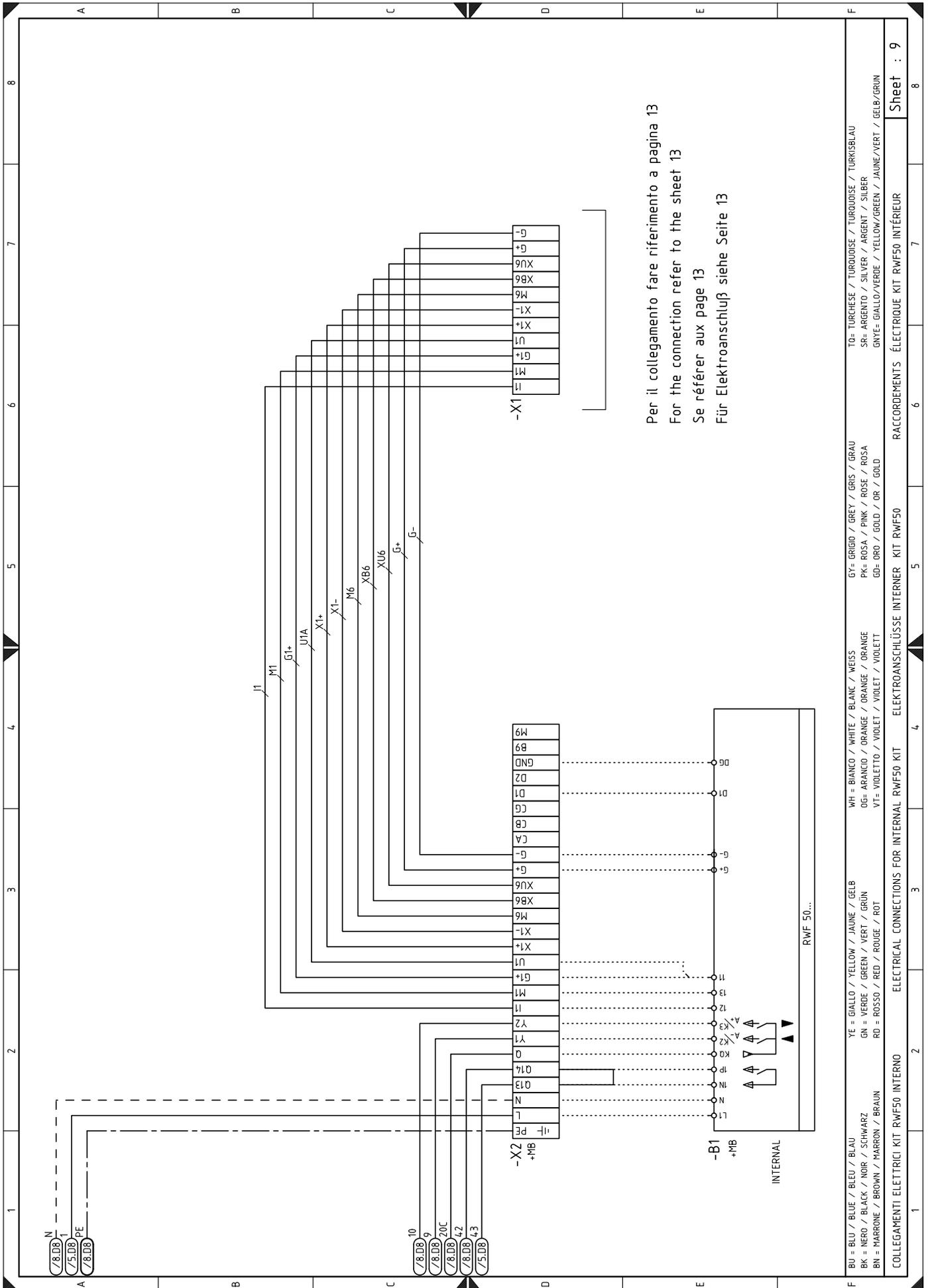




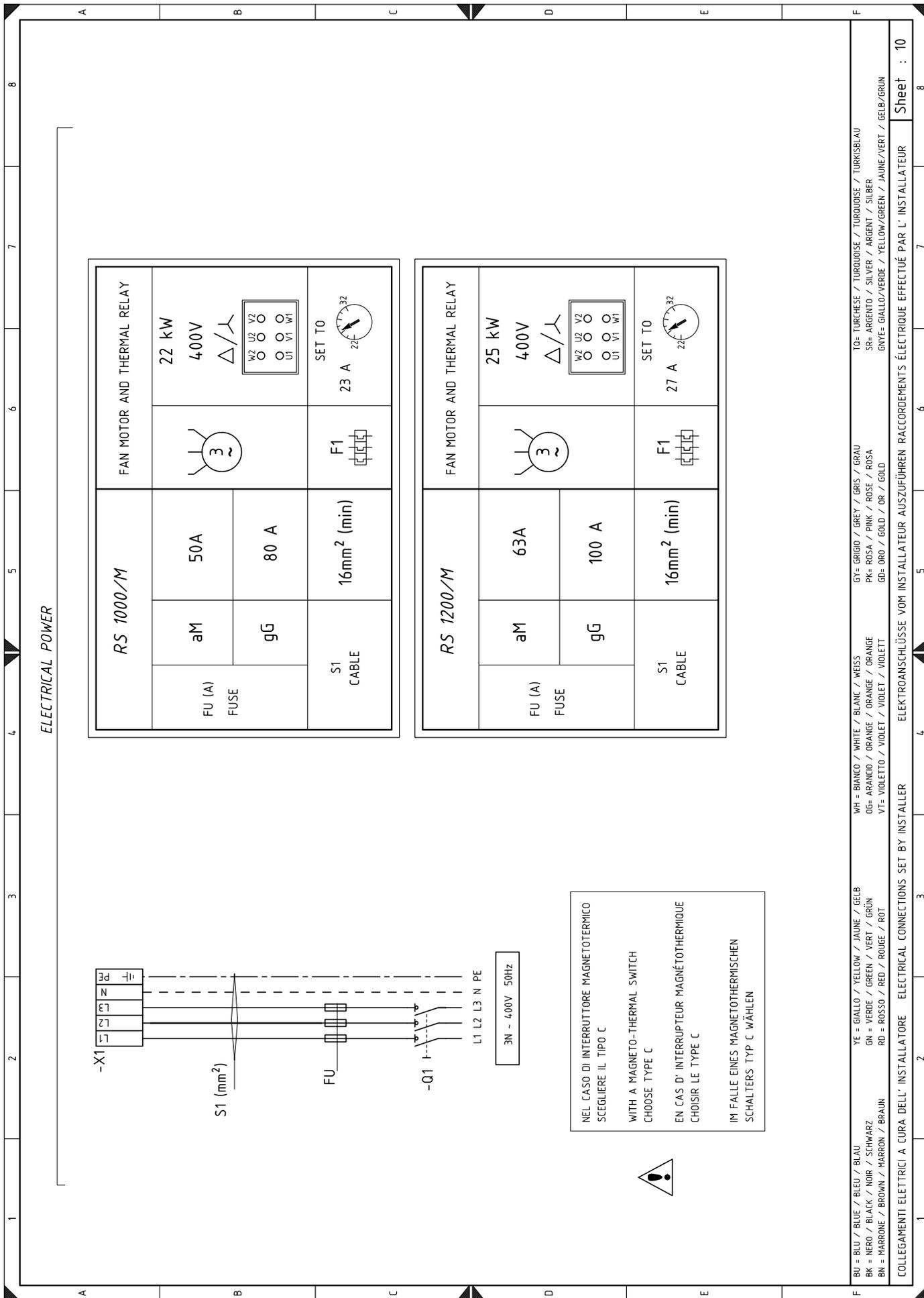


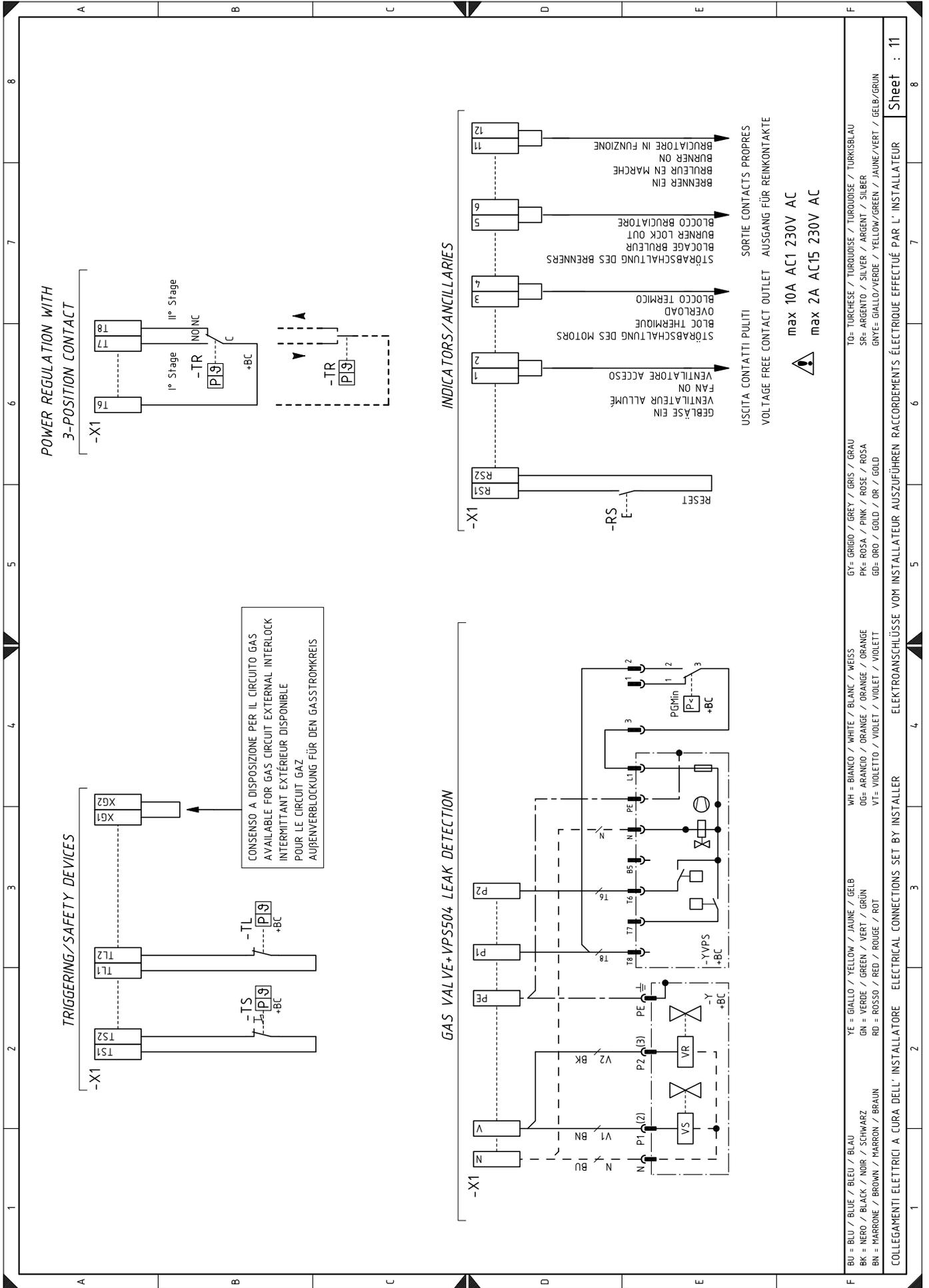
BU = BLU / BLUE / BLEU / BLAU	YE = GIALLO / YELLOW / JAUNE / GELB	WH = BIANCO / WHITE / BLANC / WEISS	GY = GRIGIO / GREY / GRIS / GRAU	TO = TURCHESE / TURQUOISE / TURKOUISE / TURKISBLAU
BK = NERO / BLACK / NOIR / SCHWARZ	GN = VERDE / GREEN / VERT / GRÜN	OG = ARANCIO / ORANGE / ORANGE / ORANGE	PK = ROSA / PINK / ROSE / ROSA	SR = ARGENTO / SILVER / ARGENT / SILBER
BN = MARRONE / BROWN / MARRON / BRAUN	RD = ROSSO / RED / ROUGE / ROT	VT = VIOLETO / VIOLET / VIOLET / VIOLETT	GD = GRG / GOLD / OR / GOLD	GNVE = GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRÜN
SCHEMA FUNZIONALE RFGO-A22				
OPERATIONAL LAYOUT RFGO-A22				
FUNKTIONSSCHEMA RFGO-A22				
SCHEMA FONCTIONNEL RFGO-A22				
				Sheet : 7

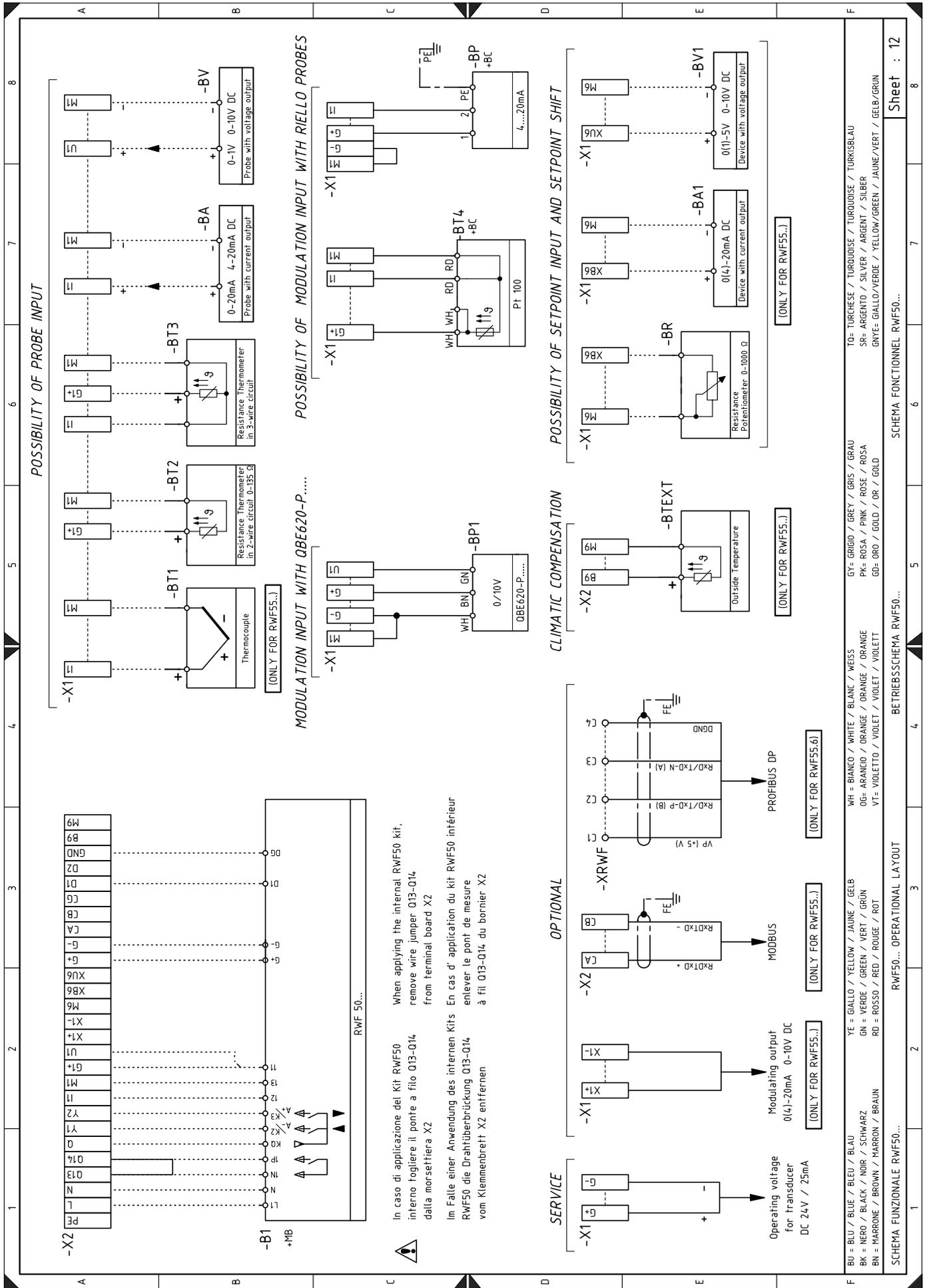


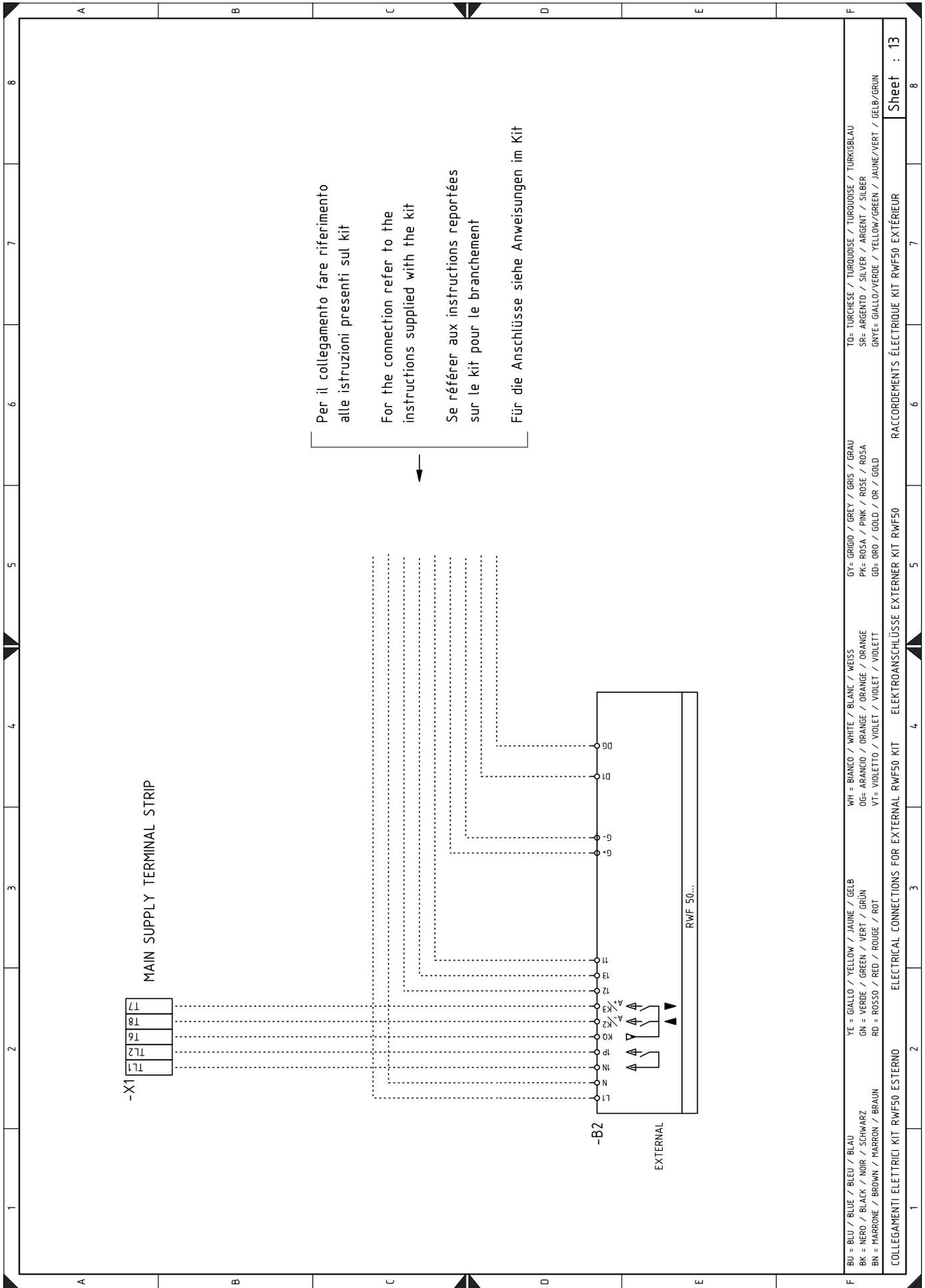


Per il collegamento fare riferimento a pagina 13
 For the connection refer to the sheet 13
 Se référer aux page 13
 Für Elektroanschluß siehe Seite 13









Wiring layout key

+BB	Burner components	XAUX	Auxiliary terminal board
+BC	Boiler components	XPGM	Maximum gas pressure switch connector
A5	Control box	XS	Flame sensors connector
B1	Output regulator RWF internal	XSM	Servomotor connector
B2	Output regulator RWF external		
BA	Output probe in current		
BA1	Output device in current to modify remote setpoint		
BP	Pressure probe		
BP1	Pressure probe		
BR	Remote setpoint potentiometer		
BT1	Thermocouple probe		
BT2	Probe Pt100, 2 wires		
BT3	Probe Pt100, 3 wires		
BT4	Probe Pt100, 3 wires		
BTEXT	External probe for climatic compensation of the set-point		
BV	Output probe in voltage		
BV1	Output device in voltage to modify remote setpoint		
F1	Fan motor thermal relay		
F3	Auxiliary fuse		
H1	Light signalling burner on		
H2	Light signalling fan motor lockout		
H3	Heat request lighting signal		
H4	Gas supply light signalling		
KL1	Star/triangle starter line contactor and direct start-up		
KT1	Star/triangle starter triangle contactor		
KS1	Star/triangle starter star contactor		
KST1	Star/triangle starter timer		
K1	Clean contacts output relay operating fan		
K2	Motor clean contacts overload relay		
K3	Clean contacts output relay burner lockout		
K6	Clean contacts output relay burner switched on		
MV	Fan motor		
PA	Air pressure switch		
PE	Burner earth		
PGMax	Maximum gas pressure switch		
PGMin	Minimum gas pressure switch		
RS	Remote burner reset button		
S1	Emergency stop button		
S2	Off / automatic / manual selector		
S4	Power increase / power reduction selector		
SH3	Burner reset button and lock-out signal		
SM	Servomotor		
TA	Ignition transformer		
TL	Limit thermostat/pressure switch		
TR	Adjustment thermostat/pressure switch		
TS	Safety thermostat/pressure switch		
UV	Flame sensor		
Y	Gas adjustment valve + gas safety valve		
YVPS	Valve leak detection device		
X1	Main terminal supply board		
X2	Terminal board for kit RWF		

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)