

GB **Forced draught gas burners**

Modulating operation



CODE	MODEL	TYPE
20152665 - 20152658 20152661	RS 310/M MZ	1138T
20152669 - 20152662 20152664	RS 410/M MZ	1135T
20152671	RS 510/M MZ	1136T
20152672	RS 610/M MZ	1137T



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 and type: RS 310/M MZ 1138T
 RS 410/M MZ 1135T
 RS 510/M MZ 1136T
 RS 610/M MZ 1137T

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:



0085

CE-0085CP0166	RS 310/M MZ (Class 2 EN 676)
CE-0085CP0166	RS 410/M MZ (Class 2 EN 676)
CE-0085CP0166	RS 510/M MZ (Class 2 EN 676)
CE-0085CP0166	RS 610/M MZ (Class 2 EN 676)

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

Legnago, 03.05.2021

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

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	Model	Type	Output
Forced draught gas burners	RS 310/M MZ	1138T	600 - 3900 kW
	RS 410/M MZ	1135T	800 - 4900 kW
	RS 510/M MZ	1136T	802 - 5520 kW
	RS 610/M MZ	1137T	820 - 6300 kW

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 COVER AND ALL THE SAFETY AND PROTECTION DEVICES
This symbol signals the obligation to reassemble the cover and all the safety and protection devices of the burner after any maintenance, cleaning or checking operations.



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



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

- This symbol indicates a list.

Abbreviations used

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

2.1.4 Delivery of the system and the instruction manual

When the system is delivered, it is important that:

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

.....

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

.....

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

2.2 Guarantee and responsibility

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



WARNING

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

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

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

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

3 Safety and prevention

3.1 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 uses expressly foreseen 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.

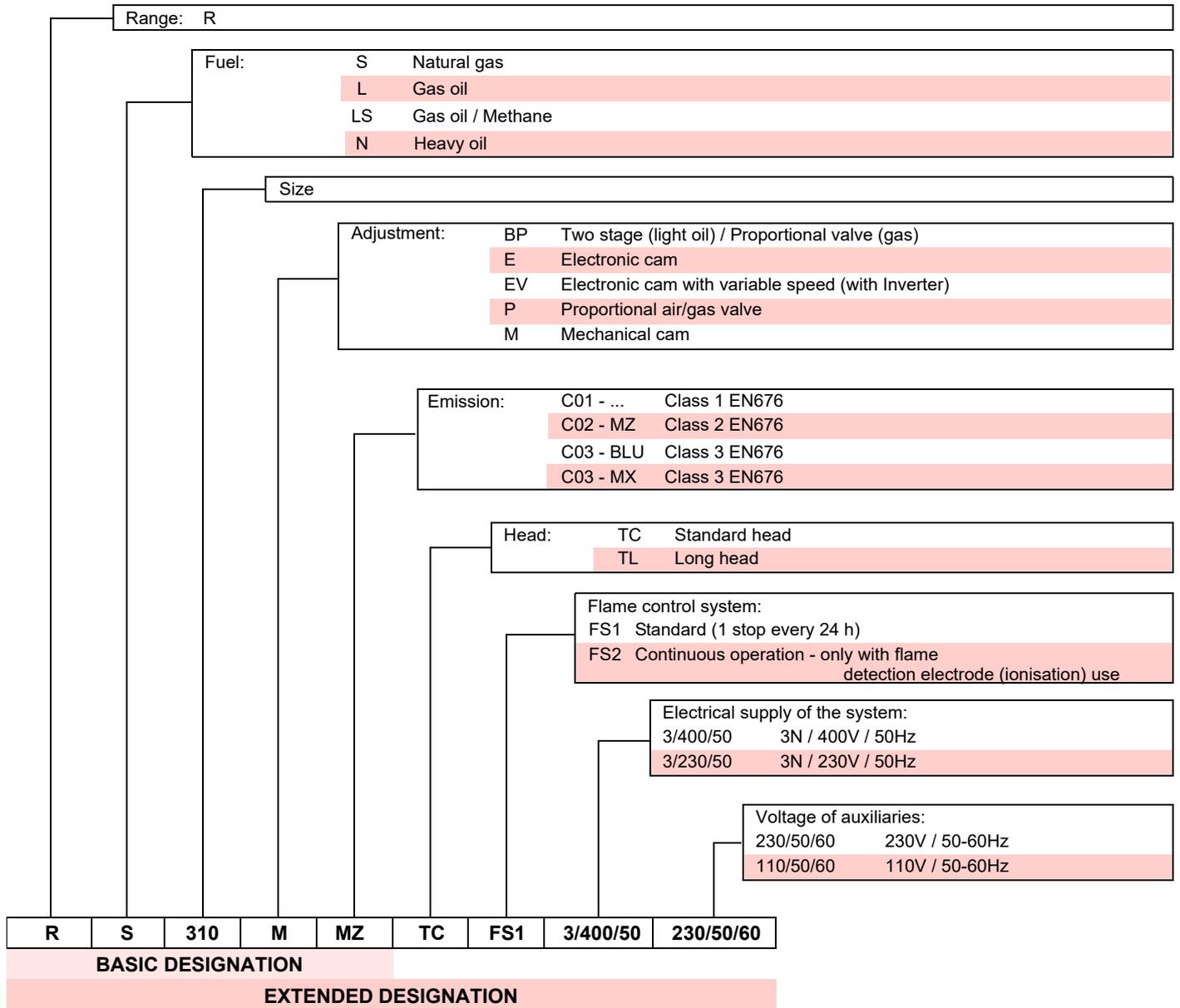
In addition:



- 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 310/M MZ FS1	3/400/50	Star/Triangle	20152665
	3/230/50	Direct	20152658
	3/400/50	Direct	20152661
RS 410/M MZ FS1	3/400/50	Star/Triangle	20152669
	3/230/50	Direct	20152662
	3/400/50	Direct	20152664
RS 510/M MZ FS1	3/400/50	Star/Triangle	20152671
RS 610/M MZ FS1	3/400/50	Star/Triangle	20152672

Tab. A

4.3 Burner categories - Countries of destination

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

Tab. B

4.4 Technical data

Model			RS 310/M MZ	RS 410/M MZ	RS 510/M MZ	RS 610/M MZ
Type			1138T	1135T	1136T	1137T
Power ⁽¹⁾	min - max	kW	600/1300 - 3900	800/2000 - 4900	802/2200 - 5520	820/2400 - 6300
Delivery ⁽¹⁾			Natural gas: G20 (methane gas) - G21 - G22 - G23 - G25			
Fuels			Natural gas: G20 (methane gas) - G21 - G22 - G23 - G25			
Gas pressure at max. output ⁽²⁾		mbar	33.2/49.5	41.7/62	48.9/73	64.6/96.4
Gas: G20/G25						
Operation			FS1: Intermittent (min. 1 stop in 24 hours) FS2: Continuous (min. 1 stop in 72 hours)			
Standard applications			Boilers: water, steam, diathermic oil			
Ambient temperature		°C	0 - 40			
Combustion air temperature		°C max	60			
Noise levels ⁽³⁾	Sound pressure	dB(A)	78	80	82.5	85
	Sound power		89	91	93,5	96

Tab. C

- (1) Reference conditions: Room temperature 20°C - Gas temperature 15°C - Barometric pressure 1013 mbar - Altitude 0 m a.s.l.
 (2) Pressure on the socket 5)(Fig. 5 on page 13) 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.

4.5 Electrical data

DIRECT START UP

Model		RS 310/M MZ	RS 410/M MZ
Code		20152658 - 20152661	20152662 - 20152664
Main electrical supply		3/3N ~ 230/400V +/-10% 50 Hz	
Fan motor IE3	rpm	2920	2930
	V	220-240/380-415	230/400
	kW	7.5	9.2
	A	25.2/14.5	28.6/16.5
Ignition transformer	V1 - V2 I1 - I2	230 V - 1 x 8 kV 1 A - 20 mA	
Absorbed electrical power	kW max	9.1	10.9
Protection level		IP 54	

STAR - TRIANGLE START UP

Model		RS 310/M MZ	RS 410/M MZ	RS 510/M MZ	RS 610/M MZ
Code		20152665	20152669	20152671	20152672
Main electrical supply		3N ~ 400V +/-10% 50 Hz			
Fan motor IE3	rpm	2910	2930	2920	2915
	V	400/690	400/690	400/690	400/690
	kW	7.5	9.2	12	15
	A	13.9/8.0	16.5/9.6	21/12.2	26.8/15.5
Ignition transformer	V1 - V2 I1 - I2	230 V - 1 x 8 kV 1 A - 20 mA			
Absorbed electrical power	kW max	9.1	10.9	13.8	17.1
Protection level		IP 54			

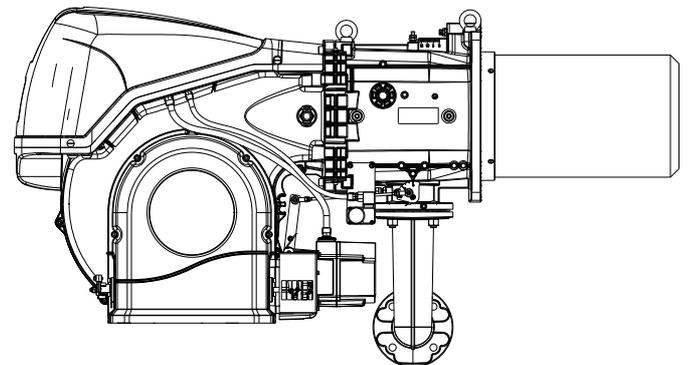
Tab. D

4.6 Burner weight

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

Model	kg
RS 310/M MZ	250
RS 410/M MZ	250
RS 510/M MZ	250
RS 610/M MZ	280

Tab. E



20072000

Fig. 1

4.7 Maximum dimensions

The maximum dimensions of the burner are given in Fig. 2.

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.



* The gas adaptor is set also for DN 80 bore.

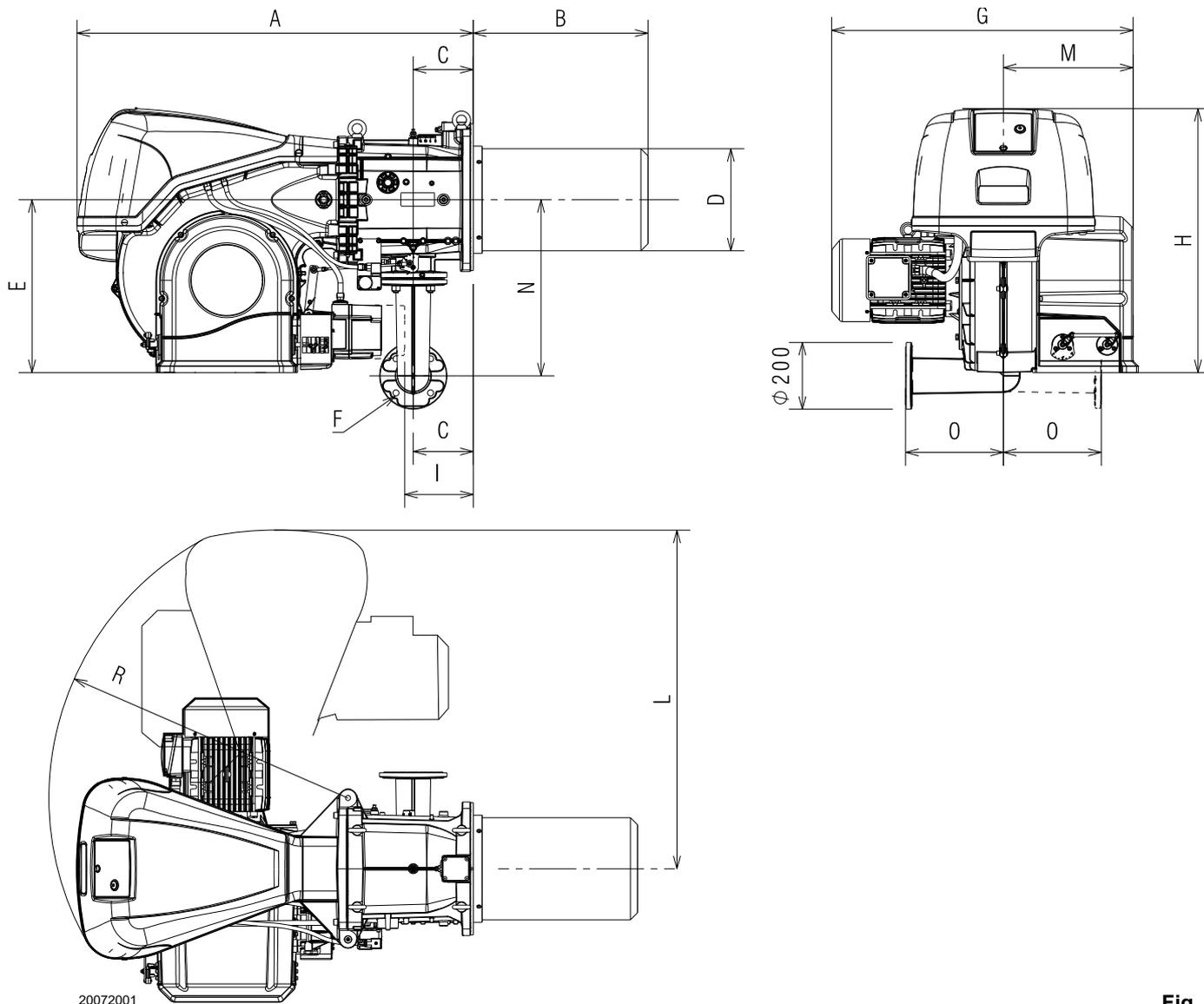


Fig. 2

mm	A	B	C	D	E	F*	G	H	I**	L	M	N	O	R
RS 310/M MZ	1178	519	178	306	520	DN65	890	790	177	1015	400	528	290	890
RS 410/M MZ	1178	519	178	306	520	DN65	908	790	177	1015	400	528	290	890
RS 510/M MZ	1178	519	178	306	520	DN65	908	790	177	1015	400	528	290	890
RS 610/M MZ	1178	500	178	330	520	DN65	980	790	177	1015	400	528	290	890

Tab. F

** Maximum position for the extraction of the servomotor cover.

4.8 Firing rates

The **MAXIMUM OUTPUT** is chosen from within the diagram area (Fig. 3).

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



The firing rate value (Fig. 3) has been obtained considering an ambient temperature of 20°C, an atmospheric pressure of 1013 mbar (approx. 0 m a.s.l.), and with the combustion head adjusted as shown on page 21.

Model	kW
RS 310/M MZ	600
RS 410/M MZ	800
RS 510/M MZ	800
RS 610/M MZ	820

Tab. G

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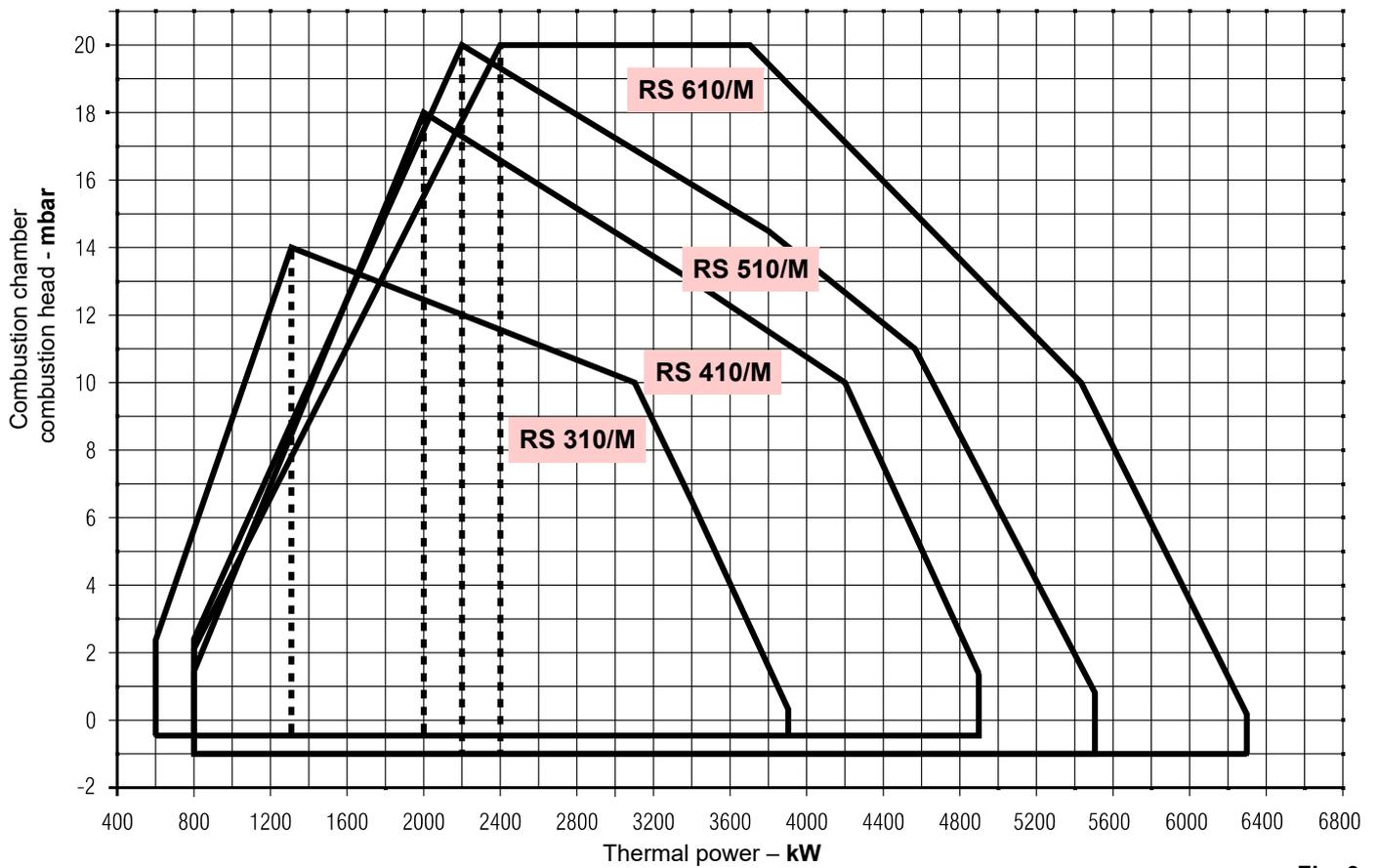


Fig. 3

4.9 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. 4).

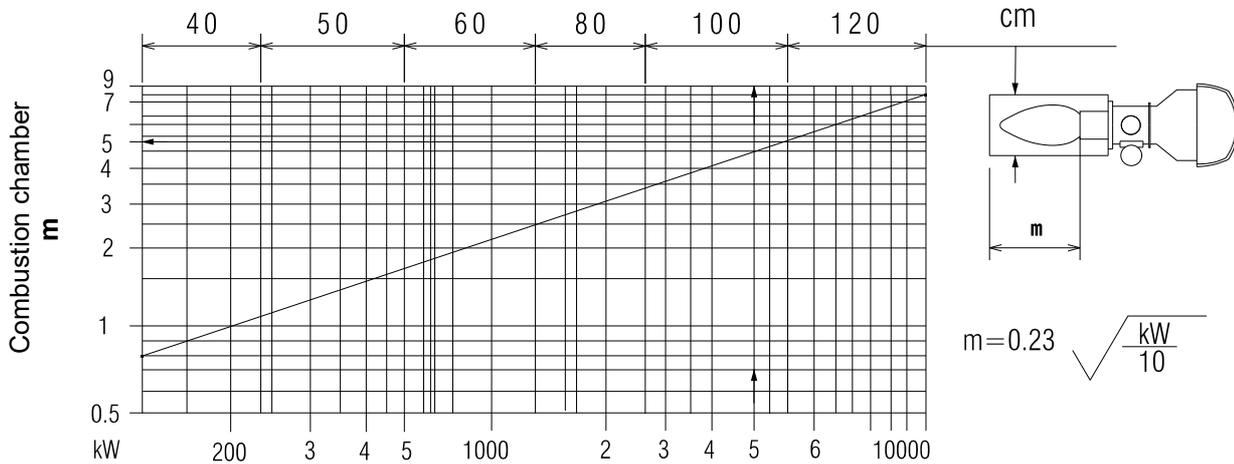
If the burner must be combined with a boiler that has not been EC approved and/or its combustion chamber dimensions are clearly smaller than those indicated in the diagram, consult the manufacturer.

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

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

Example: RS 610/M MZ

Output 5000 kW - diameter 100 cm - length 5 m



20057548

Fig. 4

4.10 Burner equipment

- Gasket for gas train adaptor. No. 1
- Adaptor for gas train. No. 1
- Screws for fixing the gas train adaptor: M 16 x 70. No. 4
- Thermal insulation screen No. 1
- M 18 x 60 screws to secure the burner flange to the boiler No. 4
- Cable grommets kit for optional electrical wiring input. . . . No. 1
- M16 x 6 studs for fixing the gas elbow to the pipe coupling No. 4
- M16 nuts to fix the gas elbow to the pipe coupling No. 4
- Instructions. No. 1
- Spare parts list. No. 1

4.11 Burner description

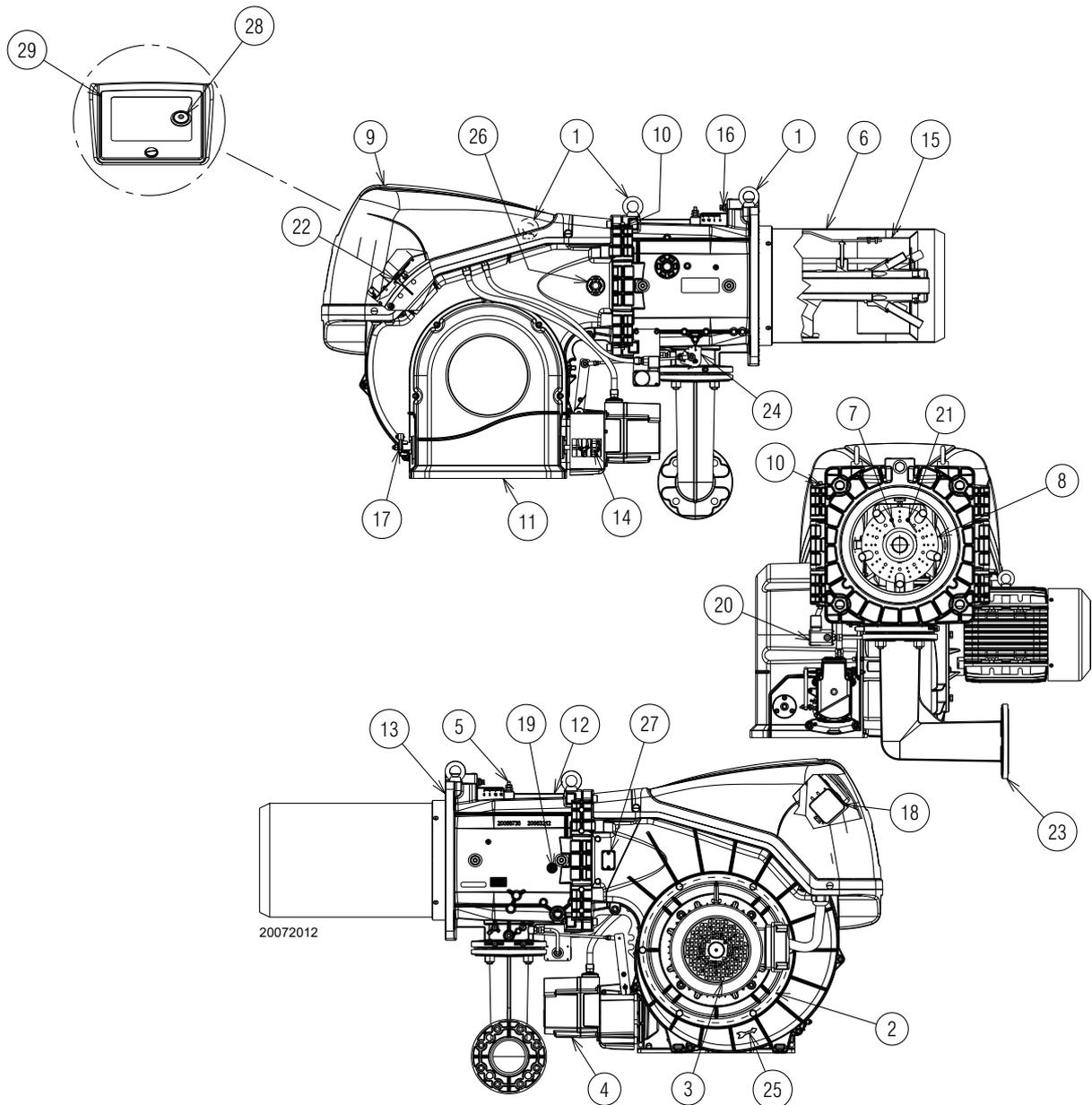


Fig. 5

- | | |
|---|--|
| 1 Lifting rings | 22 Pressure test point for air pressure switch “+” |
| 2 Fan | 23 Gas train adapter |
| 3 Fan motor | 24 Gas butterfly valve control lever |
| 4 Air damper servomotor | 25 Indication for checking the rotation direction of the purging motor |
| 5 Combustion head gas pressure test point | 26 Flame inspection window |
| 6 Combustion head | 27 Provision for UV sensor kit |
| 7 Ignition electrode | 28 Reset button |
| 8 Flame stability disk | 29 Transparent protection |
| 9 Electrical panel casing | |
| 10 Hinge for opening the burner | |
| 11 Fan air inlet | |
| 12 Pipe coupling | |
| 13 Gasket for boiler fixing | |
| 14 Adjustable profile cam | |
| 15 Shutter | |
| 16 Combustion head movement screw | |
| 17 Air damper control lever | |
| 18 Air pressure switch | |
| 19 Combustion head air pressure test point | |
| 20 Maximum gas pressure switch with pressure test point | |
| 21 Flame sensor probe | |



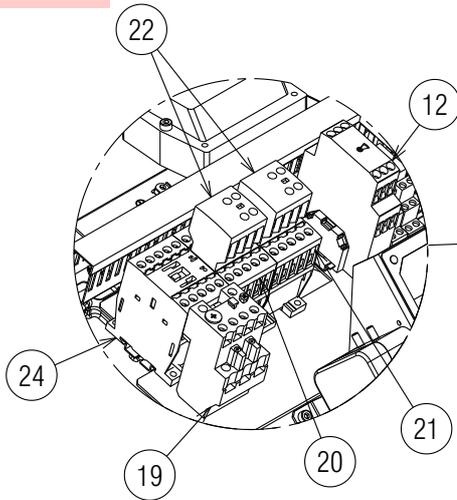
The burner can be opened to the right or to the left without links to the fuel supply side.



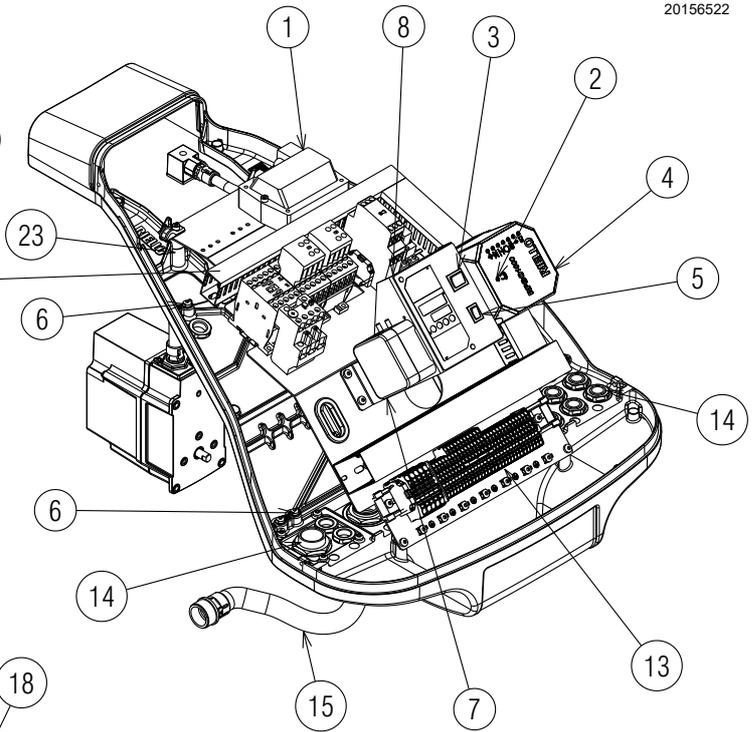
To open the burner see section “Access to head internal part” on page 20.

4.12 Electrical panel description

**STAR/TRIANGLE
START UP**



20156522



**DIRECT
START UP**

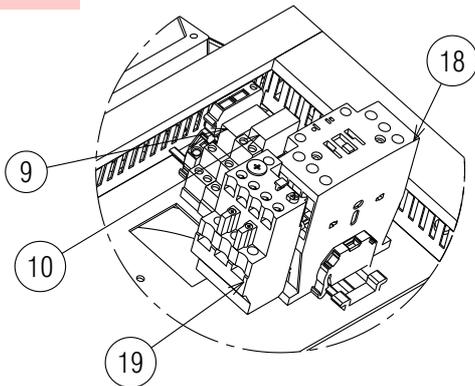


Fig. 6

- 1 Ignition transformer
- 2 Burner state indicator light and reset button. For further information see section "Burner ignition" on page 28
- 3 OFF-automatic-manual selector
- 4 Electrical control box
- 5 Power increase - power reduction selector
- 6 Earth terminal
- 7 Air pressure switch
- 8 Bracket for applying the kits
- 9 Relay with clean contacts for signalling the burner is operating
- 10 Relay with clean contacts for signalling the burner is in lock-out
- 11 Auxiliary circuits fuse (includes a spare fuse)
- 12 Timer for star/triangle start up
- 13 Main terminal supply board
- 14 Supply cables and external connections passage. See section "Electrical wiring" on page 26
- 15 Motor cables sheath
- 16 Maximum gas pressure switch sheath
- 17 Servomotor sheath
- 18 Direct start up line contactor
- 19 Thermal relay (with reset button)
- 20 Triangle contactor (Star/triangle start up)
- 21 Star contactor (Star/triangle start up)
- 22 Auxiliary contacts (Star/triangle start up)
- 23 Ionisation probe cable
- 24 Star/triangle start-up line contactor

20156519

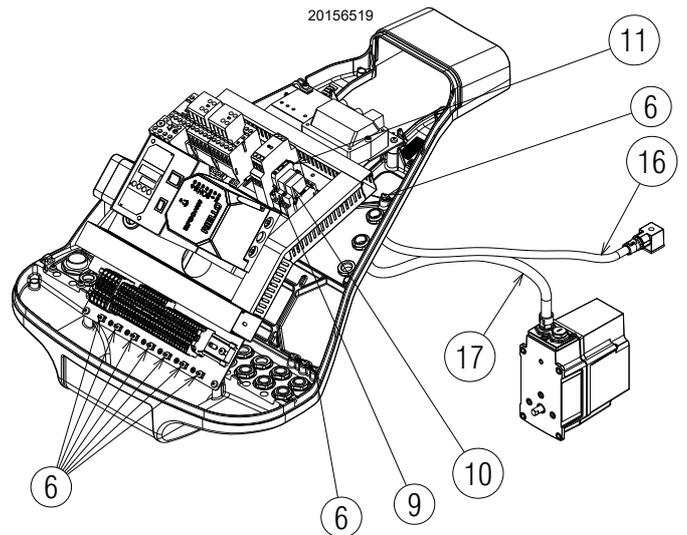


Fig. 7

4.13 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. 8

Technical data

Mains voltage	AC 230 V -15 % / +10 %
Mains frequency	50 / 60 Hz
Primary fuse (external)	Fare riferimento all'impianto elettrico
Weight	circa 1.1 kg
Power absorption	circa 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. H

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.

4.14 Servomotor SQM40 ...

Warnings



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

Avoid opening, modifying or forcing the servomotor.

- All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- 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.
- Fully disconnect the burner from the mains when working near terminals and servomotor connections.
- Condensation and exposure to water are not allowed.
- For safety reasons, the servomotor must be checked after long periods of non-use.



Fig. 9

S8907

Technical data

Mains voltage	230 V -15% +10%
Mains frequency	50 / 60 Hz
Power absorption	7 ... 15 VA
Motor	Synchronous
Drive angle	Varying between 0° and 135°



Absolutely do not adjust the red cam No. 1 more than 90° to prevent serious or irreversible damage to the mechanical adjustment parts.

Protection level	Max. IP 66, with appropriate cable entry
Cable entry	2 x M16
Cable connection	terminal board for 0.5mm ² (min.) and 2.5mm ² (max.)
Rotation direction	Anticlockwise
Rated torque (max.)	10 Nm
Holding torque	5 Nm
Operation time	30 s. at 90°
Weight	approx. 2 kg
Environmental conditions:	
Operation	-20...+60° C
Transport and storage	-20...+60°C

4.15 Calibration of the thermal relay

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

For calibration **2)**, see the table in the wiring diagram.

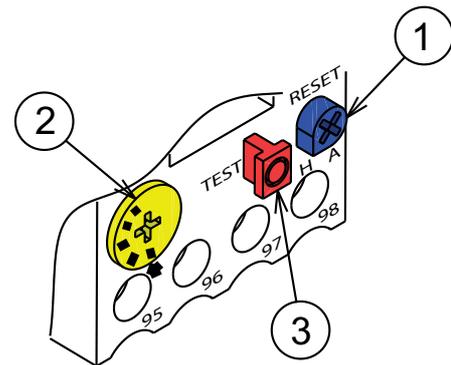
To reset, in case of an intervention of the thermal relay, press the "RESET" button 1) of Fig. 10.

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



CAUTION

The automatic reset can be dangerous. This operation is not foreseen in the burner operation. **Therefore do not position the "RESET" button 1) on "A".**



20073932

Fig. 10

4.16 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. 11).

If this is not the case:

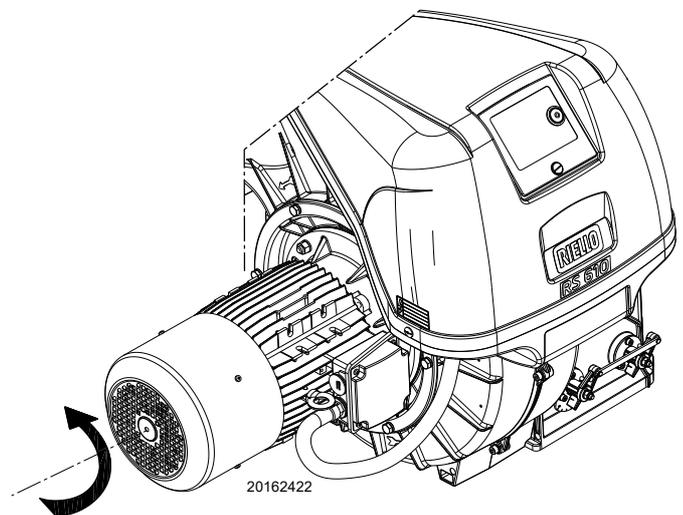
- set the burner switch to "0" (off) and wait for the control box to carry out the switch-off phase.



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.



20162422

Fig. 11

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 burner packaging includes a wooden platform, it is therefore 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 20-25cm 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-AERO		G	H
I			RIELLO SpA 137045 Lagrange (VR)
			CE

D10411

Fig. 12

Checking the characteristics of the burner

Check the identification label of the burner, showing:

- the model (A)(Fig. 12) and type of burner (B);
- the year of manufacture, in cryptographic form (C);
- the serial number (D);
- the data for electrical supply and the protection level (E);
- the absorbed electrical power (F);
- the types of gas used and the relative supply pressures (G);
- the data of the burner's minimum and maximum output possibilities (H)(see Firing rate)



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.

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

- the category of the appliance/countries of destination (I).

5.4 Operating position



- The burner is designed to operate only in positions 1, 2, 3 and 4 (Fig. 13).
- 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.

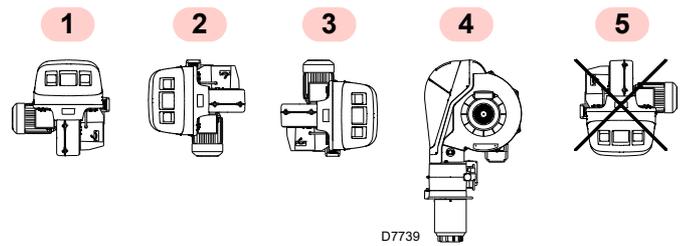


Fig. 13

5.5 Preparing the boiler

5.5.1 Boring the boiler plate

Pierce the closing plate of the combustion chamber, as in Fig. 14. The position of the threaded holes can be marked using the thermal insulation screen supplied with the burner.

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 refractory can have a conical shape (minimum 60°).

For boilers with front flue passes 1) (Fig. 15) or flame inversion chamber, a protection in refractory material 5) must be inserted between the boiler fettling 2) and the flame funnel 4).

This protective fettling must not compromise the extraction of the blast tube.

For boilers with a water-cooled front piece, a refractory lining 2)-5)(Fig. 15) is not necessary, unless expressly requested by the boiler manufacturer.

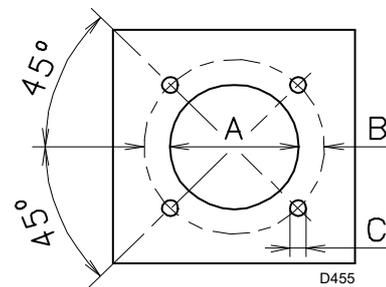


Fig. 14

mm	A	B	C
RS 310/M MZ	335	452	M18
RS 410/M MZ	335	452	M18
RS 510/M MZ	335	452	M18
RS 610/M MZ	350	452	M18

Tab. I

5.6 Securing the burner to the boiler

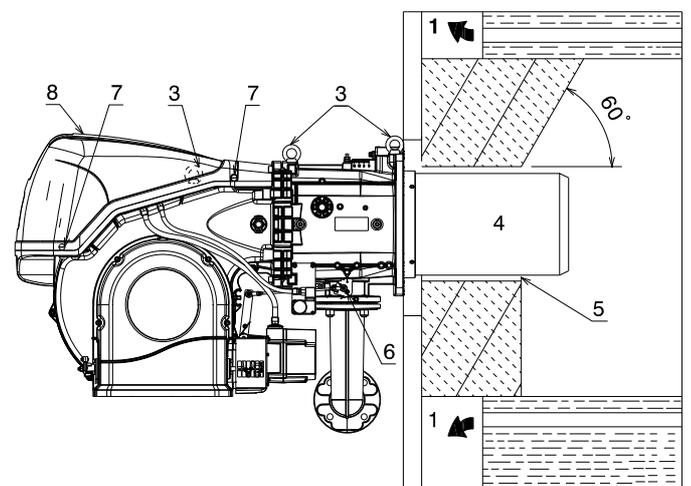


Prepare a suitable lifting system using rings 3)(Fig. 15).

- Fit the heat insulation supplied onto the blast tube 4)(Fig. 15).
- Fit the entire burner onto the boiler hole prepared previously (Fig. 14), and fasten with the screws supplied.



The seal between burner and boiler must be airtight.



20072025

Fig. 15

5.7 Access to head internal part

The burner leaves the factory set for opening to the left, therefore maintaining the pin 1)(Fig. 16) in the housing.

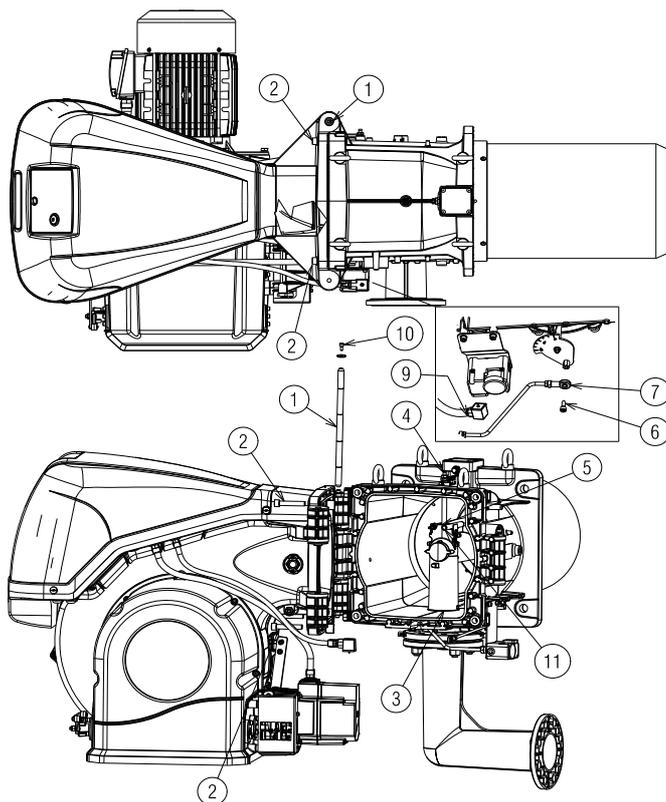
To open the burner towards the left, proceed as follows:

- A** Remove the screw 6) releasing the tie-rod 7)(Fig. 16);
- B** Disconnect the plug/socket 9)(Fig. 16) of the maximum gas pressure switch;
- C** Remove the screws 2);
- D** Open the burner to a maximum of 100-150 mm by rotating around the hinge and release the cables of the probe 5) and electrode 11);
- E** Fully open the burner as in Fig. 16;
- F** Undo the screw 4) with pressure test point.
- G** Release the head by lifting it from its housing 3), then take out the combustion head.



WARNING

To open the burner from the opposite side, before removing the pin 1)(Fig. 16), make sure that the 4 screws 2) are tight. Then shift the pin 1) to the opposite side, only then is it possible to remove the screws 2); then proceed as described in point C.



20072028

Fig. 16

5.8 Probe-electrode position



WARNING

Check that the probe and the electrode are placed as in Fig. 17, according to the dimensions indicated.

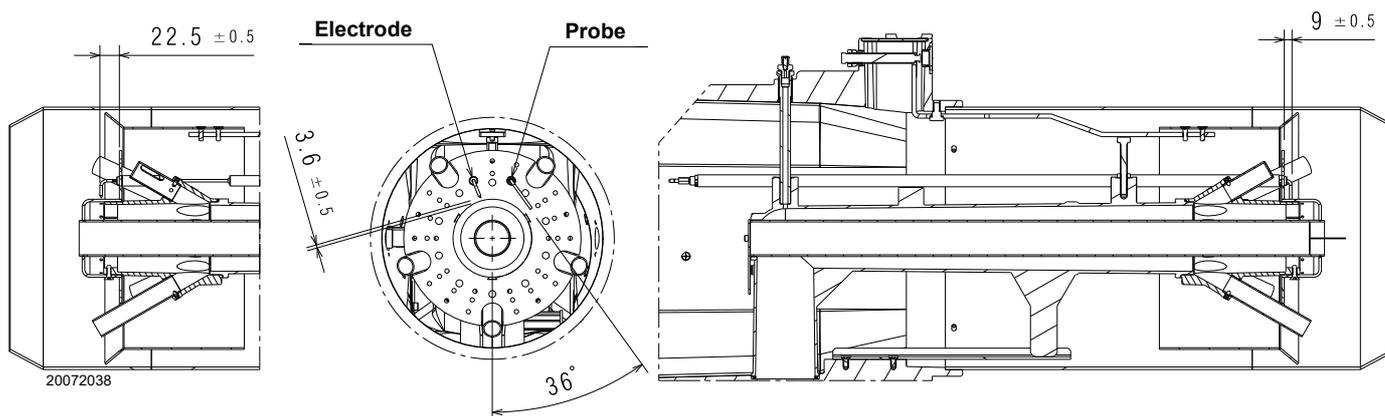
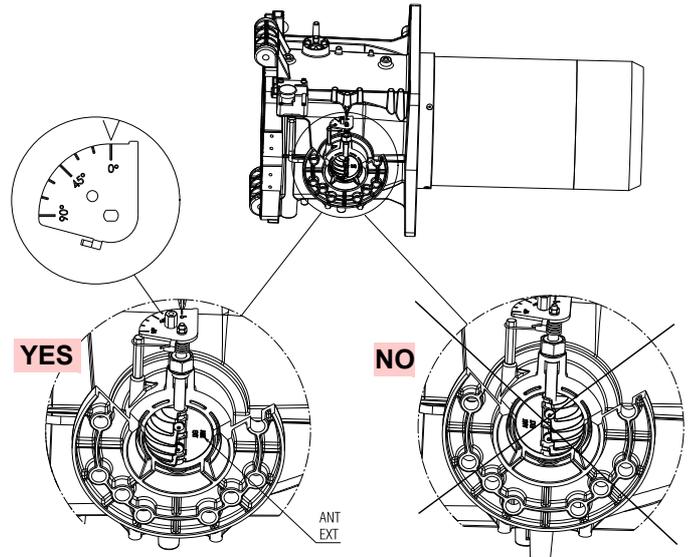


Fig. 17

5.9 Gas butterfly valve

If necessary, replace the gas butterfly valve. The correct position is shown in Fig. 18.



20078516

Fig. 18

5.10 Combustion head adjustment

Rotate the screw 1) until the notch you have found corresponds with the front surface of the screw itself.

The combustion head is opened by turning the screw 1) anti-clockwise.

The combustion head is closed by turning the screw 1) clockwise (Fig. 19).

Central air adjustment:

The factory setting is shown in **Tab. J**

Burner	RS 310	RS 410	RS 510	RS610
Set-point	7	4	7	7

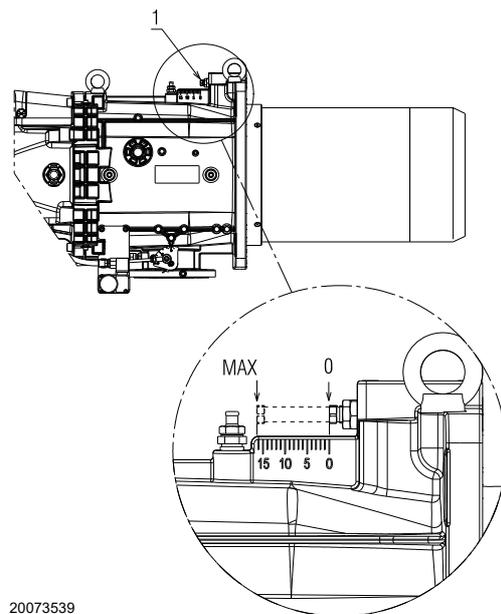
Tab. J



WARNING

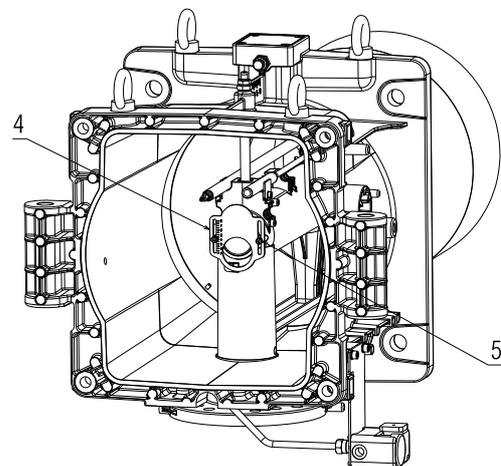
Normally the calibrations indicated in Tab. J should not be changed.

In the event that the specific application requires a particular adjustment, it is possible to change the central air flow rate using the ring nut 4)(Fig. 20). To carry out this operation loosen the screws 5)(Fig. 20) and move the ring nut 4)(Fig. 20). When finished, lock the screws 5) again (Fig. 20).



20073539

Fig. 19



20077011

Fig. 20

Below is a diagram (Fig. 21) that shows the recommended adjustment of the combustion head.

NOTE:

Depending on the specific application, the adjustment can be modified.

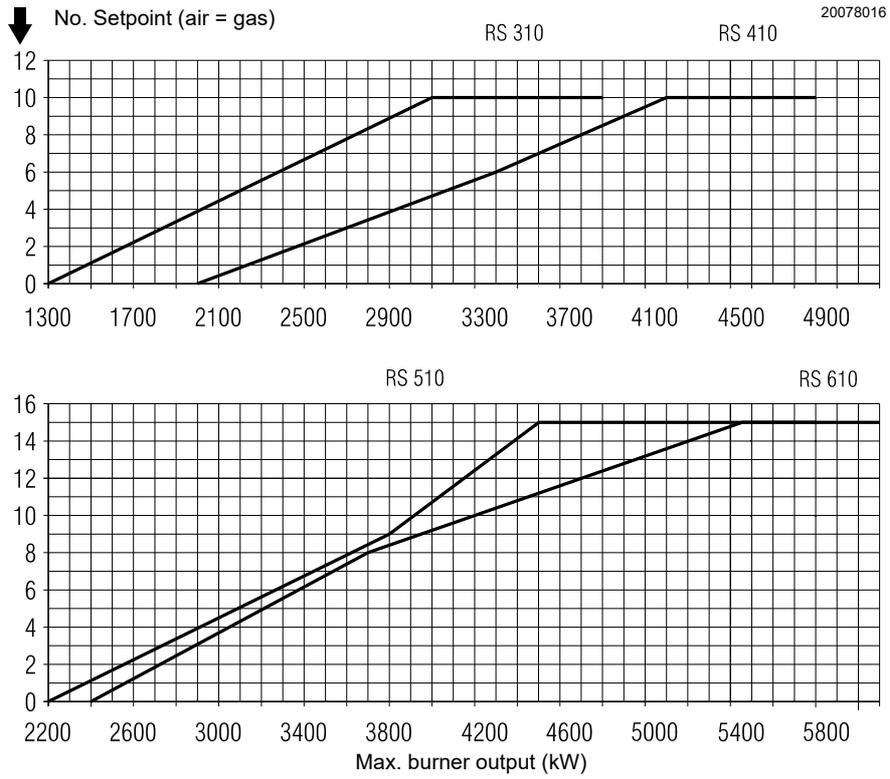


Fig. 21

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 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. 22 - Fig. 23 - Fig. 24 - Fig. 25)

- 1 Gas input pipe
- 2 Manual valve
- 3 Vibration damping joint
- 4 Pressure gauge with push-button cock
- 5 Filter
- 6A Includes:
 - filter
 - working valve
 - safety valve
 - pressure adjuster
- 6B Includes
 - working valve
 - safety valve
 - pressure adjuster
- 6C Includes
 - safety valve
 - working valve
- 6D Includes:
 - safety valve
 - working valve
- 7 Minimum gas pressure switch
- 8 Leak detection control, provided as an accessory or integrated, based on the gas train code (see manual Burner - gas train combination" supplied as standard). In compliance with the EN 676 standard, the leak detection control is compulsory for burners with maximum outputs over 1200 kW.
- 9 Gasket, for "flanged" versions only
- 10 Pressure adjuster
- 11 Train-Burner adaptor, supplied separately
- P2 Upline 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"

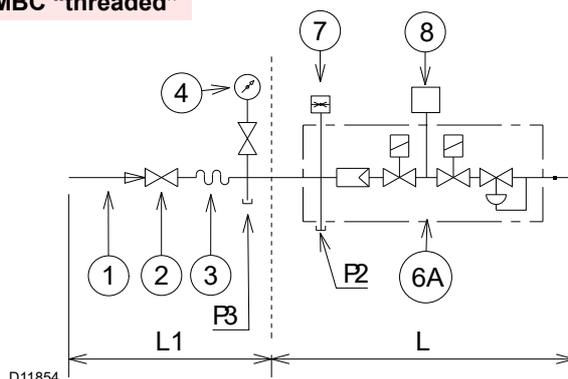


Fig. 22

MBC "flanged"-VGD

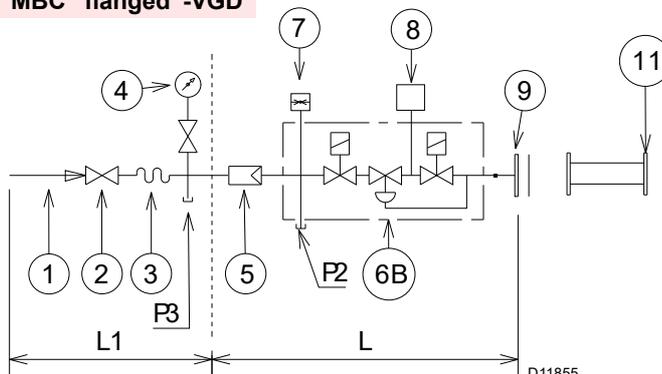


Fig. 23

DMV "flanged or threaded"

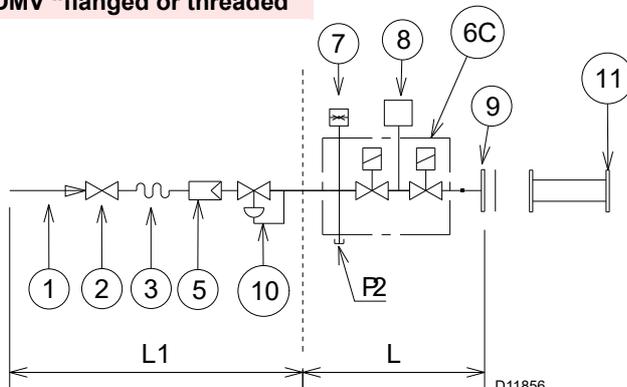


Fig. 24

CB "flanged or threaded"

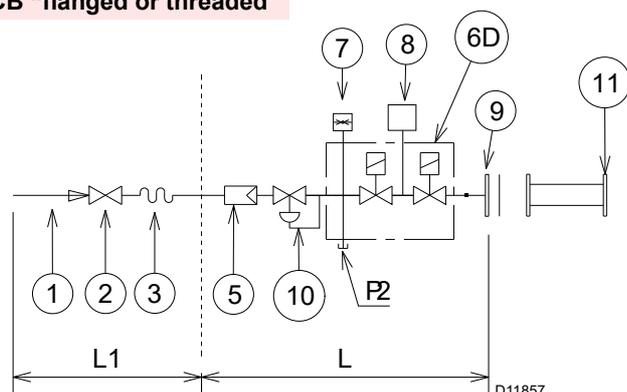


Fig. 25

5.11.2 Gas train

Approved according to standard EN 676 and provided separately from the burner.



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

5.11.3 Gas train installation



Disconnect the electrical power using the main switch.



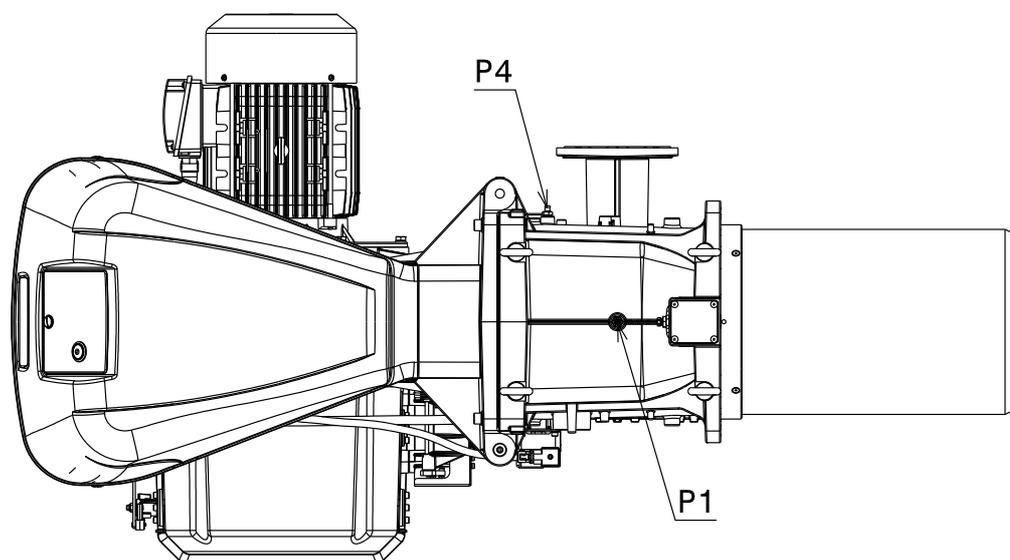
Check that there are no gas leaks.



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



The operator must use the required equipment during installation.



20072044

Fig. 26

5.11.4 Gas pressure

Tab. K indicates the minimum pressure drops along the gas supply line, depending on the maximum burner output.

The values shown in Tab. K 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 the test point P1)(Fig. 26), with:

- Combustion chamber at 0 mbar;
- Burner working at maximum output;
- Combustion head adjusted as in page 21.

Column 2

Pressure loss at gas butterfly valve 4)(Fig. 32 on page 29) with maximum opening: 90°.

Calculate the approximate maximum output of the burner in this way:

- subtract the combustion chamber pressure from the gas pressure measured at test point P1)(Fig. 26).
- Find, in the table Tab. K related to the burner concerned, the pressure value closest to the result of the subtraction.
- read the corresponding output on the left.

Example RS 410/M MZ with natural gas G20:

Maximum output operation

$$\begin{aligned} \text{Gas pressure at test point P1)(Fig. 26)} &= 46.7 \text{ mbar} \\ \text{Pressure in combustion chamber} &= 5 \text{ mbar} \\ 46.7 - 5 &= 41.7 \text{ mbar} \end{aligned}$$

A pressure of 41.7 mbar, column 1, corresponds in Tab. K to an output of 4900 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 P1)(Fig. 26), set the MAX output required from the burner operation:

- find the nearest output value in the table Tab. K for the burner in question.
- read, on the right (column 1), the pressure at the test point P1)(Fig. 26).
- Add this value to the estimated pressure in the combustion chamber.

Example RS 410/M MZ with natural gas G20:

Required burner maximum output operation: 4900 kW

$$\begin{aligned} \text{Gas pressure at an output of 4900 kW} &= 41.7 \text{ mbar} \\ \text{Pressure in combustion chamber} &= 5 \text{ mbar} \\ 41.7 + 5 &= 46.5 \text{ mbar} \end{aligned}$$

Pressure required at test point P1)(Fig. 26).



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

	kW	1 Δp (mbar)		2 Δp (mbar)	
		G 20	G 25	G 20	G 25
RS 310/M MZ	1300	3.4	5.1	0.1	0.1
	1560	5.5	8.2	0.5	0.7
	1820	7.8	11.6	1.6	2.4
	2080	10.3	15.4	2.7	4.0
	2340	13.0	19.4	3.9	5.8
	2600	15.9	23.7	5.0	7.5
	2860	18.9	28.2	6.2	9.3
	3120	22.2	33.1	7.5	11.2
	3380	25.7	38.3	8.7	13.0
	3640	29.3	43.7	10.0	14.9
RS 410/M MZ	3900	33.2	49.5	11.4	17.0
	2000	13.8	20.6	2.4	3.6
	2290	14.5	21.6	3.6	5.4
	2580	15.7	23.4	4.9	7.3
	2870	17.4	26.0	6.3	9.4
	3160	19.5	29.1	7.7	11.5
	3450	22.1	33.0	9.1	13.6
	3740	25.1	37.4	10.5	15.7
	4030	28.6	42.7	12.0	17.9
	4320	32.5	48.5	13.6	20.3
RS 510/M MZ	4610	36.9	55.1	15.1	22.5
	4900	41.7	62.2	16.8	25.1
	2200	15.7	23.4	3.3	4.9
	2540	16.3	24.3	4.8	7.2
	2880	17.4	26.0	6.3	9.4
	3220	19.2	28.6	8.0	11.9
	3560	21.6	32.2	9.6	14.3
	3900	24.6	36.7	11.4	17.0
	4240	28.2	42.1	13.1	19.5
	4580	32.5	48.5	15.0	22.4
RS 610/M MZ	4920	37.3	55.7	16.9	25.2
	5260	42.8	63.9	18.8	28.0
	5600	48.9	73.0	20.8	31.0
	2400	10.3	15.4	4.1	6.1
	2790	13.8	20.6	5.9	8.8
	3180	17.8	26.6	7.8	11.6
	3570	22.2	33.1	9.7	14.5
	3960	27.0	40.3	11.7	17.5
	4350	32.2	48.0	13.7	20.4
	4740	37.9	56.5	15.9	23.7
RS 610/M MZ	5130	43.9	65.5	18.1	27.0
	5520	50.4	75.2	20.3	30.3
	5910	57.3	85.5	22.7	33.9
	6300	64.6	96.4	25.1	37.4

Tab. K

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 burners have 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.



Turn off the fuel interception tap.



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 in compliance with the EN 60 335-1 standard.

5.12.1 Supply cables and external connections passage

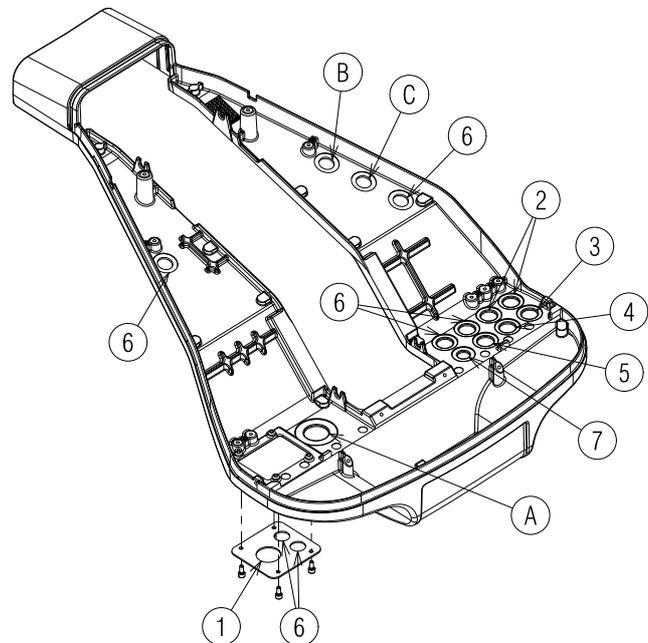
All the cables to be connected to the burner must be threaded through cable grommets. The use of the cable grommets can take various forms; by way of example see Fig. 27.

Key (Fig. 27)

- 1 Electrical supply - Bore for M32
- 2 Consents / Safety devices - Bore for M20
- 3 Minimum gas pressure switch - Bore for M20
- 4 VPS gas valve leak detection control kit- Bore for M20
- 5 Gas train - Bore for M20
- 6 Available - Bore for M20
- 7 Available - Bore for M16

Cable grommets used in the factory:

- A - Fan motor
- B - Maximum gas pressure switch
- C - Air/gas servomotor



20073934

Fig. 27



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

6 Start-up, calibration and operation of the burner

6.1 Notes on safety for the first start-up



WARNING

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



WARNING

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



WARNING

Before igniting the burner, see the paragraph “Safety test - with gas feeding closed” on page 33.

6.2 Adjustments prior to ignition

Combustion head adjustment is already described on page 21.

In addition, the following adjustments must also be made:

- open manual valves upline from the gas train.
- Adjust the minimum gas pressure switch to the start of the scale.
- Adjust the maximum gas pressure switch to the end of the scale.
- Adjust the air pressure switch to the start of the scale.
- Purge the air from the gas line.

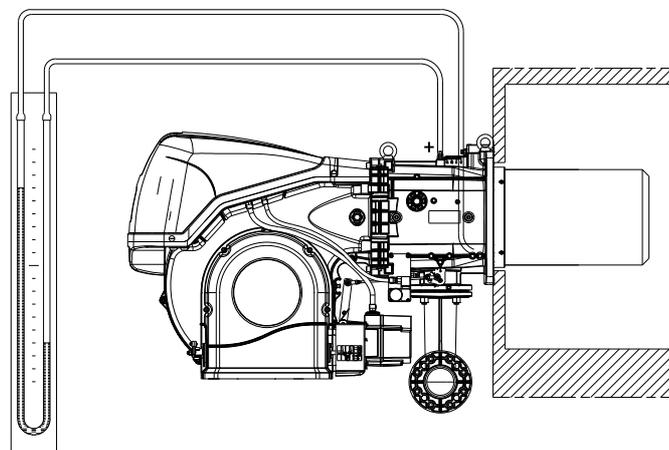
We recommend using a plastic tube routed outside the building and to purge air until gas is smelt.

- Fit a U-type pressure gauge or a differential pressure gauge (Fig. 28), with socket (+) on the gas pressure of the pipe coupling and (-) in the combustion chamber. The manometer readings are used to calculate MAX burner output using the Tab. K.
- 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 solenoids is equipped with a pilot light that signals voltage passing through.



CAUTION

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



20071253

Fig. 28

6.3 Servomotor adjustment

The servomotor (Fig. 29) provides simultaneous adjustment for the air damper, by means of the adjustable profile cam and the gas butterfly valve. Completes a rotation of 90° in 30 s.

After the adjustment made in the factory to its 6 cams to allow an initial ignition. Check that they are as shown below. In the event of a modification, follow what is described below for each cam:

Cam I (RED): 90° (The same for all models)
Limits the rotation towards the maximum.



WARNING

In the event of a variation, absolutely do not adjust beyond 90°.

Cam II (BLUE): 0° (The same for all models)
Limits the rotation towards the minimum.
With the burner off the air damper and the gas butterfly valve should be closed: 0°
It is recommended that no adjustments are made.

Cam III (ORANGE): (See Tab. L

Adjusts the ignition position and MIN. output

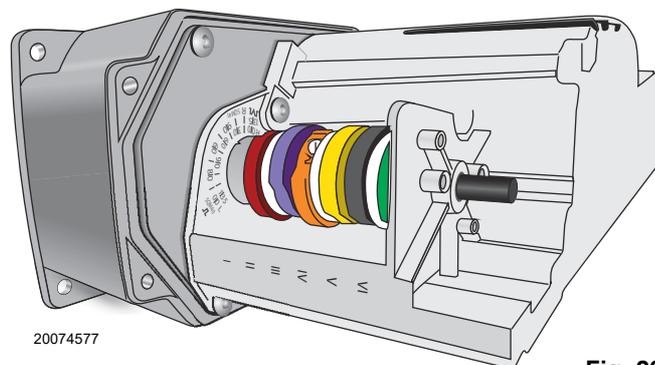
Cam IV-V-VI (YELLOW/BLACK/GREEN):

Do not use, they have no effect on the operation of the burner.

CALIBRATION

	RS 310/M	RS 410/M	RS 510/M	RS 610/M
CAM 3 (ORANGE)	5°	5°	5°	15°

Tab. L



20074577

Fig. 29

6.4 Burner start-up

Turn off the thermostats/pressure switches and check the light signal 2) comes on (Fig. 6 on page 14).

Put the selector 1)(Fig. 30) in position "MAN".

Start of the fan motor. As the burner is not fitted with a device to check the sequence of the phases, the motor rotation may be incorrect.

As soon as the burner starts up, go in front of fan motor cooling fan and check it is rotating anticlockwise or else in the direction of the arrow shown in the diagram (burner description).

If this is not the case:

- put the switch 1) of Fig. 30 to "OFF" and wait for the control box carries out the switching off phase;



disconnect the burner's electrical supply, since this operation should be carried out in the absence of the electrical supply;

- Invert the phases on the three-phase power supply;
- repeat the start-up procedure.



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

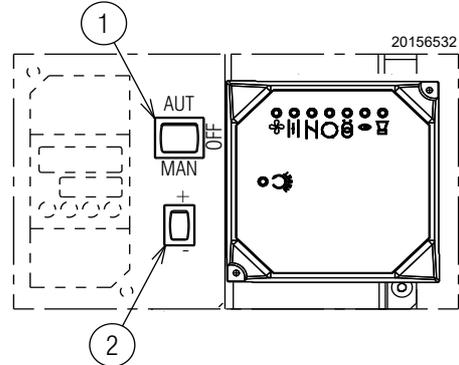


Fig. 30

6.5 Burner ignition

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

Two types of burner failure may occur:

- **Control box lockout:** when the control box button comes on (light signal) 2)(Fig. 6 on page 14) it warns you that the burner is in lockout. See "Problems - Causes - Remedies signalled by LED indicators" on page 37 for the causes of the lockout. release by pressing the push-button 2)(Fig. 6 on page 14). See control box reset.

- **Motor lockout because of thermal relay intervention:** because of an erroneous calibration of the thermal relay or problems with the motor or the main power supply. Release by pressing the button on thermal relay, see section 4.15 on page 17.

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 at the pipe coupling is indicated by the U-type pressure gauge (Fig. 28).

Once the burner has fired, now proceed with global calibration operations.

6.6 Air / fuel adjustment

The air/fuel synchronisation is carried out using a servomotor 1)(Fig. 31) which, when connected directly to the air dampers, acts on the gas butterfly valve by means of an adjustable profile cam 2) and suitable leverage.



**WARNING!
MOVING PARTS**



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 (90°).

The choking of the air, taking into account the maximum combustion output, takes place by varying the adjustment of the combustion head (see "Combustion head adjustment" on page 21).

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

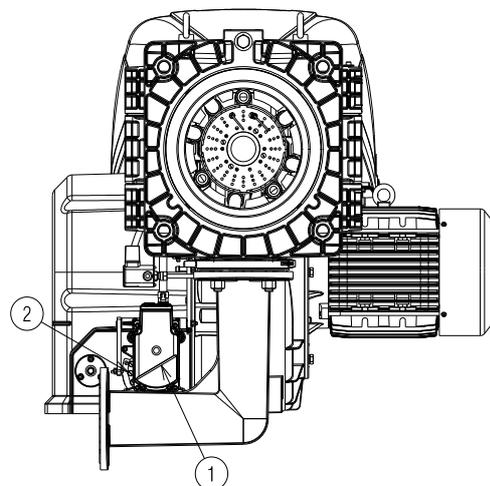


Fig. 31

6.6.1 Burner adjustment

The optimum adjustment of the burner requires an analysis of flue gases at the boiler outlet.

Adjust in sequence:

- 1 - Output upon ignition
- 2 - MAX output
- 3 - MIN output
- 4 - Intermediate outputs between Min. and Max.
- 5 - Air pressure switch
- 6 - Maximum gas pressure switch
- 7 - Minimum gas pressure switch

6.6.2 Output upon ignition

Ignition must occur at a lower output than the max. operation output. Regulations provide that the ignition output of this burner must be equal to or less than 1/3 of the MAX operation output.

Example: MAX operation output of 600 kW.

Ignition output must be equal to or lower than:

200 kW with $t_s = 3$ s.

In order to measure the ignition output:

- Disconnect the plug-socket 23)(Fig. 6 on page 14) on the ionisation probe cable (the burner starts up and then goes into lockout after the safety time has elapsed).
- Perform 10 ignitions with consecutive lockouts.
- Read the quantity of gas burned on the meter.
- This quantity must be equal to or lower than the quantity given by the formula:

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

Example for G 20 gas (9.45 kWh/Sm³):

Max. operation output: 600 kW corresponding to 63.5 Sm³/h.

After 10 ignitions with their lockouts, the delivery indicated on the meter must be equal to or less than: $63.5 : 360 = 0.176 \text{ Sm}^3$

Air adjustment

The air is adjusted by varying the angle of cam III) (Fig. 29) and by using the selector 2)(Fig. 30). To adjust the cam of the servomotor, see Fig. 33 A).

6.6.3 Maximum output

The MAX output must be set within the firing rate indicated in Fig. 3 on page 11.

In the above instructions we left the burner running at the MIN output. Now press the "increase output" button 2)(Fig. 30 on page 28), and keep it pressed until the servomotor has opened the air damper and the gas butterfly valve.

Adjustment of gas delivery

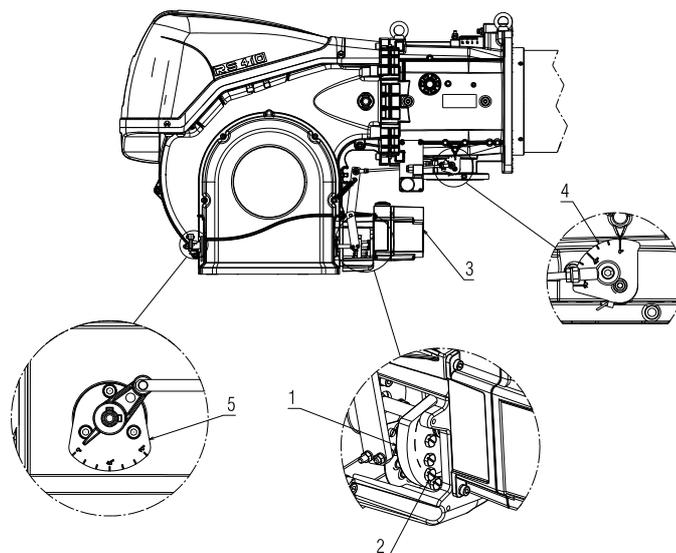
Measure the gas delivery on the gas meter.

A rough indication can be obtained from Tab. K on page 25, just read the gas pressure on the "U" pressure gauge (see Fig. 28 on page 27) and follow the indications.

- If delivery needs to be reduced, diminish outlet gas pressure; if it is already very low, slightly close the VR adjustment valve.
- If delivery needs to be increased, increase the adjuster outlet gas pressure.

Air adjustment

The air is adjusted by varying the angle of cam I) (Fig. 29 on page 27) and by using the selector 2)(Fig. 30 on page 28). To adjust the cam of the servomotor, see Fig. 33 A).

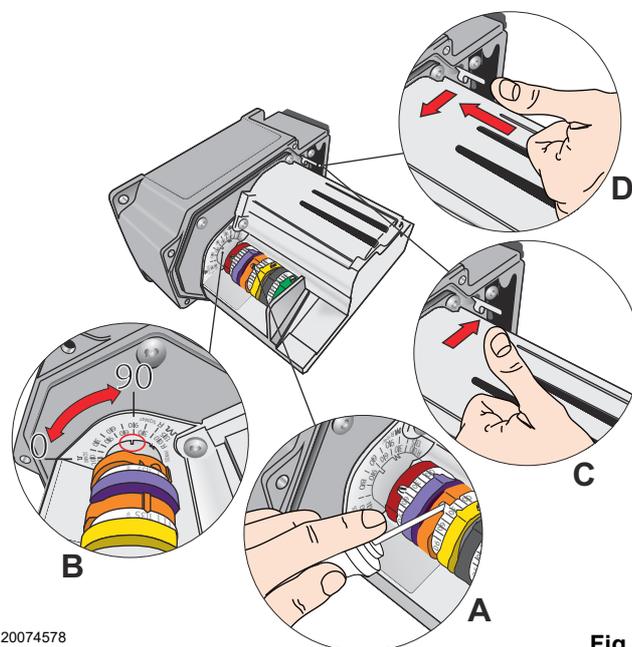


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Fig. 32

Key (Fig. 32)

- 1 Cam
- 2 Adjustment screws
- 3 Servomotor
- 4 Graduated sector for gas butterfly valve
- 5 Air damper graduated sector



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Fig. 33

6.6.4 Minimum output

Min output must be selected within the firing rate range shown on Fig. 3 on page 11.

Press button 2)(Fig. 30 on page 28) "Diminishing output" and keep it pressed until the servomotor regains (Fig. 33 B) the adjustment made in the factory: See Tab. L on page 27 and as a consequence adjusting the air damper 5) and the gas butterfly valve 4)(Fig. 32 on page 29).

Adjustment of gas delivery

Progressively adjust the end profile of the mechanical cam 1) Fig. 32 on page 29, using the screws 2).

For example, calibrate the minimum output to 800 kW, check the emissions and if necessary increase or decrease the opening of the air damper (see "Air adjustment" on page 29). Bring the output to 800 kW using the screws 2) of the mechanical cam (Fig. 32 on page 29) and check the emissions.

Air adjustment

The regulation of the air is carried out using the angle of the cam III) of the servomotor (Fig. 29 on page 27) and by using the selector 2)(Fig. 30 on page 28). To adjust the cam of the servomotor, see Fig. 33 A).

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.

To adjust the cam III, see Fig. 33 A) e B).

6.6.5 Intermediate outputs

Air adjustment

No adjustment is required

Adjustment of gas delivery

After adjusting the maximum and minimum output of the burner, carry out air adjustment on higher intermediate positions of the servomotor. The passage from one position to the next one is obtained by pressing the button 2) on the symbol (+) or (-) (Fig. 30 on page 28). For a brief period press the button 2)(Fig. 30 on page 28) "Output increase" so that the servomotor rotates by about 20°, see servomotor graduated index Fig. 33 B) and the air damper graduated index 5) (Fig. 32 on page 29).

Screw or unscrew the screw 2) of the mechanical cam (Fig. 32 on page 29) to increase or decrease the gas output so as to adjust it to the corresponding air output, to obtain optimal combustion.

Proceed in the same way with the other screws.



WARNING

Take care that the cam profile variation is progressive.

Switch off the burner using the switch 1)(Fig. 30), OFF position, release the mechanical cam I)(Fig. 32) to separate the gears of the servomotor, pressing and shifting downwards the button 3)(Fig. 33 D) and check a few times, by rotating the mechanical cam I)(Fig. 32) manually backwards and forwards, that the movement is smooth and without any hindrance.



WARNING

It is recommended that the mechanical cam I)(Fig. 32 on page 29) be bound again to the servomotor by shifting button 3)(Fig. 33 C) upwards.

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

NOTE:

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

6.7 Pressure switch adjustment

6.7.1 Air pressure switch - check CO

Adjust the air pressure switch (Fig. 34) after performing all other burner adjustments with the air pressure switch set to the start of the scale.

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 anti-clockwise by about 20% of the set point and repeat burner starting to ensure it is correct.

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



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%.



Fig. 34

6.7.2 Maximum gas pressure switch

Adjust the maximum gas pressure switch (Fig. 35) 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. 36) 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.



1 Kpa = 10 mbar

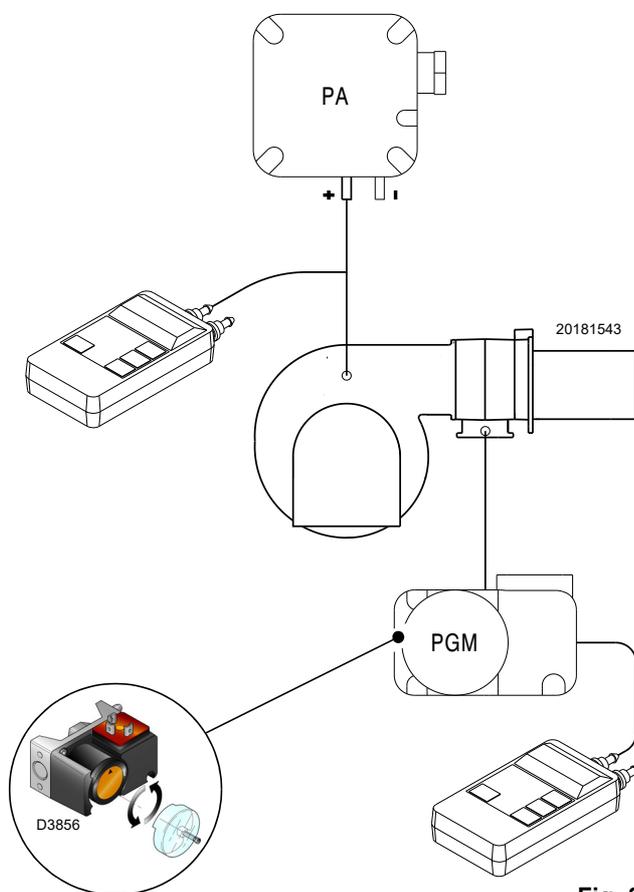


Fig. 35

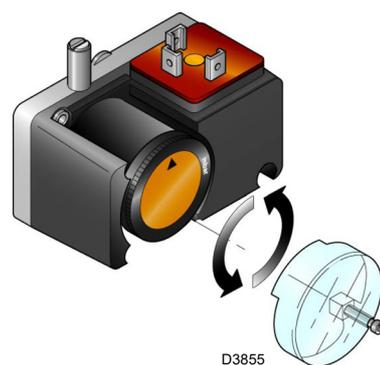


Fig. 36

6.8 Operation sequence of the burner

6.8.1 Burner start-up

- 0s** TL thermostat/pressure switch closure.
- 6s** Fan motor start. Servomotor starts: rotates 90° towards the right, i.e. until the intervention of the contact on the cam 4)
- 38s** The air damper is positioned to MAX output.
- 38s** Pre-purging phase with air delivery of the MAX output. Duration 32 seconds.
- 70s** The servomotor rotates left up to the angle set on the cam 2).
- 102s** The air damper and the gas butterfly valve set to MIN output (with cam 2).
- 103s** Ignition electrode strikes a spark.
- 109s** The VS safety valve and the VR adjustment valve open (rapid opening).
The flame is ignited at a low output level, point A (Fig. 37). There follows a progressive increase of the input, slow opening of the valve, up to the MIN output, point B (Fig. 37).
- 112s** The spark goes out.
- 133s** The starting cycle ends.

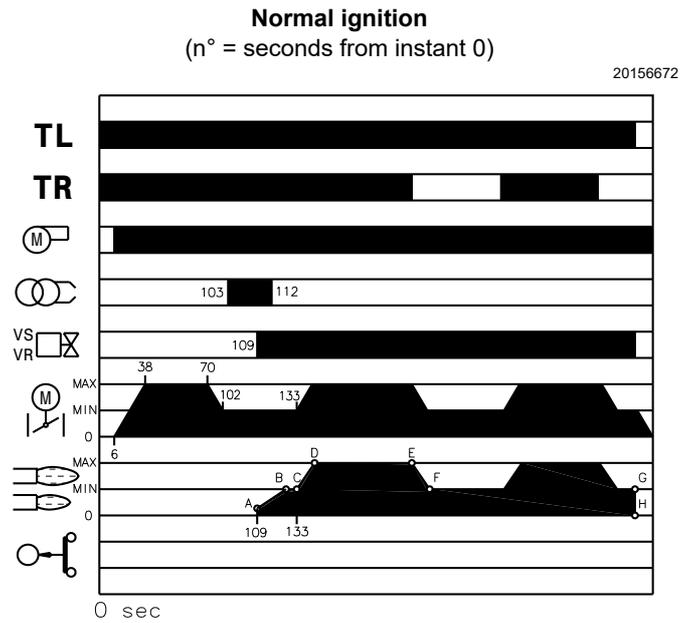


Fig. 37

6.8.2 Operation

Burner without the RWF ... output power regulator

Once the starting 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. 37). (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 output (butterfly valve), the air output (fan damper) and the air pressure.

Burner with the RWF ... output power regulator

See manual enclosed with the adjuster.

6.8.3 Burner flame goes out during operation

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

Ignition failure

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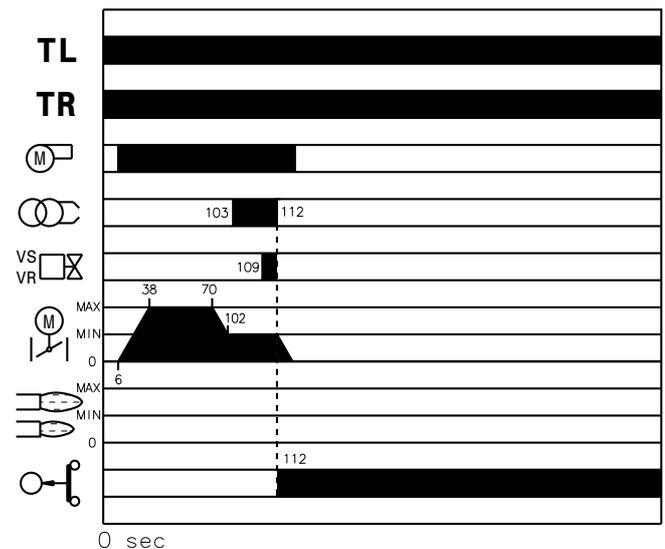


Fig. 38

6.8.4 Ignition failure

If the burner does not fire (Fig. 38), it goes into lockout within 3 sec. after the gas valve opens, 112 seconds after the control device TL closes and the pre-purging phase starts and lasts 17 seconds.

6.8.5 Control box reset

To carry out the control box reset, proceed as follows:

- Press the reset button 2)(Fig. 6 on page 14).

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.



Turn off 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

The optimum calibration of the burner requires an analysis of the flue gases.

Significant differences with respect to the previous measurements indicate the points where most 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 loosen screws.
Clean the outside of the burner.

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.

Boiler

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

Flame presence check

Check the level of the flame detection signal with the “Check mode” function from the flame control: the LEDs from 2 to 6 indicate the flame signal level, respectively. See “LED indicator and special function” on page 35.

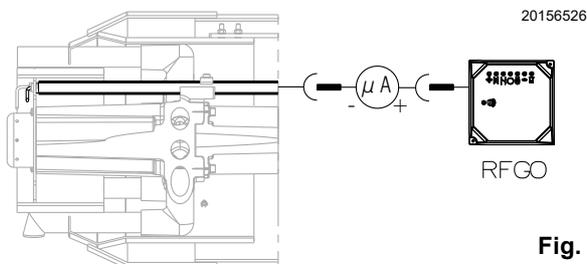


Fig. 39

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.

Gas leaks

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

Gas filter

Change the gas filter when it is dirty.

Combustion

If the combustion values measured before starting maintenance do not comply with applicable legislation or do not indicate efficient combustion, consult the Tab. M or contact our Technical Support Service to implement the necessary adjustments. It is advisable to set the burner according to the type of gas used and following the indications in Tab. M.

EN 676		Air excess			
		Max. output $\lambda \leq 1.2$		Min. output $\lambda \leq 1.3$	
GAS	CO ₂ theoretical max. 0% O ₂	CO ₂ % Calibration		CO	NO _x
		$\lambda = 1.2$	$\lambda = 1.3$	mg/kWh	mg/kWh
G 20	11.7	9.7	9.0	≤ 100	≤ 170
G 25	11.5	9.5	8.8	≤ 100	≤ 170
G 30	14.0	11.6	10.7	≤ 100	≤ 230
G 31	13.7	11.4	10.5	≤ 100	≤ 230

Tab. 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.



Turn off the fuel interception tap.



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

To open the burner, use the same procedure set out in “Access to head internal part” on page 20.

7.4 Closing the burner

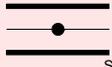
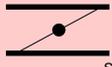
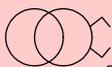
Refit following the steps described in “Access to head internal part” on page 20, but in reverse order; refit all burner components as they were originally assembled.



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

8 LED indicator and special function

8.1 Description of LED lamps

 S9740	Fan	It turns on when the fan motor is powered (T6) and blinks when RUN/CHECK switch is set to "CHECK" during damper movement phases, PTFI AND MTFI.
 S9741	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;

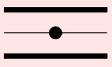
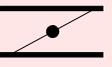
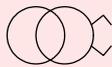
- check mode has a 2 minute timeout during the 2nd safety time. When the time out is expired, the flame control goes back to the normal operating status;
- check mode has a 2 minute timeout during the MTFI status. When the time out is expired, the flame control goes back to the normal operating status;
- 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

- 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.)
- LEDs indicate the error or lock-out code for troubleshooting.
- 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 37.

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.



WARNING

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.



WARNING

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.



WARNING

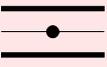
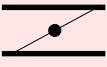
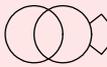
The regulation prohibits the system from allowing more than 5 remote reset attempts within a 15 minute time window.

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 processor diagnostics fault	The system detected the presence of voltage on T16, T17, T18 or T19 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the system is operating on a single-phase line (50/60Hz)
5	FR- No flame at the end of the 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**Analogue control signal converter kit**

Burner	Type	Code
All models	0/2 - 10V 0/4 - 20mA	20074479

Kit for modulating operation

Burner	Output regulator	Code
All models	RWF 50.2 3-POINT OUTLET	20073595
All models	RWF 55.5 COMPLETE WITH RS-485 INTERFACE	20074441
All models	RWF 55.6 COMPLETE WITH RS-485/PROFIBUS INTERFACE	20074442

Burner	Probe	Adjustment field	Code
All models	PT 100 temperature	- 100...+ 500°C	3010110
All models	4 - 20 mA pressure	0...2.5 bar	3010213
All models	4 - 20 mA pressure	0...16 bar	3010214

Potentiometer kit

Burner	Code
All models	20074487

Continuous purging kit

Burner	Code
All models	20074542

UV flame sensor kit

Burner	Code
All models	20144993

Soundproofing box kit

Burner	Type	dB(A)	Code
All models	C7	10	3010376

Spacer kit

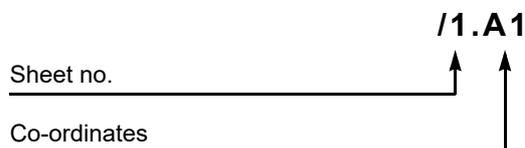
Burner	Code
All models	20008903

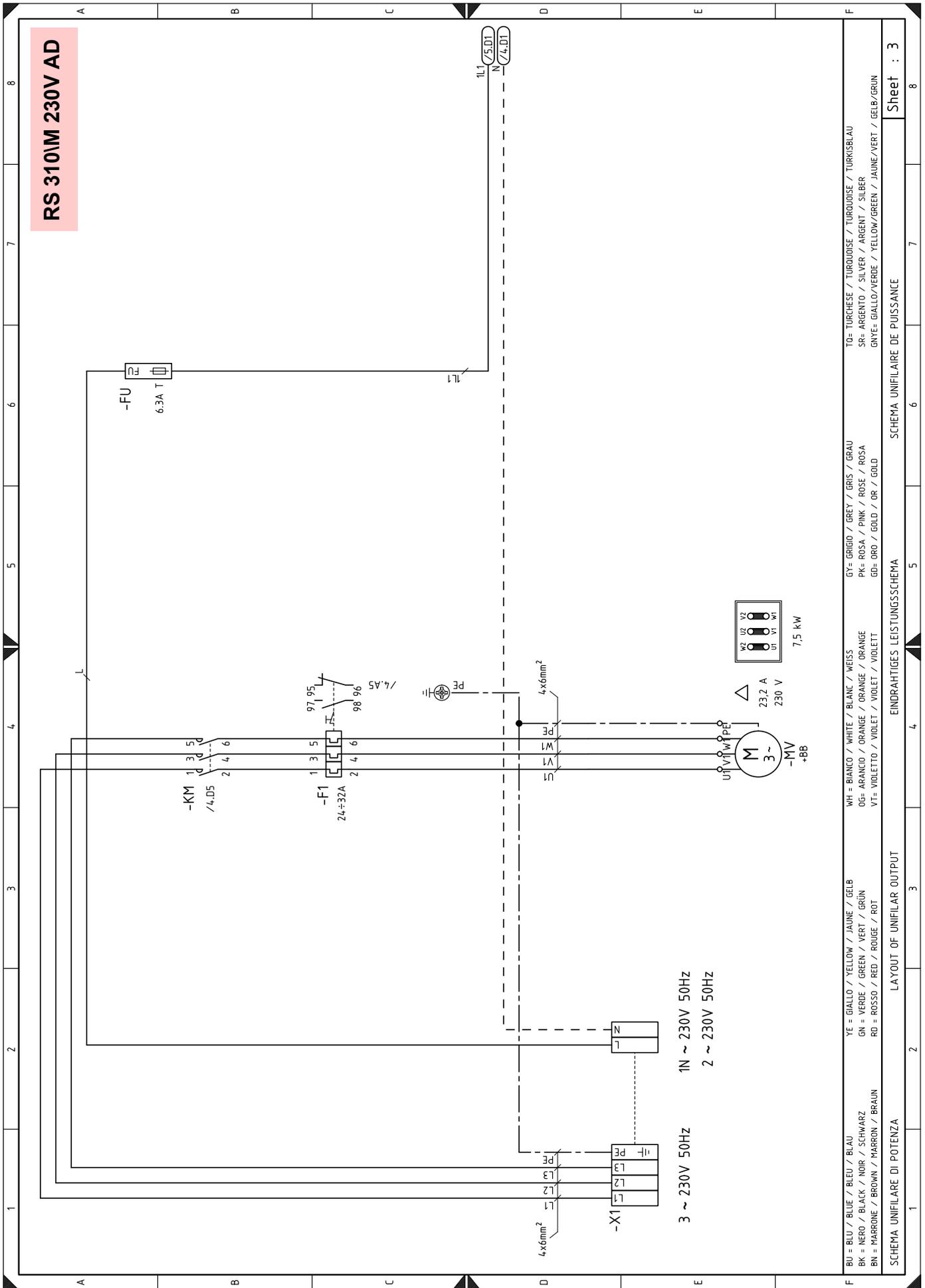
Gas trains in compliance with EN 676

Please refer to manual.

B Appendix - Electrical panel layout

1	Contents
2	Indication of references
3	Single line output diagram (RS 310/M MZ 230 V - Direct Start Up) Single line output diagram (RS 310/M MZ 400 V - Direct Start Up) Single line output diagram (RS 410/M MZ 230 V - Direct Start Up) Single line output diagram (RS 410/M MZ 400 V - Direct Start Up) Single line output diagram (RS 310/M MZ 400 V - Star/Triangle Start Up) Single line output diagram (RS 410/M MZ 400 V - Star/Triangle Start Up) Single line output diagram (RS 510/M MZ 400 V - Star/Triangle Start Up) Single line output diagram (RS 610/M MZ 400 V - Star/Triangle Start Up)
4	Functional layout (RS 310-410/M MZ 230/400 V - Direct Start Up) Functional layout (RS 310-410-510-610/M MZ 400 V - Star/Triangle Start Up)
5	Functional layout RFGO-A22 (RS 310-410/M MZ 230/400 V - Direct Start Up) Functional layout RFGO-A22 (RS 310-410-510-610/M MZ 400 V - Star/Triangle Start Up)
6	Functional layout RFGO-A22
7	Functional layout RFGO-A22
8	Output power regulator electrical wiring ... (Internal)
9	Electrical wirings that are the responsibility of the installer (RS 310-410/M MZ 230V - Direct Start Up) Electrical wirings that are the responsibility of the installer (RS 310-410/M MZ 400V - Direct Start Up) Electrical wirings that are the responsibility of the installer (RS 310-410-510-610/M MZ 400V - Star/Triangle Start Up)
10	Electrical wiring that the installer is responsible for
11	Regulator inputs/outputs

2 Indication of references



BU = BLU / BLUE / BLEU / BLAU	WH = BIANCO / WHITE / BLANC / WEISS	GY = GRIGIO / GREY / GRIS / GRAU	TO = TURCHESA / TURQUOISE / TURQUOISE / TURKISBLAU
BK = NERO / BLACK / NOIR / SCHWARZ	OG = ARANCIO / ORANGE / ORANGE	PK = ROSA / PINK / ROSE / ROSA	SR = ARGENTO / SILVER / ARGENT / SILBER
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RD = ROSSO / RED / ROUGE / ROT			

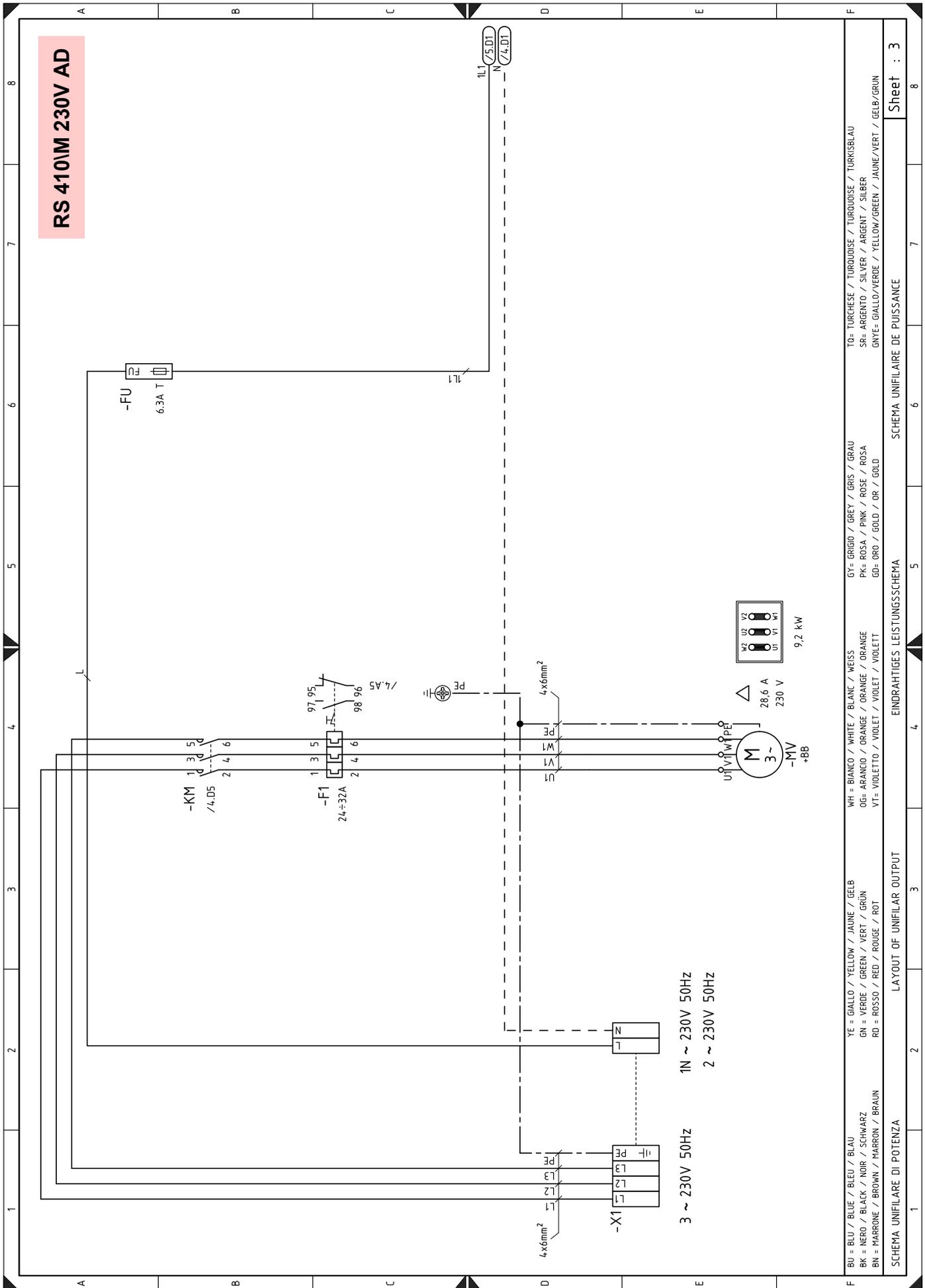
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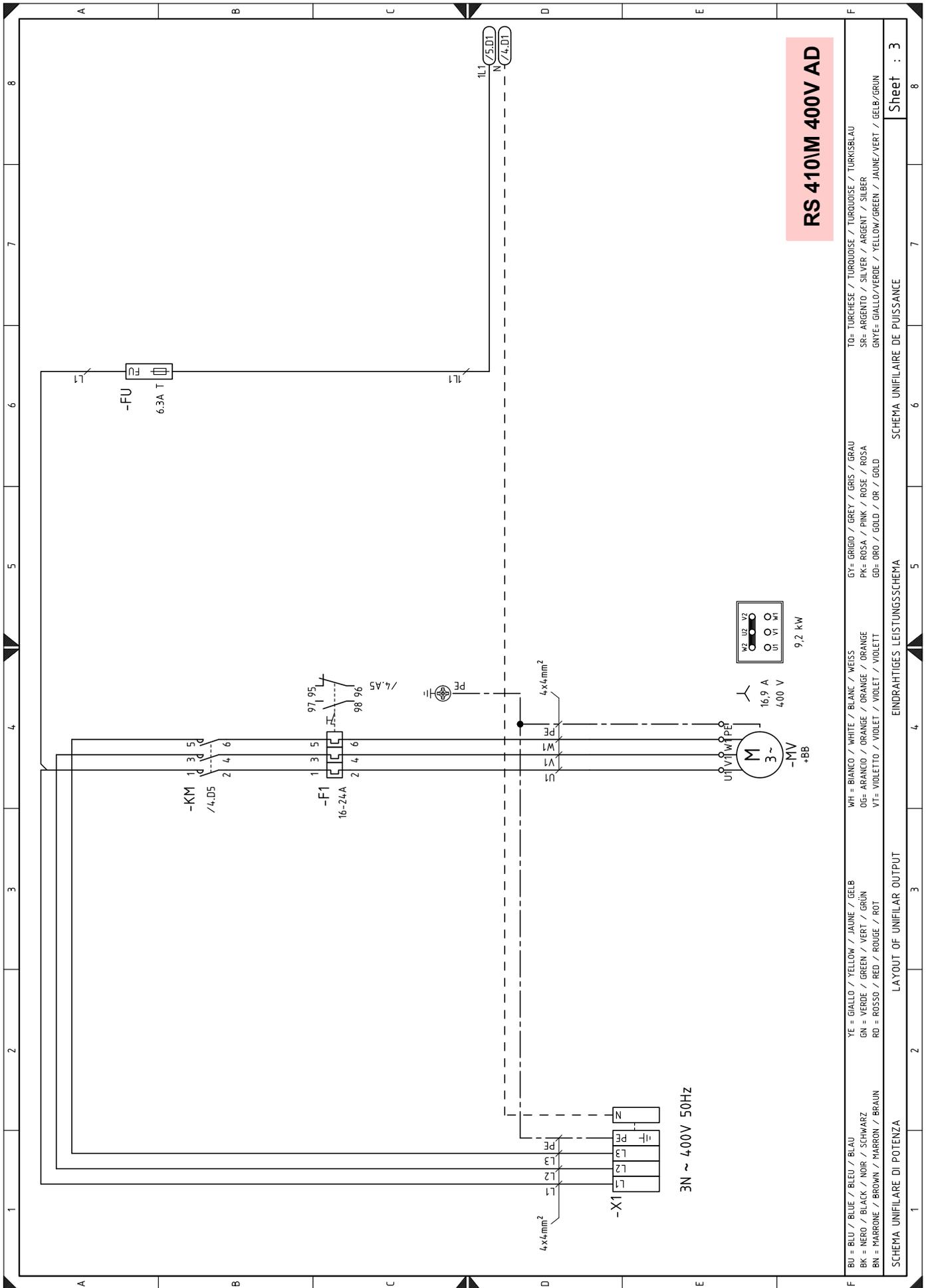
LAYOUT OF UNIFILAR OUTPUT

EINDRAHTIGES LEISTUNGSSCHEMA

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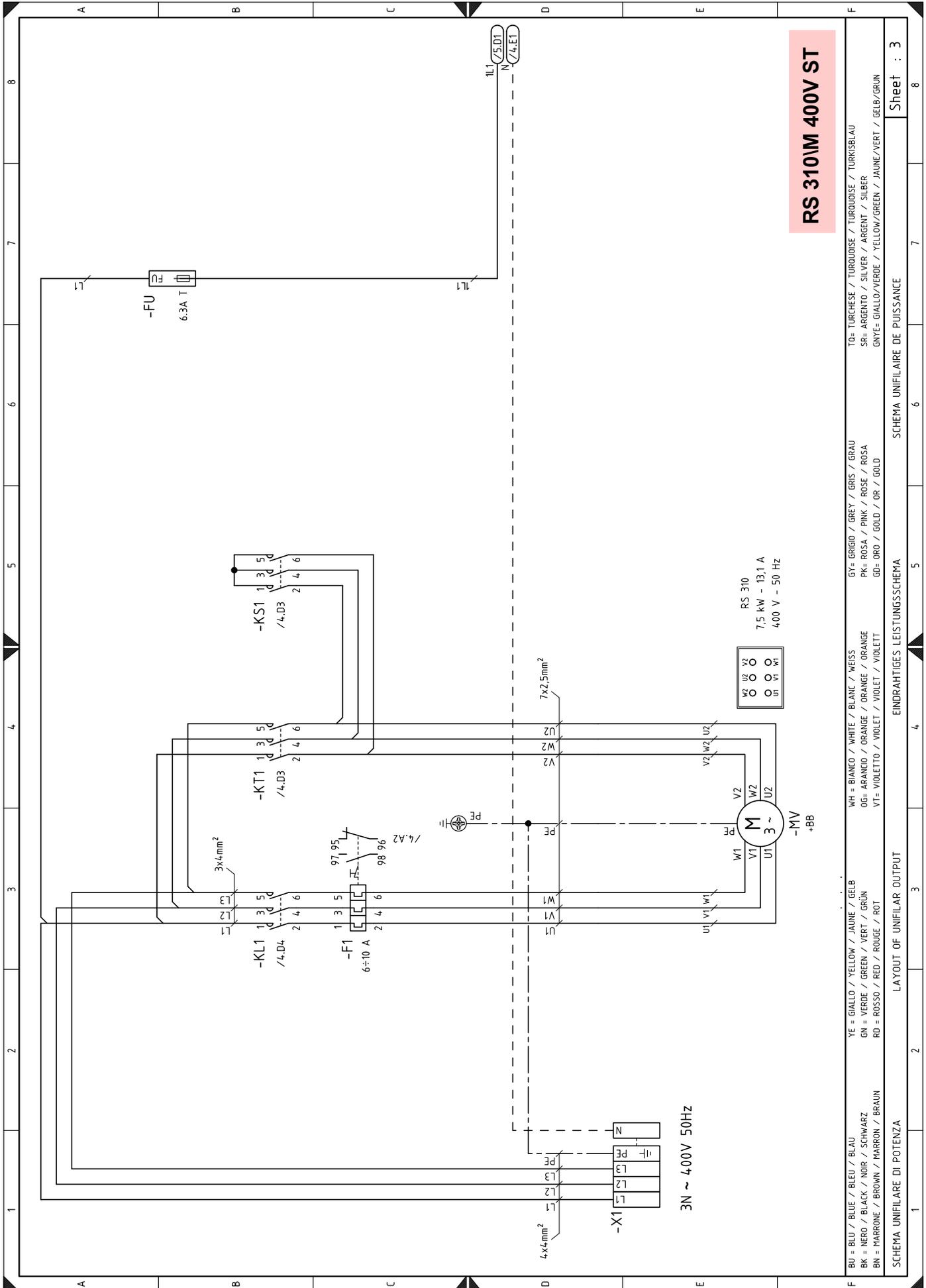
Sheet : 3





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BK = NERO / BLACK / NOIR / SCHWARZ	GN = VERDE / GREEN / VERT / GRÜN	OB = 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 = VIOLETTA / VIOLET / VIOLET / VIOLETT	GD = ORO / GOLD / OR / GOLD	GRYE = GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRÜN

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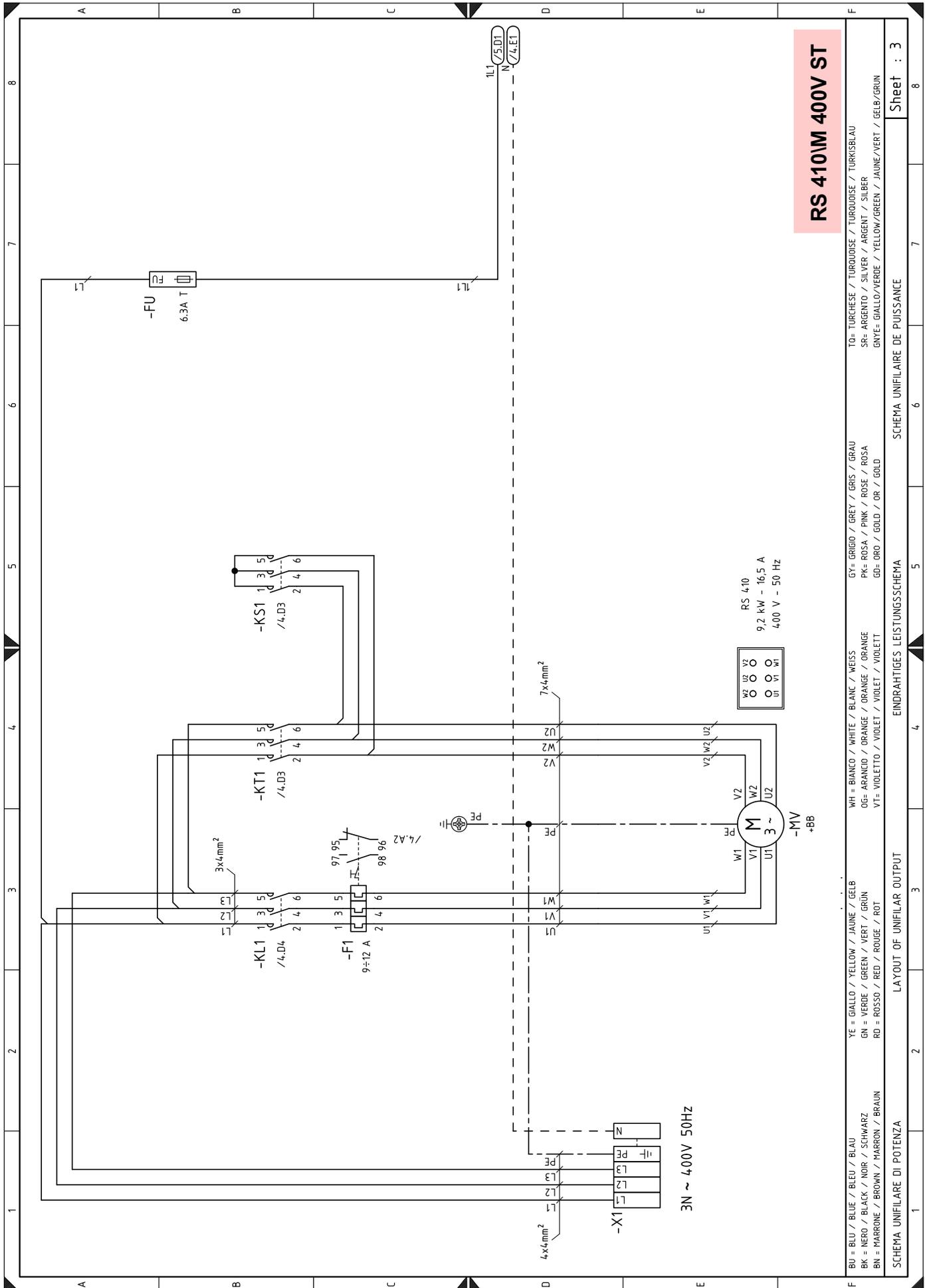


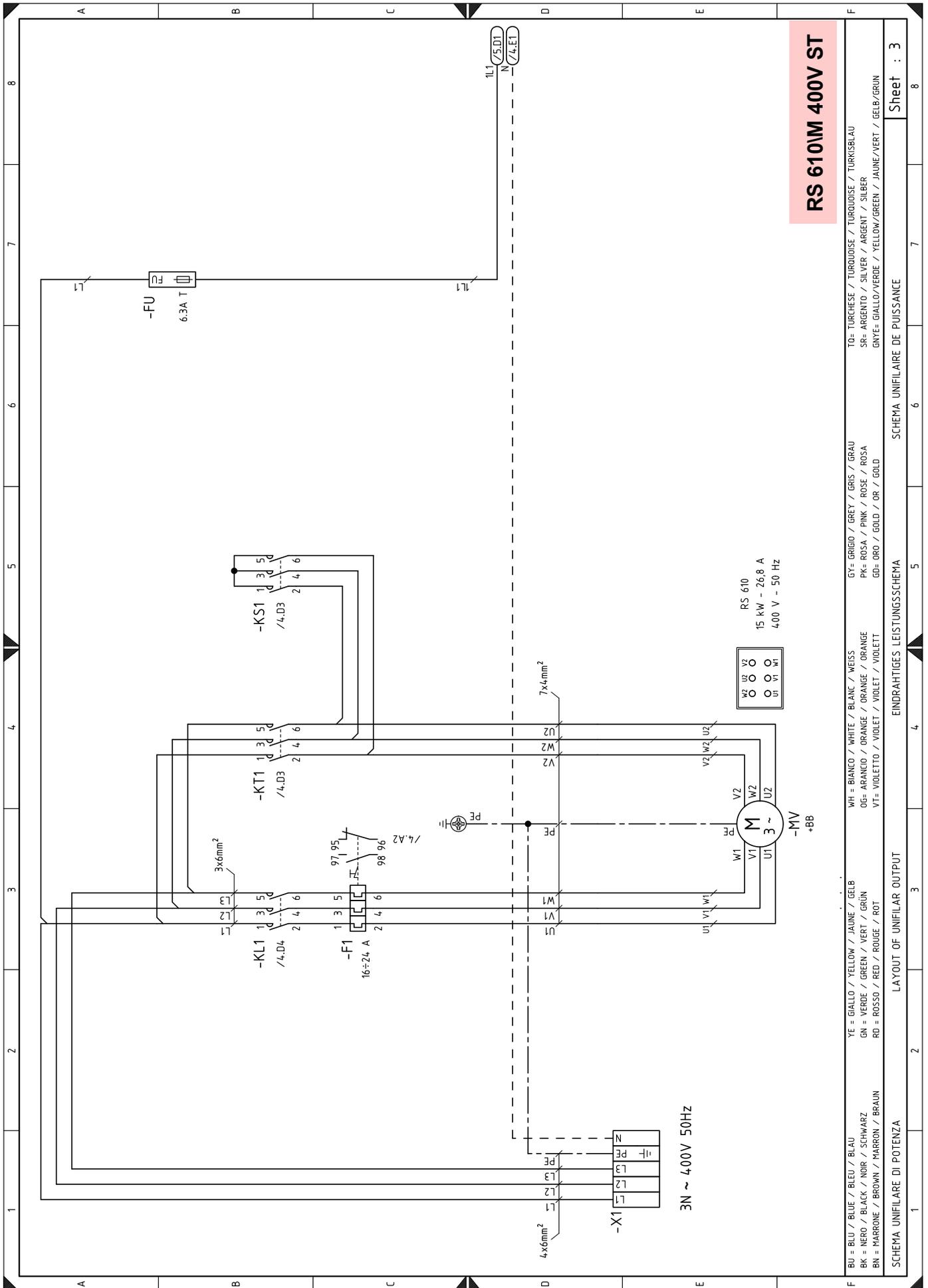
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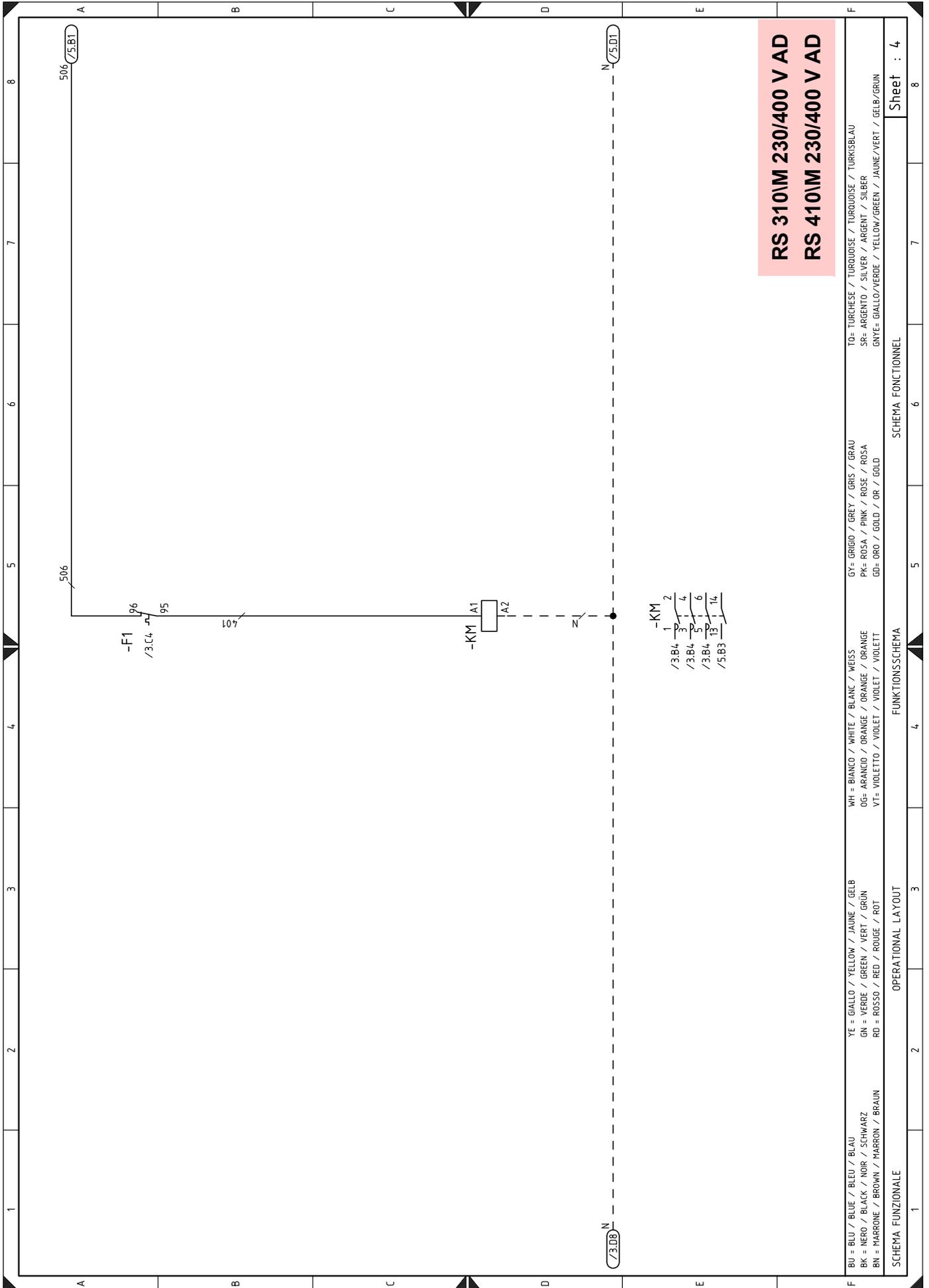
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 TO = TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
 SR = ARGENTO / SILVER / ARGENT / SILBER
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SCHEMA UNIFILARE DI POTENZA
 LAYOUT OF UNIFILAR OUTPUT
 EINDRAHTIGES LEISTUNGSSCHEMA
 SCHEMA UNIFILAIRE DE PUISSANCE

Sheet : 3







RS 310IM 230/400 V AD
RS 410IM 230/400 V AD

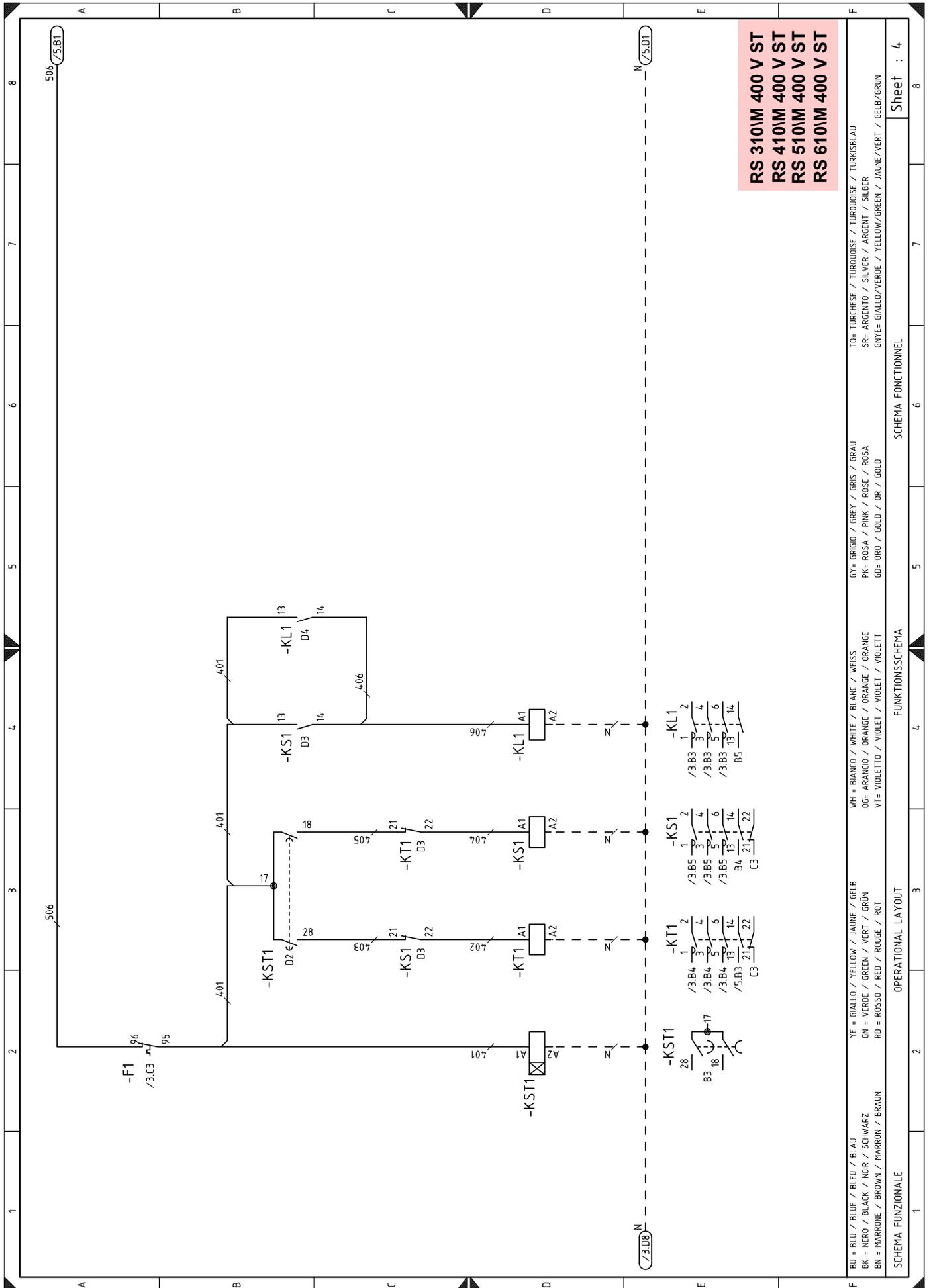
SCHEMA FUNZIONALE

OPERATIONAL LAYOUT

FUNKTIONSSCHEMA

SCHEMA FONCTIONNEL

Sheet : 4



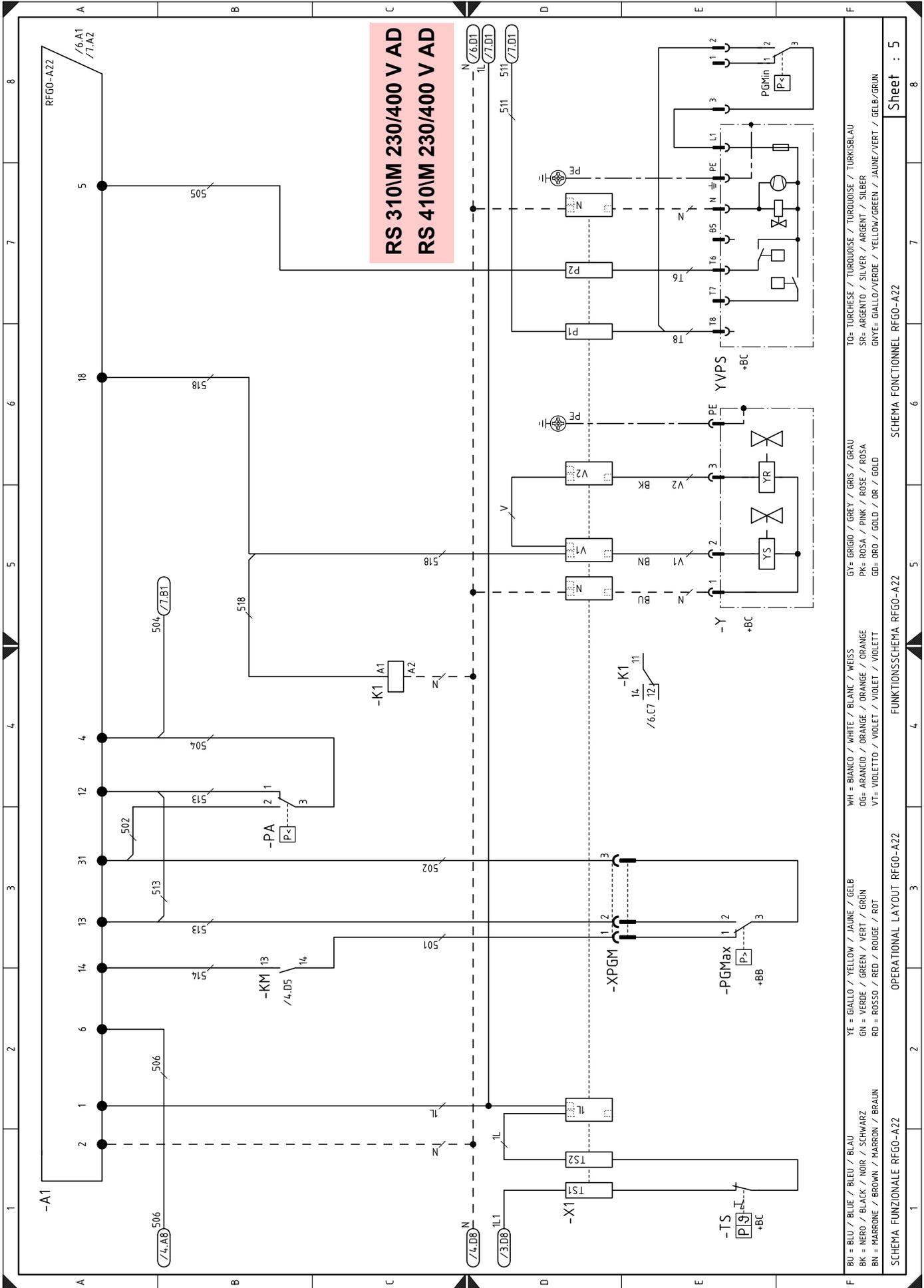
RS 310M 400 V ST
 RS 410M 400 V ST
 RS 510M 400 V ST
 RS 610M 400 V ST

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SCHEMA FUNZIONALE SCHEMA FUNCTIONNEL

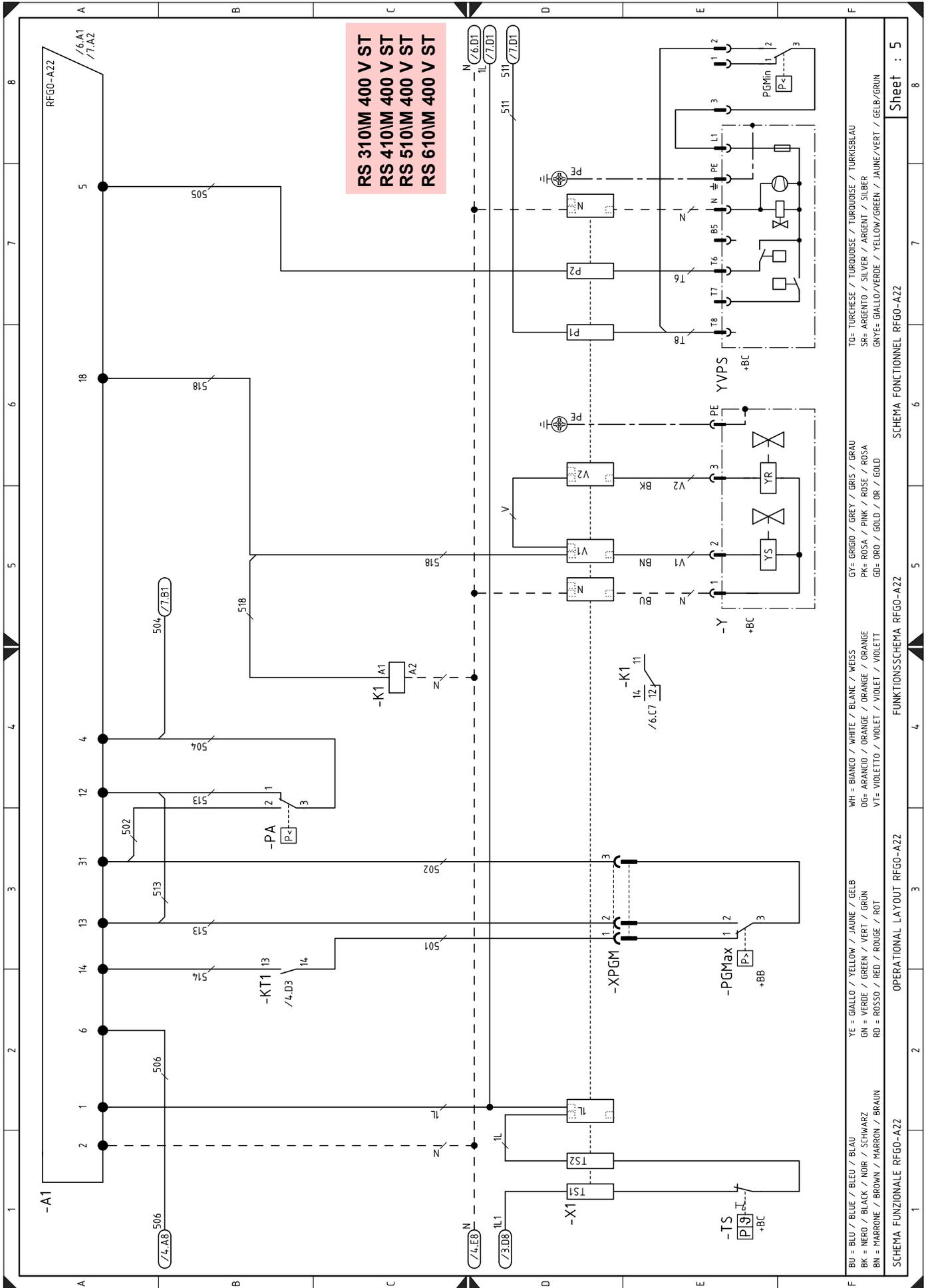
OPERATIONAL LAYOUT FUNKTIONSSCHEMA

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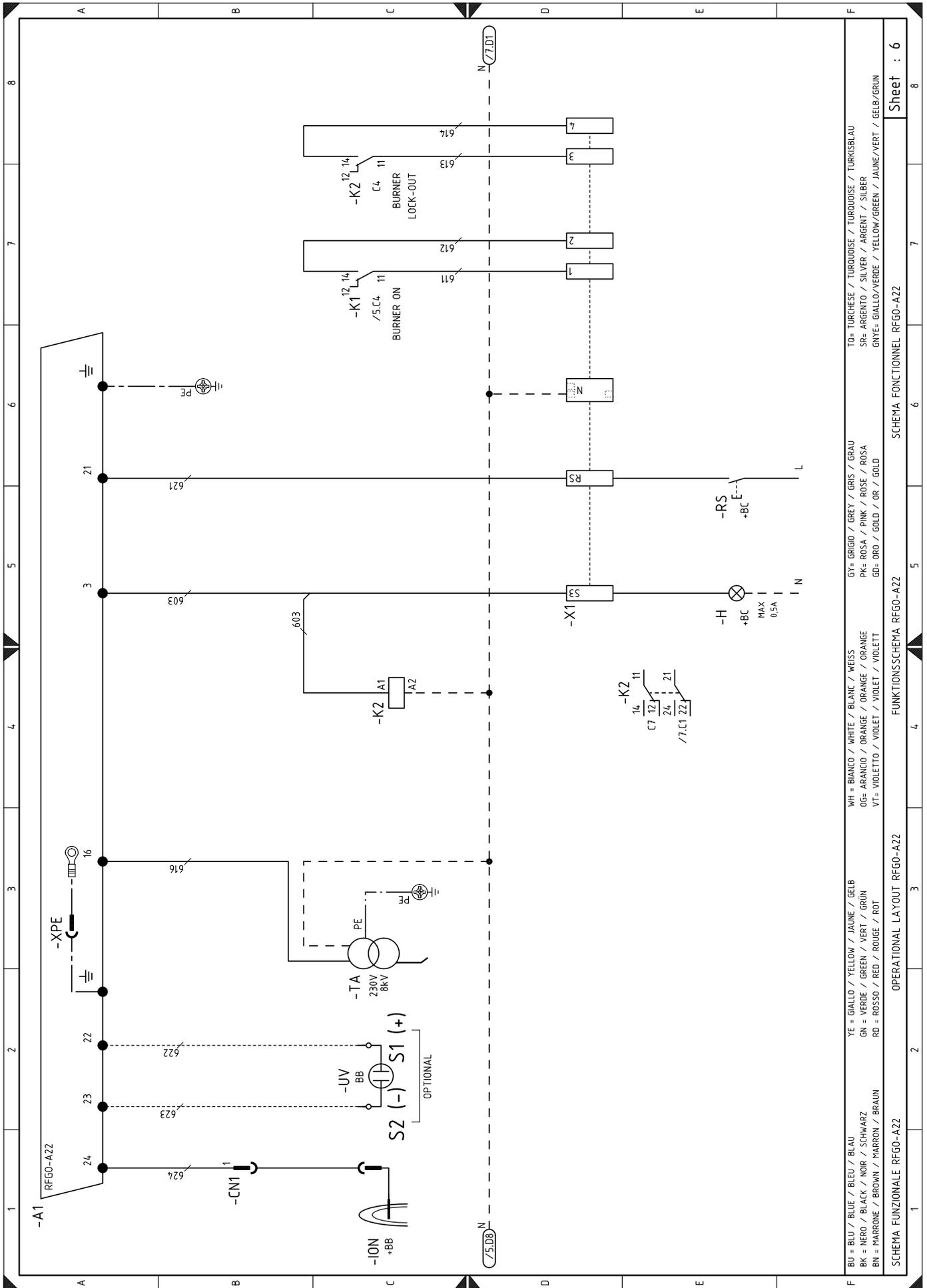


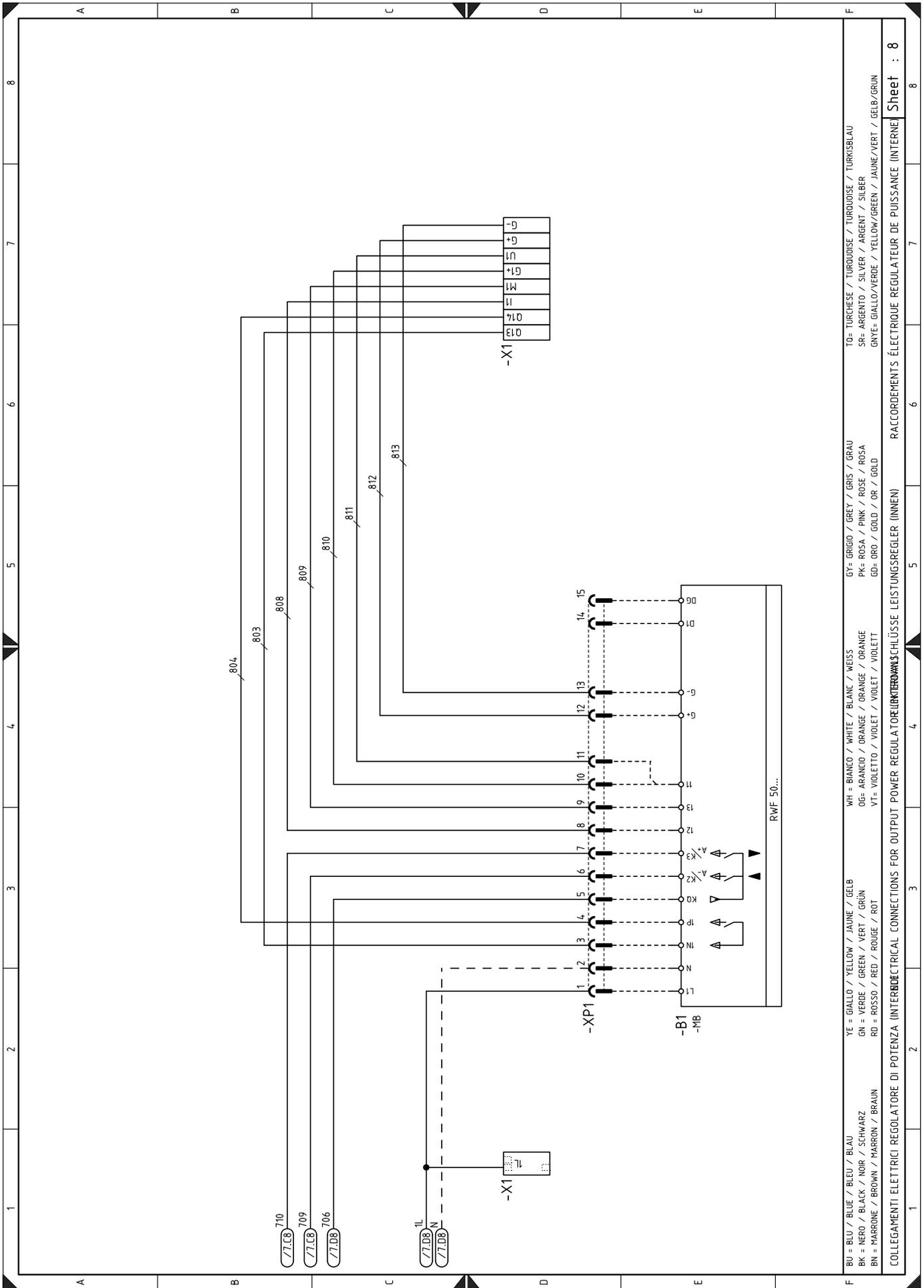
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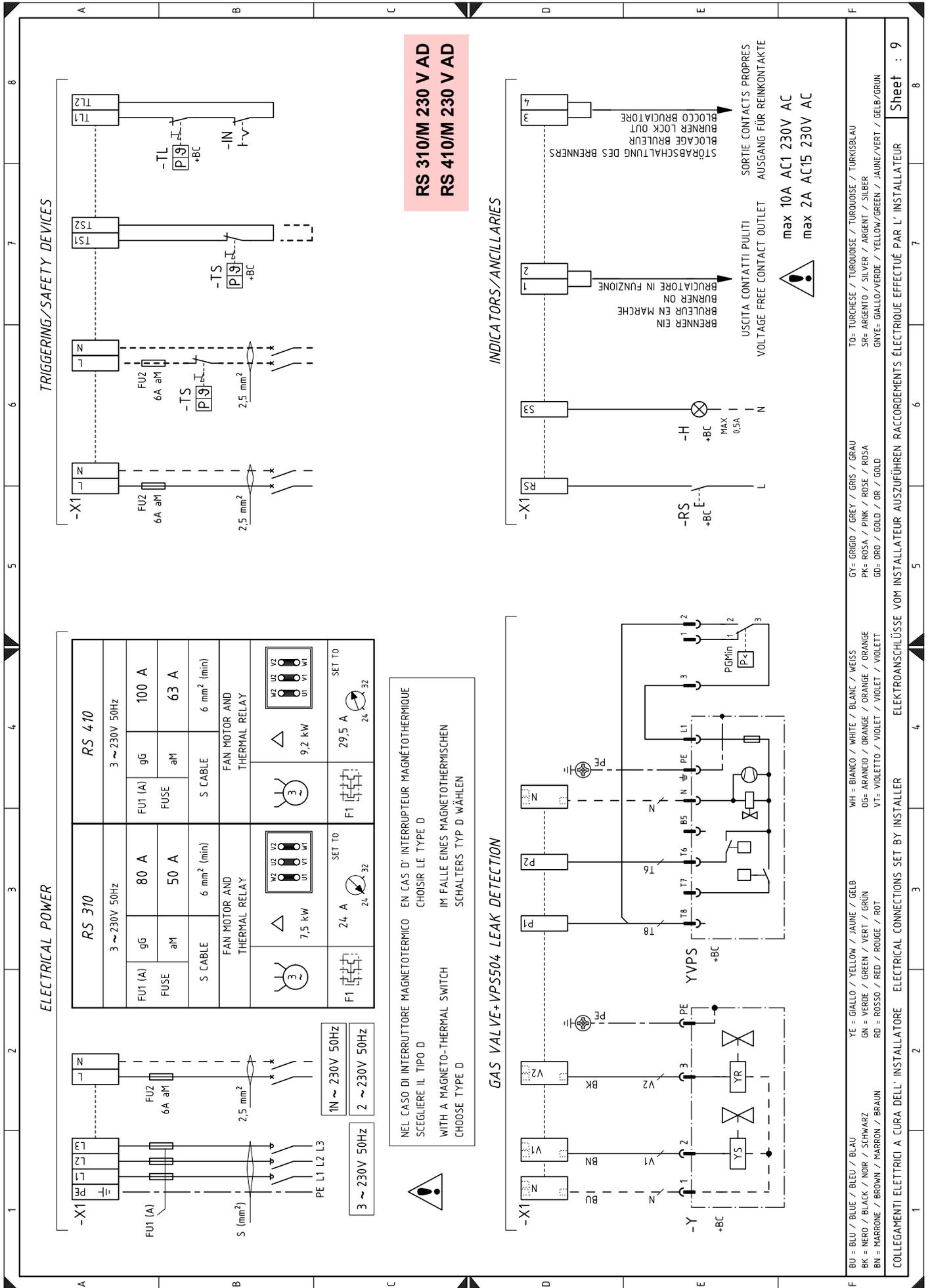
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- FUNKTIONSSCHEMA RFGO-AZZ
 SCHEMA FONCTIONNEL RFGO-AZZ
- OPERATIONAL LAYOUT RFGO-AZZ
 SCHEMA FUNZIONALE RFGO-AZZ
- Sheet : 5



BU = BLU / BLUE / BLEU / BLAU BK = NERO / BLACK / NOIR / SCHWARZ BN = MARRONE / BROWN / MARRON / BRAUN	YE = GIALLO / YELLOW / JAUNE / GELB GN = VERDE / GREEN / VERT / GRÜN RD = ROSSO / RED / ROUGE / ROT	WH = BIANCO / WHITE / BLANC / WEISS OG = ARANCIO / ORANGE / ORANGE / ORANGE VT = VIOLETTA / VIOLET / VIOLET / VIOLETT
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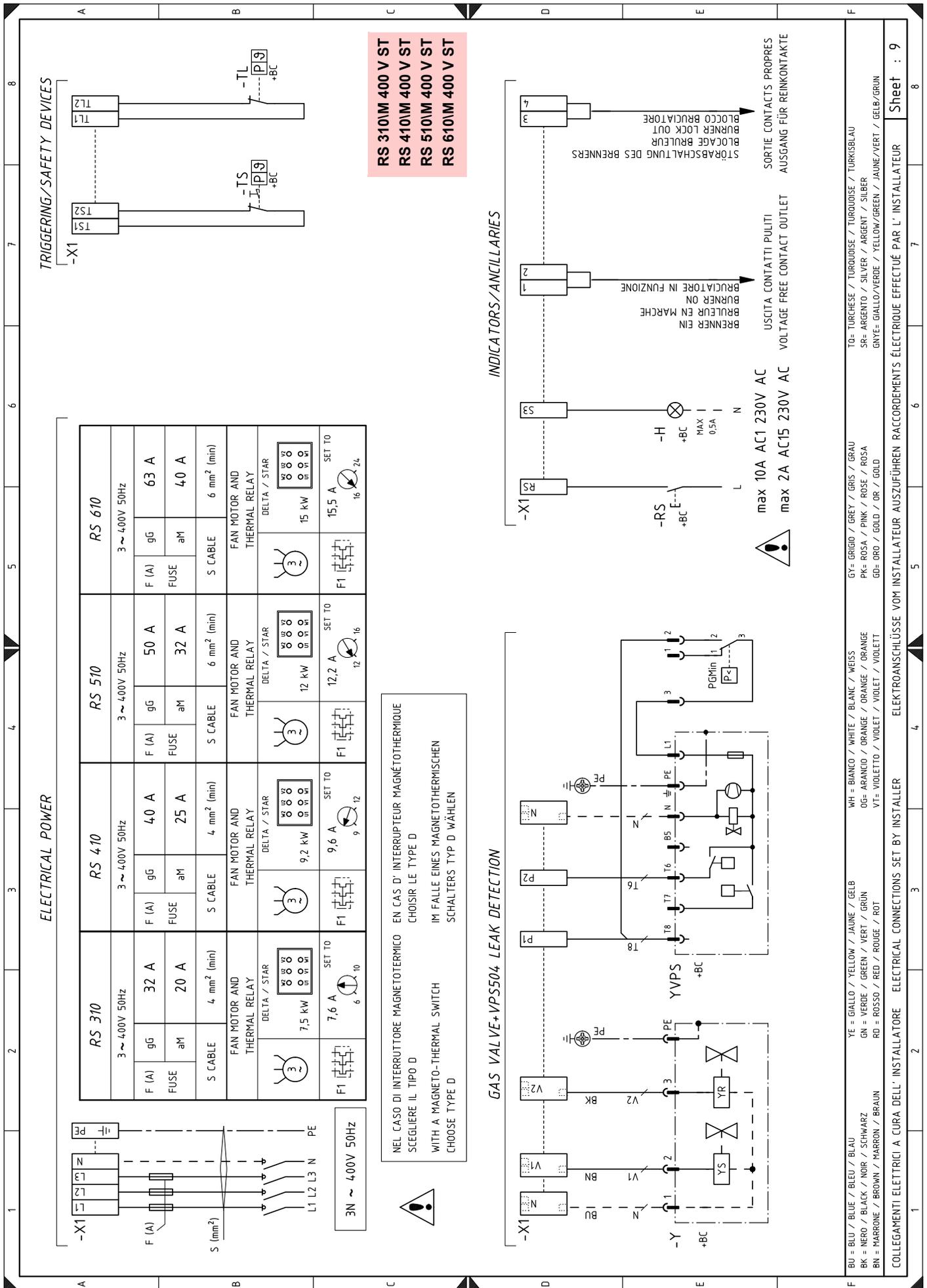


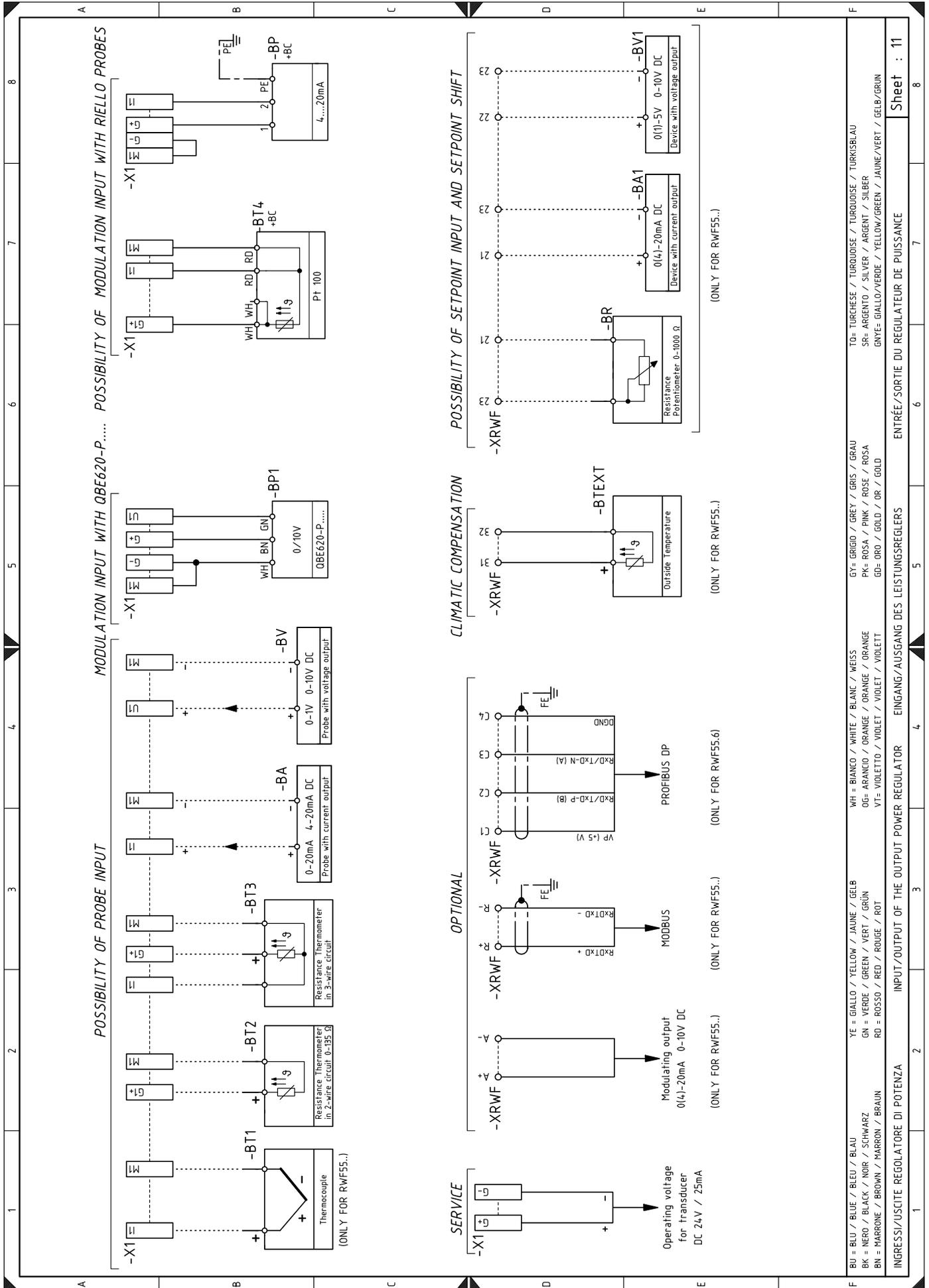
RS 310/M 230 V AD
RS 410/M 230 V AD

NEL CASO DI INTERRUPTORE MAGNETOTERMICO EN CAS D' INTERRUPTEUR MAGNÉTOHERMIQUE
SCEGLIERE IL TIPO D
WITH A MAGNETO-THERMAL SWITCH
CHOOSE TYPE D



- BU = BLU / BLUE / BLEU / BLAU
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- SR = ARGENTO / SILVER / ARGENT / SILBER
- GNYE = GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRÜN





Wiring layout key

A1	Electrical control box
B1	Output power regulator RWF50 internal
BA	Input in current DC 0...20 mA, 4...20 mA
BA1	Input in current DC 0...20 mA, 4...20 mA 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 setpoint
BV	Input in voltage DC 0...1 V, 0...10 V
BV1	Input in voltage DC 0...1 V, 0...10 V to modify remote setpoint
CN1	Connector for ionisation probe
F1	Fan motor thermal relay
FU	Auxiliary circuits safety fuse
H	Burner working lighting signal output
IN	Burner manual stop electric switch
ION	Ionisation probe
KL1	Star/triangle starter line contactor
KM	Direct start up contactor
KT1	Star/triangle starter triangle contactor
KS1	Start/triangle starter star contactor
KST1	Star/triangle starter timer
K1	Clean contacts output relay burner operating
K2	Clean contacts output relay burner lockout
MV	Fan motor
PA	Air pressure switch
PE	Burner earth
PGMin	Minimum gas pressure switch
PGMax	Maximum gas pressure switch
RS	Remote reset switch
S2	Off / automatic / manual selector
S3	Power increase / power reduction selector
SM	Servomotor
TA	Ignition transformer
TL	Limit thermostat/pressure switch
TR	Adjustment thermostat/pressure switch
TS	Safety thermostat/pressure switch
Y	Gas adjustment valve + gas safety valve
YVPS	Valve leak detection device
X1	Main terminal supply board
XM1	Servomotor connector 1
XM2	Servomotor connector 2
XM3	Servomotor connector 3
XP1	Connector for RWF output power regulator kit ... or signal converter
XPGM	Maximum gas pressure switch connector
XRWF	Terminal board for output power regulator RWF ...
UV	UV flame sensor (Optional only with kit)



If there is a problem with the fuse **FU**, there is a spare one in the fuse holder.

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