GB

Dual fuel light oil/gas burners

Modulating operation

CODE	MODEL	TYPE
20205568 - 20205664	RLS 310/M MX	1161T
20208593 - 20208594 20205742	RLS 410/M MX	1162T
20205565	RLS 510/M MX	1163T
20205563	RLS 610/M MX	1164T

20208972 (3) - 09/2025

Translation of the original instructions

1 Information and general warnings

1.1 Information about the instruction manual

1.1.1 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.

1.1.2 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.

1.1.3 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

1.1.4 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.

1.2 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.

2 Safety and prevention

2.1 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.

WARNING

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

2.2 Personnel training

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

The user:

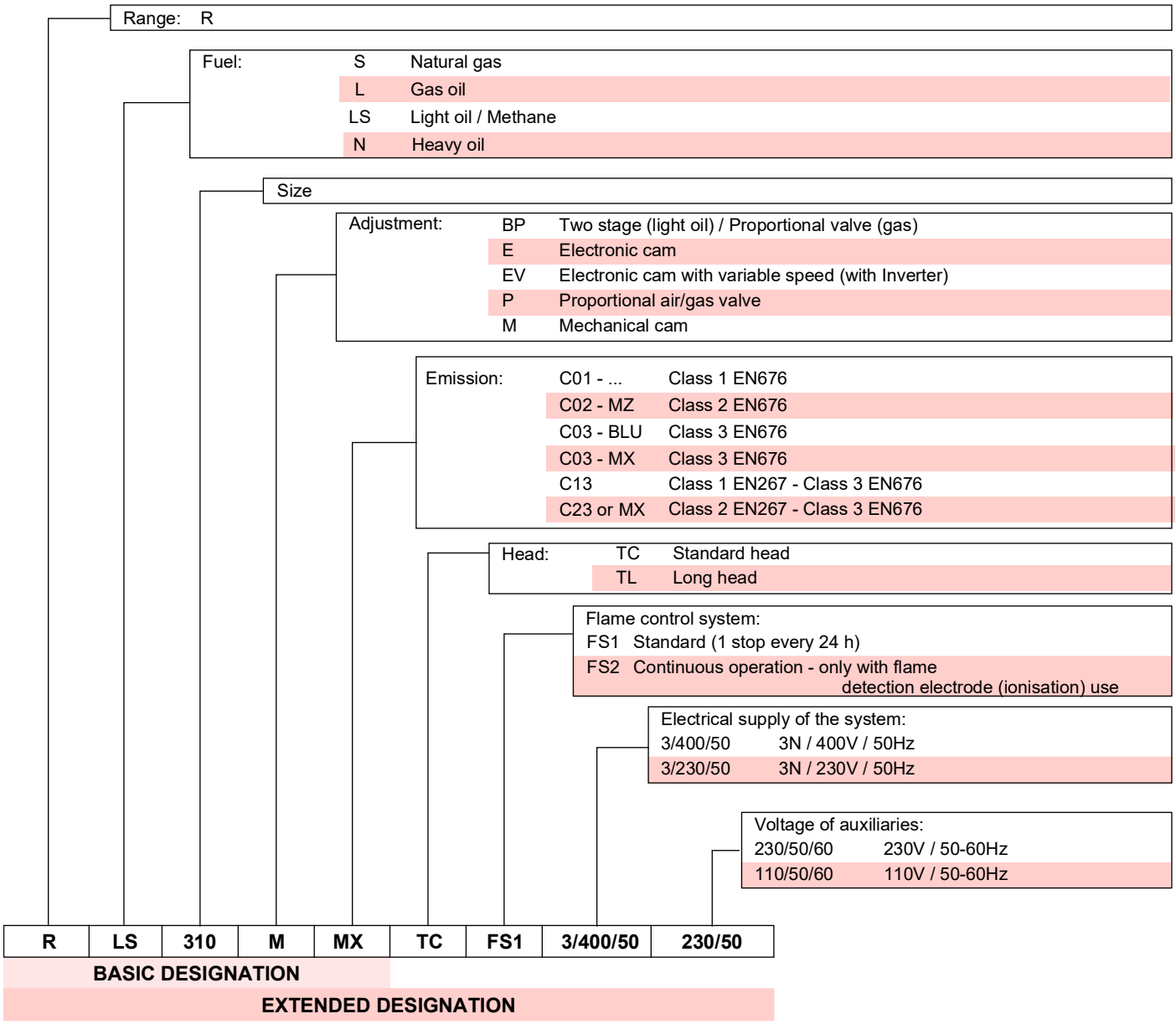
- undertakes to entrust the machine exclusively to suitably trained and qualified personnel;
- undertakes to inform his personnel in a suitable way about the application and observance of the safety instructions. With that aim, the user undertakes to ensure that everyone knows the use and safety instructions for his own duties.
- Personnel must follow 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 are obliged to 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 manufacturing company therefore accepts no responsibility whatsoever for any which may result from 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.

3 Technical description of the burner

3.1 Burner designation



3.2 Models available

Designation	Voltage	Start-up	Code
RLS 310/M MX	3/400/50	Star/Triangle	20205568
	3/400/50	Direct	20205664
RLS 410/M MX	3/400/50	Star/Triangle	20208593
	3/230/50	Direct	20208594
	3/400/50	Direct	20205742
RLS 510/M MX	3/400/50	Star/Triangle	20205565
RLS 610/M MX	3/400/50	Star/Triangle	20205563

Tab. A

3.3 Burner categories - Countries of destination

Gas category	Destination country
SE - FI - AT - GR - DK - ES - GB - IT - IE - PT - IS - CH - NO - BG - CZ - EE - HU - LT - LV - RO - SI - SK - TR	I_{2H}
DE	I_{2ELL}
NL	I_{2EK}
FR	I_{2Er}
BE	$I_{2E(R)}$
LU - PL	I_{2E}

Tab. B

3.4 Technical data

Model			RLS 310/M MX	RLS 410/M MX	RLS 510/M MX	RLS 610/M MX
Type			1161T	1162T	1163T	1164T
Power (1) Delivery (1)	min - max	kW Kg/h	600/1200 - 3600 50/100- 305	640/1500 - 4200 55/126- 352	660/1800 - 5170 56/195- 435	1000/2200 - 6155 110/185- 516
Fuels			Natural gas: G20 (methane gas) - G25 Light oil, max. viscosity at 20 °C: 6 mm^2/s (1.5°E - 6 cSt)			
Operation			FS1: Intermittent (min. 1 stop in 24 hours)			
Pump Minimum output at 16.5 bar Pressure range		kg/h bar	TA 3 700 7/40	TA 4 930 7/40	TA 5 1270 7/30	
Fuel temperature		°c max	140			
Nozzles		number	1			
Standard applications			Boilers: water, steam, diathermic oil			
Ambient temperature		°C	0 - 40			
Combustion air temperature		°C max	60			
Noise level (2) Sound pressure Sound power		dB(A)	 78 89	 80 91	 82.5 93.5	 85 96
Weigh complete with its packaging		kg	300			320
CE			CE-0476DQ3601			

Tab. C

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

(2) Sound pressure measured in manufacturer's combustion laboratory, with burner operating on test boiler and at maximum rated output. The sound power is measured with the “Free Field” method, as per EN 15036, and according to an accurate “Accuracy: Category 3”, as described by EN ISO 3746”.

3.5 Electrical data

DIRECT START UP

Model		RLS 410/M MX	RLS 310/M MX	RLS 410/M MX
Main electrical supply		3/3N ~ 230-400V+/-10% 50 Hz		
Absorbed electrical power Gas Light oil	kW max	 10.9 12.6	 9.1 10.8	 10.9 12.6
Protection level		IP 54		

STAR - TRIANGLE START UP

Model		RLS 310/M MX	RLS 410/M MX	RLS 510/M MX	RLS 610/M MX
Main electrical supply		3N ~ 400V +/-10% 50 Hz			
Absorbed electrical power Gas Light oil	kW max	 9.1 10.9	 10.9 12.6	 13.8 15.5	 17.1 18.8
Protection level		IP 54			

Tab. D

3.6 Maximum dimensions

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

Bear in mind that inspection of the combustion head requires the burner to be opened and the rear part 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.

WARNING

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

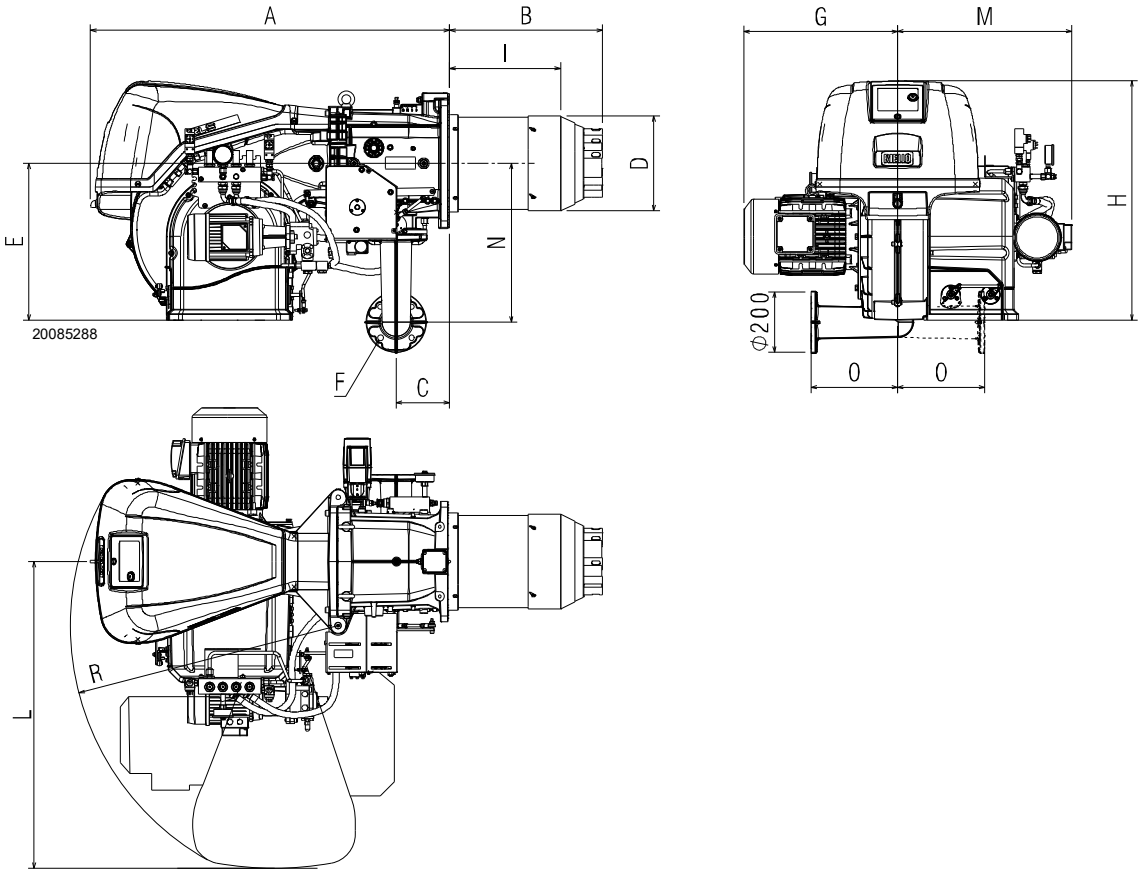


Fig. 1

mm	A	B	C	D	E	F*	G	H	I	L	M	N	O	R
RLS 310/M MX	1190	507	178	313	520	DN65	490	790	340	1015	576	528	290	890
RLS 410/M MX	1190	507	178	313	520	DN65	508	790	340	1015	576	528	290	890
RLS 510/M MX	1190	507	178	313	520	DN65	508	790	340	1015	576	528	290	890
RLS 610/M MX	1190	510	178	334	520	DN65	580	790	360	1015	576	528	290	890

Tab. E

3.7 Firing rates

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

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

Model	kW
RLS 310/M MX	600
RLS 410/M MX	640
RLS 510/M MX	660
RLS 610/M MX Gas	1000
RLS 610/M MX Light oil	1300

Tab. F

WARNING

The firing rate value (Fig. 2) has been obtained considering an ambient temperature of 20 °C, an atmospheric pressure of 1013 mbar (approx. 0 m a.s.l.), and with the combustion head adjusted as shown on page 19.

WARNING

Pre-calibration of the combustion head only for the burner model RLS 310/M MX:

If the maximum burner output of the burner falls within:

- area A of the firing rate, it is necessary to replace the gas nozzles with those supplied (No. 8 gas nozzles Ø 5.3), Fig. 15.

- area B of the firing rate, no modifications are required.

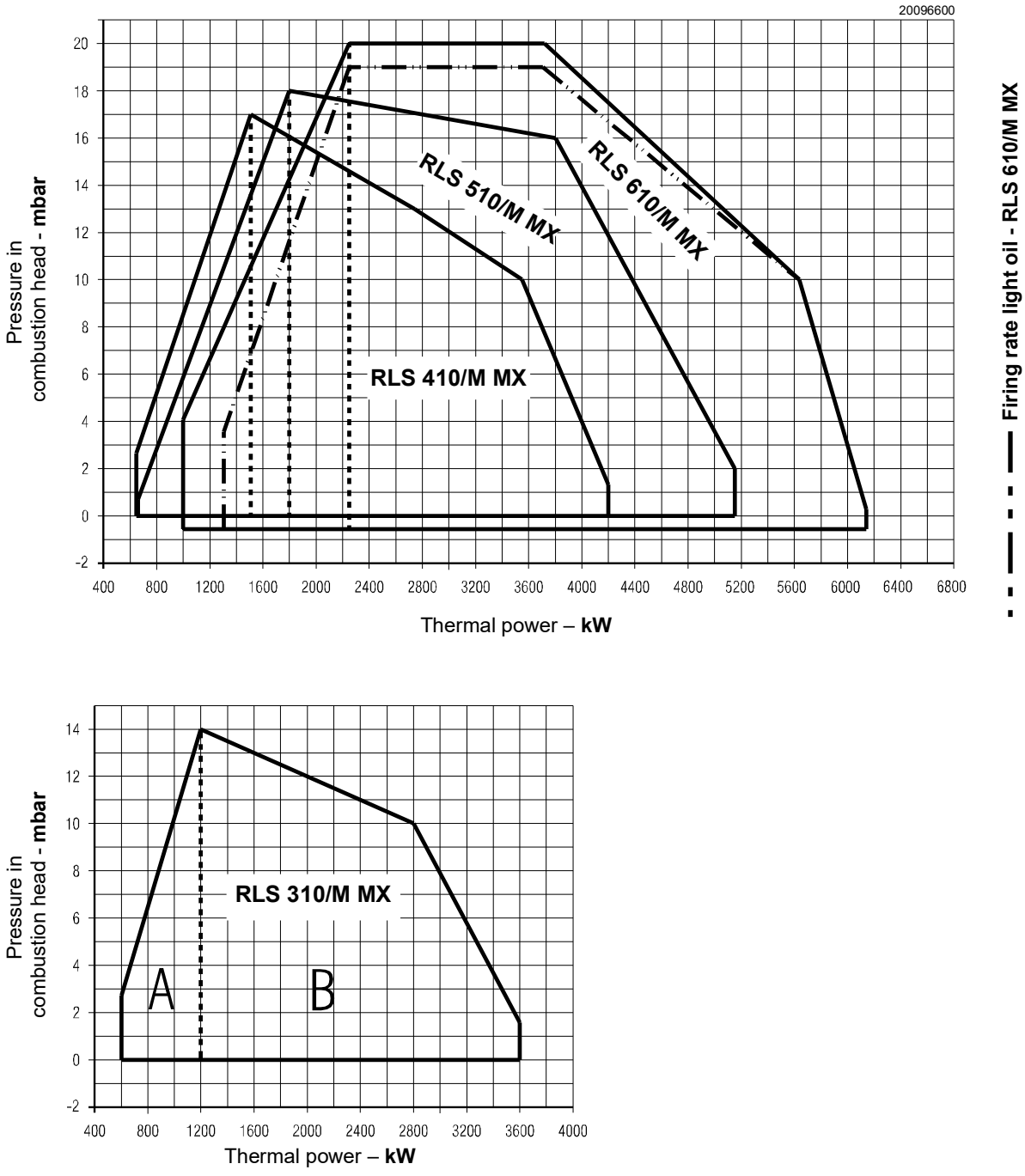


Fig. 2

3.8 Test boiler

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

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

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

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

Example: RLS 510/M MX
Output 5000 kW - diameter 100 cm - length 5 m

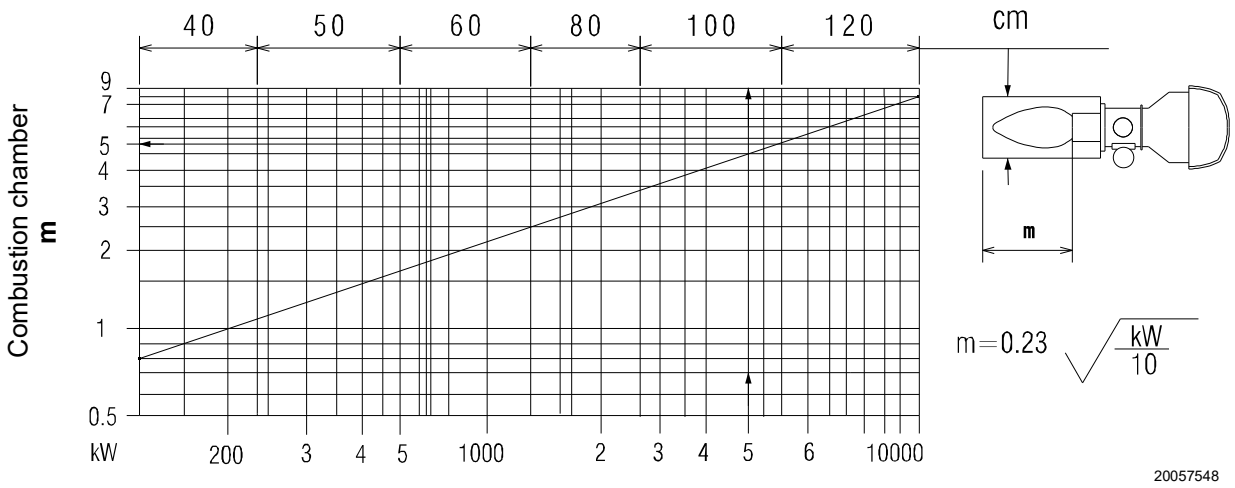
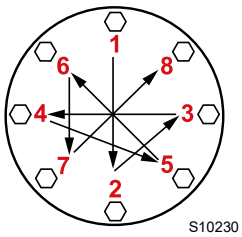


Fig. 3

3.9 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
Flexible hoses . . . . . No. 2
Hydraulic fittings. . . . . No. 2
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
Gas nozzles (only for version RLS 310/M MX) . . . . . No. 8
Instructions. . . . . No. 1
Spare parts list . . . . . No. 1

It is recommended to tighten the screws of the gas flange with a tightening torque of **40** Nm ±10%.



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

3.10 Burner description

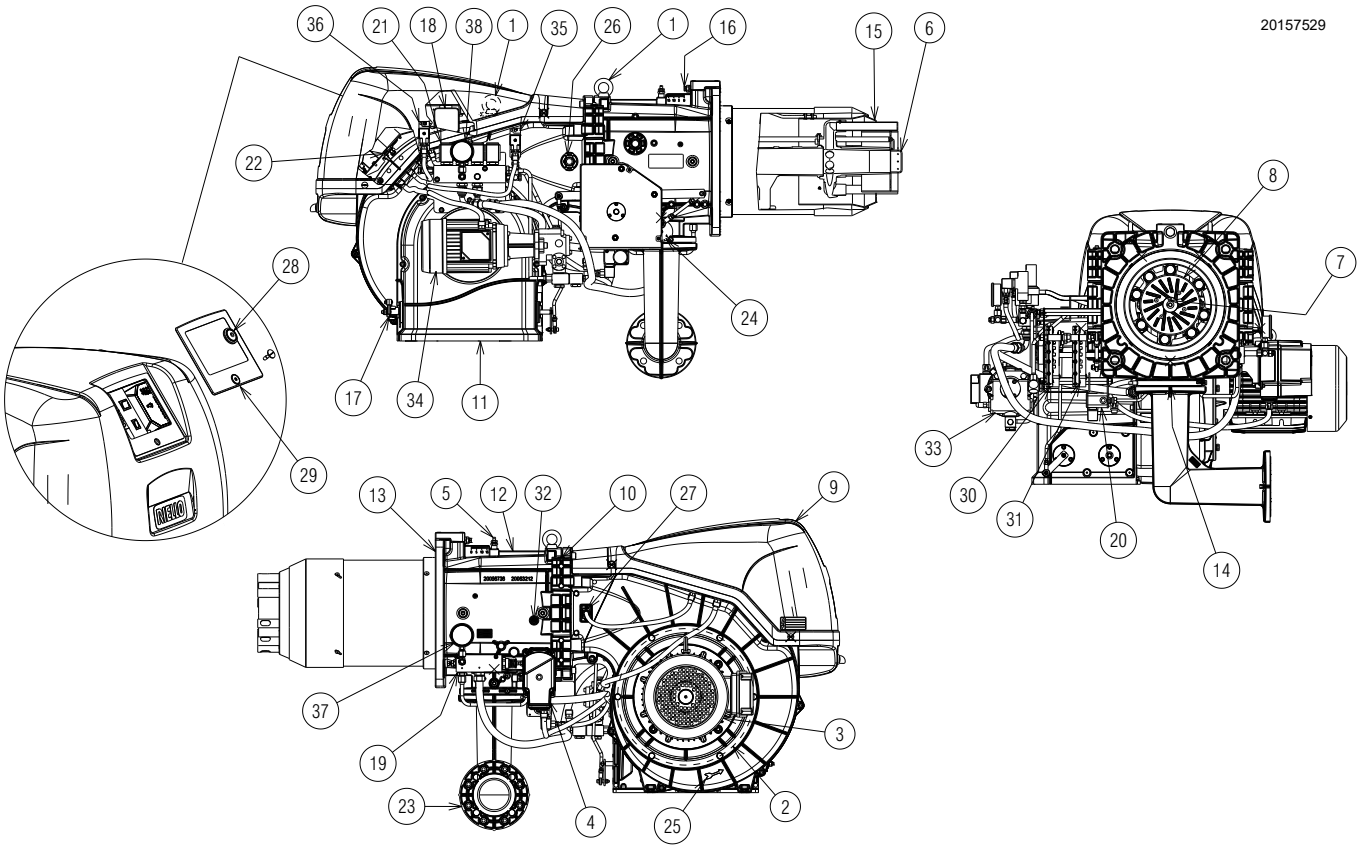


Fig. 4

1 Lifting rings
2 Fan
3 Fan motor
4 Air/gas servomotor
5 Combustion head gas pressure test point
6 Combustion head
7 Ignition electrodes
8 Flame stability disk
9 Electrical panel casing
10 Hinge for opening the burner
11 Fan air inlet
12 Pipe coupling
13 Gasket for boiler fixing
14 Gas butterfly valve
15 Shutter
16 Combustion head movement screw
17 Air damper control lever
18 Air pressure switch
19 Oil modulator
20 Maximum gas pressure switch with pressure test point
21 Valve group
22 Pressure test point for air pressure switch “+”
23 Gas train adapter
24 Gas butterfly valve control lever
25 Indication for checking the rotation direction of the purging motor
26 Flame inspection window
27 Flame sensor
28 Reset button
29 Transparent protection
30 Variable profile cam (air)
31 Variable profile cam (gas)
32 Combustion head air pressure test point
33 Pump
34 Pump motor
35 Maximum oil pressure switch
36 Minimum oil pressure switch
37 Nozzle return pressure gauge
38 Nozzle delivery pressure gauge

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

WARNING

To open the burner see section “Access to head internal part” on page 18.

3.11 Electrical panel description

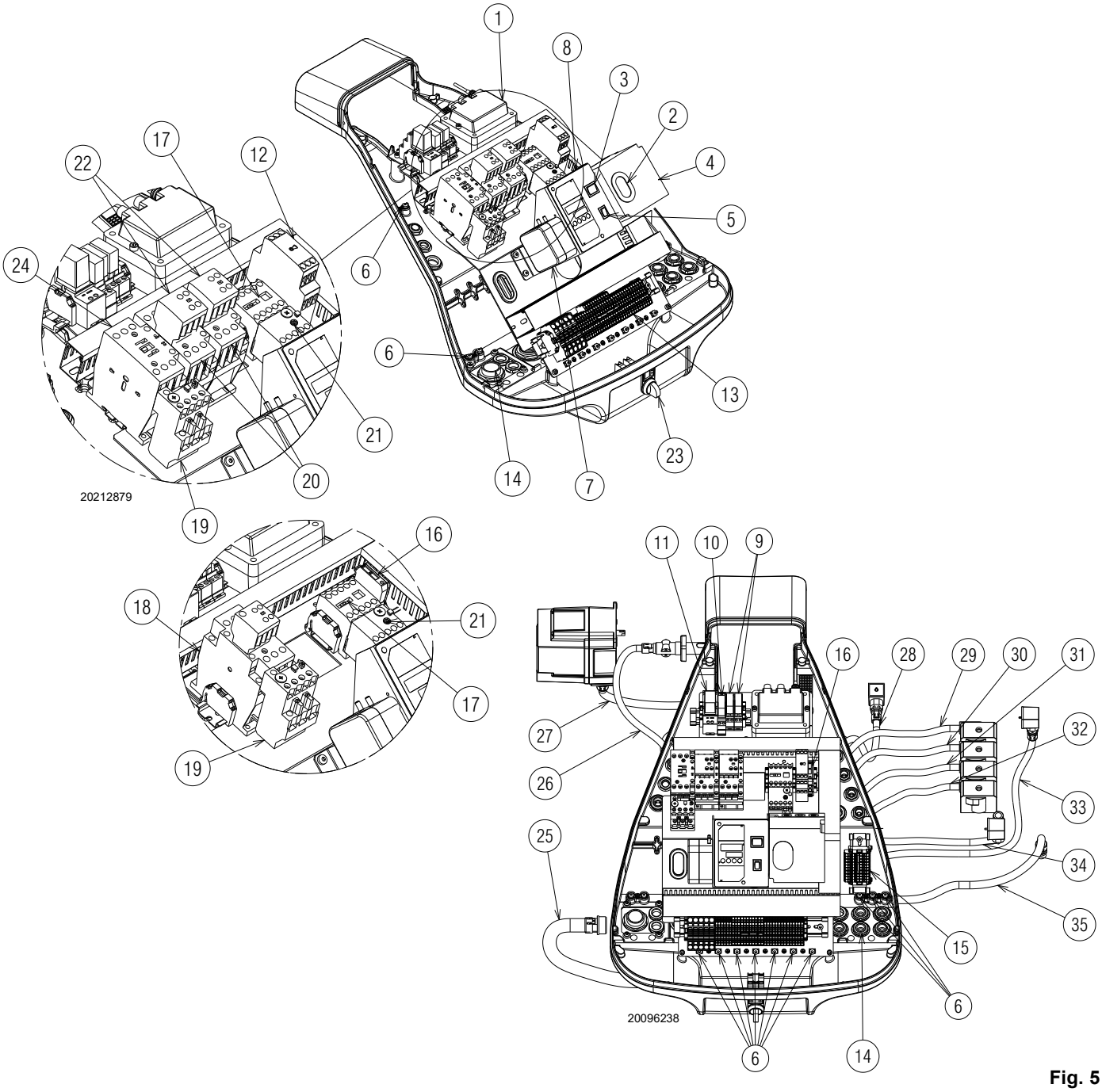


Fig. 5

1 Ignition transformer
2 Burner state indicator light and reset button.
3 OFF-automatic-manual selector
4 Flame control
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 in lock-out and that the burner is operating
10 Oil enable relay
11 Oil enable relay
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 Valve group terminal board
16 Auxiliary circuits fuse (includes a spare fuse)
17 Pump motor contact maker
18 Direct start up line contactor
19 Fan motor thermal relay (with reset button)
20 Triangle contactor (Star/triangle start up)
Star contactor (Star/triangle start up)
21 Pump motor thermal relay
22 Auxiliary contacts (Star/triangle start up)
23 Fuel selector
24 Star/triangle start-up line contactor
25 Fan motor cables sheath
26 Flame sensor sheath
27 Servomotor sheath
28 Maximum gas pressure switch sheath
29 Safety valve sheath (VS1)
30 Return line valve sheath (VR)
31 Working valve sheath (VF)
32 Safety valve sheath (VS)
33 Maximum oil pressure switch sheath
34 Minimum oil pressure switch sheath
35 Pump motor cables sheath

3.12 Flame control (LFL...)

Important notes

WARNING

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

The flame control LFL1... 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 LFL1... flame control connection area, fully disconnect the system from the power supply (omnipolar separation).
➤ Protection against electrocution from the flame control 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 flame control must not be operated, even if it displays no evident damage.
➤ **Do not press the reset button or the remote reset button of the flame control for more than 10 seconds because this will damage the internal relay.**

For safety and reliability, comply with the following instructions:
– Avoid conditions that can favour the development of condensate and humidity. Otherwise, before switching on again, make sure that the entire flame control is perfectly dry!
– Static charges must be avoided since they can damage the flame control's electronic components when touched.

Use

The LFL1... flame control is a control and supervision system of medium and large capacity forced draft burners for intermittent operation (at least one controlled shutdown every 24 hours).

Installation notes

- Check the electrical wiring inside the boiler complies with the national and local safety regulations.
- Do not confuse the powered conductors with the neutral ones.
- Ensure that spliced wires cannot get into contact with neighbouring terminals. Use adequate ferrules.
- Arrange the H.V. ignition cables separately, as far as possible from the flame control and the other cables.
- When wiring the unit, make sure that AC 230 V mains voltage cables are run strictly separate from extra low-voltage cables to avoid risks of electrical shock hazard.

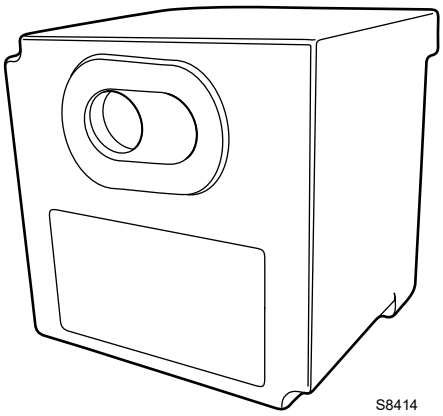


Fig. 6

Electrical wiring of the flame detector

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

- Always separate the detector cables from the other cables:
  – The capacitive reactance of the line reduces the size of the flame signal.
  – Use a separate cable.
- Respect the allowed cable lengths.
- The ionisation probe is not protected against the risk of electrocution. When connected to the electricity supply, the ionisation probe must be protected against any accidental contact.
- Position the ignition electrode and the ionisation probe so that the ignition spark cannot form an arc on the probe (risk of electric overcharge).

Technical data

Mains voltage	AC 230 V -15 % / +10 %
Mains frequency	50 / 60 Hz ±6 %
Fuse (Internal)	T6.3H250V
Primary fuse (external)	max. 10 A
Weight	approx. 1 kg
Power absorption	approx. AC 3.5 VA
Protection level	IP40
Safety class	II
Input current at terminal 1	max. 5 A continuous (peaks of 20 A / 20 ms)
Load on the control terminals	max. 4 A continuous (peaks of 20 A / 20 ms)
Environmental conditions	
Operation Climatic conditions Mechanical conditions Temperature range Humidity	DIN EN 60721-3-1 Class 1K3 Class 1M2 -20...+60°C < 95% RH

Tab. G

3.13 Servomotor SQM40 ...

Warnings

WARNING

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.


S8907

Fig. 7

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°

WARNING

Never adjust the red cam No. 1 more than 135° 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

Tab. H

3.14 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. 8.

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”.**

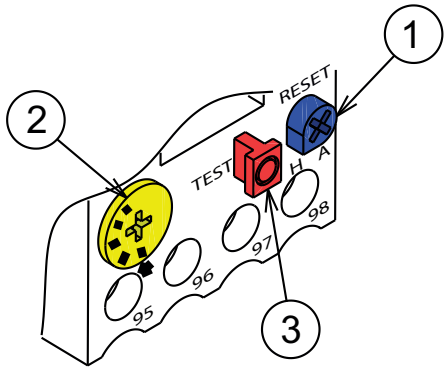


Fig. 8

3.15 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. 9).

If this is not the case:

➤ set the burner switch to “0” (off) and wait for the flame control 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.

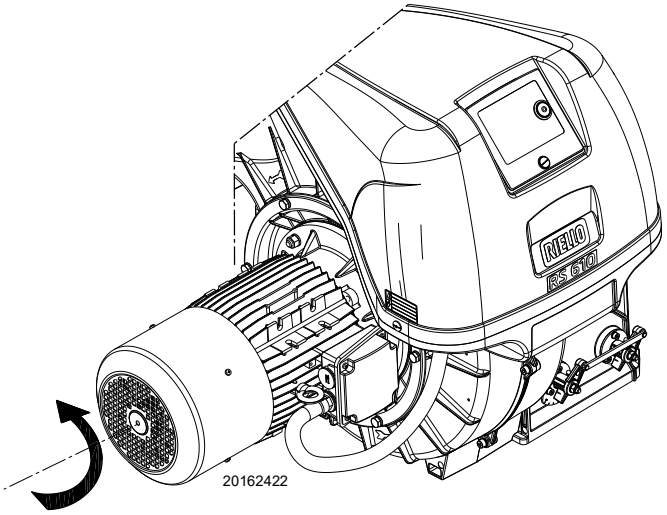


Fig. 9

4 Installation

4.1 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.

DANGER

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

WARNING

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

DANGER

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.

4.2 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.

WARNING

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 suitableness of the available means of handling.
Check also that the area in which you are working is empty and that there is an adequate escape area (i.e. a free, safe area to which you can quickly move if the burner should fall).
When handling, keep the load at not more than 20-25 cm from the ground.

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

CAUTION

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

Release the burner from the wooden platform by removing the bolts/nuts/screws that secure the burner to the platform. Handle the burner following the safety standards and regulations of the laws in force and using the eyebolts supplied as equipment.

4.3 Preliminary checks

Checking the consignment

CAUTION

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

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

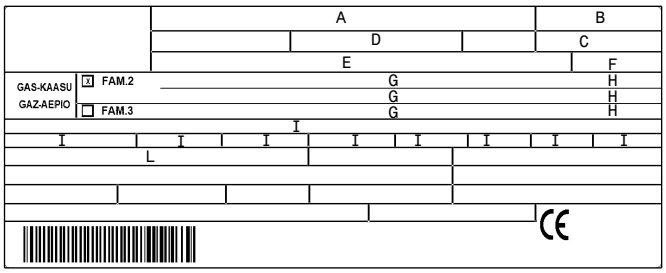


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Fig. 10

Checking the characteristics of the burner

Check the identification label of the burner, showing:
- ➤ the model (**A**)(Fig. 10) 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).
  Warning. The burner output must be within the boiler's firing rate;
- ➤ the category of the appliance/countries of destination (**I**).

WARNING

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.

4.4 Operating position

WARNING

- ➤ The burner is designed to operate only in positions **1**, **2**, **3** and **4** (Fig. 11).
- ➤ Installation **1** is preferable, as it is the only one that allows the maintenance operations as described in this manual.
- ➤ Installations **2**, **3** and **4** permit operation but make maintenance and inspection of the combustion head more difficult.

DANGER

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

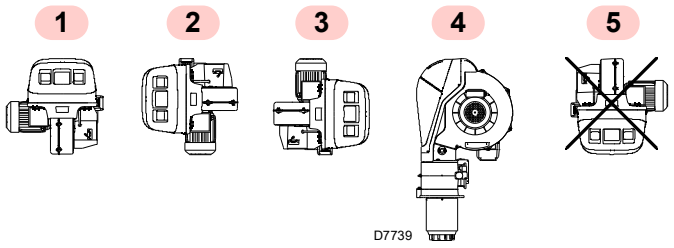

Fig. 11

4.5 Preparing the boiler

4.5.1 Boring the boiler plate

Pierce the closing plate of the combustion chamber, as in Fig. 12. The position of the threaded holes can be marked using the thermal insulation screen supplied with the burner.

4.5.2 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. 13) 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.

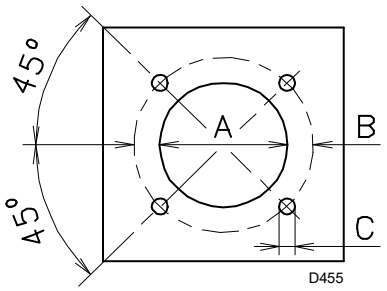

Fig. 12

mm	A	B	C
RLS 310/M MX	335	452	M18
RLS 410/M MX	335	452	M18
RLS 510/M MX	335	452	M18
RLS 610/M MX	350	452	M18

Tab. I

4.6 Securing the burner to the boiler

Prepare a suitable lifting system using rings 3)(Fig. 13).

- ➤ Fit the heat insulation supplied onto the blast tube 4)(Fig. 13).
- ➤ Fit the entire burner onto the boiler hole prepared previously (Fig. 12), and fasten with the screws supplied.

WARNING

The seal between burner and boiler must be airtight.

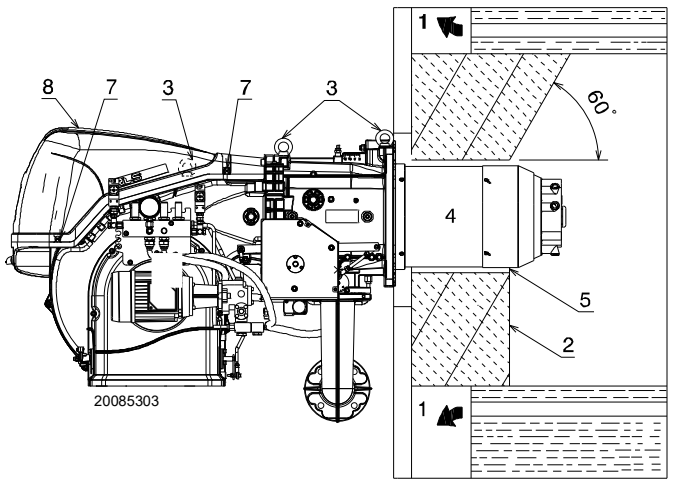

Fig. 13

4.7 Access to head internal part

The burner leaves the factory set for opening to the right, therefore maintaining the pin 1)(Fig. 14) in its housing.

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

A remove the screw 6) releasing the tie-rod 7)(Fig. 14);
B remove the screws 2);
C open the burner to a maximum of 100-150 mm by rotating around the hinge and release the cables of the electrodes 5);
D fully open the burner as in Fig. 14;
E undo the screw 4) with pressure test point;
F disconnect the light oil pipes by unscrewing the two swivel fittings 8);
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. 14), 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**.

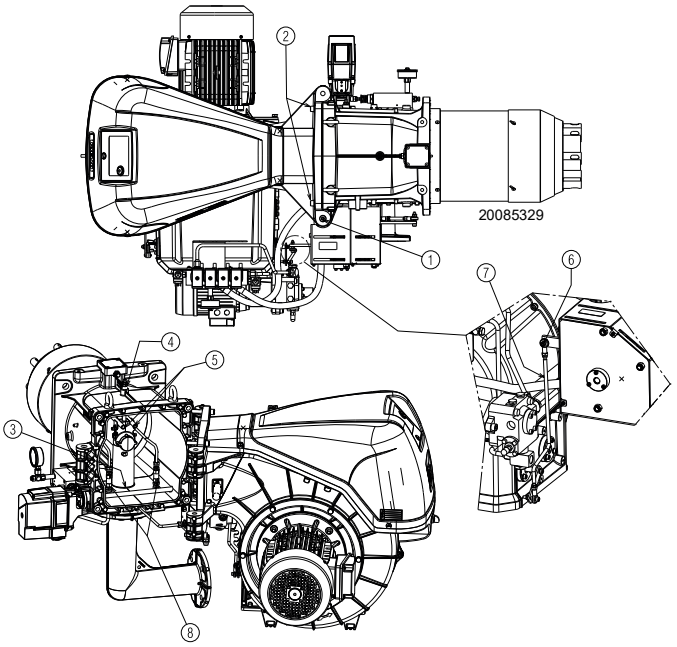

Fig. 14

4.8 Position of the electrodes and central gas nozzles

WARNING

Check that the electrodes are positioned correctly, as in Fig. 15, complying with the dimensions indicated.

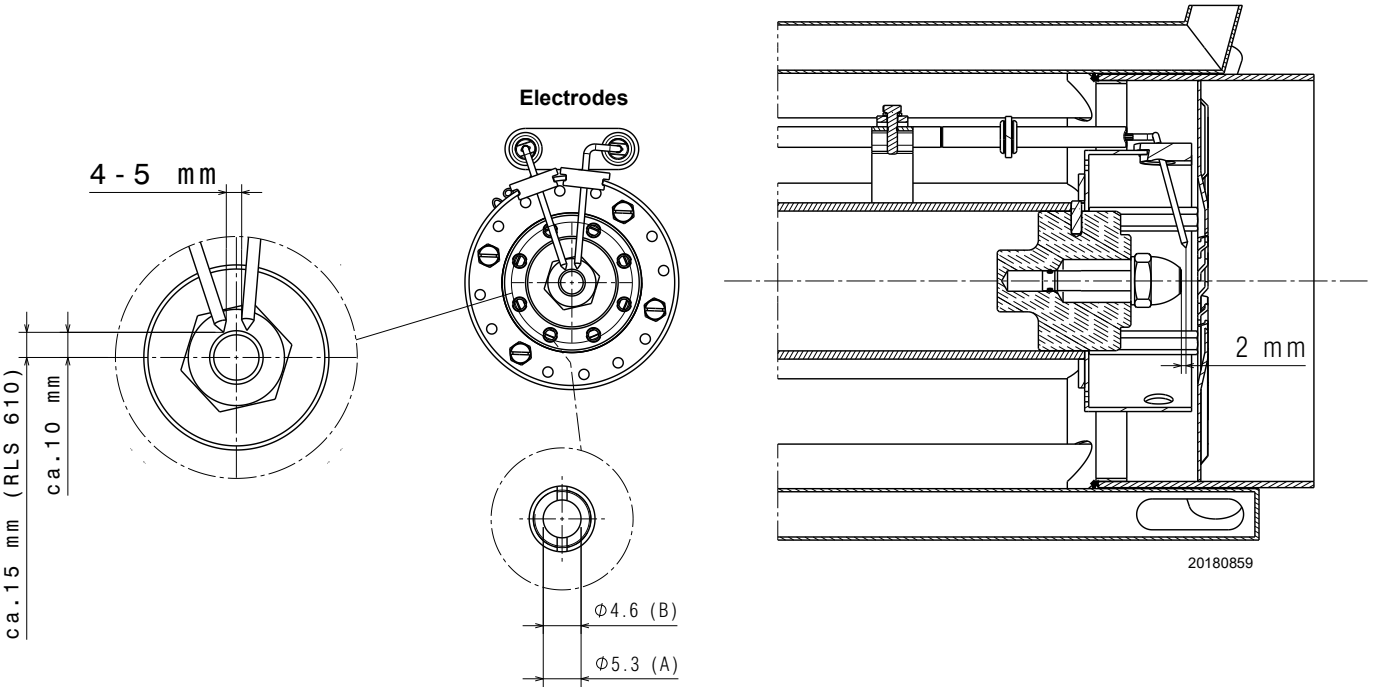

Fig. 15

4.9 Gas butterfly valve

If necessary, replace the gas butterfly valve. The correct position is shown in Fig. 16.

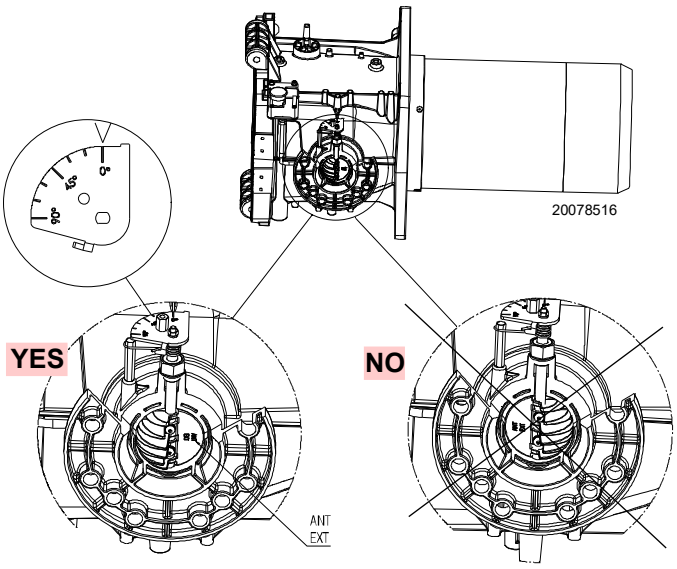

Fig. 16

4.10 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) anticlockwise.

The combustion head is closed by turning the screw 1) clockwise (Fig. 18).

WARNING

The burner leaves the factory with the combustion head adjusted to notch 0 (Fig. 18).

This adjustment allows you to secure the moving parts when the burner is being transported.

Before starting the burner, carry out the adjustments for the output required and which is indicated in the diagram (Fig. 17).

NOTE:

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

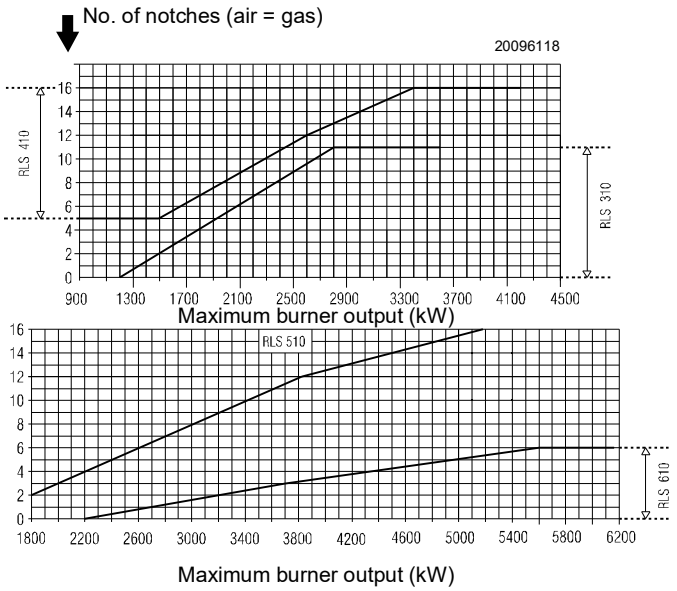

Fig. 17

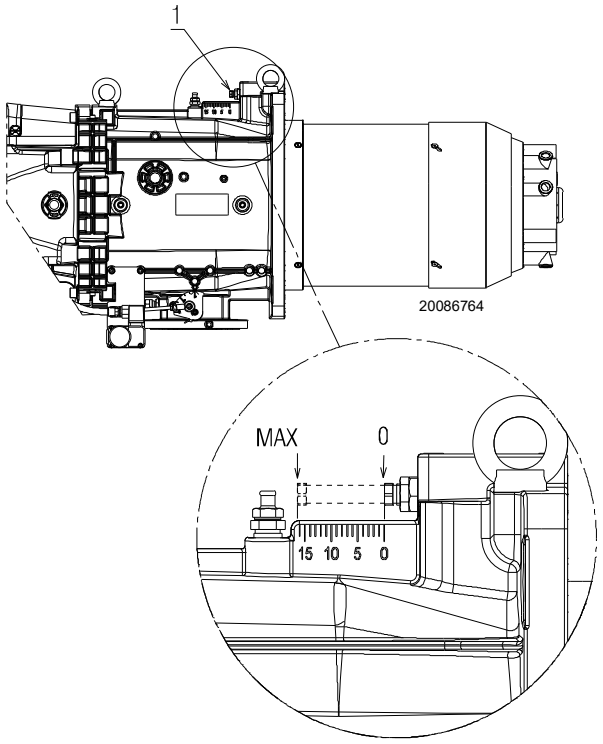

Fig. 18

WARNING

The combustion head can be adjusted within the following fields:

RLS 310/M MX: 0 - 11;

RLS 410/M MX: 5 - 16;

RLS 510/M MX: 2 - 16;

RLS 610/M MX: 0 - 6.

No adjustment can be made outside these intervals.

4.11 Nozzle installation

The burner complies with the emission requirements of the EN 267 standard.

In order to guarantee that emissions do not vary, recommended and/or alternative nozzles specified by the Manufacturer in the Instruction and warning booklet should be used.

WARNING

It is advisable to replace nozzles every year during regular maintenance operations.

CAUTION

The use of nozzles other than those specified by the Manufacturer and inadequate regular maintenance may result into emission limits non-conforming to the values set forth by the regulations in force, and in extremely serious cases, into potential hazards to people and objects.

The manufacturing company shall not be liable for any such damage arising from non-observance of the requirements contained in this manual.

Fit the nozzle with a pipe wrench (24 mm), passing through the central opening of the flame stability disc (Fig. 19).

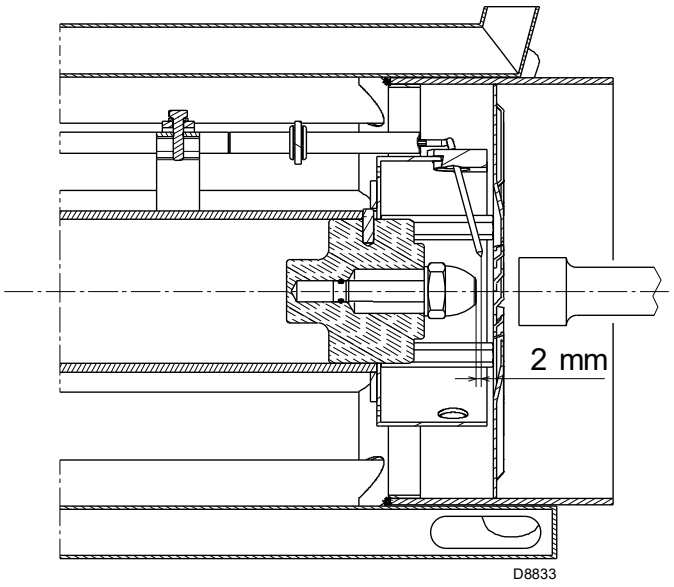

Fig. 19

Fit the nozzles on the nozzle holder without the fuel interception rod.

To calibrate the flow rate range within which the nozzle should operate, adjust the fuel pressure on the nozzle return line, according to and Tab. J.

WARNING

- ➤ Do not use any sealing products such as gaskets, sealing compound, or tape.
- ➤ Be careful to avoid damaging the nozzle sealing seat.
- ➤ The nozzle must be screwed into place tightly but not to the maximum torque value provided by the wrench.

4.11.1 Recommended nozzle

- **Fluidics type N2 45°**

Alternatively:

- **Bergonzo type B5 45° SA**

Complete range of nozzles:

➤ **Bergonzo type B5 45°**
150 - 200 - 225 - 250 - 275 - 300 - 325 - 350 - 375 - 400 - 425 - 450 - 475 - 500 - 525 - 550 - 575 - 600.

➤ **Fluidics type N1 45°**
160 - 180 - 200 - 225 - 250 - 275 - 300 - 330 - 360 - 400 - 450 - 500 - 550 - 600.

➤ **Fluidics type N2 45°**
160 - 180 - 200 - 225 - 250 - 275 - 300 - 330 - 360 - 400 - 450 - 500 - 550 - 600.

	kg/h	Delivery pressure bar	Return pressure bar	kg/h	kW
RLS 310 - 410/M MX	150	21	13	51	600
		21	19	106	1250
	200	22	8.5	67	800
		22	17.5	150	1800
	300	20	7	100	1200
		20	17.5	257	3000
	375	20	6.5	148	1750
		20	15.5	305	3600
	425	20	7.5	68	1950
		20	17	344	4100
RLS 510/M MX	250	24	9	94	1120
		25	15.5	210	2500
	360	24	7.5	116	1380
		25	14	260	3090
	400	24	8.5	153	1820
		25	15	355	4220
	450	24	8	164	1950
		25.5	16	425	5050
RLS 610/M MX	300	20	9.5	125	1500
		20	14	250	3000
	450	20	8	134	1600
		20	14	380	4550
	575	20	9.5	193	2300
		20	17	510	6070

Tab. J

4.12 Light oil supply

4.12.1 Double-pipe circuit

The burner is equipped with a self-priming pump which is capable of feeding itself within the limits listed in the table at the side.

Tank higher than burner A (Fig. 20)
Distance P must not exceed 10 meters in order to avoid straining the pump's seal; distance V must not exceed 4 meters in order to allow the self-priming of the pump even when the tank is almost empty.

Tank lower than burner B (Fig. 20)
Pump depression values higher than 0.45 bar (35 cm Hg) must not be exceeded. because at higher levels gas is released from the fuel, the pump starts making noise and its working life-span decreases.
It is good practice to ensure that the return and suction lines enter the burner from the same height; in this way it will be less probable that the suction line fails to prime or stops priming.

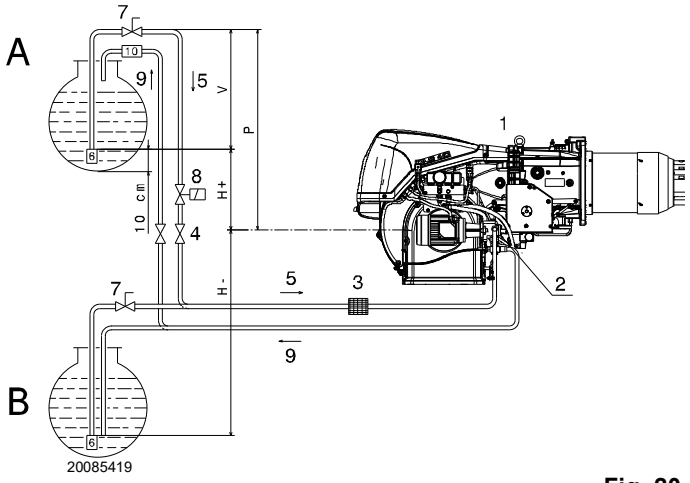

Fig. 20

Key (Fig. 20)

H = Pump/Foot valve height difference
L = Piping length
Ø = Inside pipe diameter
1 = Burner
2 = Pump
3 = Filter
4 = Manual on/off valve
5 = Suction line
6 = Foot valve
7 = Quick closing manual valve with remote control (Italy only)
8 = On/off solenoid valve (Italy only). See electrical layout. Connections to be carried out by the installer (SV).
9 = Return line
10 = Check valve (only Italy)

4.12.2 The loop circuit

A loop circuit consists of a loop of piping departing from and returning to the tank with an auxiliary pump that circulates the fuel under pressure.

A branch connection from the loop feeds the burner.

This circuit is extremely useful whenever the burner pump does not succeed in self-priming because the tank distance and/or height difference are higher than the values listed in the table.

H (m)	L (m) Ø (mm)			
	10	12	14	16
4	14	30	55	95
3.5	13	28	52	89
3	12	26	48	82
2.5	11	24	44	76
2	10	22	41	70
1.5	9	20	37	63
1	8	18	33	57
0.5	7	16	29	51
0	6	14	26	44
-0.5	5	12	22	38
-1	4	10	18	32
-1.5	3	8	15	25
-2		6	11	19
-2.5		4	7	13
-3			4	7

4.12.3 Hydraulic connections

The pumps are equipped with a by-pass that connects return line with suction line.
They are installed on the burner with the by-pass closed by screw 6)(Fig. 22 on page 22).
It is therefore necessary to connect both hoses to the pump.
The pump will break down immediately if it is run with the return line closed and the by-pass screw inserted.
Remove the plugs from the suction and return connections of the pump.
Insert the hose connections with the supplied seals into the connections and screw them down.
Take care that the hoses are not stretched or twisted during installation.
Place the pipes so that they are not crushed or are in contact with hot parts of the boiler and so it is possible to open the burner.
Connect, finally, the other end of the flexible hoses to the suction and return lines using nipples supplied with the equipment.

4.12.4 Hydraulic circuit diagram

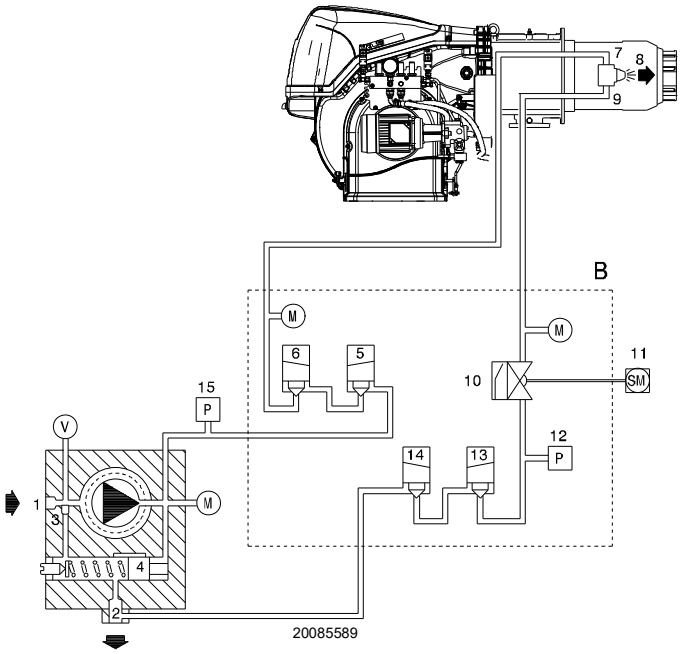

Fig. 21

Key (Fig. 21)

1 Pump suction
2 Pump return line and nozzle return line
3 Pump by-pass screw
4 Pump pressure regulator
5 Safety valve
6 Safety valve
7 Nozzle delivery line
8 Nozzle without interception rod
9 Nozzle return line
10 Pressure adjuster on nozzle return line
11 Servomotor
12 Pressure switch on nozzle return line
13 Safety valve on nozzle return line
14 Safety valve on nozzle return line
15 Pressure switch on pump delivery line
B Oil valve group and pressure variator
M Pressure gauges
V Vacuometer connection

OPERATION

Pre-purging phase:
valves 5), 6), 13) and 14) closed.

Ignition and operation phase:
valves 5), 6), 13) and 14) open.

Stop: All valves closed.

4.12.5 Priming pump

WARNING

Before starting the burner, make sure that the tank return line is not clogged.

Obstructions in the line could cause the sealing organ located on the pump shaft to break.

➤ In order for the pump (Fig. 22) to self-prime, it is vital that the screw 4) of the pump be loosened to vent the air contained in the suction line.

➤ Start the burner by closing the remote controls.
As soon as the burner starts, check the direction of rotation of the fan blade.

➤ The pump can be considered to be primed when the light oil starts coming out of the screw 4). Close the burner and undo the screws 4).

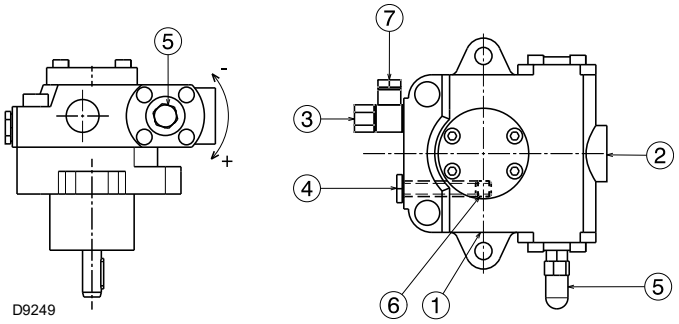

Fig. 22

Key (Fig. 22)

1	Suction line	G 1/2”
2	Return line	G 1/2”
3	Pressure switch connection	G 1/4”
4	Vacuometer connection	G 1/4”
5	Pressure adjuster	
6	By-pass screws	
7	Gauge connection	G 1/4”

MODELS		RLS 310	RLS 410	RLS 510 RLS 610
		TA 3	TA 4	TA 5
Min. delivery rate at 16.5 bar pressure	Kg/h	700	930	1270
Pressure range in outlet line	bar	7 - 40		7 - 30
Max depression in suction line	bar	0,45		0,45
Viscosity range	cSt	2 - 75		2 - 75
Maximum oil temperature	°C	150		150
Max pressure in suction and return lines	bar	5		5
Pressure calibration in factory	bar	22 - 20		22 - 20

Tab. K

The time required for this operation depends upon the diameter and length of the suction tubing.
If the pump fails to prime at first start-up and the burner locks out, wait approx. 15 seconds, reset the burner, and then repeat the start-up operation.
And so on. After 5 or 6 starting operations allow 2 or 3 minutes for the transformer to cool.

Obscure the flame sensor, the burner should lock out anyway about 10 seconds after it starts.

WARNING

The a.m. operation is possible because the pump is already full of fuel when it leaves the factory. If the pump has been drained, fill it with fuel through the opening on the vacuometer 4)(Fig. 22) prior to starting; otherwise, the pump will seize.

Whenever the length of the suction piping exceeds 20-30 meters, the supply line must be filled using a separate pump.

4.13 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.

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

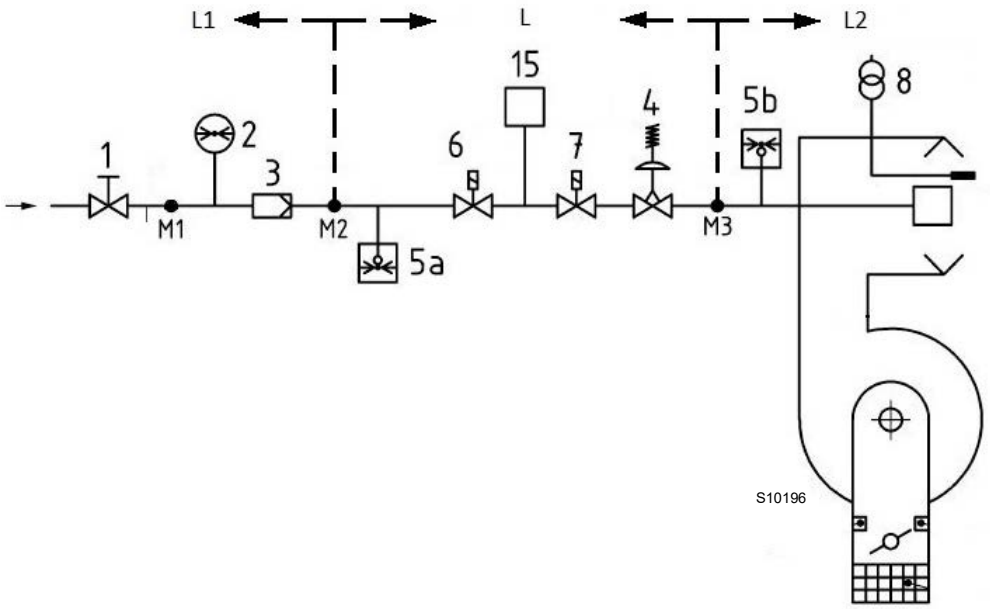

Fig. 23

Key (Fig. 23)

1	Manually operated shut-off valve
2	Pressure gauge
3	Filter
4	Governor
5a	Low pressure protection device
5b	Maximum gas pressure switch
6	1st safety shut-off device
7	2nd safety shut-off device
8	Ignition device
15	Valve leak detection control system
L	Gas train (supplied separately)
L1	Responsibility of the installer
L2	Burner
M1	Pressure test point
M2	Pressure test point
M3	Pressure test point

4.13.2 Gas train

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

4.13.3 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.

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

The operator must use the required equipment during installation.

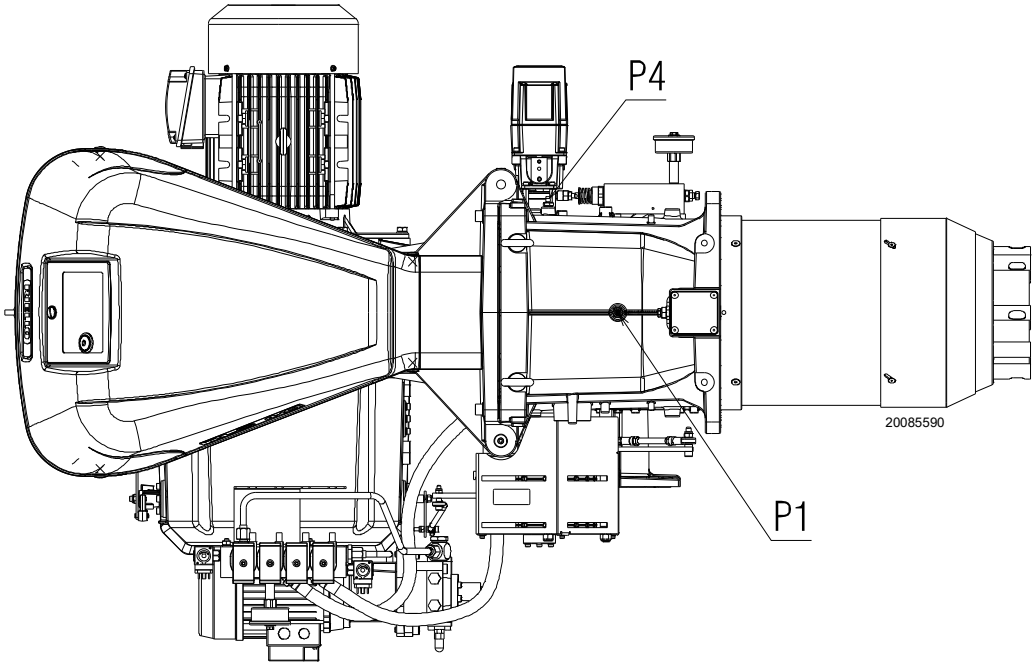

Fig. 24

4.13.4 Gas pressure

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

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

Column 1

Combustion head pressure drop.
Gas pressure measured at the test point P1)(Fig. 24), with:
- Combustion chamber at 0 mbar;
- Burner working at maximum output;
- Combustion head adjusted as in page 19.

Column 2

Pressure loss at gas butterfly valve 14)(Fig. 4 on page 11) 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. 24).
– Find, in the table Tab. L related to the burner concerned, the pressure value closest to the result of the subtraction.
– Read the corresponding output on the left.

Example RLS 410/M MX with natural gas G20:
Maximum output operation
Gas pressure at test point P1)(Fig. 24) = 29,4 mbar
Pressure in combustion chamber = 5 mbar
29.4 - 5 = 24.4 mbar

A pressure of 24.4 mbar, column 1, corresponds in the Tab. L to an output of 3000 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. 24), set the MAX output required from the burner operation:
– find the nearest output value in the table Tab. L for the burner in question.
– Read, on the right (column 1), the pressure at the test point P1)(Fig. 24).
– Add this value to the estimated pressure in the combustion chamber.

Example RLS 410/M MX with natural gas G20:
Required burner maximum output operation: 3000 kW
Gas pressure at an output of 3000 kW = 24.4 mbar
Pressure in combustion chamber = 5 mbar
24.4 + 5 = 29.4 mbar
Pressure required at test point P1)(Fig. 24).

WARNING **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
RLS 310/M MX	1200	3.6	5.4	0.1	0.1
	1467	5.4	8.1	0.2	0.3
	1733	7.5	11.2	0.4	0.6
	2000	9.9	14.8	0.7	1.0
	2267	12.7	18.9	1.0	1.5
	2533	15.8	23.6	1.3	1.9
	2800	19.3	28.8	1.7	2.5
	3067	23.1	34.5	2.1	3.1
	3333	27.3	40.7	2.6	3.9
	3600	31.8	47.4	3.1	4.6
RLS 410/M MX	1500	6.4	9.5	0	0
	1800	9.0	13.4	0.2	0.3
	2100	12.2	18.2	0.5	0.7
	2400	15.8	23.6	0.8	1.2
	2700	19.9	29.7	1.2	1.8
	3000	24.4	36.4	1.7	2.5
	3300	29.4	43.9	2.3	3.4
	3600	34.9	52.1	2.9	4.3
	3900	40.9	61.0	3.6	5.4
	4200	47.3	70.6	4.4	6.6
RLS 510/M MX	1800	7.0	10.4	1.5	2.2
	2174	9.8	14.6	2.0	3.0
	2549	13.0	19.4	2.6	3.9
	2923	16.6	24.8	3.3	4.9
	3298	20.7	30.9	4.1	6.1
	3672	25.2	37.6	4.9	7.3
	4047	30.2	45.1	5.8	8.7
	4421	35.6	53.1	6.8	10.1
	4796	41.5	61.9	7.8	11.6
	5170	47.8	71.3	9.0	13.4
RLS 610/M MX	2200	8.7	13.0	2.7	4.0
	2639	12.5	18.6	3.9	5.8
	3079	17.1	25.5	5.3	7.9
	3518	22.3	33.3	6.9	10.3
	3958	28.2	42.1	8.7	13.0
	4397	34.8	51.9	10.7	16.0
	4837	42.1	62.8	13.0	19.4
	5276	50.1	74.7	15.4	23.0
	5716	58.8	87.7	18.1	27.0
	6155	68.2	101.8	21.0	31.3

Tab. L

4.14 Electrical wiring

Notes on safety for the electrical wiring

DANGER

- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be made in accordance with the regulations currently in force in the country of destination and by qualified personnel. Refer to the wiring diagrams.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the wiring diagrams.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The burner has been type-approved for intermittent use.
  This means they should compulsorily be stopped at least once every 24 hours to enable the flame control to perform checks of its own start-up efficiency. Normally, burner stopping is guaranteed by the boiler's thermostat/pressure switch.
- If this is not the case, a time switch should be fitted in series to TL to stop the burner at least once every 24 hours. Refer to the wiring diagrams.
- The electrical safety of the device is obtained only when it is correctly connected to an efficient earthing system, made according to current standards. It is necessary to check this fundamental safety requirement. In the event of doubt, have the electrical system checked by qualified personnel. Do not use the gas tubes as an earthing system for electrical devices.
- The electrical system must be suitable for the maximum power absorption of the device, as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for that level of power absorption.
- For the main power supply of the device from the electricity mains:
  - do not use adapters, multiple sockets or extensions;
  - make provisions for an omnipolar switch with a gap between the contacts of at least 3 mm (over-voltage category III), as required by current safety regulations.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.

Before carrying out any maintenance, cleaning or checking operations:

DANGER

Turn off the burner's power supply using the main system switch.

DANGER

Turn off the fuel interception tap.

DANGER

Avoid condensate, ice and water leaks from forming.

If the cover is still present, remove it and proceed with the electrical wiring according to the wiring diagrams. Use flexible cables in compliance with the EN 60 335-1 standard.

4.14.1 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. 25.

Key (Fig. 25)

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
D Flame sensor
E Oil valve
F Pump motor
G Oil pressure switches

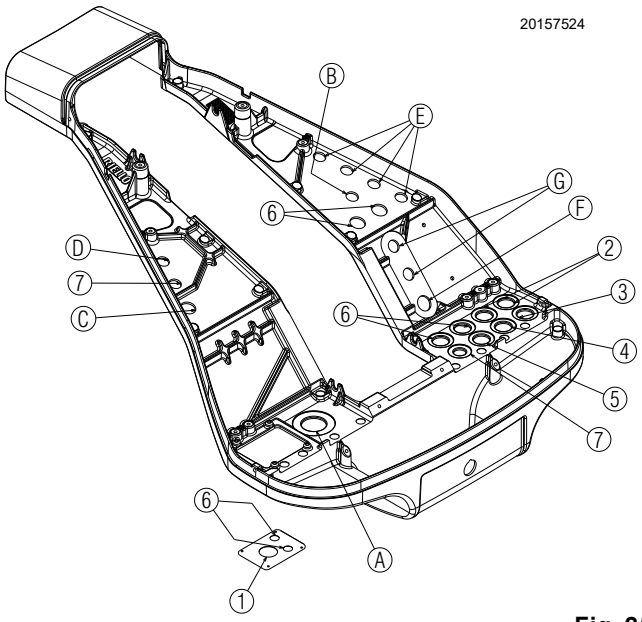

Fig. 25

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

5 Start-up, calibration and operation of the burner

5.1 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 39.

5.2 Servomotor adjustment

The servomotor (Fig. 26) provides simultaneous adjustment of the eccentric of the oil modulator, and by means of the adjustable profile cam the gas butterfly valve. and the air damper. 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): 135°** (The same for all models)
Limits the rotation towards the maximum.

DANGER

Do not make any adjustments.

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°

WARNING

It is recommended that no adjustments are made.

Cam III **(ORANGE): 50°** (The same for all models)
Adjusts the start up position and the minimum output with gas operation.

Cam IV **(YELLOW): 130°** (The same for all models)
Adjusts the position of the maximum output with gas operation.

Cam V **(BLACK): 60°** (The same for all models)
Adjusts the minimum output and ignition position with light oil operation.

Cam VI **(GREEN): 130°** (The same for all models)
adjusts the Max. output position with light oil operation.

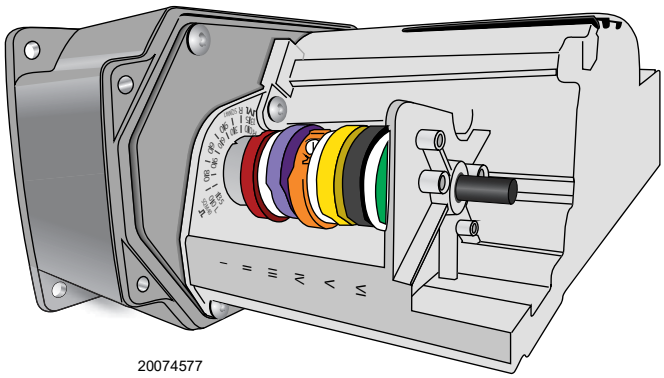

Fig. 26

5.3 Adjustments prior to ignition (light oil)

WARNING

It is recommended to adjust first the light oil burner and then the gas burner.

Carry out the fuel change with burner off.

The optimum calibration of the burner requires an analysis of the flue gases at the boiler outlet and interventions on the following points.

5.3.1 Nozzle

See information on page 20.

5.3.2 Combustion head

The adjustment of the combustion head already carried out on page 19 does not require any modifications unless the burner output is changed.

5.3.3 Pump pressure

In order to change pump pressure, act on screw 5)(Fig. 22).
See information on page 20.

5.3.4 Fan damper

Refer to the adjustment of the servomotor on page 27.

5.4 Burner start-up (light oil)

Electrically power the burner using the disconnecting switch on the boiler panel.
Position the selector 23)(Fig. 5 on page 12) on “**OIL**” to select light oil as fuel.

Close the thermostats/pressure switches and set the switch 1)(Fig. 27) to **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 to position itself in front of the cooling fan of the fan motor, check that this turns anti-clockwise or else in the direction of the arrow 25)(Fig. 4 on page 11).

If this is not the case:

➤ place the switch 1)(Fig. 27) to “**OFF**” and wait for the flame control to carry out the switching off phase;

DANGER

disconnect the burner's electrical supply, since this operation should be carried out when there is no electrical supply;

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

WARNING

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.

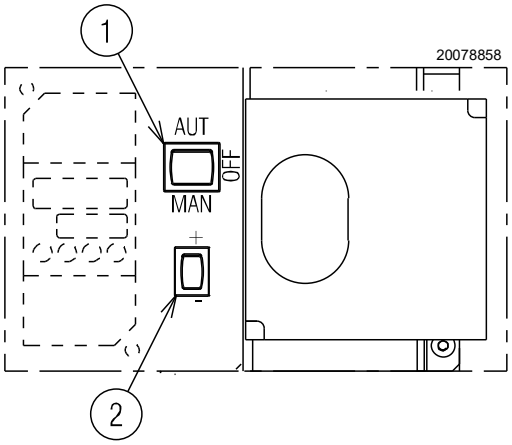

Fig. 27

5.5 Burner ignition (light oil)

Position the selector 1)(Fig. 27) on “**MAN**”.

Position the selector 23)(Fig. 5 on page 12) on “**OIL**” to select light oil as fuel.

At the closing of the limit thermostat (TL), you must start the burner.

At first ignition, there is a momentary drop in fuel pressure due to the filling of the nozzle piping. This lowering of the fuel pressure can cause the burner to lockout and can sometimes give rise to pulsations.

Once the following adjustments have been made, the ignition of the burner must generate a noise similar to the noise generated during operation.

5.6 Pressure variator

Calibration pressure on return line

With the servomotor in the minimum output position, the nut and the corresponding lock nut 2)(Fig. 28), should be secured against the eccentric 3).

With the servomotor at its maximum opening, the eccentric will press the modulator spindle bringing the pressure, which can be read on the pressure gauge 1)(Fig. 28), to the desired value (maximum output).

With the servomotors in the position of maximum output, it is possible to reduce the pressure on the return line by using the screw 4.

By turning the screw clockwise the pressure on the return line drops (the pressure at the nozzle increases), turning it the other way the pressure on the return line increases (the pressure at the nozzle drops).

Once the calibration is finished lock the lock nut 5)(Fig. 28).

Calibration pressure on delivery line

To adjust the delivery pressure, operate on the pump as described on page 22.

Example:

if you use a 450 kg/h nozzle and you want to obtain an output of 4550 kW, the pressure on the pressure gauge 1)(Fig. 28) (maximum pressure on the return circuit) must be about 14 bar. The relative delivery pressure on the pressure gauge 1), must be 20 bar (see Tab. J on page 20).

IMPORTANT

- ➤ For a correct calibration, the eccentric 3) must operate along the entire range of travel of the servomotor (20 - 130°): a pressure variation must correspond to every variation of the servomotor.
- ➤ Never take the piston of the variator to the end.
- ➤ If at the maximum delivery of the nozzle (maximum pressure on the return line) pressure oscillations can be seen on the pressure gauge 3), slightly reduce the pressure until they disappear.

NOTE:

The burner is factory set with maximum pressure on the return line of approximately 14 bar and delivery pressure of approximately 25 bar.

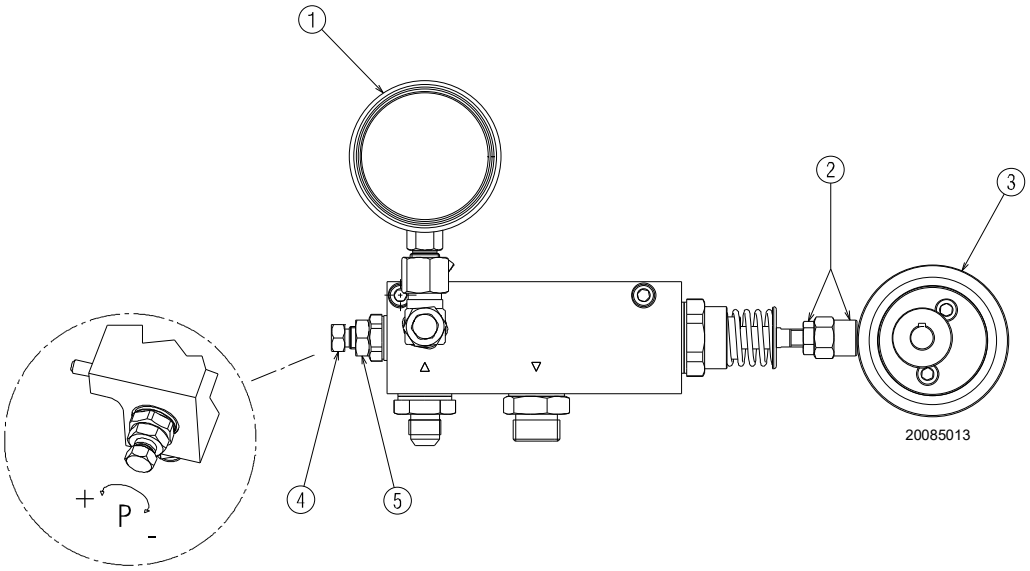

Fig. 28

Key (Fig. 28)

1 Return pressure gauge
2 Piston calibration nut and lock nut
3 Fixed eccentric
4 Adjustment screw (maximum output)
5 Locking screws (maximum output)

5.6.1 Light oil burner calibration procedure

➤ Switch on the burner, with the selector on the control panel on manual 1)(Fig. 27 on page 28). At this point, after the pre-purge operation, the servomotor stops at the ignition position.
➤ Adjust the minimum return pressure to approx. 6 bar. To do this, the length of the spindle acting needs to be changed by using the nut 2)(Fig. 28 on page 29).
➤ Proceed with calibrating the air output by adjusting the variable profile cam, using the screws 2)(Fig. 29)(cam 1 Fig. 31).
➤ Having performed this first adjustment, increase the output by means of automatic return selector 2)(Fig. 27 on page 28) on the control panel. Pause after a 15° rotation of the servomotor and carry out another adjustment using the variable profile cam of the air (cam 1 Fig. 31 on page 32). It is recommended that a calibration be carried out that is sufficient not to create a smoky flame and that attains the maximum output as quickly as possible; using the screw 4)(Fig. 28 on page 29) adjust the pressure on the return line to obtain the desired output required by the nozzle, then go back and calibrate the intermediate points.
➤ Then recheck the values of the combustion parameters at the various modulation outputs and if necessary make the necessary adjustments.
➤ With the optimal adjustment achieved, remember to lock the adjustment screws of the cam profiles by means of screws 3)(Fig. 29).

WARNING

When calibrating the cams, never go beyond the travel limits of the servomotor 0° - 130° to avoid any breakages. Carrying out a manual travel 0 - 90° of the cams, check that there are no mechanical stops before the micro-switches of the servomotor are activated.

5.6.2 Maximum output (light oil)

Adjust the servomotor to the maximum opening so that the air damper is fully open.
To regulate the light oil, use the screw 4)(Fig. 28 on page 29) until the required output is obtained.

5.6.3 Minimum output (light oil)

Min output must be selected within the firing rate range shown on page 9.

5.6.4 Intermediate outputs

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 selector 2)(Fig. 27 on page 28) on the symbol (+) or (-).

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

Screw in or unscrew the pre-set screw 2)(Fig. 29) to increase or decrease the air output so that it comes into line with the corresponding light oil output.

After the output adjustments (maximum, minimum and intermediate), it is important to lock all the air adjustment screws 2)(Fig. 29) using the locking screws 3)(Fig. 29) so as to avoid possible movements from the of air - light oil calibration positions.

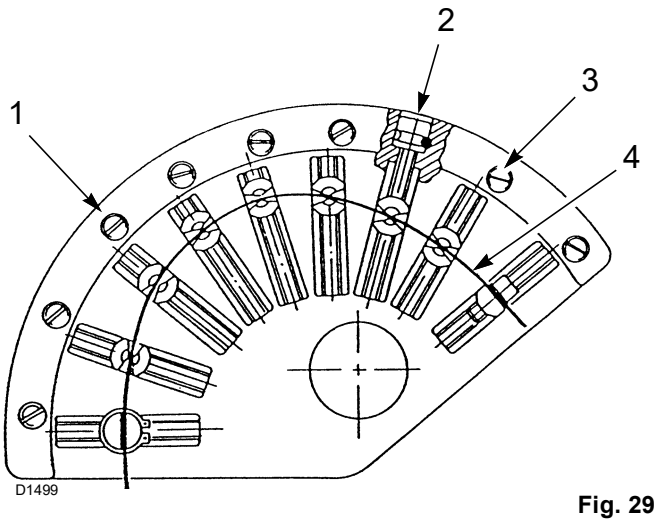

Fig. 29

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

5.7 Change of fuel

There are two change of fuel options:
1 with selector 23)(Fig. 5 on page 12);
2 with a remote selector connected to the main terminal board. Positioning the selector 23)(Fig. 5 on page 12) to "**EXT**" activates the remote selection of the fuel.

WARNING

Change the fuel only when the burner is off.

WARNING

For the remote switching of the fuel, use the relative kit.

5.8 Adjustments prior to ignition (gas)

Combustion head adjustment is already described on page 19.

In addition, the following adjustments must also be made:

- ➤ Open manual valves upstream 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.
- ➤ If necessary, adjust the air pressure switch (previously adjusted when operating with light oil).
- ➤ 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. 30), 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. L.
- ➤ 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.

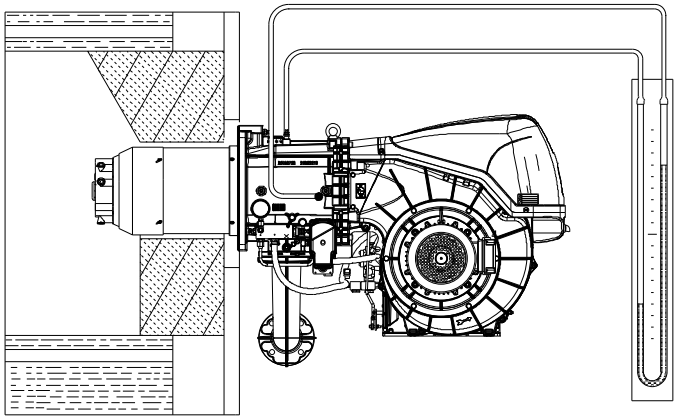

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Fig. 30

5.9 Burner ignition (gas)

Electrically power the burner using the disconnecting switch on the boiler panel.
Put the selector Fig. 5) on “**GAS**” to select gas as the fuel.

The burner should light after having performed the above steps.

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

Two types of burner failure may occur:

- ➤ **flame control lockout**: when the flame control button comes on (light signal) 2)(Fig. 5 on page 12) it warns you that the burner is in lockout. Release by pressing the push-button 2)(Fig. 5 on page 12). See flame control 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 “Calibration of the thermal relay” on page 15.

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. 30).
Once the burner has fired, now proceed with global calibration operations.

5.10 Proceed with the calibration (gas)

The fuel/combustion synchronisation is done by means of a servomotor connected to two variable profile cams, which act on the air dampers 1)(Fig. 31) and gas dampers 2)(Fig. 31).
It is advisable, to reduce the loss and for a wide calibration field, to adjust the servomotor to the maximum of the output used, the nearest possible to the maximum opening (130°).
On the gas butterfly valve, the choking of the fuel according to the required output, is carried out using the cam 2)(Fig. 31).

The values in the table can be useful as reference for good fuel calibration.

EN 676		Air excess		
		Max. output. $\lambda \leq 1.2$		Min. output $\lambda \leq 1.3$
GAS	Theoretical max CO_2 0 % O_2	CO_2 % Calibration		CO mg/kWh
		$\lambda = 1.2$	$\lambda = 1.3$	
G 20	11.7	9.7	9.0	≤ 100
G 25	11.5	9.5	8.8	≤ 100
G 30	14.0	11.6	10.7	≤ 100
G 31	13.7	11.4	10.5	≤ 100

EN 267	Air excess		
	Max. output. $\lambda \leq 1.2$		Min. output $\lambda \leq 1.3$
Theoretical max CO_2 0 % O_2	CO_2 % Calibration		CO mg/kWh
	$\lambda = 1.2$	$\lambda = 1.3$	
15.2	12.6	11.5	≤ 100

5.10.1 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

5.10.2 Output upon ignition

WARNING

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

Air adjustment
The air adjustment has already been carried out on the basis of the light oil side calibration.
There could be variations to correct the gas combustion but this involves a further check of the light oil operation.

5.10.3 Maximum output

The MAX output must be set within the firing rate indicated in Fig. 2 on page 9.

In the above instructions we left the burner running at the MIN output. Now press the “increase output” button 2)(Fig. 27 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. L on page 25, just read the gas pressure on the “U” pressure gauge (see Fig. 30 on page 31) 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.
- ➤ Screw or unscrew the screw 2) of the mechanical cam (Fig. 31 on page 32) 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.

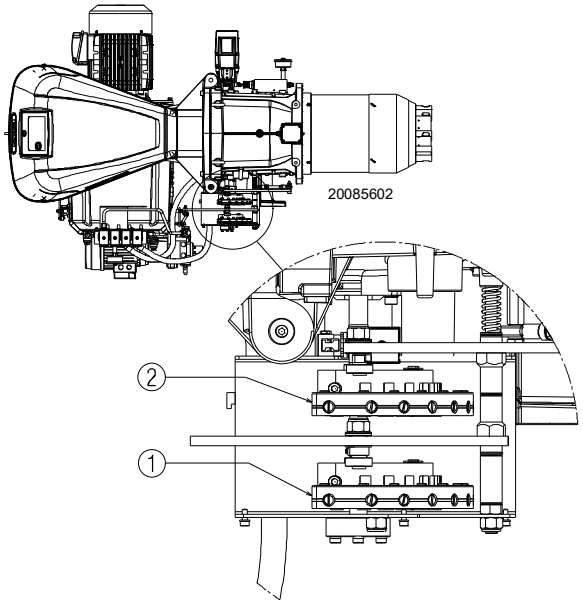


Fig. 31

Key (Fig. 31)
1 Air adjustment cam
2 Gas adjustment cam

Air adjustment

The regulation of the air is carried out by changing the angle of the cam I) and IV) of the servomotor Fig. 26 and using the selector 2)(Fig. 27 on page 28).

To adjust the cam of the servomotor, see Fig. 32 A).

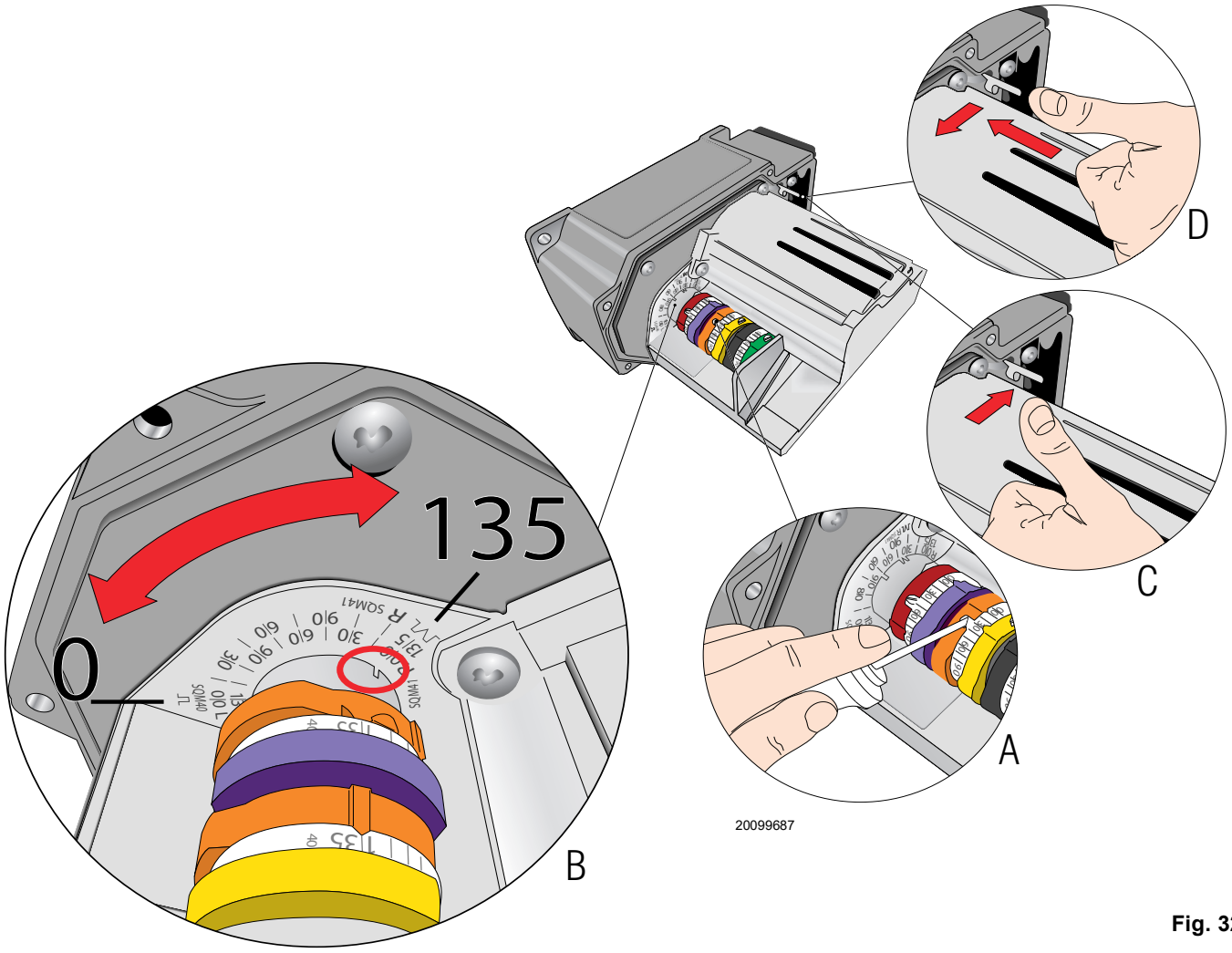


Fig. 32

5.10.4 Minimum output

Min output must be selected within the firing rate range shown on Fig. 2 on page 9.

Press the button 2)(Fig. 27 on page 28) “Decreasing output” and keep it pressed until the servomotor comes to the minimum position.

Adjustment of gas delivery

Progressively adjust the initial profile of the mechanical cam 2)(Fig. 31), using the screws 2)(Fig. 31).

For example, calibrate the minimum output to 800 kW, check the emissions and if necessary increase or decrease the opening of the air damper (“Proceed with the calibration (gas)” on page 32). Bring the output to 800 kW using the screws 2) of the mechanical cam (Fig. 29 on page 30) and check the emissions.

Air adjustment

The regulation of the air is carried out by varying the angle of the cam III) of the servomotor Fig. 26 and by using the selector 2)(Fig. 27 on page 28). To adjust the cam of the servomotor, see Fig. 32 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) Fig. 26, see Fig. 32 A) and B).

5.10.5 Intermediate outputs

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. 27 on page 28). Lightly push the button 2)(Fig. 27 on page 28) “Increasing the output” so that the servomotor turns by about 20°.

Screw or unscrew the screw 2) of the mechanical cam (Fig. 29 on page 30) 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. 27), OFF position, release the mechanical cam I) and II)(Fig. 29)(Fig. 31) to separate the gears of the servomotor, pressing and shifting downwards the button 3)(Fig. 32 D) and by manually turning several times the mechanical cam I)(Fig. 29) backwards and forwards check that the movement is smooth and without any hindrance.

WARNING

We recommend binding the mechanical cams I) and II) again (Fig. 29)(Fig. 31) to the servomotor by shifting upwards the button 3)(Fig. 32 C).

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.

5.11 Pressure switch adjustment

5.11.1 Air pressure switch - check CO

Adjust the air pressure switch after performing all other burner adjustments with the air pressure switch set to the start of the scale (Fig. 33).

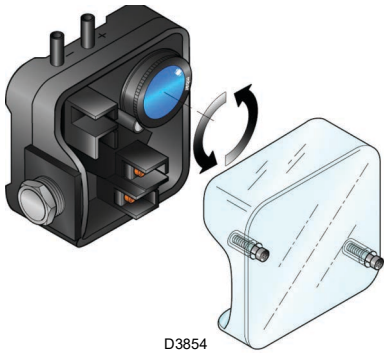


Fig. 33

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.

WARNING

In conformity with the standard, the air pressure switch must prevent the air pressure falling below 80% of the adjusted value and the CO in the flue gases exceeding 1% (10,000 ppm).
To check this, insert a combustion analyser into the chimney, slowly close the fan suction inlet (for example with cardboard) and check that the burner locks out before the CO in the fumes exceeds 1%.

The air pressure switch is installed in the “absolute” position, that is connected only to the pressure test point “+” 22)(Fig. 4 on page 11).

WARNING

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

5.11.2 Maximum gas pressure switch

Adjust the maximum gas pressure switch (Fig. 34) after making all other burner adjustments with the maximum gas pressure switch set to the end of the scale. To calibrate the maximum gas pressure switch, open the tap and then connect a pressure gauge to its pressure test point.

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

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

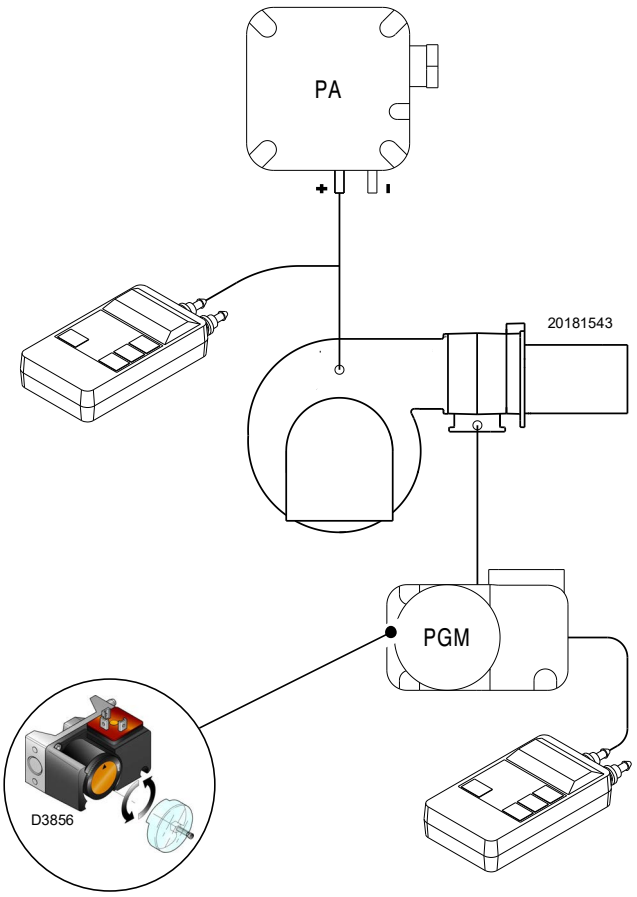


Fig. 34

5.11.3 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. 35) 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.

WARNING

1 kPa = 10 mbar

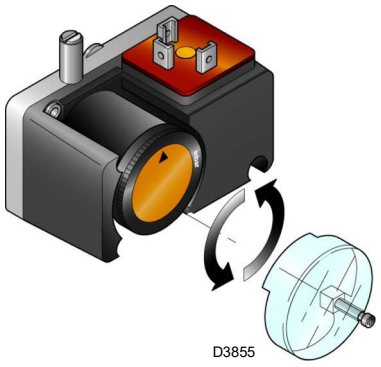


Fig. 35

5.11.4 Minimum oil pressure switch

The minimum oil pressure switch (Fig. 36) is calibrated in the factory at 18 bar. If the oil pressure falls below this value in the delivery line, the pressure switch stops the burner.

The burner restarts automatically if the pressure goes above bar value set after the burner starts.

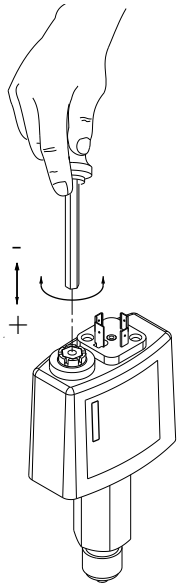


Fig. 36

5.11.5 Maximum oil pressure switch

The maximum oil pressure switch (Fig. 37) is calibrated in the factory at 3 bar. If the oil pressure in the return line goes above this value, the pressure switch stops the burner in a lockout.

To adjust the pressure switches, use a tool to operate the adjustment screw, (see Fig. 37).

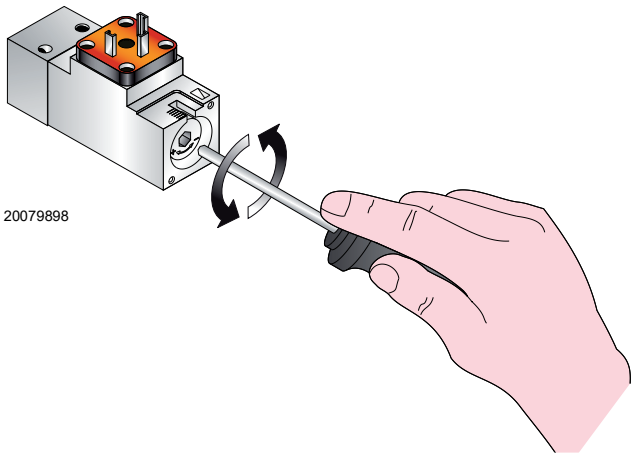


Fig. 37

5.12 Operation sequence of the burner (gas)

5.12.1 Burner start-up

0s TL thermostat/pressure switch closure.

6s Fan motor start. Servomotor starts: turn to the right 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 3).

102s The air damper and the gas butterfly valve set to MIN output (with cam 3).

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. 38). There follows a progressive increase of the input, slow opening of the valve, up to the MIN output, point B (Fig. 38).

112s The spark goes out.

133s The starting cycle ends.

Normal ignition
(no. = seconds from instant 0)

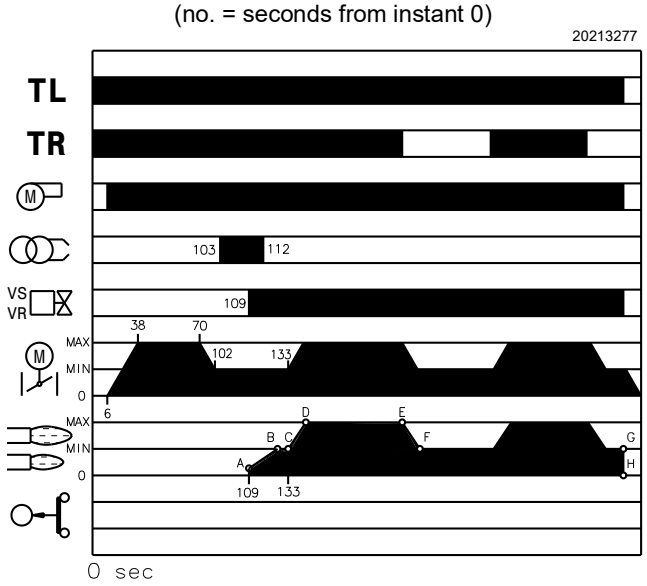


Fig. 38

5.12.2 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. 38).
(The flame control 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 cam 2). The air damper closes completely to reduce heat losses to a minimum.

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

Burner with the RWF ... output power regulator
See manual enclosed with the adjuster.

5.12.3 Burner flame goes out during operation

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

Ignition failure

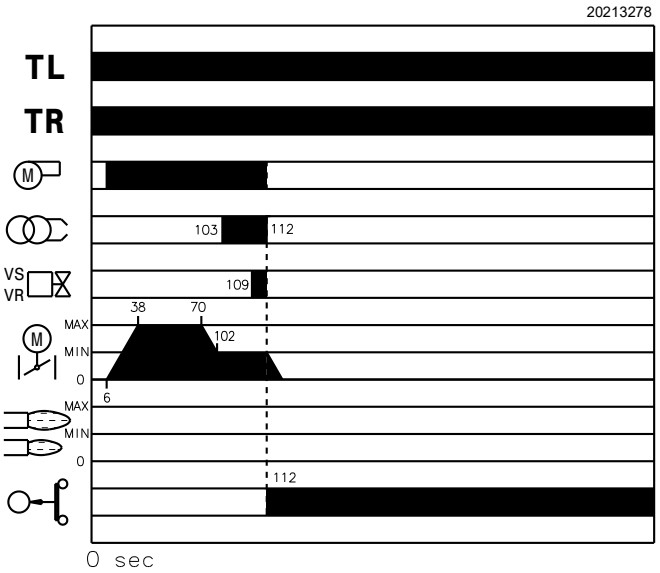


Fig. 39

5.12.4 Ignition failure

If the burner does not fire (Fig. 39), it goes into lockout within 3 sec. after the gas valve opens, 112 seconds after the control device TL closes.

5.12.5 Flame control reset

To carry out the flame control reset, proceed as follows:
➤ press the reset button 2)(Fig. 5 on page 12).

5.13 Operation sequence of the burner (light oil)

5.13.1 Burner start-up

0s TL thermostat/pressure switch closure.

6s Fan motor start. Pump motor start.
Servomotor starts: rotates 90° towards the right, i.e. until the intervention of the contact on the cam 6)

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 4).

102s The air damper and the light oil eccentric set to MIN output (with cam 4).

103s Ignition electrode strikes a spark.

109s The oil valves open.
The flame is ignited at a low output level, to the MIN output, point A (Fig. 40).

112s The spark goes out.

133s The starting cycle ends.

5.13.2 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 B (Fig. 40).
(The flame control 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 B-C).
– If subsequently the temperature or pressure increases until TR opens, the burner progressively decreases its output to the MIN value (section D-E). 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 F-G).
The TL thermostat/pressure switch opens, and the servomotor returns to angle 0° limited by the contact of cam 2).
The air damper closes completely to reduce heat losses to a minimum.

With each change of output, the servomotor automatically modifies the light oil output (using the eccentric) and the air flow rate (fan damper).

Burner with the RWF ... output power regulator
See manual enclosed with the adjuster.

5.13.3 Burner flame goes out during operation

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

Normal ignition
(no. = seconds from instant 0)

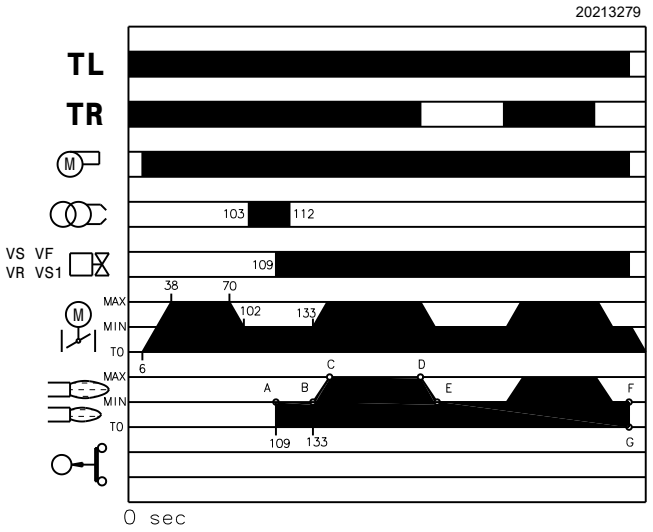


Fig. 40

Ignition failure

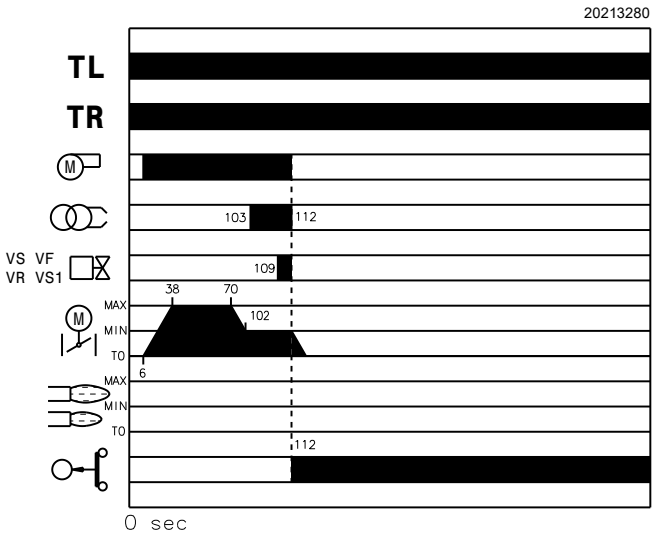


Fig. 41

5.13.4 Ignition failure

If the burner does not fire (Fig. 41), it goes into lockout within 3 sec. after the gas valve opens, 112 seconds after the control device TL closes.

5.13.5 Flame control reset

To carry out the flame control reset, proceed as follows:
➤ press the reset button 2)(Fig. 5 on page 12).

5.14 Final checks (with burner operating)

➤ Open the thermostat/pressure switch TL ➤ Open the thermostat/pressure switch TS	⇨	The burner must stop
➤ Turn the knob of the gas maximum pressure switch to the minimum end of scale position ➤ Turn the air pressure switch to the maximum end of scale position	⇨	The burner must stop in lockout
➤ Turn off the burner and cut off the power ➤ Disconnect the minimum gas pressure switch connector	⇨	The burner must not start
➤ Disconnect the sensor for the flame detection		The burner must stop in lockout due to ignition failure
➤ Obscure the flame sensor	⇨	The burner must stop in lockout due to ignition failure
➤ Turn off the burner and cut off the power ➤ Disconnect the maximum gas pressure switch connector	⇨	The burner must not start
➤ Turn off the burner and cut off the power ➤ Disconnect the minimum oil pressure switch connector	⇨	The burner goes into lockout because the oil valves do not open

Tab. M

WARNING

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

6 Maintenance

6.1 Notes on safety for the maintenance

The periodic maintenance is essential for the good operation, safety, yield and duration of the burner.

It allows you to reduce consumption and polluting emissions and to keep the product in a reliable state over time.


DANGER

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

Before carrying out any maintenance, cleaning or checking operations:


DANGER

Turn off the burner's power supply using the main system switch.


DANGER

Turn off the fuel interception tap.

6.2 Maintenance programme

6.2.1 Maintenance frequency

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

6.2.2 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 flame control 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.


WARNING

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.

6.2.3 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 is no excess wear or loose screws, especially on cams 1) and 2)(Fig. 31).
Clean the outside of the burner.
Clean and grease the adjustable profile of the cams.

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

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.

Electrical current to flame sensor (Fig. 42)

Clean the glass cover from any dust that may have accumulated.
To remove the sensor pull it outwards with force; it is inserted only by pressure.
Min. value for a good work: 70 µA.
If the value is lower, it could be due to:
– exhausted sensor;
– low voltage (lower than 187 V);
– bad regulation of the burner.

In order to measure the current, use a microammeter of 100 µA d.c., connected in series to the sensor, as in the scheme, with a capacitor of 100 µF - 1V d.c. at the same level of the instrument.

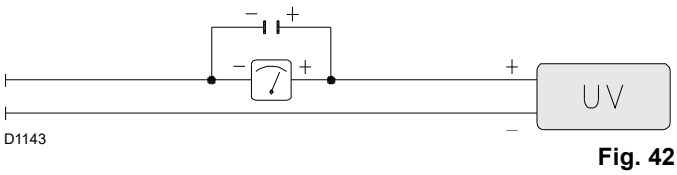


Fig. 42

6.2.4 Safety components

The safety components should be replaced at the end of their life cycle indicated in the following table.

WARNING

The specified life cycles do not refer to the warranty terms indicated in the delivery or payment conditions.

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

Tab. N

LIGHT OIL OPERATION

Pump
The delivery pressure must be stable at 20 bar.
The depression must be less than 0.45 bar.
Unusual noise must not be evident during pump operation.
If the pressure is unstable, or the pump runs noisily, the flexible hose must be detached from the line filter and the fuel must be sucked from a tank located near the burner. This measure permits the cause of the anomaly to be traced to either the suction piping or the pump.
If the problem lies in the suction line, check the filter is clean and that air is not entering the piping.

Filters (Fig. 43)
Check the filtering baskets on line 1) and at nozzle 2) present in the system.
Clean or replace if necessary.
If rust or other impurities are observed inside the pump, use a separate pump to lift any water and other impurities that may have deposited on the bottom of the tank.

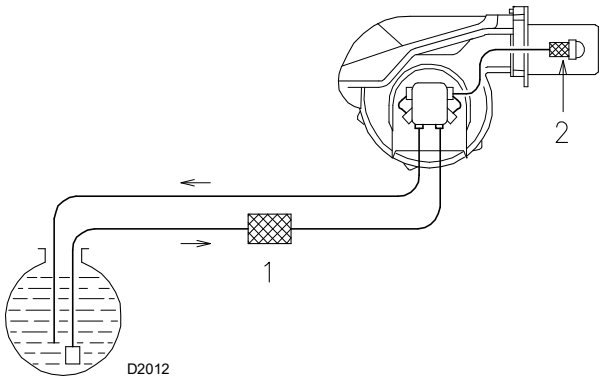


Fig. 43

Nozzles
It is advisable to replace nozzles once a year during periodical maintenance.
Do not clean the nozzle openings.

Hoses
Check that these are in good conditions.

Fuel tank
Approximately every 5 years, suck any water on the bottom of the tank using a separate pump.

Combustion
In case the combustion values found at the beginning of the intervention do not respect the standards in force or, in any case, do not correspond to a proper combustion, contact the Technical Assistance Service in order to carry out the necessary adjustments.

EN 267	Air excess		
	Max. output. $\lambda \leq 1.2$		Min. output $\lambda \leq 1.3$
Theoretical max CO_2 0 % O_2	CO_2 % Calibration		CO mg/kWh
	$\lambda = 1.2$	$\lambda = 1.3$	
15.2	12.6	11.5	≤ 100

GAS OPERATION

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
In case the combustion values found at the beginning of the intervention do not respect the standards in force or, in any case, do not correspond to a proper combustion, contact the Technical Assistance Service in order to carry out the necessary adjustments.

EN 676		Air excess		
		Max. output. $\lambda \leq 1.2$		Min. output $\lambda \leq 1.3$
GAS	Theoretical max CO_2 0 % O_2	Calibration CO_2 %		CO mg/kWh
		$\lambda = 1.2$	$\lambda = 1.3$	
G 20	11.7	9.7	9.0	≤ 100
G 25	11.5	9.5	8.8	≤ 100
G 30	14.0	11.6	10.7	≤ 100
G 31	13.7	11.4	10.5	≤ 100

6.3 Opening the burner

DANGER

Disconnect the burner from the electrical supply.

The burner leaves the factory set for opening to the right, therefore maintaining the pin 1)(Fig. 14) in its housing.

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

A remove the screw 6) releasing the tie-rod 7)(Fig. 14);
B remove the screws 2);
C open the burner to a maximum of 100-150 mm by rotating around the hinge and release the cables of the electrodes 5);
D fully open the burner as in Fig. 14;
E undo the screw 4) with pressure test point;
F disconnect the light oil pipes by unscrewing the two swivel fittings 8);
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. 14), 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**.

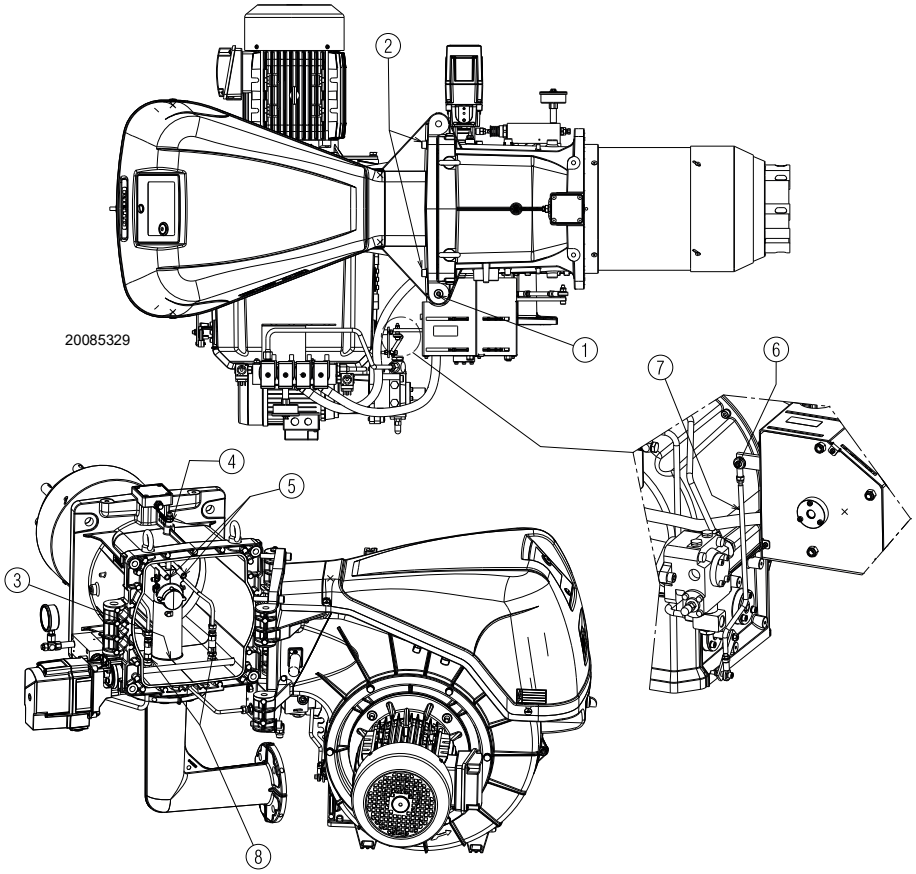


Fig. 44

6.4 Closing the burner

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

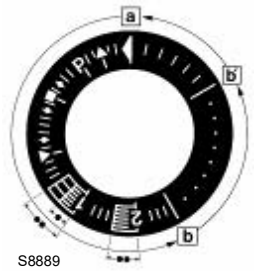
After carrying out maintenance, cleaning or checking operations, reassemble the cover and all the safety and protection devices of the burner.

7 Faults - Possible causes - Solutions

The LFL1... flame control is equipped with a lockout indicator (Fig. 45) that turns during the start-up programme, and is visible from the small lockout window.

When the burner does not start or stops, due to a failure, the symbol that appears on the indicator indicates the type of interruption.

The positions of the lockout indicator are shown in Fig. 46.



Lockout indicator

a-b	Start-up sequence
b(b')	Idle stages (without contact confirmation)
b(b')-a	Post-purging programme

Fig. 45

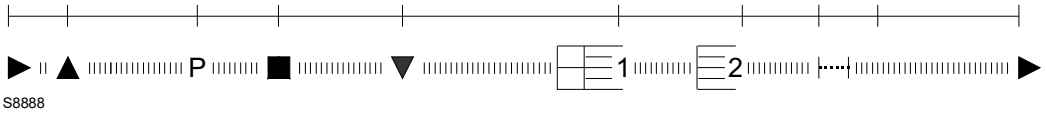


Fig. 46

Fuse replacement

The fuse 2)(Fig. 47) is in the rear part of the flame control. A spare fuse 1) is also available: it can be extracted after breaking the panel tab A) that houses it. In the event that fuse 2) has been tripped, replace it as shown in Fig. 47.

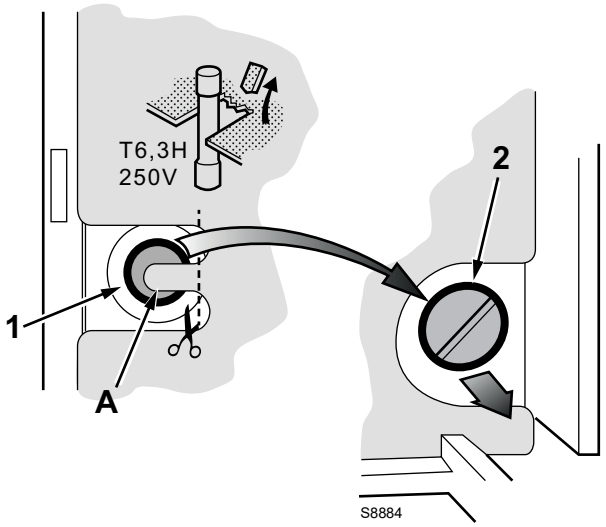


Fig. 47

Find a list of faults, causes and possible solutions for a set of failures that may occur and result in irregular burner operation or no functioning at all.

If a burner malfunction is detected, first of all:
- check that the electrical wiring is adequately connected;
- check whether fuel is delivered;
- check that every adjustment parameter is adequately set.

WARNING

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

DANGER

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

7.1 Light oil operation

Symbol	Problem	Probable cause	Suggested remedy
◀	The burner does not start	Limiter or safety control device open	Adjust or replace
		Flame control lockout	Release
		Fan motor lockout	Release the thermal relay
		No electrical power supply	Close all switches - check connections
		No light oil	Check the light oil supply circuit
		Flame control fuse interrupted	Replace
		Pump is jammed	Replace
		Faulty motor remote control switch	Replace
		Defective flame control	Replace
		Faulty electrical motor	Replace
		Defective safety solenoid valve	Replace
	The burner does not come on and the lockout appears	Flame simulation	Replace the flame control
		Flame sensor short circuit	Replace flame sensor
		Two-phase electrical supply, thermal relay steps in	Reset the thermal relay at return of the three phases
▲	The burner starts but stops at maximum air damper setting	The servomotor contact does not intervene	Adjust cam or replace servomotor
P	The burner starts and then goes into lockout	Air pressure switch poorly adjusted	Adjust it
		Pressure switch pressure point pipe blocked	Clean
■	The burner starts and then goes into lockout	Failure to the flame detection circuit	Replace flame control
▼	The burner remains in pre-purging phase	The servomotor contact III does not intervene	Adjust cam or replace servomotor
1	Once the pre-purging and the safety time has elapsed the burner goes into lockout without the flame appearing	No fuel in the tank, or water on the bottom	Refill with fuel, or remove the water
		Bad head and damper adjustments	Adjust
		High voltage cable defective or grounded	Replace
		High voltage cable deformed by high temperature	Replace and protect
		Bad electrical wiring on valves or transformer	Check
		Pump unprimed	Prime it
		Pump suction line connected to return line	Correct connection
		Soiled filters (nozzle line)	Clean
		Valves up-line from pump closed	Open them
		Opposite motor rotation	Change electrical wiring to the motor
		Light oil solenoid valves do not open	Check connections and solenoids
		Pilot burner does not work	Check
		Defective flame control	Replace
		Ignition electrode incorrectly adjusted	Adjust it
		Electrode grounded due to broken insulation	Replace
		Motor/pump coupling broken	Replace
		Faulty ignition transformer	Replace
	The flame ignites regularly but the burner goes into lock out at the end of the safety time	Faulty flame sensor or defective flame control	Replace flame sensor or flame control
		Dirty flame sensor	Clean
	Smoke in flame (dark Bacharach)	Little air	Adjust the fan head and damper
		Incorrect pump pressure	Adjust
		Nozzle filter clogged	Clean or replace
		Boiler room air vents insufficient	Increase
		Dirty or worn nozzle	Replace
		Flame disk soiled, loose or deformed	Clean it, tighten it or replace it
	Smoke in flame (yellow Bacharach)	Too much air	Adjust head and air dampers

Symbol	Problem	Probable cause	Suggested remedy
	Ignition with pulses or flame failure, delayed ignition	Poorly adjusted head	Adjust
		Incorrectly adjusted fan air damper: too much air	Adjust
		Nozzle not fit for burner or boiler	See nozzle table
		Defective nozzle	Replace
		Unsuitable pump pressure	Adjust
		Ignition electrode not adjusted correctly or soiled	Adjust it
		Output during ignition phase is too high	Reduce
	The burner does not pass to the 2nd stage	Remote control device TR fails to close	Adjust or replace
		Defective flame control	Replace
	Uneven fuel supply	Understand whether the cause lies in the pump or the fuel supply system	Supply fuel to the burner from a tank positioned near the burner itself
	Pump rusty on the inside	Water in the tank	Remove the water with a pump
	Noisy pump, unstable pressure	Air has entered the suction line	Block the couplings
		Depression value too high (higher than 35 cm Hg):	
		Excessive difference of level between burner and tank	Power the burner from a loop circuit
		Piping diameter too small	Increase
		Dirty suction line filters	Clean
		Suction line valves closed	Open them
		The paraffin solidifies due to the low temperature	Put additive in the light oil
	Pump unprimes after prolonged pause	Return pipe not immersed in fuel	Bring it to the same height as the suction line
		Air in the suction line	Block the couplings
	Pump leaks light oil	Loss of sealing organ	Replace the pump
	Dirty combustion head	Dirty nozzle or nozzle filter	Replace
		Unsuitable nozzle delivery or angle	See recommended nozzles
		Loose nozzle	Block it
		Environmental impurities on flame stability disc	Clean
		Incorrect head adjustment, or little air	Adjust it, opening the damper
		Blast tube length not suitable for the boiler	Contact the boiler manufacturer
	Burner goes into lockout during operation	Flame sensor faulty or dirty	Replace it or clean it
		Air pressure switch faulty	Replace

Tab. O

7.2 Gas operation

Symbol	Problem	Probable cause	Suggested remedy
◀	The burner does not start	No electrical power supply	Close all switches and check connections
		A limit or safety thermostat/pressure switch open	Adjust or replace
		Flame control lockout	Release the flame control
		Flame control fuse interrupted	Replace it
		Incorrect electrical wiring	Check
		Defective flame control	Replace
		No gas supply	Open the manual valves between meter and train
		Mains gas pressure insufficient	Contact your GAS COMPANY
		Minimum gas pressure switch fails to close	Adjust or replace
		Air pressure switch in operating position	Adjust or replace
		The servomotor contact does not intervene (closure cam 0°)	Adjust the closure cam 0° or replace the servomotor
	The burner does not come on and the lockout appears	Flame simulation	Replace the flame control
		Faulty motor remote control switch	Replace
		Defective electrical motor	Replace
		Motor lockout	Release the thermal relay
▲	The burner starts but stops at maximum air damper setting	The servomotor contact does not intervene (maximum cam opening)	Cam adjustment (maximum opening) or replace the servomotor
P	The burner starts and then goes into lockout	Air pressure switch does not switch owing to lack of air pressure:	
		Air pressure switch poorly adjusted	Adjust or replace
		Pressure switch pressure point pipe clogged	Clean
		Poorly adjusted head	Adjust
		Dirty fan	Clean
		High depression in the furnace	Contact our Technical Department
■	The burner turns on and then remains in lockout mode	Failure to the flame detection circuit	Replace the flame control
▼	The burner remains in pre-purging phase	The servomotor contact does not intervene (minimum cam)	Cam adjustment (minimum) or replace the servomotor

Symbol	Problem	Probable cause	Suggested remedy
1	Once the pre-purging and the safety time has elapsed the burner goes into lockout without the flame appearing	The GAS solenoid valve lets too little gas through	Increase
		The GAS solenoid valve does not open	Replace the coil or the rectifier panel
		Gas pressure too low	Increase pressure at governor
		Ignition electrode incorrectly adjusted	Adjust it
		Electrode grounded due to broken insulation	Replace
		High voltage cable defective or grounded	Replace
		High voltage cable deformed by high temperature	Replace and protect
		Faulty ignition transformer	Replace
		Incorrect valve or ignition transformer connections	Redo them
		Defective flame control	Replace
		A closed valve upstream the gas train	Open
		Air in pipework	Bleed air
	Lockout with flame appearing	The GAS solenoid valve lets too little gas through	Increase
		Dirty flame sensor	Check, replace flame sensor
		Faulty connection	Check, replace flame sensor
		Insufficient detection current (min.70 µA)	Measure current, replace flame sensor
		Flame sensor exhausted, faulty	Replace
		Maximum gas pressure switch intervention	Adjust or replace
		Defective flame control	Replace
	The burner continues to repeat the start-up cycle without lockout	The gas pressure in the gas mains lies very close to the value to which the gas pressure switch has been set. The sudden drop in pressure after valve opening causes temporary opening of the pressure switch itself, the valve immediately closes and the burner stops. Pressure increases again, the pressure switch closes again and the ignition cycle is repeated. And so on.	Reduce the intervention pressure of the minimum gas pressure switch. Replace the gas filter cartridge
	Lockout without symbol indication	Flame simulation	Replace the flame control
|	Burner goes into lockout during operation	Faulty flame sensor	Replace worn parts
		Air pressure switch faulty	Replace
◀	Lockout when the burner stops	Permanent flame in the combustion head or flame simulation	Eliminate permanency of flame or replace the flame control
	Ignition with pulsations	Poorly adjusted head	Adjust
		Ignition electrode incorrectly adjusted	Adjust it
		Incorrectly adjusted fan air damper: too much air	Adjust
		Output during ignition phase is too high	Reduce

Tab. P

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 INTERFACE RS-485/PROFIBUS	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	20096322

Continuous purging kit

Burner	Code
All models	20074542

Kit for remote fuel commutation

Burner	
All models	ON DEMAND

Soundproofing box kit

Burner	Type	dB(A)	Code
RLS 310 - 410/M MX	C7	10	3010376
RLS 510 - 610/M MX	C7 PLUS	10	20085111

Spacer kit

Burner	Code
All models	20008903

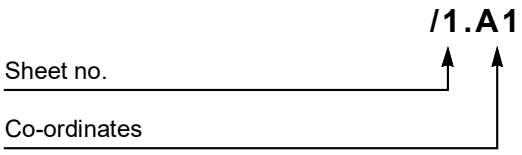
Gas trains in compliance with EN 676

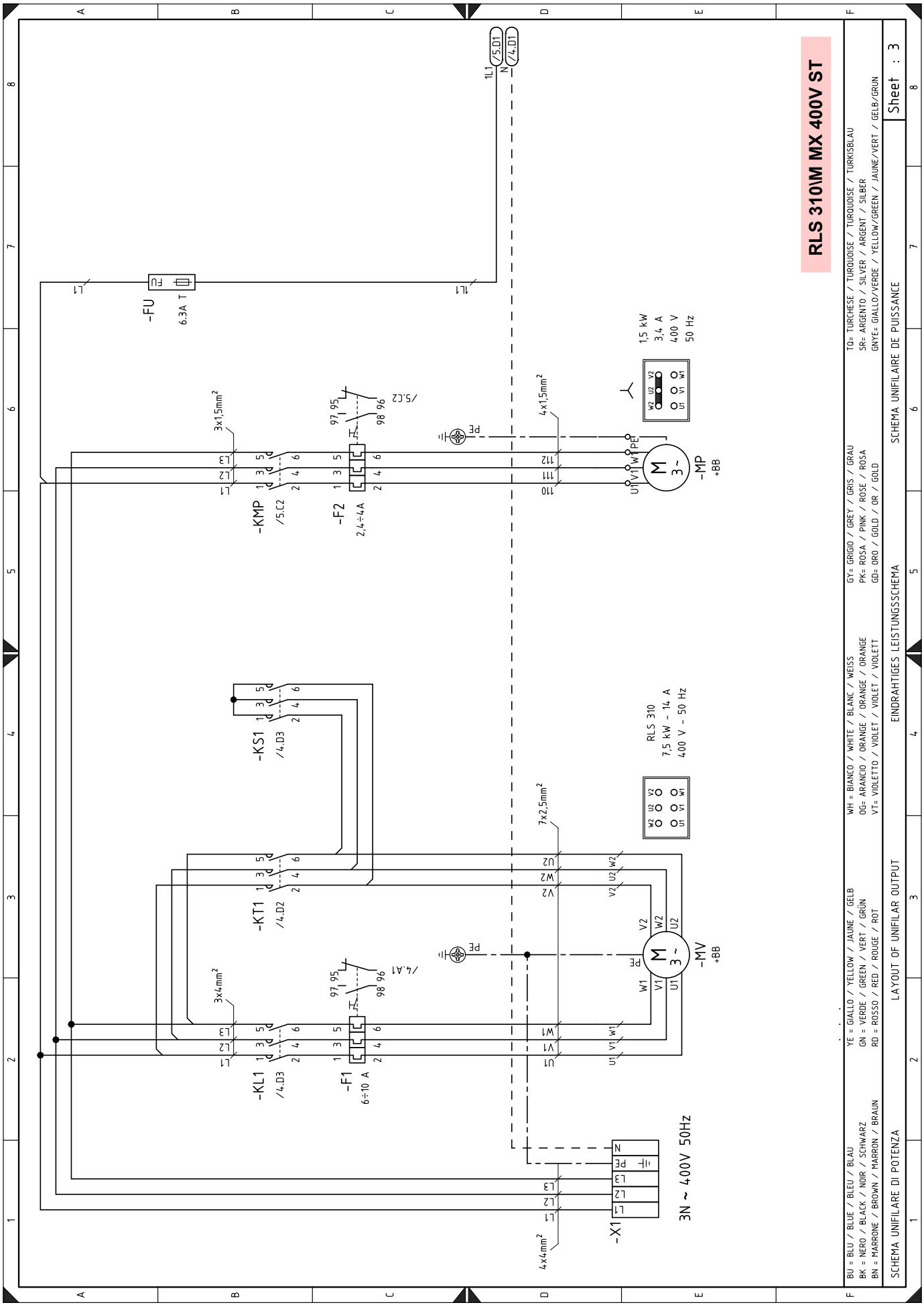
Please refer to manual.

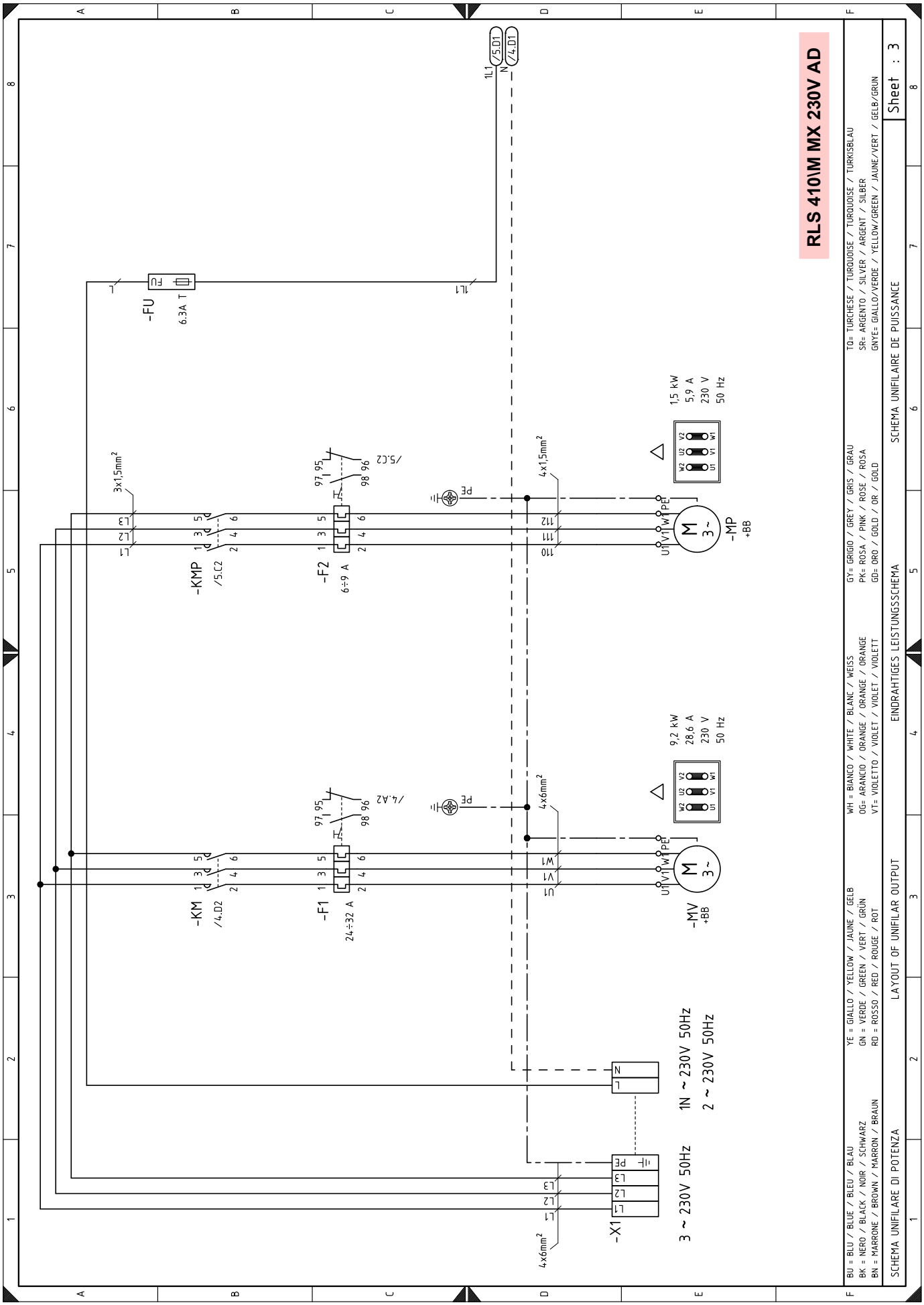
B Appendix - Electrical panel layout

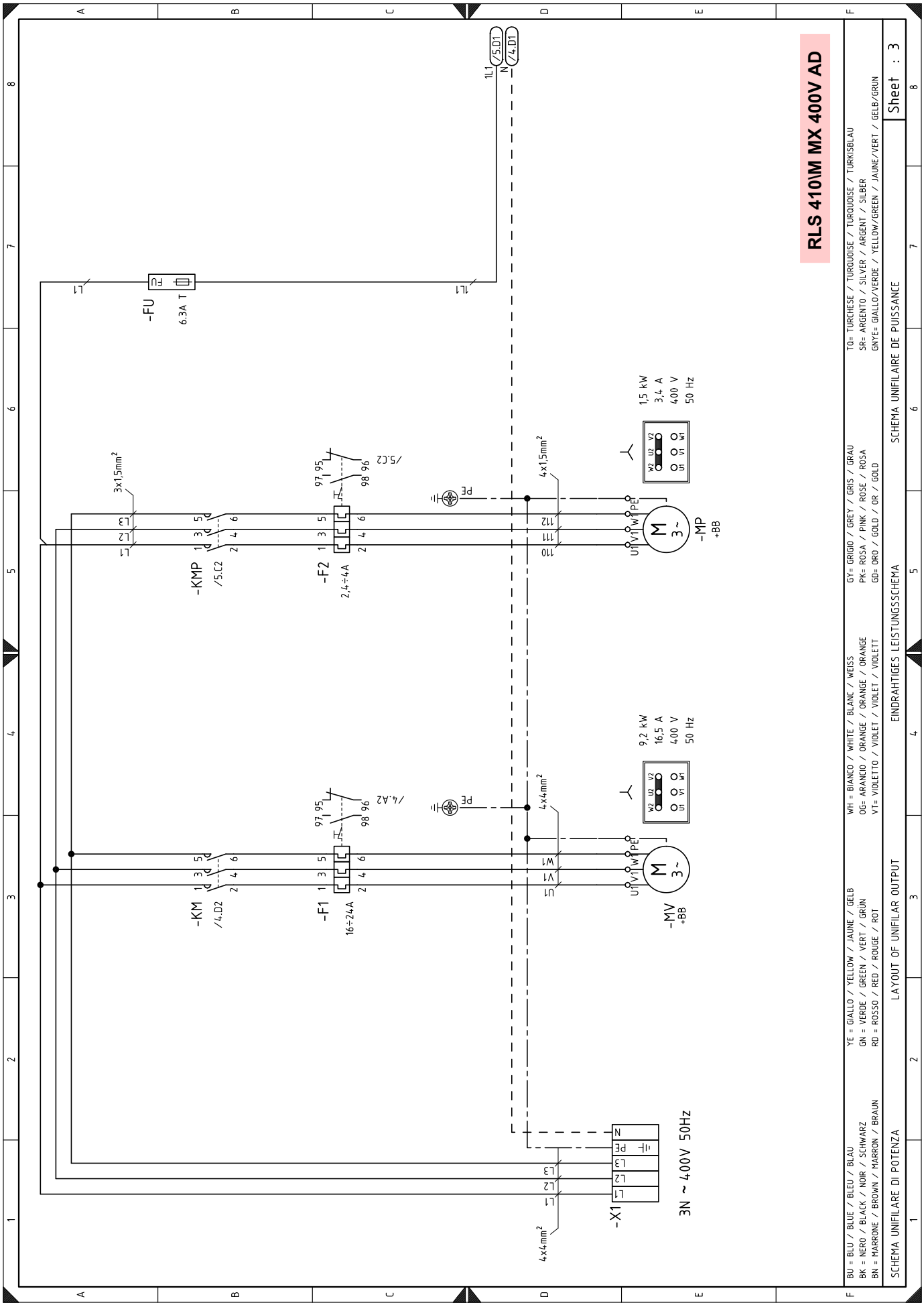
1 Contents

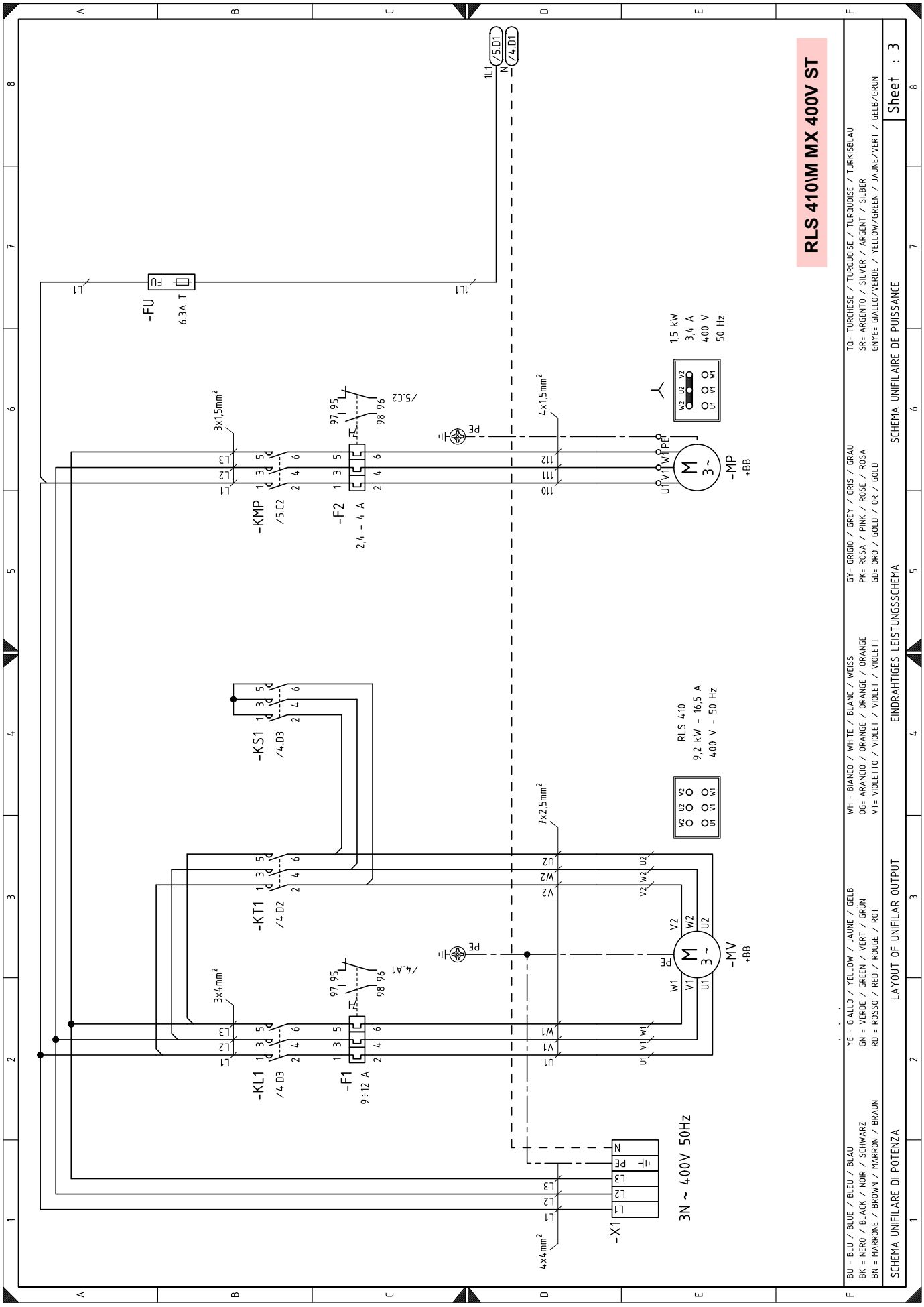
2 Indication of references

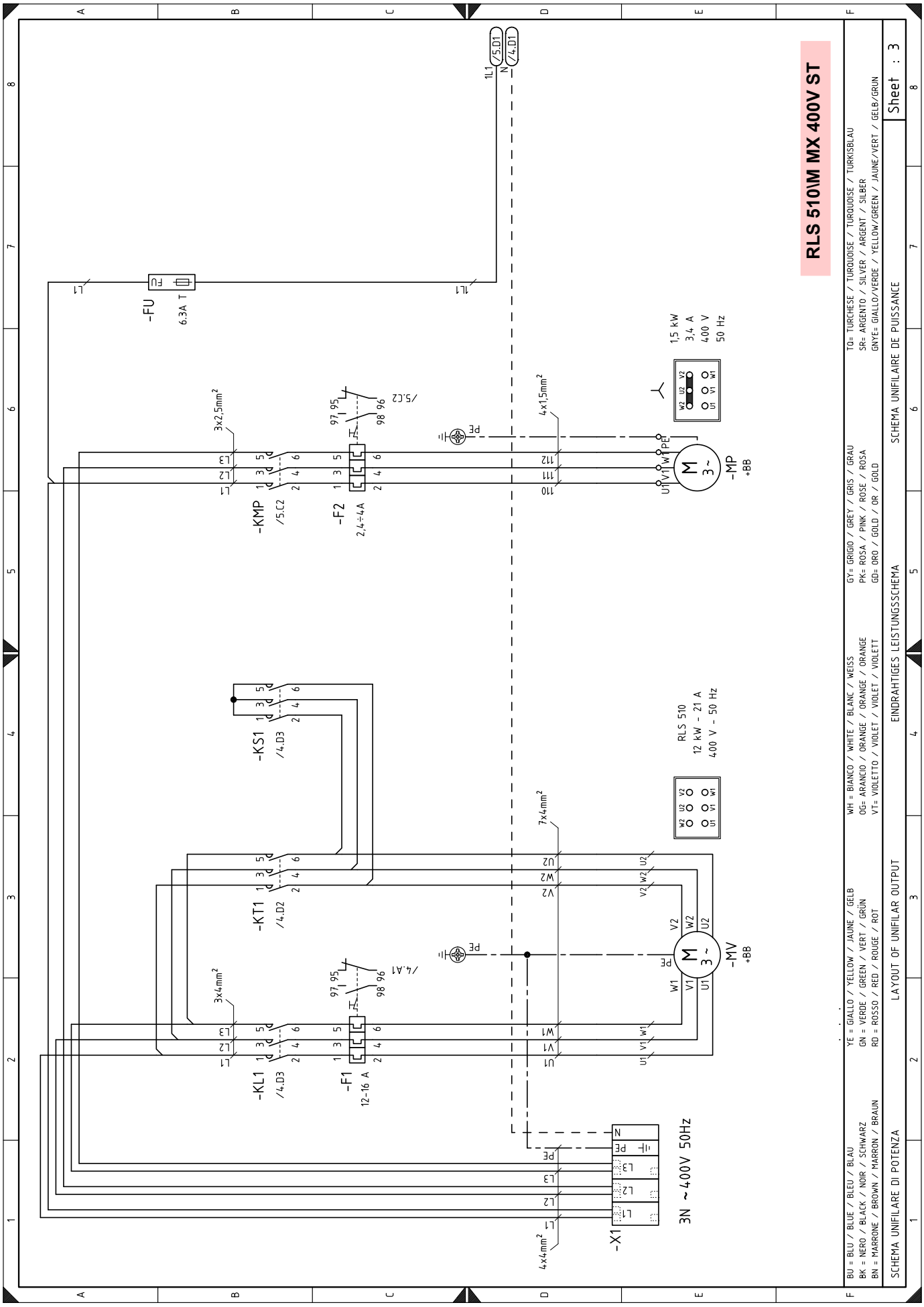


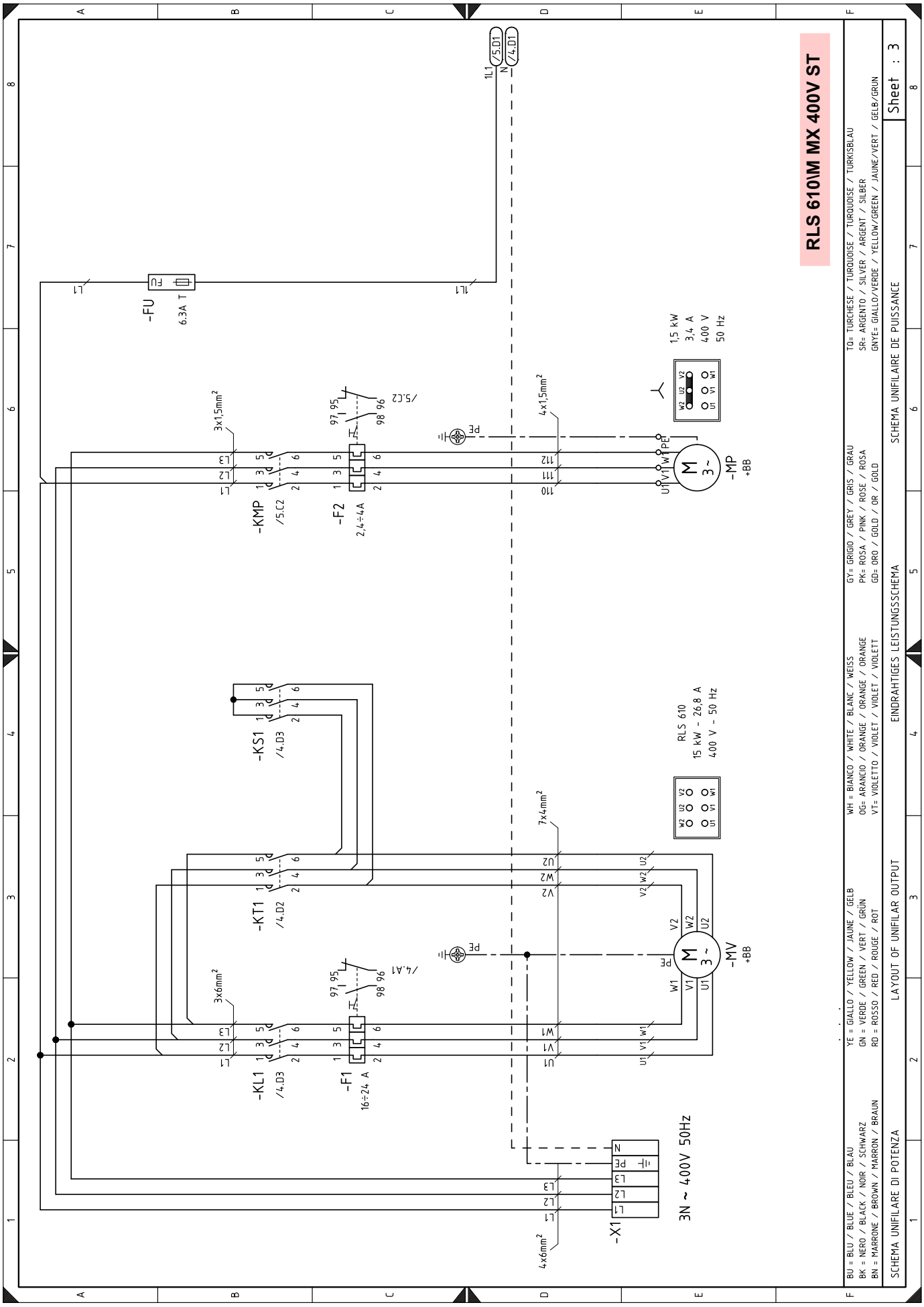

RLS 310\M MX 400V ST
SCHEMA UNIFILARE DI POTENZA
LAYOUT OF UNIFILAR OUTPUT
EINDRAHTIGES LEISTUNGSSCHEMA
SCHEMA UNIFILAIRE DE PUISSANCE
Sheet : 3
-FU
6.3A T
-KMP
-F2
2,4÷4A
-MP
1,5 kW
3,4 A
400 V
50 Hz
-KS1
-KT1
-KL1
-F1
6÷10 A
-MV
RLS 310
7,5 kW - 14 A
400 V - 50 Hz
-X1
3N ~ 400V 50Hz
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN

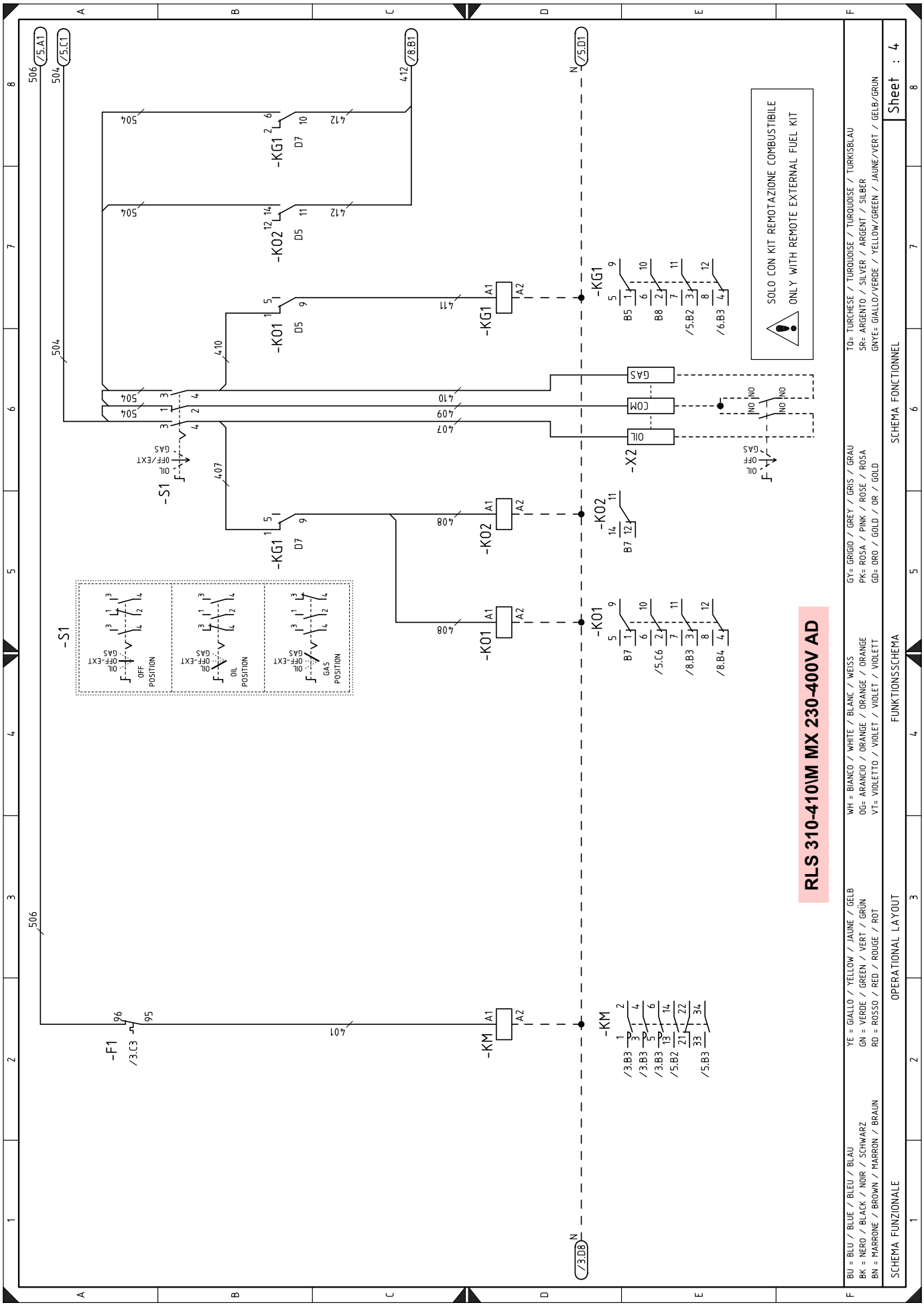

RLS 410\M MX 230V AD
SCHEMA UNIFILARE DI POTENZA
LAYOUT OF UNIFILAR OUTPUT
EINDRAHTIGES LEISTUNGSSCHEMA
SCHEMA UNIFILAIRE DE PUISSANCE
Sheet : 3
-FU
6.3A T
-KMP
/5.C2
-F2
6÷9 A
-MP
+BB
1,5 kW
5,9 A
230 V
50 Hz
-KM
/4.D2
-F1
24÷32 A
-MV
+BB
9,2 kW
28,6 A
230 V
50 Hz
-X1
3 ~ 230V 50Hz
1N ~ 230V 50Hz
2 ~ 230V 50Hz
3x1,5mm²
4x1,5mm²
4x6mm²
4x6mm²
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN

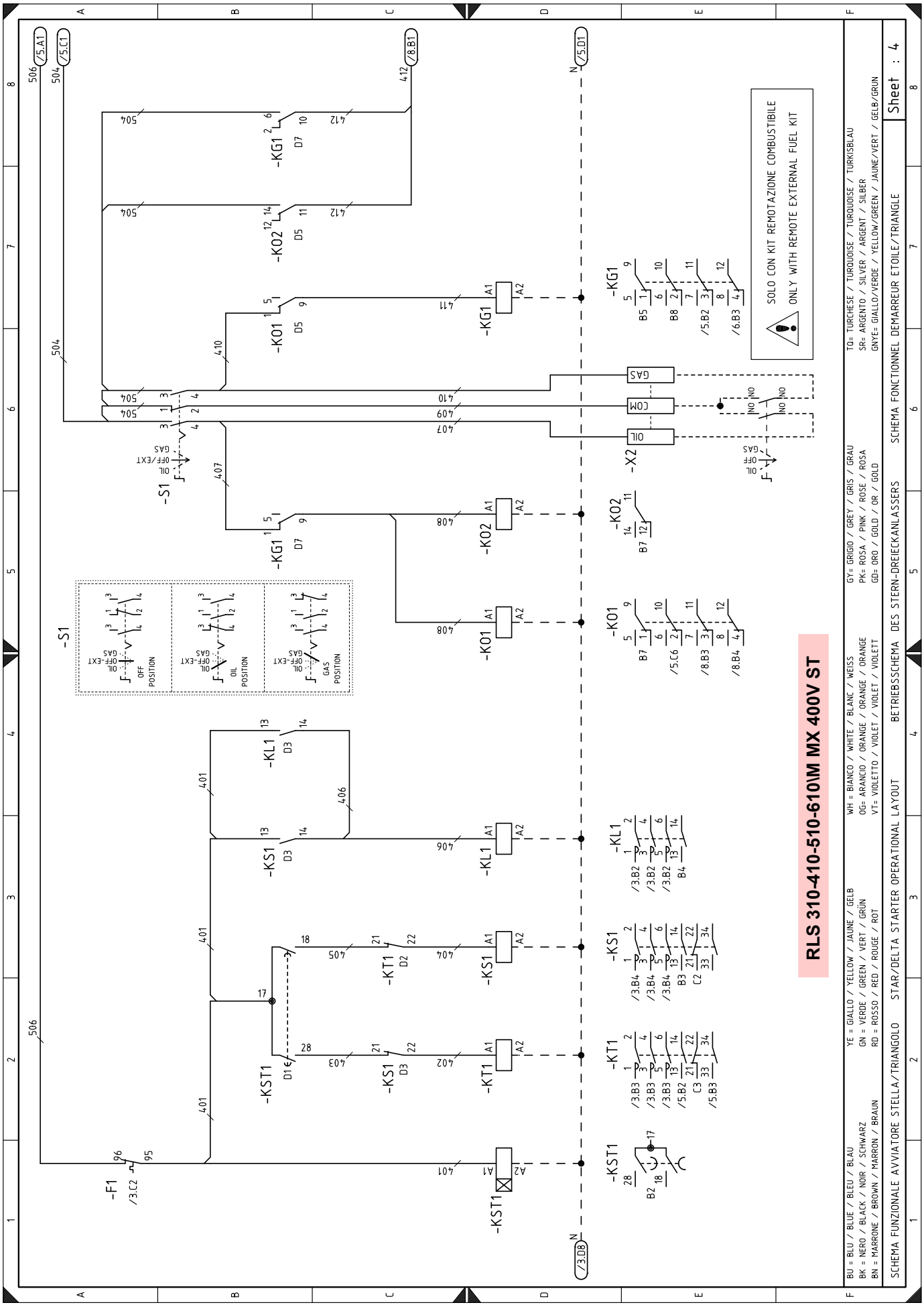

RLS 410\M MX 400V AD
-FU
6.3A T
-KMP
/5.C2
-F2
2,4÷4A
-MP
+BB
1,5 kW
3,4 A
400 V
50 Hz
-KM
/4.D2
-F1
16÷24A
-MV
+BB
9,2 kW
16,5 A
400 V
50 Hz
-X1
3N ~ 400V 50Hz
SCHEMA UNIFILARE DI POTENZA
LAYOUT OF UNIFILAR OUTPUT
EINDRAHTIGES LEISTUNGSSCHEMA
SCHEMA UNIFILAIRE DE PUISSANCE
Sheet : 3

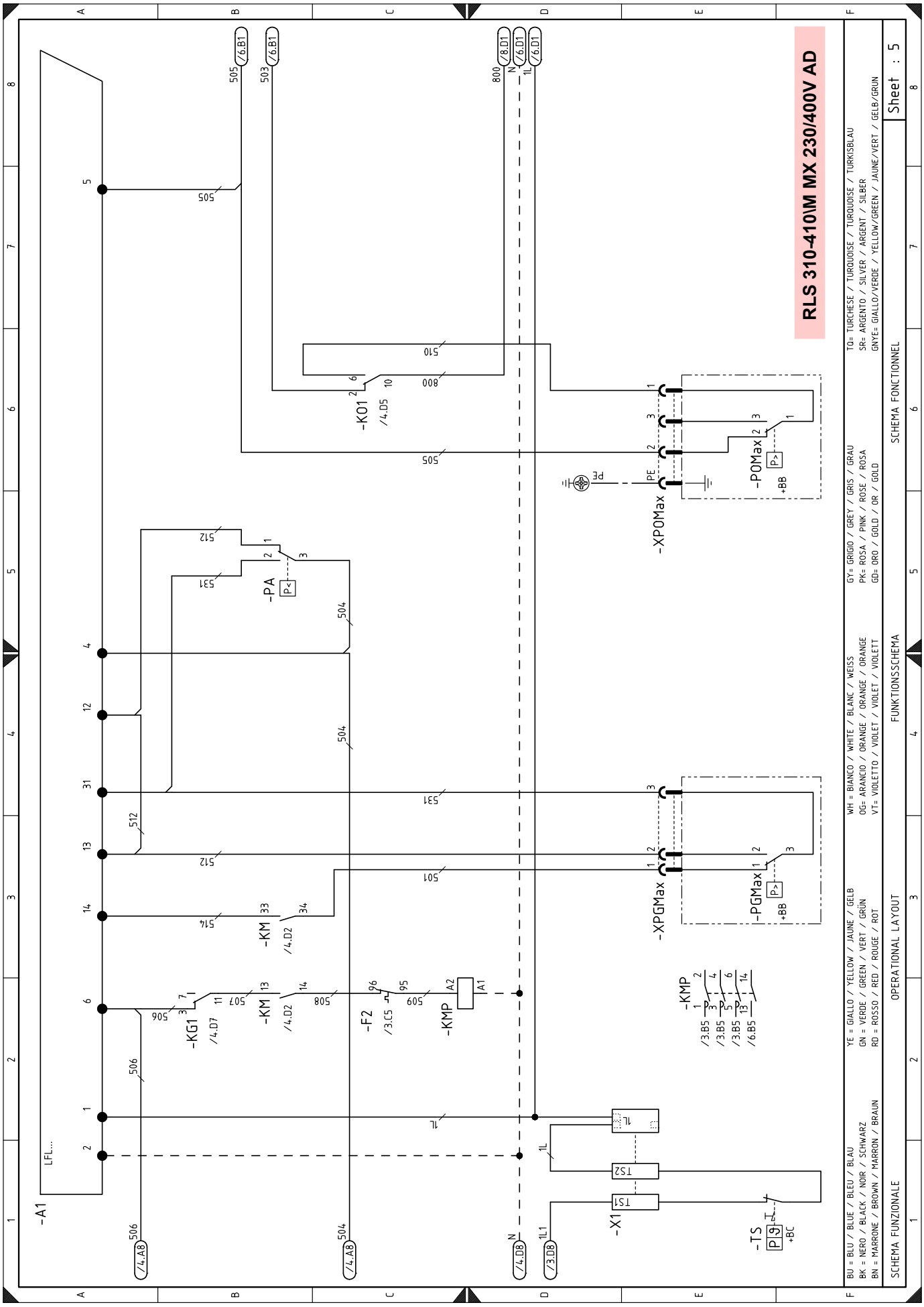

RLS 410\M MX 400V ST
-FU
6.3A T
-KMP
-F2
2,4 - 4 A
-MP
1,5 kW
3,4 A
400 V
50 Hz
-KS1
-KT1
-KL1
-F1
9÷12 A
-MV
RLS 410
9,2 kW - 16,5 A
400 V - 50 Hz
-X1
3N ~ 400V 50Hz
BU = BLU / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
SCHEMA UNIFILARE DI POTENZA
LAYOUT OF UNIFILAR OUTPUT
EINDRAHTIGES LEISTUNGSSCHEMA
SCHEMA UNIFILAIRE DE PUISSANCE
Sheet : 3

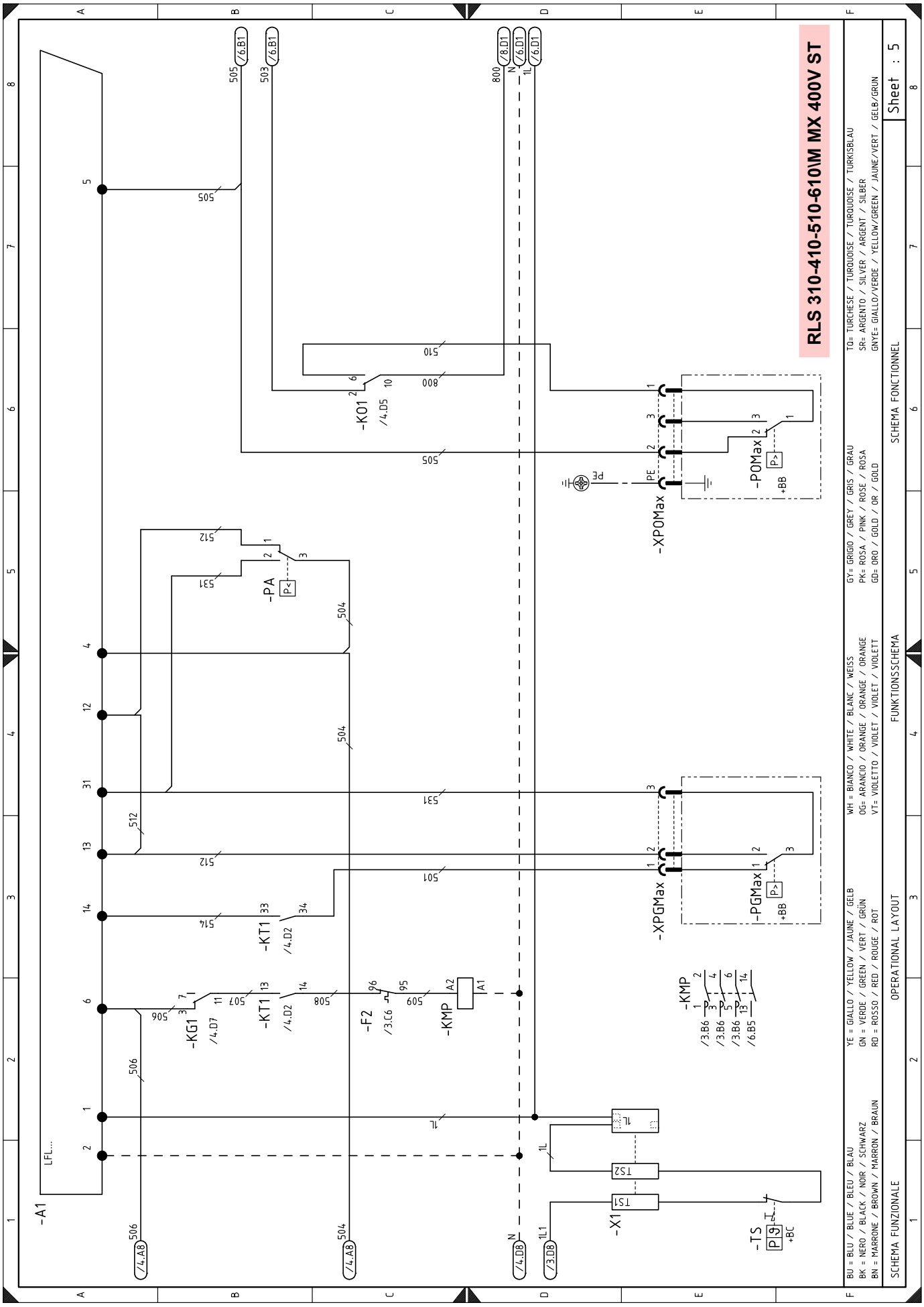

RLS 510\M MX 400V ST
SCHEMA UNIFILARE DI POTENZA
LAYOUT OF UNIFILAR OUTPUT
EINDRAHTIGES LEISTUNGSSCHEMA
SCHEMA UNIFILAIRE DE PUISSANCE
Sheet : 3
-FU
6.3A T
-KMP
-F2
2,4÷4A
-MP
1,5 kW
3,4 A
400 V
50 Hz
-KS1
-KT1
-KL1
-F1
12-16 A
-MV
RLS 510
12 kW - 21 A
400 V - 50 Hz
-X1
3N ~400V 50Hz
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN

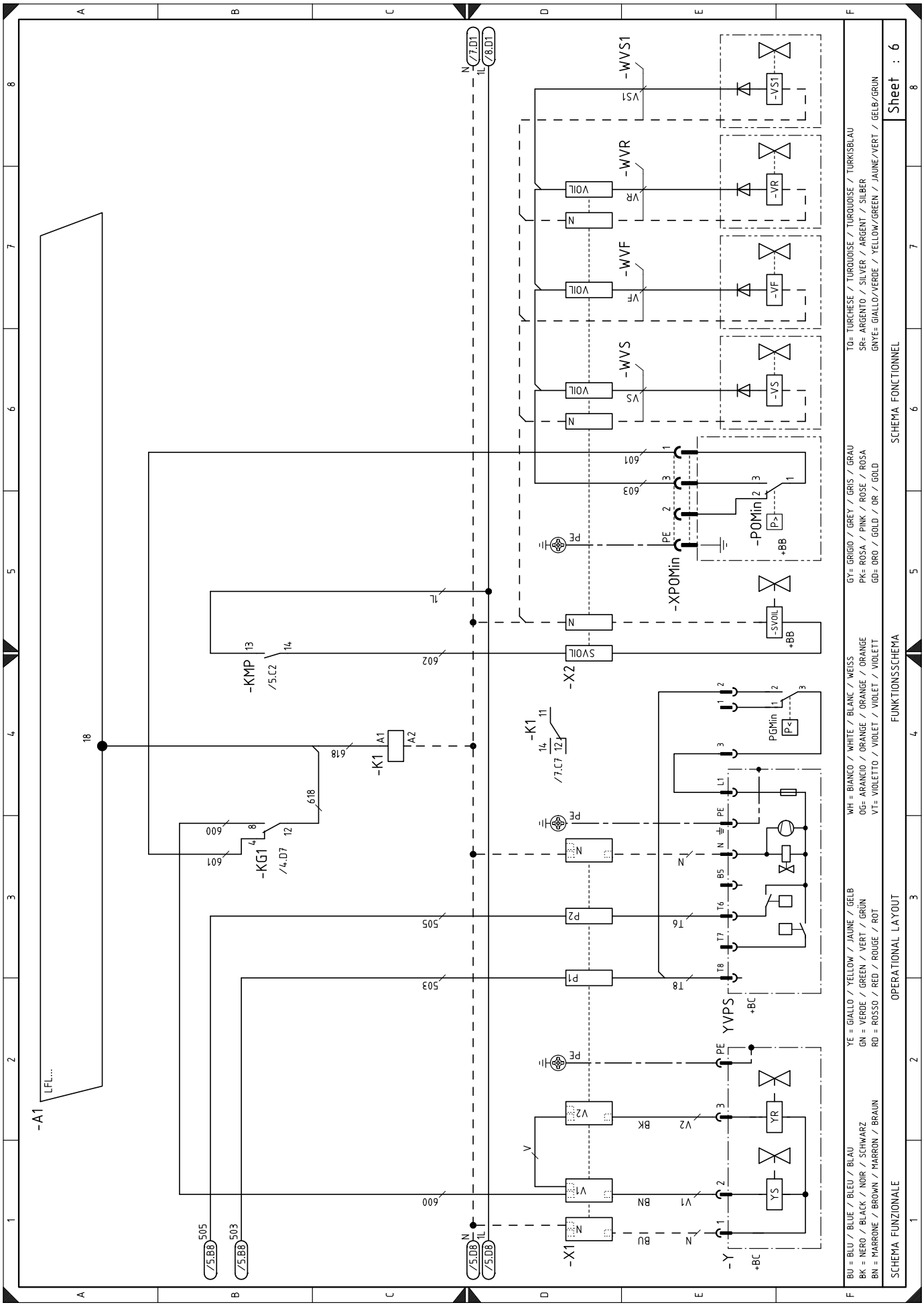

RLS 610\M MX 400V ST
SCHEMA UNIFILARE DI POTENZA
LAYOUT OF UNIFILAR OUTPUT
EINDRAHTIGES LEISTUNGSSCHEMA
SCHEMA UNIFILAIRE DE PUISSANCE
Sheet : 3
3N ~ 400V 50Hz
-FU
6.3A T
-KMP
-F2
2,4÷4A
-MP
1,5 kW
3,4 A
400 V
50 Hz
-KS1
-KT1
-KL1
-F1
16÷24 A
-MV
RLS 610
15 kW - 26,8 A
400 V - 50 Hz
-X1
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TÜRKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN

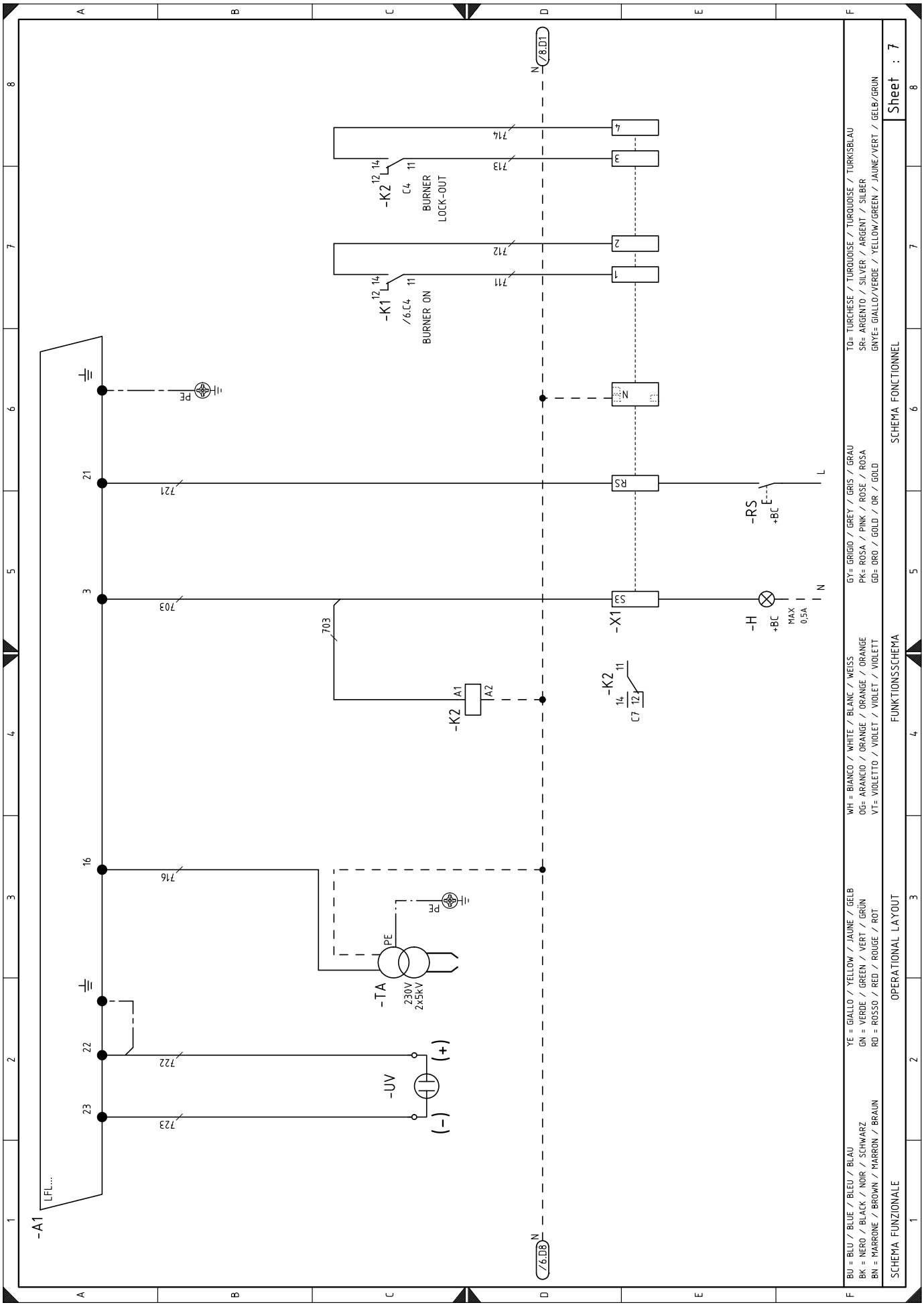

RLS 310-410\M MX 230-400V AD
SOLO CON KIT REMOTAZIONE COMBUSTIBILE
ONLY WITH REMOTE EXTERNAL FUEL KIT
SCHEMA FUNZIONALE
OPERATIONAL LAYOUT
FUNKTIONSSCHEMA
SCHEMA FONCTIONNEL
Sheet : 4
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN

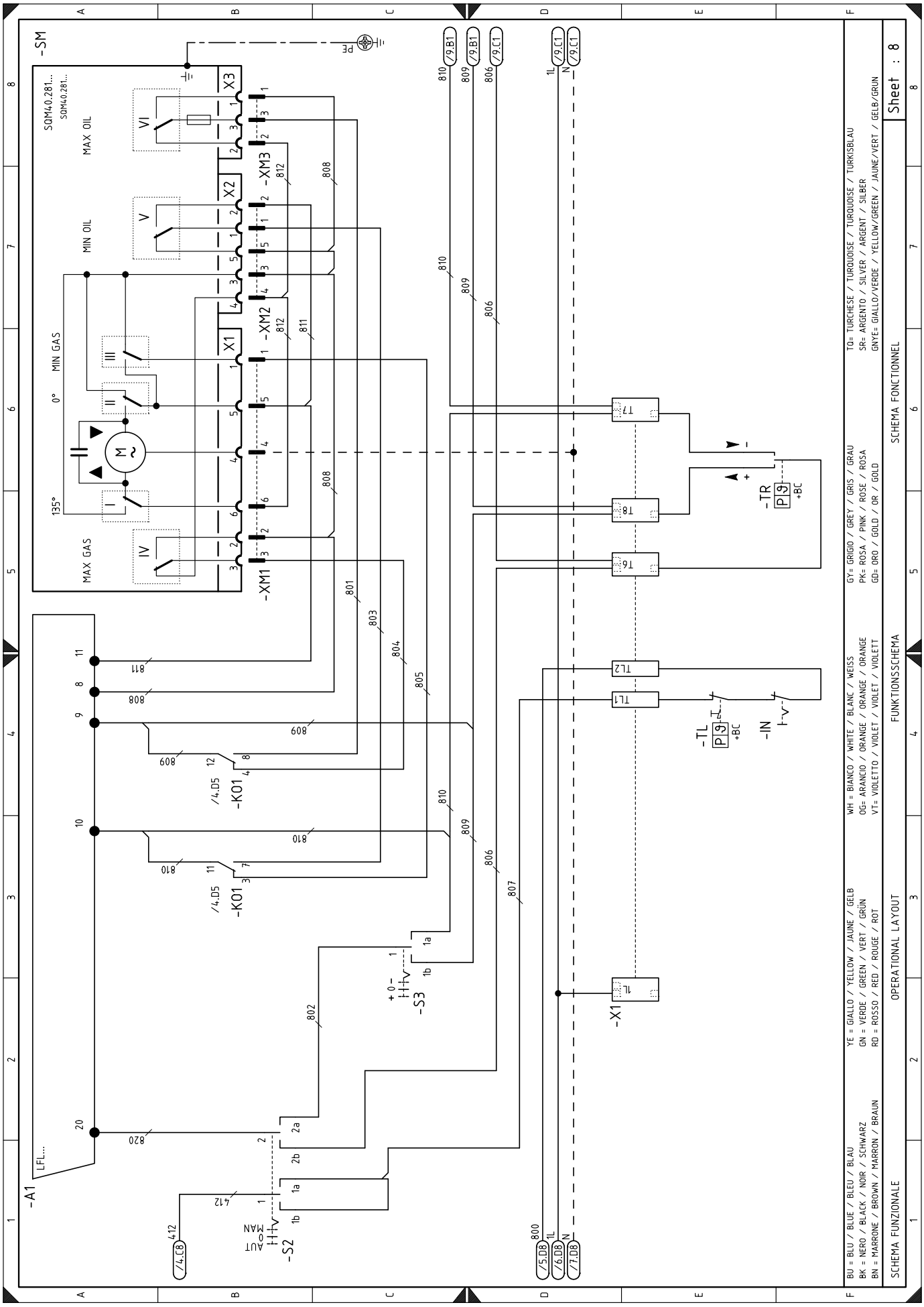

RLS 310-410-510-610IM MX 400V ST
SCHEMA FUNZIONALE AVVIATORE STELLA/TRIANGOLO STAR/DELTA STARTER OPERATIONAL LAYOUT BETRIEBSSCHEMA DES STERN-DREIECKANLASSERS SCHEMA FONCTIONNEL DEMARREUR ETOILE/TRIANGLE
Sheet : 4
SOLO CON KIT REMOTAZIONE COMBUSTIBILE
ONLY WITH REMOTE EXTERNAL FUEL KIT
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
-F1
-KST1
-KT1
-KS1
-KL1
-KG1
-KO1
-KO2
-S1
-X2
OFF POSITION
OIL POSITION
GAS POSITION

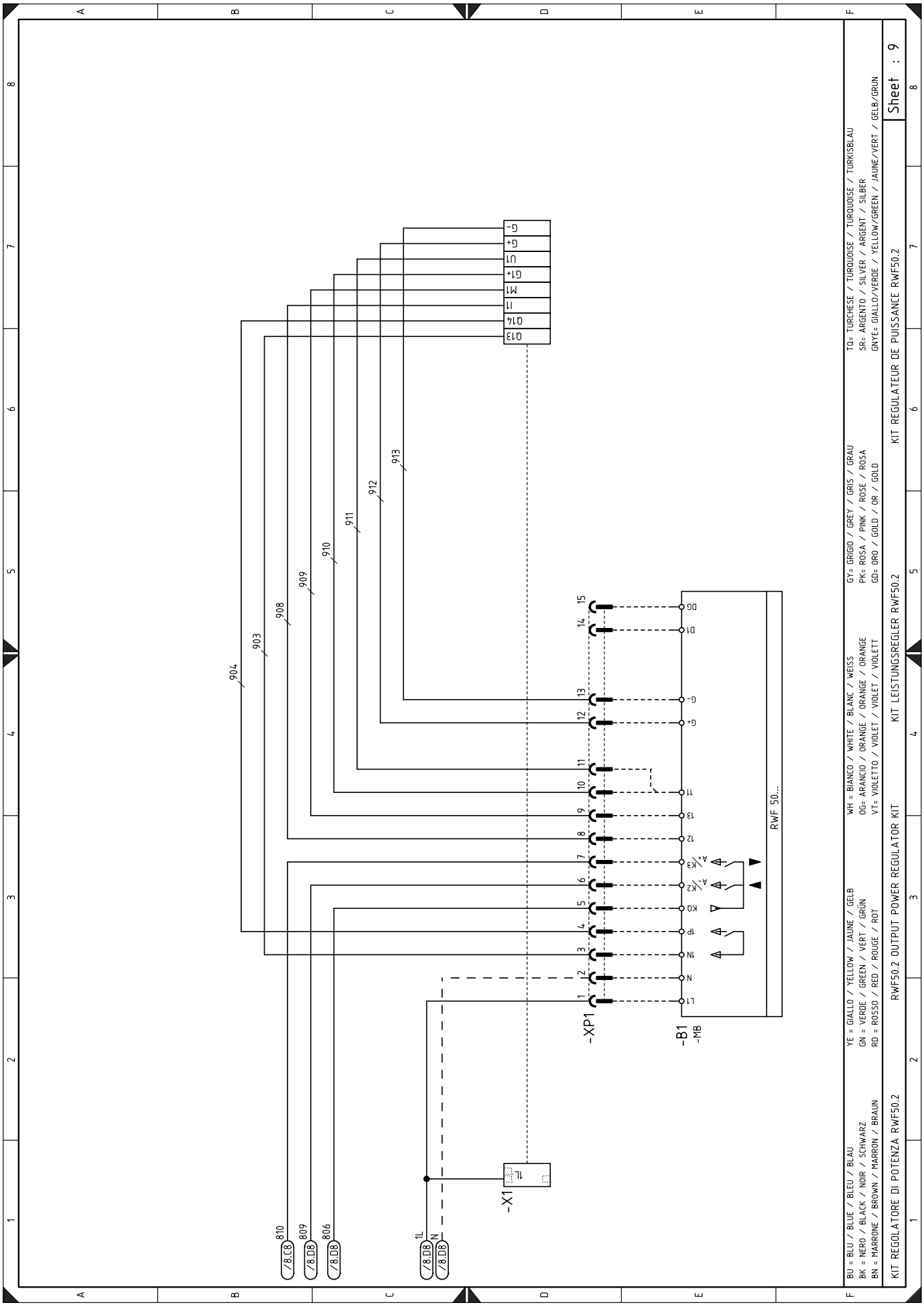

RLS 310-410\M MX 230/400V AD
-A1
LFL...
-KG1
-KM
-KMP
-F2
-PA
-KO1
-XPOMax
-POMax
-XPGMax
-PGMax
-X1
-TS
SCHEMA FUNZIONALE
OPERATIONAL LAYOUT
FUNKTIONSSCHEMA
SCHEMA FONCTIONNEL
Sheet : 5

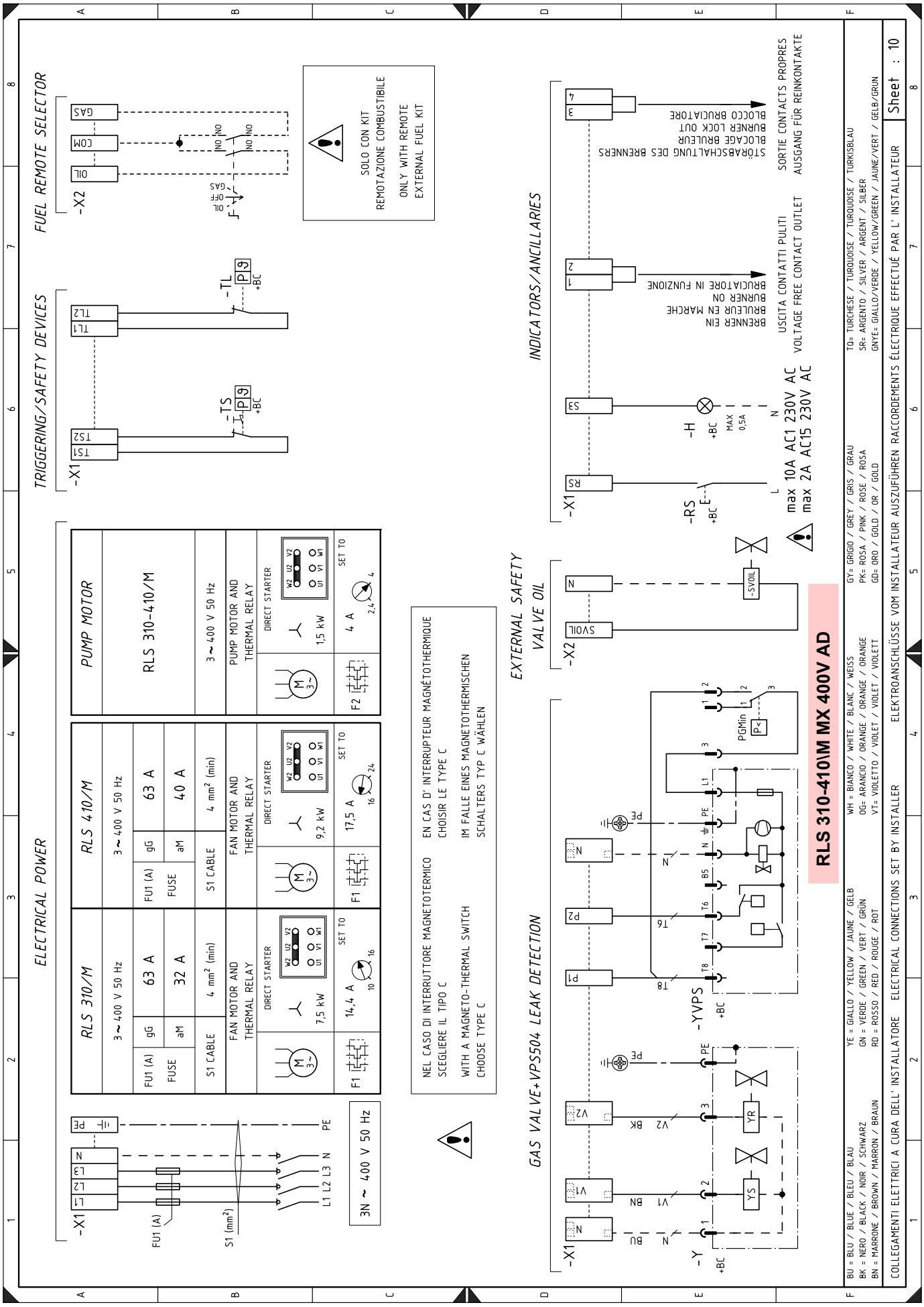

RLS 310-410-510-610\M MX 400V ST
SCHEMA FUNZIONALE
OPERATIONAL LAYOUT
FUNKTIONSSCHEMA
SCHEMA FONCTIONNEL
Sheet : 5
-A1
-KG1
-KT1
-KT1
-F2
-KMP
-PA
-XPOMax
-POMax
-XPGMax
-PGMax
-KO1
-X1
-TS
-KMP
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN

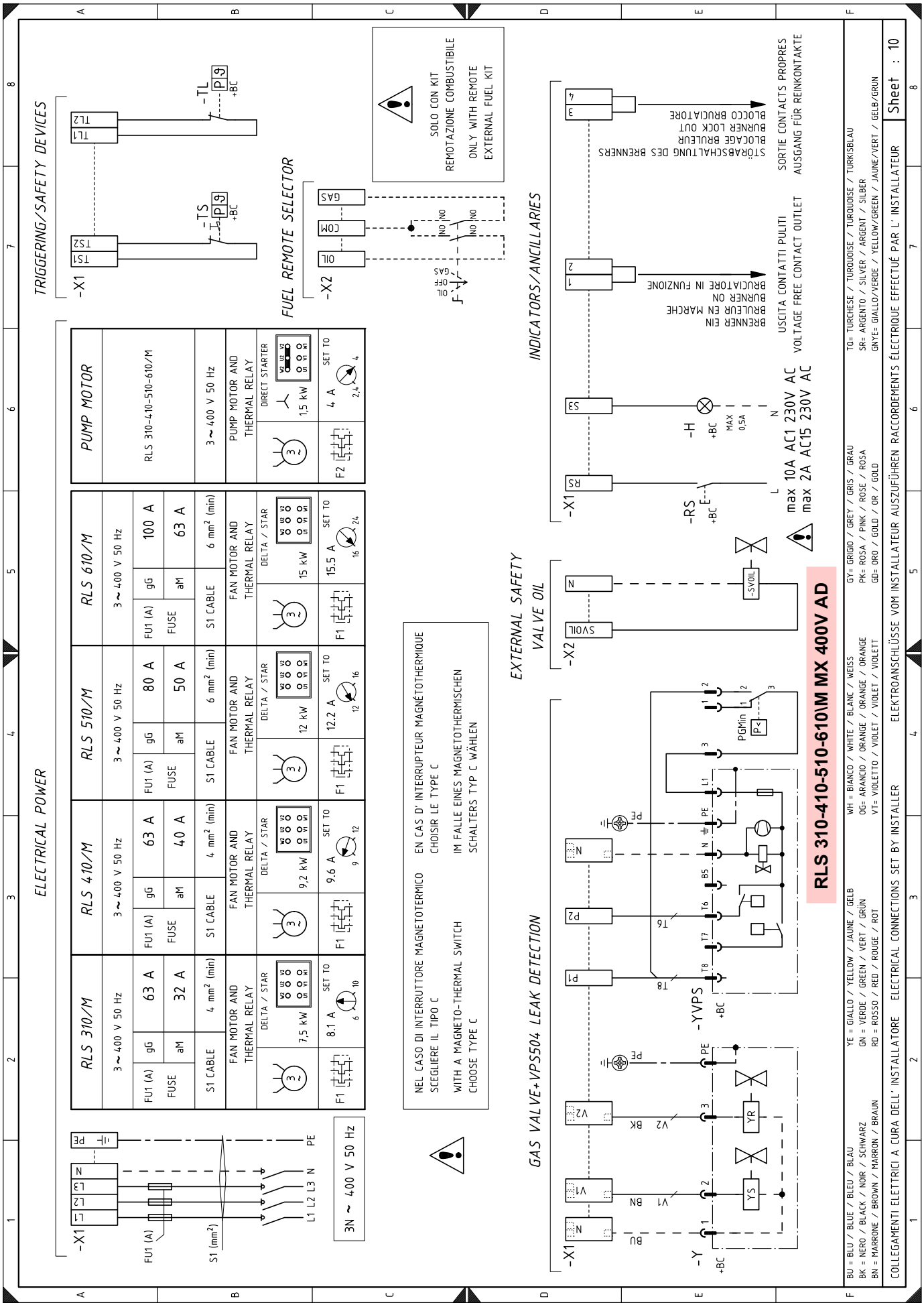

-A1
LFL...
-KG1
-K1
-KMP
-X1
-X2
-Y
YVPS
-XPOMin
-POMin
-WVS1
-WVR
-WVF
-WVS
-SVOIL
-VS1
-VR
-VF
-VS
-YR
-YS
PGMin
SCHEMA FUNZIONALE
OPERATIONAL LAYOUT
FUNKTIONSSCHEMA
SCHEMA FONCTIONNEL
Sheet : 6
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN


-A1
LFL...
-K2
BURNER LOCK-OUT
-K1
BURNER ON
-UV
-TA
230V
2x5kV
-X1
-H
-RS
+BC
MAX
0,5A
SCHEMA FUNZIONALE
OPERATIONAL LAYOUT
FUNKTIONSSCHEMA
SCHEMA FONCTIONNEL
Sheet : 7
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN


-SM
SQM40.281...
MAX OIL
MIN OIL
MIN GAS
MAX GAS
0°
135°
-XM1
-XM2
-XM3
X1
X2
X3
-A1
LFL...
-K01
-S2
-S3
-X1
-TR
-TL
-IN
SCHEMA FUNZIONALE
OPERATIONAL LAYOUT
FUNKTIONSSCHEMA
SCHEMA FONCTIONNEL
Sheet : 8


KIT REGOLATORE DI POTENZA RWF50.2
RWF50.2 OUTPUT POWER REGULATOR KIT
KIT LEISTUNGSREGLER RWF50.2
KIT REGULATEUR DE PUISSANCE RWF50.2
Sheet : 9
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
-XP1
-B1
-MB
RWF 50...
-X1
810
809
806
1L
N
/8.C8
/8.D8


ELECTRICAL POWER
RLS 310/M
RLS 410/M
PUMP MOTOR
RLS 310-410/M
3 ~ 400 V 50 Hz
FU1 (A)
FUSE
gG
aM
63 A
32 A
40 A
S1 CABLE
4 mm² (min)
FAN MOTOR AND THERMAL RELAY
PUMP MOTOR AND THERMAL RELAY
DIRECT STARTER
7,5 kW
9,2 kW
1,5 kW
14,4 A
17,5 A
4 A
SET TO
F1
F2
-X1
L1 L2 L3 N PE
3N ~ 400 V 50 Hz
NEL CASO DI INTERRUTTORE MAGNETOTERMICO SCEGLIERE IL TIPO C
WITH A MAGNETO-THERMAL SWITCH CHOOSE TYPE C
EN CAS D' INTERRUPTEUR MAGNÉTOTHERMIQUE CHOISIR LE TYPE C
IM FALLE EINES MAGNETOTHERMISCHEN SCHALTERS TYP C WÄHLEN
TRIGGERING/SAFETY DEVICES
-TS
-TL
TS1
TS2
TL1
TL2
FUEL REMOTE SELECTOR
-X2
GAS
COM
OIL
SOLO CON KIT REMOTAZIONE COMBUSTIBILE
ONLY WITH REMOTE EXTERNAL FUEL KIT
GAS VALVE+VPS504 LEAK DETECTION
-Y
-YVPS
EXTERNAL SAFETY VALVE OIL
SVOIL
-SVOIL
INDICATORS/ANCILLARIES
-H
-RS
max 10A AC1 230V AC
max 2A AC15 230V AC
BRENNER EIN
BRULEUR EN MARCHE
BURNER ON
BRUCIATORE IN FUNZIONE
USCITA CONTATTI PULITI
VOLTAGE FREE CONTACT OUTLET
SORTIE CONTACTS PROPRES
AUSGANG FÜR REINKONTAKTE
STÖRABSCHALTUNG DES BRENNERS
BLOCAGE BRULEUR
BURNER LOCK OUT
BLOCCO BRUCIATORE
RLS 310-410\M MX 400V AD
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE
ELECTRICAL CONNECTIONS SET BY INSTALLER
ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN
RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 10


ELECTRICAL POWER
TRIGGERING/SAFETY DEVICES
FUEL REMOTE SELECTOR
INDICATORS/ANCILLARIES
EXTERNAL SAFETY VALVE OIL
GAS VALVE+VPS504 LEAK DETECTION
RLS 310-410-510-610\M MX 400V AD
RLS 310/M
RLS 410/M
RLS 510/M
RLS 610/M
PUMP MOTOR
3 ~ 400 V 50 Hz
3N ~ 400 V 50 Hz
FUSE
S1 CABLE
FAN MOTOR AND THERMAL RELAY
DELTA / STAR
DIRECT STARTER
SOLO CON KIT
REMOTAZIONE COMBUSTIBILE
ONLY WITH REMOTE
EXTERNAL FUEL KIT
NEL CASO DI INTERRUTTORE MAGNETOTERMICO
SCEGLIERE IL TIPO C
WITH A MAGNETO-THERMAL SWITCH
CHOOSE TYPE C
EN CAS D' INTERRUPTEUR MAGNÉTOTHERMIQUE
CHOISIR LE TYPE C
IM FALLE EINES MAGNETOTHERMISCHEN
SCHALTERS TYP C WÄHLEN
BRENNER EIN
BRULEUR EN MARCHE
BURNER ON
BRUCIATORE IN FUNZIONE
USCITA CONTATTI PULITI
VOLTAGE FREE CONTACT OUTLET
SORTIE CONTACTS PROPRES
AUSGANG FÜR REINKONTAKTE
STÖRABSCHALTUNG DES BRENNERS
BLOCAGE BRULEUR
BURNER LOCK OUT
BLOCCO BRUCIATORE
max 10A AC1 230V AC
max 2A AC15 230V AC
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
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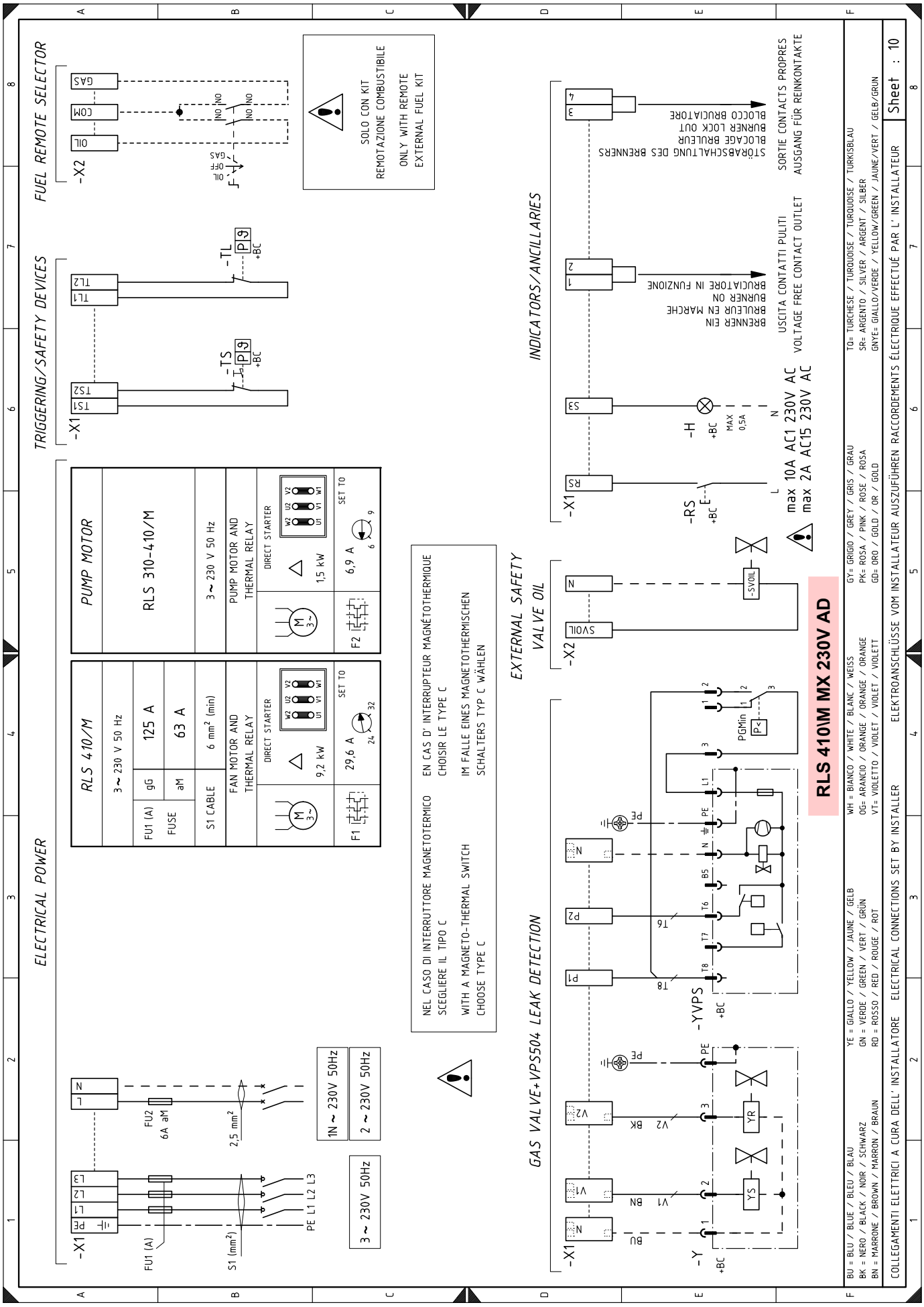
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE ELECTRICAL CONNECTIONS SET BY INSTALLER ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 10


ELECTRICAL POWER
TRIGGERING/SAFETY DEVICES
FUEL REMOTE SELECTOR
INDICATORS/ANCILLARIES
EXTERNAL SAFETY VALVE OIL
GAS VALVE+VPS504 LEAK DETECTION
PUMP MOTOR
RLS 310-410/M
3 ~ 230 V 50 Hz
PUMP MOTOR AND THERMAL RELAY
DIRECT STARTER
1,5 kW
6,9 A
SET TO
F2
RLS 410/M
FAN MOTOR AND THERMAL RELAY
9,2 kW
29,6 A
F1
S1 CABLE
6 mm² (min)
FUSE
aM
63 A
gG
125 A
FU1 (A)
SOLO CON KIT
REMOTAZIONE COMBUSTIBILE
ONLY WITH REMOTE
EXTERNAL FUEL KIT
-X2
-X1
-TS
-TL
-H
-RS
-SVOIL
-YVPS
-Y
BRENNER EIN
BRULEUR EN MARCHE
BRUCIATORE IN FUNZIONE
BURNER ON
USCITA CONTATTI PULITI
VOLTAGE FREE CONTACT OUTLET
SORTIE CONTACTS PROPRES
AUSGANG FÜR REINKONTAKTE
STÖRABSCHALTUNG DES BRENNERS
BLOCAGE BRULEUR
BURNER LOCK OUT
BLOCCO BRUCIATORE
max 10A AC1 230V AC
max 2A AC15 230V AC
NEL CASO DI INTERRUTTORE MAGNETOTERMICO SCEGLIERE IL TIPO C
WITH A MAGNETO-THERMAL SWITCH CHOOSE TYPE C
EN CAS D' INTERRUPTEUR MAGNÉTOTHERMIQUE CHOISIR LE TYPE C
IM FALLE EINES MAGNETOTHERMISCHEN SCHALTERS TYP C WÄHLEN
1N ~ 230V 50Hz
2 ~ 230V 50Hz
3 ~ 230V 50Hz
FU2 6A aM
2,5 mm²
PE L1 L2 L3
RLS 410M MX 230V AD
BU = BLU / BLUE / BLEU / BLAU
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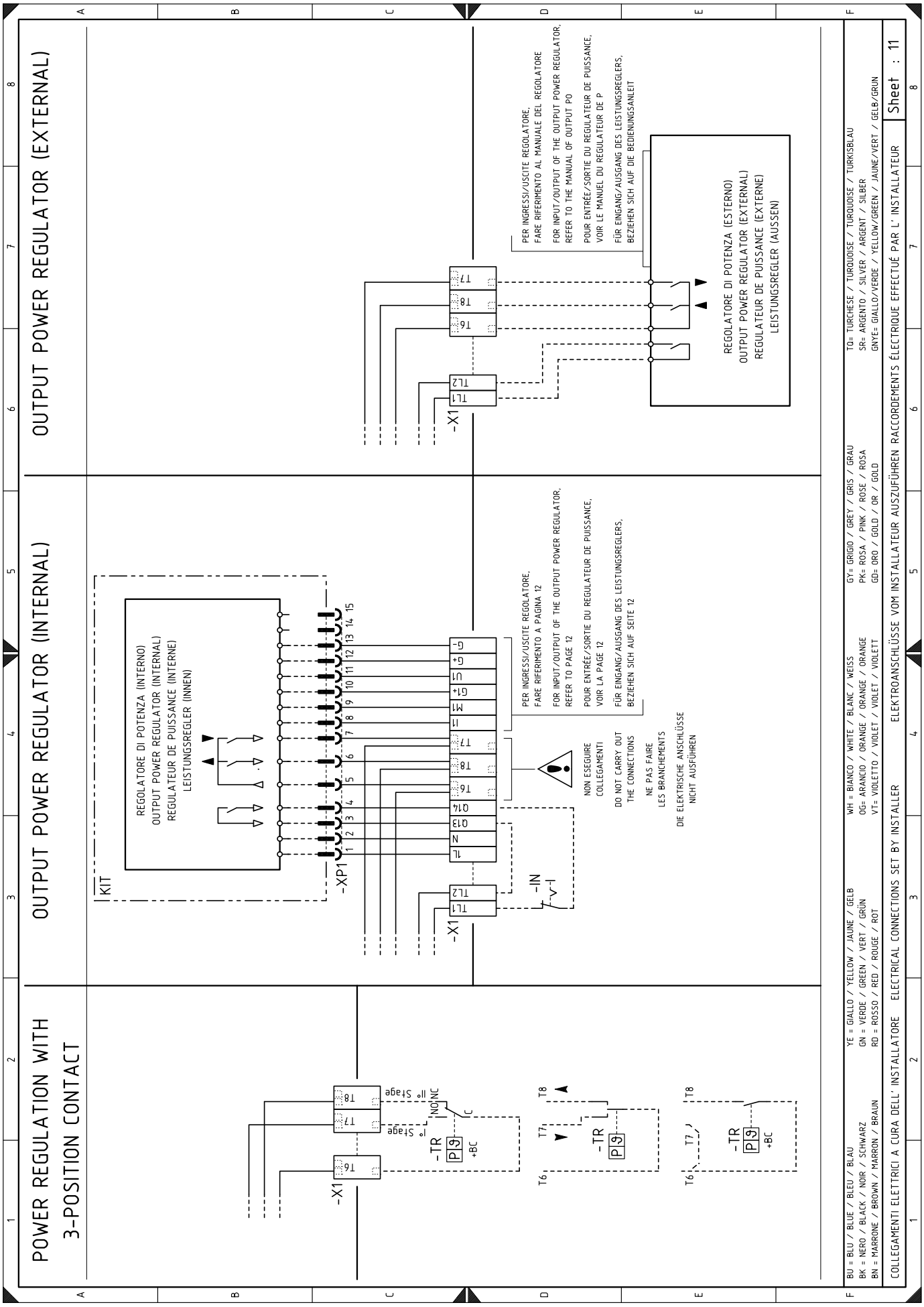
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE ELECTRICAL CONNECTIONS SET BY INSTALLER ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 10


POWER REGULATION WITH
3-POSITION CONTACT
OUTPUT POWER REGULATOR (INTERNAL)
OUTPUT POWER REGULATOR (EXTERNAL)
KIT
REGOLATORE DI POTENZA (INTERNO)
OUTPUT POWER REGULATOR (INTERNAL)
REGULATEUR DE PUISSANCE (INTERNE)
LEISTUNGSREGLER (INNEN)
-XP1
-X1
-IN
-TR
PER INGRESSI/USCITE REGOLATORE, FARE RIFERIMENTO A PAGINA 12
FOR INPUT/OUTPUT OF THE OUTPUT POWER REGULATOR, REFER TO PAGE 12
POUR ENTRÉE/SORTIE DU REGULATEUR DE PUISSANCE, VOIR LA PAGE 12
FÜR EINGANG/AUSGANG DES LEISTUNGSREGLERS, BEZIEHEN SICH AUF SEITE 12
NON ESEGUIRE COLLEGAMENTI
DO NOT CARRY OUT THE CONNECTIONS
NE PAS FAIRE LES BRANCHEMENTS
DIE ELEKTRISCHE ANSCHLÜSSE NICHT AUSFÜHREN
PER INGRESSI/USCITE REGOLATORE, FARE RIFERIMENTO AL MANUALE DEL REGOLATORE
FOR INPUT/OUTPUT OF THE OUTPUT POWER REGULATOR, REFER TO THE MANUAL OF OUTPUT PO
POUR ENTRÉE/SORTIE DU REGULATEUR DE PUISSANCE, VOIR LE MANUEL DU REGULATEUR DE P
FÜR EINGANG/AUSGANG DES LEISTUNGSREGLERS, BEZIEHEN SICH AUF DIE BEDIENUNGSANLEIT
REGOLATORE DI POTENZA (ESTERNO)
OUTPUT POWER REGULATOR (EXTERNAL)
REGULATEUR DE PUISSANCE (EXTERNE)
LEISTUNGSREGLER (AUSSEN)
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
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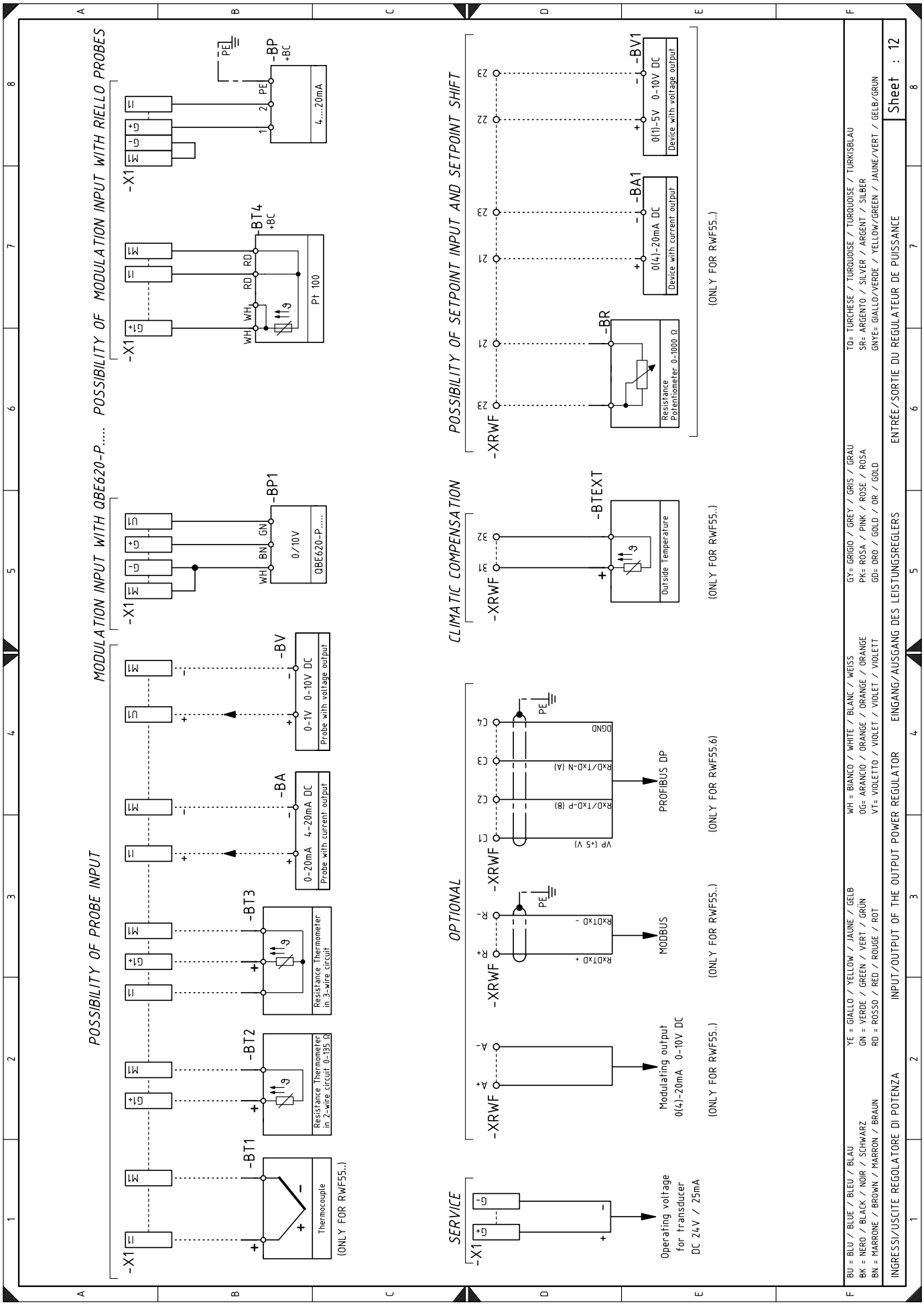
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE ELECTRICAL CONNECTIONS SET BY INSTALLER ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 11


POSSIBILITY OF PROBE INPUT
MODULATION INPUT WITH QBE620-P..... POSSIBILITY OF MODULATION INPUT WITH RIELLO PROBES
CLIMATIC COMPENSATION
POSSIBILITY OF SETPOINT INPUT AND SETPOINT SHIFT
OPTIONAL
SERVICE
-X1
-BT1
Thermocouple
(ONLY FOR RWF55..)
-BT2
Resistance Thermometer in 2-wire circuit 0-135 Ω
-BT3
Resistance Thermometer in 3-wire circuit
-BA
0-20mA 4-20mA DC
Probe with current output
-BV
0-1V 0-10V DC
Probe with voltage output
-BP1
QBE620-P.....
0/10V
-BP
4....20mA
-BT4
Pt 100
-XRWF
-BTEXT
Outside Temperature
-BR
Resistance Potentiometer 0-1000 Ω
-BA1
0(4)-20mA DC
Device with current output
-BV1
0(1)-5V 0-10V DC
Device with voltage output
Modulating output 0(4)-20mA 0-10V DC
Operating voltage for transducer DC 24V / 25mA
PROFIBUS DP
MODBUS
(ONLY FOR RWF55..)
(ONLY FOR RWF55.6)
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
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GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
INGRESSI/USCITE REGOLATORE DI POTENZA
INPUT/OUTPUT OF THE OUTPUT POWER REGULATOR
EINGANG/AUSGANG DES LEISTUNGSREGLERS
ENTRÉE/SORTIE DU REGULATEUR DE PUISSANCE
Sheet : 12

Wiring layout key

A1	Flame control
B1	Output power regulator RWF... 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
F1	Fan motor thermal relay
F2	Pump motor thermal relay
FU	Auxiliary circuits safety fuse
H	Burner working lighting signal output
IN	Burner manual stop electric switch
KG1	Relay for oil enabling
KL1	Star/triangle starter line contactor
KM	Direct start up contactor
KMP	Pump motor contact maker
KT1	Star/triangle starter triangle contactor
KS1	Start/triangle starter star contactor
KST1	Star/triangle starter timer
K01	Oil enable relay
K02	Oil enable relay
K1	Clean contacts output relay burner operating
K2	Clean contacts output relay burner lockout
MP	Pump motor
MV	Fan motor
PA	Air pressure switch
PE	Burner earth
PGMin	Minimum gas pressure switch
PGMax	Maximum gas pressure switch
POMax	Maximum oil pressure switch
POMin	Minimum oil pressure switch
RS	Remote reset switch
S1	Fuel selector
S2	Off / automatic / manual selector
S3	Power increase / power reduction selector
SM	Servomotor
SOG	Optional light oil/gas selector
VSOIL	Oil safety valve
TA	Ignition transformer
TL	Limit thermostat/pressure switch
TR	Adjustment thermostat/pressure switch
TS	Safety thermostat/pressure switch
VF-VR	Oil circuit valves
VS-VS1	Oil circuit valves
Y	Gas adjustment valve + gas safety valve
YVPS	Valve leak detection device
X1	Main terminal supply board
X2	Valve group terminal board
XM1	Servomotor connector 1
XM2	Servomotor connector 2
XM3	Servomotor connector 3
XP1	Connector for RWF output power regulator kit ... or signal converter
XPGMax	Maximum gas pressure switch connector
XPOMax	Maximum oil pressure switch connector
XPOMin	Minimum oil pressure switch connector
XRWF	Terminal board for output power regulator RWF ...
UV	Flame sensor

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

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http:// www.riello.com