GB

Dual fuel light oil/gas burners

Progressive two stage or modulating operation

CE

CODE	MODEL	TYPE
3898520 - 3898530	RLS 300/E MX	782 T1
3898622 - 3898632	RLS 400/E MX	783 T1
3899622 - 3899632	RLS 500/E MX	1300 T1

20009654 (11) - 09/2015

1 Declarations

Declaration of conformity in accordance with ISO / IEC 17050-1		
Manufacturer:	RIELLO S.p.A.	
Address:	Via Pilade Riello, 7 37045 Legnago (VR)	
Product:	Dual fuel light oil/gas burners	
Model:	RLS 300/E MX RLS 400/E MX RLS 500/E MX	
These products are in compliance with the following Technical Standards:		
EN 676		
EN 267		
EN 12100		
and according to the European Directives:		
GAD	2009/142/EC	Gas Devices Directive
MD	2006/42/EC	Machine Directive
LVD	2006/95/EC	Low Voltage Directive
EMC	2004/108/EC	Electromagnetic Compatibility
Such products are marked as follows:		
CE	RLS 300/E MX	CE-0085BR0471
	RLS 400/E MX	CE-0085BR0472
	RLS 500/E MX	CE-0085CL0207

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

Manufacturer's Declaration			
RIELLO S.p.A. declares that the following products comply with the NOx emission limits specified by German standard "**1. BImSchV release 26.01.2010**".			
Product	Type	Model	Power
Dual fuel light oil/gas burners	782 T1	RLS 300/E MX	600 - 3550 kW
	783 T1	RLS 400/E MX	800 - 4300 kW
	1300 T1	RLS 500/E MX	1120 - 5050 kW

Legnago, 21.05.2015

Executive General Manager
RIELLO S.p.A. - Burner Department
Mr. U. Ferretti

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

2 Information and general instructions

2.1 Information about the instruction manual

2.1.1 Introduction

The instruction manual supplied with the burner:

- ➤ is an integral and essential part of the product and must not be separated from it; it must therefore be kept carefully for any necessary consultation and must accompany the burner even if it is transferred to another owner or user, or to another system. If the manual is lost or damaged, another copy must be requested from the Technical Assistance Service of the area;
- ➤ is designed for use by qualified personnel;
- ➤ offers important indications and instructions relating to the installation safety, start-up, use and maintenance of the burner.

Symbols used in the manual

In some parts of the manual you will see triangular DANGER signs. Pay great attention to these, as they indicate a situation of potential danger.

2.1.2 General dangers

The **dangers** can be of **3 levels**, as indicated below.

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

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

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

2.1.3 Other symbols

DANGER: LIVE COMPONENTS

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

DANGER: FLAMMABLE MATERIAL

This symbol indicates the presence of flammable materials.

DANGER: BURNING

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

DANGER: CRUSHING OF LIMBS

This symbol indicates the presence of moving parts: danger of crushing of limbs.

WARNING: MOVING PARTS

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

DANGER: EXPLOSION

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

PERSONAL PROTECTION EQUIPMENT

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

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

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

ENVIRONMENTAL PROTECTION

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

IMPORTANT INFORMATION

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

➤ This symbol indicates a list.

Abbreviations used

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

2.1.4 Delivery of the system and the instruction manual

When the system is delivered, it is important that:

➤ the instruction manual is delivered to the user by the system manufacturer, with the recommendation to keep it in the room where the heat generator is to be installed.

➤ The instruction manual shows:
– the serial number of the burner;

.....

– the address and telephone number of the nearest Assistance Centre.

.....
.....
.....

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

2.2 Guarantee and responsibility

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

WARNING

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

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

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

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

3 Safety and prevention

3.1 Introduction

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

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

It is a good idea to remember the following:

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

In particular:

it can be applied to boilers operating with water, steam, diathermic oil, and to other uses expressly named by the manufacturer; the type and pressure of the fuel, the voltage and frequency of the electrical power supply, the minimum and maximum deliveries for which the burner has been regulated, the pressurisation of the combustion chamber, the dimensions of the combustion chamber and the 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.

3.2 Personnel training

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

The user:

➤ undertakes to entrust the machine exclusively to suitably trained and qualified personnel;

➤ undertakes to inform his personnel in a suitable way about the application and observance of the safety instructions. With that aim, he undertakes to ensure that everyone knows the use and safety instructions for his own duties;

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

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

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

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

In addition:

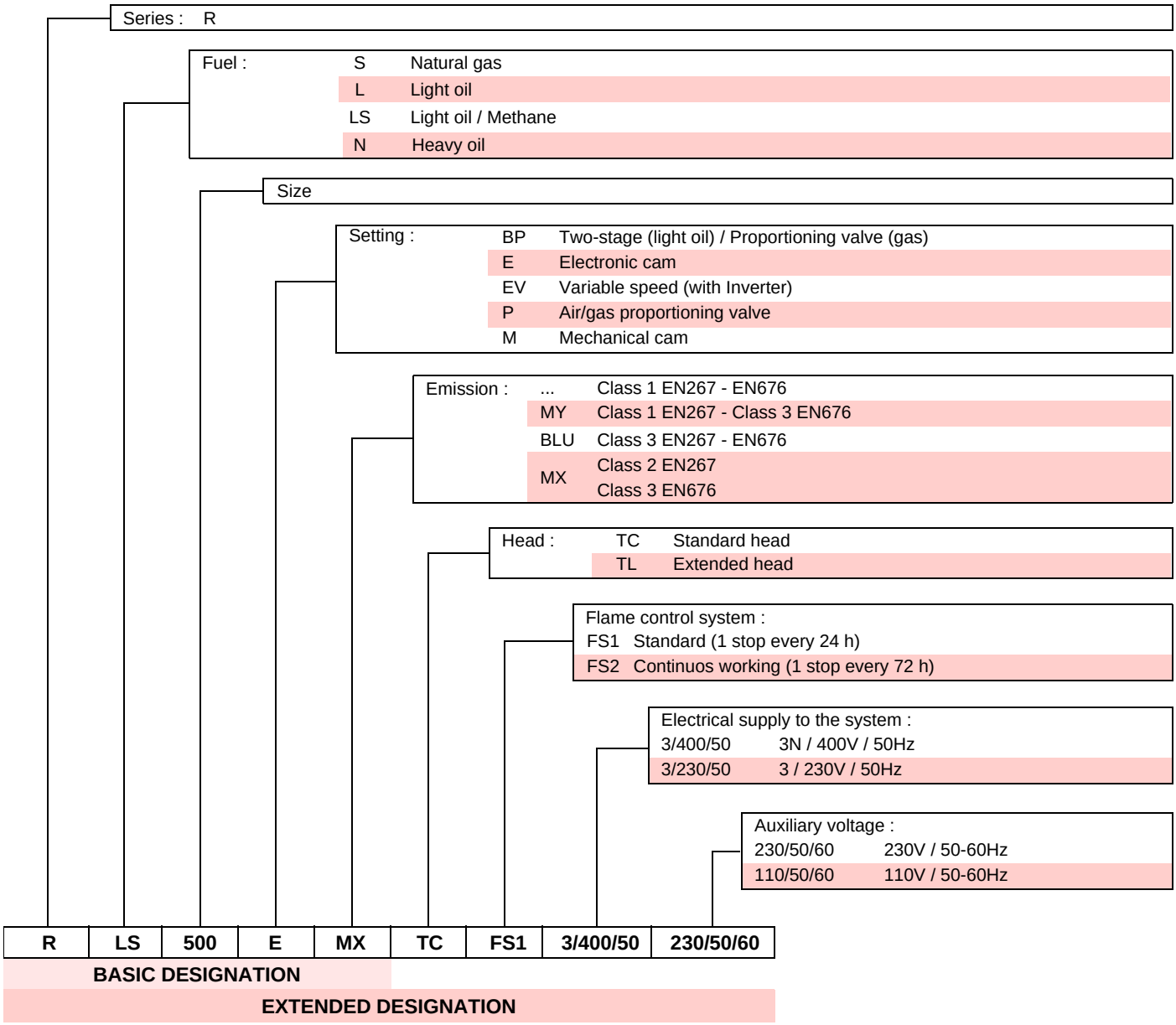
➤ the user must take all the measures necessary to prevent unauthorised people gaining access to the machine;

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

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

4 Technical description of the burner

4.1 Burner designation



4.2 Models available

Designation		Electrical supply	Starting	Code
RLS 300/E MX	TC	3/400/50	Direct	3898520 - 3898530
RLS 400/E MX	TC	3/400/50	Star/Delta	3898622 - 3898632
RLS 500/E MX	TC	3/400/50	Star/Delta	3899622 - 3899632

4.3 Burner categories - Countries of destination

Country of destination	Gas category
SE - FI - AT - GR - DK - ES - GB - IT - IE - PT - IS - CH - NO	I_{2H}
DE	I_{2ELL}
NL	I_{2L}
FR	I_{2Er}
BE	$I_{2E(R)B}$
LU - PL	I_{2E}

4.4 Technical data

Model			RLS 300/E MX	RLS 400/E MX	RLS 500/E MX
Type			782 T1	783 T1	1300 T1
Output (1) Delivery (1)	MIN - MAX	kW kg/h	600/1250 - 3550 50/105 - 299	800/1800 - 4300 68/152 - 363	1120/2500 - 5050 95/211 - 425
Fuel			LIGHT OIL, viscosity at 20 °C: 6 mm^2/s (1.5 °E - 6 cSt) NATURAL GAS: G20 (methane) - G21 - G22 - G23 - G25		
Gas pressure at maximum delivery (2) - Gas: G20/G25		mbar	24 / 33	23 / 33	35.4 / 52.6
Operation			- Continuous / Intermittent (min. 1 stop in 24 hours) - Progressive two-stage or modulating by kit (see accessoires)		
Pump	delivery (at 16,5 bar) pressure range fuel temperature	kg/h bar °C max	560 7 - 40 140		560 6 - 30 140
Nozzles		number	1		
Standard applications			Boilers: water, steam, diathermic oil		
Room temperature		°C	0 - 50		
Combustion air temperature		°C max	60		
Noise level (3)	Sound pressure Sound power	dB(A)	83 94	85,3 96,3	86,5 97,5
Weight		kg	240	250	280

Tab. A

(1) Reference conditions: Ambient temperature 20°C - Gas temperature 15°C - Barometric pressure 1013 mbar - Altitude 0 m a.s.l.
(2) Pressure at test point 5) (Fig. 4) with zero pressure in the combustion chamber and maximum burner output.
(3) Sound pressure measured in manufacturer's combustion laboratory, with burner operating on test boiler and at maximum rated output. The sound power is measured with the “Free Field” method, as per EN 15036, and according to an “Accuracy: Category 3” measuring accuracy, as set out in EN ISO 3746.

4.5 Electrical data

Model			RLS 300/E MX	RLS 400/E MX	RLS 500/E MX
Electrical supply			3N ~ 400V 50 Hz		
Fan motor IE2		rpm V kW A	2880 230/400 4,5 15/8.7	2900 400/690 7,5 13.8/8	2880 400/690 12 21.2/12.2
Pump motor		rpm V kW A	2870 220-240/380-415 1.5 5.9/3.4		
Ignition transformer		V1 - V2 I1 - I2	230 V - 2 x 5 kV 1.9 A - 35 mA		
Electrical power consumption	Light oil Gas	kW max	7.8 6	11 9.2	15.8 14
Protection level			IP 54		

Tab. B

Model			RLS 400/E MX	RLS 500/E MX
Electrical supply			3N ~ 400V 50 Hz	
Fan motor IE3		rpm V kW A	2920 400/690 7,5 14/8.1	2880 400/690 12 21.8/12.6
Pump motor		rpm V kW A	2870 220-240/380-415 1,5 5.9/3.4	
Ignition transformer		V1 - V2 I1 - I2	230 V - 2 x 5 kV 1.9 A - 35 mA	
Electrical power consumption	Light oil Gas	kW max	10.6 8.8	15.7 13.9
Protection level			IP 54	

Tab. C

4.6 Overall 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 by rotating the rear part on the hinge.

The overall dimensions of the burner when open are indicated by L and R.

Position I is a reference for the thickness of the boiler door refractory fettling.

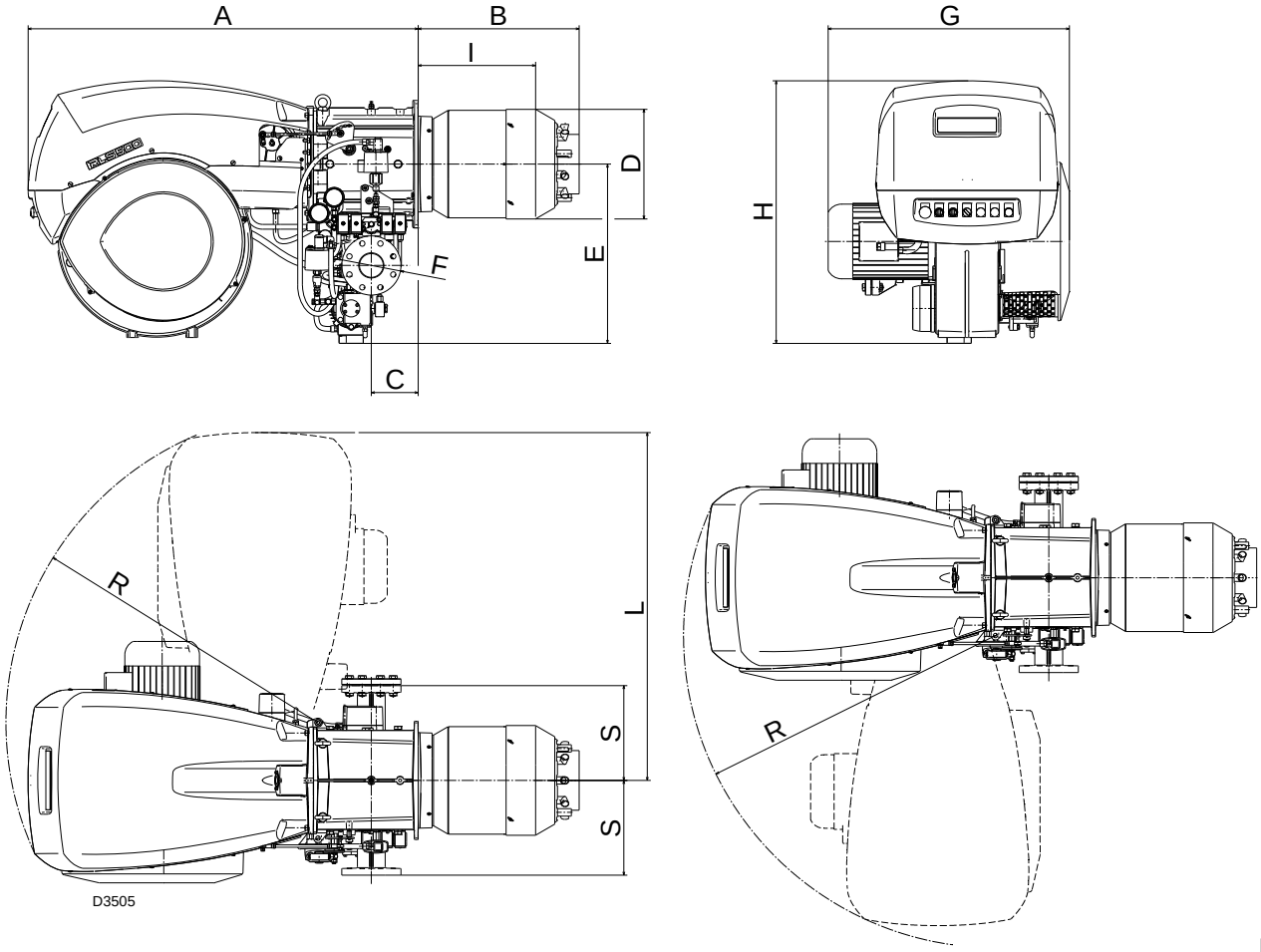


Fig. 1

mm	A	B	C	D	E	F	G	H	I	L	R	S
RLS 300/E MX	1325	510	164	313	605	DN80	720	890	370	1175	1055	320
RLS 400/E MX	1325	510	164	313	605	DN80	775	890	370	1175	1055	320
RLS 500/E MX	1325	544	164	370	605	DN80	815	890	395	1175	1055	320

Tab. D

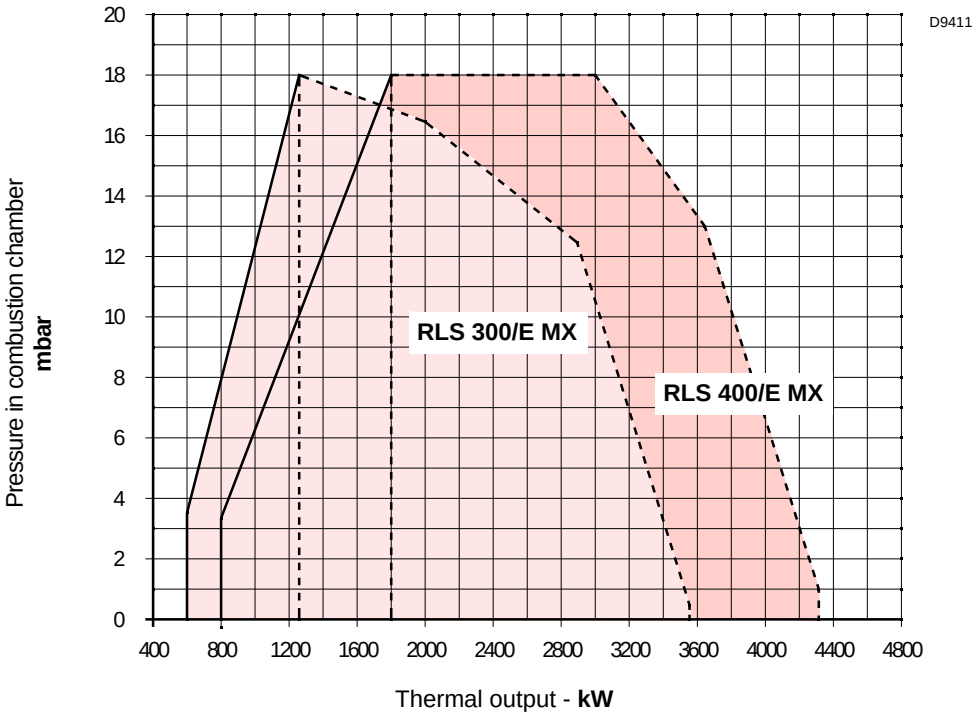
4.7 Firing rates

MAXIMUM OUTPUT must be selected in the hatched area of the diagram. (Fig. 2)

MINIMUM OUTPUT must not be lower than the minimum limit shown in the diagram:
RLS 300/E MX = 600 kW
RLS 400/E MX = 800 kW
RLS 500/E MX = 1120 kW

WARNING

The firing rate area values (Fig. 2) have been obtained considering a surrounding temperature of 20 °C, and an atmospheric pressure of 1013 mbar (approx. 0 m above sea level) and with the combustion head adjusted as shown on pag. 21.



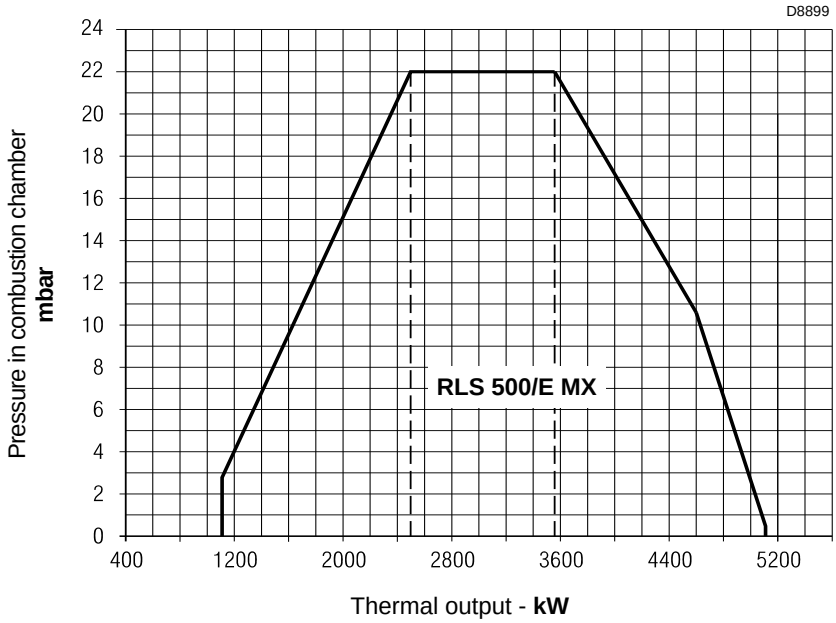


Fig. 2

4.8 Test boiler

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

If the burner must be combined with a boiler that has not been CE type-approved and/or its combustion chamber dimensions are clearly smaller than those indicated in diagram (Fig. 3), consult the manufacturer.

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

Fig. 3 indicates the diameter and length of the test combustion chamber.

Example RLS 400/E MX
Output 3000 kW
diameter 100 cm
length 4 m

MODULATION RATIO

The modulation ratio, determined using test boilers according to standard (EN 676 for gas, EN 267 for light oil), is 4 : 1.

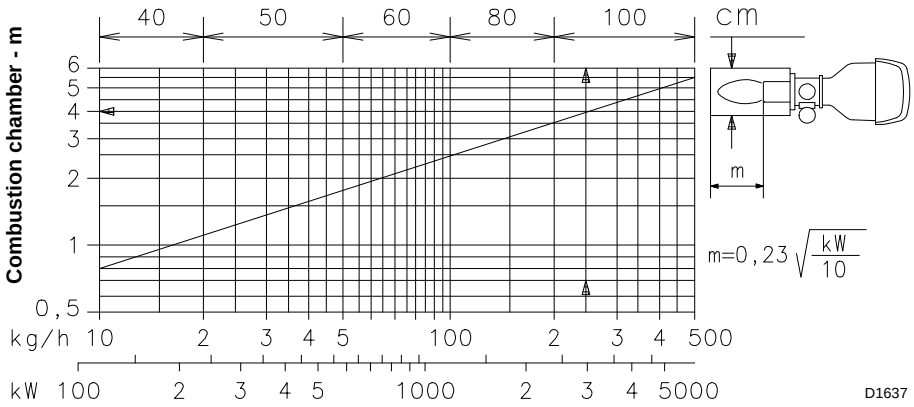


Fig. 3

4.9 Burner description

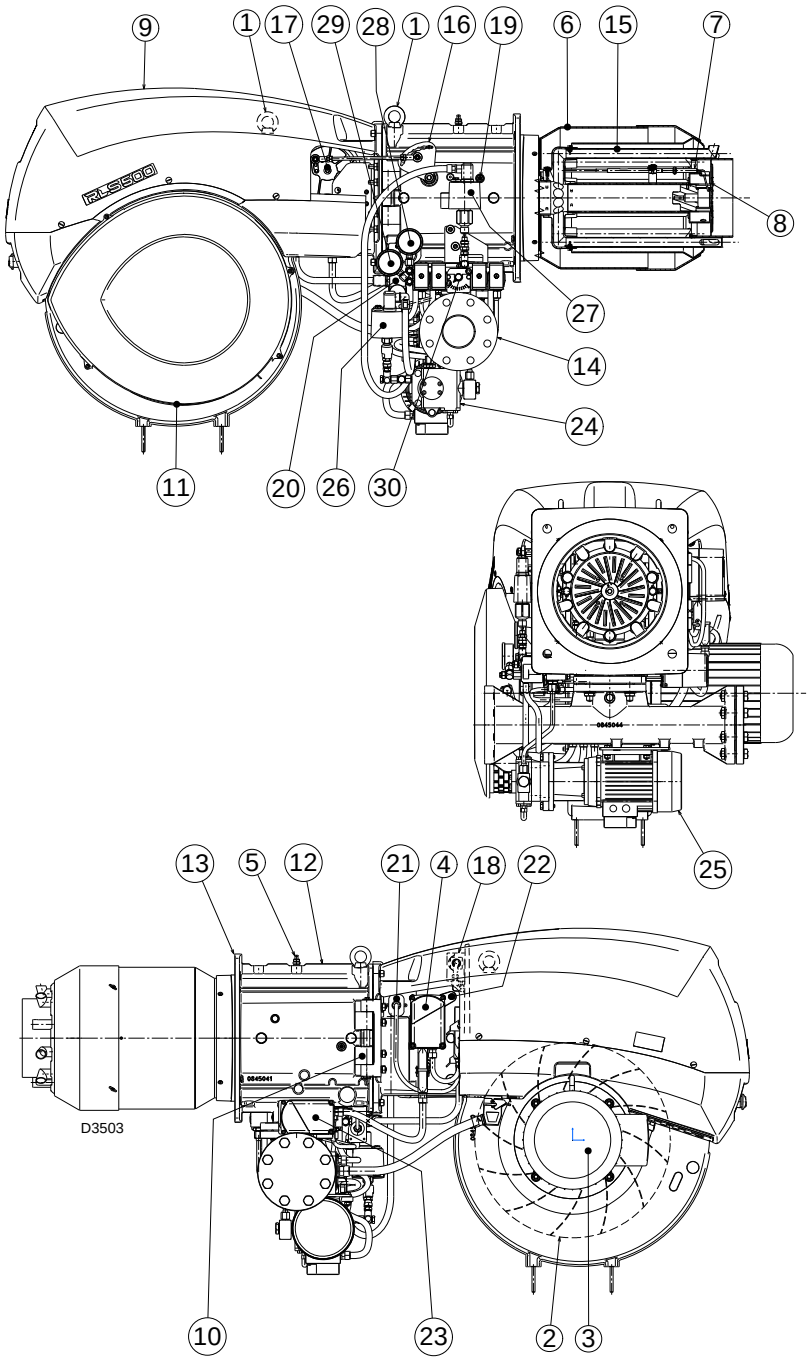


Fig. 4

1 Lifting eyebolts
2 Fan
3 Fan motor
4 Air gate valve servomotor
5 Gas pressure test point
6 Combustion head
7 Ignition electrodes
8 Flame stability disk
9 Electric panel board - cover
10 Hinge for opening burner
11 Air inlet to fan
12 Manifold
13 Thermal insulation screen for securing burner to boiler
14 Gas train flange
15 Shutter
16 Lever for movement of combustion head
17 Gears for movement of air damper
18 Air pressure switch (differential operating type)
19 Air pressure test point
20 Maximum gas pressure switch with pressure test point
21 QRI cell
22 Air pressure test point pressure test point “+”
23 Oil modulator and gas butterfly valve servomotor
24 Pump
25 Pump motor
26 Minimum oil pressure switch
27 Maximum oil pressure switch
28 Pressure gauge for pressure on nozzle return
29 Nozzle delivery pressure gauge
30 Oil modulator

CAUTION

The burner can be opened either on the right or left sides, irrespective of the side from which fuel is supplied.

When the burner is closed, the hinge can be re-positioned on the opposite side.

4.10 Description of panel board

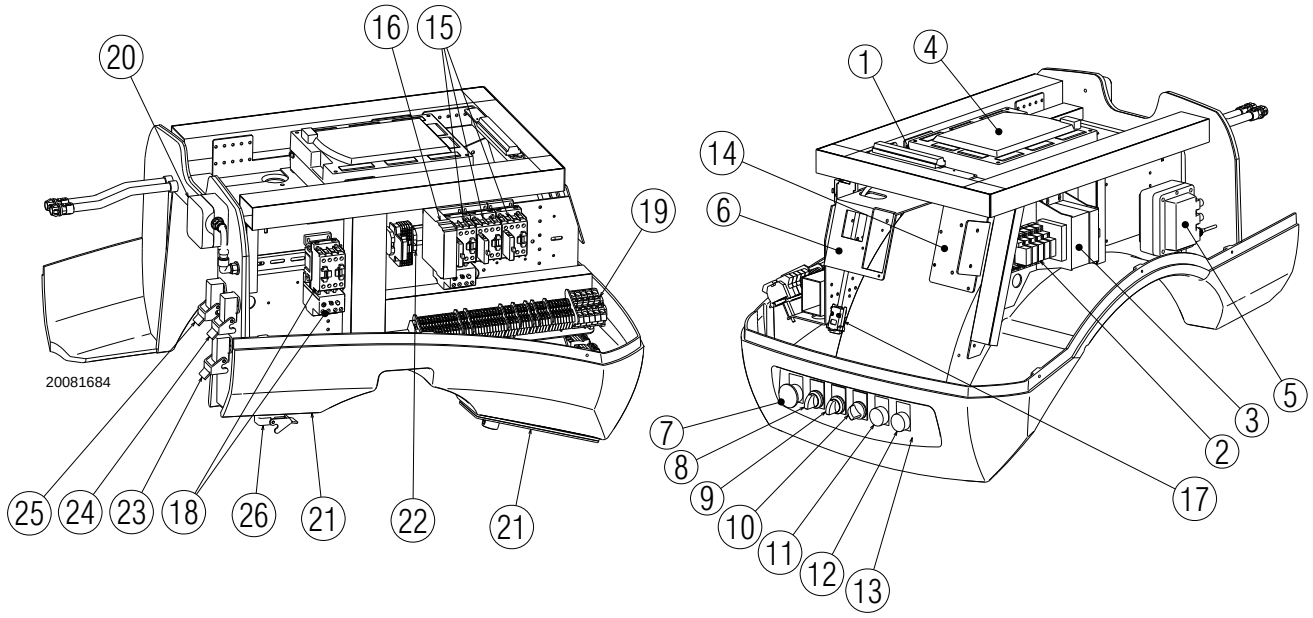


Fig. 5

1 Terminal strip for kits
2 Relay outlet - clean contacts
3 Electronic cam transformer
4 Electronic cam setting device
5 Ignition transformer
6 Bracket for mounting the power regulator RWF50
7 Stop push-button
8 Dial for off - automatic - manual
9 Power dial for increase - decrease of power
10 Fuel selector and remote fuel selector enabling
11 Signal light for power on
12 Signal light for fan and pump motors trip
13 Signal light for burner failure and lock-out reset button
14 Support for AZL kit
15 Star-powered/delta-powered starter (RLS 400-500/E MX)
16 Timer
17 AZL connector
18 Pump motor contactor and thermal cut-out
19 Main supply terminal strip
20 Air pressure switch
21 Entry for power cables, external leads and kit
22 Auxiliary circuits fuse
23 Plug-socket maximum gas pressure switch
24 Servomotor plug/socket
25 Plug-socket flame sensor
26 Oil valve/Pump motor plug/socket

NOTE

Two types of burner failure may occur:

➤ **Control box lock-out**: if the control box 13) (Fig. 5) push-button (**red led**) lights up, it indicates that the burner is in lock-out.
To reset, press the pushbutton 13) (Fig. 5).

➤ **Motors trip:** release by pressing the push button on thermal.

4.11 Burner equipment

Flange gasket N.1
Flange fixing screws M 16 x 50 . . . . . N.8
Thermal screen N.1
Screws to secure the burner flange to the boiler:
M 18 x 70 . . . . . N.4
Spacers. N.2
Pressure switch (for leak detection control) N.1
Instruction N.1
Spare parts N.1

4.12 Control box for the air/fuel ratio (LMV51...)

Warning notes

WARNING

To avoid injury to persons, damage to property or the environment, the following warning notes must be observed!

The LMV51... is a safety device!
Do not open, interfere with or modify the unit.

Riello S.p.A. will not assume responsibility for any damage resulting from unauthorized interference!

Risk of explosion!
Incorrect configuration can lead to excessive fuel supply which might cause an explosion!
Operators must be aware that incorrect settings made on the AZL5... display and operating unit and incorrect settings of the fuel and / or air actuator positions can lead to dangerous burner operating conditions.

➤ All activities (mounting, installation and service work, etc.) must be performed by qualified staff.
➤ Before making any wiring changes in the connection area of the LMV5..., completely isolate the plant from mains supply (all-polar disconnection). Ensure that the plant cannot be inadvertently switched on again and that it is indeed dead. If not observed, there is a risk of electric shock hazard.
➤ Protection against electrical shock hazard on the LMV5... and on all connected electrical components must be ensured through appropriate mounting.
➤ Each time work has been carried out (mounting, installation and service work, etc.), check to ensure that wiring is in an orderly state, that the parameters have been correctly set and make the safety checks.
➤ Fall or shock can adversely affect the safety functions. Such units must not be put into operation even if they do not exhibit any damage.
➤ In programming mode, the position check of actuators and VSD (checking electronic fuel / air ratio control) is different from the check during automatic operation.
Like in automatic operation, the actuators are still jointly driven to their required positions. If an actuator does not reach the required position, corrections are made until that position is reached.
However, in contrast to automatic operation, there are no time limits to these corrective actions.
The other actuators maintain their positions until all actuators have reached the positions currently required.
This is essential for setting fuel /air ratio control. This means that during the time the fuel / air ratio curves are programmed, the person making the plant settings must continuously monitor the quality of the combustion process (e.g. by means of a flue gas analyzer).
Also, if combustion levels are poor, or in the event of dangerous situations, the commissioning engineer must take appropriate action (e.g. switching off manually).

To ensure the safety and reliability of the LMV5... system, the following points must also be observed:
– Condensation and ingress of humidity must be avoided. Should such conditions occur, make sure that the unit will be completely dry before switching on again!
– Static charges must be avoided since they can damage the unit's electronic components when touched.


D9301

Fig. 6

Mechanical design
The LMV5... is a microprocessor-based burner management system with matching system components for the control and supervision of forced draft burners of medium to large capacity.
The following components are integrated in the basic unit of the LMV5...:

- Burner control with gas valve proving system
- Electronic fuel / air ratio control with a maximum of 4 (LMV51…) or 6 (LMV52…) actuators
- Optional PID temperature / pressure controller (load controller)
- Optional VSD moduleMechanical design

Installation notes

- Ensure that the electrical wiring inside the boiler is in compliance with national and local safety regulations.
- Do not mix up live and neutral conductors.
- Make certain that strain relief of the connected cables is in compliance with the relevant standards (e.g. as per DIN EN 60730 and DIN EN 60 335).
- Ensure that spliced wires cannot get into contact with neighboring terminals. Use adequate ferrules.
- Always run high-voltage ignition cables separately while observing the greatest possible distance to the unit and to other cables
- The burner manufacturer must protect unused AC 230 V terminals with dummy plugs (refer to sections Suppliers of other accessory items).
- When wiring the unit, ensure that AC 230 V mains voltage cables are run strictly separate from extra low-voltage cables to warrant protection against electrical shock hazard.

Electrical connection of ionization probe and flame detector

It is important to achieve practically disturbance- and loss-free signal transmission:

- Never run the detector cables together with other cables:
  – Line capacitance reduces the magnitude of the flame signal.
  – Use a separate cable.
- Observe the permissible cable lengths.
- The ionization probe is not protected against electrical shock hazard. The mainspowered ionization probe must be protected against accidental contact.
- **Locate the ignition electrode and the ionization probe such that the ignition spark cannot arc over to the ionization probe (risk of electrical overloads).**

Technical data

LMV51... basic unit	Mains voltage	AC 230 V -15 % / +10 %
	Mains frequency	50 / 60 Hz ±6 %
	Power consumption	< 30 W (typically)
	Safety class	I, with parts according to II and III to DIN EN 60730-1
Terminal loading ‘Inputs’	Unit fuse F1 (internally)	6,3 AT
	Perm. mains primary fuse (externally)	Max. 16 AT
	Undervoltage • Safety shutdown from operating position at mains voltage • Restart on rise in mains voltage	 < AC 186 V > AC 188 V
	Oil pump / magnetic clutch (nominal voltage) • Nominal current • Output factor	 2A cosj > 0.4
	Air pressure switch test valve (nominal voltage) • Nominal current • Output factor	 0.5A cosj > 0.4
Terminal loading ‘Outputs’	**Total contact loading:** • Mains voltage • Input current of unit (safety loop) total load on contacts resulting from: - Fan motor contactor - Ignition transformer - Valve - Oil pump / magnetic clutch	 AC 230 V -15 % / +10 % Max. 5 A
	Single contact loading: Fan motor contactor (nominal voltage) • Nominal current • Output factor	 1A cosj > 0.4
	Alarm output (nominal voltage) • Nominal current • Output factor	 1A cosj > 0.4
	Ignition transformer (nominal voltage) • Nominal current • Output factor	 2A cosj > 0.2
	Fuel valve gas (nominal voltage) • Nominal current • Output factor	 2A cosj > 0.4
	Fuel valve oil (nominal voltage) • Nominal current • Output factor	 1A cosj > 0.4
Cable lengths	Main line	Max. 100 m (100 pF/m)
Environmental conditions	Operation Climatic conditions Mechanical conditions Temperature range Humidity	DIN EN 60721-3-3 class 3K3 class 3M3 -20...+60 °C < 95 % r.h.

4.13 Actuator (SQM48.4....)

Warning notes

WARNING

To avoid injury to persons, damage to property or the environment, the following warning notes should be observed!

Do not open, interfere with or modify the actuators!

- ➤ All activities (mounting, installation and service work, etc.) must be performed by qualified staff.
- ➤ Before making any wiring changes in the connection area of the SQM4..., completely isolate the burner control from the mains supply (all-polar disconnection).
- ➤ Ensure protection against electric shock hazard by providing adequate protection for the connection terminals and by securing the housing cover.
- ➤ Check to ensure that wiring is in an orderly state.
- ➤ Fall or shock can adversely affect the safety functions. Such units must not be put into operation, even if they do not exhibit any damage.

Mounting notes

- Ensure that the relevant national safety regulations are complied with.
- The connection between actuator drive shaft and controlling element must be rigid with no mechanical play.
- To avoid inadmissible loads on bearings caused by rigid hubs, it is recommended to use compensating clutches with no mechanical play (e.g. metal bellows clutches).

Installation notes

- Always run the high-voltage ignition cables separate from the unit and other cables while observing the greatest possible distance.
- To ensure protection against electric shock hazard, make certain that the AC 230 V section of the SQM4... is strictly segregated from the functional low-voltage section.
- The holding torque is reduced when the actuator's power supply is switched off.
- The housing cover may only be removed for short periods of time for wiring or when making the addressing. It must be made certain that dust or dirt will not get inside the actuator while such work is carried out.
- The actuator contains a printed circuit board with ESD-sensitive components.
- The top side of the board carries a cover which affords protection against direct contact. This protective cover must not be removed! The underside side of the board must not be touched.

WARNING

When servicing or replacing the actuators, take care not to invert the connectors.

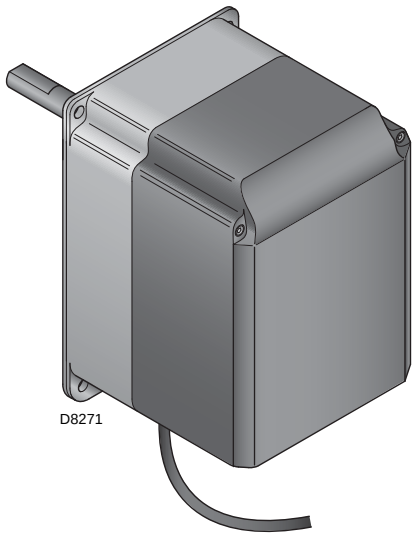


Fig. 7

Technical data

Operating voltage	AC 2 x 12 V via bus cable from the basic unit or via a separate transformer
Safety class	extra low-voltage with safe isolation from mains voltage
Power consumption	26...34 VA
Degree of protection	to EN 60 529, IP 54, provided adequate cable entries are used
Cable connection	RAST3,5 connectors
Direction of rotation	- Standard is counterclockwise - Reverse is clockwise
Nominal torque (max)	20 Nm
Holding torque (max)	20 Nm
Running time (min.) for 90°	30 s.
Weight	approx. 1,6 kg
Environmental conditions:	
Operation	DIN EN 60 721-3-3
Climatic conditions	class 3K3
Mechanical conditions	class 3M3
Temperature range	-20...+60 °C
Humidity	< 95 % r.h.

Tab. E

5 Installation

5.1 Notes on safety for the installation

After carefully cleaning all around the area where the burner will be installed, and arranging the correct lighting of the environment, proceed with the installation operations.

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.

5.2 Handling

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

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.

5.3 Preliminary checks

Checking the consignment

CAUTION

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

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

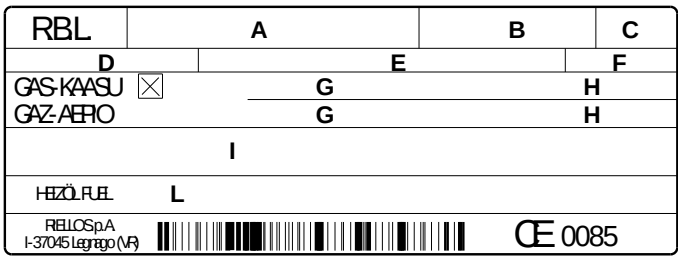


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Fig. 8

Checking the characteristics of the burner

Check the identification label of the burner, showing:
- ➤ the model (**A**) (Fig. 8) 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 electrical input 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 output of the burner must be within the boiler's firing rate;
- ➤ the category of the device/countries of destination (**I**).
- ➤ light oil (**L**) max. viscosity

WARNING

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

5.4 Operation position

The burner is designed to operate only in the positions **1**, **2, 3** and **4**.
Installation **1** is preferable, as it is the only one that allows the maintenance operations as described in this manual.
Installations **2**, **3** and **4** permit operation but make maintenance and inspection of the combustion head more difficult.
Any other position could compromise the correct operation of the appliance.
Installation **5** is prohibited for safety reasons.

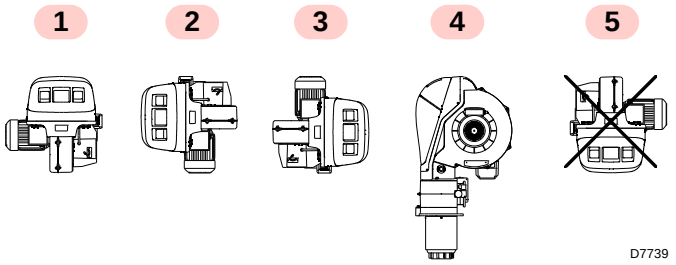


Fig. 9

5.5 Removal of the locking screws from the shutter

WARNING

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

Replace them with the screws 3) M12 X 25 supplied with the burner.

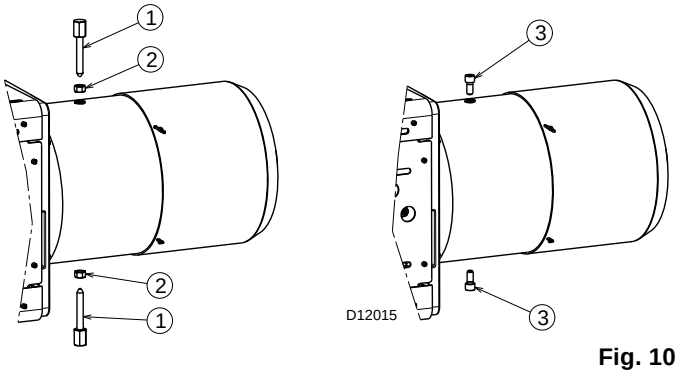


Fig. 10

5.6 Preparing the boiler

5.6.1 Boring the boiler plate

Drill the combustion chamber locking plate as shown in Fig. 11.

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

5.6.2 Blast tube length

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

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

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

For boilers having a water-cooled front the refractory fettling 2)-5)(Fig. 12) is not required unless it is expressly requested by the boiler manufacturer.

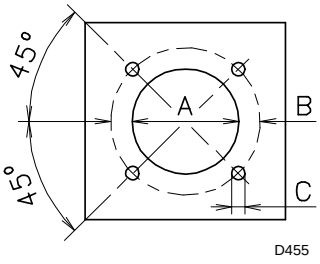


Fig. 11

mm	A	B	C
RLS 300/E MX	350	452	M 18
RLS 400/E MX	350	452	M 18
RLS 500/E MX	390	452	M 18

Tab. F

5.7 Securing the burner to the boiler

Prepare an adequate system of hoisting by hooking onto the rings 3)(Fig. 12).

➤ Slip the thermal protection (standard equipment) onto the blast tube 4)(Fig. 12).

➤ Place entire burner on the boiler hole arranged previously, see (Fig. 11), and fasten with the screws given as standard equipment.

WARNING

The burner-boiler seal must be airtight.

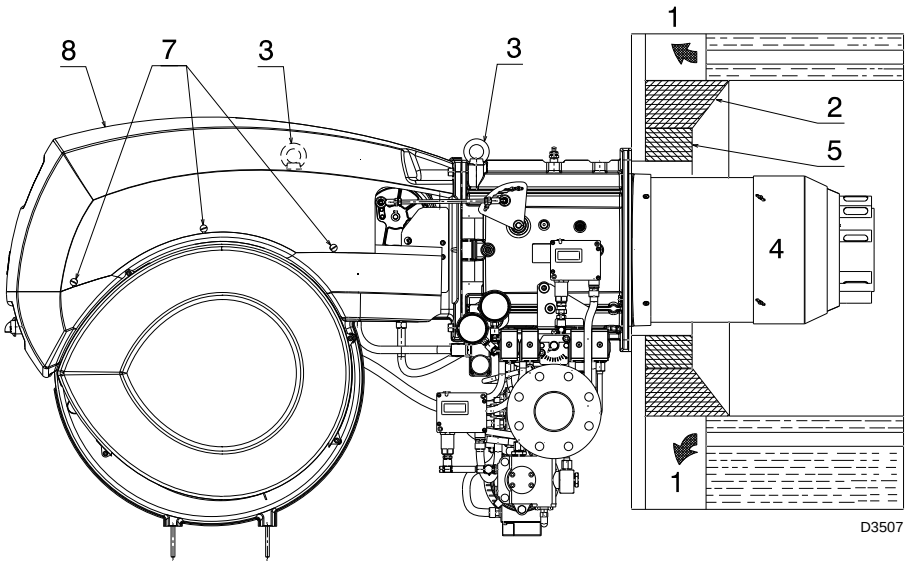


Fig. 12

5.8 Accessibility to the interior of the combustion head

In order to reach inside the combustion head proceed as follows:

➤ Open burner at hinge (Fig. 13) after removing the 4 screws 1).

➤ Disconnect the wires 2) from the electrodes.

➤ Disconnect the oil pipes by unscrewing the two connectors 3).

➤ Unscrew the under part of the elbow 4) until it comes free of its slot.

➤ Extract the internal part 5) of the combustion head.

WARNING

While unscrewing, some fuel may leak out.

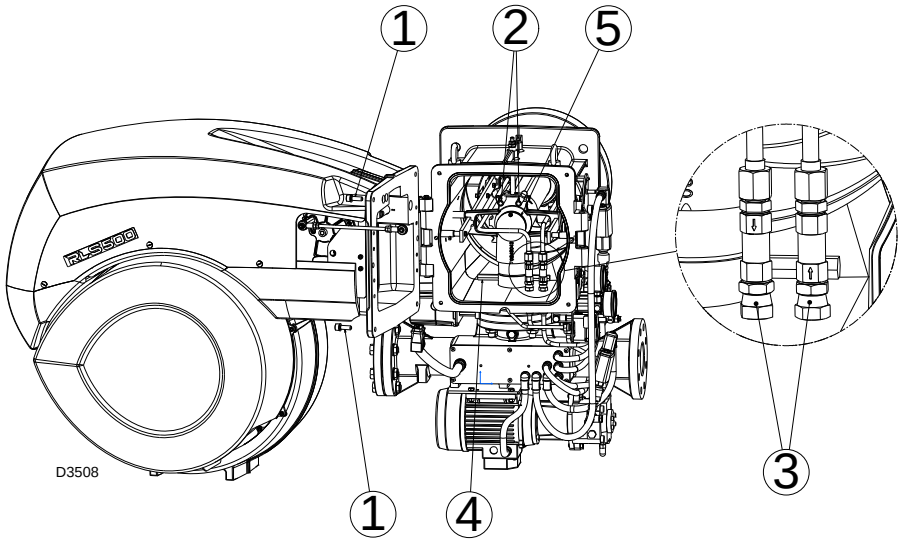


Fig. 13

5.9 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 Riello 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 Riello S.p.A. 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 nonobservance of the requirements contained in this manual.

Fit the nozzle with the box spanner, fitting the spanner through the central hole in the flame stability disk (Fig. 14).

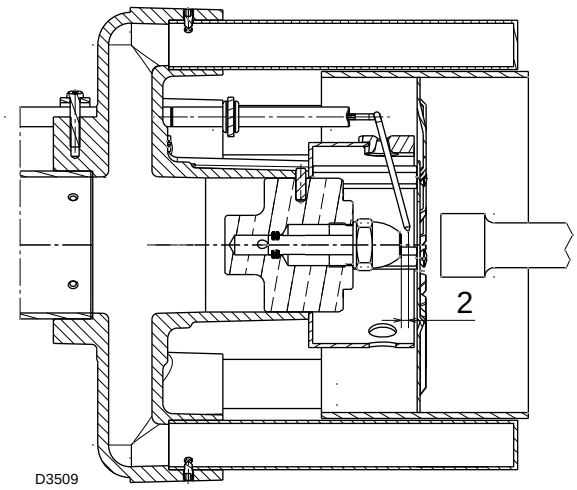


Fig. 14

Nozzles with no fuel shutoff needle must be fitted on the nozzle holder.

To set the delivery range within which the nozzle must work, nozzle return line fuel pressure must be adjusted according to Tab. G and Tab. H (pag. 20).

WARNING

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

5.9.1 Recommended nozzles

Model	Nozzles
RLS 300-400/E MX	– Bergonzo type B5 60° – Fluidics type N2 50°
RLS 500/E MX	– Fluidics type N2 50°

Intermediate flow rates may be obtained by choosing the nozzle with a nominal flow rate slightly higher than that actually required.

Complete range of nozzles:

➤ **Bergonzo type B5 60°:** 150 - 200 - 225 - 250 - 275 - 300 - 325 - 350 - 375 - 400 - 425. We normally recommend 60° angles of pulverisation.

	kg/h	Delivery pressure bar	Return pressure bar	kg/h	kW
RLS 300-400/E 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	17.5	365	4300

Tab. G

➤ **Fluidics type N2 50°:** 160 - 180 - 200 - 225 - 250 - 275 - 300 - 330 - 360 - 400 - 450. We normally recommend 50° angles of pulverisation.

	kg/h	Delivery pressure bar	Return pressure bar	kg/h	kW
RLS 500/E 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 300-400/E MX	200	23	9.5	67	800
		23	15	150	1800
	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	16.5	365	4300

Tab. H

5.10 Position of electrodes

WARNING

Make sure that the electrodes are positioned as shown in (Fig. 15).

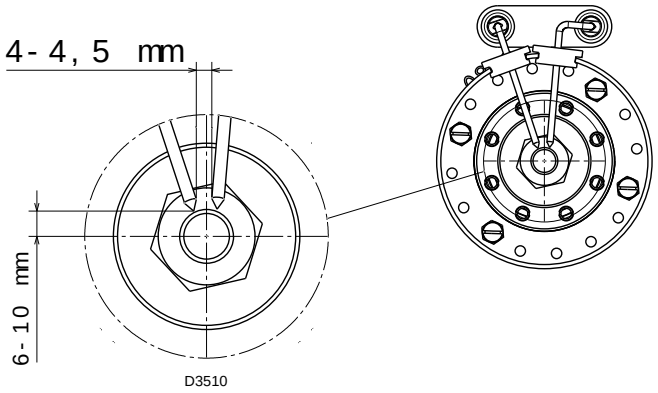


Fig. 15

5.11 Combustion head setting

In addition to varying air flow depending on the output requested, the air gate valve servomotor 4) (Fig. 4) by means of a lifting assembly - varies the setting of the combustion head.

This system allows an optimal setting even at a minimum firing rate.

For the same servomotor rotation, combustion head opening can be varied by moving the tie rod onto holes 1-2-3)(Fig. 16).

The choice of the hole (1-2-3) to be used is decided on the basis of diagram (Fig. 17) against the required maximum output.

Setting is pre-arranged in the plant for the maximum run (hole 3, Fig. 16).

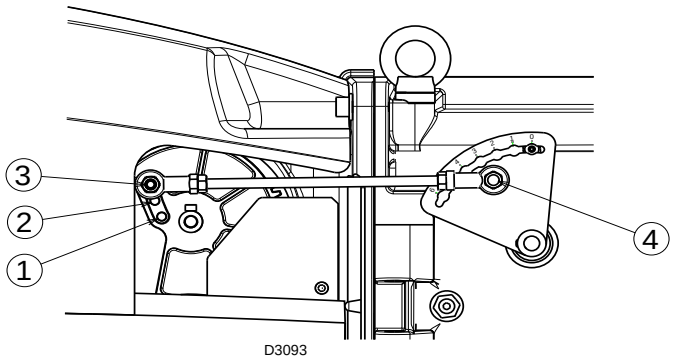
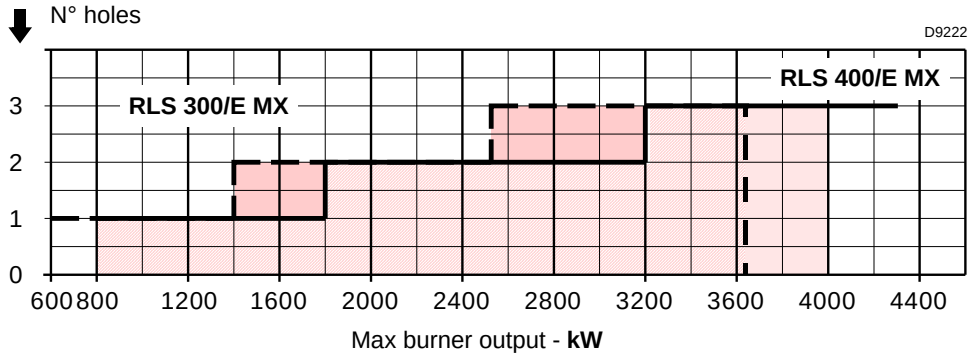


Fig. 16



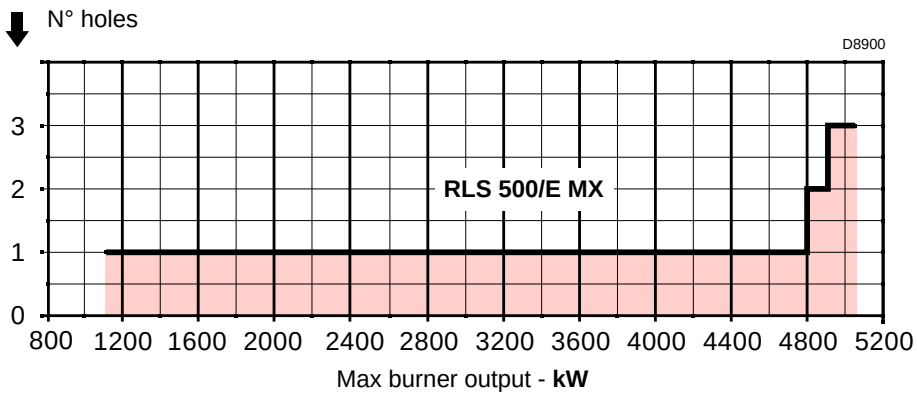


Fig. 17

When dealing with boilers featuring a strong back pressure, if air delivery is insufficient even with the damper fully open, you can use a different setting to that illustrated in diagram (Fig. 17), do this by moving the tie rod onto the next highest hole numerically speaking, thus increasing the combustion head's opening and hence air delivery.

If combustion requirements require you to move spacer 1) (Fig. 18) onto the 1st or 2nd hole of the gear and, at the same time, the hinge is on the right, you need to fit the spacers 4) (Fig. 18) supplied with the burner.

Proceed as follows (Fig. 18):

- ➤ first unscrew nuts 2), remove tie rod 3).
- ➤ Unscrew spacer 1) and position it on the hole you want.
- ➤ Screw the spacers 4) onto spacer 1) and screw 5) respectively.
- ➤ Refit the tie rod and nuts.

WARNING

RLS 400/E MX burner

To achieve operation at minimum output (Fig. 2), the combustion head's gas pipes must be adjusted to hole position 5 (Fig. 19).

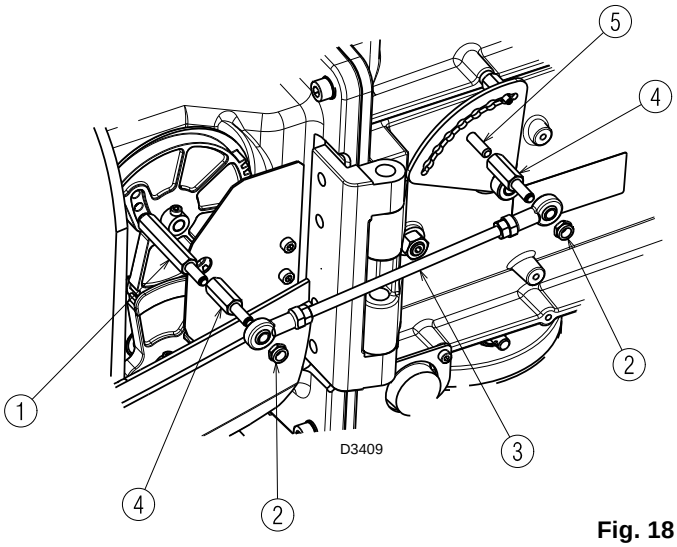


Fig. 18

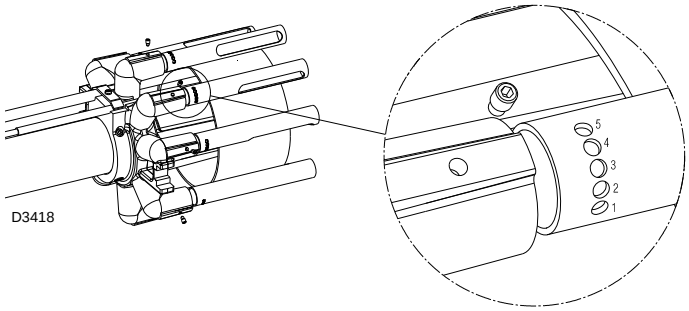


Fig. 19

5.12 Light oil supply

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

Precautions: avoid knocking, attrition, sparks and heat.

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

WARNING

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

5.12.1 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.

The tank higher than the burner A (Fig. 20)
The distance "P" must not exceed 10 meters in order to avoid subjecting the pump's seal to excessive strain; the distance "V" must not exceed 4 meters in order to permit pump self-priming even when the tank is almost completely empty.

The tank lower than the 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.

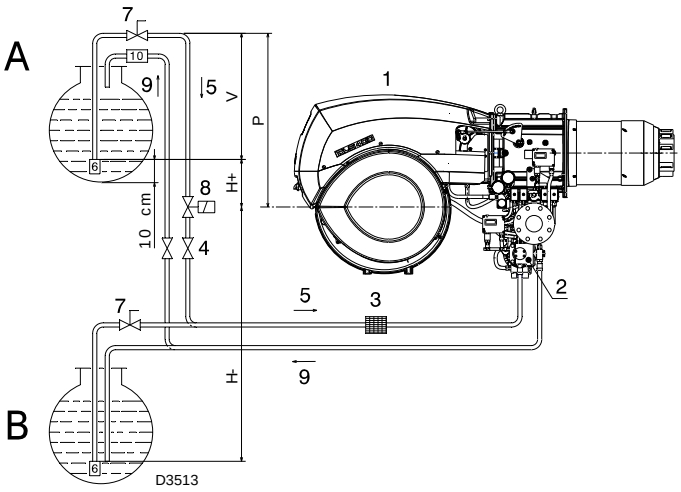


Fig. 20

Key to layout (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 = Rapid closing manual valve remote controlled (only Italy)
8 = On/off solenoid valve (only Italy). See layout of electric panel board. Electrical connections set by installer (SV)
9 = Return line
10 = Check valve (only Italy)

5.12.2 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 goes to feed 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

5.12.3 Hydraulic connections

The pumps are equipped with a by-pass that connects return line with suction line.
The pumps are installed on the burner with the by-pass closed by screw 6) (Fig. 23).
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.
Install the hoses where they cannot be stepped on or come into contact with hot surfaces of the boiler and where they do not hamper the opening of the burner.
Now connect the other end of the hoses to the suction and return lines by using the supplied nipples.

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5.12.4 Pressure regulator

The pressure variator (Fig. 21), integrated into the valve unit of the oil circuit makes it possible to vary the pressure on return of the nozzle depending on the flow rate required.

Governing of the pressure on return is obtained with the variation of a section by rotating the servomotor 23) (Fig. 4) which simultaneously also controls the gas butterfly valve.

➤ Pressure governor at 0° (maximum opening) minimum pressure on nozzle return.

➤ Pressure governor at 90° (minimum opening) = maximum pressure on nozzle return.

The servomotor is operated by the electronic cam 4) (Fig. 5); by means of this device it is possible to set different curves for oil and gas on the same servomotor (the air gate valve servomotor 4) (Fig. 4) may be operated in the same way.

➤ In **regulating with gas** it is advisable to set the servomotor at 90° in order to reduce losses from the gas butterfly valve.

➤ In **regulating with oil**, setting is made depending on the type of nozzle used and on the modulation required. Under the conditions of minimum firing rate, 20° rotation may be sufficient.

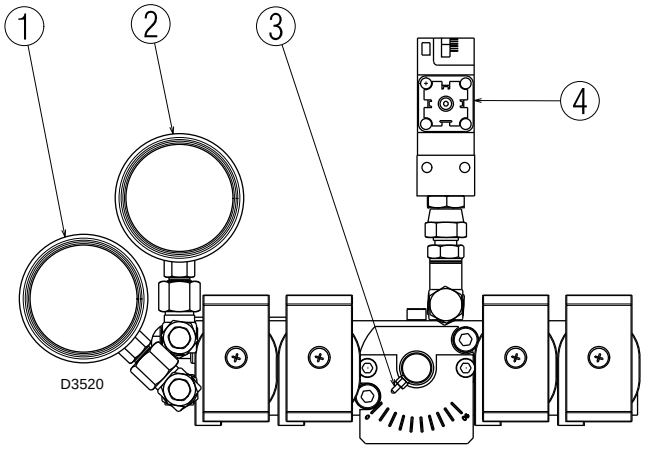


Fig. 21

Key to layout (Fig. 21)
1 Nozzle delivery pressure gauge
2 Pressure gauge for pressure on nozzle return
3 Position indicator (0 ÷ 90) of pressure variator
4 Maximum oil pressure switch on return circuit

5.12.5 Hydraulic system layout

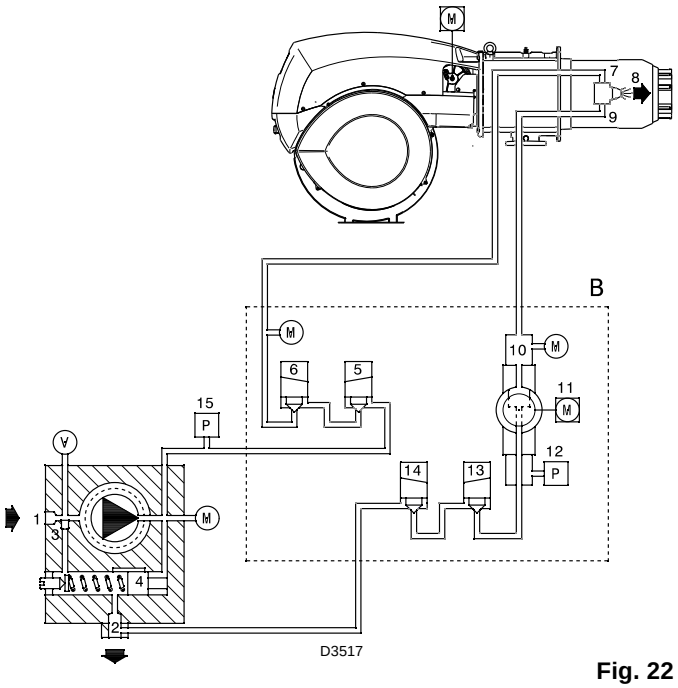


Fig. 22

Key to layout (Fig. 22)
1 Pump suction
2 Pump and nozzle return
3 By-pass screw in pump
4 Pump pressure governor
5 Safety solenoid
6 Safety solenoid
7 Nozzle delivery
8 Nozzle without interception pin
9 Nozzle return
10 Pressure variator on nozzle return
11 Servomotor for pressure variator
12 Pressure switch on nozzle return
13 Safety valve on nozzle return
14 Safety valve on nozzle return
15 Pressure switch on pump delivery
B Oil valve assembly and pressure variator
M Pressure gauge
V Vacuometer

OPERATION
Pre-purging phase:
of closed valves 5), 6), 13) and 14).
Firing phase and operation:
of opened valves 5), 6), 13) and 14).
Halt: all the valves closed.

5.12.6 Pump priming

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 self-priming to take place, one of the screw 4) (Fig. 23) of the pump must be loosened in order to bleed off the air contained in the suction line.
➤ Start the burner by closing the remote controls.
Check the fan wheel rotation direction as soon as the burner starts.
➤ The pump can be considered primed when the light oil starts coming out of the screw 4). Stop the burner and screw screw 4) in.

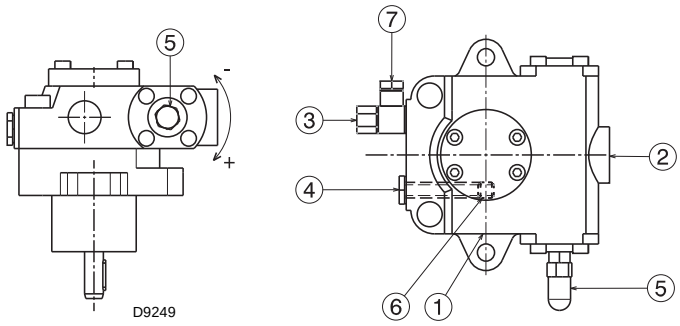


Fig. 23

Key to layout (Fig. 23)

1	Suction	G 1/2"
2	Return	G 1/2"
3	Pressure switch attachment	G 1/4"
4	Vacuum meter connection	G 1/4"
5	Pressure governor	
6	Screw for by-pass	
7	Pressure gauge connection	G 1/4"

PUMP SUNTEC		TA4	TA5
Min. delivery rate at 16,5 bar pressure	kg/h	560	
- Delivery pressure range	bar	7-40	6-30
- Max. suction depression	bar	0.45	
- Viscosity range	cSt	4 - 800	
- Light oil max. temperature	°C	140	
Max. suction and return pressure	bar	5	
- Pressure calibration in the factory	bar	22-20	

The time required for this operation depends upon the diameter and length of the suction tubing.
If the pump fails to prime at the first starting of the burner and the burner locks out, wait approx. 15 seconds, reset the burner, as often as required. After 5 or 6 starting operations allow 2 or 3 minutes for the transformer to cool.
Do not illuminate the QRI cell or the burner will lock out; 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 vacuum meter 4) (Fig. 23) prior to starting; otherwise, the pump will seize.

WARNING

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

5.12.7 Burner calibration

Note

It is advisable to first set the burner for operating on oil and then for gas.

WARNING

Execute the fuel exchange when the burner is off.

FIRING

Set switch 1) (Fig. 24) to "MAN".

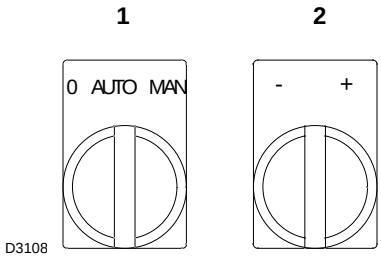


Fig. 24

During the first firing, during the passage from the 1st to the 2nd stage, there is a momentary lowering of the fuel pressure caused by the filling of the 2nd stage nozzle tubing. This lowering of the fuel pressure can cause the burner to lock-out and can sometimes give rise to pulsations.
Once the following adjustments have been made, the firing of the burner must generate a noise similar to the noise generated during operation.

OPERATION

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

- **Nozzles**
  See the information listed on pag. 20.
- **Combustion head**
  The adjustment of the combustion head already carried out (pag. 21) need not be altered unless the 2nd stage delivery of the burner is changed.
- **Pump pressure**

It is calibrated in factory and generally it goes well:
RLS 300/E MX = 22 bar
RLS 400/E MX = 20 bar
RLS 500/E MX = 25 bar

– In order to adjust pump pressure, use the relevant screw 5) (Fig. 23)

– It is possible to reduce the fuel delivery only if the temperature is higher than 0 °C:
RLS 300/E MX = 20 bar
RLS 400/E MX = 18 bar
RLS 500/E MX = 25 bar

– It is possible to increase fuel delivery or to ensure firings even at temperatures less than 0 °C.
RLS 300/E MX = 24 bar
RLS 400/E MX = 22 bar
RLS 500/E MX = 26 bar

5.13 Gas feeding

WARNING

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

Precautions: avoid knocking, attrition, sparks and heat.

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

WARNING

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

5.13.1 Gas feeding line

Key (Fig. 25 - Fig. 26 - Fig. 27 - Fig. 28)

1 Gas input pipe
2 Manual valve
3 Vibration damping joint
4 Pressure gauge with pushbutton cock
5 Filter
6A Includes:
- Filter
- working valve
- safety valve
- pressure adjuster

6C Includes
- safety valve
- working valve

6D Includes:
- safety valve
- working valve

7 Minimum gas pressure switch
8 Leak detection device, supplied as an accessory or incorporated, based on the gas train code. In compliance with the EN 676 standard, the leak detection control is compulsory for burners with maximum outputs over 1200 kW.
9 Gasket, for “flanged” versions only
10 Pressure adjuster
11 Train-burner adaptor, supplied separately
P2 Upstream pressure of valves/adjuster
P3 Upstream pressure of the filter
L Gas train supplied separately
L1 The responsibility of the installer

MB

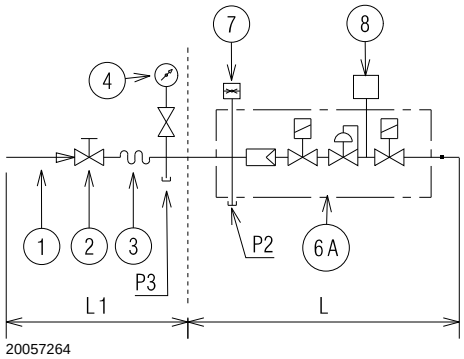


Fig. 25

MBC

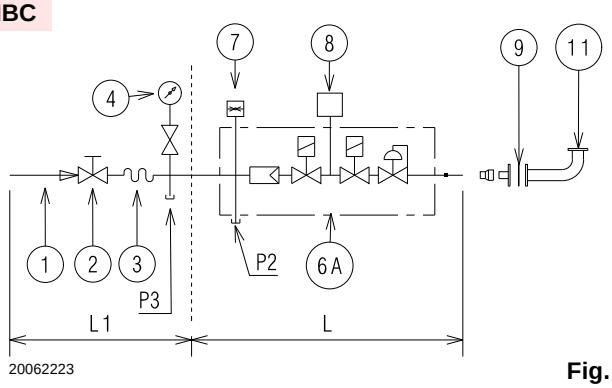


Fig. 26

DMV

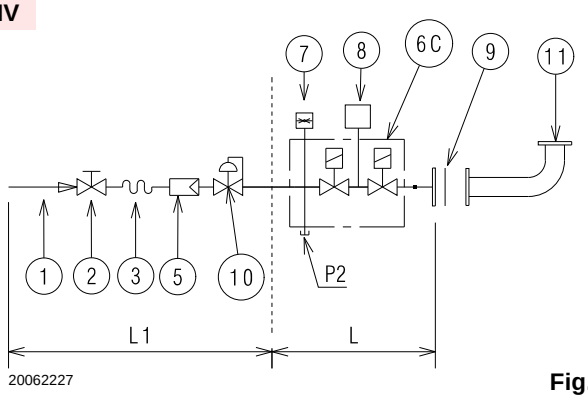


Fig. 27

CB

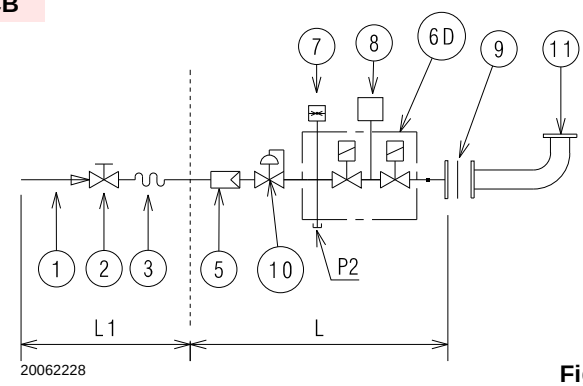


Fig. 28

5.13.2 Gas train

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

To select the correct model of the gas train, refer to the “burner-gas train combination” manual supplied.

5.13.3 Gas train installation

Disconnect the electrical power using the main system switch.

Check that there are no gas leaks.

Beware of train movements: danger of crushing of limbs.

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

The operator must use appropriate tools for installation.

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

The gas train is to be connected on the right of the burner, by flange 1) (Fig. 29).

If it is necessary to connect it on the left of the burner, loosen nuts and screws 3) and 4), remove blind flange 2) together with its gasket and fit them to flange 1) tightening the nuts and screws.

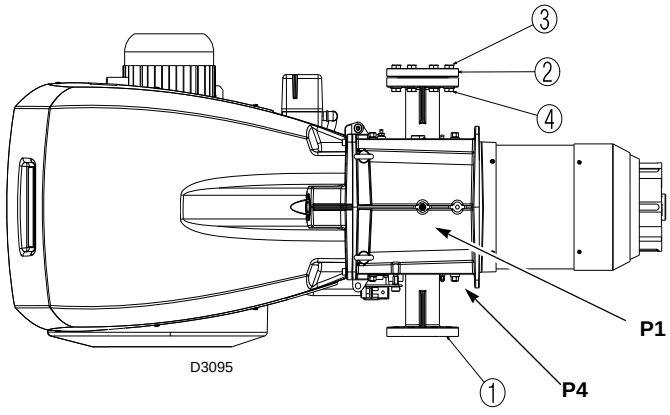


Fig. 29

5.13.4 Gas pressure

The tables show minimum pressure losses along the gas supply line depending on the maximum burner output operation.

Model	kW	1 Δp (mbar)		2 Δp (mbar)	
		G 20	G 25	G 20	G 25
RLS 300/E MX	1250	4.0	5.0	1.4	2.0
	1500	5.2	10.0	1.9	2.9
	1750	6.5	15.0	2.7	4.0
	2000	7.7	20.0	3.5	5.2
	2250	10.0	21.1	4.4	6.6
	2500	12.3	22.2	5.4	8.1
	2750	14.6	23.3	6.5	9.8
	3000	17.2	25.4	7.8	11.7
	3250	20.3	28.7	9.1	13.7
	3550	24.0	32.8	10.9	16.4
RLS 400/E MX	1800	5.4	6.7	2.8	4.2
	2000	6.9	9.0	3.5	5.2
	2250	8.8	11.9	4.4	6.5
	2500	10.7	14.8	5.4	8.1
	2750	12.5	17.7	6.5	9.8
	3000	14.4	20.6	7.8	11.6
	3250	15.6	22.7	9.1	13.6
	3500	16.7	24.8	10.6	15.8
	3750	18.2	27.2	12.2	18.2
	4000	20.1	30.0	13.8	20.7
	4300	22.5	33.5	16.0	23.9
RLS 500/E MX	2500	8.9	13.3	3.3	5.0
	2750	10.9	16.2	3.9	6.1
	3000	12.9	19.1	4.7	7.2
	3250	15.0	22.4	5.5	8.5
	3500	17.8	26.3	6.4	9.8
	3750	20.5	30.1	7.3	11.3
	4000	23.3	34.0	8.3	12.9
	4250	26.1	37.8	9.4	14.5
	4500	29.0	42.4	10.5	16.3
	4750	31.9	47.0	11.7	18.1
	5050	35.4	52.6	13.3	20.5

The values shown in the table refer to:

- natural gas G 20 PCI 9.45 kWh/Sm^3 (8.2 Mcal/Sm^3)
- natural gas G 25 PCI 8.13 kWh/Sm^3 (7.0 Mcal/Sm^3)

Column 1

Pressure loss at combustion head.
Gas pressure measured at the test point 1) (Fig. 30), with:

- Combustion chamber at 0 mbar;
- Burner working at maximum output;
- Combustion head adjusted as in the diagram of Fig. 17.

Column 2

Pressure loss at gas butterfly valve 2) (Fig. 30) 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 1) (Fig. 30).
– Find, in the table relating to the burner concerned, the pressure value closest to the result of the subtraction.
– Read off the corresponding output on the left.

Example with natural gas G 20 - RLS 500/E MX:

Maximum output operation

Gas pressure at test point 1) (Fig. 30)	=	31 mbar
Pressure in combustion chamber	=	2 mbar
31 - 2	=	29 mbar

A pressure of 29 mbar, column 1, corresponds in the table A to an output of 4500 kW.

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

To calculate the required gas pressure at test point 1) (Fig. 30), set the maximum output required from the burner operation:

– find the nearest output value in the table for the burner in question.
– Read off the pressure at test point 1) (Fig. 30) on the right in column 1.
– Add this value to the estimated pressure in the combustion chamber.

Example with natural gas G 20 - RLS 500/E MX:

Required burner maximum output operation: 4500 kW

Pressure of the gas at an output of 4500 kW	=	29 mbar
Pressure in combustion chamber	=	2 mbar
29 + 2	=	31 mbar

pressure required at test point 1) (Fig. 30).

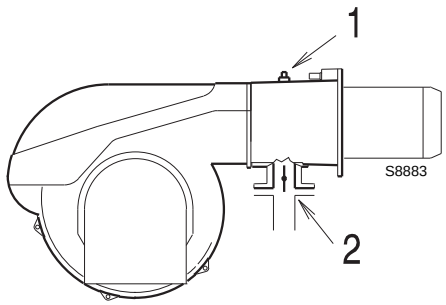


Fig. 30

5.14 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 (FS1).
  This means they should compulsorily be stopped at least once every 24 hours to enable the control box 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;
  - use a multiple pole switch with at least a 3 mm gap between the contacts (overvoltage category III), as envisaged by the present safety standards.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.

Before carrying out any maintenance, cleaning or checking operations:

DANGER

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

DANGER

Close the fuel interception tap.

DANGER

Avoid condensate, ice and water leaks from forming.

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

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

5.14.1 Supply cables and external connections passage

All the cables to be connected to the burner are fed through the grommets, as shown in Fig. 31.

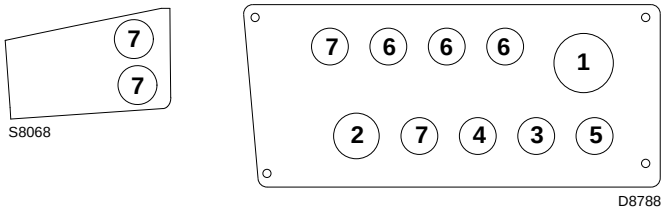


Fig. 31

Key to layout (Fig. 31)

1 Electrical supply
2 Fan motor
3 Minimum gas pressure switch
4 Pressure switch for gas leak detection control device PGVP
5 Gas train
6 Triggering / Safety devices
7 Available

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

5.15 Calibration of the thermal relay

The thermal relay (Fig. 32) is used to avoid damage to the motor owing to a strong increase in absorption or the lack of a phase.

For the calibration 2), refer to the table given in electrical layout (Electrical connections set by installer).

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

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

To test the thermal relay, insert a screwdriver in the window “TEST/TRIP” 4) and move it in the sense of the arrow (towards right)

WARNING

Automatic resetting can be dangerous.
This action is not provided for the burner operation.

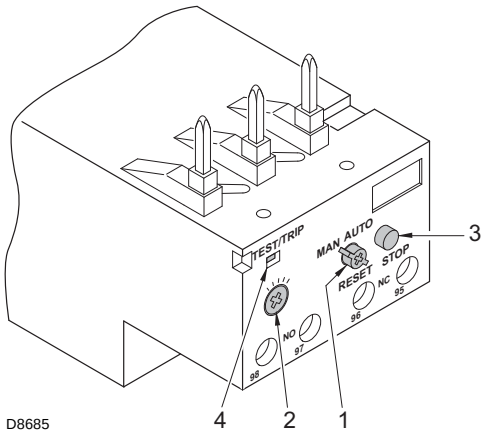


Fig. 32

6 Start-up, calibration and operation of the burner

6.1 Notes on safety for the first start-up

WARNING

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

WARNING

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

6.2 Adjustments before first firing

Adjustment of the combustion head has been illustrated on pag. 21.

In addition, the following adjustments must also be made:

– Slowly open the manual valves situated upstream of the gas train.
– Adjust the minimum gas pressure switch to the start of the scale.
– Adjust the maximum gas pressure switch to the start of the scale.
– Adjust the air pressure switch to the zero position of the scale.
– Purge the air from the gas line. Continue to purge the air (we recommend using a plastic tube routed outside the building) until gas is smelt.
– Fit a U-type manometer or a differential pressure gauge (Fig. 33), with the (+) fitting on the header gas pressure tap and (-) fitting in the combustion chamber. The manometer readings are used to calculate MAX. burner power using the table on pag. 27.
– Connect two lamps or testers to the two gas line solenoid valves to check the exact moment at which voltage is supplied. This operation is unnecessary if each of the two solenoid valves is equipped with a pilot light that signals voltage passing through.

CAUTION

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

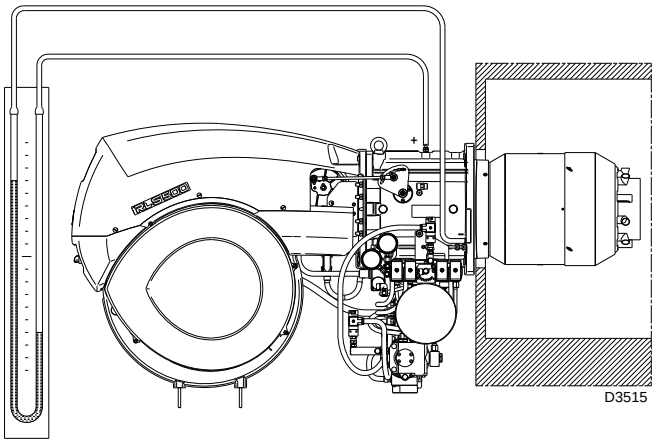


Fig. 33

6.3 Burner starting

Close load controls and set switch 1) (Fig. 34) to "MAN".

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

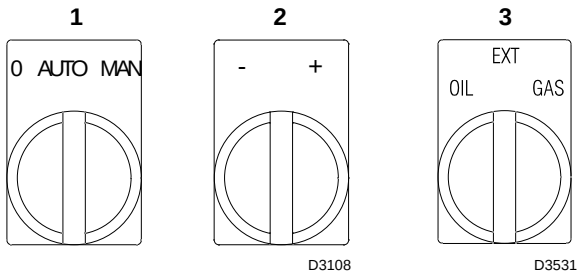


Fig. 34

6.4 Burner firing

Having completed the checks indicated in the previous heading, the burner should fire.

If the motor starts but the flame does not appear and the control box goes into lock-out, reset and wait for a new firing attempt.

If firing 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 firing delivery.

The arrival of gas at the sleeve is indicated by the U-type manometer (Fig. 33).

After burner firing a complete burner adjustment should be performed.

6.5 Fuel change

There are three possible options for changing fuel:
1 with AZL device;
2 using selector 3) (Fig. 34);
3 using a remote selector connected to the main terminal board.

The AZL device determines the priority fuel. The fuel selected is shown on the display.

By setting selector 3) (Fig. 34) to EXT, you activate the remote fuel selection facility.

In this position, if no remote selector is fitted, the display shows the priority fuel.

6.6 Combustion air adjustment

Fuel/combustion air must be synchronized with the relevant servomotors (air and gas) by storing a setting curve by means of the electronic cam.

To reduce pressure loss and to have a wider adjustment range, it is best to set the servomotors to the maximum output used, as near to maximum opening (90°) as possible.

On the gas butterfly valve, the fuel's partial setting adjustment based on required output, with the servomotor fully open, is made by using the pressure stabilizer on the gas train.

6.6.1 Air adjustment for maximum output

Set the servomotor to maximum opening (near 90°) so that the air butterfly valves are fully open.

Loosen screw 2) (Fig. 35) under the burner's intake and close grille 1) (Fig. 35) progressively until you achieve the required output.

The only time reducing intake to a partial setting is not necessary is when the burner is working at the top of the operating range given on pag. 10.

WARNING

We recommend you achieve the maximum output required manually, and adjust intake to the partial setting, define gas pressure and adjust the combustion head before completing the setting.

The value reported in the table can be a reference for a good combustion setting.

EN 676		**Excess air**		
		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**
		λ **= 1.2**	λ **= 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	**Excess air**		
	Max output $\lambda \leq$ **1.2**		**Min output** $\lambda \leq$ **1.3**
Theoretical max. **CO_2** **0 % O_2**	Calibration **CO_2 %**		**CO mg/kWh**
	λ **= 1.2**	λ **= 1.3**	
15.2	12.6	11.5	≤ 100

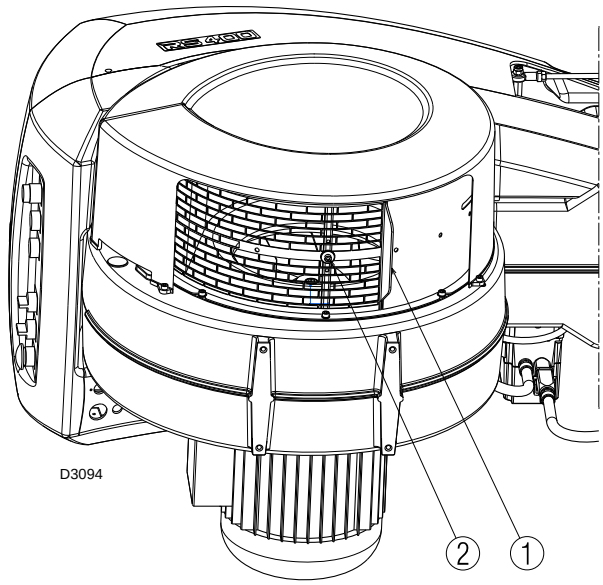


Fig. 35

6.7 Air/fuel control and power modulation system

The air/fuel and power modulation system installed on RLS burner series provides, a set of integrated functions ensuring top level energy and operational performance from the burner, both for single and grouped burners (e.g. boiler with a double combustion chamber or several generators in parallel).

The system includes the following basic functions:

1 air and fuels are supplied in correct quantities by positioning the valves by direct servo-control, thus avoiding the possibility of play typical of systems used for traditional modulating burners, in which settings are obtained by levers and a mechanical cam;
2 the modulation of burner output, on the basis of the load requested by the system, maintaining the pressure or temperature of the boiler at the working values set;
3 a sequence (cascade control) of several boilers by suitably connecting different units, and activation of internal software in the individual systems (optional item).

Further interfaces and computer communication functions (for remote control or integration in central supervision systems) are available according to the system configuration.

WARNING

The first start-up and all further operations concerning internal settings of the control system or expansion of basic functions, are accessed with a password and are reserved for technical service personnel specifically trained for internal programming of the instrument and for the specific application obtained with this burner.

The first start-up and curve synchronization manual is supplied with the burner.

The complete manual for checking and setting all parameters will be provided on application.

6.8 Adjustment pressure switches

6.8.1 Air pressure switch - CO check

Adjust the air pressure switch after having performed all other burner adjustments with the air pressure switch set to the start of the scale (Fig. 36).

Fig. 36

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

Slowly turn the appropriate knob clockwise until the burner goes into lockout.

Check the indication of the arrow pointing upwards on the graduated scale (Fig. 36).

Turn the knob clockwise again, until the value shown on the graduated scale corresponds with the arrow pointing downwards (Fig. 36), and so recovering the hysteresis of the pressure switch (shown by the white mark on a blue background, between the two arrows).

Now check the correct start-up of the burner.

If the burner locks out again, turn the knob anti-clockwise a little bit more.

6.8.2 Maximum gas pressure switch

Adjust the maximum gas pressure switch after having performed all the other burner adjustments with the pressure switch set at the end of the scale (Fig. 37).

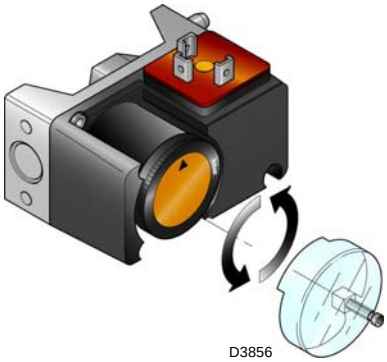


Fig. 37

With the burner operating at maximum output, decrease adjustment pressure by slowly turning the relative knob anti-clockwise until the burner locks out.

Then turn the knob clockwise by 2 mbar and repeat burner starting to ensure it is uniform.

If the burner locks out again, turn the knob anti-clockwise again by 1 mbar.

6.8.3 Minimum gas pressure switch

Adjust the minimum gas pressure switch after having performed all the other burner adjustments with the pressure switch set at the start of the scale (Fig. 38).

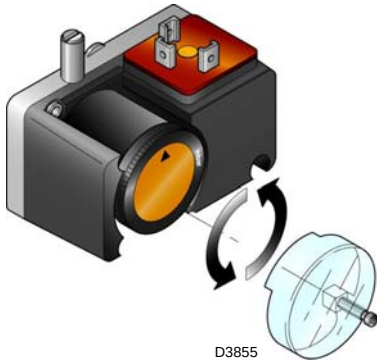


Fig. 38

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

Then turn the knob anti-clockwise by 2 mbar and repeat burner starting to ensure it is uniform.

If the burner locks out again, turn the knob anti-clockwise again by 1 mbar.

6.8.4 Pressure switch PVP kit

Adjust the pressure switch for the valve leak detection control device (PVP kit) (Fig. 39), if present, according to the instructions supplied with the kit itself.

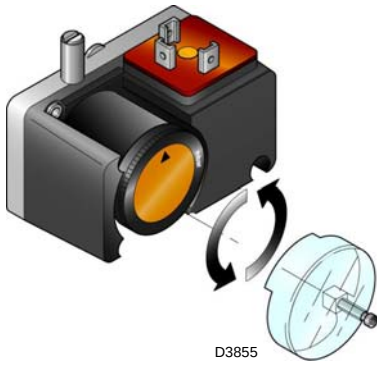


Fig. 39

6.9 Operation sequence of the burner

6.9.1 Burner starting

NORMAL FIRING

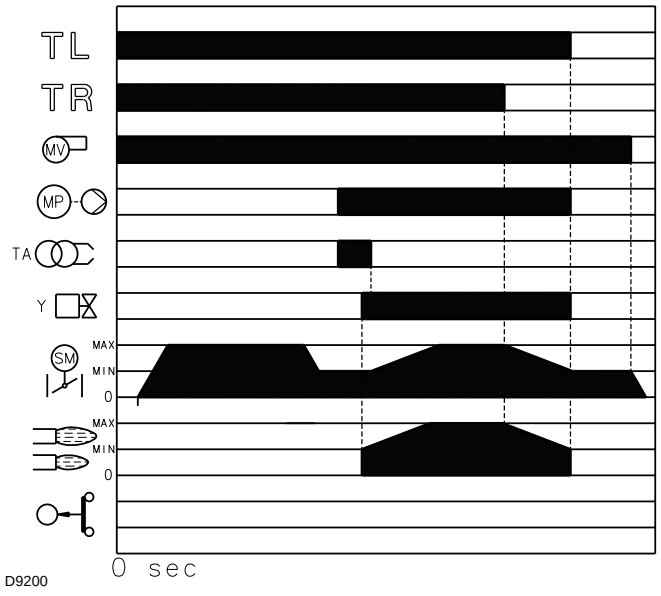


Fig. 40

Key to layout (Fig. 40 - Fig. 41)

MV - Fan motor
MP - Pump motor
SM - Servomotor
TA - Ignition transformer
TL - Limit pressure switch/thermostat
TR - Control pressure switch/thermostat or output regulator
Y - Light oil/gas valve

6.9.2 Undesired shutdown during operation

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

To check the full operating programme, refer to the LMV instrument reference handbook, supplied during the technical service training.

NO FIRING

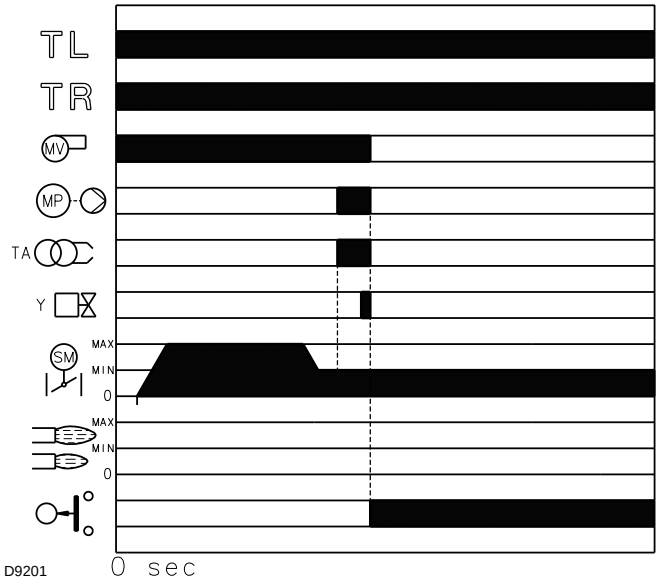


Fig. 41

6.10 Final checks (with the burner working)

➤ Open the thermostat/pressure switch TL:
➤ Open the thermostat/pressure switch TS:

the burner must stop.

➤ Rotate the maximum gas pressure switch knob to the minimum end-of-scale position.
➤ Rotate the air pressure switch knob to the maximum end-of-scale position.

the burner must stop in lockout.

➤ Switch off the burner and disconnect the voltage.
➤ Disconnect the minimum gas pressure switch connector.

the burner must not start

➤ Disconnect the QRI cell wire.

the burner must stop in lockout due to firing failure

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

7 Maintenance

7.1 Notes on safety for the maintenance

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

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

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

Before carrying out any maintenance, cleaning or checking operations:

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

Close the fuel interception tap.

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

7.2 Maintenance programme

7.2.1 Maintenance frequency

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

7.2.2 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 more care should be exercised during maintenance.

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

Burner
Clean the outside of the burner.
Clean and grease the cam variable profile.

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.

Power to photocell QRI (Fig. 42)

Min value for a good work: 3,5 Vdc (AZL display flame approx. 50%).

If the value is lower, it can depend on:
– photocell positioned incorrectly;
– ow current (lower than 187 V)
– bad regulation of the burner.

To measure power, use a voltmeter with a 10 Vdc scale, connected as illustrated on the diagram.

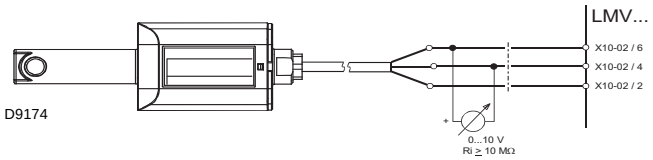


Fig. 42

LIGHT OIL OPERATION

Pump
Delivery pressure must correspond with the table on pag. 20.
The depression must be less than 0.45 bar.
Unusual noise must not be evident during pump operation.
If the pressure is found to be unstable or if 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 line or the pump.
If the problem lies in the suction line, check to make sure that 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.

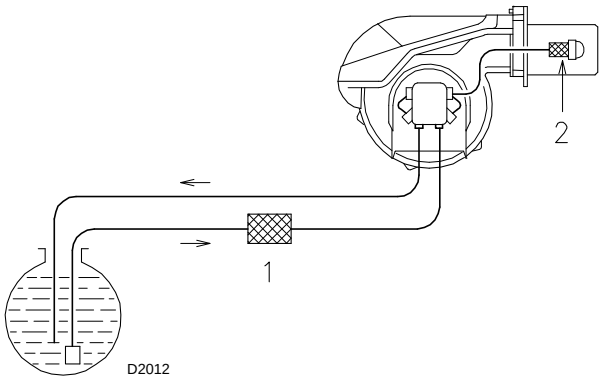


Fig. 43

Nozzles
It is advisable to replace nozzles every year during regular maintenance operations.
Do not clean the nozzle openings; do not even open them.

Flexible hoses
Check to make sure that the flexible hoses are still in good condition.

Fuel tank
Approximately every 5 years, or whenever necessary, suck any water or other impurities present 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 Assistant and have him carry out the necessary adjustments.

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

GAS OPERATION

Gas leaks
Make sure that there are no gas leaks on the pipework 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 Assistant and have him carry out the necessary adjustments.

EN 676		**Excess air**		
		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**
		λ **= 1.2**	λ **= 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

7.3 Opening the burner

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

Close the fuel interception tap.

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

➤ Remove the tie rod 1) (Fig. 44) of the head movement lever, loosening nut 2).
➤ Disconnect the gas servomotor test point 3).
➤ Disconnect the gas pressure switch socket 4).
➤ Remove screws 5).
➤ At this point it is possible to open the burner at the hinge.

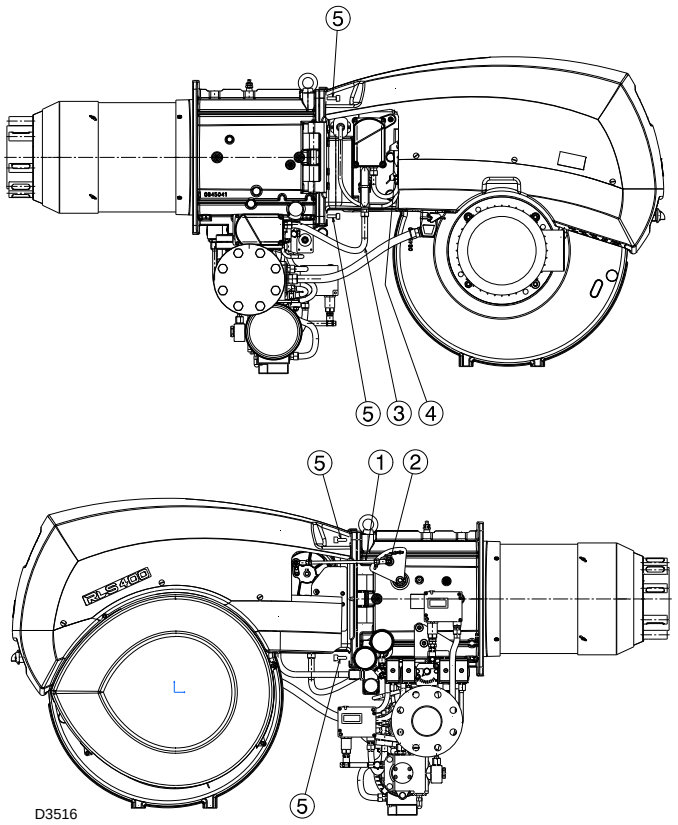


Fig. 44

7.4 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 hood and all the safety and protection devices of the burner.

8 Faults - Possible causes - Solutions

If faults arise in ignition or operations, the burner performs a "safety stop", which is signalled by the red burner lockout LED.

The display visualises alternately the lockout code and the relative diagnostic. To reset the start-up conditions, refer to the “Reset procedure” indicated in the control box manual supplied.

When the burner starts again, the red LED goes out and the control box is reset.

WARNING

In the event of a burner lockout, more than two consecutive burner reset operations could cause damage to the installation. On the third lockout, contact the Aftersales Service.

DANGER

If further lockouts or burner faults occur, interventions must only be made by qualified, authorised personnel (as indicated in this manual, and in compliance with the laws and regulations currently in force).

A Appendix - Accessories

Output power regulator kit for modulating operation

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

Two components should be ordered:
- the output regulator to install on the burner;
- the probe to install on the heat generator.

Parameter to control		Probe		Output power regulator	
	Range	Type	Code	Type	Code
Temperature	- 100...+ 500°C	PT 100	3010110	RWF50 RWF55	**20101190** **20101191**
Pressure	0...2.5 bar 0...16 bar	Probe with output 4...20 mA	3010213 3010214		

Kit AZL (display and operating unit)

Burner	Code
RLS 300-400-500/E MX	**3010355**

Pressure switch kit (for leak detection control)

Burner	Code
RLS 300-400-500/E MX	**3010344**

Kit software interface

Burner	Code
RLS 300-400-500/E MX	**3010388**

Continuous Purging Kit

Burner	Code
RLS 300-400-500/E MX	**3010094**

Soundproofing box kit

Burner	Code
RLS 300-400-500/E MX	**3010376**

Gas trains approved according to EN 676

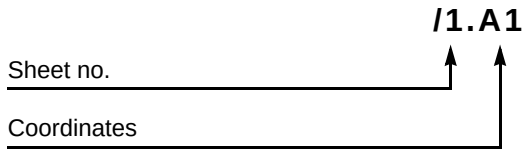
Refer to the instruction manual.

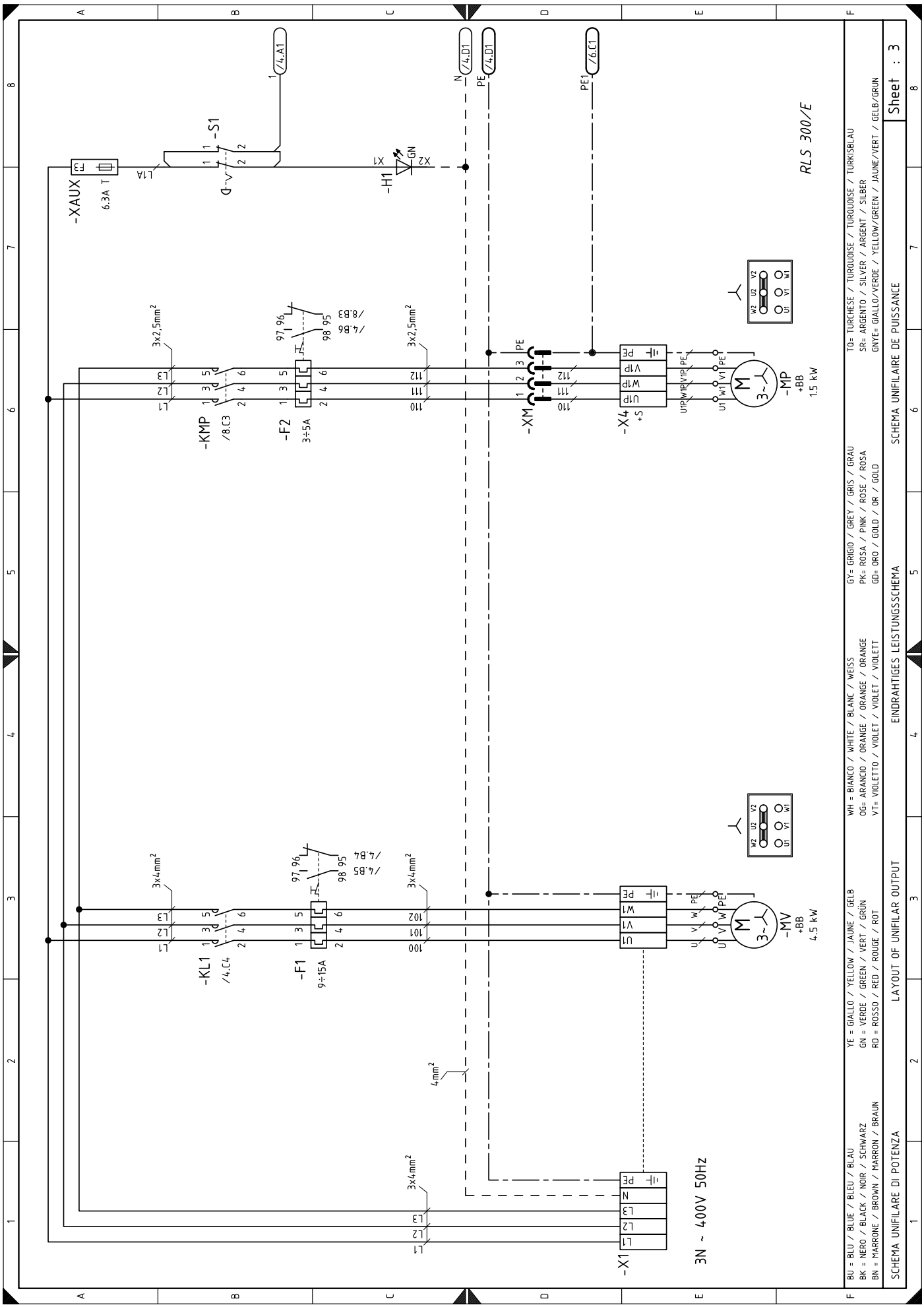
B Appendix - Electrical panel layout

Note

Diagrams without any specific reference marked are common to all burners this manual refers to.

2 Reference layout




RLS 300/E
-XAUX
6.3A T
-S1
-H1
-KMP
-F2
3÷5A
-XM
-X4
-MP
+BB
1.5 kW
-KL1
-F1
9÷15A
-MV
4.5 kW
-X1
3N ~ 400V 50Hz
SCHEMA UNIFILARE DI POTENZA
LAYOUT OF UNIFILAR OUTPUT
EINDRAHTIGES LEISTUNGSSCHEMA
SCHEMA UNIFILAIRE DE PUISSANCE
Sheet : 3
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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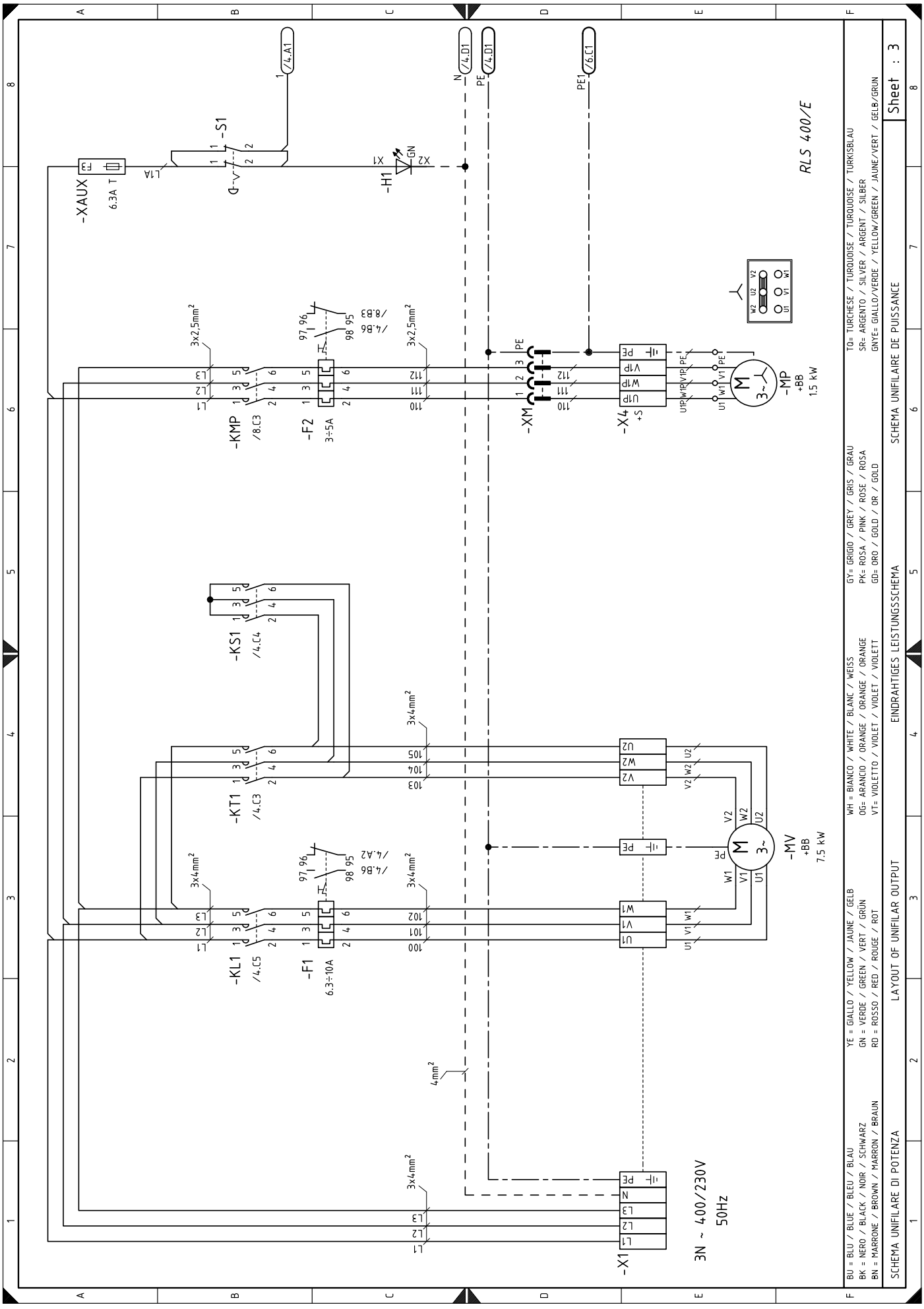
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN


RLS 400/E
-XAUX
6.3A T
-S1
-H1
-KMP
-F2
3÷5A
-XM
-X4
-MP
+BB
1.5 kW
-KS1
-KT1
-KL1
-F1
6.3÷10A
-MV
+BB
7.5 kW
-X1
3N ~ 400/230V
50Hz
SCHEMA UNIFILARE DI POTENZA
LAYOUT OF UNIFILAR OUTPUT
EINDRAHTIGES LEISTUNGSSCHEMA
SCHEMA UNIFILAIRE DE PUISSANCE
Sheet : 3
BU = BLU / BLUE / BLEU / BLAU
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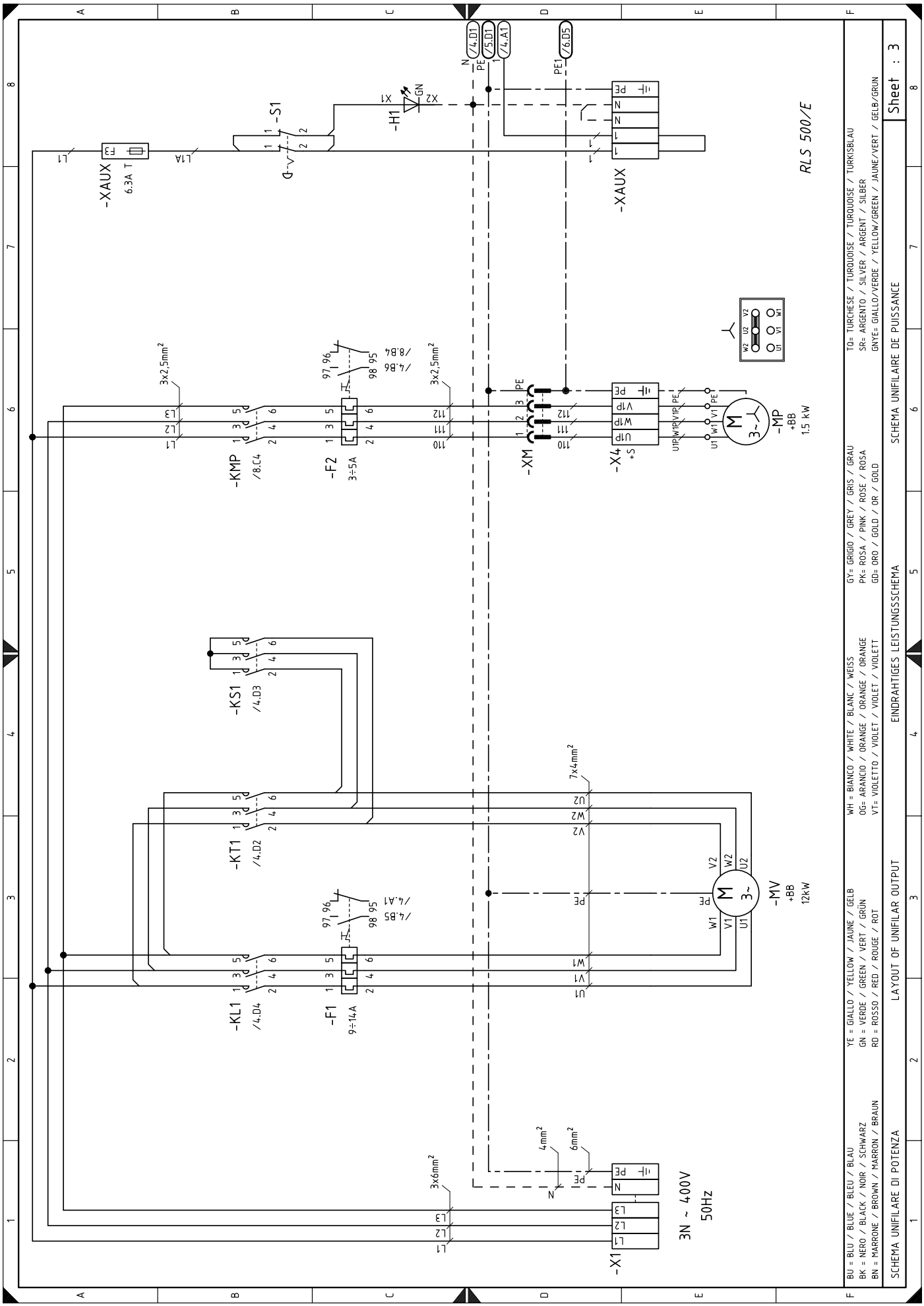
SR = ARGENTO / SILVER / ARGENT / SILBER
GNYE = GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN


RLS 500/E
-XAUX
6.3A T
-S1
-H1
-KMP
/8.C4
-F2
3=5A
-XM
-X4
+S
-MP
+BB
1.5 kW
-KS1
/4.D3
-KT1
/4.D2
-MV
+BB
12kW
-KL1
/4.D4
-F1
9=14A
-X1
3N ~ 400V
50Hz
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
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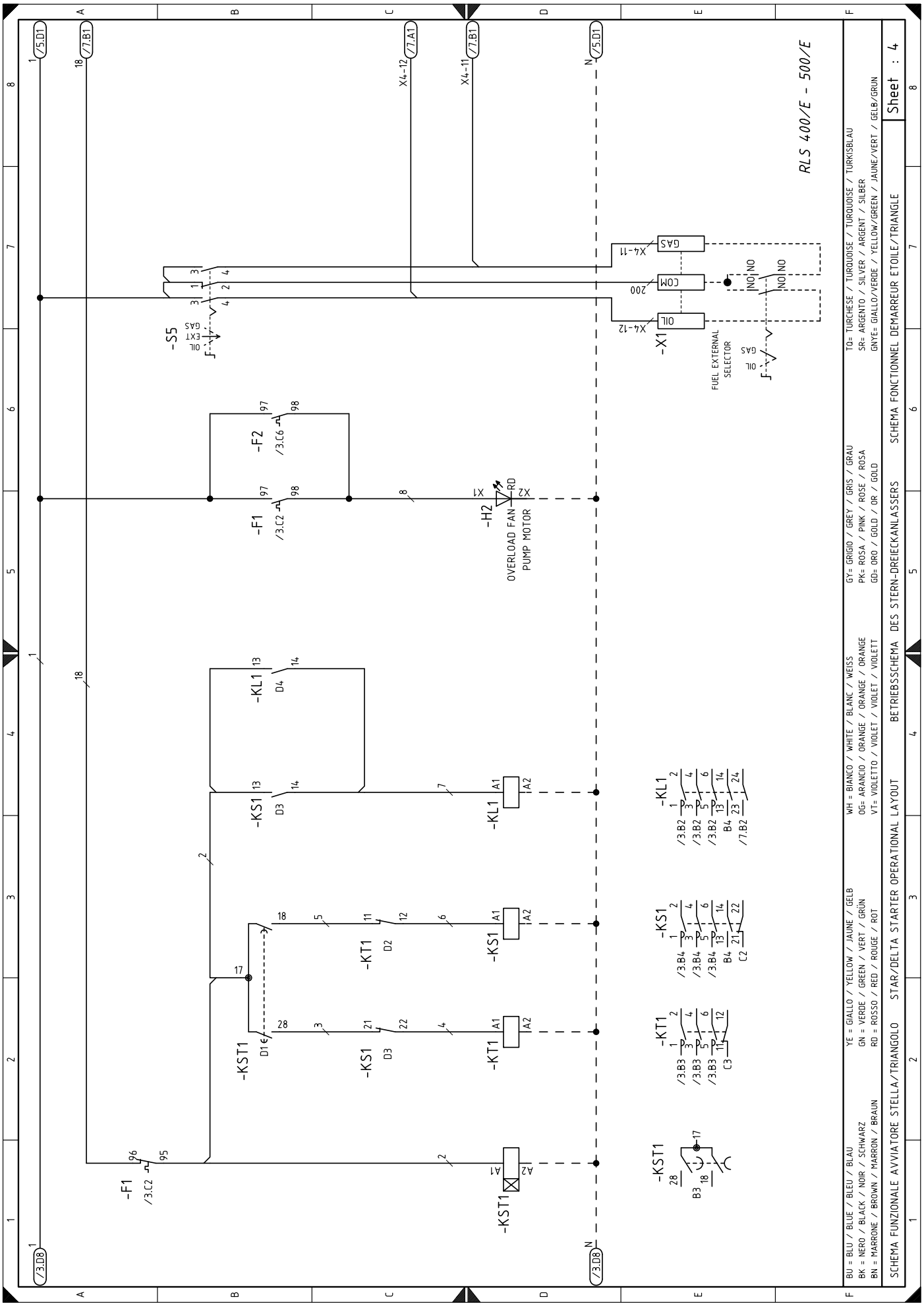
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
SCHEMA UNIFILARE DI POTENZA
LAYOUT OF UNIFILAR OUTPUT
EINDRAHTIGES LEISTUNGSSCHEMA
SCHEMA UNIFILAIRE DE PUISSANCE
Sheet : 3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SCHEMA FUNZIONALE AVVIATORE STELLA/TRIANGOLO STAR/DELTA STARTER OPERATIONAL LAYOUT BETRIEBSSCHEMA DES STERN-DREIECKANLASSERS SCHEMA FONCTIONNEL DEMARREUR ETOILE/TRIANGLE
Sheet : 4
-S5
-F1
-F2
-H2
OVERLOAD FAN
PUMP MOTOR
-X1
FUEL EXTERNAL SELECTOR
-KL1
-KS1
-KT1
-KST1
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
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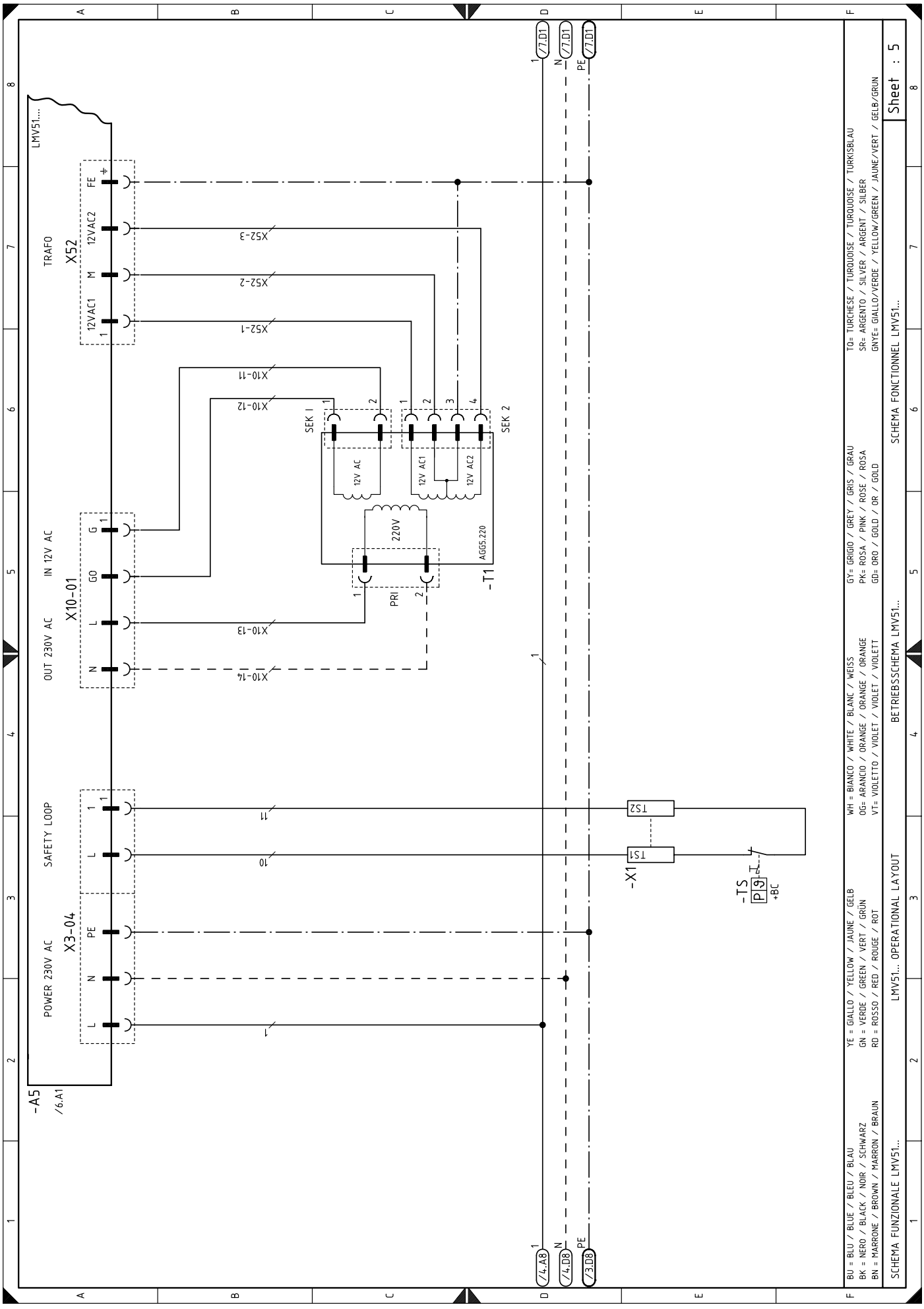
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN


LMV51....
TRAFO
X52
12VAC1
M
12VAC2
FE
X52-3
X52-2
X52-1
X10-11
X10-12
SEK 1
SEK 2
12V AC
12V AC1
12V AC2
220V
AGG5.220
-T1
PRI
X10-01
OUT 230V AC
IN 12V AC
G
GO
L
N
X10-13
X10-14
SAFETY LOOP
X3-04
POWER 230V AC
PE
11
10
1
TS2
TS1
-X1
-TS
P19
+BC
-A5
/6.A1
/7.D1
/4.A8
/4.D8
/3.D8
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
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TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
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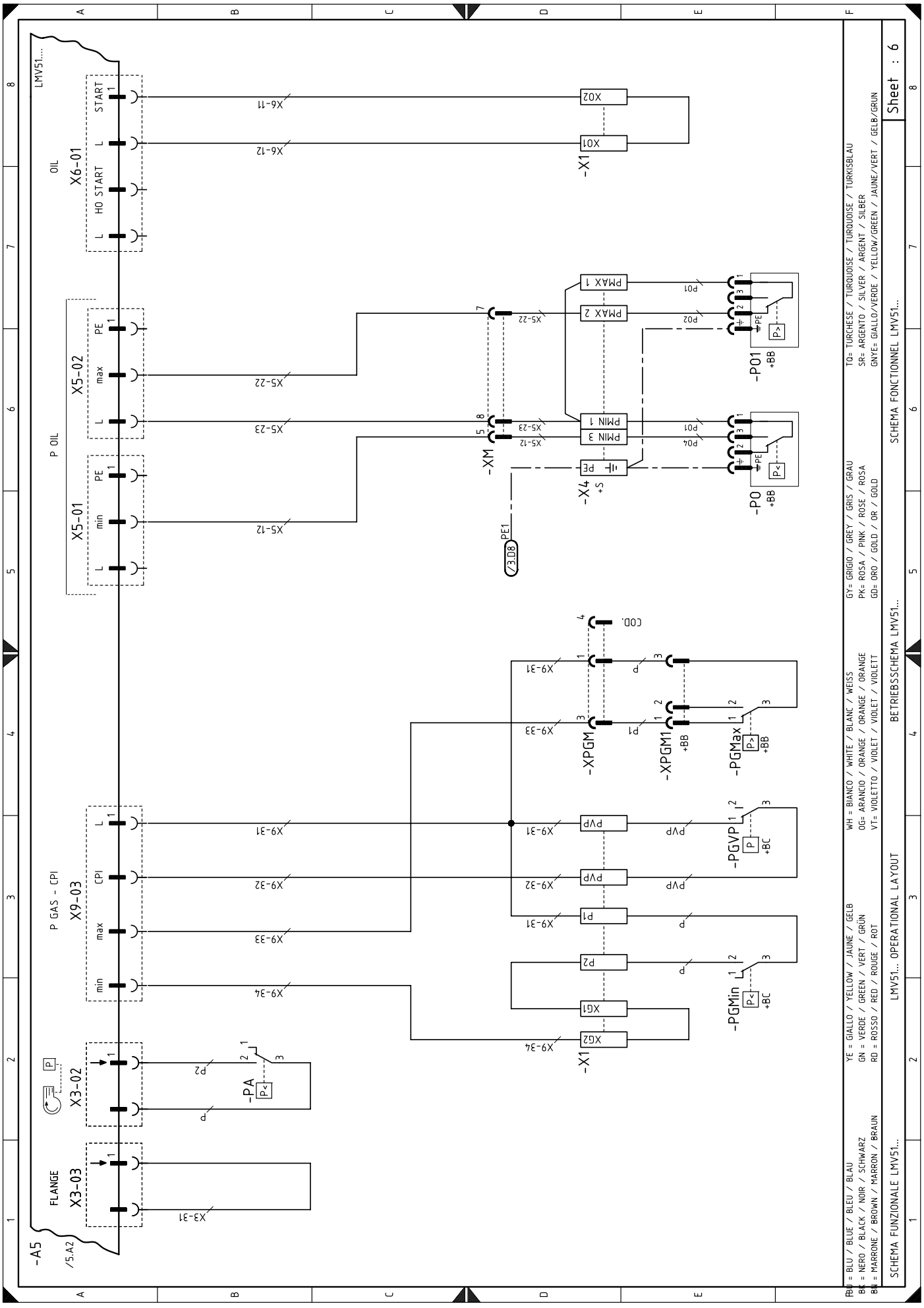
LMV51... OPERATIONAL LAYOUT
BETRIEBSSCHEMA LMV51...
SCHEMA FONCTIONNEL LMV51...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OIL
X6-01
START
HO START
P OIL
X5-02
X5-01
PE
max
min
P GAS - CPI
X9-03
CPI
FLANGE
X3-02
X3-03
-A5
/5.A2
X6-11
X6-12
X5-22
X5-23
X5-12
X9-31
X9-32
X9-33
X9-34
X3-31
-X1
XO2
XO1
XG1
XG2
-XM
-X4
PMAX 1
PMAX 2
PMIN 1
PMIN 3
PE1
/3.08
-P01
-P0
+BB
-PA
-PGVP
-PGMax
-PGMin
-XPGM
-XPGM1
+BC
COD.
Sheet : 6
SCHEMA FONCTIONNEL LMV51...
BETRIEBSSCHEMA LMV51...
LMV51... OPERATIONAL LAYOUT
SCHEMA FUNZIONALE LMV51...
BU = BLU / BLEU / BLAU
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WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
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GO= ORO / GOLD / OR / GOLD
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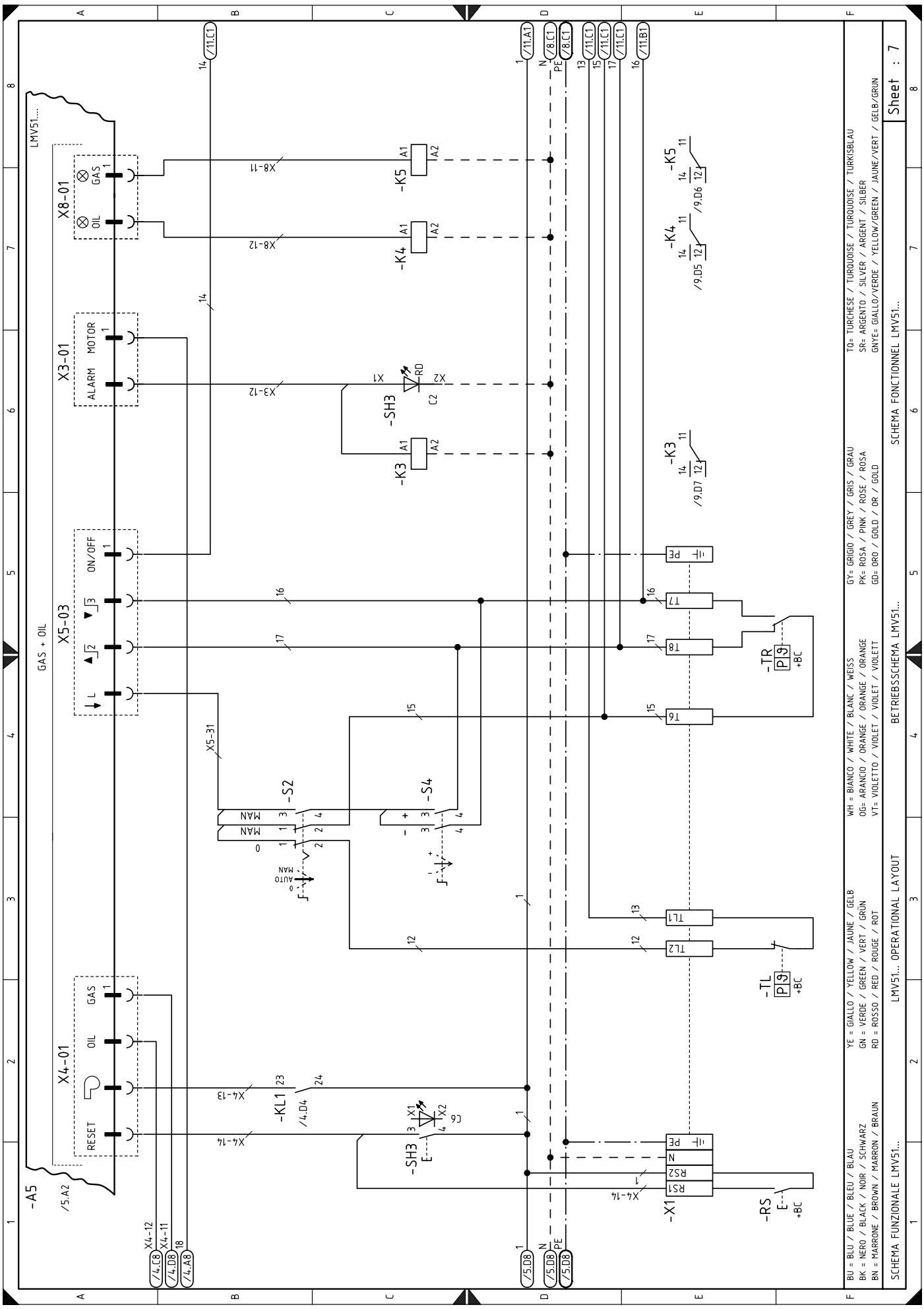
LMV51....
GAS + OIL
X8-01
X3-01
X5-03
X4-01
-A5
/5.A2
-K5
-K4
-K3
-SH3
-S2
-S4
-KL1
-TR
-TL
-RS
-X1
ON/OFF
MOTOR
ALARM
RESET
SCHEMA FUNZIONALE LMV51...
LMV51... OPERATIONAL LAYOUT
BETRIEBSSCHEMA LMV51...
SCHEMA FONCTIONNEL LMV51...
Sheet : 7
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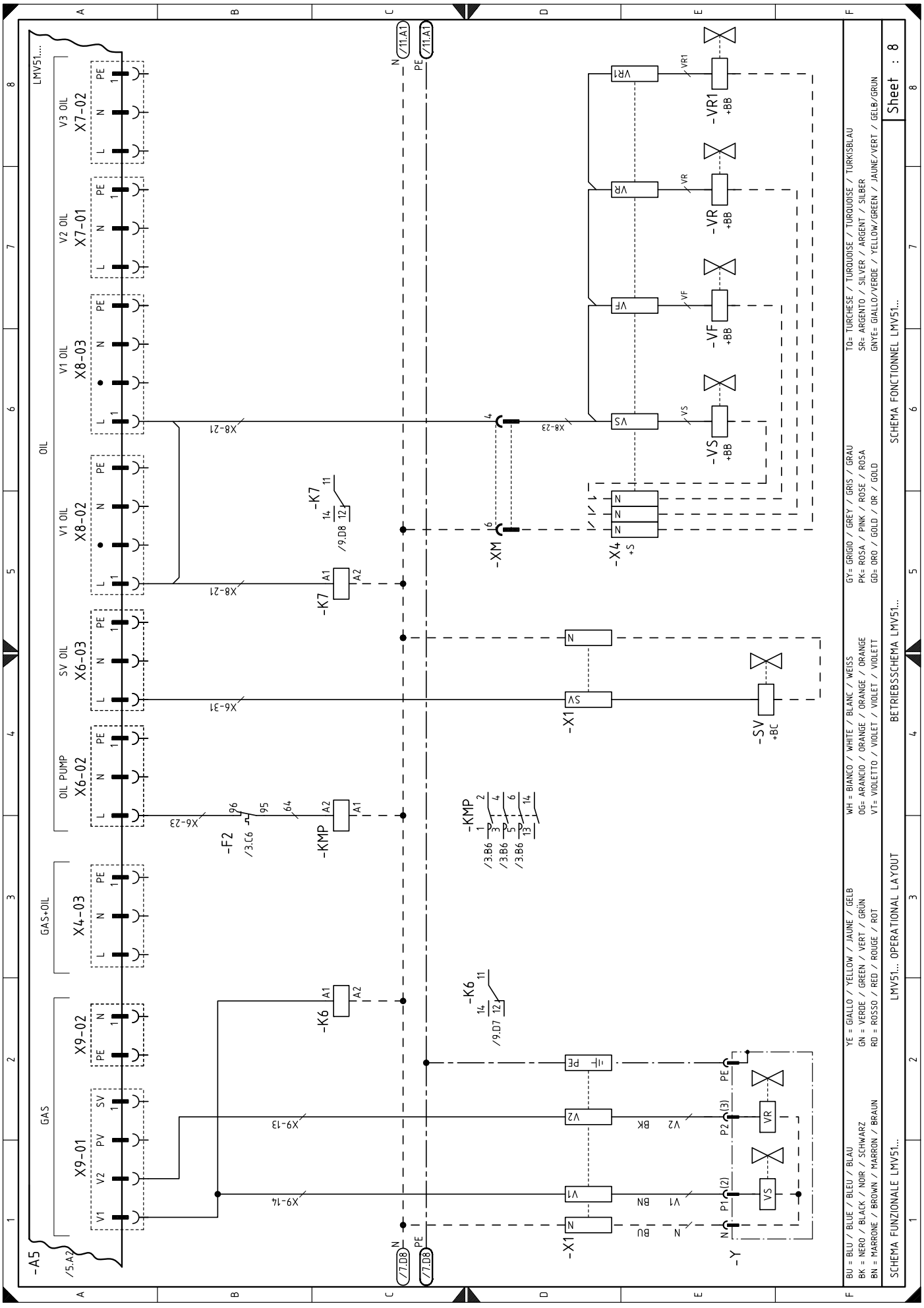
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN


LMV51....
OIL
GAS
GAS+OIL
OIL PUMP
SV OIL
V1 OIL
V2 OIL
V3 OIL
X9-01
X9-02
X4-03
X6-02
X6-03
X8-02
X8-03
X7-01
X7-02
-A5
/5.A2
-K6
-K7
-KMP
-F2
-XM
-X4
-X1
-SV
-VS
-VR
-VR1
-VF
-Y
/11.A1
/7.D8
/9.D8
/9.D7
/3.C6
/3.B6
SCHEMA FUNZIONALE LMV51...
LMV51... OPERATIONAL LAYOUT
BETRIEBSSCHEMA LMV51...
SCHEMA FONCTIONNEL LMV51...
Sheet : 8
BU = BLU / BLUE / BLEU / BLAU
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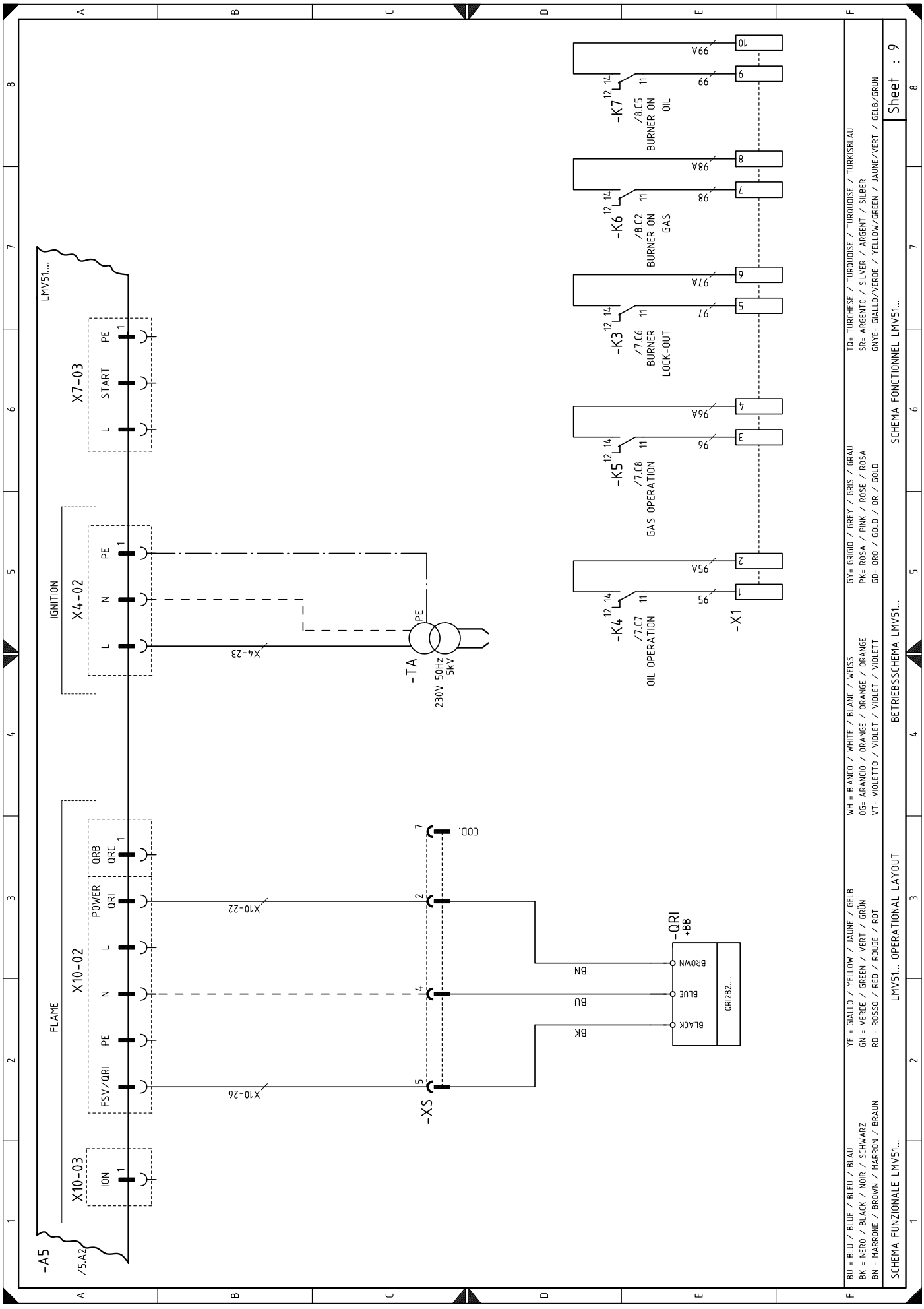
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN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-A5
/5.A2
X7-03
L START PE
X4-02
L N PE
IGNITION
X10-02
FSV/QRI PE N L POWER QRI QRB QRC
X10-03
ION
FLAME
X4-23
X10-22
X10-26
-TA
230V 50Hz 5KV
PE
-XS
COD.
-QRI
+BB
BROWN
BLUE
BLACK
QRI2B2....
BN
BU
BK
-K7 /8.C5 BURNER ON OIL
-K6 /8.C2 BURNER ON GAS
-K3 /7.C6 BURNER LOCK-OUT
-K5 /7.C8 GAS OPERATION
-K4 /7.C7 OIL OPERATION
-X1
99A
99
98A
98
97A
97
96A
96
95A
95
BU = BLU / BLUE / BLAU
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VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
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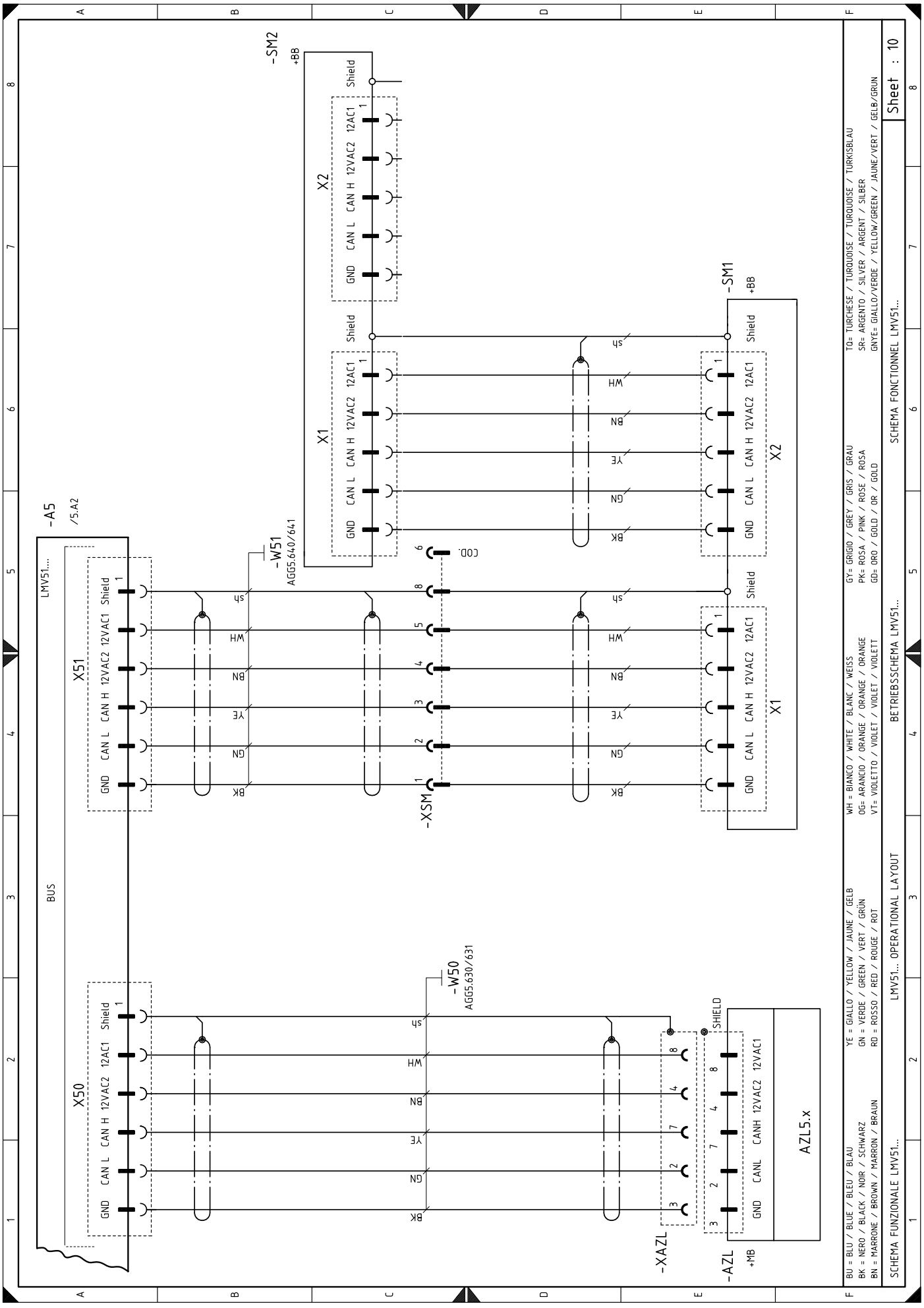
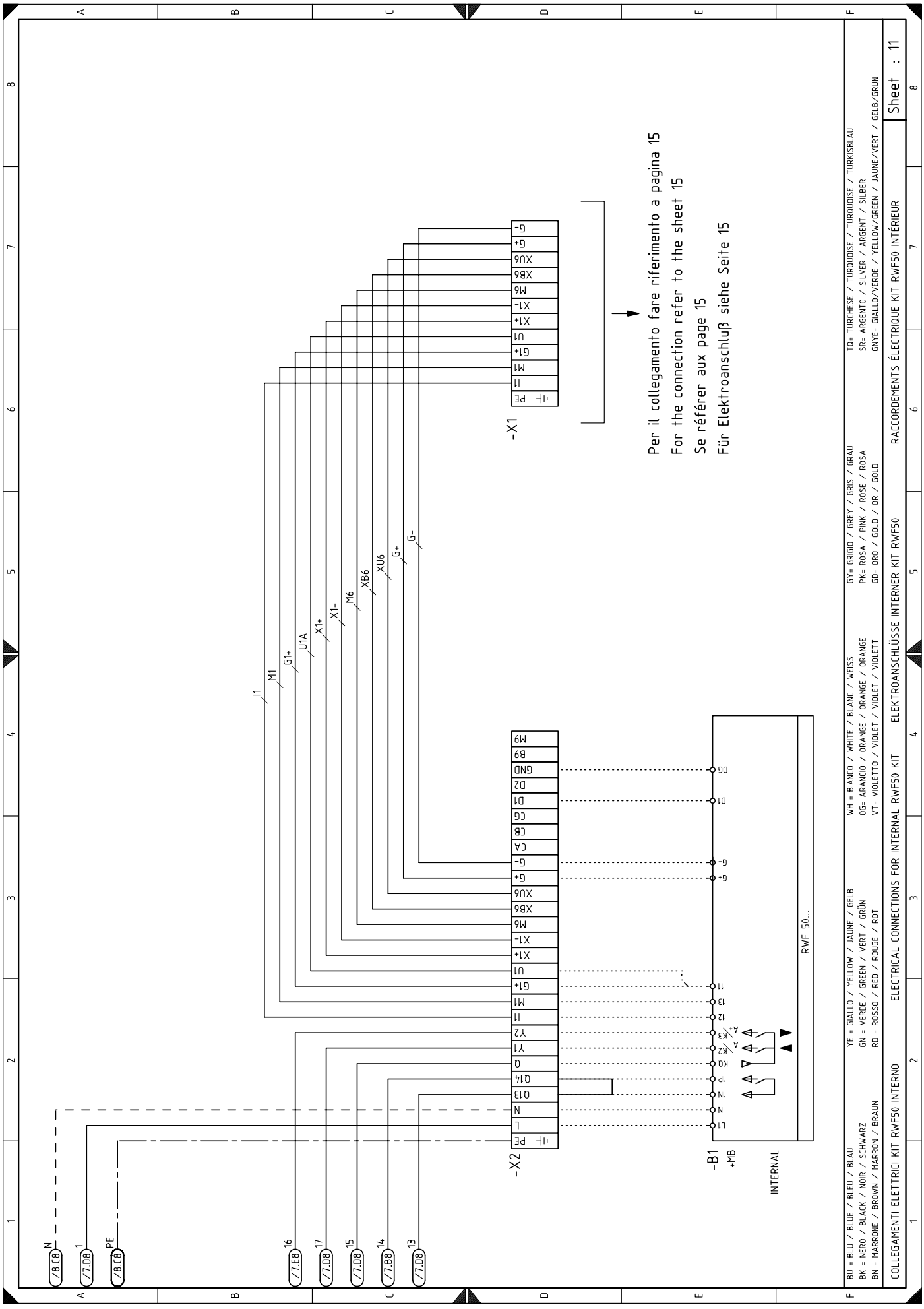
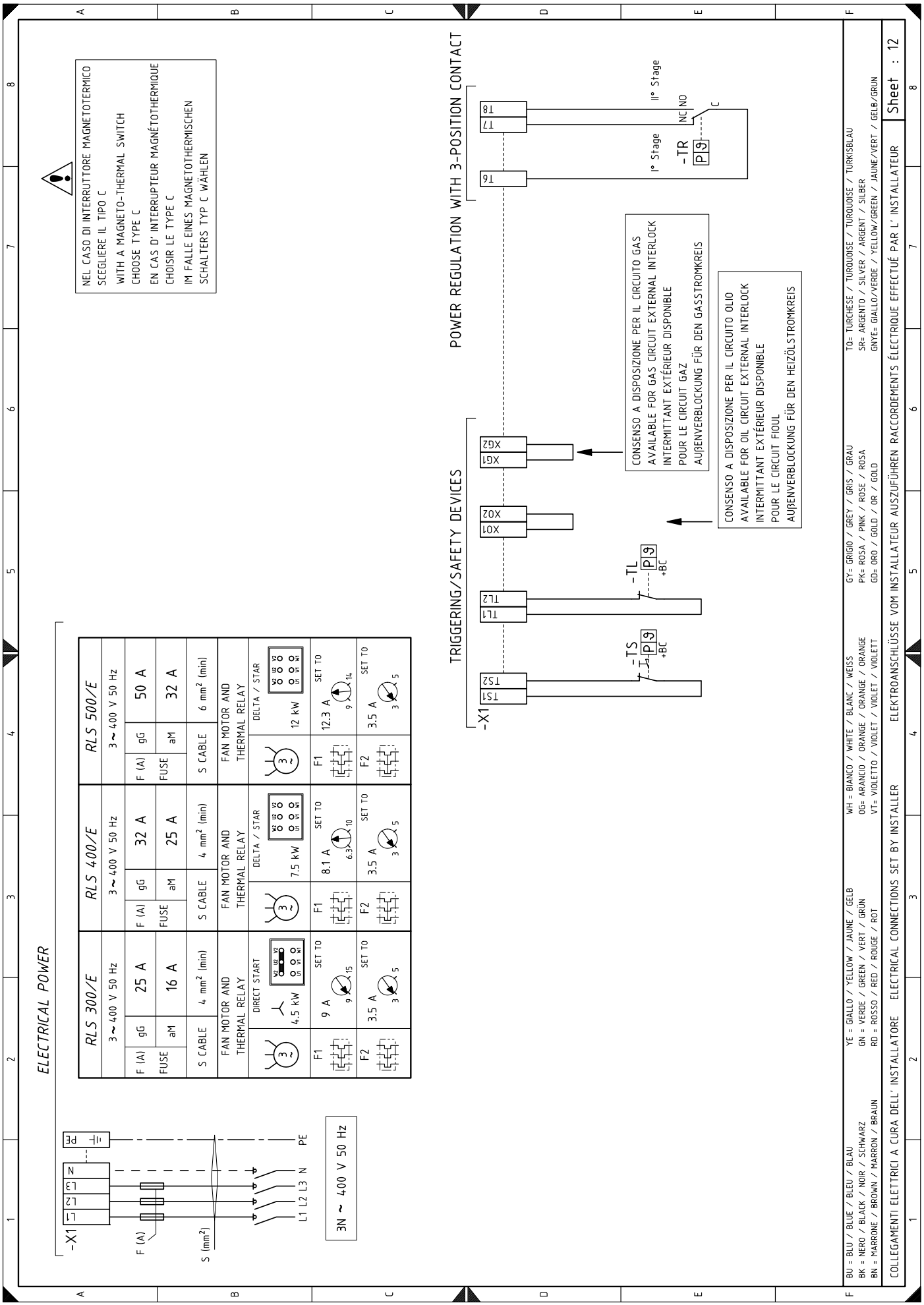
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
SCHEMA FUNZIONALE LMV51...
LMV51... OPERATIONAL LAYOUT
BETRIEBSSCHEMA LMV51...
SCHEMA FONCTIONNEL LMV51...
Sheet : 9


-SM2
+BB
X2
GND CAN L CAN H 12VAC2 12AC1
Shield
X1
-W51
AGG5.640/641
-SM1
+BB
X2
X1
-A5
/5.A2
LMV51....
X51
BUS
-XSM
-W50
AGG5.630/631
X50
-XAZL
-AZL
+MB
SHIELD
GND CANL CANH 12VAC1
AZL5.x
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
GO= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
SCHEMA FUNZIONALE LMV51...
LMV51... OPERATIONAL LAYOUT
BETRIEBSSCHEMA LMV51...
SCHEMA FONCTIONNEL LMV51...
Sheet : 10


Per il collegamento fare riferimento a pagina 15
For the connection refer to the sheet 15
Se référer aux page 15
Für Elektroanschluß siehe Seite 15
-X1
-X2
-B1
+MB
INTERNAL
RWF 50...
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 KIT RWF50 INTERNO
ELECTRICAL CONNECTIONS FOR INTERNAL RWF50 KIT
ELEKTROANSCHLÜSSE INTERNER KIT RWF50
RACCORDEMENTS ÉLECTRIQUE KIT RWF50 INTÉRIEUR
Sheet : 11


ELECTRICAL POWER
RLS 300/E
3 ~ 400 V 50 Hz
F (A) gG 25 A
FUSE aM 16 A
S CABLE 4 mm² (min)
FAN MOTOR AND THERMAL RELAY
DIRECT START
4.5 kW
F1 9 A SET TO 15
F2 3.5 A SET TO 5
RLS 400/E
3 ~ 400 V 50 Hz
F (A) gG 32 A
FUSE aM 25 A
S CABLE 4 mm² (min)
FAN MOTOR AND THERMAL RELAY
DELTA / STAR
7.5 kW
F1 8.1 A SET TO 6.3 10
F2 3.5 A SET TO 3 5
RLS 500/E
3 ~ 400 V 50 Hz
F (A) gG 50 A
FUSE aM 32 A
S CABLE 6 mm² (min)
FAN MOTOR AND THERMAL RELAY
DELTA / STAR
12 kW
F1 12.3 A SET TO 9 14
F2 3.5 A SET TO 3 5
-X1
L1 L2 L3 N PE
F (A)
S (mm²)
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
POWER REGULATION WITH 3-POSITION CONTACT
-X1
T1 T2 T3 T4 T5 T6 T7 T8
-TS
-TL
-TR
I° Stage
II° Stage
NC NO
CONSENSO A DISPOSIZIONE PER IL CIRCUITO GAS
AVAILABLE FOR GAS CIRCUIT EXTERNAL INTERLOCK
INTERMITTANT EXTÉRIEUR DISPONIBLE
POUR LE CIRCUIT GAZ
AUßENVERBLOCKUNG FÜR DEN GASSTROMKREIS
CONSENSO A DISPOSIZIONE PER IL CIRCUITO OLIO
AVAILABLE FOR OIL CIRCUIT EXTERNAL INTERLOCK
INTERMITTANT EXTÉRIEUR DISPONIBLE
POUR LE CIRCUIT FIOUL
AUßENVERBLOCKUNG FÜR DEN HEIZÖLSTROMKREIS
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
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SR= ARGENTO / SILVER / ARGENT / SILBER
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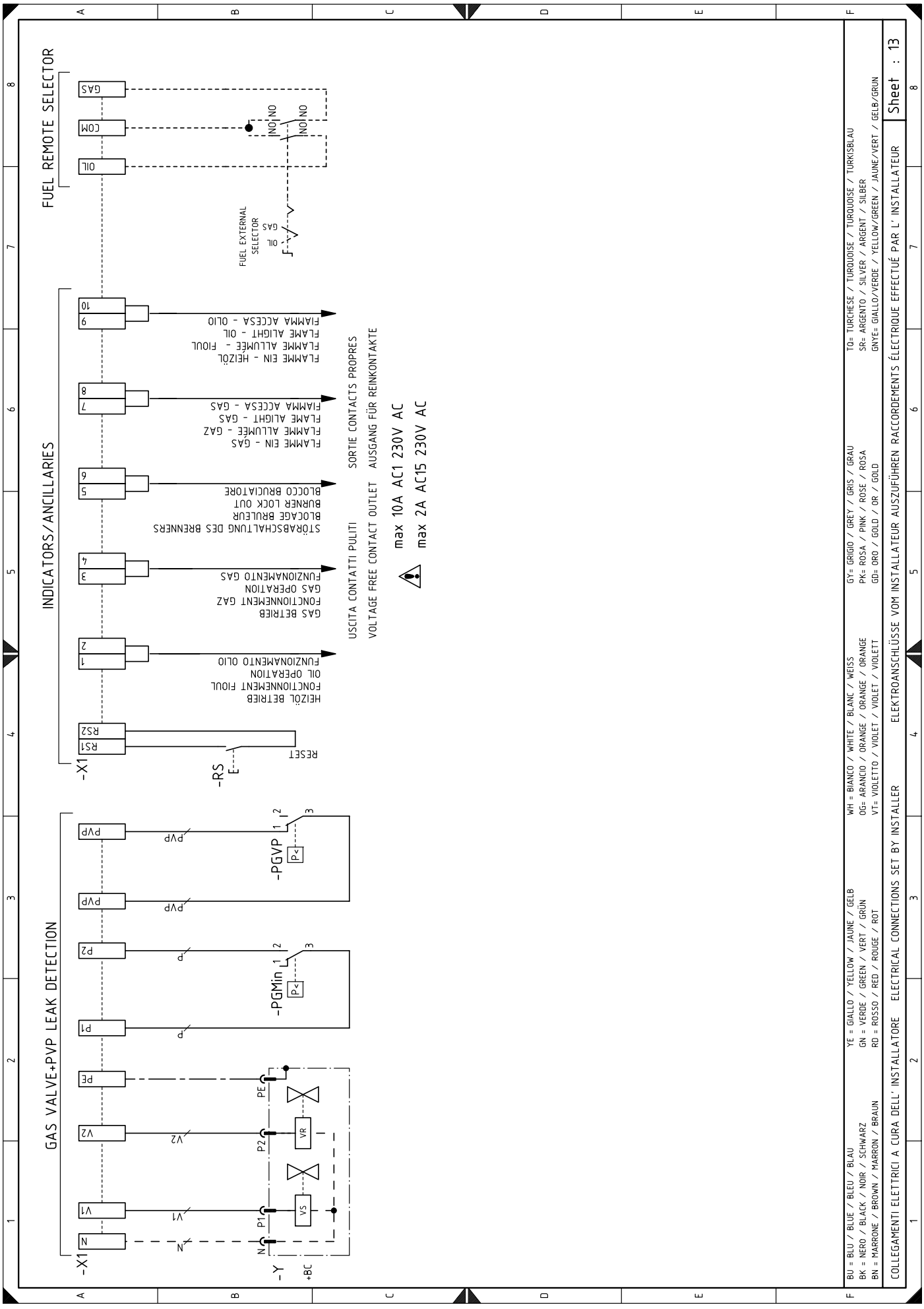
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE ELECTRICAL CONNECTIONS SET BY INSTALLER ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 12


FUEL REMOTE SELECTOR
GAS
COM
OIL
NO
NO
FUEL EXTERNAL SELECTOR
GAS
OIL
INDICATORS/ANCILLARIES
-X1
10
9
8
7
6
5
4
3
2
1
RS1
RS2
-RS
RESET
FLAMME EIN - HEIZÖL
FLAMME ALLUMÉE - FIOUL
FLAME ALIGHT - OIL
FIAMMA ACCESA - OLIO
FLAMME EIN - GAS
FLAMME ALLUMÉE - GAZ
FLAME ALIGHT - GAS
FIAMMA ACCESA - GAS
STÖRABSCHALTUNG DES BRENNERS
BLOCAGE BRULEUR
BURNER LOCK OUT
BLOCCO BRUCIATORE
GAS BETRIEB
FONCTIONNEMENT GAZ
GAS OPERATION
FUNZIONAMENTO GAS
HEIZÖL BETRIEB
FONCTIONNEMENT FIOUL
OIL OPERATION
FUNZIONAMENTO OLIO
USCITA CONTATTI PULITI
VOLTAGE FREE CONTACT OUTLET
SORTIE CONTACTS PROPRES
AUSGANG FÜR REINKONTAKTE
max 10A AC1 230V AC
max 2A AC15 230V AC
GAS VALVE+PVP LEAK DETECTION
-X1
N
V1
P2
PE
P1
PVP
-PGVP
-PGMin
P<
VS
VR
-Y
+BC
BU = BLU / BLUE / BLEU / BLAU
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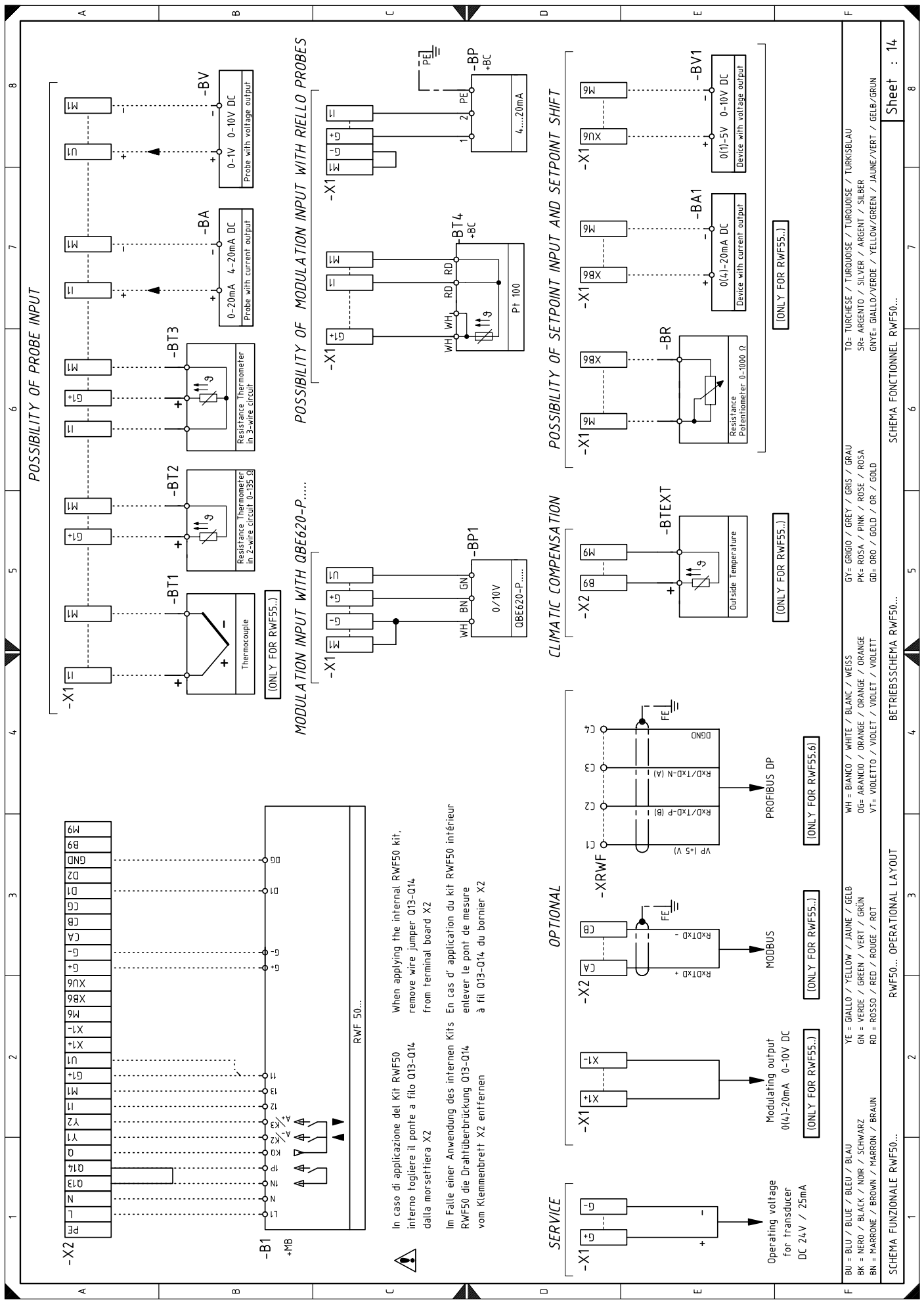
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE ELECTRICAL CONNECTIONS SET BY INSTALLER ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 13


POSSIBILITY OF PROBE INPUT
-BV
0-1V 0-10V DC
Probe with voltage output
-BA
0-20mA 4-20mA DC
Probe with current output
-BT3
Resistance Thermometer in 3-wire circuit
-BT2
Resistance Thermometer in 2-wire circuit 0-135 Ω
-BT1
Thermocouple
(ONLY FOR RWF55..)
-X1
POSSIBILITY OF MODULATION INPUT WITH RIELLO PROBES
-BP
4....20mA
-BT4
Pt 100
MODULATION INPUT WITH QBE620-P.....
-BP1
0/10V
QBE620-P.....
POSSIBILITY OF SETPOINT INPUT AND SETPOINT SHIFT
-BV1
0(1)-5V 0-10V DC
Device with voltage output
-BA1
0(4)-20mA DC
Device with current output
-BR
Resistance Potentiometer 0-1000 Ω
CLIMATIC COMPENSATION
-BTEXT
Outside Temperature
-X2
-X1
OPTIONAL
-XRWF
PROFIBUS DP
MODBUS
SERVICE
Operating voltage for transducer DC 24 V / 25mA
Modulating output 0(4)-20mA 0-10V DC
(ONLY FOR RWF55..)
(ONLY FOR RWF55.6)
RWF 50...
-B1
+MB
-X2
In caso di applicazione del Kit RWF50 interno togliere il ponte a filo Q13-Q14 dalla morsettiera X2
When applying the internal RWF50 kit, remove wire jumper Q13-Q14 from terminal board X2
Im Falle einer Anwendung des internen Kits RWF50 die Drahtüberbrückung Q13-Q14 vom Klemmenbrett X2 entfernen
En cas d' application du kit RWF50 intérieur enlever le pont de mesure à fil Q13-Q14 du bornier X2
BU = BLU / BLUE / BLEU / BLAU
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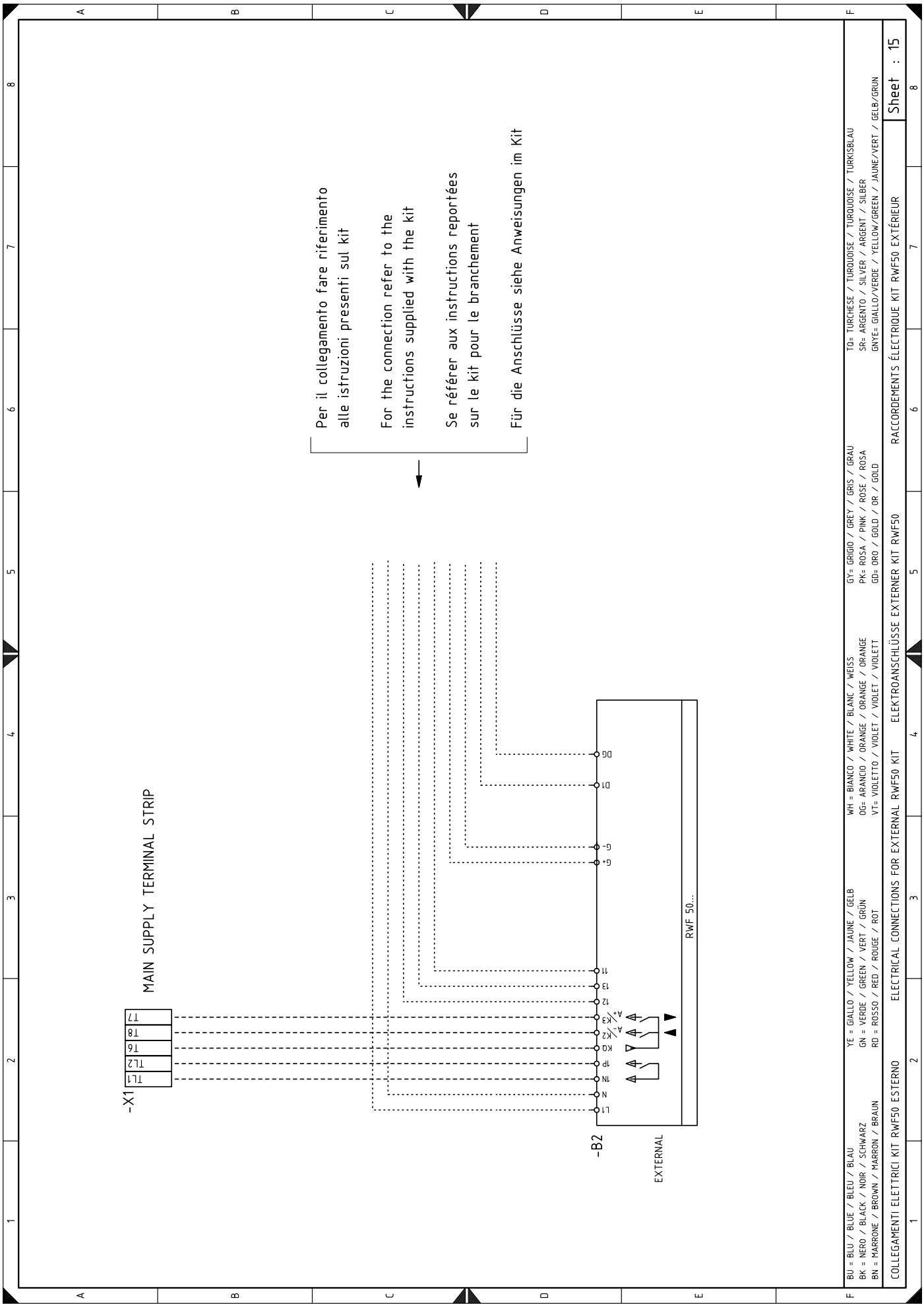
SCHEMA FUNZIONALE RWF50...
RWF50... OPERATIONAL LAYOUT
BETRIEBSSCHEMA RWF50...
SCHEMA FONCTIONNEL RWF50...
Sheet : 14


Per il collegamento fare riferimento
alle istruzioni presenti sul kit
For the connection refer to the
instructions supplied with the kit
Se référer aux instructions reportées
sur le kit pour le branchement
Für die Anschlüsse siehe Anweisungen im Kit
MAIN SUPPLY TERMINAL STRIP
-X1
T1
T2
T6
T8
T7
-B2
EXTERNAL
RWF 50...
L1
N
1N
1P
K0
A-/K2
A+/K3
12
13
11
G+
G-
D1
DG
BU = BLU / BLUE / BLEU / BLAU
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COLLEGAMENTI ELETTRICI KIT RWF50 ESTERNO
ELECTRICAL CONNECTIONS FOR EXTERNAL RWF50 KIT
ELEKTROANSCHLÜSSE EXTERNER KIT RWF50
RACCORDEMENTS ÉLECTRIQUE KIT RWF50 EXTÉRIEUR
Sheet : 15

Key to electrical layout

A5	Display and operating unit
AZL	Internal output power regulator RWF50
B1	External output power regulator RWF50
B2	Probe with current output
BA	Device with current output for editing remote setpoint
BA1	Pressure probe
BP	Pressure probe
BP1	Remote setpoint voltage divider
BR	Thermocouple probe
BT1	Probe Pt100 with 2 wires
BT2	Probe Pt100 with 3 wires
BT3	Probe Pt100 with 3 wires
BT4	External probe for the climatic compensation of the setpoint
BTEXT	Probe with voltage output
BV	Device with voltage output for editing remote setpoint
BV1	Fan motor thermal cut-out
F1	Pump motor thermal cut-out
F2	Auxiliary fuse
F3	Signal light for power on
H1	Signal light for fan and pump motors trip
H2	Direct start and star/delta starter line contactor (RLS 300)
KL1	Pump motor contactor
KMP	Star-powered/delta-powered starter /delta contactor
KT1	Star-powered/delta-powered starter /star-powered contactor
KS1	Relay
KST1	Star-powered/delta -powered starter timer
K3	Burner lock-out voltage free contact relay
K4	Light oil operation voltage free contact relay
K5	Gas operation voltage free contact relay
K6	Gas-fuelled burner ON clean contacts output relay
K7	Light-oil-fuelled burner ON clean contacts output relay
MP	Pump motor
MV	Fan motor
PA	Air pressure switch
PE	Burner ground
PGMax	Maximum gas pressure switch
PGMin	Minimum gas pressure switch
PGVP	Gas pressure switch for leak detection control device
PO	Oil pressure switch
PO1	High-limit oil pressure switch on return line
QRI	Infrared sensor
RS	Remote lock-out reset button
S1	Emergency stop push-button
S2	Switch for following operations: off-automatic-manual
S4	Button for: power increase/reduction
S5	Fuel selector and remote fuel selector enabling
SH3	Burner reset button and lockout warning
SM1	Air servomotor
SM2	Gas servomotor
T1	Electronic cam transformer
TA	Ignition transformer
TL	Limit pressure switch/thermostat
TR	Control pressure switch/thermostat
TS	Safety pressure switch/thermostat
Y	Gas adjustment valve + gas safety valve
X1	Main supply terminal strip
X2	RWF50 terminal strip
X4	Light oil assembly terminal block
XAUX	Auxiliary terminal strip
XAZL	Plug for on-board AZL
XM	Light oil assembly connector
XPGM	Maximum gas pressure switch connection plug
XPGM1	Maximum gas pressure switch connector
XS	Flame detectors connector
XSM	Air and gas servomotors connector
VF	Light oil operation valve
VR	Light oil return valve
VR1	Light oil return valve
VS	Light oil safety valve
+BB	Burner components
+BC	Boiler components
XRWF	Output power regulator RWF50 terminal strip
SV	Main safety valve

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