

Dual fuel light oil/gas burner

Two-stage progressive or modulating operation



RLS

CODE	MODEL	TYPE
20079485	RLS 500/EV C11 TC FS1	79485X



Original instructions

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1 Declarations

Declaration of conformity in accordance with ISO / IEC 17050-1

Manufacturer:	RIELLO S.p.A.	
Address:	Via Pilade Riello, 7 37045 Legnago (VR)	
Product:	Dual fuel light oil/gas burner	
Model:	RLS 500/EV C11 TC FS1	
These products are in compliance with the following Technical Standards:		
EN 676		
EN 267		
EN 12100		
and according to the European Directives:		
MD	2006/42/EC	Machine Directive
LVD	2006/95/EC	Low Voltage Directive
EMC	2004/108/EC	Electromagnetic Compatibility

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

Legnago, 10.10.2013

Executive Director
RIELLO S.p.A. - Burner Department
Mr. G. Conticini



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



2 Information and general warnings

2.1 Information about the instruction manual

2.1.1 Introduction

The instruction manual supplied with the burner:

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

Symbols used in the manual

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

2.1.2 General dangers

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



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



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



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

2.1.3 Other symbols



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



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



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



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



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



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



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



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



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



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

- This symbol indicates a list.

Abbreviations used

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

2.1.4 Delivery of the system and the instruction manual

When the system is delivered, it is important that:

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

.....

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

.....

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

2.2 Guarantee and responsibility

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



WARNING

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

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

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

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

3 Safety and prevention

3.1 Introduction

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

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

It is a good idea to remember the following:

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

In particular:

it can be applied to boilers operating with water, steam, diathermic oil, and to other 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.



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

3.2 Personnel training

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

The user:

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

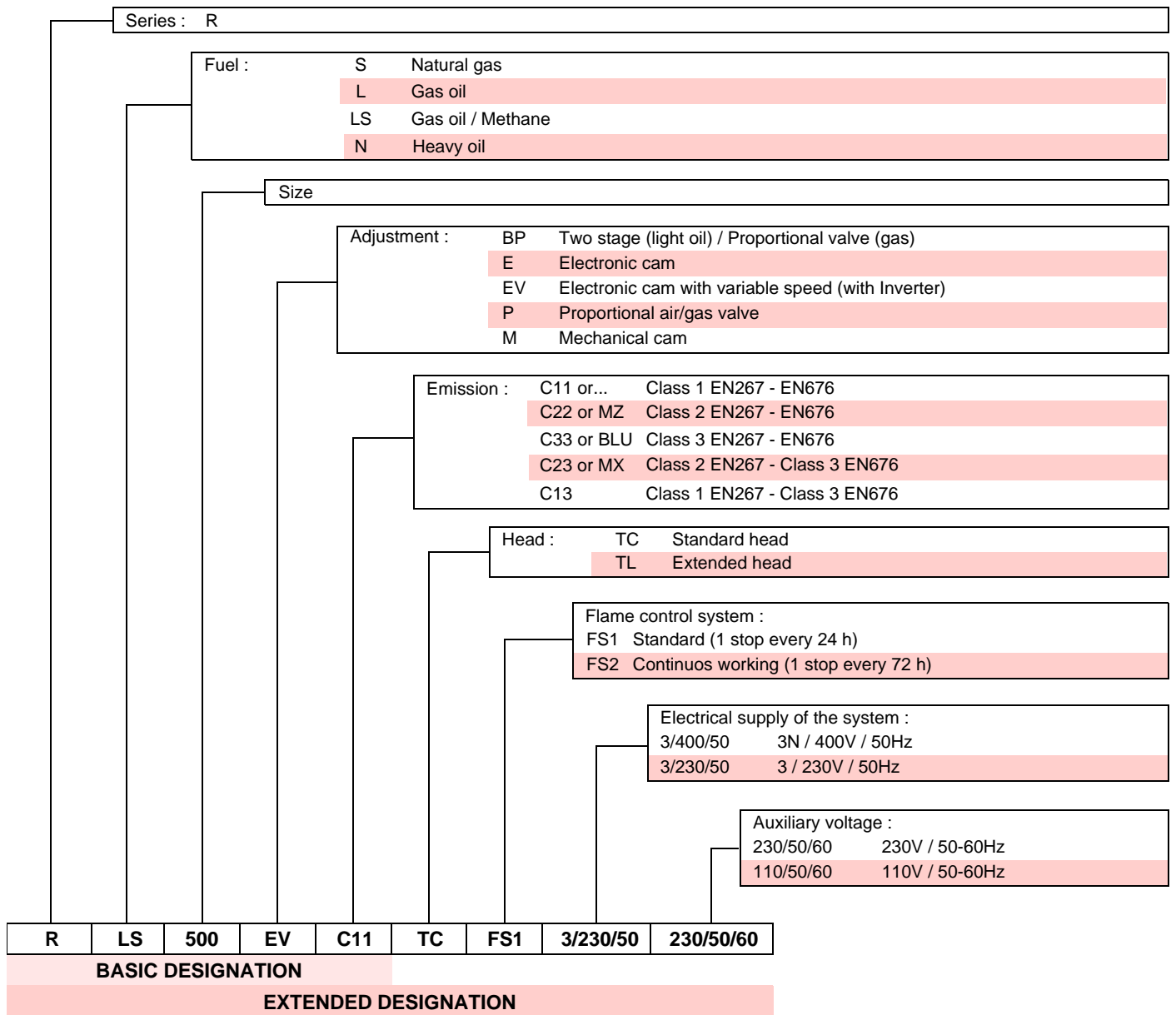
In addition:



- the user must take all the measures necessary to prevent unauthorised people gaining access to the machine;
- the user must inform the manufacturer if faults or malfunctioning of the accident prevention systems are noticed, along with any presumed danger situation.
- personnel must always use the personal protective equipment envisaged by legislation and follow the indications given in this manual.

4 Technical description of the burner

4.1 Burner designation



4.2 Models available

Designation	Voltage	Start-up	Code
RLS 500/EV C11 TC FS1	3/230/50	Inverter	20079485

Tab. A

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 ₂ H
DE	I ₂ ELL
NL	I ₂ L
FR	I ₂ Er
BE	I ₂ E(R)B
LU - PL	I ₂ E

Tab. B
4.4 Technical data

Model		RLS 500/EV C11 TC FS1	
Output ⁽¹⁾	min - max	kW	1120/2500 - 5050
Delivery ⁽¹⁾		kg/h	95/211 - 425
Fuel		Light oil, max. viscosity at 20 °C: 6 mm ² /s (1.5 °E - 6 cSt) Natural gas: G20 (methane gas) - G21 - G22 - G23 - G25	
Gas pressure at max. output ⁽²⁾ - Gas: G20/G31		mbar	55.6/31.6
Operation		Continuous / Intermittent (min. 1 stop in 24 hours) Progressive two-stage or modulating by kit (see accessoires)	
Pump	delivery at 16.5 pressure range fuel temperatur	kg/h bar °C max	560 7 - 30 140
Nozzles		number	1
Standard applications		Boilers: water. steam. diathermic oil	
Ambient temperature		°C	0 - 40
Combustion air temperature		°C max	60
Noise levels ⁽³⁾	Sound pressure	dB(A)	84.5
	Sound power		95.5
Weight		kg	280

Tab. C

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

⁽²⁾ Pressure at the test point of the pressure switch 5)(Fig. 4) with zero pressure in the combustion chamber and at maximum burner output.

⁽³⁾ Sound pressure measured in manufacturer's combustion laboratory, with burner operating on test boiler and at maximum rated output. The sound power is evaluated, in line with the regulations, on a spherical surface centred on the burner and with a radius of 1 metre.

4.5 Electrical data

Model		RLS 500/EV C11 TC FS1	
Main electrical supply		3 ~ 230V +/-10% 50 Hz	
Control circuit power supply		1N ~ 230V 50 Hz	
Fan motor	rpm	2920	
	V	230/400	
	kW	12	
	A	29.3/16.9	
Pump motor	rpm	2850	
	V	220/380	
	kW	1.5	
	A	5.9/3.4	
Ignition transformer	V1 - V2	230 V - 2 x 5 kV	
	I1 - I2	1.9 A - 35 mA	
Electrical power consumption	light oil	kW max	15
	gas		13
Protection level		IP 54	

Tab. D

4.6 Maximum dimensions

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

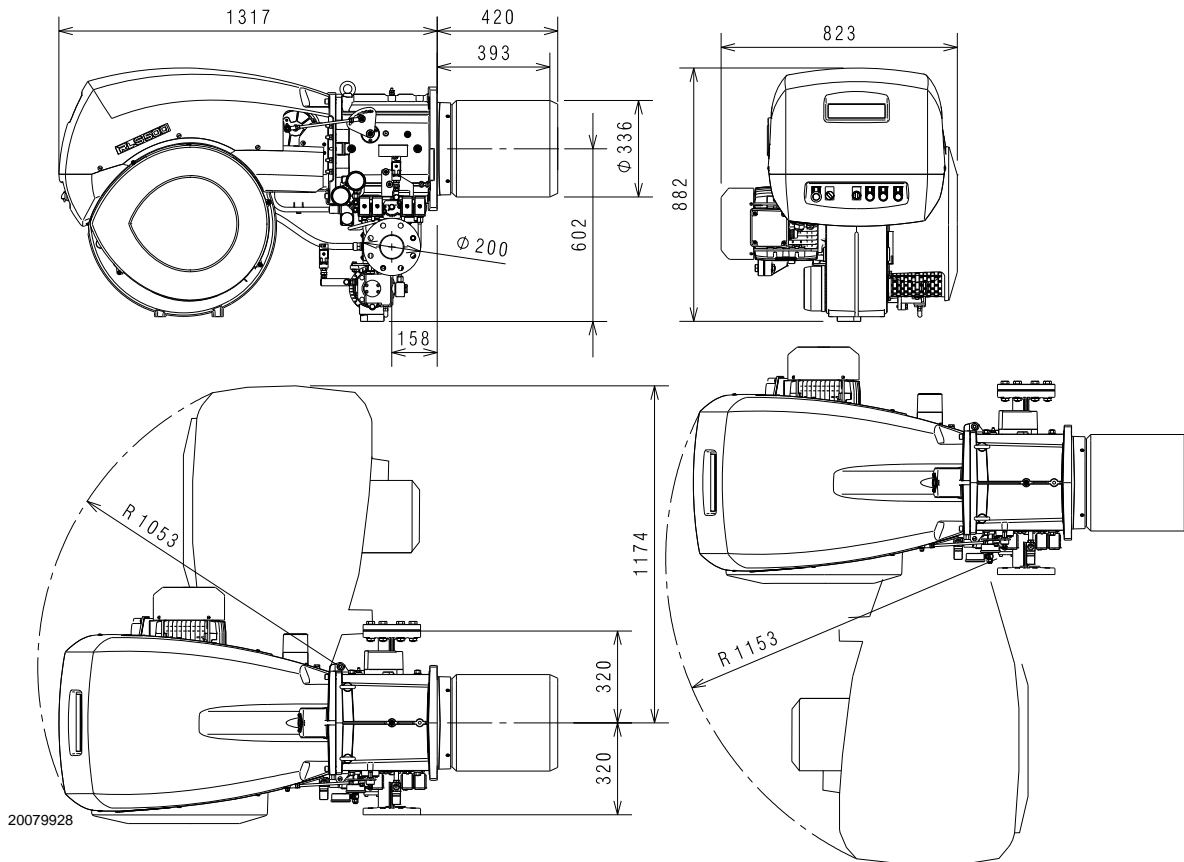


Fig. 1

4.7 Firing rate

The **maximum output** is chosen from within the continuous diagram area (Fig. 2).

The **minimum output** must not be lower than the minimum limit of the diagram: RLS 500/EV C11 TC FS1 = 1120 kW



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

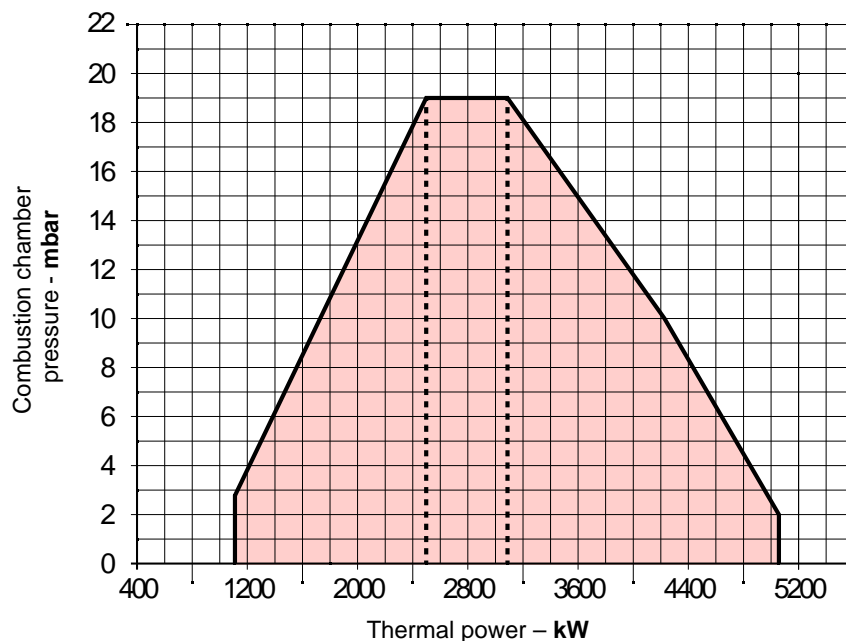


Fig. 2

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:

Output 3000 kW: diameter 100 cm - length 4 m.

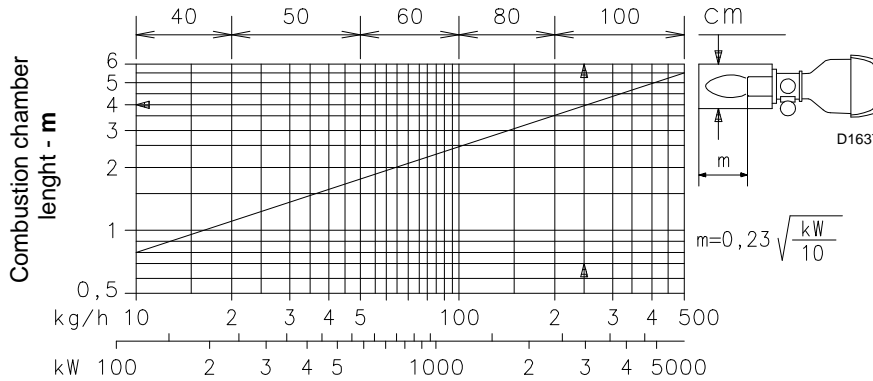


Fig. 3

4.9 Burner equipment

- Flange gasket. No. 1
- Flange fixing screws M16x50. No. 8
- Thermal insulation screen No. 1
- Screws M18x70 to secure the burner flange to the boiler . No. 4
- Spacers No. 2
- Pressure switch (for leak detection control) No. 1
- Technical instructions. No. 1
- Spare parts list. No. 1

4.10 Burner description

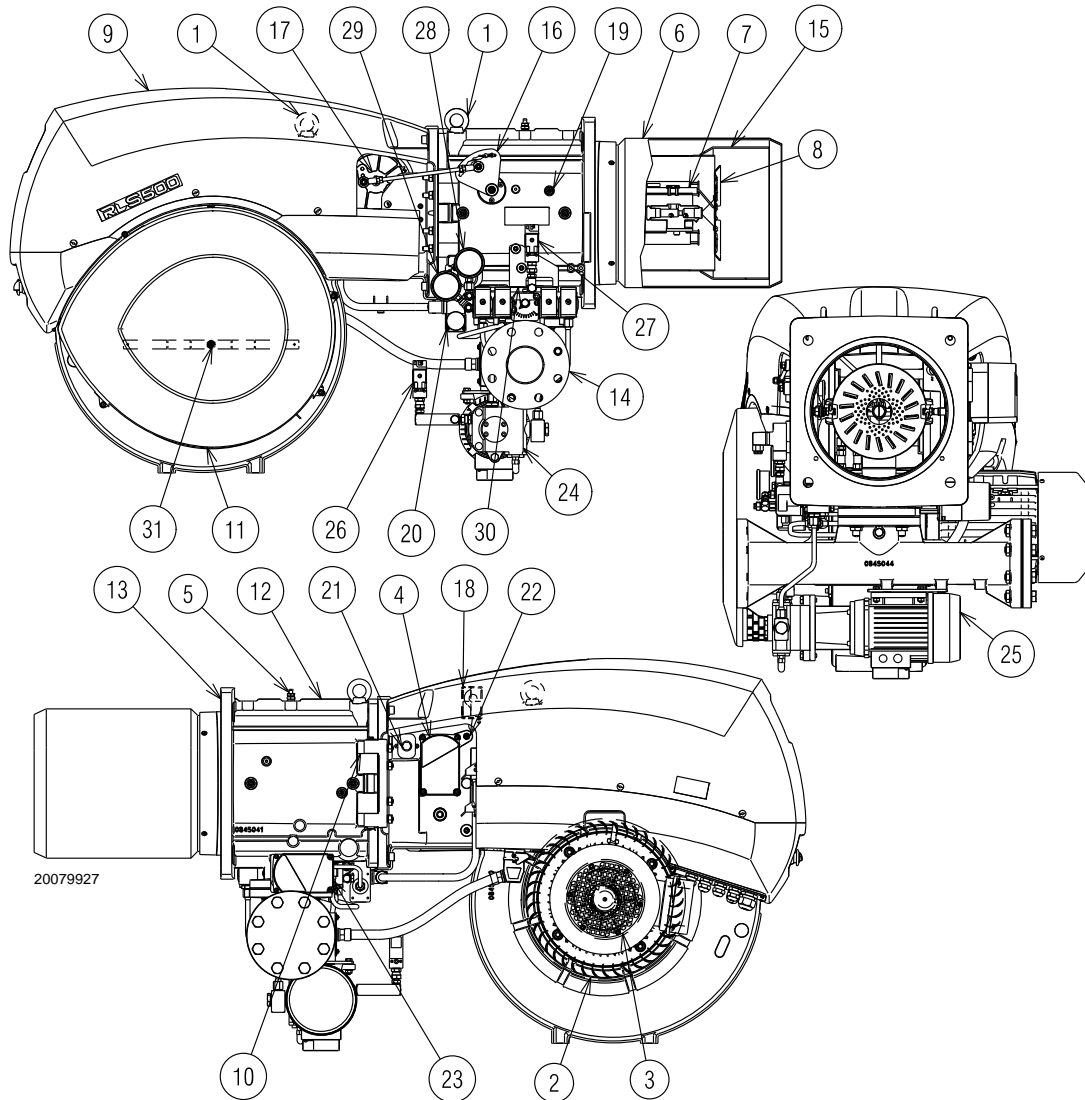


Fig. 4

- | | |
|--|-----------------------------------|
| 1 Lifting rings | 27 Maximum oil pressure switch |
| 2 Fan | 28 Nozzle return pressure gauge |
| 3 Fan motor | 29 Nozzle delivery pressure gauge |
| 4 Air damper servomotor | 30 Oil modulator |
| 5 Gas pressure test point | 31 RPM sensor |
| 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 servomotor | |
| 24 Pump | |
| 25 Pump motor | |
| 26 Minimum oil pressure switch | |



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.

4.11 Electrical panel description

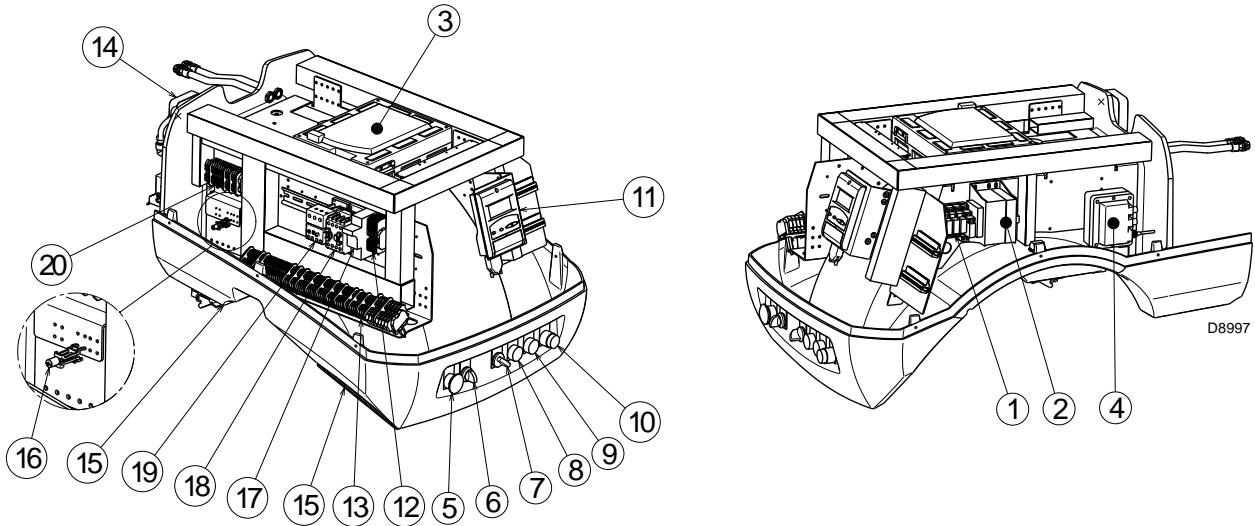


Fig. 5

- 1 Outlet relay
- 2 Electronic cam transformer
- 3 Electronic cam setting device
- 4 Ignition transformer
- 5 Stop push-button
- 6 Dial for off - automatic
- 7 Fuel selector and remote fuel selector enabling
- 8 Signal light for power on
- 9 Signal light for fan motor and pump motor trip
- 10 Signal light for burner failure and lock-out reset button
- 11 AZL display
- 12 Auxiliary terminal strip
- 13 Main supply terminal strip and Inverter Kit
- 14 Air pressure switch
- 15 Entry for power cables, external leads and kit
- 16 Terminal for shielded cables: **warning** used only to avoid a break in the cable's shielding, hence do not overtighten
- 17 Fuse carrier
- 18 Pump motor contact maker
- 19 Pump motor thermal relay
- 20 Terminal board for shielded cables

NOTE

Two types of burner failure may occur:

- **Control box lockout:**
if the control box pushbutton (**red led**) 10)(Fig. 5) lights up, it indicates that the burner is in lockout. release by pressing the pushbutton 10)(Fig. 5).
- **Motors lockout:**
see the Inverter manual.

4.12 Control box for the air/fuel ratio (LMV52...)

Warnings



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

The control box is a safety device! Avoid opening or modifying it, or forcing its operation. Riello S.p.A. cannot assume any responsibility for damage resulting from unauthorised interventions!

Risk of explosion!

An incorrect configuration can provoke fuel over-charging, with the consequential risk of 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 interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- Before modifying the wiring in the control box connection area, fully disconnect the system from the power supply (omnipolar separation). Check the system is not powered and cannot be accidentally reconnected. Failure to do this will lead to the risk of electrocution.
- Protection against electrocution from the control box and all connected electric components is obtained with correct assembly.
- Before any intervention (assembly and installation operations, assistance, etc.), ensure the wiring is in order and that the parameters are correctly set, then make the safety checks.
- Falls and collisions can negatively affect the safety functions.

In this case, the control box must not be operated, even if it displays no evident damage.

- In programming mode, the position check of actuators and VSD (checking electronic fuel / air ratio control) is different from the check during automatic operation.

As for automatic operation, the actuators are guided together to the positions requested and, if an actuator does not reach the position requested, adjustments are made until the position is actually 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 absolutely important to set the fuel / air ratio control system.

During the time the fuel / air ratio curves are being 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 control box, the following instructions must also be followed:

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



D9301

Fig. 6

Mechanical structure

The LMV5... control box is a system to check the burners, based on a microprocessor and equipped with components to adjust and monitor medium and large capacity forced draught burners.

The base control box incorporates the following components:

- Burner control with gas valve proving system
- Electronic fuel / air ratio control with a maximum of 6 actuators
- Optional PID temperature / pressure controller (load controller)
- Optional VSD module

Installation notes

- Check the electric wiring inside the boiler complies with the national and local safety regulations.
- Do not confuse the powered conductors with the neutral ones.
- 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.
- Arrange the HV ignition cables separately, as far as possible from the control box and the other cables.
- The burner manufacturer must protect unused AC 230 V terminals with plugs.
- When wiring the unit, make sure that AC 230 V mains voltage cables are run strictly separate from extra low-voltage cables to avoid risks of electrical shock hazard.

Electrical connection of ionization probe and flame detector

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

- always separate the detector cables from the other cables:
 - Line capacitance reduces the magnitude of the flame signal.
 - Use a separate cable.
- Respect the allowed cable lengths.

- The ionisation probe is not protected against the risk of electrocution. When connected to the electricity supply, the ionisation probe must be protected against any accidental contact.
- Position the ignition electrode and the ionisation probe so that the ignition spark cannot form an arc on the probe (risk of electric overcharge).

Technical data

Control box	Mains voltage	AC 230 V -15% / +10%	
	Mains frequency	50 / 60 Hz ± 6 %	
	Power absorption	< 30W (normal)	
	Safety class	I, with components in compliance with II and III, according to DIN EN 60730-1	
Load on 'input' terminals	F1 unit fuse (internal)	6.3 AT	
	Main fuse of perm. network (external)	Max. 16 AT	
	Undervoltage <ul style="list-style-type: none"> • Safety switch-off from operating position to mains voltage • Restart when mains voltage picks up 	< AC 186 V > AC 188 V	
	Oil pump / magnetic clutch (nominal voltage) <ul style="list-style-type: none"> • Nominal current • Power factor 	2A $\cos\phi > 0.4$	
	Air pressure switch test valve (nominal voltage) <ul style="list-style-type: none"> • Nominal current • Power factor 	0.5A $\cos\phi > 0.4$	
Load on 'output' terminals	Total load on the contacts: <ul style="list-style-type: none"> • Mains voltage • Total unit input current (safety circuit) load on contacts due to: <ul style="list-style-type: none"> - 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) <ul style="list-style-type: none"> • Nominal current • Power factor 	1A $\cos\phi > 0.4$	
	Alarm output (nominal voltage) <ul style="list-style-type: none"> • Nominal current • Power factor 	1A $\cos\phi > 0.4$	
	Ignition transformer (nominal voltage) <ul style="list-style-type: none"> • Nominal current • Power factor 	2A $\cos\phi > 0.2$	
	Fuel gas valve (nominal voltage) <ul style="list-style-type: none"> • Nominal current • Power factor 	2A $\cos\phi > 0.4$	
	Fuel oil valve (nominal voltage) <ul style="list-style-type: none"> • Nominal current • Power factor 	1A $\cos\phi > 0.4$	
	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 Classe 3K3 Classe 3M3 -20...+60°C < 95% RH

Tab. E

4.13 Servomotor (SQM48.4....)

Warnings



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

Avoid opening, modifying or forcing the actuators.

- All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- Before modifying the wiring in the SQM4... system connection area, fully disconnect the burner control device from the power supply (omnipolar separation).
- To avoid the risk of electrocution, protect the connection terminals in a suitable manner and correctly fix the cover.
- Check the wiring is in order.
- Falls and collisions can negatively affect the safety functions. In this case, the unit must not be operated, even if it displays no evident damage.

Assembly notes

- Check the relevant national safety standards are respected.
- The connection between the actuator command shaft and the control element must be rigid, without any mechanical play.
- To avoid an excessive load on the bearings due to rigid hubs, the use of compensation clutches without any mechanical play is recommended (e.g. metal bellows-type clutches).

Installation notes

- Arrange the H.V. ignition cables separately, as far as possible from the control box and the other cables.
- To avoid the risk of electrocution, make sure that the 230V AC section of the SQM4... unit is fully separated from the functional low-voltage section.
- The static torque is reduced when the electrical supply of the actuator is switched off.
- The housing cover may only be removed for short periods of time for wiring or when making the addressing. In similar cases, make sure that dust or dirt does not penetrate inside the actuator.
- The actuator comprises a PCB 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.



During the maintenance or replacement of the actuators, be careful not to invert the connectors.



Fig. 7

Technical data

Operating voltage	AC 2 x 12 V via bus cable from the base 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
Rotation direction	- Anticlockwise (standard) - Clockwise (inverted rotation)
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	Classe 3K3
Mechanical conditions	Classe 3M3
Temperature range	-20...+60°C
Humidity	< 95% RH

Tab. F

5 Installation

5.1 Notes on safety for the installation

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



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



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



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

5.2 Handling

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



The handling operations for the burner can be highly dangerous if not carried out with the greatest attention: keep any unauthorised people at a distance; check the integrity and suitability of the available means of handling. Check also that the area in which you are working is empty and that there is an adequate escape area (i.e. a free, safe area to which you can quickly move if the burner should fall). When handling, keep the load at not more than 20-25 cm from the ground.



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



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

5.3 Preliminary checks

Checking the consignment



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



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

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 absorbed electrical power (F);
 - the types of gas used and the relative supply pressures (G);
 - the data of the burner's minimum and maximum output possibilities (H) (see Firing rate)
- Warning.** The burner output must be within the boiler's firing rate;
- the category of the appliance/countries of destination (I).

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

S9088

Fig. 8



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

5.4 Operating position



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



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

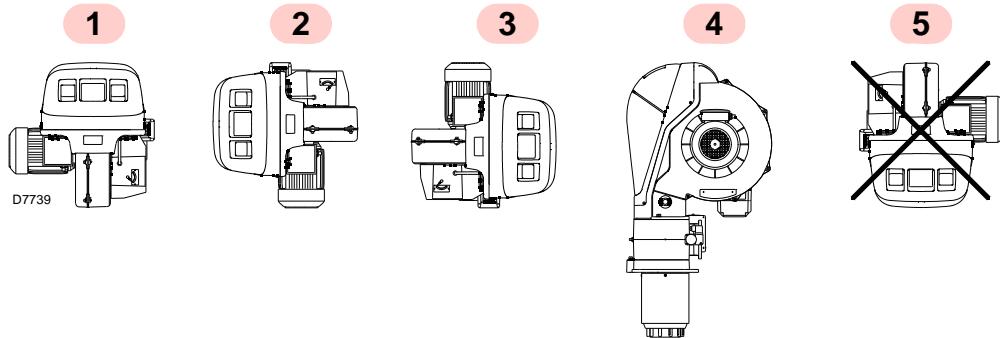


Fig. 9

5.5 Removal of the locking screws from the shutter

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

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

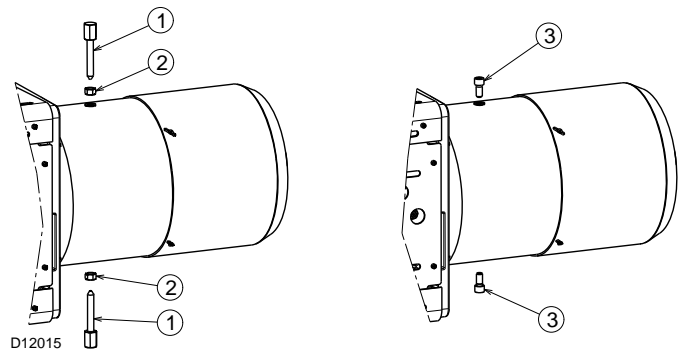


Fig. 10

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.

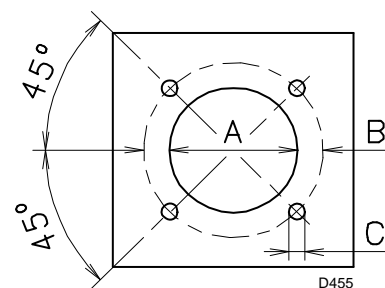


Fig. 11

mm	A	B	C
RLS 500/EV	350	452	M18

Tab. G

5.7 Securing the burner to the boiler



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



The coupling of the burner-boiler must be airtight.

- 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.

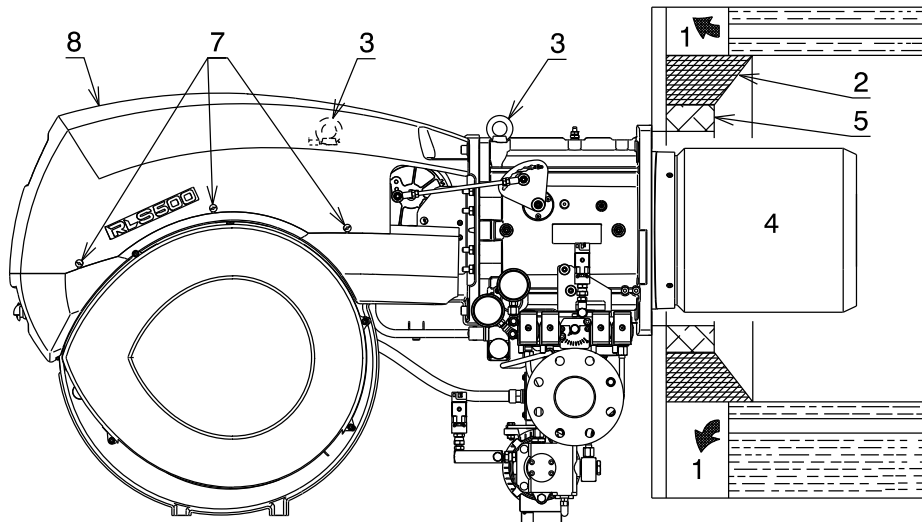


Fig. 12

5.8 Accessibility to the interior of the combustion head

- 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). Note: While unscrewing, some fuel may leak out.
- Unscrew the under part of the elbow 4) until it comes free of its slot.
- Extract the internal part 5) of the combustion head.



Be careful as some drops of fuel may leak out during this phase.

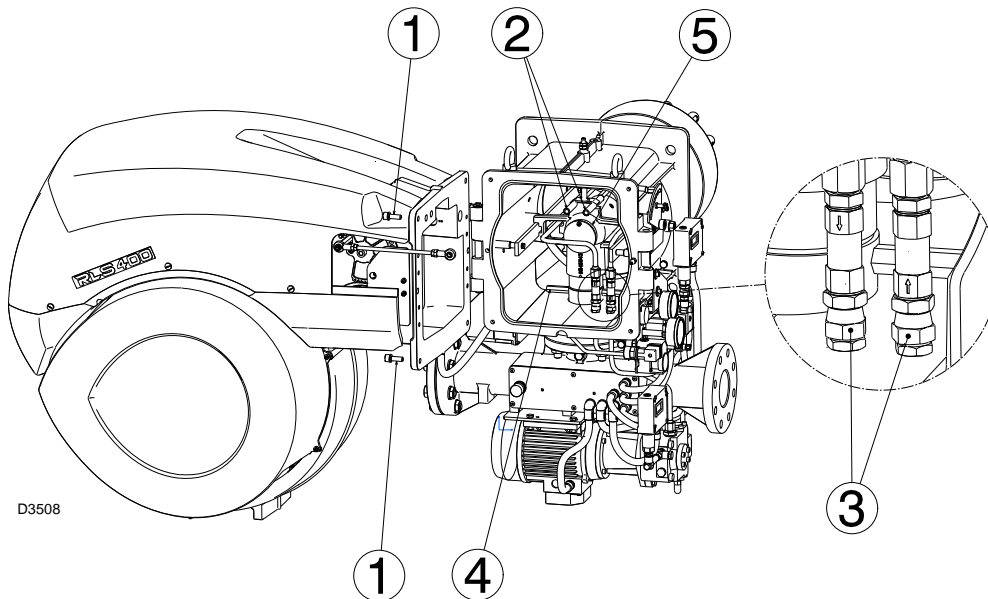


Fig. 13

5.9 Nozzles 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.



It is advisable to replace the nozzle once a year during periodical maintenance.



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.

5.9.1 Choice of nozzle

Only 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 the Tab. H.

5.9.2 Recommended nozzle

- Bergonzo type B5 45°
- 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 B5 45°: 200 - 225 - 250 - 275 - 300 - 325 - 350 - 375 - 400 - 425.
- Fluidics N2 50°: 250 - 275 - 300 - 325 - 350 - 375 - 400 - 425.

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



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

Nozzle	kg/h	Delivery pressure bar	Return pressure bar	kg/h	kW
Bergonzo B5 45°	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	
Fluidics N2 50°	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

Tab. H

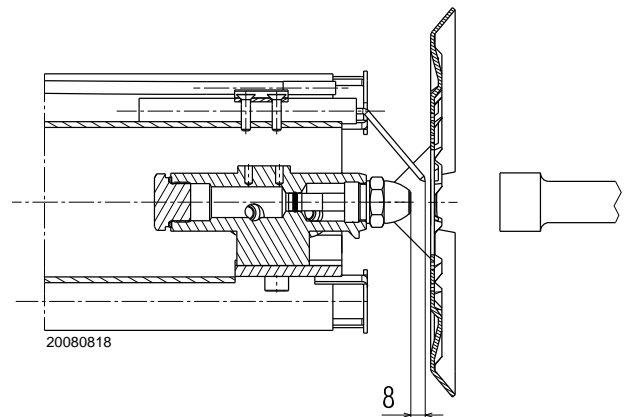


Fig. 14

5.10 Electrode position



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

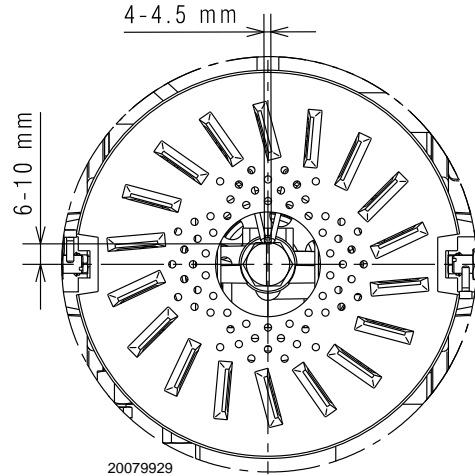


Fig. 15

5.11 Combustion head adjustment

In addition to varying air flow depending on the output requested, the air damper servomotor 4)(Fig. 4 on page 11) - by means of a lifting assembly - varies the setting of the combustion head.

Setting is pre-arranged in the plant for the minimum run (hole 1).



Altering the tie rod's position on holes 2) and 3)(Fig. 16) might result in instability during operation.

If you need to move the hinge to the right, you need to fit the spacers 4)(Fig. 17) supplied with the burner.

To assemble, proceed as follows:

- unscrew nuts 2)(Fig. 17) and remove tie rod 3);
- screw the spacers 4) onto spacer 1) and screw 5) respectively;
- once done, refit the tie rod and nuts.

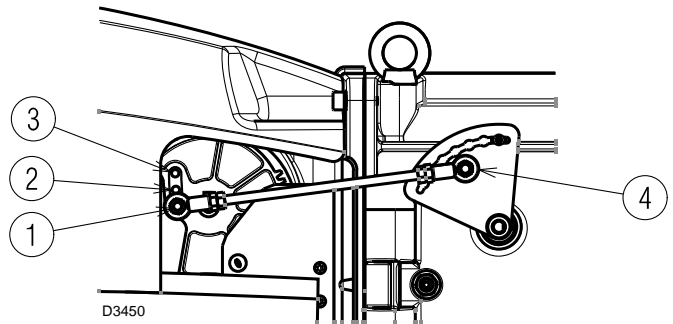


Fig. 16

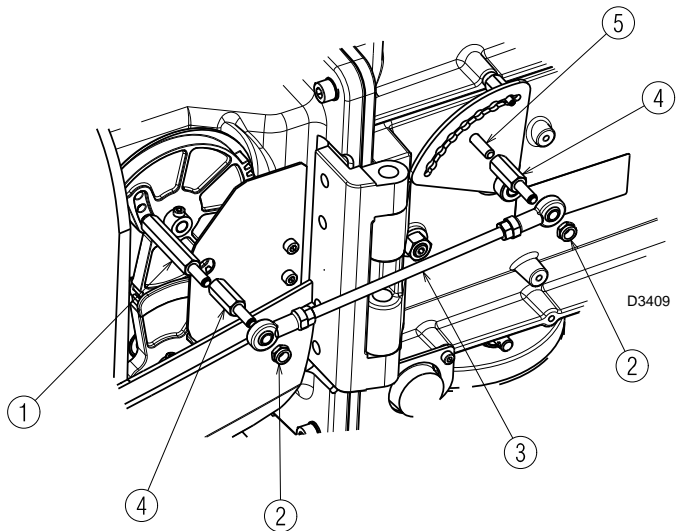


Fig. 17

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 Tab. I.

Tank higher than burner A (Fig. 18)

Distance "P" must not exceed 10 meters in order to avoid straining the pump's seal; distance "V" must not exceed 4 meters in order to allow pump self-priming even when the tank is almost empty.

Tank lower than burner B (Fig. 18)

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.

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 feeds the burner.

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

+/-H (m)	L (m)			
	Ø 10 mm	Ø 12 mm	Ø 14 mm	Ø 16 mm
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

Tab. I

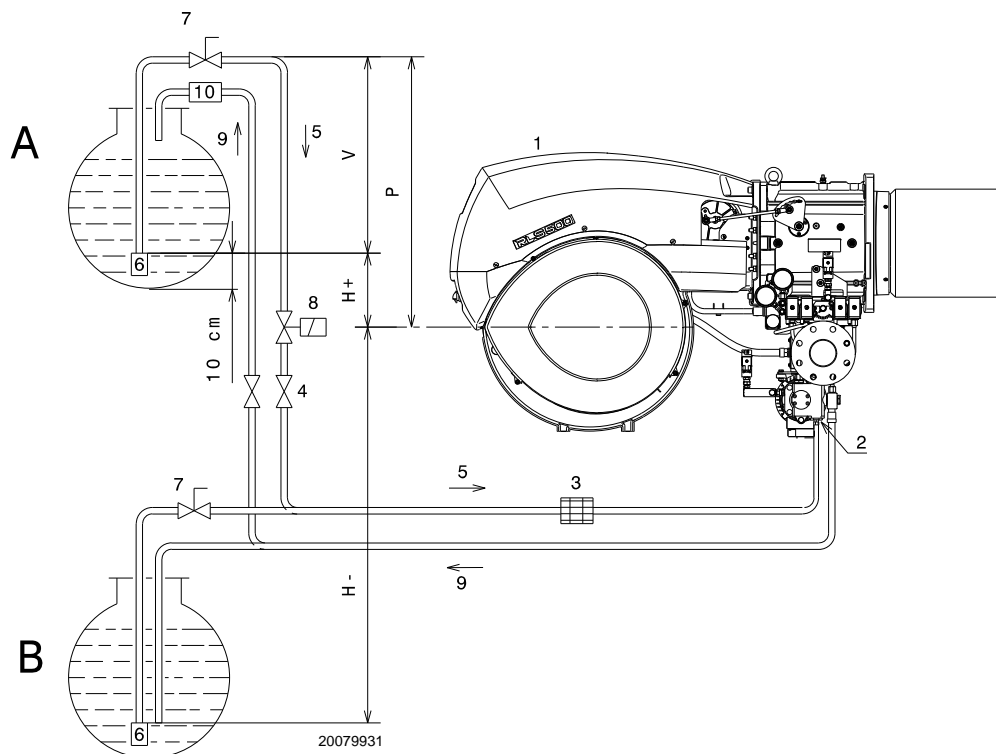


Fig. 18

Key (Fig. 18)

H = Pump/Foot valve height difference

L = Piping length

Ø = Inside pipe diameter

1 = Burner

2 = Pump

3 = Filter

4 = Manual on/off valve

5 = Suction line

6 = Foot valve

7 = Quick closing manual valve with remote control (Italy only)

8 = On/off solenoid valve (Italy only). See electrical layout. Connections to be carried out by the installer (SV).

9 = Return line

10 = Check valve (only Italy)

5.12.3 Hydraulic connections

The pumps are equipped with a by-pass that connects return line and suction line. The pumps are installed on the burner with the by-pass closed by screw 3)(Fig. 19).

It is therefore necessary to connect both hoses to the pump.

The pump will break 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.

5.12.4 Hydraulic system layout

Key (Fig. 19)

- 1 Pump suction
- 2 Pump and nozzle return
- 3 By-pass screw in pump
- 4 Pump pressure governor
- 5 Safety valve
- 6 Safety valve
- 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.

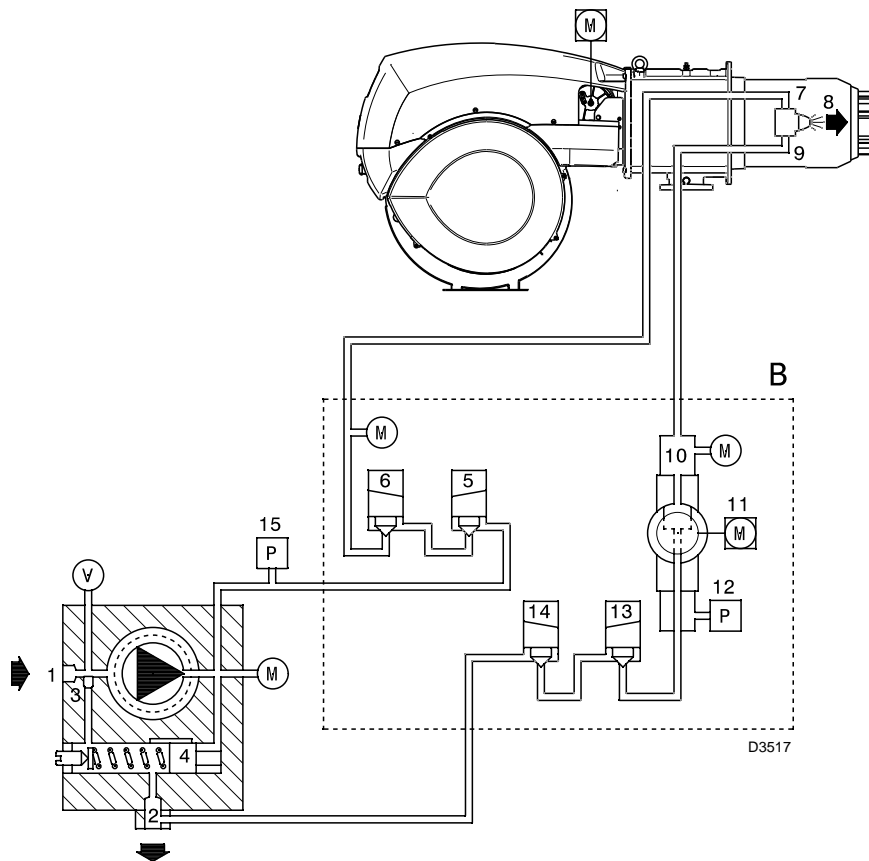


Fig. 19

5.12.5 Pressure variator

The pressure variator (Fig. 20) 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.

Key (Fig. 20)

- 1 Nozzle delivery pressure gauge
- 2 Nozzle return pressure gauge
- 3 Position indicator (0 ÷ 90) of pressure variator
- 4 Maximum oil pressure switch on return circuit

Governing of the pressure on return is obtained with the variation of a section by rotating the servomotor 23)(Fig. 4 on page 11) which simultaneously also controls the gas butterfly.

- 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 3)(Fig. 5 on page 12); 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 on page 11) may be operated in the same way.

- In adjusting 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.

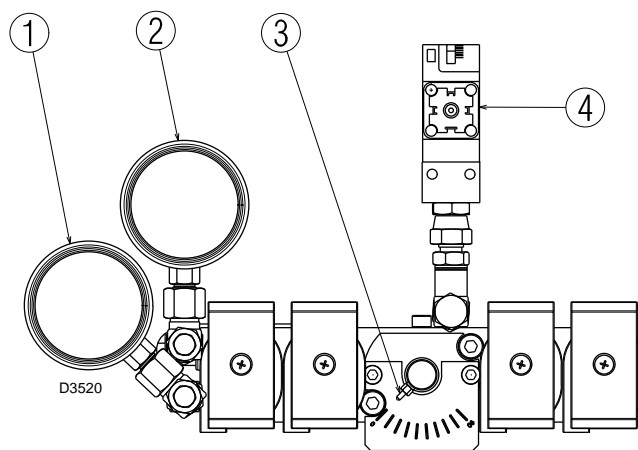


Fig. 20

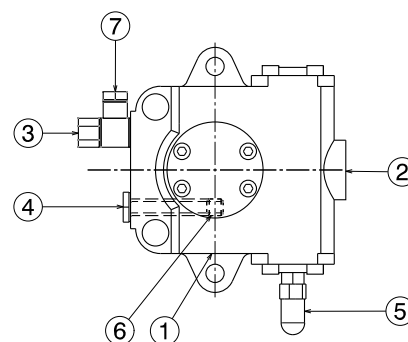
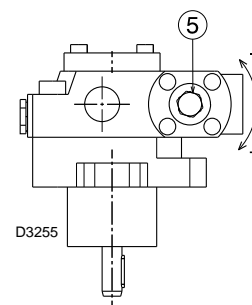


Fig. 21

5.12.6 Pump

Key (Fig. 21)

- 1 Suction line G 1/2"
- 2 Return line G 1/2"
- 3 Pressure switch attachment G 1/4"
- 4 Vacuum meter attachment G 1/4"
- 5 Pressure adjustment screw
- 6 By-pass screw
- 7 Pressure gauge attachment G 1/4"

Technical data

Min. delivery rate at 16.5 bar pressure	kg/h	560
Delivery pressure range	bar	7 - 30
Max. suction depression	bar	0,45
Viscosity range	cSt	4 - 800
Max light oil temperature	°C	140
Max. suction and return pressure	bar	5
Pressure calibration in the factory	bar	22-20

Tab. J

Priming pump



WARNING

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

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

For self-priming to take place, the screw 4)(Fig. 21) 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 is primed when diesel comes out of screw 4). Stop the burner and screw screw 4) in.



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. 21) prior to starting; otherwise, the pump will seize.

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

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, and then repeat the starting operation 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.

5.13 Gas feeding



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

Precautions: avoid knocking, attrition, sparks and heat.

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

- 1 Gas input pipe
- 2 Manual valve
- 3 Vibration damping joint
- 4 Pressure gauge with push-button cock
- 5 Filter
- 6A Includes:
 - filter
 - operation valve
 - safety valve
 - pressure adjuster
- 6B Includes
 - operation valve
 - safety valve
 - pressure adjuster
- 6C Includes
 - safety valve
 - operation valve
- 6D Includes:
 - safety valve
 - operation valve
- 7 Minimum gas pressure switch
- 8 Leak detection control, provided as an accessory or integrated, 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
- P3 Upstream pressure of the filter
- L Gas train, supplied separately
- L1 Installer's responsibility

MBC "threaded"

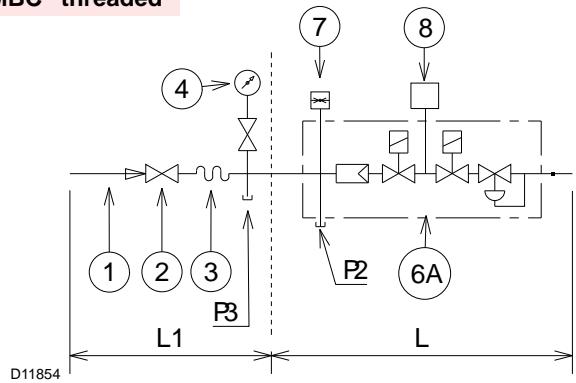


Fig. 22

MBC "flanged"

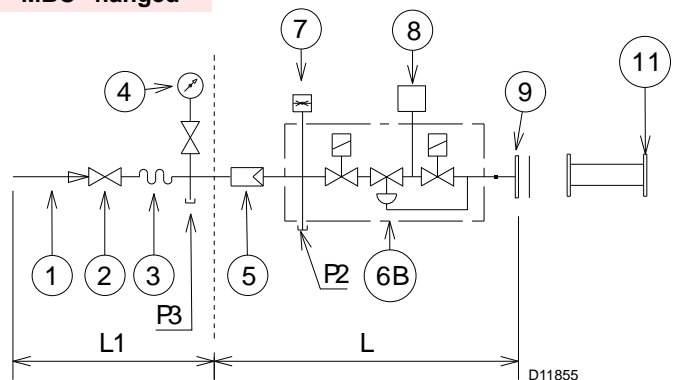


Fig. 23

DMV "flanged or threaded"

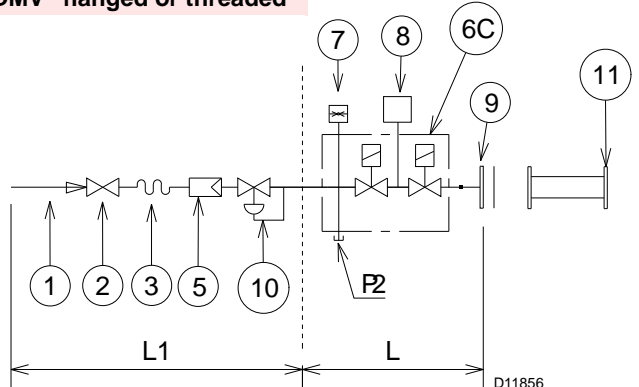


Fig. 24

CB "flanged or threaded"

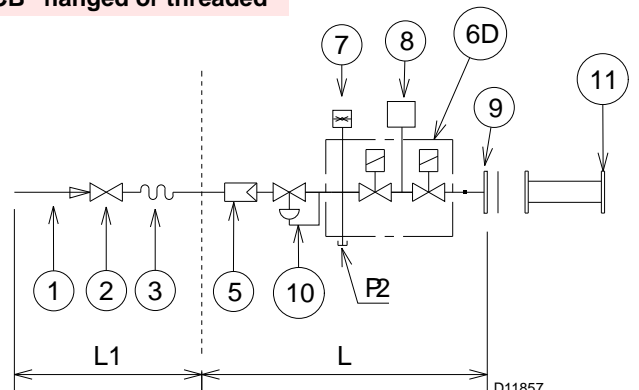


Fig. 25

5.13.2 Gas train

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

To select the correct gas train model, refer to the supplied "Burner-gas train combination" manual.

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.

The gas train is to be connected on the right of the burner, by flange 1)(Fig. 26).

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.



Once assembled the gas train, check for leaks.

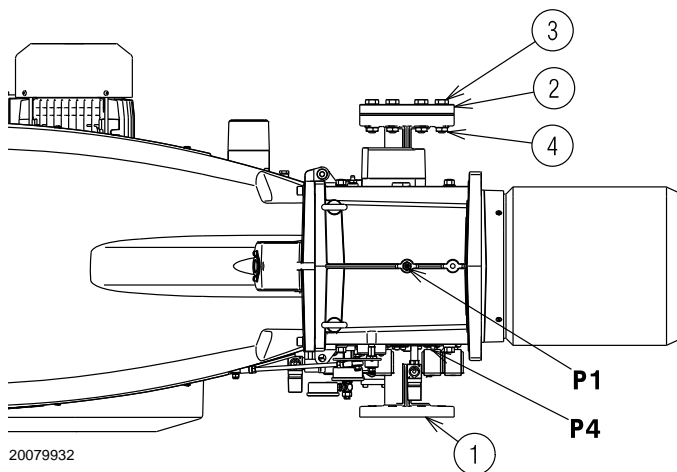


Fig. 26

5.13.4 Gas pressure

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

kW	1 Δp (mbar)	2 Δp (mbar)
2500	8.9	3.3
2750	10.9	3.9
3000	12.9	4.7
3250	15.0	5.5
3500	17.8	6.4
3750	20.5	7.3
4000	23.3	8.3
4250	26.1	9.4
4500	29.0	10.5
4750	31.9	11.7
5050	35.4	13.3

Tab. K

The values shown in Tab. K refer to:

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

Column 1

Pressure loss at combustion head.

Gas pressure measured at test point P1)(Fig. 26), with:

- combustion chamber at 0 mbar;
- burner working at maximum modulating output;
- combustion head set as in page 20.

Column 2

Pressure loss at gas butterfly valve P4)(Fig. 26) with maximum opening: 90°.

Calculate the approximate output of the burner thus:

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

Example with natural gas G20:

Operation at maximum modulating output
 Gas pressure at test point P1)(Fig. 26) = 28.3 mbar
 Pressure in combustion chamber = 5 mbar
 28.3 - 5 = 23.3 mbar

A pressure of 23.3 mbar, column 1, corresponds in Tab. K to an output of 4000 kW.

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

To calculate the required gas pressure at test point P1)(Fig. 26), set the maximum modulating output required from the burner operation:

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

Example with natural gas G20:

Operation at maximum modulating output
 Gas pressure at an output of 4000 kW = 23.3 mbar
 Pressure in combustion chamber = 5 mbar
 23.3 + 5 = 28.3 mbar
 pressure required at test point P1)(Fig. 26).

5.14 Electrical connections

Notes on safety for the electrical wiring



- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be made in accordance with the regulations currently in force in the country of destination and by qualified personnel. Refer to the wiring diagrams.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the wiring diagrams
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The burner has been type-approved for intermittent use. 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:



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



Close the fuel interception tap.



Avoid condensate, ice and water leaks from forming.

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

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

5.14.1 Supply cables and external connections passage

All the cables to be connected to the burner should be passed through cable grommets, as shown in Fig. 27.

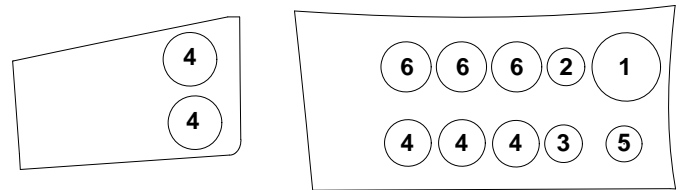


Fig. 27

Key (Fig. 27)

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



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

6 Start-up, calibration and operation of the burner

6.1 Notes on safety for the first start-up



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



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

6.2 Burner calibration (light oil operation)



It is recommended to adjust first the light oil burner and then the gas burner.
Carry out the fuel change with burner off.

6.2.1 Firing

Set switch 1)(Fig. 28) to “**AUTO**” position.

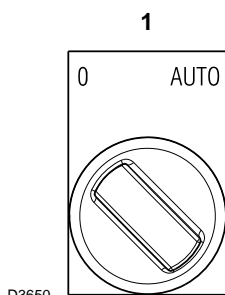


Fig. 28

Select “**MANUAL**” operating mode on the AZL display (see “Burner starting” on page 28).

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.

6.3 Adjustments before first firing (gas operation)

Adjustment of the combustion head has been illustrated on page 20.

In addition, the following adjustments must also be made:

- Slowly open the manual valves situated upstream from the gas train.
- Adjust the minimum gas pressure switch (Fig. 33) to the start of the scale.
- Adjust the maximum gas pressure switch (Fig. 32) to the end of the scale.
- Adjust the air pressure switch (Fig. 31) to the start of the scale.
- Purge the air from the gas line. We recommend using a plastic tube routed outside the building and to purge air until gas is smelt.
- Fit a U-type manometer or a differential pressure gauge (Fig. 29), 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 Tab. K on page 25.

6.2.2 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 page 19.

Combustion head

The adjustment of the combustion head already carried out (page 20) need not be altered unless the 2nd stage delivery of the burner is changed.

Pump pressure

- 20 bar: this is the pressure calibrated in the factory which is usually sufficient for most purposes. Sometimes, this pressure must be adjusted to:
- 18 bar: in order to reduce fuel delivery. This adjustment is possible only if the surrounding temperature remains above 0 °C;
- 22 bar: in order to increase fuel delivery or to ensure firings even at temperatures of less than 0 °C. In order to adjust pump pressure, use the screw 5)(Fig. 21 on page 23).

Fan air gate valve

See adjustments on page 29.

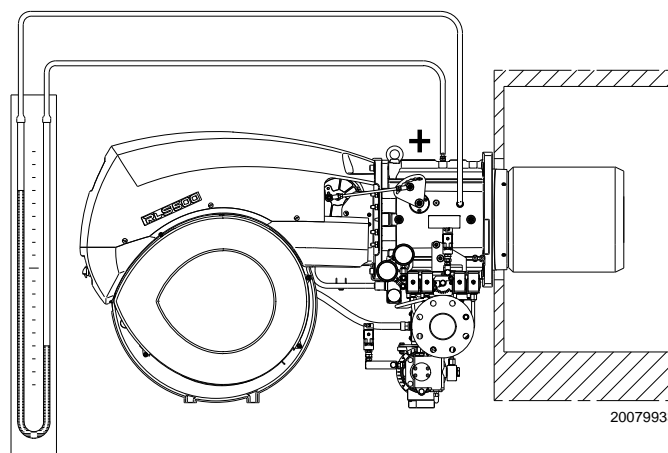


Fig. 29

- 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.



Configure the Inverter as described in the manual and according to the instructions supplied with it.



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.

6.4 Burner starting

Close all the triggering and safety devices and turn selector 1)(Fig. 30) to “**AUTO**”.

Select “**MANUAL**” operating mode on the AZL display (for further information, consult the LMV instrument reference handbook, supplied during training by the Technical Service Department).

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.

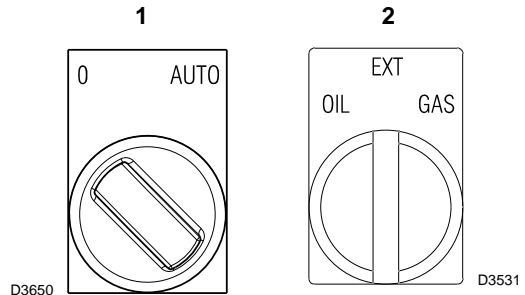


Fig. 30

6.5 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. 29 on page 27).

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

Once you have completed adjustments, select “**AUTOMATIC**” operating mode on the AZL display.

6.6 Fuel change

There are three possible options for changing fuel:

- 1 using the AZL device;
- 2 using selector 2)(Fig. 30);
- 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 2)(Fig. 30) to “**EXT**”, you activate the remote fuel selection facility. In this position, if no remote selector is fitted, the display shows the priority fuel.

6.7 Air/fuel control and power modulation system

6.7.1 General information

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 burner power is modulated according to the load required by the system, while boiler pressure or temperature is maintained at set operating values;
- 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 centrally supervised systems are available according to the system’s configuration.



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 is supplied with the burner.

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

6.7.2 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 servomotor 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.

6.8 Pressure switch adjustment

6.8.1 Air pressure switch - check CO

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

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 cardboard) until the CO value does not exceed 100 ppm.

Then slowly turn the appropriate knob clockwise until the burner reaches the lockout position.

Check the indication of the arrow pointing upwards on the graduated scale.

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

Now check the correct start-up of the burner.

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

6.8.2 Maximum gas pressure switch

Adjust the maximum gas pressure switch (Fig. 32) after having performed all the other burner adjustments with the pressure switch set at the end of the scale.

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

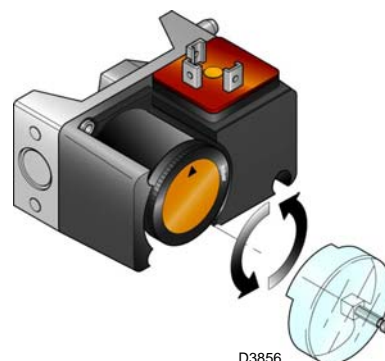
Then turn the knob clockwise by 2 mbar and repeat burner starting to ensure it is uniform.

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



D3951

Fig. 31



D3856

Fig. 32

6.8.3 Minimum gas pressure switch

Adjust the minimum gas pressure switch (Fig. 33) after having performed all the other burner adjustments with the pressure switch set at the start of the scale.

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.

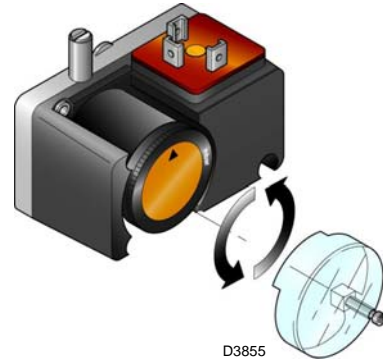


Fig. 33

6.8.4 PVP pressure switch kit

Adjust the pressure switch for the leak detection control (PVP kit) (Fig. 34) according to the instructions supplied with the kit.

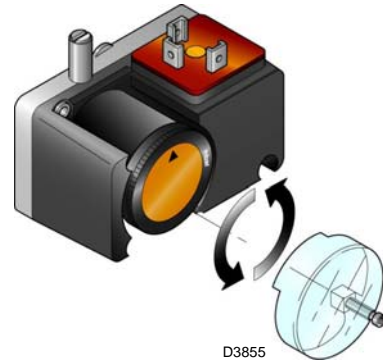


Fig. 34

6.9 Final checks (with burner operating)

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

Tab. L



WARNING

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

7 Maintenance

7.1 Notes on safety for the maintenance

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

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



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

Before carrying out any maintenance, cleaning or checking operations:



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



Close the fuel interception tap.



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

7.2 Maintenance programme

7.2.1 Maintenance frequency



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

7.2.2 Checking and cleaning



The operator must use the required equipment during maintenance.

Voltage on the QRI cell

Minimum value for correct operation: 3.5 Vdc (value on AZL display at about 50%).

If the value is lower, it could be due to:

- cell not positioned correctly
- low voltage (lower than 187 V)
- bad regulation of the burner

In order to measure, use a voltmeter with a 10 Vdc scale connected as in the diagram (Fig. 35).

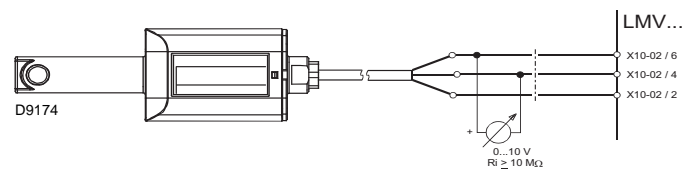


Fig. 35

Combustion

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

Combustion head

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

Burner

Clean the outside of the burner.

Fan

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

Boiler

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

GAS OIL OPERATION

Pump

The delivery pressure must comply with Tab. H on page 19.

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 piping or the pump.

If the problem lies in the suction line, check the filter is clean and that air is not entering the piping.

Nozzles

It is advisable to replace nozzles once a year during periodical maintenance.

Do not clean the nozzle openings;

Hoses

Check that these are in good conditions.

Filters (Fig. 36)

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.

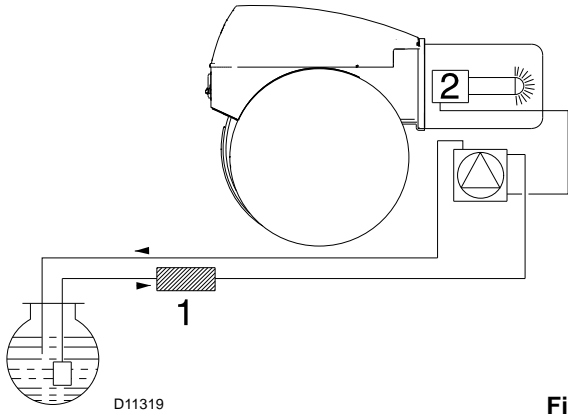


Fig. 36

Fuel tank

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

Combustion

If the combustion values found at the start of the intervention do not satisfy current standards or anyway indicate a poor state of combustion (consult the table below), contact the Technical Assistance Service for the necessary adjustments.

EN 267	Air excess		CO
	Max. output $\lambda \leq 1.2$	Min. output $\lambda \leq 1.3$	
Theoretical max. CO ₂ 0 % O ₂	CO ₂ % Calibration		mg/kWh
	$\lambda = 1.2$	$\lambda = 1.3$	
15.2	12.6	11.5	≤ 1000

Tab. M

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

If the combustion values found at the start of the intervention do not satisfy current standards or anyway indicate a poor state of combustion (consult the table below), contact the Technical Assistance Service for the necessary adjustments.

EN 676		Air excess		CO
		Max. output $\lambda \leq 1.2$	Max. output $\lambda \leq 1.3$	
GAS	Theoretical max. CO ₂ 0 % O ₂	CO ₂ % Calibration		mg/kWh
		$\lambda = 1.2$	$\lambda = 1.3$	
G 20	11.7	9.7	9	≤ 1000
G 25	11.5	9.5	8.8	≤ 1000
G 30	14.0	11.6	10.7	≤ 1000
G 31	13.7	11.4	10.5	≤ 1000

Tab. N

7.3 Opening the burner



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



Close the fuel interception tap.



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

- Remove the tie rod 1)(Fig. 37) of the head movement lever, loosening nut 2).
- Disconnect the gas servomotor test point 3).
- Disconnect the gas pressure switch test point 4).
- Remove screws 5).
- At this point it is possible to open the burner at the hinge.

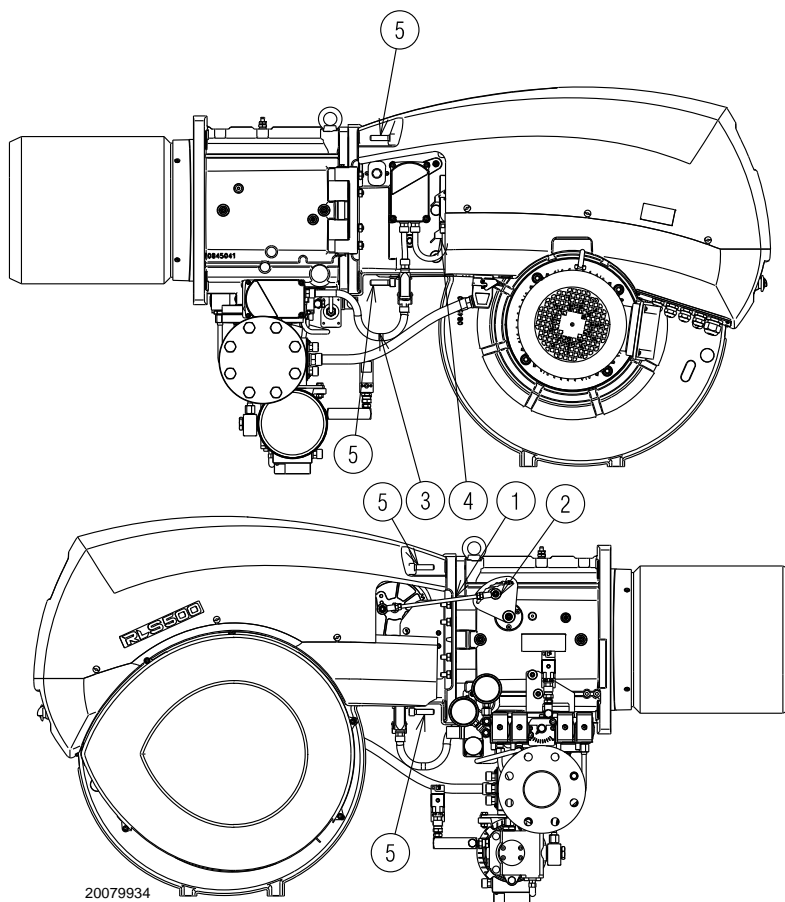


Fig. 37

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 be checked		Probe		Output regulator	
	Adjustment field	Type	Code	Type	Code
Temperature	- 100...+ 500°C	PT 100	3010110	RWF40 BASIC RWF40 HIGH	3010356 3010357
Pressure	0...2.5 bar 0...16 bar	Output probe 4...20mA	3010213 3010214		

Pressure switch kit for leak detection control (supplied as standard)

Burner	Code
RLS 500/EV C11 TC FS1	3010344

Software interface kit

Burner	Code
RLS 500/EV C11 TC FS1	3010388

Kit O₂

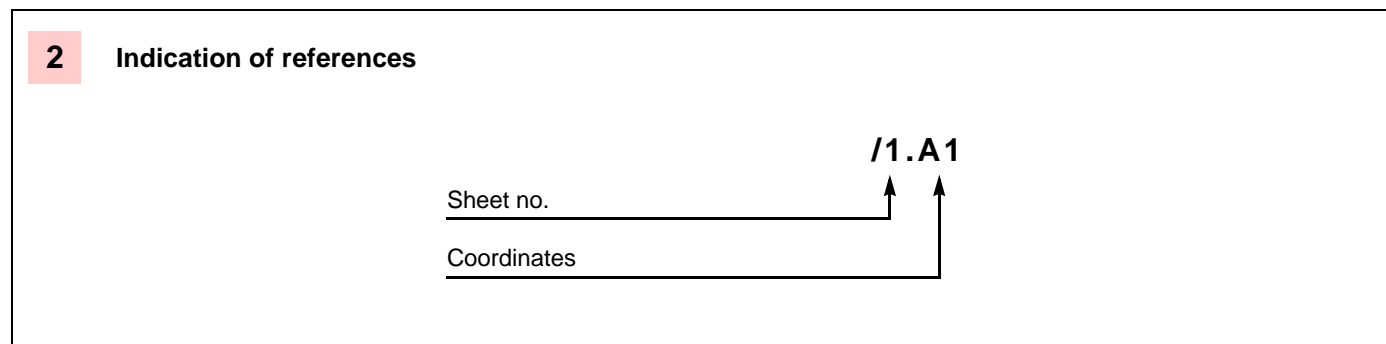
Burner	Code
RLS 500/EV C11 TC FS1	20045187

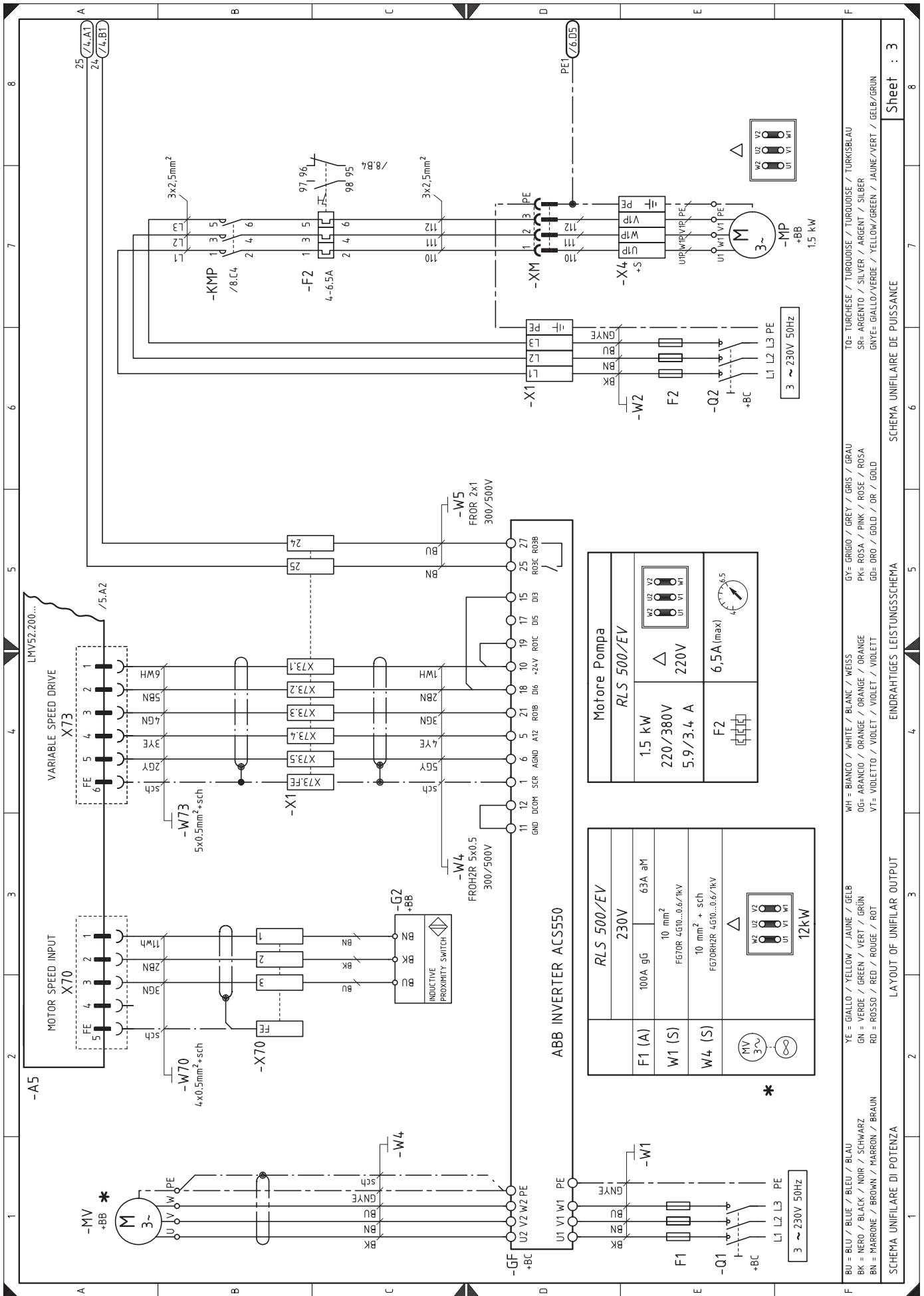
Gas trains in compliance with EN 676

Please refer to the gas train manual.

B Appendix - Electrical panel layout

1	Index of layouts
2	Indication of references
3	Layout of unifilar output
4	Layout of unifilar output
5	LMV52... operational layout
6	LMV52... operational layout
7	LMV52... operational layout
8	LMV52... operational layout
9	LMV52... operational layout
10	LMV52... operational layout
11	LMV52... operational layout
12	PLL52../QGO20.. operational layout
13	Electrical connections set by installer
14	Electrical connections set by installer





TO= TURCHESE / TURQUOISE / TURKOISE / TURKISBLAU
 SR= ARGENTO / SILVER / ARGENT / SILBER
 GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRÜN

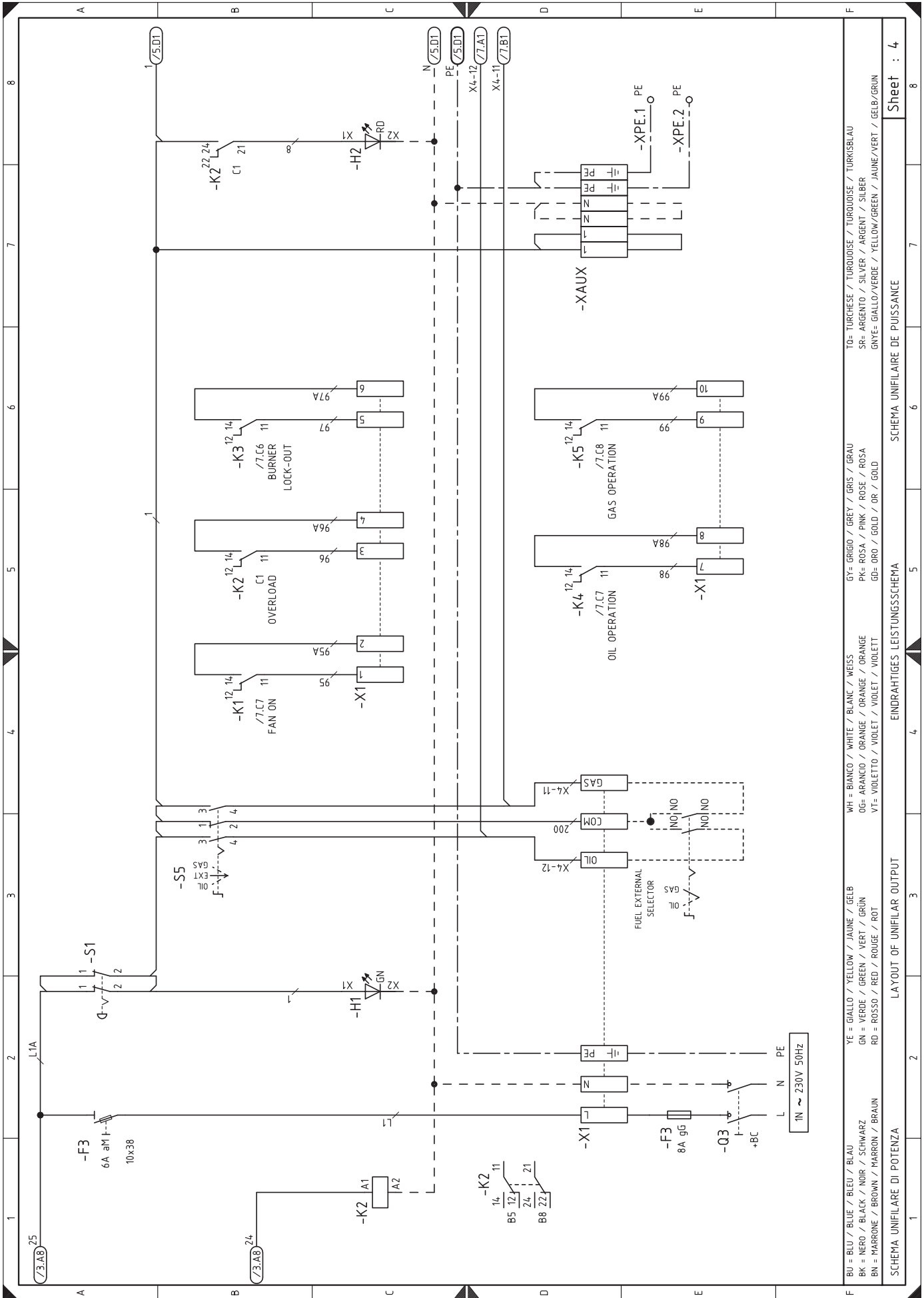
WH = BIANCO / WHITE / BLANC / WEISS
 OG= ARANCIO / ORANGE / ORANGE / ORANGE
 VI= VIOLETTO / VIOLET / VIOLET / VIOLETT

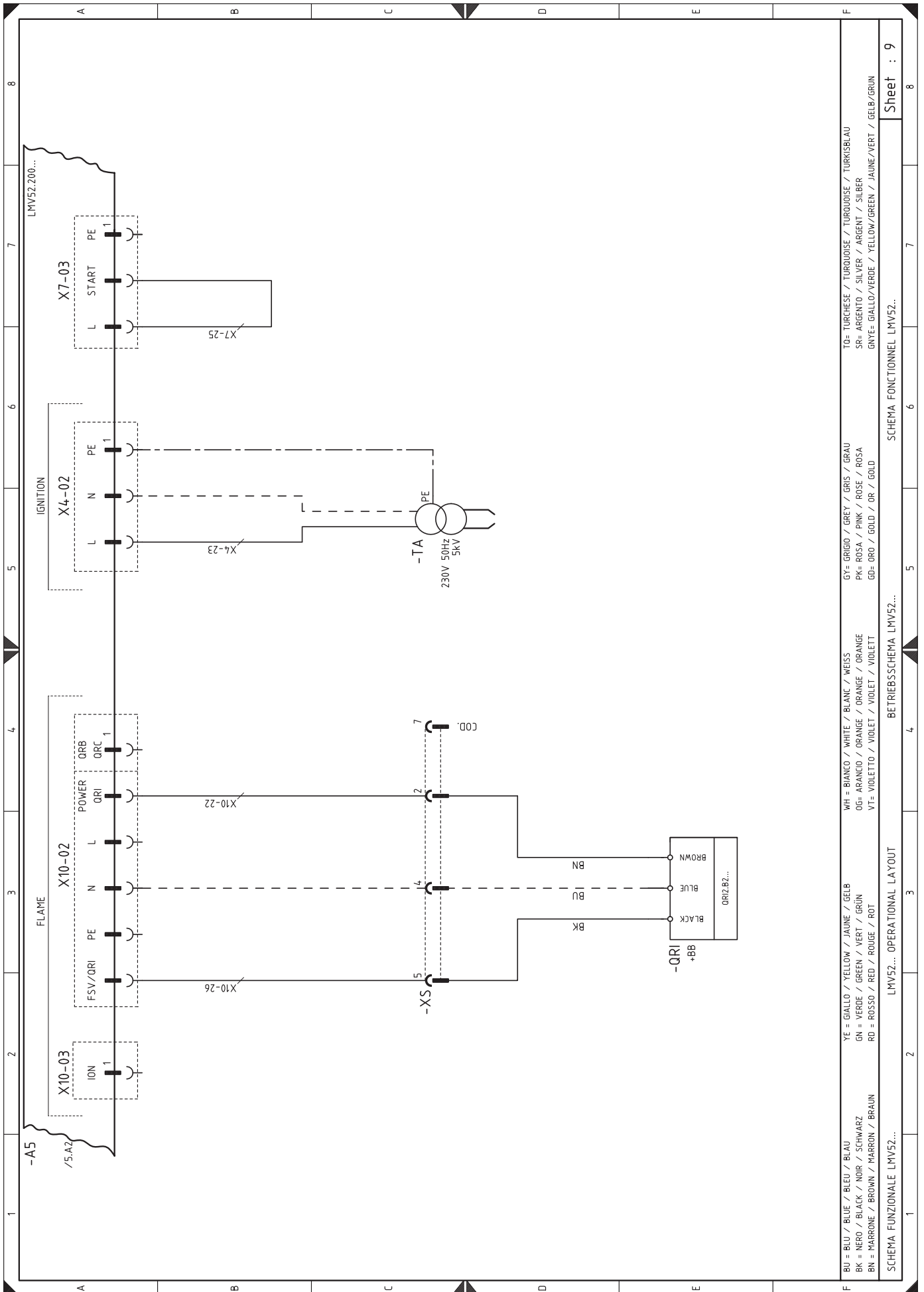
YE = GIALLO / YELLOW / JAUNE / GELB
 GN = VERDE / GREEN / VERT / GRÜN
 RD = ROSSO / RED / ROUGE / ROT

GY= GRIGIO / GREY / GRIS / GRAU
 PK= ROSA / PINK / ROSE / ROSA
 GD= ORO / GOLD / OR / GOLD

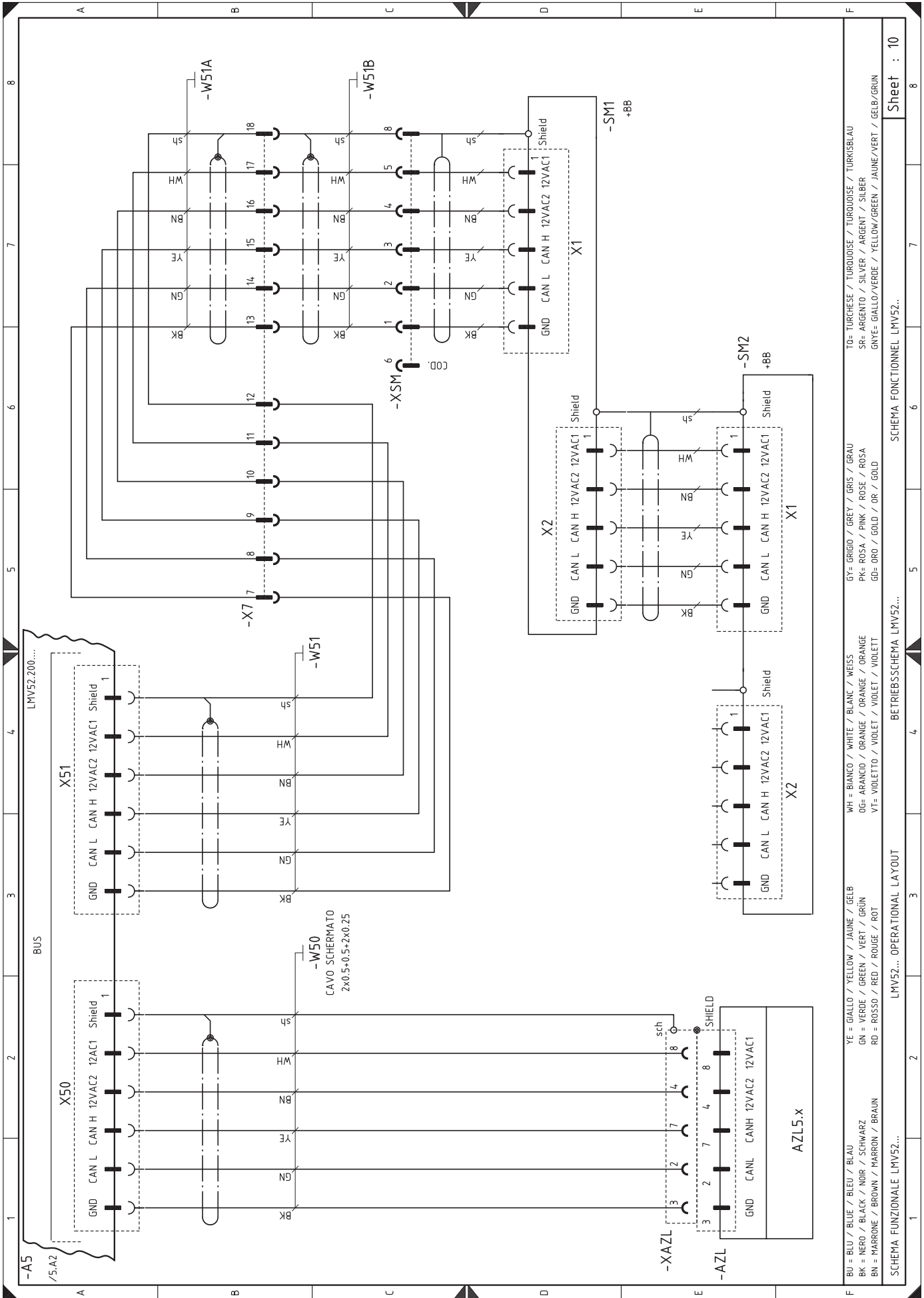
SCHEMA UNIFILARE DI POTENZA LAYOUT OF UNIFILAR OUTPUT EINDRAHTIGES LEISTUNGSSCHEMA SCHEMA UNIFILARE DE PUISSANCE

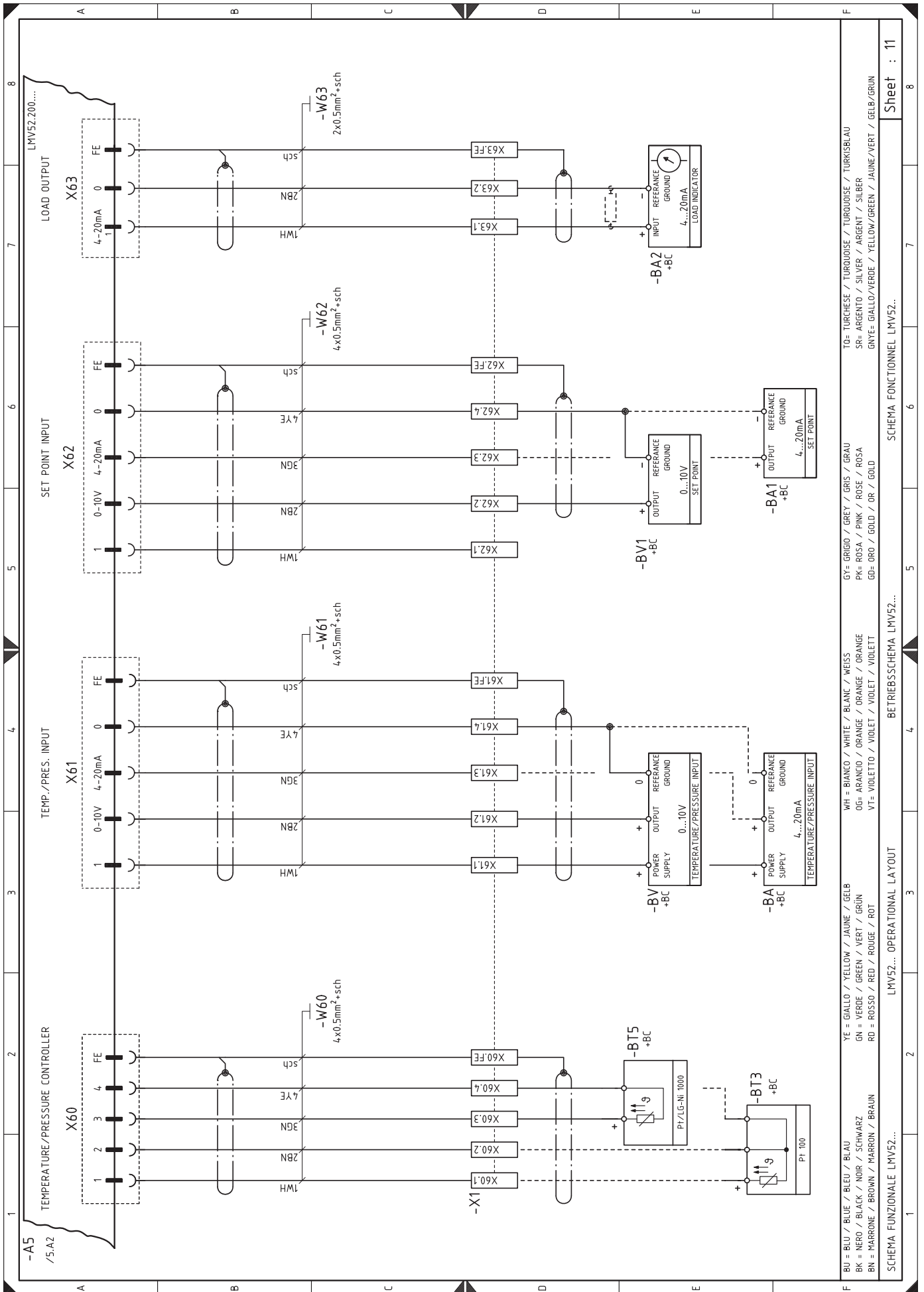
Sheet : 3

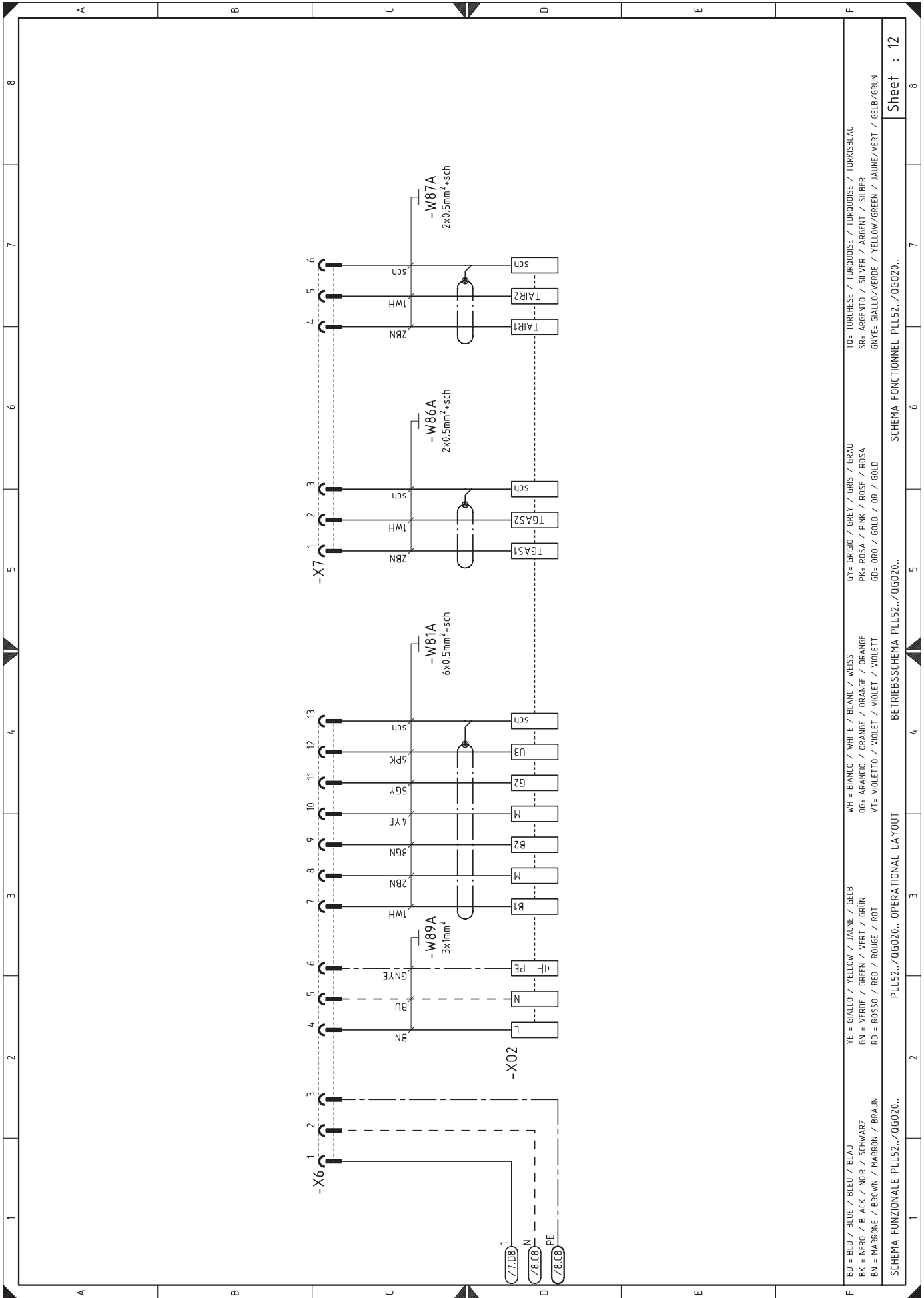


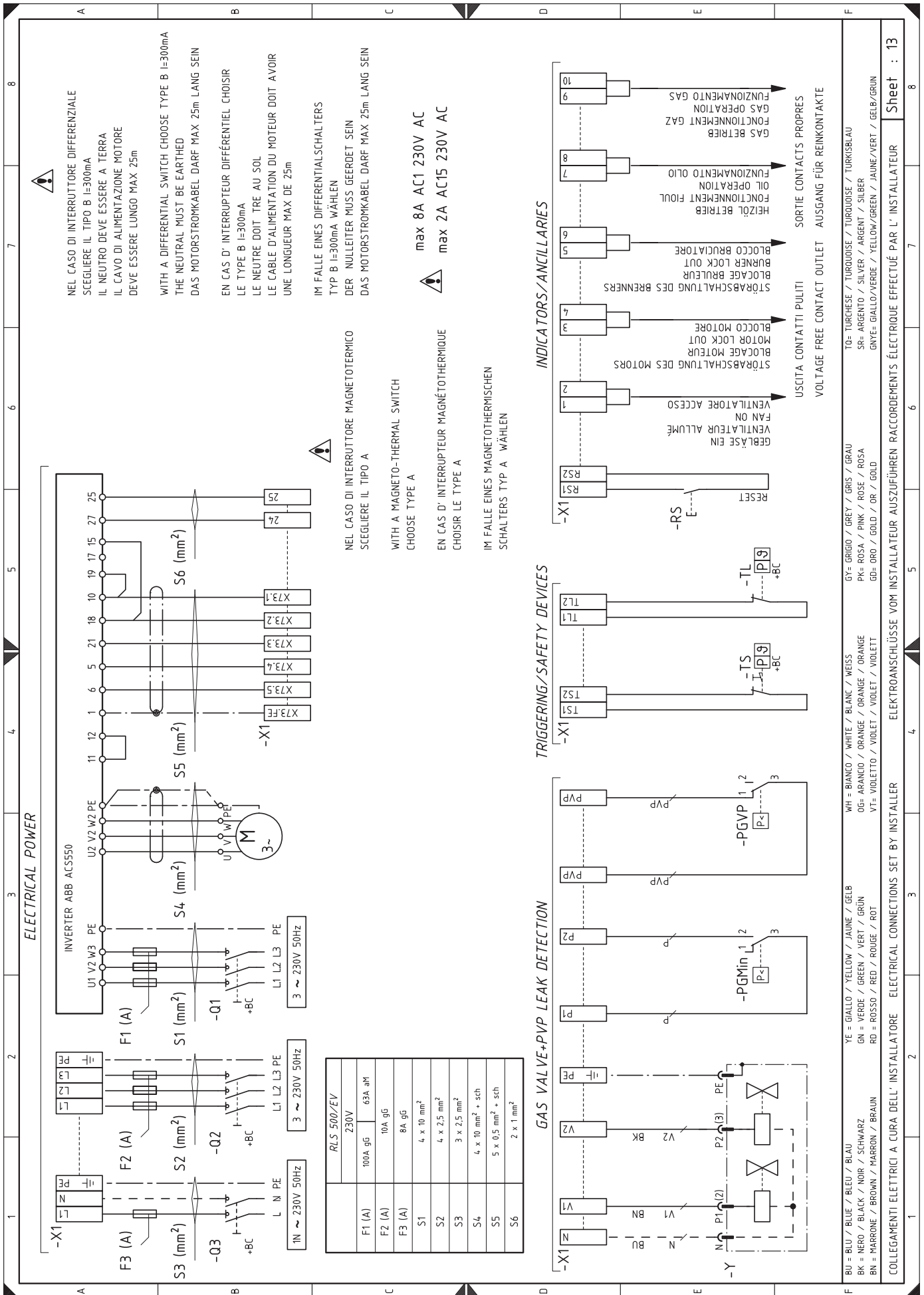


BU = BLU / BLUE / BLEU / BLAU	YE = GIALLO / YELLOW / JAUNE / GELB	WH = BIANCO / WHITE / BLANC / WEISS	GY = GRIGIO / GREY / GRIS / GRAU	TO = TIRCHESE / TURQUOISE / TURKOISE / TURKISBLAU
BK = NERO / BLACK / NOIR / SCHWARZ	GN = VERDE / GREEN / VERT / GRÜN	OG = ARANCIO / ORANGE / ORANGE / ORANGE	PK = ROSA / PINK / ROSE / ROSA	SR = ARGENTO / SILVER / ARGENT / SILBER
BN = MARRONE / BROWN / MARRON / BRAUN	RD = ROSSO / RED / ROUGE / ROT	VI = VIOLETTA / VIOLET / VIOLET / VIOLETT	GD = ORO / GOLD / OR / GOLD	GNVE = GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRÜN
SCHEMA FUNZIONALE LMV52... OPERATIONAL LAYOUT				
SCHEMA FONZIONALE LMV52... BETRIEBSSCHEMA LMV52...				
SCHEMA FONCTIONNEL LMV52... SCHEMA FONCTIONNEL LMV52...				
				Sheet : 9









RLS 500/EV	
F1 (A)	230V
F2 (A)	100A gG 63A aH
F3 (A)	10A gG
S1	8A gG
S2	4 x 10 mm ²
S3	4 x 2.5 mm ²
S4	3 x 2.5 mm ²
S5	4 x 10 mm ² + sch
S6	5 x 0.5 mm ² + sch
	2 x 1 mm ²

⚠

NEL CASO DI INTERRUPTORE DIFFERENZIALE SCEGLIERE IL TIPO B I=300mA IL NEUTRO DEVE ESSERE A TERRA IL CAVO DI ALIMENTAZIONE MOTORE DEVE ESSERE LUNGO MAX 25m

WITH A DIFFERENTIAL SWITCH CHOOSE TYPE B I=300mA THE NEUTRAL MUST BE EARTHED DAS MOTORSTROMKABEL DARF MAX 25m LANG SEIN

EN CAS D'INTERRUPTEUR DIFFERENTIEL CHOISIR LE TYPE B I=300mA LE NEUTRE DOIT TRE AU SOL LE CABLE D'ALIMENTATION DU MOTEUR DOIT AVOIR UNE LONGUEUR MAX DE 25m

IM FALLE EINES DIFFERENTIALSCHALTERS TYP B I=300mA WÄHLEN DER NULLEITER MUSS GEERDET SEIN DAS MOTORSTROMKABEL DARF MAX 25m LANG SEIN

⚠

NEL CASO DI INTERRUPTORE MAGNETOTERMICO SCEGLIERE IL TIPO A

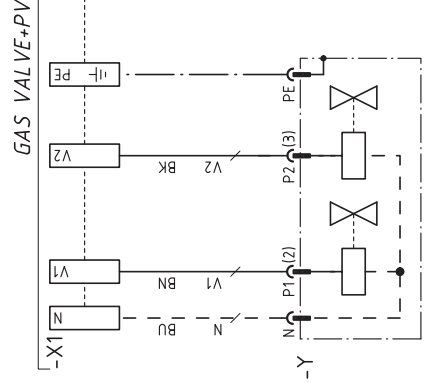
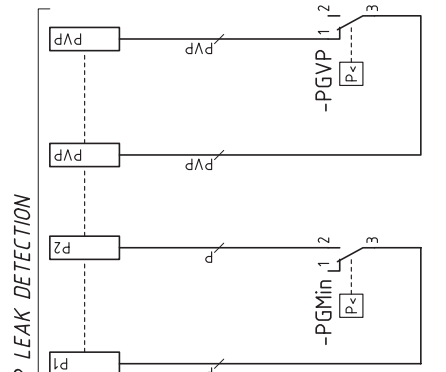
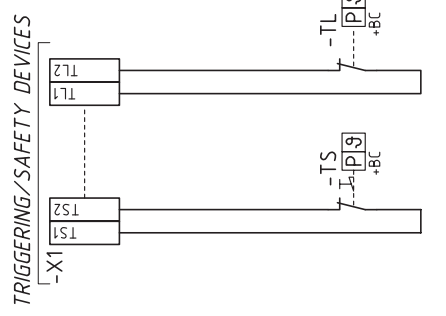
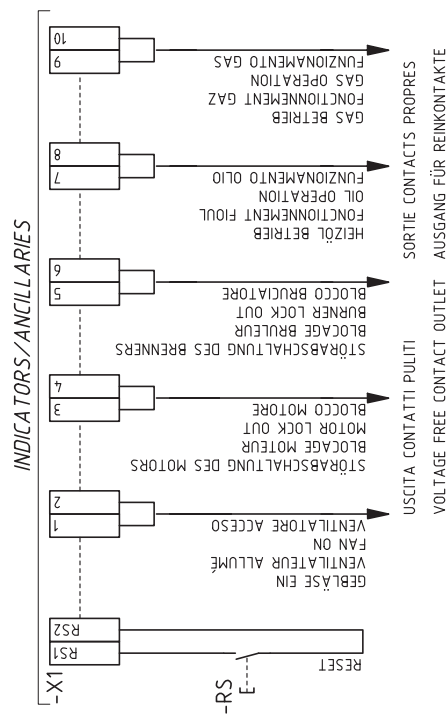
WITH A MAGNETO-THERMAL SWITCH CHOOSE TYPE A

EN CAS D'INTERRUPTEUR MAGNÉTOHERMIQUE CHOISIR LE TYPE A

IM FALLE EINES MAGNETOTHERMISCHEN SCHALTERS TYP A WÄHLEN

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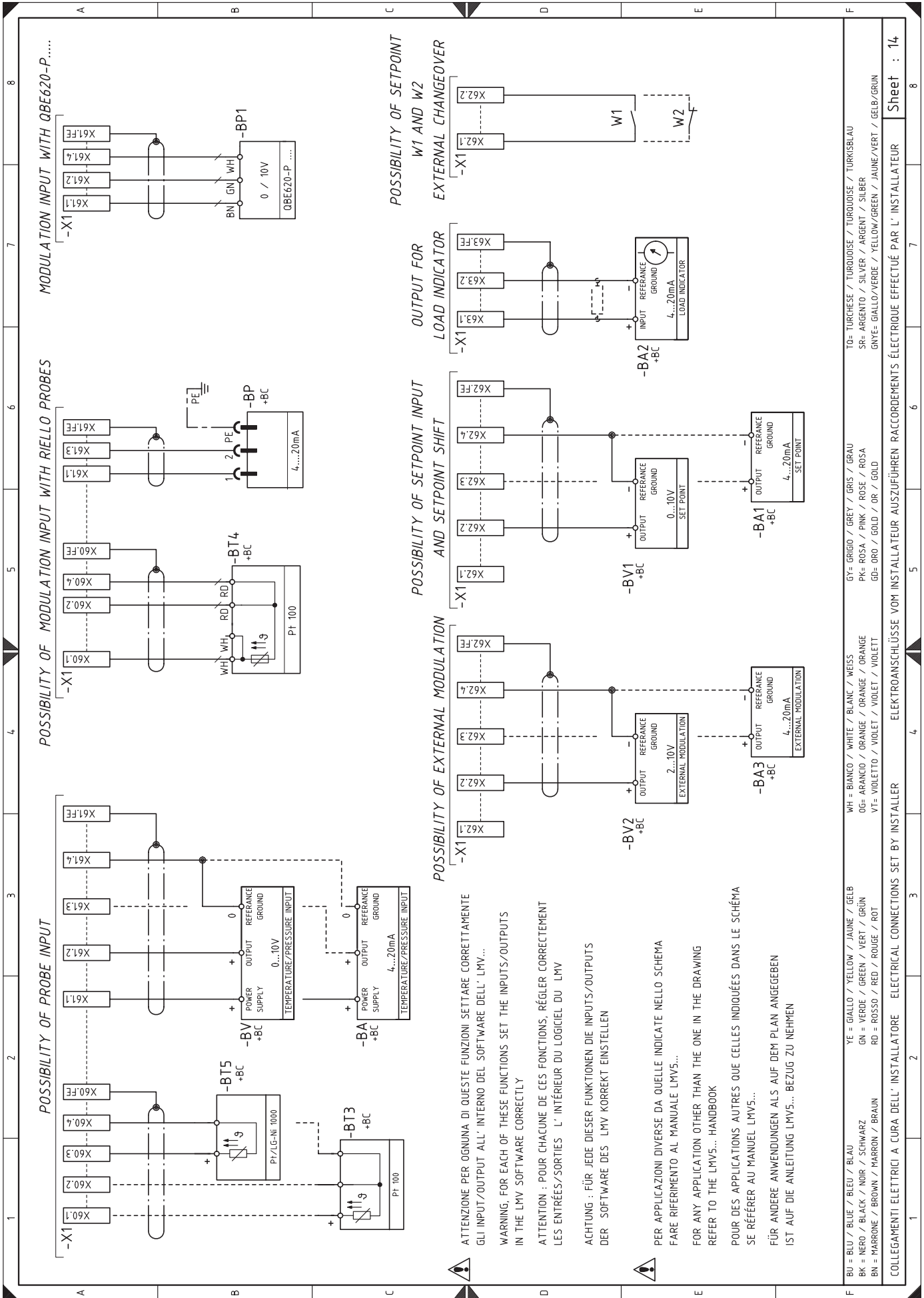
max 8A AC1 230V AC
max 2A AC15 230V AC



COLLEGAMENTI ELETTRICI A CURA DELL'INSTALLATORE ELECTRICAL CONNECTIONS SET BY INSTALLER ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L'INSTALLATEUR

Sheet : 13

TO= TURKISE / TURKOÜSİ / TURKOÜSİ / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GN= GIALLO / YELLOW / JAUNE / VERT / GELB / GRÜN
PK= ROSA / PINK / ROSE / ROSA
GD= GRU / GOLD / OR / GOLD
WH= BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VF= VIOLETTA / VIOLET / VIOLET / VIOLETT
YE= GIALLO / YELLOW / JAUNE / GELB
GN= VERDE / GREEN / VERT / GRÜN
RD= ROSSO / RED / ROUGE / ROT



Wiring layout key

+BB	Components on board burner	X1	Main supply terminal strip
+BC	Components on board boiler	X4	Light oil assembly terminal block
+S	Components on board light oil unit	X6	Connector X6
A5	Electronic cam	X7	Connector X7
AZL	Display and operating unit	XO2	Terminal board XO2
BA	Probe with current output	X70	RPM sensor terminal block
BA1	Device with current output for editing remote setpoint	XAUX	Auxiliary terminal strip
BA2	Load indicator	XAZL	Plug for on-board AZL
BA3	DC input 4...20 mA	XM	Light oil assembly connector
BP	Pressure probe	XPGM	Maximum gas pressure switch connection plug
BP1	Pressure probe	XPGM1	Maximum gas pressure switch connector
BT3	Probe Pt100 with 3 wires	XS	Flame detectors connector
BT4	Probe Pt100 with 3 wires	XSM	Air and gas servomotors connector
BT5	PT/LG-Ni1000 probe	VF	Light oil operation valve
BV	Probe with voltage output	VR	Light oil return valve
BV1	Device with voltage output for editing remote setpoint	VR1	Light oil return valve
BV2	DC voltage input 2...10 V	VS	Light oil safety valve
F2	Pump motor thermal cut-out		
F3	Auxiliary fuse		
GF	Inverter		
G2	RPM sensor		
H1	Signal light for power on		
H2	Signal light for fan and pump motors trip		
KMP	Pump motor contactor		
K1	Fan on voltage free contact relay		
K2	Motor lock-out voltage free contact relay		
K3	Burner lock-out voltage free contact relay		
K4	Light oil operation voltage free contact relay		
K5	Gas operation voltage free contact 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		
Q1	Switch / breaker three phase inverter line		
Q2	Switch / breaker three-phase pump motor line		
Q3	Switch / breaker single phase line		
QRI	Infrared sensor		
RS	Remote lock-out reset button		
S1	Emergency stop push-button		
S2	Switch for following operations: off-automatic		
S5	Fuel selector and remote fuel selector enabling		
SH3	Burner reset button and lockout warning		
SM1	Air servomotor		
SM2	Gas servomotor		
SV	External safety light oil valve		
T1	Electronic cam transformer		
TA	Ignition transformer		
TL	Limit pressure switch/thermostat		
TS	Safety pressure switch/thermostat		
Y	Gas adjustment valve + gas safety valve		

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