GB

Dual fuel gas oil/gas burners

Progressive two-stage or modulating operation

CE

RLS

CODE	MODEL	TYPE
20034254	RLS 1000/M C13	1311 T
20034255	RLS 1200/M C13	1312 T

20040160 (4) - 05/2012

Translation of the original instructions

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 gas oil/ gas burners	
Model:	RLS 1000/M C13 RLS 1200/M C13	
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	CE-	Class 3 (EN 676) - Class 2 (EN 267)

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 revision 26.01.2010**".			
Product	Type	Model	Output
Dual fuel gas oil/gas burners	1311 T 1312 T	RLS 1000/M C13 RLS 1200/M C13	1200 - 10600 kW 1500 - 11500 kW

Legnago, 30.06.2011

Burners Division Department
RIELLO S.p.A.

Mr. G. Conticini

Eng. 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.

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:

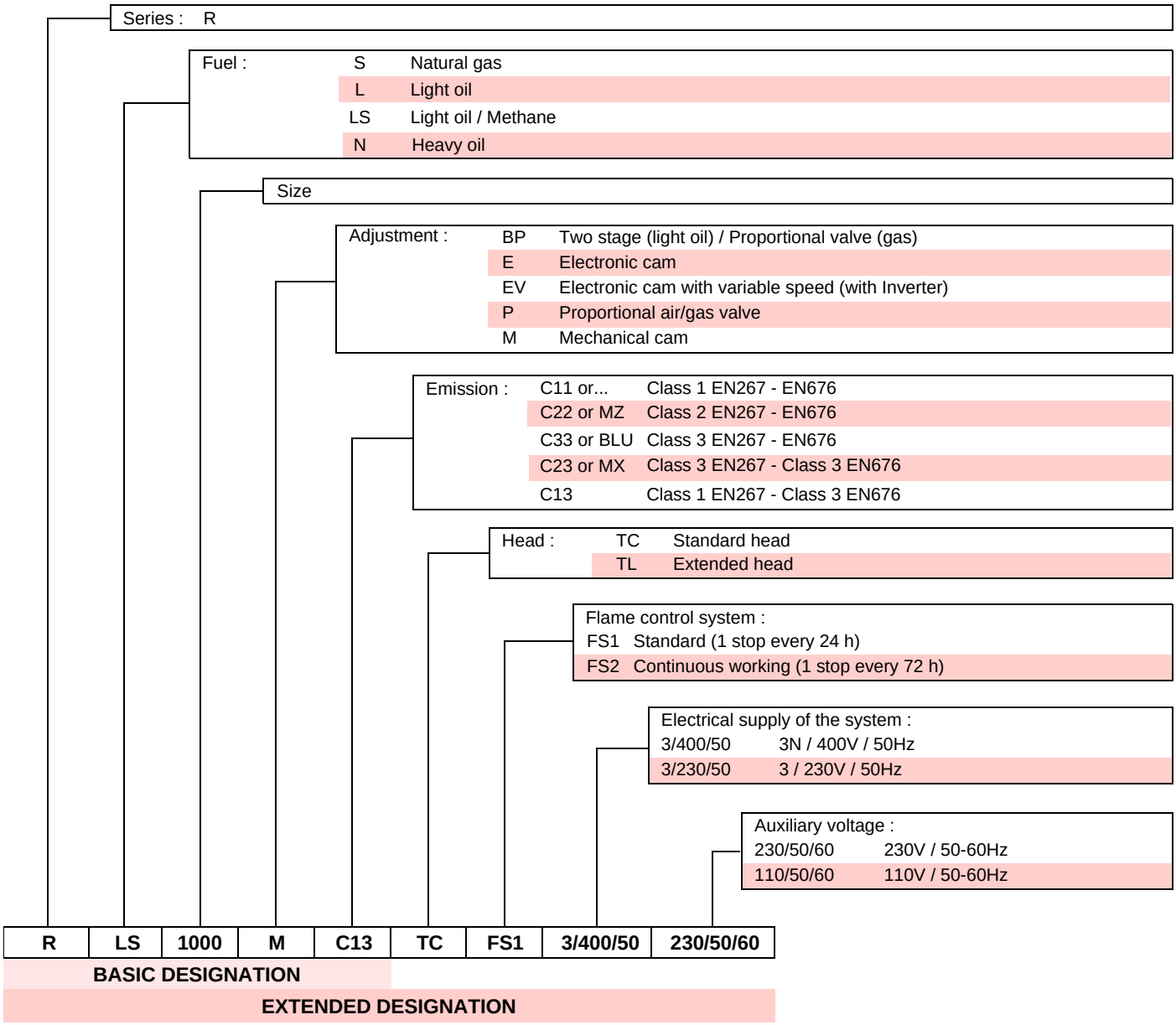
➤ the user must take all the measures necessary to prevent unauthorised people gaining access to the machine;

➤ 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		Voltage	Start-up	Code
RLS 1000/M C13	TC	3/400/50	Star/Triangle	20034254
RLS 1200/M C13	TC	3/400/50	Star/Triangle	20034255

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 1000/M C13	RLS 1200/M C13
Type			1311 T	1312 T
Output (1) Delivery (1)	min - max	kW kg/h	1200/3750 - 10600 100/315 - 867	1500/5500 - 11500 171/462 - 942
Fuels			– 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/G25		mbar	67.1/101.2	97.2/145
Operation			– Intermittent (min. 1 stop in 24 hours) – Progressive two-stage or modulating by kit (See ACCESSORIES).	
Pump	Output at 30 bar Pressure range Fuel temperature	kg/h bar °c max	1400 9/40 140	1826 9/40 140
Nozzles		number	1	
Standard applications			Boilers: water, steam, diathermic oil	
Ambient temperature		°C	0 - 50	
Combustion air temperature		°C max	60	
Noise levels (3)	Sound pressure Sound power	dB(A)	85.4 100.6	84.4 99.7

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 on the socket 5)(Fig. 5) with zero pressure in the combustion chamber and at maximum burner output.
(3) Noise emission tests carried out as per Directive EN 15036-1, with measurement accuracy ó = ± 1.5 dB, in the manufacturer's combustion lab with burner operating on test boiler at maximum output.

4.5 Electrical data

Motor IE1

Model			RLS 1000/M C13	RLS 1200/M C13
Electrical supply			3N ~ 400V +/-10% 50 Hz	
Fan motor		rpm V kW A	2940 400/690 21 39.6 - 23	2920 400/690 25 47.5 - 27.4
Pump motor		rpm V kW A	1400 230 - 400 2.2 8.8 - 5.1	1400 400 4 8.7
Ignition transformer		V1 - V2 I1 - I2	230 V - 1 x 8 kV 1 A - 20 mA	
Electrical power consumption	Light oil Gas	kW max	26 23	31 27
Protection level			IP 54	

Motor IE2

Model			RLS 1000/M C13	RLS 1200/M C13
Electrical supply			3N ~ 400V +/-10% 50 Hz	
Fan motor		rpm V kW A	2964 400/690 21 41.8 - 24.2	2920 400/690 25 44.1 - 25.5
Pump motor		rpm V kW A	1400 230 - 400 2.2 9.3 - 5.4	1400 400 4 8.2
Ignition transformer		V1 - V2 I1 - I2	230 V - 1 x 8 kV 1 A - 20 mA	
Electrical power consumption	Light oil Gas	kW max	26 23	31 27
Protection level			IP 54	

Tab. B

4.6 Burner weight

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

Model	kg
RLS 1000/M C13	500
RLS 1200/M C13	540

Tab. C

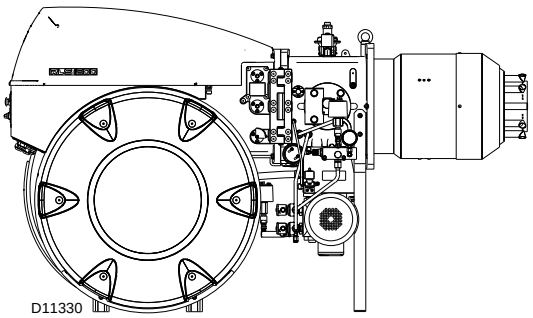


Fig. 1

4.7 Maximum dimensions

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

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

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

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

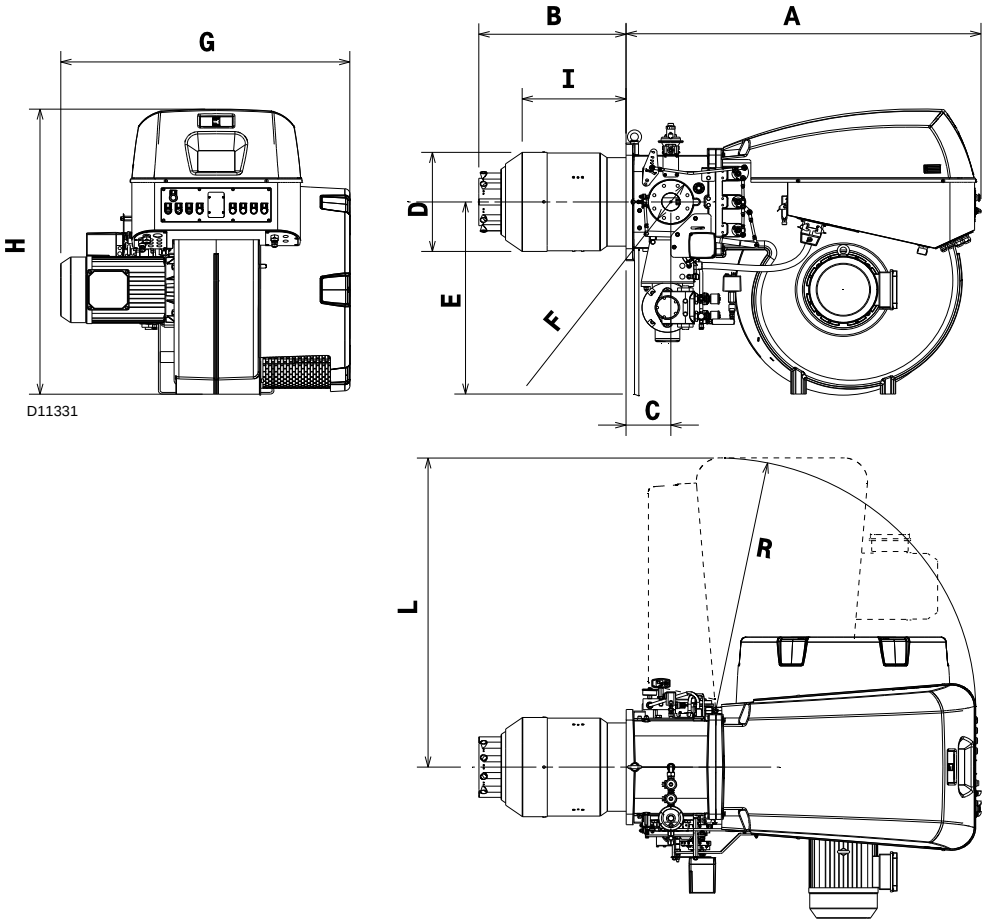


Fig. 2

mm	A	B	C	D	E	F	G	H	I	L	R
RLS 1000/M C13	1575	675	200	413	885	DN80	1220	1315	485	1425	1165
RLS 1200/M C13	1575	658	200	455	885	DN80	1295	1315	462	1425	1165

Tab. D

4.8 Firing rates

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

The **MINIMUM OUTPUT** must not be lower than the minimum limit of the diagram:
RLS 1000/M C13 = 3750 kW
RLS 1200/M C13 = 5500 kW

WARNING

The firing rate value (Fig. 3) has been obtained considering an ambient temperature of 20°C, an atmospheric pressure of 1013 mbar (approx. 0 m a.s.l.), and with the combustion head adjusted as shown on pag. 19.

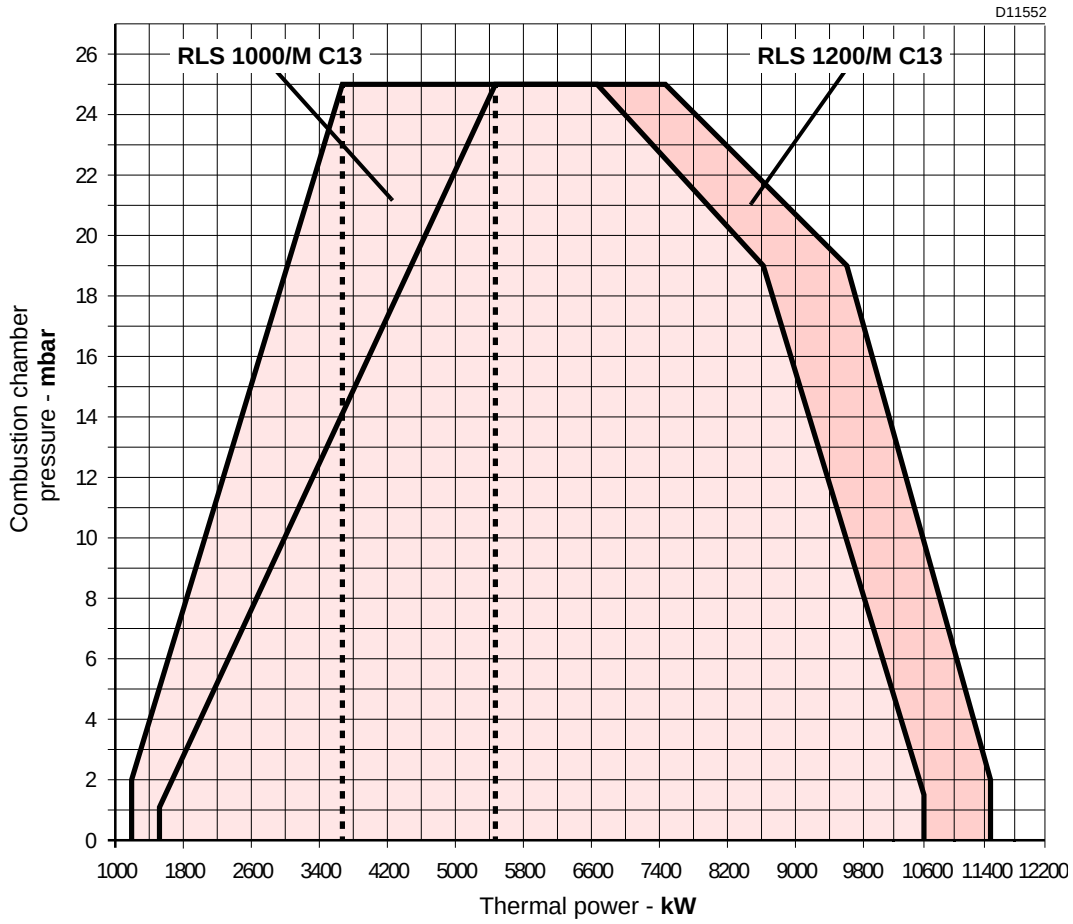


Fig. 3

4.9 Test boiler

The burner/boiler combination does not pose any problems if the boiler is EC approved and its combustion chamber dimensions are similar to those indicated in the diagram (Fig. 4).

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

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

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

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

MODULATING RATIO

The modulating ratio, obtained in the test boilers, according to standard (EN 676 for gas, EN 267 for light oil), is of 4:1

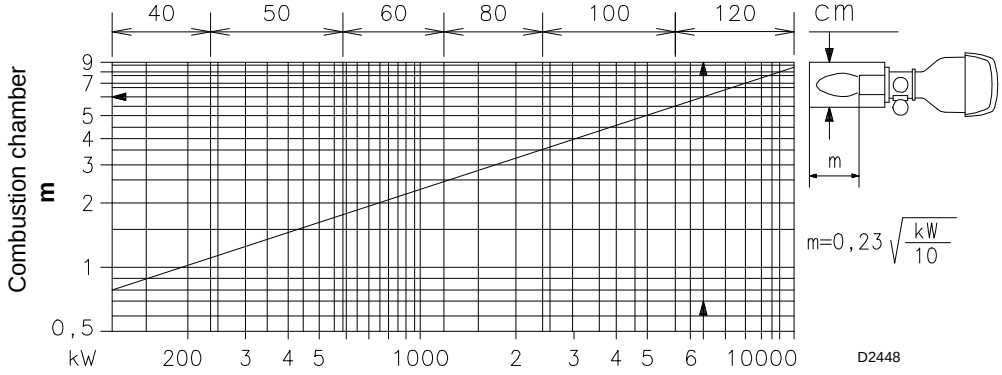


Fig. 4

4.10 Burner description

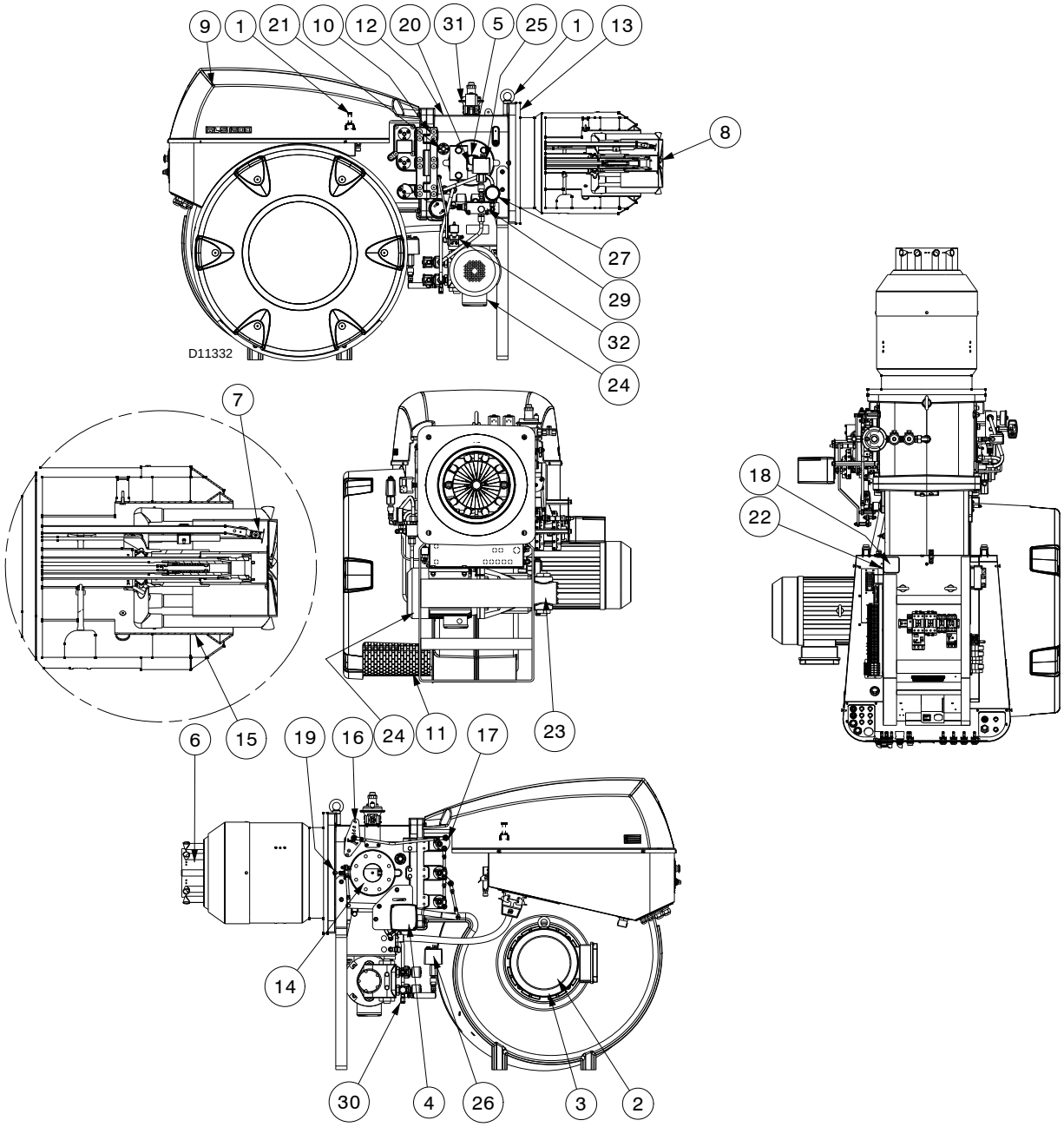


Fig. 5

1 Lifting rings
2 Fan
3 Fan motor
4 Air damper servomotor
5 Combustion head gas pressure test point
6 Combustion head
7 Ignition pilot
8 Flame stability disk
9 Electrical panel casing
10 Hinge for opening the burner
11 Fan air inlet
12 Pipe coupling
13 Gasket for boiler fixing
14 Gas train flange
15 Shutter
16 Combustion head movement lever
17 Air damper movement levers
18 Minimum air pressure switch (differential operating type)
19 Combustion head air pressure test point
20 Maximum gas pressure switch with pressure test point
21 Cell UV
22 Pressure test point for air pressure switch “+”
23 Pump
24 Pump motor
25 Minimum oil pressure switch
26 Maximum oil pressure switch
27 Nozzle return pressure gauge
28 Nozzle delivery pressure gauge
29 Oil modulator
30 Gauge connection
31 Pilot gas train
32 3-way valve for the mechanical activation of the burner lance

CAUTION

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

4.11 Electrical panel description

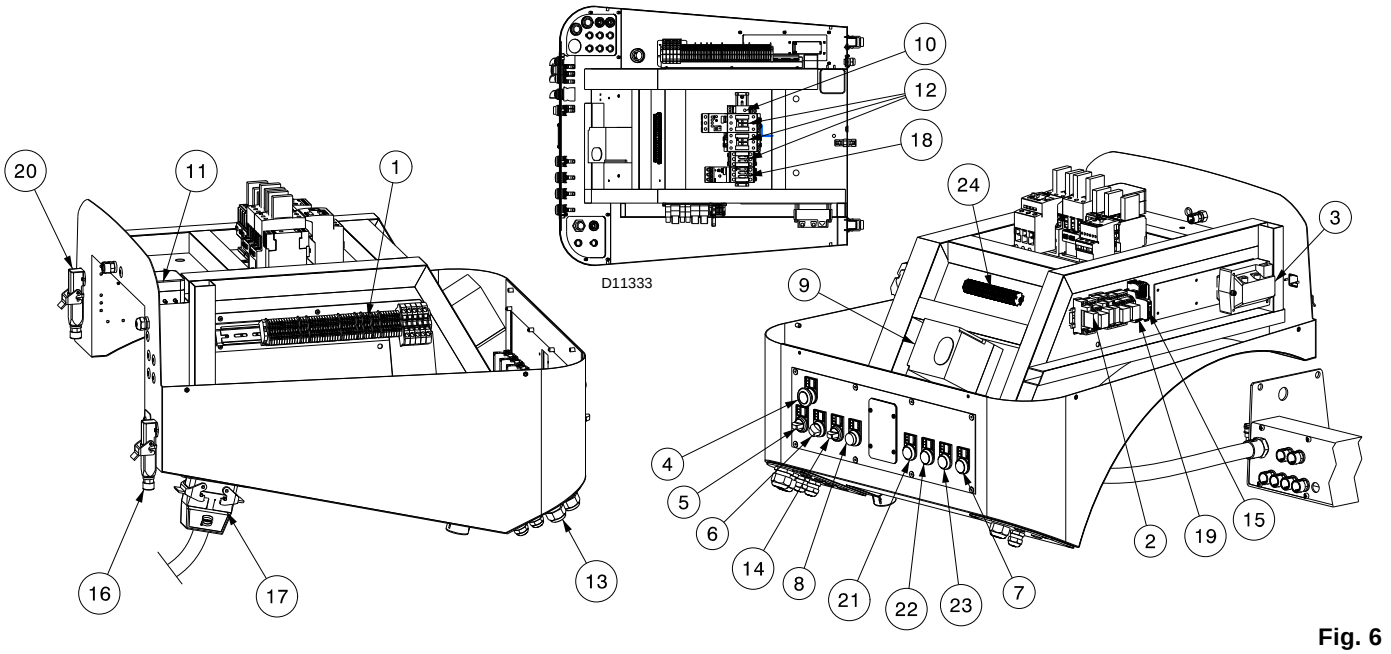


Fig. 6

1 Main terminal supply board
2 Clean contacts output relay
3 Ignition transformer
4 Stop push-button
5 OFF-automatic-manual selector
6 Power increase - power reduction selector
7 Motor, fan/pump motor thermal relay indicator light
8 Light signalling of burner lockout and reset switch
9 Electrical control box
10 Timer
11 Air pressure switch
12 Fan motor contactor and thermal relay, star-triangle starter
13 Supply cables, external connections and kits
14 Fuel selector and enable signal to remote fuel selector
15 Auxiliary circuits fuse
16 Plug/socket servomotor
17 Valve plug/socket/Pump motor/PGm (Deriv. unit)
18 Pump motor contactor and thermal relay
19 Oil/Gas selection relay
20 Flame sensor plug/sensor socket
21 Light signalling of mains live state
22 Heat request indicator light
23 Light signalling of main fuel valve open
24 Terminal board for RWF40 kit

NOTE

Two types of burner failure may occur:

➤ **Control box lockout:** if the control box button (**red led**) 9)(Fig. 6) and the backlit button 8) light up, it indicates that the burner is in lockout.
Release by pressing the pushbutton 8).

➤ **Motors lockout**: release by pressing the button on the relevant thermal relay.

4.12 Burner equipment

Gasket for gas train flange . . . . . No. 1
M 16 x 70 gas flange fastener screws . . . . . No. 8
Thermal insulation screen . . . . . No. 1
M 20 x 70 screws to secure the burner flange to the boiler . . . . . No. 4
Light gas flexible hoses . . . . . No. 2
Fitting 1” 1/2 - 3/4” (RLS 1200/M C13). . . . . No. 1
Fitting 3/4” - 1/2” (RLS 1200/M C13) . . . . . No. 1
Rotating elbow 1/2” (RLS 1000/M C13) . . . . . No. 1
Instructions. . . . . No. 1
Spare parts list . . . . . No. 1

4.13 Control box (LFL1.333..)

Warnings

WARNING

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

The control box LFL1.333.. is a safety device! Avoid opening or modifying it, or forcing its operation. Riello S.p.A. cannot assume any responsibility for damage resulting from unauthorised interventions!

➤ All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
➤ Before modifying the wiring in the LFL1333...control box connection area, fully disconnect the system from the power supply (omnipolar separation).
➤ Protection against electrocution from the control box and all connected electric components is obtained with the correct assembly.
➤ Before any intervention (assembly and installation operations, assistance, etc.), ensure the wiring is in order and that the parameters are correctly set, then make the safety checks.
➤ Falls and collisions can negatively affect the safety functions. In this case, the control box must not be operated, even if it displays no evident damage.
➤ Do not press the reset button or the remote reset button of the control box for more than 10 seconds because this will damage the internal relay.

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

Use

The control box LFL1.333.. is a control and supervision system of medium and large capacity forced draught burners for intermittent operation (at least one controlled shut-down every 24 hours).

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.
- Ensure that spliced wires cannot get into contact with neighbouring terminals. Use adequate ferrules.
- Arrange the H.V. ignition cables separately, as far as possible from the control box and the other cables.
- When wiring the unit, make sure that AC 230 V mains voltage cables are run strictly separate from extra low-voltage cables to avoid risks of electrical shock hazard.

Fig. 7

Electrical wiring of the flame detector

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

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

Technical data

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

4.14 Servomotor (SQM10.1....)

Warnings

WARNING

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

Avoid opening, modifying or forcing the actuators.

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

Assembly notes

- Check the relevant national safety standards are respected.
- When assembling the servomotor and connecting the damper, the gears can be disengaged by means of a lever, allowing the drive shaft to be easily adjusted in both directions of rotation.

Fig. 8

Technical data

Operating voltage	AC 220...240V, 50 Hz –15 % / +10 % AC 220 V, 60 Hz –15 % / +10 %
Auxiliary and limit switches switching capacity	10 (3) A, AC 24...250 V
Angular positioning	up to 160 ° (base scale)
Assembly position	optional
Electrical protection	IP 54, DIN 40050
Safety class	IT
Weight	approx. 1.7 kg
Actuator motor	synchronous motor
Power absorption	9 VA
Environmental conditions:	
Operation	DIN EN 60 721-3-1
Climatic conditions	Class 1K3
Mechanical conditions	Class 1M2
Temperature range	-20...+70°C
Humidity	< 95% RH

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.

Checking the characteristics of the burner

Check the identification label of the burner, showing:
- ➤ the model (**A**)(Fig. 9) 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**).
- ➤ light oil maximum viscosity (**L**).

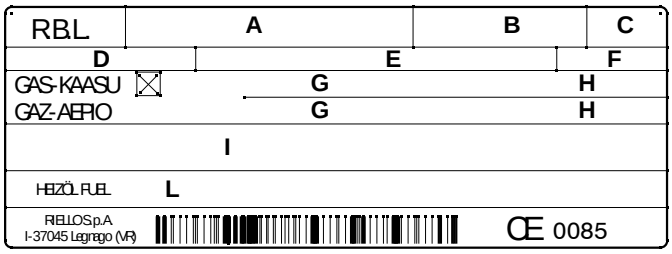


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Fig. 9

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 and makes any installation or maintenance work difficult.

5.4 Operating position

WARNING

- ➤ The burner is designed to operate only in positions **1**, **2**, **3** and **4** (Fig. 10).
- ➤ Installation **1** is preferable, as it is the only one that allows the maintenance operations as described in this manual.
- ➤ Installations **2**, **3** and **4** permit operation but make maintenance and inspection of the combustion head more difficult.

DANGER

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

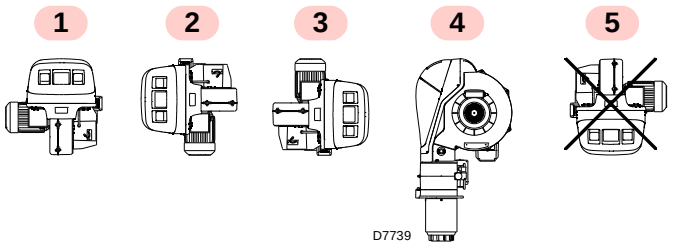


Fig. 10

5.5 Preparing the boiler

5.5.1 Boring the boiler plate

Pierce the closing plate of the combustion chamber, as in Fig. 11. The position of the threaded holes can be marked using the thermal insulation screen supplied with the burner.

mm	A	B	C
RLS 1000/M C13	460	608	M 20
RLS 1200/M C13	500	608	M 20

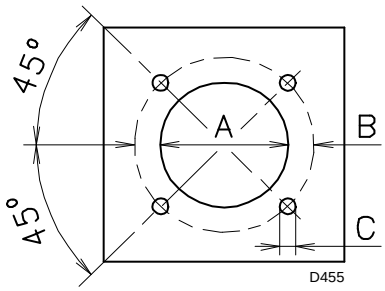


Fig. 11

5.5.2 Blast tube length

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

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

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

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

5.6 Securing the burner to the boiler

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

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

WARNING

The seal between burner and boiler must be airtight.

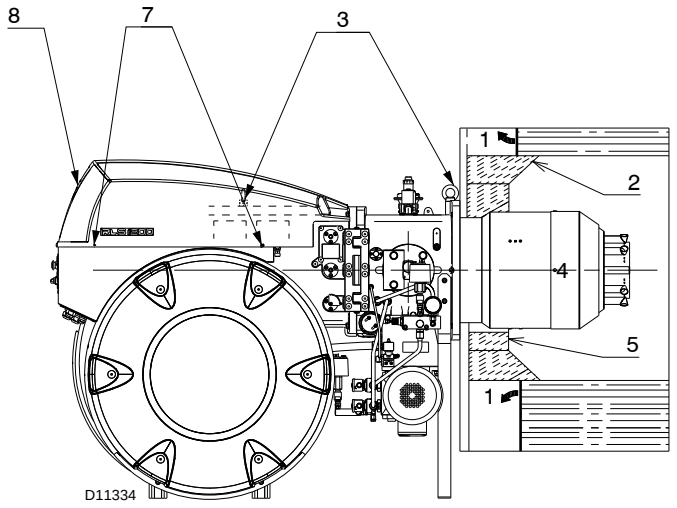


Fig. 12

5.7 Access to head internal part

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

- ➤ disconnect the electrical connections of the derivation unit servomotor pump motor;
- ➤ disconnect the leverages related to the cam and the movement of the head 12);
- ➤ unscrew the 4 fixing screws 1) and open the burner on the hinge;
- ➤ disconnect the cable 14) from the electrode 2);
- ➤ disconnect the light oil pipes unscrewing the two pipe fittings 3).

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

- ➤ Release the ignition pilot fitting 13);
- ➤ remove the screw/gas pressure socket 6) of the head;
- ➤ unscrew the locking screw of the oil lance 9) and extract the oil lance from the combustion head 10);
- ➤ pull out the inner part of the head 5).

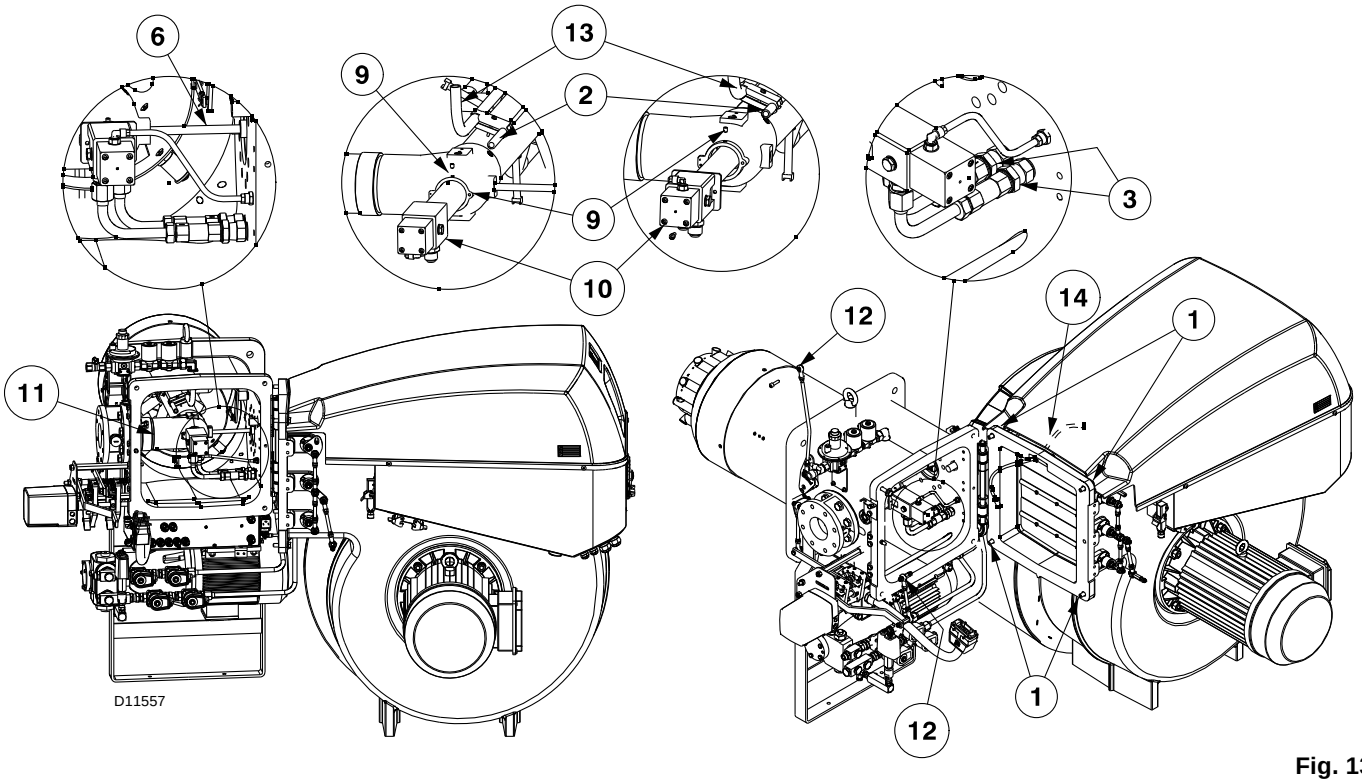


Fig. 13

5.8 Electrode position

WARNING

Place the electrode on the ignition pilot observing the dimensions specified in Fig. 14.

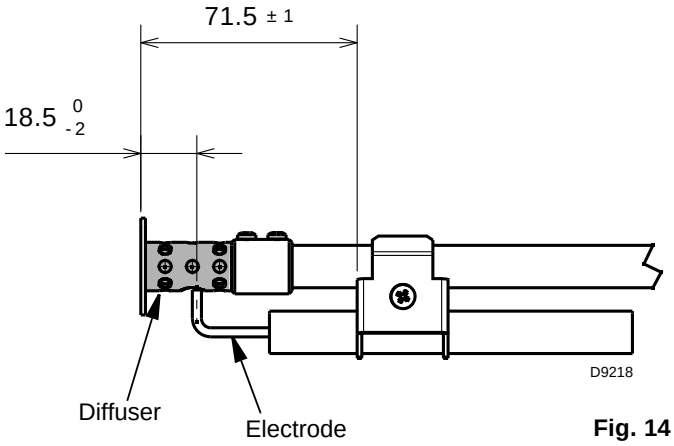


Fig. 14

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 the nozzle once a year during periodical maintenance.

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 non-observance of the requirements contained in this manual.

Fit the nozzle with a 24 mm (for RLS 1000/M C13) and 41 mm (for RLS 1200/C13 M) box wrench, passing from the centre opening of the flame stability disc (Fig. 15).

Fit the nozzles with the fuel interception rod on the nozzle holder. To calibrate the delivery range of operation of the nozzle, adjust the fuel pressure on the nozzle return line, according to Tab. E.

WARNING

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

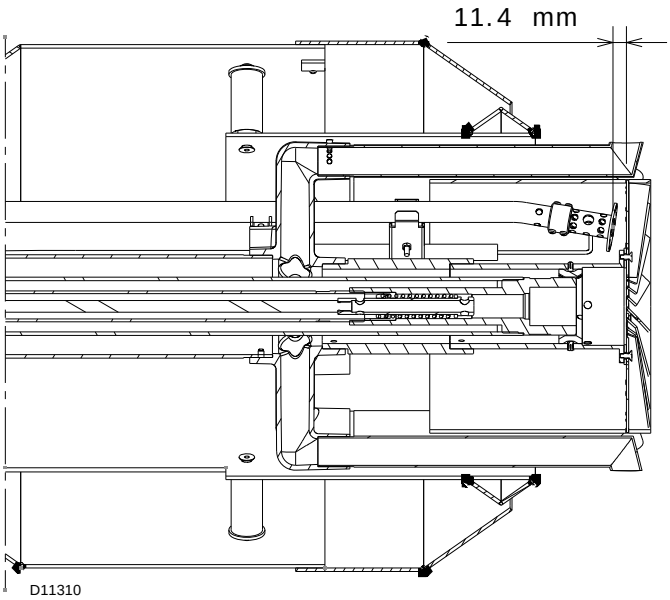


Fig. 15

5.9.1 Recommended nozzle

Model	Nozzle	
RLS 1000/E C13	– Bergonzo – Fluidics	type B5 60° type W2 60°
RLS 1200/E C13	– Bergonzo	type C3 - C5 60°

Complete range of nozzles:

- Bergonzo type B5 60°
  350 - 375 - 400 - 425 - 450 - 475 - 500 - 525 - 550 - 575 - 600 650 - 700 - 750 - 800 - 850 - 900.
- Bergonzo type C3 - C5 60°
  700 - 800 - 900 - 1000 - 1100
- Fluidics type W2 60°:
  375 - 400 - 450 - 500 - 550 - 600 - 650 - 700 - 750.

Nozzle	kg/h	Delivery pressure bar	Return pressure (bar)	kg/h	kW
Bergonzo B5 60°	350	18	8	100	1200
		20	17.5	315	3750
	600	20	6	140	1675
		22	16	563	6700
	750	20	6.5	180	2150
		22	19	722	8600
	900	16	4	168	2000
		20	15	867	10300
Bergonzo C3 - C5 60°	700	18	3	172	2043
		20	16	462	5500
	700	18	3	172	2043
		20	19	635	7550
	900	17	5	237	2815
		18	17.5	791	9400
	1100	16	6	273	3242
		18	16.5	961	11425

Tab. E

5.10 Combustion head adjustment

The air damper servomotor 4)(Fig. 5), beyond varying the air output according to the output demand, through a leverage varies the combustion head adjustment.

This system allows an optimum adjustment also at minimum firing rate. Similarly to servomotor rotation, it is possible to vary the opening of the combustion head moving the tie-rod on the holes (5-6-7-8-10)(Fig. 16).

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

In the factory, the adjustment is adjusted for the maximum stroke (hole 10, Fig. 16).

	Leverage hole	Output (kW)	
		From	A
RLS 1000	5	1200	3750
	5	3750	6700
	8	6700	8600
	8	8600	10600
RLS 1200	5	1500	5500
	5	5500	7500
	6	7500	9600
	10	9600	11500

Tab. F

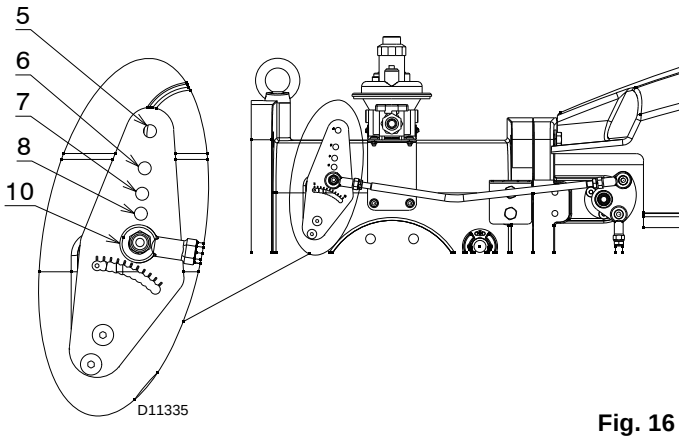


Fig. 16

5.11 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.

5.11.1 Double-pipe circuit

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

Tank higher than burner A (Fig. 17)
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. 17)
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 lifespan 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.

5.11.2 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. G.

+/- H [m]	RLS 1000/M C13				RLS 1200/M C13			
	Ø [mm]				Ø [mm]			
	20	22	24	27	22	24	27	36
4.0	26	45	73	138	19	33	65	300
3.0	22	39	63	120	16	28	55	260
2.0	18	33	53	102	13	23	45	220
1.0	15	26	44	84	10	18	38	185
0.5	13	23	39	75	9	16	33	165
0	11	20	34	66	7	13	30	145
-4.0	-	-	-	-	-	-	-	-
-3.0	-	-	-	12	-	-	-	30
-2.0	-	7	14	30	-	-	11	70
-1.0	7	14	24	48	-	9	20	108
-0.5	9	17	29	57	5	11	25	125
0	11	20	34	66	7	13	29	145

Tab. G

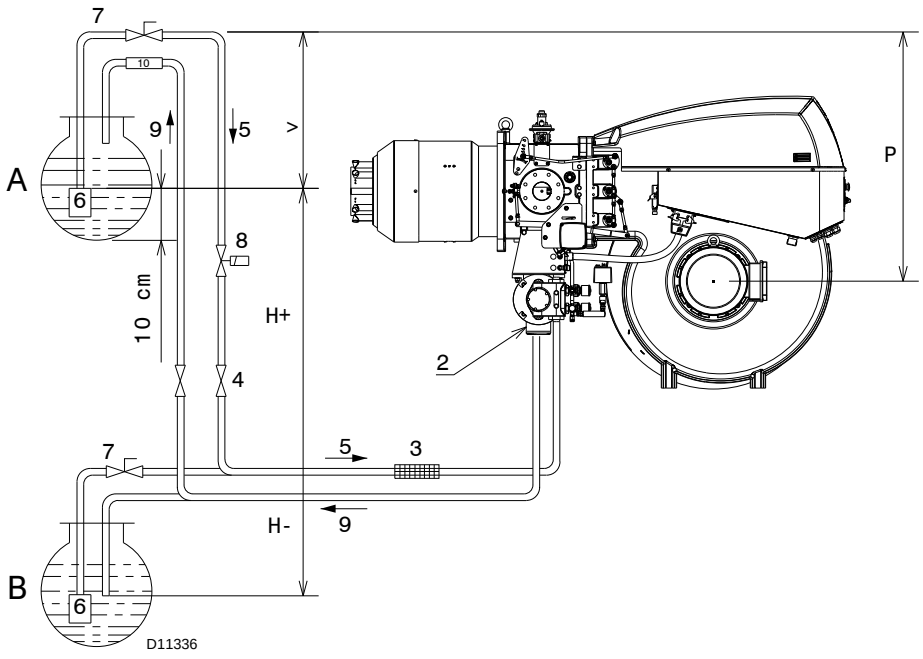


Fig. 17

Key (Fig. 17)

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)

5.11.3 Hydraulic connections

CAUTION

➤ Make sure that the flexible hoses to the pump supply and return line are installed correctly.

WARNING

Follow the instructions below:

➤ Tighten the flexible hoses with the supplied gaskets.

➤ Take care that the hoses are not stretched or twisted during installation.

➤ Place the pipes so that they are not crushed or are in contact with hot parts of the boiler and so it is possible to open the burner.

➤ Finally, connect the other end of the flexible hoses to the suction and return pipes.

5.11.4 Hydraulic circuit diagram

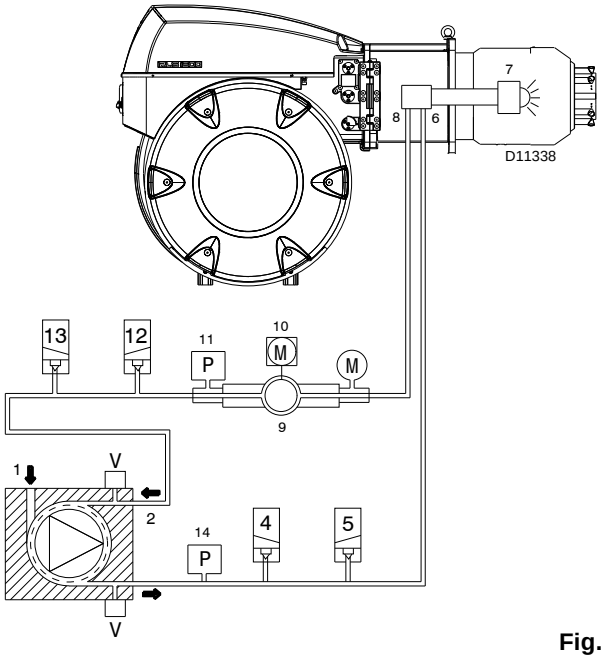


Fig. 18

Key (Fig. 18)

1 Pump suction
2 Pump return line and nozzle return line
3 Pump pressure regulator
4 Delivery safety valve
5 Delivery safety valve
6 Nozzle delivery line
7 Nozzle without interception rod
8 Nozzle return line
9 Pressure variator on nozzle return line
10 Pressure variator servomotor
11 Pressure switch on nozzle return line
12 Safety valve on nozzle return line
13 Safety valve on nozzle return line
14 Pressure switch on pump delivery line
M Pressure gauges
V Vacuometer connection

OPERATION

Pre-purging phase: valves 4), 5), 12) and 13) closed.

Ignition and operation phase: valves 4), 4), 12) and 13) open.

Stop: all valves closed.

5.11.5 Pressure variator

Calibration pressure on return line

With a servomotor position of 20°, the nut and the corresponding lock nut 6)(Fig. 19), are fixed in contact with the eccentric 3). During the rotation towards 130° of the servomotor, the eccentric will push the modulator shaft, taking the pressure read on the pressure gauge 2)(Fig. 19) to the desired value.

To calibrate the eccentric, loosen screws 7), and turn screw 4) until the desired eccentricity is obtained.

– By turning screw 4) to the right (+) the eccentricity increases, thereby increasing the difference between the maximum and minimum capacity of the nozzle.
– By turning screw 4) to the left (-) the eccentricity decreases, thereby decreasing the difference between the maximum and minimum capacity of the nozzle.

Calibration pressure on delivery line

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

Example:

if you use a 750 kg/h nozzle and you want to obtain power of 6650 kW, the pressure on the pressure gauge 3)(Fig. 19) (maximum pressure on return circuit) must be about 19 bar.
Relevant delivery pressure read on the pressure gauge 2), must be 22 bar (see table on pag. 18).

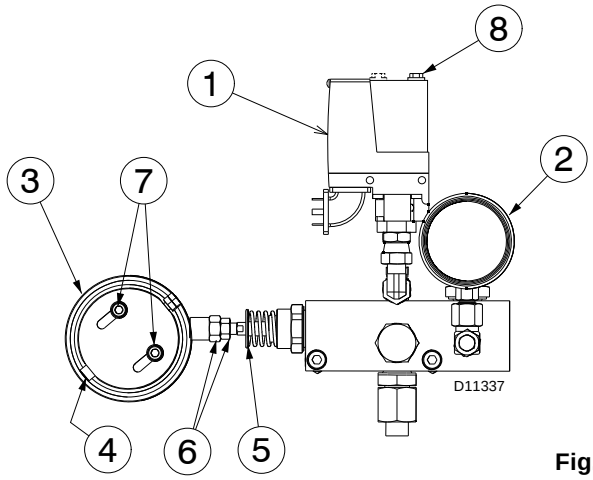


Fig. 19

Key (Fig. 19)

1 Maximum oil pressure switch
2 Return pressure gauge
3 Variable eccentric
4 Eccentric adjustment screw
5 Piston stop ring
6 Piston calibration nut and lock nut
7 Eccentric locking screws
8 Adjustment screw/calibration for maximum oil pressure switch

CAUTION

For a correct calibration, the eccentric 3) must operate on the entire range of travel of the servomotor (20A - 130A): a pressure variation must correspond to every variation of the servomotor.

WARNING

Never take the piston of the variator to the end: the stop ring 5) determines the maximum travel.

WARNING

Screw 8) (Fig. 19) - does not need adjusting as it has been calibrated in the factory

To control the outlet delivery of the nozzle, proceed as follows:
➤ open the burner following the instructions on pag. 17,
➤ connect a pipe to the nozzle, simulate the ignition and proceed with the weighing at the maximum and minimum pressures.

If at the maximum delivery of the nozzle (maximum pressure on the return line) pressure oscillations can be seen on the pressure gauge 2), slightly reduce the pressure until they disappear.

NOTE:
The burner is factory calibrated with maximum pressure on the return line of approximately 19.5 bar and delivery pressure of approximately 22 bar.

5.12 Pump

5.12.1 Technical data

Pump	RLS 1000/M C13 VBHRG	RLS 1200/M C13 VBHGRP
Min. delivery rate at 40 bar pressure	1160 kg/h	1660 kg/h
Delivery pressure range	9 - 40 bar	9 - 40 bar
Max. suction depression	0.6 bar	0.6 bar
Viscosity range	6 - 800 cSt	6 - 800 cSt
Max. light oil temperature	140°C	140°C
Max. suction and return pressure	5 bar	5 bar
Pressure calibration in the factory	20 bar	18 bar

Tab. H

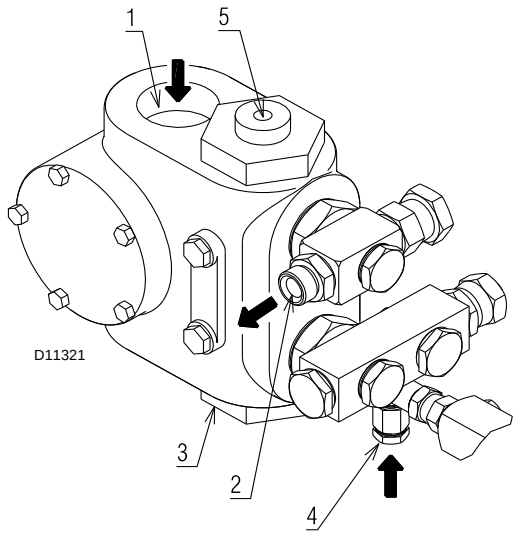


Fig. 20

Key (Fig. 20)

1	Suction line	G 1” 1/2
2	Return line	G 3/4”
3	Gauge connection	G 1/4”
4	Vacuometer connection	G 1/4”
5	Pressure adjuster	

5.12.2 Priming pump

WARNING

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

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

➤ In order for self-priming to take place, the screw 4) on the pump (Fig. 20) must be loosened to bleed off the air contained in the suction line.
➤ Start the burner by closing the remote controls. As soon as the burner starts, check the direction of rotation of the fan blade.
➤ The pump can be considered to be primed when the light oil starts coming out of the screw 4).
➤ Close the burner and undo the screws 4).

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

Do not illuminate the UV 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 vacuometer 4)(Fig. 20) 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.

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. 21 - Fig. 22 - Fig. 23 - Fig. 24)

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

6B Includes
- working valve
- safety valve
- pressure adjuster

6C Includes
- safety valve
- working valve

6D Includes:
- safety valve
- working valve
- pressure adjuster
- filter

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 Upline pressure of valves/adjuster
P3 Upstream pressure of the filter
L Gas train, supplied separately
L1 The responsibility of the installer

MBC "threaded"

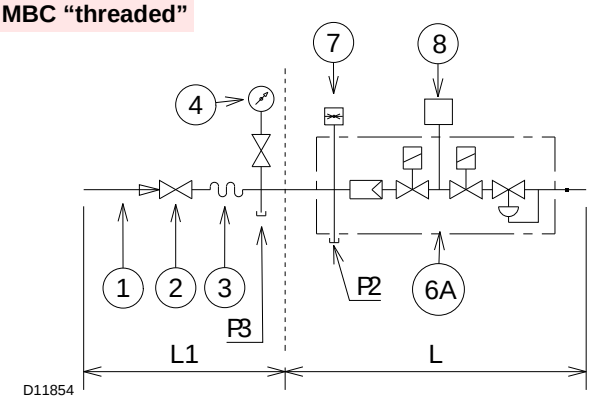


Fig. 21

MBC "flanged"

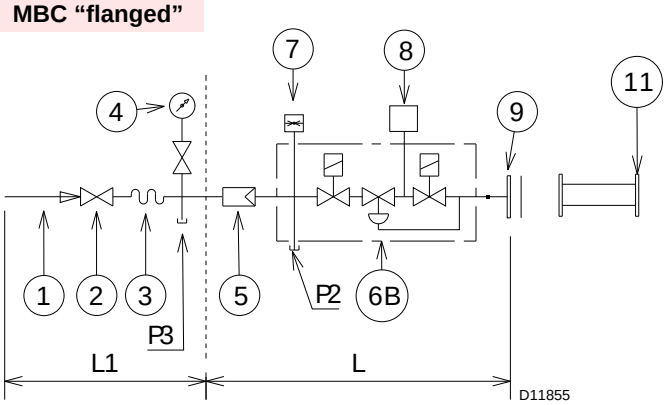


Fig. 22

DMV "flanged or threaded"

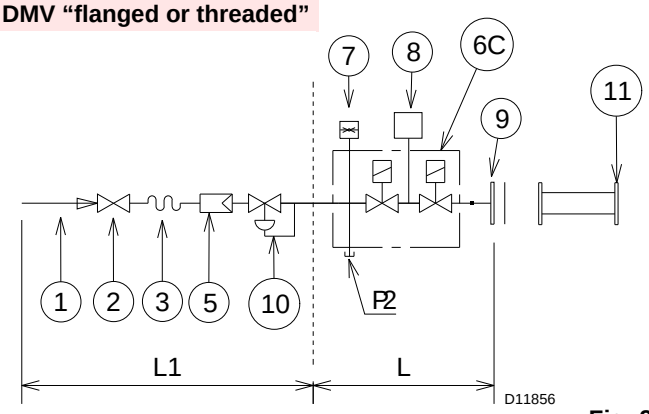


Fig. 23

CB "flanged or threaded"

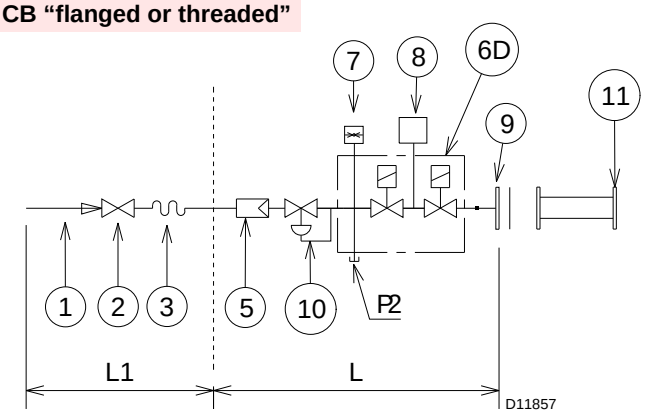


Fig. 24

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 prearranged to be connected to the burner by the flange 1)(Fig. 25).

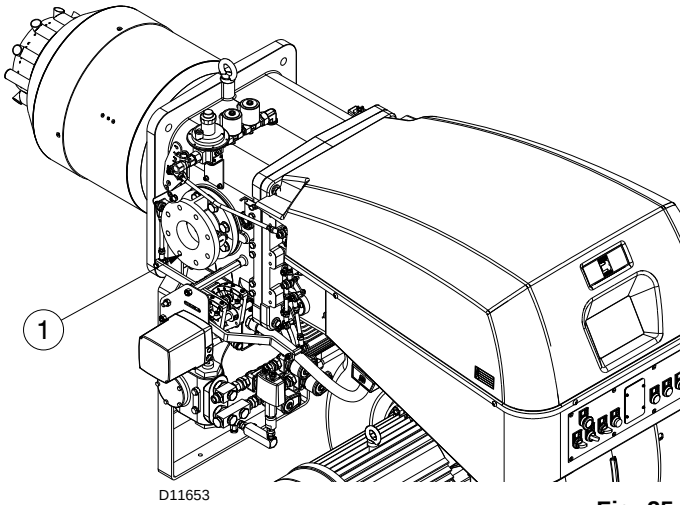


Fig. 25

5.13.4 Gas pressure

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

	kW	**1** Δp (mbar)		**2** Δp (mbar)	
		G 20	G 25	G 20	G 25
RLS 1000/M C13	3750	9.2	13.7	1.0	1.4
	4000	10.8	16.0	1.1	1.6
	4500	13.9	20.7	1.4	2.1
	5000	17.0	25.4	1.7	2.5
	5500	20.2	30.1	2.1	3.1
	6000	23.3	34.8	2.4	3.7
	6500	26.4	39.4	2.9	4.3
	7000	30.4	45.3	3.3	5.0
	7500	34.8	51.9	3.8	5.7
	8000	39.2	58.5	4.4	6.5
	8500	43.6	65.1	4.9	7.3
	9000	49.2	73.3	5.5	8.2
	9500	55.0	82.0	6.1	9.2
	10000	60.8	90.7	6.8	10.1
	10600	67.8	101.1	7.6	11.4
RLS 1200/M C13	5500	23.1	34.5	2.1	3.1
	6000	27.9	41.6	2.4	3.7
	6500	32.6	48.7	2.9	4.3
	7000	37.4	55.7	3.3	5.0
	7500	42.1	62.8	3.8	5.7
	8000	48.3	72.1	4.4	6.5
	8500	54.5	81.3	4.9	7.3
	9000	60.7	90.6	5.5	8.2
	9500	67.0	99.8	6.1	9.2
	10000	74.3	110.8	6.8	10.2
	10500	81.9	122.2	7.5	11.2
	11000	89.6	133.6	8.2	12.3
	11500	97.2	145.0	9.0	13.4

Tab. I

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

Column 1

Pressure loss at combustion head.
Gas pressure measured at test point 1)(Fig. 26), with:
- combustion chamber at 0 mbar;
- burner working at maximum modulating output;
- combustion head set as in pag. 19.

Column 2

Pressure loss at gas butterfly valve 2)(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 1)(Fig. 26).
– Find, in the table Tab. I related to the burner concerned, the pressure value closest to the result of the subtraction.
– Read off the corresponding output on the left.

Example RLS 1000/M C13 with natural gas G20:
Operation at maximum modulating output
Gas pressure at test point 1)(Fig. 26) = 44.2 mbar
Pressure in combustion chamber = 5 mbar
44.2 - 5 = 39.2 mbar

A pressure of 39.2 mbar, column 1, corresponds in Tab. I to an output of 8000 kW.

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

To calculate the required gas pressure at test point 1)(Fig. 26), set the maximum modulating output required from the burner operation:
– find the nearest output value in the table Tab. I for the burner in question.
– read, on the right (column 1), the pressure at the test point 1) (Fig. 26).
– Add this value to the estimated pressure in the combustion chamber.

Example RLS 1000/M C13 with natural gas G20:
Operation at maximum modulating output
Gas pressure at an output of 8000 kW = 39.2 mbar
Pressure in combustion chamber = 5 mbar
39.2 + 5 = 44.2 mbar
pressure required at test point 1)(Fig. 26).

5.13.5 Pilot - gas train connection

The burner is fitted with a dedicated gas train that is fixed to the pipe coupling.
➤ It should be connected to the main train downstream the filter or the pressure adjuster (depending on configuration).

Oil burners (with LPG pilot) can be directly connected to the LPG cylinder.

WARNING

Supply pressure 68 - 500 mbar

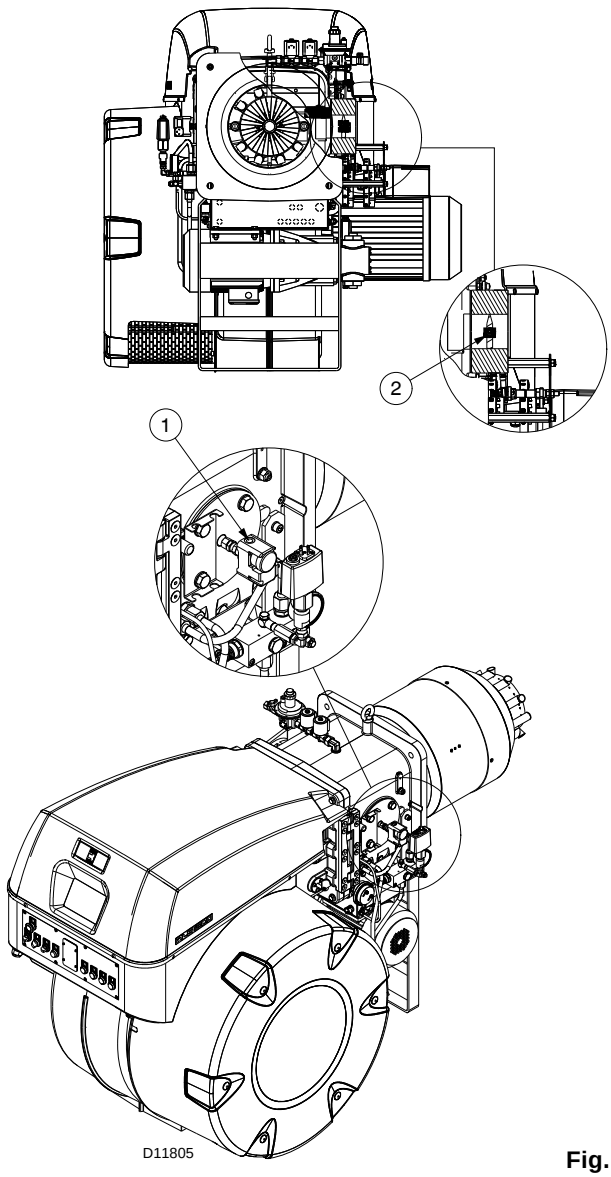


Fig. 26

5.13.6 Ignition pilot burner

For proper operation, adjust gas pressure (measured at pressure test point 1)(Fig. 27) as follows:

Model	Gas	mbar	Sm^3/h
RLS 1000/M C13	G20	1.5	12.3
	G31	1.4	3.2
RLS 1200/M C13	G20	40	14.3
	G31	30	7.1

Tab. J

WARNING

Check pilot flame stability before starting up the main burner.

In the case of ignition problems check:
➤ correct positioning of the ignition electrode;
➤ the gas pressure, according to indications.

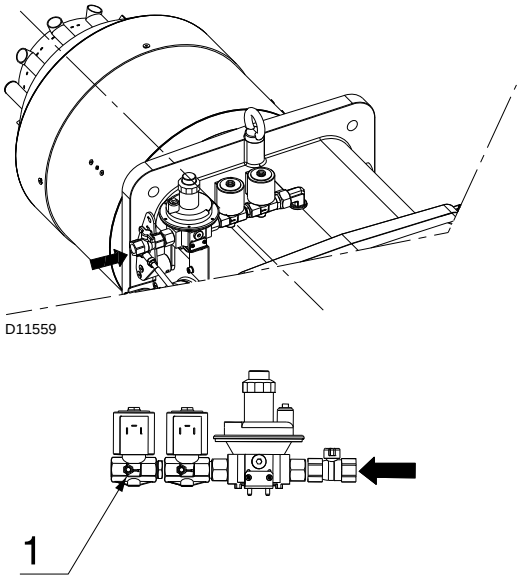
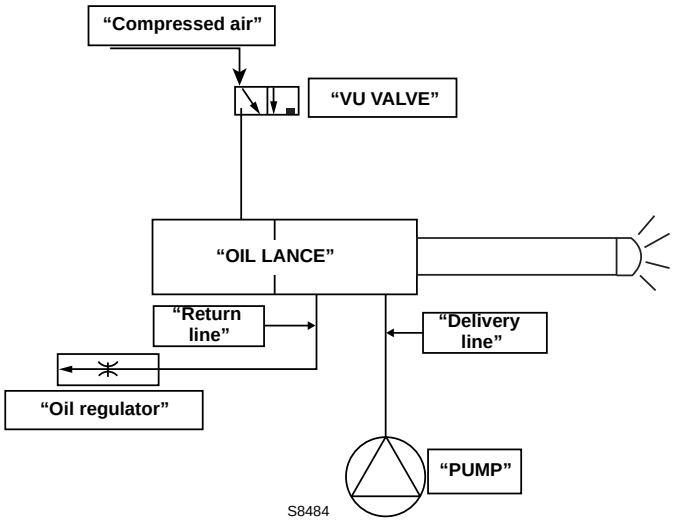


Fig. 27

5.14 Activation of the burner lance

The burner is equipped with a spray lance for light oil.
Fig. 28 shows the 3-way valve used for the mechanical activation of the burner lance and the point at which the compressed air input A) must be connected.
It must operate at 6 - 7 bar.



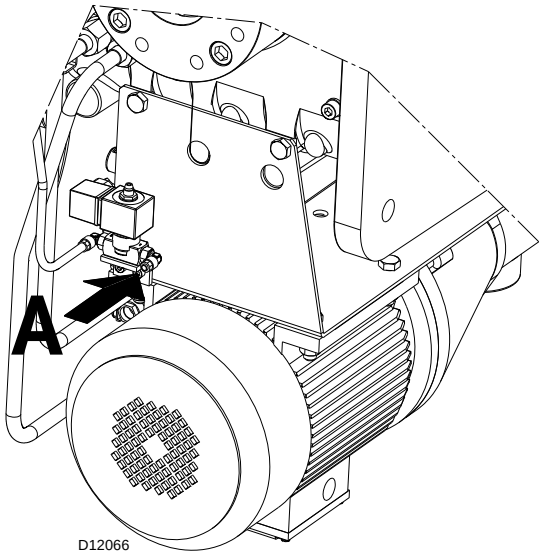


Fig. 28

5.15 Electrical connections

Notes on safety for the electrical wiring

DANGER

- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be made in accordance with the regulations currently in force in the country of destination and by qualified personnel. Refer to the wiring diagrams.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the wiring diagrams.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The burner has been type-approved for intermittent use.
  This means they should compulsorily be stopped at least once every 24 hours to enable the 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.

5.15.1 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. 29.

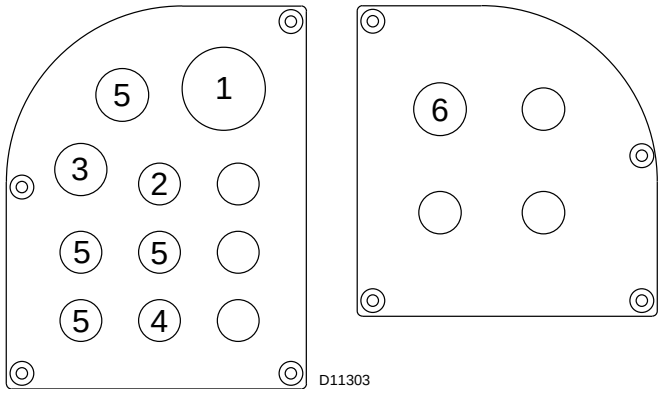


Fig. 29

Key (Fig. 29)
1 Electrical supply
2 Minimum gas pressure switch
3 Pressure switch for VPS gas valve leak detection
4 Gas train
5 Consents/Safety
6 Available

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

5.16 Calibration of the thermal relay

The thermal relay (Fig. 30) serves to avoid damage to the motor due to an excessive absorption increase or if a phase is missing.

For calibration 2), refer to the table indicated in the electrical layout (electrical wiring in charge of the installer).

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

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

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

WARNING

The automatic reset can be dangerous.

This operation is not foreseen in the burner operation.

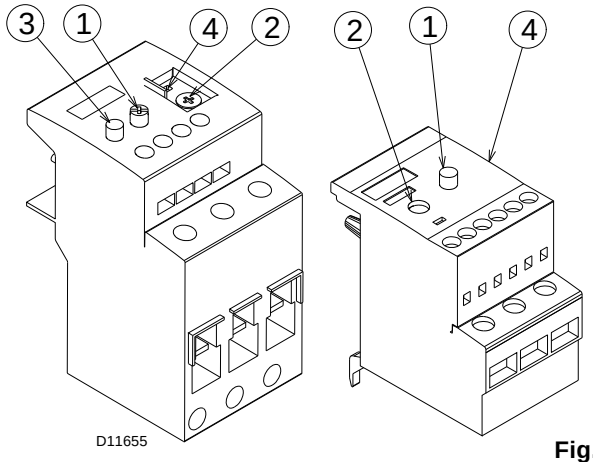


Fig. 30

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 prior to ignition (light oil)

WARNING

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

Carry out the fuel change with burner off.

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

6.2.1 Nozzle

See information on pag. 18.

6.2.2 Combustion head

The adjustment of the combustion head already carried out on pag. 19 need not be altered unless the 2nd stage delivery of the burner is changed.

6.2.3 Pump pressure

In order to change pump pressure, act on screw 5)(Fig. 20). See information on pag. 18.

6.2.4 Fan damper

Refer to the adjustment of the servomotor on pag. 31.

6.3 Burner ignition (light oil)

Position the selector 1)(Fig. 31) in “**AUTO**”.

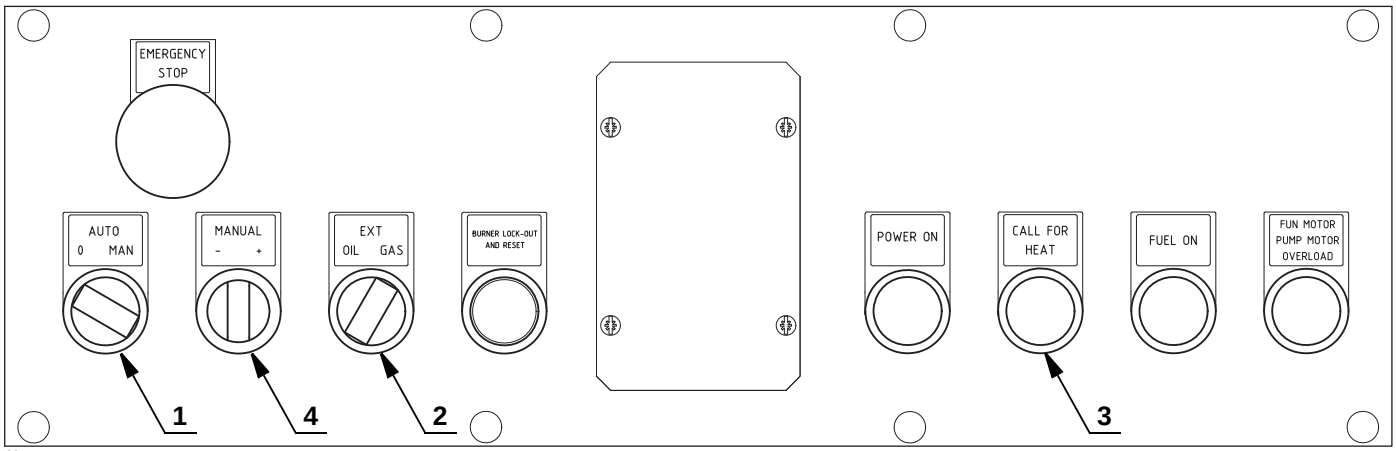
Position the selector 2) in “**OIL**” to select light oil fuel.

When the limit thermostat (TL) is closed, the “**HEAT REQUEST**” 3) signal must be switched on.

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

In the event that the burner locks-out again, refer to chapter ‘Faults - Possible causes - Solutions” on pag. 40.

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



S8411

Fig. 31

6.4 Adjustments prior to ignition (gas)

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. 39) to the start of the scale.
- ➤ Adjust the maximum gas pressure switch (Fig. 38) to the end of the scale.
- ➤ Adjust the air pressure switch (Fig. 37) to the start of the scale.
- ➤ Purge the air from the gas line.
  We recommend using a plastic tube routed outside the building and to purge air until gas is smelt.
- ➤ Fit a U-type pressure gauge or a differential pressure gauge (Fig. 32), with socket (+) on the gas pressure of the pipe coupling and (-) in the combustion chamber.
  The manometer readings are used to calculate MAX burner output.
- ➤ Connect two lamps or testers to the two gas line solenoids to check the exact moment in which voltage is supplied.
  This operation is unnecessary if each of the two solenoid valves is equipped with a pilot light that signals voltage passing through.

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.

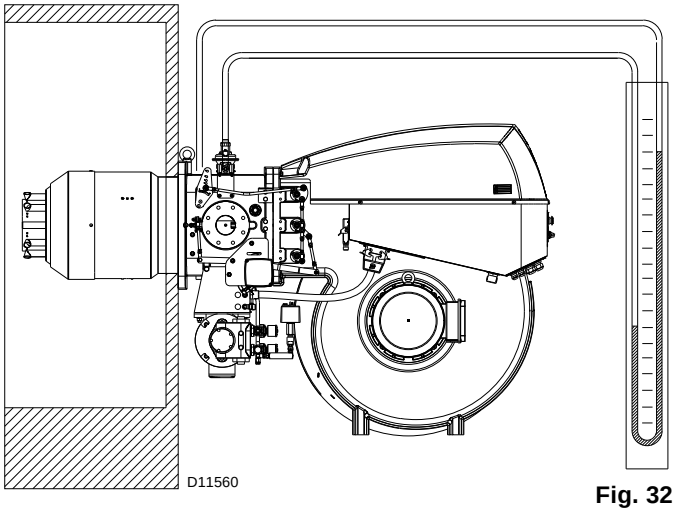


Fig. 32

6.5 Burner start-up (gas)

Close the remote controls and position the selector 1)(Fig. 31) to “**AUTO**”.

Position the selector 2) to “**GAS**” to select gas as fuel.

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

When the limit thermostat (TL) is closed, the “**CALL FOR HEAT**” 3)(Fig. 31) signal must be on. The burner will subsequently start its starting cycle.

6.6 Burner ignition

The burner should light after having performed the above steps.

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

If ignition is still not achieved, it may be that gas is not reaching the combustion head within the safety time period of 3 seconds. In this case increase gas ignition delivery.

The arrival of gas at the sleeve is indicated by the U-type manometer (Fig. 32).

In the event that the burner locks-out again, refer to chapter ‘Faults - Possible causes - Solutions” on pag. 40.

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

6.7 Change of fuel

There are two change of fuel options:

1 with selector 2)(Fig. 31);
2 with a remote selector connected to the main terminal board. Positioning the selector 2)(Fig. 31) to “**EXT**” activates the remote selection of the fuel.

6.8 Servomotor adjustment

The servomotor (Fig. 33) adjusts simultaneously, through driving gears, the output and pressure of the air and the delivery of the fuel in use.

It is equipped with adjustable cams which operate as many switches.

Cam I: limits the servomotor limit switch on the maximum position (about 130°) (light oil operation).

Cam II: limits the servomotor limit switch on the 0 position°. With the burner off the air damper is completely closed (light oil and gas operation).

Cam III: regulates the minimum modulating output. Position 45 is factory set (minimum light oil operation).

Cam IV: limits the servomotor limit switch on the max position (about 130°) (gas operation).

Cam V: regulates the minimum modulating output. Factory set at position 45 (gas operation).

Rem. cams: not used

Lever 7: servomotor reset

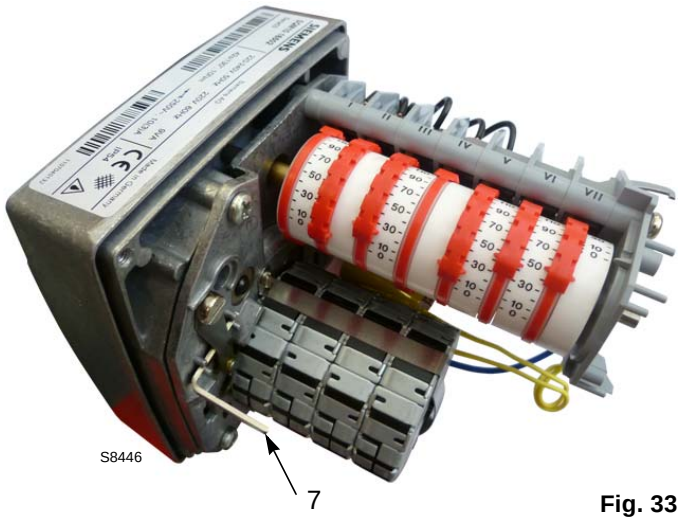


Fig. 33

6.9 Combustion air adjustment

The fuel/combustion synchronization is made by means of a servomotor connected to two variable profile cams, which act on the outlet air damper 1)(Fig. 34) and gas damper 2) and on the combustion head by appropriate levers.

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

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

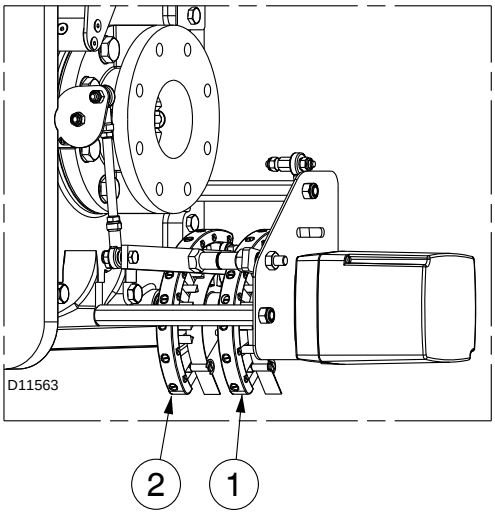


Fig. 34

The values indicated in Tab. K and Tab. L can be a reference for a good combustion calibration.

EN 676		Air excess		CO
		Max. output $\lambda \leq 1.2$	Max. output $\lambda \leq 1.3$	
GAS	Theoretical max. CO_2 0 % O_2	CO_2 % Calibration		mg/kWh
		$\lambda = 1.2$	$\lambda = 1.3$	
G 20	11.7	9.7	9	≤ 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. K

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. L

6.10 Burner adjustment and output modulation

6.10.1 Maximum output

The servomotor (Fig. 33 on pag. 31) must be adjusted to the maximum opening so that the air dampers are completely open.

6.10.2 Minimum output

Min output must be selected within the firing rate range shown on pag. 10.

Turn the selector 4)(Fig. 31) “output reduction”, and keep it turned to “**-**” until the servomotor has closed the air damper and the gas butterfly valve at 35 (adjustment made in the factory).

Air adjustment

The starting profile of cam 1)(Fig. 35) must be progressively adjusted by turning the screws 2)(Fig. 35).

WARNING

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

6.10.3 Intermediate outputs

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

The passage from one position to the next one is obtained by pressing the selector 4)(Fig. 31) on the symbol "**+**" or "**-**".

For better adjustment repeatability, take care to stop the rotation of the cam unit when the upper bearing that slides on the profile 4)(Fig. 35) is aligned with one of the adjustment screws 2).

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

CAUTION

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

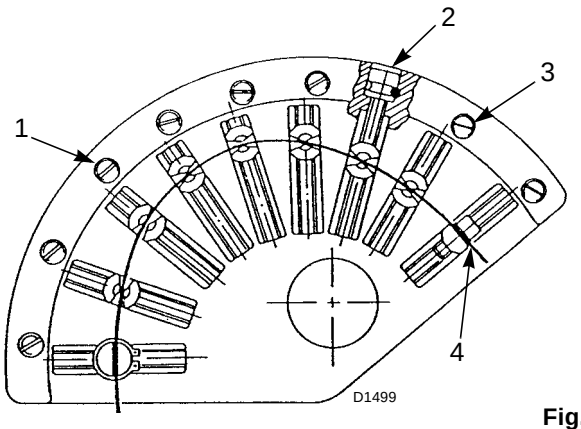


Fig. 35

Key (Fig. 35)
1 Cam
2 Adjustment screws
3 Locking screws
4 Adjustable profile

6.11 Air / fuel adjustment

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

A **Oil pump outlet pressure:**
turn screw 5)(Fig. 20 on pag. 22), on the pump.

B **Air cam:**
turn the adjustment screws 2)(Fig. 35) after having loosened screws 3).

C **Gas cam:**
turn the adjustment screws 2)(Fig. 35) after having loosened screws 3).

D **Oil cam:**
modify the eccentricity by turning the screw 7)(Fig. 36) after having loosened screws 6).
By tightening the screw 7) the eccentricity increases, thereby increasing the difference between the maximum and minimum return pressure of the nozzle.

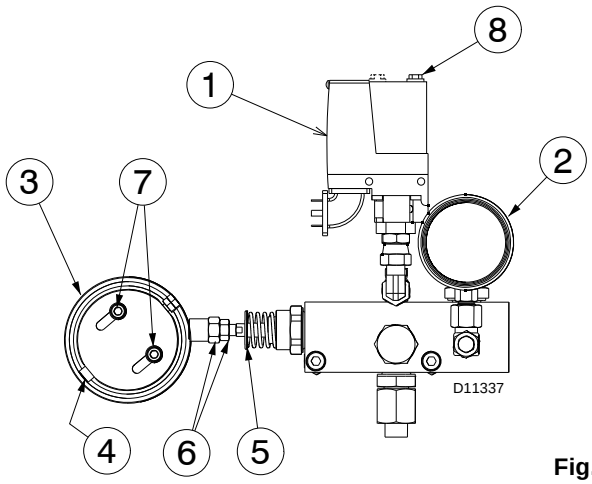


Fig. 36

Key (Fig. 36)
1 Maximum oil pressure switch
2 Return pressure gauge
3 Variable eccentric
4 Eccentric adjustment screw
5 Piston stop ring
6 Piston calibration nut and lock nut
7 Eccentric locking screws
8 Adjustment screw/calibration for maximum oil pressure switch

6.11.1 Burner calibration procedure

- ➤ Install the nozzle suitable to achieve the maximum desired output.
- ➤ Verify that the eccentricity of the oil cam is such to make a travel of about 8 mm on the shaft of oil modulator.
  Normally, with a shaft travel of 8 mm, the pressure variation needed for the modulation of the minimum to maximum output is obtained.
  To verify this, manually rotate the cam after having released the servomotor with the lever 7)(Fig. 33), so that the travel of the shaft is not exaggerated or insufficient. Remember to block the servomotor after the verification.
- ➤ Switch on the burner with the selector on the control panel in manual "**MAN**" 1) position (Fig. 31).
  At this point, after pre-purge operation, the servomotor stops at about 45.
- ➤ Adjust the outlet pressure of the pump as shown in point **A (oil pump outlet pressure)** to obtain an outlet pressure to the nozzle of 24 - 25 bar.
- ➤ Adjust the minimum return pressure to approx. 6 bar.
  To do so, the length of the shaft 5)(Fig. 36) must be varied by means of nut 6).
- ➤ Calibrate the air delivery by adjusting the variable profile cam with the screws 2)(Fig. 35).
- ➤ Having performed this first adjustment, increase the output supplied via the automatic return selector on the control panel. Pause after a 15 rotation of the servomotor and perform another adjustment by means of the variable profile cam of the air.
  A calibration that does not create smoky flame and that rapidly reaches the maximum output (maximum travel of the servomotor 130) should be performed; calibrate the return pressure on the eccentric screw 5)(Fig. 36), to achieve the output desired and requested by the nozzle and then calibrate the intermediate points.
- ➤ Then recheck the values of the combustion parameters at the various modulation outputs and if necessary make the necessary adjustments.
- ➤ Turn off the burner and wait for the complete shut-down of the fan motor.
- ➤ Now move the selector 2)(Fig. 31) to "**GAS**", perform a new ignition and check the correct gas operation at the desired output.
  If this is not so, calibrate the gas cam as in point **C (Gas Cam)** mentioned above.
- ➤ With the optimal adjustment achieved, remember to lock the adjustment screws of the cam profiles by means of screws 3)(Fig. 35).

WARNING

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

Check, performing a manual travel 0 - 130 of the cam, that there are no mechanical stops before the micro-switches 1-2 of the servomotor are activated.

6.12 Pressure switch adjustment

6.12.1 Air pressure switch - check CO

Adjust the air pressure switch after performing all other burner adjustments with the air pressure switch set to the start of the scale (Fig. 37).

With the burner operating at min. output, increase adjustment pressure by slowly turning the relative knob clockwise until the burner locks out.
Then turn the knob anti-clockwise by about 20% of the set point and repeat burner starting to ensure it is correct.
If the burner locks out again, turn the knob anti-clockwise a little bit more.

WARNING

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

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

The air pressure switch is installed in the "absolute" position, that is connected only to the pressure test point “+” 22)(Fig. 5).

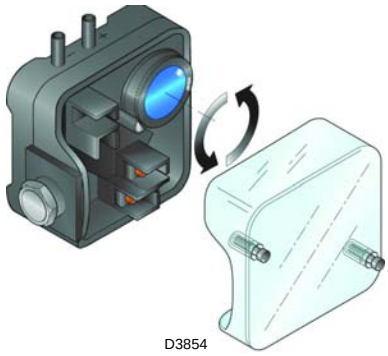


Fig. 37

6.12.2 Maximum gas pressure switch

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

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

Now turn the knob clockwise by 2 mbar and repeat the start-up of the burner.

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

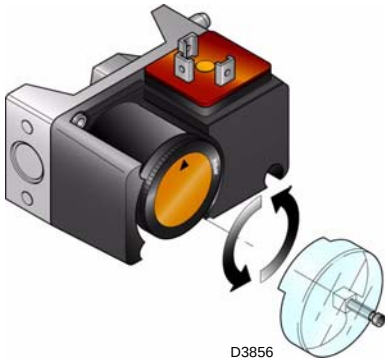


Fig. 38

6.12.3 Minimum gas pressure switch

Adjust the minimum gas pressure switch after performing all the other burner adjustments with the pressure switch set to the start of the scale (Fig. 39).

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

Now turn the knob anticlockwise by 2 mbar and repeat burner start-up to ensure it is uniform.

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

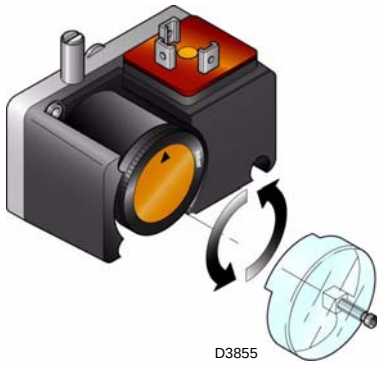


Fig. 39

6.13 Operation sequence of the burner

6.13.1 Burner start-up

0s TL thermostat/pressure switch closure.
Fan motor starts up.

6s Servomotor start: 130° rotation to the right, until the activation of the contact on cam 1).
If it's operating with oil or cam 4) if it's operating with gas.

48s The air damper positions on the MAX output.
Pre-purging with the air delivery of the MAX output.

80s The servomotor rotates towards the left until the angle set on the cam 3).
If it's operating with oil or cam 5) if it's operating with gas.

109S The air damper and the gas butterfly valve adopt the MIN output position.

113s Ignition electrode strikes a spark.

116s The pilot valves VP1 and VP2 open.
The flame is ignited at a low output level, point A (Fig. 40).

119s The spark goes out.

130s The safety valve VS opens, along with the adjustment valve VR (quick opening).
The output is then progressively increased, with the valve opening slowly up to MIN output, point B (Fig. 40).

143s The control box starting cycle ends.

6.13.2 Operation

Burner without the output power regulator RWF40
Once the starting cycle is completed, the servomotor command moves on to the TR thermostat/pressure switch that controls the pressure or the temperature in the boiler, point C (Fig. 40).
(The electrical control box continues to check the presence of the flame and the correct position of the air and gas maximum pressure switches).

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

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

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

NORMAL IGNITION

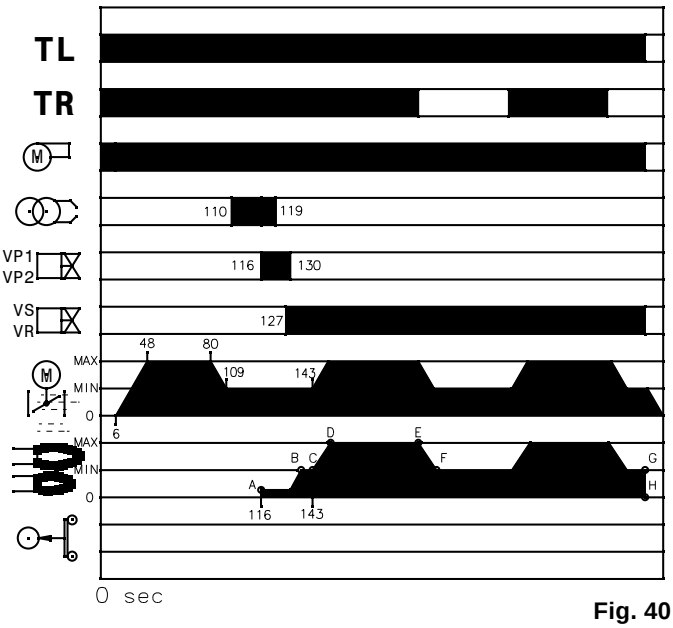


Fig. 40

NO IGNITION

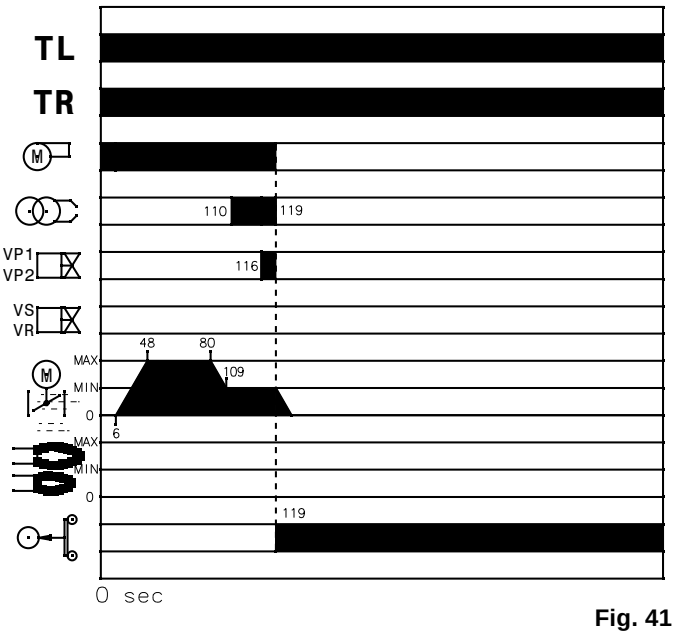


Fig. 41

6.13.3 Burner flame goes out during operation

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

6.13.4 Ignition failure

If the burner does not fire (Fig. 41), it goes into lockout within 3 sec. after the gas valve opening and 119 seconds after the TL closure.

6.14 Final checks (with burner operating)

➤ Open the thermostat/pressure switch TL ➤ Open the thermostat/pressure switch TS	⇨	The burner must stop
➤ 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
➤ Turn off the burner and cut off the power. ➤ Disconnect the minimum gas pressure switch connector.	⇨	The burner must not start
➤ Disconnect the UV probe wire.	⇨	The burner must stop in lockout due to ignition failure

Tab. M

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.

DANGER

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

Before carrying out any maintenance, cleaning or checking operations:

DANGER

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

DANGER

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
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.

Electrical current to UV cell (Fig. 42)

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

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

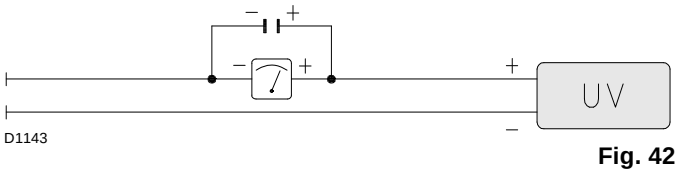


Fig. 42

Burner
Check that there is no abnormal wear or loosen screws, especially on cams 3)(Fig. 35).
Clean the outside of the burner.
Clean and grease the adjustable profile of the cams.

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

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

LIGHT OIL OPERATION

Pump
The delivery pressure must comply with the table on pag. 18.
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.

Filters (Fig. 43)
Check the filtering baskets on line 1) and at nozzle 2) present in the system.
Clean or replace if necessary.

If rust or other impurities are observed inside the pump, use a separate pump to lift any water and other impurities that may have deposited on the bottom of the tank.

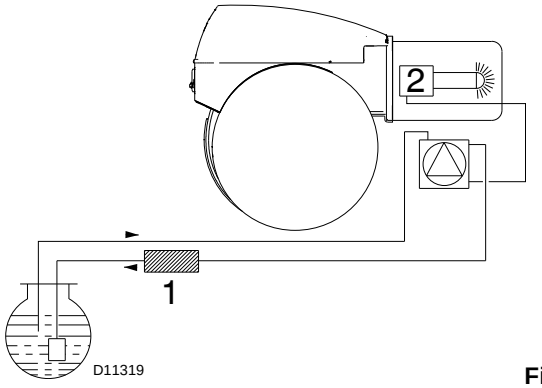


Fig. 43

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

Hoses
Check that these are in good conditions.

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

Combustion
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. N

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. O

7.3 Opening the burner

DANGER

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

DANGER

Close the fuel interception tap.

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

➤ Remove the tie-rods 1) and 4)(Fig. 44) of the head movement and damper opening lever, loosening nut 2);
➤ disconnect the socket 3) of the servomotor;
➤ disconnect the socket 7) of the derivation unit;
➤ remove the screws 5).

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

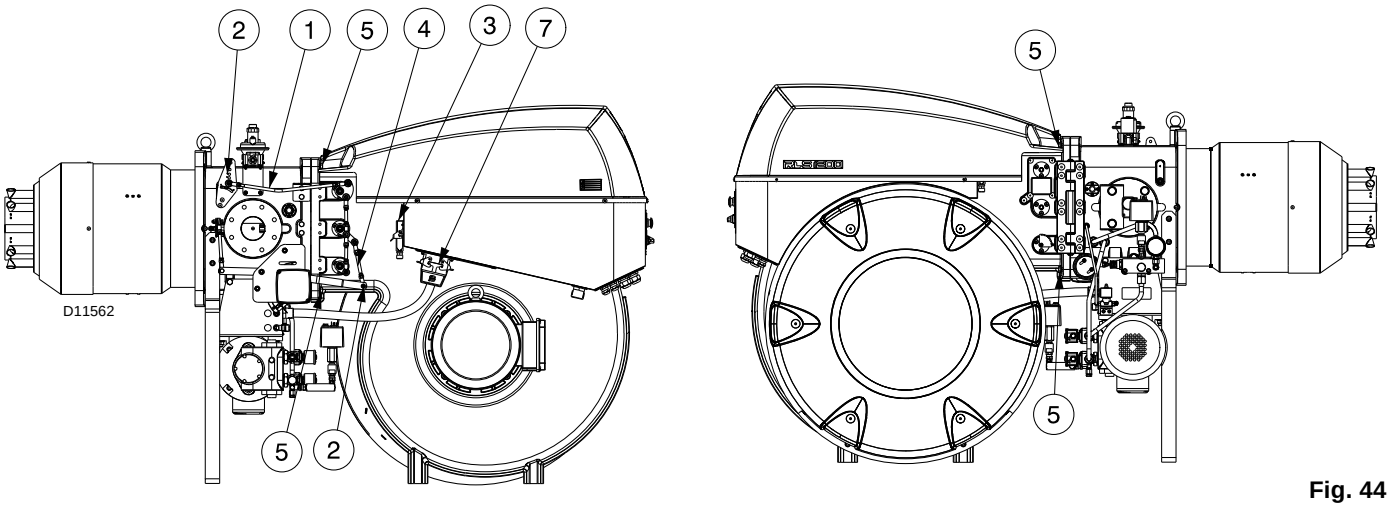


Fig. 44

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

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

If a burner malfunction is detected, first of all:

- check that the electrical wiring is adequately connected;
- check whether fuel is delivered;
- check that every adjustment parameter is adequately set.

8.1 Light oil operation

Symbol (1)	Problem	Possible cause	Recommended remedy
◀	The burner does not start	Limiter or safety control device open	Adjust or replace
		Control box lockout	Release
		Fan motor lockout	Release the thermal relay
		Intervention of maximum oil pressure switch	Adjust the pressure switch or eliminate overpressure
		No electrical power supply	Close all switches - check connections
		No light oil	Check the light oil supply circuit
		Control box fuse interrupted	Replace
		Pump is jammed	Replace
		Faulty motor remote control switch	Replace
		Defective control box	Replace
		Faulty electrical motor	Replace
		The pilot burner does not work	Check
		Defective safety solenoid valve	Replace
		Faulty oil modulator	Recondition or replace it
	The burner does not switch on, and the lock-out appears	Flame simulation	Replace the control box
		Photocell short-circuit	Replace photocell
		Two-phase electrical supply, thermal relay steps in	Reset the thermal relay at return of the three phases
▲	The burner starts but stops at maximum air damper setting	Contact 1 of the servomotor terminals 9-8 control box does not intervene	Adjust cam I or replace servomotor
P	The burner switches on, but then stops in lockout	Air pressure switch incorrectly adjusted.	Adjust it
		Pressure switch pressure point pipe blocked	Clean
■	The burner switches on, but then stops in lockout	Failure to the flame detection circuit	Replace control box
▼	The burner remains in pre-purging phase	Contact III of the servomotor terminals 10-8 control box does not intervene	Adjust cam III or replace servomotor

Symbol (1)	Problem	Possible cause	Recommended remedy
1	Once the pre-purging and the safety time has elapsed the burner goes into lockout without the flame appearing	The VP1 solenoid lets too little gas through	Increase
		The solenoid VP1 or VP2 does not open	Replace the coil or the rectifier panel
		No fuel in the tank, or water on the bottom	Refill with fuel, or remove the water
		Bad head and damper adjustments	Adjust
		Faulty or grounded high voltage cable	Replace
		High voltage cable deformed by high temperature	Replace and protect
		Bad electrical wiring on valves or transformer	Check
		Pump unprimed	Prime it
		Pump suction line connected to return line	Correct connection
		Soiled filters (nozzle line)	Clean
		The valves upstream from the pump are closed	Open them
		Opposite motor rotation	Change electrical wiring to the motor
		Light oil solenoids do not open	Check connections and solenoids
		Nozzle clogged, soiled or deformed	Clean it or replace it
		Pilot burner does not work	Check
		Defective control box	Replace
		Ignition electrode incorrectly adjusted	Adjust it
		Electrode grounded due to broken insulation	Replace
		Motor/pump coupling broken	Replace
		Faulty ignition transformer	Replace
	The flame ignites regularly but the burner goes into lock out at the end of the safety time.	Faulty photocell or control box	Replace photocell or control box
		Soiled photocell	Clean
	Smoke in flame (dark Bacharach)	Little air	Adjust the fan head and damper
		Incorrect pump pressure	Adjust
		Nozzle filter clogged	Clean or replace
		Insufficient boiler room ventilation openings	Increase
		Dirty or worn nozzle	Replace
		Flame disk soiled, loose or deformed	Clean it, tighten it or replace it
	Smoke in flame (yellow Bacharach)	Excessive air	Adjust head and air dampers
	Ignition with pulses or flame failure, delayed ignition	Poorly adjusted head	Adjust
		Incorrectly adjusted fan air damper: too much air	Adjust
		Nozzle not fit for burner or boiler	See the nozzle table
		Faulty nozzle	Replace
		Unsuitable pump pressure	Adjust
		Ignition electrode not adjusted correctly or soiled	Adjust it
		Output during ionisation phase is too high	Reduce
	The burner does not pass to 2nd stage	Remote control device TR fails to close	Adjust or replace
		Defective control box	Replace
	Uneven fuel supply	Understand whether the cause lies in the pump or the fuel supply system	Supply fuel to the burner from a tank positioned near the burner itself
	Internally rusted pump	Water in the tank	Remove the water with a pump

Symbol (1)	Problem	Possible cause	Recommended remedy
	Noisy pump, unstable pressure	Air in the suction line	Block the couplings
		Depression value too high (higher than 35 cm Hg):	
		Excessive difference of level between burner and tank	Power the burner from a loop circuit
		Piping diameter too small	Increase
		Dirty suction line filters	Clean
		Suction line valves closed	Open them
		The paraffin solidifies due to the low temperature	Put additive in the light oil
	Pump unprimes after prolonged pause	Return pipeline not immersed in the fuel	Bring it to the same height as the suction line
		Air in the suction line	Block the couplings
	Pump leaks light oil	Loss of sealing organ	Replace the pump
	Dirty combustion head	Dirty nozzle or nozzle filter	Replace
		Unsuitable nozzle delivery or angle	See recommended nozzles
		Loose nozzle	Block it
		Environmental impurities on flame stability disc	Clean
		Incorrect head adjustment, or little air	Adjust it, opening the damper
		Blast tube length not suitable for the boiler	Contact the boiler manufacturer
	Burner goes into lockout during operation	Photocell faulty or soiled	Replace it or clean it
		Air pressure switch faulty	Replace

Tab. P

(1) The control box has a disc that turns during the start-up program, visible from the reset sight window.
When the burner does not start or stops, due to a failure, the symbol that appears on the sight window indicates the type of interruption.

8.2 Gas operation

Symbol (1)	Problem	Possible cause	Recommended remedy
◀	The burner does not start	No electrical power supply	Close all switches and check connections
		A limit or safety thermostat/pressure switch open	Adjust or replace
		Control box lockout	Release the control box
		Control box fuse interrupted	Replace it (2)
		Incorrect electrical wiring	Check
		Defective control box	Replace
		No gas supply	Open the manual valves between meter and train
		Mains gas pressure insufficient	Contact your GAS COMPANY
		Minimum gas pressure switch fails to close	Adjust or replace
		Air pressure switch in operating position	Adjust or replace
		The servomotor contact does not intervene (closure cam 0°)	Adjust the closure cam 0° or replace the servomotor
	The burner does not switch on, and the lock-out appears	Flame simulation	Replace the control box
		Faulty motor remote control switch	Replace
		Defective electrical motor	Replace
		Motor lockout	Release the thermal relay
▲	The burner starts up but stops at the damper maximum opening	The servomotor contact does not intervene (maximum cam opening)	Cam adjustment (maximum opening) or replace the servomotor
P	The burner starts and then goes into lock-out	Air pressure switch inoperative due to insufficient air pressure:	
		Air pressure switch adjusted badly	Adjust or replace
		Pressure switch pressure point pipe blocked	Clean
		Poorly adjusted head	Adjust
		Dirty fan	Clean
		High depression in the furnace	Contact our Technical Department
■	The burner turns on and then remains in lockout mode	Failure to the flame detection circuit	Replace the control box
▼	The burner remains in the pre-purge phase.	The servomotor contact does not intervene (cam minimum)	Cam adjustment (minimum) or replace the servomotor

Symbol (1)	Problem	Possible cause	Recommended remedy
1	Once the pre-purging and the safety time has elapsed the burner goes into lockout without the flame appearing	The VP1 solenoid lets too little gas through	Increase
		The solenoid VP1 or VP2 does not open	Replace the coil or the rectifier panel
		Gas pressure too low	Increase pressure at governor
		Ignition electrode incorrectly adjusted	Adjust it
		Electrode grounded due to broken insulation	Replace
		Faulty or grounded high voltage cable	Replace
		High voltage cable deformed by high temperature	Replace and protect
		Faulty ignition transformer	Replace
		Incorrect valve or ignition transformer connections	Redo them
		Defective control box	Replace
		A closed valve upline the gas train	Open
		Air in pipework	Bleed air
	Lockout with flame appearing	The VP1 or VP2 solenoids let too little gas through	Increase
		Dirty flame sensor	Check, replace flame sensor
		Faulty connection	Check, replace flame sensor
		Insufficient detection current (min.70 µA)	Measure current, replace flame sensor
		Flame sensor exhausted, faulty	Replace
		Maximum gas pressure switch intervention	Adjust or replace
		Defective control box	Replace
	The burner continues to repeat the start-up cycle, without lockout	The gas pressure in the gas mains lies very close to the value to which the minimum gas pressure switch has been set. The sudden drop in pressure after valve opening causes temporary opening of the pressure switch itself, the valve immediately closes and the burner comes to a halt. Pressure increases again, the pressure switch closes again and the ignition cycle is repeated. The sequence repeats endlessly.	Reduce the minimum gas pressure switch intervention pressure. Replace the gas filter cartridge
	Lockout without symbol indication	Flame simulation	Replace the control box
I	Burner goes into lockout during operation	Faulty flame sensor	Replace worn parts
		Air pressure switch faulty	Replace
		Maximum gas pressure switch intervention	Adjust or replace
◀	Lockout when the burner stops	Permanent flame in the combustion head or flame simulation	Eliminate permanency of flame or replace the control box
	Ignition with pulsations	Poorly adjusted head	Adjust
		Ignition electrode incorrectly adjusted	Adjust it
		Incorrectly adjusted fan air damper: too much air	Adjust
		Output during ionisation phase is too high	Reduce

Tab. Q

(1) The control box has a disc that turns during the start-up program, visible from the reset sight window.
When the burner does not start or stops, due to a failure, the symbol that appears on the sight window indicates the type of interruption.

(2) The fuse is in the rear part of the control box. A spare fuse is also available: it can be extracted after breaking the panel tab that houses it.

A Appendix - Accessories

Output power regulator kit for modulating operation

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

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

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

Output power regulator kit with 4-20 μA, 0-10V signal

Two components should be ordered:
- the analogue signal converter;
- the Potentiometer

Burner	Potentiometer		Analogue Signal Converter	
	Type	Code	Type	Code
RLS 1000/M C13 RLS 1200/M C13	ASZ...	3013532	E5202	3010390

Soundproofing box kit

Burner	Code
RLS 1000/M C13 RLS 1200/M C13	3010376

Kit for the remote selection of the fuel

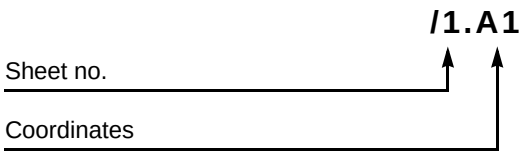
Burner	Code
RLS 1000/M C13 RLS 1200/M C13	3010372

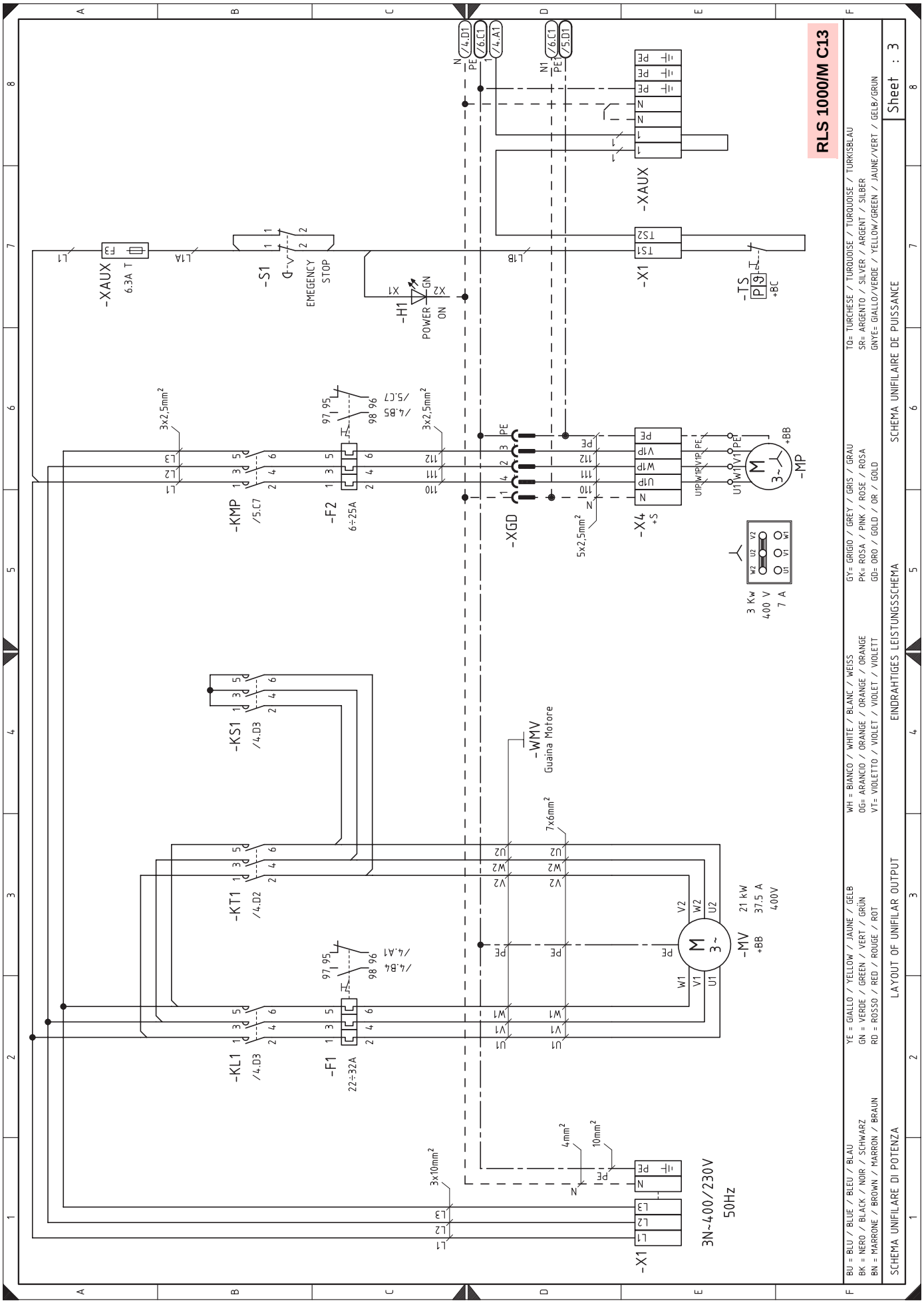
Gas trains in compliance with EN 676

Please refer to manual.

B Appendix - Electrical panel layout

2 Indication of references

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EMEGENCY STOP
-H1
POWER ON
-X1
-TS
-XGD
-X4
-MP
-KMP
-F2
-KS1
-KT1
-KL1
-F1
-WMV
Guaina Motore
-MV
21 kW
37.5 A
400V
3 Kw
400 V
7 A
3N~400/230V
50Hz
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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
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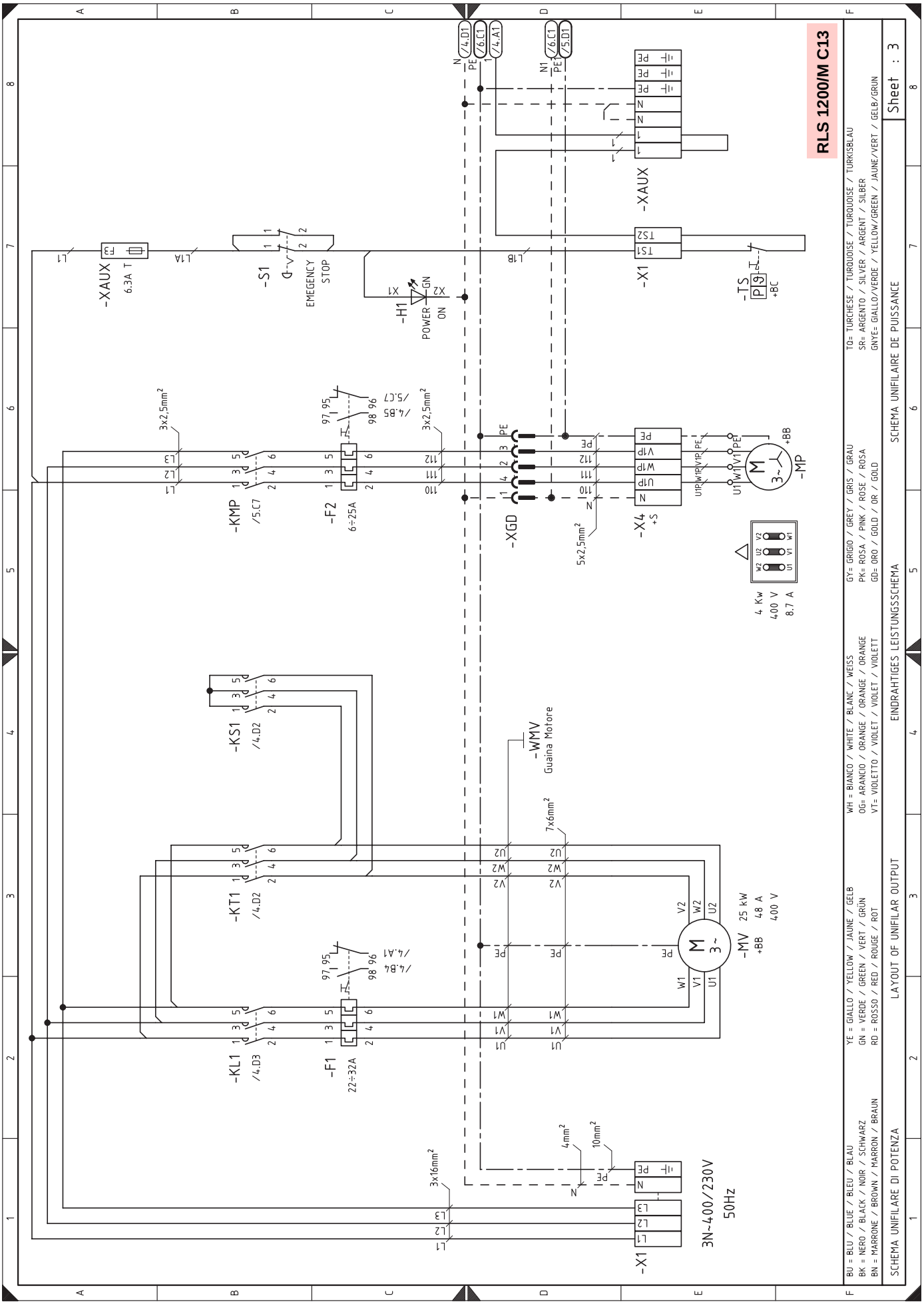
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-S1
EMEGENCY STOP
-H1
POWER ON
-X1
-TS
-KMP
-F2
-XGD
-X4
-MP
-KS1
-KT1
-WMV
Guaina Motore
-KL1
-F1
-MV
25 kW
4.8 A
400 V
4 Kw
400 V
8.7 A
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
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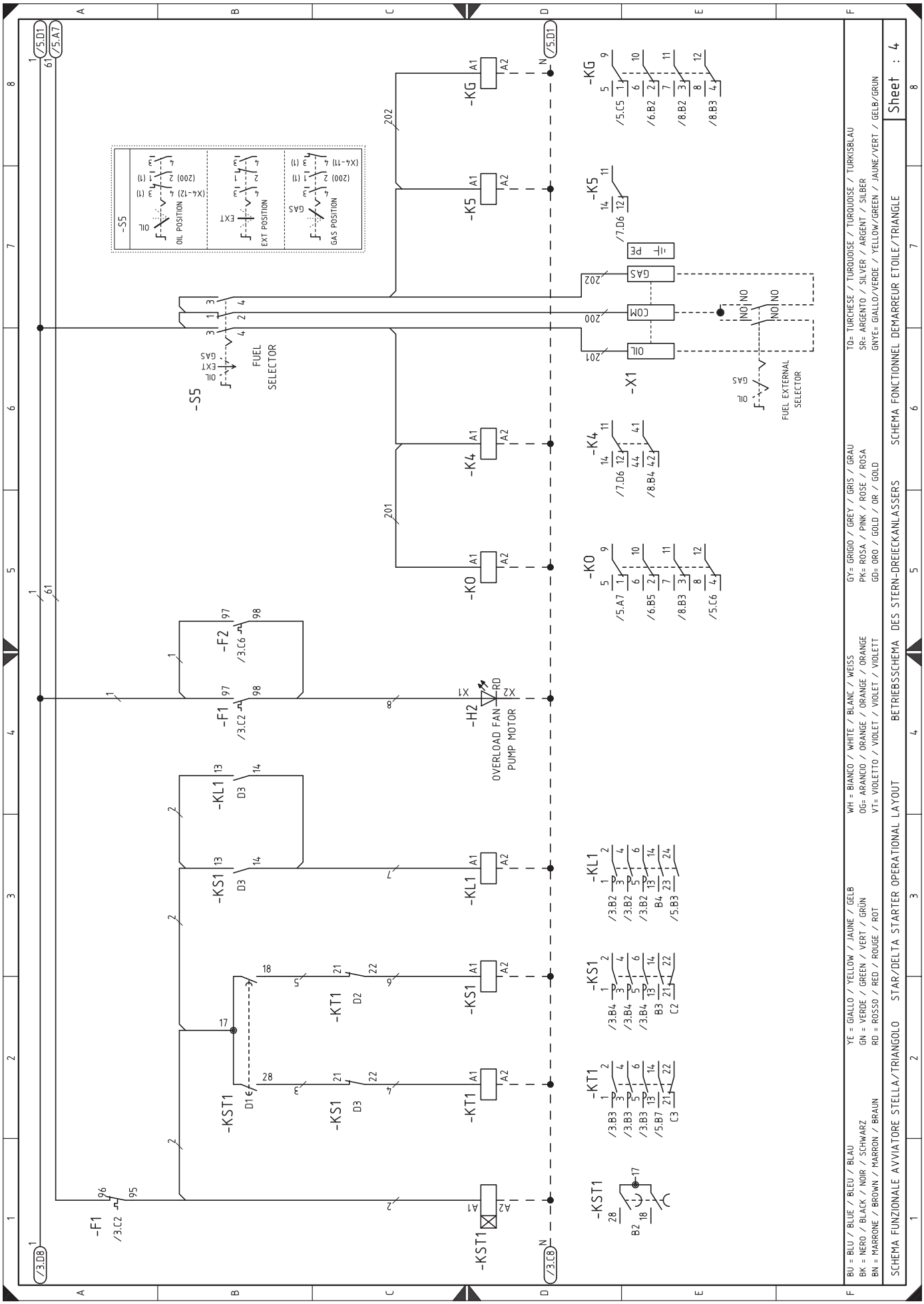
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EXT POSITION
GAS POSITION
FUEL SELECTOR
FUEL EXTERNAL SELECTOR
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-F2
-H2
OVERLOAD FAN
PUMP MOTOR
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-KS1
-KL1
-K0
-K4
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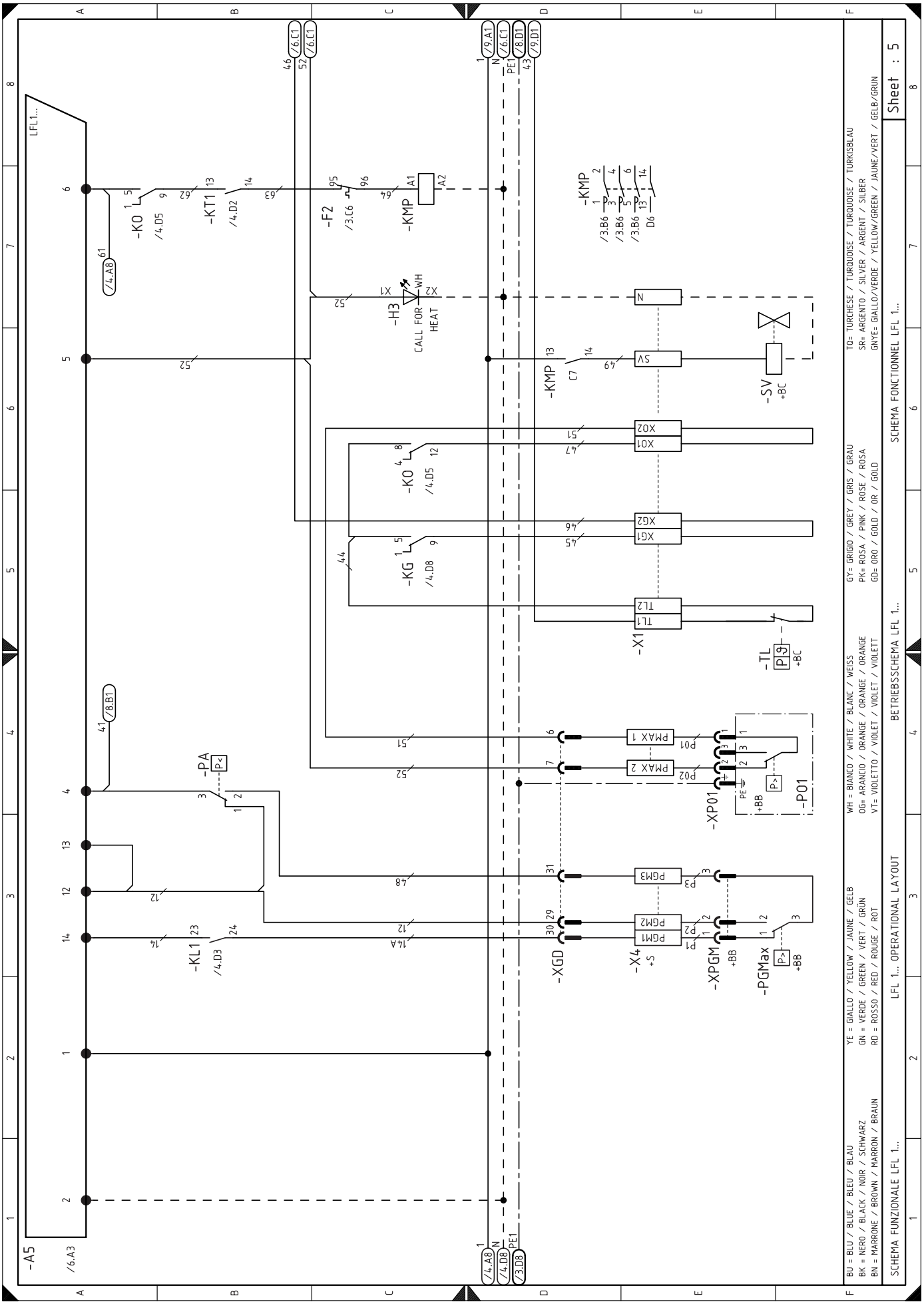
GAS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-TL
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-KG
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-X4
-XPGM
-PGMax
-XP01
-P01
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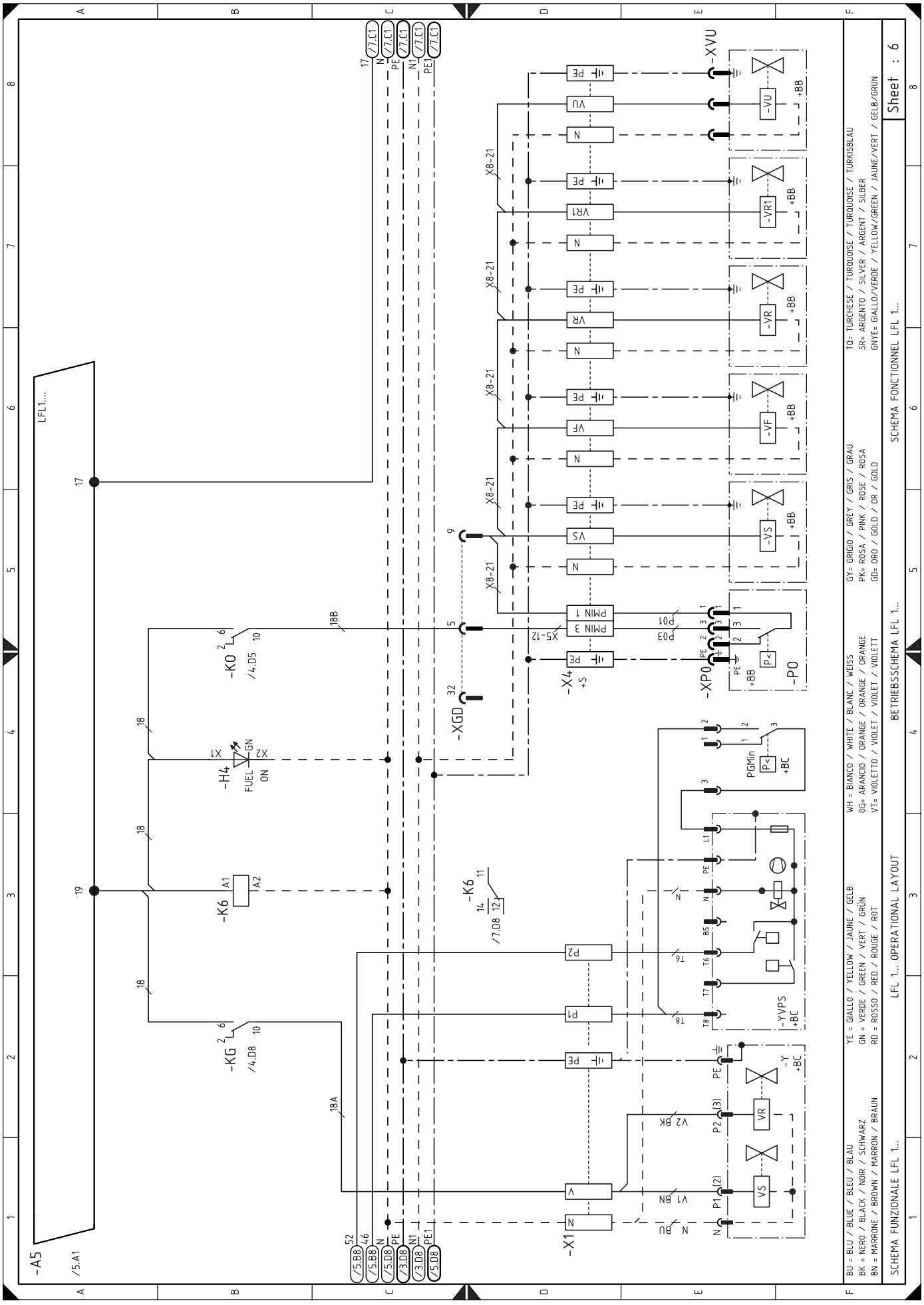
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-X4
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-P0
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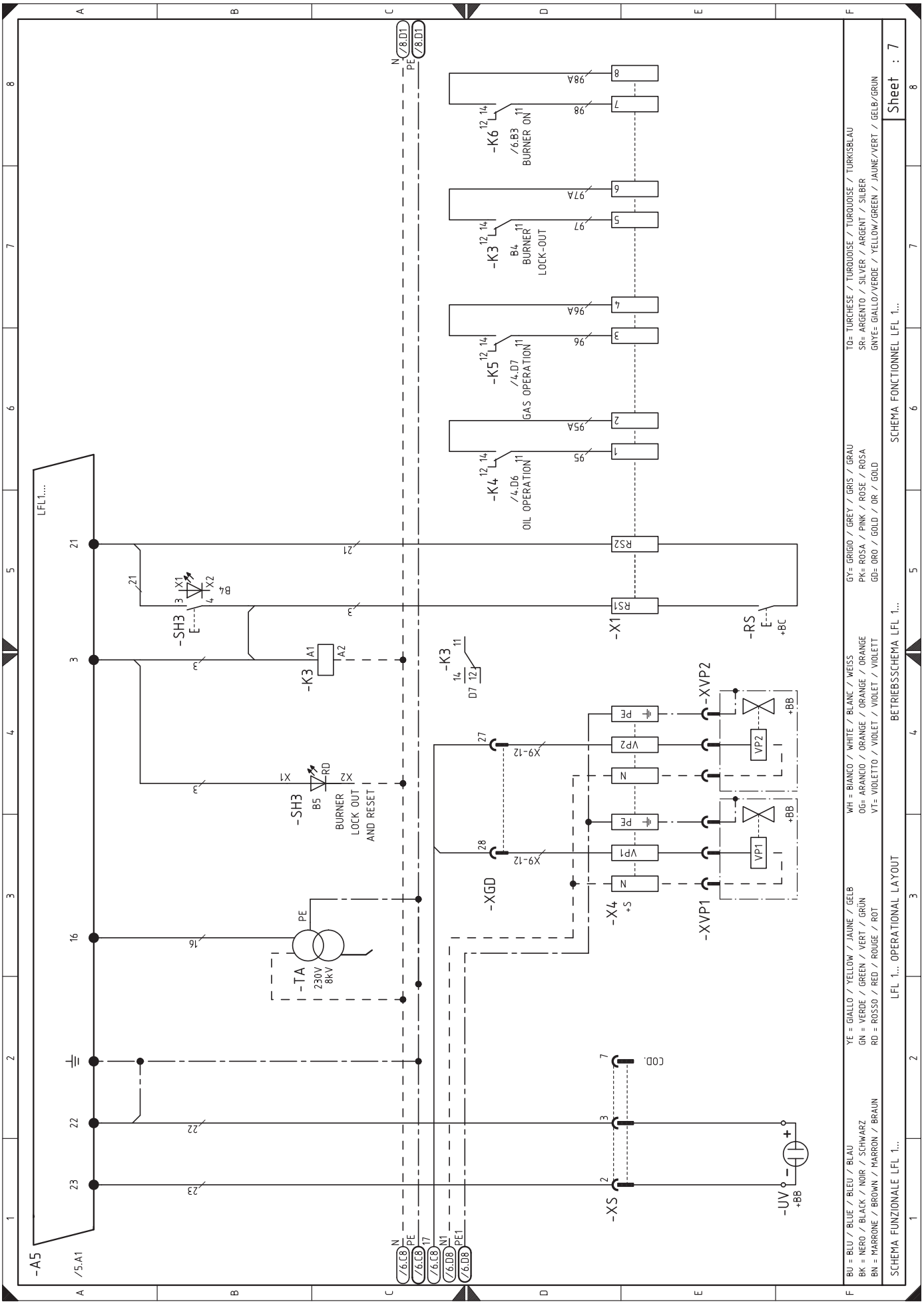
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-K4 /4.D6 OIL OPERATION
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-SH3 B5 BURNER LOCK OUT AND RESET
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-X4
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-XVP2
-X1
-RS
-XS
-UV
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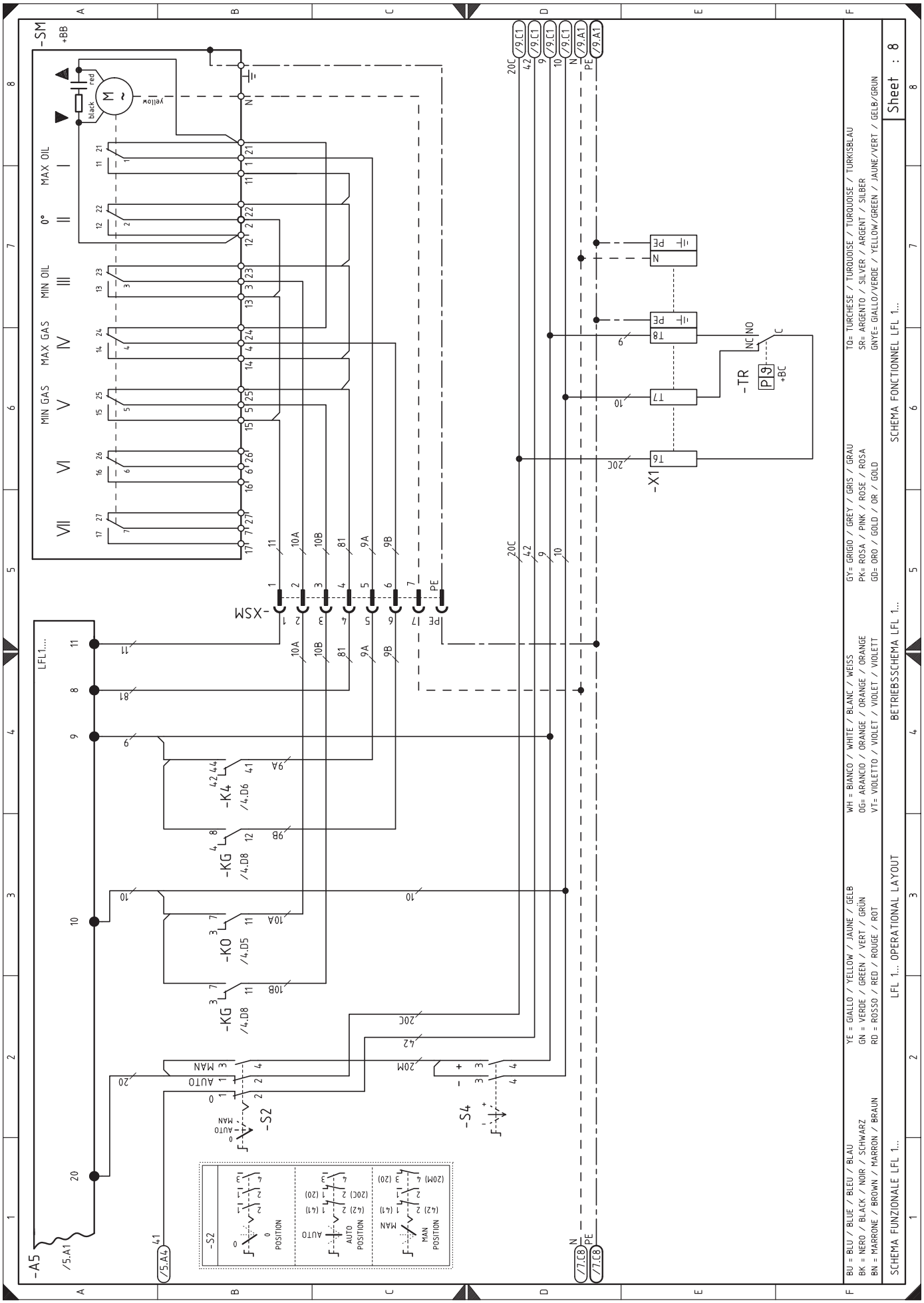
SCHEMA FONCTIONNEL LFL 1...
Sheet : 7
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN


SCHEMA FUNZIONALE LFL 1...
LFL 1... OPERATIONAL LAYOUT
BETRIEBSSCHEMA LFL 1...
SCHEMA FONCTIONNEL LFL 1...
Sheet : 8
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
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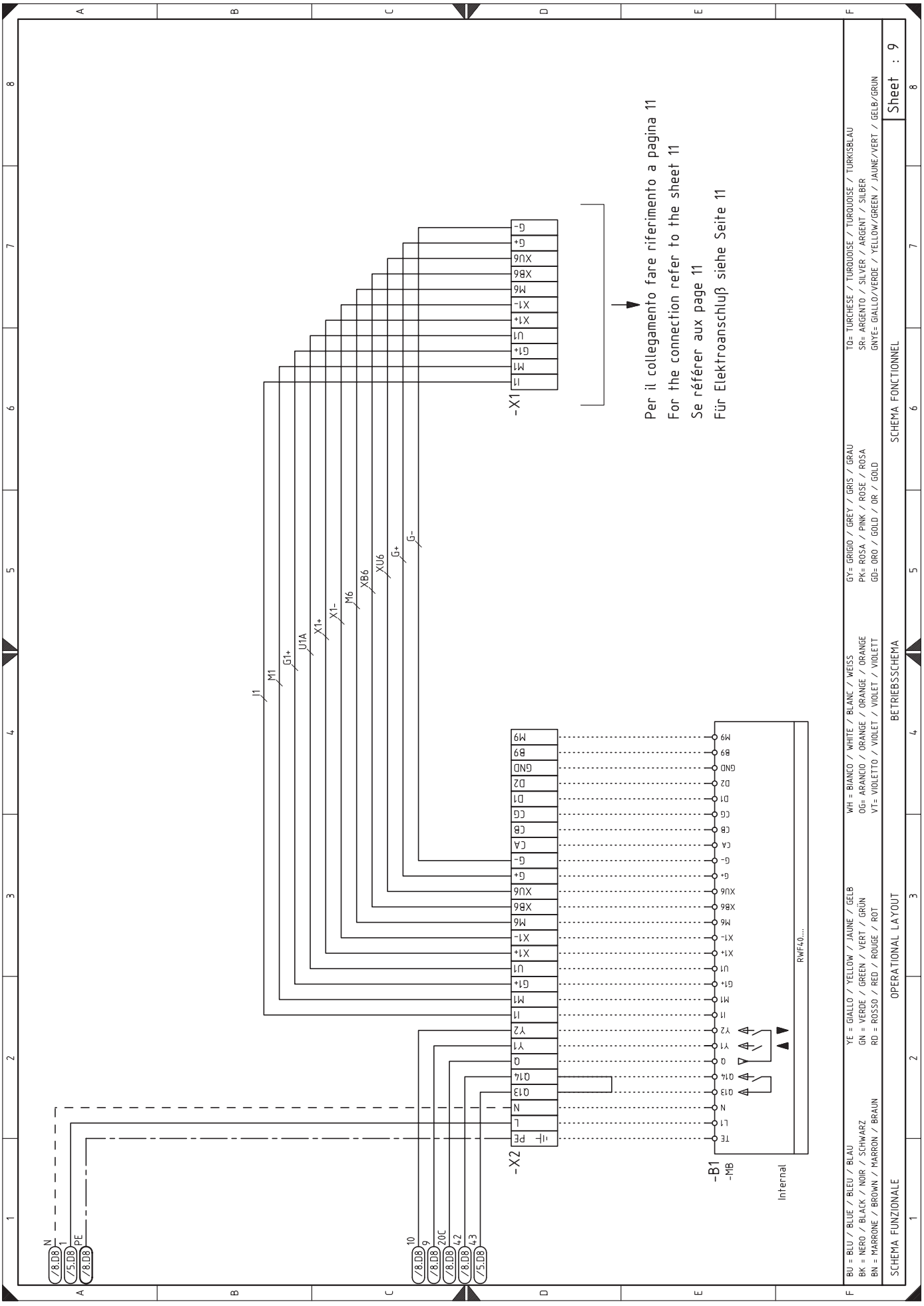
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
-SM
-A5
-X1
-XSM
-TR
-K4
-KG
-KO
-S2
-S4
MAX OIL
MIN OIL
MAX GAS
MIN GAS
AUTO
MAN
POSITION


Per il collegamento fare riferimento a pagina 11
For the connection refer to the sheet 11
Se référer aux page 11
Für Elektroanschluß siehe Seite 11
-X1
-X2
-B1
-MB
Internal
RWF40....
SCHEMA FUNZIONALE
OPERATIONAL LAYOUT
BETRIEBSSCHEMA
SCHEMA FONCTIONNEL
Sheet : 9
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
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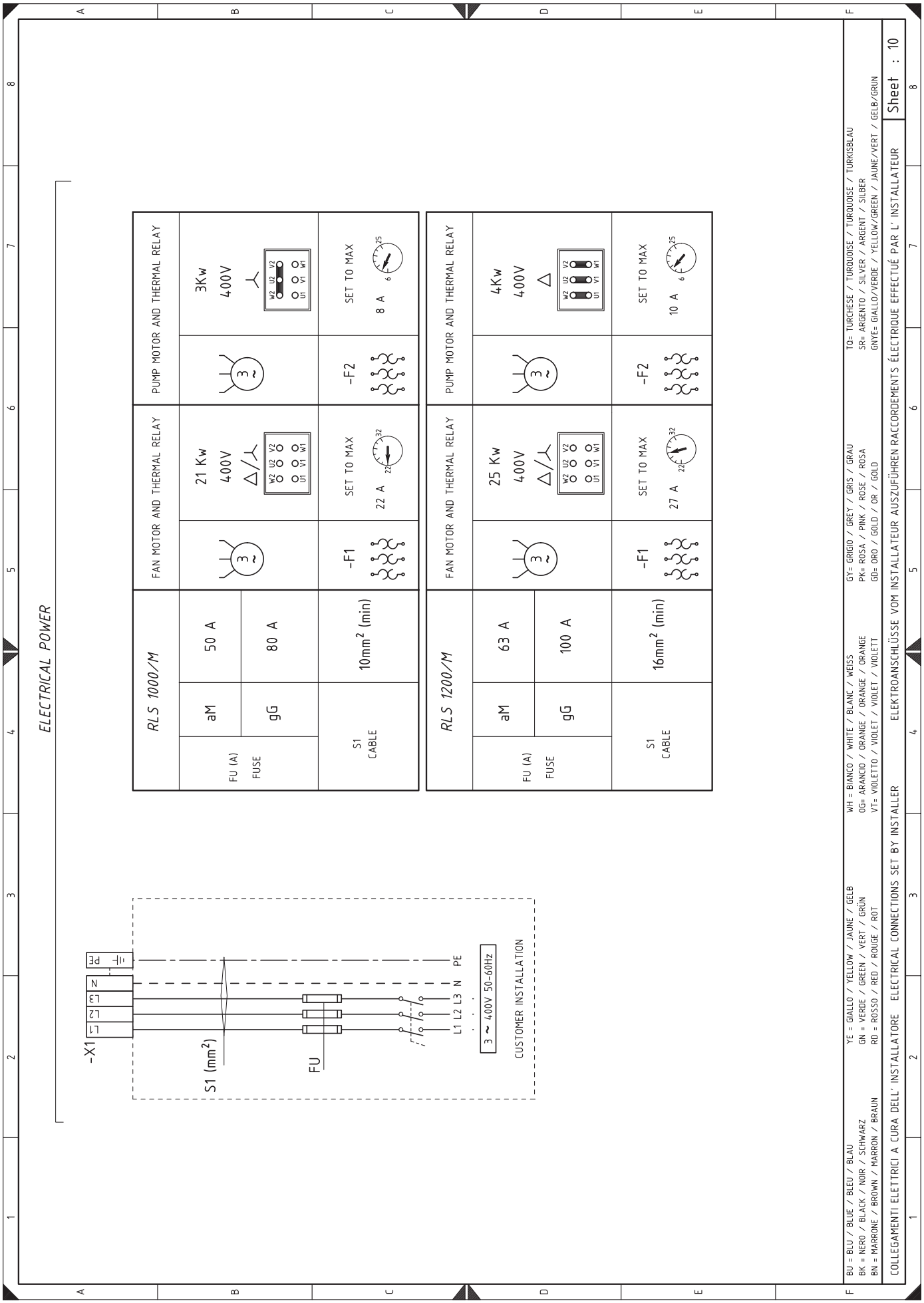
ELECTRICAL POWER
RLS 1000/M
FAN MOTOR AND THERMAL RELAY
PUMP MOTOR AND THERMAL RELAY
FU (A) FUSE
aM
gG
50 A
80 A
S1 CABLE
10mm² (min)
21 Kw
400V
Δ/Y
-F1
SET TO MAX
22 A
3Kw
400V
Y
-F2
8 A
RLS 1200/M
63 A
100 A
16mm² (min)
25 Kw
27 A
4Kw
10 A
-X1
L1 L2 L3 N PE
S1 (mm²)
FU
3 ~ 400V 50-60Hz
CUSTOMER INSTALLATION
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
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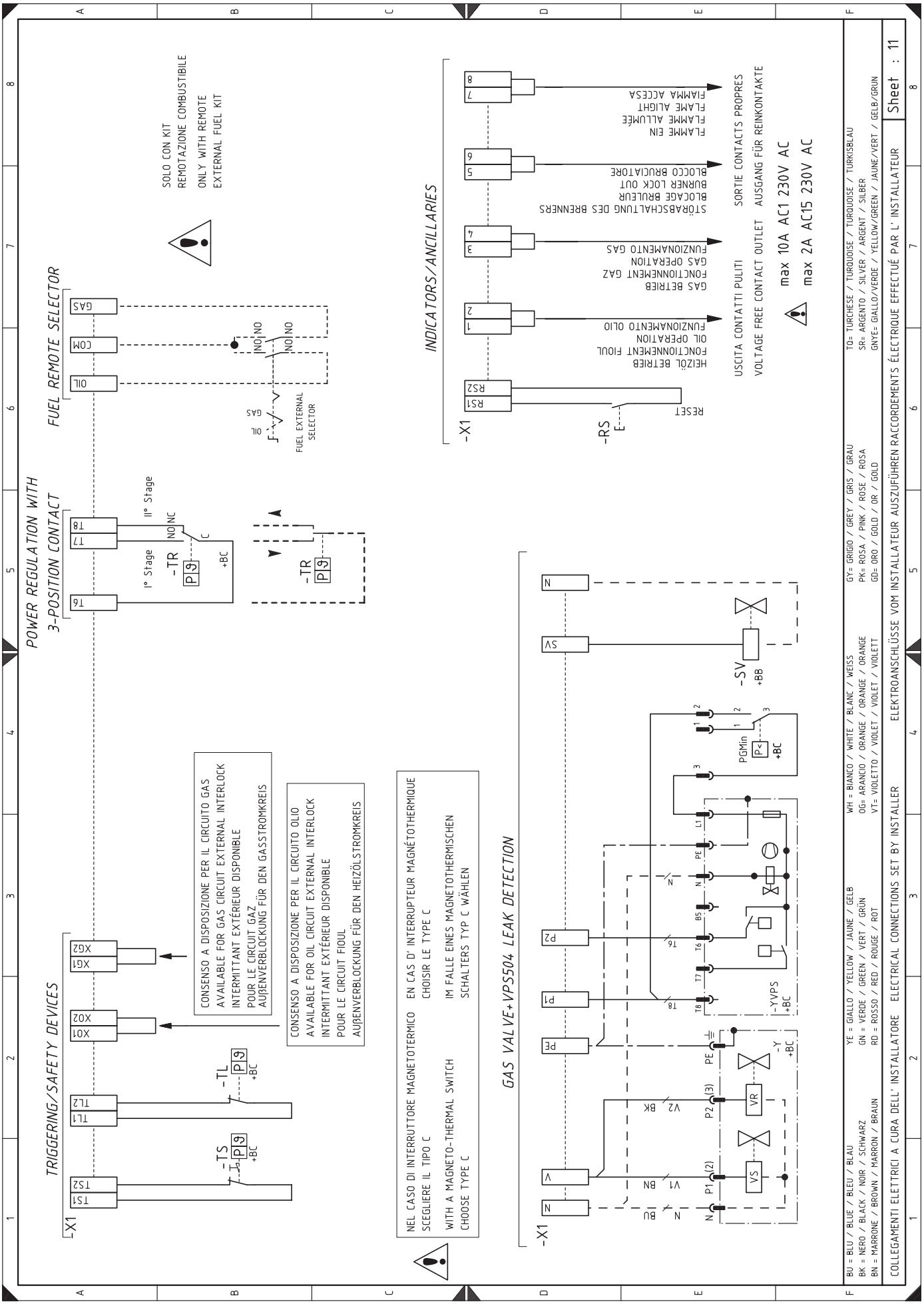
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE ELECTRICAL CONNECTIONS SET BY INSTALLER ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 10


POWER REGULATION WITH
3-POSITION CONTACT
FUEL REMOTE SELECTOR
GAS
COM
OIL
SOLO CON KIT
REMOTAZIONE COMBUSTIBILE
ONLY WITH REMOTE
EXTERNAL FUEL KIT
FUEL EXTERNAL SELECTOR
I° Stage
II° Stage
-TR
-TL
-TS
-BC
TRIGGERING/SAFETY DEVICES
-X1
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
NEL CASO DI INTERRUTTORE MAGNETOTERMICO EN CAS D' INTERRUPTEUR MAGNÉTOTHERMIQUE
SCEGLIERE IL TIPO C CHOISIR LE TYPE C
WITH A MAGNETO-THERMAL SWITCH IM FALLE EINES MAGNETOTHERMISCHEN
CHOOSE TYPE C SCHALTERS TYP C WÄHLEN
GAS VALVE+VPS504 LEAK DETECTION
-SV
-YVPS
-Y
PGMin
INDICATORS/ANCILLARIES
HEIZÖL BETRIEB
FONCTIONNEMENT FIOUL
OIL OPERATION
FUNZIONAMENTO OLIO
GAS BETRIEB
FONCTIONNEMENT GAZ
GAS OPERATION
FUNZIONAMENTO GAS
STÖRABSCHALTUNG DES BRENNERS
BLOCAGE BRULEUR
BURNER LOCK OUT
BLOCCO BRUCIATORE
FLAMME EIN
FLAMME ALLUMÉE
FLAME ALIGHT
FIAMMA ACCESA
-RS
RESET
USCITA CONTATTI PULITI SORTIE CONTACTS PROPRES
VOLTAGE FREE CONTACT OUTLET AUSGANG FÜR REINKONTAKTE
max 10A AC1 230V AC
max 2A AC15 230V AC
BU = BLU / BLUE / BLEU / BLAU
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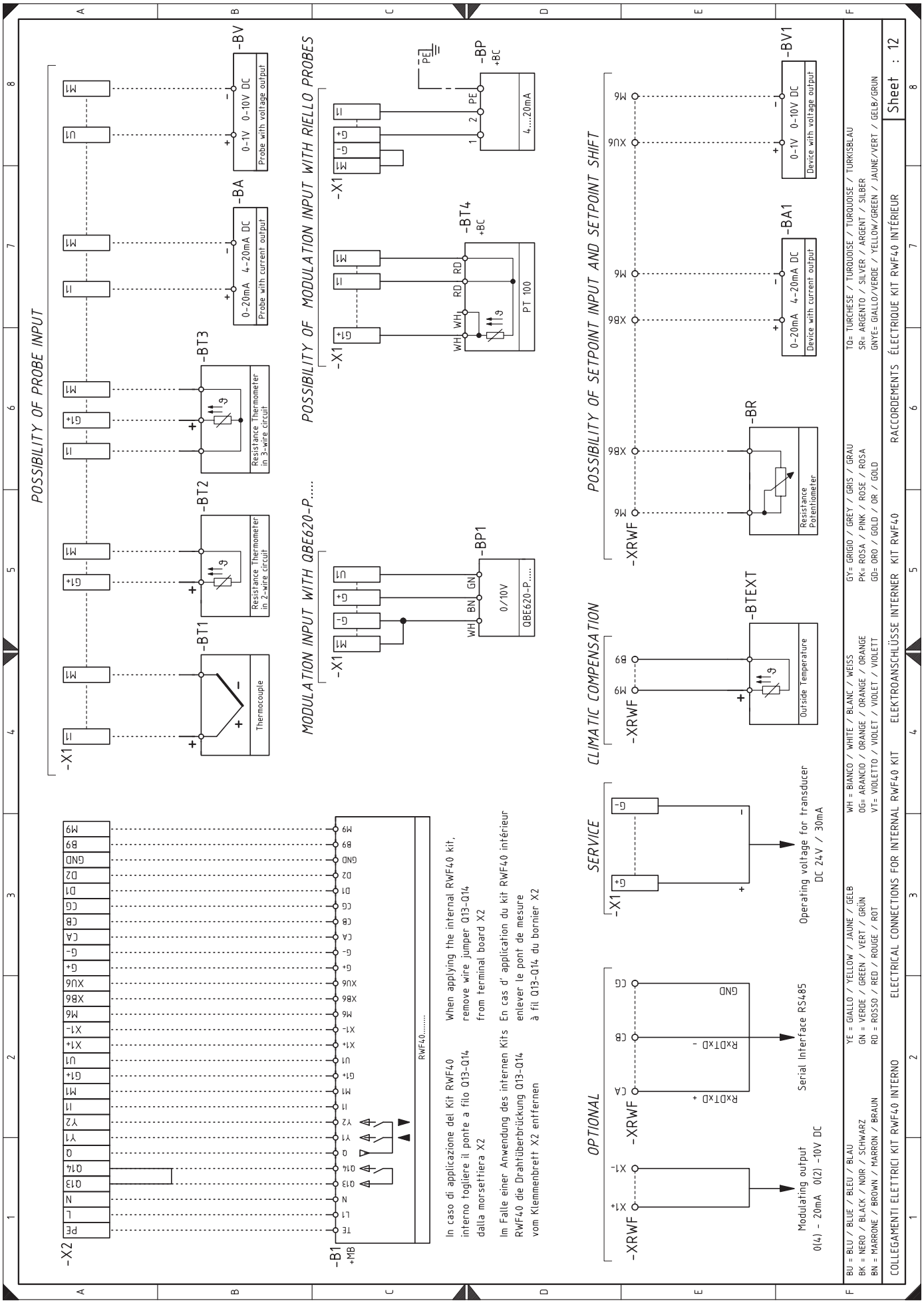
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE ELECTRICAL CONNECTIONS SET BY INSTALLER ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 11


POSSIBILITY OF PROBE INPUT
-X1
-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
-BT1
Thermocouple
MODULATION INPUT WITH QBE620-P.....
POSSIBILITY OF MODULATION INPUT WITH RIELLO PROBES
-BP1
0/10V
QBE620-P.....
-BT4
PT 100
-BP
4....20mA
PE
POSSIBILITY OF SETPOINT INPUT AND SETPOINT SHIFT
-XRWF
-BR
Resistance Potentiometer
-BA1
0-20mA 4-20mA DC
Device with current output
-BV1
0-1V 0-10V DC
Device with voltage output
CLIMATIC COMPENSATION
-BTEXT
Outside Temperature
SERVICE
Operating voltage for transducer DC 24V / 30mA
OPTIONAL
Modulating output 0(4) - 20mA 0(2) -10V DC
Serial Interface RS485
-X2
-B1 +MB
RWF40.....
In caso di applicazione del Kit RWF40 interno togliere il ponte a filo Q13-Q14 dalla morsettiera X2
When applying the internal RWF40 kit, remove wire jumper Q13-Q14 from terminal board X2
Im Falle einer Anwendung des internen Kits RWF40 die Drahtüberbrückung Q13-Q14 vom Klemmenbrett X2 entfernen
En cas d' application du kit RWF40 intérieur enlever le pont de mesure à fil Q13-Q14 du bornier X2
BU = BLU / BLUE / BLEU / BLAU
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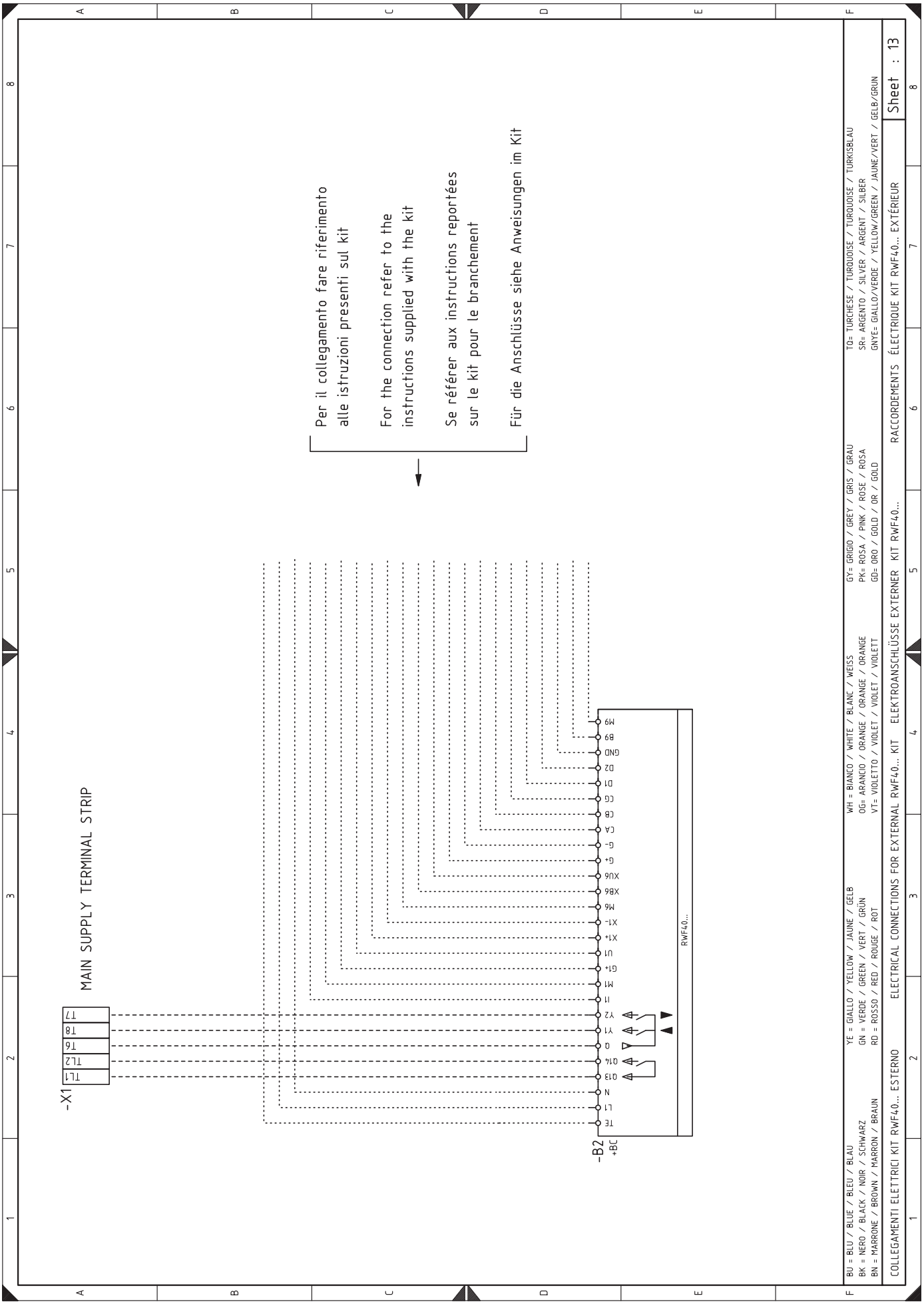
COLLEGAMENTI ELETTRICI KIT RWF40 INTERNO
ELECTRICAL CONNECTIONS FOR INTERNAL RWF40 KIT
ELEKTROANSCHLÜSSE INTERNER KIT RWF40
RACCORDEMENTS ÉLECTRIQUE KIT RWF40 INTÉRIEUR
Sheet : 12


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
-B2
RWF40...
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
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GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
COLLEGAMENTI ELETTRICI KIT RWF40... ESTERNO
ELECTRICAL CONNECTIONS FOR EXTERNAL RWF40... KIT
ELEKTROANSCHLÜSSE EXTERNER KIT RWF40...
RACCORDEMENTS ÉLECTRIQUE KIT RWF40... EXTÉRIEUR
Sheet : 13

Wiring layout key

A5	Control box
B1	Output regulator RWF40 internal
B2	Output regulator RWF40 external
BA	Output probe in current
BA1	Output devicein current to modify remote setpoint
BP	Pressure probe
BP1	Pressure probe
BR	Remote setpoint potentiometer
BT1	Thermocouple probe
BT2	Probe Pt100, 2 wires
BT3	Probe Pt100, 3 wires
BT4	Probe Pt100, 3 wires
BTEXT	External probe for climatic compensation of the set-point
BV	Output probe in voltage
BV1	Output devicein voltage to modify remote setpoint
F1	Fan motor thermal relay
F2	Pump motor thermal relay
F3	Auxiliary fuse
H1	Light signalling burner on
H2	Light signalling fan motor lockout and pump motor
H4	Burner working lighting signal
KL1	Star/triangle starter line contactor and direct start-up
KMP	Pump motor contact maker
KT1	Star/triangle starter triangle contactor
KS1	Start/triangle starter star contactor
KST1	Star/triangle starter timer
K3	Clean contacts output relay burner lockout
K4	Output relay for light oil operation clean contacts
K5	Output relay for gas operation clean contacts
K6	Clean contacts output relay burner switched on
KG	Gas operation relay
KO	Light oil operation relay
MP	Pump motor
MV	Fan motor
PA	Air pressure switch
PE	Burner earth
PGM	Maximum gas pressure switch
PGMin	Minimum gas pressure switch
PO	Oil pressure switch
PO1	Maximum oil pressure switch on return line
RS	Remote burner reset button
S1	Emergency stop button
S2	Off / automatic / manual selector
S4	Power increase / power reduction selector
S5	Fuel selector and enable signal to remote fuel selector
SH3	Burner reset button and lock-out signal
SM	Servomotor
SV	External safety valve
TA	Ignition transformer
TL	Limit thermostat/pressure switch
TR	Adjustment thermostat/pressure switch
TS	Safety thermostat/pressure switch
UV	Flame sensor
VF	Light oil operation valve
VP1	Pilot valve 1
VP2	Pilot valve 2
VR	Light oil return valve
VR1	Light oil return valve
VS	Safety light oil valve
VU	Nozzle valve
X1	Main terminal supply board
X2	Terminal board for kit RWF40
X4	Light oil unit terminal board
XAUX	Auxiliary terminal board
XGD	Derivation unit connector
XPGM	Maximum gas pressure switch connector
XPO	Oil pressure switch connector
XPO1	Oil return pressure switch connector
XRWF	Terminal board for output power regulator RWF40
XS	Flame sensors connector
XSM	Servomotor connector
XVP1	Pilot valve 1 connector
XVP2	Pilot valve 2 connector
XVU	Nozzle valve connector
Y	Gas adjustment valve + gas safety valve
YVPS	Valve leak detection device

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http:// www.riello.it
http:// www.rielloburners.com