GB

Dual fuel light oil/ gas burners

Two stage operation

CODE	MODEL
20159363	RLS 70
20159369	RLS 100
20169069	RLS 130

20168481 (3) - 07/2021

Translation of the original instructions

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1 Declarations

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

These products are in compliance with the following Technical Standards:

- EN 12100
- EN 676
- EN 267

According to the European Directives:

MD	2006/42/EC	Machine Directive
LVD	2014/35/EU	Low Voltage Directive
EMC	2014/30/EU	Electromagnetic Compatibility

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

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 Centre of the area;
- ➤ is designed for use by qualified personnel;
- ➤ offers important indications and instructions relating to the installation safety, start-up, use and maintenance of the burner.

Symbols used in the manual

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

2.1.2 General dangers

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

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

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

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

2.1.3 Other symbols

DANGER: LIVE COMPONENTS

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

DANGER: FLAMMABLE MATERIAL

This symbol indicates the presence of flammable materials.

DANGER: BURNING

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

DANGER: CRUSHING OF LIMBS

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

WARNING: MOVING PARTS

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

DANGER: EXPLOSION

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

PERSONAL PROTECTION EQUIPMENT

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

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

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

ENVIRONMENTAL PROTECTION

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

IMPORTANT INFORMATION

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

➤ This symbol indicates a list.

Abbreviations used

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

2.1.4 Delivery of the system and the instruction manual

When the system is delivered, it is important that:

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

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

.....

– the address and telephone number of the nearest Assistance Centre

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

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

2.2 Guarantee and responsibility

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

ATTENTION

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

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

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

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

3 Safety and prevention

3.1 Introduction

The burners have been designed and built in compliance with current regulations and directives, applying the known safety technical rules 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.

Specifically:

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 ambient temperature must all be within the values indicated in the instruction manual.

➤ Modification of the burner to alter its performance and destinations is not allowed.

➤ The burner must be used in exemplary technical safety conditions. Any disturbances that could compromise safety must be quickly eliminated.

➤ Opening or tampering with the burner components is not allowed, apart from the parts requiring maintenance.

➤ Only those parts envisaged by the manufacturer can be replaced.

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

3.2 Personnel training

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

The user:

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

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

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

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

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

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

In addition:

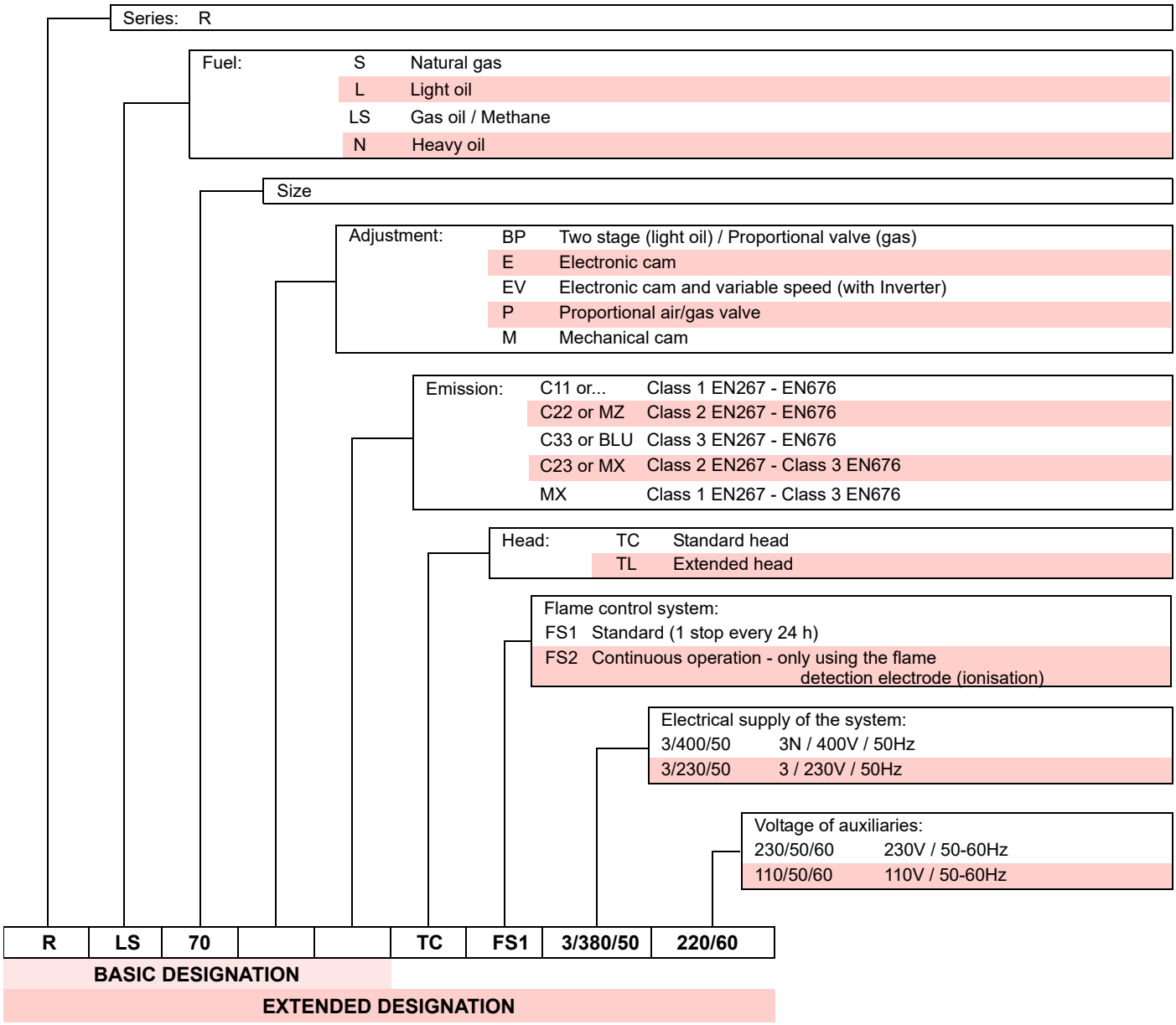
➤ must take all the measures necessary to prevent unauthorised people gaining access to the machine;

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

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

4 Technical description of the burner

4.1 Burner designation



4.2 Models available

Designation		Voltage	Start-up	Code
RLS 70	TC	3/380-220/60	Direct	20159363
RLS 100	TC	3/220/60	Direct	20159369
RLS 130	TC	3/220-380/60	Direct	20169069

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} - I_{2E} - I_2 (43.46 ÷ 45.3 MJ/m^3 (0°C))
FR	I_{2Er}
BE	$I_{2E(R)B}$
LU - PL	I_{2E}

4.4 Technical data

Model			RLS 70	RLS 100	RLS 130
Power (1) Delivery (1)	min - max	kW kg/h	232/465 ÷ 814 19/39 ÷ 69	349/698 ÷ 1163 29.5/59 ÷ 98	465/930 ÷ 1395 39/78 ÷ 118
Fuels			– Light oil, max. viscosity at 20 °C: 6 mm^2/s (1.5°E - 6 cSt) – Natural gas: G20 (methane) - G25 – LPG - G31 (butane)		
Gas pressure at max. output (2) - Gas: G20/G25/G31		mbar	6.2/7.5/7.8 - 360	10/13/12 - 360	11.5/14.4/15 - 360
Operation			– FS1 - Intermittent (min. 1 stop in 24 hours) – Two-stage (high and low flame) and one-stage (all - nothing)		
Pump	Output at 12 bar Pressure range Fuel temperature	kg/h bar °c max	220 10 - 20 60		
Nozzles		number	2		
Standard applications			Boilers: water, steam, diathermic oil		
Ambient temperature		°C	0 - 40		
Combustion air temperature		°C max	60		
Noise levels (3)	Sound pressure Sound power	dB(A)	74 85	77.5 88.5	80 91
Weight (including packaging)		kg	75	78	99

Tab. A

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

4.5 Electrical data

Model		RLS 70	RLS 100	RLS 130
Main electrical supply		3~ 220/380V 60Hz	3~ 220V 60Hz	3~ 220/380V 60Hz
Auxiliary circuit electrical supply			1N~ 220V 60Hz	
Fan motor IE3	rpm V W A	3490 220/380 1100 4.2 - 2.4	3450 220 2200 7.5	3450 220/380 2200 7.5 - 4.3
Pump motor	rpm V W A		3300 220 550 4.6	
Pump motor capacitor	µF		16	
Ignition transformer	V1 - V2 I1 - I2		230 V - 2 x 5 kV 1,9 A - 30 mA	
Maximum absorbed electric power Light oil Gas	 W Max. W Max.	 2.3 1.7	 3.6 3	
Protection level			IP 44	

Tab. B

4.6 Burner equipment

Flange for gas train . . . . . No. 1
Seal for flange . . . . . No. 1
Flange fixing screws: M 10 x 35 . . . . . No. 4
Thermal flange gasket . . . . . No. 1
Screws to fix the burner flange to the boiler: M 12 x 35 . . . No. 4
Flexible hoses . . . . . No. 2
Nipples for flexible hoses with gaskets. . . . . No. 2
Kit for LPG operation . . . . . No. 1
Label for LPG operation . . . . . No. 1
Spare parts list . . . . . No. 1
Instructions . . . . . No. 1

4.7 Maximum dimensions

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

Note that to inspect the combustion head the burner must be moved backward and turned upward. The maximum dimension of the burner, without casing, when open is given by measurement I.

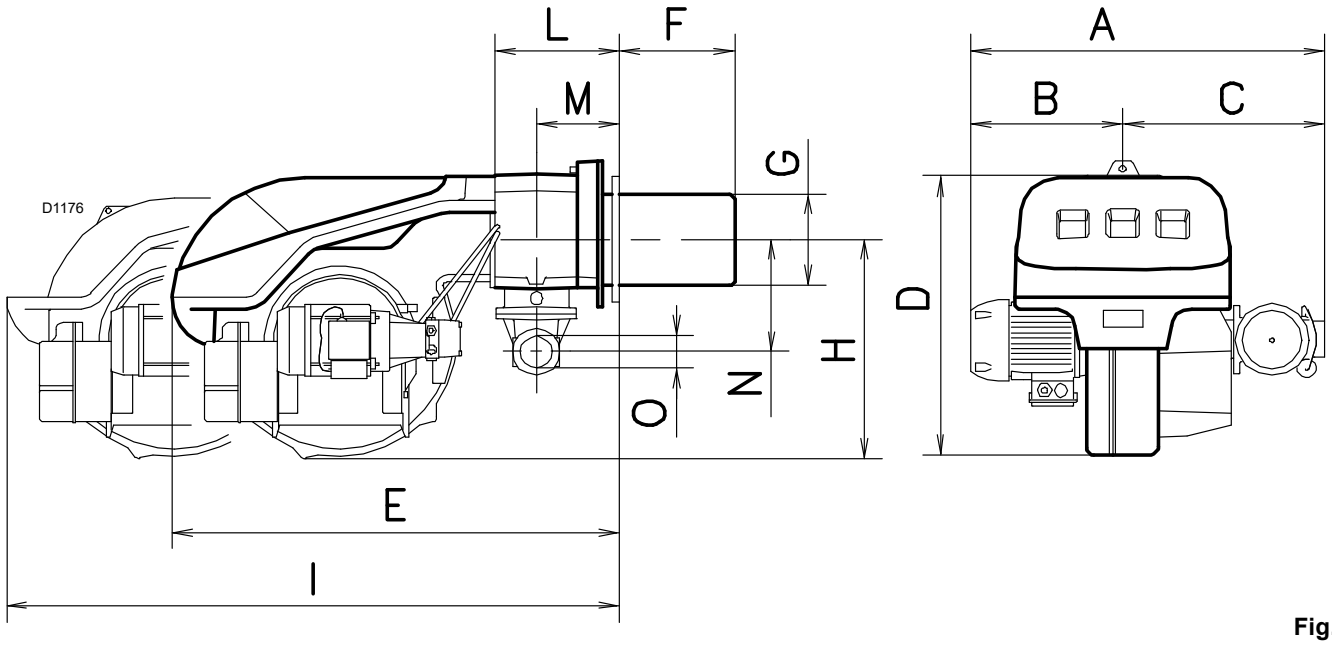


Fig. 1

Model (mm)	A	B	C	D	E	F (1)	G	H	I	L	M	N	O
RLS 70	691	296	395	555	840	250-385	179	430	1161	214	134	221	2”
RLS 100	707	312	395	555	840	250-385	189	430	1161	214	134	221	2”
RLS 130	733	338	395	555	840	250-385	189	430	1161	214	134	221	2”

Tab. C

(1) Blast tube: short-long

4.8 Firing rates

The burners RLS 70 - 100 - 130 can work in two ways: one-stage or two-stage.

The **MAXIMUM OUTPUT** is chosen within area A (and B for RLS 130)(Fig. 2). To use also area B (RLS 130), the combustion head has to be pre-calibrated. See "Combustion head pre-calibration" on page 19

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

RLS 70 = 232 kW = 19.0 kg/h

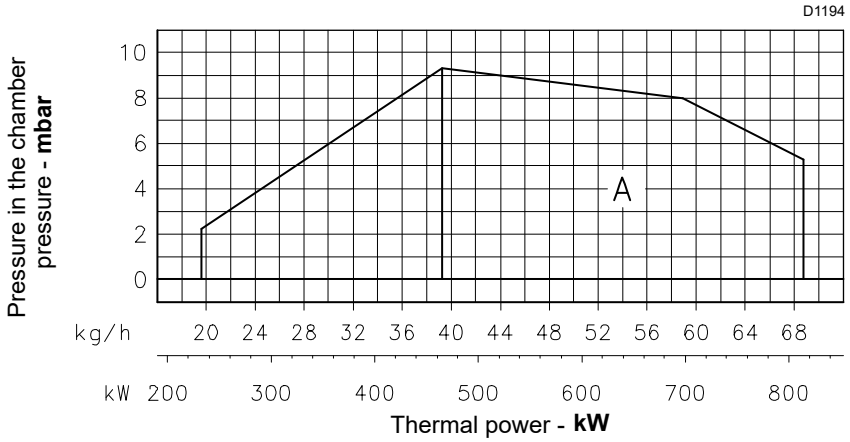
RLS 100 = 349 kW = 29.5 kg/h

RLS 130 = 465 KW = 39.0 kg/h

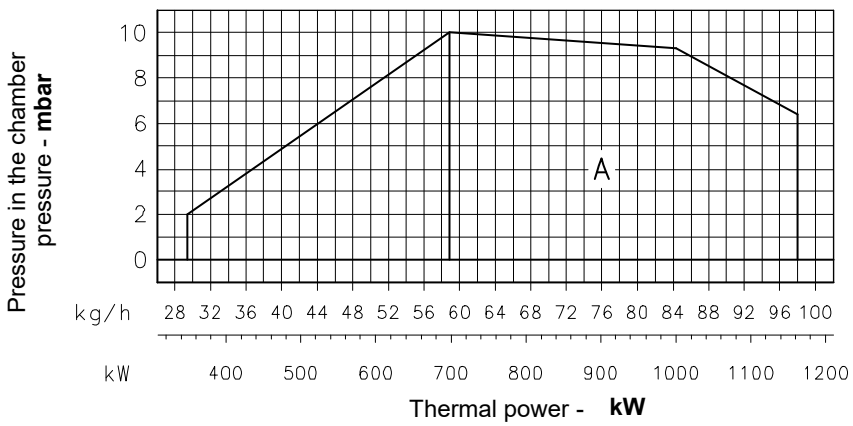
ATTENTION

The firing rate value (Fig. 2) has been obtained considering an ambient temperature of 20 °C, an atmospheric pressure of 1013 mbar (approx. 0 m a.s.l.), and with the combustion head adjusted as shown on page 21.

RLS 70



RLS 100



RLS 130

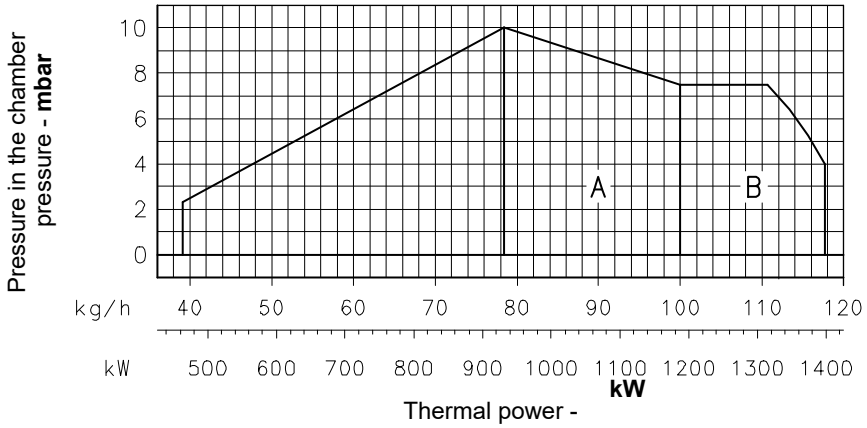


Fig. 2

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. 3).

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

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

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

Example:
Output 650 Mcal/h (407 kW): diameter 60 cm - length 2 m.

MODULATING RATIO

The modulating ratio, obtained in test boilers, according to standard (EN 676 for gas, EN 267 for light oil), is of 4:1 for light oil and 7:1 for gas.

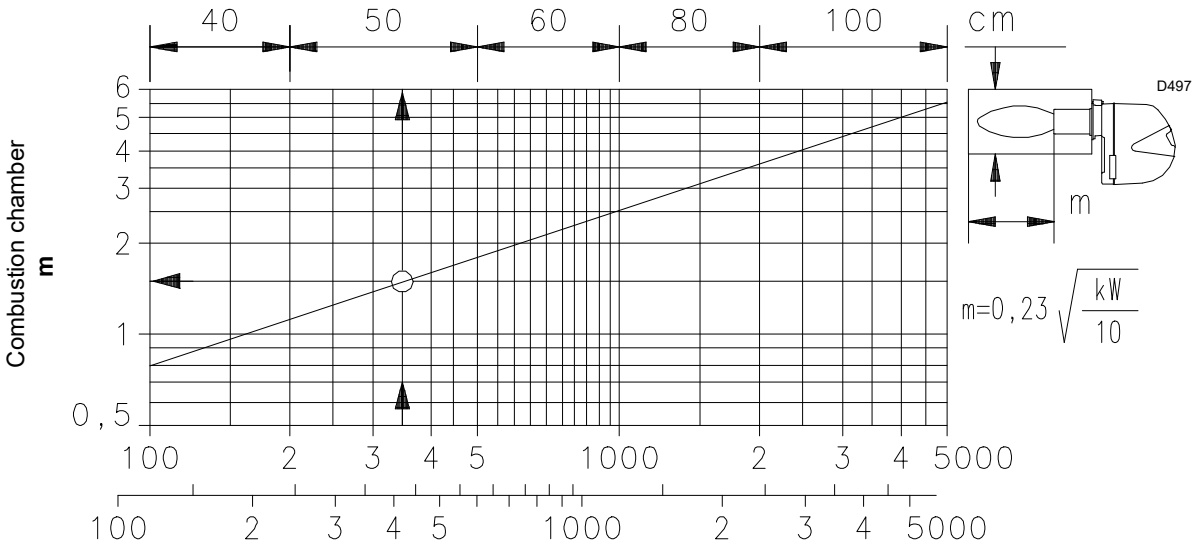


Fig. 3

4.10 Burner description

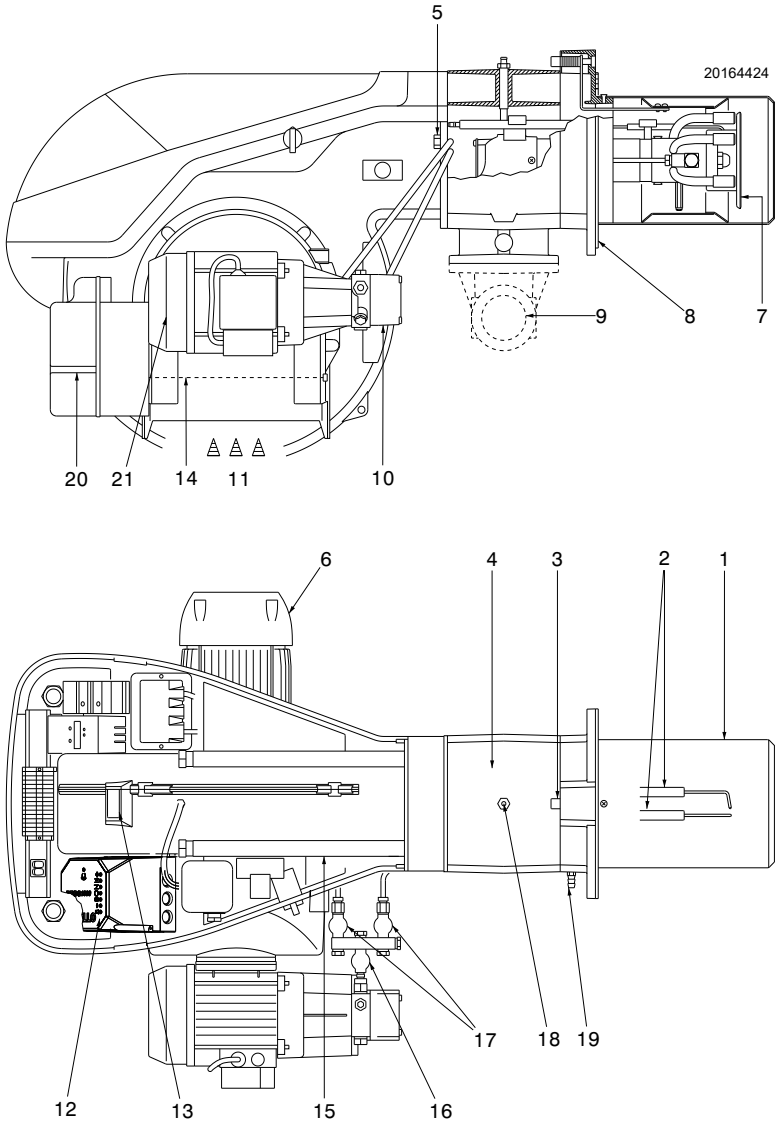


Fig. 4

1 Combustion head
2 Ignition electrodes
3 Screw for combustion head adjustment
4 Pipe coupling
5 Screws to secure fan to pipe coupling
6 Fan motor
7 Flame stability disc
8 Boiler fixing flange
9 Gas input pipe
10 Pump
11 Air inlet to fan
12 Control box with lockout pilot light and reset button
13 Flame inspection window
14 Air damper
15 Slide bars for opening the burner and inspecting the combustion head
16 Safety valve
17 1st and 2nd stage valves
18 Gas pressure test point and head fixing screw
19 Air pressure test point
20 Servomotor.
When the burner is not operating the air damper is fully closed in order to reduce heat dispersion from the boiler due to the flue draught which draws air from the fan suction inlet.
21 Pump motor

Two types of burner lockout may occur:

CONTROL BOX LOCKOUT:

if the control box 12)(Fig. 4) push-button lights up, it indicates that the burner is in lockout.

Press the push-button to reset.

MOTOR LOCKOUT:

release by pressing the push-button on thermal relay.

4.11 Electrical panel description

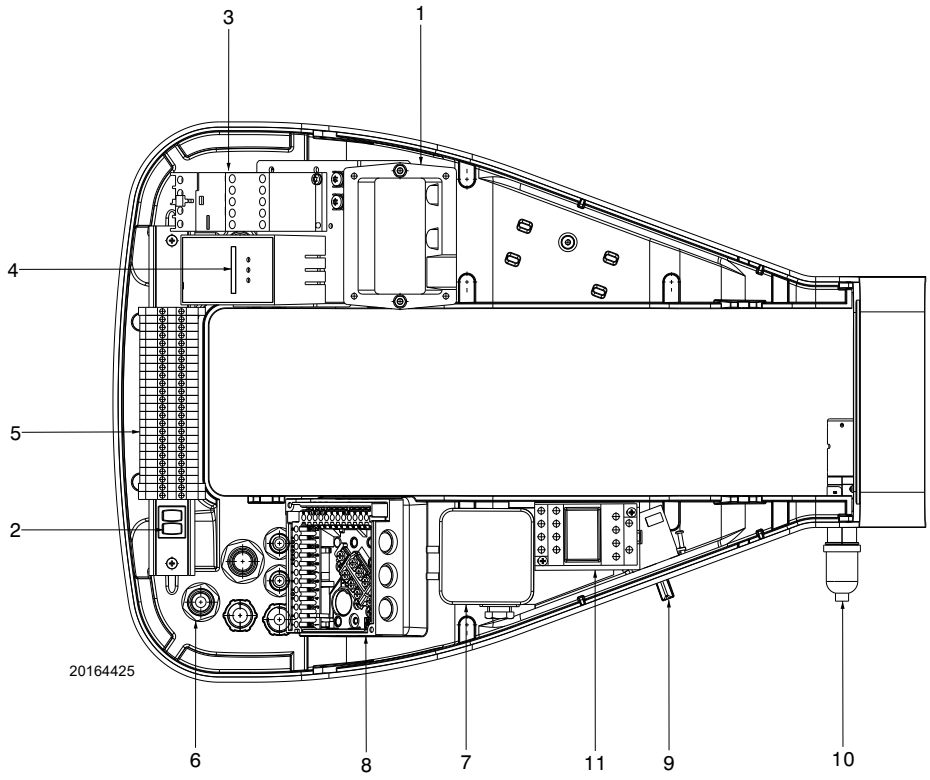


Fig. 5

1 Ignition transformer
2 Switch for:
ON-OFF operation
Switch for:
1st and 2nd stage
3 Motor contactor and thermal relay with reset button
4 Led panel
5 Terminal board for electrical connection
6 Cable-grommets for external connections to be carried out by the installer
7 Air pressure switch (differential type)
8 Control box base
9 Oil- gas switch
10 Flame sensor
11 Relay

4.12 Control box RFGO-A22

Important notes

ATTENTION

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

The control box is a safety device! Avoid opening or modifying it, or forcing its operation. The Manufacturer cannot assume any responsibility for damage resulting from unauthorised work!

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

For 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 is a control and supervision system of medium and large capacity forced draught burners.
If used with the flame detection electrode the system can operate continuously whereas, with the use of UV sensors it operates intermittently with stop and restart request at least once every 24h.

Installation notes

- Make sure that the electrical wiring inside the boiler complies with 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. 6

Technical data

Mains voltage	AC 230 V -15% / +10%
Mains frequency	50 / 60 Hz
Primary fuse (external)	Refer to the electric system
Weight	approx. 1.1 kg
Power absorption	approx. AC 7 VA
Protection level	IP40
Safety class	II
Environmental conditions	
Operation	DIN EN 60721-3-1
Climatic conditions	Class 1K2
Mechanical conditions	Class 1M2
Temperature range	-40...+60 °C
Humidity	< 90% RH (non-condensing)

Tab. D

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).

4.13 Servomotor (LKS 210 ...)

Important notes

ATTENTION

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.

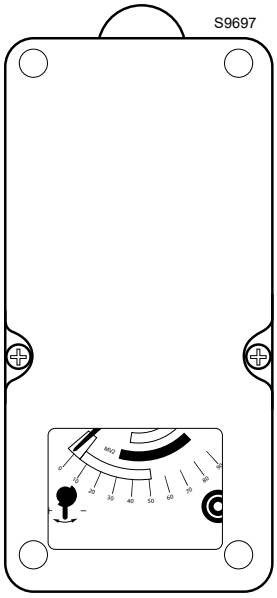


Fig. 7

Technical data

MODEL	LKS 210 - 10 ...
Operating voltage	200-240V - 50/60 Hz
Switching capacity of auxiliary and limit switches	10 A/ 250V
Opening time	0-90°, 5 sec.
Firing angle	0 - 90°
Torque	1.5 Nm
Rotation direction	Anticlockwise
Weight	0.7 kg
Protection level	IP 44

Tab. E

5 Installation

5.1 Notes on safety for the installation

After carefully cleaning all around the area where the burner is to be installed, and arranging for the environment to be illuminated correctly, proceed with the installation operations.

DANGER

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

ATTENTION

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

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

5.2 Handling

The burner packaging includes a wooden platform, it is therefore possible to handle the burner (still packaged) with a pallet truck or fork lift truck.

ATTENTION

Burner handling operations can be highly dangerous if not carried out with the greatest attention: distance unauthorised personnel, check integrity and suitability of the means available.
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. 8) and type of burner (**B**);
- ➤ the year of manufacture, in cryptographic form (**C**);
- ➤ the serial number (**D**);
- ➤ the data for electrical supply and the protection level (**E**);
- ➤ the absorbed electrical power (**F**);
- ➤ the types of gas used and the relative supply pressures (**G**);
- ➤ the data of the burner's minimum and maximum output possibilities (**H**) (see Firing rate).
  Warning. The burner output must be within the boiler's firing rate.
- ➤ The category of the appliance/countries of destination (**I**);
- ➤ light oil maximum viscosity (**L**).

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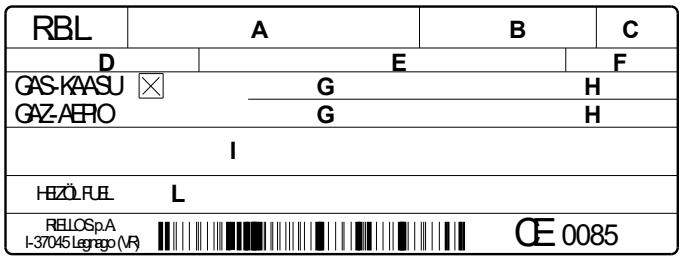

Fig. 8

ATTENTION

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

5.4 Operating position

ATTENTION

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

DANGER

- Any other position could compromise the correct operation of the appliance.
- Installation **5** are forbidden for safety reasons.

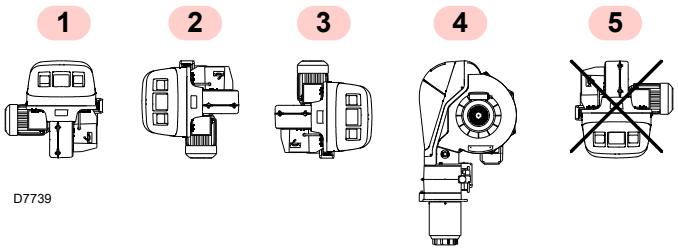

Fig. 9

5.5 Preparing the boiler

5.5.1 Boring the boiler plate

Pierce the closing plate of the combustion chamber, as in Fig. 10.

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

Model (mm)	A	B	C
RLS 70	185	275 - 325	M 12
RLS 100	195	275 - 325	M 12
RLS 130	195	275 - 325	M 12

Tab. F

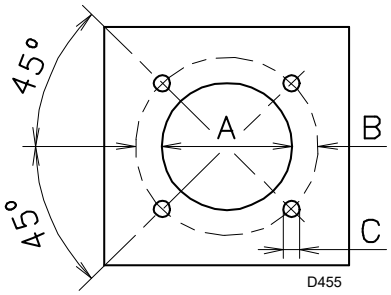

Fig. 10

5.5.2 Blast tube length

The length of the blast tube must be selected according to the indications provided by the manufacturer of the boiler, and in any case it must be greater than the thickness of the boiler door complete with its fettling. The range of lengths available, L (mm), is as follows:

Model (mm)	RLS 70	RLS 100	RLS 130
Standard	250	250	250
Extended	385	385	385

Tab. G

For boilers with front flue passes 13) or flame inversion chambers, a protection in heat-resistant material 11) must be inserted between the boiler fettling 12) and the blast tube 10).

This protection must not compromise the extraction of the blast tube.

For boilers with a water-cooled front piece, a refractory lining 11)-12)(Fig. 11) is not necessary, unless expressly requested by the boiler manufacturer.

5.5.3 Securing the burner to the boiler

Provide an adequate lifting system.

Separate the combustion head from the rest of the burner (Fig. 11):

- disconnect the light oil pipes unscrewing the two unions 6);
- loosen the 4 screws 3) and remove the cover 1);
- remove screws 2) from the two slide bars 5);
- remove the two screws 4) and pull the burner back on slide bars 5) by about 100 mm.;
- disconnect the electrode cables, then completely unthread the burner from the slide bars.

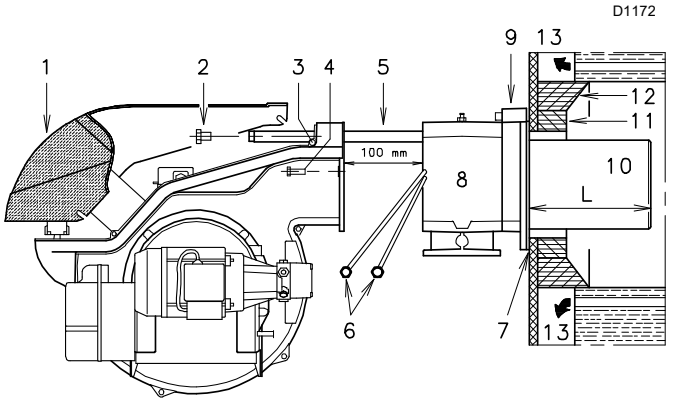

Fig. 11

ATTENTION

The seal between burner and boiler must be airtight.

5.6 Access to head internal part

In order to reach inside the combustion head (Fig. 12) proceed as follows:

➤ remove the screw 1) and the internal part 2).

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

5.6.1 Combustion head pre-calibration

Check, at this point, whether the maximum output of the burner in the 2nd stage is within area **A** or in area **B** of the firing rate. See "Firing rates" on page 11.

– If it is in area A, no intervention is required.
– However, if it is in area B:

➤ loosen the screws 1)(Fig. 13) and disassemble the blast tube 2);

➤ move the rod 3)(Fig. 13) from position **A** to position **B**, thereby drawing back the shutter 4);

➤ reassemble the blast tube 2)(Fig. 13) and the screws 1).

Once this operation (if necessary) has been carried out, fix the flange 9)(Fig. 11 on page 18) to the boiler plate, interposing the insulating gasket 7)(Fig. 11 on page 18) supplied. Use the 4 screws, also supplied with the unit, after protecting the thread with anti-seizing product.

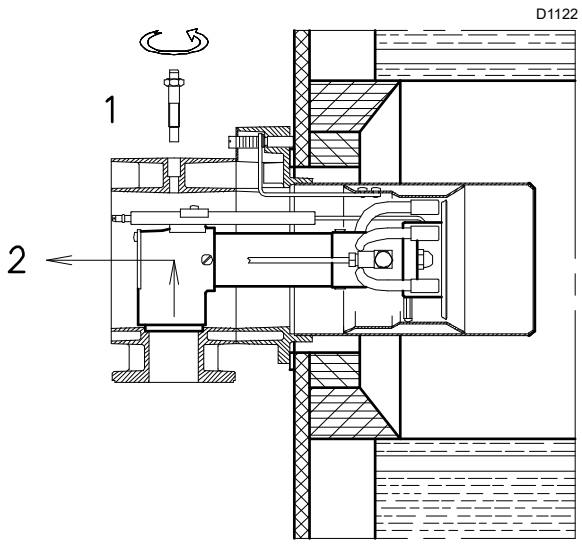

Fig. 12

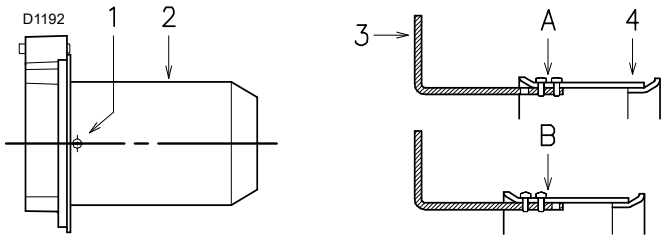

Fig. 13

5.7 Electrode positions

ATTENTION

Check that the electrodes are positioned correctly, as in Fig. 14, complying with the dimensions indicated.

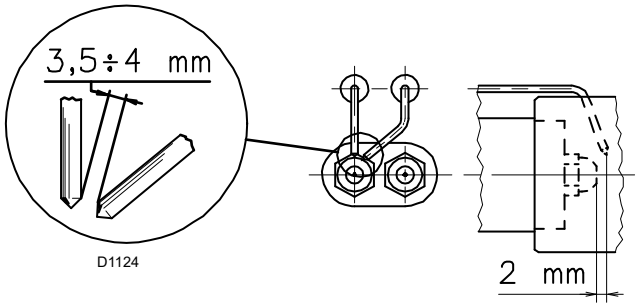

Fig. 14

5.8 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.

ATTENTION

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.

- Remove the screw 1) and the internal part 2)(Fig. 15).
- Assemble the two nozzles with the socket spanner 1)(A-Fig. 16) (16mm), after removing the plastic plugs 2)(A-Fig. 16), passing from the central opening of the flame stability disc. Alternatively, loosen the screws 1)(B-Fig. 16), remove the disc 2)(B-Fig. 16), and replace the nozzles using the spanner 3)(B-Fig. 16).
- The nozzle for the 1st stage of operation is the one beneath the ignition electrodes, Fig. 14 on page 19.

ATTENTION

- Do not use any sealing products such as: gaskets, tape or sealants.
- 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.

- Reassemble the burner on the guides 3)(Fig. 17) at about 100 mm from the pipe coupling 4), burner in the position shown in Fig. 11 on page 18;
- insert the electrode cables and then slide the burner up to the pipe coupling, the burner in the position indicated in Fig. 17;
- refit screws 2)(Fig. 17) on slide bars 3);
- fix the burner to the pipe coupling with the screws 1);
- reconnect the light oil pipes by screwing the two fittings 6)(Fig. 11 on page 18).

ATTENTION

On closing the burner on the two guides it is advisable to gently pull the high voltage wires outwards until they are under slight tension.

5.8.1 Recommended nozzle

Both nozzles must be chosen from among those listed in Tab. H.

The first nozzle determines the delivery of the burner in the 1st stage.

The second nozzle works together with the 1st nozzle to determine the delivery of the burner in the 2nd stage.

The deliveries of the 1st and 2nd stages have to be within the value range indicated Tab. A on page 8.

Use nozzles with a 60° spray angle at the recommended pressure of 12 bar.

In general both nozzles have the same delivery.

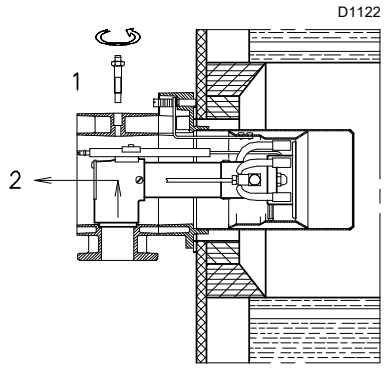

Fig. 15

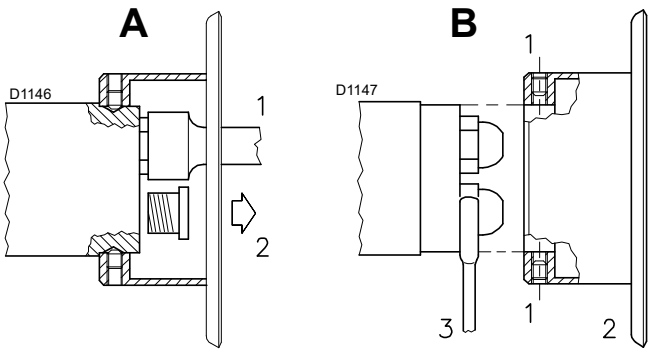

Fig. 16

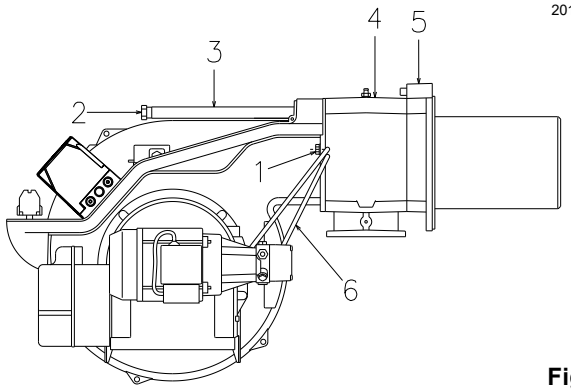

Fig. 17

GPH	Kg/h			kW
	10 bar	12 bar	14 bar	12 bar
5.00	19.2	21.2	23.1	251.4
5.50	21.1	23.3	25.4	276.3
6.00	23.1	25.5	27.7	302.4
6.50	25.0	27.6	30.0	327.3
7.00	26.9	29.7	32.3	352.3
7.50	28.8	31.8	34.6	377.2
8.00	30.8	33.9	36.9	402.1
8.30	31.9	35.2	38.3	417.5
8.50	32.7	36.1	39.2	428.2
9.00	34.6	38.2	41.5	453.1
9.50	36.5	40.3	43.8	478.0
10.0	38.4	42.4	46.1	502.9
10.5	40.4	44.6	48.4	529.0
11.0	42.3	46.7	50.7	553.9
12.0	46.1	50.9	55.3	603.7
12.3	47.3	52.2	56.7	619.1
13.0	50.0	55.1	59.9	653.5
13.8	53.1	58.5	63.3	693.8
14.0	53.8	59.4	64.5	704.5
15.0	57.7	63.6	69.2	754.3
15.3	58.8	64.9	70.5	769.7
16.0	61.5	67.9	73.8	805.3
17.0	65.4	72.1	78.4	855.1

Tab. H

5.9 Combustion head adjustment

5.9.1 Adjustments prior to ignition (with light oil)

The adjustment of the combustion head depends only on the maximum output of the burner in the 2nd stage.

➤ Turn the screw 5)(Fig. 18) until the notch indicated by the diagram (Fig. 19) corresponds with the front part of the flange 6)(Fig. 18).

Example burner RLS 100:

burner output in 2nd stage = 72 kg/h.

➤ The diagram (Fig. 19) shows that for this output, the adjustment of the combustion head is carried out on the notch 3, as in Fig. 18.

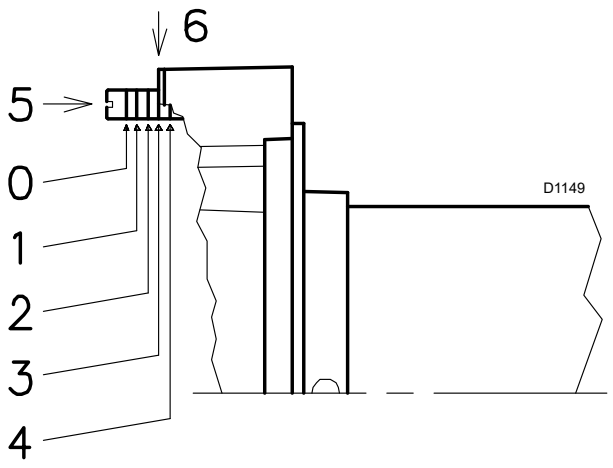

Fig. 18

Pump adjustment

No adjustment of gas delivery is required.

The pump leaves the factory set at 12 bar, a pressure to be checked and eventually modified after the burner has been started. In this phase, therefore, limit to apply a pressure gauge on the specific pump connector.

Fan damper adjustment

For the initial ignition, leave the factory setting for the 1st and 2nd stages.

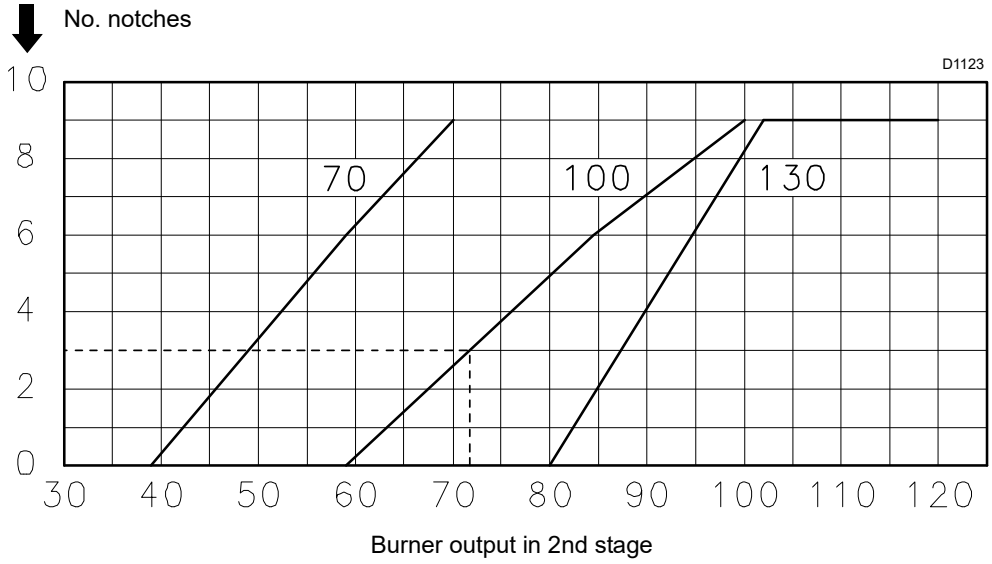

Fig. 19

5.10 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 the fuel shut-off valve is closed before performing any operation on the burner.

ATTENTION

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

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

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

Tank lower than burner B (Fig. 20)
Pump depression values higher than 0.45 bar (35°cm°Hg) must not be exceeded. Because at higher levels gas is released from the fuel; the pump becomes noisy and its lifetime is shortened.
It is good practice to ensure that the return and suction lines enter the burner from the same height; the suction line is more difficult to disconnect.

5.10.1 Loop circuit

The loop circuit is composed of a duct starting from the tank and going back to it, in which an auxiliary pump makes the pressurised fuel flow. A branch from the loop supplies the burner.

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

+/- H [m]	L [m] Ø [mm] 12	14	16
4,0	24	46	80
3,0	21	40	70
2,0	18	35	60
1,0	15	28	51
0,5	13	26	46
0	12	23	41
-4,0	-	-	-
-3,0	-	6	12
-2,0	5	12	21
-1,0	8	17	31
-0,5	10	20	36

Tab. I

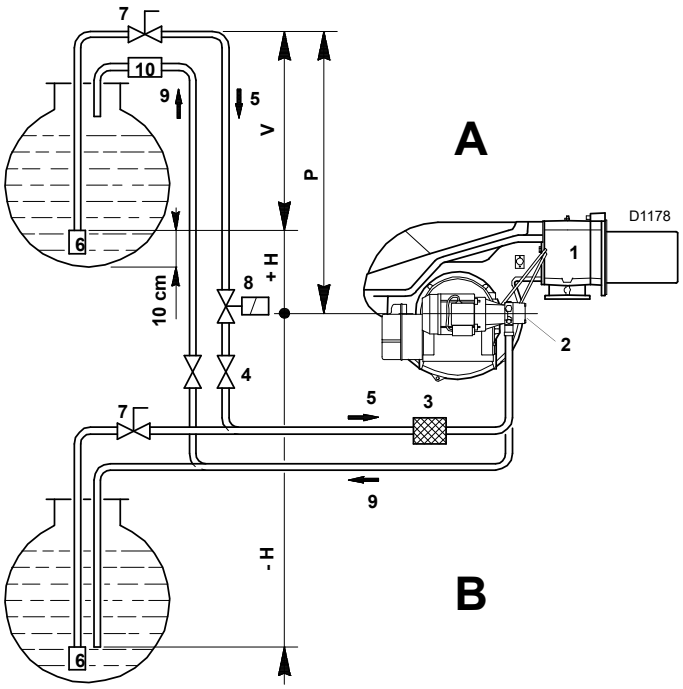

Fig. 20

Key (Fig. 20)

H = Pump/Foot valve height difference
L = Piping length
Ø = Inside pipe diameter
1 = Burner
2 = Pump
3 = Filter
4 = Manual on/off valve
5 = Suction line
6 = Foot valve
7 = Quick closing manual valve with remote control (Italy only)
8 = On/off solenoid valve (Italy only)
9 = Return line
10 = Check valve (Italy only)

5.10.2 Hydraulic connections

CAUTION

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

The pumps are equipped with a by-pass that connects return line with suction line. They are installed on the burner with the by-pass closed by screw 6)(Fig. 21).

It is therefore necessary to connect both hoses to the pump. The pump will break down immediately if it is run with the return line closed and the by-pass screw inserted.

Remove plugs from suction and return connectors of the pump.

Insert the hose connections with the supplied seals into the connections and screw them down.

ATTENTION

During the installation, hoses must not be stressed with twisting.

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

➤ Connect, finally, the other end of the flexible hoses to the suction line and return line ducts by nipples supplied with the equipment.

5.10.3 Hydraulic circuit diagram

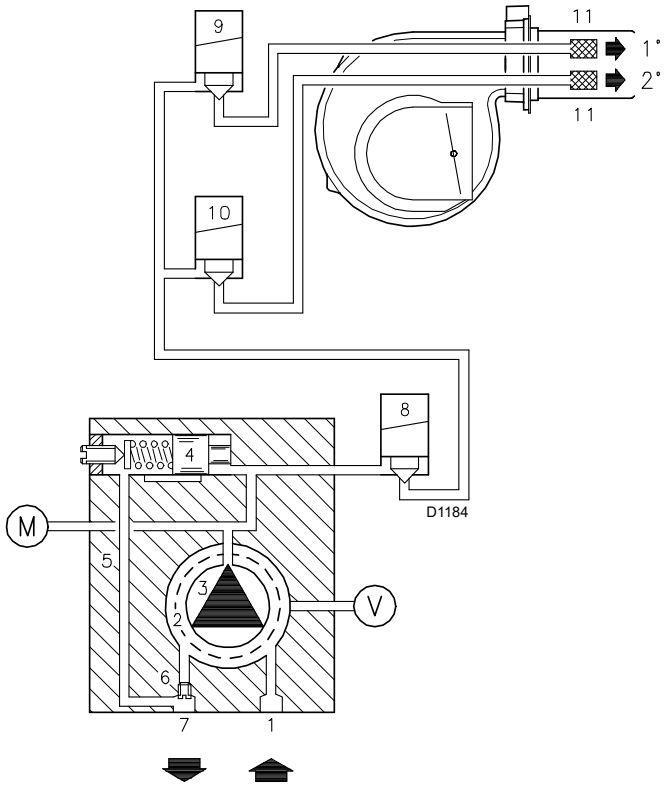

Fig. 21

Key (Fig. 21)

1 Pump suction line
2 Filter
3 Pump
4 Pressure adjuster
5 Return pipe
6 Bypass screw
7 Pump return line
8 Safety valve
9 1st stage valve
10 2nd stage valve
11 Filter
M Pressure gauge
V Vacuometer connection

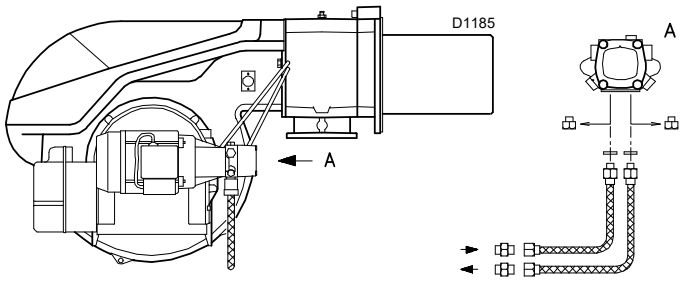

Fig. 22

5.11 Pump

5.11.1 Technical data

Pump	SUNTEC AJ 6 CC
Min. delivery rate at 12 bar pressure	220 kg/h
Delivery pressure range	10 - 20 bar
Max. suction depression	0.45 bar
Viscosity range	2.8 - 75 cSt.
Max. light oil temperature	60°C
Max. suction and return pressure	2 bar
Pressure calibration in the factory	12 bar
Filter mesh width	0,150 mm

Tab. J

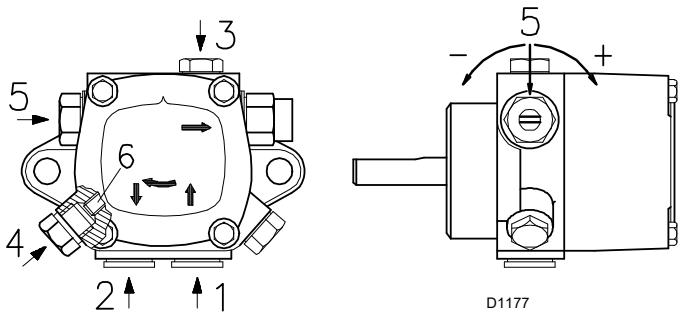

Fig. 23

Key (Fig. 23)

1	Suction line	G 1/4"
2	Return line	G 1/4”
3	Gauge connection	G 1/8”
4	Vacuometer connection	G 1/8”
5	Pressure adjuster	

5.11.2 Priming pump

ATTENTION

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.

Make sure that the valves on the suction line are open and that there is fuel in the tank.

In order for self-priming to take place, one of the screws 3) of the pump, see Fig. 23, must be loosened in order to bleed off the air contained in the suction line.

ATTENTION

The pump leaves the factory with the by-pass closed.

5.12 Gas supply

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

Precautions: avoid knocking, attrition, sparks and heat.

Make sure the fuel shut-off valve is closed before performing any operation on the burner.

ATTENTION

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

5.12.1 Gas feeding line

Key (Fig. 24 - Fig. 25 - Fig. 26 - Fig. 27)

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

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

6C Includes:
- safety valve
- working valve

6D Includes:
- safety valve
- working valve

7 Minimum gas pressure switch
8 Leak detection control, supplied as an accessory or built-in, based on the gas train code. In compliance with the EN 676 standard, gas valve leak detection control devices are 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 Pressure upstream of valves/adjuster
P3 Pressure upstream of the filter
L Gas train, supplied separately
L1 Responsibility of the installer

MBC “threaded”

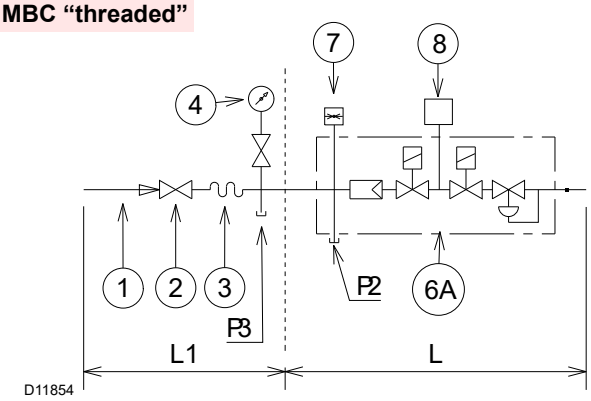

Fig. 24

MBC “flanged”-VGD

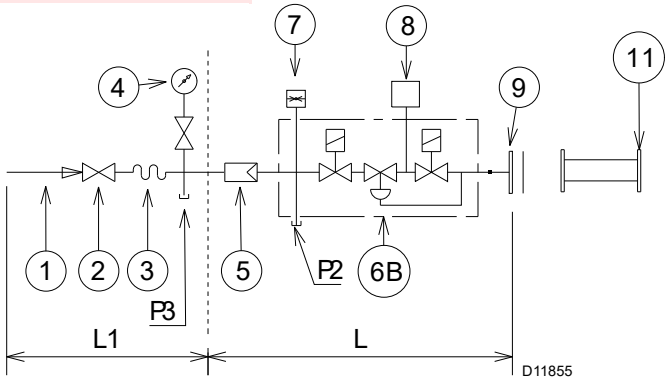

Fig. 25

DMV “flanged or threaded”

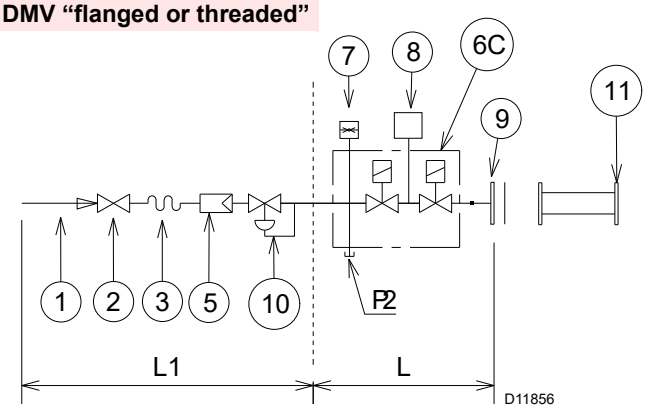

Fig. 26

CB “flanged or threaded”

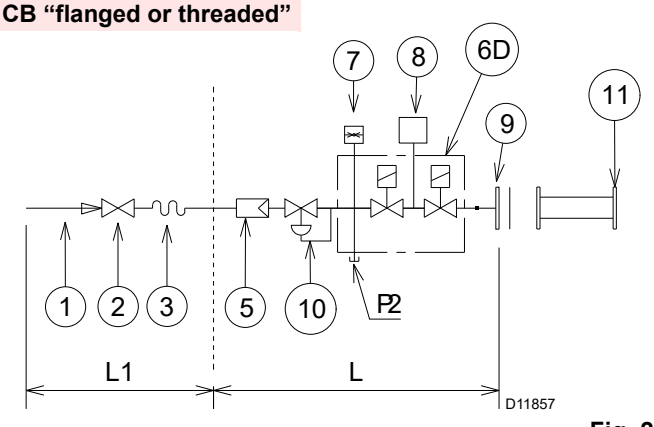

Fig. 27

5.12.2 Gas train

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

5.12.3 Gas train installation

Disconnect the electrical power using the main switch.

Check that there are no gas leaks.

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

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

The operator must use the required equipment during installation.

The gas train must be connected to the gas connection 1)(Fig. 28), using the flange 2), the gasket 3) and the screws 4) supplied with the burner.

The train can enter the burner from the right or left side, depending on which is the most convenient, see Fig. 28.

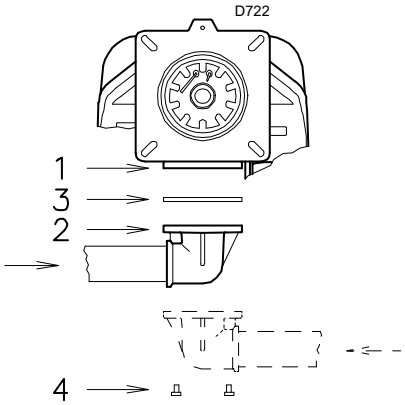

Fig. 28

5.12.4 Gas pressure

Tab. K indicates the pressure drops of the combustion head and gas butterfly valve, on the basis of the burner operating output.

	kW	1 Δp (mbar) G20	G25	G31
RLS 70	465	5.5	8.2	6.3
	515	5.6	8.3	6.4
	565	5.7	8.5	6.5
	615	5.8	8.6	6.7
	665	5.9	8.8	6.8
	715	6.0	8.9	7.1
	765	6.1	9.1	7.4
	814	6.2	9.2	7.8
RLS 100	698	8.0	11.9	10.3
	760	8.3	12.4	10.5
	825	8.6	12.8	10.8
	890	8.9	13.3	11.1
	955	9.2	13.7	11.4
	1020	9.4	14.0	11.6
	1085	9.7	14.5	11.8
	1163	10.0	14.9	12.0
RLS 130	930	9.3	13.9	10.5
	1010	9.5	14.2	10.9
	1090	9.7	14.5	11.4
	1170	9.9	14.8	11.8
	1250	10.4	15.5	12.9
	1395	11.5	17.1	14.4

Tab. K

Data of head thermal power and gas pressure refer to operation with gas butterfly valve fully open (90°).

The values shown in Tab. K refer to:
- Natural gas G 20 NCV 9.45 kWh/Sm^3 (8.2 Mcal/Sm^3)
- Natural gas G 31 NCV 27 kWh/Sm^3 (23.2 Mcal/Sm^3)

Column 1
Combustion head pressure drop.
Gas pressure measured at test point 1)(Fig. 29 on page 27), with:
- combustion chamber at 0 mbar;
- Burner operating in 2nd stage
- Gas G20 (methane) - G31 (propane)

To calculate the approximate output at which the burner operates in the 2nd stage:
- subtract the combustion chamber pressure from the gas pressure measured at test point 1)(Fig. 29 on page 27).
- Find in Tab. K related to the burner concerned, the pressure value closest to the result of the subtraction.
- Read the corresponding output on the left.

Example RLS 100 with natural gas G20:
2nd stage operation
Gas pressure at test point 1)(Fig. 29) = 11.2 mbar
Pressure in combustion chamber = 2 mbar
11.2 - 2 = 9.2 mbar

A pressure of 9.2 mbar, column 1, corresponds in Tab. K to an output of 955 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. 29), with the output fixed at that required for the burner in the 2nd stage:
– find the nearest output value in the table Tab. K for the burner in question.
– Read, on the right (column 1), the pressure at the test point 1)(Fig. 29).
– Add this value to the estimated pressure in combustion chamber.

Example RLS 100 with natural gas G20:
Desired output in 2nd stage: 955 kW
Gas pressure at an output of 210 kW = 9.2 mbar
Pressure in combustion chamber = 2 mbar
9.2 + 2 = 11.2 mbar
pressure required at test point 1)(Fig. 29).

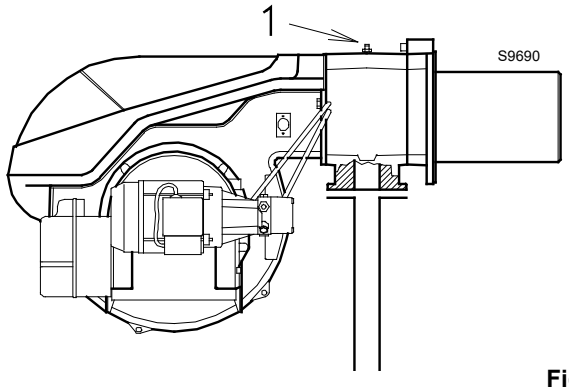

Fig. 29

5.13 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 have been type-approved for intermittent operation (FS1).
- The RFGO safety device features two built-in flame amplifiers which allow using it for applications with UV sensor only, FR sensor only or with both sensors (UV+FR). The FR amplifier circuit is subject to constant auto-control, which allows to use it for applications requiring a burner operating cycle longer than 24 hours. When it is used as a UV control, the system is considered as non-permanent, requiring one burner recycle every 24 hours.
  Normally, burner stopping is guaranteed by the boiler's thermostat/pressure switch.
  If this is not the case, you must apply a time switch to L-N in series, to stop the burner at least once every 24 hours. Refer to the wiring diagrams.
- The electrical safety of the device is obtained only when it is correctly connected to an efficient earthing system, made according to current standards. It is necessary to check this fundamental safety requirement. In the event of doubt, have the electrical system checked by qualified personnel. Do not use the gas tubes as an earthing system for electrical devices.
- The electrical system must be suitable for the maximum power absorption of the device, as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for that level of power absorption.
- For the main power supply of the device from the electricity mains:
  - do not use adapters, multiple sockets or extensions;
  - make provisions for an omnipolar switch with a gap between the contacts of at least 3 mm (over-voltage category III), as required by current safety regulations.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.

Before carrying out any maintenance, cleaning or checking operations:

DANGER

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

DANGER

Close the fuel shut-off valve.

DANGER

Avoid condensate, ice and water leaks from forming.

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

Use flexible cables according to standard EN 60 335-1.

5.13.1 Supply cables and external connections passage

All the cables to be connected to the burner terminal board 8)(Fig. 30) must be threaded through cable grommets.

The use of the cable grommets and the pre-blanked holes can be done in different manners; for example (Fig. 30):

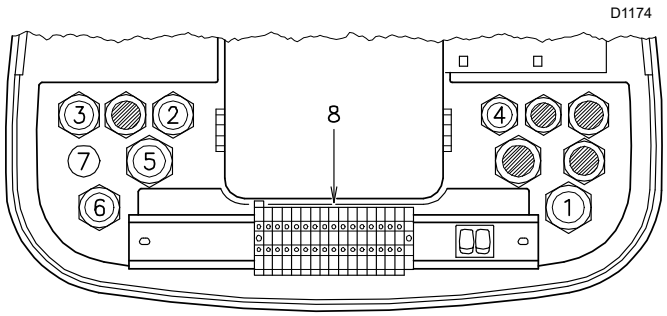

Fig. 30

Key (Fig. 30)

1	Pg 13.5	Three-phase power supply
2	Pg 11	Single-phase power supply
3	Pg 11	TL remote control
4	Pg 9	TR remote control
5	Pg 13.5	Gas valves
6	Pg 13.5	Gas pressure switch or device for leak detection control
7	Pg 11	Bore, if you want to add a cable entry

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

5.14 Calibration of the thermal relay

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

In case of 220V power supply, change the motor connection from star to triangle and replace the thermal relay with the one supplied.

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.

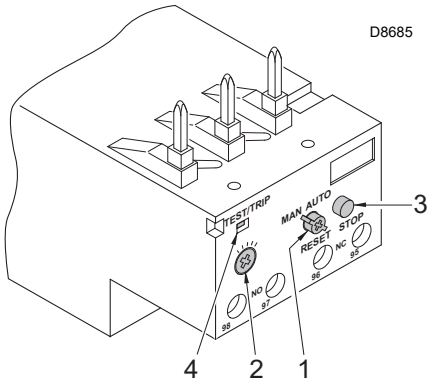

Fig. 31

ATTENTION

The automatic reset can be dangerous.

This operation is not foreseen in the burner operation.

5.15 Motor rotation

As soon as the burner starts, place yourself in front of the cooling fan of the fan motor and check that it turns anticlockwise (Fig. 32).

If this is not the case:

➤ put the switch of the burner to “0” (off) and wait until the control box carries out the switching off phase.

DANGER

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

➤ Invert the phases on the three-phase motor power supply.

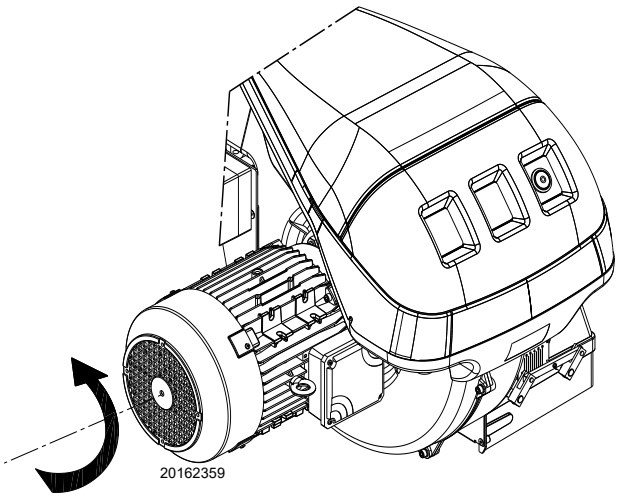

Fig. 32

6 Start-up, calibration and operation of the burner

6.1 Notes on safety for the first start-up

ATTENTION

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.

ATTENTION

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

ATTENTION

Before starting up the burner, refer to section "Safety test - with no gas supply" on page 37.

6.2 Adjustments prior to ignition (light oil)

ATTENTION

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 1st and 2nd stage nozzles

See information on page 20.

6.2.2 Combustion head

The adjustment of the combustion head already carried out on page 21 need not to be altered unless the 2nd stage output of the burner is changed.

6.2.3 Pump pressure

12 bar: this is the pressure calibrated in the factory which is usually sufficient for most purposes. Sometimes, this pressure must be adjusted to:

10 bar: in order to reduce fuel delivery. It is possible only if the ambient temperature remains above 0 C;

14 bar: in order to increase fuel delivery or to ensure firings even at temperatures of less than 0 °C.

In order to change pump pressure, act on screw 5)(Fig. 23 on page 24).

(See information on page 24).

6.2.4 1st stage fan damper

Keep the burner operating at 1st stage by setting the switch 2)(Fig. 33) to the 1st stage position. The fan damper can be adjusted by operating the orange level of the servomotor ("Servomotor adjustment" on page 33).

6.2.5 2nd stage fan damper

Turn switch 2)(Fig. 33) to the 2nd stage position. The fan damper can be adjusted by operating the red level of the servomotor, ("Servomotor adjustment" on page 33).

6.3 Burner ignition (light oil)

Start the burner by closing the remote controls, with the switch 1)(Fig. 33) in the **"ON"** position and with the fuel selector switch set to "**OIL**" (Fig. 34).

The pump can be considered to be primed when the light oil starts coming out of the screw 3)(Fig. 23 on page 24). Stop the burner: set switch 1)(Fig. 33) to "**OFF**" and tighten the screw 3).

The time required for this operation depends upon the diameter and length of the suction tubing. If the pump fails to prime at the first start of the burner and the burner locks out, reset the burner and repeat the start-up operation.

Do not light the flame sensor or the burner will lock out.

During the first firing, during the passage from the 1st to the 2nd stage, there is a momentary lowering of the fuel pressure caused by the filling of the 2nd nozzle tubing. This lowering of the fuel pressure can cause the burner to lockout and can sometimes give rise to pulsations.

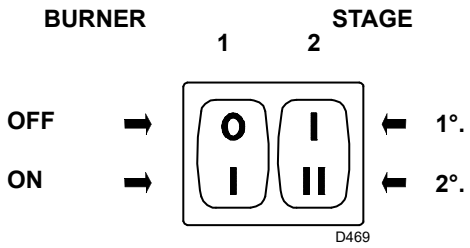

Fig. 33

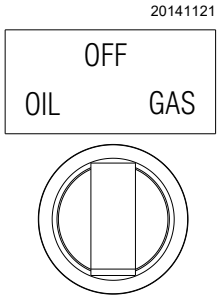

Fig. 34

6.4 Adjustments prior to ignition (gas)

Combustion head adjustment is already described on page 21.

In addition, the following adjustments must also be made:

- ➤ open the manual valves upstream of the gas train.
- ➤ Adjust the minimum gas pressure switch to the start of the scale (Fig. 40 on page 34).
- ➤ Adjust the air pressure switch to the start of the scale (Fig. 39 on page 34).
- ➤ 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 (Fig. 35) to the gas pressure test point on the pipe coupling.
- ➤ Used to approximately calculate burner output in the 2nd stage using the Tab. K on page 26.
- ➤ Connect two lamps or testers in parallel to the two gas line solenoid valves VR1 and VS in order to check the exact moment at which voltage is supplied. This operation is not required 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.

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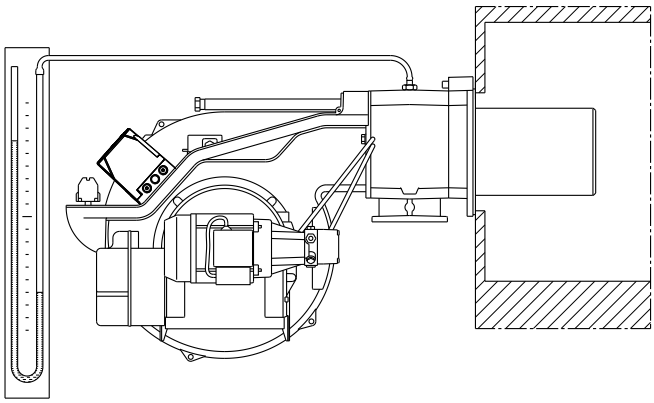

Fig. 35

6.5 Burner start-up (gas)

ATTENTION

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

Carry out the fuel change with burner off.

Close the remote controls and turn:

- ➤ switch 1)(Fig. 33 on page 30) in “**BURNER ON**” position;
- ➤ switch 2)(Fig. 33 on page 30) in “**1st STAGE**” position:
- ➤ fuel selector switch in “**GAS**” position (Fig. 36).

As soon as the burner starts, check that the lamps or the testers connected to the solenoid valves or the warning lights on the solenoid valves indicate no voltage presence. If voltage is present, stop the burner **immediately** and check the electrical wiring.

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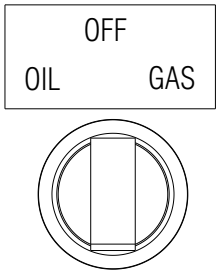


Fig. 36

6.6 Burner ignition

Once the above steps are completed, the burner should ignite.

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 does not occur, it is possible that gas is not reaching the combustion head within the safety time period of 3 seconds. Therefore, it is necessary to increase gas ignition delivery.

The arrival of gas to the sleeve is indicated by the U-type pressure gauge (Fig. 35).

If the burner locks out again, refer to chapter "Problems - Causes - Remedies signalled by LED indicators" on page 43.

ATTENTION

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

DANGER

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

Once ignition has taken place, proceed with global calibration operations.

6.7 Change of fuel

There is a change of fuel options:
➤ with selector 9)(Fig. 5 on page 14);

ATTENTION

Change the fuel only when the burner is off.

6.8 Burner adjustment (gas)

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

Adjust in sequence:
1 Burner output in 2nd stage
2 Burner output in 1st stage
3 Output upon ignition
4 Air pressure switch
5 Gas minimum pressure switch

6.8.1 Output in 2nd stage

2nd stage output must be selected within the firing rate range indicated in page 11.

Turn switch 2)(Fig. 33 on page 30) to the 2nd stage position: the servomotor will open the air damper on the value previously set for the light oil and will control the opening of the 2nd stage VR2 gas valve.

Adjustment of gas delivery

Adjust the gas delivery to the air quantity.
– If delivery needs to be reduced, diminish the adjuster outlet gas pressure; if it is already very low, slightly close the 2nd stage VR2 valve.
– If delivery needs to be increased, increase the adjuster outlet gas pressure.

6.8.2 Output in 1st stage

1st stage output must be selected within the firing rate range indicated in page 11.

Turn switch 2)(Fig. 33 on page 30) to the 1st stage position: the servomotor will close the air damper on the value previously set for the light oil and will control the opening of the 1st stage VR1 gas valve.

Adjustment of gas delivery

Adjust the gas delivery to the air quantity by operating the 1st stage VR1 gas valve.

6.8.3 Ignition output (gas)

According to standard EN 676:

Burners with MAX output up to 120 kW

Ignition can occur at the maximum operation output level. Example:
- max. operation output: 120 kW
- max. output upon ignition: 120 kW

Burners with MAX output above 120 kW

Ignition must occur at a lower output than the max. operation output.

If ignition output does not exceed 120 kW, no calculations are required. If ignition output exceeds 120 kW, the regulatory standard sets that the value be defined according to the control box safety time "ts":
– for "ts" = 2s, ignition output must be equal to or lower than 1/2 of max. operation output;
– for "ts" = 3s, ignition output must be equal to or less than 1/3 of max. operation output.

Example:

MAX operation output of 600 kW.

Ignition output must be equal to or lower than:
- 300 kW con ts = 2s
- 200 kW con ts = 3s

In order to measure the ignition output:
– Remove the flame sensor 10)(Fig. 5 on page 14) (the burner starts and locks out after the safety time).
– Perform 10 ignitions with consecutive lockouts.
– Read the quantity of gas burned on the meter. This quantity must be equal to or lower than the quantity given by the formula:

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

Example for G 20 gas (10 kWh/Nm^3):

Max operation output, 600 kW

corresponding to 60 Nm^3/h.

After 10 ignitions with a lockout, the output indicated on the meter must be equal to or less than:

60: 360 = 0.166 Nm^3.

The ignition output must be adjusted on the gas valve brake.

6.8.4 Operation with LPG - Propane - Butane

The burner cans operate also with LPG -Propane-Butane.

In this case it is necessary to replace the six nozzles 2)(Fig. 37) screwed onto the holes 1)(Fig. 37), which are suitable for natural gas, with those for LPG-Propane-Butane, provided as standard with the burner.

Apply the adhesive label for LPG operation near the characteristics label.

The firing rate and the adjustment of the burner are the same as for natural gas.

The pressure of the G31 gas (Propane) is shown on page 26.

Gas train: use the train for natural gas, see page 26, with a 1” 1/2” or 2” diameter.

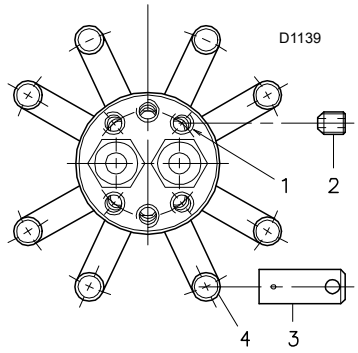


Fig. 37

6.9 Servomotor adjustment

The servomotor (Fig. 38) adjusts the air damper.

Do not alter (for the moment) the factory setting for the 4 levers. A graduated label with 4 coloured sectors shows the intervention point of the levers.

It is equipped with 4 levers:

BLUE LEVER: It adjusts the position of the air damper with the burner at rest: air damper closed.

ORANGE LEVER: It adjusts the position of the air damper with the burner operating in 1st stage.

RED LEVER: It adjusts the position of the air damper with the burner operating in 2nd stage.

Determines when the 2nd stage gas or light oil valve opens.

It must always intervene (slightly) before the red lever and after the orange lever.

It must not intervene with the red lever, to prevent the gas or light oil valve from not opening at all.

BLACK LEVER: It must not intervene immediately after the orange lever, to prevent a combustion with an air defect.

To approach the moment of the gas or light oil valve opening at the damper 2nd stage position, turn the black lever toward the left; to postpone the moment of the opening, turn the lever toward the right.

Summarising, the lever must intervene according to the following sequence:

1° Blue lever

2° Orange lever

3° Black lever

4° Red lever

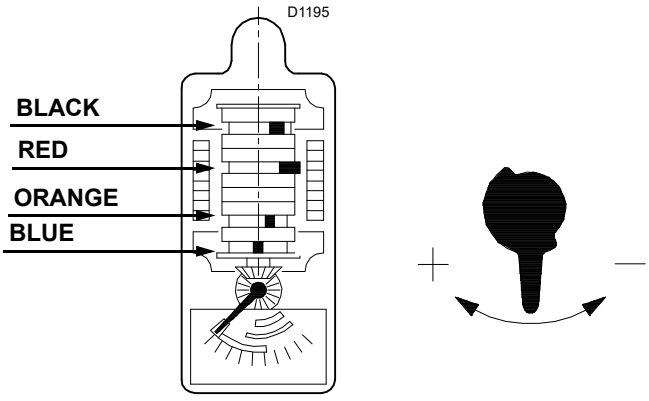


Fig. 38

6.10 Pressure switch adjustment

6.10.1 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. 39).
With the burner operating in 1st stage, increase adjustment pressure by slowly turning the relevant knob clockwise until the burner locks out.
Then turn the knob anticlockwise by about 20% of the set point and repeat burner start-up to ensure it is correct.
If the burner locks out again, turn the knob slightly anticlockwise.

as a rule, the air pressure switch must limit the CO in the fumes to less than 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 incorporated air pressure switch can work in a 'differential' mode if connected with two pipes. If a strong depression in the combustion chamber during the pre-purging phase does not allow the air pressure switch to switch, this can be obtained by applying a second tube between the air pressure switch and the suction inlet of the fan. In this way, the pressure switch will work in differential mode.

The use of the air pressure switch with differential operation is allowed only in industrial applications and where rules enable the air pressure switch to control only fan operation without any reference to CO limit.

6.10.2 Gas minimum pressure switch

Adjust the minimum gas pressure switch (Fig. 27) after having adjusted the burner, the gas valves and the gas train stabiliser. With the burner operating at maximum output:

– install a pressure gauge downstream of the gas train stabiliser (for example at the gas pressure test point on the burner combustion head);
– choke slowly the manual gas cock until the pressure gauge detects a decrease in the pressure read of about 0.1 kPa (1 mbar). In this phase, verify the CO value which must always be less than 100 mg/kWh (93 ppm).
– Increase the adjustment of the gas pressure switch until it intervenes, causing the burner shutdown;
– remove the pressure gauge and close the cock of the gas pressure test point used for the measurement;
– open completely the manual gas cock.

1 kPa = 10 mbar

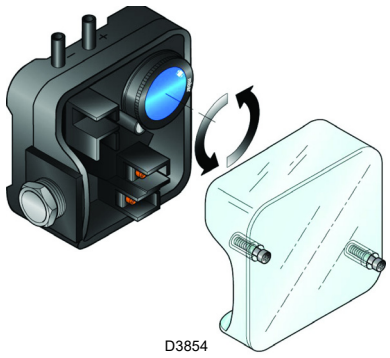


Fig. 39

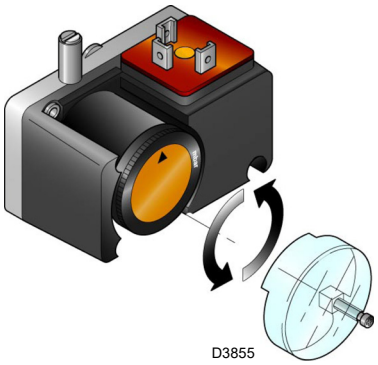


Fig. 40

6.11 Operation sequence of the burner

6.11.1 Burner start-up

0s TL closes, fan motor starts, (in case of oil operation, pump motor starts)

6s servomotor starts, maximum opening.

11s air damper is at its maximum opening

37s servomotor closing phase starts at the minimum output.

40s air damper is in the ignition point position (minimum output)

43s ignition transformer strikes a spark

48s 1st stage fuel valve opens

51s ignition discharge ends

59s with TR in 2nd stage, servomotor reaches its maximum opening and the second fuel valve opens.

Burner start-up

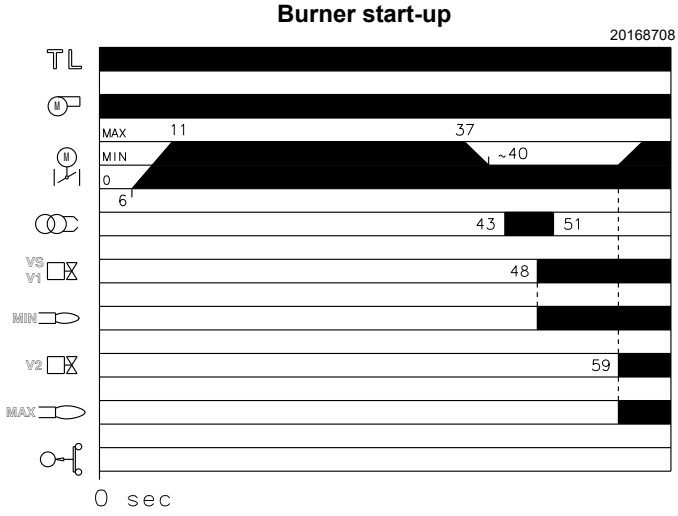


Fig. 41

6.11.2 Ignition failure

If the burner does not fire, it goes into lockout within 3 seconds after the valve opens and approximately 51 seconds after the TL closes and the pre-purging phase starts and lasts 15 seconds.

IGNITION FAILURE

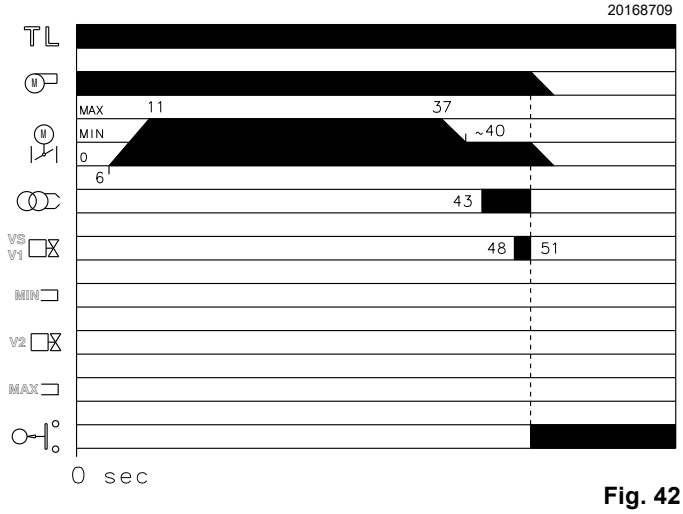


Fig. 42

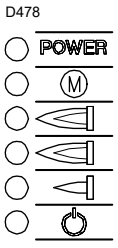
6.11.3 Burner flame goes out during operation

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

6.11.4 LED PANEL

It gives 6 information through the lighting up of the LEDs, (see Fig. 43).

Key:



= Voltage present

= Fan motor lockout (red)

= Burner lockout (red)

= 2nd stage operation

= 1st stage operation

= Burner operation

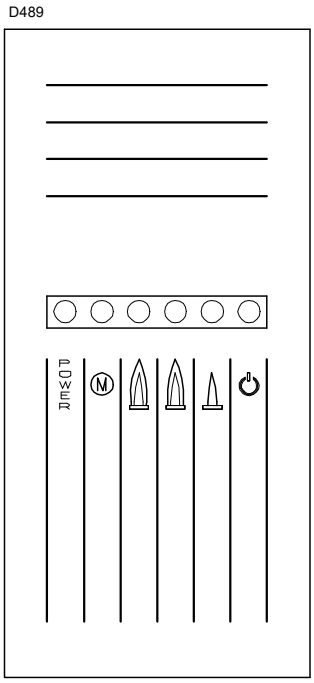


Fig. 43

6.12 Final checks (with burner operating)

➤ Open the thermostat/pressure switch TL ➤ Open the thermostat/pressure switch TS	⇨	The burner must stop
➤ Turn the knob of the gas maximum pressure switch to the minimum end of scale position ➤ Turn the air pressure switch knob 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 electrically the flame sensor	⇨	The burner must stop in lockout due to ignition failure

Tab. L

ATTENTION

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 shut-off valve.

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

7.2 Maintenance programme

7.2.1 Maintenance frequency

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

7.2.2 Safety test - with no gas supply

To perform commissioning in safety conditions, it is very important to check correct wiring between gas valves and burner.

For this purpose, after checking that connections comply with the burner wiring diagrams, it is necessary to carry out a start-up cycle with gas cock closed (dry test).

1 The manual gas valve must be closed using the locking/unlocking device (“Lock-out / tag out” procedure).
2 Ensure that burner limit electrical contacts are closed
3 Ensure that minimum gas pressure switch contact is closed
4 Try to start the burner.

The start-up cycle must occur according to the following steps:

– Fan motor start-up for pre-purging
– Gas valve leak detection control, if applicable.
– Pre-purging completion
– Achievement of the ignition point
– Power supply of the ignition transformer
– Supply of gas valves.

As gas is closed, the burner cannot ignite and its control box will switch to stop or safety lockout condition.

The actual supply of gas valves can be checked by inserting a tester; some valves are equipped with lights (or closing/opening position indicators) that activate as soon as they are powered.

ATTENTION

IF POWER SUPPLY OF GAS VALVES OCCURS IN UNEXPECTED MOMENTS, DO NOT OPEN THE MANUAL VALVE, DISCONNECT POWER SUPPLY, CHECK WIRINGS, CORRECT THE ERRORS AND CARRY OUT THE WHOLE TEST AGAIN.

7.2.3 Checking and cleaning

The operator must use the required equipment during maintenance.

Combustion
Carry out an analysis of the combustion flue gases.
Significant differences with respect to the previous measurements indicate the points where most care should be exercised during maintenance.

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

Flame inspection window
Clean the glass of the flame inspection window.

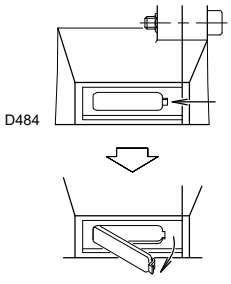


Fig. 44

Flame presence check

Check the level of the flame detection signal with the “Check mode” function from the flame control: the LEDs from 2 to 6 indicate the flame signal level, respectively. See "LED indicator and special function” on page 41.

Check Mode

With burner flame on:

- ➤ hold the reset button on the flame control pressed for at least 3 sec.;
- ➤ the button colour will change from green to yellow;
- ➤ each operating status signalling LED will be compared to 20% of the maximum brightness;
- ➤ press the reset button again (<0.5sec) to reset the standard operation of the signalling LEDs.Boiler

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

Burner

Check that there are not excess wear or loosen screws. The screws securing the electrical leads in the burner plugs should also be fully tightened.
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 impellers, 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 page 24.
The depression must be less than 0.45 bar.
Unusual noise must not be evident during pump operation.
If the pressure is unstable, or the pump runs noisily, the flexible hose must be detached from the line filter and the fuel must be sucked from a tank located near the burner.
This measure permits the cause of the anomaly to be traced to either the suction piping or the pump.
If the problem lies in the suction line, check the filter is clean and that air is not entering the piping.

Filters

Check the filtering baskets on line and at nozzle 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.

Nozzles

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

Flexible hoses

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

Fuel tank

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

Combustion

If the combustion values measured before starting maintenance do not comply with applicable Standards or do not indicate efficient combustion, consult the table below or contact our Technical Support Service to implement 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	≤ 100

Tab. M

GAS OPERATION

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

Gas filter
Change the gas filter when it is dirty.

Combustion
If the combustion values measured before starting maintenance do not comply with applicable Standards or do not indicate efficient combustion, consult the table below or contact our Technical Support Service to implement 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	≤ 100
G 25	11.5	9.5	8.8	≤ 100
G 30	14.0	11.6	10.7	≤ 100
G 31	13.7	11.4	10.5	≤ 100

Tab. N

7.2.4 Combustion control (gas)

CO_2
It is advisable to adjust the burner with a CO_2 not greater than about 10% (gas with Ncv 8600 kcal/m3). In this way it is avoided that a small decalibration (for example a variation in the tension) could cause a combustion with an air defect and with the subsequent formation of CO.

CO
It should not exceed 100 mg/kWh.

7.2.5 Safety components

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

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

Safety component	Life cycle
Flame control	10 years or 250,000 operation cycles
Flame sensor	10 years or 250,000 operation cycles
Gas valves (solenoid)	10 years or 250,000 operation cycles
Pressure switches	10 years or 250,000 operation cycles
Pressure adjuster	15 years
Servomotor (electronic cam)	10 years or 250,000 operation cycles
Oil valve (solenoid)	10 years or 250,000 operation cycles
Oil regulator	10 years or 250,000 operation cycles
Pipes/ oil fittings (metallic)	10 years
Flexible hoses (if present)	5 years or 30,000 pressurised cycles
Fan impeller	10 years or 500,000 start-ups

Tab. O

7.3 Opening the burner

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

Close the fuel shut-off valve.

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

➤ Loosen the screws 1)(Fig. 45) and remove the cover 2).
➤ Disconnect the light oil pipes 7).
➤ Remove the screws 3) and move the burner backwards by about 100 mm on the slide bars 4).
➤ Disconnect the electrode cables, then completely retract the burner.

At this point it is possible to extract the inner part 5) after having removed the screw 6)(Fig. 45).

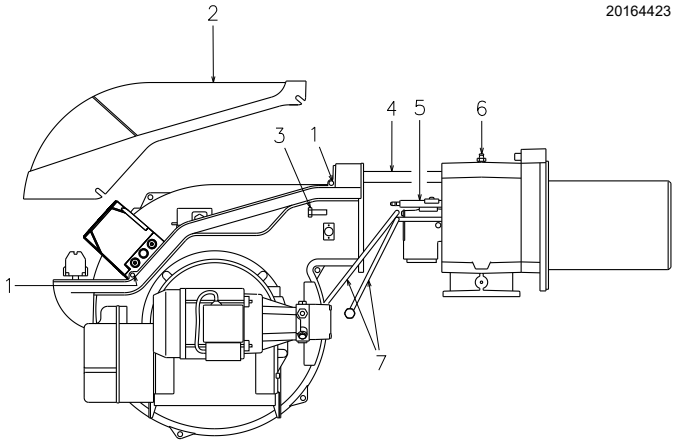


Fig. 45

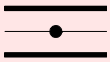
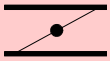
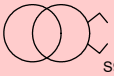
7.4 Closing the burner

➤ Push the burner to approximately 100 mm from the pipe coupling.
➤ Reconnect the cables and slide in the burner until it comes to a stop.
➤ Replace the screws 3) and carefully pull the cables outwards until they are slightly taut.
➤ Reconnect the light oil pipes.

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

8 LED indicator and special function

8.1 Description of LED lamps

S9740	Fan	It turns on when the fan motor is powered (T6) and blinks when RUN/CHECK switch is set to “CHECK” during damper movement phases, PTFI AND MTFI.
 S9741	Damper open	It blinks when the air damper is moving towards the maximum opening position until the position-reached feedback sent by the servomotor is received, then it stays steadily on for the time set by the flame control.
 S9742	Damper closed	If blinks when the air damper is moving towards the minimum opening position until the position-reached feedback sent by the servomotor is received, then it stays steadily on until the end of the pre-purging time.
S9743	Auto	It indicates that the burner is ready for the output modulation.
 S9744	Ignition	It blinks during the ignition phase (1st safety time) and stays steadily on during the MTFI.
	Flame	It blinks during the first safety time and stays steadily on if the flame detection has been correctly performed.
S9746	Alarm	It turns on in red when a lock-out condition occurs. Together with the other indicators, it indicates the type of fault during the lock-out phase. Together with the other LEDs, it indicates the operating status during the normal cycle.

Tab. P

8.2 Check mode function

By means of the reset button on-board the flame control, it is possible to use a control function during start-up phases. (pre-purging, ignition, 1st safety time and 2nd safety time).
This function, indicated as CHECK MODE, is designed to facilitate checking the phases of the burner and of the safety devices monitored by the flame control.
This function is particularly useful during the burner first commissioning or during maintenance.

To enable the check mode function:

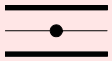
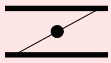
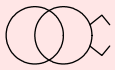
- keep the reset button pressed, see chapter 8 for more details, for at least 3 seconds, the status LED changes from green to yellow to signal that the control device is in check mode.
- the control device locks out during pre-purging, after a timeout of max 30 minutes the flame control will automatically exit the check mode function.
- check mode has a 2 minute timeout during the 2nd safety time. When it ends, the flame control goes back to the normal operating status.
- check mode has a 2 minute timeout during the MTFI status. When it ends, the flame control goes back to the normal operating status.
- During the check mode 1st or 2nd safety time, the flame signal level can be indicated by the 5 central LEDS on the flame control central panel, which turn on proportionally.
  Each lit LED (starting from the flame LED) represents 20% of the signal power.
  To exit the check mode function, press the reset button; the flame control will go back to the normal operating mode.

8.3 Flame control lock-out or emergency stop condition

The RFGO control device can be locked out (emergency stop) at any time during the operating cycle and unlocked when already locked (lock-out) by simply pressing the key on the front panel or by means of the terminal T21 on the support base.

8.4 LED lamps: burner operating status

OPERATING STATUSES INDICATED BY LEDS DURING NORMAL OPERATION AND CHECK MODE

Operation LED ● = ON	Fan	Damper open	Damper closed	Modulation	Ignition	Flame	Status
Icon	S9740	 S9741	 S9742	S9743	 S9744	S9745	S9746
Power OFF/ON							OFF
Not ready/ Diagnostics							Green
Standby			●				Green
Servomotor movement (Note 3)	●	OFF Flashing ●	● Flashing OFF				Green
Waiting for closing	Green blinking						Green
OPEN (before ignition)	●	●					Green
Minimum (before ignition)	●		●				Green
Ignition	●		●		●		Green
PTFI	●		●		●	Green blinking	Green
MTFI	●		●			●	Green
Active modulation	●			●		●	Green
Minimum output position	●		●			●	Green
With flame present	●	●				●	Green
Economy mode	●		●				Green
Check during maximum opening phase	Flashing	●					Yellow
Check during minimum closing phase	Flashing		●				Yellow
Check during ignition phase with pilot PTFI	Flashing	● Note 1	● Note 1	● Note 1	● Note 1	● Note 1	Yellow
Check during ignition phase with main fuel valve MTFI	Flashing	● Note 1	● Note 1	● Note 1	● Note 1	● Note 1	Yellow
Fault/lock-out	● Note 2	● Note 2	● Note 2	● Note 2	● Note 2	● Note 2	Red
End of the cycle	●		●	●			Green

Tab. Q

1. LEDs form a progress bar which indicates the Flame Signal Power in order to orientate the sensors during commissioning (LEDs “Grow” upwards, moving away from the Status at 20% intervals of flame power.)
2. LEDs indicate the error or lock-out code for troubleshooting.
3. LEDs change from ON to BLINKING to OFF showing the servomotor movement control until the position-reached feedback is received see paragraph **“Problems - Causes - Remedies signalled by LED indicators”** on page 43“.

9 Problems - Causes - Remedies signalled by LED indicators

When an emergency stop occurs, the control device LEDs indicate the cause of the stop.
The terminal T3 is not powered.
The device operating status is internally memorised in case of any lack of power supply.

The device lock-out condition can be caused by pressing (<1sec.) the reset button on the flame control front side or through the remote reset - terminal T21 on the base.
Since the reset button is very sensitive, do not press it strongly during the reset operation.

Unlocking the control device

The RFGO control device can be reset in two ways: reset button and remote reset terminal.
The remote reset must be a normally open connected button between T21 and flame control power supply voltage (see illustrative diagrams):

- the reset is performed when a faulty condition is detected by the flame control.
- Press the reset button to reset the system after a lock-out.
- Pressing the reset button during operation will cause an emergency stop.
- The reset or emergency stop condition can be obtained also by using the remote reset with the same modalities.
- The number of reset attempts is limited to a maximum of 5 within 15 minutes.

Error / RFGO LED lock-out Codes

During an alarm condition, the status LED becomes steady red.
The remaining LEDs turn on according to a coded sequence which identifies the lock-out cause.
The following table shows the different LED Lock-out codes.

ATTENTION

The device described in this manual can cause material problems, severe injuries or death.

It is the owner or user's responsibility to make sure that the equipment described is installed, used and commissioned in compliance with the requirements provided both by national and local law. The lock-out condition indicates the presence of a fault which occurred during the operating cycle or during stand-by mode.
Before performing an unlock attempt, it is necessary to restore the original optimal operating conditions.

ATTENTION

Thermal unit's operation, maintenance and troubleshooting interventions must be carried out by trained personnel.
The persons who solve lock-out problems or reset the control device must observe the error codes to solve the problems described in this product technical data sheet.

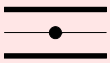
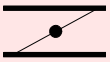
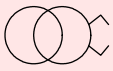
It is not admitted to tamper with or act on the system or control in a way that could compromise the product safety or warranty.
Any tests on safety devices or on loads, such as fan motor, valves, igniter, flame sensors, must be performed with the shut-off valves closed and by qualified personnel.

Do not by-pass nor exclude the safety devices connected to the flame control.
Failure to observe these guidelines will exclude any liability.

ATTENTION

The regulation prohibits the system from allowing more than 5 remote reset attempts within a 15 minute time window.
If more than 5 attempts are performed without solving the lock-out, the system will prevent the user to perform further remote resets and force him/her to wait for the 15 minutes to elapse.
The remote reset operation will be restored at the end of the waiting time.
It is recommended that qualified personnel evaluate the lock-out condition and implement the solution which is suitable for the fault to be solved.

Error / RFGO LED lock-out codes

No	Faults	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7
	Operation LED ● = ON	Fan	Open damper	Closed damper	Auto	Ignition	Flame	Status
	Icon	S9740	 S9741	 S9742	S9743	 S9744	S9745	S9746
1	Post-diagnostics fault	●						Red
2	Local reset		●					Red
3	Combustion air fan fault	●	●					Red
4	Supervisor processor diagnostics fault			●				Red
5	FR- NO Flame at the end of the 2nd safety time (MTFI)	●		●				Red
6	FR: internal circuit fault		●	●				Red
7	Internal communication fault	●	●	●				Red
8	Remote reset				●			Red
9	FR: internal fault	●			●			Red
10	Main processor fault		●		●			Red
11	Data memory test fault	●	●		●			Red
12	Data memory test fault			●	●			Red
13	Mains voltage or frequent fault	●		●	●			Red
14	Internal processor fault		●	●	●			Red
15	Internal processor fault	●	●	●	●			Red
16	No flame: 1st safety time (PTFI)	●				●		Red
17	Wiring fault		●			●		Red
18	Safety relay fault	●	●			●		Red
19	Combustion airflow switch fault in the rest position			●		●		Red
20	UV: no flame at the end of the 2nd safety time (MTFI)	●		●		●		Red
21	Safety relay fault		●	●		●		Red
22	Supervisor processor fault	●	●	●		●		Red
23	Supervisor memory test fault				●	●		Red
24	Flame loss during the operation (AUTO)	●			●	●		Red
25	Supervisor processor data memory fault		●		●	●		Red
26	Supervisor processor internal fault	●	●		●	●		Red
27	Not used							
28	Not used							
29	Operating temperature out of range		●	●	●	●		Red
30	Code memory fault	●	●	●	●	●		Red
31	FR: external short circuit						●	Red
32	Check mode timeout (manual)	●					●	Red
33	False flame in stand-by mode		●				●	Red
34	Not used							
35	Internal processor timeout			●			●	Red
36	Internal processor timeout	●		●			●	Red
37	Combustion air check timeout		●	●			●	Red
38	Internal processor timeout	●	●	●			●	Red
39	Internal processor timeout				●		●	Red
40	Internal hardware fault	●			●		●	Red
41	Internal hardware fault		●		●		●	Red
42	Main processor fault	●	●		●		●	Red
43	Supervisor processor fault			●	●		●	Red
44	Supervisor processor timeout	●		●	●		●	Red
45	Off-specification mains voltage		●	●	●		●	Red
46	Off-specification mains voltage	●	●	●	●		●	Red

No	Faults	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7
47	UV: Internal fault					●	●	Red
48	Supervisor processor fault	●				●	●	Red
49	Main processor fault		●			●	●	Red
50	Ignition feedback fault	●	●			●	●	Red
51	Pilot feedback fault			●		●	●	Red
52	Piloted valve feedback fault	●		●		●	●	Red
53	Actuator feedback waiting time expired		●	●		●	●	Red
54	Direct ignition valve feedback fault	●	●	●		●	●	Red
55	Internal processor fault				●	●	●	Red
56	UV: false flame during operation			●	●	●	●	Red
57	FR: false flame during operation	●		●	●	●	●	Red
58	T8 inlet fault		●	●	●	●	●	Red
59	Internal hardware fault	●			●	●	●	Red
60	Local reset fault	●	●	●	●	●	●	Red
61	Open POC fault		●		●	●	●	Red
62	UV: strong UV flame fault	●	●		●	●	●	Red
63	Internal hardware fault					●		Red

Tab. R

Fault explanation

No	Faults	Cause	Solution
1	Post-diagnostics fault	Initial power diagnostics fault Make sure that the status of inlets and outlets is correct upon ignition	Check T12, T13 and T14
2	Local reset	The user started the manual reset or the reset switch is faulty	Check T21 inlet or reset for normal operation
3	Combustion air fan fault	No Air Check signal (T14) during the bleed cycle or Air Check signal loss during the burner operation	Check the fan or the air pressure switch
4	Supervisor processor diagnostics fault	The system detected the presence of voltage on T16, T17, T18 or T19 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the system is operating on a single-phase line (50/60Hz)
5	FR- No flame at the end of the 2nd safety time (MTFI)	No flame at the end of the second safety time	Inspect the system, check the gas pressure, inspect the flame detection electrode, check the wiring, etc.
6	FR: internal circuit fault	Internal fault	Replace the control device
7	Internal communication fault	Internal fault	Replace the control device
8	Remote reset	The user pressed the remote reset button or the reset switch is discontinuous/dynamic	Check the remote switch
9	FR: internal fault	Internal fault	Replace the control device
10	Main processor fault	Internal fault	Replace the control device
11	Data memory test fault	Internal fault	Replace the control device
12	Data memory test fault	Internal fault	Replace the control device
13	Mains voltage or frequent fault	Off-specification power supply voltage and/or frequency	Check the input power supply
14	Internal processor fault	Internal fault	Replace the control device
15	Internal processor fault	Internal fault	Replace the control device
16	No flame: 1st safety time (PTFI)	No flame at the end of the first safety time	Inspect the system, check the gas pressure, check the flame sensor, check the wiring, etc.
17	Wiring fault	The system detected the presence of voltage on critical terminals (T16, T17, T18 or T19) at the wrong moment or there is no voltage when necessary	Inspect the wiring and make sure that the system is operating on a single-phase line (50/60Hz)
18	Safety relay fault	Internal fault	Replace the control device
19	Combustion airflow switch fault in the rest position	Open the circuit upon T13 start-up	Check the wiring for the air pressure switch

No	Faults	Cause	Solution
20	UV: no flame at the end of the 2nd safety time (MTFI)	No flame at the end of the 2nd safety time	Inspect the system, check the gas pressure, check the flame sensor, check the wiring, etc.
21	Safety relay fault	Internal fault	Replace the control device
22	Supervisor processor fault	Internal fault	Replace the control device
23	Supervisor memory test fault	Internal fault	Replace the control device
24	Flame loss during the operation (AUTO)	Loss of flame	Check the flame sensor or the fuel flow line
25	Supervisor processor data memory fault	Internal fault	Replace the control device
26	Supervisor processor internal fault	Internal fault	Replace the control device
27	Not used		
28	Not used		
29	Operating temperature out of range	Operating temperature below -40°C or above 70°C	Bring the control device within the specified temperature nominal values
30	Code memory fault	Internal fault	Replace the control device
31	FR: external short circuit	External short circuit between T24 and EARTH	Inspect the flame detection electrode
32	Check mode timeout (manual)	The interval for the manual mode (30 minutes) to end has elapsed	Exit the manual mode correctly to avoid timeout
33	False flame in stand-by mode	Unexpected flame (false or parasitic flame) detected during the Stand-by status	Check flame sensor or interference
34	Not used		
35	Internal processor timeout	Internal fault	Replace the control device
36	Internal processor timeout	Internal fault	Replace the control device
37	Combustion air check timeout	The system could not perform verification tests of the combustion air during the burner sequence	Check the wiring or the air pressure switch
38	Internal processor timeout	Internal fault	Replace the control device
39	Internal processor timeout	Internal fault	Replace the control device
40	Internal hardware fault	Internal fault	Replace the control device
41	Internal hardware fault	Internal fault	Replace the control device
42	Main processor fault	Internal fault	Replace the control device
43	Supervisor processor fault	Internal fault	Replace the control device
44	Supervisor processor timeout	Internal fault	Replace the control device
45	Off-specification mains voltage	Off-specification mains voltage/frequency	Check the mains voltage level or the frequency. Contact the factory if the problem persists
46	Off-specification mains voltage	Off-specification mains voltage/frequency	Check the mains voltage level or the frequency. Contact the factory if the problem persists
47	UV: Internal fault	Internal fault	Replace the control device
48	Supervisor processor fault	Internal fault	Replace the control device
49	Main processor fault	Internal fault	Replace the control device
50	Ignition feedback fault	The system detected the presence of voltage on T16 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the earthing is appropriate If the problem persists, contact the distributor/factory
51	Pilot feedback fault	The system detected the presence of voltage on T17 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the earthing is appropriate. If the problem persists, contact the distributor/factory
52	Piloted valve feedback fault	The system detected the presence of voltage on T19 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the earthing is appropriate If the problem persists, contact the distributor/factory
53	Actuator feedback waiting time expired	No actuator feedback on T8 for more than 10 minutes	Check the wiring Check the modulation equipment
54	Direct ignition valve feedback fault	The system detected the presence of voltage on T18 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the earthing is appropriate. If the problem persists, contact the distributor/factory
55	Internal processor fault	Internal fault	Replace the control device

No	Faults	Cause	Solution
56	UV: false flame during operation	False flame detected before ignition	Check the flame sensor
57	FR: false flame during operation	False flame detected before ignition	Check the wiring Check the flame sensor Make sure that earthing is appropriate
58	T8 inlet fault	The system detected the presence of voltage on T8 at the wrong moment or there is no voltage when necessary	Check the wiring Check the actuator
59	Internal hardware fault	Internal fault	Replace the control device
60	Local reset fault	Local reset button pressed for more than 10 seconds or reset button locked	If the problem persists, replace the control device
61	Open POC fault	The fuel valve is open at the wrong moment	Check the wiring
62	UV: strong UV flame fault	The flame sensor is too close to the flame	Increase the distance between the sensor and the flame OR use an orifice to reduce the view field
63	Internal hardware fault	Internal fault	Replace the control device

Tab. S

A Appendix - Accessories

Extended head Kit (for short head versions only)

Burner	L (mm) Standard head	L (mm) Head obtainable with the kit	Code
RLS 70	250	385	3010345
RLS 100	250	385	3010346
RLS 130	250	385	3010347

Soundproofing box kit

Burner	Type	dB(A)	Code
All models	C4/5	10	3010404

Degasser kit

Burner	Filter	Code
All models	with filter	3010055
	without filter	3010054

LPG kit

Burner	Code
All models	3010305

Maximum gas Pressure switch Kit

Burner	Code
All models	3010493

Ground fault interrupter kit

Burner	Code
All models	20098337

Seal control kit

Burner	Code 60 Hz
All models	20050030
	20050033

Gas trains in compliance with EN 676

Please refer to manual.

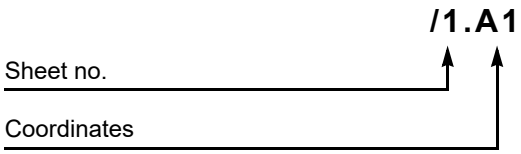
ATTENTION

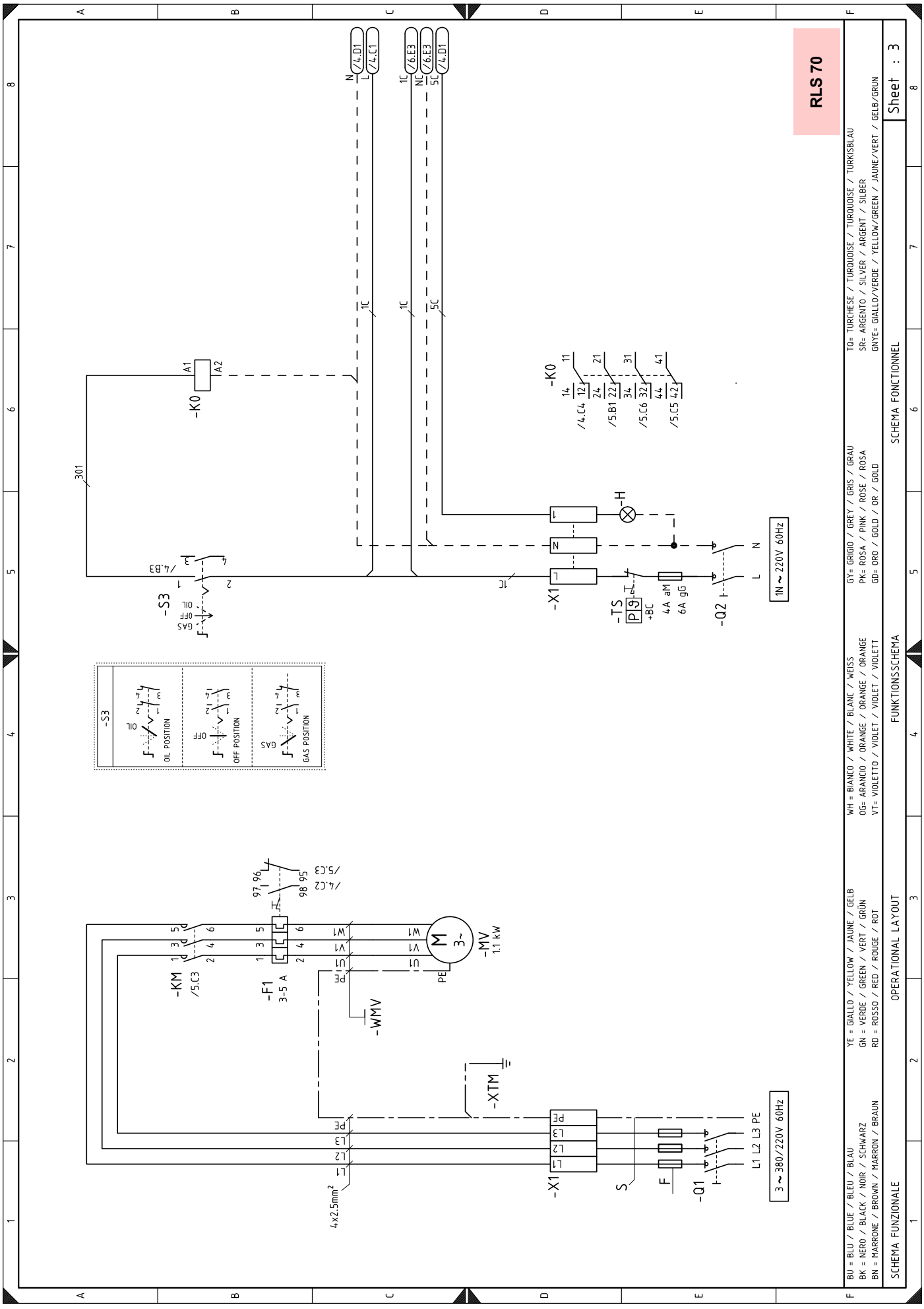
The installer is responsible for the addition of any safety device not foreseen in this manual.

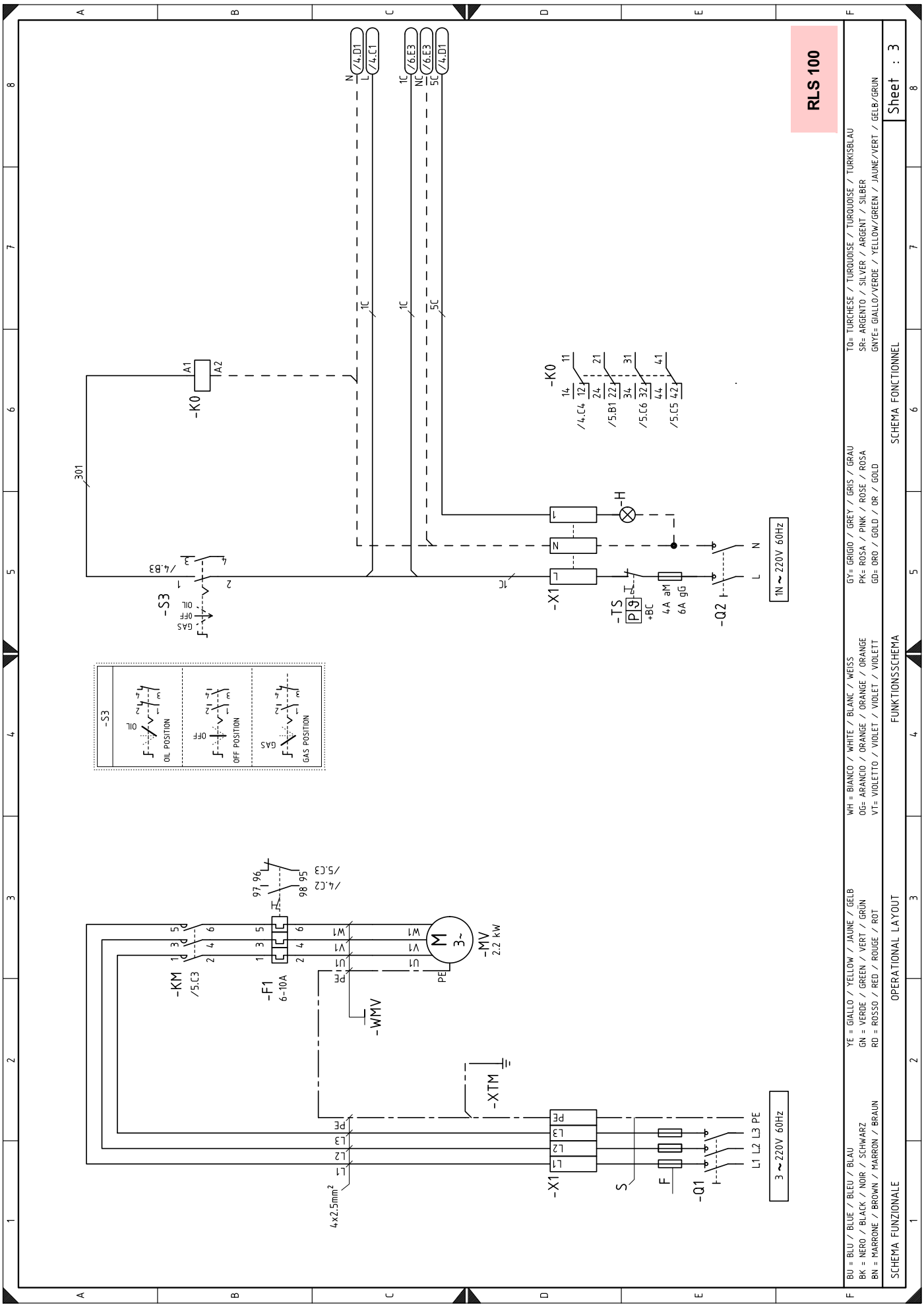
B Appendix - Electrical panel layout

1	**Index of layouts**
2	Indication of references
3	Operational layout
4	RFGO-A22 operational layout
5	RFGO-A22 operational layout
6	RFGO-A22 operational layout
7	Electrical connection set by the installer
8	Electrical connection set by the installer

2 Indication of references




RLS 70
SCHEMA FUNZIONALE
OPERATIONAL LAYOUT
FUNKTIONSSCHEMA
SCHEMA FONCTIONNEL
Sheet : 3
-K0
-S3
-X1
-TS
-Q2
-KM
-F1
-MV
-wMV
-XTM
-Q1
-H
1N ~ 220V 60Hz
3 ~ 380/220V 60Hz
4x2.5mm²
OIL POSITION
OFF POSITION
GAS POSITION
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN


RLS 100
SCHEMA FUNZIONALE
OPERATIONAL LAYOUT
FUNKTIONSSCHEMA
SCHEMA FONCTIONNEL
Sheet : 3
-K0
-S3
-KM
-F1
-MV
-WMV
-XTM
-X1
-TS
-H
-Q2
-Q1
-S
-F
1N ~ 220V 60Hz
3 ~ 220V 60Hz
4x2.5mm²
OIL POSITION
OFF POSITION
GAS POSITION
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
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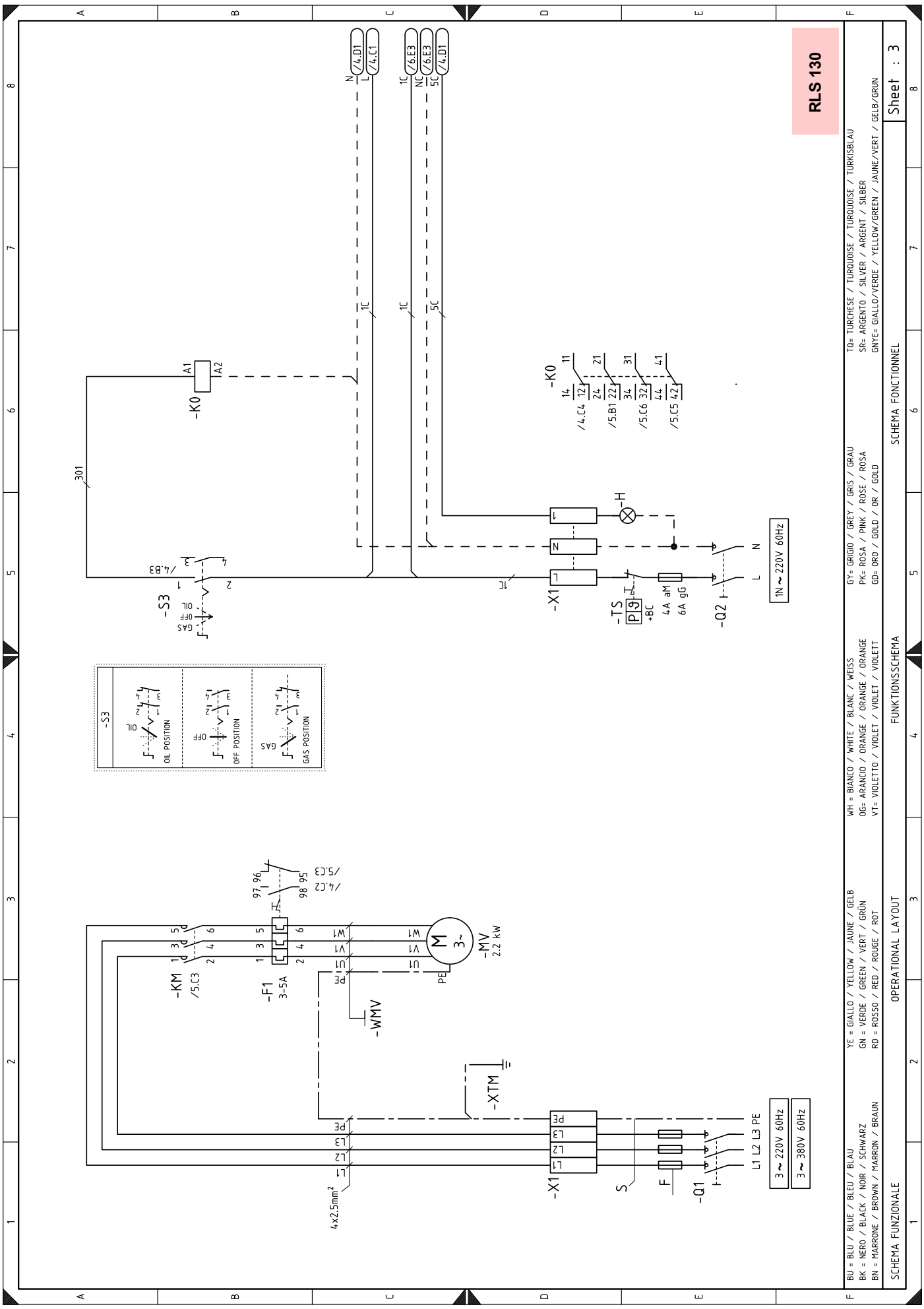
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRÜN


RLS 130
SCHEMA FUNZIONALE
OPERATIONAL LAYOUT
FUNKTIONSSCHEMA
SCHEMA FONCTIONNEL
Sheet : 3
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
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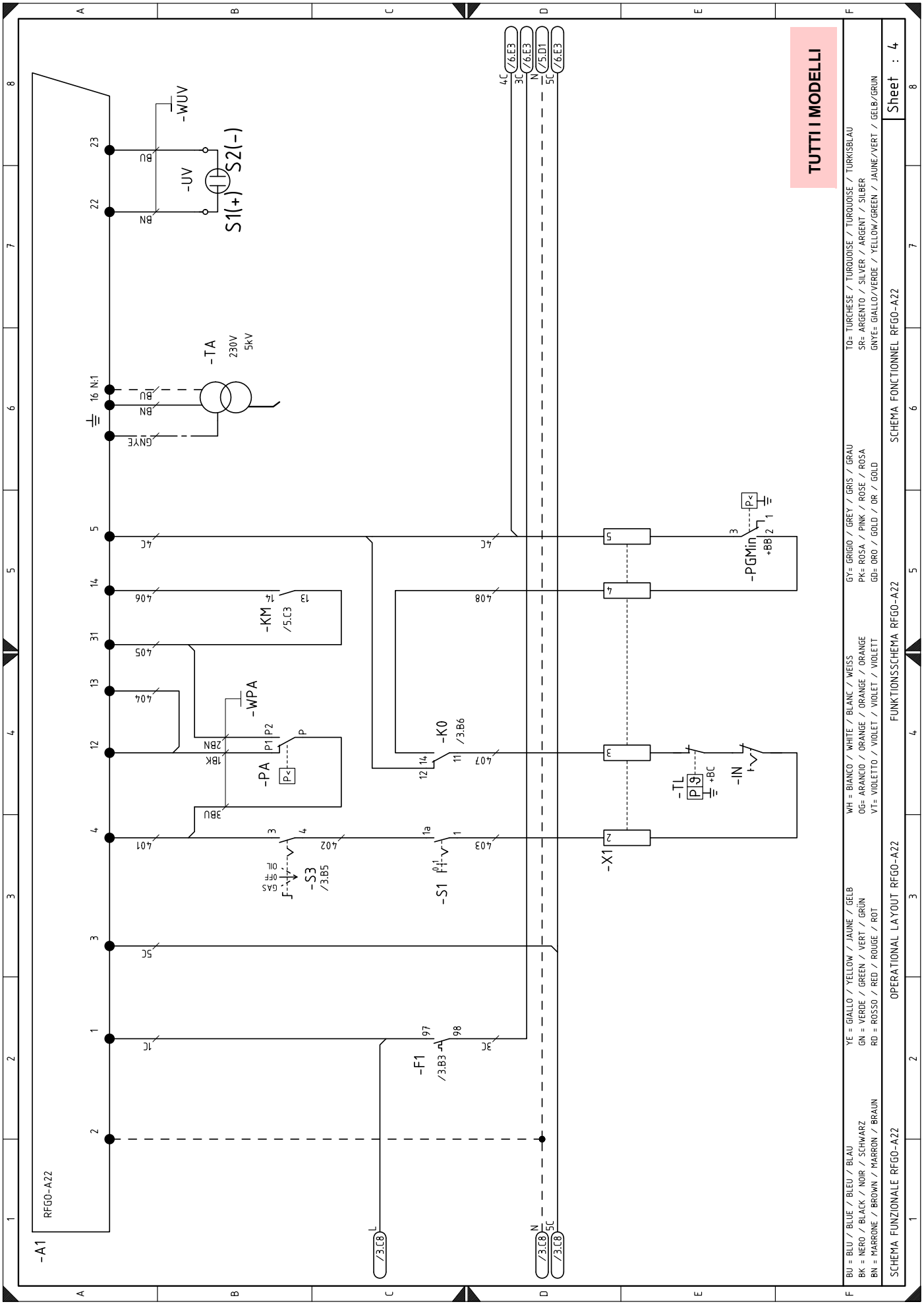
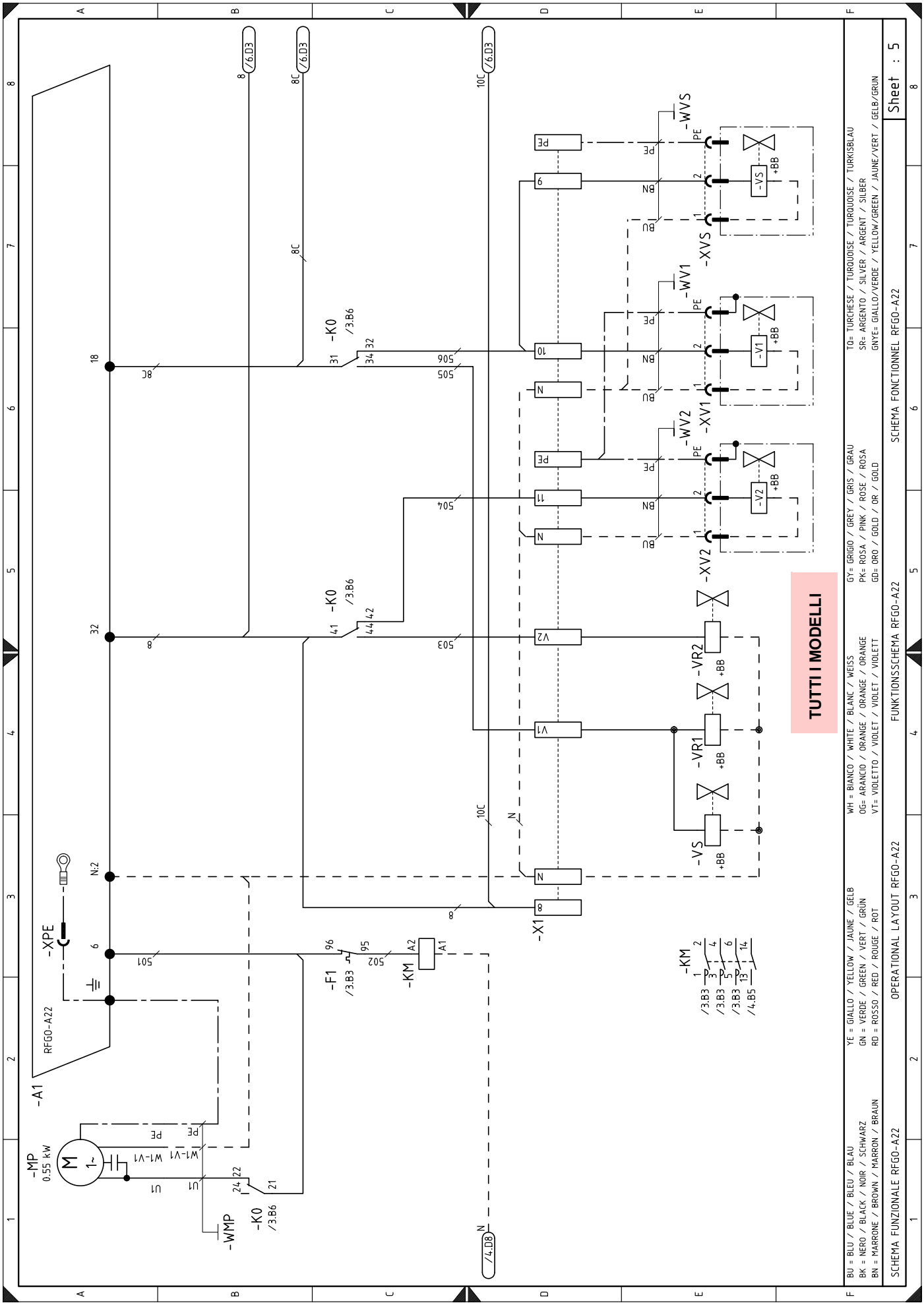
GD = ORO / GOLD / OR / GOLD
TQ = TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR = ARGENTO / SILVER / ARGENT / SILBER
GNYE = GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
-K0
-S3
OIL POSITION
OFF POSITION
GAS POSITION
-H
-TS
-X1
-Q2
1N ~ 220V 60Hz
-KM
-F1
3-5A
-MV
2.2 kW
-WMV
-XTM
4x2.5mm²
-Q1
F
S
3 ~ 220V 60Hz
3 ~ 380V 60Hz
L1 L2 L3 PE


TUTTI I MODELLI
-A1
RFGO-A22
-WUV
-UV
S1(+)
S2(-)
-TA
230V
5kV
N:1
-KM
-WPA
-PA
-K0
-S3
-S1
-F1
-X1
-PGMin
-TL
-IN
SCHEMA FUNZIONALE RFGO-A22
OPERATIONAL LAYOUT RFGO-A22
FUNKTIONSSCHEMA RFGO-A22
SCHEMA FONCTIONNEL RFGO-A22
Sheet : 4


TUTTI I MODELLI
SCHEMA FUNZIONALE RFGO-A22
OPERATIONAL LAYOUT RFGO-A22
FUNKTIONSSCHEMA RFGO-A22
SCHEMA FONCTIONNEL RFGO-A22
Sheet : 5
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
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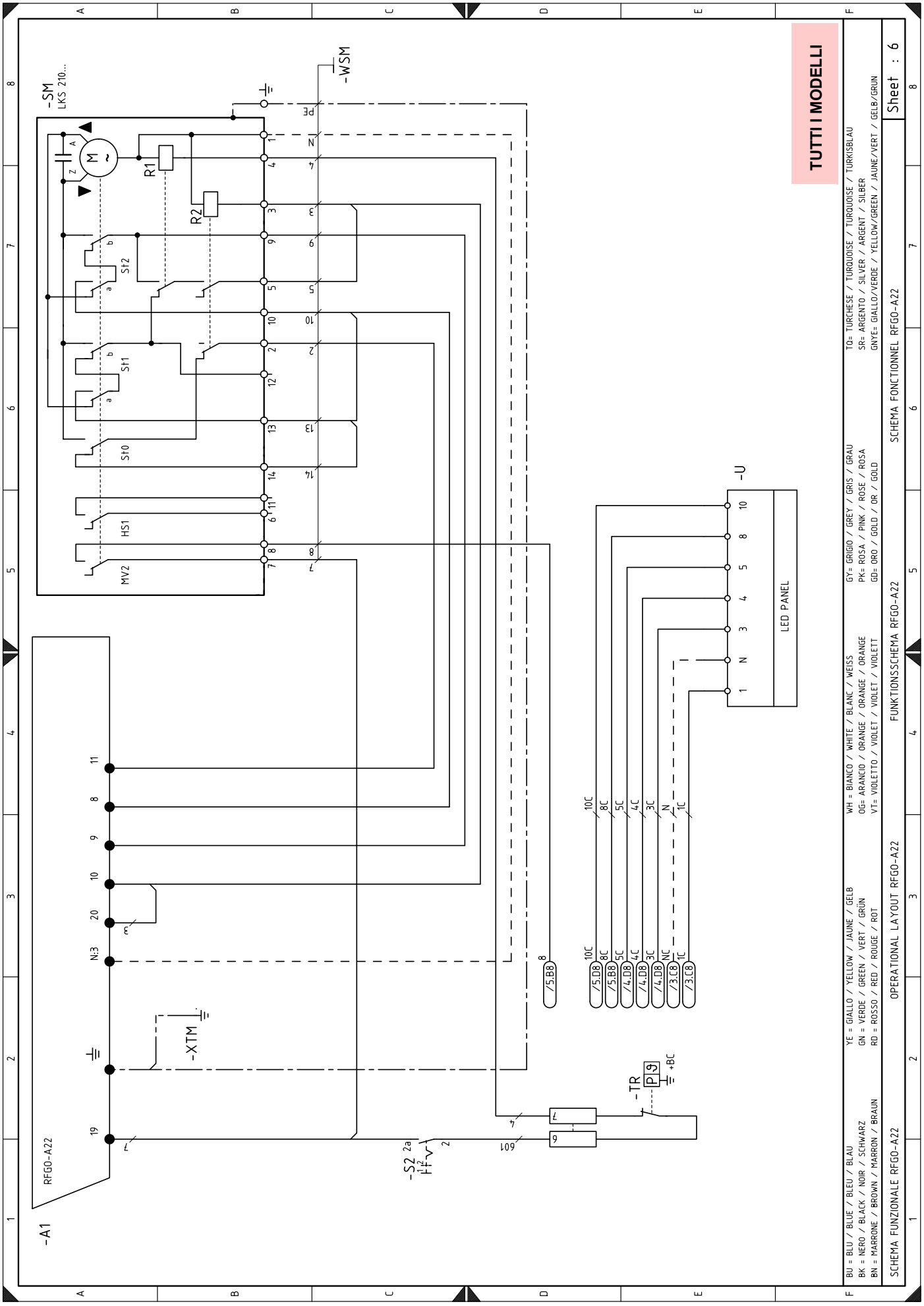
SR = ARGENTO / SILVER / ARGENT / SILBER
GNYE = GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
-A1
RFGO-A22
-XPE
-MP
0.55 kW
-WMP
-K0
/3.B6
-F1
/3.B3
-KM
-X1
-VS
-VR1
-VR2
-XV2
-WV2
-XV1
-WV1
-XVS
-WVS
-V1
-V2
+BB
/6.D3
/4.D8


TUTTI I MODELLI
-SM
LKS 210...
-WSM
R1
R2
St2
St1
St0
HS1
MV2
-U
LED PANEL
-A1
RFGO-A22
-XTM
-S2
-TR
P.9
+BC
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
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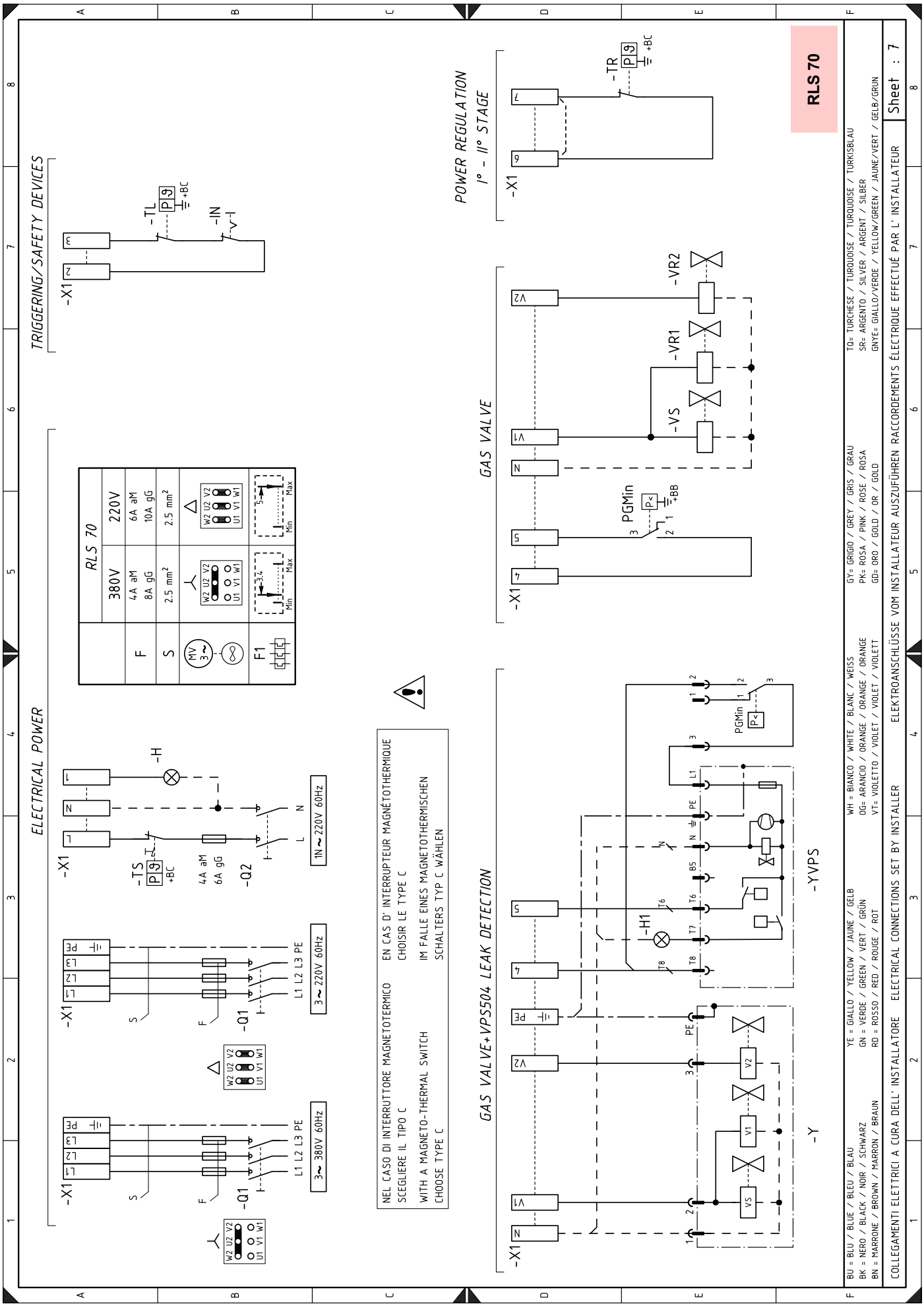
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
SCHEMA FUNZIONALE RFGO-A22
OPERATIONAL LAYOUT RFGO-A22
FUNKTIONSSCHEMA RFGO-A22
SCHEMA FONCTIONNEL RFGO-A22
Sheet : 6


TRIGGERING/SAFETY DEVICES
ELECTRICAL POWER
POWER REGULATION
I° - II° STAGE
GAS VALVE
GAS VALVE+VPS504 LEAK DETECTION
RLS 70
RLS 70
380V
220V
4A aM
8A gG
6A aM
10A gG
2.5 mm²
NEL CASO DI INTERRUTTORE MAGNETOTERMICO SCEGLIERE IL TIPO C
WITH A MAGNETO-THERMAL SWITCH CHOOSE TYPE C
EN CAS D' INTERRUPTEUR MAGNÉTOTHERMIQUE CHOISIR LE TYPE C
IM FALLE EINES MAGNETOTHERMISCHEN SCHALTERS TYP C WÄHLEN
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
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GY= GRIGIO / GREY / GRIS / GRAU
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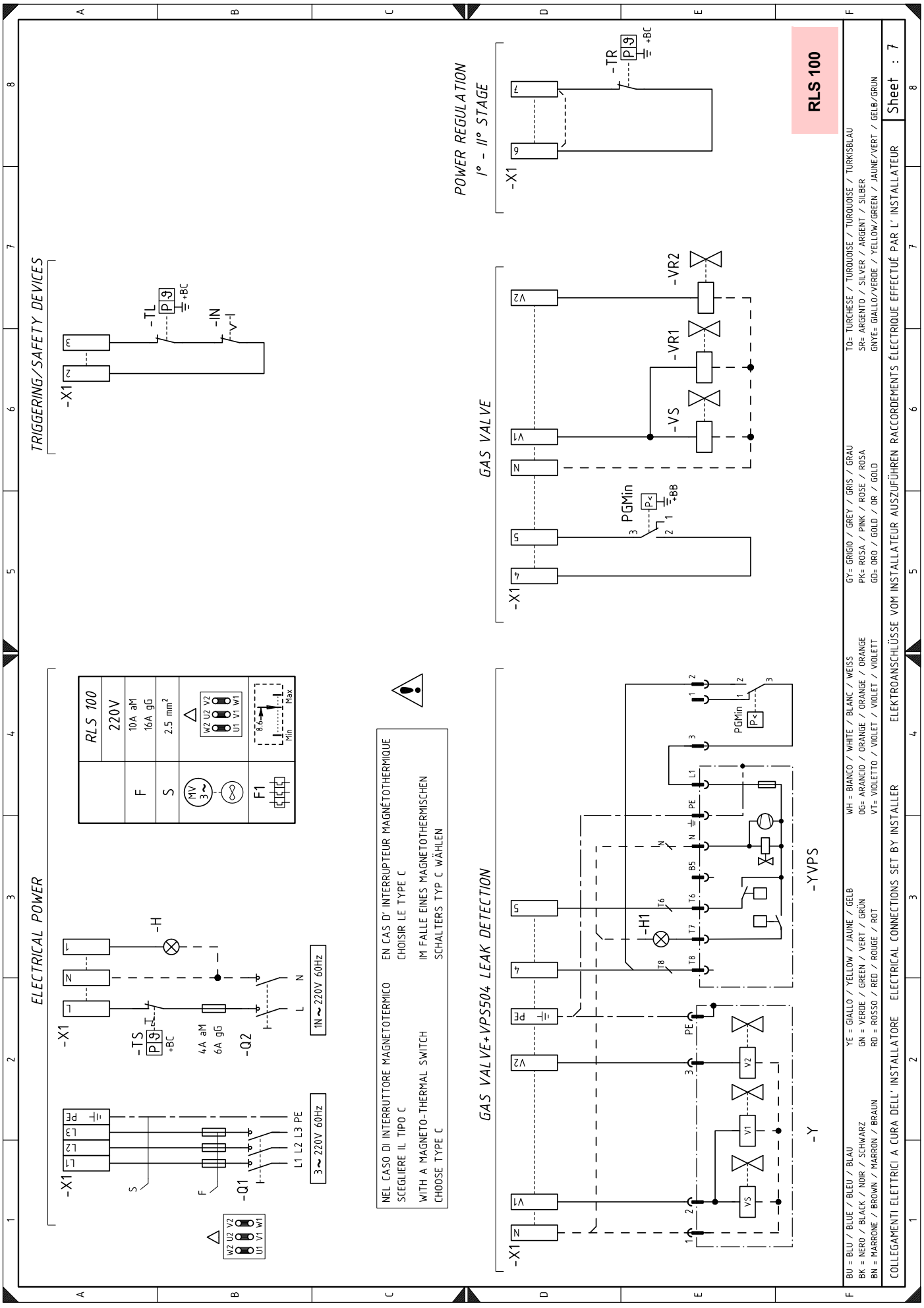
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE
ELECTRICAL CONNECTIONS SET BY INSTALLER
ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN
RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 7


RLS 100
TRIGGERING/SAFETY DEVICES
POWER REGULATION
I° - II° STAGE
GAS VALVE
ELECTRICAL POWER
GAS VALVE+VPS504 LEAK DETECTION
-X1
-TL
-IN
-TR
-VR2
-VR1
-VS
PGMin
-H
-TS
-Q2
-Q1
-H1
-YVPS
-Y
F1
RLS 100
220V
10A aM
16A gG
2.5 mm²
1N ~ 220V 60Hz
3 ~ 220V 60Hz
L1 L2 L3 PE
NEL CASO DI INTERRUTTORE MAGNETOTERMICO
SCEGLIERE IL TIPO C
WITH A MAGNETO-THERMAL SWITCH
CHOOSE TYPE C
EN CAS D' INTERRUPTEUR MAGNÉTOTHERMIQUE
CHOISIR LE TYPE C
IM FALLE EINES MAGNETOTHERMISCHEN
SCHALTERS TYP C WÄHLEN
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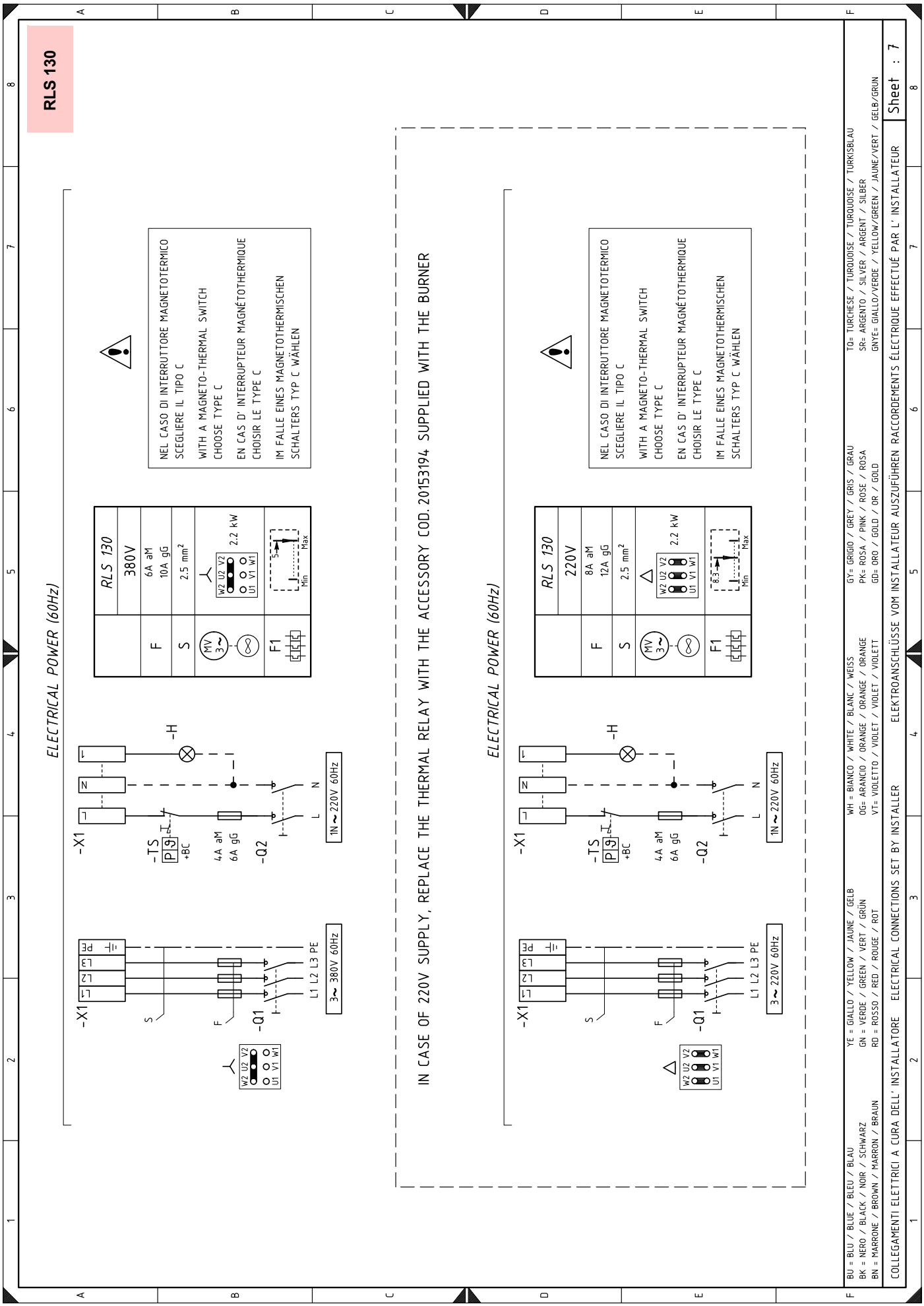
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE
ELECTRICAL CONNECTIONS SET BY INSTALLER
ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN
RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 7


RLS 130
ELECTRICAL POWER (60Hz)
RLS 130
380V
F 6A aM 10A gG
S 2.5 mm²
2.2 kW
NEL CASO DI INTERRUTTORE MAGNETOTERMICO SCEGLIERE IL TIPO C
WITH A MAGNETO-THERMAL SWITCH CHOOSE TYPE C
EN CAS D' INTERRUPTEUR MAGNÉTOTHERMIQUE CHOISIR LE TYPE C
IM FALLE EINES MAGNETOTHERMISCHEN SCHALTERS TYP C WÄHLEN
-X1
-TS
-H
-Q2
-Q1
4A aM
6A gG
1N ~ 220V 60Hz
3 ~ 380V 60Hz
L1 L2 L3 PE
IN CASE OF 220V SUPPLY, REPLACE THE THERMAL RELAY WITH THE ACCESSORY COD. 20153194 SUPPLIED WITH THE BURNER
ELECTRICAL POWER (60Hz)
RLS 130
220V
F 8A aM 12A gG
S 2.5 mm²
2.2 kW
NEL CASO DI INTERRUTTORE MAGNETOTERMICO SCEGLIERE IL TIPO C
WITH A MAGNETO-THERMAL SWITCH CHOOSE TYPE C
EN CAS D' INTERRUPTEUR MAGNÉTOTHERMIQUE CHOISIR LE TYPE C
IM FALLE EINES MAGNETOTHERMISCHEN SCHALTERS TYP C WÄHLEN
BU = BLU / BLUE / BLEU / BLAU
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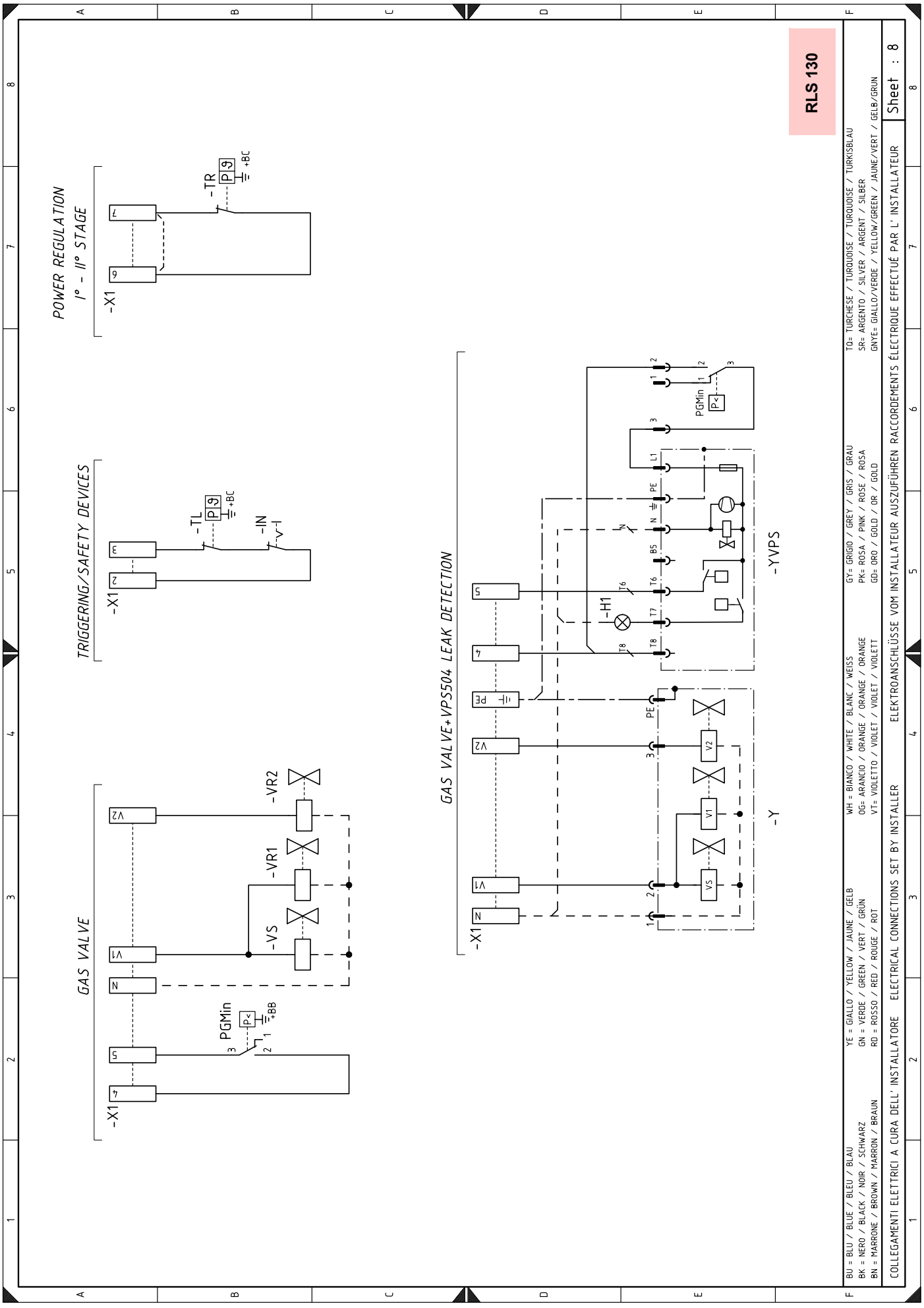
GY = GRIGIO / GREY / GRIS / GRAU
PK = ROSA / PINK / ROSE / ROSA
GD = ORO / GOLD / OR / GOLD
TQ = TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR = ARGENTO / SILVER / ARGENT / SILBER
GNYE = GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE ELECTRICAL CONNECTIONS SET BY INSTALLER ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 7


RLS 130
POWER REGULATION
I° - II° STAGE
-X1
-TR
P9
+BC
TRIGGERING/SAFETY DEVICES
-X1
-TL
-IN
GAS VALVE
-X1
-VR2
-VR1
-VS
PGMin
+BB
GAS VALVE+VPS504 LEAK DETECTION
-X1
-H1
-YVPS
-Y
PGMin
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
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GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE ELECTRICAL CONNECTIONS SET BY INSTALLER ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 8

WIRING DIAGRAM KEY

A1	Control box
F	Protection fuses for three line
F1	Thermal relay for fan motor
H	Remote lockout signal
H1	Light signalling leak detection control device lock-out
KM	Fan motor contactor
KO	Relay
IN	External switch for ON/OFF burner
MP	Pump motor
MV	Fan motor
PA	Air pressure switch
PGMin	Minimum gas pressure switch
Q1	Three-phase disconnecting switch
Q2	Single-phase disconnecting switch
SM	Servomotor
S1	ON - OFF switch
S2	1st- 2nd stage switch
S3	“Oil/OFF/Gas” selector
TA	Ignition transformer
TL	Limit thermostat
TR	Adjustment thermostat
TS	Safety thermostat
U	Led panel
UV	Flame sensor
VS	Safety valve
V1	1st stage valve
V2	2nd stage valve
VR1	Adjustment valve
VR2	Adjustment valve
XV1	1st stage valve connector
XV2	2nd stage valve connector
XVS	Safety valve connector
XPE	Control box earth
XTM	Burner earth
X1	Terminal board
Y	Gas adjustment valve + gas safety valve
YVPS	Leak detection control device

RIELLO S.p.A.
I-37045 Legnago (VR)
Tel.: +39.0442.630111
http:// www.riello.it
http:// www.riello.com

Subject to modifications