GB

Dual fuel light oil/ gas burner

Two stage light oil operation/ progressive or modulating gas operation

CE

CODE	MODEL
20170134	RLS 38/M

20170138 (1) - 11/2019

Translation of the original instructions

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:

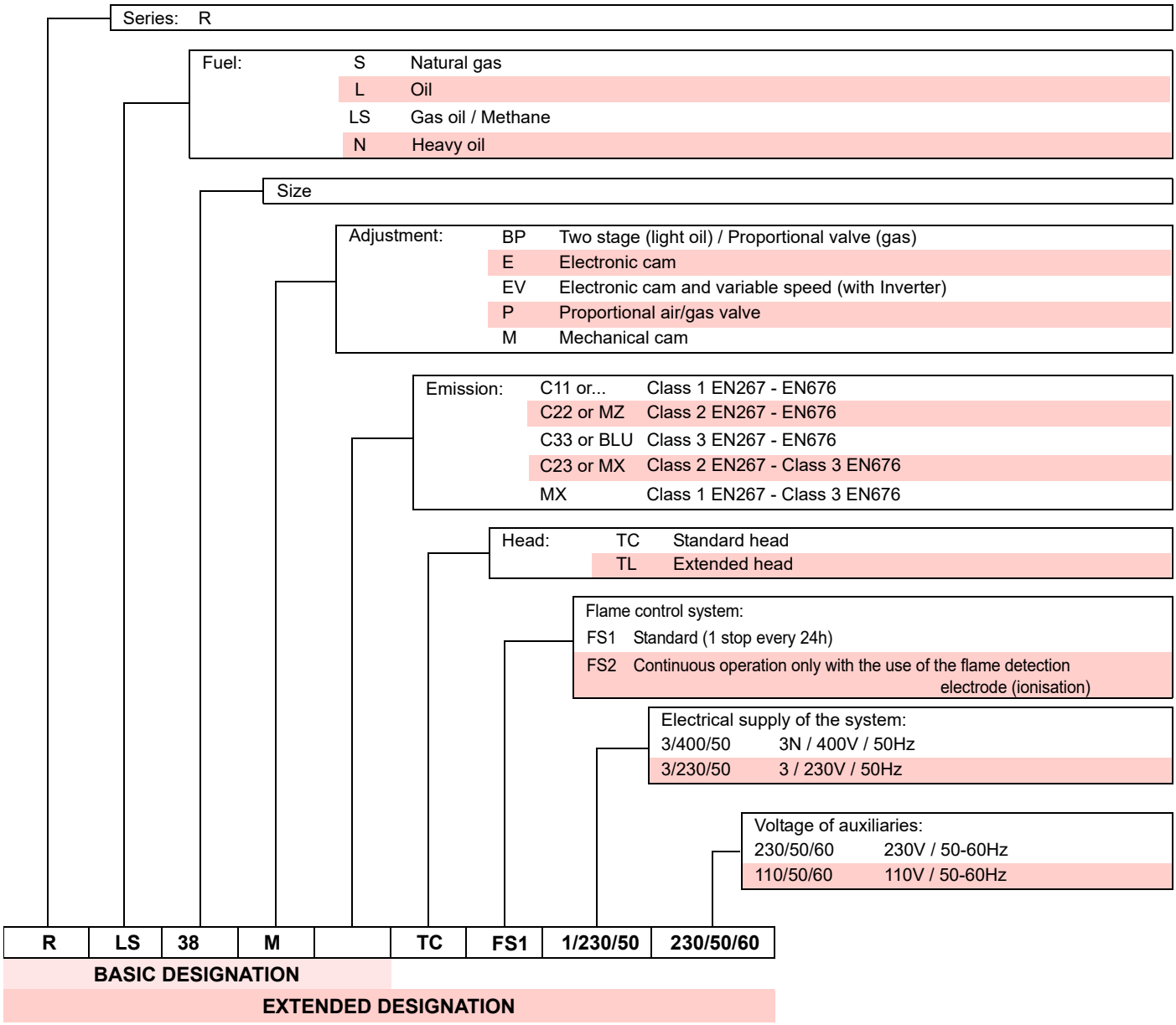
➤ must take all the measures necessary to prevent unauthorised people gaining access to the machine;

➤ 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 38/M	TC	1/230/50	Direct	20170134

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 28
Power (1) Delivery (1)	min - max	kW kg/h	232/116 ÷ 442 19.6/9.8 ÷ 37.3
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	13/19.2/12
Operation		oil	– Intermittent (min. 1 stop in 24 hours) – Two-stage (high and low flame) and one-stage (all - nothing)
		gas	– Progressive two-stage or modulating by kit (see accessories)
Pump	Output at 12 bar Pressure range Fuel temperature	kg/h bar °C max	67 4 - 18 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)	70 81
Weight (including packaging)		kg	45

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 7) (Fig. 4) 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 “Accuracy: Category 3” measurement, as described in EN ISO 3746.

4.5 Electrical data

Model		RLS 38/M
Electrical power supply	V/Ph/Hz	230/1/50
Fan motor	rpm V W A	2800 230 420 2.6
Fan motor capacitor	µF	12.5
Pump motor	rpm V W A	230 90 0.75
Pump motor capacitor	µF	4
Ignition transformer	V1 - V2 I1 - I2	230 V - 2 x 5 kV 1,9 A - 30 mA
Absorbed electrical power	W max	1000
Protection level		IP 44

Tab. B

4.6 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 H.

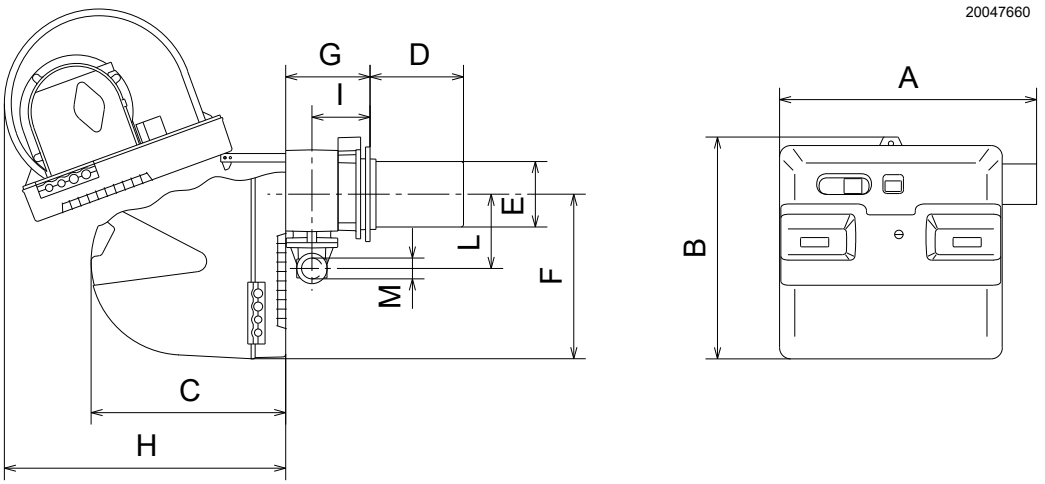


Fig. 1

mm	A	B	C	D	E	F	G	H	I	L	M
RLS 38/M	527	474	580	201	152	352	164	810	108	168	$1"^1/_2$

Tab. C

4.7 Burner equipment

Flange for gas train . . . . . No. 1
Seal for flange . . . . . No. 1
Flange fixing screws M 8 x 25 . . . . . No. 4
Thermal flange gasket . . . . . No. 1
Screws to fix the burner flange to the boiler: M 8 x 25 . . . . No. 4
Cable grommets for electrical wiring . . . . . No. 5
Flexible hoses . . . . . No. 2
Nipples for flexible hoses with gaskets . . . . . No. 2
Kit for LPG operation . . . . . No. 1
Label for LPG operation . . . . . No. 1
Instruction. . . . . No. 1
Spare parts list . . . . . No. 1

4.8 Firing rates

The burners RLS 28 - 38 - 50 can work in two ways: one-stage or two-stage.

The **MAXIMUM OUTPUT** is chosen within area A (and B for RLS 50)(Fig. 2). To use also area B (RLS 50), the combustion head has to be pre-calibrated as shown on page 18.

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

RLS 38/M = 116 kW = 9,8 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 20.

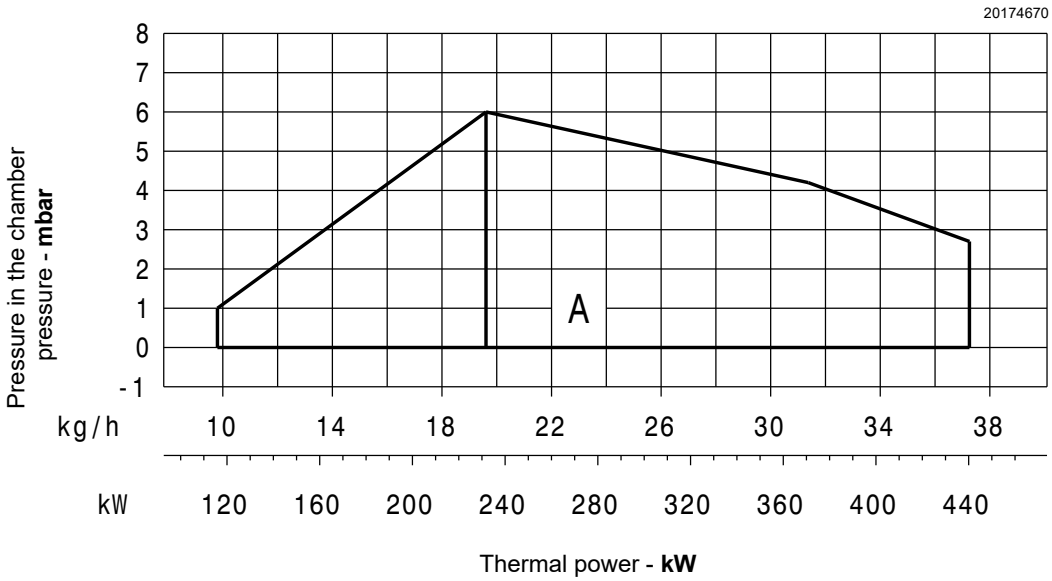


Fig. 2

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 standard.

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

Example:
Output 350 Mcal/h (407 kW): diameter 50 cm - length 1.5 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.

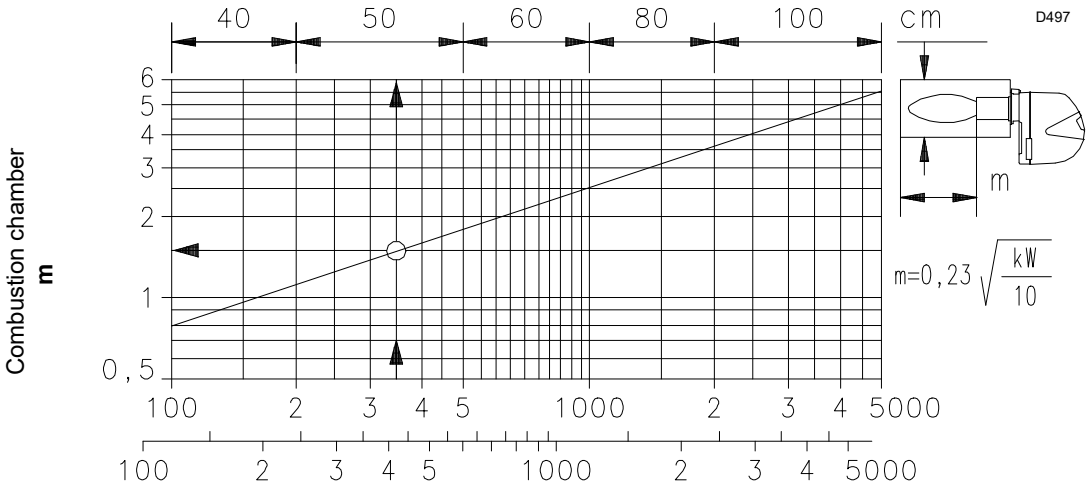


Fig. 3

4.10 Burner description

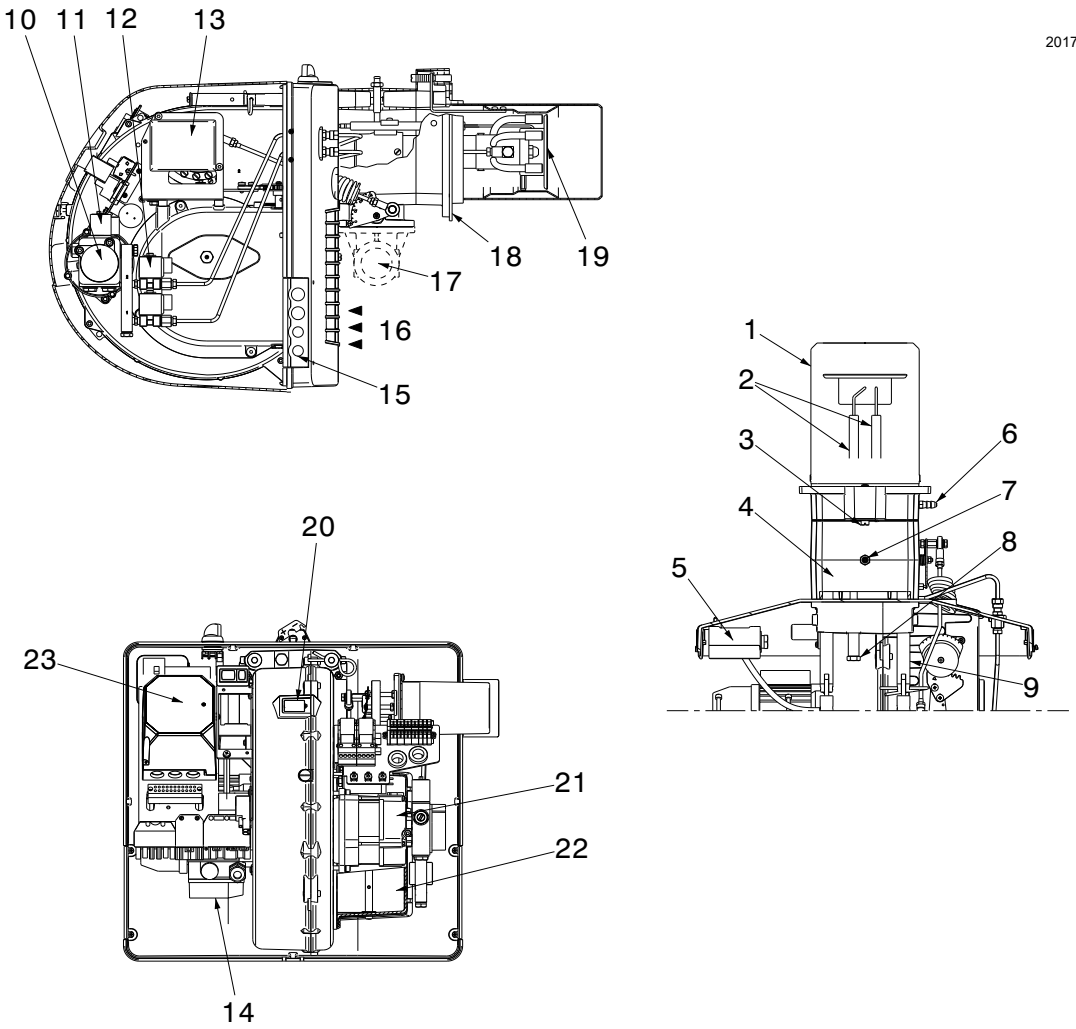


Fig. 4

1 Combustion head
2 Ignition electrodes
3 Screw for combustion head adjustment
4 Pipe coupling
5 Minimum air pressure switch (differential type)
6 Air pressure test point
7 Gas pressure test point and head fixing screw
8 Screw securing fan to pipe coupling
9 Slide bars for opening the burner and inspecting the combustion head
10 Pump
11 Safety valve
12 1st and 2nd stage valves
13 Servomotor. When the burner is not operating the air gate valve 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
14 Fan motor
15 Plate prearranged for 4 holes for the passage of hoses and electrical cables
16 Fan air inlet
17 Gas input pipe
18 Boiler fixing flange
19 Flame stability disk
20 Flame inspection window
21 Pump motor
22 Air damper
23 Control box with lockout pilot light and lockout reset button

CONTROL BOX LOCKOUT

if the control box 23) push-button lights up, it indicates that the burner is in lockout.

Press the push button to reset.

4.11 Electrical panel description

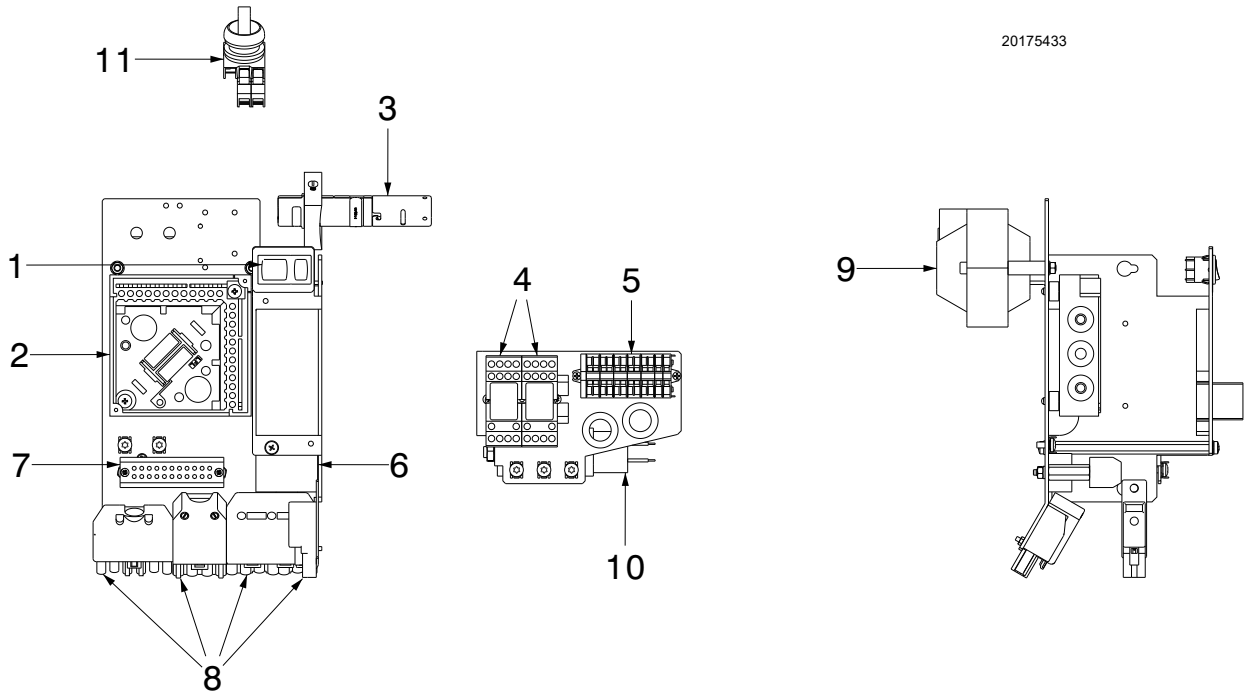


Fig. 5

1 A switch for: the automatic-manual-OFF operation
A button for: the output increase - decrease
2 Control box base
3 Flame sensor
4 Relay
5 Oil valves terminal board
6 Suppressor
7 Main terminal board
8 Socket for the electrical wiring
9 Ignition transformer
10 Pump motor capacitor
11 OIL/GAS selector

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 (SQN31...)

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.

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Fig. 7

Technical data

Operating voltage	AC 220...240 V - 15% / +10% AC 100...110 V - 15% / +10%
Mains frequency	50...60 Hz ± 6%
Switching capacity of auxiliary devices and limit switches	10 (3) A, AC 24...250 V
Angle positioning	up to 160° (full scale)
Assembly position	option
Protection level	IP 54, DIN 40050
Safety class	I
Weight	approx. 0.8 kg
Actuator motor	synchronous motor
Power absorption	6.5 VA
Environmental conditions:	
Operation Climatic conditions Mechanical conditions Temperature range Humidity	DIN EN 60 721-3-1 Class 1K2 Class 1M2 -20...+60°C < 95% RH

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).
During the 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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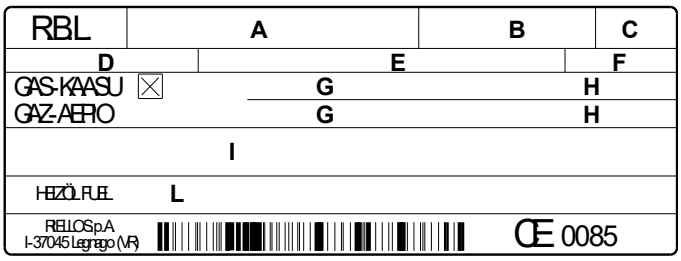

Fig. 8

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.

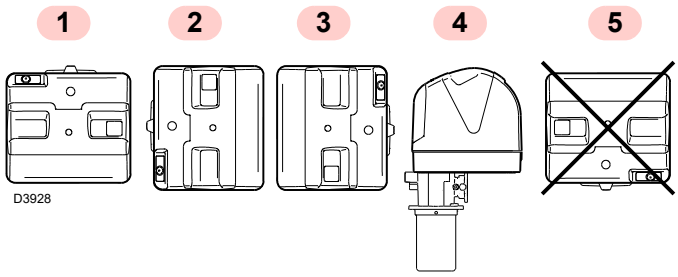

Fig. 9

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.

mm	A	B	C
RLS 38/M	160	224	M 8

Tab. F

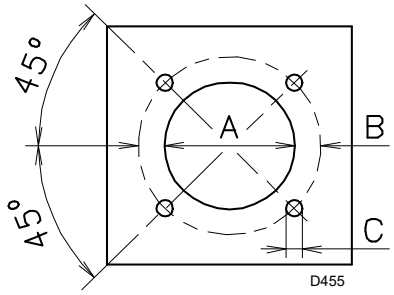

Fig. 10

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:

mm	RLS 38/M
Standard	201
Elongated	336

Tab. G

For boilers with front flue passes 13) or flame inversion chamber, a protection in refractory 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 4).
- remove screw 14) and extract the cover 15).
- remove screws 2) from the two slide bars 3).
- remove screw 1) and pull the burner back on slide bars 3) by about 100 mm.
- Disconnect the wires of the electrodes and then pull the burner completely off the slide bars, after removing the split pin from the slide bar 3).

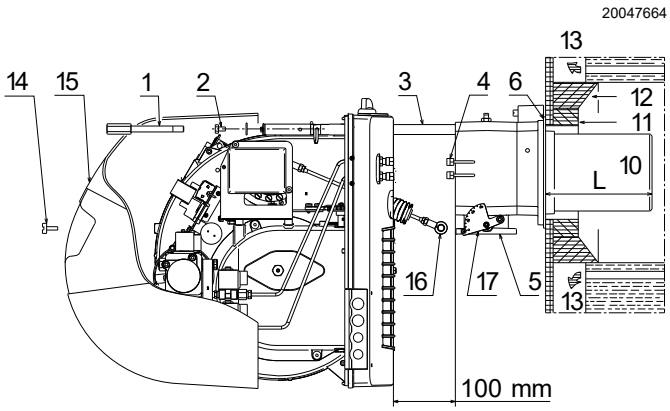

Fig. 11

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.

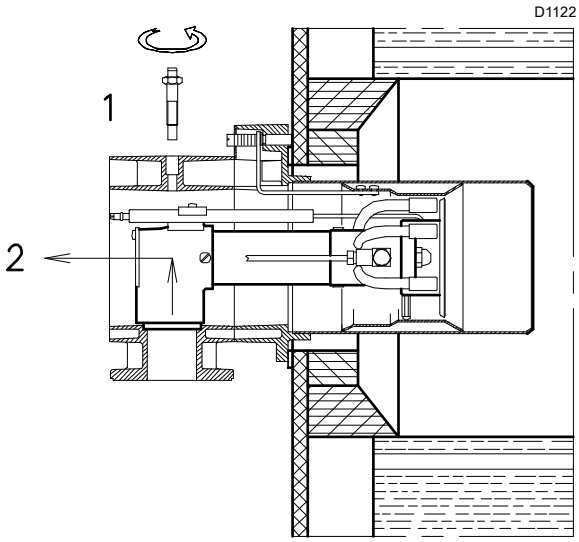

Fig. 12

5.7 Electrode positions

ATTENTION

Check that the electrodes are positioned correctly, as in Fig. 13, complying with the dimensions indicated.

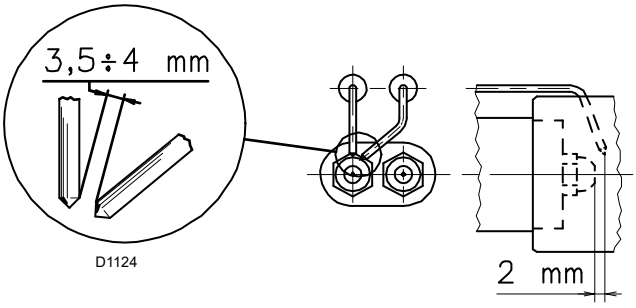

Fig. 13

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. 14).
- Assemble the two nozzles with the socket spanner 1)(A Fig. 15) (16mm), after removing the plastic plugs 2)(A Fig. 15), passing from the central opening of the flame stability disc. Alternatively, loosen the screws 1)(B Fig. 15), remove the disc 2)(B Fig. 15), and replace the nozzles using the spanner 3)(B Fig. 15).
- The nozzle for the 1st stage of operation is the one beneath the ignition electrodes, Fig. 13 on page 18.

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.

- Refit the burner 4)(Fig. 16) on the slide bars 3) at about 100 mm from the pipe coupling 5), burner in the position shown in Fig. 11 on page 17.
- Insert the electrode cables and then slide the burner up to the pipe coupling, the burner in the position indicated in Fig. 16.
- Refit screws 2)(Fig. 16) on slide bars 3).
- Fix the burner to the pipe coupling with the screw 1) and put back the split pin in one of the two slide bars 3)(Fig. 16).
- Reconnect the light oil pipes by screwing the two fittings 4)(Fig. 11 on page 17).

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 table (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.

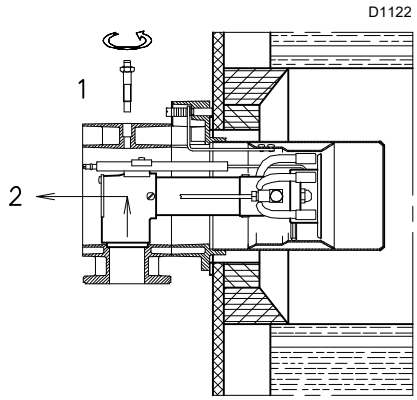

Fig. 14

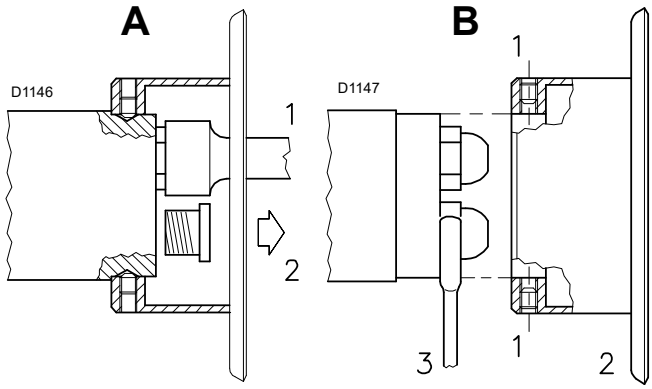

Fig. 15

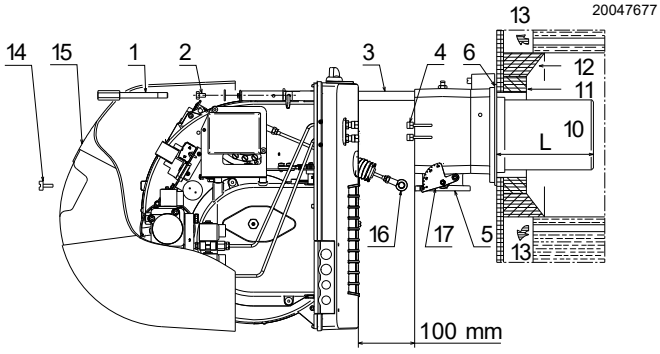

Fig. 16

60	GPH	Kg/h			kW
		10 bar	12 bar	14 bar	12 bar
RLS 38/M	2.50	9.6	10.6	11.5	125.7
	3.00	11.5	12.7	13.8	150.6
	3.50	13.5	14.8	16.1	175.5
	4.00	15.4	17.0	18.4	201.6
	4.50	17.3	19.1	20.7	226.5
	5.00	19.2	21.2	23.0	251.4

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. 17) until the notch indicated by the diagram (Fig. 18) corresponds with the front part of the flange 6)(Fig. 17).

Example burner RLS 38/M:

burner output in 2nd stage = 30 kg/h.

➤ The diagram (Fig. 18) shows that for this output, the adjustment of the combustion head is carried out on the notch 4, as in Fig. 17.

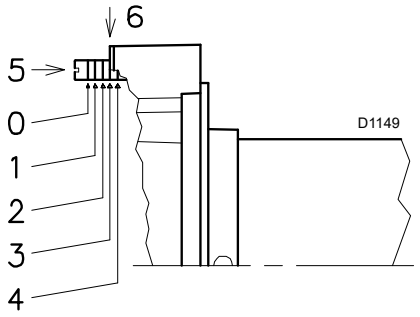

Fig. 17

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.

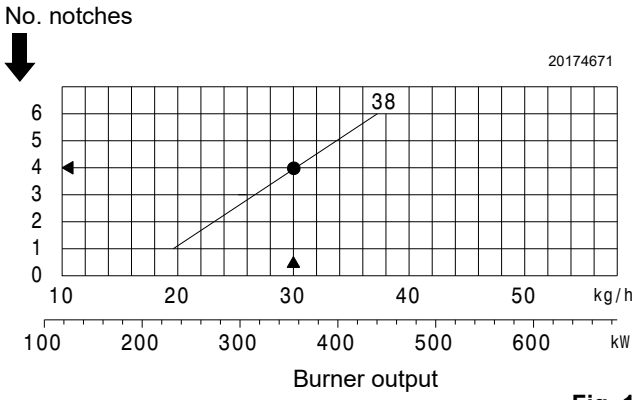

Fig. 18

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. 19)
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. 19)
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]		
	8	10	12
4.0	35	90	152
3.0	30	80	152
2.0	26	69	152
1.0	21	59	130
0.5	19	53	119
0	17	48	108
-4.0	-	6	20
-3.0	4	16	42
-2.0	9	27	64
-1.0	13	37	86
-0.5	15	43	97

Tab. I

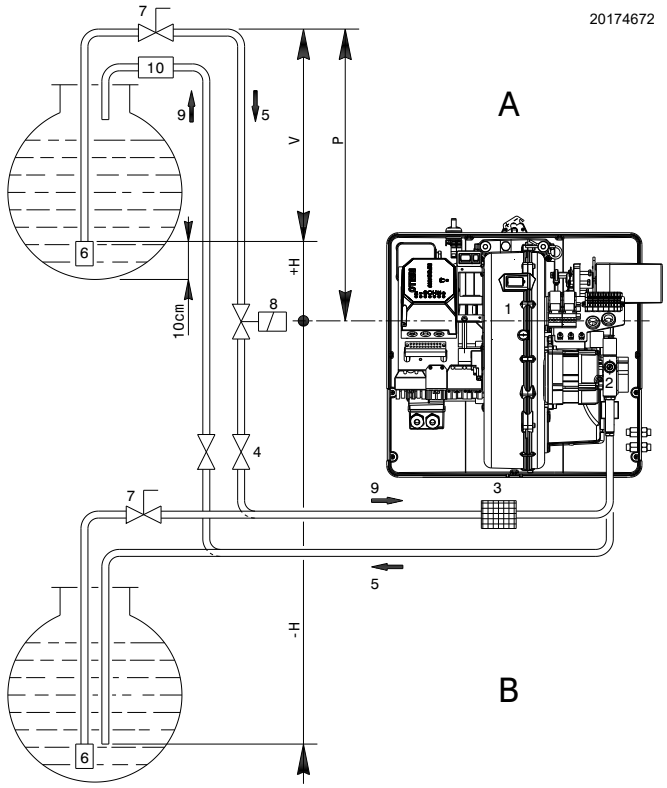

Fig. 19

Key (Fig. 19)

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. 20).

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.

Pass the flexible hoses through the holes of the plate, preferably on the right, Fig. 21:

➤ loosen the screws 1),
➤ divide the insert piece into its two parts 2) and 3) and remove the thin diaphragm blocking the two passages 4).
➤ 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

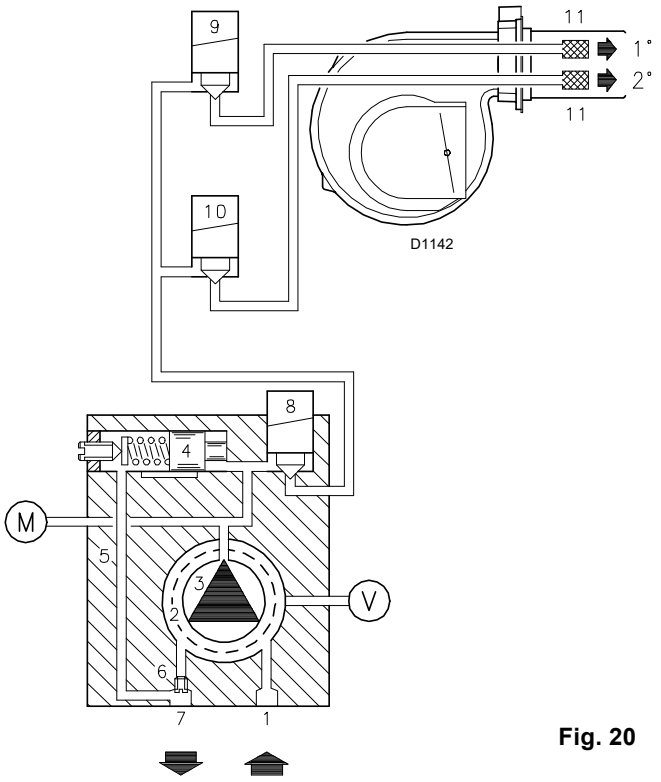

Fig. 20

Key (Fig. 20)
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

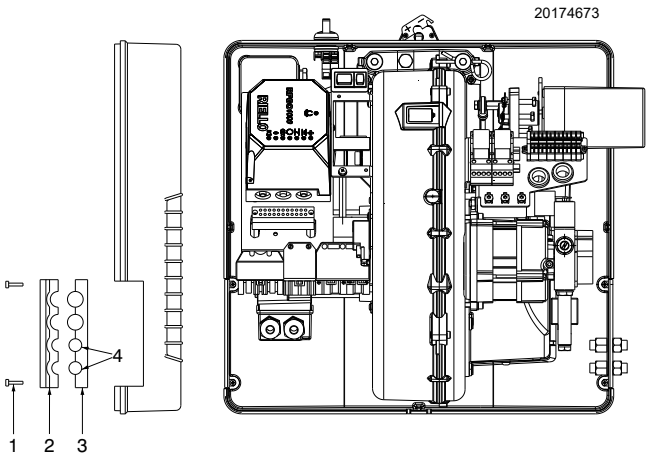

Fig. 21

5.11 Pump

5.11.1 Technical data

Pump	SUNTEC AL V65 B
Min. delivery rate at 12 bar pressure	67 kg/h
Delivery pressure range	4 - 18 bar
Max. suction depression	0.45 bar
Viscosity range	2 - 12 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

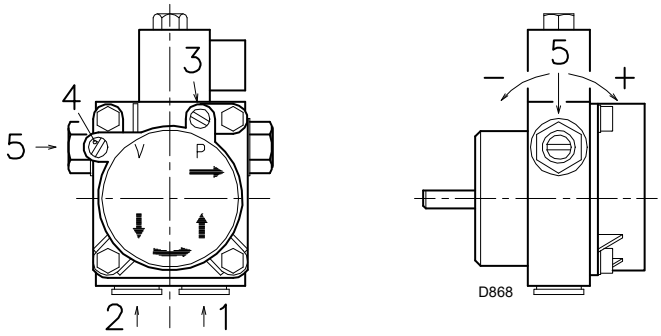

Fig. 22

Key (Fig. 22)

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. 22, 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. 23 - Fig. 24 - Fig. 25 - Fig. 26)

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”

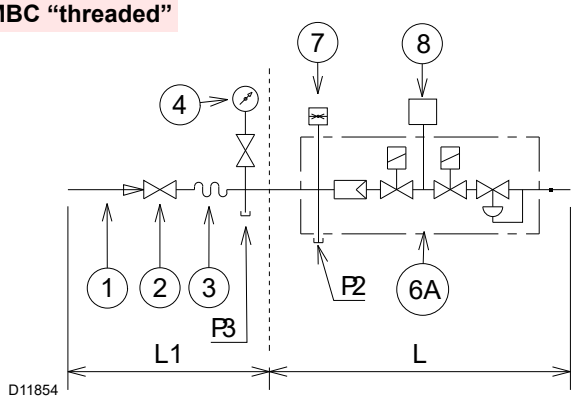

Fig. 23

MBC “flanged”

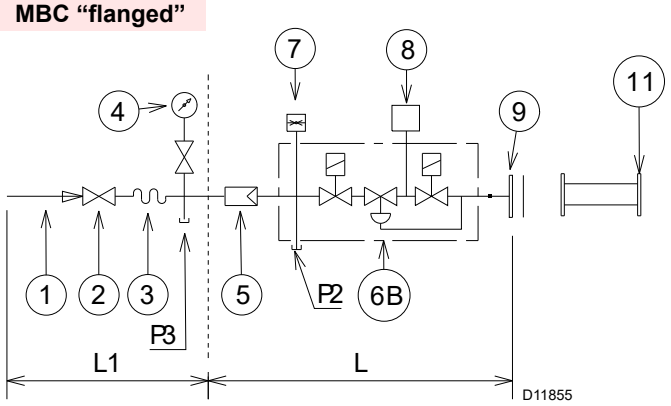

Fig. 24

DMV “flanged or threaded”

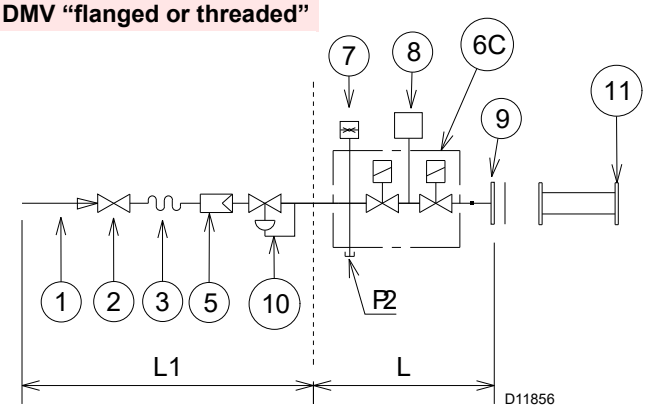

Fig. 25

CB “flanged or threaded”

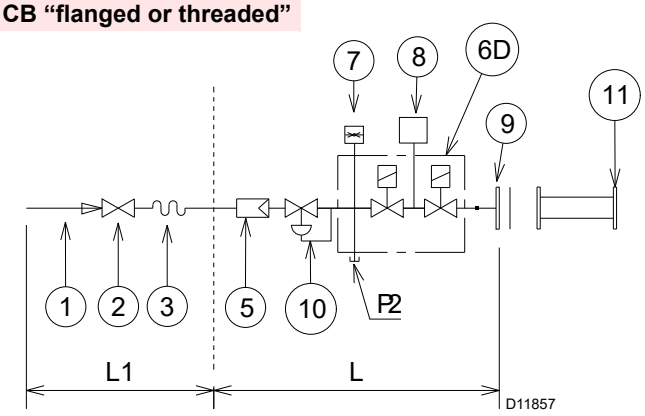

Fig. 26

5.12.2 Gas train

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

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

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. 27), 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. 27.

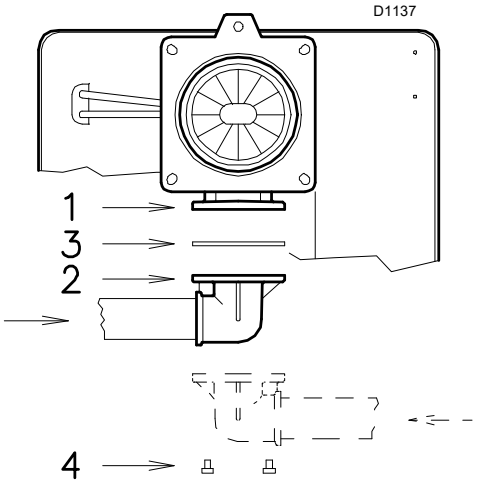

Fig. 27

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.

Model	kW	1 Δp (mbar)		
		G20	G25	G31
RLS 38	232	8.8	13.1	9.7
	260	9.1	13.6	10
	290	9.4	14.0	10.3
	320	9.8	14.6	10.6
	350	10.4	15.5	10.9
	380	11.1	16.5	11.2
	410	11.8	17.6	11.5
	442	13	19.4	12

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

Tab. K

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. 28), 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. 28).
– 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 38/M with natural gas G20:
Max output operation
Gas pressure at test point 1) (Fig. 28) = 11.4 mbar
Pressure in combustion chamber = 2 mbar
11.4 - 2 = 9.4 mbar

A pressure of 9.4 mbar, column 1, corresponds in Tab. K to an output of 290 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. 28), 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. 28).
– Add this value to the estimated pressure in combustion chamber.

Example RLS 38/M with natural gas G20:
Max output: 290 kW
Gas pressure at an output of 290 kW = 9.4 mbar
Pressure in combustion chamber = 2 mbar
9.4 + 2 = 11.4 mbar
pressure required at test point 1)(Fig. 28).

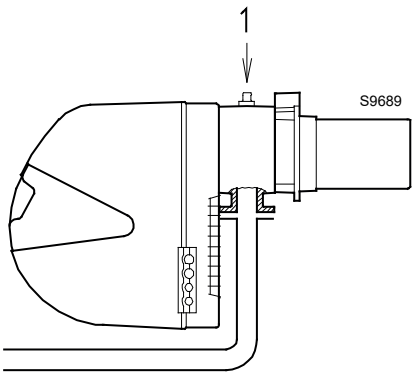

Fig. 28

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 has been set 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, a time switch must be applied 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 in compliance with the EN 60 335-1 standard.

5.13.1 Supply cables and external connections passage

All the cables to be connected to the burner plugs 7)(Fig. 29) are passed through cable grommets to be inserted in the holes of the plate, left or right, after having unscrewed the screws 8), opened the plate at parts 9) and 10) and removed the thin diaphragm that closes the holes.

The use of the cable grommets and the pre-blanked holes can be done in different manners; for example (Fig. 29):

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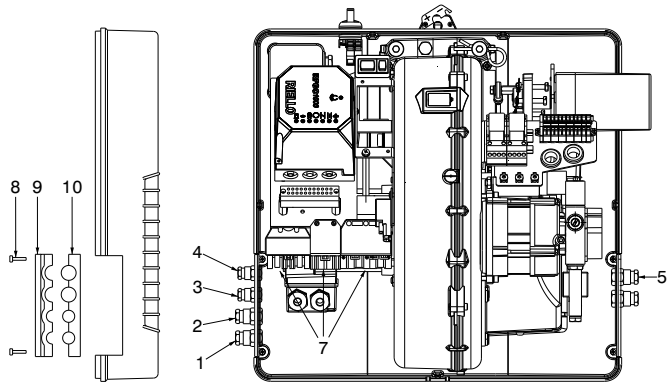


Fig. 29

Key (Fig. 29)

RLS 38/M

1	Pg 11	Single-phase power supply
2	Pg 11	Gas valves
3	Pg 9	TL remote control
4	Pg 9	TR remote control or probe (RWF)
5	Pg 11	Gas pressure switch or gas valve leak detection control device

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

5.14 Motor rotation

As soon as the burner starts up, go in front of the cooling fan of the fan motor and check it is rotating anticlockwise (Fig. 30).

If this is not the case:

➤ set the burner switch to “0” (OFF) and wait for the control box to carry out the switch-off phase.

DANGER

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

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

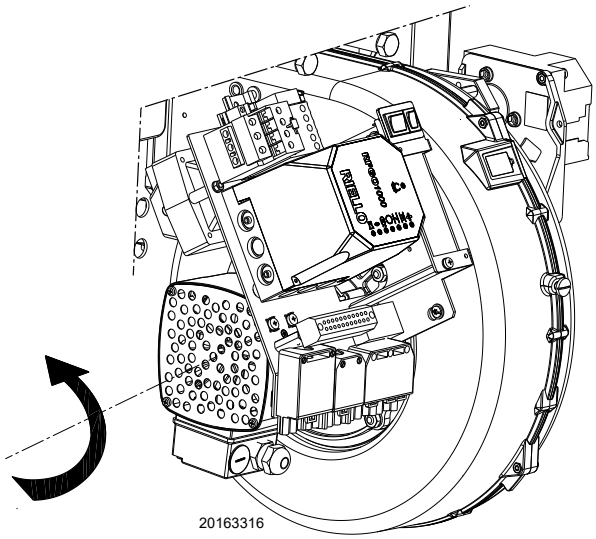


Fig. 30

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.

ATTENTION

To adjust the 1st and 2nd light oil stage, use the switch 2 (Fig. 31).

For the 1st stage keep the pressure on the **"–"** side until the position of the 1st stage is reached.

For the 2nd stage keep the pressure on the **"+"** side until the position of the 2nd stage is reached.

6.2.1 Nozzle

See information on page 19.

6.2.2 Combustion head

The adjustment of the combustion head already carried out on page 20 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. 22 on page 23).

(See information on page 23).

6.2.4 1st and 2nd stage fan damper

See adjustment ("Servomotor adjustment" on page 33).

6.3 Burner ignition (light oil)

Start the burner by closing the remote controls, with the switch 1)(Fig. 31) in the **"MAN"** position and with the fuel selector switch set to "**OIL**" (Fig. 31).

The pump can be considered to be primed when the light oil starts coming out of the screw 3)(Fig. 22 on page 23). Stop the burner: set switch 1)(Fig. 31) 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.

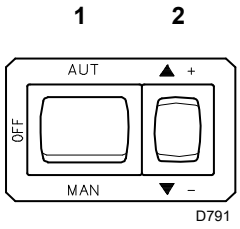


Fig. 31

6.4 Adjustments prior to ignition (gas)

Combustion head adjustment is already described on page 20.

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. 39).
- ➤ Adjust the air pressure switch to the start of the scale (Fig. 38).
- ➤ Bleed off the gas line air. 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. 32) 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 25.
- ➤ 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.

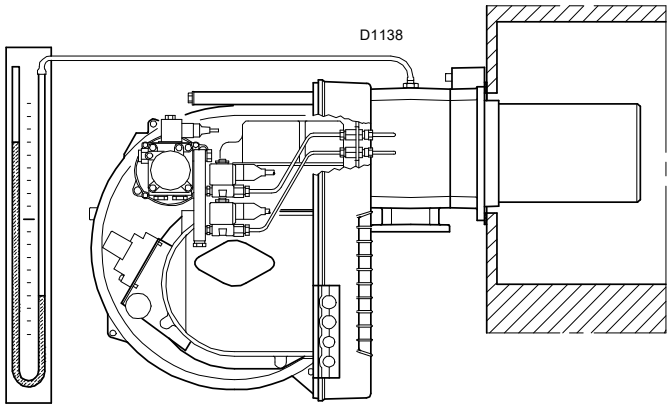


Fig. 32

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 thermostats/pressure switches and set the switch:

- ➤ switch 1)(Fig. 33 on page 30) in "**MAN**" position.

As soon as the burner starts, check that the lamps or the testers As soon as the burner starts, check the direction of rotation of the fan blade, looking through the flame inspection window.

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

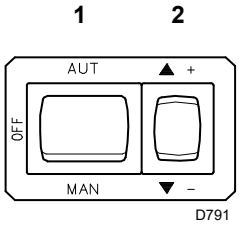


Fig. 33

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. 32).

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 Burner adjustment (gas)

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

Adjust in sequence:
1 Output upon ignition
2 MAX output
3 MIN output
4 Intermediate outputs
5 Air pressure switch - CO control
6 Minimum gas pressure switch

6.7.1 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 (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.

6.7.2 Max. output

Max. output of the burner must be set within the firing rate range shown on page 10.

In the above description, we left the burner switched on, working at MIN output. Now press the button 2)(A) “output increase”, and keep it pressed until the servomotor has opened the air damper and the gas butterfly valve at 90°.

Adjustment of gas delivery

Measure the gas delivery on the gas meter.

As a general rule, it can be seen from the table on page 25: just read the gas pressure on the U-type pressure gauge and follow the indications given on page 20.

If delivery needs to be reduced, diminish outlet gas pressure; if it is already very low, slightly close the VR adjustment valve.

If delivery needs to be increased, increase the adjuster outlet gas pressure.

Adjustment of air delivery

Progressively adjust the end profile of cam 4) by turning the cam adjustment screws as they are visible through the access opening 6).

Turn the screws clockwise to increase air delivery.

Turn the screws anti-clockwise to reduce air delivery.

6.7.3 Min. output

MIN output must be selected within the firing rate range shown on page 11.

Press the button 2)(Fig. 33 on page 30) “output reduction”, and keep it pressed until the servomotor has closed the air damper and the gas butterfly valve at 15° (adjustment made in the factory).

Adjustment of gas delivery

Measure the gas delivery on the gas meter.

If it is necessary to reduce it, slightly reduce the angle of cam III with small, regular movements, i.e. bring it from an angle of 15° to 13° - 11°.....

If it is necessary to increase it, press slightly the button “output increase” 2)(Fig. 33 on page 30) (open by 10-15° the gas butterfly valve), increase the angle of cam III with small, regular movements, i.e. bring it from an angle of 15° to 17° - 19°....

Then press the button “output reduction” until the servomotor is in the position of minimum opening, and measure the gas output.

NOTE:
The servomotor follows the adjustment of cam III only when the angle of the cam is reduced. If it is necessary to increase the angle of the cam, you must first increase the angle of the servomotor by means of the “output increase” key, then increase the angle of cam III, and finally bring the servomotor to the position of MIN output, with the “output reduction” key.

To adjust the cam III, remove the cover of the servomotor, take out the specific key 10) from inside and insert it in the notch of the cam III.

Adjustment of air delivery

Progressively adjust the starting profile of cam 4)(A) by turning the screws working through the access hole 6)(A). It is preferable not to turn the first screw since this is used to set the air damper to its fully closed position.

6.7.4 Intermediate outputs

Adjustment of gas delivery

No adjustment of gas delivery is required.

Adjustment of air delivery

Press the button 2)(Fig. 33 on page 30) “output increase” a little so that a new screw 5)(Fig. 34) appears in the opening 6)(Fig. 34). Adjust it until optimal combustion is obtained. Proceed in the same way with the other screws.

Take care that the cam profile variation is progressive.

Switch the burner off with switch 1)(Fig. 33 on page 30), OFF position, release the adjustable profile cam by setting the servomotor slot 2) in a vertical position and check several times that by rotating the cam forwards and backwards by hand, the movement is soft and smooth, without sticking.

As far as is possible, try not to move those screws at the ends of the cam that were previously adjusted for the opening of the air damper to MAX and MIN output.

NOTE:
Once you have finished adjusting outputs MAX - MIN - INTERMEDIATE, check ignition once again: noise emission at this stage must be identical to the following stage of operation. If you notice any sign of pulsations, reduce the ignition stage delivery.

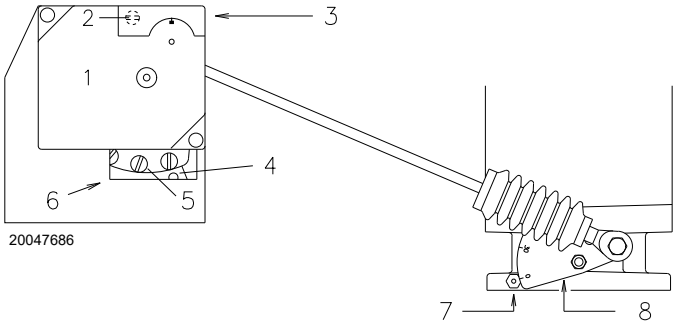


Fig. 34

Key
1 Servomotor
2 Cam 4 constraint
3 Cam 4 release
4 Adjustable profile cam
5 Screws for adjusting the adjustable profile
6 Opening for access to screws 5
7 Index for graduated sector 8
8 Graduated sector for gas butterfly valve

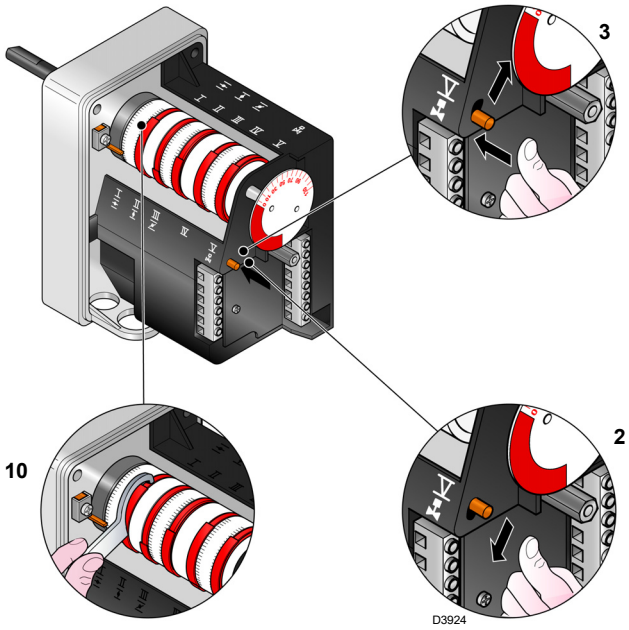


Fig. 35

6.7.5 Operation with LPG - Propane - Butane

The RLS 38/M burners can operate also with LPG -Propane-Butane.

In this case it is necessary to replace the six nozzles 2)(Fig. 36) screwed onto the holes 1)(Fig. 36), which are suitable for natural gas, with those for LPG-Propane-Butane, provided as standard with the burner. See page 33.

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 25.

Gas train: use the train for natural gas, see page 25, with a 3/4" or 1" diameter.

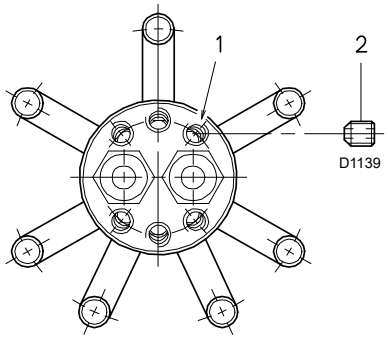


Fig. 36

Nozzle hole

Burner	Natural gas Ø mm	LPG/Propane/Butane
RLS 38/M	5	2.5

Tab. L

6.8 Servomotor adjustment

The servomotor (Fig. 37) adjusts the air damper.

The servomotor provides simultaneous adjustment for the air damper, by means of the adjustable profile cam and the gas butterfly valve. The servomotor rotates 90° in 30 seconds.

Do not alter the factory setting for the 5 cams; simply check that they are set as indicated below:

It is equipped with 4 levers:

CAM I: 90° Limits rotation toward maximum position.
When the burner is at MAX output, the gas butterfly valve must be fully open: 90°.

CAM II: 0° Limits rotation toward minimum position.
When the burner is shut down, the air damper and gas butterfly valve must be closed: 0°.

CAM III: 15° GAS Adjusts the ignition position and the MIN output.

CAM IV: 10° OIL Adjusts the ignition position and the output of the 1st stage.

CAM V: 40° Determines when the 2nd stage light oil valve opens.

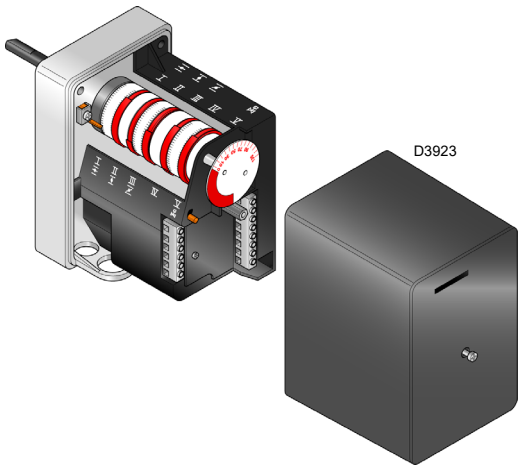


Fig. 37

6.9 Pressure switch adjustment

6.9.1 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. 38).
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.

6.9.2 Gas minimum pressure switch

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

With the burner operating at maximum output, increase the pressure. With the burner operating in 2nd stage, increase the adjustment pressure by slowly turning the relative knob clockwise until the burner stops.

Then turn the knob anticlockwise by 0.2 kPa (2 mbar) and repeat burner start-up to ensure it is uniform.

If the burner locks out again, turn the knob anticlockwise again by 0.1 kPa (1 mbar).

1 kPa = 10 mbar

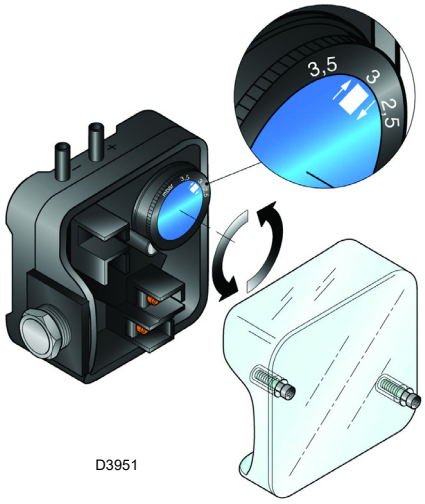


Fig. 38

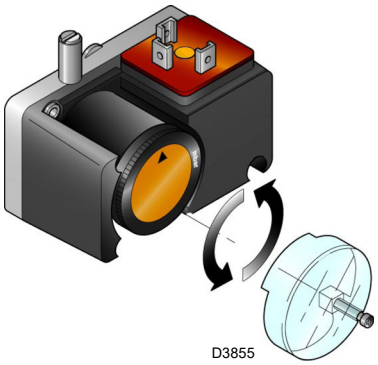


Fig. 39

6.10 Operation sequence of the burner

6.10.1 Burner start-up

0 s TL closed. The fan motor starts.

6 s Servomotor starts: rotate to the right by 90°, i.e. until the contact intervenes with cam I. The air damper is positioned to MAX output.

36 s Pre-purging stage with MAX output air delivery. Duration 32 s.

67 s The servomotor rotates towards the left as far as the angle set on cam III for the MIN output.

92 s The air damper and the gas butterfly valve adopt the MIN output position (with cam III) at 30°).

93 s Ignition electrode strikes a spark.

99 s The safety valve VS opens, along with the adjustment valve VR, quick opening. The flame is ignited at a low output level, point A. Delivery is then progressively increased, with the valve VR opening slowly up to MIN. output, point B.

102 s The spark goes out.

122 s The starting cycle comes to an end.

BURNER START-UP

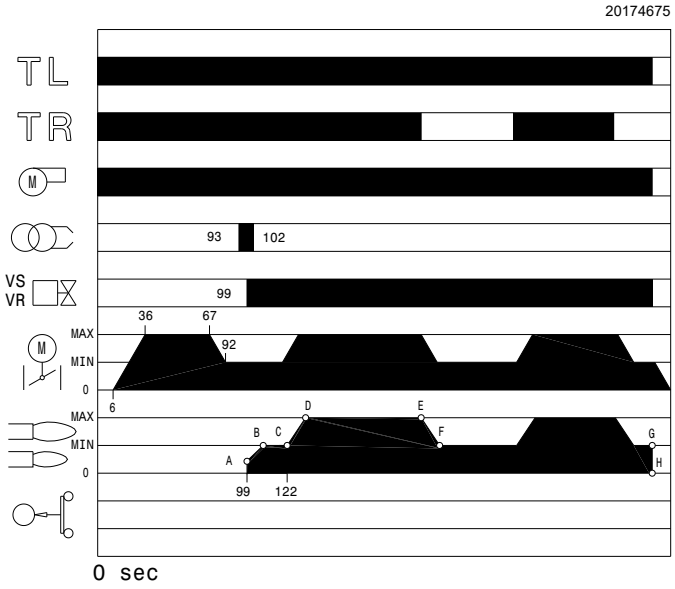


Fig. 40

6.10.2 Steady state operation

Burner without modulating operation kit

Once the start-up cycle is completed, the servomotor command moves on to the TR that controls the pressure or the temperature in the boiler, point C.

(The electrical control box still continues to check the presence of the flame and the correct position of the air and gas maximum pressure switches).

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

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

Burner with modulating operation kit

See manual enclosed with the adjuster.

IGNITION FAILURE

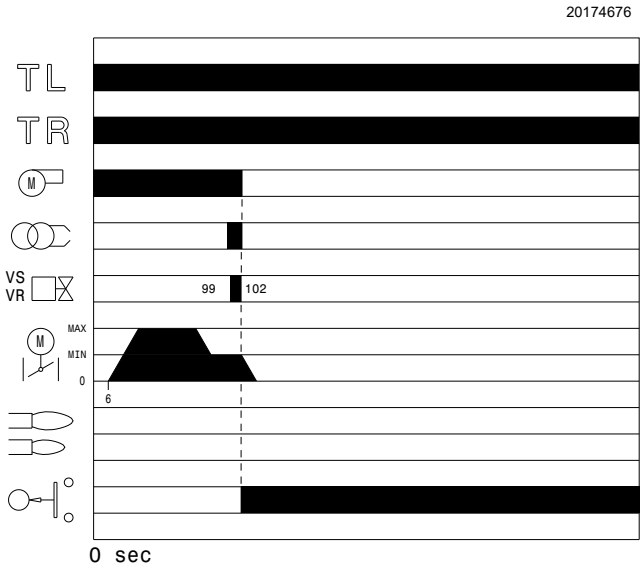


Fig. 41

6.10.3 Ignition failure

If the burner does not fire, it goes into lockout within 3 seconds after the valve opens and approximately 102 seconds after the TL closes and begins the post-purge phase which lasts 18 s.

6.10.4 Burner flame goes out during operation

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

6.11 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 the flame sensor	⇨	The burner must stop in lockout due to ignition failure

Tab. M

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.

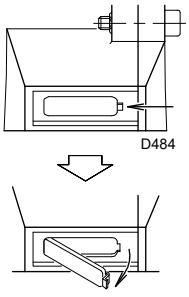


Fig. 42

Flame sensor

Clean the glass cover from any dust that may have accumulated.
The photo-electric cell 1)(Fig. 43) is held in position by a pressure fit and can therefore be removed by pulling it outward forcefully.

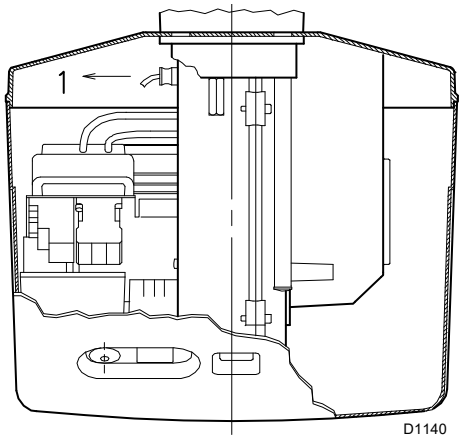


Fig. 43

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.

Flame presence check

Check the level of the flame detection signal with the “Check Mode” function from the flame control: LEDs from 2 to 6 indicate the flame signal level, respectively. See “LED lamps: burner operating status” on page 42.

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.

LIGHT OIL OPERATION

Pump

The delivery pressure must comply with the table on page 23.
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**
	λ **= 1.2**	λ **= 1.3**	
15.2	12.6	11.5	≤ 100

Tab. N

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. O

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 following table.

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. P

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.

➤ Remove screw 1) and extract the cover 2).
➤ Disconnect the light oil pipes 3).
➤ Remove screw 5), the split pin 9) and pull the burner back by about 100 mm on the slide bars 6). Disconnect the electrode cables, then completely retract the burner.
➤ Turn it as indicated in the diagram, and insert the split pin 9) into the hole of one of the two guides so that the burner remains in that position.

At this point it is possible to extract the inner part 7) after having removed the screw 8)(Fig. 44).

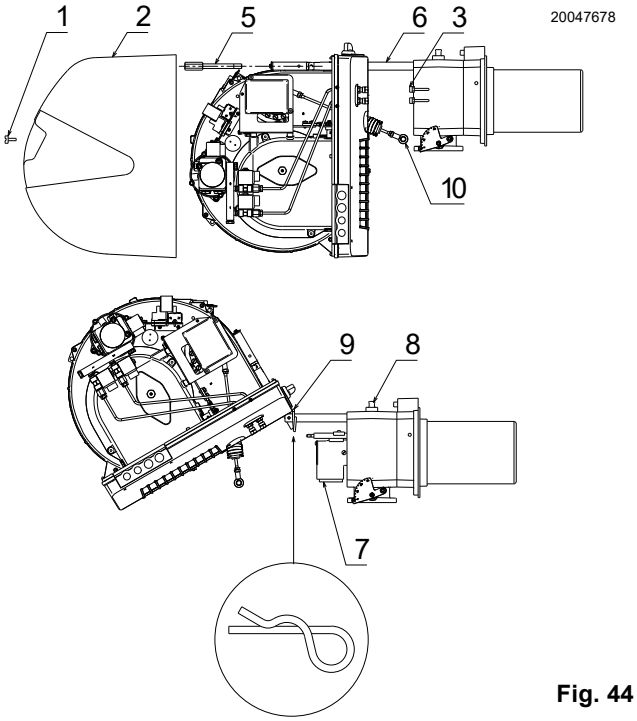


Fig. 44

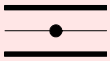
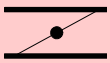
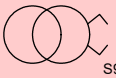
7.4 Closing the burner

➤ Remove the split pin 9) and push the burner until it is approx. 100 mm from the pipe coupling.
➤ Reconnect the cables and slide in the burner until it comes to a stop. Replace the screws 5) and split pin 9) 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. Q

T = Terminal
PTFI = Pilot ignition attempt
MTFI = Ignition attempt with main fuel valve

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:

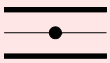
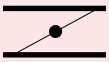
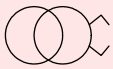
- keep the reset button pressed, See “LED lamps: burner operating status” on page 42, for more details, for at least 3 seconds, the status LED changes from green to yellow to signal that the control device is in check mode;
- the control device locks out during pre-purging, after a time-out of max 30 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. R

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 “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.

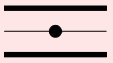
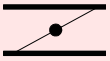
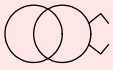
It is not admitted to tamper with or act on the system or control in a way that could compromise the product safety or warranty.
Any tests on safety devices or on loads, such as fan motor, valves, igniter, flame sensors, must be performed with the shut-off valves closed and by qualified personnel.

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

No.	Faults	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7
46	Off-specification mains voltage	●	●	●	●		●	Red
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. S

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 UV scanner, 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
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 UV scanner, 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 scanner 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 scanner or interference
34	Not used		

No.	Faults	Cause	Solution
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
56	UV: false flame during operation	False flame detected before ignition	Check the scanner
57	FR: false flame during operation	False flame detected before ignition	Check the wiring Check the scanner 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 scanner is too close to the flame	Increase the distance between the scanner and the flame OR use an orifice to reduce the view field
63	Internal hardware fault	Internal fault	Replace the control device

Tab. T

A Appendix - Accessories (optional)

EXTENDED HEAD KIT

Burner	Code
RLS 38/M	20097868

DEGASSING UNIT

Burner	Code
RLS 38/M (without filter)	3010054
RLS 38/M (with filter)	3010055

CONNECTION FLANGE KIT

Burner	Code
RLS 38/M	3010138

SOUND PROOFING BOX

Burner	Type	[dB(A)]	Code
RLS 38/M	C1/3	10	3010403

LPG KIT

Burner	Code
RLS 38/M	3010304

GAS MAX PRESSURE SWITCH KIT

Burner	Code
RLS 38/M	3010493

GROUND FAULT INTERRUPTER KIT

Bruciatore	Codice
RLS 38/M	3010321

OUTPUT REGULATOR KIT FOR MODULATING OPERATION

With modulating operation, the burner continuously adjusts its output to the heat request, thereby ensuring a great stability of the controlled parameter: temperature or pressure.

The parts to be ordered are two:
– output regulator to be installed to the burner;
– probe to be installed to heat generator.

Parameter to be controlled		Probe		Output regulator	
	Adjustment field	**Type**	**Code**	**Type**	**Code**
Temperature	- 100 ÷ 500° C	PT 100	3010110	RWF50.2 RWF55.5	20099869 20099905
Pressure	0 ÷ 2.5 bar	4 ÷ 20 mA	3010213		
	0 ÷ 16 bar	4 ÷ 20 mA	3010214		
	0 ÷ 25 bar	4 ÷ 20 mA	3090873		

GAS TRAINS APPROVED ACCORDING TO EN 676

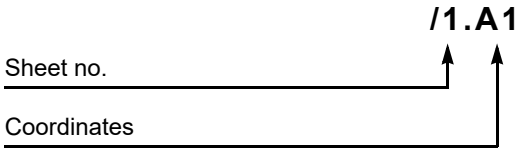
Refer to the instruction manual.

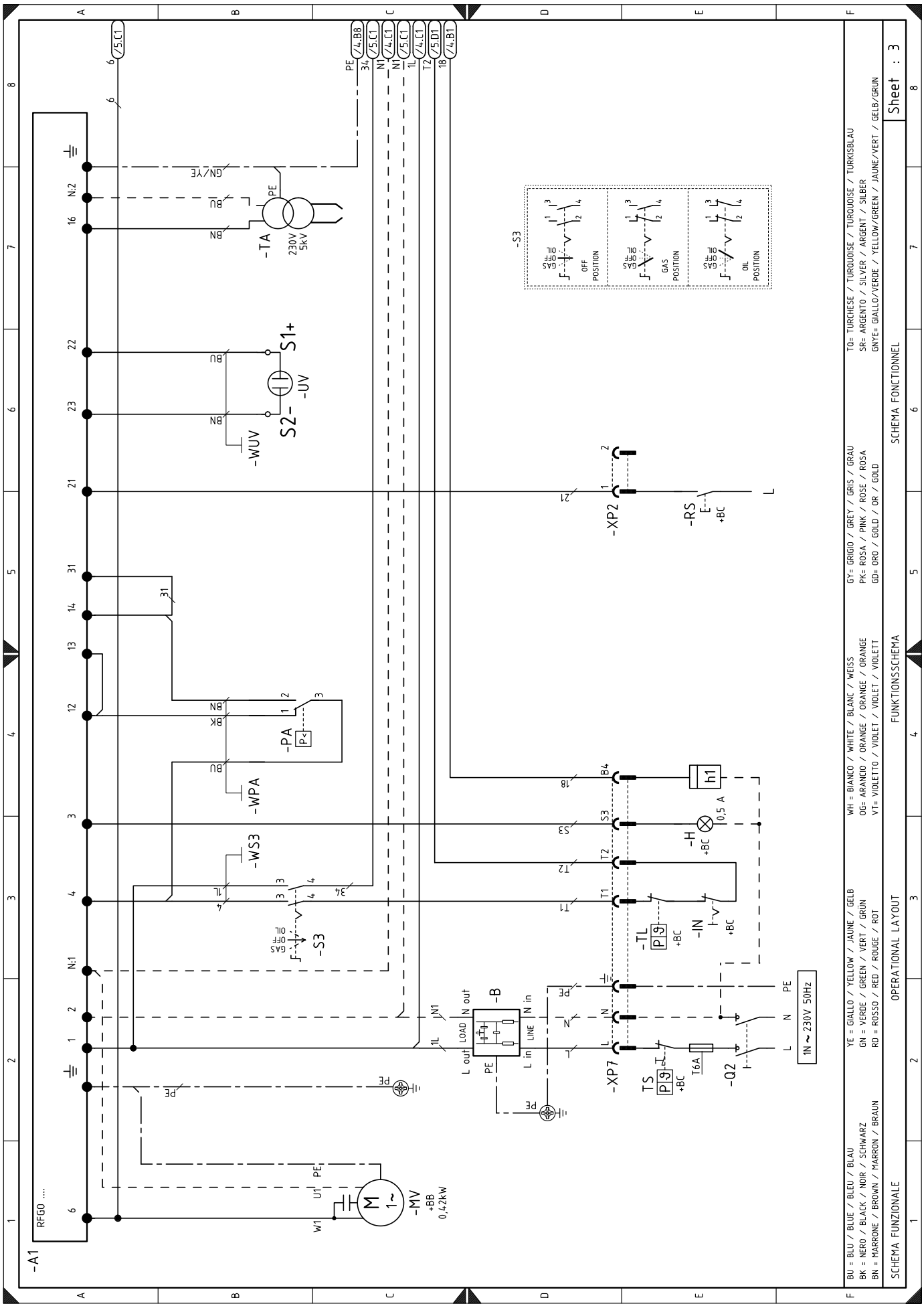
WARNING

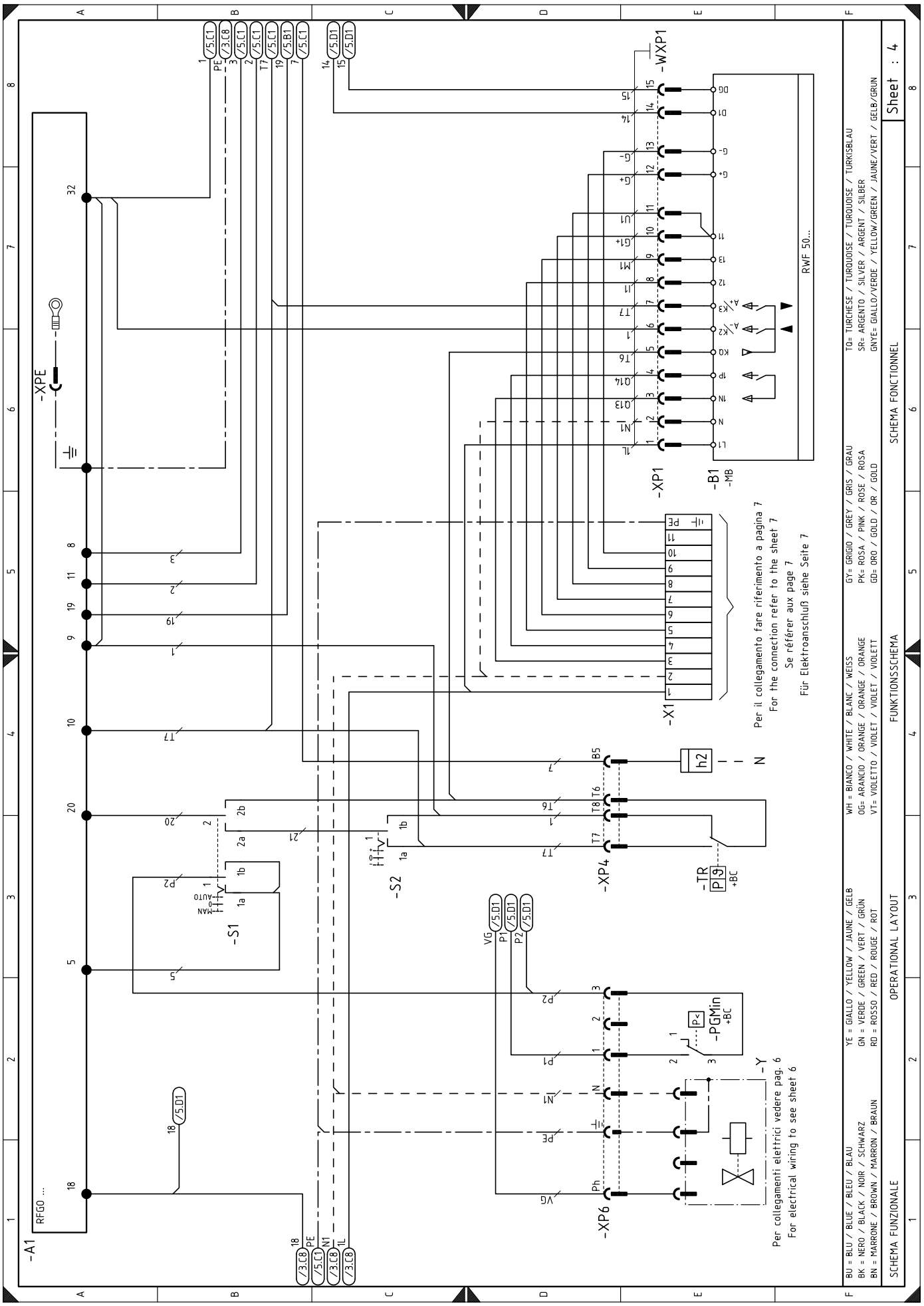
The installer is responsible for the addition of any safety device not foreseen in this manual.

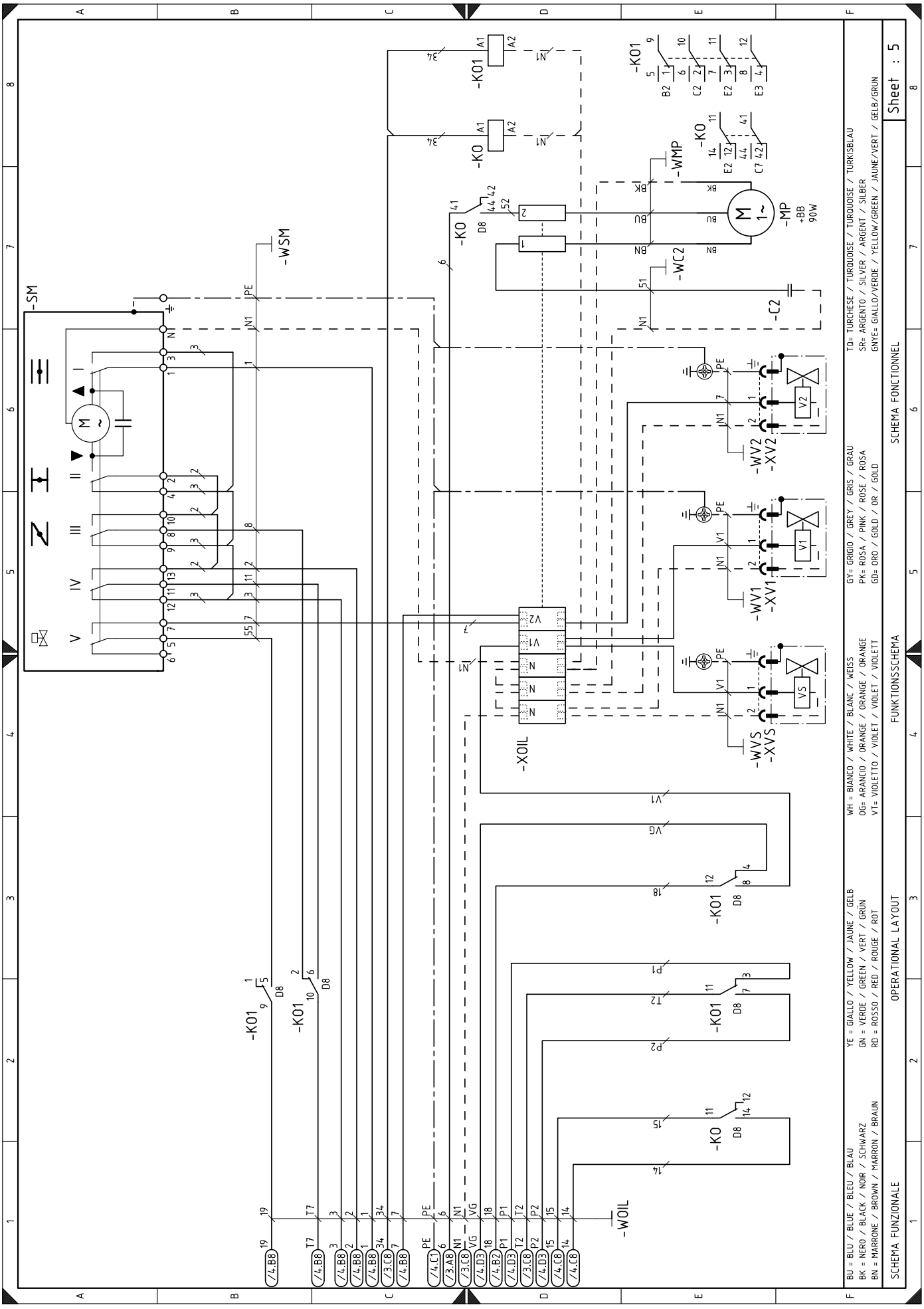
B Appendix - Electrical panel layout

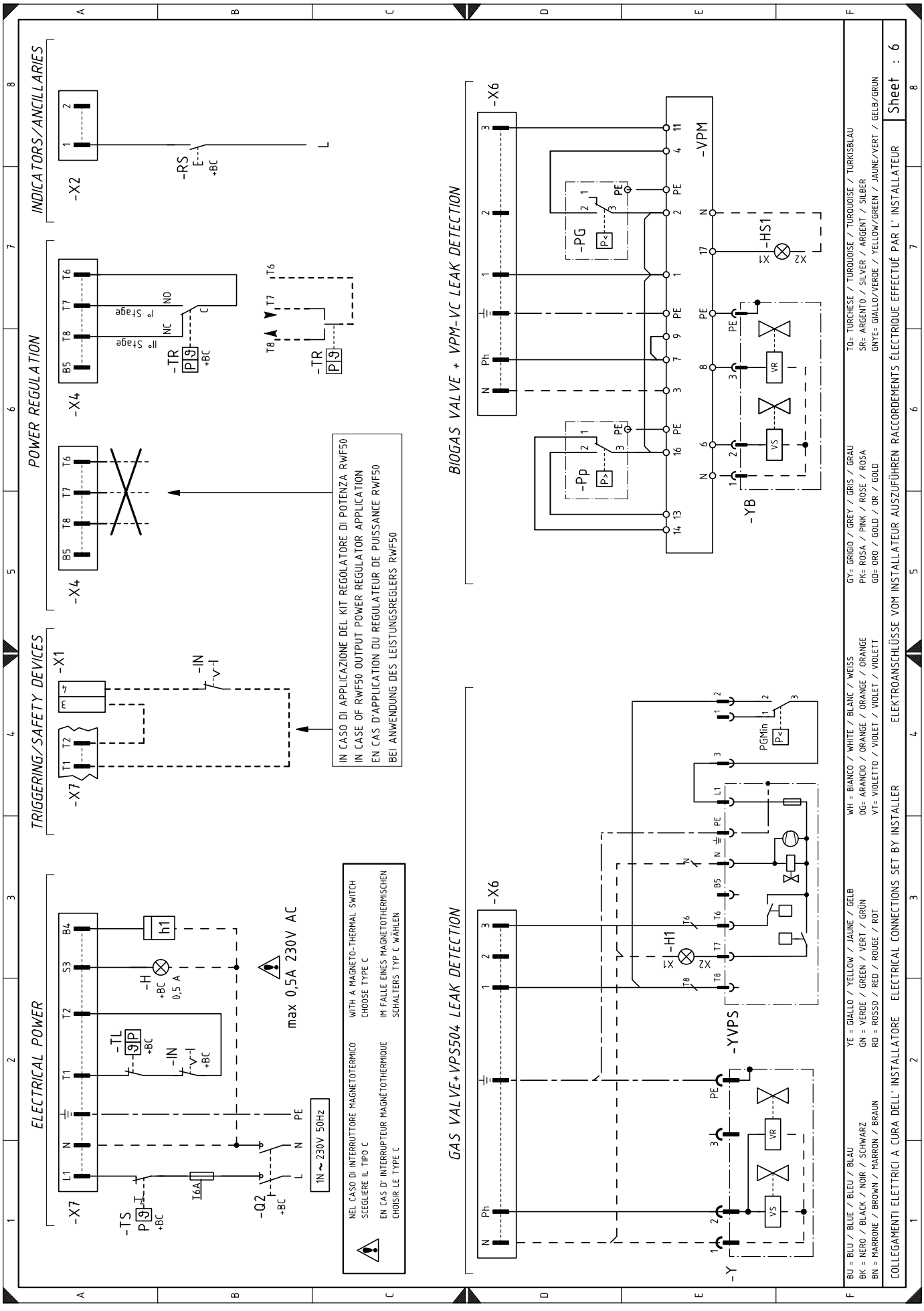
2 Indication of references




-A1
RFGO ....
-MV
+BB
0,42kW
-B
-XP7
-XP2
-RS
-Q2
T6A
-TA
230V
5kV
-UV
S1+
S2-
-WUV
-PA
-WPA
-WS3
-S3
-H
0,5 A
-IN
-TL
TS
-S53
OFF POSITION
GAS POSITION
OIL POSITION
1N ~ 230V 50Hz
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
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN


-A1
RFGO ...
-XPE
-WXP1
-XP1
-B1
-MB
RWF 50...
-X1
-S1
-S2
-XP4
-TR
-XP6
-PGMin
-Y
h2
N
Per il collegamento fare riferimento a pagina 7
For the connection refer to the sheet 7
Se référer aux page 7
Für Elektroanschluß siehe Seite 7
Per collegamenti elettrici vedere pag. 6
For electrical wiring to see sheet 6
BU = BLU / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG = ARANCIO / ORANGE / ORANGE / ORANGE
VT = VIOLETTO / VIOLET / VIOLET / VIOLETT
GY = GRIGIO / GREY / GRIS / GRAU
PK = ROSA / PINK / ROSE / ROSA
GO = ORO / GOLD / OR / GOLD
TQ = TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR = ARGENTO / SILVER / ARGENT / SILBER
GNYE = GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
SCHEMA FUNZIONALE
OPERATIONAL LAYOUT
FUNKTIONSSCHEMA
SCHEMA FONCTIONNEL
Sheet : 4


SCHEMA FUNZIONALE
OPERATIONAL LAYOUT
FUNKTIONSSCHEMA
SCHEMA FONCTIONNEL
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
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
-SM
-WSM
-KO
-KO1
-WMP
-MP
+BB
90W
-WC2
-C2
-WV2
-XV2
-WV1
-XV1
-WVS
-XVS
-XOIL
-WOIL


ELECTRICAL POWER
TRIGGERING/SAFETY DEVICES
POWER REGULATION
INDICATORS/ANCILLARIES
BIOGAS VALVE + VPM-VC LEAK DETECTION
GAS VALVE+VPS504 LEAK DETECTION
-X7
-X1
-X4
-X2
-X6
-TS
-TL
-IN
-H
-Q2
-TR
-RS
-Pp
-PG
-VPM
-HS1
-YB
-Y
-YVPS
-H1
max 0,5A 230V AC
1N ~ 230V 50Hz
I6A
NEL CASO DI INTERRUTTORE MAGNETOTERMICO SCEGLIERE IL TIPO C
EN CAS D' INTERRUPTEUR MAGNÉTOTHERMIQUE CHOISIR LE TYPE C
WITH A MAGNETO-THERMAL SWITCH CHOOSE TYPE C
IM FALLE EINES MAGNETOTHERMISCHEN SCHALTERS TYP C WÄHLEN
IN CASO DI APPLICAZIONE DEL KIT REGOLATORE DI POTENZA RWF50
IN CASE OF RWF50 OUTPUT POWER REGULATOR APPLICATION
EN CAS D'APPLICATION DU REGULATEUR DE PUISSANCE RWF50
BEI ANWENDUNG DES LEISTUNGSREGLERS RWF50
BU = BLU / BLUE / BLEU / BLAU
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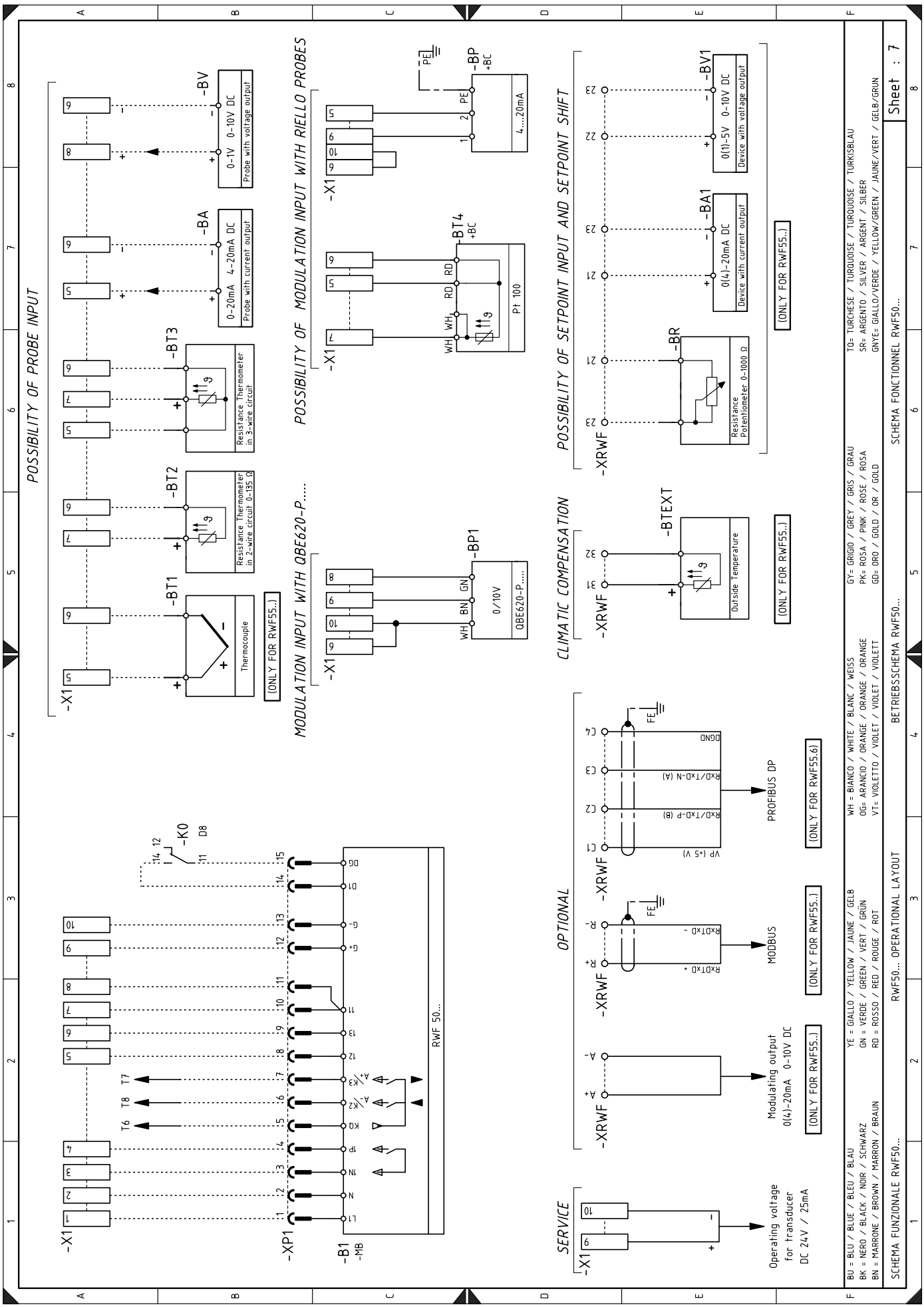
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE ELECTRICAL CONNECTIONS SET BY INSTALLER ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 6


POSSIBILITY OF PROBE INPUT
-X1
-BV
0-1V 0-10V DC
Probe with voltage output
-BA
0-20mA 4-20mA DC
Probe with current output
-BT3
Resistance Thermometer in 3-wire circuit
-BT2
Resistance Thermometer in 2-wire circuit 0-135 Ω
-BT1
Thermocouple
(ONLY FOR RWF55..)
POSSIBILITY OF MODULATION INPUT WITH RIELLO PROBES
-X1
-BP
+BC
PE
4....20mA
-BT4
+BC
WH RD
Pt 100
MODULATION INPUT WITH QBE620-P.....
-X1
-BP1
WH BN GN
0/10V
QBE620-P.....
CLIMATIC COMPENSATION
-XRWF
-BTEXT
Outside Temperature
(ONLY FOR RWF55..)
POSSIBILITY OF SETPOINT INPUT AND SETPOINT SHIFT
-XRWF
-BR
Resistance Potentiometer 0-1000 Ω
-BA1
0(4)-20mA DC
Device with current output
-BV1
0(1)-5V 0-10V DC
Device with voltage output
(ONLY FOR RWF55..)
OPTIONAL
-XRWF
A+ A-
Modulating output 0(4)-20mA 0-10V DC
(ONLY FOR RWF55..)
-XRWF
R+ R-
RxDTxD + RxDTxD -
MODBUS
(ONLY FOR RWF55..)
-XRWF
C1 C2 C3 C4
VP (+5 V)
RxD/TxD-P (B)
RxD/TxD-N (A)
DGND
PROFIBUS DP
(ONLY FOR RWF55.6)
SERVICE
-X1
Operating voltage for transducer DC 24V / 25mA
-X1
-K0
D8
-XP1
-B1
-MB
RWF 50...
T6 T8 T7
BU = BLU / BLEU / BLAU
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SCHEMA FUNZIONALE RWF50... RWF50... OPERATIONAL LAYOUT BETRIEBSSCHEMA RWF50... SCHEMA FONCTIONNEL RWF50...
Sheet : 7

Wiring layout key

A1	Control box
B	Filter to protect against radio disturbance
B1	Output regulator RWF40
BA	Input in current DC 4...20 mA
BA1	Input in current DC 4...20 mA to modify remote setpoint
+BB	Burners components
+BC	Boiler components
BP	Pressure probe
BP1	Pressure probe
BR	Remote setpoint potentiometer
BT1	Thermocouple probe
BT2	Probe Pt100, 2 wires
BT3	Probe Pt100, 3 wires
BT4	Probe Pt100, 4 wires
BTEXT	External probe for climatic compensation of the setpoint
BV	Input in voltage DC 0...10V
BV1	Input in voltage DC 0...10V to modify remote setpoint
C2	Pump motor capacitor
F1	Fan motor thermal relay (only on the three-phase version)
H	Remote lockout signal
h1	1st stage hour counter
H1, HS1	Lockout signal for the gas valve leak detection device
h2	2nd stage hour counter
IN	Burner manual stop switch
KM	Fan motor contact maker (only on the three-phase version)
KO	Relay "KO"
KO1	Relay "KO1"
MP	Pump motor
MV	Fan motor
PA	Air pressure switch
PE	Burner earth
PGM	Maximum gas pressure switch (optional)
PGMin	Minimum gas pressure switch
Q1	Three-phase line disconnecting switch (only on the three-phase version)
Q2	Single-phase line disconnecting switch
RS	Remote reset switch
S1	Selector "MAN-0-AUTO"
S2	Selector "- 0 +"
S3	Selector "GAS-OFF-OIL"
SM	Servomotor
TA	Ignition transformer
TL	Limit thermostat/pressure switch
TR	Adjustment thermostat/pressure switch
TS	Safety thermostat/pressure switch
UV	UV cell
V1	Oil valve 1st stage
V2	Oil valve 2nd stage
VS	Oil valve (safety)
X1	Power supply terminal board RWF
X2	2 pin plug
X4	4 pin plug
X5	5 pin plug (only on the three-phase version)
X6	6 pin plug
X7	7 pin plug
XOIL	Oil unit power supply terminal board
XP1	Connector for RWF40 kit
XP2	2 pole socket
XP4	4 pole socket
XP5	5-pole socket (only on the three-phase version)
XP6	6 pole socket
XP7	7 pole socket
XPGM	Maximum gas pressure switch connector (optional)
XRWF	Terminal board RWF
XV1	Valve connector V1
XV2	Valve connector V2
XVS	Valve connector VS
Y	Gas adjustment valve + gas safety valve
YVPS	Valve leak detection device

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