

**GB** Light oil burners

Progressive two-stage or modulating operation

**CE**

**UK  
CA**

**EAC**

CODE	MODEL
20205675	RL 28/M
20206107	RL 28/M
20205653	RL 38/M
20206288	RL 38/M
20205656	RL 50/M
20208625	RL 50/M



**Translation of the original instructions**

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**1 Declarations**

**Declaration of Conformity A.R. 8/1/2004 & 17/7/2009 – Belgium**

Manufacturer: RIELLO S.p.A.  
 Distributed by: 37045 Legnago (VR) Italy  
 Tel. ++39.0442630111  
 www.riello.com

This document certifies that the series of devices specified below is in compliance with the model described in the EC Declaration of Conformity and has been manufactured and distributed in compliance with the requirements defined in the Legislative Decree of January 8th 2004 and July 17th 2009.

Type of product: Light oil burner  
 Model: RL 28/M - RL 38/M - RL 50/M  
 Regulation applied: EN 267 and A.R. of January 8th 2004 - July 17th 2009  
 Controlling organisation: Kiwa Cermet Italia S.p.A.  
 Via Treviso 32-34  
 I-31020 San Vendemiano (TV) Italy

Values measured:	RL 28/M	Max. CO:	20 mg/kWh
		Max. NOx:	115 mg/kWh
	RL 38/M	Max. CO:	28 mg/kWh
		Max. NOx:	126 mg/kWh
	RL 50/M	Max. CO:	20 mg/kWh
		Max. NOx:	114 mg/kWh

**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.



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 technical safety 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.



ATTENTION

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

### 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.

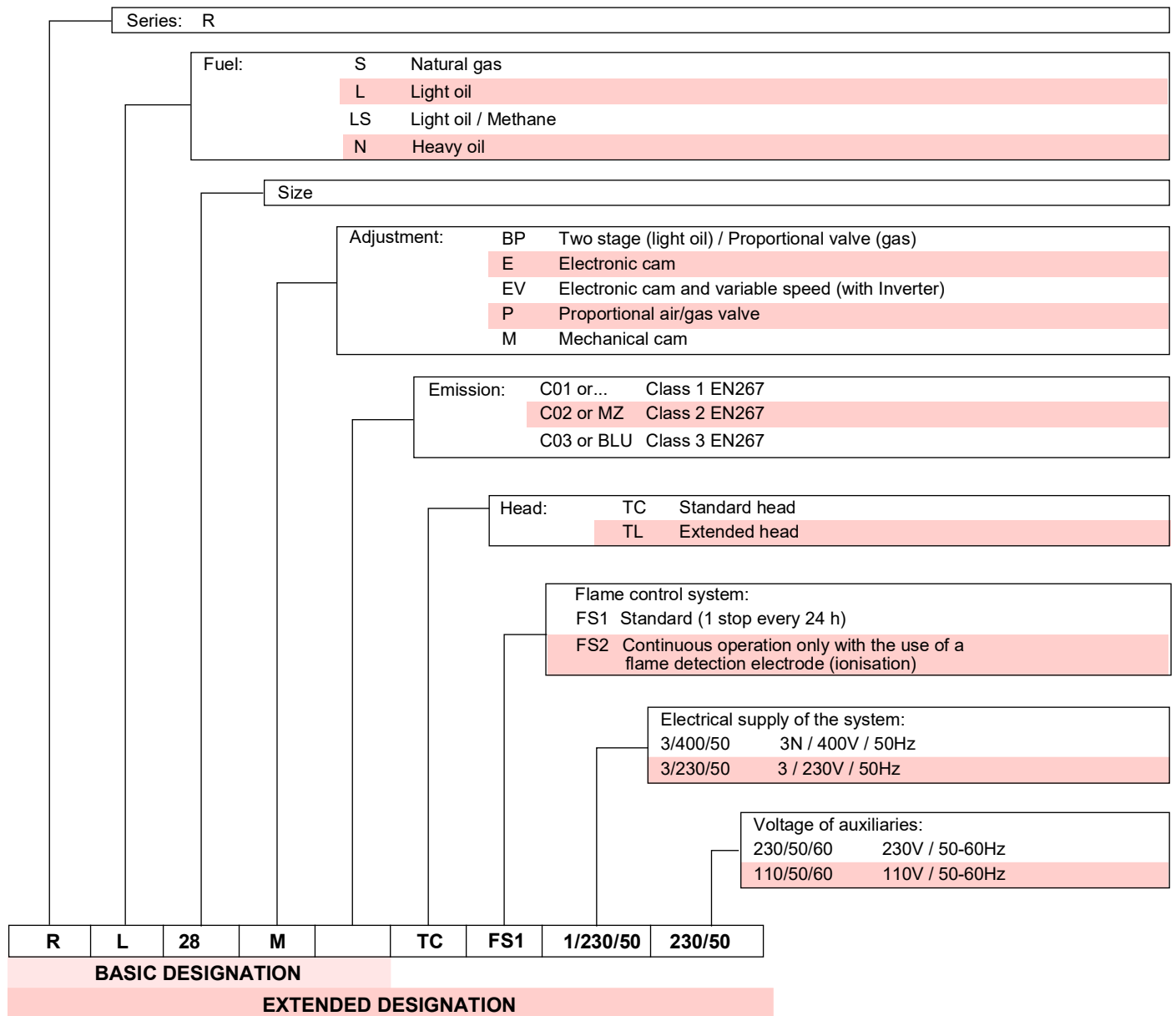
In addition:



- 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
RL 28/M		TC		1/230/50	Direct	20205675
RL 28/M		TL		1/230/50	Direct	20206107
RL 38/M		TC		3/230-400/50	Direct	20205653
RL 38/M		TL		3/230-400/50	Direct	20206288
RL 50/M		TC		3/230-400/50	Direct	20205656
RL 50/M		TL		3/230-400/50	Direct	20208625

### 4.3 Technical data

MODEL			RL 28/M	RL 38/M	RL 50/M
Output (1) Delivery (1)	MAX.	kW	166 - 332	237 - 450	296 - 593
		Mcal/h	143 - 286	204 - 387	255 - 510
		kg/h	14 - 28	20 - 38	25 - 50
	MIN.	kW	90 - 166	101 - 237	130 - 296
		Mcal/h	76.5 - 143	87 - 204	112 - 255
		kg/h	7.5 - 14	8.5 - 20	11 - 25
Fuel			Light oil		
- Lower calorific value		kWh/kg Mcal/kg	11.8 10.2		
- Density		kg/dm <sup>3</sup>	0.82 - 0.85		
- Viscosity at 20°C		mm <sup>2</sup> /s max	6 (1.5°E - 6 CsT)		
Operation			<ul style="list-style-type: none"> <li>Intermittent (min. 1 stop in 24 hours)</li> <li>Progressive two-stage (modulating by kit)</li> </ul>		
Nozzles		number	1 (with return)		
Standard applications			Boilers: water, steam, diathermic oil		
Ambient temperature		°C	0 - 40		
Combustion air temperature		°C max	60		
Pump	Output at 20 bar	kg/h	74	99	99
	Pressure range	bar	10 - 20	10 - 20	10 - 20
	Fuel temperature	°C max	60	60	60
Weight of the burner complete with packaging		kg	39	41	42
Noise levels (2)	Sound pressure	dB(A)	68	70	75.0
	Sound power		79	80	86.0

Tab. A

(1) Reference conditions: Room temperature 20°C - Barometric pressure 1013 mbar – Altitude 0 m above sea level

(2) Sound pressure measured in manufacturer's combustion laboratory, with burner operating on test boiler and at maximum output. The sound power is measured using the "Free Field" method, required by the EN 15036 standard, and according to an "Accuracy: Category 3" measurement, as described in EN ISO 3746.

### 4.4 Electrical data

Model		RL 28/M	RL 38/M	RL 50/M
Electrical power supply		230 ~ +/-10% 50 - single-phase	230 - 400 ~ +/-10% 50 - three-phase	
Absorbed electrical power	W max	720	940	1200
Protection level		IP 44		

Tab. B

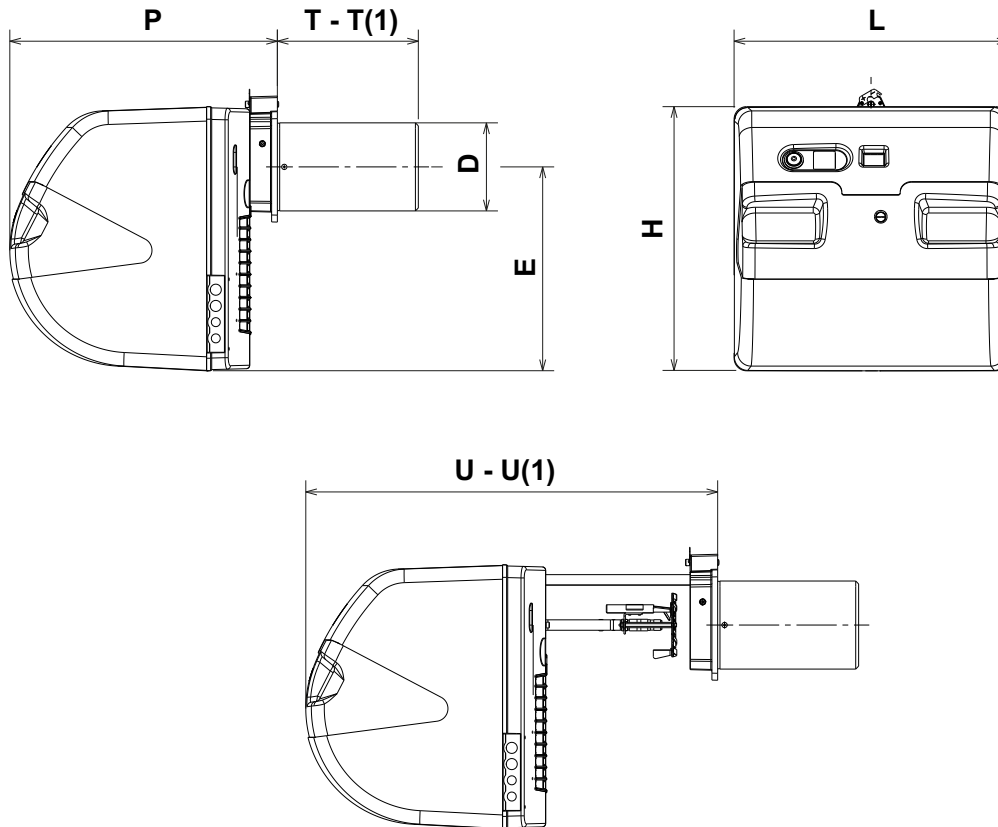
**4.5 Maximum dimensions**

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

Bear in mind that inspection of the combustion head requires the burner to be opened and the rear part drawn back on the slide bars.

The maximum dimension of the open burner is given by measurement U-U.

20152179



**Fig. 1**

mm	D	E	H	L	P	T - T(1)	U - U(1)
RL 28/M	140	352	474	476	470	241 - 351	670 - 805
RL 38/M	140	352	474	476	470	241 - 351	670 - 805
RL 50/M	152	352	474	476	470	241 - 351	670 - 805

**Tab. C**

(1) Blast tube: short-long

**4.6 Burner equipment**

- 2 - Flexible hoses
- 2 - Seals for flexible hoses
- 2 - Nipples for flexible hoses
- 1 - Thermal insulation screen
- 2 - Extensions for slide bars (models with 351 mm blast tube)
- 4 - Screws to fix the burner flange to the boiler: M 8 x 25
- 3 - Cable grommets for the electrical wiring (RL 28/M)
- 4 - Cable grommets for the electrical wiring (RL 38 - 50/M)
- 1 - Instructions
- 1 - Spare parts list

**4.7 Firing rate**

During operation, burner output varies between:

- a MINIMUM OUTPUT: area A
- a MAXIMUM OUTPUT: area B

Diagrams:

Horizontal axis: burner output

Vertical axis: pressure in combustion chamber

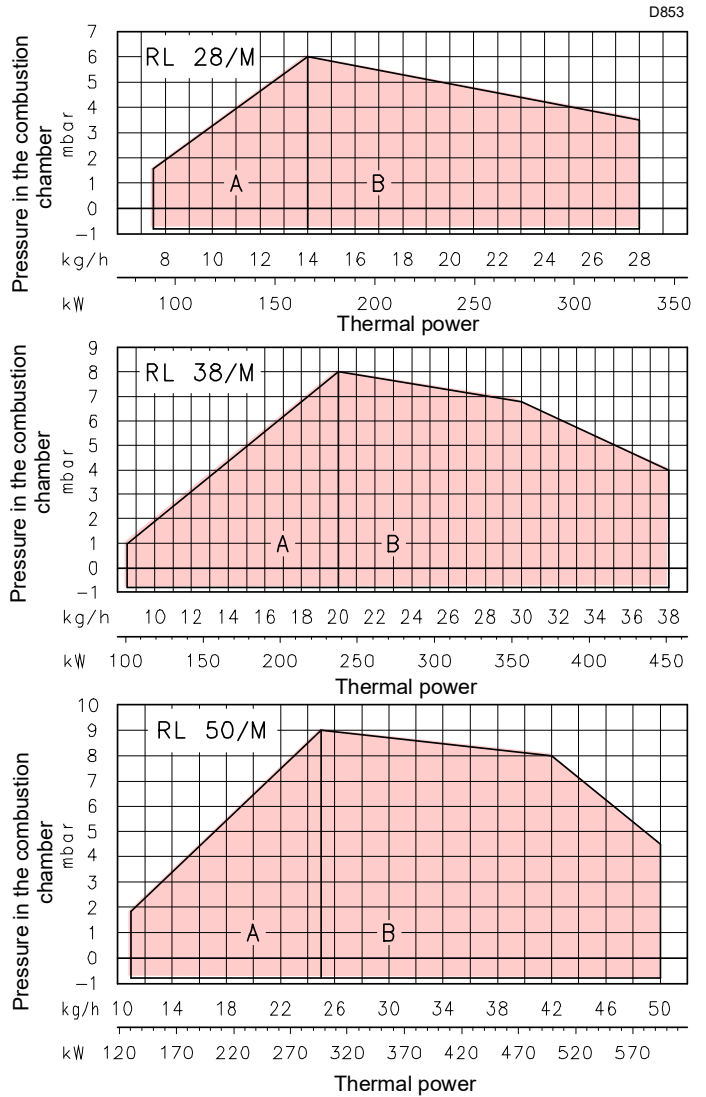
The work point is found by drawing a vertical line from the required output and an horizontal line from the corresponding pressure in the combustion chamber.

The intersection of these two lines is the work point which must lie within area A for the MINIMUM output and area B for the MAXIMUM output.



**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 18.



**Fig. 2**

**4.8 Test boiler**

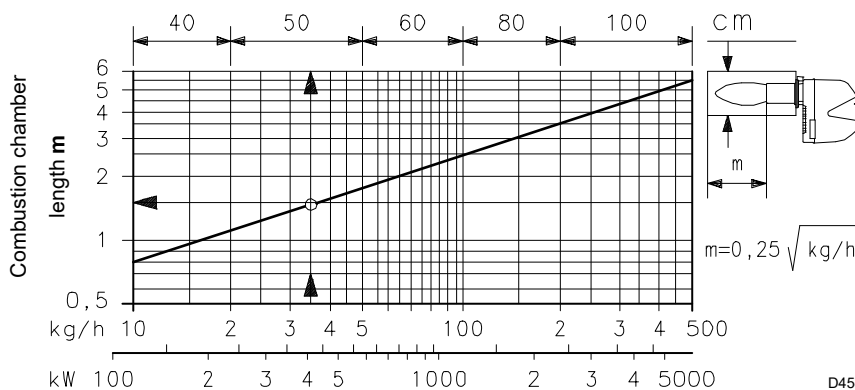
The firing rate was measured in special test boilers, according to the procedures prescribed in EN 267 regulations.

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

**Example**

output 35 kg/hour: diameter 50 cm - length 1.5 m.

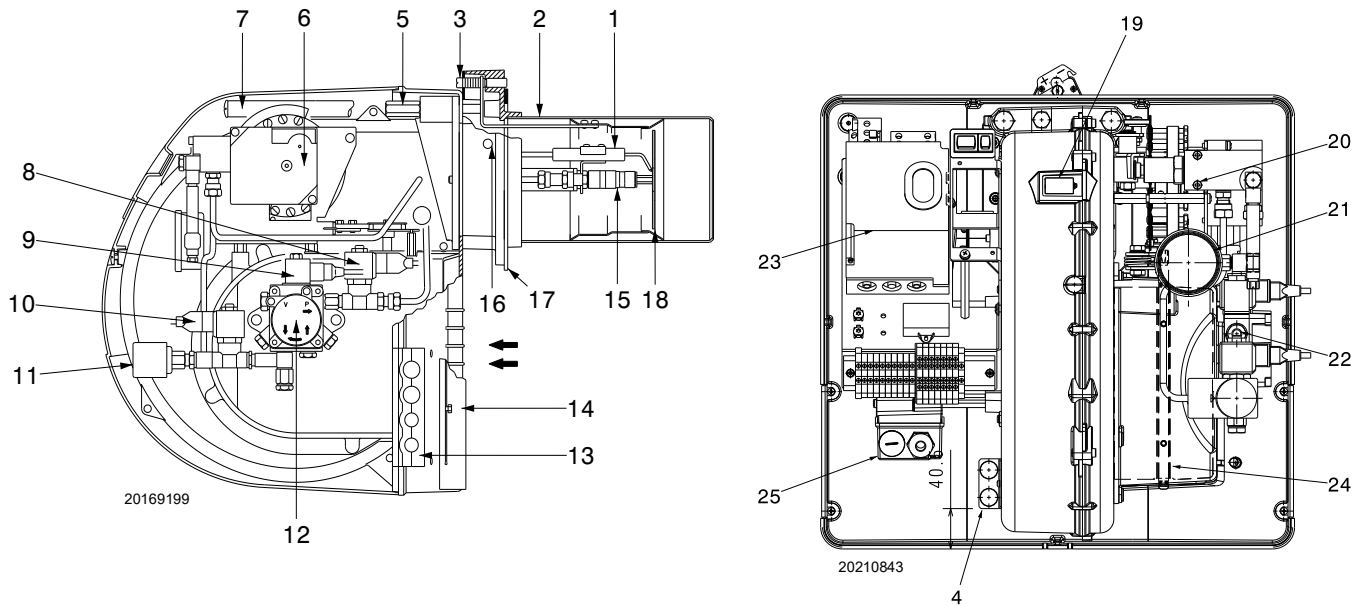
If the burner were to burn in a much smaller commercial combustion chamber, preliminary testing should be carried out.



D454

**Fig. 3**

**4.9 Burner description**



**Fig. 4**

- 1 Ignition electrodes
- 2 Combustion head
- 3 Screw for combustion head adjustment
- 4 Extensions for slide bars 7)
- 5 Screw for fixing fan to flange
- 6 Servomotor
- 7 Slide bars for opening the burner and inspecting the combustion head
- 8 Valve in delivery pump (safety)
- 9 Valve in delivery pump
- 10 Valve in nozzle return line
- 11 Oil pressure switch
- 12 Pump
- 13 Plate prearranged for making 4 holes for the passage of hoses and electrical cables.
- 14 Additional air damper
- 15 Extensions for slide bars
- 16 Fan pressure test point
- 17 Boiler fixing flange
- 18 Flame stability disc
- 19 Flame inspection window
- 20 Nozzle return pressure variator
- 21 Nozzle return pressure gauge
- 22 Pump pressure adjustment
- 23 Flame control with lockout pilot light and reset button
- 24 Air damper
- 25 Fan motor

**Two types of burner lockout may occur:**

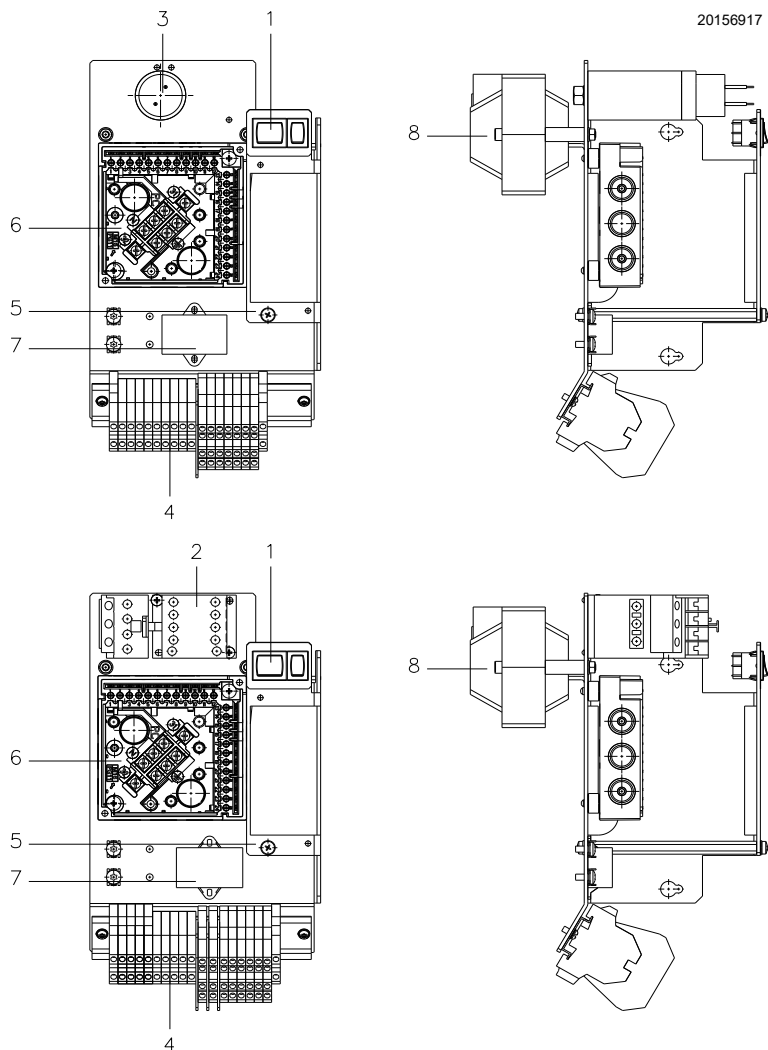
**Flame control lockout:**

if the flame control 23) push-button lights up, it indicates that the burner is in lockout. Press the push-button to reset.

**Motor lockout (RL 38 - 50/M):**

to release by pressing the push button on thermal relay 2)(Fig. 5 on page 12).

### 4.10 Electrical panel description



**Fig. 5**

- 1 Power switch for:  
automatic - manual - off operation  
Button for:  
power increase - power reduction
- 2 Motor contactor and thermal relay with reset button (RL 38-50/M)
- 3 Motor capacitor (RL 28/M)
- 4 Terminal board for electric connection
- 5 Bracket for application of RWF kit
- 6 Flame control base
- 7 Filter to protect against radio disturbance (RL 28-50/M)
- 8 Ignition transformer

**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.



It is obligatory to carry out all installation, maintenance and dismantling operations with the electrical supply disconnected.



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

**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.



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 handling, keep the load at no more than 20-25 cm from the ground.



After positioning the burner near the installation point, correctly dispose of all residual packaging, separating the various types of material. Before proceeding with the installation operations, carefully clean all around the area where the burner will be installed.

**5.3 Preliminary checks**

**Checking the consignment**



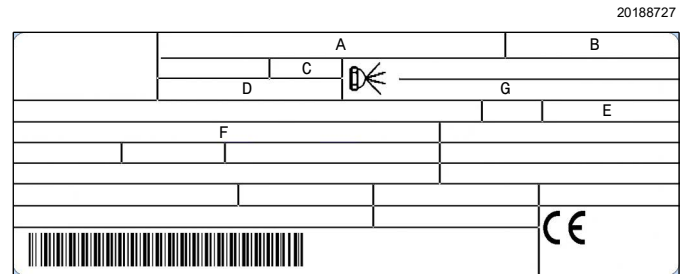
After removing all the packaging, check the integrity of the contents. In the event of doubt, do not use the burner; contact the supplier.



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

Check the identification label of the burner, showing:

- the model (see **A** in Fig. 6) and the type of burner (**B**);
- the year of manufacture, in cryptographic form (**C**);
- the serial number (**D**);
- the absorbed electrical power (**E**);
- the types of fuel used and the relative supply pressures (**F**);
- the minimum and maximum possible output data of the burner (**G**) (see Firing rate).



**Fig. 6**



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 Flame control (LFL...)

#### Important notes



ATTENTION

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

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

- All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- Before modifying the wiring in the LFL1... flame control connection area, fully disconnect the system from the power supply (omnipolar separation).
- Protection against electrocution from the flame control 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 flame control must not be operated, even if it displays no evident damage.
- **Do not press the reset button or the remote reset button of the flame control for more than 10 seconds because this will damage the internal relay.**

For safety and reliability, comply with the following instructions:

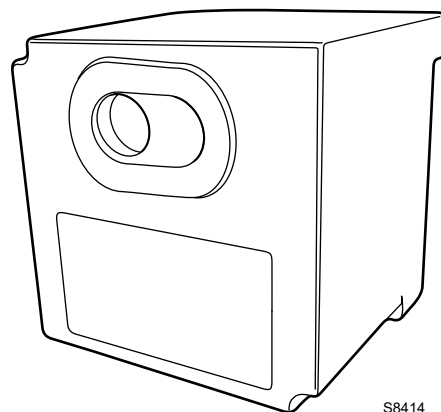
- Avoid conditions that can favour the development of condensate and humidity. Otherwise, before switching on again, make sure that the entire flame control is perfectly dry!
- Static charges must be avoided since they can damage the flame control's electronic components when touched.

#### Use

The LFL1... flame control is a control and supervision system of medium and large capacity forced draft burners for intermittent operation (at least one controlled shutdown every 24 hours).

#### Installation notes

- Check the electrical wiring inside the boiler complies with the national and local safety regulations.
- Do not confuse the powered conductors with the neutral ones.
- Ensure that spliced wires cannot get into contact with neighbouring terminals. Use adequate ferrules.
- Arrange the H.V. ignition cables separately, as far as possible from the flame control 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.



S8414

Fig. 7

#### Electrical wiring of the flame detector

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

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

#### Technical data

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

Tab. D

**5.5 Servomotor (SQN90...)**

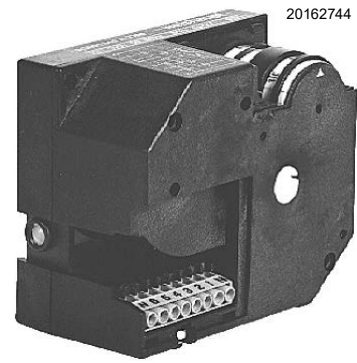
**Important notes**



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

Avoid opening, modifying or forcing the servomotor.

- All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- 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.
- Fully disconnect the burner from the mains when working near terminals and servomotor connections.
- Condensation and exposure to water are not allowed.
- For safety reasons, the servomotor must be checked after long periods of non-use.



**Fig. 8**

**Technical data**

Mains voltage	AC 220V-15%...AC 240V+10% AC 100V-15%...AC110V+10%
Mains frequency	50 / 60 Hz +/- 6%
Power absorption	8 VA
Motor	Synchronous
Drive angle	up to 90°
Cable connection	terminal board for 0.5 mm <sup>2</sup> (min.) and 2.5 mm <sup>2</sup> (max)
Rotation direction	Anticlockwise
Operation time	24 s. at 90°
Weight	approx. 0.55 kg
Breakdown voltage	24...250V AC
Safety class	II to DIN EN 60730
Environmental conditions:	
Storage	DIN EN 60721-3-1
Climatic conditions	Class 1K3
Mechanical conditions	Class 1M2
Temperature	-20...+60°C
Humidity	< 95 % RH

**Tab. E**

### 5.6 Operating position

The burner is set up to operate only in positions **1, 2, 3 and 4**.

Installation **1** is preferable, as it is the only one that allows the maintenance operations as described in this manual.

Installations **2, 3 and 4** allow operation but make maintenance and inspection of the combustion head more difficult, page 29.



Any other position could compromise the correct operation of the appliance.

The installation **5** is prohibited for safety reasons.

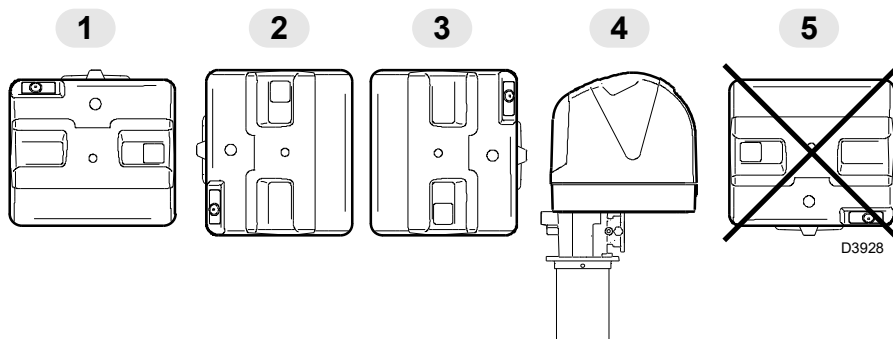


Fig. 9

### 5.7 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
RL 28/M	160	224	M 8
RL 38/M	160	224	M 8
RL 50/M	160	224	M 8

Tab. F

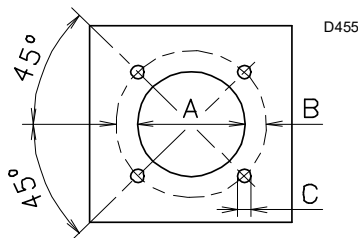


Fig. 10

### 5.8 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:

Blast tube 7)(Fig. 11):	RL 28/M	RL 38/M	RL 50/M
• short	241	241	241
• long	351	351	351

For boilers with front flue passes 10)(Fig. 11) or flame inversion chambers, a protection in heat-resistant material 8) must be inserted between the boiler refractory 9) and the blast tube 7).

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

### 5.9 Securing the burner to the boiler



Provide an adequate lifting system of the burner.

Remove blast tube 7) from the burner 4)(Fig. 11) and proceed as follows:

- remove the screws 2) from the two slide bars 3).
- Remove the screw 1) retaining the burner 4) to the flange 5).
- Remove the blast tube 7) complete with flange 5) and slide bars 3).

Fix the flange 5) to the plate of the boiler interposing the seal 6) supplied with the unit. Use the 4 screws, also supplied, after protecting their thread with an anti-locking product.



The seal between burner and boiler must be airtight.

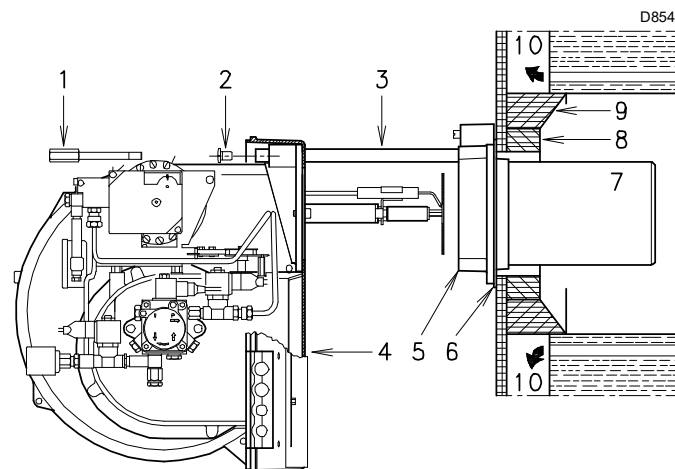


Fig. 11

**5.10 Nozzle installation**

**5.10.1 Nozzle selection**

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 the Manufacturer in the instruction and warning booklet should be used.



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



The use of nozzles other than those specified by the Manufacturer 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 Manufacturer shall not be liable for any such damage arising from non-observance of the requirements contained in this manual.

The nozzle must be chosen from among those listed in Tab. G:

- 1 = Bergonzo nozzle type A3
- 2 = Nozzle maximum output
- 3 = Delivery pump pressure
- 4 = Nozzle return line maximum pressure

If you want an output somewhere between the two values shown in the table, select a nozzle with a higher flow rate. The reduction in the flow rate is obtained with the pressure variator.

**NOZZLES RECOMMENDED:**

Bergonzo type A3, or A4 - 45° angle.

1	2	3	4
A3	kg/h	bar	bar
15	13	20	17
20	20	20	17
30	24	20	15
40	30	20	16
50	33	20	16
60	42	20	16
70	50	20	15

Tab. G

**5.10.2 Nozzle assembly**

At this installation stage the burner is still separated from the blast tube; therefore it is possible to fit the two nozzles with the socket wrench 1)(Fig. 12) passing through the central opening of the flame stability disc.

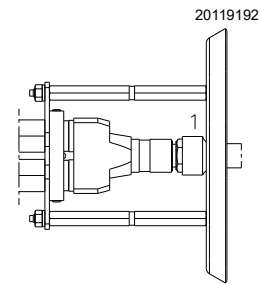


Fig. 12



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.



Check that the electrodes are placed as in Fig. 13.

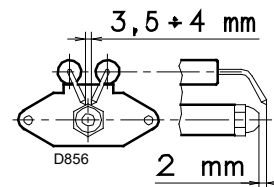


Fig. 13

- Finally remount the burner 4)(Fig. 14) on the slide bars 3) and slide it up to the flange 5), keeping it slightly raised to prevent the flame stability disk from pressing against the blast tube.
- Tighten the screws 2) on the slide bars 3) and the screws 1) fixing the burner to the flange.

If it proves necessary to change a nozzle with the burner already fitted to the boiler, proceed as outlined below:

- slide back the burner on the slide bars as shown in Fig. 11.
- Remove the nuts 1)(Fig. 14) and the disc 2).
- Replace the nozzle with wrench 3)(Fig. 15).

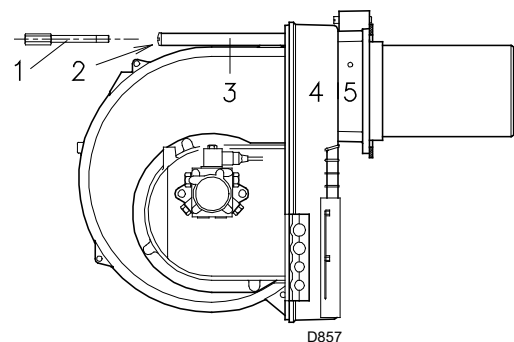


Fig. 14

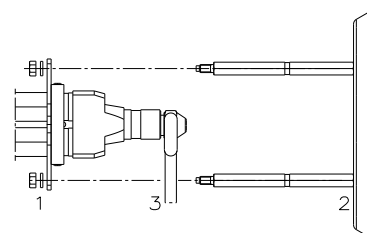


Fig. 15

### 5.11 Combustion head adjustment

The adjustment of the combustion head depends only on the maximum output at which the burner has to operate.

Turn the screw 4)(Fig. 16) until the notch indicated by the diagram (Fig. 17) corresponds with the front part of the flange 5)(Fig. 16).



**ATTENTION**

The adjustments indicated can be modified during the initial start-up.

**Example:**

Burner RL 50/M

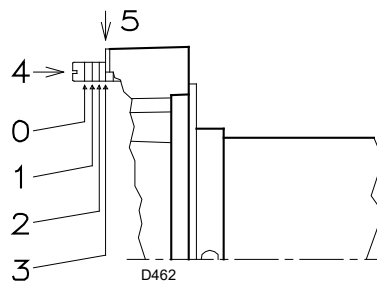
Maximum light oil output = 32 kg/h.

Diagram (Fig. 17) indicates that for an output of 32 kg/h the RL 50/M burner requires the combustion head to be adjusted to approximately 3 notches, as shown in Fig. 17.

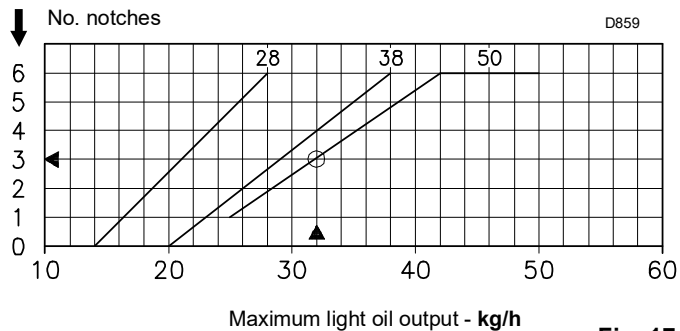


**ATTENTION**

When fixing the burner to the two slide bars, it is advisable to gently move the high voltage cables outwards so as to stretch them slightly.



**Fig. 16**



**Fig. 17**

**6 Hydraulic system**

**6.1 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.

**DOUBLE-PIPE CIRCUIT (A)**

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

**The tank is higher than the burner A**

The distance "P" must not exceed 10 meters in order to avoid subjecting the pump seal to excessive strain; the distance V must not exceed 4 meters in order to permit pump self-priming even when the tank is almost completely empty.

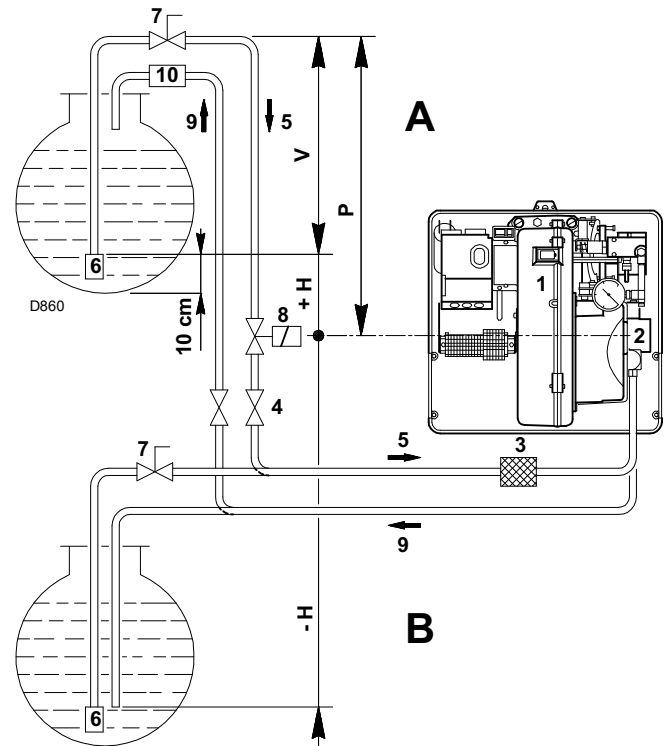
**The tank is lower than the burner B**

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.

**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. H.



**Fig. 18**

Key (Fig. 18)

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

+/- H (metres)	RL 28/M L (metres)			RL 38-50/M L (metres)		
	ø (10 mm)	ø (12 mm)	ø (14 mm)	ø (10 mm)	ø (12 mm)	ø (14 mm)
+ 4.0	63	144	150	51	112	150
+ 3.0	55	127	150	45	99	150
+ 2.0	48	111	150	39	86	150
+ 1.0	40	94	150	32	73	144
+ 0.5	37	86	150	29	66	132
0	33	78	150	26	60	120
- 0.5	29	70	133	23	54	108
- 1.0	25	62	118	20	47	96
- 2.0	17	45	88	13	34	71
- 3.0	10	29	58	7	21	46
- 4.0	-	12	28	-	8	21

**Tab. H**

### 6.2 Hydraulic connections



- 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 flexible hoses with the supplied seals into the connections and screw them down.



- 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. 19);
- undo the screws 1), divide the insert piece into parts 2) and 3);
- remove the thin diaphragm blocking the two holes 4).
- Install the hoses where they cannot be stepped on or come into contact with hot surfaces of the boiler.
- Finally, connect the other end of the flexible hoses to the nipples supplied, using two wrenches: one on the hose's swivel fitting, for screwing, and one on the nipple, to counteract the reaction force.

Key (Fig. 20)

- |         |                               |
|---------|-------------------------------|
| 1       | Pump suction line             |
| 2       | Filter                        |
| 3       | Pump                          |
| 4       | Pressure adjuster             |
| 5       | Return pipe                   |
| 6       | Bypass screw                  |
| 7       | Pump return line              |
| 8-15-16 | Solenoid valves               |
| 9       | Delivery line                 |
| 10      | Nozzle                        |
| 11      | Return line                   |
| 12      | Pressure adjustment           |
| 13      | Pressure adjustment eccentric |
| 14      | Maximum oil pressure switch   |
| M       | Pressure gauge                |
| V       | Vacuometer connection         |

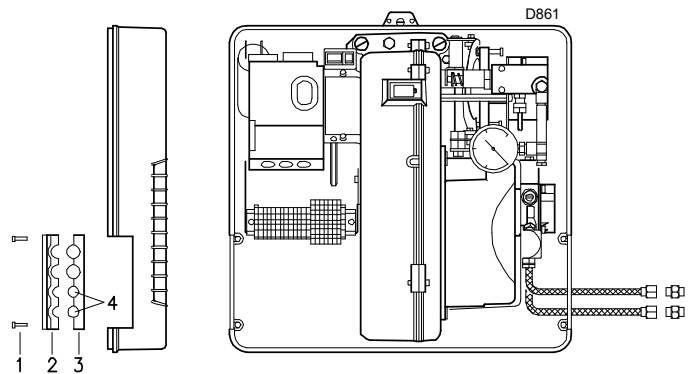


Fig. 19

#### 6.2.1 Hydraulic circuit diagram

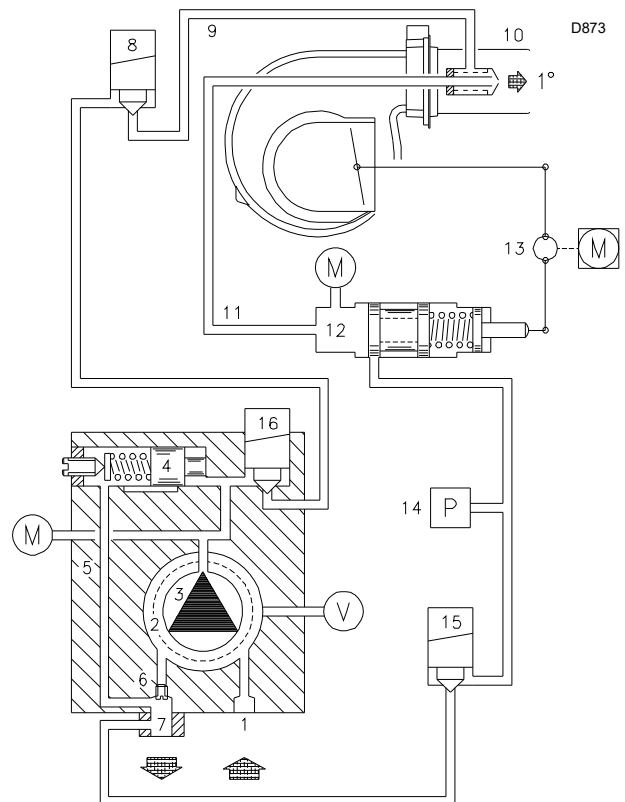


Fig. 20

6.3 Pump

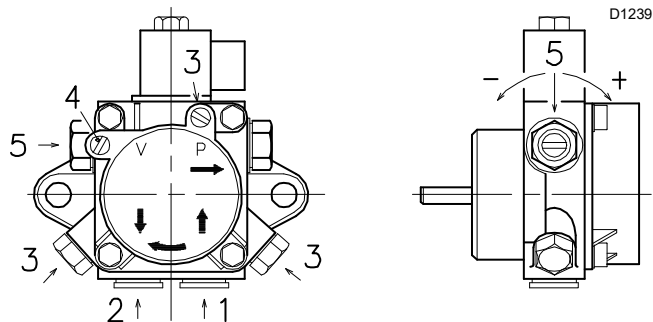


Fig. 21

Key (Fig. 21)

- 1 Suction line G 1/4"
- 2 Return line G 1/4"
- 3 Pressure gauge connection G 1/8"
- 4 Vacuometer connection G 1/8"
- 5 Pressure adjustment

6.3.1 Technical data

		RL 28/M	RL 38/M RL 50/M
		Suntec AL 75C	Suntec AL 95C
Min. delivery rate at 20 bar pressure	kg/h	74	99
Delivery pressure range	bar	10 - 20	10 - 20
Max. suction depression	bar	0.45	0.45
Viscosity range	mm <sup>2</sup> /s (cSt)	2 - 12	2 - 12
Max. light oil temperature	°C	60	60
Max. suction and return pressure	bar	2	2
Pressure calibration in the factory	bar	20	20
Filter mesh width	mm	0.15	0.15

Tab. I

6.3.2 Priming pump



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.

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

- In order for self-priming to take place, one of the screws 3)(Fig. 21) of the pump must be loosened in order to bleed off the air contained in the suction line.
- Start the burner by closing the control devices and with the switch 1)(Fig. 22) in "MAN" position. As soon as burner starts, check the fan rotation direction through the flame inspection window 19).
- The pump can be considered to be primed when the light oil starts coming out of the screw 3).
- Stop the burner: set switch 1)(Fig. 22) to "OFF" and tighten the screw 3).

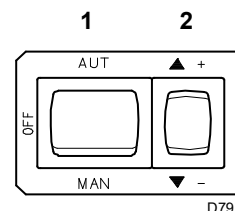


Fig. 22

The time required for this operation depends upon the diameter and length of the suction tubing.

If the pump fails to prime at the first starting of the burner and the burner locks out, wait approx. 15 seconds, reset the burner, and then repeat the starting operation as often as required.

And so on. After 5 or 6 starting operations allow 2 or 3 minutes for the transformer to cool.



The a.m. operation is possible because the pump is already full of fuel when it leaves the factory. If the pump has been drained, fill it with fuel through the opening on the vacuum meter prior to starting; otherwise, the pump will seize.

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

## 7 Electric system

### Notes on safety for the electrical wiring



- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be made in accordance with the regulations currently in force in the country of destination and by qualified personnel. Refer to the wiring diagrams.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the wiring diagrams.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The burner has been type-approved for intermittent use. This means they should compulsorily be stopped at least once every 24 hours to enable the flame control to perform checks of its own start-up efficiency. Normally, burner stopping is guaranteed by the boiler's thermostat/pressure switch.
- If this is not the case, a time switch should be fitted in series to TL to stop the burner at least once every 24 hours. Refer to the wiring diagrams.
- The electrical safety of the device is obtained only when it is correctly connected to an efficient earthing system, made according to current standards. It is necessary to check this fundamental safety requirement. In the event of doubt, have the electrical system checked by qualified personnel. Do not use the gas tubes as an earthing system for electrical devices.
- The electrical system must be suitable for the maximum power absorption of the device, as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for that level of power absorption.
- For the main power supply of the device from the electricity mains:
  - do not use adapters, multiple sockets or extensions;
  - 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:



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



Close the fuel shut-off valve.



Avoid condensate, ice and water leaks from forming.

The RL 38-50/M models leave the factory for **400 V** power supplies. If the power supply is **230 V**, change the motor connection (from star to delta) and the calibration of the thermal relay.

The electrical connections are performed by the installer

Use flexible cables according to EN 60 335-1 Regulations:

- if in PVC sheath, use at least H05 VV-F
- if in rubber sheath, use at least H05 RR-F.

### 7.0.1 Supply cables and external connections passage

All the cables to be connected to the terminal board 5)(Fig. 23) of the burner are passed through cable grommets supplied with the unit to be inserted in the holes of the plate, preferably on the left, after having unscrewed the screws 6), opened the plate at parts 7 and 8 and removed the thin diaphragm that closes the holes.

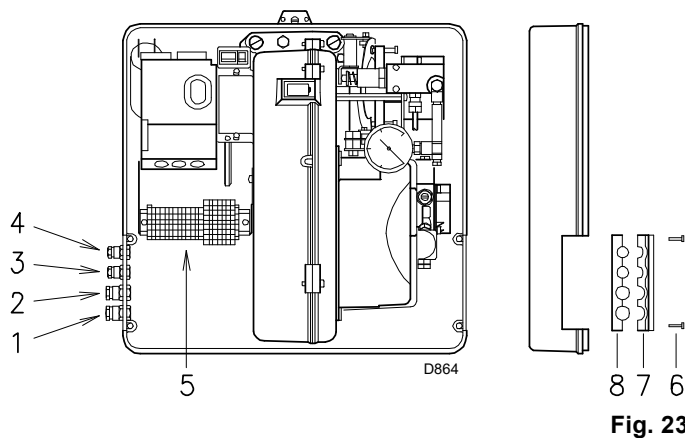
The use of the cable grommets and the pre-blanked holes can be done in different manners; for example:

**RL 28/M**

- 1 - Pg 11 Single-phase power supply
- 3 - Pg 9 TL remote control
- 4 - Pg 9 TR remote control or probe (RWF)

**RL 38-50/M**

- Pg 11 Three-phase power supply
- Pg 11 Single-phase power supply
- Pg 9 TL remote control
- Pg 9 TR remote control or probe (RWF)



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

### 7.1 Calibration of the thermal relay

The thermal relay (Fig. 24) serves to avoid damage to the motor due to an excessive absorption increase or if a phase is missing. For calibration 2), refer to the table indicated in the electrical layout (electrical wiring by the installer).

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

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

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



The automatic reset can be dangerous. This operation is not foreseen in the burner operation.

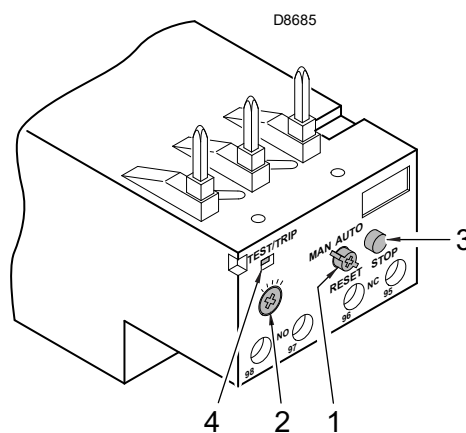


Fig. 24

### 7.2 Motor rotation

As soon as the burner starts, place yourself in front of the cooling fan of the fan motor and check that it turns anticlockwise (Fig. 25).

If this is not the case:

- put the switch of the burner to "0" (off) and wait until the flame control carries out the switching off phase.



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

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

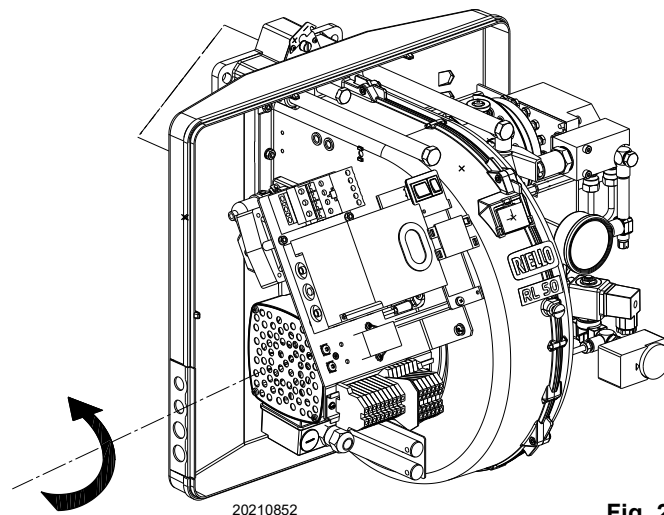


Fig. 25

**8 Start-up, calibration and operation of the burner**

**8.1 Notes on safety for the first start-up**



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



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

**8.2 Adjustments prior to ignition**

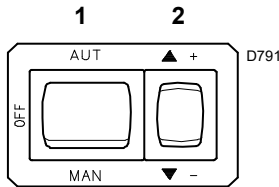


Burner ignition must be carried out by qualified personnel with the appropriate tools.

**8.2.1 Burner ignition**

Turn off the remote controls and set the switch 1)(Fig. 26) to "MAN".

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



**Fig. 26**

**8.2.2 Adjusting the burner**

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

The adjustments that have already been performed and generally do not need variations are:

- Combustion head
- Servomotor, cams I - II - IV

Whereas the following must be adjusted one after the other:

- 1 - MAX burner output
- 2 - MIN burner output
- 3 - Intermediate outputs between Min. and Max.

**1 - MAXIMUM OUTPUT**

MAX output must be selected within the firing rate range shown on page 10

In the above instructions we left the burner running at the MIN output. Now press the button 2)(Fig. 26) "+" and keep it pressed until the servomotor has reached 90°.

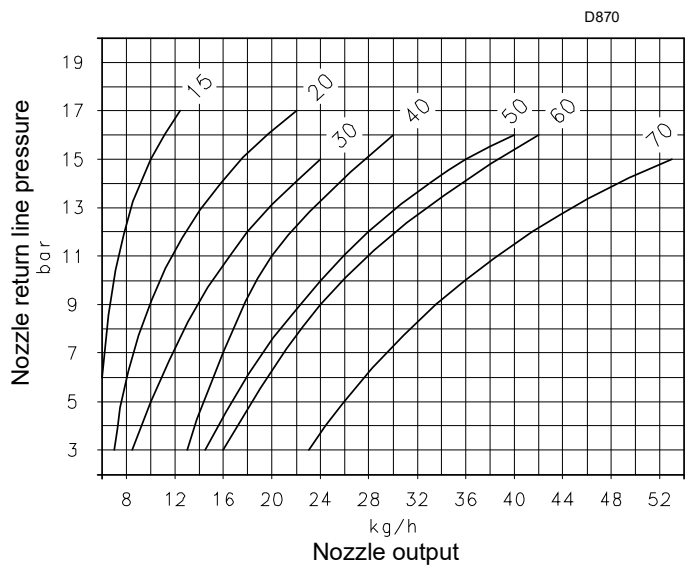
**Nozzle output adjustment**

The nozzle output varies depending on the light oil pressure on the nozzle return line.

The diagram (Fig. 27) indicates this relation for Bergonzo type A3 nozzles with a 20 bar pump delivery pressure.

**NOTE:**

**With a 20 bar pump delivery pressure, the nozzle return line pressure must not be greater than 17 bar. The pressure difference between pump delivery and nozzle return line must be at least 3 bars. With smaller pressure differences, the nozzle return line pressure may be unstable.**



**Fig. 27**

To set the maximum nozzle output, vary the upper cam end profile 7)(Fig. 28 on page 25) using the screws 8).

The value of the pressure on the return line of the nozzle is shown on the pressure gauge 10).

**Air adjustment**

There are two air dampers, 1) and 2)(Fig. 29 on page 25), for air regulation. Air dampers factory set at maximum opening.

**First** adjust the air damper 2) which must be closed progressively until optimal combustion is achieved. If the total closure of the air damper 2) is not sufficient, close the air damper 1) **second** as follows:

adjust the lower cam end profile 4)(Fig. 28 on page 25) by turning the screws 5) that appear inside the opening 6).

If the burner is operated at full power, the fan air may not be sufficient even with both air dampers 1) and 2) fully open. In this case, remove the air damper 2) and adjust the air with air damper 1) only, as explained above.

Cams 7) - 4)(Fig. 28 on page 25):

- to increase the output, tighten the screws 8)-5);
- to decrease the output, undo the screws 8)-5);

**2 - MINIMUM OUTPUT**

MIN output must be selected within the firing rate range indicated on page 10.

Press button 2)(Fig. 26) “-” and keep it pressed until the servomotor reaches 15° (factory adjustment).

**Nozzle output adjustment**

The nozzle flow output is given in the diagram (Fig. 27) in correspondence with the nozzle return line pressure, measured with the pressure gauge 10)(Fig. 28).

To vary the minimum nozzle output, change the upper cam start profile 7)(Fig. 28) using the screws 8).

**Air flow adjustment**

Adjust the lower cam start profile 4)(Fig. 28) by turning the screws 5) that appear inside the opening 6).

If possible, do not turn the first screw, since this is used to set the air damper to its fully closed position.

**3 - INTERMEDIATE OUTPUTS**

**Oil/air output adjustment**

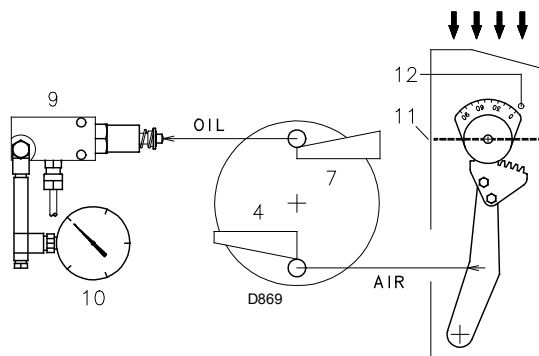
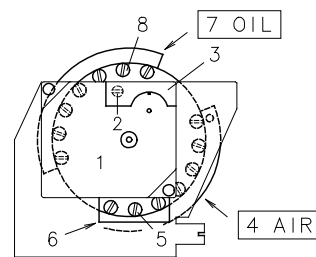
Lightly press the “+” button 2)(Fig. 26) so that a new screw 5)(Fig. 28) appears inside the opening 6)(Fig. 28). Adjust the screw 8)(Fig. 28) which varies the upper cam profile 7) and the corresponding screw 5) which controls the lower cam 4) until optimal combustion is achieved. Proceed in the same way with the following screws except for the last screw, previously adjusted to obtain the maximum power.

Take care that the cam profile variation is progressive.

Switch the burner off with switch 1)(Fig. 26), **OFF** position, release the adjustable profile cam by setting the servomotor slot 2)(Fig. 28) 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 any hindrance.

**NOTE:**

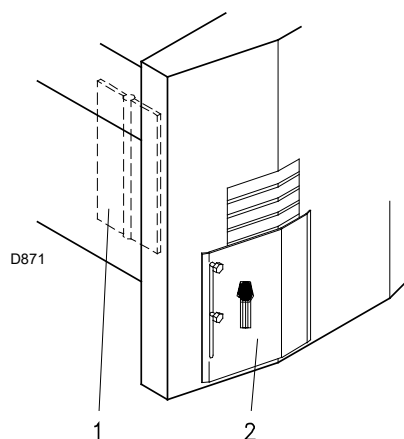
The servomotor cams I - II - IV do not need to be adjusted. Only cam III may need an intervention. In this case remove the cover 1)(Fig. 30), inserted with a trigger catch, extract the special key 2) from inside, and insert it in the notch of cam III. The servomotor follows the adjustment of cam III only when the angle of the cam is reduced. If it is necessary to increase the cam angle (15..16..17°..), first increase the servomotor angle by means of the “+” key, then increase the cam III angle, and finally bring the servomotor to the position of MIN output, with the “-” key.



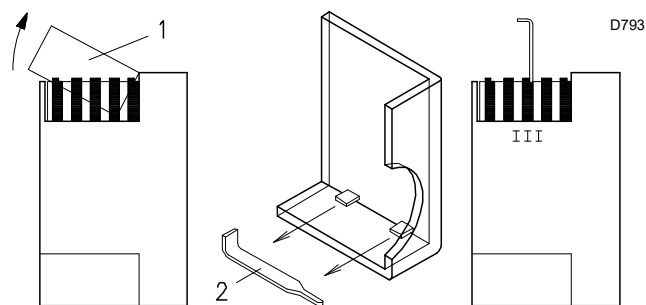
**Fig. 28**

Key (Fig. 28)

- 1 Servomotor
- 2 ⊖ Cam 4) and 7) engaged/⊕ disengaged
- 3 Servomotor cam cover
- 4 Air damper control cam
- 5 Cam 4) adjustment screws
- 6 Slit to access the screws 5)
- 7 Pressure variator control cam
- 8 Cam 7) adjustment screws
- 9 Pressure variator
- 10 Pressure gauge for nozzle return line pressure measurement
- 11 Air damper
- 12 Contents



**Fig. 29**



**Fig. 30**

### 8.3 Servomotor

The servomotor simultaneously adjusts the air damper 11)(Fig. 28 on page 25) and the pressure variator 9) by means of a double variable profile cam, 4) and 7). The servomotor's rotation angle is 90° in 24 s.

Do not alter the factory setting for the 4 cams; just check that they are as specified below:

- Cam I:**            **90°**   Limits rotation toward maximum position.
- Cam II:**           **0°**     Limits rotation toward minimum position.  
With burner off, the air damper must be closed: 0°.
- Cam III:**          **15°**   Adjusts the ignition position and the MIN output.
- Cam IV:**          **not used.**



D790

Fig. 31

### 8.4 Pressure switch adjustment

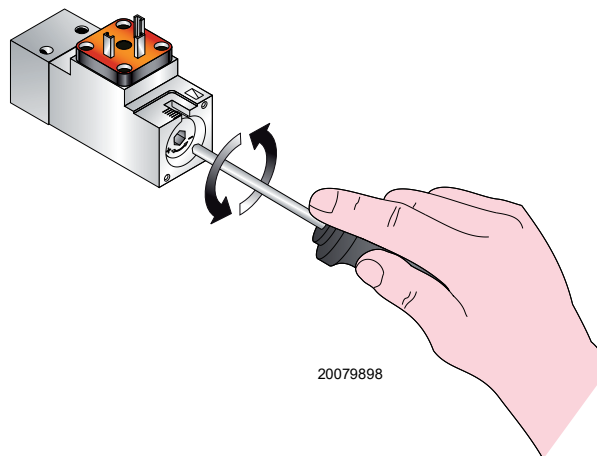
#### 8.4.1 Oil pressure switch

The pressure switch 11)(Fig. 4 on page 11) is adjusted in the factory at 3 bar. If the light oil pressure reaches this value in the return duct, the pressure switch stops the burner.

The burner restarts automatically if the pressure goes back to less than 3 bar after stopping.

If the burner is fed by a loop circuit with a pressure of Px, the pressure switch must be adjusted at Px + 3 bar.

To adjust the pressure switches, use a tool to operate the adjustment screw, see Fig. 32.



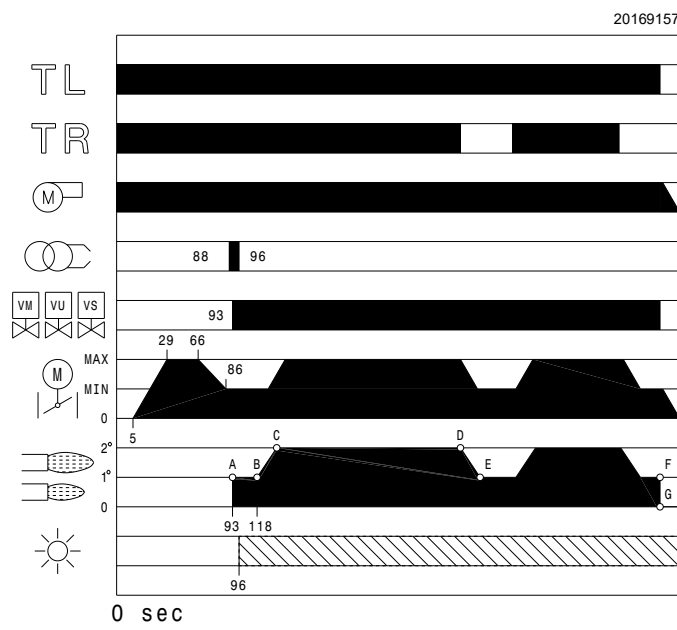
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Fig. 32

**8.5 Burner operation**

**8.5.1 Burner start-up**

- 0 s:** TL remote control closing, motor starting.  
The pump 3) sucks the fuel from the tank through the piping 1) and the filter 2) and pumps it under pressure to delivery. The piston 4) rises and the fuel returns to the tank through the piping 5) - 7). The screw 6) closes the by-pass towards the suction line and the solenoid valves 8)-15)-16), de-energised, close the path towards the nozzle.
  - 5 s:** Servomotor start-up: rotates to the right by 90°, i.e. until the contact intervenes on the cam I). The air damper is positioned to MAX output.
  - 29 s:** Pre-purging stage with MAX output air delivery.
  - 66 s:** The servomotor rotates to the left until the contact on cam III) activates (Fig. 31).
  - 86 s:** The air damper and the pressure variator set to the MIN output position.
  - 88 s:** Ignition electrode strikes a spark.
  - 93 s:** Solenoid valves 8) - 15) - 16) open; the fuel goes through the duct 9), passing through the filter 10) and enters the nozzle.
- A part of the fuel is sprayed out of the nozzle and when it reaches the spark ignites: low output flame, point A; the rest of the fuel goes through the duct 11 at the pressure preset by the variator 12, then it goes back to the tank through the duct 7).
- 96 s:** The spark goes out.
  - 118 s:** The start-up cycle ends.



**Fig. 33**

**8.5.2 Steady state operation**

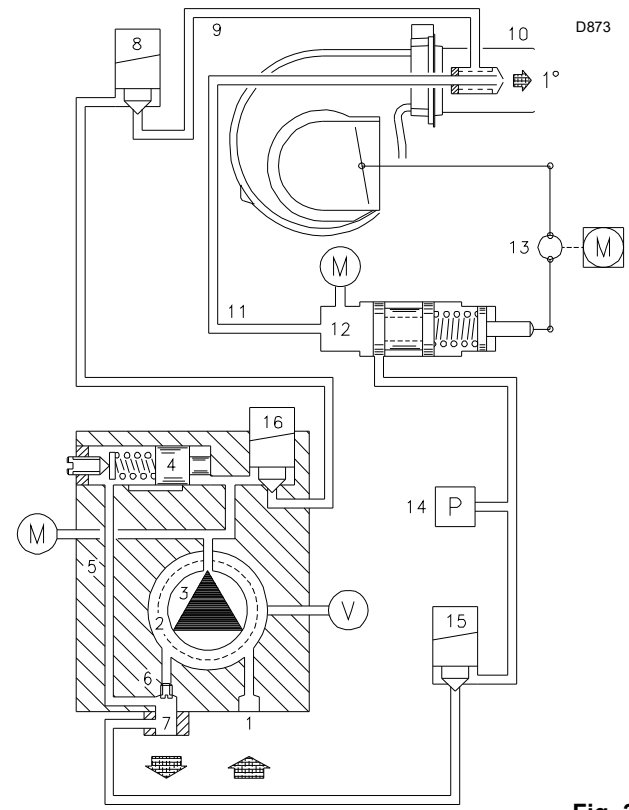
**Burner without output regulator RWF**

- Once the start-up cycle is completed, the servomotor command moves on to the TR remote control that controls the pressure or the temperature in the boiler, point B.
- If the temperature or pressure is low (so the TR remote control is closed), the burner progressively increases the output up to the MAX value (section B-C).
  - If subsequently the temperature or pressure increases until TR opens, the burner progressively decreases its output to the MIN value (section D-E). And so on.
  - The burner locks out when the heat request is less than the heat supplied by the burner at MIN output, (section F-G).
  - The TL remote control opens, the servomotor returns to angle 0° limited by the contact of cam II. The air damper closes completely to reduce heat losses to a minimum.

With each change of output, the servomotor automatically modifies the light oil output (pressure variator) and the air flow rate (fan damper).

**Burner with output regulator RWF**

See the manual supplied with the regulator.



**Fig. 34**

**8.5.3 Ignition failure**

If the burner does not ignite, it locks out within 5 seconds after the light oil valve opens, 96 s after the TL closes and the post-purging phase starts lasting 15s.

**8.5.4 Burner flame goes out during operation**

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

**8.6 Final checks**

---

- Block the flame sensor and turn off the remote controls: the burner must start and then stop in lockout after approximately 5 s after ignition.
- Free the flame sensor and turn off the remote controls: the burner must stop in lockout.
- Block the flame sensor when the burner is operating: the flame must turn off and the burner stop in lockout within 1 s.
- Turn on the remote control TL followed by TS while the burner is operating: the burner must stop.

**ATTENTION**

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

## 9 Maintenance

### 9.1 Notes on safety for the maintenance

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

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



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

Before carrying out any maintenance, cleaning or checking operations:



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



Close the fuel shut-off valve.

### 9.2 Maintenance programme

#### 9.2.1 Maintenance frequency



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

#### 9.2.2 Checking and cleaning



The operator must use the required equipment during maintenance.

#### Pump

The delivery pressure must be stable at 20 bar.

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 pump is found to be responsible, check to make sure that the filter is not dirty. The vacuumeter is installed upstream from the filter and consequently will not indicate whether the filter is clogged or not.

Contrarily, if the problem lies in the suction line, check to make sure that the filter is clean and that air is not entering the piping.

#### 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.

#### Combustion head

Check to make sure that all the parts of the combustion head are in good condition, positioned correctly, free of all impurities, and that no deformation has been caused by operation at high temperatures.

#### Burner

Make sure that the screws are well secured.

#### Nozzles

Avoid cleaning the nozzle openings.

It is advisable to replace nozzles once a year during periodical maintenance. The replacement of the nozzle requires combustion control.

#### Servomotor

Release the servomotor by turning the notch 2)(Fig. 28 on page 25) by 90° and manually checking that the cam movement is smooth.

#### Filters

Check the following filter boxes:

• on line 1) • in the pump 2) • in the nozzle 3), and clean or replace as required.

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

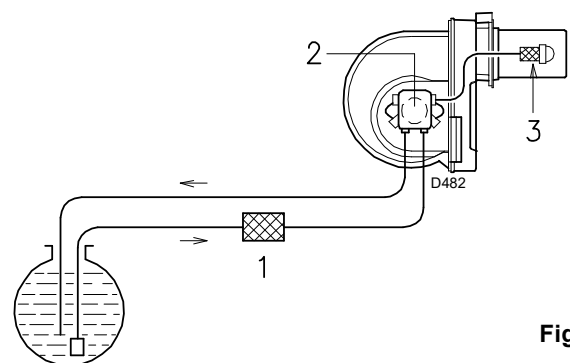


Fig. 35

#### Fuel tank

Approximately every 5 years, or whenever necessary, suck any water or other impurities present on the bottom of the tank using a separate pump.

#### Boiler

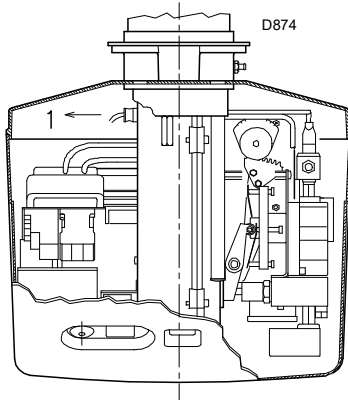
Clean the boiler as indicated in its accompanying instructions in order to maintain all the original combustion characteristics intact, especially: the flue gas temperature and combustion chamber pressure.

#### Flexible hoses

- Check periodically the conditions of the flexible hoses. Replace at least **every 2 years**.
- Check to make sure that the hoses are still in good condition.

**Flame sensor**

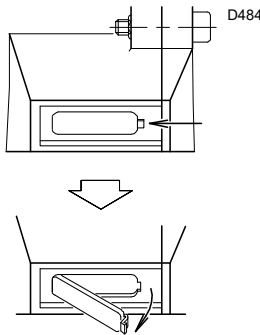
Clean the glass cover from any dust that may have accumulated. To remove the flame sensor 1)(Fig. 36) pull it outwards with force; it is inserted only by pressure.



**Fig. 36**

**Flame inspection window**

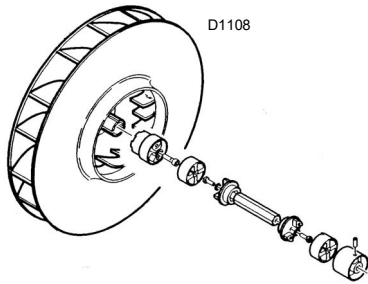
Clean the viewing port as required (Fig. 37).



**Fig. 37**

**Possible pump and/or coupling replacement**

Carry out the fitting following the instructions in the Fig. 38.



**Fig. 38**

**Electrical current to flame sensor (Fig. 39)**

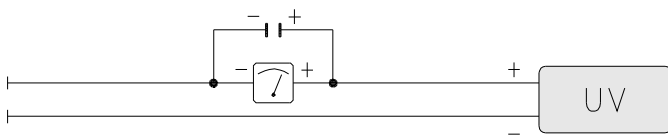
Clean the glass cover from any dust that may have accumulated. To remove the sensor pull it outwards with force; it is inserted only by pressure.

Min. value for a good work: 70  $\mu$ A.

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

- exhausted sensor;
- low voltage (lower than 187 V);
- bad regulation of the burner;

In order to measure the current, use a microammeter of 100  $\mu$ A d.c., connected in series to the sensor, as in the scheme, with a capacitor of 100  $\mu$ F - 1V d.c. at the same level of the instrument.



**Fig. 39**

**Combustion**

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

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 <sub>2</sub> 0 % O <sub>2</sub>	CO <sub>2</sub> % Calibration		mg/kWh
	$\lambda = 1.2$	$\lambda = 1.3$	
15.2	12.6	11.5	$\leq 100$

**Tab. J**

**9.2.3 Safety components**

The safety components must be replaced at the end of their life cycle indicated in Tab. K. 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) (if present)	10 years or 250,000 operation cycles
Oil valve (solenoid) (if present)	10 years or 250,000 operation cycles
Oil regulator (if present)	10 years or 250,000 operation cycles
Oil pipes/ couplings (metallic) (if present)	10 years
Fan impeller	10 years or 500,000 start-ups

**Tab. K**

### 9.3 Opening the burner



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



Close the fuel shut-off valve.



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

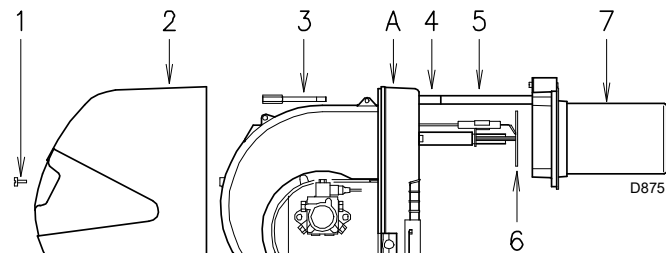


Fig. 40

- Remove the screw 1) and extract the cover 2).
- Loosen the screws 3).
- Install the 2 extensions 4) supplied on the slide bars 5) (models with 351 mm blast tube).
- Pull part **A** backward keeping it slightly raised to avoid damaging the disc 6) on blast tube 7).

### 9.4 Closing the burner

Refit following the steps described but in reverse order; refit all burner components as they were originally assembled.



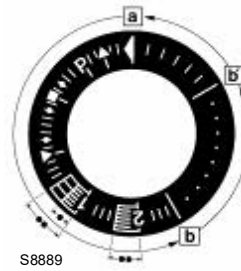
After carrying out maintenance, cleaning or checking operations, reassemble the cover and all the safety and protection devices of the burner.

## 10 Faults - Possible causes - Solutions

The LFL1... flame control is equipped with a lockout indicator (Fig. 41) that turns during the start-up programme, and is visible from the small lockout window.

When the burner does not start or stops, due to a failure, the symbol that appears on the indicator indicates the type of interruption.

The positions of the lockout indicator are shown in Fig. 42.



### Lockout indicator

- a-b Start-up sequence
- b(b') Idle stages (without contact confirmation)
- b(b')-a Post-purging programme

Fig. 41

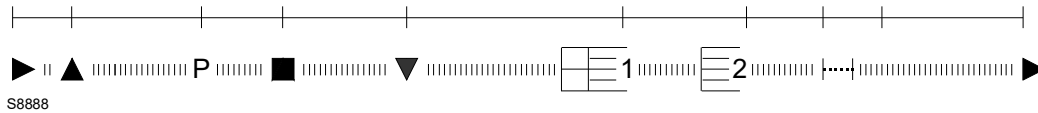


Fig. 42

### Fuse replacement

The fuse 2 (Fig. 43) is in the rear part of the flame control. A spare fuse 1 is also available; it can be extracted after breaking the panel tab A that houses it. In the event that fuse 2 has been tripped, replace it as shown in Fig. 43.

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

If a burner malfunction is detected, first of all:

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

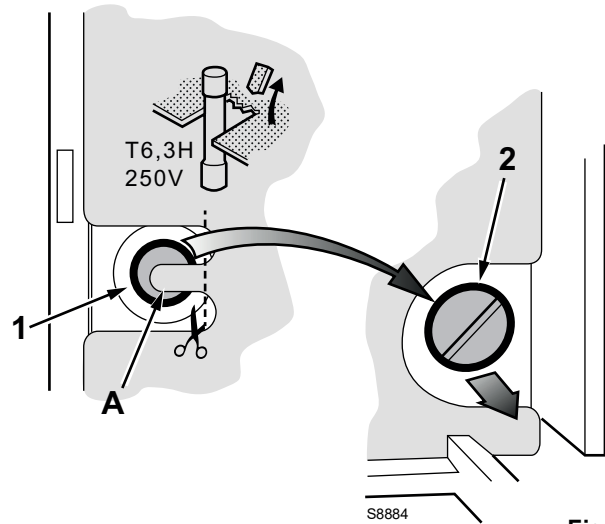


Fig. 43



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.

**10.1 Light oil operation**

Symbol	Problem	Probable cause	Suggested remedy
◀	The burner does not start	Limiter or safety control device open	Adjust or replace
		Flame control lockout	Release
		Fan motor lockout	Release the thermal relay
		No electrical power supply	Close all switches - check connections
		No light oil	Check the light oil supply circuit
		Flame control fuse interrupted	Replace
		Pump is jammed	Replace
		Faulty motor remote control switch	Replace
		Defective flame control	Replace
		Faulty electrical motor	Replace
Defective safety solenoid valve	Replace		
	The burner does not come on and the lockout appears	Flame simulation	Replace the flame control
		Flame sensor short circuit	Replace flame sensor
		Two-phase electrical supply, thermal relay steps in	Reset the thermal relay at return of the three phases
▲	The burner starts but stops at maximum air damper setting	The servomotor contact does not intervene	Adjust cam or replace servomotor
P	The burner starts and then goes into lockout	Air pressure switch poorly adjusted	Adjust it
		Pressure switch pressure point pipe blocked	Clean
■	The burner starts and then goes into lockout	Failure to the flame detection circuit	Replace flame control
▼	The burner remains in pre-purging phase	The servomotor contact III does not intervene	Adjust cam or replace servomotor
1	Once the pre-purging and the safety time has elapsed the burner goes into lockout without the flame appearing	No fuel in the tank, or water on the bottom	Refill with fuel, or remove the water
		Bad head and damper adjustments	Adjust
		High voltage cable defective or grounded	Replace
		High voltage cable deformed by high temperature	Replace and protect
		Bad electrical wiring on valves or transformer	Check
		Pump unprimed	Prime it
		Pump suction line connected to return line	Correct connection
		Soiled filters (nozzle line)	Clean
		Valves up-line from pump closed	Open them
		Opposite motor rotation	Change electrical wiring to the motor
		Light oil solenoid valves do not open	Check connections and solenoids
		Pilot burner does not work	Check
		Defective flame control	Replace
		Ignition electrode incorrectly adjusted	Adjust it
		Electrode grounded due to broken insulation	Replace
		Motor/pump coupling broken	Replace
		Faulty ignition transformer	Replace
		The flame ignites regularly but the burner goes into lock out at the end of the safety time	Faulty flame sensor or defective flame control
	Dirty flame sensor		Clean
		Smoke in flame (dark Bacharach)	Little air
Incorrect pump pressure			Adjust
Nozzle filter clogged			Clean or replace
Boiler room air vents insufficient			Increase
Dirty or worn nozzle			Replace
Flame disk soiled, loose or deformed			Clean it, tighten it or replace it
	Smoke in flame (yellow Bacharach)	Too much air	Adjust head and air dampers

Symbol	Problem	Probable cause	Suggested remedy
	Ignition with pulses or flame failure, delayed ignition	Poorly adjusted head	Adjust
		Incorrectly adjusted fan air damper: too much air	Adjust
		Nozzle not fit for burner or boiler	See nozzle table
		Defective nozzle	Replace
		Unsuitable pump pressure	Adjust
		Ignition electrode not adjusted correctly or soiled	Adjust it
		Output during ignition phase is too high	Reduce
	The burner does not pass to the 2nd stage	Remote control device TR fails to close	Adjust or replace
		Defective flame control	Replace
	Uneven fuel supply	Understand whether the cause lies in the pump or the fuel supply system	Supply fuel to the burner from a tank positioned near the burner itself
	Pump rusty on the inside	Water in the tank	Remove the water with a pump
	Noisy pump, unstable pressure	Air has entered the suction line	Block the couplings
		Depression value too high (higher than 35 cm Hg):	
		Excessive difference of level between burner and tank	Power the burner from a loop circuit
		Piping diameter too small	Increase
		Dirty suction line filters	Clean
		Suction line valves closed	Open them
		The paraffin solidifies due to the low temperature	Put additive in the light oil
	Pump unprimes after prolonged pause	Return pipe not immersed in fuel	Bring it to the same height as the suction line
		Air in the suction line	Block the couplings
	Pump leaks light oil	Loss of sealing organ	Replace the pump
	Dirty combustion head	Dirty nozzle or nozzle filter	Replace
		Unsuitable nozzle delivery or angle	See recommended nozzles
		Loose nozzle	Block it
		Environmental impurities on flame stability disc	Clean
		Incorrect head adjustment, or little air	Adjust it, opening the damper
		Blast tube length not suitable for the boiler	Contact the boiler manufacturer
	Burner goes into lockout during operation	Flame sensor faulty or dirty	Replace it or clean it
		Air pressure switch faulty	Replace

Tab. L

## A Appendix - Accessories

### Extended head Kit (for short head versions only)

Burner	L (mm)		Code
	Standard head	Head obtainable with the kit	
RL 28/M	241	351	3010120
RL 38/M	241	351	3010121
RL 50/M	241	351	3010122

### Soundproofing box kit

Burner	Type	dB(A)	Code
All models	C1/3	10	3010403

### Degasser kit

Burner	Filter	Code
All models	with filter	3010055

### Kit for modulating operation

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 RWF55	20082208 20099657
Pressure	0...2.5 bar	Output probe 4...20 mA	3010213		
	0...16 bar		3010214		
	0...25 bar		3090873		

### Spacer kit

Burner	Code
All models	3010095

### Potentiometer kit

Burner	Code
All models	3010109

### Head kit for boilers with flame inversion

Burner	Code
RL 28-38/M	3010178
RL 50/M	3010179

### Flange kit

Burner	Code
All models	3010138



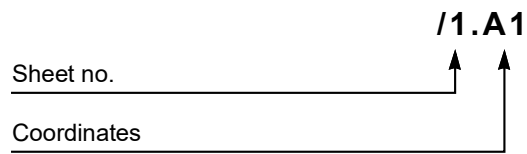
ATTENTION

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

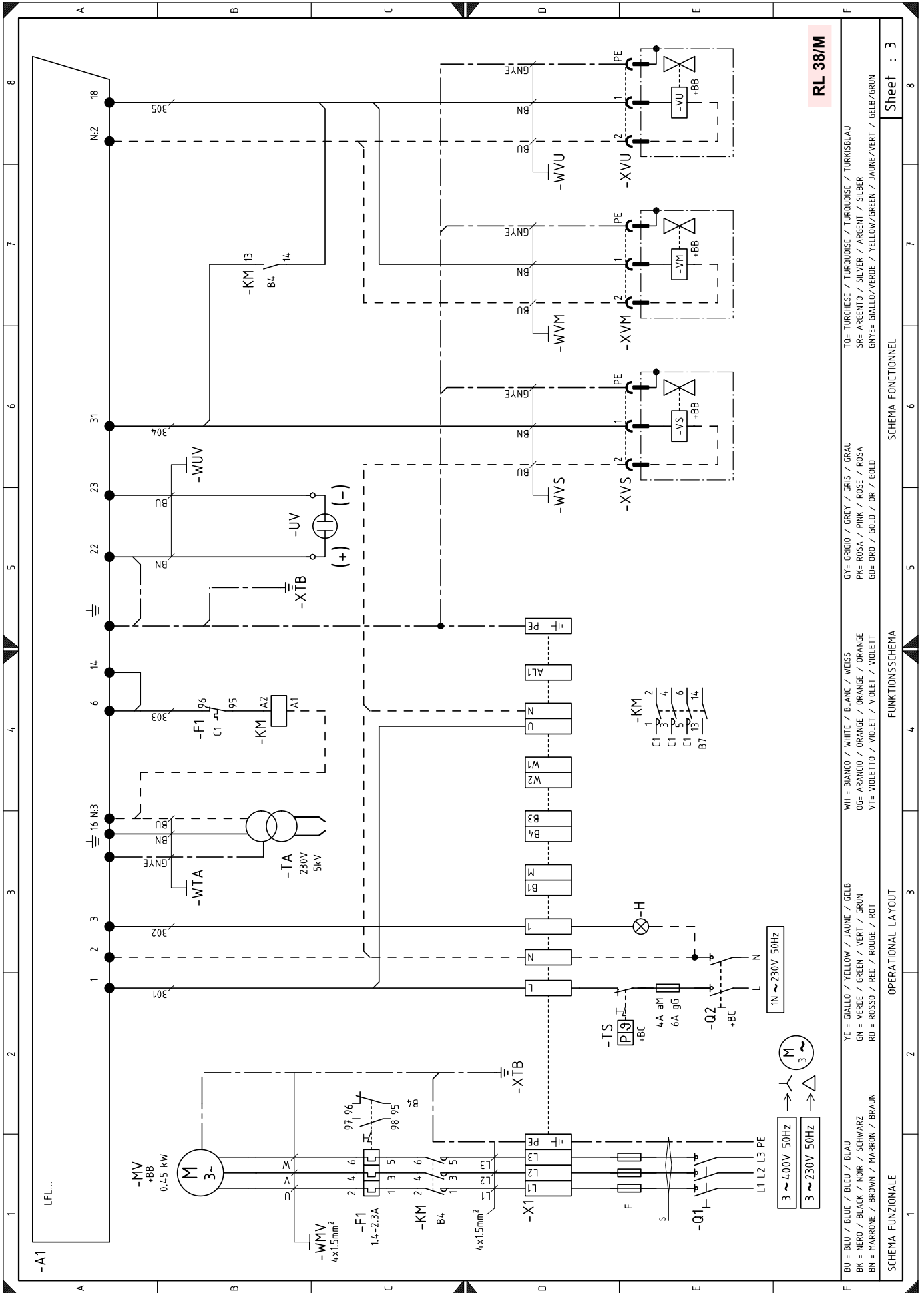
**B Appendix - Electrical panel layout**

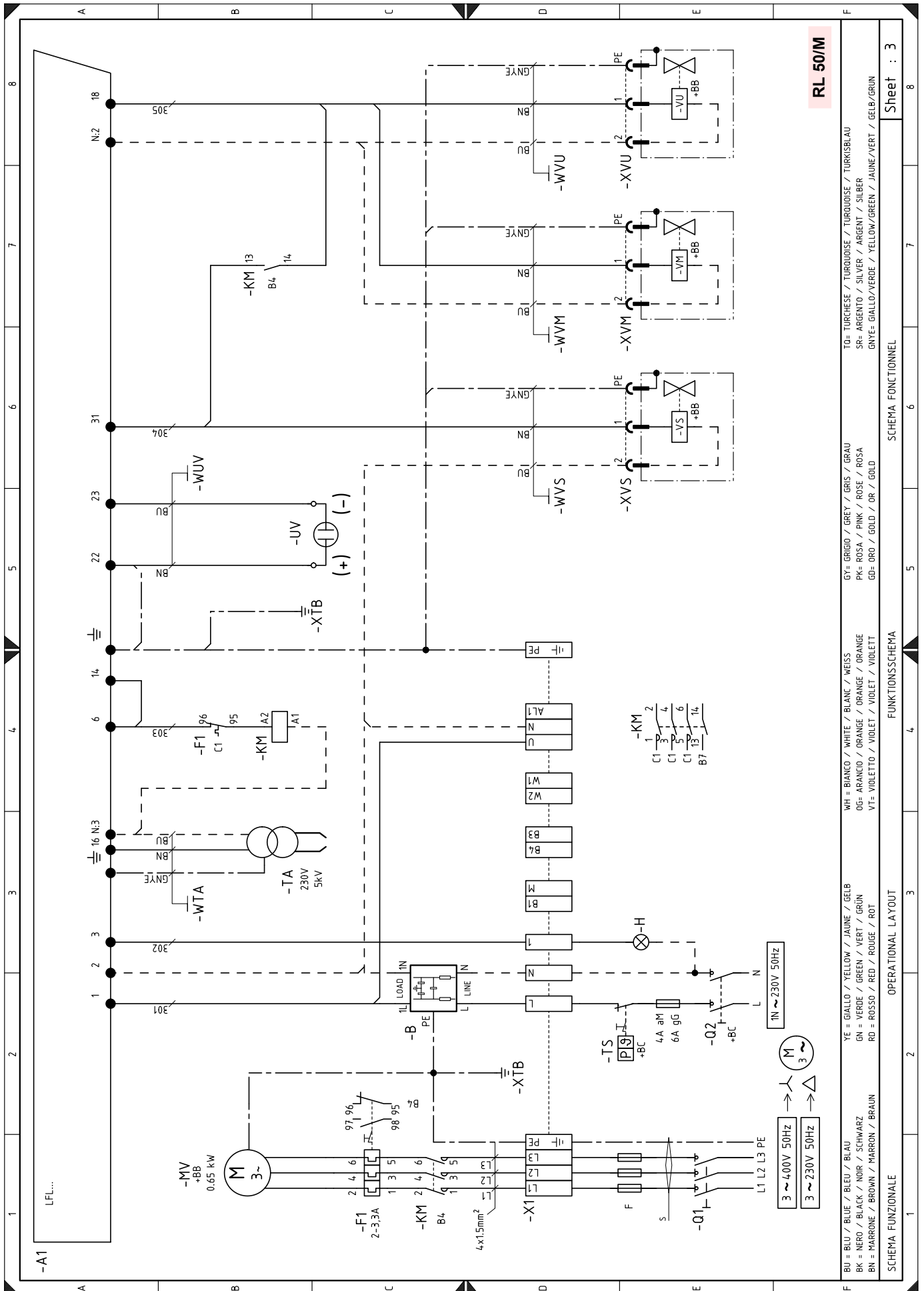
<b>1</b>	<b>Index of layouts</b>
<b>2</b>	Reference indication
<b>3</b>	Functional layout LFL...
<b>4</b>	Functional layout LFL...
<b>5</b>	Electrical wiring that is the responsibility of the installer
<b>6</b>	Functional layout RWF

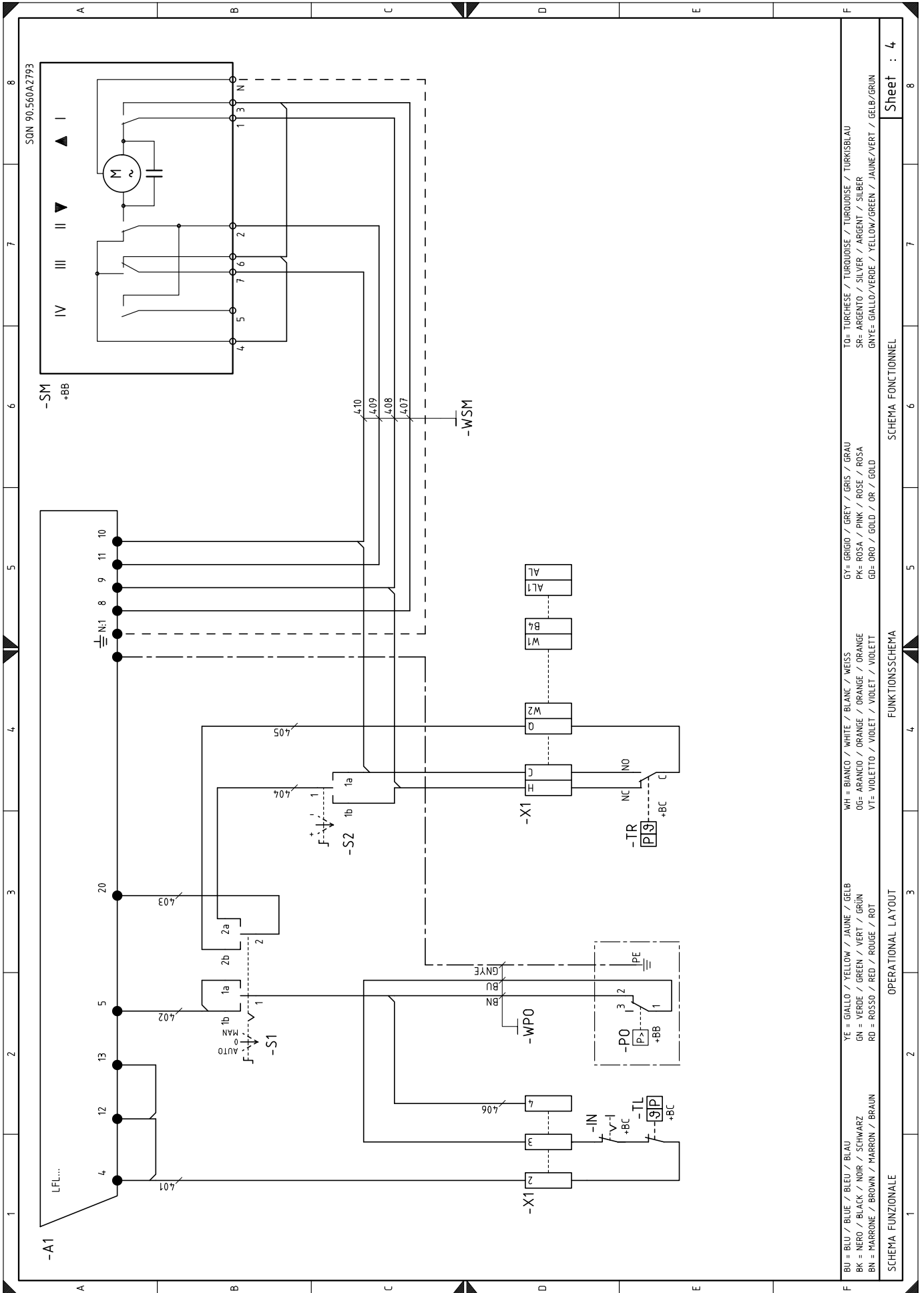
**2 Reference indication**

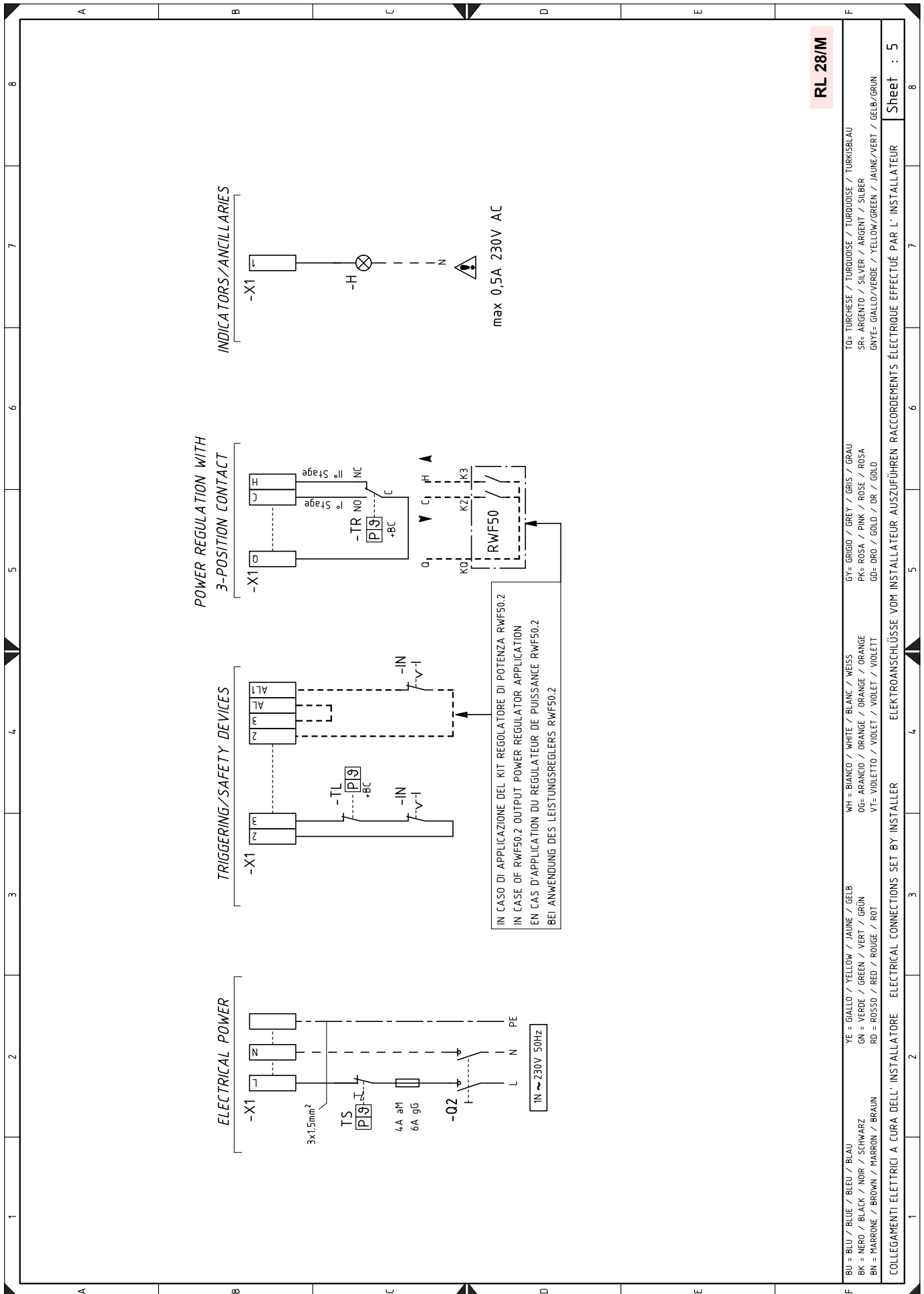


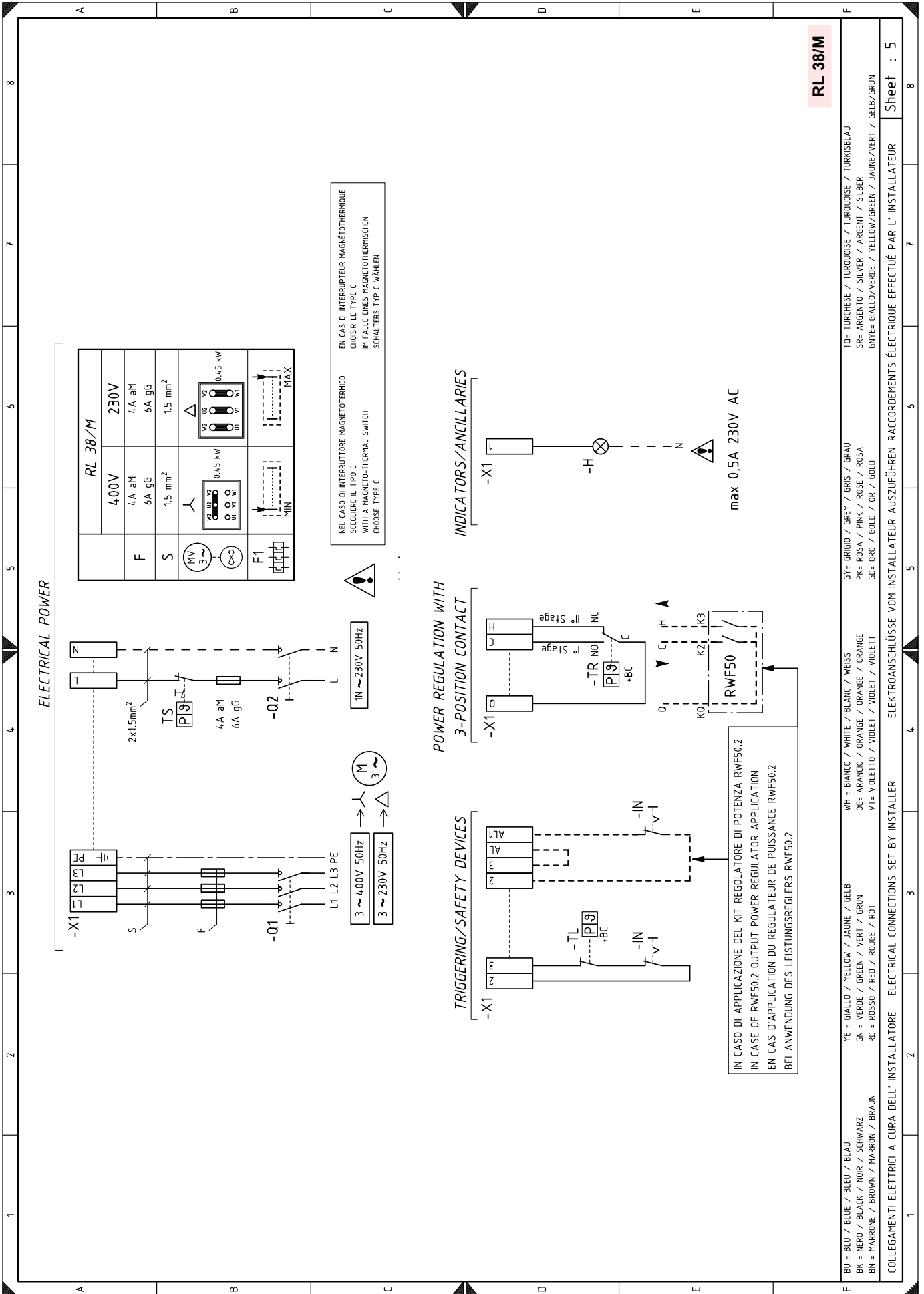


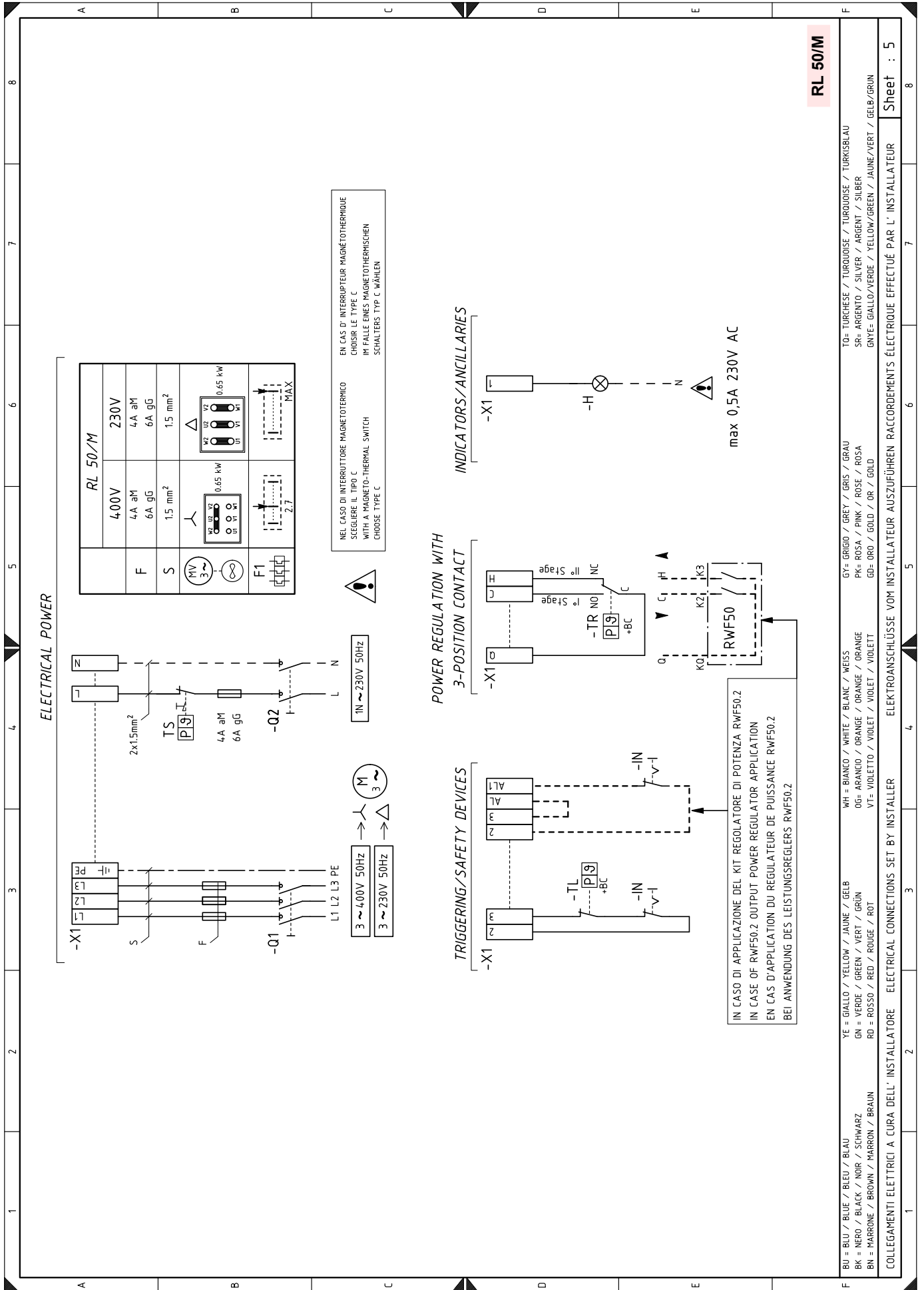












**RL 50/M**

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

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  
VF= VIOLETTO / VIOLET / VIOLET / VIOLETT  
GY= GRIGIO / GREY / GRIS / GRAU  
PK= ROSA / PINK / ROSE / ROSA  
GD= ORO / GOLD / OR / GOLD  
TO= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU  
SR= ARGENTO / SILVER / ARGENT / SILBER  
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRÜN

Sheet : 5



**WIRING DIAGRAM KEY**

A1	Flame control
B	Filter to protect against radio disturbance
B1	RWF Output power regulator
BA	Probe with output under current
BA1	Output device in current to modify remote setpoint
BP	Pressure probe
BP1	Pressure probe
BR	Remote setpoint potentiometer
BT1	Thermocouple probe
BT2	Probe Pt100, 2 wires
BT3	Probe Pt100, 3 wires
BT4	Probe Pt100, 3 wires
BTEXT	External probe for climatic compensation of the setpoint
BV	Probe with output under voltage
BV1	Device with output under voltage for change of remote setpoint
C	Capacitor
F	Three-phase line fuses
F1	Fan motor thermal relay
H	Remote lockout signal
IN	Burner manual stop switch
KM	Fan motor contactor
MV	Fan motor
Q1	Three-phase disconnecting switch
Q2	Single-phase disconnecting switch
S1	Off / automatic / manual selector
S2	Output increase / decrease selector
SM	Servomotor
TA	Ignition transformer
TL	Limit thermostat/pressure switch
TR	Adjustment thermostat/pressure switch
TS	Safety thermostat/pressure switch
X1	Terminal board
XPE	Flame control earth
XTB	Burner earth
UV	Flame sensor
PO	Oil pressure switch
VS	Valve in delivery pump (safety)
VM	Valve in delivery pump
VU	Nozzle valve
XVS	Valve connector in delivery pump (safety)
XVM	Valve connector in delivery pump
XVU	Nozzle valve connector
XRWF	RWF terminal board

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**RIELLO**

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