

GB Light oil burners

Two stage operation



CODE - CÓDIGO	MODEL - MODELO	TYPE - TIPO
3470210	RL 34 MZ	972 T
3470211	RL 34 MZ	972 T
3470310	RL 44 MZ	973 T
3470311	RL 44 MZ	973 T
3470340	RL 44 MZ	973 T
3470341	RL 44 MZ	973 T

- #The burner has **CE marking** and conforms to the basic requisites of the following Directives:
 - Electromagnetic Compatibility Directive 2014/30/UE;
 - Low Voltage Directive 2014/35/UE;
 - Machine Directive 2006/42/EC;
- #The burner meets protection level of IP 40 pursuant to EN 60529 standard.

IDENTIFICATION

The Identification Plate on the product gives the serial number, model and main technical and performance data. If the Identification Plate is tampered with, removed or missing, the product cannot be clearly identified thus making any installation or maintenance work potentially dangerous.

GENERAL WARNINGS

The dimension of the boiler's combustion chamber must respond to specific values, in order to guarantee a combustion with the lowest polluting emissions rate.

You are therefore advised to consult the Technical Assistance Department before choosing this type of burner for the combination with a boiler.

Qualified personnel are those with the professional and technical requirements indicated by law no. 46 dated March 5, 1990. The commercial organisation has a widespread network of agencies and technical offices whose personnel participates periodically in instructional and refresher courses at the company training centre.

This burner must only be used for the application it was designed for.

The manufacturer cannot accept liability for any damage to persons, animals or property due to error in installation or in the burner adjustment, or due to improper or unreasonable use or non observance of the technical instruction enclosed with the burner, or due to the intervention of unqualified personnel.

USER INFORMATION

If faults arise in ignition or operations, the burner performs a "safety stop", which is signalled by the red burner lock out Led. To rearm start up conditions, press the release button. When the burner starts up again, the red Led goes out.

This operation can be repeated a maximum of 3 times. If the "safety stop" recurs, then the Technical Assistance Centre must be called out.

BASIC SAFETY MEASURES

- Children or inexpert persons must not use the appliance.
- Under no circumstances must the intake grids, dissipation grids and ventilation vents in the installation room be blocked with cloths, paper or any other material.
- Unauthorised persons must not attempt to repair the appliance
- It is dangerous to pull or twist the electric leads.
- Cleaning operations must not be performed if the appliance is not disconnected from the main power supply.
- Do not clean the burner or its parts with inflammable substances (e.g. petrol, alcohol, etc.). The cover must be cleaned with soapy water.
- Do not place anything on the burner.
- Do not leave containers and inflammable products in the installation room.

The following symbols are used in this manual:

 **ATTENTION** = for actions requiring special care and adequate preparation.

 **FORBIDDEN** = for actions **THAT MUST NOT** be performed.

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N.B.

Figures mentioned in the text are identified as follows:

- 1)(A) =Part 1 of figure A, same page as text;
 1)(A)p.3 =Part 1 of figure A, page number 3.

INFORMATION ABOUT THE INSTRUCTION MANUAL

INTRODUCTION

The instruction manual supplied with the burner:

- is an integral and essential part of the product and must not be separated from it; it must therefore be kept carefully for any necessary consultation and must accompany the burner even if it is transferred to another owner or user, or to another system. If the manual is lost or damaged, another copy must be requested from the Technical Assistance Service **Riello** 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.

DELIVERY OF THE SYSTEM AND THE INSTRUCTION MANUAL

When the system is delivered, it is important that:

- The instruction manual is supplied 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 carefully informs the user about:
 - the use of the system,
 - any further tests that may be necessary before the system is started up,
 - maintenance and the need to have the system checked at least once a year by the manufacturer or another specialised technician.

To ensure a periodic check, **Riello** recommends the drawing up of a Maintenance Contract.

TECHNICAL DATA

MODEL			RL 34 MZ	RL 44 MZ	RL 44 MZ
TYPE			972 T	973 T	973 T
POWER ⁽¹⁾	2nd stage	kW	154 - 395	235 - 485	235 - 485
OUTPUT ⁽¹⁾		Mcal/h	132 - 340	204 - 418	204 - 418
		kg/h	13 - 33.6	20 - 41	20 - 41
	1st stage	kW	97 - 154	155 - 235	155 - 235
		Mcal/h	83 - 133	133 - 204	133 - 204
		kg/h	8.3 - 13	13 - 20	13 - 20
FUEL		LIGHT OIL			
- net calorific value		kWh/kg	11.8		
		Mcal/kg	10.2 (10.200 kcal/kg)		
- density		kg/dm³	0.82 - 0.85		
- viscosity at 20 °C		mm²/s max	6 (1.5 °E - 6 cSt)		
OPERATION			• Intermittent (min. 1 stop in 24 hours). • Two-stage (high and low flame) and single-stage (all - nothing).		
NOZZLES		number	2		
STANDARD APPLICATIONS			Boilers: water. steam. diathermic oil		
AMBIENT TEMPERATURE		°C	0 - 40		
COMBUSTION AIR TEMPERATURE		°C max	60		
ELECTRICAL SUPPLY		V	230 ~ +/-10%		230 - 400 with neutral ~ +/-10%
		Hz	50/60 - single-phase		50/60 - three-phase
ELECTRIC MOTOR		rpm	2800	2800	2800
		W	300	420	450
		V	220 - 240	230	220/240 - 380/415
		A	2.4	2.65	2.0 - 1.2
MOTOR CAPACITOR		µF/V	12.5/450	16/425	
IGNITION TRANSFORMER		V1 - V2	230 V - 2 x 12 kV		
		I1 - I2	0.2 A - 30 mA		
PUMP	output (at 12 bar)	kg/h	45	67	67
	pressure range	bar	7 - 14	10 - 20	10 - 20
	fuel temperature	°C max	60	60	60
ELECTRICAL POWER CONSUMPTION		W max	600	700	750
NOISE LEVEL ⁽²⁾ SOUND PRESSURE		dB(A)	68	70	
SOUND POWER			79	81	

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

(2) Sound pressure measured in manufacturer's combustion laboratory, with burner operating on test boiler and at maximum rated output. The sound power is measured with the "Free Field" method, as per EN 15036, and according to an "Accuracy: Category 3" measuring accuracy, as set out in EN ISO 3746.

VARIANTS

Model	Code	Electrical supply	Blast tube length mm
RL 34 MZ	3470210	single-phase	216
	3470211	single-phase	351
RL 44 MZ	3470310	single-phase	216
	3470311	single-phase	351
	3470340	three-phase	216
	3470341	three-phase	351

ACCESSORIES (optional):

• LONG HEAD KIT:

Burner	RL 34 MZ	RL 44 MZ
	Code 3010426	Code 3010425

• CLEAN CONTACT KIT	Code 3010419
• KIT POST-PURGING	Code 3010453
• KIT HOURCOUNTER	Code 3010450
• KIT GROUND FAULT INTERRUPTER	Code 3010448
• RADIO DISTURBANCE PROTECTION KIT If the burner is installed in places particularly subject to radio disturbance (emission of signals exceeding 10 V/m) owing to the presence of an INVERTER, or in applications where the length of the thermostat connections exceeds 20 metres, a protection kit is available as an interface between the control box and the burner.	Code 3010386

• DEGASSING UNIT

It may occur that a certain amount of air is contained in the light oil sucked up by the pump. This air may originate from the light oil itself as a consequence of depressurisation or air leaking past imperfect seals. In double-pipe systems, the air returns to the tank from the return pipe; in single-pipe systems, the air remains in circulation causing pressure variations in the pump and burner malfunctions.

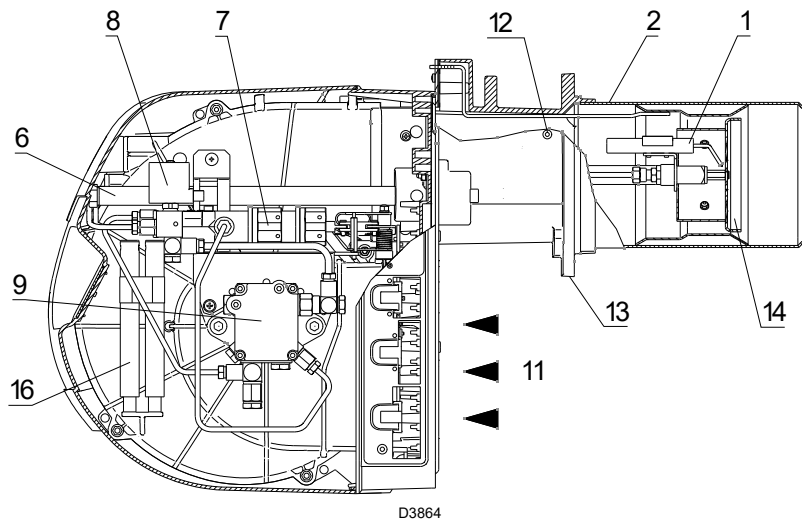
For this reason, we advise installing a degassing unit near the burner in single-pipe installations. Degassing units are provided in two versions:

CODE **3010054** without filter

CODE **3010055** with filter

Degassing unit characteristics

- Burner output : 80 kg/h max
- Light oil pressure : 0.7 bar max
- Ambient temperature : 40 °C max
- Light oil temperature : 40 °C max
- Attachment connectors : 1/4 inch



BURNER DESCRIPTION (A)

- 1 Ignition electrodes
- 2 Combustion head
- 3 Screw for combustion head adjustment
- 4 Flame sensor for flame presence control
- 5 Screw for fixing fan to flange
- 6 Slide bars for opening the burner and inspecting the combustion head
- 7 Hydraulic cylinder for regulation of the air gate valve in 1st and 2nd stage positions. 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.
- 8 1st and 2nd stage valve assembly
- 9 Pump
- 10 Plate prearranged to drill 4 holes for the passage of hoses and electrical cables.
- 11 Air inlet to fan
- 12 Fan pressure test point
- 13 Boiler mounting flange
- 14 Flame stability disk
- 15 Flame inspection window
- 16 Extensions for slide bars 6)
- 17 Motor contactor and thermal RELAY reset button (RL 44 three-phase MZ)
- 18 Motor capacitor (RL 34 MZ - RL 44 MZ single-phase)
- 19 Control box with lockout pilot light and lock-out reset button
- 20 Two switches:
 - one "burner off - on"
 - one for "1st - 2nd stage operation"
- 21 Sockets for electrical connections
- 22 Air damper
- 23 Pump pressure adjustment
- 24 Plate prearranged to drill 2 holes for the passage of hoses.

Two types of burner failure may occur:
Control box lockout: if the control box 19)(A) pushbutton (red led) lights up, it indicates that the burner is in lockout.
 To reset, hold the pushbutton down for between 1 and 3 seconds.
Motor lockout (RL 44 MZ three-phase): release by pressing the pushbutton on thermal relay 17)(A).

PACKAGING-WEIGHT (B) - approximate measurements

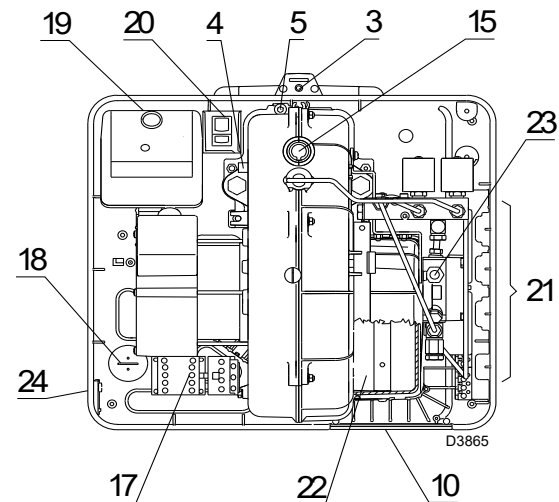
- The burners are shipped in cardboard boxes with the maximum dimensions shown in table (B).
- The weight of the burner complete with packaging is indicated in table (B).

MAX. DIMENSIONS (C) - approximate measurements.

The maximum dimensions of the burner are given in (C).
 Bear in mind that inspection of the combustion head requires the burner to be opened and the rear part withdrawn on the slide bars.
 The maximum dimension of the burner, without casing, when open is given by measurement O.

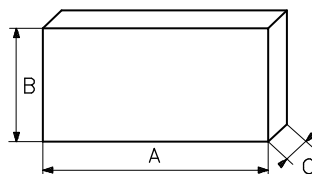
STANDARD EQUIPMENT

- 2 - Flexible hoses
- 2 - Gaskets for flexible hoses
- 2 - Nipples for flexible hoses
- 1 - Thermal insulation screen
- 2 - Extensions 16)(A) for slide bars 6)(A)(for model with 351 mm blast tube)
- 4 - Screws to secure the burner flange to the boiler: M 8 x 25
- 2 - Plugs for electrical connections (RL 34 MZ and 44 MZ single-phase)
- 3 - Plugs for the electrical connection (RL 44 MZ three-phase)
- 1 - Instruction booklet
- 1 - Spare parts list



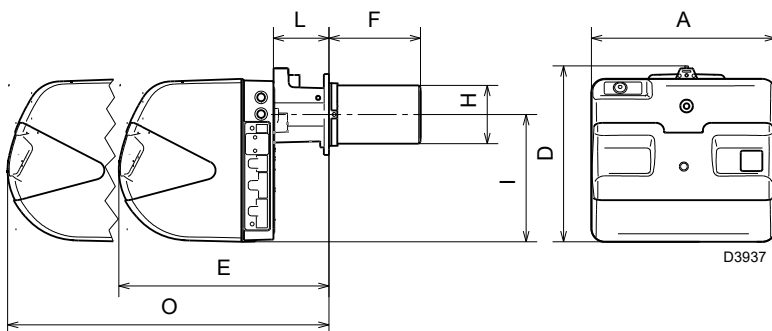
(A)

mm	A	B	C	kg
RL 34 MZ	1000	500	485	32
RL 44 MZ	1000	500	485	33



(B)

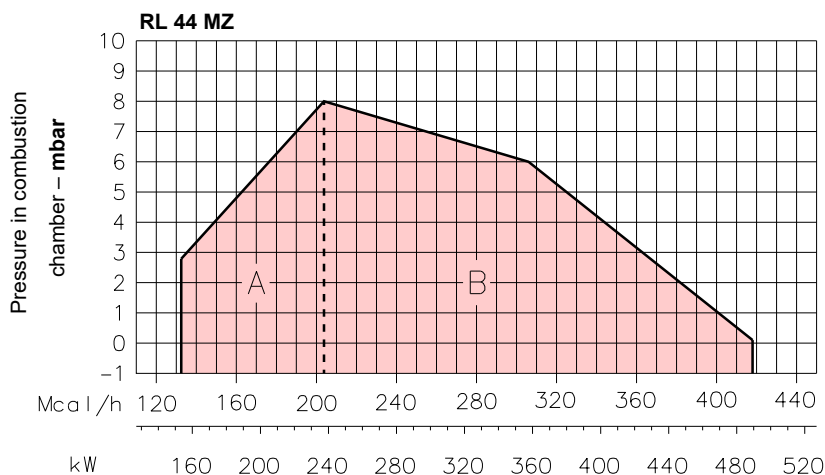
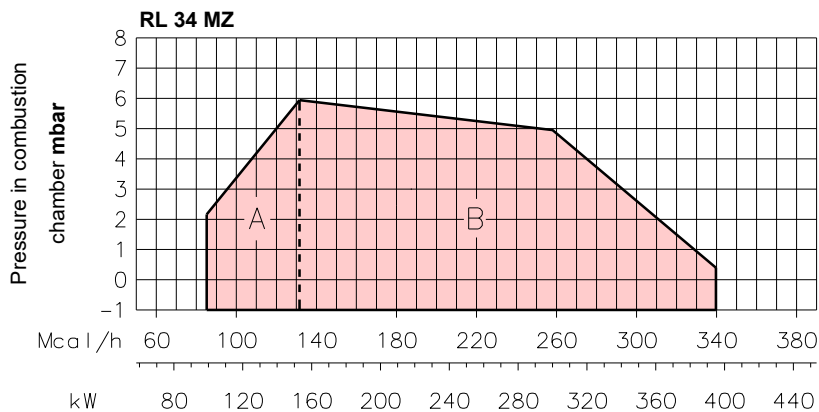
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mm	A	D	E	F ⁽¹⁾	H	GB	L	O ⁽¹⁾
RL 34 MZ	442	422	508	216 - 351	140	305	138	780 - 915
RL 44 MZ	442	422	508	216 - 351	152	305	138	780 - 915

(1) Blast tube: short-long

(C)



FIRING RATES (A)

The RL 34 MZ - RL 44 MZ model burners can work in two ways: one-stage and two-stage.

1st stage OUTPUT must be selected within area A of the adjacent diagrams.

2nd stage OUTPUT must be within area B. This area supplies the maximum output of the burner according to the pressure in the combustion chamber.

The work point may be found by plotting a vertical line from the desired delivery and a horizontal line from the pressure in the combustion chamber. The intersection of these two lines is the work point which must lie within area B.

Attention:

The FIRING RATE area values have been obtained considering a surrounding temperature of 20 °C, and an atmospheric pressure of 1013 mbar (approx. 0 m above sea level) and the combustion head adjusted as shown on page 7.

TEST BOILER (B)

The firing rate was set in relation to special test boilers in accordance with the methods defined in EN 267 standards.

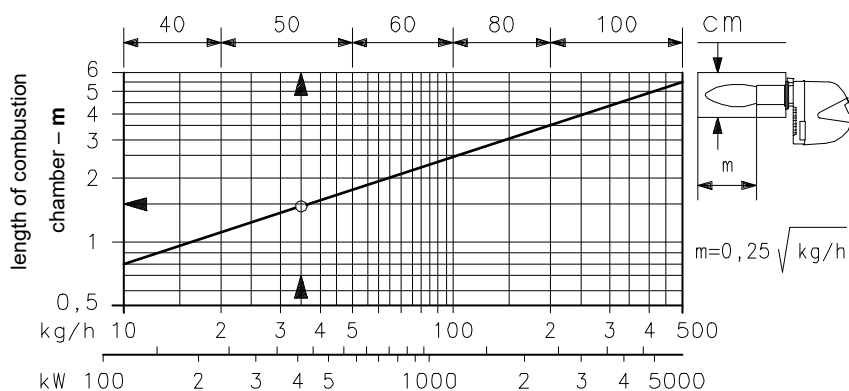
Figure (B) indicates the diameter and length of the test combustion chamber.

Example Output 35 kg/hour:
diameter = 50 cm; length = 1.5 m.

Whenever the burner is operated in a much smaller commercially-available combustion chamber, a preliminary test should be performed.

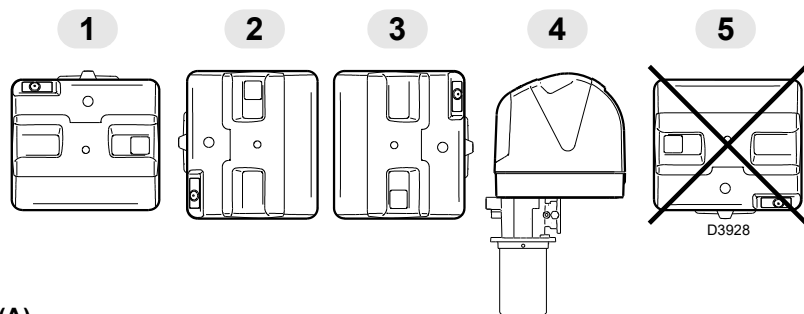
(A)

D3866



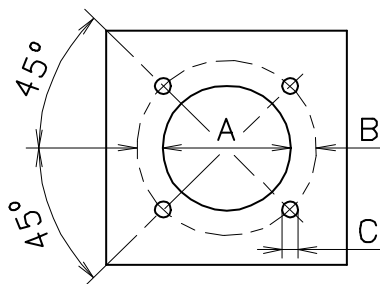
(B)

D454



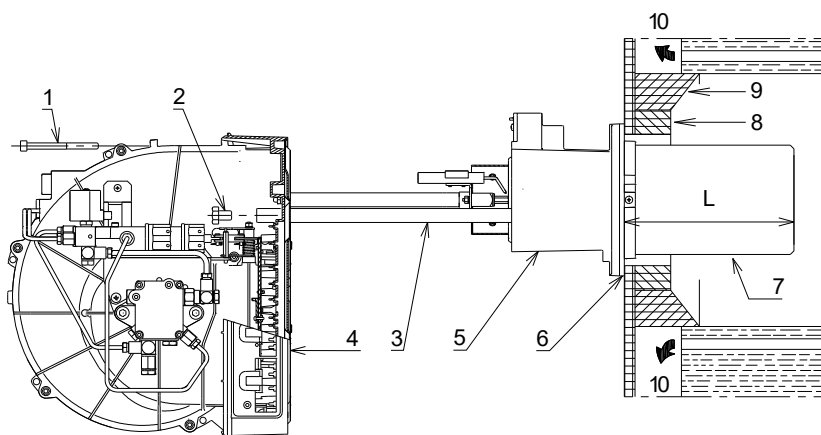
(A)

mm	A	B	C
RL 34 MZ	160	224	M 8
RL 44 MZ	160	224	M 8



D455

(B)



D3867

(C)

INSTALLATION

⚠ THE BURNER MUST BE INSTALLED IN CONFORMITY WITH LEGISLATION AND LOCAL STANDARDS.

OPERATING POSITION (A)

⚠ The burner is designed to work only in the positions **1, 2, 3 and 4**.

Installation **1** is preferable, as it is the only one that allows performing maintenance operations as described in this manual. Installations **2, 3 and 4** permit operation but make maintenance and inspection of the combustion head difficult, page 14.

⊘ Any other position could compromise the correct working of the appliance. Installation **5** is prohibited for safety reasons.

BOILER PLATE (B)

Drill the combustion chamber locking plate as shown in (B). The position of the threaded holes can be marked using the thermal screen supplied with the burner.

BLAST TUBE LENGTH (C)

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, is as follows:

Blast tube 7):	RL 34 MZ	RL 44 MZ
• short	216	216
• long	351	351

For boilers with front flue passes 10) or flame inversion chambers, protective fettling in refractory material 8) must be inserted between the boiler's fettling 9) and the blast tube 7).

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

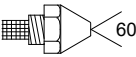
For boilers having a water-cooled front the refractory fettling 8)-9)(C) is not required unless it is expressly requested by the boiler manufacturer.

SECURING THE BURNER TO THE BOILER (C)

Dismantle the nozzle assembly 7) and the pipe coupling 5) from the burner 4):

- Remove the screws 2) from the two slide bars 3).
- Remove the screw 1) and move the burner on the guides 3).

Fix assembly 5) and 7) (C) to the boiler plate and insert the supplied insulating gasket 6) C). Use the four screws supplied after protecting the thread with antiseizing products. The burner-boiler seal must be airtight.

	GPH	kg/h (1)			kW 12 bar	Nozzles recommended
		10 bar	12 bar	14 bar		
RL 34 MZ	1.00	3.9	4.3	4.7	51.0	DANFOSS 60° H DELAVAN 60° A MONARCH 60° PL HAGO 60° P
	1.25	4.8	5.4	5.8	64.0	
	1.50	5.8	6.5	7.0	77.0	
	1.75	6.8	7.5	8.2	89.0	
	2.00	7.7	8.5	9.2	100.8	
	2.25	8.6	9.5	10.4	112.7	
	2.50	9.6	10.6	11.5	125.7	
	2.75	10.7	11.8	12.8	139.3	
	3.00	11.5	12.7	13.8	150.6	
	3.25	12.4	13.7	14.9	162.5	
	3.50	13.5	14.8	16.1	175.5	
	4.00	15.6	17.2	18.7	203.5	
	4.50	17.3	19.1	20.7	226.5	
RL 44 MZ	1.50	5.8	6.5	7.0	77.0	DELAVAN 45° A MONARCH 45° PL-PLP HAGO 60° P
	1.75	6.8	7.5	8.2	89.0	
	2.00	7.7	8.5	9.2	100.8	
	2.25	8.6	9.5	10.4	112.7	
	2.50	9.6	10.6	11.5	125.7	
	2.75	10.7	11.8	12.8	139.3	
	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	
	5.50	21.1	23.3	25.3	276.3	
	6.00	23.1	25.5	27.7	302.4	

(1) light oil: density 0.84 kg/dm³
viscosity 4.2 cSt/20 °C
temperature 10 °C

(A)

CHOICE OF NOZZLES FOR 1st AND 2nd STAGE

The burner complies with the emission requirements of the EN 267 standard.

In order to guarantee that emissions do not vary, recommended and/or alternative nozzles specified by Riello in the Instruction and warning booklet should be used.



Warning: It is advisable to replace nozzles every year during regular maintenance operations.



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 nonobservance of the requirements contained in this manual.

Both nozzles must be chosen from among those listed in table (A).

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 must be contained within the value range indicated on page 2.

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

The two nozzles usually have equal deliveries, but the 1st stage nozzle may have the following specifications if required:

- a delivery less than 50% of the total delivery whenever the back-pressure peak must be reduced at the moment of firing;
- a delivery higher than 50% of the total delivery whenever the combustion during the 1st stage must be improved.

Example with RL 34 MZ

Boiler power = 270 kW - efficiency 90%

Power required by the burner =

$$270 : 0.9 = 300 \text{ kW}$$

$$300 : 2 = 150 \text{ kW per nozzle}$$

therefore, two equal, 60°, 12 bar nozzles are required:

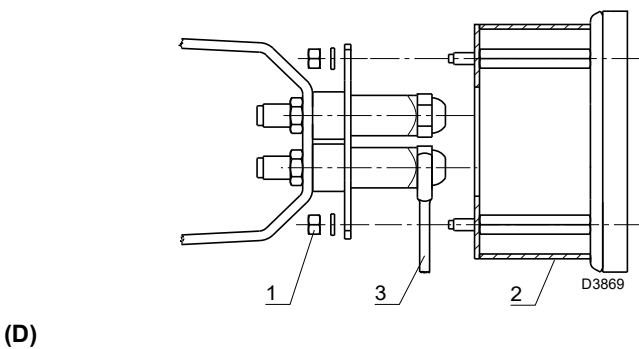
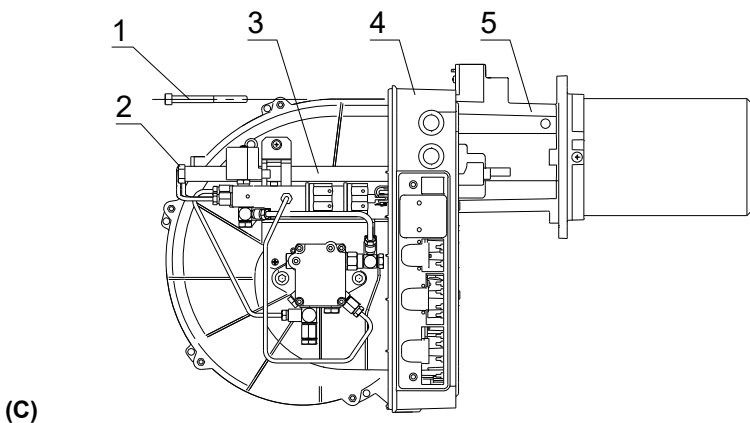
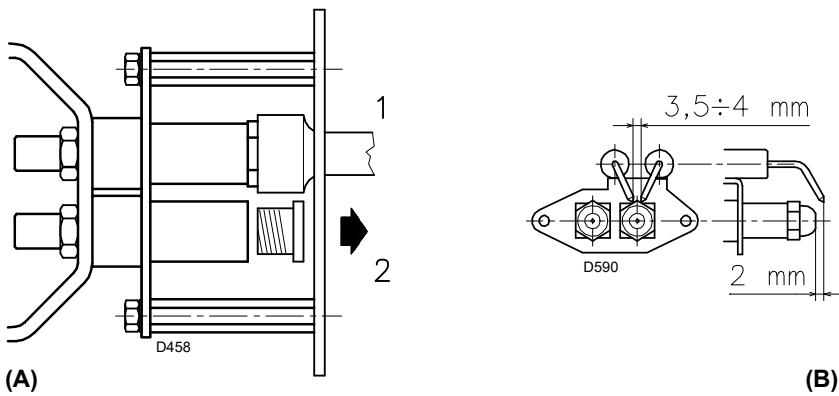
$$1^\circ = 3.00 \text{ GPH} - 2^\circ = 3.00 \text{ GPH},$$

or the following two different nozzles:

$$1^\circ = 2.50 \text{ GPH} - 2^\circ = 3.50 \text{ GPH},$$

or:

$$1^\circ = 3.50 \text{ GPH} - 2^\circ = 2.50 \text{ GPH}.$$



NOZZLE ASSEMBLY

At this stage of installation the burner is still disassembled from the blast tube; it is therefore possible to fit two nozzles with the box spanner 1) (A) (16 mm), after having removed the plastic plugs 2)(A), fitting the spanner through the central hole in the flame stability disk. Do not use any sealing products such as gaskets, sealing compound, or tape. Be careful to avoid damaging the nozzle sealing seat. The nozzle must be screwed into place tightly but not to the maximum torque value provided by the wrench. The nozzle for the 1st stage of operation is the one lying beneath the firing electrodes fig. (B)

Make sure that the electrodes are positioned as shown in fig. (B).

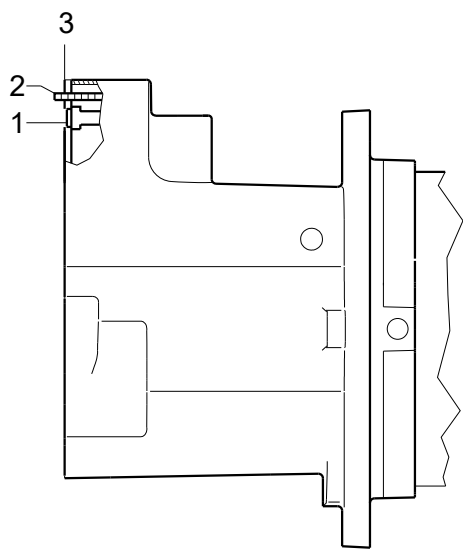
Finally remount the burner 4)(C) to the slide bars 3) and slide it up to the flange 5), keeping it slightly raised to prevent the flame stability disk from pressing against the blast tube.

Tighten the screws 2) on the slide bars 3) and screw 1) that attaches the burner to the flange.

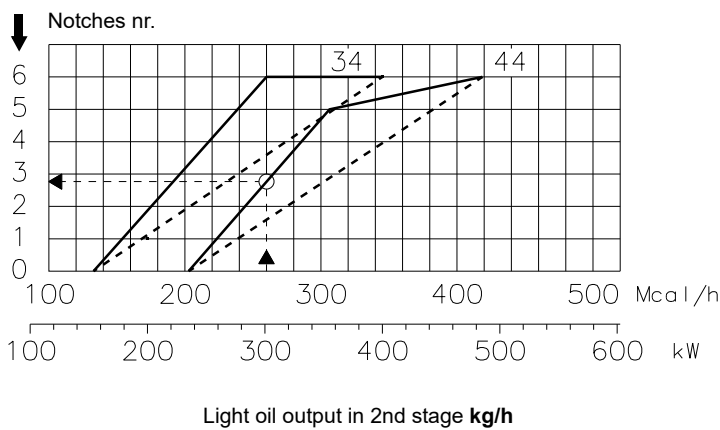
If it proves necessary to change a nozzle with the burner already fitted to the boiler, proceed as outlined below:

- Open the burner on its guides as shown in fig. (C) p.5.
- Remove the nuts 1)(D) and the diffuser disc assembly 2)
- Use spanner 3)(D) to change the nozzles.

COMBUSTION HEAD ADJUSTMENT



(A) D3910



(B) D3870

COMBUSTION HEAD ADJUSTMENT

At this point of the installation, nozzle and pipe coupling are fixed to the boiler as in fig. (C) p. 5. The setting of the combustion head depends exclusively on the output of the burner in the 2nd stage - in other words, the combined output of the two nozzles selected on page 6 is a particularly simple operation. Turn screw 1)(A) until the notch on the sheet 2(A) is level with the plate 3)(A).

Example

The RL 44 MZ Model with two 3.00 GPH nozzles and 12 bar pump pressure. Find the delivery of the two 3.00 GPH nozzles in table (A), page 6:
 $12.7 + 12.7 = 25.4 \text{ kg/h}$
(corresponding to 300 kW). Diagram (B) shows that for an output of 25.4 kg/h the burner RL 44 MZ needs a combustion head notch regulation 3 approx.

Note

If the pressure in the chamber is equal to 0 mbar, the air must be adjusted with reference to the hatched line on the diagram (B).

Once the regulation of the head has been concluded, refit the burner 4)(C)p.5 on the guides 3)(C)p.5 at approximately 100 mm from the pipe coupling 5)(C).5, insert the electrode cables and then slide the burner as far as the pipe coupling. Replace the screws 2)p.5 on the guides 3)p.5. Fix the burner to the pipe coupling with the screw 1)p.5.

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.

HYDRAULIC SYSTEM

FUEL SUPPLY

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 higher than the burner A

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.

The tank 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 starts making noise and its working life-span decreases.

It is good practice to ensure that the return and suction lines enter the burner from the same height; in this way it will be less probable that the suction line fails to prime or stops priming.

The loop circuit

A loop circuit consists of a loop of piping departing from and returning to the tank with an auxiliary pump that circulates the fuel under pressure. A branch connection from the loop goes to feed 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 the table.

Key to lay-out (A)

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 = Rapid closing manual valve remote controlled (only Italy)

8 = On/off solenoid valve (only Italy)

9 = Return line

10 = Check valve (only Italy)

HYDRAULIC CONNECTIONS (B)

The pumps are equipped with a by-pass that connects return line with suction line. The pumps are installed on the burner with the by-pass closed by screw 6)(B)p.11.

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 the plugs from the suction and return connections of the pump.

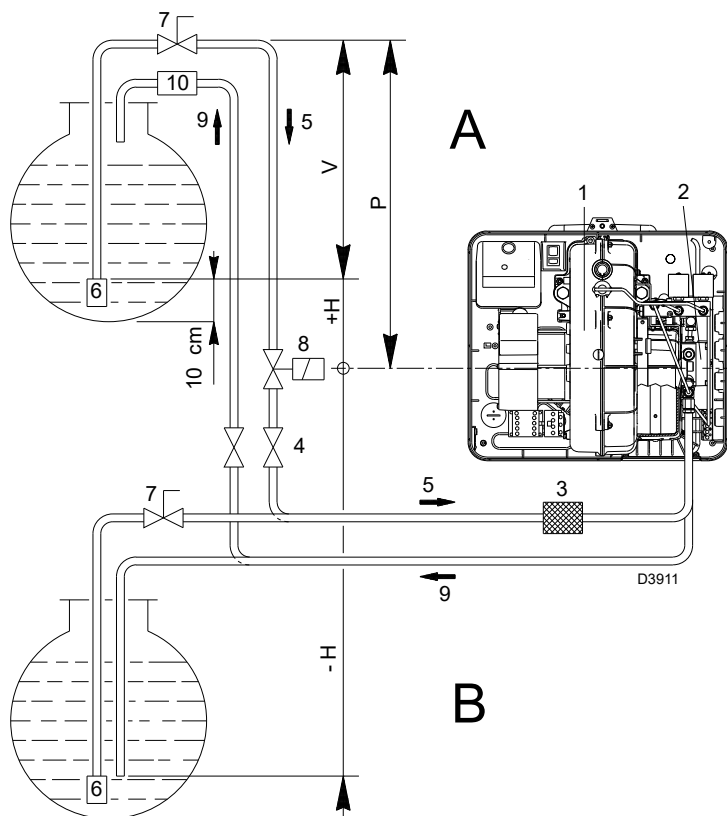
Insert the hose connections with the supplied seals into the connections and screw them down.

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

Pass the hoses through the holes on the left-hand plate 5)(B), removing the thin diaphragm that closes the two holes or as per the following instructions: unscrew the screws 1), now divide the insert piece into its two parts 2) and 3) and remove the thin diaphragm blocking the two passages 4).

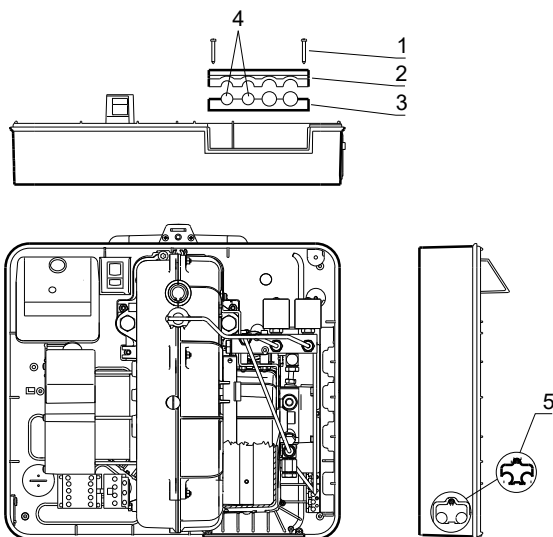
Install the hoses where they cannot be stepped on or come into contact with hot surfaces of the boiler.

Now connect the other end of the hoses to the supplied nipples, using two wrenches, one to hold the nipple steady while using the other one to turn the rotary union on the hose.



+ H - H (m)	L (m)					
	RL 34 MZ Ø (mm)			RL 44 MZ Ø (mm)		
	8	10	12	8	10	12
+ 4.0	52	134	160	35	90	152
+ 3.0	46	119	160	30	80	152
+ 2.0	39	104	160	26	69	152
+ 1.0	33	89	160	21	59	130
+ 0.5	30	80	160	19	53	119
0	27	73	160	17	48	108
- 0.5	24	66	144	15	43	97
- 1.0	21	58	128	13	37	86
- 2.0	15	43	96	9	27	64
- 3.0	8	28	65	4	16	42
- 4.0	-	12	33	-	6	20

(A)

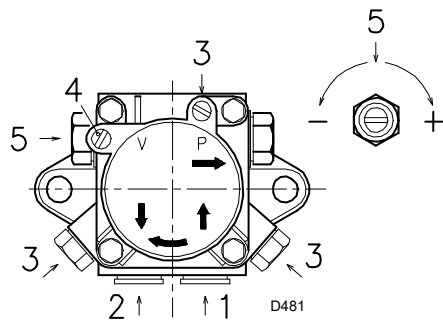


(B)

D3871

RL 34 MZ
SUNTEC AN 57 C

RL 44 MZ
SUNTEC AN 67 C



PUMP		AN 57 C	AN 67 C
A	kg/h	45	67
B	bar	7 - 14	10 - 20
C	bar	0.45	0.45
D	cSt	2 - 75	2 - 75
E	°C	60	60
F	bar	2	2
G	bar	12	12
H	mm	0.150	0.150

(A)

PUMP (A)

- 1 - Suction line G 1/4"
- 2 - Return line G 1/4"
- 3 - Gauge connection G 1/8"
- 4 - Vacuum meter connection G 1/8"
- 5 - Pressure adjustment screw

- A - Min. delivery rate at 12 bar pressure
- B - Delivery pressure range
- C - Max. suction depression
- D - Viscosity range
- E - Light oil max. temperature
- F - Max. suction and return pressure
- G - Pressure calibration in the factory
- H - Filter mesh width

PUMP PRIMING

- 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)(A) 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 switch 1)(B)p.10 in the "ON" position. The pump must rotate in the direction of the arrow marked on the cover.
- The pump can be considered to be primed when the light oil starts coming out of the screw 3). Stop the burner: switch 1)(B)p.10 set 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 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.

Do not illuminate the flame sensor or the burner will lock out; the burner should lock out anyway about 10 seconds after it starts.

Attention: 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.

BURNER CALIBRATION



ATTENTION

QUALIFIED PERSONNEL WITH THE RIGHT INSTRUMENTS MUST HANDLE THE BURNER'S START-UP.

FIRING

Set switch 1)(B) to "ON".

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

Once the following adjustments have been made, the firing of the burner must generate a noise similar to the noise generated during operation. If one or more pulsations or a delay in firing in respect to the opening of the light oil solenoid valve occur, see the suggestions provided on p. 14: causes 34 to 42.

OPERATION

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

• 1st and 2nd nozzles

See the information listed on page 6.

• Combustion head

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

• 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. This is only possible if the room temperature is above 0 °C. Never fall below 10 bar: at which pressures the cylinders may have difficulty in opening;

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

In order to adjust pump pressure, use the screw 5)(A), p. 9.

• 1st stage fan air gate valve

Keep the burner operating at 1st stage by setting the switch 2)(B) to the 1st stage position. Opening of the air gate valve 1)(A) must be adjusted in proportion to the selected nozzle: the index 7)(A) must be aligned with the specified in table (C). This adjustment is achieved by turning the hex element 4):

- in rh direction (- sign) the opening is reduced;
- in lh direction (+ sign) the opening increases.

Example:

RL 44 MZ - 1st stage nozzle 3.00 GPH:

notch 22° aligned with index 7)(A).

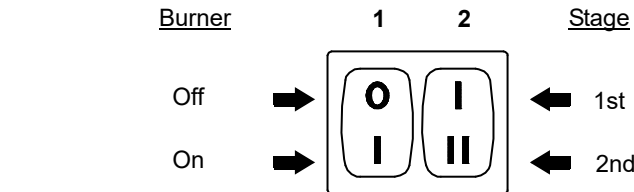
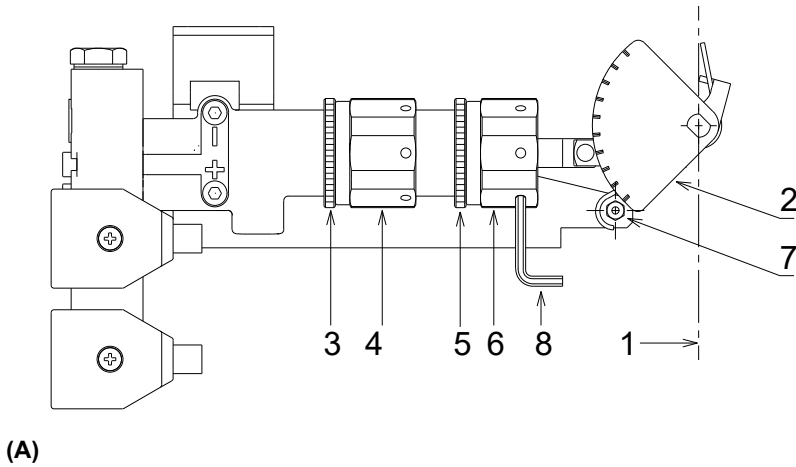
When the adjustment is terminated lock the hex element 4) with the ring nut 3).

• 2nd stage fan air damper valve

Set switch 2)(B) to the 2nd stage position and adjust the air gate valve 1)(A) by turning the hex element 6)(A), after having loosened the ring nut 5)(A).

Air pressure at attachment 1)(D) must be approximately the same as the pressure specified in table (D) plus the combustion chamber pressure measured at attachment 2). Refer to the example in the adjacent figure.

NOTE: in order to facilitate adjustment of hex elements 4) and 6)(A), use a 3 mmc Allen key 8)(A).



(B) D469

50 Hz Versions

RL 34 MZ		RL 44 MZ	
GPH	α	GPH	α
2,25	20	3,00	22
2,50	23	3,50	26
3,00	27	4,00	28
3,25	30	4,50	30
3,50	33	5,00	32
4,00	37		
4,50	40		

60 Hz Versions

RL 34 MZ		RL 44 MZ	
GPH	α	GPH	α
2,25	20	3,00	20
2,50	22	3,50	24
3,00	25	4,00	26
3,25	28	4,50	28
3,50	30	5,00	30
4,00	32		
4,50	35		

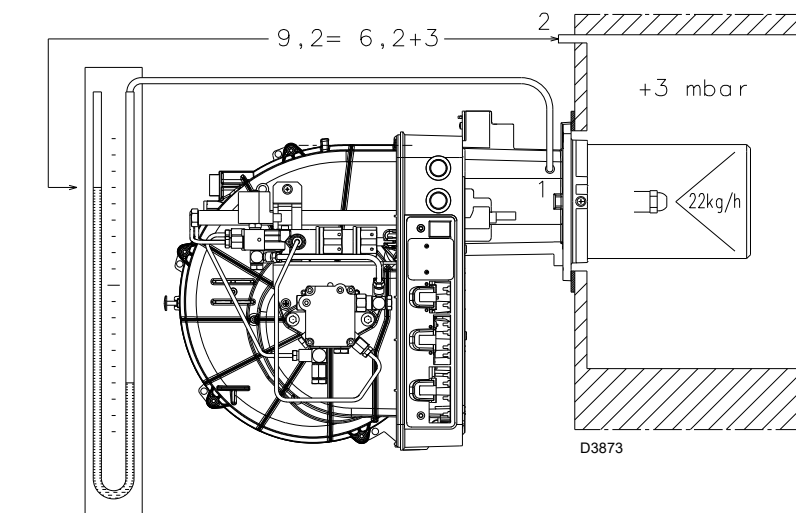
1st STAGE

α = Notch Nr.

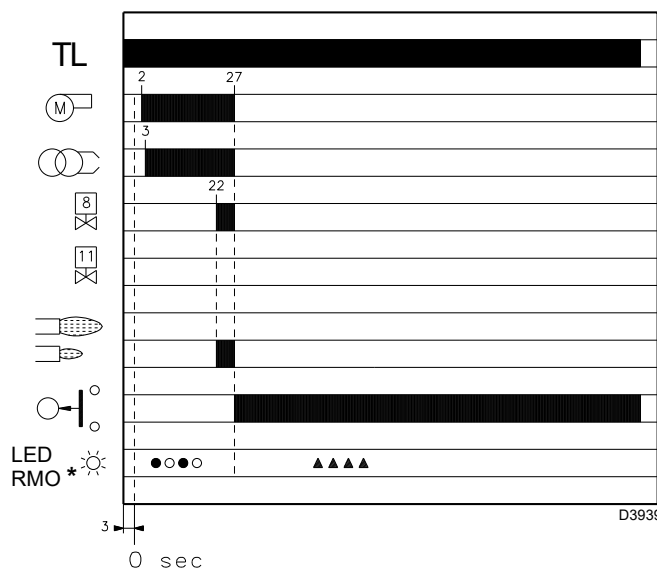
RL 34 MZ		RL 44 MZ	
kg/h	mbar	kg/h	mbar
13	5.4	20	4.2
14	5.6	22	4.7
16	5.7	24	4.9
18	5.9	26	5.1
20	6.0	29	5.4
22	6.2	32	5.6
24	6.4	35	6.3
26	6.6	38	7.4
28	6.7	40	8.6
30	6.9	41	9.0
32	7.0		
34	7.1		

2nd STAGE

mbar = Air pressure in 1) with zeropressure in 2)



(D) D3873

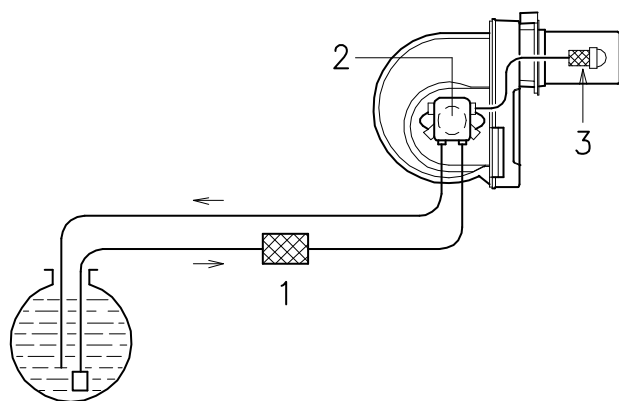


(A)



If the flame goes out during operation, the burner shuts down automatically within 1 second and automatically attempts to start again by repeating the starting cycle.

(A)



D482

FINAL CHECKS

- Obscure the flame sensor and switch on the control devices: the burner should start and then lockout about 5 s after opening of the 1st nozzle operation valve.
- Illuminate the flame sensor and switch on the control devices: the burner should start and then go into lockout after about 10 s.
- Obscure the flame sensor while the burner is in 2nd stage operation, the following must occur in sequence: flame extinguished within 1 s, pre-purging for about 20 s, sparking for about 5 s, burner goes into lockout.
- Switch off control device TL followed by control device TS while the burner is operating: the burner should stop.

MAINTENANCE

⚠ The burner requires periodic maintenance carried out by a qualified and authorised technician **in conformity with legislation and local standards**.

⚠ Periodic maintenance is essential for the reliability of the burner, avoiding the excessive consumption of fuel and consequent pollution.

⚠ Before carrying out any cleaning or control always first switch off the electrical supply to the burner acting on the main switch of the system.

Combustion

The optimum calibration of the burner requires an analysis of the flue gases. Significant differences with respect to the previous measurements indicate the points where more care should be exercised during maintenance.

Pump

The delivery pressure must be stable at 12 bar.
The depression must be less than 0.45 bar.
Unusual noise must not be evident during pump operation.

If the pressure is found to be unstable or if the pump runs noisily, the flexible hose must be detached from the line filter and the fuel must be sucked from a tank located near the burner. This measure permits the cause of the anomaly to be traced to either the suction piping or the pump. If the 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.

Filters (A)

Check the following filter boxes:

- on line 1) • in the pump 2) • at 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.

Fan

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

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.

Nozzles

Do not clean the nozzle openings.

It is advisable to replace nozzles every year during regular maintenance operations.

The change of nozzle requires the combustion to be controlled.

Flame sensor

Clean the glass cover from any dust that may have accumulated. To extract the flame sensor 4) (A)p.3 pull it outward forcefully. it is only pressed in

Flexible hoses

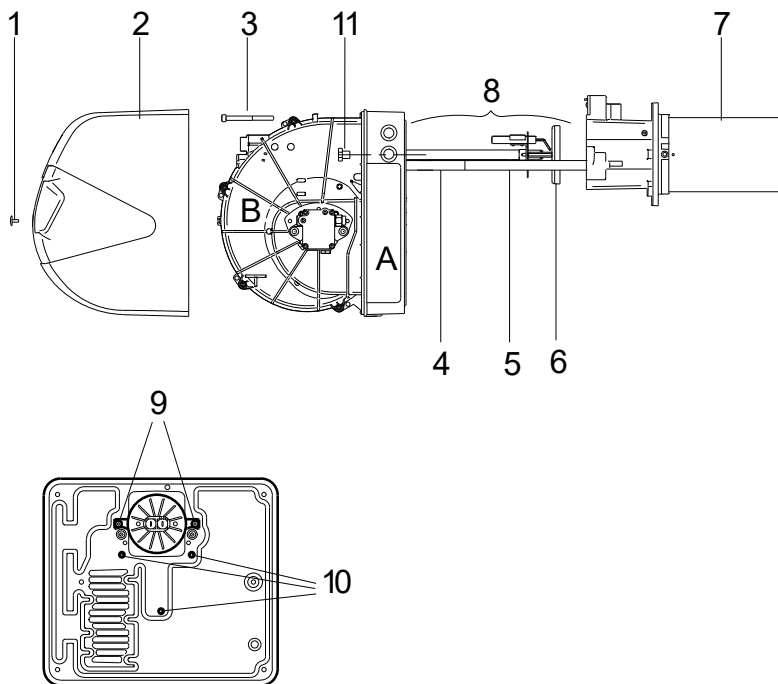
Check to make sure that the flexible hoses are still in good condition and that they are not crushed or otherwise deformed.

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.



(A)

D3962

TO OPEN THE BURNER (A)

- Switch off the voltage
- Remove screw 1 and withdraw the casing 2)
- Unscrew screw 3)
- Fit the two extensions 4), on the burner, on the guides 5) (model with nozzle 351 mm)
- Pull part A backward keeping it slightly raised to avoid damaging the disk 6) on blast tube 7).

MAINTENANCE OF THE ELECTRICAL PANEL (B)

If it is necessary to maintain the electrical panel A)(Fig. A) it is possible just to remove the fan assembly B)(Fig. A) to get better access to the electrical components.

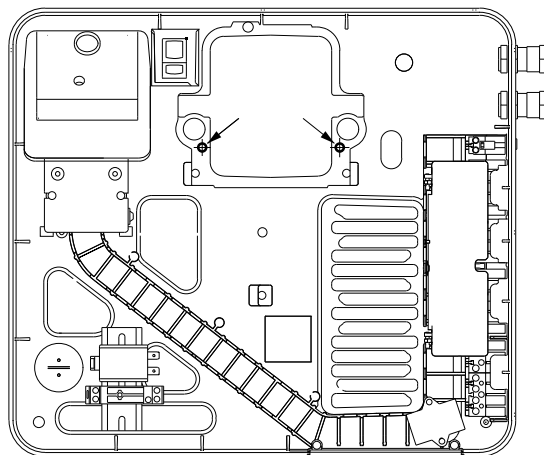
With the burner open as in fig. (A), disconnect the electrode cables and remove the head unit 8)(A) by undoing the two screws 9)(A).

Disconnect the cables relative to the fan motor, remove the 3 screws 10)(A) on the protective sheet and the two screws 11)(A) and slide out the fan assembly B)(Fig. A) from the guides 4) - 5)(A).

Finally it is possible to use 2 of the 3 screws 10)(A) to fix the electrical panel to the pipe coupling in the points indicated on fig. (B), and then perform the maintenance operations.

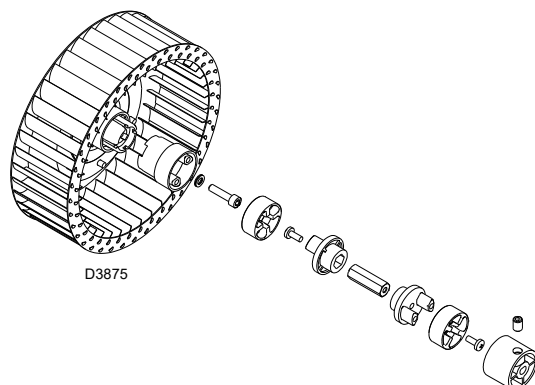
POSSIBLE PUMP AND/OR COUPLING REPLACEMENT (C)

Carry out the fitting following the instructions in the figure (C).



(B)

D3877



(C)

BURNER START-UP CYCLE DIAGNOSTICS

During start-up, indication is according to the following table:

COLOUR CODE TABLE	
Sequences	Colour code
Pre-purging	● ○ ● ○ ● ○ ● ○ ●
Ignition phase	● ○ ● ○ ● ○ ● ○ ●
Operation, flame ok	□ □ □ □ □ □ □ □ □
Operating with weak flame signal	□ ○ □ ○ □ ○ □ ○ □
Electrical supply lower than ~ 170V	● ▲ ● ▲ ● ▲ ● ▲ ●
Lock-out	▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲
Extraneous light	▲ □ ▲ □ ▲ □ ▲ □ ▲
Key: ○ Off ● Yellow □ Green ▲ Red	

RESETTING THE CONTROL BOX AND USING DIAGNOSTICS

The control box features a diagnostics function through which any causes of malfunctioning are easily identified (indicator: **RED LED**).

To use this function, you must wait at least 10 seconds once it has entered the safety condition (**lockout**), and then press the reset button.

The control box generates a sequence of pulses (1 second apart), which is repeated at constant 3-second intervals.

Once you have seen how many times the light pulses and identified the possible cause, the system must be reset by holding the button down for between 1 and 3 seconds.

RED LED on wait at least 10s	Lock-out	Press reset for > 3s	Pulses	Interval 3s	Pulses
			● ● ● ● ●		● ● ● ● ●

The methods that can be used to reset the control box and use diagnostics are given below.

RESETTING THE CONTROL BOX

To reset the control box, proceed as follows:

- Hold the button down for between 1 and 3 seconds.
The burner restarts after a 2-second pause once the button is released.
- If the burner does not restart, you must make sure the limit thermostat is closed.

VISUAL DIAGNOSTICS

Indicates the type of burner malfunction causing lockout.

To view diagnostics, proceed as follows:

- Hold the button down for more than 3 seconds once the red LED (burner lockout) remains steadily lit.
A yellow light pulses to tell you the operation is done.
Release the button once the light pulses. The number of times it pulses tells you the cause of the malfunction, according to the coding system indicated in the table on page 15.

SOFTWARE DIAGNOSTICS

Reports burner life by means of an optical link with the PC, indicating hours of operation, number and type of lock-outs, serial number of control box etc ...

To view diagnostics, proceed as follows:

- Hold the button down for more than 3 seconds once the red LED (burner lockout) remains steadily lit.
A yellow light pulses to tell you the operation is done.
Release the button for 1 second and then press again for over 3 seconds until the yellow light pulses again.
Once the button is released, the red LED will flash intermittently with a higher frequency: only now can the optical link be activated.

Once the operations are done, the control box's initial state must be restored using the resetting procedure described above.

BUTTON PRESSED FOR	CONTROL BOX STATUS
Between 1 and 3 seconds	Control box reset without viewing visual diagnostics.
More than 3 seconds	Visual diagnostics of lockout condition: (Led pulses at 1-second intervals).
More than 3 seconds starting from the visual diagnostics condition	Software diagnostics by means of optical interface and PC (hours of operation, malfunctions etc. can be viewed)

The sequence of pulses issued by the control box identifies the possible types of malfunction, which are listed in the table on page 15.

SIGNAL	FAULT	POSSIBLE CAUSE	SOLUTION
No blink	The burner does not start	1 - No electrical power supply 2 - A limit or safety control device is open 3 - Control box lock-out 4 - Pump is jammed 5 - Erroneous electrical connections 6 - Defective control box 7 - Defective electrical motor 8 - Defective motor capacitor (RL 34 MZ - RL 44 MZ single-phase)	Close all switches - Check fuses Adjust or replace Reset control box (no sooner than 10 s after the lockout) Replace Check connections Replace Replace Replace it
4 pulses ● ● ● ●	The burner starts and then goes into lockout	9 - Flame sensor short-circuit 10 - Light is entering or flame is simulated	Replace sensor Eliminate light or replace control box
2 pulses ● ●	After pre-purge and the safety time, the burner goes to lockout at the end of the safety time	11 - No fuel in tank; water on tank bottom 12 - Inappropriate head and air damper adjustments 13 - Light oil solenoid valves fail to open (1st stage or safety) 14 - 1st nozzle clogged, dirty, or deformed 15 - Dirty or poorly adjusted firing electrodes 16 - Grounded electrode due to broken insulation 17 - High voltage cable defective or grounded 18 - High voltage cable deformed by high temperature 19 - Ignition transformer defective 20 - Erroneous valves or transformer electrical connections 21 - Defective control box 22 - Pump unprimed 23 - Pump/motor coupling broken 24 - Pump suction line connected to return line 25 - Valves up-line from pump closed 26 - Filters dirty: line - pump - nozzle 27 - Defective flame sensor or control box 28 - Flame sensor dirty 29 - 1st stage operation of cylinder is faulty 30 - Motor lockout (RL 44 MZ three-phase - RL) 31 - Defective motor command remote control device (RL 44 MZ three-phase - RL) 32 - Electrical power supply two-phase (RL 44 MZ three-phase) 33 - Incorrect motor rotation direction	Top up fuel level or suck up water Adjust, see page 7 and 10 Check connections; replace coil Replace Adjust or clean Replace Replace Replace and protect Replace Check Replace Prime pump and see "Pump unprimed" Replace Correct connection Open Clean Replace sensor or control box Clean Change the cylinder Reset thermal relay Substitute it Reset thermal relay Change motor electrical connections
7 pulses ● ● ● ● ● ● ●	Flame detachment	34 - Poorly adjusted head 35 - Poorly adjusted or dirty firing electrodes 36 - Poorly adjusted fan air gate: too much air 37 - 1st nozzle is too big (pulsation) 38 - 1st nozzle is too small (flame detachment) 39 - 1st nozzle dirty, or deformed 40 - Pump pressure not suitable 41 - 1st stage nozzle unsuited to burner or boiler 42 - Defective 1st stage nozzle	Adjust, see page 7, fig. (F) Adjust, see page 7, fig. (B) Adjust Reduce 1st nozzle delivery Increase 1st nozzle delivery Replace Adjust it: between 10 - 14 bar See Nozzle Table, page 6; reduce 1st stage nozzle Replace
	The burner does not pass to 2nd stage	43 - Control device TR does not close 44 - Defective control box 45 - 2nd stage sol. valve coil defective 46 - Piston jammed in valve unit	Adjust or replace Replace Replace Replace entire unit
	Fuel passes to 2nd stage but air remains in 1st	47 - Low pump pressure 48 - 2nd stage operation of cylinder is faulty	Increase Change cylinder
	Burner stops at transition between 1st and 2nd stage. Burner repeats starting cycle.	49 - Nozzle dirty 50 - Flame sensor dirty 51 - Excess air	Renew nozzle Clean Reduce
	Uneven fuel supply	52 - Check if cause is in pump 53 - Water in tank	Feed burner from tank or fuel supply system Suck water from tank bottom with separate pump
	Noisy pump, unstable pressure	54 - Air has entered the suction line 55 - Depression value too high (higher than 35 cm Hg) 56 - Tank/burner height difference too great 57 - Piping diameter too small 58 - Suction filters clogged 59 - Paraffin solidified due to low temperature	Tighten connectors Feed burner with loop circuit Increase Clean Open Add additive to light oil
	Pump unprimed after prolonged pause	60 - Return pipe not immersed in fuel 61 - Air enters suction piping	Bring to same height as suction pipe Tighten connectors
	Pump leaks light oil	62 - Leakage from sealing organ	Replace pump
	Smoke in flame - dark Bacharach - yellow Bacharach	63 - Not enough air 64 - Nozzle worn or dirty 65 - Nozzle filter clogged 66 - Erroneous pump pressure 67 - Flame stability disc dirty, loose, or deformed 68 - Boiler room air vents insufficient 69 - Too much air	Adjust head and fan air damper, see page 7 and 10 Replace Clean or replace Adjust to between 10 - 14 bar Clean, tighten in place, or replace Increase Adjust head and fan air damper, see page 7 and 10
	Dirty combustion head	70 - Nozzle or filter dirty 71 - Unsuitable nozzle delivery or angle 72 - Loose nozzle 73 - Impurities on flame stability spiral 74 - Erroneous head adjustment or not enough air 75 - Blast tube length unsuited to boiler	Replace See recommended nozzles, page 6 Tighten Clean Adjust, see page 10; open gate valve Contact boiler manufacturer
10 pulses ● ● ● ● ● ● ● ● ● ●		76 - Connection or internal fault 77 - Presence of electromagnetic disturbance	Use the radio disturbance protection kit)

APPENDIX

Electrical wiring



NOTES

Electrical wiring must be made in accordance with the regulations currently in force in the country of destination and by qualified personnel.

Riello S.p.A. declines all liability for modifications or connections other than those shown on these diagrams.

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

All the cables to be connected to the burner are fed through the grommets.

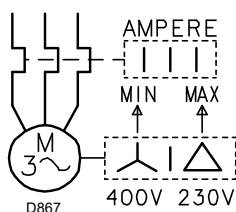
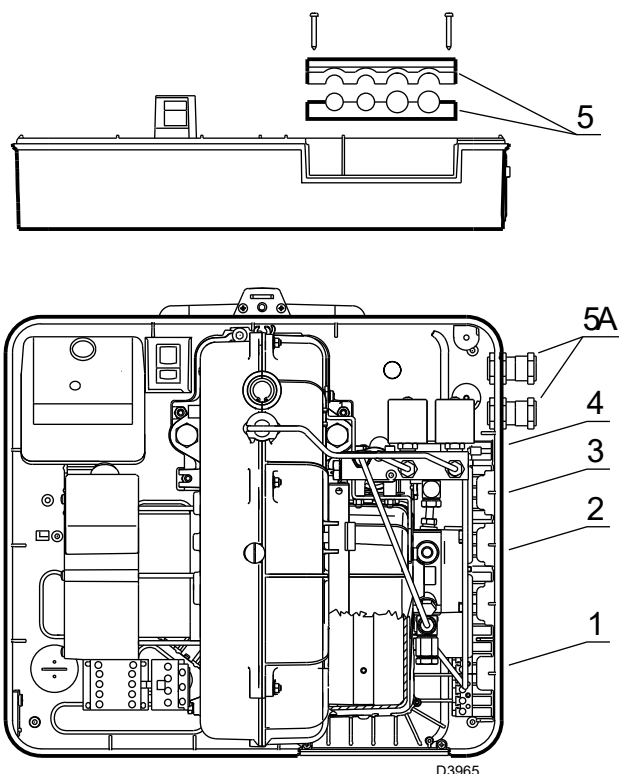
The use of the grommets can take various forms; by way of example we indicate the following mode:

RL 34-44 MZ single phase

- 1- 7 pole socket for single phase power supply, thermostat/pressure switch TL
- 2- 4 pole socket, thermostat/pressure switch TR
- 3- 5 pole socket
- 4- 2 pole socket for remote control box reset accessory
- 5 - 5A Housing for the nozzles
(Drill if 5A nozzles are required)

RL 44 MZ three-phase

- 1- 7 pole socket for single-phase power supply, thermostat/pressure switch TL
- 2- 4 pole socket, thermostat/pressure switch TR
- 3- 5 pole socket for three phase supply
- 4- 2 pole socket for remote control box reset accessory
- 5 - 5A Housing for the nozzles
(Drill if 5A nozzles are required)



THERMAL RELAY CALIBRATION (RL 44 MZ three phase)

This is required to avoid motor burn-out in the event of a significant increase in intake power caused by a missing phase.

- If the motor is star-powered, **400 V**, the cursor should be positioned at "MIN".
- If the motor is delta-powered, **230 V**, the cursor should be positioned at "MAX".

Even if the scale of the thermal relay does not include rated motor input power at 400 V, protection is still ensured in any case.

NOTES

- The RL 44 MZ three-phase model leaves the factory with provision for a **400V** power supply. If **230 V** power supply is used, change the motor connection from star to delta and change the setting of the thermal relay as well.
- The RL 34 -44 MZ -burners have been type-approved for intermittent operation. This means they should compulsorily be stopped at least once every 24 hours to enable the control box to perform checks of its own efficiency at start-up. Normally the boiler's limit thermostat pressure switch TL ensures the stopping of the burner. If this is not the case, it is necessary to apply in series with IN a timer switch that turns off the burner at least once every twenty-four hours.
- The burners RL 34-44 MZ leave the factory ready for two-stage functioning and must therefore be connected to the thermostat/pressure switch TR. Alternatively, if single stage operation is required, instead of thermostat/pressure switch TR install a jumper lead between terminals T6 and T8 of plug X4.



ATTENTION:

- Do not invert the neutral with the phase wire in the electricity supply line. Any inversion would cause a lockout due to firing failure.
- Only use original spare parts to replace the components.

Electrical panel layout

1	CONTENTS
2	Indexisation of references
3	Functional diagram
4	Electrical wiring that the installer is responsible for

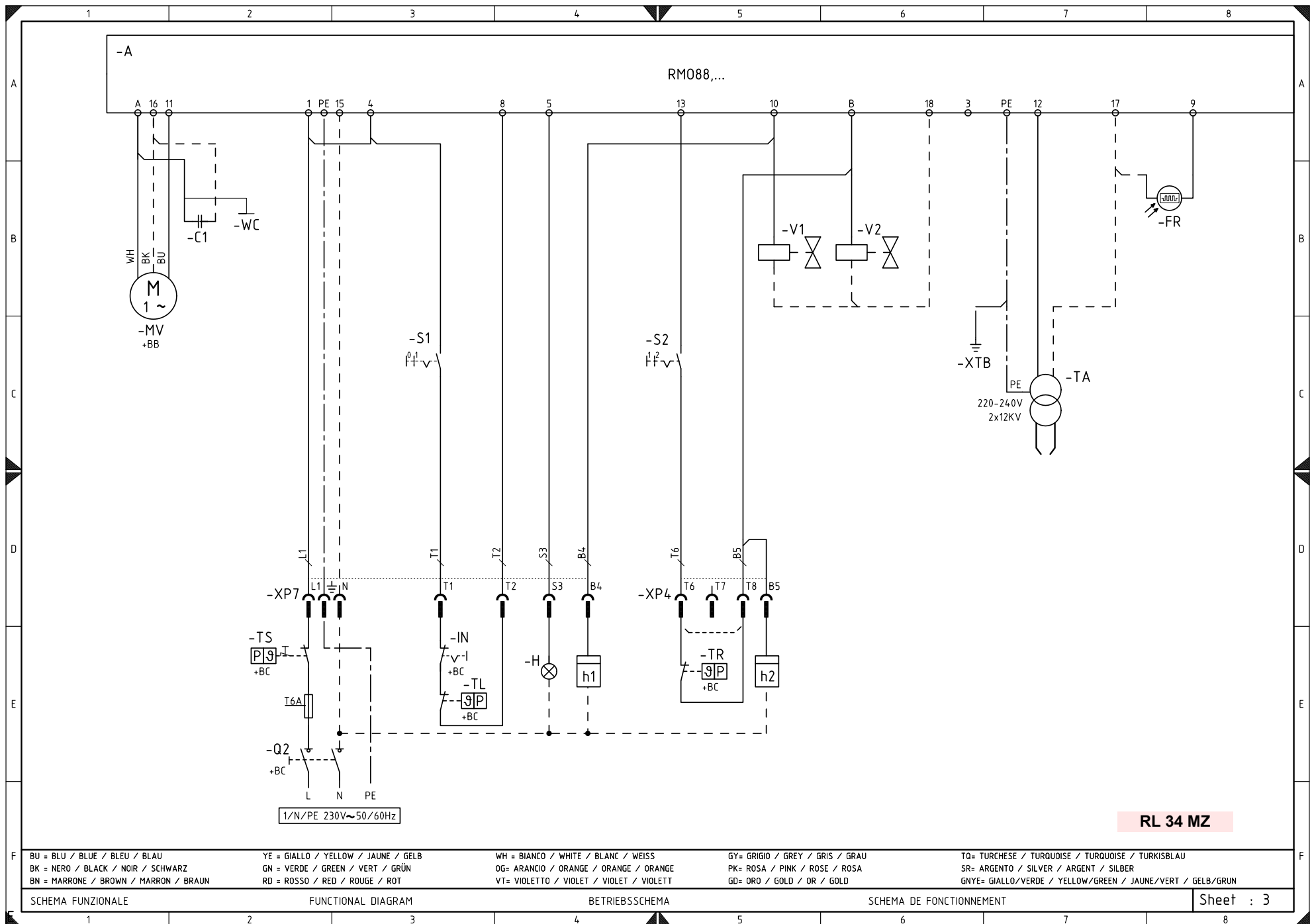
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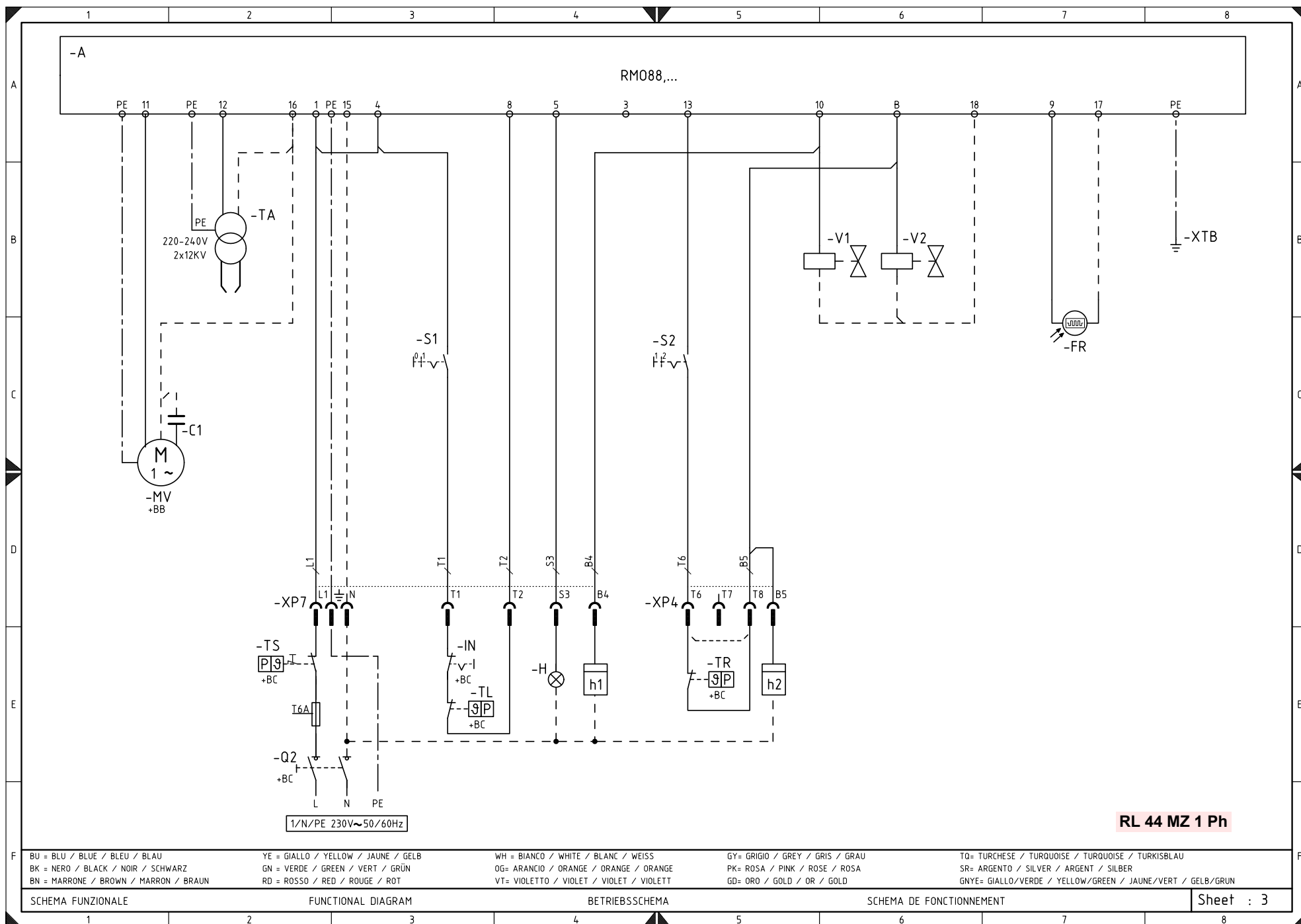
Indexisation of references

Sheet no.

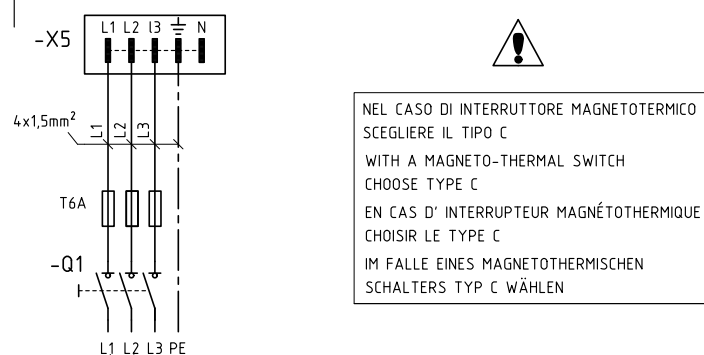
Coordinates

/1.A1

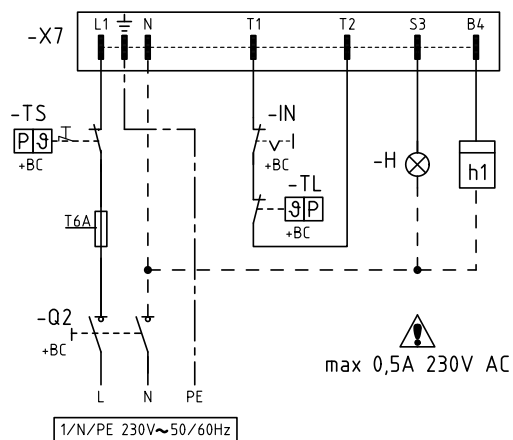




SOLO PER LA VERSIONE TRIFASE / ONLY THREE PHASE VERSION

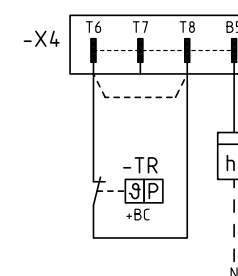


3/N/PE 400/230V~50/60Hz → 3 ~
3/PE 230V~50/60Hz →

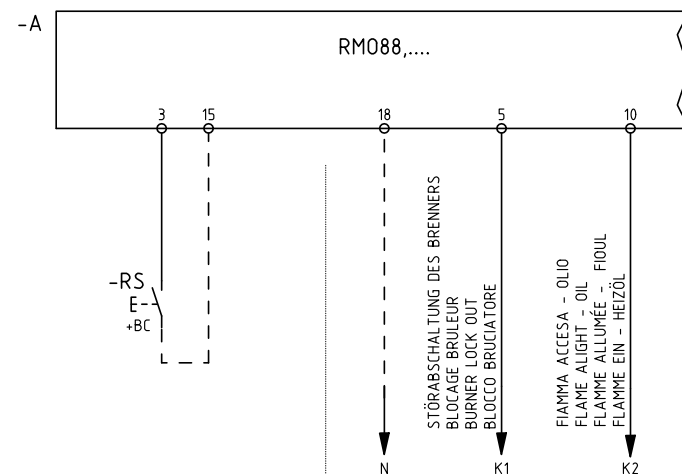


1/N/PE 230V~50/60Hz

SOLO LA VERSIONE BISTADIO / ONLY TWO STAGE VERSION



KITS



PULSANTE DI SBLOCCO A DISTANZA
REMOTE RESET BUTTON
BOUTON DE DEPLOCAGE A DISTANCE
FERNETSTORUNGSTASTE

USCITA PER KIT RELE' CONTATTI PULITI
OUTPUT FOR VOLTAGE FREE CONTACTS KIT
SORTIE POUR KIT RELAIS CONTACTS PROPRES
AUSGANG FÜR REINKONTAKTE-KIT



max 10A AC1 230V AC

max 2A AC15 230V AC

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 = VIOLETT / 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/GRÜN

COLLEGAMENTI ELETTRICI A CURA DELL'INSTALLATORE ELECTRICAL CONNECTIONS SET BY INSTALLER

ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L'INSTALLATEUR

Sheet : 4

WIRING DIAGRAM KEY

A	- Electrical control box
BB	- Components on burners
BC	- Components on boiler
C1	- Capacitor
F1	- Fan motor thermal relay
FR	- Flame sensor
H	- Remote lockout signalling
IN	- Manual burner arrest switch
h1	- Hour counter
h2	- Hour counter
KM	- Motor contact maker
MV	- Fan motor
Q1	- Three-phase knife switch
Q2	- Single phase knife switch
RS	- Remote burner reset button (accessory)
S1	- Switch: burner on-off
S2	- Switch: 1st - 2nd stage
TA	- Ignition transformer
TL	- Extreme thermostat/pressure switch
TR	- Adjustment thermostat/pressure switch
TS	- Safety thermostat/pressure switch
XP4	- 4 pole socket
XP5	- 5 pole socket
XP7	- 7 pole socket
XTB	- Shelf earth
XTM	- Fan unit earth
X4	- 4 pin plug
X5	- 5 pin plug
X7	- 7 pin plug
V1	- Ignition solenoid /1st stage
V2	- 2nd stage solenoid
WC	- Capacitor connection

LEYENDA ESQUEMAS ELÉCTRICOS

A	- Caja de control eléctrica
BB	- Componentes a bordo del quemador
BC	- Componentes a bordo de la caldera
C1	- Condensador
F1	- Relé térmico motor ventilador
FR	- Sensor llama
H	- Señalización de bloqueo remoto
IN	- Interruptor parada manual del quemador
h1	- Cuentahoras
h2	- Cuentahoras
KM	- Cuentahoras motor
MV	- Motor ventilador
Q1	- Interruptor seccionador trifásico
Q2	- Interruptor seccionador monofásico
RS	- Pulsador de desbloqueo a distancia del quemador (accesorio)
S1	- Interruptor: quemador encendido-apagado
S2	- Interruptor: primera - segunda llama
TA	- Transformador de encendido
TL	- Termostato/presostato de límite
TR	- Termostato/presostato de regulación
TS	- Termostato/presostato de seguridad
XP4	- Conector hembra de 4 contactos
XP5	- Conector hembra de 5 contactos
XP7	- Conector hembra de 7 contactos
XTB	- Tierra ménsula
XTM	- Tierra grupo ventilador
X4	- Conector macho de 4 contactos
X5	- Conector macho de 5 contactos
X7	- Conector macho de 7 contactos
V1	- Electroválvula de encendido/primera llama
V2	- Electroválvula de segunda llama
WC	- Cable de conexión condensador

LEGENDA ESQUEMAS ELÉCTRICOS

A	- Caixa de controlo eléctrica
BB	- Componentes bordo queimadores
BC	- Componentes bordo caldeira
C1	- Condensador
F1	- Relé térmico motor ventilador
FR	- Sensor de chama
H	- Sinalização de bloqueio remoto
IN	- Interruptor paragem manual queimador
h1	- Conta-horas
h2	- Conta-horas
KM	- Contactador motor
MV	- Motor ventilador
Q1	- Interruptor seccionador trifásico
Q2	- Interruptor seccionador monofásico
RS	- Botão de desbloqueio queimador a distância (acessório)
S1	- Interruptor: queimador aceso-apagado
S2	- Interruptor: 1ª - 2ª chama
TA	- Transformador de acendimento
TL	- Termóstato/pressostato de limite
TR	- Termóstato/pressostato de regulação
TS	- Termóstato/pressostato de segurança
XP4	- Tomada de 4 pólos
XP5	- Tomada de 5 pólos
XP7	- Tomada de 7 pólos
XTB	- Terra consola
XTM	- Terra grupo ventilador
X4	- Ficha de 4 pólos
X5	- Ficha de 5 pólos
X7	- Ficha de 7 pólos
V1	- Electroválvula de acendimento/1ª chama
V2	- Electroválvula de 2ª chama
WC	- Conexão condensador