GB **Light oil burners**

CN **轻油燃烧器**

Two-stage operation
两段火运行

CODE - 编码	MODEL - 型号	TYPE - 类型
20044403	RL 250 MZ	970 T

20044425 (2) - 05/2013

GB **CONTENTS**

TECHNICAL DATA

MODEL			RL 250 MZ
TYPE			970 T
OUTPUT (1) DELIVERY (1)	2nd stage (min - max)	kW kg/h	1250 ÷ 2700 106 ÷ 228
	1st stage (min)	kW kg/h	600 51
FUEL			LIGHT OIL
- net calorific value		kWh/kg Mcal/kg	11.8 10.2 (10.200 kcal/kg)
- density		kg/dm^3	0.82 - 0.85
- viscosity at 20 °C		mm^2/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 TEMPERATUR		°C	0 - 40
COMBUSTION AIR TEMPERATURE		°C max	60
PUMP	delivery at 12 bar (kg/h) pressure range (bar) fuel temperatur (°C)		230 10 - 21 90
CONFORMITY TO EC DIRECTIVES			2004/108 - 2006/95 - 2006/42
NOISE LEVELS (2)		dBA	85.4

(1) Reference conditions: Ambient temperature 20°C - Barometric pressure 1000 mbar - Altitude 100 m a.s.l.
(2) Sound pressure measured in manufacturer's combustion laboratory, with burner operating on test boiler and at maximum rated output.

ELECTRICAL DATA

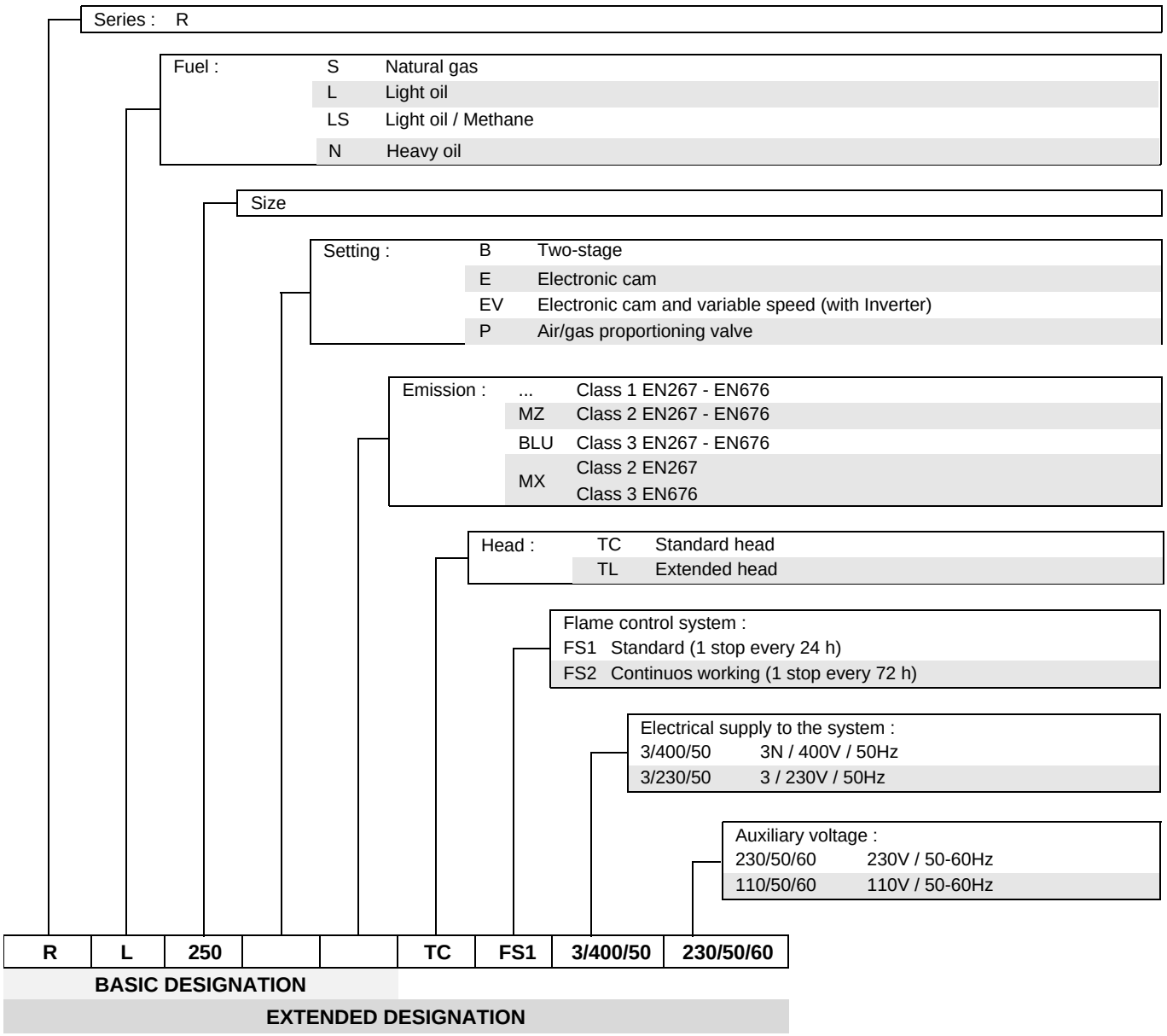
Motor IE1

Model		RL 250 MZ
Electrical supply	V/Ph/Hz	400/3/50
Auxiliary power supply	V/Ph/Hz	230/1/50
Electric motor	rpm W V A	2900 6600 230/400 24.3 - 14
Ignition transformer	V1 - V2 I1 - I2	230 V - 2 x 5 kV 1.9 A - 35 mA
Electrical power consumption	W max	7200
Electrical protection		IP 54

Motor IE2

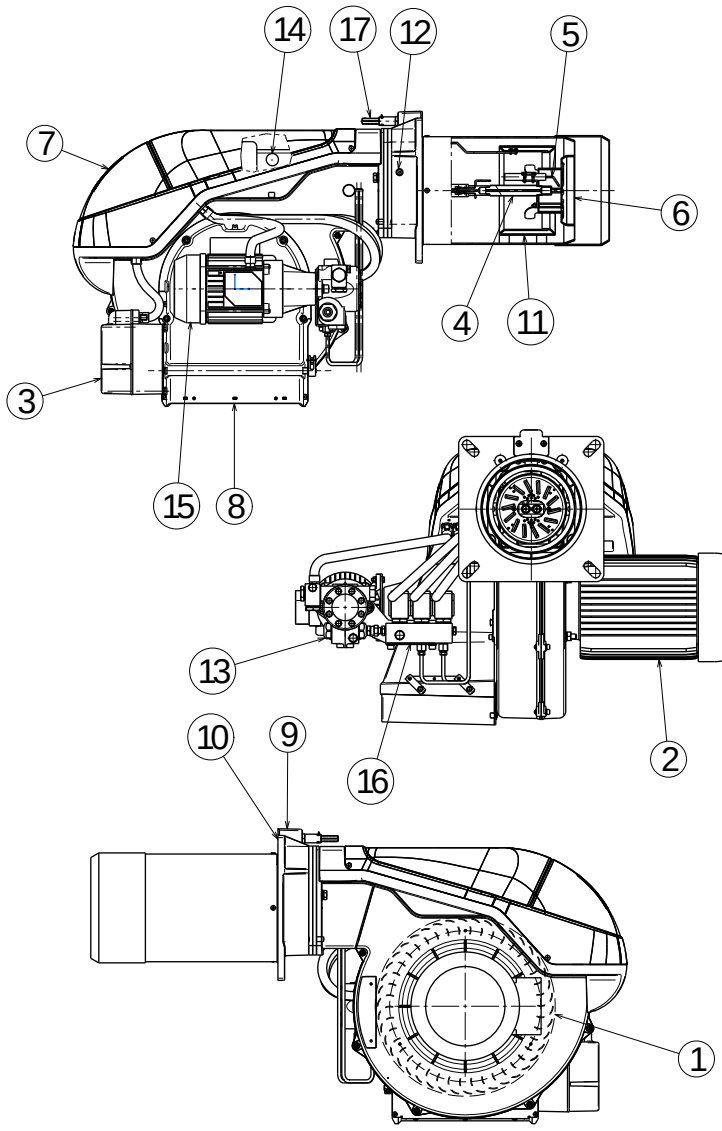
Model		RL 250 MZ
Electrical supply	V/Ph/Hz	400/3/50
Auxiliary power supply	V/Ph/Hz	230/1/50
Electric motor	rpm W V A	2900 7500 230/400 23.9 - 13.8
Ignition transformer	V1 - V2 I1 - I2	230 V - 2 x 5 kV 1.9 A - 35 mA
Electrical power consumption	W max	7200
Electrical protection		IP 54

DESIGNATION OF BURNER SERIES RL

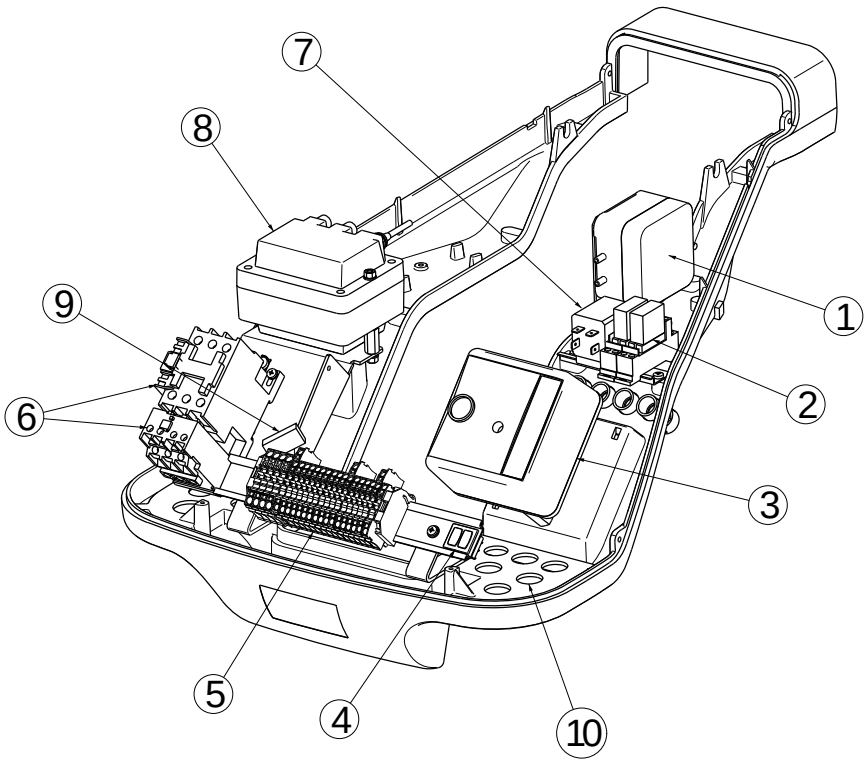


LIST OF AVAILABLE MODELS

Designation		Electrical supply	Starting	Code
RL 250 MZ		400V-50Hz	Direct	20044403



D3940 **(A)**



D3941 **(B)**

BURNER DESCRIPTION (A)

1 Fan
2 Fan motor
3 Air gate valve servomotor
4 Combustion head
5 Ignition electrodes
6 Flame stability disk
7 Panel board - cover
8 Air inlet to fan
9 Manifold
10 Thermal insulation screen for securing burner to boiler
11 Shutter
12 Air pressure test point
13 Pump
14 Photoelectric cell
15 Pump motor
16 Valve group
17 Screw for combustion head adjustment

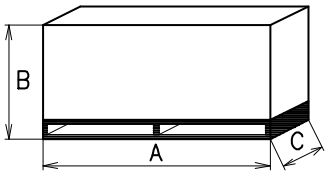
DESCRIPTION OF PANEL BOARD (B)

1 Air pressure switch
2 Voltage free contacts relay
3 Control box
4 Two switches:
- one “burner off - on”
- one for “1st - 2nd stage operation”
5 Main supply terminal strip
6 Motor contactor and thermal cut-out with reset button
7 Pump motor relay
8 Ignition transformer
9 Connector for Status
10 Entry for power cables and external leads

N.B.

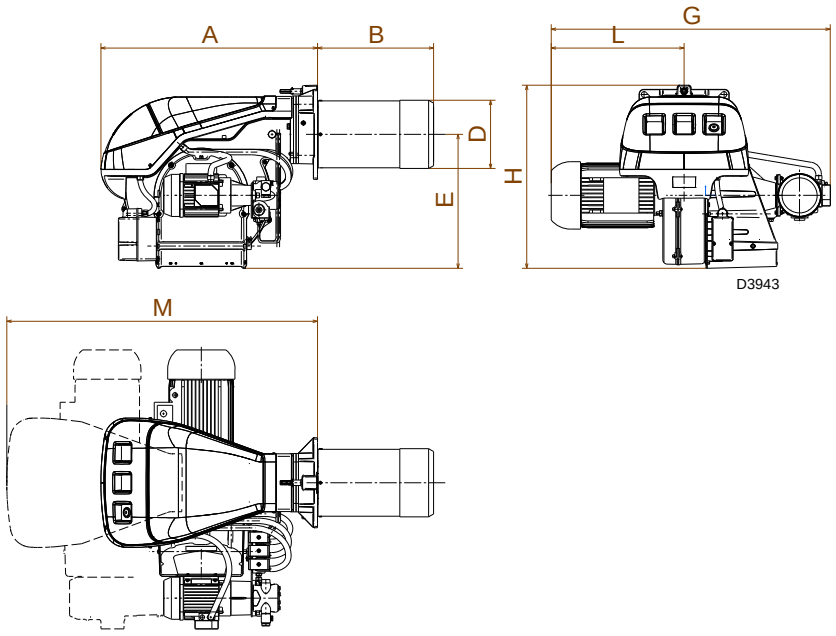
Two types of burner failure may occur:
Control box lock-out: if the control box 3)(B) pushbutton (**red led**) lights up, it indicates that the burner is in lock-out.
To reset, hold the pushbutton down for between 1 and 3 seconds.
Motors trip: release by pressing the push button of the thermal cutout relay.

mm	A	B	C	kg
RL 250 MZ	1400	725	1040	140



D36

(A)



mm	A	B	D	E	G	H	L	M
RL 250 MZ	705	378	222	436	910	596	432	1163

(B)

PACKAGING - WEIGHT (A) - Approximate measurements

- The burner stands on a wooden base which can be lifted by fork-lifts. Outer dimensions of packaging are indicated in (A).
- The weight of the burner complete with packaging is indicated in Table (A).

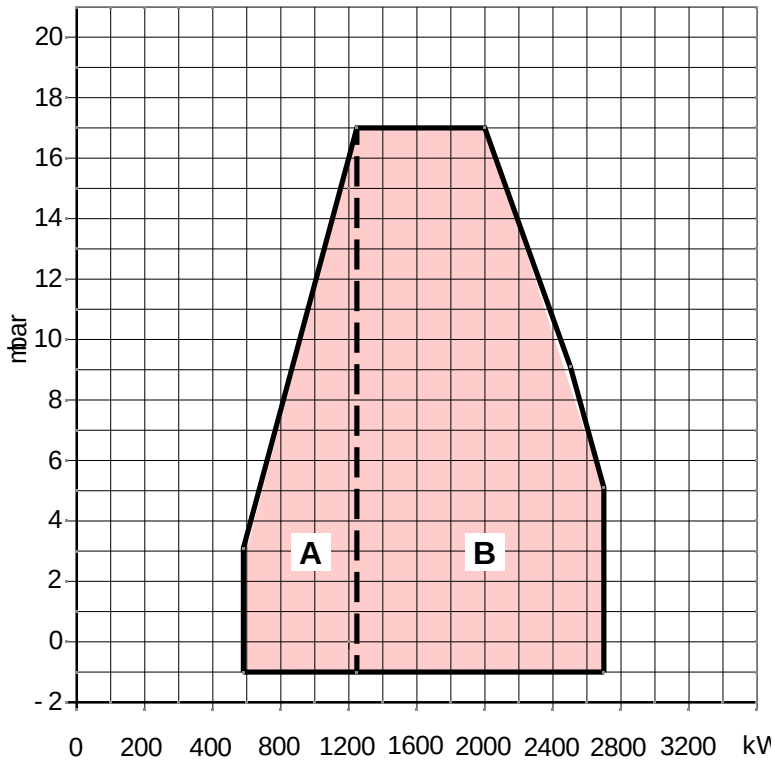
STANDARD EQUIPMENT

1 - Thermal insulation screen
4 - Screws to secure the burner flange to the boiler: M 16 x 40
1 - Instruction booklet
1 - Spare parts list

MAX. DIMENSIONS (B) - Approximate measurements

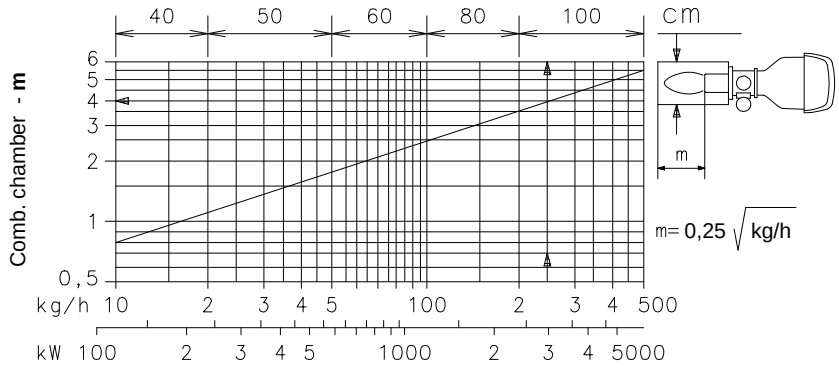
The maximum dimensions of the burner are given in (B). Bear in mind that inspection of the combustion head requires the burner to be opened by pulling the rear part back on the pivots.
The overall dimensions of the burner when open are indicated by M.

RL 250 MZ



D3944

(A)



D1637

(B)

FIRING RATES (A)

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

2nd stage DELIVERY must be selected within area B. This area provides the maximum delivery of the burner in relation to the pressure in the combustion chamber.

Important: The FIRING RATE area values have been obtained considering a surrounding temperature of 20°C, and an atmospheric pressure of 1000 mbar (approx. 100 m above sea level) and with the combustion head adjusted as shown on page 8.

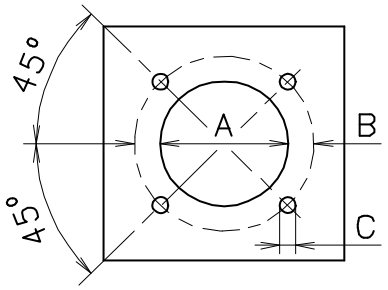
BOILERS (B)

The burner/boiler matching does not pose any problems if the boiler is CE type-approved and its combustion chamber dimensions are similar to those indicated in diagram (B).
If the burner must be combined with a boiler that has not been CE type-approved and/or its combustion chamber dimensions are clearly smaller than those indicated in diagram (B), consult the manufacturer.

TEST BOILER (B)

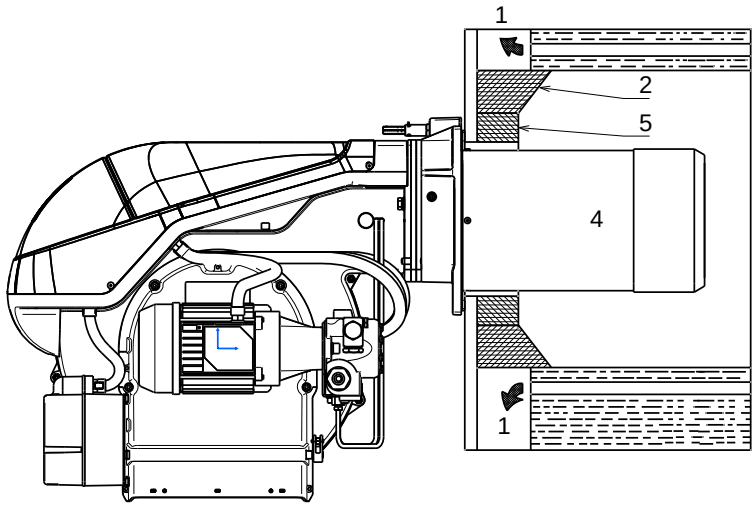
The firing rates were set in relation to special test boilers, according to EN 267 regulations.
Figure (B) indicates the diameter and length of the test combustion chamber.
Example:
RL 250 MZ burner
Output 1770 kW:
diameter 80 cm - length 3 m.

mm	A	B	C
RL 250 MZ	230	325 - 368	M16



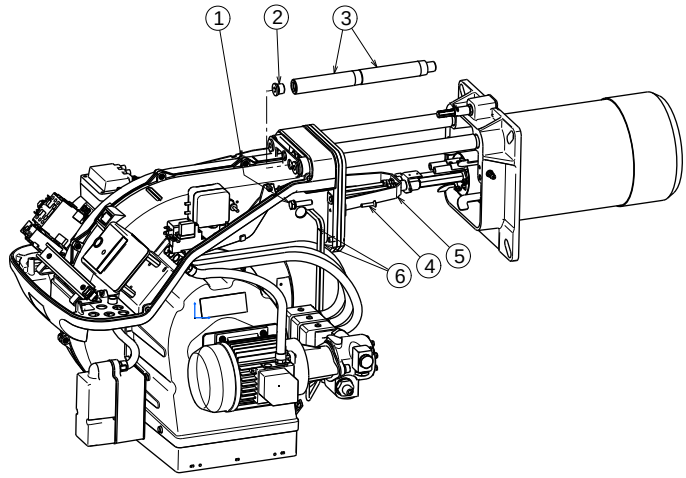
(A)

D455



(B)

D3945



(C)

D3946

Nozzle	GPH	kg/h			kW
		10 bar	12 bar	14 bar	12 bar
type **HAGO S-S 60°**	12.0	44.16	48.73	52.96	582.36
	13.0	47.84	52.79	57.38	630.89
	14.0	51.52	56.86	61.79	679.42
	15.0	55.20	60.92	66.20	727.95
	16.0	58.88	64.98	70.62	776.48
	17.0	62.57	69.04	75.03	825.01
	18.0	66.25	73.10	79.44	873.54
	19.0	69.93	77.16	83.86	922.07
	20.0	73.61	81.22	88.27	970.60
	22.0	80.97	89.34	97.10	1067.66
	24.0	88.33	97.47	105.93	1164.72
	25.0	92.00	101.53	110.34	1198.00
	26.0	95.69	105.59	114.75	1261.78
	28.0	103.05	113.71	123.58	1358.84
	30.0	110.41	121.83	132.41	1455.90
	32.0	117.77	129.95	141.24	1533.47
	34.0	125.13	138.08	150.06	1629.31
	35.0	128.81	142.14	154.48	1667.23

(D)

INSTALLATION

BOILER PLATE (A)

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

BLAST TUBE LENGTH (B)

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

For boilers with front flue passes 1) or flame inversion chambers, protective fettling in refractory material 5) must be inserted between the boiler fettling 2) and the blast tube 4).
This protective fettling must not compromise the extraction of the blast tube.
For boilers having a water-cooled front the refractory fettling 2)-5)(B) is not required unless it is expressly requested by the boiler manufacturer.

SECURING THE BURNER TO THE BOILER (B)

- Slip the thermal insulation screen (standard equipment) onto the blast tube 4) (B).
- Place entire burner on the boiler hole (arranged previously, see fig. (A), and fasten with the screws given as standard equipment. The coupling of the burner-boiler must be air-tight.

ACCESSIBILITY TO THE INTERIOR OF THE COMBUSTION HEAD (C)

- Remove the covering hood of the panel board.
- Loosen the screws 1).
- Remove the extensions 3) after loosening the cap 2).
- Remove the screws 4) and disconnect the light oil adduction tubes 6).
  Note: while unscrewing, some fuel may leak out.
- Extract the combustion head 5).

CHOICE OF NOZZLES FOR 1ST AND 2ND STAGE

Both nozzles must be chosen from among those listed in Table (D).
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.
As a rule the two nozzles have equal deliveries but the 1st stage nozzle may have a delivery less than 50% of the total delivery when a reduction of the counter-pressure peak is desired at the moment of starting (the burner allows good combustion rates also with a 33 - 100 % ratio between the 1st and 2nd stage).

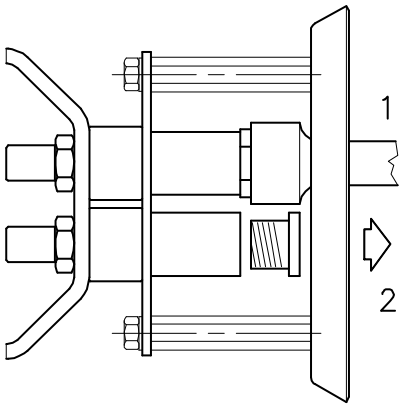
Example
Boiler output = 1630 kW - efficiency 90 %
Output required by the burner =
1630 : 0,9 =1812 kW;
1812 : 2 =906 KW per nozzle;

therefore, two equal, 60°, 12 bar nozzles are required:
1° = 18 GPH - 2° = 18 GPH,

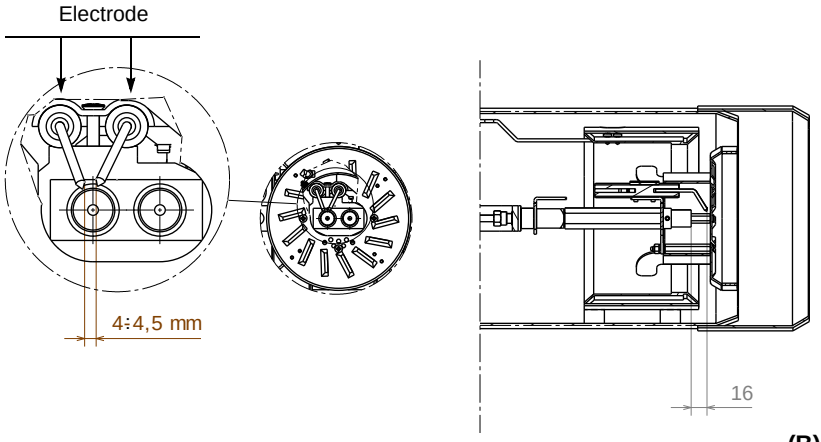
or the following two different nozzles:
1° = 15 GPH - 2° = 21 GPH.

NOTE: Instead of the nozzles given in tab. (D), you can use the following nozzle types:

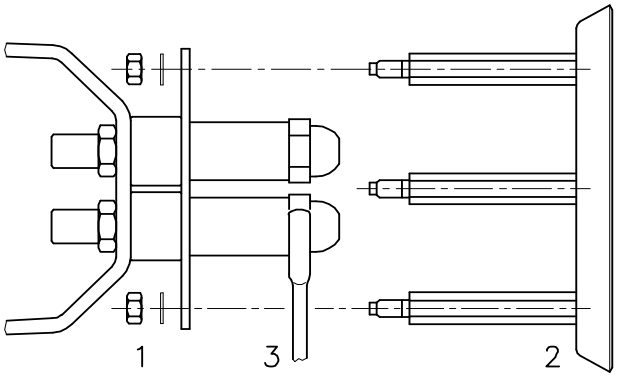
- **DELAVAN B 60°**;
- **MONARCH PLP 70°** (up to 30 GPH).



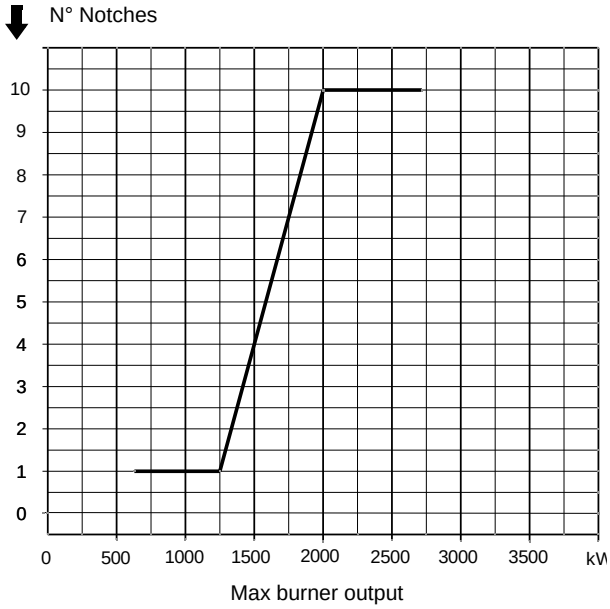
(A) D691



D3947 (B)



D1249 (D)



D3948 (E)

NOZZLE ASSEMBLY

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 nozzles 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).

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

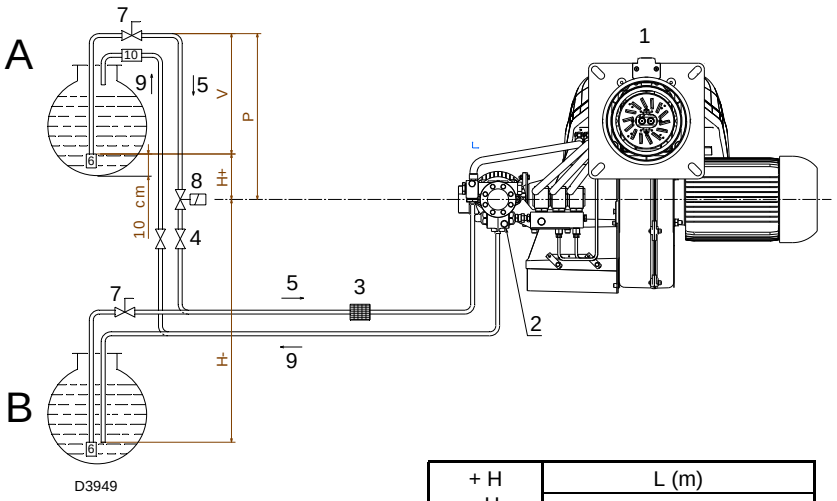
- Retract the burner on its slide bars as shown in fig. (C) page 7.
- Remove the nuts 1)(D) and the disk 2)(D).
- Use spanner 3)(D) to change the nozzles.

POSITION OF ELECTRODES (B)

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

COMBUSTION HEAD SETTING (E)

Turn screw 17)(A)p. 2 until the notch identified is aligned with the front surface of the line.



+ H - H (m)	L (m) Ø (mm) 12	14	16
+ 4,0	71	138	150
+ 3,0	62	122	150
+ 2,0	53	106	150
+ 1,0	44	90	150
+ 0,5	40	82	150
0	36	74	137
- 0,5	32	66	123
- 1,0	28	58	109
- 2,0	19	42	81
- 3,0	10	26	53
- 4,0	-	10	25

(A)

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 more improbable that the suction line fails to prime or stops priming.

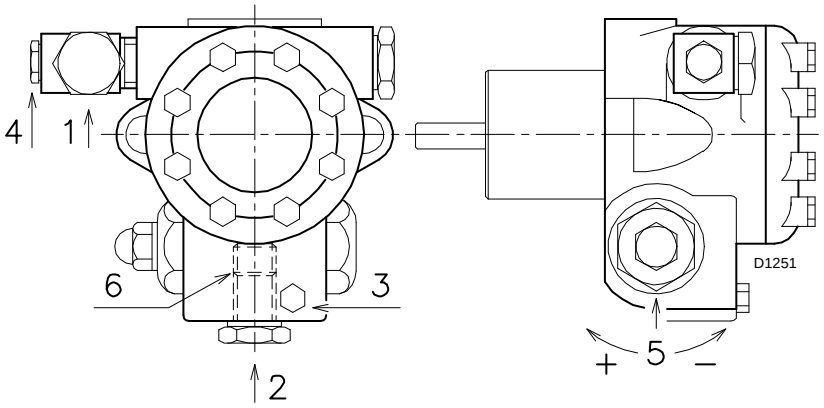
The loop circuit
A loop circuit consists of a loop of piping departing from and returning to the tank with an auxiliary pump that circulates the fuel under pressure. A branch connection from the loop goes to feed the burner. This circuit is extremely useful whenever the burner pump does not succeed in self-priming because the tank distance and/or height difference are higher than the values listed in the Table.
Note: We advise you to fit, on the loop circuit, an oil pressure switch connected to the thermostatic series. It will provide clearance to the burner only if there ispressure.

Key
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 (Italy only)
8 = On/off solenoid valve (Italy only
9 = Return line
10 = Check valve (Italy only)

HYDRAULIC CONNECTIONS

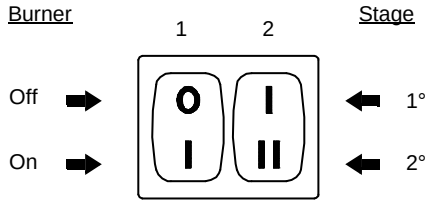
The pumps are equipped with a by-pass that connects return line and suction line. The pumps are installed on the burner with the by-pass closed by screw 6), see diagram page 14.
It is therefore necessary to connect both hoses to the pump.
The pump will break immediately if it is run with the return line 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.
Install the hoses where they cannot be stepped on or come into contact with hot surfaces of the boiler and where they do not hamper the opening of the burner.
Now connect the other end of the hoses to the suction and return lines by using the supplied nipples.

PUMP
SUNTEC TA 2



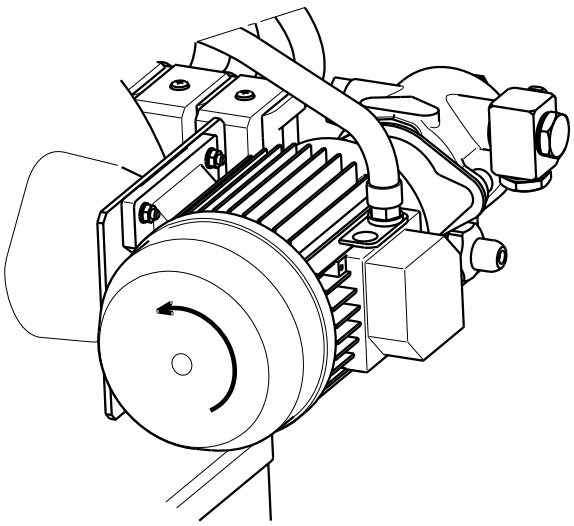
		J7 C
A	kg/h	230
B	bar	10 - 21
C	bar	0,45
D	cSt	2,8 - 200
E	°C	90
F	bar	1,5
G	bar	12
H	mm	0,170

(A)



(B)

ROTATION OF PUMP MOTOR



(C)

PUMP

1 - Suction	G 1/2"
2 - Return	G 1/2"
3 - Pressure gauge attachment	G 1/8"
4 - Vacuum meter attachment	G 1/8"
5 - Pressure adjustment screw	
6 - By-pass 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).
- For self-priming to take place, the screw 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 thermostats/ pressure switches, and with the switch 1)(B) in the "ON" position. The rotation of the pump motor must be as indicated in Fig.C.
- 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) 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. After 5 or 6 starting operations allow 2 or 3 minutes for the transformer to cool.
Do not illuminate the UV cell or the burner will lock out; the burner should lock out anyway about 10 seconds after it starts.

Important: 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

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 lock-out 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.

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

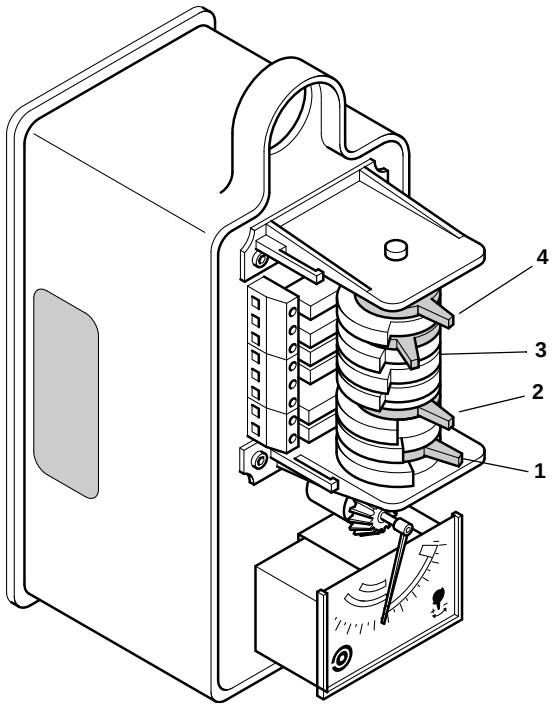
• 1st and 2nd stage nozzles
See the information listed on page 7.

• Combustion head
The adjustment of the combustion head already carried out (page 8) 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 adjustment is possible only if the surrounding temperature remains above 0 °C;
14 bar in order to increase fuel delivery or to ensure firings even at temperatures of less than 0 °C.
In order to adjust pump pressure, use the screw 5)(A).

• 1st and 2nd stage fan air gate valve
See adjustments page 11 (Servomotor).

SERVOMOTOR



D3958

SERVOMOTOR (A)
The servomotor, by means of connection mechanisms, simultaneously regulates air pressure and delivery and the flow of fuel in use.
It features adjustable cams that operate as many switches.

Cam **1**: **blue**
Limits servomotor travel to 0° position. With the burner off, the air damper is fully closed.

Cam **2**: **orange**
Adjusts the position of the air damper to 1st stage or pre-purging (factory set to 30° position).

Cam **3**: **red**
Adjusts air damper travel or 2nd stage operation without exceeding 90° (factory set to 90° position).

Cam **4**: **black**
Determines how early 2nd-stage valve is switched on.

WARNING
Under no circumstances should the **BLUE** cam be moved to the right, beyond the air damper closing position.
Under no circumstances should the **RED** cam be moved to the left beyond 90°.

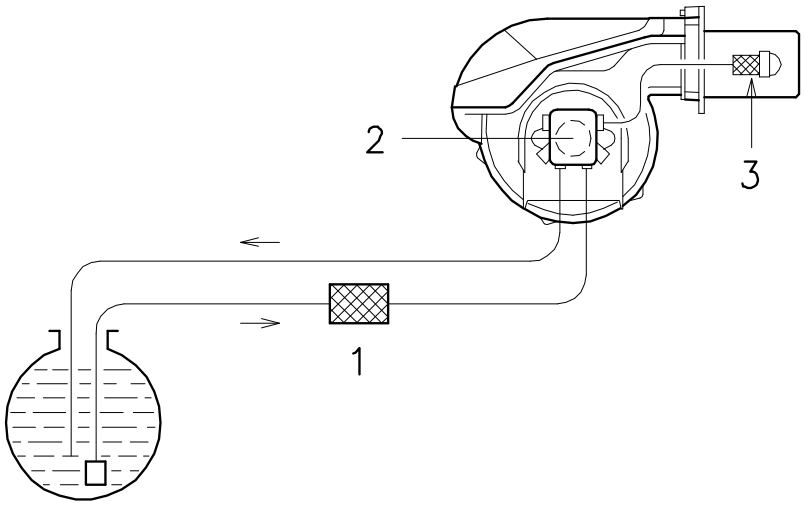
AIR PRESSURE SWITCH

(A) D3951

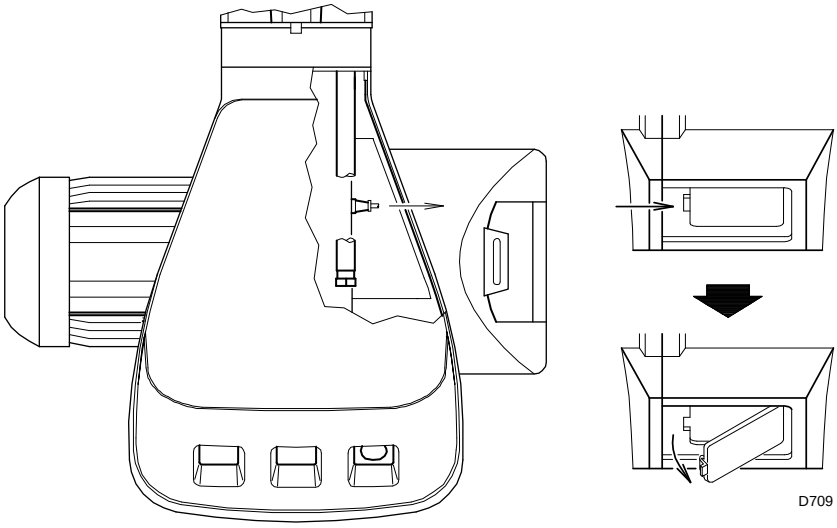
AIR PRESSURE SWITCH (A)
CO CHECK

Adjust the air pressure switch after having performed all other burner adjustments with the air pressure switch set to the start of the scale (A).

With the burner working at MIN output, insert a combustion analyser in the stack and slowly close the fan suction line inlet (for example, with cardboard) until the Bacharach index is equal to 2.
Slowly turn the appropriate knob clockwise until the burner goes into lockout.
Check the indication of the arrow pointing upwards on the graduated scale (A). Turn the knob clockwise again, until the value show on the graduated scale corresponds with the arrow pointing downwards (A), and so recovering the hysteresis of the pressure switch represented by the white mark on a blue background, between the two arrows.
Now check the correct start-up of the burner.
If the burner locks out again, turn the knob slightly in an anticlockwise direction.



(A) D707



D1254 D709

(B) **(C)**

FINAL CHECKS

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

MAINTENANCE

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 vacuum meter 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

Check the following filter boxes:
• on line 3) • in the pump 2) • at the nozzle , 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. Replace the nozzles every 2-3 years or whenever necessary. Combustion must be checked after the nozzles have been changed.

Photocell

Clean the glass cover from any dust that may have accumulated. Photocell 1) is held in position by a pressure fit and can therefore be removed by pulling it outward forcefully.

Flexible hoses

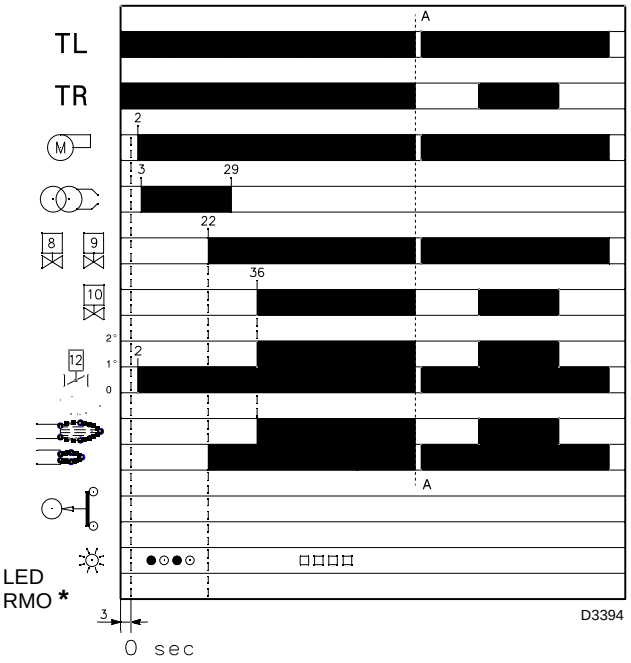
Check to make sure that the flexible hoses are still in good condition and that they are not crushed or otherwise deformed.

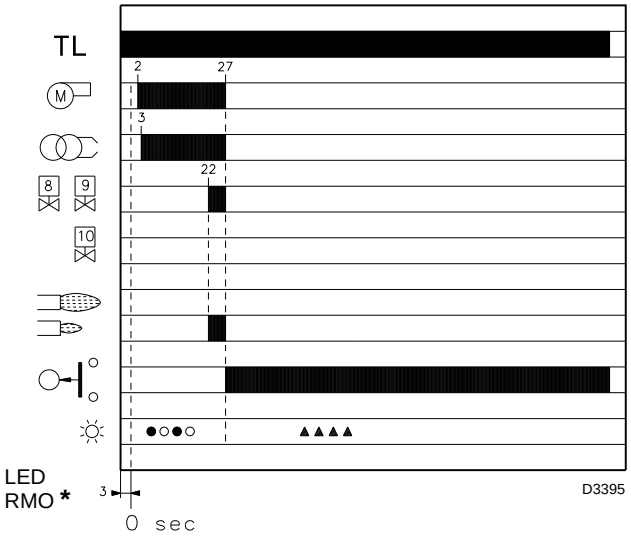
Fuel tank

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.

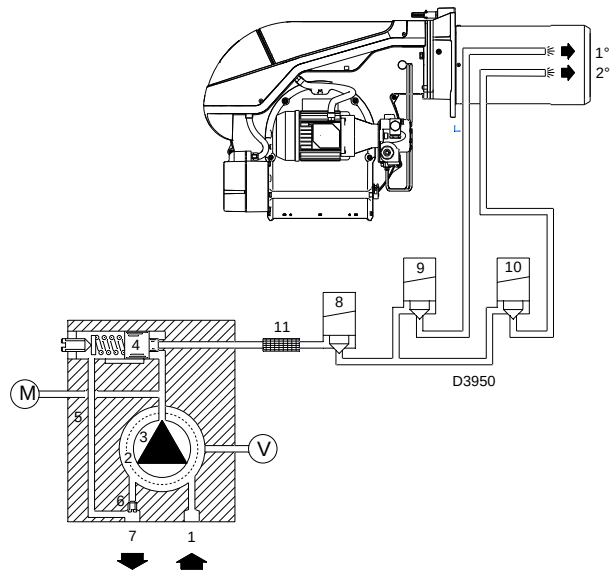




* ○ Off ● Yellow □ Green ▲ Red

For further details see page 15.

(A)



(B)

BURNER OPERATION

BURNER STARTING (A) - (B)

Starting phases with progressive time intervals shown in seconds:

- Thermostat/pressure switch TL closes. After about 3s:
- **0 s :** The control box starting cycle begins.
- **2 s :** The fan motor starts. Servomotor (12) starts, air damper opens in 1st stage position.
- **3 s :** The ignition transformer is connected. 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 heading towards suction and the solenoid valves 8) - 9) - 10), de-energized, close the passage to the nozzles.
  22 s : Solenoid valves 8) and 9) open and the fuel is sprayed out through the nozzle, igniting when it comes into contact with the spark. This is the 1st stage flame.
- **29 s:** The ignition transformer switches off.
- **36 s:** If the control device TR is closed or has been replaced by a jumper wire, the 2nd stage solenoid valve 10) opens and the servomotor moves the air damper to 2nd stage position. The starting cycle comes to an end.

STEADY STATE OPERATION

System equipped with one control device TR

Once the starting cycle has come to an end,set 0-auto-man selector to auto the command of the 2nd stage solenoid valve passes on to the control device TR that controls boiler temperature or pressure.

- When the temperature or the pressure increases until the control device TR opens, solenoid valve 10) closes, and the burner passes from the 2nd to the 1st stage of operation.
- When the temperature or pressure decreases until the control device TR closes, solenoid valve 10) opens, and the burner passes from the 1st to the 2nd stage of operation, and so on.
- The burner stops when the demand for heat is less than the amount of heat delivered by the burner in the 1st stage. In this case, the control device TL opens, and solenoid valves 8)-9) close, the flame immediately goes out. The fan's air gate valve closes completely.

Systems not equipped with control device TR (jumper wire installed)

The burner is fired as described in the case above. If the temperature or pressure increase until control device TL opens, the burner shuts down (Section A-A in the diagram).

FIRING FAILURE

If the burner does not fire, it goes into lock-out within 5 s of the opening of the 1st nozzle valve and 30 s after the closing of control device TL.
The control box red pilot light will light up.

UNDESIRED SHUTDOWN DURING OPERATION

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.

HYDRAULIC SYSTEM LAYOUT

1 Pump suction
2 Filter
3 Pump
4 Pressure governor (with cut-off system)
5 Return pipe
6 By-pass screw
7 Pump return
8 Safety solenoid
9 1st stage valve
10 2nd stage valve
11 Filter
M Pressure gauge
V Vacuometer

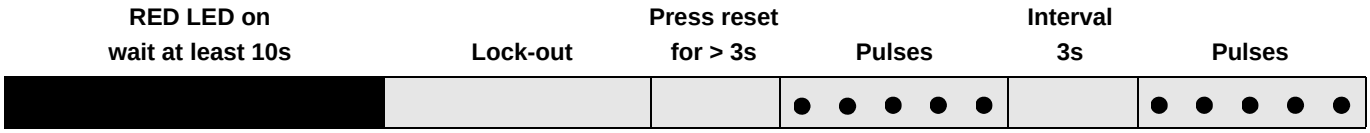
BURNER START-UP CYCLE DIAGNOSTICS

During start-up, indication is according to the followig 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 (**lock-out**), 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.



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 lock-out.
To view diagnostics, proceed as follows:

- Hold the button down for more than 3 seconds once the red LED (burner lock-out) 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 16.

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 lock-out) 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 lock-out 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 16.

In the event of a burner lockout, more than two consecutive burner reset operations could cause damage to the installation. On the third lockout, contact the Aftersales Service. If further lockouts or burner faults occur, interventions must only be made by qualified, authorised personnel (as indicated in this manual, and in compliance with the laws and regulations currently in force).

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

ACCESSORIES (optional)

• **STATUS** (see page 17)	Code **3010322**
• **DIAGNOSTICS INTERFACE KIT**	Code **3002719**
• **SILENCER BOX KIT**	Code **3000779**
• **LONG HEAD KIT**	Code **3010422**
• **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**

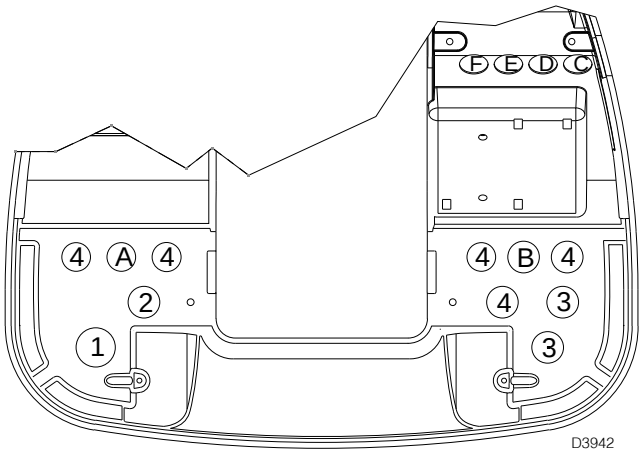
Electrical connections

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

All the wires to connect to the burner must enter through the supplied fairleads.
The fairleads and hole press-outs can be used in various ways; the following lists show one possible solution:

1 - Three-phase power supply
2 - Single-phase power supply
3 - Triggering / Safety devices
4 - Available

Cable grommets used in the factory:
A - Fan motor
B - Servomotor
C - Pump motor
D - Safety solenoid
E - 1st stage solenoid valve
F - 2nd stage solenoid valve



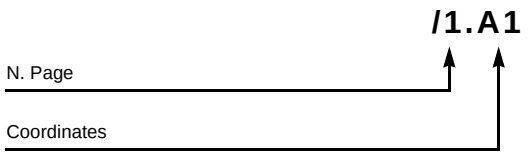
NOTES
The RL 250 MZ burner has been type- approved for intermittent operation. This means it shoulds compulsorily be stopped at least once every 24 hours to enable the control box to perform checks of its own efficiency at start-up. Burner halts are normally provided for automatically by the boiler load control system.
If this is not the case, a time switch should be fitted in series to IN to provide for burner shut-down at least once every 24 hours.

Wiring must be performed by qualified personnel in accordance with the regulations in force in the country of destination.
Riello S.p.a. declines all responsibility for changes or wiring performed in any way other than that illustrated in these diagrams.

WARNING
Do not invert the neutral with the phase wire in the electricity supply line.

Layout of electric panel board

2 **References layout**



CN **目录**

技术数据

型号			RL 250 MZ
类型			970 T
出力 (1) 流量 (1)	2 段火 (最小 - 最大)	kW kg/h	1250 ÷ 2700 106 ÷ 228
	1 段火 (最小)	kW kg/h	600 51
燃料			轻油
- 净热值		kWh/kg Mcal/kg	11.8 10.2 (10.200 kcal/kg)
- 密度		kg/dm^3	0.82 - 0.85
- 20 °C 时的粘度		mm^2/s	最大 6 (1.5 °E - 6 cSt)
运行			- 间歇式 (每 24 小时至少停机一次) - 两段火 (高 – 低火焰) 和单段火 (启动 - 停机)
喷嘴		数量	2
适用范围			热水锅炉、蒸汽锅炉、导热油炉
环境温度		°C	0 - 40
助燃空气温度		最高 °C	60
油泵	压力为 12 bar 时的出力 (kg/h) 压力范围 (bar) 燃料温度 (°C)		230 10 - 21 90
电功率消耗		最大 kW	7,2
电气保护等级			IP 54
符合 EC 标准			2004/108 - 2006/95 - 2006/42
噪音水平 (2)		dBA	85.4

(1) 参考条件：环境温度 20°C - 大气压力 1000 mbar - 海拔 100 m a.s.l.
(2) 噪声值于制造商实验室内的测试锅炉上测得，且燃烧器处于最大额定出力状态。

电源参数

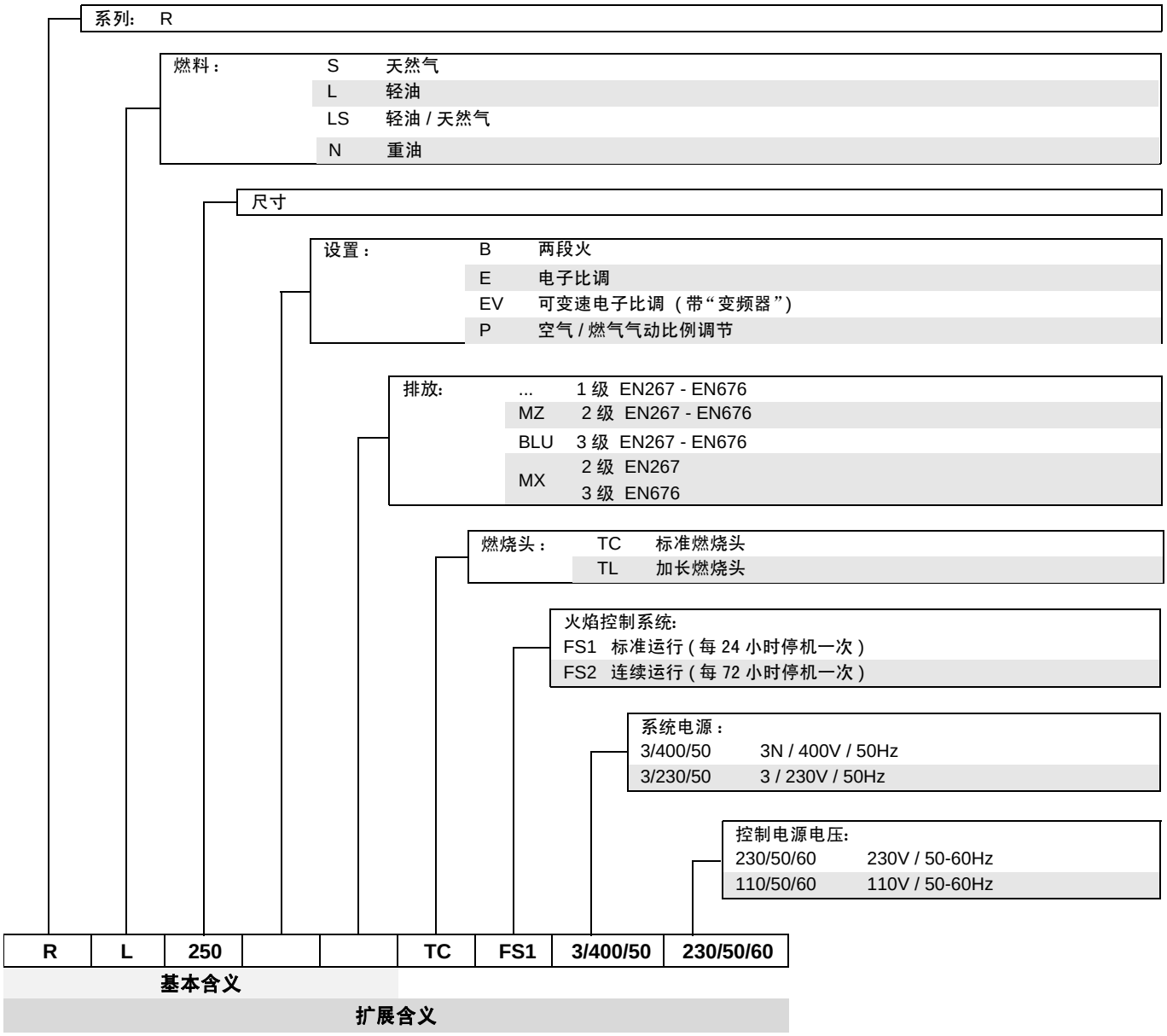
电机 IE1

型号		RL 250 MZ
电源	V/Ph/Hz	400/3/50
电源	V/Ph/Hz	230/1/50
马达	rpm W V A	2900 6600 230/400 24.3 - 14
点火变压器	V1 - V2 I1 - I2	230 V - 2 x 5 kV 1.9 A - 35 mA
电气保护等级	W max	7200
电气保护等级		IP 54

电机 IE2

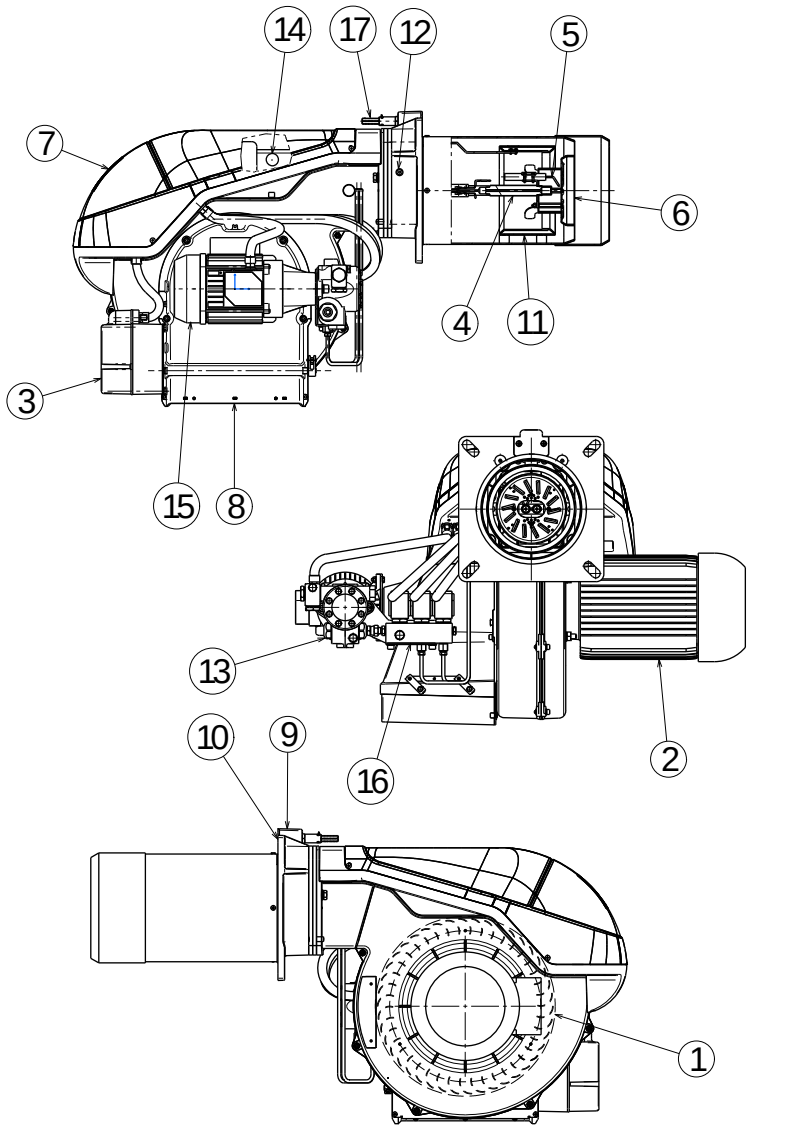
型号		RL 250 MZ
电源	V/Ph/Hz	400/3/50
电源	V/Ph/Hz	230/1/50
马达	rpm W V A	2900 7500 230/400 23.9 - 13.8
点火变压器	V1 - V2 I1 - I2	230 V - 2 x 5 kV 1.9 A - 35 mA
电气保护等级	W max	7200
电气保护等级		IP 54

RL 系列燃烧器含义

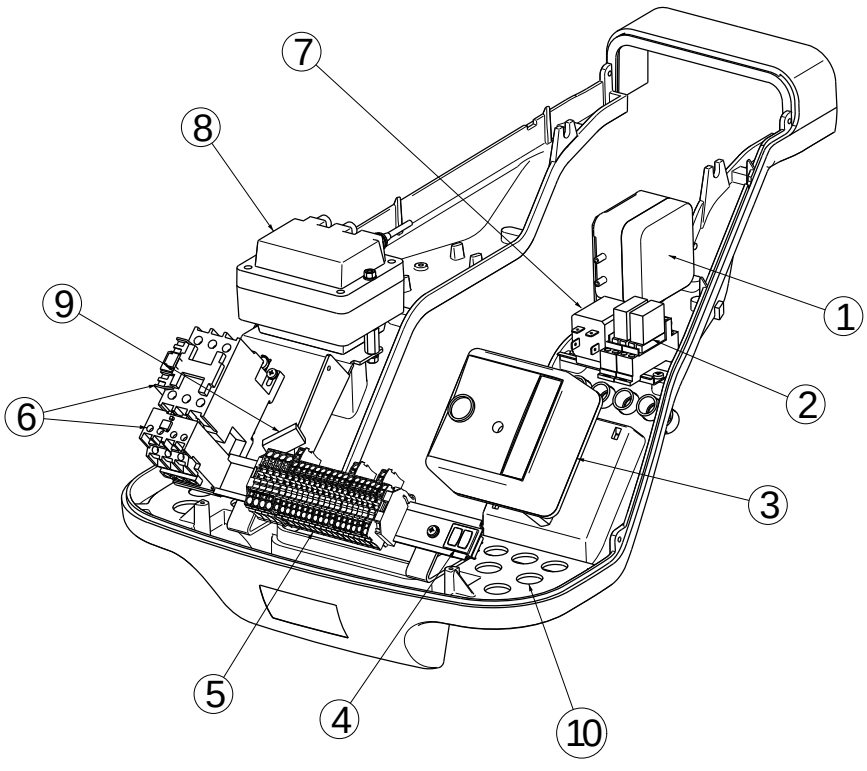


可订货型号列表

型号	电源	启动	编码
RL 250 MZ	400V-50Hz	直接启动	20044403



D3940 **(A)**



D3941 **(B)**

燃烧器描述 (A)

1 风机
2 风机电机
3 风门挡板伺服电机
4 燃烧头
5 点火电极
6 稳焰盘
7 配电盘 - 保护罩
8 风机进风口
9 多歧管
10 安装燃烧器到锅炉用隔热垫
11 调节阀
12 风压测试点
13 油泵
14 光电管
15 油泵电机
16 电磁阀组
17 调节燃烧头用螺丝

配电盘描述 (B)

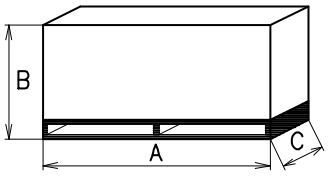
1 风压开关
2 无源触点继电器
3 控制盒
4 两个开关：
- 之一 “ 燃烧器停机 - 启动 ”
- 之二 “1 段火 - 2 段火运行 ”

5 主电源接线端子板
6 带复位按钮的电机接触器和热断路器
7 油泵电机继电器
8 点火变压器
9 “状态面板” 连接器
10 电缆和外部导线入口

注意

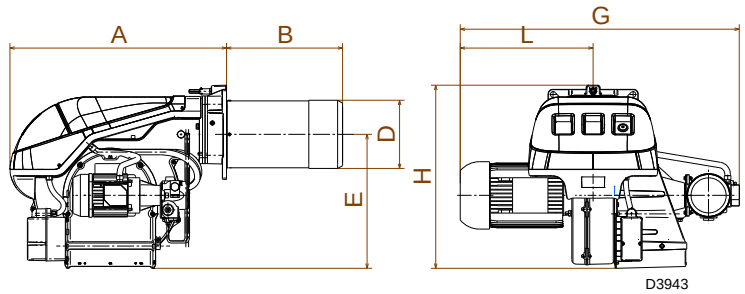
两种燃烧器故障：
控制盒锁定：如果控制盒 3)(B) 按钮 (**红色 led** 灯) 亮起，指示燃烧器锁定。
如需复位，按住该按钮 1–3 秒。
电机跳闸：按下热继电器上按钮可恢复供电。

mm	A	B	C	kg
RL 250 MZ	1400	725	1040	140

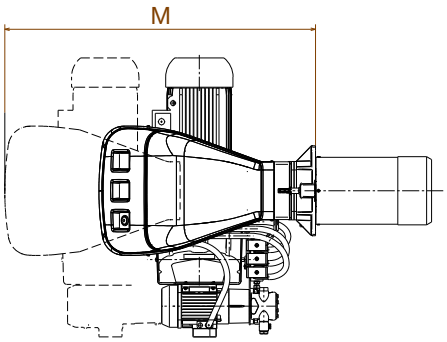


D36

(A)



D3943



mm	A	B	D	E	G	H	L	M
RL 250 MZ	705	378	222	436	910	596	432	1163

(B)

包装 - 重量 (A) - 大概值

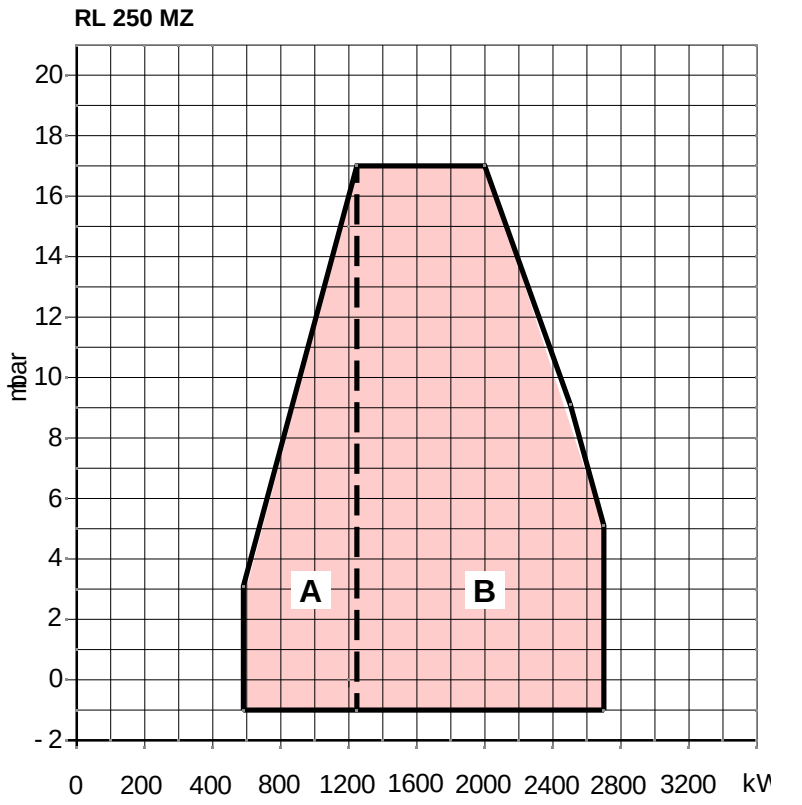
- 燃烧器整机放置于能由叉车吊起的木质底盘上。其带包装的外观尺寸如 表 (A) 所示。
- 燃烧器带外包装的整体重量如表 (A) 所示。

标准配置

1 - 隔热垫
4 - 将带法兰的燃烧筒安装到锅炉用螺丝：M 16 x 40
1 - 操作手册
1 - 零部件目录

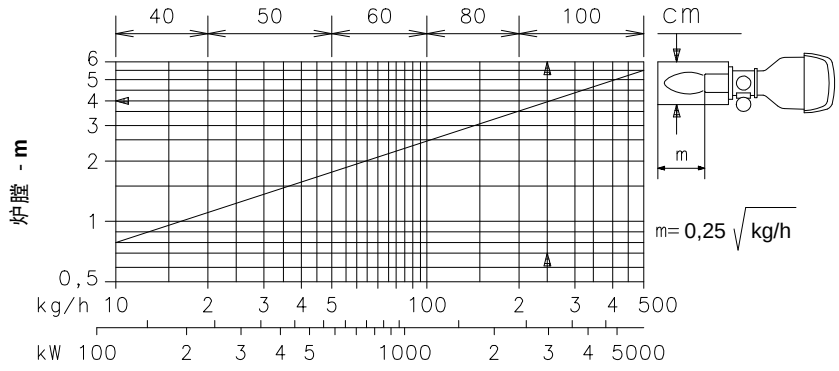
最大尺寸 (B) - 大概值

燃烧器最大尺寸如表 (B) 所示。
请谨记检查燃烧头时需要打开燃烧器，将其后部从滑杆上取下。
将燃烧器打开后，其不带外罩的最大尺寸如尺寸 M 所示。



D3944

(A)



D1637

(B)

出力范围 (A)

1 段火出力 必须在图中所示 A 区内选择。

2段火出力 必须在图中所示B区内选择。此区域反映了燃烧器最大出力与炉膛内压力的关系。

重要提示：出力范围内所示数值在以下条件下获得：环境温度为 20 °C，大气压力位 1000 mbar (大约海拔高度为100米)，燃烧头调整至如第8页所示状态。

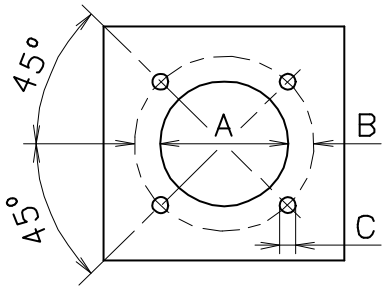
锅炉 (B)

若锅炉符合 CE 类的认证标准，且炉膛尺寸与图 (B) 所示相似，则燃烧器和锅炉相互匹配。
如果必须将燃烧器安装在未经 CE 认证的锅炉上且 / 或锅炉炉膛尺寸明显小于图 (B) 所示，请咨询制造商。

测试锅炉 (B)

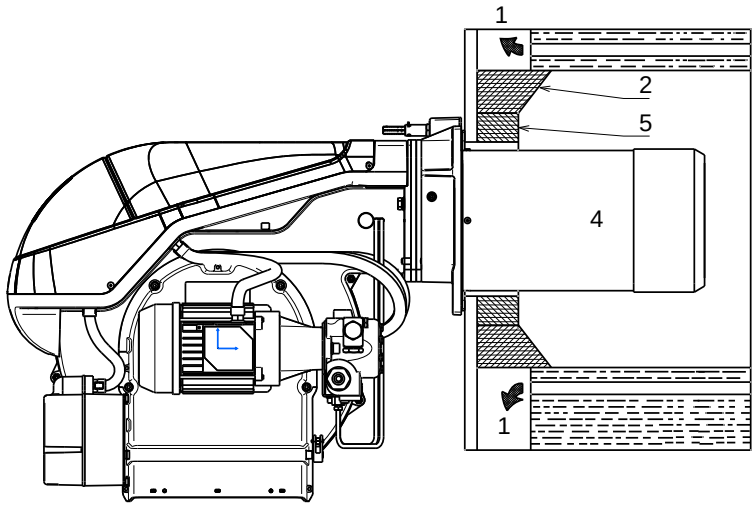
出力曲线根据 EN 676 标准在专用测试锅炉上获得。
图 (B) 为测试锅炉的炉膛直径及长度。
举例：
RL 250 MZ 型燃烧器
出力 1770 kW：
直径 80 cm - 长度 3 m。

mm	A	B	C
RL 250 MZ	230	325 - 368	M16



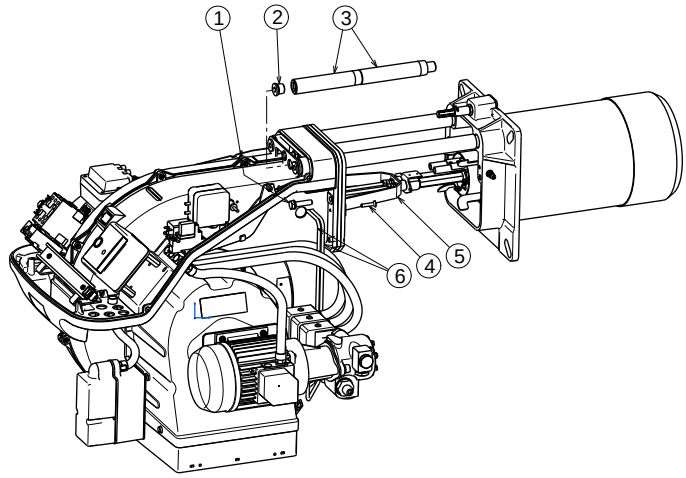
(A)

D455



(B)

D3945



(C)

D3946

喷嘴	GPH	kg/h			kW
		10 bar	12 bar	14 bar	12 bar
型号 **HAGO S-S 60°**	12.0	44.16	48.73	52.96	582.36
	13.0	47.84	52.79	57.38	630.89
	14.0	51.52	56.86	61.79	679.42
	15.0	55.20	60.92	66.20	727.95
	16.0	58.88	64.98	70.62	776.48
	17.0	62.57	69.04	75.03	825.01
	18.0	66.25	73.10	79.44	873.54
	19.0	69.93	77.16	83.86	922.07
	20.0	73.61	81.22	88.27	970.60
	22.0	80.97	89.34	97.10	1067.66
	24.0	88.33	97.47	105.93	1164.72
	25.0	92.00	101.53	110.34	1198.00
	26.0	95.69	105.59	114.75	1261.78
	28.0	103.05	113.71	123.58	1358.84
	30.0	110.41	121.83	132.41	1455.90
	32.0	117.77	129.95	141.24	1533.47
	34.0	125.13	138.08	150.06	1629.31
	35.0	128.81	142.14	154.48	1667.23

(D)

安装

锅炉法兰 (A)

如 (A) 所示，在锅炉门上钻孔。随燃烧器提供的隔热垫可帮助确定螺栓孔的位置。

燃烧筒长度 (B)

必须根据锅炉生产商提供的数据选择合适长度的燃烧筒，且在任何情况下其长度必须大于锅炉门加炉补的厚度之和。

带前烟道 1) 或中心回焰炉膛的锅炉，其使用耐火材料制成的保护性炉补 5) 必须装于锅炉炉补 2 和燃烧筒 4 之间。
此保护性炉补不得妨碍取下燃烧筒。

带水冷却前板的锅炉，则不需要耐火材料制成的炉补 2)-5)(B)，除非锅炉制造商另有要求。

固定燃烧器到锅炉上 (B)

- 将隔热垫 (标准配置) 安装到燃烧筒 4) (B) 上。
- 将燃烧器整体放置于锅炉安装孔上 (已操作完成，见图 (A))，拧紧螺丝，螺丝已包含在标准配置中。
  燃烧器 – 锅炉的连接必须达到气密水平。

燃烧头内部操作 (C)

- 取下面板保护罩
- 拧松螺丝 1)。
- 拧松保护盖 2) 后，取下加长部件 3)。
- 取下螺丝 4)，断开轻油吸油管 6)。
  注意：拧松螺丝时，可能会有一些燃油泄漏。
- 取出燃烧头 5)。

选择 1 段火和 2 段火喷嘴

两个喷嘴均需在表 (D) 中选择。
1号喷嘴控制燃烧器在1段火运行时的出力大小。
2 号喷嘴 与 1 号喷嘴一起控制燃烧器在 2 段火运行时的出力大小。
1 段火及 2 段火的出力大小必须在第 2 页所示的数值范围内。
建议压力为 12bar 时，喷嘴喷射角度为 60° 。
通常，两个喷嘴的出力大小相同。但在点火时，需要背压峰值降低，此时 1 号喷嘴出力可小于总出力的 50% 。(在 1 段火及 2 段火运行中，燃烧器在 33- 100 % 出力范围时，均可获得高燃烧率)。

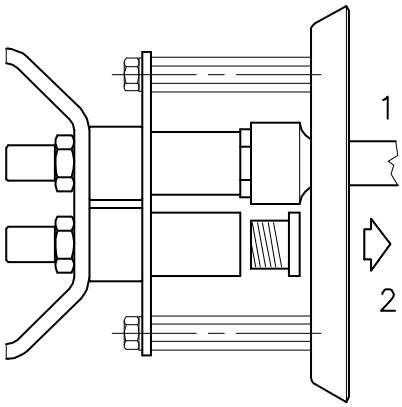
举例：
锅炉功率 = 1630 kW - 效率 90 %
燃烧器所需出力 =
1630 ：0,9= 1812 kW ；
1812 ：2 = 906 KW 每一喷嘴；

因此，两个相同喷嘴，喷射角度为 60°，气压为 12 bar，所需喷嘴为：
1° = 18 GPH - 2° = 18 GPH,

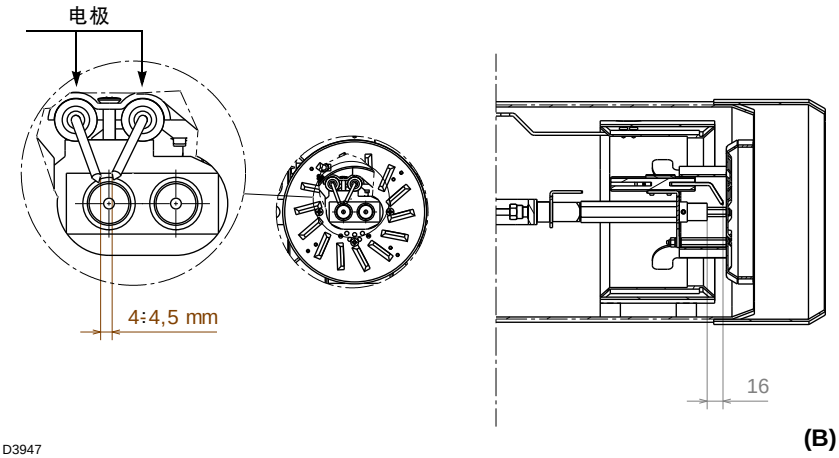
或者使用两个不同喷嘴：
1° = 15 GPH - 2° = 21 GPH。

注意：除了表 (D) 所列喷嘴，还可选择以下型号喷嘴：

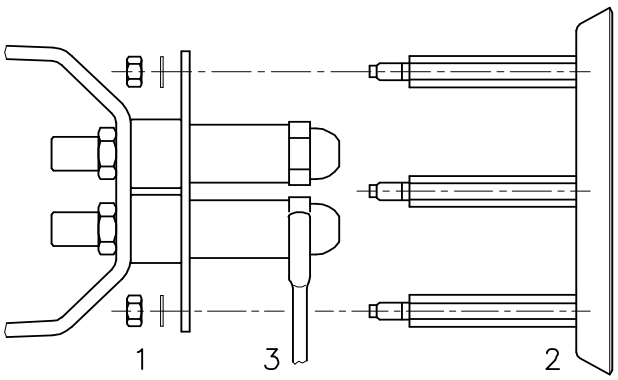
- **DELAVAN B 60°** ；
- **MONARCH PLP 70°** (至 30 GPH)。



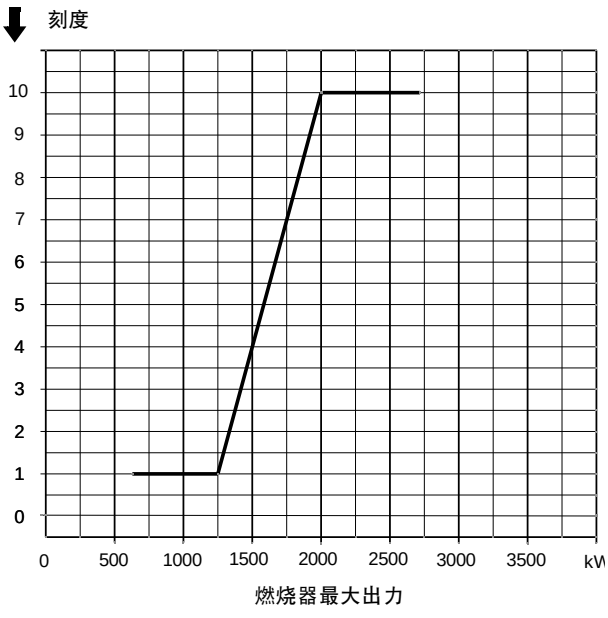
(A) D691



D3947 (B)



D1249 (D)



D3948 (E)

喷嘴安装

在取下塑料塞子 2)(A) 后，用 16 mm 扳手 1) (A) 安装两个喷嘴，将扳手伸入火焰稳定盘的中心孔。

请勿使用任何密封材料，如密封垫、复合密封材料或密封胶带。注意不要损坏喷嘴的密封座。安装时必须将喷嘴拧到位，但不要拧脱扣。

1 段火运行时的喷嘴位于点火电极下，如图 (B)

如果确需在燃烧器未从锅炉上拆下时更换喷嘴，则需按以下程序进行操作：

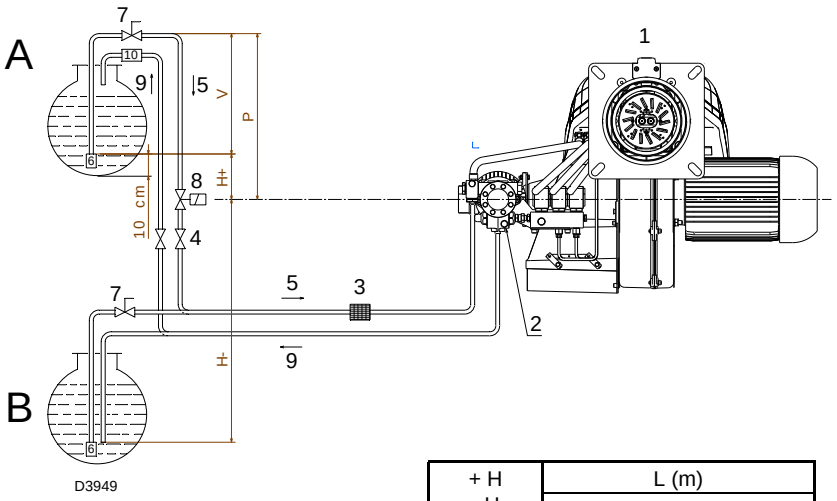
- 按图 (C) p. 7 所示，沿滑杆拉出燃烧器。
- 拆下螺母 1)(D) 和稳焰盘 2)(D)。
- 使用扳手 3)(D) 更换喷嘴。

电极位置 (B)

确认电极位置如图 (B) 所示。

燃烧头设定 (E)

拧紧螺丝 17)(A)p. 2 直至所标识刻度线与管线外缘平齐。



+ H - H (m)	L (m) Ø (mm)		
	12	14	16
+ 4,0	71	138	150
+ 3,0	62	122	150
+ 2,0	53	106	150
+ 1,0	44	90	150
+ 0,5	40	82	150
0	36	74	137
- 0,5	32	66	123
- 1,0	28	58	109
- 2,0	19	42	81
- 3,0	10	26	53
- 4,0	-	10	25

(A)

燃料供应

双管回路 (A)

燃烧器配置一台自吸泵，可对燃烧器自动送油。自吸泵的高度见左表。

高位油箱 **A**

为了避免破坏油泵密封，高度“P”不能超过 10 米；为了即使在油箱油量极少的情况下能也启动油泵，高度“V”不能超过 4 米。

低位油箱 **B**

油泵吸入口真空度不能超过 0.45 bar (35 cm Hg)，真空度过高会造成燃油汽化，油泵启动噪音大，且会降低油泵寿命。

保持燃烧器回油管和进油管在相同水平高度，这样可以避免进油管吸不到油。

循环回路

循环回路是一个闭合管路，燃油在压力下从油箱引出，经过一个循环油泵再回到油箱。从此闭合管路中引出一个支管来为燃烧器供油。这一循环回路在以下情况下特别有用，即当油箱距离太远或高度差大于表中所列数据，燃烧器不能自动注油启动时。

注意：建议在循环回路上安装一个油压开关串联到恒温器上。只有管路上有油压时，燃烧器才能启动运行。

图示

H = 油泵 / 底阀高度差
L = 管道长度
Ø = 管道内径
1 = 燃烧器
2 = 油泵
3 = 过滤器
4 = 手动 开 / 关 阀
5 = 进油管
6 = 底阀
7 = 远程控制快关手动阀 (仅限意大利)
8 = 开 / 关 电磁阀 (仅限意大利)
9 = 回油管
10 = 止回阀 (仅限意大利)

油管路连接

油泵配有旁路系统可以连接进油管和回油管。油泵安装在燃烧器上时，旁路系统被螺丝 6)(B) 封住，如第 14 页图所示。

需要连接两根软管到油泵上。

如回油管关闭且旁路系统螺丝为插入状态，此时运行油泵会立即损坏油泵。

拆下油泵入口及回油口的堵头。

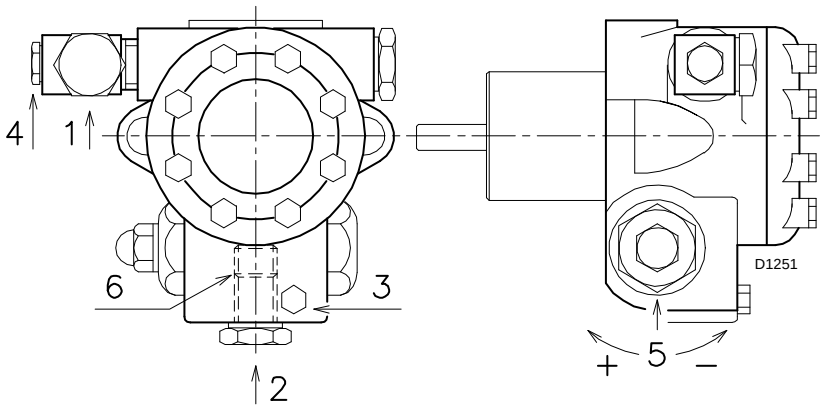
将所附的密封垫加入到连接管连接到油泵并拧紧。

注意安装软管时不要拉伸或扭曲软管。

软管应安装在不易被踩踏的位置，不能接触到锅炉的高温表面，亦不能妨碍打开燃烧器进行检修。

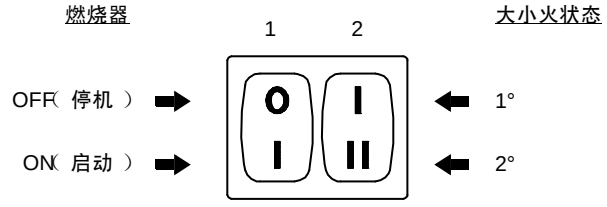
现在可以用随附的软管接头将软管的另一端与进油管路和回油管路相连接。

油泵
SUNTEC TA 2



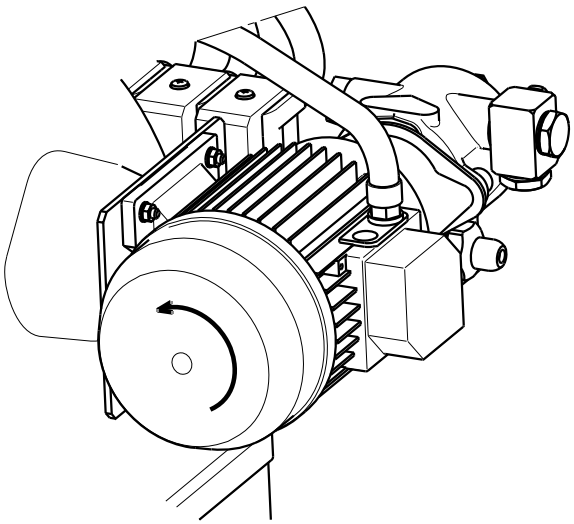
		J7 C
A	kg/h	230
B	bar	10 - 21
C	bar	0,45
D	cSt	2,8 - 200
E	°C	90
F	bar	1,5
G	bar	12
H	mm	0,170

(A)



(B) D469

油泵电机旋转方向



(C) D3959

油泵

1 - 进油管	G 1/2"
2 - 回油管	G 1/2"
3 - 压力表表座	G 1/8"
4 - 真空计表座	G 1/8"
5 - 压力调节螺丝	
6 - 旁路螺丝	

A - 气压为 12 bar 时的最小供油量
B - 供油压力范围
C - 油泵吸入口最大真空度
D - 粘度范围
E - 轻油最高温度
F - 最大进油及回油压力
G - 出厂时的压力校准
H - 过滤网宽度

油泵启动

- **启动燃烧器前，确认油箱回油管路畅通。回油管路堵塞可能损坏油泵轴上的密封圈。**（油泵出厂时旁路系统已被堵塞）。
- 启动自吸功能时，松开油泵上的螺丝 3)(A)，排出进油管路中的空气。
- 将开关1)(B)置于"ON"位置，将温控器/压力开关闭合，启动燃烧器。电机旋转方向必须与图 C 所示一致。
- 若从螺丝3)处有油漏出，则可认为油泵运行正常。将开关 1)(B) 置于“OFF”位置，关闭燃烧器，并拧紧螺丝 3)。

启动所需时间取决于进油管直径及长度。如果首次启动油泵失败且燃烧器锁定，等待大约 15 秒后，复位燃烧器，之后按规定的启动间隔再次启动燃烧器。启动 5 或 6 次后请间隔 2 至 3 分钟，以利于点火变压器的冷却。
不要遮挡光电管，否则燃烧器会锁定；燃烧器将在启动后 10 秒锁定。

重要提示：油泵在出厂时已经注满油。如果有油泻出，请从油泵的真空计表座处将油注满，否则会损坏油泵。当供油管的长度超过 20–30 米时，请另加一台独立的油泵。

燃烧器校准

点火
将开关 1)(B) 置于 "ON" 位置。
首次点火时，当 1 段火运行转换为 2 段火运行时，会因燃油需将 2 段火喷嘴管路注满而出现短暂的油压下降现象。这一压力的下降可能会导致燃烧器锁定，有时还会引起燃烧器震动。
如果能进行如下调整，燃烧器点火时的噪音就会接近其运行时的噪音。

运行
燃烧器的优化校核需要在锅炉排气口安装烟气分析仪，并对以下部分进行调整：

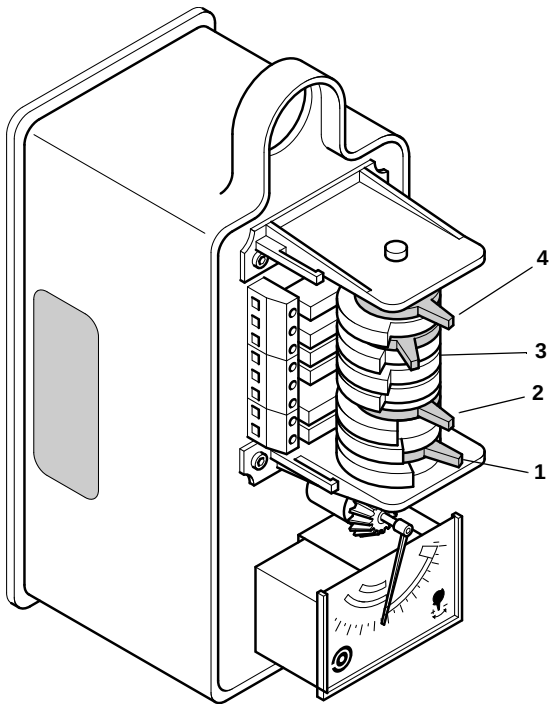
• 1 段火和 2 段火喷嘴
内容详见第 7 页。

• 燃烧头
除改变 2 段火时燃烧器的出力大小外，其它有关燃烧头调整之事宜按之前相关内容 (第 8 页) 进行操作。

• 油泵压力
12 bar：此压力位出厂时的预设值，可以满足大部分用户的需求。有些情况下，也需对此压力做出调整，如：
10 bar 在此压力下，可减小燃油输送量，但环境温度需在 0°C 以上。
14 bar 在此压力下，可增加燃油输送量。此压力可保证温度低于 0°C 时，燃烧器仍能点火启动。
调整油泵压力，可使用螺丝 5)(A)。

• 1 段火和 2 段火风门挡板
见第 11 页伺服电机的调节。

伺服电机



D3958

伺服电机 (A)
伺服电机，通过机械连接方式，同时调节风压、风量以及所需燃气量。
各种调节通过控制各开关的凸轮实现。

凸轮 1： 蓝
限定伺服电机角度至 0° 位置。燃烧器停机时，风门挡板完全关闭。

凸轮 2： 橙
调整风门挡板位置至 1 段火或预吹扫位置（工厂设定为 30° 位置）。

凸轮 3： 红
调节风门挡板至 2 段火运行位置，不超过 90°（工厂设定为 90°）。

凸轮 4： 黑
监测 2 段火阀门何时开启。

警告
在任何情况下，都不得将**蓝色**凸轮移至右侧，超过风门挡板关闭的位置。
在任何情况下，都不得将**红色**凸轮移至左侧，超过 90°。

风压开关

(A) D3951

风压开关 (A) - CO 检测

在进行上述燃烧器各部分调节时，风压开关置于量程 (A) 的开始位置。上述所有调整结束后，方可调节风压开关。

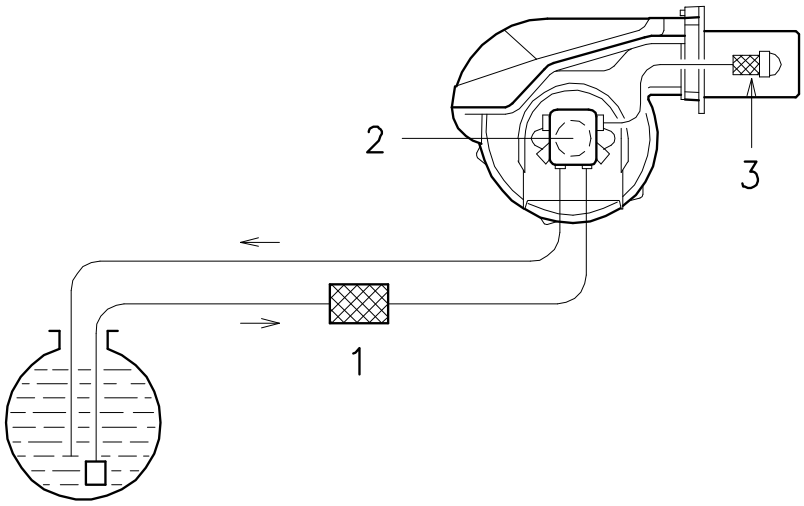
燃烧器处于最大出力时，在烟囱中插入一个烟气分析仪，然后缓慢减小风机入口（如可使用厚纸板遮挡），直至黑度 Bacharach 指数等于 2。

顺时针转动压力调节手柄，增大压力直至燃烧器锁定。

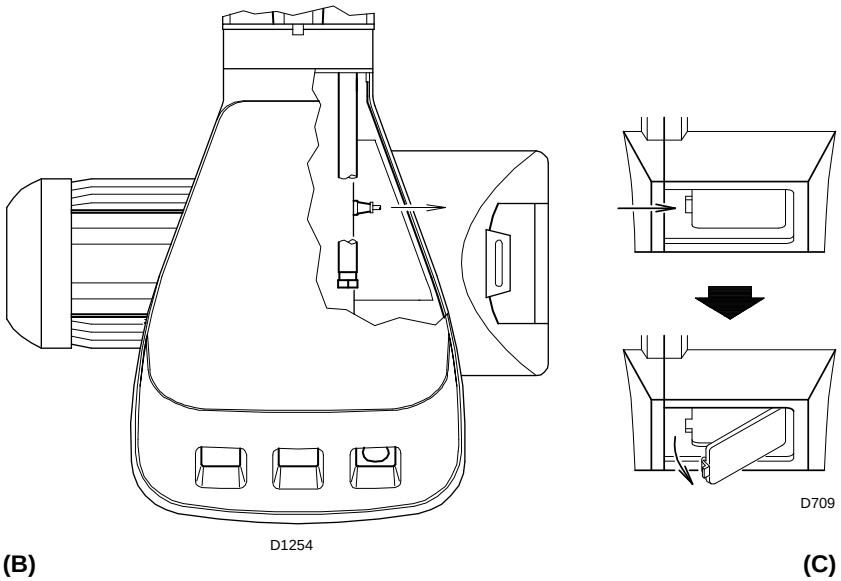
确认箭头向上所指刻度 (A) 位置。再次顺时针旋转手柄，直至刻度盘上所示值与箭头向下所指位置 (A) 一致，恢复压力开关的迟滞，用在两个箭头之间的蓝底白色标记显示。

重新检查燃烧器启动是否正确。

如果燃烧器再次锁定，将手柄逆时针旋转一点。



(A) D707



D1254

D709

(B) **(C)**

最终检查

- 遮蔽光电管，闭合温控器/压力开关：燃烧器应启动，然后在 1 段火电磁阀开启 5 秒后锁定。
- 照亮光电管，闭合温控器 / 压力开关：燃烧器应启动，且大约 10 秒后锁定。
- 燃烧器处于 2 段火运行时遮蔽光电管，应按顺序发生以下情况 ：火焰在 1 秒内熄灭，吹扫大约 20 秒，点火大约 5 秒，燃烧器锁定。
- 燃烧器运行时，断开安全控制装置 TS 后，再断开调节控制装置 TL：燃烧器应停机。

维护

燃烧

燃烧器的最优校准需要安装烟气分析仪。如果任何参数与之前测量数值出入较大，则需在维护时特别注意这些参数的校准。

油泵

输油压力必须保持在 12 bar。

压力损失 必须小于 0.45 bar。

油泵运行不应出现噪音异常。

如果出现压力不稳定或油泵运行时出现异常噪音，则必须将连接到管路过滤器上的软管拆下，并且将燃烧器旁油箱中的燃料抽干。采用此种方法可找出设备异常的原因：进油管异常或油泵异常。

如果油泵异常，检查确认过滤器有无污垢。真空计安装位置在燃料通过过滤器后，因此不能显示过滤器是否堵塞。

反之，如果是进油管路存在问题，需检查确认过滤器洁净以及管路中有没有空气。

过滤器

检查下列过滤器：

• 在管路处 3) • 在油泵处 2) • 在喷嘴处，如需要可进行清洁或更换。

如果油泵内出现污物或锈迹，需使用另外一台独立的泵将油箱底部的水或是污物抽干净。

风机

检查确认风机和风机叶片上没有污物或积灰，否则会造成风机空气流量减少并产生燃烧污染。

燃烧头

打开燃烧器，确认燃烧头所有部件状态良好，没有出现因高温变形或有污物附着其上等情况，且燃烧头位置正确。

喷嘴

不要清洁喷嘴开口处。如需要，2-3 年可更换一次喷嘴。更换喷嘴后必须重新检查燃烧状况。

光电管

清洁光电管外的玻璃罩上积累的灰尘。光电管通过压力固定安装，如需取下，可将其用力向外拉出。

软管

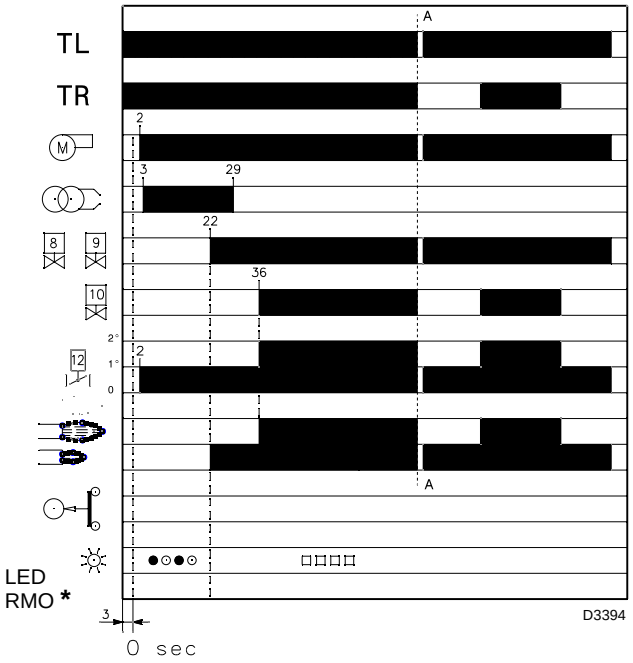
检查软管以确认其状态良好，没有遭碾压或出现变形的情况。

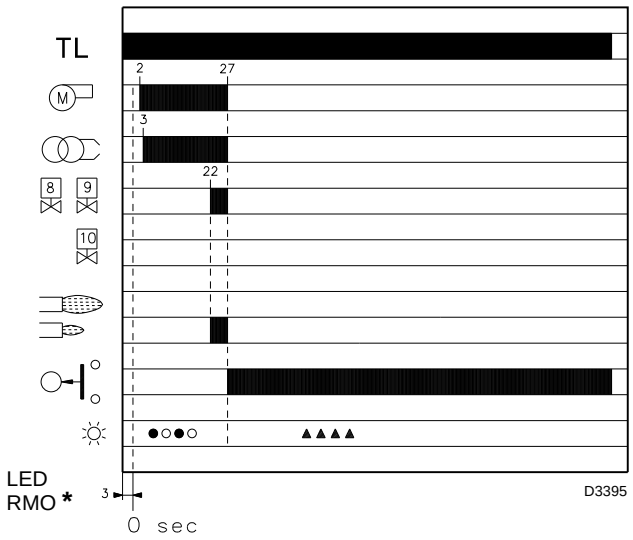
燃料箱

大约每 5 年，或任何必要时，用另一台泵将油箱底部的水或其它不洁杂质抽净。

锅炉

按照随附说明书清洁锅炉以保证其最初燃烧特性完好，特别是燃气温度和炉膛压力。

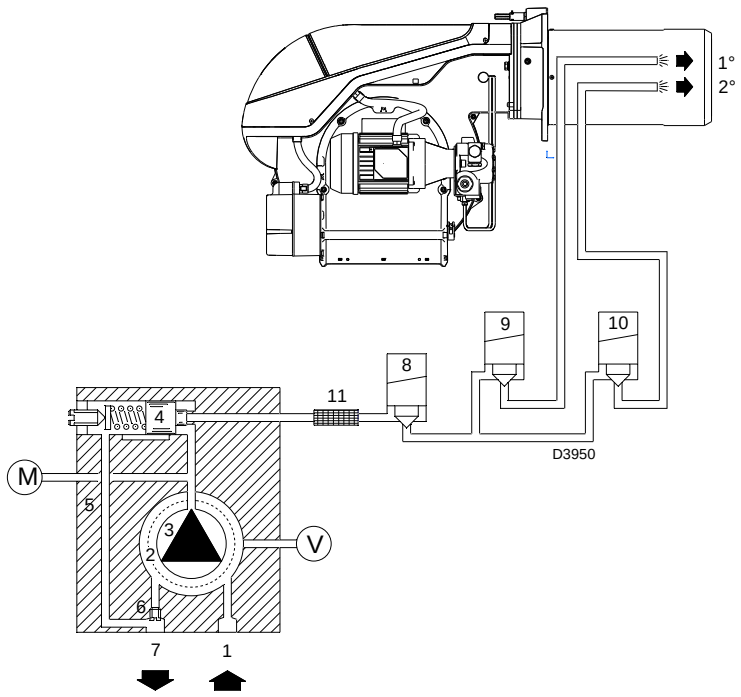




○ 停机　● 黄色　□ 绿色　▲ 红色

* 详细信息见第 15 页。

(A)



(B)

燃烧器运行

燃烧器启动 (A) - (B)

启动阶段中，程序时间以秒显示：

- 温控器 / 压力开关 TL 闭合。
  大约 3 秒后：
- **0 秒：**控制盒启动周期开始。
- **2 秒：**风机电机启动。伺服电机 (12) 启动，风门挡板开启至 1 段火位置。
- **3 秒：**点火变压器打火。
  油泵 3) 从油箱中吸入燃油，通过油管 1) 和过滤器 2)，在一定压力下将燃油输送到燃烧器。活塞 4) 抬升，燃油回流至油箱，通过油管 5) - 7)。螺丝 6) 切断通向进油口的旁路，电磁阀 8) - 9) - 10) 断电，关闭喷嘴通路。
  22 秒：电磁阀8)和9)开启，燃料从喷嘴喷出，遭遇火花时点燃。此为 1 段火火焰。
- **29 秒：**点火变压器断电。
- **36 秒：**如果控制装置 TR 闭合或 被一根跳线替换，2 段火电磁阀 10) 开启，伺服电机驱动风门挡板至 2 段火位置。启动周期结束。

稳定运行

装有控制装置 TR 的系统

一旦启动周期结束，设定 “停机 – 自动 – 手动” 转换器至自动，2段火电磁阀转由控制锅炉温度和压力的控制装置 TR 来控制。

- 当温度或压力增大直至控制装置 TR 断开，电磁阀 10) 闭合，燃烧器由 2 段火运行转至 1 段火运行。
- 当温度和压力降低至控制装置 TR 闭合，电磁阀 10) 断开，燃烧器由 1 段火运行转至 2 段火运行。以此类推。
- 如果热需求低于燃烧器1段火运行出力时提供的热量，则燃烧器停机。此时，控制装置 TL 断开，电磁阀 8)-9) 闭合，火焰立即熄灭。风机风门挡板完全关闭。

未装控制装置 TR 的系统 (装有跳线)

燃烧器按上述过程点火。如果温度或压力增大至控制装置TL开启，燃烧器停机(图中 A-A 部分)。

点火失败

如果燃烧器点不着火，将在 1 段火喷嘴阀开启 5 秒内或控制装置 TL 闭合 30 秒后锁定。

控制盒红色指示灯亮起。

运行中意外停机

如果运行中火焰熄灭，燃烧器会在 1 秒内自动熄灭，之后会自动重启启动周期。

油管路系统图例

1 油泵吸油口
2 过滤器
3 油泵
4 压力调节器 (带切断系统)
5 回油管
6 旁路螺丝
7 油泵回油管道
8 安全电磁阀
9 1 段火调节阀
10 2 段火调节阀
11 过滤器
M 压力计
V 真空计

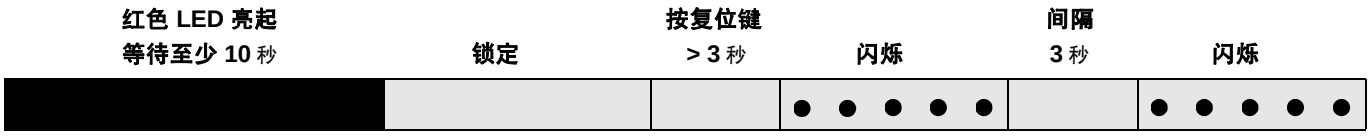
燃烧器启动周期诊断

启动阶段各项指示如下表：

颜色编码表	
顺序	**颜色编码**
预吹扫	●○●○●○●○●
点火阶段	●○●○●○●○●
运行，火焰良好	□□□□□□□□□
运行，火焰信号弱	□○□○□○□○□
电源电压低于 ~ 170V	●▲●▲●▲●▲●
锁定	▲▲▲▲▲▲▲▲▲
外部光源	▲□▲□▲□▲□▲
图例： ○ 停机	● 黄色 □ 绿色 ▲ 红色

复位控制盒及故障诊断

控制盒具有诊断功能，因此很容易确定故障原因 (指示器：**红色 LED**)。
要使用这一功能，必须等进入安全状态 (**锁定**) 至少 10 秒之后再按下复位键超过 3 秒。
控制盒会连续闪烁 (间隔 1 秒)，每组闪烁间隔 3 秒。
注意信号灯的闪烁次数，并确定可能的故障原因。复位需按住按钮 1-3 秒。



复位控制盒及进行诊断。

复位控制盒

复位控制操作程序如下：
- 按住按钮 1-3 秒。
  松开按钮 2 秒后，燃烧器重新启动。
  如果燃烧器未能启动，检查确认限位温控器闭合。

可视诊断

提示造成锁定的燃烧器故障类型。
可视诊断程序如下：
- 一旦红色 LED 灯常亮 (燃烧器锁定)，按下按钮超过 3 秒。
  黄色灯闪烁提示运行结束。
  一旦黄色灯闪烁，松开按钮。闪烁次数提示故障原因，可查阅第 16 页上的编码表。

软件诊断

通过红外线接口和 PC 机连接，可报告燃烧器运行时间，提示运行小时数、锁定次数及类型、控制盒序列号等内容。
软件诊断程序如下：
- 一旦红色 LED 灯常亮 (燃烧器锁定)，按下按钮超过 3 秒。
  黄色灯闪烁提示运行结束。
  松开按钮 1 秒，然后再按下按钮超过 3 秒，直至黄色灯再次闪烁。
  一旦松开按钮，红色 LED 灯会间歇式高频率闪烁：此时才能启动红外线连接，进行软件诊断。

一旦运行结束，必须通过上述复位过程恢复控制盒到初始状态。

按压按钮	控制盒状态
1-3 秒	无需进行可视诊断即可复位控制盒。
超过 3 秒	锁定时进行可视诊断： (LED 以 1 秒间隔闪烁)。
可视诊断开始后超过 3 秒	通过红外线接口和 PC 机进行软件诊断 (可查看运行小时数、故障类型等)

控制盒发出的闪烁信号可提示可能的故障类型，见第 16 页列表。


警告

在燃烧器锁定的情况下，连续进行两次以上燃烧器复位操作会导致设备损坏。
第三次锁定时，请联系售后服务部门。如果出现更多锁定或燃烧器故障，只能由具备相应资格且经过授权的人员来维修，并且要遵循本手册的指示和遵守现行的法律法规。

信号	故障	可能的故障原因	解决方案
无闪烁	燃烧器不启动	1 - 无电源 2 - 温控器 / 压力开关 TL 开启 3 - 温控器 / 压力开关 TS 开启 4 - 控制盒锁定 5 - 油泵堵塞 6 - 错误的电气连接 7 - 控制盒故障 8 - 电机故障	闭合所有开关 - 检查保险丝 调整或更换 调整或更换 复位控制盒 (锁定 10 秒后) 更换 检查电气连接 更换 更换
闪烁 2 次 ● ●	预吹扫和安全时间后，燃烧器锁定	9 - 油箱内无油；油箱底部有水 10 - 燃烧头和风门挡板调节不当 11 - 轻油电磁阀开启失败 (1 段火阀或安全阀) 12 - 1 段火喷嘴堵塞、脏或变形 13 - 点火电极脏或调整不当 14 - 由于点火电极电缆绝缘损坏而导致接地 15 - 高压电缆损坏或接地 16 - 高温使高压电缆变形 17 - 点火变压器故障 18 - 阀门或点火变压器电气连接错误 19 - 控制盒故障 20 - 油泵不能启动 21 - 油泵 / 电机联轴器损坏 22 - 油泵吸油管和回油管相通 23 - 安装于油泵上游的阀门关闭 24 - 过滤器脏：管路 – 油泵 – 喷嘴 25 - 光电管或控制盒故障 26 - 光电管脏 27 - 1 段火液压缸故障 28 - 电机电气保护启动 29 - 电机控制装置故障 30 - 缺相热断路器触发 31 - 电机旋转方向错误	油箱注油或将水从油箱中抽出 调整 检查电气连接；更换线圈 更换 调整或清洁 更换 更换 更换及保护 更换 检查 更换 启动油泵，并参看“油泵不能启动”一节 更换 正确连接 打开 清洁 更换光电管或控制盒 清洁 更换液压缸 复位热断路器 更换 确保三相连接后，复位热断路器 改变电机电气连接
闪烁 4 次 ● ● ● ●	燃烧器启动 然后锁定	32 - 光电管短路 33 - 外部光源或虚假火焰	更换光电管 消除光源或更换控制盒
闪烁 7 次 ● ● ● ● ● ● ●	火焰脱盘	34 - 燃烧头调整不当 35 - 点火电极脏或调整不当 36 - 风门挡板调整不当：风量过大 (1 段火运行时) 37 - 1 段火喷嘴过粗 (出油量不稳) 38 - 1 段火喷嘴过细 (火焰脱盘) 39 - 1 段火喷嘴脏或变形 40 - 油泵压力不当 41 - 1 段火喷嘴与燃烧器或锅炉不匹配 42 - 1 段火喷嘴损坏	调整 调整 调整 降低 1 段火喷嘴出力 增大 2 段火喷嘴出力 更换 调整压力范围至 10–14 bar 见喷嘴工作范围表，第 10 页：降低 1 段火 更换
	燃烧器不能转换至 2 段火运行	43 - 温控器 / 压力开关 TR 不能闭合 44 - 控制盒损坏 45 - 2 段火电磁阀线圈损坏 46 - 液压缸内活塞阻塞	调整或更换 更换 更换 更换整个组件
	燃料进入 2 段火阶段，但风门仍停在 1 段火阶段	47 - 油泵压力低 48 - 2 段火液压缸故障	增大 更换气缸
	燃烧器在 1 段火和 2 段火转换时停机。 燃烧器重启启动周期	49 - 喷嘴脏 50 - 光电管脏 51 - 风量过大	更换 清洁 减少
	燃料供应不稳定	52 - 检查是否为油泵原因 或燃料供应系统原因	从燃烧器附进的油箱输油到燃烧器
	油泵内生锈	53 - 油箱内有水	用另一台独立的泵将油箱底部的水抽干
	油泵噪音异常，压力不稳	54 - 输油管内进入空气 - 压力损失过大 (超过 35 cm Hg)： 55 - 油箱 / 燃烧器高度差过大 56 - 管路内径过小 57 - 吸油过滤器阻塞 58 - 吸油阀关闭 59 - 因低温燃油凝固	拧紧连接头 通过循环回路给燃烧器供油 增大 清洁 打开 向轻油中加入添加剂
	长时间停机后，油泵不能启动	60 - 回油管路中燃油不足 61 - 吸油管路中进入空气	注油至与进油管相同的高度 拧紧连接头
	油泵漏油	62 - 密封件发生泄漏	更换油泵
	火焰中有烟气 - 黑色 - 黄色	63 - 空气量不足 64 - 喷嘴磨损或脏 65 - 喷嘴过滤器堵塞 66 - 油泵压力不正常 67 - 稳焰盘脏、松或变形 68 - 锅炉房通风孔太小 69 - 风量过大	调整燃烧头或风门挡板 更换 清洁或更换 调整压力范围至 10 - 14 bar 清洁，加固，或更换 增大 调整燃烧头或风门挡板
	燃烧头脏	70 - 喷嘴或过滤器脏 71 - 喷嘴出力或角度不当 72 - 喷嘴松动 73 - 稳焰盘脏 74 - 燃烧头调整错误或风量不足 75 - 燃烧筒长度与锅炉不匹配	更换 见推荐喷嘴 加固 清洁 调整： 开大风门挡板 联系锅炉制造商
闪烁 10 次 ● ● ● ● ● ● ● ● ● ●	燃烧器锁定	76 – 连接或内部故障 77 - 出现电磁干扰	使用抗电磁干扰组件

配件（可选）

- **状态面板**（见第 17 页）　　编码 **3010322**
- **诊断界面组件**　　编码 **3002719**
- **消音柜**　　编码 **3000779**
- **加长燃烧头**　　编码 **3010422**
- **抗电磁干扰组件**
  安装“变频器”后，如果燃烧器的安装位置受电磁干扰（信号强度超过 10 V/m），或安装时温控器接线长度超过 20 米，需在控制盒和燃烧器间加装一个防护组件。　　编码 **3010386**

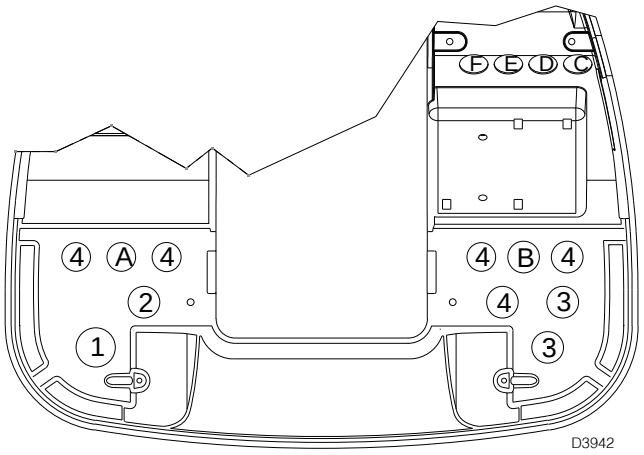
电气连接

使用符合 EN 60 335-1 标准的电缆。

所有连接到燃烧器接线端子板上的电缆都必须穿入随附的导缆孔。
导缆孔及备用孔可有多种用途，如：

1 - 三相电源
2 - 单相电源
3 - 触发 / 安全装置
4 - 备用

工厂中所使用的电缆护套：
A - 风机电机
B - 伺服电机
C - 油泵电机
D - 安全电磁阀
E - 1 段火电磁阀
F - 2 段火电磁阀



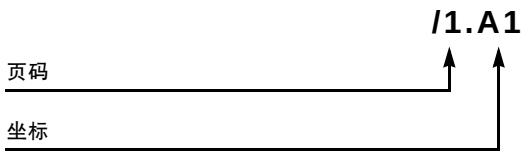
注意
RL 250 MZ 型燃烧器为间歇式运行即至少每 24 小时强制停机一次以便对控制盒进行自检，确保其功能的有效性。正常情况下，锅炉负荷控制系统会自动将燃烧器停机。
如果不是这种情况，则需在燃烧器中串联一个定时器以保证燃烧器至少每 24 小时停机一次。

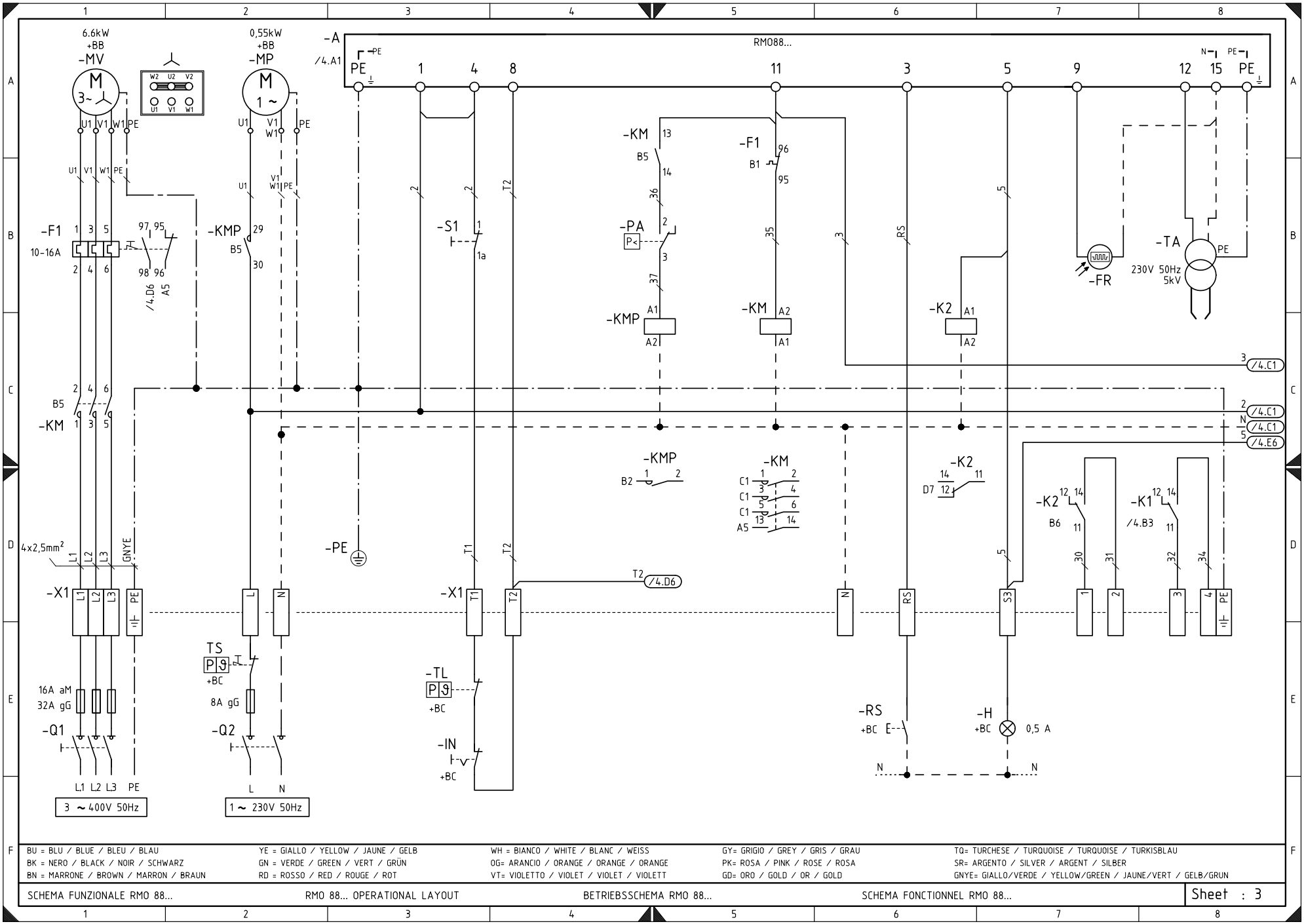
电气连接必须由具有资质的技术人员操作，且必须符合安装地的强制标准。
因改变本手册电气连接图或电气连接与图不符而造成的后果，利雅路公司将不承担任何责任。

警告
在电气连接中勿将零线与火线接反。

配电盘连接图

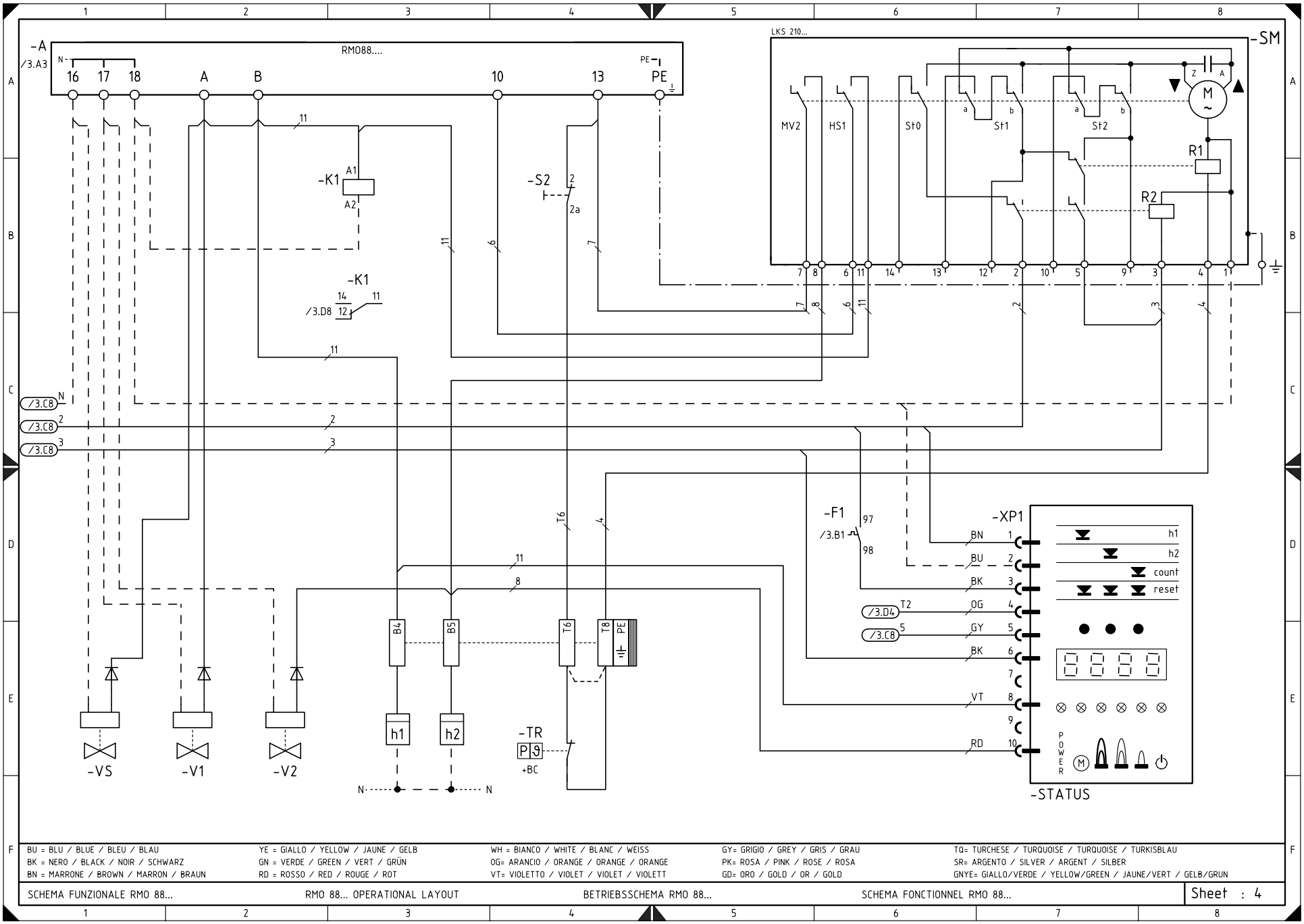
2 图例参考





BU = BLU / BLUE / BLEU / BLAU	YE = GIALLO / YELLOW / JAUNE / GELB	WH = BIANCO / WHITE / BLANC / WEISS	GY= GRIGIO / GREY / GRIS / GRAU	TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
BK = NERO / BLACK / NOIR / SCHWARZ	GN = VERDE / GREEN / VERT / GRÜN	OG= ARANCIO / ORANGE / ORANGE / ORANGE	PK= ROSA / PINK / ROSE / ROSA	SR= ARGENTO / SILVER / ARGENT / SILBER
BN = MARRONE / BROWN / MARRON / BRAUN	RD = ROSSO / RED / ROUGE / ROT	VT= VIOLETTO / VIOLET / VIOLET / VIOLETT	GD= ORO / GOLD / OR / GOLD	GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN

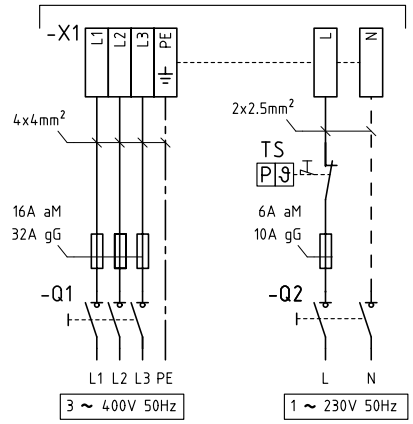
SCHEMA FUNZIONALE RMO 88...	RMO 88... OPERATIONAL LAYOUT	BETRIEBSSCHEMA RMO 88...	SCHEMA FONCTIONNEL RMO 88...	Sheet : 3



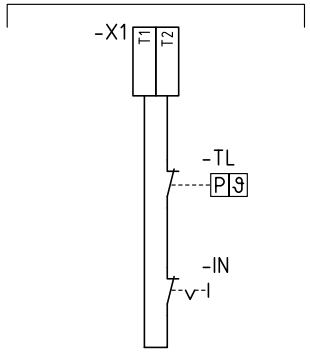
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN

SCHEMA FUNZIONALE RMO 88... | RMO 88... OPERATIONAL LAYOUT | BETRIEBSSCHEMA RMO 88... | SCHEMA FONCTIONNEL RMO 88... | Sheet : 4

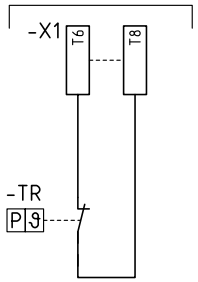
ELECTRICAL POWER



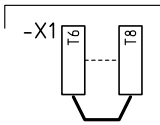
TRIGGERING/SAFETY DEVICES



POWER REGULATION I° II° STAGE

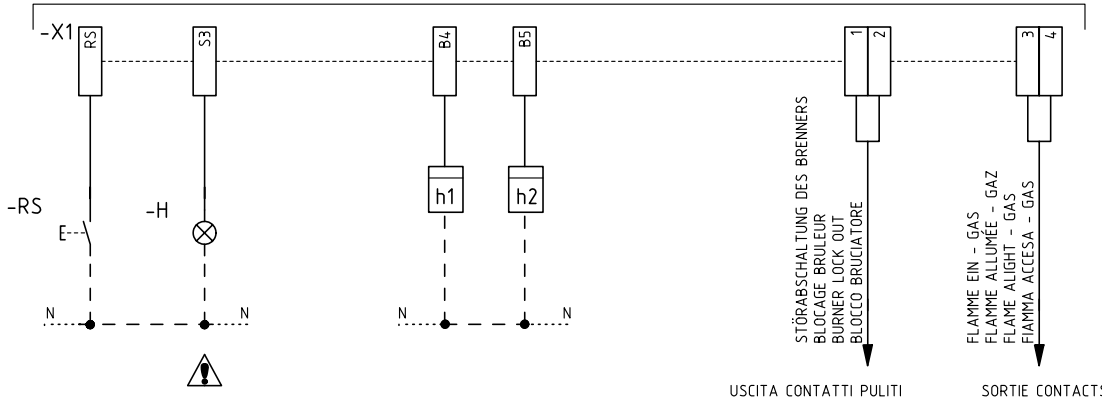


SINGLE STAGE OPERATION



NEL CASO DI INTERRUTTORE MAGNETOTERMICO SCEGLIERE IL TIPO C	EN CAS D' INTERRUPTEUR MAGNÉTOTHERMIQUE CHOISIR LE TYPE C
WITH A MAGNETO-THERMAL SWITCH CHOOSE TYPE C	IM FALLE EINES MAGNETOTHERMISCHEN SCHALTERS TYP C WÄHLEN

INDICATORS/ANCILLARIES



BU = BLU / BLUE / BLEU / BLAU	YE = GIALLO / YELLOW / JAUNE / GELB	WH = BIANCO / WHITE / BLANC / WEISS	GY= GRIGIO / GREY / GRIS / GRAU	TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
BK = NERO / BLACK / NOIR / SCHWARZ	GN = VERDE / GREEN / VERT / GRÜN	OG= ARANCIO / ORANGE / ORANGE / ORANGE	PK= ROSA / PINK / ROSE / ROSA	SR= ARGENTO / SILVER / ARGENT / SILBER
BN = MARRONE / BROWN / MARRON / BRAUN	RD = ROSSO / RED / ROUGE / ROT	VT= VIOLETTO / VIOLET / VIOLET / VIOLETT	GD= ORO / GOLD / OR / GOLD	GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN

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

Sheet : 5

KEY TO ELECTRICAL LAYOUT

A	-	Control box
F1	-	Fan motor thermal cut-out
FR	-	Photocell
H	-	Remote lock-out signal
h1	-	1st stage hourcounter
h2	-	2nd stage hourcounter
IN	-	Burner manual stop switch
K1	-	Burner on voltage free contact relay
K2	-	Burner lock-out voltage free contact relay
KMP	-	Pump motor relay
KM	-	Fan motor contactor
MP	-	Pump motor
MV	-	Fan motor
PA	-	Air pressure switch
PE	-	Burner ground
Q1	-	Three-phase disconnect switch
Q2	-	Single-phase disconnect switch
RS	-	Remote lock-out reset button
S1	-	Switch: burner off - on
S2	-	Switch: 1st - 2nd stage operation
SM	-	Servomotor
TA	-	Ignition transformer
TL	-	Limit pressure switch/thermostat
TR	-	Control pressure switch/thermostat
TS	-	Safety pressure switch/thermostat
X1	-	Main supply terminal strip
XP1	-	Connector for STATUS
VS	-	2nd stage solenoid valve
V1	-	1st stage solenoid valve
V2	-	Safety solenoid valve

电气接线图图例

A	-	控制盒
F1	-	风机电机热断路器
FR	-	光电管
H	-	远程锁定信号
h1	-	1 段火计时器
h2	-	2 段火计时器
IN	-	燃烧器手动停止开关
K1	-	燃烧器运行无源触点继电器
K2	-	燃烧器锁定无源触点继电器
KMP	-	油泵电机继电器
KM	-	风机电机接触器
MP	-	油泵电机
MV	-	风机电机
PA	-	风压开关
PE	-	燃烧器接地
Q1	-	三相关断开关
Q2	-	单相关断开关
RS	-	远程锁定复位按钮
S1	-	开关：燃烧器停机 – 启动
S2	-	开关：1 段火 - 2 段火运行
SM	-	伺服电机
TA	-	点火变压器
TL	-	压力限位开关 / 温控器
TR	-	压力控制开关 / 温控器
TS	-	压力安全开关 / 温控器
X1	-	主电源接线端子板
XP1	-	连接器状态
VS	-	2 段火电磁阀
V1	-	1 段火电磁阀
V2	-	安全电磁阀

Registered Office - 公司注册所在地 :
RIELLO S.p.A.
I-37045 Legnago (VR)
Tel.: +39.0442.630111
http:// www.riello.it
http:// www.rielloburners.com

Manufacturing site:
Riello Heating Equipment (Shanghai) CO., LTD
No. 388, Jinbai Road - Jinshan Industrial Zone
201506 - Shanghai
CHINA

生产场所 :
Riello Heating Equipment (Shanghai) CO., LTD
利雅路热能设备 (上海) 有限公司
上海市金山工业区金百路 388 号