

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
20033838	AL 34 MZ	972 T
20033830	AL 44 MZ	973 T

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 5 March 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 responsibility for any damage to persons, animals or property due to errors in installation or in the burner adjustment, or due to improper or unreasonable use or non-observance of the technical instructions enclosed with the burner, or due to the intervention of unqualified personnel.

USER INFORMATION

If faults arise in firing or operation, the burner performs a "safety stop", which is signalled by the red burner lockout LED. To rearm start-up conditions, press the reset button. When the burner starts up again, the red LED goes out.

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

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 covered up 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.

TECHNICAL DATA page 2
Variants 2
Accessories 2
Burner description 3
Packaging - Weight 3
Max. dimensions 3
Standard equipment 3
Firing rates 4
Test boiler 4

INSTALLATION 5
Operating position 5
Boiler plate 5
Blast tube length 5
Securing the burner to the boiler 5
Choice of nozzles for 1st and 2nd stage 6
Nozzle assembly 7
Combustion head adjustment 8
Hydraulic system 9
Pump 10
Pump priming 10
Burner calibration 11
Burner operation 12
Final checks 13
Maintenance 13
Burner start-up cycle diagnostics 15
Resetting the control box and using diagnostics 15
Faults - Possible causes - Solutions 16

APPENDIX 17
Electrical wiring 17
Electrical panel layout 18

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 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, recommends the draw-ing up of a Maintenance Contract.

TECHNICAL DATA

MODEL			AL 34 MZ	AL 44 MZ
TYPE			972 T	973 T
POWER ⁽¹⁾ OUTPUT ⁽¹⁾	2nd stage	kW	154 - 395	235 - 485
		Mcal/h	132 - 340	204 - 418
		kg/h	13 - 33,6	20 - 41
	1st stage	kW	97 - 154	155 - 235
		Mcal/h	83 - 133	133 - 204
		kg/h	8,3 - 13	13 - 20
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			<ul style="list-style-type: none"> 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% Hz 50/60 - single-phase	
ELECTRIC MOTOR		rpm W V A	2800 300 220 - 240 2,4	2800 420 230 2,65
MOTOR CAPACITOR		µF/V	12.5/450	16/425
IGNITION TRANSFORMER		V1 - V2 I1 - I2	230 V - 2 x 12 kV 0.2 A - 30 mA	
PUMP output (at 12 bar)		kg/h	45	67
pressure range		bar	7 - 14	10 - 20
fuel temperature		°C max	60	60
ELECTRICAL POWER CONSUMPTION		W max	600	700
PROTECTION LEVEL			IP40	
IN CONFORMITY WITH DIRECTIVES			2006/42/EC - 2014/30/UE - 2014/35/UE	
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

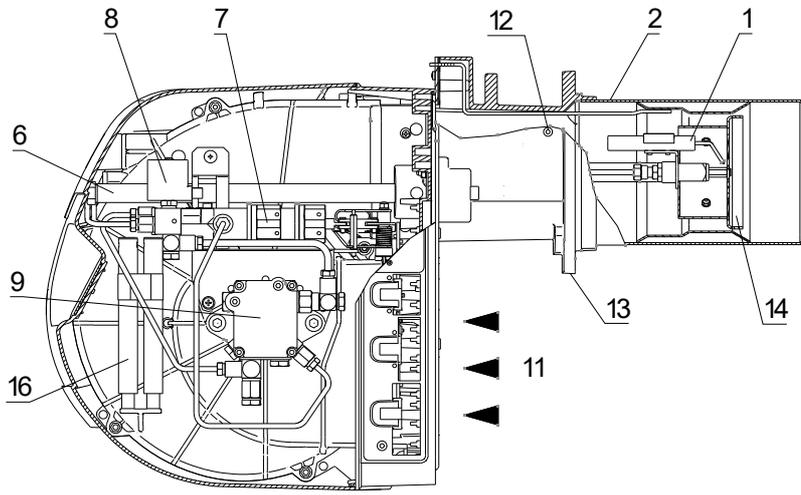
Model	Code	Electrical supply	Blast tube length mm
AL 34 MZ	20033838	single-phase	216
AL 44 MZ	20033830	single-phase	216

ACCESSORIES (optional):

• LONG HEAD KIT:

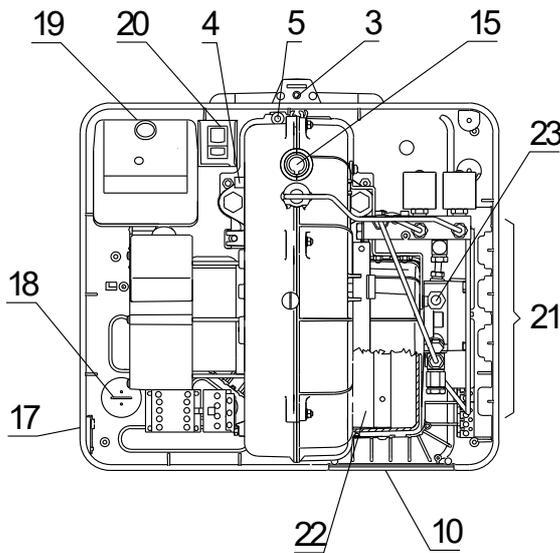
Burner	AL 34 MZ	AL 44 MZ
	Code 3010426	Code 3010425

• 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



BURNER DESCRIPTION (A)

- 1 Ignition electrodes
- 2 Combustion head
- 3 Screw for combustion head adjustment
- 4 Photocell 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 Plate prearranged to drill 2 holes for the passage of hoses
- 18 Motor capacitor
- 19 Control box with lockout pilot light and lockout 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.



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.

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.

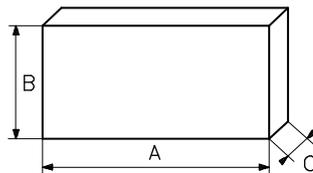
The maximum dimensions of the burner are given in (C).
 Bear in mind that inspection of the combustion head requires the burner to be opened and the rear part withdrawn on the slide bars.
 The maximum dimension of the burner, without casing, when open is given by measurement O.

STANDARD EQUIPMENT

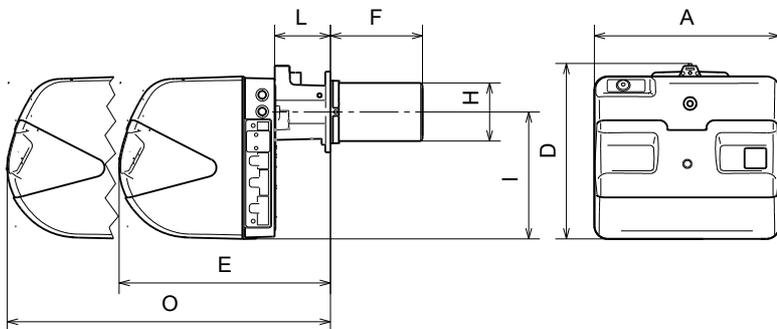
- 2 - Flexible hoses
- 2 - Gaskets for flexible hoses
- 2 - Nipples for flexible hoses
- 1 - Thermal insulation screen
- 2 - Extensions 16)(A) for slide bars 6)(A)(for model with 351 mm blast tube)
- 4 - Screws to secure the burner flange to the boiler: M 8 x 25
- 2 - Plugs for electrical connections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

(A)

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



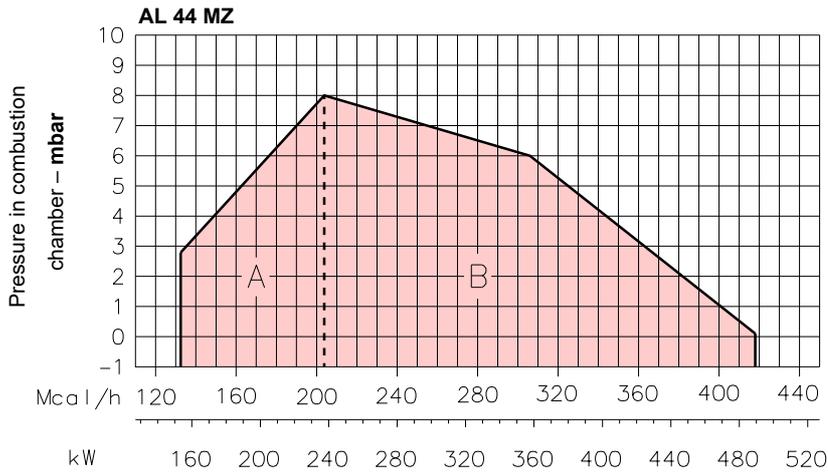
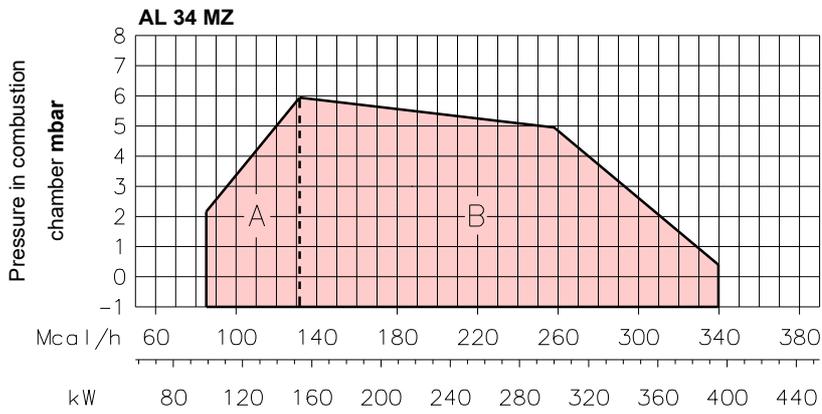
(B)



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

(1) Blast tube: short-long

(C)



FIRING RATES (A)

The AL 34 MZ - AL 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 are 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)

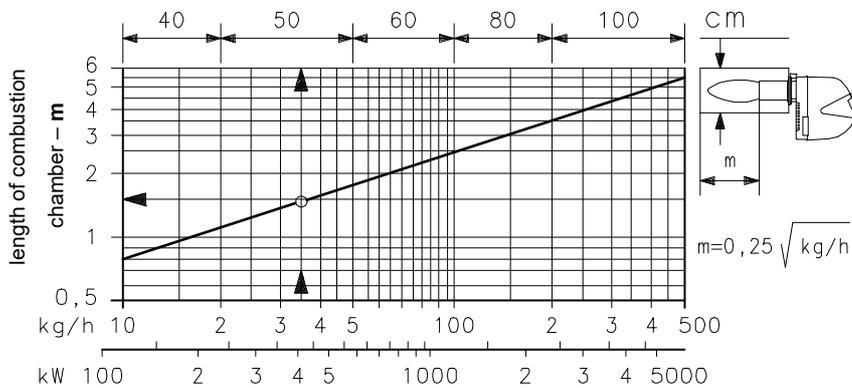
The firing rate was set in relation to special test boilers in accordance with the methods defined in EN 267 standards.

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

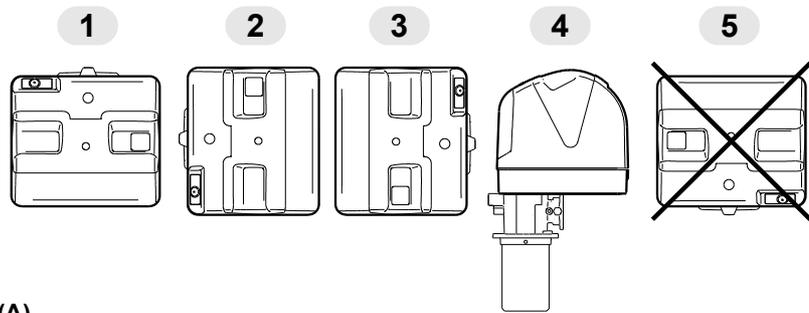
Example Output 35 kg/hour:
diameter = 50 cm; length = 1.5 m.

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

(A)

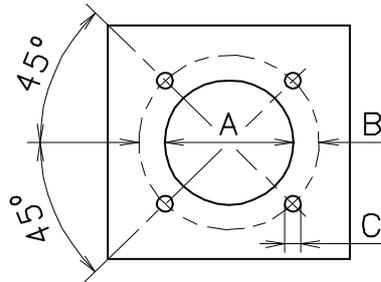


(B)

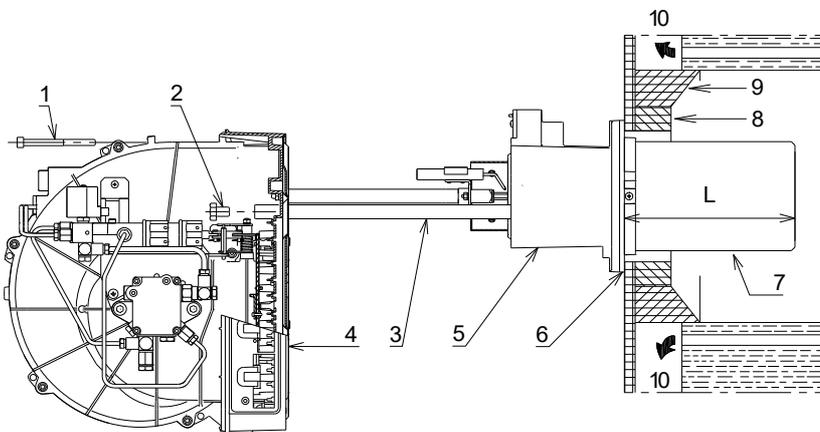


(A)

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



(B)



(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):	AL 34 MZ	AL 44
• short	216	MZ 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.

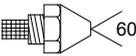
For boilers having a water-cooled front the refractory fettling 8)-9)(C) is not required unless it is expressly requested by the boiler manufacturer.

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.

 60	GPH	kg/h (1)			kW 12 bar	Nozzles recommended
		10 bar	12 bar	14 bar		
AL 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	
AL 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 manufacturer 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 manufacturer and inadequate regular maintenance may result into emission limits non-conforming to the values set forth by the regulations in force, and in extremely serious cases, into potential hazards to people and objects.

The 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 AL 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:

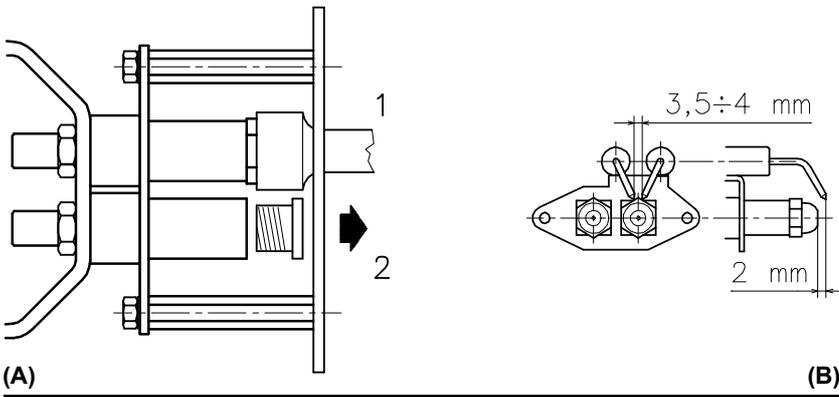
$$1^\circ = 3.00 \text{ GPH} - 2^\circ = 3.00 \text{ GPH},$$

or the following two different nozzles:

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

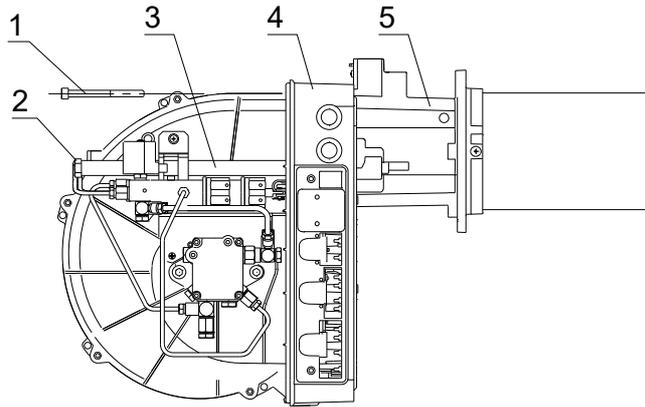
or:

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

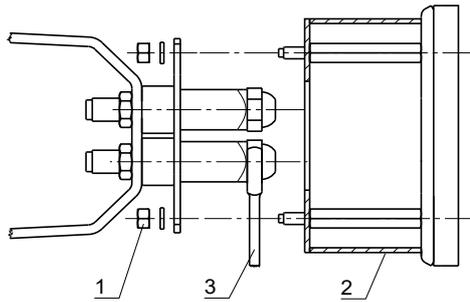


(A)

(B)



(C)



(D)

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).

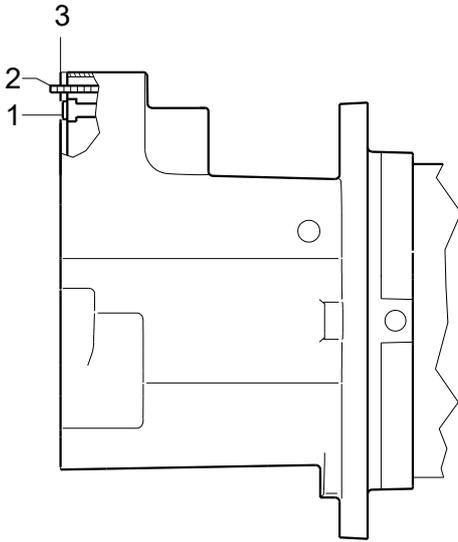
Finally remount the burner 4)(C) to the slide bars 3) and slide it up to the flange 5), keeping it slightly raised to prevent the flame stability disk from pressing against the blast tube.

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

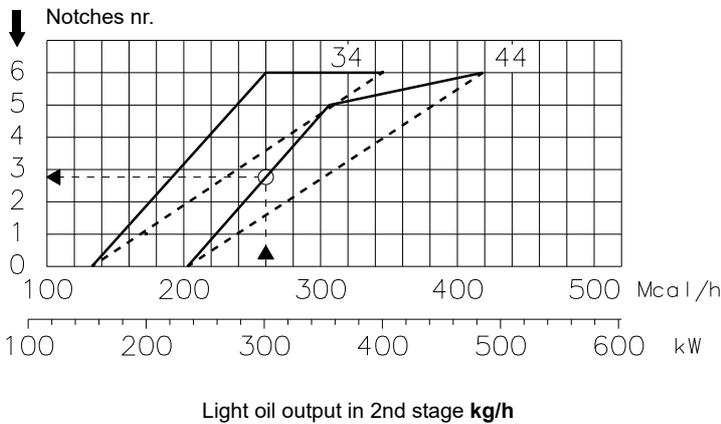
If it proves necessary to change a nozzle with the burner already fitted to the boiler, proceed as outlined below:

- 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)



(B)

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 AL 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 AL 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.

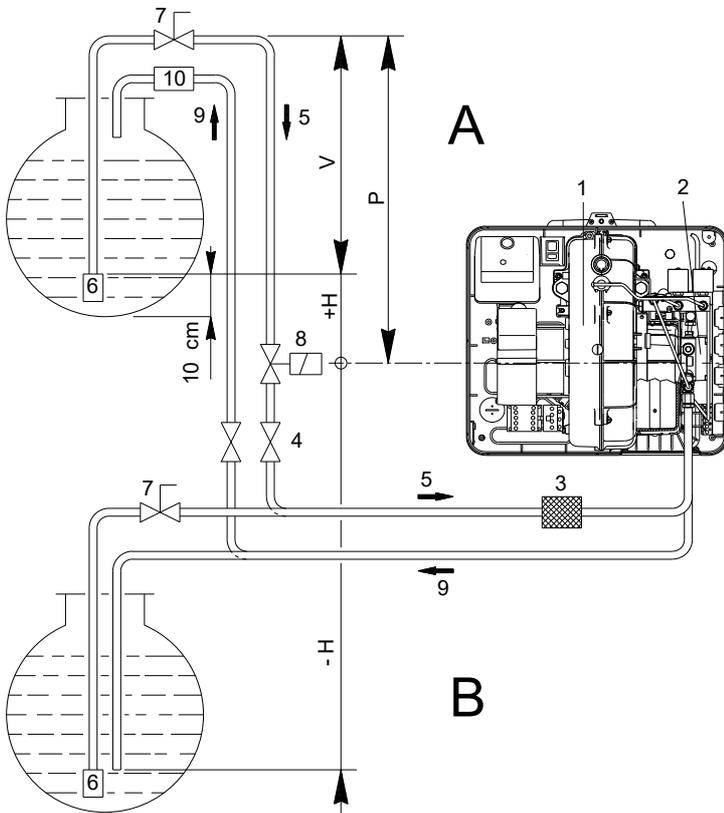
Insert the hose connections with the supplied seals into the connections and screw them down.

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).

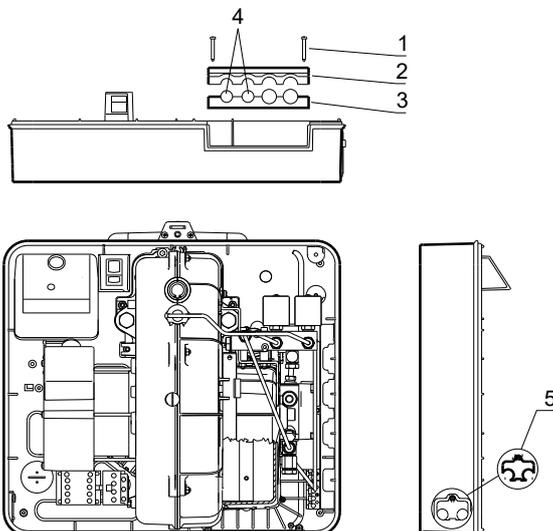
Install the hoses where they cannot be stepped on or come into contact with hot surfaces of the boiler.

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)					
	AL 34 MZ Ø (mm)			AL 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

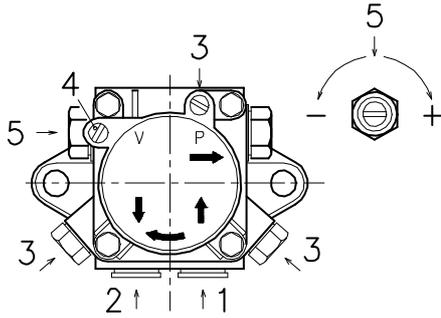
(A)



(B)

AL 34 MZ
SUNTEC AN 57 C

AL 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 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 photocell 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:

AL 44 MZ - 1st stage nozzle 3.00 GPH: notch 22° aligned with index 7)(A).

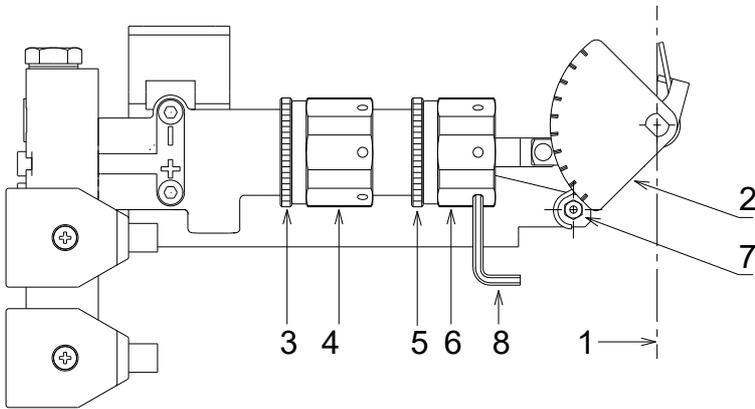
When the adjustment is terminated lock the hex element 4) with the ring nut 3).

• 2nd stage fan air damper valve

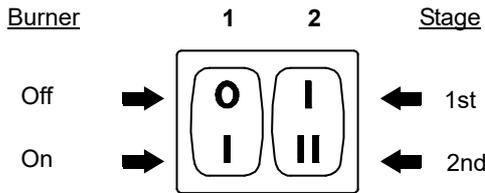
Set switch 2)(B) to the 2nd stage position and adjust the air gate valve 1)(A) by turning the hex element 6)(A), after having loosened the ring nut 5)(A).

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).



(A)



(B)

50 Hz Versions

AL 34 MZ		AL 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

AL 34 MZ		AL 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

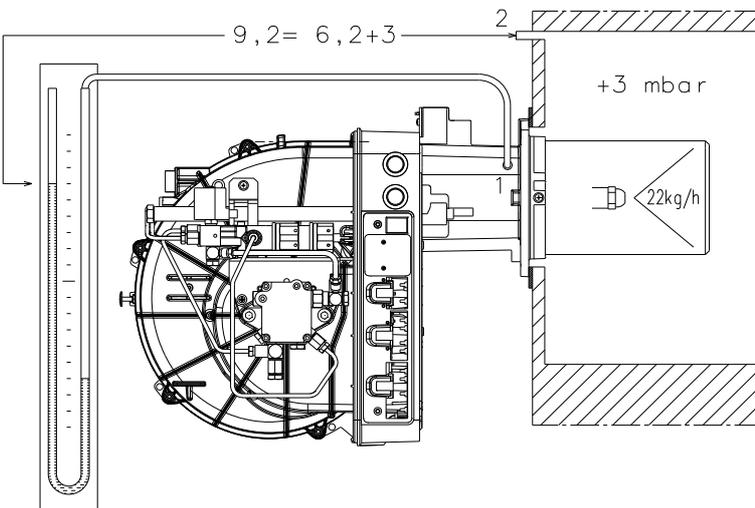
α = Notch Nr.

(C)

AL 34 MZ		AL 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)

BURNER OPERATION

BURNER STARTING (A) - (B)

Starting phases with progressive time intervals shown in seconds:

- Control device TL closes.
- After about 3s:
- **0 s** : The control box starting cycle begins.
- **2 s** : The fan motor starts.
- **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) - 11), de-energized, close the passage to the nozzles.

The hydraulic cylinder 15), piston A, opens the air gate valve: pre-purging begins with the 1st stage air delivery.

- **22 s** : The solenoid valves open 8); and the fuel passes through the piping 9) and filter 10) and is then 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 11) is opened and the fuel enters the valve 12) and raises the piston which opens two passages: one to piping 13), filter 14), and the 2nd stage nozzle, and the other to the cylinder 15), piston B, that opens the fan air gate valve in the 2nd stage. 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, 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 11) 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 11) 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 remote control device TL opens, solenoid valve 8) closes, the flame immediately goes out. The fan's air damper valve closes completely.

System 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).

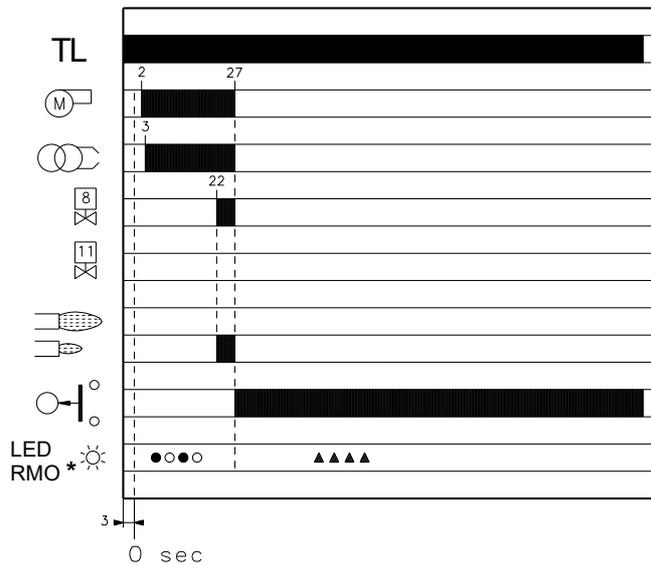
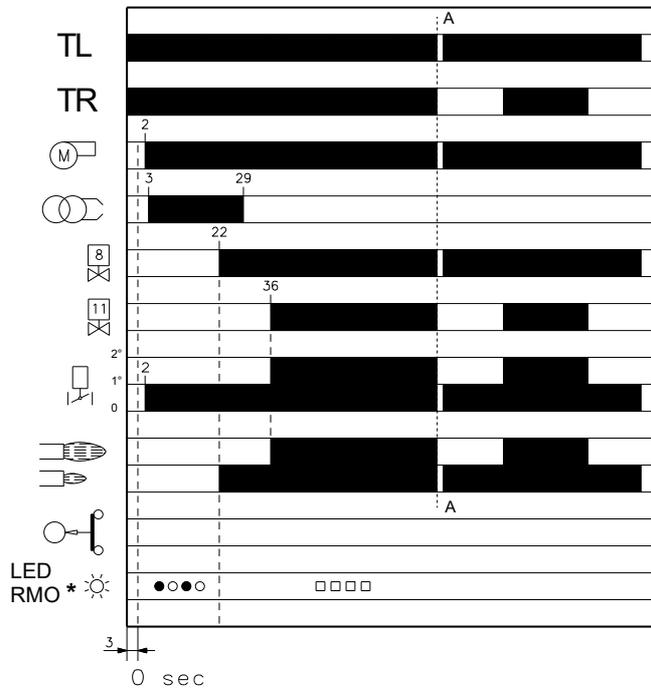
When the solenoid valve 11) de-energizes, the piston 12) closes the passage to the 2nd stage nozzle and the fuel contained in the cylinder 15), piston B, is discharged into the return piping 7).

FIRING FAILURE

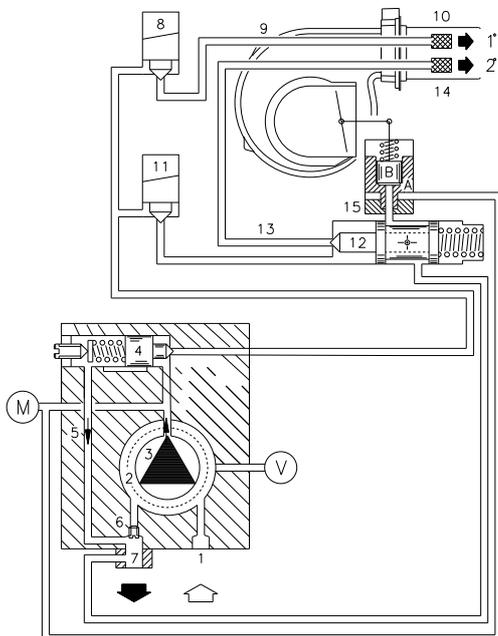
If the burner does not fire, it goes into lockout within 5 s of the opening of the 1st nozzle valve and 30 s after the closing of control device TL. The control box red pilot light will light up.

UNDESIRE 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.

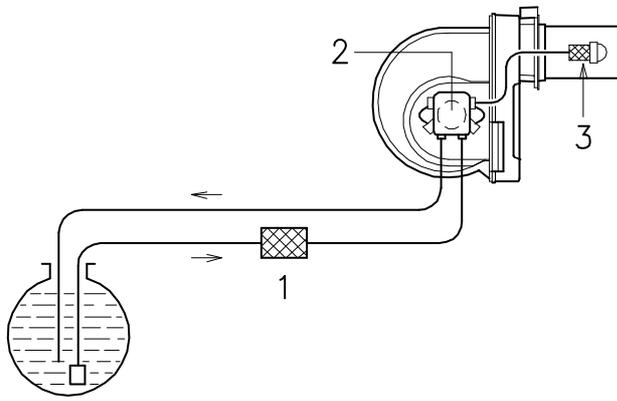


(A)



(B)

(A)



FINAL CHECKS

- Obscure the photocell 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 photocell and switch on the control devices: the burner should start and then go into lockout 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, 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.

Photocell

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

Flexible hoses

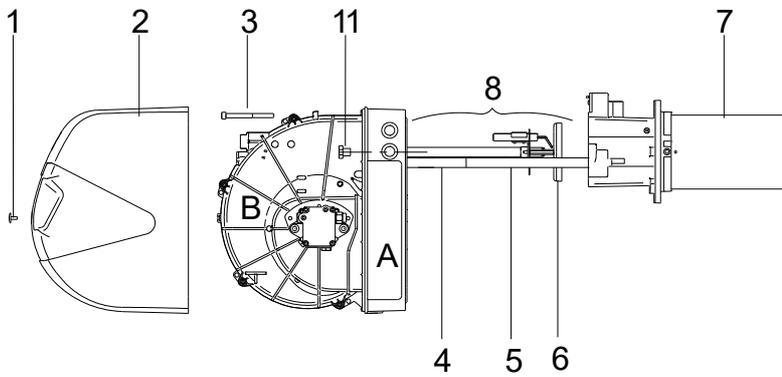
Check to make sure that the flexible hoses are still in good condition and that they are not crushed or otherwise deformed.

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.



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).

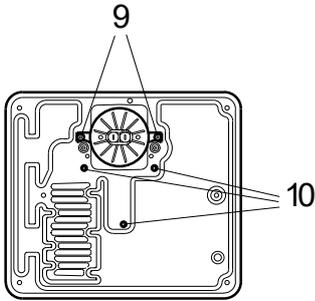
MAINTENANCE OF THE ELECTRICAL PANEL (B)

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.

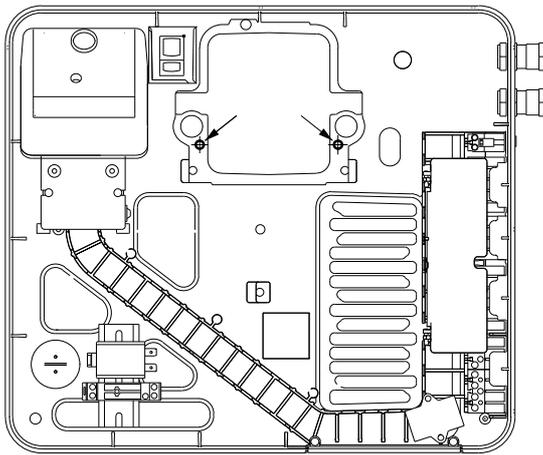
With the burner open as in fig. (A), disconnect the electrode cables and remove the head unit 8)(A) by undoing the two screws 9)(A).

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).

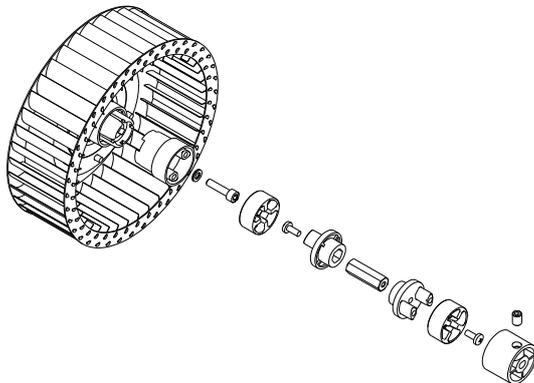
Finally it is possible to use 2 of the 3 screws 10)(A) to fix the electrical panel to the pipe coupling in the points indicated on fig. (B), and then perform the maintenance operations.



(A)



(B)



(C)

POSSIBLE PUMP AND/OR COUPLING REPLACEMENT (C)

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

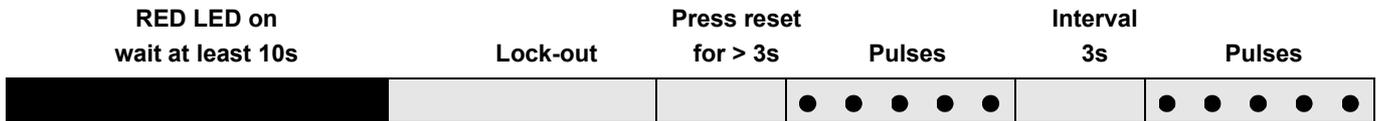
BURNER START-UP CYCLE DIAGNOSTICS

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.



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	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 - Photocell short-circuit 10 - Light is entering or flame is simulated	Replace photocell 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 photocell or control box 28 - Photocell dirty 29 - 1st stage operation of cylinder is faulty 30 - Incorrect motor rotation direction	Top up fuel level or suck up water Adjust, see page 8 Check connections; replace coil Replace Adjust or clean Replace Replace Replace and protect Replace Check Replace Prime pump and see "Pump unprimes" Replace Correct connection Open Clean Replace photocell or control box Clean Change the cylinder Change motor electrical connections
7 pulses ● ● ● ● ● ● ●	Flame detachment	31 - Poorly adjusted head 32 - Poorly adjusted or dirty firing electrodes 33 - Poorly adjusted fan air gate: too much air 34 - 1st nozzle is too big (pulsation) 35 - 1st nozzle is too small (flame detachment) 36 - 1st nozzle dirty, or deformed 37 - Pump pressure not suitable 38 - 1st stage nozzle unsuited to burner or boiler 39 - Defective 1st stage nozzle	Adjust, see page 8 Adjust, see page 5 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	40 - Control device TR does not close 41 - Defective control box 42 - 2nd stage sol. valve coil defective 43 - Piston jammed in valve unit	Adjust or replace Replace Replace Replace entire unit
	Fuel passes to 2nd stage but air remains in 1st	44 - Low pump pressure 45 - 2nd stage operation of cylinder is faulty	Increase Change cylinder
	Burner stops at transition between 1st and 2nd stage. Burner repeats starting cycle.	46 - Nozzle dirty 47 - Photocell dirty 48 - Excess air	Renew nozzle Clean Reduce
	Uneven fuel supply	49 - Check if cause is in pump from tank or fuel supply system	Feed burner located near burner
	Internally rusted pump	50 - Water in tank	Suck water from tank bottom with separate pump
	Noisy pump, unstable pressure	51 - Air has entered the suction line - Depression value too high (higher than 35 cm Hg): 52 - Tank/burner height difference too great 53 - Piping diameter too small 54 - Suction filters clogged 55 - Suction valves closed 56 - Paraffin solidified due to low temperature	Tighten connectors Feed burner with loop circuit Increase Clean Open Add additive to light oil
	Pump unprimes after prolonged pause	57 - Return pipe not immersed in fuel 58 - Air enters suction piping	Bring to same height as suction pipe Tighten connectors
	Pump leaks light oil	59 - Leakage from sealing organ	Replace pump
	Smoke in flame - dark Bacharach - yellow Bacharach	60 - Not enough air 61 - Nozzle worn or dirty 62 - Nozzle filter clogged 63 - Erroneous pump pressure 64 - Flame stability disc dirty, loose, or deformed 65 - Boiler room air vents insufficient 66 - Too much air	Adjust head and fan air damper, see page 8 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 8
	Dirty combustion head	67 - Nozzle or filter dirty 68 - Unsuitable nozzle delivery or angle 69 - Loose nozzle 70 - Impurities on flame stability spiral 71 - Erroneous head adjustment or not enough air 72 - Blast tube length unsuited to boiler	Replace See recommended nozzles, page 7 Tighten Clean Adjust, see page 8; open gate valve Contact boiler manufacturer
10 pulses ● ● ● ● ● ● ● ● ● ●		73 - Connection or internal fault 74 - 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. manufacturer declines all liability for modifications or connections other than those shown on these diagrams.

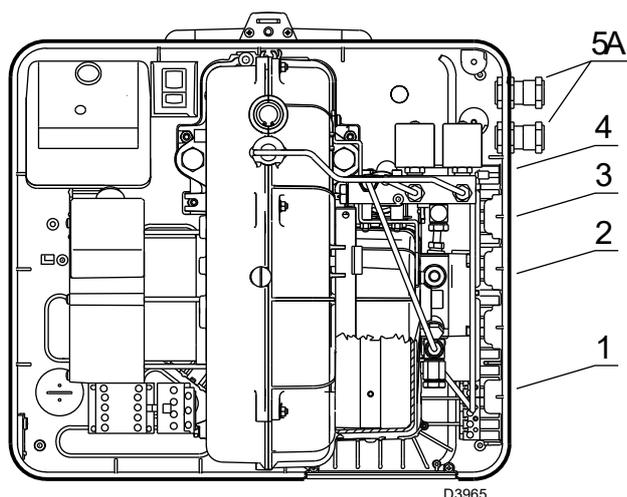
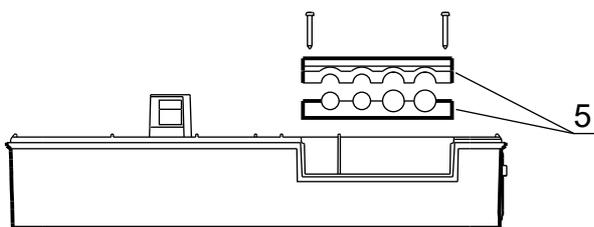
Use flexible cables according to standard EN 60 335-1.

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:

AL 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)



D3965

NOTES

- The AL 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 AL 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.

识别

产品铭牌上印有序列号、型号、主要技术及性能数据。如果铭牌被篡改、拆除或丢失，产品型号不容易识别，安装或维修过程中会存在潜在危险。

通用警告

为了保证燃烧污染物排放降至最低，锅炉燃烧室的尺寸必须满足特定尺寸。

建议在给特殊锅炉选择燃烧器时，咨询我们的技术支持部门。

有资质人员是指那些经过专业培训机构培训合格的专业技术人员。

该燃烧器只能用于设计时指定的应用。

由于错误安装或错误调整，或不正确或不合理使用，或没有遵照随燃烧器附带的使用说明书来使用，或由无资质人员操作等因素所造成的任何人、畜、财产损失，制造商概不负责。

用户告知

如果燃烧器在点火或运行中出现故障，燃烧器执行“安全停机”，会有红色 LED 指示灯指示燃烧器锁定。要重新启动燃烧器，按一下复位按钮。燃烧器重新启动后，红色 LED 指示灯熄灭。

这个操作最多允许重复 3 次，如果“安全停机”还是发生，请联系我们的技术支持部门。

基本安全规则

- ▶ 严禁未成年人和无资质人员操作此设备。
- ▶ 在安装燃烧器房间的通风孔，进气格栅，排气格栅上不允许覆盖衣物、纸张或其他任何东西。
- ▶ 非认证人员不允许维修燃烧器。
- ▶ 拉出或缠绕电源插头是危险的。
- ▶ 清洁燃烧器前要断开主电源。
- ▶ 不要使用易燃物来擦拭燃烧器（如酒精、汽油等）。
- ▶ 盖子可以用肥皂水擦拭。
- ▶ 不要在燃烧器上放置任何东西。
不要在安装燃烧器的房间放置易燃物。

本手册使用的如下符号，解释如下：

 **注意** = 操作者需要特别注意并有所准备。

 **禁止** = 对操作者，**决不允许这样做**。

技术数据	页码 2
可选型号	2
配件	2
燃烧器描述	3
包装 - 重量	3
最大尺寸	3
标准配置	3
出力图	4
试验锅炉	4
安装	5
安装位置	5
锅炉法兰	5
燃烧筒长度	5
固定燃烧器到锅炉上	5
一段火及二段火喷嘴选择	6
喷嘴安装	7
燃烧头设置	8
管路系统	9
油泵	10
油泵启动	10
燃烧器校准	11
燃烧器运行	12
最终检查	13
维护	13
燃烧器启动阶段故障诊断	15
复位控制盒及执行故障诊断	15
故障 - 可能原因 - 故障排除	16
附录	17
电气接线	17
配电盘接线图	18

注意

文中所涉及数字标识定义如下：

- 1)(A) = 图 A 第 1 部分，内容见本页；
- 1)(A)p.3 = 图 A 第 1 部分，内容见第 3 页。

介绍

燃烧器随机使用手册：

- 说明书是产品必不可少的组成部分，因此需妥善保管此手册以备查阅；若燃烧器易主，也需随附此手册。若此手册丢失或损毁，需向本地区技术服务部索取；
- 专为有资质的操作人员编写；
- 内容包括燃烧器的安全安装、启动、使用及维护等重要操作的说明。

系统的交付及使用手册

系统交付使用后，需特别注意以下事项：

- 建议用户将系统制造商提供的用户手册存放于热发生器安装室内。
- 使用手册内有：
 - 燃烧器序列号；

.....

- 最近技术支持中心地址及电话；

.....

.....

.....

- 系统供应商需特别告知用户以下内容：
 - 系统的使用，
 - 系统启动前所需的进一步测试，
 - 由制造商或专业技术人员进行至少每年一次的维护或必要的系统检查。
- 为保证对系统进行定期检查，建议制定维护维修合同。

技术参数

型号		AL 34 MZ	AL 44 MZ
类型		972 T	
热功率 (1)		973 T	
出力 (1)	二段火	kW	154 - 395
		Mcal/h	132 - 340
		kg/h	13 - 33,6
	一段火	kW	97 - 154
		Mcal/h	83 - 133
		kg/h	8,3 - 13
燃料		轻油	
- 净热值		kWh/kg	11,8
		Mcal/kg	10,2 (10.200 kcal/kg)
- 密度		kg/dm ³	0,82 - 0,85
- 20 °C 时的粘度		mm ² /s 最大值	6 (1,5 °E - 6 cSt)
运行		<ul style="list-style-type: none"> • 间歇运行 (每 24 小时至少停机 1 次)。 • 两段 (高低火力) 以及单段 (开 - 关)。 	
喷嘴		个数	2
标准应用		锅炉: 热水炉, 蒸汽炉, 导热油炉	
环境温度		°C	0 - 40
助燃空气温度		°C 最高	60
电源		V	230 ~ +/-10%
		Hz	50/60 - 单相
电机	rpm	2800	2800
	W	300	420
	V	220 - 240	230
	A	2,4	2,65
	µF/V	12,5/450	16/425
点火变压器		V1 - V2	230 V - 2 x 12 kV
		I1 - I2	0.2 A - 30 mA
油泵	出力 (在 12 bar 时)	kg/h	45
	压力范围	bar	7 - 14
	燃油温度	°C 最高	60
消耗电功率		W 最大值	600
电气保护等级		IP40	
符合指令		2006/42/EC - 2014/30/UE - 2014/35/UE	
噪音水平 (2)	声压	dB(A)	68
	声功率		70
			79
			81

(1) 参考条件: 环境温度 20°C - 气压 1013 mbar - 海拔 0 米 A.S.L.

(2) 声压在制造商的燃烧实验室内进行测量, 测试时燃烧炉在测试锅炉上以最大的额定功率运行。声功率按照 EN 15036 标准中说明的“自由场法”以及 EN ISO 3746 标准中规定的测量精度“精度: 类别 3”进行测量。

可选型号

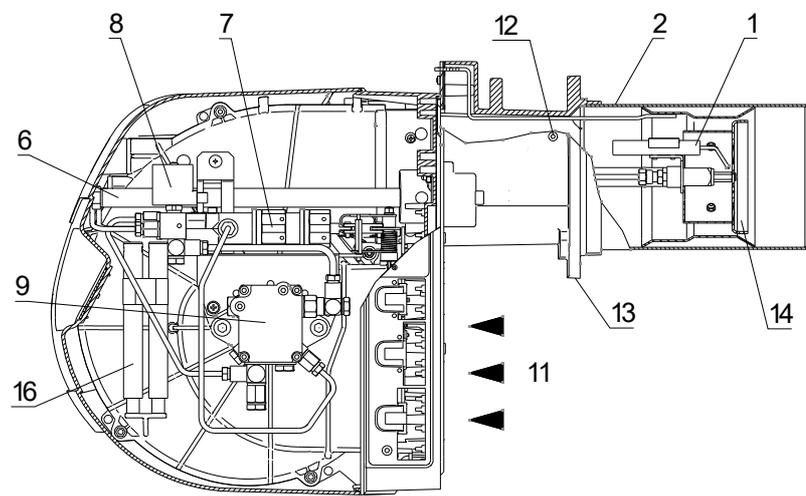
型号	编号	电源	燃烧筒长度 mm
AL 34 MZ	20033838	单相	216
AL 44 MZ	20033830	单相	216

配件 (可选):

• 加长燃烧头:

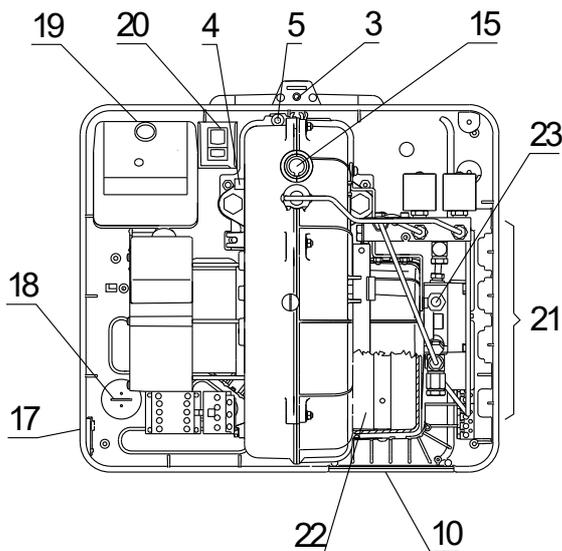
燃烧器	AL 34 MZ	AL 44 MZ
	编号 3010426	编号 3010425

• 接触器组件	编号 3010419
• 后吹扫装置	编号 3010453
• 计时器	编号 3010450
• 接地故障断路器	编号 3010448
• 电磁干扰防护套件 如果由于附近有变频器, 使得燃烧器受到电磁干扰 (电磁信号强度大于 10 V/m), 或恒温器的连接线长度超过 20 米时, 需要在电气控制与燃烧器之间安装电磁干扰防护装置。	编号 3010386



燃烧器描述 A)

- 1 点火电极
- 2 燃烧头
- 3 燃烧头调节螺栓
- 4 火焰监控的电眼
- 5 固定风机的螺栓
- 6 打开燃烧器及检查燃烧头用滑杆
- 7 一段火及二段火运行风门调节用液压缸
燃烧器停机时，风门完全关闭，以降低因通风造成空气从风机吸入口进入而产生的锅炉热量散发。
- 8 一段火及二段火电磁阀
- 9 油泵
- 10 穿软管及电缆用 4 孔板
- 11 空气入口
- 12 风机压力测试点
- 13 连接锅炉的法兰
- 14 稳焰盘
- 15 观火孔
- 16 滑杆 6) 的加长杆
- 17 穿软管用 2 孔板
- 18 电机电容器
- 19 带锁定指示灯及锁定复位按钮的控制盒
- 20 两组开关：
- 之一“燃烧器关 - 开”
- 之二“一段火 - 二段火”运行转换开关
- 21 电气连接用插接口
- 22 风门挡板
- 23 油泵压力调节钮。



两种燃烧器故障：

控制盒锁定：如果控制盒按钮 19)(A)(红色 led) 灯亮起，则指示燃烧器锁定。
如要复位，按住该按钮 1-3 秒。

包装 - 重量 (B) - (大概值)

- 燃烧器外包装为纸箱，其最大尺寸参见表(B)。
- 燃烧器连同包装盒重量参见表 (B)。

最大尺寸 (C) - 大概值。

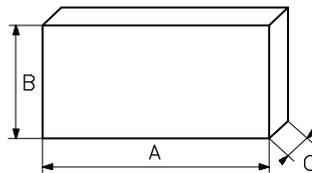
燃烧器最大尺寸如表 (C) 所示。
注意检查燃烧头时需要将燃烧器沿滑杆拉出。
去除包装后，燃烧器的最大尺寸如 O 所示。

标准配置

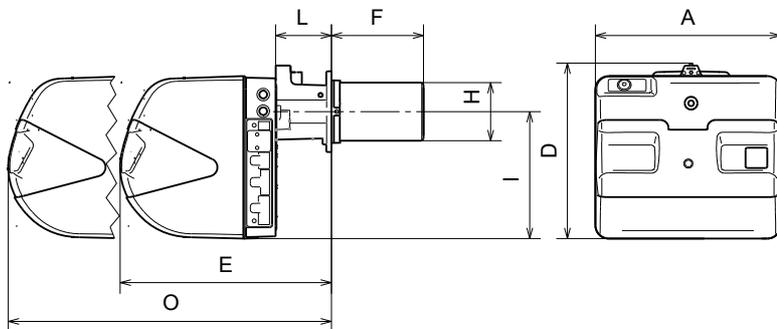
- 2 - 软管
- 2 - 软管垫圈
- 2 - 带垫圈的软管接头
- 1 - 隔热垫
- 2 - 滑杆 6)(A) 的加长杆 16)(A) (351 mm 燃烧筒型号专用)
- 4 - 固定燃烧器到锅炉上的螺栓：M 8 x 25
- 2 - 电气连接插头
- 1 - 说明书
- 1 - 零件图

(A)

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



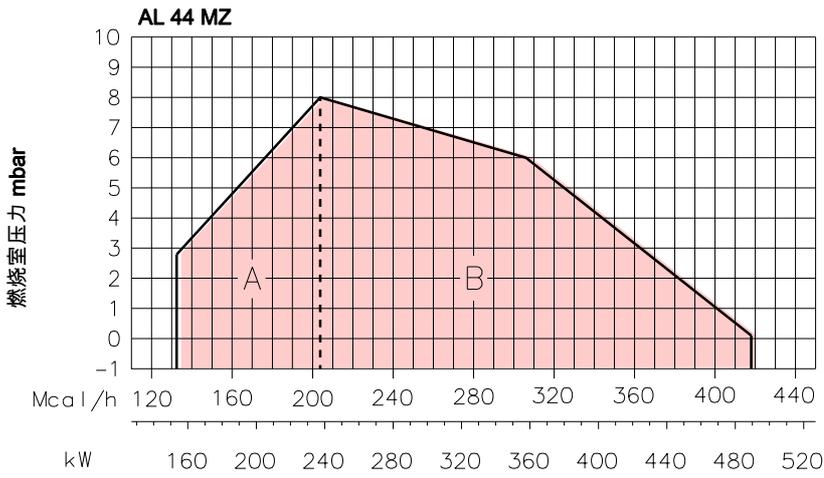
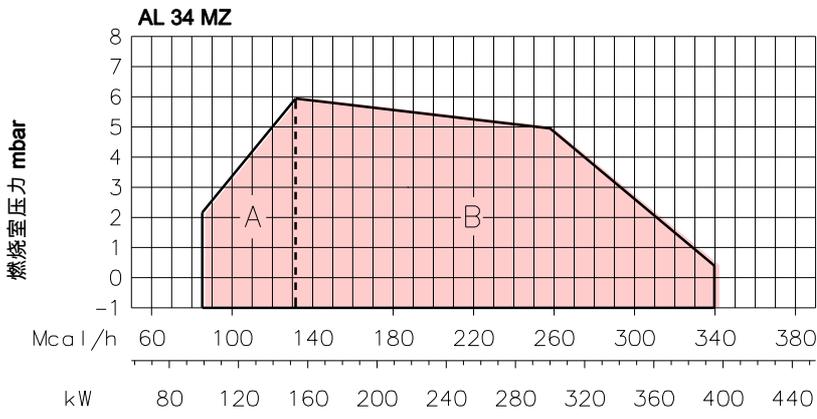
(B)



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

(1) 燃烧筒：标准 - 加长

(C)



出力图 (A)

AL 34 MZ - AL 44 MZ 型号燃烧器有下列两种工作模式：一段火与二段火。

一段火出力 范围必须在左图所示 A 区内选择。

二段火出力 范围必须在左图所示 B 区内选择。这是燃烧器对应燃烧室内压力所提供的最大出力。

从期望得到的燃烧器出力处划一条垂直线，从燃烧室背压处划一条水平线，两线交叉点即为工作点，此点必须位于 B 区内。

重要：

出力图的值在如下条件下获得：环境温度 20 °C，大气压 1013 mbar (约 0 m 海拔)，燃烧头按第 7 页所示调整。

试验锅炉 (B)

出力曲线是根据 EN 267 标准在专用试验锅炉上进行测试绘制而成的。

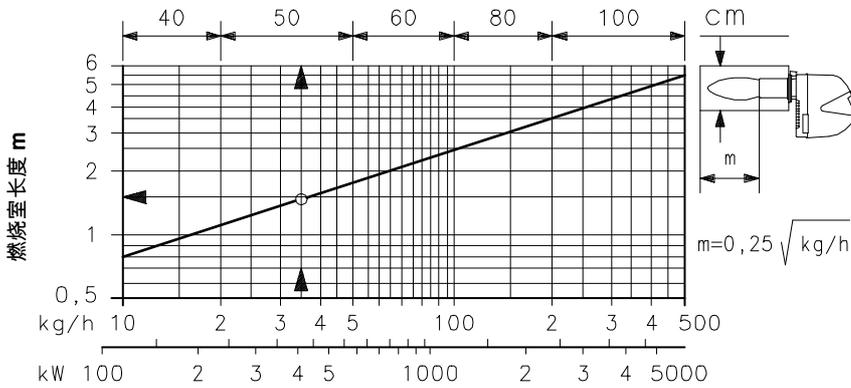
图 (B) 给出试验锅炉炉膛直径和长度。

举例 出力 35 kg/ 小时：

直径 = 50 cm ；长度 = 1.5 m。

若燃烧器安装在尺寸远小于商用燃烧室的特殊燃烧室时，需进行预测试。

(A)



(B)

安装

 燃烧器的安装必须符合当地法律及标准。

安装位置 (A)

 燃烧器只能安装于位置 1, 2, 3 及 4。
安装位置 1 为最优, 因为只有在此位置才能如本手册所述对燃烧器进行维护。安装位置 2, 3 及 4 时燃烧器可以运行, 但不利于维护和检修燃烧头, 第 14 页。

 任何其它的安装位置都可能对燃烧器的正常运行带来危害。为保证安全, 禁止将燃烧器安装于位置 5。

锅炉连接法兰 (B)

按图 (B) 所示在锅炉上钻固定孔。可以用随机带的隔热垫划钻孔位置。

燃烧筒长度 (C)

燃烧筒的长度必须根据锅炉制造商所提供的说明书来选择, 并且任何情况下必须大于锅炉前炉墙和炉衬的总厚度。可供选择的长度 L 如下:

燃烧筒 7):	AL 34 MZ	AL 44 MZ
• 标准	216	216
• 加长	351	351

对于带前烟箱 10) 或反转火焰的锅炉, 必须在炉衬 9) 及燃烧筒 7) 之间插入耐火材料制作的防护炉衬 8)。

防护炉衬不得妨碍燃烧筒的移动。

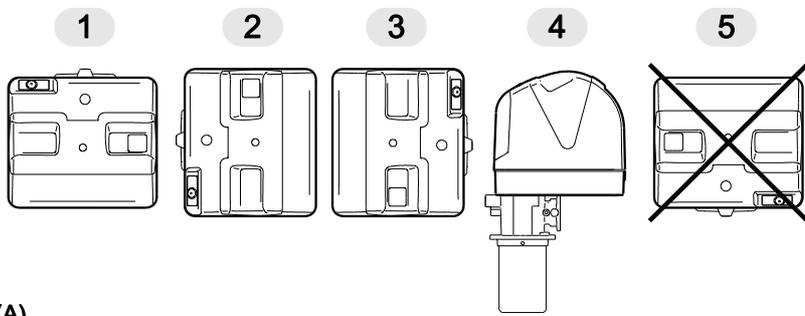
对于有前水冷壁的锅炉炉衬 8)-9)(C) 可以省略, 除非锅炉厂商特别要求。

固定燃烧器到锅炉上 (C)

从燃烧器 4) 上拆下燃烧头 7) 及多歧管 5):

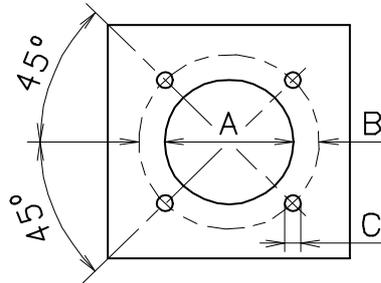
- 拆下两个滑杆 3) 上的螺栓 2)。
- 拆下螺栓 1) 并沿滑杆 3) 拉出燃烧器。

将组件 5) 和 7) (C) 安装到锅炉法兰盘, 并在燃烧头和法兰盘之间安装随供的隔热垫片 6) (C)。用随附的四颗螺栓固定。燃烧器和锅炉之间必须密封。

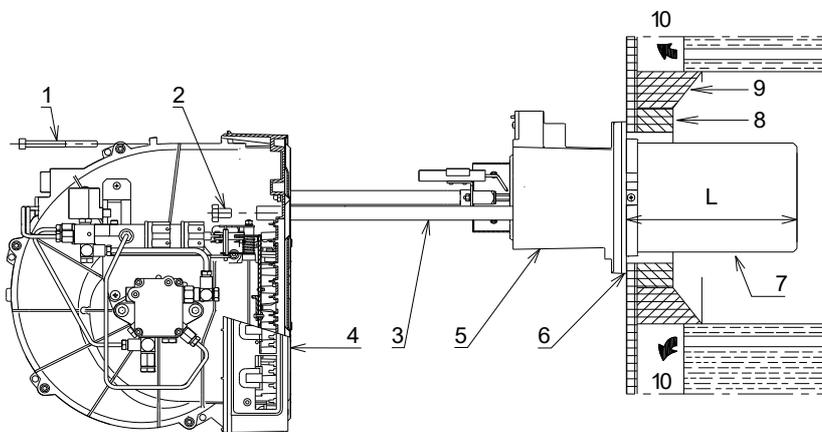


(A)

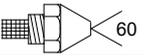
mm	A	B	C
AL 34 MZ	160	224	M 8
AL 44 MZ	160	224	M 8



(B)



(C)

	GPH	kg/h ⁽¹⁾			kW 12 bar	推荐喷嘴
		10 bar	12 bar	14 bar		
AL 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	
AL 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) 轻油： 密度 0.84 kg/dm³
 粘度 4.2 cSt/20 °C
 温度 10 °C

(A)

一段火及二段火喷嘴选择

燃烧器符合 EN 267 标准所规定的排放要求。为了保证排放稳定，应使用本操作手册所列出的制造商推荐及 / 或提供的专用喷嘴。

警告：在定期的维护操作中，建议每年更换一次喷嘴。

注意：不使用制造商提供的专用喷嘴或不进行定期维护，可能会导致排放不能达到强制标准要求，如问题严重还会给人员和财物带来潜在危害。

任何由于未遵守本操作手册内要求而造成的损失，制造商概不负责。

两个喷嘴都必须由表 (A) 中选出。

1 号喷嘴 决定一段火时燃烧器出力。

2 号喷嘴 与 1 号喷嘴同时工作，决定二段火时燃烧器的出力。

一段火及二段火时的出力必须在第 2 页所示数值范围之内。

建议在压力为 12 bar 时，喷嘴喷射角度为 60°。

两个喷嘴通常具有相等的流量，但也可根据需要对 1 号喷嘴进行如下调节：

- 当点火时，需要降低背压峰值，此时出力应小于总出力的 50% ；
- 需要增加一段火运行时出力，此时应大于总出力的 50% 。

范例 型号型号 AL 34 MZ

锅炉功率 = 270 kW - 效率 90%

燃烧器所需功率 =

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

$300 / 2 = 150 \text{ kW}$ 每一喷嘴

因此，所需两个喷嘴相同，喷射角度 60°，油压 12 bar：

1° = 3.00 GPH - 2° = 3.00 GPH，

或以下两个不同喷嘴：

1° = 2.50 GPH - 2° = 3.50 GPH。

或：

1° = 3.50 GPH - 2° = 2.50 GPH。

喷嘴安装

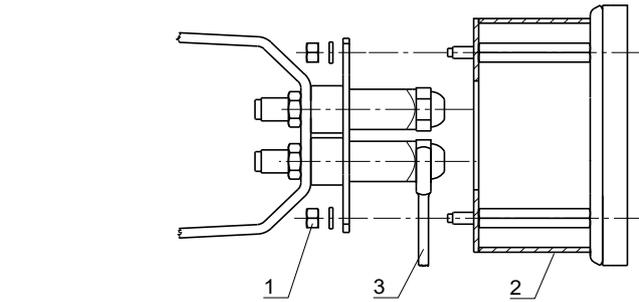
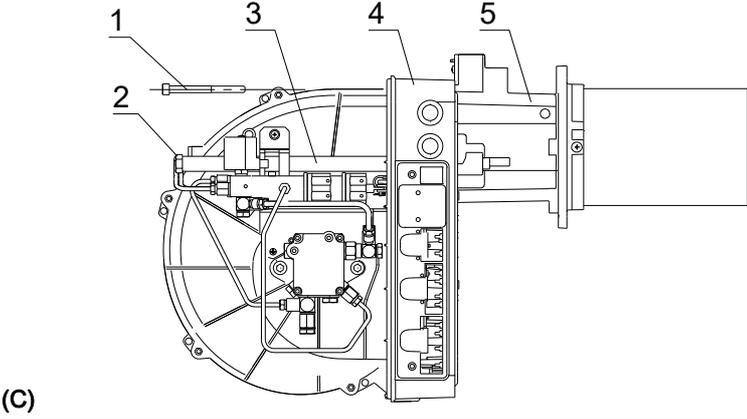
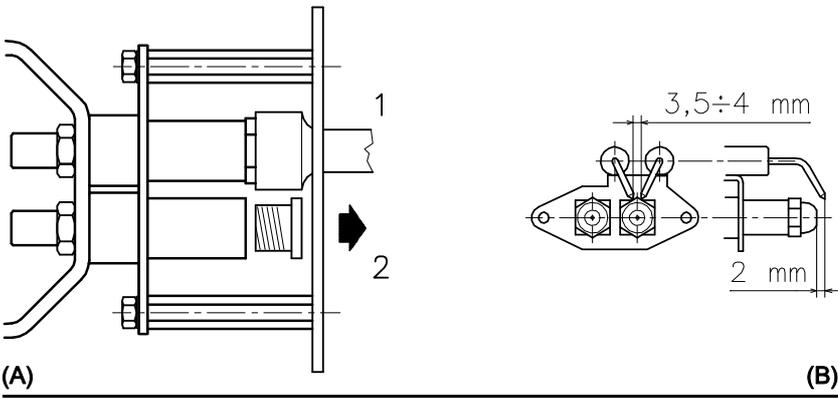
安装进行到这个阶段，燃烧器和燃烧筒还未安装，因此可以在取下塑料塞子 2(A) 后，用 16 mm 扳手 1(A) 将两个喷嘴从稳焰盘的中心进行安装。请勿使用任何密封材料，如密封垫、复合密封材料或密封胶带。注意不要损坏喷嘴的密封座。安装时必须将喷嘴拧到位，但不要拧脱扣。一段火运行时的喷嘴位于点火电极下，如图 (B)。

请确认点火电极连接位置如图 (B) 所示。

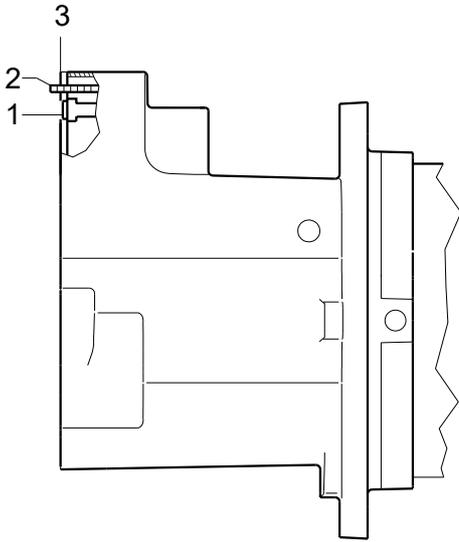
最后将燃烧器 4(C) 重新安装到滑杆 3 上，并将其一直推到法兰处 5，滑动时将燃烧器轻微托起，避免火焰稳定盘与燃烧筒发生摩擦。拧紧滑杆 3 上的螺栓 2) 和的螺栓 1) 使燃烧器和法兰密封。

如需要为已安装到锅炉上的燃烧器更换喷嘴，则需按以下提示步骤操作：

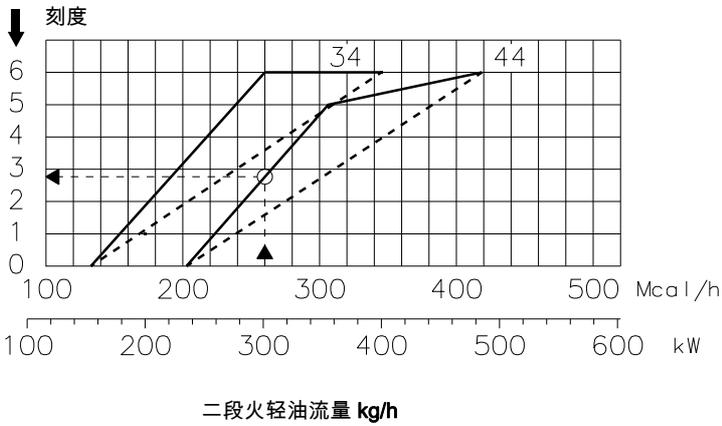
- 按图 (C) p.5 所示，拉出燃烧器。
- 取下螺母 1(D) 及磁盘 2)。
- 使用扳手 3(D) 更换喷嘴。



燃烧头调节



(A)



(B)

燃烧头调节

安装进行到这一阶段，如图 (C) p. 5 所示，将燃烧头和多歧管安装到锅炉上。只需按燃烧器的最大出力来调整燃烧头的设置，简单的说在第 6 页选择的两个喷嘴的总出油量即为燃烧器最大出力。

旋转螺栓 1)(A) 直至指示杆 2)(A) 上的刻槽与面板 3)(A) 的表面对齐。

范例

AL 44 MZ 型号配 2 个 3.00 GPH 喷嘴以及 12 bar 压力油泵

两个 3.00 GPH 喷嘴的流量见表 (A)，第 6 页：

$$12.7 + 12.7 = 25.4 \text{ kg/h}$$

(相当于 300 kW)。

图 (B) 显示在流量为 25.4 kg/h 时，AL 44 MZ 型燃烧器需要将其燃烧头调整约至刻度 3 处。

注意

如果燃烧室背压为 0 mbar 时，需按图 (B) 阴影线所示调整空气量。

燃烧头调整完成后，将燃烧器 4)(C)p.5 重新装回到滑杆 3)(C)p.5 上，距多歧管 5)(C)p.5 大约 100 mm，接好电极电缆，然后将燃烧器完全关闭。

将螺栓 2)p.5 装回滑杆 3)p.5 上。

用螺栓 1)p.5 将燃烧器与油管接口固定好。

注意

燃烧器安装好后，建议轻轻的拉出点火电极的电缆，直至它们被轻轻的拉紧。

管路系统

燃油供应

双管系统 (A)

燃烧器必须配置一台自吸泵，自吸泵的高度见下表。

高位油箱 A

为了避免破坏油泵密封，高度“P”不能超过10米；为了油泵在油箱油量极少情况下依然能吸到油，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。

最好是保持燃烧器进油管和回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，燃油在循环油泵作用下从油箱抽出，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时，燃烧器不能自动注油启动。

图例说明 (A)

H = 油泵 / 底阀高度差

L = 管道长度

∅ = 管道内径

1 = 燃烧器

2 = 油泵

3 = 过滤器

4 = 手动阀

5 = 进油管

6 = 底阀

7 = 快关手动阀远程控制 (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)

管路连接 (B)

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，旁路系统被螺栓 6(B)p.11 封住了。

需要连接两根软管到油泵上。

如回油管关闭且安装了旁路螺栓，运行油泵将导致油泵立即损坏。

拆下油泵入口及回油口的堵头。

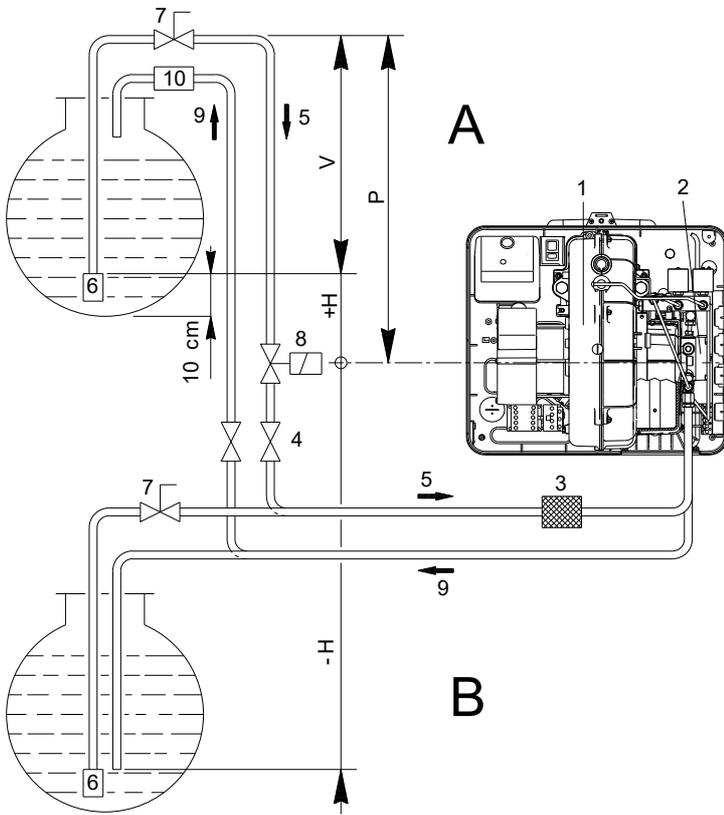
将所附的密封垫加入到连接管连接到油泵并拧紧。

注意安装软管时不要拉伸或扭曲软管。

将软管从左手面板 5(B) 上的孔中穿过，将管上的两个堵帽取下，或按如下操作：拧松螺栓 1)，然后将连接件分成 2) 和 3) 两部分并去掉塞住两个管路 4) 的堵帽。

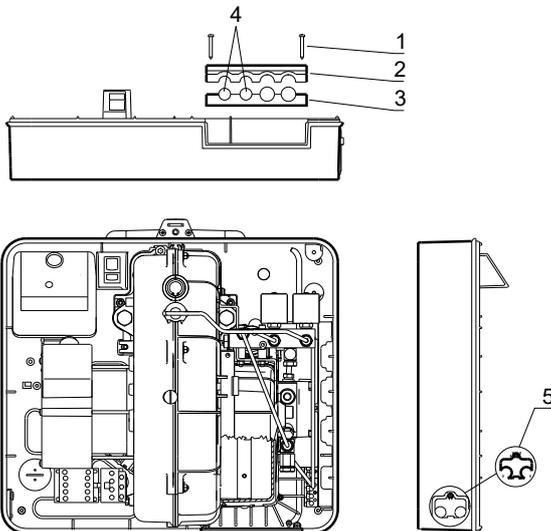
软管应安装在不易被绊倒的位置，不能接触到锅炉的高温表面，不能影响到燃烧器检修时的打开。

现在可以安装剩余零件，使用两个扳手，其一固定凸出部，另一个转动软管上的螺扣。



+ H - H (m)	L (m)					
	AL 34 MZ ∅ (mm)			AL 44 MZ ∅ (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

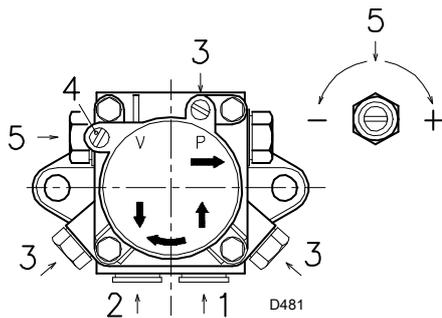
(A)



(B)

AL 34 MZ
SUNTEC AN 57 C

AL 44 MZ
SUNTEC AN 67 C



油泵		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)

油泵 (A)

- 1 - 供油 G 1/4"
- 2 - 回油 G 1/4"
- 3 - 压力表座 G 1/8"
- 4 - 真空表座 G 1/8"
- 5 - 压力调节螺栓

- A - 压力位 12 bar 时的最小输油量
- B - 压力范围
- C - 吸入口最大真空度
- D - 粘度范围
- E - 轻油最高温度
- F - 最大吸入及回油压力
- G - 工厂预设压力
- H - 滤网目数

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)。
 - 启动时，松开油泵上的螺栓 3)(A)，排出进油管路中的空气。
 - 闭合启动控制装置并将手动开关 1)(B) P.10 转到“ON(启动)”位置，启动燃烧器。油泵转动方向必须与燃烧器外壳上所标箭头方向一致。
 - 若从螺栓 3) 处有油漏出，油泵注油成功。关闭燃烧器，将开关 1)(B)p.10 置于“OFF”位置并拧紧螺栓 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。

注意：

油泵在出厂时已经注满油。如果有油泻出，请从油泵的真空表座处将油注满，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



注意
启动燃烧器必须由取得资质且有正确操作工具的人员进行操作。

点火

将开关 1)(B) 置于“ON”处。
首次点火时，当一段火运行转换为二段火运行时，会由于二段火喷嘴管路注油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。
一旦完成下面的调整，燃烧器点火时的噪音就会接近其运行时的噪音。如果燃烧器仍然在开启轻油电磁阀时出现一两次震动或延迟点火现象，请查看 14 页上第 34-42 项原因。

运行

燃烧器的优化校准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 段火及 2 段火喷嘴

内容详见第 6 页“喷嘴选择”。

• 燃烧头

除非燃烧器的最大出力发生改变，否则有关燃烧头的已经完成的调整不需要改变。

• 油泵压力

12 bar：此压力为出厂时的预设值，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 为了减小出力。只有在环境温度高于 0 °C 时，才能作此调整，但绝对不可调至低于 10 bar。如果压力低于 10 bar，液压缸将难以开启；

14 bar 为了增加出力，保证环境温度低于 0 °C 时的点火启动。

通过油压调节钮 5)(A)p. 9 调整油泵压力。

• 一段火风门

将开关 2)(B) 置于一段火运行处以保持燃烧器在一段火运行。风门 1)(A) 的开启程度必须根据所选喷嘴进行调整：指针 7)(A) 必须与表 (C) 所示一致。可以用六角螺丝 4) 来进行调整：

- 向右旋 (- 号方向) 减小风量；
- 向左旋 (+ 号方向) 增大风量。

举例：

AL 44 MZ - 一段火喷嘴 3.00 GPH：

刻度 22° 必须与指针 7)(A) 对齐。

调整结束后，用螺母 3) 将六角螺丝 4) 拧紧。

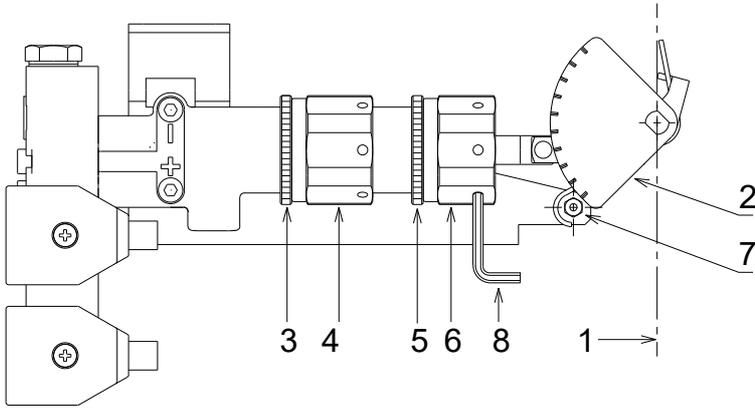
• 二段火风门

将开关 2)(B) 置于二段火运行位置，松开螺母 5)(A) 后，转动六角螺丝 6)(A) 调整风门 1)(A)。

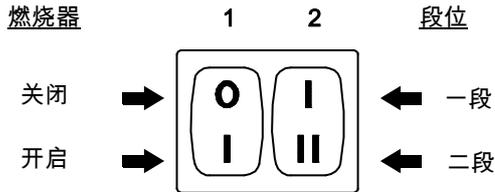
附件 1)(D) 的气压值必须接近表 (D) 所示压力与附件 2) 所测燃烧室压力的和。

参见左图所示。

注意：为了调整六角螺丝 4) 和 6)(A)，可使用 3 mm 六角扳手 8)(A)。



(A)



(B)

50 Hz 机型

AL 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 机型

AL 34 MZ		AL 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		

一段火

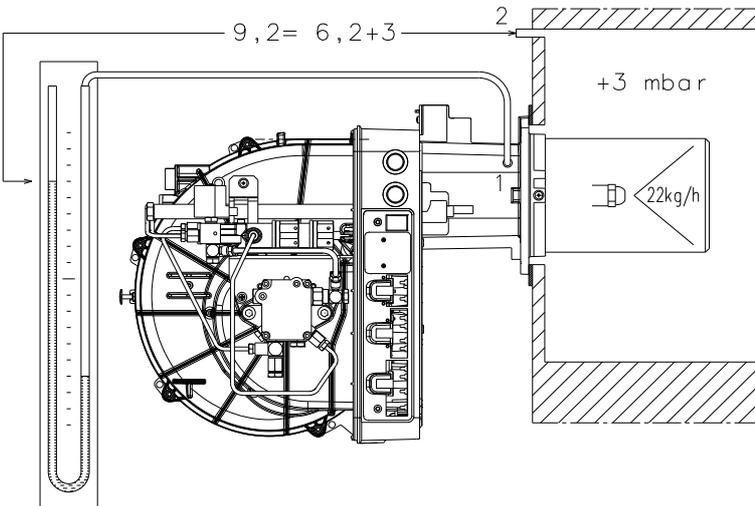
α = 刻度值

(C)

AL 34 MZ		AL 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		

二段火

mbar = 测点 2) 压力为零时测点 1) 处的风压



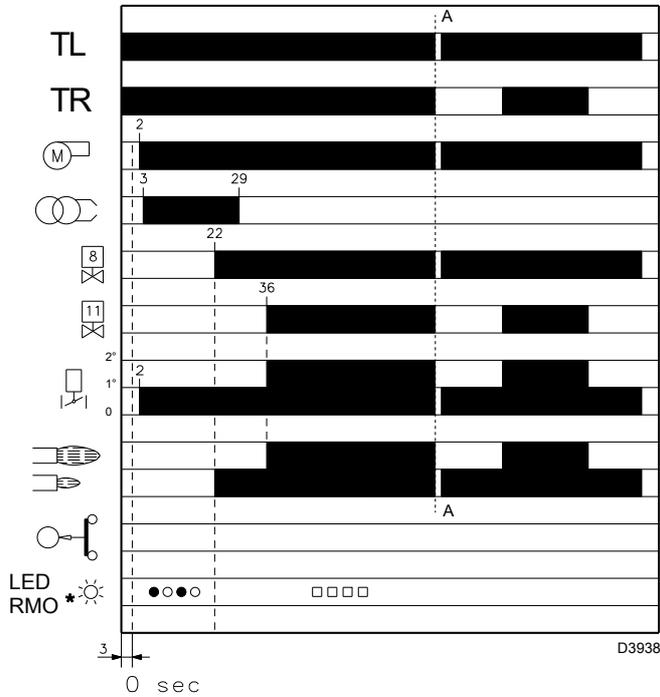
(D)

燃烧器运行

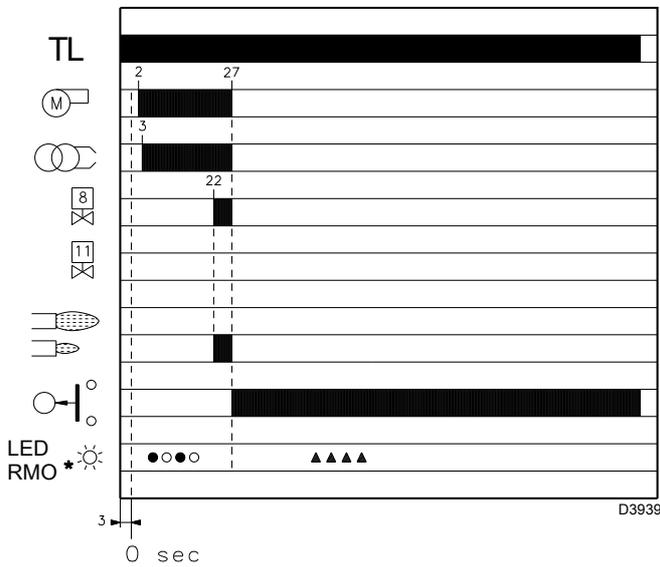
燃烧器启动 (A) - (B)

启动阶段各步骤的时间间隔以秒计，显示如下

- 启动控制装置 TL。
- 大约 3 秒后：
- 0 秒：控制盒启动阶段开始。
- 2 秒：风机马达开始启动。
- 3 秒：点火变压器连接
- 油泵 3) 通过油管 1) 及滤油器 2) 将燃油吸入泵中，并开始加压送油。活塞 4) 升高，油通过油管 5)-7) 流回油箱。螺栓 6) 将泵旁路关闭，电磁阀 8)-11) 断电，关闭油路。
- 液压缸 15) 和活塞 A 开启风门：在一段火风门开度下开始进行预吹扫。
- 22 秒：电磁阀 8) 开启，燃油流经油管 9) 和滤油器 10)，由喷嘴喷出，遇点火电极产生的火花后点燃。此为一段火火焰。
- 29 秒：点火变压器断电。
- 36 秒：如果控制装置 TR 闭合或被短接，二段火电磁阀 11) 打开，燃油进入阀 12) 并抬升活塞，同时打开两个油路：一路流向油管 13)，滤油器 14) 及二段火喷嘴，另一路流向液压缸 15) 及活塞 B，开启二段火风门。
- 至此，启动周期结束。



D3938



D3939

稳态运行

装有控制装置 TR 的系统

启动周期结束后，二段火电磁阀传递指令给控制装置 TR 来控制锅炉温度及压力。

- 如果温度或压力升高至控制装置 TR 断开，则电磁阀 11) 关闭，燃烧器由二段火转为一段火运行。
- 如果温度或压力降低至控制装置 TR 闭合，则电磁阀 11) 开启，燃烧器由一段火转为二段火运行。
- 以此类推。

- 一段火运行时，如热量需求小于燃烧器所输送的热量时，燃烧器停止运行。在此情况下，远程控制装置 TL 断开，电磁阀 8) 关闭，火焰立刻熄灭。风机风门完全关闭。

未装控制装置 TR 的系统 (装有短接线)

燃烧器会按前面所述被点燃。如果温度或压力升高至控制装置 TL 断开，则燃烧器关闭 (如图 A-A 所示)。

当电磁阀 11) 断电，活塞 12) 关闭二段火喷嘴油路，液压缸 15) 及活塞 B 内燃油流入回油管 7)。

点火失败

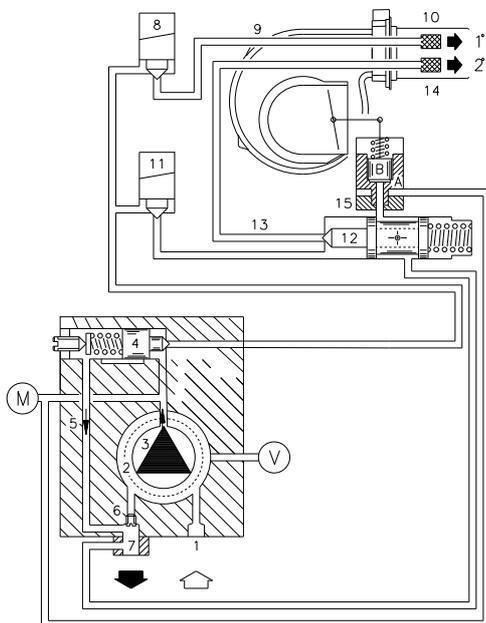
如果燃烧器点火失败，会在 1 段火喷嘴电磁阀开启 5 秒之内或控制装置 TL 闭合 30 秒后进入锁定状态。控制盒指示灯将会亮红灯。

燃烧器运行中意外关闭

如果运行过程中火焰熄灭，燃烧器将会在 1 秒内自动关闭，并且会自动进入启动阶段启动。

- * ○ 灯灭 ● 黄色 □ 绿色 ▲ 红色
 详见第 14 页。

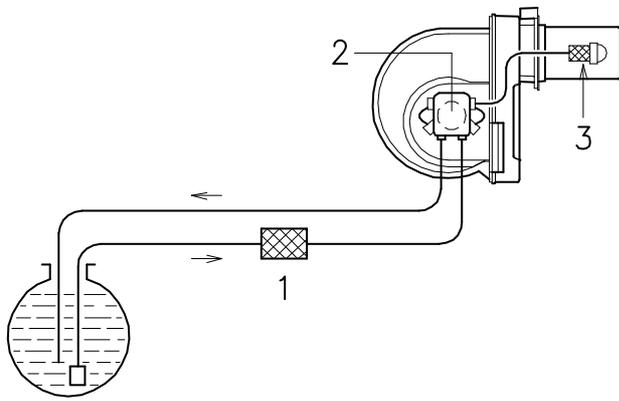
(A)



D3912

(B)

(A)



最终检查

- 闭合启动控制装置及遮挡光电管：燃烧器将启动，并在开启1段火喷嘴电磁阀5秒后锁定。
- 闭合启动控制装置并照亮光电管：燃烧器将启动，并在大约10秒后锁定。
- 燃烧器处于二段火运行时，拔出光电管，会接连出现以下情况：火焰1秒内熄灭，预吹扫约20秒，点火约5秒，燃烧器进入锁定状态。
- 燃烧器运行时，顺序断开控制装置 TL 及 TS：燃烧器将停止运行。

维护

- ⚠ 燃烧器需定期由具有资质的技术人员进行检修，并符合当地的强制性规范。
- ⚠ 定期检修可保证燃烧器的良好性能，避免燃油的过度消耗以及增加污染物的排放。
- ⚠ 在进行任何清洗或操作之前，请先切断燃烧器系统主开关的电源。

燃烧

燃烧器的优化校准需要烟气分析仪。维护时与原有数据存在较大差异的地方应多加注意。

油泵

油泵工作时压力必须稳定在 12 bar。

真空必须低于 0.45 bar。

油泵运行时噪音不能过大。

如果压力不稳或噪音过大，可以从过滤网上取下软管，并从附近的油箱中为油泵供油。这一措施可以诊断是否进油管及油泵的工作异常。

如果油泵工作异常，检查并确保过滤网清洁。真空计安装位置在过滤网之前，因此不能指示过滤网是否被堵塞。另一方面，如果进油管有问题，检查并确保过滤网清洁以及进油管内没有空气进入。

过滤网 (A)

检查下列过滤器：

- 管路 1) • 油泵 2) • 喷嘴 3)，需要时清洁并更换过滤网。

如果油泵内生锈或有污物，请使用另一个独立的油泵将油箱底部的水或污物抽出。

风机

检查确保风机内部及扇叶上没有灰尘积聚，灰尘会减少空气流通量并增加燃烧污染物的排放。

燃烧头

检查确保燃烧头的所有部件性能完好、安装正确以及未被污染，这样就燃烧器就不会在高温运行时出现故障。

喷嘴

不要清洁喷嘴口。

建议在定期维护时每年更换喷嘴。

更换喷嘴时需要对燃烧进行控制。

光电管

清洁玻璃罩上可能积聚的任何灰尘。用力取出光电管 4) (A)p.3。安装时需用力。

软管

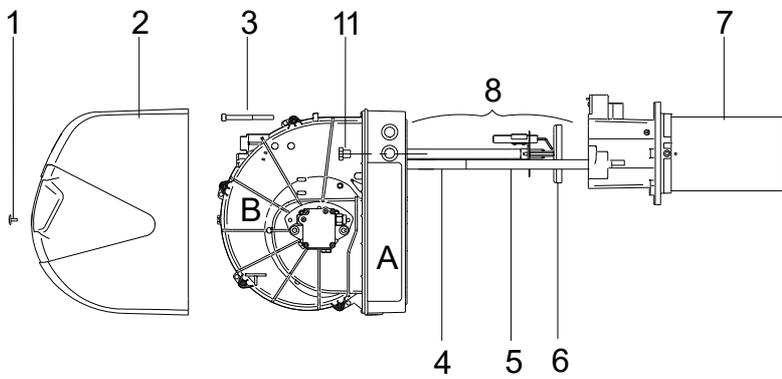
检查确认软管完好无损，未遭破坏。

燃油箱

大概每 5 年、任何必要时刻、燃料箱底部进水或有污物时，需要启用另外一部独立的油泵清洁油箱。

锅炉

为了保持最初的燃烧性能不被破坏，请按随附说明书上的要求清洁锅炉，特别要注意烟气温度及炉膛背压。

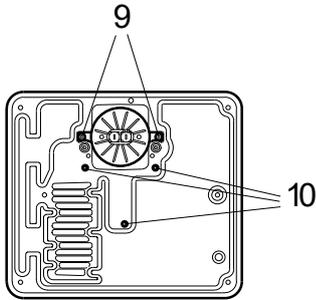


打开燃烧器 (A)

- 断开所有电源
- 拆下螺栓 1, 同时取下外壳 2)
- 拆下螺栓 3)
- 将燃烧器上的两个延长段 4) 接在滑杆 5) 上 (仅适用于 351 mm 加长燃烧头型号)
- 略抬起机体 A, 向后拉, 注意不要碰坏在燃烧筒 7) 里的稳焰盘 6)。

配电盘的维护 (B)

如需检修配电盘 A)(图 A), 可以先取下风机组件 B)(图 A) 以方便对电气元件进行维修操作。
 如图 (A) 所示, 打开燃烧器时, 需断开电极电缆并拧下 2 个螺栓 9)(A), 取下燃烧头 8)(A)。断开与风机相连的电缆, 取下保护垫上的 3 个螺栓 10)(A) 和另外 2 个螺栓 11)(A), 从滑杆 4) - 5)(A) 上取出风机组件 B)(图 A)。最后, 可以使用 3 个螺栓中的 2 个按图 (B) 所示的位置将配电盘与多歧管连接, 之后可进行维修操作。

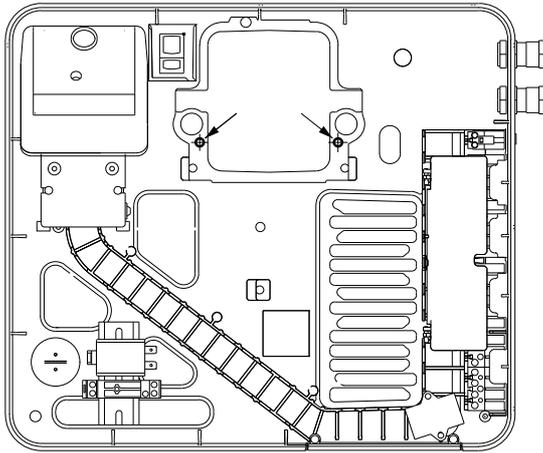


可能进行的油泵及 / 或联轴器更换 (C)

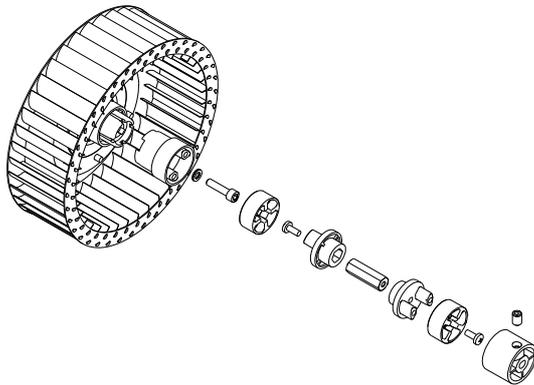
按图 (C) 给出的说明进行维修。

(A)

D3962



(B)



(C)

燃烧器启动阶段故障诊断
启动过程中的各项指标见下表：

颜色代码表	
启动过程	颜色代码
预吹扫	● ○ ● ○ ● ○ ● ○ ●
点火阶段	● ○ ● ○ ● ○ ● ○ ●
运行，火焰正常	□ □ □ □ □ □ □ □ □
运行，火焰较弱	□ ○ □ ○ □ ○ □ ○ □
电压低于 ~ 170V	● ▲ ● ▲ ● ▲ ● ▲ ●
锁定	▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲
外部光源	▲ □ ▲ □ ▲ □ ▲ □ ▲
图例： ○ 灯灭 ● 黄色 □ 绿色 ▲ 红色	

复位控制盒及执行故障诊断

控制盒具有故障诊断功能，因此能很容易确定故障原因（指示器：红色 LED 指示灯）。要使用这一功能，须等进入安全保护状态（锁定状态）至少 10 秒之后再按下复位按钮。控制盒红色报警灯组脉冲闪烁（相隔 1 秒），闪烁会以 3 秒间隔不断重复出现。可根据指示灯的闪烁次数来判断可能的故障原因，系统复位时必须按住按钮 1-3 秒。



按如下方法可复位控制盒及执行故障诊断。

复位控制盒

复位控制盒程序如下：
- 按住复位键 1-3 秒。
 松开复位键 2 秒后燃烧器重启。
 若温度限位开关处于断开状态，则燃烧器不能重启。

视觉故障诊断

提示引起燃烧器锁定的故障类型。
查看故障诊断，并按以下步骤操作：
- 当红色 LED 持续亮起（燃烧器锁定）时，按住按钮超过 3 秒。
 黄灯闪烁说明操作成功。
 指示灯闪烁则松开按钮。指示灯闪烁次数提示故障原因，如第 15 页列表所示。

软件故障诊断

通过与 PC 电脑连接，报告燃烧器使用寿命，提示运行时间、锁定次数及类型、控制盒序列号等
查看故障诊断，并按以下步骤操作：
- 当红色 LED 持续亮起（燃烧器锁定）时，按住按钮超过 3 秒。
 黄灯闪烁说明操作成功。
 松开按钮 1 秒之后再次按下按钮超过 3 秒直至黄灯再次闪烁。
 松开按钮，红色 LED 高频闪烁：此时光链路被激活。

一旦操作成功，必须按照上述控制盒复位程序将控制盒恢复初始状态。

按键时间	控制盒状态
1 - 3 秒	在视觉故障诊断前复位控制盒。
大于 3 秒	在锁定状态进行视觉故障诊断： (Led 指示灯以 1 秒间隔闪烁)。
开始视觉故障诊断后超过 3 秒	通过红外线与 PC 机连接进行软件故障诊断 (可查看运行时间、故障等)

控制盒指示灯闪烁情况提示故障类型，如第 15 页列表所示。

指示灯	故障	可能的故障原因	排除故障建议
不闪烁	燃烧器未启动	1 - 电源没电 2 - 启动或安全控制装置断开 3 - 控制盒锁定 4 - 油泵堵塞 5 - 不正确的电气接线 6 - 控制盒损坏 7 - 电机损坏 8 - 电容损坏	关闭所有电源 - 检查保险丝 调节或更换 复位控制盒 (锁定 10 秒后) 更换 检查接线 更换 更换 更换
闪烁 4 次 ● ● ● ●	燃烧器启动之后进入锁定状态	9 - 光电管短路 10 - 有外部光源进入或虚假火焰	更换光电管 消除光源或更换控制盒
闪烁 2 次 ● ●	预吹扫及安全时间过后, 燃烧器进入锁定状态	11 - 油箱中没有油; 油箱底部有水 12 - 燃烧头及风门调节不当 13 - 燃油电磁阀打开失败 (一段火或安全阀) 14 - 1 段火喷嘴堵塞、脏或损坏 15 - 点火电极脏或调节不当 16 - 由于绝缘破损电极接地 17 - 高压电缆损坏或接地 18 - 高压电缆由于高温而损坏 19 - 点火变压器损坏 20 - 电磁阀或点火变压器电气连接错误 21 - 控制盒损坏 22 - 油泵不启动 23 - 油泵 / 马达联轴器断开 24 - 油泵吸油管和回油管短路 25 - 油泵上游的阀关闭 26 - 过滤网脏: 油路 - 油泵 - 喷嘴 27 - 光电管或控制盒损坏 28 - 光电管脏 29 - 一段火运行液压缸故障 30 - 电机转向反向	增加油到相应水平或抽走油箱底部水 调节, 见第 7 页及第 8 页 检查连接或更换线圈 更换 调节或清洁 更换 更换 更换或采取保护措施 更换 检查 更换 启动油泵, 参见“油泵不启动” 更换 正确连接 开启 清洁 更换光电管或控制盒 清洁 更换液压缸 更换电机电源接线
闪烁 7 次 ● ● ● ● ● ● ●	脱火	31 - 燃烧头调节不当 32 - 点火电极调节不当或脏 33 - 风门调节不当: 风量过大 34 - 1 段火喷嘴流量过大 (震动) 35 - 1 段火喷嘴流量过小 (脱火) 36 - 1 段火喷嘴脏或损坏 37 - 油泵压力不当 38 - 一段火喷嘴与燃烧器或锅炉不匹配 39 - 一段火喷嘴损坏	调整, 见第 8 页 调整, 见第 5 页 调整 减小 1 段火喷嘴流量 增大 1 段火喷嘴流量 更换 调整至 10 - 14 bar 参见喷嘴列表, 第 6 页, 减小一段火喷嘴流量 更换
	燃烧器不能转到二段火	40 - 控制装置 TR 不能闭合 41 - 控制盒故障 42 - 二段火电磁阀线圈故障 43 - 电磁阀的活塞堵塞	调整或更换 更换 更换 更换整个部件
	燃油进入二段火运行但风量为一段火风量	44 - 油泵压力低 45 - 二段火风门液压缸故障	加压 更换液压缸
	一、二段火转换时燃烧器停机。燃烧器重复启动周期。	46 - 喷嘴脏 47 - 光电管脏 48 - 空气过大	更换喷嘴 清洁 减少
	燃油供应不稳定	49 - 查看原因是否出在油泵、供应系统上	就近给燃烧器 油箱还是燃油 供油
	油泵内部生锈	50 - 油箱内有水	用另一个泵将油箱内水抽干
	油泵噪音大, 压泵不稳	51 - 进油管有空气 52 - 油泵进油压力过高 (高于 35 cm Hg) 53 - 油箱 / 燃烧器高度差过大 54 - 管道直径太小 55 - 进油管过滤网堵塞 56 - 温度过低, 燃油凝固	紧固接头 采用循环回路为燃烧器供油 增大 清洁 开启 向燃油中加入添加剂
	油泵长时间不启动	57 - 回油管没有燃油 58 - 进油管有空气	升高到与进油管同样高度 紧固接头
	油泵漏油	59 - 由密封圈处泄露	更换油泵
	烟气 - 黑度等级 - 黄度等级	60 - 空气不足 61 - 喷嘴磨损或脏 62 - 喷嘴过滤网堵塞 63 - 油泵压力不当 64 - 稳火叶片脏, 松动或损坏 65 - 炉膛通风不足 66 - 空气过量	调整燃烧头及风门, 见第 7 页及第 8 页 更换 清洁或更换 调整至 10 - 14 bar 清洁, 紧固或更换 增大 调整燃烧头及风门, 见第 7 页及第 8 页
	燃烧头脏	67 - 喷嘴或过滤网脏 68 - 喷嘴流量或角度不当 69 - 喷嘴松动 70 - 稳火叶片上有杂物 71 - 燃烧头调节不当或空气不足 72 - 燃烧筒高度与锅炉不匹配	更换 参见推荐喷嘴, 见第 7 页 固定 清洁 调整, 见第 8 页; 打开风门阀 联系锅炉制造商
闪烁 10 次 ● ● ● ● ● ● ● ● ● ●		73 - 接线错误或内部故障 74 - 存在电磁干扰	启动抗电磁干扰工具包

电气接线



注意

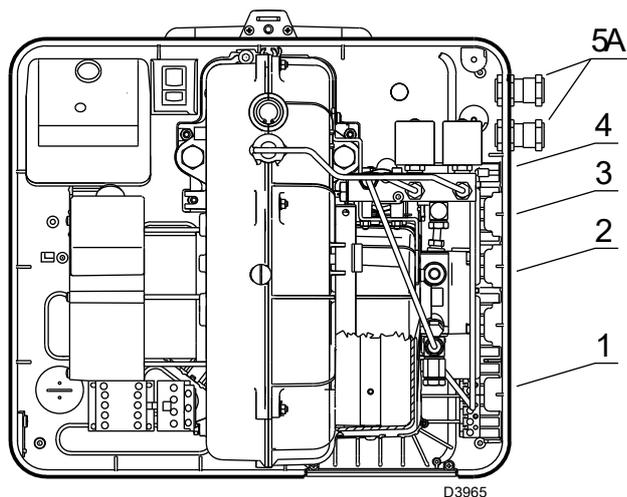
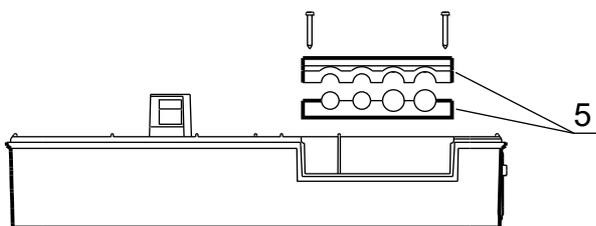
电气接线必须符合该国的强制性法规，且必须由具有相关资质的人员执行。

擅自修改接线或不按接线图接线所造成的损失，制造商概不负责。

根据 EN 60 335-1 标准使用柔性电缆。

所有连接到燃烧器的电缆必须穿过导缆孔。

导缆孔可以有不同的用法；下面是其中一种模式：



AL 34-44 MZ 单相

- 1- 7孔插座 单相供电，温度/压力开关 TL
- 2- 四孔插座 温度/压力开关 TR
- 3- 四孔插座
- 4- 两孔插座 远程复位控制盒附件
- 5 - 5A 连接喷嘴的油管
(如使用 5A 喷嘴，需要钻孔)

注意

- AL 34 -44 MZ - 型号的燃烧器只能间歇运行，即燃烧器必须每 24 小时停机一次来检测控制盒在启动循环中的有效性。正常情况下，锅炉的温度/压力限位开关 TL 会保证燃烧器的停机。如果不能实现，则需在燃烧器上串接一个计时开关来实现燃烧器至少每 24 小时停机一次。
- AL 34-44 MZ 型燃烧器出厂时具备两段火功能，因此必须连接温度/压力开关 TR。若要改成单段火运行，在温度/压力开关 TR 的位置，在插头 X4 的接线端子 T6-T8 之间插入一个短接线。



警告：

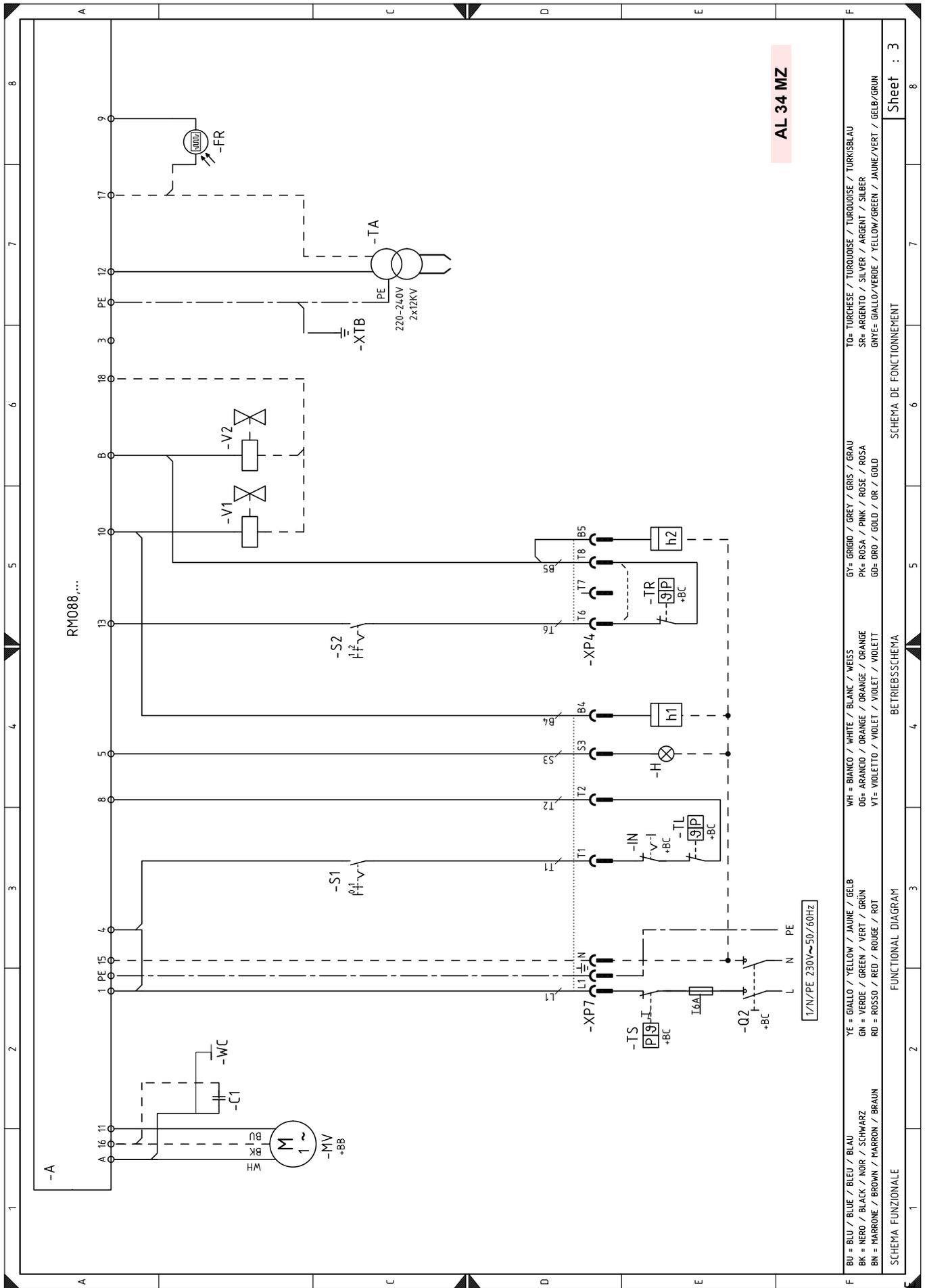
- 不要把零线和相线反接。任何反接可能造成点火失败，燃烧器锁定。
- 所有损坏部件的更换必须使用原厂配件。

Electrical panel layout - 电气接线图

1	INDEX - 目录
2	Indication of references - 参考指示
3 AL 34 MZ AL 44 MZ	Functional diagram - 功能图
4 AL 34 MZ AL 44 MZ	Electrical connections set by installer - 安装人员用电气连接图

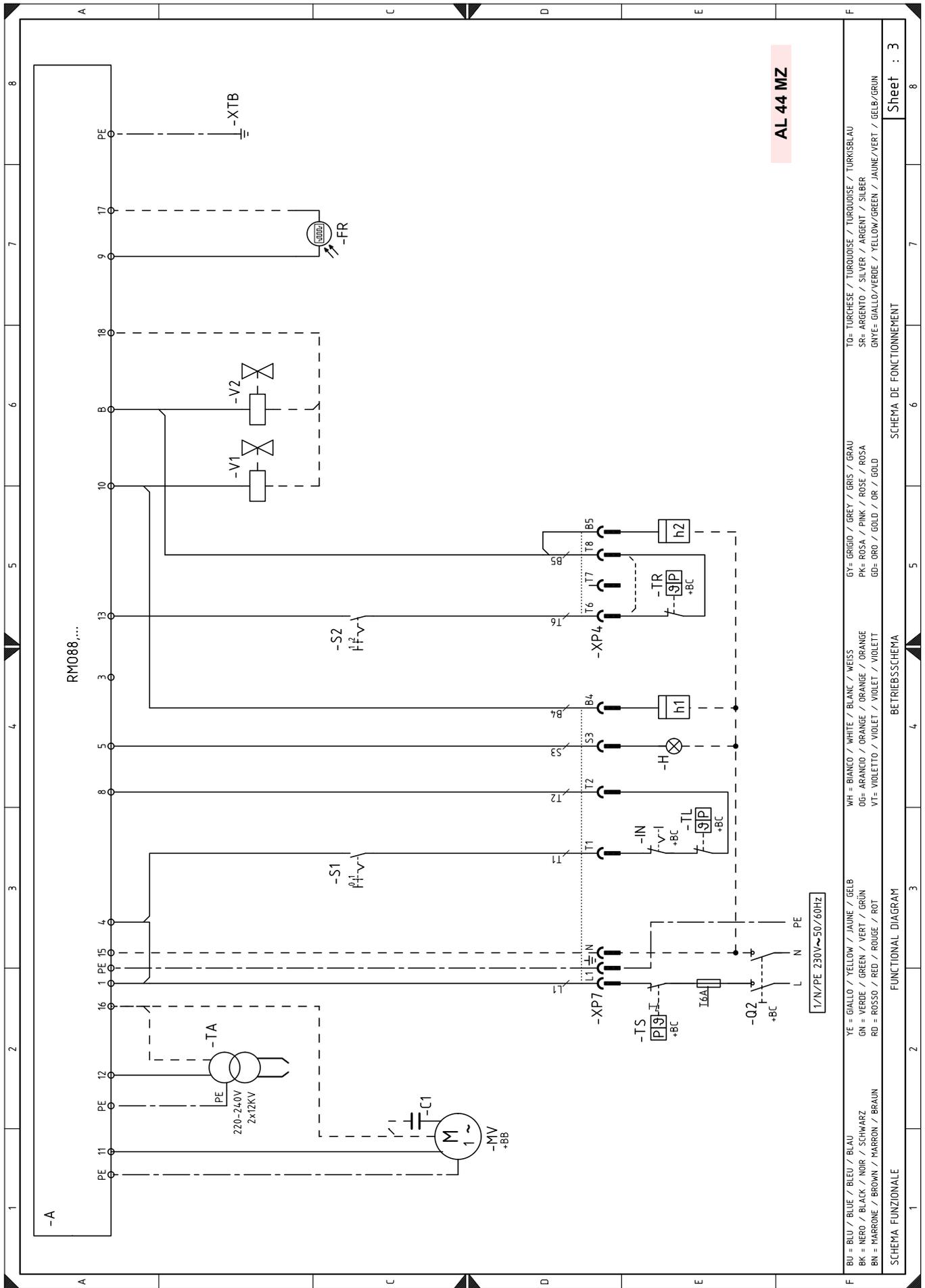
2 Indication of references - 参考指示





AL 34 MZ

1	2	3	4	5	6	7	8
BU = BLU / BLUE / BLEU / BLAU	YE = GIALLO / YELLOW / JAUNE / GELB	WH = BIANCO / WHITE / BLANK / WEISS	GY = GRIGIO / GREY / GRIS / GRAU	TO = TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU	SR = ARGENTO / SILVER / ARGENT / SILBER	GN = VERDE / GREEN / VERT / GRÜN	BN = MARRONE / BROWN / MARRON / BRAUN
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	GY = GRIGIO / GREY / GRIS / GRAU	RD = ROSSO / RED / ROUGE / ROT	BN = MARRONE / BROWN / MARRON / BRAUN
BN = MARRONE / BROWN / MARRON / BRAUN	RD = ROSSO / RED / ROUGE / ROT	VI = VIOLETT / VIOLET / VIOLET / VIOLETT	GD = ORO / GOLD / OR / GOLD	GY = GRIGIO / GREY / GRIS / GRAU	TO = TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU	GN = VERDE / GREEN / VERT / GRÜN	BN = MARRONE / BROWN / MARRON / BRAUN
SCHEMA FUNZIONALE				SCHEMA DE FONCTIONNEMENT			
FUNCTIONAL DIAGRAM				BETRIEBSSCHEMA			
Sheet : 3				Sheet : 3			



AL 44 MZ

F	BU = BLU / BLUE / BLEU / BLAU	YE = GIALLO / YELLOW / JAUNE / GELB	WH = BIANCO / WHITE / BLANK / WEISS	GY = GRIGIO / GREY / GRIS / GRAU	TO = TURCHESA / TURQUOISE / TURKOISE / 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	VI = VIOLETT / VIOLET / VIOLET / VIOLETT	GD = ORO / GOLD / OR / GOLD	GYE = GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRÜN

SCHEMA FUNZIONALE / FUNCTIONAL DIAGRAM / SCHEMA DE FONCTIONNEMENT

1 2 3 4 5 6 7 8

Sheet : 3

KEY TO ELECTRICAL LAYOUT

A	- Electrical control box
BB	- Components on burners
BC	- Components on boiler
C1	- Capacitor
FR	- Photocell
H	- Remote lockout signalling
IN	- Manual burner arrest switch
h1	- Hour counter
h2	- Hour counter
MV	- Fan motor
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
XP7	- 7 pole socket
XTB	- Shelf earth
X4	- 4 pin plug
X7	- 7 pin plug
V1	- Ignition solenoid /1st stage
V2	- 2nd stage solenoid
WC	- Capacitor connection

电气图图例说明

A	- 控制盒
BB	- 燃烧器部件
BC	- 锅炉部件
C1	- 电容
FR	- 光电管
H	- 远程锁定
IN	- 燃烧器手动开关
h1	- 计时器
h2	- 计时器
MV	- 风机马达
Q2	- 单相闸刀开关
RS	- 燃烧器远程复位键 (附件)
S1	- 开关: 燃烧器 开 - 关
S2	- 开关: 一段火 - 二段火
TA	- 点火变压器
TL	- 温度 / 压力开关
TR	- 温度 / 压力调节开关
TS	- 温度 / 压力安全开关
XP4	- 4 孔插座
XP5	- 5 孔插座
XP7	- 7 孔插座
XTB	- 机架接地
X4	- 4 针插头
X5	- 5 针插头
X7	- 7 针插头
V1	- 点火电磁阀 / 一段火
V2	- 二段火电磁阀
WC	- 电容器连接

