

GB Forced draught gas burners

CN 强制通风燃气燃烧器

Progressive two-stage operation
两段火运行

RS



CODE - 编码

MODEL - 型号

TYPE - 类型

20033634

RS 50

811 T1

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N.B.

Figures mentioned in the text are identified as follows:

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

TECHNICAL DATA

MODEL			RS 50	
TYP			811 T1	
OUTPUT ⁽¹⁾	2nd stage	kW	290 - 581	
		Mcal/h	249 - 500	
	min. 1st stage	kW	116	
		Mcal/h	100	
FUEL			NATURAL GAS: G20 - G21 - G22 - G23 - G25	
			G20	G25
- Net calorific value		kWh/Nm³	10	8.6
		Mcal/Nm³	8.6	7.4
- Absolute density		kg/Nm³	0.71	0.78
- Max delivery		Nm³/h	58	68
- Pressure at maximum delivery (2)		mbar	7.2	10.6
OPERATION			• Intermittent (min. 1 stop in 24 hours) • Two-stage (high and low flame) and single-stage (all - nothing)	
STANDARD APPLICATION			Boilers: water. steam. diathermic oil	
AMBIENT TEMPERATURE		°C	0 - 40	
COMBUSTION AIR TEMPERATURE		°C max	60	
ELECTRICAL SUPPLY		V Hz	230 - 400 with neutral ~ +/-10% 50 - three-phase	
ELECTRICAL MOTOR		rpm W V A	2800 650 220/240-380/415 3 - 1.7	
IGNITION TRASFORMER		V1 - V2 I1 - I2	230 V - 1 x 8 kV 1 A - 20 mA	
ELECTRICAL POWER CONSUMPTION		W max	750	
ELECTRICAL PROTECTION			IP 44	
IN CONFORMITY WITH EEC DIRECTIVES			2009/142 - 89/336 - 2004/108 - 73/23 - 2006/95 - 2006/42	
NOISE LEVELS ⁽³⁾		dBA	72	

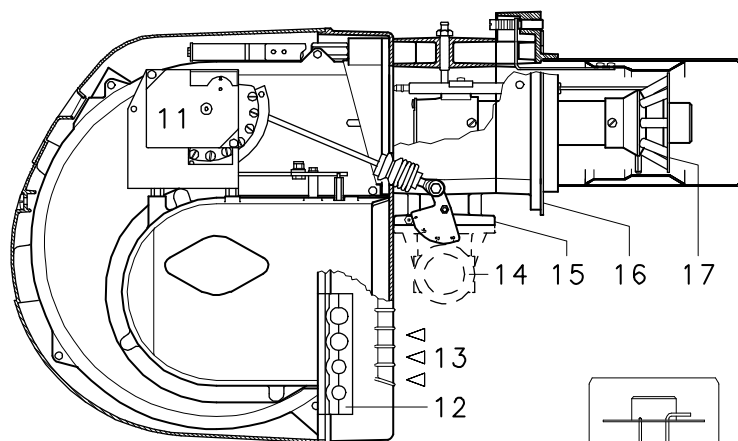
(1) Reference conditions: Ambient temperature 20°C - Barometric pressure 1000 mbar - Altitude 100 m a.s.l.

(2) Pressure at test point 8)(A)p.3, with zero pressure in the combustion chambre, with open gas ring 2)(B)p.7 an maximum burner output

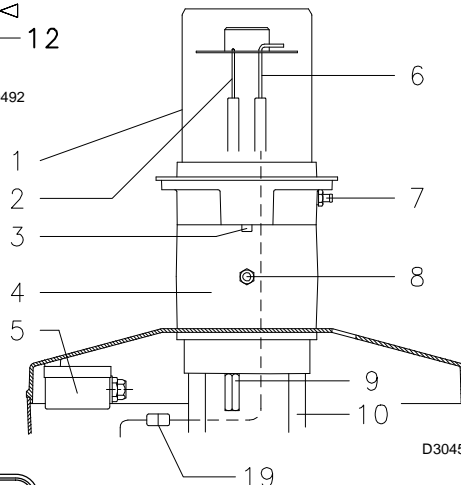
(3) Sound pressure measured in manufacturer's combustion laboratory, with burner operating on test boiler and at maximum rated output.

GAS CATEGORY

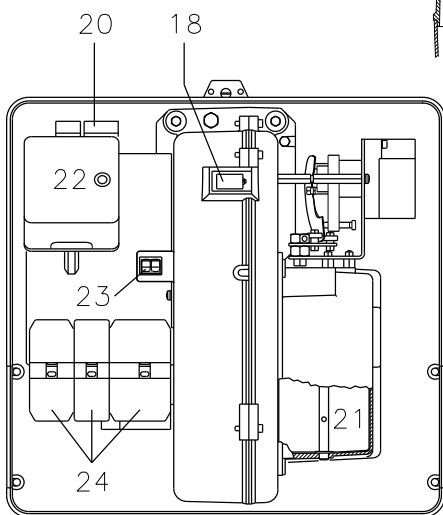
COUNTRY	CATEGORY
IT - AT - GR - DK - FI - SE	II _{2H3B} / P
ES - GB - IE - PT	II _{2H3P}
NL	II _{2L3B} / P
FR	II _{2Er3P}
DE	II _{2ELL3B} / P
BE	I _{2E(R)B} , I _{3P}
LU	II _{2E 3B/P}



D492



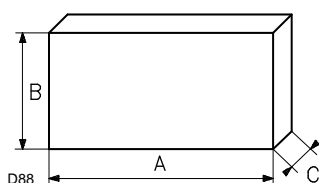
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D11243

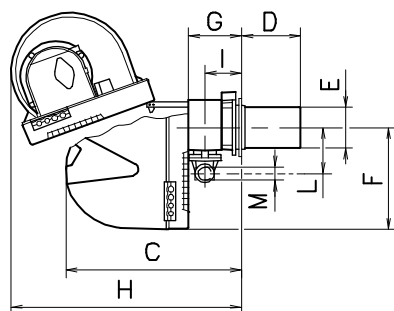
(A)

mm	A	B	C	kg
RS 50	1010	625	495	41



D88

(B)



D495

(C)

mm	A	B	C	D ⁽¹⁾	E	F	G	H	I	L	M
RS 50	476	474	580	216 - 351	152	352	164	810	108	168	1"1/2

(1) Blast tube: short-long

BURNER DESCRIPTION (A)

- 1 Combustion head
- 2 Ignition electrode
- 3 Screw for combustion head adjustment
- 4 Sleeve
- 5 Minimum air pressure switch (differential operating type)
- 6 Flame sensor probe
- 7 Air pressure test point
- 8 Gas pressure test point and head fixing screw
- 9 Screws securing fan to sleeve
- 10 Slide bars for opening the burner and inspecting the combustion head
- 11 Servomotor controlling the gas butterfly valve and of air gate valve (by means of a variable profile cam mechanism).
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.
- 12 Plate with four hole knock-outs for electrical cable routing
- 13 Air inlet to fan
- 14 Gas input pipework
- 15 Gas butterfly valve
- 16 Boiler mounting flange
- 17 Flame stability disk
- 18 Flame inspection window
- 19 Plug-socket on ionisation probe cable
- 20 Motor contactor and thermal cut-out reset button
- 21 Air gate valve
- 22 Control box with lock-out pilot light and lock-out reset button
- 23 Two switches:
- one "burner off - on"
- one for "1st - 2nd stage operation"
- 24 Plugs for electrical connections

Two types of burner failure may occur:

- **Control box lock-out:** if the control box 22)(A) 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.
- **Motor trip:** release by pressing the pushbutton on thermal cutout 20)(A).

PACKAGING - WEIGHT (B) - Approximate measurements

- The burner 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

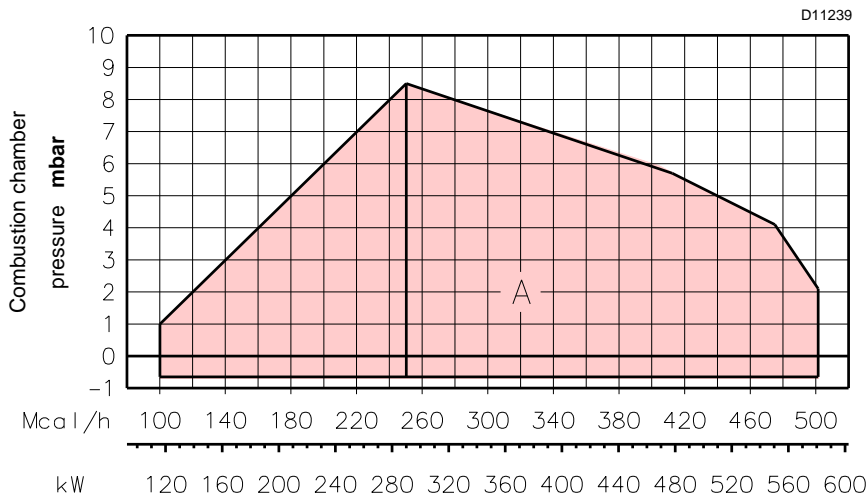
The maximum dimensions of the burner are given in (C).

Note that if you need to examine the combustion head, the burner must be pulled backward on the slide bars and turned upward.

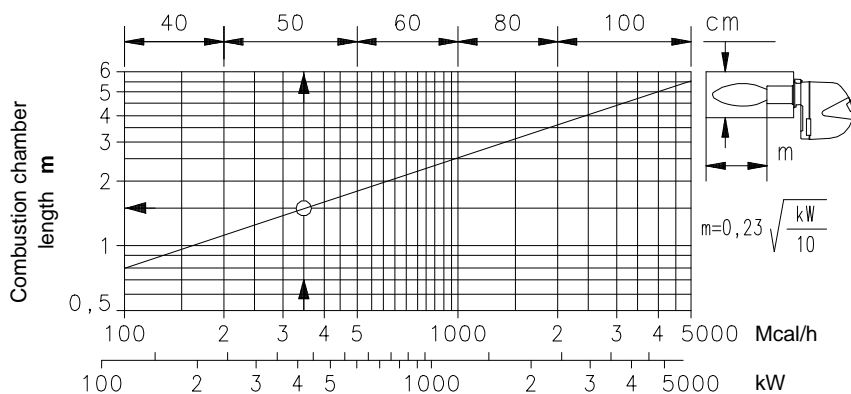
The maximum dimension of the burner, without the cover, when open is give by measurement H.

STANDARD EQUIPMENT

- 1 - Gas train flange
- 1 - Flange gasket
- 4 - Flange fixing screws M 8 x 25
- 1 - Thermal insulation screen
- 4 - Screws to secure the burner flange to the boiler: M 8 x 25
- 6 - Fairleads for electrical connections
- 1 - Instruction booklet
- 1 - Spare parts list



(A)



(B)

D497

FIRING RATES (A)

The RS 50 burners can work in two ways: one-stage and two-stage

MAXIMUM OUTPUT must be selected in area A.

MINIMUM OUTPUT must not be lower than the minimum limit shown in the diagram.

RS 50 = 116 kW

Important:

The FIRING RATE value range has been obtained considering an ambient 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 7.

TEST BOILER (B)

The firing rates were set in relation to special test boilers, according to EN 676 regulations. Figure (B) indicates the diameter and length of the test combustion chamber.

Example:

Output 350 Mcal/h:

diameter = 50 cm; length = 1,5 m.

COMMERCIAL BOILERS

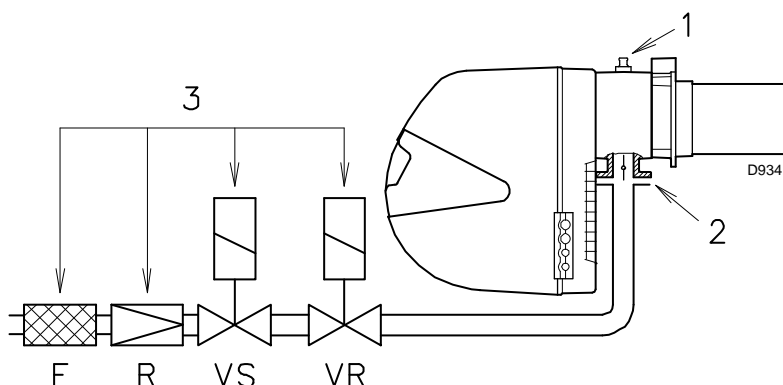
The burner/boiler combination does not pose any problems if the boiler is CE type-approved and its combustion chamber dimensions are similar to those indicated in diagram (B).

If the burner must be combined with a commercial boiler that has not been CE type-tested and/or its combustion chamber dimensions are clearly smaller than those indicated in diagram (B), consult the manufacturer.

Δp (mbar)

kW	1	2	3					
			Ø 1" 3970077	Ø 1"1/4 3970144	Ø 1"1/2 3970145	Ø 1"1/2 3970180	Ø 2" 3970146 3970160	Ø 2" 3970181 3970182
290	2.2	0.3	13.4	7.9	5.5	4.4	2.1	2.7
330	2.9	0.4	16.6	9.7	6.9	5.0	2.7	3.4
370	3.6	0.5	20.0	11.6	8.4	6.1	3.3	3.9
410	4.3	0.6	23.7	13.7	10.1	7.0	4.0	4.4
450	5.0	0.7	27.6	15.9	11.9	8.3	4.7	5.1
490	5.6	0.9	31.7	18.2	13.7	9.7	5.5	5.9
530	6.3	1.0	36.1	20.6	15.7	10.5	6.3	6.6
580	7.2	1.2	41.8	23.9	18.5	12.0	7.4	7.8

(A)



(B)

GAS PRESSURE

The adjacent tables show minimum pressure losses along the gas supply line depending on the burner output in 2nd stage operation.

Column 1

Pressure loss at combustion head.

Gas pressure measured at test point 1)(B), with:

- Combustion chamber at 0 mbar
- Burner operating in 2nd stage
- Gas ring 2)(B)p.7 adjusted as indicated in diagram (C)p. 7.

Column 2

Pressure loss at gas butterfly valve 2)(B) with maximum opening: 90°.

Column 3

Pressure loss of gas train 3)(B) includes: adjustment valve VR, safety valve VS (both fully open), pressure governor R, filter F.

The values shown in the various tables refer to: natural gas G20 PCI 10 kWh/Nm³ (8.6 Mcal/Nm³). With:

natural gas G25 PCI 8.6 kWh/Nm³ (7.4 Mcal/Nm³) multiply tabulated values by 1.3.

Calculate the approximate 2nd stage output of the burner thus:

- subtract the combustion chamber pressure from the gas pressure measured at test point 1)(B).
- Find the nearest pressure value to your result in column 1 of the table for the burner in question.
- Read off the corresponding output on the left.

Example:

- 2nd stage operation
- Natural gas G20 PCI 10 kWh/Nm³
- Gas ring 2)(B)p.7 adjusted as indicated in diagram (C)p.7.
- Gas pressure at test point 1)(B) = 6.3 mbar
- Pressure in combustion chamber = 2 mbar

$$6.3 - 2 = 4.3 \text{ mbar}$$

A 2nd stage output of 410 kW shown in Table corresponds to 4.3 mbar pressure, column 1.

This value serves as a rough guide, the effective delivery must be measured at the gas meter.

To calculate the required gas pressure at test point 1)(B), set the output required from the burner in 2nd stage operation:

- find the nearest output value in the table for the burner in question.
- Read off the pressure at test point 1)(B) on the right in column 1.
- Add this value to the estimated pressure in the combustion chamber.

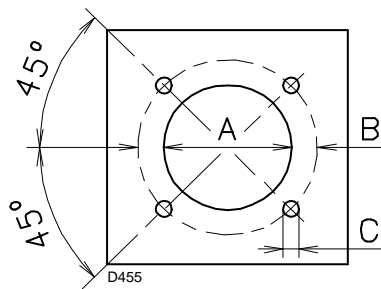
Example:

- Required burner output in 2nd stage operation: 410 kW
- Natural gas G20 PCI 10 kWh/Nm³
- Gas ring 2)(B)p.7 adjusted as diagram (C)p.7.
- Gas pressure at burner output of 410 kW, taken from table, column 1 = 4.3 mbar
- Pressure in combustion chamber = 2 mbar

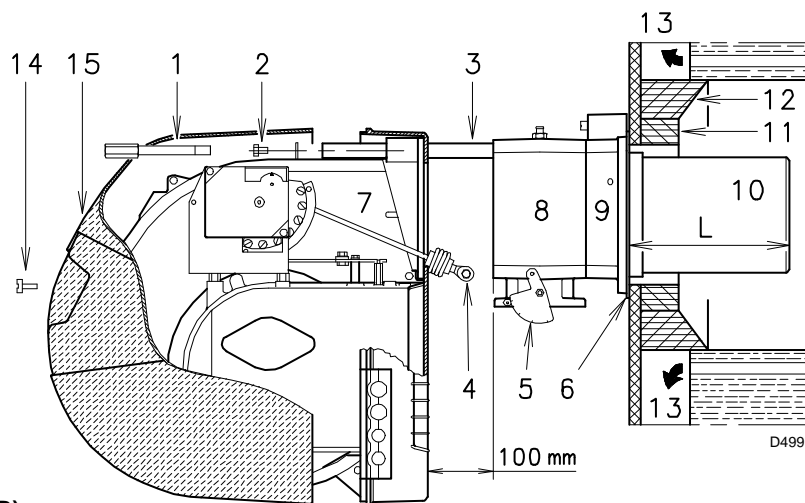
$$4.3 + 2 = 6.3 \text{ mbar}$$

pressure required at test point 1)(B).

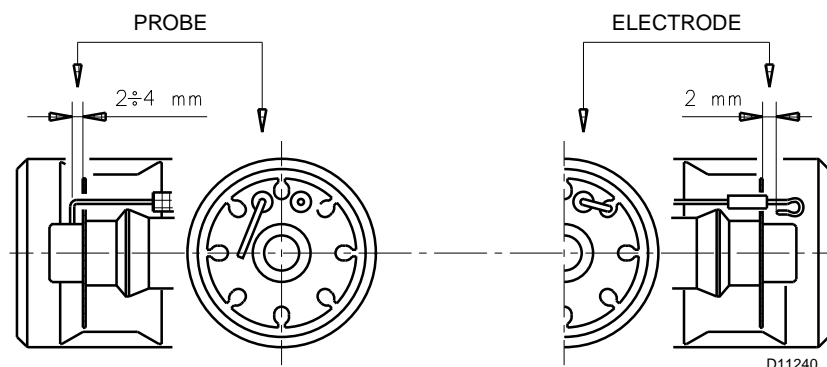
mm	A	B	C
RS 50	160	224	M 8



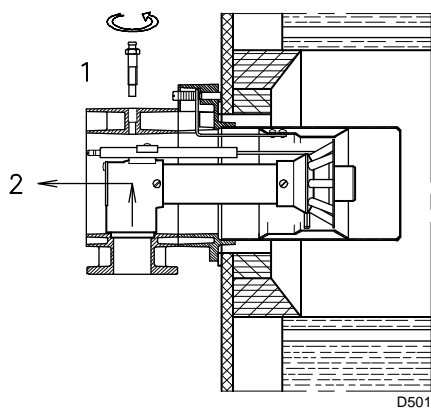
(A)



(B)



(C)



(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. The range of lengths available, L (mm), is as follows:

Blast tube 10):	RS 50
• short	216
• long	351

For boilers with front flue passes 13) or flame inversion chambers, protective fettling in refractory material 11) must be inserted between the boiler fettling 12) and the blast tube 10).

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

For boilers having a water-cooled front the refractory fettling 11)-12)(B) is not required unless it is expressly requested by the boiler manufacturer.

SECURING THE BURNER TO THE BOILER (B)

Before securing the burner to the boiler, check through the blast tube opening to make sure that the flame sensor probe and the ignition electrode are correctly set in position, as shown in (C).

Now detach the combustion head from the burner, fig.(B):

- remove screw 14) and withdraw the cover 15).
- Disengage the articulated coupling 4) from the graduated sector 5).
- Remove the screws 2) from the slide bars 3)
- Remove screw 1) and pull the burner back on slide bars 3) by about 100 mm.

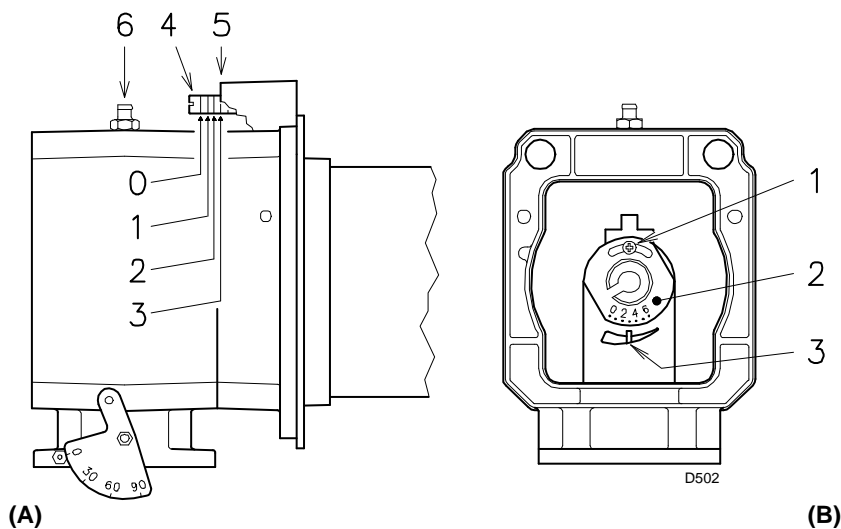
Disconnect the wires from the probe and the electrode and then pull the burner completely off the slide bars, after removing the split pin from the slide bar 3).

Secure the flange 9)(B) to the boiler plate, interposing the thermal insulating screen 6)(B) supplied with the burner. Use the 4 screws, also supplied with the unit, after first protecting the thread with an anti-locking product.

The seal between burner and boiler must be airtight.

If you noticed any irregularities in positions of the probe or ignition electrode during the check mentioned above, remove screw 1)(D), extract the internal part 2)(D) of the head and proceed to set up the two components correctly.

Do not attempt to turn the probe. Leave it in the position shown in (C) since if it is located too close to the ignition electrode the control box amplifier may be damaged.



SETTING THE COMBUSTION HEAD

Installation operations are now at the stage where the blast tube and sleeve are secured to the boiler as shown in fig.(A). It is now a very simple matter to set up the combustion head, as this depends solely on the output developed by the burner in 2nd stage operation.

It is therefore essential to establish this value before proceeding to set up the combustion head.

There are two adjustments to make on the head:

air and gas deliveries.

In diagram (C) find the notch to use for adjusting the air and the gas, and then proceed as follows:

Air adjustment (A)

Turn screw 4)(A) until the notch identified is aligned with the front surface 5)(A) of the flange.

Gas adjustment (B)

Loosen screws 1)(B) and turn ring 2) until the notch identified is aligned with index 3).

Tighten the screw 1) fully down.

Example:

burner output = 432 kW (373 Mcal/h).

If we consult diagram (C) we find that for this output, air and gas must be adjusted using notch 3, as shown in figs.(A) and (B).

Note

Diagram (C) shows the ideal settings for the combustion head. If the gas mains pressure is too low to reach the 2nd stage operation pressure indicated on page 5, and if the ring 2)(B) is not fully open, it can be opened wider by 1 or 2 notches.

Continuing with the previous example, page 5 indicates that for burner with output of 432 kW (373 Mcal/h) a pressure of approximately 4,6 mbar is necessary at test point 6)(A). If this pressure cannot be reached, open the ring 2)(B) to notch 4 or 5.

Make sure that the combustion characteristics are satisfactory and free of pulsations.

Once you have finished setting up the head, refit the burner 4)(D) to the slide bars 3) at approximately 100 mm from the sleeve 5) - burner positioned as shown in fig.(B)p.6 - insert the flame detection probe cable and the ignition electrode cable and then slide the burner up to the sleeve so that it is positioned as shown in fig.(D).

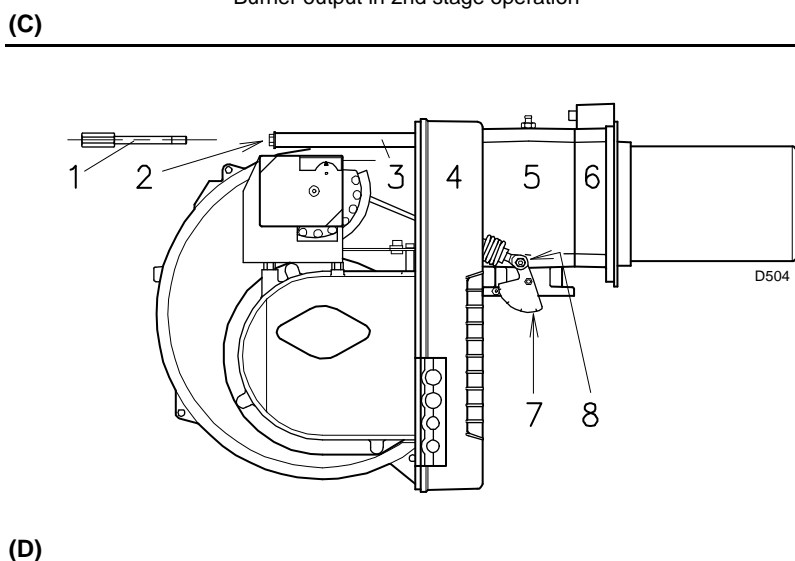
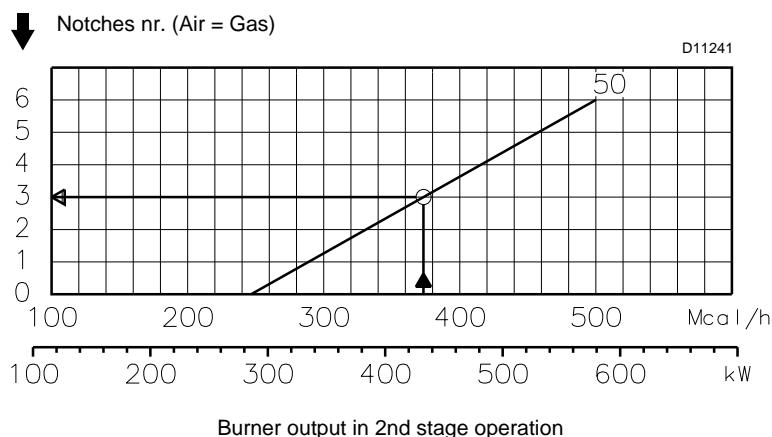
Refit screws 2) on slide bars 3).

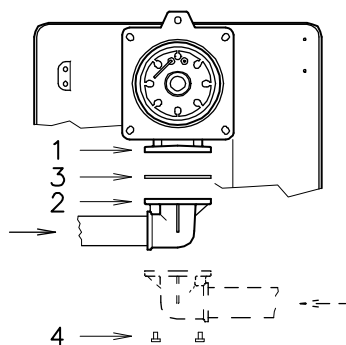
Secure the burner to the sleeve by tightening screw 1) and then refit the split pin into one of two slide bars 3).

Reconnect the articulation 8) to the graduated sector 7).

Important

When fitting the burner on the two slide bars, it is advisable to gently draw out the high tension cable and flame detection probe cable until they are slightly stretched.





(A)

D505

GAS LINE

- The gas train must be connected to the gas attachment 1)(A), using flange 2), gasket 3) and screws 4) supplied with the burner.
- The gas train can enter the burner from the right or left side, depending on which is the most convenient, see fig.(A).
- Gas solenoids 8)-9)(B) must be as close as possible to the burner to ensure gas reaches the combustion head within the safety time range of 3 s.
- Make sure that the pressure governor calibration range (colour of the spring) comprises the pressure required by the burner.

GAS TRAIN (B)

It is type-approved according to EN 676 Standards and is supplied separately from the burner with the code indicated in Table (C).

KEY (B)

- 1 - Gas input pipe
- 2 - Manual valve
- 3 - Vibration damping joint
- 4 - Pressure gauge with pushbutton cock
- 5 - Filter
- 6 - Pressure governor (vertical)
- 7 - Minimum gas pressure switch
- 8 - Safety solenoid VS (vertical)
- 9 - Adjustment solenoid VR (vertical)

Two adjustments:

- ignition delivery (rapid opening)
- maximum delivery (slow opening)

- 10 - Standard issue burner gasket with flange
 - 11 - Gas adjustment butterfly valve
 - 12 - Burner
 - 13 - Gas valve 8)-9) leak detection control device.
- In accordance with EN 676 Standards, gas valve leak detection control devices are compulsory for burners with maximum outputs of more than 1200 kW.

- 14 - Gas train/burner adaptor.

P1 - Pressure at combustion head

P2 - Pressure down-line from the pressure governor

P3 - Pressure up-line from the filter

L - Gas train supplied separately with the code indicated in Table (C)

L1 - The responsibility of the installer

KEY TO TABLE (C)

C.T. = Gas valves 8) - 9) leak detection control devices:

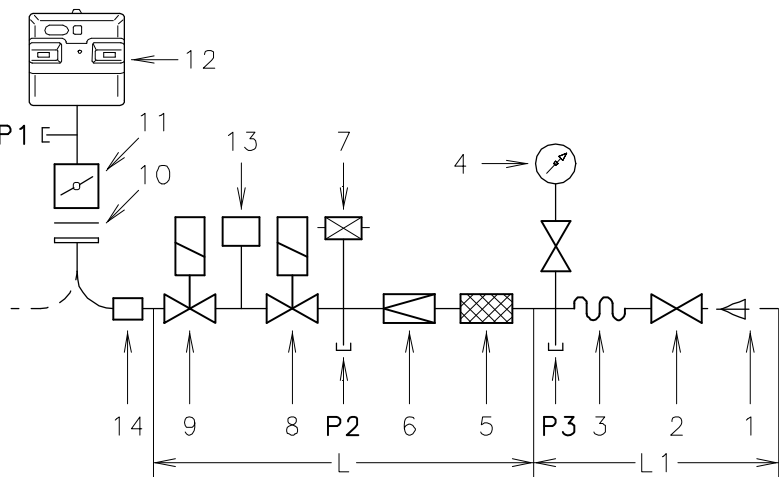
- = Gas train without gas valve leak detection control device; device that can be ordered separately and assembled subsequently (see Column 13).
- ◆ = Gas train with assembled VPS valve leak detection control device.

13 = VPS valve leak detection control device. Supplied separately from gas train on request.

14 = Gas train/burner adaptor. Supplied separately from gas train on request.

Note

See the accompanying instructions for the adjustment of the gas train.



(B)

D935

GAS BURNERS AND RELEVANT GAS TRAINS APPROVED ACCORDING TO EN 676

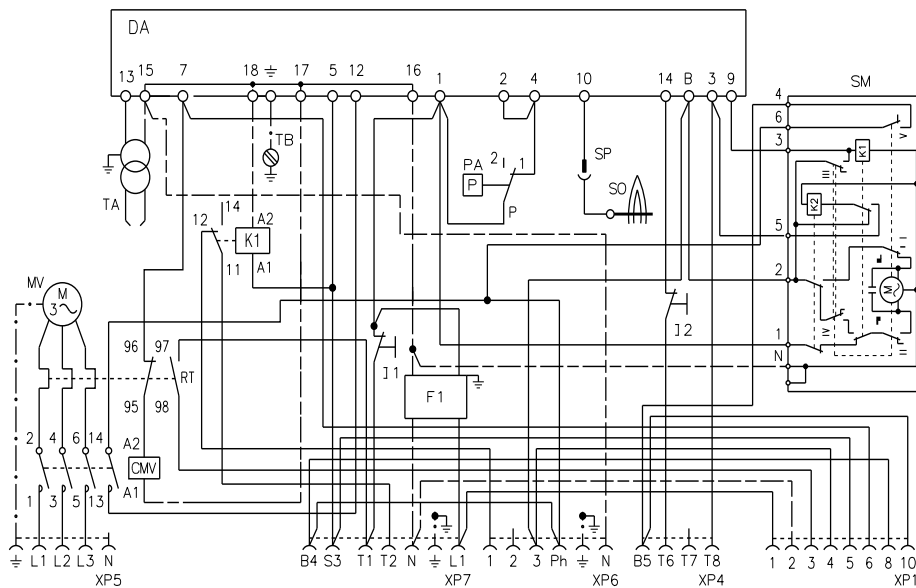
Gas train L			13	14
Ø	C.T.	Code	Code	Code
1"	—	3970077	3010123	3000824
1"1/4	—	3970144	3010123	—
1"1/2	—	3970145	3010123	—
1"1/2	—	3970180	3010123	—
2"	—	3970146	3010123	3000822
2"	—	3970181	3010123	3000822
2"	◆	3970160	—	3000822
2"	◆	3970182	—	3000822

(C)

GAS TRAIN COMPONENTS L

Code	Components		
	Filter 5	Pressure governor 6	Solenoids 8 - 9
3970077	Multiblock MB DLE 410		
3970144	Multiblock MB DLE 412		
3970145	GF 515/1	FRS 515	DMV DLE 512/11
3970180	Multiblock MB DLE 415		
3970146 3970160	GF 520/1	FRS 520	DMV DLE 520/11
3970181 3970182	Multiblock MB DLE 420		

ELECTRICAL EQUIPMENT FACTORY-SET



(A)

D3014

ELECTRICAL SYSTEM



The first firing must be carried out by qualified personnel with the right instruments.



All the installation, maintenance and disassembly operations must be carried out with the electricity supply disconnected.



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

LAYOUT (A)

Burners RS 50 (three-phase)

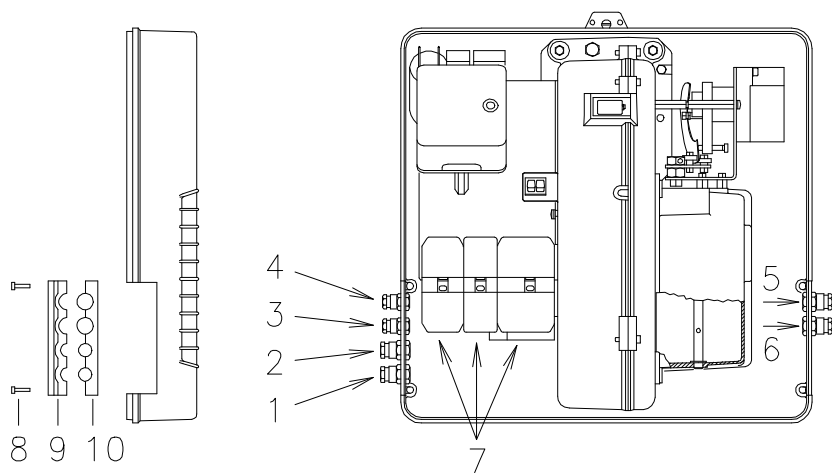
- Models RS 50 leave the factory preset for **400 V** power supply.
- If **230 V** power supply is used, change the motor connection from star to delta and change the setting of the thermal cut-out as well.

Key to Layouts (A)

CMV	- Motor contactor
F1	- Protection against radio interference
DA	- Control box (Landis RMG)
K1	- Relay
I1	- Switch: burner off - on
I2	- Switch: 1st - 2nd stage operation
MV	- Fan motor
PA	- Air pressure switch
RT	- Thermal cut-out
SM	- Servomotor
SO	- Ionisation probe
SP	- Plug-socket
TA	- Ignition transformer
TB	- Burner ground
XP1	- Connector for STATUS
XP4	- 4 pole socket
XP5	- 5 pole socket
XP6	- 6 pole socket
XP7	- 7 pole socket

ATTENTION

In the case of phase-phase feed, a bridge must be fitted on the control box terminal strip between terminal 6 and the earth terminal.



(A)

D3027

ELECTRICAL CONNECTIONS

Use flexible cables according to EN 60 335-1

Regulations:

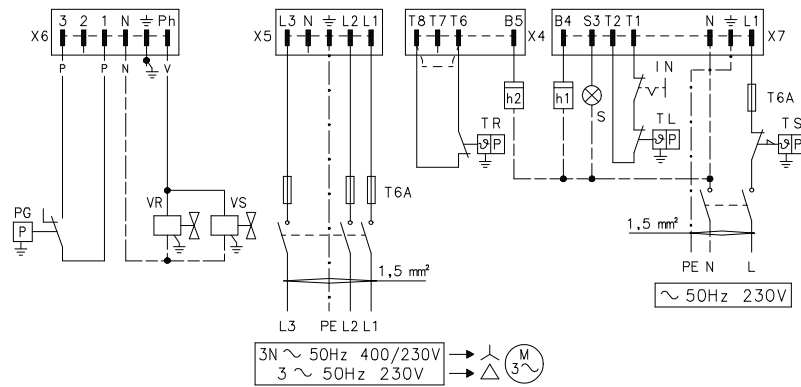
- if in PVC sheath, use at least H05 VV-F
- if in rubber sheath, use at least H05 RR-F.

All the wires to connect to the burner plugs 7)(A) must enter through the supplied fairleads, which must be fitted into the relevant holes in the left hand or right hand plate.

To do this, first unscrew screws 8), then split the plate into its parts 9) and 10) and remove the membrane press-outs from the holes.

The fairleads and hole press-outs can be in various ways.

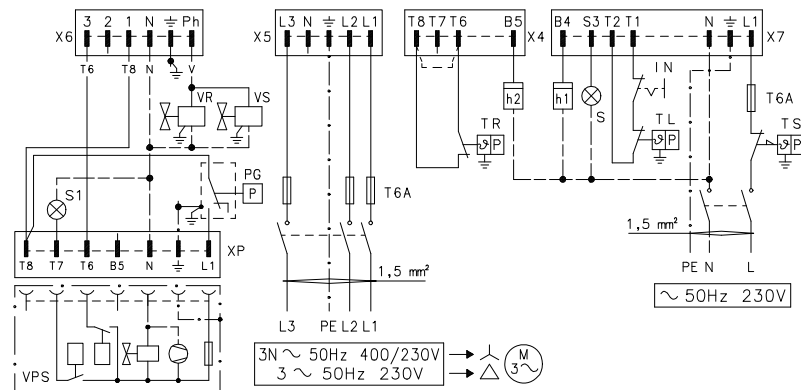
RS 50 THREE-PHASE WITHOUT LEAK DETECTION CONTROL DEVICE



(A)

D943

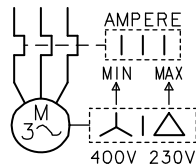
RS 50 THREE-PHASE WITHOUT LEAK DETECTION CONTROL DEVICE VPS



(B)

D944

CALIBRATION OF THERMAL RELAY



(C)

D867

LAYOUT (A) - The RS 50 Models electrical connection three-phase power supply without leak detection control device

LAYOUT (B) - The RS 50 Models electrical connection three-phase power supply with VPS leak detection control device.

Gas valve leak detection control takes place immediately before every burner starting.

Key to layouts (A) - (B)

- h1 - 1st stage hourcounter
- h2 - 2nd stage hourcounter
- IN - Burner manual stop switch
- XP - Plug for leak detection control device
- X4 - 4 pole plug
- X5 - 5 pole plug
- X6 - 6 pole plug
- X7 - 7 pole plug
- PC- Gas pressure switch for leak detection control device
- PG- Min. gas pressure switch
- S - Remote lock-out signal
- S1 - Remote lock-out signal of leak detection control device
- TR- High-low mode load remote control system: controls operating stages 1 and 2.
If the burner is to be set up for single stage operation, replace of remote control device TR with a jumper.
- TL - Load limit remote control system: shuts down the burner when the boiler temperature or pressure reaches the preset value.
- TS- Safety load control system: operates when TL is faulty
- VR- Adjustment valve
- VS- Safety valve

LAYOUT (C)

Calibration of thermal cut-out 20(A)p.3

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

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

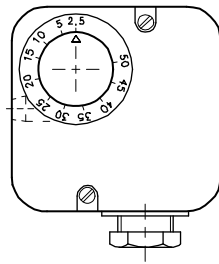
Even if the scale of the thermal cut-out does not include rated motor absorption at 400 V, protection is still ensured in any case.

N.B.

- The RS 50 three-phase leave the factory preset for 400 V power supply. If 230 V power supply is used, change the motor connection from star to delta and change the setting of the thermal cut-out as well.
- The RS 50 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 check 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.
- The RS 50 burners are factory set for two-stage operation and must therefore be connected to control device TR.
Alternatively, if single stage operation is required, instead of control device TR install a jumper lead between terminals T6 and T8 of connector X4.

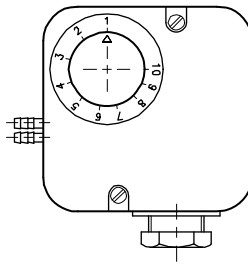
WARNING: Do not invert the neutral with the phase wire in the electricity supply line. Inverting the wires will make the burner go into lock-out because of firing failure.

MIN GAS PRESSURE SWITCH



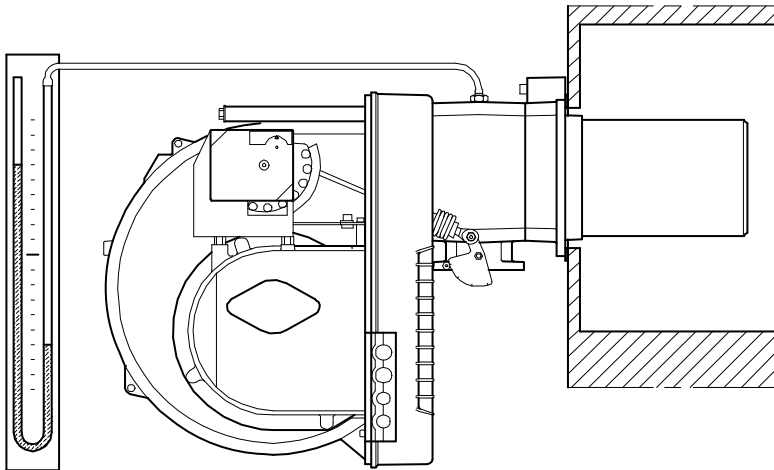
(A)

AIR PRESSURE SWITCH



(B)

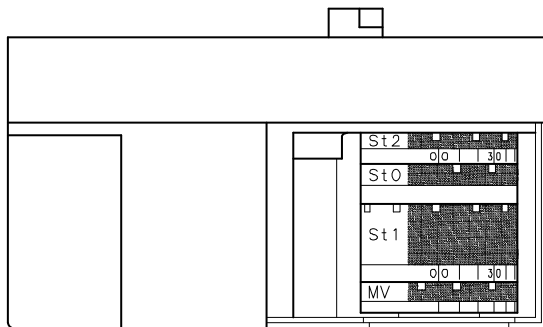
D897



(C)

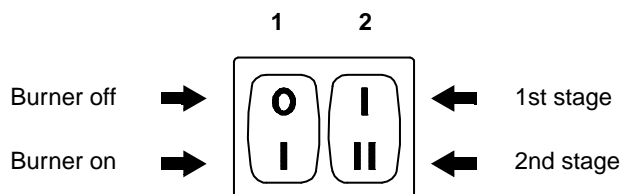
D514

SERVOMOTOR



(D)

D517



(E)

D469

ADJUSTMENTS BEFORE FIRST FIRING

Adjustment of the combustion head, and air and gas deliveries has been illustrated on page 7.

In addition, the following adjustments must also be made:

- open manual valves up-line from the gas train.
- Adjust the minimum gas pressure switch to the start of the scale (A).
- Adjust the air pressure switch to the zero position of the scale (B).
- Purge the air from the gas line.

Continue to purge the air (we recommend using a plastic tube routed outside the building) until gas is smelt.

- Fit a U-type manometer (C) to the gas pressure test point on the sleeve.

The manometer readings are used to calculate the 2nd stage operation burner power using the tables on page 5.

- Connect two lamps or testers to the two gas line solenoid valves VR and VS to check the exact moment at which voltage is supplied.

This operation is unnecessary if each of the two solenoid valves is equipped with a pilot light that signals voltage passing through.

Before starting up the burner it is good practice to adjust the gas train so that ignition takes place in conditions of maximum safety, i.e. with gas delivery at the minimum.

SERVOMOTOR (D)

The servomotor provides simultaneous adjustment of the air gate valve, by means of the variable profile cam, and the gas butterfly valve.

The angle of rotation of the servomotor is equal to the angle on the graduated sector controlling the gas butterfly valve. The servomotor rotates through 90 degrees in 12 seconds.

Do not alter the factory setting for the 4 cams; simply check that they are set as indicated below:

Cam St2 : 90°

Limits rotation toward maximum position. When the burner is in 2nd stage operation the gas butterfly valve must be fully open: 90°.

Cam St0 : 0°

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

Cam St1 : 15°

Adjusts the ignition position and the output in 1st stage operation.

Cam MV : 85°

Lights up the 2nd stage LED (STATUS)

BURNER STARTING

Close the control devices and set:

- switch 1)(E) to "Burner ON" position
- switch 2)(E) to "1st STAGE" position.

As soon as the burner starts check the direction of rotation of the fan blade, looking through the flame inspection window 18)(A)p.3.

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

BURNER FIRING

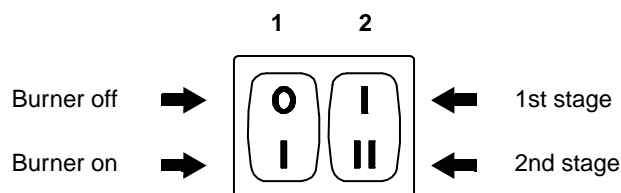
Having completed the checks indicated in the previous heading, the burner should fire. If the motor starts but the flame does not appear and the control box goes into lock-out, reset and wait for a new firing attempt.

If firing is still not achieved, it may be that gas is not reaching the combustion head within the safety time period of 3 seconds.

In this case increase gas firing delivery.

The arrival of gas at the sleeve is indicated by the U-type manometer (C).

Once the burner has fired, now proceed with global calibration operations.



(A)

D469

BURNER CALIBRATION

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

Adjust successively:

- 1 - First firing output
- 2 - 2nd stage burner output
- 3 - 1st stage burner output
- 4 - Intermediate outputs between 1st and 2nd stage
- 5 - Air pressure switch
- 6 - Minimum gas pressure switch

1 - FIRING OUTPUT

According to EN 676 Regulations:

Burners with max. output up to 120 kW

Firing can be performed at the maximum operation output level. Example:

- Max. operation output : 120 kW
- Max. firing output : 120 kW

Burners with max. output above 120 kW

Firing must be performed at a lower output than the max. operation output. If the firing output does not exceed 120 kW, no calculations are required. If firing output exceeds 120 kW, the regulations prescribe that the value be defined according to the control box safety time "ts":

- for "ts" = 2s, firing output must be equal to or lower than 1/2 of max. operation output.
- For "ts" = 3s, firing output must be equal to or lower than 1/3 of max. operation output.

Example: MAX operation output of 600 kW.

Firing output must be equal to or lower than:

- 300 kW with "ts" = 2s
- 200 kW with "ts" = 3s

In order to measure the firing output:

- Disconnect the plug-socket 19)(A)p.3 on the ionization probe cable (the burner will fire and then go into lock-out after the safety time has elapsed).
- Perform 10 firings with consecutive lock-outs.
- On the meter read the quantity of gas burned. This quantity must be equal to or lower than the quantity given by the formula, for ts = 3s:

$$\frac{\text{Nm}^3/\text{h (max. burner delivery)}}{360}$$

Example for G 20 gas (10 kWh/Nm³):

Max. operation output: 600 kW corresponding to 60 Nm³/h.

After 10 firings with lock-outs, the delivery read on the meter must be equal to or lower than:

$$60 : 360 = 0,166 \text{ Nm}^3.$$

2 - 2ND STAGE OUTPUT

2nd stage output of the burner must be set within the firing rate range shown on page 4.

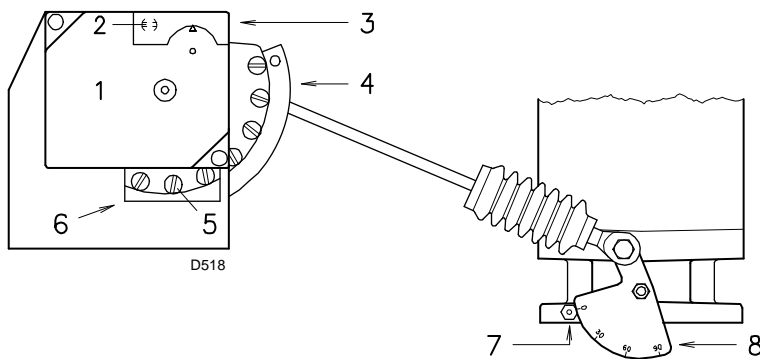
In the above instructions we left the burner running in 1st stage operation. Now set switch 2)(A) to the 2nd stage position: the servomotor will open, simultaneously, the air gate valve and the gas butterfly valve to 90°.

Gas calibration

Measure the gas delivery at the meter.

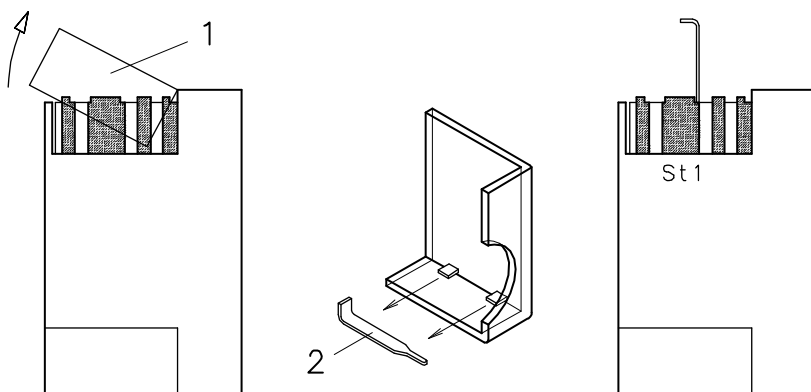
A guideline indication can be calculated from the tables on page 5, simply read off the gas pressure on the U-type manometer, see fig.(C) on page 12, and follow the instructions on page 5.

- If delivery needs to be reduced, diminish outlet gas pressure and, if it is already very low, slightly close adjustment valve VR.
- If delivery needs to be increased, increase outlet gas pressure.



- 1 Servomotor
- 2 Cam 4 engaged \ominus /disengages \oplus
- 3 Cam cover
- 4 Adjustable profile cam
- 5 Cam profile adjustment screws
- 6 Opening for access to screws 5
- 7 Index for graduated sector 8
- 8 Graduated sector for gas butterfly valve

(A)



(B)

Adjusting air delivery

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

- Turn the screws clockwise to increase air delivery.
- Turn the screws counter-clockwise to reduce air delivery.

3 - 1ST STAGE OUTPUT

Burner power in 1st stage operation must be selected within the firing rate range shown on page 4.

Set the switch 2)(A)p.13 to the 1st stage position: the servomotor 1)(A) will close the air gate valve and, at the same time, closes the gas butterfly valve down to 15°, i.e. down to the original factory setting.

Adjusting gas delivery

Measure the delivery of gas from the gas meter.

- If this value is to be reduced, decrease the angle of cam St1 (B) slightly by proceeding a little at a time until the angle is changed from 15° to 13° or 11°....
- If it is necessary to increase the mains pressure, move to 2nd stage operation by altering the setting of switch 2)(A)p.13 and increase the angle of cam St1, proceeding a little at a time until the angle is changed from 15° to 17° - 19°....

At this point return to 1st stage operation and measure gas delivery.

Note

The servomotor follows the adjustment of cam St1 only when the angle is reduced. If, however the angle must be increased, switch to 2nd stage operation, increase the angle and then return to 1st stage operation to check the effect of the adjustment.

If you increase the angle of St1 while the burner is operating in 1st stage, lock-out will result.

In order to adjust cam St1, remove press-fit cover 1), as shown in fig.(B), extract the relevant key 2) from inside, and fit it into the keyway in cam St1.

Adjustment of air delivery

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

4 - INTERMEDIATE OUTPUTS

Adjustment of gas delivery

No adjustment of gas delivery is required.

Adjustment of air delivery

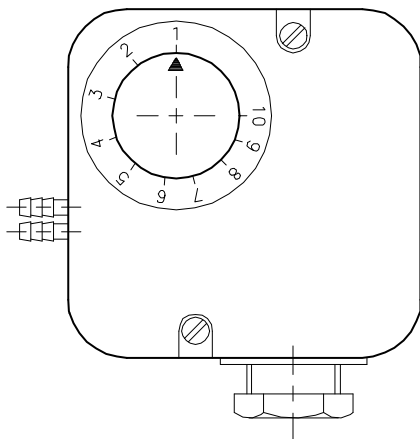
Switch off the burner using switch 1)(A)p.13, disengage the variable profile cam, set the servomotor shaft slot 2)(A) to a vertical position and turn the central screws of the cam so that the cam offers a progressive gradient. Try turning the cam back and forth by hand a few times until the movement is completely smooth with no signs of sticking.

Do not alter the position of the screws at each end of the cam track, which have already been adjusted for 1st and 2nd stage air gate valve control.

Note

Once you have finished adjusting 2nd stage - 1st stage - intermediate outputs, check ignition once again: noise emission at this stage must be identical to the following stage of operation. If you notice any sign of pulsations, reduce the ignition stage delivery.

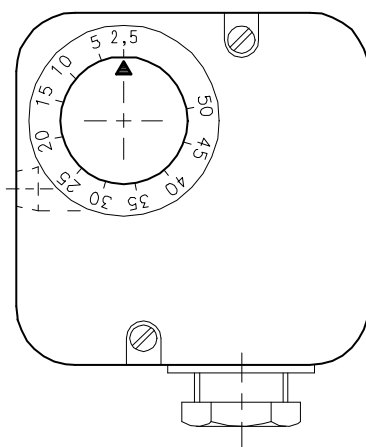
AIR PRESSURE SWITCH 5)(A)p. 3



(A)

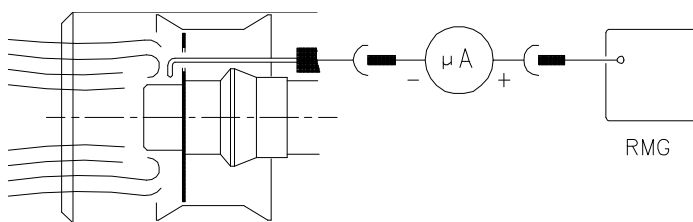
D521

MIN GAS PRESSURE SWITCH 7)(B)p. 8



(B)

D896



(C)

D3023

5 - AIR PRESSURE SWITCH (A)

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 operating in 1st stage, increase adjustment pressure by slowly turning the relative knob clockwise until the burner locks out. Then turn the knob anti-clockwise by about 20% of the set point and repeat burner starting to ensure it is correct. If the burner locks out again, turn the knob anti-clockwise a little bit more.

Attention

As a rule, the air pressure switch must limit the CO in the fumes to less than 1% (10,000 ppm). To check this, insert a combustion analyser into the chimney, slowly close the fan suction inlet (for example with cardboard) and check that the burner locks out, before the CO in the fumes exceeds 1%.

The air pressure switch may operate in "differential" operation in two pipe system. If a negative pressure in the combustion chamber during pre-purging prevents the air pressure switch from switching, switching may be obtained by fitting a second pipe between the air pressure switch and the suction inlet of the fan. In such a manner the air pressure switch operates as differential pressure switch.

Warning

The use of the air pressure switch with differential operation is allowed only in industrial applications and where rules enable the air pressure switch to control only fan operation without any reference to CO limit.

6 - MINIMUM GAS PRESSURE SWITCH (B)

Adjust the minimum gas pressure switch after having performed all the other burner adjustments with the pressure switch set at the start of the scale (B).

With the burner operating in 2nd stage, increase adjustment pressure by slowly turning the relative knob clockwise until the burner locks out. Then turn the knob anti-clockwise by 2 mbar and repeat burner starting to ensure it is uniform.

If the burner locks out again, turn the knob anti-clockwise again by 1 mbar.

FLAME PRESENT CHECK (C)

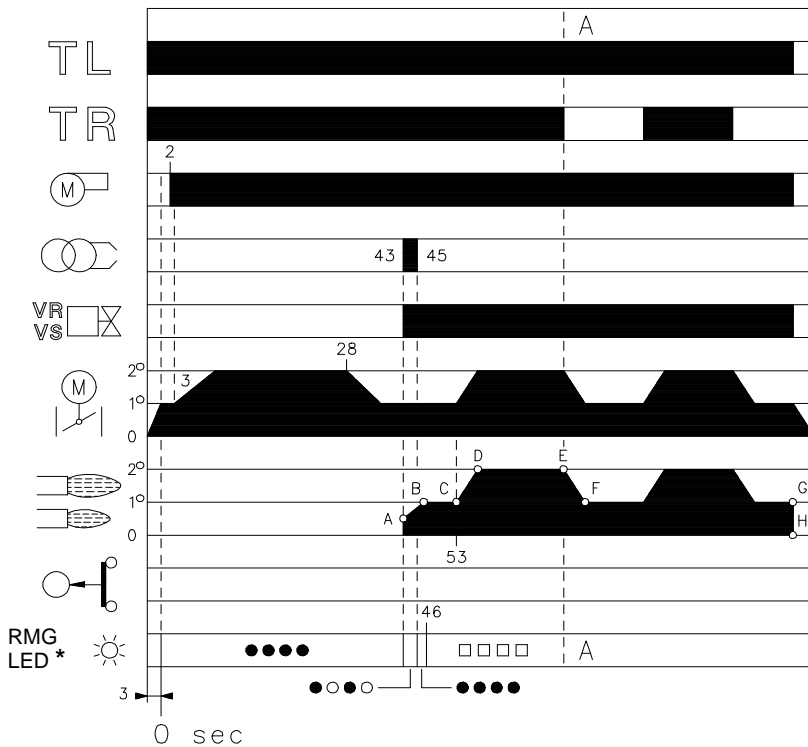
The burner is fitted with an ionisation system which ensures that a flame is present. The minimum current for plant operation is 5 μ A.

The burner provides a much higher current, so that controls are not normally required. However, if it is necessary to measure the ionisation current, disconnect the plug-socket 19)(A)p.3 on the ionisation probe cable and insert a direct current microammeter with a base scale of 100 μ A.

Carefully check polarities!

NORMAL FIRING

(n° = seconds from instant 0)

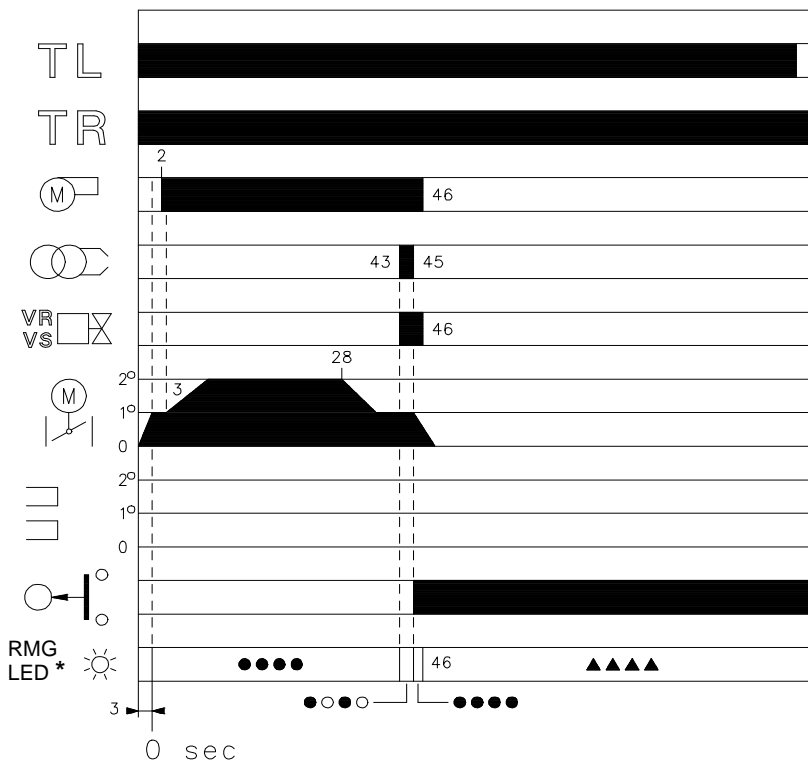


* ○ Off ● Yellow □ Green ▲ Red
For further details see page 17.

(A)

D3028

NO FIRING



* ○ Off ● Yellow ▲ Red
For further details see page 17.

(B)

D3029

BURNER OPERATION

BURNER STARTING (A)

- Control device TL closes.
Servomotor starts: it rotates during opening up to the angle set on cam St1.
After about 3s:
- 0 s : The control box starting cycle begins.
- 2 s : Fan motor starts.
- 3 s : Servomotor starts: it rotates during opening until contact on cam St2 is tripped.
The air gate valve is positioned to 2nd stage output.
Pre-purge stage with air delivery at 2nd stage output.
Duration 25 seconds.
- 28 s : Servomotor starts: it rotates during closing up to the angle set on cam St1.
- 43 s : The air gate valve and the gas butterfly are positioned to 1st stage output.
Ignition electrode strikes a spark.
Safety valve VS and adjustment valve VR (rapid opening) open. The flame is ignited at a low output level, point A. Output is then progressively increased, with the valve opening slowly up to 1st stage output, point B.
- 45 s : The spark goes out.
- 53 s : If remote control device TR is closed or if it has been replaced by a jumper, the servomotor will continue to turn until the cam St2 come into operation, setting the air gate valve and the gas butterfly valve to the 2nd stage operation position, section C-D.
The control box starting cycle ends.

STEADY STATE OPERATION (A)

System equipped with one control device TR.

Once the starting cycle has come to an end, control of the servomotor passes on to the control device TR that controls boiler temperature or pressure, point D.

(The control box will continue, however, to monitor flame presence and the correct position of the air pressure switch).

- When the temperature or the pressure increases until the control device TR opens, the servomotor closes the gas butterfly valve and the air gate valve and the burner passes from the 2nd to the 1st stage of operation, section E-F.
- When the temperature or pressure decreases until the control device TR closes, the servomotor opens the gas butterfly valve and the air gate valve 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, section G-H. Control device TL now opens, the servomotor returns toward the 0° position, limited in this movement by cam St0. The air gate valve closes completely to reduce heat losses to a minimum.

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).

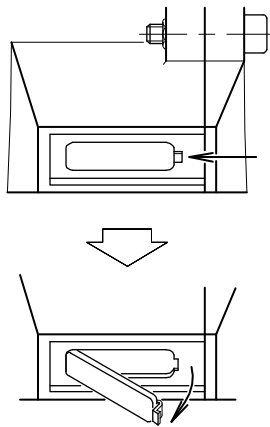
FIRING FAILURE (B)

If the burner does not fire, it goes into lock-out within 3 s of the opening of the gas solenoid valve and 49 s after the closing of control device TL. The control box red pilot light will light up.

BURNER FLAME GOES OUT DURING OPERATION

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

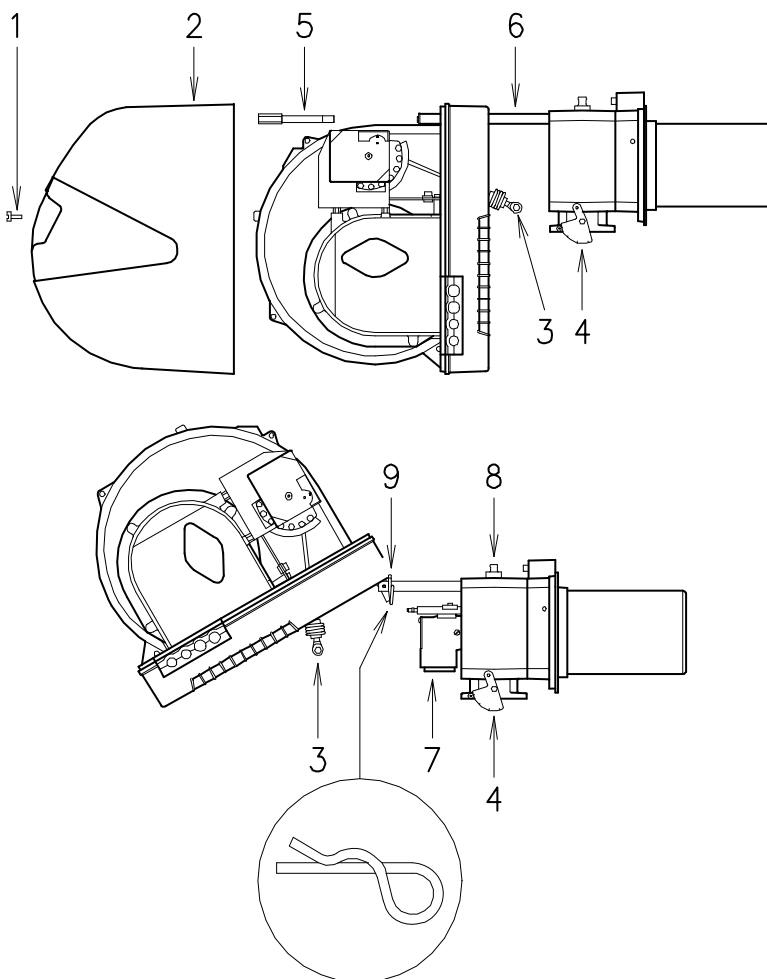
FLAME INSPECTION WINDOW



(A)

D484

OPENING THE BURNER



(B)

D535

FINAL CHECKS (with burner running)

- Disconnect one of the wires on the minimum gas pressure switch:
- Open remote control device TL:
- Open remote control device TS:
the burner must stop
- Disconnect the common wire P from the air pressure switch:
- Disconnect the ionisation probe lead:
the burner must lock out
- Make sure that the mechanical locking systems on the various adjustment devices are fully tightened.

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.

Gas leaks

Make sure that there are no gas leaks on the pipework between the gas meter and the burner.

Gas filter

Change the gas filter when it is dirty.

Flame inspection window

Clean the flame inspection window (A).

Combustion head

Open the burner and make sure that all components of the combustion head are in good condition, not deformed by the high temperatures, free of impurities from the surroundings and correctly positioned. If in doubt, disassemble the elbow fitting 7)(B).

Servomotor

Disengage the cam 4)(A)p.14 from servomotor, by turning slot 2)(A)p.14 through 90° and turn it backward and forward by hand to make sure it is free moving. Now engage cam 4)(A)p.14 again.

Burner

Check for excess wear or loose screws in the mechanisms controlling the air gate valve and the gas butterfly valve. Also make sure that the screws securing the electrical leads in the burner connections are fully tightened.

Clean the outside of the burner, taking special care with the transmission joints and cam 4)(A)p.14.

Combustion

Adjust the burner if the combustion values found at the beginning of the operation do not comply with the regulations in force, or at any rate, do not correspond to good combustion. Use the appropriate card to record the new combustion values; they will be useful for subsequent controls.

TO OPEN THE BURNER (B):

- Switch off the electrical power.
- Remove screw 1) and withdraw cover 2).
- Disengage the articulated coupling 3) from the graduated sector 4).
- Remove screw 5), the split pin 9) and pull the burner back by about 100 mm on the slide bars 6). Disconnect the probe and electrode leads and then pull the burner fully back.
- Turn the burner as shown in the figure and fit the split pin 9) into one of the slide bar holes so that the burner remains in position.

Now extract the gas distributor 7) after having removed the screw 8).

TO CLOSE THE BURNER (B):

- Remove the split pin 9) and push the burner until it is about 100 mm from the sleeve.
- Re-connect the leads and slide in the burner until it comes to a stop.
- Refit screw 5), the split pin 9) and pull the probe and electrode leads gently out until they are slightly stretched.
- Re-couple the articulated coupling 3) to the graduated sector 4).

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 (**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.

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

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

RESETTING THE CONTROL BOX

To reset the control box, proceed as follows:

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

VISUAL DIAGNOSTICS

Indicates the type of burner malfunction causing 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 19.

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.

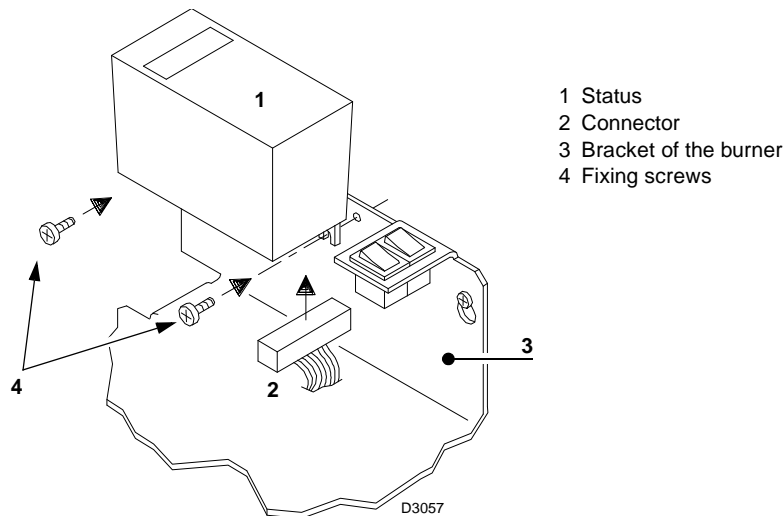
BUTTON PRESSED FOR	CONTROL BOX STATUS
Between 1 and 3 seconds	Control box reset without viewing visual diagnostics.
More than 3 seconds	Visual diagnostics of lock-out condition: (LED pulses at 1-second intervals).
More than 3 seconds starting from the visual diagnostics condition	Software diagnostics 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 19.

SIGNAL	FAULT	PROBABLE CAUSE	SUGGESTED REMEDY
2 x blinks ● ●	After pre-purge and safety time, the burner goes to lock-out and the flame does not appear	1 - The solenoid VR allows little gas through 2 - Solenoid valves VR or VS fail to open. 3 - Gas pressure too low 4 - Ignition electrode wrongly adjusted. 5 - Electrode grounded due to broken insulation 6 - High voltage cable defective 7 - High voltage cable deformed by high temperature 8 - Ignition transformer defective 9 - Erroneous valve or transformer electrical connections 10 - Control box defective. 11 - A cock down-line of the gas train is closed 12 - Air in pipework. 13 - VS and VR gas valves unconnected or with interrupted coil	Increase Renew the coil or rectifier panel Increase pressure at governor Adjust, see fig. (C)p. 6 Replace Replace Replace and protect Replace Open Bleed air Check connections or replace coil
3 x blinks ● ● ●	The burner does not start and lock-out warning appears	14 - Air pressure switch in operating position	Adjust or replace
	The burner starts and then locks out	Air pressure switch inoperative due to insufficient air pressure: 15 - Air pressure switch adjusted badly 16 - Pressure switch pressure point pipe blocked 17 - Head wrongly adjusted 18 - High negative draft in chamber	Adjust or replace Clean Adjust Connect air pressure switch to fan suction inlet
	Lock-out during pre-purging	19 - Defective motor remote control switch 20 - Defective electrical motor 21 - Motor protection tripped	Replace Replace Reset thermal cut-out when third phase is re-connected
4 x blinks ● ● ● ●	The burner starts and then locks out	22 - Flame simulation	Replace control box
	Lock out when burner stops	23 - Flame remains in combustion head or flame simulation	Eliminate persistence of flame or replace control box
7 x blinks ● ● ● ● ● ● ●	The burner goes to lock-out right after flame appearance	24 - The solenoid VR allows little gas through 25 - Ionisation probe wrongly adjusted. 26 - Insufficient ionisation (less than 5 μ A). 27 - Probe grounded 28 - Burner poorly grounded 29 - Phase and neutral wires inverted 30 - Defective control box.	Increase Adjust, see fig. (C)p. 6 Check probe position Withdraw or replace cable Check grounding Correct by intervening Replace
	Burner locks out at transition between 1st and 2nd stage or between 2nd and 1st stage	31 - Too much air or too little gas	Adjust air and gas
	During operation, the burner stops in lock out	32 - Probe or ionisation cable grounded 33 - Fault on air pressure switch.	Replace worn parts Replace
10 x blinks ● ● ● ● ● ● ● ●	The burner does not start and lock-out warning appears	34 - Erroneous electrical connections	Check connections
	The burner goes to lock-out	35 - Control box defective. 36 - Presence of electromagnetic disturbance.	Replace Use the radio disturbance protection kit
No blink	The burner does not start	37 - No electrical power supply 38 - A limiter or safety control device is open. 39 - Control box fuses blown 40 - Control box lock-out 41 - No gas supply. 42 - Mains gas pressure insufficient. 43 - Minimum gas pressure switch fails to close 44 - Servomotor fails to move to St1 position.	Close all switches - Check connections Adjust or replace Replace Reset control box Open the manual valves between meter and train Contact your GAS COMPANY Adjust or replace Replace
	The burner repeats the starting cycle without lock out	45 - Mains gas pressure is near the value to which the min. gas pressure switch gas is adjusted. The repeated drop in pressure which follows valve opening causes temporary opening of the pressure switch itself, the valve immediately closes and the burner comes to a halt. Pressure increases again, the pressure switch closes again and the firing cycle is repeated. The sequence repeats endlessly.	Reduce operating pressure of minimum gas pressure switch. Replace gas filter
	Ignition with pulsation	46 - Poorly adjusted head. 47 - Ignition electrode wrongly adjusted. 48 - Poorly adjusted fan air gate: too much air. 49 - Output during ignition phase is too high	Adjust, see p. 7 Adjust, see fig. (C)p. 6 Adjust Reduce
	The burner does not pass to 2nd stage	50 - Remote control device TR does not close. 51 - Defective control box. 52 - Servomotor faulty	Adjust or replace Replace Replace
	Burner stops with air gate valve open	53 - Servomotor faulty	Replace

STATUS (optional)

Assembly



- 1 Status
- 2 Connector
- 3 Bracket of the burner
- 4 Fixing screws

STATUS

Accessory available on request.
See page 2.

ASSEMBLY

The burners are preset to accept the Status. To assemble, proceed as follows:

- Connect Status 1) using connector 2) fitted on the bracket 3).
- Fasten Status to the bracket using the screws 4) supplied with the kit.

The **STATUS** unit has three functions:

1 - BURNER OPERATING HOURS AND THE NUMBER OF FIRINGS ARE SHOWN ON DISPLAY V

Total operating hours

Press button "h1".

2nd stage operating hours

Press button "h2".

1st stage operating hours (calculated)

Total hours - 2nd stage operating hours.

Number of firings

Press button "count".

Resetting operating hours and number of firings

Press the three "reset" buttons simultaneously.

Non-volatile memory

The operating hours and the number of firings will remain in memory even in the case of electrical power failures.

2 - INDICATES THE TIMES RELATIVE TO THE FIRING STAGE

The leds illuminate in the following sequence, fig. A:

WITH REMOTE CONTROL THERMOSTAT TR CLOSED:

- 1 - Burner off, TL open
- 2 - Control device TL closed
- 3 - Motor start:
seconds count starts on read-out V
- 4 - Burner firing
- 5 - Transition to 2nd stage
seconds count stops on read-out V
- 6 - 10 seconds after stage 5 the code I I I I will appear on the read-out: this indicates that the starting phase is terminated.

WITH REMOTE CONTROL THERMOSTAT TR OPEN

- 1 - Burner off, TL open
- 2 - Control device TL closed
- 3 - Motor start:
seconds count starts on read-out V
- 4 - Burner firing
- 7 - 30 seconds after stage 4:
seconds count stops on read-out V
- 8 - 10 seconds after stage 7 the code I I I I will appear on the read-out: this indicates that the starting phase is terminated.

The times, in seconds, shown on read-out V, indicate the succession of the various starting stages described on page 16.

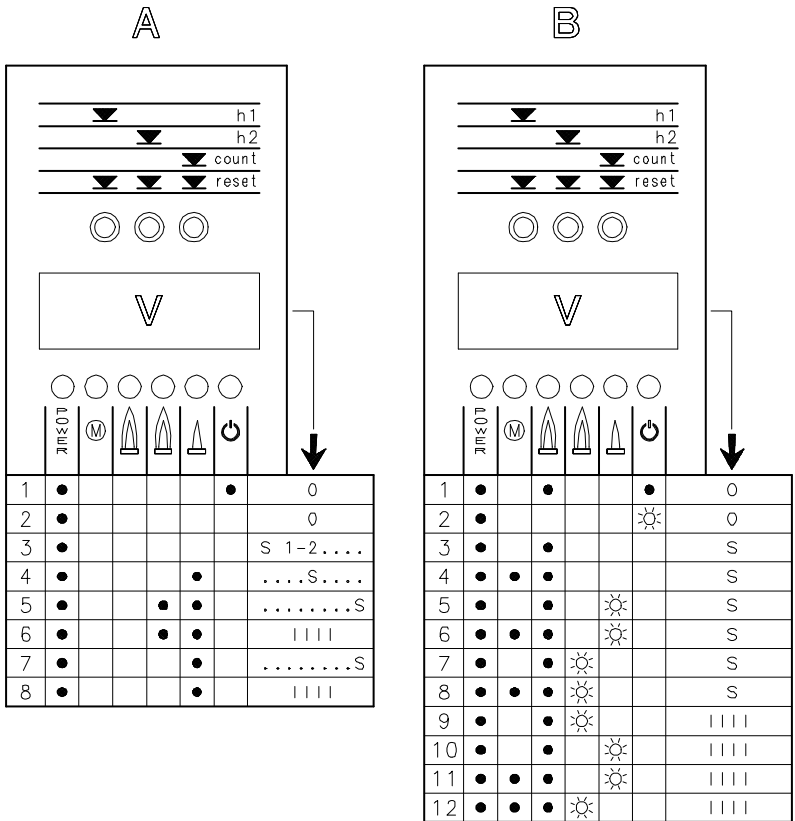
3 - IN THE CASE OF BURNER MALFUNCTIONS, THE STATUS PANEL INDICATES THE EXACT TIME AT WHICH THE FAULT OCCURRED.

There are 12 possible combinations of illuminated leds, see fig. (B). For the causes of the malfunction refer to the numbers shown between brackets; see the legend on page 19 for interpretation of the numbers.

- 1 (24)
- 2 (44)
- 3 (15 ÷ 23)
- 4 (22)
- 5 (1 ÷ 13, 32 ÷ 34, 36)
- 6 (22)
- 7 (32)
- 8 (22)
- 9 (32 ÷ 34)
- 10 (32 ÷ 34)
- 11 (22)
- 12 (22)

Key to symbols:

- **POWER** = Power on
- (M) = Fan motor blocked (red)
- < = Burner lock-out (red)
- < = 2nd stage operation
- < = 1st stage operation
- < = Load level reached (Stand-by), led: on



- ☀ = Led flashing
- = Led illuminated
- S = Time in seconds
- I I I I = Burner start cycle terminated

D947

D978

ACCESSORIES (optional):

- **KIT FOR LPG OPERATION:** The kit allows the RS 50 burners to operate on LPG.

BURNER	RS 50	
Output kW	140 ÷ 581	
Blast tube length mm	216	351
Code	3010083	3010084

- **VIBRATION REDUCTION KIT**

BURNER	RS 50	
Output kW	116 ÷ 580	
Blast tube length mm	216	351
Code	3010200	

- **GROUND FAULT INTERRUPTER:** code **3010321**
- **STATUS** (see page 20): code **3010322**
- **GAS TRAIN ACCORDING TO REGULATION EN 676 (with valves, pressure governor and filter):** see page 8.
- **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.

BURNER	RS 50	
Code	3010386	

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

技术数据	页码 2
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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。

技术数据

型号			RS 50	
类型			811 T1	
功率 ⁽¹⁾	二段火	kW	290 - 581	
		Mcal/h	249 - 500	
	一段火	kW	116	
		Mcal/h	100	
燃料		天然气 : G20 - G21 - G22 - G23 - G25		
		G20	G25	
- 净热值		kWh/Nm³	10	8.6
		Mcal/Nm³	8.6	7.4
- 绝对密度		kg/Nm³	0.71	0.78
- 最大出力		Nm³/h	58	68
- 最大出力时的燃气压力 ⁽²⁾		mbar	7.2	10.6
运行			• 间歇式 (每 24 小时至少停机一次) • 两段火 (高 - 低火焰) 及单段火 (启动 - 停机)	
标准应用			锅炉 : 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	
电源		V Hz	230 - 400 带零线 ~ +/-10% 50 - 三相	
电机		rpm W V A	2800 650 220/240-380/415 3 - 1.7	
点火变压器		V1 - V2 I1 - I2	230 V - 1 x 8 kV 1 A - 20 mA	
电功率消耗		W 最大	750	
电气保护等级			IP 44	
符合 EEC 标准			2009/142 - 89/336 - 2004/108 - 73/23 - 2006/95 - 2006/42	
噪音水平 ⁽³⁾		dBA	72	

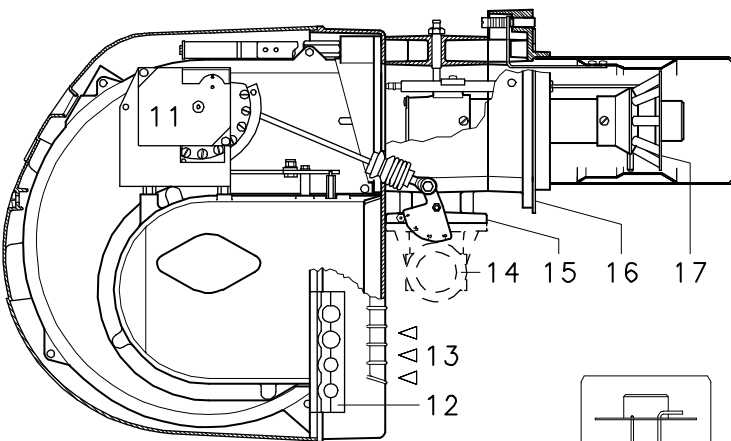
(1) 参考条件 : 环境温度 20°C - 大气压力 1000 mbar - 海拔 100 m a.s.l.

(2) 燃烧器处于最大出力，且炉膛压力为零，气体环 2)(B)p.7 打开时，测试点 8)(A)p.3 处的压力。

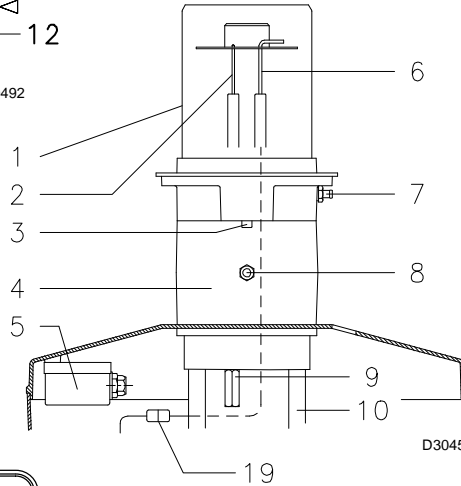
(3) 噪声值于制造商实验室内的测试锅炉上测得，且燃烧器处于最大额定出力状态。

燃气类型

适用国家	燃气类型
IT - AT - GR - DK - FI - SE	II _{2H3B} / P
ES - GB - IE - PT	II _{2H3P}
NL	II _{2L3B} / P
FR	II _{2Er3P}
DE	II _{2ELL3B} / P
BE	I _{2E(R)B} , I _{3P}
LU	II _{2E 3B/P}



D492



D3045

燃烧器描述 (A)

- 1 燃烧头
- 2 点火电极
- 3 燃烧头调节螺栓
- 4 多歧管
- 5 最小风压开关 (微分运行模式)
- 6 火焰探测器
- 7 风压测试点
- 8 燃气压力测试点以及固定燃烧头用螺栓
- 9 固定风机到燃烧头螺栓
- 10 打开燃烧器及检查燃烧头用滑杆
- 11 控制燃气蝶阀以及风门挡板 (通过可变凸轮进行调节) 的伺服电机
- 燃烧器停机时, 风门挡板完全关闭以减少因通风, 即风机进气口吸入空气, 而造成的热量损失。
- 12 穿电缆用带四个导缆孔的夹板
- 13 风机进风口
- 14 燃气进气管路
- 15 燃气蝶阀
- 16 锅炉安装用法兰
- 17 稳焰盘
- 18 火焰检查窗
- 19 离子探针用插头-插座
- 20 带复位键的电机触发器和热断路器
- 21 风门挡板
- 22 带锁定指示灯及复位按钮的控制盒
- 23 两个开关:
 - 之一 燃烧器“停机-启动”开关
 - 之二 “1段火-2段火”转换开关
- 24 电气连接插座

两类燃烧器故障:

- **控制盒锁定:** 如果控制盒按钮 22)(A) 指示灯 (红色 led 灯) 亮, 则燃烧器锁定。如需复位, 可按该按钮 1-3 秒。
- **电机锁定:** 按下热继电器按钮 20)(A) 以恢复供电。

包装 - 重量 (B) - 近似值

- 燃烧器外包装为纸箱, 其最大尺寸见表 (B)。
- 燃烧器连同包装箱重量见表 (B)。

最大尺寸 (C)

近似值

燃烧器的外观尺寸见表 (C)。

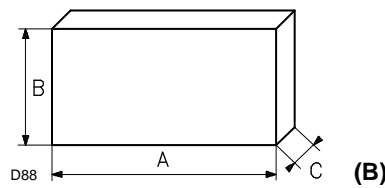
注意: 检查燃烧头时需要将燃烧器沿滑杆拉出并向上翻转。

燃烧器不带外壳, 打开后的最大尺寸见测量值 H。

标准配置

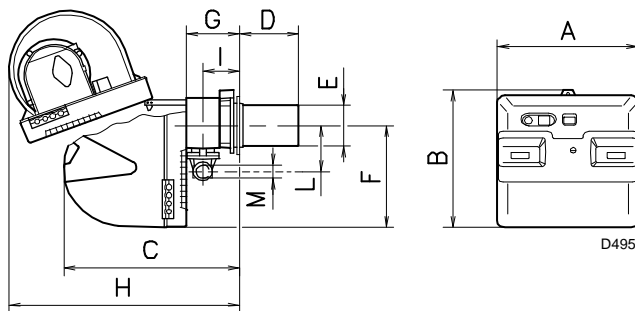
- 1 - 燃气阀组法兰
- 1 - 法兰垫片
- 4 - 法兰安装螺栓 M 8 x 25
- 1 - 隔热垫
- 4 - 固定燃烧器法兰到锅炉上的螺栓: M 8 x 25
- 6 - 电气连接用导缆孔
- 1 - 说明书
- 1 - 零配件表

mm	A	B	C	kg
RS 50	1010	625	495	41



(A)

(B)

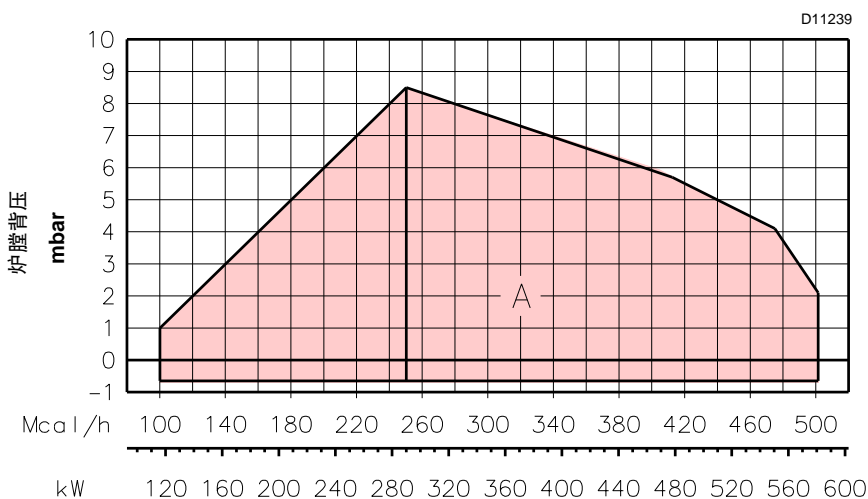


D495

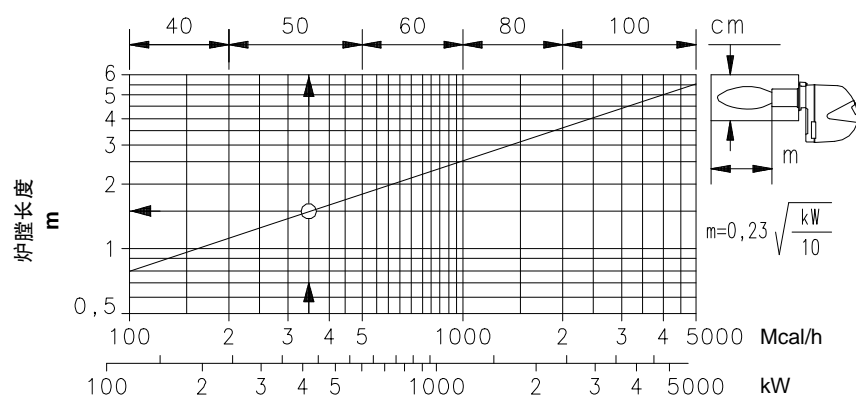
(C)

mm	A	B	C	D ⁽¹⁾	E	F	G	H	I	L	M
RS 50	476	474	580	216 - 351	152	352	164	810	108	168	1"1/2

(1) 燃烧筒: 标准 - 加长



(A)



(B)

D497

出力范围 (A)

RS 50 燃烧器可以以两种模式运行：单段火模式及两段火模式。

最大出力，在 A 区内选择，

最小出力时，不得低于图中所示的最小值：

RS 50 = 116 kW

注意：

出力曲线的出力值在如下条件下获得：环境温度 20 °C, 大气压 1000mbar (约 100 m 海拔)，燃烧头按第 7 页所示进行调整。

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：

出力 350 Mcal/h：

直径 = 50 cm；长度 = 1.5 m。

商用锅炉

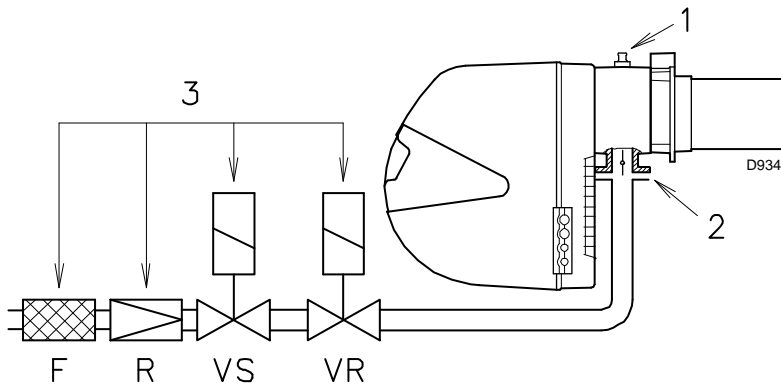
如果锅炉类型符合 CE 认证，且锅炉炉膛尺寸与图 (B) 所列值近似，则燃烧器与锅炉的匹配不会出现问题。

如果燃烧器必须与未经 CE 认证的商用锅炉配套，且该锅炉炉膛尺寸明显小于图 (B) 所列值，请咨询制造商。

Δp (mbar)

kW	1	2	3					
			Ø 1" 3970077	Ø 1"1/4 3970144	Ø 1"1/2 3970145	Ø 1"1/2 3970180	Ø 2" 3970146 3970160	Ø 2" 3970181 3970182
290	2.2	0.3	13.4	7.9	5.5	4.4	2.1	2.7
330	2.9	0.4	16.6	9.7	6.9	5.0	2.7	3.4
370	3.6	0.5	20.0	11.6	8.4	6.1	3.3	3.9
410	4.3	0.6	23.7	13.7	10.1	7.0	4.0	4.4
450	5.0	0.7	27.6	15.9	11.9	8.3	4.7	5.1
490	5.6	0.9	31.7	18.2	13.7	9.7	5.5	5.9
530	6.3	1.0	36.1	20.6	15.7	10.5	6.3	6.6
580	7.2	1.2	41.8	23.9	18.5	12.0	7.4	7.8

(A)



(B)

燃气压力

左表列出燃烧器在 2 段火运行时，燃气供应管路的最小压力损失。

栏 1

燃烧头压力损失。

测试点 1)(B) 处的燃气压力，此时：

- 炉膛压力为 0 mbar。
- 燃烧器为 2 段火运行
- 燃气环 2)(B)p.7 按表 (C)p. 7 进行调整。

栏 2

燃气蝶阀 2)(B) 在最大开度 90° 时的压力损失。

栏 3

燃气阀组 3)(B) 的压力损失包括：调节阀 VR，安全阀 VS (两个全开)，调压器 R，过滤器 F。

各表中所列数值为：

天然气 G20 PCI 10 kWh/Nm³ (8.6 Mcal/Nm³)。

使用：

天然气 G25 PCI 8.6 kWh/Nm³ (7.4 Mcal/Nm³) 表中数值乘以一个系数 1.3。

计算燃烧器 2 段火运行时的大概出力，可按如下方法进行：

- 将测试点 1)(B) 处测得的燃气压力减去炉膛背压。
- 在表格栏 1 中查出与用公式计算得数最接近的燃气压力值。
- 读出左边相应的出力值。

举例：

- 2 段火运行
- 天然气 G20 PCI 10 kWh/Nm³
- 燃气环 2)(B)p.7 按表 (C)p.7 进行调整。
- 测试点 1)(B) 处燃气压力 = 6.3 mbar
- 炉膛压力 = 2 mbar
- 6.3 - 2 = 4.3 mbar

表中与 2 段火出力 410 kW 对应的压力为 4.3 mbar (栏 1)。

此值只能作为参考值，精确的出力值应根据燃气计量表测量。

为了计算压力测试点 1)(B) 处的燃气压力，将燃烧器设定为 2 段火出力运行：

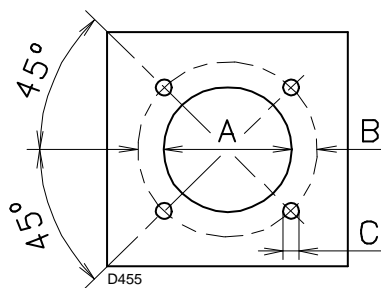
- 在表中找出相关燃烧器的近似出力值。
- 读出右边栏 1 中压力测试点 1)(B) 处的压力值。
- 将此压力值与与炉膛估计压力相加。

举例：

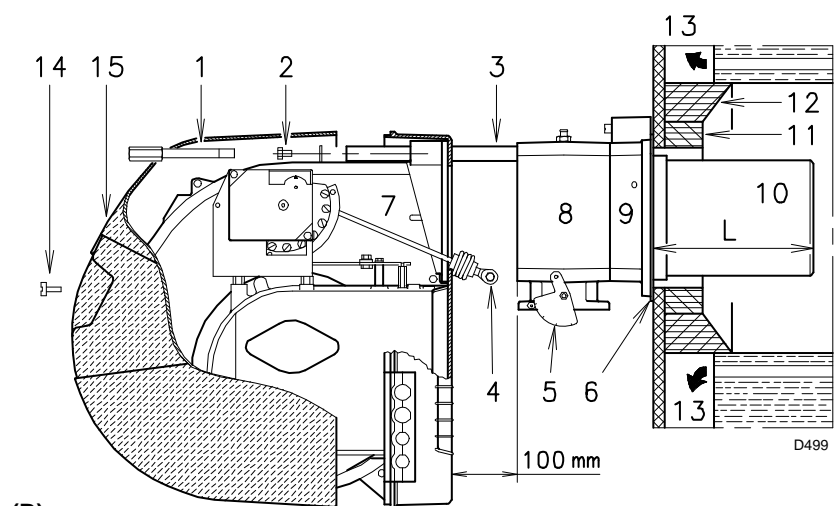
- 燃烧器 2 段火运行所需出力：410 kW
- 天然气 G20 PCI 10 kWh/Nm³
- 燃气环 2)(B)p.7 按图 (C)p.7 调整。
- 燃烧器出力为 410 kW 时的燃气压力，如表中栏 1 所示 = 4.3 mbar
- 炉膛背压 = 2 mbar
- 4.3 + 2 = 6.3 mbar

压力测试点 1)(B) 处所需压力。

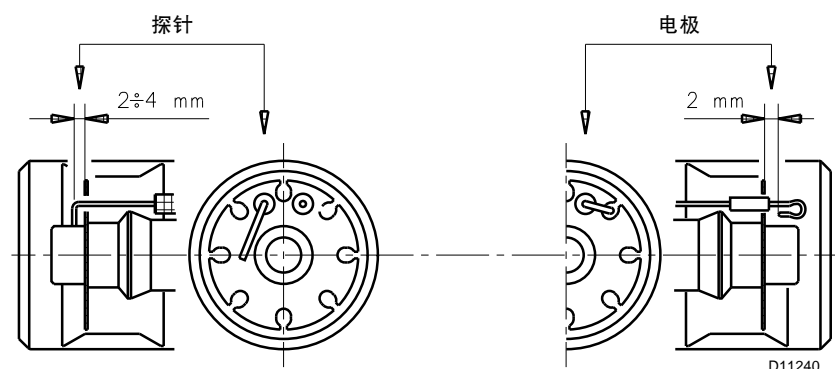
mm	A	B	C
RS 50	160	224	M 8



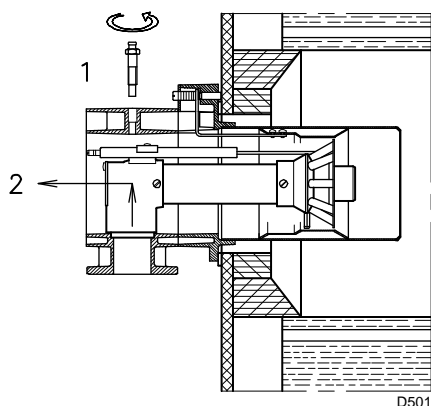
(A)



(B)



(C)



(D)

安装

锅炉钢板 (A)

如 (A) 所示, 在炉膛挂板上钻孔。

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，且在任何情况下其厚度必须大于锅炉钢板加炉补的厚度之和。可选的长度范围 L (mm) 如下：

燃烧筒 10):	RS 50
• 标准	216
• 加长	351

帶前烟道13)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11)必须装于锅炉炉补12)和燃烧筒10)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 11)-12)(B)，除非锅炉制造商另有要求。

将燃烧器安装到锅炉上 (B)

在将燃烧器安装到锅炉之前，从燃烧筒开口处检查探针和电极连接是否正确，如图 (C) 所示。

从燃烧器上取下燃烧头，如图 (B):

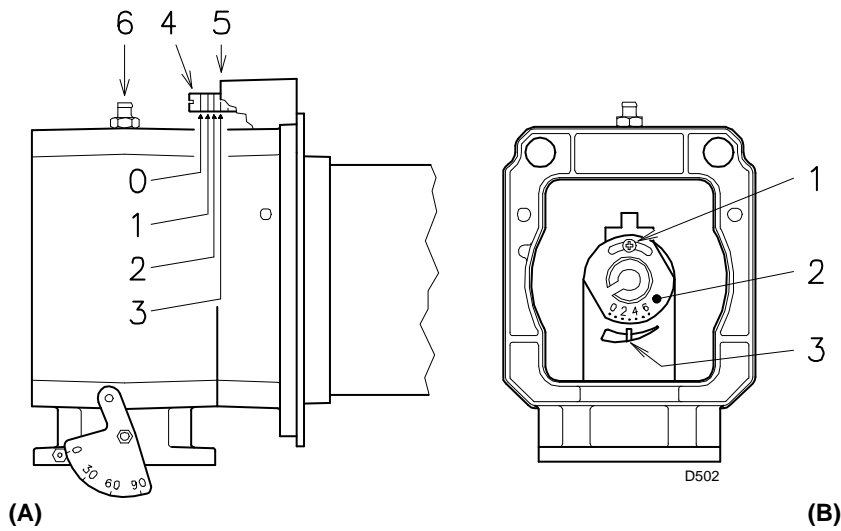
- 取下螺栓 14)，同时取下外壳 15)。
 - 从刻度指示盘 5) 解开连杆 4) 的连接：
 - 从滑杆 3) 上取下螺栓 2)；
 - 取下螺栓 1)，将燃烧器沿滑杆 3) 拉出大约 100 mm；
- 断开探针及点火电极连接，从滑杆 3) 上取下开口销，将燃烧器从滑杆上完全取下。

将法兰 9)(B) 安装到锅炉挂板上，并在中间安装隔热垫 6)(B)。使用随附的 4 个螺栓固定。

燃烧器和锅炉之间的密封必须达到气密标准。

如果进行上述检查时发现探针及电极的位置不正确，可拆下螺栓 1)(D)，取出燃烧头内部部件 2)(D)，然后对探针和电极进行调整。

请勿旋转探针：应使其如 (C) 所示。如果探针位置距离点火电极太近，可能会损害控制盒放大器。



燃烧头调节

在安装的这一阶段，如图 (A) 所示，将燃烧筒和多歧管安装到锅炉上。这样可以很容易的调节燃烧头，因为此设置只取决于燃烧器 2 段火运行时的出力。

在设置燃烧头之前应首先确定出力值。

燃烧头的调节有两种：

空气量调节和燃气量调节。

图 (C) 所示为调节空气量和燃气量的刻度值，然后按如下进行操作：

空气量调节 (A)

旋转螺栓 4)(A) 直至刻度槽与法兰前表面 5)(A) 对齐。

燃气量调节 (B)

拧松螺栓 1)(B)，并转动环 2) 直至刻度槽与刻度 3) 一致。

将螺栓 1) 完全拧紧。

举例：

燃烧器出力 = 432 kW (373 Mcal/h).

查看图表 (C) 得知，燃烧器此出力时，空气量和燃气量应调整至刻度 3，如图 (A) 和 (B) 所示。

注意

图 (C) 所示为理想的燃烧头设定状态。如果燃气主管路压力过低，不能达到第 5 页所示的 2 段火运行压力，且如果燃气环 2)(B) 未完全开启，可将其开启度扩大 1 或 2 个刻度。

继续上一个例子，如第 5 页所示，燃烧器出力为 432 kW (373 Mcal/h)，测试点处的 6)(A) 压力约为 4,6 mbar。如果不能达到此压力，则开启燃气环 2)(B) 至刻度 4 或 5。

确认燃烧性能良好稳定。

燃烧头调整完成后，将燃烧器 4)(D) 重新装回到滑杆 3) 上，距多歧管 5) 约 100mm，此时燃烧器位置如图(B)p.6，插好离子探针电缆与点火电极，然后将燃烧器推向多歧管，直至图 (D)所示位置。

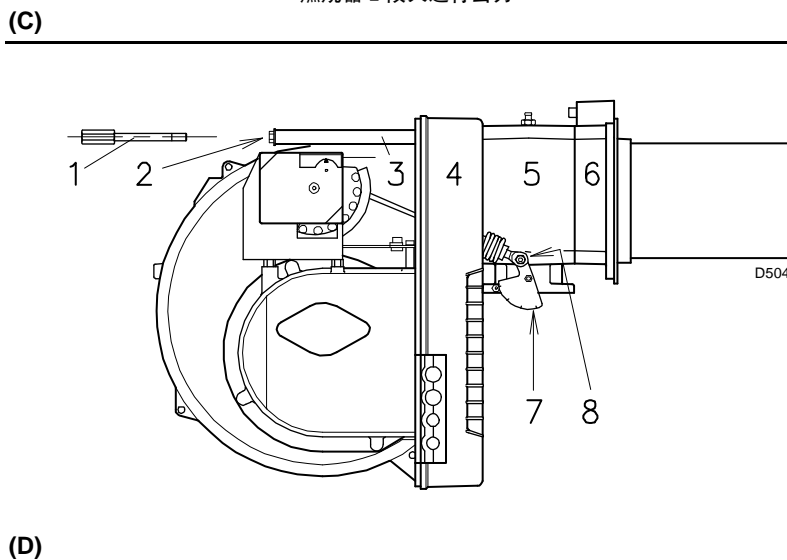
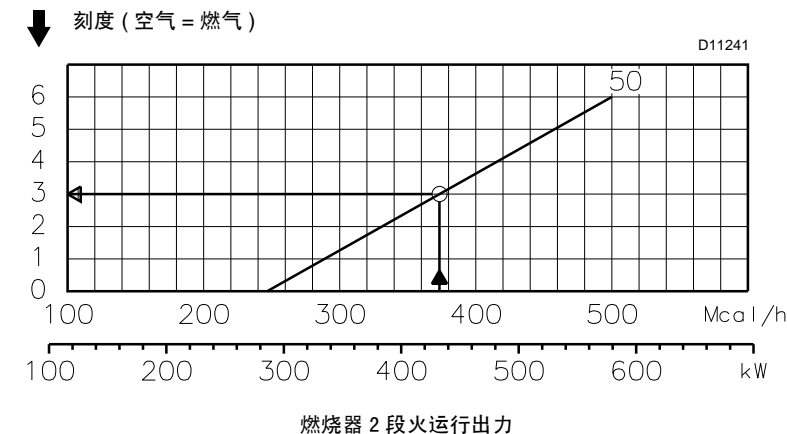
将螺栓 1) 重新装回滑杆 3) 上。

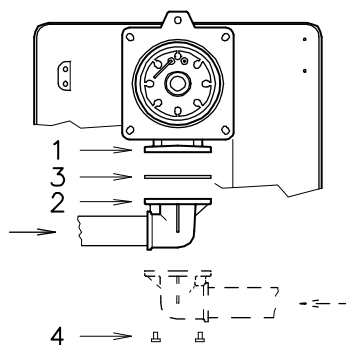
用螺栓 1) 将燃烧器与多歧管固定好，然后重新将开口销插入滑杆 3) 中的任意一个。

将接口 8) 重新与刻度盘 7) 连接。

注意

将燃烧器重新安回两个滑杆上后，建议轻轻的拉出高压电缆以及火焰探测探针电缆，直至它们被轻轻的拉紧。





(A)

D505

燃气管路

- 用随燃烧器所附之法兰 2)，垫片 3)，及螺栓 4) 将燃气阀组与燃气管路附件 1)(A) 连接。
- 燃气阀组可从燃烧器的左边或右边进行安装，视具体情况，以方便安装为宜，见图 (A)。
- 燃气电磁阀 8)-9)(B) 必须尽可能靠近燃烧器以确保燃气在 3 秒的安全时间内达到燃烧头。
- 确认压力调节器的调节范围 (弹簧颜色) 与燃烧器所需压力匹配。

燃气阀组 (B)

燃气阀组符合 EN 676 标准，不包含在燃烧器内，需单独订购，编码见表 (C)。

图示 (B)

- 1 - 燃气进气管路
 - 2 - 手动阀
 - 3 - 减震器
 - 4 - 带按钮的压力表
 - 5 - 过滤器
 - 6 - 压力调节器 (垂直)
 - 7 - 最小燃气压力开关
 - 8 - 安全电磁阀 VS (垂直)
 - 9 - 调节电磁阀 VR (垂直)
- 两种调节方式：
- 点火出力 (快速开启)
 - 最大出力 (慢速开启)

- 10 - 燃烧器标准法兰垫
- 11 - 燃气调节蝶阀
- 12 - 燃烧器
- 13 - 燃气阀 8)-9) 泄漏检测装置。
按 EN 676 标准要求，最大出力大于 1200kW 的燃烧器必须强制安装泄漏检测装置。
- 14 - 燃气阀组 / 燃烧器适配器

- P1 - 燃烧头处压力
P2 - 燃气调节器后压力
P3 - 过滤器前压力

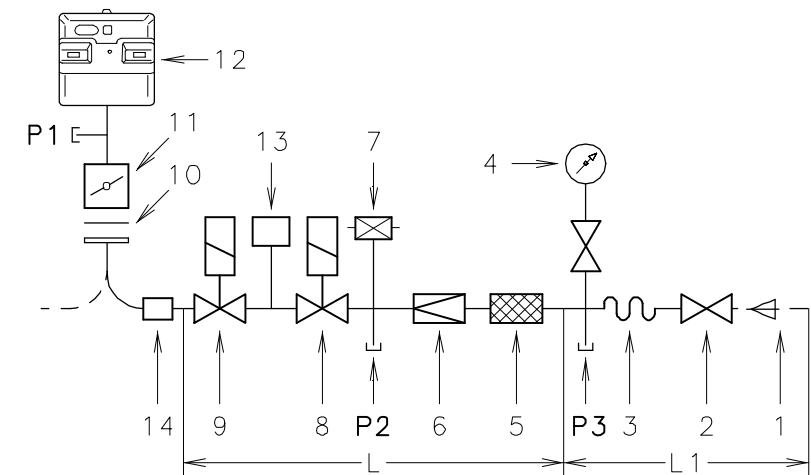
- L - 需单独订购的燃气阀组编码见表 (C)
L1 - 由安装人员负责

表 (C) 示例

- C.T. = 燃气阀 8) - 9) 泄漏检测装置：
- = 不带泄漏检测装置的燃气阀组：泄漏检测装置可单独订购，再进行安装 (参见栏 13)。
 - ◆ = 带泄漏检测装置的燃气阀组。
- 13 = 泄漏检测装置。如需要，可单独为燃气阀组订购此装置。
- 14 = 燃气阀组 / 燃烧器适配器。
如需要，可单独为燃气阀组订购此装置。

注意

调节燃气阀组请参看随附手册。



(B)

D935

符合 EN 676 标准的燃气燃烧器及其相关燃气阀组

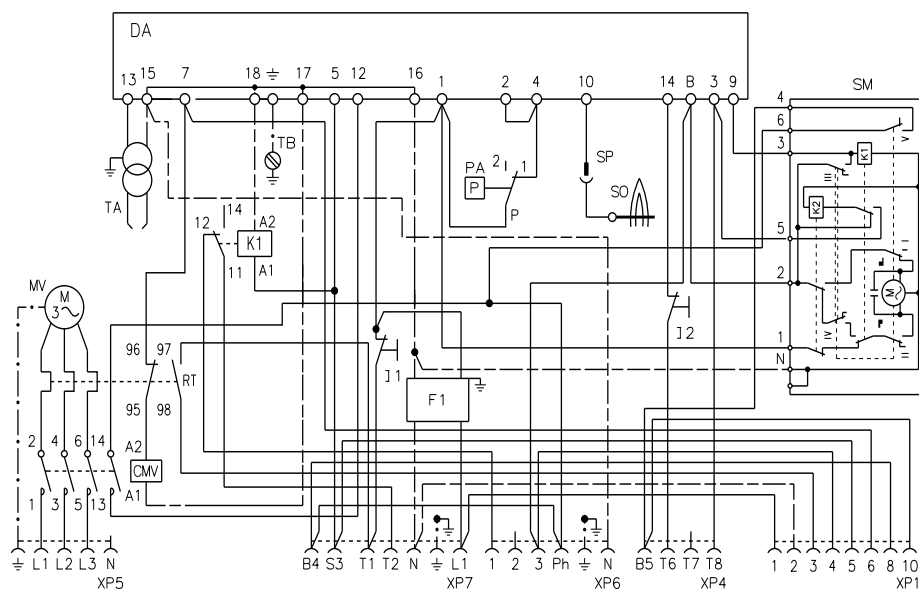
燃气阀组 L			13	14
Ø	C.T.	代码	代码	代码
1"	-	3970077	3010123	3000824
1"1/4	-	3970144	3010123	-
1"1/2	-	3970145	3010123	-
1"1/2	-	3970180	3010123	-
2"	-	3970146	3010123	3000822
2"	-	3970181	3010123	3000822
2"	◆	3970160	-	3000822
2"	◆	3970182	-	3000822

(C)

燃气阀组组件 L

代码	组件		
	过滤器 5	压力调节器 6	电磁阀 8 - 9
3970077	一体式 MB DLE 410		
3970144	一体式 MB DLE 412		
3970145	GF 515/1	FRS 515	DMV DLE 512/11
3970180	一体式 MB DLE 415		
3970146 3970160	GF 520/1	FRS 520	DMV DLE 520/11
3970181 3970182	一体式 MB DLE 420		

内部电气接线



(A)

D3014

电气系统



首次点火必须由具有专业资质的人员用专用工具进行操作。



所有安装、维护和拆卸操作必须在断开电源之后进行。



燃烧器需要有具有资质和授权的技术人员进行定期维护, 且符合当地的强制标准。

图 示 (A)

RS 50 型燃烧器 (三相)

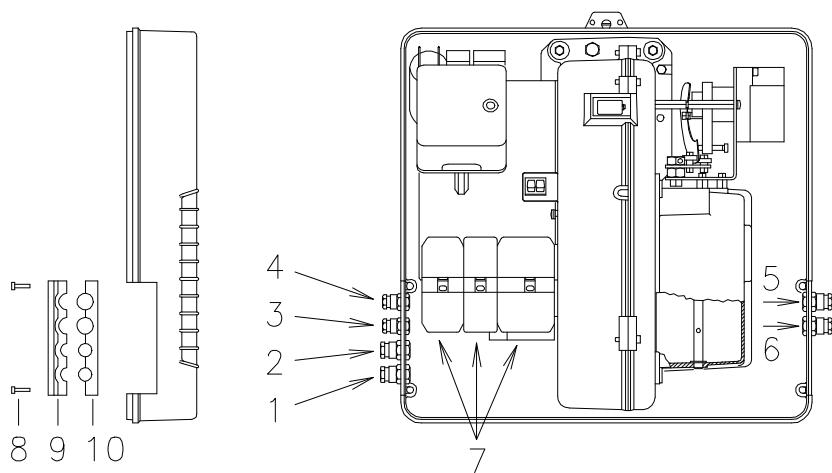
- RS 50 型燃烧器，工厂预设**为 400 V 电源**。
- 如果使用 **230 V 电源**，将电机连接由星形改为三角形，同时改变热继电器的设置。

图例说明 (A)

- | | |
|-----|-----------------------|
| CMV | - 电机电容 |
| F1 | - 抗电磁干扰保护装置 |
| DA | - 控制盒 (RMG) |
| K1 | - 继电器 |
| I1 | - 开关: 燃烧器 停机 - 启动 |
| I2 | - 开关: 1 段火 - 2 段火转换开关 |
| MV | - 风机电机 |
| PA | - 风压开关 |
| RT | - 热断路器 |
| SM | - 伺服电机 |
| SO | - 离子电极 |
| SP | - 插头 - 插座 |
| TA | - 点火变压器 |
| TB | - 燃烧器接地 |
| XP1 | - “状态显示面板”连接器 |
| XP4 | - 4 孔插座 |
| XP5 | - 5 孔插座 |
| XP6 | - 6 孔插座 |
| XP7 | - 7 孔插座 |

注意

在相-相供电情况下, 必须在控制盒的 6 号端子和接地端子之间接一个桥接器。



(A)

D3027

电气连接

使用符合 EN 60 335-1 标准的柔性电缆：

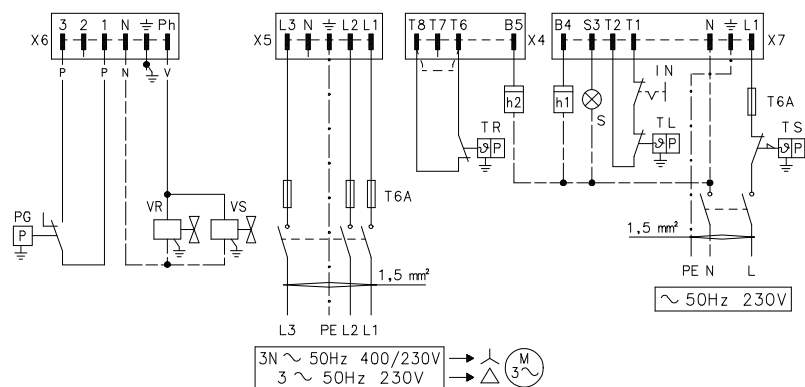
- 如护套为 PVC，电缆最低标准为 H05 VV-F
- 如护套为橡胶，电缆最低标准为 H05 RR-F

所有连接到燃烧器插座7)(A)的电缆必须穿过导缆孔。导缆孔必须适合左手或右手进行操作的金属板上的孔。

首先拧松螺栓 8)，然后将金属板分成 9) 和 10) 两部分，将孔上的膜去除。

导缆孔和穿孔可以有几种用途。

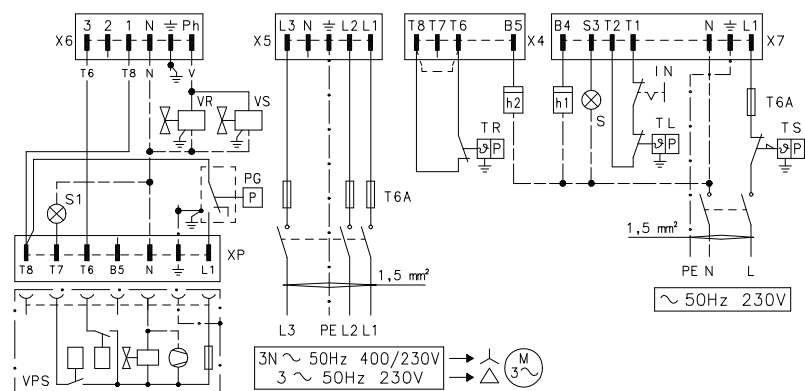
RS 50 型不带泄漏检测装置 三相电源



(A)

D943

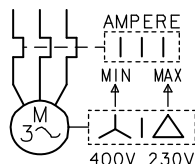
RS 50 型 不带泄漏检测装置 VPS 三相电源



(B)

D944

热继电器校准



(C)

D867

图示 (A) - RS 50 型燃烧器电气连接，三相电源，不带泄漏检测装置

图示 (B) - RS 50 型燃烧器电气连接，三相电源，带 VPS 泄漏检测装置。

燃烧器每次启动前都会进行燃气泄漏检测。

图示 (A) - (B)

h1 - 1 段火计时器

h2 - 2 段火计时器

IN - 燃烧器手动停止开关

XP - 泄漏检测装置用插头

X4 - 4 极插头

X5 - 5 极插头

X6 - 6 极插头

X7 - 7 极插头

PC - 泄漏检测装置用燃气压力开关

PG - 最小燃气压力开关

S - 远程锁定信号

S1 - 泄漏检测装置的远程锁定信号

TR - 高 - 低火模式远程控制系统：用来控制 1 段火和 2 段火。

如果燃烧器被设置为单段火运行，则可用一个跳接线替换远程控制系统。

TL - 负荷限制远程控制系统：

如果锅炉温度或压力达到预设值，此系统可将燃烧器停机。

TS - 安全负荷控制系统：

TL 故障时此系统启动。

VR - 调节阀

VS - 安全阀

图例说明 (C)

热断路器校准 20)(A)p.3

此操作系为避免由于掉相引起输入电流急剧增大而烧毁电机。

- 如果电机为星形驱动，电压 **400 V**，指示标位于“MIN”。

- 如果电机为角形连接，电压 **230 V**，指示标位于“MAX”。

即使电机在电压 400 V 时的额定输入功率超出热继电器的量程，电气保护在任何情况下仍会发挥作用。

注意

- RS 50 型燃烧器为三相电源，出厂时预设为使用 400V 电源。如果使用 230 V 电源，将电机连接由星形改为角形，同时改变热动继电器的设置。

- RS 50 型燃烧器为间歇运行模式。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。

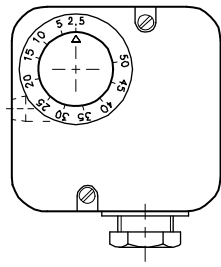
正常情况下，锅炉负荷控制系统会将燃烧器自动停机。如果燃烧器未能自动停机，需在 IN 中串联一个计时器，以使燃烧器可以至少每 24 小时停机一次。

- RS 50 燃烧器出厂时预设为两段火运行模式，因此必须连接控制装置 TR。

但如果需要单段火运行，可以用一个跳接线代替控制装置 TR，将此跳接线安装在连接器 X4 上的端子 T6 和 T8 之间。

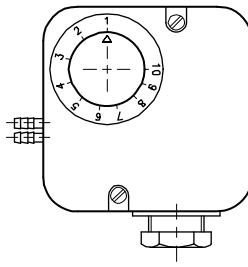
警告：不得将零线和相线反接。反接零线和相线会导致燃烧器因点火失败而锁定。

最小燃气压力开关



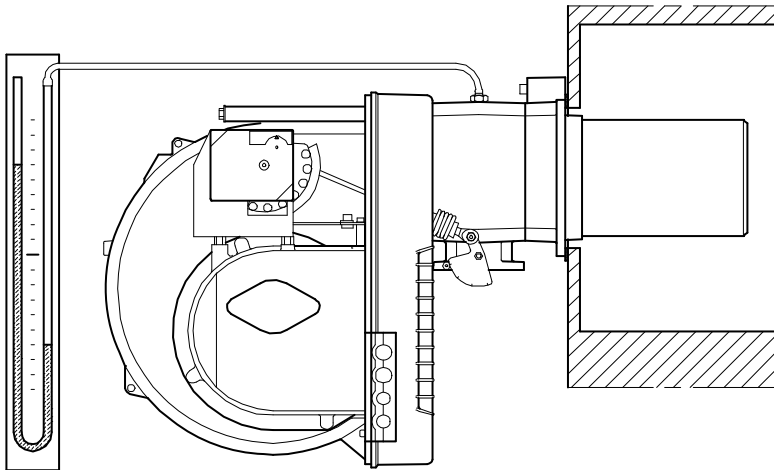
(A)

风压开关



(B)

D897



(C)

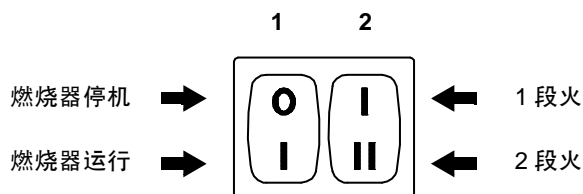
D514

伺服电机



(D)

D517



(E)

D469

点火前调试

按第 7 页所述调整燃烧头、空气量及燃气量以及空气。

另外，还需对以下方面进行调节：

- 打开燃气阀组前的手动阀。
- 调整最小燃气压力开关到量程的开始位置 (A)。
- 调整空气压力开关到量程的开始位 (B)。
- 排尽燃气管路中的空气。
连续排放空气 (建议使用一根塑料管接到室外排放) 直至闻到燃气的味道。
- 在烟囱上的燃气压力测试点安装“U”型压力计 (C)。
根据第 5 页上的表，可用压力表上的读数来计算燃烧器 2 段火出力。
- 连接两个灯泡或测试仪到两个电磁阀 VR 和 VS 上，用以检查何时供电。
如果两个电磁阀已安装了指示灯显示何时通过电流，则无需进行此步骤。

启动燃烧器前，最好先调整燃气阀组以便燃烧器能在最安全的情况下点火，如使燃气流量最小。

伺服电机 (D)

伺服电机通过改变凸轮轮廓线可实现同步调节风门，并可同时对燃气蝶阀进行调节。
伺服电机旋转角度与控制燃气蝶阀开启程度的刻度盘所示角度相等。伺服电机 12 秒内旋转 90 度。请勿改变以下 4 个凸轮的出厂设定值；只需检查各凸轮的设置是否与以下所述相符：

凸轮 St2 : 90°

最大旋转角度。燃烧器以 2 段火模式运行时，燃气蝶阀必须全开，角度为 90°。

凸轮 St0 : 0°

最小旋转角度。燃烧器停机时，风门阀及燃气蝶阀必须全关，角度为 0°。

凸轮 St1 : 15°

调整点火位置及 1 段火运行出力。

凸轮 MV : 85°

接通 2 段火 LED 指示灯 (状态显示面板)

燃烧器启动

闭合控制装置，并进行如下设置：

- 并将开关 1)(E) 置于 燃烧器 “ON” 的位置。
- 并将开关 2)(E) 置于 “1 段火运行” 位置。

燃烧器一启动，通过火焰检查窗 18)(A)p.3 检查风机叶片旋转方向。

确认连接到电磁阀上的灯泡或测试仪，或电磁阀自带的指示灯，显示电磁阀未通电。如果显示电磁阀通电，则应**立即**将燃烧器停机，并检查电气连接。

燃烧器点火

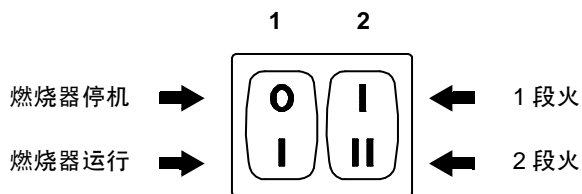
完成以上检查步骤后，可进行燃烧器点火。如果电机启动，但未产生火焰，且控制盒锁定，则复位并等待下一次点火。

如果点火仍未成功，有可能是燃气在 3 秒的安全时间内未到达燃烧头。

在此情况下，应增加点火燃气量。

燃气是否到达燃烧头可通过 U 型压力表 (C) 查看。

一旦点火成功，即可进行全面的校准工作。



(A)

D469

燃烧器校准

燃烧器的优化校准需要在锅炉排烟口安装烟气分析仪。

顺次调整：

- 1 - 首次点火出力
- 2 - 2 段火燃烧器出力
- 3 - 1 段火燃烧器出力
- 4 - 1 段火和 2 段火之间的中间出力
- 5 - 风压开关
- 6 - 最小燃气压力开关

1 - 点火出力

符合 EN 676 标准：

燃烧器最大出力为 120 kW 时

点火出力可以为燃烧器运行最大出力。举例：

- 最大运行出力 : 120 kW
- 最大点火出力 : 120 kW

燃烧器最大出力高于 120 kW 时

点火出力必须低于燃烧器运行最大出力。若点火出力低于 120 kW，无需进行另外计算。若点火出力高于 120 kW，根据标准规定，点火出力应根据控制盒所标明的安全时间 "ts" 进行调整：

- 当 "ts" = 2 秒时，点火出力必须小于等于燃烧器运行最大出力的 1/2。
- 当 "ts" = 3 秒时，点火出力必须小于等于燃烧器运行最大出力的 1/3。

举例：燃烧器最大运行出力为 600 kW。

点火出力必须小于等于：

- 300 kW 带 "ts" = 2 秒
- 200 kW 带 "ts" = 3 秒

如何测定点火出力：

- 将电离探针电缆上的插头-插座 19)(A) p.3 断电 (燃烧器点火，安全时间后进入锁定状态)。
- 在持续的锁定状态下进行点火 10 次。
- 在燃气表上读出消耗的燃气体积。
当 ts = 3 秒时，此燃气体积应小于或等于根据以下公式所计算出的数值：

$$\frac{\text{Nm}^3/\text{h} (\text{燃烧器最大供气量})}{360}$$

举例 燃气 G 20 (10 kWh/Nm³):

最大运行出力：600 kW，燃气体积为 60 Nm³/h。

点火锁定 10 次后，燃气表上显示的供气量必须等于或小于：

$$60 : 360 = 0,166 \text{ Nm}^3.$$

2 - 2 段火出力

燃烧器 2 段火出力必须按照第 4 页所示的出力范围进行设置。

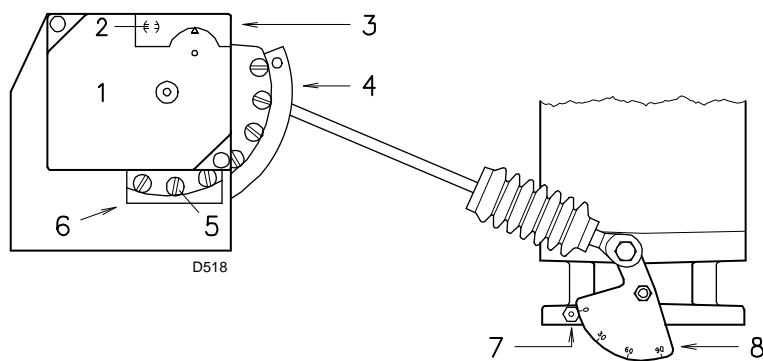
按上述说明操作时，燃烧器处于 1 段火运行。现在将开关 2)(A) 置于 2 段火运行位置：伺服电机开启风门挡板，同时开启燃气蝶阀至 90°。



燃气校准

根据燃气表测定燃气体积。

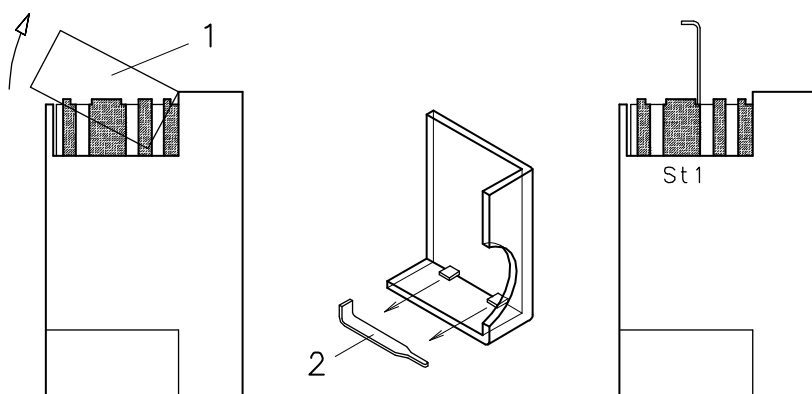
可根据第 5 页上的表格计算出合理的供气量，在“U”型压力计上读出燃气压力，见第 12 页图 (C)，然后按第 5 页上说明进行计算。

- 如需减小供气量，则可降低燃气压力；如果此时压力已经较低，则可关闭调节阀 VR。
- 如需增大供气量，增大燃气压力。



- 1 伺服电机
- 2 凸轮 4  连接 /  脱开
- 3 凸轮盖
- 4 可变轮廓凸轮
- 5 调整凸轮廓线螺栓
- 6 可对螺栓 5 进行操作的开孔
- 7 刻度盘 8 的刻度
- 8 燃气蝶阀开启角度指示盘

(A)



(B)

空气量调节

通过调节螺栓 6)(A) 逐步调整凸轮 4)(A) 的外廓线。

- 顺时针调节螺栓增大空气量。
- 逆时针调节螺栓减小空气量。

3-1 段火燃烧器出力

燃烧器的 1 段火出力必须设定在第 4 页所示出力范围内。

将按钮 2)(A)p.13 置于 1 段火运行位置: 伺服电机 1)(A) 关闭风门阀及燃气蝶阀至 15° 角, 此为工厂最初设定的调节位置。

调整燃气量

根据气量计测定燃气供气量。

- 如需减小供气量，可依次逐步减小凸轮 St1 (B) 的角度 15° 至 13° 至 11°.....
- 如需增加供气量，将开关 2)(A)p.13 置于 2 段火运行位置，并依次逐步增加凸轮 St1 的角度，如 15° 至 17° 至 19°....

此时,可回到 1 段火运行模式,并测量供气量。

注意

当凸轮 St1 角度减小时, 伺服电机随着凸轮的调节而调节。如需增大凸轮角度, 则先调至 2 段火运行位置, 增大角度, 然后再回调至 1 段火运行位置, 以测试凸轮调节的有效性。

如果增大 $St1$ 的角度，而燃烧器处于 1 段火运行时，燃烧器会锁定。

要调节凸轮 St1，按压并取下凸轮盖 1)，如图 (B) 所示，从中取出相关部件 2)，装在凸轮 St1 的插槽中。

空气量调整

通过调节孔 6)(A) 调节螺栓以逐步调整凸轮 4)(A) 的起始廓线。最好不要调节第一个螺栓，因为此螺栓用于将风门阀完全关闭。

4 - 中间出力

此时无需调整燃气供应量。

空气量调节

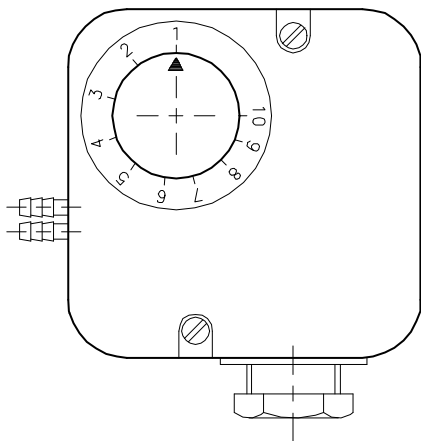
使用开关 1) (A) p.13 关闭燃烧器, 将伺服电机离合器 2) A 调整至垂直位置以便脱开凸轮, 旋转凸轮中间的调节螺栓, 使钢带平滑, 之后用手前后转动凸轮, 检查其运转是否平滑顺畅。

不要改变凸轮两端的螺栓位置, 此位置已经被调整至控制 1 段火和 2 段火运行时风门挡板的位置。

注意

一旦完成对“2 段火 - 1 段火 - 中间”出力的调整, 再次检查点火: 此时的噪音水平应与燃烧器点火后运行时的噪音水平相当。如果燃烧器出现任何震动, 应减小点火时的燃气供应量。

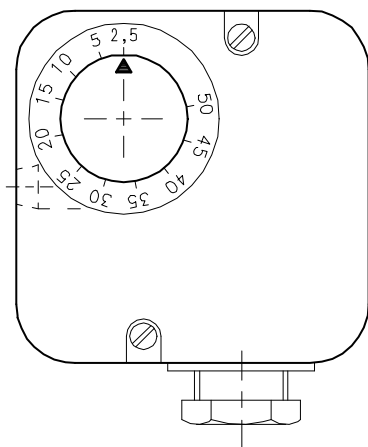
风压开关 5)(A)p. 3



(A)

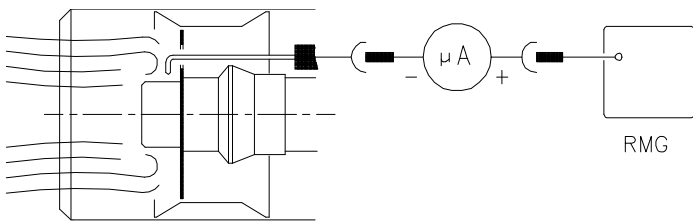
D521

最小燃气压力开关 7)(B)p. 8



(B)

D896



(C)

D3023

5 - 风压开关 (A)

在进行上述燃烧器各部分调节时，空气压力开关置于量程 (A) 的开始位置。上述所有调整结束后，方可调节空气压力开关。
当燃烧器运行处于 1 段火运行时，顺时针转动压力调节旋钮，增大设定压力直至燃烧器锁定。然后将调节旋钮逆时针回调约 20%，重新启动燃烧器以确认其运行正常。
如果燃烧器再次锁定，则沿逆时针方向继续微调压力调节旋钮。

注意：通常，空气压力开关必须保证烟气中 CO 浓度不超过 1% (10,000 ppm)。
要检测此项，需在锅炉烟筒内安装烟气分析仪同时减小风机进风口面积（如可使用厚纸板遮挡），在烟气中 CO 浓度超过 1% 时，检查燃烧器是否锁定。

空气压力开关如果连接两个管路的话，则以“微分”模式运行。如果在预吹扫阶段锅炉炉膛内出现负压，无法闭合空气压力开关，需在空气压力开关和风机进气口之间加装一个连接管。这样，空气压力开关就能以微分压力开关模式运行。

警告：以“微分”模式工作时，空气压力开关只适用于工业领域，或符合当地允许空气压力开关仅控制风机运行而不涉及 CO 排放的规定。

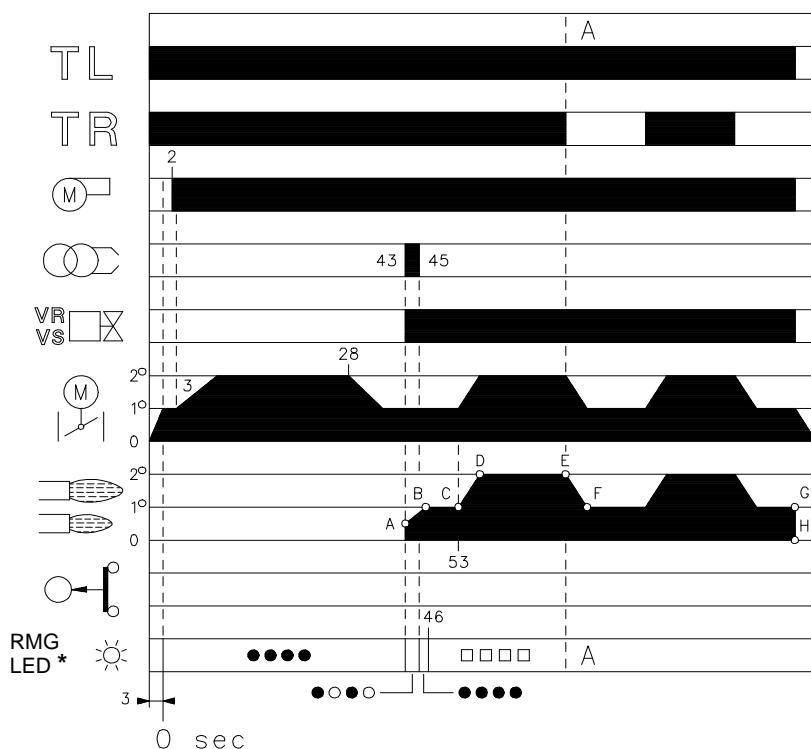
6 - 最小燃气压力开关 (B)

在进行上述燃烧器各部分调节时，此时开关位置应置于量程开始位置 (B)。上述调整结束后，开始调节最小燃气压力开关。
当燃烧器在 2 段火运行时，通过顺时针旋转压力调节旋钮增大压力直至燃烧器锁定。之后，逆时针旋转旋钮调节 2 mbar，使燃烧器重新启动以确保燃烧器运行平稳。
若此时燃烧器再次锁定，继续沿逆时针方向旋转旋钮 1 mbar。

火焰状态检查 (C)

燃烧器带有一个电离系统，可以保证对火焰状态进行检查。控制盒运行的最小电流为 5 μA。
燃烧器提供更大的电流，因此一般不需要控制电流的强度。但是，如需测量电离电流，则先断开电离探针电缆上的插头 - 插座 19)(A)p.3，然后安装一个量程为 100 μA 的微安计。
安装时需仔细检查电极连接是否正确！

正常火焰
(n° = 从 0 秒开始计算的秒数)

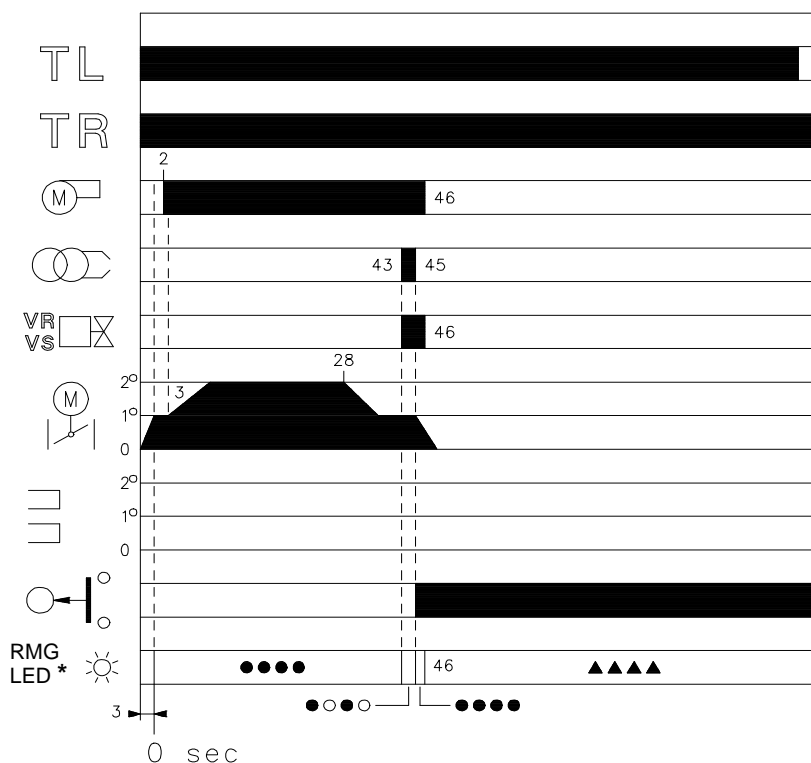


* ○ 灯灭 ● 黄灯 □ 绿灯 ▲ 红灯
详见第 17 页。

(A)

D3028

点火失败



* ○ 灯灭 ● 黄灯 ▲ 红灯
详见第 17 页。

(B)

D3029

燃烧器运行

燃烧器启动 (A)

- 远程控制装置 TL 闭合。
伺服电机启动: 伺服电机旋转, 开启至凸轮 St1 上所设定之角度。
时间大约 3 秒;
- 0 秒 : 控制盒启动阶段开始。
- 2 秒 : 风机启动。
- 3 秒 : 伺服电机启动: 伺服电机旋转, 直至触发凸轮 St2 上的接触器。
此时, 风门挡板调节至 2 段火出力位置。
预吹扫时的空气输送量为燃烧器 2 段火运行时的风量。
吹扫时间为 25 秒。
- 28 秒 : 伺服电机启动: 伺服电机旋转, 闭合至凸轮 St1 上所设定之角度。
- 43 秒 : 此时风门挡板和燃气蝶阀处于 1 段火出力位置。
点火电极产生火花。
安全阀 VS 和调节阀 VR (快速开启) 开启。火焰在低出力水平 (A 点) 时点燃。
之后, 随着阀门缓慢开启至 1 段火出力位置 (B 点) 时, 燃烧器的出力水平也随之逐渐平稳增加。
- 45 秒 : 火花熄灭。
- 53 秒 : 如果远程控制装置 TR 关闭, 或已被桥接器替代, 则伺服电机将继续旋转直至启动凸轮 St2 用以将风门挡板和燃气蝶阀调节至 2 段火运行位置, 即 C-D 部分。控制盒启动阶段结束。

安全模式运行 (A)

安装有控制装置 TR 的系统

启动周期结束后, 对伺服电机的控制转移给控制锅炉温度及压力的控制装置 TR, D 点。
(但控制盒会继续检测火焰状态以及空气压力开关位置是否正确)。

- 如果温度或压力升高至控制装置 TR 断开, 伺服电机关小燃气蝶阀及风门挡板, 燃烧器由 2 段火转为 1 段火运行, E-F 部分。
- 如果温度或压力降低至控制装置 TR 关闭, 伺服电机开启燃气蝶阀及风门挡板, 燃烧器由 1 段火转为 2 段火运行。此过程会循环往复。
- 1 段火运行时, G-H 部分, 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, 控制装置 TL 断开, 伺服电机回到凸轮 St0 所设定的角度 0°。风门挡板完全关闭以将热量损失降至最低。

未安装 TR 的系统 (装有桥接器)

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

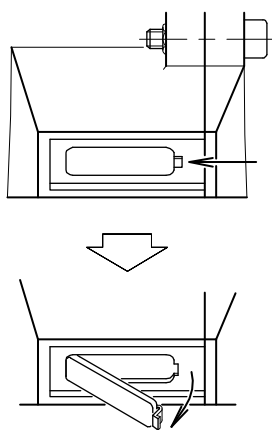
点火失败 (B)

如果燃烧器点火失败, 会在燃气电磁阀开启 3 秒内且在控制装置 TL 闭合 49 秒后内锁定。控制盒红色指示灯将会亮起。

燃烧器运行时火焰熄灭

如果燃烧器运行时, 火焰突然熄灭, 则燃烧器会在 1 秒内锁定。

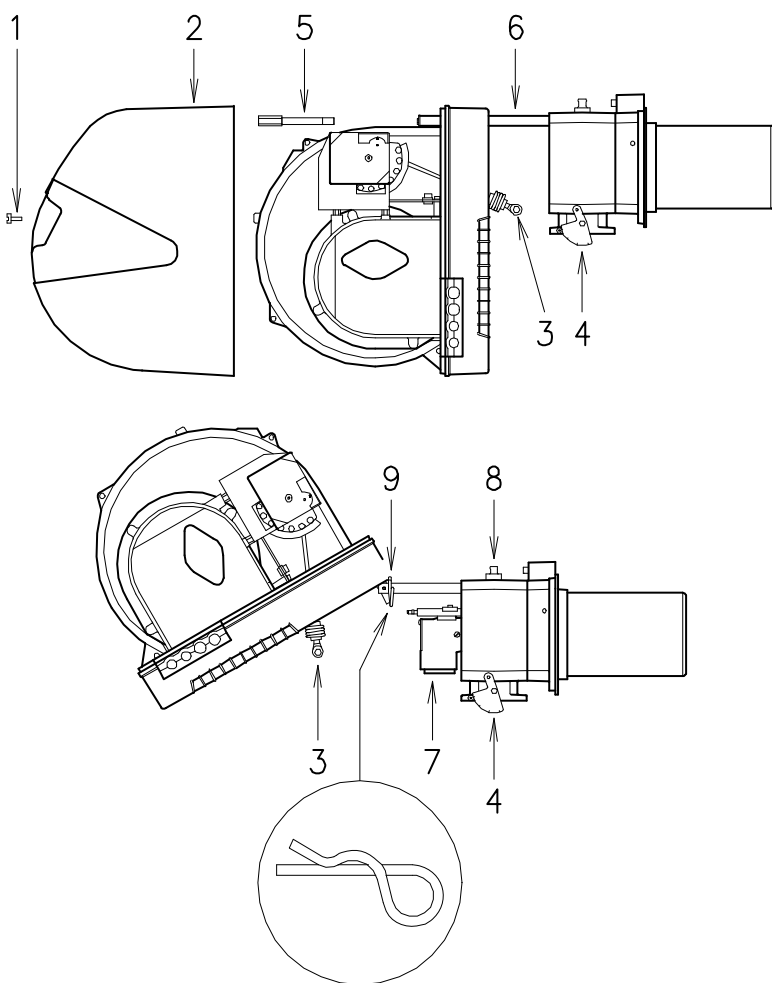
火焰检查窗



(A)

D484

打开燃烧器



(B)

D535

最终检查 (燃烧器运行时)

- 断开远程控制装置 TL ;
- 断开远程控制装置 TS ;
- 断开最小燃气压力开关的电源线 ;

燃烧器应该停机

- 断开连接压力开关的公共端子 P ;
- 断开电离探针的接头 ;

燃烧器锁定并停机

- 确保各调节装置上的机械锁定系统锁紧。

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。

燃气泄漏检测

确认燃气表和燃烧器之间的连接管路没有燃气泄漏。

燃气过滤器

过滤器脏时请更换 (详见燃气阀组安装指南部分)。

火焰检查窗

清洁火焰检查窗 (A)。

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。如有疑问, 拆开弯头查看 7)(B)。

伺服电机

将伺服电机离合器 2)(A)p.14 旋转 90°, 以便脱开凸轮 4)(A)p.14, 用手前后转动凸轮, 确认其转动平滑。然后重新连接凸轮 4)(A)p.14。

燃烧器

检查以确认控制风门挡板及燃气蝶阀的系统是否有使用过度或螺栓松动的情况。同时确认固定燃烧器接线端子板电气导线的各螺栓没有任何松动。

清洁燃烧器外部, 清洁时需特别注意传动接头和凸轮 4)(A)p.14。

燃烧

如果在燃烧器运行的初始阶段获得的燃烧数据不符合当地强制标准, 或者在任意出力下燃烧效果不好, 则需调整燃烧器。用卡片记录新产生的燃烧数据, 可作为之后对燃烧器进行维护调试的参考信息。

打开燃烧器 (B):

- 关掉电源。
- 拆下螺栓 1), 同时 取下保护盖 2)。
- 从刻度指示盘 4) 处解开连杆 3) 的连接。
- 移除螺栓 5) 和开口销 9), 沿滑杆 6) 将燃烧器拉出约 100 mm。断开探针和电极的电缆, 然后将燃烧器整个取出。
- 按图所示, 旋转燃烧器, 将开口销 9) 插入任一滑杆, 这样可固定燃烧器位置。
- 取下螺栓 8) 后, 可接着取下组件 7)。

关闭燃烧器 (B):

- 取下开口销 9), 从烟囱处将燃烧器推回大约 100 mm。
- 重新连接电极导线, 并在燃烧器内将其拉紧。
- 重新拧紧螺栓 5), 开口销 9), 将探针和电极导线向外轻轻拉紧。
- 重新连接连杆 3) 到刻度指示盘 4)。

燃烧器启动阶段故障诊断
启动过程中的各项指示见下表：

颜色代码表	
启动顺序	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	▲□▲□▲□▲□▲
图示：	○ 灯灭 ● 黄灯 □ 绿灯 ▲ 红灯

控制盒复位及故障诊断
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。
控制盒发出一组闪烁信号（每一信号间隔 1 秒），该组信号会以 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。

红色 LED 指示灯亮 等待至少 10 秒	锁定	按下重置按钮 时间大于 3 秒	闪烁	间隔 3 秒	闪烁
			●●●●●●●●		●●●●●●●●

以下方法可用来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。

可视诊断

- 指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 19 页列表所示。

软件诊断

- 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。

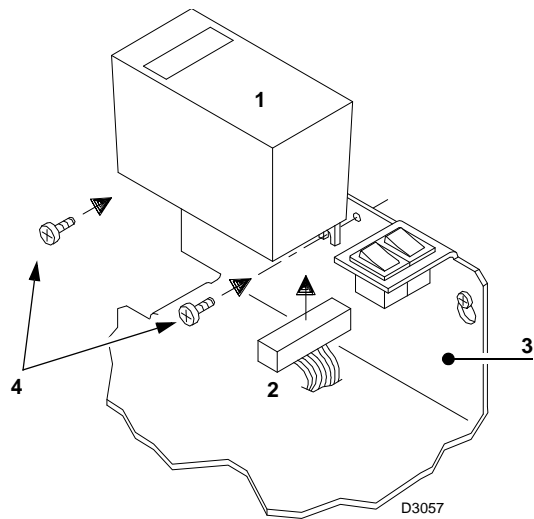
按键时间	控制盒状态
1 – 3 秒	在可视诊断前复位控制盒。
大于 3 秒	在锁定状态进行可视诊断： (Led 指示灯以 1 秒间隔闪烁)。
开始可视诊断后超过 3 秒	通过红外线与 PC 电脑连接进行软件诊断（可查看运行时间、故障等）

控制盒指示灯闪烁情况提示故障类型，如第 19 页列表所示。

指示灯	故障	可能的故障原因	排除故障建议
闪烁 2 次 ● ●	预吹扫及安全时间过后，燃烧器未产生火焰进入锁定状态	1 - 运行电磁阀 VR 通过燃气体积过小 2 - 电磁阀 VR 或 VS 未开启 3 - 燃气压力过低 4 - 点火电极调节不当 5 - 由于绝缘损坏导致电极接地 6 - 高压电缆故障 7 - 由于高温高压电缆变形 8 - 点火变压器故障 9 - 电磁阀或变压器电气连接错误 10 - 控制盒故障 11 - 燃气阀组进前手动阀门关闭 12 - 燃气管路中有空气 13 - VS 和 VR 燃气阀门未连接或有干扰线圈	增大 更换线圈或线路板 增大压力 调节，见图 (C)p. 6 更换 更换或保护 更换 检查 更换 开启 排净空气 检查连接或更换线圈
闪烁 3 次 ● ● ●	燃烧器启动前出现锁定 燃烧器启动后因锁定停机 在预吹扫阶段锁定	14 - 风压压力开关处于运行位置 由于没有足够的空气压力导致空气压力开关失效： 15 - 空气压力开关调节不当 16 - 压力开关的压力测试点处的管路堵塞 17 - 燃烧头调节不当 18 - 锅炉炉膛负压过高 19 - 电机远程控制接触器故障 20 - 电机故障 21 - 电机保护启动	调节或更换 调节或更换 清洁 调节 风压开关连接到风机进气口 更换 更换 三相连接时复位热断路器
闪烁 4 次 ● ● ● ●	燃烧器启动后锁定 燃烧器停机时锁定	22 - 虚假火焰 23 - 燃烧头处持续火焰或虚假火焰	更换控制盒 消除持久性的火焰或更换控制盒
闪烁 7 次 ● ● ● ● ● ● ●	燃烧器出现火焰后立即锁定 燃烧器在 1 段火和 2 段火之间转换时燃烧器锁定。 运行时，燃烧器在锁定时停机	24 - 运行电磁阀 VR 通过燃气体积过小 25 - 探针电极调节不当 26 - 电离不足（小于 5 μ A） 27 - 探针接地 28 - 燃烧器接地不良 29 - 零线 - 火线 接反 30 - 控制盒故障 31 - 空气过多或燃气过少 32 - 探头或电离电缆接地 33 - 风压开关故障	增大 调整，见图 (C)p. 6 检查探针位置 撤回或更换电缆 检查接地 更正 更换 调节空气及燃气 更换磨损零件 更换
闪烁 10 次 ● ● ● ● ● ● ● ● ● ●	燃烧器未启动并出现锁定 燃烧器锁定	34 - 电气连接错误 35 - 控制盒故障 36 - 存在电磁干扰	检查连接 更换 使用抗电磁干扰保护组件
无闪烁	燃烧器不启动 燃烧器不断重复启动周期，未出现锁定 脉冲点火 燃烧器不能进入 2 段火运行 风门挡板开启时燃烧器停机	37 - 电源没电 38 - 一个限制器或安全控制装置开启 39 - 控制盒保险丝熔断 40 - 控制盒锁定 41 - 没有燃气供应 42 - 主管路燃气压力不足 43 - 最小燃气压力开关断开 44 - 伺服电机未运转至 St1 位置 45 - 燃气管路中的燃气压力接近最小燃气压力开关的设定值。电磁阀开启后，压力突然下降会造成暂时性的压力开关自动开启，阀门立即关闭，导致燃烧器停机。压力恢复后，压力开关再次闭合，点火周期重复。以此类推。 46 - 燃烧头调节不当 47 - 点火电极调节不当 48 - 风门挡板调节不当：风量过大 49 - 点火阶段出力过大 50 - 远程控制装置 TR 断开 51 - 控制盒故障 52 - 伺服电机故障 53 - 伺服电机故障	闭合所有开关 - 检查所有连接 调整或更换 更换 复位控制盒 开启触发器和阀组之间的手动阀 联系燃气公司 调整或更换 更换 降低最小燃气压力开关的运行压力 更换燃气过滤器 调整，见第 7 页 调整，见图 (C)p. 6 调整 更换 调整或更换 更换 更换 更换

状态显示面板 (可选)

组装



- 1 状态显示面板
- 2 连接器
- 3 支架
- 4 安装螺栓

状态显示面板
为根据需要订购的配件
见第 2 页。

组装
燃烧器已为安装“状态显示面板”预留了位置，
安装步骤如下：
- 用连接线 2) 将“状态显示面板” 1) 安装到支
架 3) 上。
- 使用随此组件附带的螺栓 4) 将“状态显示面
板”固定在支架上。

此“状态显示面板”具有以下三个功能：

1 - 读数面板 V 可显示燃烧器运行小时数和点火次
数
总的运行小时数
按按钮“h1”。
2 段火运行小时数
按按钮“h2”。
11 段火运行小时数
总的小时数 - 2 段火运行小时数
点火次数
按按钮“count”。
复位运行小时数和点火次数
同时按下三个“reset”按钮。
运行稳定状态记录
即使出现断电情况，运行小时数和点火次数仍会
储存在面板内。

2 - 显示和点火阶段有关的次数：
led 指示灯以下列顺序亮起，见图 A：

远程控制装置 TR 闭合：
1 - 燃烧器停机，TL 断开
2 - 控制装置 TL 闭合
3 - 电机启动：
读数面板 V 开始计秒
4 - 燃烧器点火
5 - 2 段火阀通电
读数面板 V 停止计秒
6 - 第 5 阶段后 10 秒，代码 I I I I 将出现在读数面板
上：这显示启动周期结束。

控制装置 TR 开启：
1 - 燃烧器停机，TL 开启
2 - 控制装置 TL 闭合
3 - 电机启动：
读数面板 V 开始计秒
4 - 燃烧器点火
7 - 第 4 阶段后 30 秒：
读数面板 V 停止计秒
8 - 第 7 阶段后 10 秒，代码 I I I I 将出现在读数面板
上：这显示启动周期结束。

读数面板 V 上显示的次数、秒数可指示第 16 页上
所述之启动周期中不同阶段的次序。

3 - 如果燃烧器出现故障，“状态显示面板”会显
示故障发生的确切时间。

led 灯亮起，有 12 种可能性，见图 (B)。故障原因
可查阅括号中的数字：数字含义见第 19 页上图
例。

- 1 (24)
- 2 (44)
- 3 (15 ÷ 23)
- 4 (22)
- 5 (1 ÷ 13, 32 ÷ 34, 36)
- 6 (22)
- 7 (32)
- 8 (22)
- 9 (32 ÷ 34)
- 10 (32 ÷ 34)
- 11 (22)
- 12 (22)

指示信号：

- POWER = 电源显示
- (M) = 风机电机锁定 (红色)
- 燃烧器锁定 (红色)
- 2 段火运行
- 1 段火运行
- 达到负荷要求 (待机)，

led: 灯亮

A						B					
1	●				0	1	●			●	0
2	●				0	2	●			☀	0
3	●				S 1-2....	3	●				S
4	●			S....	4	●				S
5	●			S	5	●			☀	S
6	●				I I I I	6	●			☀	S
7	●			S	7	●			☀	S
8	●				I I I I	8	●			☀	S
						9	●			☀	I I I I
						10	●			☀	I I I I
						11	●			☀	I I I I
						12	●			☀	I I I I

- ☀ = Led 灯闪烁
- = Led 灯亮
- S = 按秒计时
- I I I I = 燃烧器启动周期结束

配件 (可选):

- **LPG 运行组件** : RS 50 型燃烧器安装此组件后可运行 LPG。

燃烧器	RS 50	
出力 kW	140 ÷ 581	
燃烧筒长度 mm	216	351
代码	3010083	3010084

- **减震器组件**

燃烧器	RS 50	
出力 kW	116 ÷ 580	
燃烧筒长度 mm	216	351
代码	3010200	

- **接地故障断路器** : 代码 **3010321**
- **状态显示面板** (见页 20): 代码 **3010322**
- **符合 EN 676 标准的燃气阀组 (带阀门、压力调节器和过滤器)**: 见页 8。
- **抗电磁干扰组件**

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。

燃烧器	RS 50
代码	3010386

重要： 本手册未列明之任何其它附加安全设备由安装方负责。



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