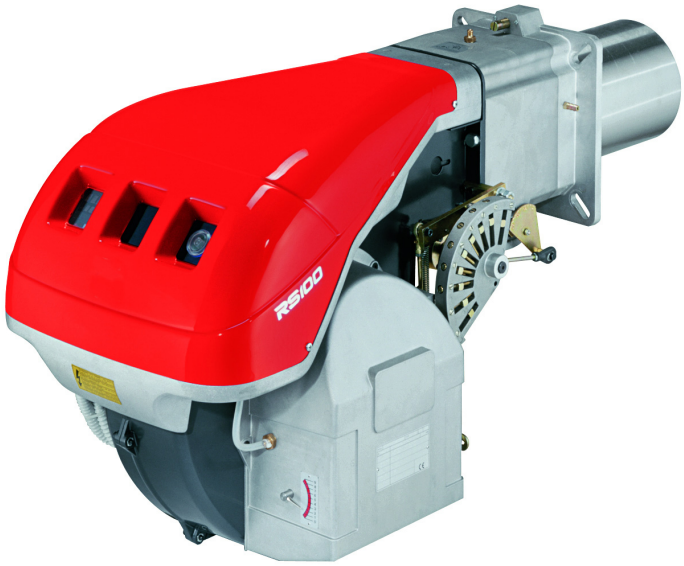
GB

Forced draught gas burner

Low-high-low or modulating operation



CODE	MODEL
C9524300 - C9524301 - C9524303	RS 70/M
C9525300 - C9525301 - C9525302	RS 100/M
C9526300 - C9526301	RS 130/M

2915993 (6) - 11/2014

CONTENTS

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.4 = part 1 of figure A, page number 4.

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 delivered to the user by the system manufacturer, with the recommendation to keep it in the room where the heat generator is to be installed.
- The instruction manual shows:
  – the serial number of the burner;

    .....

  – the address and telephone number of the nearest Assistance Centre.

    .....
    .....
    .....

- The system supplier must carefully inform the user about:
  – the use of the system;
  – any further tests that may be required before activating the system;
  – maintenance, and the need to have the system checked at least once a year by a representative of the manufacturer or another specialized technician.
  To ensure a periodic check, the manufacturer recommends the drawing up of a Maintenance Contract.

GUARANTEE AND RESPONSIBILITY

The manufacturer guarantees its new products from the installation date, in accordance with the regulations in force and/or the sales contract. At the moment of the first start-up, check that the burner is integral and complete.

Failure to observe the information given in this manual, operating negligence, incorrect installation and carrying out of non authorised modifications will result in the annulment by the manufacturer of the guarantee that it supplies with the burner.

In particular, the rights to the guarantee and the responsibility will no longer be valid, in the event of damage to things or injury to people, if such damage/injury was due to any of the following causes:

- incorrect installation, start-up, use and maintenance of the burner;
- improper, incorrect or unreasonable use of the burner;
- intervention of unqualified personnel;
- carrying out of unauthorized modifications on the equipment;
- use of the burner with safety devices that are faulty, incorrectly applied and/or not working;
- installation of untested supplementary components on the burner;
- powering of the burner with unsuitable fuels;
- faults in the fuel supply system;
- use of the burner even following an error and/or an irregularity;
- repairs and/or overhauls incorrectly carried out;
- modification of the combustion chamber with inserts that prevent the regular development of the structurally established flame;
- insufficient and inappropriate surveillance and care of those burner components most likely to be subject to wear and tear;
- the use of non-original components, including spare parts, kits, accessories and optional;
- force majeure.

The manufacturer furthermore declines any and every responsibility for the failure to observe the contents of this manual.

SAFETY AND PREVENTION

INTRODUCTION

The burners have been designed and built in compliance with current regulations and directives, applying the known technical rules of safety and envisaging all the potential danger situations.

It is necessary, however, to bear in mind that the imprudent and clumsy use of the equipment may lead to situations of death risk for the user or third parties, as well as the damaging of the burner or other items. Inattention, thoughtlessness and excessive confidence often cause accidents; the same applies to tiredness and sleepiness.

It is a good idea to remember the following:

- The burner must only be used as expressly described. Any other use should be considered improper and therefore dangerous.

In particular:

it can be applied to boilers operating with water, steam, diathermic oil, and to other uses expressly named by the manufacturer;

the type and pressure of the fuel, the voltage and frequency of the electrical power supply, the minimum and maximum deliveries for which the burner has been regulated, the pressurisation of the combustion chamber, the dimensions of the combustion chamber and the room temperature must all be within the values indicated in the instruction manual.

- Modification of the burner to alter its performance and destinations is not allowed.
- The burner must be used in exemplary technical safety conditions. Any disturbances that could compromise safety must be quickly eliminated.
- Opening or tampering with the burner components is not allowed, apart from the parts requiring maintenance.
- Only those parts envisaged by the manufacturer can be replaced.

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

PERSONNEL TRAINING

The user is the person, body or company that has acquired the machine and intends to use it for the specific purpose. He is responsible for the machine and for the training of the people working around it.

The user:

- undertakes to entrust the machine exclusively to suitably trained and qualified personnel;
- undertakes to inform his personnel in a suitable way about the application and observance of the safety instructions. With that aim, he undertakes to ensure that everyone knows the use and safety instructions for his own duties;
- Personnel must observe all the danger and caution indications shown on the machine.
- Personnel must not carry out, on their own initiative, operations or interventions that are not within their province.
- Personnel must inform their superiors of every problem or dangerous situation that may arise.
- The assembly of parts of other makes, or any modifications, can alter the characteristics of the machine and hence compromise operating safety. The manufacturer therefore declines any and every responsibility for any damage that may be caused by the use of non-original parts.

TECHNICAL DATA

Model			RS 70/M	RS 100/M	RS 130/M
Output (1)	High	MBtu/hr kW	1761 - 3084 516 - 904	2644 - 4405 775 - 1291	3521 - 5545 1032 - 1625
	Low	MBtu/hr kW	512 150	570 167	607 178
Fuel			Natural or Propane gas		
- Max. delivery		SCFH	3084	4405	5545
- Pressure at max. delivery (2)		“WC	4.06	3.66	3.20
Operation			Low - high or modulating		
Standard applications			Boilers: water, steam, thermal oil		
Ambient temperature		°F	32 - 104 (0 - 40 °C)		
Combustion air temperature		°F max	140 (60 °C)		
Noise levels (3)		dBA	75	77	78.5

(1) Reference conditions: Ambient temperature 68 °F (20 °C) - Barometric pressure 394 “WC - Altitude 329 ft a.s.l.
(2) Pressure at test point 16)(A)p.5, with zero pressure in the combustion chamber, with open gas ring 2)(B)p.9 at maximum burner output
(3) Sound pressure measured in manufacturer’s combustion laboratory, with burner operating on test boiler and at maximum rated output.

ELECTRICAL DATA

Model		RS 70/M	RS 100/M	RS 130/M
Control circuit power supply	V/Ph/Hz	120/1/60		
Main electrical supply (+/- 10%)	V/Ph/Hz	208-230/3/60		
Fan motor IE2/EPACT	rpm W - HP V A	3475 1100 - 1.5 208-230 4	3500 2200 - 3 208-230 7.8	3500 2200 - 3 208-230 7.8
Ignition transformer	V1 - V2 I1 - I2	120 V - 1 X 8 kV 1.6 A - 20 mA		
Electrical power consumption	W max	1350	2600	2600
Electrical control circuit consumption	W	750		
Total electrical consumption	W	2100	3350	3350
Electrical protection		NEMA 1		

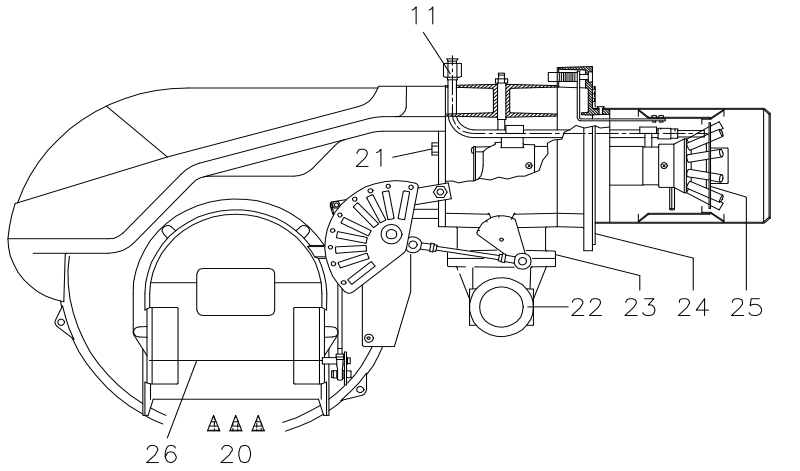
Model		RS 70/M	RS 100/M	RS 130/M
Control circuit power supply	V/Ph/Hz	120/1/60		
Main electrical supply (+/- 10%)	V/Ph/Hz	460/3/60		
Fan motor IE2/EPACT	rpm W - HP V A	3475 1100 - 1.5 460 2	3500 2200 - 3 460 3.9	3500 2200 - 3 460 3.9
Ignition transformer	V1 - V2 I1 - I2	120 V - 1 X 8 kV 1.6 A - 20 mA		
Electrical power consumption	W max	1350	2600	2600
Electrical control circuit coms.	W	750		
Total electrical consumption	W	2100	3350	3350
Electrical protection		NEMA 1		

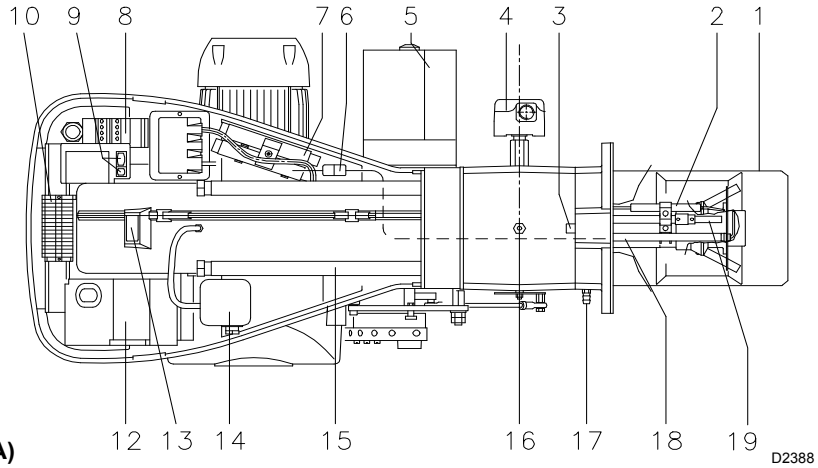
Model		RS 70/M	RS 100/M	RS 130/M
Control circuit power supply	V/Ph/Hz	120/1/60		
Main electrical supply (+/- 10%)	V/Ph/Hz	575/3/60		
Fan motor IE2/EPACT	rpm W - HP V A	3475 1100 - 1.5 575 1.6	3500 2200 - 3 575 3.1	3500 2200 - 3 575 3.1
Ignition transformer	V1 - V2 I1 - I2	120 V - 1 X 8 kV 1.6 A - 20 mA		
Electrical power consumption	W max	1350	2600	2600
Electrical control circuit consumption	W	750		
Total electrical consumption	W	2100	3350	3350
Electrical protection		NEMA 1		

Model		RS 70/M	RS 100/M
Control circuit power supply	V/Ph/Hz	120/1/60	
Main electrical supply (+/- 10%)	V/Ph/Hz	208-220/1/60	
Fan motor	rpm W - HP V A	3400 1100 - 1.5 208-220 7	3450 1800 - 2.4 208-220 11.5
Motor capacitor	μF	50	70
Ignition transformer	V1 - V2 I1 - I2	120 V - 1 X 8 kV 1.6 A - 20 mA	
Electrical power consumption	W max	1540	2530
Electrical control circuit consumption	W	750	
Total electrical consumption	W	2290	3280
Electrical protection		NEMA 1	

BURNER MODELS DESIGNATIONS

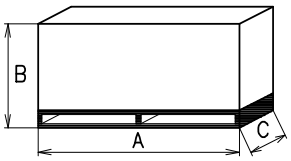
Model	Code	Code RBNA	Voltage	Flame safeguard
RS 70/M	3787070 3787075 20094620	C9524300 C9524301 C9524303	208-230/460/3/60 575/3/60 208-220/1/60	Burner mounted Burner mounted Burner mounted
RS 100/M	3787270 3787275 20094623	C9525300 C9525301 C9525302	208-230/460/3/60 575/3/60 208-220/1/60	Burner mounted Burner mounted Burner mounted
RS 130/M	3787470 3787475	C9526300 C9526301	208-230/460/3/60 575/3/60	Burner mounted Burner mounted



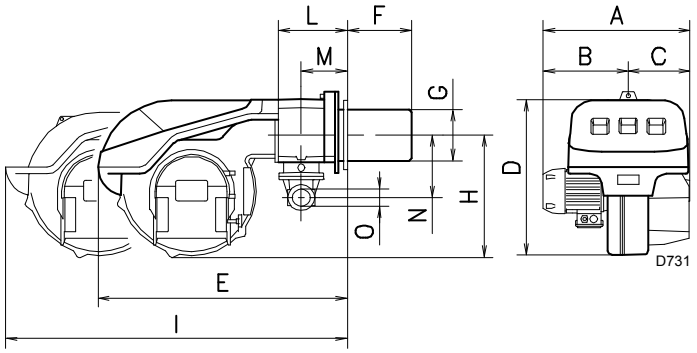


(A)

inch	A (1)	B	C	lbs
RS 70/M	46 27/32“ - 52 5/32“	29 1/8“	27 1/4“	154
RS 100/M	46 27/32“ - 52 5/32“	29 1/8“	27 1/4“	161
RS 130/M	46 27/32“ - 52 5/32“	29 1/8“	27 1/4“	168



(B)



(C)

BURNER DESCRIPTION (A)

1 Combustion head
2 Ignition electrode
3 Screw for combustion head adjustment
4 High gas pressure switch
5 Servomotor controlling the gas butterfly valve and the air damper (by means of a variable profile cam mechanism).
When the burner is stopped the air damper will be completely closed to reduce heat loss
6 Plug-socket on flame rod cable
7 Extensions for slide bars 15) (supplied by kit)
8 Motor contactor and thermal overload with reset button
9 Power switch for different operations:
automatic - manual - off
Button for:
power increase - power reduction
10 Terminal strip for electrical connection
11 Pilot burner attachment
12 Flame safeguard with lock-out pilot light and lock-out reset button
13 Flame inspection window
14 Low air pressure switch
(differential operating type)
15 Slide bars for opening the burner and inspecting the combustion head
16 Gas pressure test point and head fixing screw
17 Air pressure test point
18 Flame sensor probe (flame rod)
19 Pilot burner
20 Air inlet to fan
21 Screws securing fan to sleeve
22 Gas input pipework
23 Gas butterfly valve
24 Boiler mounting flange
25 Flame stability disk
26 Air damper

Two types of burner failure may occur:
- **FLAME SAFEGUARD LOCK-OUT:**
if the flame relay 12)(A) pushbutton lights up, it indicates that the burner is in lock-out.
To reset, press the pushbutton.
- **MOTOR TRIP:**
release by pressing the pushbutton on thermal overload 8)(A).

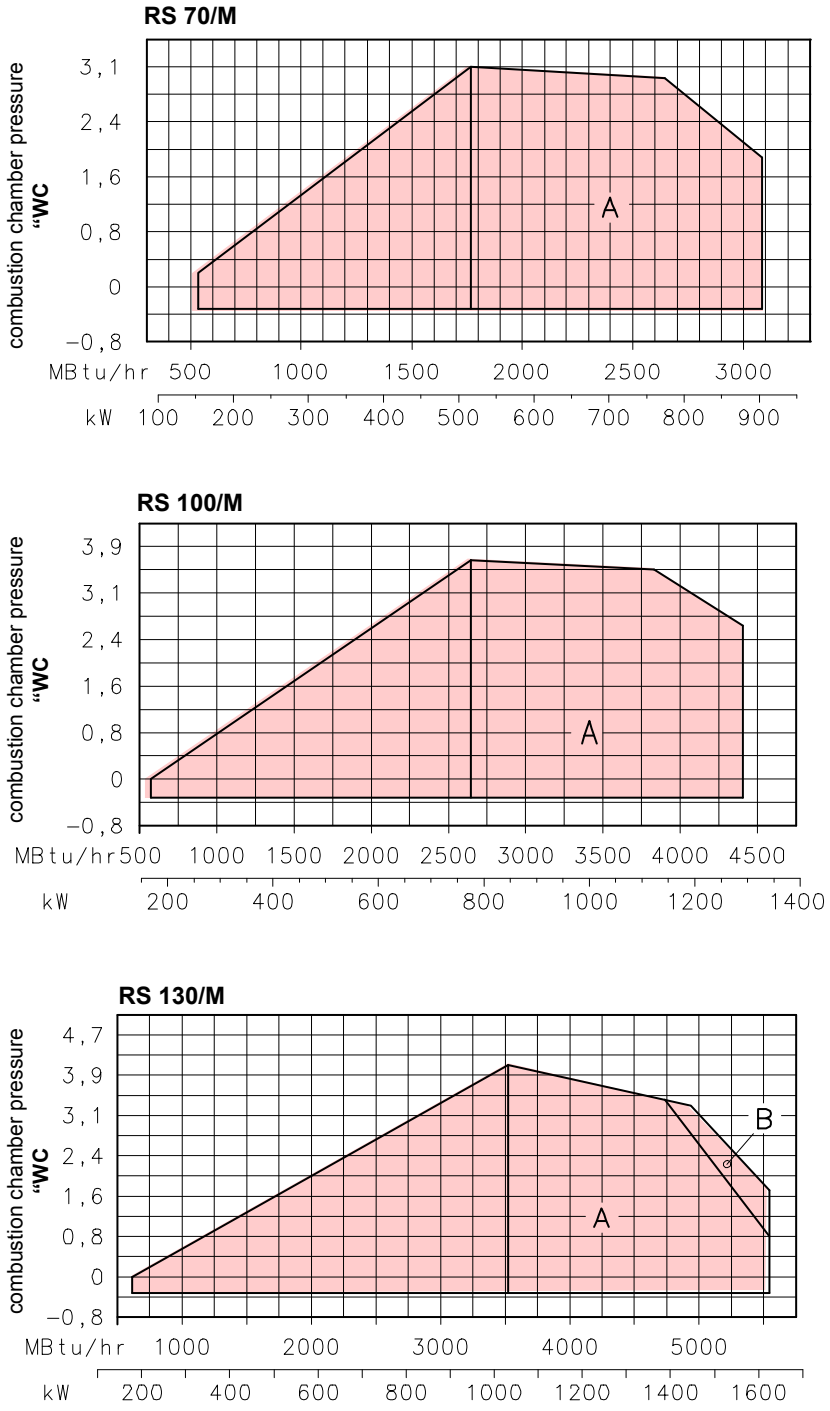
PACKAGING - WEIGHT (B) - Approximate measurements
- The burners are shipped skid mounted.
Outer dimensions of packaging are indicated in (B).
- The weight of the burner complete with packaging is indicated in Table (B).

MAX. DIMENSIONS (C) - Approximate measurements
The maximum dimensions of the burners are given in (C).
Bear in mind that inspection of the combustion head requires the burner to be opened by withdrawing the rear part on the slide bars.
The maximum dimension of the burner, when open, is give by measurement I.

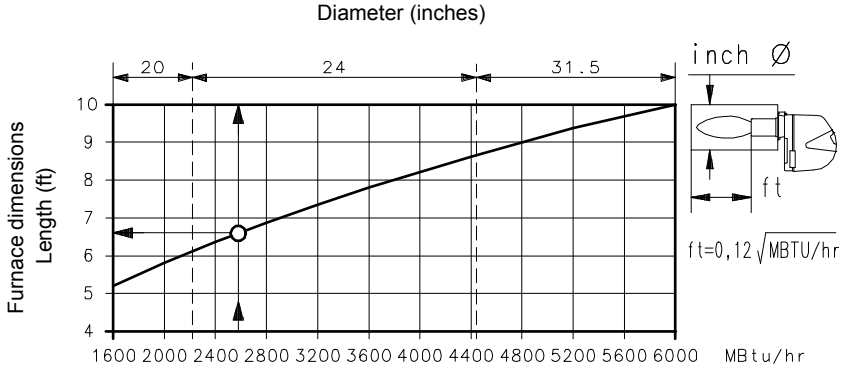
STANDARD EQUIPMENT
1 - Gas train flange
1 - Flange gasket
4 - Flange fixing screws 3/8 W x 1”
1 - Burner head gasket
2 - Extensions 7)(A) for slide bars 15)(A)
(for kit)
4 - Screws to secure the burner flange to the boiler:
1/2 W
1 - Instruction booklet
1 - Spare parts list

inch	A	B	C	D	E	F (1)	G	H	I (1)	L	M	N	O
RS 70/M	20 1/8“	11 21/32“	8 15/32“	21 27/32“	33 1/16“	9 27/32“ - 15 5/32“	7 1/32“	16 29/32“	45 11/16“ - 51 1/32“	8 13/32“	5 9/32“	8 11/16“	2”
RS 100/M	20 3/4“	12 9/32“	8 15/32“	21 27/32“	33 1/16“	9 27/32“ - 15 5/32“	7 1/32“	16 29/32“	45 11/16“ - 51 1/32“	8 13/32“	5 9/32“	8 11/16“	2”
RS 130/M	21 25/32“	13 5/16“	8 15/32“	21 27/32“	33 1/16“	11 1/32“ - 16 11/32“	7 3/32“	16 29/32“	45 11/16“ - 51 1/32“	8 13/32“	5 9/32“	8 11/16“	2”

(1) Blast tube: short - long (obtainable with kit)



(A) D2389



(B) D2919

FIRING RATES (A)

During operation, burner output varies between:

- **MAXIMUM OUTPUT**, selected within area A,
- and **MINIMUM OUTPUT**, which must not be lower than the minimum limit in the diagram.

RS 70/M = 512 MBtu/hr
RS 100/M = 568 MBtu/hr
RS 130/M = 607 MBtu/hr

Note

In order to utilize also area B (RS 130/M) it is necessary to perform the calibration of the combustion head as explained on page 8.

Important

The FIRING RATE area values have been obtained considering an ambient temperature of 68 °F (20 °C), and an atmospheric pressure of 394 “WC and with the combustion head adjusted as shown on page 9.

Note:

The FIRING RATE areas given in figure (A) have been reduced by 10% with respect to the maximum range that can be reached.

Consult Procedure on page 16 to refer burner operating condition in high altitude plants.

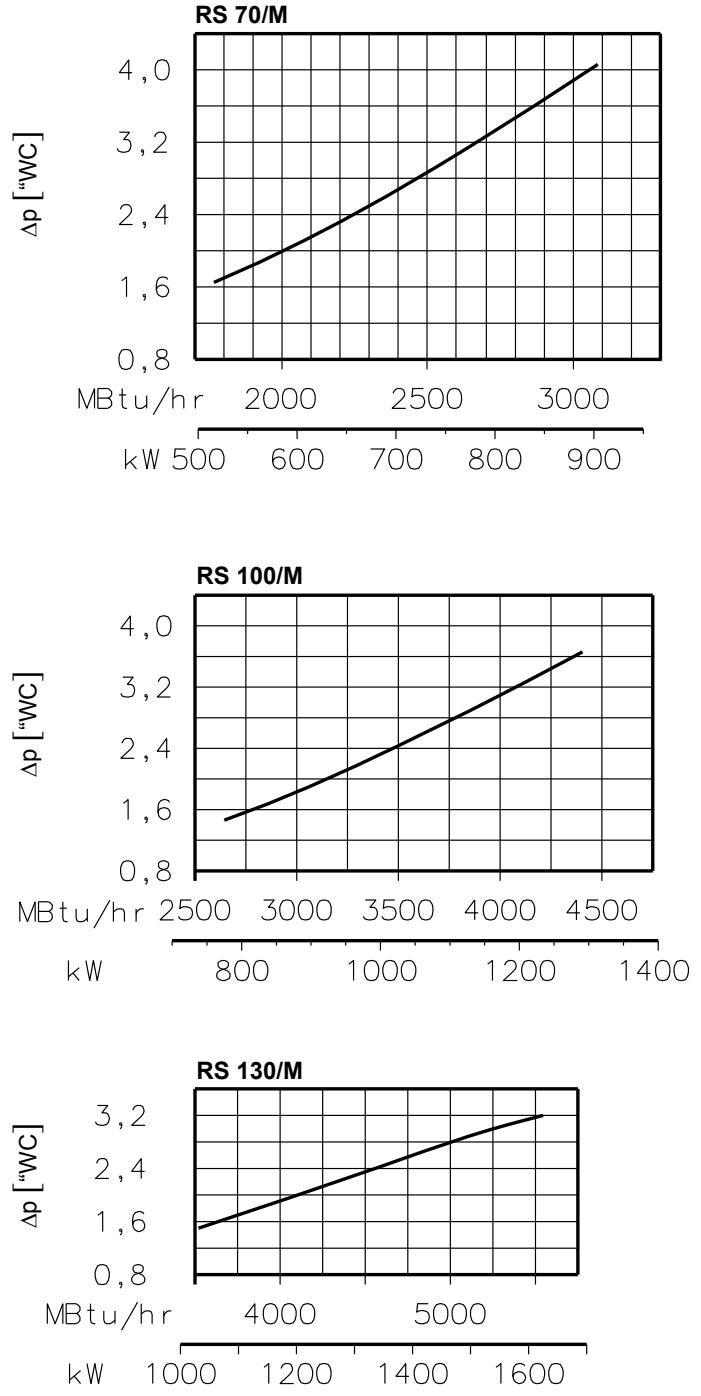
MINIMUM FURNACE DIMENSIONS (B)

The firing rates were set in relation to certified test boilers.

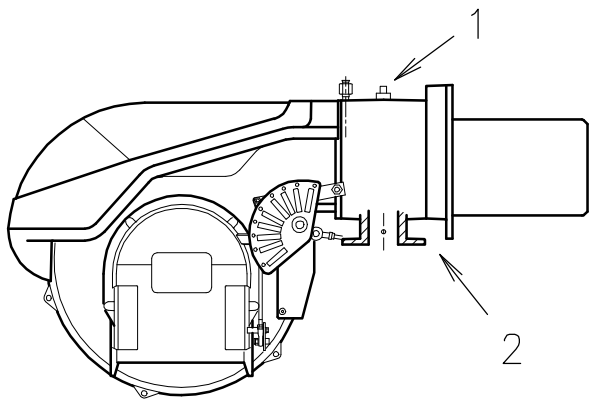
Figure (B) indicates the diameter and length of the test combustion chamber.

Example:

Output 2579 MBtu/hr:
diameter = 24 inch; length 6.6 ft



(A) D3123



(B) D2390

GAS PRESSURE

The adjacent diagrams are used to calculate manifold pressure taking into account combustion chamber pressure.

Diagrams (A)

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

- Combustion chamber at 0 "WC
- Burner operating at maximum output
- Gas ring 2)(B)p.9 adjusted as indicated in diagram (C)p.9.

Calculate the approximate maximum output of the burner as follows:

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

Example - RS 100/M:

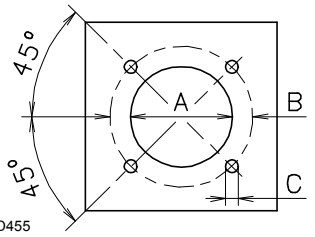
- Maximum output operation
- Natural gas
- Gas ring 2)(B)p.9 adjust as indicated in diagram (C)p.9
- Gas pressure at test point 1)(B) = 3.15 "WC
- Pressure in combustion chamber = 1.18 "WC

3.15 - 1.18 = 1.97 "WC

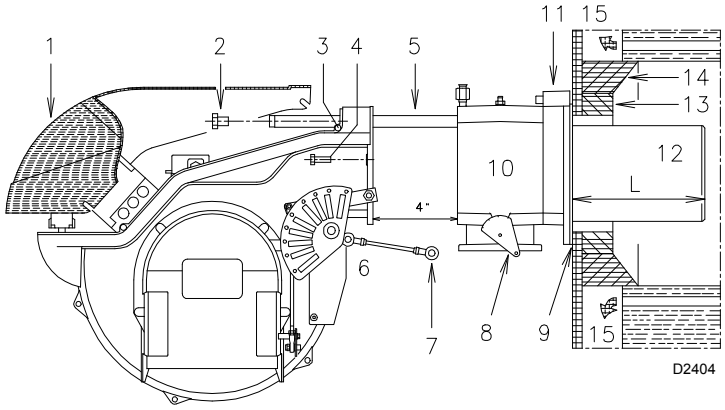
A maximum output of 2815 MBtu/hr shown diagram RS 100/M corresponds to 1.97 "WC pressure.

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

inch	A	B	C
RS 70/M	7 9/32“	10 13/16“ - 12 25/32“	1/2 W
RS 100/M	7 9/32“	10 13/16“ - 12 25/32“	1/2 W
RS 130/M	7 21/32“	10 13/16“ - 12 25/32“	1/2 W



(A)



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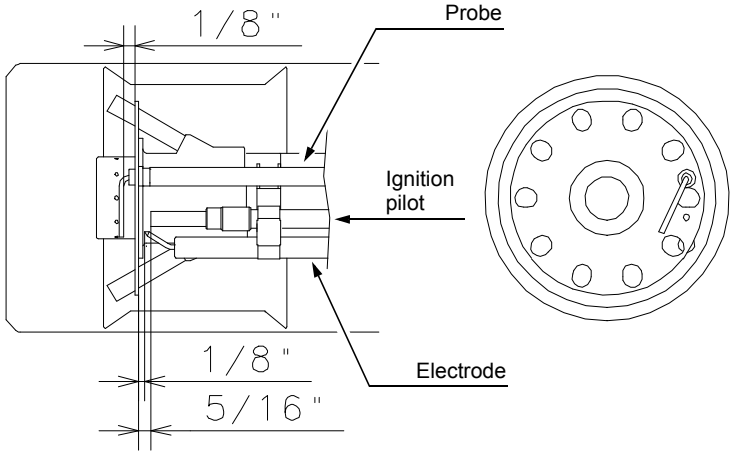
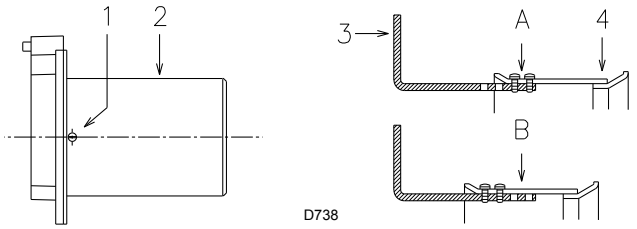
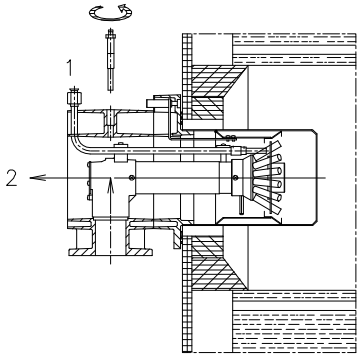


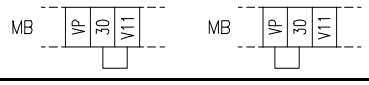
(C)



(D)



(E)



(F)

INSTALLATION

BOILER PLATE (A)

Drill the combustion chamber mounting plate as shown in (A). The position of the threaded holes can be marked using the burner head gasket 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, it must be greater than the thickness of the boiler door complete with its insulation. The length available, L (inches), is as follows:

Blast tube 12)	RS 70/M	RS 100/M	RS 130/M
• short	9 27/32“	9 27/32“	11 1/32“
• long (with kit)	15 5/32“	15 5/32“	16 11/32“

For boilers with front flue passes 15) or flame inversion chambers, protective insulation material 13), must be inserted between the boiler refractory 14) and the blast tube 12).
This protective insulation must not compromise the extraction of the blast tube.
For boilers having a water-cooled front, the insulation 13)-14) is not required unless it is required 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 (flame rod) is correctly set in position, as shown in (C).

Now detach the combustion head from the burner, fig. (B):
- loosen the four screws 3) and remove the cover 1);
- disengage the swivel joint 7) from the graduated sector 8);
- remove the screws 2) from the slide bars 5);
- remove the two screws 4) and pull the burner back on slide bars 5) by about 4”;
- disconnect the wires from the flame rod and the electrode and then pull the burner completely off the slide bars.

COMBUSTION HEAD CALIBRATION

At this point check, for model RS 130/M, whether the maximum delivery of the burner at high fire operation is contained in area A or in area B of the firing rate. See page 6.
If it is in area A then no operation is required.
If, on the other hand, it is in area B:
- unscrew the screws 1)(D) and disassemble the blast tube 2);
- move the fixing of the rod 3)(D) from position A to position B, thereby causing the shutter 4) to retract;
- now refit the blast tube 2)(D) and the screws 1).

Once this operation has been carried out (if it was required), secure the flange 11)(B) to the boiler plate, inserting the gasket 9)(B). 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.

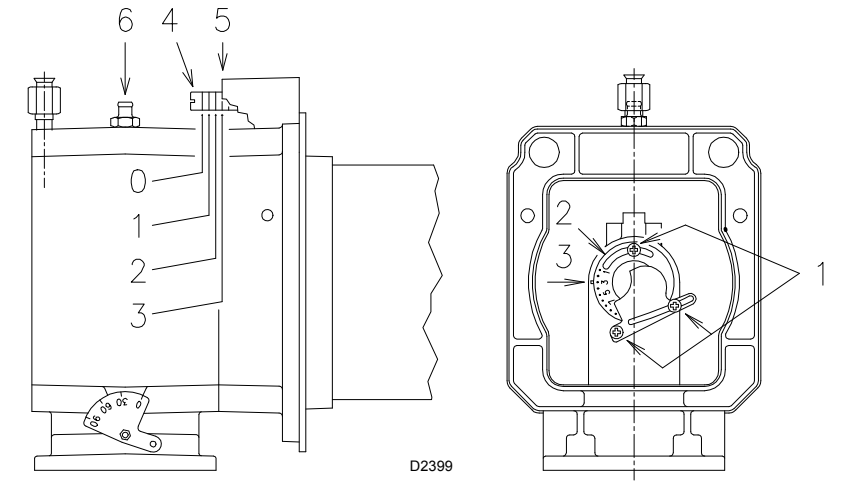
If you noticed any irregularities in the positions of the flame rod or ignition electrode during the check mentioned above, remove screw 1)(E), extract the internal part 2)(E) of the head and set up the two components correctly.

IGNITION PILOT ADJUSTMENT

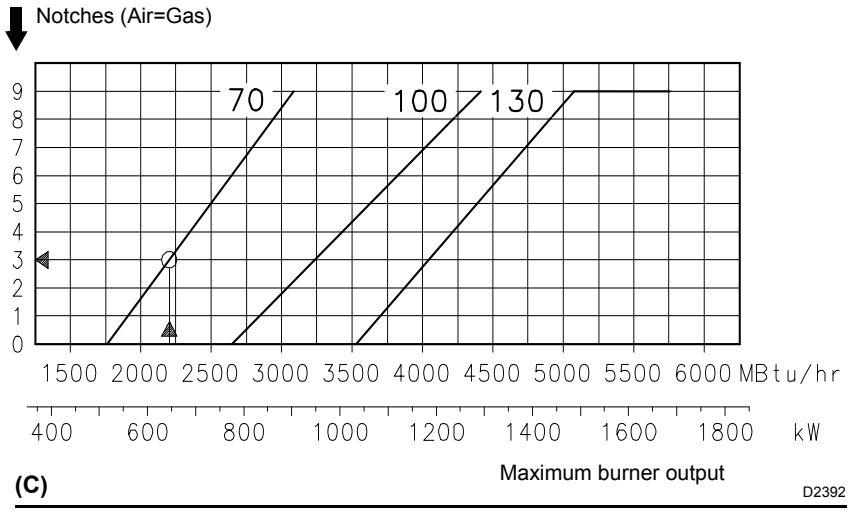
Place the pilot and electrode as shown in fig. (C).
The pilot works correctly at pressures ranging from 5 - 12” WC.

Important

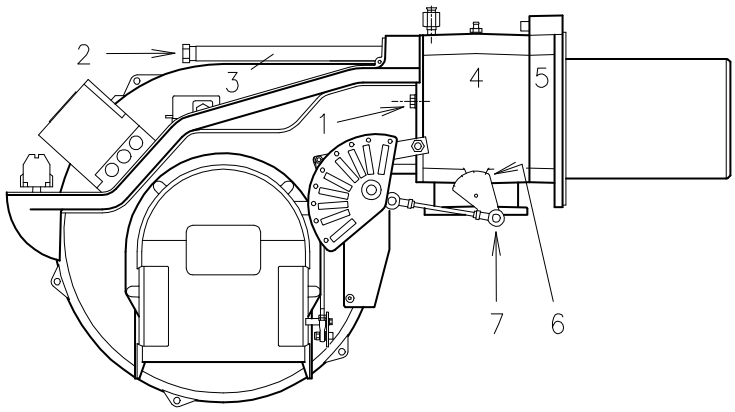
To set the pilot without main burner operaton, proceed as follows:
- Move the jumper from terminals "**30-V11**" to terminals "**30-VP**", as given in fig. (F), this way the main valve is cut out.
- With the burner in the manual position, hold the air damper in the minimum position and make the setting.
- When the setting is correct, replace the jumper on “**30-V11**”.



(A) **(B)**



(C)



(D)

COMBUSTION HEAD SETTING

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 MAX output developed by the burner.
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 the 3 screws 1)(B) and turn ring 2) until the notch identified is aligned with index 3).
Tighten the 3 screws 1) fully down.

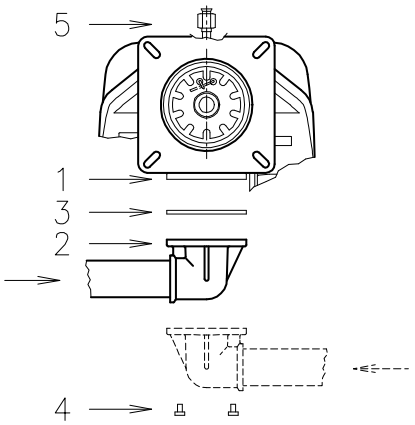
Example RS 70/M
MAX output = 2200 MBtu/hr.
If we consult diagram (C) we find that for this output, air must be adjusted using notch 3, as shown in figs. (A) and (B).

Note
Diagram (C) shows the ideal settings for the ring 2)(B). If the gas main pressure is too low to reach the maximum output operation pressure indicated on page 7, 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 7 indicates that for burner RS 70/M with output of 2200 MBtu/hr a pressure of approximately 2.36 “WC is necessary at test point 6)(A). If the 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.

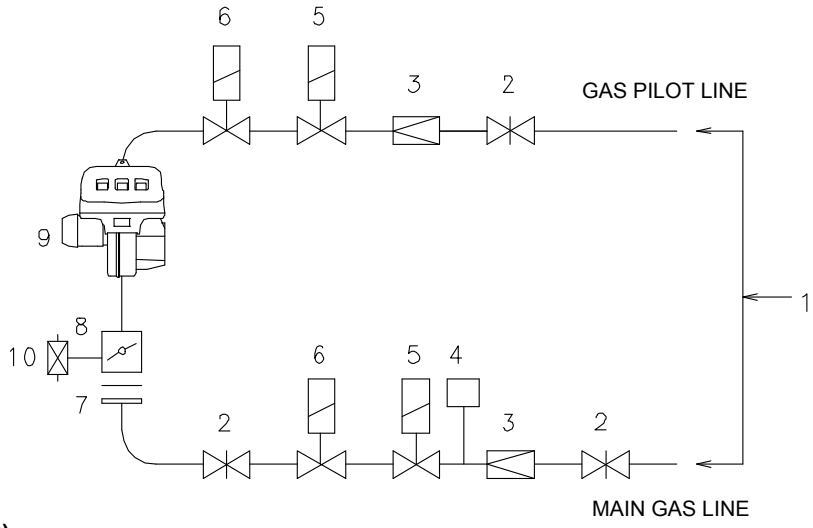
Once you have finished setting up the head, refit the burner to the slide bars 3)(D) at approximately 4” from the sleeve 4)(D) - burner positioned as shown in fig. (B)p.8 - insert the flame rod cable and the ignition electrode cable and then slide the burner up to the sleeve so that it is positioned as shown in fig. (D).
Refit screws 2) on slide bars 3).
Secure the burner to the sleeve by tightening screw 1).
Reconnect the swivel joint 7) to the graduated sector 6).
Connect gas train and pilot train as shown in fig. (A) page 10.

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) D2393

TYPICAL UL SCHEMATIC GAS PIPING



(B) D2438

GAS PIPING

- The main 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).
- The gas safety shut-off valves 5)-6)(A) must be as close as possible to the burner to ensure gas reaches the combustion head within the safety time range.
- The pilot gas train must be connected to the gas attachment 5)(A) and can enter the burner from the right or left side.

GAS TRAIN (B)

It must be type-approved according to required standards and is supplied separately from the burner.

Note

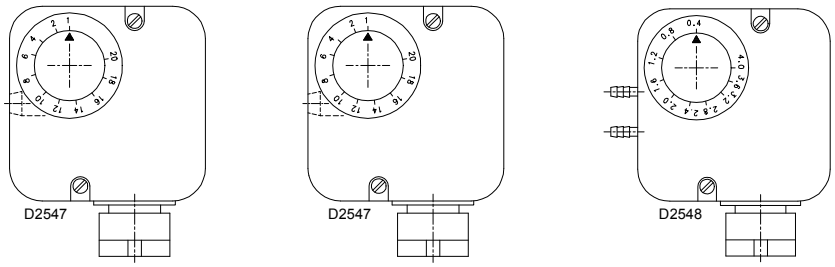
See the accompanying instructions for the adjustment of the gas train.

KEY (A)

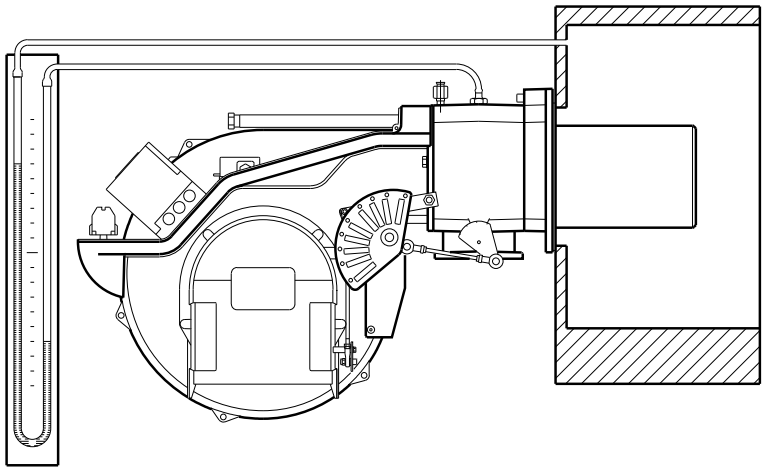
1 - Gas input pipe
2 - Manual valve
3 - Pressure regulator
4 - Low gas pressure switch
5 - 1st safety shut off valve
6 - 2nd safety shut off valve
7 - Standard issue burner with flange gasket
8 - Gas adjustment butterfly valve *
9 - Burner
10 - High gas pressure switch *

* On the burner

LOW GAS PRESSURE SWITCH HIGH GAS PRESSURE SWITCH AIR PRESSURE SWITCH



(A) **(B)** **(C)**



(D) D2401

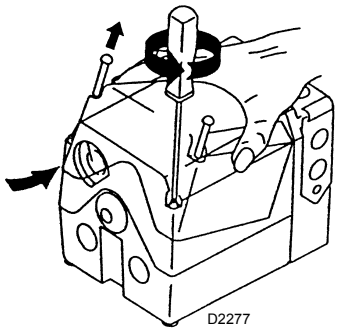
ADJUSTMENTS BEFORE FIRST FIRING

Adjustment of the combustion head, and air and gas deliveries has been illustrated on page 9.

In addition, the following adjustments must also be made:

- Open manual valves up-stream from the gas train.
- Adjust the low gas pressure switch to the start of the scale (A).
- Adjust the high gas pressure switch to the end of the scale (B).
- Adjust the air pressure switch to the zero position of the scale (C).
- Purge the air from the gas line.
  Fit a U-type manometer (D) to the gas pressure test point on the sleeve.
  The manometer readings are used to calculate the MAX. burner power using the diagrams on page 7.

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.



(A)

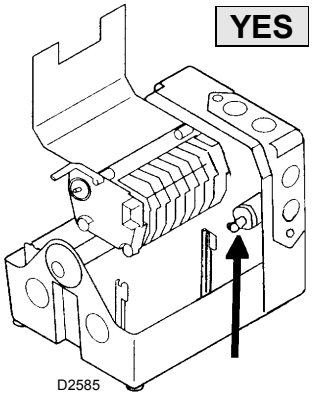
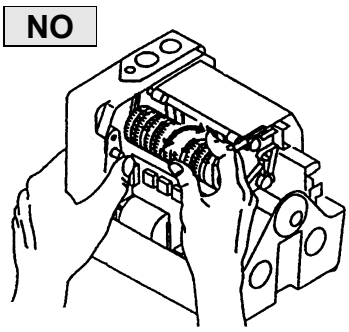
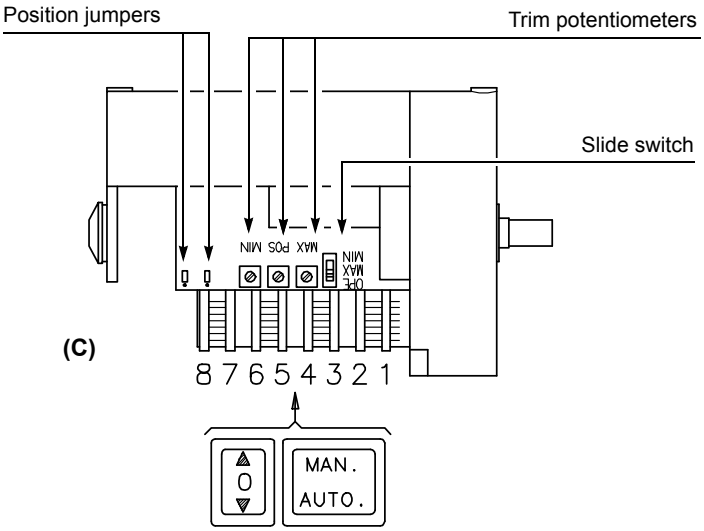


Figure above shows how the servomotor is released to manually check there is no binding though its motion.

(B)



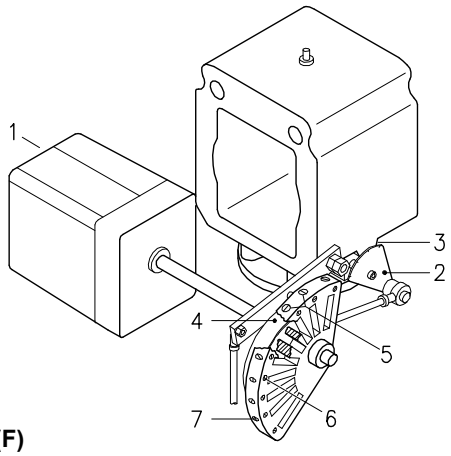
Don't release the button indicated in this figure: the syncronization of the cams made in factory would be changed.



(C)

(D) (E)

D2593



(F)

1 Servomotor
2 Graduated sector for gas butterfly valve
3 Index for graduated sector 2
4 Adjustable profile cam
5 Adjustment screws for cam starting profile
6 Adjustment fixing screws
7 Adjustment screws for cam and profile

D2594

SERVOMOTOR

The servomotor gives simultaneous regulation of the air damper through the variable cam profile 4)(F) and the gas butterfly valve.
It rotates by 130° in approx. 35 s.
The factory settings must not be changed for the first firing, just check that they comply with the details below.
To open the servomotor, remove the screws and pull the cover outward, fig. (A).

CAMS AND TRIM POTENTIOMETERS FUNCTIONS

Cam 1: 130°
Limits rotation towards maximum for gas.

Cam 2: 0°
Limits rotation towards minimum, air damper closed on stand by.

Cam 3: 20°
Limits gas ignition position.

Cams 4 - 5 - 6 - 7 - 8: not used

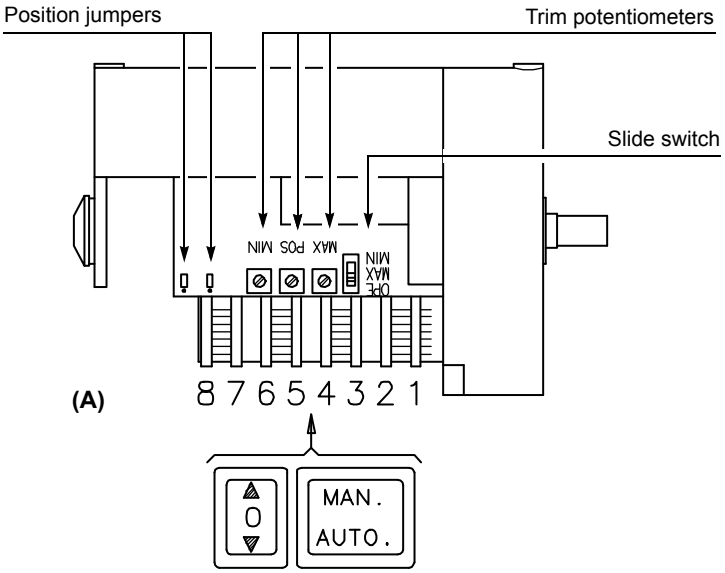
Trim potentiometer MAX
Limits maximum modulation.
It must be set near the stroke end (cam 1) to exploit as far as possible the variable profile cam and maximum opening of the gas butterfly valve.

Trim potentiometer MIN
Limits minimum modulation.
It must be set near the stroke end (cam 2) to exploit as far as possible the variable profile cam.

Trim potentiometer POS
Limits an intermediate operating position between MAX and MIN, supplying power to the "P" terminal in the servomotor (through an external command). This function cuts out any external signals.

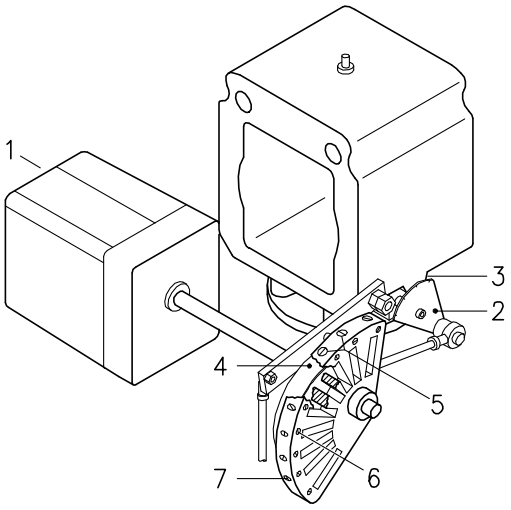
Note
Using the slide switch to select MAX or MIN, the servomotor goes into the position for the respective settings of the MAX and MIN TRIM POTENTIOMETERS.

When the settings are complete, place the slide switch on OPE.



(A) (B) (C)

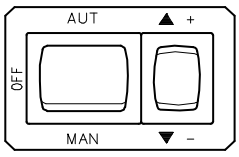
D2593



1 Servomotor
2 Graduated sector for gas butterfly valve
3 Index for graduated sector 2
4 Adjustable profile cam
5 Adjustment screws for cam starting profile
6 Adjustment fixing screws
7 Adjustment screws for cam and profile

(D)

D2594



D791

(E)

BURNER STARTING

Close the control circuit, with the switch in fig. C) in the AUTO position.
On firing (pilot burner and main valve) turn the switch (C) to MAN and the switch 1)(E) in the AUT position.

MAXIMUM OUTPUT

Using button (B), "increase output" until it stops, app. 130° (cam 1).
Place the slide switch on MAX and set the relative MAX trim potentiometer (setting must be very near to 130°) to exploit as far as possible the variable profile cam 4)(D) and have the gas butterfly valve on maximum opening, graduated sector 2) on index 3) fig. (D).
The setting of the gas flow must be made on the gas train regulator and, if necessary, on the gas valve.
The air setting must be made on the variable profile cam 4)(D) by turning the screws 5), after loosening the screws 6).

MINIMUM OUTPUT

With the slide switch on the OPE position, use button (B) "decrease output" until it stops at app. 20° (cam 3).
Put the slide switch in the MIN position and set the modulation minimum using the relative MIN trim potentiometer.
Set the air using the variable profile cam 4)(D).
If a lower modulation minimum is required than the level set on cam 3 of the servomotor (20°), decrease the cam setting.

INTERMEDIATE OUTPUTS

With the switch (C) in the AUTO position, the slide switch in the OPE position and the switch 1)(E) in the MAN position, move the button 2)(E) in various intermediate levels between maximum and minimum and set the variable profile cam 4)(D) to achieve optimum combustion, by turning the screws 5).

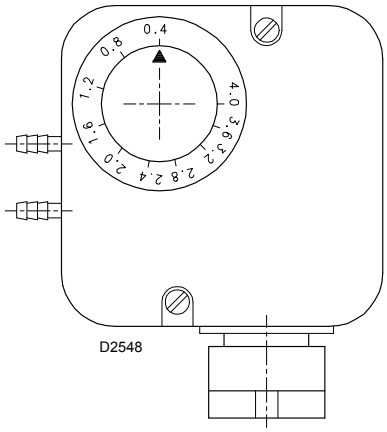
If possible, do not change the previously set maximum and minimum levels.
Check the various setting levels with a combustion analysis.

Important

Make a progressive adjustment of the profile, without sharp changes.
When the setting is complete, lock the cam profile using screws 6)(D).
Turn the burner off, release the servomotor as shown in fig. (B) page 12 and manually turn cam 4)(D) to check there is no binding.

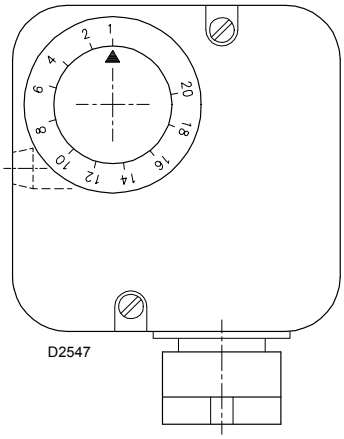
Finally fix the adjustment by turning the screws 6)(D).

AIR PRESSURE SWITCH



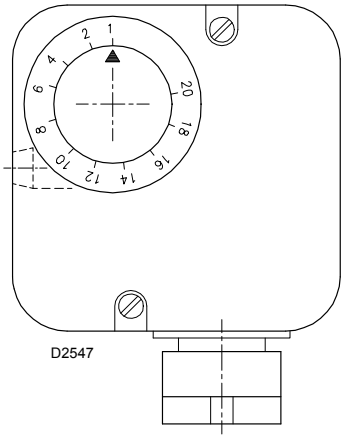
(A)

HIGH GAS PRESSURE SWITCH

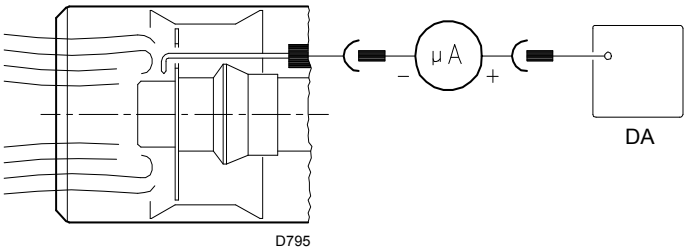


(B)

LOW GAS PRESSURE SWITCH



(C)



(D)

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 at min. output, increase adjustment pressure by slowly turning the relative dial clockwise until the burner locks out.
Then turn the dial 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 dial anti-clockwise a little bit more.

Attention:
As a rule, the air pressure switch must prevent the formation of CO.
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 400 ppm.

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.

HIGH GAS PRESSURE SWITCH (B)

Adjust the high gas pressure switch after having performed all other burner adjustments with the maximum gas pressure switch set to the end of the scale (B).
With the burner operating at MAX output, reduce the adjustment pressure by slowly turning the adjustment dial anticlockwise until the burner locks out.
Then turn the dial clockwise by 0.8” WC and repeat burner firing.
If the burner locks out again, turn the dial again clockwise by 0.4” WC.

LOW GAS PRESSURE SWITCH (C)

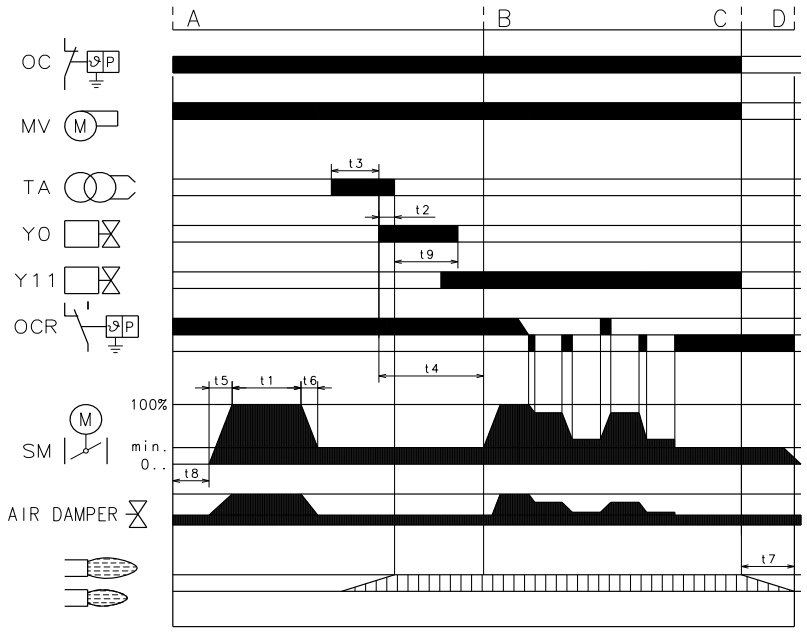
Adjust the low gas pressure switch after having performed all the other burner adjustments with the pressure switch set at the start of the scale (C).
With the burner operating at MAX output, increase adjustment pressure by slowly turning the relative dial clockwise until the burner locks out.
Then turn the dial anti-clockwise by 0.8” WC and repeat burner starting to ensure it is uniform.
If the burner locks out again, turn the dial anti-clockwise again by 0.4” WC.

FLAME PRESENT CHECK (D)

The burner is fitted with an ionisation (flame rod) system which ensures that a flame is present. The minimum current for reliable operation is 6 µA (see manufacturers documentation). 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 6)(A)p.5 on the ionisation probe cable and insert a direct current microamperometer with a base scale of 100 µA. Carefully check polarities.

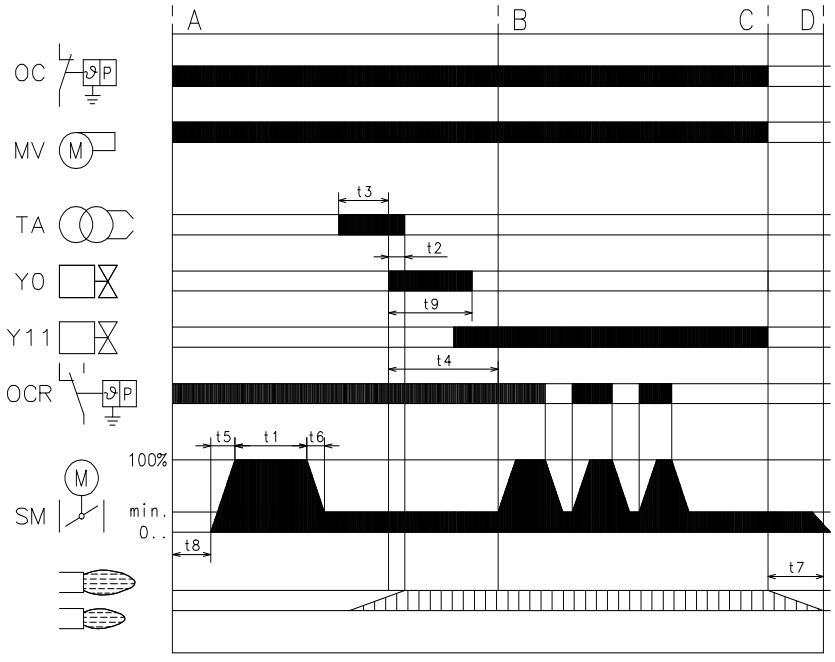
LFL 1.335 Series 01

Full Modulation



(A) D2273

Low - High



(B) D2274

BURNER OPERATION

BURNER STARTING

- Load control close.
  Fan motor starts.
- Servomotor starts:
  130° rotation to right, until contact is made on cam 1)(A) page 13.
  The air damper is positioned to MAX. output.
- Pre-purge stage with air delivery at MAX. output.
- After pre-purge stage, servomotor rotates to left up to the angle set on cam 3)(A) page 13 for MIN. output.
- The air damper and the gas butterfly are positioned to MIN. output.
- Ignition electrode strikes a spark.
- Pilot valve opens. The pilot flame is ignited.
- After about 12 s the main flame ignites and starting cycle ends.

STEADY STATE OPERATION

At the end of the starting cycle, the servomotor control then passes to the load control for boiler pressure or temperature.
(The LFL control box continues, however, to check that the flame is present and that the air pressure switch is in the correct position.)

- If the temperature or pressure is low, the burner progressively increases its output to the MAX. value.
- If the temperature or pressure is high, the burner progressively decreases its output to the MIN. value.
  And so on.
- The burner locks out when demand for heat is less than the heat supplied by the burner at min. output.
  Load control opens. The servomotor returns to the 0° angle limited by contact with cam 2. The air damper closes completely to reduce thermal dispersion to a minimum.

Every time output is changed, the servomotor automatically modifies gas delivery (gas butterfly valve) and air delivery (fan air damper).

Switching times are given in seconds, in the burner startup sequence.

LFL 1.335 Series 01

t1	30	**t6**	optional
t2	2	**t7**	12
t3	4	**t8**	4
t4	20	**t9**	16
t5	optional		

Legend for the times

t1 Pre-purge time with air damper open
t2 Safety time
t3 Pre-ignition time, short (ignition transformer on terminal 16)
t4 Interval between start of t2 and release of valve at terminal 19
t5 Interval between end of t4 and release of load controller or valve at terminal 20
t5 Running time of air damper into OPEN position
t6 Running time of air damper into low-flame position (MIN)
t7 Permissible after-burn time
t8 Interval until OPEN command for the air damper is given
t9 Running time of pilot

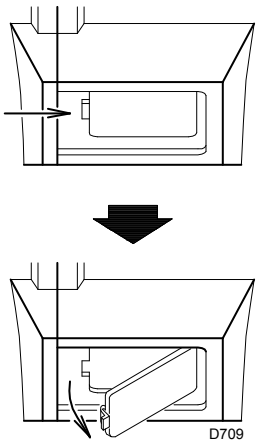
FIRING FAILURE

If the burner does not fire, it locks out within 2.5 seconds from opening the pilot valve and then within 5 seconds from opening the main valves.

BURNER FLAME GOES OUT DURING OPERATION

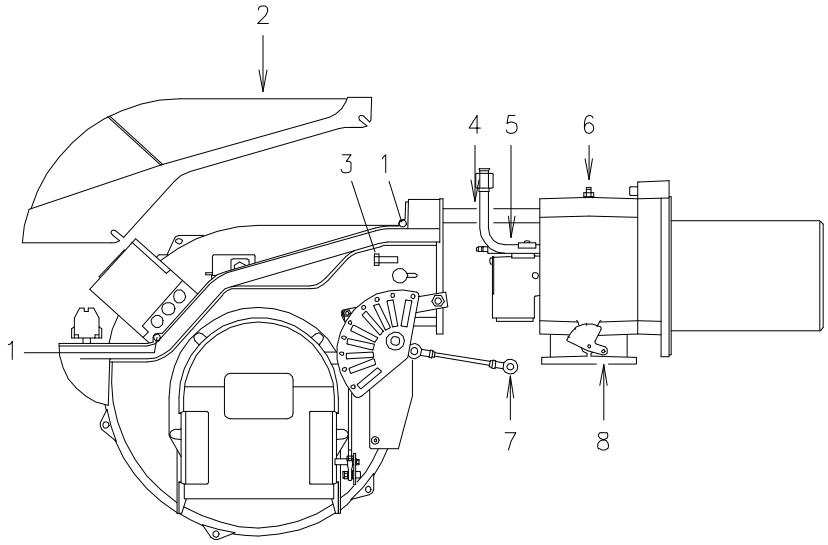
If the flame should accidentally go out during operation, the burner will lock out within 1s.

FLAME INSPECTION WINDOW



(A)

OPENING THE BURNER



(B) D2402

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.

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 5)(B).

Servomotor
Disengage the cam 4)(D)p. 13 from the servomotor and turn it backwards and forwards by hand to make sure it moves freely.

Burner
Check for excess wear or loose screws in the mechanisms controlling the air damper and the gas butterfly valve. Also make sure that the screws securing the electrical leads in the burner terminal strip are fully tightened.
Clean the outside of the burner, taking special care with the swivel joints and cam.

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

TO OPEN THE BURNER (B):
- Switch off the electrical power.
- Loosen screws 1) and withdraw cover 2).
- Disengage the swivel joint 7) from the graduated sector 8).
- Fit the two extensions onto the slide bars 4).
- Remove screws 3), and pull the burner back by about 4” on the slide bars 4). Disconnect the probe and electrode leads and then pull the burner fully back.

Now extract the gas distributor 5) after having removed the screw 6) and disconnecting the pilot gas line.

TO CLOSE THE BURNER (B):
- Push the burner until it is about 4” from the sleeve.
- Re-connect the leads and slide in the burner until it comes to a stop.
- Refit screws 3), and pull the probe and electrode leads gently out until they are slightly stretched.
- Re-couple the swivel joint 7) to the graduated sector 8).
- Remove the two extensions from the slide bars 4).
- Connect the pilot gas line.

BURNER FAULTS

Control program under fault conditions and lock-out indication

In case of any disturbance, the sequence mechanism stops and with it the lock-out indicator. The symbol above the reading mark of the indicator gives the type of disturbance:

◀ **No start**, e.g. because one contact is not closed. Lock-out during or after control program sequence due to extraneous light (e.g. non-extinguished flames, leaking fuel valves, defects in the flame supervision circuit, etc.)

▲ **Interruption of startup sequence**, because the OPEN signal has not been delivered to terminal 8 by limit switch “a”. Terminals 6, 7 and 14 remain under voltage until the fault has been corrected!

P **Lockout**, because there is no air pressure indication at the beginning of air pressure control. **Every air pressure failure after this moment in time leads to lock-out, too!**

■ **Lock-out** due to a fault in the flame supervision circuit.

▼ **Interruption of startup sequence**, because the position signal for the low-flame position has not been delivered to terminal 8 by auxiliary switch “m”. Terminals 6, 7 and 14 remain under voltage until the fault has been corrected!

1 **Lock-out**, because no flame signal is present after completion of the (1st) safety time.

2 **Lock-out**, because no flame signal has been received on completion of the 2nd safety time (flame signal of the main flame with interrupted pilot burners).

| **Lock-out**, because the flame signal has been lost during burner operation.

If lock-out occurs at any other moment in time between the start and the pre-ignition which is not marked by a symbol, this is usually caused by a premature, i.e. faulty flame signal, e.g. caused by a self-igniting UV tube.

ELECTRICAL WIRING

NOTES ON SAFETY FOR THE ELECTRICAL WIRING

- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be carried out by qualified personnel and in compliance with the regulations currently in force in the country of destination.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the electrical layouts.
- The burners have been type-approved for intermittent operation.
  This means they should be stopped at least once every 24 hours to enable the control box to perform self checks at start-up.
  Burner halts are normally provided for automatically by the boiler load control system.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- Do not invert the neutral with the phase in the electrical supply line. Any inversion would cause a lockout due to firing failure.
- The electrical safety of the device is obtained only when it is correctly connected to an efficient earthing system, made according to current standards. It is necessary to check this fundamental safety requirement. In the event of doubt, have the electrical system checked by qualified personnel. Do not use the gas tubes as an earthing system for electrical devices.
- The electrical system must be suitable for the maximum input power of the device,as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for the input power of the device.
- For the main power supply of the device from the electricity mains:
  – do not use adapters, multiple sockets or extensions;
  – use an omnipolar switch with an opening of at least $^{1}/_{8}$” (overvoltage category) between the contacts, as indicated by the current safety standards.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.

Before carrying out any maintenance, cleaning or checking operations:

disconnect the electricity supply from the burner by means of the main switch of the system;

close the fuel interception tap.

If the cover is still present, remove it and proceed with the electrical wiring.

The burners leave the factory preset for:

- **208-230V** power supply:
  only in this case, if 460 V power supply is required, change the fan motor connection from delta to star for IE1 and double star to star for IE2/EPACT according to the indications of page 20 and change the setting of the thermal overload according to page 19;
- or **575V** power supply;
  depending on the burner model (see page 4).
- The setting of the thermal overload must be according to page 19.

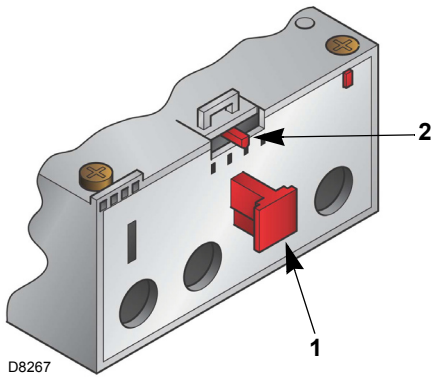
After carrying out maintenance, cleaning or checking operations, reassemble the hood and all the safety and protection devices of the burner.

CALIBRATION OF THE THERMAL RELAY

The thermal relay is used to avoid damage to the motor owing to a strong increase in absorption or the lack of a phase.

For the calibration, refer to the table below.

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



FUSE AND THREE PHASE CABLE CALIBRATION

Three phase (IE 2/Epact)

		RS 70/M			RS 100/M			RS 130/M		
		208 - 230 V	460 V	575 V	208 - 230 V	460 V	575 V	208 - 230 V	460 V	575 V
F (A) Fuse	Non time Delay	15 A	6 A	5 A	25 A	10 A	10 A	25 A	10 A	10 A
	Time Delay	7 A	4 A	3 A	15 A	7 A	5 A	15 A	7 A	5 A
S (AWG)		14	14	14	14	14	14	14	14	14

Single phase

		RS 70/M	RS 100/M
		208 - 220 V	208 - 220 V
F (A) Fuse	Non time Delay	40 A	50 A
	Time Delay	20 A	30 A
S (AWG)		12	10

Thermal overload calibration

Three phase (IE 2/Epact)

	RS 70/M			RS 100/M			RS 130/M		
	208 - 230 V	460 V	575 V	208 - 230 V	460 V	575 V	208 - 230 V	460 V	575 V
Thermal overload Set to Max:	4.6 A	2.3 A	1.8 A	9 A	4.5 A	3.6 A	9 A	4.5 A	3.6 A

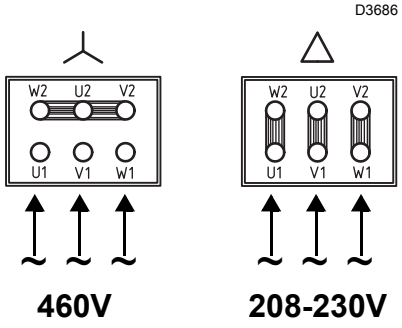
Single phase

	RS 70/M	RS 100/M
	208 - 220 V	208 - 220 V
Thermal overload Set to Max:	8 A	13.2 A

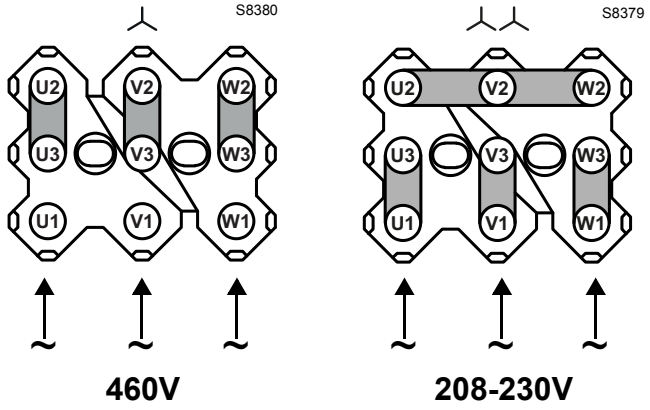
Motor connection at 208-230 or 460V

WARNING:
the motors, manufactured for 208-230/460 **IE2/Epact** voltage, have a different connection than **IE1** motors, no more star/delta but star/double star.
Please, pay attention to the indications in case of modification of voltage, maintenance, or substitution.

IE1

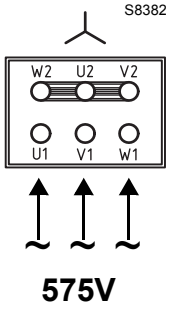


IE2/Epact



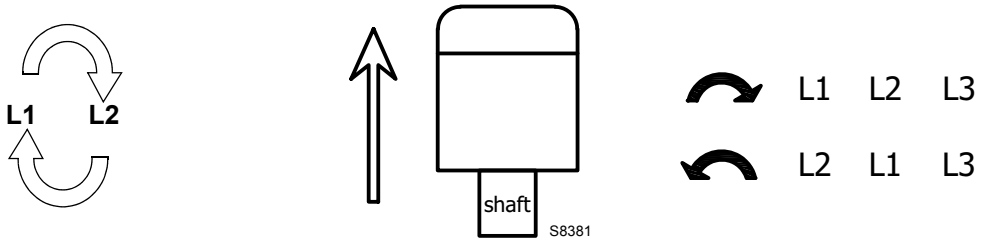
Motor connection at 575V

WARNING:
the motors, manufactured for 575V **IE2/Epact** voltage, have the same control box base of the IE1 motors.
Please pay attention to the indications in case of maintenance or substitution.

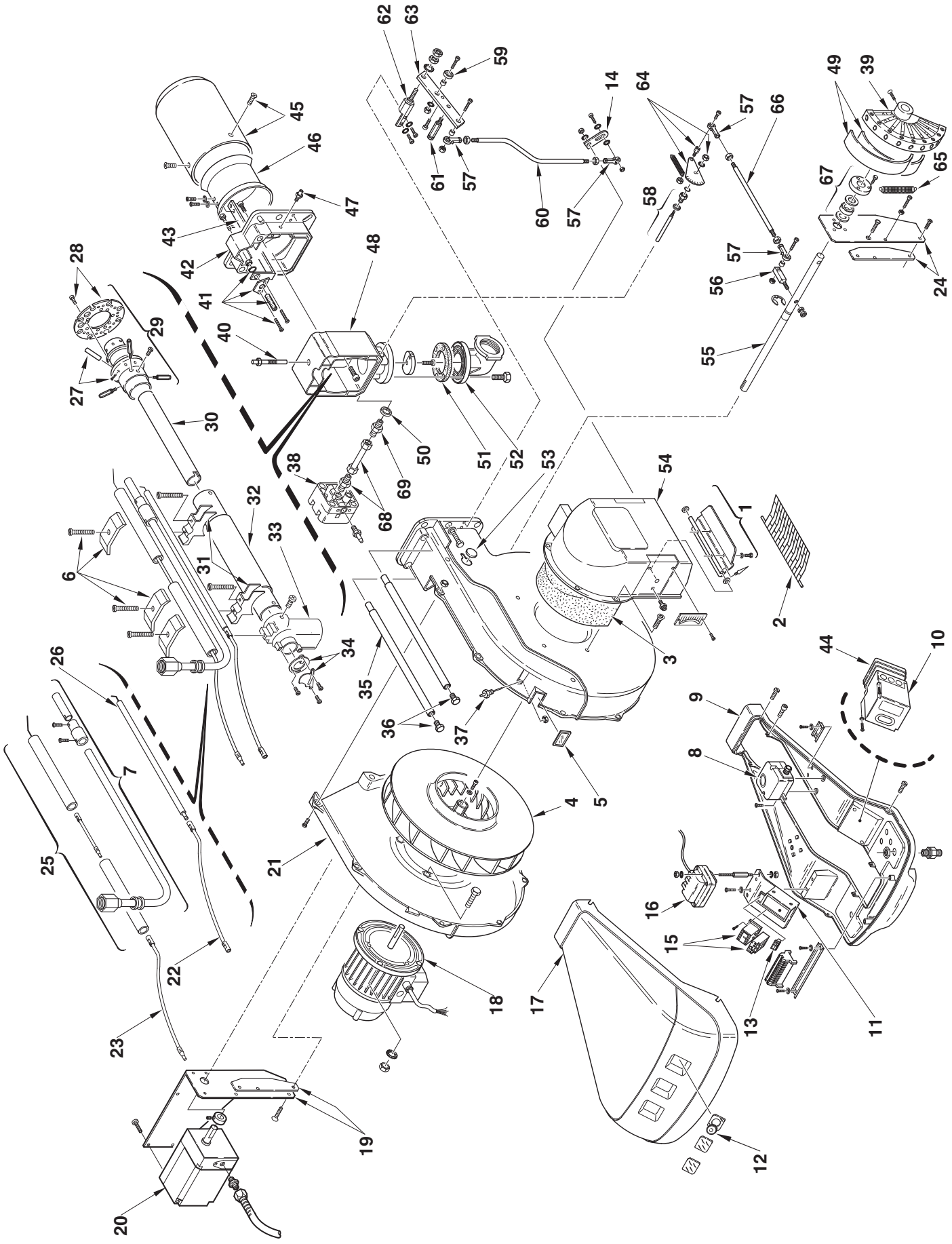


Reversible direction

WARNING:
If it is necessary to reverse the direction then reverse the two main supply phases.
For example: L1 with L2, there is not difference between **IE1** and **IE2/Epact.**



APPENDIX - SPARE PARTS



N.	CODE		RS 70/M			RS 100/M			RS 130/M		DESCRIPTION	BURNER SERIAL NUMBER
			C9524300	C9524301	C9524303	C9525300	C9525301	C9525302	C9526300	C9526301		
1	**3003948**		•	•	•	•	•	•	•	•	AIR DAMPER ASSEMBLY	
2	**3003949**		•	•	•	•	•	•	•	•	GRID	
3	**3003952**		•	•	•	•	•	•	•	•	SOUND DAMPING	
4	**3012939**		•	•	•						FAN	
4	**3012403**					•	•	•			FAN	
4	**3012940**								•	•	FAN	
5	**3003763**		•	•	•	•	•	•	•	•	INSPECTION WINDOW	
6	**3003409**		•	•	•	•	•	•	•	•	U BOLT	
7	**3012973**		•	•	•						PILOT TUBE	
7	**3012975**					•	•	•			PILOT TUBE	
7	**3012974**								•	•	PILOT TUBE	
8	**3012948**		•	•	•	•	•	•	•	•	AIR PRESSURE SWITCH	
9	**3013127**		•	•	•	•	•	•	•	•	BASE PLATE	
10	**3012955**	C5830008	•	•	•	•	•	•	•	•	CONTROL BOX LFL 1.335	
11	**3012343**		•	•	•	•	•	•	•	•	SUPPORT	
12	**3007627**		•	•	•	•	•	•	•	•	MEMBRAN	
13	**3012080**		•	•	•	•	•	•	•	•	SWITCH	
14	**3012359**		•	•	•	•	•	•	•	•	LEVER	
15	**3012935**		•								OVERLOAD+CONTACTOR 208-230/460V	
15	**3012936**					•					OVERLOAD+CONTACTOR 208-230/460V	
15	**3012937**								•		OVERLOAD+CONTACTOR 208-230/460V	
15	**3012991**			•							OVERLOAD+CONTACTOR 575V	
15	**3013124**						•				OVERLOAD+CONTACTOR 575V	
15	**3013125**									•	OVERLOAD+CONTACTOR 575V	
15	**3012937**				•						OVERLOAD+CONTACTOR 208-220 (Single Phase)	
15	**3003621**							•			OVERLOAD+CONTACTOR 208-220 (Single Phase)	
16	**3012956**		•	•	•	•	•	•	•	•	TRANSFORMER	
17	**3012934**		•	•	•	•	•	•	•	•	COVER	
18	**3012941**		•								MOTOR 208-230/460V	
18	**3012943**					•			•		MOTOR 208-230/460V	
18	**3013059**			•							MOTOR 575V	
18	**3013060**						•				MOTOR 575V	
18	**3013061**									•	MOTOR 575V	
18	**20032429**				•						MOTOR 208-220V(Single Phase)	
18	**20094157**							•			MOTOR 208-220V(Single Phase)	
19	**3012957**		•	•	•	•	•	•	•	•	ANCHOR PLATE	
20	**3012944**		•	•	•	•	•	•	•	•	SERVOMOTOR	
21	**3012012**		•	•	•	•	•	•	•	•	HALF-SHELL	
22	**3012958**		•	•	•	•	•	•	•	•	PROBE LEAD	
23	**3012959**		•	•	•	•	•	•	•	•	H.T. LEAD	
24	**3012346**		•	•	•	•	•	•	•	•	ANCHOR PLATE	
25	**3012960**		•	•	•	•	•	•			ELECTRODE	
25	**3013128**								•	•	ELECTRODE	
26	**3012175**		•	•	•	•	•	•			PROBE	

N.	CODE		RS 70/M			RS 100/M			RS 130/M		DESCRIPTION	BURNER SERIAL NUMBER
			C9524300	C9524301	C9524303	C9525300	C9525301	C9525302	C9526300	C9526301		
26	**3012176**								•	•	PROBE	
27	**3012023**		•	•	•						TUBE	
27	**3012024**					•	•	•			TUBE	
27	**3012025**								•	•	TUBE	
28	**3012961**		•	•	•						DISC	
28	**3012962**					•	•	•	•	•	DISC	
29	**3012963**		•	•	•						GAS HEAD	
29	**3012964**					•	•	•			GAS HEAD	
29	**3012965**								•	•	GAS HEAD	
30	**3012031**		•	•	•						INTERIOR TUBE	
30	**3012033**					•	•	•			INTERIOR TUBE	
30	**3012035**								•	•	INTERIOR TUBE	
31	**3012966**		•	•	•	•	•	•	•	•	SUPPORT	
32	**3012967**		•	•	•	•	•	•			EXTERIOR TUBE	
32	**3012968**								•	•	EXTERIOR TUBE	
33	**3012042**		•	•	•	•	•	•	•	•	ELBOW	
34	**3012014**		•	•	•	•	•	•	•	•	FERRULE	
35	**3012013**		•	•	•	•	•	•	•	•	BAR	
36	**3003481**		•	•	•	•	•	•	•	•	SCREW	
37	**3003891**		•	•	•	•	•	•	•	•	CONNECTOR	
38	**3012969**	C5332011	•	•	•	•	•	•	•	•	GAS PRESSURE SWITCH	
39	**3012358**		•	•	•	•	•	•	•	•	CAM ASSEMBLY	
40	**3012049**		•	•	•	•	•	•	•	•	SCREW	
41	**3003974**		•	•	•	•	•	•	•	•	CONTROL DEVICE	
42	**3003975**		•	•	•	•	•	•			FRONT PIECE	
42	**3003976**								•	•	FRONT PIECE	
43	**3012051**		•	•	•						SQUARE	
43	**3003979**					•	•	•			SQUARE	
43	**3012053**								•	•	SQUARE	
44	**3013010**	C5360002	•	•	•	•	•	•	•	•	CONTROL BOX BASE	
45	**3003987**		•	•	•						END CONE	
45	**3012055**					•	•	•			END CONE	
45	**3012057**								•	•	END CONE	
46	**3003983**		•	•	•	•	•	•			SHUTTER	
46	**3003984**								•	•	SHUTTER	
47	**3003322**		•	•	•	•	•	•	•	•	CONNECTOR	
48	**3012970**		•	•	•	•	•	•	•	•	MANIFOLD	
49	**3006097**		•	•	•	•	•	•	•	•	FLAT SPRING	
50	**3007166**		•	•	•	•	•	•	•	•	SEAL	
51	**3005482**		•	•	•	•	•	•	•	•	SEAL	
52	**3012971**		•	•	•	•	•	•	•	•	FLANGE AND ELBOW	
53	**3003996**		•	•	•	•	•	•	•	•	PLUG	
54	**3012348**		•	•	•	•	•	•	•	•	AIR INTAKE	
55	**3012972**		•	•	•	•	•	•	•	•	SHAFT	

N.	CODE		RS 70/M			RS 100/M			RS 130/M		DESCRIPTION	BURNER SERIAL NUMBER
			C9524300	C9524301	C9524303	C9525300	C9525301	C9525302	C9526300	C9526301		
56	**3012350**		•	•	•	•	•	•	•	•	LEVER	
57	**3006098**		•	•	•	•	•	•	•	•	PIN JOINT	
58	**3012059**		•	•	•	•	•	•	•	•	BUTTERFLY VALVE SHAFT	
59	**3003841**		•	•	•	•	•	•	•	•	BEARING	
60	**3012351**		•	•	•	•	•	•	•	•	TIE ROD	
61	**3012352**		•	•	•	•	•	•	•	•	BAR	
62	**3012353**		•	•	•	•	•	•	•	•	BAR	
63	**3012354**		•	•	•	•	•	•	•	•	LEVER	
64	**3012355**		•	•	•	•	•	•	•	•	GRADUATE SECTOR	
65	**3012356**		•	•	•	•	•	•	•	•	SPRING	
66	**3012060**		•	•	•	•	•	•	•	•	TIE ROD	
67	**3012357**		•	•	•	•	•	•	•	•	BEARING	
68	**3013055**		•	•	•	•	•	•	•	•	TUBE	
69	**3003220**		•	•	•	•	•	•	•	•	CONNECTOR	

ACCESSORIES (optional):

- **Kit for LPG operation:** The kit allows the RS 70-100-130/M burners to operate on LPG.

Burner	**RS 70/M**	**RS 100/M**	**RS 130/M**
OUTPUT MBtu/hr	918 - 3084	1320 - 4405	1764 - 5545
CODE	3010273	3010274	3010275

- **Kit for lengthening the combustion head**

L = Standard length
L1 = Length obtainable with the kit

COD. 3010259	L = $9^{27}/_{32}$“	L1 = $15^{5}/_{32}$“	• RS 70/M
COD. 3010260	L = $9^{27}/_{32}$“	L1 = $15^{5}/_{32}$“	• RS 100/M
COD. 3010261	L = $11^{1}/_{32}$“	L1 = $16^{11}/_{32}$“	• RS 130/M

- **Gas train according to UL regulation:** see page 10.

Important:
The installer is responsible for the supply and installation of any safety device(s) not indicated in this manual.

APPENDIX - PROCEDURE TO REFER BURNER OPERATING CONDITION IN HIGH ALTITUDE PLANTS

- Find the **corrected burner capacity** for the plant's altitude in chart **1** and the **corrected pressure** in chart **2**.
- Check in the firing rate graph of the burner (page 7), if the working point defined by the values above is within the range limits. If not, higher burner size is needed.

Note
Charts are based only on altitude variation (reference temperature = 68°F , 20°C)

To get the combined correction in case of different air temperature, a compensation of **1000 ft each 20°F (305 m each 11°C)** is applicable.

Example
Rated capacity = 3000 MBtu/hr - Rated air pressure = 1.5"w.c.
Real altitude = 5000 ft - Real temperature = 108°F
Δ = 108°F - 68°F (reference temp.) = 40°F (equivalent 2000 ft variation)
Proceeding as described above and considering a "virtual altitude" of (5000 + 2000) ft:
- the corrected capacity is 3847 MBtu/hr;
- the corrected burner air pressure is 1.92.

➡ **Burner RL 100/M is OK**

1 CORRECTED BURNER CAPACITY ACCORDING TO ALTITUDE

S8369

Rated Capacity		Altitude									
	m. a.s.l.	0	100	305	610	915	1220	1525	1830	2135	2440
	ft a.s.l	0	328	1000	2000	3000	4000	5000	6000	7000	8000
500		494	500	512	530	551	571	593	616	641	669
1000		987	1000	1023	1061	1101	1142	1186	1232	1282	1337
1500		1481	1500	1535	1591	1652	1713	1778	1848	1924	2006
2000		1974	2000	2046	2121	2202	2284	2371	2464	2565	2675
2500		2468	2500	2558	2652	2753	2855	2964	3079	3206	3343
3000		2962	3000	3069	3182	3303	3425	3557	3695	3847	4012
3500		3455	3500	3581	3712	3854	3996	4149	4311	4488	4680
4000		3949	4000	4092	4243	4404	4567	4742	4927	5130	5349
4500		4442	4500	4604	4773	4955	5138	5335	5543	5771	6018
5000		4936	5000	5116	5303	5505	5709	5928	6159	6412	6686
5500		5429	5500	5627	5834	6056	6280	6520	6775	7053	7355
6000		5923	6000	6139	6364	6606	6851	7113	7391	7694	8024
6500		6417	6500	6650	6894	7157	7422	7706	8006	8335	8692
7000		6910	7000	7162	7425	7708	7993	8299	8622	8977	9361
7500		7404	7500	7673	7955	8258	8564	8892	9238	9618	10029
8000		7897	8000	8185	8485	8809	9135	9484	9854	10259	10698
8500		8391	8500	8697	9016	9359	9705	10077	10470	10900	11367
9000		8885	9000	9208	9546	9910	10276	10670	11086	11541	12035
9500		9378	9500	9720	10076	10460	10847	11263	11702	12183	12704
10000		9872	10000	10231	10607	11011	11418	11855	12318	12824	13373
Average barometric Pressure (20°C)	**mbar**	**1013**	**1000**	**977,4**	**942,8**	**908,2**	**875,8**	**843,5**	**811,85**	**779,8**	**747,8**
Average barometric Pressure (68°F)	**"w.c.**	**399**	**394**	**385**	**371**	**358**	**345**	**332**	**320**	**307**	**294**

2 CORRECTED BURNER AIR PRESSURE ACCORDING TO ALTITUDE

Rated Pressure		Altitude									
	m. a.s.l.	0	100	305	610	915	1220	1525	1830	2135	2440
	ft a.s.l	0	328	1000	2000	3000	4000	5000	6000	7000	8000
0,50		0,49	0,50	0,51	0,53	0,55	0,57	0,59	0,62	0,64	0,67
1,00		0,99	1,00	1,02	1,06	1,10	1,14	1,19	1,23	1,28	1,34
1,50		1,48	1,50	1,53	1,59	1,65	1,71	1,78	1,85	1,92	2,01
2,00		1,97	2,00	2,05	2,12	2,20	2,28	2,37	2,46	2,56	2,67
2,50		2,47	2,50	2,56	2,65	2,75	2,85	2,96	3,08	3,21	3,34
3,00		2,96	3,00	3,07	3,18	3,30	3,43	3,56	3,70	3,85	4,01
3,50		3,46	3,50	3,58	3,71	3,85	4,00	4,15	4,31	4,49	4,68
4,00		3,95	4,00	4,09	4,24	4,40	4,57	4,74	4,93	5,13	5,35
4,50		4,44	4,50	4,60	4,77	4,95	5,14	5,33	5,54	5,77	6,02
5,00		4,94	5,00	5,12	5,30	5,51	5,71	5,93	6,16	6,41	6,69
5,50		5,43	5,50	5,63	5,83	6,06	6,28	6,52	6,77	7,05	7,35
6,00		5,92	6,00	6,14	6,36	6,61	6,85	7,11	7,39	7,69	8,02
6,50		6,42	6,50	6,65	6,89	7,16	7,42	7,71	8,01	8,34	8,69
7,00		6,91	7,00	7,16	7,42	7,71	7,99	8,30	8,62	8,98	9,36
7,50		7,40	7,50	7,67	7,96	8,26	8,56	8,89	9,24	9,62	10,03
8,00		7,90	8,00	8,18	8,49	8,81	9,13	9,48	9,85	10,26	10,70
8,50		8,39	8,50	8,70	9,02	9,36	9,71	10,08	10,47	10,90	11,37
9,00		8,88	9,00	9,21	9,55	9,91	10,28	10,67	11,09	11,54	12,04
9,50		9,38	9,50	9,72	10,08	10,46	10,85	11,26	11,70	12,18	12,70
10,00		9,87	10,00	10,23	10,61	11,01	11,42	11,86	12,32	12,82	13,37
Average barometric Pressure (20°C)	**mbar**	**1013**	**1000**	**977,4**	**942,8**	**908,2**	**875,8**	**843,5**	**811,85**	**779,8**	**747,8**
Average barometric Pressure (68°F)	**"w.c.**	**399**	**394**	**385**	**371**	**358**	**345**	**332**	**320**	**307**	**294**

Reference conditions (Charts 1-2): Ambient temperature 68 °F (20 °C) - Barometric pressure 394" WC (1000 mbar) - Altitude 328 ft a.s.l. (100 m a.s.l.)