GB

Forced draught gas burners

Progressive two-stage or modulating operation

Code	Model	Type
C9342400 - C9342410	RS 68/E LN	1132T1
C9343400 - C9343410	RS 120/E LN	1132T

20029324 (5) - 03/2014

1 Information and general instructions

1.1 Information about the instruction manual

1.1.1 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.

Symbols used in the manual

In some parts of the manual you will see triangular DANGER signs. Pay great attention to these, as they indicate a situation of potential danger.

1.1.2 General dangers

The **dangers** can be of **3 levels**, as indicated below.


DANGER

Maximum danger level!
This symbol indicates operations which, if not carried out correctly, **cause** serious injury, death or long-term health risks.


WARNING

This symbol indicates operations which, if not carried out correctly, **may cause** serious injury, death or long-term health risks.


CAUTION

This symbol indicates operations which, if not carried out correctly, **may cause** damage to the machine and/or injury to people.

1.1.3 Danger: live components


DANGER

This symbol indicates operations which, if not carried out correctly, lead to electric shocks with lethal consequences.

Other symbols:

ENVIRONMENTAL PROTECTION

This symbol gives indications for the use of the machine with respect for the environment.

➤ This symbol indicates a list.

Abbreviations used

Ch.	Chapter
Fig.	Figure
Pag.	Page
Sec.	Section
Tab.	Table

Delivery of the system and the instruction manual

When the system is delivered, it is important that:

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

    .....

  - – the address and telephone number of the nearest Assistance Centre;

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

- ➤ The system supplier carefully informs the user about:
  - – the use of the system,
  - – any further tests that may be necessary before the system is started up,
  - – maintenance and the need to have the system checked at least once a year by the manufacturer or another specialised technician.
    To ensure a periodic check, the manufacturer recommends the drawing up of a Maintenance Contract.

1.2 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 the 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 non authorised 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 power 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 flame, as structurally established;
- ➤ insufficient and inappropriate surveillance and care of those burner components most subject to wear and tear;
- ➤ use of non-original components, including spare parts, kits, accessories and optionals;
- ➤ force majeure.

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

1.2.1 Owner's responsibility

Please pay attention to the Safety Warnings contained within this instruction manual. Keep this manual for your records and provide it to your quali fi ed service agency for use in professionally setting up and maintaining your burner.

Your burner will provide years of ef fi cient operation if it is professionally installed and maintained by a qualifi ed service technician. If at any time the burner does not appear to be operating properly, immediately contact your qualifi ed service agency for consultation.

We recommend annual inspection/service of your gas heating system by a qualifi ed service agency.

Failure to follow these instructions, misuse, or incorrect adjustment of the burner could lead to equipment malfunction and result in asphyxiation, explosion or fire.

If you smell gas:

- ➤ Do not touch any electrical items.
- ➤ Open all windows.
- ➤ Close all gas supply valves.
- ➤ Contact your local gas authority immediately.

- Do not store flammable or hazardous materials in the vicinity of fuel burning appliances.
- Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or death.
- Refer to this manual for instructional or additional information.
- Consult a certified installer, service representative or the gas supplier for further assistance.
- Burner shall be installed in accordance with manufacturers requirements as outlined in this manual, local codes and authorities having jurisdiction.

2 Safety and prevention

2.1 Introduction

The RIELLO 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 users 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.

2.2 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.
- Must take all the measures necessary to prevent unauthorised people gaining access to the machine.
- 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.
- Must inform the manufacturer if faults or malfunctioning of the accident prevention systems are noticed, along with any presumed danger situation.
- Personnel must always use the personal protective equipment envisaged by legislation and follow the indications given in this manual.
- Personnel must follow 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 are obliged to 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 all responsibility for any damage that may be caused by the use of non-original parts.

3 Technical description of the burner

3.1 Technical data

Model			RS 68/E LN	RS 120/E LN
Output (1)	High	MBtu/hr kW	1327 - 3258 389 - 955	2282 - 4924 666 - 1443
	Low	MBtu/hr kW	570 167	1136 333
Fuel			Natural gas	
• Max delivery • Pressure at maximum delivery (2) natural gas		SCFH “ WC	3258 4.60	4924 8.85
Operation			Low - high or modulating	
Standard application			Boilers: water, steam, thermal oil	
Ambient temperature		°F	32 - 104 (0 - 40 °C)	
Combustion air temperature		°F max	140 (60 °C)	
Noise levels (3)		dB(A)	75	77

(1) Reference conditions: Ambient temperature 68 °F (20 °C) - Barometric pressure 394” WC - Altitude 329 ft.
(2) Pressure at test point 21) (Fig. 1), with zero pressure in the combustion chamber, with open gas ring 2) (Fig. 23, page 23) at maximum burner output
(3) Sound pressure measured in manufacturer’s combustion laboratory, with burner operating on test boiler and at maximum rated output.
* Firing rate for C-UL/US Listing

3.2 Burner models designation

Model	Code	Code RBNA	Main Voltage	Flame safeguard
RS 68/E LN	20029006	C9342400	208-220/3/60	Burner mounted
		C9342410	460/3/60	
		-	575/3/60	
RS 120/E LN	20029007	C9343400	208-220/3/60	Burner mounted
		C9343410	460/3/60	
		-	575/3/60	

3.3 Electrical data

3.3.1 Three phase burner

Fan motor IE1			
Model		**RS 68/E LN**	**RS 120/E LN**
RBNA Code		C9342400	C9343400
Control circuit power supply	V/Ph/Hz	120/1/60	
Main electrical supply (+/-10%)	V/Ph/Hz	208-220/3/60	
Fan motor	rpm HP V A	3400 2.4 208-230 7.4	3400 3 208-230 8.5
Ignition transformer	V1 - V2 I1 - I2	120 V - 1 x 8 kV 1.6 A - 20 mA	
Electrical power consumption	W	2350	2750
Electrical control circuit cons.	W max	750	
Total electrical consumption	W	3100	3500
Electrical protection		NEMA 1	

Fan motor IE1			
Model		**RS 68/E LN**	**RS 120/E LN**
RBNA Code		C9342410	C9343410
Control circuit power supply	V/Ph/Hz	120/1/60	
Main electrical supply (+/-10%)	V/Ph/Hz	460/3/60	
Fan motor	rpm HP V A	3400 2.4 460 4.3	3400 3 460 4.9
Ignition transformer	V1 - V2 I1 - I2	120 V - 1 x 8 kV 1.6 A - 20 mA	
Electrical power consumption	W max	2750	3150
Electrical control circuit cons.	W	750	
Total electrical consumption	W	3500	3900
Electrical protection		NEMA 1	

Fan motor IE1			
Model		**RS 68/E LN**	**RS 120/E LN**
RBNA Code		-	-
Control circuit power supply	V/Ph/Hz	120/1/60	
Main electrical supply (+/-10%)	V/Ph/Hz	575/3/60	
Fan motor	rpm HP V A	3400 2.4 575 2.8	3400 3 575 3.7
Ignition transformer	V1 - V2 I1 - I2	120 V - 1 x 8 kV 1.6 A - 20 mA	
Electrical power consumption	W max	2250	2900
Electrical control circuit cons.	W	750	
Total electrical consumption	W	3000	3650
Electrical protection		NEMA 1	

3.3.2 Three phase burner

Fan motor IE2/EPACT			
Model		**RS 68/E LN**	**RS 120/E LN**
RBNA Code		C9342400	C9343400
Control circuit power supply	V/Ph/Hz	120/1/60	
Main electrical supply (+/-10%)	V/Ph/Hz	208-220/3/60	
Fan motor	rpm HP V A	3500 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	2600	
Electrical control circuit cons.	W	750	
Total electrical consumption	W	3350	
Electrical protection		NEMA 1	

Fan motor IE2/EPACT			
Model		**RS 68/E LN**	**RS 120/E LN**
RBNA Code		C9342410	C9343410
Control circuit power supply	V/Ph/Hz	120/1/60	
Main electrical supply (+/-10%)	V/Ph/Hz	460/3/60	
Fan motor	rpm HP V A	3500 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	2600	
Electrical control circuit cons.	W	750	
Total electrical consumption	W	3350	
Electrical protection		NEMA 1	

Fan motor IE2/EPACT			
Model		**RS 68/E LN**	**RS 120/E LN**
RBNA Code		-	-
Control circuit power supply	V/Ph/Hz	120/1/60	
Main electrical supply (+/-10%)	V/Ph/Hz	575/3/60	
Fan motor	rpm HP V A	3500 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	2600	
Electrical control circuit cons.	W	750	
Total electrical consumption	W	3350	
Electrical protection		NEMA 1	

3.4 Burner description

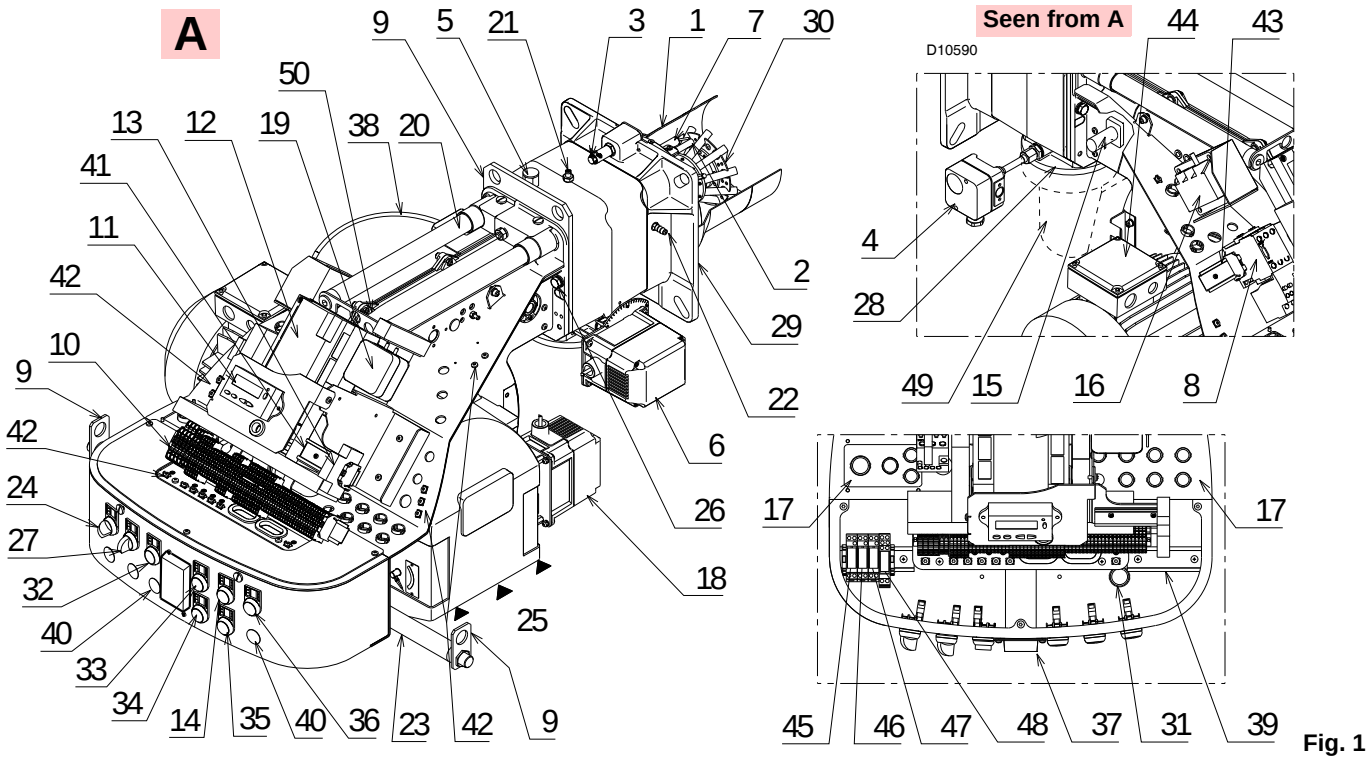


Fig. 1

1 Combustion head
2 Burner pilot
3 Screw for combustion head adjustment
4 Maximum gas pressure switch
5 Burner pilot attachment
6 Gas actuator
7 Ignition electrode
8 Fan motor contactor and thermal relay with reset button
9 Lifting ring
10 Terminal board for electrical wiring
11 Operator panel with LCD display
12 Control box for checking flame and air/fuel ratio
13 Auxiliary fuse
14 Signal “CALL FOR HEAT”
15 UV flame sensor
16 Ignition transformer
17 Holes for cable grommets for electrical wiring for accessories(to be carried out by the installer)
18 Air actuator
19 Air pressure switch
20 Sliding bars for opening the burner and inspecting the combustion head
21 Gas pressure test point and head fixing screw
22 Combustion head air pressure test point
23 Extension sliding bars
24 Switch “OFF - ON”
25 Fan air inlet
26 Screws to secure fan to pipe coupling
27 Switch “LOCAL REMOTE”
28 Gas butterfly valve
29 Boiler fixing flange
30 Flame stability disc
31 Horn
32 Button “ALARM SILENCE”
33 Signal “POWER ON”
34 Signal “IGNITION ON”
35 Signal “FUEL ON”
36 Signal “ALARM ON”
37 RWF40 modulator (with anolog output 4-20 mA)
38 Hight voltage lead
39 Din bar available for accessories
40 Optional holes
41 Din bar for fuse holder step-down transformer and OCI 412.10
42 Ground terminals
43 Din bar for thermal relay, fan motor contactor and available for accessories
44 Fan motor
45 k_1 relay
46 k_5 relay
47 k_3 relay
48 k_2 relay
49 Gas train flange
50 Air pressure switch test point

3.5 Burner equipment

The burner is supplied complete with:
Gas train flange . . . . . No. 1
Flange gasket . . . . . No. 1
Screws (M10 x 40) to fix the flange . . . . . No. 4
Instruction manuals . . . . . No. 1

3.6 Packaging - weight - Approximate measurements

➤ The packaging of the burner (Fig. 2) rests on a wooden platform that is particularly suitable for lift trucks.
The overall dimensions of the packaging are shown in the table.
➤ The weight of the burner complete with its packaging is shown in table.

Inch	A	B	C	lbs
RS 68/E LN	55 33/64	30 29/32	39 3/8	212
RS 120/E LN	55 33/64	30 29/32	39 3/8	205

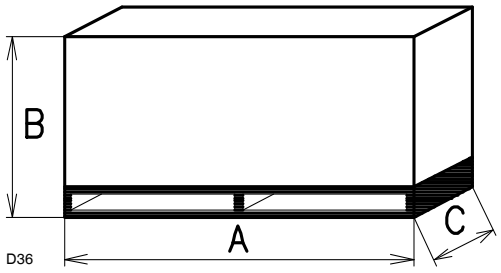


Fig. 2

3.7 Burner dimensions

The dimensions of the burner are shown in Fig. 3.

Bear in mind that inspection of the combustion head requires the burner to be opened and the rear part drawn back on the sliding bars.

The dimensions of the open burner are indicated by position I.

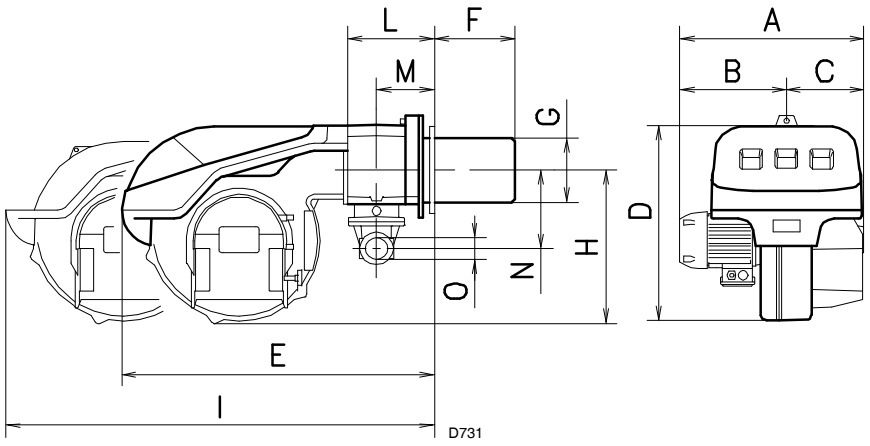


Fig. 3

Inch	A	B	C	D	E	F	G	H	I	L	M	N	O
RS 68/E LN	23 27/64	12 3/4	10 5/8	23 11/32	40 3/4	9 17/32	8 37/64	16 47/64	63 15/32	8 25/32	5 5/8	8 3/4	2
RS 120/E LN	23 27/64	12 3/4	10 5/8	23 11/32	40 3/4	9 17/32	8 37/64	16 47/64	63 15/32	8 25/32	5 5/8	8 3/4	2

3.8 Firing rates

The maximum output is chosen within area **A** of the diagram (Fig. 4).

The **minimum output** must not be lower than the minimum limit of the diagram.

WARNING

The firing rate was obtained considering a room temperature of 68 °F and an atmospheric pressure of 394 “WC (approx. 0 ft above sea level), with the combustion head adjusted.

WARNING

In order to utilize also area B (RS 120/E LN), it is necessary to perform the calibration of the combustion head as explaned in Fig. 19, page 21.

The firing rates were obtained in special test boilers. Fig. 5 indicates the diameter and length of the test combustion chamber.

Example

Output 2579 MBtu/hr:

diameter = 23.6 inch; length 6.6 ft

The RS 68/E LN - RS 120/E LN burners are suitable for operation on either flame-inversion boilers***** or boilers with combustion chambers featuring flow from the base (three flue passes) on which the best results are obtained in terms of low NOx emissions.

The maximum thickness of the boiler’s front door must not exceed 8” (see fig. C).

(*****) For flame inversion boilers, a kit is available to reduce CO emissions if required.
The kit includes 5 gas pipes, identical to the other 5 already fitted to the burner head. In standard conditions, the burner head is fitted with a second group of pipes, with gas outlet in a different direction with respect to the others. With this Kit, the second group of pipes is replaced, so that all the pipes are the same. After fitting the kit, ensure they work correctly by measuring the CO and flue gases emissions.

3.8.1 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 (Fig. 4), 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 (100 ft = 2°F).

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)

40 : 2 = 20 x 100 = 2000 ft

Proceeding as descripted above and considering a “virtual altitude” of (5000 + 2000) ft

- 3000 MBtu/hr at 7000 ft, the corrected capacity is 3847 MBtu/hr
- 1.5” WC at 7000 ft, the corrected burner air pressure is 1.92

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.).

Example

Output 2579 Mbtu/hr - diameter 24 inch - length 6.6 ft.

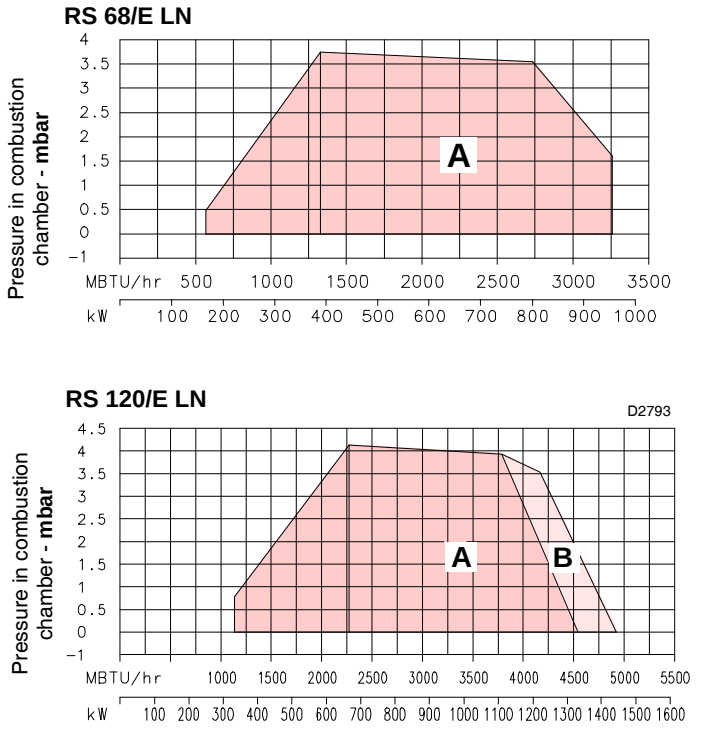


Fig. 4

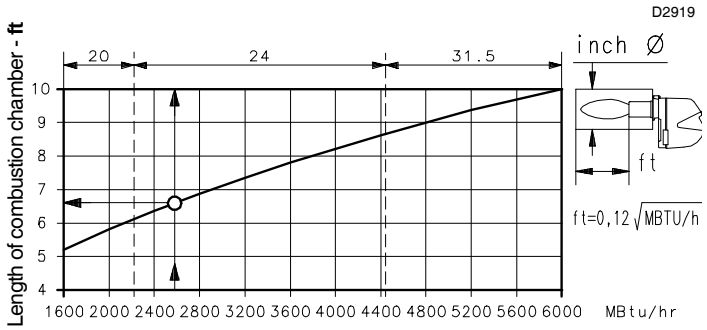


Fig. 5

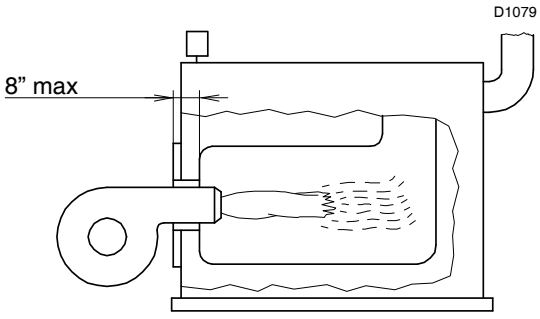


Fig. 6

1 CORRECTED BURNER CAPACITY ACCORDING TO ALTITUDE

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

3.9 Control box for the air/fuel ratio (LMV37.4...)

Warning notes

WARNING

To avoid injury to persons, damage to property or the environment, the following warning notes must be observed!

The LMV37.4... is a safety device!
Do not open, interfere with or modify the unit.

Riello S.p.A. will not assume responsibility for any damage resulting from unauthorized interference!

- ➤ All activities (mounting, installation and service work, etc.) must be performed by qualified staff.
- ➤ Before making any wiring changes in the connection area, completely isolate the plant from mains supply (all-polar disconnection). Ensure that the plant cannot be inadvertently switched on again and that it is indeed dead. If not observed, there is a risk of electric shock hazard.
- ➤ Ensure protection against electric shock hazard by providing adequate protection for the burner control's connection terminals.
- ➤ Each time work has been carried out (mounting, installation, service work, etc.), check to ensure that wiring and parameters is in an orderly state.
- ➤ Fall or shock can adversely affect the safety functions. Such units must not be put into operation, even if they do not exhibit any damage.

Introduction

The control box for the air/fuel ratio (Fig. 7), (hereafter referred to simply as the control box), that equips the burners, carries out a series of integrated functions in order to optimise burner functioning, both for single operation and together with other units (e.g. double furnace boiler or more than one generator at the same time).

The basic functions carried out by the control box relate to:

- ➤ flame control;
- ➤ the dosage of air and fuel via the positioning (with direct servocontrol) of the relative valves, excluding the possible play in the mechanical cam calibration systems;
- ➤ the modulation of burner output, on the basis of the load requested by the system, maintaining the pressure or temperature of the boiler at the working values set;
- ➤ the safety diagnostic of the air and fuel circuits, via which it is possible to easily identify any causes of malfunctioning.

Mechanical design

The following system components are integrated in the LMV37.4... basic unit:

- Burner control with gas valve proving system
- Electronic air / fuel ratio control
- Control frequency converter air fan
- Modbus interface

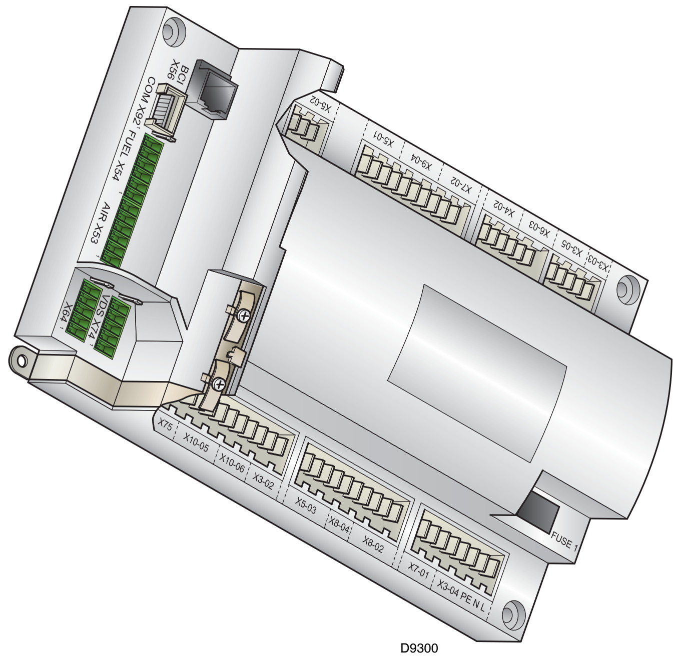


Fig. 7

Installation notes

- Always run high-voltage ignition cables separately while observing the greatest possible distance to the unit and to other cables.
- Do not mix up live and neutral conductors (fire hazard, dangerous failures, loss of protection against electric shock hazard, etc.).
- Do not lay the connecting cable from the LMV37.4... to the AZL2… together with other cables.

WARNING

The first start-up, like every further operation for the internal settings of the control box, requires access by means of a password and is only to be carried out by personnel of the Technical Assistance Service who have been specifically trained in the internal programming of the tool.

Electrical connection of the flame detectors

It is important to achieve practically disturbance- and loss-free signal transmission:

- Never run the detector cable together with other cables.
  – Line capacitance reduces the magnitude of the flame signal.
  – Use a separate cable.
- Observe the maximum permissible detector cable lengths.
- The ionization probe is not protected against electric shock hazard. It is mainspowered and must be protected against accidental contact.
- Locate the ignition electrode and the ionization probe such that the ignition spark cannot arc over to the ionization probe (risk of electrical overloads).

Technical data

LMV37.4... basic unit	Mains voltage	AC 120 V -15 % / +10 %
	Mains frequency	50 / 60 Hz ±6 %
	Power consumption	< 30 W (typically)
	Safety class	I, with parts according to II and III to DIN EN 60730-1
Terminal loading 'Inputs'	Unit fuse F1 (internally)	6.3 AT
	Perm. mains primary fuse (externally)	Max. 16 AT
	Undervoltage	
	• Safety shutdown from operating position at mains voltage	Approx. AC 93 V
	• Restart on rise in mains voltage	Approx. AC 96 V
Terminal loading 'Outputs'	**Total contact loading:**	
	• Nominal voltage	AC 120 V, 50 / 60 Hz
	• Unit input current (safety loop) from: - Fan motor contactor - Ignition transformer - Valves - Oil pump / magnetic clutch	Max. 5 A
	Individual contact loading:	
	Fan motor contactor	
	• Nominal voltage	AC 120 V, 50 / 60 Hz
	• Nominal current	1.6 A pilot duty load declaration to UL372
	• Power factor	cosφ > 0.4
	Alarm output	
	• Nominal voltage	AC 120 V, 50 / 60 Hz
	• Nominal current	1 A
	• Power factor	cosφ > 0.4
	Ignition transformer	
	• Nominal voltage	AC 120 V, 50 / 60 Hz
	• Nominal current	1.6 A pilot duty load declaration to UL372 or 250 VA ignition load declaration to UL372
	• Power factor	cosφ > 0.2
	Fuel valves	
	• Nominal voltage	AC 120 V, 50 / 60 Hz
	• Nominal current	1.6 A pilot duty load declaration to UL372
	• Power factor	cosφ > 0.4
	Operation display	
	• Nominal voltage	AC 120 V, 50 / 60 Hz
	• Nominal current	0.5 A
	• Power factor	cosφ > 0.4
Cable lengths	Mains line	Max. 100 m (100 pF/m)
	Display, BCI	For used outside the burner cover or the control panel: Max. 3 m (100 pF/m)
	External lockout reset button	Max. 20 m (100 pF/m)
Environmental conditions	Operation	DIN EN 60721-3-3
	Climatic conditions	Class 3K3
	Mechanical conditions	Class 3M3
	Temperature range	-20...+60 °C
	Humidity	< 95 % r.h.

Operation sequence of the burner

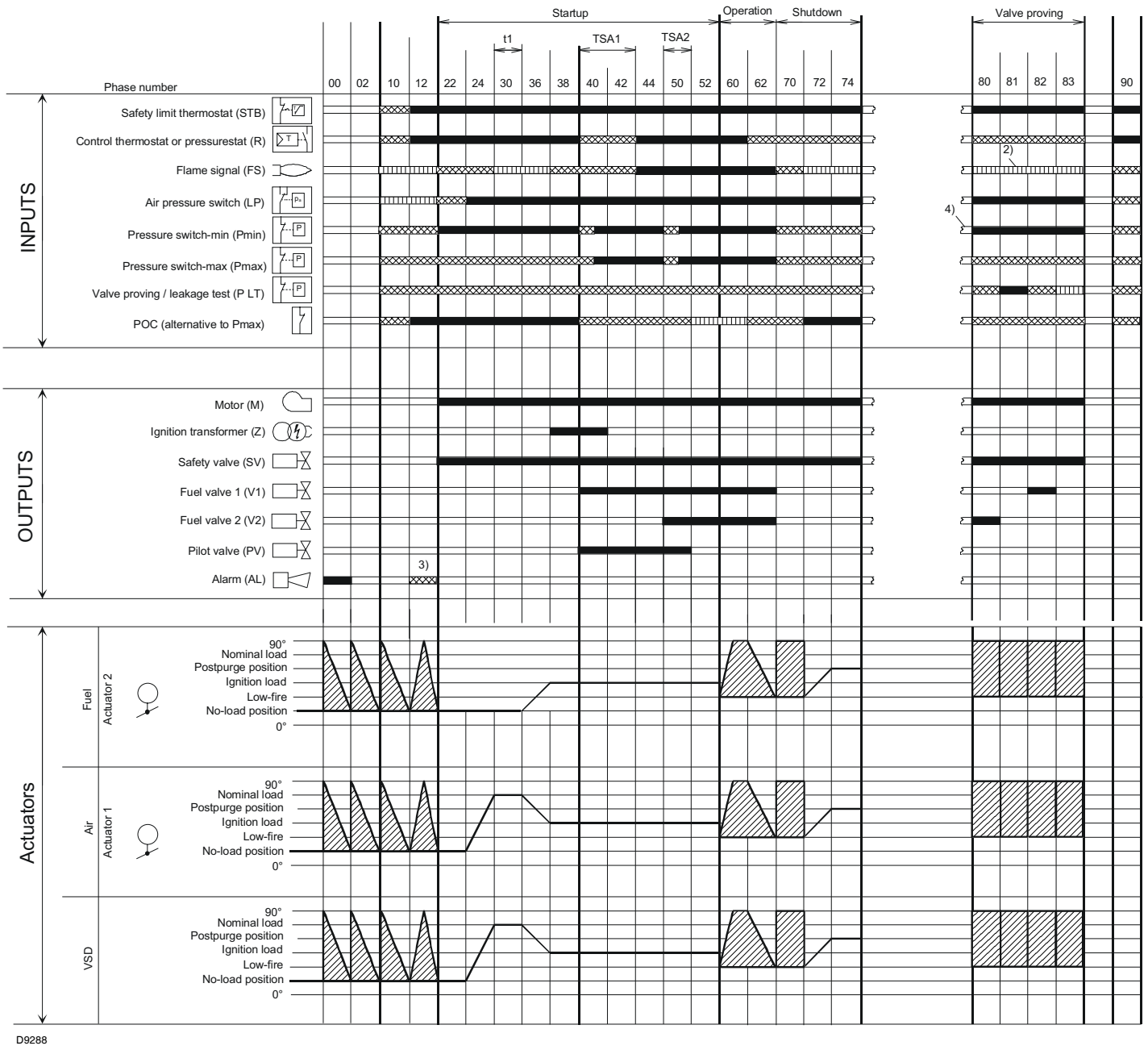


Fig. 8

Legend to the sequence diagrams:

Valve proving takes place depending on the parameter:

2) Only with valve proving on startup
3) Parameter: with/without alarm in the event of start prevention
4) In the event of an erroneous signal on startup, followed by phase 10, otherwise phase 70
0° Position as supplied (0°)
90° Actuator fully open (90°)

Assignment of times:

t1 Prepurge time
TSA1 Safety time 1 gas / oil
TSA2 Safety time 2 gas / oil

Signal ON

Signal OFF

Any signal is allowed

In standby: after referencing, the actuator is driven to the no-load position

3.10 Actuators (SQM33.5...)

Warning notes

WARNING

To avoid injury to persons, damage to property or the environment, the following warning notes should be observed!

Do not open, interfere with or modify the actuators!

- ➤ All activities (mounting, installation and service work, etc.) must be performed by qualified staff.
- ➤ Before making any wiring changes in the connection area of the units, completely isolate the equipment from mains supply (all-polar disconnection). If not observed, there is a risk of electric shock hazard.
- ➤ Ensure protection against electric shock hazard by providing adequate protection for the connection terminals and by securing the housing cover.
- ➤ After any kind of activity (mounting, installation and service work, etc.), check wiring.
  Also ensure that the parameters are correctly set.
- ➤ Fall or shock can adversely affect the safety functions. Such units must not be put into operation, even if they do not exhibit any damage.

WARNING

The actuator's housing must not be opened. The actuator contains an optical feedback system.

Use

The actuators (Fig. 9) are used to drive and position the air damper and the gas butterfly valve, without mechanical leverages but via the interposition of an elastic coupling.

They are commanded by the control box, which constantly checks their position by means of a return signal from the optic sensor inside the actuator.

The position (in degrees) of the actuators can be seen on the display of the Operator Panel.
Index "0" for fuel actuator, index "1" for air actuator.

Installation notes

- Always run the high-voltage ignition cables separate from the unit and other cables while observing the greatest possible distance.
- The holding torque is reduced when the actuator is disconnected from power.

WARNING

When servicing or replacing the actuators, take care not to invert the connectors.

Fig. 9

Technical data

Operating voltage	AC / DC 24 V ±20 % (load on interface)
Safety class	2 to EN 60 730 part 1 and parts 2…14
Power consumption	max. 10 W
Degree of protection	IP54 to EN 60 529-1
Opening time 0 - 90°	min: 5s, max.: 120s (depending on the type of control box)
Firing rate	0 - 90°
Cable connection	RAST2,5 connectors
Direction of rotation	Clockwise/anticlockwise (can be selected from the control box)
Nominal output torque	3 Nm
Holding torque (when live)	3 Nm
Holding torque (when dead)	2.6 Nm
Weight	approx. 1 kg
Environmental conditions:	
Operation Climatic conditions Mechanical conditions Temperature range Humidity	DIN EN 60 721-3-3 class 3K5 class 3M4 -20...+60 ×C < 95 % r.h.

4 Installation

4.1 Notes on safety for the installation

After carefully cleaning all around the area where the burner will be installed, and arranging the correct lighting of the environment, proceed with the installation operations.

DANGER

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

WARNING

The installation of the burner must be carried out by qualified personnel, as indicated in this manual and in compliance with the standards and regulations of the laws in force.

4.2 Handling

The packaging of the burner includes a wooden platform, so it is possible to move the burner (still packaged) with a transpallet truck or fork lift truck.

With regard to the transport in the obligatory passages, refer to the overall dimensions shown in Fig. 3, page 10.

WARNING

The handling operations for the burner can be highly dangerous if not carried out with the greatest attention: keep any unauthorised people at a distance; check the integrity and suitableness of the available means of handling.

Check also that the area in which you are working is empty and that there is an adequate escape area (i.e. a free, safe area to which you can quickly move if the burner should fall).
During the handling, keep the load at not more than 10” from the ground.

CAUTION

After positioning the burner near the installation point, correctly dispose of all residual packaging, separating the various types of material.
Before proceeding with the installation operations, carefully clean all around the area where the burner will be installed.

4.3 Preliminary checks

Checking the consignment

CAUTION

After removing all the packaging, check the integrity of the contents. In the event of doubt, do not use the burner; contact the supplier.

The packaging elements (wooden cage or cardboard box, nails, clips, plastic bags, etc.) must not be abandoned as they are potential sources of danger and pollution; they should be collected and disposed of in the appropriate places.

WARNING

The output of the burner must be within the boiler's firing rate;

WARNING

A burner label that has been tampered with, removed or is missing, along with anything else that prevents the definite identification of the burner makes any installation or maintenance work difficult.

4.4 Operation position

The burner is designed to operate only in the positions **1**, **2, 3** and **4** (Fig. 10).

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

Any other position could compromise the correct operation of the appliance.

Installation **5** is prohibited for safety reasons.

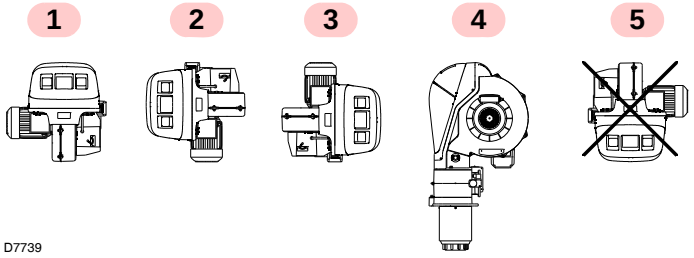


Fig. 10

4.5 Securing the burner to the boiler

4.5.1 Boiler plate

Make holes in the plate shutting off the combustion chamber, as illustrated in Fig. 11.
The position of the threaded holes can be marked using the thermal insulation screen supplied with the burner.

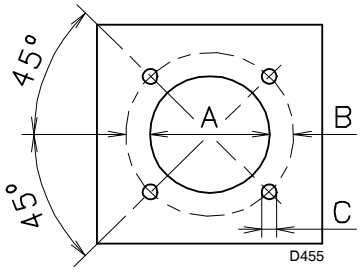


Fig. 11

inch	A	B	C
RS 68/E LN	9 1/16	12 25/32 - 14 1/2	5/8 W
RS 120/E LN	9 1/16	12 25/32 - 14 1/2	5/8 W

- For boilers with front flue passes 13) (Fig. 12) or flame inversion chambers, a protection in refractory material 11) must be inserted between the boiler refractory 12) and the blast tube 10). This protection must not compromise the extraction of the blast tube.
- For boilers with a water-cooled frontal, a refractory lining is not necessary 11)-12) (Fig. 12) unless expressly requested by the boiler manufacturer.

4.5.2 Boiler fixing

Secure the burner to the boiler, fixing the flange 9) (Fig. 12) to the boiler plate and interposing the insulating gasket 8).

Use the 4 screws, with a tightening torque of 26-29 Lbf. ft, after protecting their thread with anti-seize products.

The seal between burner and boiler must be airtight.

After the start-up, check there is no leakage of flue gases into the external environment.

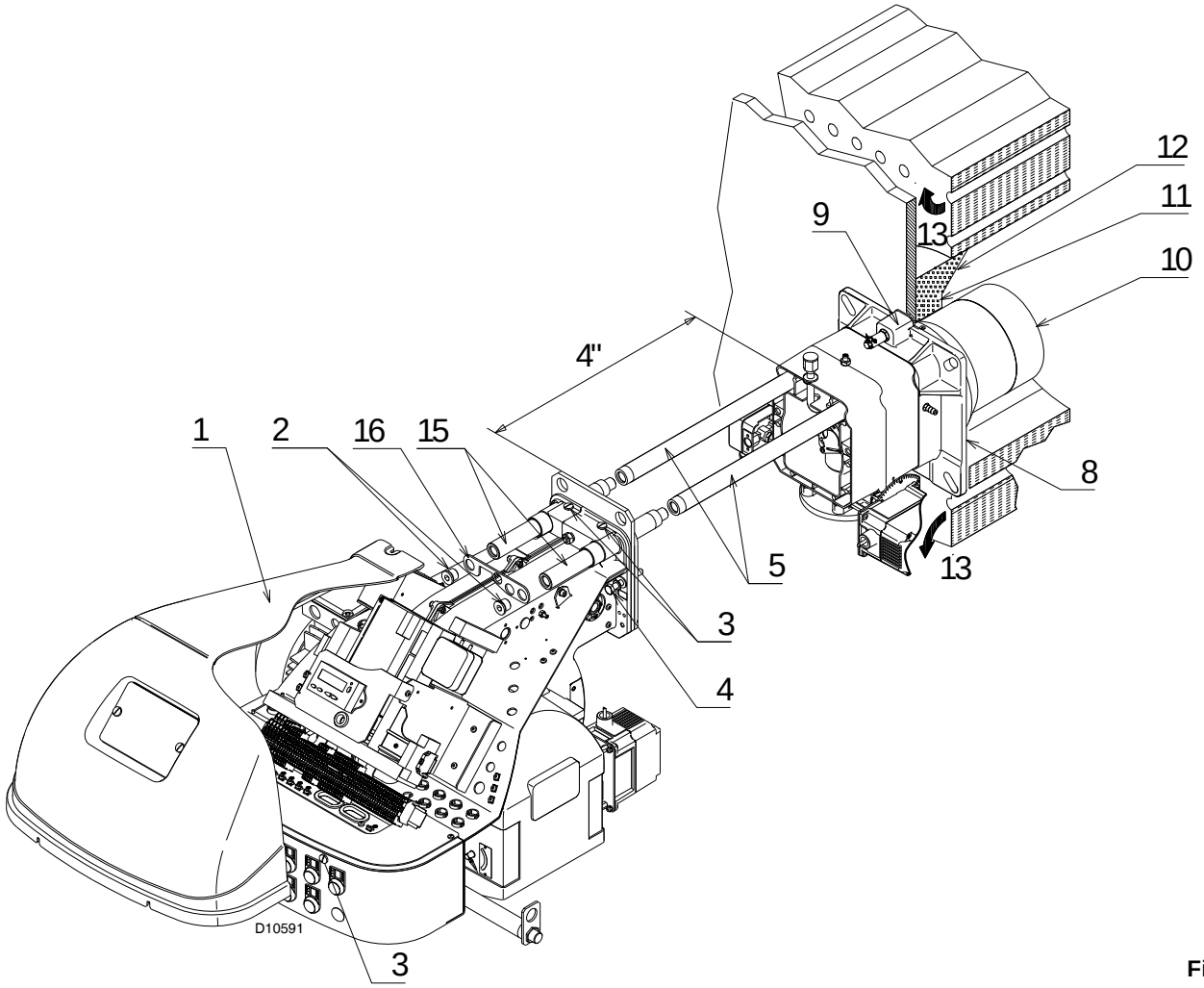


Fig. 12

4.6 Electrode positioning

To verify the correct position of the ignition electrode (Fig. 13), you need to separate the combustion head from the rest of the burner.

WARNING

Measures must be respected.

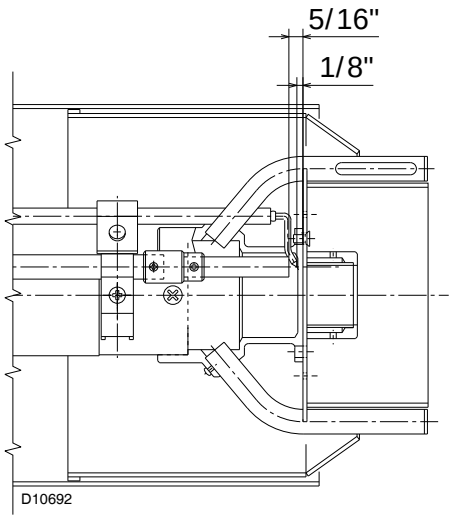


Fig. 13

4.6.1 Combustion head calibration

At this point check, for model RS 120/E LN, 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 Fig. 4, page 11. If it is in area A then no operation is required. If on the other hand, it is in area B, before starting the burner remove the 4 circular sectors 1)(Fig. 15) fastened behind the stabilizing disc by removing the 8 screws 2)(Fig. 15).

Detach the combustion head from the burner, (Fig. 12):

- ➤ loosen the 4 screws 3) and remove the cover 1);
- ➤ remove the screws 2) from the slide bars 5);
- ➤ remove the 2 screws 4) and pull the burner back on slide bars 5) by about 4";
- ➤ install the extension bars 15) Fig. 12, page 18 and re-screw the screws 2) including the safety plate 16);
- ➤ disconnect the electrode wires and then pull the burner completely off the slide bars.

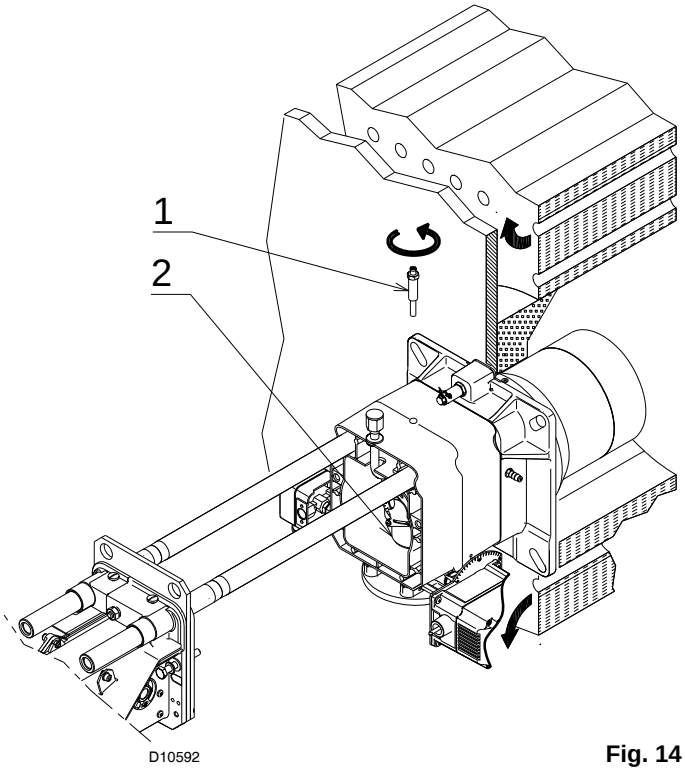


Fig. 14

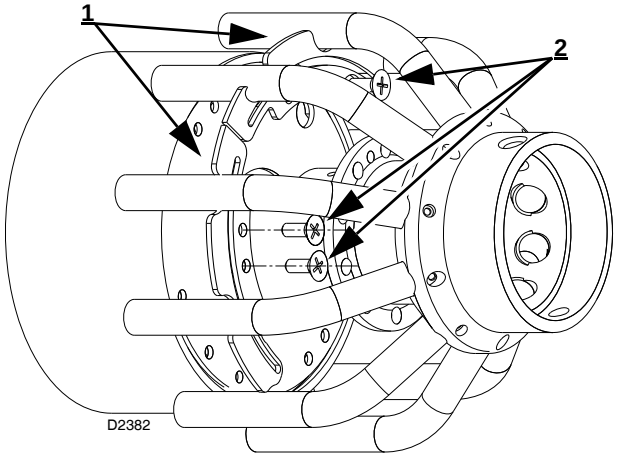


Fig. 15

4.7 Adjustment of the combustion head

At this point of the installation, the combustion head is fixed to the boiler as shown in Fig. 14.

It is therefore especially easy to adjust, and this adjustment depends only on the maximum output of the burner.

Two adjustments of the head are foreseen:

➤ air adjustment R1

➤ gas adjustment R2

In the diagram of Fig. 16, find the notch at which to adjust both air and central gas/air.

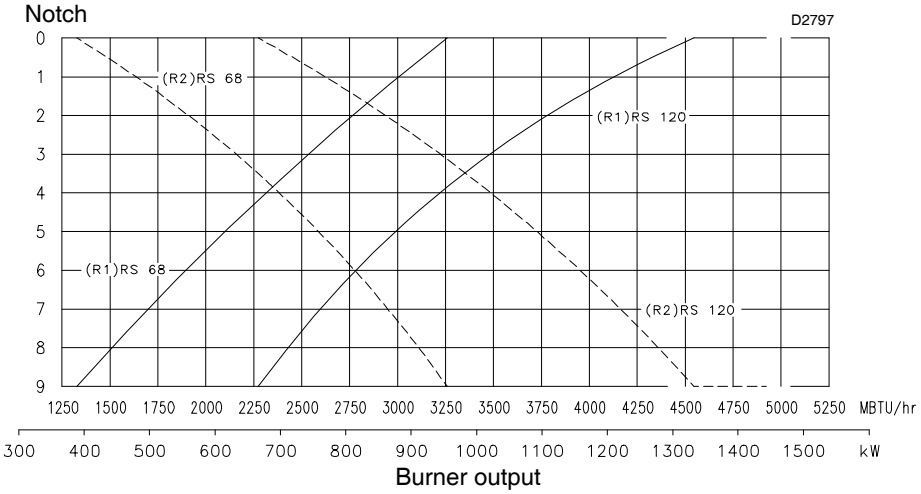


Fig. 16

4.7.1 Air adjustment

Turn screw 4)(Fig. 17) until the notch identified is aligned with the front surface 5)(Fig. 17) of the flange.

CAUTION

To facilitate adjustment, loosen the screw 3) (Fig. 17), adjust and then lock.

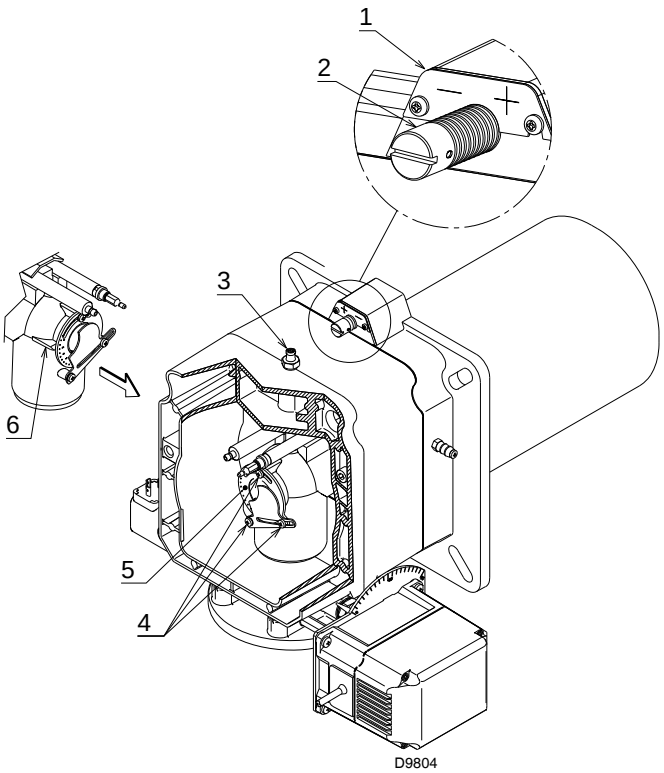


Fig. 17

4.7.2 Gas adjustment

➤ Loosen the 3 screws 4)(Fig. 17) and turn ring 5) until the notch identified is aligned with index 6).

➤ Tighten the 3 screws 1) fully down.

Example

RS 120/E LN, burner output = 3750 MBtu/hr

If we consult diagram (Fig. 16) we find that for this output the adjustments are:

- air: R1 = notch 2;
- gas: R2 = notch 5.

Note

Diagram (Fig. 16) indicates an optimal regulation for a type of boiler seen in Fig. 5, page 11.

If the pressure of gas allows it, by closing ring nut (Fig. 5, page 11) a reduction of the formation of NOx is obtained.

Continuing with the previous example, (Fig. 23, page 23) indicates that for burner with output of 3750 MBtu/hr a pressure of approximately 2.8” is necessary at test point 3)(Fig. 17). If this pressure cannot be reached, open the ring 5)(Fig. 17) to notch 4 or 5.

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

Once the combustion head adjustment is completed:

- ➤ push the burner on the sliding bars 3) at approximately 4” from the pipe coupling 4) - burner in the position shown in Fig. 18;
- ➤ insert the electrode cable, then slide the burner as far as the pipe coupling - burner in the position shown in Fig. 19;
- ➤ unscrew the 2 screws 2) from the extension 5) and reposition them as previously Fig. 19.
- ➤ refit the screws 2) on the sliding bars 3);
- ➤ fix the burner to the pipe coupling with the screws 1).

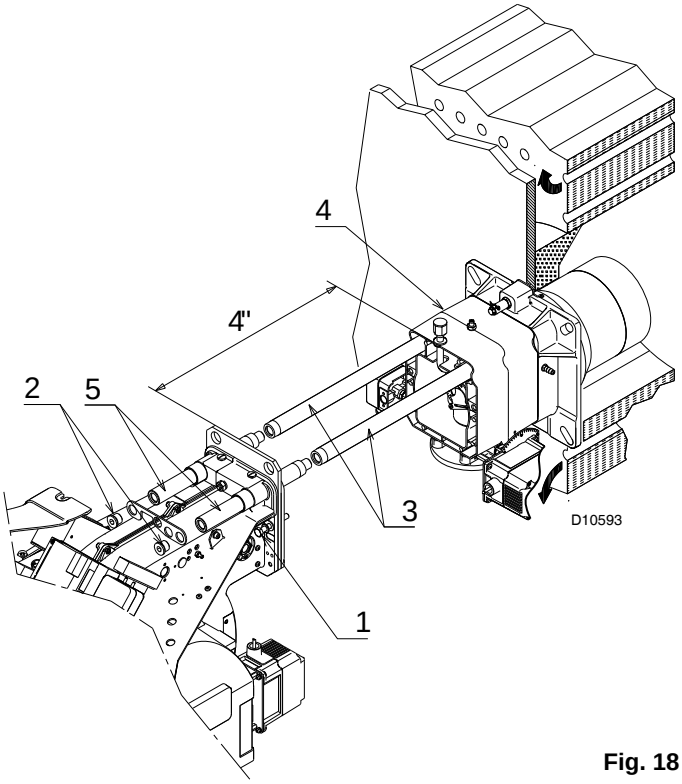
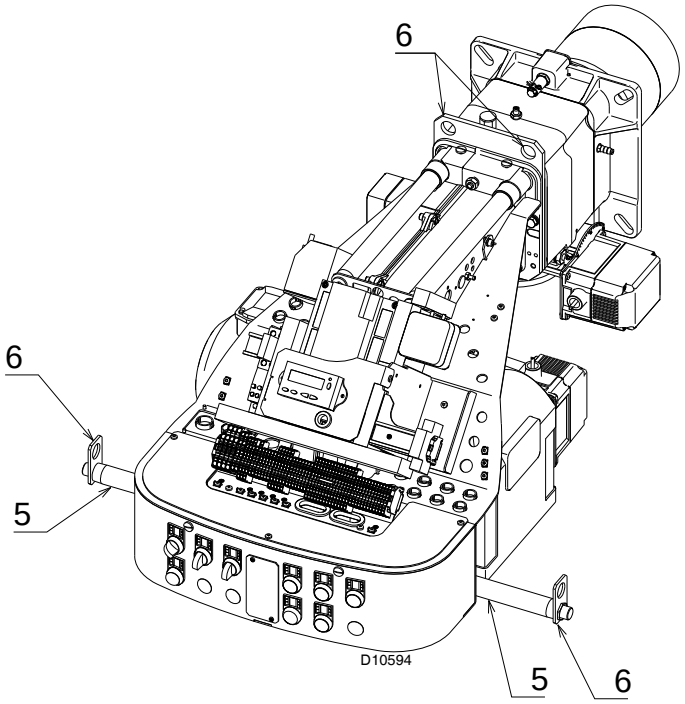


Fig. 18

WARNING

When fitting the burner on the two sliding bars, it is advisable to gently draw out the high voltage cable until it is slightly taut.



5) Extension sliding bars
6) Lifting rings

Fig. 19

4.8 Gas train assembly

- ➤ The gas train is type-approved according to standard UL 795 and is supplied separately from the burner.
- ➤ The gas train can enter the burner from the right or left side, depending on which is the most convenient, see Fig. 20.
- ➤ The gas train must be connected to the gas attachment 1) (Fig. 20) with the flange 2), the gasket 3) and the screws 4) supplied with the burner.
- ➤ The gas solenoids must be as close as possible to the burner, to ensure that the gas reaches the combustion head within the safety time of 3s.
- ➤ Ensure that the maximum pressure necessary for the burner is included in the calibration field of the pressure regulator (colour of the spring).
- ➤ The pilot gas train must be connected to the gas attachment 5)(Fig. 20) and can enter the burner from the right or left side.

WARNING

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

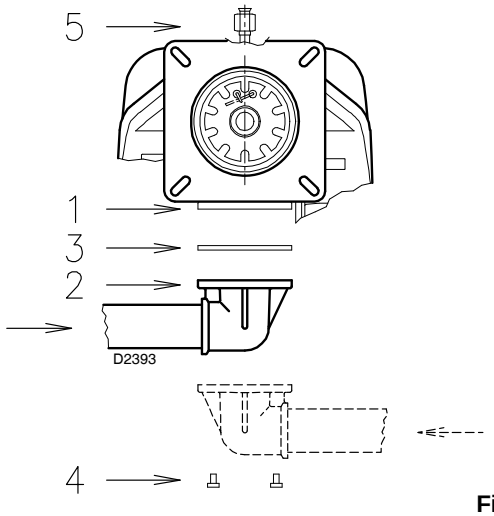


Fig. 20

4.9 Gas feeding line

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

KEY (Fig. 21)

1 Gas input pipe
2 Manual valve
3 Pressure regulator
4 Minimum 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 Maximum gas pressure switch (*)

(*) On the burner

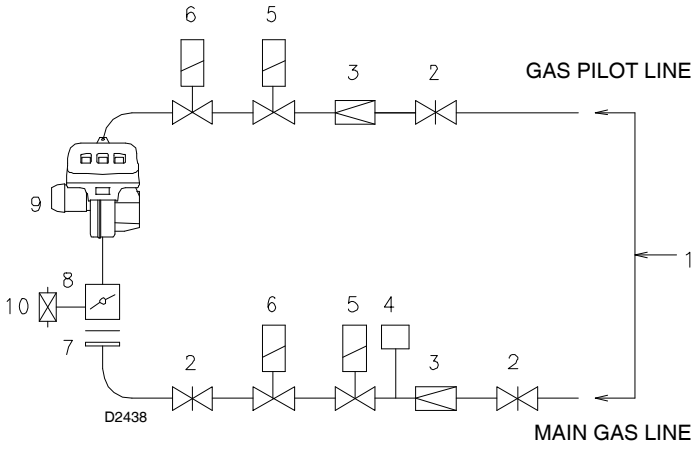


Fig. 21

4.10 Gas supply pressure

The diagram (Fig. 23) show minimum load losses at combustion head depending on the maximum burner output operation with natural gas (G 20).

Gas pressure is measured at the test point 1)(Fig. 22), with:
- Combustion chamber at 0 mbar
- Burner working at maximum output
- Ring nut 2) (Fig. 17) adjusted as in the diagram of Fig. 16

NOTE

To know the approximate output at which the burner is operating at its maximum:
– subtract the combustion chamber pressure from the gas pressure measured at test point 1)(Fig. 22);
– find, in the diagram (Fig. 23) the pressure value closest to the result you want;
– read the corresponding output on the left.

Example for RS 120/E LN
- Maximum output operation
- Natural gas
- Gas ring 2)(Fig. 16, page 20) adjust as indicated in diagram Fig. 16, page 20
- Gas pressure at test point 1)(Fig. 22) = 5.11 “WC
- Pressure in combustion chamber = 1.18 “WC

5.11 - 1.18 = 3.93 “WC

A maximum output of 3030 MBtu/hr shown diagrams RS 120/E LN corresponds to 3.93 “WC pressure.

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

NOTE

To know the required gas pressure at test point 1) (Fig. 22), set the maximum output required from the burner operation, then:
– find the nearest output value in the table for the burner in question.
– read, on the diagram (Fig. 23), the pressure test point 1) (Fig. 22);
– add this value to the estimated pressure in the combustion chamber.

Example for RS 120/E LN
- Maximum output required: 3750 MBtu/hr
- Ring nut 2) (Fig. 17) adjusted as in the diagram of Fig. 16
- Gas pressure at output of 2815 MBtu/hr = 6 “WC
- Pressure in combustion chamber = 1.18 “WC

6 + 1.18 = 7.15 “WC

pressure required at pressure test point 1) (Fig. 22).

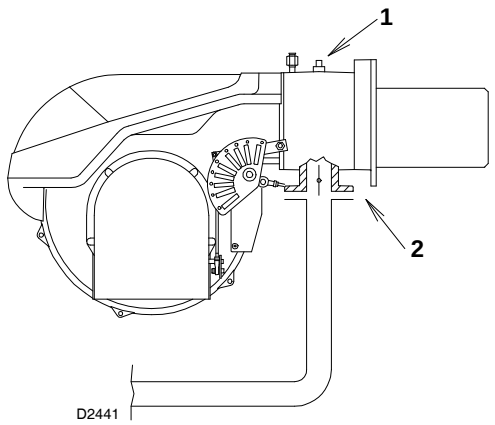


Fig. 22

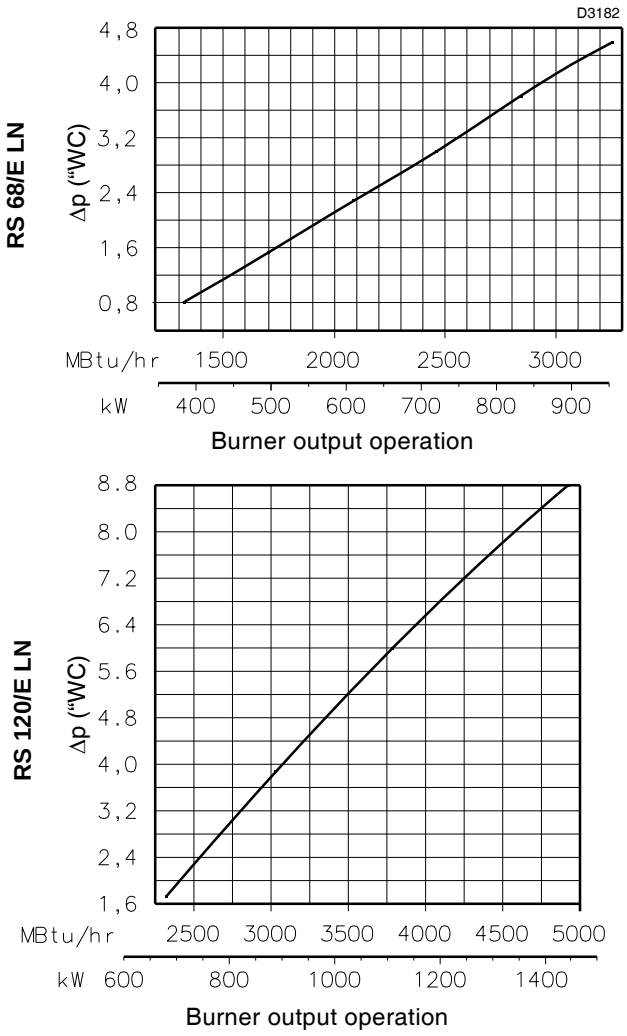


Fig. 23

Δp “wc gas butterfly 2)(Fig. 22)

RS 68/E LN		
MBtu/hr	kW	Δp “WC
1194	350	0.04
1365	400	0.04
1535	450	0.04
1706	500	0.1
1877	550	0.1
2047	600	0.1
2218	650	0.1
2388	700	0.1
2559	750	0.2
2730	800	0.2
2934	860	0.2
3071	900	0.2
3241	950	0.2

RS 120/E LN		
MBtu/hr	kW	Δp “WC
2047	600	0.1
2218	650	0.1
2440	715	0.2
2593	760	0.2
2815	825	0.2
3037	890	0.2
3258	955	0.2
3480	1020	0.3
3719	1090	0.3
3992	1170	0.3
4265	1250	0.4
4335	1300	0.5
4606	1350	0.5
4777	1400	0.5

4.11 Electrical wiring

4.11.1 Notes on safety for the electrical wiring

DANGER

- 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.
- 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.

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

All the cables to be connected to the burner are fed through the grommets. See figure on the right.

The use of the cable grommets can take various forms.
By way of example we indicate the following mode (according to **UL795**):

1 Three phase power supply with $^3/_4$ inch cable grommet.
2 Available: single phase power supply and other devices with $^1/_2$ inch cable grommet.
3 Available: HORN
4 Available: consents/safety, minimum gas pressure switch, gas valves and other devices with $^3/_8$ inch cable grommet.
5 Anchor plate for installation of step down transformer.
6 Available for ground terminals

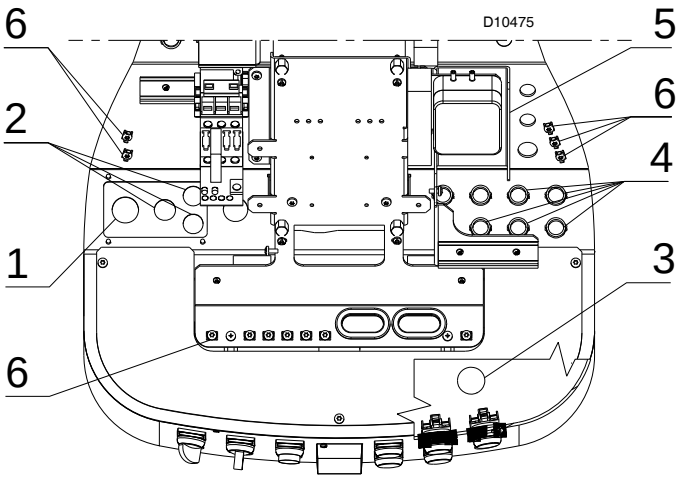


Fig. 24

WARNING

The control panel is in compliance with UL508A.

4.12 Thermal relay calibration

Depending on the burner type, there are two different thermal relays:
– Electro-mechanical termal relay (used for single phase motors)
– Electronic thermal relay (used for three phase motors)

4.12.1 Electro-mechanical thermal relay

The electro-mechanical termal relay (Fig. 25) 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 given in electrical layout. If the minimum value of the scale of the thermal relay is greater than the rating absorption of the motor, protection is still ensured.

This arises when the power supply of the motor is a nominal value.

➤ To reset, in the case of an intervention of the thermal relay, press the button “**RESET**” (Fig. 25).

➤ The button “**STOP**” (Fig. 25) opens the NC (95-96) contact and stops the motor.

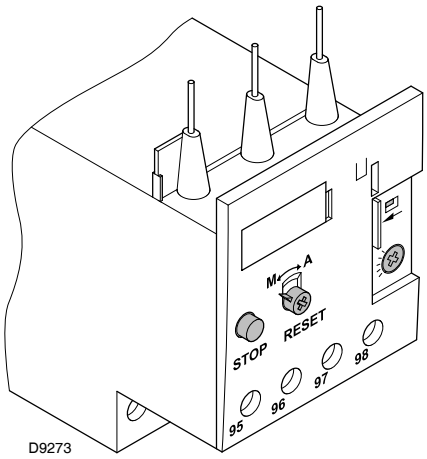


Fig. 25

➤ To test the thermal relay, insert a screwdriver in the window “**TEST**” (Fig. 26) and move it in the sense of the arrow (towards right).

WARNING

Automatic resetting can be dangerous.

This action is not provided for the burner operation.

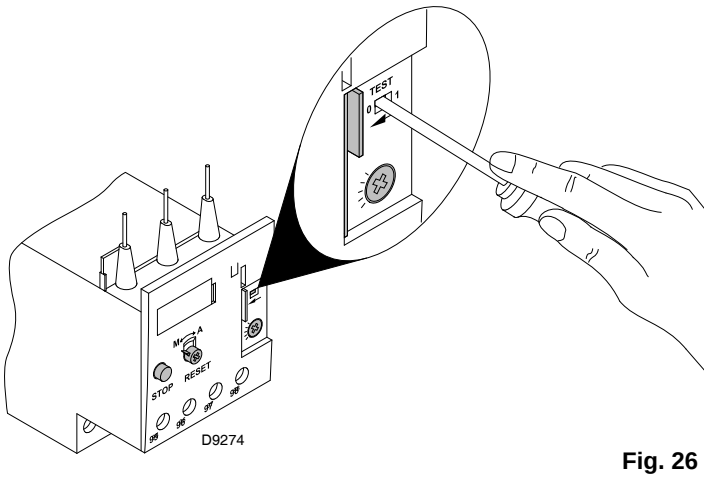


Fig. 26

4.12.2 Electronic thermal relay

➤ To reset, in the case of an intervention of the thermal relay, press the button “**RESET**” (Fig. 27).

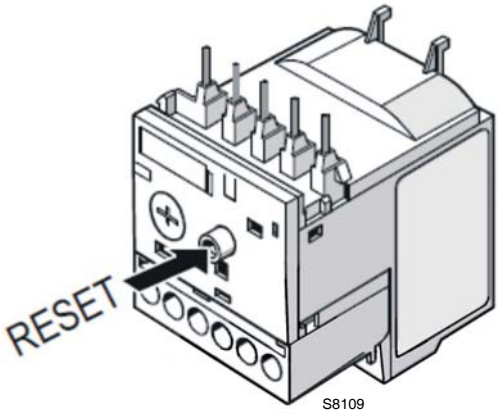


Fig. 27

There are two different solution to test the electronic thermal relay:

➤ **Device test (Fig. 28)**
Push slowly the button in the window with a little screwdriver.

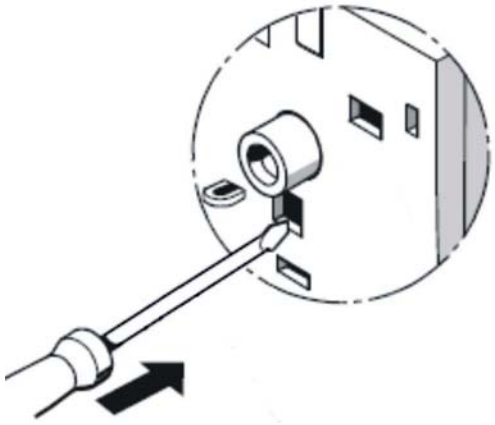


Fig. 28

➤ **Contact test NC (95-96) and NO (97-98)(Fig. 29)**
Insert in the window a little screwdriver and move it in the sense of the arrow.

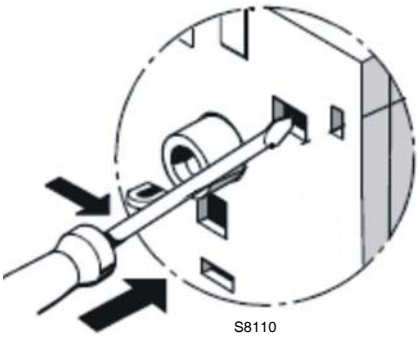


Fig. 29

4.13 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.

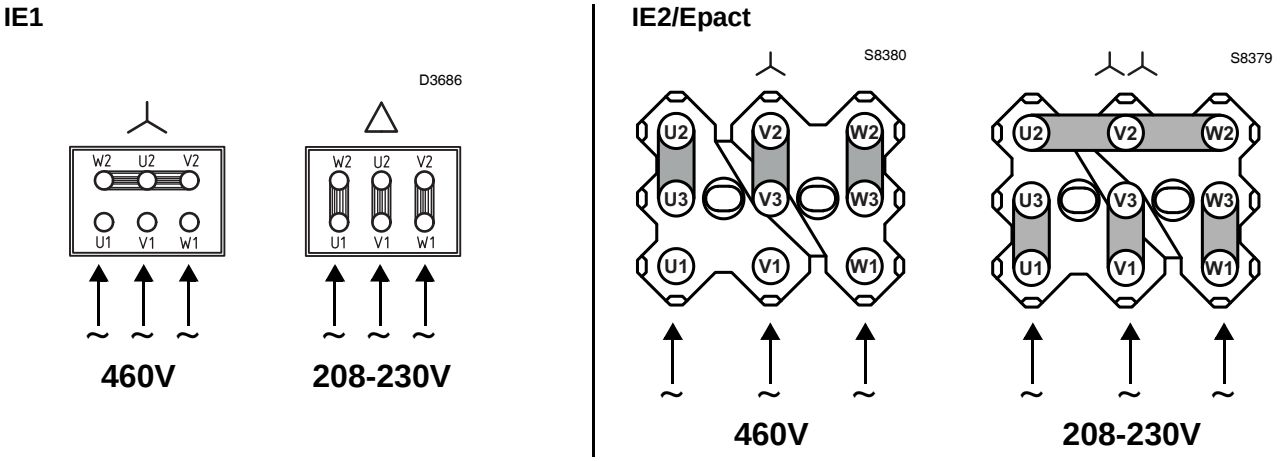


Fig. 30

4.14 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.

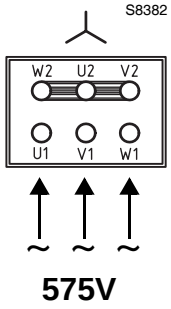


Fig. 31

4.15 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.**

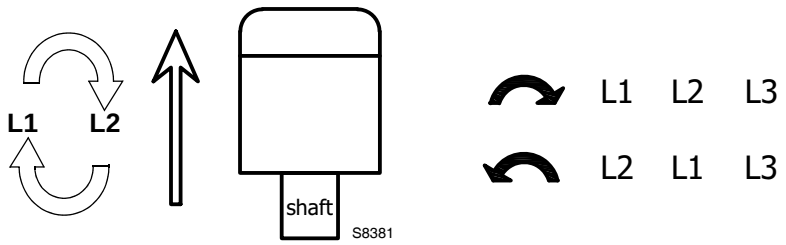


Fig. 32

5 Start-up, calibration and operation of the burner

5.1 Notes on safety for the first start-up

WARNING

The first start-up of the burner must be carried out by qualified personnel, as indicated in this manual and in compliance with the standards and regulations of the laws in force.

WARNING

Check the correct working of the adjustment, command and safety devices.

5.2 Operations before start-up

➤ Ensure that the gas supply company has carried out the supply line vent operations, eliminating air or inert gases from the piping.
➤ Slowly open the manual valves situated upstream of the gas train.
➤ Adjust the minimum gas pressure (Fig. 33) switch to the start of the scale.

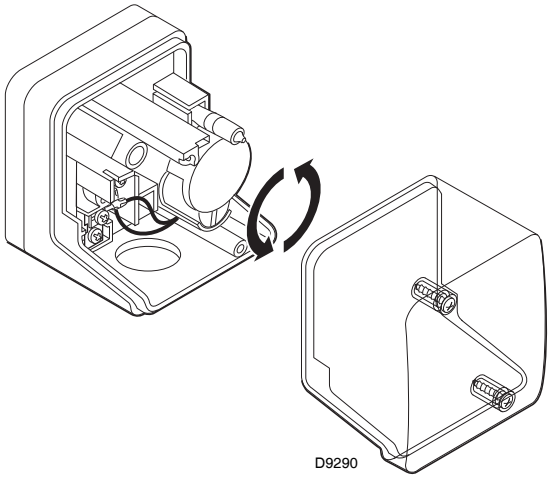


Fig. 33

➤ Adjust the maximum gas pressure switch (Fig. 34) to the end of the scale.

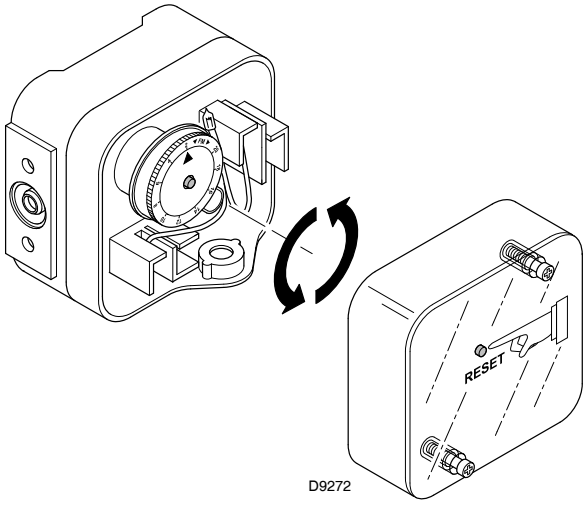


Fig. 34

➤ Adjust the air pressure switch (Fig. 35) to the start of the scale.

Fig. 35

➤ Purge the air from the gas line.
Fit a U-type manometer (Fig. 36) to the gas pressure test point on the sleeve.
The manometer readings are used to calculate the MAX. burner power using the diagram on page 23.

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.

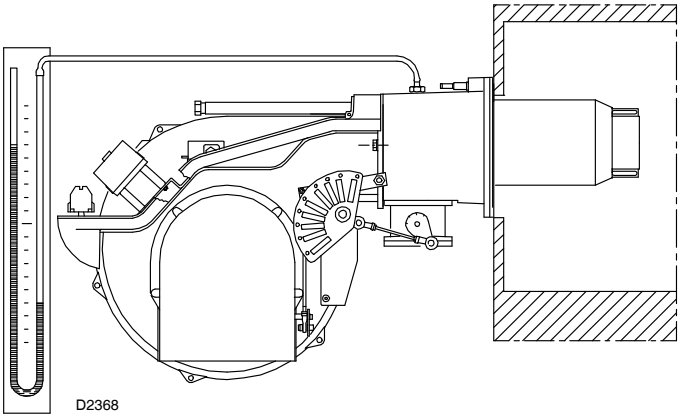


Fig. 36

5.3 Burner start-up

Feed electricity to the burner via the disconnecting switch on the boiler panel.

Close the thermostats/pressure switches, set the parameters on the RWF 40 regulator. Please refer to the spacific manual for this operation. Turn the switch of Fig. 37 to position **"ON"** and turn the switch of Fig. 37 to position **"LOCAL"**.

DANGER

Make sure that the lamps or testers connected to the solenoids, or indicator lights on the solenoids themselves, show that no voltage is present. If voltage is present, stop the burner **immediately** and check the electrical wiring. When the burner starts, check the direction of the motor rotation, as indicated in (Fig. 37).
As the burner is not fitted with a device to check the sequence of the phases, the motor rotation may be incorrect. As soon as the burner starts up, go in front of the cooling fan of the fan motor and check it is rotating anticlockwise. See Fig. 37.
If this is not the case:

- ➤ place the switch of Fig. 37 in position **"0"** and wait for the control box to carry out the switch-off phase;
- ➤ disconnect the electrical supply from the burner;
- ➤ invert the phases on the three-phase power supply.

DANGER

Adjusting gas/air delivery

- – Move slowly towards the maximum output (butterfly gas valve completely open);
- – adjust the required maximum output with the gas pressure stabilizer;
- – adjust the combustion parameters with the air servomotor and store the maximum combustion point;

complete the procedure slowly, synchronizing the combustion with the two servomotors and storing the different setting points.

WARNING

For the start-up procedure and the parameters calibration, refer to the specific instruction manual of the LMV37... electronic cam supplied with the burner.

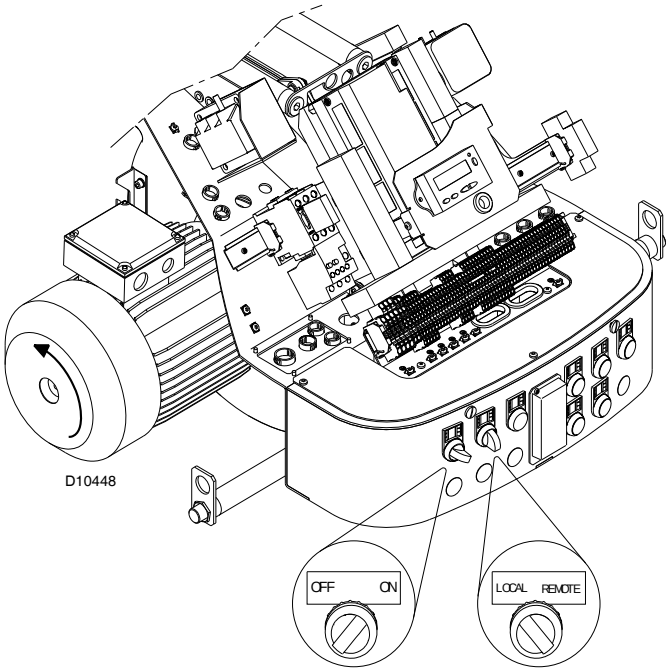


Fig. 37

5.4 Final calibration of the pressure switches

5.4.1 Air pressure switch

The air pressure switch is connected in differential (Fig. 39) and is activated by both the negative pressure of the air intake and the air pressure from the fan.

Adjust the air pressure switch (Fig. 38) after having performed all other burner adjustments with the air pressure switch set to the min. of the scale.

With the burner operating at low fire, adjust the pressure switch by slowly turning the relative knob clockwise until the burner locks out.

Then turn the knob counter-clockwise about 20% of the set point and start-up the burner again to ensure the set point is correct.

If the burner locks out again, turn the knob counter-clockwise a little bit more.

Fig. 38

5.4.2 Maximum gas pressure switch

Adjust the maximum gas pressure switch after having performed all other burner adjustments with the maximum gas pressure switch set to the end of the scale (Fig. 40).
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.

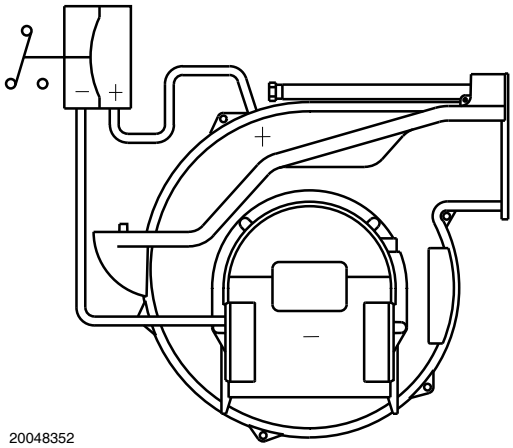


Fig. 39

5.4.3 Minimum gas pressure switch

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 (Fig. 41).
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.

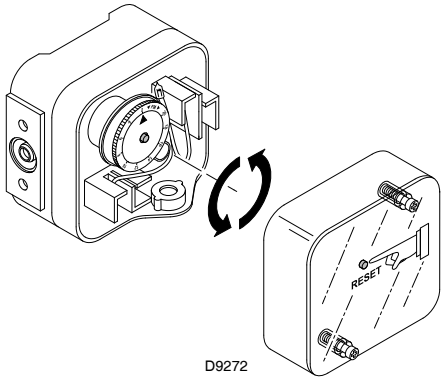


Fig. 40

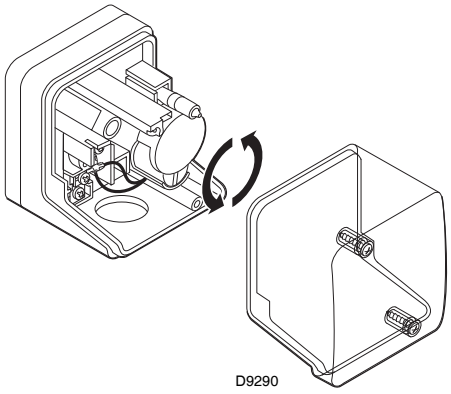


Fig. 41

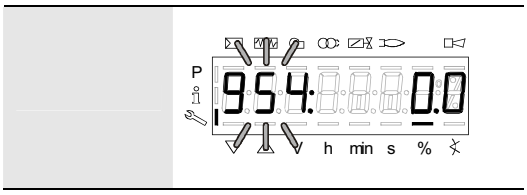
5.5 Flame signal measurement

Check the flame signal through the parameter 954, as indicated in Fig. 42. The displayed value is expressed in percentage.

For further and specific information, please refer to the specific instruction manual.

The value during the operation must be higher than 24%. If at the burner start-up the value is higher or equal of 18%, the burner locks out due to the extraneous light.

The display (Fig. 42) shows parameter **954**: flashing on the left. On the right, the flame's intensity is displayed as a percentage.
Example: **954: 0.0**



S8171

Fig. 42

5.6 Final checks (with the burner working)

➤ Open the control limit operation ➤ Open the high limit operation	⇨	The burner must stop
➤ Rotate the maximum gas pressure switch knob to the minimum end-of-scale position ➤ Rotate the air pressure switch knob to the maximum end of scale position	⇨	The burner must stop in lockout
➤ Switch off the burner and disconnect the voltage ➤ Disconnect the minimum gas pressure switch	⇨	The burner must not start
➤ Cover the UV flame sensor	⇨	The burner must stop in lockout due to firing failure

WARNING

Make sure that the mechanical locking systems on the different adjustment devices are fully tightened.

6 Maintenance

6.1 Notes on safety for the maintenance

The periodic maintenance is essential for the good operation, safety, yield and duration of the burner.

It allows you to reduce consumption and polluting emissions and to keep the product in a reliable state over time.

DANGER

The maintenance interventions and the calibration of the burner must only be carried out by qualified, authorised personnel, in accordance with the contents of this manual and in compliance with the standards and regulations of current laws.

Before carrying out any maintenance, cleaning or checking operations:

DANGER

Disconnect the electricity supply from the burner by means of the main switch of the system.

DANGER

Close the fuel interception tap.

6.2 Maintenance programme

6.2.1 Maintenance frequency

The gas combustion system should be checked **at least once a year** by a representative of the manufacturer or another specialised technician.

6.2.2 Checking and cleaning

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 there are no gas leaks on the conduit between the gas meter and the burner.

Gas filter

Replace the gas filter when it is dirty.

Flame inspection window

Clean the glass of the flame inspection window.

Combustion head

Open the burner and make sure that all the components of the combustion head are:

– undamaged
– not deformed due to high temperature
– free of ambient dirt or dust
– free of rusted materials
– adequately positioned

Make sure that the gas outlet holes for the start-up, on the combustion head distributor, are free of dirt or rust deposits.

In case of doubt, disassemble the inner part 5)(Fig. 44, page 32).

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 produce good combustion.

Use the appropriate card to record the new combustion values; they will be useful for subsequent controls.

UV scanner

In order to reach the UV scanner (Fig. 43), proceed as follows:

➤ Extract the UV scanner 2).
➤ Clean the glass cover from any dust that may have accumulated.

WARNING

➤ Be extremely careful while troubleshooting the detector; line voltage is present on some of the terminals when power is on.
➤ Open the master switch to disconnect power before removing or installing the detector.

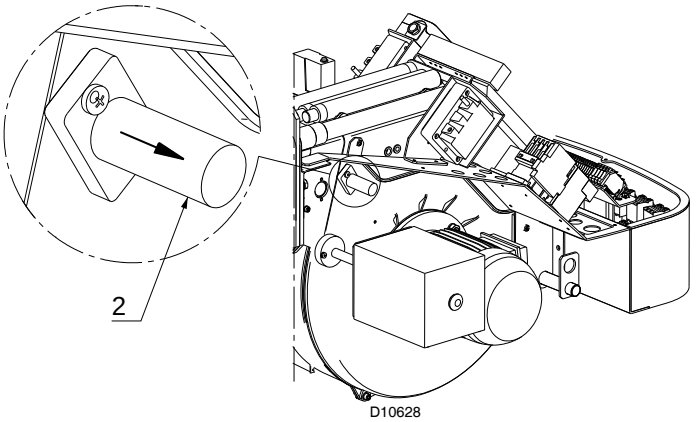


Fig. 43

6.3 Opening the burner

DANGER

Disconnect the electrical supply from the burner.

In order to open the burner, proceed as follows:
- ➤ loosen the 4 screws 1) (Fig. 44) and remove the cover 2);
- ➤ install the 2 extensions 9) on the sliding bars 4) and re-screw the screws 8);
- ➤ remove the screws 3) and pull back the burner on the sliding bars 4) of about 4";
- ➤ disconnect the electrode lead, then unthread the burner completely from the sliding bars;
- ➤ remove the screw 6) and extract the inner part 5) of the head.

6.4 Closing the burner

In order to close the burner, re-install all components with reverse procedure:
- ➤ remove the 2 extensions 9) and re-screw the screws 8) on the sliding bars 4) ;
- ➤ push the burner up to approximately 4" from the pipe coupling;
- ➤ reinsert the electrode lead and slide the burner as far as the stop.
- ➤ fix the screws 3) to secure the burner to the combustion head;
- ➤ fix the 4 screws 1) to install the cover 2).

WARNING

Connect the electrical supply from the burner.

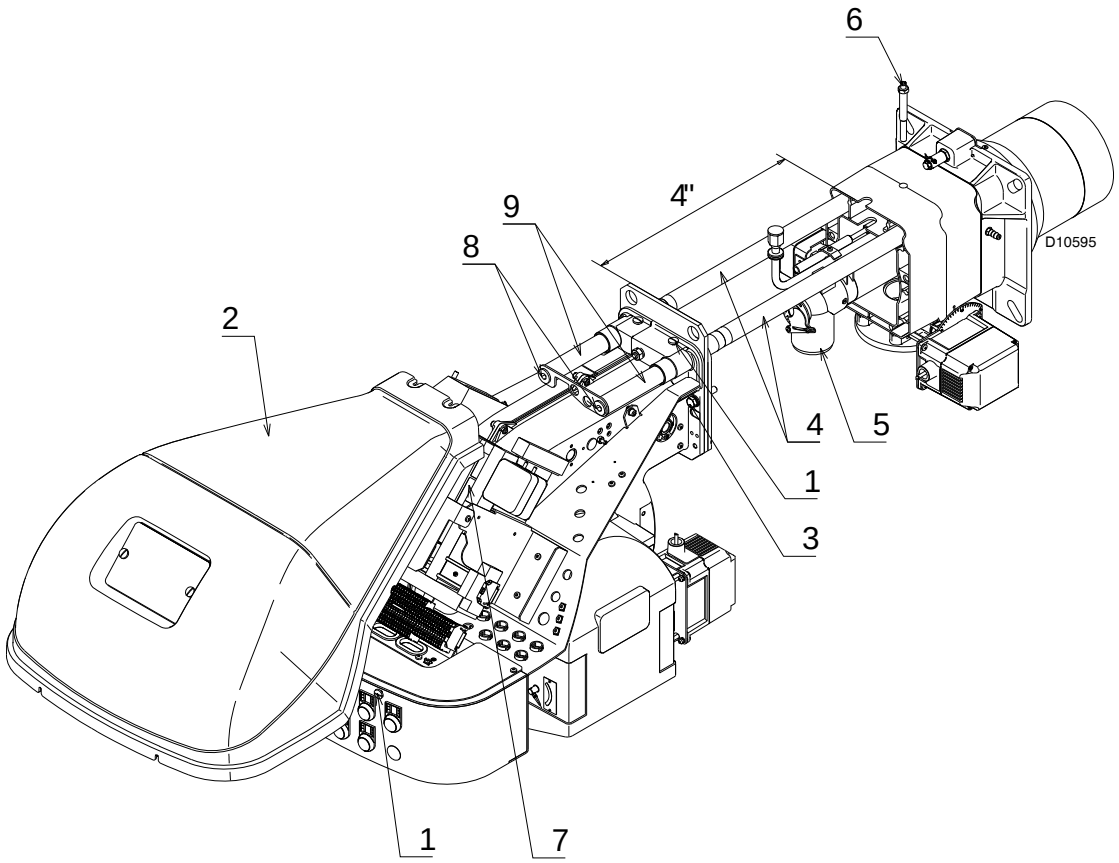
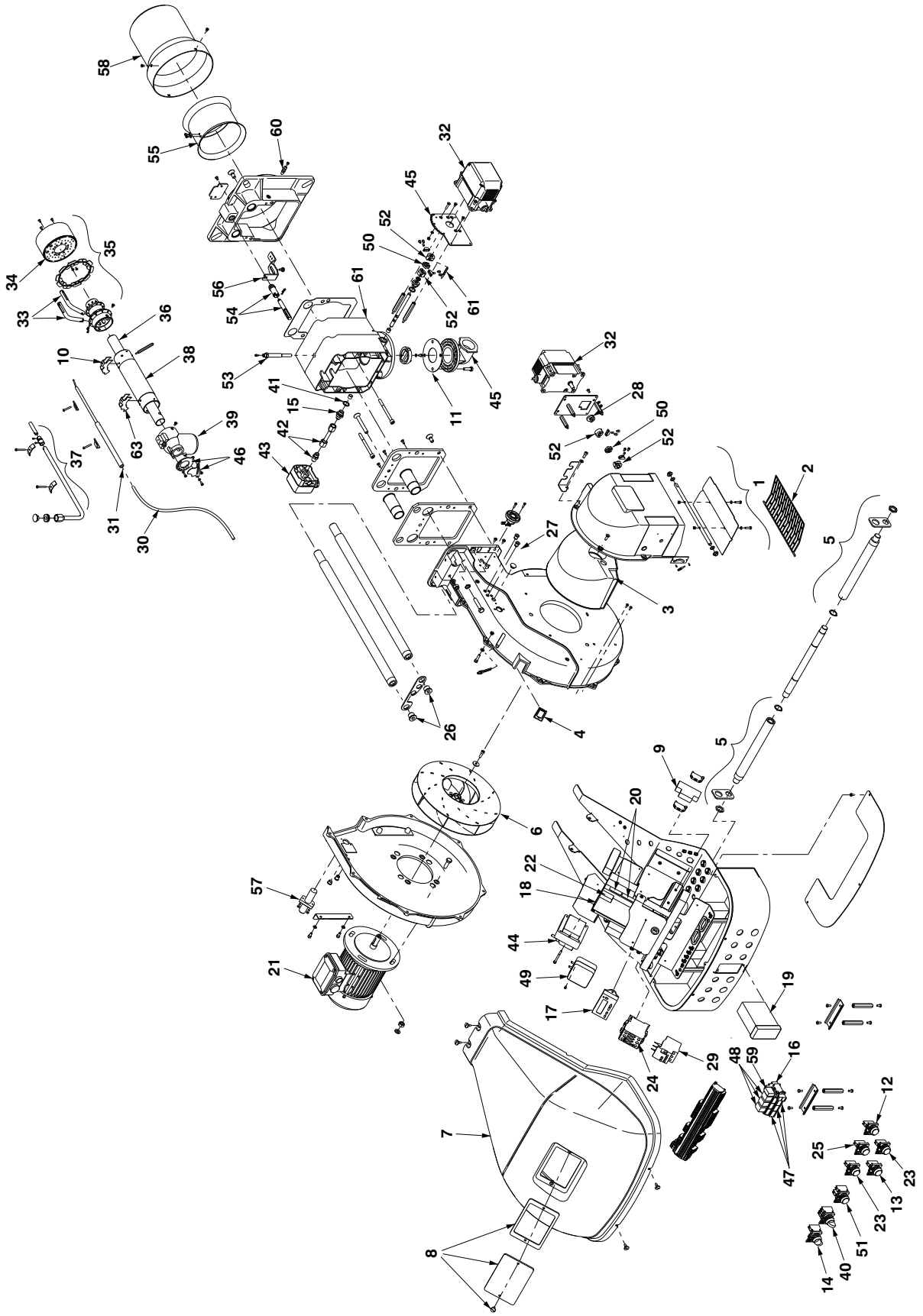


Fig. 44

A Appendix - Spare parts



No.	CODE		RS 68/E LN	RS 120/E LN	DESCRIPTION	*
1		3013260	•	•	AIR DAMPER ASSEMBLY	
2		3003949	•	•	GRID	
3		3003952	•	•	SOUND DAMPING	C
4		3003763	•	•	INSPECTION WINDOW	
5		3013686	•	•	BAR EXTENSIONNS	
6		3012403	•		FAN	C
6		3012940		•	FAN	C
7		20027230	•	•	COVER	
8		20026784	•	•	INSPECTION WINDOW	
9		20014366	•	•	FUSE HOLDER	C
10		3013087	•	•	SUPPORT	
11		3005482	•	•	SEAL	
12		20027018	•	•	RED SIGNAL LIGHT	C
13		20027020	•	•	YELLOW SIGNAL LIGHT	C
14		20027021	•	•	COMMUTATOR	C
15		3003220	•	•	CONNECTOR	C
16		3020071	•	•	BASE	C
17		20010967	•	•	AZL DISPLAY	B
18		20010968	•	•	ELECTRONIC CAM	C
19		20027287	•	•	RWF 40 HIGH	C
20		3013940	•	•	CONNECTORS ASSEMBLY	C
21		20030201	•		MOTOR 1.8 KW	C
21		20030200		•	MOTOR 2.2 KW	C
22		3006211	•	•	FUSE 6.3A	A
23		20027013	•	•	GREEN SIGNAL LIGHT	C
24		20028310	•	•	CONTACTOR	C
25		20027014	•	•	WITHE SIGNAL LIGHT	C
26		3013681	•	•	SCREW	C
27		3003891	•	•	CONNECTOR	C
28		3014079	•	•	SPACER	
29		20028312	•	•	OVERLOAD TERMAL RELAY	C
30		3012393	•	•	ELECTRODE CONNECTION	A
31		3013081	•	•	ELECTRODE	A
32		20008601	•	•	SERVOMOTOR	B
33		3012924	•		TUBE	
33		3012925		•	TUBE	
34		3013082	•		SCOOP	
34		3013083		•	SCOOP	
35		3013084	•		GAS HEAD	
35		3013085		•	GAS HEAD	
36		3012035	•	•	INTERIOR TUBE	
37		3012974	•	•	GAS PILOT	
38		3013088	•	•	EXTERIOR TUBE	
39		3012042	•	•	ELBOW	
40		20027422	•	•	COMMUTATOR	C
41		3007088	•	•	SEAL	B
42		3013055	•	•	TUBE	
43		3012969	•	•	GAS PRESSURE SWITCH	B
44		3012956	•	•	TRANSFORMER 1.7A 120V	B
45		3012971	•	•	FLANGE AND ELBOW	C
46		3012014	•	•	DISC	C
47		3012841	•	•	BASE	
48		20010969	•	•	RELAY 110V	C

No.	CODE		RS 68/E LN	RS 120/E LN	DESCRIPTION	*
49		3012948	•	•	AIR PRESSURE SWITCH	A
50		3013938	•	•	DISC	
51		20010962	•	•	BUTTON	
52		3013937	•	•	HUB	
53		3012049	•	•	SCREW	
54		3012639	•	•	CONTROL DEVICE	
55		20030203	•		SHUTTER	C
55		20030202		•	SHUTTER	C
56		20030204	•	•	BRACKET	
57		3003396	•	•	UV FLAME SENSOR	A
58		20030206	•	•	END CONE	
59		3020068	•	•	RELAY	C
60		3003322	•	•	CONNECTOR	
61		20028318	•		MANIFOLD	
61		20029237		•	MANIFOLD	
62		3013939	•	•	INDEX	C
63		3013086	•	•	SUPPORT	

*

ADVISED PARTS

A = Spare parts for minimum fittings
A+B = Spare parts for basic safety fittings
A+B+C = Spare parts for extended safety fittings

B Appendix - Accessories

- **Tubes kit**

Burner	Code
RS 68/E LN	3010247
RS 120/E LN	3010248

- **Gas train according to UL Standards**

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

C Appendix - Burner start up report

Model number:		Serial number:	
Project name:		Start-up date:	
Installing contractor:		Phone number:	

Model number:		Serial number:	
Project name:		Start-up date:	
Installing contractor:		Phone number:	

GAS OPERATION

Gas Supply Pressure:		CO_2: Low Fire		High Fire	
Main Power Supply:		O_2: Low Fire		High Fire	
Control Power Supply:		CO: Low Fire		High Fire	
Burner Firing Rate:		NO_X: Low Fire		High Fire	
Manifold Pressure:		Net Stack Temp - Low Fire:		High Fire	
Pilot Flame Signal:		Comb. Efficiency - Low Fire:		High Fire	
Low Fire Flame Signal:		Overfire Draft:			
High Fire Flame Signal:					

CONTROL SETTINGS

Operating Setpoint:		Low Oil Pressure:	
High Limit Setpoint:		High Oil Pressure:	
Low Gas Pressure:		Flame Safeguard Model Number:	
High Gas Pressure:		Modulating Signal Type:	

NOTES

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http:// www.riello.com

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http://www.riello.ca

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Hingham, Massachusetts,
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2165 Meadowpine Blvd
Mississauga, Ontario
Canada L5N 6H6