

Forced draught gas burner

Progressive two stage or modulating operation



Code	Model
20039989	RS 50/EV

1	Information and general instructions	3
1.1	Information about the instruction manual	3
1.1.1	Introduction	3
1.1.2	General dangers	3
1.1.3	Safety precautions	3
1.1.4	Danger: live components	3
1.2	Guarantee and responsibility	4
1.2.1	Owner's responsibility	4
2	Safety and prevention	5
2.1	Introduction	5
2.2	Personnel training	5
3	Technical description of the burner	6
3.1	Technical data	6
3.2	Electrical data	6
3.3	Burner models designation	7
3.4	Burner description	8
3.5	Packaging - weight	9
3.6	Burner dimensions	9
3.7	Standard equipment	9
3.8	Firing rate	10
3.8.1	Procedure to refer burner operating condition in high altitude plants	10
3.9	Commercial boilers	12
3.10	Minimum furnace dimensions	12
3.11	Control box for the air/fuel ratio (LMV37.4...)	13
3.12	Actuators (SQM33.5...)	16
4	Installation	17
4.1	Notes on safety for the installation	17
4.2	Handling	17
4.3	Preliminary checks	17
4.4	Boiler plate	17
4.5	Blast tube length	18
4.6	Securing the burner to the boiler	18
4.7	Ignition pilot adjustment	18
4.8	Combustion head setting	19
4.8.1	Modulation minimum output	19
4.8.2	To open the burner	20
4.9	Gas piping	20
4.10	Gas train	21
4.11	Gas pressure	21
4.12	Electrical wiring	22
4.13	Connection cable between the inverter and the electronic cam LMV 37	23
4.14	Inverter connection	23
4.15	Speed sensor adjustment	24
5	Start-up, calibration and operation of the burner	25
5.1	Notes on safety for the first start-up	25
5.2	Operations before start-up	25
5.3	Burner firing	25
5.4	Burner start-up	26
5.5	Pressure switch adjustment	26
5.5.1	Air pressure switch	26
5.5.2	Minimum gas pressure switch	27
5.6	Flame signal measurement	27

5.7

Final checks (with the burner working)

27

6

Maintenance

28

6.1

Notes on safety for the maintenance

28

6.2

Opening the burner

29

6.2.1

To open the burner

29

6.2.2

To close the burner

29

A

Appendix - Spare parts

30

B

Appendix - Accessories

33

C

Appendix - Burner start up report

34

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 Safety precautions

Good safety practices must be used when working on burner equipment. The potential energy in the electrical supply, fuel and related equipment must be handled with extreme care to prevent equipment failures, injuries and potential death.



WARNING

If you smell gas, open window, extinguish any open flames, stay away from electrical switches, evacuate the building and immediately call the gas company.

If this equipment is not installed, operated, operated and maintained in accordance with the manufacturers instructions, this product could expose you to substances in fuel or from fuel combustion which can cause death or serious illness.

Improper servicing of this equipment may create a potential hazard to equipment and operators.

Servicing must be done by a fully trained and qualified personnel.

1.1.4 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 to 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.



WARNING

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 qualified service agency for use in professionally setting up and maintaining your burner.

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

We recommend annual inspection/service of your gas heating system by a qualified 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.



WARNING

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 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 50/EV
Output ⁽¹⁾	High	MBtu/hr kW	1099 - 2201 322 - 645
	Low	MBtu/hr kW	321 94
Fuel			Natural or propane gas
– Max delivery		SCFH	2201
– Pressure at maximum delivery ⁽²⁾		" WC	2.83
Operation			Low - high-low 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)
Electrical protection			NEMA 1
Noise levels ⁽³⁾		dB(A)	72

Tab. A

⁽¹⁾ Reference conditions: ambient temperature 68 °F (20°C) - Barometric pressure 394" WC - Altitude 329 ft.

⁽²⁾ Pressure at test point 7)(Fig. 1, page 8) with zero pressure in the combustion chamber and maximum burner output.

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

3.2 Electrical data

Model			RS 50/EV
Control circuit power supply	V/Ph/Hz		120/1/60
Main power supply (+/-10%)	V/Ph/Hz		208-220/3/60
Fan motor	rpm		3400
	W - HP		0.75
	V		208-230
	A		3.6
Ignition transformer	V1 - V2		120 V - 1 x 8 kV
	I1 - I2		1.6 A - 20 mA
Electrical power consumption	W		950
Electrical control circuit cons.	W max		750
Total electrical consumption	W		1700

Tab. B

Model			RS 50/EV
Control circuit power supply	V/Ph/Hz		120/1/60
Main power supply (+/-10%)	V/Ph/Hz		460/3/60
Fan motor	rpm		3400
	W - HP		0.75
	V		460
	A		1.8
Ignition transformer	V1 - V2		120 V - 1 x 8 kV
	I1 - I2		1.6 A - 20 mA
Electrical power consumption	W		950
Electrical control circuit cons.	W max		750
Total electrical consumption	W		1700

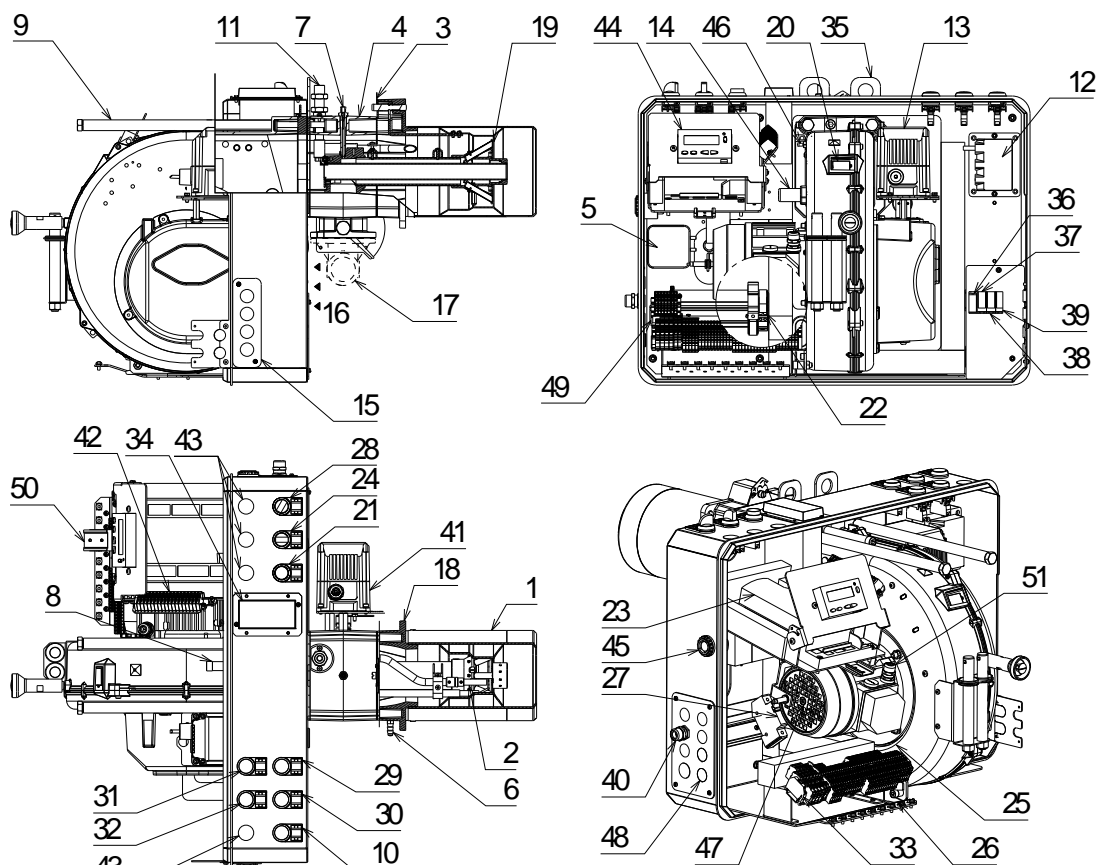
Tab. C

Model	RS 50/EV	
Control circuit power supply	V/Ph/Hz	120/1/60
Main power supply (+/-10%)	V/Ph/Hz	575/3/60
Fan motor	rpm	3450
	W - HP	0.75
	V	575
	A	1.3
Ignition transformer	V1 - V2	120 V - 1 x 8 kV
	I1 - I2	1.6 A - 20 mA
Electrical power consumption	W	950
Electrical control circuit cons.	W max	750
Total electrical consumption	W	1700

Tab. D

3.3 Burner models designation

Model	Code	Code RBNA	Voltage	Flame safeguard
RS 50/EV	20039989		208-220/3/60	Burner mounted
			460/3/60	
			575/3/60	

3.4 Burner description

Fig. 1

- | | |
|--|--|
| <ul style="list-style-type: none"> 1 Combustion head 2 Ignition pilot 3 Screw for combustion head adjustment 4 Sleeve 5 Low air pressure switch 6 Air combustion head pressure test point 7 Gas pressure test point and head fixing screw 8 Screw securing fan to sleeve 9 Slide bars for opening the burner and inspecting the combustion head 10 Signal "Alarm ON" 11 Pilot attachment 12 Ignition transformer "TA" 13 Air actuator 14 UV scanner 15 Plate with four hole knock-outs for electrical cable routing 16 Air inlet to fan 17 Gas input connection 18 Boiler mounting flange 19 Flame stability disk 20 Flame inspection window 21 Button "Alarm Silence" 22 Relay "KMV" 23 Control box for checking flame and air/fuel ratio 24 Switch "Local - Remote" 25 Fan motor 26 Ground terminals 27 Auxiliary fuses 28 Switch "OFF/ON" 29 Signal "Power ON" 30 Lamp Signal "Call for Heat" 31 Signal "Ignition ON" 32 Signal "Fuel ON" | <ul style="list-style-type: none"> 33 Burner terminal board "X1" 34 RWF40 modulator (with analog output 4-20 mA) 35 Lifting rings 36 Relay "K2" 37 Relay "K1" 38 Relay "K3" 39 Relay "K5" 40 Connector for shielding of inverter cable 41 Gas actuator 42 RWF40 terminal board "X3" 43 Optional holes 44 Operator panel with LCD display 45 Horn 46 Air pressure switch test point 47 Speed sensor 48 Holes for cable grommets for electrical wiring for accessories (to be carried out by the installer) 49 Speed sensor and inverter terminal board "X70" 50 DIN bar available for accessories (OC1 412.10) 51 Connector for shielding of motor cable |
|--|--|

One type of burner failure may occur:

► **Flame safeguard lock-out**

If the alarm signal lamp in "ON" 10)(Fig. 1) lights up, it indicates that the burner is in lock-out. To reset, press the reset pushbutton.

3.5 Packaging - weight

The burners are skid mounted. Outer dimensions of packaging are indicated in Tab. E.

The weight of the burner complete with packaging is indicated in Tab. E.

inch	A	B	C	lbs
RS 50/EV	39 ³¹ / ₃₂ "	24 ¹³ / ₁₆ "	21 ¹¹ / ₁₆ "	93

Tab. E

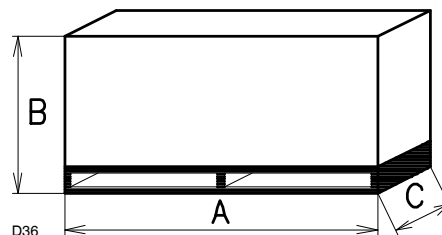


Fig. 2

3.6 Burner dimensions

The maximum dimensions of the burners are given in (Fig. 3).

Inspection of the combustion head requires the burner to be opened and the rear part withdrawn on the slide bars.

The maximum dimension of the burner when open, without casing, is give in measurement H.

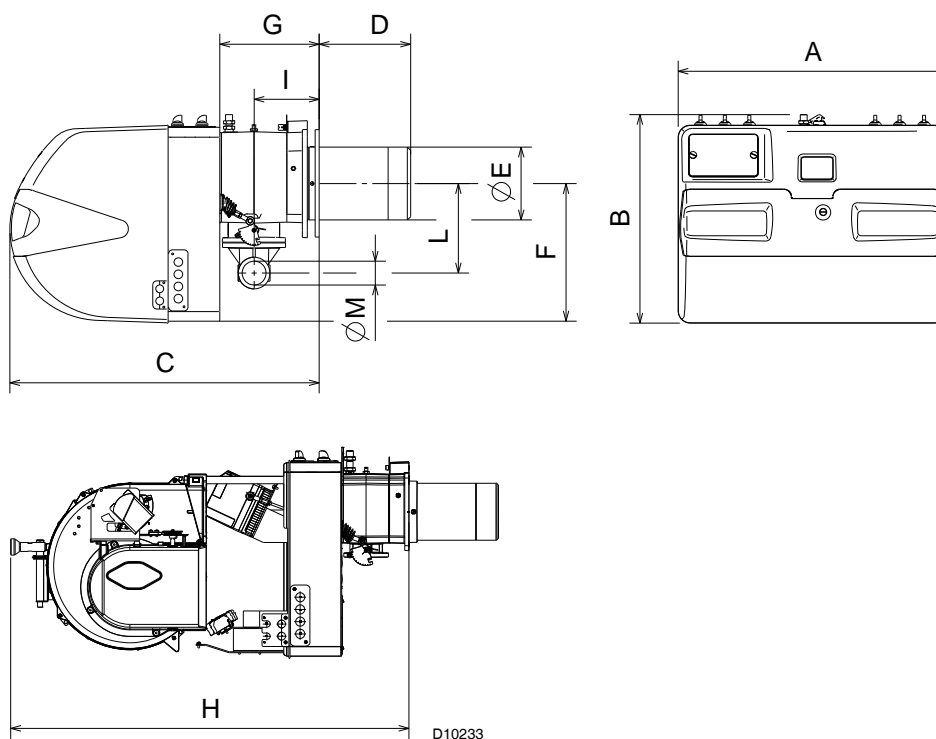


Fig. 3

inch	A	B	C	D ₍₁₎	E	F	G	H	I	L	M
RS 50/EV	18 ²³ / ₃₂ "	18 ²¹ / ₃₂ "	22 ¹³ / ₁₆ "	8 ¹ / ₂ " - 13 ¹³ / ₁₆ "	5 ³¹ / ₃₂ "	13 ²⁷ / ₃₂ "	6 ⁷ / ₁₆ "	31 ⁷ / ₈ "	4 ¹ / ₄ "	6 ⁵ / ₈ "	1 ¹ / ₂ "

Tab. F

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

3.7 Standard equipment

Gas train flange	No. 1
Flange gasket	No. 1
Flange fixing screws	No. 4
Instruction manual	No. 1

3.8 Firing rate

The burner can work in two ways: low and high fire.

MAXIMUM OUTPUT must be selected in area A (Fig. 4).

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

Model	MBtu/hr	kW
RS 50/EV	321	94

NOTE:

the firing rate areas given in Fig. 4 have been reduced by 10% with respect to the maximum range that can be reached.

Consult procedure below to refer burner operating condition in high altitude plants.



The firing rate area values have been obtained considering an ambient temperature of 68 °F, and an atmospheric pressure of 394" WC and with the combustion head adjusted as shown at page 19.

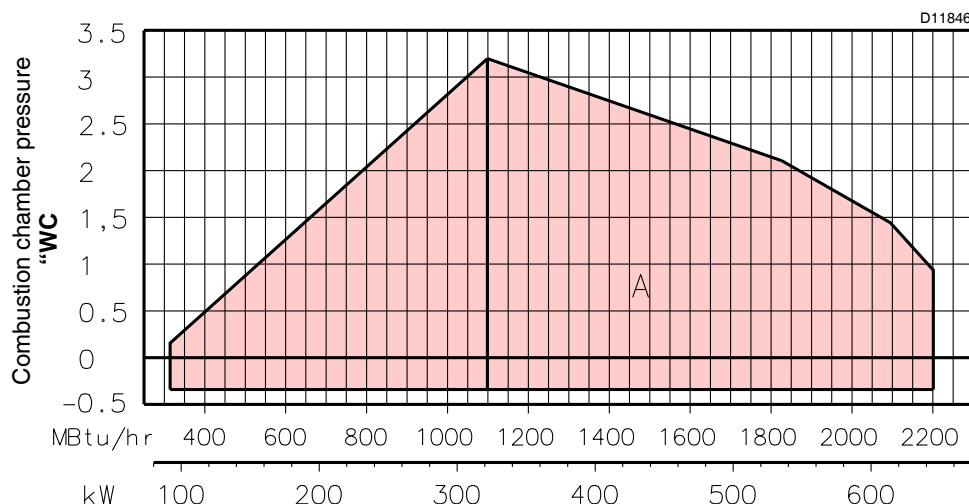


Fig. 4

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 = 1500 MBtu/hr - Rated air pressure = 1.5" WC

Real altitude = 3000 ft - Real temperature = 88 °F

Δ = 88 °F - 68 °F (reference temp.) = 20 °F
(equivalent 1000 ft variation)

20 : 2 = 10 x 100 = 1000 ft

Proceeding as described above and considering a "virtual altitude" of (3000 + 1000) ft:

- 1500 MBtu/hr at 4000 ft, the corrected capacity is 1713 MBtu/hr
- 1.5" WC at 4000 ft, the corrected burner air pressure is 1.71

Reference conditions:

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

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 Commercial boilers

The burner is 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. 5).

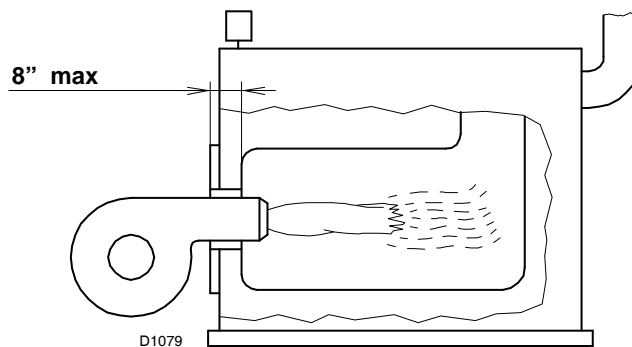


Fig. 5

3.10 Minimum furnace dimensions

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

Fig. 6 indicates the diameter and length of the test combustion chamber.

Example

Output 1388 MBtu/hr:
diameter 20 inch - length 4.9 ft

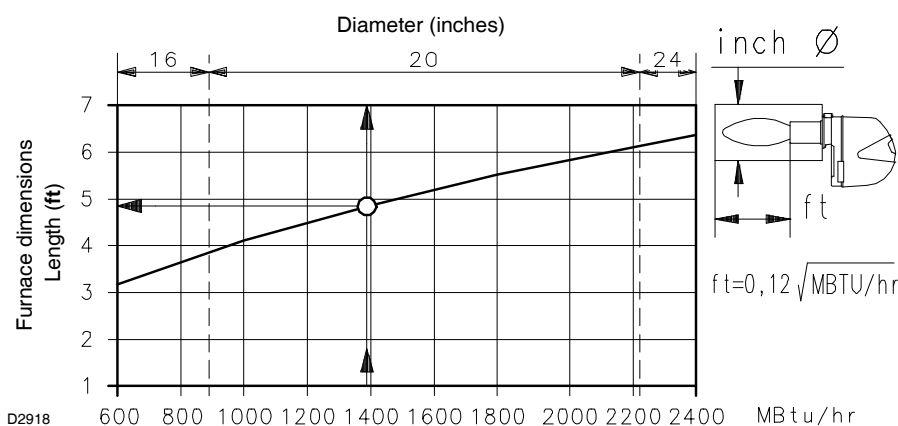


Fig. 6

3.11 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.

The manufacturer 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 servo-control) 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

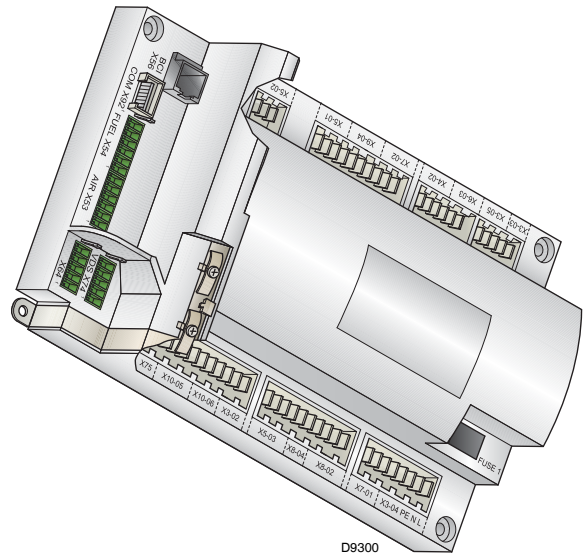


Fig. 7

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

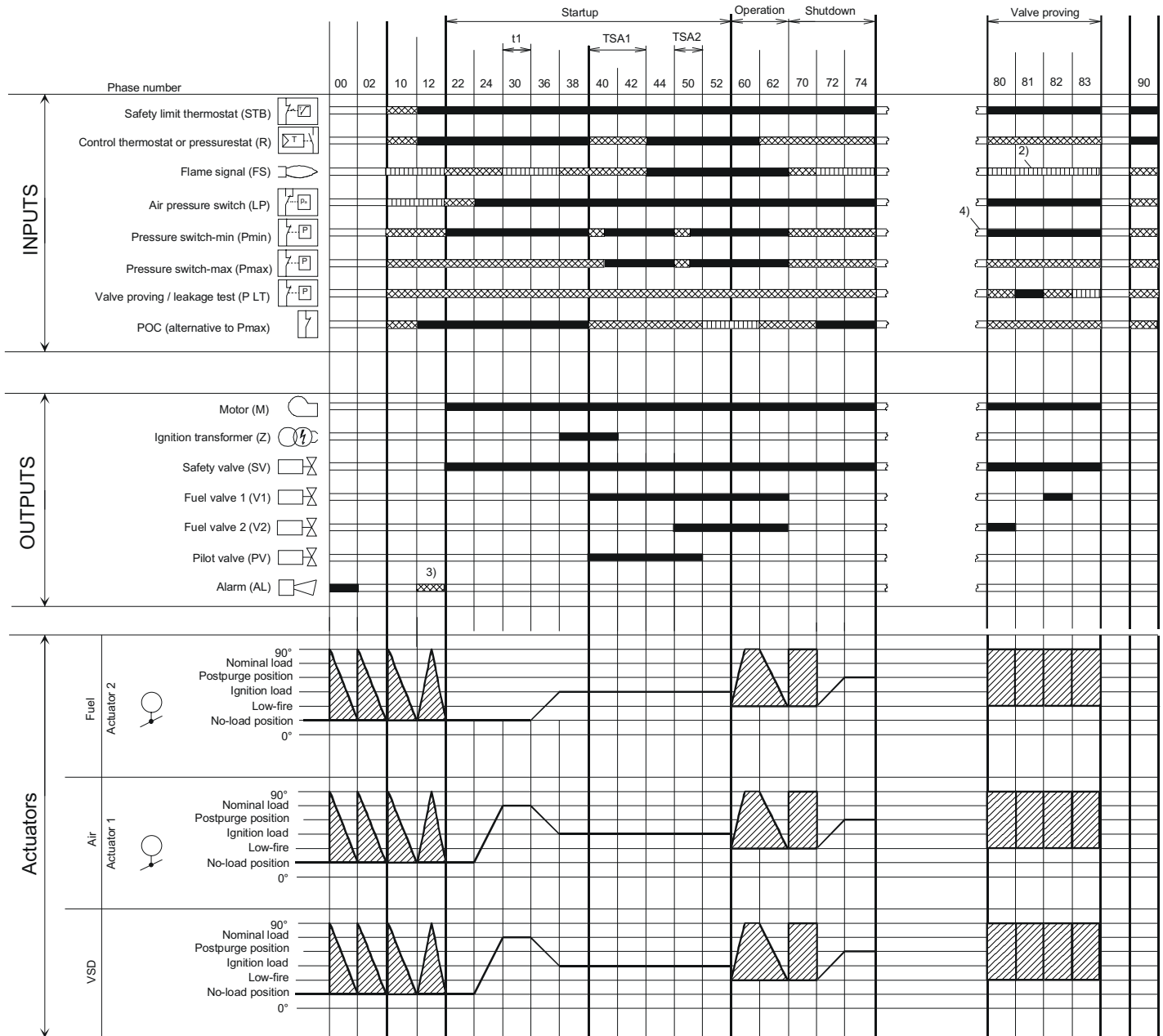
It is important to achieve practically disturbance- and loss-free signal transmission:

- 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	
	<ul style="list-style-type: none"> Safety shutdown from operating position at mains voltage Restart on rise in mains voltage 	Approx. AC 93 V Approx. AC 96 V
Terminal loading 'Outputs'	Total contact loading:	
	• Nominal voltage	AC 120 V, 50 / 60 Hz
	• Unit input current (safety loop) from:	Max. 5 A
	- Fan motor contactor	
	- Ignition transformer	
	- Valves	
	- Oil pump / magnetic clutch	
	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	$\cos\varphi > 0.4$
	Alarm output	
	• Nominal voltage	AC 120 V, 50 / 60 Hz
	• Nominal current	1 A
	• Power factor	$\cos\varphi > 0.4$
	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	$\cos\varphi > 0.2$
	Fuel valves	
	• Nominal voltage	AC 120 V, 50 / 60 Hz
	• Nominal current	1.6 A pilot duty load declaration to UL372
	• Power factor	$\cos\varphi > 0.4$
	Operation display	
	• Nominal voltage	AC 120 V, 50 / 60 Hz
	• Nominal current	0.5 A
	• Power factor	$\cos\varphi > 0.4$
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



D9288

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°)

- Signal ON
- Signal OFF
- Any signal is allowed



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

Assignment of times:

- t1 Purge time
- TSA1 Safety time 1 gas / oil
- TSA2 Safety time 2 gas / oil

3.12 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 \pm 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	DIN EN 60 721-3-3
Climatic conditions	class 3K5
Mechanical conditions	class 3M4
Temperature range	-20...+60 °C
Humidity	< 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.



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



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. 2, page 9.



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 suitability 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.

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



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.



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



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 Boiler plate

Drill the combustion chamber mounting plate as shown in Fig. 10. The position of the threaded holes can be marked using the head gasket supplied with the burner.

inch	A	B	C
RS 50/EV	6 ⁹ / ₃₂ "	8 ¹³ / ₁₆ "	³ / ₈ W

Tab. G

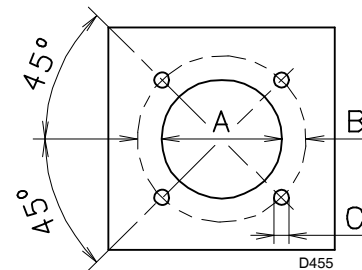


Fig. 10

4.5 Blast tube length

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

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

Model	L (short blast tube)	L (long blast tube)
RS 50/EV	8 1/2"	13 13/16"

- For boilers with front flue passes (6) or flame inversion chambers, protective insulation (4) must be inserted between the boiler refractory (5) and the blast tube (3).
- This protective insulation must not compromise the extraction of the blast tube.
- For boilers having a water-cooled front the insulation (4)-5) (Fig. 11) is not required unless it is required by the boiler manufacturer.

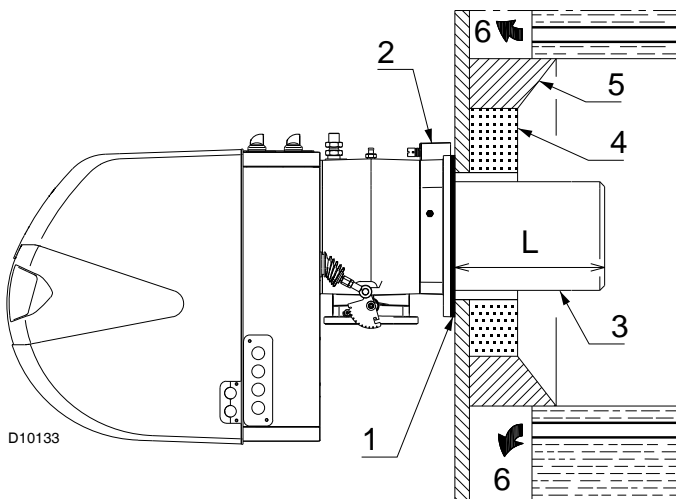


Fig. 11

4.6 Securing the burner to the boiler

- Secure the flange (2)(Fig. 11) to the boiler plate, inserting the gasket (1)(Fig. 11).
- Use the 4 screws, after first protecting the thread with an anti-locking product.
- The seal between burner and boiler must be airtight.

4.7 Ignition pilot adjustment

Place the pilot and electrode as shown in Fig. 12.

The pilot works correctly at pressures ranging from 5 - 12" WC.

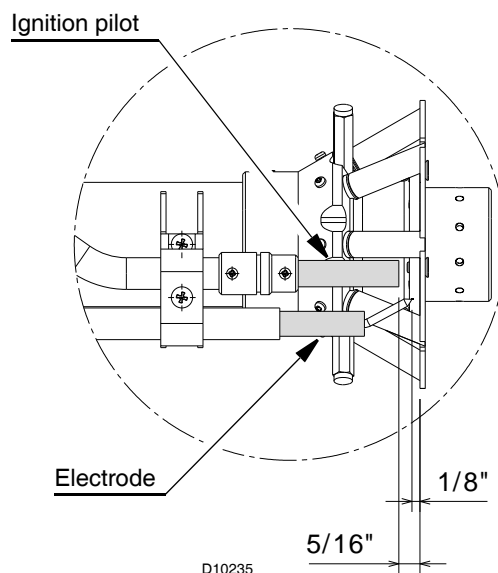


Fig. 12

4.8 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. 13.



The fan part of the burner shall be completely backward using the guides.

4.8.1 Modulation minimum output

When the MIN output is within the value range given in Tab. H, the gas ring 2) (Fig. 13) is adjusted to zero.

Model	MBtu/hr	kW
RS 50/EV	321 - 488	94 - 143

Tab. H

There are two possible cases:

A The MIN burner output is not in the values of Tab. H

In diagram (Fig. 14), depending on the MAX output, find the notch to use for adjusting the air and the gas.

Proceed as follows.

Air adjustment (Fig. 13)

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

Gas adjustment (Fig. 13)

- Loosen screw 1) and turn ring 2) until the notch identified is aligned with index 3).
- Tighten the screw 1) fully down.

Example:

the burner varies its output between:

MIN = 450 and MAX = 1650 MBtu/hr.

The MIN output of 450 MBtu/hr is not found in the values of Tab. H and therefore diagram (Fig. 14) is valid, from which it results that for a MAX output of 1650 MBtu/hr the gas and air adjustments are done on notch 3, as in Fig. 13.

In this case the pressure load loss of the combustion head is given by column A Tab. I, page 21.

Diagram (Fig. 14) shows the ideal settings for the ring 2)(Fig. 13).

If the gas supply pressure is too low to reach the max output operation pressure indicated in Tab. I, and if the ring 2)(Fig. 13) is not fully open, it can be opened wider by 1 or 2 notches.

Continuing with the previous example, Tab. I indicates that for burner with output of 1650 MBtu/hr a pressure of approximately 1.9" WC is necessary at test point 6)(Fig. 13).

If this pressure cannot be reached, open the ring 2)(Fig. 13) to notch 4 or 5.

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

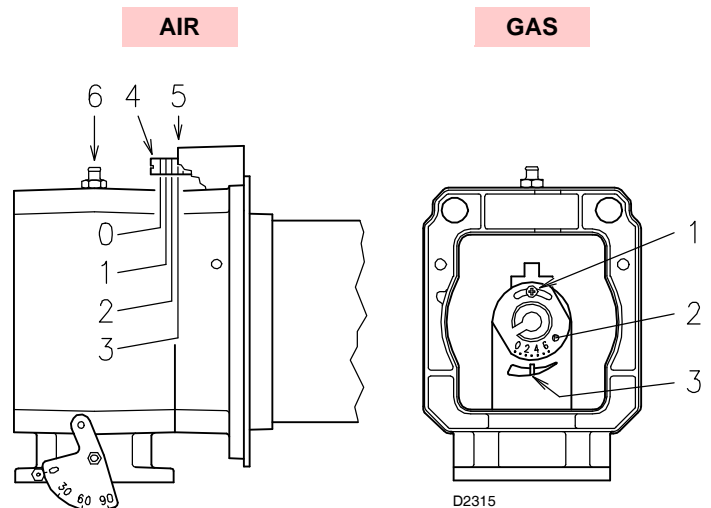


Fig. 13

Notches (Air = Gas)

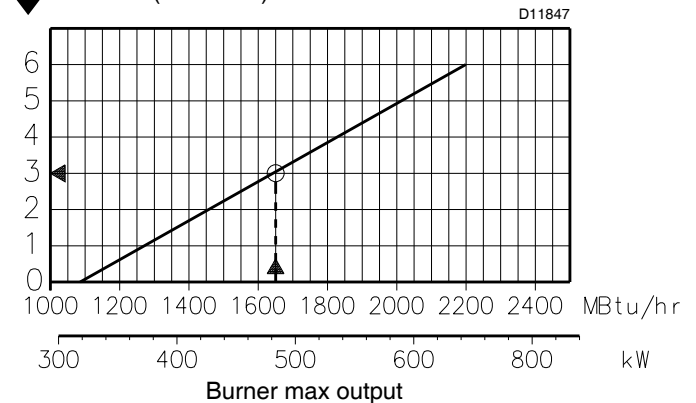


Fig. 14

B The MIN burner output is found in the values of the Tab. H

Air adjustment (Fig. 13)

- The same as the previous case: follow diagram (Fig. 14).

Gas adjustment (Fig. 13)

- The gas ring 2)(Fig. 13) is always adjusted to position 0, irrespective of the MAX burner.
- In this case the pressure load loss of the combustion heads is given by column B in Tab. I.

4.8.2 To open the burner



WARNING

Switch off the electrical power.

To open the burner proceed as follows:

- remove screws 2)(Fig. 16) and withdraw the cover 3);
- remove the screws 4) from the slide bars 5);
- install the extension bars 7);
- remove screw 6) and pull the burner back 13) on slide bars 5) by about 4";
- disconnect the electrode wires and then pull the burner completely back;
- unscrew the head fixing screw 11);
- unscrew the pin 8)(Fig. 15) from the connection 9);
- push ahead the connection to the end stop on the plug 10), therefore extract the inner part of the combustion head 12).

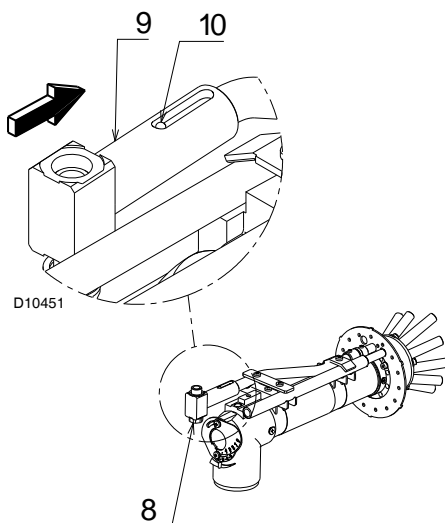


Fig. 15

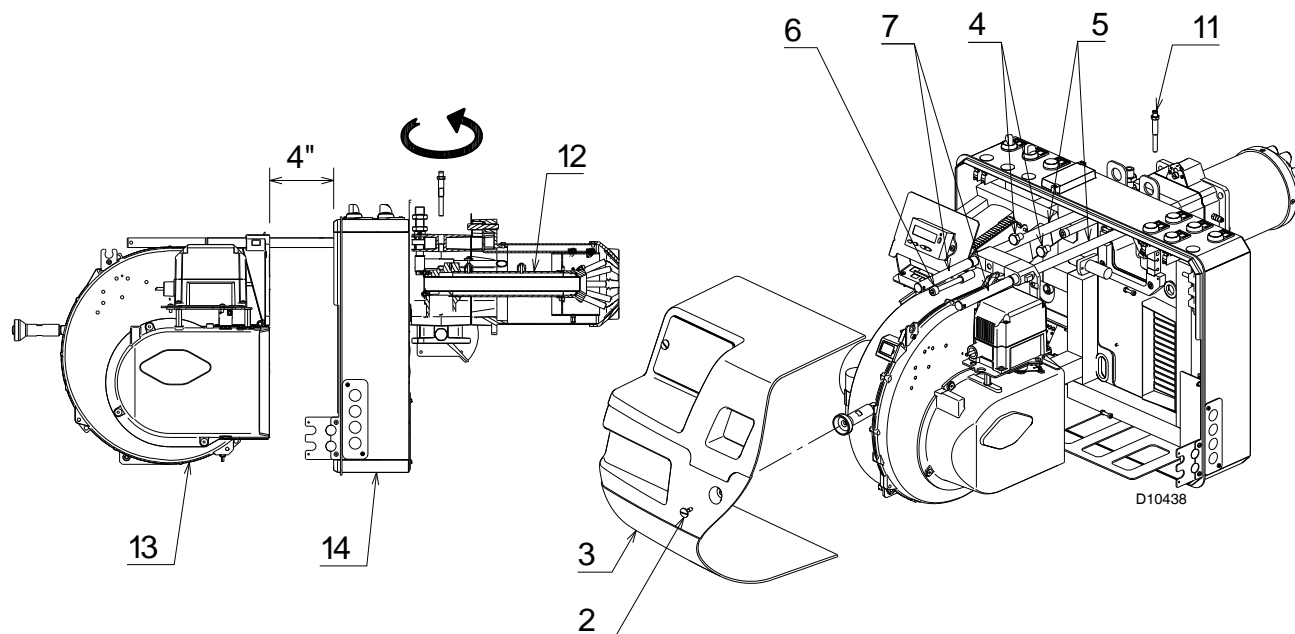


Fig. 16

4.9 Gas piping

The main gas train must be connected to the gas attachment 1)(Fig. 17), using flange 2), gasket 3) and screws 4) supplied with the burner.

The main gas train can enter the burner from the right or left side, depending on which is the most convenient.

Gas safety shut-off valves 5)-6)(Fig. 18) 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)(Fig. 17) and can enter the burner from the right or left side.

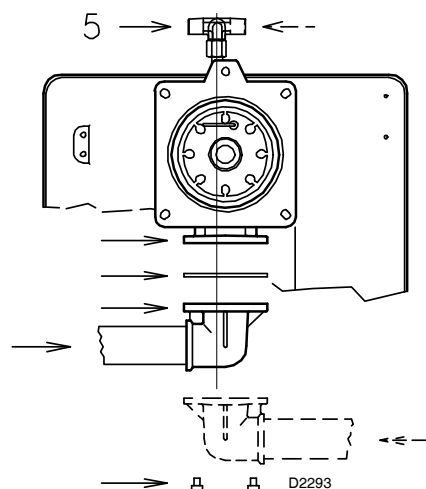


Fig. 17

4.10 Gas train

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



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

Key to layout

- 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 gasket with flange
- 8 Gas adjustment butterfly valve
- 9 Burner

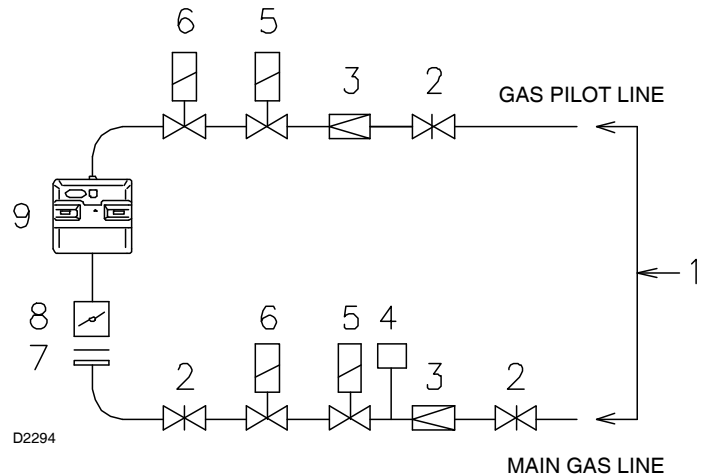


Fig. 18

4.11 Gas pressure

The Tab. I is used to calculate manifold pressure taking into account combustion chamber pressure.

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

Model	MBtu/hr	kW	Δp (" WC)	
			A	B
RS 50/EV	1099	322	0.87	0.87
	1249	366	1.14	1.3
	1402	411	1.42	1.61
	1552	455	1.69	2.01
	1706	500	1.97	2.36
	1856	544	2.2	2.76
	2006	588	2.48	3.15
	2197	644	2.83	3.78

Tab. I

Gas manifold pressure measured at test point 1)(Fig. 19), with:

- combustion chamber at 0" WC;
- burner operating at maximum output;
- column A (Tab. I): gas ring 2)(Fig. 13) adjusted as indicated in diagram (Fig. 14).
- column B (Tab. I): gas ring 2)(Fig. 13) adjusted to zero.

Calculate the approximate maximum output of the burner as follows:

- subtract the combustion chamber pressure from the gas pressure measured at test point 1)(Fig. 19);
- find the nearest pressure value to your result in column A or B (Tab. I) for the burner in question;
- read off the corresponding output on the left.

Example with natural gas

- Maximum output operation
- Gas ring 2)(Fig. 13) adjusted as indicated in diagram (Fig. 14)
- Gas pressure at test point 1)(Fig. 19) = 2.48" WC
- Pressure in combustion chamber = 0.79" WC
- $2.48 - 0.79 = 1.69$ " WC

A maximum output of 1552 MBtu/hr shown in Tab. I corresponds to 1.69" WC pressure, column A.

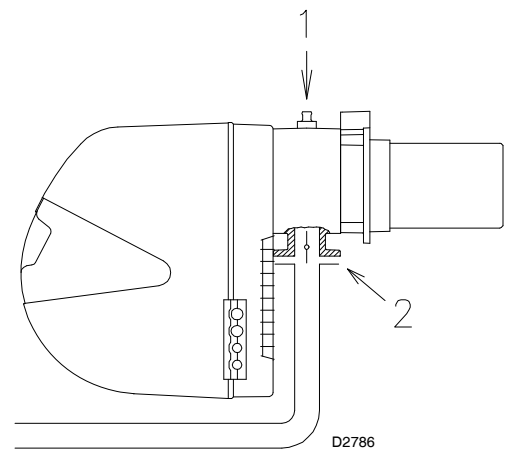


Fig. 19

4.12 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. Refer to the electrical layouts.
- 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 $\frac{1}{8}$ " (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.

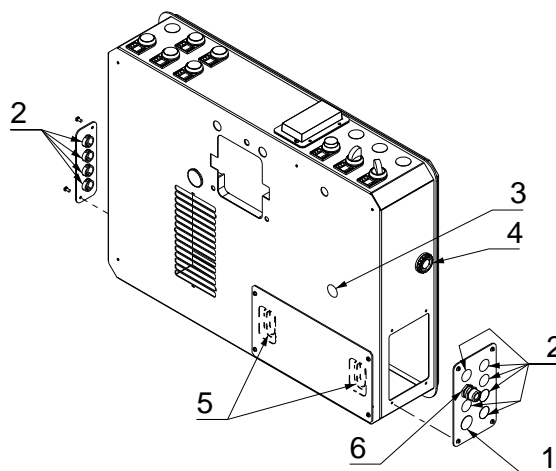
If the hood is still present, remove it and proceed with the electrical wiring.

All the cables to be connected to the burner are fed through the grommets.

The use of the cable grommets can take various forms.

By the way of example we indicate the following mode (Fig. 20) (according to **UL795**):

- 1 Three phase power supply with $\frac{1}{2}$ " cable grommet (no single phase);
- 2 Single phase power supply with $\frac{1}{2}$ " cable grommet.
Available:
Consents/safety, minimum gas pressure switch, gas valves and other devices with $\frac{3}{8}$ " cable grommet.
- 3 Available: maximum gas pressure switch (kit) and other
- 4 Horn
- 5 Available: step down transformer
- 6 Connector for shielding of inverter cable



D11907

Fig. 20



The control panel is in compliance with UL508A.

4.13 Connection cable between the inverter and the electronic cam LMV 37 ...



WARNING

It is very important to shield the motor cable 1) as shown in Fig. 21.



WARNING

It is very important to fix the cable shielding as shown in Fig. 21.

Key (Fig. 21)

- 1 Motor cable power supply (coming from the inverter).
- 2 Connection cable between the inverter and the electronic cam LMV 37 ... (coming from the inverter).
- 3 Single phase supply cable.

The connection from the Inverter to LMV37.... must be done as shown in Fig. 21.

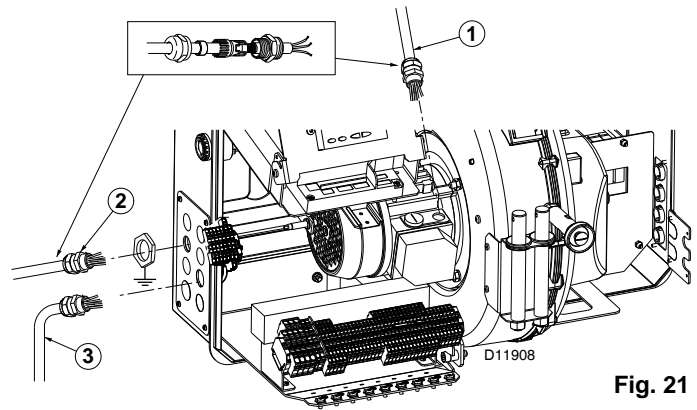


Fig. 21

4.14 Inverter connection



WARNING

Following, it is reported an example how to connect the Inverter.

For further information, please refer to the relevant Inverter instruction manual.

Typical installation (Fig. 22)

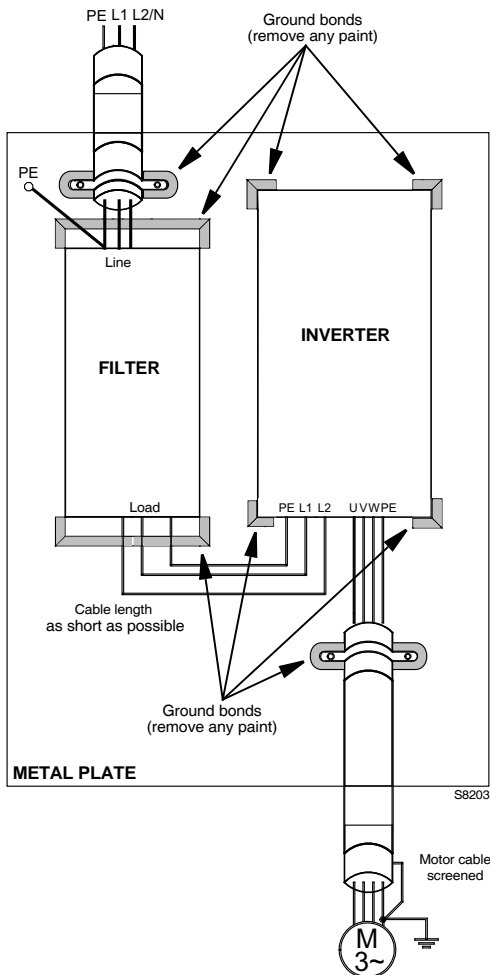


Fig. 22

Treatment of cables

Countermeasures against cable noise

The treatment of cables is the most important countermeasure. The machinery manufacturers are requested

to examine the current structure of the cable lead - in.

- Use cables with woven screen
- The screen of the cable should be earthed with a large area.
- It is desirable to earth the screen of the cable by clamping the cable to the earth plate.
- The screen must be earthed on both side of the cable (take care for good earthing system).

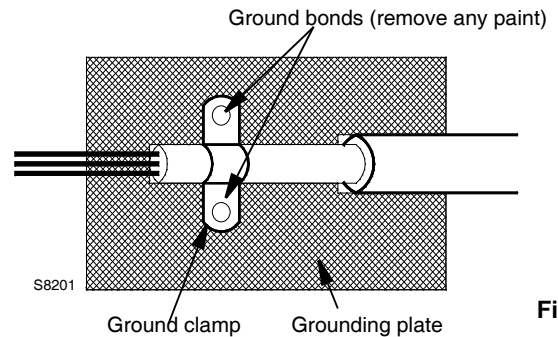


Fig. 23

Examples:

Number 1,2,3 show not proper ways to earth a cable screen.

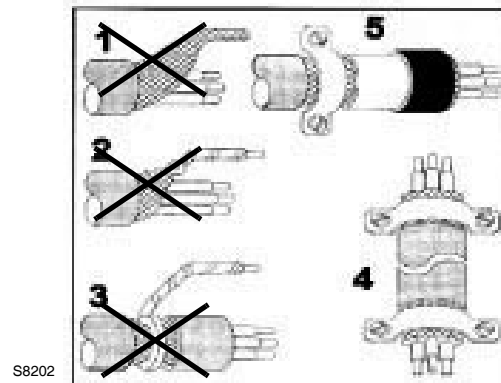


Fig. 24

4.15 Speed sensor adjustment



The measurement of speed sensor 1)(Fig. 25) must be respected!



It is important that the disc 2) is installed on the burner as shown in the Fig. 26.

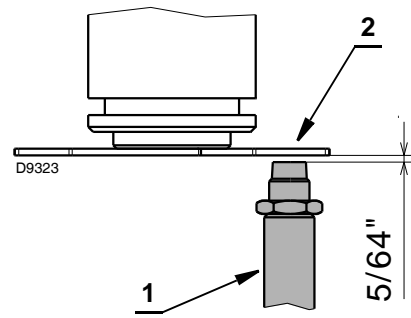


Fig. 25

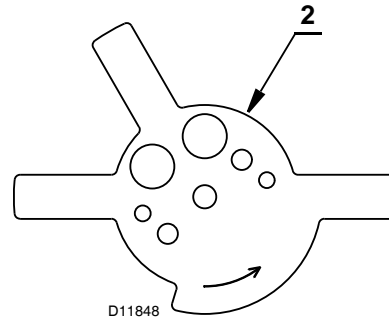


Fig. 26

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.

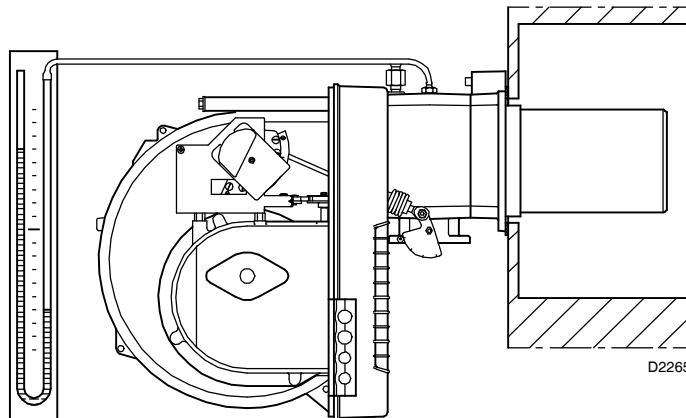
**WARNING**

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 switch (Fig. 29) to the start of the scale.
- Adjust the air pressure switch (Fig. 31) to the start of the scale.
- Purge the air from the gas line.
Fit a U-type manometer (Fig. 27) to the gas pressure test point on the sleeve.
The manometer readings are used to calculate the MAX. burner power.

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. 27****5.3 Burner firing**

Having completed the checks indicated in the previous heading, the pilot of the burner should fire.

If the motor starts but the flame does not appear and the flame safeguard goes into lock-out, reset and wait for a new firing attempt.

Pilot adjustment has been illustrated on Fig. 12, page 18.

Having adjusted the pilot, reconnect the main valve and ignite the main flame; it might require several attempts to purge the air from the gas lines or to adjust the valve with little gas.

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

5.4 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 specific manual for this operation. Turn the switch of Fig. 28 to position “ON” and turn the switch of Fig. 28 to position “LOCAL”.



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. 28.

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.

If this is not the case:

- place the switch of Fig. 28 in position “OFF” 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 inverter output.



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

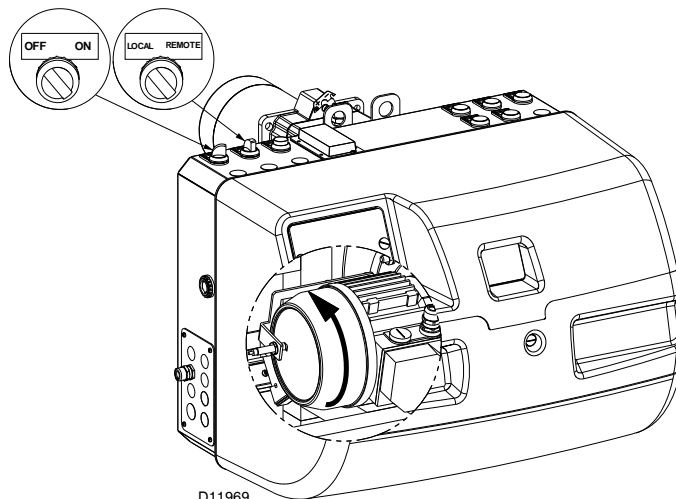


Fig. 28

5.5 Pressure switch adjustment

5.5.1 Air pressure switch

The air pressure switch is connected in differential (Fig. 30) 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. 29) 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.

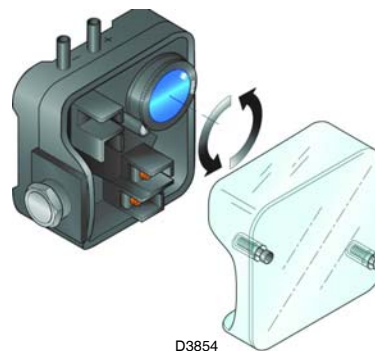


Fig. 29

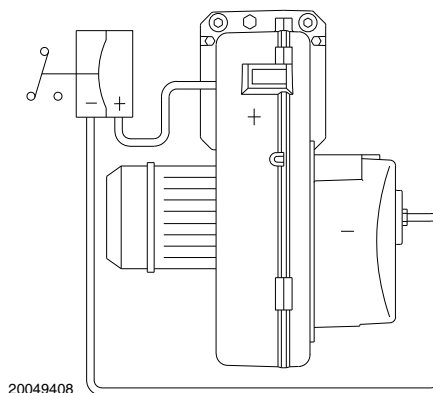


Fig. 30

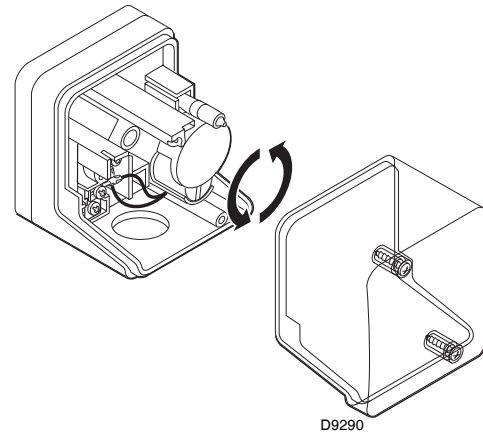
5.5.2 Minimum gas pressure switch

Adjust the minimum gas pressure switch (Fig. 29) after having performed all the other burner adjustments with the pressure switch set at the start of the scale.

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. 31

5.6 Flame signal measurement

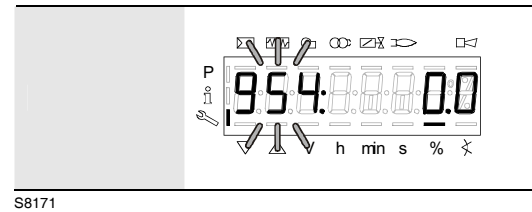
Check the flame signal through the parameter 954, as indicated in Fig. 32. The displayed value is expressed in percentage.

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. 32) 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. 32

5.7 Final checks (with the burner working)

➤ Open the control limit operation	➡	The burner must stop
➤ Open the high limit operation	➡	The burner must stop in lockout
➤ Rotate the maximum gas pressure switch knob to the minimum end-of-scale position (if installed)	➡	The burner must stop in lockout
➤ 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	➡	The burner must not start
➤ Disconnect the minimum gas pressure switch	➡	The burner must stop in lockout
➤ 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.

6.1 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.



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:



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



Close the fuel interception tap.

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.

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.

Flame inspection window

Clean the flame inspection window (Fig. 33).

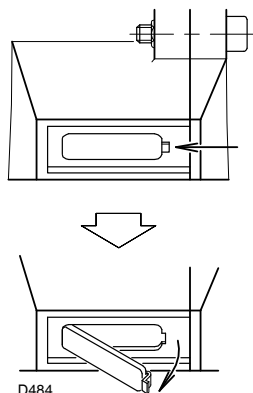


Fig. 33

UV scanner

Clean the glass cover from any dust that may have accumulated. In order to reach the UV scanner, extract the flame sensor 1)(Fig. 34).

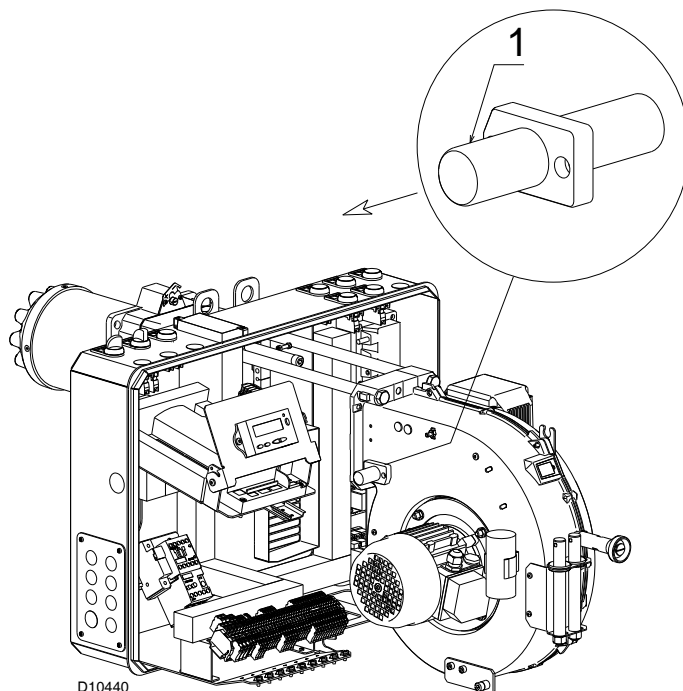


Fig. 34

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 connections are fully tightened.

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.

6.2 Opening the burner

6.2.1 To open the burner



Switch off the electrical power.

WARNING

To open the burner proceed as follows:

- remove the screws 2)(Fig. 35) from the slide bars 3);
- install the extension bars 4);
- remove screw 1) and pull the burner back on slide bars 3) by about 4" (Fig. 36);
- disconnect the electrode wires and then pull the burner completely back;
- unscrew the pin 8) from the connection 9)(Fig. 37);
- push ahead the connection to the end stop on the plug 10)(Fig. 37), therefore extract the inner part of the combustion head 12)(Fig. 36).

6.2.2 To close the burner

To close the burner proceed as follows:

- push the burner 13)(Fig. 36) at approximately 4" from the electrical board 14);
- insert the ignition electrode cables and then slide the burner up to the sleeve so that it is positioned as shown in Fig. 35.
- Disinstall and arrange in the correct site the extension bars 4);
- refit screws 2) on slide bars 3);
- secure the burner to the sleeve by tightening screw 1).



WARNING

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

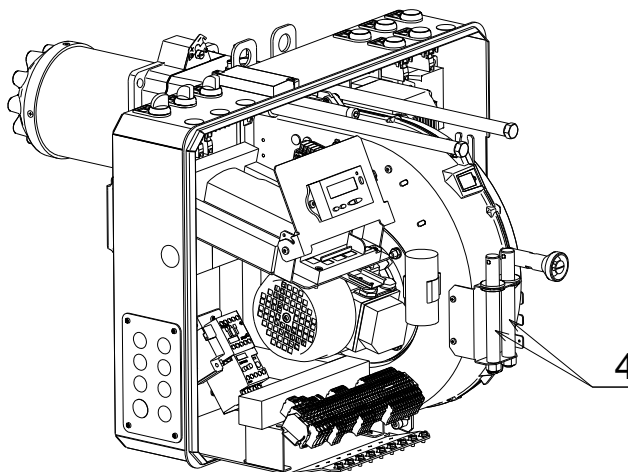
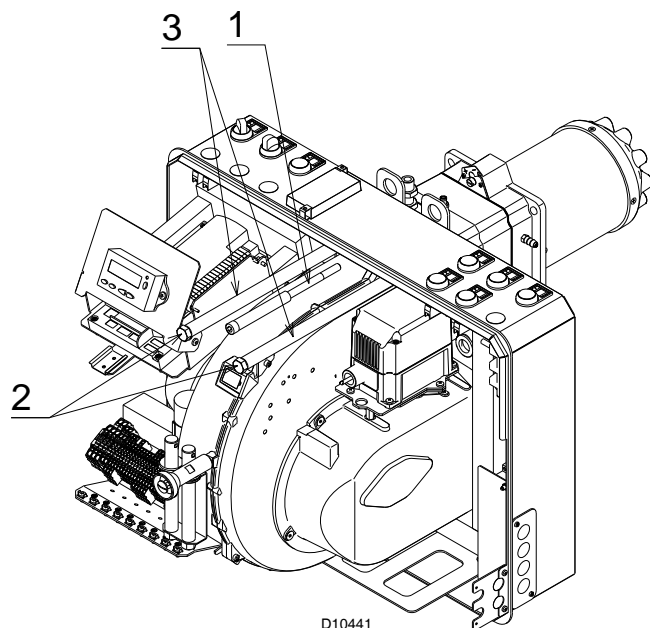


Fig. 35

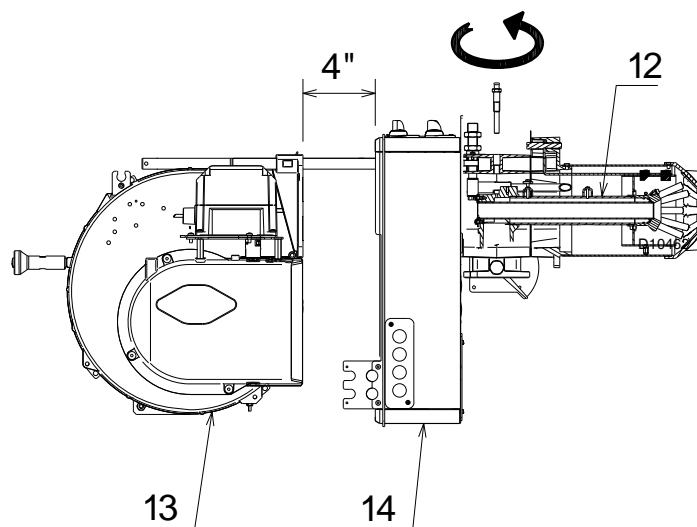


Fig. 36

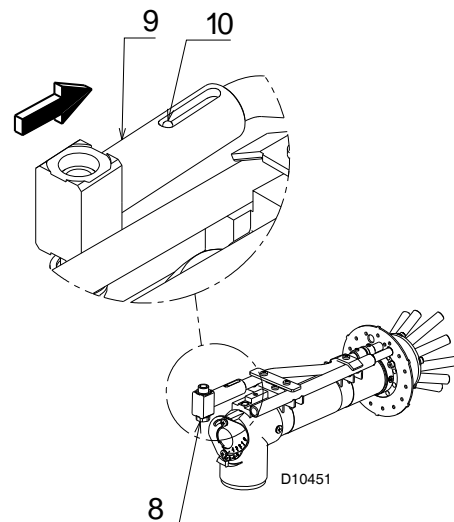
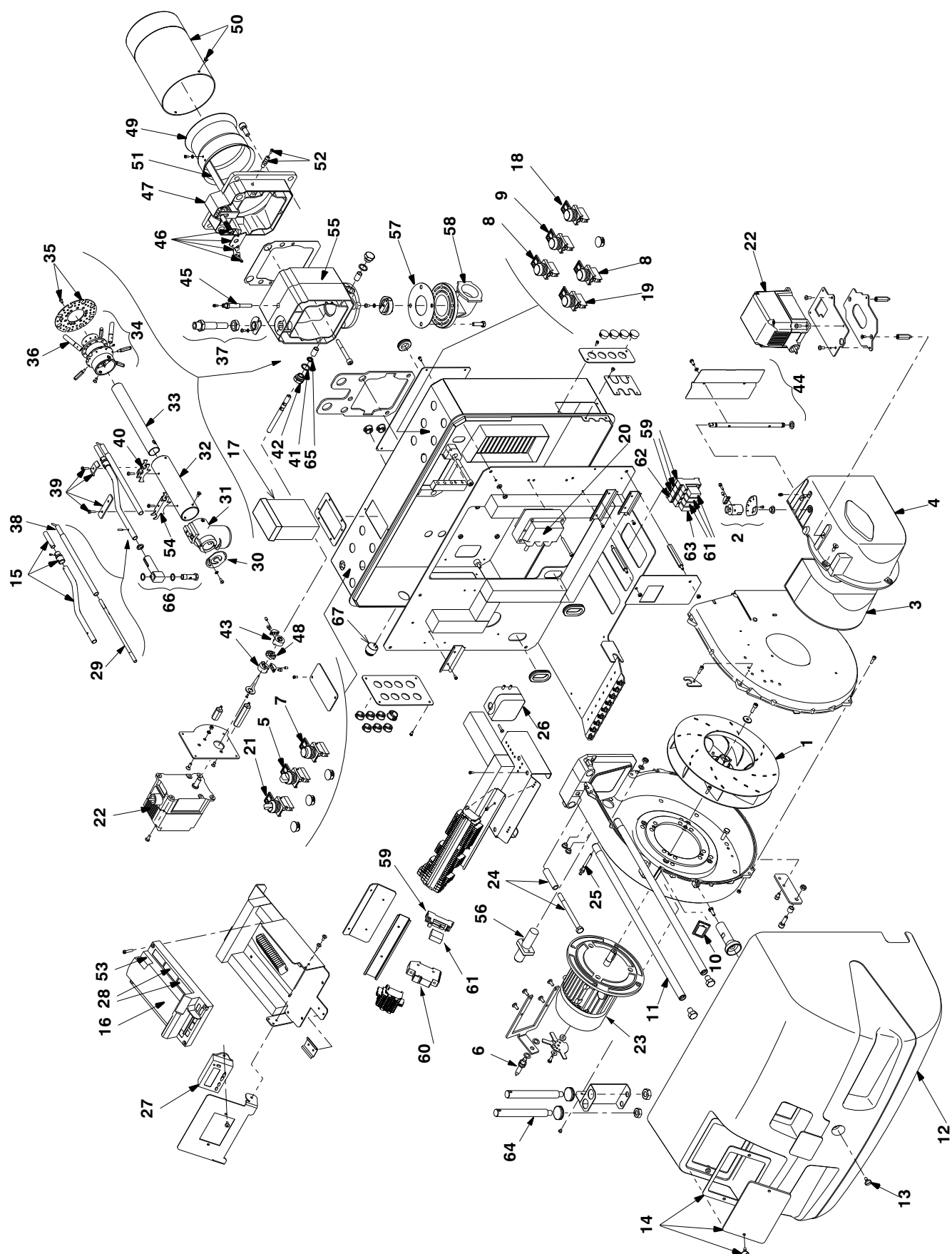


Fig. 37

A

Appendix - Spare parts



N.	CODE	DESCRIPTION	*
1	3003760	FAN	A
2	3014194	GRADUATE SECTOR	
3	3003830	SOUND DAMPING	
4	20027040	AIR INTAKE	
5	20027023	SWITCH	
6	20042704	SPEED SENSOR	
7	20010962	BUTTON	C
8	20027013	LIGHT SIGNAL	C
9	20027014	LIGHT SIGNAL	C
10	3003763	INSPECTION WINDOW	
11	20026772	BAR	C
12	20026773	COVER	C
13	3013727	SCREW	
14	20026784	VIEWING PORT AND SEAL	
15	20026787	PILOT TUBE	
16	3013927	CONTROL BOX	B
17	20027017	CONTACTOR	C
18	20027018	LIGHT SIGNAL	
19	20027020	LIGHT SIGNAL	
20	3012956	TRANSFORMER	B
21	20027021	SWITCH	C
22	20018135	SERVOMOTOR	B
23	3012994	MOTOR	C
24	20027028	SCREW	
25	3003891	CONNECTOR	C
26	3012948	AIR PRESSURE SWITCH	A
27	3013926	DISPLAY	
28	3013940	CONNECTORS	
29	3003794	ELECTRODE CONNECTOR	A
30	3003846	FERRULE	
31	3003854	ELBOW	
32	3013129	EXTERIOR TUBE	
33	3013861	INTERIOR TUBE	
34	3012083	GAS HEAD	
35	3012999	DISC	A
36	3003867	TUBE	
37	20026794	PILOT CONNECTOR UNIT	
38	3013136	ELECTRODE	A
39	20027450	U BOLT	
40	3013002	SUPPORT	
41	3007166	SEAL	C
42	3003863	CONNECTOR	
43	20019263	HUB	
44	20027030	AIR DAMPER ASSEMBLY	C
45	3003873	TEST POINT	
46	3003797	CONTROL DEVICE	
47	3003838	FRONT PIECE	

N.	CODE	DESCRIPTION	*
48	3013938	DISC	
49	3003806	SHUTTER	C
50	3003811	END CONE	C
51	3003803	SQUARE	B
52	3003893	TEST POINT	
53	3006211	FUSE	
54	20026791	SUPPORT	
55	20027033	MANIFOLD	
56	3003396	UV PROBE	A
57	3005483	SEAL	C
58	3013004	FLANGE AND ELBOW	
59	3012841	BASE RELAY	C
60	20027039	FUSE HOLDER	
61	20010969	RELAY	C
62	3020071	BASE RELAY	C
63	3020068	RELAY	C
64	3003764	EXTENTION	
65	3003203	PISTON SEAL	
66	20026793	CONNEVTOR	

★

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**

- **Kit for lengthening the combustion head**

Burner	Standard length	Length obtainable with kit	Code
RS 50/EV	8 1/2"	13 13/16"	3010258

- **Kit for LPG operation**

The kit allows the burner to operate on LPG.

Burner	MBtu/hr	Code
RS 50/EV	549 - 1986	3010272

- **Gas train according to UL Standards**



WARNING

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:	_____

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

RIELLO

RIELLO S.p.A.
I-37045 Legnago (VR)
Tel.: +39.0442.630111
[http:// www.riello.it](http://www.riello.it)
[http:// www.rielloburners.com](http://www.rielloburners.com)

RIELLO

35 Pond Park Road
Hingham, Massachusetts,
U.S.A. 02043

RIELLO BURNERS NORTH AMERICA

1-800-4-RIELLO

1-800-474-3556

<http://www.riello-burners.com>

2165 Meadowpine Blvd
Mississauga, Ontario
Canada L5N 6H6