Dual fuel light oil/gas burners

Progressive two-stage or modulating operation

CODE	MODEL
C9534000 - C9534001	RLS 70
C9535000 - C9535001	RLS 100
C9536000 - C9536001	RLS 130

2916046 (11) - 12/2013

Original instructions

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.

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

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

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.

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 intructions, 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

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 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 Burner models designation

Model	Code	RBNA code	Voltage	Flame safeguard
RLS 70	3485070 3485075	C9534000 C9534001	208-230/460/3/60 575/3/60	Burner mounted Burner mounted
RLS 100	3485270 3485275	C9535000 C9535001	208-230/460/3/60 575/3/60	Burner mounted Burner mounted
RLS 130	3485470 3485475	C9536000 C9536001	208-230/460/3/60 575/3/60	Burner mounted Burner mounted

Tab. A

3.2 Technical data

Model			RLS 70	RLS 100	RLS 130
Output (1) Delivery (1)	High	MBtu/hr (4) kW GPH	1750 - 3094 513 - 907 12.5 - 22.1	2646 - 4396 775 - 1288 18.9 - 31.4	3500 - 5292 1026 - 1551 25 - 37.8
	Low	MBtu/hr (4) kW GPH	854 250 6.1	1330 390 9.5	1750 513 12.5
Fuel			#2 Fuel oil Natural gas / Propane gas		
Gas pressure at maximum delivery (2) Gas: Natural gas		“ WC	2.44	3.94	4.29
Operation			Low-high light oil Low-high-low / modulating gas		
Nozzles		number	2		
Standard applications			Boilers: water, steam, thermal oil		
Ambient temperature		°F	32 - 104 (0 - 40 °C)		
Combustion air temperature		°F max	140 (60 °C)		
Pump delivery (at 174 PSI) pressure range fuel temperature		GPH PSI ° F max	54 145 - 290 140 (60 °C)		
Noise levels (3)		dBA	74	77.5	80

Tab. B

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

(2) Pressure at test point 7) (Fig. 3, page 10) 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.

(4) Equivalent Btu values based on 1 USGPH = 140,000 Btu/hr.

Fan and pump motor IE1

Model			RLS 70	RLS 100	RLS 130
Control circuit power supply		V/Ph/Hz	120/1/60		
Main electrical supply (+/- 10%)		V/Ph/Hz	208 - 230/3/60		
Fan motor		rpm W - HP V A	3400 1100 - 1.5 208 - 230 4.7	3360 1800 - 2.4 208 - 230 7.4	3400 2200 - 3 208 - 230 8.5
Pump motor		V W - HP A	208 - 230/460/575 550 - 0.75 2.6 - 1.5 - 1.1		
Ignition transformer	Oil	V1 - V2 I1 - I2	120 V - 2 X 5 kV 2.7 A - 30 mA		
	Gas	V1 - V2 I1 - I2	120 V - 1 X 8 kV 1.6 A - 20 mA		
Electrical power consumption		W max	1550	2350	2750
Electrical control circuit consumption		W	750		
Total electrical consumption		W	2300	3100	3500
Electrical protection			NEMA 1		

Model			RLS 70	RLS 100	RLS 130
Control circuit power supply		V/Ph/Hz	120/1/60		
Main electrical supply (+/- 10%)		V/Ph/Hz	460/3/60		
Fan motor		rpm W - HP V A	3400 1100 - 1.5 460 2.7	3360 1800 - 2.4 460 4.3	3400 2200 - 3 460 4.9
Pump motor		V W - HP A	208 - 230/460/575 550 - 0.75 2.6 - 1.5 - 1.1		
Ignition transformer	Oil	V1 - V2 I1 - I2	120 V - 2 X 5 kV 2.7 A - 30 mA		
	Gas	V1 - V2 I1 - I2	120 V - 1 X 8 kV 1.6 A - 20 mA		
Electrical power consumption		W max	1750	2750	3150
Electrical control circuit consumption		W	750		
Total electrical consumption		W	2500	3500	3900
Electrical protection			NEMA 1		

Model			RLS 70	RLS 100	RLS 130
Control circuit power supply		V/Ph/Hz	120/1/60		
Main electrical supply (+/- 10%)		V/Ph/Hz	575/3/60		
Fan motor		rpm W - HP V A	3360 1100 - 1.5 575 2	3420 1800 - 2.4 575 2.8	3400 2200 - 3 575 3.7
Pump motor		V W - HP A	208 - 230/460/575 550 - 0.75 2.6 - 1.5 - 1.1		
Ignition transformer	Oil	V1 - V2 I1 - I2	120 V - 2 X 5 kV 2.7 A - 30 mA		
	Gas	V1 - V2 I1 - I2	120 V - 1 X 8 kV 1.6 A - 20 mA		
Electrical power consumption		W max	1550	2250	2900
Electrical control circuit consumption		W	750		
Total electrical consumption		W	2300	3000	3650
Electrical protection			NEMA 1		

Tab. C

Fan and pump motor IE2/EPACT

Model			RLS 70	RLS 100	RLS 130
Control circuit power supply		V/Ph/Hz		120/1/60	
Main electrical supply (+/- 10%)		V/Ph/Hz		208-230/3/60	
Fan motor		rpm W - HP V A	3475 1100 - 1.5 208-230 4	3500 2200 - 3 208-230 7.8	3500 2200 - 3 208-230 7.8
Pump motor		V W - HP A		208 - 230/460/575 550 - 0.75 2.6 - 1.5 - 1.1	
Ignition transformer	Oil	V1 - V2 I1 - I2		120 V - 2 X 5 kV 2.7 A - 30 mA	
	Gas	V1 - V2 I1 - I2		120 V - 1 X 8 kV 1.6 A - 20 mA	
Electrical power consumption		W max	1350	2600	2600
Electrical control circuit consumption		W		750	
Total electrical consumption		W	2100	3350	3350
Electrical protection				NEMA 1	

Model			RLS 70	RLS 100	RLS 130
Control circuit power supply		V/Ph/Hz		120/1/60	
Main electrical supply (+/- 10%)		V/Ph/Hz		460/3/60	
Fan motor		rpm W - HP V A	3475 1100 - 1.5 460 2	3500 2200 - 3 460 3.9	3500 2200 - 3 460 3.9
Pump motor		V W - HP A		208 - 230/460/575 550 - 0.75 2.6 - 1.5 - 1.1	
Ignition transformer	Oil	V1 - V2 I1 - I2		120 V - 2 X 5 kV 2.7 A - 30 mA	
	Gas	V1 - V2 I1 - I2		120 V - 1 X 8 kV 1.6 A - 20 mA	
Electrical power consumption		W max	1350	2600	2600
Electrical control circuit consumption		W		750	
Total electrical consumption		W	2100	3350	3350
Electrical protection				NEMA 1	

Model			RLS 70	RLS 100	RLS 130
Control circuit power supply		V/Ph/Hz		120/1/60	
Main electrical supply (+/- 10%)		V/Ph/Hz		575/3/60	
Fan motor		rpm W - HP V A	3475 1100 - 1.5 575 1.6	3500 2200 - 3 575 3.1	3500 2200 - 3 575 3.1
Pump motor		V W - HP A		208 - 230/460/575 550 - 0.75 2.6 - 1.5 - 1.1	
Ignition transformer	Oil	V1 - V2 I1 - I2		120 V - 2 X 5 kV 2.7 A - 30 mA	
	Gas	V1 - V2 I1 - I2		120 V - 1 X 8 kV 1.6 A - 20 mA	
Electrical power consumption		W max	1350	2600	2600
Electrical control circuit consumption		W		750	
Total electrical consumption		W	2100	3350	3350
Electrical protection				NEMA 1	

Tab. D

3.3 Packaging - weight - Approximate measurements

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
RLS 70	46 27/32“	29 1/8“	27 1/4“	159
RLS 100	46 27/32“	29 1/8“	27 1/4“	165
RLS 130	46 27/32“	29 1/8“	27 1/4“	170

Tab. E

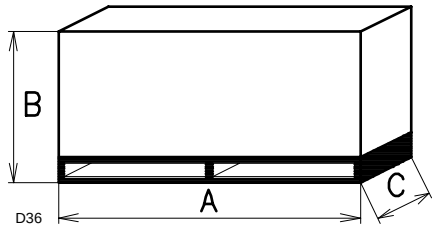


Fig. 1

3.4 Overall dimensions

The maximum dimensions of the burners are given in Fig. 2.

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 I.

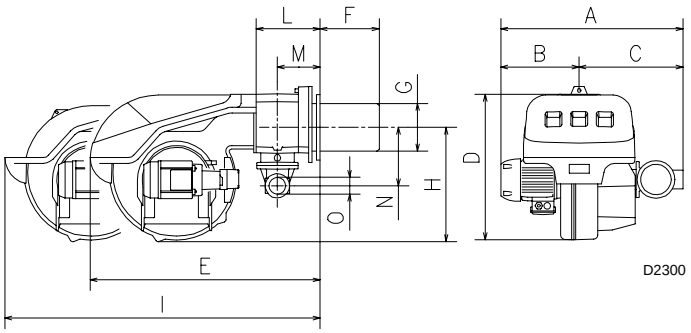


Fig. 2

RLS	A	B	C	D	E	F	G	H	I	L	M	N	O
70	27 1/2“	11 3/8“	16 1/8“	21 27/32“	33 3/32“	9 27/32“	7 7/16“	16 15/16“	45 23/32“	8 7/16“	5 9/32”	8 23/32“	2“
100	28 7/8“	12 25/32“	16 1/8“	21 27/32“	33 3/32“	9 27/32“	7 7/16“	16 15/16“	45 23/32“	8 7/16“	5 9/32”	8 23/32“	2“
130	28 7/8“	12 25/32“	16 1/8“	21 27/32“	33 3/32“	9 27/32“	7 7/16“	16 15/16“	45 23/32“	8 7/16“	5 9/32”	8 23/32“	2“

Tab. F

3.5 Standard equipment

1 - Gas train flange
1 - Flange gasket
4 - Flange fixing screws
1 - Burner head gasket
4 - Screws to secure the burner flange to the boiler:
1/2 W x 13/8”
1 - Adaptor G 1/8“ / 1/8“ NPT
2 - Flexible hoses
1 - Instruction booklet

3.6 Burner description

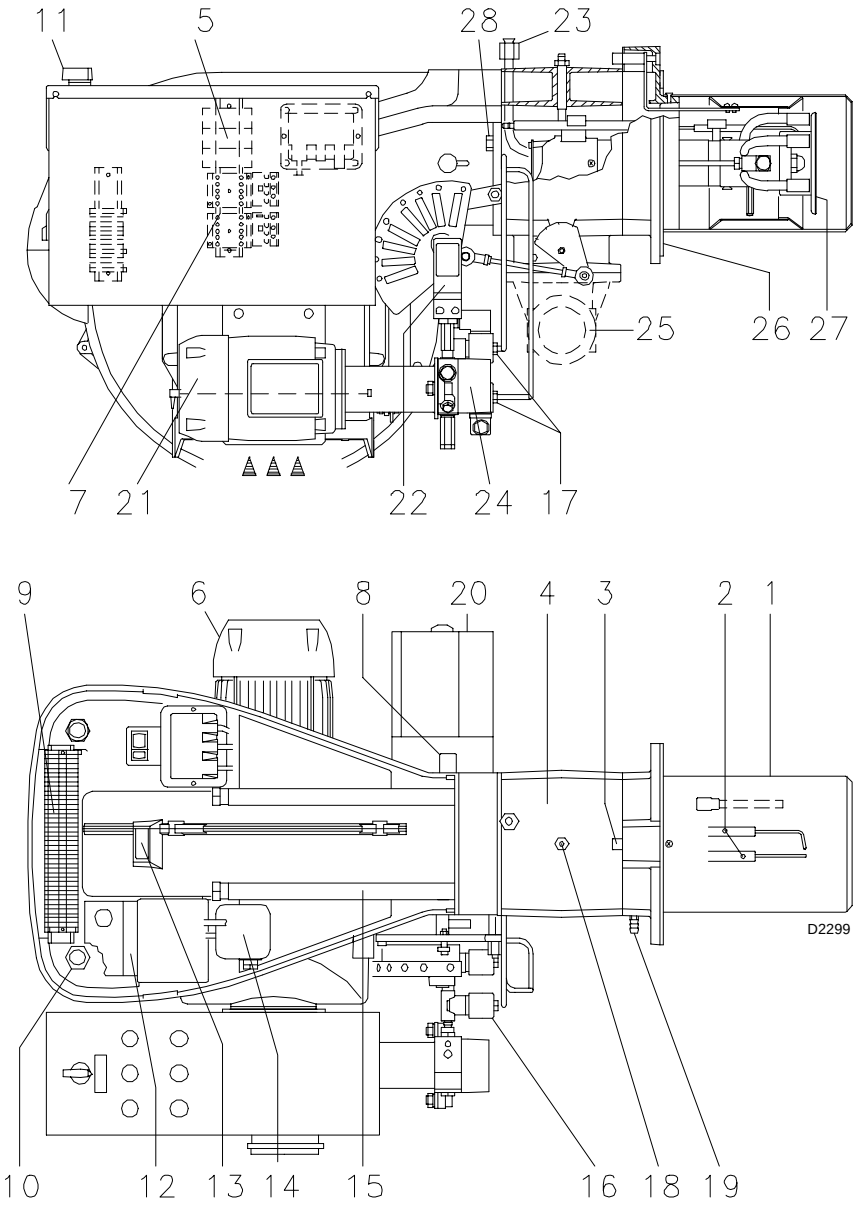


Fig. 3

1 Combustion head
2 Ignition electrodes
3 Screw for combustion head adjustment
4 Sleeve
5 Relay for oil / gas selection
6 Fan motor
7 Motors contactors and thermal cut-out with reset button
8 UV scanner
9 Terminal strip
10 Knockouts for electrical connections by installer
11 Oil / gas selector switch
12 Flame safeguard
13 Flame inspection window
14 Low air pressure switch (differential operating type)
15 Slide bars for opening the burner and inspecting the combustion head
16 Safety solenoid valve
17 Low and high fire oil valves
18 Gas pressure test point and head fixing screw
19 Air pressure test point
20 Servomotor
When the burner is not operating the air damper is fully closed in order to reduce heat loss.
21 Pump motor
22 Low oil pressure switch
23 Pilot attachment
24 Pump
25 Gas input connection
26 Boiler mounting flange
27 Flame stability disk
28 Screw securing fan to sleeve

Two types of burner failure may occur:

Flame relay lock-out: if the flame relay 12) (Fig. 3) pushbutton lights up, it indicates that the burner is in lock-out.
To reset, press the pushbutton.

Motor trip: release by pressing the pushbutton on the thermal overload 7) (Fig. 3).

3.7 Firing rates

MAXIMUM OUTPUT must be selected in area A.

In order to increase to area B (RLS 130) it is necessary to perform the calibration of the combustion head as explained on page 16.

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

RLS 70	= 854 MBtu/hr	= 6.1 GPH
RLS 100	= 1330 MBtu/hr	= 9.5 GPH
RLS 130	= 1750 MBtu/hr	= 12.5 GPH

WARNING

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 on page 16.

NOTE:

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

Consult Procedure on page 12 to refer burner operating condition in high altitude plants.

3.7.1 Minimum furnace dimensions

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

Fig. 5 indicates the diameter and length of the test combustion chamber.

Example:

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

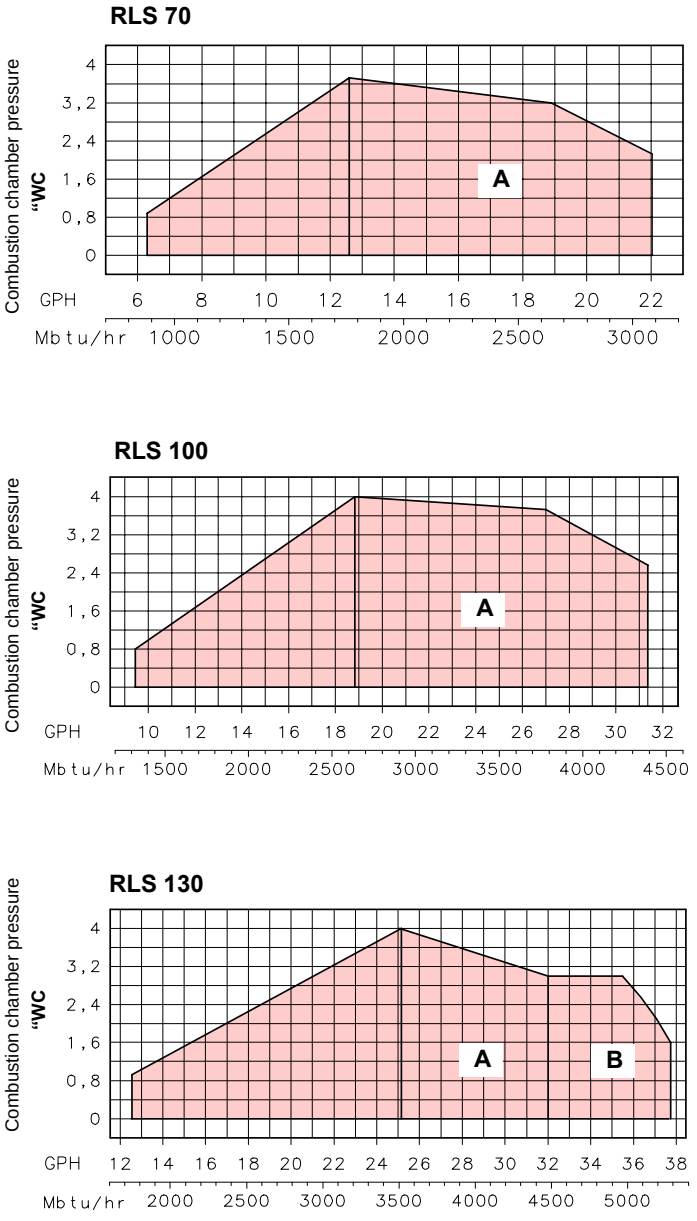


Fig. 4

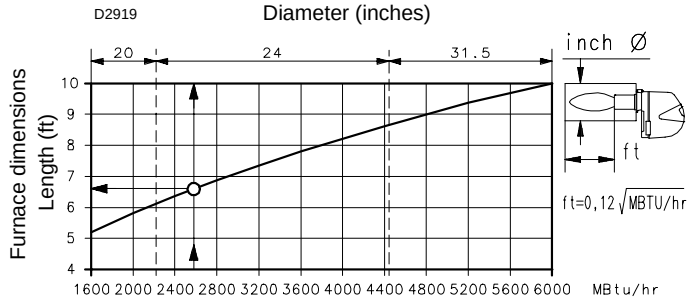


Fig. 5

3.7.2 Procedure to refer burner operating condition in high altitude plants

Find the corrected burner capacity for the plant's altitude in chart 1 and the corrected pressure in chart 2.

Check in the firing rate graph of the burner page 11, if the working point defined by the values above is within the range limits.

If not, higher burner size is needed.

NOTE:
Charts are based only on altitude variation (reference temperature = 68°F , 20°C)
To get the combined correction in case of different air temperature, a compensation of 1000 ft each 20°F (305 m each 11°C) is applicable.

Example

Rated capacity = 3000 MBtu/hr - Rated air pressure = 1.5"w.c.

Real altitude = 5000 ft - Real temperature = 108°F

Δ = 108°F - 68°F (reference temp.) = 40°F (equivalent 2000 ft variation)

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

– the corrected capacity is 3847 MBtu/hr;
– the corrected burner air pressure is 1.92. ➡ **Burner RLS 100 is OK**

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

Tab. G

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

Tab. 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. 2.


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 Preparing the boiler

4.4.1 Boring the boiler plate

Drill the combustion chamber mounting plate as shown in Fig. 6. The position of the threaded holes can be marked using the gasket supplied with the burner.

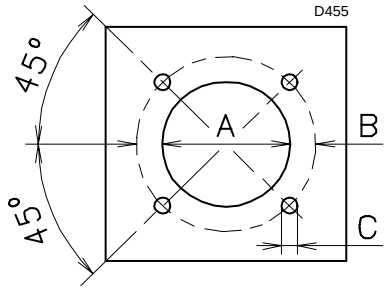


Fig. 6

inch	A	B	C
RLS 70	7 $^{9}/_{32}$“	10 $^{27}/_{32}$“ - 12 $^{25}/_{32}$“	$^{1}/_{2}$ W
RLS 100	7 $^{21}/_{32}$“	10 $^{27}/_{32}$“ - 12 $^{25}/_{32}$“	$^{1}/_{2}$ W
RLS 130	7 $^{21}/_{32}$“	10 $^{27}/_{32}$“ - 12 $^{25}/_{32}$“	$^{1}/_{2}$ W

Tab. I

4.4.2 Blast tube length

The length of the blast tube must be selected according to the indications provided by the manufacturer of the boiler, it must be greater than the thickness of the boiler door complete with its insulation. The range of lengths available, L (inch), is as follows:

Blast tube 10):	RLS 70	RLS 100	RLS 130
• short	9 $^{27}/_{32}$“	9 $^{27}/_{32}$“	9 $^{27}/_{32}$“
• long	1 $^{55}/_{32}$“	1 $^{55}/_{32}$“	1 $^{55}/_{32}$“

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

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

For boilers having a water-cooled front, the insulation 11)-12) (Fig. 7) is not required unless it is required by the boiler manufacturer.

4.5 Securing the burner to the boiler

Detach the combustion head from the burner, (Fig. 7):

- ➤ disconnect the oil pipes by unscrewing the two connectors 6).
- ➤ 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”.
- ➤ Disconnect the electrode wires and then pull the burner completely off the slide bars.

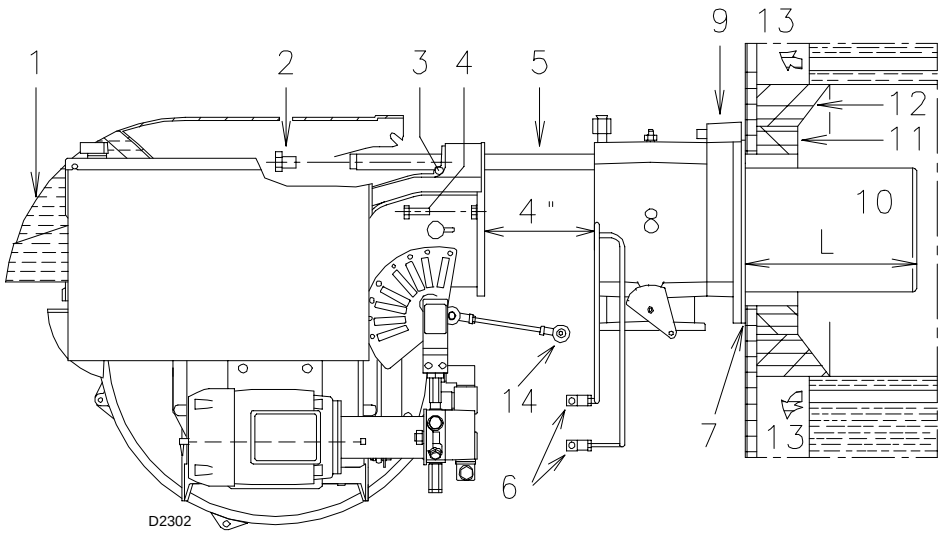


Fig. 7

4.6 Combustion head setting

The setting of the combustion head depends exclusively on the maximum delivery of the burner.

Turn screw 5)(Fig. 8) until the notch shown in diagram (Fig. 9) is level with the front surface of flange 6).

Example for burner RLS 100

maximum burner delivery = 23.1 GPH.

If diagram (Fig. 9) is consulted it is clear that for this delivery, the combustion head must be adjusted using notch 3.

NOTE:

In case of high altitude installation site, head setting must refer to the "corrected capacity" according procedure described at page 12.

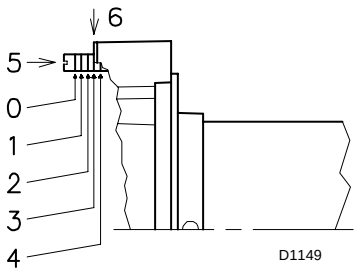


Fig. 8

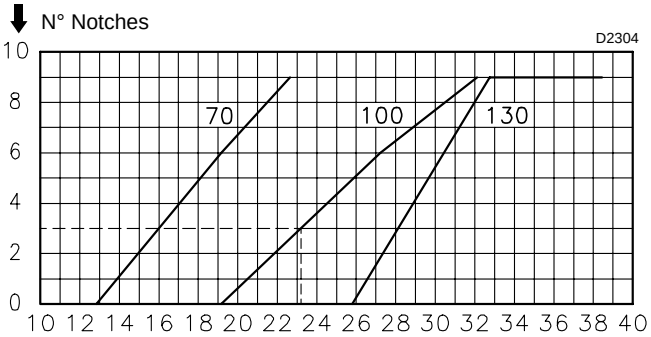


Fig. 9

4.6.1 Combustion head calibration (only for RLS 130)

At this point check, on model RLS 130, whether the maximum delivery of the burner is contained in area A or in area B of the firing rate. See page 11.

If it is in area A then no adjustment is required. If it is in area B:

- ➤ unscrew the screws 1)(Fig. 10) and disassemble the blast tube 2).
- ➤ Move the fixing of the rod 3) from position A to position B, thereby causing the shutter 4) to retract.
- ➤ Now refit the blast tube 2) and the screws 1).

Once this operation has been carried out, secure the flange 9) (Fig. 7) to the boiler plate, inserting the gasket 7) supplied with the burner.

Use the 4 screws, also supplied with the unit, after first protecting the thread with an anti-seize product.

Tighten the seal between burner and boiler.

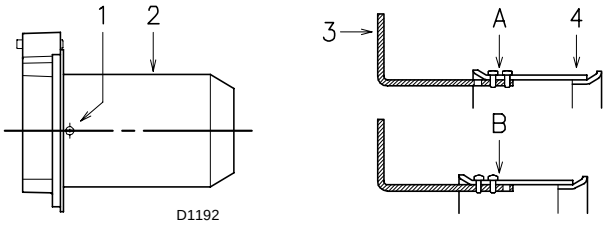


Fig. 10

4.7 Electrode position

WARNING

Make sure that the electrode is positioned as shown in Fig. 11.

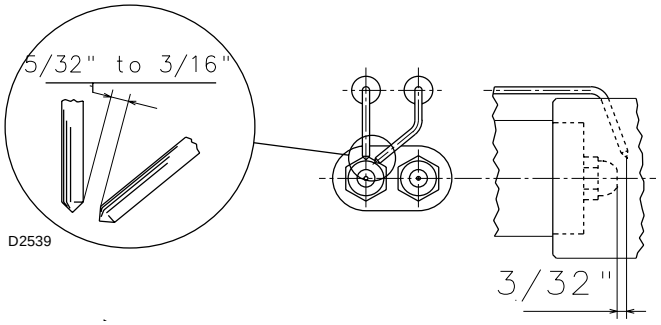


Fig. 11

4.8 Nozzle

The burner complies with the emission requirements of the UL 296 standard.

In order to guarantee that emissions do not vary, recommended and/or alternative nozzles specified by Riello in the Instruction and warning booklet should be used.

WARNING

It is advisable to replace nozzles every year during regular maintenance operations.

CAUTION

The use of nozzles other than those specified by the Manufacturer and inadequate regular maintenance may result into emission limits non-conforming to the values set forth by the regulations in force, and in extremely serious cases, into potential hazards to people and objects.

The manufacturing company shall not be liable for any such damage arising from nonobservance of the requirements contained in this manual.

4.8.1 Nozzle selection

Both nozzles must be chosen from among those listed in Tab. J.

The first nozzle determines the delivery of the burner in low fire.

The second nozzle combines together with the 1st nozzle to determine the total firing rate at high fire.

The total firing rates of low and high fire must be contained within the value range indicated on page 6.

Use nozzles with a 60° spray angle at the recommended pressure of 174 PSI.

The two nozzles have equal deliveries rates.

Nozzle size	GPH			MBtu/hr
	145 PSI	174 PSI	203 PSI	174 PSI
5.00	6.15	6.79	7.4	951
5.50	6.76	7.46	8.13	1044
6.00	7.4	8.17	8.87	1144
6.50	8.01	8.84	9.61	1238
7.00	8.61	9.51	10.34	1331
7.50	9.22	10.18	11.08	1425
8.00	9.86	10.86	11.82	1520
8.30	10.21	11.27	12.26	1578
8.50	10.47	11.56	12.55	1618
9.00	11.08	12.23	13.29	1712
9.50	11.69	12.90	14.03	1806
10.0	12.3	13.58	14.76	1901
10.5	12.94	14.28	15.49	1999
11.0	13.54	14.95	16.23	2093
12.0	14.76	16.3	17.71	2282
12.3	15.15	16.71	18.16	2339
13.0	16.01	17.64	19.18	2470
13.8	17.0	18.73	20.27	2622
14.0	17.23	19.02	20.65	2663
15.0	18.48	20.37	22.16	2852
15.3	18.83	20.78	22.57	2909
16.0	19.69	21.74	23.63	3044
17.0	20.94	23.09	25.1	3514

Tab. J

4.8.2 Nozzle assembly

- ➤ Remove screw 1)(Fig. 12) and extract the nozzle assembly 2).
- ➤ Install both nozzles 1)(Fig. 13), after having removed the plastic plugs 2);
- ➤ fitting the wrench through the central hole in the flame stability disk or loosen screws 1)(Fig. 14);
- ➤ remove disk 2) and replace the nozzles using the wrench 3).

WARNING

- ➤ Do not use any sealing products such as gaskets, sealing compound, or tape.
- ➤ Be careful to avoid damaging the nozzle sealing seat.
- ➤ The nozzles must be screwed into place tightly but carefully.
- ➤ The nozzle for low fire operation is the one lying beneath the firing electrodes.
- ➤ Make sure that the electrodes are positioned as shown in Fig. 11.

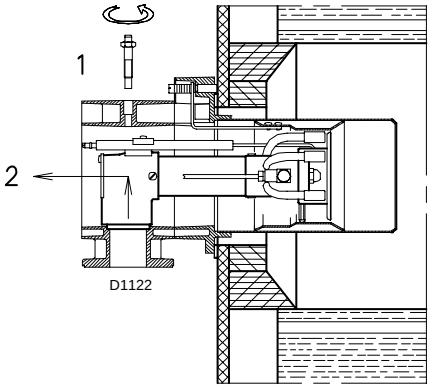


Fig. 12

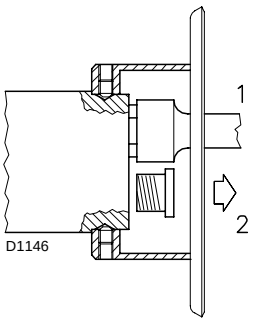


Fig. 13

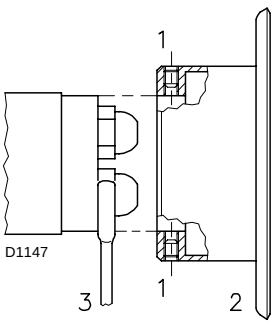


Fig. 14

4.9 Burner refitting

- ➤ Refit the burner to the slide bars 3)(Fig. 15) at approximately 4” from the sleeve 4) - burner positioned as shown in (Fig. 7, page 15)
- ➤ insert the ignition electrode cables and then slide the burner up to the sleeve so that it is positioned as shown in Fig. 15.
- ➤ Refit screws 2) (Fig. 15) on slide bars 3).
- ➤ Secure the burner to the sleeve by tightening screws 1).
- ➤ Connect the oil pipes again by screwing on the two connectors 6) (Fig. 7, page 15).

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.

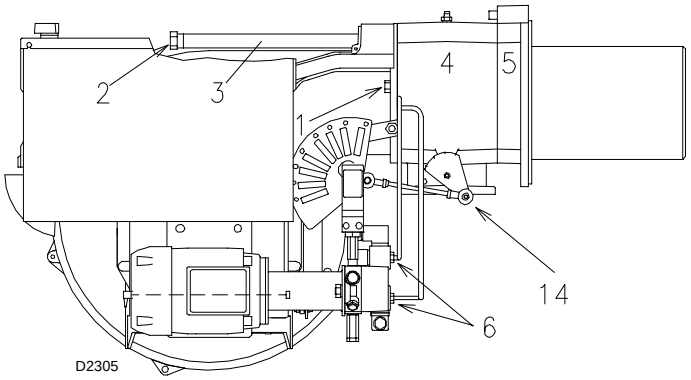


Fig. 15

4.10 Fuel supply

The burner is equipped with a self-priming pump which is capable of feeding itself within the limits listed in the table at the left.

The tank higher than the burner A

The distance "P" must not exceed 33 ft in order to avoid subjecting the pump's seal to excessive strain; the distance "V" must not exceed 13 ft in order to permit pump self-priming even when the tank is almost completely empty.

The tank lower than the burner B

Pump suction pressures higher than 13 “Hg must not be exceeded because at higher levels gas is released from the fuel, the pump starts making noise and its working life-span decreases.

It is good practice to ensure that the return and suction lines enter the burner from the same height; in this way it will be more improbable that the suction line fails to prime or stops priming.

+/- H	L ft		
ft	Ø 3/8”	Ø 1/2”	Ø 5/8”
+ 13	100	210	320
+ 10	88	180	320
+ 6.6	75	155	320
+ 3.3	68	140	320
+ 1.6	52	110	270
0	45	98	240
- 1.6	39	85	200
- 3.3	26	55	140
- 6.6	19	42	104
- 10	--	13	36

Tab. K

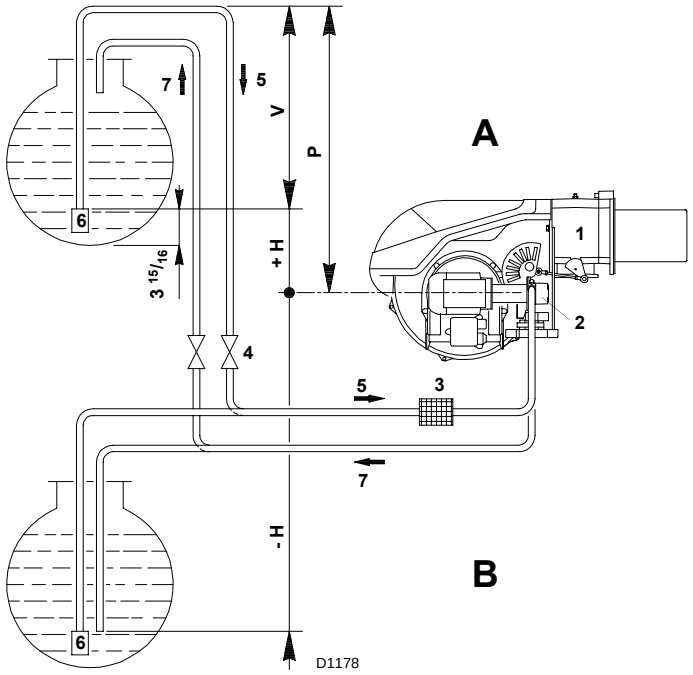


Fig. 16

H = Pump/Foot valve height difference
L = Piping length
Ø = Inside pipe diameter
1 = Burner
2 = Pump
3 = Filter
4 = Manual on/off valve
5 = Suction line
6 = Foot valve
7 = Return line

4.10.1 Hydraulic connections

The pumps are equipped with a by-pass that separates return line and suction line. The pumps are installed on the burner with the by-pass closed by screw 6), see diagram Fig. 19.

It is therefore necessary to connect both hoses to the pump.

WARNING

Damage to the pump seal will occur immediately if it is run with the return line closed and the by-pass screw inserted.

Remove the plugs from the suction and return connections of the pump.

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

Take care that the hoses are not stretched or twisted during installation.

Install the hoses where they cannot be stepped on or come into contact with hot surfaces of the boiler and where they do not hamper the opening of the burner.

Now connect the other end of the hoses to the suction and return lines.

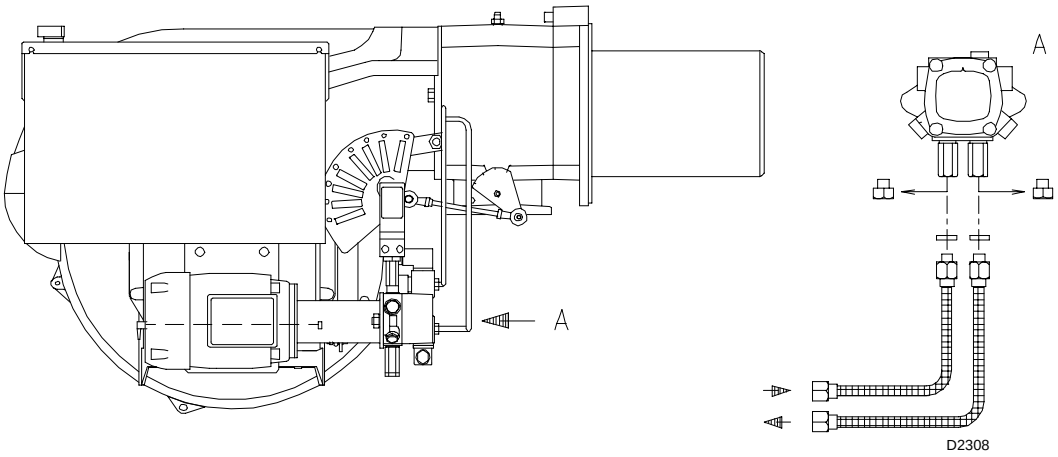


Fig. 17

4.10.2 Pump AJ4 CC

1	Suction	1/4” NPT
2	Return	1/4” NPT
3	Pressure gauge attachment	G 1/8”
4	Vacuum gauge attachment	G 1/8”
5	Pressure regulator	

Technical data

Min. delivery rate at 174 PSI pressure	GPH	54
Delivery pressure range	PSI	145 - 290
Max. suction	“Hg	13
Viscosity range	cSt	2.8 - 75
Max fuel oil temperature	°F - °C	140 - 60
Max. suction and return pressure	PSI	29
Pressure calibration in the factory	PSI	174
Filter mesh width	inch	0.006

Tab. L

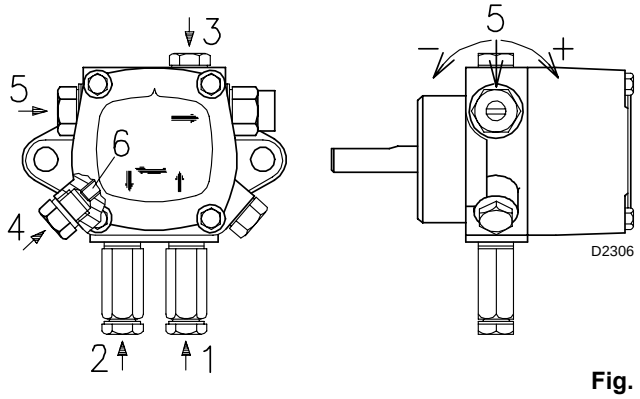


Fig. 18

Priming pump

WARNING

Before starting the burner, make sure that the tank return line is not clogged.

Obstructions in the line could cause the seal located on the pump shaft to break.

The time required for this operation depends upon the diameter and length of the suction tubing.

➤ The pump leaves the factory with the by-pass closed.
➤ Also check to make sure that the valves located on the suction line are open and that there is sufficient fuel in the tank.
➤ For self-priming to take place, one of the screws 3) of the pump (Fig. 18) must be loosened in order to bleed off the air contained in the suction line.

4.10.3 Oil hydraulic system layout

Key (Fig. 19)
1 Pump suction
2 Filter
3 Pump
4 Pressure regulator
5 Return pipe
6 By-pass screw
7 Pump return
8 Safety solenoid
9 Low fire valve
10 High fire valve
11 Filter
M Pressure gauge
P low oil pressure switch
V Vacuum gauge

4.10.4 Oil pressure switch

The oil pressure switch 22)(Fig. 3, page 10) is factory set to 145 PSI (10 bar).

If the oil pressure goes down to this value, the pressure switch stops the burner.

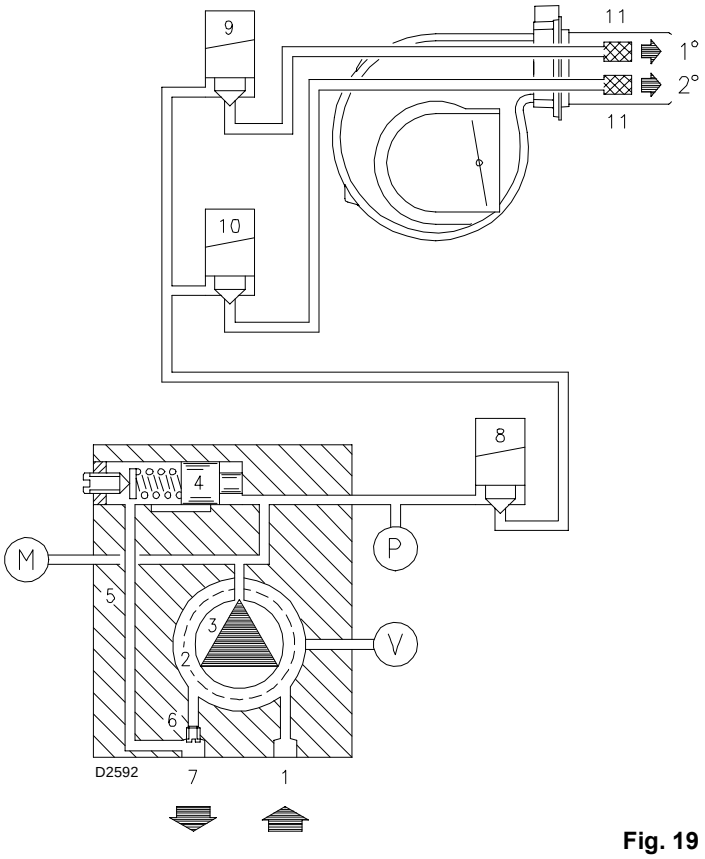


Fig. 19

4.11 Gas supply

4.11.1 Gas train

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

WARNING

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

- The main gas train must be connected to the gas attachment 1)(Fig. 20), 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.
- Gas safety shut-off valves 5)-6)(Fig. 21) 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. 21) and can enter the burner from the right or left side.

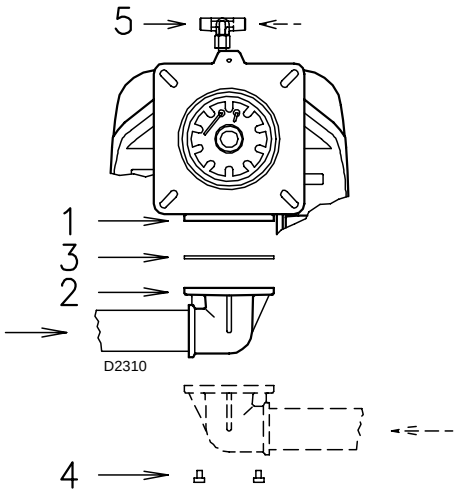


Fig. 20

4.11.2 Gas feeding line

Key to layout (Fig. 21)

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 butterfly valve
9 Burner

TYPICAL UL SCHEMATIC GAS PIPING

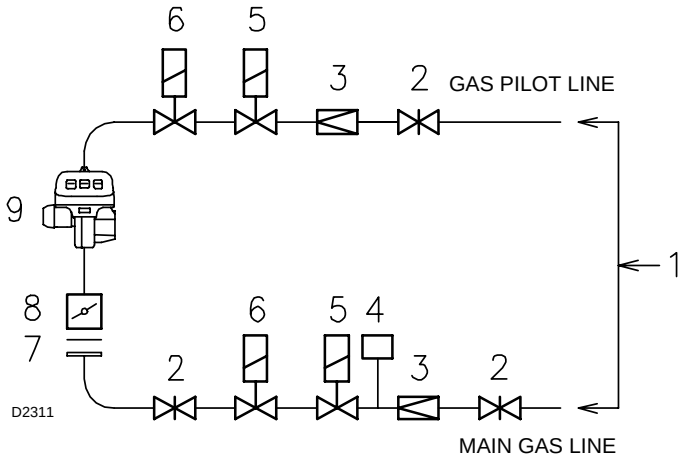


Fig. 21

4.11.3 Gas pressure

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

Column 1

Gas manifold pressure measured at test point 1) (Fig. 23), with:

- Combustion chamber at 0" WC
- Burner operating at maximum output
- Natural gas

Calculate the approximate high fire output of the burner as follows:

– Subtract the combustion chamber pressure from the gas pressure measured at test point 1) (Fig. 23).
– Find the nearest pressure value to your result in column 1 of the diagram for the burner in question.
– Read off the corresponding output on the left.

Example - RLS 100

- Maximum output operation
- Natural gas
- Gas pressure at test point 1) (Fig. 23) = 4.41" WC
- Pressure in combustion chamber = 0.79" WC

4.41 - 0.79 = 3.62" WC

A maximum output of 3616 MBtu/hr shown in diagram RLS 100 corresponds to 3.62" WC pressure, column 1, natural gas.

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

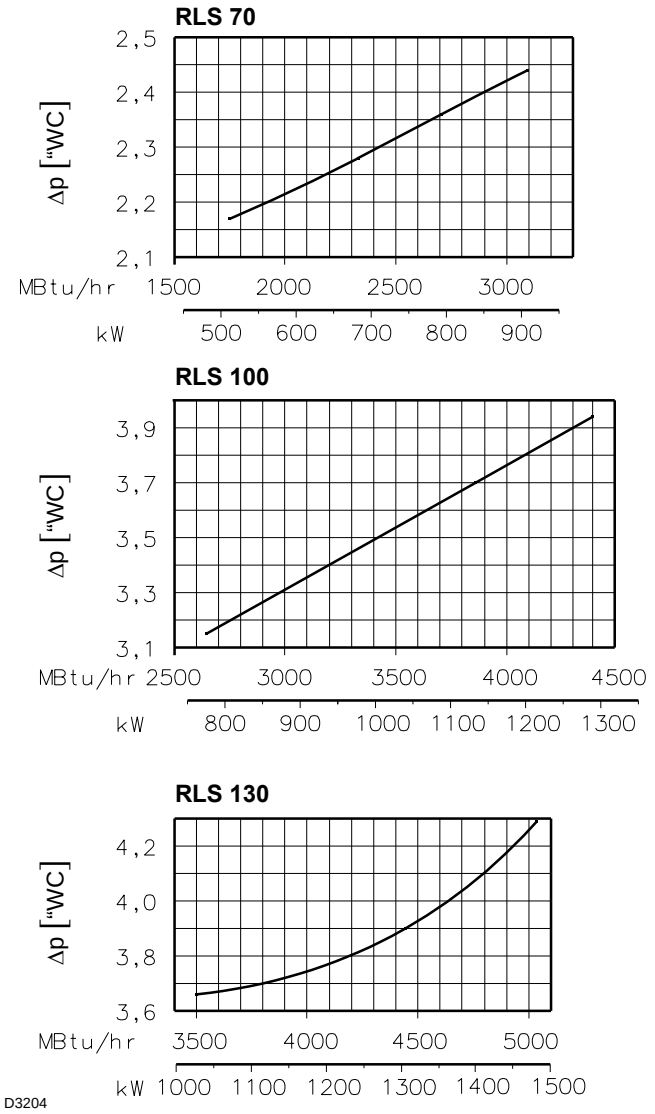


Fig. 22

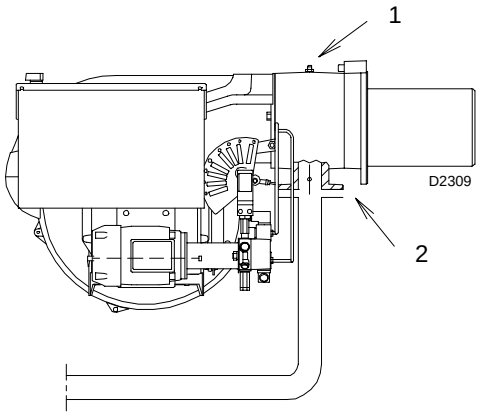


Fig. 23

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 burners have been type-approved for intermittent operation. This means they should compulsorily be stopped at least once every 24 hours to enable the control box to check its own efficiency at start-up.
  Burner halts are normally provided for automatically by the boiler load control system.
  If this is not the case, a time switch should be fitted in series to IN to provide for burner shut-down at least once every 24 hours.
- ➤ The electrical safety of the device is obtained only when it is correctly connected to an efficient earthing system, made according to current standards.
  It is necessary to check this fundamental safety requirement. In the event of doubt, have the electrical system checked by qualified personnel.
  Do not use the gas tubes as an earthing system for electrical devices.
- ➤ The electrical system must be suitable for the maximum input power of the device,as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for the input power of the device.
- ➤ For the main power supply of the device from the electricity mains:
  - do not use adapters, multiple sockets or extensions;
  - use an omnipolar switch with an opening of at least $^1/_8$" (overvoltage category) between the contacts, as indicated by the current safety standards.
- ➤ Do not touch the device with wet or damp body parts and/or in bare feet.
- ➤ Do not pull the electric cables.

Before carrying out any maintenance, cleaning or checking operations:


DANGER

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


DANGER

close the fuel interception tap.

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

- The burners leave the factory preset for:
  - **208-230 V** power supply: only in this case, if 460 V power supply is required, change the fan motor connection from delta to star for IE1 and double star to star for IE2/EPACT according to the indications of page 24 and change the setting of the thermal overload according to the table at page 25;
  - or **575 V** power supply;
    depending on the burner model (see page 6).


WARNING

When installing for the first time and after any maintenance work, make sure the gas valves are connected properly to the orange terminals before proceeding to ignite the burner.

Insert auxiliary lamps or check, with the aid of a tester, that power is not being supplied to the valves during standby or pre-purging.

Burner ignition with the gas valves open during pre-purging may cause an explosive condition.

4.13 Motor connection at 208-230 or 460V

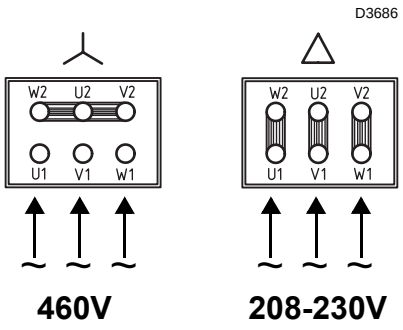
WARNING

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.

WARNING

Please, pay attention to the indications in case of modification of voltage, maintenance, or substitution.

IE1



IE2/Epact

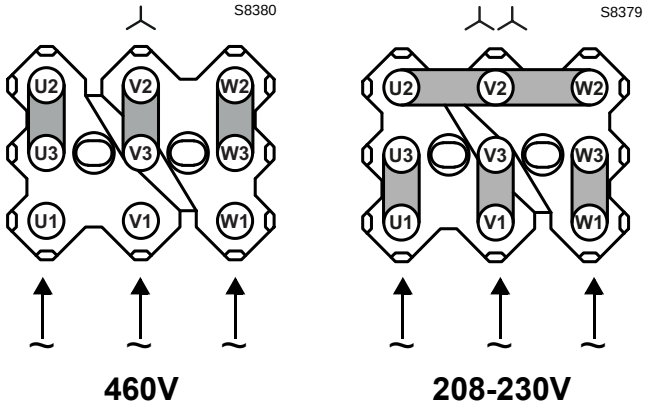


Fig. 24

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.

WARNING

Please pay attention to the indications in case of maintenance or substitution.

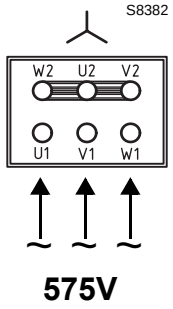


Fig. 25

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**.

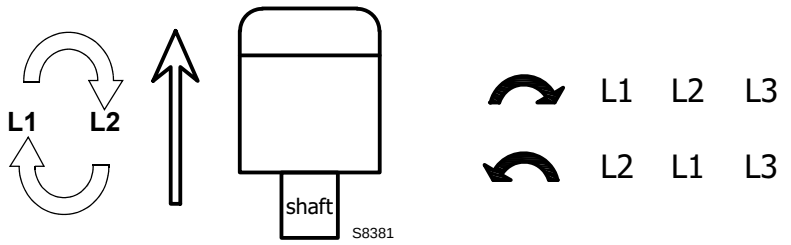


Fig. 26

4.16 Calibration of the thermal relay

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

For the calibration, refer to the table below.

To reset, in the case of an intervention of the thermal relay, press the button 1)(Fig. 27).

Notes:

The setting of the thermal overload must be according to the table below.

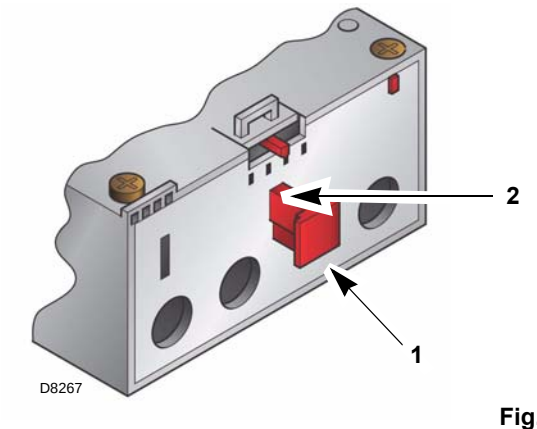


Fig. 27

Fuse and threephase cable calibration

IE 1

		RLS 70			RLS 100			RLS 130		
		208 - 230 V	460 V	575 V	208 - 230 V	460 V	575 V	208 - 230 V	460 V	575 V
F1 (A) Fuse	Non time Delay	15 A	8 A	6 A	20 A	15 A	8 A	25 A	15 A	10 A
	Time Delay	8 A	5 A	4 A	12 A	8 A	5 A	15 A	9 A	6 A
F2 (A) Fuse	Non time Delay	8 A	5 A	4 A	8 A	5 A	4 A	8 A	5 A	4 A
	Time Delay	5 A	3 A	2 A	5 A	3 A	2 A	5 A	3 A	2 A
S1 (AWG)		14	14	14	14	14	14	14	14	14
S2 (AWG)		14	14	14	14	14	14	14	14	14

IE 2/Epact

		RLS 70			RLS 100			RLS 130		
		208 - 230 V	460 V	575 V	208 - 230 V	460 V	575 V	208 - 230 V	460 V	575 V
F1 (A) Fuse	Non time Delay	15 A	6 A	5 A	25 A	10 A	10 A	25 A	10 A	10 A
	Time Delay	7 A	4 A	3 A	15 A	7 A	5 A	15 A	7 A	5 A
F2 (A) Fuse	Non time Delay	8 A	5 A	4 A	8 A	5 A	4 A	8 A	5 A	4 A
	Time Delay	5 A	3 A	2 A	5 A	3 A	2 A	5 A	3 A	2 A
S1 (AWG)		14	14	14	14	14	14	14	14	14
S2 (AWG)		14	14	14	14	14	14	14	14	14

Thermal overload calibration

IE 1

	RLS 70			RLS 100			RLS 130		
	208 - 230 V	460 V	575 V	208 - 230 V	460 V	575 V	208 - 230 V	460 V	575 V
Thermal overload fan motor. Set to Max:	5.4 A	3.1 A	2.3 A	8.5 A	4.9 A	3.2 A	9.8 A	5.6 A	4.3 A
Thermal overload pump motor. Set to Max:	3 A	1.7 A	1.3 A	3 A	1.7 A	1.3 A	3 A	1.7 A	1.3 A

IE 2/Epact

	RLS 70			RLS 100			RLS 130		
	208 - 230 V	460 V	575 V	208 - 230 V	460 V	575 V	208 - 230 V	460 V	575 V
Thermal overload fan motor. Set to Max:	4.6 A	2.3 A	1.8 A	9 A	4.5 A	3.6 A	9 A	4.5 A	3.6 A
Thermal overload pump motor. Set to Max:	3 A	1.7 A	1.3 A	3 A	1.7 A	1.3 A	3 A	1.7 A	1.3 A

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 Adjustments before first firing (light-oil operation)

The optimum calibration of the burner requires an analysis of the flue gases at the boiler outlet and interventions on the following points.

5.2.1 Combustion head setting

The setting of the combustion head depends exclusively on the maximum delivery of the burner.

See information shown on page 16.

5.2.2 Pump adjustment

No settings are required for the pump, which is set to 174 PSI by the manufacturer. This pressure must be checked and adjusted (if required) after the burner has been ignited.

The only operation required in this phase is the application of a pressure gauge on the appropriate pump attachment.

5.2.3 Air damper adjustment

The first time the burner is fired leave the factory setting unchanged for both low and high fire operation.

5.2.4 Ignition pilot adjustment

Place the pilot and electrode as shown in Fig. 28.

The pilot works correctly at pressures ranging from 6 - 12” WC.

WARNING

To set the pilot without main burner operation, proceed as follows:

– Move the jumper from terminals **"30-V11"** to terminals **"30-VP"**, as given in Fig. 29, this way the main valve will not be energized.
– With the burner in the manual position, hold the air damper in the minimum position and make the setting.
– When the setting is correct, replace the jumper on **“30-V11”**.

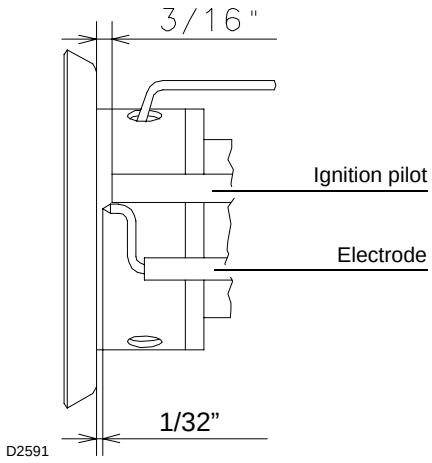


Fig. 28

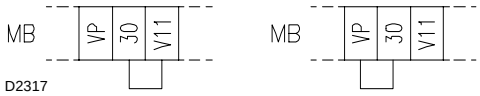


Fig. 29

MB - Burner terminal strip

5.3 Servomotor

The servomotor gives simultaneous regulation of the air damper through the variable cam profile 4)(Fig. 30) and the gas butterfly valve.

It rotates by 130° in approx. 35 s.

The factory settings must not be changed for the first firing, just check that they comply with the details below.

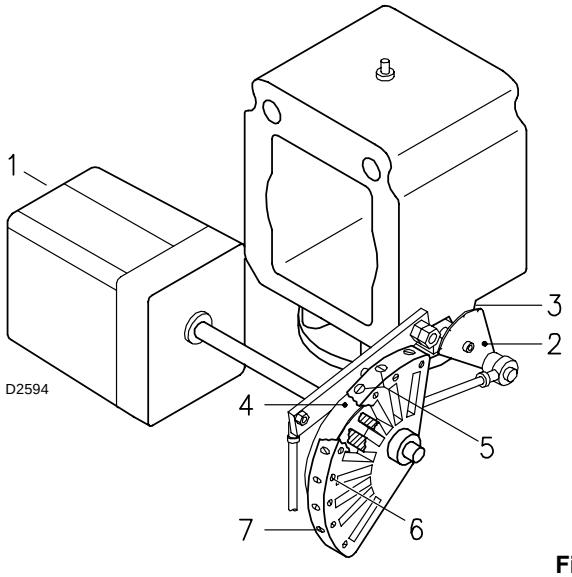


Fig. 30

Key (Fig. 30)
1 Servomotor
2 Graduated sector for gas butterfly valve
3 Index for graduated sector 2
4 Adjustable profile cam
5 Adjustment screws for cam starting profile
6 Adjustment fixing screws
7 Adjustment screws for cam and profile

To open the servomotor, remove the screws and pull the cover outward, (Fig. 31).

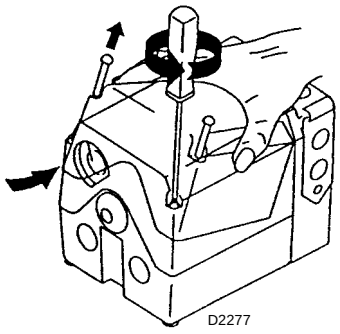


Fig. 31

In the Fig. 32 and Fig. 33 shows how the servomotor is released to manually check there is no binding though its motion.

WARNING

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

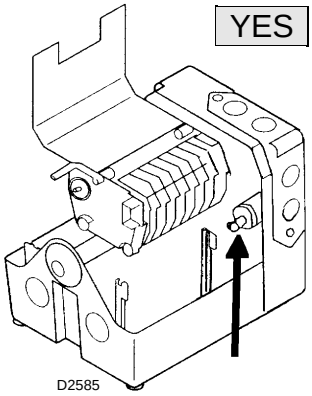


Fig. 32

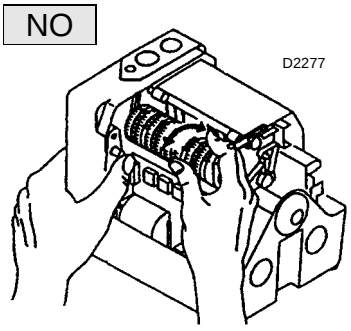


Fig. 33

5.4 Cams and trim potentiometers functions

Cam 1: **130°** (GAS only)
Limits rotation towards maximum for gas.
Cam 2: **0°** (GAS and OIL)
Limits rotation towards minimum, air damper closed on stand by.
Cam 3: **20°** (GAS only)
Limits gas ignition regulation.
Cam 4: **120°** (OIL only)
Limits rotation towards maximum, high fire.
Cam 5: **30°** (OIL only)
Regulates ignition position and low fire.
Cam 6: **110°** (OIL only)
Regulates the valve control position high fire.
It must always be ahead of cam 5.
Cams 7 - 8: not used

Trim potentiometer MAX (gas only)

Limits maximum modulation.

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

Trim potentiometer MIN (gas only)

Limits minimum modulation.

It must be set near the stroke end (cam 2) to exploit as far as possible the variable profile cam.

Trim potentiometer POS

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

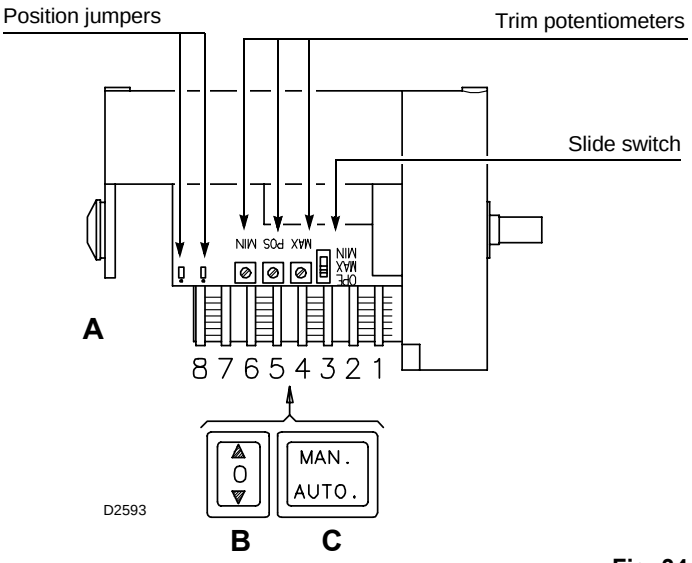


Fig. 34

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

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

5.5 Burner starting

Turn the selection switch 11)(Fig. 3, page 10), to the “OIL” position.

5.5.1 Fuel oil adjustment

Perform a visual setting (without taking a smoke test), which will be perfected after setting the gas.

Close the remote controls, with the servomotor switch in C)(Fig. 34) in the “AUTO” position and the switch in (Fig. 36) in the AUT position.

After firing, turn the switch C) (Fig. 34) to MAN position.

The servomotor should be placed at app. 30° (cam 5); if not, use the button B)(Fig. 34) "decrease output" to stop cam 5 (low fire position). Adjust cam 5 in opening and closing, according to needs.

Use the button B)(Fig. 34) "increase output" until it stops (app. 120°, cam 4 - high fire position).

Adjust cam 4.

Attention: do not exceed 130°, this would cause mechanical problems in the variable profile cam 4)(Fig. 30, page 27).

If you go below 110° (set on cam 6) the oil valve closes, therefore set cam 6 at app. 10° before setting cam 4.

5.6 Adjustments before first firing (gas operation)

Adjustment of the combustion head has been illustrated on page 16.

In addition, the following adjustments must also be made:

- ➤ Open manual valves up-stream from the gas train.
- ➤ Adjust the low gas pressure switch to the start of the scale (Fig. 39).
- ➤ Adjust the high gas pressure switch to the upper limit of the scale (Fig. 38).
- ➤ Adjust the air pressure switch to the zero position of the scale (Fig. 37).
- ➤ Purge the air from the gas line.
- ➤ Fit a U-type manometer (Fig. 35) to the gas pressure test point on the sleeve.
- ➤ The manometer readings are used to calculate MAX. burner power using the diagrams on page 22. 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.

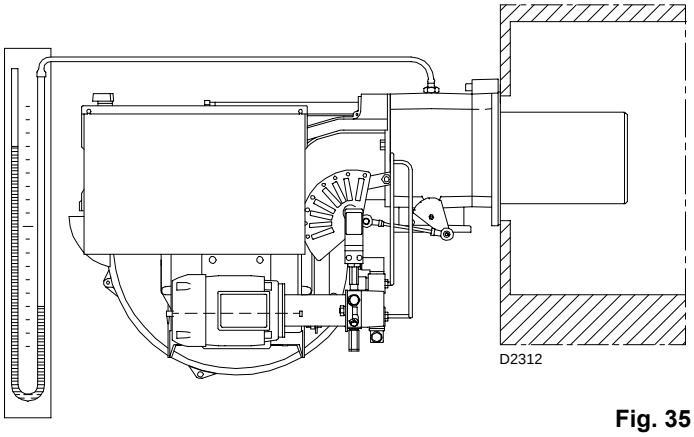


Fig. 35

5.7 Gas adjustment

Turn the selector switch 11)(Fig. 3, page 10), to the “GAS” position.

Close the operation controls, with the switch in C)(Fig. 34) in the “AUTO” position.

On firing (pilot burner and main valve) turn the switch C)(Fig. 34) to MAN and the switch in (Fig. 36) in the AUT position.

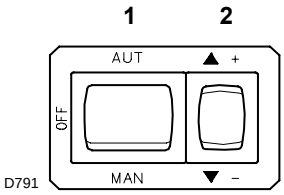


Fig. 36

5.7.1 Maximum output

Using button B)(Fig. 34), "increase output" until it stops, app. 130° (cam 1).

Place the slide switch on MAX and set the relative MAX trim potentiometer (setting must be very near to 130°) to exploit as far as possible the variable profile cam 4)(Fig. 30, page 27) and have the gas butterfly valve on maximum opening, graduated sector 2) on index 3)(Fig. 30).

The setting of the gas flow must be made at the gas regulator and, if necessary, on the gas valve.

The air setting must be made on the variable profile cam 4)(Fig. 30, page 27) by turning the screws 5), after loosening the screws 6).

WARNING

The gas output must be higher than the oil output; if not the stroke of the servomotor cannot be increased above 130°.

5.7.2 Minimum output

With the slide switch on the OPE position, use button B)(Fig. 34) "decrease output" until it stops at app. 20° (cam 3).

Put the slide switch in the MIN position and set the modulation minimum (gas only) using the relative MIN trim potentiometer.

Set the air using the variable profile cam 4)(Fig. 30, page 27).

If a lower modulation minimum is required than the level set on cam 3 of the servomotor (20°), decrease the cam setting.

5.7.3 Intermediate outputs

With the switch C)(Fig. 34) in the AUTO position, the slide switch in the OPE position and the switch 1)(Fig. 36, page 29) in the MAN position, move the button 2)(Fig. 36, page 29) in various intermediate levels between maximum and minimum and set the variable profile cam 4)(Fig. 30, page 27) to achieve optimum combustion, by turning the screws 5).

If possible, do not change the previously set maximum and minimum levels.

Check the various setting levels with a combustion analysis.

WARNING

Make a progressive setting of the profile, without sharp changes.

When the setting is complete, lock the cam profile using screws 6)(Fig. 30, page 27).

Turn the burner off, release the servomotor as shown in (Fig. 32, page 27) and manually turn cam 4)(Fig. 30, page 27) to check the cam is not binding during rotation.

Definitive fuel-oil adjustment

Setting is made only by adjusting the servomotor cam:

cam 4 for high fire oil and cam 5 for low fire oil.

NOTE:
Do not change the profile of cam 4)(Fig. 30, page 27), which has already been set for gas.

Turn the selection switch 11)(Fig. 3, page 10) to OIL.

Turn the burner on with switch C)(Fig. 34) on AUTO and the slide switch on OPE.

After firing, turn the switch 1)(Fig. 36, page 29) to MAN position, use button 2)(Fig. 36, page 29) to "decrease output" until cam 5 stops, which had previously been set and then make the definitive setting for low fire oil, opening or closing the cam to obtain optimum combustion.

Use button 2)(Fig. 36, page 29) "increase output" until cam 4 stops, which had previously been set, and make the definitive setting for high fire oil, opening or closing the cam for optimum combustion.

NOTE:
Cam 4 must not be set above 130° (it must not exceed cam 1, gas maximum).
Cam 6, which commands the high fire oil valve, must always be ahead of cam 4.

5.7.4 Gas combustion checks

CO2

It is better to set the burner with CO2 not higer than 10% (with natural gas). In this way avoiding a loss of calibration setting (for example draft variation) that could cause combustion with little air and the production of CO.

CO

It must be not higher than 400 PPM.

5.8 Final calibration of the pressure switches

5.8.1 Air pressure switch

Adjust the air pressure switch after having performed all other burner adjustments with the air pressure switch set to the start of the scale (Fig. 37).

With the burner operating at min. output, increase adjustment pressure by slowly turning the relative dial clockwise until the burner locks out.

Then turn the dial anti-clockwise by about 20% of the set point and repeat burner starting to ensure it is correct.

If the burner locks out again, turn the dial anti-clockwise a little bit more.

as a rule, the air pressure switch must prevent the formation of CO.

To check this, insert a combustion analyser into the chimney, slowly close the fan suction inlet (for example with cardboard) and check that the burner locks out, before the CO in the fumes exceeds 400 ppm.

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

5.8.2 High gas pressure switch

Adjust the high gas pressure switch after having performed all other burner adjustments with the maximum gas pressure switch set to the end of the scale (Fig. 38).

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.

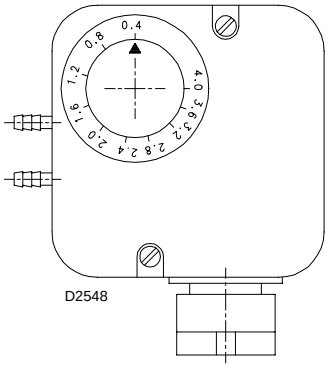


Fig. 37

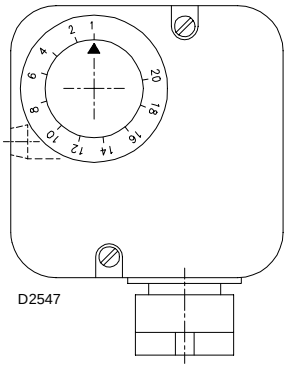


Fig. 38

5.8.3 Low gas pressure switch

Adjust the low gas pressure switch after having performed all the other burner adjustments with the pressure switch set at the start of the scale (Fig. 39).

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.

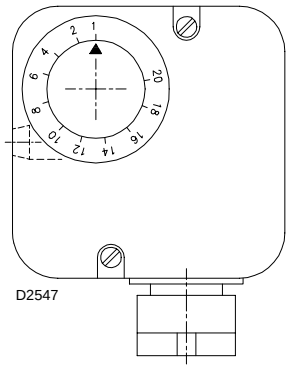


Fig. 39

5.9 Flame signal measurement

Min value for a good signal: 70 µA. If the value is lower, it can be due to:

– Worn scanner;
– Low current;
– Bad set up of the burner.

In order to measure the current, use a microammeter of 100 mA c.c., connected to the scanner, as in the diagram, with a capacitor of 100 mF - 1V c.c. at the same level of the instrument. See (Fig. 40).

LFL 1.335 WITH U.V. DETECTOR

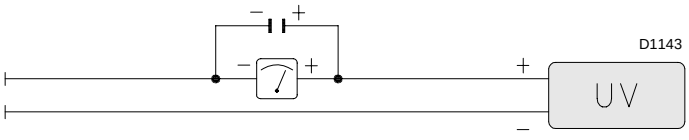


Fig. 40

5.10 Operation layout

See (Fig. 41). Switching times are given in seconds, in the burner startup sequence.

LFL 1.335 Series 01

t1	37.5	t6	optional
t2	2.5	t7	15
t3	5	t8	5
t4	25	t9	16
t5	optional		

Tab. M

Key for the times

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

5.10.1 Burner flame goes out during operation

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

Key to layouts

B7	-	UV cell
F1	-	Thermal overload (fan motor)
F2	-	Thermal overload (pump motor)
K...	-	Relay
K1	-	Fan motor contactor
K2	-	Pump motor contactor
M1	-	Fan motor
M2	-	Pump motor
S10	-	Air pressure switch
S12	-	High gas pressure switch
S14	-	Oil pressure switch
SM	-	Servomotor
T1	-	Ignition transformer (pilot)
T2	-	Ignition transformer (oil)
TB	-	Burner ground
XMB	-	Burner terminal strip
Y21	-	1st stage oil valve
Y22	-	2nd stage oil valve
Y20	-	Safety oil valve

Full modulation

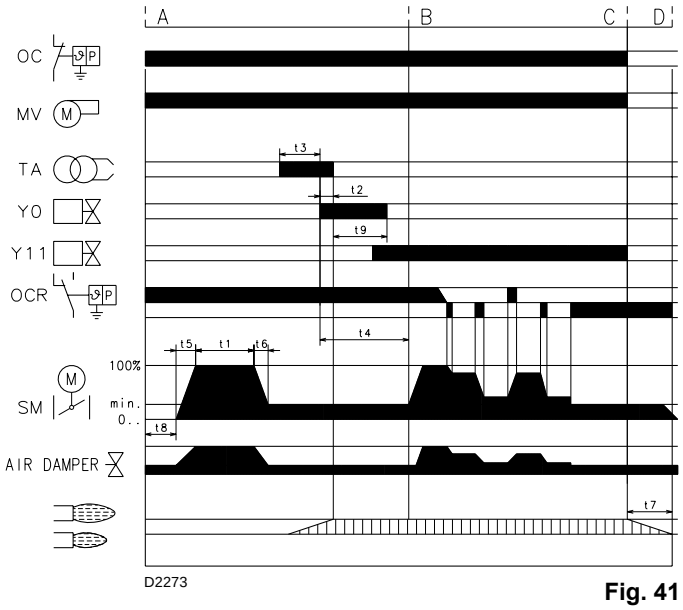


Fig. 41

High - Low

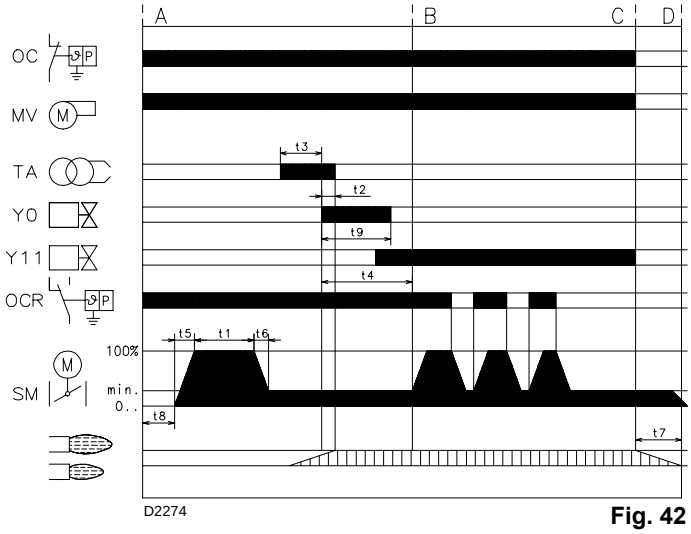


Fig. 42

5.10.2 Firing failure

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

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 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.

Combustion head

Open the burner and make sure that all components of the combustion head are in good condition, not deformed by the high temperatures, free of impurities from the surroundings and correctly positioned. If in doubt, disassemble the elbow fitting 7)(Fig. 45, page 34).

Fan

Check to make sure that no dust has accumulated inside the fan or on its blades, as this condition will cause a reduction in the air flow rate and provoke polluting combustion.

Burner

Check for excess wear or loose screws. Also make sure that the screws securing the electrical leads in the burner connections are fully tightened.
Clean the outside of the burner.
Clean and grease the cam variable profile.

Flame inspection window

Clean the flame inspection window (Fig. 43).

UV scanner

Clean the glass cover from any dust that may have accumulated. The scanner 1)(Fig. 44) is held in position by a pressure fit and can therefore be removed by pulling it outward forcefully.

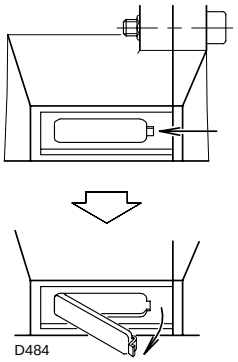


Fig. 43

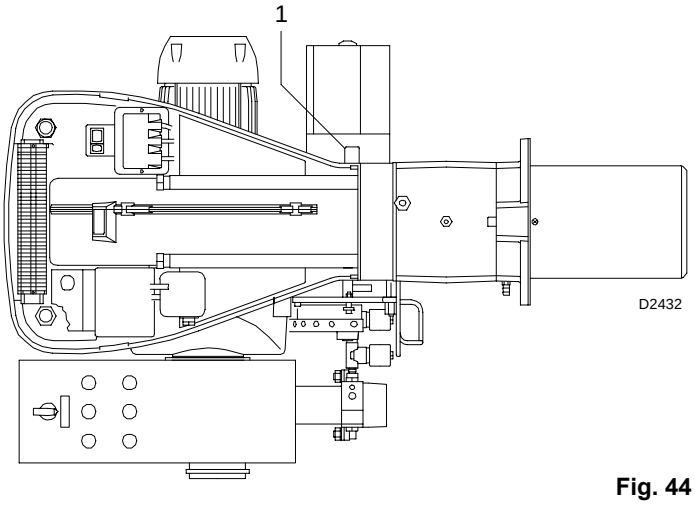


Fig. 44

Boiler

Clean the boiler as indicated in its accompanying instructions in order to maintain all the original combustion characteristics intact, especially the flue gas temperature and combustion chamber pressure.

Nozzles (fuel oil)

Do not clean the nozzle orifices. The nozzle filters however may be cleaned or replaced as required.

Replace the nozzles every 2-3 years or whenever necessary. Combustion must be checked after the nozzles have been changed.

Flexible hoses (fuel oil)

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

Filters

Check the filtering baskets on line and at nozzle present in the system. Clean or replace if necessary.
If rust or other impurities are observed inside the pump, use a separate pump to lift any water and other impurities that may have deposited on the bottom of the tank.

Gas leaks

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

Fuel tank

Approximately every 5 years, or whenever necessary, suck any water or other impurities present on the bottom of the tank using a separate pump.

Combustion

Adjust the burner if the combustion values found at the beginning of the operation do not comply with the regulations in force, or at any rate, do not correspond to good combustion.

6.3 Opening the burner

DANGER

Disconnect the electrical supply from the burner.

➤ Loosen screws 1) and withdraw the cover 2)(Fig. 45)
➤ Disengage the swivel coupling 7) from the graduated sector.
➤ Disconnect the light-oil pipes.
➤ Remove screws 3) and pull the burner back by about 4” on the slide bars. Disconnect the electrode leads and then pull the burner fully back.
➤ Now extract the internal part 5) after having removed the screw 6).

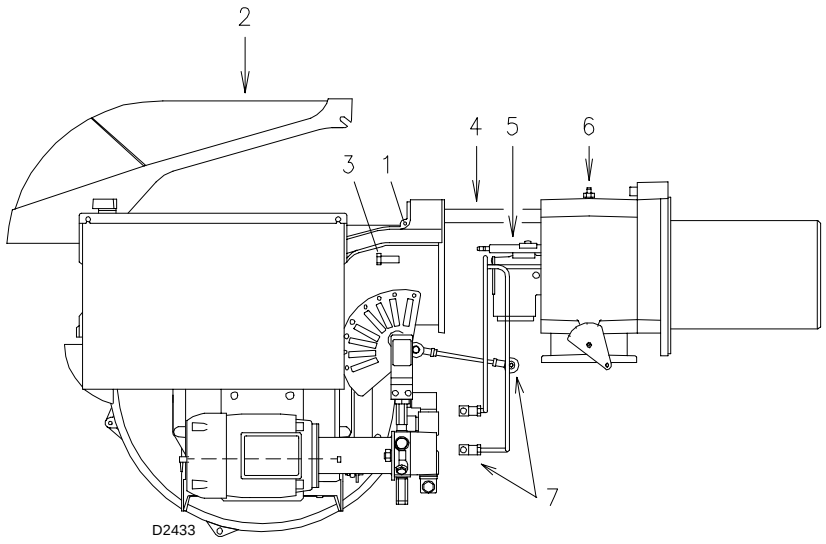


Fig. 45

6.4 Closing the burner

To close the burner proceed sa follows:
➤ push the burner until it is about 4” from the sleeve (Fig. 45).
➤ Re-connect the leads and slide in the burner until it comes to a stop.
➤ Refit screws 3) and pull the leads gently out until they are slightly stretched.
➤ Re-couple the swivel coupling 7) to the graduated sector.
➤ Reconnect the light-oil pipes.

7 Faults - Possible causes - Solutions

Find a list of faults, causes and possible solutions for a set of failures that may occur and result in irregular burner operation or no functioning at all.

If a burner malfunction is detected, first of all:
– check that the electrical wiring is adequately connected;
– check whether fuel is delivered;
– check that every adjustment parameter is adequately set.

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

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

▲ **Interruption of startup sequence**, because the OPEN signal has not been delivered to terminal 8 by cam 1 (gas) or cam 4 (oil). Terminals 6, 7 and 14 remain under voltage until the fault has been corrected!

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

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

▼ **Interruption of startup sequence**, because the position signal for the low-flame position has not been delivered to terminal 8 by cam 3 (gas) or cam 5 (oil). Terminals 6, 7 and 14 remain under voltage until the fault has been corrected!

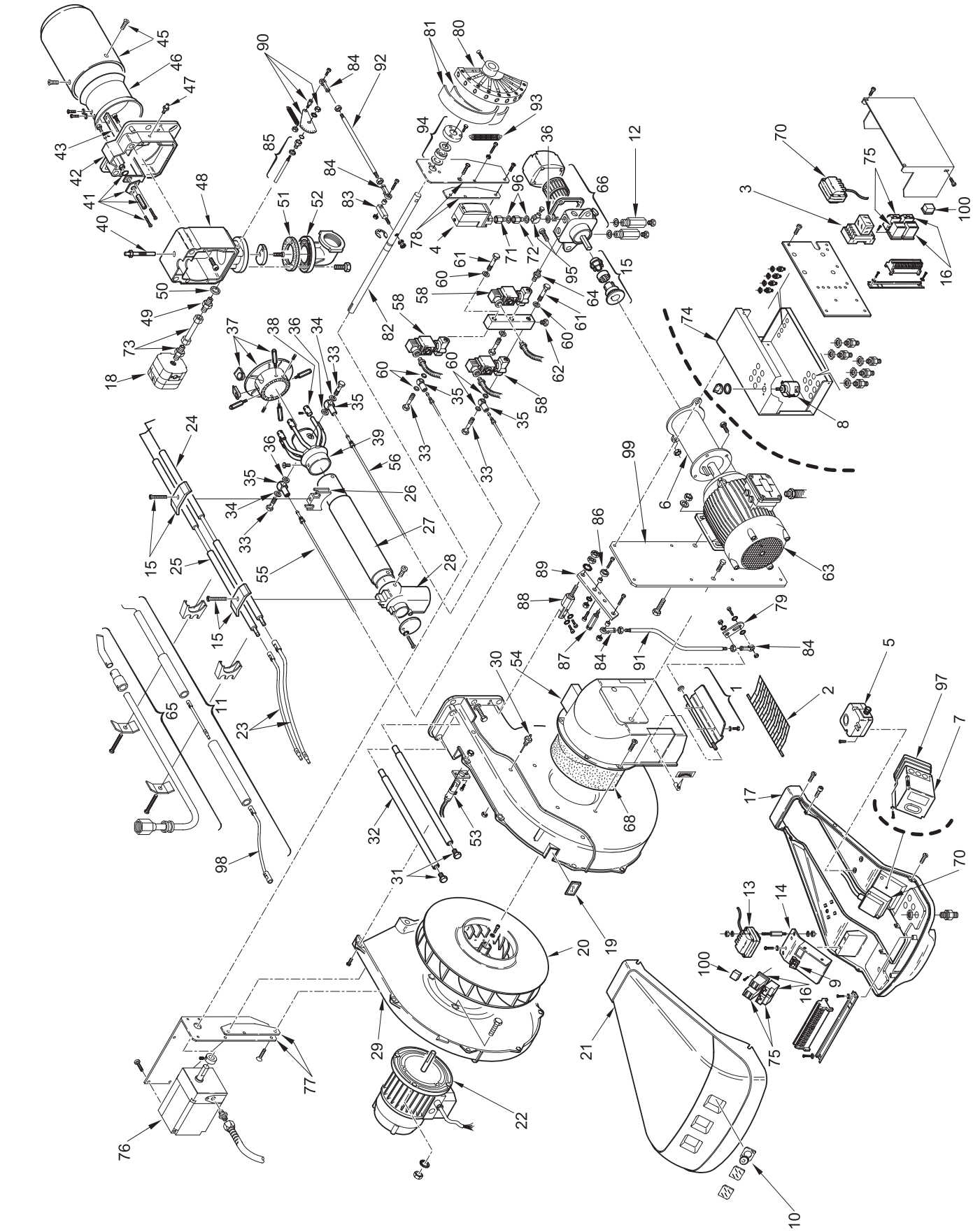
1 **Lock-out**, because no flame signal is present after completion of the (1st) safety time.

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

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

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

A Appendix - Spare parts



N.	COD.		C9534000 (3485070)	C9534001 (3485075)	C9535000 (3485270)	C9535001 (3485275)	C9536000 (3485470)	C9536001 (3485475)	DESCRIPTION	*
1		3003948	•	•	•	•	•	•	AIR DAMPER ASSEMBLY	
2		3003949	•	•	•	•	•	•	GRID	
3		3013038	•	•	•	•	•	•	OVERLOAD	
4		3012384	•	•	•	•	•	•	OIL PRESSURE SWITCH	
5		3012948	•	•	•	•	•	•	AIR PRESSURE SWITCH	
6		3013050	•	•	•	•	•	•	BELL	
7	C5830008	3012955	•	•	•	•	•	•	CONTROL BOX LFL 1.335	
8		3012310	•	•	•	•	•	•	SELECTOR SWITCH	
9		3012080	•	•	•	•	•	•	SWITCH	
10		3007627	•	•	•	•	•	•	MEMBRAN	
11		3013052	•	•	•	•	•	•	PILOT ELECTRODE	
12		3013524	•	•	•	•	•	•	CONNECTOR	
13		3012938	•	•	•	•	•	•	TRANSFORMER	
14		3013039	•	•	•	•	•	•	SUPPORT	
15		3013051	•	•	•	•	•	•	DRIVE COUPLING	
16		3012935	•						OVERLOAD+CONTACTOR 208-230/460V	
16		3012991		•					OVERLOAD+CONTACTOR 575V	
16		20028310			•				OVERLOAD+CONTACTOR 208-230/460V	
16		3013124				•			OVERLOAD+CONTACTOR 575V	
16		3012937					•		OVERLOAD+CONTACTOR 208-230/460V	
16		3013125						•	OVERLOAD+CONTACTOR 575V	
17		3013127	•	•	•	•	•	•	BASE PLATE	
18	C5332011	3012969	•	•	•	•	•	•	GAS PRESSURE SWITCH	
19		3003763	•	•	•	•	•	•	INSPECTION WINDOW	
20		3012939	•	•					FAN	
20		3012403			•	•			FAN	
20		3012940					•	•	FAN	
21		3012934	•	•	•	•	•	•	COVER	
22		3012941	•						MOTOR 208-230/460V	
22		3013059		•					MOTOR 575V	
22		3013060				•			MOTOR 575V	
22		3012943			•		•		MOTOR 208-230/460V	
22		3013061						•	MOTOR 575V	
23		3012959	•	•	•	•	•	•	H.T. LEAD	
24		3013040	•	•	•	•	•	•	ELECTROD	
25		3013041	•	•	•	•	•	•	ELECTROD	
26		3012430	•	•	•	•	•	•	SUPPORT	
27		3013042	•	•	•	•	•	•	TUBE	
28		3012042	•	•	•	•	•	•	ELBOW	
29		3012012	•	•	•	•	•	•	HALF-SHELL	
30		3003891	•	•	•	•	•	•	CONNECTOR	
31		3003481	•	•	•	•	•	•	SCREW	

N.	COD.		C9534000 (3485070)	C9534001 (3485075)	C9535000 (3485270)	C9535001 (3485275)	C9536000 (3485470)	C9536001 (3485475)	DESCRIPTION	*
32		3012013	•	•	•	•	•	•	BAR	
33		3006721	•	•	•	•	•	•	SCREW	
34		3007077	•	•	•	•	•	•	SEAL	
35		3006722	•	•	•	•	•	•	CONNECTOR	
36		3003381	•	•	•	•	•	•	SEAL	
37		3013043	•	•					SCOOP	
37		3013044			•	•			SCOOP	
37		3013045					•	•	SCOOP	
38		3012436	•	•	•	•	•	•	GAS NOZZLE	
39		3012437	•	•	•	•	•	•	GAS HEAD	
40		3012049	•	•	•	•	•	•	SCREW	
41		3003974	•	•	•	•	•	•	CONTROL DEVICE	
42		3003975	•	•					FRONT PIECE	
42		3003976			•	•	•	•	FRONT PIECE	
43		3012438	•	•					SQUARE	
43		3012440			•	•			SQUARE	
43		3012442					•	•	SQUARE	
44		3003991	•	•	•	•	•	•	FLANGE GASKET	
45		3012444	•	•					END CONE	
45		3012446			•	•	•	•	END CONE	
46		3003983	•	•					SHUTTER	
46		3003984			•	•	•	•	SHUTTER	
47		3003322	•	•	•	•	•	•	CONNECTOR	
48		3013046	•	•	•	•	•	•	MANIFOLD	
49		3003220	•	•	•	•	•	•	CONNECTOR	
50		3007166	•	•	•	•	•	•	SEAL	
51		3005482	•	•	•	•	•	•	SEAL	
52		3012971	•	•	•	•	•	•	FLANGE AND ELBOW	
53	C5360028	3003396	•	•	•	•	•	•	U.V.DETECTOR	
54		3012454	•	•	•	•	•	•	AIR INTAKE	
55		3013047	•	•	•	•	•	•	TUBE	
56		3013048	•	•	•	•	•	•	TUBE	
57		3012953	•	•	•	•	•	•	SOCKET	
58		3012952	•	•	•	•	•	•	NEEDLE VALVE	
59		3013524	•	•	•	•	•	•	CONNECTOR	
60		3007077	•	•	•	•	•	•	SEAL	
61		3003592	•	•	•	•	•	•	BAR	
62		3003681	•	•	•	•	•	•	CORK	
63		3013031	•		•		•		MOTOR 208-230/460V	
63		3013063		•		•		•	MOTOR 575V	
64		3009087	•	•	•	•	•	•	CONNECTOR	
65		3013049	•	•	•	•	•	•	PILOT TUBE	

N.	COD.		C9534000 (3485070)	C9534001 (3485075)	C9535000 (3485270)	C9535001 (3485275)	C9536000 (3485470)	C9536001 (3485475)	DESCRIPTION	*
66		3013523	•	•	•	•	•	•	PUMP	
67		3003936	•	•	•	•	•	•	FILTER + SEAL	
68		3003952	•	•	•	•	•	•	SOUND DAMPING	
70		3012956	•	•	•	•	•	•	TRANSFORMER	
71		3012125	•	•	•	•	•	•	CONNECTOR	
72		3012003	•	•	•	•	•	•	SCREW	
73		3013055	•	•	•	•	•	•	TUBE	
74		3013134	•	•	•	•	•	•	AUXILIARY PANNEL	
75		20027432	•		•		•		OVERLOAD+CONTACTOR FOR MOTOR 208-230/460V	
75		3013131		•		•		•	OVERLOAD+CONTACTOR FOR MOTOR 575V	
76		3012944	•	•	•	•	•	•	SERVOMOTOR	
77		3012957	•	•	•	•	•	•	ANCHOR PLATE	
78		3012346	•	•	•	•	•	•	ANCHOR PLATE	
79		3012359	•	•	•	•	•	•	LEVER	
80		3012358	•	•	•	•	•	•	CAM ASSEMBLY	
81		3006097	•	•	•	•	•	•	FLAT SPING	
82		3012972	•	•	•	•	•	•	SHAFT	
83		3012350	•	•	•	•	•	•	LEVER	
84		3006098	•	•	•	•	•	•	PIN JOINT	
85		3012059	•	•	•	•	•	•	BUTTERFLY VALVE SHAFT	
86		3003841	•	•	•	•	•	•	BEARING	
87		3012352	•	•	•	•	•	•	BAR	
88		3012353	•	•	•	•	•	•	BAR	
89		3012354	•	•	•	•	•	•	LEVER	
90		3012599	•	•	•	•	•	•	GRADUATE SECTOR	
91		3012351	•	•	•	•	•	•	TIE ROD	
92		3012060	•	•	•	•	•	•	TIE ROD	
93		3012356	•	•	•	•	•	•	SPRING	
94		3012357	•	•	•	•	•	•	BEARING	
95		3012123	•	•	•	•	•	•	CONNECTOR	
96		3007077	•	•	•	•	•	•	SEAL	
97	C5360002	3013010	•	•	•	•	•	•	CONTROL BOX BASE	
98		3013140	•	•	•	•	•	•	H.T. LEAD	
99		3013144	•	•	•	•	•	•	BRACKET	
100		20028602	•	•	•	•	•	•	AUXILIARY CONTACT BLOCK	

*

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

- **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.

- **Kit for lengthening the combustion head**

L = Standard length
L1 = Length obtainable with the kit

Code **3010267**	L = 9 $^{27}/_{32}$"	L1 = 15 $^{5}/_{32}$"	• RLS 70
Code **3010268**	L = 9 $^{27}/_{32}$"	L1 = 15 $^{5}/_{32}$"	• RLS 100
Code **3010269**	L = 9 $^{27}/_{32}$"	L1 = 15 $^{5}/_{32}$"	• RLS 130

- **Kit for LPG operation** - Code **3010305**: The kit allows the RLS 70-100-130 burners to operate on LPG.