

GB Forced draught gas burners

Low-High-Low or Modulating Operation



CODE	MODEL
20165993	RS 28/M
20166042	RS 38/M
20166043	RS 50/M



Original instructions

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	Other symbols	3
1.1.4	Delivery of the system and the instruction manual.	4
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 equipment	6
3.4	Burner models designation	7
3.5	Burner dimensions	7
3.6	Firing rate	8
3.6.1	Procedure to refer burner operating condition at an altitude and/or at a combustion supporter air temperature different to the standard values (328 ft above sea level, 68 °F).	9
3.7	Minimum furnace dimensions	9
3.8	Burner description	10
3.9	Electrical panel description	11
3.10	RFGO-A13 control box.	12
3.11	SQN70 Servomotor	13
4	Installation	14
4.1	Notes on safety for the installation.	14
4.2	Handling.	14
4.3	Preliminary checks	14
4.4	Boiler plate	15
4.5	Blast tube length	15
4.6	Securing the burner to the boiler	15
4.7	Ignition pilot adjustment	16
4.8	Combustion head adjustment	16
4.9	Gas supply	18
4.9.1	Gas train.	18
4.9.2	Gas feeding line	18
4.9.3	Gas pressure	19
4.10	Electrical wiring	20
4.10.1	Notes on terminals	20
4.10.2	Supply cables and external connections passage	21
4.11	Calibration of the thermal relay	21
4.12	Motor connection at 208-230 or 460V	22
4.13	Motor connection at 575V	22
4.14	Motor rotation	23
4.15	Burner operation	24
4.15.1	Burner starting	24
4.15.2	Steady state operation	24
4.15.3	Firing failure	24
4.15.4	Burner flame goes out during operation.	24
5	Start-up, calibration and operation of the burner	25
5.1	Notes on safety for the first start-up	25
5.2	Adjustments before first firing.	25

5.2.1	Servomotor	26
5.3	Burner start-up	26
5.4	Burner firing	26
5.5	Burner calibration	27
5.5.1	Firing output	27
5.5.2	Maximum output	27
5.5.3	Minimum output	27
5.5.4	Intermediate outputs	27
5.6	Final calibration of the pressure switches	28
5.6.1	Air pressure switch - CO check	28
5.6.2	Low gas pressure switch	28
6	Maintenance	29
6.1	Notes on safety for the maintenance	29
6.2	Maintenance programme	29
6.2.1	Maintenance frequency	29
6.2.2	Safety test - with gas ball valve closed	29
6.2.3	Checking and cleaning	29
6.2.4	Flame presence check	30
6.2.5	Safety components	30
6.3	Opening the burner	31
6.4	Closing the burner	31
7	LED indicator and special function	32
7.1	Description of LED lamps	32
7.2	Check mode function	32
7.3	Flame control lock-out or emergency stop condition	32
7.4	LED lamps: burner operating status	33
8	Problems - Causes - Remedies signalled by LED indicators	34
A	Appendix - Spare parts	39
B	Appendix - Accessories	43
C	Appendix - Burner start up report	44

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 Other symbols



DANGER

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



DANGER: FLAMMABLE MATERIAL
This symbol indicates the presence of flammable materials.



DANGER: BURNING
This symbol indicates the risks of burns due to high temperatures.



DANGER: CRUSHING OF LIMBS
This symbol indicates the presence of moving parts: danger of crushing of limbs.



WARNING: MOVING PARTS

This symbol indicates that you must keep limbs away from moving mechanical parts; danger of crushing.



DANGER: EXPLOSION

This symbol signals places where an explosive atmosphere may be present. An explosive atmosphere is defined as a mixture - under atmospheric conditions - of air and flammable substances in the form of gases, vapours, mist or dust in which, after ignition has occurred, combustion spreads to the entire unburned mixture.



PERSONAL PROTECTION EQUIPMENT

These symbols indicate the equipment that must be worn and kept by the operator for protection against threats against safety and/or health while at work.



OBLIGATION TO ASSEMBLE THE COVER AND ALL THE SAFETY AND PROTECTION DEVICES

This symbol signals the obligation to reassemble the cover and all the safety and protection devices of the burner after any maintenance, cleaning or checking operations.



ENVIRONMENTAL PROTECTION

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



IMPORTANT INFORMATION

This symbol indicates important information that you must bear in mind.

- This symbol indicates a list.

Abbreviations used

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

1.1.4 Delivery of the system and the instruction manual

When the system is delivered, it is important that:

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

.....

- the address and telephone number of the nearest Assistance Centre

.....

.....

.....

- The system supplier must carefully inform the user about:
 - the use of the system;
 - any further tests that may be required before activating the system;
 - maintenance, and the need to have the system checked at least once a year by a representative of the manufacturer or another 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 uses expressly foreseen by the manufacturer;

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

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



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

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

In addition:



- must take all the measures necessary to prevent unauthorised people gaining access to the machine;
- the user 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.

3 Technical description of the burner

3.1 Technical data

Model			RS 28/M	RS 38/M	RS 50/M	RS 50/M
Output ⁽¹⁾	High	MBtu/hr	617 - 1232	880 - 1665	1099 - 2201	1099 - 2201
		kW	181 - 361	258 - 488	322 - 645	322 - 645
	Low	MBtu/hr	198	266	321	321
		kW	58	78	94	94
Fuel			Natural or propane gas			
- Max delivery		SCFH	1232	1665	2201	2201
- Pressure at maximum delivery ⁽²⁾ natural gas		" WC	2.95	2.6	2.83	2.83
Operation			Low - high-low or modulating FS2 - Continuous operation - only using the flame detection electrode (ionisation) These burners are suitable also for the intermittent operation (FS1) only using the UV flame sensor kit			
Standard application			Boilers: water, steam, thermal oil			
Ambient temperature		°F	32 - 104 (0 - 40 °C)			
Combustion air temperature		°F max	140 (60 °C)			
Noise levels ⁽³⁾		dBa	68	70	72	72
Weight (complete with packaging)		lbs	84	88	91	93

Tab. A

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

(2) Pressure at test point 8)(Fig. 4, page 10), with zero pressure in the combustion chamber, with open gas ring 2) at 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 28/M	RS 38/M	RS 38/M	RS 50/M	RS 50/M
Main power supply (+/-10%)		V/Ph/Hz	120/1/60		208-230/460/575/3/60		120-230/1/60
Fan motor		rpm	3400		3400/3450		3450
		W - HP	370 - 0.5		550 - 0.75		550 - 0.75
		V	120		208-230/460/575		120 - 230
		A	5.2		3.2 - 1.8 - 1.3		9.8 - 4.9
Motor capacitor		µF	50				20
Ignition transformer		V1 - V2 I1 - I2	120 V - 1 x 7 kV 1.6 A - 23 mA				
Electrical power consumption		W max	1345		1720		1870
Electrical protection			NEMA 1				

Tab. B

3.3 Burner equipment

The burner is supplied complete with:

Gas train flange	No. 1
Flange gasket.	No. 1
Flange fixing screws.	No. 4
Screws (3/8 W x 1") to secure the burner flange to the boiler	No. 4
Burner head gasket	No. 1
Instruction manual	No. 1

3.4 Burner models designation

Model	RIELLO code	RBNA code	Voltage	Flame safeguard
RS 28/M TC FS1	20154108	20165993	120/1/60	Burner mounted
RS 38/M TC FS1	20154129	20166042	120/1/60	
RS 38/M TC FS1	20154134	==	==	Burner mounted
RS 38/M TC FS1	20154131	==	==	
RS 50/M TC FS1	20154141	==	==	Burner mounted
RS 50/M TC FS1	20154137	==	==	
RS 50/M TC FS1	20154146	20166043	120/1/60	

Tab. C

3.5 Burner dimensions

The dimensions of the burner are shown in Fig. 1.

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

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

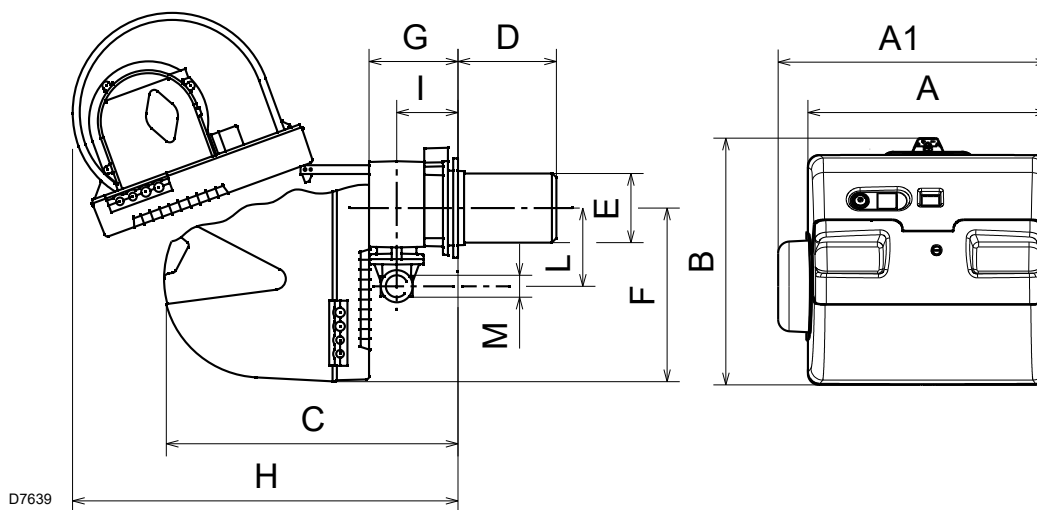


Fig. 1

inch	A	A1	B	C	D (1)
RS 28/M	18 ²³ / ₃₂ "	-	18 ²¹ / ₃₂ "	22 ¹³ / ₁₆ "	8 ¹ / ₂ " - 13 ¹³ / ₁₆ "
RS 38/M	18 ²³ / ₃₂ "	-	18 ²¹ / ₃₂ "	22 ¹³ / ₁₆ "	8 ¹ / ₂ " - 13 ¹³ / ₁₆ "
RS 50/M three-phase	18 ²³ / ₃₂ "	-	18 ²¹ / ₃₂ "	22 ¹³ / ₁₆ "	8 ¹ / ₂ " - 13 ¹³ / ₁₆ "
RS 50/M single-phase	-	21 ³ / ₁₆ "	18 ²¹ / ₃₂ "	22 ¹³ / ₁₆ "	8 ¹ / ₂ " - 13 ¹³ / ₁₆ "

inch	E	F	G	H	I	L	M
RS 28/M	5 ¹ / ₂ "	13 ²⁷ / ₃₂ "	6 ⁷ / ₁₆ "	31 ⁷ / ₈ "	4 ¹ / ₄ "	6 ⁵ / ₈ "	1 ¹ / ₂ "
RS 38/M	5 ¹ / ₂ "	13 ²⁷ / ₃₂ "	6 ⁷ / ₁₆ "	31 ⁷ / ₈ "	4 ¹ / ₄ "	6 ⁵ / ₈ "	1 ¹ / ₂ "
RS 50/M three-phase	5 ³¹ / ₃₂ "	13 ²⁷ / ₃₂ "	6 ⁷ / ₁₆ "	31 ⁷ / ₈ "	4 ¹ / ₄ "	6 ⁵ / ₈ "	1 ¹ / ₂ "
RS 50/M single-phase	5 ³¹ / ₃₂ "	13 ²⁷ / ₃₂ "	6 ⁷ / ₁₆ "	31 ⁷ / ₈ "	4 ¹ / ₄ "	6 ⁵ / ₈ "	1 ¹ / ₂ "

Tab. D

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

3.6 Firing rate

The **maximum output** is chosen within area of the Fig. 2.

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

- RS 28/M = 198 MBtu/hr 58 kW
- RS 38/M = 266 MBtu/hr 78 kW
- RS 50/M = 321 MBtu/hr 94 kW

NOTE:

The **FIRING RATE** areas given in figure (A) have been reduced by 10% with respect to the maximum range that can be reached. See "Procedure to refer burner operating condition at an altitude and/or at a combustion supporter air temperature different to the standard values (328 ft above sea level, 68 °F)." on page 9 for operation at different ambient temperatures and/or altitudes.



WARNING

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

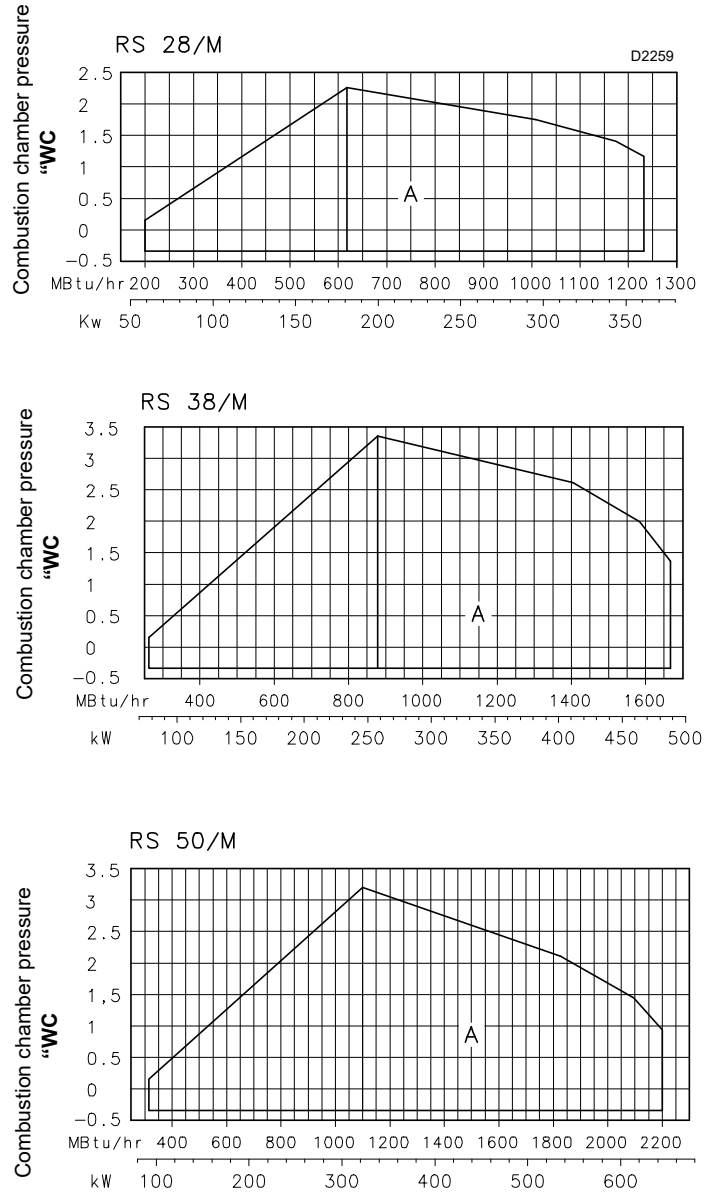


Fig. 2

3.6.1 Procedure to refer burner operating condition at an altitude and/or at a combustion supporter air temperature different to the standard values (328 ft above sea level, 68 °F).

AIR TEMPERATURE

Altitude	Altitude	bar. press.	bar. press.	0	5	10	15	20	25	30	40	°C
ft a.s.l.	m a.s.l.	"w.c.	mbar	32	41	50	59	68	77	86	104	°F
0	0	399	1013.00	1.087	1.068	1.049	1.031	1.013	0.996	0.980	0.948	
328	100	394	1000.00	1.073	1.054	1.035	1.017	1.000	0.983	0.967	0.936	
1.000	305	385	977.40	1.049	1.030	1.012	0.994	0.977	0.961	0.945	0.915	
2.000	610	371	942.80	1.012	0.994	0.976	0.959	0.943	0.927	0.912	0.883	
3.000	915	358	908.20	0.975	0.957	0.940	0.924	0.908	0.893	0.878	0.850	
4.000	1.220	345	875.80	0.940	0.923	0.907	0.891	0.876	0.861	0.847	0.820	
5.000	1.525	332	843.50	0.905	0.889	0.873	0.858	0.844	0.829	0.816	0.790	
6.000	1.830	320	811.85	0.871	0.856	0.841	0.826	0.812	0.798	0.785	0.760	
7.000	2.135	307	779.80	0.837	0.822	0.807	0.793	0.780	0.767	0.754	0.730	
8.000	2.440	294	747.80	0.803	0.788	0.774	0.761	0.748	0.735	0.723	0.700	

Tab. E

F - correction factor of discharge head and delivery in relation to temperature and altitude.

Reference conditions:

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

Example

Using the Tab. E, for an altitude of 3,000 ft and an air temperature of 68 °F, an **F** factor value is obtained equal to 0.908; if the capacity at the boiler furnace is $Q_{foc} = 4,500$ Mbtu/h, the correct output will be equal to:

$$Q_{burner} = Q_{foc} / F = 4,500 / 0.908 = 4,956 \text{ Mbtu/h}$$

3.7 Minimum furnace dimensions

The firing rates were obtained in special test boilers.

Fig. 3 indicates the diameter and length of the test combustion chamber.

Example

Output 1388 Mbtu/hr - diameter 20 inch - length 4.9 ft.

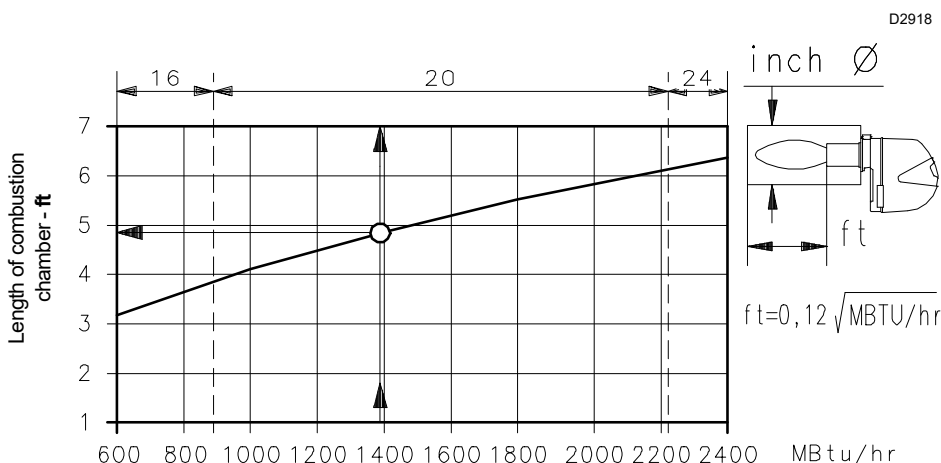


Fig. 3

3.8 Burner description

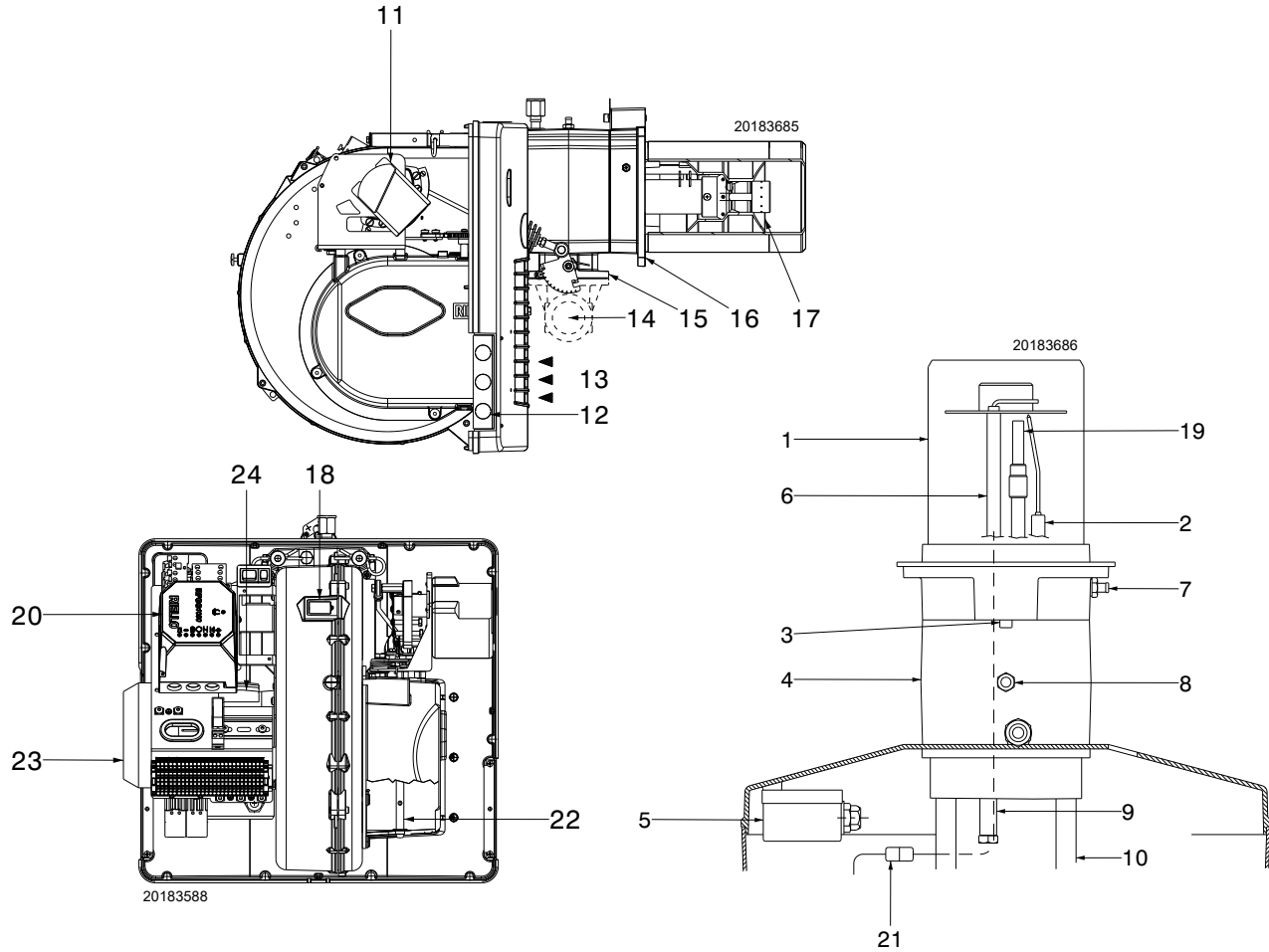


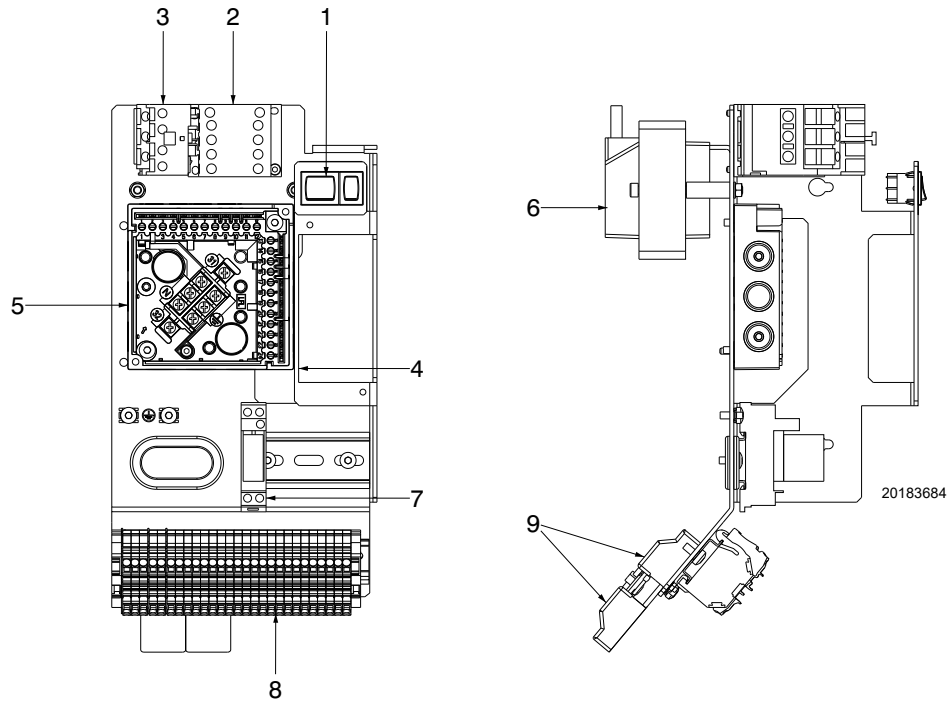
Fig. 4

- 1 Combustion head
- 2 Ignition electrode
- 3 Screw for combustion head adjustment
- 4 Sleeve
- 5 Low air pressure switch (differential operating type)
- 6 Flame sensor probe (flame rod)
- 7 Air pressure test point
- 8 Gas pressure test point and head fixing screw
- 9 Screws securing fan to sleeve
- 10 Slide bars for opening the burner and inspecting the combustion head
- 11 Servomotor controlling the gas butterfly valve and air damper (by means of a variable profile cam mechanism).
When the burner is not operating the air damper is fully closed in order to reduce heat loss.
- 12 Plate with four hole knock-outs for electrical cable routing
- 13 Air inlet to fan
- 14 Gas input connection
- 15 Gas butterfly valve
- 16 Boiler mounting flange
- 17 Flame stability disk
- 18 Flame inspection window
- 19 Ignition pilot
- 20 Flame safeguard
- 21 Plug-socket on flame rod probe cable
- 22 Air damper
- 23 Protection (for RS 50/M single-phase burner)
- 24 Fan motor

Two types of burner failure may occur:

- **FLAME SAFEGUARD LOCK-OUT:** if the flame relay 20)(Fig. 4) push-button lights up, it indicates that the burner is in lock-out. To reset, press the push-button.
- **MOTOR TRIP (RS 38 - 50 three-phase):** release by pressing the push-button on thermal overload).

3.9 Electrical panel description



- 1 Switch for:
automatic-manual-OFF operation
Button for: increase - decrease output
- 2 Motor contactor
- 3 Thermal relay with reset button
- 4 Bracket for the application of RWF kit
- 5 Control box base
- 6 Ignition transformer
- 7 Relay
- 8 Terminal board for electrical connection
- 9 3 poles plug and socket

Fig. 5

3.10 RFGO-A13 control box

Warnings



WARNING

To avoid accidents, material or environmental damage, observe the following instructions!

The control box is a safety device! Avoid opening or modifying it, or forcing its operation. Riello S.p.A. cannot assume any responsibility for damage resulting from unauthorised interventions!

- All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- Before modifying the wiring in the control box connection area, fully disconnect the system from the power supply (omnipolar separation). Check the system is not powered and cannot be accidentally reconnected. Failure to do this will lead to the risk of electrocution.
- Protection against electrocution from the control box and all connected electric components is obtained with the correct assembly.
- Before any intervention (assembly and installation operations, assistance, etc.), ensure the wiring is in order and that the parameters are correctly set, then make the safety checks.
- Falls and collisions can negatively affect the safety functions. In this case, the control box must not be operated, even if it displays no evident damage.

For the safety and reliability of the control box, comply with the following instructions:

- avoid conditions that can favour the development of condensate and humidity. Otherwise, before switching on again, make sure that the entire control box is perfectly dry!
- Static charges must be avoided since they can damage the control box's electronic components when touched.



Fig. 6

Technical data

Mains voltage	110 Vac +20 % / +15 %
Mains frequency	50 / 60 Hz
Primary fuse (external)	max. 10 A
Weight	approx. 2.5 lbs.
Power absorption	approx. AC 7 VA
Protection level	IP40
Safety class	II
Environmental conditions:	
Operation	DIN EN 60721-3-3
Mechanical conditions	Class 3M3
Temperature range	Class 3K3
Humidity	-104 to 140°F < 90 % r.h. (without condensing)

Tab. F

Mechanical structure

The control box is made of plastic to resist knocks, heat and flame propagation.

3.11 SQN70 Servomotor

Important notes



WARNING

To avoid accidents, material or environmental damage, observe the following instructions!

Avoid opening, modifying or forcing the servomotor.

- All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- Falls and collisions can negatively affect the safety functions. In this case, the servomotor must not be operated, even if it displays no evident damage.
- Fully disconnect the burner from the mains when working near terminals and servomotor connections.
- Condensation and exposure to water are not allowed.
- For safety reasons, the servomotor must be checked after long periods of non-use.

NOTE:

Do not allow condensation, ice formation or water inlet!



Fig. 7

Technical data

Mains voltage	115V - 15%+10%
Mains frequency	50 / 60 Hz +/- 6%
Power absorption	6 VA
Motor	Synchronous
Drive angle	Varying between 0° and 90°
NEMA rating	NEMA1, 2, 5 and 12 for indoor use
Rotation direction	Anticlockwise
Rated torque (max.)	22 lb-in
Holding torque	11.5 lb-in
Operation time	25 s. at 90° at 60 Hz
Weight	1 lb
Environmental conditions:	
Temperature range	-5°F... to 140°F

Tab. G

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.



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 20-25 cm 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. 8. The position of the threaded holes can be marked using the burner head gasket supplied with the burner.

inch	A	B	C
RS 28/M	6 9/32"	8 13/16"	3/8 W
RS 38/M	6 9/32"	8 13/16"	3/8 W
RS 50/M	6 9/32"	8 13/16"	3/8 W

Tab. H

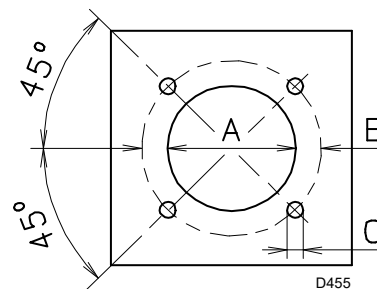


Fig. 8

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:

Blast tube	RS 28/M	RS 38/M	RS 50/M
Short	8 1/2"	8 1/2"	8 1/2"
Long (with kit)	13 13/16"	13 13/16"	13 13/16"

Tab. I

For boilers with front flue passes 13)(Fig. 9) or flame inversion chambers, protective insulation 11) must be inserted between the boiler 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) is not required unless it is required by the boiler manufacturer.

4.6 Securing the burner to the boiler



Prepare a suitable lifting system.

The manufacturer declines **any and every responsibility** for any possible lifting movements, different from those indicated in **this manual**.

Before securing the burner to the boiler, check through the blast tube opening to make sure that the flame sensor probe is correctly set in position, as shown in Fig. 11.

Now detach the combustion head from the burner, (Fig. 9):

- remove screw 14) and withdraw the cover 15).
- Disengage the swivel coupling 4) from the graduated sector 5).
- Remove the screws 2) from the slide bars 3)
- Remove screw 1) and pull the burner back on slide bars 3) by about 4". Disconnect the wires from the probe and the electrode and then pull the burner completely off the slide bars, after removing the split pin from the slide bar 3).

Secure the flange 9)(Fig. 9) to the boiler plate, inserting the head gasket 6)(Fig. 9). Use the 4 screws, also supplied with the unit, after first protecting the thread with an anti-seize product.

The seal between burner and boiler must be airtight.

If you noticed any irregularities in the positions of the probe or ignition electrode during the check mentioned above, remove screw 1)(Fig. 10), extract the internal part 2)(Fig. 10) of the head and set up the two components correctly.

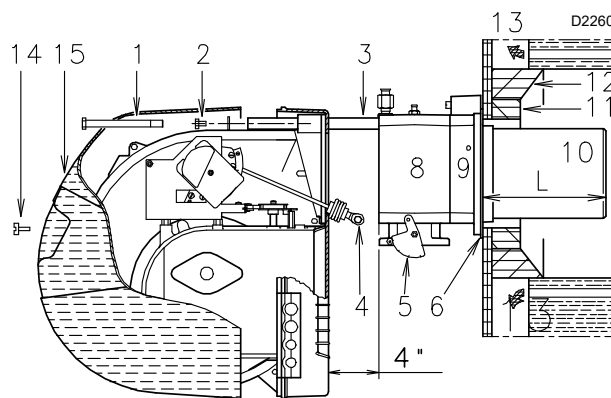


Fig. 9

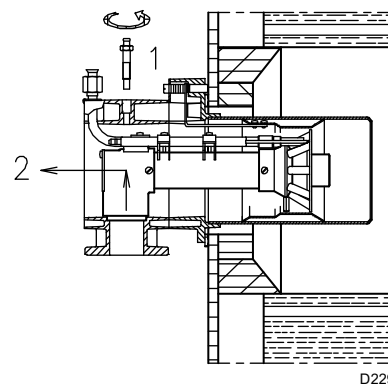


Fig. 10



The seal between burner and boiler must be airtight.

4.7 Ignition pilot adjustment

Place the pilot and electrode as shown in Fig. 11.

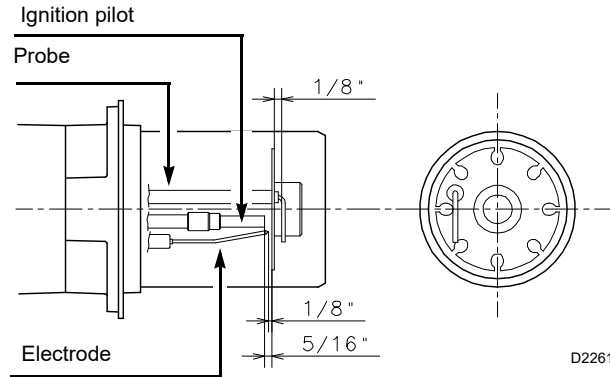
The pilot works correctly at pressures ranging from 5 - 12" WC.

IMPORTANT

To set pilot without main burner operation, use the function "Check mode" of the control box (see page 32).



Measures must be respected.



D2261

Fig. 11

4.8 Combustion head adjustment

Installation operations are now at the stage where the blast tube and sleeve are secured to the boiler as shown in Fig. 12, page 17.

There are two possible cases:

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

In diagram (Fig. 13, page 17), depending on the MAX output, find the notch to use for adjusting the air and the gas, and then proceed as follows:

Air adjustment

Turn screw 4)(Fig. 12, page 17 - A) until the notch identified is aligned with the front surface 5)(Fig. 12, page 17 - A) of the flange.

Gas adjustment

Loosen screw 1)(Fig. 12, page 17 - B) and turn ring 2) until the notch identified is aligned with index 3).

Tighten the screw 1) fully down.

Example:

the burner RS 38/M varies its output between: MIN = 378.7 and MAX = 1288 MBtu/hr.

The MIN output of 378.7 MBtu/hr is not found in the values of tTab. J and therefore diagram (Fig. 13, page 17) is valid, from which it results that for a MAX output of 1288 MBtu/hr the gas and air adjustments are done on notch 3, as in Fig. 12, page 17 - A and Fig. 12, page 17 - B.

In this case the pressure load loss of the combustion head is given by column 1 on page 19.

NOTE:

Diagram (Fig. 13, page 17) shows the ideal settings for the ring 2)(Fig. 12, page 17 - B). If the gas supply pressure is too low to reach the max output operation pressure indicated on page 19, and if the ring 2)(Fig. 12, page 17 - B) is not fully open, it can be opened wider by 1 or 2 notches. Continuing with the previous example, page 19. indicates that for burner RS 38/M with output of 1288 MBtu/hr a pressure of approximately 1.81" WC is necessary at test point 6)(Fig. 12, page 17 - A). If this pressure cannot be reached, open the ring 2)(Fig. 12, page 17 - B) to notch 4 or 5.



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

The MIN burner output is found in the values of Tab. J, page 17.

Air adjustment

The same as the previous case: diagram in Fig. 13.

Gas adjustment

The gas ring 2)(Fig. 12 - B) 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 1 page 19.

Once you have finished setting up the head, refit the burner 4)(Fig. 14) to the slide bars 3) at approximately 4" from the sleeve 5) - burner positioned as shown in Fig. 10, page 15 - insert the flame rod cable and the ignition electrode cable and then slide the burner up to the sleeve so that it is positioned as shown in Fig. 14.

Refit screws 2) on slide bars 3).

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

Reconnect the swivel connector 8) to the graduated sector 7).

Connect gas train and pilot train as shown in Fig. 15, page 18.



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

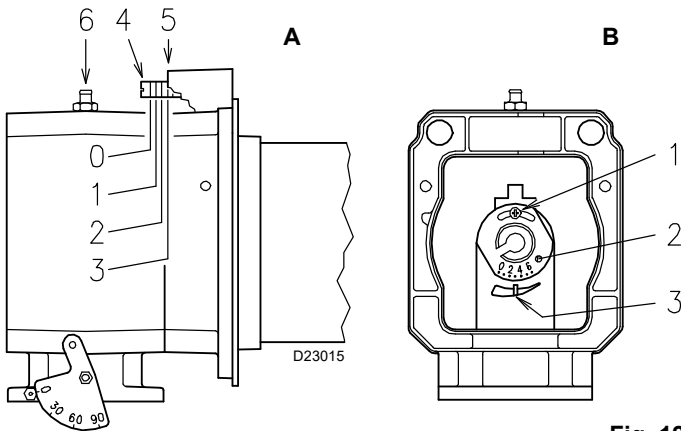


Fig. 12

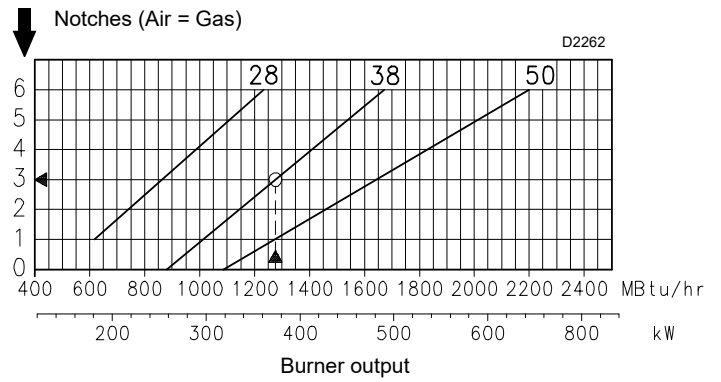


Fig. 13

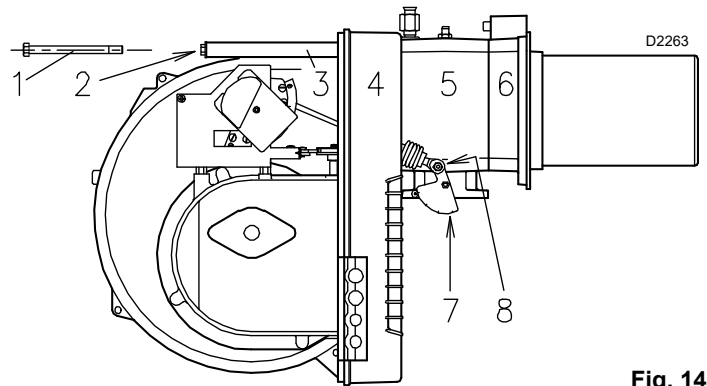


Fig. 14

Modulation minimum output: when the MIN output is within the value range given Tab. J, the gas ring 2)(Fig. 12 - B) is adjusted to zero.

Model	MBtu/hr
RS 28/M	198 - 280
RS 38/M	266 - 375
RS 50/M	321 - 488

Tab. J

4.9 Gas supply

4.9.1 Gas train



Check that there are no gas leaks.



Pay attention when handling the train: danger of crushing of limbs.



Make sure that the gas train is properly installed by checking for any fuel leaks.



The operator must use the required equipment during installation.

The gas train is type-approved according to standard UL 795 and is supplied separately from the burner.

- The main gas train must be connected to the burner head 1)(Fig. 17), using flange 2), gasket 3) and bolts 4) supplied with the burner.
- The gas train can enter the burner from the right or left side, depending on which is the most convenient, see Fig. 17.
- Safety shut-off valves 5)-6) 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 connection 5)(Fig. 17) and can enter the burner from the right or left side.



WARNING

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

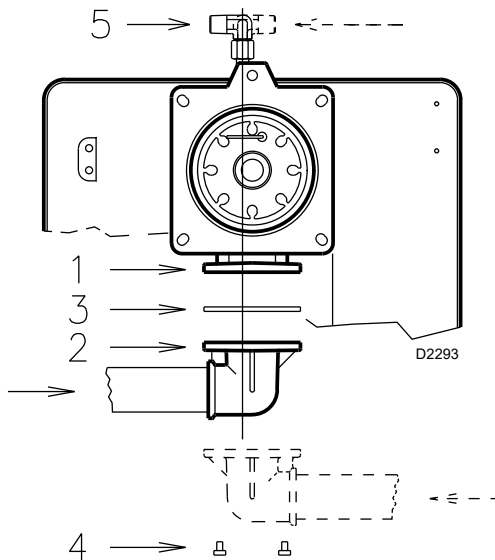


Fig. 15

4.9.2 Gas feeding line



Explosion danger due to fuel leaks in the presence of a flammable source.

Precautions: avoid knocking, attrition, sparks and heat.

Make sure the fuel interception tap is closed before performing any operation on the burner.



WARNING

The fuel supply line must be installed by qualified personnel, in compliance with current standards and laws.

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

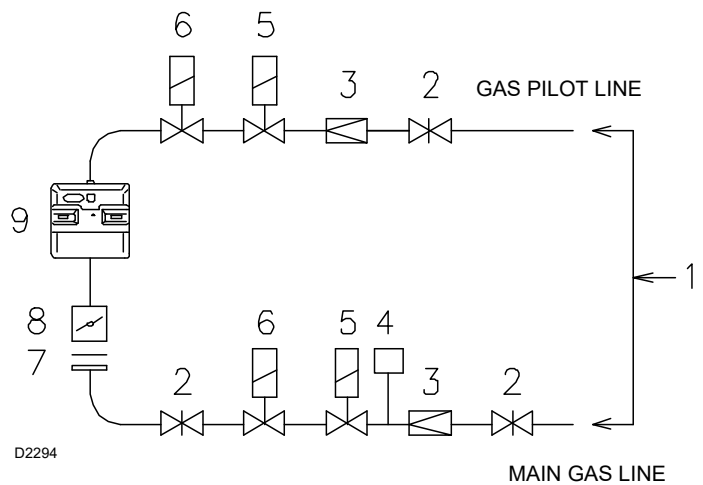


Fig. 16

Key (Fig. 16)

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

4.9.3 Gas pressure

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

Column 1

Gas manifold pressure measured at test point 1)(Fig. 17), with:

- Combustion chamber at 0" WC
- **A** = Gas ring 2)(Fig. 12, page 17 - B) adjusted as indicated in diagram (Fig. 13).
- **B** = Gas ring 1)(Fig. 12, page 17 - B) set to zero.

Calculate the approximate output of the burner thus:

- subtract the combustion chamber pressure from the gas pressure measured at test point 1)(Fig. 17).
- Find the nearest pressure value to your result in column 1 of the table for the burner in question.
- Read off the corresponding output on the left.

Example - RS 28/M:

- Maximum output operation
- Natural gas
- Gas ring 2)(Fig. 12, page 17 - B) adjusted as indicated in diagram (Fig. 13, page 17).
- Gas pressure at test point 1)(Fig. 17) = 2.36" WC
- Pressure in combustion chamber = 0.79" WC
- $2.36 - 0.79 = 1.57" \text{ WC}$

An output of 795 MBtu/hr shown in - RS 28/M corresponds to 1.57" WC pressure, column 1.

This value serves as a rough guide, the exact flow rate must be measured at the gas meter.



The heat output and gas pressure data in the head refer to operation with gas butterfly valve fully open (90°).

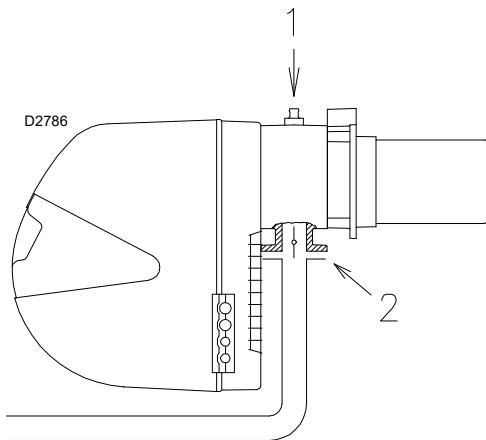


Fig. 17

	Mbtu/hr (GCV)	Natural Gas	
		Δp	
		Combustion head ("WC)	
		A	B
RS 28/M	624	0.98	0.98
	699	1.22	1.30
	795	1.57	1.69
	891	1.85	2.05
	986	2.17	2.28
	1078	2.48	2.68
	1174	2.76	3.07
	1232	2.95	3.58
RS 38/M	870	1.02	1.02
	979	1.22	1.38
	1099	1.46	1.77
	1211	1.69	2.28
	1327	1.89	2.72
	1440	2.72	3.11
	1552	2.36	3.54
	1665	2.6	4.21
RS 50/M	1090	0.87	0.87
	1249	1.14	1.30
	1402	1.42	1.61
	1552	1.69	2.01
	1706	1.97	2.36
	1856	2.2	2.76
	2006	2.48	3.15
	2197	2.83	3.78

Tab. K

4.10 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 made in accordance with the regulations currently in force in the country of destination and by qualified personnel. Refer to the wiring diagrams.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the wiring diagrams.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- Burners have been type-approved for continuous operation (FS2). Burner FS1 operation has also been approved only with the use of the UV flame sensor kit.
- The RFGO safety device features two built-in flame amplifiers which allow using it for applications with UV sensor only, FR sensor only or with both sensors (UV+FR). The FR amplifier circuit is subject to constant auto-control, which allows to use it for applications requiring a burner operating cycle longer than 24 hours. When it is used as a UV control, the system is considered as non-permanent, requiring one burner recycle every 24 hours. Normally, burner stopping is guaranteed by the boiler's thermostat/pressure switch. If this is not the case, you must apply a time switch to L-N in series, to stop the burner at least once every 24 hours. Refer to the wiring diagrams.
- 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, in compliance with the current safety standards.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.

Before carrying out any maintenance, cleaning or checking operations:



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



Turn off the fuel interception tap.



Avoid condensate, ice and water leaks from forming.

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

By way of example we indicate the following mode (according to UL795):

4.10.1 Notes on terminals

On the electrical panel there terminals with a "spring" system. The opening of these terminals must be made via a suitable tool, using a flat-blade screwdriver of the correct size. The clamp uses a pressurised opening system.

Clamp opening

- insert the correct screwdriver into the opening, pushing down until the hole for the cable is completely open.
- Insert the previously stripped cable and remove the screwdriver. Make sure the cable is securely fastened Fig. 18.

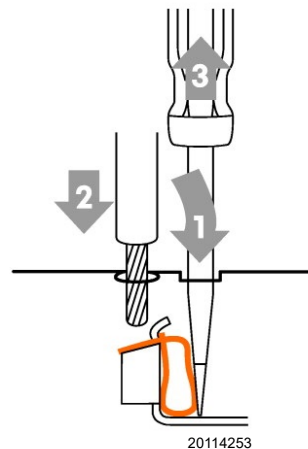


Fig. 18

4.10.2 Supply cables and external connections passage

All the cables to be connected to the burner are fed through the holes of the right and left plates after unscrewing the screws 8) and opening the pre-trimmed hole (Fig. 19). The use of the cable grommets can take various forms. By way of example we indicate the following mode (according to **UL795**):

- 1 three phase power supply with $\frac{3}{8}$ inch cable grommet
- 2 Available: single phase power supply and other devices
- 3 Available: consents/safety, minimum gas pressure switch, gas valves, pilot valves and other devices

All holes have a $\frac{3}{8}$ inch dimension.



The control panel is in compliance with UL508A.

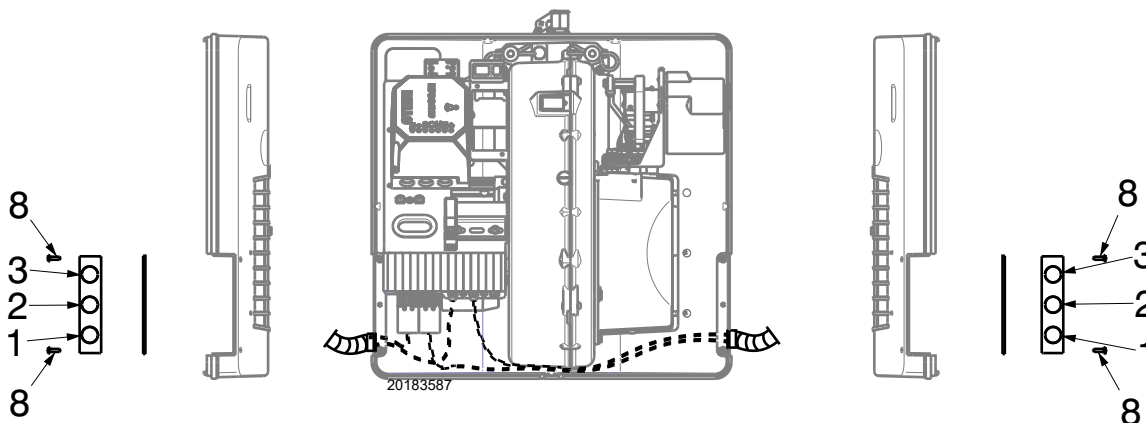


Fig. 19



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

4.11 Calibration of the thermal relay

The thermal relay (Fig. 20) serves to avoid damage to the motor due to an excessive absorption increase or if a phase is missing.

For calibration 2), refer to the table indicated in the electrical layout (electrical wiring in charge of the installer).

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

The button "STOP" 3) opens the NC contact (95-96) and stops the motor.

Insert a screwdriver in the window "TEST/TRIP" 4) and move it in the arrow direction (to the right) to carry out the thermal relay test.



The automatic reset can be dangerous.
This operation is not foreseen in the burner operation.

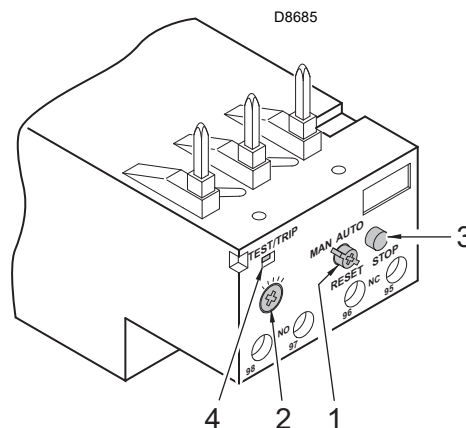


Fig. 20

4.12 Motor connection at 208-230 or 460V

WARNING:

the motors, manufactured for 208-230/460 **IE3 NEMA Premium Efficiency** voltage, have the same connection than **IE2/Epact** motors, but different connection than **IE1** motors no more star/delta but star/double star. Please, pay attention to the indications in case of modification of voltage, maintenance, or substitution.

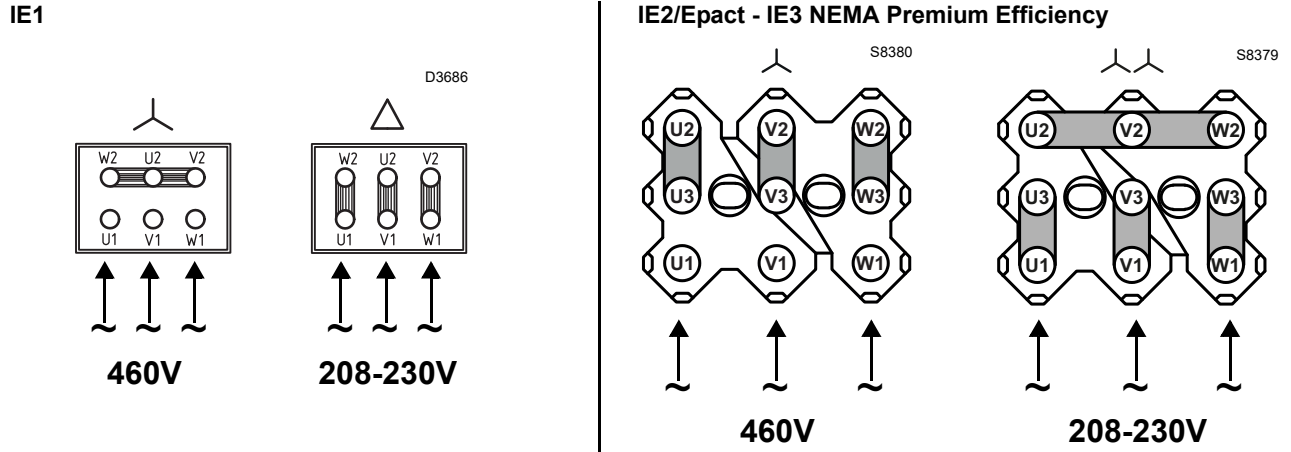


Fig. 21

4.13 Motor connection at 575V

WARNING:

the motors, manufactured for 575V **IE3 NEMA Premium Efficiency** voltage, have the same control box base of the **IE1** and **IE2/Epact** motors. Please pay attention to the indications in case of maintenance or substitution.

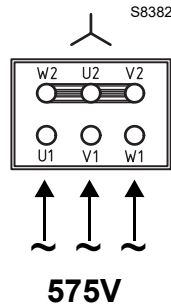


Fig. 22

4.14 Motor rotation

As soon as the burner starts up, go in front of the cooling fan of the fan motor and check it is rotating anticlockwise (Fig. 23).

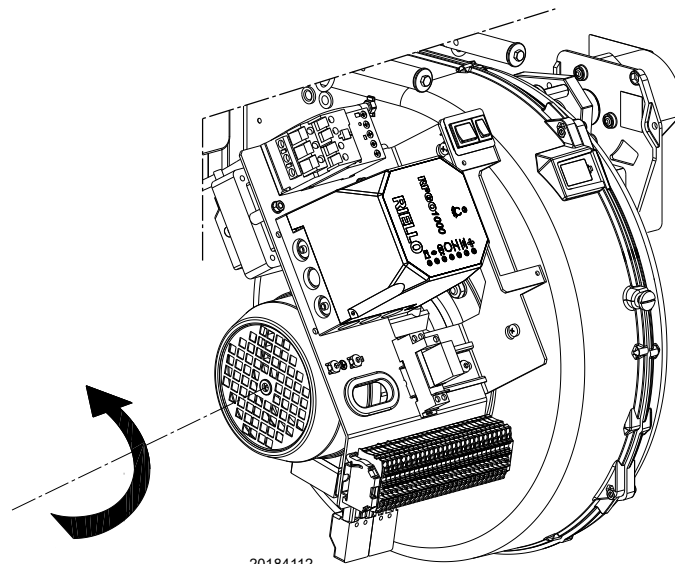
If this is not the case:

- set the burner switch to "0" (OFF) and wait for the control box to carry out the switch-off phase.



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

- Invert the phases on the three-phase motor power supply.



20184112

Fig. 23

4.15 Burner operation

4.15.1 Burner starting

- Operating closes.
Fan motor starts.
- Servomotor starts:
90° rotation to right, until contact is made on red cam.
The air damper is positioned to MAX. output.
- Pre-purge stage with air delivery at MAX. output.
- After pre-purge stage, servomotor rotates to left up to the angle set on blue cam for MIN. output.
- The air damper and the gas butterfly are positioned to MIN. output.
- Ignition electrode strikes a spark.
- Pilot valve opens. The pilot flame is ignited.
- After about 12s the main flame ignites and starting cycle ends.

4.15.2 Steady state operation

Burner without modulating control RWF

At the end of the starting cycle, the servomotor control then passes to the load control for boiler pressure or temperature.

(The flame safeguard continues, however, to check that the flame is present and that the air pressure switch is in the correct position.)

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

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

Burner with modulating control RWF

See the handbook enclosed with the modulating control.

Switching times are given in seconds, in the burner start-up sequence.

RFGO A13

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

Tab. L

4.15.3 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.

4.15.4 Burner flame goes out during operation

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

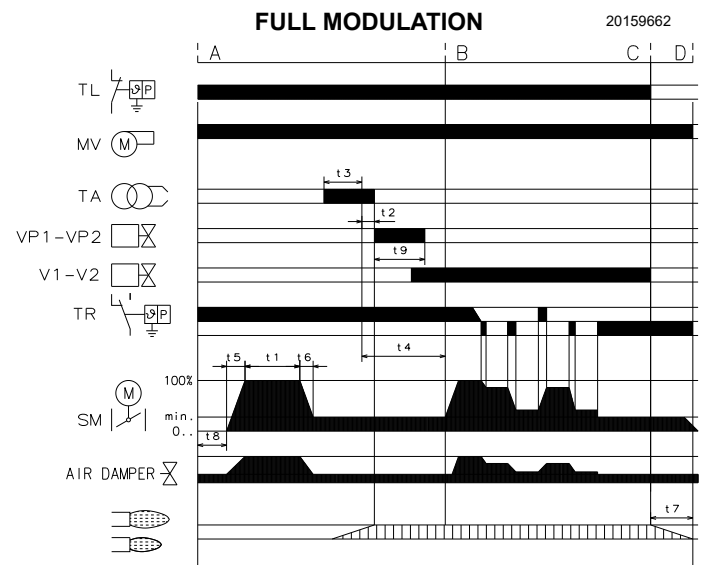


Fig. 24

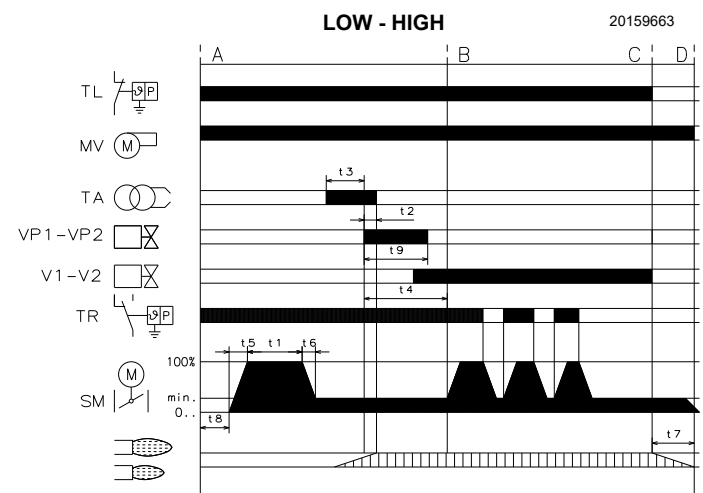


Fig. 25

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
- t6** Running time of air damper into OPEN position
- t7** Running time of air damper into low-flame position (MIN)
- t8** Post-purge time
- t9** Interval until OPEN command for the air damper is given
- t9** Running time of pilot
- TL** Operating control
- TR** Modulating controller
- MV** Fan Motor
- SM** Air and Fuel Actuator
- TA** Ignition transformer
- VP1** Safety pilot valve
- VP2** Main pilot valve
- V1** Safety gas valve
- V2** Main gas valve

5

Start-up, calibration and operation of the burner

5.1 Notes on safety for the first start-up



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.



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



Refer to paragraph “Safety test - with gas ball valve closed” on page 29 before the first start-up.

5.2 Adjustments before first firing

Adjustment of the combustion head, and air and gas deliveries has been illustrated page 16.

In addition, the following adjustments must also be made:

- open manual valves on the gas train.
- Adjust the low gas pressure switch to the start of the scale (Fig. 26).
- Adjust the air pressure switch to the zero position of the scale (Fig. 27).
- Purge the air from the gas line.
- Fit a U-type manometer (Fig. 28) to the gas pressure test point on the sleeve. The manometer readings are used to calculate MAX burner input using the tables on page 19.



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.

LOW GAS PRESSURE SWITCH

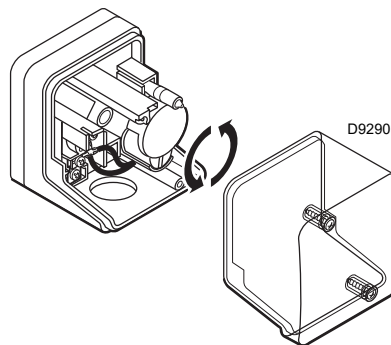


Fig. 26

AIR PRESSURE SWITCH

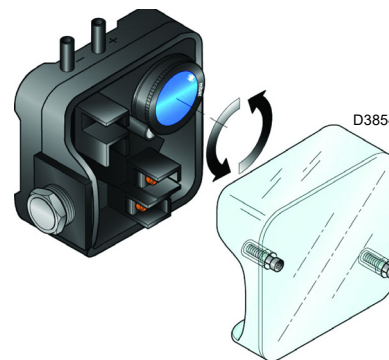
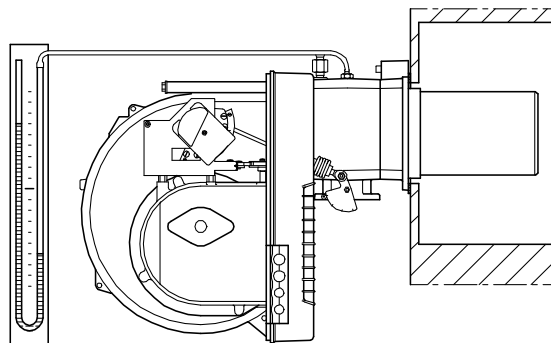


Fig. 27



D2265

Fig. 28

5.2.1 Servomotor

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

The angle of rotation of the servomotor is equal to the angle on the graduated sector controlling the gas butterfly valve. The servomotor rotates through 90 degrees in 25 seconds.

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

Red cam: 90°

Limits rotation toward maximum position.

When the burner is at max output the gas butterfly valve must be fully open: 90°.

Blue cam: 0°

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

Orange cam: 15°

Adjusts the ignition position and the MIN output.

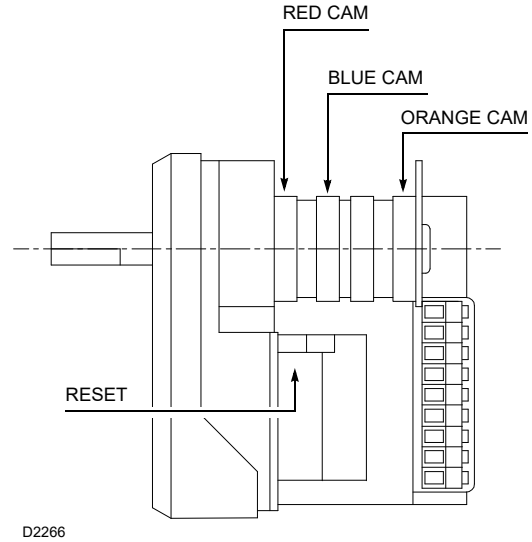


Fig. 29

5.3 Burner start-up

Close the control circuit and set switch 1)(Fig. 30) to “MAN”.

As soon as the burner starts check the direction of rotation of the fan blade, looking through the flame inspection window 18)(Fig. 4, page 10).

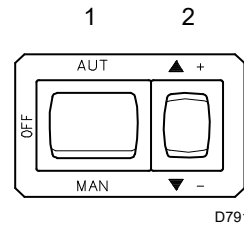


Fig. 30

5.4 Burner firing

Having completed the checks indicated in the previous heading, the burner pilot 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 page 16.

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.

5.5 Burner calibration

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

Adjust successively:

- 1 - First firing output
- 2 - Max. burner output
- 3 - Min. burner output
- 4 - Intermediate outputs between low and high fire
- 5 - Air pressure switch
- 6 - Minimum gas pressure switch

5.5.1 Firing output

Pilot adjustment has been illustrated on page 16.

5.5.2 Maximum output

The maximum output of the burner must be set within the firing rate range shown on page 8.

In the above instructions we left the burner running in MIN. output operation. Now press switch 2)(Fig. 30, page 26) "increase output" and keep it pressed until the servomotor has opened the air damper and the gas butterfly valve to 90°.

Gas calibration

Measure the gas delivery at the meter.

A guideline indication can be calculated from the table on page 6, simply read off the gas pressure on the U-type manometer, see Fig. 28, and follow the instructions on page 19.

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

Adjusting air delivery

Progressively adjust the end profile of cam 3)(Fig. 31) by turning the cam adjustment screws as they appear through the access opening 5)(Fig. 31).

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

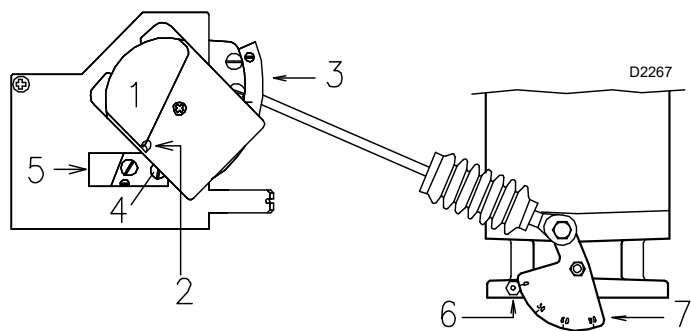


Fig. 31

Key

- 1 Servomotor
- 2 Lever, push to engage, push to release
- 3 Adjustable profile cam
- 4 Cam profile adjustment screws
- 5 Opening for access to screws 4)
- 6 Index for graduated sector 7)
- 7 Graduated sector for gas butterfly valve

5.5.3 Minimum output

Minimum output must be selected within the firing rate range shown on page 8.

Press switch 2)(Fig. 30, page 26) "output reduction" until the servomotor has closed the air damper and the gas butterfly valve to 15° (factory set adjustment).

Adjusting gas delivery

Measure the delivery of gas from the gas meter.

- If this value is to be reduced, decrease the angle of orange cam (Fig. 29, page 26) slightly by proceeding a little at a time until the angle is changed from 15° to 13° or 11°....
- If it has to be increased press the switch "output increase" 2)(Fig. 30, page 26) (i.e. open the gas butterfly valve by 10-15°), increase the orange cam angle (Fig. 29, page 26) with small successive movements, i.e. take it from angle 15° to 17° - 19°.... Then press the switch "output decrease" until the servomotor is taken to the minimum opening position and measure the gas delivery.

NOTE:

The servomotor follows the adjustment of cam only when the cam angle is reduced. If it is necessary to increase the cam angle, first increase the servomotor angle with the switch "output increase", then increase the orange cam angle, and at the end bring the servomotor back to the MIN output position with the switch "output decrease".

Adjustment of air delivery

Progressively adjust the starting profile of cam 3)(Fig. 31) by turning the screws working through the access hole 5)(Fig. 31).

5.5.4 Intermediate outputs

Adjustment of gas delivery

No adjustment of gas delivery is required.

Adjustment of air delivery

With the switch 1)(Fig. 30, page 26) move in intermediate outputs and set the variable profile cam 3) by turning the screws 4).

- If the burner operation is low-high it is sufficient to set only minimum and maximum firing rates
- If the burner operation is modulating, all the points of modulation should be adjusted.

When the adjustment is complete, release the servomotor and manually check there is no binding of the cam.

5.6 Final calibration of the pressure switches

5.6.1 Air pressure switch - CO check

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. 32).

With the burner operating, 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.



WARNING

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 this way the air pressure switch operates as differential pressure switch.

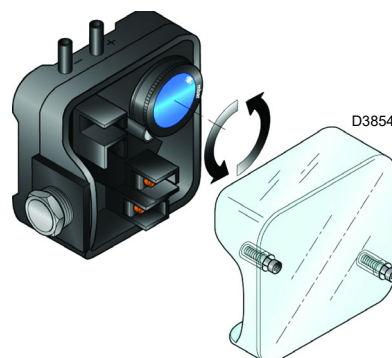


Fig. 32

5.6.2 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. 33).

With the burner operating, 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.

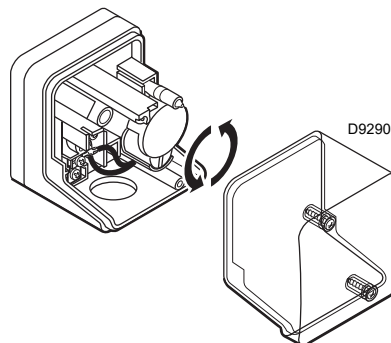


Fig. 33



WARNING

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

6

Maintenance

6.1 Notes on safety for the maintenance

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

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



DANGER

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

Before carrying out any maintenance, cleaning or checking operations:



DANGER

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



DANGER

Turn off the fuel interception tap.



Wait for the components in contact with heat sources to cool down completely.

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 Safety test - with gas ball valve closed

It is fundamental to ensure the correct execution of the electrical connections between the gas solenoid valves and the burner to perform safely the commissioning.

For this purpose, after checking that the connections have been carried out in accordance with the burner's electrical diagrams, an ignition cycle with closed gas ball valve -dry test- must be performed

- 1 The manual ball gas valve must be closed
- 2 The electrical contacts of the burner limit switch need to be closed
- 3 Ensures closed the contact of the low gas pressure switch
- 4 Make a trial for burner ignition.

The start-up cycle must be as follows:

- Starting the fan for pre-ventilation
- Performing the gas valve seal control, if provided
- Completion of pre-ventilation
- Arrival of the ignition point
- Power supply of the ignition transformer
- Electrical Supply of solenoid gas valves.

Since the manual gas ball valve is closed, the burner will not light up and its control box will go to a safety lockout condition.

The actual electrical supply of the solenoid gas valves can be verified by inserting a tester. Some valves are equipped with light signals (or close/open position indicator) that turn on at the same time as their power supply.



WARNING

IF THE ELECTRICAL SUPPLY OF THE GAS VALVES OCCURS AT UNEXPECTED TIMES, DO NOT OPEN MANUAL GAS BALL VALVE, SWITCH OFF POWER LINE; CHECK THE WIRES; CORRECT THE ERRORS AND REPEAT THE COMPLETE TEST.

6.2.3 Checking and cleaning



The operator must use the required equipment during maintenance.

Combustion

The optimum calibration of the burner requires an analysis of the flue gases. Significant differences with respect to the previous measurements indicate the points where more care should be exercised during maintenance.

In case the combustion values found at the beginning of the intervention do not respect the standards in force or, in any case, do not correspond to a proper combustion, contact the Technical Assistant and have him carry out the necessary adjustments.

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. 36, page 31).

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 that the graduated sector that controls the air damper is secured by the nut 2)(Fig. 31, page 27).

The tightness of the screws that fasten the cables to the burner terminal strip must also be checked.

Clean the outside of the burner.

Clean and grease the cam variable profile.

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.

Gas leaks

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

Gas filter

Change the gas filter when it is dirty.

Flame inspection window

Clean the flame inspection window (Fig. 34).

6.2.4 Flame presence check

The burner is fitted with an ionisation system which ensures that a flame is present. The minimum current for plant operation is 3 μA .

The burner provides a much higher current, so that controls are not normally required.

However, if it is necessary to measure the ionisation current, there are two methods:

► Flame presence check with RFGO function

- Check the level of the flame detection signal with the “Check mode” function from the flame control: the LEDs from 2 to 6 indicate the flame signal level, respectively. See “LED indicator and special function” on page 32.

Check Mode

With burner flame on:

- hold the reset button on the flame control pressed for at least 3 sec.;
- the button colour will change from green to yellow;
- each operating status signalling LED will be compared to 20% of the maximum brightness;
- press the reset button again (<0.5 sec) to reset the standard operation of the signalling LEDs.

► Flame presence check with microamperometer instrument

- disconnect the plug-socket 7)(Fig. 4, page 10) on the ionisation probe cable and insert a direct current microamperometer with a base scale of 100 μA .



Carefully check polarities!

WARNING

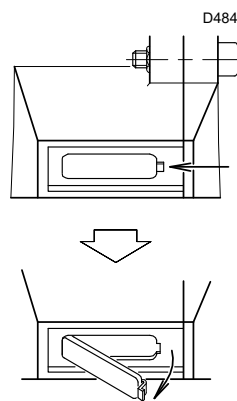


Fig. 34

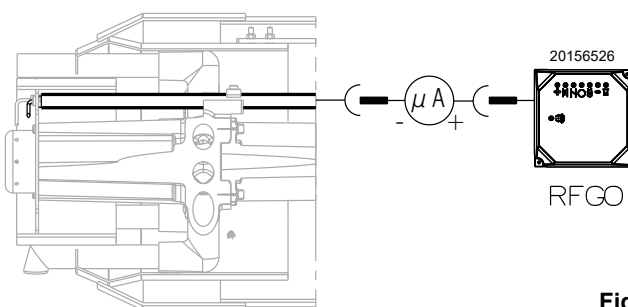


Fig. 35

6.2.5 Safety components

The safety components should be replaced at the end of their life cycle indicated in the following table.



WARNING

The specified life cycles do not refer to the warranty terms indicated in the delivery or payment conditions.

Safety component	Life cycle
Flame control	10 years or 250,000 operation cycles
Flame sensor	10 years or 250,000 operation cycles
Gas valves (solenoid)	10 years or 250,000 operation cycles
Pressure switches	10 years or 250,000 operation cycles
Pressure adjuster	15 years
Servomotor (electronic cam) (if present)	10 years or 250,000 operation cycles
Oil valve (solenoid) (if present)	10 years or 250,000 operation cycles
Oil regulator (if present)	10 years or 250,000 operation cycles
Oil pipes/ couplings (metallic) (if present)	10 years
Flexible hoses (if present)	5 years or 30,000 pressurised cycles
Fan impeller	10 years or 500,000 start-ups

Tab. M

6.3 Opening the burner



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



Close the fuel interception tap.



Wait for the components in contact with heat sources to cool down completely.

- Switch off the electrical power;
- remove screw 1)(Fig. 36) and withdraw cover 2);
- disengage the swivel coupling 3) from the graduated sector 4).
- remove screw 5), the split pin 9) and pull the burner back by about 4" on the slide bars 6);
- disconnect the probe and electrode leads and then pull the burner fully back;
- turn the burner as shown in the figure and fit the split pin 9) into one of the slide bar holes so that the burner remains in position;
- now extract the gas distributor 7) after having removed the screw 8) and disconnecting the pilot gas line.

6.4 Closing the burner

- Remove the split pin 9)(Fig. 36) and push the burner until it is about 4" from the sleeve;
- re-connect the leads and slide in the burner until it comes to a stop;
- refit screw 5), the split pin 9) and pull the probe and electrode leads gently out until they are slightly stretched;
- re-couple the swivel coupling 3) to the graduated sector 4);
- connect the pilot gas line.



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

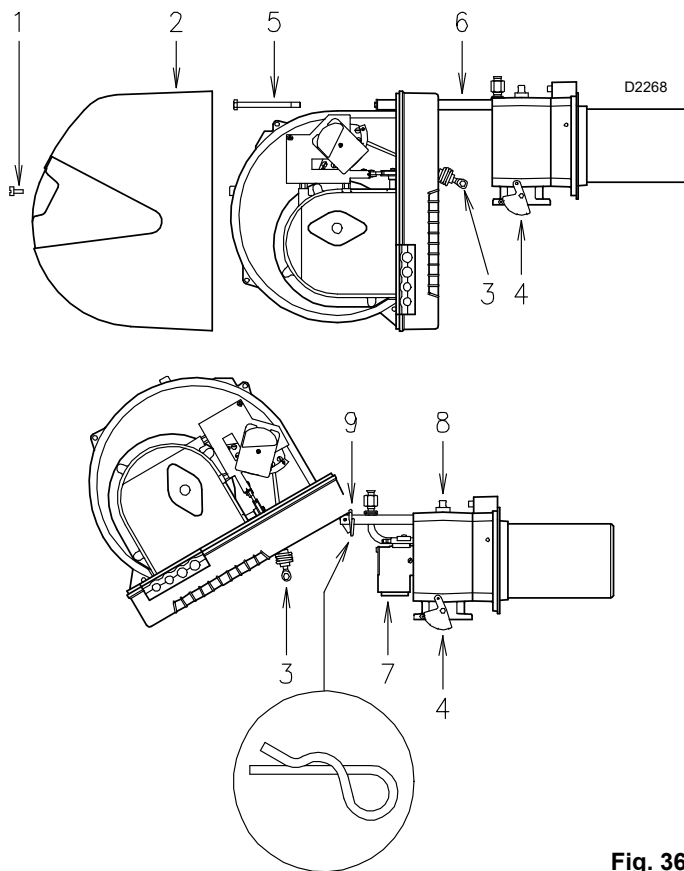

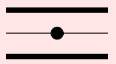
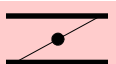

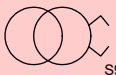




Fig. 36

7 LED indicator and special function

7.1 Description of LED lamps

	Fan	It turns on when the fan motor is powered (T6) and blinks when RUN/CHECK switch is set to "CHECK" during damper movement phases, PTFI AND MTFI.
	Open damper	It blinks when the air damper is moving towards the maximum opening position until the position-reached feedback sent by the servomotor is received, then it stays steadily on for the time set by the flame control.
	Closed damper	If blinks when the air damper is moving towards the minimum opening position until the position-reached feedback sent by the servomotor is received, then it stays steadily on until the end of the pre-purging time.
	Auto	It indicates that the burner is ready for the output modulation.
	Ignition	It blinks during the ignition phase (1st safety time) and stays steadily on during the MTFI.
	Flame	It blinks during the first safety time and stays steadily on if the flame detection has been correctly performed.
	Alarm	It turns on in red when a lock-out condition occurs. Together with the other indicators, it indicates the type of fault during the lock-out phase. Together with the other LEDs, it indicates the operating status during the normal cycle.

Tab. N

T = Terminal

PTFI = Pilot ignition attempt

MTFI = Ignition attempt with main fuel valve

7.2 Check mode function

By the reset push button on the main panel of the control flame the check mode functions are available (prepurging, ignition, 1st safety time and 2nd safety time).

The CHECK MODE is designed to facilitate the checking of the working phase of the burner.

This function is particularly useful during the burner first commissioning or during maintenance.

To enable the check mode function:

- keep the reset button pressed, see chapter 8 for more details, for at least 3 seconds, the status LED changes from green to yellow to signal that the control device is in check mode;
- the control device locks out during pre-purging, after a timeout of max 30 minutes the flame control will automatically exit the check mode function;


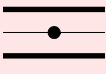
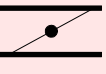

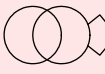

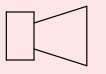
- check mode has a 2 minute timeout during the 2nd safety time. When the time out is expired, the flame control goes back to the normal operating status;
- check mode has a 2 minute timeout during the MTFI status. When the time out is expired, the flame control goes back to the normal operating status;
- during the check mode 1st or 2nd safety time, the flame signal level can be indicated by the 5 central LEDs on the flame control central panel, which turn on proportionally. Each lit LED (starting from the flame LED) represents 20% of the signal power.
To exit the check mode function, press the reset button; the flame control will go back to the normal operating mode.

7.3 Flame control lock-out or emergency stop condition

The RFGO control device can be locked (emergency stop) at any time during the operating cycle and unlocked when already locked (lock-out) by simply pressing the key on the front panel or by means of the terminal T21 on the support base.

7.4 LED lamps: burner operating status

OPERATING STATUSES INDICATED BY LEDs DURING NORMAL OPERATION AND CHECK MODE

Operation LED ● = ON	Fan	Open damper	Closed damper	Modulation	Ignition	Flame	Status
Icon	 S9740	 S9741	 S9742	 S9743	 S9744	 S9745	 S9746
Power OFF/ON							OFF
Not ready/ Diagnostics							Green
Standby			●				Green
Servomotor movement (Note 3)	●	OFF Flashing ↔ ●	● Flashing OFF				Green
Waiting for closing	Green blinking						Green
OPEN (before ignition)	●	●					Green
Minimum (before ignition)	●		●				Green
Ignition	●		●		●		Green
PTFI	●		●		●	Green blinking	Green
MTFI	●		●			●	Green
Active modulation	●			●		●	Green
Minimum output position	●		●			●	Green
With flame present	●	●				●	Green
Economy mode	●		●				Green
Check during maximum opening phase	Flashing	●					Yellow
Check during minimum closing phase	Flashing		●				Yellow
Check during ignition phase with pilot PTFI	Flashing	● Note 1	● Note 1	● Note 1	● Note 1	● Note 1	Yellow
Check during ignition phase with main fuel valve MTFI	Flashing	● Note 1	● Note 1	● Note 1	● Note 1	● Note 1	Yellow
Fault/lock-out	● Note 2	● Note 2	● Note 2	● Note 2	● Note 2	● Note 2	Red
End of the cycle	●		●	●			Green

Tab. O

1. LEDs form a progress bar which indicates the Flame Signal Power in order to orientate the sensors during commissioning (LEDs "Grow" upwards, moving away from the Status at 20% intervals of flame power.)
2. LEDs indicate the error or lock-out code for troubleshooting.
- 3°. LEDs change from ON to BLINKING to OFF showing the servomotor movement control until the position-reached feedback is received See "Problems - Causes - Remedies signalled by LED indicators" on page 34.°.

8 Problems - Causes - Remedies signalled by LED indicators

When an emergency stop occurs, the control device LEDs indicate the cause of the stop.

The terminal T3 is not powered.

The device operating status is internally memorised in case of lack of power supply.

The device lock-out condition can be caused by pressing (<1sec.) the reset button on the flame control front side or through the remote reset - terminal T21 on the base.

The reset button is very sensitive, do not press it strongly during the reset operation.

Unlocking the control device

The RFGO control device can be reset in two ways: reset button and remote reset terminal.

The remote reset must be a normally open connected button between T21 and flame control power supply voltage (see illustrative diagrams):

- the reset is performed when a faulty condition is detected by the flame control.
- Press the reset button to reset the system after a lock-out.
- Pressing the reset button during operation will cause an emergency stop.
- The reset or emergency stop condition can be obtained also by using the remote reset with the same modalities.
- The number of reset attempts is limited to a maximum of 5 within 15 minutes.

Error / RFGO LED lock-out Codes

During an alarm condition, the status LED becomes steady red.

The remaining LEDs turn on according to a coded sequence which identifies the lock-out cause.

The following table shows the different LED Lock-out codes.



WARNING

The device described in this manual can cause material problems, severe injuries or death.

It is the owner or user's responsibility to make sure that the equipment described is installed, used and commissioned in compliance with the requirements provided both by national and local law. The lock-out condition indicates the presence of a fault which occurred during the operating cycle or during stand-by mode.

Before performing an unlock attempt, it is necessary to restore the original optimal operating conditions.



WARNING

Thermal unit's operation, maintenance and troubleshooting interventions must be carried out by trained personnel.

The persons who solve lock-out problems or reset the control device must observe the error codes to solve the problems described in this product technical data sheet.

It is not admitted to tamper with or act on the system or control in a way that could compromise the product safety or warranty.

Any tests on safety devices or on loads, such as fan motor, valves, igniter, flame sensors, must be performed with the shut-off valves closed and by qualified personnel.

Do not by-pass nor exclude the safety devices connected to the flame control.

Failure to observe these guidelines will exclude any liability.



WARNING

The regulation prohibits the system from allowing more than 5 remote reset attempts within a 15 minute time window.

If more than 5 attempts are performed without solving the lock-out, the system will prevent the user to perform further remote resets and force him/her to wait for the 15 minutes to elapse.

The remote reset operation will be restored at the end of the waiting time.

It is recommended that qualified personnel evaluate the lock-out condition and implement the solution which is suitable for the fault to be solved.

Error / RFGO LED lock-out codes

No	Faults	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7
	Operation LED ● = ON	Fan	Open damper	Closed damper	Auto	Ignition	Flame	Status
	Icon	 S9740	 S9741	 S9742	 S9743	 S9744	 S9745	 S9746
1	Post-diagnostics fault	●						Red
2	Local reset		●					Red
3	Combustion air fan fault	●	●					Red
4	Supervisor processor diagnostics fault			●				Red
5	FR- NO Flame at the end of the 2 nd safety time (MTFI)	●		●				Red
6	FR: internal circuit fault		●	●				Red
7	Internal communication fault	●	●	●				Red
8	Remote reset				●			Red
9	FR: internal fault	●			●			Red
10	Main processor fault		●		●			Red
11	Data memory test fault	●	●		●			Red
12	Data memory test fault			●	●			Red
13	Mains voltage or frequent fault	●		●	●			Red
14	Internal processor fault		●	●	●			Red
15	Internal processor fault	●	●	●	●			Red
o. 16	No flame: 1 st safety time (PTFI)	●				●		Red
17	Wiring fault		●			●		Red
18	Safety relay fault	●	●			●		Red
19	Combustion airflow switch fault in the rest position			●		●		Red
20	UV: no flame at the end of the 2 nd safety time (MTFI)	●		●		●		Red
21	Safety relay fault		●	●		●		Red
22	Supervisor processor fault	●	●	●		●		Red
23	Supervisor memory test fault				●	●		Red
24	Flame loss during the operation (AUTO)	●			●	●		Red
25	Supervisor processor data memory fault		●		●	●		Red
26	Supervisor processor internal fault	●	●		●	●		Red
27	Not used							
28	Not used							
29	Operating temperature out of range		●	●	●	●		Red
30	Code memory fault	●	●	●	●	●		Red
31	FR: external short circuit						●	Red
32	Check mode timeout (manual)	●					●	Red
33	False flame in stand-by mode		●				●	Red
34	Not used							
35	Internal processor timeout			●			●	Red
36	Internal processor timeout	●		●			●	Red
37	Combustion air check timeout		●	●			●	Red
38	Internal processor timeout	●	●	●			●	Red
39	Internal processor timeout				●		●	Red
40	Internal hardware fault	●			●		●	Red
41	Internal hardware fault		●		●		●	Red
42	Main processor fault	●	●		●		●	Red
43	Supervisor processor fault			●	●		●	Red

No	Faults	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7
44	Supervisor processor timeout	•		•	•		•	Red
45	Off-specification mains voltage		•	•	•		•	Red
46	Off-specification mains voltage	•	•	•	•		•	Red
47	UV: Internal fault					•	•	Red
48	Supervisor processor fault	•				•	•	Red
49	Main processor fault		•			•	•	Red
50	Ignition feedback fault	•	•			•	•	Red
51	Pilot feedback fault			•		•	•	Red
52	Piloted valve feedback fault	•		•		•	•	Red
53	Actuator feedback waiting time expired		•	•		•	•	Red
54	Direct ignition valve feedback fault	•	•	•		•	•	Red
55	Internal processor fault				•	•	•	Red
56	UV: false flame during operation			•	•	•	•	Red
57	FR: false flame during operation	•		•	•	•	•	Red
58	T8 inlet fault		•	•	•	•	•	Red
59	Internal hardware fault	•			•	•	•	Red
60	Local reset fault	•	•	•	•	•	•	Red
61	Open POC fault		•		•	•	•	Red
62	UV: strong UV flame fault	•	•		•	•	•	Red
63	Internal hardware fault					•		Red

Tab. P

Fault explanation

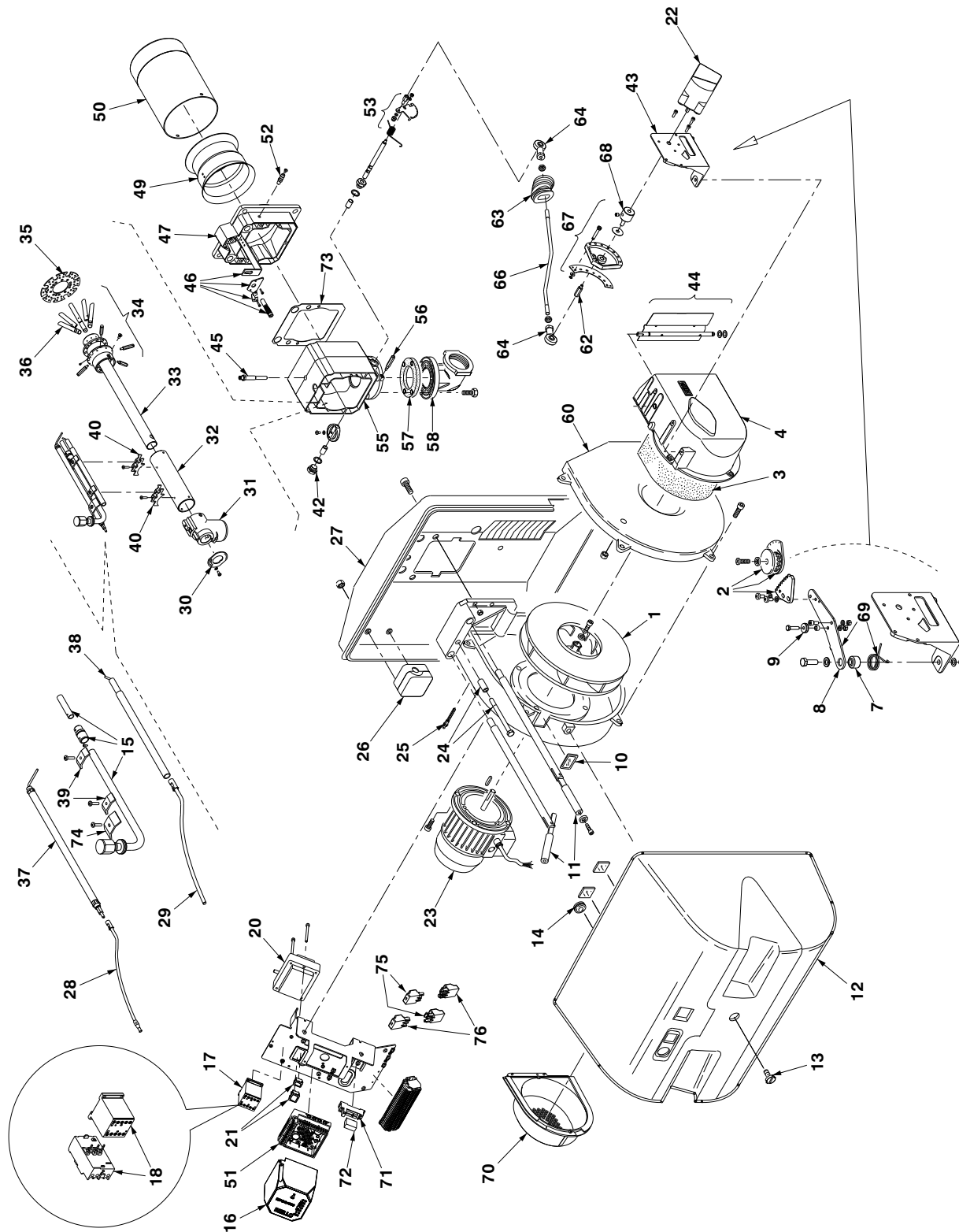
No	Faults	Cause	Solution
1	Post-diagnostics fault	Initial power diagnostics fault Make sure that the status of inlets and outlets is correct upon ignition	Check T12, T13 and T14
2	Local reset	The user started the manual reset or the reset switch is faulty	Check T21 inlet or reset for normal operation
3	Combustion air fan fault	No Air Check signal (T14) during the bleed cycle or Air Check signal loss during the burner operation	Check the fan or the air pressure switch
4	Supervisor processor diagnostics fault	The system detected the presence of voltage on T16, T17, T18 or T19 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the system is operating on a single-phase line (50/60Hz)
5	FR- No flame at the end of the 2 nd safety time (MTFI)	No flame at the end of the second safety time	Inspect the system, check the gas pressure, inspect the flame detection electrode, check the wiring, etc.
6	FR: internal circuit fault	Internal fault	Replace the control device
7	Internal communication fault	Internal fault	Replace the control device
8	Remote reset	The user pressed the remote reset button or the reset switch is discontinuous/dynamic	Check the remote switch
9	FR: internal fault	Internal fault	Replace the control device
10	Main processor fault	Internal fault	Replace the control device
11	Data memory test fault	Internal fault	Replace the control device
12	Data memory test fault	Internal fault	Replace the control device
13	Mains voltage or frequent fault	Off-specification power supply voltage and/or frequency	Check the input power supply
14	Internal processor fault	Internal fault	Replace the control device
15	Internal processor fault	Internal fault	Replace the control device
o. 16	No flame: 1 st safety time (PTFI)	No flame at the end of the first safety time	Inspect the system, check the gas pressure, check the flame sensor, check the wiring, etc.
17	Wiring fault	The system detected the presence of voltage on critical terminals (T16, T17, T18 or T19) at the wrong moment or there is no voltage when necessary	Inspect the wiring and make sure that the system is operating on a single-phase line (50/60Hz)
18	Safety relay fault	Internal fault	Replace the control device
19	Combustion airflow switch fault in the rest position	Open the circuit upon T13 start-up	Check the wiring for the air pressure switch
20	UV: no flame at the end of the 2 nd safety time (MTFI)	No flame at the end of the 2 nd safety time	Inspect the system, check the gas pressure, check the flame sensor, check the wiring, etc.
21	Safety relay fault	Internal fault	Replace the control device
22	Supervisor processor fault	Internal fault	Replace the control device
23	Supervisor memory test fault	Internal fault	Replace the control device
24	Flame loss during the operation (AUTO)	Loss of flame	Check the flame sensor or the fuel flow line
25	Supervisor processor data memory fault	Internal fault	Replace the control device
26	Supervisor processor internal fault	Internal fault	Replace the control device
27	Not used		
28	Not used		
29	Operating temperature out of range	Operating temperature below -40°C or above 70°C	Bring the control device within the specified temperature nominal values
30	Code memory fault	Internal fault	Replace the control device
31	FR: external short circuit	External short circuit between T24 and EARTH	Inspect the flame detection electrode
32	Check mode timeout (manual)	The interval for the manual mode (30 minutes) to end has elapsed	Exit the manual mode correctly to avoid timeout

No	Faults	Cause	Solution
33	False flame in stand-by mode	Unexpected flame (false or parasitic flame) detected during the Stand-by status	Check flame sensor or interference
34	Not used		
35	Internal processor timeout	Internal fault	Replace the control device
36	Internal processor timeout	Internal fault	Replace the control device
37	Combustion air check timeout	The system could not perform verification tests of the combustion air during the burner sequence	Check the wiring or the air pressure switch
38	Internal processor timeout	Internal fault	Replace the control device
39	Internal processor timeout	Internal fault	Replace the control device
40	Internal hardware fault	Internal fault	Replace the control device
41	Internal hardware fault	Internal fault	Replace the control device
42	Main processor fault	Internal fault	Replace the control device
43	Supervisor processor fault	Internal fault	Replace the control device
44	Supervisor processor timeout	Internal fault	Replace the control device
45	Off-specification mains voltage	Off-specification mains voltage/frequency	Check the mains voltage level or the frequency. Contact the factory if the problem persists
46	Off-specification mains voltage	Off-specification mains voltage/frequency	Check the mains voltage level or the frequency. Contact the factory if the problem persists
47	UV: Internal fault	Internal fault	Replace the control device
48	Supervisor processor fault	Internal fault	Replace the control device
49	Main processor fault	Internal fault	Replace the control device
50	Ignition feedback fault	The system detected the presence of voltage on T16 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the earthing is appropriate If the problem persists, contact the distributor/factory
51	Pilot feedback fault	The system detected the presence of voltage on T17 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the earthing is appropriate. If the problem persists, contact the distributor/factory
52	Piloted valve feedback fault	The system detected the presence of voltage on T19 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the earthing is appropriate If the problem persists, contact the distributor/factory
53	Actuator feedback waiting time expired	No actuator feedback on T8 for more than 10 minutes	Check the wiring Check the modulation equipment
54	Direct ignition valve feedback fault	The system detected the presence of voltage on T18 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the earthing is appropriate. If the problem persists, contact the distributor/factory
55	Internal processor fault	Internal fault	Replace the control device
56	UV: false flame during operation	False flame detected before ignition	Check the flame sensor
57	FR: false flame during operation	False flame detected before ignition	Check the wiring Check the flame sensor Make sure that earthing is appropriate
58	T8 inlet fault	The system detected the presence of voltage on T8 at the wrong moment or there is no voltage when necessary	Check the wiring Check the actuator
59	Internal hardware fault	Internal fault	Replace the control device
60	Local reset fault	Local reset button pressed for more than 10 seconds or reset button locked	If the problem persists, replace the control device
61	Open POC fault	The fuel valve is open at the wrong moment	Check the wiring
62	UV: strong UV flame fault	The flame sensor is too close to the flame	Increase the distance between the sensor and the flame OR use an orifice to reduce the view field
63	Internal hardware fault	Internal fault	Replace the control device

Tab. Q

A

Appendix - Spare parts



N.	CODE								DESCRIPTION	*
		RS 28/M - 20154108 (20165993)	RS 38/M - 20154129 (20166042)	RS 38/M - 20154134	RS 38/M - 20154131	RS 50/M - 20154141	RS 50/M - 20154137	RS 50/M - 20154146 (20166043)		
1	3012985	•							FAN	C
1	3012986		•	•	•				FAN	C
1	3003760					•	•	•	FAN	C
2	3012063	•	•	•	•	•	•	•	GRADUATE SECTOR	
3	3003830	•	•	•	•	•	•	•	SOUND DAMPING	
4	3003890	•	•	•	•	•	•	•	AIR INTAKE	
7	3003843	•	•	•	•	•	•	•	PIN	
8	20098438	•	•	•	•	•	•	•	LEVER	C
9	3003841	•	•	•	•	•	•	•	BEARING	
10	3003763	•	•	•	•	•	•	•	INSPECTION WINDOW	
11	3003842	•	•	•	•	•	•	•	BAR	
12	3012987	•	•	•	•	•	•	•	COVER	
12	3013873							•	COVER	
13	3003766	•	•	•	•	•	•	•	SCREW	
14	3007627	•	•	•	•	•	•	•	MEMBRAN	
15	3013009	•	•	•	•	•	•	•	PILOT TUBE	
16	20144930	•	•	•	•	•	•	•	CONTROL BOX	B
17	3012989	•	•						CONTACTOR	C
17	20006633							•	CONTACTOR	C
18	20154704			•		•			STARTER	
18	3013131				•		•		STARTER	
20	3012956	•	•	•	•	•	•	•	TRANSFORMER	B
21	3012080	•	•	•	•	•	•	•	SWITCH	C
22	3013008	•	•	•	•	•	•	•	SERVOMOTOR	B
23	3012993	•	•						MOTOR 120V	C
23	3012994			•		•	•		MOTOR 208-230/460V	C
23	3013057				•				MOTOR 575V	C
23	3013869							•	MOTOR 120V	C
24	3003778	•	•	•	•	•	•	•	SHORT SHAFT	
25	3003891	•	•	•	•	•	•	•	CONNECTOR	C
26	3012948	•	•	•	•	•	•	•	AIR PRESSURE SWITCH	B
27	3012089	•	•	•	•	•	•	•	FRONT SHIELD	
27	3013872							•	FRONT SHIELD	
28	20155571	•	•	•	•	•	•	•	PROBE LEAD	A

N.	CODE								DESCRIPTION	*
		RS 28/M - 20154108 (20165993)	RS 38/M - 20154129 (20166042)	RS 38/M - 20154134	RS 38/M - 20154131	RS 50/M - 20154141	RS 50/M - 20154137	RS 50/M - 20154146 (20166043)		
29	3012995	•	•	•	•	•	•	•	H.T.LEAD	A
30	3003844	•							FERRULE	
30	3003845		•	•	•				FERRULE	
30	3003846					•	•	•	FERRULE	
31	3003854	•	•	•	•	•	•	•	ELBOW	
32	3013129	•	•	•	•	•	•	•	EXTERIOR TUBE	
33	3003857	•							INTERIOR TUBE	
33	3003859		•	•	•				INTERIOR TUBE	
33	3003861					•	•	•	INTERIOR TUBE	
34	3012081	•							GAS HEAD	
34	3012083		•	•	•	•	•	•	GAS HEAD	
35	3012998	•		•	•				DISC	A
35	3012997		•						DISC	A
35	3012999					•	•	•	DISC	A
36	3003865	•							TUBE	
36	3003866		•	•	•				TUBE	
36	3003867					•	•	•	TUBE	
37	3012174	•	•	•	•	•	•	•	PROBE	A
38	3013136	•	•	•	•	•	•	•	ELECTRODE	A
39	3013001	•	•	•	•	•	•	•	U BOLT	
40	3013002	•	•	•	•	•	•	•	SUPPORT	
42	3003863	•	•	•	•	•	•	•	PLUG	
43	3013007	•	•	•	•	•	•	•	SUPPORT	
44	3012085	•	•	•	•	•	•	•	AIR DAMPER ASSEMBLY	
45	3003873	•	•	•	•	•	•	•	TEST POINT	
46	3013196	•							CONTROL DEVICE	
46	3013198		•	•	•				CONTROL DEVICE	
46	3003803					•	•	•	CONTROL DEVICE	
47	3003798	•	•	•	•				FRONT PIECE	
47	3003838					•	•	•	FRONT PIECE	
49	3003805	•	•	•	•				SHUTTER	C
49	3003806					•	•	•	SHUTTER	C
50	3003807	•							END CONE	B
50	3003809		•	•	•				END CONE	B

N.	CODE								DESCRIPTION	*
		RS 28/M - 20154108 (20165993)	RS 38/M - 20154129 (20166042)	RS 38/M - 20154134	RS 38/M - 20154131	RS 50/M - 20154141	RS 50/M - 20154137	RS 50/M - 20154146 (20166043)		
50	3003811								END CONE	B
51	20144947	•	•	•	•	•	•	•	CONTROL BOX BASE	
52	3003893	•	•	•	•	•	•	•	CONNECTOR	
53	3003875	•	•	•	•	•	•	•	GRADUATE SECTOR	
55	3013003	•	•	•	•	•	•	•	MANIFOLD	
56	3003878	•	•	•	•	•	•	•	INDEX	
57	3005483	•	•	•	•	•	•	•	SEAL	C
58	3013004	•	•	•	•	•	•	•	ELBOW	
60	3003829	•	•	•	•	•	•	•	HALF-SHELL	
62	3003888	•	•	•	•	•	•	•	SPACER	
63	3003883	•	•	•	•	•	•	•	DOME	
64	3006098	•	•	•	•	•	•	•	PIN JOINT	
66	3003881	•	•	•	•	•	•	•	TIE ROD	
67	3012062	•	•	•	•	•	•	•	CAM	
68	3013006	•	•	•	•	•	•	•	SHAFT	
69	3013478	•	•	•	•	•	•	•	SPRING - LEVER	A
70	3013874								PROTECTION	A
71	3012841	•	•	•	•	•	•	•	BASE	
72	20010969	•	•	•	•	•	•	•	RELAY	
73	3012734	•	•	•	•	•	•	•	SEAL FOR MANIFOLD	
74	20073810	•	•	•	•	•	•	•	U BOLT	
75	3006607	•	•	•	•	•	•	•	3 POLES PLUG	
76	3006608	•	•	•	•	•	•	•	3 POLES SOCKET	

*** 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****Long head kit**

Burner	Standard head length (inch)	Length obtainable with the kit (inch)	Code
RS 28/M	8 ¹ / ₂ "	13 ¹³ / ₁₆	3010256
RS 38/M	8 ¹ / ₂ "	13 ¹³ / ₁₆ "	3010257
RS 50/M	8 ¹ / ₂ "	13 ¹³ / ₁₆ "	3010258

Kit for LPG operation

The kit allows the RS 28-38-50/M burners to operate on LPG.

Burner		RS 28/M	RS 38/M	RS 50/M
Output	MBtu/hr	358 - 1232	437 - 1665	549 - 1986
Blast tube length	inch	8 ¹ / ₂ " 13 ¹³ / ₁₆ "	8 ¹ / ₂ " 13 ¹³ / ₁₆ "	8 ¹ / ₂ " 13 ¹³ / ₁₆ "
Code		3010270	3010271	20043293

RWF kit

Burner	Code
All models	20094961

UV flame sensor kit

Burner	Code
All models	20182554

Gas train according to UL Standards

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

C**Appendix - Burner start up report**

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

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

GAS OPERATION			
Gas Supply Pressure:	_____	CO ₂ : Low Fire	_____ High Fire
Main Power Supply:	_____	O ₂ : Low Fire	_____ High Fire
Control Power Supply:	_____	CO: Low Fire	_____ High Fire
Burner Firing Rate:	_____	NO _x : Low Fire	_____ High Fire
Manifold Pressure:	_____	Net Stack Temp - Low Fire:	_____ High Fire
Pilot Flame Signal:	_____	Comb. Efficiency - Low Fire:	_____ High Fire
Low Fire Flame Signal:	_____	Overfire Draft:	_____
High Fire Flame Signal:	_____		

CONTROL SETTINGS			
Operating Set-point:	_____	Low Oil Pressure:	_____
High Limit Set-point:	_____	High Oil Pressure:	_____
Low Gas Pressure:	_____	Flame Safeguard Model	_____
High Gas Pressure:	_____	Number:	_____
		Modulating Signal Type:	_____

NOTES

RIELLO

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

RIELLO

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

RIELLO BURNERS NORTH AMERICA
<http://www.riello.ca>

1-800-4-RIELLO

2165 Meadowpine Blvd
Mississauga, Ontario
Canada L5N 6H6