Forced draught gas burners

Progressive two stage or modulating operation

<table>
<thead>
<tr>
<th>CODE</th>
<th>MODEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>20125110 - 20125111 - 20125112</td>
<td>RS 280/EV</td>
</tr>
<tr>
<td>20125114 - 20125120 - 20125122</td>
<td>RS 310/EV</td>
</tr>
<tr>
<td>20125124 - 20125125 - 20125132</td>
<td>RS 410/EV</td>
</tr>
<tr>
<td>20125133 - 20125134 - 20125135</td>
<td>RS 510/EV</td>
</tr>
</tbody>
</table>
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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: 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.
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

1.2 Guarantee and responsibility

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

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

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

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

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

➤ 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.
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

<table>
<thead>
<tr>
<th>Model</th>
<th>RS 280/EV</th>
<th>RS 310/EV</th>
<th>RS 410/EV</th>
<th>RS 510/EV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output delivery (1)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High kW</td>
<td>762</td>
<td>3077</td>
<td>2770*</td>
<td>1026</td>
</tr>
<tr>
<td>High MBtu/hr (4)</td>
<td>2600</td>
<td>10500</td>
<td>9450*</td>
<td>3500</td>
</tr>
<tr>
<td>Low kW</td>
<td>308</td>
<td>-</td>
<td>-</td>
<td>403</td>
</tr>
<tr>
<td>Low MBtu/hr (4)</td>
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<td>-</td>
<td>-</td>
<td>1375</td>
</tr>
<tr>
<td>Fuel</td>
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<td>Natural gas</td>
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<td>Gas max. delivery SCFH</td>
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<td>10396</td>
<td>13465</td>
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<tr>
<td>Gas pressure at max delivery (2) °WC</td>
<td></td>
<td>19.1</td>
<td>19.5</td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td></td>
<td></td>
<td>Low-high or modulating</td>
<td></td>
</tr>
<tr>
<td>Standard applications</td>
<td></td>
<td>Boilers: water, steam, thermal oil</td>
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<td></td>
</tr>
<tr>
<td>Ambient temperature °F</td>
<td></td>
<td>32-104 (0-40°C)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combustion air temperature °F Max.</td>
<td></td>
<td>140 (60°C)</td>
<td></td>
<td></td>
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<tr>
<td>Noise level (3) dB(A)</td>
<td></td>
<td>82.7</td>
<td>78.7</td>
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</tbody>
</table>

(1) Firing Rate for C-ETL Canadian Listing
(2) Reference conditions: ambient temperature 68 °F (20°C) - Barometric pressure 394” WC - Altitude 329 ft.
(3) Pressure at test point 5(Fig. 5) with zero pressure in the combustion chamber and maximum burner output.
(4) Sound pressure measured in manufacturer’s combustion laboratory, with burner operating on test boiler and at maximum rated output.
(4) Equivalent Btu values based on 1 USGPH = 140,000 Btu/hr.
## 3.2 Electrical data

<table>
<thead>
<tr>
<th>Model</th>
<th>Control circuit power supply</th>
<th>V/Ph/Hz</th>
<th>RS 280/EV</th>
<th>RS 310/EV</th>
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<td>Main power supply (+/- 10%)</td>
<td>V/Ph/Hz</td>
<td>230-460/3/60</td>
<td>575/3/60</td>
</tr>
<tr>
<td></td>
<td>Fan motor</td>
<td>rpm</td>
<td>3520</td>
<td>3520</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HP</td>
<td>5.5</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>V</td>
<td>230/460</td>
<td>575</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>12.4-6.2</td>
<td>5.0</td>
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<td>Ignition transformer</td>
<td>V1 - V2</td>
<td>120 V - 1 x 8 kV</td>
<td>1.6 A - 20 mA</td>
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<tr>
<td>Electrical power consumption</td>
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<td>4500</td>
<td>4530</td>
<td>8320</td>
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<tr>
<td>Electrical control circuit consumption</td>
<td>W max</td>
<td>5250</td>
<td>5280</td>
<td>9070</td>
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<tr>
<td>Electrical protection</td>
<td>NEMA 3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Model Code RBNA Code Voltage Fan motor starting Flame safeguard

<table>
<thead>
<tr>
<th>Model</th>
<th>Code RBNA</th>
<th>Code</th>
<th>Voltage</th>
<th>Fan motor starting</th>
<th>Flame safeguard</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS 280/EV</td>
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<td>20121844</td>
<td>230/3/60</td>
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<tr>
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<td>20122571</td>
<td>460/3/60</td>
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<td>20125112</td>
<td>20122571</td>
<td>575/3/60</td>
<td></td>
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</tr>
<tr>
<td>RS 310/EV</td>
<td>20125114</td>
<td>20121848</td>
<td>230/3/60</td>
<td>Inverter</td>
<td>Burner mounted</td>
</tr>
<tr>
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<td>20125120</td>
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<tr>
<td></td>
<td>20125122</td>
<td>20122571</td>
<td>575/3/60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS 410/EV</td>
<td>20125124</td>
<td>20121848</td>
<td>230/3/60</td>
<td>Inverter</td>
<td>Burner mounted</td>
</tr>
<tr>
<td></td>
<td>20125125</td>
<td>20122575</td>
<td>460/3/60</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20125132</td>
<td>20122575</td>
<td>575/3/60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS 510/EV</td>
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<td>20121865</td>
<td>230/3/60</td>
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<td></td>
<td>20125135</td>
<td>20122577</td>
<td>575/3/60</td>
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</tbody>
</table>

Tab. C

## 3.3 Burner models designation

### Model Code RBNA Code Voltage Fan motor starting Flame safeguard

<table>
<thead>
<tr>
<th>Model</th>
<th>Code RBNA</th>
<th>Code</th>
<th>Voltage</th>
<th>Fan motor starting</th>
<th>Flame safeguard</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS 410/EV</td>
<td>20125114</td>
<td>20121848</td>
<td>230/3/60</td>
<td>Inverter</td>
<td>Burner mounted</td>
</tr>
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<td></td>
<td>20125120</td>
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<td></td>
<td>20125122</td>
<td>20122571</td>
<td>575/3/60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS 510/EV</td>
<td>20125133</td>
<td>20121865</td>
<td>230/3/60</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20125134</td>
<td>20122577</td>
<td>460/3/60</td>
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</tr>
<tr>
<td></td>
<td>20125135</td>
<td>20122577</td>
<td>575/3/60</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tab. E
3.4 Packaging - weight - Approximate measurements

The packaging of the burner (Fig. 1) rests on a wooden platform that is particularly suitable for lift trucks. The overall dimensions of the packaging are shown in the Tab. F.

The weight of the burner complete with its packaging is shown in Tab. F.

<table>
<thead>
<tr>
<th>inch</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS 280/EV</td>
<td>71&quot;</td>
<td>45&quot;</td>
<td>43 5/16&quot;</td>
<td>550</td>
</tr>
<tr>
<td>RS 310/EV</td>
<td>80&quot;</td>
<td>45&quot;</td>
<td>47 1/4&quot;</td>
<td>575</td>
</tr>
<tr>
<td>RS 410/EV</td>
<td>80&quot;</td>
<td>45&quot;</td>
<td>47 1/4&quot;</td>
<td>575</td>
</tr>
<tr>
<td>RS 510/EV</td>
<td>80&quot;</td>
<td>45&quot;</td>
<td>47 1/4&quot;</td>
<td>575</td>
</tr>
</tbody>
</table>

Tab. F

3.5 Burner dimensions

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

Bear in mind that inspection of the combustion head requires the burner to be opened by rotating the rear part on the hinge.

The overall dimensions of the burner when open are indicated by L and R.
3.6 Firing rates

**Maximum output** must be selected in the hatched area of the diagram (Fig. 3).

**Minimum output** must not be lower than the minimum limit shown in the diagram.

<table>
<thead>
<tr>
<th>Model</th>
<th>MBtu/hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS 280/EV</td>
<td>2.600</td>
</tr>
<tr>
<td>RS 310/EV</td>
<td>3.500</td>
</tr>
<tr>
<td>RS 410/EV</td>
<td>4.000</td>
</tr>
<tr>
<td>RS 510/EV</td>
<td>5.000</td>
</tr>
</tbody>
</table>

**Tab. H**

The firing rate area values have been obtained considering an ambient temperature of 68 °F, and an atmospheric pressure of 394" WC and with the combustion head adjusted as shown on page 22.

---

**3.6.1 Procedure to refer burner operating condition in high altitude plants**

Find the CORRECTED BURNER CAPACITY for the plant’s altitude in chart 1 and the CORRECTED PRESSURE in chart 2.

Check in the firing rate graph of the burner (Fig. 3), if the working point defined by the values above is within the range limits.

If not, higher burner size is needed.

**Note**

- Charts are based only on altitude variation (reference temperature = 68°F, 20°C)
- To get the combined correction in case of different air temperature, a compensation of 1000 ft each 3.6°F (305 m each 2°C) is applicable (100 ft = 0.36°F).

**Example**

- Rated Capacity = 5000 MBtu/hr
- Rated Air Pressure = 2.61 "WC
- Reference Altitude = 328 ft
- Reference Temperature = 20°C = 68°F
- Real Altitude = 3000 ft
- Real Temperature = 17°C = 62.6°F
- Temperature Difference = 68°F – 62.6°F = 5.4°F
- Virtual Altitude Increment = 5.4°F/3.6°F x 1000 ft = 1500 ft
- Virtual Altitude = (Real Altitude) + (Virtual Altitude Increment) = 3000 ft + 1500 ft = 4500 ft
- Corrected Capacity = (5090+5113)/2 = 5101.5 MBtu/hr
- Corrected Pressure = (4.41+4.87)/2 = 4.64 °WC

**Reference conditions:**

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

1. **CORRECTED BURNER CAPACITY ACCORDING TO ALTITUDE**

<table>
<thead>
<tr>
<th>Rated Capacity</th>
<th>m a.s.l.</th>
<th>0</th>
<th>100</th>
<th>305</th>
<th>610</th>
<th>915</th>
<th>1220</th>
<th>1525</th>
<th>1830</th>
<th>2135</th>
<th>2440</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ft a.s.l</td>
<td>0</td>
<td>328</td>
<td>1000</td>
<td>2000</td>
<td>3000</td>
<td>4000</td>
<td>5000</td>
<td>6000</td>
<td>7000</td>
<td>8000</td>
</tr>
<tr>
<td>1000</td>
<td>995</td>
<td>1000</td>
<td>1011</td>
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Altitude

<table>
<thead>
<tr>
<th>Average barometric pressure (20°C)</th>
<th>mbar</th>
<th>1013</th>
<th>1000</th>
<th>977.4</th>
<th>942.8</th>
<th>908.2</th>
<th>875.8</th>
<th>843.5</th>
<th>811.85</th>
<th>779.8</th>
<th>747.8</th>
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<tbody>
<tr>
<td>Average barometric pressure (68°F)</td>
<td>&quot;w.c.&quot;</td>
<td>399</td>
<td>394</td>
<td>385</td>
<td>371</td>
<td>358</td>
<td>345</td>
<td>332</td>
<td>320</td>
<td>307</td>
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2. **CORRECTED BURNER AIR PRESSURE ACCORDING TO ALTITUDE**

<table>
<thead>
<tr>
<th>Rated Pressure</th>
<th>m a.s.l.</th>
<th>0</th>
<th>100</th>
<th>305</th>
<th>610</th>
<th>915</th>
<th>1220</th>
<th>1525</th>
<th>1830</th>
<th>2135</th>
<th>2440</th>
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<tbody>
<tr>
<td></td>
<td>ft a.s.l</td>
<td>0</td>
<td>328</td>
<td>1000</td>
<td>2000</td>
<td>3000</td>
<td>4000</td>
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<td>0.5</td>
<td>0.39</td>
<td>0</td>
<td>0.73</td>
<td>1.08</td>
<td>1.46</td>
<td>1.87</td>
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<td>2.76</td>
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Altitude

<table>
<thead>
<tr>
<th>Average barometric pressure (20°C)</th>
<th>mbar</th>
<th>1013</th>
<th>1000</th>
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<tbody>
<tr>
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<td>358</td>
<td>345</td>
<td>332</td>
<td>320</td>
<td>307</td>
<td>294</td>
</tr>
</tbody>
</table>

These altitude charts are apparently incorrect and being revised. But we did have the factory confirm that the 410 is more than capable of the 11,075 mbh input required for this application at 6100' elev.
3.7 Minimum furnace dimensions

The firing rates were set in relation to certified test boilers. Fig. 4 indicates the diameter and length of the test combustion chamber.

Example RS 510/EV:
Output 19200 MBtu/hr: diameter 39.4 inch - length 16.5 ft.

3.8 Standard equipment

Flange gasket ......................... No. 1
Flange fixing screws (M18x60) ........ No. 4
Gas train flange ....................... No. 1
Gas train flange gasket ................. No. 2
Gas train flange fixing screws (M16x60) No. 4
Instruction manual ..................... No. 1
3.9 Burner description

1 Lifting eyebolts
2 Fan
3 Fan motor
4 Air servomotor
5 Gas pressure test point
6 Combustion head
7 Ignition pilot
8 Flame stability disk
9 Electric panel board - cover
10 Hinge for opening burner
11 Air inlet to fan
12 Manifold
13 Thermal insulation screen for securing burner to boiler
14 Gas train flange
15 Shutter
16 Flame inspection window
17 Gas butterfly valve
18 Combustion head air pressure test point
19 Air pressure test point "+"
20 Max gas pressure switch with pressure test point
21 Flame detector
22 Indication for checking the fan motor rotation
23 Gas servomotor
24 Reset button
25 Transparent protection
26 Pilot gas train attachment
27 Motor revolution sensor

**WARNING**

The burner can be opened either on the right or left sides, irrespective of the side from which fuel is supplied. When the burner is closed, the hinge can be re-positioned on the opposite side.
3.10 Panel board description

Burner failure may occur:

- **Flame safeguard lock-out**
  
  If the flame safeguard alarm 6)(Fig. 6) lights up, it indicates that the burner is in lock-out. To reset, press the reset push-button.
3.11 Control box for the air/fuel ratio (LMV37.4...)

Warning notes

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

The LMV37.4... is a safety device!
Do not open, interfere with or modify the unit.
Riello S.p.A. will not assume responsibility for any damage resulting from unauthorized interference!

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

Introduction

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

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

Mechanical design

The following system components are integrated in the LMV37.4... basic unit:
- Burner control with gas valve proving system
- Electronic air / fuel ratio control
- Control frequency converter air fan
- Modbus interface

Installation notes

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

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

Electrical connection of the flame detectors

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

<table>
<thead>
<tr>
<th>LMV37.4... basic unit</th>
<th>Mains voltage</th>
<th>AC 120 V -15 % / +10 %</th>
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<tbody>
<tr>
<td><strong>Mains frequency</strong></td>
<td>50 / 60 Hz ±6 %</td>
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</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>&lt; 30 W (typically)</td>
<td></td>
</tr>
<tr>
<td><strong>Safety class</strong></td>
<td>I, with parts according to II and III to DIN EN 60730-1</td>
<td></td>
</tr>
</tbody>
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### Terminal loading 'Inputs'

<table>
<thead>
<tr>
<th>Unit fuse F1 (internally)</th>
<th>6.3 AT</th>
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</thead>
<tbody>
<tr>
<td>Perm. mains primary fuse (externally)</td>
<td>Max. 16 AT</td>
</tr>
</tbody>
</table>

#### Undervoltage
- Safety shutdown from operating position at mains voltage: Approx. AC 93 V
- Restart on rise in mains voltage: Approx. AC 96 V

### Terminal loading 'Outputs'

#### Total contact loading:
- Nominal voltage: AC 120 V, 50 / 60 Hz
- Unit input current (safety loop) from: Max. 5 A
  - Fan motor contactor
  - Ignition transformer
  - Valves
  - Oil pump / magnetic clutch

#### Individual contact loading:

- **Fan motor contactor**
  - Nominal voltage: AC 120 V, 50 / 60 Hz
  - Nominal current: 1.6 A pilot duty load declaration to UL372
  - Power factor: \( \cos \phi > 0.4 \)

- **Alarm output**
  - Nominal voltage: AC 120 V, 50 / 60 Hz
  - Nominal current: 1 A
  - Power factor: \( \cos \phi > 0.4 \)

- **Ignition transformer**
  - Nominal voltage: AC 120 V, 50 / 60 Hz
  - Nominal current: 1.6 A pilot duty load declaration to UL372 or 250 VA ignition load declaration to UL372
  - Power factor: \( \cos \phi > 0.2 \)

- **Fuel valves**
  - Nominal voltage: AC 120 V, 50 / 60 Hz
  - Nominal current: 1.6 A pilot duty load declaration to UL372
  - Power factor: \( \cos \phi > 0.4 \)

- **Operation display**
  - Nominal voltage: AC 120 V, 50 / 60 Hz
  - Nominal current: 0.5 A
  - Power factor: \( \cos \phi > 0.4 \)

#### Cable lengths

| Mains line | Max. 100 m (100 pF/m) |
| Display, BCI | For used outside the burner cover or the control panel: Max. 3 m (100 pF/m) |
| External lockout reset button | Max. 20 m (100 pF/m) |

#### Environmental conditions

| Operation | DIN EN 60721-3-3 |
| Climatic conditions | Class 3K3 |
| Mechanical conditions | Class 3M3 |
| Temperature range | -20...+60 °C |
| Humidity | < 95 % r.h. |

---

**Tab. I**
Operation sequence of the burner

Legend to the sequence diagrams:
Valve proving takes place depending on the parameter:
2) Only with valve proving on startup
3) Parameter: with/without alarm in the event of start prevention
4) In the event of an erroneous signal on startup, followed by phase 10, otherwise phase 70

0° Position as supplied (0°)
90° Actuator fully open (90°)

Assignment of times:
t1 Prepurge time
TSA1 Safety time 1 gas / oil
TSA2 Safety time 2 gas / oil
3.12 Actuator (SQM33.5...)

Warning notes

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

Do not open, interfere with or modify the actuators!

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

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

Use

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

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

The position (in degrees) of the actuators can be seen on the display of the Operator Panel.

Index “0” for fuel actuator, index “1” for air actuator.

Installation notes

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

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

Technical data

<table>
<thead>
<tr>
<th>Operating voltage</th>
<th>AC / DC 24 V ±20 % (load on interface)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety class</td>
<td>2 to EN 60 730 part 1 and parts 2…14</td>
</tr>
<tr>
<td>Power consumption</td>
<td>max. 10 W</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP54 to EN 60 529-1</td>
</tr>
<tr>
<td>Opening time 0 - 90°</td>
<td>min: 5s, max.: 120s (depending on the type of control box)</td>
</tr>
<tr>
<td>Firing rate</td>
<td>0 - 90°</td>
</tr>
<tr>
<td>Cable connection</td>
<td>RAST2,5 connectors</td>
</tr>
<tr>
<td>Direction of rotation</td>
<td>Clockwise/anticlockwise (can be selected from the control box)</td>
</tr>
<tr>
<td>Nominal output torque</td>
<td>3 Nm</td>
</tr>
<tr>
<td>Holding torque (when live)</td>
<td>3 Nm</td>
</tr>
<tr>
<td>Holding torque (when dead)</td>
<td>2.6 Nm</td>
</tr>
<tr>
<td>Weight</td>
<td>approx. 1 kg</td>
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</table>

Environmental conditions:

<table>
<thead>
<tr>
<th>Operation</th>
<th>DIN EN 60 721-3-3</th>
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<tr>
<td>Climatic conditions</td>
<td>class 3K5</td>
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<tr>
<td>Mechanical conditions</td>
<td>class 3M4</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-20...+60 °C</td>
</tr>
<tr>
<td>Humidity</td>
<td>&lt; 95 % r.h.</td>
</tr>
</tbody>
</table>

Tab. J
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.

Combustion air inside the boiler must be free from hazardous mixes (e.g.: chloride, fluoride, halogen); if present, it is highly recommended to carry out cleaning and maintenance more frequently.

4.2 Handling

The burner packaging includes a wooden platform, it is therefore 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 suitableness of the available means of handling.

Check also that the area in which you are working is empty and that there is an adequate escape area (i.e. a free, safe area to which you can quickly move if the burner should fall).

When handling, keep the load at not more than 20-25cm 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 output of the burner must be within the boiler's firing rate;

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.

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

4.4 Operation position

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

Installation 1 is preferable, as it is the only one that allows the maintenance operations as described in this manual.

Installations 2, 3 and 4 permit operation but make maintenance and inspection of the combustion head more difficult.

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

Installation 5 is prohibited for safety reasons.

Fig. 10
4.5 Preparing the boiler

4.5.1 Boring the boiler plate
Drill the combustion chamber locking plate as shown in Fig. 11. The position of the threaded holes can be marked using the thermal screen supplied with the burner.

4.5.2 Blast tube length
The length of the blast tube must be selected according to the indications provided by the manufacturer of the boiler, and in any case it must be greater than the thickness of the boiler door complete with its fettling.

For boilers with front flue passes 1)(Fig. 16 on page 22) or flame inversion chamber, a protection in refractory material 5) must be inserted between the boiler fettling 2) and the blast tube 4).

The refractory can have a conical shape (minimum 60°).
This protective fettling must not compromise the extraction of the blast tube.

For boilers with a water-cooled front piece, a refractory lining 2)-5)(Fig. 16 on page 22) is not necessary, unless expressly requested by the boiler manufacturer.

4.6 Securing the burner to the boiler

Prepare a suitable lifting system using the rings 3)(Fig. 12), after removing the fixing screws 7) of the casing 8).

Fit the heat insulation supplied onto the blast tube 4)(Fig. 12).
Fit the entire burner onto the boiler hole prepared previously, and fasten with the screws supplied.

The seal between burner and boiler must be airtight.

The manufacturer declines any and every responsibility for any possible lifting movements, different from those indicated in this manual.
4.7 Accessibility to the interior of the combustion head

The burner leaves the factory set for opening to the right, therefore maintaining the pin 1 (Fig. 13) in its housing.

To open the burner towards the right, proceed as follows:
A remove the screws 2;
B open the burner to a maximum of 4-6 inch (100-150 mm) by rotating around the hinge and release the cables of the electrodes 5;
C fully open the burner as in Fig. 13;
D undo the screw 4) with pressure test point;
E release the ignition pilot retainer;
F release the head by lifting it from its housing 3), then take out the combustion head.

**WARNING**

To open the burner from the opposite side, before removing the pin 1)(Fig. 13), make sure that the 4 screws 2) are tight.
Then shift the pin 1) to the opposite side, only then is it possible to remove the screws 2).
Disconnect the socket 9)(Fig. 13) of the maximum gas pressure switch, then proceed as described above at point B).
4.8 Electrode and ignition pilot adjustment

**WARNING**

Place the pilot and electrodes observing the dimensions in Fig. 14.

4.9 Gas butterfly valve

**WARNING**

If necessary, replace the gas butterfly valve. The correct position is shown in Fig. 15.
4.10 Combustion head setting

Rotate the screw 1)(Fig. 16) until the notch you have found corresponds with the front surface of the screw itself.

The combustion head is opened by turning the screw 1) anticlockwise.

The combustion head is closed by turning the screw 1) clockwise.

The burner leaves the factory with the combustion head adjusted to notch 0 (Fig. 16).

This adjustment allows you to secure the moving parts when the burner is being transported.

Before starting the burner, carry out the adjustments for the output required.

NOTE:
Depending on the specific application, the adjustment can be modified.

The combustion head can be adjusted within the following fields:
RS 280/EV: 0 - 12
RS 310/EV: 0 - 11
RS 410/EV: 0 - 8
RS 510/EV: 0 - 11

No adjustment can be made outside these intervals.

WARNING
The burner leaves the factory with the combustion head adjusted to notch 0 (Fig. 16).

This adjustment allows you to secure the moving parts when the burner is being transported.

Before starting the burner, carry out the adjustments for the output required.

NOTE:
Depending on the specific application, the adjustment can be modified.

The combustion head can be adjusted within the following fields:
RS 280/EV: 0 - 12
RS 310/EV: 0 - 11
RS 410/EV: 0 - 8
RS 510/EV: 0 - 11

No adjustment can be made outside these intervals.
4.11 Gas feeding

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.

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

Key (Fig. 18)
1 Gas input pipe for main burner
2 Manual valve
3 Min gas pressure switch
4 Safety shut-off valve
5 NO vent valve
6 Regulating shut off valve
7 Gas input pipe for pilot
8 Gas adjustment butterfly valve
9 Burner
10 Max gas pressure switch
11 Manual valve (for seal control)
12 Pilot regulator

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

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

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.
4.11.2 Gas pressure

The Tab. L shows minimum pressure losses along the gas supply line depending on the maximum burner output operation.

The values shown in the Tab. L refer to natural gas (GCV).

Column 1
Pressure loss at combustion head.
Gas pressure measured at the test point 1)(Fig. 19), with:
- combustion chamber at 0” WC;
- burner working at maximum output;
- combustion head adjusted as in the diagram of Fig. 17 on page 22.

Column 2
Pressure loss at gas butterfly valve 17)(Fig. 5 on page 12) with maximum opening: 90”.

Calculate the approximate maximum output of the burner as follows:
- subtract the combustion chamber pressure from the gas pressure measured at test point 1)(Fig. 19);
- find, in the Tab. L relating to the burner concerned, the pressure value closest to the result of the subtraction;
- read off the corresponding output on the left.

Example for RS 510/EV:
- Maximum output operation
- Gas pressure at test point 1)(Fig. 19)=11.7 ”WC
- Pressure in combustion chamber=2 ”WC

\[ 11.7 - 2 = 9.7 \text{ ”WC} \]

An output of 10500 MBtu/hr shown in Tab. L corresponds to 9.7 ”WC pressure, column 1.
This value serves as a rough guide, the effective delivery must be measured at the gas meter.

### Tab. L

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Fig. 19
4.12 Electrical wiring

Notes on safety for the electrical wiring

- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be carried out by qualified personnel and in compliance with the regulations currently in force in the country of destination. Refer to the electrical layouts.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the electrical layouts.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- Do not invert the neutral with the phase in the electrical supply line.
  Any inversion would cause a lockout due to firing failure.
- The electrical safety of the device is obtained only when it is correctly connected to an efficient earthing system, made according to current standards.
  It is necessary to check this fundamental safety requirement. In the event of doubt, have the electrical system checked by qualified personnel.
- Do not use the gas tubes as an earthing system for electrical devices.
- The electrical system must be suitable for the maximum input power of the device, as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for the input power of the device.
- For the main power supply of the device from the electricity mains:
  - do not use adapters, multiple sockets or extensions;
  - use an omnipolar switch with an opening of at least 1/8" (overvoltage category) between the contacts, as indicated by the current safety standards.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.

Before carrying out any maintenance, cleaning or checking operations:

- Disconnect the 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.
4.12.1 Supply cables and external connections

All the cables to be connected to the burner are fed through the grommets. See Fig. 20.

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

1. Three phase power supply with 3/4 inch cable grommet
2. Available: single phase power supply and other devices with 1/2 inch cable grommet
3. Available: consents/safety, minimum gas pressure switch, gas valves and other devices with 3/8 inch cable grommet
4. Available: hole for M20
5. Available for ground terminals
6. Available for inverter three phase power supply with 3/4 inch cable grommet

A. Variable speed sensor
B. Maximum gas pressure switch
C. UV sensor
D. Air servomotor
E. Fuel servomotor
F. Air pressure switch
G. Motor earth cable

The control panel is in compliance with UL508A.

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

4.12.2 Cable shielding

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

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

The connection from the Inverter to LMV36.... must be done as shown in Fig. 21.

1. Motor supply cable
2. Single phase supply cable
3. Clamp for connection of controls cable shielding from Inverter
4.12.3 Installation of shielded cables

In the case of clamp type A:
- unscrew the screw until space is created for inserting the shielding of the shielded cable A1)(Fig. 22);
- insert the shielded cable with the shielding inside the clamp A2);
- screw in the screw until it is completely tightened on the shielding A3).

**WARNING**
Do not overtighten.

In the case of clamp type B:
- pull the indicated tabs upwards and lift until locked in the open position B1)(Fig. 22);
- insert the shielded cable with the shielding inside the clamp B2);
- put pressure on the indicated part until the clamp closes automatically on the shielding B3).

---

**Fig. 22**
4.12.4 Inverter connection

Following, it is reported an example how to connect the Inverter. For further information, please refer to the relevant Inverter instruction manual.

Typical installation

**Treatment of cables**

Countermeasures against cable noise

The treatment of cables is the most important countermeasure. The machinery manufacturers are requested to examine the current structure of the cable lead - in.

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

**Example:**

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

[Diagram of Inverter connection with detailed annotations]

**Fig. 23**

**Fig. 24**

**Fig. 25**
4.13 Motor connection at 208-230 or 460V

The motors, manufactured for 208-230/460 V, have the same connection as 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.

![Diagram of motor connections](image1)

4.14 Motor connection at 575V

The motors, manufactured for 575 V, 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.

![Diagram of motor connections](image2)

4.15 Reversible direction

If it is necessary to reverse the direction then reverse the two main supply phases.

For example: L1 with L2, there is no difference between IE1, IE2/Epact and IE3 NEMA Premium Efficiency.

![Diagram of reversible direction](image3)
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.

5.2 Adjustments before first firing

Adjustment of the combustion head has been illustrated on page 22.

In addition, the following adjustments must also be made:

- Open manual valves up-stream from the gas train.
- Purge the air from the gas line.
- Adjust the low gas pressure switch to the start of the scale (Fig. 33).
- Adjust the high gas pressure switch to the upper limit of the scale (Fig. 33).
- Adjust the air pressure switch to the zero position of the scale (Fig. 33).
- Fit a U-type manometer (Fig. 33) to the gas pressure test point on the sleeve.

The manometer readings are used to calculate MAX. burner power using the Tab. L on page 24.

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.

5.3 Burner firing

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

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

Pilot adjustment has been illustrated on Fig. 14 on page 21.

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

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

5.4 Burner calibration

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

Adjust successively:

- Firing output
- Maximum burner output
- Minimum burner output
- Intermediate outputs between low and high fire
- Air pressure switch
- Minimum gas pressure switch
5.5 Burner start-up

Feed electricity to the burner via the disconnecting switch on the boiler panel.
Close the thermostats/pressure switches, set the parameters on the RWF55 regulator.
Please refer to the specific manual for this operation.
Turn the switch of Fig. 30 to position “ON” and turn the switch of Fig. 30 to position “LOCAL”.

Make sure that the lamps or testers connected to the solenoids, or indicator lights on the solenoids themselves, show that no voltage is present. If voltage is present, stop the burner immediately and check the electrical wiring.

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

5.6 Adjusting gas/air delivery

- Move slowly towards the maximum output (butterfly gas valve completely open);
- adjust the required maximum output with the gas pressure stabilizer;
- adjust the combustion parameters with the air servomotor and store the maximum combustion point;
- complete the procedure slowly, synchronizing the combustion with the two servomotors and storing the different setting points.

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

5.7.1 Air pressure switch
For the RS 280 model, the air pressure switch is connected in differential mode and is activated by both the negative pressure of the air intake and the positive pressure from the fan.
For the RS 310-410-510 models, the air pressure switch is connected in absolute mode and is activated by the positive pressure from the fan (Fig. 31).
Adjust the air pressure switch (Fig. 31) after having performed all other burner adjustments with the air pressure switch set to the min. of the scale.
With the burner operating at low fire, adjust the pressure switch by slowly turning the relative knob clockwise until the burner locks out.
Then turn the knob counter-clockwise about 20% of the set point and start-up the burner again to ensure the set point is correct.
If the burner locks out again, turn the knob counter-clockwise a little bit more.

5.7.2 Maximum gas pressure switch
Adjust the maximum gas pressure switch after having performed all other burner adjustments with the maximum gas pressure switch set to the end of the scale (Fig. 32).
With the burner operating at MAX output, reduce the adjustment pressure by slowly turning the adjustment dial anticlockwise until the burner locks out.
Then turn the dial clockwise by 0.8” WC and repeat burner firing.
If the burner locks out again, turn the dial again clockwise by 0.4” WC.

5.7.3 Minimum gas pressure switch
Adjust the minimum gas pressure switch after having performed all the other burner adjustments with the pressure switch set at the start of the scale (Fig. 33).
With the burner operating at MAX output, increase adjustment pressure by slowly turning the relative dial clockwise until the burner locks out.
Then turn the dial anti-clockwise by 0.8” WC and repeat burner starting to ensure it is uniform.
If the burner locks out again, turn the dial anti-clockwise again by 0.4” WC.
5.7.4 Steady state operation
At the end of the starting cycle, the servomotor control then passes to load control for boiler pressure or temperature.
➢ If the temperature or pressure is low (and the load control is consequently closed), the burner progressively increases output up to MAX.
➢ If subsequently the temperature or pressure increases until the load control opens, the burner progressively decreases output down to MIN.

➢ The burner shuts off when demand for heat is less than the heat supplied by the burner in the MIN output.
➢ The servomotor returns to the 0° angle. The air damper closes completely to reduce thermal dispersion to a minimum.
Every time output is changed, the servomotor automatically modifies oil delivery (pressure regulator) and air delivery (fan damper).

5.8 Firing failure
➢ If the burner does not fire, it goes into lock-out within 5 sec. of the opening of the valve.
➢ If the flame should go out for accidental reasons during operation, the burner will lock out in 1 s.

5.9 Flame signal measurement
Check the flame signal through the parameter 954, as indicated in Fig. 34. The displayed value is expressed in percentage.
The value during the operation must be higher than 24%. If at the burner start-up the value is higher or equal of 18%, the burner locks out due to the extraneous light.
For further and specific information, please refer to the specific instruction manual.
The display (Fig. 34) shows parameter 954: flashing on the left. On the right, the flame’s intensity is displayed as a percentage.
Example: 954: 0.0

5.10 Final checks (with the burner working)

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

Tab. M

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.

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

Before carrying out any maintenance, cleaning or checking operations:

- Disconnect the electrical supply from the burner by means of the main system switch.
- Turn off the fuel interception tap.
- Wait for the components in contact with heat sources to cool down completely.

DANGER

6.2 Maintenance programme

6.2.1 Maintenance frequency

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

6.2.2 Checking and cleaning

The operator must use the required equipment during maintenance.

**Combustion head**

Open the burner and make sure that all components of the combustion head are in good condition, not deformed by the high temperatures, free of impurities from the surroundings and correctly positioned.

**Burner**

Check for excess wear or loose screws. Also make sure that the screws securing the electrical leads in the burner connections are fully tightened.

Clean the outside of the burner.

**UV scanner**

In order to reach the UV scanner, proceed as follows:
- extract the UV scanner 2)(Fig. 35);
- clean the glass cover from any dust that may have accumulated.

**Flame inspection window**

Clean the flame inspection window 1)(Fig. 36).

**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.
**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.

**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.

**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.

### 6.3 Opening the burner

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

**DANGER**
Close the fuel interception tap.

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

See “Accessibility to the interior of the combustion head” on page 20.

### 6.4 Closing the burner

Refit following the steps described but in reverse order; refit all burner components as they were originally assembled.

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

20122395
# Appendix - Burner start up report

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## NOTES

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