

**GB** **Dual fuel gas oil/ gas burners**

Two stage operation



**B10**

CODE	MODEL	TYPE
20032836 - 20034847	RLS 70	687T1
20032998 - 20034878	RLS 100	688T1
20033000 - 20034879	RLS 130	689T1



<b>1</b>	<b>Declaration</b>	<b>3</b>
<b>2</b>	<b>Information and general warnings</b>	<b>4</b>
2.1	Information about the instruction manual	4
2.1.1	Introduction	4
2.1.2	General dangers	4
2.1.3	Danger: live components	4
2.2	Guarantee and responsibility	5
2.3	Guidance for the use of bio fuel blends up to 10%	5
2.3.1	Information and general instructions	6
2.3.2	Product Disclaimer Statement	6
<b>3</b>	<b>Safety and prevention</b>	<b>7</b>
3.1	Introduction	7
3.2	Safety warnings	7
3.3	Basic safety rules	7
3.4	Personnel training	7
<b>4</b>	<b>Technical description of the burner</b>	<b>8</b>
4.1	Burner designation	8
4.2	Models available	8
4.3	Technical data	9
4.4	Electrical data	9
4.5	Countries of destination - Burner categories	10
4.6	Packaging - Weight	10
4.7	Overall dimensions	11
4.8	Standard equipment	11
4.9	Firing rates	12
4.10	Test boiler	12
4.10.1	Commercial boilers	12
4.11	Burner description	13
<b>5</b>	<b>Installation</b>	<b>14</b>
5.1	Notes on safety for the installation	14
5.2	Handling	14
5.3	Preliminary checks	14
5.4	Installer/Service notes for the use of Gas oil with Bio blends up to 10%	15
5.5	Operating position	15
5.6	Boiler plate	15
5.7	Blast tube length	16
5.8	Securing the burner to the boiler	16
5.8.1	Combustion head calibration	16
5.9	Nozzle installation	17
5.9.1	Choice of nozzles for 1st and 2nd stage	17
5.9.2	Nozzle assembly	17
5.10	Servomotor	18
5.11	Gas oil supply	19
5.11.1	Double-pipe circuit	19
5.11.2	Single-pipe circuit	20
5.12	Hydraulic system layout	20
5.13	Hydraulic connections	21
5.14	Pump	21
5.14.1	Technical data	21
5.14.2	Pump priming	21
5.15	Gas supply	22
5.15.1	Gas line	22
5.15.2	Gas train	23
5.15.3	Gas pressure	23

<b>6</b>	<b>Electrical system</b> .....	<b>25</b>
6.1	Notes on safety for the electrical wiring .....	25
6.2	Electrical connections .....	25
6.3	Calibration of thermal relay .....	26
6.4	Current to the UV photocell.....	26
<b>7</b>	<b>Start-up, calibration and operation of the burner</b> .....	<b>27</b>
7.1	Notes on safety for the first start-up .....	27
7.2	Adjustment before first firing (gas oil operation) .....	27
7.2.1	Combustion head setting .....	27
7.2.2	Pump adjustment .....	27
7.2.3	Fan gate adjustment .....	27
7.3	Burner calibration (gas oil operation) .....	27
7.3.1	Firing .....	27
7.3.2	Operation .....	27
7.4	Adjustment before first firing (gas operation) .....	28
7.5	Burner starting (gas operation) .....	29
7.6	Burner firing (gas operation) .....	29
7.7	Burner calibration (gas operation).....	29
7.7.1	2nd stage output .....	29
7.7.2	1st stage output .....	29
7.7.3	Firing output .....	29
7.7.4	Air pressure switch - CO check.....	30
7.7.5	Minimum gas pressure switch.....	30
7.8	Combustion checks.....	30
7.9	Burner operation .....	31
7.9.1	Burner flame goes out during operation.....	31
7.9.2	Led panel .....	31
7.10	LPG - Propane - Butane operation .....	32
<b>8</b>	<b>Maintenance</b> .....	<b>33</b>
8.1	Notes on safety for the maintenance .....	33
8.2	Maintenance programme .....	33
8.2.1	Maintenance frequency.....	33
8.2.2	Checking and cleaning.....	33
8.3	Opening the burner .....	35
8.4	Closing the burner.....	35
<b>9</b>	<b>Faults - Possible causes - Solutions</b> .....	<b>36</b>
<b>A</b>	<b>Appendix - Accessories (optional)</b> .....	<b>40</b>
<b>B</b>	<b>Appendix - Electrical panel layout</b> .....	<b>41</b>

## 1 Declaration

## Declaration of conformity in accordance with ISO / IEC 17050-1

Manufacturer: RIELLO S.p.A.  
 Address: Via Pilade Riello, 7  
 37045 Legnago (VR)  
 Product: Dual fuel gas oil/ gas burners  
 Model: RLS 70 - RLS 100 - RLS 130  
 These products are in compliance with the following Technical Standards:  
 EN 676  
 EN 267  
 EN 12100  
 and according to the European Directives:

GAD	2009/142/EC	Gas Devices Directive
MD	2006/42/EC	Machine Directive
LVD	2014/35/UE	Low Voltage Directive
EMC	2014/30/UE	Electromagnetic Compatibility

Such products are marked as follows:



CE-0694BO0118

The quality is guaranteed by a quality and management system certified in accordance with UNI EN ISO 9001.

Legnago, 01.12.2015

General Manager  
 RIELLO S.p.A. - Burners Department  
 Eng. U. Ferretti

Research and Development Director  
 RIELLO S.p.A. - Burners Department  
 Eng. F. Comencini

**2 Information and general warnings**

**2.1 Information about the instruction manual**

**2.1.1 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.

**2.1.2 General dangers**

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



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



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



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

**2.1.3 Danger: live components**



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

**Other symbols**



**ENVIRONMENTAL PROTECTION**

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

- This symbol indicates a list.

**Abbreviations used**

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

**Delivery of the system and the instruction manual**

When the system is delivered, it is important that:

- the instruction manual is 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.

## 2.2 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 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;
- the 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.**

Riello warranty is subject to correct burner, appliance and application matching, and set up in line with Riello's instructions and guidelines. All components within the hydraulic circuit suitable for bio fuel use and supplied by Riello will be identified as Bio compatible. No warranty is given in relation to the use of components which are not so identified with bio fuel blends. If in any doubt please contact Riello for further advice.

If any Riello burners are used with fuel with a bio content >10% then the components within the hydraulic circuit maybe affected and are not covered under warranty. The hydraulic circuit consists of;

- Pump
  - Hydraulic ram (where applicable)
  - Valve block
  - Flexible oil lines (considered as a consumable component)
1. Irrespective of any warranty given by Riello in relation to normal use and manufacturing defects, when fuels not meeting the relevant standards are used, or where fuel storage issues have not been addressed correctly, or the equipment used is not compatible, if failures occur which are directly or indirectly attributed to such issues and/or to the non-observance of this guidance, then no warranty or liability is implied or accepted by Riello.
  2. Riello have carefully chosen the specification of the bio compatible components including the flexible oil lines to protect the pump, safety valve and nozzle. The Riello warranty is dependent upon the use of Riello genuine components including the oil lines, being used.
  3. Riello warranty does not cover defects arising from incorrect commissioning or servicing by non Riello employed service engineers, and any issues impacting the burner arising from external site related issues.

## 2.3 Guidance for the use of bio fuel blends up to 10%

### Background

With increasing focus on renewable and sustainable energy requirements, Bio fuel usage is set to increase. Riello is committed to promoting energy conservation and the use of renewable energy from sustainable resources including liquid bio fuels, however there are some technical aspects that must be considered at the planning stage of using such fuels to reduce the potential for equipment failure or the risks of fuel leakage.

Liquid Bio fuel is a generic description used for oil that can come from numerous feed stocks including recycled cooking oils. These types of oils have to be considered and treated differently from standard mineral or fossil fuels, as they are generally more acidic, hygroscopic and less stable.

Due to this, a holistic approach is needed from the specification of the liquid Bio fuel, the storage of the fuel, its oil supply line and ancillary equipment, and very importantly the oil filtration and the burner itself. The specification for FAME (Fatty Acids Methyl Ester) liquid Bio fuel is critical to reliable equipment operation.

It is a minimum requirement that the fuel blend (up to 10% Bio) is obtained with gasoil in accordance with the relevant EN standards, regional regulations and FAME in accordance with EN 14214. It is also important that the fuel blends meet the require-

ments related to operational environment conditions within the relevant EN standards.

When choosing your Riello oil products where you know Bio fuels will be in use, please make sure that a Bio compatible burner and/or components have been supplied. If an existing burner is to be used with a liquid Bio fuel then a kit may be required to make it compatible and the guidance notes enclosed concerning oil storage and filtration must be adhered to. The end user is responsible for the thorough verification of the potential risks associated with the introduction of a bio fuel blend and the suitability of the appliances and installation applicable.

Irrespective of any warranty given by Riello in relation to normal use and manufacturing defects, when fuels not meeting the relevant standards are used, or where fuel storage issues have not been addressed correctly, or the equipment used is not compatible, if failures occur which are directly or indirectly attributed to such issues and/or to the non-observance of this guidance, then no warranty or liability is implied or accepted by Riello.

### 2.3.1 Information and general instructions

To ensure consistency, the supplier of the fuel must be able to demonstrate compliance with a recognised Quality Control and management system to ensure high standards are maintained within the storage, blending and delivery processes. The installation oil storage tank and its ancillaries must also be prepared BEFORE liquid Bio fuel is introduced. Checks and preparation should include;

- For new installations, make sure that all materials and seals in the oil storage and supply line to the burner are compatible with Bio fuels. For all installations, there must be a good quality bio compatible oil filter at the tank and then a secondary filter of 100 Microns protecting the burner from contamination.
- If an existing oil storage tank is to be used then in addition to the materials checks as detailed above, it will be essential that the tank is first inspected for condition and checked for water or other contamination. Riello strongly recommends that the tank is cleaned and oil filters replaced prior to Bio fuel delivery. If this is not completed then due to the hydroscopic nature of Bio fuel, it will effectively clean the tank, absorb water present which in turn will result in equipment failure that is not covered by the manufacturer's warranty.
- Depending on the capacity of the oil storage tank and oil usage, fuels may remain static within the tank for some considerable time and so Riello recommends that the oil distributor is consulted regarding the use of additional Biocides within the fuel to prevent microbial growth from occurring within the tank. . Riello suggests that fuel suppliers and or service companies are contacted for guidance on fuel filtration. Special attention should be applied to fuel applications where oil may be stored for long periods of time.
- The burner must be set according to the appliance application and commissioned checking that all combustion parameters are as recommended in the appliance technical manual.
- Riello recommends that the in line and burner oil pump filters are inspected and if required replaced at least every 4 months during burner use, before the burner start-up following a long period of discontinue operation and even more frequently where contamination has occurred. Particular attention is needed when inspecting and checking for fuel leakages from seals, gaskets and hoses.

### 2.3.2 Product Disclaimer Statement

**CAREFULLY READ THE FOLLOWING DISCLAIMER. YOU ACCEPT AND AGREE TO BE BOUND BY THIS DISCLAIMER BY PURCHASING RIELLO BIO COMPATIBLE BURNERS AND/OR COMPONENTS.**

Although the information and recommendations (hereinafter "Information") in this guidance is presented in good faith, believed to be correct and has been carefully checked, Riello (and its subsidiaries) makes no representations or warranties as to the completeness or accuracy of the Information. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will Riello (and its subsidiaries) be responsible for damages of any nature whatsoever resulting from the use of or reliance upon Information.

Other than set forth herein, Riello (and its subsidiaries) makes no additional warranties with respect to the bio compatible burner, either express or implied, including that of merchantability or fitness for a particular purpose or use.

In no event shall Riello (and its subsidiaries) be liable for any indirect, incidental, special or consequential damages including, without limitation, loss of profits, damages for loss of business profits, business interruption, loss of business information, loss of equipment, or other pecuniary loss or compensation for services whether or not it is advised of the possibility of such damages.

With the exception of injuries to persons, Riello's liability is limited to the customer's right to return defective/non-conforming products as provided by the relevant product warranty.



## 3 Safety and prevention

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

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

### 3.2 Safety warnings

The dimension of the boiler's combustion chamber must respond to specific values, in order to guarantee a combustion with the lowest polluting emissions rate.

The Technical Service Personnel will be glad to give you all the information for a correct matching of this burner to the boiler.

This burner must only be used for the application it was designed for.

The manufacturer accepts no liability within or without the contract for any damage caused to people, animals and property due to installation, adjustment and maintenance errors or to improper use.

### 3.3 Basic safety rules

- Children or inexperienced persons must not use the appliance.
- Under no circumstances must the intake grids, dissipation grids and ventilation vents in the installation room be covered up with cloths, paper or any other material.
- Unauthorised persons must not attempt to repair the appliance.
- It is dangerous to pull or twist the electric leads.
- Cleaning operations must not be performed if the appliance is not disconnected from the main power supply.
- Do not clean the burner or its parts with inflammable substances (e.g. petrol, alcohol, etc.). The cover must be cleaned with soapy water.
- Do not place anything on the burner.
- Do not block or reduce the size of the ventilation vents in the installation room.
- Do not leave containers and inflammable products or combustible materials in the installation room.

### 3.4 Personnel training

The user is the person, body or company that has acquired the machine and intends to use it for the specific purpose. He is responsible for the machine and for the training of the people working around it.

The user:

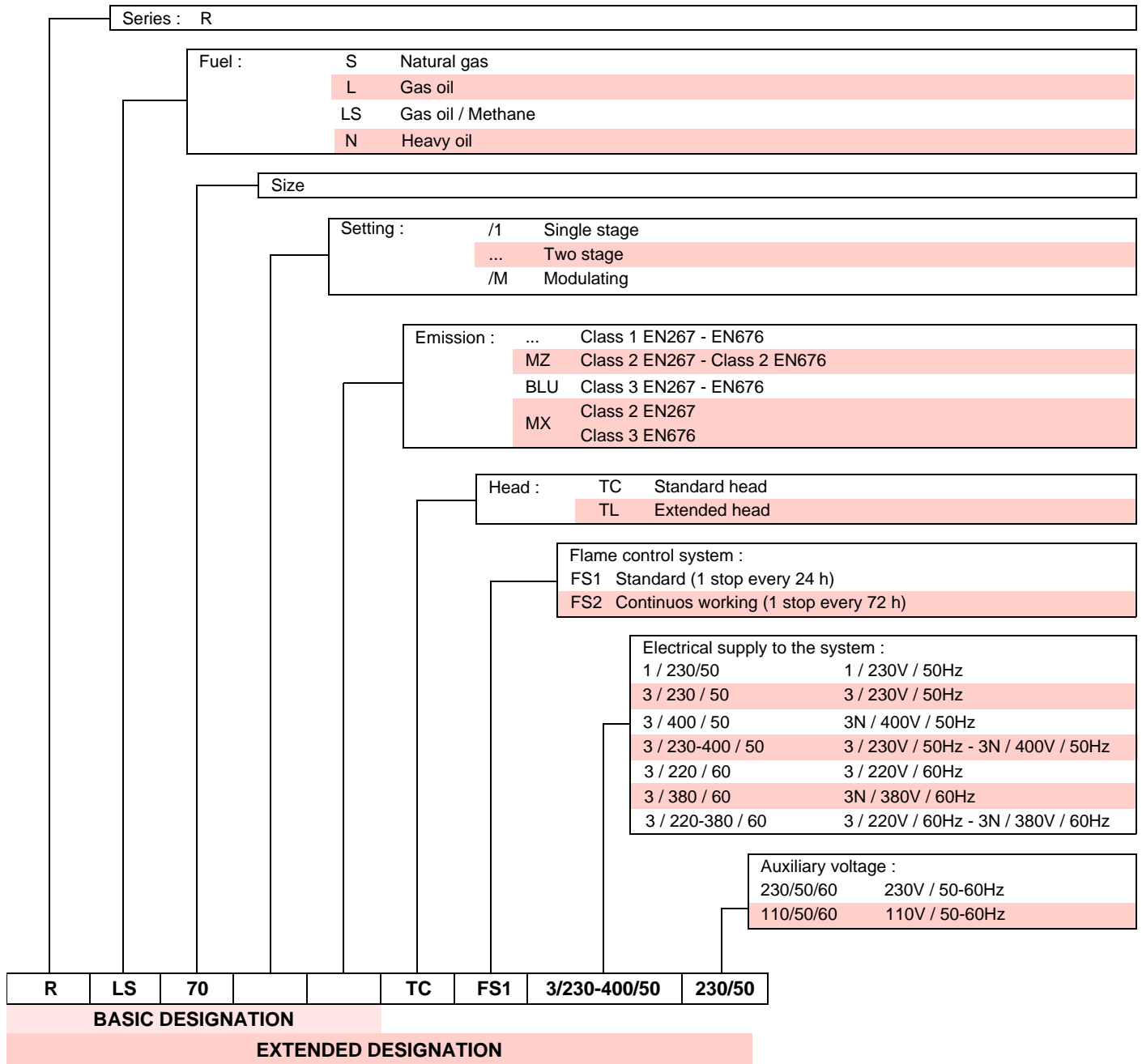
- undertakes to entrust the machine exclusively to suitably trained and qualified personnel;
- must take all the measures necessary to prevent unauthorised people gaining access to the machine;
- undertakes to inform his personnel in a suitable way about the application and observance of the safety instructions. With that aim, he undertakes to ensure that everyone knows the use and safety instructions for his own duties;
- must inform the manufacturer if faults or malfunctioning of the accident prevention systems are noticed, along with any presumed danger situation.
- Personnel must always use the personal protective equip-

ment envisaged by legislation and follow the indications given in this manual.

- 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.

**4 Technical description of the burner**

**4.1 Burner designation**



**4.2 Models available**

Designation		Electrical supply	Code
RLS 70	TC	3/230-400/50	20032836
RLS 70	TL	3/230-400/50	20034847
RLS 100	TC	3/230-400/50	20032998
RLS 100	TL	3/230-400/50	20034878
RLS 130	TC	3/230-400/50	20033000
RLS 130	TL	3/230-400/50	20034879

## 4.3 Technical data

Model			RLS 70	RLS 100	RLS 130
Type			687T1	688T1	689T1
Output (1) Delivery (1)	2 <sup>nd</sup> stage	kW	465 - 814	698 - 1163	930 - 1395
		kg/h	39 - 69	59 - 98	78 - 118
	min. 1 <sup>st</sup> stage	kW	232	349	465
		kg/h	19	29.5	39
Fuel			Gas oil, viscosity at 20 °C: 6 mm <sup>2</sup> /s max (1,5 °E - 6 cSt) Gas oil and Blends of gas oil and bio fuel (FAME in accordance with EN 14214) up to 10% Natural gas: G20 (methane) - G21 - G22 - G23 - G25 GPL - G30 (propane) - G31 (butane)		
Gas pressure at maximum delivery (2) gas: G20/G25/G31		mbar	6.2 / 7.5 / 7.8	10 / 13 / 12	11.5 / 14.4 / 15
Operation			- Intermittent (min. 1 stop in 24 hours) - Two stage (high and low flame) and single-stage (all - nothing)		
Nozzles		number	2		
Standard applications			Boilers: water, steam, diathermic oil		
Ambient temperatur		°C	0 - 40		
Combustion air temperature		°C max	60		
Pump	delivery (at 12 bar)	kg/h	220		
	pressure range	bar	10 - 20		
	fuel temperatur	° C max	60		
Electrical protection			IP 44		
Noise levels (3)	Sound pressure	dB(A)	74	77.5	80
	Sound power		85	88.5	91

**Tab. A**

- (1) Reference conditions: ambient temperature 20°C - Barometric pressure 1013 mbar - Altitude 0 m a.s.l.  
 (2) Pressure at test point 18)(Fig. 5 at page 13) with zero pressure in the combustion chamber and maximum burner output.  
 (3) Sound pressure measured in manufacturer's combustion laboratory, with burner operating on test boiler and at maximum rated output.

## 4.4 Electrical data

### Motor IE1

Model		RLS 70	RLS 100	RLS 130
Electrical supply	V/Ph/Hz	230-400/3N/50		
Auxiliary power supply	V/Ph/Hz	230/3/50		
Fan motor	rpm	2800	2830	2860
	V	230/400	230/400	230/400
	kW	1.1	1.5	2.2
	A	4.7/3	6.4/4	8.5/5
Pump motor	V	220/240		
	W	550		
	A	2.4		
Pump motor capacitor	µF	25		
Ignition transformer	V1 - V2 I1 - I2	230 V - 2 x 5 kV 1.9 A - 30 mA		
Electrical power consumption	kW max	2.0	2.6	3.2

**Tab. B**

### Motor IE2

Model		RLS 70	RLS 100	RLS 130
Electrical supply	V/Ph/Hz	230-400/3N/50		
Auxiliary power supply	V/Ph/Hz	230/3/50		
Fan motor	rpm	2860	2860	2860
	V	230/400	230/400	230/400
	kW	1.1	1.5	2.2
	A	4.1/2.4	5.5/3.4	7.9/4.6
Pump motor	V	220/240		
	W	550		
	A	2.4		
Pump motor capacitor	µF	25		
Ignition transformer	V1 - V2	230 V - 2 x 5 kV		
	I1 - I2	1.9 A - 30 mA		
Electrical power consumption	kW max	1.9	2.5	3.1

Tab. C

### 4.5 Countries of destination - Burner categories

Country of destination	Gas category
IT - AT - GR - DK - FI - SE - EE - CZ - HU - LT - SK BG - LV - SI - PL	I <sub>2</sub> H3B/P
ES - GB - IE - PT	I <sub>2</sub> H3P
NL	I <sub>2</sub> L3B/P
FR	I <sub>2</sub> Er3P
DE	I <sub>2</sub> ELL3B/P
BE	I <sub>2</sub> E(R)B, I <sub>3</sub> P
LU - PL	I <sub>2</sub> E3B/P
NO - CY - MT	I <sub>3</sub> B/P
RO	I <sub>2</sub> H

Tab. D

### 4.6 Packaging - Weight

- The burners are shipped in cardboard boxes with the maximum dimensions shown in Tab. E.
- The weight of the burner complete with packaging is indicated in Tab. E.

mm	A	B	C	kg
RLS 70	1390	645	985	70
RLS 100	1390	645	985	73
RLS 130	1390	645	985	76

Tab. E

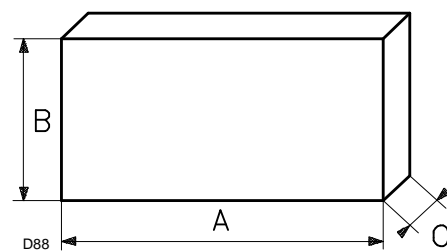


Fig. 1

## 4.7 Overall dimensions

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

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

The maximum dimension of the burner, without the cover, when open is given by measurement H.

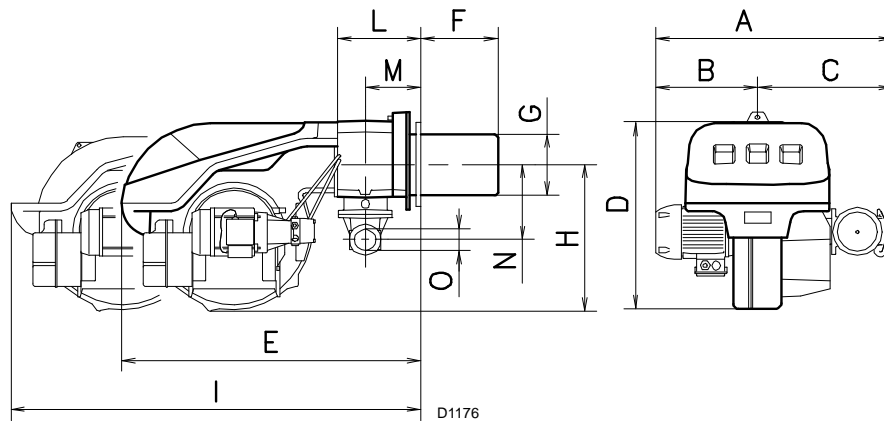


Fig. 2

mm	A	B	C	D	E	F <sup>(1)</sup>	G	H	I <sup>(1)</sup>	L	M	N	O
RLS 70	691	296	395	555	840	250 - 385	179	430	1161 - 1295	214	134	221	2"
RLS 100	707	312	395	555	840	250 - 385	189	430	1161 - 1295	214	134	221	2"
RLS 130	733	338	395	555	840	250 - 385	189	430	1161 - 1295	214	134	221	2"

Tab. F

<sup>(1)</sup> Blast tube: short-long

## 4.8 Standard equipment

- 1 - Gas train flange
- 1 - Flange gasket
- 4 - Flange fixing screws (M10x35)
- 1 - Thermal insulation screen
- 4 - Screws (M12x35) to secure the burner flange to the boiler
- 2 - Hoses
- 2 - Nipples for hoses with gaskets
- 1 - KIT for LPG operation
- 1 - Label for LPG operation
- 1 - Instruction booklet
- 1 - Spare parts list



**WARNING**

In case of use with gas oil containing up to 10% Bio blend, it will be essential to use flexible oil lines suitable for bio fuel use.  
Please contact Riello for further information.

**4.9 Firing rates**

The burners can work in two ways: one stage and two stage.

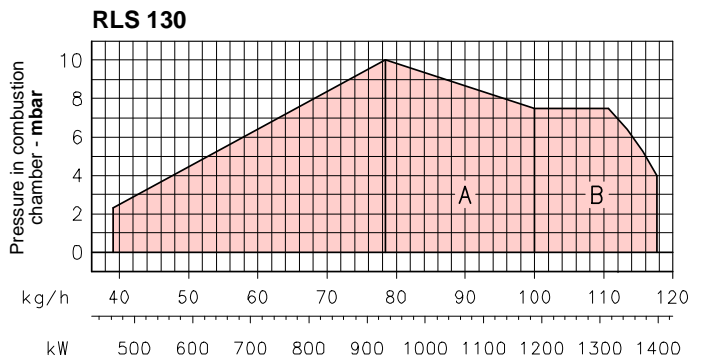
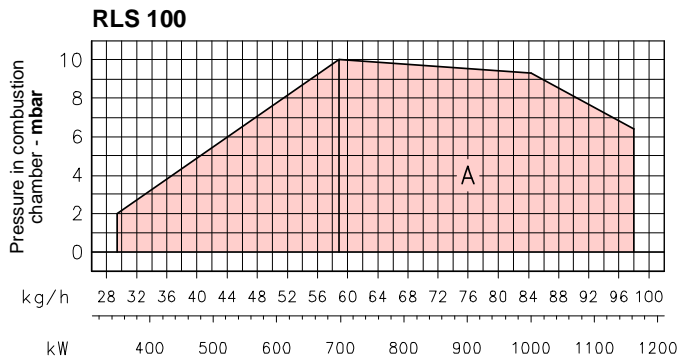
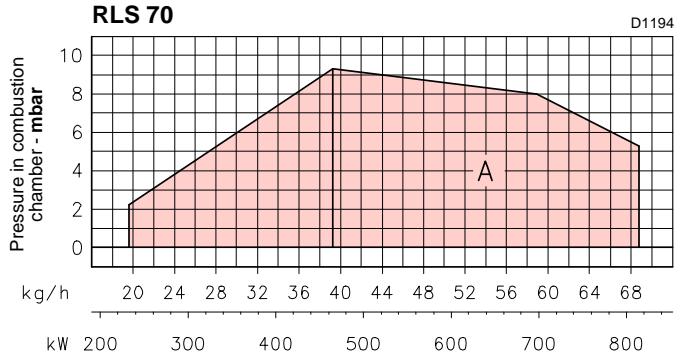
**MAXIMUM OUTPUT** must be selected in area A (and B for model RLS 130). In order to utilize also area B (RLS 130) it is necessary to perform the calibration of the combustion head as explained on page 16.

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

Model	kW	kg/h
RLS 70	232	19
RLS 100	349	29.5
RLS 130	465	39



The firing rate value (Fig. 3) has been obtained considering an ambient temperature of 20 °C, an atmospheric pressure of 1013 mbar (approx. 0 m above sea level), and with the combustion head adjusted as shown on page 27.



**Fig. 3**

**4.10 Test boiler**

The firing rates were set in relation to special test boilers, according to EN 676 and EN 267 regulations.

Fig. 4 indicates the diameter and length of the test combustion chamber.

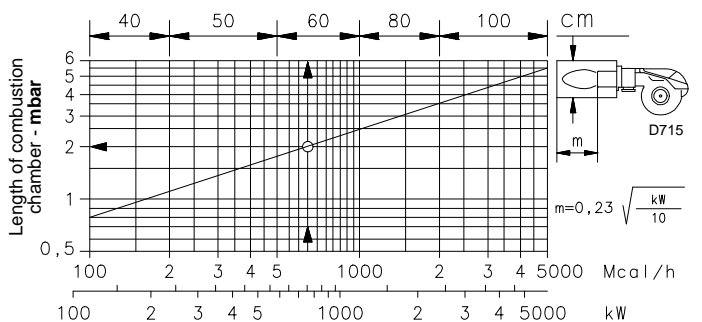
**Example:**

output 650 Mcal/h: diameter 60 cm - length 2 m.

**4.10.1 Commercial boilers**

The burner/boiler combination does not pose any problems if the boiler is CE type-approved and its combustion chamber dimensions are similar to those indicated in diagram (Fig. 4).

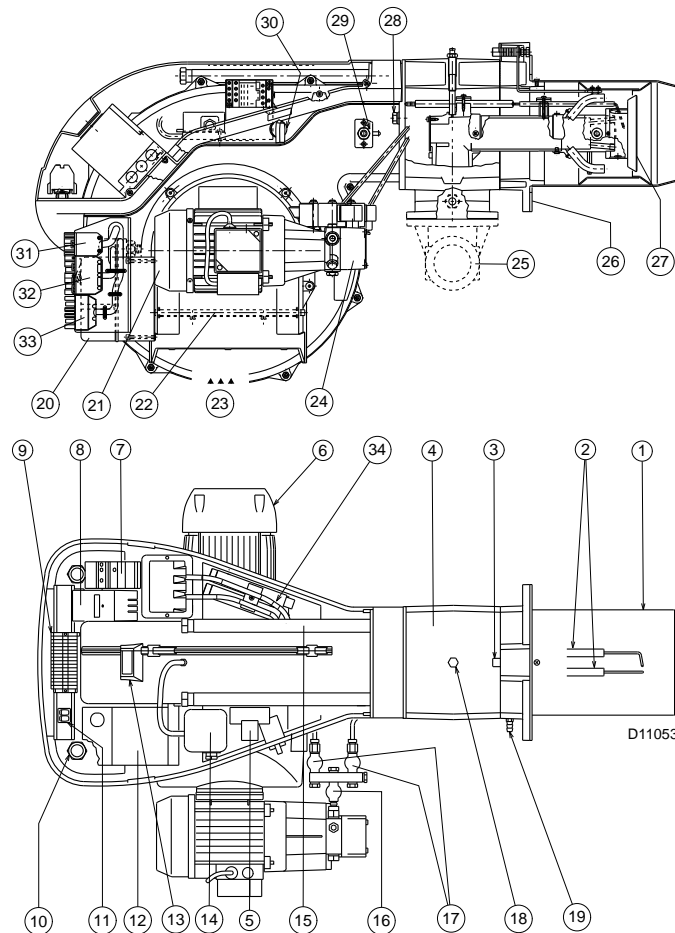
If the burner must be combined with a commercial boiler that has not been CE type-approved and/or its combustion chamber dimensions are clearly smaller than those indicated in diagram (Fig. 4), consult the manufacturer.



**Fig. 4**

**4.11 Burner description**

- 1 Combustion head
  - 2 Ignition electrodes
  - 3 Screw for combustion head adjustment
  - 4 Sleeve
  - 5 Relay
  - 6 Fan motor
  - 7 Motor contactor and thermal cut-out with reset button
  - 8 LED PANEL
  - 9 Terminal strip
  - 10 Fairleads for electrical connections by installer
  - 11 Two switches:  
- one "burner off - on"  
- one for "1<sup>st</sup> - 2<sup>nd</sup> stage"
  - 12 Control box with lock-out pilot light and lock-out reset button
  - 13 Flame inspection window
  - 14 Minimum air pressure switch (differential operating type)
  - 15 Slide bars for opening the burner and inspecting the combustion head
  - 16 Safety solenoid valve
  - 17 1<sup>st</sup> and 2<sup>nd</sup> stage valves
  - 18 Gas pressure test point and head fixing screw
  - 19 Air pressure test point
  - 20 Servomotor.
- When the burner is not operating the air gate valve is fully closed in order to reduce to a minimum heat dispersion from the boiler due to the flue draught which draws air from the fan suction inlet.
- 21 Pump motor
  - 22 Air gate valve
  - 23 Air inlet to fan
  - 24 Pump
  - 25 Gas input pipework
  - 26 Boiler mounting flange
  - 27 Flame stability disk
  - 28 Screw securing fan to sleeve
  - 29 Cell UV
  - 30 OIL/GAS selector
  - 31 4 pole socket
  - 32 7 pole socket
  - 33 6 pole socket
  - 34 Extensions for slide bars 15)



**Fig. 5**

Two types of burner failure may occur:

**Control box lock-out:**

if the control box 12) push-button lights up, it indicates that the burner is in lock-out. To reset, press the push-button.

**Motor trip:**

release by pressing the pushbutton on thermal relay 7).

**5 Installation**

**5.1 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.

**5.2 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). When 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.

**5.3 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.

RBL	A	B	C
D	E		F
GAS/KASU <input checked="" type="checkbox"/>	G		H
GAZ/AEFO	G		H
I			
HEZÖ/FUE	L		
RIELLO SpA I-37045 Legnago (VR)			CE 0085

D9243

**Fig. 6**

**Checking the characteristics of the burner**

- Check the identification label of the burner, showing:
- the model (A)(Fig. 6) and type of burner (B);
  - the year of manufacture, in cryptographic form (C);
  - the serial number (D);
  - the data for electrical supply and the protection level (E);
  - the electrical input power (F);
  - the types of gas used and the relative supply pressures (G);
  - the data of the burner's minimum and maximum output possibilities (H) (see Firing rates)
- Warning.** The output of the burner must be within the boiler's firing rate;
- the category of the device/countries of destination (I).
  - gas oil (L) max. viscosity.



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.



**5.4 Installer/Service notes for the use of Gas oil with Bio blends up to 10%**

- During the burner installation, check that the gasoil and bio fuel blends are in accordance with Riello specifications (please refer to the chapters "Technical Data" and "Guidance for the use of bio fuel blends up to 10%" within the burner technical manual).
- If a Bio blend is in use the installer must seek information from the end user that their fuel supplier can evidence that the blends of fuel conform to the relevant standards.
- Check that the materials used in the construction of the oil tank and ancillary equipment are suitable for bio fuels, If not these must be upgraded or replaced with Bio compatible parts.
- Particular attention should be given to the oil storage tank and supply to the burner. Riello recommends that existing oil storage tanks are cleaned, inspected and any traces of water are removed BEFORE bio fuel is introduced (Contact the tank manufacturer or oil supplier for further advice). If these recommendations are not respected this will increase the risk of contamination and possible equipment failure.
- In line oil filters should be replaced making sure that they are Bio compatible. Riello recommends a good quality bio compatible oil filter at the tank and a secondary 100 micron filter are used to protect the burner pump and nozzle from contamination.
- The burner hydraulic components and flexible oil lines must be suitable for bio fuel use (check with Riello if in doubt). Riello have carefully chosen the specification of the bio compatible components including the flexible oil lines to protect the pump, safety valve and nozzle. The Riello warranty is dependent upon the use of Riello genuine components including the oil lines, being used. The burner must be commissioned and combustion parameters set to appliance manufacturer's recommendations.
- Regularly check visually for any signs of oil leakage from seals, gaskets and hoses.
- It is strongly recommended that with Bio fuel use, oil filters are inspected and replaced every 4 months. More regularly where contamination is experienced.
- During extended periods of non operation and/or where burners are using oil as a standby fuel, it is strongly recommended that the burner is put into operation for short periods at least every three months.

**5.5 Operating position**

The burner is designed to work only in the positions 1, 2, 3 and 4. Installation 1 is preferable, as it is the only one that allows performing maintenance operations as described in this manual. Installations 2, 3 and 4 permit operation but make maintenance and inspection of the combustion head difficult, page 33.



Any other position could compromise the correct working of the appliance. Installation 5 is prohibited for safety reasons.

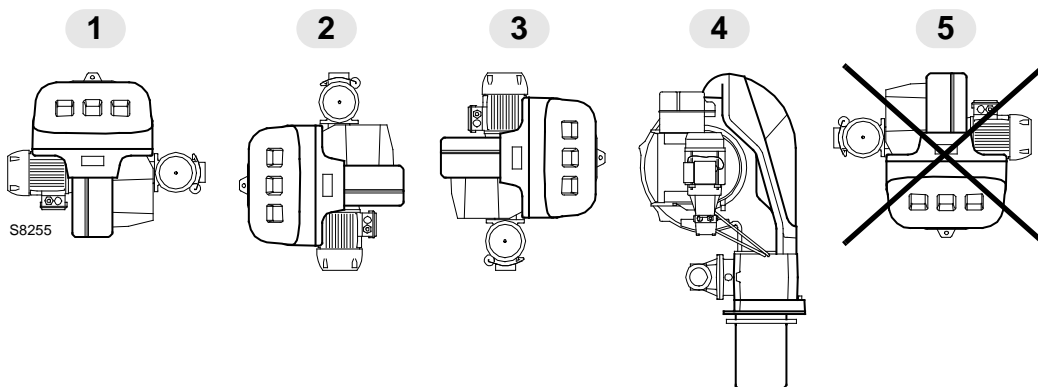


Fig. 7

**5.6 Boiler plate**

Drill the combustion chamber locking plate as shown in Fig. 8. The position of the threaded holes can be marked using the thermal screen supplied with the burner.

mm	A	B	C
RLS 70	185	275 - 325	M 12
RLS 100	195	275 - 325	M 12
RLS 130	195	275 - 325	M 12

Tab. G

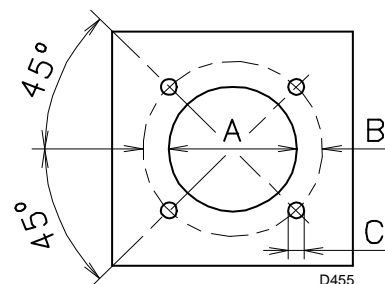


Fig. 8

### 5.7 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.

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

Blast tube 10)(Fig. 9)	Short	Long
RLS 70	250	385
RLS 100	250	385
RLS 130	250	385

For boilers with front flue passes 13)(Fig. 9) or flame inversion chambers, protective fettling in refractory material 11) must be inserted between the boiler fettling 12) and the blast tube 10).

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

For boilers having a water-cooled front the refractory fettling 11)-12)(Fig. 9) is not required unless it is expressly requested by the boiler manufacturer.

### 5.8 Securing the burner to the boiler

Detach the combustion head from the burner:

- disconnect the hoses by unscrewing the two connectors 6)(Fig. 9).
- Loosen the 4 screws 3) and remove the cover 1).
- Remove the screws 2) from the slide bars 5).
- Remove the two screws 4) and pull the burner back on slide bars 5) by about 100 mm.

- Only for long blast tube burner: remove the screws 2) and install the two extension bars 14) onto the slide bars 5); then fix the screw 2).
- Disconnect the electrode wires and then pull the burner completely off the slide bars 5).

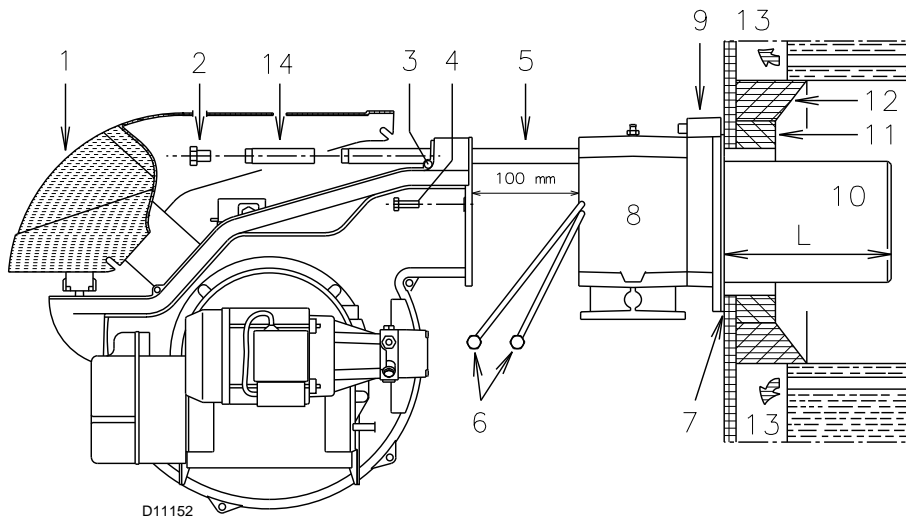


Fig. 9

#### 5.8.1 Combustion head calibration

At this point check, for model RLS 130, whether the maximum delivery of the burner in 2<sup>nd</sup> stage operation is contained in area A or in area B of the firing rate. See page 12.

If it is in area A then no operation is required.

If, on the other hand, it is in area B:

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

Once this operation has been carried out (if it was required), secure the flange 9)(Fig. 9) to the boiler plate, interposing the thermal insulating screen 7) supplied with the burner.

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

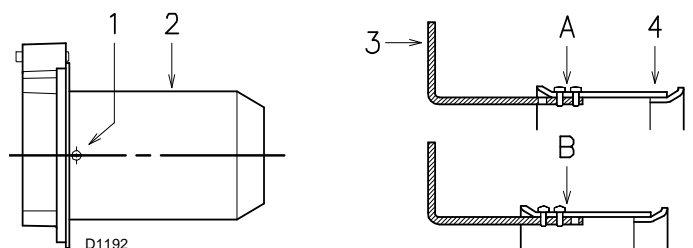


Fig. 10



The seal between burner and boiler must be airtight.

**5.9 Nozzle installation**

**5.9.1 Choice of nozzles for 1<sup>st</sup> and 2<sup>nd</sup> stage**

The burner complies with the emission requirements of the EN 267 standard.

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



**WARNING**

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



**CAUTION**

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

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

Both nozzles must be chosen from among those listed in Tab. H. The first nozzle determines the delivery of the burner in the 1st stage.

The second nozzle works together with the 1st nozzle to determine the delivery of the burner in the 2nd stage.

The deliveries of the 1st and 2nd stages must be contained within the value range indicated on page 9.

Use nozzles with a 60° spray angle at the recommended pressure of 12 bar.

The two nozzles usually have equal deliveries.

GPH	kg/h			kW
	10 bar	12 bar	14 bar	12 bar
5.00	19.2	21.2	23.1	251.4
5.50	21.1	23.3	25.4	276.3
6.00	23.1	25.5	27.7	302.4
6.50	25.0	27.6	30.0	327.3
7.00	26.9	29.7	32.3	352.3
7.50	28.8	31.8	34.6	377.2
8.00	30.8	33.9	36.9	402.1
8.30	31.9	35.2	38.3	417.5
8.50	32.7	36.1	39.2	428.2
9.00	34.6	38.2	41.5	453.1
9.50	36.5	40.3	43.8	478.0
10.0	38.4	42.4	46.1	502.9
10.5	40.4	44.6	48.4	529.0
11.0	42.3	46.7	50.7	553.9
12.0	46.1	50.9	55.3	603.7
12.3	47.3	52.2	56.7	619.1
13.0	50.0	55.1	59.9	653.5
13.8	53.1	58.5	63.3	693.8
14.0	53.8	59.4	64.5	704.5
15.0	57.7	63.6	69.2	754.3
15.3	58.8	64.9	70.5	769.7
16.0	61.5	67.9	73.8	805.3
17.0	65.4	72.1	78.4	855.1

**Tab. H**

**5.9.2 Nozzle assembly**

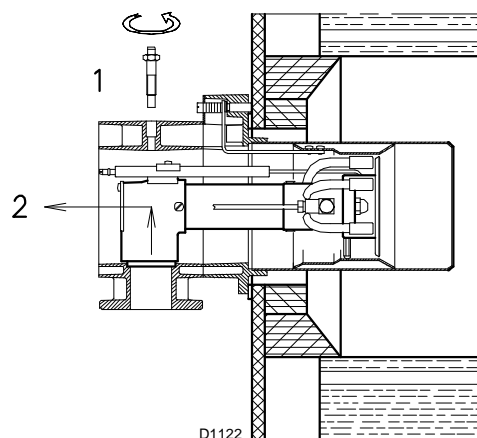
- Remove screw 1)(Fig. 11) and extract the internal part 2).
- Fit two nozzles with the box spanner (16 mm) 1)(Fig. 12), after having removed the plastic plugs 2).
- Fitting the spanner through the central hole in the flame stability disk or loosen screws 1)(Fig. 13).
- Remove disk 2)(Fig. 13) and replace the nozzles using the wrench 3).



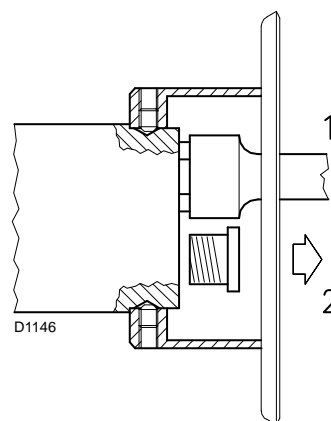
**WARNING**

Do not use any sealing products such as gaskets, sealing compound, or tape.

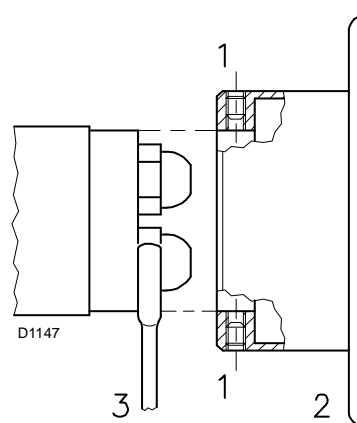
Be careful to avoid damaging the nozzle sealing seat. The nozzles must be screwed into place tightly but not to the maximum torque value provided by the wrench.



**Fig. 11**



**Fig. 12**



**Fig. 13**

The nozzle for the 1st stage of operation is the one lying beneath the firing electrodes (Fig. 14).

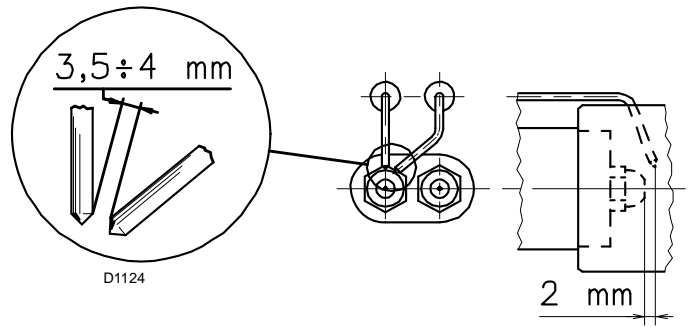


Make sure that the electrodes are positioned as shown in Fig. 14.

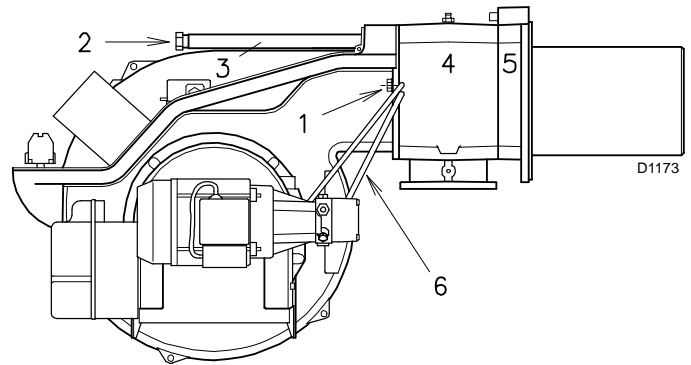
- Refit the burner to the slide bars 3)(Fig. 15) at approximately 100 mm from the sleeve 4) - burner positioned as shown in Fig. 9 at page 16.
- Insert the ignition electrode cables and then slide the burner up to the sleeve so that it is positioned as shown in Fig. 15.
- Refit screws 2) on slide bars 3).
- **Only for long blast tube burner:** unscrew the screws 2) and remove the two extension bars 14)(Fig. 9) from the slide bars 3); then refit the screw 2).
- Secure the burner to the sleeve by tightening screws 1).
- Connect the oil pipes again by screwing on the two connectors 6)(Fig. 9 at page 16).



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



**Fig. 14**



**Fig. 15**

**5.10 Servomotor**

The servomotor (Fig. 16) adjusts the air gate valve. The servomotor rotates through 90° in 5 seconds. Do not alter (for the time-being) the factory setting for the 4 levers. A graduated plate with 4 coloured sectors marks the lever operation point.

**Blue lever**

Sets the position of the air gate valve while the burner is shut down: air gate valve closed.

**Orange lever**

Sets the position of the air gate valve during 1<sup>st</sup> stage operation.

**Red lever**

Sets the position of the air gate valve during 2<sup>nd</sup> stage operation.

**Black lever**

Establishes when the 2<sup>nd</sup> stage gas or gas oil valve opens. It must always operate (just) before the red lever and after the orange lever.

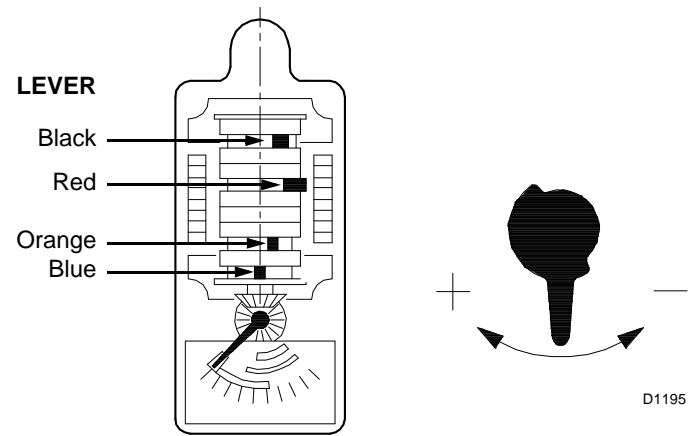
It must not operate with the red lever as this may prevent the gas or gas oil valve from opening at all.

It must not operate straight after the orange lever to avoid combustion in the absence of air.

For gas or gas oil valve opening to approach that of 2<sup>nd</sup> stage air gate valve position, rotate the black lever to the left; to delay opening time, rotate the lever to the right.

In brief, the levers must be operated in the following sequence:

- 1 Blue lever
- 2 Orange lever
- 3 Black lever
- 4 Red lever



**Fig. 16**

**5.11 Gas oil supply**



**WARNING**

Where gas oil containing bio diesel is in use, it is recommended to avoid over oxygenation of the blended fuels.

Where at all possible avoid the use of two pipe systems where the circulated fuel is returned to the tank.

If this cannot be avoided make sure that the return pipe is normally below the surface of the fuel level within the storage tank.



**WARNING**

In case of use with gas oil containing up to 10% Bio blend, it will be essential to use flexible oil lines suitable for bio fuel use.

Please contact Riello for further information.



**DANGER**

It is strongly recommended a periodic check of the pump pressure operation (annually or better every six months, if the burner operation is continuous).



**CAUTION**

You are advised to use additional filters on the fuel supply line.

Riello recommends a good quality fuel filter at the tank (Fig. 17 - Fig. 18) and a secondary filter (100 μ for gas oil and 15 μ for kerosene) are used to protect the burner pump and nozzle from contamination.

In case of Biodiesel use, pay attention to install Biocompatible filters.

**5.11.1 Double-pipe circuit**

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

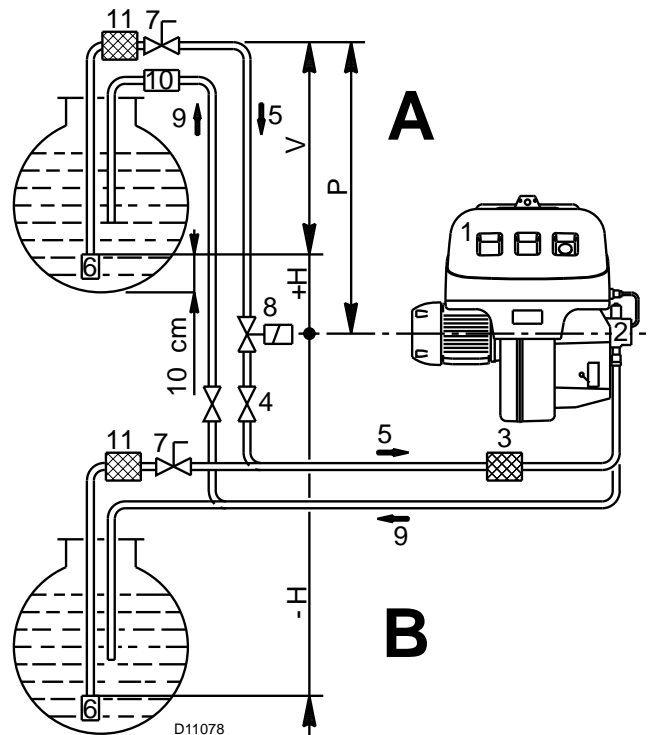
**The tank higher than the burner A (Fig. 17)**

The distance "P" must not exceed 10 meters in order to avoid subjecting the pump's seal to excessive strain; the distance "V" must not exceed 4 meters in order to permit pump self-priming even when the tank is almost completely empty.

**The tank lower than the burner B (Fig. 17)**

Pump depression values higher than 0.45 bar (35 cm Hg) must not be exceeded because at higher levels gas is released from the fuel, the pump starts making noise and its working life-span decreases.

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



**Fig. 17**

Key (Fig. 17)

- H Pump/Foot valve height difference
- L Piping length
- ∅ Inside pipe diameter
- 1 Burner
- 2 Pump
- 3 Filter
- 4 Manual on/off valve
- 5 Suction line
- 6 Foot valve
- 7 Rapid closing manual valve remote controlled (only Italy)
- 8 On/off solenoid valve (only Italy)
- 9 Return line
- 10 Check valve (only Italy)
- 11 Tank filter

+/- H (meters)	L (meters)		
	∅ 8 mm	∅ 10 mm	∅ 12 mm
+ 4	71	138	150
+ 3	62	122	150
+ 2	53	106	150
+ 1	44	90	150
+ 0.5	40	82	150
0	36	74	137
- 0.5	32	66	123
- 1	28	58	109
- 2	19	42	81
- 3	10	26	53
- 4	-	10	25

**Tab. I**

**5.11.2 Single-pipe circuit**

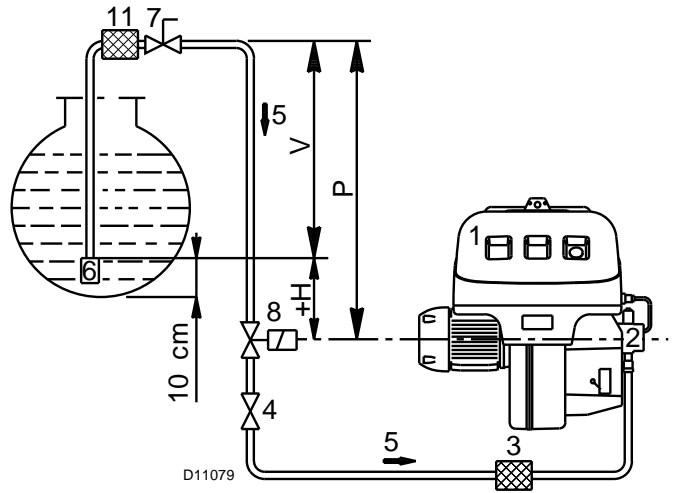
In order to obtain single-pipe working it is necessary to unscrew the return hose, remove the by-pass screw 6)(Fig. 19) and then screw the plug 7)(Fig. 19).

The distance "P" must not exceed 10 meters in order to avoid subjecting the pump's seal to excessive strain; the distance "V" must not exceed 4 meters.

For the priming pump loosen the screw 3)(Fig. 21) in order to bleed off the air contained in the suction line and wait until the fuel flows out.

Key (Fig. 18)

- H Pump/Foot valve height difference
- L Piping length
- ∅ Inside pipe diameter
- 1 Burner
- 2 Pump
- 3 Filter
- 4 Manual on/off valve
- 5 Suction line
- 6 Foot valve
- 7 Rapid closing manual valve remote controlled (only Italy)
- 8 On/off solenoid valve (only Italy)
- 11 Tank filter

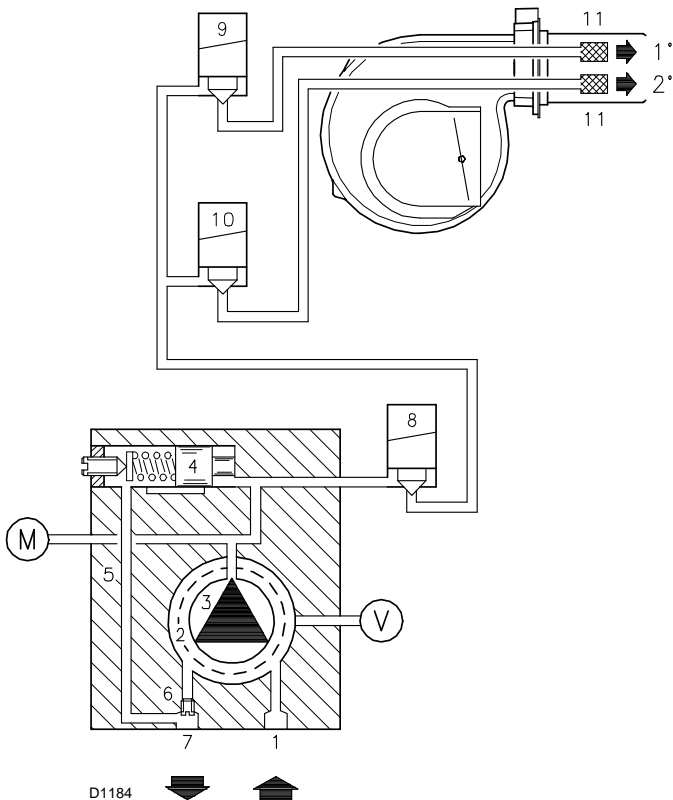


**Fig. 18**

+H (meters)	L (meters)		
	∅ 8 mm	∅ 10 mm	∅ 12 mm
4	71	138	150
3	62	122	150
2	53	106	150
1	44	90	150
0.5	40	82	150

**Tab. J**

**5.12 Hydraulic system layout**



Key Fig. 19

- 1 Pump suction
- 2 Filter
- 3 Pump
- 4 Pressure governor
- 5 Return pipe
- 6 By-pass screw
- 7 Pump return
- 8 Safety solenoid
- 9 1st stage valve
- 10 2nd stage valve
- 11 Filter
- M Pressure gauge
- V Vacuometer

**Fig. 19**

**5.13 Hydraulic connections**

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

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

The pump will break immediately if it is run with the return line closed and the by-pass screw inserted.

- Remove the plugs from the suction and return connections of the pump.
- Insert the hose connections with the supplied seals into the connections and screw them down.

- Take care that the hoses are not stretched or twisted during installation.
- Install the hoses where they cannot be stepped on or come into contact with hot surfaces of the boiler and where they do not hamper the opening of the burner.

Now connect the other end of the hoses to the suction and return lines by using the supplied nipples.

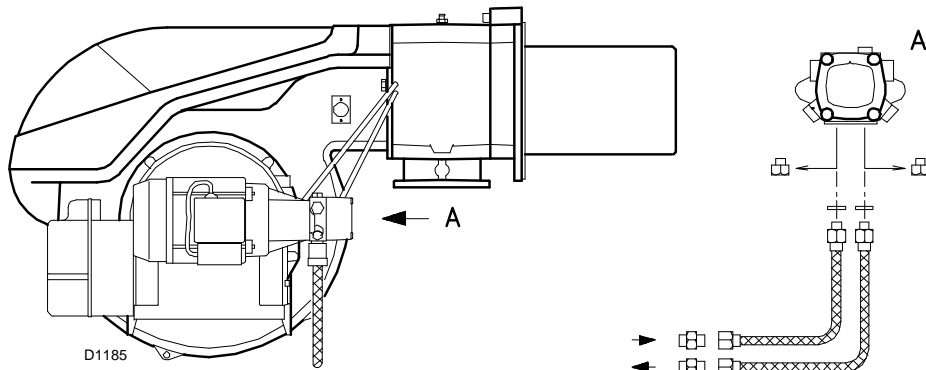


Fig. 20

**5.14 Pump**



**WARNING**

In case of use with gas oil containing up to 10% Bio blend, it will be essential to use flexible oil lines suitable for bio fuel use. Please contact Riello for further information.

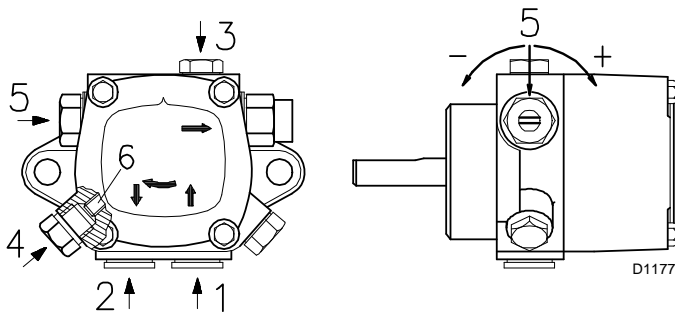


Fig. 21

- 1 Suction G 1/4"
- 2 Return G 1/4"
- 3 Pressure gauge attachment G 1/8"
- 4 Vacuum meter attachment G 1/8"
- 5 Pressure governor
- 6 By-pass screw

**5.14.1 Technical data**

**Suntec AJV6CC**

Min. delivery rate at 12 bar pressure	kg/h	220
Delivery pressure range	bar	10 - 20
Max. suction depression	bar	0.45
Viscosity range	mm <sup>2</sup> /s (cSt)	1 - 75
Max. gas oil temperature	°C	60
Max. suction and return pressure	bar	2
Pressure calibration in the factory	bar	12
Filter mesh width	mm	0.15

Tab. K

**5.14.2 Pump priming**



**WARNING**

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

**Obstructions in the line could cause the sealing organ located on the pump shaft to break.** (The pump leaves the factory with the by-pass closed).

- Also check to make sure that the valves located on the suction line are open and that there is sufficient fuel in the tank.
- For self-priming to take place, one of the screws 3)(Fig. 21) of the pump, must be loosened in order to bleed off the air contained in the suction line.
- Start the burner by closing the control devices, with switch 1)(Fig. 22) in the "ON" position and with switch 30)(Fig. 5 at page 13) in the "OIL" position.
- The pump can be considered to be primed when the gas oil starts coming out of the screw 3)(Fig. 21). Stop the burner: switch 1)(Fig. 22) set to "OFF" and tighten the screw 3).

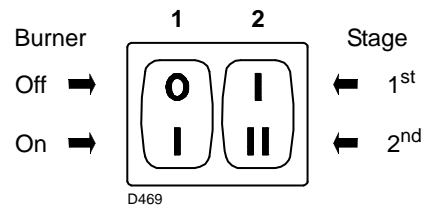


Fig. 22

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

If the pump fails to prime at the first starting of the burner and the burner locks out, reset the burner, and then repeat the starting operation.

Do not illuminate the cell UV or the burner will lock out.



**5.15 Gas supply**

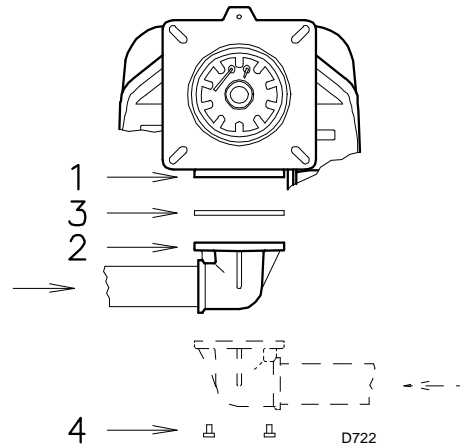
**5.15.1 Gas line**

The gas train must be connected to the gas attachment 1)(Fig. 23), using flange 2), gasket 3) and screws 4) supplied with the burner.

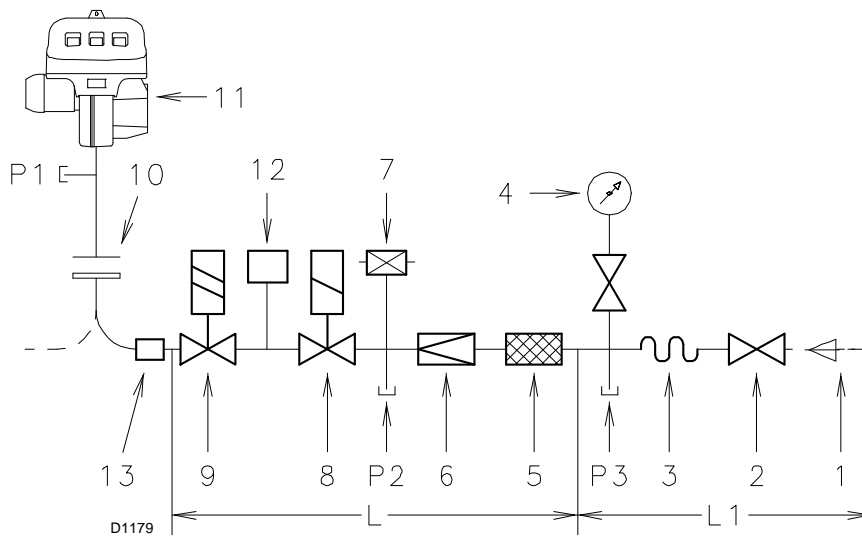
The gas train can enter the burner from the right or left side, depending on which is the most convenient, see Fig. 23.

Gas solenoids 8)-9)(Fig. 24) must be as close as possible to the burner to ensure gas reaches the combustion head within the safety time range of 2 s.

Make sure that the pressure governor calibration range (colour of the spring) comprises the pressure required by the burner.



**Fig. 23**



**Fig. 24**

Key Fig. 24

- 1 Gas input pipe
- 2 Manual valve
- 3 Vibration damping joint
- 4 Pressure gauge with pushbutton cock
- 5 Filter
- 6 Pressure governor (vertical)
- 7 Minimum gas pressure switch
- 8 Safety solenoid VS (vertical)
- 9 Adjustment solenoid VR (vertical)  
Three adjustments:  
- ignition delivery (rapid opening)  
- 1st stage delivery VR1 (slow opening)  
- 2nd stage delivery VR2 (slow opening)
- 10 Standard issue burner gasket with flange
- 11 Burner
- 12 Gas valve 8)-9) leak detection control device.  
In accordance with EN 676 Standards, gas valve leak detection control devices are compulsory for burners with maximum outputs of more than 1200 kW.
- 13 Gas train/burner adaptor
- P1 Pressure at combustion head
- P2 Pressure down-line from the pressure governor
- P3 Pressure up-line from the filter
- L Gas train supplied separately with the code indicated in Tab. M
- L1 The responsibility of the installer

**GAS TRAIN COMPONENTS**

Code	5	6	8 - 9
3970153	GF 515/1	FRS 515	MVD 515/5 + ZRDLE 415/5
3970183	Multiblock MB ZR DLE 415		
3970154	GF 520/1	FRS 520	MVD 520/5 + ZRDLE 420/5
3970166			
3970184	Multiblock MB ZR DLE 420		
3970185			
3970155	GF 40065/3	FRS 5065	MVD 5065/5 + VGF 10 + SKP 10
3970167			
3970156	GF 40080/3	FRS 5080	MVD 5080/5 + VGF 10 + SKP 10
3970168			

**Tab. L**



### 5.15.2 Gas train

It is type-approved according to EN 676 Standards and is supplied separately from the burner with the code indicated in Tab. M.

Gas train - L (Fig. 24)			Burner			12	13
Ø	C.T.	Code	RLS 70	RLS 100	RLS 130	Code	Code
1" 1/2	-	3970153	•	•	•	3010125	3000843
1" 1/2	-	3970183	•	•	•	3010125	3000843
2"	-	3970154	•	•	•	3010125	-
2"	◆	3970166	•	•	•	-	-
2"	-	3970184	•	•	•	3010125	-
2"	◆	3970185	•	•	•	-	-
DN 65	-	3970155	•	•	•	3010125	3000825
DN 65	◆	3970167	•	•	•	-	3000825
DN 80	-	3970156	-	-	•	3010125	3000826
DN 80	◆	3970168	-	-	•	-	3000826

Tab. M

Key Tab. M

C.T. Gas valves 8) - 9) leak detection control devices:

- Gas train without gas valve leak detection control device; device that can be ordered separately and assembled subsequently (see Column 12).
  - ◆ Gas train with assembled VPS valve leak detection control device.
- 12 VPS valve leak detection control device.  
Supplied separately from gas train on request.
- 13 Gas train/burner adaptor.  
Supplied separately from gas train on request.

**Note**

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

### 5.15.3 Gas pressure

The Tab. N show minimum pressure losses along the gas supply line depending on the burner output in 2<sup>nd</sup> stage operation.

Model	kW	1 Δp (mbar)		2 Δp (mbar)					
		G20	G31	3970153	3970183	3970154 3970166	3970184 3970185	3970155 3970167	3970156 3970168
RLS 70	465	5.5	6.3	11.6	8.5	4.8	5.2	-	-
	515	5.6	6.4	13.9	10.0	5.8	6.2	-	-
	565	5.7	6.5	16.3	12.0	6.8	7.2	-	-
	615	5.8	6.6	18.9	13.5	8.0	8.2	-	-
	665	5.9	6.8	21.7	15.0	9.2	9.5	-	-
	715	6.0	7.1	24.6	17.2	10.5	10.8	-	-
	765	6.1	7.4	27.7	18.5	11.3	11.5	4.4	-
	814	6.2	7.8	30.9	20.0	13.2	13.0	5.0	-
RLS 100	695	8.0	10.3	23.5	17.0	9.9	10.1	-	-
	760	8.3	10.5	27.4	18.5	11.7	11.5	4.4	-
	825	8.6	10.8	31.6	20.5	13.6	13.2	5.1	-
	890	8.9	11.1	36.1	23.0	15.6	14.0	5.8	-
	955	9.2	11.4	40.9	26.0	17.7	16.0	6.6	-
	1020	9.4	11.6	45.9	29.0	19.9	18.0	7.5	-
	1085	9.7	11.8	51.1	33.0	22.3	20.0	8.4	4.5
	1163	10.0	12.0	57.7	38.0	25.3	22.0	9.5	5.0
RLS 130	930	9.3	10.5	39.0	22.0	16.9	15.0	6.3	-
	1010	9.5	10.9	44.9	28.0	19.6	17.0	7.4	-
	1090	9.7	11.4	51.5	33.0	22.5	20.0	8.5	4.5
	1170	9.9	11.8	58.3	37.0	25.6	22.0	9.6	5.1
	1250	10.4	12.9	65.4	40.0	28.8	25.0	10.8	5.7
	1330	10.9	14.0	72.9	43.0	32.2	28.0	12.2	6.4
	1410	11.5	15.0	80.7	48.0	35.8	31.0	13.6	7.1
	1512	13.0	17.5	91.2	53.0	40.6	34.0	15.3	8.0

Tab. N

### Column 1 (Tab. N)

Pressure loss at combustion head.

Gas pressure measured at test point 1)(Fig. 25), with:

- Combustion chamber at 0 mbar
- Burner operating in 2nd stage
- Gas G20 (methane) - G31 (propane)

### Column 2 (Tab. N)

Pressure loss of gas train 2)(Fig. 25) with gas G20 includes:

- adjustment valve VR
- safety valve VS (both fully open)
- pressure governor R
- filter F

With: propane G31 PCI 27 kWh/Nm<sup>3</sup> (23,2 Mcal/Nm<sup>3</sup>) multiply values of column 2 by 0,41.

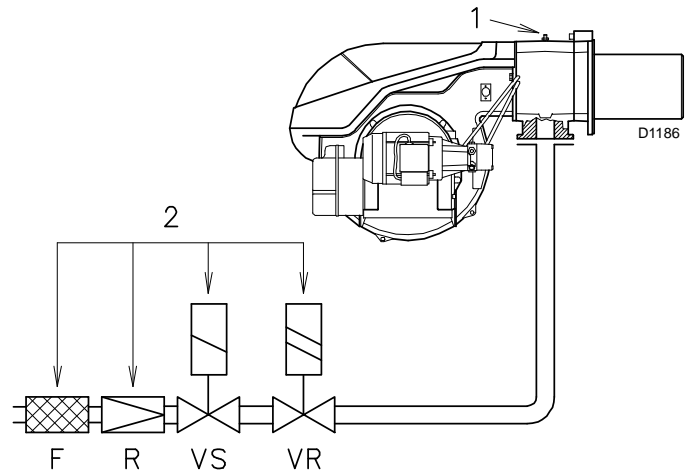


Fig. 25

Calculate the approximate 2<sup>nd</sup> stage output of the burner thus:

- subtract the combustion chamber pressure from the gas pressure measured at test point 1)(Fig. 25).
- Find the nearest pressure value to your result in column 1 of the Tab. N for the burner in question.
- Read off the corresponding output on the left.

### Example - RLS 100

- 2<sup>nd</sup> stage operation
  - Natural gas G20 PCI 10 kWh/Nm<sup>3</sup>
  - Gas pressure at test point 1)(Fig. 25) = 11.2 mbar
  - Pressure in combustion chamber = 2 mbar
- $$11.2 - 2 = 9.2 \text{ mbar}$$

A 2<sup>nd</sup> stage output of 955 kW shown in Tab. N RLS 100 corresponds to 9.2 mbar pressure, column 1, gas G20.

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

To calculate the required gas pressure at test point 1)(Fig. 25), set the output required from the burner in 2<sup>nd</sup> stage operation:

- find the nearest output value in the Tab. N for the burner in question.
- Read off the pressure at test point 1)(Fig. 25) on the right in column 1.
- Add this value to the estimated pressure in the combustion chamber.

### Example - RLS 100

- Required burner output in 2<sup>nd</sup> stage operation: 955 kW
  - Natural gas G20 PCI 10 kWh/Nm<sup>3</sup>
  - Gas pressure at burner output of 955 kW, column 1, G 20 = 9.2 mbar
  - Pressure in combustion chamber = 2 mbar
- $$9.2 + 2 = 11.2 \text{ mbar}$$

pressure required at test point 1)(Fig. 25).



Gas train: for GPL use the gas train with 1 1/2" or 2" diameter.

**6 Electrical system**

**6.1 Notes on safety for the electrical wiring**



**DANGER**

- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be carried out by qualified personnel and in compliance with the regulations currently in force in the country of destination. Refer to the wiring diagrams.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the wiring diagrams.
- Do not invert the neutral with the phase in the electrical supply line. Any inversion would cause a lockout due to firing failure.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The burners have been set for intermittent operation. This means they should compulsorily be stopped at least once every 24 hours to enable the control box to perform checks of its own start-up efficiency. Normally the boiler's thermostat/pressure switch ensures the stopping of the burner. If this is not the case, it is necessary to apply in series with IN a timer switch that turns off the burner at least once every twenty-four 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.
- 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, as indicated by the current safety standards.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.

Before carrying out any maintenance, cleaning or checking operations:



**DANGER**

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



**DANGER**

isolate the fuel supply.

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

**6.2 Electrical connections**



**WARNING**

Electrical wiring must be made in accordance with the regulations currently in force in the country of destination and by qualified personnel. Riello S.p.A. declines all liability for modifications or connections other than those shown on these diagrams.

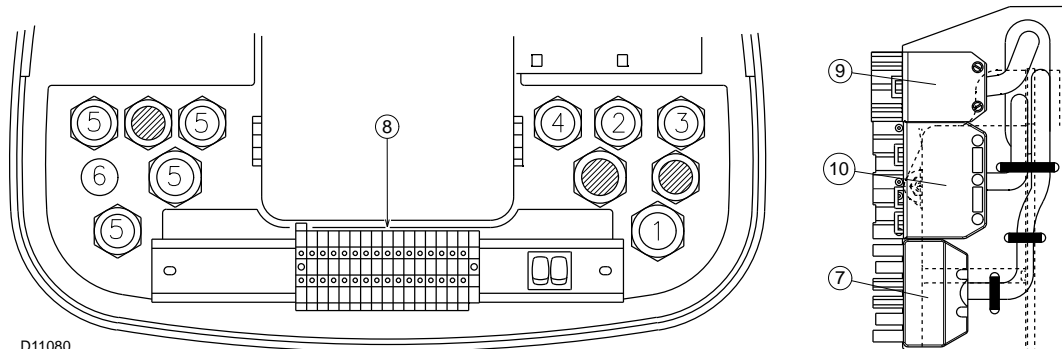
Use flexible cables according to EN 60 335-1. Regulations:

- if in PVC sheath, use at least H05 VV-F;
- if in rubber sheath, use at least H05 RR-F.

All the wires to connect to the burner terminal strip 8)(Fig. 26) must enter through the supplied fairleads.

The fairleads and hole press-outs can be used in various ways; the following lists show one possible solution:

- 1 Pg 13.5 Three-phase power supply
- 2 M20 7 pole socket input
- 3 M20 4 pole socket input
- 4 M20 6 pole socket input
- 5 Optional holes
- 6 Open the hole, if necessary add a cable gland
- 7 6 pole socket for gas valves, gas pressure switch or device for VPS control
- 8 Terminal strip
- 9 4 pole socket for TR thermostat/pressure switch
- 10 7 pole socket single-phase power supply for TR thermostat/pressure switch



D11080

**Fig. 26**

**6.3 Calibration of thermal relay**

This is required to avoid motor burn-out in the event of a significant increase in power absorption caused by a missing phase.

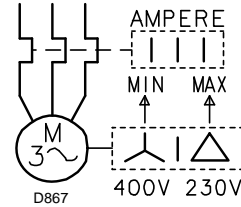
- If the motor is star-powered, 400 V, the cursor should be positioned to "MIN".
- If the motor is delta-powered, 230 V, the cursor should be positioned to "MAX".

Even if the scale of the thermal cut-out does not include rated motor absorption at 400 V, protection is still ensured in any case.

**NOTE**

- The burners leaves the factory pre-set for 400 V power supply. If 230 V power supply is used, change the fan motor connection from star to delta and change the setting of the thermal cut-out as well.
- The burners have been type- approved for intermittent operation. This means they should compulsorily be stopped at least once every 24 hours to enable the control box to check its own efficiency at start-up. Burner halts are normally provided for automatically by the boiler load control system. If this is not the case, a time switch should be fitted in series to IN to provide for burner shut-down at least once every 24 hours.

- The burners are factory set for two-stage operation and must therefore be connected to control device TR. Alternatively, if single stage operation is required, instead of control device TR install a jumper lead between terminals 6 and 7 of the terminal strip.



**Fig. 27**



- Do not invert the neutral with the phase wire in the electricity supply line. Any inversion would cause a lockout due to firing failure.
- Only use original spare parts to replace the components.

**6.4 Current to the UV photocell**

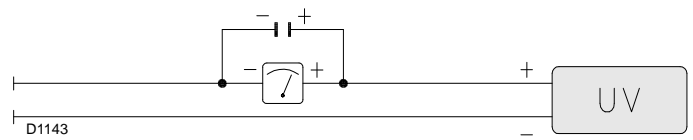
Min value for a good work: 70  $\mu$ A.

If the value is lower, it can depend on:

- exhausted photocell
- low current (lower than 187 V)
- bad regulation of the burner

In order to measure the current, use a microammeter of 100  $\mu$ A c.c., connected to the photocell, as in the scheme, with a capacitor of 100 mF - 1V c.c. at the same level of the instrument.

See Fig. 28.



**Fig. 28**

**7 Start-up, calibration and operation of the burner**

**7.1 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.

**7.2 Adjustment before first firing (gas oil operation)**

**7.2.1 Combustion head setting**

The setting of the combustion head depends exclusively on the delivery of the burner in the 2<sup>nd</sup> stage.

Turn screw 5)(Fig. 29) until the notch shown in diagram (Fig. 30) is level with the front surface of flange 6).

**Example burner RLS 100:**

2<sup>nd</sup> stage burner delivery = 72 kg/h.

If diagram (Fig. 30) is consulted it is clear that for this delivery, the combustion head must be adjusted using notch 3, as shown in Fig. 29.

**7.2.2 Pump adjustment**

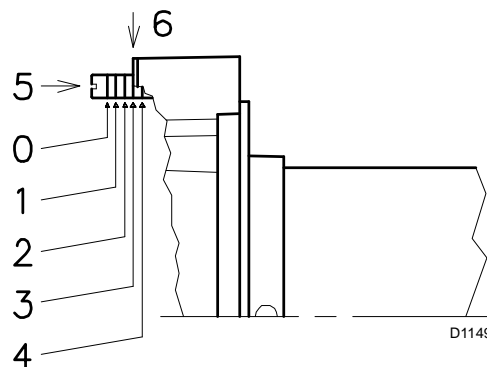
No settings are required for the pump, which is set to 12 bar by the manufacturer.

This pressure must be checked and adjusted (if required) after the burner has been ignited.

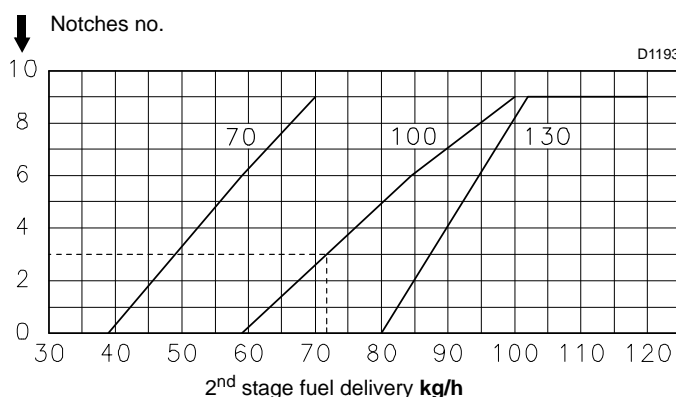
The only operation required in this phase is the application of a pressure gauge on the appropriate pump attachment.

**7.2.3 Fan gate adjustment**

The first time the burner is fired leave the factory setting unchanged for both 1<sup>st</sup> stage and 2<sup>nd</sup> stage operation.



**Fig. 29**



**Fig. 30**

**7.3 Burner calibration (gas oil operation)**



It is advisable to first set the burner for operating on oil and then for gas.

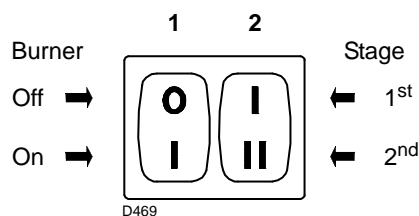
Execute the fuel exchange when the burner is off.

**7.3.1 Firing**

Set switch 1)(Fig. 31) to "ON".

During the first firing, during the passage from the 1<sup>st</sup> to the 2<sup>nd</sup> stage, there is a momentary lowering of the fuel pressure caused by the filling of the 2<sup>nd</sup> stage nozzle tubing.

This lowering of the fuel pressure can cause the burner to lock-out and can sometimes give rise to pulsations.



**Fig. 31**

**7.3.2 Operation**

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

**1<sup>st</sup> and 2<sup>nd</sup> stage nozzles**

See the information listed on page 17.

**Combustion head**

The adjustment of the combustion head already carried out (page 27) need not be altered unless the 2<sup>nd</sup> stage delivery of the burner is changed.

**Pump pressure**

- 12 bar: this is the pressure calibrated in the factory which is usually sufficient for most purposes.  
Sometimes, this pressure must be adjusted to:
- 10 bar: in order to reduce fuel delivery.  
This adjustment is possible only if the surrounding temperature remains above 0°C.
- 14 bar: in order to increase fuel delivery or to ensure firings even at temperatures of less than 0°C. In order to adjust pump pressure, use the screw 5)(Fig. 21 at page 21).

**1<sup>st</sup> stage fan air gate valve**

Keep the burner operating at 1<sup>st</sup> stage by setting the switch 2)(Fig. 31) to the 1<sup>st</sup> stage position. The fan air gate valve is adjusted by moving the orange lever of the servomotor, see page 18.

**2<sup>nd</sup> stage fan air gate valve**

Set switch 2)(Fig. 31) to the 2<sup>nd</sup> stage position. The fan air gate valve is adjusted by moving the red lever of the servomotor, see page 18.

**7.4 Adjustment before first firing (gas operation)**

Adjustment of the combustion head has been illustrated on page 27.

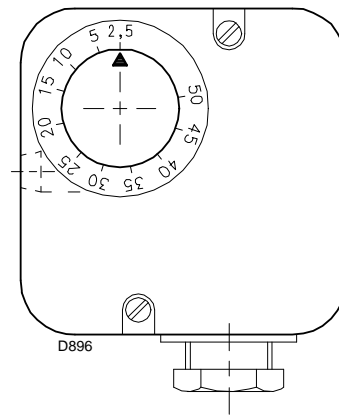
In addition, the following adjustments must also be made:

- open manual valves up-line from the gas train.
- Adjust the minimum gas pressure switch to the start of the scale (Fig. 32).
- Adjust the air pressure switch to the zero position of the scale (Fig. 33).
- Purge the air from the gas line.  
Continue to purge the air (we recommend using a plastic tube routed outside the building) until gas is smelt.
- Fit a U-type manometer (Fig. 34) to the gas pressure test point on the sleeve.

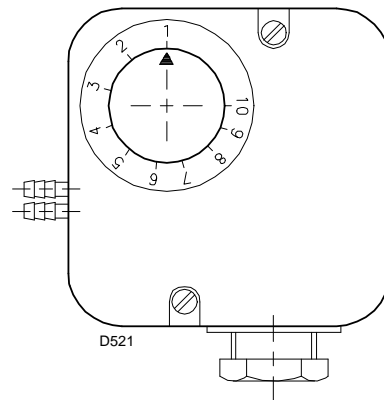
The manometer readings are used to calculate the 2<sup>nd</sup> stage operation burner power using the Tab. N at page 23.

- Connect two lamps or testers to the two gas line solenoid valves VR1 and VS to check the exact moment at which voltage is supplied.  
This operation is unnecessary if each of the two solenoid valves is equipped with a pilot light that signals voltage passing through.

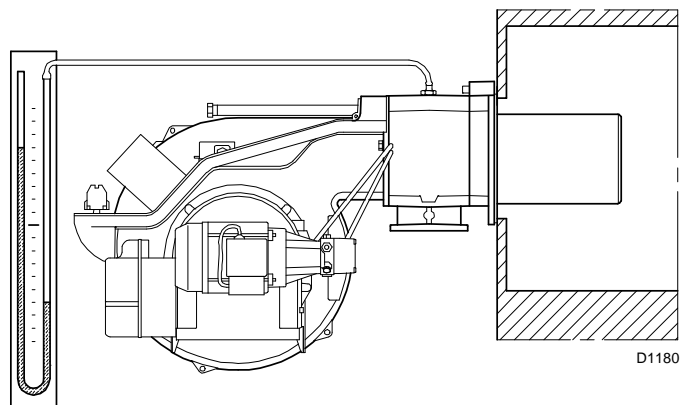
Before starting up the burner it is good practice to adjust the gas train so that ignition takes place in conditions of maximum safety, i.e. with gas delivery at the minimum.



**Fig. 32**



**Fig. 33**



**Fig. 34**

## 7.5 Burner starting (gas operation)



It is advisable to first set the burner for operating on oil and then for gas.

Execute the fuel exchange when the burner is off.

Close the control devices and set:

- switch 1)(Fig. 35) to "burner ON" position
- switch 2)(Fig. 35) to "1<sup>st</sup> stage" position

As soon as the burner starts make sure that the lamps or testers connected to the solenoids, or pilot lights on the solenoids themselves, indicate that no voltage is present.

If voltage is present, then **immediately** stop the burner and check electrical connections.

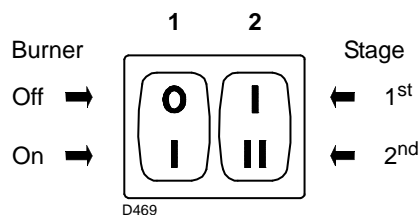


Fig. 35

## 7.6 Burner firing (gas operation)

Having completed the checks indicated in the previous heading, the burner should fire. If the motor starts but the flame does not appear and the control box goes into lock-out, reset and wait for a new firing attempt.

If firing is still not achieved, it may be that gas is not reaching the combustion head within the safety time period of 3 seconds.

In this case increase gas firing delivery.

The arrival of gas at the sleeve is indicated by the U-type manometer (Fig. 34).

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

## 7.7 Burner calibration (gas operation)

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

Adjust successively:

- 2<sup>nd</sup> stage burner output
- 1<sup>st</sup> stage burner output
- Firing output
- Air pressure switch
- Minimum gas pressure switch

### 7.7.1 2<sup>nd</sup> stage output

2<sup>nd</sup> stage output of the burner must be set within the firing rate range shown at page 12.

Set switch 2)(Fig. 35) to the 2<sup>nd</sup> stage position: the servomotor will open the air gate valve at the previously set value for oil and will control the opening of the 2<sup>nd</sup> stage gas valve VR2.

#### Gas calibration

Adjust gas delivery to the amount of air.

- If delivery needs to be reduced, diminish outlet gas pressure and, if it is already very low, slightly close 2<sup>nd</sup> stage adjustment valve VR2.
- If delivery needs to be increased, increase outlet gas pressure.

### 7.7.2 1<sup>st</sup> stage output

Burner power in 1<sup>st</sup> stage operation must be selected within the firing rate range shown at page 12.

Set the switch 2)(Fig. 35) to the 1<sup>st</sup> stage position: the servomotor will close the air gate valve at the previously set value for oil and will control the opening of the 1<sup>st</sup> stage gas valve VR1.

#### Adjusting gas delivery

Adjust gas delivery to the amount of air by adjusting the 1<sup>st</sup> stage gas valve VR1.

### 7.7.3 Firing output

According to EN 676 Regulations:

#### Burners with MAX output up to 120 kW

Firing can be performed at the maximum operation output level.

Example:

- max. operation output : 120 kW
- max. firing output : 120 kW

#### Burners with MAX output above 120 kW

Firing must be performed at a lower output than the max. operation output. If the firing output does not exceed 120 kW, no calculations are required. If firing output exceeds 120 kW, the regulations prescribe that the value be defined according to the control box safety time "ts":

- for ts = 2s, firing output must be equal to or lower than 1/2 of max. operation output;
- for ts = 3s, firing output must be equal to or lower than 1/3 of max. operation output.

#### Example:

MAX operation output of 600 kW.

Firing output must be equal to or lower than:

- 300 kW con ts = 2s
- 200 kW con ts = 3s

In order to measure the firing output:

- extract the UV cell 29)(Fig. 5 at page 13) (the burner will ignite and lock-out at the end of a safety period).
- Perform 10 firings with consecutive lock-outs.
- On the meter read the quantity of gas burned. This quantity must be equal to or lower than the quantity given by the formula:

$$\frac{\text{Nm}^3/\text{h (max. burner delivery)}}{360}$$

360

Example for G 20 (10 kWh/Nm<sup>3</sup>):

max. operation output: 600 kW corresponding to 60 Nm<sup>3</sup>/h.

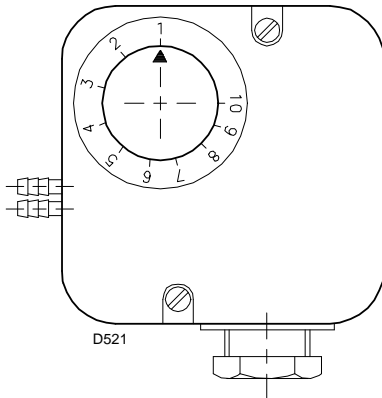
After 10 firings with lock-outs, the delivery read on the meter must be equal to or lower than: 60 : 360 = 0.166 Nm<sup>3</sup>.

Firing output must be adjusted on the gas valve throttle.



**7.7.4 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. 36).



**Fig. 36**

With the burner operating in 1<sup>st</sup> stage, increase adjustment pressure by slowly turning the relative knob clockwise until the burner locks out.

Then turn the knob 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 knob anti-clockwise a little bit more.



**WARNING**

As a rule, the air pressure switch must limit the CO in the fumes to less than 1% (10,000 ppm).

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 1%.

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

such a manner the air pressure switch operates as differential pressure switch.



**WARNING**

The use of the air pressure switch with differential operation is allowed only in industrial applications and where rules enable the air pressure switch to control only fan operation without any reference to CO limit.

**7.7.5 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. 36).

With the burner operating in 2<sup>nd</sup> stage, increase adjustment pressure by slowly turning the relative knob clockwise until the burner locks out.

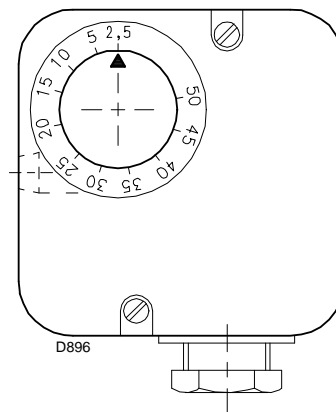
Then turn the knob anti-clockwise by 0.2 kPa (2 mbar) and repeat burner starting to ensure it is uniform.

If the burner locks out again, turn the knob anti-clockwise again by 0.1 kPa (1 mbar).



**WARNING**

1 kPa = 10 mbar



**Fig. 37**

**7.8 Combustion checks**

**CO<sub>2</sub>**

It is better to set the burner with CO<sub>2</sub> not higher than 10% (gas with Pci 8,600 kcal/m<sup>3</sup>).

In this way avoiding a loss of calibration setting (for example draft variation) that could cause combustion with little air and the production of CO.

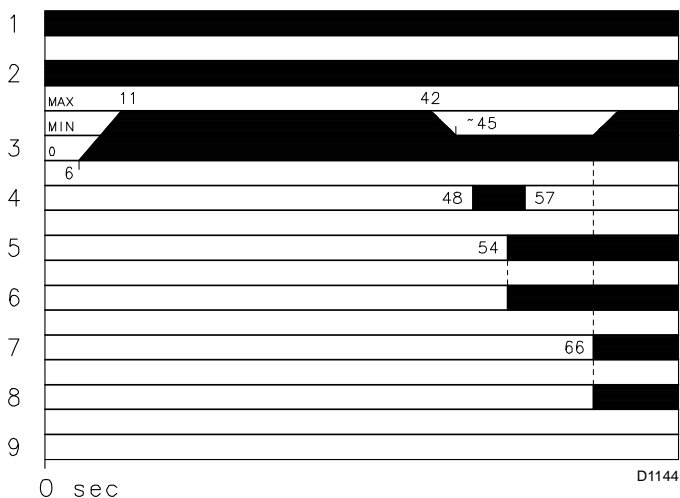
**CO**

It must be not higher than 100 mg/kWh.



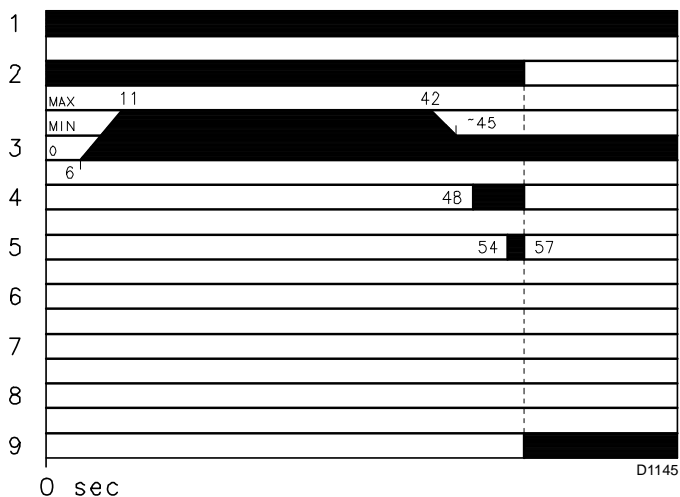
**7.9 Burner operation**

**NORMAL FIRING**  
(n° = seconds from instant 0)



**Fig. 38**

**NO FIRING**



**Fig. 39**

Key Fig. 38 - Fig. 39

- 1 Thermostat
- 2 Motor
- 3 Air gate valve
- 4 Ignition transformer
- 5 First valve
- 6 First flame
- 7 Second valve
- 8 Second flame
- 9 Lock-out

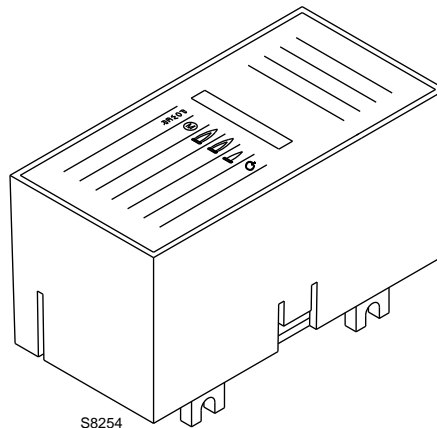
**7.9.1 Burner flame goes out during operation**

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

**7.9.2 Led panel**

The burners are fitted with an electronic device, which supplies a diagnostic of burner status.

It provides 6 data items signalled by the leds lighting up. See Fig. 40.



**Fig. 40**

Key Fig. 40

- POWER Power on
- (M) Fan motor blocked (red colour)
- (flame icon) Burner lock-out (red colour)
- (flame icon) 2<sup>nd</sup> stage operation
- (flame icon) 1<sup>st</sup> stage operation
- (flame icon) Burner operating

D478

### 7.10 LPG - Propane - Butane operation

The burners can also operate on LPG-Propane- Butane gases.

In this case it is necessary to assemble the nozzles 2)(Fig. 41) on the holes 1) and the caps 3) on the small pipes 4) supplied with the burner.

Apply the self-adhesive label for LPG operation near the characteristic label.

The **firing rate range** and burner adjustment are similar to those for natural gas.

The **G31 (Propane) gas pressure** is shown on page 23.

**Gas train:**

use the gas train for natural gas, see page 23, with 1"1/2 or 2" diameter.

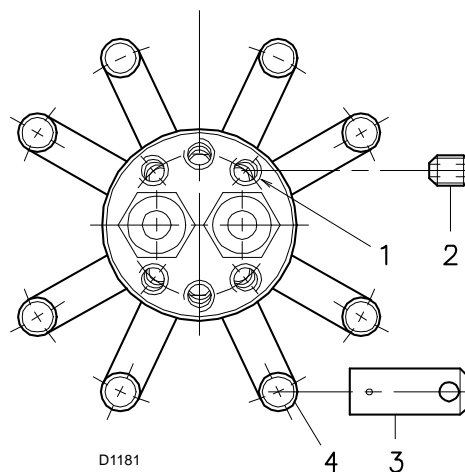


Fig. 41

## 8 Maintenance

### 8.1 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.



Close the fuel interception tap.

### 8.2 Maintenance programme

#### 8.2.1 Maintenance frequency

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

#### 8.2.2 Checking and cleaning

##### Combustion

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

Significant differences with respect to the previous measurements indicate the points where more care should be exercised during maintenance.

##### Combustion head

Open the burner and make sure that all components of the combustion head are in good condition, not deformed by the high temperatures, free of impurities from the surroundings and correctly positioned. If in doubt, disassemble the elbow fitting 5)(Fig. 44).

##### UV cell

Clean the glass cover from any dust that may have accumulated. The photo-electric cell 1)(Fig. 42) is held in position by a pressure fit and can therefore be removed by pulling it outward forcefully.

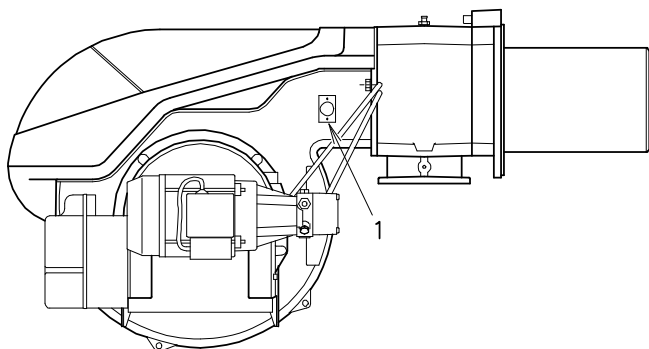


Fig. 42

##### 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.

#### Flame inspection window

Clean the flame inspection window (Fig. 43).

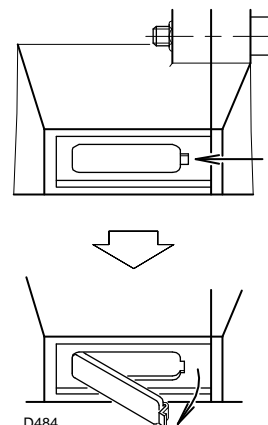


Fig. 43

#### 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.

#### 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 OIL OPERATION**

**Filters**

Check the filtering baskets on line and at nozzle present in the system. Clean or replace if necessary.

If rust or other impurities are observed inside the pump, use a separate pump to lift any water and other impurities that may have deposited on the bottom of the tank.

**Pump**

The delivery pressure must be stable. The depression must be less than 0.4 bar. Unusual noise must not be evident during pump operation.

If the pressure is found to be unstable or if the pump runs noisily, the flexible hose must be detached from the line filter and the fuel must be sucked from a tank located near the burner. This measure permits the cause of the anomaly to be traced to either the suction piping or the pump.

If the pump is found to be responsible, check to make sure that the filter is not dirty. The vacuumeter is installed upstream from the filter and consequently will not indicate whether the filter is clogged or not. Contrarily, if the problem lies in the suction line, check to make sure that the filter is clean and that air is not entering the piping.

Please check that the supply line and filters are clear. The use of a pump vacuum gauge will assist in this. This measure permits the cause of the anomaly to be traced to either the suction line or the pump.

If the problem lies in the suction line, check to make sure that the filter is clean and that air is not entering the piping.

**Hoses**

- Check periodically the flexible pipes conditions. They have to be replaced at least **every 2 years**.
- In case of use of gas oil and bio fuel blends, it is strongly recommended to inspect **even more frequently** the hoses and replace them where contamination has occurred.
- Check to make sure that the hoses are still in good condition.

**Nozzles**

Do not clean the nozzle openings; do not even open them. The nozzle filters however may be cleaned or replaced as required.

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

Combustion must be checked after the nozzles have been changed.

**Fuel tank**

If water or contamination is present within the fuel tank, it is essential that this is removed before the equipment is to be used. This is extremely important when gas oil containing Bio diesel is in use. If in doubt about how to achieve this then please contact the fuel or oil tank supplier.

**Combustion**

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.

EN 267	Excess air		
	Max output $\lambda \leq 1.2$		Min output $\lambda \leq 1.3$
Theoretical max. CO <sub>2</sub> 0 % O <sub>2</sub>	Calibration CO <sub>2</sub> %		CO mg/kWh
	$\lambda = 1,2$	$\lambda = 1,3$	
15.2	12.6	11.5	≤ 100

**GAS OPERATION**

**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.

**Combustion**

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.

EN 676	Excess air			
	Max output $\lambda \leq 1,2$		Min output $\lambda \leq 1,3$	
GAS	Theoretical max. CO <sub>2</sub> 0 % O <sub>2</sub>	Calibration CO <sub>2</sub> %		CO mg/kWh
		$\lambda = 1,2$	$\lambda = 1,3$	
G 20	11.7	9.7	9.0	≤ 100
G 25	11.5	9.5	8.8	≤ 100
G 30	14.0	11.6	10.7	≤ 100
G 31	13.7	11.4	10.5	≤ 100

### 8.3 Opening the burner



**Disconnect the electrical supply from the burner.**

- Loosen screws 1)(Fig. 44) and withdraw the cover 2).
- Disconnect the hoses 7).
- Remove screws 3) and pull the burner back by about 100 mm on the slide bars 4).

- Only for long blast tube burner: remove the screws 9) and install the two extension bars 8) onto the slide bars 4); then fix the screw 9).
- Disconnect the electrode leads and then pull the burner fully back.
- Remove the screw 6) and extract the internal part 5).

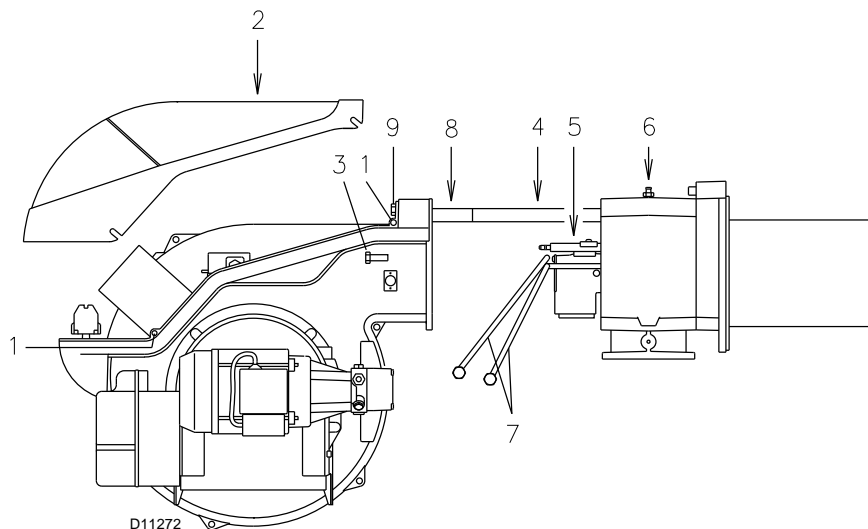


Fig. 44

### 8.4 Closing the burner

- Push the burner until it is about 100 mm from the sleeve.
- Only for long blast tube burner: unscrew the screws 9) and remove the two extension bars 8) from the slide bars 4); then fix the screw 9).
- Re-connect the leads and slide in the burner until it comes to a stop.
- Refit screws 3) and pull the leads gently out until they are slightly stretched.
- Reconnect the hoses 7).

**9 Faults - Possible causes - Solutions**

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

If a burner malfunction is detected, first of all:

- check that the electrical wiring is adequately connected;
- check whether fuel is delivered;
- check that every adjustment parameter is adequately set.

<b>GAS OIL OPERATION</b>			
<b>SYMBOL (1)</b>	<b>FAULT</b>	<b>PROBABLE CAUSE</b>	<b>SUGGESTED REMEDY</b>
◀	The burner does not start	A limit or safety control device is open	Adjust or replace
		Control box lock-out	Reset
		Fan motor blocked	Reset thermal cut-out
		Oil pressure switch intervenes	Adjust pressure switch or eliminate overpressure
		No electrical power supply	Close all switches - Check connections
		No gas oil	Check the gas oil supply circuit
		Control box fuse blown	Replace
		Pump is jammed	Replace
		Defective motor command control device	Replace
		Defective control box	Replace
		Defective electrical motor	Replace
		The pilot burner does not work	Check
		Defective safety solenoid valve	Replace
		Defective oil modulator	Recondition or replace
The burner does not start and a function lock-out occurs	Flame simulation	Replace control box	
	Photocell short-circuit	Replace photocell	
	2-phase power supply thermal relay trips	Reset thermal cut-out when third phase is re-connected	
▲	The burner starts but stops at maximum air damper setting	Contact 1 of servomotor does not operate control box terminals 9-8	Adjust cam I or replace servo-motor
P	The burner starts and then goes into lock-out	Air pressure switch adjusted badly	Adjust
		Pressure switch pressure point pipe blocked	Clean
■	The burner starts and then goes into lock-out	Fault in flame detection circuit	Replace control box
▼	The burner remains in pre-purging phase	Contact III of servomotor does not operate control box terminals 10-8	Adjust cam III or replace servomotor
1	After pre-purge and the safety time, the burner goes to lock-out and the flame does not appear	The solenoid VP1 allows little gas through	Increase
		Solenoid valves VP1 or VP2 fail to open	Renew the coil or rectifier panel
		No fuel in tank; water on tank bottom	Top up fuel level or suck up water
		Inappropriate head and air gate valve adjustments	Adjust
		High voltage cable defective or grounded	Replace
		High voltage cable deformed by high temperature	Replace and protect
		Erroneous valves or transformer electrical connections	Check
		Pump unprimed	Prime
		Pump suction line connected to return line	Correct connection
		Filters dirty (on line 1 at the nozzle)	Clean
		Valves up-line from pump closed	Open
		Incorrect motor rotation direction	Change motor electrical connections
		Gas oil solenoid valves fail to open	Check the connections and the solenoid valves
		Nozzle clogged, dirty, or deformed	Clean or replace
The pilot burner does not work	Check		

GAS OIL OPERATION			
SYMBOL (1)	FAULT	PROBABLE CAUSE	SUGGESTED REMEDY
1		Defective control box	Replace
		Ignition electrode wrongly adjusted	Adjust
		Grounded electrode due to broken insulation	Replace
		Pump/motor coupling broken	Replace
		Ignition transformer defective	Replace
	The flame ignites normally but the burner locks out when the safety time has elapsed	Defective photocell or control box	Replace photocell or control box
		Dirty photocell	Clean
	Smoke in flame - dark Bacharach	Not enough air	Adjust head and fan gate
		Erroneous pump pressure	Adjust
		Nozzle filter clogged	Clean or replace
		Boiler room air vents insufficient	Increase
		Nozzle worn or dirty	Replace
		Flame disk dirty, loose, or deformed	Clean, tighten in place, or replace
	Smoke in flame (yellow Bacharach)	Too much air	Adjust head and air gate
	Firing with pulsations or flame detachment, delayed firing	Poorly adjusted head	Adjust
		Poorly adjusted fan air gate: too much air	Adjust
		Nozzle unsuited for burner or boiler	See Nozzle Table
		Defective nozzle	Replace
		Inappropriate pump pressure	Adjust
		Poorly adjusted or dirty firing electrodes	Adjust
		Output during ionisation phase is too high	Reduce
	The burner does not pass to 2nd stage	Control device TR does not close	Adjust or replace
		Defective control box	Replace
	Uneven fuel supply	Check if cause is in pump or in the fuel supply system	Feed the burner from a tank located nearby
	Rusty pump internal parts	Water in tank	Suck water from tank bottom with separate pump
	Noisy pump, unstable pressure	Air has entered the suction line	Tighten connectors
		Depression value too high (higher than 35 cm Hg):	
		Tank/burner height difference too great	Feed burner with loop circuit
		Piping diameter too small	Increase
		Suction filters clogged	Clean
		Suction valves closed	Open
		Paraffin solidified due to low temperature	Add additive to gas oil
	Pump unprimes after prolonged pause	Return pipe not immersed in fuel	Bring to same height as suction pipe
		Air enters suction piping	Tighten connectors
	Pump leaks gas oil	Leakage from sealing organ	Replace pump
	Dirty combustion head	Nozzle or filter dirty	Replace
		Unsuitable nozzle delivery or angle	See recommended nozzles
		Loose nozzle	Tighten
		Impurities on flame stability disk	Clean
		Erroneous head adjustment or not enough air	Adjust, open air damper
		Blast tube length unsuited to boiler	Contact boiler manufacturer
I	During operation, the burner stops in lock out	Dirty or defective photocell	Clean or replace
		Defective air pressure switch	Replace

(1) The control box is fitted with a disc rotates during the firing programme, which can be seen through the transparent lock-out reset button.  
When the burner does not fire or comes to a halt following a fault, the symbol which appears behind the reset button indicates the type of problem.

GAS OPERATION			
SYMBOL (1)	FAULT	PROBABLE CAUSE	SUGGESTED REMEDY
◀	The burner does not start	No electrical power supply	Close all switches and check connections
		A limiter or safety control device is open	Adjust or replace
		Control box lock-out	Reset control box
		Control box fuse blown	Replace (2)
		Erroneous electrical connections	Check
		Defective control box	Replace
		No gas supply	Open the manual valves between meter and train
		Mains gas pressure insufficient	Contact your GAS COMPANY
		Minimum gas pressure switch fails to close	Adjust or replace
		Air pressure switch in operating position	Adjust or replace
		Contact (locking cam) of servomotor does not operate	Adjust locking cam or replace servomotor
	The burner does not start and a function lock-out occurs	Flame simulation	Replace control box
		Defective motor command control device	Replace
		Defective electrical motor	Replace
▲	The burner starts but stops at maximum air damper setting	Motor protection tripped	Reset thermal cut-out
		Contact of servomotor does not operate (Cam-max. opening)	Adjust cam (max.) or replace servomotor
P	The burner starts and then goes into lock-out	Air pressure switch inoperative due to insufficient air pressure:	
		Air pressure switch adjusted badly	Adjust or replace
		Pressure switch pressure point pipe blocked	Clean
		Poorly adjusted head	Adjust
		Dirty fan	Clean
		High negative draft in chamber	Ask our technical office
■	The burner starts and then goes into lock-out	Fault in flame detection circuit	Replace control box
▼	The burner remains in pre-purging phase	Contact servomotor does not operate (Minimum cam)	Adjust cam (minimum) or replace servomotor
1	After pre-purge and the safety time, the burner goes to lock-out and the flame does not appear	The solenoid VP1 allows little gas through	Increase
		Solenoid valves VP1 or VP2 fail to open	Renew the coil or rectifier panel
		Gas pressure too low	Increase pressure at governor
		Ignition electrode wrongly adjusted	Adjust
		Grounded electrode due to broken insulation	Replace
		High voltage cable defective or grounded	Replace
		High voltage cable deformed by high temperature	Replace and protect
		Ignition transformer defective	Replace
		Erroneous valves or transformer electrical connections	Repeat connection
		Defective control box	Replace
		A cock down-line of the gas train is closed	Open
		Air in pipework	Bleed air
		The burner goes to lock-out right after flame appearance	The solenoid VP1 or VP2 allows little gas through
	Dirty flame sensor		Check, replace flame sensor
	Defective connection		Check, replace flame sensor
	Insufficient deflection current (min.70 µA)		Measure current, replace flame sensor
	Exhausted, defective flame sensor		Replace
	Max. gas pressure switch operates		Adjust or replace
	Defective control box		Replace



GAS OPERATION			
SYMBOL <sup>(1)</sup>	FAULT	PROBABLE CAUSE	SUGGESTED REMEDY
	The burner repeats the starting cycle without lock out	Mains gas pressure is near the valve to which the min. gas pressure switch gas is adjusted. The repeated drop in pressure which follows valve opening causes temporary opening of the pressure switch itself, the valve immediately closes and the burner comes to a halt. Pressure increases again, the pressure switch closes again and the firing cycle is repeated. And so on.	Reduce operating pressure of minimum gas pressure switch. Replace gas filter
	Lock out without symbol indication	Flame simulation	Replace control box
	During operation, the burner stops in lock out	Defective flame sensor	Replace worn parts
		Fault on air pressure switch	Replace
		Max. gas pressure switch operates	Adjust or replace
◀	Lock out when burner stops	Flame remains in combustion head or flame simulation	Eliminate persistence of flame or replace control box
	Ignition with pulsation	Poorly adjusted head	Adjust
		Ignition electrode wrongly adjusted	Adjust
		Poorly adjusted fan air gate: too much air	Adjust
		Output during ionisation phase is too high	Reduce

- (1) The control box is fitted with a disc rotates during the firing programme, which can be seen through the transparent lock-out reset button.  
When the burner does not fire or comes to a halt following a fault, the symbol which appears behind the reset button indicates the type of problem.
- (2) The fuse is located in the rear part of the control box. A pull-out fuse is also available as a spare part which can be fitted after breaking the tag on the panel which holds in place.

**A**
**Appendix - Accessories (optional)**
**EXTENDED HEAD KIT**

“Standard head” burners can be transformed into “extended head” versions, by using the special kit. The kits available for the various burners, giving the original and the extended lengths, are listed below.

Burner	Code
<b>RLS 70</b>	3010345
<b>RLS 100</b>	3010346
<b>RLS 130</b>	3010347

**DEGASSING UNIT**

It may occur that a certain amount of air is contained in the fuel sucked up by the pump.

This air may originate from the fuel itself as a consequence of depressurisation or air leaking past imperfect seals.

In double-pipe systems, the air returns to the tank from the return pipe; in single-pipe systems, the air remains in circulation causing pressure variations in the pump and burner malfunctions.

For this reason, we advise installing a degassing unit near the burner in single-pipe installations.

Degassing units are provided in two versions:

Burner	Code
<b>RLS 70-100-130</b> (without filter)	20034277
<b>RLS 70-100-130</b> (with filter)	20034281

**Degassing unit characteristics**

Burner output	80 kg/h max
Fuel pressure	0.7 bar max
Ambient temperature	40 °C max
Fuel temperature	40 °C max
Attachment connectors (without filter)	FF G 1/4 tank side FM G 3/8 conic burner side
Attachment connectors (with filter)	FF G 3/8 tank side FM G3/8 conic burner side

**SOUND PROOFING BOX**

If noise emission needs reducing even further, sound-proofing boxes is available.

Burner	Box type	Average noise reduction [dB(A)]	Code
<b>RLS 70-100-130</b>	C4/5	10	3010404

**LPG KIT**

For burning LPG gas, a dedicated kit is available with RLS dual fuel burners.

Burner	Code
<b>RLS 70-100-130</b>	3010305

**GAS MAX PRESSURE SWITCH KIT**

If necessary a gas max pressure switch kit is available.

Burner	Code
<b>RLS 70-100-130</b>	3010493

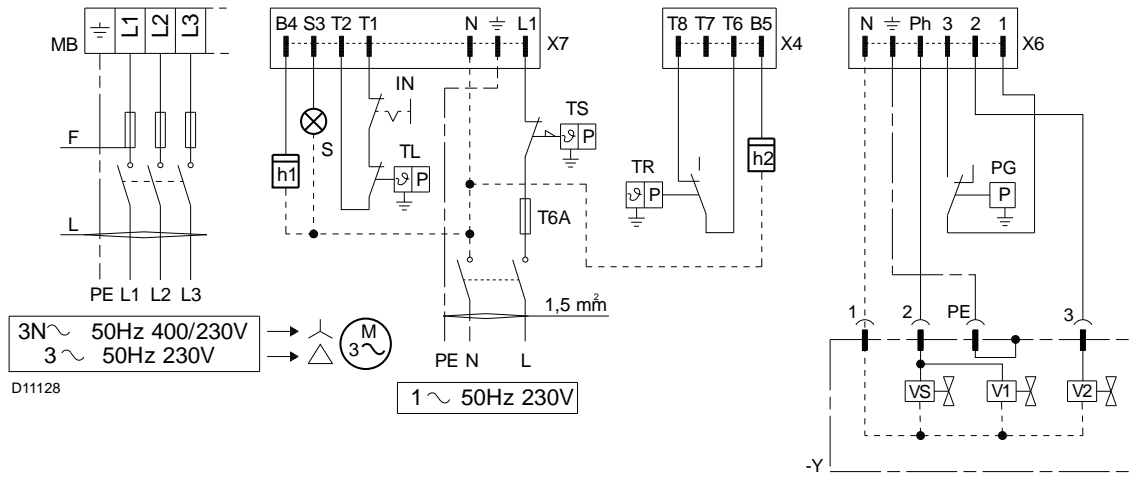
**GAS TRAINS APPROVED ACCORDING TO EN 676**

Refer to the instruction manual.



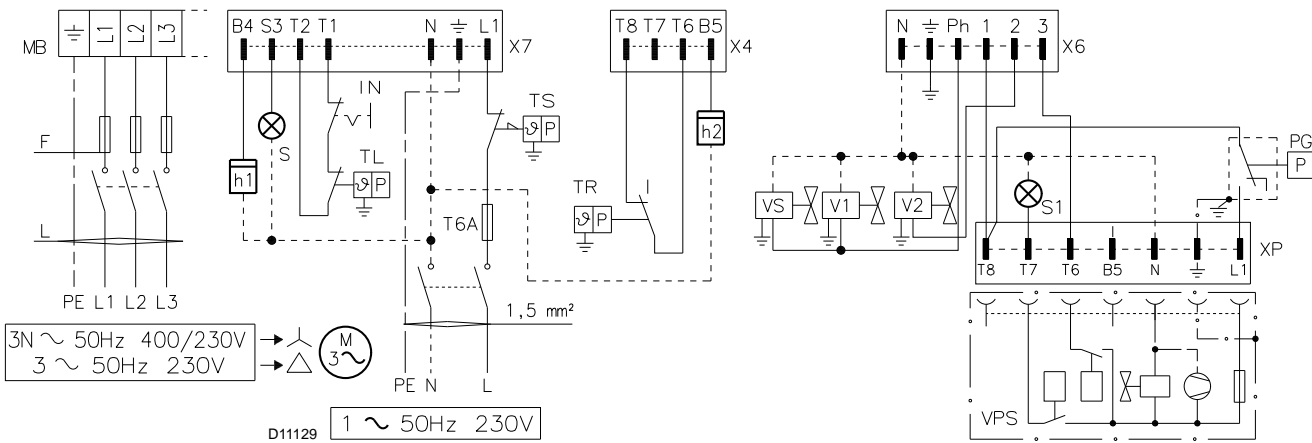
**TO BE COMPLETED BY THE INSTALLER**

**RLS 70 - WITHOUT LEAK DETECTION CONTROL DEVICE**



**Fig. 2**

**RLS 100-130 - WITH VPS LEAK DETECTION CONTROL DEVICE**



**Fig. 3**



Gas valve leak detection control takes place immediately before every burner start-up.

Fuses and cables cross-section layouts (Fig. 2 - Fig. 3), see table below.

Cross-section when not indicated: 1,5 mm<sup>2</sup>

		RLS 70		RLS 100		RLS 130	
		230 V	400 V	230 V	400 V	230 V	400 V
F	A	T10	T6	T16	T10	T16	T10
L	mm <sup>2</sup>	1.5	1.5	1.5	1.5	1.5	1.5

**Key to layout (Fig. 2 - Fig. 3)**

- h1 1<sup>st</sup> stage hour counter
- h2 2<sup>nd</sup> stage hour counter
- IN Burner manual stop switch
- MB Burner terminal strip
- PG Min. gas pressure switch
- S Remote lock-out signal
- S1 Remote lock-out signal of leak detection control device
- TL Load limit remote control system: shuts down the burner when the boiler temperature or pressure reaches the pre-set value.
- TR High-low mode load remote control system: controls min. and max. output.
- TS Safety load control system: operates when TL is faulty.
- T6A 1<sup>st</sup> stage fuse
- VPS Leak detection control device
- VR Adjustment valve
- VS Safety valve
- V1 1<sup>st</sup> stage valve
- V2 2<sup>nd</sup> stage valve
- Y Gas valve unit
- XP Plug for leak detection control device
- X4 4 pole plug
- X6 6 pole plug
- X7 7 pole plug







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