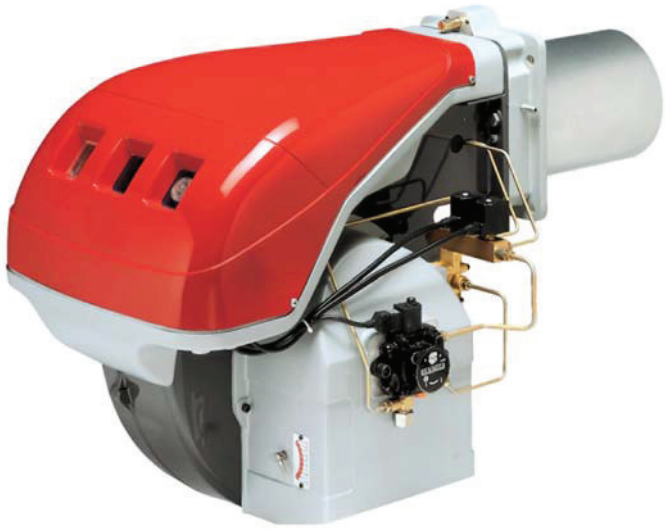
RIELLO

GB Light oil burner
E Quemador de gasóleo
P Queimador de gasóleo

Two-stage operation
Funcionamiento a dos llamas
Funcionamento a duas chamas

CE



CODE - CÓDIGO	MODEL - MODELO	TYPE - TIPO
3475030 - 3475032	RL 70	660 T1
3475031 - 3475033	RL 70	660 T1
3475230 - 3475232	RL 100	661 T1
3475231 - 3475233	RL 100	661 T1
3475430 - 3475432	RL 130	662 T1
3475431 - 3475433	RL 130	662 T1

2916069 (5) - 06/2012

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

Manufacturer: RIELLO S.p.A.

Address: Via Pilade Riello, 7
37045 Legnago (VR)

Product: Light oil burner

Model: RL 70
RL 100
RL 130

These products are in compliance with the following Technical Standards:
EN 267
EN 292

According to the European Directives:

MD	2006/42/EEC	Machine Directive
LVD	2006/95/EC	Low Voltage Directive
EMC	2004/108/EC	Electromagnetic Compatibility

such products are marked as follows:

CE-0440/B

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

Declaración de conformidad según ISO / IEC 17050-1

bricante: RIELLO S.p.A.

Dirección: Via Pilade Riello, 7
37045 Legnago (VR)

Producto: Quemador de gasóleo

Modelo: RL 70
RL 100
RL 130

Estos productos están conformes con las siguientes Normas Técnicas:
EN 267
EN 292

Según lo dispuesto por las Directivas Europeas:

MD	2006/42/CEE	Directiva máquinas
LVD	2006/95/CE	Directiva baja tensión
EMC	2004/108/CE	Compatibilidad electromagnética

estos productos están marcados como se indica a continuación:

CE-0440/B

La calidad está garantizada mediante un sistema de calidad y management certificado según UNI EN ISO 9001.

Declaração de conformidade conforme a norma ISO / IEC 17050-1

Fabricante: RIELLO S.p.A.

Endereço: Via Pilade Riello, 7
37045 Legnago (VR)

Produto: Queimador de gasóleo

Modelo: RL 70
RL 100
RL 130

Esses produtos são conformes às seguintes Normas Técnicas:
EN 267
EN 292

De acordo com as disposições das Directivas Europeias:

MD	2006/42/CEE	Directiva Máquinas
LVD	2006/95/CE	Directiva Baixa Tensão
EMC	2004/108/CE	Compatibilidade Electromagnética

Tais produtos são marcados como indicado a seguir:

CE-0440/B

A qualidade é garantida mediante um sistema de qualidade e gestão certificado segundo UNI EN ISO 9001.

Manufacturer's Declaration

RIELLO S.p.A. declares that the following products comply with the NOx limits specified by German standard “1. BImSchV 2009”.

Product	Type	Model
Light oil burner	RL 100	661 T1
	RL 130	662 T1

Declaración del fabricante

RIELLO S.p.A. declara que los siguientes productos respetan los valores límite de emisión de los NOx impuestos por la legislación alemana “1. BImSchV 2009”.

Producto	Tipo	Modelo
Quemador de gasóleo	RL 100	661 T1
	RL 130	662 T1

Declaração do fabricante

RIELLO S.p.A. declara que os seguintes produtos respeita os valores limite dos NOx impostos pela normativa alemã “1. BImSchV 2009”.

Produto	Tipo	Modelo
Queimador de gasóleo	RL 100	661 T1
	RL 130	662 T1

Legnago, 11.06.2012

Burners Division Department
Dirección División Quemadores
Direção Divisão Queimadores
RIELLO S.p.A.

Ing. I. Zinna

Ing. R. Cattaneo

Contents

1 Information and general instructions

1.1 Information about the instruction manual

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 RIELLO of the area;
- ➤ is designed for use by qualified personnel;
- ➤ offers important indications and instructions relating to the installation safety, start-up, use and maintenance of the burner.

Symbols used in the manual

In some parts of the manual you will see triangular DANGER signs. Pay great attention to these, as they indicate a situation of potential danger.

1.1.1 General dangers

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

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

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

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

1.1.2 Danger: live components

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

Other symbols

ENVIRONMENTAL PROTECTION

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

➤ This symbol indicates a list.

Abbreviations used

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

Delivery of the system and the instruction manual

When the system is delivered, it is important that:

- ➤ The instruction manual is supplied to the user by the system manufacturer, with the recommendation to keep it in the room where the heat generator is to be installed.
- ➤ The instruction manual shows:
  the serial number of the burner;
  the address and telephone number of the nearest Assistance Centre;
- ➤ The system supplier carefully informs the user about:
  - the use of the system,
  - any further tests that may be necessary before the system is started up,
  - maintenance and the need to have the system checked at least once a year by the manufacturer or another specialised technician.

  To ensure a periodic check, RIELLO recommends the drawing up of a Maintenance Contract.

1.2 Guarantee and responsibility

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

WARNING

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

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

- incorrect installation, start-up, use and maintenance of the burner;
- improper, incorrect or unreasonable use of the burner;
- intervention of unqualified personnel;
- carrying out of non authorised modifications on the equipment;
- use of the burner with safety devices that are faulty, incorrectly applied and/or not working;
- installation of untested supplementary components on the burner;
- powering of the burner with unsuitable fuels;
- faults in the fuel power supply system;
- use of the burner even following an error and/or an irregularity;
- repairs and/or overhauls incorrectly carried out;
- modification of the combustion chamber with inserts that prevent the regular development of the flame, as structurally established;
- insufficient and inappropriate surveillance and care of those burner components most subject to wear and tear;
- use of non-original RIELLO components, including spare parts, kits, accessories and optionals;
- force majeure.

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

2 Safety and prevention

2.1 Introduction

The RIELLO burners have been designed and built in compliance with current regulations and directives, applying the known technical rules of safety and envisaging all the potential danger situations.

It is necessary, however, to bear in mind that the imprudent and clumsy use of the equipment may lead to situations of death risk for the user or third parties, as well as the damaging of the burner or other items. Inattention, thoughtlessness and excessive confidence often cause accidents; the same applies to tiredness and sleepiness.

It is a good idea to remember the following:

- The burner must only be used as expressly described. Any other use should be considered improper and therefore dangerous.
  In particular:
  it can be applied to boilers operating with water, steam, diathermic oil, and to other users expressly named by the manufacturer;
  the type and pressure of the fuel, the voltage and frequency of the electrical power supply, the minimum and maximum deliveries for which the burner has been regulated, the pressurisation of the combustion chamber, the dimensions of the combustion chamber and the room temperature must all be within the values indicated in the instruction manual.
- Modification of the burner to alter its performance and destinations is not allowed.
- The burner must be used in exemplary technical safety conditions. Any disturbances that could compromise safety must be quickly eliminated.
- Opening or tampering with the burner components is not allowed, apart from the parts requiring maintenance.
- Only those parts envisaged by the manufacturer can be replaced.

2.2 Personnel training

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

The user:

- undertakes to entrust the machine exclusively to suitably trained and qualified personnel;
- must take all the measures necessary to prevent unauthorised people gaining access to the machine;
- undertakes to inform his personnel in a suitable way about the application and observance of the safety instructions. With that aim, he undertakes to ensure that everyone knows the use and safety instructions for his own duties;
- must inform the manufacturer if faults or malfunctioning of the accident prevention systems are noticed, along with any presumed danger situation.
- Personnel must always use the personal protective equipment envisaged by legislation and follow the indications given in this manual.
- Personnel must follow all the danger and caution indications shown on the machine.
- Personnel must not carry out, on their own initiative, operations or interventions that are not within their province.
- Personnel are obliged to inform their superiors of every problem or dangerous situation that may arise.
- The assembly of parts of other makes, or any modifications, can alter the characteristics of the machine and hence compromise operating safety. The manufacturer therefore declines any and all responsibility for any damage that may be caused by the use of non-original parts.

3 Technical description of the burner

3.1 Technical data

MODEL			RL 70	RL 100	RL 130
TYPE			660 T1	661 T1	662 T1
OUTPUT (1) DELIVERY (1)	2nd stage	kW Mcal/h kg/h	474 - 830 408 - 714 40 - 70	711 - 1186 612 - 1020 60 - 100	948 - 1540 816 - 1325 80 - 130
	1nd stage	kW Mcal/h kg/h	255 - 474 219 - 408 21.5 - 40	356 - 711 306 - 612 30 - 60	486 - 948 418 - 816 41 - 80
FUEL			LIGHT OIL		
- Net calorific value		kWh/kg Mcal/kg	11.8 10.2 (10.200 Kcal/kg)		
- Density		kg/dm^3	0.82 - 0.85		
- viscosity at 20 °C		mm^2/s max	6 (1,5 °E - 6 cSt)		
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 TEMPERATURE		°C	0 - 40		
COMBUSTION AIR TEMPERATURE		°C max	60		
POWER SUPPLY		V Hz	230 - 400 with neutral ~ +/- 10% 50 - three-phase		
ELECTRICAL MOTOR		rpm W V A	2800 1100 220/240 - 380/415 4.7 - 2.7	2800 1500 220/240 - 380/415 6.4 - 3.7	2800 2200 220/240 - 380/415 8.5 - 4.9
IGNITION TRASFORMER		V1 - V2 I1 - I2	230 V - 2 x 5 kV 1.9 A - 30 mA		
PUMP	delivery (at 12 bar) pressure range fuel temperature	kg/h bar °C max	107 10 - 20 60	220 10 - 20 60	220 10 - 20 60
ELECTRICAL POWER CONSUMPTION		W max	1400	1800	2600
ELECTRICAL PROTECTION			IP 44		
IN CONFORMITY WITH EEC DIRECTIVES			89/336 - 2004/108 - 73/23 - 2006/95 - 2006/42		
NOISE LEVELS (2)		dBA	75	77	78.5
TYPE-APPROVAL		EC	05 07 90223 001		

(1) Reference conditions: Ambient temperature 20 °C - Barometric pressure 1000 mbar - Altitude 100 m a.s.l.

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

3.1.1 Variants

Model	Code	Power supply electrical	Length of blast tube mm
RL 70	3475030 - 3475032	Three-phase	250
	3475031 - 3475033	Three-phase	385
RL 100	3475230 - 3475232	Three-phase	250
	3475231 - 3475233	Three-phase	385
RL 130	3475430 - 3475432	Three-phase	250
	3475431 - 3475433	Three-phase	385

3.1.2 Accessories (optional):

- **STATUS** (see pag. 27): code 3010322
- **RADIO DISTURBANCEPROTECTION KIT**
  If the burner is installed in places particularly subject to radio disturbance (emission of signals exceeding 10 V/m) owing to the presence of an INVERTER, or in applications where the length of the thermostat connections exceeds 20 metres, a protection kit is available as an interface between the control box and the burner.

BURNER	RL 70 - RL 100 - RL 130
Code	3010386

- **DEGASSING UNIT**

It may occur that a certain amount of air is contained in the light oil sucked up by the pump. This air may originate from the light oil itself as a consequence of depressurization 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:

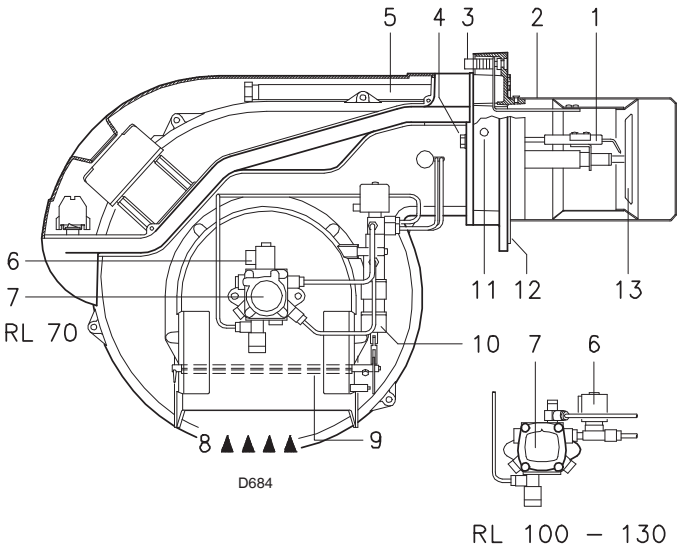
CODE **3010054** without filter

CODE **3010055** with filter

- Burner delivery : max. 80 kg/h
- Light oil pressure : max. 0.7 bar
- Ambient temperature : max. 50 °C (without filter)
- Ambient temperature : max. 40 °C (with filter)
- Light oil temperature : max. 50 °C (without filter)
- Light oil temperature : max. 40 °C (with filter)
- Connectors : 1/4 inch

For burner deliveries higher than 80 kg/h, install two parallel degassing units

3.2 Burner description (Fig. 1)



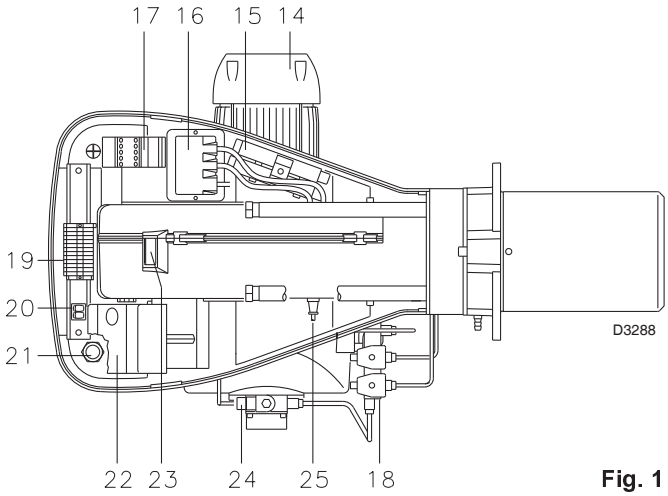


Fig. 1

1 Ignition electrodes
2 Combustion head
3 Screw for combustion head adjustment
4 Screw for fixing fan to flange
5 Slide bars for opening the burner and inspecting the combustion head
6 Safety solenoid valve
7 Pump
8 Air inlet to fan
9 Air gate valve
10 Hydraulic cylinder for regulation of the air gate valve in 1st and 2nd stage positions.
When the burner is not operating the air gate valve is fully closed in order to reduce heat dispersion from the boiler due to the flue draught which draws air from the fan suction inlet.
11 Fan pressure test point
12 Boiler mounting flange
13 Flame stability disk
14 Electrical motor
15 Extensions for slide bars 5)
16 Ignition transformer
17 Motor contactor and thermal cut-out with reset button
18 1st and 2nd stage valve assembly
19 Terminal strip
20 Two switches:
- one "burner off - on"
- one for "1st - 2nd stage operation"
21 Fairleads for wiring carried out by the installer
22 Control box with lock-out pilot light and lock-out reset button
23 Flame inspection window
24 Pump pressure adjustment
25 Photoresistor for flame presence control

Two types of burner failure may occur:

Control box lock-out: if the control box 22)(Fig. 1) pushbutton (red led) lights up, it indicates that the burner is in lock-out.
To reset, hold the pushbutton down for between 1 and 3 seconds.

Motor trip: release by pressing the pushbutton on thermal cut-out 17)(Fig. 1).

3.2.1 Weight (Tab. A) - approximate measurements

- The weight of the burner complete with its packaging is shown in table (Tab. A)

	kg
RL 70	60
RL 100	63
RL 130	66

Tab. A

3.2.2 Max. dimensions (Fig. 2) - approximate measurements

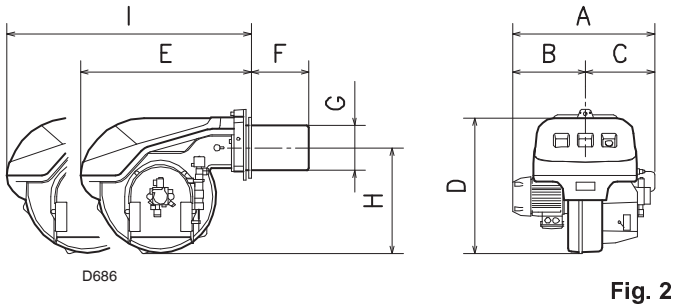


Fig. 2

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

Bear in mind that inspection of the combustion head requires the burner to be opened and the rear part withdrawn on the slide bars.

The dimensions of the open burner are indicated by position **I**.

mm	A	B	C	D	E	F (1)	G	H	I (1)
RL 70	580	296	284	555	680	250 - 385	179	430	951 - 1086
RL 100	599	312	287	555	680	250 - 385	179	430	951 - 1086
RL 130	625	338	287	555	680	250 - 385	189	430	951 - 1086

(1) Blast tube: short-long

3.2.3 Standard equipment

2 - Flexible hoses
2 - Gaskets for flexible hoses
2 - Nipples for flexible hoses
1 - Thermal insulation screen
2 Extensions 15)(Fig. 1) for slide bars 5)(Fig. 1) (for models with 385 mm blast tube)
4 - Screws to secure the burner flange to the boiler: M 12 x 35
2 - Nozzles
1 - Instruction booklet
1 - Spare parts list

3.3 Firing rates (Fig. 3)

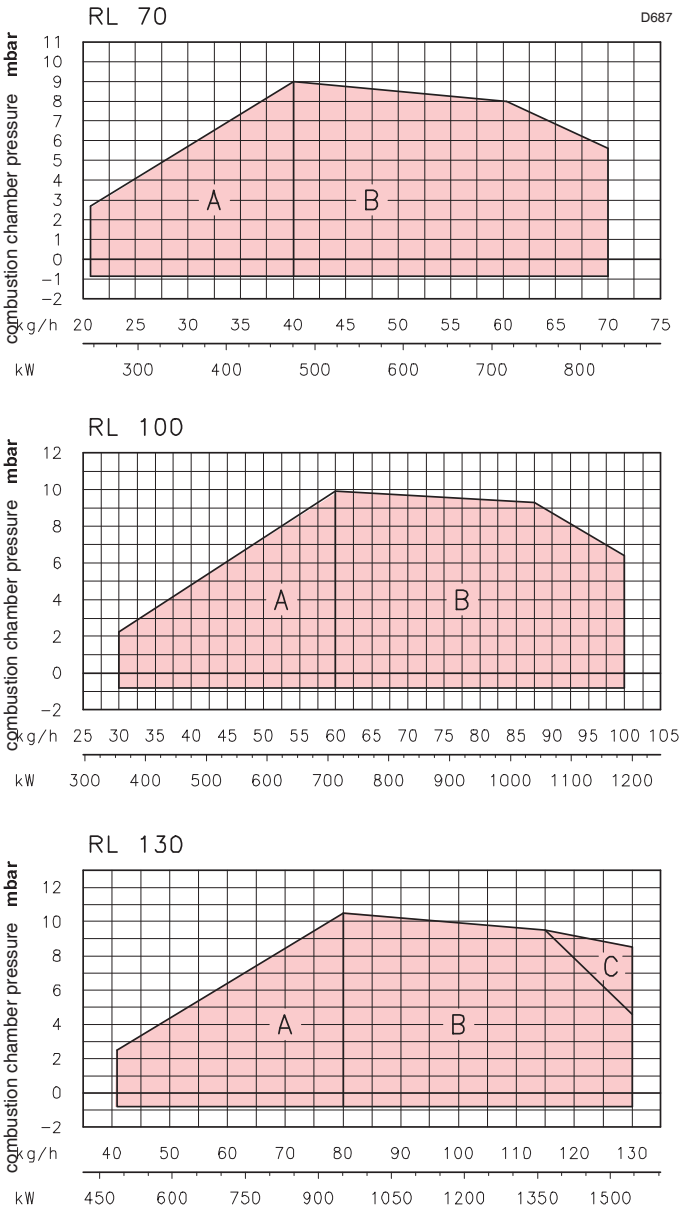


Fig. 3

The RL 70 - 100 - 130 burners model can work in two ways: one-stage and two-stage.

1st stage DELIVERY must be selected within area A of the adjacent diagrams.

2nd stage DELIVERY must be selected within area B (and C for model RL 130). This area provides the maximum delivery of the burner in relation to the pressure in the combustion chamber.

The work point may be found by plotting a vertical line from the desired delivery and a horizontal line from the pressure in the combustion chamber. The intersection of these two lines is the work point which must lie within area B.

In order to utilize also area C (RL 130) it is necessary to perform the calibration of the combustion head as explained on pag. 10.

WARNING

The FIRING RATE area values have been obtained considering a surrounding temperature of 20 °C, and an atmospheric pressure of 1000 mbar (approx. 100 m above sea level) and with the combustion head adjusted as shown on pag. 13.

3.3.1 Test boiler (Fig. 4)

The firing rates were set in relation to special test boilers in accordance with the methods defined in EN 267 standards.

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

Example:
delivery 65 kg/hour:

diameter = 60 cm; length = 2 m.

Whenever the burner is operated in a much smaller commercially-available combustion chamber, a preliminary test should be performed.

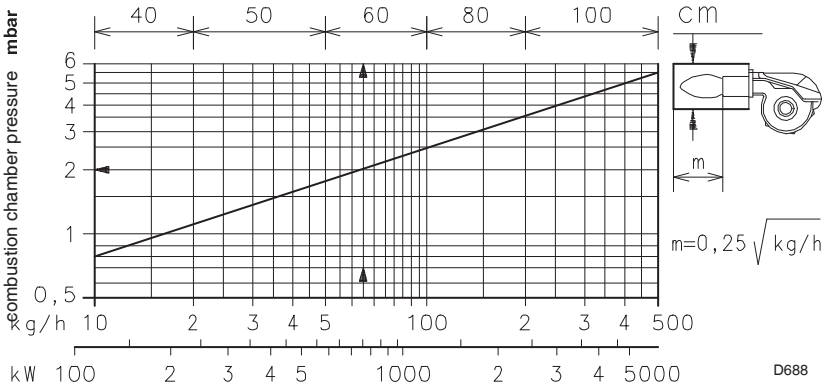


Fig. 4

4 Installation

Notes on safety for the installation

After carefully cleaning all around the area where the burner will be installed, and arranging the correct lighting of the environment, proceed with the installation operations.

DANGER

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

WARNING

The installation of the burner must be carried out by qualified personnel, as indicated in this manual and in compliance with the standards and regulations of the laws in force.

4.1 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.

WARNING

The handling operations for the burner can be highly dangerous if not carried out with the greatest attention: keep any unauthorised people at a distance; check the integrity and suitableness of the available means of handling.
Check also that the area in which you are working is empty and that there is an adequate escape area (i.e. a free, safe area to which you can quickly move if the burner should fall).
During the handling, keep the load at not more than 20-25 cm from the ground.

CAUTION

After positioning the burner near the installation point, correctly dispose of all residual packaging, separating the various types of material. Before proceeding with the installation operations, carefully clean all around the area where the burner will be installed.

4.2 Preliminary checks

Checking the consignment

CAUTION

After removing all the packaging, check the integrity of the contents. In the event of doubt, do not use the burner; contact the supplier.

The packaging elements (wooden cage or cardboard box, nails, clips, plastic bags, etc.) must not be abandoned as they are potential sources of danger and pollution; they should be collected and disposed of in the appropriate places.

Checking the characteristics of the burner

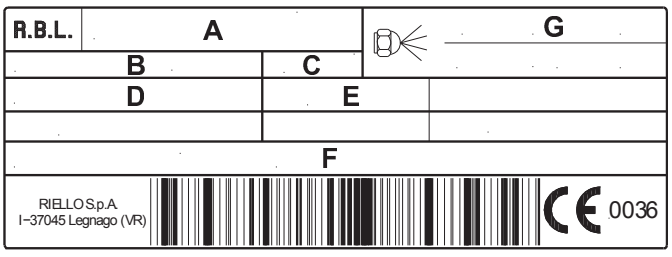


Fig. 5

Check the identification label of the burner, showing:
- ➤ the model (see **A** in Fig. 5) and type of burner (**B**);
- ➤ the year of manufacture, in cryptographic form (**C**);
- ➤ the serial number (**D**);
- ➤ the electrical input power (**E**);
- ➤ the types of fuel used and the relative supply pressures (**F**);
- ➤ the data of the burner's minimum and maximum output possibilities (**G**) (see Firing rate)

WARNING

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

WARNING

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

4.3 Boiler plate (Fig. 6)

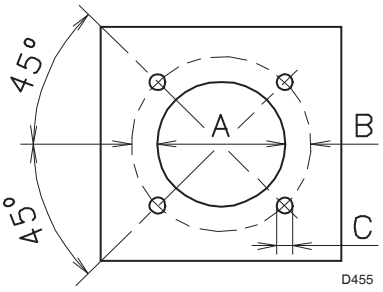


Fig. 6

Drill the combustion chamber locking plate as shown in (Fig. 6). The position of the threaded holes can be marked using the thermal screen supplied with the burner.

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

4.4 Blast tube length (Fig. 7)

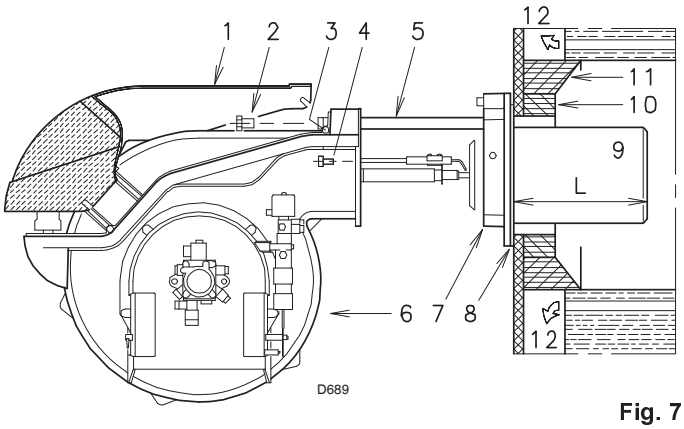


Fig. 7

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 9):	RL 70	RL 100	RL 130
• short	250	250	250
• long	385	385	385

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

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

For boilers having a water-cooled front the refractory fettling 10)-11)(Fig. 7) is not required unless it is expressly requested by the boiler manufacturer.

4.5 Securing the burner to the boiler (Fig. 8)

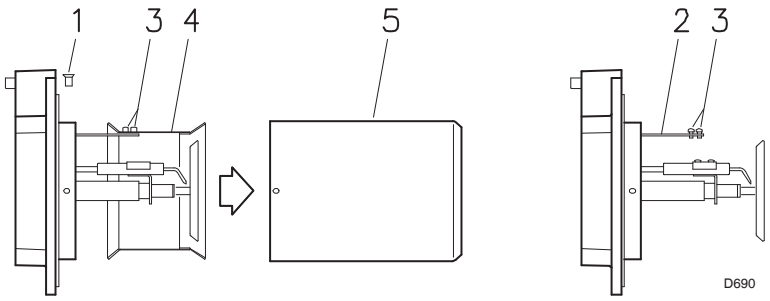


Fig. 8

Disassemble the blast tube 9) from the burner 6) by proceeding as follows:
– Loosen the four screws 3) and remove the cover 1).
– Remove the screws 2) from the two slide bars 5).
– Remove the two screws 4) fixing the burner 6) to the flange 7).
– Withdraw the blast tube 9) complete with flange 7) and slide bars 5).

Combustion head calibration

At this point check, for model RL 130, whether the maximum delivery of the burner in 2nd stage operation is contained in area B or in area C of the firing rate. See pag. 8.

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

If, on the other hand, it is in area C:
– Unscrew the screws 1) (Fig. 8) and disassemble the blast tube 5)
– Unscrew the screws 3) and remove the shutter 4)
– Tighten the screws 3) on the rod 2)
– Now refit the blast tube 5) and the screws 1)

Once this operation has been carried out (if it was required), secure flange 7) (Fig. 7) to the boiler plate interposing the supplied gasket 8). Use the 4 screws provided after having protected the thread with anti-seize products (high-temperature grease, compounds, graphite).

The burner-boiler seal must be airtight.

4.6 Choice of nozzles for 1st and 2nd stage

Both nozzles must be chosen from among those listed in table (Tab. B).

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 pag. 5.

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

The two nozzles usually have equal deliveries, but the 1st stage nozzle may have the following specifications if required:

- ➤ a delivery less than 50% of the total delivery whenever the back-pressure peak must be reduced at the moment of firing: the burner allows good combustion values also with a ratio 40 - 100 % between the 1st and 2nd stage;
- ➤ a delivery higher than 50% of the total delivery whenever the combustion during the 1st stage must be improved.

GPH	kg/h (1)			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
17.5	67.3	74.2	80.7	880.0
18.0	69.2	76.4	83.0	906.1
19.0	73.0	80.6	87.6	956.0
19.5	75	82.7	89.9	980.9
20.0	76.9	84.8	92.2	1005.8
21.5	82.7	91.2	99.1	1081.7
22.0	84.6	93.3	101.4	1106.6

Tab. B

(1) light oil: density 0.84 kg/dm^3 - viscosity 4.2 cSt/20 °C - temperature 10 °C

Example with the RL 70 model:

Boiler output = 635 kW - efficiency 90 %

Output required by the burner =

635 : 0,9 = 705 kW

705 : 2 = 352 kW per nozzle;

therefore, two equal, 60°, 12 bar nozzles are required:

1° = 7,0 GPH - 2° = 7,0 GPH,

or the following two different nozzles:

1° = 6,0 GPH - 2° = 8,0 GPH,

or:

1° = 8,0 GPH - 2° = 6,0 GPH,

4.7 Nozzle assembly

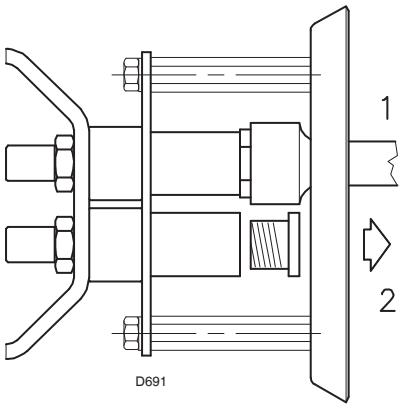


Fig. 9

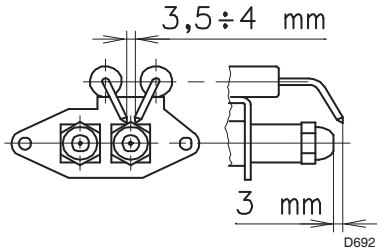


Fig. 10

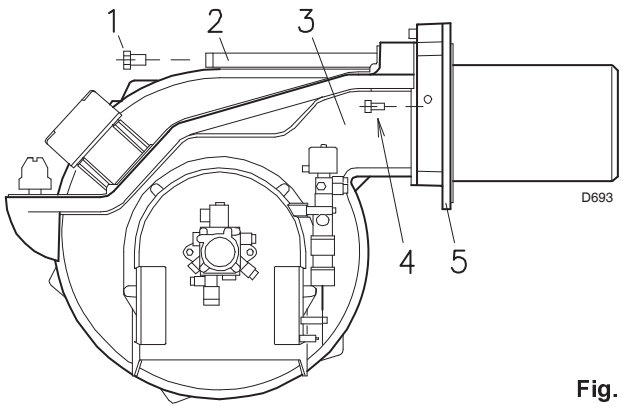


Fig. 11

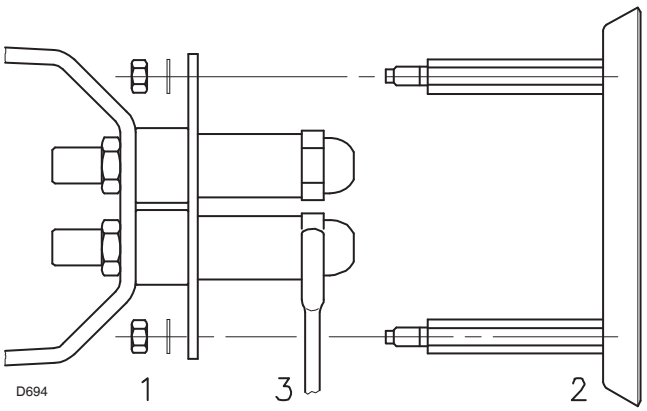


Fig. 12

At this stage of installation the burner is still disassembled from the blast tube; it is therefore possible to fit two nozzles with the box spanner 1)(Fig. 9) (16 mm), after having removed the plastic plugs 2)(Fig. 9), fitting the spanner through the central hole in the flame stability disk. 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.

The nozzle for the 1st stage of operation is the one lying beneath the firing electrodes (Fig. 10)

Make sure that the electrodes are positioned as shown in (Fig. 10)

Finally refit the burner 3)(Fig. 11) to the slide bars 2) and slide it up to the flange 5), **keeping it slightly raised to prevent the flame stability disk from pressing against the blast tube**.

Tighten the screws 1) on the slide bars 2) and screws 4) fixing the burner to the flange.

If it proves necessary to change a nozzle with the burner already fitted to the boiler, proceed as outlined below:

– Retract the burner on its slide bars as shown in (Fig. 7 pag. 10).
– Remove the nuts 1) (Fig. 12) and the disk 2).
– Use spanner 3)(Fig. 12) to change the nozzles.

NOTE:

The supplied nozzles can be used when meeting the required delivery only. Otherwise they must be replaced with complying nozzles.

4.8 Combustion head setting

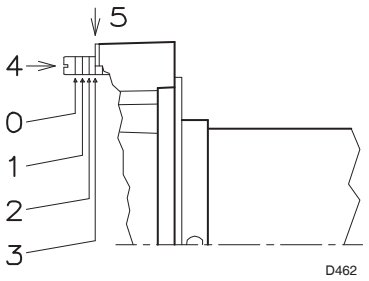


Fig. 13

The setting of the combustion head depends exclusively on the delivery of the burner in the 2nd stage - in other words, the combined delivery of the two nozzles selected on pag. 11.

Turn screw 4)(Fig. 13) until the notch shown in diagram (Fig. 14) is level with the front surface of flange 5)(Fig. 13).

Example:

The RL 70 Model with two 6.0 GPH nozzles and 12 bar pump pressure.

Find the delivery of the two 6.0 GPH nozzles in (Tab. B pag. 11):

25.5 + 25.5 = 51 kg/h.

Diagram Fig. 14 indicates that for a delivery of 51 kg/h the RL 70 Model requires the combustion head to be set to approx. three notches, as shown in Fig. 13

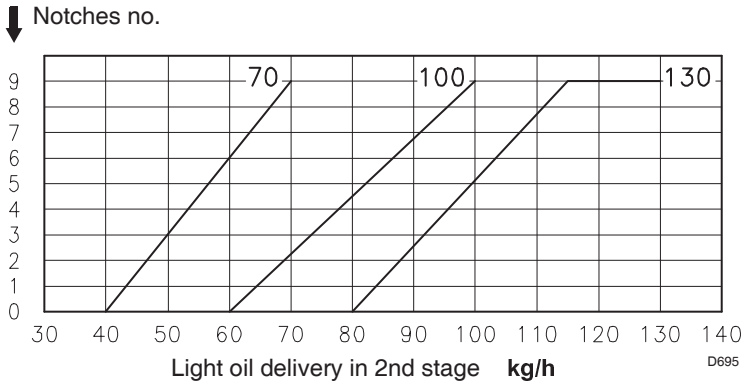


Fig. 14

5 Electrical system

Notes on safety for the electrical wiring

- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be carried out by qualified personnel and in compliance with the regulations currently in force in the country of destination. Refer to the wiring diagrams.
- RIELLO declines all responsibility for modifications or connections different from those shown in the electrical layouts.
- Do not invert the neutral with the phase in the electrical supply line. Any inversion would cause a lockout due to firing failure.
- The RL 70-100-130 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 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 with an opening of at least 3 mm (overvoltage category) between the contacts, as indicated by the current safety standards.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.

5.1 Electrical system (factory set)

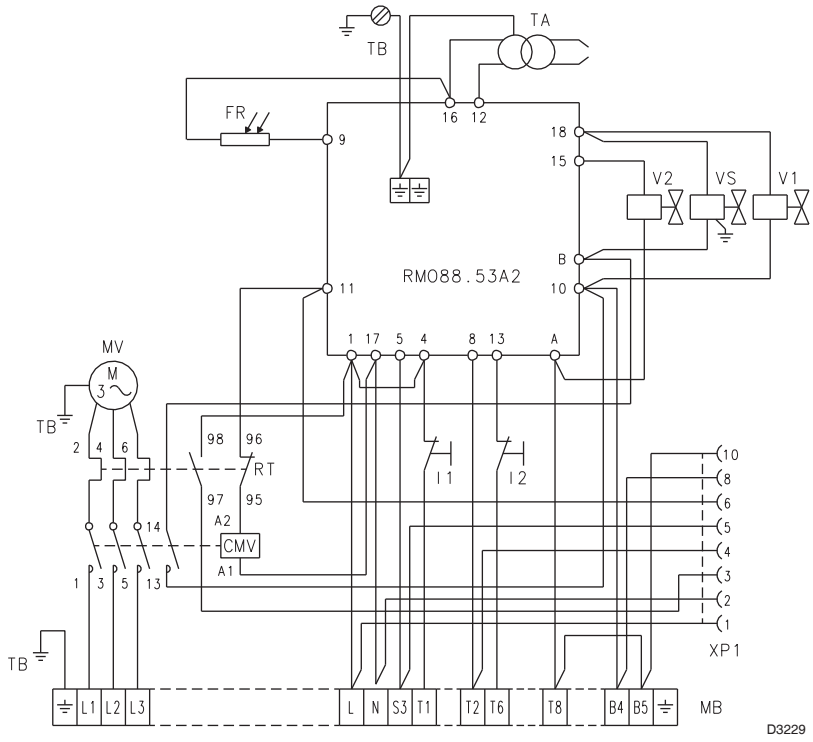


Fig. 15

Burners RL 70 - RL 100 - RL 130

➤ Models RL 70 - 100 - 130 leave the factory preset for 400 V power supply.

➤ If 230 V power supply is used, change the motor connection from star to delta and change the setting of the thermal cut-out as well.

Key to wiring diagram (Fig. 15)

CMV	-	Motor contactor
FR	-	Photoresistor
I1	-	Switch: burner off - on
I2	-	Switch: 1st - 2nd stage operation
MB	-	Terminal strip
MV	-	Fan motor
RMO88.53A2	-	Control box
RT	-	Thermal cut-out
TA	-	Ignition transformer
TB	-	Burner ground (earth) connection
V1	-	1st stage solenoid valve
V2	-	2nd stage solenoid valve
VS	-	Safety solenoid valve
XP1	-	Connector for STATUS

NOTE:

For remote-reset, connect a push-button switch (NO) between terminal 3 and neutral of the control box (terminals 15, 16, 17 and 18).

5.1.1 Electrical connections (Fig. 16)

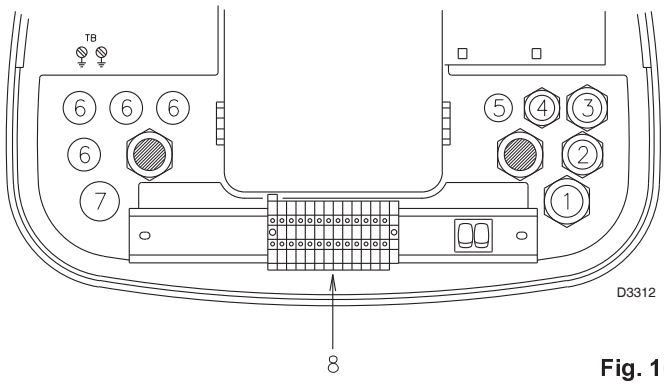


Fig. 16

Set up by the installer

Use flexible cables according to regulation EN 60 335-1:

➤ if in PVC boot, use at least H05 VV-F

➤ if in rubber boot, use at least H05 RR-F.

All the cables to be connected to the burner terminal strip 8)(Fig. 16) must be routed through the fairleads.

The fairleads and precut holes can be used in various ways. One example is given below:

1	Pg 13,5	Three-phase power supply
2	Pg 11	Single-phase power supply
3	Pg 11	Control device TL
4	Pg 9	Control device TR
5	Pg 9	Fitting hole for fairlead, if required
6	Pg 11	Fitting hole for fairlead, if required
7	Pg 13,5	Fitting hole for fairlead, if required

RL 70 - 100 - 130 Models electrical connection three-phase 230/400 V power supply with neutral phase wire.

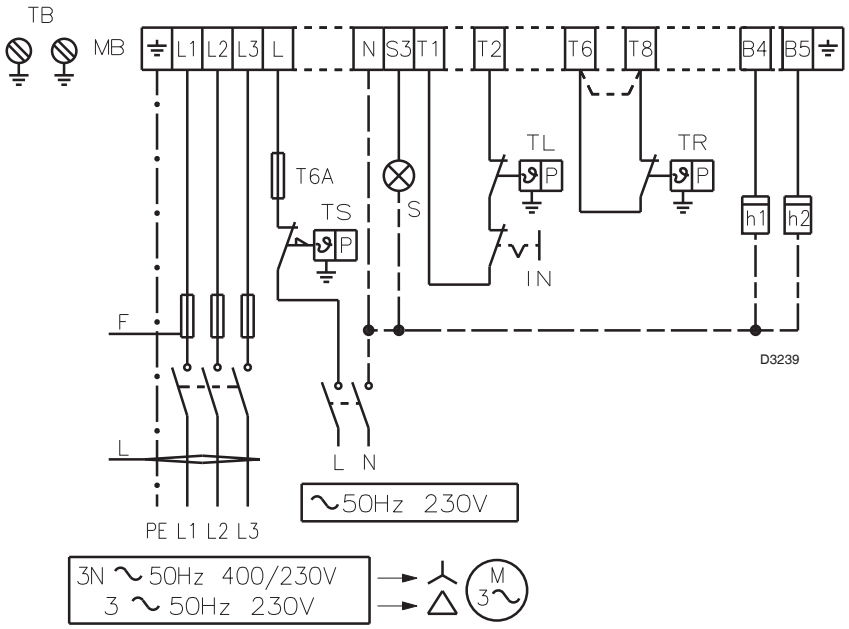


Fig. 17

		RL 70		RL 100		RL 130	
		230 V	400 V	230 V	400 V	230 V	400 V
F	A	T10	T6	T16	T10	T16	T10
L	mm^2	1.5	1.5	1.5	1.5	1.5	1.5

Fuses and cables section layout, see table (Fig. 17).

Cable section not indicated: 1.5 mm^2.

Key to wiring diagram (Fig. 17)

H1 - 1st stage hourcounter
H2 - 2nd stage hourcounter
IN - Manual burner stop switch
MB - Terminal strip
S - Remote lock-out signal
TB - Burner ground (earth) connection
TL - Limit control device system: this shuts down the burner when the boiler temperature or pressure exceeds the set-point value.
TR - High-low mode control device system: this controls operating stages 1 and 2 and is necessary only for two-stage operation.
TS - Safety control device system: this operates when TL is faulty.

WARNING

The burner is factory set for two-stage operation and the TR remote control device that commands light oil valve V2 must therefore be connected.

Alternatively, if single stage operation is required, instead of control device TR install a jumper lead between terminal 5 and 6 of the terminal strip.

Calibration of thermal cut-out 17)(Fig. 1 pag. 6)

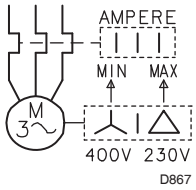


Fig. 18

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:

Burners RL 70 - 100 - 130 leave the factory preset for 400 V power supply. If 230 V power supply is used, change the motor connection from star to delta and change the setting of the thermal cut-out as well.The RL 70 - 100 - 130 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 perform checks of 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, it is necessary to apply in series with IN a timer switch that turns off the burner at least once every twenty-four hours.

WARNING

Do not invert the neutral with the phase in the electrical supply line.

6 Hydraulic system

6.1 Fuel supply

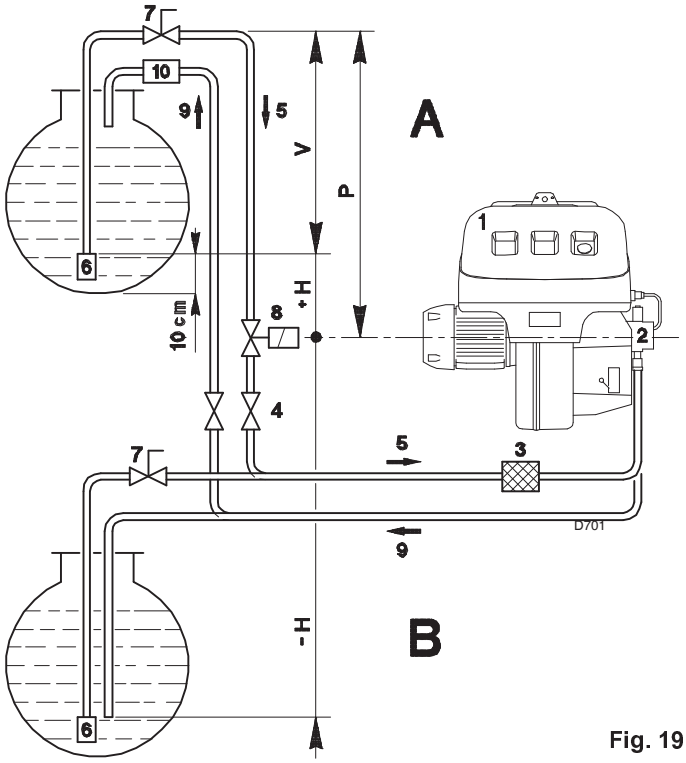


Fig. 19

Double-pipe circuit (Fig. 19)

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

The tank higher than the burner A

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

Pump depression of 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 less probable that the suction line fails to prime or stops priming.

The loop circuit

A loop circuit consists of a loop of piping departing from and returning to the tank with an auxiliary pump that circulates the fuel under pressure. A branch connection from the loop goes to feed the burner. This circuit is extremely useful whenever the burner pump does not succeed in self-priming because the tank distance and/or height difference are higher than the values listed in the table.

+ H - H (m)	L (m)					
	RL 70 Ø (mm)			RL 100 - 130 Ø (mm)		
	10	12	14	12	14	16
+ 4.0	51	112	150	71	138	150
+ 3.0	45	99	150	62	122	150
+ 2.0	39	86	150	53	106	150
+ 1.0	32	73	144	44	90	150
+ 0.5	29	66	132	40	82	150
0	26	60	120	36	74	137
- 0.5	23	54	108	32	66	123
- 1.0	20	47	96	28	58	109
- 2.0	13	34	71	19	42	81
- 3.0	7	21	46	10	26	53
- 4.0	-	8	21	-	10	25

Tab. C

Key

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

6.2 Hydraulic connections (Fig. 20)

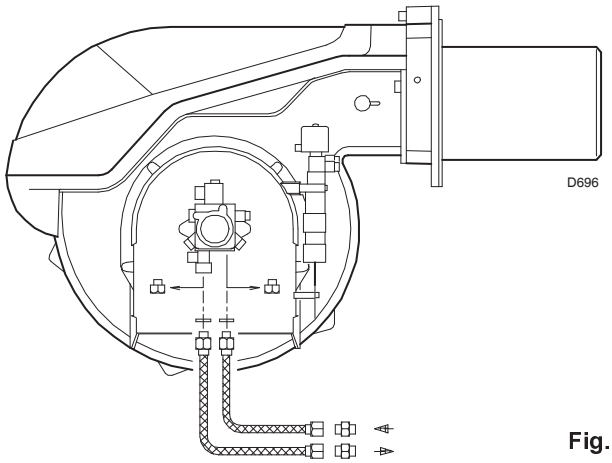


Fig. 20

The pumps are equipped with a by-pass that connects return line with suction line. The pumps are installed on the burner with the by-pass closed by screw 6) (Fig. 27 pag. 21).

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

The pump will break down 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.

Now connect the other end of the hoses to the supplied nipples, using two wrenches, one to hold the nipple steady while using the other one to turn the rotary union on the hose.

RL 70

PUMP SUNTEC AL 95 C

RL 100 - RL 130

PUMP SUNTEC AJ6 CC

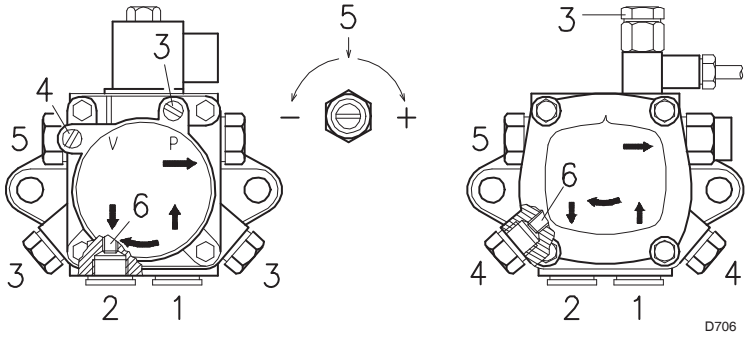


Fig. 21

6.3 Pump (Fig. 21)

1 - Suction G 1/4"
2 - Return G 1/4"
3 - Pressure gauge connection G 1/8"
4 - Vacuum meter connection G 1/8"
5 - Pressure adjustment screw
6 - Screw for by-pass

A - Min. delivery rate at 12 bar pressure
B - Delivery pressure range
C - Max. suction depression
D - Viscosity range
E - Light oil max. temperature
F - Max. suction and return pressure
G - Pressure calibration in the factory
H - Filter mesh width

6.3.1 Pump priming

– 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).
– In order 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 and with switch 1) (Fig. 22 pag. 19) in the "ON" position. The pump must rotate in the direction of the arrow marked on the cover.
– The pump can be considered to be primed when the light oil starts coming out of the screw 3). Stop the burner: switch 1) (Fig. 22 pag. 19) set to "OFF" and tighten the screw 3).

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, wait approx. 15 seconds, reset the burner, and then repeat the starting operation as often as required. After 5 or 6 starting operations allow 2 or 3 minutes for the transformer to cool.

Do not illuminate the photoresistor or the burner will lock out; the burner should lock out anyway about 10 seconds after it starts.

WARNING

The a.m. operation is possible because the pump is already full of fuel when it leaves the factory. If the pump has been drained, fill it with fuel through the opening on the vacuum meter prior to starting; otherwise, the pump will seize.

Whenever the length of the suction piping exceeds 20-30 meters, the supply line must be filled using a separate pump.

7 Burner calibration

7.1 Firing

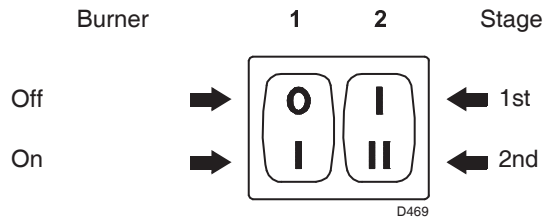


Fig. 22

Notes on safety for the first start-up

WARNING

The first start-up of the burner must be carried out by qualified personnel, as indicated in this manual and in compliance with the standards and regulations of the laws in force.

WARNING

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

Set switch 1) (Fig. 22) to "ON".

During the first firing, during the passage from the 1st to the 2nd stage, there is a momentary lowering of the fuel pressure caused by the filling of the 2nd stage nozzle tubing. This lowering of the fuel pressure can cause the burner to lock-out and can sometimes give rise to pulsations.

Once the following adjustments have been made, the firing of the burner must generate a noise similar to the noise generated during operation. If one or more pulsations or a delay in firing in respect to the opening of the light oil solenoid valve occur, see the suggestions provided on pag. 25: causes 34 ÷ 42

7.2 Operation

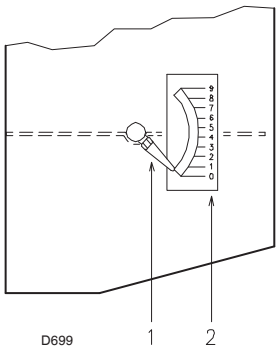


Fig. 23

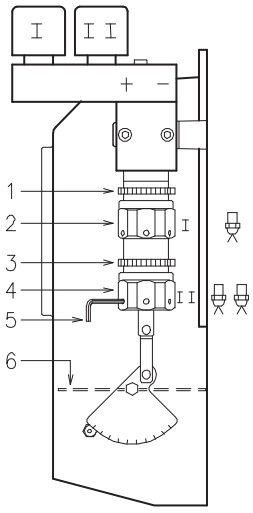


Fig. 24

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

➤ **1st and 2nd stage nozzles**

See the information listed on pag. 11.

➤ **Combustion head**

The adjustment of the combustion head already carried out need not be altered unless the 2nd 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. Never calibrate to pressures below 10 bar, at which pressures the cylinders may have difficulty in opening;

14 bar: 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 relevant screw 5) (Fig. 21 pag. 18)

➤ **1st stage fan air gate valve**

Keep the burner operating at 1st stage by setting the switch 2) (Fig. 22) to the 1st stage position. Opening of the air gate valve 6) (Fig. 24) must be adjusted in proportion to the selected nozzle: the index 1) (Fig. 23) must be aligned with the notch 2) (Fig. 23) specified in table (Tab. D) This adjustment is achieved by turning the hex element 2) (Fig. 24):

– in rh direction (- sign) the opening is reduced;
– in lh direction (+ sign) the opening increases.

Example: RL 70 - 1st stage nozzle 6.0 GPH:

2.3 notch (Fig. 23) aligned with index 1).

When the adjustment is terminated lock the hex element 2) (Fig. 24) with the ring nut 1).

RL 70		RL 100		RL 130	
GPH	N°	GPH	N°	GPH	N°
5	2.0	7	2.0	10	2.0
6	2.3	8	2.1	11	2.1
7	2.6	9	2.2	12	2.2
8	2.7	10	2.4	13	2.3
9	2.8	11	2.6	14	2.5
		12	2.7	15	2.6
		13	2.8	16	2.7
		14	2.9	17	2.8
				18	2.9
				19	3.0

Tab. D

N° = Notch 2) (Fig. 23)

➤ **2st stage fan air gate valve**

Set switch 2) (Fig. 22 pag. 19) to the 2nd stage position and adjust the air gate valve 6)(Fig. 24) by turning the hex element 4)(Fig. 24), after having loosened the ring nut 3)(Fig. 24).

Air pressure at connection 1)(Fig. 25) must be approximately the same as the pressure specified in the table (Fig. 25) plus the combustion chamber pressure measured at connection 2). Refer to the example in the adjacent figure.

RL 70		RL 100		RL 130	
kg/h	mbar	kg/h	mbar	kg/h	mbar
40	8.5	60	7.2	80	7
50	8.6	70	7.7	90	7.2
60	8.8	80	8.4	100	7.6
70	9.2	90	9.3	110	8.1
		100	11.0	120	9.0
				130	11.0
				130	8.5 (1)

Tab. E

mbar = air pressure in 1) with zero pressure in 2)

(1) With shutter 4) retracted (Fig. 8 pag. 10)

NOTE:
in order to facilitate adjustment of hex elements 2) and 4)(Fig. 24), use a 3 mm Allen key 5) (Fig. 24).

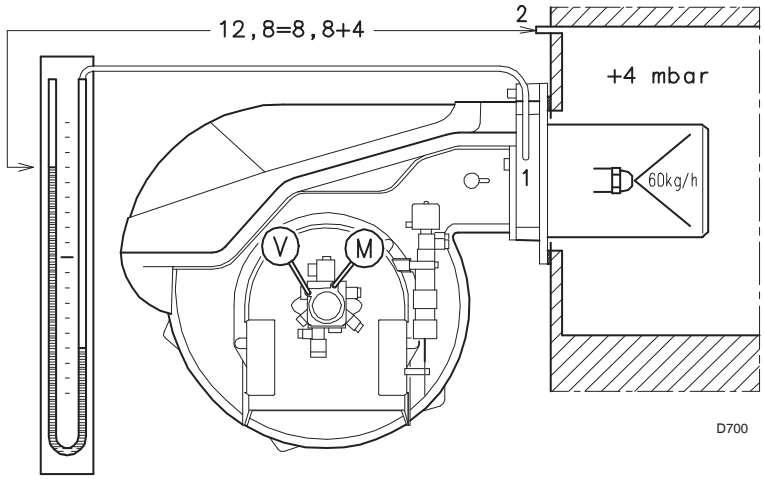
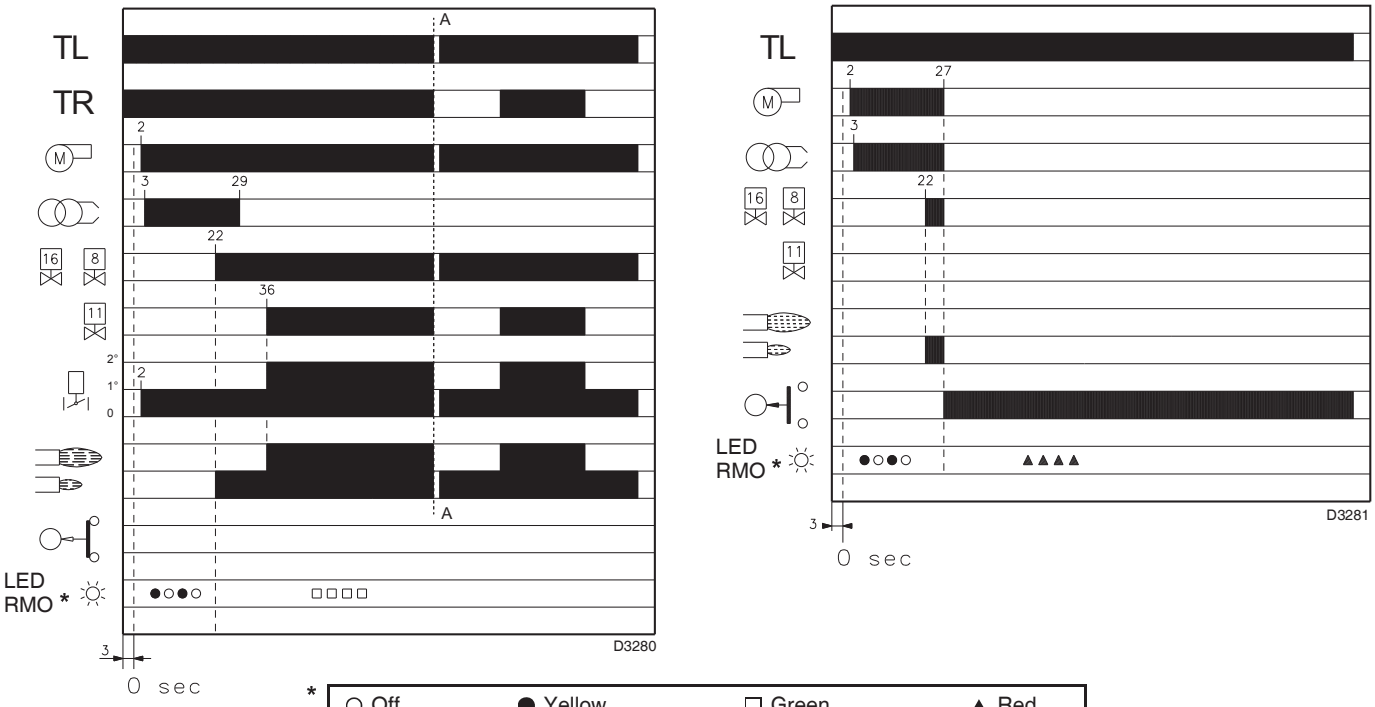


Fig. 25



* ○ Off ● Yellow □ Green ▲ Red

For further details see pag. 24.

Fig. 26

7.2.1 Burner starting (Fig. 26) - (Fig. 27)

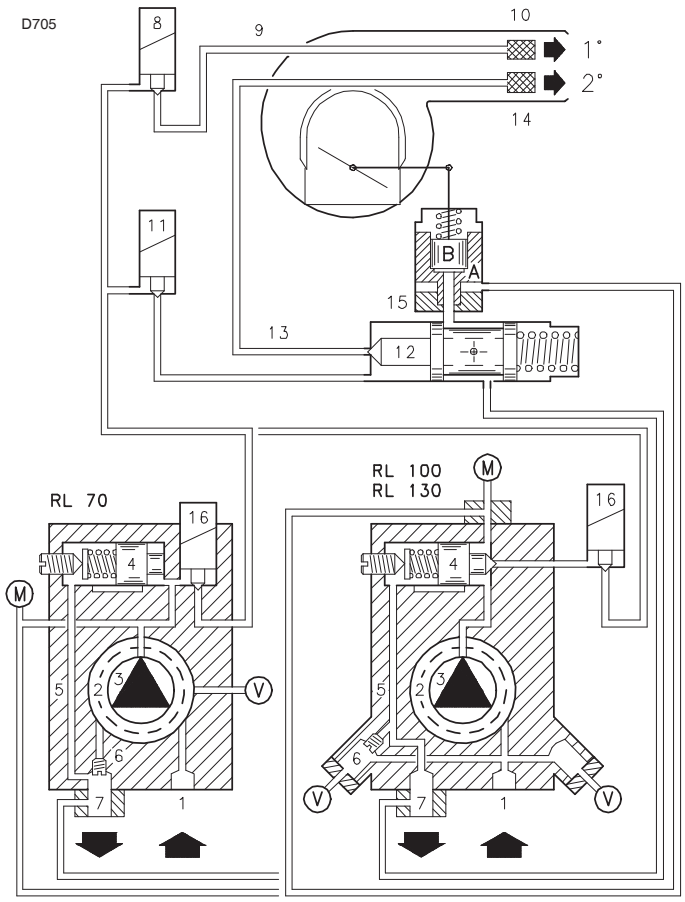


Fig. 27

Starting phases with progressive time intervals shown in seconds:

Control device TL closes.

After about 3s:

- **0 s :** The control box starting cycle begins.
- **2 s :** The fan motor starts.
- **3 s :** The ignition transformer is connected.
  The pump 3) sucks the fuel from the tank through the piping 1) and the filter 2) and pumps it under pressure to delivery. The piston 4) rises and the fuel returns to the tank through the piping 5) - 7). The screw 6) closes the by-pass heading towards suction and the solenoid valves 8) - 11) - 16), de-energized, close the passage to the nozzles.
  The hydraulic cylinder 15), piston A, opens the air gate valve: pre-purging begins with the 1st stage air delivery.
- **22 s :** Solenoid valves 8) and 16) open and the fuel passes through the piping 9) and filter 10) and is then sprayed out through the nozzle, igniting when it comes into contact with the spark. This is the 1st stage flame.
- **29 s:** The ignition transformer switches off.
- **36 s:** If the control device TR is closed or has been replaced by a jumper wire, the 2nd stage solenoid valve 11) is opened and the fuel enters the device 12) and raises the piston which opens two passages: one to piping 13), filter 14), and the 2nd stage nozzle, and the other to the cylinder 15), piston B, that opens the fan air gate valve in the 2nd stage.
  The starting cycle comes to an end.

7.2.2 Steady state operation

System equipped with one control device TR

Once the starting cycle has come to an end, the command of the 2nd stage solenoid valve passes on to the control device TR that controls boiler temperature or pressure.

- When the temperature or the pressure increases until the control device TR opens, solenoid valve 11) closes, and the burner passes from the 2nd to the 1st stage of operation.
- When the temperature or pressure decreases until the control device TR closes, solenoid valve 11) opens, and the burner passes from the 1st to the 2nd stage of operation. And so on.
- The burner stops when the demand for heat is less than the amount of heat delivered by the burner in the 1st stage. In this case, the control device TL opens, and solenoid valves 8)-16) close, the flame immediately goes out. The fan's air gate valve closes completely.

Systems not equipped with control device TR (jumper wire installed)

The burner is fired as described in the case above. If the temperature or pressure increase until control device TL opens, the burner shuts down (Section A-A in the diagram).

When the solenoid valve 11) de-energizes, the piston 12) closes the passage to the 2nd stage nozzle and the fuel contained in the cylinder 15), piston B, is discharged into the return piping 7).

7.2.3 Firing failure

If the burner does not fire, it goes into lock-out within 5 s of the opening of the 1st stage valve and 30 s after the closing of control device TL.

The control box red pilot light will light up.

7.2.4 Undesired shutdown during operation

If the flame goes out during operation, the burner shuts down automatically within 1 second and automatically attempts to start again by repeating the starting cycle.

7.2.5 Final checks

- **Darken the photoresistor and switch on the control devices**: the burner should start and then lock-out about 5 s after opening of the 1st stage operation valve.
- **Illuminate the photoresistor and switch on the control devices**: the burner should start and then go into lock-out after about 10 s.
- **Darken the photoresistor while the burner is in 2nd stage operation, the following must occur in sequence:** flame extinguished within 1 s, pre-purging for about 20 s, sparking for about 5 s, burner goes into lock out.
- **Switch off control device TL followed by control device TS while the burner is operating:** the burner should stop.

8 Maintenance

Notes on safety for the maintenance

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

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

DANGER

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

Before carrying out any maintenance, cleaning or checking operations:

DANGER

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

DANGER

close the fuel interception tap;

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.

Pump

The delivery pressure must be stable at 12 bar.

The depression must be less than 0.45 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 vacuum meter 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.

Filters (Fig. 28)

Check the following filter boxes:

• on line 1) • in the pump 2) • at the nozzle 3), and clean or replace as required.

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.

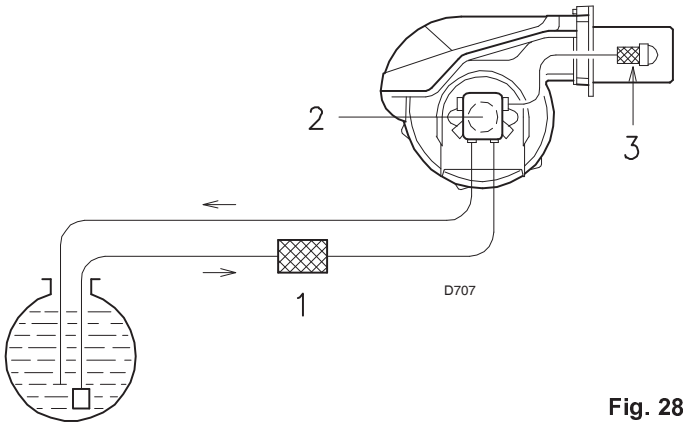


Fig. 28

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.

Combustion head

Check to make sure that all the parts of the combustion head are in good condition, positioned correctly, free of all impurities, and that no deformation has been caused by operation at high temperatures.

Nozzles

Do not clean the nozzle openings; do not even open them.

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

Photoresistor (Fig. 29)

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

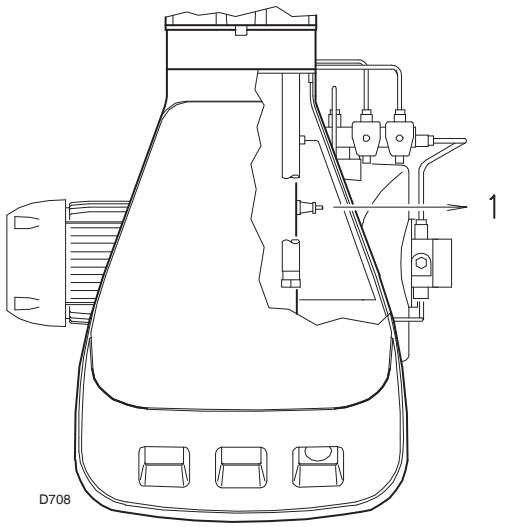


Fig. 29

Flame inspection window (Fig. 30)

Clean the glass whenever necessary.

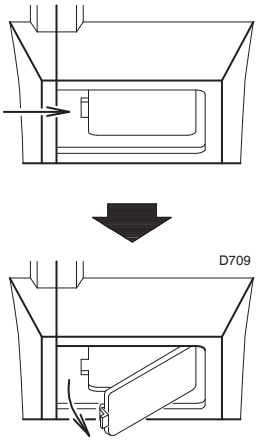


Fig. 30

Flexible hoses

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

Fuel tank

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

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.

To open the burner (Fig. 31)

Switch off the electrical power.
Remove screws 1) and withdraw the casing 2).
Unscrew the screws 3).
Fit the two extensions 4) supplied with the burner onto the slide bars 5) (model with 385 mm blast tube).
Pull part A backward keeping it slightly raised to avoid damaging the disk 6) on blast tube 7).

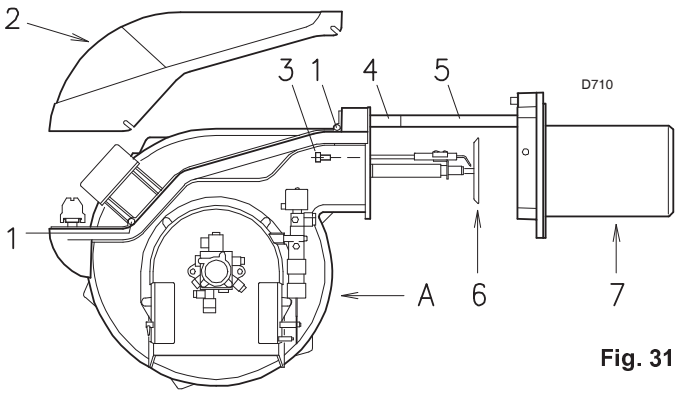


Fig. 31

Fuel pump and/or couplings replacement (Fig. 32)

In conformity with figures (Fig. 32)

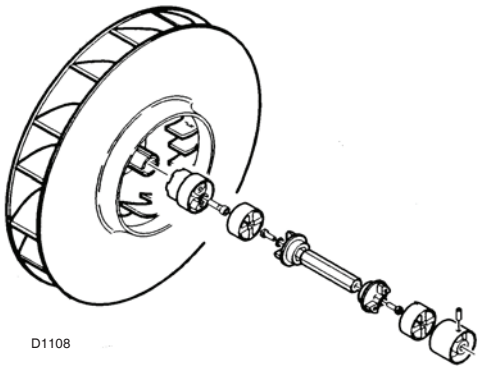


Fig. 32

8.1 Burner start-up cycle diagnostics

During start-up, indication is according to the following table:

Colour code table	
Sequences	Colour code
Pre-purging	●○●○●○●○●
Ignition phase	●○●○●○●○●
Operation, flame ok	□□□□□□□□□
Operating with weak flame signal	□○□○□○□○□
Electrical supply lower than ~ 170V	●▲●▲●▲●▲●
Lock-out	▲▲▲▲▲▲▲▲▲
Extraneous light	▲□▲□▲□▲□▲
Key: ○ Off ● Yellow □ Green ▲ Red	

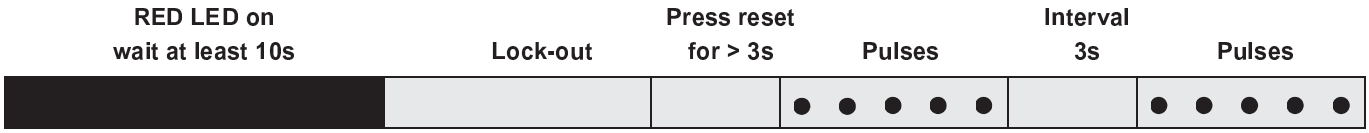
8.2 Resetting the control box and using diagnostics

The control box features a diagnostics function through which any causes of malfunctioning are easily identified (indicator: **RED LED**).

To use this function, you must wait at least 10 seconds once it has entered the safety condition (**lock-out**), and then press the reset button.

The control box generates a sequence of pulses (1 second apart), which is repeated at constant 3-second intervals.

Once you have seen how many times the light pulses and identified the possible cause, the system must be reset by holding the button down for between 1 and 3 seconds.



The methods that can be used to reset the control box and use diagnostics are given below.

8.3 Resetting the control box

To reset the control box, proceed as follows:

– Hold the button down for between 1 and 3 seconds.
  The burner restarts after a 2-second pause once the button is released.
  If the burner does not restart, you must make sure the limit thermostat is closed.

8.4 Visual diagnostics

Indicates the type of burner malfunction causing lock-out.

To view diagnostics, proceed as follows:

– Hold the button down for more than 3 seconds once the red LED (burner lock-out) remains steadily lit.
  A yellow light pulses to tell you the operation is done.
  Release the button once the light pulses. The number of times it pulses tells you the cause of the malfunction, according to the coding system indicated in the table on pag. 25.

8.5 Software diagnostics

Reports burner life by means of an optical link with the PC, indicating hours of operation, number and type of lock-outs, serial number of control box etc.

To view diagnostics, proceed as follows:

– Hold the button down for more than 3 seconds once the red LED (burner lock-out) remains steadily lit.
  A yellow light pulses to tell you the operation is done.
  Release the button for 1 second and then press again for over 3 seconds until the yellow light pulses again.
  Once the button is released, the red LED will flash intermittently with a higher frequency: only now can the optical link be activated.

Once the operations are done, the control box's initial state must be restored using the resetting procedure described above.

Button pressed for	Control box status
Between 1 and 3 seconds	Control box reset without viewing visual diagnostics.
More than 3 seconds	Visual diagnostics of lock-out condition: (LED pulses at 1-second intervals).
More than 3 seconds starting from the visual diagnostics condition	Software diagnostics by means of optical interface and PC (hours of operation, malfunctions etc. can be viewed)

The sequence of pulses issued by the control box identifies the possible types of malfunction, which are listed in the table on pag. 25

SIGNAL	FAULT	PROBABLE CAUSE	SUGGESTED REMEDY
No blink	The burner does not start	1 - No electrical power supply	Close all switches - Check fuses
		2 - Limit control device TL is open	Adjust or replace
		3 - Safety control device TS is open	Adjust or replace
		4 - Control box lock-out	Reset control box (no sooner than 10 s after the lock-out)
		5 - Pump is jammed	Replace
		6 - Erroneous electrical connections	Check
		7 - Defective control box	Replace
		8 - Defective electrical motor	Replace
2 led blinks ● ●	After pre-purge and the safety time, the burner goes to lock-out and the flame does not appear	9 - No fuel in tank; water on tank bottom	Top up fuel level or suck up water
		10 - Inappropriate head and air gate valve adjustments	Adjust, see pag. 13 and pag. 19
		11 - Light oil solenoid valves fail to open (1st stage or safety)	Check connections; replace coil
		12 - 1st stage nozzle clogged, dirty, or deformed	Replace
		13 - Dirty or poorly adjusted firing electrodes	Adjust or clean
		14 - Grounded electrode due to broken insulation	Replace
		15 - High voltage cable defective or grounded	Replace
		16 - High voltage cable deformed by high temperature	Replace and protect
		17 - Ignition transformer defective	Replace
		18 - Erroneous valves or transformer electrical connections	Check
		19 - Defective control box	Replace
		20 - Pump unprimed	Prime pump and see "Pump unprimes"
		21 - Pump/motor coupling broken	Replace
		22 - Pump suction line connected to return line	Correct connection
		23 - Valves up-line from pump closed	Open
		24 - Filters dirty: line - pump - nozzle	Clean
		25 - Defective photoresistor or control box	Replace photoresistor or control box
		26 - Photoresistor dirty	Clean
		27 - 1st stage operation of cylinder is faulty	Change cylinder
		28 - Motor protection tripped	Reset thermal cut-out
		29 - Defective motor command control device	Replace
		30 - 2-phase power supply thermal relay trips	Reset thermal cut-out when third phase is re-connected
		31 - Incorrect motor rotation direction	Change motor electrical connections
4 led blinks ● ● ● ●	The burner starts and then goes into lock-out	32 - Photoresistor short-circuit	Replace photoresistor
		33 - Light is entering or flame is simulated	Eliminate light or replace control box

SIGNAL	FAULT	PROBABLE CAUSE	SUGGESTED REMEDY
7 led blinks ● ● ● ● ● ● ●	Flame detachment	34 - Poorly adjusted head	Adjust, see pag. 13, Fig. 14
		35 - Poorly adjusted or dirty firing electrodes	Adjust, see pag. 13, Fig. 10 or clean
		36 - Poorly adjusted fan air gate: too much air	Adjust
		37 - 1st nozzle is too big (pulsation)	Reduce 1st nozzle delivery
		38 - 1st nozzle is too small (flame detachment)	Increase 1st nozzle delivery
		39 - 1st nozzle dirty, or deformed	Replace
		40 - Inappropriate pump pressure	Adjust to between 10 - 14 bar
		41 - 1st stage nozzle unsuited to burner or boiler	See Nozzle Table, pag. 11 ; reduce 1st stage
		42 - Defective 1st stage nozzle	Replace
	The burner does not pass to 2nd stage	43 - Control device TR does not close	Adjust or replace
		44 - Defective control box	Replace
		45 - 2nd stage sol. valve coil defective	Replace
		46 - Piston jammed in valve unit	Replace entire unit
	Fuel passes to 2nd stage but air remains in 1st	47 - Low pump pressure	Increase
		48 - 2nd stage operation of cylinder is faulty	Change cylinder
	Burner stops at transition between 1st and 2nd stage or vice versa. Burner repeats starting cycle	49 - Nozzle dirty	Replace
		50 - Photoresistor dirty	Clean
		51 - Excess air	Reduce
	Uneven fuel supply	52 - Check if cause is in pump or in the fuel supply system	Feed the burner from a tank located nearby
	Rusty pump internal parts	53 - Water in tank	Suck water from tank bottom with separate pump
	Noisy pump, unstable pressure	54 - Air has entered the suction line	Tighten connectors
		- Depression value too high (higher than 35 cm Hg)	
		55 - Tank/burner height difference too great	Feed burner with loop circuit
		56 - Piping diameter too small	Increase
		57 - Suction filters clogged	Clean
		58 - Suction valves closed	Open
		59 - Paraffin solidified due to low temperature	Add additive to light oil
	Pump unprimes after prolonged pause	60 - Return pipe not immersed in fuel	Bring to same height as suction pipe
		61 - Air enters suction piping	Tighten connectors
	Pump leaks light oil	62 - Leakage from sealing organ	Replace pump
	Smoke in flame	63 - Not enough air	Adjust head and fan gate, see pag. 13 and pag. 19.
	- dark Bacharach	64 - Nozzle worn or dirty	Replace
		65 - Nozzle filter clogged	Clean or replace
		66 - Erroneous pump pressure	Adjust to between 10 - 14 bar
		67 - Flame stability spiral dirty, loose, or deformed	Clean, tighten in place, or replace
		68 - Boiler room air vents insufficient	Increase
	- yellow Bacharach	69 - Too much air	Adjust head and fan gate, see pag. 13 and pag. 19.
	Dirty combustion head	70 - Nozzle or filter dirty	Replace
		71 - Unsuitable nozzle delivery or angle	See recommended nozzles, pag. 11
		72 - Loose nozzle	Tighten
		73 - Impurities on flame stability spiral	Clean
		74 - Erroneous head adjustment or not enough air	Adjust, see pag. 19, open gate valve
		75 - Blast tube length unsuited to boiler	Contact boiler manufacturer
10 led blinks ● ● ● ● ● ● ● ● ● ●	The burner goes to lock-out	76 - Connection or internal fault	
		77 - Presence of electromagnetic disturbance	Use the radio disturbance protection kit

9 STATUS (optional)

Accessory available on request. See pag. 5.

9.1 Assembly

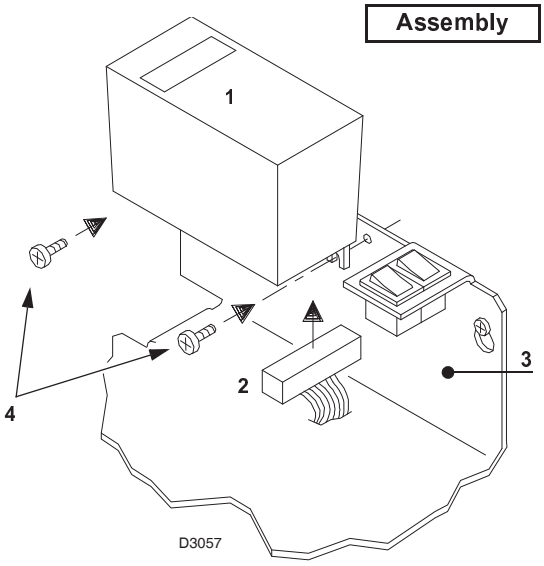


Fig. 33

The burners are preset to accept the Status. To assemble, proceed as follows:
– Connect Status 1) using connector 2) fitted on the bracket 3).
– Fasten Status to the bracket using the screws 4) supplied with the kit.

1 Status
2 Connector
3 Bracket of the burner
4 Fixing screws

9.2 The STATUS unit has three functions:

1 Burner operating hours and the number of firings are shown on display V

Total operating hours

Press button "h1".

2nd stage operating hours

Press button "h2".

1st stage operating hours (calculated)

Total hours - 2nd stage operating hours

Number of firings

Press button "count".

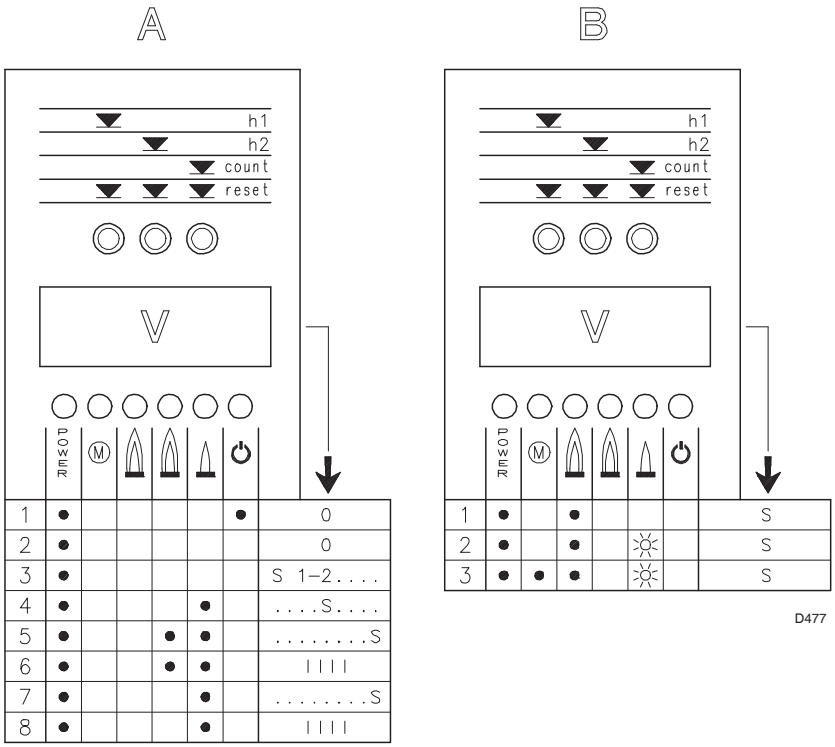
Resetting operating hours and number of firings

Press the three “reset” buttons simultaneously.

Non-volatile memory

The operating hours and the number of firings will remain in the memory even in the case of electrical power failures.

2 Indicates the times relative to the firing stage



☼ = LED flashing
○ = LED illuminated
S = Time in seconds
I I I I = Burner start cycle terminated

Fig. 34

The leds illuminate in the following sequence, see fig. A:

WITH CONTROL DEVICE TR CLOSED:

1 - Burner off, TL open

2 - Control device TL closed

3 - Motor start:
seconds count starts on display V

4 - 1st stage valve energized

5 - 2nd stage valve energized
seconds count stops on display V

6 - 10 seconds after stage 5 the code I I I I will appear on the display: this indicates that the starting phase is terminated.

WITH CONTROL DEVICE TR OPEN:

1 - Burner off, TL open

2 - Control device TL closed

3 - Motor start:
seconds count starts on display V

4 - 1st stage valve energized

7 - 30 seconds after stage 4:
seconds count stops on display V

8 - 10 seconds after stage 7 the code I I I I will appear on the display: this indicates that the starting phase is terminated.

The times, in seconds, shown on display V, indicate the succession of the various starting stages described on pag. 21

3 In the case of burner malfunctions, the status panel indicates the exact time at which the fault occurred.

There are 3 possible combinations of illuminated leds, see fig. (B).

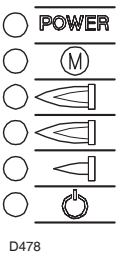
For the causes of the malfunction refer to the numbers shown in brackets; see the legend on pag. 25 for interpretation of the numbers.

1 ..... (9 ÷ 10)

2 ..... (11 ÷ 33)

3 ..... (32)

Key to symbols (STATUS)



○ = Power present
○ = Fan motor blocked (red)
○ = Burner lock-out (red)
○ = 2st stage operation
○ = 1st stage operation
○ = Load level reached (Stand-by), led: on

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