GB

Light oil burner

One stage operation

CODE	MODEL
20026994	RDB 3.2R BF

20034433 (12) - 06/2022



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1 Information and general instructions

1.1 Information about the instruction manual

1.1.1 Introduction

The instruction manual supplied with the burner:

- ➤ is an integral and essential part of the product and must not be separated from it; it must therefore be kept carefully for any necessary consultation and must accompany the burner even if it is transferred to another owner or user, or to another system. If the manual is lost or damaged, another copy must be requested from the Technical Assistance Service of the area;
- ➤ is designed for use by qualified personnel;
- ➤ offers important indications and instructions relating to the installation safety, start-up, use and maintenance of the burner.

Symbols used in the manual

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

1.1.2 General dangers

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



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



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



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

1.1.3 Other symbols



DANGER: LIVE COMPONENTS

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



DANGER: FLAMMABLE MATERIAL

This symbol indicates the presence of flammable materials.



DANGER: BURNING

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



DANGER: CRUSHING OF LIMBS

This symbol indicates the presence of moving parts: danger of crushing of limbs.



WARNING: MOVING PARTS

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



DANGER: EXPLOSION

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



PERSONAL PROTECTION EQUIPMENT

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



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

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



ENVIRONMENTAL PROTECTION

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



IMPORTANT INFORMATION

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

➤ This symbol indicates a list.

Abbreviations used

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

1.1.4 Delivery of the system and the instruction manual

When the system is delivered, it is important that:

➤ the instruction manual is delivered to the user by the system manufacturer, with the recommendation to keep it in the room where the heat generator is to be installed.

➤ The instruction manual shows:
– the serial number of the burner;

.....

– the address and telephone number of the nearest Assistance Centre

.....
.....
.....

➤ The system supplier must carefully inform the user about:
– the use of the system;
– any further tests that may be required before activating the system;
– maintenance, and the need to have the system checked at least once a year by a representative of the manufacturer or another specialised technician.
To ensure a periodic check, the manufacturer recommends the drawing up of a Maintenance Contract.

1.2 Guarantee and responsibility

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



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;
➤ 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.

2 Safety and prevention

2.1 Introduction

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

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

It is a good idea to remember the following:

➤ The burner must only be used as expressly described. Any other use should be considered improper and therefore dangerous.

In particular:

it can be applied to boilers operating with water, steam, diathermic oil, and to other uses expressly foreseen by the manufacturer;

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

➤ Modification of the burner to alter its performance and destinations is not allowed.

➤ The burner must be used in exemplary technical safety conditions. Any disturbances that could compromise safety must be quickly eliminated.

➤ Opening or tampering with the burner components is not allowed, apart from the parts requiring maintenance.

➤ Only those parts envisaged by the manufacturer can be replaced.



WARNING

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

2.2 Personnel training

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

The user:

➤ undertakes to entrust the machine exclusively to suitably trained and qualified personnel;

➤ undertakes to inform his personnel in a suitable way about the application and observance of the safety instructions. With that aim, he undertakes to ensure that everyone knows the use and safety instructions for his own duties;

➤ personnel must observe all the danger and caution indications shown on the machine.

➤ Personnel must not carry out, on their own initiative, operations or interventions that are not within their province.

➤ Personnel must inform their superiors of every problem or dangerous situation that may arise.

➤ The assembly of parts of other makes, or any modifications, can alter the characteristics of the machine and hence compromise operating safety. The manufacturer therefore declines any and every responsibility for any damage that may be caused by the use of non-original parts.

In addition:



➤ must take all the measures necessary to prevent unauthorised people gaining access to the machine;

➤ the user must inform the manufacturer if faults or malfunctioning of the accident prevention systems are noticed, along with any presumed danger situation;

➤ personnel must always use the personal protective equipment envisaged by legislation and follow the indications given in this manual.

3 Technical description of the burner

3.1 Technical data

Model	RDB 3.2R BF
Output - Thermal power (with air at 20 °C)	1.1 - 2.7 GPH – 142.9 - 338.8 MBtu/h
Fuel	Gas oil, viscosity 4 – 6 mm^2/s at 20 °C *(Hi = 11.86 kWh/kg)*
Electrical supply	Single phase, ~ 50Hz 230 V ± 10%
Motor	Run current 1.3 A – 2750 rpm – 288 rad/s
Capacitor	5 µF
Ignition transformer	Secondary 18 kV – 25 mA
Pump	Maximum pressure 218 psi
Absorbed electrical power	0.215 kW

Tab. A

3.2 Burner description

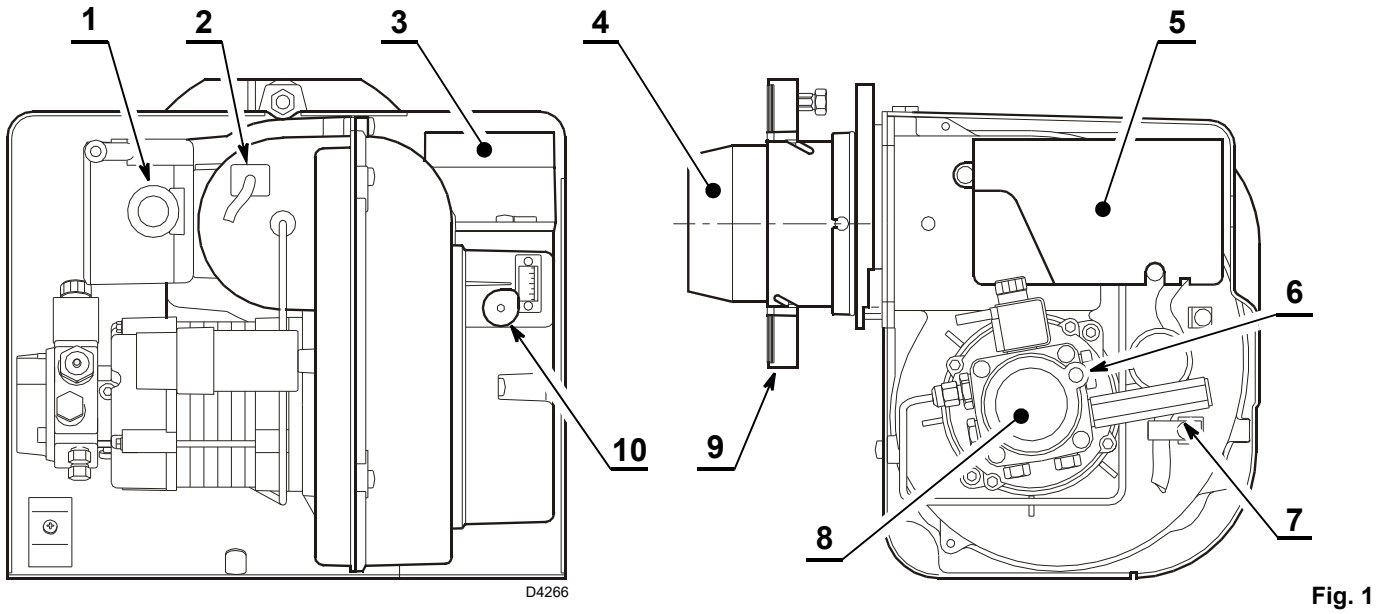


Fig. 1

1 Reset push-button with lock-out lamp
2 Flame sensor
3 Snorkel (BF)
4 Blast tube
5 Control box
6 Pump pressure adjustment screw
7 Pressure gauge port
8 Pump
9 Flange
10 Air damper adjustment screw

3.3 Burner equipment

Flange and gasket..... No. 1
Hoses with nipple..... No. 1
Screw and nuts for flange..... No. 1
Screw of by-pass pump..... No. 1
Hexagonal key..... No. 1
Bolts for flange to be fixed to boiler..... No. 4

3.4 Burner dimensions

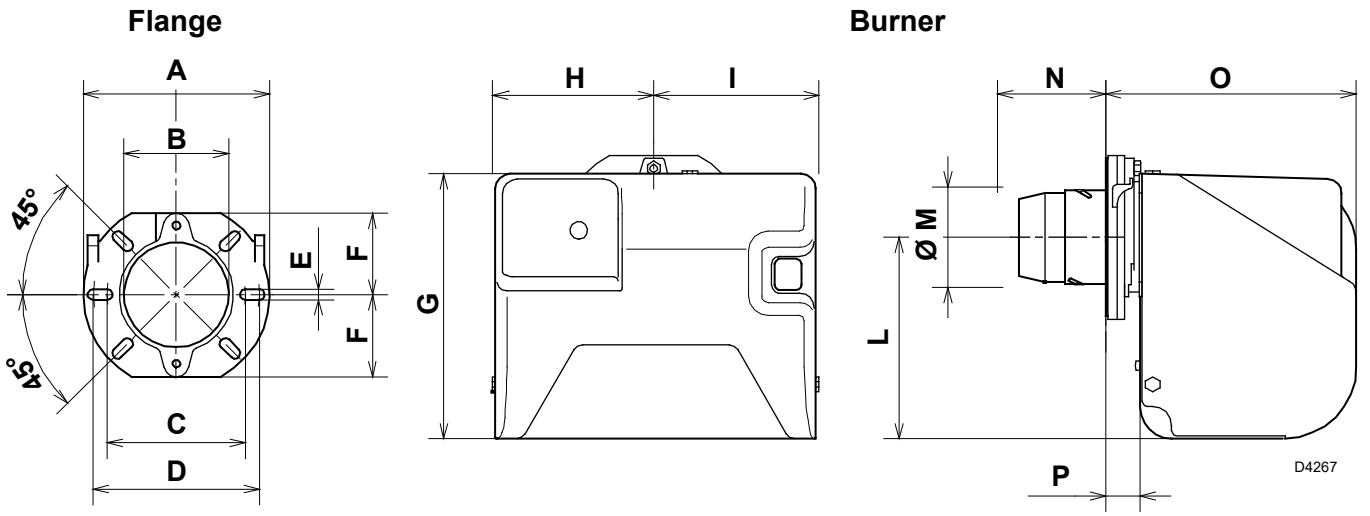


Fig. 2

A	B	C	D	E	F	G	H	I	L	Ø M	N	O	P
7 7/16"	4 11/64"	5 33/64"	6 5/8"	7/16"	3 17/64"	10 35/64"	6 27/64"	6 37/64"	8 1/32"	3 3/4"	2 47/64"	9 31/32"	1 17/64"

Tab. B

3.5 Firing rate

The **MAXIMUM OUTPUT** is chosen from within the diagram area (Fig. 3).

The **MINIMUM OUTPUT** must not be lower than the minimum limit of the diagram.

The burner delivery must be selected within area of the diagrams (Fig. 3). This area is called firing rates and 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 the firing rates.

WARNING

The firing rate area values have been obtained considering a surrounding temperature of 20 °C, and an atmospheric pressure of 1013 mbar (approx. 0 m above sea level) and with the combustion head adjusted as shown on page 15.



Fig. 3

4 Installation

4.1 Notes on safety for the installation

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

DANGER

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

WARNING

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

DANGER

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

4.2 Handling

The packaging of the burner includes a carton box, 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).
When handling, keep the load at not more than 20-25cm from the ground.

After positioning the burner near the installation point, correctly dispose of all residual packaging, separating the various types of material.

CAUTION

Before proceeding with the installation operations, carefully clean all around the area where the burner will be installed.

4.3 Preliminary checks

Checking the consignment

CAUTION

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

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

Checking the characteristics of the burner

Check the identification label of the burner, showing:
- ➤ the model **A**)(Fig. 4) 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.

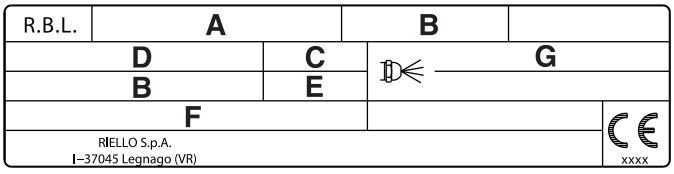


Fig. 4

4.4 Working position

WARNING

The burner is designed to operate only in the positions **1**, and **3** (Fig. 5).
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** allow working operations but not maintenance with hooking to the boiler.

DANGER

Any other position could compromise the correct operation of the appliance. Installation **5** is forbidden for safety reasons.

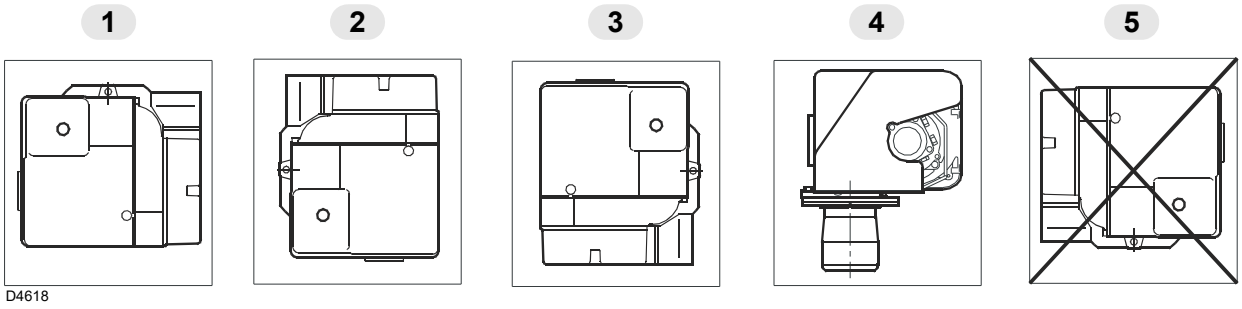


Fig. 5

4.5 Boiler fixing

- Put on the flange 1)(Fig. 6) the screw and two nuts.
- Widen, if necessary, the insulating gasket holes 5)(Fig. 7).
- Fix the flange 1)(Fig. 7) to the boiler door 4) using screws 2) and (if necessary) the nuts 3) interposing the insulating gasket 5).

WARNING

The seal between burner and boiler must be airtight.

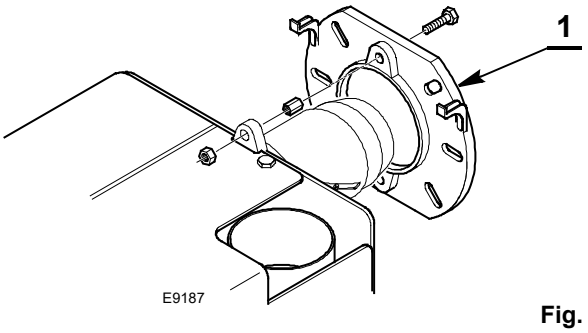


Fig. 6

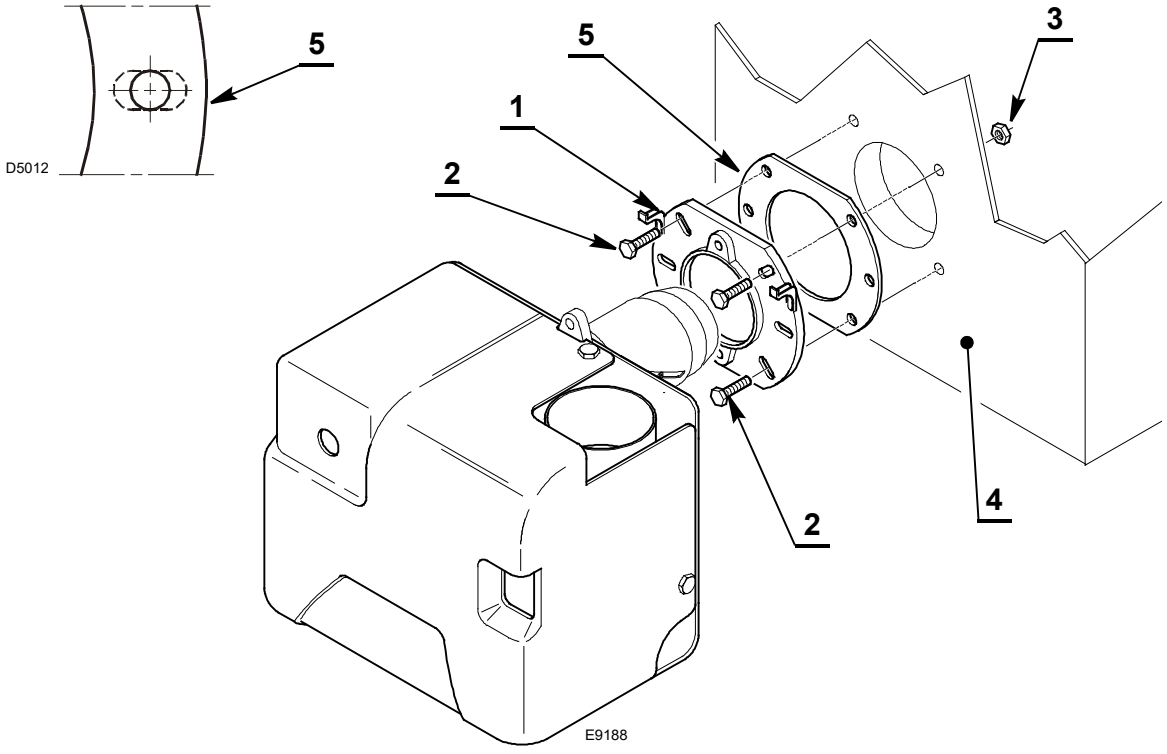


Fig. 7

4.6 Burner assembly

CAUTION

For correct BF application, the burner must be installed on an appropriate BF boiler.

The temperature of the incoming air must not exceed 70 °C.

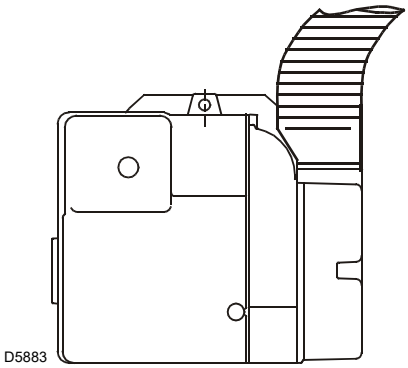


Fig. 8

The combustion air supply is through a flexible or rigid pipe connected to the air intake.

Consequently, you must comply with the following requirements and instructions:

The combustion air intake tube must be:

- ➤ fastened securely to the burner;
- ➤ made of a suitable material, with temperature characteristics in the range - 22 °F to 176 °F;
- ➤ in compliance with all requirements of applicable regulations in force in the country of destination.
- ➤ The intake-tube / burner system must not allow a loss of over 70.67 ft^3/h at 0.2"wc: for instance, the above requirements will be met if you use flues for pressure exhaust of flue gases (the condensation kind).
- ➤ Make sure the air intake tube's inlet is positioned so that it is not likely to be obstructed by foreign matter and, where necessary, use suitable screens.
- ➤ The temperature of the incoming air must not exceed 104 °F;
- ➤ The inside diameter of the intake tube must be at least 4 inch.
- ➤ The intake tube can be up to 100 ft in length.

WARNING

Length is reduced if there are bends in the intake section.

For instance, using a tube with a smooth inside surface, you must allow for the following losses:

- – for each 45° bend, tube length is reduced by 5 ft;
- – for each 90° bend, tube length is reduced by 10 ft.

NOTE:

Burner installation must in any case comply with the flue systems included within the boiler approved configuration.

WARNING

- ➤ Under no circumstances should the air's entry in the hose intake area be obstructed.
- ➤ The hose must not be blocked in any way or feature a shutting device (valves, membranes etc.).

5 Hydraulic systems

5.1 Fuel supply

5.1.1 Pump

The pump is designed to allow working with one pipe.

In order to obtain two pipes working it is necessary to unscrew the return plug 2)(Fig. 9), screw the by-pass screw 3),supplied as burner equipment and then screw the return hose.

WARNING

The suction plug 1) is made of plastic. Once removed, it must not be used again.

In single pipe installations, the plug in the return line 2) must be totally in steel.

Key (Fig. 9)
1 Suction line
2 Return line
3 By-pass screw
4 Gauge connection
5 Pressure adjuster
6 Vacuum gauge connection
7 Valve
8 Auxiliary pressure test point

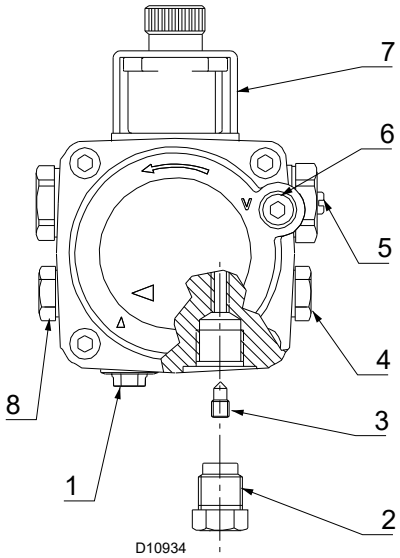


Fig. 9

5.2 One pipe system

Pressurised one pipe systems (Fig. 10) have a positive fuel pressure on intake to the burner.
Usually the tank is higher than the burner, or the fuel pumping systems are on the outside of the boiler.

Vacuum one pipe systems (Fig. 11) have a negative fuel pressure (depression) on intake to the burner.
Usually the tank is lower than the burner.

CAUTION

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

Riello recommends a good quality fuel filter at the tank (Fig. 10 - Fig. 11) and a secondary filter (60 µ for gas oil) are used to protect the burner pump and nozzle from contamination.

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

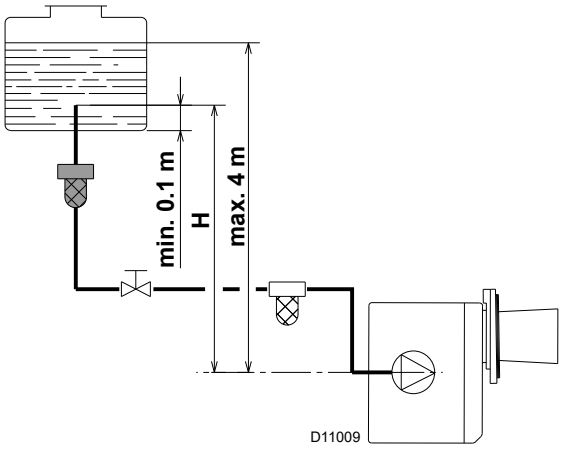


Fig. 10

5.2.1 Priming pump

On the system in Fig. 10 it is sufficient to loosen the plug of the vacuum gauge 6)(Fig. 9) and wait until the fuel flows out.

On the system in Fig. 11 start the burner and wait for the priming. Should lock-out occur prior to the arrival of the fuel, await at least 20 seconds before repeating the operation.

WARNING

The installer must ensure that the supply pressure is not above 0.5 bar.
Above that level, the pump seal is subject to too much stress.

H metres	L metres	
	I.D. (8 mm)	I.D. (10 mm)
0.5	10	20
1	20	40
1.5	40	80
2	60	100

Tab. C

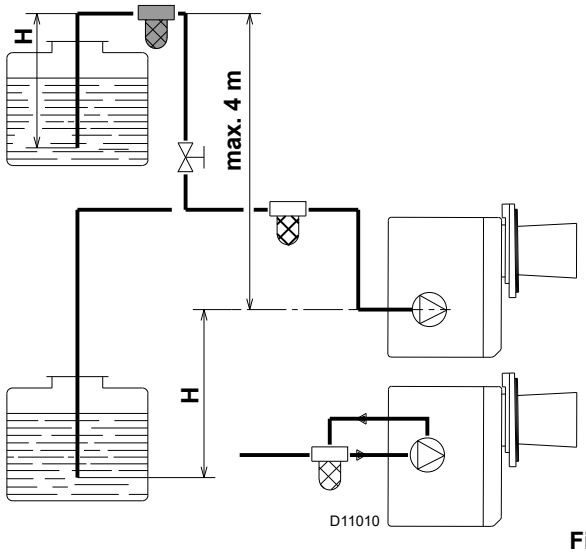


Fig. 11

H difference of level
L max. length of the suction line
I.D. internal diameter of the oil pipes

NOTE:
The Tab. C and Tab. D show the maximum approximate lengths for the supply line, depending on the difference in level, length, and the diameter of the fuel conduit.

H metres	L metres	
	I.D. (8 mm)	I.D. (10 mm)
0	35	100
0.5	30	100
1	25	100
1.5	20	90
2	15	70
3	8	30
3.5	6	20

Tab. D

5.3 Two pipe system

Vacuum two pipe systems (Fig. 12) have a negative fuel pressure (depression) on intake to the burner.
Usually the tank is lower than the burner.

The return line should terminate in the oil tank at the same level as the suction line; in this case a non-return valve is not required.

Should however the return line arrives over the fuel level, the non-return valve is indispensable. This solution however is less safe than previous one, due to the possibility of leakage of the valve.

CAUTION

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

Riello recommends a good quality fuel filter at the tank (Fig. 12) and a secondary filter (60 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.

5.3.1 Priming pump

WARNING

Before starting the burner make sure that the return pipe-line is not clogged: any obstruction would cause the pump seals to break.

On the system in Fig. 12 start the burner and wait for the priming. Should lock-out occur prior to the arrival of the fuel, await at least 20 seconds before repeating the operation.

WARNING

The pump vacuum should not exceed a maximum of 0.4 bar (30 cm Hg).
Beyond this limit gas is released from the oil.

NOTE:
The Tab. E shows the maximum approximate lengths for the supply line, depending on the difference in level, length, and the diameter of the fuel conduit.

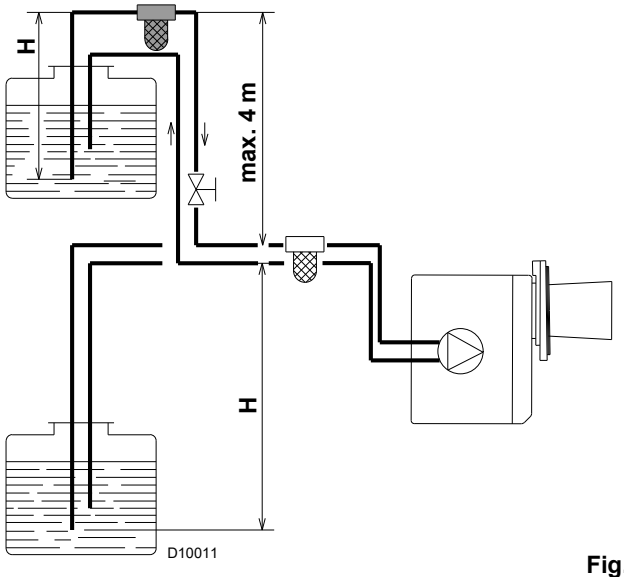


Fig. 12

H metres	L metres	
	I.D. (8 mm)	I.D. (10 mm)
0	35	100
0.5	30	100
1	25	100
1.5	20	90
2	15	70
3	8	30
3.5	6	20

Tab. E

H difference of level
L max. length of the suction line
I.D. internal diameter of the oil pipes

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.
- 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 L-N 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

Close the fuel interception tap.

DANGER

Avoid condensate, ice and water leaks from forming.

6.1.1 Control box

DANGER

This operation must be performed with the burner turned off and mains power disconnected.

WARNING

The replacement of the control box must be performed by qualified personnel, as indicated in this manual and in accordance with standards and regulations in force.

To remove the control box from the burner follow of the instruction:

- loosen the screw 1)(Fig. 13), open the protection 2) and remove all components;
- remove the coil 3) and loosen the two screws 4);
- move a little the control box and remove the high voltage leads.

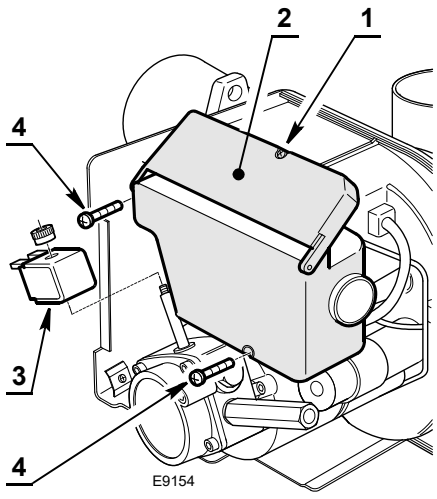


Fig. 13

WARNING

- The control box can be used on the burners with or without the heater.
- If the heater is damaged, introduce the bridge 7)(Fig. 14) into the control box so that the burner can operate without the heater until the heater will be replaced.

WARNING

- The control box as spare part is supplied with the jumper 7)(Fig. 14) already installed.
- If the control box is installed on a burner with the heater, remove the jumper 7) before putting the cover in place. Connect, also, the cables of the heater and the thermostat.



Fig. 14

6.2 Electrical wiring

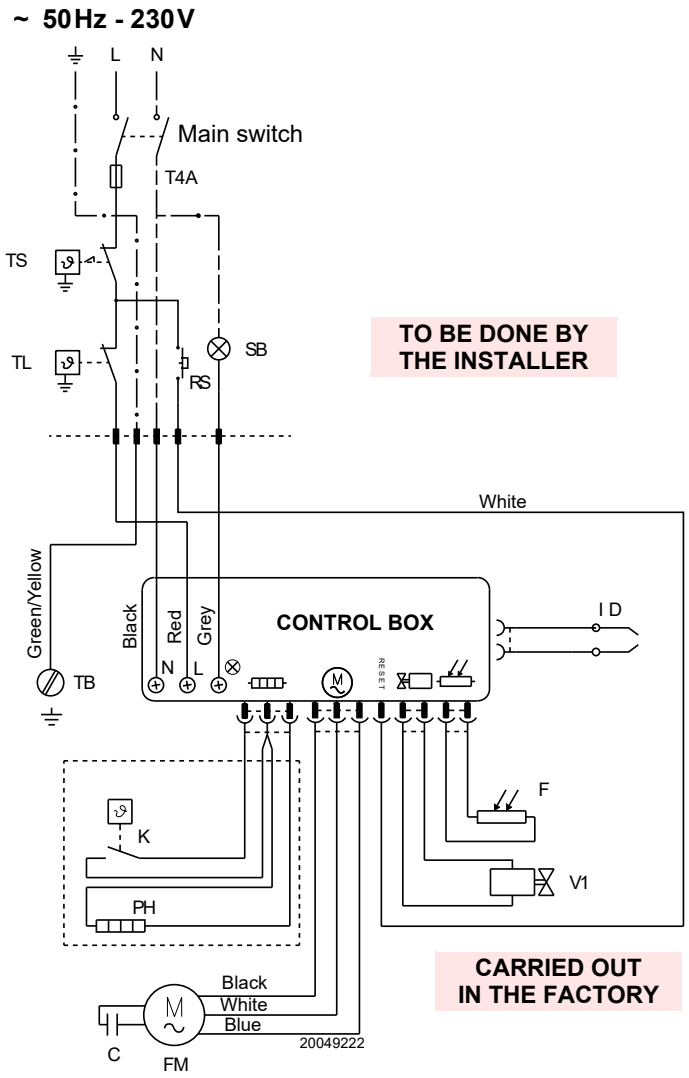


Fig. 15

WARNING

- Do not invert the neutral with the phase in the electrical supply line.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The section of the conductors must be at least 1mm^2. (Unless requested otherwise by local standards and legislation).

WARNING

Test the burner verifying the shut-down by opening the thermostats and the lock-out by darkening the flame sensor.

CAUTION

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

Key (Fig. 15)

C	Capacitor
F	Flame sensor
FM	Fan motor
K	Start up thermostat after pre-heating
ID	Ignition electrodes
PH	Heater
RS	Remote reset push-button
SB	Remote lock-out signal (230VAC - 0,5A max.)
T4A	Fuse
TB	Burner-earth
TL	Limit thermostat
TS	Safety thermostat
V1	Oil valve

7 Start-up, calibration and operation of the burner

7.1 Notes on safety for the first start-up

WARNING

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

WARNING

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

7.2 Combustion adjustment

In conformity with UL 296 the application of the burner on the boiler, adjustment and testing must be carried out observing the instruction manual of the boiler, including verification of the CO and CO_2 concentration in the flue gases, their temperatures and the average temperature of the water in the boiler.

To suit the required appliance output, fit the proper nozzle, then adjust the pump pressure, the setting of the combustion head and the air damper opening in accordance with the following table.

Values in the table refer to 12.5% CO_2 and to sea level.

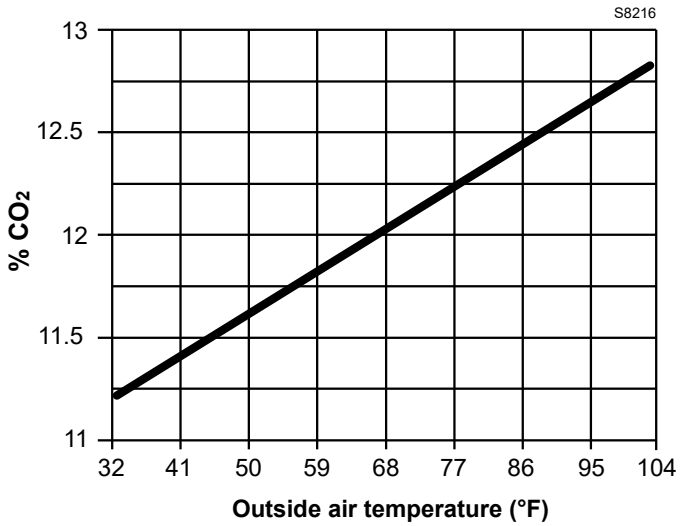


Fig. 16

Nozzle		Pump pressure	Burner output	Combustion head adjustment	Air damper adjustment
GPH	Angle	bar	kg/h ± 4%	Set-point	Set-point
0.85	60° S	12	3.50	0	1.1
1.00	60° S	12	4.00	0	1.3
1.10	60° S	12	4.50	1	1.7
1.25	60° S	12	5.00	2	2.5
1.35	60° S	12	5.40	2	3.2
1.50	60° S	12	6.20	2	5
1.65	60° S	12	6.70	3	5
1.75	60° S	12	7.00	4	6
2.00	60° S	12	8.00	5	8
2.00	60° S	14	8.33	6	8.3

Tab. F

7.3 Nozzles installation

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 the manufacturer in the Instruction and warning booklet should be used.

WARNING

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

CAUTION

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

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

7.3.1 Nozzles recommended

– Danfoss type S

Angle 60°: in most cases.
Angle 80°: in case of flame detachment, during ignitions at low temperatures.

7.4 Pump pressure

The pump leaves the factory set for light oil working.

7.5 Combustion head setting

To adjust the combustion head, proceed as follows:

– loosen the two screws 1)(Fig. 17) in the ring slots.
– Turn the blast tube 2) to regulate it, until the end of the slotted ring 3) centres up with the notch shown in the Tab. F on page 15.
– **Turn in a clockwise direction:**
in order to increase the volume of air entering the combustion chamber and thus diminishing its pressure.
There is a reduction of CO_2 and the adhesion of the flame to the air diffuser disc improves.
(Setting advisable for ignitions at low temperatures).
– **Turn in an anticlockwise direction:**
in order to reduce the volume of air entering the combustion chamber and thus increasing its pressure.
The CO_2 improves and the adhesion of the flame to the diffuser tends to reduce.
(This setting is not advisable for ignitions at low temperatures).
– Tighten the two screws 1).

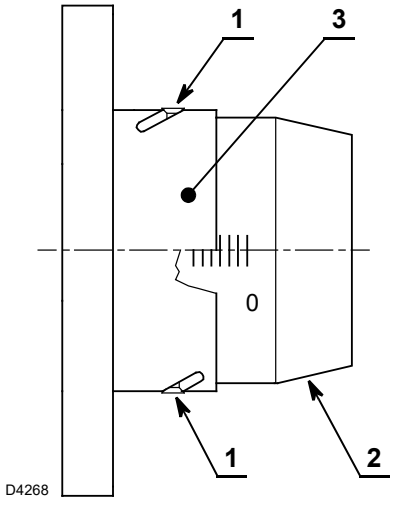


Fig. 17

7.6 Air damper adjustment

The settings indicated in the schedule refer to the combustion-chamber with “zero” depression.

This regulation is purely indicative.

Each installation however, has its own unpredictable working conditions: actual nozzle output; positive or negative pressure in the combustion-chamber, the need of excess air, etc.

All these conditions may require a different air damper setting.

7.7 Diffuser disc and electrodes adjustment

To adjust the diffuser disc unit, proceed as follows:
– loosen the screw 1)(Fig. 18);
– move the diffuser disc unit up to level **A**;
– tighten the screw 1).

To adjust the electrodes unit, proceed as follows:
– loosen the screw 2)(Fig. 18).
– move the electrodes unit up to level **B**.
– tighten the screw 2).

	mm
A	$7.5^{+0.7}_{-0.5}$
B	4 ± 0.5

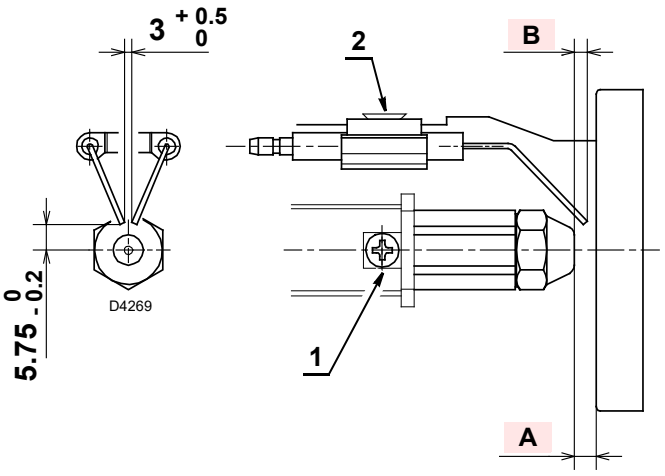
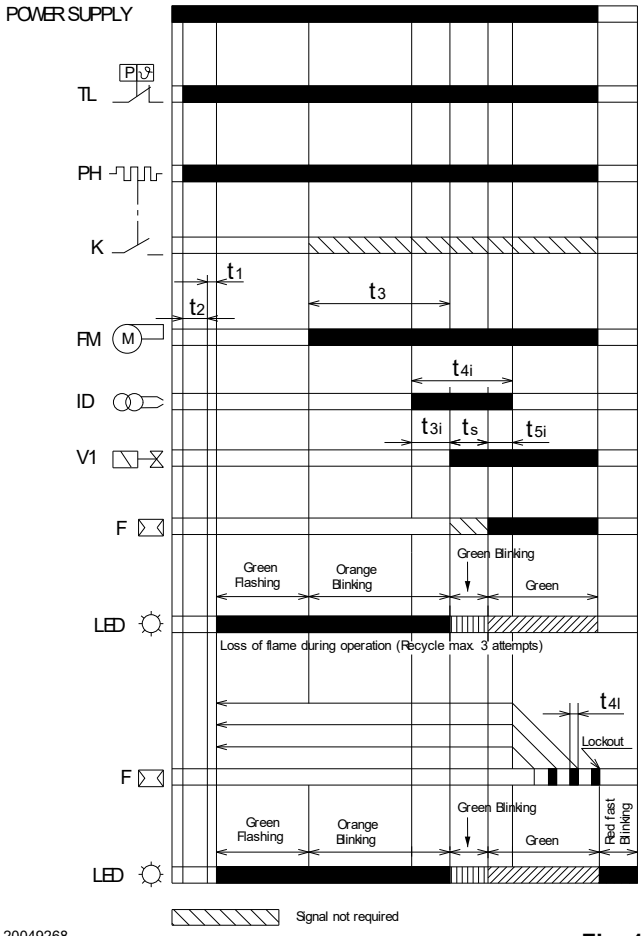


Fig. 18

7.8 Operation programme

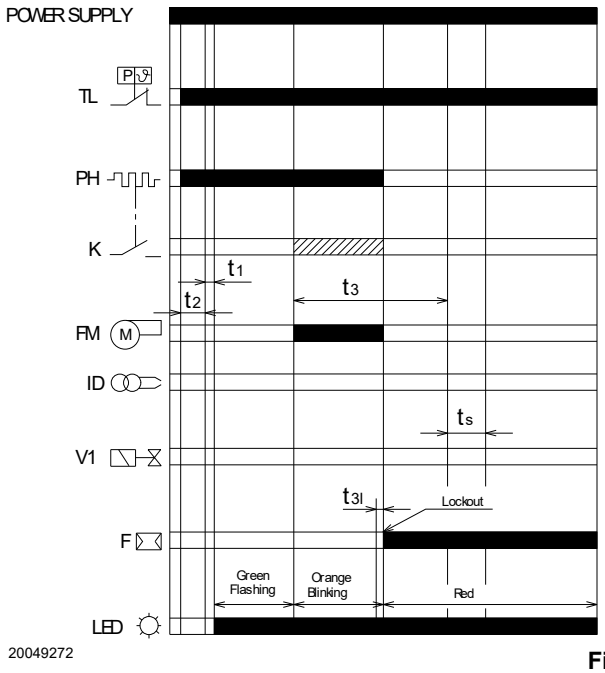
Normal operation



20049268

Fig. 19

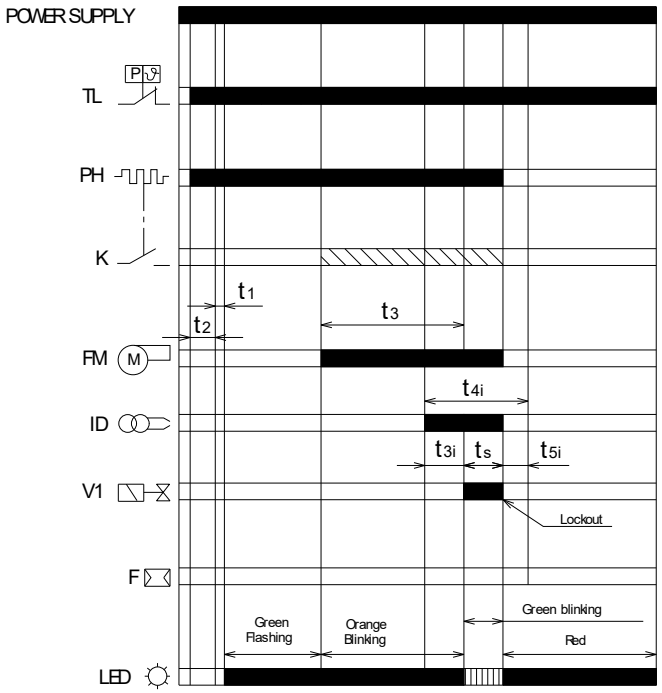
Lock-out due to extraneous light during pre-purging



20049272

Fig. 20

Lock-out due to ignition failure



20049270

Fig. 21

Key to lay-out

F – Flame sensor
FM – Fan motor
ID – Ignition device
K – Start up thermostat after pre-heating
PH – Pre-heater
TL – Limit thermostat
V1 – Oil-valve
t1 – Waiting time
t2 – Initialization check time
t3 – Pre-purge time
t3i – Spark pre-ignition time
t3l – Checks extraneous light during pre-purging
t4i – Total spark ignition time
t4l – Reaction time to achieve safety shut-down due to flame failure
t5i – Spark post- ignition time
ts – Safety time

7.9 Table of timings

Symbol	Description	Value (sec.)
t0	Standby: the burner awaits the heat request	-
t1	Waiting time for an input signal: reaction time, control box remains in waiting status for t1	≤ 1
t2	Initialisation standby time: check time following the main power start-up	3.5
t2l	Checks for any extraneous lights or parasite flame during t2: waiting status for t2l, after goes in lockout	25
t2p	Max. oil pre-heating time: waiting mode for t2p, after which there is a lockout (if the heater is present)	max 600*
t3	Pre-purge time: the fan motor is operating, then the oil valve is activated	15
t3l	Checks extraneous light or parasite flame during pre-purging: Control box goes into lockout immediately	≤ 1
t3i	Discharge pre-ignition time	2
ts	Safety time	5
t4i	Total discharge ignition time	10
t4l	Reaction time for valve deactivation due to absence of flame	≤ 1
t5i	Discharge post-ignition time	3
-	Time required for release of control box	1 - 2
tr	Re-cycles: Max. 3 repeats of the complete ignition sequence in the event of flame absence during operation; the final action at the last attempt following flame failure is a lockout	3 re-cycles

* independent by flame control-box

7.9.1 Operations status indication

Status	Reset push-button colour	Seconds		Colour code
OFF	OFF	-	-	-
Pre-heating time	GREEN flashing	0.5	2.5	■□■□■□■□■□
Pre-purge	ORANGE blinking	0.5	0.5	●○●○●○●○●○
Safety time	GREEN blinking	0.5	0.5	■□■□■□■□■□
Normal operating position	GREEN*	-	-	Steady ON

7.9.2 Faults diagnosis - lockouts

Fault description	Reset push-button colour	Seconds		Colour code
Extraneous light or parasite flame signal	GREEN, RED blinking alternately	0.5	0.5	■▲■▲■▲■▲■▲
Frequency main supply anomaly	ORANGE	-	-	Steady ON
Internal voltage fault	ORANGE, GREEN fast blinking alternately	0.2	0.2	●■●■●■●■●■
Reset push-button / Remote reset anomaly	GREEN, RED fast blinking alternately	0.2	0.2	■▲■▲■▲■▲■▲
Lockout for no flame after Ts	RED	-	-	Steady ON
Lockout due to extraneous light or parasite flame signal	RED blinking	0.5	0.5	▲△▲△▲△▲△▲△
Lockout for maximum number of recycles (flame failure during operation)	RED fast blinking	0.2	0.2	▲△▲△▲△▲△▲△
Lockout after exceeding max. pre-heating time	RED flashing	0.5	2.5	▲△▲△▲△▲△▲△
Lockout due to fan motor fault	RED, ORANGE flashing inverted	2.5	0.5	▲●▲●▲●▲●▲●
Lockout due to malfunction in the internal control circuit that drives the oil valve	RED, GREEN flashing inverted	2.5	0.5	▲■▲■▲■▲■▲■
Lockout due to eeprom fault	ORANGE, GREEN blinking alternately	0.5	0.5	●■●■●■●■●■

Key to layout

ON	OFF	Colour code
▲	△	RED
●	○	ORANGE
■	□	GREEN

* The blinking of the LED depends on the quality of flame signal (see paragraph 3.5.4).

7.9.3 Fuel pre-heating function

If the burner is equipped with the fuel pre-heating function, in the presence of a start request from the heat request thermostat of the boiler, the burner awaits the closure of the start-up thermostat (or pre-heating) positioned on the nozzle holder.

If the start-up thermostat does not close within 600 seconds, the burner goes into lockout mode.

If the flame goes out during operation, the burner performs recycling if the start-up thermostat is closed.

If the flame goes out during operation, the purging stops and the burner waits for the start-up thermostat to be closed before restarting the pre-purging.

7.9.4 Shut-down test

If the reset push-button or remote reset is pressed during operation, for more than 5 seconds but less than 10 seconds (to avoid passing to the next menu), the burner will switch off, the oil valve will close, the flame will go out, and the start-up sequence will begin again.

If shut-down test is enabled, the number of repetitions of the start-up sequence and the number of the reset are restored.

7.9.5 Diagnosis of the flame signal quantity

The burner allows the diagnosis of the quality of the signal arriving from the flame sensor during operation.

Quality of the flame sensor signal	Number of green LED blinks
Acceptable	1 - 2 blinks
Good	3 - 4 blinks
Very good	5 blinks, or always ON

NOTE:
If the signal measured is more than 6 times the minimum threshold value (approx. 3 lux), the green LED will remain ON. Otherwise, the number of blinks indicates the quality of the signal arriving from the sensor (no. of blinks * approx. 3 lux). The signal measured depends on the sensitivity of the sensor used, and its tolerance: if the sensor is highly sensitive, the signal level will be high (for the same flame).

Flame detection	Parameters
Type of sensitive element	Photo-conductive cell
Functioning principle	Detection of visible light
Sensitivity to the flame during the pre-purging	> 1 Lux
Typical sensitivity to the flame during normal operation	> 3 Lux
Typical sensitivity to the flame failure	< 2 Lux

NOTE:
With 2 lux the burner goes into lock-out after 3 re-cycles

7.9.6 Intermittent operation

The control box will initiate automatic reset shutdown followed by a restart after 24 hours of operation.

It is possible to reduce this automatic shutdown to 1 hour (see programming menu paragraph) to check for a possible failure of the flame sensor, see “**Notes on safety for the electrical wiring**” on page 13.

7.9.7 Recycle and limit of repetitions

The control box has a recycle function - i.e. the complete repetition of the start-up sequence - with which up to 3 attempts are made if the flame goes out during operation.

If the flame fails 4 times during operations, this will cause the burner to lock out. If there is a new heat request during the recycle, then the 3 attempts are reset with the switching of the heat request thermostat.

NOTE:
After 510 seconds of continuous operation a new attempt of possibility is added.

By disconnecting power supply, when new heat demand occur (power supply is applied to the burner) all attempts re-ignition possibilities are allowed (3 maximum).

7.9.8 Extraneous light present or parasite flame

If, at the moment that the boiler heat request thermostat commands the burner to start, an extraneous light or a parasitic flame is detected, the burner will remain idle until the light or flame disappears. Otherwise the system will lock after 25 seconds.

If the extraneous light or the parasitic flame is detected during pre-purging, the burner locks immediately.

The fault is indicated by way of the blinking LED (See “Faults diagnosis - lockouts” on page 19).

7.9.9 Pre and post spark ignition

In the pre-spark ignition time the ignition device starts 2 seconds before the oil valve opens.
In the post-spark ignition time, the ignition device stops 3 seconds after safety time.
The ignition is present throughout the safety time.

NOTE:
In the case of continuous recycle or another heat request in a short time, the repetitions of the ignition transformer function cycle may not exceed one attempt per minute.

7.9.10 Reset protection and remote reset

The burner can be reset by pushing the built-in reset push-button for more than 1s (< 2s).

The system will only unlock after the button has been released.

The unit can also be reset via an external button (remote reset) which connects the L terminal (LINE) to the RESET terminal (refer to the wiring diagrams). Max length of external remote reset cable is 3 meters.

NOTE:
The burner can only be reset 5 consecutive times; after this, you must disconnect the power supply to obtain a further 5 reset attempts.
The burner can only be reset if power supply is applied to the control box.

7.9.11 External lock-out indicator

The burner is equipped with an external locking signal function, i.e. to signal (together with the integrated reset push-button) a burner locking alarm.

The control box enables the command of an external lamp ⊗ by way of the exit (230Vac-0.5Amp max).

7.9.12 Frequency main supply anomaly

During the pre-purge the control-box automatically detects the value of the frequency of the main supply in the range of 50-60 Hz, in both cases working times are verified. The LED blinks to indicate the fault (See “Faults diagnosis - lockouts” on page 19).

- ➤ If the anomaly is present before the heat request or during the pre-heating phase, the burner will not start up and the anomaly will be signalled.
- ➤ If the anomaly is detected during pre-purging, the burner will remain in the purging phase and the anomaly will be signalled.
- ➤ The anomaly is not detected during normal operation, the burner will remain in that status.

When the anomaly disappears, the burner restarts.

7.9.13 Internal voltage anomaly

The control-box automatically detects if the internal voltage works correctly. The LED blinks to indicate the fault (See “Faults diagnosis - lockouts” on page 19).

- ➤ If the anomaly is detected during the initialisation phase, the burner does not start.
- ➤ If the anomaly is detected after a lock-out the burner does not start.
- ➤ If the anomaly is detected after a shut-down test the burner does not start.
- ➤ The anomaly is not detected during normal operation, the burner will remain in that status.

When the anomaly disappears, the burner restarts.

7.9.14 Reset push-button / Remote reset anomaly

If the reset push-button or remote reset are faulty or remain pressed for more than 60 seconds, the anomaly - as long as it is active - is indicated by the blinking of the LED (See “Faults diagnosis - lockouts” on page 19).

This anomaly is merely a visualisation.

- ➤ If the anomaly is detected during pre-purge or safety time, the burner does not stop and the start-up sequence continues.
- ➤ If the anomaly is detected during operation, the burner does not stop (it goes on operating) but the anomaly signalling is activated.
- ➤ If the anomaly is detected in the lock-out position, the anomaly signalling is not activated and the burner cannot be reset. When the anomaly disappears the blinking of the led stops.

7.9.15 Fan motor check

The control-box automatically detects the presence of the fan motor, if there is a failure the control-box will perform a lock-out. The LED blinks to indicate the lock-out (See “Faults diagnosis - lockouts” on page 19).

7.9.16 Oil-valve check

The control-box automatically detects the presence of the oil-valve coil, if there is a failure the control-box will perform a lock-out. The LED blinks to indicate the lock-out (See “Faults diagnosis - lockouts” on page 19).

7.9.17 EEprom check

The control-box automatically detects if EEprom memory of microcontroller has failed and will perform a lock-out. The LED blinks to indicate the lock-out (See “Faults diagnosis - lockouts” on page 19).

7.10 Priming pump operation

In the lock-out condition, the burner can be subjected to a pump purging procedure by activating just the motor for 30 seconds to purge the air from the piping and the filters of the light oil supply tubes.

Repeat this function a maximum of 5 times to avoid damaging the pump.

The priming pump cycle can be deactivated before the end of the "Priming pump time" (30s) by press the push-button for 1 ÷ 2 seconds.

Priming pump activation sequence	The colour of the LED button becomes
The function can only be activated using the remote reset	RED
The remote reset push-button must be pressed for more than 6s and then released. If the button is not released, the control box remains in this position, with the LED blinking, and the burner does not start.	GREEN / ORANGE / RED BLINKING
Press the remote reset push-button and then release it after 3 seconds to activate the pump cleaning function.	GREEN / ORANGE / RED
The fan motor starts up after 2 seconds, and operates for 30 seconds.	GREEN / ORANGE / RED
At the end of the pump cleaning procedure, the control box returns to the initial lock-out condition.	RED

Tab. G

7.11 Automatic pre-heating disabling

It is possible to disable the pre-heater function in automatic mode by pressing the reset remote.

When the pre-heating is disabled, the pre-heating remains off until:

– a lock-out occurs
– the main supply voltage is interrupted
– intermittent operation (reset after 1 hour or 24 hours)

Sequence of pre-heating deactivation	The colour of the LED button becomes
- Pre-heating deactivation is only permitted if there is no lock-out or fault	-
- Pre-heating deactivation is only permitted by means of the remote reset push-button	-
- Supply the burner and simultaneously maintain pressed the remote reset for 3 sec.	RED
- Release the remote reset push-button within 3 seconds	OFF
- The burner will only begin the pre-heating deactivation and the purging restart if the remote reset push-button has been released within 3 seconds	-

Tab. H

7.12 Programming menu

GENERAL NOTES

It is possible to access the programming menu using the reset push-button or remote reset only on running OPERATION.

If in page menu the reset push-button is not pressed, after 10 seconds occur automatic exit and there is a green led flashing for the value set.

If the number of pressures on the push-button exceeds the maximum allowable, the value in memory will remain the maximum one. If the push-button or remote reset is pressed for more than 60 seconds, a failure of the push-button will be visualised and the control-box will restart.

BLOCK DIAGRAM

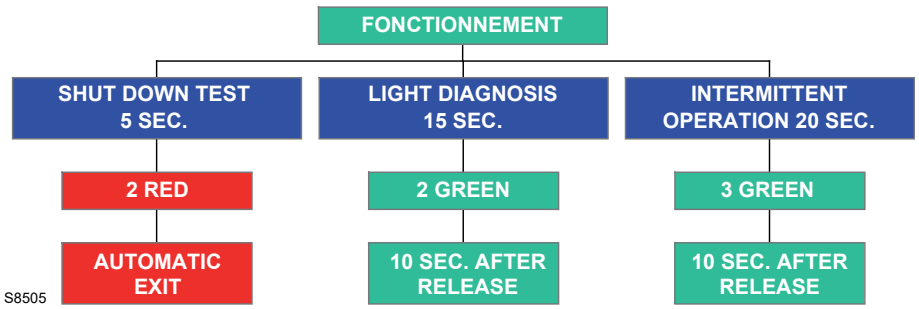


Fig. 22

Version	Release push-button time	Led signal page menu	N° push-button pressing	Led visualised (GREEN)	Exit menu
Shutdown test	5s ≤ t < 10s	2 blinking RED	/	/	Automatic after blinking stop
Light diagnosis	15s ≤ t < 20s	2 blinking GREEN	1 = enable (default) 2 = disable	1 blink 2 blinks	10 sec. after release push-button
Intermittent operation	20s ≤ t < 25s	3 blinking GREEN	1 = 0 disabled 2 = 1 hour 3 = 24 hours (default)	1 blink 2 blinks 3 blinks	10 sec. after release push-button

7.12.1 Shutdown test

At the exit of shutdown test page menu there is no led blinking.

After shutdown, the burner restarts automatically and the no. of attempts of recycle are restored.

Sequence for shutdown test

➤ Allowable programming only during running operation
➤ Press push-button for 5 sec. ≤ t < 10 sec.
➤ RED led blinking 2 times (0.2s ON; 0.2s OFF)
➤ Release push-button
➤ The burner will initialise a shutdown followed by a restart

7.12.2 Light diagnosis

Sequence for enable/disable

- ➤ Allowable programming only during running operations mode
- ➤ Press push-button for 15 sec. ≤ t < 20 sec.
- ➤ GREEN led blinking 2 times
- ➤ Release push-button
- ➤ GREEN led OFF
- ➤ Press push-button 1 time for enable or 2 times for disable function
- ➤ GREEN led ON and OFF with every press and release operation
- ➤ After 10 sec. GREEN led blinking for times programmed (0.5s ON; 0.5s OFF)

7.12.3 Intermittent operation

Sequence for enable/disable

- ➤ Allowable programming only during running operations mode
- ➤ Press push-button for 20 sec. ≤ t < 25 sec.
- ➤ GREEN led blinking 3 times
- ➤ Release push-button
- ➤ GREEN led OFF
- ➤ Press push-button 1 time for disable function
- ➤ Press push-button 2 times for enable a shutdown every 1 hour
- ➤ Press push-button 3 times for enable a shutdown every 24 hours
- ➤ GREEN led ON and OFF with every press and release operation
- ➤ After 10 sec. GREEN led blinking for times programmed (0.5s ON; 0.5s OFF)

7.13 Lockout types

The control box display causes of malfunctioning any time that lockout occurs, identified by the reset push-button colour. The sequence of led pulses in the reset push-button issued by the control box identifies the possible types of malfunction, which are listed in the table below.

Lockout description	Lockout time	Led colour	Probable cause
Presence of extraneous light during standby	After 25 seconds	▲△▲△	– presence of a false flame signal after heat demand
Pre-heating not finished	After 600 seconds	▲△▲△	– faulty resistance of oil pre-heater – faulty switch of thermostat for start-up – short-circuit socket is not connected
Presence of extraneous light detected during pre-purging	Within 1 second	▲△▲△	– presence of false flame signal during pre-purging
Presence of extraneous light detected during pre-heater	After 25 seconds	▲△▲△	– presence of false flame signal during pre-heater
The flame is not detected after the safety time	5 seconds after the activation of the oil valve	RED Steady ON	– flame sensor defective or dirty – oil valve defective or dirty – faulty ignition transformer – badly regulated burner – oil fuel not present
Flame failure during operation	After 3 recycles	▲△▲△	– badly adjusted burner – oil valve defective or dirty – flame sensor defective or dirty
Faulty fan motor	Immediate	▲●▲●	– faulty fan motor – fan motor not connected
Malfunction in the internal control circuit of the oil valve	Immediate	▲■▲■	– faulty oil valve – internal control circuit of the oil valve faulty
Eeprom fault	Immediate	●■●■	– faulty internal memory

Tab. I

Frequency of reset push-button blinking for status indication - See “Faults diagnosis - lockouts” on page 19



WARNING

To reset the control box after visual diagnostics have been displayed, you must press the reset push-button.

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.



Turn off the fuel interception tap.



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

8.2 Maintenance programme

8.2.1 Maintenance frequency



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

8.2.2 Checking and cleaning



The operator must use the required equipment during maintenance.

Combustion head

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

Burner

Check for excess wear or loose screws and clean the outside of the burner.

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 sensor

Clean the flame sensor.

Electrodes

Check the correct position of electrodes

Nozzles

It is advisable to replace nozzles every year during regular maintenance operations. Do not clean the nozzle openings; do not even open them.

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

Delivery pressure must correspond with the Tab. F on page 15. 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**.

Check to make sure that the hoses are still in good condition.

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.

Boiler

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

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.

Allow the burner to work for 10 min. and then check the combustion readings with the parameters indicated within the appliance instruction manual. **Then carry out a combustion check verifying:**

– Smoke temperature at the chimney;
– Content of CO_2 (%);
– Content of CO (ppm);
– Smoke value according to opacity smokes index according to Bacharach scale.

8.2.3 Maintenance position

Access to the combustion head, the diffuser disc-holder assembly, electrodes and nozzle.

➤ Loosing the fixing nut to the flange 1)(Fig. 23) and remove the burner out of the boiler.
➤ Hook the burner to the flange 1), by removing the blast tube 2) after loosing the fixing screws 3).
➤ Remove the small cables 4) from the electrodes 5) and the diffuser disc-holder assembly from the nozzle-holder 6) after loosing its fixing screw 7).
➤ Once replacement of the nozzle has been made, screw it and tighten it as shown in the Fig. 18 on page 17.

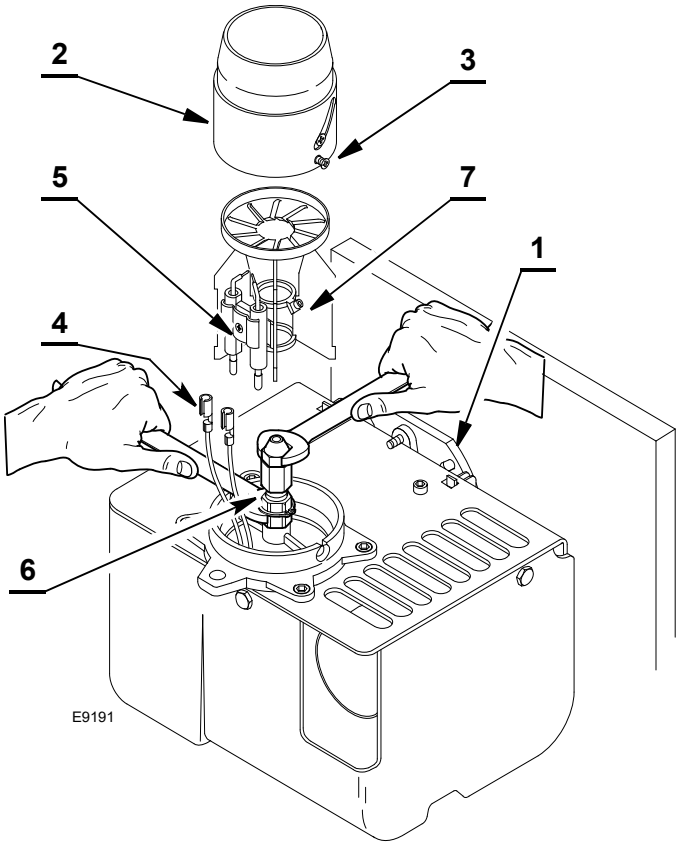


Fig. 23

9 Faults / Solutions

Here below you can find some causes and the possible solutions for some problems that could cause a failure to start or incorrect operation of the burner.

A fault usually makes the lockout led signal which is situated inside the reset push-button of the control box.

When the lockout lamp comes on, the burner will only attempt to start up after the reset push-button has been pressed. If ignition is then normal, the stop can be attributed to a temporary fault that is not dangerous.

If however the lock out continues the cause must be determined and the solution found.



In the event of a burner lockout, more than two consecutive burner reset operations could cause damage to the installation. On the third lockout, contact the Aftersales Service.



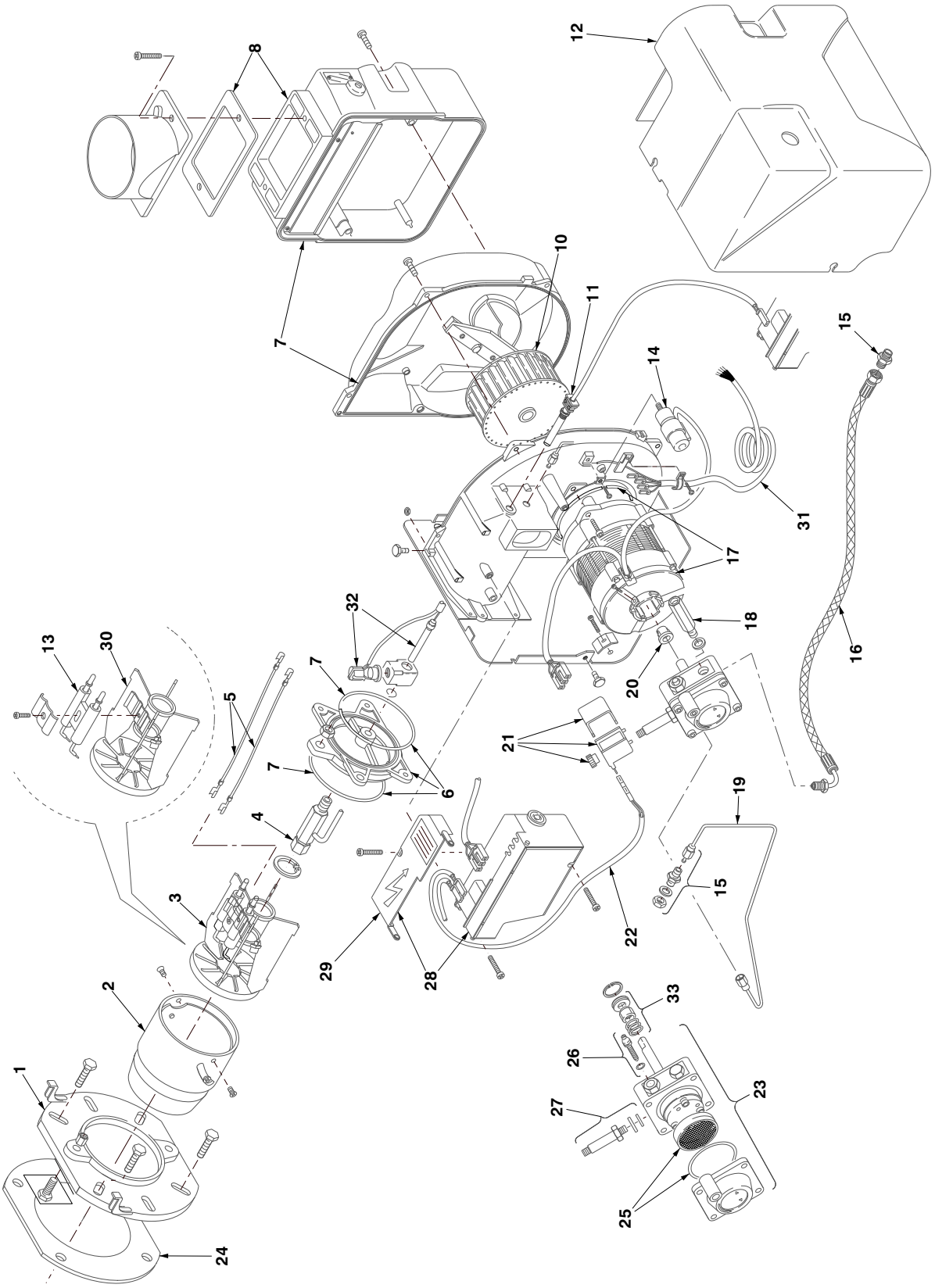
If further lockouts or burner faults occur, interventions must only be made by qualified, authorised personnel (as indicated in this manual, and in compliance with the laws and regulations currently in force).

Faults	Possible cause	Fault diagnostics	Solutions
The burner does not start when there is heat demand.	Lack of electrical supply.	OFF	Check presence of voltage in the L - N the pin plug.
			Check the conditions of the fuses.
			Check that safety thermostat is not lock out.
	The flame sensor sees false light.	■▲■▲	Eliminate the extraneous light.
	The connections in the control box are wrongly inserted.	OFF	Check and connect all the plugs and sockets properly.
	The P short-circuit socket is not connected	■□■□■	Replace them.
The burner goes into lockout mode before or during the pre-purging.	The flame sensor sees extraneous light.	▲△▲△	Eliminate the extraneous light.
Burner runs normally in the pre-purge and ignition cycle and locks out after 5 seconds ca.	The flame sensor is dirty.	RED Steady ON	Clear it.
	The flame sensor is faulty.		Replace it.
	Flame moves away or fails.		Check pressure and output of the fuel.
			Check air output.
			Change nozzle.
			Check the coil of solenoid valve.
Burner starts with an ignition delay.	The ignition electrodes are wrongly positioned.	OFF	Adjust them according to the instructions of this manual.
	Air output is too high.		Set the air output according to the instructions of this manual.
	Nozzle dirty or worn.		Replace it.



The manufacturer cannot accept responsibility for any damage to persons, animals or property due to error in installation or in the burner adjustment, or due to improper or unreasonable use or non observance of the technical instruction enclosed with the burner, or due to the intervention of unqualified personnel.

A Appendix - Spare parts



N.	CODE	DESCRIPTION	*
1	**3008637**	FLANGE	
2	**3002572**	BLAST TUBE ASSEMBLY	B
3	**3002571**	DIFFUSER DISC - ELECTRODE ASSEMBLY	A
4	**20034467**	NOZZLE HOLDER	B
5	**3008794**	HIGH VOLTAGE LEAD	A
6	**20034465**	COLLAR	
7	**3008963R**	KIT SEALS	A
8	**3008839**	AIR DAMPER ASSEMBLY	
10	**3005799**	FAN	C
11	**20132550**	FLAME SENSOR	A
12	**3008962**	COVER	
13	**3020121**	ELECTRODE	A
14	**20081251**	CAPACITOR	B
15	**3003602**	CONNECTOR	C
16	**3005720**	HOSE	A
17	**3008964**	MOTOR	C
18	**3008876**	PRESSURE GAUGE	
19	**20034468**	TUBE	
20	**3000443**	JOINT	A
21	**3008648**	COIL - SHELL AND KNOB	A
22	**3008851**	LEAD COIL	A
23	**20034559**	PUMP	B
24	**3005795**	GASKET	
25	**3008653**	FILTER - O-RING	A
26	**3008651**	PUMP PRESSURE REGULATOR	A
27	**3007582**	SOLENOID VALVE	B
28	**20037830**	CONTROL BOX	B
29	**3008649**	CONTROL BOX PROTECTION	
30	**3020119**	DIFFUSER DISC	A
31	**20034469**	CONNECTION	A
32	**20034471**	HEATER	B
33	**3000439**	PUMP SEAL	

*

ADVISED PARTS

A = Spare parts for minimum fittings
A+B = Spare parts for basic safety fittings
A+B+C = Spare parts for extended safety fittings

B Appendix - Burner start up report

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

GAS OPERATION

Gas Supply Pressure:		CO_2: Low Fire		High Fire	
Main Power Supply:		O_2: Low Fire		High Fire	
Control Power Supply:		CO: Low Fire		High Fire	
Burner Firing Rate:		NO_X: Low Fire		High Fire	
Manifold Pressure:		Net Stack Temp - Low Fire:		High Fire	
Pilot Flame Signal:		Comb. Efficiency - Low Fire:		High Fire	
Low Fire Flame Signal:		Overfire Draft:			
High Fire Flame Signal:					

OIL OPERATION

Oil supply pressure:		CO_2: Low Fire		High Fire	
Oil suction pressure:		O_2: Low Fire		High Fire	
Control Power Supply:		CO: Low Fire		High Fire	
Burner Firing Rate:		NO_X: Low Fire		High Fire	
Low Fire Flame Signal:		Net Stack Temp - Low Fire:		High Fire	
High Fire Flame Signal:		Comb. Efficiency - Low Fire:		High Fire	
Low Fire Nozzle Size:		Overfire Draft:			
High Fire Nozzle Size:		Smoke number:			

CONTROL SETTINGS

Operating Setpoint:		Low Oil Pressure:	
High Limit Setpoint:		High Oil Pressure:	
Low Gas Pressure:		Flame Safeguard Model Number:	
High Gas Pressure:		Modulating Signal Type:	

NOTES

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

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

RIELLO BURNERS NORTH AMERICA
http://www.riello.ca
1-800-4-RIELLO

2165 Meadowpine Blvd
Mississauga, Ontario
Canada L5N 6H6

Subject to modifications