

Gas oil / Kerosene burners

Progressive two-stage or modulating operation



B10

| CODE | MODEL | TYPE |
|----------|-----------|--------|
| 20034826 | P 140 P/G | 481 M1 |
| 20034827 | P 140 P/G | 481 M1 |

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

Manufacturer: RIELLO S.p.A.
Address: Via Pilade Riello, 7
37045 Legnago (VR)
Product: Gas oil / Kerosene burner
Model: P 140 P/G

These products are in compliance with the following Technical Standards:

EN 267

EN 292

and according to the European Directives:

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

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

Legnago, 01.03.2011

Mr. G. Conticini
Burners Division Department
RIELLO S.p.A.



2 Information and general warnings

2.1 Information about the instruction manual

2.1.1 Introduction

The instruction manual supplied with the burner:

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

Symbols used in the manual

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

2.1.2 General dangers

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



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



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



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

2.1.3 Danger: live components



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

Other symbols



ENVIRONMENTAL PROTECTION

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

- This symbol indicates a list.

Abbreviations used

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

Delivery of the system and the instruction manual

When the system is delivered, it is important that:

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

.....

- the address and telephone number of the nearest Assistance Centre.

.....

.....

.....

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

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

2.2 Guarantee and responsibility

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



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

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

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

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

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

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

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

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

Background

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

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

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

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

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

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

2.3.1 Information and general instructions

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

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

2.3.2 Product Disclaimer Statement

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

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

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

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

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

3 Safety and prevention

3.1 Introduction

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

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

It is a good idea to remember the following:

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

In particular:

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

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

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

3.2 Safety warnings

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

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

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

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

3.3 Basic safety rules

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

3.4 Personnel training

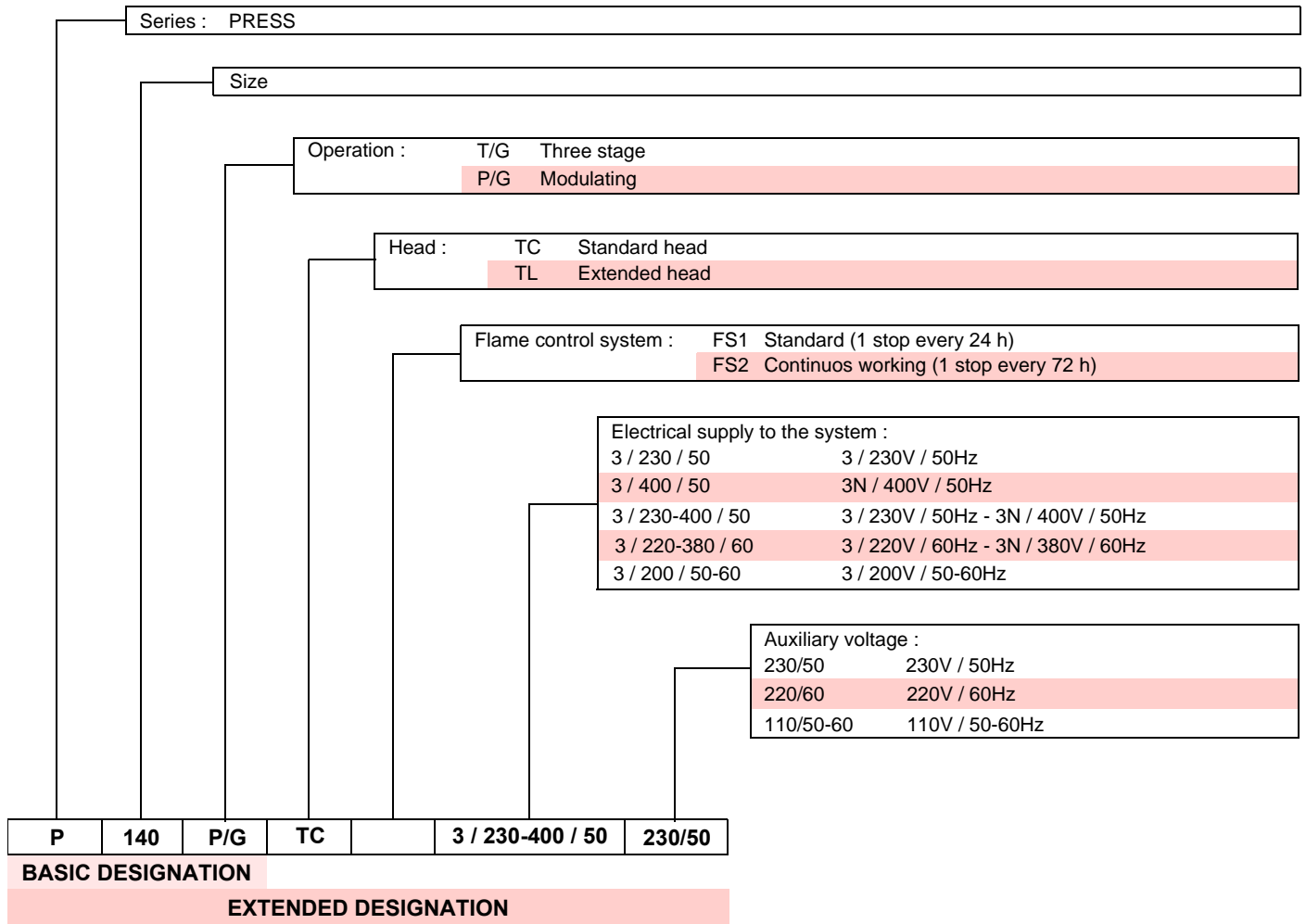
The user is the person, body or company that has acquired the machine and intends to use it for the specific purpose. He is responsible for the machine and for the training of the people working around it.

The user:

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

4 Technical description of the burner

4.1 Burner designation



4.2 Models available

| Designation | Electrical supply | Code |
|--------------|-------------------|----------|
| P 140 P/G TC | 3/230-400/50 | 20034826 |
| P 140 P/G TL | 3/230-400/50 | 20034827 |

4.3 Technical data

| | | | |
|---------------------------|---------------------|---|-----------------------|
| Thermal power - Output | | 415 ÷ 1660 kW - 35 ÷ 140 kg/h | |
| Operation | | 2-stage progressive/Modulating (with kit) | |
| Fuel | | Gas oil and Blends of gas oil and bio fuel (FAME in accordance with EN 14214) up to 10% | |
| Gas oil | net calorific value | kWh/kg | 11.86 |
| | | Mcal/kg | 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) |
| Kerosene | net calorific value | kWh/kg | 11.97 |
| | | Mcal/kg | 10.3 (10.300 kcal/kg) |
| | density | kg/dm ³ | 0.77 - 0.83 |
| | viscosity at 20 °C | mm ² /s max | 6 (1.5 °E - 6 cSt) |
| Electrical supply | | 3N ~ 50 Hz 400 / 230 V | ∧ |
| | | 3 ~ 50 Hz 230 V | △ |
| Motor | | 13.5A / 230V - 8A / 400V | |
| Ignition transformer | | Primary: 2A - Secondary: 2 x 6,5 kV - 35 mA | |
| Absorbed electrical power | | 4.5 kW | |
| Electrical protection | | IP 40 according EN 60529 (IEC 529-1989) | |

Tab. A

(1) Reference conditions: ambient temperature 20°C - Barometric pressure 1013 mbar - Altitude 0 m a.s.l.

4.4 Overall dimensions

The maximum dimensions of the burner are given in Fig. 1.

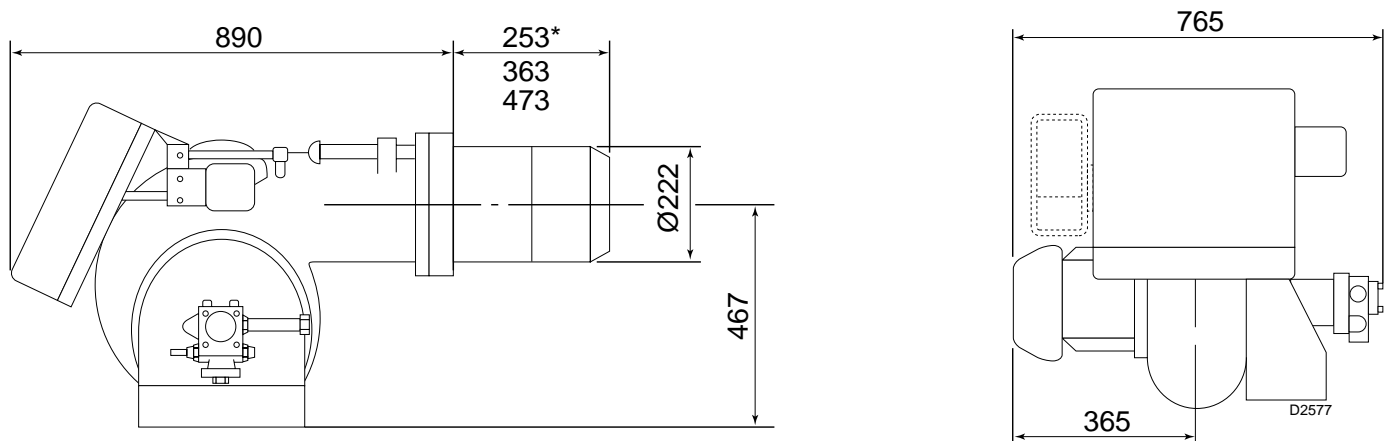


Fig. 1

(*) It is possible with a spacer upon request

4.5 Firing rates

The output of the burner during the operation varies from a maximum and a minimum value.

The max. output should be inside of the operating field, see drawing below.

The minimum output may decrease up to 75 kg/h.

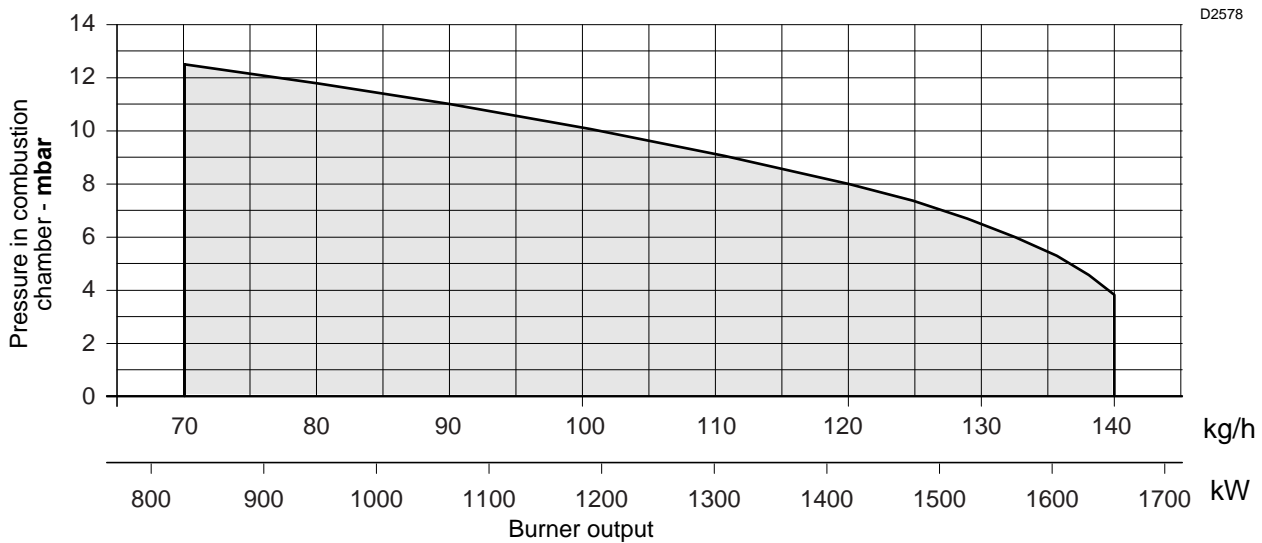


Fig. 2

4.6 Burner description

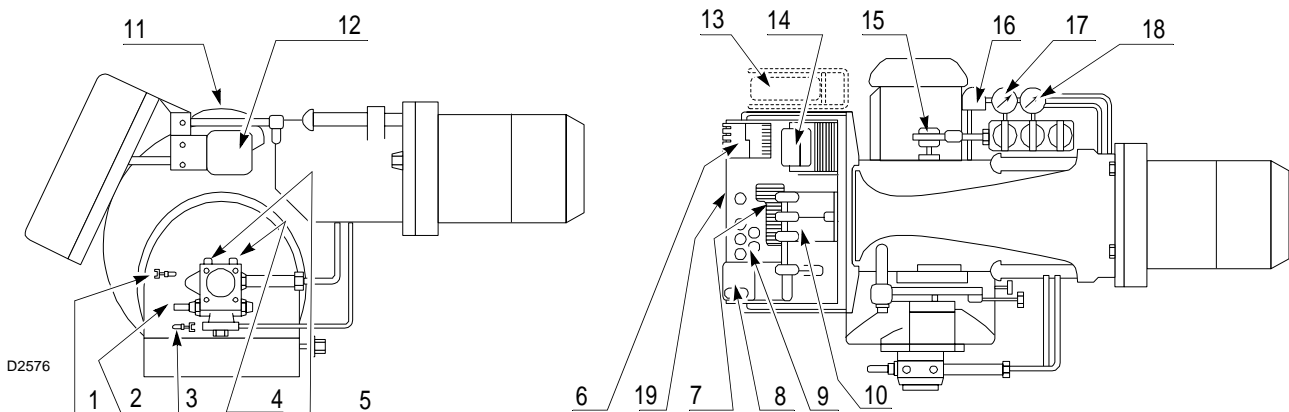


Fig. 3

- | | |
|---|--|
| 1 Suction line | 11 Air regulating cam |
| 2 Pump pressure adjustment screw | 12 Servomotor |
| 3 Return line | 13 Modulating controller (only for modulating) |
| 4 Manometer plug (G 1/4) | 14 Ignition transformer |
| 5 Vacuumer plug (G 1/4) | 15 Return pressure adjusting eccentric |
| 6 Reset push-button of the motor overload relay | 16 Pressure switch |
| 7 Wiring terminal board | 17 Manometer on return line |
| 8 Control box reset push-button and lock-out lamp | 18 Manometer on supply line |
| 9 Cable clamps | 19 Electric board |
| 10 Rod for combustion head shifting | |

4.7 Standard equipment

- | | |
|------------------------|-------|
| Hoses..... | No. 2 |
| Nipples..... | No. 2 |
| Screws..... | No. 4 |
| Gasket for flange..... | No. 1 |
| Cable clamps..... | No. 4 |



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

5 Installation

5.1 Notes on safety for the installation

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



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



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

5.2 Handling

The packaging of the burner includes a wooden platform, so it is possible to move the burner (still packaged) with a transpallet truck or fork lift truck.



The handling operations for the burner can be highly dangerous if not carried out with the greatest attention: keep any unauthorised people at a distance; check the integrity and suitability of the available means of handling.

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

When handling, keep the load at not more than 20-25 cm from the ground.



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

5.3 Preliminary checks

Checking the consignment



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



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

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 data for electrical supply and the protection level (E);
- the absorbed electrical power (F);
- the types of fuel used and the relative supply pressures (G);
- the data of the burner's minimum and maximum output possibilities (H) (see Firing rate).

| | | | |
|-----|---|---|--------|
| | B | E | F |
| ⊕ ≤ | H | | H |
| G | | | C |
| A | D | | R.B.L. |
| | | | |

S8324

Fig. 4



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

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

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

5.5 Operating position

The burner is designed to work only in the positions **1, 2, 3** and **4**. Installation **1** is preferable, as it is the only one that allows performing maintenance operations as described in this manual. Installations **2, 3** and **4** permit operation but make maintenance and inspection of the combustion head difficult, page 26.



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

Installation **5** is prohibited for safety reasons.

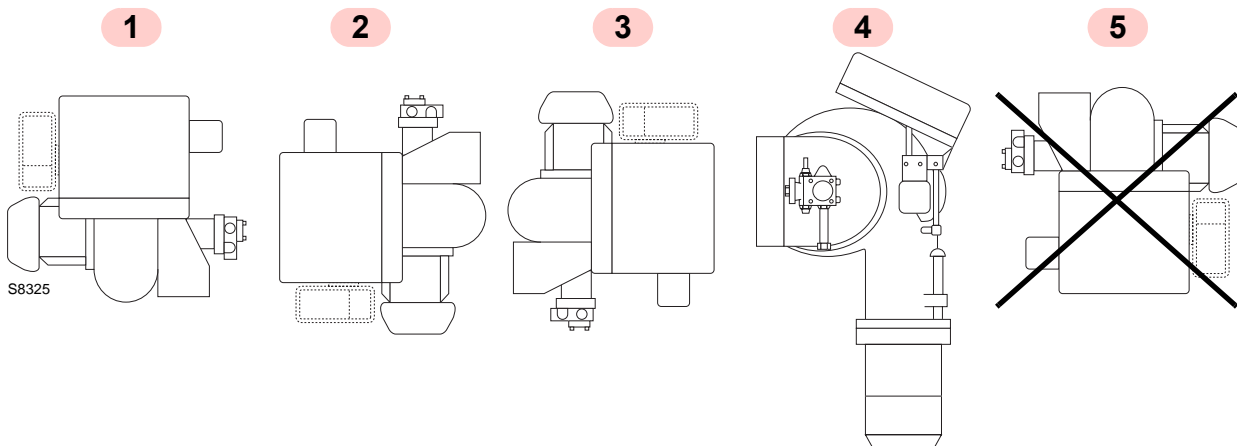


Fig. 5

5.6 Mounting the burner on the boiler

For the separation of the blast tube from the burner body, follow these instructions:

- Remove the cover (1), the split pin and the pin (2), the nuts (3) and the screws (4).
- Slide the blast tube from the burner body of approx. 100÷120 mm, release the fork of the combustion head shifting (6) removing the spit pins (5).
- Now it is possible to withdraw the blast tube from the slides (7).
- Mount the blast tube to the boiler interposing the gasket (8).
- Set up the proper nozzle and inset the slides (7) in the burner maintaining the distance of approx. 100÷120 mm.
- Mount the fork (6) and hook it by the split pins (5).
- Close the burner, fasten the screws (4), the nuts (3), the split pin and the pin (2).

5.6.1 Burner opening for service

Follow the above instructions without remove the nuts (3).

By lifting the burner using the hooks it is possible to fix it to the boiler without separating from the blast tube.

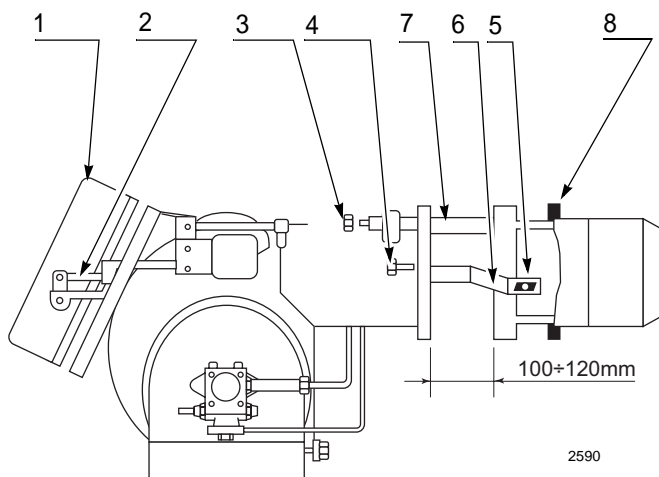
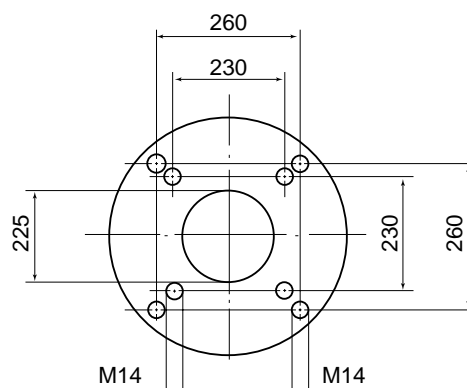


Fig. 6

5.6.2 Boiler front plate drilling combustion head projection

Drill the combustion chamber locking plate as shown in Fig. 7.



D2702

Fig. 7

For the combustion head projection carefully follow the boiler manufacturer indications.

A proper protection with refractory material on the combustion chamber shall be made, when boilers with frontal smoke box are used.

5.7 Nozzle 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 Riello in the Instruction and warning booklet should be used.



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



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

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

5.7.1 Nozzles recommended

- Fluidics type N1 (without cut-off)
- Fluidics type W2 (with cut-off)
- Bergonzo type B3 or B5 (with cut-off)

You can also fit nozzles with no shutoff needle (Fluidics N1): in this case, you lose the feature preventing dripping on the nozzle holder.

5.8 Burners items set at the factory

5.8.1 Servomotor

The servomotor controls contemporaneously the air delivery and pressure and the fuel delivery.

It is provided with three adjustable cams, controlling the corresponding switches.

1st cam: it controls the stroke of the servomotor at the position of 0°. When the burner is off the air damper is completely closed.

2nd cam: it controls the stroke of the servomotor at the position of 130°.

3rd cam: it controls the minimum modulating output, leaves the factory set at 20°.

5.8.2 Pump pressure

The pump leaves the factory rated at 25 bar.

5.8.3 Motor over load relay

Set by the factory for the three-phase electric supply 400V. Should the electric supply be three-phase 230V the setting has to be modified as indicated at page 24.

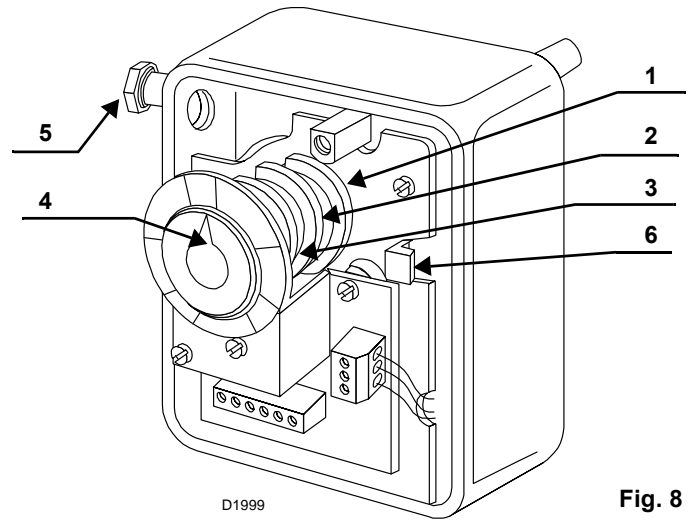


Fig. 8

- 1 1st Cam (blue)
- 2 2nd Cam (red)
- 3 3rd Cam (black)
- 4 Pointer
- 5 Clamp
- 6 Motor reset lever

5.9 Adjustments necessary to the burner

5.9.1 Adjustment of the maximum fuel delivery

This adjustment is carried out by choosing the proper nozzle from the table here below.

| Nozzle type N1 - 50° | Maximum delivery kg/h | Fuel pressure in the delivery line manometer (2) Fig. 10 bar | Fuel max. pressure in the return line manometer (3) Fig. 10 bar |
|-------------------------|--------------------------|--|--|
| 145 | 140 | 25 | 17,5 |
| 130 | 130 | 25 | 18 |
| 115 | 115 | 25 | 18 |
| 100 | 100 | 25 | 18 |
| 90 | 90 | 25 | 18 |
| 80 | 80 | 25 | 18 |
| 70 | 70 | 25 | 18 |

Tab. B

If you desire a max. output intermediate between two values indicated in the table, it is useful to choose the nozzle with higher delivery.

The output decrease could be obtained later, by acting on the pressure controller, see item B.

5.9.2 Adjustment of the pressure controller

The variation of the pressure in the return line (manometer 3 Fig. 10 on page 16) modifies the fuel delivery from the nozzle.

Approximate ratio between: nozzle delivery and type (as %) - return pressure

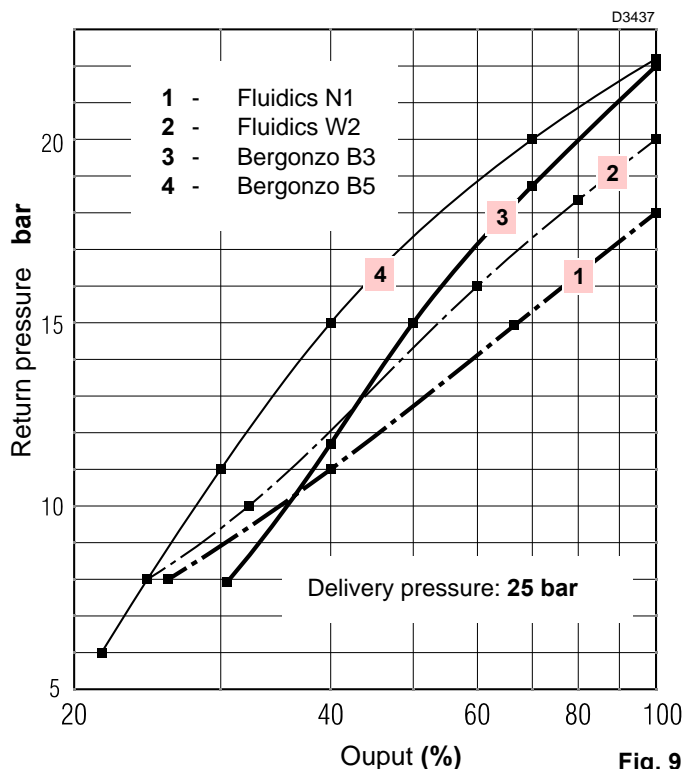


Fig. 9

Nozzles available (delivery in kg/h):

| Bergonzo | Fluidics |
|----------|----------|
| 70 | 70 |
| 80 | 80 |
| 90 | 90 |
| 100 | 100 |
| 125 | 115 |
| 150 | 130 |
| | 145 |

Tab. C

To properly rate the output range of the nozzle operation, it is necessary to set the maximum and minimum pressure of the fuel in the return line from the nozzle, in compliance with the above diagram.

- After the nozzle set-up, remove the protective cover of the servomotor 12) Fig. 3, and ignite the burner.

- After the burner ignition, disconnect the plug placed on the electric board 19) Fig. 3, to take the voltage off from the servomotor.

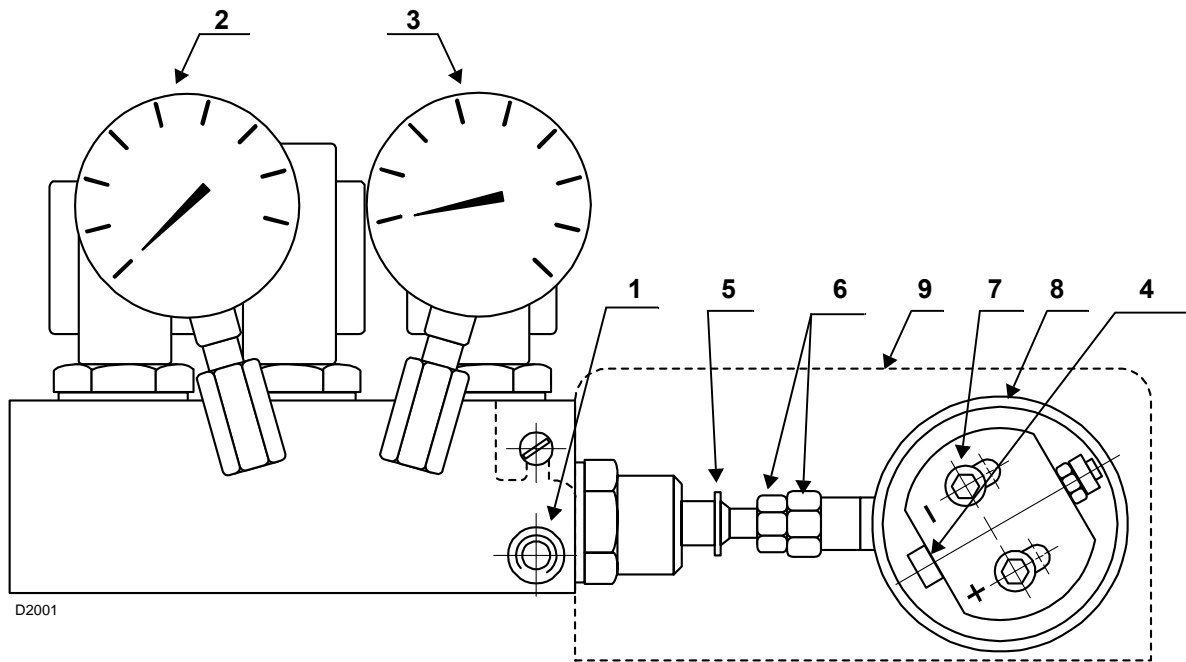
In this way the burner operates at the minimum output.

- Acting on the re-set lever 6) Fig. 8 disjoin the cam 1) Fig. 13 from the motor of the servomotor.

- Turn manually and slowly the cam with adjustable profil 1) Fig. 13 firmly connected to the eccentric 8) Fig. 10 and check the pressure variation by the manometer 3) Fig. 10.

- The output and the pressure of the nozzle are at minimum when the servomotor is on the position of 20°, while they are at maximum when the servomotor is positioned on 130°.

The fine adjustment of the pressure in the return line could be carried out by changing the setting of the eccentric 8) Fig. 10, of the nut and lock-nut 6) Fig. 10.

Pressure controller

Fig. 10

- 1 - Pressure switch plug
- 2 - Manometer for pressure in delivery line
- 3 - Manometer for pressure in return line
- 4 - Eccentric adjusting screw
- 5 - Ring for piston stop
- 6 - Nut and lock-nut for piston rating
- 7 - Eccentric locking screws
- 8 - Variable eccentric
- 9 - Cover

The eccentric (8) setting should be carried out as follows:

remove the cover (9), loosen the screws (7), and act on the screw (4) to obtain the desired eccentricity. Turn clockwise (+) the screw (4) to increase the eccentricity, increasing the difference between the min. and max. capacity of the nozzle; turn anticlockwise (-) to decrease the eccentricity and, consequently the difference between the min. and max. capacity of the nozzle.

- The proper setting of the eccentric (8) is possible when its operation field follows the servomotor operation field ($20^{\circ} \div 130^{\circ}$): so, that any variation of the servomotor position corresponds to a pressure variation.
- Never let the piston batter: the stop ring (5) determines the max. stroke.
- When the setting is carried out, verify manually that no slow-down occurs between 20° and 130° and further the maximum and minimum pressures correspond to those chosen as per diagram of page 15.
- If you wish to check the delivery capacity of the nozzle, proceed as follows:
Open the burner according to instructions at page 13, place the nozzle, simulate the start-up and then proceed with the weighing at the maximum and minimum pressures.
- If at maximum capacity of the nozzle (maximum pressure in the return line) pressure fluctuations are detected on the manometer (3), slightly decrease the pressure till their complete elimination.

5.9.3 Combustion head adjustment

The stroke of the combustion head is contemporaneous to the eccentric (8) Fig. 10 on page 16 movement and to that of the cam with adjustable profil (1) Fig. 13 on page 18. The combustion head position is noticed on the graduated cylinder (2) Fig. 12.

The control levers of the combustion head are set, by the factory, for the max. stroke of 40 mm (the stroke is indicated by the set-point of the graduated cylinder from 0 to 9), this stroke is suitable for a modulating range from 35 - 40 kg/h.

Using a different modulating range it shall be necessary to re-set the control levers in order to get the combustion head stroke corresponding to the set-points indicated in the diagram below.

Example:

modulating range 45 - 113 kg/h: following the diagram it is clear that the set-point 1 is the proper one for 45 kg/h and set-point 8 is for 113 kg/h, so the stroke of the combustion head may correspond to 7 set-points.



in order to avoid any slow-down it is necessary to not overcome the positions of min. and max. opening, corresponding to:
 graduated cylinder (2) Fig. 12:
 set-point 9 with servomotor at 130°;
 set-point 0 with servomotor at 0°.

In order to vary the stroke of the combustion head, follow these indications:

the connecting rod (1) which drives the push-rod (8) of the combustion head, is provided with a slot; by moving the tension rod (9) towards the external part of the slot, the stroke of the combustion head may be shortened up to 20 mm.

If a higher reduction should be necessary, act in this way:

with the servomotor at 0°, loosen the screws (5) and push, in the arrow direction, the ring (6) placed under the cam with adjustable profil (7).

So it is obtainable a reduction of the eccentricity with the consequent reduction of the stroke.

After the setting fasten the screws (5).

With the aforesaid settings, the stroke of the combustion head is fixed.

Following the example (7 set-points) it is necessary that the start and the end of the stroke are coincident with the desired values: 1 and 8.

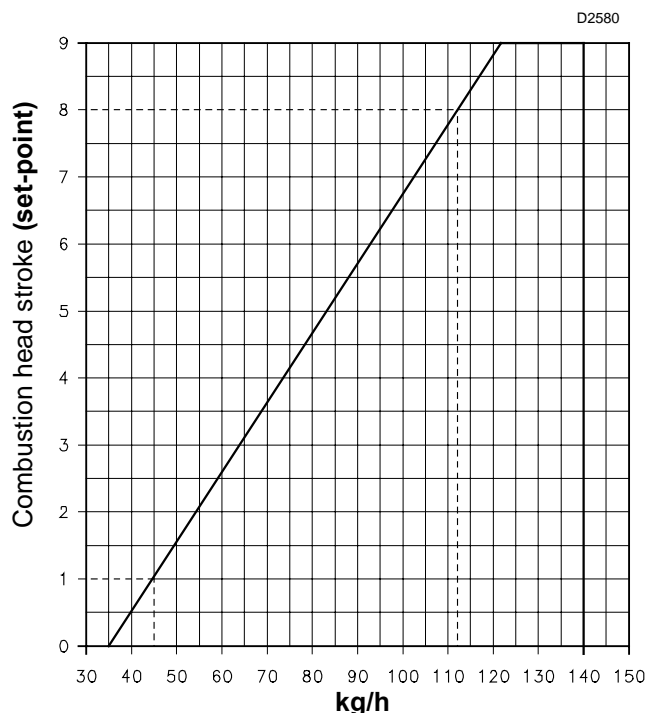
In order to obtain this turn the hexagonal coupling (3) clockwise or anticlockwise, after loosening of the nuts (4).

With the servomotor positioned at 0°, the set-point 1 shall be coincident with the reference plane (10), while, if the servomotor is positioned at 130° the index shall be coincident with the set-point 7.

After the setting fasten the nuts (4) with the ball joint (9), as indicated in the drawing.

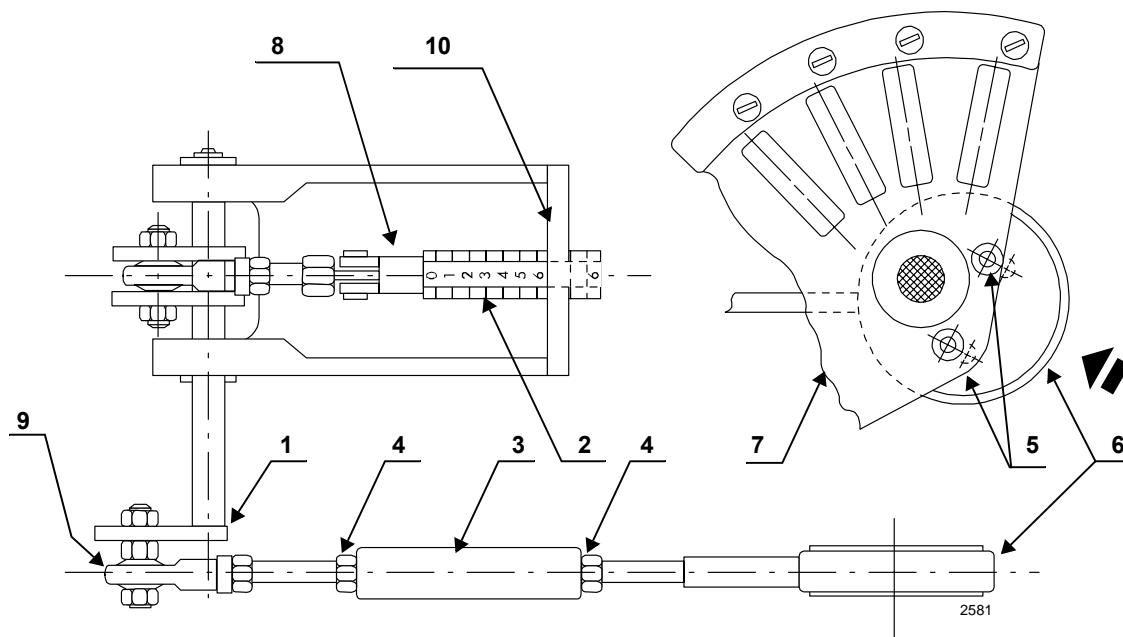
The combustion head settings have to be carried out with burner closed, not in operation and with servomotor free.

After the setting verify manually the operation, by turning the cam (7), and that no slow-down exists between 0° and 130°.



D2580

Fig. 11



2581

Fig. 12

5.9.4 Air damper adjustment

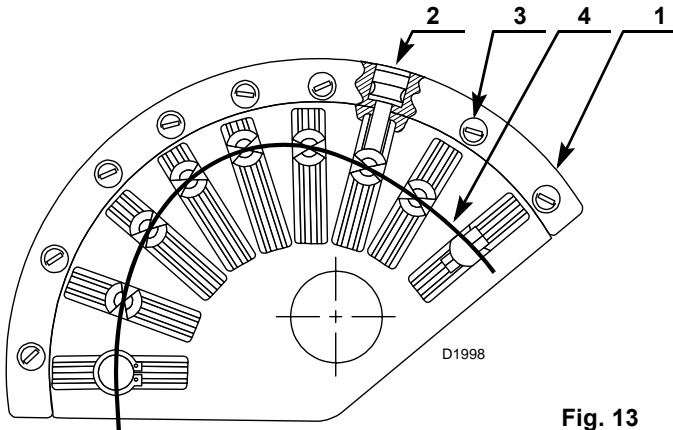


Fig. 13

- 1 - Cam
- 2 - Adjusting screws
- 3 - Locking screws
- 4 - Variable profile

The air damper adjustment is made by acting on the cam with variable profile (1).

This adjustment has to be carried out after the settings of the pressure controller and of the combustion head.

With the burner in operation, switch off the elec. supply of the servomotor and re-set it by acting on the lever (6) (Fig. 12 on page 17).

Setting of the maximum output

Place the servomotor on 130°, lock it and vary the profile (4) by gradually acting on the screws (2).

Setting of the minimum output

Reset the servomotor again, place it manually on 20°, lock and adjust the profile (4) by gradually acting on the screws (2).

Settings of intermediate outputs

Follow the same procedure.

At the end of the setting, re-check all the regulations, re-connect the electrical wires to the servomotor and fasten the adjusting screws (2) by the locking screws (3).

Length variation of the air damper tension rod

It is useful to extend the tension rod when the air damper moves into a reduced angle (air damper at half stroke for the maximum output), in this way the cam profile is not too much bent (4).

With the burner stop, act in this way:

- Disjoint the articulation (2) from the lever (1) (see drawing).
- Unscrew the extension (3) from the tension rod (4) (some rounds).
- Re-connect the articulation to the lever and move the profile (4) (Fig. 13) up to reach the air damper set-point 0 with servomotor at 0°.

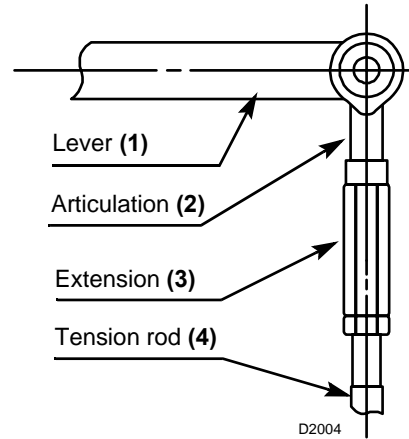


Fig. 14

5.10 Gas oil supply



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

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

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



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

Please contact Riello for further information.



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



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

Riello recommends a good quality fuel filter at the tank (Fig. 15 - Fig. 16) and a secondary filter (100 μ for gas oil and 15 μ for kerosene) are used to protect the burner pump and nozzle from contamination.

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

5.10.1 Double-pipe circuit

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

The tank higher than the burner A (Fig. 15)

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

The tank lower than the burner B (Fig. 15)

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

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

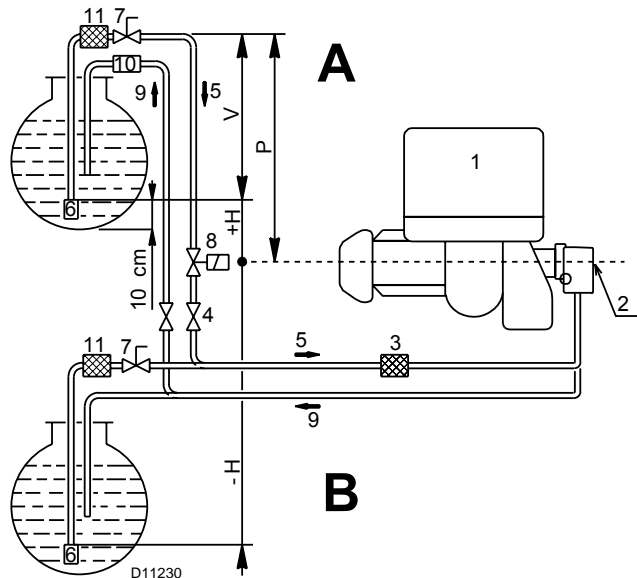


Fig. 15

Key (Fig. 15)

- H Difference in the pipes height;
- L Total length of the suction tube;
- ϕi Internal diameter of the tube. Copper tubes ϕi 14 and 16 mm could be replaced by steel tubes G 1/2" and G 3/4".
- 1 Burner
- 2 Pump
- 3 Filter
- 4 Manual on/off valve
- 5 Suction line
- 6 Foot valve
- 7 Rapid closing manual valve remote controlled (only Italy)
- 8 On/off solenoid valve (only Italy)
- 9 Return line
- 10 Check valve (only Italy)
- 11 Tank filter

| H meters | L meters | |
|----------|----------------|----------------|
| | ϕi 14 mm | ϕi 16 mm |
| + 2,0 | 50 | 70 |
| + 1,5 | 45 | 65 |
| + 1,0 | 40 | 60 |
| + 0,5 | 35 | 50 |
| 0 | 30 | 45 |
| - 0,5 | 25 | 40 |
| - 1,0 | 20 | 35 |
| - 1,5 | 15 | 30 |
| - 2,0 | 10 | 25 |
| -3,0 | 5 | 15 |

Tab. D

5.10.2 Single-pipe circuit

In order to obtain single-pipe working it is necessary to unscrew the return hose, remove the by-pass screw 6)(Fig. 18) and then screw the plug 2).

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

For the priming pump loosen the screw 3)(Fig. 18) in order to bleed off the air contained in the suction line and wait until the fuel flows out.

Key (Fig. 16)

- H Difference in the pipes height;
- L Total length of the suction tube;
- øi Internal diameter of the tube. Copper tubes øi 14 and 16 mm could be replaced by steel tubes G 1/2" and G 3/4".
- 1 Burner
- 2 Pump
- 3 Filter
- 4 Manual on/off valve
- 5 Suction line
- 6 Foot valve
- 7 Rapid closing manual valve remote controlled (only Italy)
- 8 On/off solenoid valve (only Italy)
- 11 Tank filter

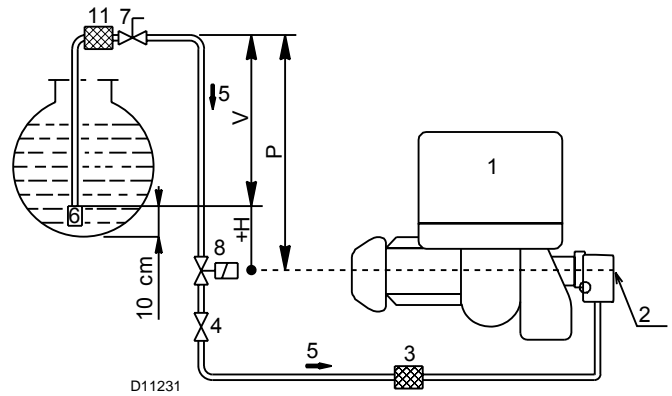


Fig. 16

| H meters | L meters | |
|----------|----------|----------|
| | øi 14 mm | øi 16 mm |
| + 2,0 | 50 | 70 |
| + 1,5 | 45 | 65 |
| + 1,0 | 40 | 60 |
| + 0,5 | 35 | 50 |

Tab. E

5.11 Hydraulic connections

The pumps are equipped with a by-pass that connects return line and suction line. The pumps are installed on the burner with the by-pass closed by screw 6)(Fig. 18).

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

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

Remove the plugs from the suction and return connections of the pump.

Insert the hose connections with the supplied seals into the connections and screw them down.



Take care that the hoses are not stretched or twisted during installation.

Install the hoses where they cannot be stepped on or come into contact with hot surfaces of the boiler and where they do not hamper the opening of the burner.

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

5.11.1 Hydraulic line schema

Oil pressure switch

If the back pressure in the fuel return line is too high, the pressure switch stops the burner.

Recommended setting (recommended values with resistance of pipe returning to tank ≤ 0.5 bar): **1.5 ÷ 2.0 bar**

If control box lockout occurs (pos. P), reset the pressure switch with values increasing by 0.5 bar.

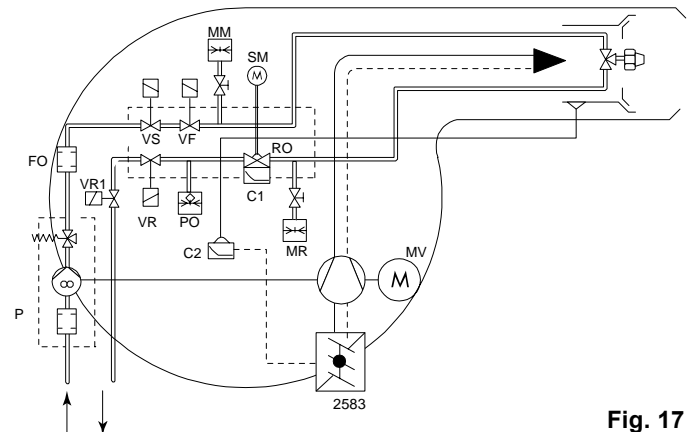


Fig. 17

- Cn - Control cams
- FO - Oil filter
- MM - Oil delivery pressure gauge
- MR - Oil return pressure gauge
- P - Pump with filter and pressure regulator
- RO - Oil return pressure regulator

5.12 Pump



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

Suntec TA3

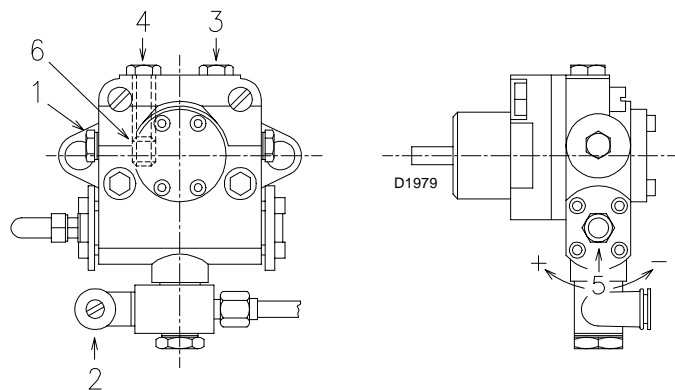


Fig. 18

Key (Fig. 18)

- | | | |
|---|---------------------------|--------|
| 1 | Suction | G 1/2" |
| 2 | Return | G 1/2" |
| 3 | Pressure gauge connection | G 1/8" |
| 4 | Vacuum meter connection | G 1/8" |
| 5 | Pressure adjustment screw | |
| 6 | Screw for by-pass | |
| 7 | Pressure gauge attachment | G 1/4" |

5.12.1 Technical data

Suntec TA3

| | | |
|---------------------------------------|--------------------------|---------|
| Min. delivery rate at 12 bar pressure | kg/h | 665 |
| Delivery pressure range | bar | 7 - 40 |
| Max. suction depression | bar | 0.45 |
| Viscosity range | mm ² /s (cSt) | 4 - 800 |
| Max. gas oil temperature | °C | 140 |
| Max. suction and return pressure | bar | 1.5 |
| Pressure calibration in the factory | bar | 30 |
| Filter mesh width | mm | 0.17 |

Tab. F

5.12.2 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).

- For self-priming to take place, the screw 3)(Fig. 18) of the pump must be loosened in order to bleed off the air contained in the suction line.
- The pump can be considered to be primed when the gas oil starts coming out of 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.



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.

6 Electrical system**6.1 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.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the wiring diagrams.
- Do not invert the neutral with the phase in the electrical supply line. Any inversion would cause a lockout due to firing failure.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The burners have been set for intermittent operation. This means they should compulsorily be stopped at least once every 24 hours to enable the control box to perform checks of its own start-up efficiency. Normally the boiler's thermostat/pressure switch ensures the stopping of the burner.
If this is not the case, it is necessary to apply in series with IN a timer switch that turns off the burner at least once every twenty-four hours. Refer to the wiring diagrams.
- The electrical safety of the device is obtained only when it is correctly connected to an efficient earthing system, made according to current standards. It is necessary to check this fundamental safety requirement. In the event of doubt, have the electrical system checked by qualified personnel.
- The electrical system must be suitable for the maximum input power of the device, as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for the input power of the device.
- For the main power supply of the device from the electricity mains:
 - do not use adapters, multiple sockets or extensions;
 - use an omnipolar switch, as indicated by the current safety standards.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.

Before carrying out any maintenance, cleaning or checking operations:



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



isolate the fuel supply.

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

6.2 Electrical wiring factory-set

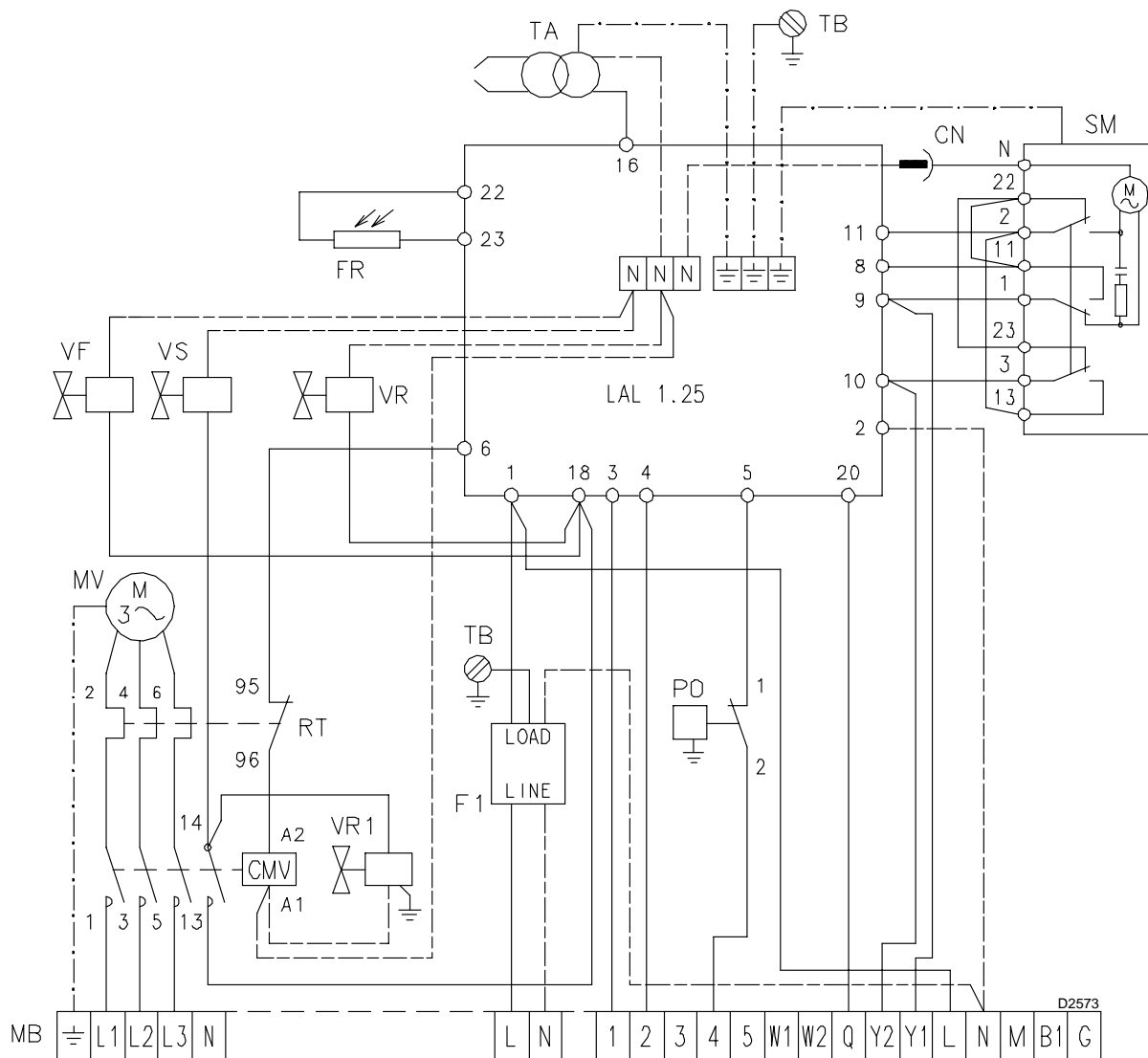


Fig. 19

Key (Fig. 19)

- MB Wiring terminal block
- MV Fan motor
- CMV Motor contactor
- F1 Protection against radio interference
- RT Thermal cut-out
- PO Oil pressure switch
- TA Ignition transformer
- SM Servomotor
- FR Photocell
- VF Solenoid valve on supply line
- CN Connector
- VS Safety solenoid valve
- VR Solenoid valve on return line
- VR1 Solenoid valve on return line
- TB Burner ground (earth) connection

6.3 Electrical connection to the terminal strip - installer-set

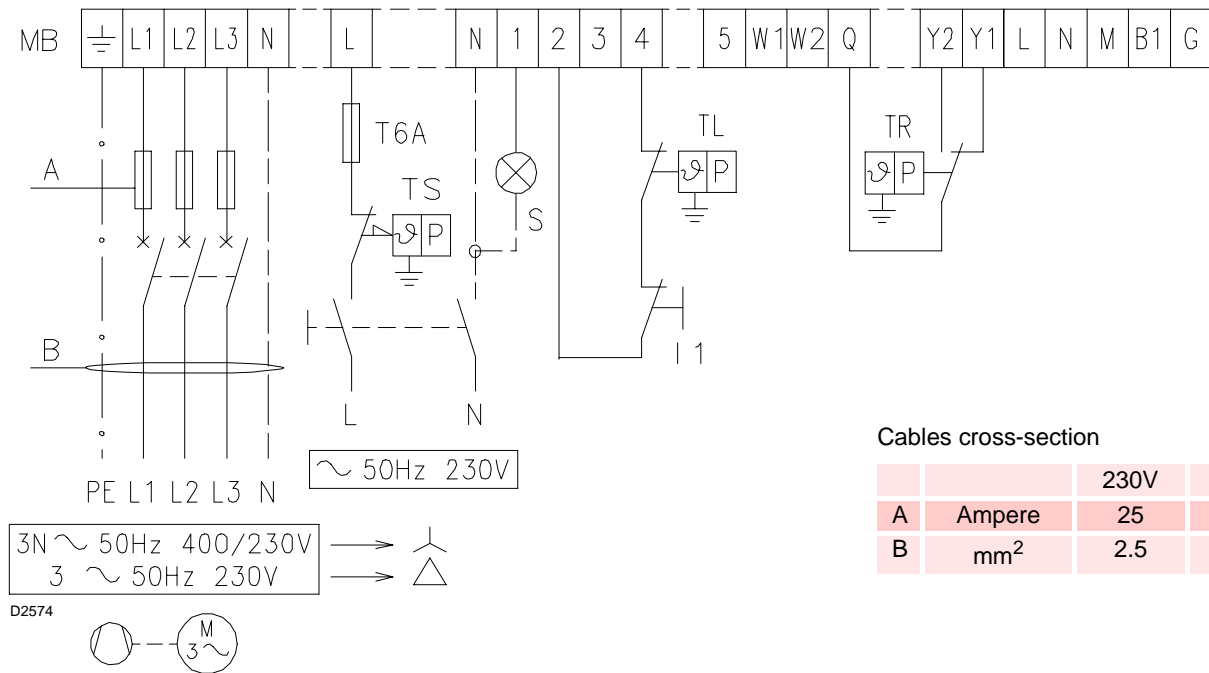


Fig. 20

(1): for two stages progressive version
(2): for modulating version

NOTE:
- Check the lock-out by darkening the photo-cell after removal of the cover.
Attention: high voltage.

Key to layout

- BP Pressure probe
- BT Temperature probe
- I1 Burner manual stop switch
- MB Burner terminal block
- S Remote lock-out signal
- TL Load limit remote control system
- TR High-low mode load control system
- TS Safety load control system
- a-d Red
- b-c White

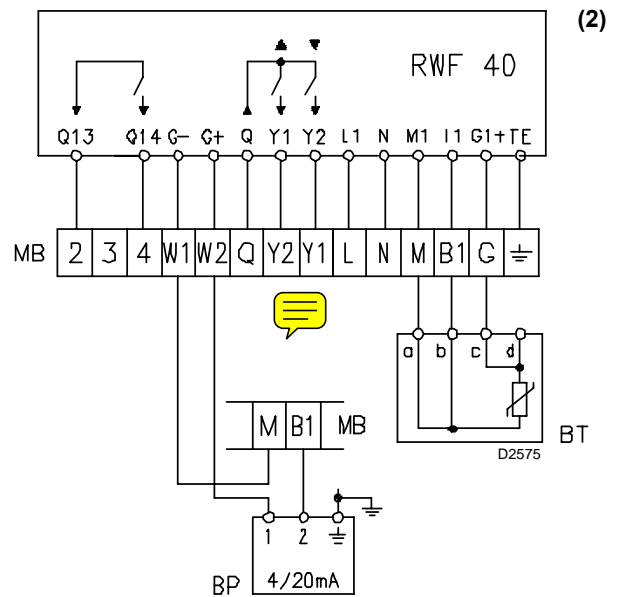


Fig. 21

7 Burner operation

7.1 Notes on safety for the first start-up



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



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

7.2 Burner start-up cycle

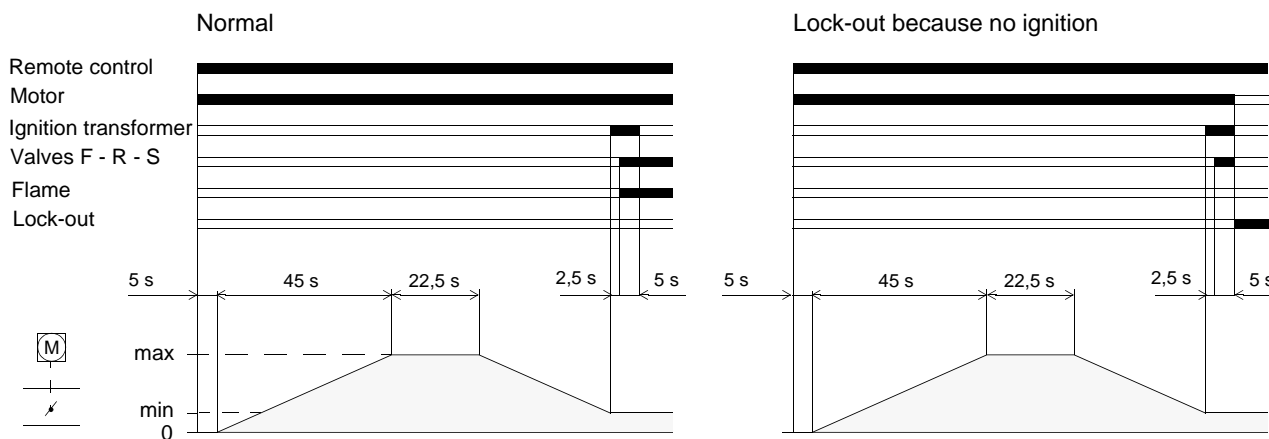


Fig. 22

MOTOR LOCK-OUT: It is caused by the motor overload relay if, overload or no phase occurs.

8 Maintenance

8.1 Notes on safety for the maintenance

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

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



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

Before carrying out any maintenance, cleaning or checking operations:



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



Close the fuel interception tap.

8.2 Maintenance programme

8.2.1 Maintenance frequency

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

8.2.2 Checking and cleaning

Combustion

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

Combustion head

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.

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.

Burner

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

Filters

Check the filtering baskets on line and at nozzle present in the system. Clean or replace if necessary. If rust or other impurities are observed inside the pump, use a separate pump to lift any water and other impurities that may have deposited on the bottom of the tank.

Pump

The delivery pressure must be stable. The depression must be less than 0.4 bar. Unusual noise must not be evident during pump operation. If the pressure is found to be unstable or if the pump runs noisily, the hose must be detached from the line filter and the fuel must be sucked from a tank located near the burner. This measure permits the cause of the anomaly to be traced to either the suction piping or the pump.

If the pump is found to be responsible, check to make sure that the filter is not dirty. The vacuumeter is installed upstream from the filter and consequently will not indicate whether the filter is clogged or not. Contrarily, if the problem lies in the suction line, check to make sure that the filter is clean and that air is not entering the piping. Please check that the supply line and filters are clear. The use of a pump vacuum gauge will assist in this. This measure permits the cause of the anomaly to be traced to either the suction line or the pump. If the problem lies in the suction line, check to make sure that the filter is clean and that air is not entering the piping.

Hoses

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

Nozzles

Do not clean the nozzle openings; do not even open them. The nozzle filters however may be cleaned or replaced as required. It is advisable to replace nozzles every year during regular maintenance operations. Combustion must be checked after the nozzles have been changed.

Fuel tank

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

Combustion

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

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

9 Faults - Possible causes - Solutions

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

If a burner malfunction is detected, first of all:

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

| SYMBOL (1) | FAULT | PROBABLE CAUSE | SUGGESTED REMEDY |
|--|--|---|--|
| ◀ | The burner does not start | A limit or safety control device is open | Adjust or replace |
| | | Control box lock-out | Reset control box |
| | | Oil pressure switch intervenes | Adjust pressure switch or eliminate overpressure |
| | | Motor protection tripped (RL 38-50/M) | Reset thermal cut-out |
| | | No electrical power supply | Close all switches - Check connections |
| | | Control box fuse blown | Replace (2) |
| | | Contact II of servomotor does not operate, control box terminals 11 - 8 | Adjust cam II or replace servo-motor |
| | | Pump is jammed | Replace |
| | | Defective capacitor (RL 28/M) | Replace |
| | | Defective motor command control device (RL 38-50/M) | Replace |
| | The burner does not start and a function lock-out occurs | Defective control box | Replace |
| | | Defective electrical motor | Replace |
| | | Flame simulation | Replace control box |
| | | Photocell short-circuit | Replace photocell |
| | Missing phase (RL 38-50/M) thermal cut-out trips | Reset thermal cut-out when third phase is re-connected | |
| ▲ | The burner starts but stops at maximum air damper setting | Contact I of servomotor does not operate, control box terminals 9-8 | Adjust cam I or replace servomotor |
| ■ | The burner starts and then goes into lock-out | Fault in flame detection circuit | Replace control box |
| ▼ | The burner remains in pre-purging phase | Contact III of servomotor does not operate, control box terminals 10-8 | Adjust cam III or replace servomotor |
| 1 | After pre-purge and the safety time, the burner goes to lock-out and the flame does not appear | No fuel in tank; water on tank bottom | Top up fuel level or suck up water |
| | | Inappropriate head and air damper adjustments | Adjust |
| | | gas oil solenoid valves fail to open | Check connections; replace coil |
| | | Nozzle clogged, dirty, or deformed | Replace |
| | | Dirty or poorly adjusted firing electrodes | Adjust or clean |
| | | Grounded electrode due to broken insulation | Replace |
| | | High voltage cable defective or grounded | Replace |
| | | High voltage cable deformed by high temperature | Replace and protect |
| | | Ignition transformer defective | Replace |
| | | Erroneous electrical connections of valves or transformer | Check |
| | | Defective control box | Replace |
| | | Pump unprimed | Prime pump and see "Pump unprimed" (54-55) |
| | | Pump/motor coupling broken | Replace |
| | | Pump suction line connected to return line | Correct connection |
| | Valves up-line from pump closed | Open | |
| | Filters dirty: line - pump - nozzle | Clean | |
| | Incorrect motor rotation direction | Change motor electrical connections | |
| | The flame ignites normally but the burner locks out when the safety time has elapsed | Defective photocell or control box | Replace photocell or control box |
| Dirty photocell | | Clean | |
| Firing with pulsations or flame detachment, delayed firing | Poorly adjusted head | Adjust | |
| | Poorly adjusted or dirty firing electrodes | Adjust | |
| | Poorly adjusted fan air gate: too much air | Adjust | |
| | Nozzle unsuited for burner or boiler | See Nozzle Table | |
| | Defective nozzle | Replace | |
| | Inappropriate pump pressure | Adjust | |
| The burner does not pass to 2nd stage | Control device TR does not close | Adjust or replace | |
| | Defective control box | Replace | |
| Uneven fuel supply | Check if cause is in pump or fuel supply system | Feed burner from tank located near burner | |

| SYMBOL (1) | FAULT | PROBABLE CAUSE | SUGGESTED REMEDY |
|------------|--|---|--|
| | Internally rusted pump | Water in tank | Suck water from tank bottom with separate pump |
| | Noisy pump, unstable pressure | Air has entered the suction line | Tighten connectors |
| | | - Depression value too high (higher than 35 cm Hg): | |
| | | Tank/burner height difference too great | Feed burner with loop circuit |
| | | Piping diameter too small | Increase |
| | | Suction filters clogged | Clean |
| | | Suction valves closed | Open |
| | Pump unprimes after prolonged pause | Paraffin solidified due to low temperature | Add additive to gas oil |
| | | Return pipe not immersed in fuel | Bring to same height as suction pipe |
| | Pump leaks gas oil | Air enters suction piping | Tighten connectors |
| | | Leakage from sealing organ | Replace pump |
| | Smoke in flame - dark Bacharach | Not enough air | Adjust head and fan gate |
| | | Nozzle worn or dirty | Replace |
| | | Nozzle filter clogged | Clean or replace |
| | | Erroneous pump pressure | Adjust |
| | | Flame stability disk dirty, loose, or deformed | Clean, tighten in place, or replace |
| | | Boiler room air vents insufficient | Increase |
| | - yellow Bacharach | Too much air | Adjust head and fan gate |
| | | Dirty combustion head | Replace |
| | Dirty combustion head | Nozzle or filter dirty | Replace |
| | | Unsuitable nozzle delivery or angle | See recommended nozzles |
| | | Loose nozzle | Tighten |
| | | Impurities on flame stability disk | Clean |
| | | Erroneous head adjustment or not enough air | Adjust, open air damper |
| | | Blast tube length unsuited to boiler | Contact boiler manufacturer |
| I | During operation, the burner stops in lock out | Dirty or defective photocell | Clean or replace |

- (1) When the burner does not fire or comes to a halt following a fault, the symbol which appears on control box 23)(Fig. 3 at page 10) indicates the type of problem.
- (2) The fuse is located in the rear part of the control box 23)(Fig. 3 at page 10). A pull-out fuse is also available as a spare part which can be fitted after breaking the tang on the panel which holds it in place.

A
Appendix - Accessories (optional)
Spacer kit

If burner head penetration into the combustion chamber needs reducing, varying thickness spacers are available, as given in the following table.

| Burner | Code |
|-----------|---------|
| P 140 P/G | 3000722 |

Sound proofing box

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

| Burner | Box type | Average noise reduction [dB(A)] | Code |
|-----------|----------|---------------------------------|---------|
| P 140 P/G | C4/5 | 10 | 3010404 |

Burner regulator

To obtain modulating operation, the burner requires a regulator.

| Burner | Regulator type | Code |
|-----------|----------------|---------|
| P 140 P/G | RWF 40 | 3010211 |

Burner probe

The relative temperature or pressure probes fitted to regulator, must be chosen on the basis of the application.

| Burner | Probe type | Range (°C) (bar) | Code |
|-----------|--------------------|------------------|---------|
| P 140 P/G | Temperature PT 100 | -100 ÷ 500 °C | 3010110 |
| | Pressure 4 ÷ 20 mA | 0 ÷ 2.5 bar | 3010213 |
| | Pressure 4 ÷ 20 mA | 0 ÷ 16 bar | 3010214 |

Burner potentiometer kit

Depending on the servomotor fitted to the burner, a three-pole potentiometer (1000 Ω) can be installed to the position of the servomotor.

| Burner | Code |
|-----------|---------|
| P 140 P/G | 3010021 |



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