

GB Dual fuel Kerosene/Gas oil-Gas burners

Progressive two-stage or modulating operation



B₁₀

CODE	MODEL	TYPE
20034832	GI/EMME 1400	680 T1
20034833	GI/EMME 1400	680 T1
20034834	GI/EMME 2000	681 T1
20034835	GI/EMME 2000	681 T1
20034247	GI/EMME 3000	682 T1
20034836	GI/EMME 3000	682 T1
20034248	GI/EMME 4500	683 T1
20034837	GI/EMME 4500	683 T1

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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: Dual fuel Gas oil / Kerosene gas burners
Models: GI/EMME 1400
GI/EMME 2000
GI/EMME 3000
GI/EMME 4500

These products are in compliance with the following Technical Standards:

EN 267

EN 676

EN 292

DIN 4788 (02.1990)

and according to the European Directives:

MD	2006/42/EC
LVD	2006/95/EC
EMC	2004/108/EC

Machine Directive
Low Voltage Directive
Electromagnetic Compatibility

Such products are marked as follows:



CE-0085AQ0712

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

Legnago, 01.03.2012

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 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 Models available

MODEL	Code	Electrical supply three phase	Blast tube length mm	Motor
GI/EMME 1400	20034832	230 - 400N	385	direct starting
	20034833	230 - 400N	495	direct starting
GI/EMME 2000	20034834	230 - 400N	385	direct starting
	20034835	230 - 400N	495	direct starting
GI/EMME 3000	20034247	230 - 400N	476	direct starting
	20034836	230 - 400N	606	direct starting
GI/EMME 4500	20034248	400N	476	star-delta starting
	20034837	400N	606	star-delta starting

Tab. A

4.1.1 Gas categories

Country	Category
AT - GR - DK - ES - GB - IT - IE - PT	I ₂ H
DE	I ₂ ELL
NL	I ₂ L
FR - LU - BE	I ₂ E

NOTE:

The installer is responsible for the addition of any safety device not foreseen in the present manual.

Tab. B

4.2 Technical data

MODEL			GI/EMME 1400	GI/EMME 2000	GI/EMME 3000	GI/EMME 4500
Type			680 T1	681 T1	682 T1	683 T1
Output	Min. modulation	Kcal/h	350.000	500.000	750.000	1.000.000
		kW	407	581	872	1.163
	Min. operation	Kcal/h	705.000	1.000.000	1.500.000	2.021.000
		kW	820	1.163	1.744	2.350
	Max. operation	Kcal/h	1.325.000	2.000.000	3.000.000	4.000.000
		kW	1.540	2.325	3.488	4.650
Fuel			Gas oil and Blends of gas oil and bio fuel (FAME in accordance with EN 14214) up to 10%			
Kerosene	net calorific value	kWh/kg	11.97			
		Mcal/kg	10.3 (10.300 kcal/kg)			
	density	kg/dm³	0.77 - 0.83			
	viscosity at 20 °C	mm²/s max	6 (1.5 °E - 6 cSt)			
Gas oil	net calorific value	kWh/kg	11.86			
		Mcal/kg	10.2 (10.200 kcal/kg)			
	density	kg/dm³	0.82 - 0.85			
	viscosity at 20 °C	mm²/s max	6 (1.5 °E - 6 cSt)			
Natural gas			- G20 (methane) - G21 - G22 - G23 - G25 - GPL: G31 - PCI 26 kWh/Nm³			
Maximum pressure		mbar	200	360	360	360
Minimum pressure (1)		mbar	20	26	33	43
Control box			SIEMENS LFL 1.333			
Weight		Kg	190	235	280	285

Tab. C

(1) Minimum pressure (measured at the sleeve) with the combustion chamber at 0 bar to obtain maximum output.

4.3 Electrical data

Motor IE1

Model		GI/EMME 1400	GI/EMME 2000	GI/EMME 3000	GI/EMME 4500
Code		20034832 20034833	20034834 20034835	20034247 20034836	20034248 20034837
Electrical power supply (2)		Three phase 230 V +/- 10% 50 Hz 400V +/- 10% 50 Hz			
Electric motors	rpm	2860	2910	2910	2920
Fan motor	kW	3	4	9.2	15
	V	230/400	230/400	220/380	400/690
	A	13.5/8	14/8.1	31.5/18.2	29/16.8
Pump motor	kW	1.1	1.1	1.5	1.5
	V	220/380	220/380	220/380	220/380
	A	4.7/2.7	4.7/2.7	6.4/3.7	6.4/3.7
Ignition transformer	V1 - V2 I1 - I2	230 V - 2 x 6 kV 1.9 A - 35 mA			
Electrical power consumption (Light oil)	kW max	6.7	6.8	13.0	19.3
Electrical power consumption (Gas)	kW max	5.3	5.4	11.1	17.3
Electrical protection		IP 54			

Motor IE2

Model		GI/EMME 1400	GI/EMME 2000	GI/EMME 3000	GI/EMME 4500
Code		20034832 20034833	20034834 20034835	20034247 20034836	20034248 20034837
Electrical power supply (2)		Three phase 230 V +/- 10% 50 Hz 400V +/- 10% 50 Hz			
Electric motors	rpm	2920			
Fan motor	kW	3	4	9.2	15
	V	230/400	230/400	230/400	400/690
	A	13.5/7.8	13.5/7.8	29.1/16.8	26.6/15.4
Pump motor	kW	1.1	1.1	1.5	1.5
	V	220/380	220/380	220/380	220/380
	A	4.5/2.6	4.5/2.6	5.9/3.4	5.9/3.4
Ignition transformer	V1 - V2 I1 - I2	230 V - 2 x 6 kV 1.9 A - 35 mA			
Electrical power consumption (Light oil)	kW max	6.6	6.7	12.9	19.1
Electrical power consumption (Gas)	kW max	5.2	5.3	11.0	17.3
Electrical protection		IP 54			

- (2) The GI/EMME 4500 model is only available in version with a star - triangle remote - starter; when opening, please therefore specify the required operating voltage.

4.4 Overall dimensions

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

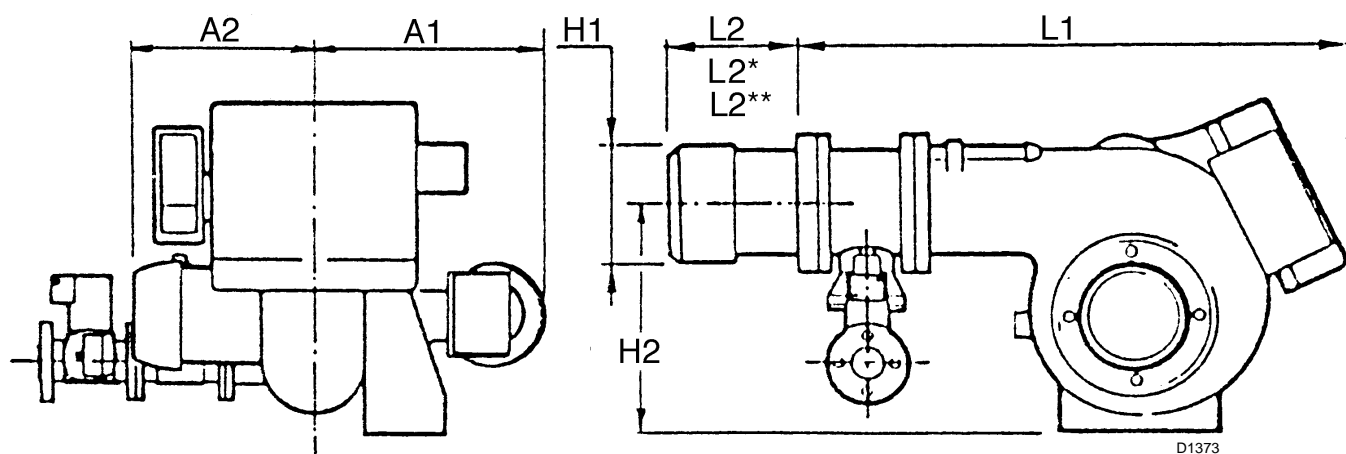


Fig. 1

TYPE	A1	A2	L1	L2	L2*	L2**	H1	H2
GI/EMME 1400	482	376	1090	275	385	495	250	467
GI/EMME 2000	482	396	1090	275	385	495	260	467
GI/EMME 3000	538	447	1320	346	476	606	336	525
GI/EMME 4500	538	508	1320	346	476	606	336	525

L2 Tube length, short head + spacer

L2* Tube length, short head

L2** Tube length, long head

4.5 Firing rates

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).

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.

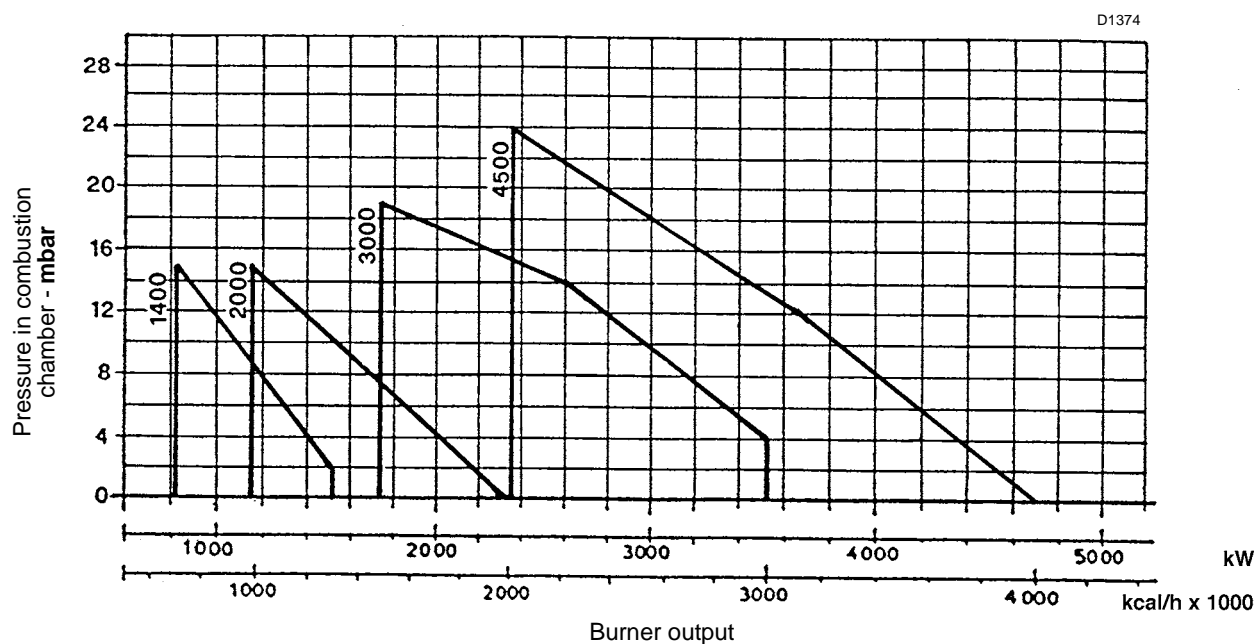


Fig. 2

4.6 Burner description

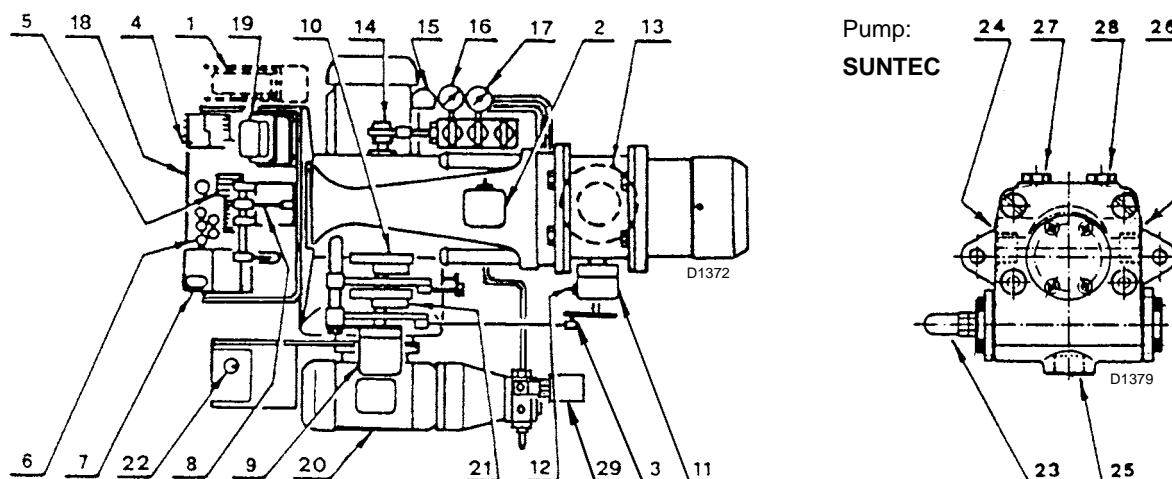


Fig. 3

- | | |
|---|-------------------------------|
| 1 Output modulation unit (only on modulating version) | 18 Electrical control board |
| 2 Air pressure switch | 19 Ignition transformer |
| 3 Gas butterfly control rod | 20 Pump unit |
| 4 Fan motor relay releaser | 21 Gas adjustment cam |
| 5 Terminal strip | 22 Oil - gas selector switch |
| 6 Fair lead | 23 Pressure regulator |
| 7 Control box release pushbutton with lock signal | 24 Inlet fitting |
| 8 Head drive rod | 25 Return fitting |
| 9 Servomotor | 26 Delivery fitting |
| 10 Air adjustment cam | 27 Vacuum - meter fitting |
| 11 Max. gas pressure switch | 28 Pressure gauge fitting |
| 12 Gas pressure socket to sleeve | 29 Oil pressure switch (min.) |
| 13 Gas regulator | |
| 14 Return pressure adjustment cam | |
| 15 Oil pressure switch (max.) | |
| 16 Pressure gauge on return | |
| 17 Pressure gauge on delivery | |

- The fan motor relay release for models with starter is located inside the starter.
- The pump motor relay release is located inside the box to the side of the pump unit.

4.7 Standard equipment

Gas train gasket (for GI/EMME 1400)	No. 1
Gas train gasket	No. 1
Screws (for GI/EMME 1400)	No. 8
Screws	No. 12
Pin extension	No. 2
Insulating screen	No. 1
Hoses	No. 2
Nipples	No. 2
Fair leads	No. 4
Washers (for GI/EMME 1400)	No. 8
Washers	No. 12



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.

R.B.L.	A	B	C
D	E	F	
<input checked="" type="checkbox"/>	G	H	
	G	H	
			
			CE

S8334

Fig. 4

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).



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 35.



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

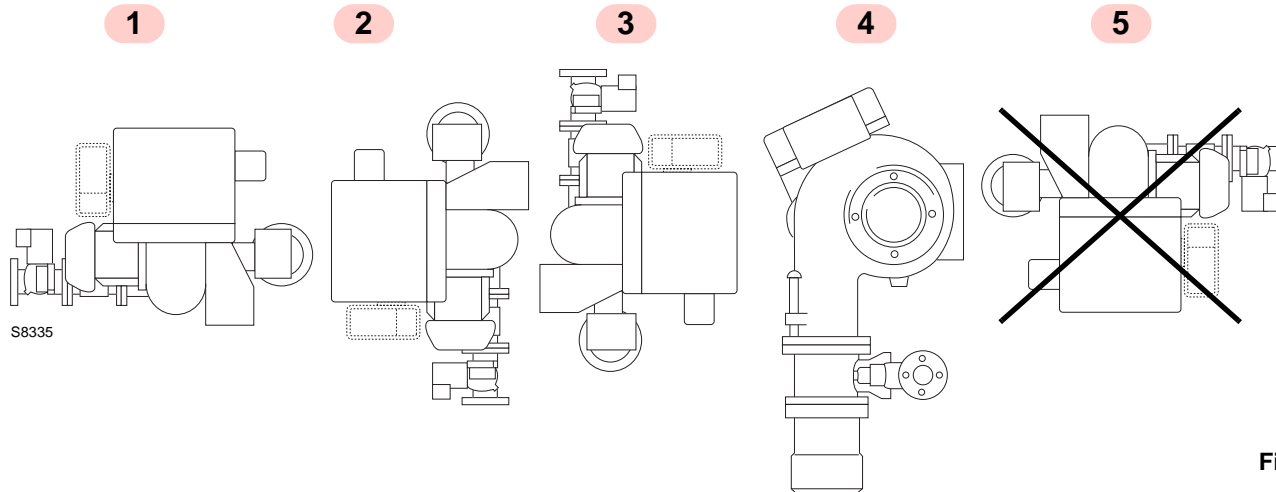


Fig. 5

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 from bracket 1), pin 2), stops 4) and screws 3).
- Detach hoses 6).
- Release the tie-rod on the gas butterfly, removing screw 11).
- Slide the burner out of the combustion head by about 100 ÷ 120 mm, and release the drive fork 7) by removing screws 10).
- It is now possible to slide the burner fully out on pins 5).
- Secure the tube to the boiler, inserting the insulating screen 9).
- Slide the burner in on pins 5), leaving it open by about 100 ÷ 120 mm.
- Refit fork 7), securing it with screws 10).
- Completely close the burner, securing it with screws 3), fit stops 4), pin with cotter 2), gas butterfly tie-rod 11), and hoses 6).
- When the burner is open, it is possible to detach gas sleeve 8) from the tube.
- Before fitting the burner to the boiler, it is advisable to fit the tube as specified below.

NOTE:

By lifting the burner with hooks, it is possible to secure it to the boiler without detaching it from the combustion head.

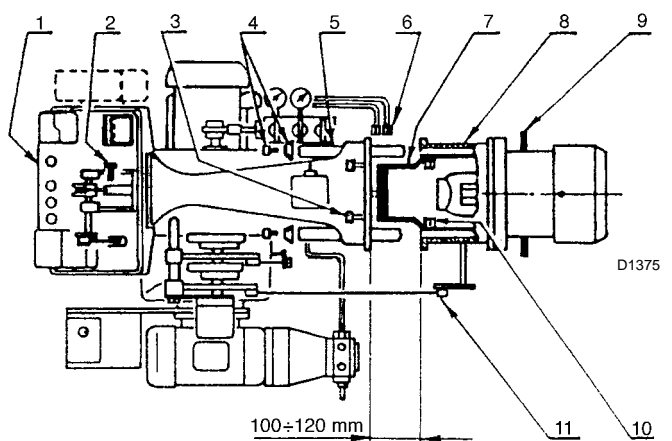


Fig. 6

5.6.1 Boiler front plate drilling combustion head projection

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

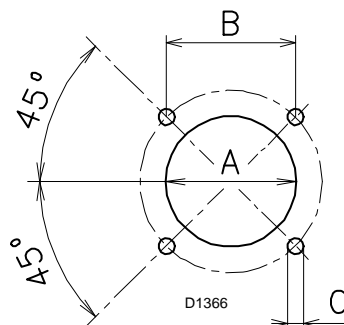


Fig. 7

The position of the threaded holes can be marked using the thermal screen supplied with the burner.

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.

mm	A	B	C
GI/EMME 1400	255	260	M 16
GI/EMME 2000	265	260	M 16
GI/EMME 3000	340	310	M 20
GI/EMME 4500	340	310	M 20

5.6.2 Maintenance of the combustion head

- Repeat the operations described using the special extensions for pins 5) supplied as standard with the system.
- When opening the burner, it is advisable to support its weight by suitable means or using the wheeled support unit available on request.

5.6.3 Electrode positioning

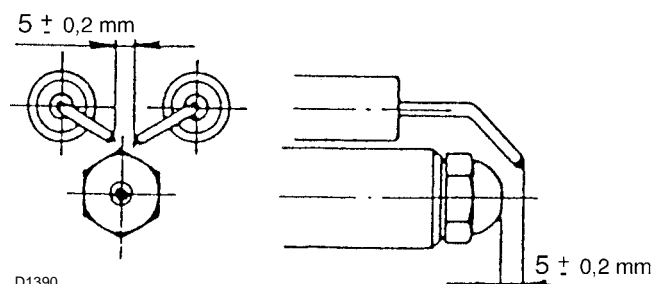


Fig. 8

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.

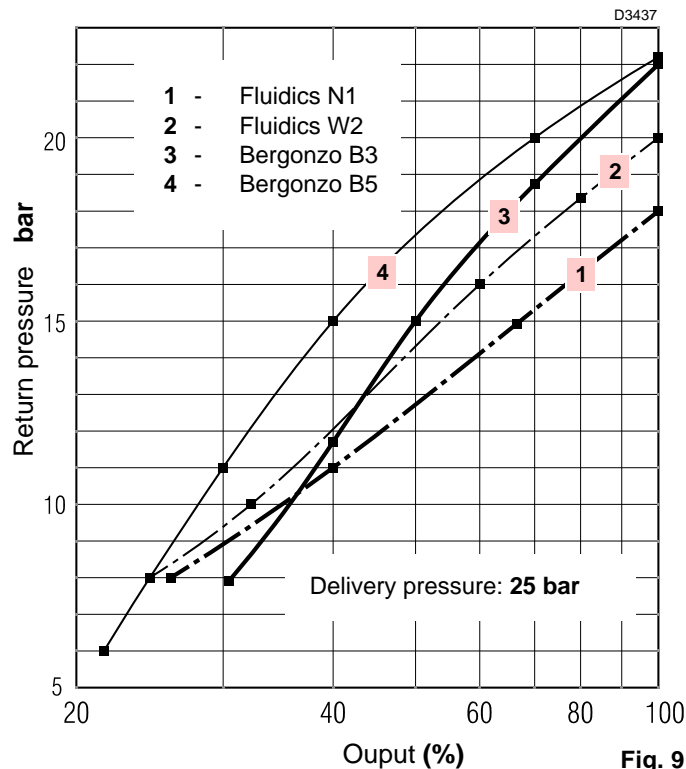
5.7.1 Nozzles recommended

Select the nozzle, with a delivery rating slightly higher than effectively required, from the following types:

- **Fluidics** type **N1** (without shutoff needle)
- **Fluidics** type **W2** (with shutoff needle)
- **Bergonzo** type **B3** or **B5** (with shutoff needle)

5.7.2 Adjustment of the pressure controller

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



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

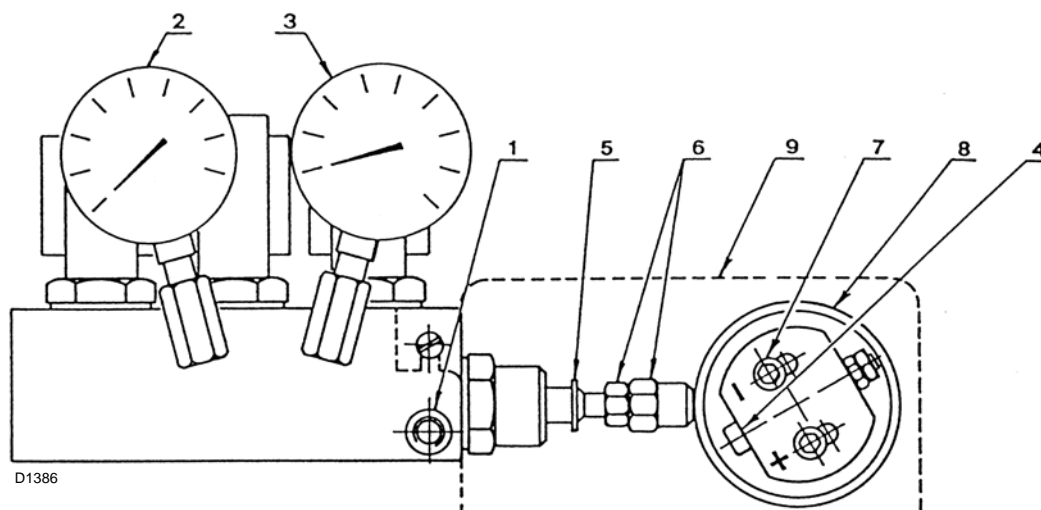
Nozzles available (delivery in kg/h):

Bergonzo	Fluidics
70	70
80	80
90	90
100	100
125	115
150	130
175	145
200	160
225	180
250	200
275	225
300	250
325	275
350	300
375	330
400	360
425	400
450	450

Tab. D

Angles of 45° - 50° are normally recommended. For narrow combustion chambers, use nozzles with angles of 30° - 35°.

To set the delivery range within which the nozzle must operate, adjust max. and min. fuel pressure on return from nozzle in relation to the graph (Fig. 9).

Pressure controller

Fig. 10
Key (Fig. 10)

- 1 - Pressure switch fitting
- 2 - Delivery pressure gauge
- 3 - Return pressure gauge
- 4 - Cam adjustment screw
- 5 - Piston halt ring
- 6 - Piston calibration nut and locknut
- 7 - Cam locking screws
- 8 - Variable cam
- 9 - Gear-case

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°÷130°): 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 14, 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.

To calibrate cam 8):

- remove gear - case 9), slacken screws 7), and act on screw 4) until required eccentricity is obtained;
- turning screw 4) to the right (+ sign), eccentricity is increased, thus increasing the difference between nozzle maximum and minimum delivery;

- turning screw 4) to the left (- sign), eccentricity is reduced, thereby reducing the difference between nozzle maximum and minimum delivery.

Every variation of eccentricity may require a travel offset using nut and locknut 6).

NOTE:

To obtain correct calibration, cam 8) must operate over the full travel range of the servomotor (20° - 130°): every variation of the servomotor must be matched by a variation in pressure.

Never give the variator piston a snug fit: stop ring 5) sets maximum travel.

When the adjustment has been made, manually check that there is no knocking between 20° and 130° and that maximum and minimum pressures match pre-selected values as indicated on the graph (Fig. 9 at page 15).

If, at maximum nozzle delivery (maximum return pressure), pressure oscillations are seen on pressure gauge 3), slightly reduce pressure until the oscillations are eliminated.

5.8 Burners items set at the factory

5.8.1 Servomotor

The servomotor simultaneously regulates, through a transmission system, air delivery and pressure and delivery of the fuel in use.

It is fitted with adjustable cams which drive a similar number of selector switches.

Cam **POS. 1**: Sets the servomotor limit switch to max. position. (oil operation).

Cam **POS. 2**: Sets the servomotor limit switch to 0° position. When the burner is off, the air damper is completely closed.

Cam **POS. 3**: Regulates minimum modulation delivery. It is factory calibrated in the 20° position. (oil operation).

Cam **POS. 4**: Sets the servomotor limit switch to max position. (gas operation).

Cam **POS. 5**: Regulates minimum modulation delivery. It is factory calibrated in the 20°. (gas operation).

Rem. cam: No utilized.

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 30.

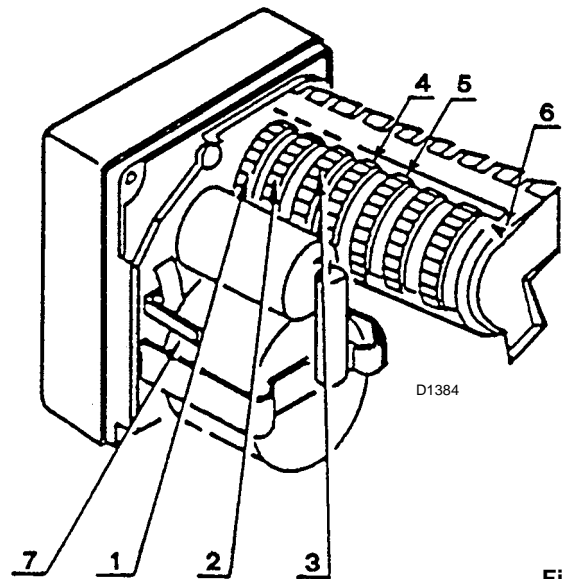


Fig. 11

- 1 - 4 Limit switch cam (max. air damper aperture)
- 2 Limit switch cam (max. air damper closure)
- 3 - 5 Minimum delivery position cam (and start-up)
- 6 Position read-out index
- 7 Servomotor release

5.9 Combustion head adjustment

The combustion head moves simultaneously with cam 8)(Fig. 10 at page 16), the variable-profile cams and the gas butterfly.

Head position can be seen on cylinder 2)(Fig. 13). The head control lever systems are factory-calibrated for maximum travel.

If a different modulation range is required, these levers must be recalibrated so that head travel takes place as illustrated in the graph (Fig. 12).

Procedure to follow in the event of ignition difficulties:

- 1 Adjust fuel pressure in the return line to between 5 and 8 bar and regulate air delivery to ensure that correct conditions of combustion are present.
- 2 If difficulties persist, set the combustion head to minimum on notch 2 or 3, maintaining the maximum delivery adjustment as shown in the diagram (Fig. 12).

Example:

With burner GI/EMME 4500, for modulation from 1.400.000 to 3.400.000 kcal/h, you see from the graph: notch 1 for 1.400.000 kcal/h, notch 6.5 for 3.400.000 kcal/h, with a travel of 5.5 notches.



To avoid causing knocking, never exceed maximum and minimum aperture positions corresponding, respectively, on cylinder (2) (Fig. 13), to notch 9 with the servomotor at 130° and notch 0 with the servomotor at 0°.

To modify combustion head travel, proceed as follows:

con-rod 1), which controls drive rod 8) of the combustion head, is fitted with a slot; when tie-rod 9) is moved towards the outside of the slot, head travel decreases by about 20 mm (approx. 4 notches).

If a larger reduction is required, proceed as follows:

with the servomotor at 0°, slacken screws 5) and push ring 6) under the variable-profile cam in the direction of the arrow.

This reduces eccentricity and thus decreases travel.

Having established the required travel, fully secure screws 5).

In the previous example (travel of 5.5 notches), travel start - end must coincide with the required values of 1 and 6.5.

To obtain this, turn hex. sleeve 3) one way or the other after having slackened nuts 4).

With the servomotor positioned at 0°, notch 1 must coincide with reference surface 10); when the servomotor is positioned at 130°, it must coincide with notch 6.5.

Having completed the adjustment, fully secure nuts 4) with ball-joint 9) positioned as shown in the (Fig. 13).

Head calibrations are performed with the burner closed and not operating and with the servomotor released.

Having completed the adjustment, manually check cam 7) travel to ensure there is no knocking between 0° and 130°.

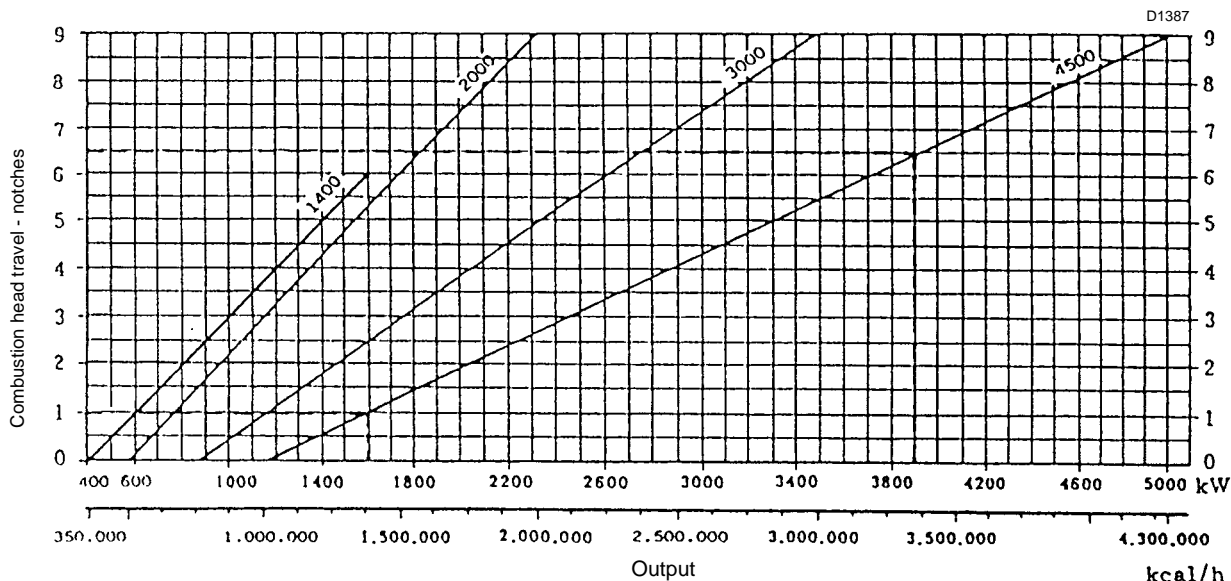


Fig. 12

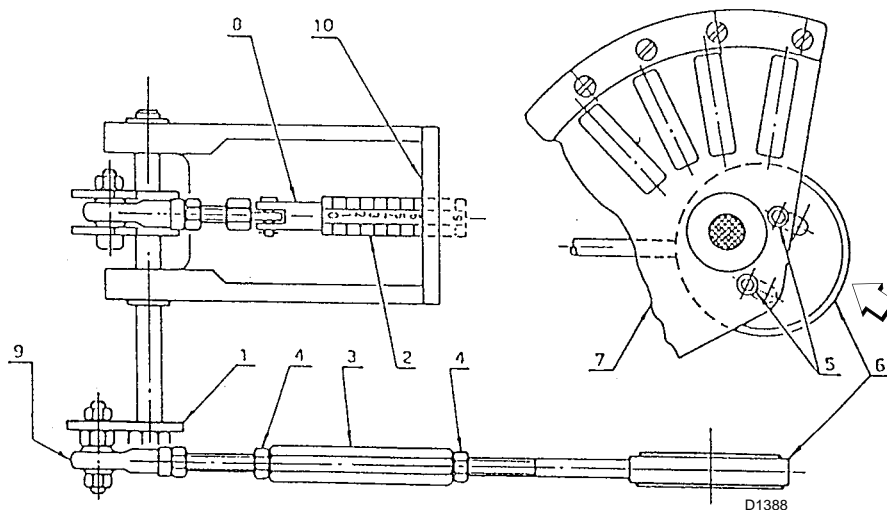


Fig. 13

5.9.1 Air damper adjustment

Air damper adjustment is performed by acting on the variable profile cam.

This operation is performed after having adjusted the pressure variator and the combustion head.

With the burner on, remove voltage from the servomotor, detaching the fast-on pin located on the electrical control panel, and release movement by pressing on release 7) (Fig. 11 at page 17).

Calibrate maximum output, minimum output and intermediate outputs in this order. Having completed the adjustment, re-check all calibrations, reset the electrical connections of the servomotor and secure the adjustment screws with the crossways screws.

Modifying air damper tie-rod length

It is recommended to extend the tie-rod when the air damper moves within a reduced angle (air damper at about half travel of maximum output); this helps avoid giving the cam too curved a profile.

With the burner off, proceed as follows:

- detach ball-joint 2) (Fig. 14) from lever 1);
- unscrew extension 3) a few turns from tie-rod 4);
- reconnect the ball-joint to the lever and raise the cam profile until the air damper index returns to 0 with the servomotor at 0°.

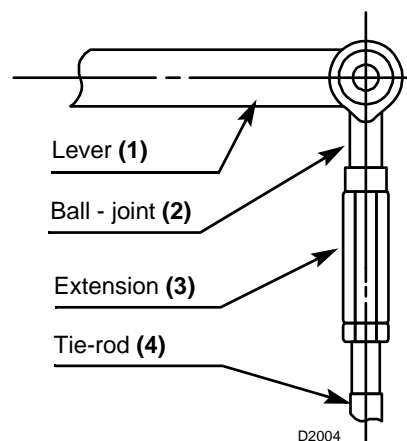


Fig. 14

5.9.2 Electrical current to the UV cell

Minimum value for correct operation: 70 μ A.

If a lower value is read, it may be caused by:

- exhausted cell;
- low voltage (less than 187 V);
- poor burner adjustment.

To measure the electrical current to the cell, use a 100 μ A d.c. microamperometer connected in series to the cell itself, as shown in the diagram, with a 100 μ F - 10 V d.c. capacitor in parallel to the instrument.

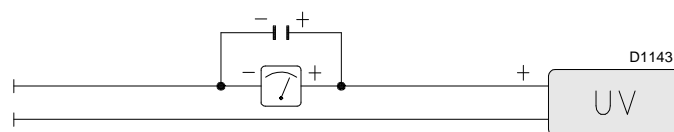


Fig. 15

5.10 Firing output

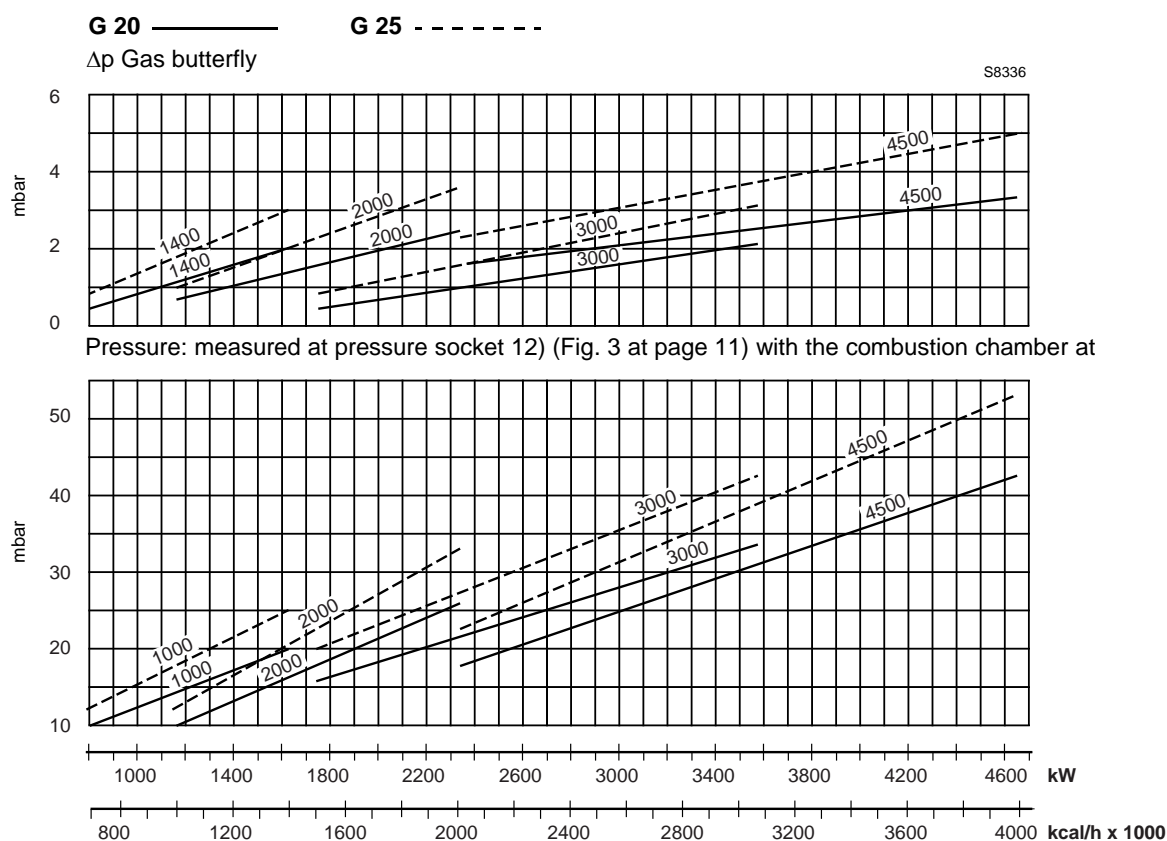


Fig. 16

GI/EMME 1400

Gas train L					Connection	13	Components		
Ø	COD.	Δp mbar					5	6	8 - 9
		820 kW	1200 kW	1540 kW					
2"	3970160	13,0	28,0	40,0	2"	-	GF 520/1	FRS 520	DMV - DLE 520/11
2"	3970182	13,0	23,0	35,0	2"	-	Multiblock MB DLE 420		
DN 65	3970161	5,0	10,0	15,0	2"	3000825	GF 40065/3	FRS 5065	DMV - DLE 5065/11
DN 80	3970162	-	5,5	8,0	2"	3000826	GF 40080/3	FRS 5080	DMV - DLE 5080/11

GI/EMME 2000

Gas train L					Connection	13	Components		
Ø	COD.	Δp mbar					5	6	8 - 9
		1160 kW	1800 kW	2325 kW					
2"	3970160	24,0	58,0	85,0	DN 80	3010128	GF 520/1	FRS 520	DMV - DLE 520/11
2"	3970182	20,0	42,0	75,0	DN 80	3010128	Multiblock MB DLE 420		
DN 65	3970161	9,0	21,0	32,0	DN 80	3000831	GF 40065/3	FRS 5065	DMV - DLE 5065/11
DN 80	3970162	-	11,0	16,0	DN 80	3000832	GF 40080/3	FRS 5080	DMV - DLE 5080/11
DN 100	3970163	-	5,0	7,5	DN 80	3010127	GF 40100/3	FRS 5100	DMV - DLE 5100/11

GI/EMME 3000

Gas train L					Connection	13	Components		
Ø	COD.	Δp mbar					5	6	8 - 9
		1744 kW	2600 kW	3788 kW					
DN 65	3970161	20,0	40,0	70,0	DN 80	3000831	GF 40065/3	FRS 5065	DMV - DLE 5065/11
DN 80	3970162	10,0	19,0	35,0	DN 80	3000832	GF 40080/3	FRS 5080	DMV - DLE 5080/11
DN 100	3970163	5,0	10,0	17,0	DN 80	3010127	GF 40100/3	FRS 5100	DMV - DLE 5100/11

GI/EMME 4500

Gas train L					Connection	13	Components		
Ø	COD.	Δp mbar					5	6	8 - 9
		2350 kW	3300 kW	4650 kW					
DN 65	3970161	33,0	65,0	130,0	DN 80	3000831	GF 40065/3	FRS 5065	DMV - DLE 5065/11
DN 80	3970162	17,0	33,0	56,0	DN 80	3000832	GF 40080/3	FRS 5080	DMV - DLE 5080/11
DN 100	3970163	8,5	15,0	28,0	DN 80	3010127	GF 40100/3	FRS 5100	DMV - DLE 5100/11

According to regulation EN 676.

Burners with max. output above 120 kW.

Firing must be performed at a lower output than the max. operation output.

If the firing output does not exceed **120 kW**, no calculations are required.

If firing output exceeds **120 kW**, the regulations prescribe that the value be defined according to the control box safety time "ts":

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

Example:

MAX. operation output of 1800 kW.

Firing output must be equal or lower than:

- 900 kW with "ts" = 2s;
- 600 kW with "ts" = 3s.

In order to measure the firing output:

- Disconnect the ionization probe cable (the burner will fire and then go into lock-out after the safety time has elapsed).
- Perform 10 firings with consecutive lock-outs.
- On the meter read the quality of gas burned.

This quality must be equal to or lower than the quality given by the formula:

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

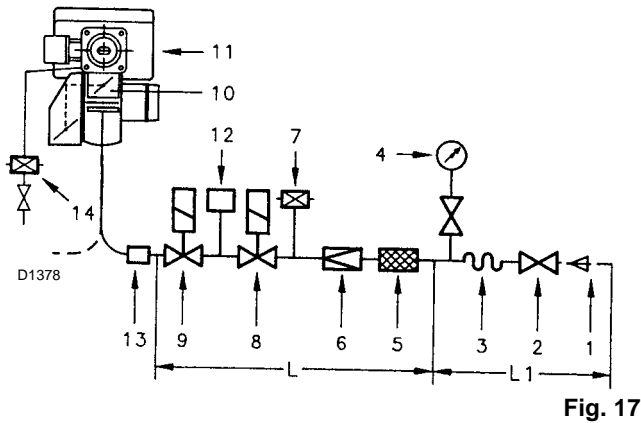
Example (for G 20 gas):

Max. operation output: 1800 kW corresponding to 180 Nm³/h.

After 10 firing with lock-outs, the delivery read on the meter must be equal to or lower than:

$$180 : 360 = 0.5 \text{ Nm}^3$$

5.10.1 Gas train according to regulation EN 676

**key**

- 1 Gas input pipe
- 2 Manual valve
- 3 Vibration damping joint
- 4 Pressure gauge with pushbutton cock
- 5 Filter
- 6 Pressure governor
- 7 Minimum gas pressure switch
- 8 Safety solenoid VS
- 9 Adjustment solenoid VR
- 10 Gas control butterfly
- 11 Burner
- 12 Gas valve 8) - 9) leak detection control device:
 - In accordance with EN 676 Standards, gas valve leak detection control devices are compulsory for burners with maximum outputs of more than 1200 kW.
- 13 Gas train / burner adaptor
Supplied separately from gas train on request.
- 14 Gas max. pressure switch
- L - Gas train supplied separately with the code indicated in Table.
- L 1- At the responsibility of the installer.

The manifold pressure loss values indicated in the chart are for natural gas G 20; for G 25 multiply the values by 1.3.

5.11 Gas oil supply



WARNING

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

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

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



WARNING

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

Please contact Riello for further information.



DANGER

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



CAUTION

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

Riello recommends a good quality fuel filter at the tank (Fig. 18 - Fig. 19) and a secondary filter (100 μ for gas oil and 15 μ for kerosene) are used to protect the burner pump and nozzle from contamination.

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

5.11.1 Double-pipe circuit

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

The tank higher than the burner A (Fig. 18)

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. 18)

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.

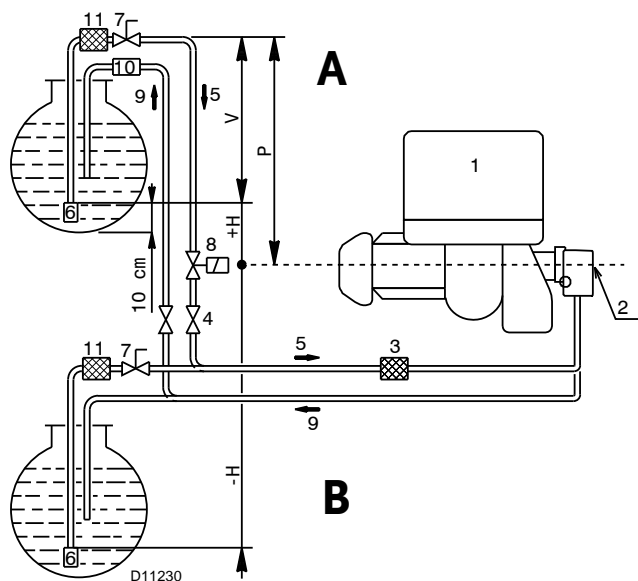


Fig. 18

Key (Fig. 18)

H Pump/Foot valve height difference

L Piping length

\varnothing Inside pipe diameter

1 Burner

2 Pump

3 Filter

4 Manual on/off valve

5 Suction line

6 Foot valve

7 Rapid closing manual valve remote controlled (only Italy)

8 On/off solenoid valve (only Italy)

9 Return line

10 Check valve (only Italy)

11 Tank filter

G/M	1400		2000		3000		4500	
H m	L m							
	Øi 14	Øi 16	Øi 16	Øi 18	Øi G 1/2"	Øi G 3/4"	Øi G 3/4"	Øi G 1"
+ 2,0	55	70	40	60	25	85	55	130
+ 1,5	45	65	35	55	23	80	50	120
+ 1,0	40	60	30	50	20	70	45	110
+ 0,5	35	50	25	45	18	65	40	100
0	30	45	20	40	15	60	35	90
- 0,5	25	40	18	35	12	50	30	80
- 1,0	20	35	15	30	10	45	25	70
- 1,5	15	30	13	25	8	35	20	60
- 2,0	10	25	10	20	5	30	15	45
- 3,0	5	15	5	10	3	15	10	25

Tab. E

5.11.2 Single-pipe circuit

In order to obtain single-pipe working it is necessary to unscrew the return hose, remove the by-pass screw 6)(Fig. 21) 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. 21) in order to bleed off the air contained in the suction line and wait until the fuel flows out.

Key (Fig. 19)

H Pump/Foot valve height difference

L Piping length

Ø Inside pipe diameter

1 Burner

2 Pump

3 Filter

4 Manual on/off valve

5 Suction line

6 Foot valve

7 Rapid closing manual valve remote controlled (only Italy)

8 On/off solenoid valve (only Italy)

11 Tank filter

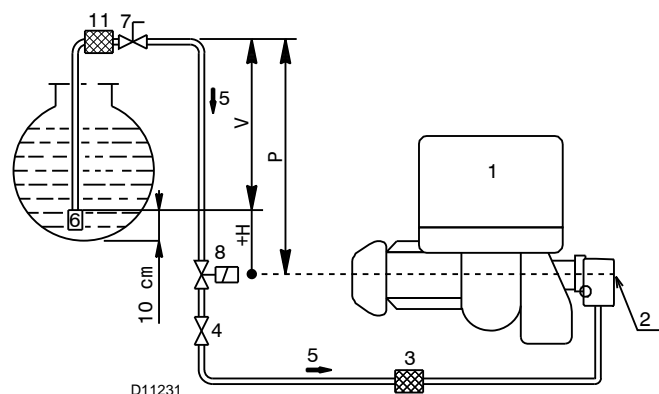


Fig. 19

G/M	1400		2000		3000		4500	
H m	L m							
	Øi 14	Øi 16	Øi 16	Øi 18	Øi G 1/2"	Øi G 3/4"	Øi G 3/4"	Øi G 1"
+ 2,0	55	70	40	60	25	85	55	130
+ 1,5	45	65	35	55	23	80	50	120
+ 1,0	40	60	30	50	20	70	45	110
+ 0,5	35	50	25	45	18	65	40	100

Tab. F

5.12 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. 21).

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.

5.12.1 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 $\leq 0,5$ bar):

GI/EMME 1400	1,5 ÷ 2,0 bar
GI/EMME 1400	2,0 ÷ 2,5 bar
GI/EMME 1400	3,0 ÷ 3,5 bar
GI/EMME 1400	4,0 ÷ 4,5 bar

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

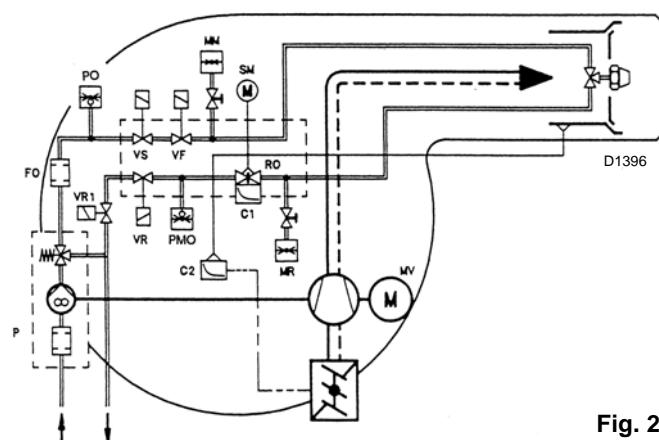


Fig. 20

Key

Cn	- Control cams
FO	- Oil filter
MM	- Oil delivery pressure gauge
MR	- Oil return pressure gauge
MV	- Fan motor
P	- Pump with pressure regulator
PO	- Oil min. pressure switch
POM	- Oil max. pressure switch
RO	- Oil return pressure regulator
Vn	- Valves

5.13 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 TA2

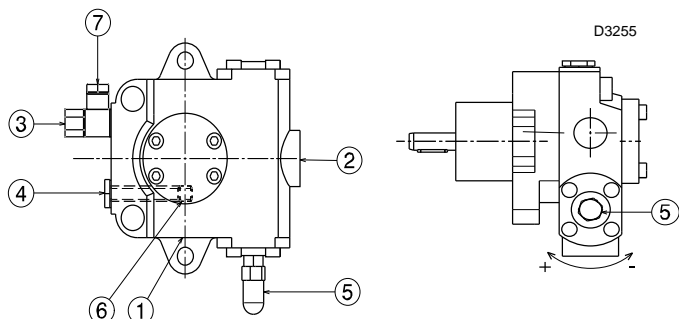


Fig. 21

Suntec TA3

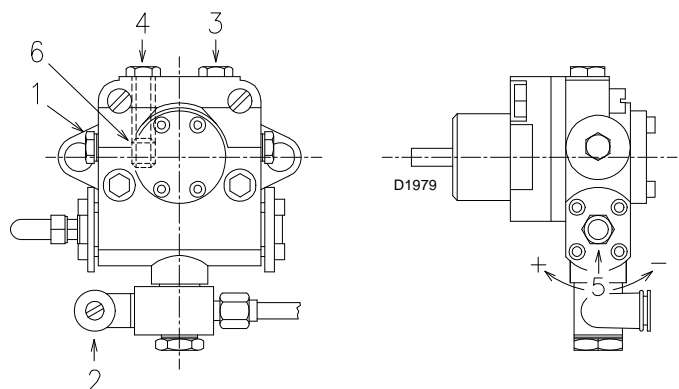


Fig. 22

Suntec TA4

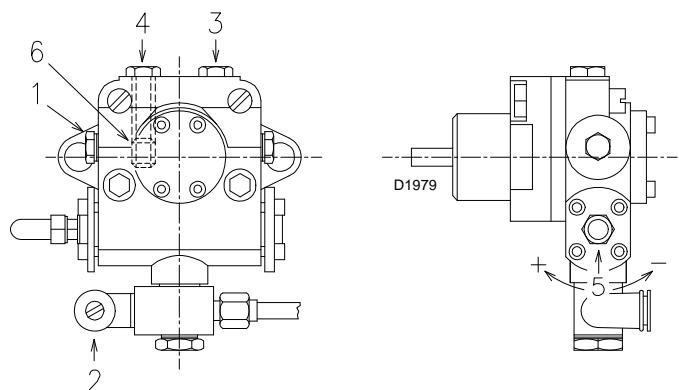


Fig. 23

Suntec TA5

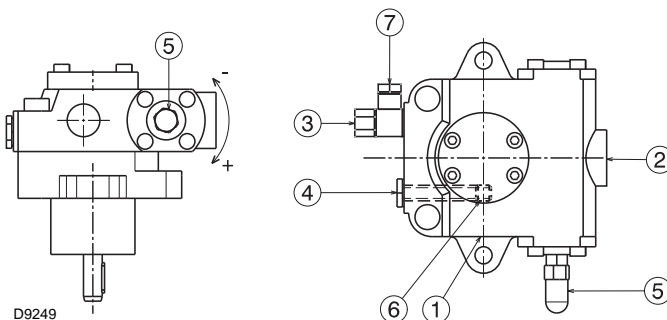


Fig. 24

Key

Suntec	TA2	TA3	TA4	TA5
1 Suction	G 1/2"	G 1/2"	G 1/2"	G 1/2"
2 Return	G 1/2"	G 1/2"	G 1/2"	G 1/2"
3 Pressure gauge connection	G 1/8"	G 1/8"	G 1/8"	G 1/4"
4 Vacuum meter connection	G 1/8"	G 1/8"	G 1/8"	G 1/4"
5 Pressure adjustment screw				
6 Screw for by-pass				
7 Pressure gauge attachment	G 1/4"	G 1/4"	G 1/4"	G 1/4"

5.13.1 Technical data

Suntec TA2

Min. delivery rate at 12 bar pressure	kg/h	480
Delivery pressure range	bar	7 - 40
Max. suction depression	bar	0.45
Viscosity range	mm ² /s (cSt)	3 - 75
Max. gas oil temperature	°C	140
Max. suction and return pressure	bar	5
Pressure calibration in the factory	bar	30

Suntec TA3

Min. delivery rate at 12 bar pressure	kg/h	667
Delivery pressure range	bar	7 - 40
Max. suction depression	bar	0.45
Viscosity range	mm ² /s (cSt)	3 - 75
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

Suntec TA4

Min. delivery rate at 12 bar pressure	kg/h	730
Delivery pressure range	bar	7 - 40
Max. suction depression	bar	0.45
Viscosity range	mm ² /s (cSt)	3 - 75
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

Suntec TA5

Min. delivery rate at 16.5 bar pressure	kg/h	1450
Delivery pressure range	bar	7 - 30
Max. suction depression	bar	0.45
Viscosity range	mm ² /s (cSt)	3 - 75
Max. gas oil temperature	°C	140
Max. suction and return pressure	bar	5
Pressure calibration in the factory	bar	30
Filter mesh width	mm	0.17

Tab. G

5.13.2 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. 21) 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



DANGER

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

Before carrying out any maintenance, cleaning or checking operations:



DANGER

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



DANGER

isolate the fuel supply.

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

6.2 Electrical wiring factory-set

Direct motor starting (GI/EMME 1400 - 2000 - 3000)

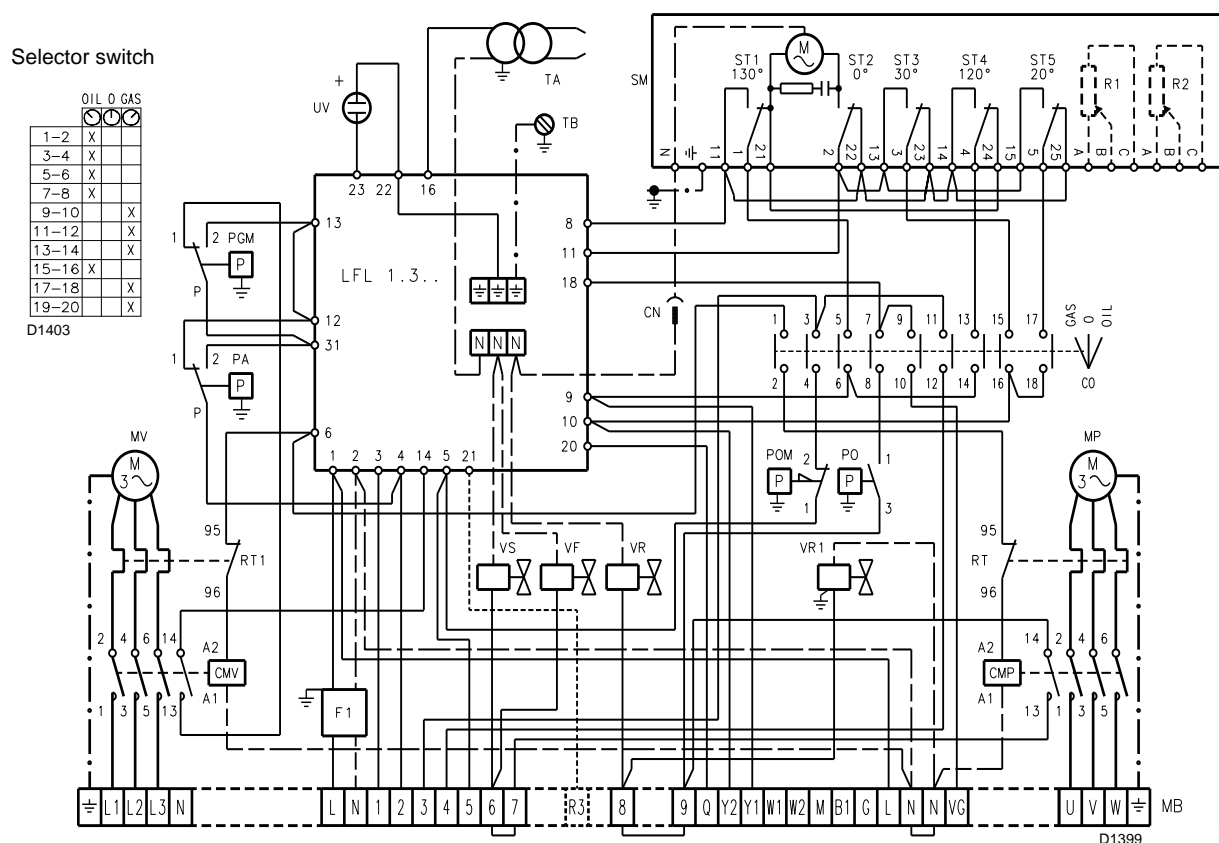


Fig. 25

Key (Fig. 25)

- CMP - Pump motor contact - maker
- CMV - Fan motor contact - maker
- CN - Connector
- CO - Selector switch
- F1 - RFI suppressor
- LFL 1.3.- Control box
- MB - Burner terminal strip
- MP - Pump motor
- MV - Fan motor
- PA - Air pressure switch
- PGM - Gas MAX. pressure switch
- PO - Oil pressure switch
- POM - Oil MAX. pressure switch
- RT - Pump thermal overload relay
- RT1 - Fan thermal overload relay
- SM - Air damper servomotor
- TA - Ignition transformer
- TB - Burner grounding
- UV - QRA probe
- VF - Oil operation valve
- VR-VR1- Oil return valves
- VS - Oil safety valve

Star - delta motor starting (GI/EMME 2000 - 3000 - 4500)

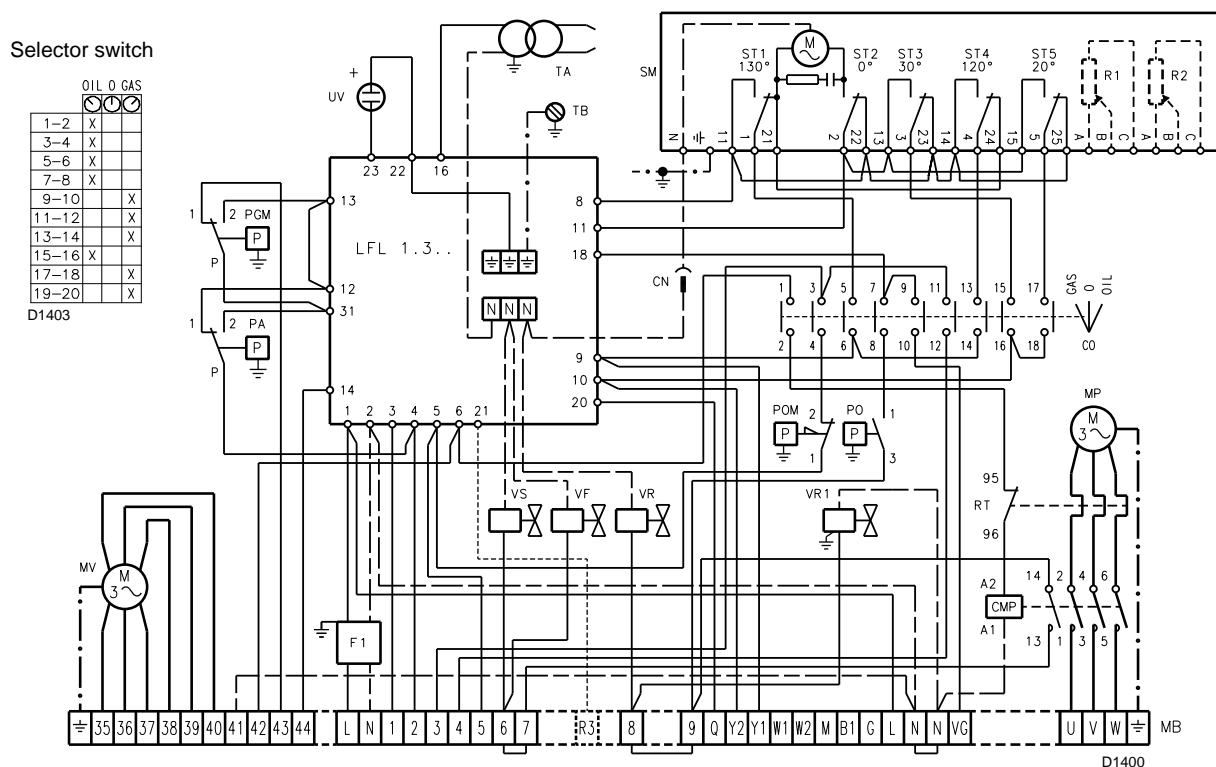


Fig. 26

Key (Fig. 25)

- CMP - Pump motor contact - maker
- CMV - Fan motor contact - maker
- CN - Connector
- CO - Selector switch
- F1 - RFI suppressor
- LFL 1.3..- Control box
- MB - Burner terminal strip
- MP - Pump motor
- MV - Fan motor
- PA - Air pressure switch
- PGM - Gas MAX. pressure switch
- PO - Oil pressure switch
- POM - Oil MAX. pressure switch
- RT - Pump thermal overload relay
- RT1 - Fan thermal overload relay
- SM - Air damper servomotor
- TA - Ignition transformer
- TB - Burner grounding
- UV - QRA probe
- VF - Oil operation valve
- VR-VR1- Oil return valves
- VS - Oil safety valve

6.3 Electrical connection to the terminal strip - installer-set

Direct motor starting (GI/EMME 1400 - 2000 - 3000)

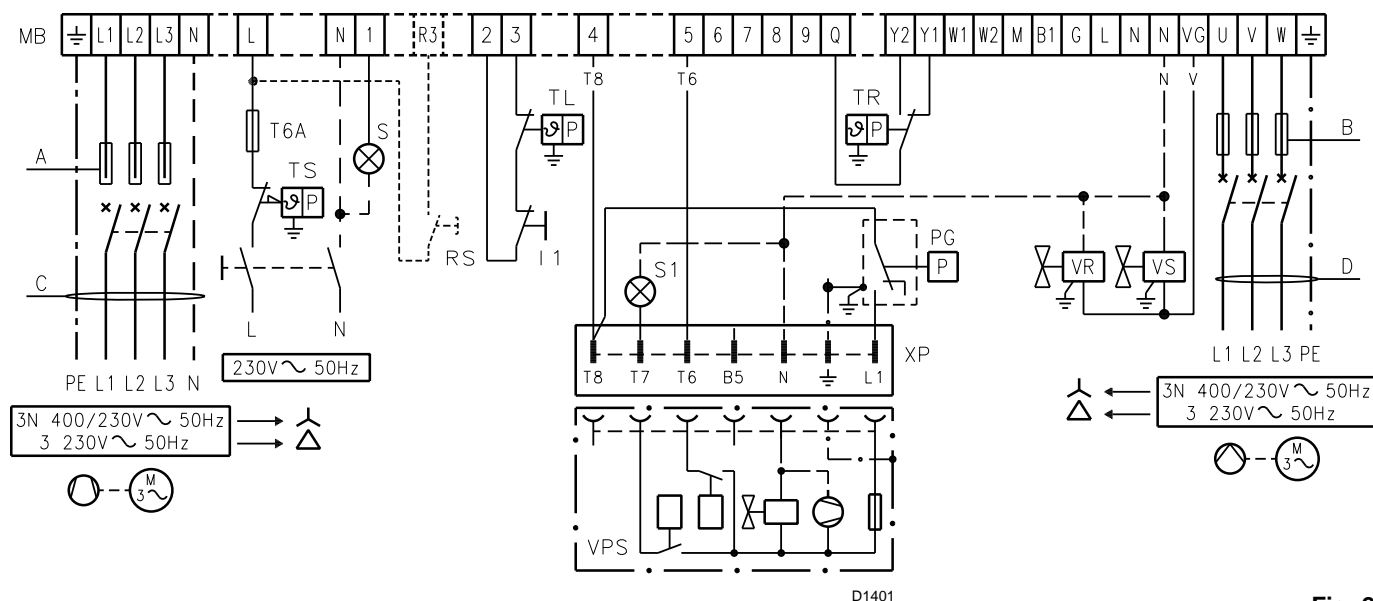


Fig. 28

- with direct motor starting;
- with VPS leak detection control device.

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

Cables cross-section

	G/M 1400		G/M 2000		G/M 3000	
	230 V	400 V	230 V	400 V	230 V	400 V
A A gG/gL	20	16	25	20	40	32
B A gG/gL	6	4	6	4	10	6
C mm ²	2,5	2,5	2,5	2,5	6	4
D mm ²	1,5	1,5	1,5	1,5	2,5	1,5

Key to layout

- MB - Burner terminal strip
- MA - Starter terminal strip
- RS - Remote lock-out reset button (if present)
- S - Remote lock-out signal
- S1 - VPS lock-out signal
- S2 - Fan motor lock-out signal
- I1 - Manual burner stop switch
- VR - Adjustment valve
- VS - Safety valve
- PG - Min gas pressure switch
- TL - Limit load control system
- TS - Safety load control system
- TR - High - low mode load control system: controls 1st and 2nd stage operation
- VPS - Valve proving system

Star - delta motor starting (GI/EMME 2000 - 3000 - 4500)

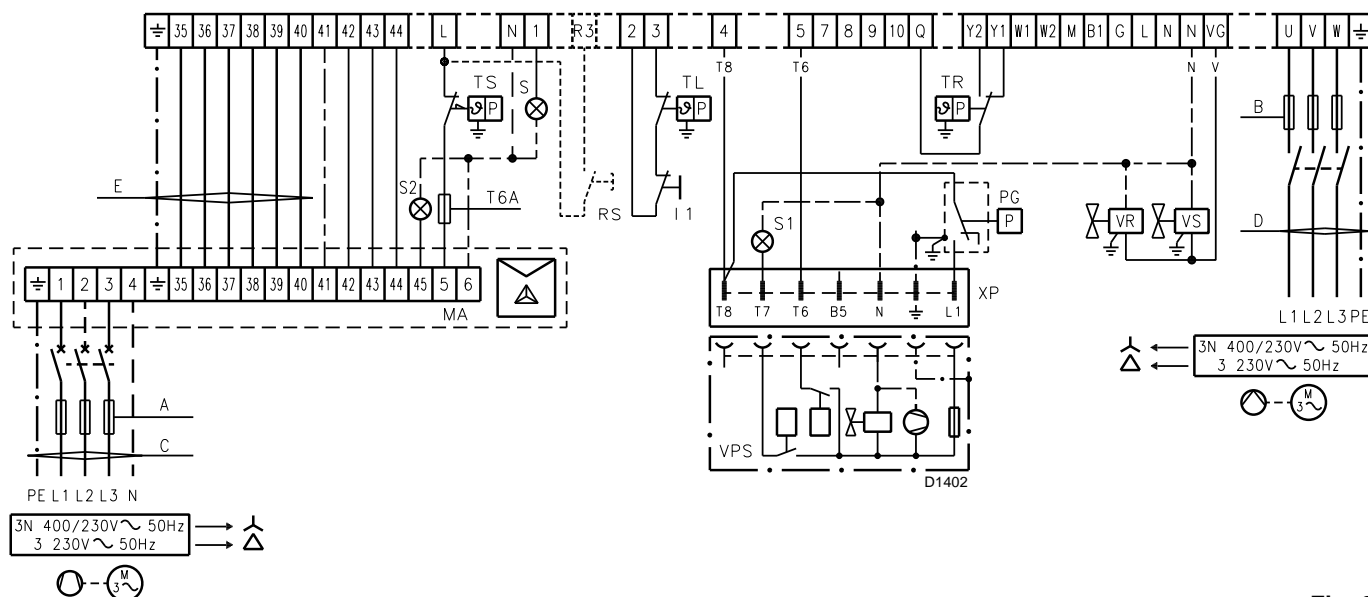


Fig. 29

- with star-delta motor starting;
- with VPS leak detection control device.

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

Cables cross-section

	G/M 2000		G/M 3000		G/M 4500	
	230 V	400 V	230 V	400 V	230 V	400 V
A A gG/gL	25	20	40	32	63	40
B A gG/gL	6	4	10	6	10	6
C mm ²	2,5	2,5	2,5	2,5	6	4
D mm ²	1,5	1,5	1,5	1,5	2,5	1,5
E mm ²	1,5	1,5	2,5	2,5	4	2,5

Key to layout

- MB - Burner terminal strip
 MA - Starter terminal strip
 RS - Remote lock-out reset button (if present)
 S - Remote lock-out signal
 S1 - VPS lock-out signal
 S2 - Fan motor lock-out signal
 I1 - Manual burner stop switch
 VR - Adjustment valve
 VS - Safety valve
 PG - Min gas pressure switch
 TL - Limit load control system
 TS - Safety load control system
 TR - High - low mode load control system: controls 1st and 2nd stage operation
 VPS - Valve proving system

6.3.1 Connection RWF40

Connection of regulator RWF40 and related probe to GI/EMME 1400 - 2000 - 3000 - 4500 burners (modulating operation).

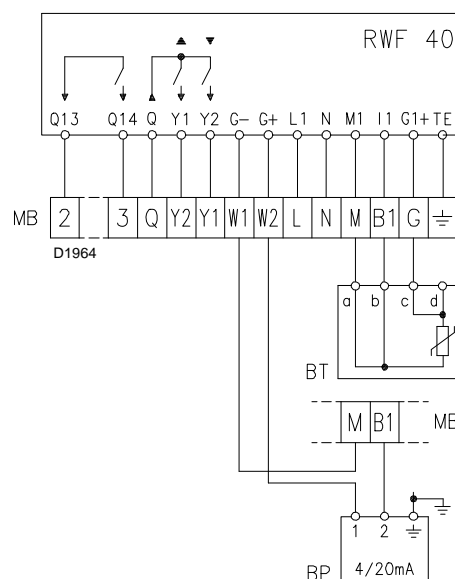


Fig. 30

- a - b : Red
 c - d : White

Key to layout

- PB - Pressure probe
 PT - Temperature probe
 MB - Burner terminal strip

NOTE:

The TR and TL load controls are not required when the RWF40 is connected, as their function is performed by the RWF40 itself.

6.3.2 Calibration of thermal relay

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

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

If the scale of the thermal relay does not include rated motor absorption at 400 V, protection is still ensured.

NOTE:

To verify the lock-out, remove cover from base plate and obscure the U. V. detector.

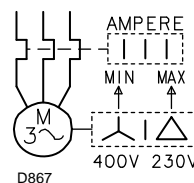


Fig. 31



high voltage.

- These models leave the factory preset for 400 V power supply.
If power supply is 230 V, change:
 - the connection of the motors (from star to delta) and the thermal relays setting (GI/EMME 1400 - 2000 - 3000 direct starting);
 - the pump motor connection (from star to delta) and the thermal relay setting (GI/EMME 2000 - 3000 - 4500 star-delta starting).
- For continuous operation, safety standards require a compulsory stop every 24 hours, controlled by a special monitored switch connected in series with the load control devices (TL and I1).

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 Starting the burner

7.2.1 Venting the gas supply

This is done by removing the screw from the gas pressure switch, or the pressure test point.

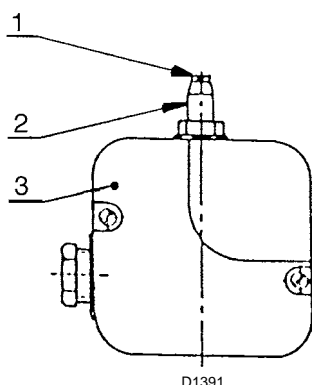


Fig. 32

- 1 - Screw
- 2 - Fitting for pressure measurement
- 3 - Pressure switch

7.2.2 Minimum gas pressure switch

Adjust the minimum gas pressure switch after having performed all the other burner adjustments with the pressure switch set at the start of the scale. With the burner operating, increase adjustment pressure by slowly turning the relative knob clockwise until the burner locks out. Then turn the knob anti-clockwise by **2 mbar** and repeat burner starting to ensure it is uniform. If the burner locks out again, turn the knob anti-clockwise again by **1 mbar**.

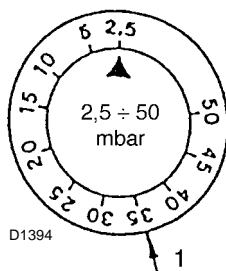


Fig. 33

- 1 - Adjustment knob

7.2.3 Maximum gas pressure switch

Only adjust maximum gas pressure switch after having adjusted the air pressure switch. With the burner operating at maximum potential, reduce adjustment pressure by turning the adjustment knob anticlockwise until the burner comes to lockout. Then increase the adjustment by **2 mbar** and repeat burner start-up. If the burner has lockout again, increase pressure by a further **1 mbar**.

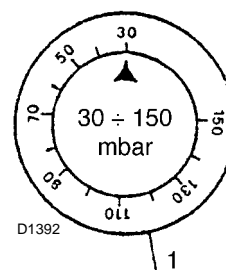


Fig. 34

7.2.4 Air pressure switch

Adjust the air pressure switch after having performed all other burner adjustments with the air pressure switch set to the start of the scale. With the burner operating in 1st stage, increase adjustment pressure by slowly turning the relative knob clockwise until the burner locks out. Then turn the knob anti-clockwise by **1 mbar** and repeat burner starting to ensure it is uniform. If the burner locks out again, turn the knob anti-clockwise again by **0.5 mbar**.

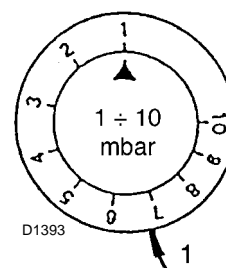


Fig. 35



As a rule, the air pressure switch must be triggered when the **CO** in the fumes is equal to or greater than **1% (10.000 ppm)**. To check this, insert a combustion analyser into the chimney, slowly close the fan suction inlet (for example with cardboard) and check that the burner locks out, when the CO in the fumes reaches 1%.

7.2.5 Gas butterfly GI / EMME 2000 - 3000 - 4500

The gas butterfly is fitted with an external adjustment unit, see (Fig. 36), which assists subsequent cam calibration at low mains pressures. Lock-ring **B** can be used to modify the throughput cross-selection at minimum potential:

- 0 minimum aperture
- 2 maximum aperture

Having set the adjustment, lock with screw **A**.

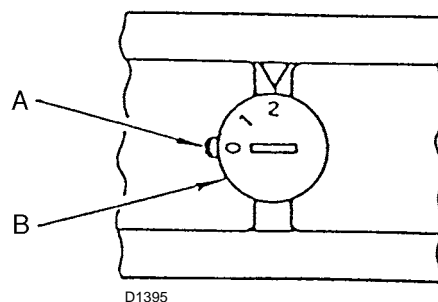


Fig. 36

7.2.6 AIR / GAS RATIO ADJUSTMENT

The final setting of gas delivery in relation to air delivery should be performed after having defined operating conditions for gasoil operation; this final setting is obtained by changing the profile of cam. 21) (Fig. 3 at page 11).

7.3 Burner start-up cycle

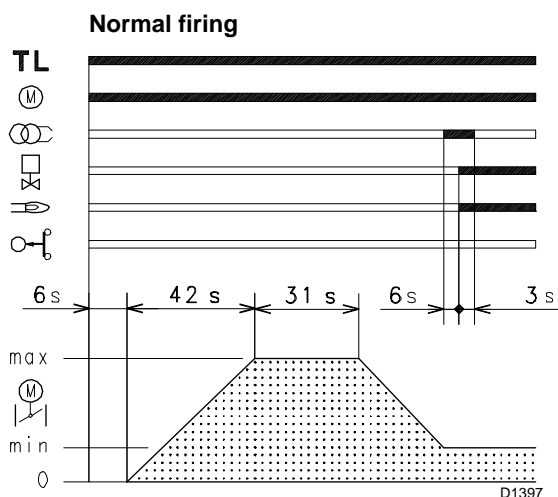


Fig. 37

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

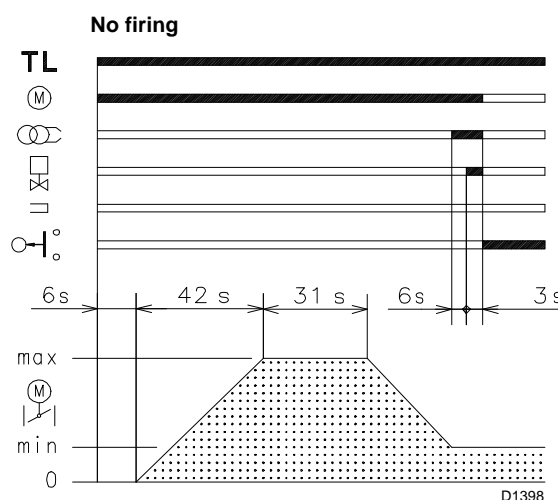


Fig. 38

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 $\lambda \leq 1.3$
	Calibration CO ₂ %		CO mg/kWh
Theoretical max. CO ₂ 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	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	Replace
		Defective motor command control device	Replace
		Defective control box	Replace
		Defective electrical motor	Replace
	The burner does not start and a function lock-out occurs	Flame simulation	Replace control box
		Photocell short-circuit	Replace photocell
		Missing phase 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
	Internally rusted pump	Water in tank	Suck water from tank bottom with separate pump

SYMBOL (1)	FAULT	PROBABLE CAUSE	SUGGESTED REMEDY
	Noisy pump, unstable pressure	Air has entered the suction line - Depression value too high (higher than 35 cm Hg): Tank/burner height difference too great Piping diameter too small Suction filters clogged Suction valves closed Paraffin solidified due to low temperature	Tighten connectors Feed burner with loop circuit Increase Clean Open Add additive to gas oil
	Pump unprimes after prolonged pause	Return pipe not immersed in fuel Air enters suction piping	Bring to same height as suction pipe Tighten connectors
	Pump leaks gas oil	Leakage from sealing organ	Replace pump
	Smoke in flame - dark Bacharach	Not enough air Nozzle worn or dirty Nozzle filter clogged Erroneous pump pressure Flame stability disk dirty, loose, or deformed Boiler room air vents insufficient	Adjust head and fan gate Replace Clean or replace Adjust Clean, tighten in place, or replace Increase
	- yellow Bacharach	Too much air	Adjust head and fan gate
	Dirty combustion head	Nozzle or filter dirty Unsuitable nozzle delivery or angle Loose nozzle Impurities on flame stability disk Erroneous head adjustment or not enough air Blast tube length unsuited to boiler	Replace See recommended nozzles Tighten Clean Adjust, open air damper 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 11) indicates the type of problem.
- (2) The fuse is located in the rear part of the control box 23)(Fig. 3 at page 11). 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	mm	Code
GI/EMME 1400 - 2000	102	3000722
GI/EMME 3000 - 4500	130	3000751

Sound proofing box

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

Box type	Average noise reduction [dB(A)]	Code
C7	10	3010376

Burner support

For easier maintenance, a mobile burner support has been designed, which means the burner can be dismantled without the need of forklift trucks.

Code
3000731

Burner regulator

To obtain modulating operation, the burner requires a regulator.

Regulator type	Code
RWF 40	3010211

Burner probe

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

Probe type	Range (°C) (bar)	Code
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.

Code
3010021

LPG kit

For burning LPG gas, a special kit is available to be fitted to the combustion head on the burner, as given in the following table.

Burner	Kit code for 'standard head'	Kit code for 'extended head'
GI/EMME 1400 - 2000	3010063	3010063
GI/EMME 3000	3090223	3090223
GI/EMME 4500	3090937	3090937

The logo consists of the word "RIELLO" in a bold, red, sans-serif typeface.

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