

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

Progressive two-stage or modulating operation



CODE	MODEL	TYPE
3486683 - 3486684	GI/EMME 1400	680 T80
3487683 - 3487684	GI/EMME 2000	681 T80
3488783 - 3488784	GI/EMME 3000	682 T80
3489085 - 3489086	GI/EMME 4500	683 T80
3489087 - 3489088	GI/EMME 4500	683 T80



Original instructions

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

Manufacturer: RIELLO S.p.A.
Address: Via Pilade Riello, 7
37045 Legnago (VR)
Product: Dual fuel gas oil/ gas burners
Model: GI/EMME 1400
GI/EMME 2000
GI/EMME 3000
GI/EMME 4500

These products are in compliance with the following Technical Standards:

EN 676

EN 267

EN 12100

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, 03.09.2014

Executive General Manager
RIELLO S.p.A. - Burner Department

Mr. U. Ferretti



Research & Development Director
RIELLO S.p.A. - Burner Department

Mr. R. Cattaneo



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 Other symbols



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



DANGER: FLAMMABLE MATERIAL
This symbol indicates the presence of flammable materials.



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



DANGER: CRUSHING OF LIMBS
This symbol indicates the presence of moving parts: danger of crushing of limbs.



WARNING: MOVING PARTS

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



DANGER: EXPLOSION

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



PERSONAL PROTECTION EQUIPMENT

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



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

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



ENVIRONMENTAL PROTECTION

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



IMPORTANT INFORMATION

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

- This symbol indicates a list.

Abbreviations used

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

2.1.4 Delivery of the system and the instruction manual

When the system is delivered, it is important that:

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

.....

- the address and telephone number of the nearest Assistance Centre

.....

.....

.....

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

2.2 Guarantee and responsibility

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



WARNING

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

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

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

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

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 foreseen by the manufacturer;

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

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



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

3.2 Personnel training

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

The user:

- undertakes to entrust the machine exclusively to suitably trained and qualified personnel;
- undertakes to inform his personnel in a suitable way about the application and observance of the safety instructions. With that aim, he undertakes to ensure that everyone knows the use and safety instructions for his own duties;
- personnel must observe all the danger and caution indications shown on the machine.
- Personnel must not carry out, on their own initiative, operations or interventions that are not within their province.
- Personnel must inform their superiors of every problem or dangerous situation that may arise.
- The assembly of parts of other makes, or any modifications, can alter the characteristics of the machine and hence compromise operating safety. The manufacturer therefore declines any and every responsibility for any damage that may be caused by the use of non-original parts.

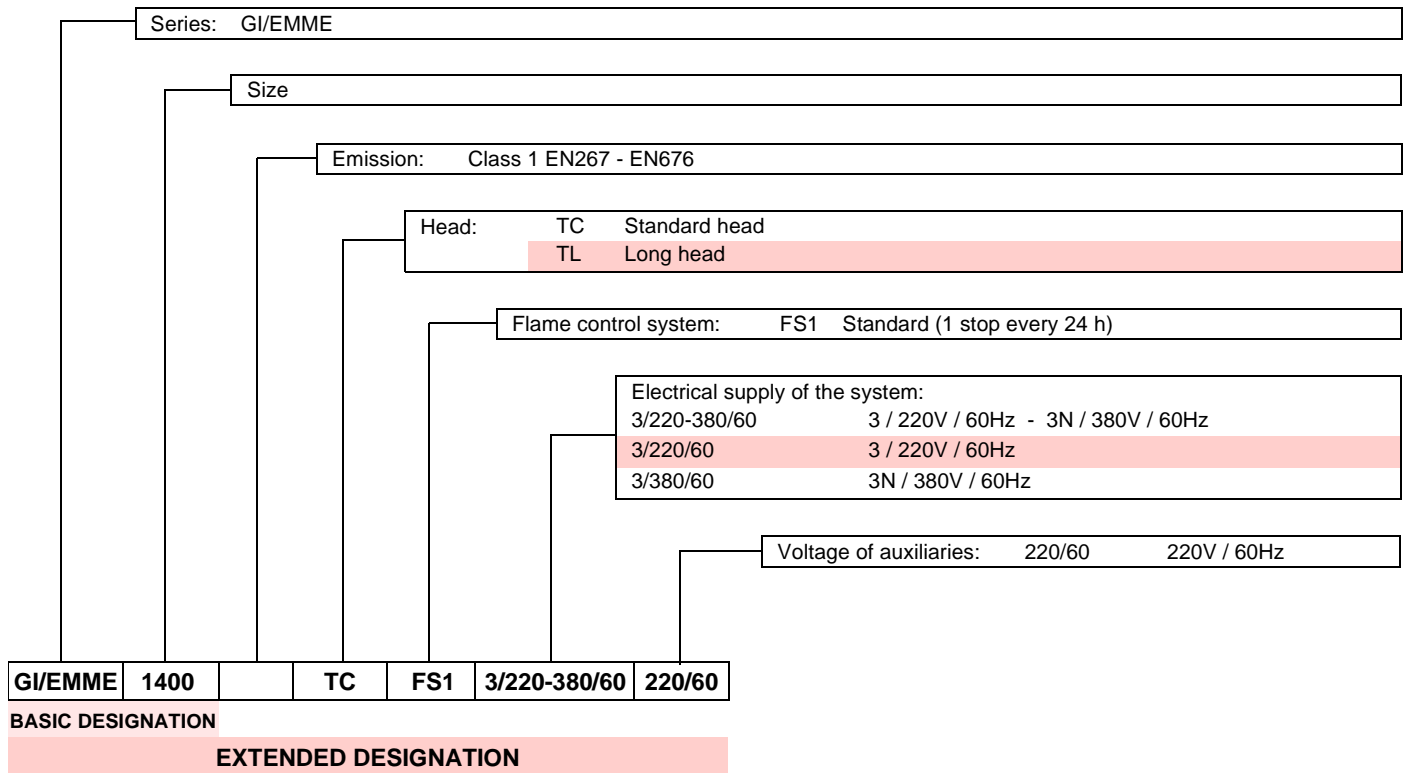
In addition:



- must take all the measures necessary to prevent unauthorised people gaining access to the machine;
- the user must inform the manufacturer if faults or malfunctioning of the accident prevention systems are noticed, along with any presumed danger situation;
- personnel must always use the personal protective equipment envisaged by legislation and follow the indications given in this manual.

4 Technical description of the burner

4.1 Burner designation



4.2 Models available

Designation		Voltage	Start-up	Code
GI/EMME 1400	TC	3/220-380/60	Direct starting	3486683
GI/EMME 1400	TL	3/220-380/60	Direct starting	3486684
GI/EMME 2000	TC	3/220-380/60	Direct starting	3487683
GI/EMME 2000	TL	3/220-380/60	Direct starting	3487684
GI/EMME 3000	TC	3/220-380/60	Direct starting	3488783
GI/EMME 3000	TL	3/220-380/60	Direct starting	3488784
GI/EMME 4500	TC	3/220/60	Star/Delta	3489085
GI/EMME 4500	TC	3/380/60	Star/Delta	3489087
GI/EMME 4500	TL	3/220/60	Star/Delta	3489086
GI/EMME 4500	TL	3/220/60	Star/Delta	3489088

Tab. A

4.3 Burner categories - Countries of destination

Country of destination	Gas category
SE - FI - AT - GR - DK - ES - GB - IT - IE - PT - IS - CH - NO	I _{2H}
DE	I _{2ELL}
NL	I _{2L}
FR	I _{2Er}
BE	I _{2E(R)B}
LU - PL	I _{2E}

Tab. B

4.4 Technical data

Model			GI/EMME 1400	GI/EMME 2000	GI/EMME 3000	GI/EMME 4500
Output	Min - Max	kW	415/814 - 1660	590/1163 - 2370	890/1744 - 3560	1190/2325 - 5100
		Mcal/h	357/700 - 1428	507/1000 - 2040	765/1500 - 3061	1020/2000 - 4386
Fuel			– Light oil, viscosity max. at 20 °C: 6 mm ² /s (1.5 °E - 6 cSt) – Natural gas: G20 (methane gas) - G21 - G22 - G23 - G25			
Maximum pressure ⁽¹⁾		mbar	200	360	360	360
Minimum pressure		mbar	20	26	30	39
Operation			– Intermittent (min. 1 stop in 24 hours) – Progressive two-stage or modulating with kit (see accessories)			
Pump	Output at 30 bar	kg/h	330	495	675	
	Pressure range	bar	7 - 40	7 - 40	7 - 40	
	Fuel temperature	°C max	0 - 150	0 - 150	0 - 150	
Nozzle		number	1			
Standard applications			Boilers: water, steam, diathermic oil			
Ambient temperature		°C	0 - 50			
Combustion air temperature		°C max	60			
Electrical protection			IP40			
Weight		kg	190	200	280	500

Tab. C

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

4.5 Electrical data

Model			GI/EMME 1400	GI/EMME 2000	GI/EMME 3000	GI/EMME 4500 3489085-86	GI/EMME 4500 3489087-88
			Electrical supply ⁽³⁾	V/Hz	3/200-380/60		
Fan motor IE2	rpm	3525	3520	3500	3520	3500	
	kW	3.0	4.0	9.2	15.0	15.0	
	V	220/380	220/380	220/380	220/380	380/660	
	A	10/5.8	14.6/8.5	29.1/16.8	46/26.6	26.6/15.4	
Pump motor	kW	1.1			1.5		
	V	220/380			220/380		
	A	4.4/2.5			5.8/3.4		
Ignition transformer	V1 - V2 I1 - I2	230 V - 2 x 6 kV 2.3 A - 35 mA					
Electrical power consumption	kW max	5.0	6.4	12.1	17.9	17.9	

Tab. D

Model			GI/EMME 1400	GI/EMME 2000	GI/EMME 3000	GI/EMME 4500 3489085-86	GI/EMME 4500 3489087-88
			Electrical supply ⁽³⁾	V/Hz	3/200-380/60		
Fan motor IE3	rpm	3525	3520	3540	3520	3520	
	kW	3.0	4.0	9,2	15.0	15.0	
	V	220/380	220/380	220/380	220/380	380/660	
	A	10/5.8	14.6/8.5	30.5/17.6	49.2/28.4	28.4/16.4	
Pump motor	kW	1.1			1.5		
	V	220/380			220/380		
	A	4.4/2.5			5.8/3.4		
Ignition transformer	V1 - V2 I1 - I2	230 V - 2 x 6 kV 2.3 A - 35 mA					
Electrical power consumption	kW max	5.0	6.4	10.7/12.5	16.9/18.7	16.9/18.7	

Tab. E

⁽³⁾ The GI/EMME 4500 model is only available in a version with a "star-triangle" remote-starter; when ordering, please therefore specify the required operating voltage.

4.6 Maximum dimensions

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

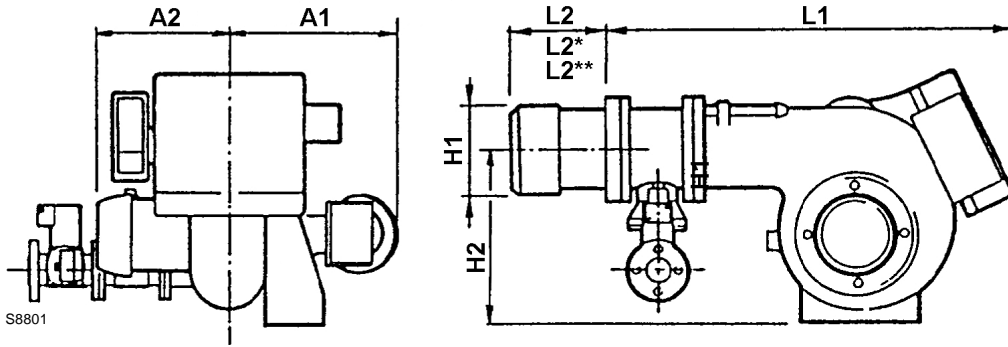


Fig. 1

mm	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

Tab. F

- L2** Tube length, short head plus spacer
- L2*** Tube length, short head
- L2**** Tube length, long head

4.7 Firing rates

The **MAXIMUM OUTPUT** is chosen from within the continuous diagram area (Fig. 2).



The firing rate area values have been obtained considering a surrounding temperature of 20°C and an atmospheric pressure of 1000 mbar (approx. 100 m above sea level).

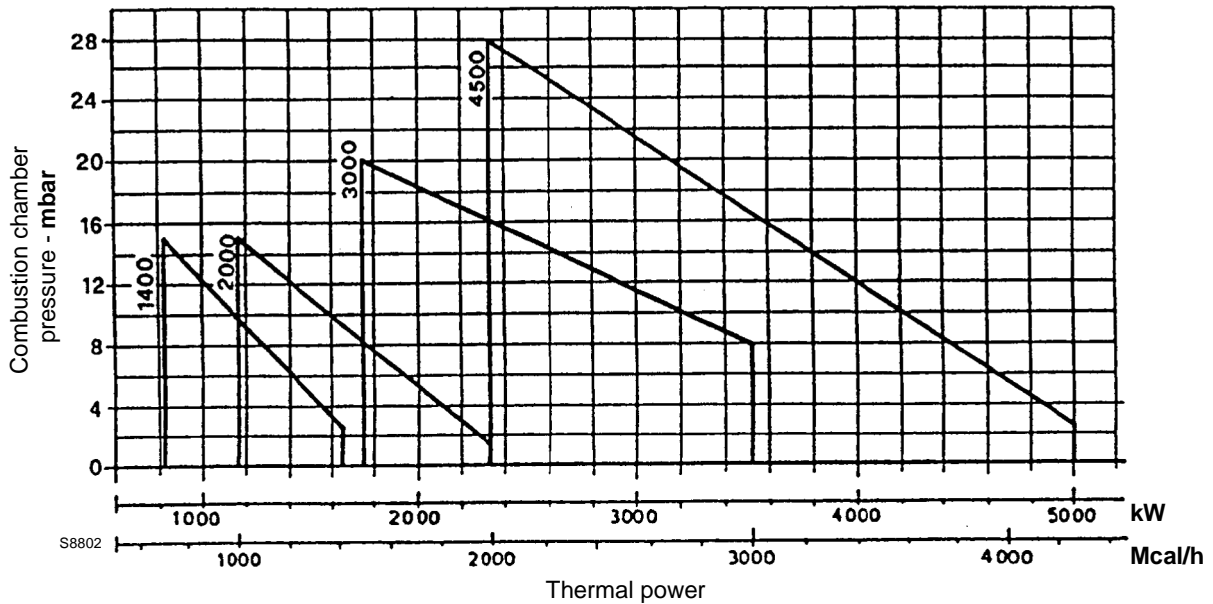


Fig. 2

4.8 Correlation between gas pressure and burner output

Example for GI/EMME 3000:

to obtain the maximum output, a gas head pressure of 30 mbar is measured with the combustion chamber at 0 mbar using gas G20 with a net heat value of 10 kWh/Nm³ (8.570 kcal/Nm³).

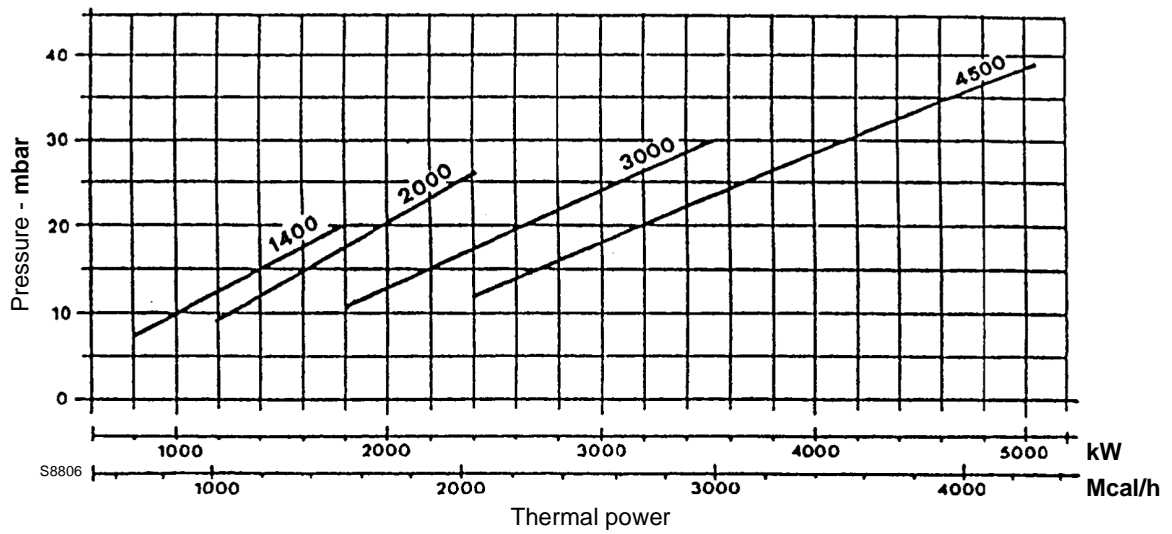


Fig. 3

4.9 Burner equipment

- Gasket for gas train flange No. 1
- Thermal insulation screen No. 1
- Screws No. 12
- Hoses No. 2
- Pin extensions No. 2
- Nipples No. 2
- Fair leads No. 4
- Wachters No. 8
- Instruction booklet No. 1
- Spare parts list No. 1

4.10 Burner description

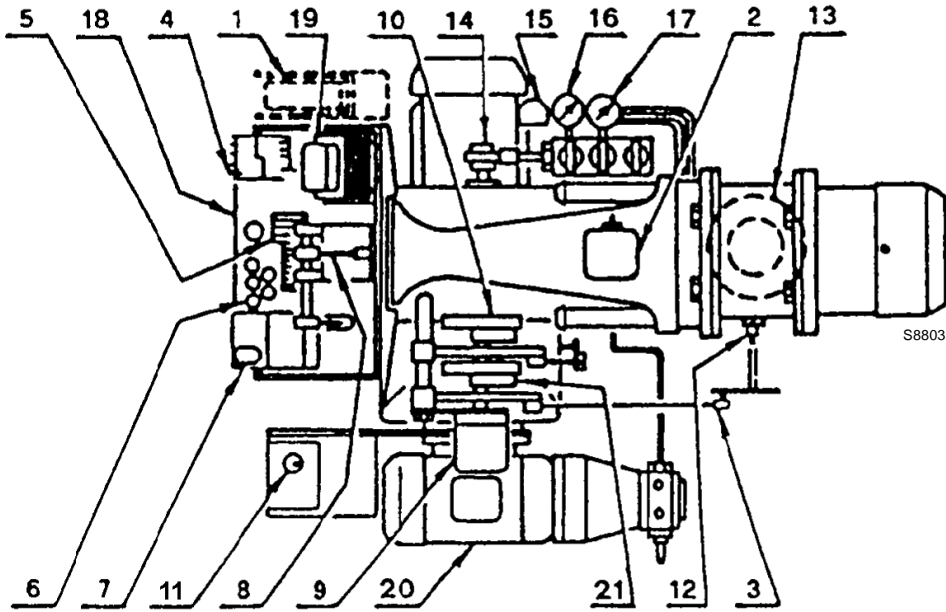


Fig. 4

- 1 Output modulation unit (only for modulating version)
- 2 Air pressure switch
- 3 Gas butterfly control rod
- 4 Fan motor overload release
- 5 Terminal strip
- 6 Fair lead
- 7 Control box release pushbutton with lock signal
- 8 Head drive rod
- 9 Servomotor
- 10 Air adjustment cam
- 11 Oil/gas selector switch
- 12 gas pressure socket to sleeve
- 13 Gas regulator
- 14 Return pressure adjustment cam
- 15 Oil pressure switch
- 16 Pressure gauge on return
- 17 Pressure gauge on delivery
- 18 Electrical control board
- 19 Ignition transformer
- 20 Pump unit
- 21 Gas adjustment cam



WARNING

The motor overload relay release on the burner GI/EMME 4500 is located inside the starter; the pump motor overload relay release is located inside the box to the side of the unit pump.

4.11 Control box (LFL1.335..)

Warnings



To avoid accidents, material or environmental damage, observe the following instructions!

The control box is a safety device! Avoid opening or modifying it, or forcing its operation. Riello S.p.A. cannot assume any responsibility for damage resulting from unauthorised interventions!

- All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- Before modifying the wiring in the control box connection area, fully disconnect the system from the power supply (omnipolar separation).
- Protection against electrocution from the control box and all connected electric components is obtained with the correct assembly.
- Before any intervention (assembly and installation operations, assistance, etc.), ensure the wiring is in order and that the parameters are correctly set, then make the safety checks.
- Falls and collisions can negatively affect the safety functions. In this case, the control box must not be operated, even if it displays no evident damage.
- **Do not press the reset button or the remote reset button of the control box for more than 10 seconds because this will damage the internal relay.**

For safety and reliability, comply with the following instructions:

- avoid conditions that can favour the development of condensate and humidity. Otherwise, before switching on again, make sure that the entire control box is perfectly dry!
- Static charges must be avoided since they can damage the control box's electronic components when touched.

Use

The control box is a control and supervision system of medium and large capacity forced draught burners for intermittent operation (at least one controlled shut-down every 24 hours).

Installation notes

- Check the electric wiring inside the boiler complies with the national and local safety regulations.
- Do not confuse the powered conductors with the neutral ones.
- Ensure that spliced wires cannot get into contact with neighbouring terminals. Use adequate ferrules.
- Arrange the H.V. ignition cables separately, as far as possible from the control box and the other cables.
- When wiring the unit, make sure that AC 230 V mains voltage cables are run strictly separate from extra low-voltage cables to avoid risks of electrical shock hazard.



Fig. 5

Electrical wiring of the flame detector

It is important for signal transmission to be almost totally free of any disturbances or loss:

- Always separate the detector cables from the other cables:
 - The capacitive reactance of the line reduces the size of the flame signal.
 - Use a separate cable.
- Respect the allowed cable lengths.
- The ionisation probe is not protected against the risk of electrocution. When connected to the electricity supply, the ionisation probe must be protected against any accidental contact.
- Position the ignition electrode and the ionisation probe so that the ignition spark cannot form an arc on the probe (risk of electric overcharge).

Technical data

Mains voltage	AC 230V -15% / +10%
Mains frequency	50 / 60 Hz ±6 %
Fuse (Internal)	T6.3H250V
Primary fuse (external)	max. 10 A
Weight	approx. 1 kg
Power absorption	approx. AC 3.5 VA
Protection level	IP40
Safety class	II
Input current at terminal 1	max. 5 A continuous (peaks of 20 A / 20 ms)
Load on the control terminals	max. 4 A continuous (peaks of 20 A / 20 ms)
Environmental conditions	
Operation	DIN EN 60721-3-1
Climatic conditions	Class 1K3
Mechanical conditions	Class 1M2
Temperature range	-20...+60°C
Humidity	< 95% RH

Tab. G

4.12 Servomotor (SQM10.1....)

Warnings



To avoid accidents, material or environmental damage, observe the following instructions!

Avoid opening, modifying or forcing the actuators.

- All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- Before modifying the wiring in the connection area of the servomotor, fully disconnect the burner control device from the power supply (omnipolar separation).
- To avoid the risk of electrocution, protect the connection terminals in a suitable manner and correctly fix the cover.
- Check the wiring is in order.
- Falls and collisions can negatively affect the safety functions. In this case, the servomotor must not be operated, even if it displays no evident damage.

Assembly notes

- Check the relevant national safety standards are respected.
- When assembling the servomotor and connecting the damper, the gears can be disengaged by means of a lever, allowing the drive shaft to be easily adjusted in both directions of rotation.



Fig. 6

Technical data

Operating voltage	AC 220...240V, 50 Hz -15 % / +10 % AC 220 V, 60 Hz -15 % / +10 %
Auxiliary and limit switches switching capacity	10 (3) A, AC 24...250 V
Angular positioning	up to 160 ° (base scale)
Assembly position	optional
Electrical protection	IP 54, DIN 40050
Safety class	GB
Weight	approx. 1.7 kg
Actuator motor	synchronous motor
Power absorption	9 VA
Environmental conditions:	
Operation	DIN EN 60 721-3-1
Climatic conditions	Class 1K3
Mechanical conditions	Class 1M2
Temperature range	-20...+70°C
Humidity	< 95% RH

Tab. H

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.



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

5.2 Handling

The burner packaging includes a wooden platform, it is therefore 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 20-25cm 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.

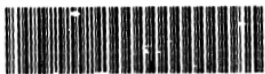



The packaging elements (wooden cage or cardboard box, nails, clips, plastic bags, etc.) must not be abandoned as they are potential sources of danger and pollution; they should be collected and disposed of in the appropriate places.

Checking the characteristics of the burner

Check the identification label of the burner, showing:

- the model (A)(Fig. 7) and type of burner (B);
 - the year of manufacture, in cryptographic form (C);
 - the serial number (D);
 - the data for electrical supply (E);
 - the absorbed electrical power (F);
 - the types of gas used and the relative supply pressures (G);
 - the data of the burner's minimum and maximum output possibilities (H) (see Firing rate)
- Warning.** The burner output must be within the boiler's firing rate;
- light oil maximum viscosity (I).

R.B.L.	A	<input checked="" type="checkbox"/> GAS: FAM.2	H
TIPO/TYP/TYPE	B	C	Press. G
N°	D	COMPONENTS OF THIS BURNER MARKED 50 Hz ARE ALSO SUITABLE FOR 60 Hz	
E	F	MADE IN ITALY	I
TWO STAGES PROGRESSIVE / MODULATING		Fuel max visc.	
I _{sc}			 RIELLO S.p.A. I-37146 Legnago (VR)
I _{max}			
PESO-WEIG:			

S8816

Fig. 7



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 Operating position



- The burner is designed to operate only in positions 1, 2, 3 and 4 (Fig. 8).
- Installation 1 is preferable, as it is the only one that allows the maintenance operations as described in this manual.
- Installations 2, 3 and 4 permit operation but make maintenance and inspection of the combustion head more difficult.



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

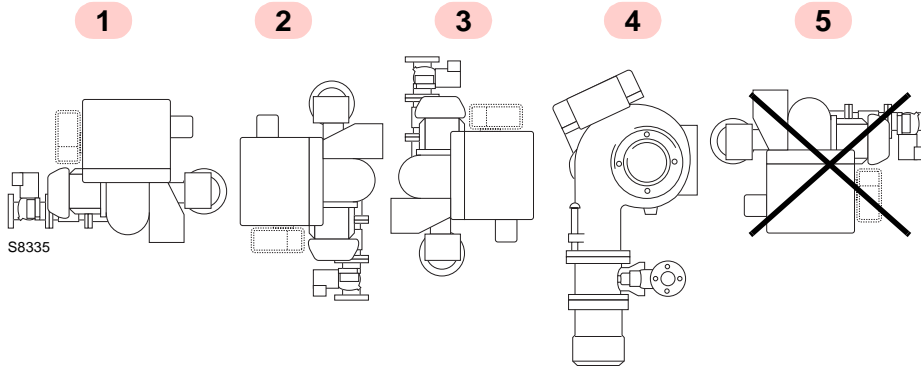


Fig. 8

5.5 Preparing the boiler

5.5.1 Boiler plate

Drill the combustion chamber locking plate as shown in Fig. 9. The position of the threaded holes can be marked using the thermal screen supplied with the burner.

mm	A	B	C
GI/EMME 1400	255	260	M16
GI/EMME 2000	265	260	M16
GI/EMME 3000	340	310	M20
GI/EMME 4500	340	310	M20

Tab. I

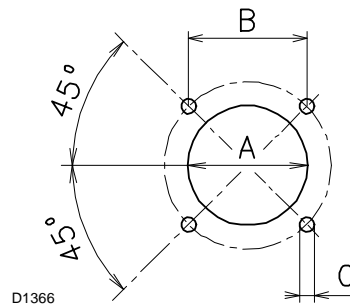


Fig. 9

5.6 Mounting the burner on the boiler

To detach the burner from the combustion head, proceed as follows:

- remove the cover from bracket 1)(Fig. 10), pin 2), stops 4) and screws 3).
- Detach the hoses 6) and release the tie-rod on the gas butterfly, removing screw 11).
- Slide the burner out of the combustion head by about 100-120 mm.
- 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.



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

5.6.1 Maintenance of the combustion head

- Repeat the operations described above 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.

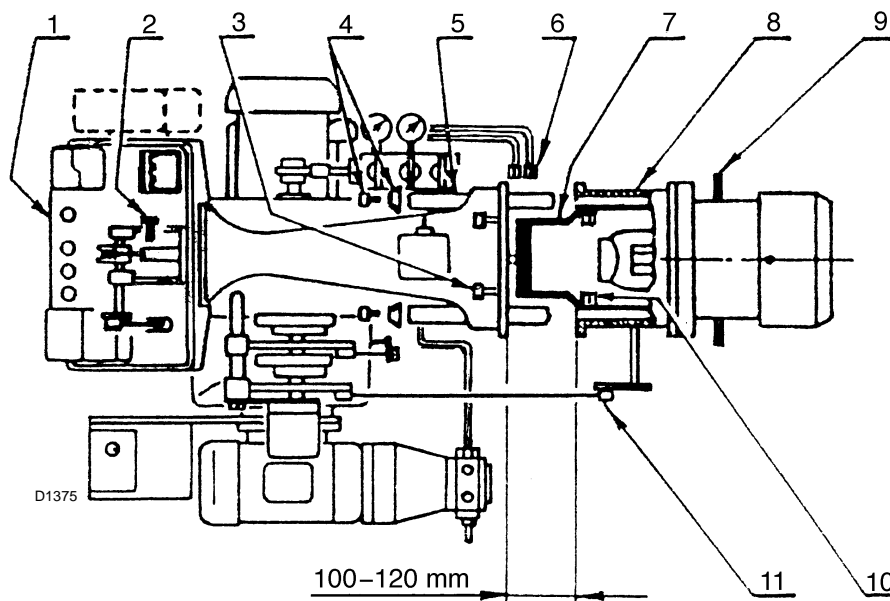


Fig. 10

5.7 Electrode position



WARNING

Place the electrode observing the dimensions specified in Fig. 11.

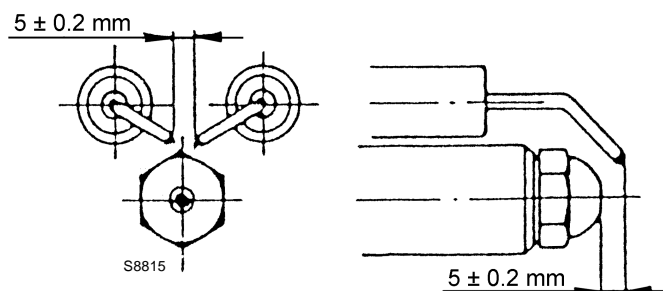


Fig. 11

5.8 Nozzle installation

The burner complies with the emission requirements of the EN267 Standard. In order to guarantee that emissions do not vary, recommended and/or alternative nozzles specified by Riello in the Instruction and warning booklet should be used.



WARNING

It is advisable to replace the nozzle once a year during periodical maintenance.



CAUTION

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

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

5.8.1 Recommended nozzle

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

- types without needle valve: Bergonzo B5
- types with needle valve: Bergonzo B5

Nozzle with needle valve can also be used (in this case you have a light increase of the pressure on the return line).

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 graphs opposite (Fig. 12 and Fig. 13).



WARNING

- Do not use any sealing products such as gaskets, sealing compound, or tape.
- Be careful to avoid damaging the nozzle sealing seat.
- The nozzle must be screwed into place tightly but not to the maximum torque value provided by the wrench.

5.8.2 Relationship between nozzle type and delivery/return pressure

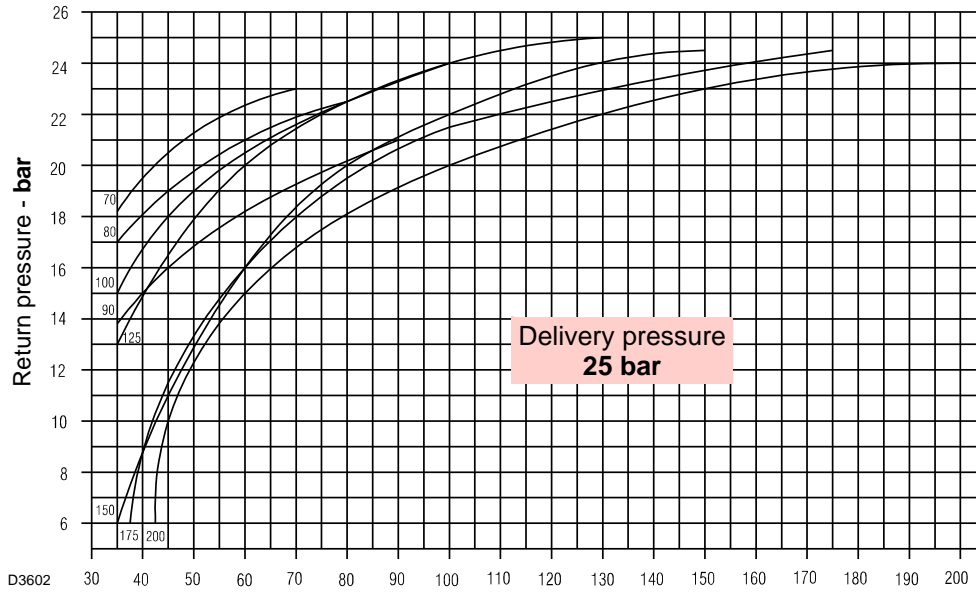


Fig. 12

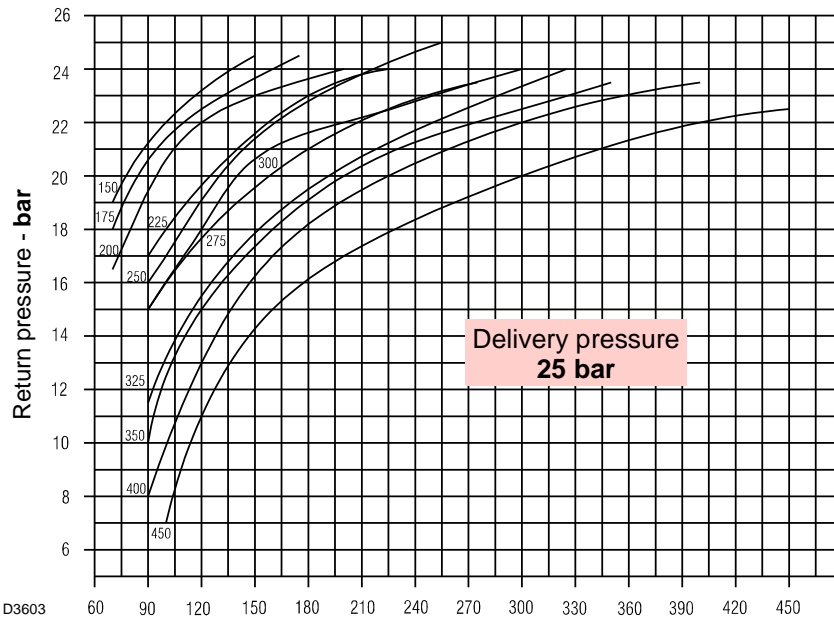


Fig. 13

5.9 Combustion head adjustment

The combustion head moves simultaneously with cam 8) (Fig. 17 on page 18), the variable-profile cams and the gas butterfly.

Head position can be seen on cylinder 2)(Fig. 15).

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. 14).

Example:

with burner GI/EMME 4500, for modulation from 1400 to 3400 Mcal/h, you see from the graph: notch 1 for 1400 Mcal/h, notch 6.5 for 3400 Mcal/h, with a travel of 5.5 notches.

NOTE

To avoid causing knocking, never exceed maximum and minimum aperture positions corresponding, respectively, on cylinder

2)(Fig. 15), 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 Fig. 15.
- 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°.

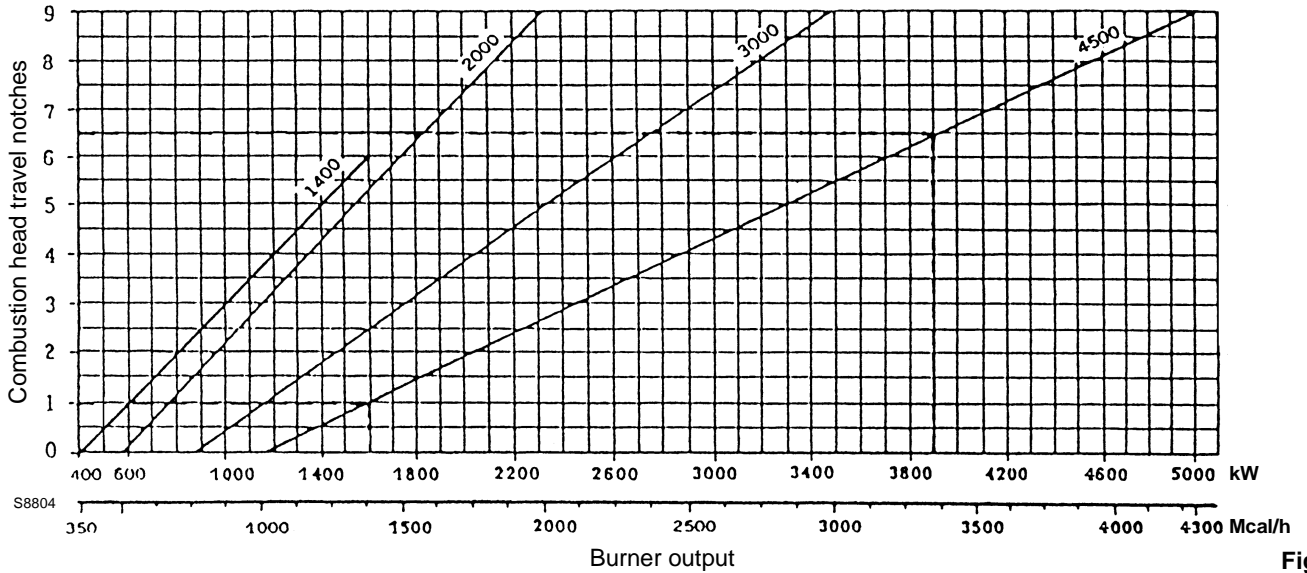


Fig. 14

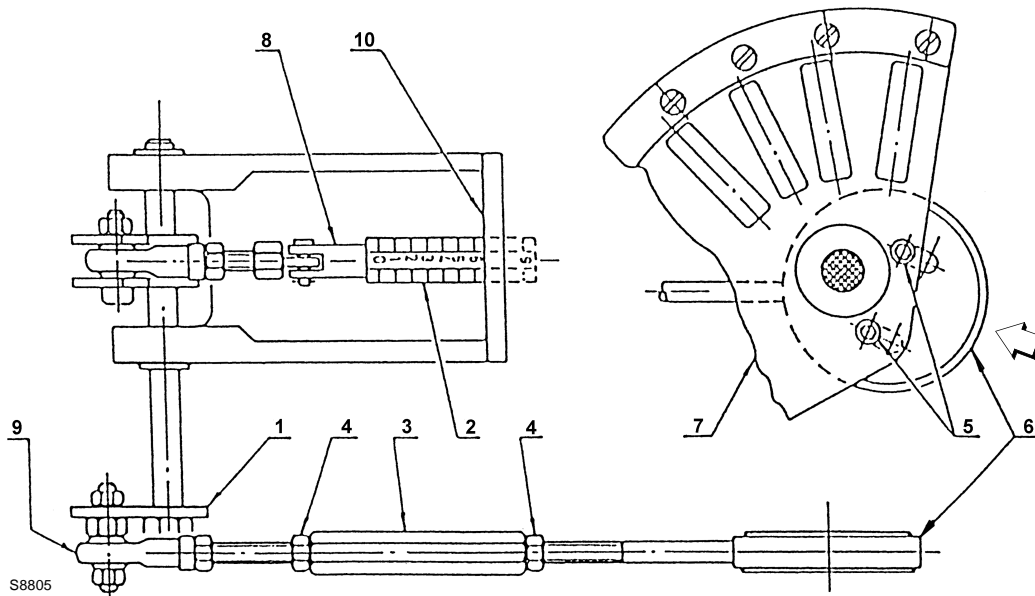


Fig. 15

5.10 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 5)(Fig. 31 on page 29).

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.

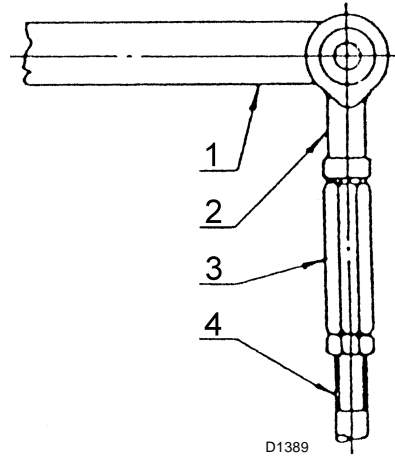


Fig. 16

5.10.1 Modifying air damper tie-rod length



WARNING

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.

Key (Fig. 16)

- 1 Lever
- 2 Ball - joint
- 3 Extension
- 4 Tie-rod

With the burner off, proceed as follows:

- detach ball-joint 2)(Fig. 16) 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°.

5.11 Pressure variator

To calibrate cam 8)(Fig. 17):

- 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).



CAUTION

- 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. 12).
- If, at maximum nozzle delivery (maximum return pressure), pressure oscillations are seen on pressure gauge 3), slightly reduce pressure until the oscillations are eliminated.

Key (Fig. 17)

- 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

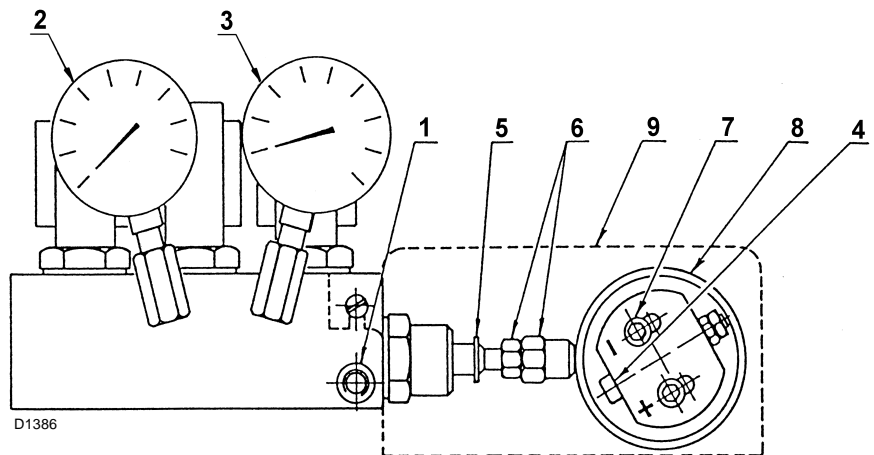


Fig. 17

5.12 Light oil supply



Explosion danger due to fuel leaks in the presence of a flammable source.

Precautions: avoid knocking, attrition, sparks and heat.

Make sure the fuel interception tap is closed before performing any operation on the burner.



WARNING

The fuel supply line must be installed by qualified personnel, in compliance with current standards and laws.



WARNING

Before placing the burner in operation, ensure that the return line is open. Any obstruction may damage the pump seal.

Pay attention to do not overcome the max. depression of 0,45 bar (35 cm Hg), over this value the fuel may turn into gas.

Check the pipes are perfectly sealed.

When the fuel tank is under the burner level we suggest to let the return line arrive where the suction line starts. In this case the foot valve is not necessary.

Should the return line arrive over the fuel level, the foot valve is indispensable.

Notice that this solution is less safe than the previous one, because it is possible the valve has not a good sealing.

5.12.1 Hydraulic connections



CAUTION

Make sure that the flexible hoses to the pump supply and return line are installed correctly.



WARNING

Follow the instructions below:

- Tighten the flexible hoses with the supplied gaskets.
- Take care that the hoses are not stretched or twisted during installation.
- Place the pipes so that they are not crushed or are in contact with hot parts of the boiler and so it is possible to open the burner.

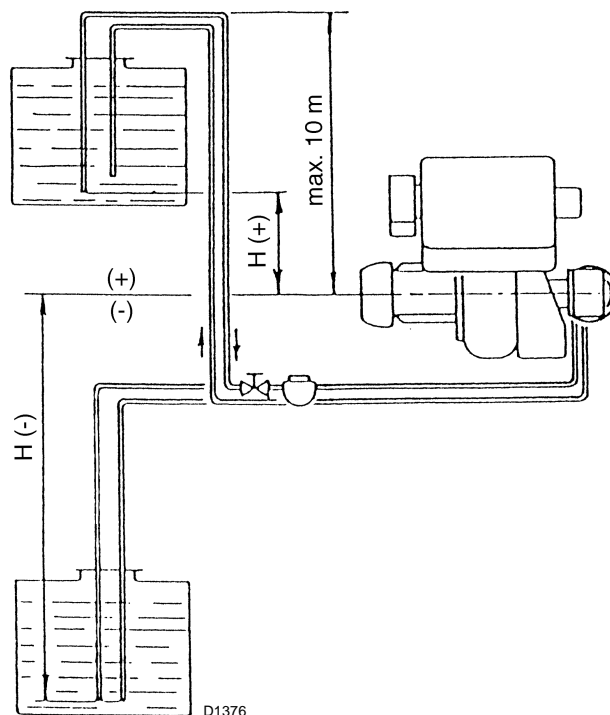


Fig. 17

Key (Fig. 17)

H Difference in the pipes height.

L Total length of the suction tube.

Øi Internal diameter of the tube.

Copper tubes Ø 14 and 16 mm could be replaced by steel tubes G 1/2" and G 3/4".

+/-H (m)	G/M 1400		G/M 2000		G/M 3000		G/M 4500	
	L (m)							
	Øi 14	Øi 16	Øi 16	Øi 18	Øi G1/2"	Øi G3/4"	Øi G3/4"	Øi G1"
+ 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. J

5.12.2 Pump

Technical data

Pump		GI/EMME 1400 TA2C	GI/EMME 2000 TA3C	GI/EMME 3000-4500 TA4C
Nozzle pressure range	bar	7 - 40	7 - 40	7 - 40
Delivery pressure setting	bar	30	30	30
Operating viscosity	mm ² /s (cSt)	3 - 75	3 - 75	3 - 75
Oil temperature in the pump	°C	0 - 150	0 - 150	0 - 150
Inlet pressure	bar	0,45	0,45	0,45
Return pressure	bar	5	5	5
Pressure calibration in the factory	bar	30	30	30
Rated speed	rpm max	3600	3600	3600
Weight	kg	5.4	5.7	6.0

Tab. K

Key (Fig. 18)

- 1 Suction G 1/2
- 2 Return G 1/2
- 3 Pressure switch attachment G 1/4
- 4 Vacuum meter attachment G 1/4
- 5 Pressure adjustment screw
- 6 By-pass screw
- 7 Pressure gauge attachment

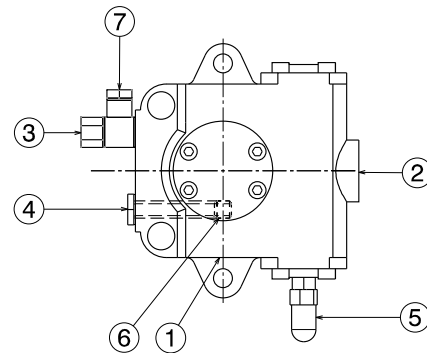
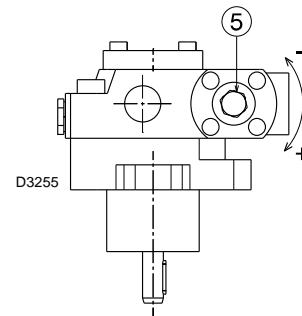


Fig. 18

Priming pump



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.

- Fill the pump with the light oil from the vacuumeter plug 4)(Fig. 18), put the burner in operation, purge the air from the manometer plug 7) and wait for the pump priming.
- If lock-out occurs repeat the procedure.

5.12.3 Hydraulic operation layout

Oil pressure switch:

in the event of excessive counter-pressure on the fuel return line, the burner is brought to a halt (Fig. 19)

It is factory set at 1.5 bar. If the burner is fed by a pressure Pa ring circuit, it must be adjusted to Pa+1.5 bar.

If the lock halt takes place (P position), press the red reset button on the oil pressure switch.

Maximum oil pressure switch

The maximum oil pressure switch measures the pressure immediately downstream of the regulator. It has been factory set to 3 bar. If the pressure exceeds the set value while operating, the opening of the contact prevents the burner from operating, in some cases putting it in a lockout condition.

It should be regulated to a pressure about 2-3 bar above the actual pressure of the return line pump.

Minimum oil pressure switch

This has the function of preventing the burner from operating if there is insufficient spray pressure.

It should be adjusted to about 4 bar lower than the spray pressure.

It has been factory set to 5 bar.

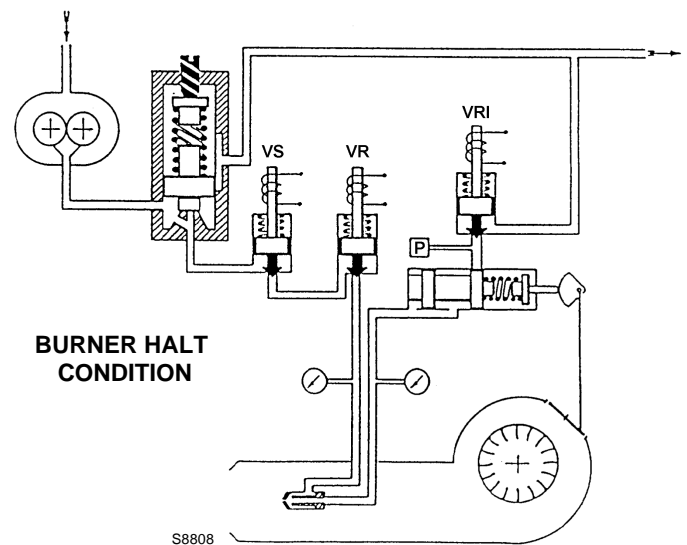


Fig. 19

5.13 Gas feeding



Explosion danger due to fuel leaks in the presence of a flammable source.

Precautions: avoid knocking, attrition, sparks and heat.

Make sure the fuel interception tap is closed before performing any operation on the burner.



WARNING

The fuel supply line must be installed by qualified personnel, in compliance with current standards and laws.

5.13.1 Gas feeding line

Key (Fig. 20 - Fig. 21 - Fig. 22 - Fig. 23)

- 1 Gas input pipe
- 2 Manual valve
- 3 Vibration damping joint
- 4 Pressure gauge with push-button cock
- 5 Filter
- 6A Includes:
 - filter
 - working valve
 - safety valve
 - pressure adjuster
- 6B Includes
 - working valve
 - safety valve
 - pressure adjuster
- 6C Includes
 - safety valve
 - working valve
- 6D Includes:
 - safety valve
 - working valve
- 7 Minimum gas pressure switch
- 8 Leak detection control, provided as an accessory or integrated, based on the gas train code. In compliance with the EN 676 standard, the leak detection control is compulsory for burners with maximum outputs over 1200 kW.
- 9 Gasket, for "flanged" versions only
- 10 Pressure adjuster
- 11 Train-Burner adaptor, supplied separately
- P2 Upline pressure of valves/adjuster
- P3 Upstream pressure of the filter
- L Gas train, supplied separately
- L1 The responsibility of the installer

MBC "threaded"

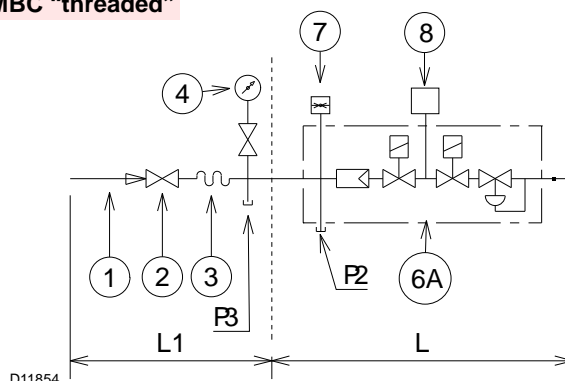


Fig. 20

MBC "flanged"

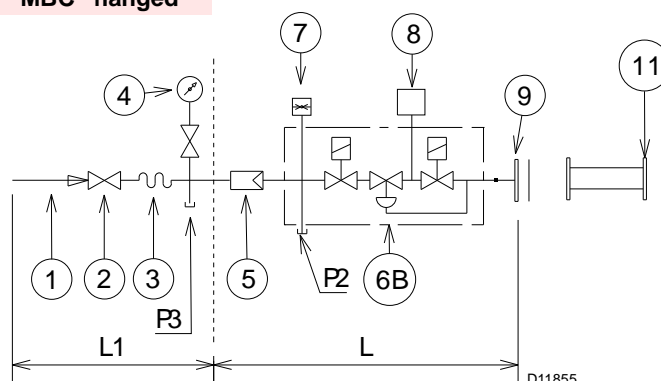


Fig. 21

DMV "flanged or threaded"

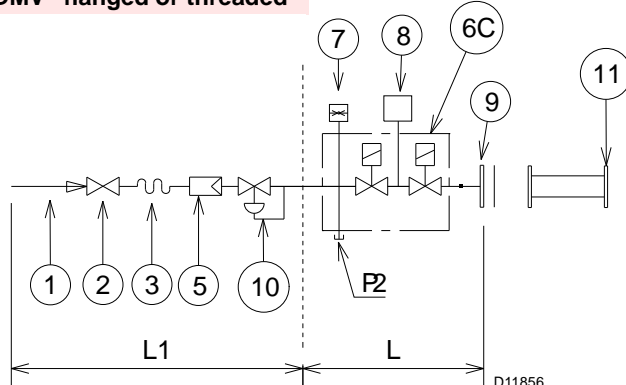


Fig. 22

CB "flanged or threaded"

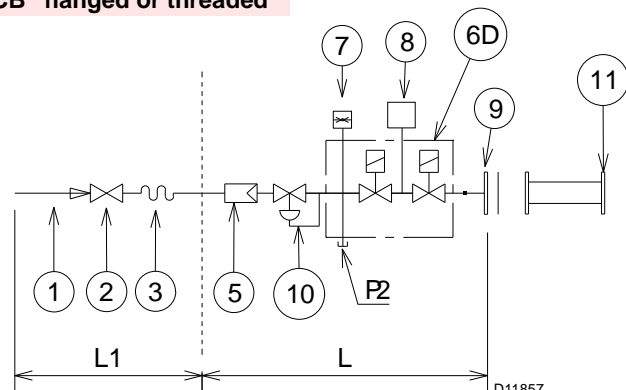


Fig. 23

5.13.2 Gas train

Approved according to standard EN 676 and provided separately from the burner.

To select the correct gas train model, refer to the supplied "Burner-gas train combination" manual.

5.13.3 Gas train installation



Disconnect the electrical power using the main switch.



Check that there are no gas leaks.



Pay attention when handling the train: danger of crushing of limbs.



Make sure that the gas train is properly installed by checking for any fuel leaks.



The operator must use the required equipment during installation.

5.14 Electrical wiring

Notes on safety for the electrical wiring



DANGER

- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be made in accordance with the regulations currently in force in the country of destination and by qualified personnel. Refer to the wiring diagrams.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the wiring diagrams.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The burner has been type-approved for intermittent use.
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, burner stopping is guaranteed by the boiler's thermostat/pressure switch.
- If this is not the case, a time switch should be fitted in series to TL to stop the burner at least once every 24 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. Do not use the gas tubes as an earthing system for electrical devices.
- The electrical system must be suitable for the maximum power absorption of the device, as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for that level of power absorption.
- For the main power supply of the device from the electricity mains:
 - do not use adapters, multiple sockets or extensions;
 - use a multiple pole switch with at least a 3mm gap between the contacts (overvoltage category III), as envisaged by the present 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

Turn off the fuel interception tap.



DANGER

Avoid condensate, ice and water leaks from forming.

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

Use flexible cables in compliance with the EN 60 335-1 standard.



After carrying out maintenance, cleaning or checking operations, reassemble the hood and all the safety and protection devices of the burner.

5.14.1 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 start-powered, 380 V, the cursor should be positioned to "MIN".
- If it is delta-powered, 220 V, the cursor should be positioned to "MAX".

If the scale of the thermal relay does not include reted motor absorption at 380 V, protection is still ensured.

NOTE:

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

These models leave the factory preset for 380 V power supply.

If power supply is 220 V, change:

the connection of the motors (from star to delta) and the thermal relays setting (GI/EMME 1400 - 2000 - 3000 direct 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).

5.14.2 Electrical wiring factory-set (direct motor starting for G/M 1400 - 2000 - 3000)

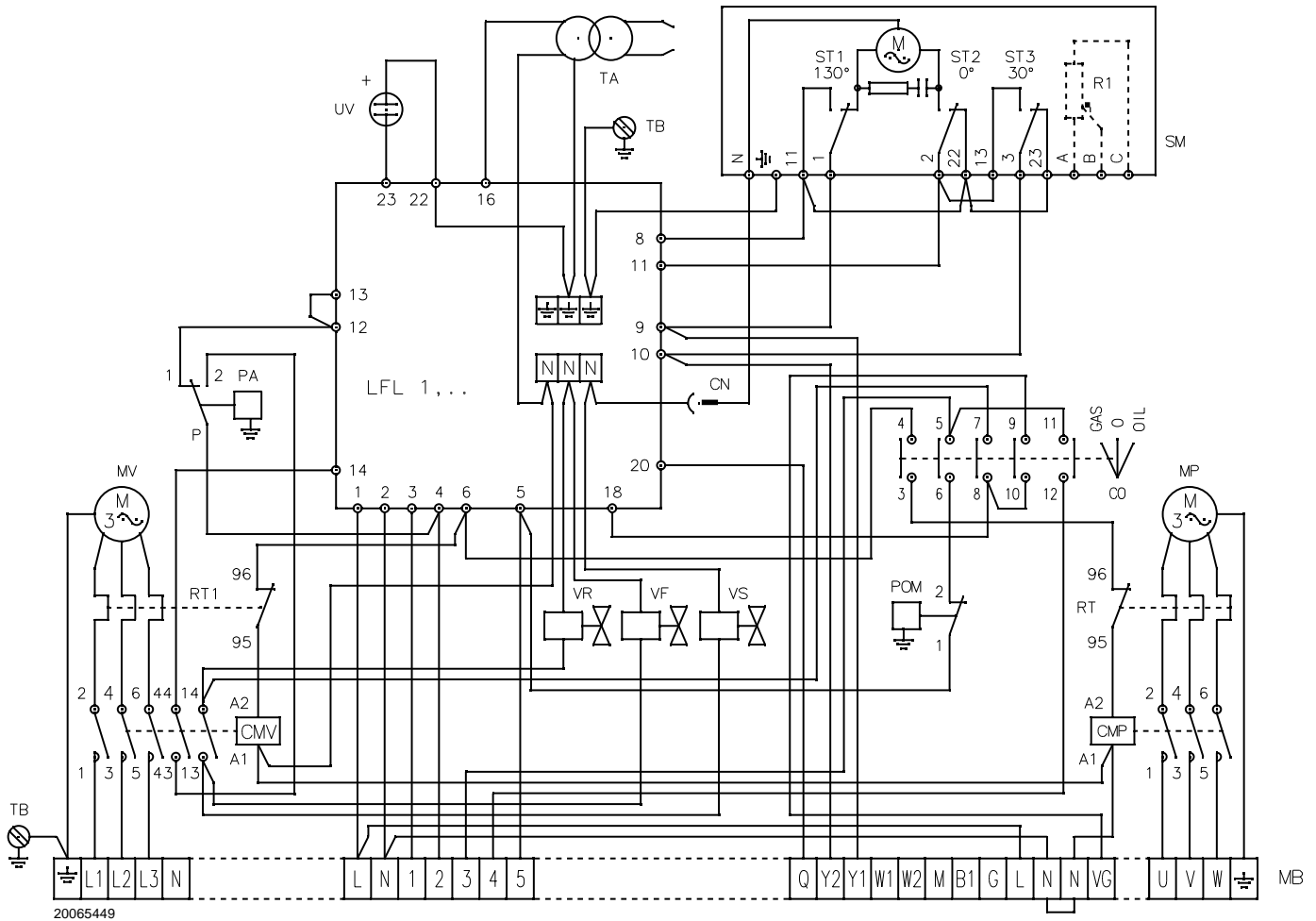


Fig. 24

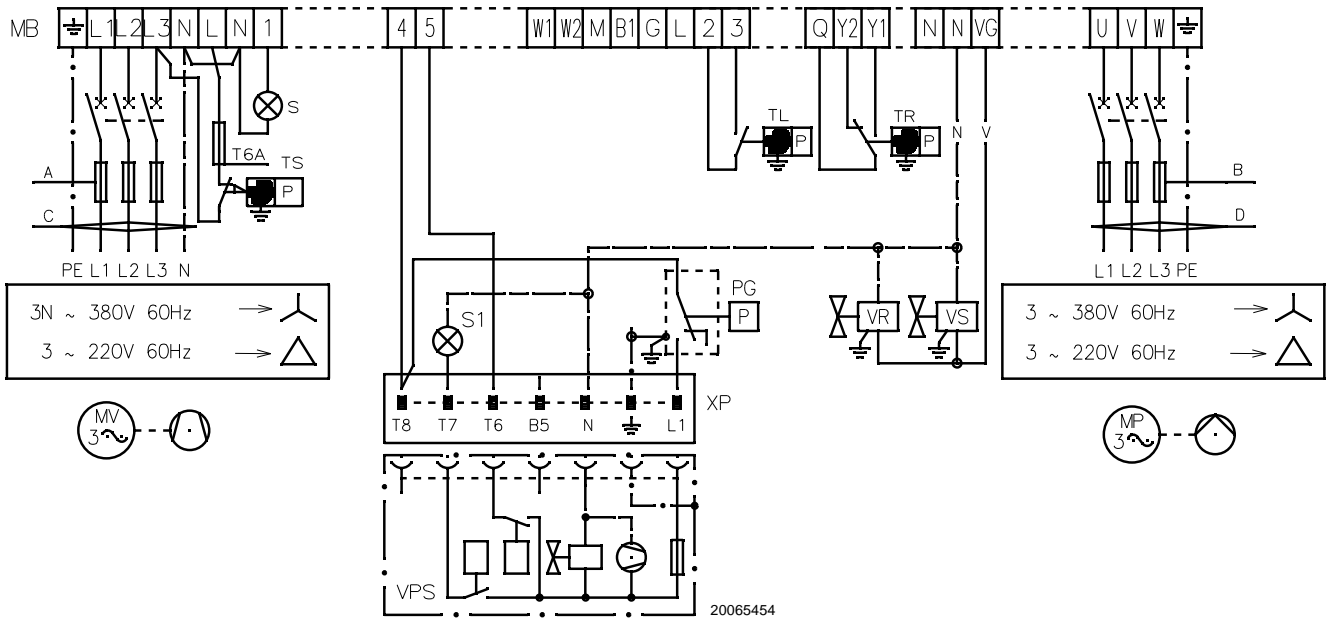
Key to layout (Fig. 24)

- CMP Pump motor contact – maker
- CMV Fan motor contact – maker
- CN Connector
- CO Selector switch “GAS – 0 – OIL”
- LFL 1,.. Control box
- MB Burner terminal strip
- MP Pump motor
- MV Fan motor
- PA Air 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 Oil return valve
- VS Oil safety valve

Selector switch

	OIL	0	GAS
	☺	☹	☺
3 - 4	X		
5 - 6	X		
7 - 8	X		
9 - 10			X
11 - 12			X

5.14.3 Electrical connection to the terminal strip factory-set (direct motor starting for G/M 1400 - 2000 - 3000)



	G/M 1400		G/M 2000		G/M 3000	
	220V	380V	220V	380V	220V	380V
A AMPERE	25	25	35	25	63	50
B AMPERE	6	4	6	4	16	10
C mm ²	2,5	2,5	4	2,5	6	4
D mm ²	2,5	1,5	2,5	1,5	4	2,5

Fig. 25

Key to layout (Fig. 25)

- MB Burner terminal strip
- S Remote lock-out signal
- S1 VPS lock-out signal
- 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 control system: controls 1st and 2nd stage operation
- MV Fan motor
- MP Pump motor
- VPS Valve proving system
- XP Connector of Valve proving system



Cross – section of wires not indicated: 1 mm².

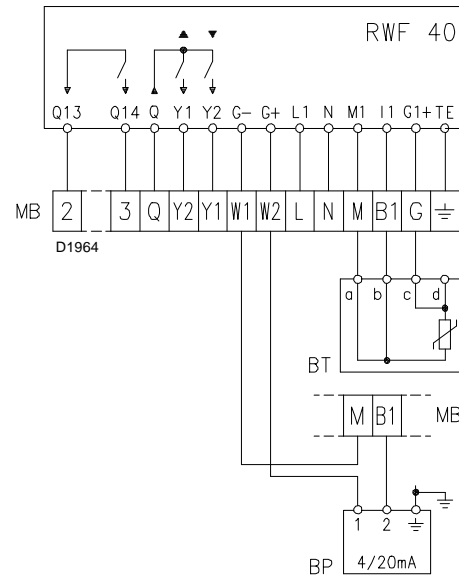


Fig. 26

5.14.4 Connection RWF40

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

NOTE:

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

Key to layout (Fig. 26)

- PB Pressure probe
- PT Temperature probe
- MB Burner terminal strip
- a-b Red
- c-d White

5.14.5 Star/delta motor starting (G/M 4500)

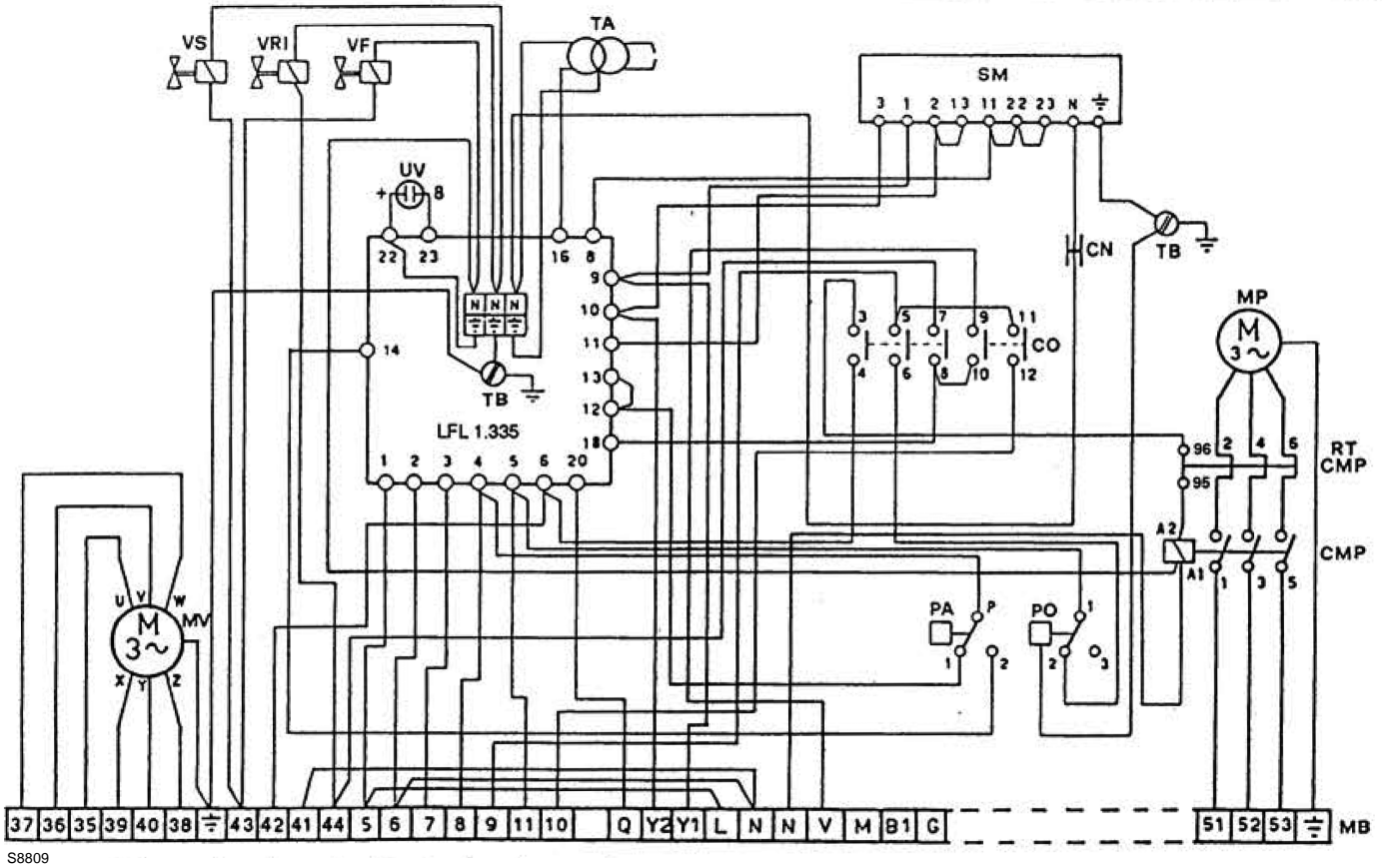


Fig. 27

Key to layout (Fig. 27)

- CMP Pump motor contact – maker
- CN Connector
- CO Selector switch “GAS – 0 – OIL”
- LFL 1.. Control box
- MB Burner terminal strip
- MP Pump motor
- MV Fan motor
- PA Air pressure switch
- POM Oil pressure switch
- RT CMP overload relay CMP
- SM Air damper servomotor
- TA Ignition transformer
- TB Burner grounding
- VF Oil operation valve
- VRI Oil return valve
- VS Oil safety valve

Selector switch

	OIL	0	GAS
	⊖	⊕	⊖
3 - 4	X		
5 - 6	X		
7 - 8	X		
9 - 10			X
11 - 12			X

5.14.6 Electrical connection to the terminal strip for G/M 4500

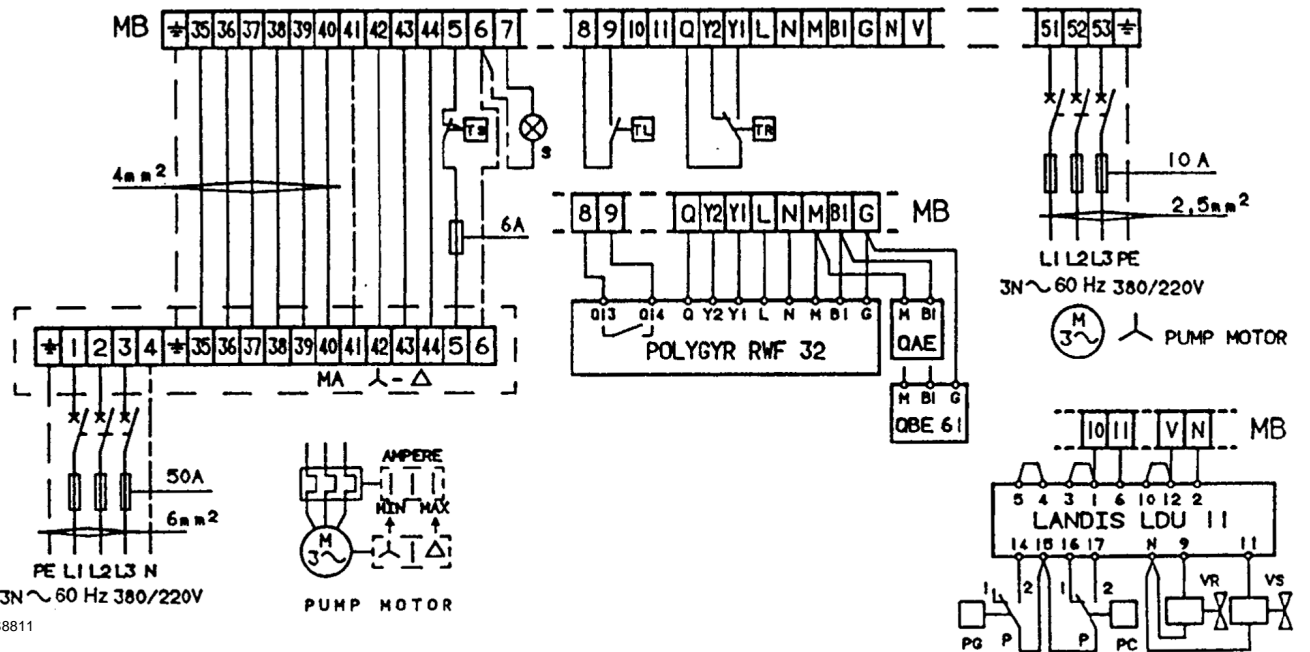
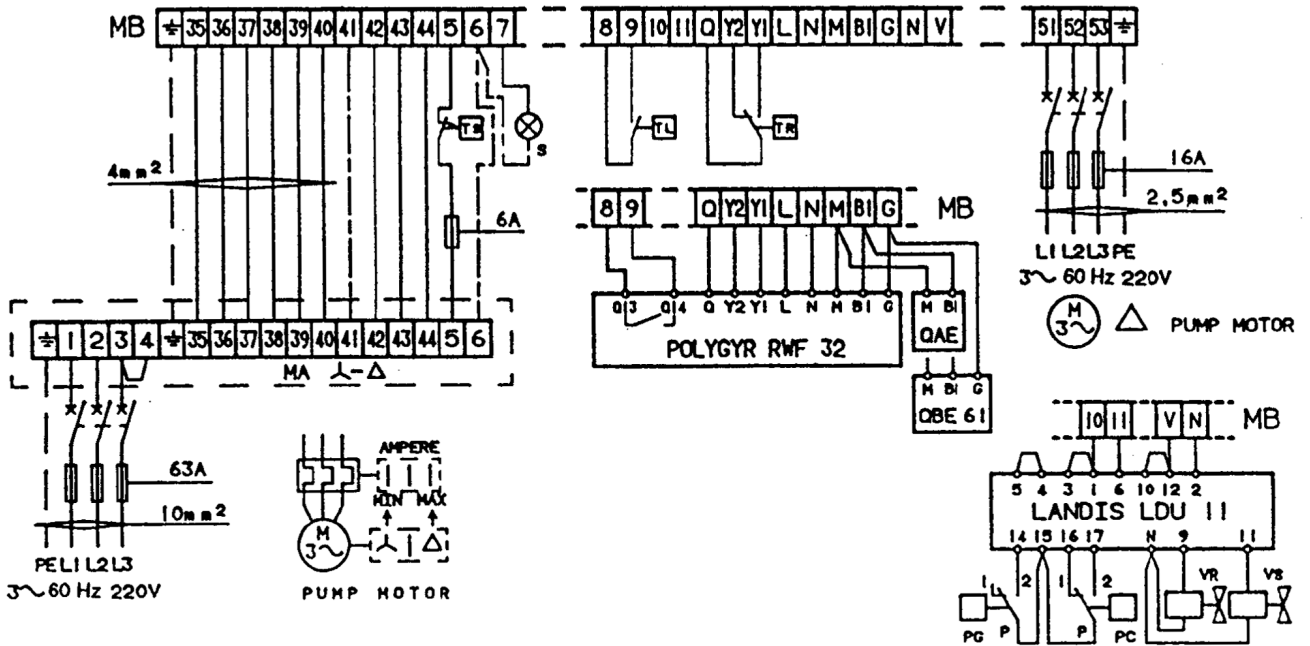


Fig. 28

Key to layout (Fig. 28)

- MA Starter terminal strip
- MB Burner terminal strip
- PC Check pressure switch
- S Remote lock-out signal
- VR Gas adjustment valve
- VS Gas safety valve
- PG Min. gas pressure switch
- TL Limit control system
- TS Safety control system
- TR High - low mode control system



Cross - section of wires not indicated: 1 mm².

Star/triangle starter

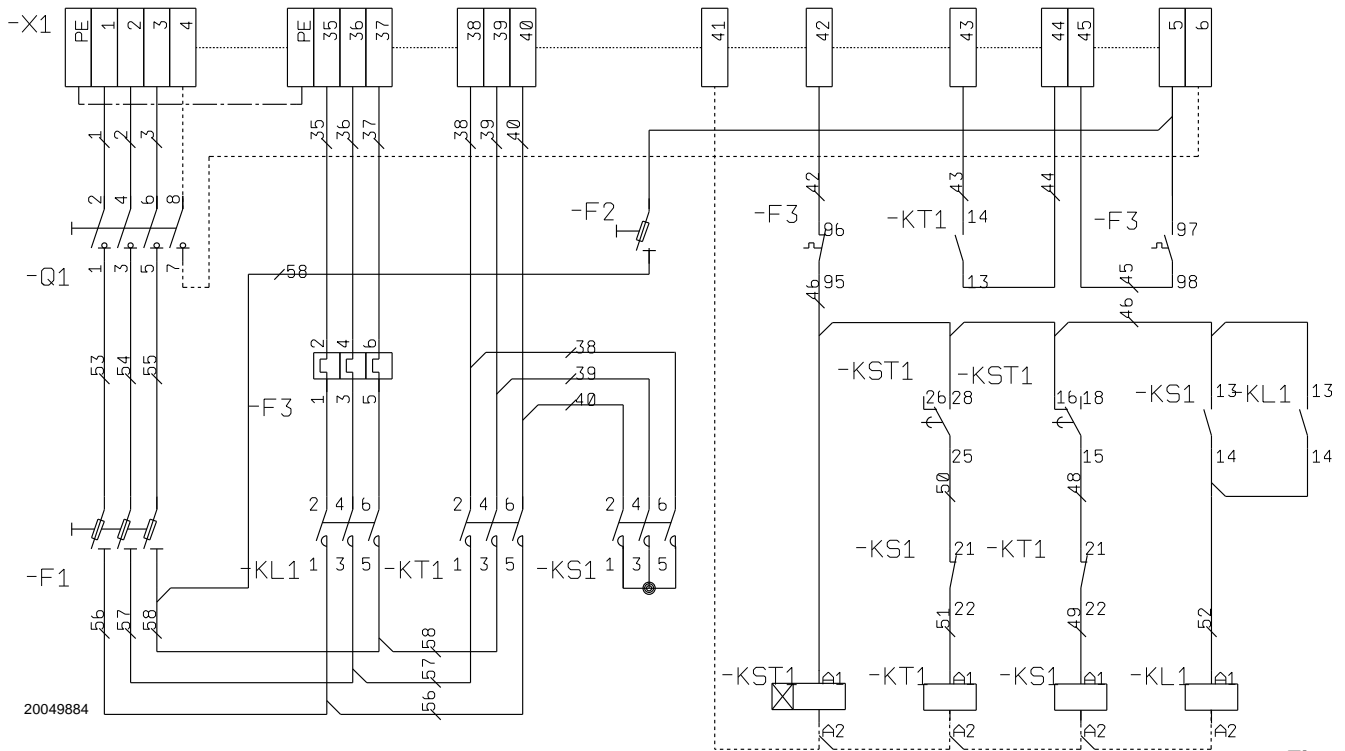
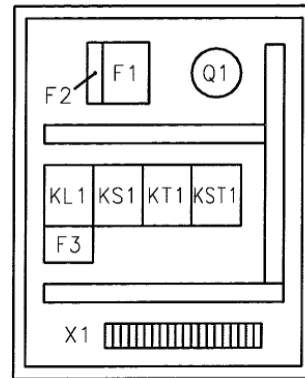


Fig. 29

Key to layout (Fig. 29)

- F1 Power line fuses
- F2 Control devices fuse
- F3 Thermal relay - Factory calibration at:
16.7A for 380V; 29A for 200V
- MA Starter terminal strip
- KL1 Line contact-maker
- KS1 Star contact-maker
- KT1 Delta contact-maker
- KST1 Timer relay for switching from star to delta (factory calibration at 10 s.)
- Q1 Disconnecting switch with interlock



S8810

Fig. 30

6 Start-up, calibration and operation of the burner

6.1 Notes on safety for the first start-up



WARNING

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



WARNING

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

6.2 Adjustments for light oil operation



WARNING

It is recommended to adjust first the light oil burner and then the gas burner.

Carry out the fuel change with burner off.

The following points do not generally require further adjustment.

- Servomotor (see information below).
- Pump - factory set at 25 bar.
- Remote overload cut-out (star-triangle starter) factory set for a three-phase electrical power supply at 380V.

If electrical power supply is a three-phase / 220V, calibration should be modified (see electrical wiring).

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

- Nozzles - see the information listed on page 15
- Combustion head - see the information listed on page 16.
- Air damper adjustment - see the information listed on page 18.

6.3 Servomotor adjustment

The servomotor (Fig. 31) 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 0° position. When the burner is off, the air damper is completely closed.

Cam POS. 2: sets the servomotor limit switch to 130° position.

Cam POS. 3: regulates minimum modulation delivery. It is factory calibrated in the 20° position.

Key (Fig. 31)

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

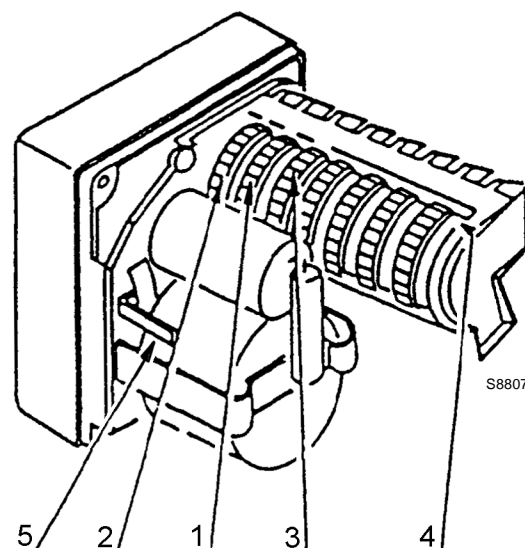


Fig. 31

6.4 Adjustments for gas operation

In addition, the following adjustments must also be made:

- Slowly open the manual valves situated upstream from the gas train.
- Adjust the minimum gas pressure switch to the start of the scale.
- Adjust the maximum gas pressure switch to the end of the scale.
- Adjust the air pressure switch to the start of the scale.
- Purge the air from the gas line.
We recommend using a plastic tube routed outside the building and to purge air until gas is smelt.
- Connect two lamps or testers to the two gas line solenoids to check the exact moment in which voltage is supplied.
This operation is unnecessary if each of the two solenoid valves is equipped with a pilot light that signals voltage passing through.



CAUTION

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

6.4.1 Air breather

This adjustment is performed by opening the special screw placed on the minimum gas pressure switch mounted on the gas train.

Key (Fig. 32)

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

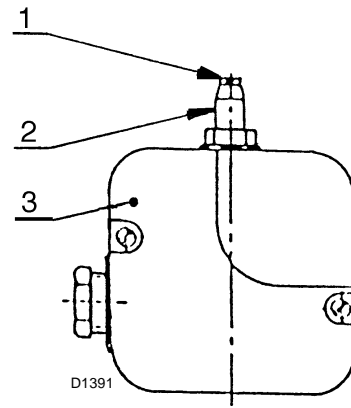


Fig. 32

6.4.2 Gas butterfly

The gas butterfly is fitted with an external adjustment unit, which assists subsequent cam calibration at low mains pressures.

- Lock-ring B)(Fig. 33) can be used to modify the throughput cross-section at minimum potential:
 - 0 = minimum aperture
 - 2 = maximum aperture
- Having set the adjustment, lock with screw A).

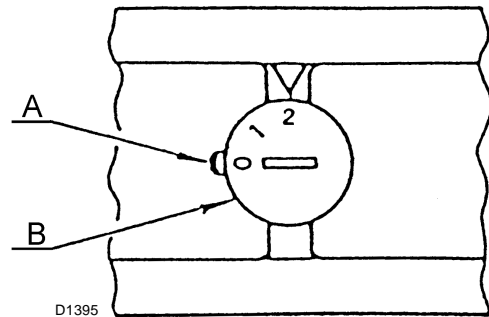


Fig. 33

6.5 Pressure switch adjustment

6.5.1 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.



WARNING

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%.

6.5.2 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.

6.6 Air/gas ratio adjustment

The final setting of gas delivery in relation to air delivery should be performed after having defined operating conditions for light oil operation.

This final setting is obtained by changing the profile of cam 21)(Fig. 4 on page 10).

6.7 Operation sequence of the burner

6.7.1 Burner start-up

- 0s TL thermostat/pressure switch closure.
Fan motor starts up.
- 5s Servomotor start: 130° rotation to the right, until the activation of the contact on cam 1).
- 40s The air damper positions on the MAX output.
Pre-purging with the air delivery of the MAX output.
- 77s The servomotor rotates towards the left until the angle set on the cam 3).
- 85s The air damper and the fuel valve adopt the MIN output position.
- 89s Ignition electrode strikes a spark.
- 94s The fuel valve open.
- 102s The spark goes out. The control box starting cycle ends.

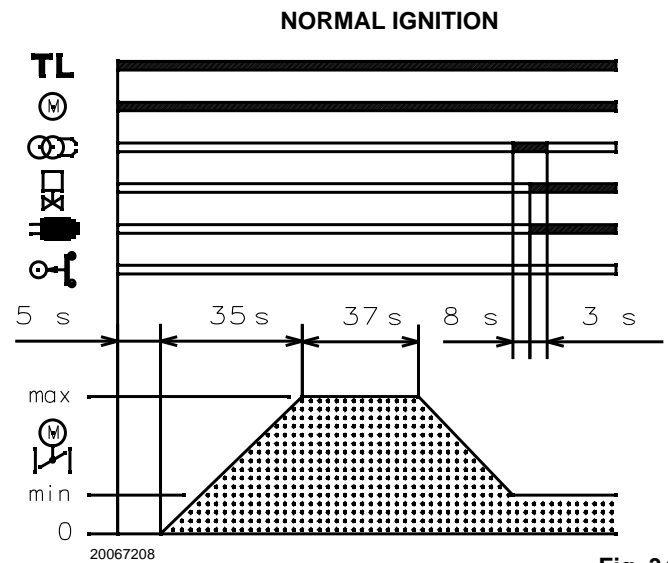


Fig. 34

6.7.2 Burner flame goes out during operation

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

6.7.3 Ignition failure

If the burner does not fire (Fig. 35), it goes into lockout within 2.5 seconds after the gas valve opening and 102 seconds after the TL closure.

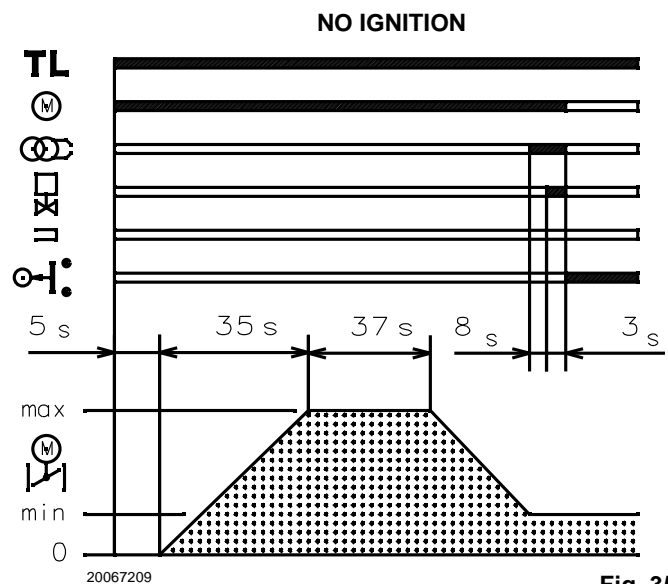


Fig. 35

6.8 Final checks (with burner operating)

<ul style="list-style-type: none"> ➤ Open the thermostat/pressure switch TL ➤ Open the thermostat/pressure switch TS 	➡	The burner must stop
<ul style="list-style-type: none"> ➤ Turn the air pressure switch to the maximum end of scale position 	➡	The burner must stop in lockout
<ul style="list-style-type: none"> ➤ Switch off the burner and disconnect the voltage ➤ Disconnect the minimum gas pressure switch ➤ Rotate the maximum oil pressure switch at the maximum of the scale 	➡	The burner must not start
<ul style="list-style-type: none"> ➤ Cover the UV flame sensor 	➡	The burner must stop in lockout due to ignition failure



Make sure that the mechanical locking systems on the various adjustment devices are fully tightened.

7 Maintenance

7.1 Notes on safety for the maintenance

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

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



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

Before carrying out any maintenance, cleaning or checking operations:



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



Turn off the fuel interception tap.



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

7.2 Maintenance programme

7.2.1 Maintenance frequency



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

7.2.2 Checking and cleaning



The operator must use the required equipment during maintenance.

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 most care should be exercised during maintenance.

Combustion head

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

Burner

Clean the outside of the burner.
Clean and grease the adjustable profile of the cams.

Fan

Check to make sure that no dust has accumulated inside the fan or on its blades, as this condition will cause a reduction in the air flow rate and provoke polluting combustion.

Electrical current to UV cell (Fig. 36)

Clean the glass cover from any dust that may have accumulated. To remove the photocell, pull out outwards; it is only pressed in. Min value for a good work: 70 µA.

If the value is lower, it could be due to:

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

In order to measure the current, use a microammeter of 100 µA d.c., connected in series to the photocell, as in the scheme, with a capacitor of 100 µF - 1V d.c. at the same level of the instrument.

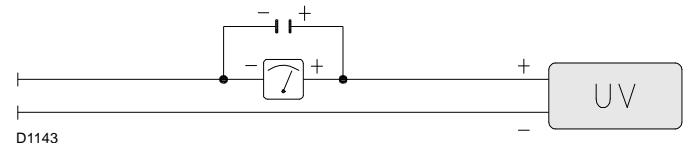


Fig. 36

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.

LIGHT OIL OPERATION

Pump

If the pressure is found to be unstable or if the pump runs noisily, the flexible hose must be detached from the line filter and the fuel must be sucked from a tank located near the burner.

This measure permits the cause of the anomaly to be traced to either the suction piping or the pump.

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

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.

Nozzles

It is advisable to replace nozzles once a year during periodical maintenance.

Hoses

Check that these are in good conditions.

Fuel tank

Approximately every 5 years, suck any water on the bottom of the tank using a separate pump.

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 in order to carry out the necessary adjustments.

EN 267	Air excess		CO
	Max. output. $\lambda \leq 1.2$	Min. output. $\lambda \leq 1.3$	
Theoretical max CO ₂ 0 % O ₂	CO ₂ % Calibration		mg/kWh
	$\lambda = 1.2$	$\lambda = 1.3$	
15.2	12.6	11.5	≤ 1000

Tab. L

GAS OPERATION

Gas leaks

Make sure that there are no gas leaks on the pipe between the gas meter and the burner.

Gas filter

Change the gas filter when it is dirty.

Combustion

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

EN 676		Excess air		CO
		Max. output. $\lambda \leq 1.2$	Max. output. $\lambda \leq 1.3$	
GAS	Theoretical max CO ₂ 0 % O ₂	CO ₂ % Calibration		mg/kWh
		$\lambda = 1.2$	$\lambda = 1.3$	
G 20	11.7	9.7	9	≤ 1000
G 25	11.5	9.5	8.8	≤ 1000
G 30	14.0	11.6	10.7	≤ 1000
G 31	13.7	11.4	10.5	≤ 1000

Tab. M

8 Faults - Possible causes - Solutions

The control box is equipped with a lockout indicator (Fig. 37) that turns during the start-up programme, and is visible from the small lockout window.

When the burner does not start or stops, due to a failure, the symbol that appears on the indicator indicates the type of interruption.

The positions of the lockout indicator are shown in Fig. 38.



Lockout indicator

- a-b Start-up sequence
- b-b' Idle stages (without contact confirmation)
- b(b')-a Post-purging programme

Fig. 37

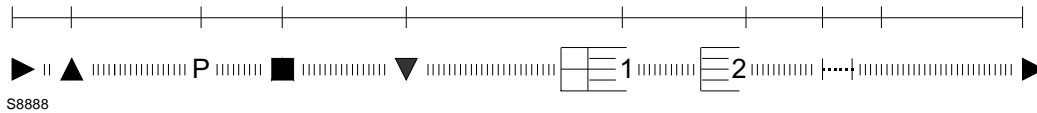


Fig. 38

Fuse replacement

The fuse 2)(Fig. 39) is in the rear part of the control box. A spare fuse 1) is also available: it can be extracted after breaking the panel tab A) that houses it. In the event that fuse 2) has been tripped, replace it as shown in Fig. 39.

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.



WARNING

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



DANGER

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

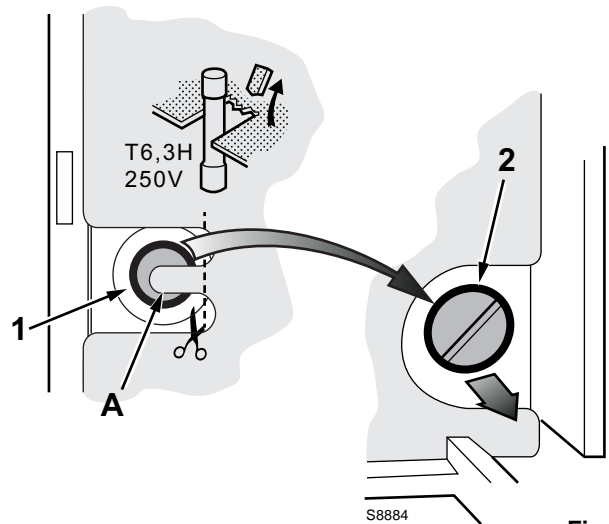


Fig. 39

8.1 Light oil operation

Symbol ⁽¹⁾	Problem	Possible cause	Recommended remedy
◀	The burner does not start	Limiter or safety control device open	Adjust or replace
		Control box lockout	Release
		Fan motor lockout	Release the thermal relay
		Intervention of maximum oil pressure switch	Adjust the pressure switch or eliminate overpressure
		No electrical power supply	Close all switches - check connections
		No light oil	Check the light oil supply circuit
		Control box fuse interrupted	Replace
		Pump is jammed	Replace
		Faulty motor remote control switch	Replace
		Defective control box	Replace
		Faulty electrical motor	Replace
	Defective safety solenoid valve	Replace	
	Faulty oil modulator	Recondition or replace it	
	The burner does not switch on, and the lock-out appears	Flame simulation	Replace the control box
Photocell short-circuit		Replace photocell	
Two-phase electrical supply, thermal relay steps in		Reset the thermal relay at return of the three phases	
▲	The burner starts but stops at maximum air damper setting	Contact 1 of the servomotor terminals 9-8 control box does not intervene	Adjust cam I or replace servomotor
P	The burner switches on, but then stops in lockout	Air pressure switch incorrectly adjusted	Adjust it
		Pressure switch pressure point pipe blocked	Clean
■	The burner switches on, but then stops in lockout	Failure to the flame detection circuit	Replace control box
▼	The burner remains in pre-purging phase	Contact III of the servomotor terminals 10-8 control box does not intervene	Adjust cam III or replace servomotor
1	Once the pre-purging and the safety time has elapsed the burner goes into lockout without the flame appearing	No fuel in the tank, or water on the bottom	Refill with fuel, or remove the water
		Bad head and damper adjustments	Adjust
		Faulty or grounded high voltage cable	Replace
		High voltage cable deformed by high temperature	Replace and protect
		Bad electrical wiring on valves or transformer	Check
		Pump unprimed	Prime it
		Pump suction line connected to return line	Correct connection
		Soiled filters (nozzle line)	Clean
		The valves upstream from the pump are closed	Open them
		Opposite motor rotation	Change electrical wiring to the motor
		Light oil solenoids do not open	Check connections and solenoids
		Nozzle clogged, soiled or deformed	Clean it or replace it
		Defective control box	Replace
		Ignition electrode incorrectly adjusted	Adjust it
		Electrode grounded due to broken insulation	Replace
		Motor/pump coupling broken	Replace
		Faulty ignition transformer	Replace
	The flame ignites regularly but the burner goes into lock out at the end of the safety time	Faulty photocell or control box	Replace photocell or control box
		Soiled photocell	Clean

Symbol (1)	Problem	Possible cause	Recommended remedy
	Smoke in flame (dark Bacharach)	Little air	Adjust the fan head and damper
		Incorrect pump pressure	Adjust
		Nozzle filter clogged	Clean or replace
		Insufficient boiler room ventilation openings	Increase
		Dirty or worn nozzle	Replace
		Flame disk soiled, loose or deformed	Clean it, tighten it or replace it
	Smoke in flame (yellow Bacharach)	Excessive air	Adjust head and air dampers
	Ignition with pulses or flame failure, delayed ignition	Poorly adjusted head	Adjust
		Incorrectly adjusted fan air damper: too much air	Adjust
		Nozzle not fit for burner or boiler	See the nozzle table
		Faulty nozzle	Replace
		Unsuitable pump pressure	Adjust
		Ignition electrode not adjusted correctly or soiled	Adjust it
		Output during ionisation phase is too high	Reduce
	The burner does not pass to 2° stage	Remote control device TR fails to close	Adjust or replace
		Defective control box	Replace
	Uneven fuel supply	Understand whether the cause lies in the pump or the fuel supply system	Supply fuel to the burner from a tank positioned near the burner itself
	Internally rusted pump	Water in the tank	Remove the water with a pump
	Noisy pump, unstable pressure	Air in the suction line	Block the couplings
		Depression value too high (higher than 35 cm Hg):	
		Excessive difference of level between burner and tank	Power the burner from a loop circuit
		Piping diameter too small	Increase
		Dirty suction line filters	Clean
		Suction line valves closed	Open them
		The paraffin solidifies due to the low temperature	Put additive in the light oil
	Pump unprimes after prolonged pause	Return pipeline not immersed in the fuel	Bring it to the same height as the suction line
		Air in the suction line	Block the couplings
	Pump leaks light oil	Loss of sealing organ	Replace the pump
	Dirty combustion head	Dirty nozzle or nozzle filter	Replace
		Unsuitable nozzle delivery or angle	See recommended nozzles
		Loose nozzle	Block it
		Environmental impurities on flame stability disc	Clean
		Incorrect head adjustment, or little air	Adjust it, opening the damper
		Blast tube length not suitable for the boiler	Contact the boiler manufacturer
	Burner goes into lockout during operation	Photocell faulty or soiled	Replace it or clean it
		Air pressure switch faulty	Replace

Tab. N

8.2 Gas operation

Symbol ⁽¹⁾	Problem	Possible cause	Recommended remedy
◀	The burner does not start	No electrical power supply	Close all switches and check connections
		A limit or safety thermostat/pressure switch open	Adjust or replace
		Control box lockout	Release the control box
		Control box fuse interrupted	Replace it ⁽²⁾
		Incorrect electrical wiring	Check
		Defective control box	Replace
		No gas supply	Open the manual valves between meter and train
		Mains gas pressure insufficient	Contact your gas company
		Minimum gas pressure switch fails to close	Adjust or replace
		Air pressure switch in operating position	Adjust or replace
		The servomotor contact does not intervene (closure cam 0°)	Adjust the closure cam 0° or replace the servomotor
	The burner does not switch on, and the lock-out appears	Flame simulation	Replace the control box
		Faulty motor remote control switch	Replace
		Defective electrical motor	Replace
Motor lockout		Release the thermal relay	
▲	The burner starts up but stops at the damper maximum opening	The servomotor contact does not intervene (maximum cam opening)	Cam adjustment (maximum opening) or replace the servomotor
P	The burner starts and then goes into lockout	Air pressure switch inoperative due to insufficient air pressure:	
		Air pressure switch poorly adjusted	Adjust or replace
		Pressure switch pressure point pipe blocked	Clean
		Poorly adjusted head	Adjust
		High depression in the furnace	Contact our Technical Department
■	The burner turns on and then remains in lockout mode	Failure to the flame detection circuit	Replace the control box
▼	The burner remains in the pre-purge phase	The servomotor contact does not intervene (cam minimum)	Cam adjustment (minimum) or replace the servomotor
1	Once the pre-purging and the safety time has elapsed the burner goes into lockout without the flame appearing	Gas pressure too low	Increase pressure at governor
		Ignition electrode incorrectly adjusted	Adjust it
		Electrode grounded due to broken insulation	Replace
		Faulty or grounded high voltage cable	Replace
		High voltage cable deformed by high temperature	Replace and protect
		Faulty ignition transformer	Replace
		Incorrect valve or ignition transformer connections	Redo them
		Defective control box	Replace
		A closed valve upline the gas train	Open
		Air in pipework	Bleed air
		Lockout with flame appearing	Dirty flame sensor
	Faulty connection		Check, replace flame sensor
	Insufficient detection current (min.70 µA)		Measure current, replace flame sensor
	Flame sensor exhausted, faulty		Replace
	Defective control box		Replace

Symbol (1)	Problem	Possible cause	Recommended remedy
	The burner continues to repeat the start-up cycle, without lockout	The gas pressure in the gas mains lies very close to the value to which the minimum gas pressure switch has been set. The sudden drop in pressure after valve opening causes temporary opening of the pressure switch itself, the valve immediately closes and the burner comes to a halt. Pressure increases again, the pressure switch closes again and the ignition cycle is repeated. The sequence repeats endlessly.	Reduce the minimum gas pressure switch intervention pressure. Replace the gas filter cartridge
	Lockout without symbol indication	Flame simulation	Replace the control box
	Burner goes into lockout during operation	Faulty flame sensor	Replace worn parts
		Air pressure switch faulty	Replace
		Maximum gas pressure switch intervention	Adjust or replace
◀	Lockout when the burner stops	Permanent flame in the combustion head or flame simulation	Eliminate permanency of flame or replace the control box
	Ignition with pulsations	Poorly adjusted head	Adjust
		Ignition electrode incorrectly adjusted	Adjust it
		Incorrectly adjusted fan air damper: too much air	Adjust
		Output during ionisation phase is too high	Reduce

Tab. O

A Appendix - Accessories**Spacer kit**

Burner	Spacer thickness (mm)	Code
GI/EMME 1400 - 2000	102	3000722
GI/EMME 3000 - 4500	130	3000751

Soundproofing box kit

Burner	Box type	dB(A)	Code
GI/EMME 1400 - 2000 GI/EMME 3000 - 4500	C7	10	3010376

Kit for modulating operation

With the modulating operation, the burner continually adapts the power to the request for heat, ensuring great stability for the parameter controlled: temperature or pressure.

Two components should be ordered:

- the output power regulator to be installed on the burner;
- the probe to be installed on the heat generator.

Parameter to be checked		Probe		Output regulator	
	Adjustment field	Type	Code	Type	Code
Temperature	- 100...+ 500°C	PT 100	3010110	RWF40	3010211
Pressure	0...2.5 bar 0...16 bar	Output probe 4...20 µA	3010213 3010214		

Potentiometer kit

Burner	Code
GI/EMME 1400 - 2000 GI/EMME 3000 - 4500	3010021

LPG kit

Burner	Code
GI/EMME 1400 - 2000	3010063
GI/EMME 3000	3090223
GI/EMME 4500	3090937

Burner support

Burner	Code
GI/EMME 1400 - 2000 GI/EMME 3000 - 4500	3000731

Gas trains in compliance with EN 676

Please refer to manual.

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