

**C83X**

**Gas - Light oil burners**

**MANUAL OF INSTALLATION - USE - MAINTENANCE**



**BURNERS - BRUCIATORI - BRULERS - BRENNER - QUEMADORES - ГОРЕЛКИ**

## DANGERS, WARNINGS AND NOTES OF CAUTION

**This manual is supplied as an integral and essential part of the product and must be delivered to the user.**

**Information included in this section are dedicated both to the user and to personnel following product installation and maintenance.**

**The user will find further information about operating and use restrictions, in the second section of this manual. we highly recommend to read it.**

**Carefully keep this manual for future reference.**

*The following:*

- Entails the customer's acknowledgement and acceptance of the company's general terms and conditions of sale, in force at the date of order confirmation and available in the appendix to the current price lists.
- Is intended exclusively for specialised, experienced and trained users able to operate in conditions that are safe for people, the device and the environment, and in full compliance with the requirements set out on the following pages and with current health and safety regulations.

Information regarding assembly/installation, maintenance, replacement and repair is always and exclusively intended for (and therefore only to be carried out by) specialised personnel and/or directly by the Authorised Technical Service

### IMPORTANT :

The supply has been made at the best conditions on the basis of the customer's order and technical indications concerning the state of the places and the installation systems, as well as the need to prepare certain certifications and / or additional adaptations with respect to the standard observed and transmitted for each product. In this respect, the manufacturer declines any responsibility for complaints, malfunctions, criticalities, damages and/or anything else consequent to incomplete, inaccurate and/or missing information, as well as failure to comply with the technical requirements and installation regulations, initial start-up, operational management and maintenance.

For proper operation of the device, it is necessary to ensure the readability and conservation of the manual, also for future reference. In case of deterioration or more simply for reasons of technical and operational insight, contact the manufacturer directly. Text, descriptions, images, examples and anything else contained in this document are the exclusive property of the manufacturer. Any reproduction is prohibited.

### RISK ANALYSIS

#### Instruction manual supplied with the burner:

This 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. In the event of damage or loss, another copy must be requested from the local customer service centre;

#### Delivery of the system and instruction manual

The supplier of the system is obliged to accurately inform the user about:–  
Use of the system;

- any further testing that may be necessary before activating the system;
- maintenance and the requirement to have the system checked at least once a year by a contractor or other specialised technician.

To ensure periodic monitoring, the manufacturer recommends drawing up a Maintenance Agreement.

### WARRANTY AND LIABILITY

In particular, warranty and liability claims will no longer be valid in the event of damage to persons and/or property if such damage is 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;
- Operation by unqualified personnel;
- Carrying out of unauthorised changes to the device;
- 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;
- Use of the burner even after an error and/or 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 supervision and care of the burner components most subject to wear and tear;
- Use of non-original components, whether spare parts, kits, accessories and optional;
- Force majeure.

**Furthermore, the manufacturer declines all responsibility for non-compliance with this manual.**



**WARNING!** Failure to comply with this manual, operational negligence, incorrect installation and unauthorised modifications will result in the manufacturer's warranty for the burner being voided.

#### Personnel training

The user is the person, organisation or company that has acquired the appliance and intends to use it for the specific purpose. The user is responsible for the appliance and for training the personnel that operate it.

#### The user:

- Undertakes to entrust the machine to suitably trained and qualified personnel;
- Must take all measures necessary to prevent unauthorised people gaining access to the appliance;
- Undertakes to adequately inform personnel about application and observance of the safety requirements, and therefore ensure that they are familiar with the operating instructions and safety requirements;
- Must inform the manufacturer if any faults or malfunctions of the accident prevention systems occur, and if there is any suspected danger;
- Personnel must always use the personal protective equipment required by law and follow the instructions provided in this manual;
- Personnel must observe all danger and caution notices on the appliance;
- Personnel must not carry out, on their own initiative, operations or interventions outside their area of expertise;
- Personnel must inform their superiors of any problem and danger that may arise;
- The assembly of parts of other makes, or any modifications made, may alter the characteristics of the appliance and may therefore compromise operational safety. The manufacturer therefore declines all responsibility for damages arising from the use of non-original parts.

### GENERAL INTRODUCTION

- The equipment must be installed in compliance with the regulations in force, following the manufacturer's instructions, by qualified personnel.
- Qualified personnel means those having technical knowledge in the field of components for civil or industrial heating systems, sanitary hot water generation and particularly service centres authorised by the manufacturer.
- Improper installation may cause injury to people and animals, or damage to property, for which the manufacturer cannot be held liable.
- Remove all packaging material and inspect the equipment for integrity.

In case of any doubt, do not use the unit - contact the supplier.

The packaging materials (wooden crate, nails, fastening devices, plastic bags, foamed polystyrene, etc), should not be left within the reach of children, as they may prove harmful.

- Before any cleaning or servicing operation, disconnect the unit from the mains by turning the master switch OFF, and/or through the cutout devices that are provided.
- Make sure that inlet or exhaust grilles are unobstructed.
- In case of breakdown and/or defective unit operation, disconnect the unit. Make no attempt to repair the unit or take any direct action.

Contact qualified personnel only.

Units shall be repaired exclusively by a servicing centre, duly authorised by the manufacturer, with original spare parts and accessories.

Failure to comply with the above instructions is likely to impair the unit's safety.

To ensure equipment efficiency and proper operation, it is essential that maintenance operations are performed by qualified personnel at regular intervals, following the manufacturer's instructions.

- When a decision is made to discontinue the use of the equipment,

those parts likely to constitute sources of danger shall be made harmless.

- In case the equipment is to be sold or transferred to another user, or in case the original user should move and leave the unit behind, make sure that these instructions accompany the equipment at all times so that they can be consulted by the new owner and/or the installer.
- This unit shall be employed exclusively for the use for which it is meant. Any other use shall be considered as improper and, therefore, dangerous.

The manufacturer shall not be held liable, by agreement or otherwise, for 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.

The damages resulting from improper installation, use and failure to comply with the instructions supplied by the manufacturer. The occurrence of any of the following circumstances may cause explosions, polluting unburnt gases (example: carbon monoxide CO), burns, serious harm to people, animals and things:

- Failure to comply with one of the WARNINGS in this chapter
- Incorrect handling, installation, adjustment or maintenance of the burner
- Incorrect use of the burner or incorrect use of its parts or optional supply

### SPECIAL INSTRUCTIONS FOR BURNERS

a Make the following checks:

- • the burner should be installed in a suitable room, with ventilation openings complying with the requirements of the regulations in force, and sufficient for good combustion;
- • only burners designed according to the regulations in force should be used;
- • this burner should be employed exclusively for the use for which it was designed;
- • before connecting the burner, make sure that the unit rating is the same as delivery mains (electricity, gas oil, or other fuel);
- • observe caution with hot burner components. These are, usually, near to the flame and the fuel pre-heating system, they become hot during the unit operation and will remain hot for some time after the burner has stopped.

When the decision is made to discontinue the use of the burner, the user shall have qualified personnel carry out the following operations:

- a • remove the power supply by disconnecting the power cord from the mains;
- b • disconnect the fuel supply by means of the hand-operated shutoff valve and remove the control handwheels from their spindles.

### Special warnings

- Make sure that the burner has, on installation, been firmly secured to the appliance, so that the flame is generated inside the appliance fire-box.
- Before the burner is started and, thereafter, at least once a year, have qualified personnel perform the following operations:
  - a set the burner fuel flow rate depending on the heat input of the appliance;
  - b set the flow rate of the combustion-supporting air to obtain a combustion efficiency level at least equal to the lower level required by the regulations in force;
  - c check the unit operation for proper combustion, to avoid any harmful or polluting unburnt gases in excess of the limits permitted by the regulations in force;
  - d make sure that control and safety devices are operating properly;
  - e make sure that exhaust ducts intended to discharge the products of combustion are operating properly;
  - f on completion of setting and adjustment operations, make sure that all mechanical locking devices of controls have been duly tightened;
  - g make sure that a copy of the burner use and maintenance instructions is available in the boiler room.
- In case of a burner shut-down, reset the control box by means of the RESET pushbutton. If a second shut-down takes place, call the Technical Service, without trying to RESET further.
- The unit shall be operated and serviced by qualified personnel only, in compliance with the regulations in force.

## GENERAL INSTRUCTIONS DEPENDING ON FUEL USED

### ELECTRICAL CONNECTION

- For safety reasons the unit must be efficiently earthed and installed as required by current safety regulations.
- It is vital that all safety requirements are met. In case of any doubt, ask for an accurate inspection of electrics by qualified personnel, since the manufacturer cannot be held liable for damages that may be caused by failure to correctly earth the equipment.
- Qualified personnel must inspect the system to make sure that it is adequate to take the maximum power used by the equipment shown on the equipment rating plate. In particular, make sure that the system cable cross section is adequate for the power absorbed by the unit.
- No adaptors, multiple outlet sockets and/or extension cables are permitted to connect the unit to the electric mains.
- An omnipolar switch shall be provided for connection to mains, as required by the current safety regulations.
- The use of any power-operated component implies observance of a few basic rules, for example:
  - do not touch the unit with wet or damp parts of the body and/or with bare feet;
  - do not pull electric cables;
  - do not leave the equipment exposed to weather (rain, sun, etc.) unless expressly required to do so;
  - do not allow children or inexperienced persons to use equipment;
- The unit input cable shall not be replaced by the user. In case of damage to the cable, switch off the unit and contact qualified personnel to replace.

When the unit is out of use for some time the electric switch supplying all the power-driven components in the system (i.e. pumps, burner, etc.) should be switched off.

### FIRING WITH GAS, LIGHT OIL OR OTHER FUELS GENERAL

#### General Warnings

- The burner shall be installed by qualified personnel and in compliance with regulations and provisions in force; wrong installation can cause injuries to people and animals, or damage to property, for which the manufacturer cannot be held liable.
- Before installation, it is recommended that all the fuel supply system pipes be carefully cleaned inside, to remove foreign matter that might impair the burner operation.
- Before the burner is commissioned, qualified personnel should inspect the following:
  - a the fuel supply system, for proper sealing;
  - b the fuel flow rate, to make sure that it has been set based on the firing rate required of the burner;
  - c the burner firing system, to make sure that it is supplied for the designed fuel type;
  - d the fuel supply pressure, to make sure that it is included in the range shown on the rating plate;
  - e the fuel supply system, to make sure that the system dimensions are adequate to the burner firing rate, and that the system is equipped with all the safety and control devices required by the regulations in force.
- When the burner is to remain idle for some time, the fuel supply tap or taps should be closed.

#### Special instructions for using gas

Have qualified personnel inspect the installation to ensure that:

- a the gas delivery line and train are in compliance with the regulations and provisions in force;
- b all gas connections are tight;
- c the boiler room ventilation openings are such that they ensure the air supply flow required by the current regulations, and in any case are sufficient for proper combustion.
- Do not use gas pipes to earth electrical equipment.
- Never leave the burner connected when not in use. Always shut the gas valve off.
- In case of prolonged absence of the user, the main gas delivery valve to the burner should be shut off.

## BURER DATA PLATE

For the following information, please refer to the data plate:

- Burner type and burner model: must be reported in any communication with the supplier
- Burner ID (serial number): must be reported in any communication with the supplier
- Date of production (year and month)
- Information about fuel type and network pressure

Consump	
Type	--
Model	--
Year	--
S.Number	--
Output	--
Oil Flow	--
Fuel	--
Category	--
Gas Pressure	--
Viscosity	--
El.Supply	--
El.Consump.	--
Fan Motor	--
Protection	--
Drwaing n°	--
P.I.N.	--

### Precautions if you can smell gas

- do not operate electric switches, the telephone, or any other item likely to generate sparks;
  - immediately open doors and windows to create an air flow to purge the room;
  - close the gas valves;
  - contact qualified personnel.
- Do not obstruct the ventilation openings of the room where gas appliances are installed, to avoid dangerous conditions such as the development of toxic or explosive mixtures.

### Using oil pressure gauges

Generally, pressure gauges are equipped with a manual valve. Open the valve only to take the reading and close it immediately afterwards.

### SYMBOLS USED



#### **WARNING**

Failure to observe the warning may result in irreparable damage to the unit or damage to the environment



#### **DANGER!**

Failure to observe the warning may result in serious injuries or death.



#### **WARNING**

Failure to observe the warning may result in electric shock with lethal consequences.

### BURNER SAFETY

The burners- and the configurations described below - comply with the regulations in force regarding health, safety and the environment. For more in-depth information, refer to the declarations of conformity that are an integral part of this Manual.



**DANGER!** Incorrect motor rotation can seriously damage property and injure people.



Do not touch any mechanical moving parts with your hands or any other part of your body. Injury hazard

Do not touch any parts containing fuel (i.e. tank and pipes). Scalding hazard

Do not use the burner in situations other than the ones provided for in the data plate.

Do not use fuels other than the ones stated.

Do not use the burner in potentially explosive environments.

Do not remove or by-pass any machine safety devices.

Do not remove any protection devices or open the burner or any other component while the burner is running.

Do not disconnect any part of the burner or its components while the burner is running.

Untrained staff must not modify any linkages.

- After any maintenance, it is important to restore the protection devices before restarting the machine.

- All safety devices must be kept in perfect working order.

- Personnel authorized to maintain the machine must always be provided with suitable protections.

**ATTENTION:** while running, the parts of the burner near the generator (coupling flange) are subject to overheating. Where necessary, avoid any contact risks by wearing suitable PPE.



### Safety and prevention

- 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.

### DIRECTIVES AND STANDARDS

#### Gas - Light oil burners

##### European directives

**2016/426/UE** (appliances burning gaseous fuels)

**2014/35/UE** (Low Tension Directive)

**2014/30/UE** (Electromagnetic compatibility Directive)

**2006/42/CE** (Machinery Directive)

##### Harmonized standards

**UNI EN 676** (Automatic forced draught burners for gaseous fuels)

**UNI EN 267-2011** (Automatic forced draught burners for liquid fuels)

**EN 55014-1** (Electromagnetic compatibility- Requirements for household appliances, electric tools and similar apparatus)

**EN 60204-1:2006** (Safety of machinery – Electrical equipment of machines.)

**CEI EN 60335-1** (Specification for safety of household and similar electrical appliances);

**CEI EN 60335-2-102** (Household and similar electrical appliances. Safety. Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections).

**UNI EN ISO 12100:2010** (Safety of machinery - General principles for design - Risk assessment and risk reduction);

#### Industrial burners

##### European directives

**2006/42/CE** (Machinery Directive)

**2014/35/UE** (Low Tension Directive)

**2014/30/UE** (Electromagnetic compatibility Directive)

**2006/42/CE** (Machinery Directive)

##### Harmonized standards

**EN 746-2** (Industrial thermoprocessing equipment - Part 2: Safety requirements for combustion and fuel handling systems)

**EN 55014-1** (Electromagnetic compatibility- Requirements for household appliances, electric tools and similar apparatus)

**EN 60204-1:2006** (Safety of machinery – Electrical equipment of machines.)

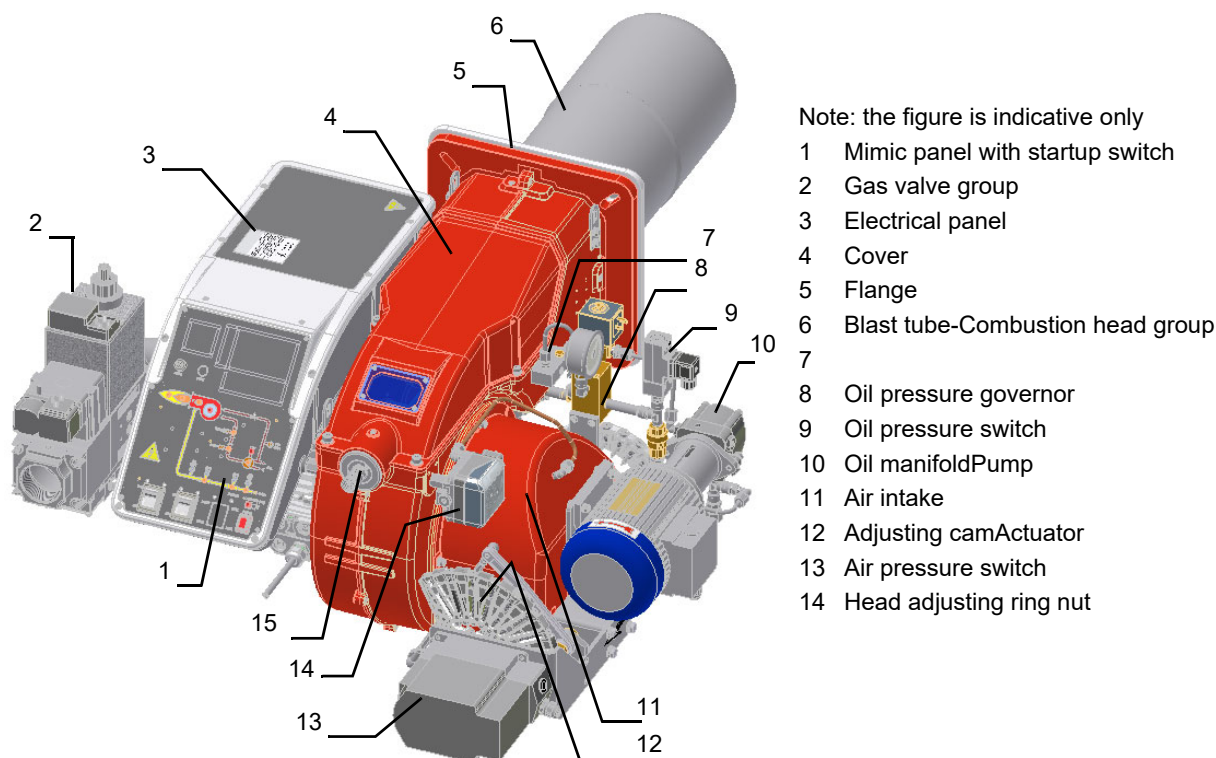
**CEI EN 60335-1** (Specification for safety of household and similar electrical appliances);

**UNI EN ISO 12100:2010** (Safety of machinery - General principles for design - Risk assessment and risk reduction);

## PART I: SPECIFICATIONS

## BURNERS FEATURES

This series represents monobloc gas burners made in die-cast aluminium housing, that can burn either gas or light oil, thanks to the adjustable combustion head which allows a good performance with both fuels. They can be provided in progressive or fully-modulating version.



**Gas operation:** the gas coming from the supply line, passes through the valves group provided with filter and governor. This one forces the pressure in the utilisation limits. The actuators move proportionally the air damper and the gas butterfly valve, in order to achieve the optimisation of the gas flue values, as to get an efficient combustion.

**Light oil operation:** the fuel coming from the supply line, is pushed by the pump to the nozzle and then into the combustion chamber, where the mixture between fuel and air takes place and consequently the flame.

In the burners, the mixture between fuel and air, to perform clean and efficient combustion, is activated by atomisation of oil into very small particles. This process is achieved making pressurised oil passing through the nozzle.

The pump main function is to transfer oil from the tank to the nozzle in the desired quantity and pressure. To adjust this pressure, pumps are provided with a pressure regulator (except for some models for which a separate regulating valve is provided). Other pumps are provided with two pressure regulators: one for the high and one for low pressure (in double-stage systems with one nozzle).

The adjustable combustion head can improve the burner performance. The combustion head determines the energetic quality and the geometry of the flame. Fuel and comburent are routed into separated ways as far as the zone of flame generation (combustion chamber). The control panel, placed on the burner front side, shows each operating stage.

## Burner model identification

Burners are identified by burner type and model. Burner model identification is described as follows.

Type	<b>C83X</b>	Model	<b>MG.</b>	<b>MD.</b>	<b>S.</b>	<b>*</b>	<b>A.</b>	<b>1.</b>	<b>50.</b>
	<b>(1)</b>		<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>	<b>(6)</b>	<b>(7)</b>	<b>(8)</b>

1	BURNER TYPE	<b>C83X</b>
2	FUEL	MG - Natural gas-Light oil LG - LPGLight oil
3	OPERATION (Available versions)	PR - Progressive MD - Fully modulating
4	BLAST TUBE	S - Standard L - Extended SR = Standard blast tube + ABS polymer (silenced) air intake SP = Standard blast tube + aluminum air intake LR = Extended blast tube + ABS polymer (silenced) air intake LP = Extended blast tube + aluminum air intake
5	DESTINATION COUNTRY	* - see data plate
6	BURNER VERSION	A - Standard Y - SpecialeSpecial
7	EQUIPMENT	0 = 2 gas valves 1 = 2 gas valves + gas proving system 7 = 2 gas valves + maximum gas pressure switch 8 = 2 gas valves + gas proving system + maximum gas pressure switch
8	GAS CONNECTION	32 = Rp1 <sub>1/4</sub> 40 = Rp1 <sub>1/2</sub> 50 = Rp2 65 = DN65 80 = DN80

## Fuel



**WARNING! The burner must be used only with the fuel specified in the burner data plate .**

The burner technical specifications, described in this manual, refer to natural gas (calorific net value  $H_i = 9.45 \text{ kWh/Stm}^3$ , density  $\rho = 0.717 \text{ Kg/Stm}^3$ ) and LPG (calorific net value  $H_i = 26.79 \text{ kWh/Stm}^3$ , density  $\rho = 2.151 \text{ Kg/Stm}^3$ ). For different fuel such as town gas and biogas, multiply the values of flow and pressure by the corrective factors shown in the table below.

Type	--
Model	--
Year	--
S.Number	--
Output	--
Oil Flow	--
Fuel	--
Category	--
Gas Pressure	--
Viscosity	--
El.Supply	--
El.Consump.	--

Fuel	$H_i$ (KWh/Stm <sup>3</sup> )	$\rho$ (kg/Stm <sup>3</sup> )	$f_Q$	$f_p$
Town gas	4,88	0,6023	1,936	3,3
Biogas	6,395	1,1472	1,478	3,5

For example, to obtain the flow and pressure values for the biogas:

$$Q_{biogas} = Q_{naturalGas} \cdot 1,478$$

$$p_{biogas} = p_{naturalGas} \cdot 3,5$$



**ATTENTION! The combustion head type and the settings depend on the fuel. The burner must be used only for its intended purpose specified in the burner data plate .**



**ATTENTION! The corrective factors in the above table depend on the gas composition, so on the calorific value and the density of the gas. The above value can be taken only as reference.**

## Technical Specifications

BURNER TYPE		C83X MG...	C83X LG...
Output	min. - max. kW	200 - 830	
Fuel		Nat. gas - Light oil	
Gas category - Natural gas		(see next paragraph)	
Gas rate- Natural gas	min. - max. (Stm <sup>3</sup> /h)	21 - 88	-
Gas pressure	min. - max. mbar	(see Note 2)	
Light oil rate	min. - max.kg/h	16,9 - 70	
LPG rate		-	7,5-31
Oil viscosity		2 - 7.4 cSt @40°C	
Power supply		230V 3~ / 400V 3N ~ 50Hz	
Total power consumption	kW	2.15	
Fan motor	kW	1.1	
Pump motor	kW	0,55	
Protection		IP40	
Approx. weight	kg	60	
Operation		Progressive - Fully modulating	
Valves size / Gas connection - 32		1" <sup>1</sup> / <sub>4</sub> / Rp 1 <sup>1</sup> / <sub>4</sub>	1" <sup>1</sup> / <sub>4</sub> / Rp 1 <sup>1</sup> / <sub>4</sub>
Valves size / Gas connection - 40		1" <sup>1</sup> / <sub>2</sub> / Rp 1 <sup>1</sup> / <sub>2</sub>	1" <sup>1</sup> / <sub>2</sub> / Rp 1 <sup>1</sup> / <sub>2</sub>
Valves size / Gas connection - 50		2" / Rp 2	2" / Rp 2
Valves size / Gas connection - 65		2" <sup>1</sup> / <sub>2</sub> / DN65	2" <sup>1</sup> / <sub>2</sub> / DN65
Operating temperature	°C	-10 ÷ +50	
Storage Temperature	°C	-20 ÷ +60	
Working service(*)		Intermittent	

<b>Note1:</b>	All gas flow rates are referred to Stm <sup>3</sup> / h (1.013 mbar absolute pressure, 15 °C temperature) and are valid for G20 gas (net calorific value H <sub>i</sub> = 34,02 MJ / Stm <sup>3</sup> ); for L.P.G. (net calorific value H <sub>i</sub> = 93,5 MJ / Stm <sup>3</sup> )
<b>Note2:</b>	Maximum gas pressure = 360 mbar (with Dungs MBDLE) = 500 mbar (with Siemens VGD or Dungs MultiBloc MBE) Minimum gas pressure = see gas curves.
<b>Note3:</b>	Burners are suitable only for indoor operation with a maximum relative humidity of 80 %
<b>Note4:</b>	with electrode: for safety reasons the burner must stop automatically every 24 hours

(\*) **NOTE ON THE WORKING SERVICE:** the control box automatically stops after 24h of continuous working. The control box immediately starts up, automatically.

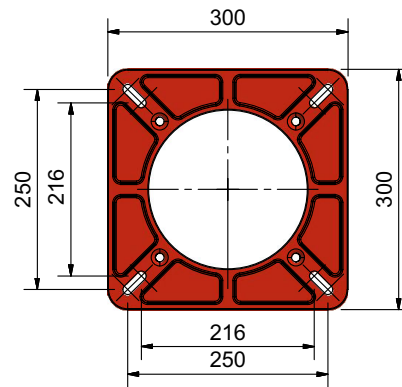
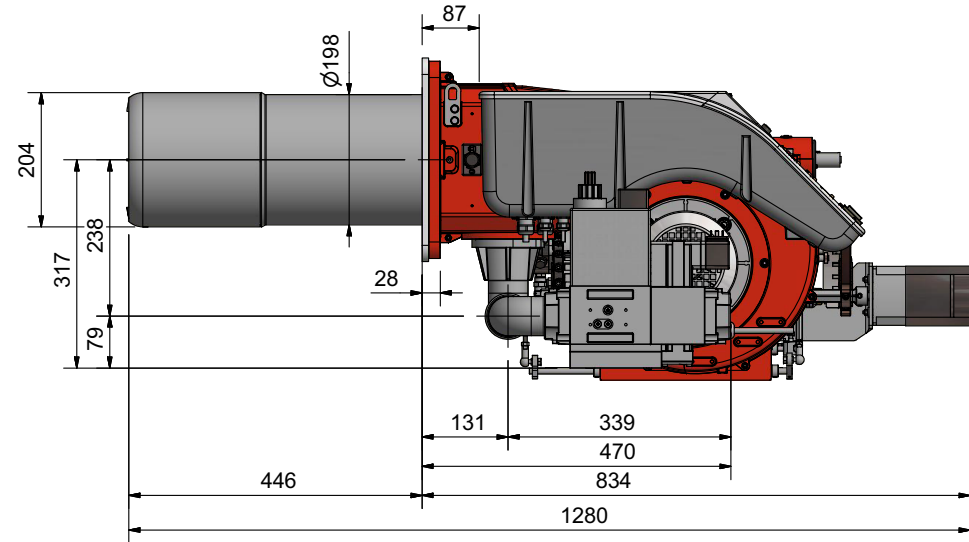
## Gas categories and countries of application

Countries
AL, AT, BE, BG, CH, CY, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MK, MT, NO, NL, PL, PT, RO, SE, SI, SK, TR

Group	
H	L (*)
E	2R (*)
EK (*)	Er (*)
LL (*)	E (R)

(\*) Premix type ...N burners are not enabled to work with these gas categories.

The above gas groups can be combined according to the standard EN437:2021 and national situation of countries.

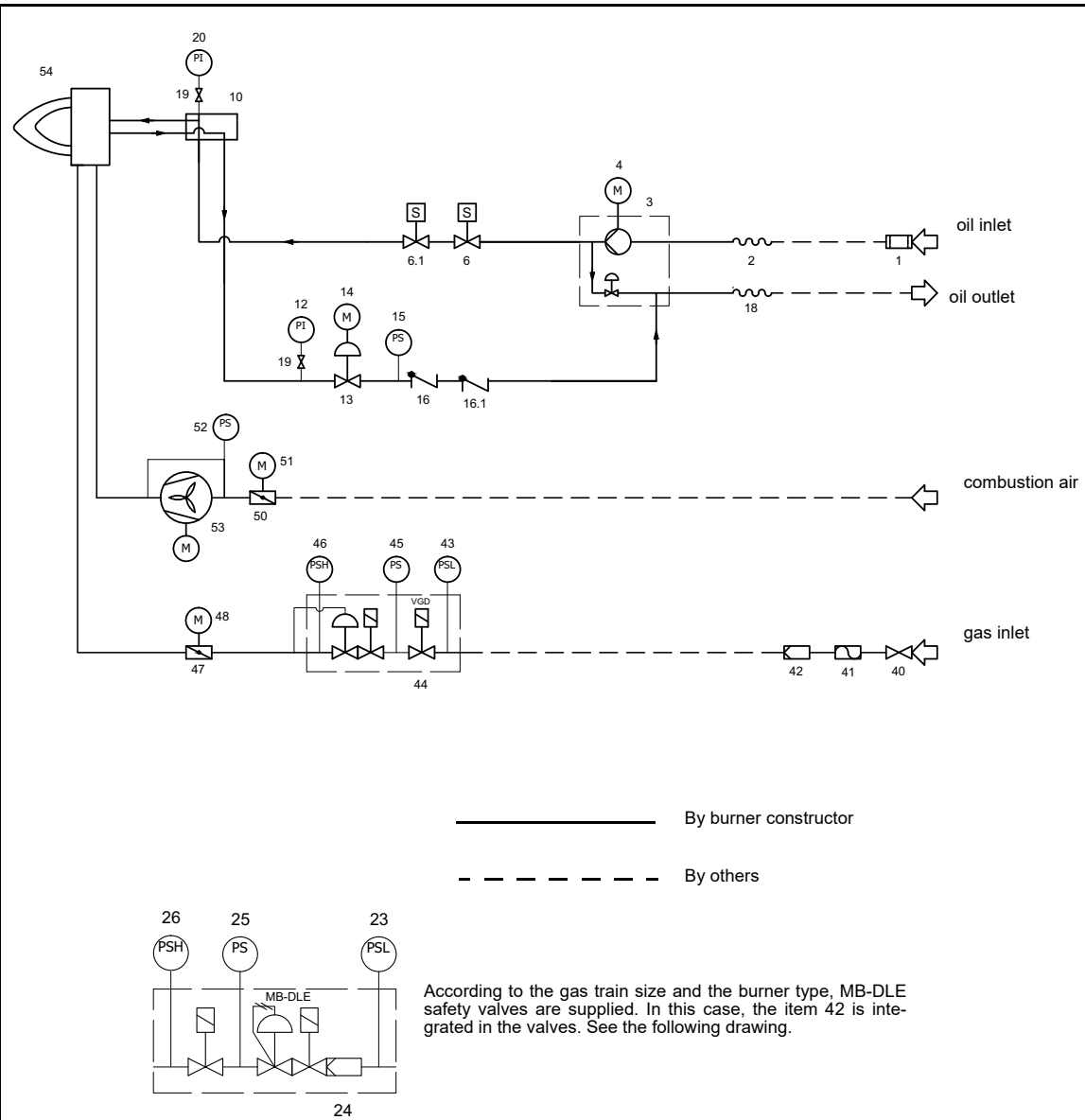


Burner flange

**B\*: SPECIAL** blast tube lengths must be agreed with **Cib Unigas**



3I2MG-21 v0 Hydraulic diagram



LEGEND	
POS	OIL TRAIN
1	Filter
2	Flexible hose
3	Pump and pressure governor
4	Electrical motor
6	Solenoid valve
6.1	Solenoid valve
10	Oil distributor
12	Pressure gauge
13	Pressure governor
15	Pressure switch
16	One-way valve
16.1	One-way valve
18	Flexible hose
19	Manual valve
20	Pressure gauge
MAIN GAS TRAIN	
23	Pressure switch - PGMIN
24	Safety valve with built in gas governor
25	Proving system pressure switch - PGCP
26	Pressure switch - PGMAX
40	Manual valve
41	Bellows unit
42	Filter
44	Safety valve with built in gas governor
45	Proving system pressure switch - PGMIN - LT
46	Pressure switch - PGMAX
47	Butterfly valve
51	Actuator
COMBUSTION AIR TRAIN	
50	Air damper
51	Actuator
52	Pressure switch - PA
53	Draught fan with electromotor
54	Burner

**Note:** The following POS are optional: 19, 20, 40, 41, 46

## How to read the burner “Performance curve”

To check if the burner is suitable for the boiler to which it must be installed, the following parameters are needed:

- furnace input, in kW or kcal/h ( $\text{kW} = \text{kcal/h}/860$ );
- backpressure (data are available on the boiler ID plate or in the user's manual).

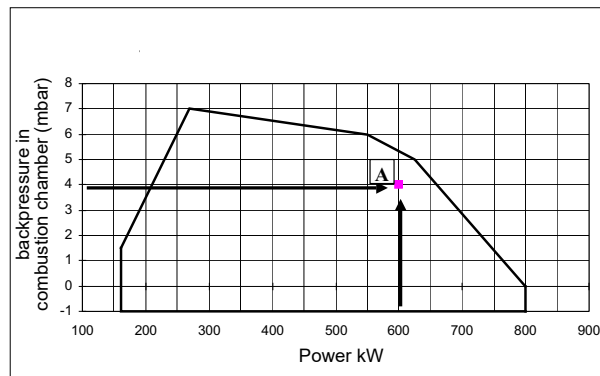
Example:

Furnace input: 600kW

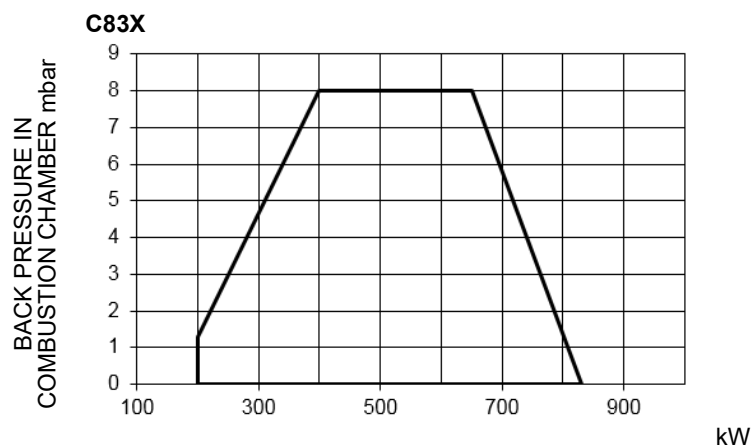
Backpressure: 4 mbar

In the “Performance curve” diagram, draw a vertical line matching the furnace input value and an horizontal line matching the backpressure value. The burner is suitable if the intersection point A is inside the performance curve.

Data are referred to standard conditions: atmospheric pressure at 1013 mbar, ambient temperature at 15° C.



## Performance Curves



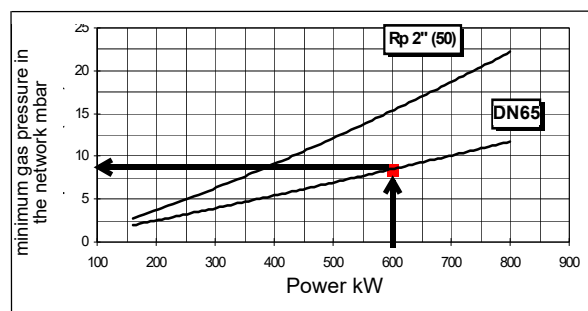
To get the input in kcal/h, multiply value in kW by 860.

Data are referred to standard conditions: atmospheric pressure at 1013mbar, ambient temperature at 15° C

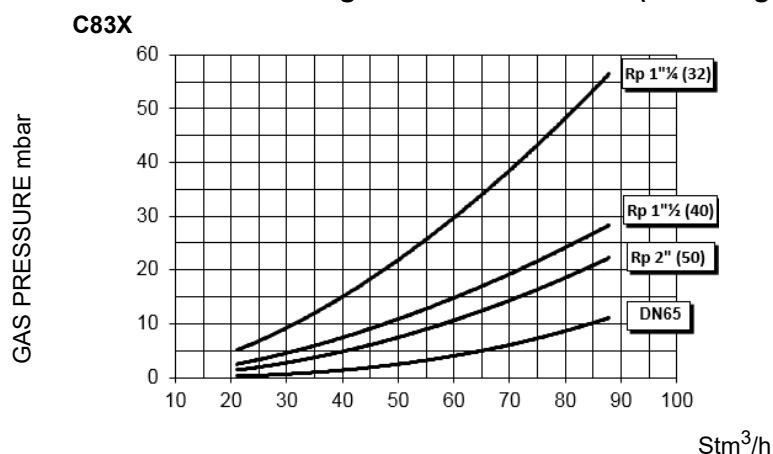
**NOTE:** The performance curve is a diagram that represents the burner performance in the type approval phase or in the laboratory tests, but does not represent the regulation range of the machine. On this diagram the maximum output point is usually reached by adjusting the combustion head to its “MAX” position (see paragraph “Adjusting the combustion head”); the minimum output point is reached setting the combustion head to its “MIN” position. During the first ignition, the combustion head is set in order to find a compromise between the burner output and the generator specifications, that is why the minimum output may be different from the Performance curve minimum

### Checking the proper gas train size

To check the proper gas train size, it is necessary to the available gas pressure value upstream the burner's gas valve. Then subtract the backpressure. The result is called **pgas**. Draw a vertical line matching the furnace input value (600kW, in the example), quoted on the x-axis, as far as intercepting the network pressure curve, according to the installed gas train (DN65, in the example). From the interception point, draw an horizontal line as far as matching, on the y-axis, the value of pressure necessary to get the requested furnace input. This value must be lower or equal to the **pgas** value, calculated before.



### Pressure in the Network / gas flow rate curves (natural gas)



**ATTENTION:** the gas rate value is quoted on the x-axis, the related network pressure is quoted on the y-axis (pressure value in the combustion chamber is not included). To know the minimum pressure at the gas train inlet, necessary to get the requested gas rate, add the pressure value in the combustion chamber to the value read on the y-axis.



The values in the diagrams refer to **natural gas** with a calorific value of 8125 kcal/Stm<sup>3</sup> (15°C, 1013 mbar) and a density of 0.714 kg/Stm<sup>3</sup>.



The values in the diagrams refer to **GPL** with a calorific value of 22300 kcal/Stm<sup>3</sup> (15°C, 1013 mbar) and a density of 2.14 kg/Stm<sup>3</sup>. When the calorific value and the density change, the pressure values should be adjusted accordingly.

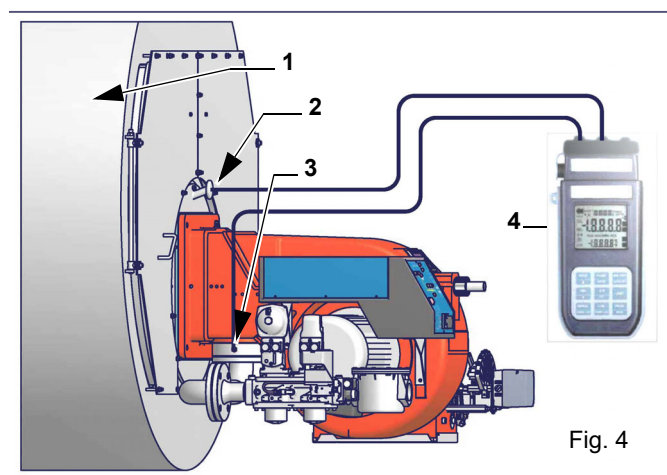
Where:

$$\Delta p_2 = \Delta p_1 * \left( \frac{Q_2}{Q_1} \right)^2 * \left( \frac{\rho_2}{\rho_1} \right)$$

- $p_1$  Natural gas pressure shown in diagram
- $p_2$  Real gas pressure
- $Q_1$  Natural gas flow rate shown in diagram
- $Q_2$  Real gas flow rate
- $\rho_1$  Natural gas density shown in diagram
- $\rho_2$  Real gas density

### Combustion head gas pressure curves

Combustion head gas pressure depends on gas flow and combustion chamber backpressure. When backpressure is subtracted, it depends only on gas flow, provided combustion is properly adjusted, flue gases residual O<sub>2</sub> percentage complies with "Recommended combustion values" table and CO in the standard limits). During this stage, the combustion head, the gas butterfly valve and the actuator are at the maximum opening. Refer to , showing the correct way to measure the gas pressure, considering the values of pressure in combustion chamber, surveyed by means of the pressure gauge or taken from the boiler's Technical specifications.



Note: the figure is indicative only.

Key

- 1 Generator
- 2 Pressure outlet on the combustion chamber
- 3 Gas pressure outlet on the butterfly valve
- 4 Differential pressure gauge



**ATTENTION: THE BURNED GAS RATE MUST BE READ AT THE GAS FLOW METER. WHEN IT IS NOT POSSIBLE, THE USER CAN REFERS TO THE PRESSURE-RATE CURVES AS GENERAL INFORMATION ONLY.**

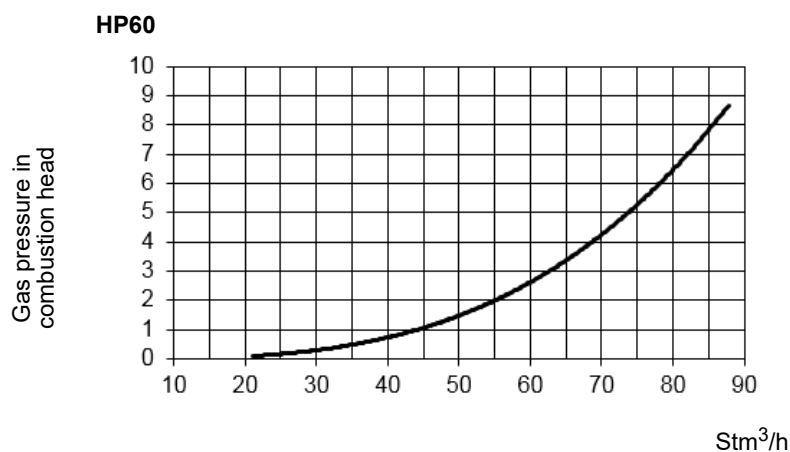
### Measuring gas pressure in the combustion head

In order to measure the pressure in the combustion head, insert the pressure gauge probes: one into the combustion chamber's pressure outlet to get the pressure in the combustion chamber and the other one into the butterfly valve's pressure outlet of the burner. On the basis of the measured differential pressure, it is possible to get the maximum flow rate: in the pressure - rate curves (showed on the next paragraph), it is easy to find out the burner's output in Stm<sup>3</sup>/h (quoted on the x axis) from the pressure measured in the combustion head (quoted on the y axis). The data obtained must be considered when adjusting the gas flow rate.

### Gas pressure burner head vs natural gas flow rate



**Curves are referred to pressure = 0 mbar in the combustion chamber!**



## PART II: INSTALLATION

## MOUNTING AND CONNECTING THE BURNER

## Transport and storage

If the product must be stored, avoid humid and corrosive places. Observe the temperatures stated in the burner data table at the beginning of this manual. The packages containing the burners must be locked inside the means of transport in such a way as to guarantee the absence of dangerous movements and avoid any possible damage.

In case of storage, the burners must be stored inside their packaging, in storerooms protected from the weather. Avoid humid or corrosive places and respect the temperatures indicated in the burner data table at the beginning of this manual.

## Packing

The burners are despatched in wooden crates whose dimensions are:

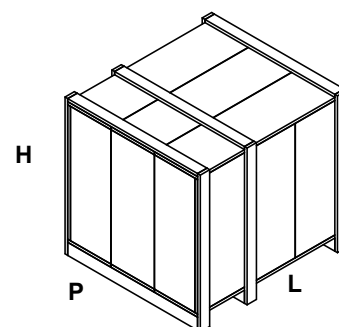
- 1370mm x 930mm x 820mm

Such packages fear moisture and are not suitable for stacking. Packing cases of this type are affected by humidity and are not suitable for stacking.

The following are placed in each packing case: These packagings are damaged by moisture and the maximum number of overlapping packagings indicated on the outside of the packaging may not be exceeded.

- burner with detached gas train;
- gasket or ceramic fibre plait (according to burner type) to be inserted between the burner and the boiler;
- envelope containing this manual and other documents.
- oil flexible hoses;

To get rid of the burner's packing, follow the procedures laid down by current laws on disposal of materials.



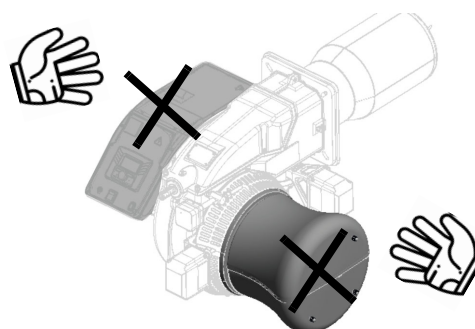
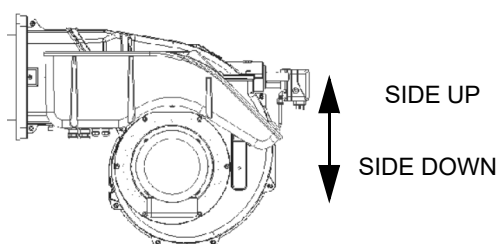
The burner is designed to work positioned according to the picture below. For different installations, please contact the Manufacture.

## Handling the burner

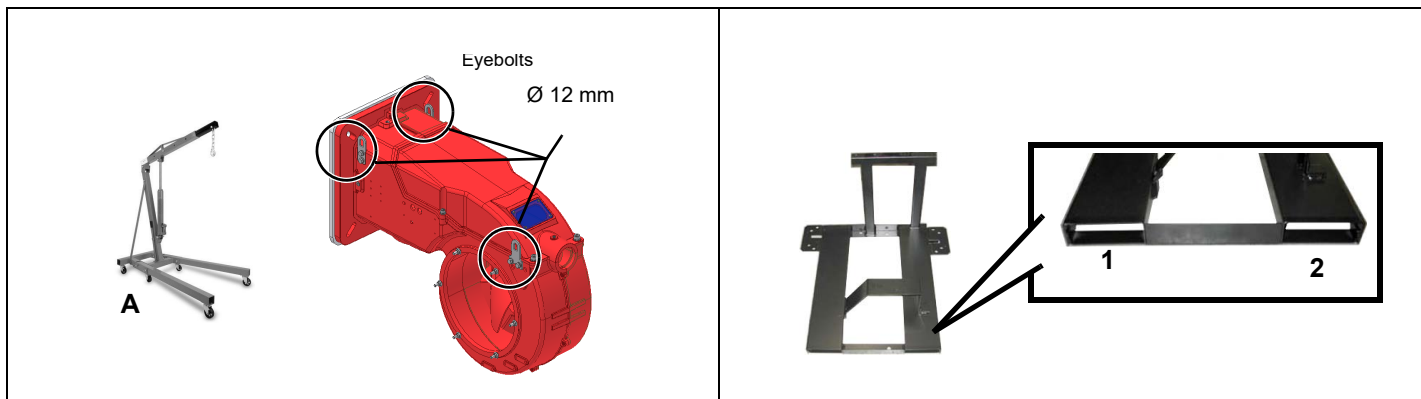
The burner is designed to work positioned according to the picture below. For different installations, please contact the Manufacture.



**Warning!** Don't lift the burner by the air intake silencer!



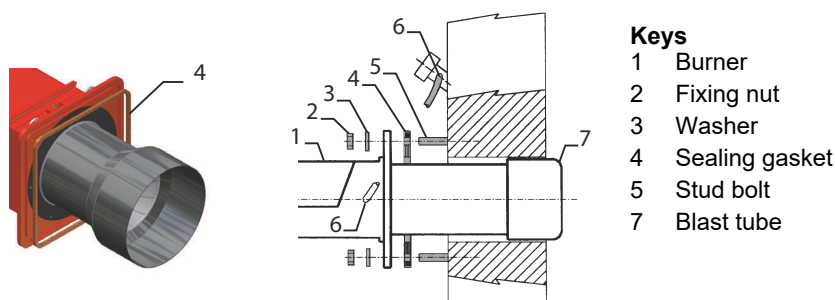
The burner is provided with eyebolts, for handling operations and it can be lifted with a hydraulic lift or a small manual crane. (A) The burner is mounted on a stirrup provided for handling the burner by means of a fork lift truck: the forks must be inserted into the A and B ways. Remove the stirrup only once the burner is installed to the boiler.



### Fitting the burner to the boiler

To install the burner into the boiler, proceed as follows:

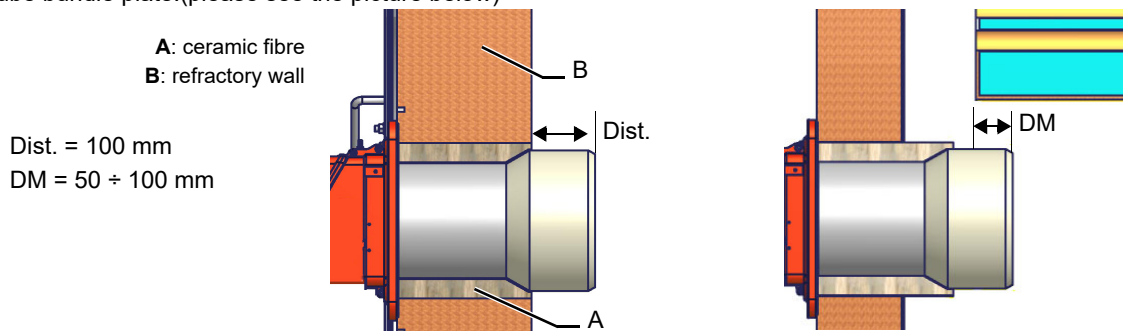
- 1 make a hole on the closing door of the combustion chamber as described on paragraph "Overall dimensions")
- 2 place the burner to the boiler: lift it up and handle it according to the procedure described on paragraph "Handling the burner";
- 3 place the 4 stud bolts (5) on boiler's door, according to the burner drilling template described on paragraph "Overall dimensions";
- 4 fasten the 4 stud bolts;
- 5 place the gasket on the burner flange;
- 6 install the burner into the boiler;
- 7 fix the burner to the stud bolts, by means of the fixing nuts, according to the next picture.
- 8 After fitting the burner to the boiler, ensure that the gap between the blast tube and the refractory lining is sealed with appropriate insulating material (ceramic fibre cord or refractory cement).



### Matching the burner to the boiler

The burners described in this manual have been tested with combustion chambers that comply with EN676 regulation and whose dimensions are described in the diagram . In case the burner must be coupled with boilers with a combustion chamber smaller in diameter or shorter than those described in the diagram, please contact the supplier, to verify that a correct matching is possible, with respect of the application involved. To correctly match the burner to the boiler verify the type of the blast tube . Verify the necessary input and the pressure in combustion chamber are included in the burner performance curve; otherwise the choice of the burner must be revised consulting the burner manufacturer. To choose the blast tube length follow the instructions of the boiler manufacturer. In absence of these consider the following:

- Cast-iron boilers, three pass flue boilers (with the first pass in the rear part): the blast tube must protrude no more than **Dist** = 100 mm into the combustion chamber. (please see the picture below)
- Pressurised boilers with flame reversal: in this case the blast tube must penetrate **DM** 50 ÷ 100 mm into combustion chamber in respect to the tube bundle plate.(please see the picture below)





***WARNING! Carefully seal the free space between blast tube and the refractory lining with ceramic fibre rope or other suitable means.***

The length of the blast tubes does not always allow this requirement to be met, and thus it may be necessary to use a suitably-sized spacer to move the burner backwards or to design a blast tube that suits the utilisation (please, contact the manufacturer).

## GAS TRAIN CONNECTIONS



**WARNING:** before executing the connections to the gas pipe network, be sure that the manual cutoff valves are closed.



**ATTENTION:** it is recommended to mount filter and gas valves to avoid that extraneous material drops inside the valves, during maintenance and cleaning operation of the filters (both the filters outside the valves group and the ones built-in the gas valves).



**ATTENTION:** once the gas train is mounted, the gas proving test must be performed, according to the procedure set by laws in force.

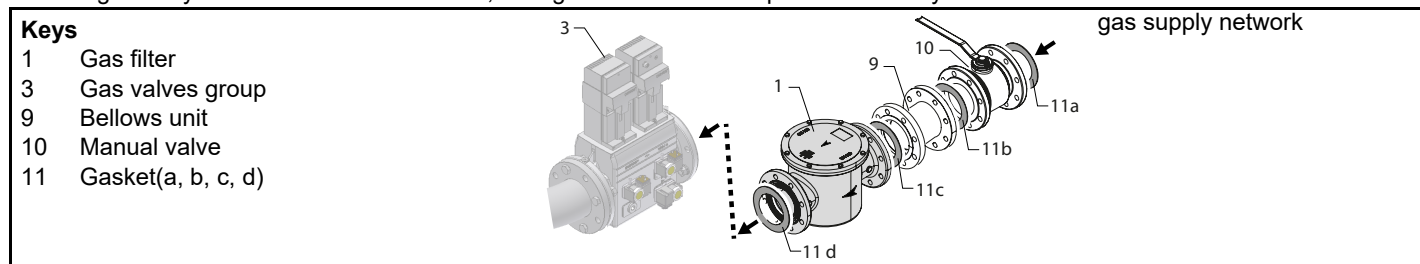


**CAUTION:** The direction of gas flow must follow the arrow on the body of the components mounted on the gas ramp (valves, filters, gaskets...).



**NOTE:** the bellows unit, the manual cutoff valve and the gaskets are not part of the standard supply

Following the "Hydraulic Schematics" section, the figure shows the components fitted by the installer.

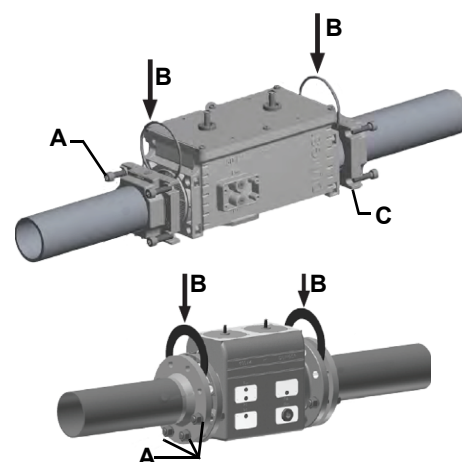


Procedure to install the double gas valve unit: **two (2) gas flanges are required; they may be threaded or flanged depending on size**

- **first step:** install the flanges to prevent entry of foreign bodies in the gas line
- on the gas pipe, clean the already assembled parts and then install the valve unit check gas flow direction: it must follow the arrow on the valve body
- VGD20: make sure the O-rings are correctly positioned between the flanges and the valve

### In all cases:

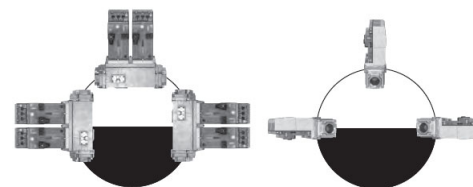
- ensure that the gaskets are correctly positioned between the flanges;
- fasten all the components with screws, according to the following diagrams:
- make sure bolts on the flanges are properly tightened
- check that the connections of all components are leak .



**CAUTION:** Use seals suitable for the gas used.



**WARNING:** Slowly open the fuel cock to avoid breaking the pressure regulator.



### Gas Filter (if provided)

The gas filters remove the dust particles that are present in the gas, and prevent the elements at risk (e.g.: burner valves, counters and regulators) from becoming rapidly blocked. The filter is normally installed upstream from all the control and on-off devices.



**ATTENTION:** it is recommended to install the filter with gas flow parallel to the floor in order to prevent dust fall on the safety valve during maintenance operation.

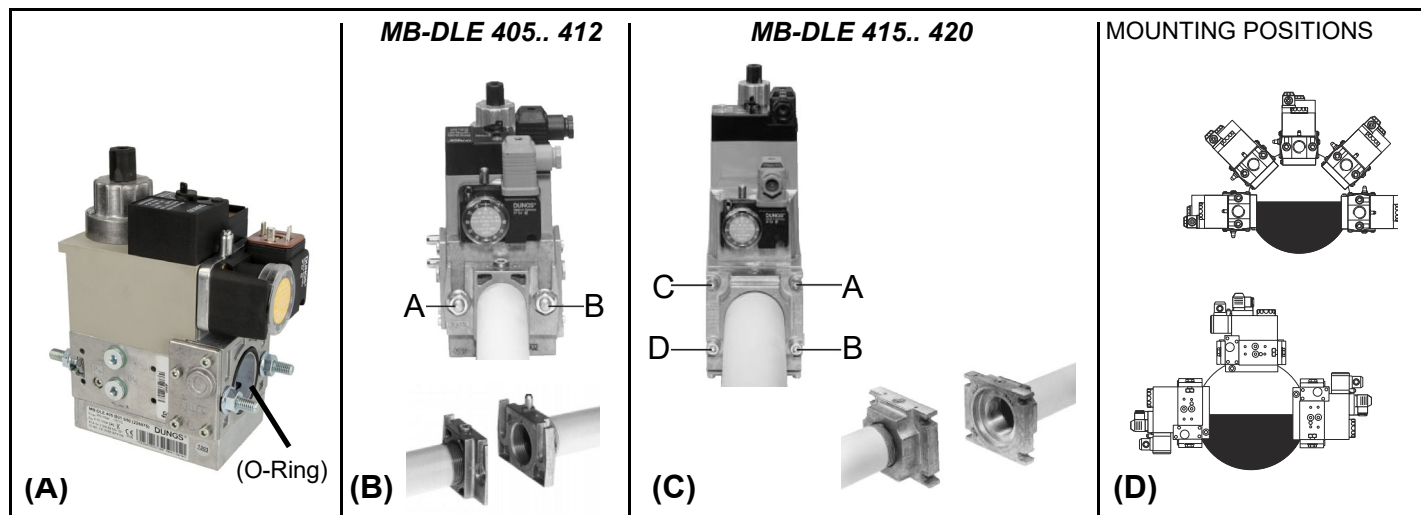
Once the train is installed, connect the gas valves group and pressure switches plugs.

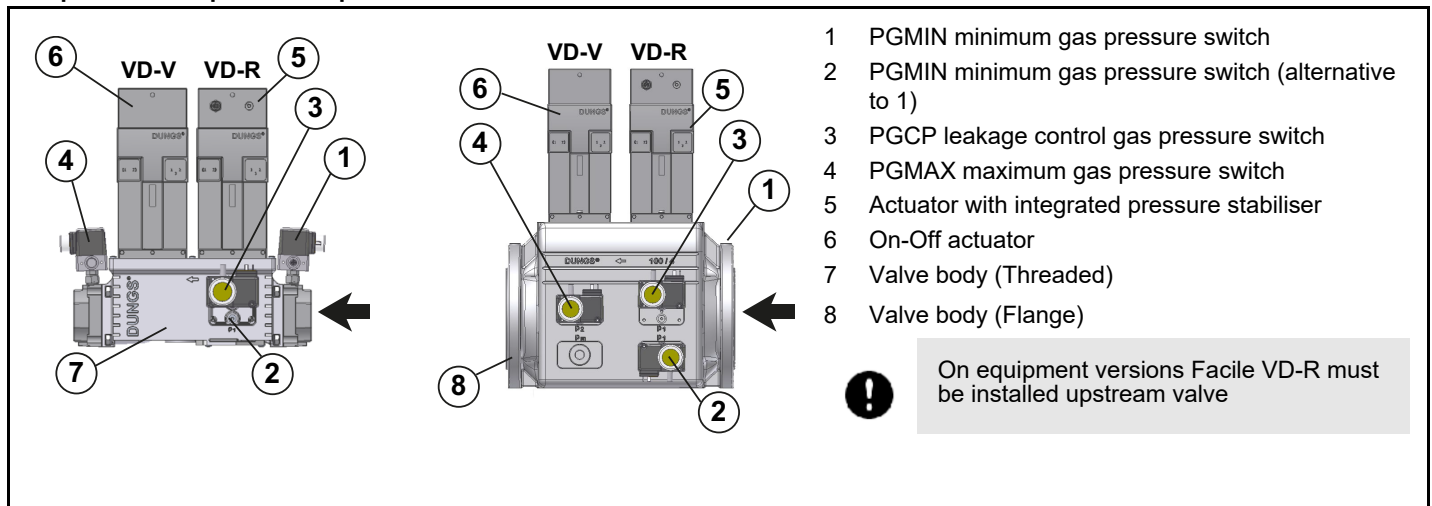
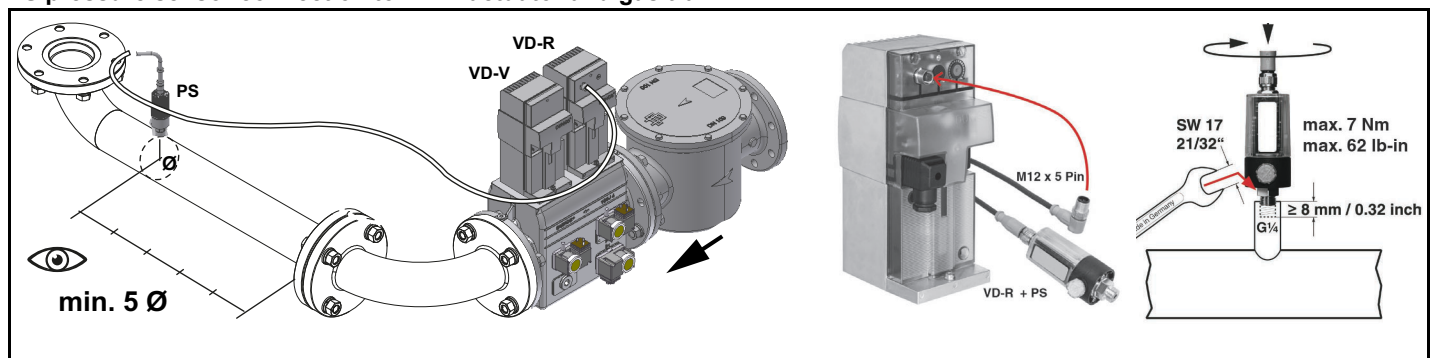


## MultiBloc MB-DLE - Assembling the gas train

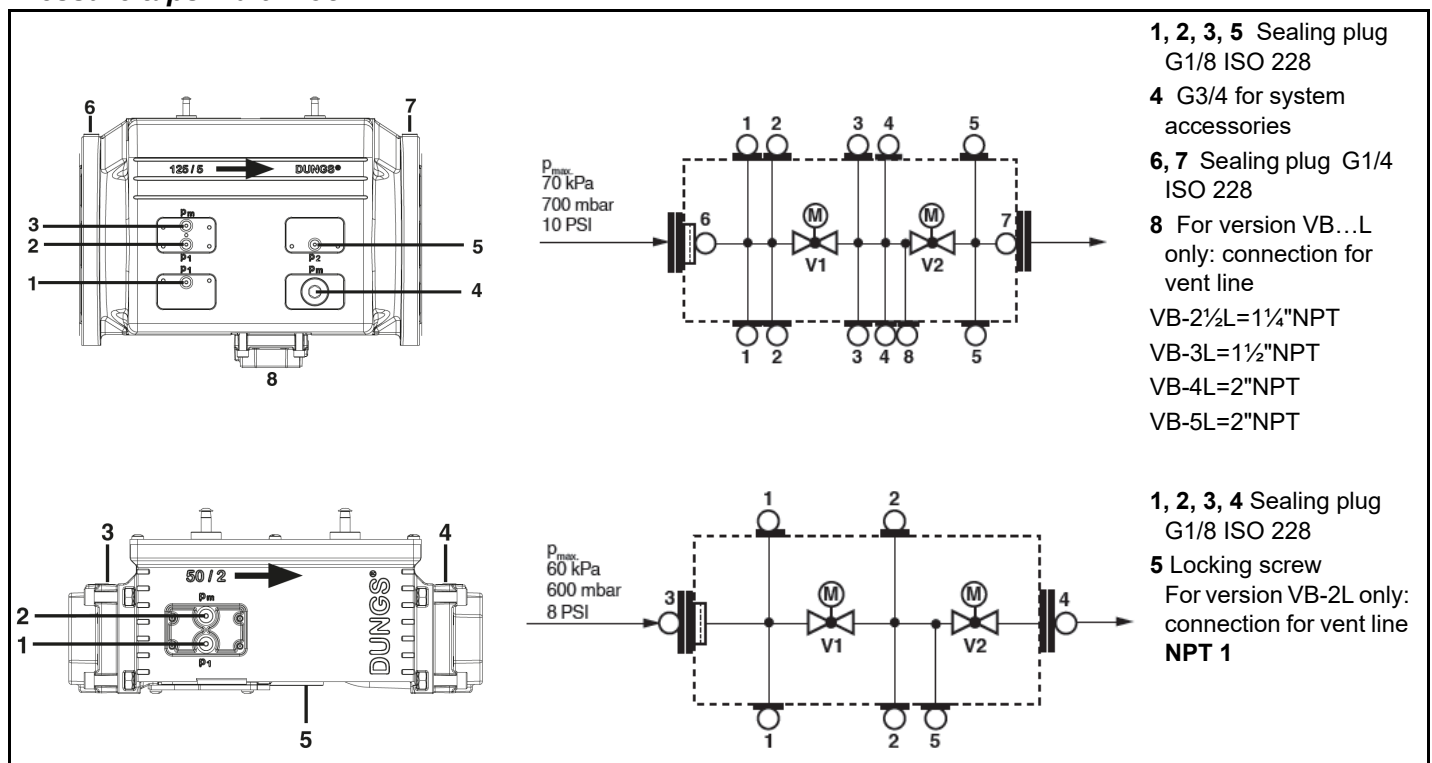
### Mounting

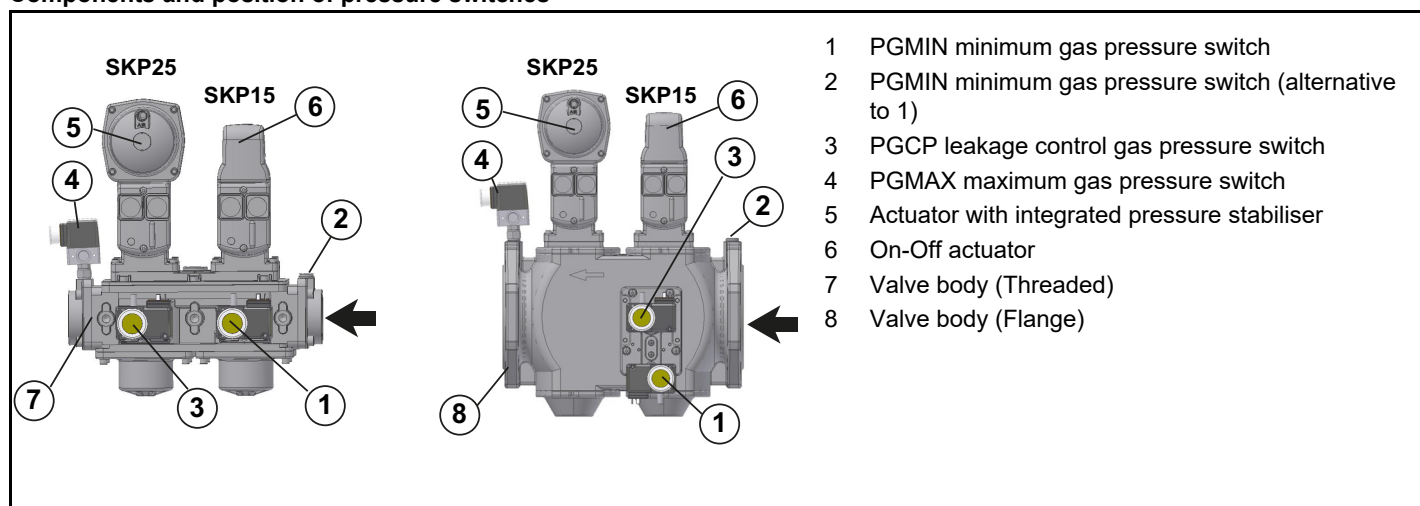
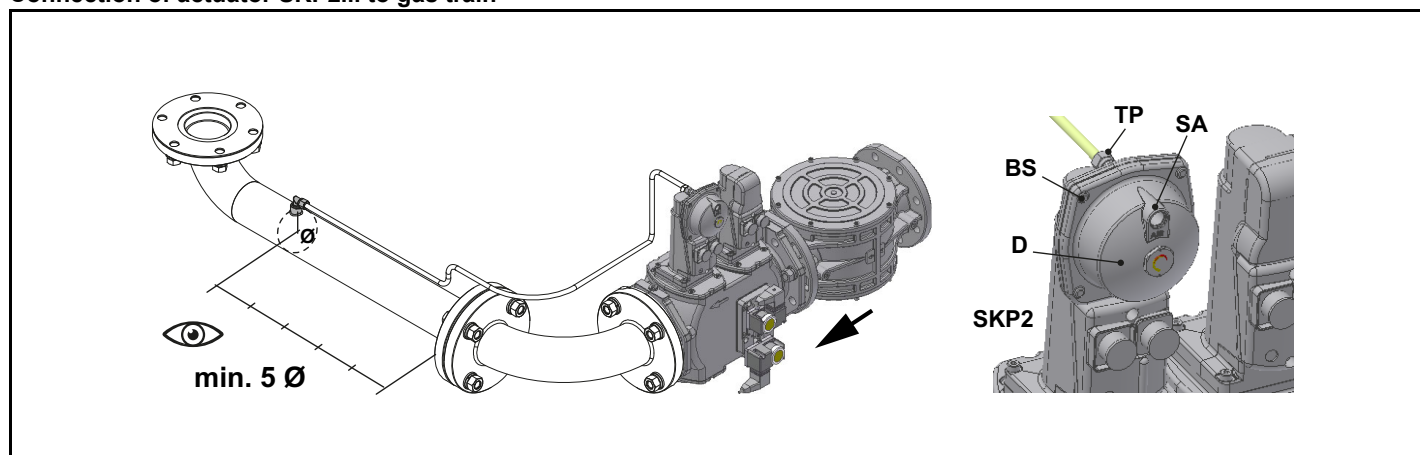
- 1 Mount flange onto tube lines: use appropriate sealing agent
- 2 Insert MB-DLE: note position of O rings
- 3 Remove MultiBloc between the threaded flanges
- 4 After installation, perform leakage and functional test
- 5 Disassembly in reverse order



**DUNGS MBE****Components and position of pressure switches****PS pressure sensor connection to VD-R actuator and gas train**

Attention: In the case of the MBE... valve, a pressure limit switch downstream of the safety valve is mandatory.

**Pressure taps MultiBloc MBE**

**Siemens VGD20.. e VGD40..****Components and position of pressure switches****Connection of actuator SKP2... to gas train****Siemens SKP2.. (pressure governor)**

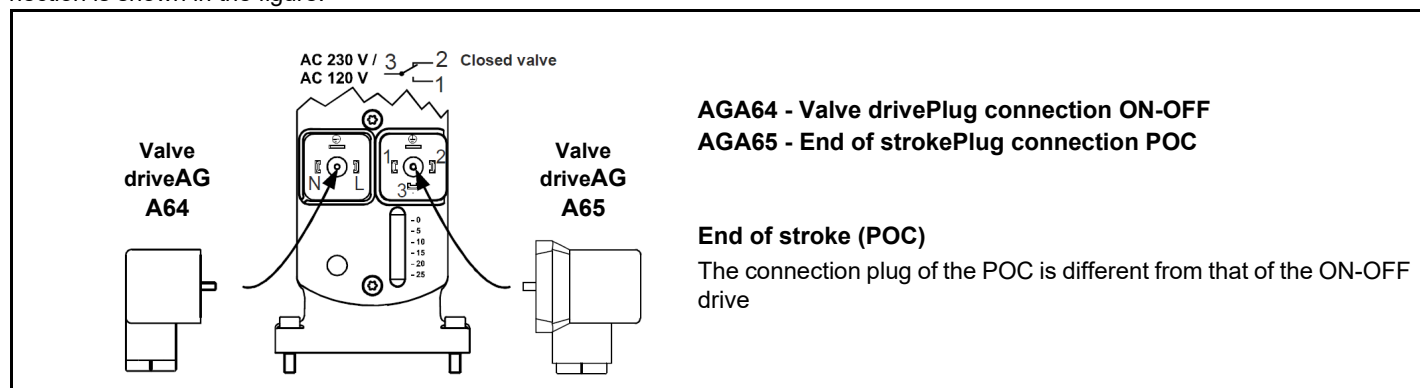
- Connect the reference gas pipe (TP in figure; 8mm-external size pipe supplied loose), to the gas pressure nipples placed on the gas pipe, downstream the gas valves: gas pressure must be measured at a distance that must be at least 5 times the pipe size.
- Leave the blowhole free (SA in figure). Should the spring fitted not permit satisfactory regulation, ask one of our service centres for a suitable replacement.
- D: pressure adjustment spring seat



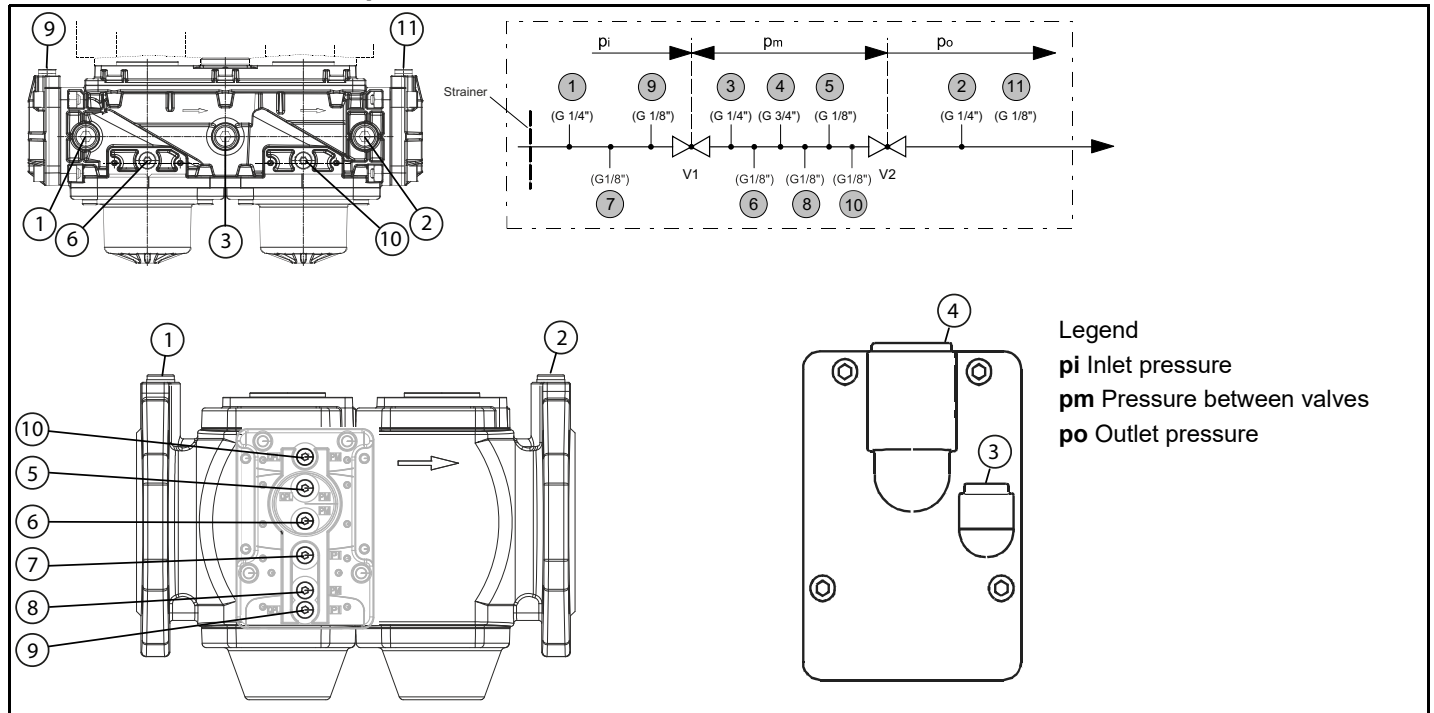
**WARNING:** removing the four screws BS causes the device to be unserviceable!

**version with SKP2 (built-in pressure stabilizer) Siemens VGD../VRD.. SKPx5 (Auxiliary-optional micro switch) Gas valve**

If the auxiliary microswitch (POC) is required, a dedicated actuator, different from the one usually supplied, must be ordered. The connection is shown in the figure.



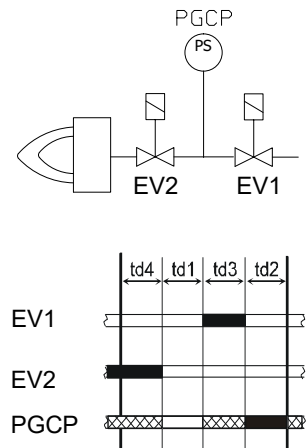
## Siemens VGD Pressure taps



### Integrated proving system (burners equipped with LME7x, LMV, LDU)

This paragraph describes the integrated proving system operation sequence:

- At the beginning both the valves (EV1 and EV2) must be closed.
- Test space evacuating: EV2 valve (burner side) opens and keep this position for a preset time (td4), in order to bring the test space to ambient pressure. Test atmospheric pressure: EV2 closes and keep this position for a preset time (test time td1). The pressure switch PGCP has not to detect a rise of pressure.
- Test space filling: EV1 opens and keep this position for a preset time (td3), in order to fill the test space.
- Test gas pressure: EV1 closes and keep this position for a preset time (td2). The pressure switch PGCP has not to detect a pressure drop down.

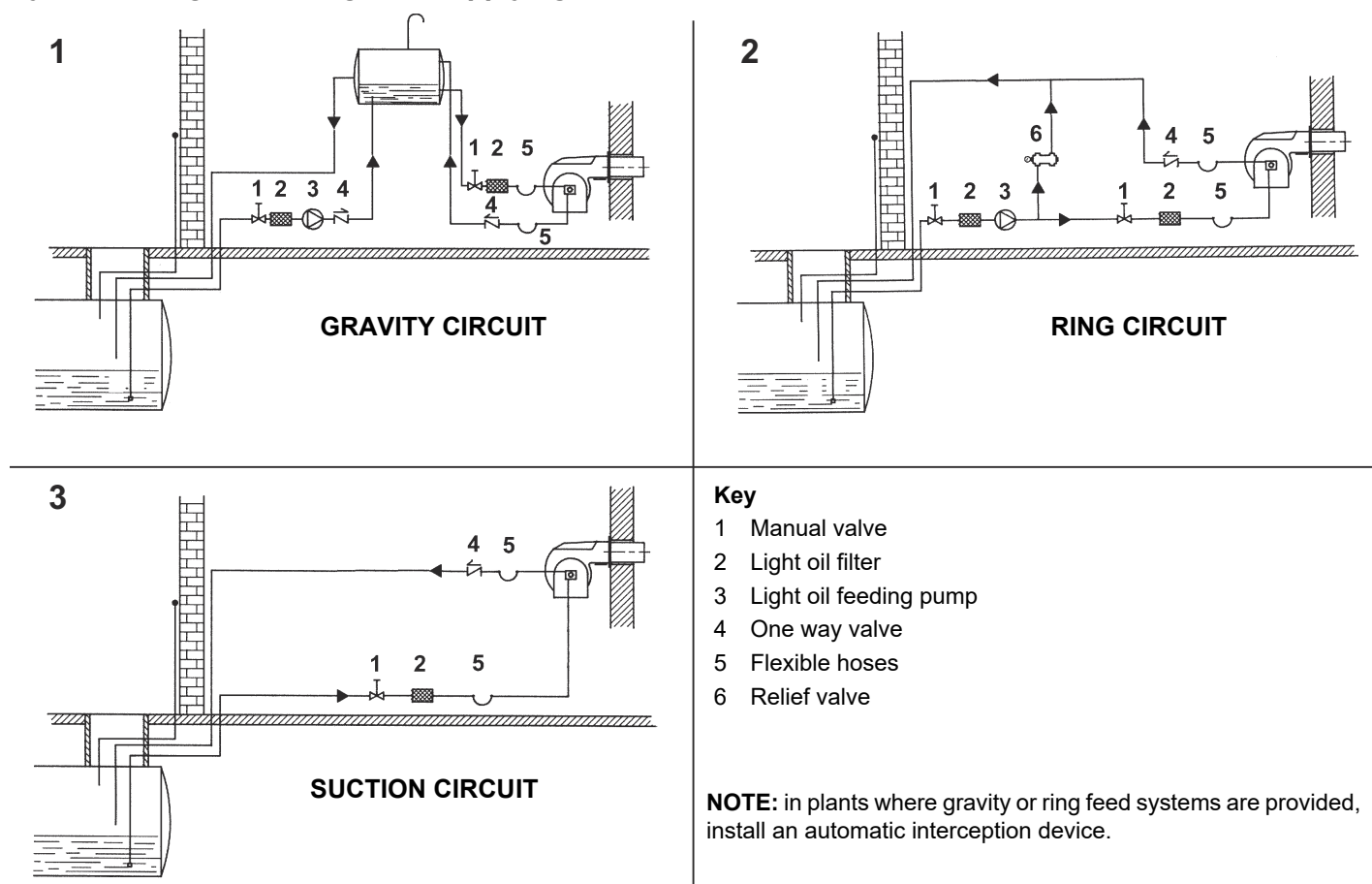


If all of the test phases are passed the proving system test is successful, if not a burner lockout happens.

On LMV5x and LMV2x/3x and LME73 (except LME73.831BC), the valve proving can be parameterized to take place on startup, shutdown, or both. On LME73.831BC the valve proving is parameterized to take place on startup only.

## OIL TRAIN CONNECTIONS

### Hydraulic diagrams for light oil supplying circuits

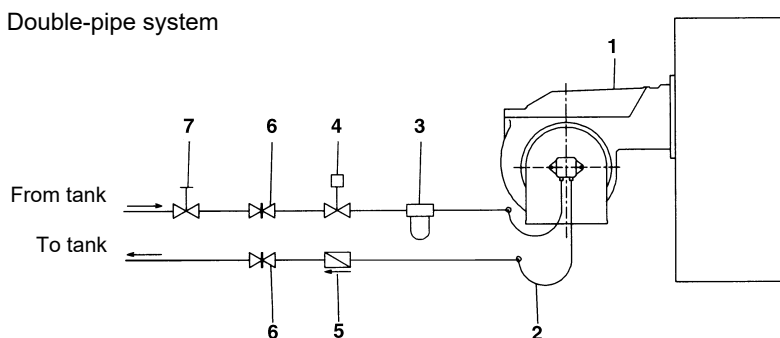


### Installation diagram of light oil pipes



please read carefully the “warnings” chapter at the beginning of this manual.

Fig. 5 - Double-pipe system



#### Key

- 1 Burner
- 2 Flexible hoses (fitted)
- 3 Light oil filter (fitted)
- 4 Automatic interceptor (\*)
- 5 One-way valve (\*)
- 6 Gate valve
- 7 Quick-closing gate-valve (outside the tank or boiler rooms)

The burner is supplied with filter and flexible hoses, all the parts upstream the filter and downstream the return flexible hose, must be installed by the customer. As far as the hoses connection, see the related paragraph.

(\*) Only for installations with gravity, siphon or forced circulation feed systems. If the device installed is a solenoid valve, a timer must be installed to delay the valve closing. The direct connection of the device without a timer may cause pump breaks.

Depending on the installed pump, it is possible to design the plant for single or double pipe feeding line

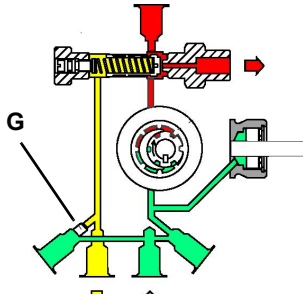
**Single-pipe system:** a single pipe drives the oil from the tank to the pump's inlet. Then, from the pump, the pressurised oil is driven to the nozzle: a part comes out from the nozzle while the other part goes back to the pump. In this system, the by-pass plug, if provided, must be removed and the optional return port, on the pump's body, must be sealed by steel plug and washer.

**Double-pipe system:** as for the single pipe system, a pipe that connects the tank to the pump's inlet is used besides another pipe that connects the pump's return port to the tank, as well. The excess of oil goes back to the tank: this installation can be considered self-bleeding. If provided, the inside by-pass plug must be installed to avoid air and fuel passing through the pump.

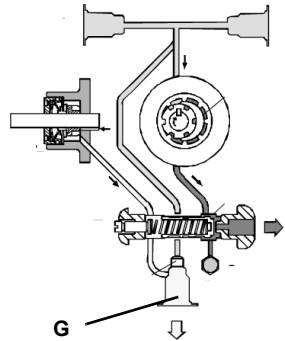
Burners come out from the factory provided for double-pipe systems. They can be suited for single-pipe system (recommended in the case of gravity feed) as described before. To change from a 1-pipe system to a 2-pipe-system, insert the by-pass plug **G** (as for ccw-rotation- referring to the pump shaft).

**Caution:** Changing the direction of rotation, all connections on top and side are reversed. **HP UHE series pumps:** a kit (Art.-Nr.: 0841211) is required for the transition from 2-pipe to 1-pipe system

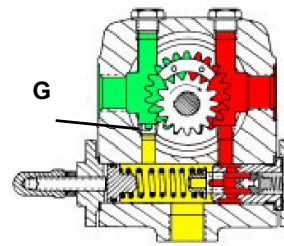
Suntec AJ6



Suntec E..



Suntec TA



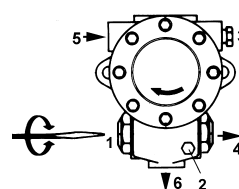
## About the use of fuel pumps

- Do not use fuel with additives to avoid the possible formation over time of compounds which may deposit between the gear teeth, thus obstructing them.
- After filling the tank, wait before starting the burner. This will give any suspended impurities time to deposit on the bottom of the tank, thus avoiding the possibility that they might be sucked into the pump.
- On initial commissioning a "dry" operation is foreseen for a considerable length of time (for example, when there is a long suction line to bleed). To avoid damages inject some lubrication oil into the vacuum inlet.
- Care must be taken when installing the pump not to force the pump shaft along its axis or laterally to avoid excessive wear on the joint, noise and overloading the gears.
- Pipes should not contain air pockets. Rapid attachment joint should therefore be avoided and threaded or mechanical seal junctions preferred. Junction threads, elbow joints and couplings should be sealed with removable seal component. The number of junctions should be kept to a minimum as they are a possible source of leakage.
- Do not use PTFE tape on the suction and return line pipes to avoid the possibility that particles enter circulation. These could deposit on the pump filter or the nozzle, reducing efficiency. Always use O-Rings or mechanical seal (copper or aluminium gaskets) junctions if possible.
- An external filter should always be installed in the suction line upstream the fuel unit.



**ATTENTION:** before the burner first start, it is mandatory to fill the adduction pipes with diesel fuel and bleed out residual air bubbles. Prior to switching on the burner, check direction of rotation of the pump motor by briefly pressing the starter switch; ensure there are no anomalous sounds during equipment operation, and only then turn on the burner. Neglect to comply with this requirement will invalidate the burner warranty.

Suntec E6 - E7 1001	
Oil viscosity	3 - 75 cSt
Oil temperature	0 - 90°C
Inlet maximum pressure	1,5 bar
Maximum return pressure	1,5 bar
Minimum inlet pressure	- 0,45 to avoid gasing
Rotation speed	3600 rpm max.

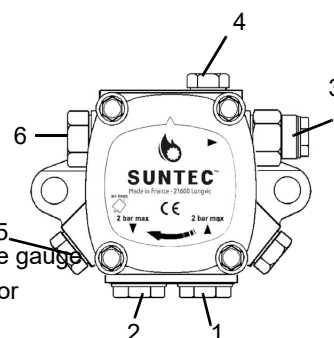


- Key**
1. Pressure governor
  2. Pressure gauge
  3. Vacuum gauge
  5. Nozzle
  7. Suction
  8. Return

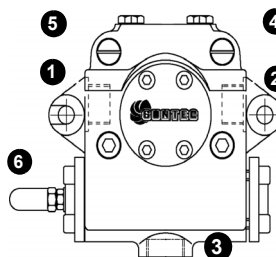
Suntec AJ6	
Viscosity	2 - 75 cSt
Oil temperature	60°C max
Inlet maximum pressure	2 bar
Inlet minimum pressure	- 0.45 bar to avoid gasing
Rated speed	3600 rpm max.

**Key**

- 1 Suction
- 2 Return
- 3 To the nozzle
- 4 Pressure gauge
- 5 Vacuum pressure gauge
- 6 Pressure governor



Suntec TA..	
Oil viscosity	3 ÷ 75 cSt
Oil temperature	0 ÷ 150°C
Min. suction pressure	- 0.45 bar to avoid gasing
Max. suction pressure	5 bar
Max. return pressure	5 bar
Rotation speed	3600 rpm max.



**Key**

1. Inlet G1/2
2. To the nozzle G1/2
3. Return G1/2
4. Pressure gauge port G1/4
5. Vacuum gauge port G1/4
6. Pressure governor






**Connecting the oil flexible hoses to the pump**

To connect the flexible oil hoses to the pump, proceed as follows, according to the pump provided:

- 1 remove the closing nuts A and R on the inlet and return connections of the pump;
- 2 screw the rotating nut of the two flexible hoses on the pump **being careful to avoid exchanging the lines**: see the arrows marked on the pump.

For further information, refer to the technical documentation of the pump.

Suntec E..	Suntec AJ6	Suntec TA
 A R	 A R	 A R



## ELECTRICAL CONNECTIONS



**WARNING!** Respect the basic safety rules. make sure of the connection to the earthing system. do not reverse the phase and neutral connections. fit a differential thermal magnet switch adequate for connection to the mains. **WARNING!** before executing the electrical connections, pay attention to turn the plant's switch to OFF and be sure that the burner's main switch is in 0 position (OFF) too. Read carefully the chapter "WARNINGS", and the "Electrical connections" section.

**ATTENTION:** Connecting electrical supply wires to the burner terminal block MA, be sure that the ground wire is longer than phase and neutral ones.

- 1 To execute the electrical connections, proceed as follows:remove the cover from the electrical board, unscrewing the fixing screws;
- 2 execute the electrical connections to the supply terminal board as shown in the attached wiring diagrams;
- 3 check the direction of the fan motor (see next paragraph);
- 4 refit the panel cover.



**WARNING:** (only for double stage and progressive burners) The burner is provided with an electrical bridge between terminals 6 and 7; when connecting the high/low flame thermostat, remove this bridge before connecting the thermostat.



**CAUTION:** check the motor thermal cut-out adjustment

**NOTE:** the burners are supplied for three-phase 380/400/415/480 V supply, and in the case of three-phase 220/230/240 V supply it is necessary to modify the electrical connections into the terminal box of the electric motor and replace the overload tripped relay.

### Note on electrical supply

In the case where the power supply of the AUXILIARIES of the phase-phase burner (without a neutral), for the flame detection it is necessary to connect the RC circuit Siemens between the terminal 2 (terminal X3-04-4 in case of LMV2x, LMV3x, LMV5x, LME7x) of the base and the earth terminal, RC466890660. For LMV5 control box, please refer to the labeling recommendations available on the Siemens CD attached to the burner

#### Key

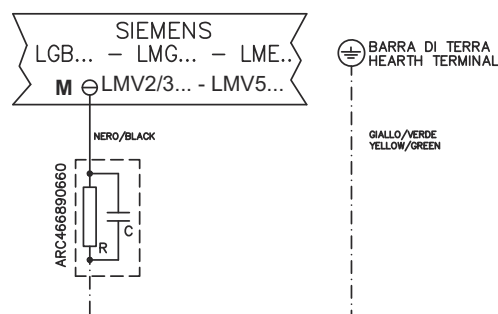
C - Capacitor (22 nF , 250 V)

LME / LMV - Siemens control box

R - Resistor (1 MΩ)

M: Terminal 2 (LGB, LME), Terminal X3-04-4 ( LMV2x, LMV3x, LMV5, LME7x)

RC466890660 - RC Siemens filter



## PART III: OPERATION



**DANGER!** Incorrect motor rotation can seriously damage property and injure people.

**DANGER:** During commissioning operations, do not let the burner operate with insufficient air flow (danger of formation of carbon monoxide); if this should happen, make the gas decrease slowly until the normal combustion values are achieved.

**WARNING:** before starting the burner up, be sure that the manual cutoff valves are open and check that the pressure upstream the gas train complies the value quoted on paragraph "Technical specifications". Be sure that the mains switch is closed.

IN THE EVENT OF A BLOCKAGE, THE CAUSE MUST BE ASSESSED. IF THE FLAME BACKFIRE WARNING LIGHT IS ON, IT IS IMPERATIVE TO CHECK THE INTEGRITY AND GOOD CONDITION OF THE COMBUSTION HEAD AS DESCRIBED IN THE MAINTENANCE SECTION BEFORE UNLOCKING THE APPLIANCE.

#### LIMITATIONS OF USE

THE BURNER IS AN APPLIANCE DESIGNED AND CONSTRUCTED TO OPERATE ONLY AFTER BEING CORRECTLY CONNECTED TO A HEAT GENERATOR (E.G. BOILER, HOT AIR GENERATOR, FURNACE, ETC.), ANY OTHER USE IS TO BE CONSIDERED IMPROPER AND THEREFORE DANGEROUS.

THE USER MUST GUARANTEE THE CORRECT FITTING OF THE APPLIANCE, ENTRUSTING THE INSTALLATION OF IT TO QUALIFIED PERSONNEL AND HAVING THE FIRST COMMISSIONING OF IT CARRIED OUT BY A SERVICE CENTRE AUTHORIZED BY THE COMPANY MANUFACTURING THE BURNER.

A FUNDAMENTAL FACTOR IN THIS RESPECT IS THE ELECTRICAL CONNECTION TO THE GENERATOR'S CONTROL AND SAFETY UNITS (CONTROL THERMOSTAT, SAFETY, ETC.) WHICH GUARANTEES CORRECT AND SAFE FUNCTIONING OF THE BURNER.

THEREFORE, ANY OPERATION OF THE APPLIANCE MUST BE PREVENTED WHICH DEPARTS FROM THE INSTALLATION OPERATIONS OR WHICH HAPPENS AFTER TOTAL OR PARTIAL TAMPERING WITH THESE (E.G. DISCONNECTION, EVEN PARTIAL, OF THE ELECTRICAL LEADS, OPENING THE GENERATOR DOOR, DISMANTLING OF PART OF THE BURNER).

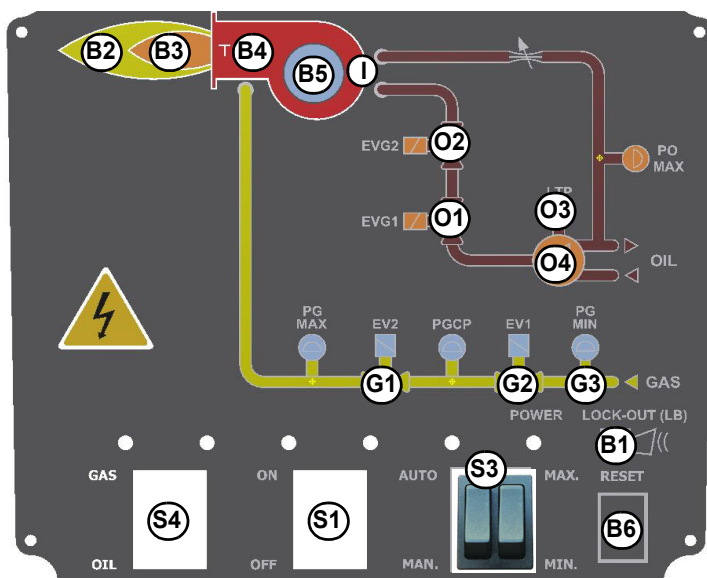
NEVER OPEN OR DISMANTLE ANY COMPONENT OF THE MACHINE EXCEPT FOR ITS MAINTENANCE.

TO SECURE THE MACHINE, ACT ON THE ISOLATOR SWITCH. IN CASE OF ANOMALIES THAT REQUIRED A SHUT DOWN OF THE BURNER, IT'S POSSIBLE TO ACT ON THE AUXILIARY LINE SWITCH, LOCATED ON THE BURNER FRONT PANEL.

IN CASE OF A BURNER SHUT-DOWN, RESET THE CONTROL BOX BY MEANS OF THE RESET PUSHBUTTON. IF A SECOND SHUT-DOWN TAKES PLACE, CALL THE TECHNICAL SERVICE, WITHOUT TRYING TO RESET FURTHER.

WARNING: DURING NORMAL OPERATION THE PARTS OF THE BURNER NEAREST TO THE GENERATOR (COUPLING FLANGE) CAN BECOME VERY HOT, AVOID TOUCHING THEM SO AS NOT TO GET BURNT.

## - Burner front panel **Fully modulating / Progressive Burners**



### Keys

- B1 Lock-out LED
- B2 Hi-flame operation LED
- B3 Lo-flame operation LED
- B4 "Ignition transformer operation" LED
- B5 "Fan motor overload tripped" LED
- B6 Reset pushbutton for control box
- G1 "EV2 opening" LED
- G2 "EV1 opening" LED
- G3 "Gas pressure switch signal" LED
- S1 Main switch
- S3 (only on fully modulating burners)

### Operation selector MAN - AUTO

(operation in manual or automatic mode):

MIN = operation with minimum output

0 = Stop

MAX = operation at the maximum output

S4 Fuel selection

O1 EVG1 solenoid valve operation LED

O2 EVG2 solenoid valve operation LED

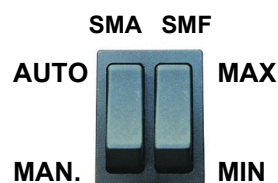
O3 "Pump motor overload tripped" LED

O4 Oil pump in operation LED

A1 Burner Modulator (only on fully modulating burners)

A2 AZL...

Fig. 4



### SMA

MAN

AUTO automatic operation

### SMF

MIN low flame operation

0

MAX high flame operation

### Fuel selection:

- In order to start the burner with gas or light oil, the operator must commute the selector on the burner control panel on (1) = gas, or (2) = light oil.

If the selector is set on (1) the gas cock must be open, while the light oil cock must be closed. Viceversa if the selector is set on (2).

**CAUTION:** if the fuel chosen is oil, be sure the cutoff valves on the feed and return pipes are open.

- Check the control box is not locked; if so, reset it by means of the button on LMV panel.
- Check the series of thermostats and pressure switches turn the burner to on.

### Gas operation

- At the beginning of the start-up cycle, the actuator drives the air damper to the maximum opening position, then the fan motor starts up: the pre-purge phase begins.
- At the end of the pre-purge, the air damper is driven to the ignition position, the ignition transformer is energised (signalled by the light **B4** on the front panel) then, few seconds later, the EV1 and EV2 gas valves are energised (light G1 and G2 on the front panel).
- Few seconds after the gas valves opening, the ignition transformer is de-energised and light **B4** turns to off.
- The burner operates in the low flame stage; few seconds later the two-stages operation begins and the burner output increases or decreases, driven by the external thermostats (progressive burners) or by the modulator (fully-modulating burners).

### Light oil operation

- The fan motor starts and the pre-purge phase as well. Since the pre-purge phase must be carried out at the maximum air rate, the

control box drives the actuator opening and when the maximum opening position is reached, the pre-purge time counting starts.

- At the end of the pre-purge time, the actuator is in the light oil ignition position: the ignition transformer is energised (lamp **B4** on); the ignitor gas valves and the light oil valves open. Few seconds after the valves opening, the transformer is de-energised and lamp **B4** turns off.
- The burner is now operating, meanwhile the actuator goes to the high flame position; after some seconds, the two-stage operation begins; the burner is driven automatically to high flame or low flame, according to the plant requirements. Operation in high or low flame is signalled by LED **B2** on the burner control panel.

The fuel is pushed into the pump to the nozzle at the delivery pressure set by the pressure governor. The solenoid valve stops the fuel immission into the combustion chamber. The fuel flow rate that is not burnt goes back to the tank through the return circuit. The nozzle is feeded at constant pressure, while the return line pressure is adjusted by means of the pressure governor controlled by an actuator.

### Fuel selection:

- In order to start the burner with gas or light oil, the operator must commute the selector on the burner control panel on (1) = gas, or (2) = light oil.  
If the selector is set on (1) the gas cock must be open, while the light oil cock must be closed. Viceversa if the selector is set on (2).  
**CAUTION:** if the fuel chosen is oil, be sure the cutoff valves on the feed and return pipes are open.

### Gas operation

- Check the gas feeding pressure is sufficient (signalling lamp **G3** on).
- **Burners fitted with gas proving system:** the gas proving system test begins; when the test is performed the proving system LED turns on. At the end of the test, the burner starting cycle begins: in case of leakage in a valve, the gas proving system stops the burner and the lamp **B1** turns on.

**NOTE:** if the burner is fitted with Dungs VPS504, the pre-purge phase starts once the gas proving system is successfully performed. Since the pre-purge phase must be carried out with the maximum air rate, the control box drives the actuator opening and when the maximum opening position is achieved, the pre-purge time counting starts.

- At the end of the pre-purge time, the actuator drives the complete closing (ignition with gas position) and, as this is achieved the ignition transformer is energised (LED **B4** is on); the gas valves open.
- Few seconds after the valves opening, the transformer is de-energised and lamp **B4** turns off.
- The burner is now operating, meanwhile the actuator goes to the high flame position and, after some seconds, the two-stage operation begins; the burner is driven automatically to high flame or low flame, according to the plant requirements.

Operation in high or low flame is signalled by lamp **B2** on the frontal panel.

### Light oil operation

- The fan motor starts and the pre-purge phase as well. Since the pre-purge phase must be carried out at the maximum air rate, the control box drives the actuator opening and when the maximum opening position is reached, the pre-purge time counting starts.
- At the end of the pre-purge time, the actuator is in the light oil ignition position: the ignition transformer is energised (lamp **B4** on); the ignitor gas valves (if provided) and the light oil valves open. Few seconds after the valves opening, the transformer is de-energised and lamp **B4** turns off.
- The burner is now operating, meanwhile the actuator goes to the high flame position; after some seconds, the two-stage operation begins; the burner is driven automatically to high flame or low flame, according to the plant requirements. Operation in high or low flame is signalled by LED **B2** on the burner control panel.

## AIR FLOW AND FUEL ADJUSTMENT



**WARNING! During commissioning operations, do not let the burner operate with insufficient air flow (danger of formation of carbon monoxide); if this should happen, make the fuel decrease slowly until the normal combustion values are achieved.**

**WARNING! the combustion air excess must be adjusted according to the values in the following chart.**

Recommended combustion parameters		
Fuel	Recommended (%) CO <sub>2</sub>	Recommended (%) O <sub>2</sub>
Natural gas	9 ÷ 10	3 ÷ 4.8
Light oil	11.5 ÷ 13	2.9 ÷ 4.9
LPG	11 ÷ 12	2.8 ÷ 4.3

### Adjustments - brief description

Adjust the air and gas flow rates at the maximum output ("high flame") first, by means of the air damper and the adjusting cam respectively.

- Check that the combustion parameters are in the suggested limits.
- Check the flow rate measuring it on the counter or, if it was not possible, verifying the combustion head pressure by means of a

differential pressure gauge.

- Then, adjust the combustion values corresponding to the points between maximum and minimum: set the shape of the adjusting cam foil. The adjusting cam sets the air/gas ratio in those points, regulating the opening-closing of the throttle gas valve.
- Set, now, the low flame output, acting on the low flame microswitch of the actuator in order to avoid the low flame output increasing too much or that the flues temperature gets too low to cause condensation in the chimney.

### Fuel



**DANGER!** The burner must be used only with the fuel specified in the burner data plate.

Type	--
Model	--
Year	--
S.Number	--
Output	--
Oil Flow	--
Fuel	--
Category	--
Gas Pressure	--
Viscosity	--
El.Supply	--
El.Consump.	--

## ADJUSTMENTS FOR GAS OPERATION

### Adjustments - brief description

- Adjust the air and gas flow rates at the maximum output ("high flame") first, by means of the air damper and the valves group pressure stabiliser respectively.
- Check that the combustion parameters are in the suggested limits.
- Check the flow rate measuring it on the counter or, if it was not possible, verifying the combustion head pressure by means of a differential pressure gauge, as described on par. "Measuring the gas pressure in the combustion head".
- Then, adjust the combustion values corresponding to the points between maximum and minimum (progressive -fully modulating burners only): set the shape of the adjusting cam foil. The adjusting cam sets the air/gas ratio in those points, regulating the opening-closing of the air damper.
- Set, now, the low flame output, acting on the low flame microswitch of the actuator in order to avoid the low flame output increasing too much or that the flues temperature gets too low to cause condensation in the chimney.

To change the burner setting during the testing in the plant, follows the next procedure, according to the model provided.

### Progressive burners

#### Air and Gas Flow Rate Settings by means of Berger STM30../Siemens SQM40.. actuator

- 1 check the fan motor rotation.
- 2 Only for burners provided with **Multibloc MB-DLE gas valves**: before starting the burner up, set the slow opening. To set the slow opening, remove cover **T**, reverse it upside down and use it as a tool to rotate screw **VR**. Clockwise rotation reduces start flow rate, anticlockwise rotation increases it. Do not use a screwdriver on the screw **VR**!

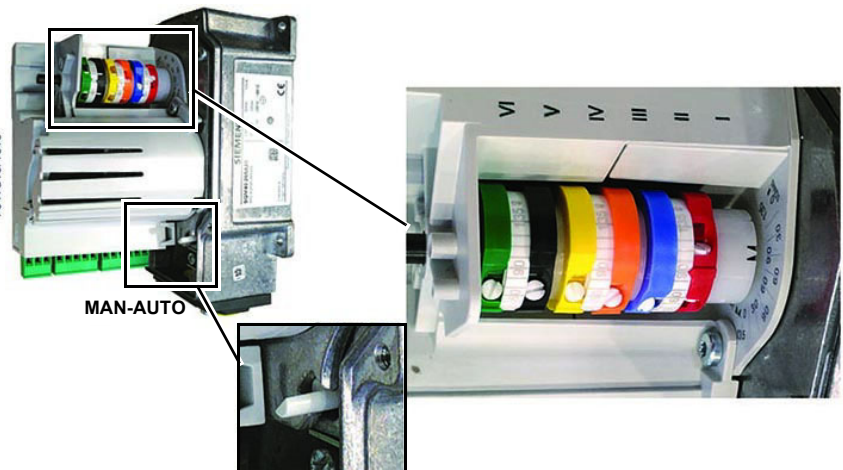
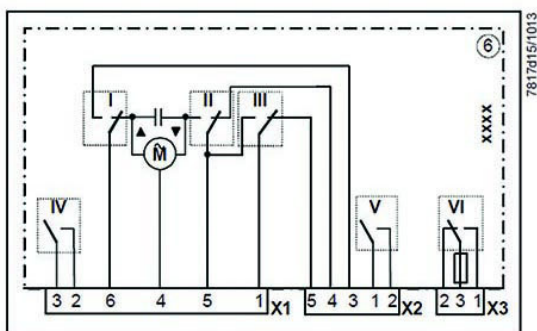
**Note:** the screw **VS** must be removed only in case of replacement of the coil.

- 3 Before starting the burner up, drive the high flame actuator microswitch matching the low flame one (in order to let the burner operates at the lowest output) to safely achieve the high flame stage.
- 4 Start the burner up by means of the thermostat series and wait until the pre-purge time comes to an end and that the burner starts up;
- 5 drive the burner to high flame stage, by means of the thermostat **TAB**.
- 6 Then move progressively the microswitch to higher values until it reaches the high flame position; always check the combustion values and eventually adjusting the gas by means of the valves group stabiliser.
- 7 go on adjusting air and gas rates: check, continuously, the flue gas analysis, as to avoid combustion with little air; dose the air according to the gas flow rate change following the steps quoted below;

1

#### SQM40.265 CSV Actuator cams

- |          |                 |
|----------|-----------------|
| (RD) I   | High flame      |
| (BU) II  | Stand-by        |
| (OG) III | Low flame - gas |
| (YE) IV  | Low flame - oil |
| (BK) V   | Ignition - oil  |
| (GN) VI  | Ignition - gas  |

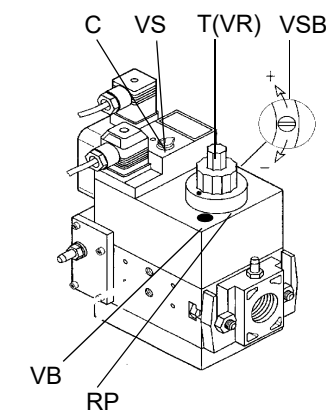


Acting on the pressure stabiliser of the valves group, adjust the **gas flow rate in the high flame stage** as to meet the values requested by the boiler/utilisation:

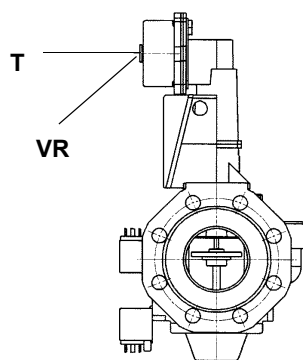
- **Multibloc MB-DLE:** The pressure governor is adjusted by operating the screw **VS** located under the cover **C**. By screwing down the pressure is increased and by unscrewing it is reduced. The valve is adjusted by means of the **RP** regulator after slackening the locking screw **VB** by a number of turns. By unscrewing the regulator **RP** the valve opens, screwing the valve closes.

- **Siemens VGD valves group:** remove cap **T** and act on the **VR** adjusting screw to increase or decrease the pressure and consequently the gas rate; screwing **VR** the rate increases, unscrewing it decreases (see next figure).

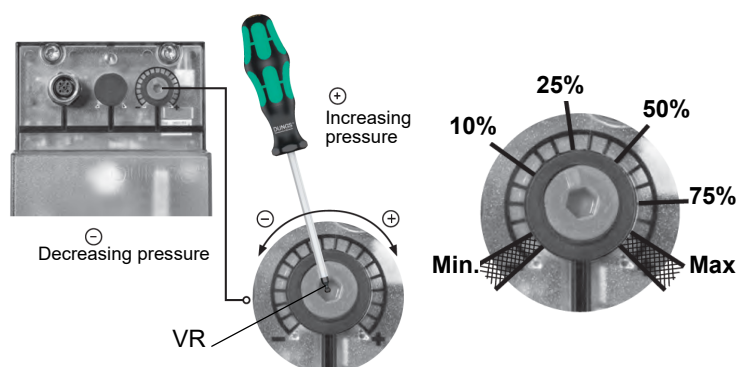
- **MultiBloc MBET** To set the outlet pressure of the VD-R regulator, act on the adjustment ring nut



Dungs Multibloc MB-DLE



Siemens VGD..



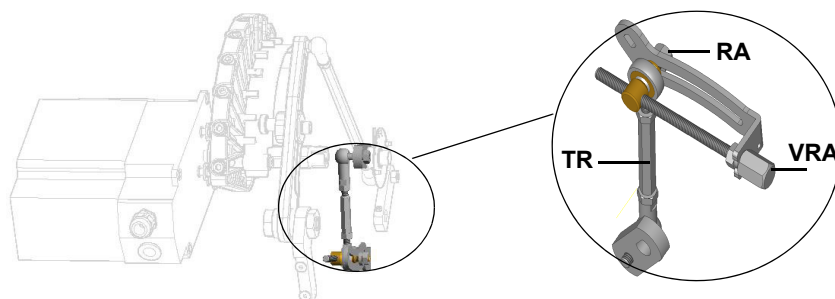
3

- 4 Drive the burner to high flame stage (please refer to the LMVx documentation attached to this manual).
- 5 To adjust the **air flow rate in the high flame stage**, loose the **RA** nut and screw **VRA** as to get the desired air flow rate: moving the rod **TR** towards the air damper shaft, the air damper opens and consequently the air flow rate increases, moving it far from the shaft the air damper closes and the air flow rate decreases.



**Note:** once the procedure is performed, be sure that the blocking nut **RA** is fasten. Do not change the position of the air damper rods.

- 6 If necessary, adjust the combustion head position (see the dedicated paragraph).
- 7 The air and gas rate are now adjusted at the maximum power stage, go on with the point to point adjustment on the **SV1** (FGR side) adjusting cam as to reach the minimum output point.
- 8 Procedere, ora, alla regolazione dei pressostati. Now adjust the pressure switches.



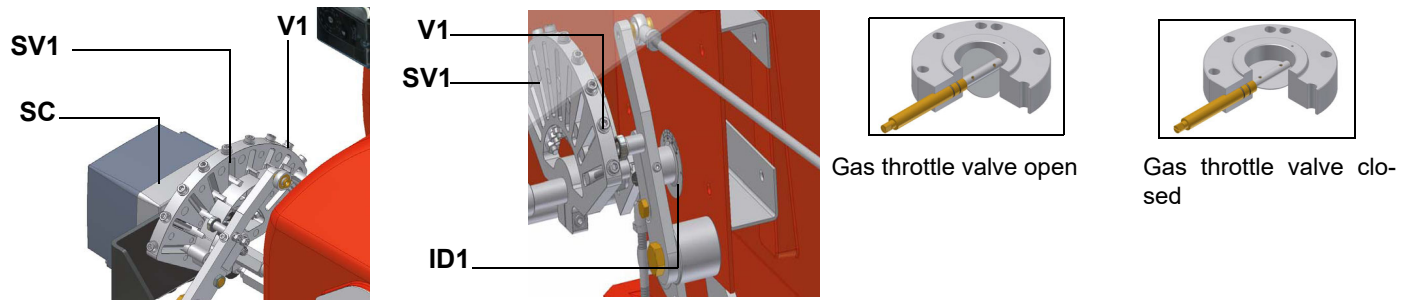
- 9 If necessary, adjust the combustion head position (see the dedicated paragraph)..



**Attention!** if it is necessary to change the head position, repeat the air and gas adjustments described above.

- 10 The air and gas rate are now adjusted at the maximum power stage, go on with the point to point adjustment on the **SV1** (gas side) adjusting cam as to reach the minimum output point.
- 11 as for the point-to-point regulation, move the gas low flame microswitch a little lower than the maximum position (90°);
- 12 set the **TAB** thermostat to the minimum in order that the actuator moves progressively towards the low flame position;
- 13 move the gas low flame microswitch to the minimum to move the actuator towards the low flame until the two bearings find the adjusting screw that refers to the lower position: screw **V1** to increase the rate, unscrew to decrease.





- 14 Move again the gas low flame microswitch towards the minimum to meet the next screw on the adjusting cam and repeat the previous step; go on this way as to reach the desired low flame point.
- 15 Now adjust the pressure switches.

### Fully-modulating burners

To adjust the fully-modulating burners, use the **CMF** switch on the burner control panel (see next picture), instead of the **TAB** thermostat as described on the previous paragraphs about the progressive burners. Go on adjusting the burner as described before, paying attention to use the CMF switch instead of **TAB**.

The **CMF** position sets the operating stages: to drive the burner to the high-flame stage, set CMF=1; to drive it to the low-flame stage, set CMF=2.



CMF

- CMF = 0 stop at the current position
- CMF = 1 high flame operation
- CMF = 2 low flame operation
- CMF = 3 automatic operation



## ADJUSTING THE GAS VALVES GROUP

### Multibloc MB-DLE

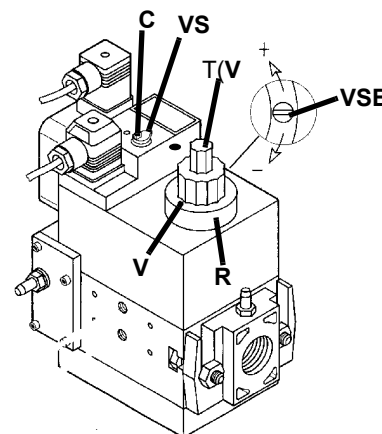
The multibloc unit is a compact unit consisting of two valves, gas pressure switch, pressure stabilizer and gas filter.

The valve is adjusted by means of the **RP** regulator after slackening the locking screw **VB** by a number of turns. By unscrewing the regulator **RP** the valve opens, screwing the valve closes. To set the fast opening remove cover **T**, reverse it upside down and use it as a tool to rotate screw **VR**. Clockwise rotation reduces start flow rate, anticlockwise rotation increases it.

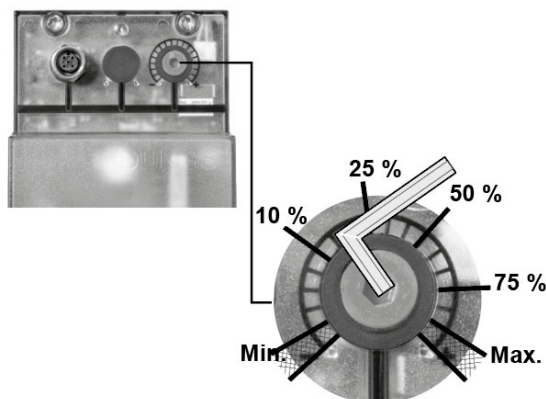
Do not use a screwdriver on the screw **VR**!

The pressure stabilizer is adjusted by operating the screw **VS** located under the cover **C**. By screwing down the pressure is increased and by unscrewing it is reduced.

Note: the screw **VS** must be removed only in case of replacement of the coil.



### MultiBloc MBE Regulation VD-R with PS



Outlet pressure	MIN	10%	25%	50%	75%	MAX
<b>PS-10/40</b>	4 mbar 0,4 kPa 2 "w.c.	10 mbar 1,0 kPa 4 "w.c.	25 mbar 2,5 kPa 10 "w.c.	50 mbar 5,0 kPa 20 "w.c.	75 mbar 7,5 kPa 30 "w.c.	100 mbar 10,0 kPa 40 "w.c.
<b>PS-50/200</b>	20 mbar 2,0 kPa 8 "w.c.	50 mbar 5,0 kPa 20 "w.c.	125 mbar 12,5 kPa 50 "w.c.	250 mbar 25,0 kPa 100 "w.c.	375 mbar 37,5 kPa 150 "w.c.	500 mbar 50,0 kPa 200 "w.c.

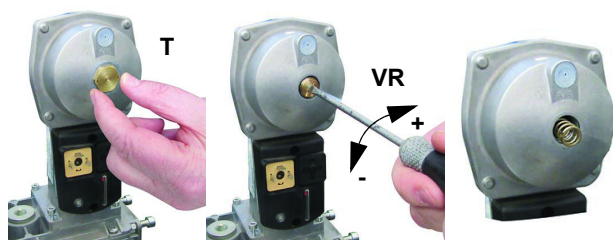


**Caution:** check that the range of the installed spring is compatible with the gas pressure at the burner head (see appropriate diagram) to which must be added the back pressure and approx. 5 /10 mbar for various leaks and gas line.



**While making outlet pressure adjustments, do not exceed a value that creates a hazardous condition to the burner!**

### Siemens VGD../VRD.. version with SKP2



Performance range (mbar)			
	neutral	yellow	red
Spring colour SKP 25.0	0 ÷ 22	15 ÷ 120	100 ÷ 250
Spring colour SKP 25.4		7 ÷ 700	150 ÷ 1500

The pressure adjusting range, upstream the gas valves group, changes according to the spring provided with the valve group.

To replace the spring supplied with the valve group, proceed as follows:

To increase or decrease gas pressure, and therefore gas flow rate, remove the cap **T** and use a screwdriver to adjust the regulating screw **VR**. Turn clockwise to increase the flow rate, counterclockwise to reduce it.

### Calibration air and gas pressure switches

The **air pressure switch** locks the control box if the air pressure is not the one requested. If it happens, unlock the burner by means of the control box unlock pushbutton, placed on the burner control panel.

The **gas pressure switches** check the pressure to avoid the burner operate when the pressure value is not in the requested pressure range.



### Calibration of low gas pressure switch

With the burner operating at maximum power, increase the regulation pressure by slowly turning the control knob clockwise until the burner stops, taking care it does not go into lockout and the display shows the error "**Err c20 d0**".

As for the gas pressure switch calibration, proceed as follows:

- Be sure that the filter is clean.
- Remove the transparent plastic cap.
- While the burner is operating at the maximum output, test the gas pressure on the pressure port of the minimum gas pressure switch.
- Slowly close the manual cutoff valve (placed upstream the pressure switch, see gas train installation diagram), until the detected pressure is reduced by 50%. Pay attention that the CO value in the flue gas does not increase: if the CO values are higher than the limits laid down by law, slowly open the cutoff valve as to get values lower than these limits.
- Check that the burner is operating correctly.
- Clockwise turn the pressure switch adjusting ring nut (as to increase the pressure value) until the burner stops.
- Slowly fully open the manual cutoff valve.
- Refit the transparent plastic cover on the pressure switch.

### Calibration the maximum gas pressure switch (when provided)

To calibrate the maximum pressure switch, proceed as follows according to its mounting position:

- remove the pressure switch plastic cover;
- if the maximum pressure switch is mounted upstream the gas valves: measure the gas pressure in the network, when flame is off; by means of the adjusting ring nut **VR**, set the value read, increased by the 30%.
- if the maximum pressure switch is mounted downstream the "gas governor-gas valves" group and upstream the butterfly valve: light the burner, adjust it according to the procedure in the previous paragraph. Then, measure the gas pressure at the operating flow rate, downstream the "gas governor-gas valves" group and upstream the butterfly valve; by means of the adjusting ring nut **VR**, set the value read on step 2, increased by the 30%;
- replace the plastic cover.

### Calibration of air pressure switch

To calibrate the air pressure switch, proceed as follows:

- Remove the transparent plastic cap.
- Once air and fuel setting have been accomplished, startup the burner.
- During the pre-purge phase of the operation, turn slowly the adjusting ring nut **VR** in the clockwise direction (to increase the adjusting pressure) until the burner lockout, then read the value on the pressure switch scale and set it to a value reduced by 15%.
- Repeat the ignition cycle of the burner and check it runs properly.
- Refit the transparent plastic cover on the pressure switch.

### Calibration gas leakage pressure switch (PGCP)

- remove the pressure switch plastic cover;
- adjust the PGCP pressure switch to the same value set for the minimum gas pressure switch;
- replace the plastic cover.

### Adjusting the combustion head



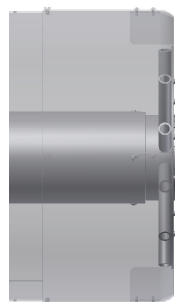
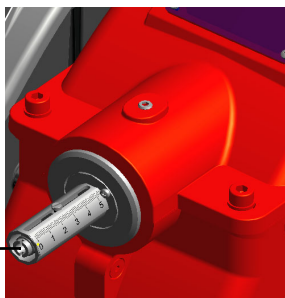
**Attention! if it is necessary to change the head position, repeat the air and fuel adjustments described above.**

### Head adjusting

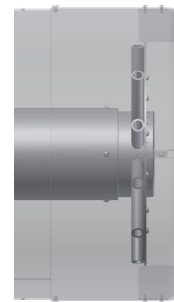
The combustion head position affects the flame stability. The diffuser position must be set during the commissioning according to the regulation needs. The diffuser position is factory set as shown in figure "A" (x = 10 mm). If different settings are required, it is possible to change the position: loosen the VB screw and slightly move the combustion head backwards, turning clockwise the knob VRT.

Fasten VB screw when the adjustment is accomplished.

VRT

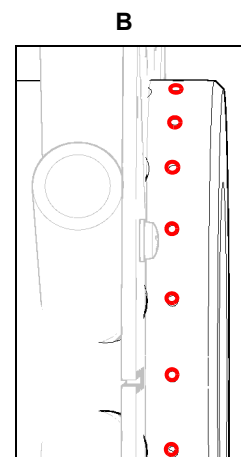
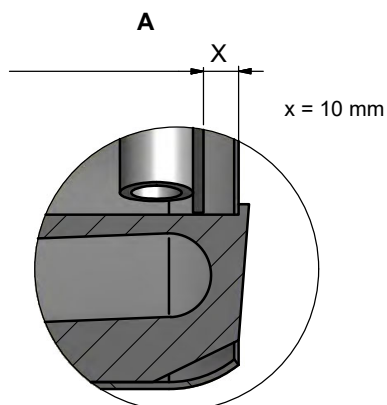
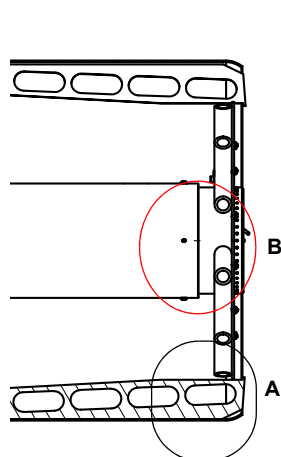


"all-ahead" position



"all-backwards" head position

Depending on the boiler application, it is possible to act on the holes (figure B) to improve the flame stability and NOx, CO emission values. If necessary, close/open the holes in figure "B" using the screws kit given with the burner.



**Attention!** if it is necessary to change the head position, repeat the air and fuel adjustments described above.

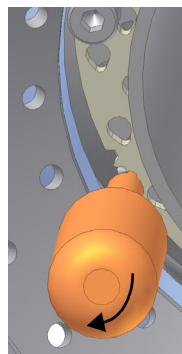
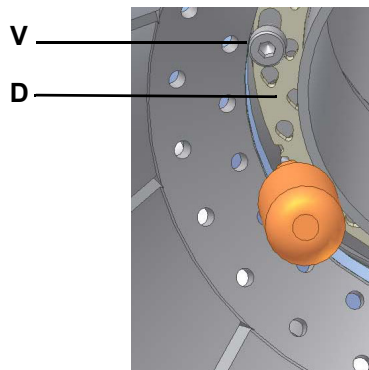


**CAUTION:** perform these adjustments once the burner is turned off and cooled.

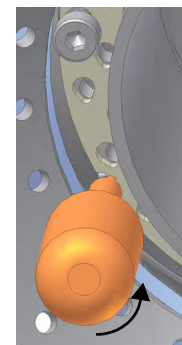
### **(HP72) Center head holes gas flow regulation (LPG burners)**

To adjust the gas flow, partially close the holes, as follows:

- 1 loosen the three **V** screws that fix the adjusting plate **D**;
- 2 insert a screwdriver on the adjusting plate notches and let it move CW/CCW as to open/close the holes;
- 3 once the adjustment is performed, fasten the **V** screws.



opened holes



closed holes

The adjusting plate correct position must be regulated in the plant during the commissioning.

The factory setting depends on the type of fuel for which the burner is designed:

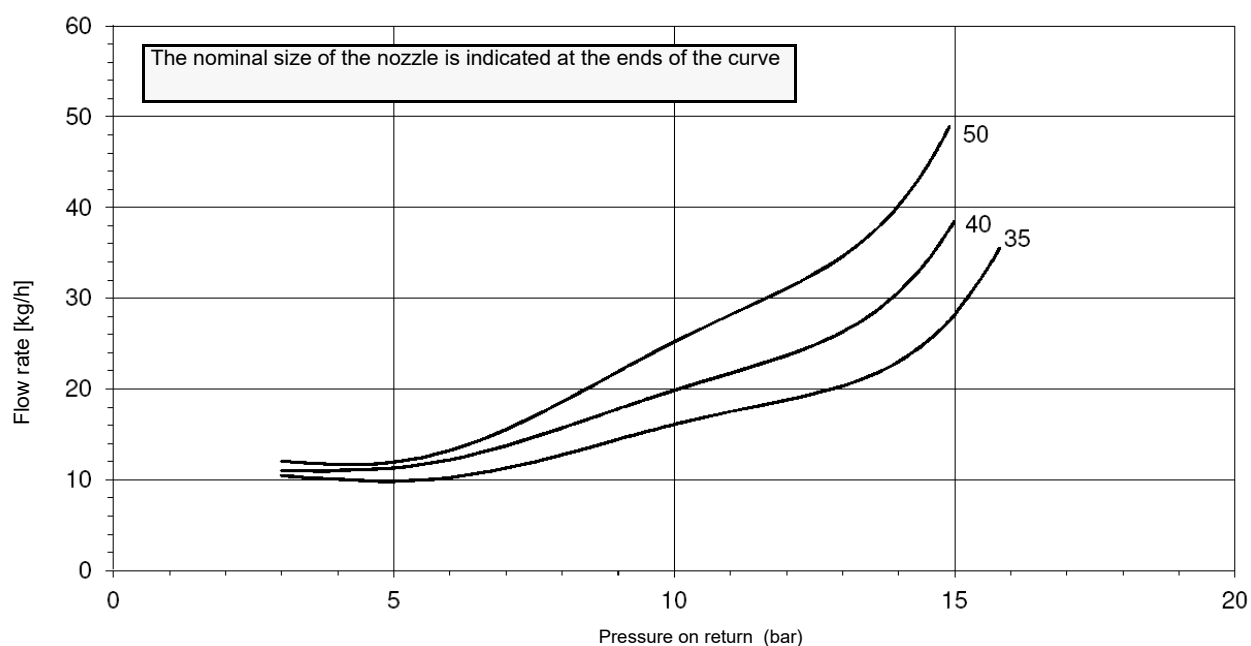
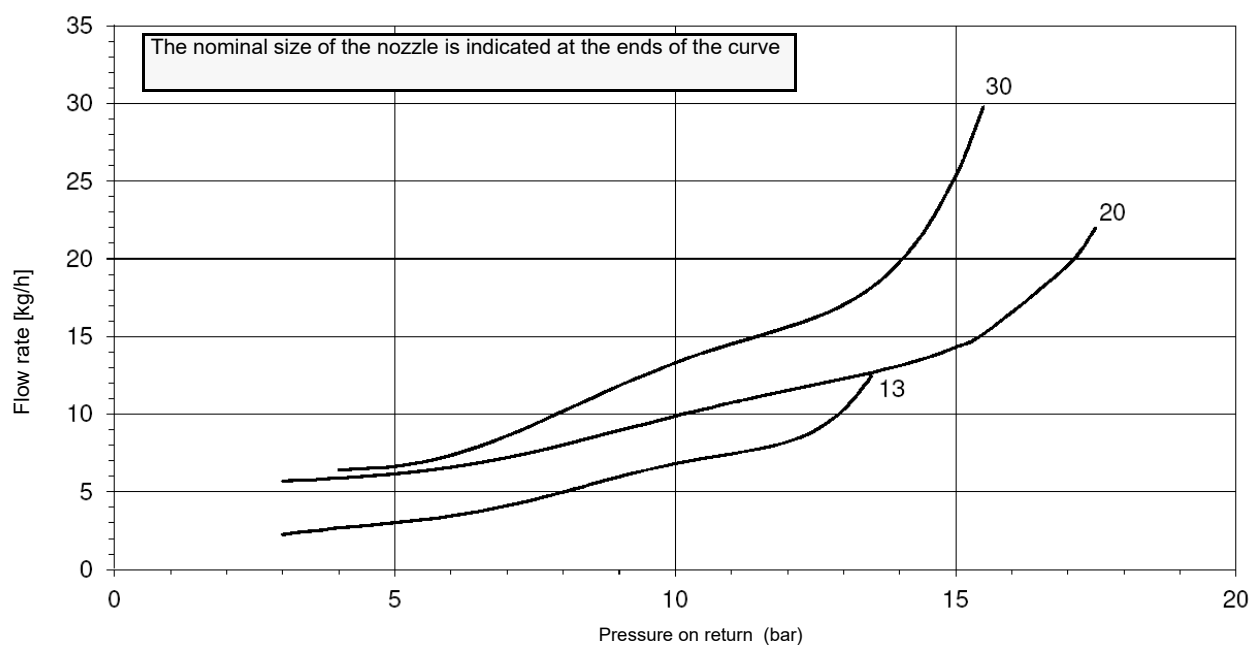
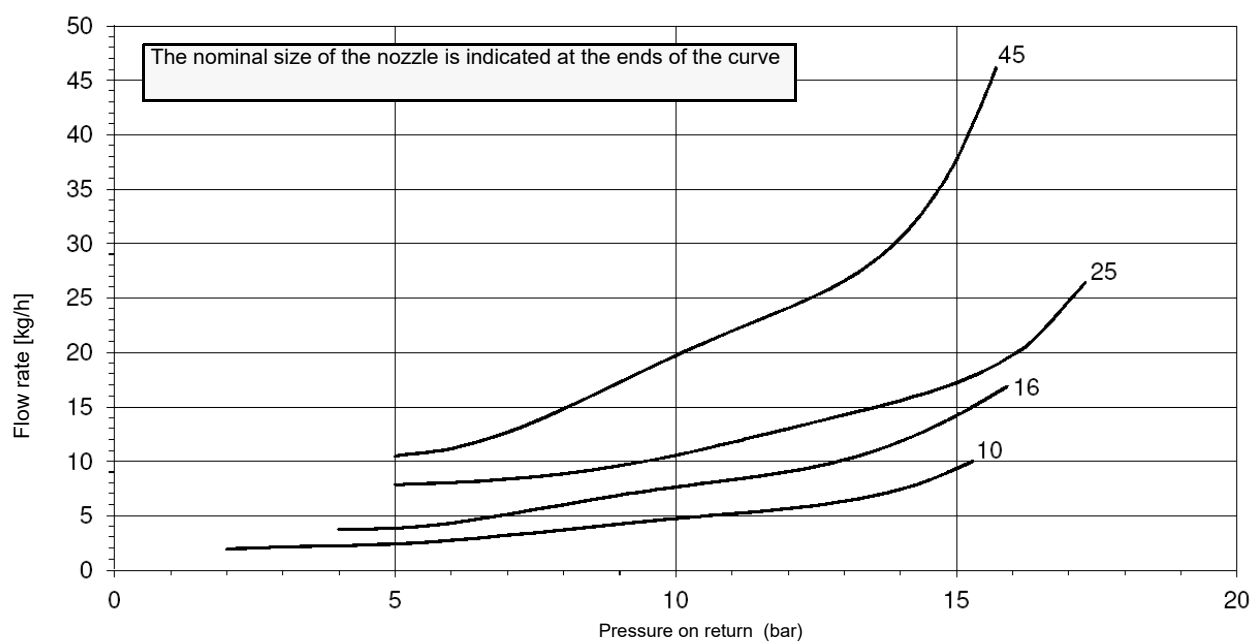
- For LPG burners, plate holes are opened about 1.4mm

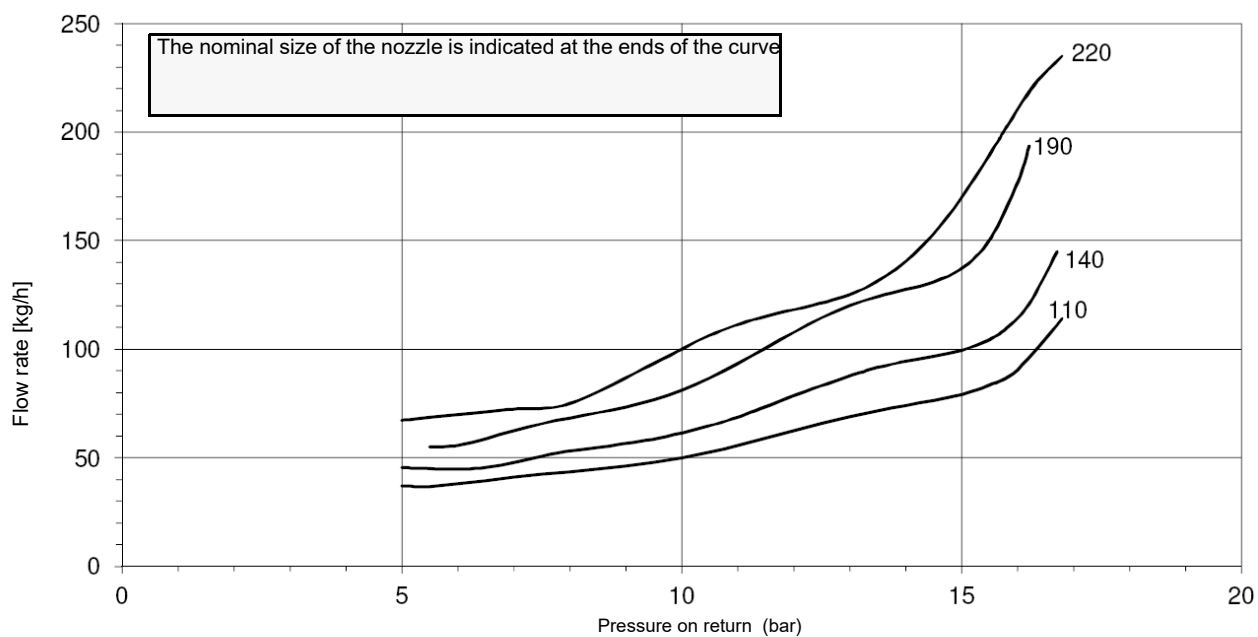
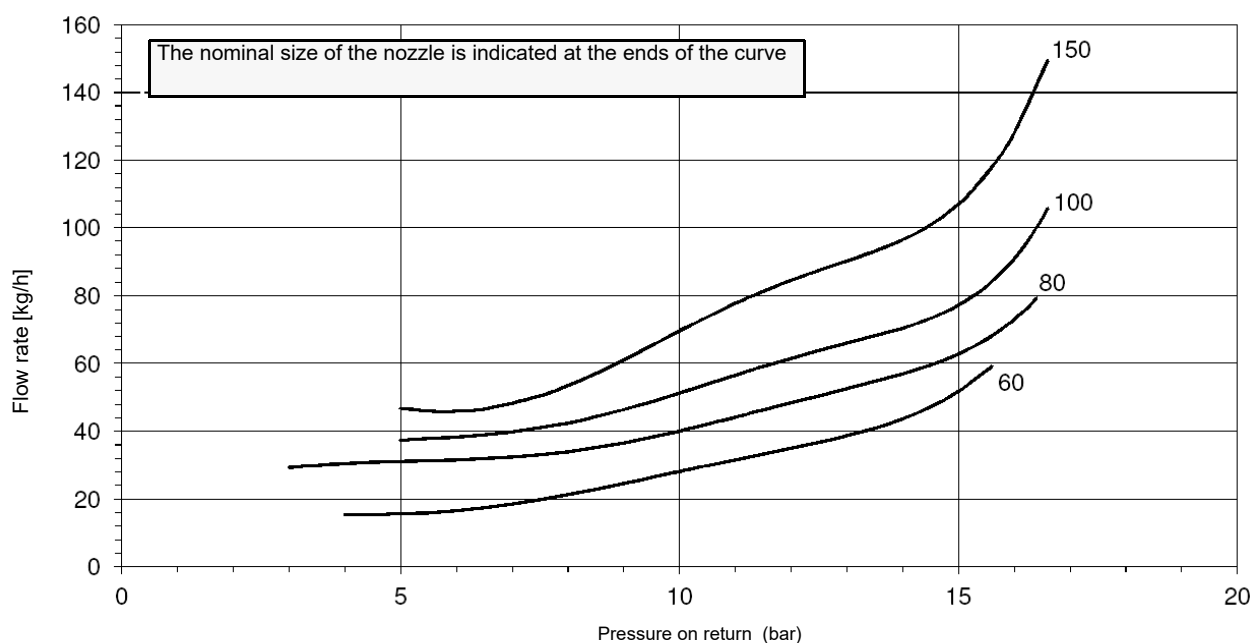
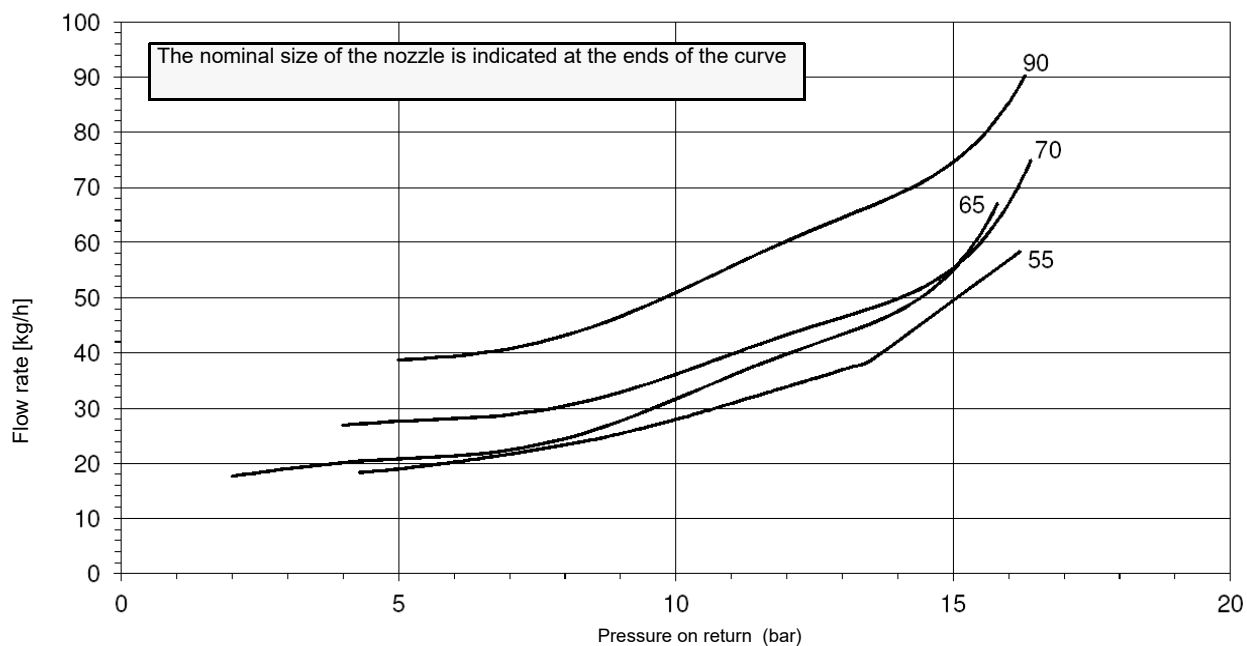
### **ADJUSTMENT PROCEDURE FOR LIGHT OIL OPERATION**

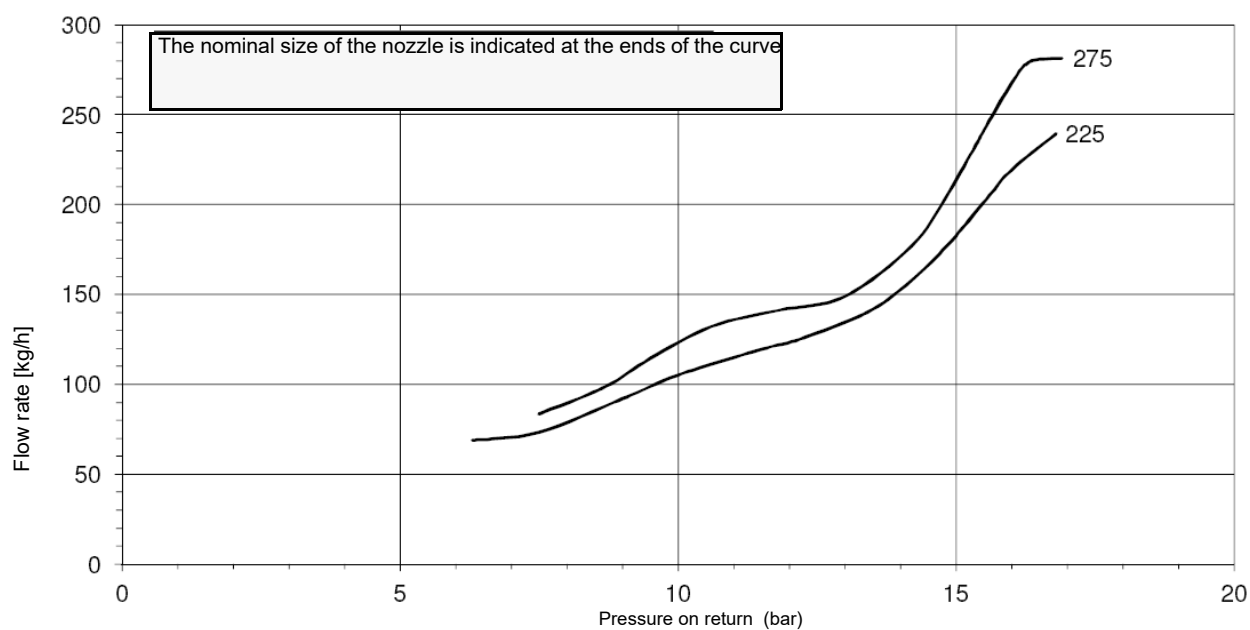
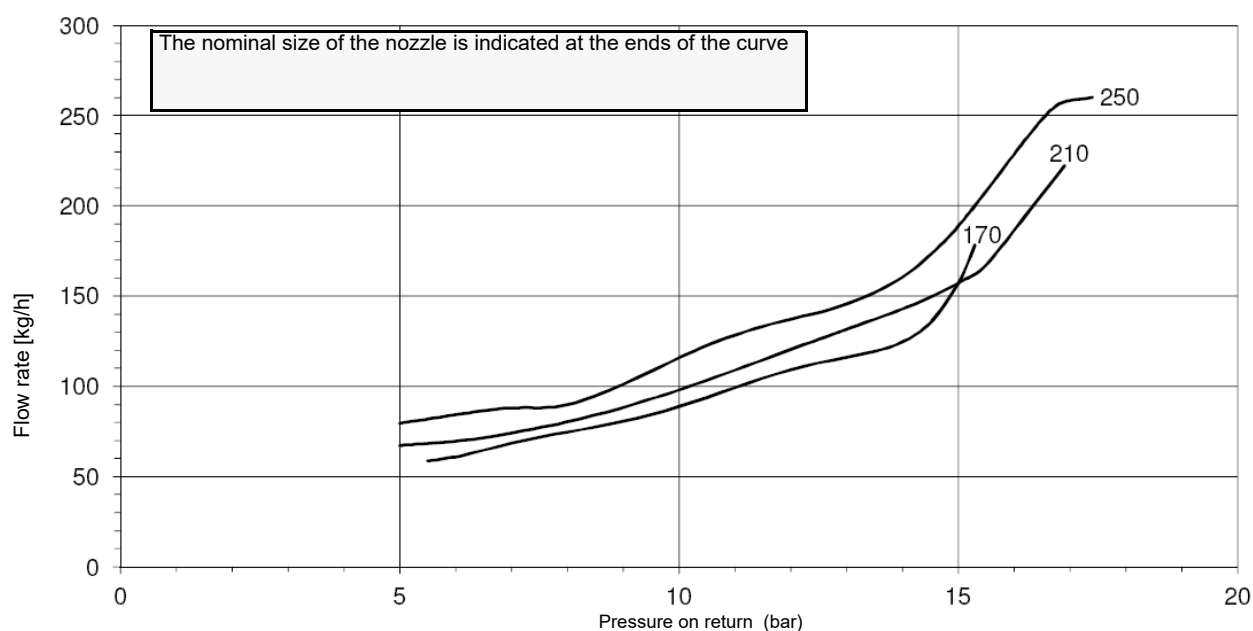
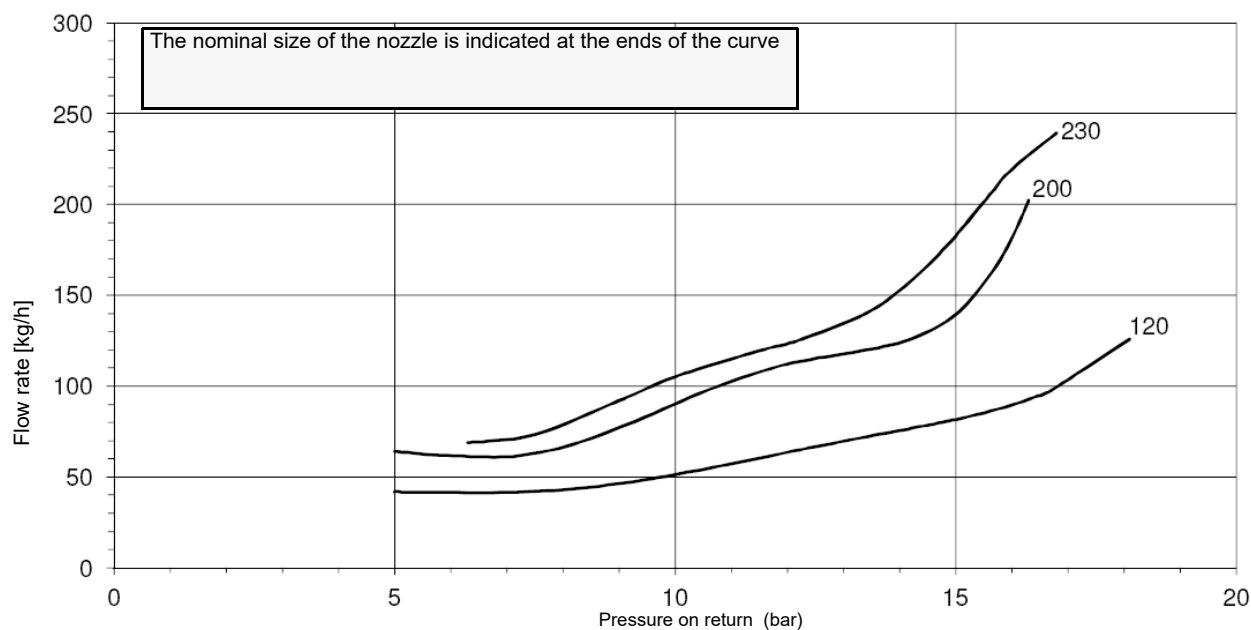
The oil flow rate can be adjusted choosing a nozzle that suits the boiler/utilisation output and setting the delivery and return pressure values according to the ones quoted on the following charts.

**FLUIDICS KW3...45°**

NOZZLE SUPPLY PRESSURE = 20 bar. VISCOSITY AT NOZZLE = 5 cSt

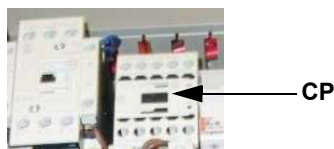


**FLUIDICS KW3...45°****NOZZLE SUPPLY PRESSURE = 20 bar. VISCOSITY AT NOZZLE = 5 cSt**

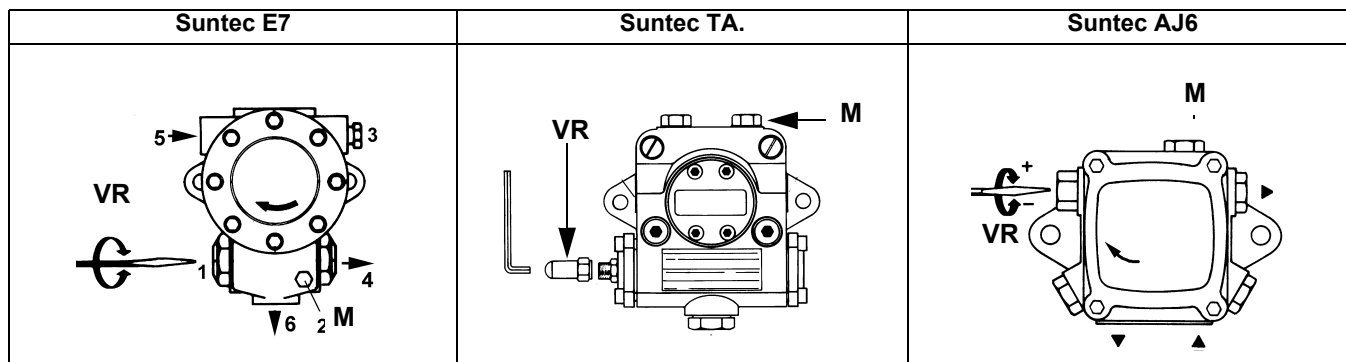
**FLUIDICS KW3...45°****NOZZLE SUPPLY PRESSURE = 20 bar. VISCOSITY AT NOZZLE = 5 cSt**

### Progressive burners

- 1 Once the air and gas flow rates are adjusted, turn the burner off, switch to the oil operation (OIL, on the burner control panel).
- 2 with the electrical panel open, prime the oil pump acting directly on the related **CP** contactor (see next picture): check the pump motor rotation and keep pressing for some seconds until the oil circuit is charged;



- 3 bleed the air from the **M** pressure gauge port by loosing the cap without removing it, then release the contactor.



- 4 Before starting the burner up, drive the high flame actuator microswitch matching the low flame one (in order to let the burner operates at the lowest output) to safely achieve the high flame stage .
- 5 Start the burner up by means of the thermostat series and wait until the pre-purge time comes to an end and that the burner starts up;
- 6 drive the burner to high flame stage, by means of the thermostat **TAB** (as far as fully-modulating burners, see the related paragraph).
- 7 Then move progressively the microswitch to higher values until it reaches the high flame position; always check the combustion values and eventually adjusting the oil pressure (see next step).
- 8
- 9 Only if necessary, adjust the supply pressure as follows; insert a pressure gauge into the port shown on figure and act on the pump adjusting screw **VR**. Pressure values are indicated at the beginning of this paragraph.
- 10 in order to get the maximum oil flow rate, adjust the pressure (reading its value on the **PG** pressure gauge) without changing the air flow rate set during the gas operation adjustments (see previous paragraph): checking always the combustion parameters, the adjustment is to be performed by means of the **SV2** adjusting cam screw (see picture) when the cam has reached the high flame position.
- 11 once the oil rate is adjusted at the maximum output (the air rate was adjusted in the gas regulation), go on with the point to point adjustment on the **SV2** (light oil side) adjusting cam as to reach the minimum output point, as described on the next steps.
- 12 as for the point-to-point regulation, move the gas low flame microswitch a little lower than the maximum position (90°);
- 13 set the **TAB** thermostat to the minimum in order that the actuator moves progressively towards the low flame position (as far as fully-modulating burners, see the related paragraph);
- 14 move the low flame cam to the minimum to move the actuator towards the low flame until the two bearings find the adjusting screw that refers to the lower position: screw **V2** to increase the rate, unscrew to decrease.
- 15 Move again cam III towards the minimum to meet the next screw on the adjusting cam and repeat the previous step; go on this way as to reach the desired low flame point.
- 16 The low flame position must never match the ignition position that is why the cam must be set 20° - 30° more than the ignition position.

Turn the burner off; then start it up again. If the adjustment is not correct, repeat the previous steps.

17

### Fully-modulating burners

To adjust the fully-modulating burners, use the **CMF** switch on the burner control panel (see next picture), instead of the **TAB** thermostat as described on the previous paragraphs about the progressive burners. Go on adjusting the burner as described before, paying attention to use the **CMF** switch instead of **TAB**.

The **CMF** position sets the operating stages: to drive the burner to the high-flame stage, set **CMF**=1; to drive it to the low-flame stage, set **CMF**=2.



- CMF = 0 stop at the current position  
 CMF = 1 high flame operation  
 CMF = 2 low flame operation  
 CMF = 3 automatic operation



### Maximum oil pressure switch

The oil pressure switch on the return line, checks that the pressure does not exceed a default value. This value must not be higher than the maximum acceptable pressure on the return line (this value is reported on the specification table). A pressure change on the return line could affect the combustion parameters: for this reason, the pressure switch must be set, say, at 20% over the pressure recorded during the combustion adjustment. The factory setting is 4 bar.

It is recommended to verify that the combustion parameters are within the range of acceptable values even against a pressure variation that gets close to the limit of the pressure switch.

This check should be carried out along the whole range of the burner output.

In case of unacceptable values, reduce from 20% to 15% the overpressure; later on, repeat the adjustments described above.

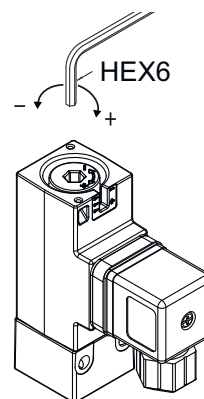
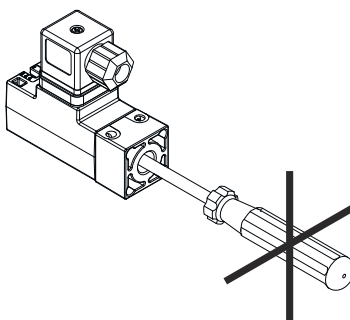
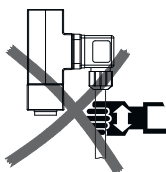
### Minimum oil pressure switch (when provided)

The minimum oil pressure switch on the inlet line, checks that the pressure does not drop below a default value. The pressure switch must be set, say, at 10% under the pressure at the nozzle.

### Oil pressure switch adjustment

Follow the below instruction, according to the pressure switch installed.

#### Trafag Picostat 9B4..



## PART IV: MAINTENANCE

At least once a year carry out the maintenance operations listed below. In the case of seasonal servicing, it is recommended to carry out the maintenance at the end of each heating season; in the case of continuous operation the maintenance is carried out every 6 months.



**WARNING: ALL OPERATIONS ON THE BURNER MUST BE CARRIED OUT WITH THE MAINS DISCONNECTED AND THE FUEL MANUAL CUTOFF VALVES CLOSED!**

**ATTENTION: READ CAREFULLY THE "WARNINGS" CHAPTER AT THE BEGINNING OF THIS MANUAL.**

### ROUTINE MAINTENANCE

- Check that the gas meter is not moving when the burner is off. In case it is rotating, look for possible leaks.
- Check that all parts in contact with combusting air (air box, protection mesh and Archimedean screw) are clean and free from any obstruction that might impede free afflux. Clean it with compressed air if available and/or a dry brush or cloths. Eventually wash it with non corrosive detergents.
- Check of blast tube; it must be substituted in case of obvious cracks or anomalous holes. Slight deformations that do not affect combustion may be tolerated
- Check and clean the cartridge of the fuel filter, replace it if necessary;
- carefully check the fuel flexible hoses for leaks;
- check and clean the filter on the fuel pump: filter must be thoroughly cleaned at least once in a season to ensure correct working of the fuel unit. To remove the filter, unscrew the four screws on the cover. When reassemble, make sure that the filter is mounted with the feet toward the pump body. If the gasket between cover and pump housing should be damaged, it must be replaced;
- remove, check and clean the combustion head;
- check the ignition electrodes and their ceramic insulators, clean, adjust and replace if necessary;
- remove and clean the oil nozzles (IMPORTANT: do not clean the nozzles using metallic or sharp utensils, use only solvents or steam); at the end of maintenance operations, refit the burner, turn it on and check the combustion. If in doubt, replace the defective nozzle/s. In case of intensive use of the burner, the nozzles must be replaced at the end of the working season;
- examine and clean the detection electrode/photoelement (according to the burner models), replace it if necessary, in case of doubt, check the detection circuit, after the burner start-up;
- clean and grease levers and rotating parts.
- At least every 2 months, or more often if needed, clean the room where the burner is installed.
- Avoid leaving installations, papers, nylon bags, etc., inside the room. They could be sucked by the burner and cause malfunctioning.
- Check that the room's vents are free from obstructions.

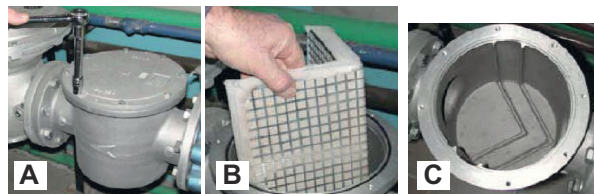


**DANGER! Incorrect motor rotation can seriously damage property and injure people. ATTENTION when servicing, if it was necessary to disassemble the gas train parts, remember to execute the gas proving test, once the gas train is reassembled, according to the procedure imposed by the law in force.**

### Gas filter maintenance

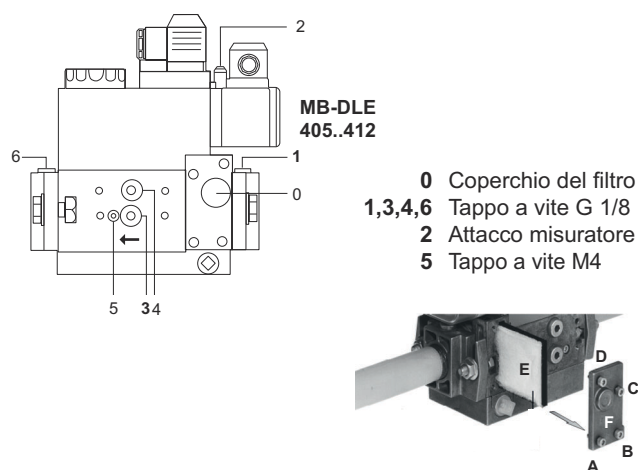
To clean or remove the filter, proceed as follows:

- 1 remove the cap unscrewing the fixing screws (A);
- 2 remove the filtering cartridge (B), clean it using water and soap, blow it with compressed air (or replace it, if necessary)
- 3 replace the cartridge in its proper position taking care to place it in between the guides as not to hamper the cap replacement;
- 4 be sure to replace the "O" ring into its place (C) and replace the cover fastening by the proper screws (A).

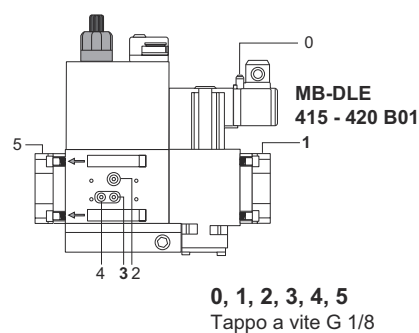
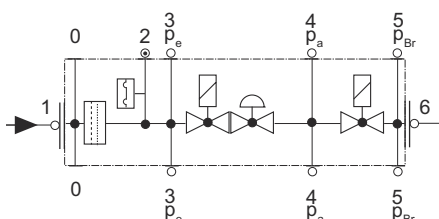


**WARNING: Before opening the filter, close the manual cutoff valve downstream the filter and bleed the gas; check that inside the filter there is no pressurised gas.**

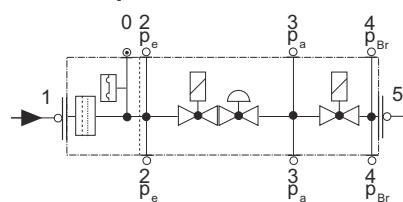
## Adjusting the gas valves group and removing the filter



### Prese di pressione



### Prese di pressione

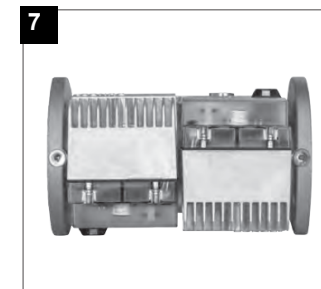
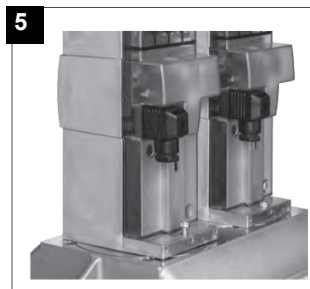
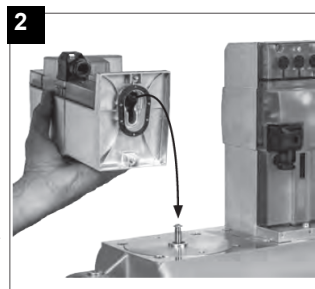
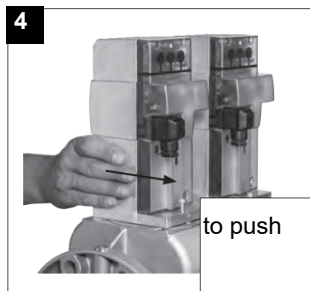
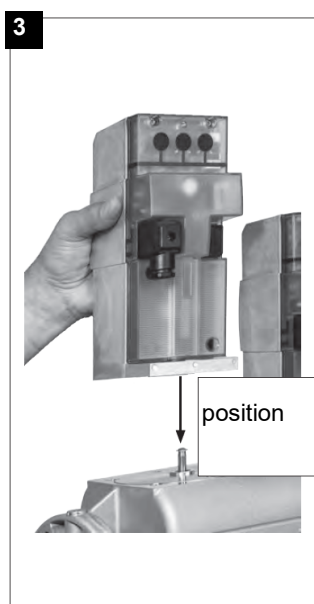
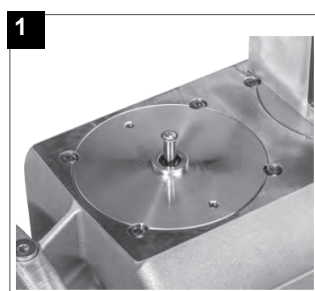


- Check the filter at least once a year!
- Change the filter if the pressure difference between pressure connection 1 and 3 (Fig. 1-Fig. 3) is  $\Delta p > 10$  mbar.
- Change the filter if the pressure difference between pressure connection 1 and 3 (Fig. 1-Fig. 3) is twice as high compared to the last check.

You can change the filter without removing the fitting.

- 1 Interrupt the gas supply closing the on-off valve.
- 2 Remove screws 1 ÷ 4 using the Allen key n. 3 and remove filter cover 5 in Fig. 5.
- 3 Remove the filter 6 and replace with a new one.
- 4 Replace filter cover 5 and tighten screws 1 ÷ 4 without using any force and fasten.
- 5 Perform leakage and functional test,  $p_{max.} = 360$  mbar.

## MultiBloc MBEMultiBloc VD Mounting



1. Position VD on VB, fig. 2+3.
2. Slide VD forward up to the stop, fig. 4.
3. Screw VD on with 2 M5 screws for each, max. 5 Nm/44 in.-lb., fig. 5/6.
4. VD can be mounted rotated by 180°, fig. 7.



### ***Technical procedure of self cleaning filters substitution (valid for all models)***

- 1 Close the bowl valve before the self cleaning filter
- 2 Switch off any electrical equipment on board on the filter (example motorization or heaters)



**WARNING! Drain the system by unscrewing the drain screw on the bottom of the self cleaning filter**

- 3 Disconnect the outlet pipe from the cover of the self cleaning filter
- 4 Remove the cover with all the filter pack, leaving only the bowl on the line
- 5 Clean any residue on the bottom of the bowl and clean the seat of the O-ring seal



**WARNING! Replace the O-ring seal between the bowl and cover**

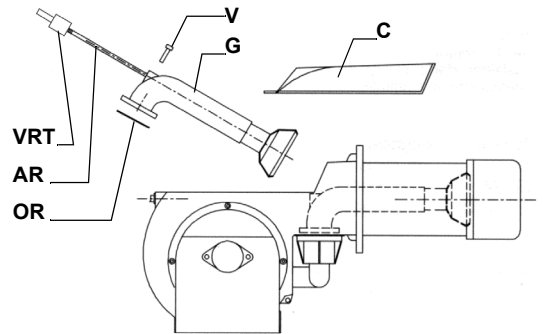
- 6 Insert the filter pack again making sure to respect the correct inlet/outlet direction or any references on the cover and tray
- 7 Replace the filter by following the reverse order operations
- 8 Make sure there is no leakage and give the power to any electrical equipment on the filter

### ***Removing the combustion head***

- Remove the lid C.
- Unscrew the screws V holding in position the manifold G and pull out the complete group as shown in figure.

Note: for the subsequent assembly carry out the above described operations in the reverse order, checking the correct position of the OR ring.

To remove the combustion head, pull it out. Once removed, check that the air and gas holes are not obstructed. Clean the combustion head by means of compressed air or scrape off the scale using a metallic brush



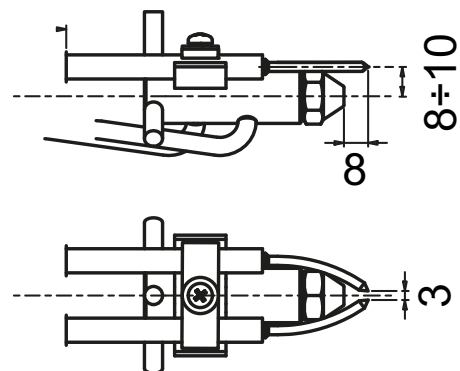
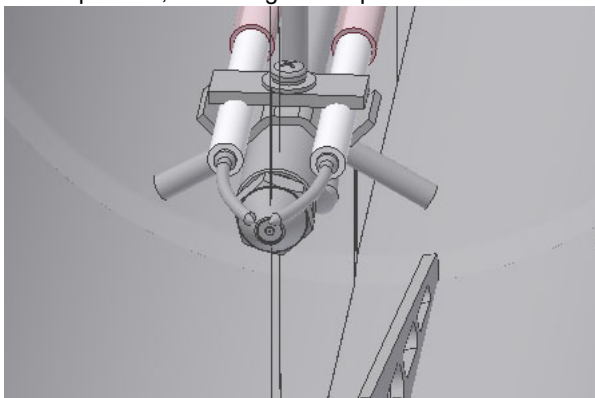
### ***Electrodes Adjustment***

Important Note: Check the ignition and detection electrodes after removing/adjusting the combustion head.



**ATTENTION: avoid the ignition and detection electrodes to contact metallic parts (blast tube, head, etc.), otherwise the boiler's operation would be compromised. Check the electrodes position after any intervention on the combustion head.**

Adjust the electrodes position, according to the quotes in mm shown othe next picture



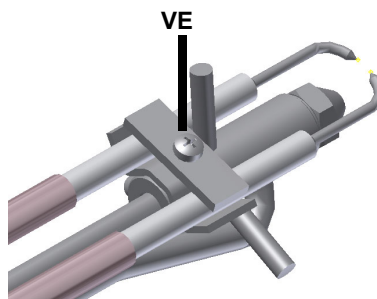
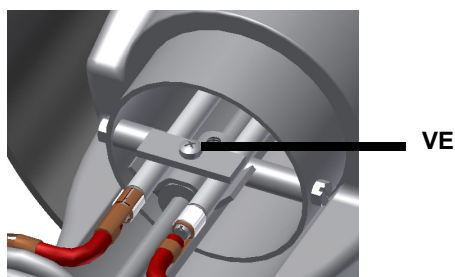
## Cleaning/replacing the electrodes



**ATTENTION:** avoid the electrodes to get in touch with metallic parts (blast tube, head, etc.), otherwise the boiler operation would be compromised. Check the electrodes position after any intervention on the combustion head.

To clean/replace the electrodes, proceed as follows:

- 1 remove the combustion head as described in the previous paragraph
- 2 remove the electrodes ass.y and clean them
- 3 in order to replace the electrodes, unscrew the **VE** fixing screws and remove them: place the new electrodes being careful to observe the measures in the previous paragraph; reassemble the electrodes and the combustion head following the reversed procedure



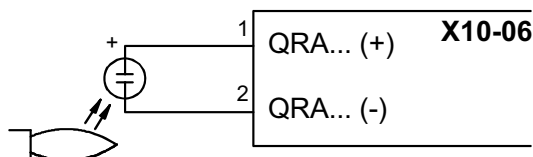
## Flame detection probe

To clean/replace the detection photocell, proceed as follows:

- 1 Disconnect the system from the electrical power supply.
  - 2 Shut off the fuel supply;
  - 3 remove the photocell from its slot (see next figure);
  - 4 clean the bulbe if dirty, taking care not to touch it with bare hands;
  - 5 if necessary, replace the bulb;
- replace the photocell into its slot.



Device	Flame detector	Minimum detection signal
Siemens LMV2x/3x	QRA	70 $\mu$ A (intensity of flame >24%)



## Seasonal stop

To stop the burner in the seasonal stop, proceed as follows:

- 1 turn the burner main switch to 0 (Off position)
- 2 disconnect the power mains
- 3 close the fuel valve of the supply line

## Burner disposal

In case of disposal, follow the instructions according to the laws in force in your country about the "Disposal of materials".

## WIRING DIAGRAMS

Refer to the attached wiring diagrams.

### WARNING

- 1 - Electrical supply 230V / 400V 50Hz 3N a.c.
- 2 - Do not reverse phase with neutral
- 3 - Ensure burner is properly earthed

**TROUBLESHOOTING GUIDE Gas operation**

<b>BURNER DOESN'T LIGHT</b>	* No electric power supply	* Restore power supply
	* Main switch open	* Close switch
	* Thermostats open	* Check set points and thermostat connections
	* Bad thermostat set point or broken thermostat	* Reset or replace the thermostat
	* No gas pressure	* Restore gas pressure
	* Safety devices (manually operated safety thermostat, pressure switches and so on) open	* Restore safety devices; wait till boiler reaches operating temperature then check safety device functionality.
	* Broken fuses	* Replace fuses. Check current absorption
	* Fan thermal contacts open (three phases motors only)	* Reset contacts and check current absorption
	* Burner control lock out	* Reset and check its functionality
<b>GAS LEAKAGE: BURNER LOCKS OUT (NO FLAME)</b>	* Burner control damaged	* Replace burner control
	* Gas flow is too low	* Increase the gas flow * Check gas filter cleanness * Check butterfly valve opening when burner is starting (only Hi-Low flame and progressive)
	* Ignition electrodes discharge to ground because dirty or broken	* Clean or replace electrodes
	* Bad electrodes setting	* Check electrodes position referring to instruction manual
	* Electrical ignition cables damaged	* Replace cables
	* Bad position of cables in the ignition transformer or into the electrodes	* Improve the installation
<b>BURNER LOCKS OUT WITH FLAME PRESENCE</b>	* Ignition transformer damaged	* Replace the transformer
	* Wrong setting of flame detector	* Adjust flame detector
	* Flame detector damaged	* Replace flame detector
	* Bad cables of flame detector	* Check cables
	* Burner control damaged	* Replace burner control
	* Phase and neutral inverted	* Adjust connections
	* Ground missing or damaged	* Check ground continuity
	* Voltage on neutral	* Take off tension on neutral
	* Too small flame (due to not much gas)	* Adjust gas flow * Check gas filter cleanness
<b>only FOR LME22: BURNER CONTINUES TO PERFORM ALL ITS FEATURES WITHOUT IGNITING THE BURNER</b>	* Too much combustion air	* Adjust air flow rate
	* Air pressure switch damaged or bad links	* Check air pressure switch functions and links
<b>BURNER LOCKS OUT WITHOUT ANY GAS FLOW</b>	* Burner control damaged	* Replace burner control
	* Gas valves don't open	* Check voltage on valves; if necessary replace valve or the burner control * Check if the gas pressure is so high that the valve cannot open
	* Gas valves completely closed	* Open valves
	* Pressure governor too closed	* Adjust the pressure governor
	* Butterfly valve closed	* Open the butterfly valve
	* Maximum pressure switch open.	* Check connection and functionality
<b>THE BURNER IS BLOCKED AND THE EQUIPMENT PROVIDES A LOCK CODE "CAUSE AIR PRESSURE SWITCH FAULT"</b>	* Air pressure switch doesn't close the NO contact	* Check connections * Check pressure switch functionality
	* Air pressure switch damaged (it keeps the stand-by position or badly set)	* Check air pressure switch functionality * Reset air pressure switch
	* Air pressure switch connections wrong	* Check connections
	* Air fan damaged	* Replace motor
	* No power supply	* Reset power supply
<b>BURNER LOCKS OUT DURING NORMAL RUNNING</b>	* Air damper too closed	* Adjust air damper position
	* Flame detector circuit interrupted	* Check wiring * Check photocell
	* Burner control damaged	* Replace burner control
<b>THE BURNER STARTS AND AFTER A WHILE IT REPEATS THE STARTING CYCLE.</b>	* Maximum gas pressure switch damaged or badly set	* Reset pressure switch or replace it
	* Gas pressure switch badly set	* Reset the pressure switch
	* Gas filter dirty	* Clean gas filter
<b>BURNER STANDS WHILE RUNNING WITHOUT ANY SWITCHING OF THERMOSTATS</b>	* Gas governor too low or damaged	* Reset or replace the governor
	* Thermal contacts of fan motor open	* Reset contacts and check values * Check current absorption
<b>FAN MOTOR DOESN'T START</b>	* Internal motor wiring broken	* Replace wiring or complete motor
	* Fan motor starter broken	* Replace starter
	* Fuses broken (three phases only)	* Replace fuses and check current absorption
<b>BURNER DOESN'T SWITCH TO HIGH FLAME</b>	* Hi-low flame thermostat badly set or damaged	* Reset or replace thermostat
	* Servomotor cam badly set	* Reset servomotor cam
<b>mechanical only: SOMETIMES THE SERVOMOTOR RUNS IN THE WRONG WAY</b>	* Servomotor capacitor damaged	* Replace capacitor
<b>PHASE-TO-PHASE SUPPLY OR PRESENCE OF VOLTAGE ON NEUTRAL*</b>	* Lights up and freezes	* In such cases, insert an RC circuit (our code 2531003).



## TROUBLESHOOTING GUIDE Light oil operation

<b>BURNER DOESN'T LIGHT</b>	* No electric power supply	* Wait for electric power supply is back
	* Main switch open	* Close the switch
	* Thermostats open	* Check set points and thermostat connections
	* Bad thermostat set point or broken thermostat	* Set or replace the thermostat
	* No gas pressure	* Restore gas pressure
	* Safety devices (manually operated safety thermostat or pressure switch, and so on ...) open	* Restore safety devices; wait that boiler reaches its temperature then check safety device functionality.
	* Broken fuses	* Replace fuses. Check current absorption
	* Fan thermal contacts open (only three phases)	* Reset contacts and check current absorption
	* Burner control locked out	* Reset and check its functionality
<b>BURNER LOCKS OUT WITH FLAME PRESENCE</b>	* Burner control damaged	* Replace burner control
	* Flame detector dirty or damaged	* Clean or replace flame detector
	* Burner control damaged	* Replace burner control
	* Smoking flame	* Reset combustion air flow rate
		* Check the nozzle and, if necessary, replace it
		* Check cleanness of combustion head
		* Check chimney suction
		* Check boiler cleanness
	* Combustion head dirty	* Clean combustion head
<b>BURNER LOCKS OUT WITHOUT ANY FUEL FLOW RATE</b>	* No fuel	* Fill the tank
	* Pump joint broken	* Check pump pressure
	* Pump damaged	* Check pump suction
		* Replace pump
	* Compressed air (or steam) too high	* Released compressed air (or steam) pressure
	* Oil metering valve not open far enough	* Check air pressure
		* Check servomotor position
	* Oil valve not energized	* Check wiring path or replace valve
	* Fan motor not efficient	* Adjust or replace the motor
	* Fan or pump motor runs in the wrong way	* Change rotation
	* Obstructed nozzle	* Clean or replace the nozzle
	* Check valve in the tank locked or leaking	* Clean or replace the valve
	* Oil filter dirty	* Clean filter
	* Pump filter dirty	
	* Solenoid valve dirty or broken	* Clean or replace solenoid valve
<b>BURNER LOCKS OUT WITH FUEL FLOW RATE (NO FLAME)</b>	* Oil pressure too low	* Reset oil pressure
	* Nozzle dirty or damaged	* Clean or replace nozzle
	* Water in the tank	* Take off all the water from the tank
		* Clean all filters
	* Suction too high	* Check suction before pump. If necessary clean filters.
	* Ignition electrodes grounded because dirty or damaged	* Clean or replace electrodes
	* Ignition electrodes badly set	* Check electrodes position referring to instruction manual
	* Cables damaged	* Replace cables
	* Bad position of cables in the ignition transformer or into the electrodes	* Improve the installation
	* Ignition transformer damaged	* Replace the transformer
<b>PUMP TOO NOISY</b>	* Suction too high (over 0,35 bar) (dirty filters, check valve in the tank locked, and so on ...)	* Clean filters
		* Replace check valve in the tank
	* Flexible hoses damaged	* Replace flexible hoses
	* Air infiltration in the pipes	* Take off all infiltration
	* Pipe too long or too narrow	* Increase line size
<b>BURNER RUMBLES WHEN MODULATING TO HIGH FIRE</b>	* Burner is too lean	* Adjust air-oil ratio
	* Drawer assembly not set properly	* Check drawer position
	* Oil may be too hot	* Check oil temperature
	* Flame is blowing off head	* Check head position
<b>CARBON BUILD-UP ON THE FIRESIDES OF THE BOILER</b>	* Oil flame not retaining to head	
	* Dirty nozzle	* Clean the nozzle
	* Oil spray impinging on burner head	* Check position of the nozzle respect to the head
	* Spray angle of the nozzle too wide	* Reduce spray angle
<b>FLAME IRREGULAR OR SPARKING</b>	* Oil pressure at nozzle too low	* Reset oil pressure
	* Air flow rate too high	* Adjust air flow rate
	* Oil is too cold	* Adjust oil temperature
	* Dirt in the oil	* Check filters
	* Water in the fuel	* Take off all the water
	* Oil impingement on the combustion head	* Drawer assembly far too rear
		* Nozzle is not protruding through centerhole of air diffuser
		* Oil flame not retaining to the head
<b>BURNER LIGHTS BUT FLAME DOESN'T RETAIN TO BURNER HEAD</b>	* Nozzle dirty or damaged	* Clean or, if necessary, replace the nozzle
	* Drawer assembly not positioned correctly	* Move forward or backward
	* Nozzle too far forward through centerhole of diffuser	* Move nozzle backward respect to diffuser
	* Oil or air pressure at nozzle is too low	* Increase oil or air pressure
	* Air louver too open	* Reduce air louver opening
<b>FLAME IRREGULAR OR SMOKING</b>	* Too much spread between oil and air (or steam) pressure	* Set the spread to a proper value
	* Not enough combustion air	* Adjust air flow rate
	* Nozzle dirty or damaged	* Clean or, if necessary, replace the nozzle
	* Flame is too big for furnace or nozzle spray angle is wrong	* Check burner-furnace coupling
		* Change nozzle with a suitable one
	* Nozzle spray angle wrong (flame too long or too wide)	* Replace nozzle
	* Boiler dirty	* Clean the boiler
	* Not enough suction at chimney	* Check chimney cleanness or size
	* Pressure at nozzle too low	* Reset oil pressure
	* Oil too cold	* Reset oil temperature
	* Combustion air inlet dirty	* Clean the air inlet
<b>FUEL GAS TEMPERATURE TOO HIGH</b>	* Flame is too small respect to furnace volume	* Replace nozzle or reset pump pressure
	* Boiler dirty	* Clean the boiler
	* Oil flow rate too high	* Adjust oil pressure or replace nozzle



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Note: specifications and data subject to change. Errors and omissions excepted.