

HTP1030

HTP1050

HTP1080

**Gas - light oil
dual fuel burners**

MANUAL OF INSTALLATION - USE - MAINTENANCE

***CIB* UNIGAS**

BURNERS - BRUCIATORI - BRULERS - BRENNER - QUEMADORES - ГОРЕЛКИ

TABLE OF CONTENTS

WARNINGS	3
 PART I: INSTALLATION 5	
GENERAL FEATURES	5
Example of installation	6
How to choose the burner	7
Burner model identification	8
Country and usefulness gas categories	8
Overall dimensions	9
Performance curves	10
Pressure in the network / gas rate curves	11
INSTALLATION	12
Packing	12
Handling the burner	12
Fitting the burner to the boiler	12
Fan installation	13
Matching the burner to the boiler	13
GAS TRAIN CONNECTIONS	13
Assembling the gas grain	15
Siemens VGD20.. and VGD40.. gas valves - with SKP2.. (pressure governor)	16
Pressure adjusting range	16
Hydraulic diagrams for light oil supplying circuits	18
Light oil piping installation diagram	19
About the use of fuel pumps	19
Suntec TV Pressure governor	20
Assembling the light oil flexible hoses	20
Connecting the burner to the light oil pumping unit	21
Electrical connections	21
Rotation of fan motor and pump motor	21
ADJUSTMENTS	22
Combustion head gas pressure curves depending on the flow rate	22
Measuring the gas pressure in the combustion head	22
Pressure - rate in combustion head curves	23
Gas Filter	24
VPS504 Gas proving system	24
Adjusting the injector gas flow rate: Brahma EG12*R valve and pressure governor	24
Adjustments - brief description	25
Adjustment procedure	25
Calibration of air pressure switch.....	27
Calibration of low gas pressure switch	27
Adjusting the high gas pressure switch (when provided)	28
PGCP Gas leakage pressure switch (with SiemensLDU/Siemens LMV burner control)	28
Fully modulating burners	28
Adjustment for light oil operation	29
Oil circuit	33
 PART II: OPERATION 34	
OPERATION	35
 PART III: MAINTENANCE 36	
ROUTINE MAINTENANCE	36
Gas filter maintenance	36
Replacing the spring in the gas valve group	37
Light oil filter maintenance	37
Removing the combustion head	37
Adjusting the ignition electrode	38
Replacing the ignition electrode	39
Cleaning and replacing the detection photocell	40
Seasonal stop	40
TROUBLESHOOTING	41
SPARE PARTS	42

APPENDIX

WARNINGS

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.

1) 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 cut-out 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.

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.
- For all the units that have been modified or have options fitted then original accessory equipment only shall be used.
- 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 damages resulting from improper installation, use and failure to comply with the instructions supplied by the manufacturer.

2) SPECIAL INSTRUCTIONS FOR BURNERS

- 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 shut-off 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 firebox.
- 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.

3) GENERAL INSTRUCTIONS DEPENDING ON FUEL USED

3a) 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.

3b) FIRING WITH GAS, LIGHT OIL OR OTHER FUELS

GENERAL

- 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.

Precautions if you can smell gas

- a do not operate electric switches, the telephone, or any other item likely to generate sparks;
- b immediately open doors and windows to create an air flow to purge the room;
- c close the gas valves;
- d 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.

DIRECTIVES AND STANDARDS

Gas burners

European directives:

- Directive 90/396/CEE - Gas Appliances;
- Directive 2006/95/EC on low voltage;
- Directive 2004/108/CEE on electromagnetic compatibility

Harmonised standards :

- UNI EN 676 (Gas Burners;
- CEI EN 60335-1(Household and similar electrical appliances - Safety. Part 1: General requirements;
- EN 50165 (Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements.

Light oil burners

European directives:

- Directive 2006/95/EC on low voltage;
- Directive 2004/108/CEE on electromagnetic compatibility

Harmonised standards :

- CEI EN 60335-1(Household and similar electrical appliances - Safety. Part 1: General requirements;
- EN 50165 (Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements.

National standards :

- UNI 7824: Monobloc nebulizer burners for liquid fuels. Characteristics and test methods

Heavy oil burners

European directives:

- Directive 2006/95/EC on low voltage;
- Directive 2004/108/CEE on electromagnetic compatibility

Harmonised standards :

- CEI EN 60335-1 Household and similar electrical appliances - SafetyPart 1: General requirements;
- EN 50165 Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements.

National standards :

- UNI 7824: Monobloc nebulizer burners for liquid fuels. Characteristics and test methods

Gas - Light oil burners

European directives:

- Directive 90/396/CEE Gas Appliances;
- Directive 2006/95/EC on low voltage;
- Directive 2004/108/CEE on electromagnetic compatibility

Harmonised standards :

- UNI EN 676 Gas Burners
- CEI EN 60335-1(Household and similar electrical appliances - Safety. Part 1: General requirements;
- EN 50165 Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements.

National standards :

- UNI 7824: Monobloc nebulizer burners for liquid fuels. Characteristics and test methods

Gas - Heavy oil burners

European directives:

- Directive 90/396/CEE - Gas Appliances;
- Directive 2006/95/EC on low voltage;
- Directive 2004/108/CEE on electromagnetic compatibility

Harmonised standards :

- UNI EN 676 (Gas Burners;
- CEI EN 60335-1(Household and similar electrical appliances - Safety. Part 1: General requirements;
- EN 50165 Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements.

National standards :

- UNI 7824: Monobloc nebulizer burners for liquid fuels. Characteristics and test methods

PART I: INSTALLATION

GENERAL FEATURES

This series of industrial burners is designed for all those applications that require big-sized air fans or air-flue heat exchangers to be installed in sound-proof areas to reduce noise. They can be provided with built-in or separately-mounted control panel (console or wall-mounted).

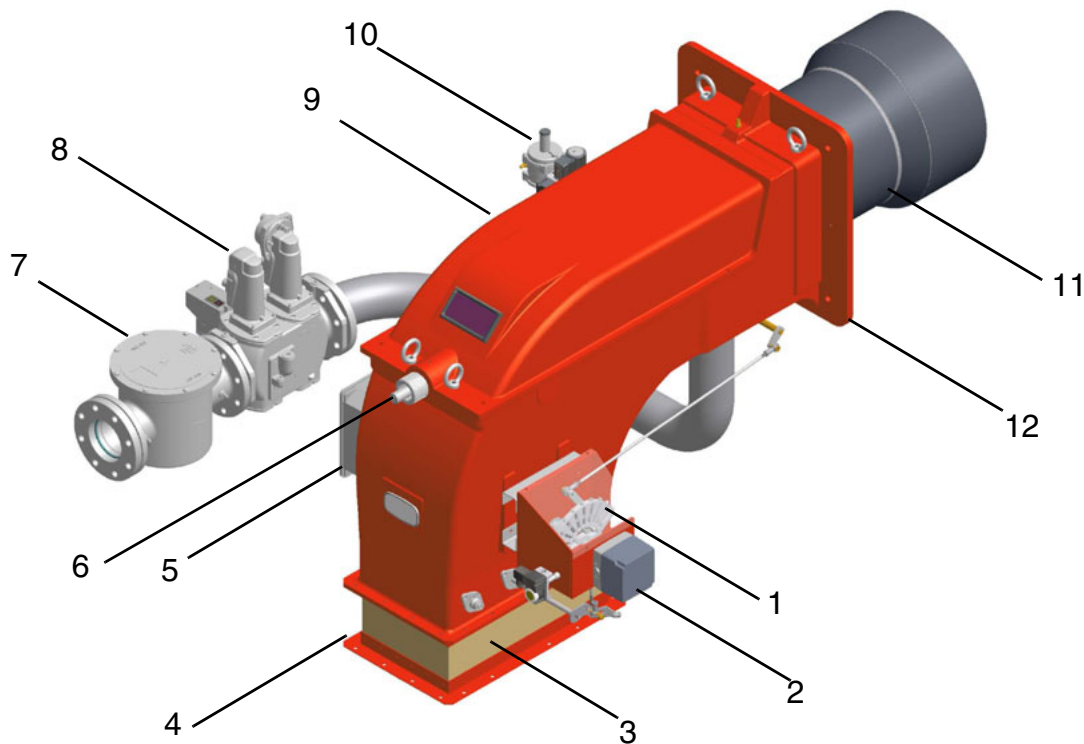


Fig. 1

- 1 Adjusting cam
- 2 Actuator
- 3 Bellows
- 4 Air inlet flange
- 5 Junction box
- 6 Combustion head adjusting screw
- 7 Gas filter
- 8 Gas valves group
- 9 Cover
- 10 Ignitor gas train
- 11 Combustion head-blast tube ass.y
- 12 Burner flange

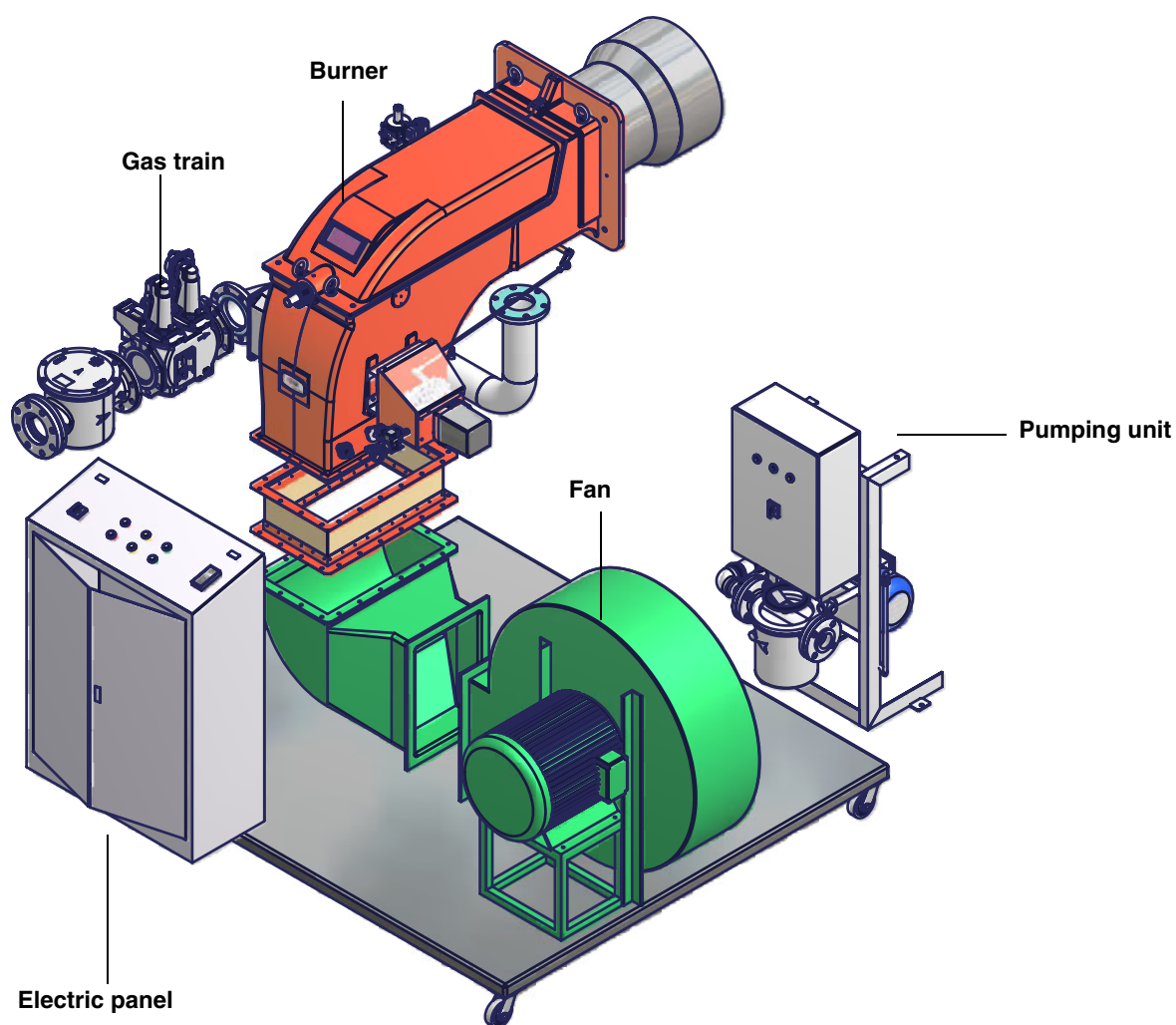
Gas operation: the gas coming from the supply line, passes through the valves group provided with filter and stabiliser. This one forces the pressure in the utilisation limits. The actuator (2) moves proportionally the air damper and the gas butterfly valve. It drives an adjusting cam (1) with variable shape. This one allows 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 (8) 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 (11) 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).

Example of installation

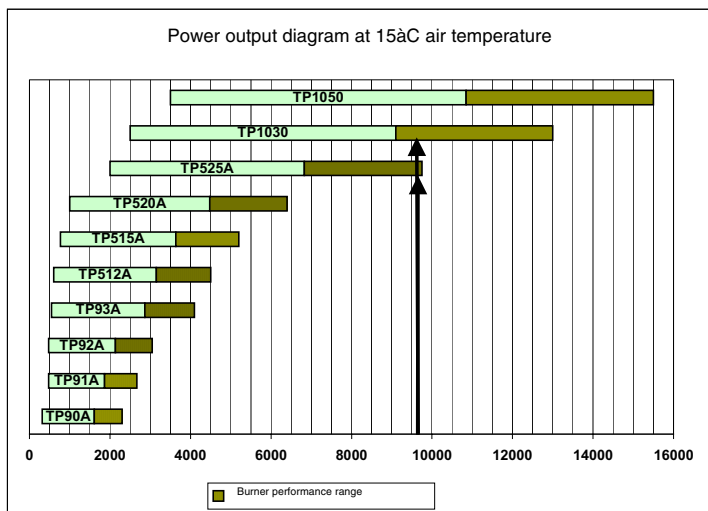
Note: the picture shows one of the possible installations. Fan, electrical panel and pumping unit can be placed according to the customer needs.

How to choose the burner

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

- fuel
- furnace input, in kW or kcal/h ($\text{kW} = \text{kcal/h} / 860$);
- boiler type;
- combustion head type (reverse flame or three phase)
- temperature or pressure of the thermal carrier fluid
- Comburent air temperature
- Air duct positioning
- Pressure in the combustion chamber
- Elevation (altitude) of burner installation
- Gas train (only for gas burners)
- Pumping unit (only for light-oil or heavy-oil burners)
- Air fan
- Bilt-in or separated control panel
- backpressure (data are available on the boiler's ID plate or in the user's manual).

Burners provided with built-in control panel are designed for IP40 index of protection. For other values of IP, please contact the manufacturer Technical Dpt.



Data requested:

- furnace input;
- air temperature
- altitude
- generator pressure or temperature

Example:

- furnace input: 9600kW
- air temperature: 15°C
- altitude: 0m

Fig. 2

See the diagram in Fig. 2, as to find the burners that better suite the power range requested in the exmple (9600kW). Once the models are founded out, the choice regards technical and economical features. Technical features can be summarised in a higher modulation ratio (fewer start-ups, less consumption, fewer swigings in the generator temperature and pressure values).

Checking the proper gas train size

To check the proper gas train size, it is necessary to know the available gas pressure value upstream the burner's gas valve. Then subtract the backpressure. The result is called **p_{gas}**. 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 **p_{gas}** value, calculated before.

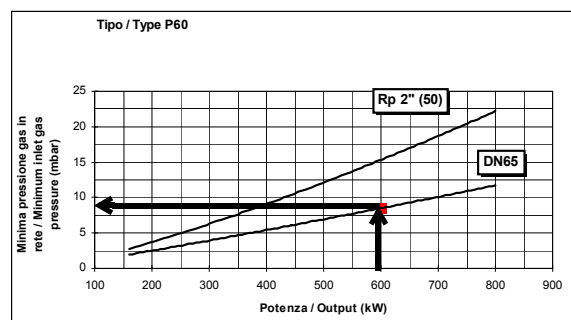


Fig. 3

Burner model identification

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

Type HTP1030	Model	M-. PR. S. *. A. 1. 80
(1)	(2)	(3) (4) (5) (6) (7) (8)
(1) BURNER TYPE	HTP1030 - HTP1050 - HTP1080	
(2) FUEL	MG - Natural gas-light oil	
(3) OPERATION Available versions	PR - Progressive MD - Fully modulating	
(4) BLAST TUBE	S - Standard	
(5) DESTINATION COUNTRY	* - see data plate	
(6) BURNER VERSION	A - StandardY - Special	
(7) EQUIPMENT	1 = 2 valves + gas proving system 8 = 2 valves + gas proving system + high gas pressure switch	
(8) GAS CONNECTION	80 = DN80 100 = DN100 125 = DN125	

Technical specifications

BURNER TYPE		HTP1030	HTP1050	HTP1080
Output	min - max kW	2550-13000	3500-15500	4500-19000
Fuel		Natural gas-light oil		
Gas category		(see next paragraph)		
Gas rate	min.- max.(Stm ³ /h)	270-1376	370-1641	476-2010
Oil Density		840 kg/m ³		
Oil Viscosity		2 - 7.4 cSt@ 40°C		
Light oil rate	min.-max. kg/h	215 - 1095	295 - 1306	380 - 1600
Power supply		400V 3N~ 50		
Total power consumption	kW	5.5		
Total power consumption	kW	6		
Protection		IP40		
Operation		Progressive - Fully modulating		
Gas pressure		(see Note 2)		
Gas train 80	ØValves Connection	80 / DN80		
Gas train 100	ØValves Connection	100 / DN100		
Gas train 125	ØValves Connection	125 / DN125		
Weight	kg	300		
Operating temperature	°C	-10 ÷ +50		
Storage Temperature	°C	-20 ÷ +60		
Working service*		Intermittent		

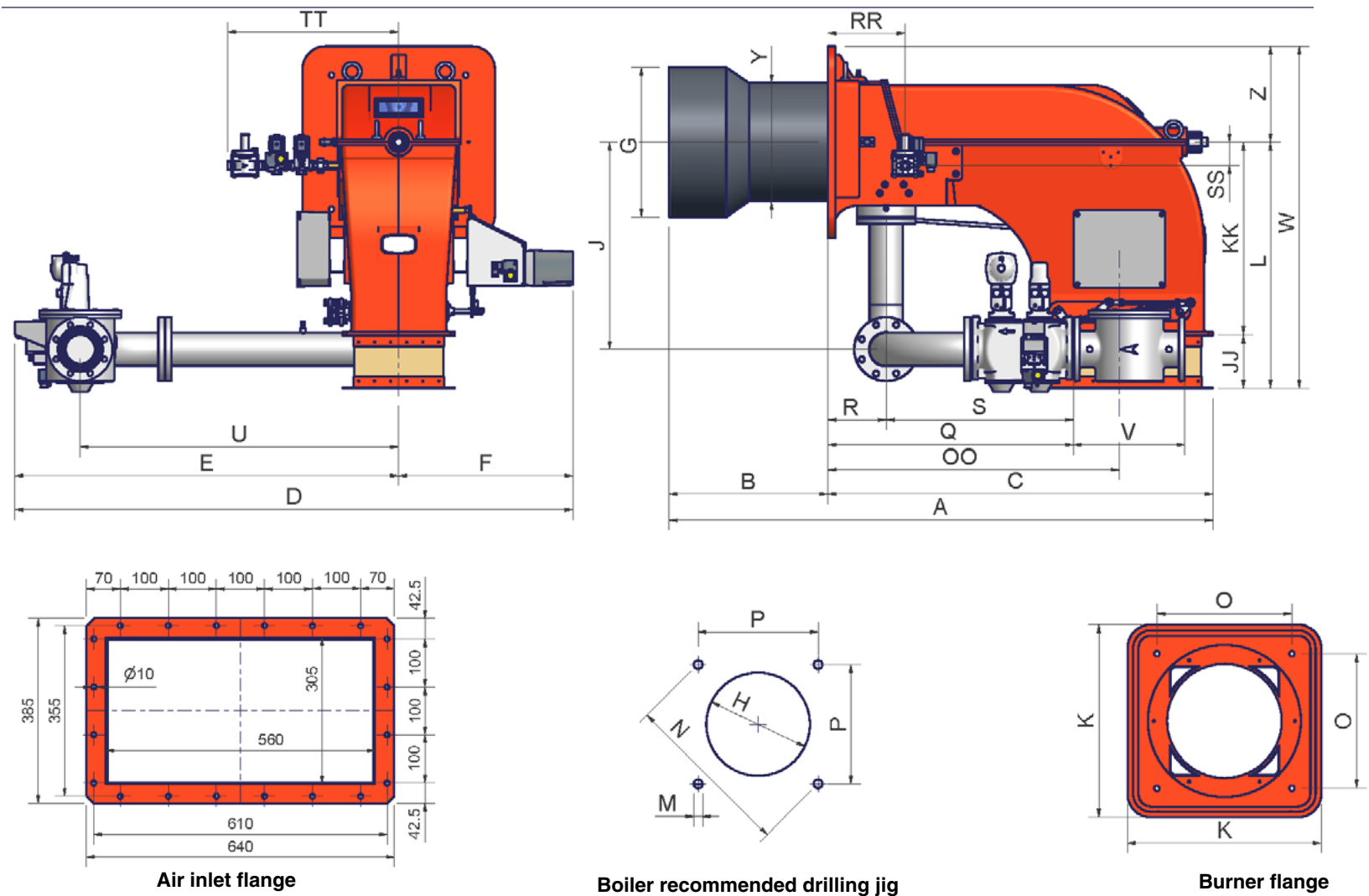
Note1:	all gas flow rates are referred to Stm ³ /h (1013 mbar absolute pressure, 15 °C temperature) and are valid for G20 natural gas (nett calorific value H _i = 34.02 MJ/Stm ³).
Note2:	Maximum gas pressure = 500mbar (with Siemens VGD gas valves). Minimum gas pressure = see gas curves.

***NOTE ON THE BURNER WORKING SERVICE:** for safety reasons, one controlled shutdown must be performed every 24 hours of continuous operation.

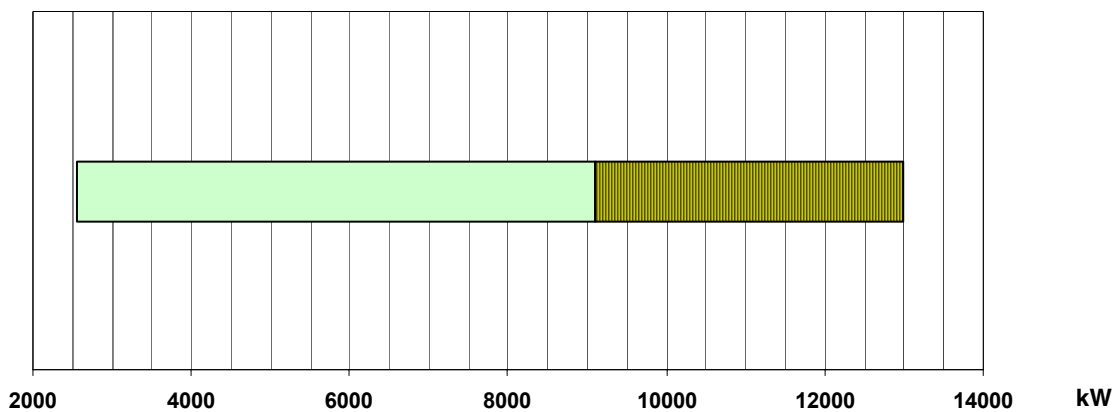
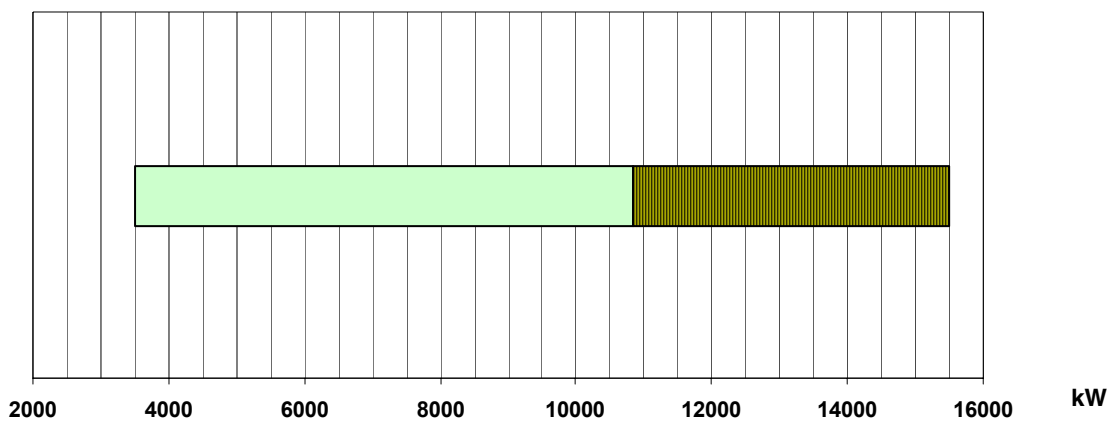
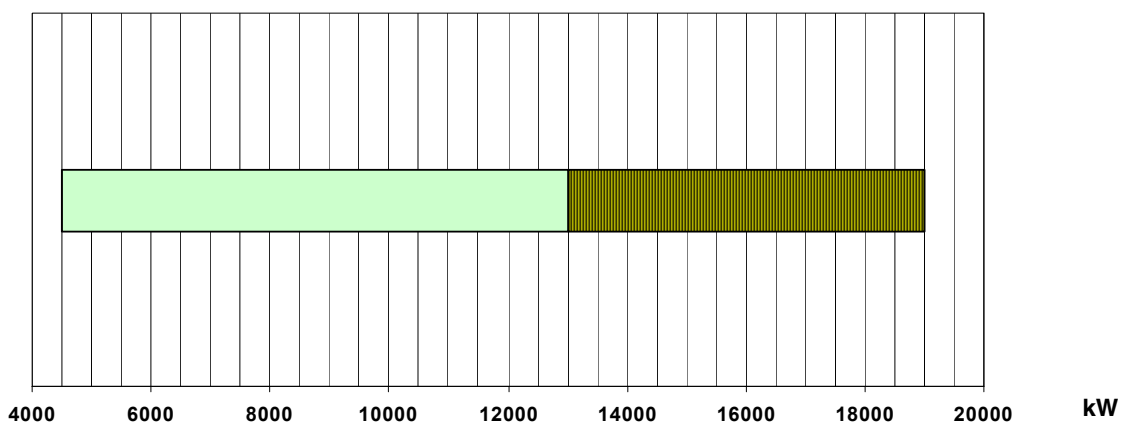
Country and usefulness gas categories

GAS CATEGORY	COUNTRY																								
	AT	ES	GR	SE	FI	IE	HU	IS	NO	CZ	DK	GB	IT	PT	CY	EE	LV	SI	MT	SK	BG	LT	RO	TR	CH
I _{2H}																									
I _{2E}	LU	PL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I _{2E(R) B}	BE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I _{2L}	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I _{2ELL}	DE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I _{2Er}	FR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Overall dimensions (mm)



	DN	A	B	C	CC	D	E	F	G	H	J	JJ	K	KK	L	M	N	O	OO	P	Q	R	RR	S	SS	TT	U	V	W	Y	Z
HTP1030	80	1864	544	1320	348	1898	1301	597	464	504	710	185	660	660	845	M16	651	460	1000	460	936	200	265	736	80	587	1092	322	1175	372	330
HTP1030	100	1864	544	1320	348	1914	1317	597	464	504	710	185	660	660	845	M16	651	460	1000	460	842	200	265	642	80	587	1092	382	1175	372	330
HTP1050	80	1864	544	1320	348	1898	1301	597	489	539	710	185	660	660	845	M16	651	460	1000	460	936	200	265	736	80	587	1092	322	1175	408	330
HTP1050	100	1864	544	1320	348	1914	1317	597	489	539	710	185	660	660	845	M16	651	460	1000	460	842	200	265	642	80	587	1092	382	1175	408	330
HTP1080	100	1864	544	1320	348	1914	1317	597	514	564	710	185	660	660	845	M16	651	460	1000	460	842	200	265	642	80	587	1092	382	1175	408	330
HTP1080	125	1864	544	1320	348	1946	1349	597	514	564	710	185	660	660	845	M16	651	460	1000	460	954	200	265	754	80	587	1192	480	1175	408	330

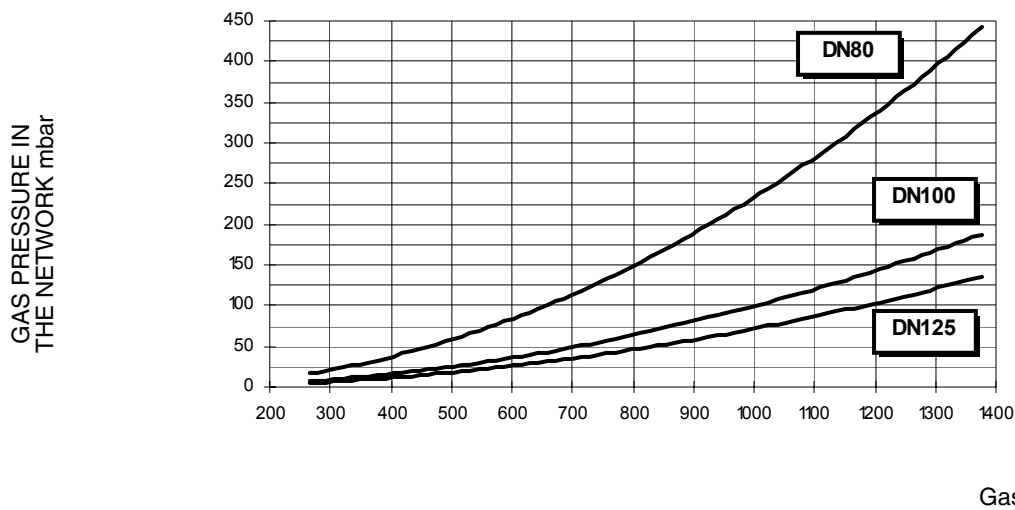
Performance curves**HTP1030****HTP1050****HTP1080**

Performance range

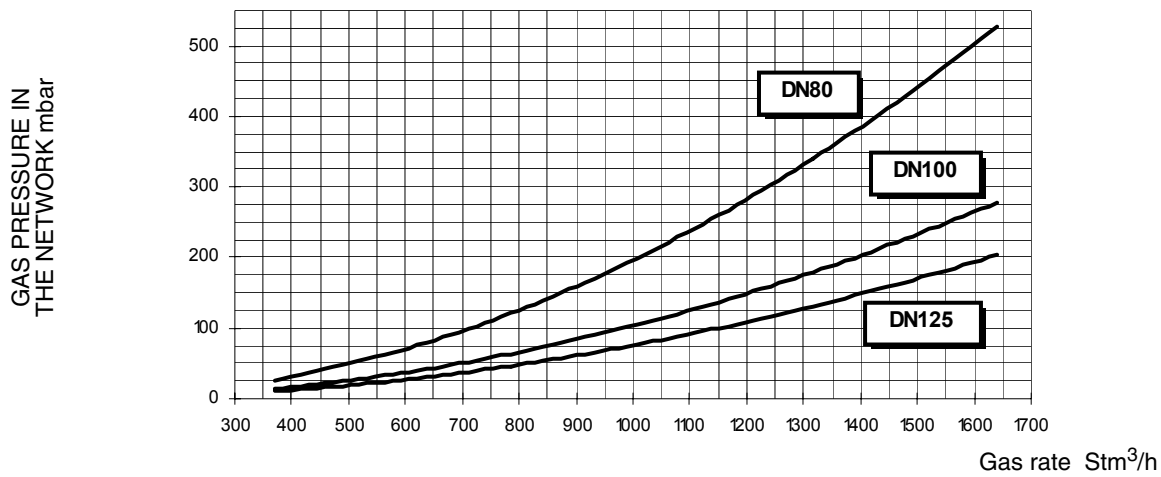
To get the input in kcal/h, multiply value in kW by 860.
 Data are referred to standard conditions: 1013mbar, 15°C.

Pressure in the network / gas rate curves

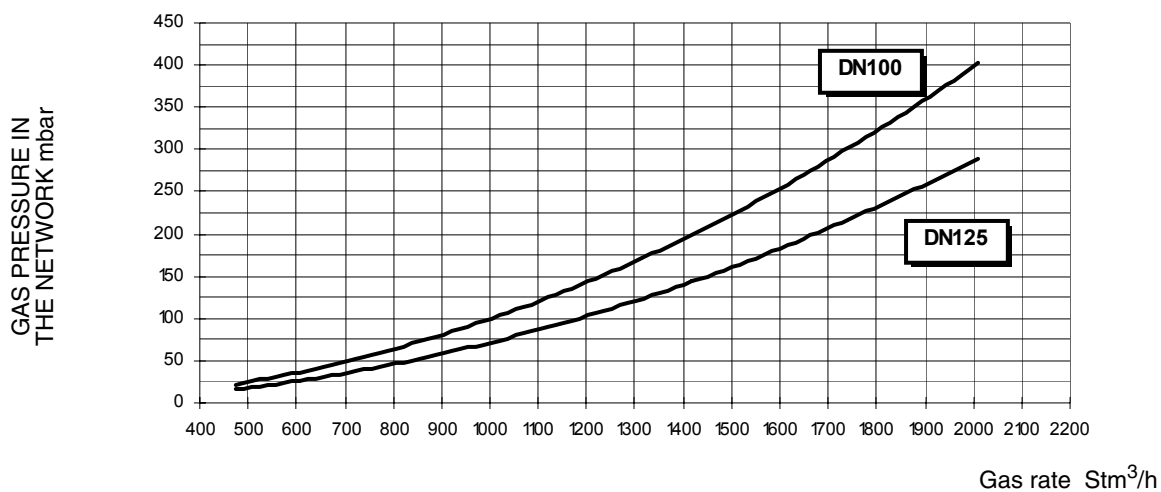
HTP1030



HTP1050



HTP1080



Caution: 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.

INSTALLATION

Packing

The burners are despatched in wodden crates whose dimensions are:

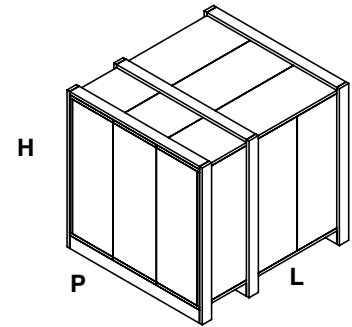
HTP1030 - HTP1050: 2180 mm x 1180 mm x 1210 mm (L x P x H)

HTP1080: 2180 mm x 1580 mm x 1560 mm (L x P x H)

Packing cases of this type are affected by humidity and are not suitable for stacking.

In each packing case, find:

- 1 burner with gas train detached;
- 1 gasket to be inserted between the burner and the boiler;
- 2 flexible oil pipes;
- 1 oil filter;
- 1 envelope containing this manual



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

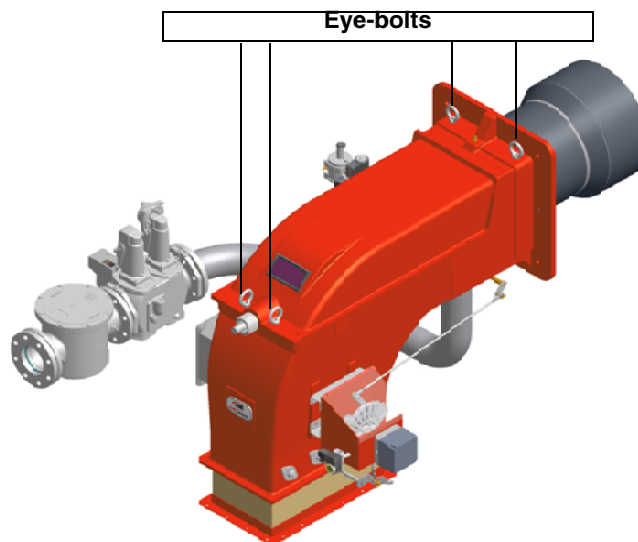
Handling the burner



ATTENTION! Handling operations must be performed by trained personnel specialised on handling loads. If these operations are not carried out correctly, the residual risk for the machine to overturn and fall down remains.

To handle the machine, use means suitable to handle requested loads (see par. "Technical specifications").

The burner is provided with eye-bolts for lifting.



Fitting the burner to the boiler

- 1 To perform the installation, it is necessary to drill the boiler door as described on paragraph "Overall dimensions";
- 2 screw the studbolts (5) on the boiler door, according to the drilling plate (see paragraph "Overall dimensions");
- 3 move the burner towards the boiler: lift the burner by means of the eyebolts placed on its top side;
- 4 remove the blast tube, by loosening the three screws beside the burner flange;
- 5 place the ceramic fibre plait on the burner flange;
- 6 replace the blast tube: before fastening completely the screws, avoid any misalignment between the blast tube axis and the combustion head axis;
- 7 install the burner to the boiler;
- 8 fix the burner to the stud bolts, by means of the fixing nuts, according to Fig. 4.
- 9 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).

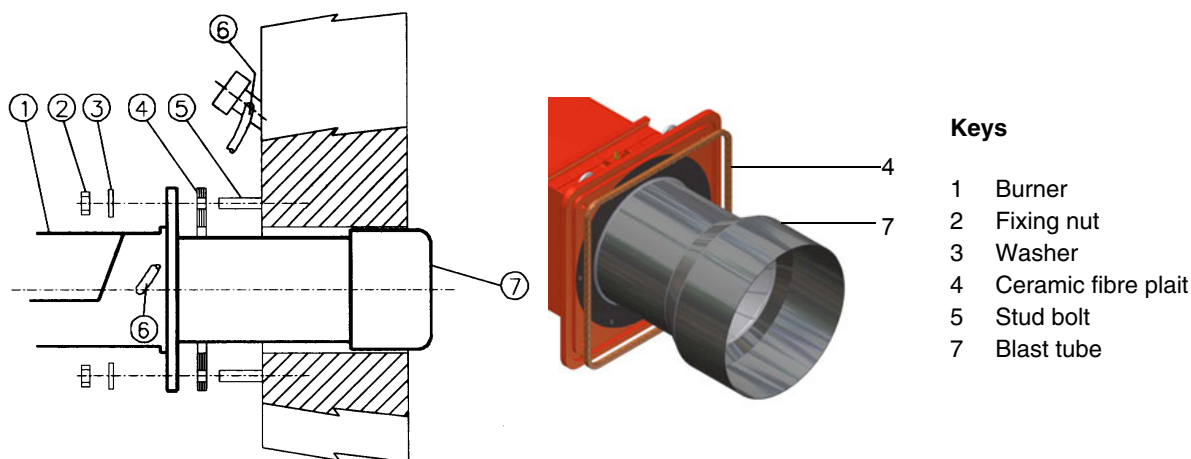


Fig. 4

Fan installation

Pay attention when designing the air duct: dimensioning must be performed according to the flow rate, the temperature, the distance between the fan and the burner and according to the fan features as well.

ATTENTION! The bellows unit provided is made of canvas and is provided with blocking spacers to avoid breaking it during installation: **first** place the bellows unit between flanges, **then** remove the spacers. Canvas has to be stretched after the installation, but not stressed.

Matching the burner to the boiler

To correctly match the burner to the boiler 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 100 mm into the combustion chamber.
- Pressurised boilers with flame reversal: in this case the blast tube must penetrate at least 50 - 100 mm into combustion chamber in respect to the tube bundle plate.

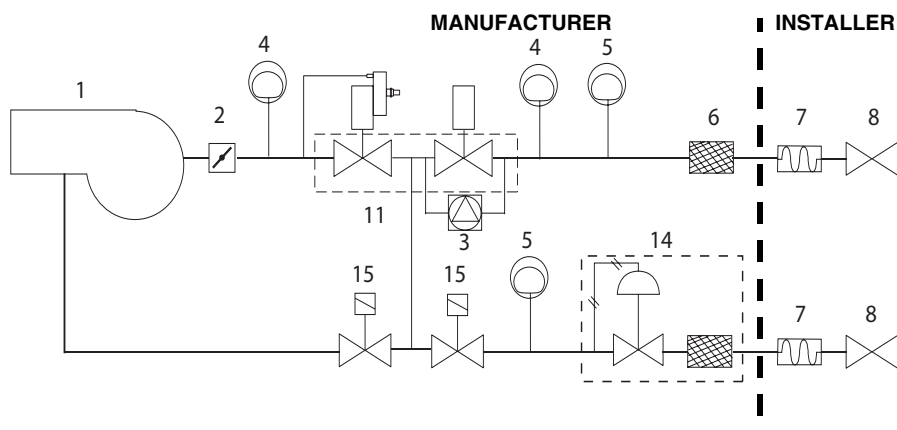
The length of the blast tubes does not always allow this requirement to be met, and thus it may be necessary to use a suitably-sized spacer to move the burner backwards.

GAS TRAIN CONNECTIONS

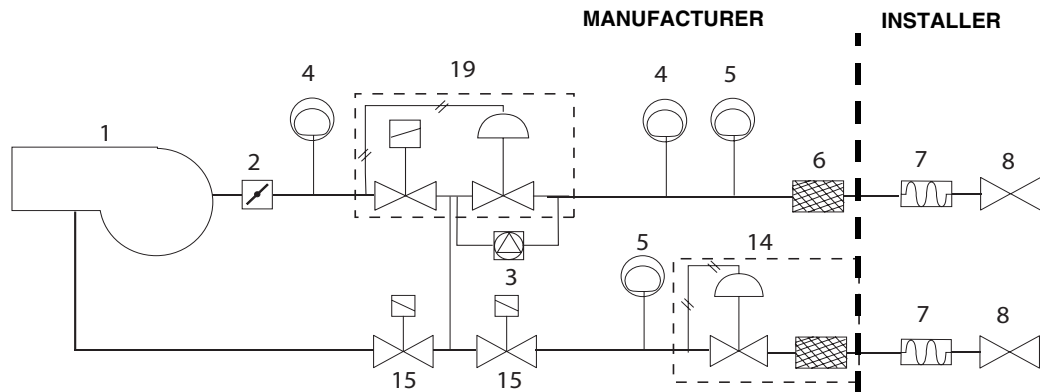
The diagrams show the components of the gas train included in the delivery and which must be fitted by the installer. The diagrams are in compliance with the current laws.

ATTENTION: BEFORE EXECUTING THE CONNECTIONS TO THE GAS PIPE NETWORK, BE SURE THAT THE MANUAL CUTOFF VALVES ARE CLOSED.

Gas train - 1 (DN80/100): Gas train with valves group VGD40 with built-in gas pressure governor + VPS504 gas proving system



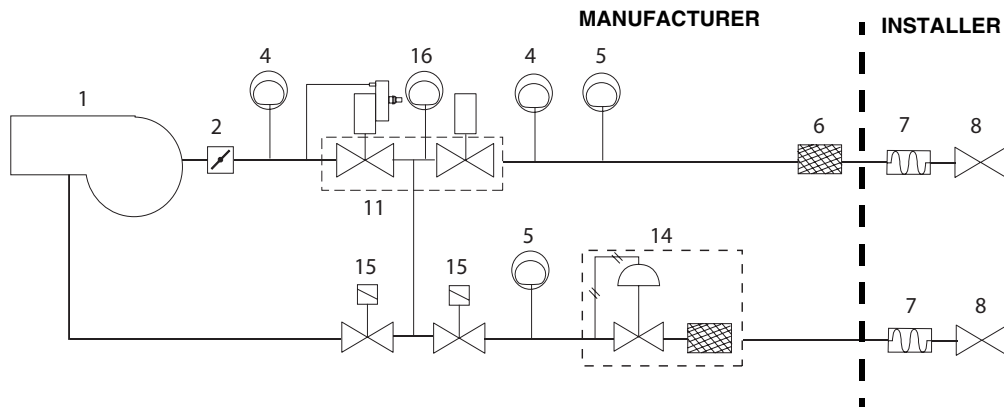
Gas train 2 (DN80/100): Gas train with valves group MBC 1900/3100/5000SE (2 valves + gas filter + pressure governor + pressure switch) + LDU gas proving system



Key

- | | |
|--------------------------------------|----------------------------------|
| 1 Burner | 8 Manual cutoff valve |
| 2 Butterfly valve | 11 VGD Valves group |
| 3 Gas proving system | 14 Pressure governor with filter |
| 4 High gas pressure switch (option*) | 15 Ignitor gas valve |
| 5 Low gas pressure switch | 19 MBC Valves group (DN80/100) |
| 6 Gas filter | |
| 7 Bellow joint | |

Gas train - 3: Gas train with valves group VGD 40 with built-in gas pressure governor + gas leakage pressure switch (PGCP) for Siemens LDU/LMV burner control



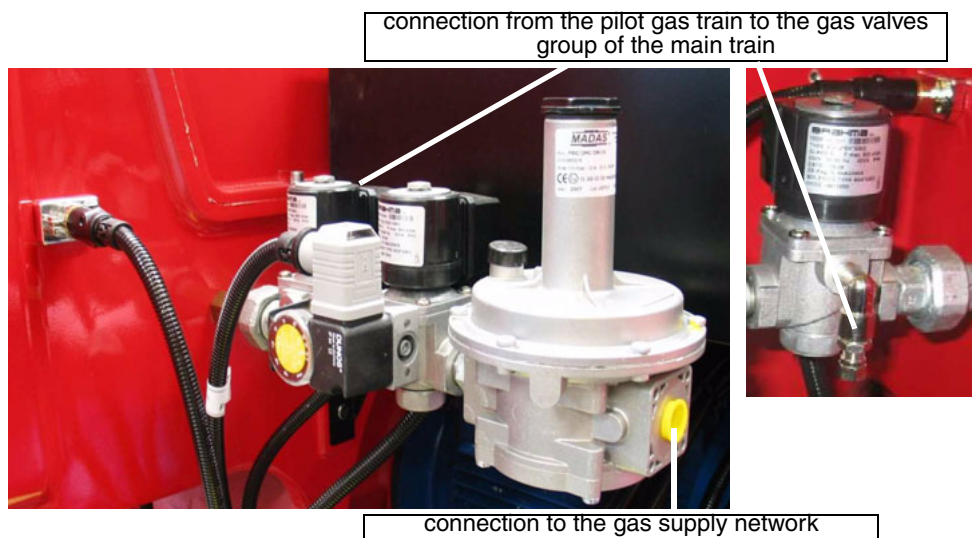
Key

- | | |
|--------------------------------------|---|
| 1 Burner | 8 Manual cutoff valve |
| 2 Butterfly valve | 11 VGD Valves group |
| 4 High gas pressure switch (option*) | 14 Pressure governor with filter |
| 5 Low gas pressure switch | 15 Ignitor gas valve |
| 6 Gas filter | 16 PGCP (leakage control pressure switch) |
| 7 Bellow joint | |

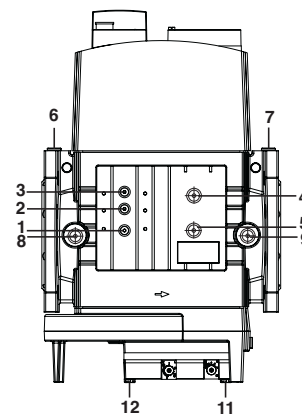
* Note: the high gas pressure switch can be mounted either upstream the gas valve or downstream the gas valves but upstream the butterfly gas valve.

The pilot gas train is already installed to the burner, the following connections must be executed:

- connection from the filter with stabiliser to the gas supply network
- connection from the valve to the main gas train, by means of the pipe provided with the burner.



SIEMENS VGD40..



DUNGS MBC3100-5000SE

Fig. 5 - pipe port (3) for connecting the pilot gas train to the valves group of the main gas train

Assembling the gas grain

To assemble the main gas train, proceed as follows:

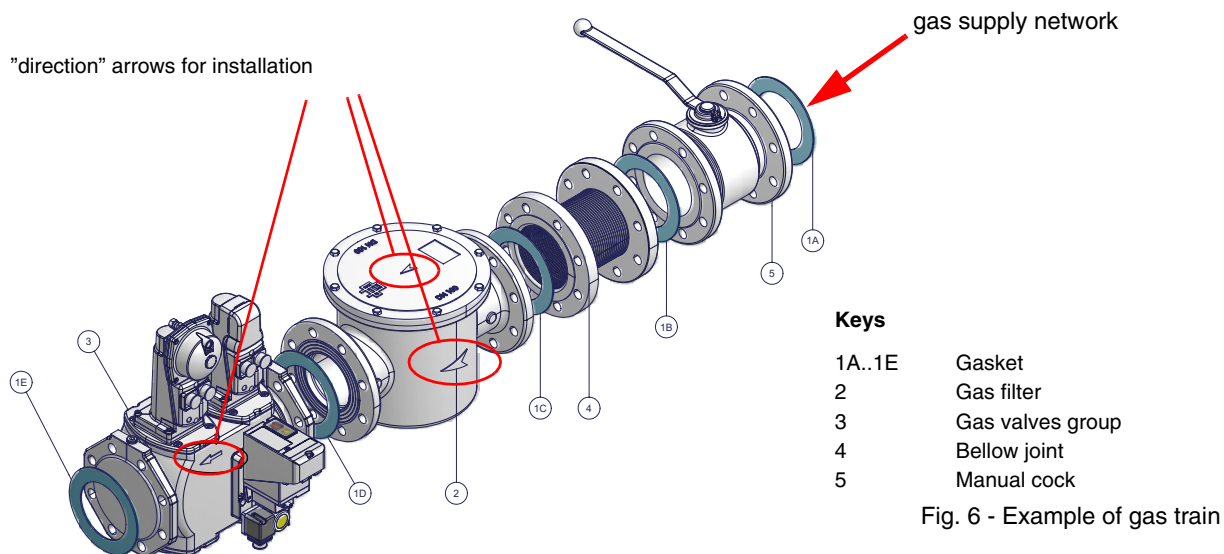


Fig. 6 - Example of gas train

- 1) in case of flanged joints: place a gasket (no. 1A..1E - Fig. 6) between the elements
- 2) fasten all the items by means of screws, according to the schemes showed before, observing the mounting direction for each item.

NOTE: the bellow joint, the manual valve and the gaskets are not part of the standard supply.



ATTENTION: once the gas train is mounted according to the diagram on Fig. 6, the gas proving test must be performed, according to the procedure set by the laws in force.

The procedures of installation for the gas valves are showed in the next paragraphs, according to the gas train used:

- flanged gas trains with Multibloc Dungs MBC..SE 1900-3100-5000 or Siemens VGD40.. (flanged valves group)

Siemens VGD20.. and VGD40.. gas valves - with SKP2.. (pressure governor)

Mounting

- When mounting the VGD.. double gas valve, two flanges are required (as for VGD20.. model, the flanges are threaded);
- to prevent cuttings from falling inside the valve, first fit the flanges to the piping and then clean the associated parts;
- install the valve;
- the direction of gas flow must be in accordance with the direction of the arrow on the valve body;
- ensure that the bolts on the flanges are properly tightened;
- ensure that the connections with all components are tight;
- make certain that the O-rings and gaskets between the flanges and the double gas valve are fitted.
- Connect the reference gas pipe (**TP** in figure), 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.



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

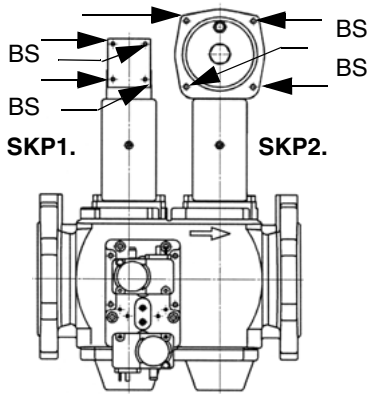


Fig. 7

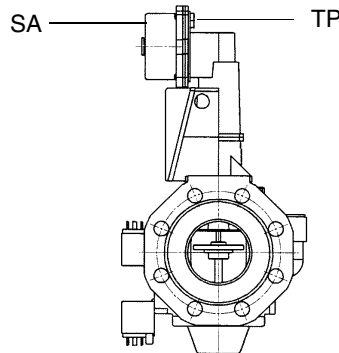


Fig. 8

SIEMENS VGD..MOUNTING
POSITIONS

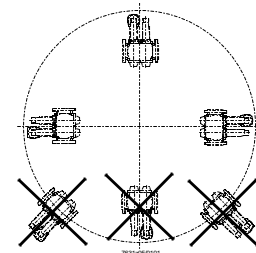


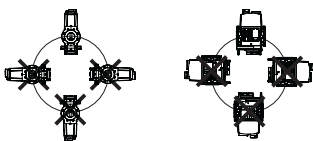
Fig. 9

MULTIBLOC DUNGS MBC1900-3100-5000SE (Flanged valves group)

Mounting

1. Insert setscrews A
 2. Insert seals
 3. Insert setscrews B
 4. Tighten setscrews A + B.
- Ensure correct seating of the seal!
6. After installation, perform leakage and functional test.
 7. Disassembly in reverse order.

Mounting positions



OPTION

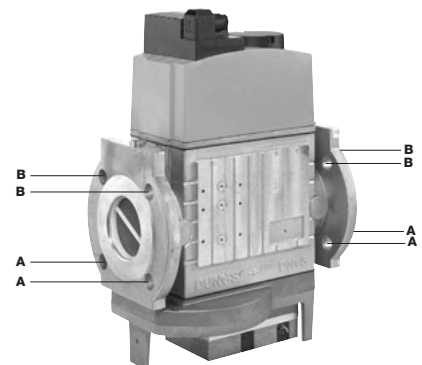
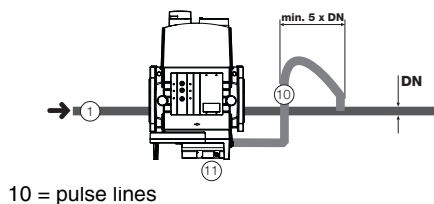
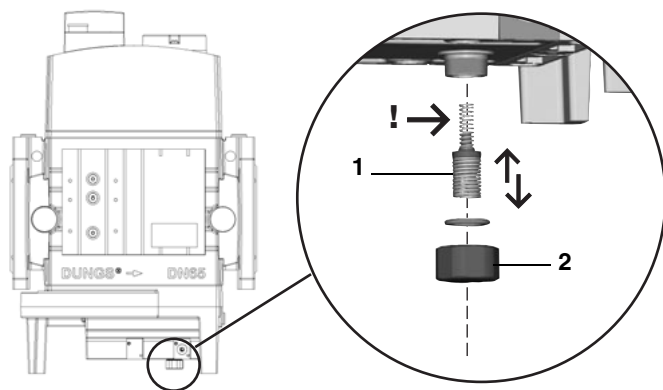
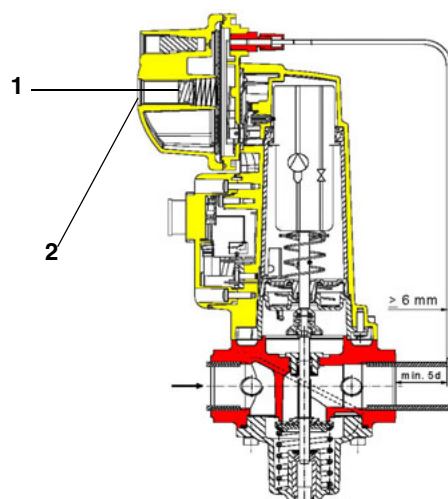


Fig. 10

Pressure adjusting range

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

**DUNGS MBC..SE****Siemens SKP actuator****Keys**

1 spring

2 cap

DUNGS MBC valves:

Performance range (mbar)	4 - 20	20 - 40	40 - 80	80 - 150
Spring colour	-	red	black	green

Siemens VGD valves with SKP actuator:

Performance range (mbar)	0 - 22	15 - 120	100 - 250
Spring colour	neutral	yellow	red

Once the train is installed, electrically connect all its elements: gas valves group, pressure switches, gas proving system.



ATTENTION: once the gas train is mounted according to the diagram on Fig. 6, the gas proving test must be performed, according to the procedure set by the laws in force.

Hydraulic diagrams for light oil supplying circuits

Fig. 11 - Gravity circuit

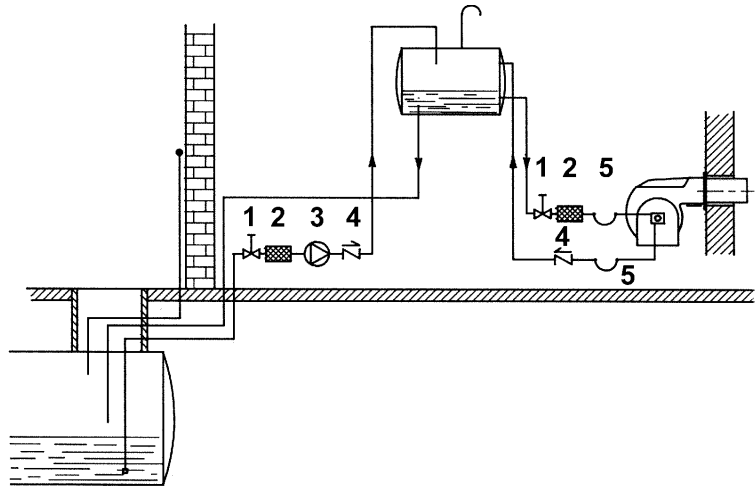


Fig. 12 - Ring circuit

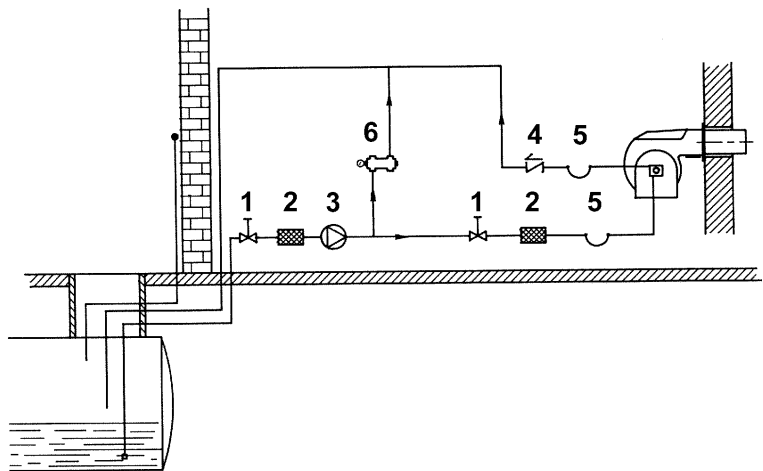
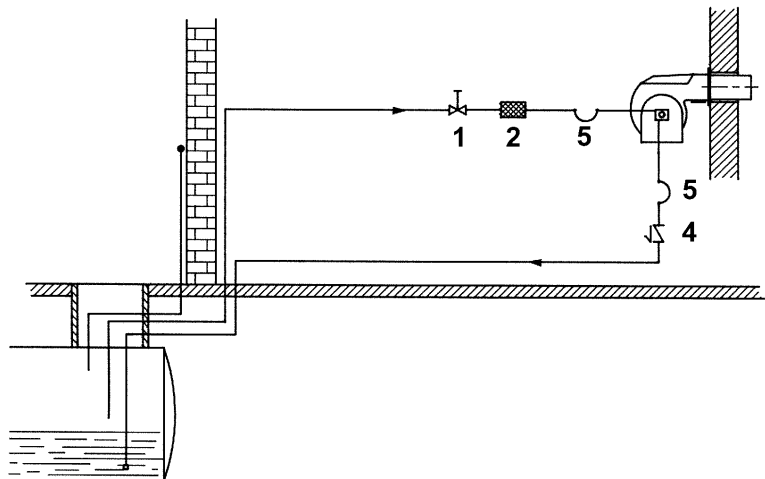


Fig. 13 - Suction circuit



Key

- 1 Manual valve
- 2 Light oil filter
- 3 Light oil feeding pump
- 4 One way valve
- 5 Flexible hoses
- 6 Relief valve

NOTE: in plants where gravity or ring feed systems are provided, install an automatic interception device (see n. 4 - Fig. 14).

Light oil piping installation diagram

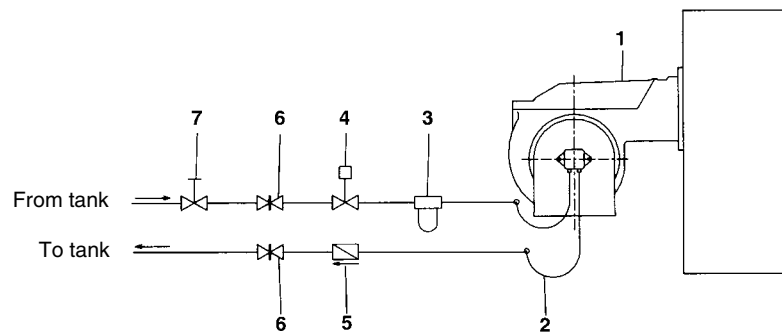


Fig. 14

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 (not in vicinity of tank or boiler)

(*) 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.

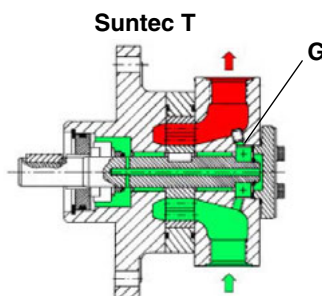
The pumps that are used can be installed both into single-pipe and double-pipe systems.

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-stage 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.
pipeline length in meters.



Bleed

Bleeding in two-pipe operation is automatic: it is assured by a bleed flat on the piston. In one-pipe operation, the plug of a pressure gauge port must be loosened until the air is evacuated from the system.

About the use of fuel pumps

- Make sure that the by-pass plug is not used in a single pipe installation, because the fuel unit will not function properly and damage to the pump and burner motor could result.
- 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 sg component. The number of junctions should be kept to a minimum as they are a possible source of leakage.

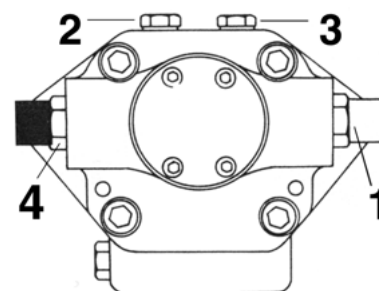
- Do not use PTFE tape on the suction and return line pipes to avoid the possibility that particles enter circulation. These could deposit on the pump filter or the nozzle, reducing efficiency. Always use O-Rings or mechanical seal (copper or aluminium gaskets) junctions if possible.
- An external filter should always be installed in the suction line upstream of the fuel unit.

Suntec T pump

Viscosity	4 - 800 cSt
Oil temperature	0 - 140 °C
Minimum suction pressure	- 0.45 bar to prevent gasing
Maximum suction pressure	5 bar
Rated speed	3600 rpm max.

Key

- 1 To pressure adjusting valve G3/4
- 2 Pressure/vacuum gauge port to measure the inlet pressure/vacuum G1/4
- 3 Pressure gauge port G1/4
- 4 Inlet G3/4



Suntec TV Pressure governor

Pressure adjustment

Remove cap-nut 1 and the gasket 2, unscrew the lock nut 4. To increase pressure, twist adjusting screw 3 clockwise.

To decrease the pressure, twist screw counterclockwise. Tight the lock nut 4, refit the gasket 2 and the cap nut 1.

Key

- 1 Cap nut
- 2 Gasket
- 3 Adjusting screw
- 4 Lock nut
- 5 Gasket

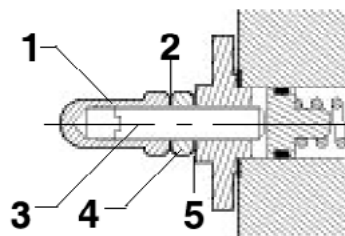


Fig. 15

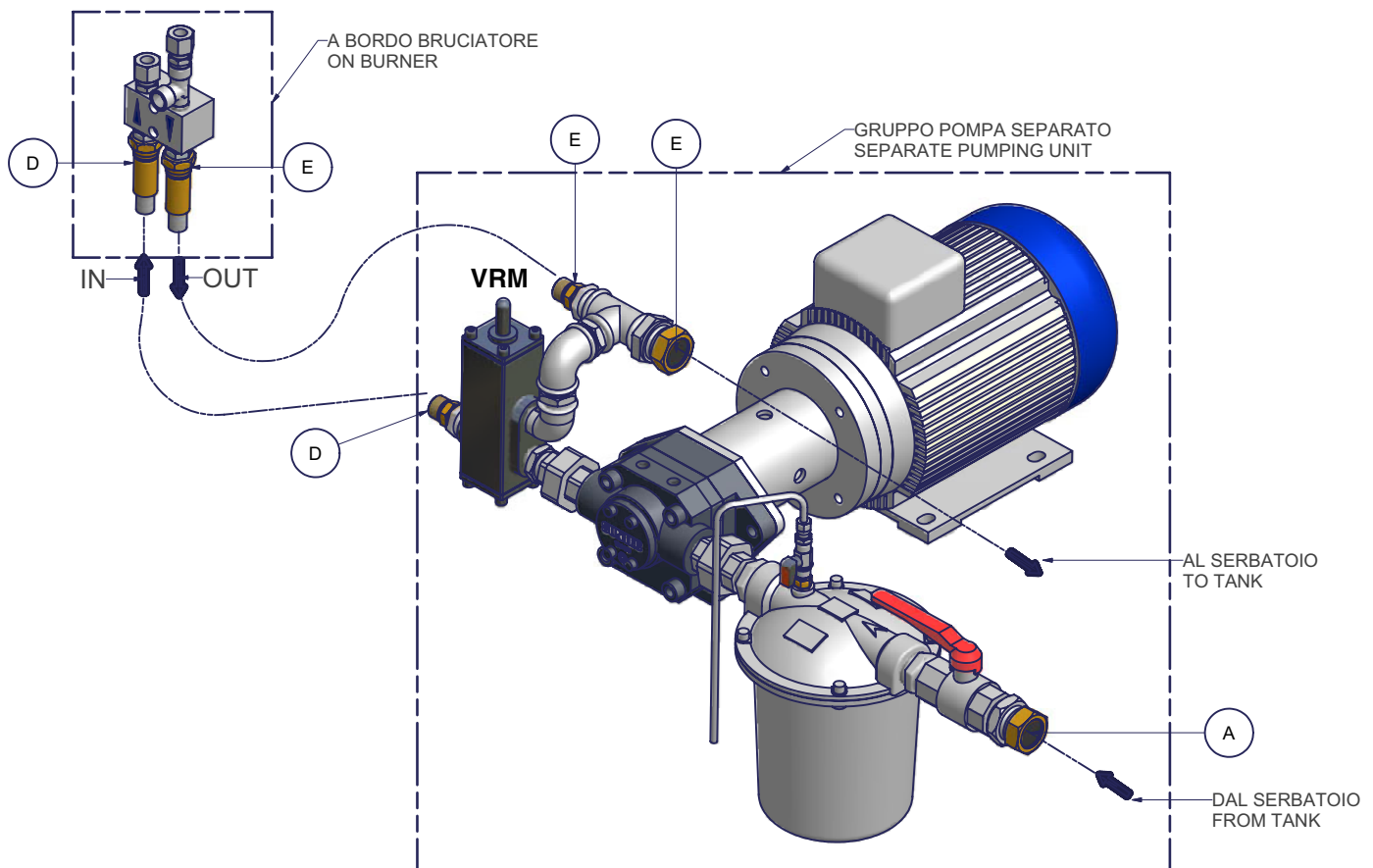
Assembling the light oil flexible hoses

To connect the flexible light 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 inlet and return lines**: see the arrows marked on the pump that show the inlet and the return (see previous paragraph).

Connecting the burner to the light oil pumping unit

Follow the scheme in the picture below to connect the burner to the oil pumping unit. The pump sends the oil coming from the tank to the burner. The pressure governor makes the oil reach the nozzle at the required pressure, while the excess of oil goes back to the tank. To change the delivery pressure act on the VRM adjusting screw of the delivery pressure governor.



CAUTION: caps are not sealing type but used for shipment only. The flexible hoses between the pump and the burner are the ones called (on the label) "Oil high pressure flexible hose". The flexible hose called "Oil low pressure flexible hose" is the one to be connected upstream the oil filter.

Electrical connections

	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.
	ATTENTION: 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.

To execute the electrical connections, please refer to the attached electrical wiring diagrams.

To execute the electrical connections, proceed as follows:

- 1 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 following diagrams,
- 3 check the direction of the fan motor (see next paragraph)
- 4 refit the panel cover.

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

Rotation of fan motor and pump motor

Once the electrical connection of the burner is executed, remember to check the rotation of the motor. The motor should rotate according to the indication on the body. In the event of wrong rotation, reverse the three-phase supply and check again the rotation of the motor.

ADJUSTMENTS

	ATTENTION: 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.
	ATTENTION: 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: EVER LOOSE THE SEALED SCREWS, OTHERWISE THE DEVICE WARRANTY WILL BE IMMEDIATELY INVALIDATE!

Combustion head gas pressure curves depending on the flow rate

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

The curves referred to the gas pressure in the combustion head, depending on the gas flow rate, are referred to the burner properly adjusted (percentage of residual O₂ in the flues as shown in the "Recommended combustion values" table and CO in the standard limits). During this stage, the combustion head, the gas butterfly valve and the servocontrol are at the maximum opening. Refer to Fig. 16, 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.

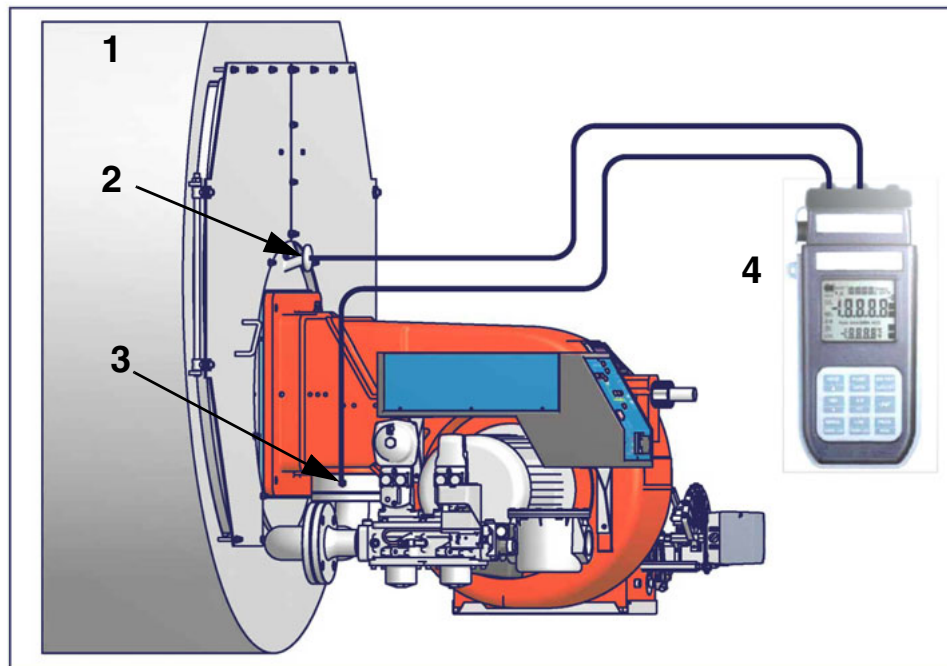


Fig. 16

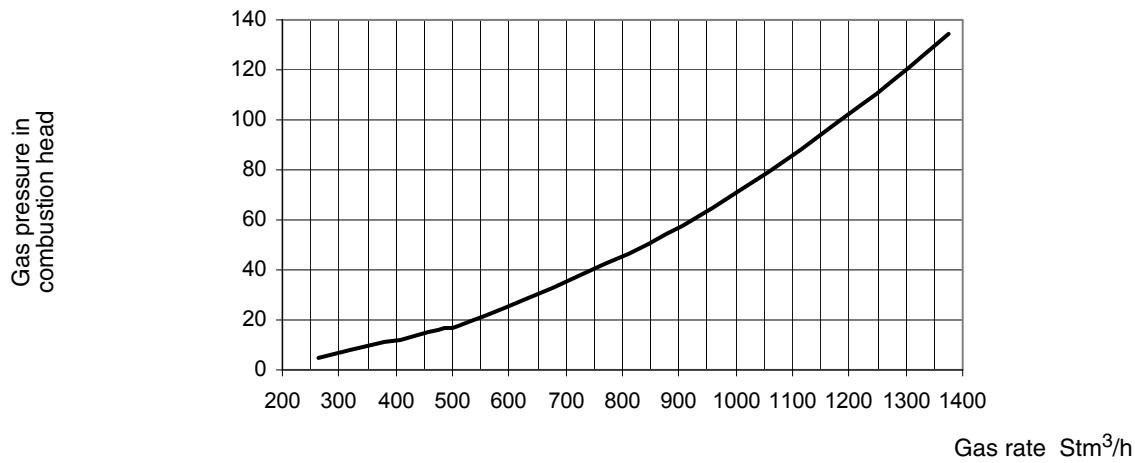
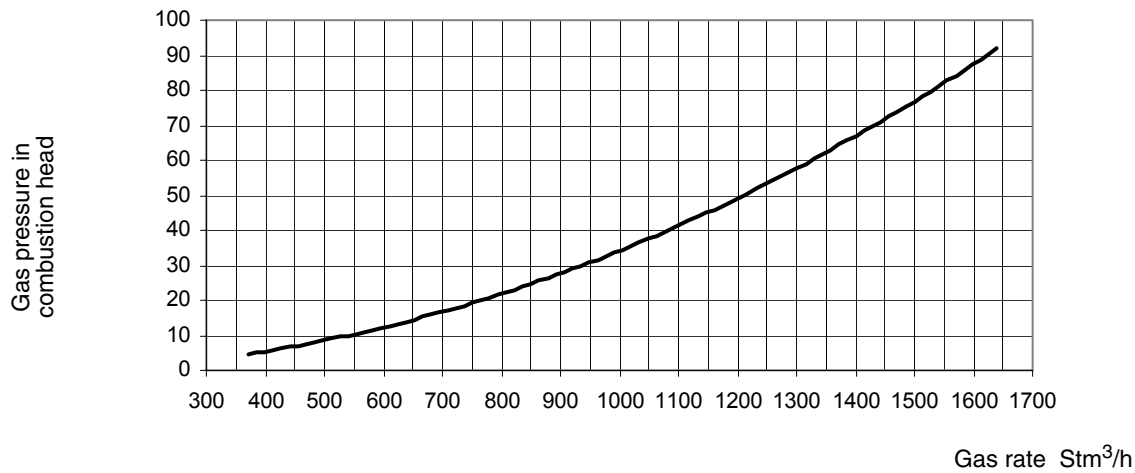
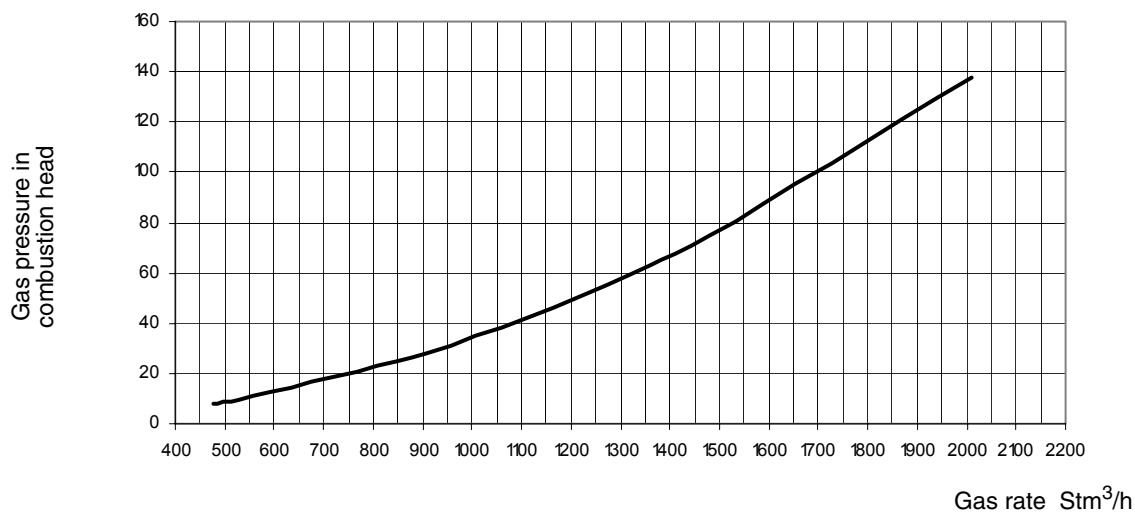
Key

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

Measuring the 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 (Fig. 16-2) to get the pressure in the combustion chamber and the other one into the butterfly valve's pressure outlet of the burner (Fig. 16-3). 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 Stm³/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.

NOTE: THE PRESSURE-RATE CURVES ARE GIVEN AS INFORMATION ONLY; FOR A PROPER SETTING OF THE GAS RATE, PLEASE REFER TO THE GAS METER READING.

Pressure - rate in combustion head curves**HTP1030****HTP1050****HTP1080**

IMPORTANT! the combustion air excess must be adjusted according to the in the following chart:

Recommended combustion parameters		
Fuel	Recommended (%) CO_2	Recommended (%) O_2
Natural gas	9 ÷ 10	3 ÷ 4.8
Light oil	11.5 ÷ 13	2.9 ÷ 4.9

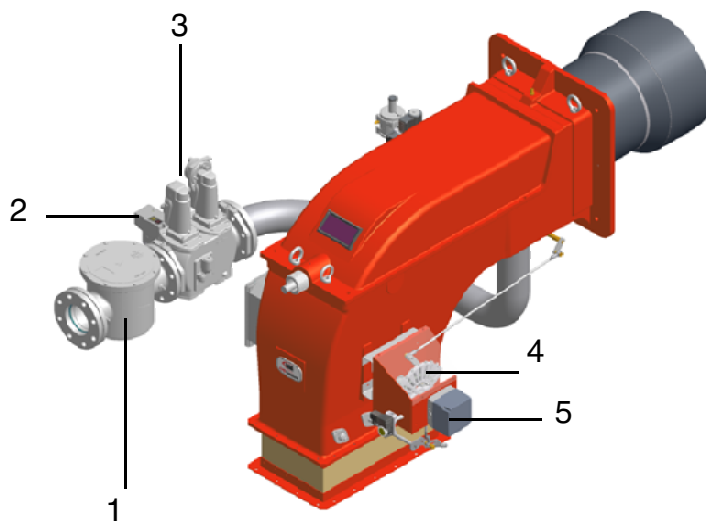


Fig. 17

Keys

- 1 Gas filter
- 2 Gas proving system
- 3 Gas valves
- 4 Adjusting cam
- 5 Actuator

Gas Filter

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.

VPS504 Gas proving system

The VPS504 checks the operation of the seal of the gas shut off valves. This check is carried out as soon as the boiler thermostat gives a start signal to the burner, creating, by means of the diaphragm pump inside it, a pressure in the test space of 20 mbar higher than the supply pressure.

When wishing to monitor the test, install a pressure gauge ranged to that of the pressure supply point PA.

If the test cycle is satisfactory, after a few seconds the consent light LC (yellow) comes on. In the opposite case the lockout light LB (red) comes on.

To restart it is necessary to reset the appliance by pressing the illuminated pushbutton LB.

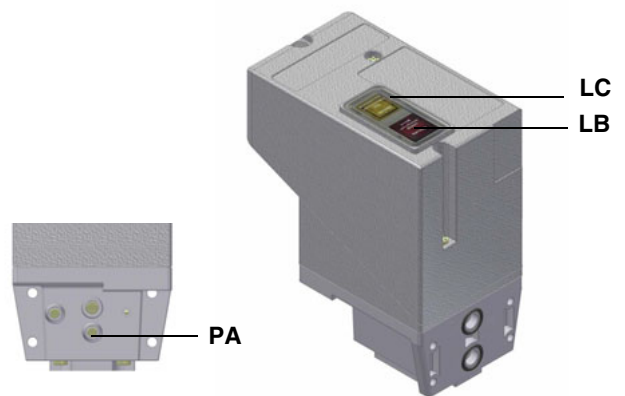


Fig. 18

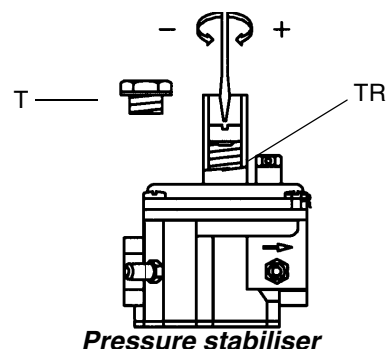
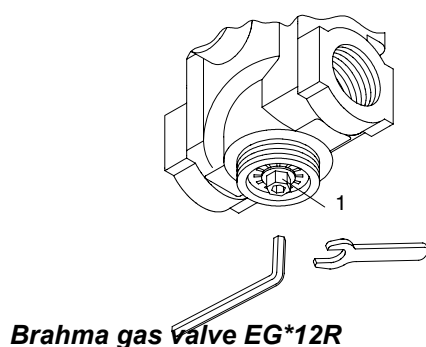
Adjusting the injector gas flow rate: Brahma EG12*R valve and pressure governor

To change the injector gas valve flow rate, proceed as follows:

- 1 remove the protection on the bottom of the valve, moving it counterclockwise (see next picture);
- 2 rotate clockwise the nut 1 as shown, to close the valve; counterclockwise to open the valve.

To perform a finest adjustment, act directly on the pressure governor as follows (see next picture):

- 3 remove the cap T: to increase the outlet gas pressure, use a screwdriver on the screw TR as shown in the picture below. Screw to increase the pressure, unscrew to decrease; once the regulation is performed, replace cap T.



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.

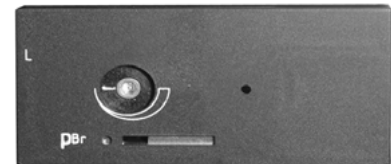
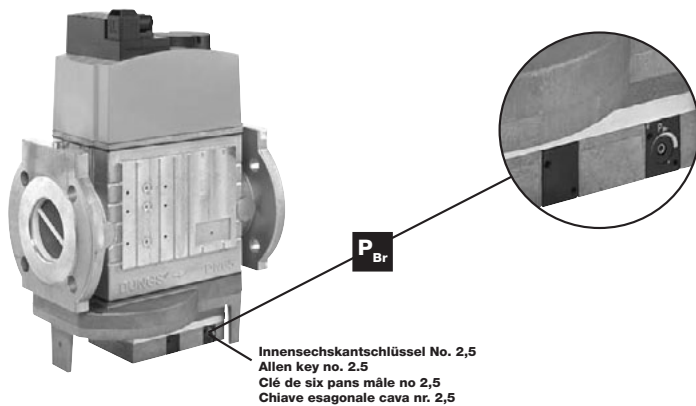
- Check that the combustion parameters are in the suggested limits.
- Check the flow rate measuring it on the counter or, if it was not possible, verifying the combustion head pressure by means of a differential pressure gauge, as described on par. "Measuring the gas pressure in the combustion head" on page 22.
- 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.

Now, adjust the burner according to the actuator model provided.

Adjustment procedure

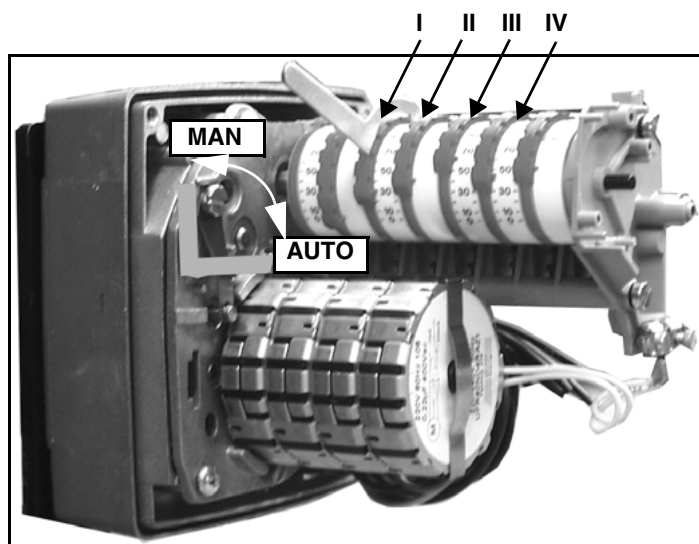
To change the burner setting during the testing in the plant, follow the next procedure.

On the DUNGS MBC..SE gas valves group, set the pressure regulator to 1/3 of its stroke, using a 2.5 allen key.



Pressure setting

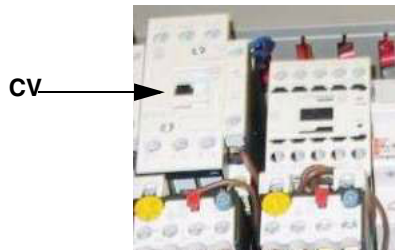
- 1 Before starting the burner up, drive the high flame actuator microswitch matching the low flame one (in order to let the burner operates at the lowest output) to safely achieve the high flame stage.
- 2 cam IV (stroke limitation cam) must be set a little higher than the cam III to limit the output in the first seconds the flame appears;
NOTE: cam IV must shift according to cam III.



Actuator cams

- I High flame
- II Stand-by and Ignition
- III Low flame (gas)
- IV Low flame (oil)
- V Stroke limitation

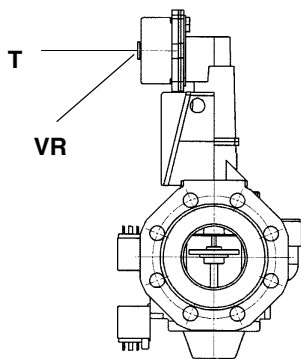
- 1 turn the burner on by selecting GAS fuel by means of the burner **CM** switch (it is placed on the burner control panel)
- 2 open the electrical panel to check the fan motor rotation and act directly on the related contactor (see next picture).



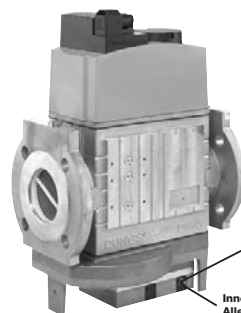
- 3 Before starting the burner up, drive the high flame actuator microswitch matching the low flame one (in order to let the burner operates at the lowest output) to safely achieve the high flame stage.
- 4 Start the burner up by means of the thermostat series and wait until the pre-purge time comes 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 flow 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;
- 8 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:

- **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).

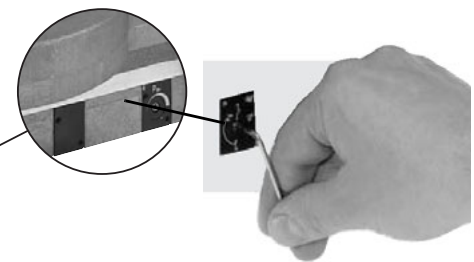
- **Dungs MBC..SE valves group:** act on its pressure governor to increase or decrease the pressure and consequently the gas rate.



Siemens VGD..



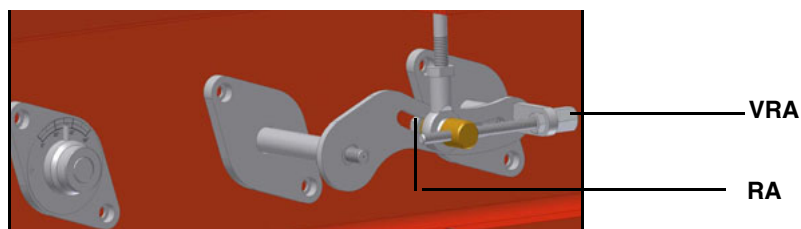
Innensechskantschlüssel No. 2,5
Allen key no. 2,5
Clé de six pans mâle no 2,5
Chiave esagonale cava nr. 2,5



Dungs MBC..SE

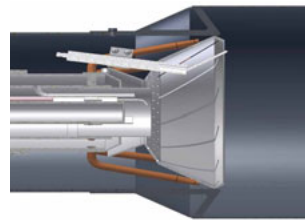
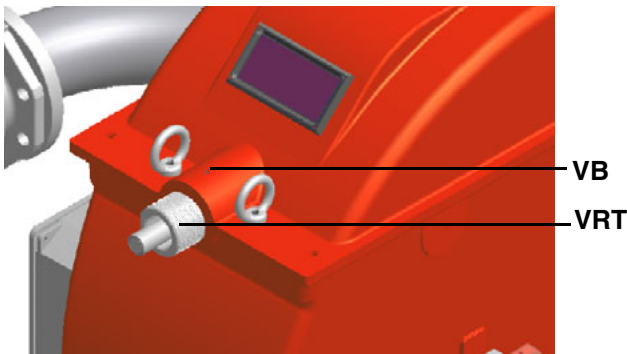
- 9 To adjust the **air flow rate in the high flame stage**, loose the **RA** nut and screw **VRA** as to get the desired air flow rate: moving the rod **TR** towards the air damper shaft, the air damper opens and consequently the air flow rate increases, moving it far from the shaft the air damper closes 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.

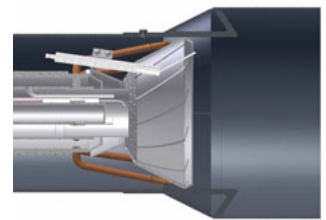


Note: once the procedure is performed, be sure that the blocking nut **RA** is fasten. Do not change the position of the air damper rods.

- 10 Only if necessary, change the combustion head position: to let the burner operate at a lower output, loose the **VB** screw and move progressively back the combustion head towards the MIN position, by turning clockwise the **VRT** ring nut. Fasten **VB** screw when the adjustment is accomplished.



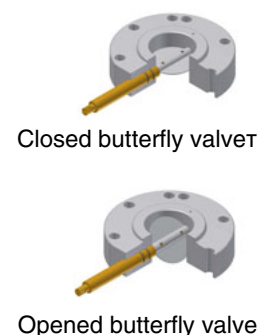
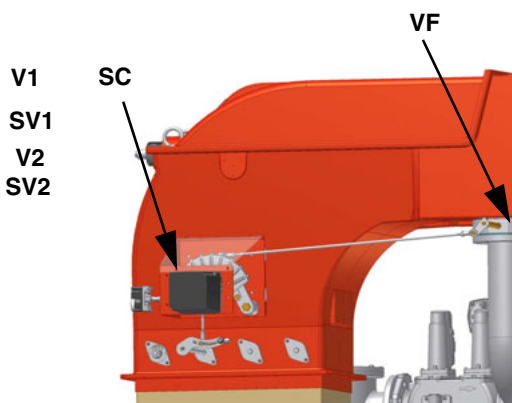
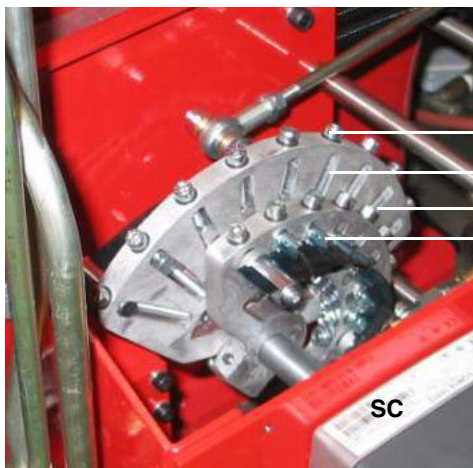
"MAX" head position



head position

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

- 11 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.
- 12 as for the point-to-point regulation, move the gas low flame microswitch (cam III) 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;
- 14 move cam III 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.
- 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 Now adjust the pressure switches (see next paragraph).



Closed butterfly valvet

Opened butterfly valve

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 of low gas pressure switch

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.

Adjusting the high gas pressure switch (when provided)

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

- 1 remove the pressure switch plastic cover;
- 2 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%.
- 3 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%;
- 4 replace the plastic cover.

PGCP Gas leakage pressure switch (with SiemensLDU/Siemens LMV burner control)

- 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.;

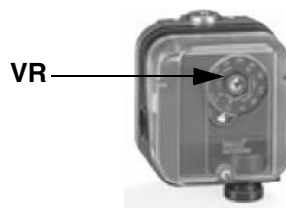


Fig. 19

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.

To move the adjusting cam set CMF=1 or 2 and then CMF=0.

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

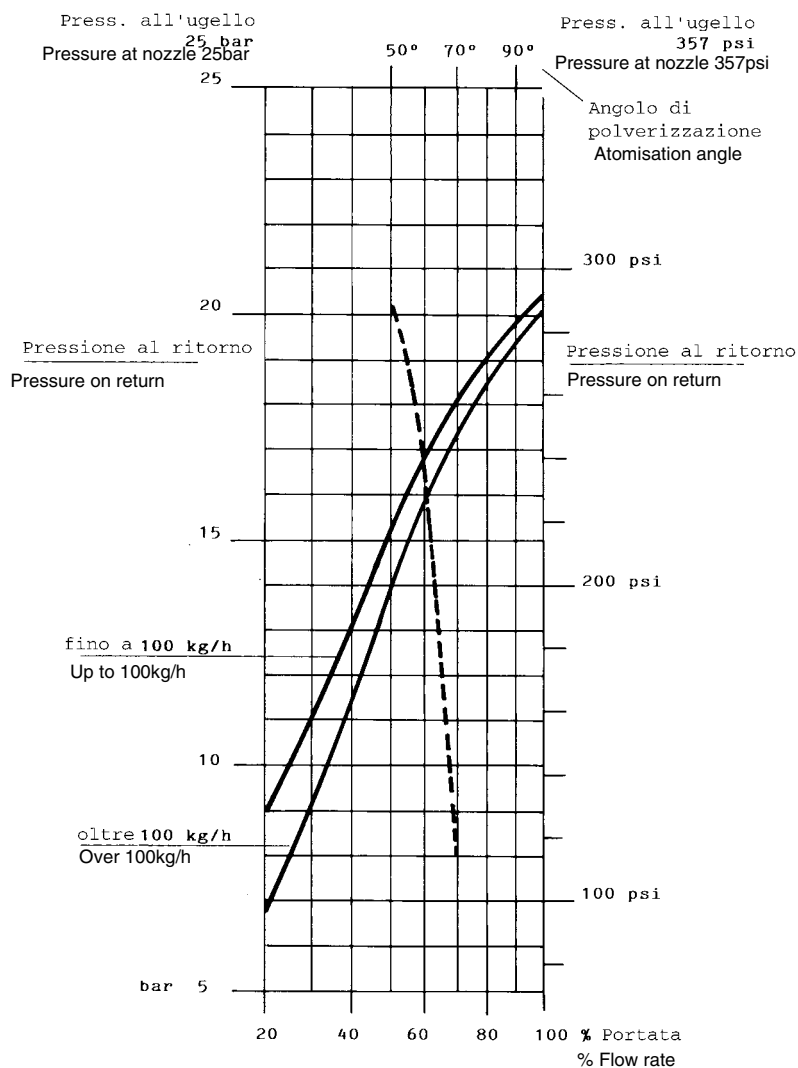
Adjustment for light oil operation

The light oil flow rate can be adjusted choosing a by-pass nozzle that suits the boiler/utilisation output and setting the delivery and return pressure values according to the ones quoted on the chart below and the diagram on Fig. 20 (as far as reading the pressure values, see next paragraphs).

NOZZLE	DELIVERY PRESSURE bar	RETURN PRESSURE MAX. bar	RETURN PRESSURE MIN. bar
FLUIDICS WR2 / BERGONZO B / BERGONZO C	25	20	7 (recommended)

DIMENSIONS	FLOW RATE kg/h	
	Min	Max
40	13	40
50	16	50
60	20	60
70	23	70
80	26	80
90	30	90
100	33	100
115	38	115
130	43	130
145	48	145
160	53	160
180	59	180
200	66	200
225	74	225
250	82	250
275	91	275
300	99	300
330	109	330
360	119	360
400	132	400
450	148	450
500	165	500
550	181	550
600	198	600
650	214	650
700	231	700
750	250	750
800	267	800

Fig. 20



-----Atomisation angle according to the return pressure
 _____ % Flow rate

Tab. 1

Example: as for over 100kg/h nozzles, the 80% of the nozzle flow rate can be obtained with a return pressure at about 18bar (see Fig. 20Fig. 20).

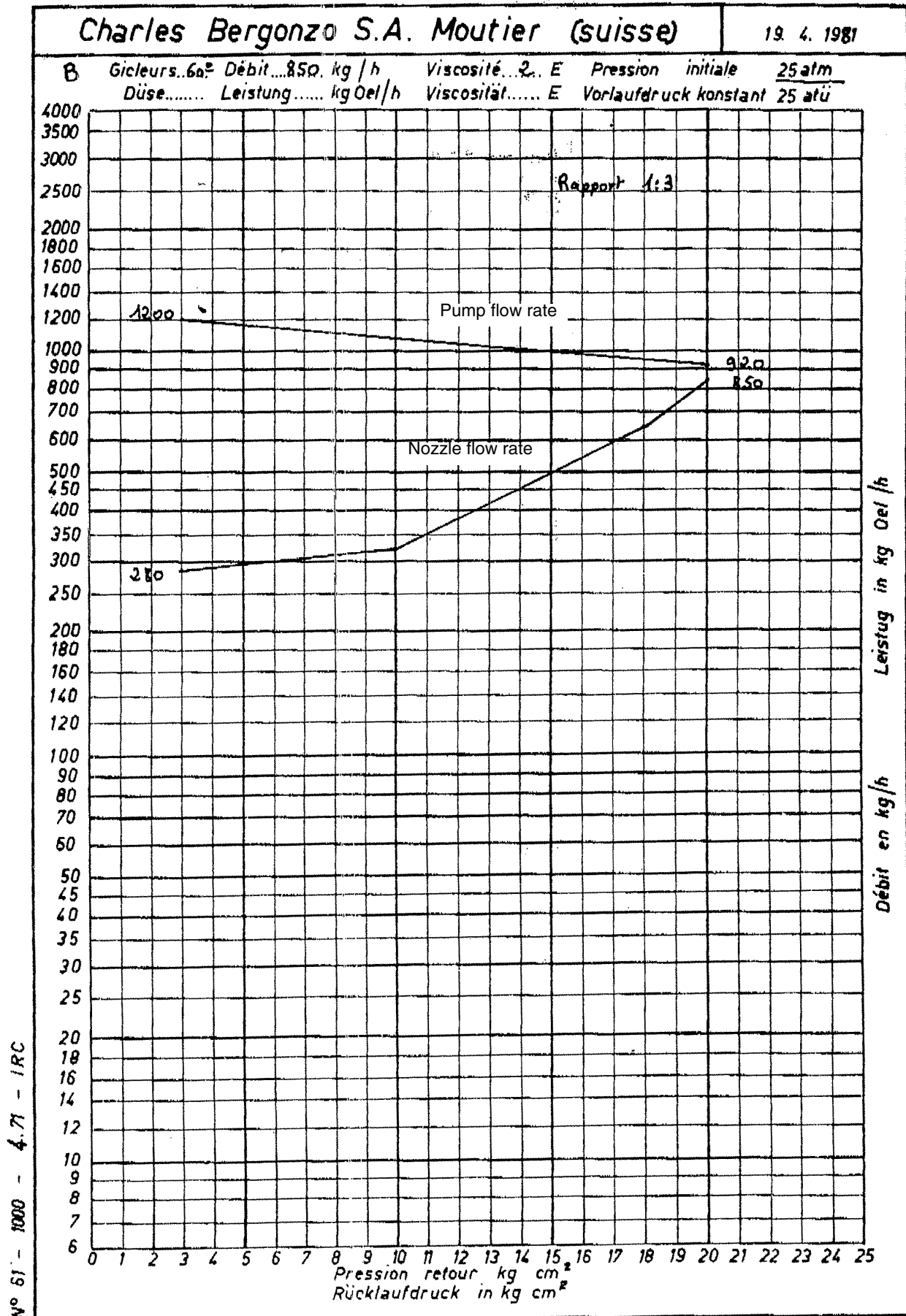
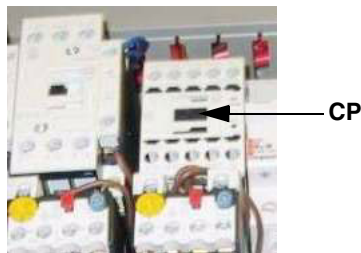


Fig. 21 - Bergonzo nozzle - example with 850kg/h nozzle

- Once the air and gas flow rates are adjusted, turn the burner off, turn the burner on again by means of the **CM** selector to switch to the light oil operation (OIL, on the burner control panel).
- 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 (Fig. 22) by loosening the cap without removing it, then release the contactor.

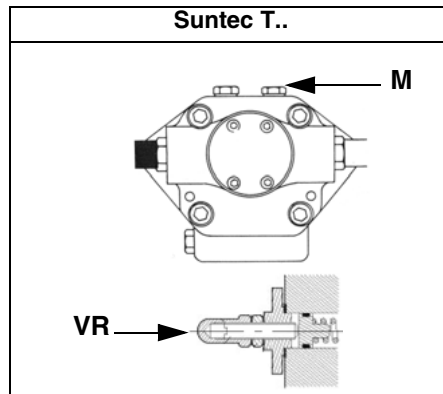
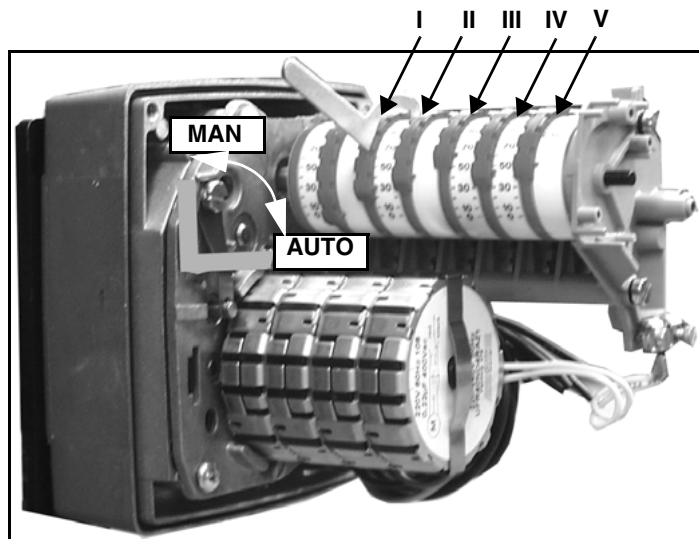


Fig. 22

- 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 achieve safely the high flame stage .
- 5 record the high flame value set during the gas operation adjustments (see previous paragraphs);
- 6 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;
- 7 drive the burner to high flame stage, by means of the thermostat **TAB**.
- 8 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).



Actuator cams

- I High flame
- II Stand-by and Ignition
- III Low flame (gas)
- IV Low flame (oil)
- V Stroke limitation

- 9 the nozzle supply pressure is already factory-set and must not be changed. Only if necessary, adjust the supply pressure as follows (see related paragraph); insert a pressure gauge into the port shown on Fig. 23 and act on the pump adjusting screw **VR** (see Fig. 22 and page 20) as to get the nozzle pressure at 25bar (according to the nozzle model provided- see page 29).

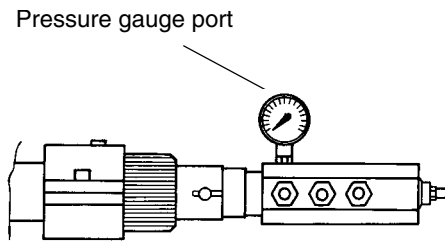


Fig. 23

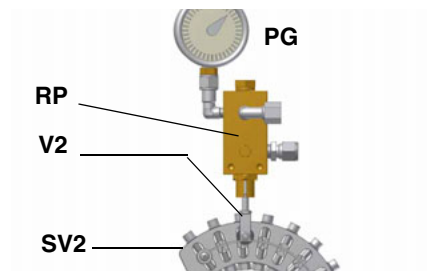


Fig. 24

- 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 as for the point-to-point regulation in order to set the cam foil shape, move the oil low flame microswitch (cam IV) 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 cam IV (oil low flame) towards the minimum to move the actuator towards the low flame until the two bearings find the adjusting screw that refers to a lower position: screw **V2** to increase the rate, unscrew to decrease, in order to get the pressure as showed on chart/diagram on "Adjustment for light oil operation" on page 29, according to the requested rate.
- 14 Move again cam V 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 The low flame position must never match the ignition position that is why cam **IV** must be set 20°- 30° more than the ignition position.
- 16 Set cam V ("stroke limitation cam") 5° higher than the lowest "low flame cam" (cam III or cam IV).
- 17 Turn the burner off; then start it up again. If the adjustment is not correct, repeat the previous steps.
- 18 Replace the actuator and control panel covers.

As far as fully-modulating burners, see paragraph "Fully modulating burners" on page 28.

Light oil circuit

The fuel is pushed into the pump 1 to the nozzle 3 at the delivery pressure set by the pressure governor. The solenoid valve 2 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 spill-back nozzle is feeded at constant pressure, while the return line pressure is adjusted by means of the pressure governor controlled by an actuator coupled to an adjusting cam. The fuel amount to be burnt is adjusted by means of the burner actuator according to the adjustments set (see previous paragraph).

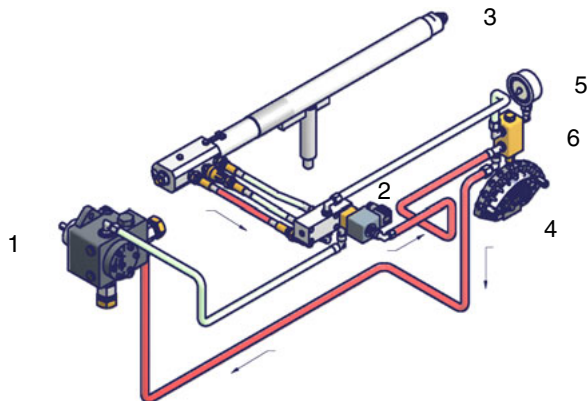


Fig. 25 - Stand-by

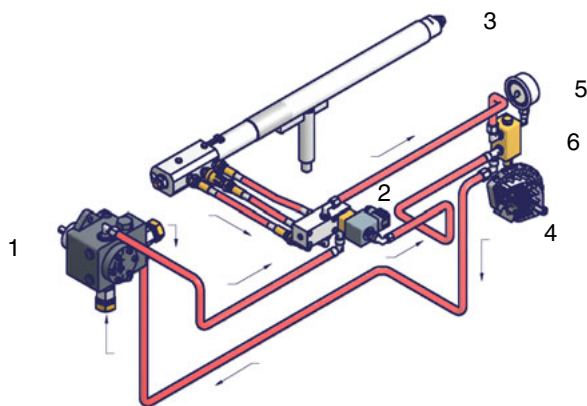


Fig. 26 - Pre-purge

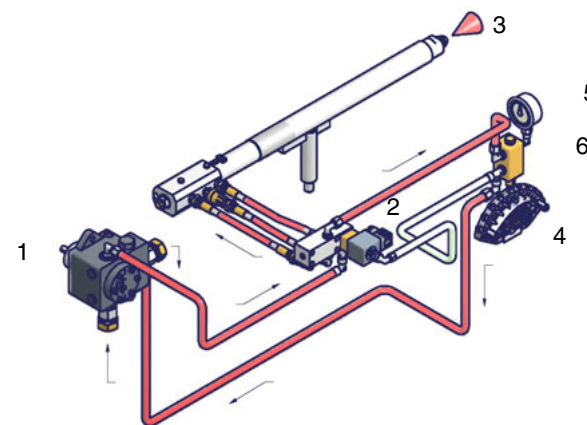


Fig. 27 - Low flame

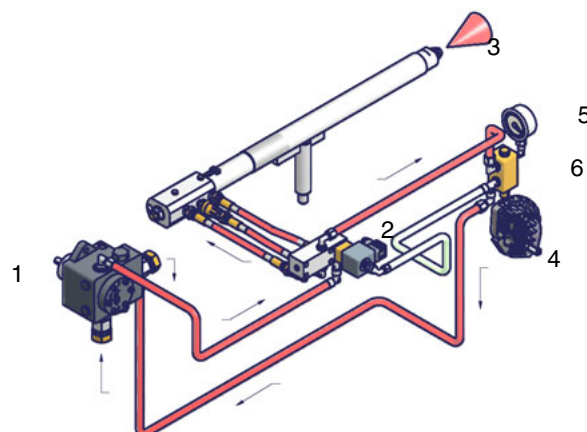


Fig. 28 - High flame

Key

- 1 Light oil pump
- 2 Light oil solenoid valve
- 3 Nozzle
- 4 Adjusting cam
- 5 Pressure gauge
- 6 Pressure governor

PART II: OPERATION**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.

OPERATE ONLY THE MAIN SWITCH, WHICH THROUGH ITS EASY ACCESSIBILITY AND RAPIDITY OF OPERATION ALSO FUNCTIONS AS AN EMERGENCY SWITCH, AND ON THE RESET BUTTON.

IN THE EVENT OF REPEATED LOCKOUTS, DO NOT PERSIST WITH THE RESET BUTTON AND CONTACT QUALIFIED PERSONNEL WHO WILL PROCEED TO ELIMINATE THE MALFUNCTION.

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.

OPERATION



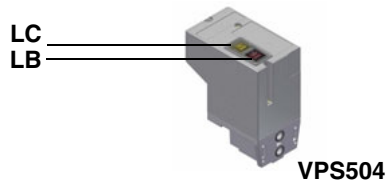
ATTENTION: before starting the burner up, be sure that the manual cutoff valves are open and check that the pressure upstream the gas train complies the value quoted on paragraph “Technical specifications”.

- Choose the typer of fuel by turning the burner switch, on the burner control panel.
CAUTION: if the fuel chosen is light oil, be sure the cutoff valves on the feed and return pipes are open.
- Check the control box is not locked (signalling light on); if so, reset it by means of the reset pushbutton.
- Check the series of thermostats and pressure switches turn the burner to on.

Gas operation

- Check the gas feeding pressure is sufficient (signalling lamp on).

Burners provided 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 staning cycle begins: in case of leakage in a valve, the gas proving system stops the burner and the related lamp turns on. Reset it, by means of the reset pushbutton on the device, in burners with VPS504 (pushbutton **LB** in picture), or by the pushbutton on the burner panel if this one is fitted with LDU11 proving system.



NOTE: if the burner is fitted with Dungs VPS504, the pre-purgue phase starts once the gas proving system is successfully performed. Since the pre-purgue 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; the ignitor gas valves and the main gas valves open.
- Few seconds after the valves opening, the transformer is de-energised and lamp **L** 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 the related lamp on the burner control 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 on); the ignitor gas valves and the light oil valves open. Few seconds after the valves opening, the transformer is de-energised and lamp 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 the related lamps on the burner control panel.

PART III: 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 and clean the gas filter cartridge, if necessary replace it (see next paragraphs);
- Check and clean the fuel filter cartridge, replace if necessary.
- Check and clean the filter inside the light oil 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. An external filter should always be installed in the suction line upstream of the fuel unit.
- Check the fuel hoses for possible leaks.
- Remove, check and clean the combustion head (see page 37);
- Check ignition electrodes, clean, adjust and, if necessary, replace them (see page 39);
- Check and carefully clean the **UV** detector, replace it if necessary; if in doubt, check the detection current, once the burner starts up (see on page 40).
- Remove and clean the fuel nozzle  (**Important: cleaning must be performed using solvent, not metal tools!**). At the end of maintenance operations after the burner reassembly, light the flame and check its shape, replacing the nozzle whenever a questionable flame shape appears. Whenever the burner is used intensely, we recommend preventively replacing the nozzle at the start of each heating season.
- Clean and grease sliding and rotating parts.



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.

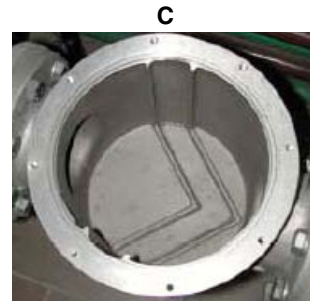
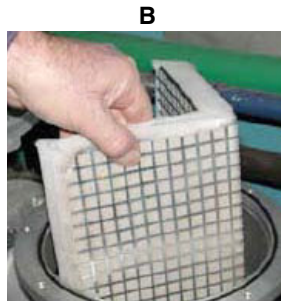
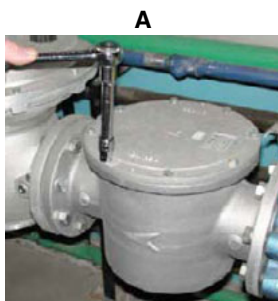
Gas filter maintenance



ATTENTION: 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.

To clean or remove the filter, proceed as follows:

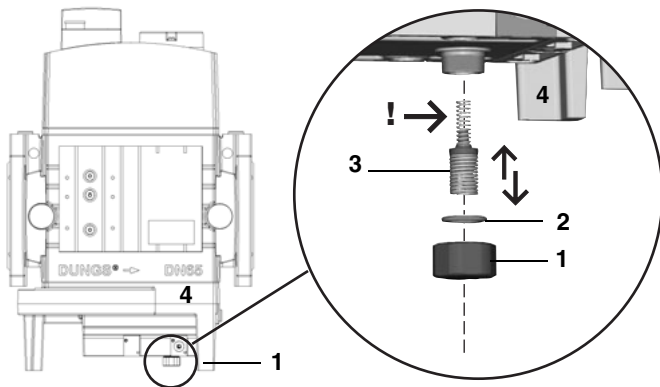
- 1 remove the cap unscrewing the fixing screws (A);
- 2 remove the filtering cartridge (B), clean it using water and soap, blow it with compressed air (or replace it, if necessary)
- 3 replace the cartridge in its proper position taking care to place it in between the guides as not to hamper the cap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



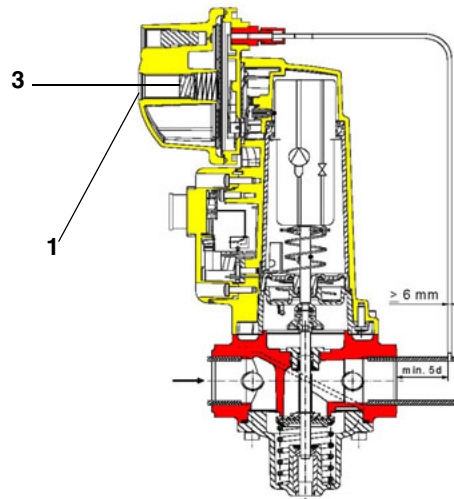
Replacing the spring in the gas valve group

To replace the spring in the gas valve group, proceed as follows:

- 1 Carefully twist the protection cap 1 and the O-ring 2.
 - 2 remove the "set value" spring 3 from housing 4.
 - 3 Replace spring 3.
 - 4 Carefully insert the new "set value" spring. Pay attention to mount properly. First insert the spring part with smaller diameter in the housing.
 - 5 Place O-ring 2 in protective cap 1. Screw in the protective cap with the O-ring in it.
- Stick the adhesive label for spring identification on the type plate.



DUNGS MBC..SE



SKP Siemens actuator

Light oil filter maintenance

For correct and proper servicing, proceed as follows:

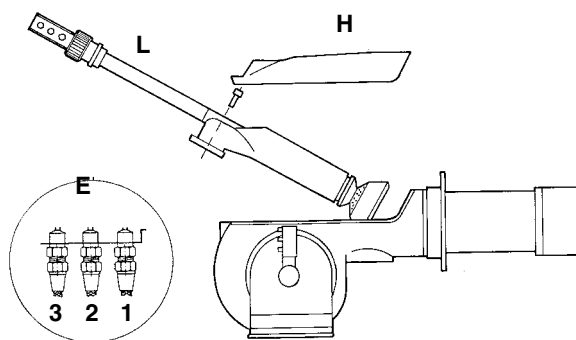
- 1 cutoff the required pipe section;
- 2 unscrew the filter cup;
- 3 remove the filtering cartridge, wash it with gasoline; if necessary, replace it; check the tightening O-rings and replace them if necessary;
- 4 replace the cup and restore the pipe line.



Removing the combustion head

- 1 Remove the cover H.
- 2 Slide the photoresistance out of its housing.
- 3 Unscrew the V screws that block the gas collector G, loosen the three joints E and remove the ass.y as shown on the following picture.
- 4 Clean the combustion head by means of a vacuum cleaner; scrape off the scale by means of a metallic brush.

Note: to remount the burner, follow the same procedure in the reversed order.



Key

- 1 Inlet
- 2 Return
- 3 Gun opening
- E Oil piping connections
- H Cover
- L Oil gun

Adjusting the ignition electrode



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

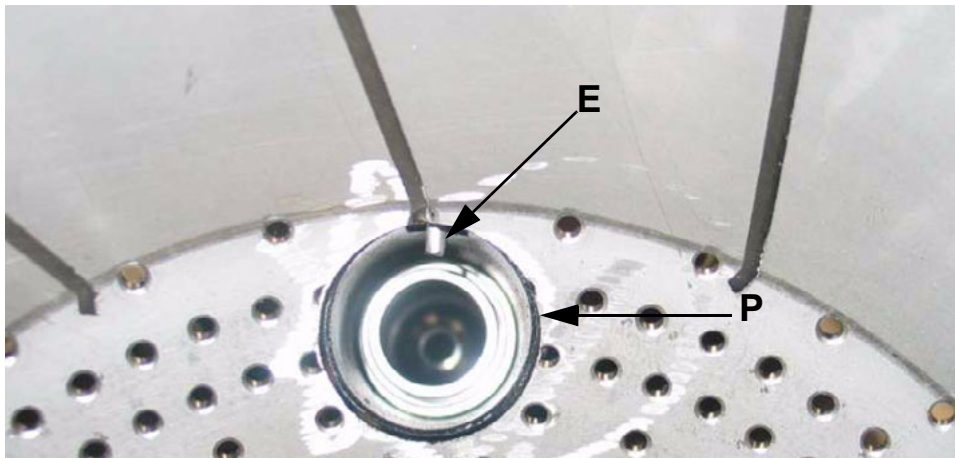


Fig. 29 - Detailed view of the diffuser with pilot (P) and ignition electrode (E)

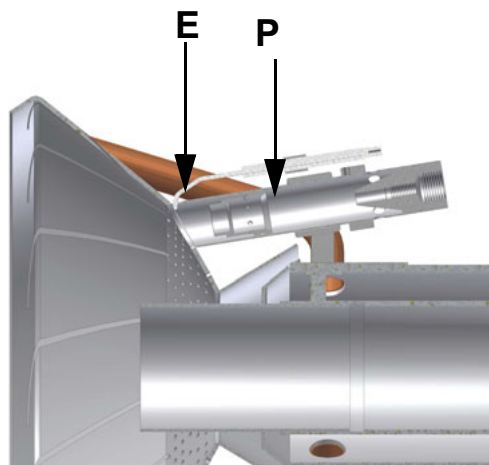


Fig. 30 - Detailed view of the combustion head with pilot (P) and ignition electrode (E)

Observe the values quoted on figure.

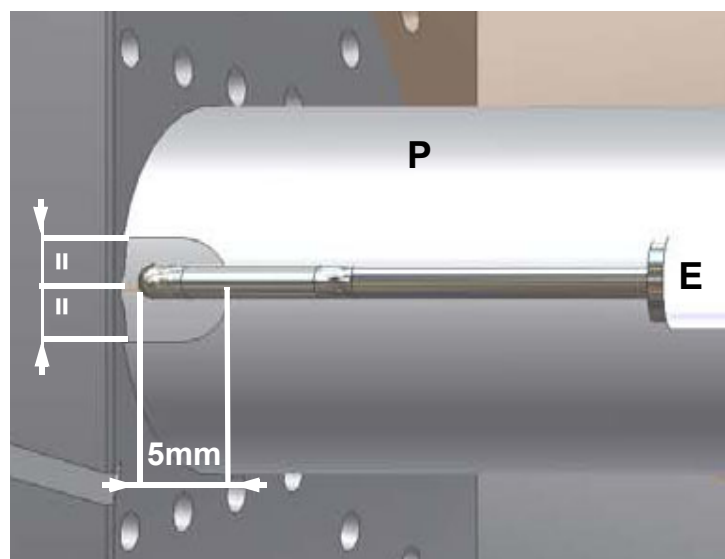


Fig. 31

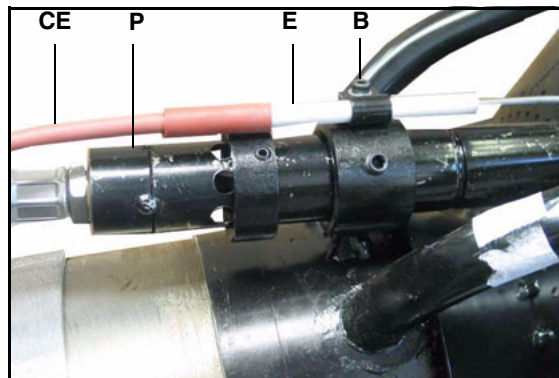
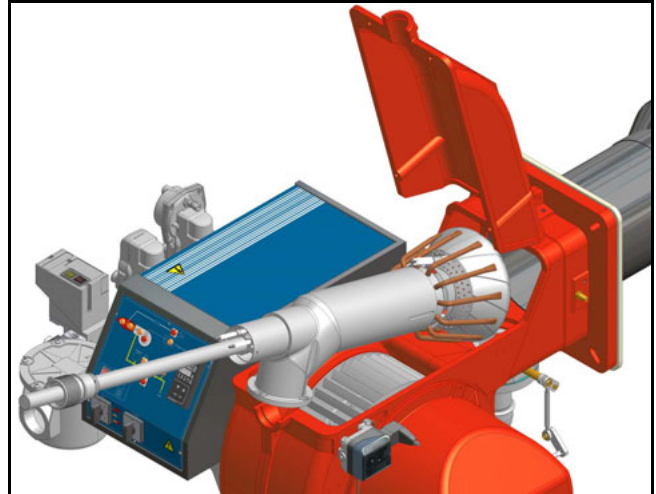
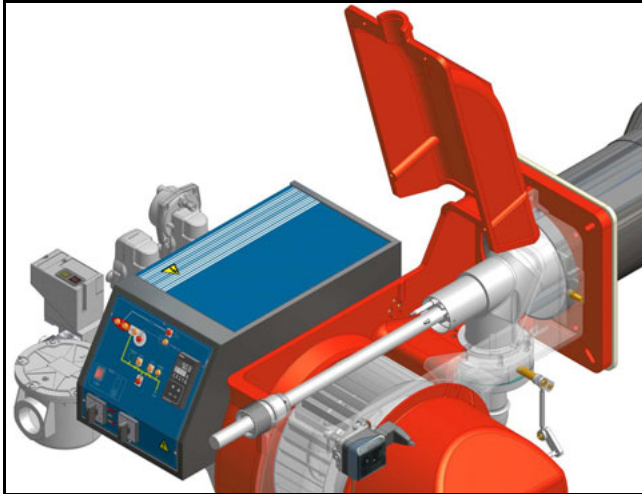
Replacing the ignition electrode



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

To replace the ignition electrode, proceed as follows:

- 1 remove the burner cover
- 2 disconnect the electrode (E) cable (CE);
- 3 remove the combustion head (see par. "Removing the combustion head");
- 4 loose screw (B) that fasten the ignition electrode (E) to the burner pilot (P);
- 5 remove the electrode and replace it, referring to the values quoted on Fig. 31;



Cleaning and replacing the detection photocell

The photocell working life is about 10000 working hours (about 1 year), at max 50°C after which it must be replaced.

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

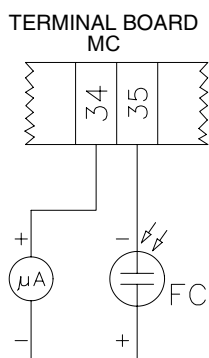
- 1 Disconnect the system from the electrical power supply.
- 2 Shut off the fuel supply;
- 3 remove the photocell from its slot (see next figure);
- 4 clean the bulbe if dirty, taking care not to touch it with bare hands;
- 5 if necessary, replace the bulb;
- 6 replace the photocell into its slot.



Checking the detection current

To check the detection signal follow the scheme in Fig. 32.

If the signal is lower than the value quoted, check the position of the UV detector (photocell), the electrical contacts and, if necessary, replace the UV detector.



Control box	Minimum detection signal
Siemens LFL1.3..	70μA with UV detector)

Fig. 32: Detection by photocell QRA..

Seasonal stop

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

- 1 turn the burner's main switch to 0 (Off position)
- 2 disconnect the power mains
- 3 close the fuel cock 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".

TROUBLESHOOTING

CAUSE / TROUBLE	THE BURNER DOESN'T START	CONTINUES WITH PRE-PRGEE	DOESN'T START AND LOCK-OUT	DOESN'T START AND REPEATS THE CYCLE	STARTS AND REPEATS THE CYCLE	DOESN'T SWITCH TO HI FLAME	LOCKOUT DURING OPERATION	TURNS OFF AND REPEATS CYCLE DURING OPERATION
MAIN SWITCH OPEN	●							
LACK OF GAS	●							
HIGH GAS PRESSURE SWITCH DEFECTIVE	●							
DEFECTIVE THERMOSTAT	●							
OVERLOAD TRIPPED INTERVENTION	●							
AUXILIARIES FUSES INTERRUPTED	●							
DEFECTIVE AIR PRESSURE SWITCH	●							
DEFECTIVE CONTROL BOX	●		●				●	
DEFECTIVE ACTUATOR	●	●	●				●	
AIR PRESSURE SWITCH FAULT OR BAD SETTING		●						
GAS PRESSURE SWITCH BAD SETTING							●	
IGNITION TRANSFORMER FAULT			●	●	●			●
DETECTION ELECTRODE BAD POSITION			●					
BUTTERFLY VALVE BAD SETTING			●					
DEFECTIVE GAS GOVERNOR			●	●	●			●
DEFECTIVE HI-LO FLAME THERMOSTAT						●		
ACTUATOR CAM WRONG SETTING						●		
PHOTODETECTOR FAULT OR WRONG SETTING							●	

SPARE PARTS

Description	Code		
	HTP1030	HTP1050	HTP1080
SIEMENS LDU GAS PROVING SYSTEM	2020413	2020413	2020413
SIEMENS LFL CONTROL BOX	2020448	2020448	2020448
IGNITION ELECTRODE	2080257	2080257	2080257
OIL FILTER	2090018	2090018	2090018
GAS FILTER DN80	2090112	-	-
GAS FILTER DN100	2090113	2090113	2090113
GAS FILTER DN125	2090128	2090128	2090128
AIR PRESSURE SWITCH DUNGS GW50 A6	2160085	2160085	2160085
GAS PRESSURE SWITCH DUNGS GW500 A6	2160088	2160088	2160088
GAS PRESSURE SWITCH DUNGS GW500 A5	2160089	2160089	2160089
IGNITION TRANSFORMER	2170301	2170301	2170301
PUMP MOTOR	2180257	2180257	2180257
GAS VALVE GROUP SIEMENS VGD.. DN80	2190169	2190169	2190169
GAS VALVE GROUP SIEMENS VGD.. DN100	2190174	2190174	2190174
GAS VALVE ACTUATOR SKP15	2190181	2190181	2190181
GAS VALVE ACTUATOR SKP25	2190183	2190183	2190183
GAS VALVE GROUP SIEMENS VGD.. DN125	2190184	2190184	2190184
GAS VALVE GROUP DUNGS MBC3100SE DN80	21903M7	21903M7	21903M7
GAS VALVE GROUP DUNGS MBC5000SE DN100	21903M8	21903M8	21903M8
PILOT GAS ELECTROVALVE	2190502	2190502	2190502
OIL SOLENOID VALVE - PARKER	2190750	2190750	2190750
OIL SOLENOID VALVE - L338	2190437	2190437	2190437
GAS PROVING SYSTEM VPS504	2191604	2191604	2191604
FLEXIBLE HOSE L=1500	2340004	2340004	2340004
FLEXIBLE HOSE L=600	2340059	2340059	2340059
FLEXIBLE HOSE L=385	2340088	2340088	2340088
FLEXIBLE HOSE L=435	2340089	2340089	2340089
FLEXIBLE HOSEL L=300	234FX03	234FX03	234FX03
GAS FLEXIBLE HOSE	234FX07	234FX07	234FX07
FLEXIBLE HOSE L=347	234FX24	234FX24	234FX24
FLEXIBLE HOSE L=485	234FX31	234FX31	234FX31
SMALL ADJUSTING CAM FOIL	2440013	2440013	2440013
BIG ADJUSTING CAM FOIL	2440014	2440014	2440014
ACTUATOR	2480004	2480004	2480004
UV PROBE	2510001	2510001	2510001
BURNER MODULATOR	2570112	2570112	2570112
LIGHT OIL GOVERNOR	2570006	2570008	2570008
SUNTEC TV LIGHT OIL GOVERNOR	2570036	2570036	2570036
PUMP	2590159	2590159	2590159
NOZZLE - FLUIDICS	2610203	2610203	2610203
NOZZLE - BERGONZO B	2610210	2610210	2610210
NOZZLENOZZLE - BERGONZO C	2610213	2610213	2610213
PRESSURE GOVERNOR WITH FILTER	2800085	2800085	2800085
COMBUSTION HEAD	3060277	3060292	3060292
BLAST TUBE	30910N9	30910Q9	30910Q8
IGNITION CABLE	6050010	6050010	6050010

NOTE: it is recommended to mention the burner ID number on the spare parts request form.

APPENDIX

SIEMENS LFL 1.3.. CONTROL BOX

Automatic programme in the event of interruption and indication of position when interrupted

By default, in the event of any kind of interruption, the flow of fuel is immediately interrupted. At the same time the programmer stops and this indicates the position at the time of the interruption.

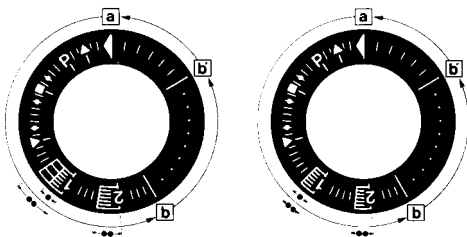
A symbol on the indicator disc shows each time the type of stoppage:

- ◀ No start-up (for example fault in the CLOSED signal for the limit contact "Z" at terminal 8 or some other contact between the terminals 12 and 4 or 4 and 5 is not closed).
- ◀ Start-up suspended because of a fault in the OPEN signal for the limit contact "A" at terminal 8.
- P Block due to absence of air pressure signal. From this moment onwards any absence of air pressure will cause a block.
- Block due to malfunction of the flame detector circuit.
- ▼ Start-up interrupted because there is a fault in the MINMUM signal for the auxiliary contact of the damper servo motor at terminal 8.
- 1 Block due to absence of flame signal at the end of the 1st safety period.

From this moment onwards any absence of a flame signal will cause a block.

- 2 Block due to absence of flame signal at the end of the 2nd safety period (flame signal of main burner).
- █ Block due to absence of flame signal or air pressure during operation.

Where a block stoppage occurs at any moment between switch on and pre-ignition without registering any symbol, the cause is normally an unscheduled flame signal.



a-b Start-up programme

b-b' For time variants: move the programmer on to the automatic stop after the burner starts up (b' = position of the programmer during normal burner operation).

b(b')-a Post-ventilation programme after a regulation stop. At the start-up position "a" the programmer stops automatically.

. Safety time duration for mono-tube burners

.. Safety time duration for twin-tube burners

The apparatus can be reset immediately after a block. After resetting (and after the elimination of any problem causing the stoppage or after a power failure) the programmer returns to its start-up position. In this event only the terminals 7, 9, 10 and 11 are live in accordance with the monitoring programme. Only after this the device programs a new startup.

Operation

The wiring system and also the control system of the programmer "P" have already been given in this manual. The response signals required for the active parts and the flame monitor circuit are shown by a hatching. In the absence of these response signals the mechanism interrupts the start-up programme; the exact time of the interruption can be identified from the visual indicator and will cause a block if the safety code requires it.

- A consent to start-up by means of the thermostat or pressostat "R"
- A-B start-up program
- B-C normal burner operation
- C regulation stop caused by "R"
- C-D programmer returns to start-up position A.

During the regulation stop only terminals 11 and 12 are live and the damper, through the limit contact "Z" of its servo-motor is in the CLOSED position. The flame detector circuit F is activated (terminals 22 and 23 or 23/4) for the detector test and the paracitic light test.

Where the burners do not have dampers (or have an independent 00 damper control mechanism) there must be a bridge between terminals 6 and 8, otherwise the mechanism will not start up the burner.

For a burner to start up the following conditions must be met:

- Mechanism not blocked/reset.
- Damper closed. Limit contact switch Z must be in the CLOSED position and allow current to flow between terminals 11 and 8.
- Any contacts checking that the fuel valve (bv...) is closed, or other contacts with similar functions, must be closed between terminal 12 and the air pressostat LP.
- The contact for the air pressostat LP must be in the off position (LP test) so as to feed terminal 4.
- The gas pressostat contacts GP and the safety thermostat and pressostat contacts W must also be closed.

Start-up program

A Start-up

(R closes the start-up control ring between terminals 4 and 5)

The programmer starts up. At the same time the ventilator motor is fed through terminal 6 (only for pre-ventilation) and, after t7, the ventilator motor or the combustion gas exhaust fan is fed through terminal 7 (pre-ventilation and post-ventilation).

At the end of t16, the command opening the damper passes through terminal 9; during the damper opening time the programmer does not move since terminal 8, through which the programmer is fed, is dead.

Only once the damper is fully open and the limit contact switch A has switched on, feeding terminal 8, does the programme proceed.

t1 Pre-ventilation time with damper fully open (nominal air flow).

Shortly after the beginning of the pre-ventilation time, the air pressostat should switch off the current between terminals 4 and 13; otherwise the apparatus would block (air pressure monitor).

At the same time the terminal 14 should be live since current feeding the ignition transformer and the fuel valves passes through this circuit.

During pre-ventilation time the flame detector circuit is checked and in the event of an operational defect the monitor brings about a block.

At the end of the pre-ventilation time the monitor automatically moves the damper servo-motor, through terminal 10, to the flame ignition position which is governed by the auxiliary contact "M".

During this period the programmer stops until terminal 8, is again activated through contact "M".

After a few seconds the little programmer motor is directly fed by the active part of the apparatus.

After this point terminal 8 plays no further part in the burner ignition process.

Mono-tube burner

t3 Pre-ignition time waiting the response from the fuel valve at terminal 18.

t2 Safety time (start up flame strenght); at the end of the safety time a flame signal should appear at terminal 22 of the amplifier and it should stay on until a regulation stop; if this does not happen the mechanism will block.

t4 Interval; at the end of t4, terminal 19 is live.

t5 Interval At the end of t5 terminal 20 is live. At the same time the monitor outlets from 9 and 11 and terminal 8 into the active part of the apparatus are kept galvanically separated so as to protect the monitor itself from recovery voltage through the capacity regulator circuit.

Twin-tube burners (**)

t3 Preignition time until the all clear to the pilot burner valve at terminal 17.

t2 First safety time (pilot flame strenght); at the end of the safety time a flame signal should appear at terminal 22 of the amplifier and it should stay on, until a regulation stop; if it does not, the apparatus will block.

t4 Interval until the consent to the fuel valve at terminal 19, for the first flame of the main burner.

t9 2nd safety time; at the end of the second safety time the main burner should be lit by means of the pilot. At the end of this period, terminal 17 is dead and therefore the pilot burner will be out.

t5 Interval; at the end of t5 terminal 20 is live. At the same time the monitor outlets from 9 to 11 and the terminal 8 at the input of the active part of the apparatus are galvanically separated so as to protect the apparatus itself from recovery voltage through the strenght regulator circuit.

When the strenght regulator LR at terminal 20 gives the consent, the start-up programme for the apparatus comes to an end. Depending on time variants, the programmer stops either immediately or at the end of a set time, without effecting the position of the contacts.

B Operational position of the burner

B-C Burner operation (production of heat)

While the burner is working the strenght regulator controls the damper, according to the demand for heat, by means of the positioning at nominal load of the auxiliary contact "V" of the damper servocontrol.

C Regulation stop for operation of "R"

When there is a regulation stop the fuel valves immediately close. At the same time the programmer starts to programme:

t6 Post-ventilation time (post-ventilation with the ventilator "G" at terminal 7). Shortly after beginning of the post-ventilation time terminal 10 becomes live and moves the damper to the "MIN" position. The full closure of the damper only happens towards the end of the post-ventilation time and is prompted by an automatic signal from terminal 11

t13 Admissible post-ignition time

During this time the flame monitor circuit may still receive a flame signal without the apparatus blocking.

D-A End of automatic programme

At the end of t6, at the point where the programmer and the automatic contacts have reverted to the starter position, the detection probe test restarts.

During an operational stop even an unscheduled flame signal lasting a few seconds can cause a block because during this period an NTC in the circuit acts as retarder. This means that brief unscheduled influences cannot cause a block.

(**) Times t3, t2 and t4 only apply only to safety devices in the series 01.

Specifications

Mains voltage	220V -15%...240V +10%
Frequency	50Hz -6%...60Hz +6%
Absorbed capacity	3.5 VA
Built-in fuse	T6.3/250E slow action DIN41571 No. 451915070
External fuse	max. 16A
Interference	N-VDE0875
Flow permitted at terminal 1	5A (DIN 0660 AC3)
Flow permitted at control terminals	4A (DIN 0660 AC3)

Flow at monitor contacts:

input at terminals 4 & 5	1A, 250V
input at terminals 4 & 11	1A, 250V
input at terminals 4 & 14	function of the load at terminals 16 and 19, min. 1A, 250V

Emplacement

Protection

Permitted ambient temp

Min. temperature (trans/storage) -50° C

Weight:

apparatus approx. 1,000g.

base approx. 165g.

Ionisation monitor

voltage in detector electrode	
normal working	330V ±10%
test	380V ±10%
short circuit current	max. 0,5 mA
ionisation current, min. request	6 µA
max. permitted length for connecting cables	
normal cable (laid separately**)	80m
armoured cable (high frequency) protection at terminal 22	140m

UV monitor

Voltage in UV detector	
normal working	330V ±10%
test	380V ±10%
Detector current, min. request*	70µA
Max. detector current	
normal working	630 µA
test	1300 µA
Max. length of connecting cable	
normal cable (laid separately**) 100m	
armoured cable (high frequency) protected at terminal 22	200m

Weight

QRA2 60 g

QRA10 450 g.

*Connect up in parallel to the measuring device a condenser 100µF, 10...25V.

** The wire connecting up the detector electrode should not be in the same sleeve as the other conductor wires.

Ignition spark monitor with QRE1 series 02 detector

Minimum detector current 30µA

Operating times

t7 initial delay for ventilator G2	2
t16 initial delay of air damper OPEN consent	4
t11 opening time for damper	any
t10 initial delay for air pressure monitor	8
t1 pre-ventilation time with damper open	36
t12 travel time for air damper to MIN position	any
t3 t3' pre-ignition time	t3 4 t3 '-
t2 t2' safety time (1st safety time for burners with intermittent pilot lighter)	t2 2 t2 '-
t4 t4' interval between start of t2 and response to valve at terminal 19	t4 10 t4 '-

t9 2nd safety time for burners with intermittent pilot lighter 2

t5 interval between end of t4 and response at terminal 20 10

t20 interval before programmer cuts out after start-up-
duration of start-up 60

t6 post-ventilation time (G2 only) 12

t13 permitted post-ignition time 12

t16 initial delay from opening consent of the air damper

t20 interval until the automatic shut-off of the programming mechanism after the burner start

Key

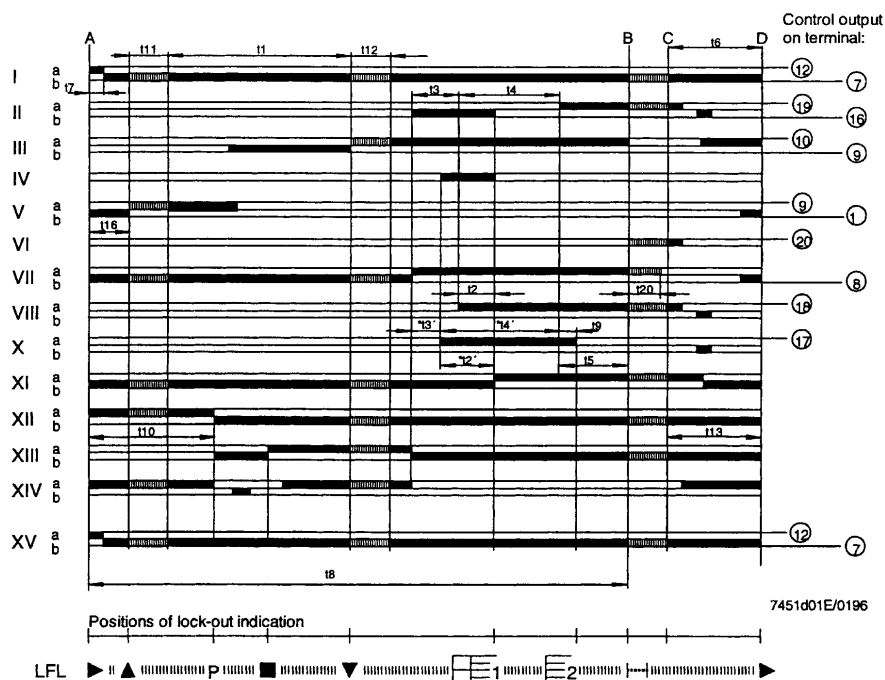
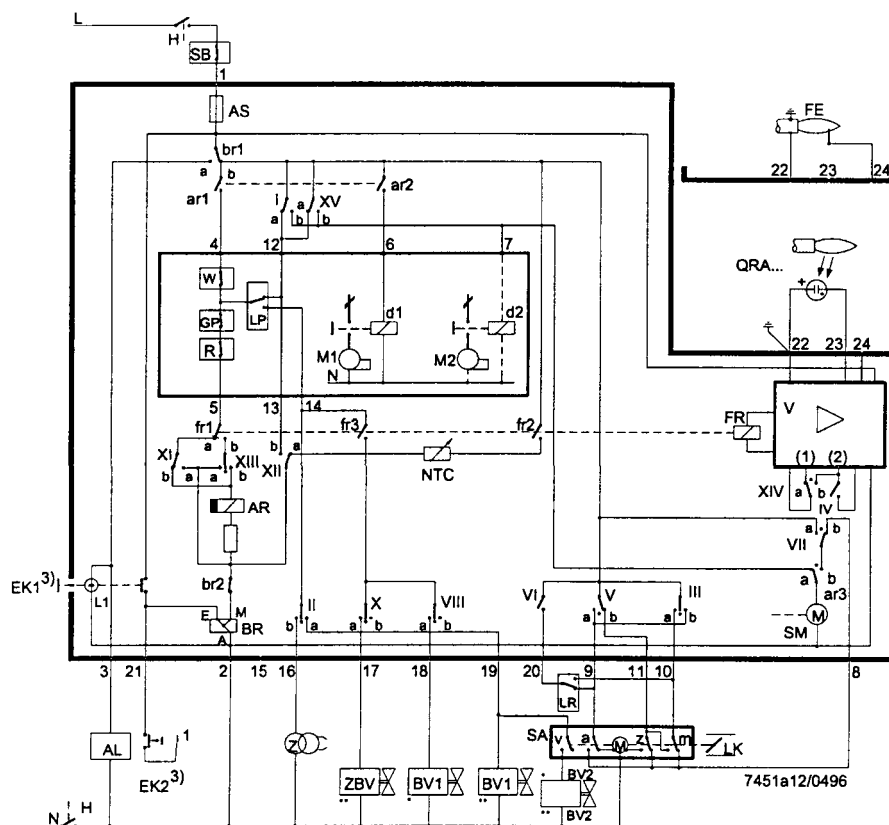
A	limit contact switch for damper OPEN position
AI	block remote signal
AR	main relay (working network) with contacts "ar"
AS	Monitor fuse
BR	block relay with "br" contacts
BV	fuel valve
EK	reset button
FE	detector electrode of ionisation circuit
FR	flame relay with "fr" contacts
G	ventilator motor or burner motor
GP	gas pressure switch
H	main interruptor switch
L	block stoppage LED
LK	air damper
LP	air pressostat
LR	safety regulator
M	auxiliary contact switch for damper "MIN" position
QRA	UV detector
QRE	ignition spark detector
R	thermostat or pressostat
S	fuse
SA	damper servo-motor
SM	synchronous programmer motor
V	flame signal amplifier
V	in case of servo-motor: auxiliary contact for response to fuel valve with regard of damper position
W	safety pressostat or thermostat
Z	ignition transformer
Z	in case of servomotor: end of limit contact switch for damper CLOSED position
ZBV	pilot burner fuel valve
°	for mono-tube burners
°°	for twin-tube burners

- (1) input for raising QRA detector voltage to test level
- (2) input for excitation of flame relay during flame detector test circuit (contact XIV) and during safety time (contact IV)
- (3) Do not press EK for more than 10 seconds

Programmer diagram

t1	pre-ventilation time
t2	safety time
*t2	'1st safety time
t3	pre-ignition time
*t3	'pre-ignition time
t4	interval for creating current between terminals 18 and 19
*t4	'interval for creating current between terminals 17 and 19
t5	interval for creating current between terminals 19 and 20
t6	post-ventilation time
t7	interval between startup consent and current created at terminal 7
t8	duration of start-up
*t9	2nd safety time
t10	interval before air pressure monitoring begins
t11	damper opening travel time
t12	damper closure travel time
t13	permissible post-combustion time
t16	initial delay of damper OPEN response
t20	interval before programmer automatically stops

* These times are valid with the use of a series 01 safety device for monitoring burners with intermittent pilot lighter.



VALVE PROVING SYSTEM SIEMENS LDU11

The LDU11... gas valve proving system is designed for use in gas-fired plant equipped with two safety shutoff valves. During each startup cycle, the control unit automatically programs the valve proving test and, in the event of a leak, prevents burner startup.

The LDU11... control unit is designed to provide automatic gas valve proving (leakage test) based on the pressure proving principle. It is for use in gas-fired plant with or without vent pipe to the atmosphere. For plants without vent pipe, where DIN/DVGW regulations apply, refer to the hints given on "Connection examples with vent pipe to the atmosphere".

Gas valve proving is initiated automatically with every burner startup using one or two standard pressure monitors, either

- prior to burner startup,
- during the pre-purge time, if it lasts at least 60 s,
- immediately after the controlled shutdown, or
- on completion of the burner control's control program, e.g. on completion of the post-purge time

The valve proving test is based on the two-stage pressure proving principle: first, the valve on the mains side is tested by evacuating the test space and by monitoring the atmospheric pressure in it. Then, the valve on the burner side is checked by pressurizing the test space and by monitoring the gas pressure. If the pressure increases excessively during the

first test phase (Test 1), or decreases excessively during the second test phase (Test 2), the control unit inhibits burner startup and goes to lockout. In that case, the lockout reset button lights up to indicate the fault. Remote indication of the fault is also possible.

A program indicator, which stops whenever a fault occurs, indicates which of the two valves is leaking.

Mode of operation

To carry out the first phase of the valve proving test, called "Test 1", there must be atmospheric pressure in the length of pipe between the two valves to be tested. In plants with a vent to the atmosphere, this pressure is available if the valve proving test is conducted prior to or during the pre-purge time. In plants without a vent pipe, atmospheric pressure is made available as the control unit opens the valve on the burner side during the time "t4". If the valve proving test is performed after the operation of the burner, the valve on the burner side after the controlled shutdown can be kept open until "t4" has elapsed, thus reducing the pressure in the test space and making certain its gas content is burnt off in the combustion chamber during the post-purge time. A prerequisite for this procedure is an appropriate control program of the burner control as provided by Landis & Staefa burner controls type LFE..., LFL..., LGK... or LEC.... The test space is closed off after it has been evacuated.

During the first test phase (Test 1) which follows immediately, the control unit checks if the atmospheric pressure in the test space is maintained using the pressure monitor. If the valve on the mains side is leaking, causing the pressure to rise above the switching point of the pressure monitor, the control unit initiates an alarm and goes to lockout.

The program indicator then stops and indicates "Test 1".

If the pressure does not increase because the valve closes correctly, the control unit immediately programs the second test phase (Test 2). To do this, the valve on the mains side is pressurized ("filling" of test space). During the second test phase, the pressure may not fall below the switching point of the pressure monitor due to a leak of the valve on the burner side.

If it does, the control unit goes to lockout again, thus inhibiting burner startup.

On the successful completion of the second test phase, the control unit closes the internal control loop between terminals 3 and 6 (circuit path: terminal 3 - contact "ar 2" - terminals 4 and 5 - contact III - terminal 6). This control loop is usually included in the start control loop of the burner control.

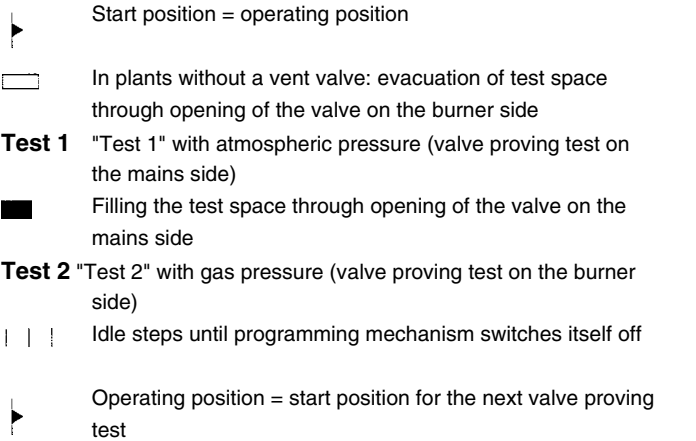
After the control loop has been closed, the programming mechanism of the control unit returns to its start position where it switches itself off. During these "idle steps", the position of the control contacts of the programming mechanism remains unchanged.

Program and lockout indicator

When the unit goes to lockout, the programming mechanism stops and also the position indicator fitted to the spindle of the mechanism. The symbol that stops above the reading mark not only indicates during which test phase lockout occurred, but also after how many programming steps within the test phase (1 step = 2.5 seconds).

Specifications

Mains voltage	AC 220 V -15 %...240 V +10 % AC 100 V -15 %...110 V +10 % Mains frequency 50 Hz -6 %...60 Hz +6 %
Power consumption	
- during the test	3.5 VA
- during burner operation	2.5 VA
Prefuse (externally)	T16/500 V
Unit fuse	T6,3H250 V to IEC 127
Radio interference protection	N to VDE 0875
Perm. input current at terminal	15 A continuous to VDE 0660 AC3
Environmental conditions:	
Temperature	-50...+60 °C
Humidity	< 95 % r.h.
Mechanical conditions	class 2M2
Climatic conditions	class 3K5
Temperature	-20...+60 °C
Humidity	< 95 % r.h.
Condensation, formation of ice and influence of water	are not permitted
Perm. current rating of control terminals	4 A to VDE 0660 AC3
Required switching capacity of pressure switch "DW"	1 A min., AC 250 V
Mounting position	optional
Degree of protection	IP40
Weight	
control unit approx.	1000 g
base approx.	165 g
CE conformity	According to the directives of the European Community
Electromagnetic compatibility	EMC 89/336
EWG include. 92/31 EEC, Gas	appliance directive 90/396 EEC
Emissions	EN 50081-1
Immunity	EN 50082-2

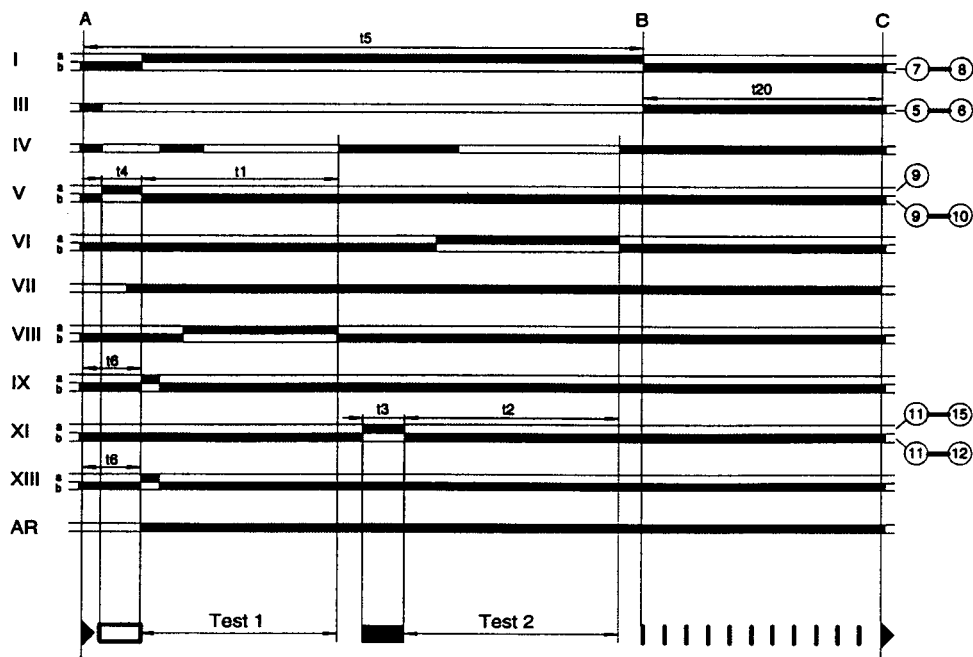
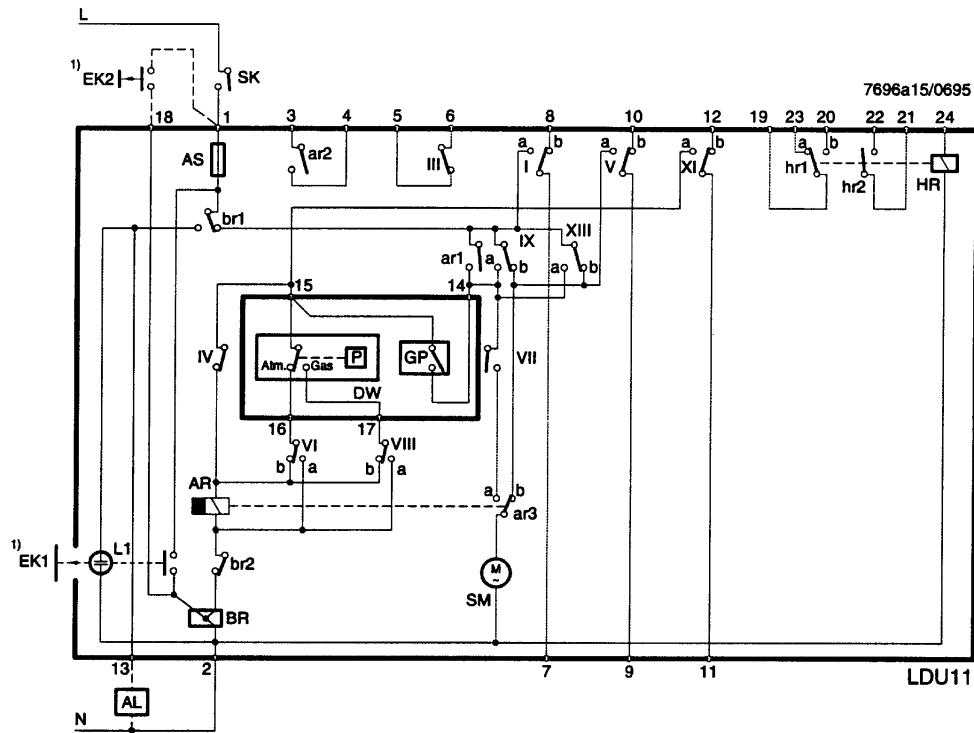


In the event of lockout, all terminals receiving voltage from the control unit are de-energized, except terminal 13, which is used for lockout indication. After the unit has been reset, the programming mechanism automatically returns to its start position and immediately reprograms a new valve proving test.

Note: do not press the reset button for more than 10 seconds.

Control program after a power failure

A power failure prior to evacuating the test space does not cause the program sequence to change. If a power failure occurs after the evacuation, the valve proving test will not be continued when power is restored, but the programming mechanism first returns to its start position to reprogram the complete proving test.



KEY

- AL Alarm signal "Leaking valve"
- AR Main relay with contacts "ar..."
- AS Built-in fuse
- BR Lockout relay with contacts "br..."
- DW Pressure monitor for valve proving test (does not replace the gas pressure monitor used to signal lack of gas)
- EK... Lockout reset button
- GP Gas pressure monitor (for lack of gas)
- HR Auxiliary relay with contacts "hr..."
- L1 Built-in lockout warning lamp
- SM Synchronous motor of programming mechanism
- SK Mains switch

Warning notes

- The electrical wiring must comply with local and country-specific standards and regulations!
- The LDU11... must be completely isolated from the mains before per-

forming any work on it!

- The LDU11... is a safety device. It is therefore not permitted to open, interfere with or modify the unit!
- Check wiring carefully before putting the unit into operation!
- Check all safety functions when putting the unit into operation or after replacing a fuse!
- Ensure protection against electric shock hazard on the unit and at all electrical connections through appropriate mounting!
- Electromagnetic emissions must be checked from an application point of view!
- The regulations and standards covering the specific application must be observed!
- All installation and commissioning work must be carried out by qualified personnel!
- In the geographical areas where DIN standards are in use, the installation must be in compliance with VDE requirement, particularly with the standards DIN/VDE 0100 and 0722!
- Condensation and ingress of humidity must be avoided!
- Ignition cable must always be laid separately, observing the greatest possible distance to other cables!



C.I.B. UNIGAS S.p.A.
Via L.Galvani, 9 - 35011 Campodarsego (PD) - ITALY
Tel. +39 049 9200944 - Fax +39 049 9200945/9201269
web site: www.cibunigas.it - e-mail: cibunigas@cibunigas.it

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