

HP60 - HP65 HP72 - HP73A

***Double stage
LPG - light oil burners***

MANUAL OF INSTALLATION - USE - MAINTENANCE

CIB UNIGAS

BURNERS - BRUCIATORI - BRULERS - BRENNER - QUEMADORES - ГОРЕЛКИ

DANGERS, WARNINGS AND NOTES OF CAUTION

THIS MANUAL IS SUPPLIED AS AN INTEGRAL AND ESSENTIAL PART OF THE PRODUCT AND MUST BE DELIVERED TO THE USER.

INFORMATION INCLUDED IN THIS SECTION ARE DEDICATED BOTH TO THE USER AND TO PERSONNEL FOLLOWING PRODUCT INSTALLATION AND MAINTENANCE.

THE USER WILL FIND FURTHER INFORMATION ABOUT OPERATING AND USE RESTRICTIONS, IN THE SECOND SECTION OF THIS MANUAL. WE HIGHLY RECOMMEND TO READ IT.

CAREFULLY KEEP THIS MANUAL FOR FUTURE REFERENCE.

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 and accessories.

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

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

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

The manufacturer shall not be held liable, by agreement or otherwise, for damages resulting from improper installation, use and failure to comply with the instructions supplied by the manufacturer. The occurrence of any of the following circumstances may cause explosions, polluting unburnt gases (example: carbon monoxide CO), burns, serious harm to people, animals and things:

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

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

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

- Regulation 2016/426/UE (appliances burning gaseous fuels)
- 2014/35/UE (Low Tension Directive)
- 2014/30/UE (Electromagnetic compatibility Directive)
- 2006/42/EC (Machinery Directive)

Harmonized standards

- UNI EN 676 (Automatic forced draught burners for gaseous fuels)
- EN 55014-1 (Electromagnetic compatibility- Requirements for household appliances, electric tools and similar apparatus)
- EN 60204-1:2006 (Safety of machinery – Electrical equipment of machines.)
- CEI EN 60335-1 (Specification for safety of household and similar electrical appliances);
- CEI EN 60335-2-102 (Household and similar electrical appliances. Safety. Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections).
- UNI EN ISO 12100:2010 (Safety of machinery - General principles for design - Risk assessment and risk reduction);

Light oil burners

European directives

- 2014/35/UE (Low Tension Directive)
- 2014/30/UE (Electromagnetic compatibility Directive)
- 2006/42/EC (Machinery Directive)

Harmonized standards

- UNI EN 267:2011 (Automatic forced draught burners for liquid fuels)
- EN 55014-1 (Electromagnetic compatibility- Requirements for household appliances, electric tools and similar apparatus)
- EN 60204-1:2006 (Safety of machinery – Electrical equipment of machines.)
- CEI EN 60335-1 (Specification for safety of household and similar electrical appliances);
- CEI EN 60335-2-102 (Household and similar electrical appliances. Safety. Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections).
- UNI EN ISO 12100:2010 (Safety of machinery - General principles for design - Risk assessment and risk reduction);

Heavy oil burners

European Directives

- 2014/35/UE (Low Tension Directive)
- 2014/30/UE (Electromagnetic compatibility Directive)
- 2006/42/EC (Machinery Directive)

Harmonized standards

- UNI EN 267 (Automatic forced draught burners for liquid fuels)
- EN 55014-1 (Electromagnetic compatibility- Requirements for household appliances, electric tools and similar apparatus)
- EN 60204-1:2006 (Safety of machinery – Electrical equipment of machines.)
- CEI EN 60335-1 (Specification for safety of household and similar electrical appliances);
- CEI EN 60335-2-102 (Household and similar electrical appliances. Safety. Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections).
- UNI EN ISO 12100:2010 (Safety of machinery - General principles for design - Risk assessment and risk reduction);

Gas - Light oil burners

European Directives

- Regulation 2016/426/UE (appliances burning gaseous fuels)
- 2014/35/UE (Low Tension Directive)
- 2014/30/UE (Electromagnetic compatibility Directive)
- 2006/42/EC (Machinery Directive)

Harmonized standards

- UNI EN 676 (Automatic forced draught burners for gaseous fuels)
- UNI EN 267 (Automatic forced draught burners for liquid fuels)
- EN 55014-1 (Electromagnetic compatibility- Requirements for household appliances, electric tools and similar apparatus)
- EN 60204-1:2006 (Safety of machinery – Electrical equipment of machines.)
- CEI EN 60335-1 (Specification for safety of household and similar electrical appliances);
- CEI EN 60335-2-102 (Household and similar electrical appliances. Safety. Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections).
- UNI EN ISO 12100:2010 (Safety of machinery - General principles for design - Risk assessment and risk reduction);

Gas - Heavy oil burners

European directives:

- Regulation 2016/426/UE (appliances burning gaseous fuels)
- 2014/35/UE (Low Tension Directive)
- 2014/30/UE (Electromagnetic compatibility Directive)
- 2006/42/EC (Machinery Directive)

Harmonized standards

- UNI EN 676 (Automatic forced draught burners for gaseous fuels)
- EN 55014-1 (Electromagnetic compatibility- Requirements for household appliances, electric tools and similar apparatus)
- EN 60204-1:2006 (Safety of machinery – Electrical equipment of machines.)
- CEI EN 60335-1 (Specification for safety of household and similar electrical appliances);
- CEI EN 60335-2-102 (Household and similar electrical appliances. Safety. Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections).
- UNI EN ISO 12100:2010 (Safety of machinery - General principles for design - Risk assessment and risk reduction);

Industrial burners

European directives

- Regulation 2016/426/UE (appliances burning gaseous fuels)
- 2014/35/UE (Low Tension Directive)
- 2014/30/UE (Electromagnetic compatibility Directive)
- 2006/42/EC (Machinery Directive)

Harmonized standards

- EN 55014-1 (Electromagnetic compatibility- Requirements for household appliances, electric tools and similar apparatus)
- EN 746-2 (Industrial thermoprocessing equipment - Part 2: Safety requirements for combustion and fuel handling systems)
- UNI EN ISO 12100:2010 (Safety of machinery - General principles for design - Risk assessment and risk reduction);
- EN 60204-1:2006 (Safety of machinery – Electrical equipment of machines.)
- EN 60335-2 (Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements)

Burner data plate

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

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

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

SYMBOLS USED



WARNING!

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



DANGER!

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



WARNING!

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

Figures, illustrations and images used in this manual may differ in appearance from the actual product.

BURNER SAFETY

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



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

Residual risks deriving from misuse and prohibitions

The burner has been built in order to make its operation safe; there are, however, residual risks.



Do not touch any mechanical moving parts with your hands or any other part of your body. Injury hazard
Do not touch any parts containing fuel (i.e. tank and pipes). Scalding hazard
Do not use the burner in situations other than the ones provided for in the data plate.
Do not use fuels other than the ones stated.
Do not use the burner in potentially explosive environments.
Do not remove or by-pass any machine safety devices.
Do not remove any protection devices or open the burner or any other component while the burner is running.
Do not disconnect any part of the burner or its components while the burner is running.
Untrained staff must not modify any linkages.



After any maintenance, it is important to restore the protection devices before restarting the machine.
All safety devices must be kept in perfect working order.
Personnel authorized to maintain the machine must always be provided with suitable protections.



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

PART I: INSTALLATION

GENERAL FEATURES

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

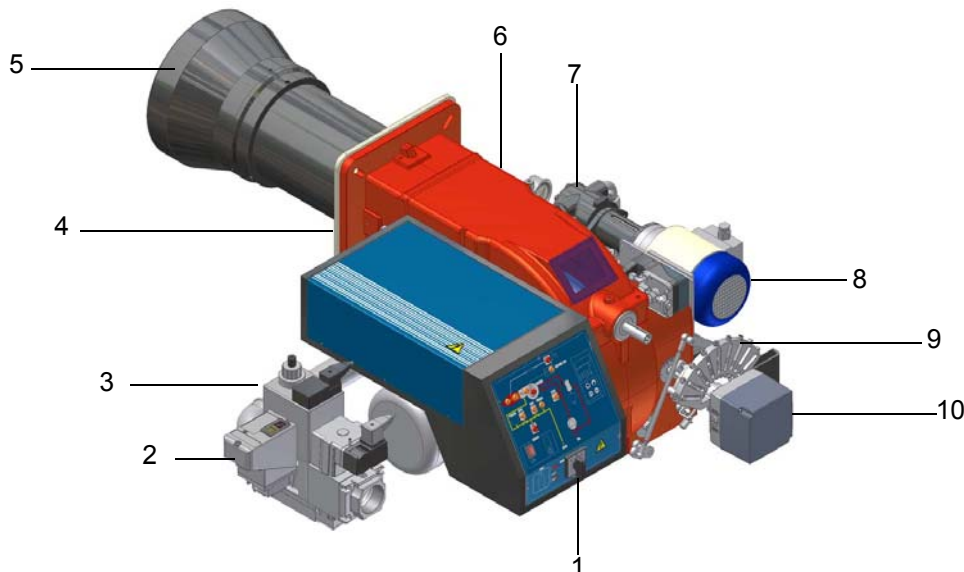


Fig. 1

- 1 Control panel with startup switch
- 2 Gas proving system
- 3 Gas valve group
- 4 Burner flange
- 5 Blast tube-Combustion head ass.y
- 6 Cover
- 7 Light oil pump
- 8 Pump motor
- 9 Gas adjusting cam
- 10 Actuator

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 (10) moves proportionally the air damper and the gas butterfly valve. It drives an adjusting cam (13) with variable shape. This one allows the optimisation of the gas flow values, as to get an efficient combustion.

Light oil operation: the fuel coming from the supply line, is pushed by the pump (8) 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 (5) determines the energetic quality and the geometry of the flame. Fuel and comburent are routed into separated ways as far as the zone of flame generation (combustion chamber). The control panel (1), placed on the burner front side, shows each operating stage.

How to interpret the burner "Performance curve"

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

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

Example:

Furnace input: 600kW

Backpressure: 4mbar

In the "Performance curve" diagram (Fig. 2), draw a vertical line matching the furnace input value and an horizontal line matching the backpressure value. The burner is suitable if the intersection point A is inside the performance curve.

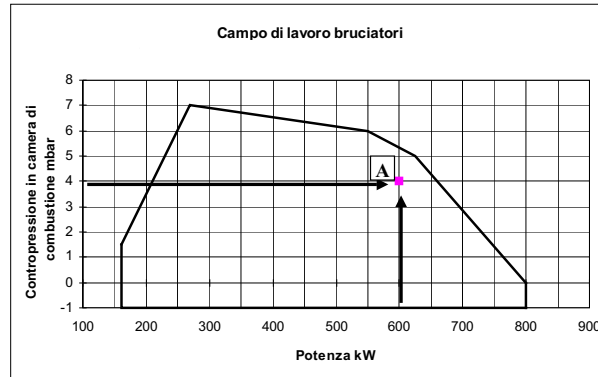


Fig. 2

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

Checking the proper gas train size To check the proper gas train size, it is necessary to the available gas pressure value upstream the burner's gas valve. Then subtract the backpressure. The result is called 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.

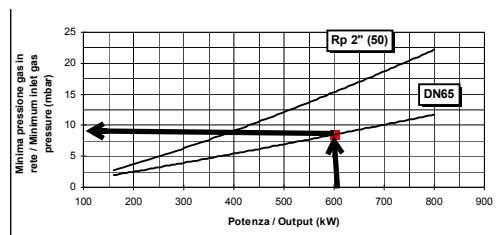


Fig. 3

Рис. 4

Burner model identification

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

Type	HP60	Model	LG.	PR.	S.	*	A.	1.	50
	(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) BURNER TYPE	HP60 - HP65 - HP72 - HP73A								
(2) FUEL	L - LPG G - Light oil								
(3) OPERATION (Available versions)	PR - Progressive MD - Fully modulating								
(4) BLAST TUBE	S - Standard L - Extended								
(5) DESTINATION COUNTRY	* - see data plate								
(6) BURNER VERSION	A - Standard Y - Speciale								
(7) EQUIPMENT	0 = 2 gas valves 1 = 2 gas valves + gas proving system 7 = 2 gas valves 8 = 2 gas valves + gas proving system								
(8) GAS CONNECTION see Specifications	32 = Rp1 _{1/4} 40 = Rp1 _{1/2} 50 = Rp2 65 = DN65 80 = DN80								

Specifications

BURNER TYPE		HP60...0.32	HP60...0.40	HP60...0.50	HP60...0.65
Output	min. - max. kW	170 - 880			
Fuel		LPG - Light oil			
Gas category		I _{3B/P}			
Gas rate	min. - max. (Stm ³ /h)	6.5 - 34			
Gas pressure	min. - max. mbar	(see Note 2)			
Light oil rate	min. - max. kg/h	14 - 74			
Oil viscosity		2 - 7.4 cSt @40°C			
Power supply		230V 3~ / 400V 3N ~ 50Hz			
Total power consumption	kW	2.15			
Fan motor	kW	1.1			
Pump motor	kW	0.55			
Protection		IP40			
Approx. weight	kg	60	65	70	80
Operation		Progressive - Fully modulating			
Gas Train		32	40	50	65
Valves size / Gas connection		1" _{1/4} / Rp1 _{1/4}	1" _{1/2} / Rp1 _{1/2}	2" / Rp2	2" _{1/2} / DN65
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 LPG (net calorific value H _i = 93.6 MJ/Stm ³).
Note2:	Maximum gas pressure = 360mbar (with Dungs MBLE/MBC valves) = 500mbar (with Dungs MBC and 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.

BURNER TYPE		HP65...0.32	HP65...0.40	HP65...0.50	HP65...0.65
Output	min. - max. kW	270 - 970			
Fuel		LPG - Light oilLPG - Light oil			
Gas category		I _{3B/P}			
Gas rate	min. - max. kW (Stm ³ /h)	10.5 - 37			
Gas pressure	min. - max. mbar	(see Note 2)			
Light oil rate	min.- max.kg/h	23 - 82			
Oil viscosity		2 - 7.4 cSt @40°C			
Power supply		230V 3~ / 400V 3N ~ 50Hz			
Total power consumption	kW	2.6			
Fa motor	kW	1.5			
Pump motor	kW	0.55			
Protection		IP40			
Approx. weight	kg	90	95	105	115
Operation		Progressive - Fully modulating			
Gas Train		32	40	50	65
Valves size / Gas connection		1" _{1/4} / Rp1 _{1/4}	1" _{1/2} / Rp1 _{1/2}	2" / Rp2	2" _{1/2} / DN65
Operating temperature	°C	-10 ÷ +50			
Storage Temperature	°C	-20 ÷ +60			
Working service*		Intermittent			

BURNER TYPE		HP72...0.40	HP72...0.50	HP72...0.65	HP72...0.80
Output	min. - max. kW	330 - 1200			
Fuel		LPG - Light oilLPG - Light oil			
Gas category		I _{3B/P}			
Gas rate	min.- max. (Stm ³ /h)	12.7 - 46			
Gas pressure	min. - max. mbar	(see Note 2)			
Light oil rate	min. - max kg/h	28 - 101			
Oil viscosity		2 - 7.4 cSt @40°C			
Power supply		230V 3~ / 400V 3N ~ 50Hz			
Total power consumption	kW	3.25			
Fan motor	kW	2.2			
Pump motor	kW	0.55			
Protection		IP40			
Approx. weight	kg	100	110	120	130
Operation		Progressive - Fully modulating			
Gas Train		40	50	65	80
Valves size / Gas connection		1" _{1/2} / Rp1 _{1/2}	2" / Rp2	2" _{1/2} / DN65	3" / DN80
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 LPG (net calorific value H _i = 93.6 MJ/Stm ³).
Note2:	Maximum gas pressure = 360mbar (with Dungs MBDLE/MBC valves) = 500mbar (with Dungs MBC and 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.

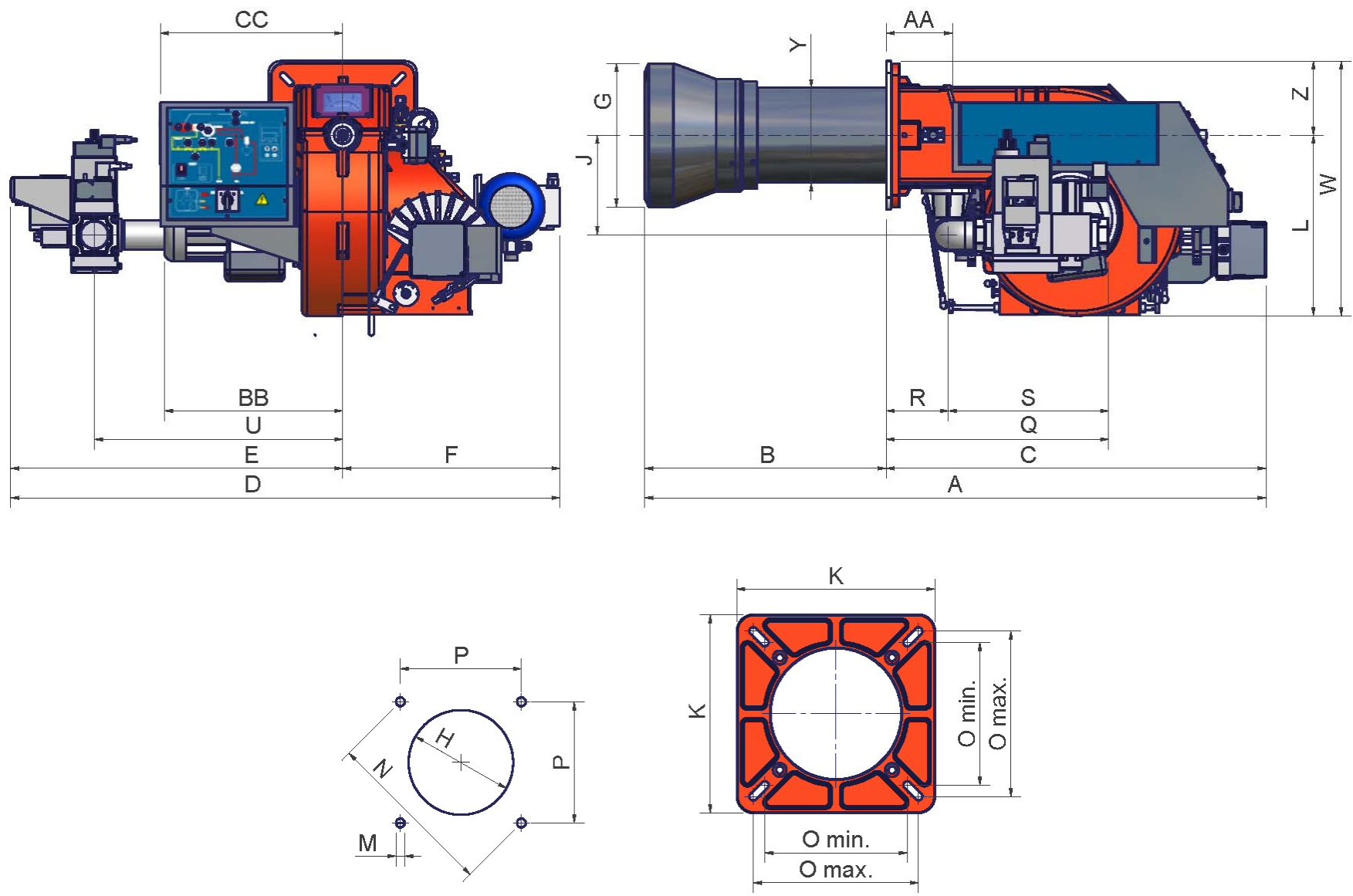
BURNER TYPE		HP72...1.40	HP72...1.50	HP72...1.65	HP72...1.80
Output	min. - max. kW	330 - 1550			
Fuel		LPG - Light oil			
Gas category		I _{3B/P}			
Gas rate	min. - max. (Stm ³ /h)	12.7 - 59.6			
Gas pressure	min.- max. mbar	(see Note 2)			
Light oil rate	min.- max. kg/h	28 - 131			
Oil viscosity		2 - 7.4 cSt @40°C			
Power supply		230V 3~ / 400V 3N ~ 50Hz			
Total power consumption	kW	3.25			
Fan motor	kW	2.2			
Pump motor	kW	0.55			
Protection		IP40			
Approx. weight	kg	100	110	120	130
Operation		Progressive - Fully modulating			
Gas Train		40	50	65	80
Valves size / Gas connection		1" _{1/2} / Rp1 _{1/2}	2" / Rp2	2" _{1/2} / DN65	3" / DN80
Operating temperature	°C	-10 ÷ +50			
Storage Temperature	°C	-20 ÷ +60			
Working service*		Intermittent			

BURNER TYPE		HP73A LG..x.50	HP73A LG..x.65	HP73A LG..x.80
Output	min. - max. kW	320 - 2300		
Fuel		LPG - Light oil		
Gas category		I _{3B/P}		
Gas rate	min.- max. (Stm ³ /h)	12.3 - 88.5		
Gas pressure	min.- max. mbar	(see Note 2)		
Light oil rate	min.-max. kg/h	27 - 194	27 - 194	27 - 194
Oil viscosity		2 - 7.4 cSt @40°C		
Power supply		230V 3~ / 400V 3N ~ 50Hz		
Total power consumption	kW	4.05		
Fan motor	kW	3		
Pump motor	kW	0.55		
Index of Protection		IP40		
Approx. weight	kg	115	125	135
Operation		Progressive - Fully modulating		
Gas train		50	65	80
Valves size/Gas connectionValves size / Gas connection		2" / Rp2	2" _{1/2} / DN65	3" / DN80
Storage Temperature	°C	-10 ÷ +50		
Working service*	°C	-20 ÷ +60		
Operating temperature		Intermittent		

Note1:	All gas flow rates are referred to Stm ³ /h (1013 mbar absolute pressure, 15 °C temperature) and are valid for LPG (net calorific value H _i = 93.6 MJ/Stm ³).
Note2:	Maximum gas pressure = 360mbar (with Dungs MBDLE/MBC valves) = 500mbar (with Dungs MBC and 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.

Overall dimensions (mm)



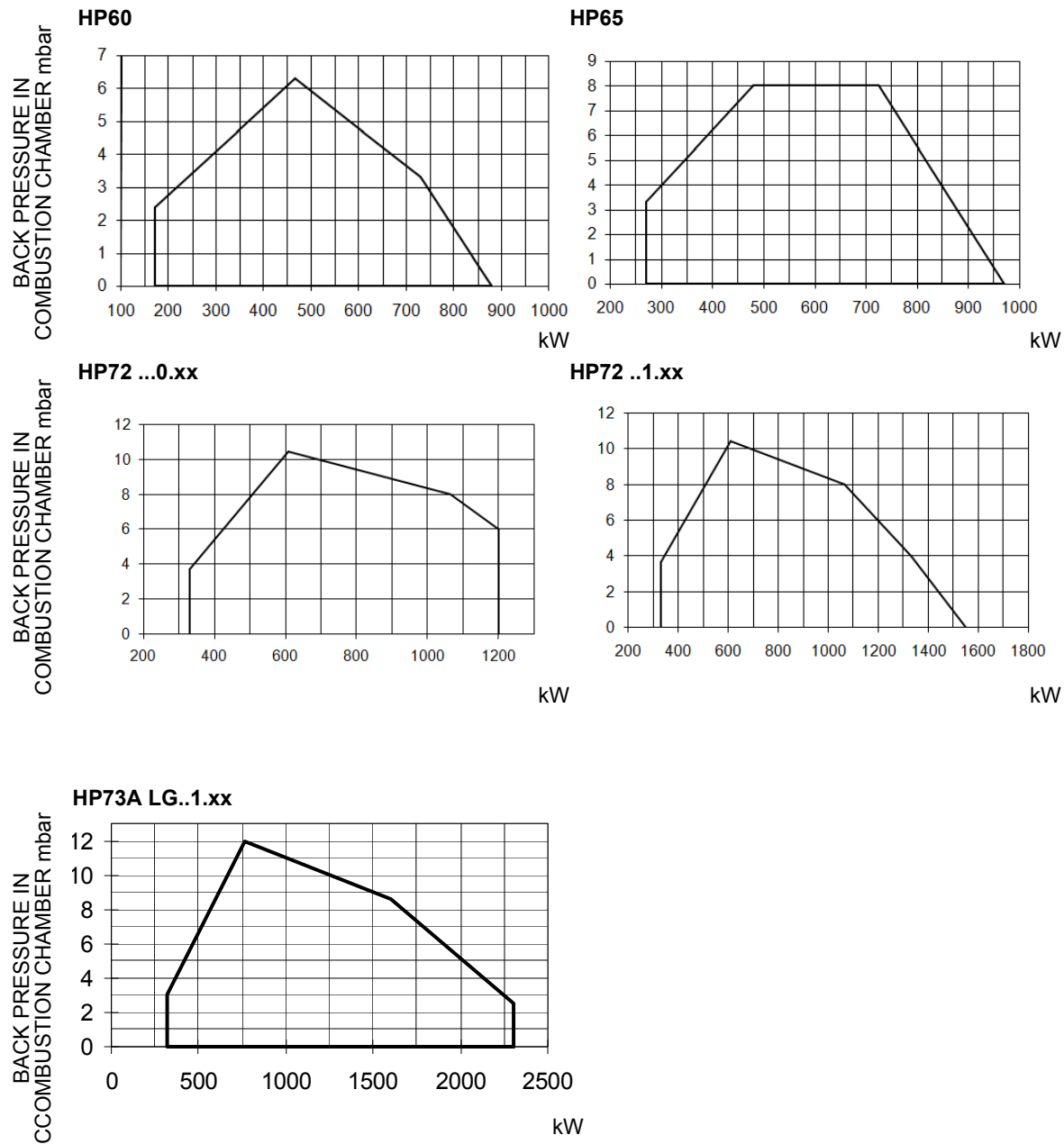
	DN	A	AA	B	BB	C	CC	D	E	F	G	H	J	K	L	M	N	O - min	O - max	P	Q	R	S	U	V	W	Y	Z
HP60 LG..0.32	32	1100	99	364	314	736	362	930	595	430	240	280	210	240	344	M10	269	190	190	190	368	112	256	444	x	464	162	120
HP60 LG..0.40	40	1100	99	364	314	736	362	930	500	430	240	280	210	240	344	M10	269	190	190	190	445	112	327	444	x	464	162	120
HP60 LG.. 0.50	50	1100	99	364	314	736	362	930	500	430	240	280	210	240	344	M10	269	190	190	190	445	112	335	444	x	464	162	120
HP60 LG.. 0.65	65	1100	99	364	314	736	362	1115	685	430	240	280	250	240	420	M10	269	190	190	190	845	112	403	540	313	540	162	120
HP65 LG.. 0.32	32	1156	139	362	347	794	382	1022	588	454	240	280	208	300	376	M10	330	216	250	233	386	130	256	539	x	531	162	155
HP65 LG..1.32	32	1156	139	362	347	794	382	1148	674	454	240	280	208	300	376	M10	330	216	250	233	386	130	256	539	x	531	162	155
HP65 LG.. 0.40	40	1156	139	362	347	794	382	1022	584	454	240	280	208	300	376	M10	330	216	250	233	457	130	327	539	x	531	162	155
HP65 LG..1.40	40	1156	139	362	347	794	382	1148	670	454	240	280	208	300	376	M10	330	216	250	233	457	130	327	539	x	531	162	155
HP65 LG.. 0.50	50	1156	139	362	347	794	382	1022	568	454	240	280	208	300	376	M10	330	216	250	233	465	130	335	519	x	531	162	155
HP65 LG..1.50	50	1156	139	362	347	794	382	1148	694	454	240	280	208	300	376	M10	330	216	250	233	465	130	335	519	x	531	162	155
HP65 LG..0.65	65	1156	139	362	347	794	382	1120	666	454	240	280	275	300	393	M10	330	216	250	233	533	130	403	565	313	548	162	155
HP65 LG..1.65	65	1156	139	362	347	794	382	1226	772	454	240	280	275	300	393	M10	330	216	250	233	533	130	403	565	313	548	162	155
HP72 LG.. 0.50	50	1299	139	505	373	794	382	1022	588	454	300	340	208	300	376	M10	330	216	250	233	457	130	327	519	x	531	198	155
HP72 LG..1.50	50	1299	139	505	373	794	382	1148	714	454	300	340	208	300	376	M10	330	216	250	233	457	130	327	519	x	531	198	155
HP72 LG.. 0.50	50	1299	139	505	373	794	382	1022	568	454	300	340	208	300	376	M10	330	216	250	233	465	130	335	519	x	531	198	155
HP72 LG..1.50	50	1299	139	505	373	794	382	1148	694	454	300	340	208	300	376	M10	330	216	250	233	465	130	335	519	x	531	198	155
HP72 LG..0.65	65	1299	139	505	373	794	382	1120	666	454	300	340	275	300	393	M10	330	216	250	233	533	130	403	565	313	548	198	155
HP72 LG..1.65	65	1299	139	505	373	794	382	1226	772	454	300	340	275	300	393	M10	330	216	250	233	533	130	403	565	313	548	198	155
HP72 LG.. 0.80	80	1299	139	505	373	794	382	1120	666	454	300	340	275	300	407	M10	330	216	250	233	574	130	444	565	344	562	198	155
HP72 LG..1.80	80	1299	139	505	373	794	382	1228	774	454	300	340	275	300	407	M10	330	216	250	233	574	130	444	565	344	562	198	155
HP72 LG..0.100	100	1299	139	505	373	794	382	1395	941	454	300	340	434	300	579	M10	330	216	250	233	653	130	523	824	405	734	198	155
HP72 LG..1.100	100	1299	139	505	373	794	382	1503	1049	454	300	340	434	300	579	M10	330	216	250	233	653	130	523	824	405	734	198	155
HP73A LG..1.50	50	1294	139	505	373	794	382	1148	694	454	254	270	208	300	376	M10	330	216	250	233	465	130	335	519	x	531	218	155
HP73A LG..1.65	65	1294	139	505	373	794	382	1226	772	454	254	270	275	300	393	M10	330	216	250	233	533	130	403	565	313	548	218	155
HP73A LG..1.80	80	1294	139	505	373	794	382	1228	774	454	254	270	275	300	407	M10	330	216	250	233	574	130	444	565	344	562	218	155
HP73A LG..1.100	100	1294	139	505	373	794	382	1503	1049	454	254	270	434	300	579	M10	330	216	250	233	653	130	523	824	405	734	218	155

*DN = gas valves size

HP60 - HP72:

Fit a counterflange between burner and boiler. As an alternative, make a smaller hole H, but greather than Y and fit the blast tube from the internal side of boiler. mo

Performance Curves



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

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

Pressure in the network - gas rate curves MOUNTINGS AND CONNECTIONS

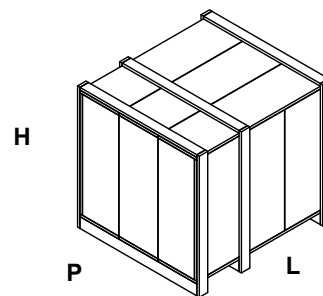
Packing

Burners are despatched in cardboard packages and whose dimensions: **1280mm x 850mm x 760mm (L x P x H)**

Packing cases of this kind are affected by humidity and are not suitable for stacking. The following are placed in each packing case:

- 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

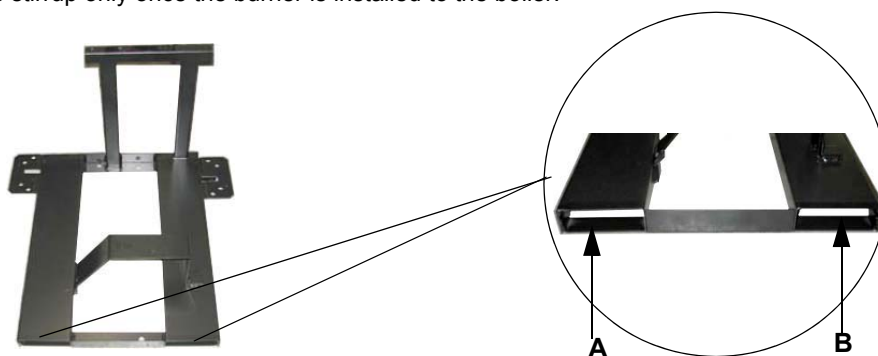


Handling the burner



ATTENTION! The handling operations must be carried out by specialised and trained personnel. If these operations are not carried out correctly, the residual risk for the burner to overturn and fall down still persists. To move the burner, use means suitable to support its weight (see paragraph "Technical specifications"). The unpacked burner must be lifted and moved only by means of a fork lift truck.

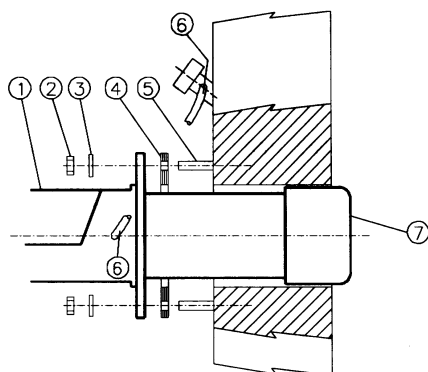
The burner is mounted on a stirrup provided for handling the burner by means of a fork lift truck: the forks must be inserted into the A and B ways. Remove the stirrup only once the burner is installed to the boiler.



Fitting the burner to the boiler

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

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



Keys

- 1 Burner
- 2 Fixing nut
- 3 Washer
- 4 Sealing gasket
- 5 Stud bolt
- 7 Blast tube

Matching the burner to the boiler

The burners described in this manual have been tested with combustion chambers that comply with EN676 regulation and whose dimensions are described in the diagram . In case the burner must be coupled with boilers with a combustion chamber smaller in dia-

meter or shorter than those described in the diagram, please contact the supplier, to verify that a correct matching is possible, with respect of the application involved. To correctly match the burner to the boiler verify the 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 lenght 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 or to design a blast tube that suits the utilisation (please, contact the manufacturer).

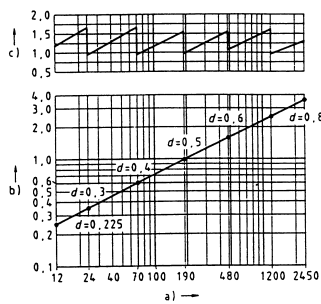


Fig. 5

Key

- a) Heat output in kW
- b) Length of the flame tube in meters
- c) Flame tube firing intensity in MW/m^3
- d) Combustion chamber diameter (m)

Fig. 5 - Firing intensity, diameter and length of the test flame tube as a function of the heat input in kW.

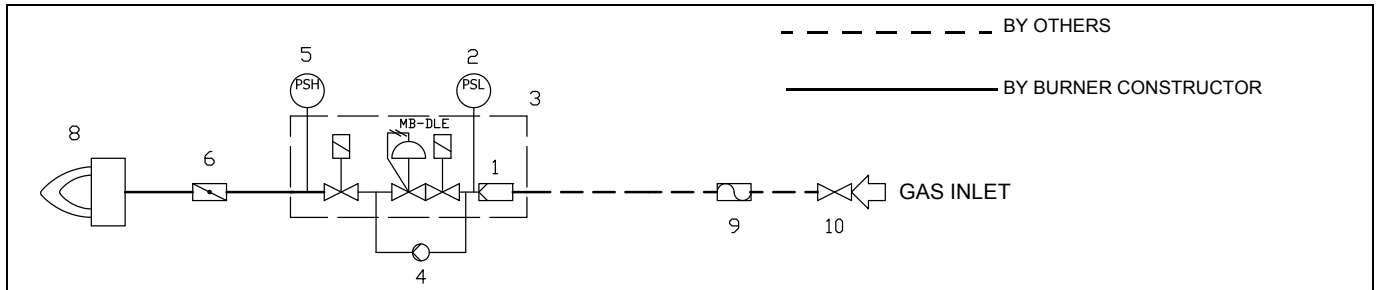
Gas train connections

The next 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.

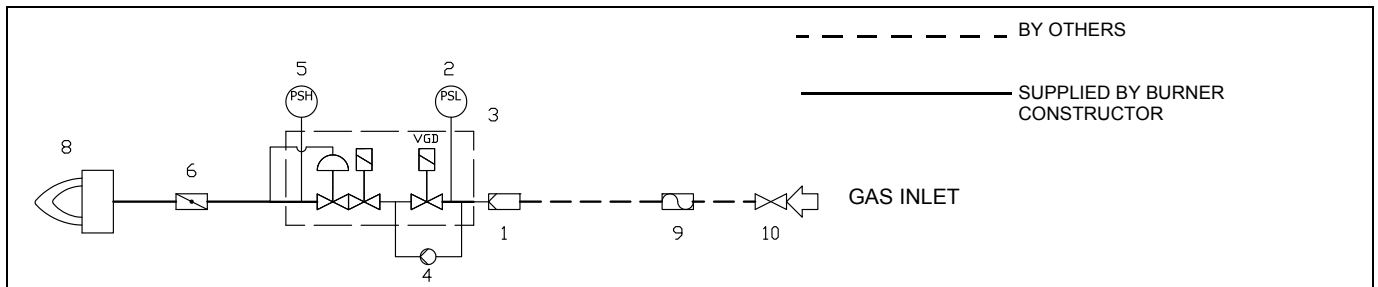


ATTENTION: BEFORE EXECUTING THE CONNECTIONS TO THE GAS PIPE NETWORK, BE SURE THAT THE MANUAL CUTOFF VALVES ARE CLOSED. READ CAREFULLY THE “WARNINGS” CHAPTER AT THE BEGINNING OF THIS MANUAL.

Gas train with valves group MB-DLE (2 valves + gas filter + pressure governor) + VPS504 gas proving system



Gas train with valves group VGD with built-in gas pressure governor + gas proving system VPS504



Key

MAIN GAS TRAIN	
1	Filter
2	Pressure switch - PGMIN
3	Safety valve with built in gas governor
4	Proving system (if present)
5	Pressure switch - PGMAX(*optional)
6	Butterfly valve
7	Main burner
8	Manual valve(*optional)
9	Bellows unit(*optional)

Assembling the gas train

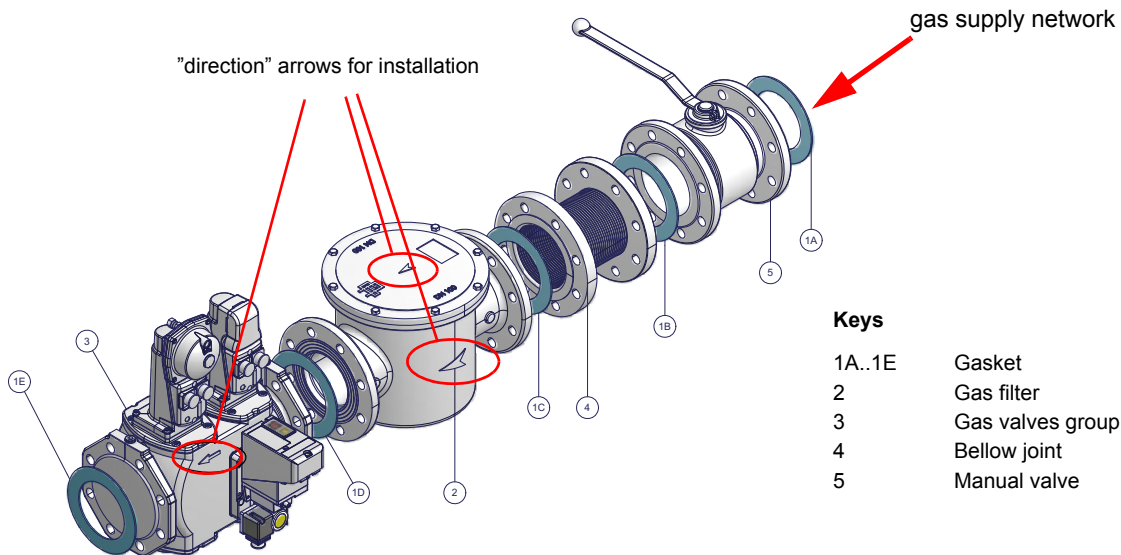


Fig. 6 - Example of gas train

To mount the gas train, proceed as follows:

1-a) in case of threaded joints: use proper seals according to the gas used;

1-b) in case of flanged joints: place a gasket (no. 1A..1E - Fig. 6) between the elements

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 shown in the next paragraphs, according to the gas train used:

- threaded gas trains with Multibloc Dungs MB-DLE, Siemens VGD20..
- flanged gas trains with Siemens VGD40..

MULTIBLOC DUNGS MB-DLE 415..420

Mounting

1. Loosen screws A and B **do not** unscrew (Fig. 7 - Fig. 8).
2. unscrew screws C and D (Fig. 7 - Fig. 8).
3. Remove MultiBloc between the threaded flanges (Fig. 8).
4. After mounting, perform leakage and functional tests.

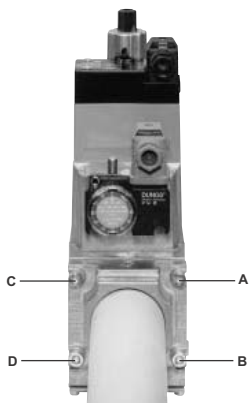


Fig. 7

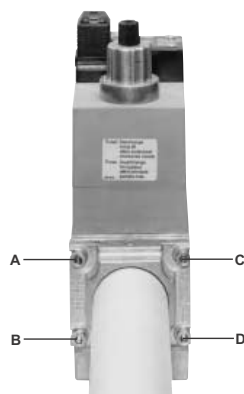


Fig. 8

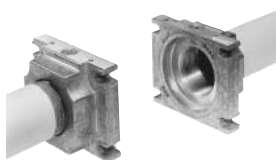


Fig. 9

MOUNTING POSITIONS

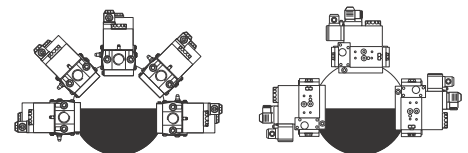


Fig. 10

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



Caution: the SKP2 diaphragm D must be vertical (see Fig. 13).



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

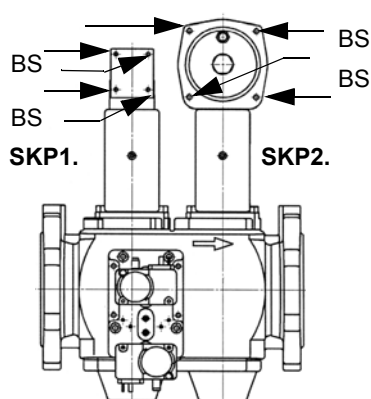


Fig. 11

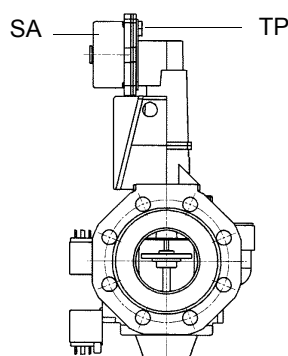


Fig. 12

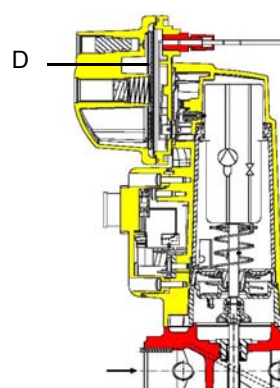


Fig. 13

SIEMENS VGD..MOUNTING
POSITIONS

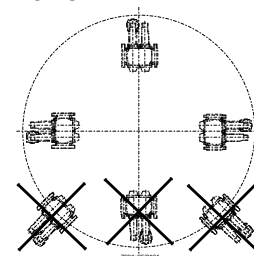


Fig. 14

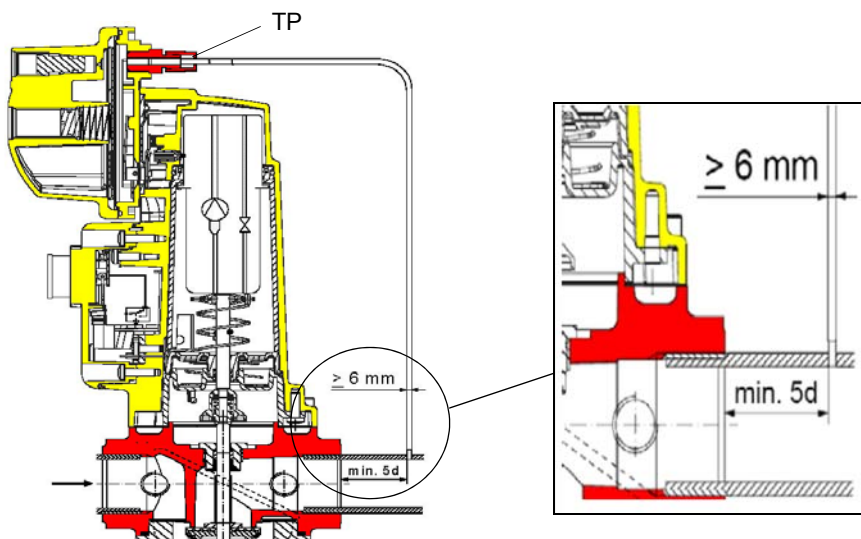
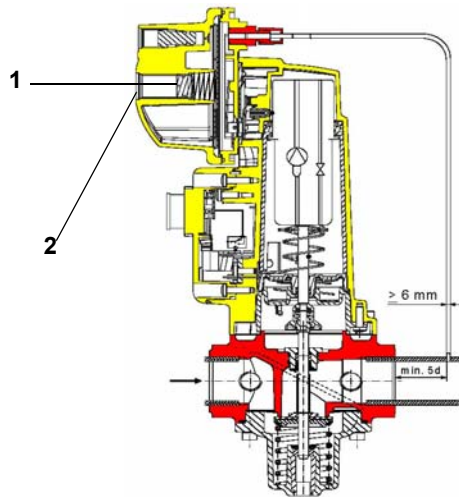


Fig. 15

Pressure adjusting range

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



Keys

1 spring

2 cap

Siemens SKP actuator

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, connect electrically 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. 16 - Gravity circuit

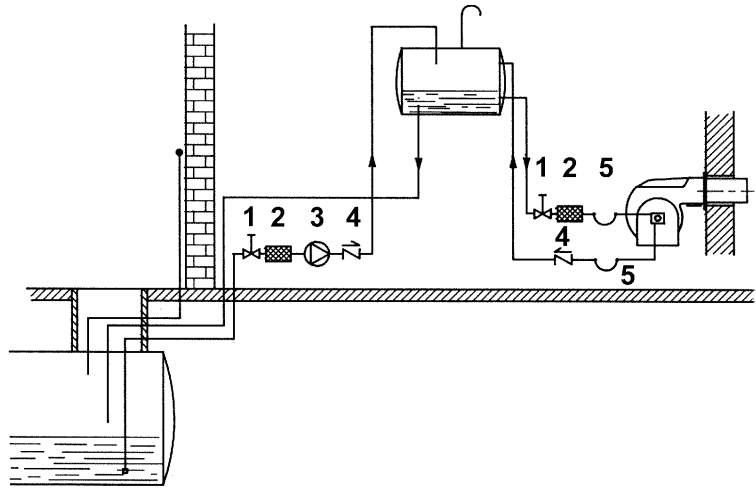


Fig. 17 - Ring circuit

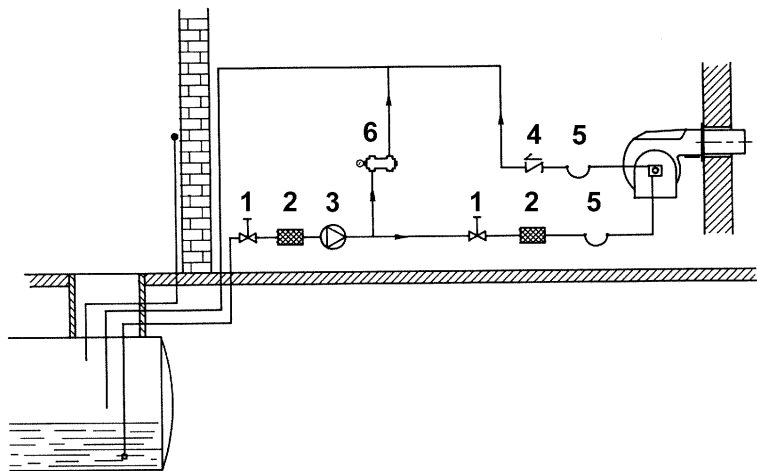
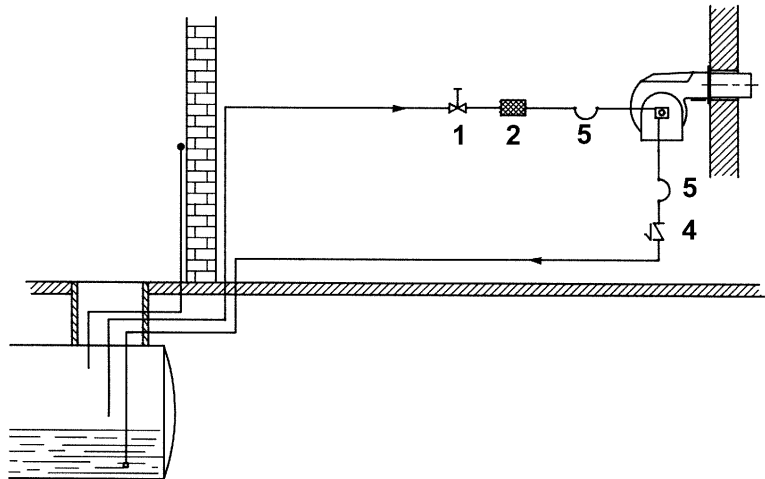


Fig. 18 - Suction circuit

**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-“ Double-pipe system” on page 20).

Installation diagram of light oil pipes

⚠ PLEASE READ CAREFULLY THE “WARNINGS” CHAPTER AT THE BEGINNING OF THIS MANUAL.

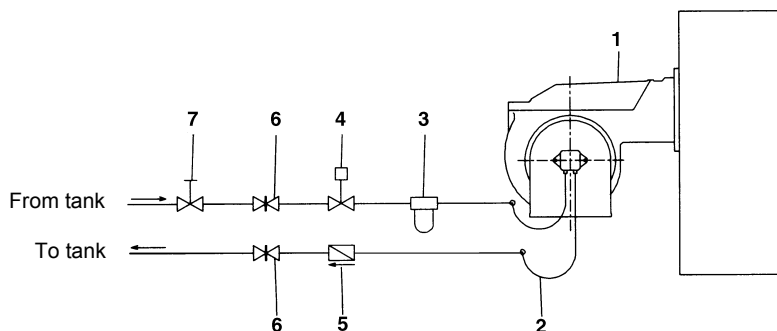


Fig. 19 - Double-pipe system

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

Key

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

(*) 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.

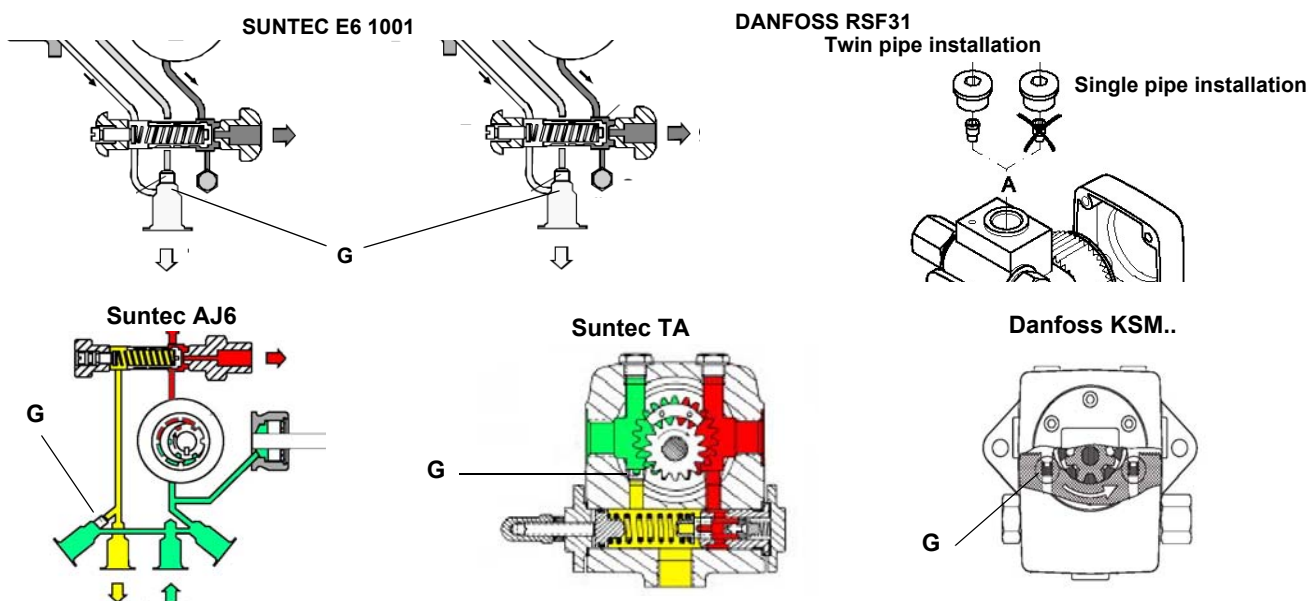
The pumps that are used can be installed both into single-pipe and double-pipe systems.

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.



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

Light oil pumps

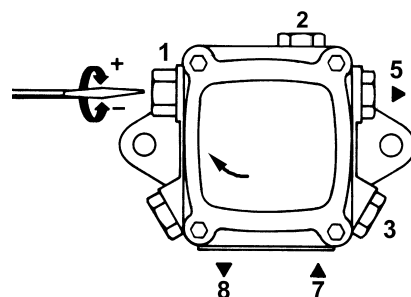
The pumps provided with these burners can be:

- HP60 - HP65: Suntec AJ6
- HP72: Suntec E7/Danfoss RSF41
- HP73A: Suntec TA2 / Danfoss KSM50

Pump Suntec AJ6	
Viscosity	2.8 - 75 cSt
Oil temperature	60°C max
Inlet maximum pressure	2 bar
Inlet minimum pressure	- 0.45 bar to avoid gasing
Rated speed	3600 rpm max.

Key

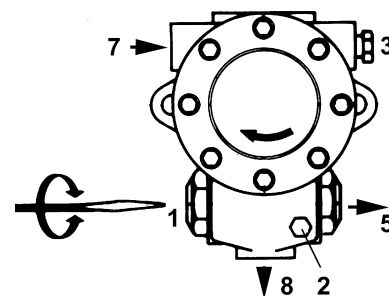
- 1 Pressure governor
- 2 Pressure gauge
- 3 Vacuum gauge
- 5 To the Nozzle
- 7 Inlet
- 8 Return



Suntec E7 1001	
Oil viscosity	2,8 ÷ 450 cSt
Oil temperature	0 ÷ 90°C
Inlet maximum pressure	1,5 bar
Maximum return pressure	1,5 bar
Minimum inlet pressure	- 0.45 bar to avoid gasing
Rotation speed max.	3600 rpm

Key SUNTEC

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



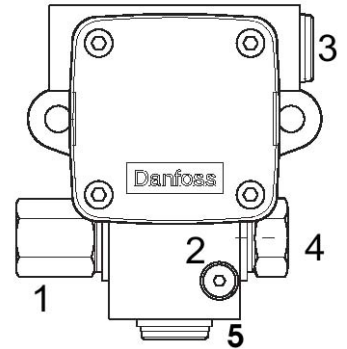
Pump : Suntec E

Danfoss RSF41

Oil viscosity	2,5 ÷ 450 cSt
Oil temperature	-10 ÷ 120°C
Inlet maximum pressure	4 bar
Maximum return pressure	4 bar
Minimum inlet pressure	- 0.45 bar to avoid gasing
Rotation speed max.	3600 rpm

Key DANFOSS

- 1 Pressure governor
- 2 Pump pressure gauge
- 3 Inlet
- 4 To the nozzle
- 5 Return

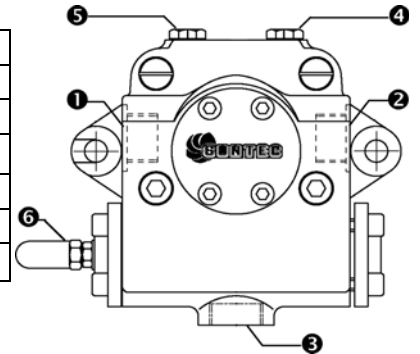


Pump : Danfoss RSF

Suntec TA..

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

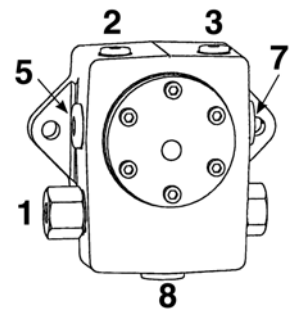
- 1 Inlet G1/2
- 2 To the nozzle G1/2
- 3 Return G1/2
- 4 Pressure gauge port G1/4
- 5 Vacuum gauge port G1/4
- 6 Pressure governor

**Danfoss KSM..**

Oil viscosity	2.5 ÷ 450 cSt
Oil temperature	-10 ÷ 160 °C
Max. suction pressure	4 bar
Min. suction pressure	-0.45 bar to avoid gasing
Max. return pressure	4 bar
Rotation speed	3450 rpm max

Keys

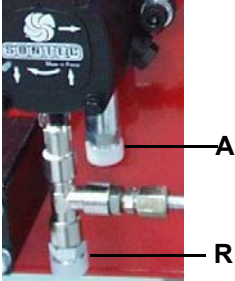

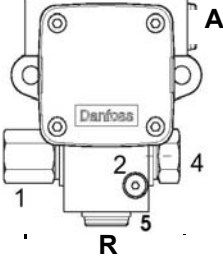
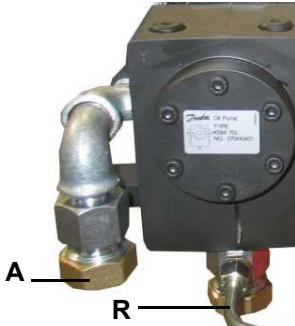

- 1 Pressure governor
- 2 Pressure gauge/vacuum gauge port to measure inlet pressure/vacuum
- 3 Pressure gauge port
- 5 Inlet
- 7 To nozzle
- 8 Return




Connecting 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).

Suntec AJ6	Suntec E..	Danfoss RSF..	Danfoss KSM	Suntec TA
				

Electrical connections

	<p>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.</p> <p>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.</p>
---	--

	<p>IMPORTANT: while connecting electric supply wires to burner's terminal block be sure that ground wire should be longer than phase and neutral ones.</p>
---	---

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 attached wiring diagrams;
- 3 check the direction of the fan motor (see next paragraph);
- 4 refit the panel cover.

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.

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

ADJUSTMENTS

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 O_2 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 actuator are at the maximum opening. Refer to Fig. 20, 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.

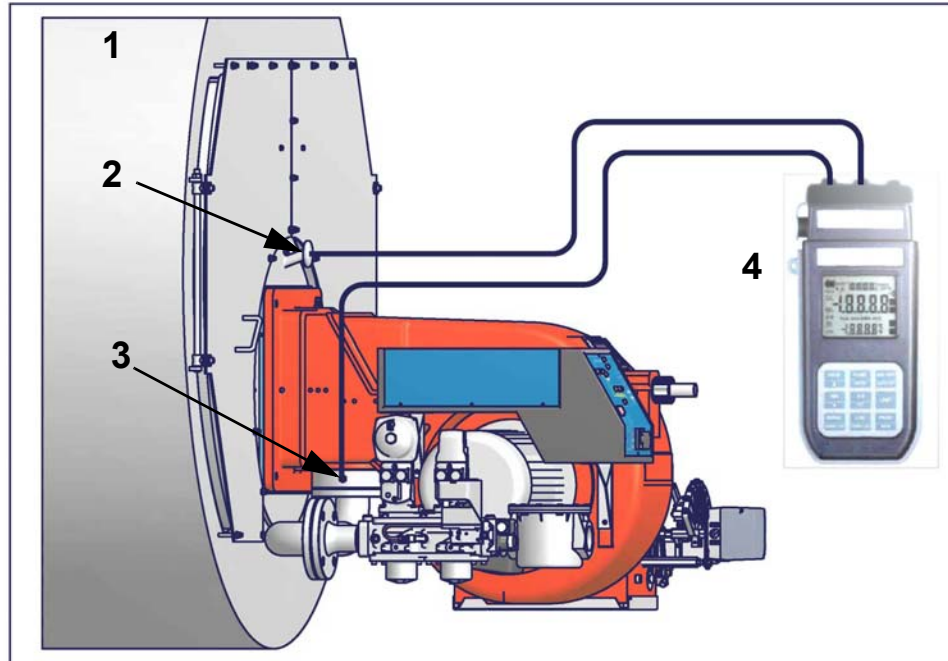


Fig. 20

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 to get the pressure in the combustion chamber and the other one into the butterfly valve's pressure outlet of the burner. On the basis of the measured differential pressure, it is possible to get the maximum flow rate: in the pressure - rate curves (showed on the next paragraph), it is easy to find out the burner's output in Stm^3/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.

	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 fuel decrease slowly until the normal combustion values are achieved.
	WARNING: NEVER LOOSE THE SEALED SCREWS! OTHERWISE, THE DEVICE WARRANTY WILL BE IMMEDIATELY INVALIDATE!

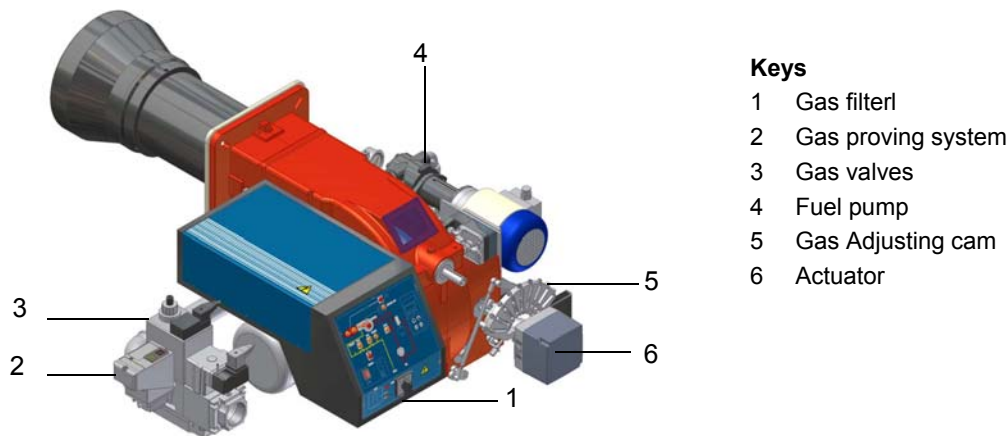


Fig. 21

Gas Filter

The gas filters remove the dust particles that are present in the gas, and prevent the elements at risk (e.g.: burners, 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.

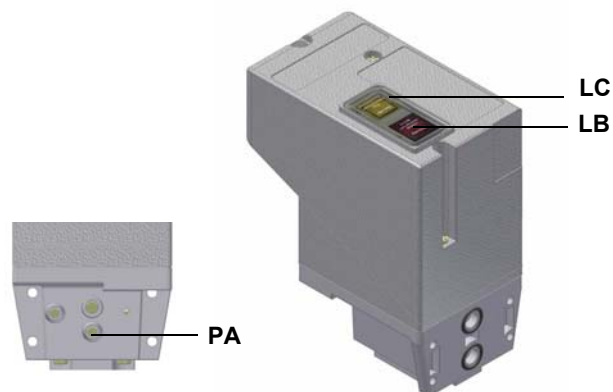


Fig. 22



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
LPG	11 ÷ 12	2.8 ÷ 4.3
Light oil	11.5 ÷ 13	2.9 ÷ 4.9

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 25.
- 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.

Adjustment procedure for gas operation

- 1 set GAS fuel by means of the burner **CM** switch (it is placed on the burner control panel - see page 39)
- 2 check the fan motor rotation (see pag. 24).

Only for burners provided with **Dungs Multibloc MB-DLE gas valves**: before starting the burner up, adjust the valves slow opening. To set the fast opening remove cover **T**, reverse it upside down and use it as a tool to rotate screw **VR**. Clockwise rotation reduces start flow rate, anticlockwise rotation increases it. Do not use a screwdriver on the screw **VR**! The pressure stabilizer is adjusted by operating the screw **VS** located under the cover **C**. By screwing down the pressure is increased and by unscrewing it is reduced.

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

Only for burners provided with **Dungs Multibloc MB-DLE gas valves**: before starting the burner up, adjust the valves slow opening. To set the fast opening remove cover **T**, reverse it upside down and use it as a tool to rotate screw **VR**. Clockwise rotation reduces start flow rate, anticlockwise rotation increases it. Do not use a screwdriver on the screw **VR**! The pressure stabilizer is adjusted by operating the screw **VS** located under the cover **C**. By screwing down the pressure is increased and by unscrewing it is reduced.

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

- 3 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;
- 4 drive the burner to high flame stage, by means of the thermostat **TAB**.
- 5 do not change the air flow rate adjustment set in the light oil operation (see previous paragraph);
- 6 acting on the pressure stabiliser of the valves group, adjust the **gas flow rate in the high flame stage** as to meet the values requested by the boiler/utilisation:

- **Multibloc MB-DLE**: the valve is adjusted by means of the **RP** regulator after slackening the locking screw **VB** by a number of turns. By unscrewing the regulator **RP** the valve opens, screwing the valve closes. - **Siemens VGD valves group**: remove cap **T** and act on the **VR** adjusting screw to increase or decrease the pressure and consequently the gas rate; screwing **VR** the rate increases, unscrewing it decreases (see next figure).

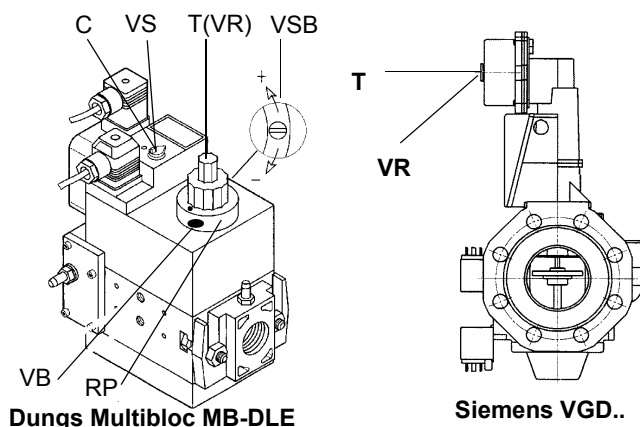
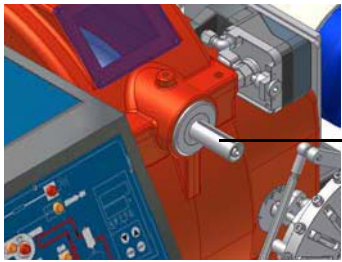


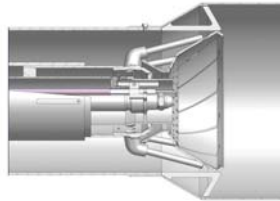
Fig. 23

⚠ Pressure stabiliser is factory-set. The setting values must be locally adapted to machine conditions. Important! Follow the instructions carefully!

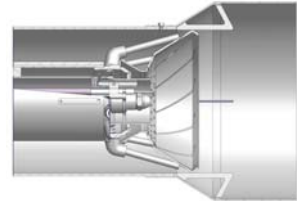
- 7 The burner is factory-set with the head in its MAX position (maximum output). To let the burner operate at a lower output, turn clockwise the **VRT** screw and move progressively the combustion head back towards the MIN position. **Attention!** if it is necessary to change the head position, repeat the air and gas adjustments described above.



VRT



"MAX" head position



"MIN" head position "MIN" head

8 drive the burner to the low flame stage by means of the **TAB** thermostat;

In order to change the gas flow rate slacken the nuts **DB** (Fig. 24) and adjust the opening angle of the gas butterfly valve by rotating the rod **TG** (clockwise rotation increases gas flow, anticlockwise rotation decreases it). The mark on the butterfly valve shaft shows the measured opening degree of the valve regarding the horizontal axis (Fig. 24). **NOTE:** At the end of settings, make sure the locking screws **RA** and **DB** are fully tightened.

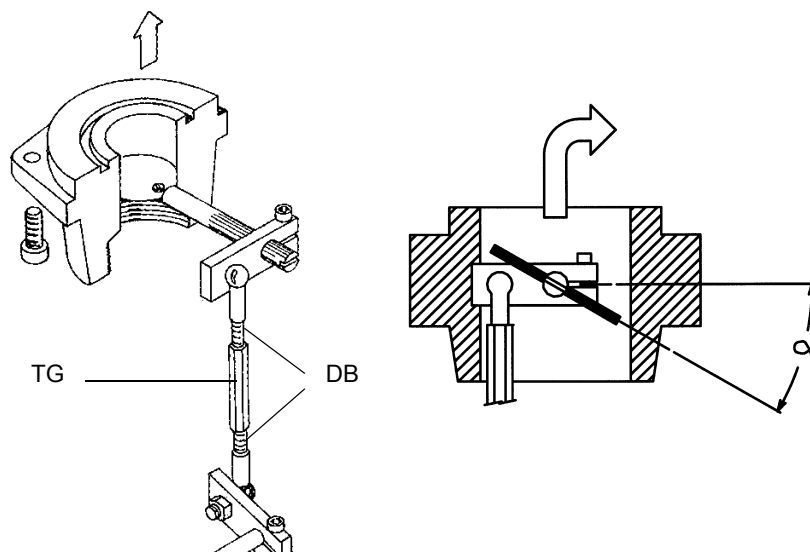


Fig. 24

9 Now adjust the pressure switches.

- 10 In the case that the flue gas temperature is not the one required, go back to the light oil operation and adjust the oil flow rate as to meet the flue gas temperature values requested. Consequently adjust the air always observing the combustion analysis. Then go back to the gas operation and repeat only the gas adjustments (because the air rate has already been set in the light oil operation); always check the combustion values.
- 11 Turn the burner off and then start it up again. If the adjustment is not correct, repeat the previous steps.

Calibration of air and gas pressure switches

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

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



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:

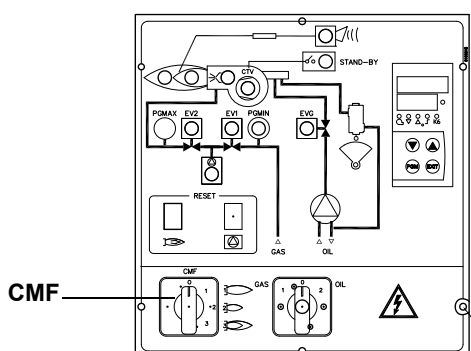
- 1 remove the plastic cover;
- 2 measure the gas pressure in the network, when flame is off;
- 3 by means of the adjusting ring nut **VR**, set the value read on step 2, increased by the 30%;
- 4 replace the plastic cover.

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 procedure 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 table below and the diagram on Fig. 25 (as far as reading the pressure values, see next paragraphs).

NOZZLE	NOZZLE SUPPLY PRESSURE bar	HIGH FLAME RETURN PRESSURE bar	LOW FLAME RETURN PRESSURE bar
MONARCH BPS	20	See table below	See table below
BERGONZO A3	20	11 ÷ 13	6 (recommended)

RETURN PRESSURE bar														
Nozzle sizeNozzle size (GPH)	0	1,4	2,8	4,1	5,5	6,9	8,3	9,6	11	12,4	13,8	15,2	Flow rate in kg/h with close return	Pressure with close return to use in the nozzle choice)
0,75	1,3	1,6	2,1	2,5									3,2	5,5
1,0	2,1	2,1	2,4	3,0	3,7	4,6	5,2						5,4	8,6
1,5	2,9	3,0	3,3	4,1	4,9	6,0	7,0						7,9	9,3
2,0	4,6	5,1	5,4	6,4	7,5	8,7	9,9						10,5	9,3
2,5	3,5	4,1	4,9	5,9	7,5	9,1	10,8	12,4					13,5	10,7
3,0	5,6	5,9	6,2	7,2	8,7	10,0	11,9	13,8					15,3	11,0
3,5	7,0	7,2	7,8	8,7	9,9	11,3	12,4	13,7	18,4				19,7	12,1
4,0	7,8	7,9	8,3	8,6	10,3	11,6	13,0	14,1	17,3	20,2			21,0	12,8
4,5	9,2	9,4	10,0	11,0	11,9	12,9	14,3	15,3	17,2	24,5			24,8	14,1
5,0	10,8	11,0	11,3	11,6	13,0	14,3	15,6	17,0	18,6	24,3			26,2	13,4
5,5	9,7	10,0	10,2	11,1	12,1	13,4	14,8	16,4	18,1				29,7	12,4
6,0	9,2	9,5	9,9	10,0	10,8	12,4	14,1	15,7	17,5	18,9	29,3		33,1	14,8
6,5	10,5	10,8	11,1	11,4	12,1	13,8	15,3	16,5	18,4	20,0	22,4	36,2	36,7	15,5
7,0	8,7	9,4	10,0	11,4	13,2	14,9	17,2	19,6	23,1	25,1	33,2		33,7	15,2
7,5	11,3	11,8	10,3	13,0	14,3	15,3	17,2	19,2	21,8	24,2	30,4		39,3	14,1
8,0	9,9	9,9	10,2	11,3	12,6	14,3	16,1	18,4	21,1	24,3			39,7	13,8
9,0	10,8	11,0	11,1	12,6	14,5	16,1	18,8	21,8	25,1	28,9			45,9	13,8
9,5	11,4	11,6	12,2	13,7	15,3	17,3	19,7	23,2	26,5	30,0	33,5		49,1	14,5
10,5	11,6	11,6	12,2	13,7	15,4	17,6	20,7	24,0	27,3	31,2	35,5		50,9	15,2
12,0	13,7	14,0	14,3	15,6	18,1	21,9	25,8	30,2	34,7	39,7	44,5		61,7	14,5
13,8	13,4	13,4	13,7	15,6	18,1	23,2	28,3	34,7	41,0	47,7	54,7		71,2	15,2
15,3	16,5	16,9	17,2	18,4	20,7	23,8	28,3	33,1	36,9	44,5	51,8		76,0	15,2
17,5	21,6	21,9	21,9	23,2	25,8	29,6	34,7	40,7	46,4	54,0	62,3	71,2	89,7	15,5
19,5	19,7	20,0	20,3	21,3	23,8	28,0	32,7	39,7	47,1	55,3	66,4	75,0	97,3	16,2
21,5	24,8	24,8	25,1	26,1	28,3	33,4	37,8	45,1	53,1	61,7	73,8	83,9	106,5	16,6
24,0	26,7	27,0	27,7	29,3	31,8	36,6	45,8	55,0	65,5	77,3	90,9	106,2	111,6	15,9
28,0	28,6	28,9	30,5	35,3	43,6	42,1	67,1	85,5	107,1	127,8	151,7		154,8	14,8
30,0	25,8	25,8	28,6	35,9	43,2	56,3	73,8	90,6	102,4	120,8	144,0	160,9	164,1	15,5
35,0	34,3	35,0	40,7	49,9	63,6	82,7	103,6	122,1	145,9	120,8			186,0	13,8
40,0	52,8	53,1	60,4	70,6	86,8	106,5	128,8	149,7	179,6	172,6			217,2	13,1
45,0	73,4	73,4	83,0	93,5	112,2	134,5	157,7	185,0	225,7	209,8			242,3	12,4
50,0	92,5	94,4	104,6	118,9	139,9	167,2	196,8	231,8	263,3				266,8	11,4

Tab. 1- Monarch nozzle

N.B. Specific gravity of the light oil: 0.840kg/dm³

Example: If the nozzle provided is mod. MONARCH 10.5 GPH, when the return pressure is 13.8 bar, the flow rate will be 35.5kg/h (see the chart above). If the return pressure is 13.80bar (with the same nozzle), the flow rate value will be 15.4kg/h. The flow rate in the High-flame operation is related to the nozzle provided with close return.

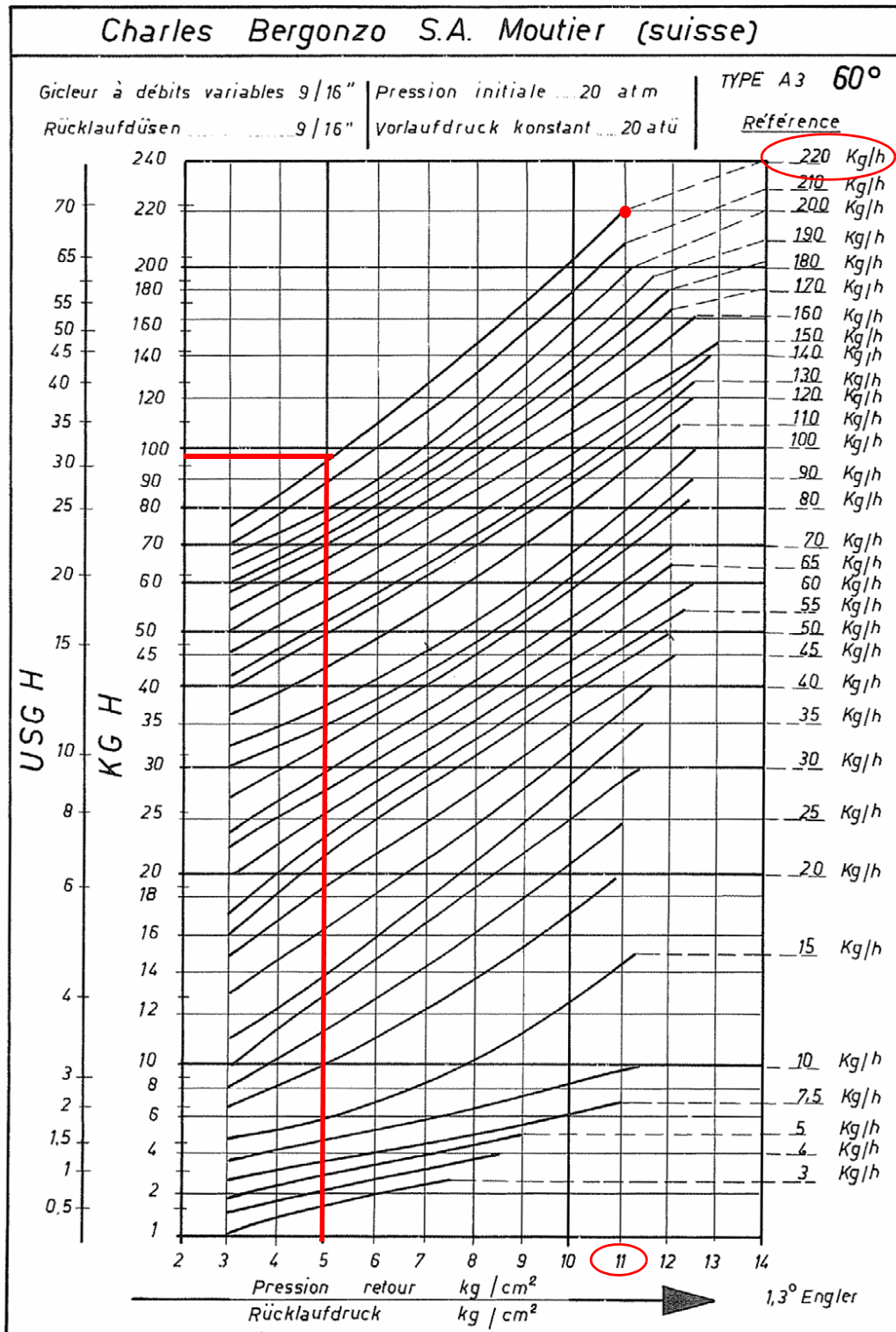
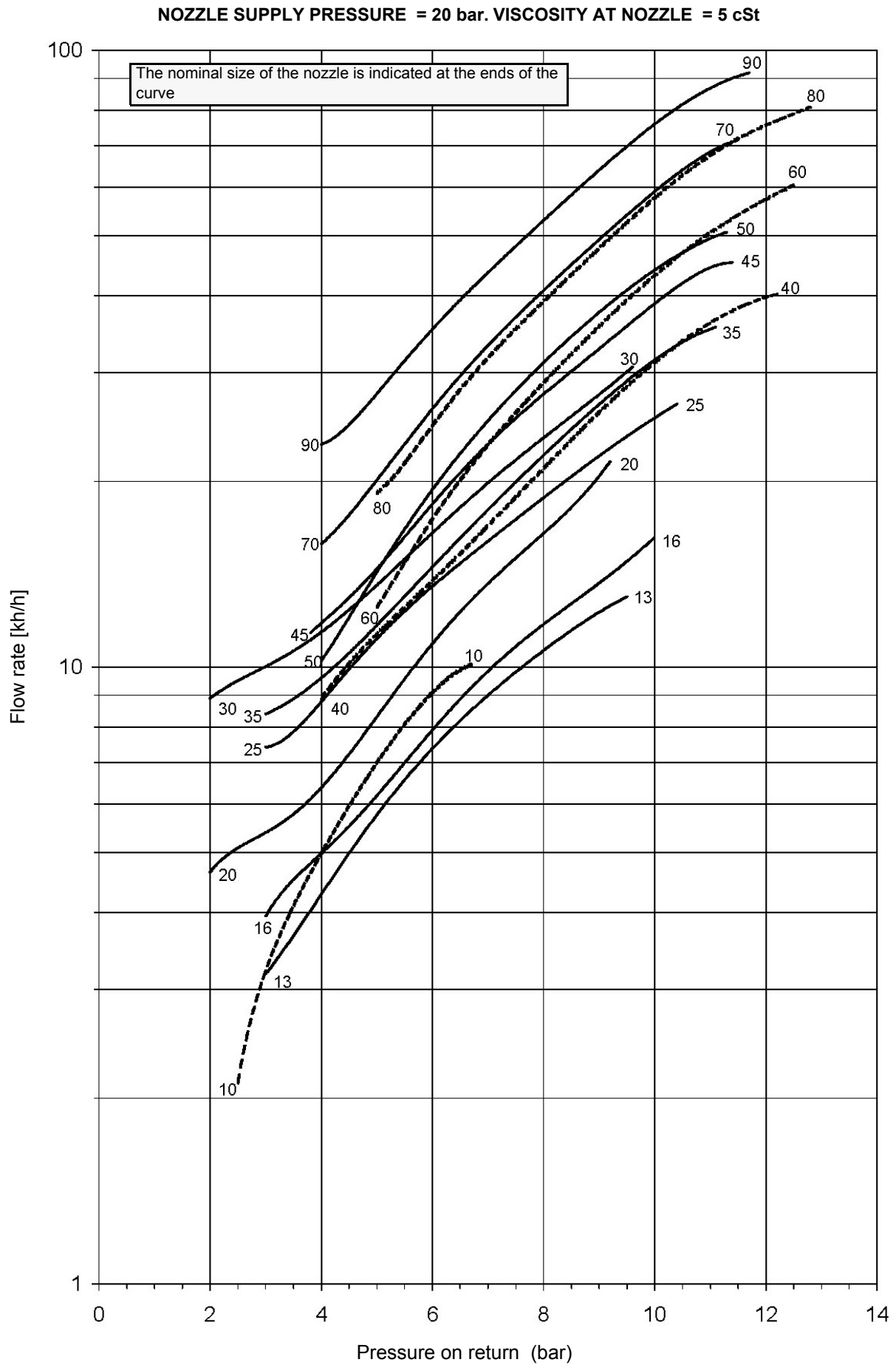


Fig. 25

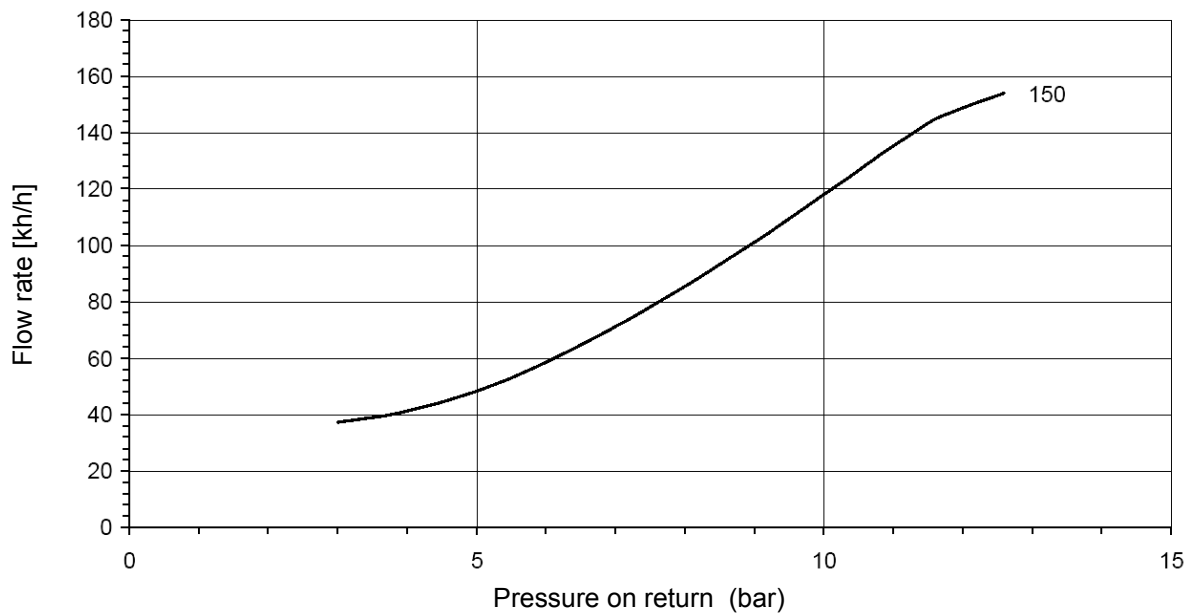
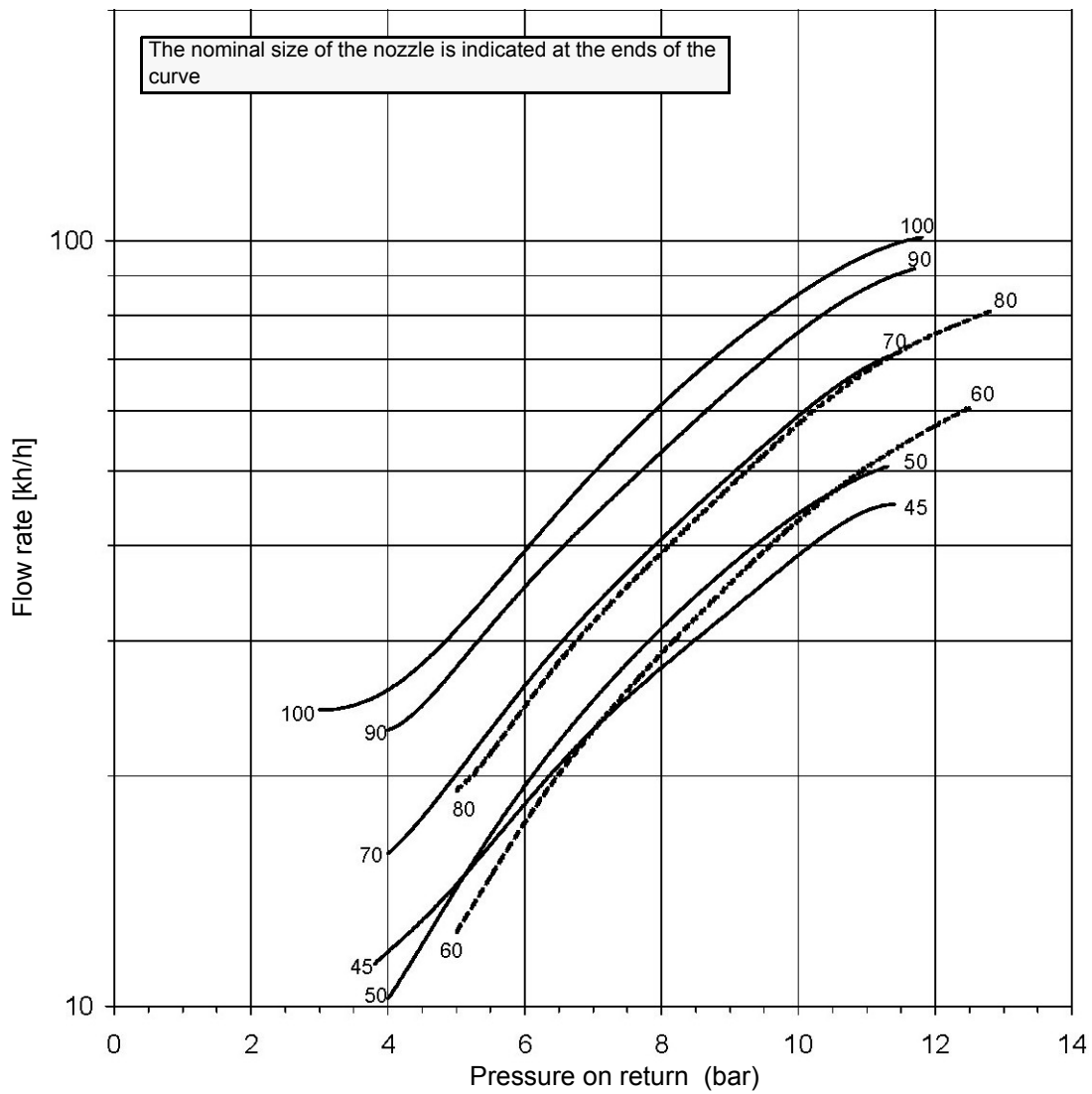
Example (Bergonzo): if a 220kg/h flow rate BERGONZO nozzle is provided, set the return pressure at 11bar, supply at 20bar on the delivery to get a 220kg/h flow rate. If the return pressure needed is 5bar, instead, act on the V adjusting screw on the pressure governor (see chapter on page 30). The flow rate will then be about 95kg/h (see the example showed on the Bergonzo diagram).

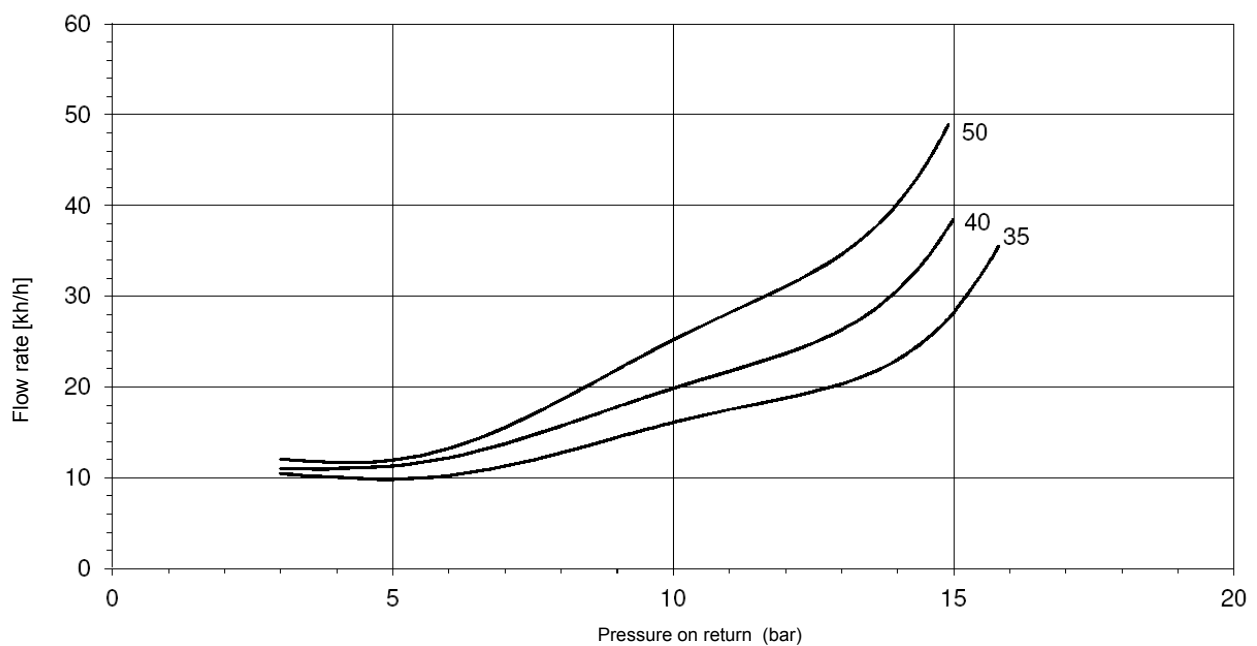
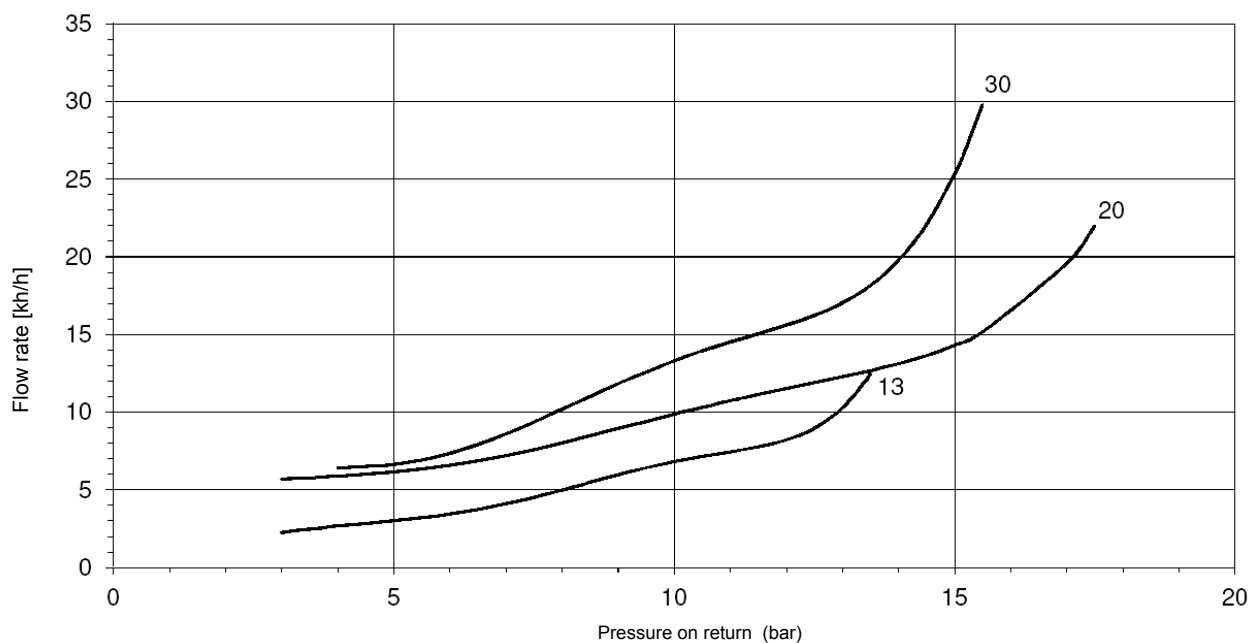
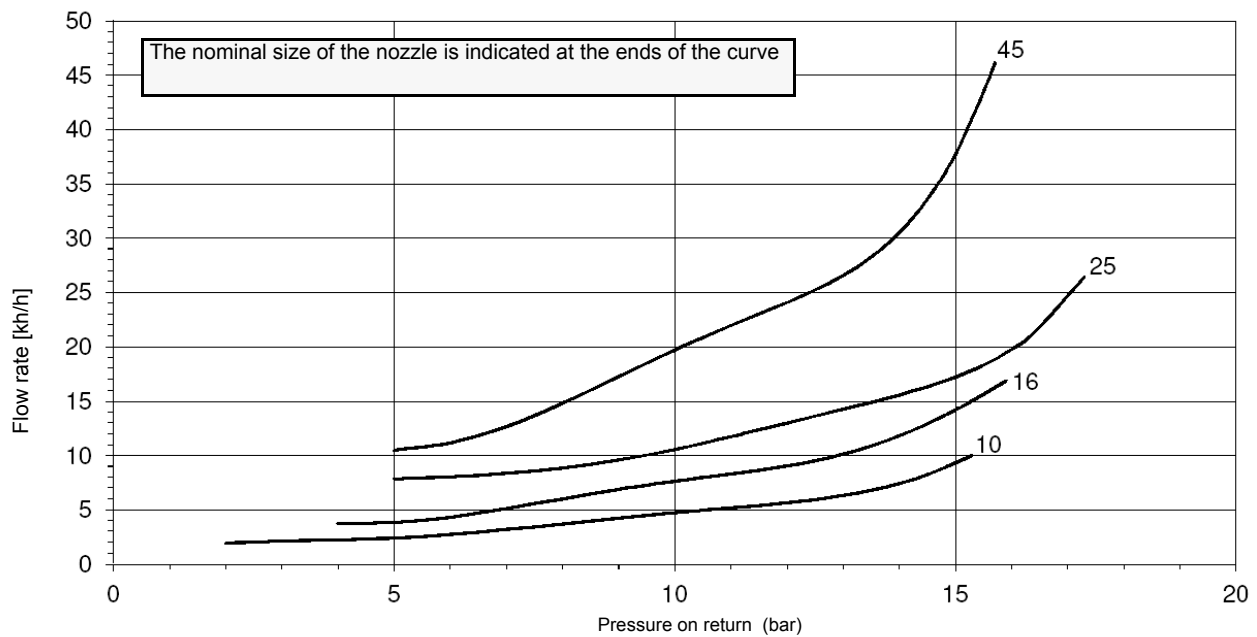
FLUIDICS KW3...60°

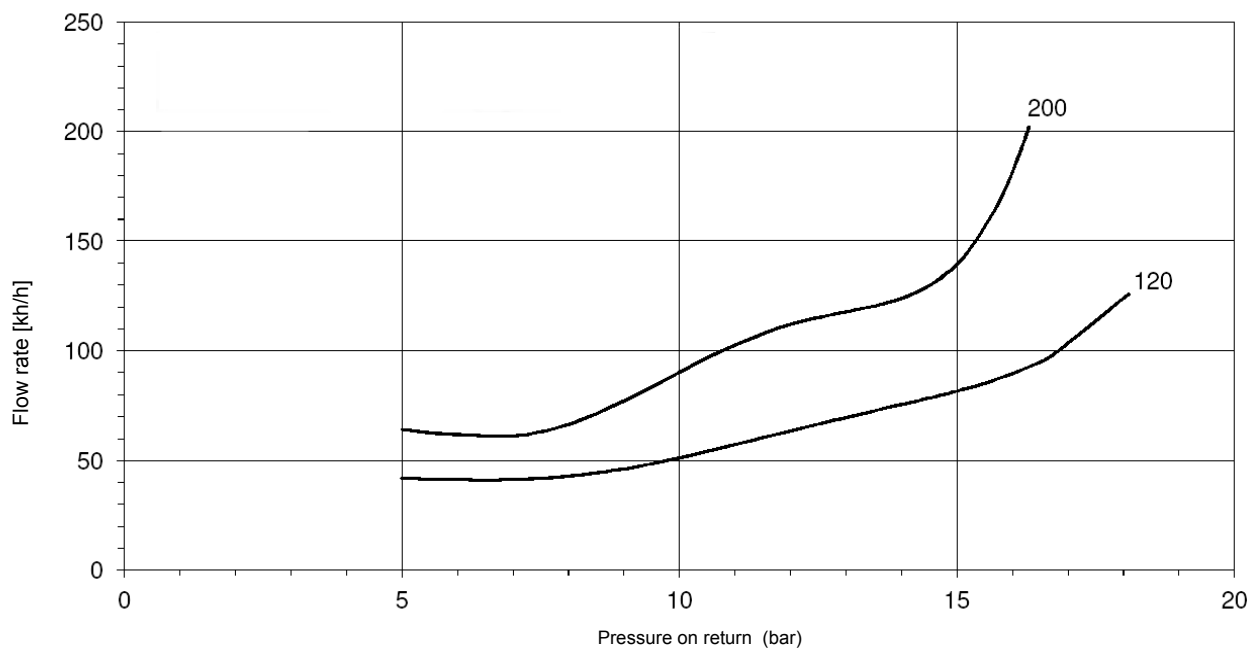
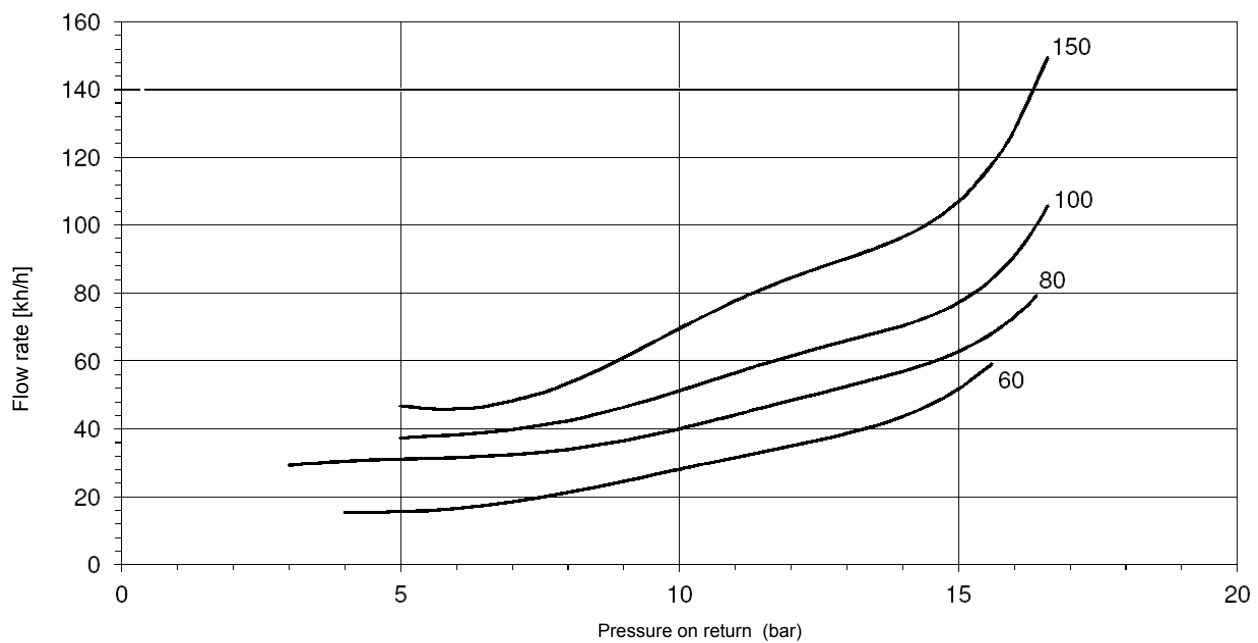
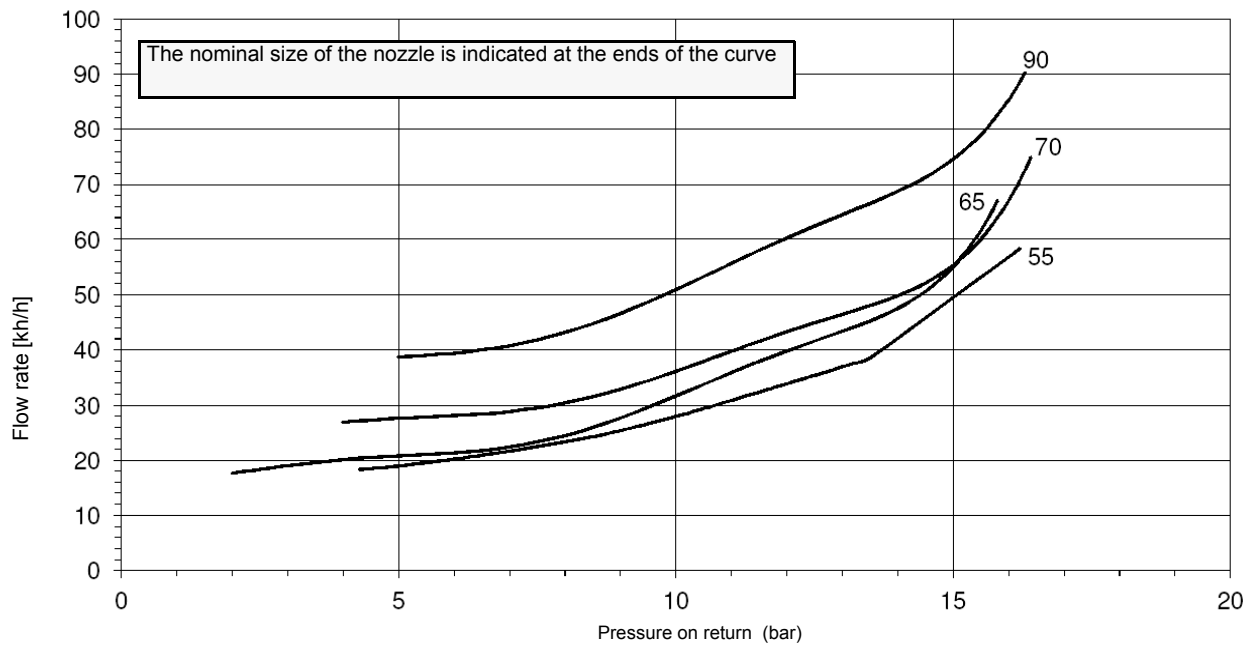


FLUIDICS KW3...60°

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

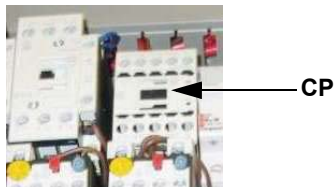


FLUIDICS KW3...45°**NOZZLE SUPPLY PRESSURE = 20 bar. VISCOSITY AT NOZZLE = 5 cSt**

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

Adjustment procedure for light oil operation

- 1 The light oil flow rate is set by choosing a nozzle that suits the boiler/utilisation output and setting the delivery and return pressure values according to the ones quoted on the table below and the diagram on page 30 (as far as reading the pressure values, see next paragraphs). Once the air and gas flow rates are adjusted, turn the burner off, switch the **CM** switch to the heavy oil operation (OIL, on the burner control panel (see page 39).
- 2 with the electrical panel open, prime the oil pump acting 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 start the burner up by means of the thermostat series;
- 4 bleed the air from the **M** pressure gauge port (Fig. 26) by loosening the cap without removing it, then release the contactor.

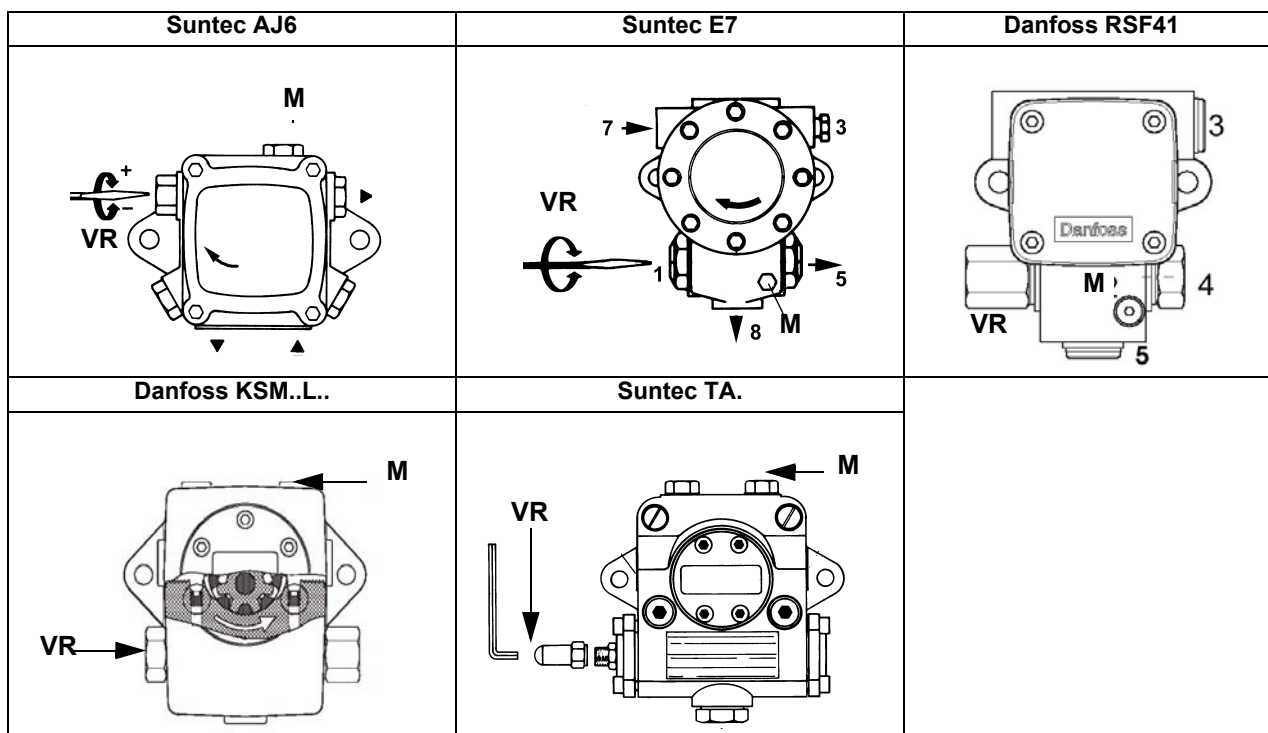
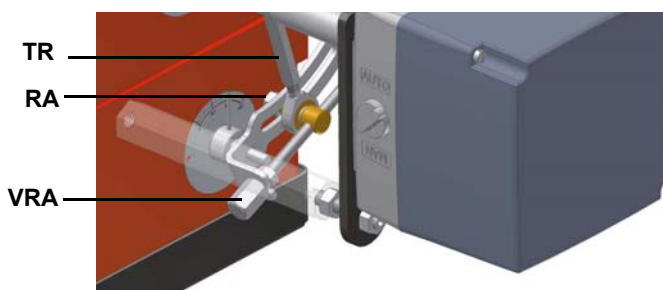


Fig. 26

- 5 drive the burner to high flame stage, by means of the thermostat **TAB** (high/low flame thermostat - see Wiring diagrams).
- 6 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. 27 and act on the pump adjusting screw **VR** (see Fig. 28) as to get the nozzle pressure at 20bar (Monarch or Fluidics nozzles - see page 30).
- 7 the oil flow rate in the high flame stage is the maximum pressure with the return line closed
- 8 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 fastened. Do not change the position of the air damper rods.



- 9 drive the burner to low flame by means of the **TAB** thermostat.

- 10 To perform the regulation, remove the cap **D** and loosen the screw **V** (see Fig. 30), by means of a screwdriver (see Fig. 30). The regulating screw **V** acts on the return pressure from the nozzle. Set the pressure to the minimum value of 5 bar. Read the values on the pressure gauge placed on the regulator's coupling **M**. Once the regulation is accomplished, replace cap **D**.



Note: After a certain operating period, the pressure can change because of some dirt on the needle's seal: remove the screw **VT** (see Fig. 28) and clean.

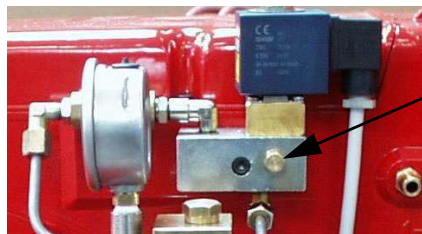


Fig. 27

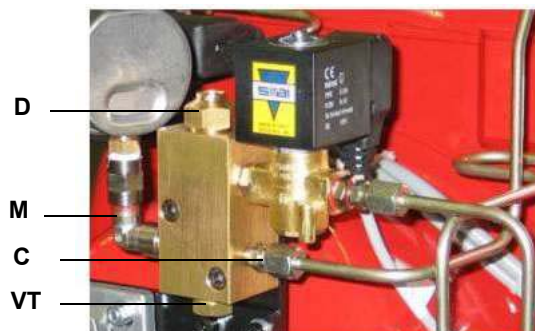


Fig. 28 - Oil manual governor

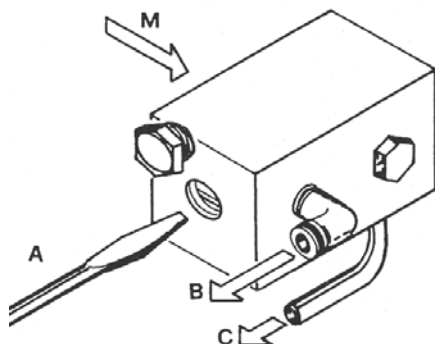


Fig. 29

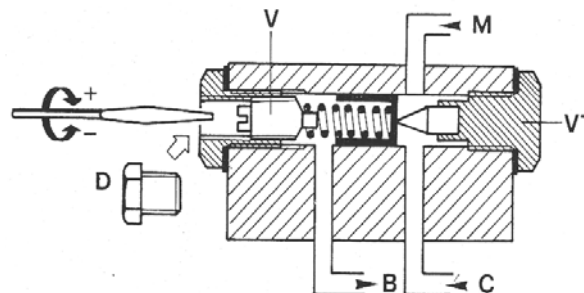


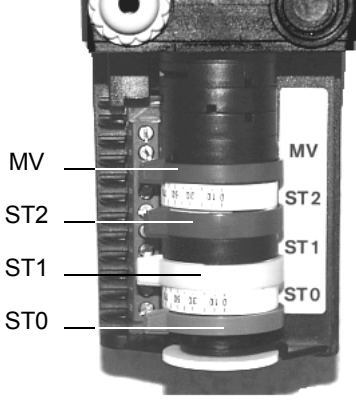

Fig. 30

- D** Adjusting screw cap
- V** Pressure adjusting screw
- M** Pressure gauge port
- VT** Needle screw
- B** Return to tank
- C** Return from nozzle

- 11 always checking the combustion values, adjust the low flame air flow rate by means of the actuator ST1 (Berger)/III (Siemens) cam;
- 12 The low flame position must never match the ignition position that is why cam MV (Berger)/IV (Siemens) must be set 20° - 30° more than the ignition position ST1 (Berger)/III (Siemens).
- 13 Turn the burner off and go on with the gas operation adjustment.

Attention:

- **Berger actuator:** cams can be moved manually
- **Siemens actuator:** set the MAN/AUTO lever to MAN to move the cams, remember to set it to AUTO once the adjustment is accomplished.

Berger STA12 B 3.41	Siemens SQN72
 <p>The image shows the internal components of a Berger STA12 B 3.41 gas valve. It features a central vertical shaft with several cam rings. Labels on the left and right sides point to specific components: MV (Auxiliary cam for the second valve enabling), ST2 (High flame cam), ST1 (Low flame), and ST0 (Ignition position). The cam rings are white with black markings.</p>	 <p>The image shows the internal components of a Siemens SQN72 gas valve. It features a central vertical shaft with several cam rings. Labels on the left and right sides point to specific components: I (High flame cam, red), II (Ignition position, blue), III (Low flame, orange), and IV (Auxiliary cam for the second valve enabling, black). A label 'AUTO-MAN' points to a blue component on the right. The cam rings are colored according to their function.</p>
<p>ST2 = High flame cam ST0 = Ignition position ST1 = Low flame MV = Auxiliary cam for the second valve enabling</p>	<p>I = High flame cam (red) II = Ignition position (blue) III = Low flame (orange) IV = Auxiliary cam for the second valve enabling (black)</p>

OPERATING PRINCIPLE FOR LIGHT OIL CIRCUIT

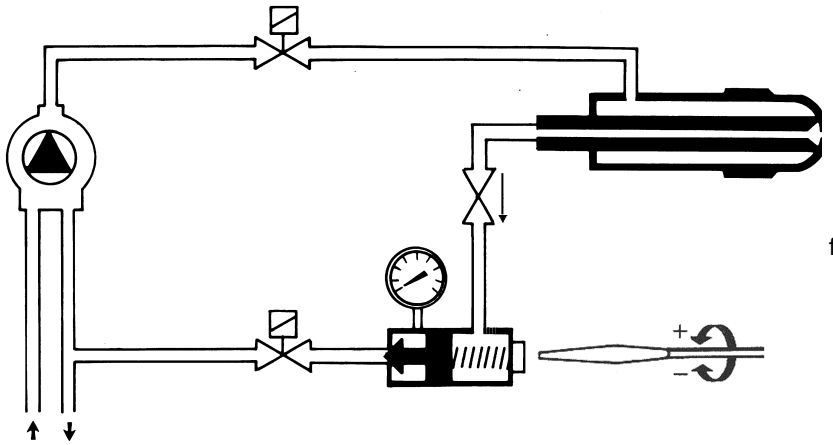


Fig. 31

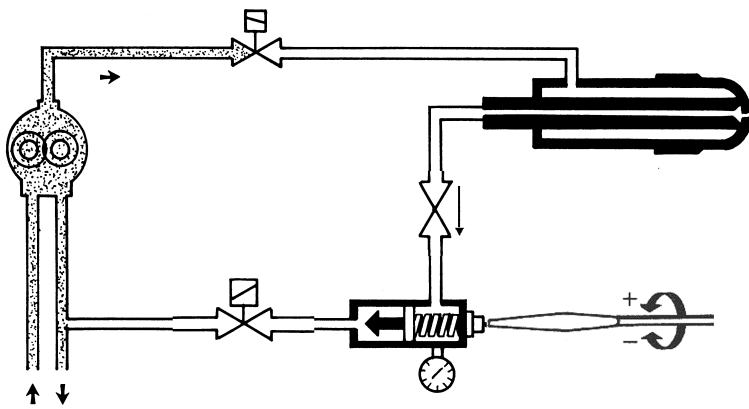


Fig. 32 - Pre-purge

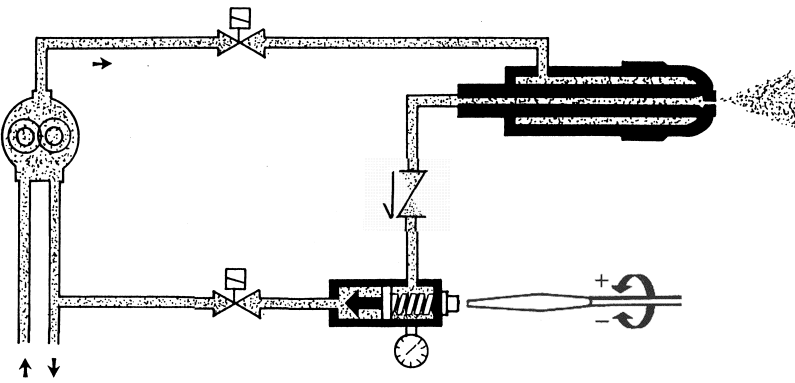


Fig. 33 - Low flame

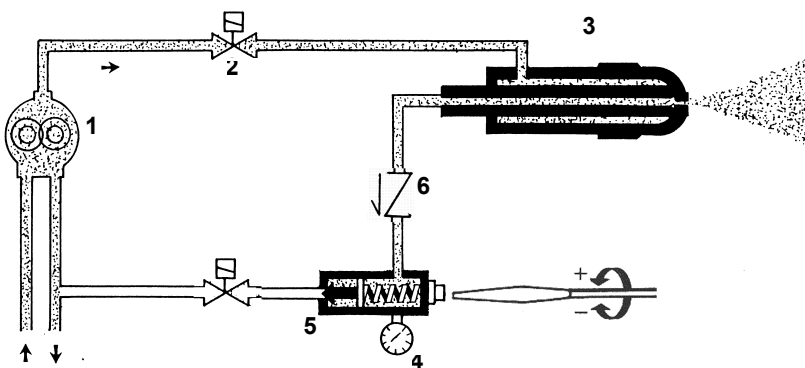


Fig. 34 - High flame

Keys

- 1 Light oil pump
- 2 Light oil solenoid valve
- 3 Nozzle
- 4 Pressure gauge
- 5 Pressure regulator
- 6 Nonreturn valve

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).

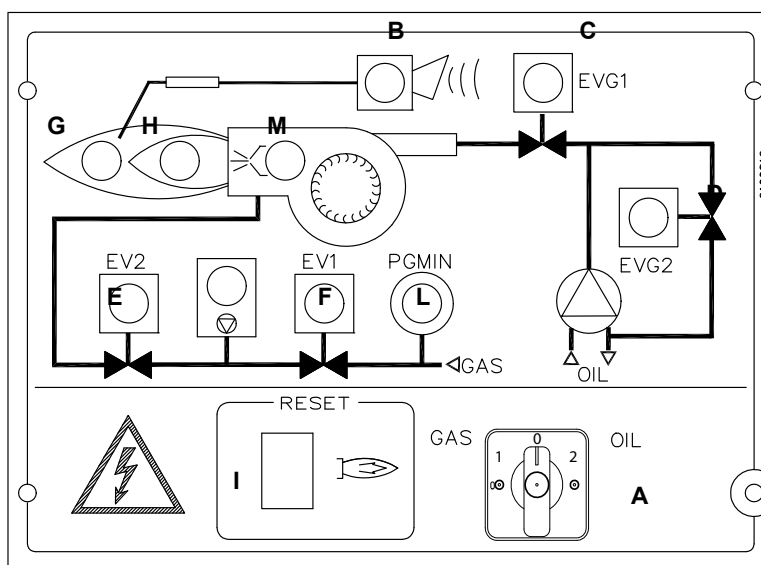
NEVER OPEN OR DISMANTLE ANY COMPONENT OF THE MACHINE.

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

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

Burner control panel



KeysA Manual operation switch: 0 - OFF; 1 - Gas; 2 - Light oil

- B Burner lockout signalling lamp
- C EVG1 light oil solenoid valve's opening signalling lamp
- D EVG2 light oil solenoid valve's opening signalling lamp
- E EV2 gas solenoid valve's opening signalling lamp
- F EV1 gas solenoid valve's opening signalling lamp
- G High flame gas solenoid valve's opening signalling lamp
- H Low flame gas solenoid valve's opening signalling lamp
- I Flame control device's unlock pushbutton
- L Gas pressure switch control signalling lamp
- M Ignition transformer's operation signalling lamp

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".

Fuel selection:

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

To start the burner, proceed as follows.

- 1 Select the fuel by means of the **A** switch on the burner's control panel.

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

- 2 Check the control box is not in block condition (signalling light **B** must be off), eventually release it by means of the pushbutton **I** on the burner's front panel (reset).
- 3 Check the series of thermostats (or pressure switches) gives the signal to operation to the burner.

Gas operation

- 1 Set the **A** switch to 1 (GAS - gas operation).
- 2 Check the gas supply pressure is sufficient (lamp **L** on).

Burners fitted with gas proving system: the check of the gas proving system begins; the when the check is performed the lamp on the gas proving system, is on. At the end of the check, the startup cycle of the burner begins. In case of leakage in a valve, the gas proving system stops the burner and the lamp **B** turns to on. Reset it, by means of the reset pushbutton on the gas proving system.

- 3 At the beginning of start-up, the servocontrol drives the air damper to the maximum opening position, the fan's motor starts up and the pre-purge phase begins. During this phase, the air damper's complete opening is signalled by the lamp **G** on the front panel.
- 4 At the end of the pre-purge phase, the air damper goes to the ignition position, the ignition transformer is energised (lamp **M** on) and, 3 seconds later, the two gas valves **EV1** and **EV2** are energised (Lamps **F** and **E** respectively on the graphic panel) .
- 5 3 seconds after the gas valves opening, the transformer is turned off and the lamp **M** as well.
- 6 The burner is now in low-operation (LED **H** on),
- 7 8 seconds later the double-stage operation begins and the burner switches automatically to high flame (LED **G** on) or remains in low flame operation, according to the temperature detected by the thermostats or the pressure detected by the pressure switches (according to the boiler model).

Light-oil operation

- 1 Set the **A** switch to 2 (OIL - light oil operation).
- 2 The fan and the pump's motors start up: the pre-purge phase begins.
- 3 At the end of the pre-purge phase, the ignition transformer is energised (lamp **H** on) and the light oil valve **EVG1** is supplied (lamp **C** on).
- 4 Some seconds later, if the **TAB** thermostat is closed to high flame stage, the burner drives to high flame enabling the light oil valve **EVG2** (lamp **D** on).

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 43);
- Check ignition electrodes, clean, adjust and, if necessary, replace them (see page 44);
- 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 45).
- 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.

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 filter in the MULTIBLOC DUNGS MB-DLE 415 - 420 B01 1" 1/2 - 2"**

- Check the filter at least once a year!
- Change the filter if the pressure difference between pressure connection 1 and 2 (Fig. 35-Fig. 36) $\Delta p > 10$ mbar.
- Change the filter if the pressure difference between pressure connection 1 and 2 (Fig. 35-Fig. 36) is twice as high compared to the last check.

You can change the filter without removing the fitting.

- 1 Interrupt the gas supply closing the on-off valve.
- 2 Remove screws 1 ÷ 6 (Fig. 37).
- 3 Change filter insert.
- 4 Re-insert filter housing, screw in screws 1 ÷ 6 without using any force and fasten.
- 5 Perform leakage and functional test, $p_{max.} = 360$ mbar.

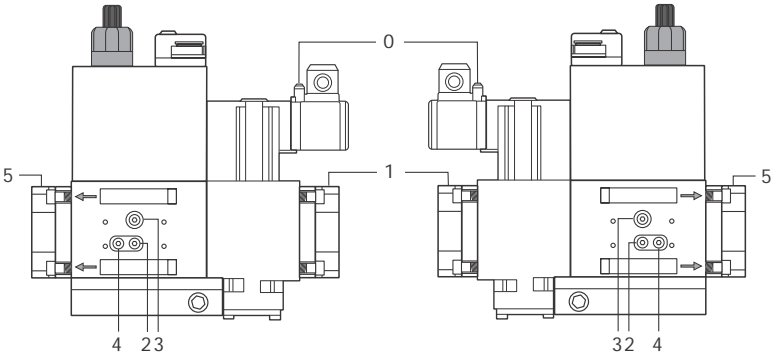


Fig. 35

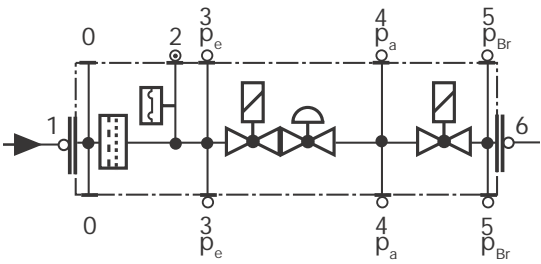


Fig. 36

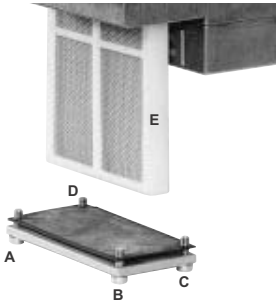


Fig. 37

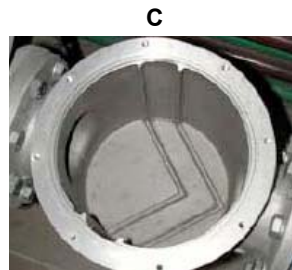
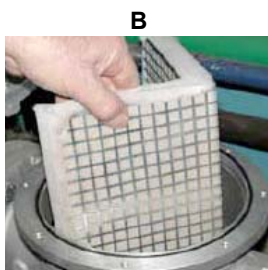
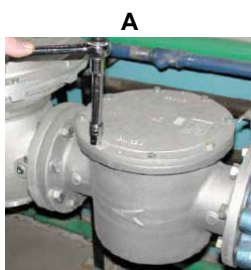
Gas filter maintenance



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:

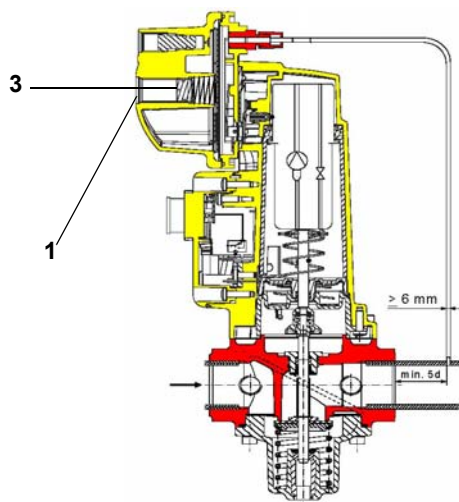
- 1 remove the cap unscrewing the fixing screws (A);
- 2 remove the filtering cartridge (B), clean it using water and soap, blow it with compressed air (or replace it, if necessary)
- 3 replace the cartridge in its proper position taking care to place it inbetween the guides as not to hamper the cap 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.
- 6 Stick the adhesive label for spring identification on the type plate.

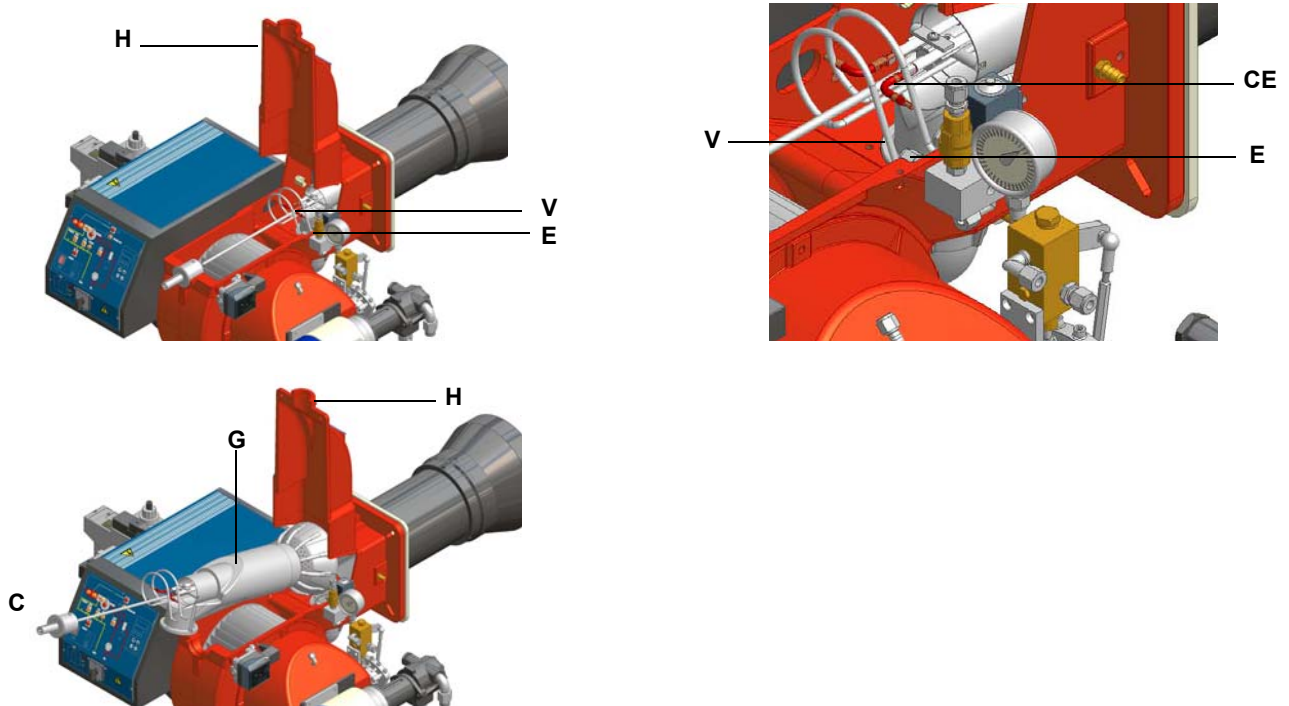


SKP Siemens actuator

Removing the combustion head

- 1 Remove the top **H**.
- 2 Disconnect the electrode cables **CE**.
- 3 Remove the **UV** detector out of its housing: disconnect electrode cables and the light oil flexible hoses.
- 4 Loosen the screws **S** holding the **VR** group: screw the VR screw in order to loose the threaded rod **C**.
- 5 Loosen the screws **V** holding the gas manifold **G**, loosen the two connectors **E** and remove the assembly as shown.
- 6 Clean the combustion head by means of a vacuum cleaner; scrape off the scale by means of a metallic brush.

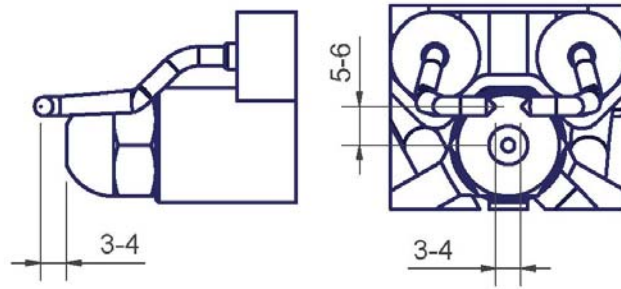
Note: to replace the combustion head, reverse the operations described above.



Adjusting the electrodes position

Adjust the electrodes position, according to the quotes (in mm) shown on the next picture.

HP65



HP60

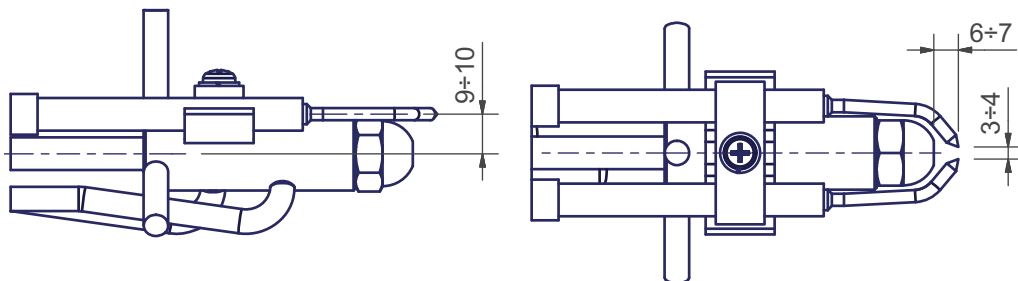
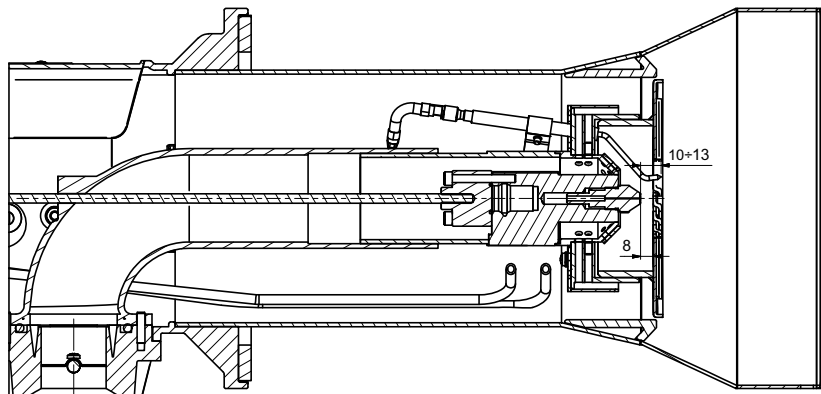


Fig. 38

Cleaning/replacing the electrodes

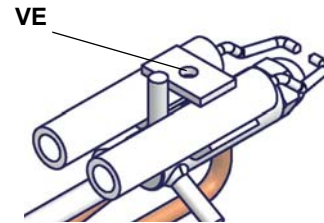


ATTENTION: avoid the electrodes to get in touch with metallic parts (blast tube, head, etc.), otherwise the boiler operation would be compromised. Check the electrodes position after any intervention on the combustion head.

To clean/replace the electrodes, proceed as follows:

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

procedure.



Cleaning and replacing the detection probe

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 picture);
- 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 current follow the diagram on Fig. 39. If the signal is less than the value indicated, check the position of the detection electrode or detector, the electrical contacts and, if necessary, replace the electrode or the detector.

Control box	Minimum detection signal
Siemens LME21-22	200 μ A

Photocell connector



2 = -FC

1 = +FC

Fig. 39

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 valve in 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 / FAULT	BURNER DOESN'T START	CONTINUE PRE-PURGE	BURNER DOESN'T START AND LOCKS	BURNER DOESN'T START AND REPEATS THE CYCLE	BURNER STARTS AND REPEATS THE CYCLE	BURNER DOESN'T SWITCH TO HIGH FLAME	BURNER'S LOCKOUT DURING OPERATION	BURNER STOPS AND REPEATS CYCLE DURING OPERATION	BURNER'S LOCKOUT AFTER START	THE FLAME CONTROL DEV. REPEATS THE CYCLE WITHOUT GIVE CONSENT
MAIN SWITCH OPEN	●									
ABSENCE OF GAS	●									
MINIMUM GAS PRESSURE SWITCH FAULT OR BAD SETTING	●			●	●			●		
BOILER THERMOSTATS OPEN	●									
OVERLOAD TRIPPED INTERVENTION	●									
FUSES INTERVENTION	●									
AIR PRESSURE SWITCH FAULT OR BAD SETTING	●		●				●			●
DEFECTIVE CONTROL BOX	●	●	●				●			
DEFECTIVE AIR DAMPER ACTUATOR		●								
DEFECTIVE IGNITION TRANSFORMER			●							
IGNITION ELECTRODE WRONG POSITION			●							
THROTTLE VALVE BAD SETTING			●							
DEFECTIVE GAS GOVERNOR				●	●			●		
DEFECTIVE HI-LO FLAME THERMOSTAT						●				
ACTUATOR CAM BAD SETTING						●				
DETECTION ELECTRODE BAD POSITION OR DEFECTIVE DETECTION CIRCUIT							●		●	
REVERSED PHASE AND NEUTRAL CONNECTION									●	

WIRING DIAGRAMS

Refer to the attached wiring diagrams.

WARNING

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

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SIGLA/ITEM	FUNZIONE			FUNCTION			SIGLA/ITEM	FUNZIONE			FUNCTION			
BERGER STA6B3.41/63N32L	SERVOCOMANDO SERRANDA ARIA			AIR DAMPER ACTUATOR			LPGMIN	LAMPADA SEGNALE PRESENZA GAS IN RETE			INDICATOR LIGHT FOR PRESENCE OF GAS IN THE NETWORK			
CM	SELETTORE MANUALE COMBUSTIBILE 1) GAS 0) OFF 2) GASOLIO			COMBUSTIBLE SELECTOR 1)GAS 0)OFF 2)LIGHT OIL			LSPG	LAMPADA SEGNALE BLOCCO CONTROLLO TENUTA VALVOLE			INDICATOR LIGHT FOR LEAKAGE OF VALVES			
EV1,2	ELETTROVALVOLE GAS (O GRUPPO VALVOLE)			GAS ELECTRO-VALVES (OR VALVES GROUP)			LSPG1	LAMPADA SEGNALE BLOCCO CONTROLLO TENUTA VALVOLE			INDICATOR LIGHT FOR LEAKAGE OF VALVES			
EVG1	ELETTROVALVOLE GASOLIO			LIGHT OIL ELECTRO VALVE			LT	LAMPADA SEGNALE BLOCCO TERMICO MOTORE VENTILATORE			INDICATOR LIGHT FOR FAN MOTOR OVERLOAD THERMAL CUTOUT			
EVG2	ELETTROVALVOLE GASOLIO			LIGHT OIL SOLENOID VALVE			LTA	LAMPADA SEGNALE TRASFORMATORE DI ACCENSIONE			IGNITION TRANSFORMER INDICATOR LIGHT			
F2	FUSIBILI LINEA MOTORE VENTILATORE			FAN MOTOR LINE FUSES			LTP	LAMPADA SEGNALE BLOCCO TERMICO MOTORE POMPA			INDICATOR LIGHT FOR PUMP MOTOR OVERLOAD THERMAL CUTOUT			
F3	FUSIBILE DI LINEA			LINE FUSE			MP	MOTORE POMPA GASOLIO			LIGHT OIL PUMP MOTOR			
F4	FUSIBILI LINEA POMPA			PUMP LINE FUSES			MV	MOTORE VENTILATORE			FAN MOTOR			
FC	SONDA UV RILEVAZIONE FIAMMA			UV FLAME DETECTOR			PA	PRESSOSTATO ARIA			AIR PRESSURE SWITCH			
FU1	FUSIBILE DI LINEA			LINE FUSE			PGMAX	PRESSOSTATO GAS DI MASSIMA PRESSIONE (OPTIONAL)			MAXIMUM PRESSURE GAS SWITCH (OPTIONAL)			
IG	INTERRUTTORE GENERALE			MAINS SWITCH			PGMIN	PRESSOSTATO GAS DI MINIMA PRESSIONE			MINIMUM GAS PRESSURE SWITCH			
KA1	RELE' AUSILIARIO			AUXILIARY RELAY			POMAX	PRESSOSTATO DI MASSIMA PRESSIONE OLIO (OPTIONAL)			MAXIMUM OIL PRESSURE SWITCH (OPTIONAL)			
KA2	RELE' AUSILIARIO			AUXILIARY RELAY			PS	PULSANTE SBLOCCO FIAMMA			LOCK-OUT RESET BUTTON			
KM1	CONTATTORE MOTORE VENTILATORE			FAN MOTOR CONTACTOR			PS1	PULSANTE SBLOCCO FIAMMA			LOCK-OUT RESET BUTTON			
KM2	CONTATTORE MOTORE POMPA GASOLIO			LIGHT OIL PUMP MOTOR CONTACTOR			RL1	RELE' AUSILIARIO			AUXILIARY RELAY			
LAF	LAMPADA SEGNALE ALTA FIAMMA BRUCIATORE			BURNER IN HIGH FLAME INDICATOR LIGHT			SIEMENS AGQ3.1A27	ADATTATORE PER Sonda UV RILEVAZIONE FIAMMA			ADAPTER FOR UV FLAME DETECTOR			
LB	LAMPADA SEGNALE BLOCCO BRUCIATORE			INDICATOR LIGHT FOR BURNER LOCK-OUT			SIEMENS LME22.331	APPARECCHIATURA CONTROLLO FIAMMA			CONTROL BOX			
LB1	LAMPADA SEGNALE BLOCCO BRUCIATORE			INDICATOR LIGHT FOR BURNER LOCK-OUT			SIEMENS SQN30.151	SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO)			AIR DAMPER ACTUATOR (ALTERNATIVE)			
LBF	LAMPADA SEGNALE BASSA FIAMMA BRUCIATORE			BURNER IN LOW FLAME INDICATOR LIGHT			SIEMENS SQN72.2A4A20	SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO)			AIR DAMPER ACTUATOR (ALTERNATIVE)			
LEV1	LAMPADA SEGNALE APERTURA [EV1]			INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EV1]			ST	SERIE TERMOSTATI/PRESSOSTATI			SERIES OF THERMOSTATS OR PRESSURE SWITCHES			
LEV2	LAMPADA SEGNALE APERTURA [EV2]			INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EV2]			TA	TRASFORMATORE DI ACCENSIONE			IGNITION TRANSFORMER			
LEV1	LAMPADA SEGNALE APERTURA [EV1]			INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EV1]			TAB	TERMOSTATO/PRESSOSTATO ALTA-BASSA FIAMMA			HIGH-LOW THERMOSTAT/PRESSURE SWITCHES			
LEV2	LAMPADA SEGNALE APERTURA [EV2]			INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EV2]			TP	TERMICO MOTORE POMPA GASOLIO			LIGHT OIL PUMP MOTOR THERMAL			
LFG	LAMPADA SEGNALE FUNZIONAMENTO BRUCIATORE A GAS			BURNER GAS OPERATION INDICATOR LIGHT			TV	TERMICO MOTORE VENTILATORE			FAN MOTOR THERMAL			
LFO	LAMPADA SEGNALE FUNZIONAMENTO BRUCIATORE A GASOLIO			BURNER LIGHT OIL OPERATION INDICATOR LIGHT			VPS50x	CONTROLLO DI TENUTA VALVOLE GAS (OPTIONAL)			GAS PROVING SYSTEM (OPTIONAL)			

EV

2

1

3

2

1

6

5

4

9

8

7

12

11

10

VC

1

2

3

4

PA

1

2

3

PGMAX

2

1

STA/SQN

1

2

3

4

5

MV

1

2

3

VPS504

1

2

3

4

5

TA

1

2

3

1

4

7

10

13

2

5

8

11

14

3

6

9

12

15

FQA

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

FC

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APPARECCHIATURA
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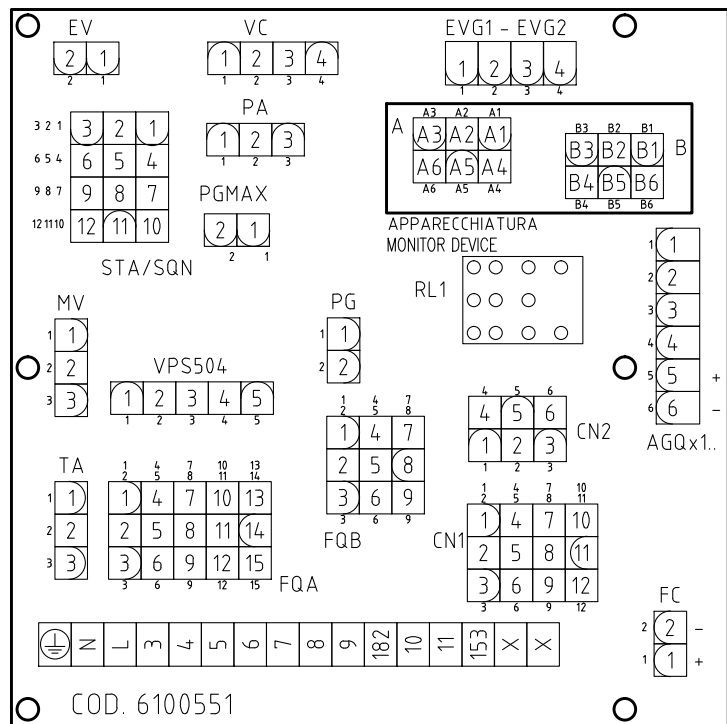
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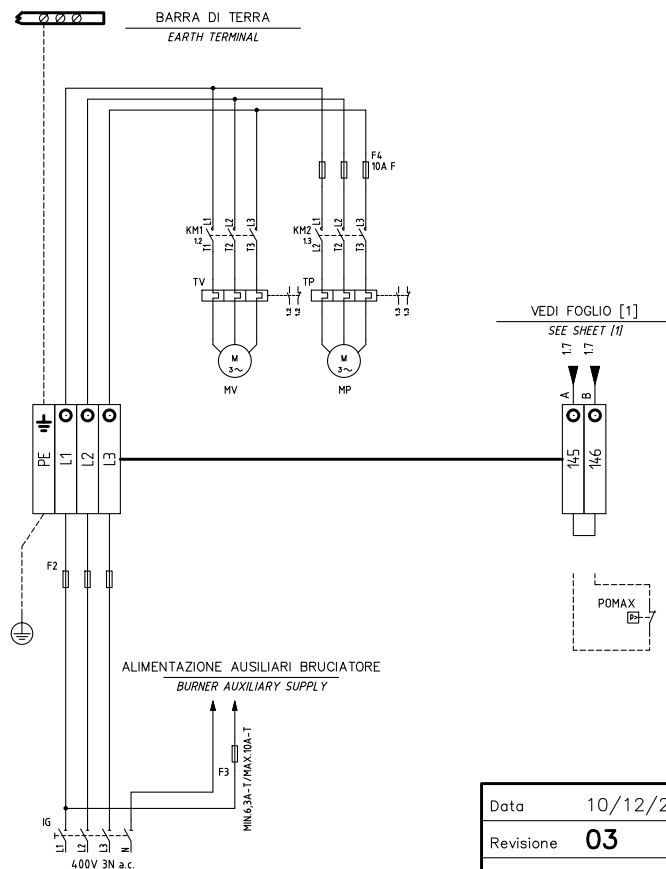
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0G - MC1
MORSETTIERA COLLEGAMENTO LINEA E MOTORE TRIFASE
MOTOR THREE PHASES AND ELECTRIC SUPPLY CONNECTION TERMINAL BOARD



Data	10/12/2007	PREC.	FOGLIO
Revisione	03	1	2
Dis. N.	18 - 119	SEGUE	TOTALE
		/	2

SIEMENS LME11/21/22 CONTROL BOX

The series of equipment LME.. is used for the startup and supervision of 1- or 2- stage gas burners. The series LME.. is interchangeable with the series LGB.. and LMG.., all diagrams and accessories are interchangeable.

Comparative table

LGB Series	LMG Series	LME Series
---	LMG 25.33	LME 11.33
LGB 21.33	LMG 21.33	LME 21.33
LGB 22.33	LMG 22.33	LME 22.33

Preconditions for burner startup

- Burner control must be reset
- All contacts in the line are closed, request for heat
- No undervoltage
- Air pressure switch LP must be in its "no-load" position
- Fan motor or AGK25 is closed
- Flame detector is darkened and there is no extraneous light

Undervoltage

Safety shutdown from the operating position takes place should mains voltage drop below about AC 175 V (at UN = AC 230 V)

Restart is initiated when mains voltage exceeds about AC 185 V (at UN = AC 230 V).

Controlled intermittent operation

After no more than 24 hours of continuous operation, the burner control will initiate automatic controlled shutdown followed by a restart.

Reversed polarity protection with ionization




If the connections of live conductor (terminal 12) and neutral conductor (terminal 2) are mixed up, the burner control will initiate lockout at the end of the safety time "TSA".

Control sequence in the event of fault

If lockout occurs, the outputs for the fuel valves, the burner motor and the ignition equipment will immediately be deactivated (< 1 second).

Operational status indication

In normal operation, the different operating states are showed by means of the multicolor LED, inside the lockout reset button:

	red LED Steady on
	yellow LED
	green LED	○... Off

During startup, status indication takes place according to the table:

Status	Color code	Color
Waiting time tw, other waiting states	○.....	Off
Ignition phase, ignition controlled	● ○ ● ○ ● ○ ● ○ ● ○	Flashing yellow
Operation, flame ok	□.....	Green
Operation, flame not ok	□ ○ □ ○ □ ○ □ ○ □ ○	Flashing green
Extraneous light on burner startup	□ ▲ □ ▲ □ ▲ □ ▲ □ ▲	Green - red
Undervoltage	● ▲ ● ▲ ● ▲ ● ▲ ● ▲	Yellow - red
Fault, alarm	▲.....	Red
Error code output (refer to "Error code table")	▲ ○ ▲ ○ ▲ ○ ▲ ○	Flashing red

START-UP PROGRAM

As far as the startup program, see its time diagram:

A Start command (switching on)

This command is triggered by control thermostat / pressure controller «R». Terminal 12 receives voltage and the programming mechanism starts running. On completion of waiting time «tw» with the LME21..., or after air damper «SA» has reached the nominal load position (on completion of «t11») with the LME22..., fan motor «M» will be started.

tw Waiting time

During the waiting time, air pressure monitor «LP» and flame relay «FR» are tested for correct contact positions.

t11 Programmed opening time for actuator «SA»

(Only with LME22...) The air damper opens until the nominal load position is reached. Only then will fan motor «M» be switched on.

t10 Specified time for air pressure signal

On completion of this period of time, the set air pressure must have built up, or else lockout will occur.

t1 Prepurge time

Purging the combustion chamber and the secondary heating surfaces: required with low-fire air volumes when using the LME21... and with nominal load air volumes when using the LME22.... The diagrams show the so-called prepurge time «t1» during which air pressure monitor «LP» must indicate that the required air pressure is available. The effective prepurge time «t1» comprises interval end «tw» through «t3».

t12 Programmed closing time for actuator «SA»

(Only with LME22...) During «t12», the air damper travels to the low-fire position.

t3 Preignition time

During «t3» and up to the end of «TSA», flame relay «FR» is forced to close. On completion of «t3», the release of fuel is triggered at terminal 4.

TSA Ignition safety time

On completion of «TSA», a flame signal must be present at terminal 1. That flame signal must be continuously available until shutdown occurs, or else flame relay «FR» will be deenergized, resulting in lockout.

t4 Interval BV1 and BV2-LR

Time between the end of TSA and the signal to the second fuel valve BV2 or to the load controller LR

B - B' Interval for flame establishment

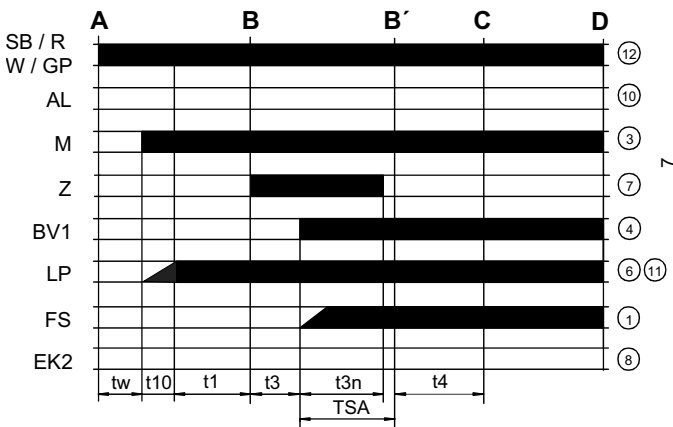
C Burner operation position

C - D Burner operation (heat production)

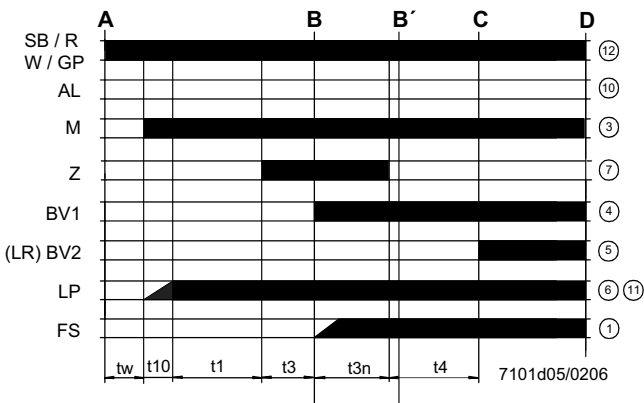
D Controlled by "R" shutdown

The burner stops and the control device is ready for a new startup.

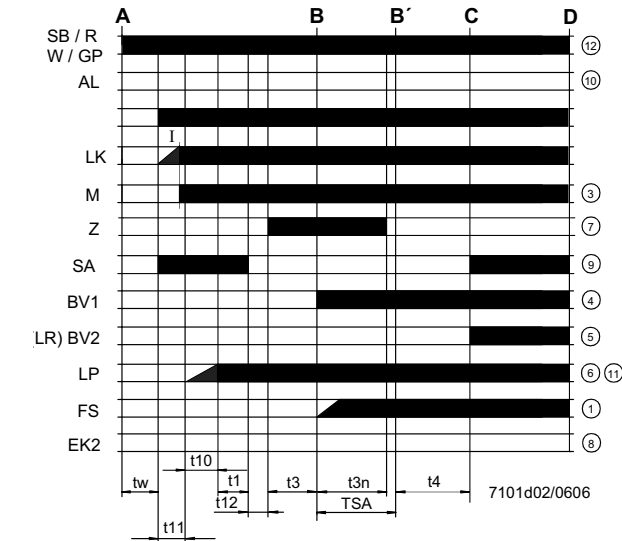
LME11 control sequence



LME21 control sequence



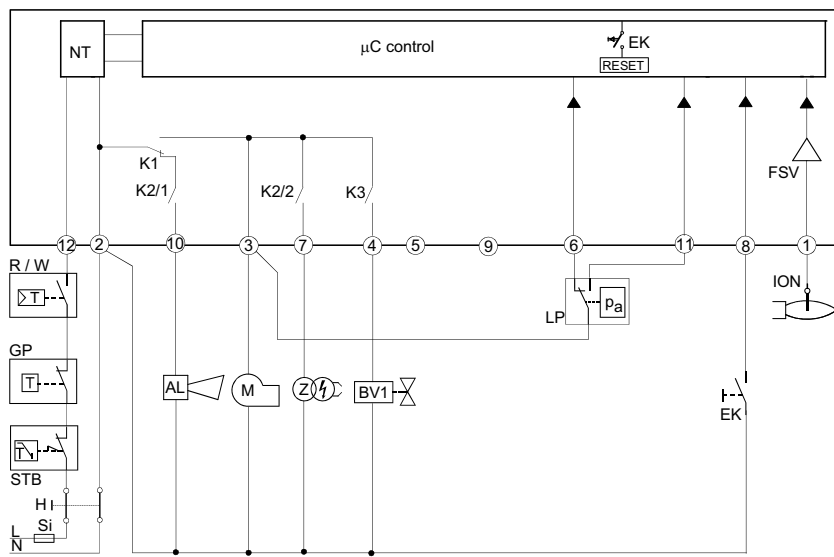
LME22 control sequence



Control sequence

- tw Waiting time
- t1 Purge time
- TSA Ignition safety time
- t3 Preignition time
- t3n Postignition time
- t4 Interval between BV1 and BV2/LR
- t10 Specified time for air pressure signal
- t11 Programmed opening time for actuator SA
- t12 Programmed closing time for actuator SA

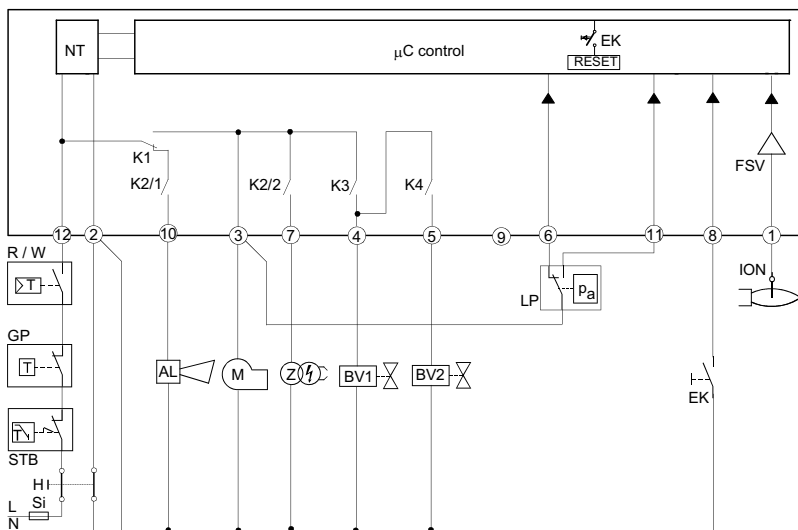
LME11 connection diagram



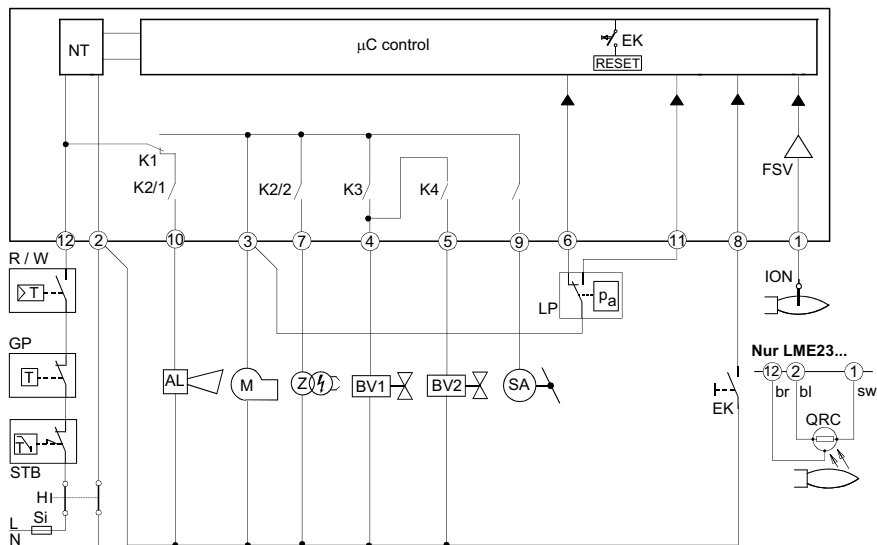
Connection diagram

- AL Error message (alarm)
- BV Fuel valve
- EK2 Remote lockout reset button
- FS Flame signal
- GP Gas pressure switch
- LP Air pressure switch
- LR Load controller
- M Fan motor
- R Control thermostat/pressurestat
- SB Safety limit thermostat
- W Limit thermostat /pressure switch
- Z Ignition transformer

LME21 connection diagram



LME22 connection diagram



CONTROL PROGRAM IN THE EVENT OF FAULT

- If a fault occurs, all outputs will immediately be deactivated (in less than 1s).
- After an interruption of power, a restart will be made with the full program sequence.
- If the operating voltage drops below the undervoltage threshold, a safety shutdown is performed.
- If the operating voltage exceeds the undervoltage threshold, a restart will be performed.
- In case of extraneous light during "t1", a lockout occurs.
- In case of extraneous light during "tw", there is a prevention of startup and a lockout after 30 seconds.
- In case of no flame at the end of TSA, there will be max. 3 repetitions of the startup cycle, followed by a lockout at the end of TSA, for mod. LME11..; directly a lockout at the end of TSA for LME21-22 models.
- For LME11 model: if a loss of flame occurs during operation, in case of an establishment of flame at the end of TSA, there will be max. 3 repetitions, otherwise a lockout will occur.
- For LME21-22 models: if a loss of flame occurs during operation, there will be a lockout.
- If the contact of air pressure monitor LP is in working position, a prevention of startup and lockout after 65 seconds will occur.
- If the contact of air pressure monitor LP is in normal position, a lockout occurs at the end of t10.
- If no air pressure signal is present after completion of t1, a lockout will occur.

CONTROL BOX LOCKED

In the event of lockout, the LME.. remains locked and the red signal lamp (LED) will light up. The burner control can immediately be reset. This state is also maintained in the case of mains failure.

DIAGNOSTICS OF THE CAUSE OF FAULT

- Press the lockout reset button for more than 3 seconds to activate the visual diagnostics.
- Count the number of blinks of the red signal lamp and check the fault condition on the "Error code table" (the device repeats the blinks for regular intervals).

During diagnostics, the control outputs are deactivated:

- the burner remains shut down;
- external fault indication is deactivated;
- fault status is showed by the red LED, inside the LME's lockout reset button according to the "Error code table":

ERROR CODE TABLE	
2 blinks **	No establishment of flame at the end of TSA - Faulty or soiled fuel valves - Faulty or soiled flame detector - Inadequate adjustment of burner, no fuel - Faulty ignition equipment
3 blinks ***	The air pressure switch does not switch or remains in idle position: - LP is faulty - Loss of air pressure signal after t10 - LP is welded in normal position.
4 blinks ****	- Extraneous light when burner starts up.
5 blinks *****	- LP is working position.
6 blinks *****	Free.
7 blinks *****	Loss of flame during operation - Faulty or soiled fuel valves - Faulty or soiled flame detector - Inadequate adjustment of burner
8 ÷ 9 blinks	Free
10 blinks *****	Faulty output contacts Attention: "lockout" remote signal (terminal no. 10) not enabled - Wiring error - Anomalous voltage on output terminals - Other faults
14 blinks ***** (only for LME4x)	- CPI contact (gas valve microswitch) not closed.

RESETTING THE BURNER CONTROL

When lockout occurs, the burner control can immediately be reset, by pressing the lockout reset button for about 1..3 seconds. The LME.. can only be reset when all contacts in the line are closed and when there is no undervoltage.

LIMITATION OF REPETITIONS (only for LME11.. model)

If no flame is established at the end of TSA, or if the flame is lost during operation, a maximum of 3 repetitions per controller startup can be performed via "R", otherwise lockout will be initiated. Counting of repetitions is restarted each time a controlled startup via "R" takes place.

⚠ Condensation, formation of ice and ingress of water are not permitted!

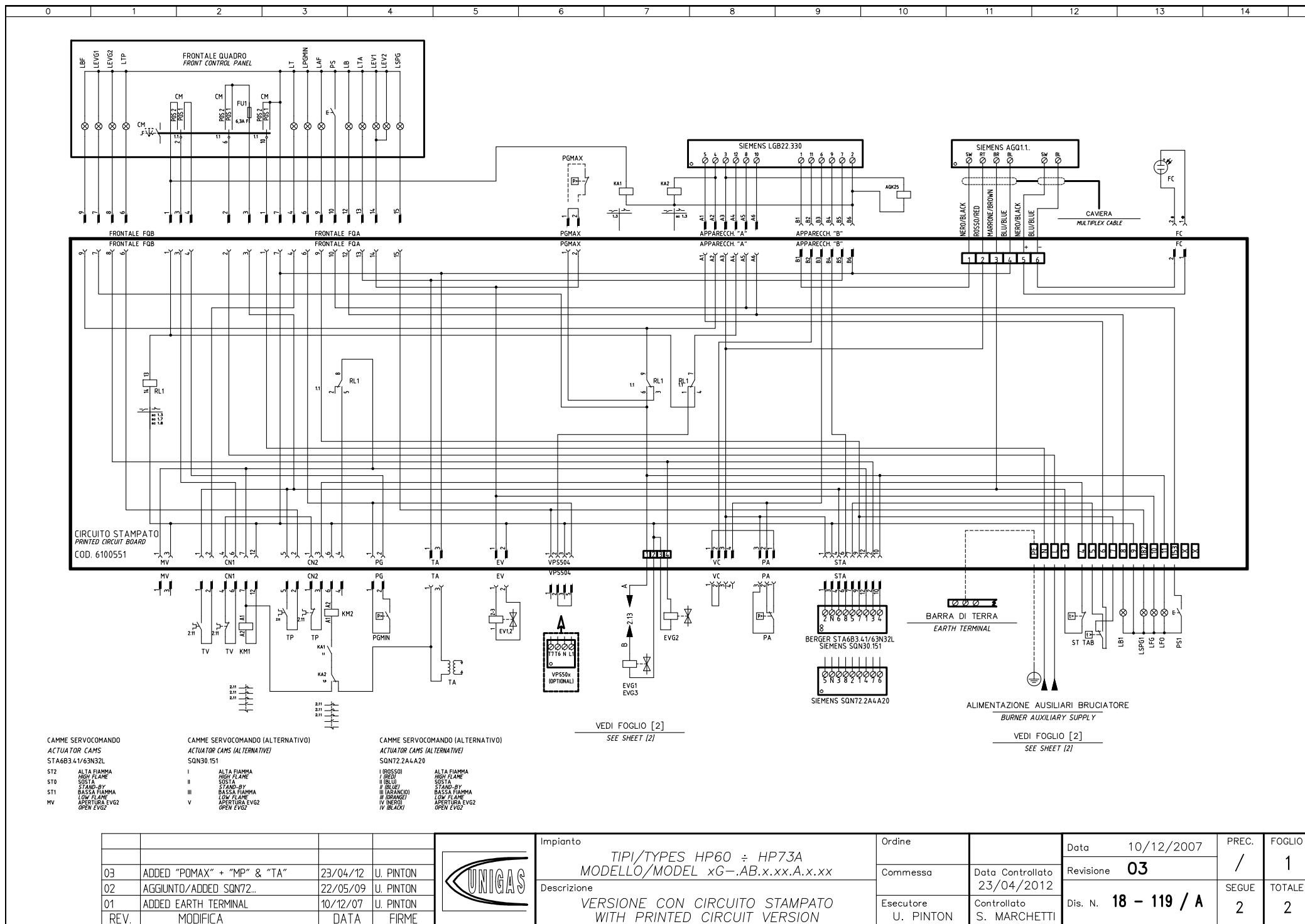
TECHNICAL CHARACTERISTICS

Mains voltage	120V AC +10% / -15% 230V AC +10% / -15%
Frequency	50 ... 60 Hz +/- 6%
Power consumption	12VA
External primary fuse	max. 10 A (slow)
input current at terminal 12	max. 5 A
Detection cable length	max. 3m (for electrode)
Detection cable length	max. 20 m (laid separately, for QRA probe)
Reset cable length	max. 20 m (posato separatamente)
Term. 8 & 10 cable length	max. 20 m
Thermostat cable length and other terminals	max. 3 m
Safety class	I
Index of protection	IP40 (to be ensured during mounting)
Operating conditions	-20... +60 °C, < 95% UR
Storage conditions	-20... +60 °C, < 95% UR
Weight	approx. 160 g

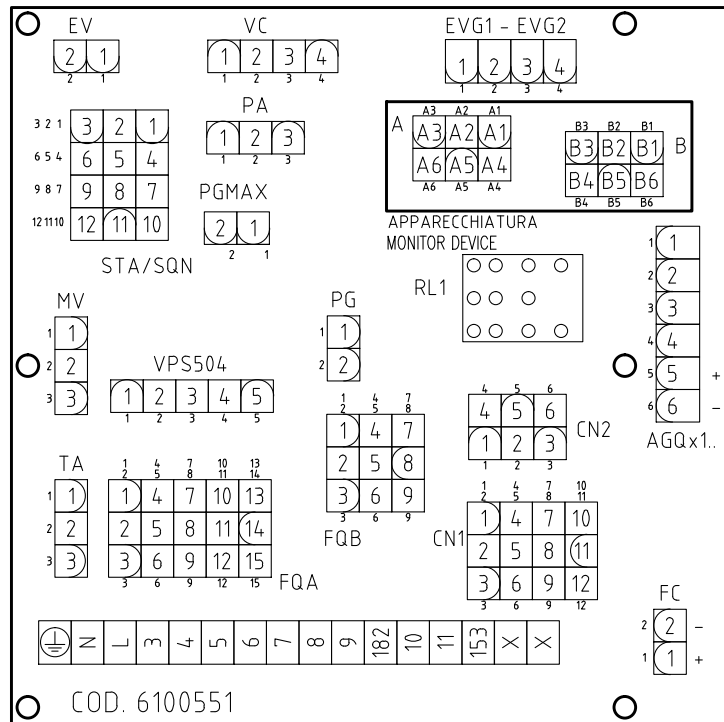


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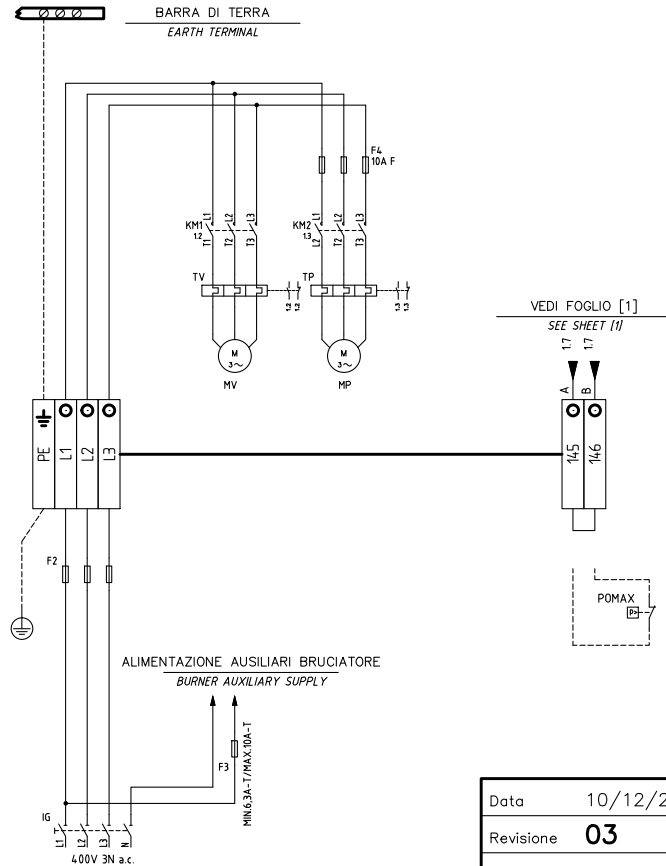
Note: specifications and data subject to change. Errors and omissions excepted.



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SIGLA/ITEM	FUNZIONE			FUNCTION			SIGLA/ITEM	FUNZIONE			FUNCTION			
AGK25	RESISTENZA SIMULAZIONE CARICO MOTORE VENTILATORE			RESISTANCE FOR FAN MOTOR LOAD SIMULATION			LPGMIN	LAMPADA SEGNALE PRESENZA GAS IN RETE			INDICATOR LIGHT FOR PRESENCE OF GAS IN THE NETWORK			
BERGER STA683.41/63N32L	SERVOCOMANDO SERRANDA ARIA			AIR DAMPER ACTUATOR			LSPG	LAMPADA SEGNALE BLOCCO CONTROLLO TENUTA VALVOLE			INDICATOR LIGHT FOR LEAKAGE OF VALVES			
CM	SELETTORE MANUALE COMBUSTIBILE 1) GAS 0) OFF 2) GASOLIO			COMBUSTIBLE SELECTOR 1)GAS 0)OFF 2)LIGHT OIL			LSPG1	LAMPADA SEGNALE BLOCCO CONTROLLO TENUTA VALVOLE			INDICATOR LIGHT FOR LEAKAGE OF VALVES			
EV1,2	ELETTROVALVOLE GAS (0 GRUPPO VALVOLE)			GAS ELECTRO-VALVES (0R VALVES GROUP)			LT	LAMPADA SEGNALE BLOCCO TERMICO MOTORE VENTILATORE			INDICATOR LIGHT FOR FAN MOTOR OVERLOAD THERMAL CUTOUT			
EVG1	ELETTROVALVOLE GASOLIO			LIGHT OIL ELECTRO VALVE			LTA	LAMPADA SEGNALE TRASFORMATORE DI ACCENSIONE			IGNITION TRANSFORMER INDICATOR LIGHT			
EVG2	ELETTROVALVOLE GASOLIO			LIGHT OIL SOLENOID VALVE			LTP	LAMPADA SEGNALE BLOCCO TERMICO MOTORE POMPA			INDICATOR LIGHT FOR PUMP MOTOR OVERLOAD THERMAL CUTOUT			
F2	FUSIBILI LINEA MOTORE VENTILATORE			FAN MOTOR LINE FUSES			MP	MOTORE POMPA GASOLIO			LIGHT OIL PUMP MOTOR			
F3	FUSIBILE DI LINEA			LINE FUSE			MV	MOTORE VENTILATORE			FAN MOTOR			
F4	FUSIBILI LINEA POMPA			PUMP LINE FUSES			PA	PRESSOSTATO ARIA			AIR PRESSURE SWITCH			
FC	SONDA UV RILEVAZIONE FIAMMA			UV FLAME DETECTOR			PGMAX	PRESSOSTATO GAS DI MASSIMA PRESSIONE (OPTIONAL)			MAXIMUM PRESSURE GAS SWITCH (OPTIONAL)			
FU1	FUSIBILE DI LINEA			LINE FUSE			PGMIN	PRESSOSTATO GAS DI MINIMA PRESSIONE			MINIMUM GAS PRESSURE SWITCH			
IG	INTERRUTTORE GENERALE			MAINS SWITCH			POMAX	PRESSOSTATO DI MASSIMA PRESSIONE OLIO (OPTIONAL)			MAXIMUM OIL PRESSURE SWITCH (OPTIONAL)			
KA1	RELE' AUSILIARIO			AUXILIARY RELAY			PS	PULSANTE SBLOCCO FIAMMA			LOCK-OUT RESET BUTTON			
KA2	RELE' AUSILIARIO			AUXILIARY RELAY			PS1	PULSANTE SBLOCCO FIAMMA			LOCK-OUT RESET BUTTON			
KM1	CONTATTORE MOTORE VENTILATORE			FAN MOTOR CONTACTOR			RL1	RELE' AUSILIARIO			AUXILIARY RELAY			
KM2	CONTATTORE MOTORE POMPA GASOLIO			LIGHT OIL PUMP MOTOR CONTACTOR			SIEMENS AGQ1.1A27	ADATTATORE PER Sonda UV RILEVAZIONE FIAMMA			ADAPTER FOR UV FLAME DETECTOR			
LAF	LAMPADA SEGNALE ALTA FIAMMA BRUCIATORE			BURNER IN HIGH FLAME INDICATOR LIGHT			SIEMENS LGB22.330	APPARECCHIATURA CONTROLLO FIAMMA			CONTROL BOX			
LB	LAMPADA SEGNALE BLOCCO BRUCIATORE			INDICATOR LIGHT FOR BURNER LOCK-OUT			SIEMENS SON30.151	SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO)			AIR DAMPER ACTUATOR (ALTERNATIVE)			
LB1	LAMPADA SEGNALE BLOCCO BRUCIATORE			INDICATOR LIGHT FOR BURNER LOCK-OUT			SIEMENS SON72.2A4.420	SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO)			AIR DAMPER ACTUATOR (ALTERNATIVE)			
LBF	LAMPADA SEGNALE BASSA FIAMMA BRUCIATORE			BURNER IN LOW FLAME INDICATOR LIGHT			ST	SERIE TERMOSTATI/PRESSOSTATI			SERIES OF THERMOSTATS OR PRESSURE SWITCHES			
LEV1	LAMPADA SEGNALE APERTURA [EV1]			INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EV1]			TA	TRASFORMATORE DI ACCENSIONE			IGNITION TRANSFORMER			
LEV2	LAMPADA SEGNALE APERTURA [EV2]			INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EV2]			TAB	TERMOSTATO/PRESSOSTATO ALTA-BASSA FIAMMA			HIGH-LOW THERMOSTAT/PRESSURE SWITCHES			
LEVG1	LAMPADA SEGNALE APERTURA [EVG1]			INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVG1]			TP	TERMICO MOTORE POMPA GASOLIO			LIGHT OIL PUMP MOTOR THERMAL			
LEVG2	LAMPADA SEGNALE APERTURA [EVG2]			INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVG2]			TV	TERMICO MOTORE VENTILATORE			FAN MOTOR THERMAL			
LFG	LAMPADA SEGNALE FUNZIONAMENTO BRUCIATORE A GAS			BURNER GAS OPERATION INDICATOR LIGHT			VPS50x	CONTROLLO DI TENUTA VALVOLE GAS (OPTIONAL)			GAS PROVING SYSTEM (OPTIONAL)			
LF0	LAMPADA SEGNALE FUNZIONAMENTO BRUCIATORE A GASOLIO			BURNER LIGHT OIL OPERATION INDICATOR LIGHT										



06 - MC1
MORSETTIERA COLLEGAMENTO LINEA E MOTORE TRIFASE
MOTOR THREE PHASES AND ELECTRIC SUPPLY CONNECTION TERMINAL BOARD



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