HP60 - HP65
HP72 - HP73A
Dual fuel burners gas - light oil DOUBLE-STAGE

MANUAL OF INSTALLATION - USE - MAINTENANCE

CIB UNIGAS

BURNERS - BRUCIATORI - BRULERS - BRENNER - QUEMADORES - ГОРЕЛКИ

M039150CF rel. 5.4 09/2016

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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 circustances 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, reser 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 saftey 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 house hold 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 house hold 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);

National Standard

-UNI 7824 (Atomizing burners of the monobloc type. Characteristics and test methods)

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 house hold 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);

Norme nazionali / National Standard

-UNI 7824 (Atomizing burners of the monobloc type. Characteristics and test methods.

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 house hold 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);

Norme nazionali / National Standard

-UNI 7824 (Atomizing burners of the monobloc type. Characteristics and test methods.

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 house hold 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);

National Standard

- UNI 7824 (Atomizing burners of the monobloc type. Characteristics and test methods.

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 house hold 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.

PART I: INSTALLATION MANUAL

BURNER FEATURES

Burner model identification

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

Type **HP72** Model	**MG.**	**AB.**	**S.**	***.**	**A.**	**0.**	**40**
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

(1) BURNER TYPE	**HP72**
(2)FUEL	M - Natural gas G - Light oil
(3)OPERATION (Available versions)	AB - Double stage
(4) BLAST TUBE	S - standard
(5) DESTINATION COUNTRY	* - Destination countrysee data plate
(6) BURNER VERSION	A - Standard
(7)EQUIPMENT	0 = 2 gas valves 1 = 2 gas valves + gas proving system 7 = 2 gas valves + maximum gas pressure switch 8 = 2 gas valves + gas proving system + maximum gas pressure switch
(8)GAS CONNECTIONS	32 = Rp $1/_{1/4}$ 40 = Rp$1_{1/2}$ 50 = Rp2 65 = DN65 80 = DN80

Technical specifications

BURNER TYPE		**HP60 MG**	**HP65 MG**
Output	min. - max.kW	170 - 880	270-970
Fuel		Nat. gas - Light oil	
Gas category		(see next paragraph)	
Gas rate	min. - max. (Stm^3/h)	18 - 93	29-103
Gas pressure	min. - max. mbar	(see Note 2)	
Light oil rate	min. - max. kg/h	14 - 74	23-82
Light oil train inlet pressure	max. bar	2	
Oil viscosity		2 - 7.4 cSt @ 40°C	
Oil density		840 kg/m3	
Power supply		400V 3N ~ 50Hz	
Total power consumption	kW	2.15	2.55
Electric motor	kW	1.1	1.5
Pump motor	kW	0.55	0.55
Protection		IP40	
Approx. weight	kg	72	107
Operation		Double-stage	
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*		Intermitent	

BURNER TYPE		**HP72 MG....0.50**	**HP72 MG.....0.65**	**HP72 MG....0.80**
Output	min. - max.kW	330 - 1200		
Fuel		Nat. gas - Light oil		
Gas category		(see next paragraph)		
Gas rate	min. - max. (Stm^3/h)	35 - 127		
Gas pressure.	min. - max. mbar	(see Note 2)		
Light oil rate	min. - max. kg/h	28 - 101		
Light oil train inlet pressure	max. bar	2		
Oil viscosity		2 - 7.4 cSt @ 40°C		
Oil density		840 kg/m3		
Power supply		400V 3N ~ 50Hz		
Total power consumption	kW	3.25		
Electric motor	kW	2.2		
Pump motor	kW	0.55		
Protection		IP40		
Approx. weight	kg	107	117	127
Operation		Double-stage		
Gas Train		50	65	80
Valves size / Gas connection		2"/ Rp2	$2"_{1/2}$ / DN65	3" / DN80
Operating temperature	°C	-10 ÷ +50		
Storage Temperature	°C	-20 ÷ +60		
Working service*		Intermittent		

BURNER TYPE		HP72 MG.....1.50	HP72 MG.....1.65	HP72 MG.....1.80
Output	min. - max. kW	330 - 1550		
Fuel		Nat. gas - Light oil		
Gas category		(see next paragraph)		
Gas rate	min. - max. (Stm^3/h)	35 - 164		
Gas pressure.	min. - max. mbar	(see Note 2)		
Light oil rate	min. - max. kg/h	28 - 131		
Light oil train inlet pressure	max. bar	2		
Oil viscosity		2 - 7.4 cSt @ 40°C		
Oil density		840 kg/m3		
Power supply		400V 3N ~ 50Hz		
Total power consumption	kW	3.25		
Fan motor	kW	2.2		
Pump motor	kW	0.55		
Protection		IP40		
Approx. weight	kg	107	117	127
Operation		Double-stage		
Gas Train		50	65	80
Valves size / Gas connection		2" / Rp2	$2"_{1/2}$ / DN65	3" / DN80
Operating temperature	°C	-10 ÷ +50		
Storage Temperature	°C	-20 ÷ +60		
Working service**		Intermitent		

BURNER TYPE				
BURNER TYPE		**HP73A MG.....50**	**HP73A MG.....65**	**HP73A MG.....80**
Output	min. - max.kW	320 - 2300		
Fuel		Nat. gas - Light oil		
Gas category		(see next paragraph)		
Gas rate	min. - max. (Stm^3/h)	34 - 243		
Gas pressure.	min. - max. mbar	(see Note 2)		
Light oil rate	min. - max. kg/h	27 - 194		
Light oil train inlet pressure	max. bar	2		
Oil viscosity		2 - 7.4 cSt @ 40°C		
Oil density		840 kg/m3		
Power supply		400V 3N ~ 50Hz		
Total power consumption	kW	3.5		
Fan motor	kW	3		
Pump motor	kW	0.55		
Protection		IP40		
Approx. weight	kg	112	122	132
Operation		Double stage		
Gas train		50	65	80
Valves size / Gas connection		2" / Rp2	$2"_{1/2}$ / DN65	3" / DN80
Operating temperature	°C	-10 ÷ +50		
Storage temperature	°C	-20 ÷ +60		
Working service *		Intermittent		

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

Note1:	**All gas flow rates are referred to Stm^3/h (1013 mbar absolute pressure, 15 °C temperature) and are valid for G20 gas (net calorific value H_i = 34.02 MJ/Stm^3).**
Note2:	**Maximum gas pressure = 360mbar (with Dungs MBDLE/MBC valves)** **= 500mbar (with Dungs MBC or Siemens VGD gas valves).** **Minimum gas pressure = see gas curves.**

Country and usefulness gas categories

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

(*) Only for I_{2EK} : the appliance was configured for the appliance category K (I2K) and is suitable for the use of G and G+ distribution gases according to the specifications as included in the NTA 8837:2012 Annex D with a Wobbe index of 43.46 – 45.3 MJ/m3 (dry, 0 °C, upper value) or 41.23 – 42.98 (dry, 15 °C, upper value). This appliance can moreover be converted and/or be calibrated for the appliance category E (I2E). This therefore implies that the appliance "is suitable for G+ gas and H gas or is demonstrably suitable for G+ gas and can demonstrably be made suitable for H gas" within the meaning of the "Dutch Decree of 10 May 2016 regarding amendment of the Dutch Gas Appliances Decree and the Dutch Commodities (Administrative Fines) Act in connection with the changing composition of gas in the Netherlands as well as technical amendment of some other decrees.

Fuel

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

Fuel	**Hi** (KWh/Stm^3)	**ρ** (kg/Stm^3)	f_Q	f_p
LPG	26.79	2.151	0.353	0.4
Town gas	4.88	0.6023	1.936	3.3
Biogas	6.395	1.1472	1.478	3.5

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

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

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

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

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

Matching the burner to the boiler

The burners described in this manual have been tested with combustion chambers that comply with EN676 regulation and whose dimensions are described in the diagram . In case the burner must be coupled with boilers with a combustion chamber smaller in diameter or shorter than those described in the diagram, please contact the supplier, to verify that a correct matching is possible, with respect of the application involved. To correctly match the burner to the boiler verify the type of the blast tube . Verify the necessary input and the pressure in combustion chamber are included in the burner performance curve; otherwise the choice of the burner must be revised consulting the burner manufacturer. To choose the blast tube 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 **Dist** = 100 mm into the combustion chamber. (Fig. 4)
- Pressurised boilers with flame reversal: in this case the blast tube must penetrate **Dm** 50 ÷ 100 mm into combustion chamber in respect to the tube bundle plate.(Fig. 5)

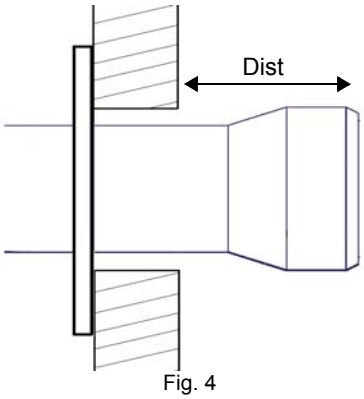


Fig. 4

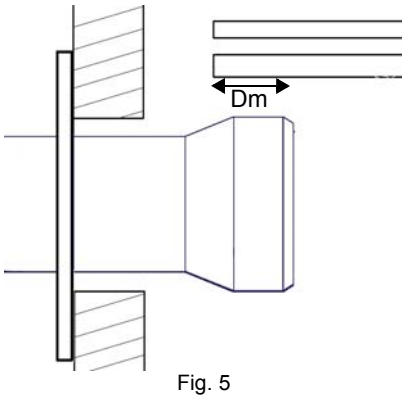


Fig. 5

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 tha suites the utilisation (please, contact the manifacturer).

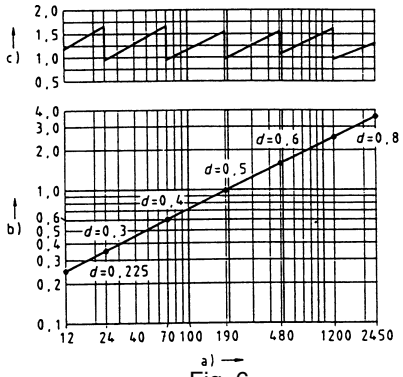


Fig. 6

Key

a) Heat output in kW

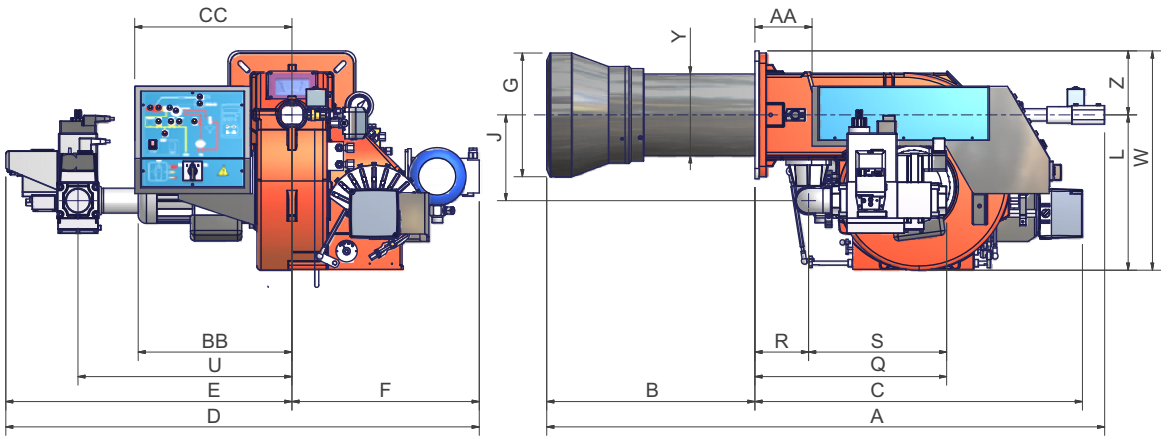
b) Lenght of the flame tube in meters

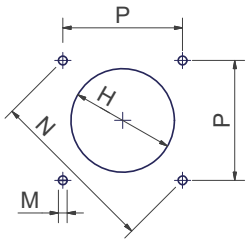
c) Flame tube firing intensity in MW/m^3

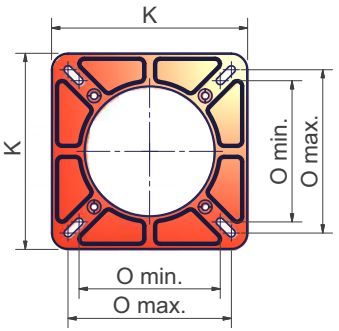
d) Combustion chamber diameter (m)

Fig. 6 - Firing intensity, diameter and lenght of the test flame tube as a function of the heat input in kW.

Overall dimensions (mm)







Boiler drilling plate and burner flange

	DN	AS	AA	BS	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 AB - 0.32	32	1115	99	379	314	736	362	930	500	430	240	280	210	240	344	M10	269	190	190	190	374	112	256	444	x	464	162	120
HP60 AB - 0.40	40	1115	99	379	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 AB - 0.50	50	1115	99	379	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 AB - 0.65	65	1115	99	379	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 AB - 0.32	32	1156	139	362	347	794	382	1042	588	454	240	280	208	300	376	M10	330	216	250	233	386	130	256	539	x	531	198	155
HP65 AB - 1.32	32	1156	139	362	347	794	382	1042	588	454	240	280	208	300	376	M10	330	216	250	233	386	130	256	539	x	531	198	155
HP65 AB - 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	535	x	531	198	155
HP65 AB - 1.40	40	1156	139	362	347	794	382	1148	710	454	240	280	208	300	376	M10	330	216	250	233	457	130	327	535	x	531	198	155
HP65 AB - 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	198	155
HP65 AB - 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	198	155
HP65 AB - 0.65	65	1156	139	362	347	794	382	1120	568	454	240	280	208	300	376	M10	330	216	250	233	533	130	403	565	313	548	198	155
HP65 AB - 1.65	65	1156	139	362	347	794	382	1226	666	454	240	280	208	300	376	M10	330	216	250	233	533	130	403	565	313	548	198	155
HP72 AB - 0.40	40	1353	139	505	373	794	382	1022	584	454	300	340	208	300	376	M10	330	216	250	233	457	130	327	535	x	531	198	155
HP72 AB - 1.40	40	1353	139	505	373	794	382	1148	710	454	300	340	208	300	376	M10	330	216	250	233	457	130	327	535	x	531	198	155
HP72 AB - 0.50	50	1353	139	505	373	794	382	1022	772	454	300	340	208	300	376	M10	330	216	250	233	465	130	335	519	x	531	198	155
HP72 AB - 1.50	50	1353	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 AB - 0.65	65	1353	139	505	373	794	382	1120	666	454	300	340	273	300	393	M10	330	216	250	233	533	130	403	565	313	548	198	155
HP72 AB - 1.65	65	1353	139	505	373	794	382	1226	772	454	300	340	273	300	393	M10	330	216	250	233	533	130	403	565	313	548	198	155
HP72 AB - 0.80	80	1353	139	505	373	794	382	1120	666	454	300	340	273	300	407	M10	330	216	250	233	574	130	444	565	344	562	198	155
HP72 AB - 1.80	80	1353	139	505	373	794	382	1228	774	454	300	340	273	300	407	M10	330	216	250	233	574	130	444	565	344	562	198	155
HP73A AB - 1.50	50	1294	139	500	373	794	382	1148	694	454	234	264	208	300	376	M10	330	216	250	233	465	130	335	519	x	531	198	155
HP73A AB - 1.65	65	1294	139	500	373	794	382	1226	772	454	234	264	273	300	393	M10	330	216	250	233	533	130	403	565	313	548	198	155
HP73A AB - 1.80	80	1294	139	500	373	794	382	1228	774	454	234	264	273	300	407	M10	330	216	250	233	574	130	444	565	344	562	198	155

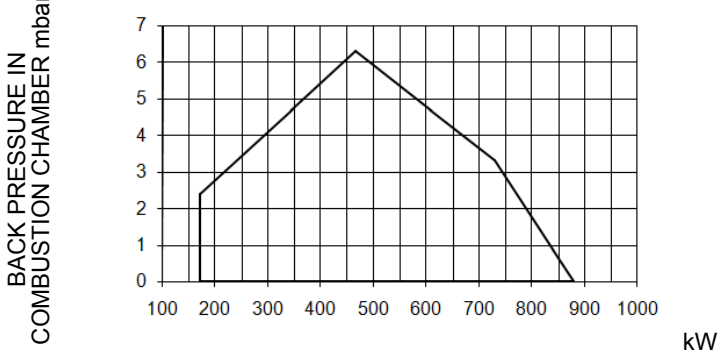
*DN = gas valves size

HP60 - HP72:

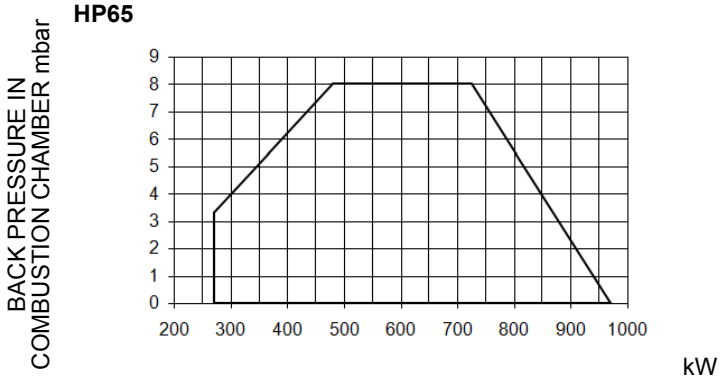
Fit a counterflange between burner and boiler. As an alternative, make a smaller hole H, but greather than Y and fit the blast tube from the internal side of boiler.

Performance curves

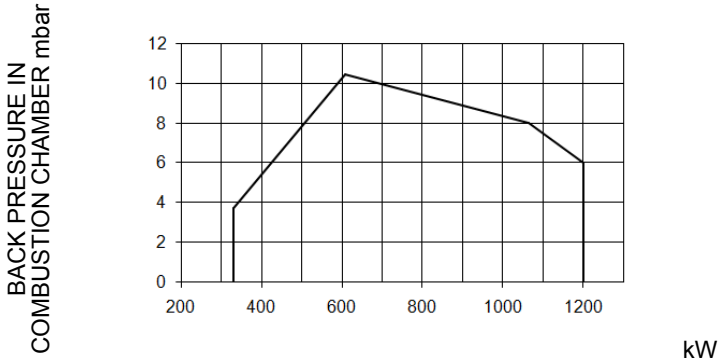
HP60



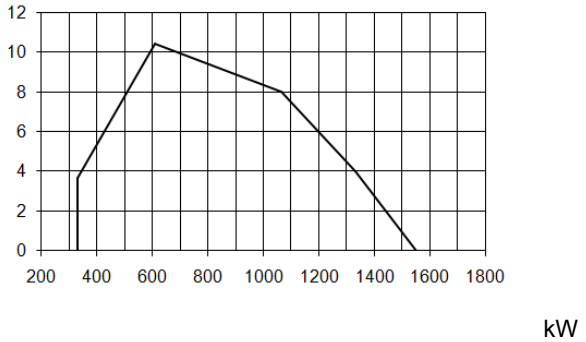
HP65



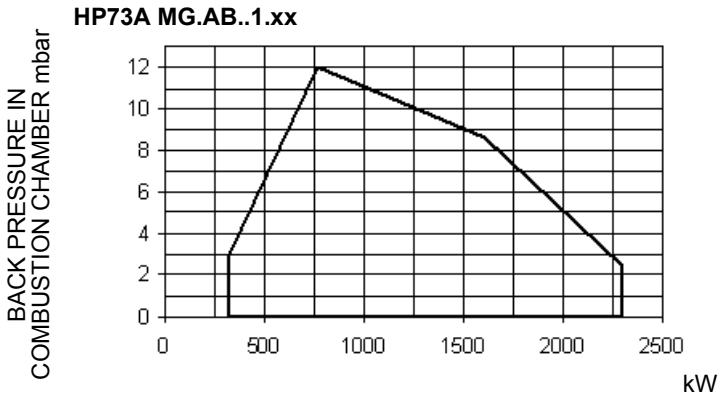
HP72 MG.AB.x.xx.A.0.xx



HP72 MG.AB.x.xx.A.1.xx



HP73A MG.AB..1.xx

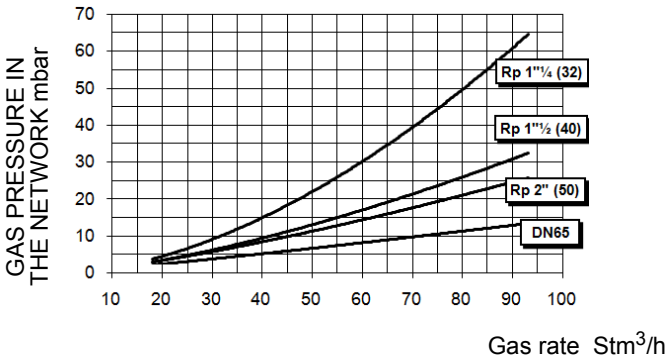


To get the input in kcal/h, multiply value in kW by 860. Data are referred to standard conditions: atmospheric pressure at 1013mbar, ambient temperature at 15°C

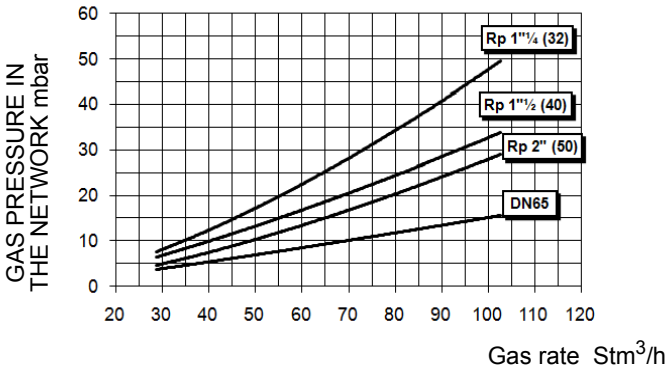
NOTE: The performance curve is a diagram that represents the burner performance in the type approval phase or in the laboratory tests, but does not represent the regulation range of the machine. On this diagram the maximum output point is usually reached by adjsuting the combustion head to its “MAX”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

Pressure in the network curves/gas rate

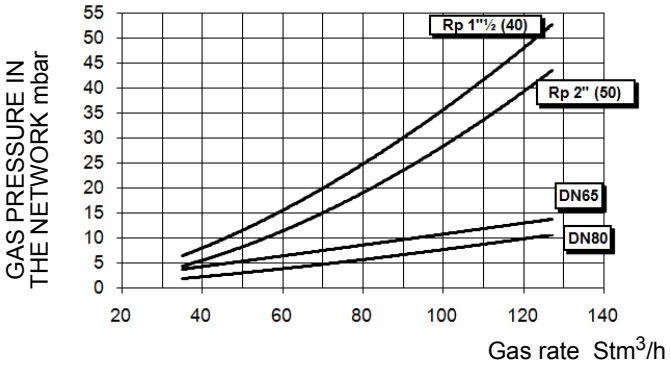
HP60



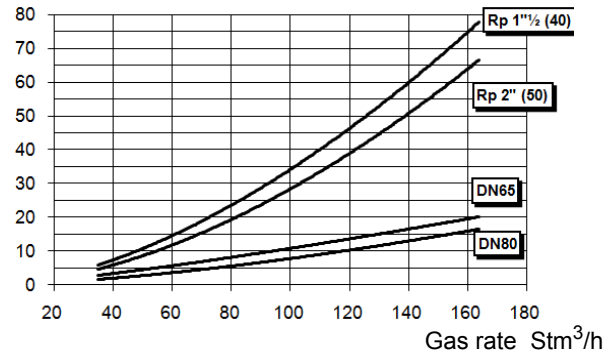
HP65



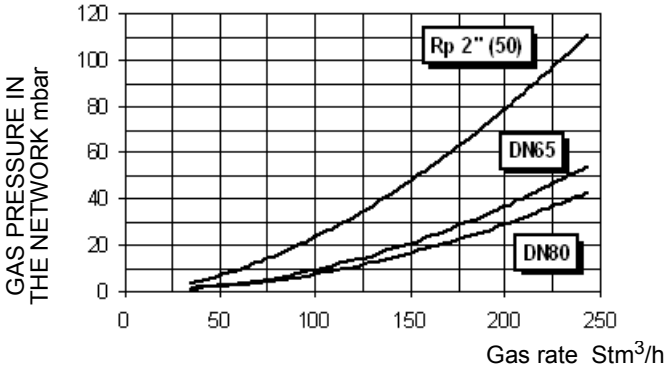
HP72...0.xx



HP72...1.xx



HP73A



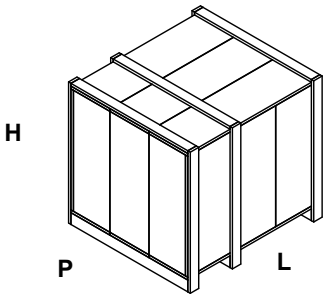
Caution: the gas rate value is quoted on the x-axis, the related network pressure is quoted on the y-axis (pressure value in the combustion chamber is not included). To know the minimum pressure at the gas train inlet, necessary to get the requested gas rate, add the pressure value in the combustion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

WARNING: the diagrams refers to natural gas. For different type of fuel please refer to the paragraph "Fuel" at the beginning of this chapter.

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:

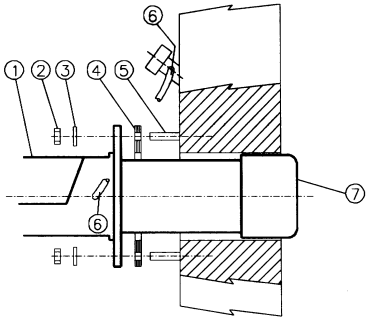
- burner with gas train detached;
- gasket to be inserted between the burner and the boiler;
- flexible oil pipes;
- oil filter;
- envelope containing this manual

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

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 stud bolts (5) on boiler's door, according to the burner drilling template described on paragraph "Overall dimensions";
4 fasten the 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

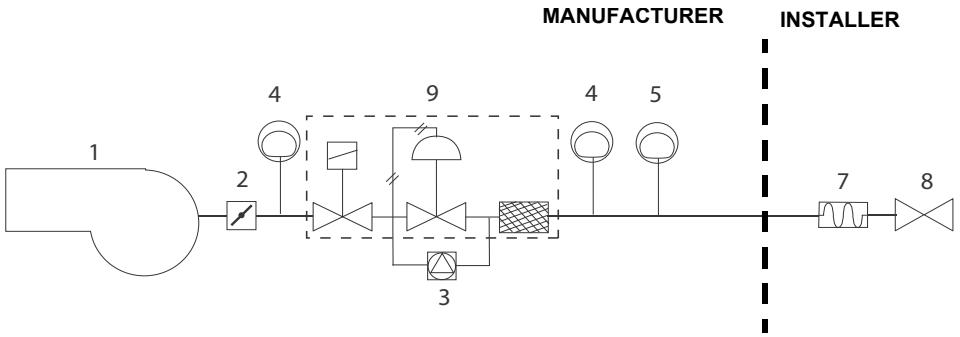
GAS TRAIN CONNECTIONS

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

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

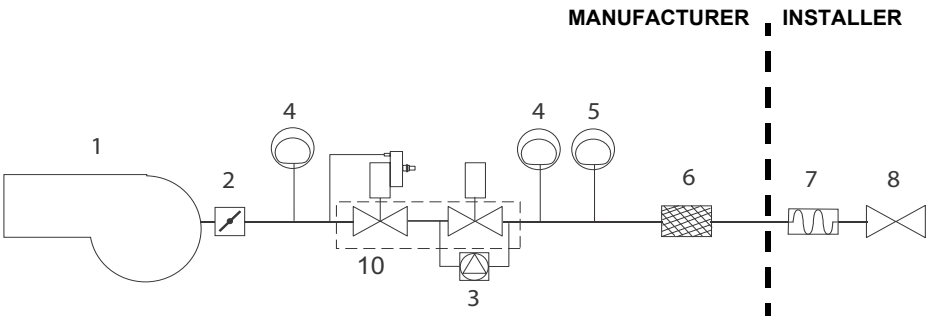
Gas train - 1

Gas train with valves group VGD 20/40 with built-in gas pressure governor + VPS504 gas proving system



Gas train - 2

Gas train with valves group VGD 20/40 with built-in gas pressure governor + VPS504 gas proving system

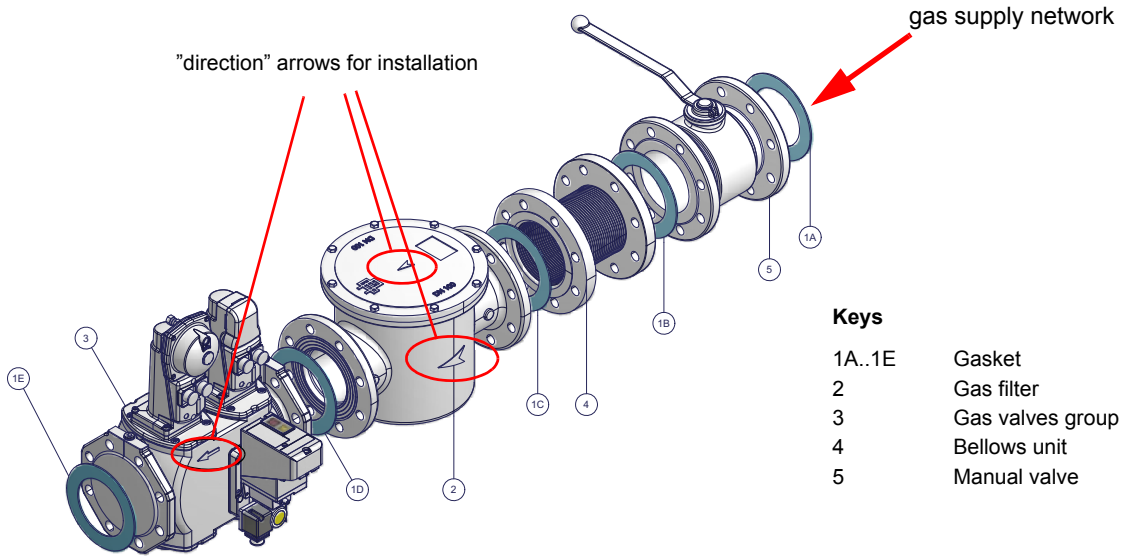


Key

1 Burner
2 Butterfly valve
3 Gas proving system
4 High gas pressure switch (option*)
5 Low gas pressure switch
6 Gas filter
7 Bellow unit
8 Manual shutoff valve
9 DUNGS MB-DLE valves group
10 VGD valves group

* Note: the maximum gas pressure switch can be mounted either upstream or downstream the gas valve but upstream the butterfly gas valve (see item no.4 in the scheme above).

Assembling the gas grainTo assemble the gas train, proceed as follows:



Keys

1A..1E	Gasket
2	Gas filter
3	Gas valves group
4	Bellows unit
5	Manual valve

Fig. 7 - 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. 7) between the elements

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

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

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

- threaded gas trains with Multibloc Dungs MB-DLE 415-420 or Siemens VGD20..
- flanged gas trains with Siemens VGD40..

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

MULTIBLOC DUNGS MB-DLE 415..420

Mounting

1. Loosen screws A and B **do not** unscrew (Fig. 8 - Fig. 9).
2. unscrew screws C and D (Fig. 8 - Fig. 9).
3. Remove MultiBloc between the threaded flanges (Fig. 9).
4. After mounting, perform leakage and functional tests.

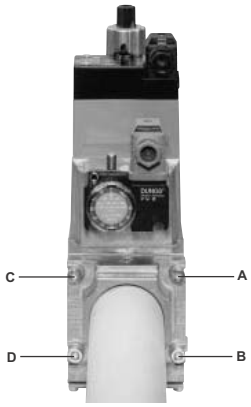


Fig. 8

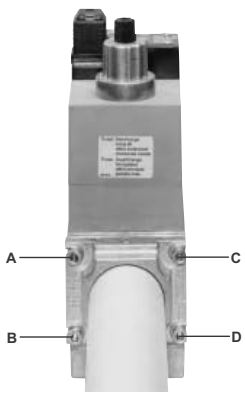


Fig. 9

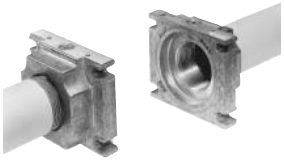


Fig. 10

MOUNTING POSITIONS

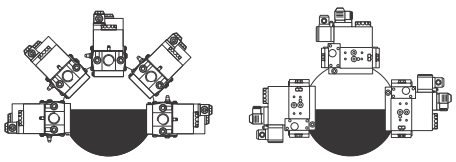


Fig. 11

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. 14).

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

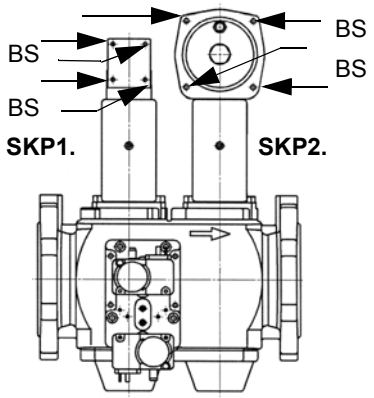


Fig. 12

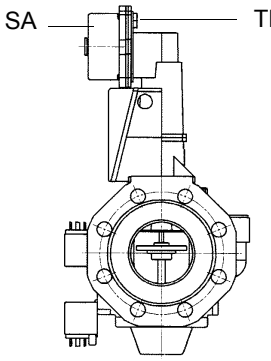


Fig. 13

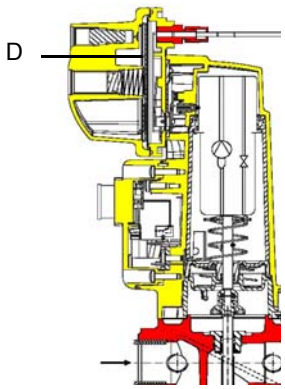


Fig. 14

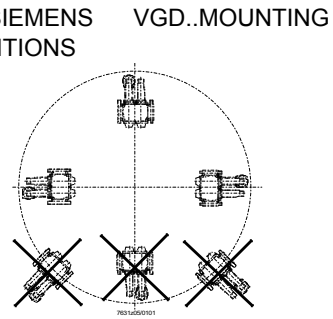


Fig. 15

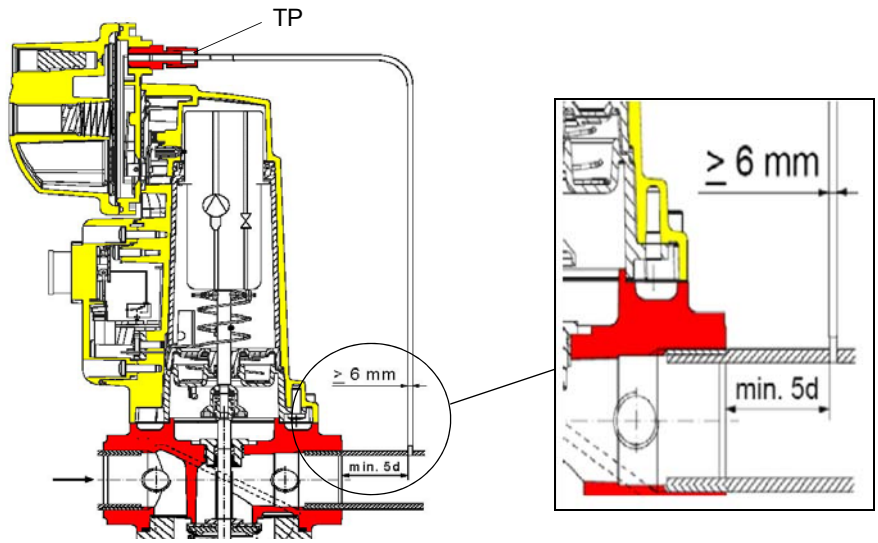


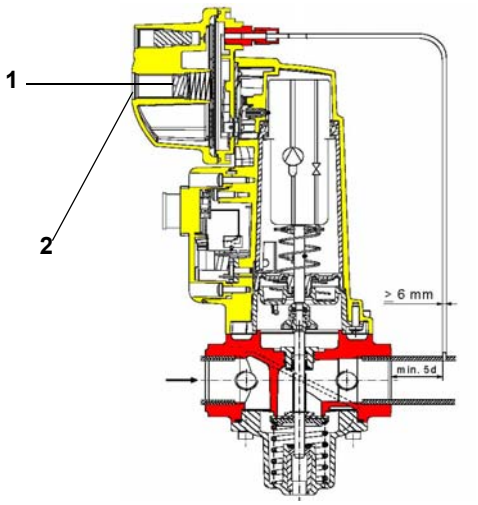
Fig. 16

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

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

Pressure adjusting range

The pressure adjusting range, upstream 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

Hidraulic system

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 othe part goes back to the pump. In this system, the by-pass pulg, if provided, must be removed and the optional return port, on the pump's body, must be sealed by steel plug and washer.

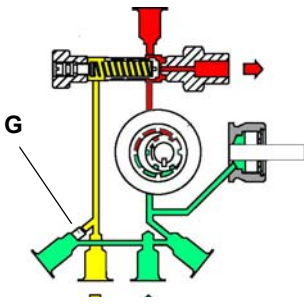
Double-pipe system: as for the single pipe system, a pipe that connects the tank to the pump's inlet is used besides another pipe that connects the pum's return port to the tank, as well. The excess of oil goes back to the tank: this installation can be considered self-bleeding. If provided, the inside 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 decribed 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).

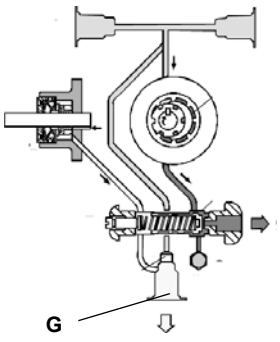
Caution: Changing the direction of rotation, all connections on top and side are reversed.

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

Suntec AJ6



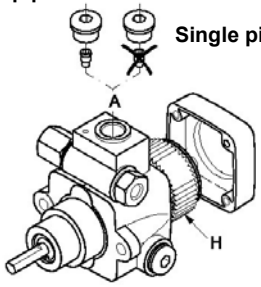
SUNTEC E7 1001



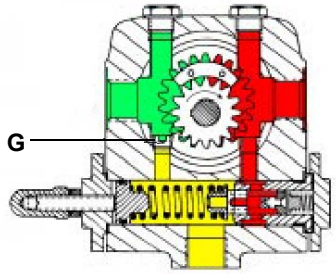
DANFOSS RSF41

Twin pipe installation

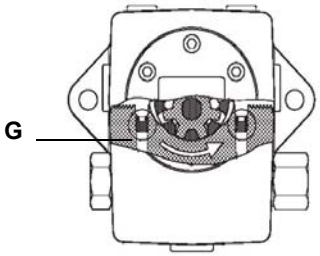
Single pipe installation



Suntec TA



Danfoss KSM..



Bleed

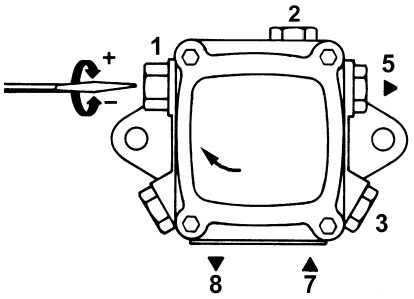
Bleeding in two-pipe operation is automatic : it is assured by a bleed flat on the piston. In one-pipe operation, the plug of a pressure gauge port must be loosened until the air is evacuated from the system.

About the use of fuel pumps

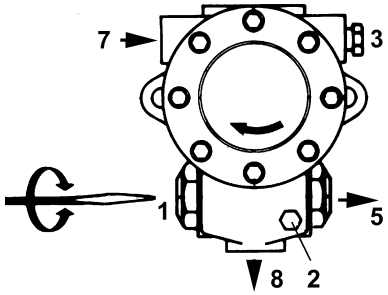
- Make sure that the by-pass plug is not used in a single pipe installation, because the fuel unit will not function properly and damage to the pump and burner motor could result.
- Do not use fuel with additives to avoid the possible formation over time of compounds which may deposit between the gear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

Oil pumps

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

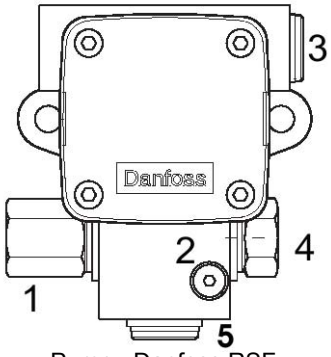


Suntec E7 1001	
Oil viscosity	2,8 ÷ 450 cSt
Oil temperature	0 ÷ 90°C
Inlet maximum pressure	1,5 bar
Maximum return pressure	1,5 bar
Minimum inlet pressure	- 0,45 to avoid gasing
Rotation speed max.	3600 rpm



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 to avoid gasing
Rotation speed макс.max.	3600 rpm



Pump : Danfoss RSF

SUNTECKey AJ6

1 Pressure governor
2 Pressure gauge
3 Vacuum pressure gauge
5 To the nozzle
7 Inlet
8 Return

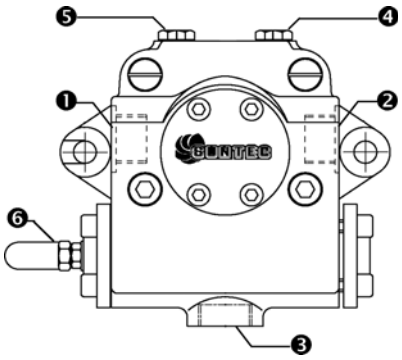
SUNTECKey E7

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

DANFOSSKey RSF41

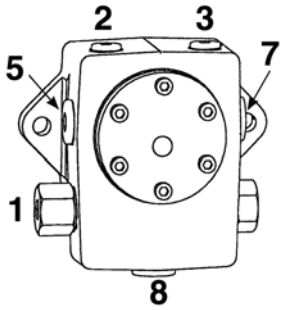
1 Pressure governor
2 Pump pressure gauge
3 Inlet
4 To the nozzle
5 Return

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



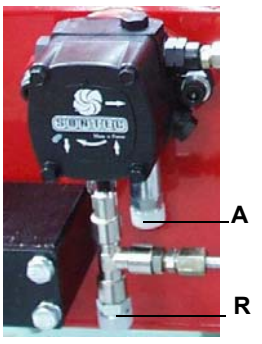
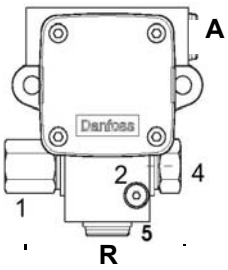
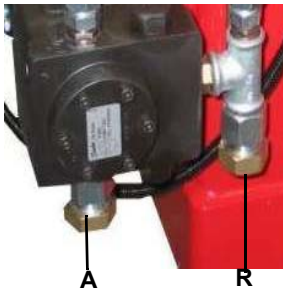
Keys

1 Pressure governor
2 Pressure/Vacuum gauge port to measure inlet pressure/vacuum
3 Pressure gauge port
5 Suction
7 To the nozzle
8 Return

Assembling the light oil flexible hoses

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

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

Suntec AJ6	Suntec E7	Danfoss RSF41	Suntec TA2	Danfoss KSM50
				

Hydraulic diagrams for light oil supplying circuits

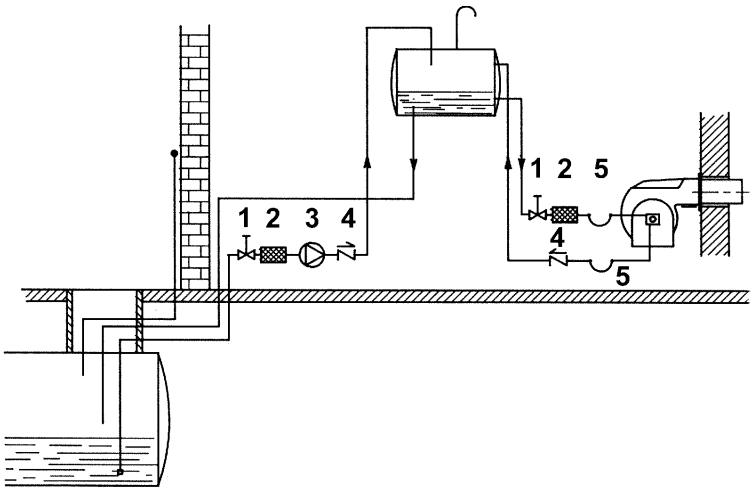


Fig. 17 - Gravity circuit

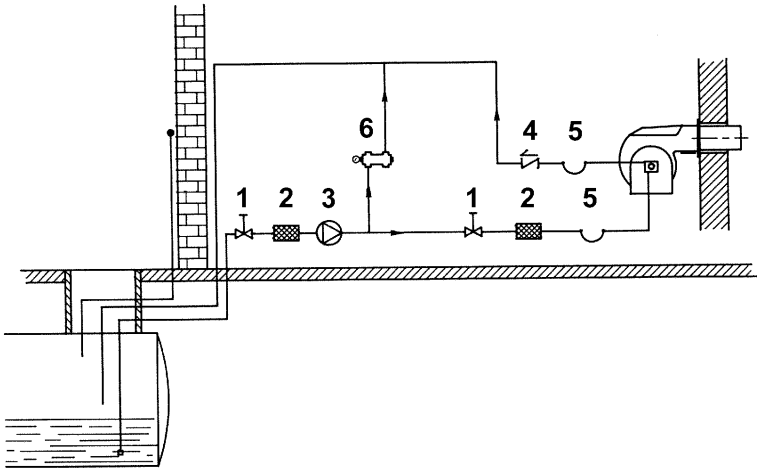


Fig. 18 - Ring circuit

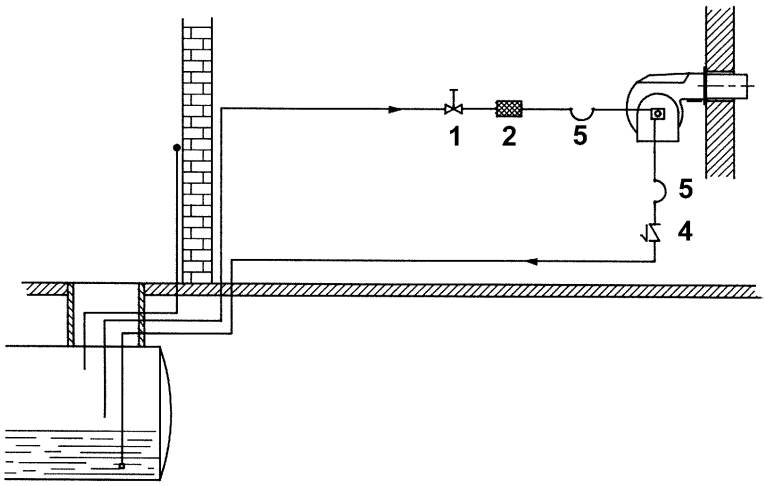


Fig. 19 - Suction circuit

Key

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

Burners are the factory set ready for twin-pipe feeding. They can be adapted for a single pipe system (recommended in the case of gravity feed). Refer to the appendix for details.

NOTE: in plants using the gravity or ring feed system, install an automatic interception device (see n. 4 in Fig. 20).

Installation diagram of light oil pipes

PLEASE READ CAREFULLY THE "WARNINGS" CHAPTER AT THE BEGINNING OF THIS MANUAL.

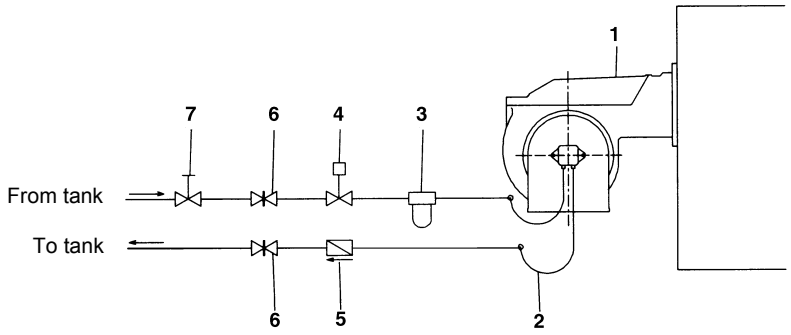


Fig. 20 - Double-pipe system

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.

Electrical connections

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

	IMPORTANT: while connecting electric supply wires to burner's teminal block be sure that ground wire should be longer than phase and neutral ones.

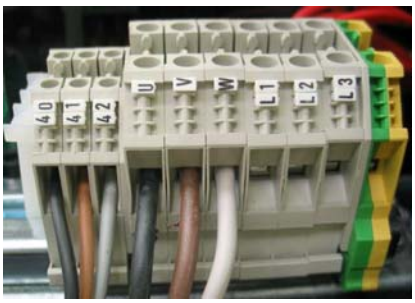
To execute the electrical connections, proceed as follows:

1 remove the cover from the electrical board, unscrewing the fixing screws;
2 execute the electrical connections to the supply terminal board as shown in the following diagrams and in the wiring diagrams (see related chapter),
3 check the direction of the fan motor (see next pargraph)
4 refit the panel cover

Connect the three-phase supply to terminals L1, L2, L3 and PE (ground); then shunt the phase and neutral wires (Fig. 21) for the auxi-

liaries on the printed circuit (N-terminal = neutral; L-terminal = phase)

MC supply terminal block



Keys

IG: main switch
KM1: fan motor contactor
KM2: pump motor contactor
MP: pump motor
MV: fan motor
TP: pump motor thermal cutout
TV: fan motor thermal cutout

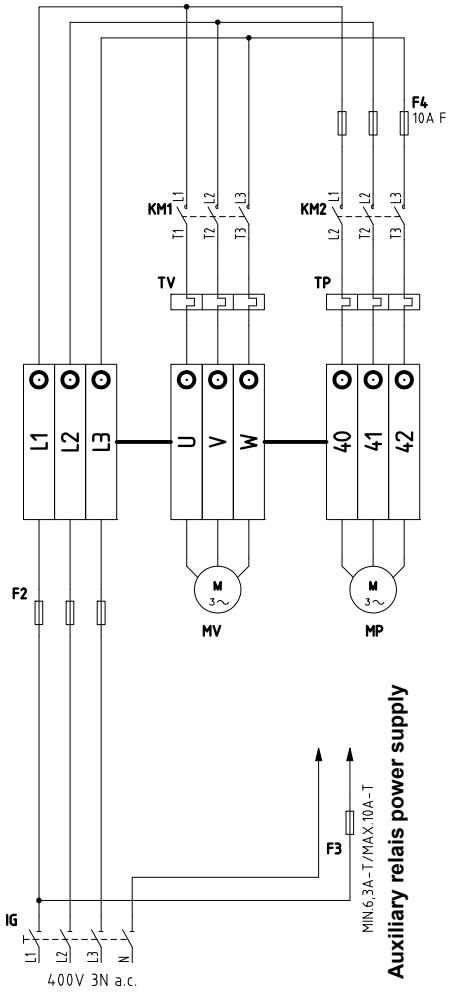


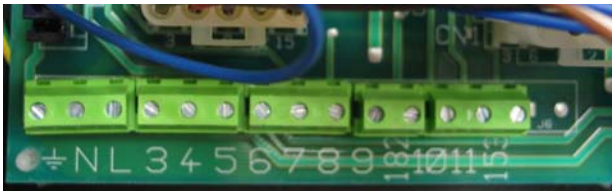
Fig. 21

As far as connections, refer to the terminal block showed on next picture.

1 Connect the signal conductors from the boiler to the burner, as for the next elements (Fig. 22):
ST: thermostat/pressure switch series
TAB: High/low flame thermostat

2 Connect the signal conductors from the burner to the boiler, as for the next elements (Fig. 22)
LB: Burner's lockout signalling LED
LSPG: Gas proving system' lockout signalling LED

MA terminal block for burners with printed circuit board provided (standard)



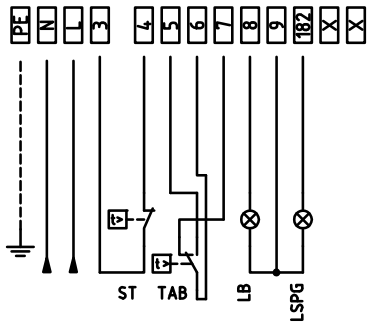


Fig. 22

WARNING: The burner is provided with a jumper between terminals 6 and 7; in the event of connecting the high/low flame thermostat remove this jumper before connecting the thermostat.

Electrical wiring diagram for burners with no printed circuit board provided provided

If the burner is ordered without printed circuit board, follow the next connections diagrams.

MA terminal block for burners with no printed circuit board provided

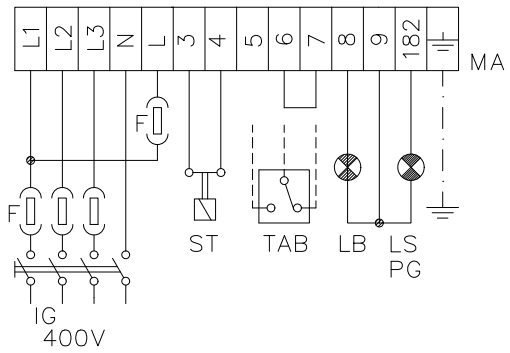


Fig. 23

Rotation of fan motor and pump motor

Once the burner's electrical connection is accomplished, remember to check the rotation of the fan and pump motors. The motor should rotate in counterclockwise direction looking at motor's cooling fan. In case of incorrect rotation, reverse the three-phase supply and check again the rotation of the motor.

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

ADJUSTEMENTS

	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 INVALIDATE!
	ATTENTION! before starting the burner up, make sure that the return pipe to the tank is not obstructed. Any obstruction would cause the pump seal to break.

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

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

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. 24, 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.

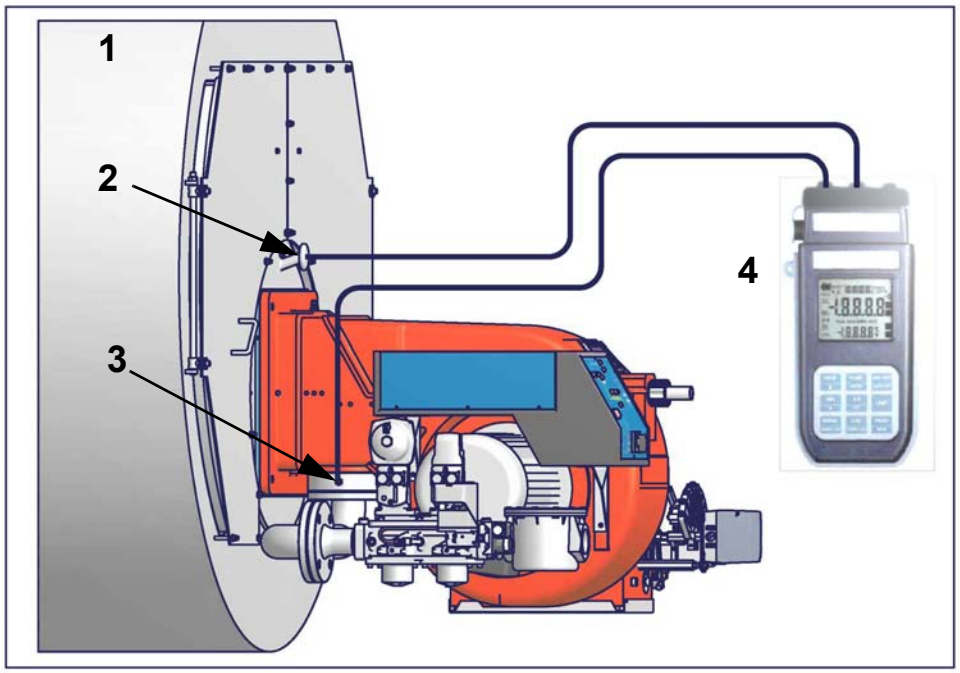


Fig. 24

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

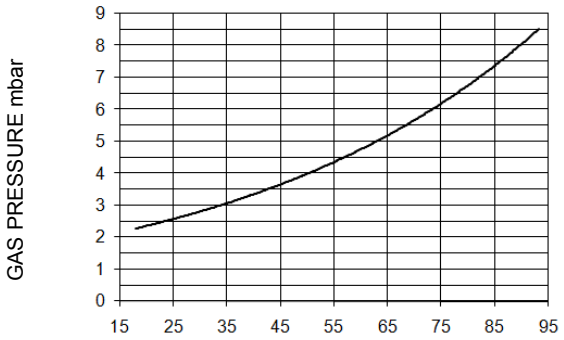
In order to measure the pressure in the combustion head, insert the pressure gauge probes: one into the combustion chamber's pressure outlet to get the pressure in the combustion chamber and the other one into the butterfly valve's pressure outlet of the burner. On the basis of the measured differential 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.

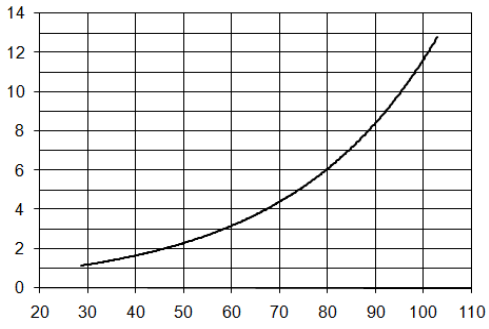
NOTE: THE PRESSURE-RATE CURVES ARE GIVEN AS INFORMATION ONLY; FOR A PROPER SETTING OF THE GAS RATE, PLEASE REFER TO THE GAS METER READING.

Pressure in combustion head- gas rate curves

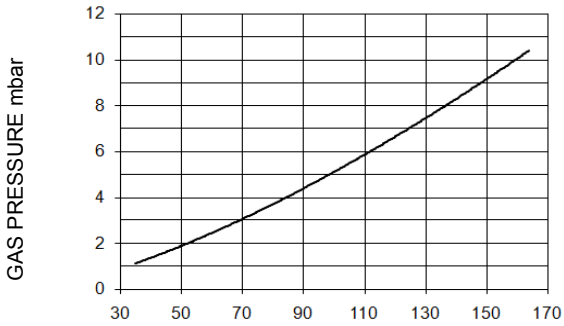
HP60



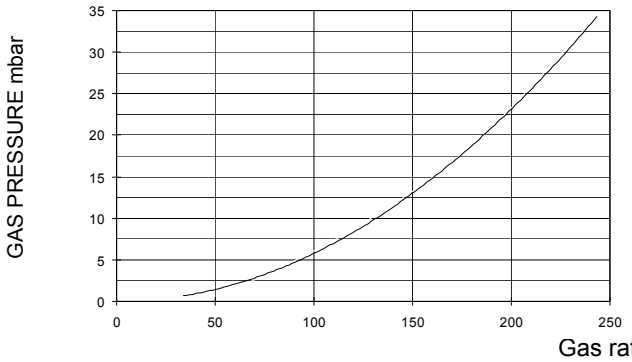
HP65



HP72



HP73A



WARNING: the diagrams refers to natural gas. For different type of fuel please refer to the paragraph "Fuel" at the beginning of this chapter.

Oil nozzles

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 the next pictures (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	5 (recommended)

MONARCH NOZZLE

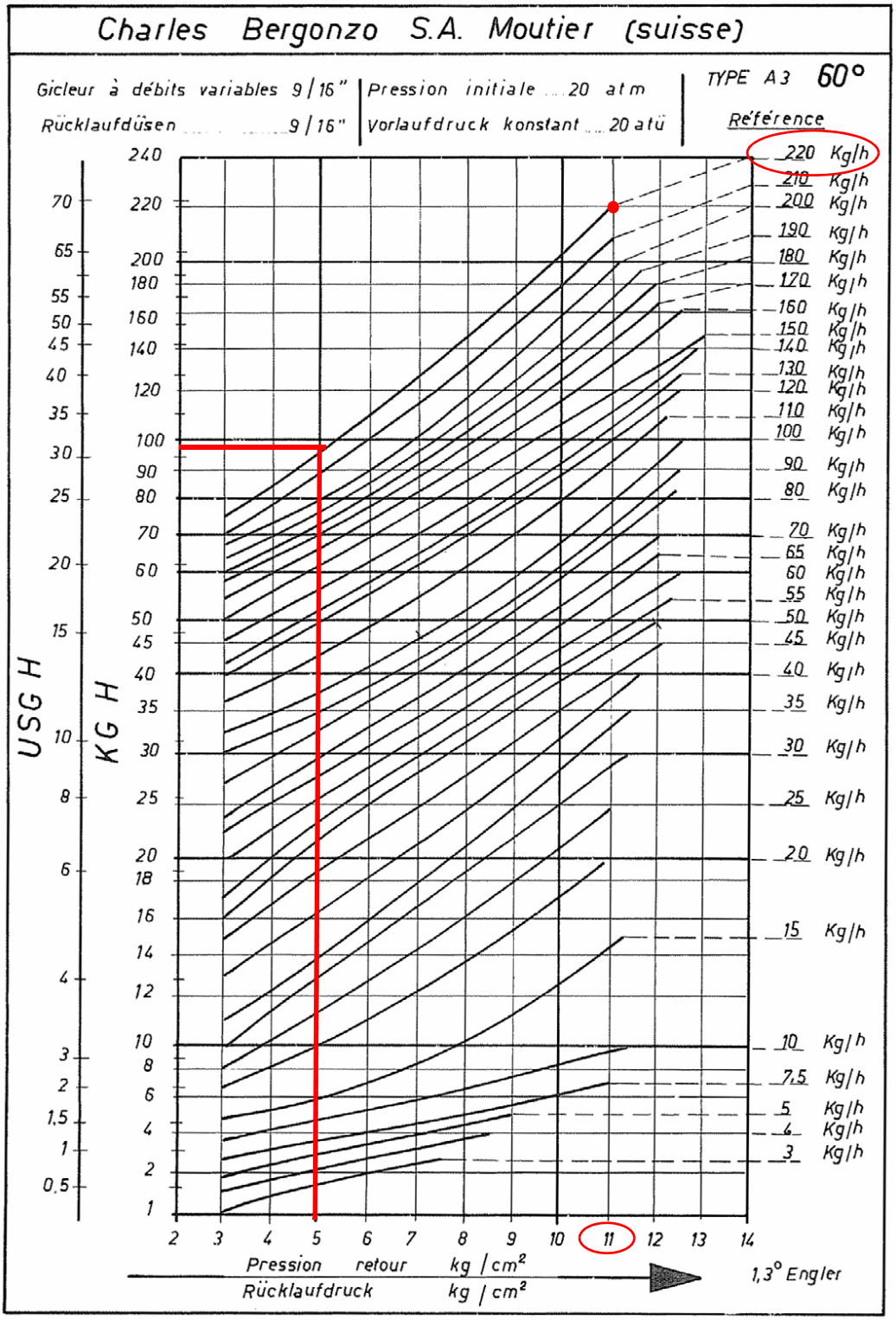
	RETURN PRESSURE bar													
Nozzle size (GPH)	0	1,4	2,8	4,1	5,5	6,9	8,3	9,6	11	12,4	13,8	15,2	Flow rate in kg/h with close return	Pressure with close return to use in the nozzle choice)
0,75	1,3	1,6	2,1	2,5									3,2	5,5
1,0	2,1	2,1	2,4	3,0	3,7	4,6	5,2						5,4	8,6
1,5	2,9	3,0	3,3	4,1	4,9	6,0	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/dm^3

Example: If the nozzle provided is mod. MONARCH 10.5 GPH, when the return pressure is about 13.80bar, the flow rate will be 35.5kg/h (see example on Tab. 2). If the return pressure is 8.3bar (with the same nozzle), the flow rate value will be 20.7kg/h. The flow rate in the High-flame operation is related to the nozzle provided with close return. The flow rate in the Low-flame operation can be adjusted by means of the manual pressure regulator, taking care no to go under 8bar.

BERGONZO NOZZLE DIAGRAMS



NOZZLE SUPPLY PRESSURE = 20 bar

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. The flow rate will then be about 95kg/h (see the example showed on the Bergonzo diagram).

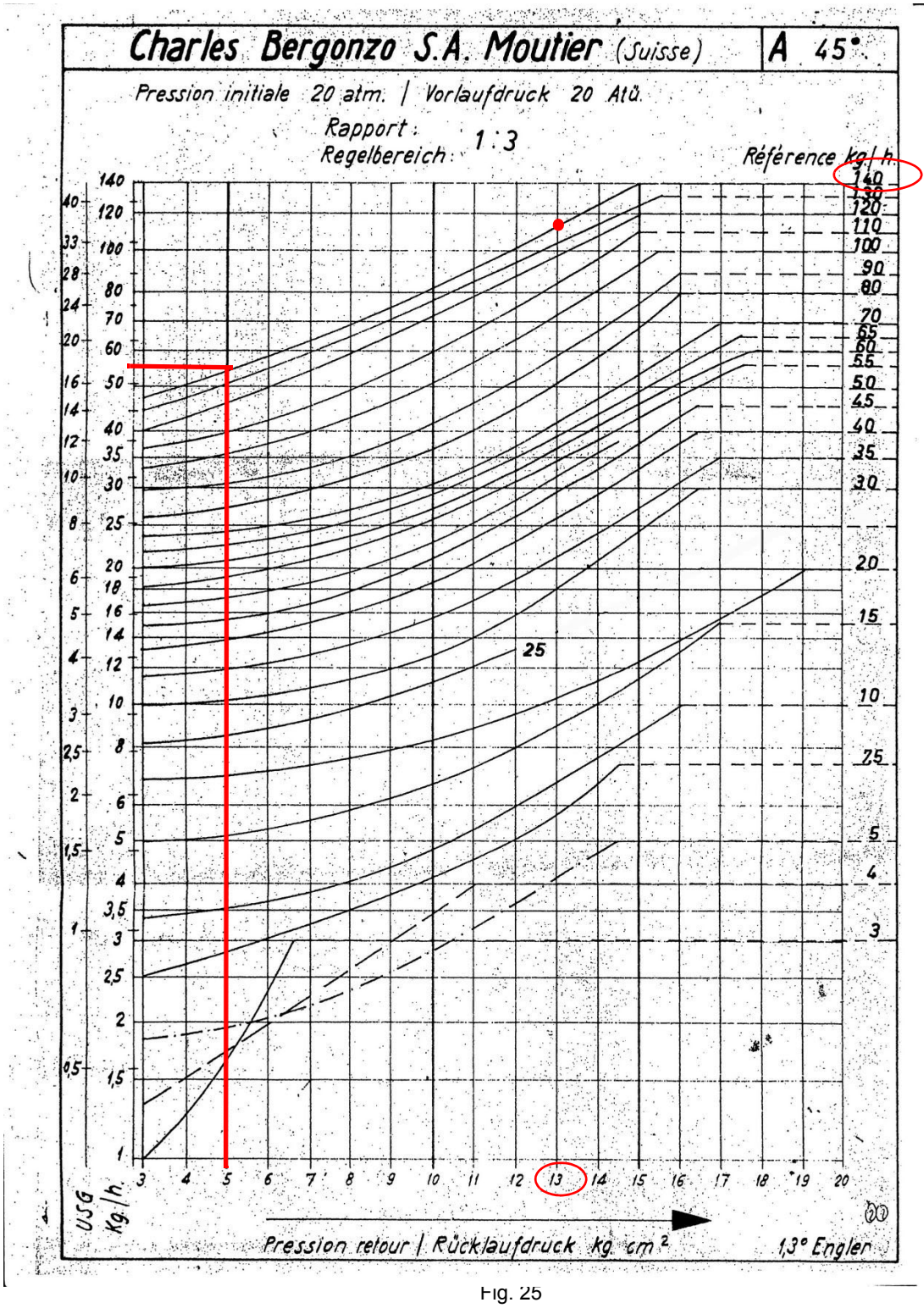
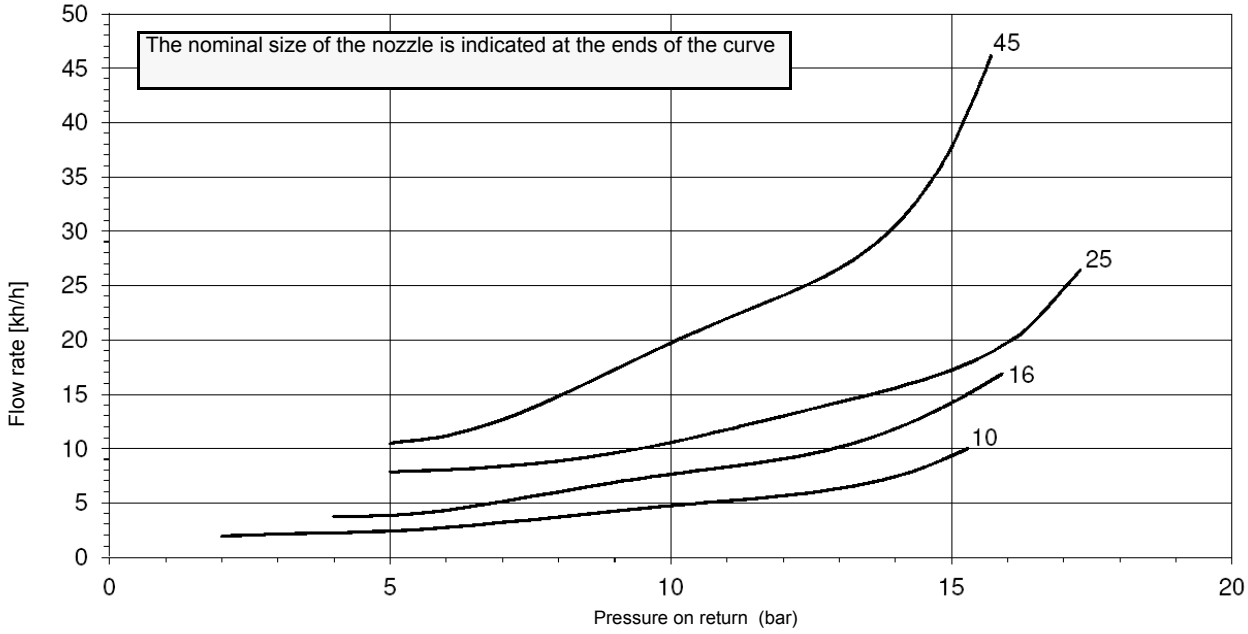


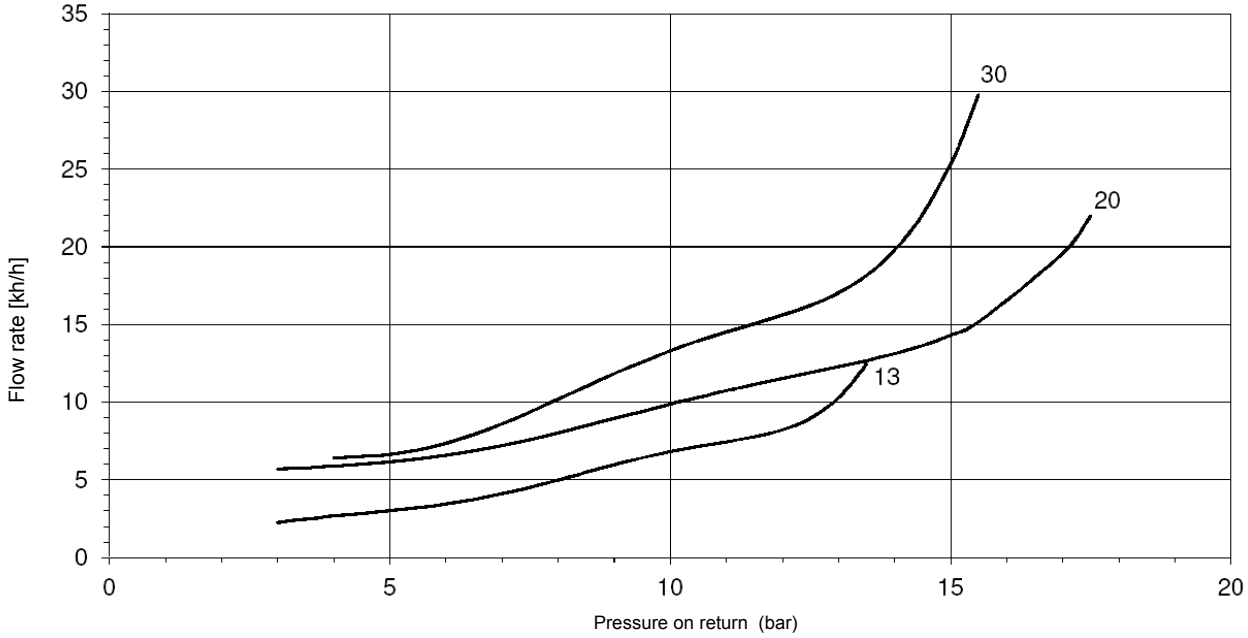
Fig. 25

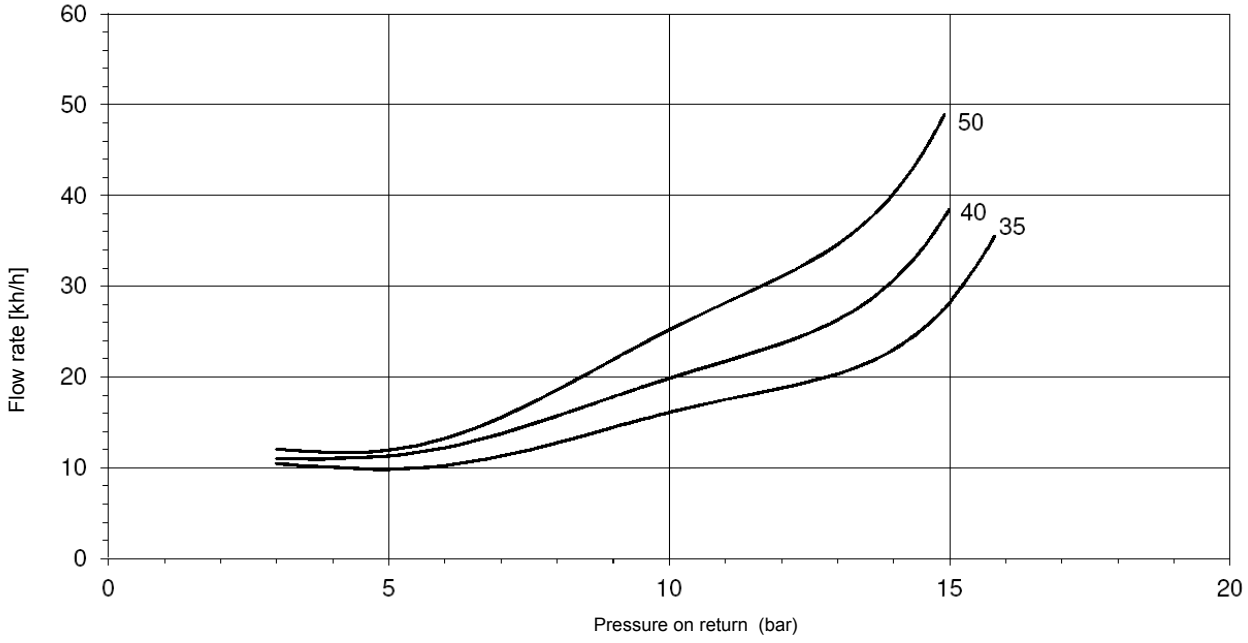
Example (Bergonzo): if a 140kg/h flow rate BERGONZO 45° nozzle is provided, set the return pressure at 13bar, supply at 20bar on the delivery to get a 110kg/h flow rate. If the return pressure needed is 5bar, instead, act on the adjusting screw on the pressure governor. The flow rate will then be about 55kg/h (see the example showed on the Bergonzo diagram).

FLUIDICS KW3...45°

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

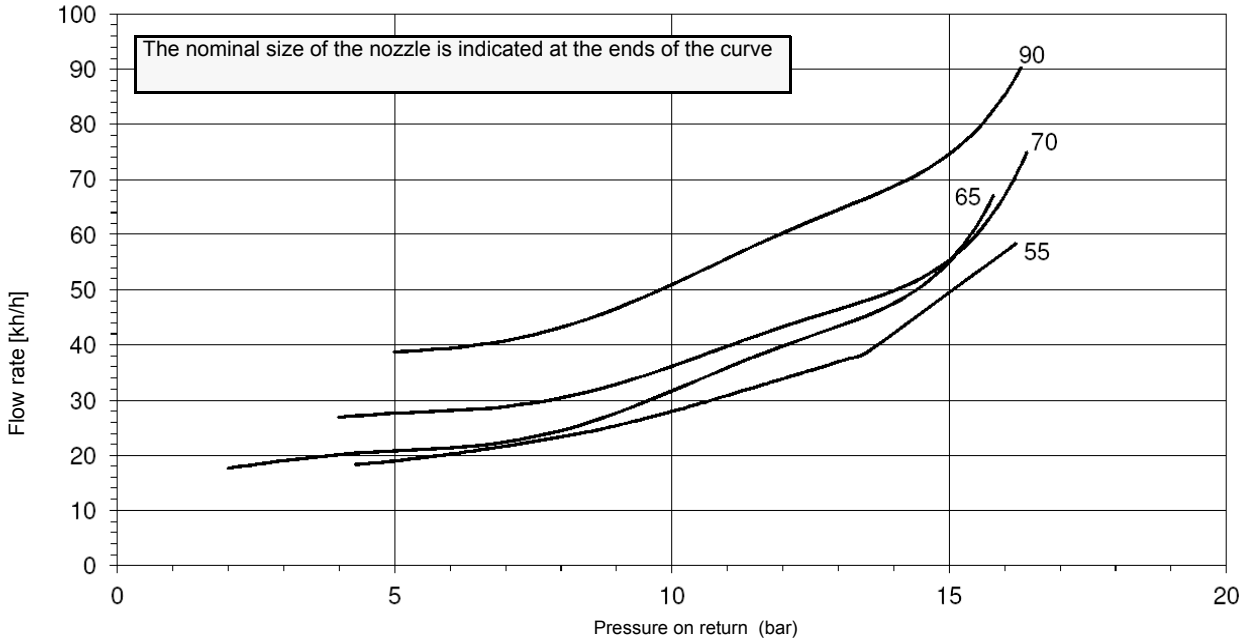


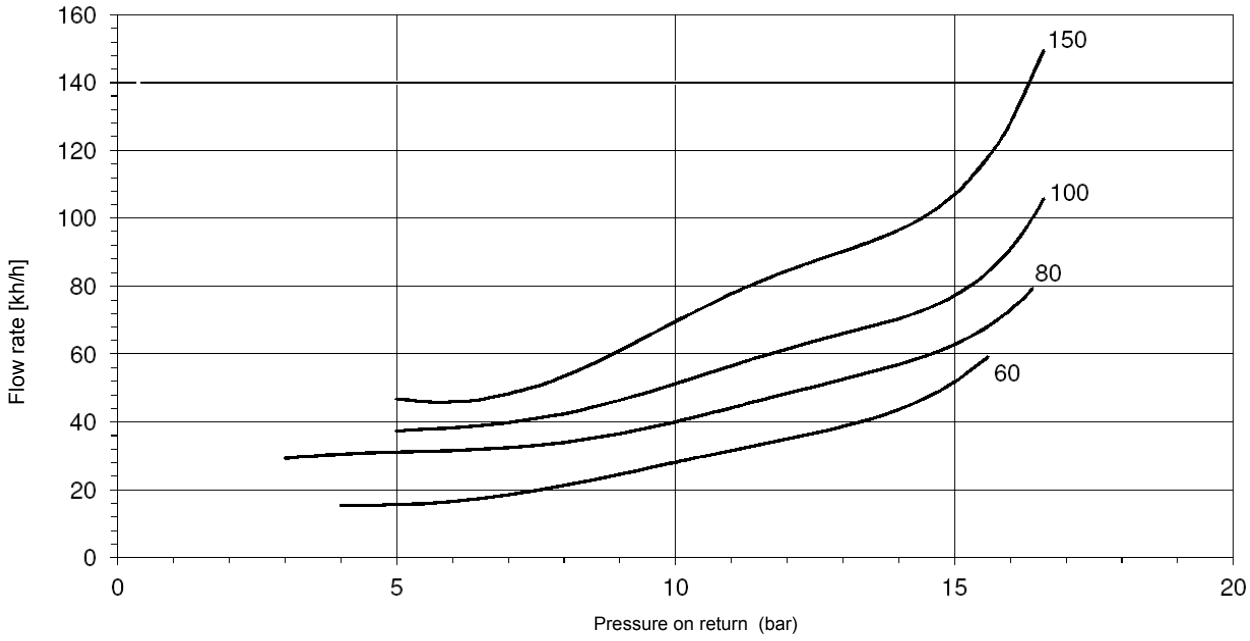


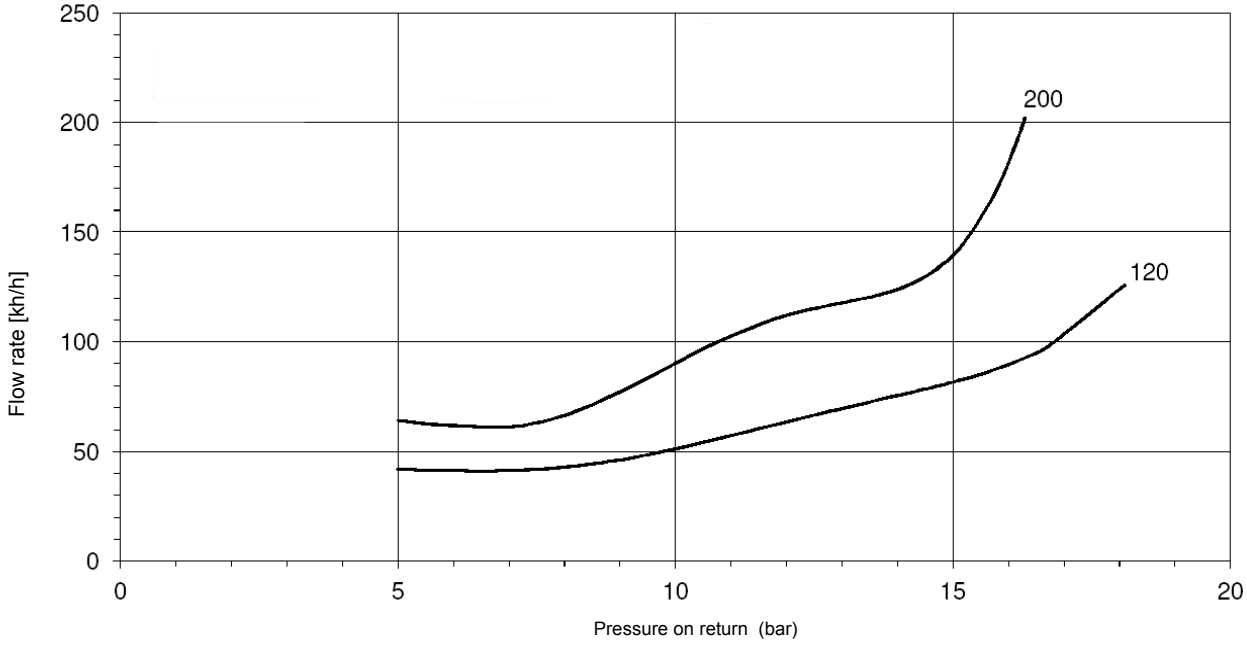


FLUIDICS KW3...45°

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

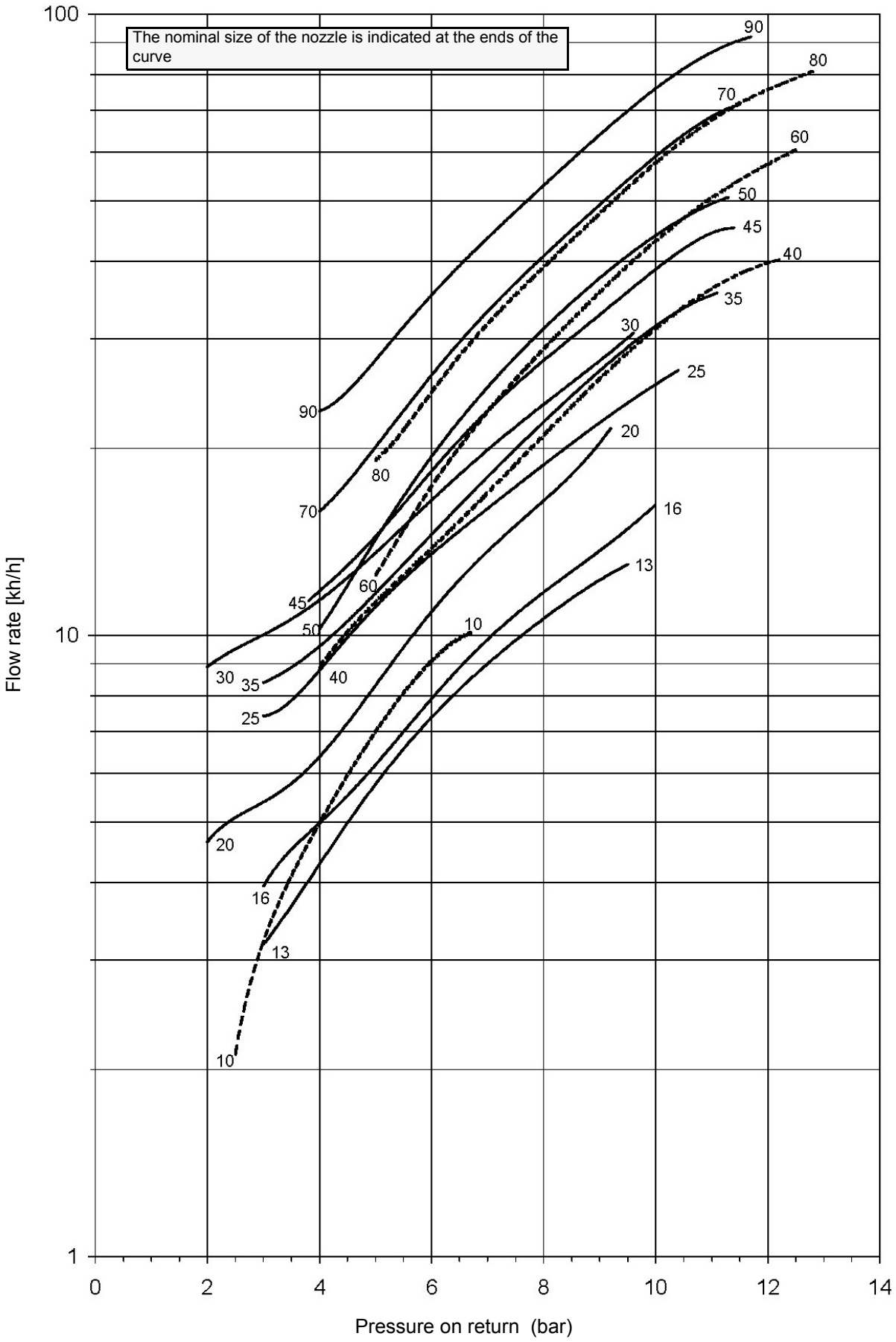






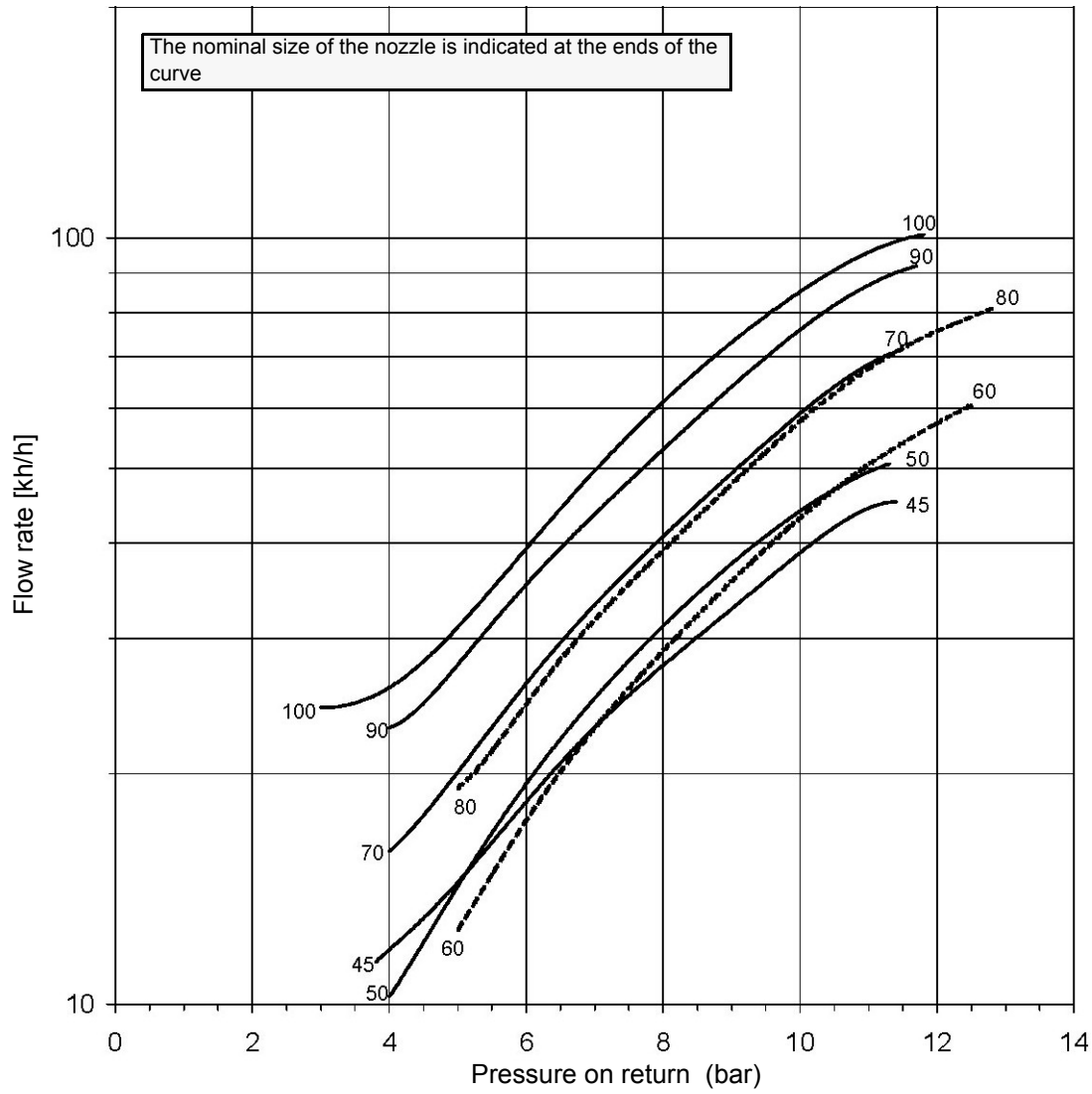
FLUIDICS KW3...60°

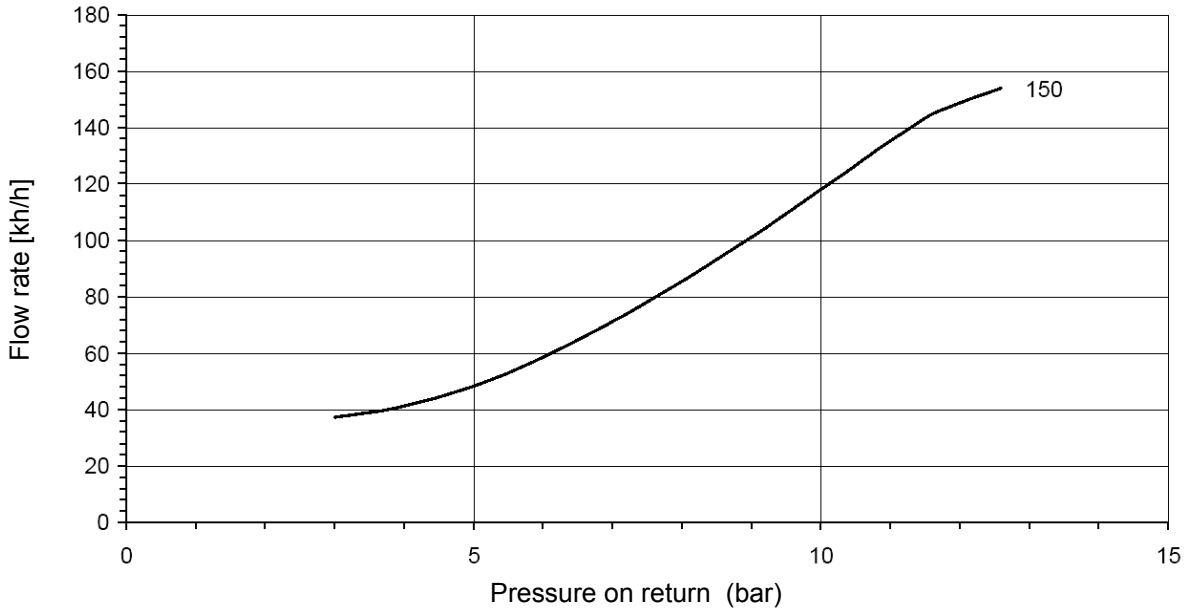
NOZZLE SUPPLY PRESSURE = 20 bar. VISCOSITY AT NOZZLE = 5 cSt



FLUIDICS KW3...60°

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





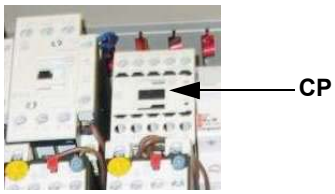
Adjustments - brief description

- 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.
- Adjust the combustion values in the high-flame stage.
- 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 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 27 (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 42).

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 loosing the cap without removing it, then release the contactor.

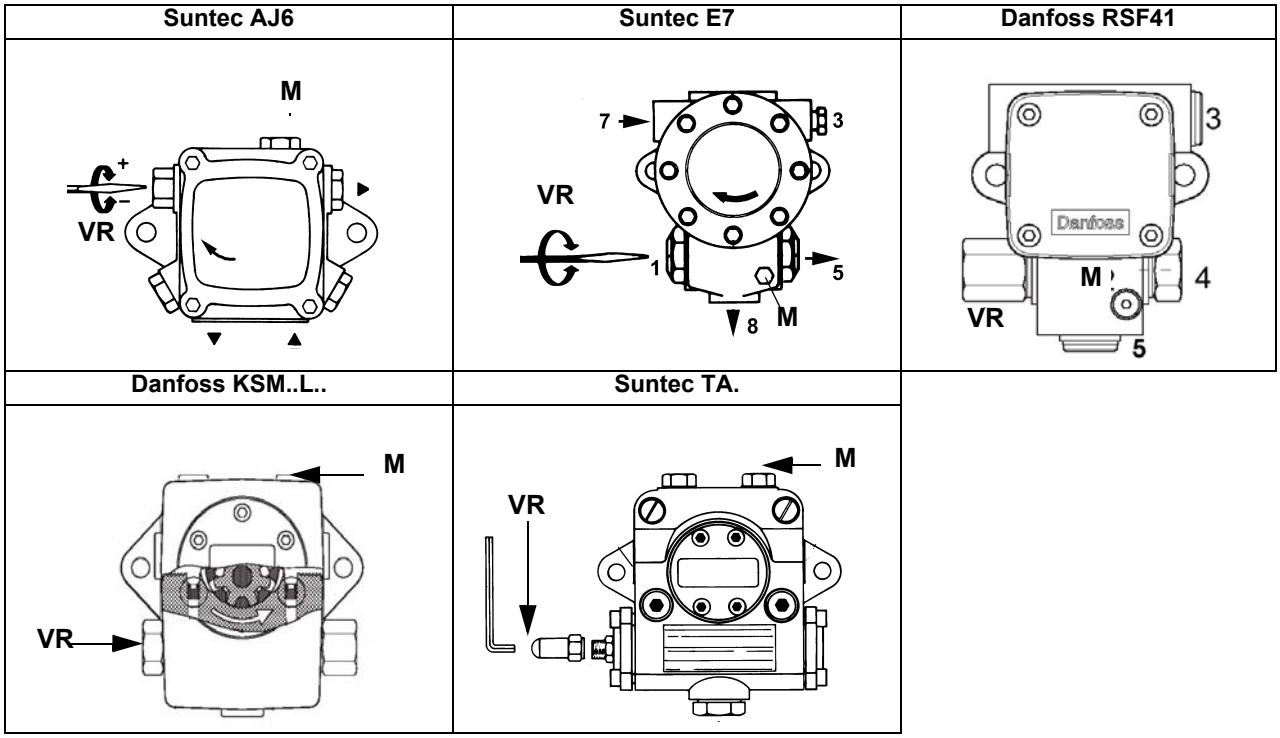


Fig. 26

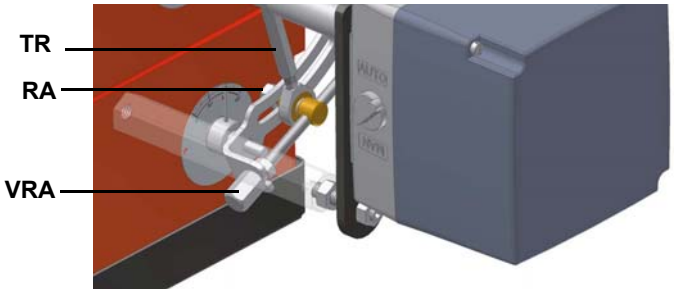
5 drive the burner to high flame stage, by means fo the thermostat **TAB** (high/low flame thermostat - see Wiring diagrams).

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 on the pump adjusting screw **VR** (see Fig. 28) as to get the nozzle pressure at 20bar (Monarch or Fluidics nozzles - see page 27).

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 perfomed, be sure that the blocking nut **RA** is fasten. 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 pressurefrom 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.

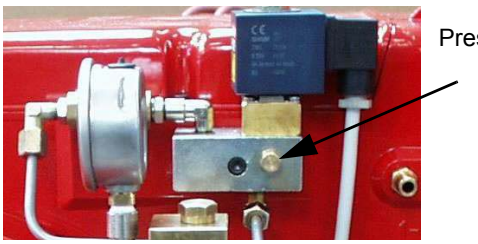


Fig. 27

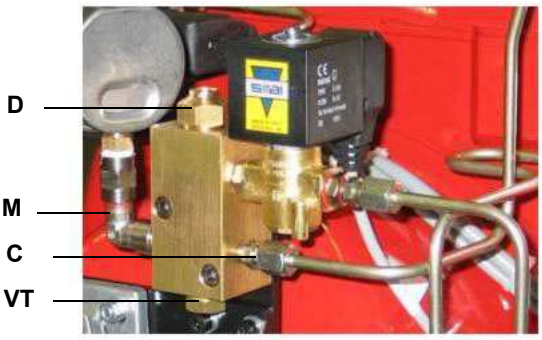


Fig. 28 - Oil manual governor

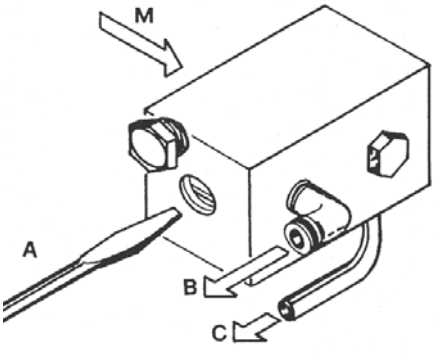


Fig. 29

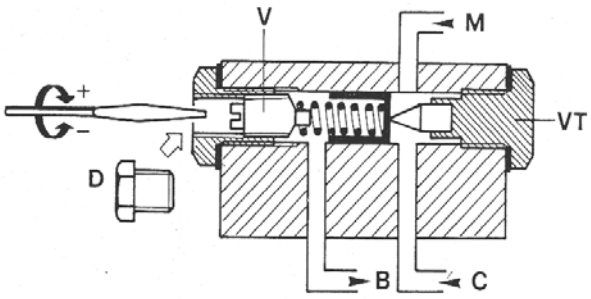


Fig. 30

D Adjusting screw cap
V Pressure adjusting screw
M Pressure gauge port
VT Needle screw
B Return to tank
CReturn 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;

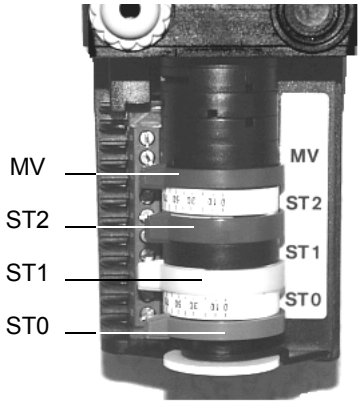
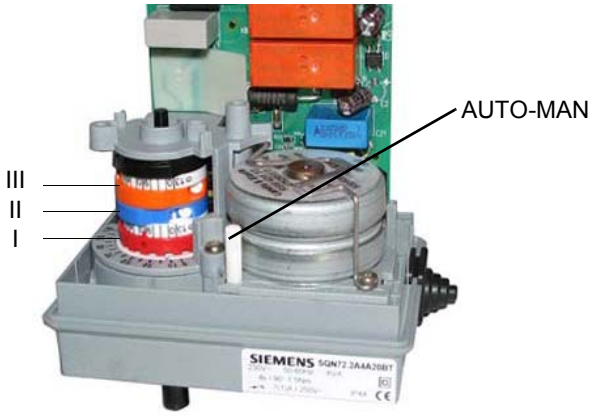
12 The low flame position must never match the ignition position that is why cam MV (Berger)/IV (Siemens) must be set 20°- 30° more than the ignition position ST1 (Berger)/III (Siemens).

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, rememeber to set it to AUTO once the adjustment is accomplished.**

Berger STA12 B 3.41	Siemens SQN72
	
ST2 = High flame cam ST0 = Ignition position ST1 = Low flame MV = Auxiliary cam for the second valve enabling	I = High flame cam (red) II = Ignition position (blue) III = Low flame (orange)) IV = Auxiliary cam for the second valve enabling (black)

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 42)

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 **VSB** must be removed only in case of replacemente 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 **VSB** must be removed only in case of replacemente of the coil.

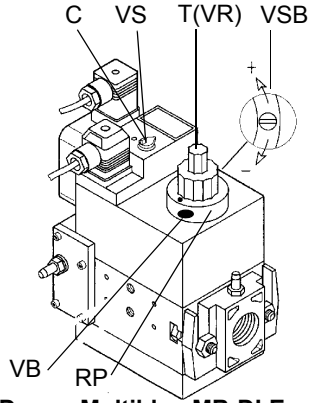
3 Start the burner up by means of the thermostat series and wait until the pre-purge time comes to an end and that the burner starts up;

4 drive the burner to high flame stage, by means fo the thermostat **TAB**.

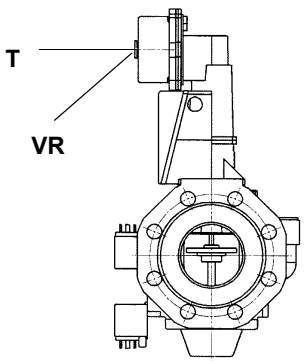
5 do not change the air flow rate adjustment set in the light oil operation (see previous paragraph);

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; screwind **VR** the rate increases, unscrewing it decreases (see next figure).



Dungs Multibloc MB-DLE

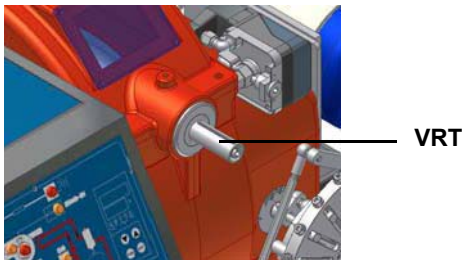


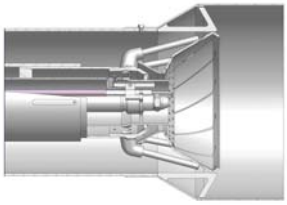
Siemens VGD..

Fig. 31

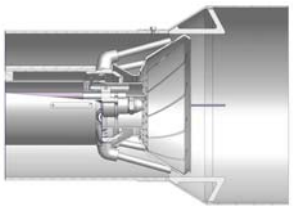
⚠ Pressure stabiliser is factory-set. The setting values must be locally adapted to machine conditions. Important! Follow the instructions carefully!

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.





"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. 32) 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 regardingthe horizontal axis (Fig. 32).**NOTE:** At the end of settings, make sure the locking screws **RA** and **DB** are fully tightened.

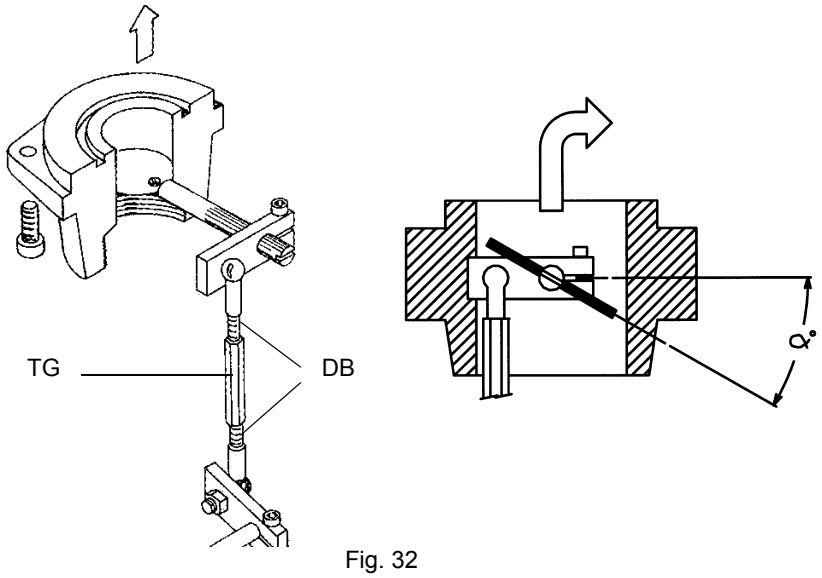


Fig. 32

9 Now adjust the pressure switches (see pag. 38).

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 reqested. 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 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 o 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 maximum gas pressure switch (when provided)

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

1 remove the pressure switch plastic cover;

2 if the maximum pressure switch is mounted upstreaam the gas valves: measure the gas pressure in the network, when flame is off; by means of the adjusting ring nut **VR**, set the value read, increased by the 30%.

3 if the maximum pressure switch is mounted downstream the “gas governor-gas valves” group and upstream the butterfly valve: light the burner, adjust it according to the procedure in the previous paragrph. Then, measure the gas pressure at the operating flow rate, downstream the “gas governor-gas valves” group and upstream the butterfly valve; by means of the adjusting ring nut **VR**, set the value read on step 2, increased by the 30%;

4 replace the plastic cover.

Maximum oil pressure switch

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

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

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

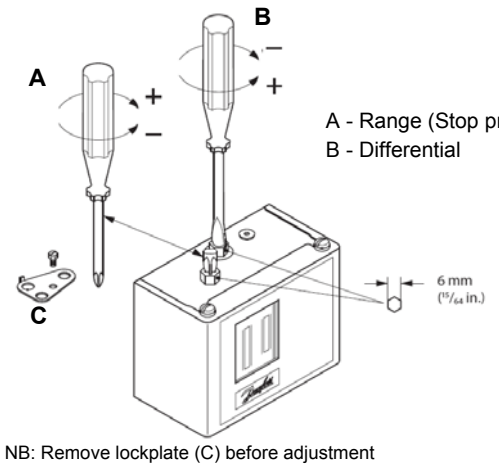
In case of inacceptable values, reduce from 20% to 15% the overpressure; later on, repeat the adjustments described above.

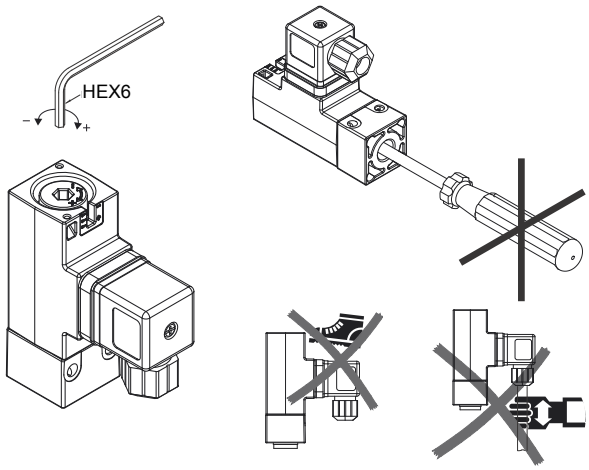
Minimum oil pressure switch (when provided)

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

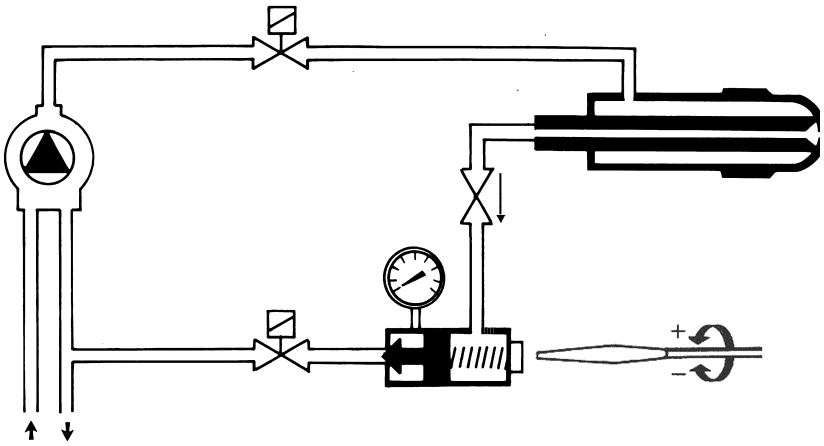
Oil pressure switch adjustment

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

<table>
<tr>
<td>

NB: Remove lockplate (C) before adjustment</td>
<td>
</td>
</tr>
<tr>
<td>Danfoss KP..</td>
<td>Trafag Picostat 9B4..</td>
</tr>
</table>

OPERATING PRINCIPLE FOR LIGHT OIL CIRCUIT



f

Fig. 33

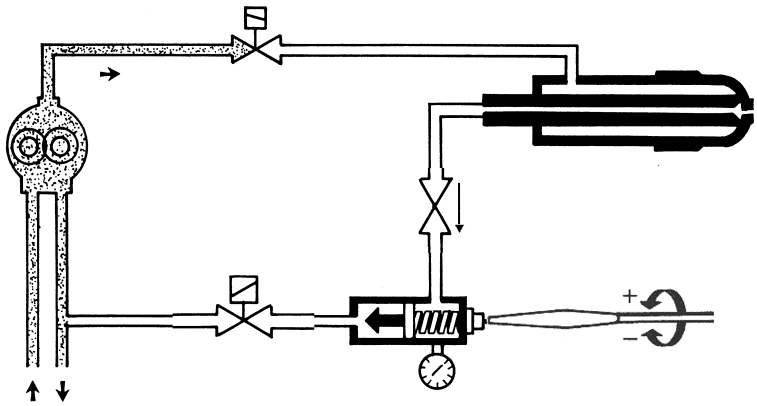


Fig. 34 - Pre-purge

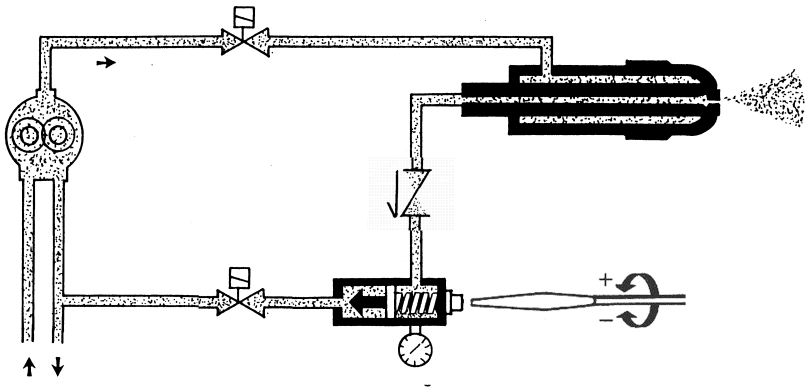


Fig. 35 - Low flame

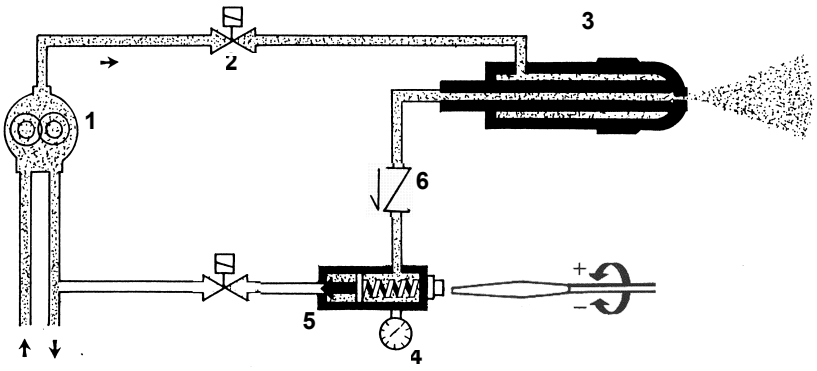


Fig. 36 - High flame

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 AUTHORISED 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).

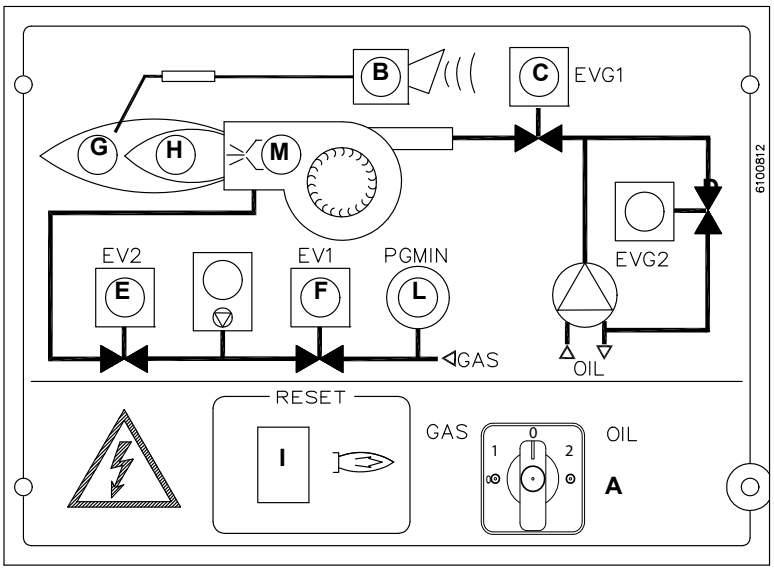
NEVER OPEN OR DISMANTLE ANY COMPONENT OF THE MACHINE.

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



Keys A 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-purgue 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-purgue 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-purgue phase begins.

3 At the end of the pre-purgue 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 enablig 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 MANAUL CUTOFF VALVES CLOSED!

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

ROUTINE MAINTENANCE

- Check and clean the gas filter cartdrige (see Fig. 37), replace it if necessary;
- Check and clean the light oil filter cartdrige, replace it if necessary;
- Check for condition of the light oil pipes, verify for possible leaks;
- Check and clean the filter on the 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;
- Remove, check and clean the combustion head (page 45);
- Check the ignition electrodes, clean and eventually adjust it, if necessary replace it (page 46);
- Remove and clean the oil nozzle (Important: use solvents for cleaning, not metal utensils) and at the end of the maintenance procedures, after replacing the burner, turn it on and check the shape of the flame; if in doubt replace the nozzle. Where the burner is used intensively it is recommended to replace the nozzle as a preventive measure, at the begin of the operating season.
- Check and carefully clean the UV detector, replace it if necessary; if in doubt, check the ionization current, after having started the burner, following the directions in Fig. 41.
- Clean and grease joints and rotating parts.

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. 37-Fig. 38) Δp> 10 mbar.
- Change the filter if the pressure difference between pressure connection 1 and 2 (Fig. 37-Fig. 38) 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. 39).
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.
6 Pay attention that dirt does not fall inside the valve.

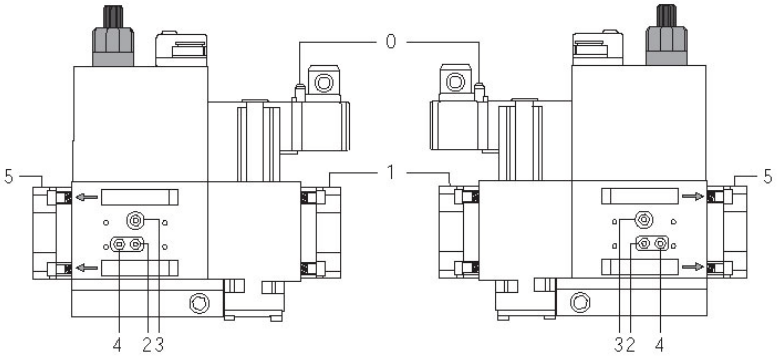


Fig. 37

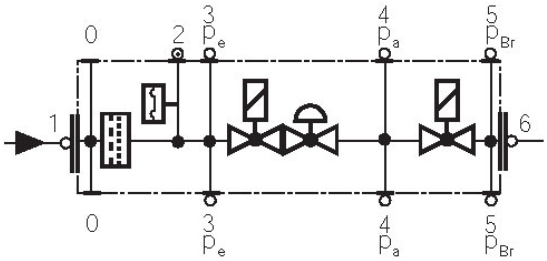


Fig. 38

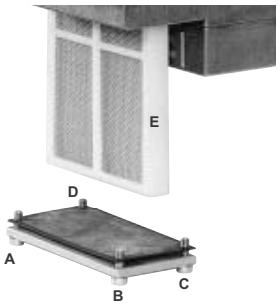
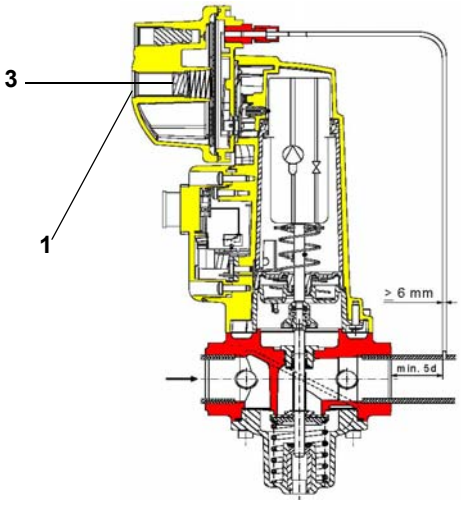


Fig. 39

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

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 “O” ring into its place (C) and replace the cover fastening by the proper screws (A).

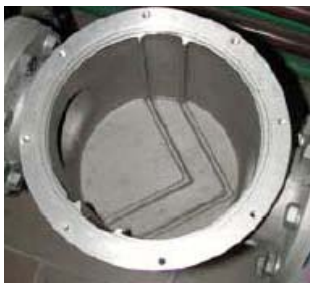
A



B



C

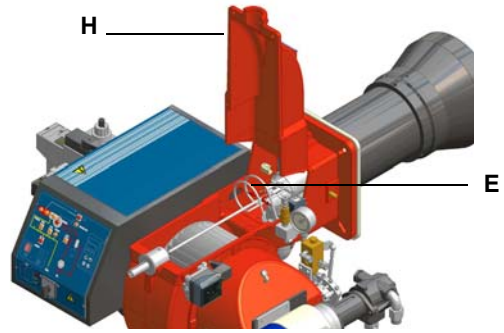


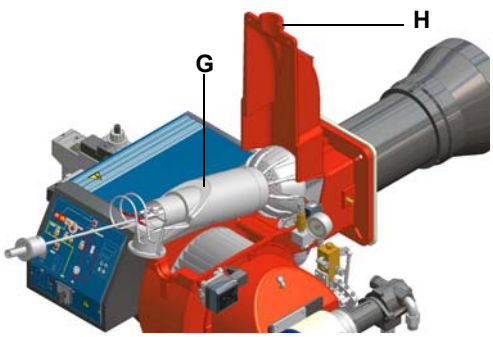
Removing the combustion head

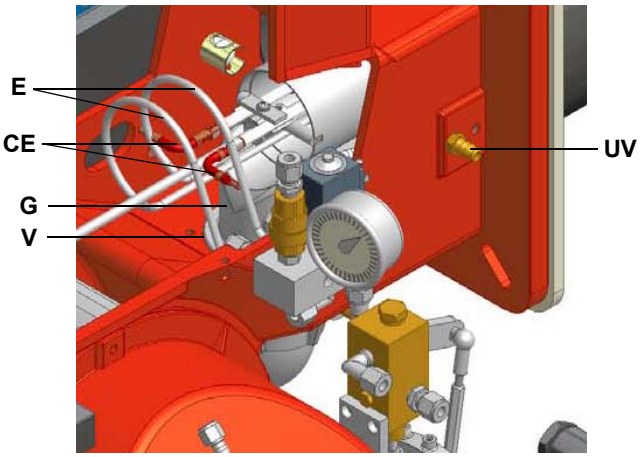
1 Remove the top **H**.
2 Disconnect the electrode cables **CE**.
3 Remove the **UV** detector out of its housing: disconnect electrode cables and the light oil flexible hoses.
4 Unscrew screws **S that fasten VR group:** unscrew **VR** until the threaded rod is free.
5 Loosen the screws **V** holding the gas manifold **G**, loosen the two connectors **E** and remove the assembly as shown.

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

6 Clean the combustion head by means of a vacuum cleaner; scrape off the scale by means of a metallic brush.







Cleaning/replacing the electrodes

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

To clean/replace the electrodes, proceed as follows:

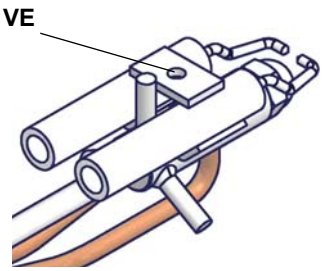
1 remove the combustion head as described in the previous paragraph;

2 remove the electrodes ass.y and clean them;

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

.





Adjusting the electrodes position

⚠	**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 adjust the electrodes position with respect to the combustion head, slacken the screw **VE** and move the oil lance as necessary. At the end of settings check the electrodes position and tighten the screw **VE**.

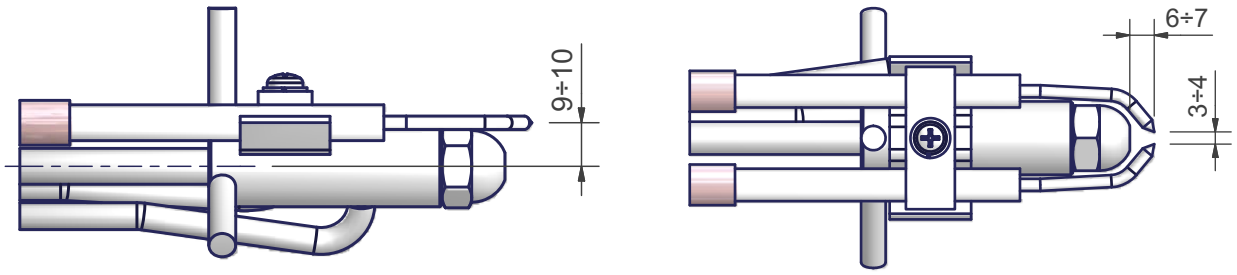


Fig. 40

Check the detection current

To check the ionization current follow the diagram in Fig. 41. If the current intensity is not in the recommended range, check contacts, if the combustion head is dirty and the UV detector position, replace it if necessary.

Control box	Minimum detection signal
Siemens LME21-22	200 µA

Photocell connector



Fig. 41

Seasonal stop

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

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

Burner disposal

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

TROUBLESHOOTING

FAULTS / CAUSES	BURNER DOESN'T START	CONTINUES PRE-PURGE PHASE	DOESN'T START AND GOES TO LOCKOUT	DOESN'T START AND REPEATS CYCLE	STARTS AND REPEATS CYCLE	DOESN'T SWITCH TO HIGH FLAME	LOCKOUT DURING OPERATION	SHUTS OFF AND REPEATS CYCLE DURING OPERATION	NOISY FUEL PUMP
MAIN SWITCH OPEN	●								
LINE FUSES BROKEN	●								
LACK OF GAS	●								
GAS PRESSURE SWITCH DEFECTIVE	●								
MAX. THERMOSTAT DEFECTIVE	●								
FAN THERMAL CUTOUT INTERVENTION	●								
AUXILIARIES FUSE INTERVENTION	●								
AIR PRESSURE SWITCH DEFECTIVE	●		●				●		
CONTROL BOX DEFECTIVE	●	●	●				●		
SERVOCONTROL DEFECTIVE		●							
AIR PRESSURE SWITCH UNCALIBRATED OR FAULTY							●		
GAS PRESSURE SWITCH UNCALIBRATED			●	●	●			●	
IGNITION TRANSFORMER DEFECTIVE			●						
ELECTRODES BAD POSITION			●						
GAS BUTTERFLY UNCALIBRATED			●						
GAS GOVERNOR DEFECTIVE				●	●			●	
HI-LO FLAME THERMOSTAT DEFECTIVE						●			
SERVOCONTROL CAM UNCALIBRATED						●			
UV DETECTOR BAD POSITION							●		
DIRTY FUEL FILTERS									●

WIRING DIAGRAMS

Complete key

AGQx.1A27	Auxiliary device for UV probe
BP	Light oil pump contactor coil
BV	Fan motor contactor coil
CM	Operation selector 0) Off - 1) Gas - 2) Light oil
CMF	Manual operation selector 0) Stop - 1) High flame - 2) Low flame - 3) Automatic
CP	Contacts on pump motor contactor
CR1	Contacts on auxiliary relais
CTP	Contacts on pump motor thermal cutout
CTV	Contacts on fan motor thermal cutout
CV	Contacts on fan motor contactor
EV1	Gas solenoid valve, network side (or valves group)
EV2	Gas solenoid valve, burner side (or valves group)
EVG1	Light oil solenoid valve 1st stage
EVG2	Light oil solenoid valve 2nd stageF÷F4Fuses
FC	UV probe
IM	Fan motor switch
IL	Auxiliary line switch
L	Phase
LAF	High flame operation signaling lamp
LB	Burner lockout signalling lamp
LBF	Low flame operation signaling lamp
LEV1	EV1’s opening signaling lamp
LEV2	EV2’s opening signaling lamp
LEVG1	EVG1’s opening signaling lamp
LEVG2	EVG2’s opening signaling lamp
LGB/LMG/LME22.33	SIEMENS control box
LPG	Low gas pressure in the network signaling lamp
LS	Burner in stop position (STAND-BY) signaling lamp
LSPG	Gas valves leakage signaling lamp
LT	Intervention of thermal cutout signaling lamp
LTA	Ignition transformer in operation signaling lamp
MA	Burner power supply terminal board
MC	Burner components terminal board
MP	Pump motor
MV	Fan motor
N	Neutral
PA	Air pressure switch
PGMAX	Maximum gas pressure switch (optional, if provided remove the connection between terminals 156 e 158 in terminal board MC)
PGMIN	Minimum gas pressure switch
PS	Reset pushbutton for LGB/LMG/LME
Pt100	Connection for Pt100
R1	Auxiliary relay
SQN72/STA	Actuator for air damper,
ST	Series of thermostats or pressure switches
TA	Ignition transformer
TP	Pump motor thermal cutout
TV	Fan motor thermal cutout
VPS504	DUNGS Leakage control device (optional, if provided remove the connection between 177 and 178 on terminal board MC)

ATTENTION:

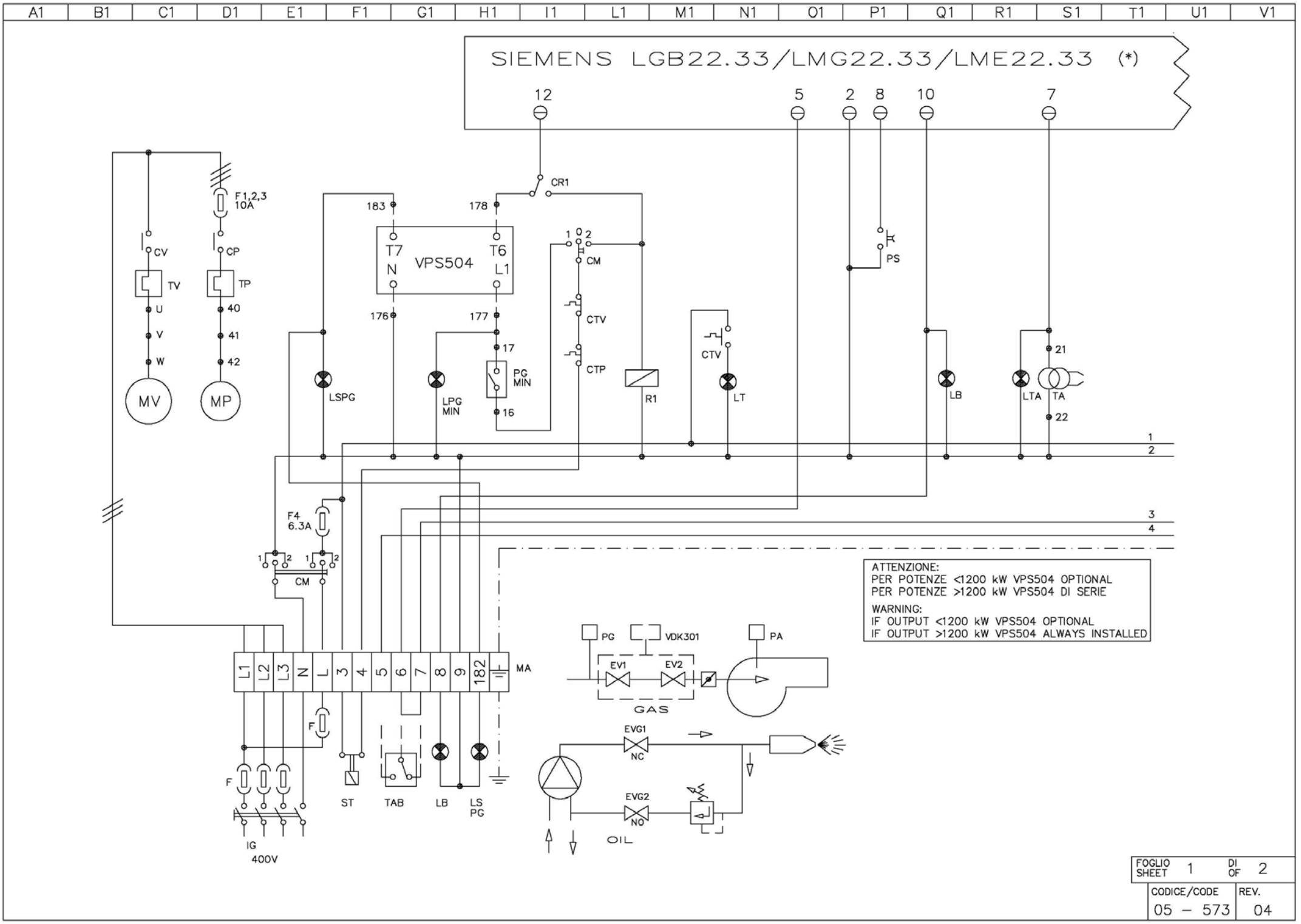
1 - Electrical supply 400V 50Hz 3 N a.c.

2 - Don’t reverse phase with neutral

3 - Ensure to the burner a proper hearthing

Wiring diagram Cod. 05-573.

Electrical wiring diagram Cod. 18-119 -Burners provided with printed circuit


A1 B1 C1 D1 E1 F1 G1 H1 I1 L1 M1 N1 O1 P1 Q1 R1 S1 T1 U1 V1
SIEMENS LGB22.33/LMG22.33/LME22.33 (*)
12 5 2 8 10 7
CR1
183 178
T7 N VPS504 T6 L1
176 177
CM
CTV
CTP
PS
F1,2,3 10A
CV CP
TV TP
U V W
40 41 42
MV MP
LSPG
LPG MIN
PG MIN
17 16
R1
CTV
LT
LB
LTA TA
21 22
1 2
3 4
F4 6.3A
CM
ATTENZIONE:
PER POTENZE <1200 kW VPS504 OPTIONAL
PER POTENZE >1200 kW VPS504 DI SERIE
WARNING:
IF OUTPUT <1200 kW VPS504 OPTIONAL
IF OUTPUT >1200 kW VPS504 ALWAYS INSTALLED
L1 L2 L3 N L 3 4 5 6 7 8 9 182 MA
F
F
IG
400V
ST
TAB
LB
LS PG
PG
VDK301
PA
EV1 EV2
GAS
EVG1
NC
EVG2
NO
OIL
FOGLIO SHEET 1 DI OF 2
CODICE/CODE 05 – 573
REV. 04

L E G E N D A cod. 05-573 REV.4

AGQx.1A27	Apparecchio ausiliario per sonda UV
BV	Bobina contattore motore ventilatore
BP	Bobina contattore motore pompa
CM	Commutatore di funzionamento 0) spento 1) gas 2) gasolio
CP	Contatti contattore pompa
CR1	Contatti relè ausiliari
CTP	Contatti termico motore pompa
CTV	Conttatti termico motore ventilatore
CV	Contatti contattore motore ventilatore
EV1	Elettrovalvola gas lato rete (o gruppo valvole)
EV2	Elettrovalvola gas lato bruciatore (o gruppo valvole)
EVG1	Elettrovalvola gasolio I° stadio
EVG2	Elettrovalvola gasolio II° stage
F÷F4	Fusibili
FC	Sonda UV
IG	Interruttore generale
L	Fase
LAF	Lampada segnalazione bruciatore in alta fiamma
LB	Lampada segnalazione blocco bruciatore
LBF	Lampada segnalazione bruciatore in bassa fiamma
LEV1	Lampada segnalazione apertura elettrovalvola EV1
LEV2	Lampada segnalazione apertura elettrovalvola EV2
LEVG1	Lampada segnalazione apertura elettrovalvola gasolio EVG1
LEVG2	Lampada segnalazione apertura elettrovalvola gasolio EVG2
LGB/LMG/LME22.33	Apparecchiatura SIEMENS controllo fiamma
LPG	Lampada segnalazione bassa pressione gas in rete
LSPG	Lampada segnalazione perdite valvole gas
LT	Lampada segnalazione termico motore ventilatore
LTA	Lampada segnalazione trasformatore di accensione
MA	Morsettiera di alimentazione bruciatore
MC	Morsettiera di collegamento componenti bruciatore
MP	Motore pompa
MV	Motore ventilatore
N	Neutro
PA	Pressostato aria comburente
PGMAX	Pressostato gas di massima (optional se previsto togliere il ponte tra i morsetti 156 e 158 nella morsettiera MC)
PGMIN	Pressostato gas di minima pressione
PS	Pulsante di sblocco LGB..
R1	Relè ausiliario
TAB	Termostato alta/bassa fiamma (dove previsto togliere il ponte tra i morsetti 6 e 7 nella morsettiera MA)
SQN30/STA6B	Servocomando SIEMENS o BERGER serranda aria
ST	Serie termostati o pressostati
TA	Trasformatore di accensione
TP	Termico motore pompa
TV	Termico motore ventilatore
VPS504	Apparecchiatura DUNGS controllo perdita valvole (optional se previsto togliere il ponte tra i morsetti 177 e 178 nella morsettiera MC)

CAMME SERVOCOMANDO

SIEMENS	BERGER	
SQN30.151	STA6B3.41	
I	ST2	Alta fiamma
II	ST0	Accensione
III	ST1	Bassa fiamma
V	MV	Apertura elettrovalvola EVG2

ATTENZIONE :
1 - Alimentazione e 400V 50Hz 3N a.c.
2 - Non invertire fasneutro
3 - Assicurare una buona messa a terra del bruciatore

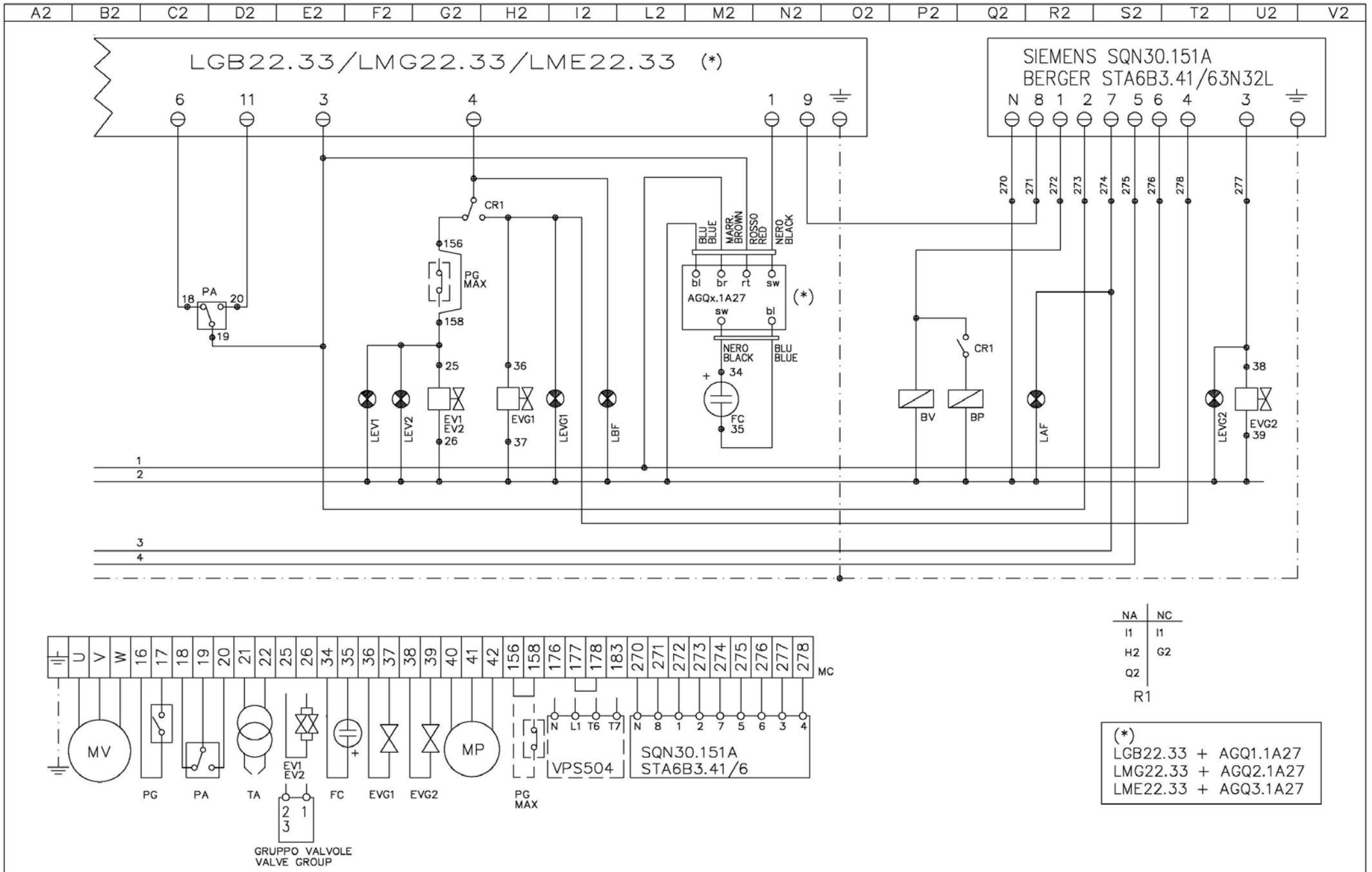
KEY cod. 05-573 REV. 4

AGQx.1A27	Auxiliary unit for UV probe
BP	Pump motor remote contactor coil
BV	Fan motor remote contactor coil
CM	Manual operation switch 0) off 1) gas 2) light oil
CP	Pump motor contactor
CR1	Relay contacts
CTP	Pump motor overload contacts
CTV	Fan motor overload contacts
CV	Fan motor contactor
EV1	Gas electro-valve upstream (or valve group)
EV2	Gas electro-valve downstream (or valve group)
EVG1	Light oil electro-valve I° stage
EVG2	Light oil electro-valve II° stage
F÷F4	Fuses
FC	UV flame detector
IG	Main switch
L	Phase
LAF	Burner in high flame indicator light
LB	Burner lockout indicator light
LBF	Burner in low flame indicator light
LEV1	Indicator light for opening of electro-valve EV1
LEV2	Indicator light for opening of electro-valve EV2
LEVG1	Indicator light for opening of electro-valve EVG1
LEVG2	Indicator light for opening of electro-valve EVG2
LGB/LMG/LME22.33	SIEMENS flame monitor device
LPG	Indicator light for presence of gas in the network
LSPG	Indicator light for leakage of valves
LT	Indicator light for fan overload tripped
LTA	Ignition transformer indicator light
MA	Supply terminal block
MC	Terminal block for connection of burner components
MP	Pump motor
MV	Fan motor
N	Neutral
PA	Combustion air pressure switch
PGMAX	High gas pressure switch (where supplied, remove the bridge between terminals 156 and 158 in terminal block MC)
PGMIN	Low gas pressure switch
PS	Lockout reset button LGB..
R1	Auxiliary relay
TAB	High/low thermostat (where supplied, remove the bridge between terminal 6 and 7 in terminal block MA)
SQN30/STA6B	Servo control SIEMENS or BERGER air damper
ST	Series thermostats or pressure switches
TA	Ignition transformer
TP	Pump motor thermal
TV	Fan motor thermal
VPS504	DUNGS valve leakage monitor device (where supplied, remove the bridge between terminals 177 and 178 in terminal block MC)

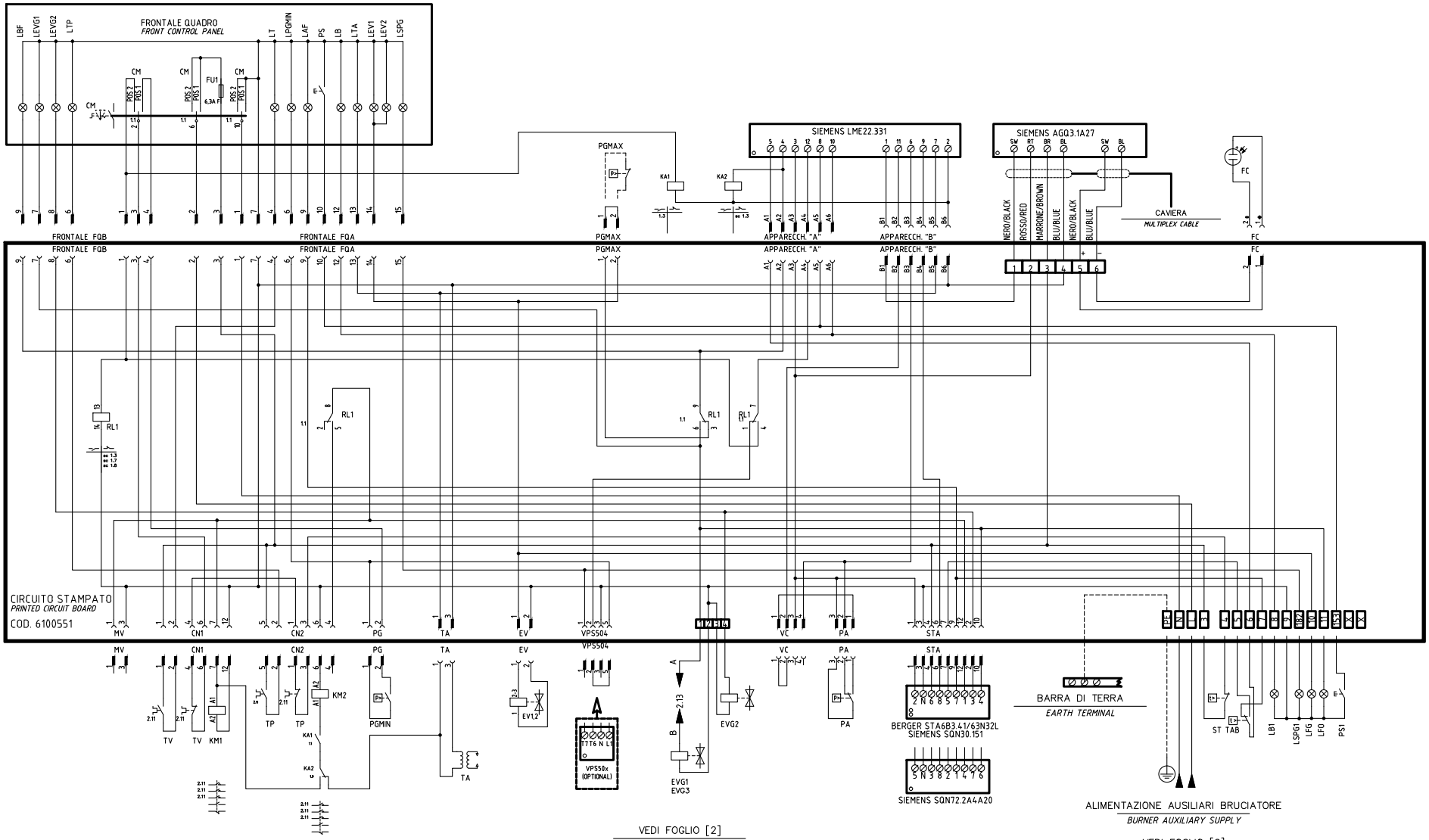
SERVO CONTROL CAMS

SIEMENS		BERGER	
SQN30.151		STA6B3.41	
I	-	ST2	High flame
II	-	ST0	Start-up
III	-	ST1	Low flame
V	-	MV	Open EVG2

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



FOGLIO SHEET	2	DI OF	2
CODICE/CODE	05 – 573	REV.	04



CAMME SERVOCOMANDO
ACTUATOR CAMS
STA6B3.41/63N32L

ST2	ALTA FIAMMA *HIGH FLAME*
ST0	SOSTA *STAND-BY*
ST1	BASSA FIAMMA *LOW FLAME*
MV	APERTURA EVG2 *OPEN EVG2*

CAMME SERVOCOMANDO (ALTERNATIVO)
ACTUATOR CAMS (ALTERNATIVE)
SQN30.151

I	ALTA FIAMMA *HIGH FLAME*
II	SOSTA *STAND-BY*
III	BASSA FIAMMA *LOW FLAME*
V	APERTURA EVG2 *OPEN EVG2*

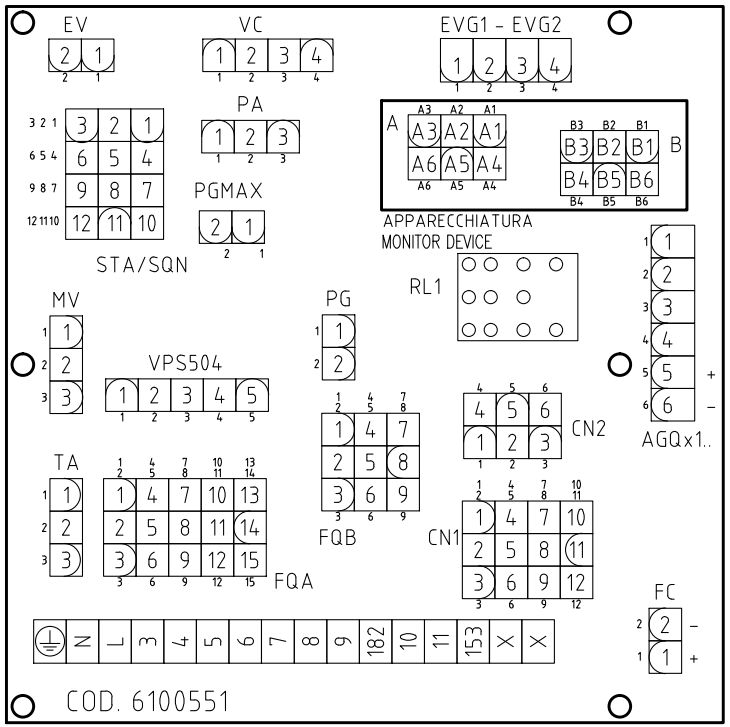
CAMME SERVOCOMANDO (ALTERNATIVO)
ACTUATOR CAMS (ALTERNATIVE)
SQN72.2A4A20

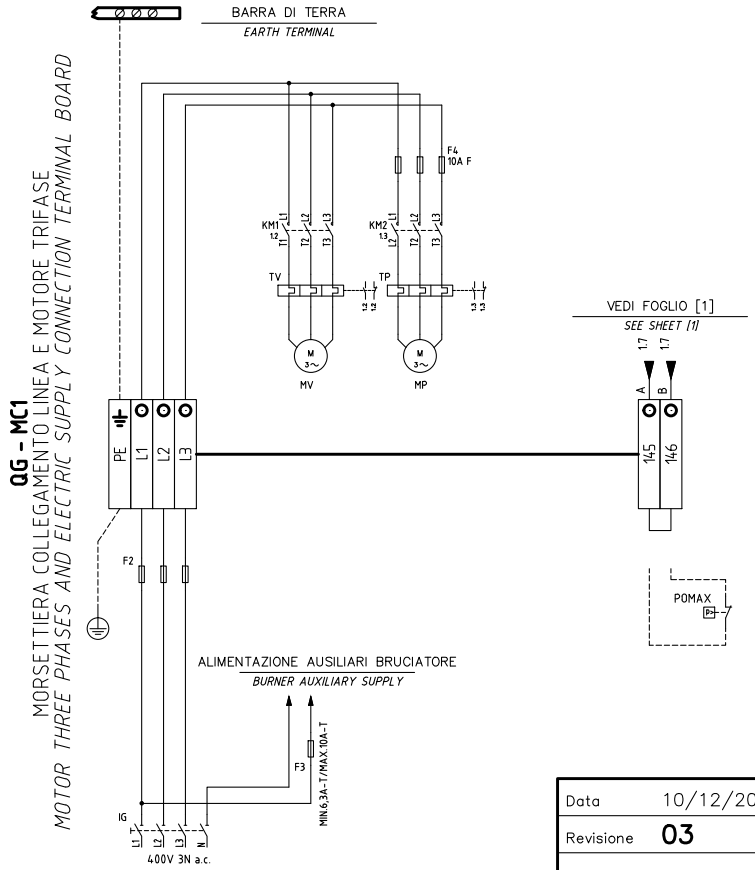
I (ROSSO) *I (RED)*	ALTA FIAMMA *HIGH FLAME*
II (BLU) *II (BLUE)*	SOSTA *STAND-BY*
III (ARANCIO) *III (ORANGE)*	BASSA FIAMMA *LOW FLAME*
IV (NERO) *IV (BLACK)*	APERTURA EVG2 *OPEN EVG2*

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

SIGLA/ITEM	FUNZIONE	FUNCTION
BERGER STA6B3.41/63N32L	SERVOCOMANDO SERRANDA ARIA	AIR DAMPER ACTUATOR
CM	SELETTORE MANUALE COMBUSTIBILE 1) GAS 0) OFF 2) GASOLIO	COMBUSTIBLE SELECTOR 1)GAS 0)OFF 2)LIGHT OIL
EV1,2	ELETTROVALVOLE GAS (O GRUPPO VALVOLE)	GAS ELECTRO-VALVES (OR VALVES GROUP)
EVG1	ELETTROVALVOLE GASOLIO	LIGHT OIL ELECTRO VALVE
EVG2	ELETTROVALVOLA GASOLIO	LIGHT OIL SOLENOID VALVE
F2	FUSIBILI LINEA MOTORE VENTILATORE	FAN MOTOR LINE FUSES
F3	FUSIBILE DI LINEA	LINE FUSE
F4	FUSIBILI LINEA POMPA	PUMP LINE FUSES
FC	SONDA UV RILEVAZIONE FIAMMA	UV FLAME DETECTOR
FU1	FUSIBILE DI LINEA	LINE FUSE
IG	INTERRUTTORE GENERALE	MAINS SWITCH
KA1	RELE' AUSILIARIO	AUXILIARY RELAY
KA2	RELE' AUSILIARIO	AUXILIARY RELAY
KM1	CONTATTORE MOTORE VENTILATORE	FAN MOTOR CONTACTOR
KM2	CONTATTORE MOTORE POMPA GASOLIO	LIGHT OIL PUMP MOTOR CONTACTOR
LAF	LAMPADA SEGNALAZIONE ALTA FIAMMA BRUCIATORE	BURNER IN HIGH FLAME INDICATOR LIGHT
LB	LAMPADA SEGNALAZIONE BLOCCO BRUCIATORE	INDICATOR LIGHT FOR BURNER LOCK-OUT
LB1	LAMPADA SEGNALAZIONE BLOCCO BRUCIATORE	INDICATOR LIGHT FOR BURNER LOCK-OUT
LBF	LAMPADA SEGNALAZIONE BASSA FIAMMA BRUCIATORE	BURNER IN LOW FLAME INDICATOR LIGHT
LEV1	LAMPADA SEGNALAZIONE APERTURA [EV1]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EV1]
LEV2	LAMPADA SEGNALAZIONE APERTURA [EV2]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EV2]
LEVG1	LAMPADA SEGNALAZIONE APERTURA [EVG1]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVG1]
LEVG2	LAMPADA SEGNALAZIONE APERTURA [EVG2]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVG2]
LFG	LAMPADA SEGNALAZIONE FUNZIONAMENTO BRUCIATORE A GAS	BURNER GAS OPERATION INDICATOR LIGHT
LFO	LAMPADA SEGNALAZIONE FUNZIONAMENTO BRUCIATORE A GASOLIO	BURNER LIGHT OIL OPERATION INDICATOR LIGHT

SIGLA/ITEM	FUNZIONE	FUNCTION
LPGMIN	LAMPADA SEGNALAZIONE PRESENZA GAS IN RETE	INDICATOR LIGHT FOR PRESENCE OF GAS IN THE NETWORK
LSPG	LAMPADA SEGNALAZIONE BLOCCO CONTROLLO TENUTA VALVOLE	INDICATOR LIGHT FOR LEAKAGE OF VALVES
LSPG1	LAMPADA SEGNALAZIONE BLOCCO CONTROLLO TENUTA VALVOLE	INDICATOR LIGHT FOR LEAKAGE OF VALVES
LT	LAMPADA SEGNALAZIONE BLOCCO TERMICO MOTORE VENTILATORE	INDICATOR LIGHT FOR FAN MOTOR OVERLOAD THERMAL CUTOUT
LTA	LAMPADA SEGNALAZIONE TRASFORMATORE DI ACCENSIONE	IGNITION TRANSFORMER INDICATOR LIGHT
LTP	LAMPADA SEGNALAZIONE BLOCCO TERMICO MOTORE POMPA	INDICATOR LIGHT FOR PUMP MOTOR OVERLOAD THERMAL CUTOUT
MP	MOTORE POMPA GASOLIO	LIGHT OIL PUMP MOTOR
MV	MOTORE VENTILATORE	FAN MOTOR
PA	PRESSOSTATO ARIA	AIR PRESSURE SWITCH
PGMAX	PRESSOSTATO GAS DI MASSIMA PRESSIONE (OPTIONAL)	MAXIMUM PRESSURE GAS SWITCH (OPTIONAL)
PGMIN	PRESSOSTATO GAS DI MINIMA PRESSIONE	MINIMUM GAS PRESSURE SWITCH
POMAX	PRESSOSTATO DI MASSIMA PRESSIONE OLIO (OPTIONAL)	MAXIMUM OIL PRESSURE SWITCH (OTIONAL)
PS	PULSANTE SBLOCCO FIAMMA	LOCK-OUT RESET BUTTON
PS1	PULSANTE SBLOCCO FIAMMA	LOCK-OUT RESET BUTTON
RL1	RELE' AUSILIARIO	AUXILIARY RELAY
SIEMENS AGQ3.1A27	ADATTATORE PER SONDA UV RILEVAZIONE FIAMMA	ADAPTER FOR UV FLAME DETECTOR
SIEMENS LME22.331	APPARECCHIATURA CONTROLLO FIAMMA	CONTROL BOX
SIEMENS SQN30.151	SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO)	AIR DAMPER ACTUATOR (ALTERNATIVE)
SIEMENS SQN72.2A4A20	SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO)	AIR DAMPER ACTUATOR (ALTERNATIVE)
ST	SERIE TERMOSTATI/PRESSOSTATI	SERIES OF THERMOSTATS OR PRESSURE SWITCHES
TA	TRASFORMATORE DI ACCENSIONE	IGNITION TRANSFORMER
TAB	TERMOSTATO/PRESSOSTATO ALTA-BASSA FIAMMA	HIGH-LOW THERMOSTAT/PRESSURE SWITCHES
TP	TERMICO MOTORE POMPA GASOLIO	LIGHT OIL PUMP MOTOR THERMAL
TV	TERMICO MOTORE VENTILATORE	FAN MOTOR THERMAL
VPS50x	CONTROLLO DI TENUTA VALVOLE GAS (OPTIONAL)	GAS PROVING SYSTEM (OPTIONAL)





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APPENDIX

SIEMENS LME11/21/22 CONTROL BOX

The series of equipment LME.. is used for the starup and supervisione 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) aremixed 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 **yellow LED** **green LED** LED	..... Steady on ❍... 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

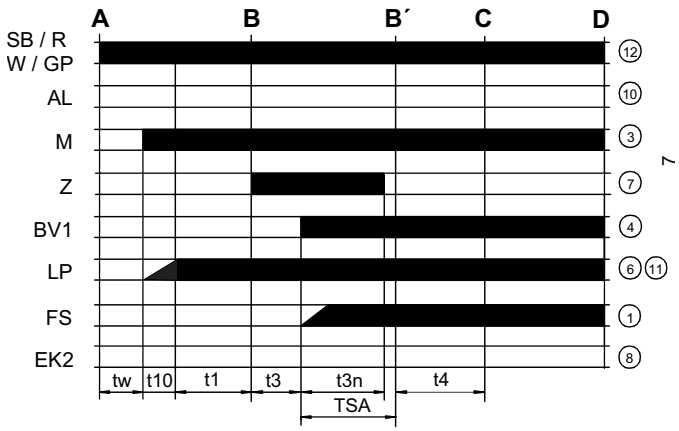
C Burner operation position

C - D Burner operation (heat production)

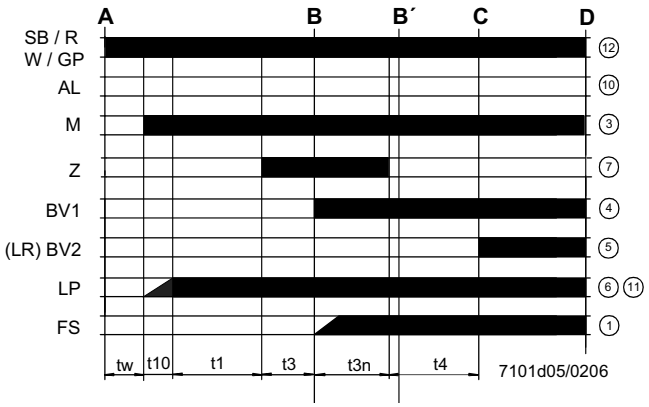
D Controlled by "R" shutdown

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

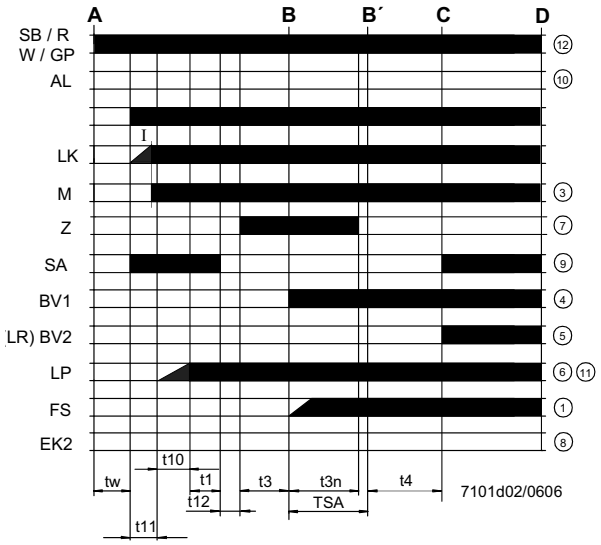
LME11 control sequence



LME21 control sequence



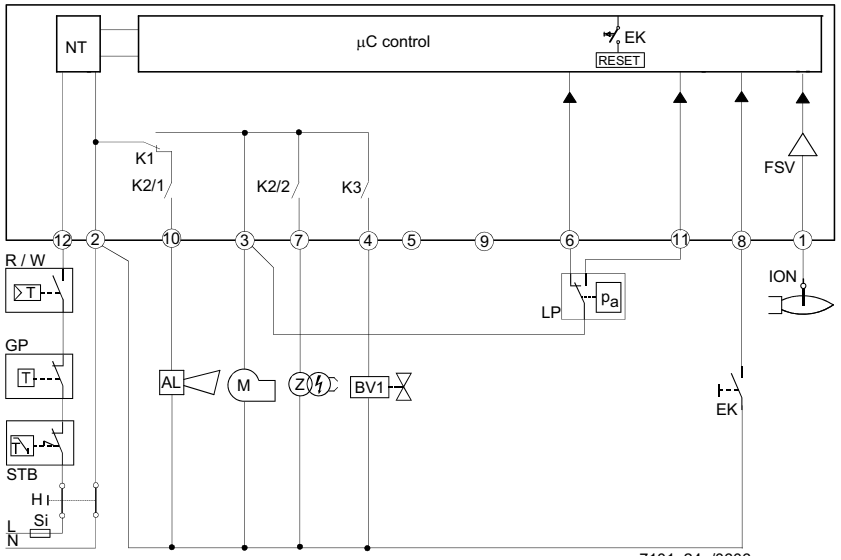
LME22 control sequence



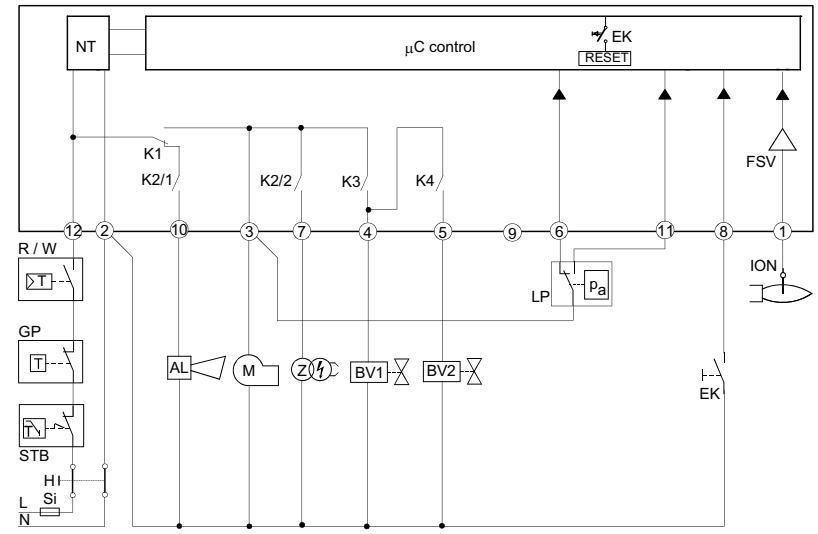
Control sequence

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

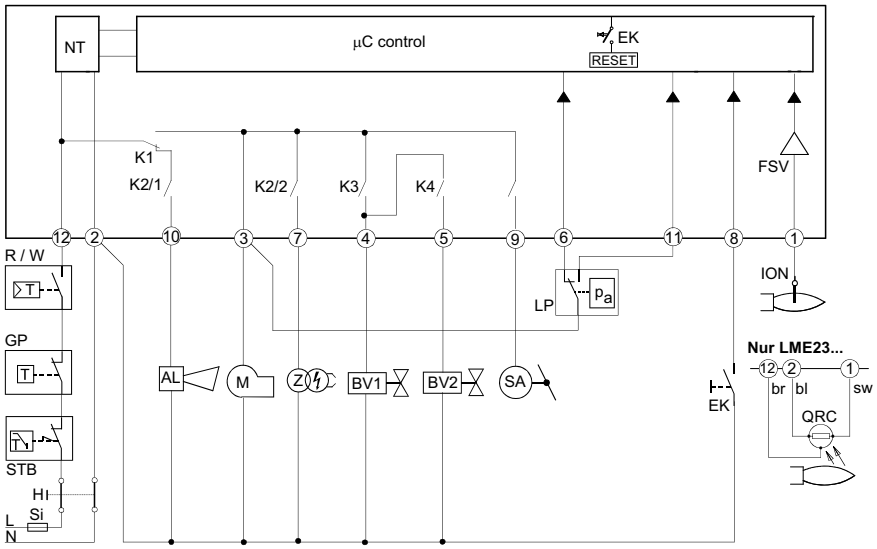
LME11 connection diagram



LME21 connection diagram



LME22 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

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 thresold, a safety shutdown is performed.
- If the operating voltage exceeds the undervoltage thresold, 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.
- IIf 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 mantained in the case fo mains failure.

DIAGNOSITICS OF THE CASUE 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 signsl 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 buttonaccording 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 adjustement 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 - LPis 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 adjustement 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 ouput 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.

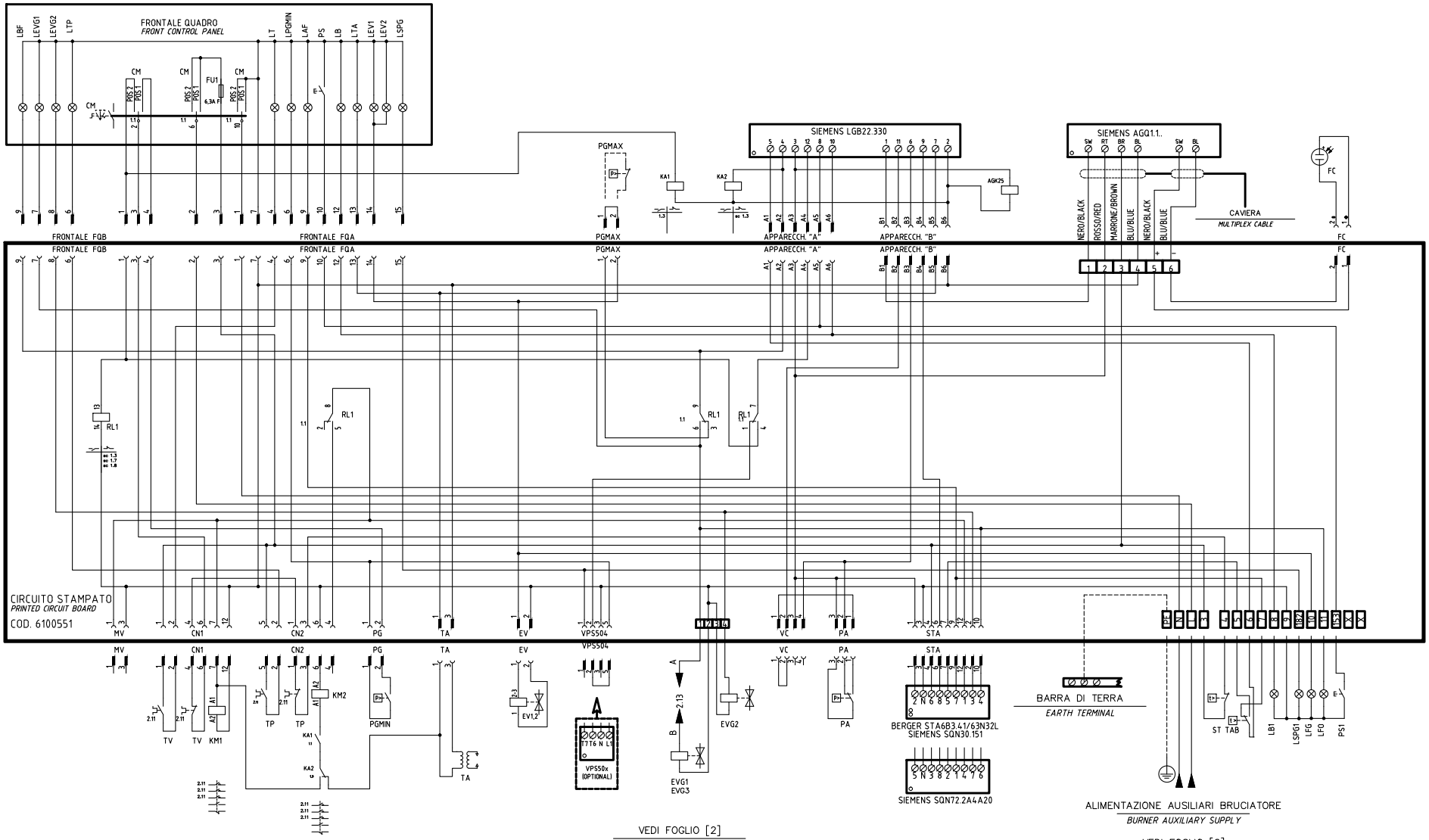
⚠ **Condensation, formation of ice and ingress of water are not permitted!**

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

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

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



CAMME SERVOCOMANDO
ACTUATOR CAMS
STA6B3.41/63N32L

ST2	ALTA FIAMMA *HIGH FLAME*
ST0	SOSTA *STAND-BY*
ST1	BASSA FIAMMA *LOW FLAME*
MV	APERTURA EVG2 *OPEN EVG2*

CAMME SERVOCOMANDO (ALTERNATIVO)
ACTUATOR CAMS (ALTERNATIVE)
SQN30.151

I	ALTA FIAMMA *HIGH FLAME*
II	SOSTA *STAND-BY*
III	BASSA FIAMMA *LOW FLAME*
V	APERTURA EVG2 *OPEN EVG2*

CAMME SERVOCOMANDO (ALTERNATIVO)
ACTUATOR CAMS (ALTERNATIVE)
SQN72.2A4A20

I (ROSSO) *I (RED)*	ALTA FIAMMA *HIGH FLAME*
II (BLU) *II (BLUE)*	SOSTA *STAND-BY*
III (ARANCIO) *III (ORANGE)*	BASSA FIAMMA *LOW FLAME*
IV (NERO) *IV (BLACK)*	APERTURA EVG2 *OPEN EVG2*

REV.	MODIFICA	DATA	FIRME
03	ADDED "POMAX" + "MP" & "TA"	23/04/12	U. PINTON
02	AGGIUNTO/ADDED SQN72...	22/05/09	U. PINTON
01	ADDED EARTH TERMINAL	10/12/07	U. PINTON

UNIGAS

Impianto
TIPI/TYPES HP60 ÷ HP73A
MODELLO/MODEL xG-.AB.x.xx.A.x.xx

Descrizione
VERSIONE CON CIRCUITO STAMPATO
WITH PRINTED CIRCUIT VERSION

Ordine

Commessa

Esecutore
U. PINTON

Data Controllato
23/04/2012

Controllato
S. MARCHETTI

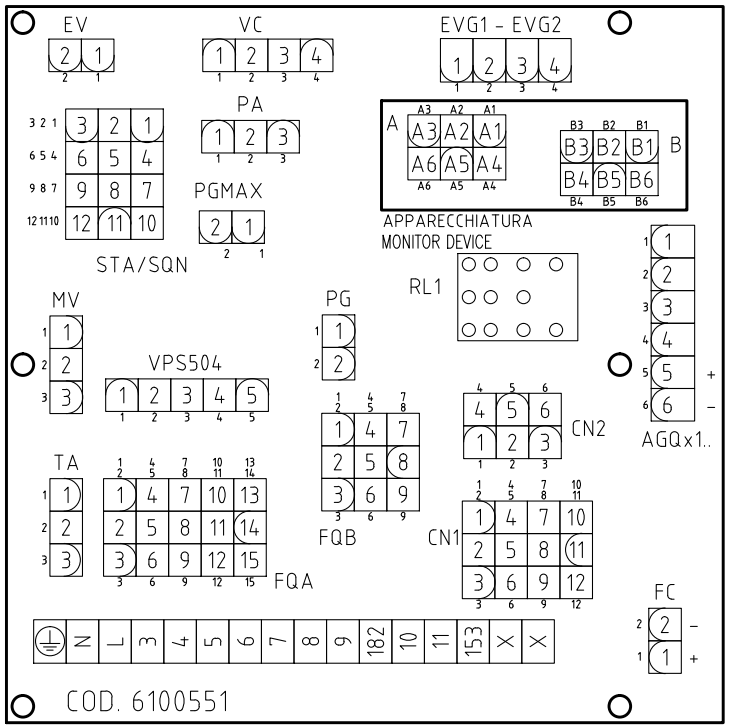
Data 10/12/2007
Revisione 03
Dis. N. 18 - 119 / A

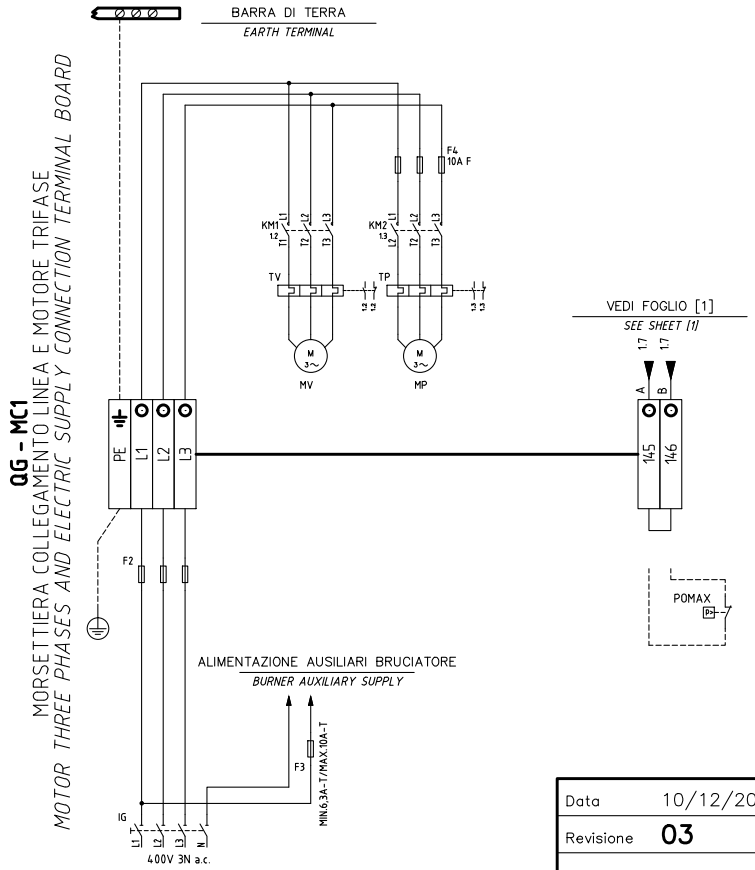
PREC.	FOGLIO
/	1
SEGUE	TOTALE
2	2

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

SIGLA/ITEM	FUNZIONE	FUNCTION
AGK25	RESISTENZA SIMULAZIONE CARICO MOTORE VENTILATORE	RESISTANCE FOR FAN MOTOR LOAD SIMULATION
BERGER STA6B3.41/63N32L	SERVOCOMANDO SERRANDA ARIA	AIR DAMPER ACTUATOR
CM	SELETTORE MANUALE COMBUSTIBILE 1) GAS 0) OFF 2) GASOLIO	COMBUSTIBLE SELECTOR 1)GAS 0)OFF 2)LIGHT OIL
EV1,2	ELETTROVALVOLE GAS (0 GRUPPO VALVOLE)	GAS ELECTRO-VALVES (OR VALVES GROUP)
EVG1	ELETTROVALVOLE GASOLIO	LIGHT OIL ELECTRO VALVE
EVG2	ELETTROVALVOLA GASOLIO	LIGHT OIL SOLENOID VALVE
F2	FUSIBILI LINEA MOTORE VENTILATORE	FAN MOTOR LINE FUSES
F3	FUSIBILE DI LINEA	LINE FUSE
F4	FUSIBILI LINEA POMPA	PUMP LINE FUSES
FC	SONDA UV RILEVAZIONE FIAMMA	UV FLAME DETECTOR
FU1	FUSIBILE DI LINEA	LINE FUSE
IG	INTERRUTTORE GENERALE	MAINS SWITCH
KA1	RELE' AUSILIARIO	AUXILIARY RELAY
KA2	RELE' AUSILIARIO	AUXILIARY RELAY
KM1	CONTATTORE MOTORE VENTILATORE	FAN MOTOR CONTACTOR
KM2	CONTATTORE MOTORE POMPA GASOLIO	LIGHT OIL PUMP MOTOR CONTACTOR
LAF	LAMPADA SEGNALAZIONE ALTA FIAMMA BRUCIATORE	BURNER IN HIGH FLAME INDICATOR LIGHT
LB	LAMPADA SEGNALAZIONE BLOCCO BRUCIATORE	INDICATOR LIGHT FOR BURNER LOCK-OUT
LB1	LAMPADA SEGNALAZIONE BLOCCO BRUCIATORE	INDICATOR LIGHT FOR BURNER LOCK-OUT
LBF	LAMPADA SEGNALAZIONE BASSA FIAMMA BRUCIATORE	BURNER IN LOW FLAME INDICATOR LIGHT
LEV1	LAMPADA SEGNALAZIONE APERTURA [EV1]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EV1]
LEV2	LAMPADA SEGNALAZIONE APERTURA [EV2]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EV2]
LEVG1	LAMPADA SEGNALAZIONE APERTURA [EVG1]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVG1]
LEVG2	LAMPADA SEGNALAZIONE APERTURA [EVG2]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVG2]
LFG	LAMPADA SEGNALAZIONE FUNZIONAMENTO BRUCIATORE A GAS	BURNER GAS OPERATION INDICATOR LIGHT
LFO	LAMPADA SEGNALAZIONE FUNZIONAMENTO BRUCIATORE A GASOLIO	BURNER LIGHT OIL OPERATION INDICATOR LIGHT

SIGLA/ITEM	FUNZIONE	FUNCTION
LPGMIN	LAMPADA SEGNALAZIONE PRESENZA GAS IN RETE	INDICATOR LIGHT FOR PRESENCE OF GAS IN THE NETWORK
LSPG	LAMPADA SEGNALAZIONE BLOCCO CONTROLLO TENUTA VALVOLE	INDICATOR LIGHT FOR LEAKAGE OF VALVES
LSPG1	LAMPADA SEGNALAZIONE BLOCCO CONTROLLO TENUTA VALVOLE	INDICATOR LIGHT FOR LEAKAGE OF VALVES
LT	LAMPADA SEGNALAZIONE BLOCCO TERMICO MOTORE VENTILATORE	INDICATOR LIGHT FOR FAN MOTOR OVERLOAD THERMAL CUTOUT
LTA	LAMPADA SEGNALAZIONE TRASFORMATORE DI ACCENSIONE	IGNITION TRANSFORMER INDICATOR LIGHT
LTP	LAMPADA SEGNALAZIONE BLOCCO TERMICO MOTORE POMPA	INDICATOR LIGHT FOR PUMP MOTOR OVERLOAD THERMAL CUTOUT
MP	MOTORE POMPA GASOLIO	LIGHT OIL PUMP MOTOR
MV	MOTORE VENTILATORE	FAN MOTOR
PA	PRESSOSTATO ARIA	AIR PRESSURE SWITCH
PGMAX	PRESSOSTATO GAS DI MASSIMA PRESSIONE (OPTIONAL)	MAXIMUM PRESSURE GAS SWITCH (OPTIONAL)
PGMIN	PRESSOSTATO GAS DI MINIMA PRESSIONE	MINIMUM GAS PRESSURE SWITCH
POMAX	PRESSOSTATO DI MASSIMA PRESSIONE OLIO (OPTIONAL)	MAXIMUM OIL PRESSURE SWITCH (OTIONAL)
PS	PULSANTE SBLOCCO FIAMMA	LOCK-OUT RESET BUTTON
PS1	PULSANTE SBLOCCO FIAMMA	LOCK-OUT RESET BUTTON
RL1	RELE' AUSILIARIO	AUXILIARY RELAY
SIEMENS AGQ1.1A27	ADATTATORE PER SONDA UV RILEVAZIONE FIAMMA	ADAPTER FOR UV FLAME DETECTOR
SIEMENS LGB22.330	APPARECCHIATURA CONTROLLO FIAMMA	CONTROL BOX
SIEMENS SQN30.151	SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO)	AIR DAMPER ACTUATOR (ALTERNATIVE)
SIEMENS SQN72.2A4A20	SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO)	AIR DAMPER ACTUATOR (ALTERNATIVE)
ST	SERIE TERMOSTATI/PRESSOSTATI	SERIES OF THERMOSTATS OR PRESSURE SWITCHES
TA	TRASFORMATORE DI ACCENSIONE	IGNITION TRANSFORMER
TAB	TERMOSTATO/PRESSOSTATO ALTA-BASSA FIAMMA	HIGH-LOW THERMOSTAT/PRESSURE SWITCHES
TP	TERMICO MOTORE POMPA GASOLIO	LIGHT OIL PUMP MOTOR THERMAL
TV	TERMICO MOTORE VENTILATORE	FAN MOTOR THERMAL
VPS50x	CONTROLLO DI TENUTA VALVOLE GAS (OPTIONAL)	GAS PROVING SYSTEM (OPTIONAL)





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