

K590X-FGR EA
K660X-FGR EA
K750X-FGR EA

Gas burners

Microprocessor controlled
LMV2x / 3x

MANUAL OF INSTALLATION - USE - MAINTENANCE

CIB UNIGAS

BURNERS - BRUCIATORI - BRULERS - BRENNER - QUEMADORES - ГОРЕЛКИ

DANGERS, WARNINGS AND NOTES OF CAUTION

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

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

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

CAREFULLY KEEP THIS MANUAL FOR FUTURE REFERENCE.

1) GENERAL INTRODUCTION

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

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

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

Contact qualified personnel only.

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

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

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

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

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

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

2) SPECIAL INSTRUCTIONS FOR BURNERS

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

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

- a Remove the power supply by disconnecting the power cord from the mains.
- b Disconnect the fuel supply by means of the hand-operated shut-off valve and remove the control handwheels from their spindles.

Special warnings

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

3) GENERAL INSTRUCTIONS DEPENDING ON FUEL USED

3a) ELECTRICAL CONNECTION

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

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

GENERAL

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

SPECIAL INSTRUCTIONS FOR USING GAS

Have qualified personnel inspect the installation to ensure that:

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

Precautions if you can smell gas

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

DIRECTIVES AND STANDARDS

Gas burners

European directives

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

Harmonized standards

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

Light oil burners

European directives

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

Harmonized standards

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

Heavy oil burners

European Directives

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

Harmonized standards

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

Gas - Light oil burners

European Directives

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

Harmonized standards

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

Gas - Heavy oil burners

European directives:

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

Harmonized standards

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

Industrial burners

European directives

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

Harmonized standards

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

Burner data plate

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

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

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

SYMBOLS USED



WARNING!

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



DANGER!

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



WARNING!

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

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

BURNER SAFETY

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



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

Residual risks deriving from misuse and prohibitions

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



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

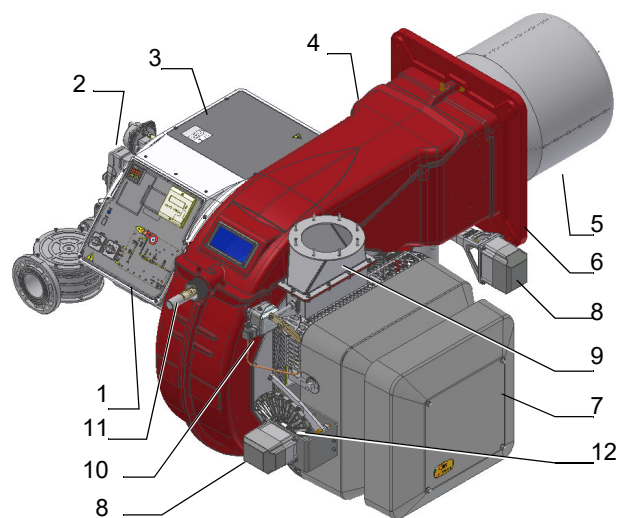
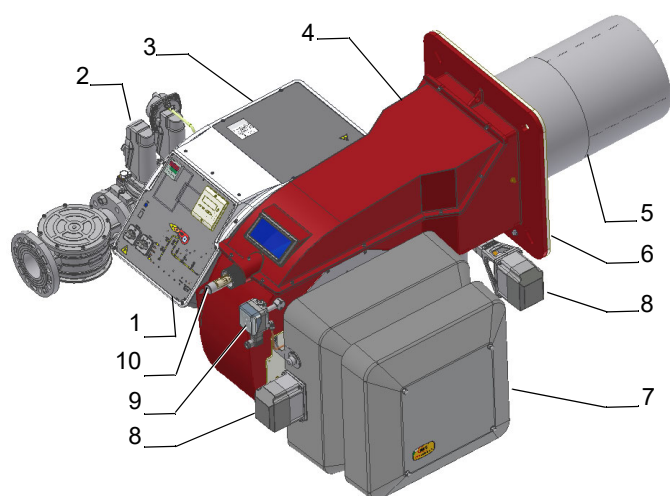


After any maintenance, it is important to restore the protection devices before restarting the machine.
All safety devices must be kept in perfect working order.
Personnel authorized to maintain the machine must always be provided with suitable protections.



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

PART I: SPECIFICATIONS



Note: the figure is indicative only

- 1 Control panel with startup switch
- 2 Gas train
- 3 Electrical panel
- 4 Cover
- 5 Blast tube + Combustion head
- 6 Flange
- 7 Silencer (Low noise air intake R)
- 8 Actuator
- 9 FGR, flue gas recirculation (only for FGR type burners)
- 10 Air pressure switch
- 11 Combustion head adjusting ring nut

Gas operation: From the supply line the gas fuel passes through the gas train (filter, safety valves, gas pressure regulator and butterfly valve). The pressure regulator sets the gas pressure within the combustion head utilization limits. Air is supplied by a fan, which may be onboard or separated depending on burner configuration, and is channeled through an air damper.

The air damper and the gas butterfly valve are actuated by servomotors according to load curves, in order to achieve the correct proportion between fuel and air flows, and to optimize flue gas parameters.

The adjustable combustion head can improve the burner performance by controlling the flame geometry and combustion efficiency.

Fuel and air are routed through separated channels inside the combustion head, then mixed to ignite the flame inside the combustion chamber. The ignition spark is provided by electrodes and a high voltage transformer (a pilot flame may also be employed, depending on burner configuration).

Pre-ventilation of the combustion chamber is usually implemented according to gas directives.

The control panel, onboard or separated, allows the operator to monitor each operating phase.

Burner model identification

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

Type	K750X-FGR EA	Model	M-	MD	SR	*	A	1	65	EA	.FGR
	(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

Burner model identification

1	BURNER TYPE	K590X-FGR EA, K660X-FGR EA, K750X-FGR EA
2	FUEL	M - Natural gas, L - LPG
3	OPERATION (Available versions)	MD - Fully modulating
4	BLAST TUBE	SR = Standard blast tube + ABS polymer (silenced) air intake LR = Extended blast tube + ABS polymer (silenced) air intake
5	DESTINATION COUNTRY	* - see data plate
6	BURNER VERSION	A - Standard Y - Special
7	EQUIPMENT	1 = 2 gas valves + gas proving system 8 = 2 gas valves + gas proving system + maximum gas pressure switch
8	GAS CONNECTION	65 = DN65 80 = DN80 100 = DN100 125 / DN125
9	MICRO-PROCESSOR CONTROL WITH FGR	EF = Medium-large burners complete with electronic cam LMV5x and temperature-compensated flue gas recirculation FGR, without O ₂ monitoring, without inverter. EA = micro-processor control, without inverter EB = micro-processor control, with inverter

FGR:Flue gas recirculation

Technical Specifications

BURNER TYPE		K590X-FGR EA (M-)	K660X-FGR EA (M-)	K750X-FGR EA (M-)	K590X-FGR EA (L-)	K660X-FGR EA (L-)	K750X-FGR EA (L-)
Output	min. - max. kW	670 - 5900	680 - 6600	860 - 7500	670 - 5900	680 - 6600	860 - 7500
Fuel		M - Natural gas			L - LPG		
Category		(see next paragraph)			I _{3B/P}		
Gas rate- Natural gas	min.- max. (Stm ³ /h)	71 - 624	72 - 698	91 - 794	-	-	-
Gas pressure	mbar	(see Note 2)			(see Note 2)		
Power supply triphase		220V/230V 3~ / 380V/400V 3N ~ 50Hz					
Auxiliary Power supply		220V/230V 2~ / 220V/230V 1N ~ 50Hz					
Gas rate- LPG	min.-max. kg/h	-	-	-	25 - 220	25 - 246	32 - 280
Total power consumption	kW	15,5			15,5		
Electric motor	kW	15,0			15,0		
Protection		IP40					
Operation		MD - Fully modulating					
Gas train 50	Valves size / Gas connection	-	-	-	50 = Rp2		
Gas train 65		65 / DN65					
Gas train 80		80 / DN80					
Gas train 100		100 / 100					
Gas train 125		125 / 125					
Operating temperature	°C	-10 ÷ +50					
Storage Temperature	°C	-20 ÷ +60					
Working service (*)		Continuous					

Note1:	All gas flow rates are referred to Stm ³ /h (1.013 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 = 500mbar (with Siemens VGD or Dungs MultiBloc MBE) Minimum gas pressure = see gas curves.
Note3:	Burners are suitable only for indoor operation with a maximum relative humidity of 80 %

Gas categories and countries of application

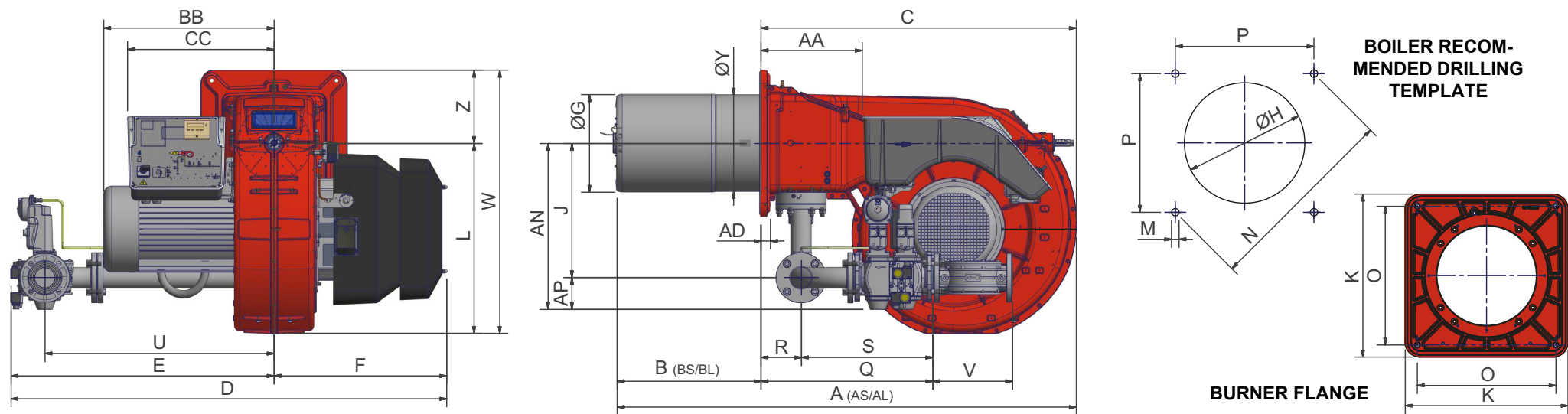
GAS CATEGORY	COUNTRY
I _{2H}	AT, ES, GR, SE, FI, IE, HU, IS, NO, CZ, DK, GB, IT, PT, CY, EE, LV, SI, MT, SK, BG, LT, RO, TR, CH
I _{2E}	LU, PL
I _{2E} (R) B	BE
I _{2EK}	NL
I _{2ELL}	DE
I _{2Er}	FR

Fuel

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

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

Overall dimensions (mm)

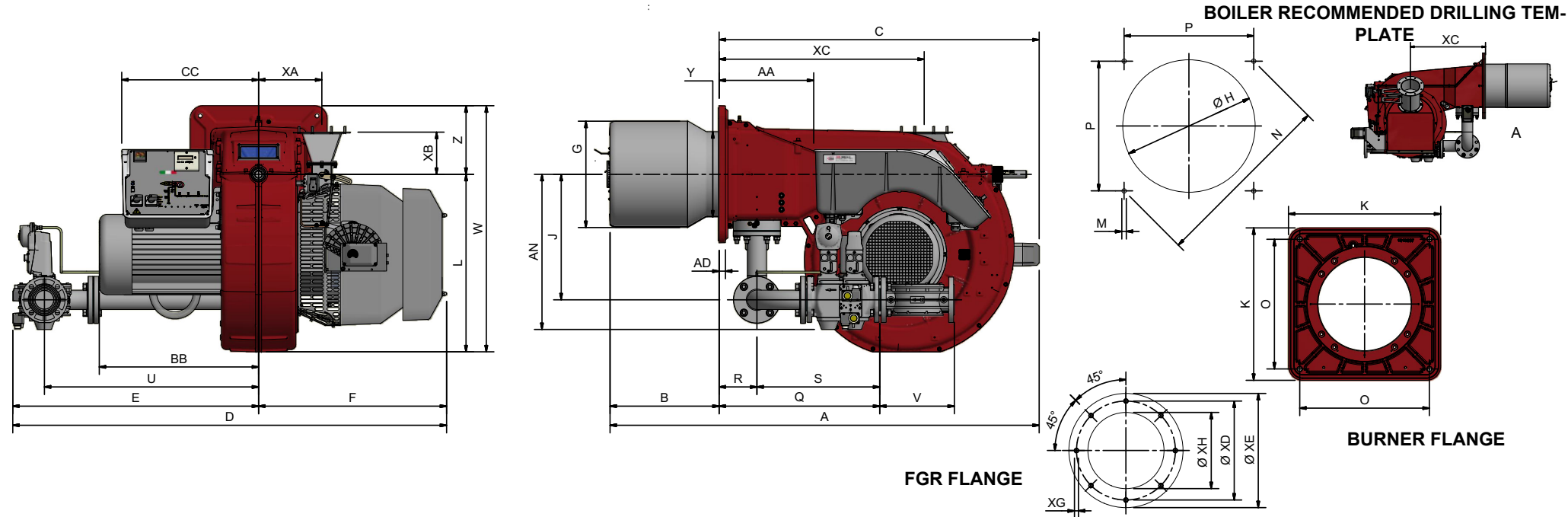


BS = standard blast tube BL = long blast tube DN = gas valves size

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

TIPO	DN	A (AS)	A (AL)	AA	AD	AN	AP	B (BS)	B (BL)	BB	C	CC	D	E	F	G	H	I	J	K	L	M	N	O min	O max	P	Q	R	S	U	V	W	Y	Z
K590X-FGR EA	50	1631	1731	366	25	595	101	430	530	626	1201	524	1672	946	726	360	400	405	494	540	690	M16	651	460	460	460	763	150	614	845	190	960	x	270
	65	1631	1731	366	25	611	117	430	530	626	1201	524	1695	969	726	360	400	405	494	540	690	M16	651	460	460	460	636	150	487	845	292	960	x	270
	80	1631	1731	366	25	626	132	430	530	626	1201	524	1728	1002	726	360	400	405	494	540	690	M16	651	460	460	460	687	150	538	875	313	960	x	270
	100	1631	1731	366	25	639	145	430	530	626	1201	524	1808	1082	726	360	400	405	494	540	690	M16	651	460	460	460	791	150	642	942	353	960	x	270
	125	1631	1731	366	25	738	175	430	530	626	1201	524	2073	1347	726	360	400	405	562	540	690	M16	651	460	460	460	904	150	754	1192	479	960	x	270
K660X-FGR EA	50	1631	1731	366	25	595	101	430	530	626	1201	524	1672	946	726	383	400	405	494	540	690	M16	651	460	460	460	763	150	614	845	190	960	336	270
	65	1631	1731	366	25	611	117	430	530	626	1201	524	1695	969	726	383	400	405	494	540	690	M16	651	460	460	460	636	150	487	845	292	960	336	270
	80	1631	1731	366	25	626	132	430	530	626	1201	524	1728	1002	726	383	400	405	494	540	690	M16	651	460	460	460	687	150	538	875	313	960	336	270
	100	1631	1731	366	25	639	145	430	530	626	1201	524	1808	1082	726	383	400	405	494	540	690	M16	651	460	460	460	791	150	642	942	353	960	336	270
	125	1631	1731	366	25	738	175	430	530	626	1201	524	2073	1347	726	383	400	405	562	540	690	M16	651	460	460	460	904	150	754	1192	479	960	336	270
K750X-FGR EA	50	1631	1731	366	25	595	101	430	530	626	1201	524	1672	946	726	419	470	421	494	540	690	M16	651	460	460	460	763	150	614	845	190	960	x	270
	65	1631	1731	366	25	611	117	430	530	626	1201	524	1695	969	726	419	470	421	494	540	690	M16	651	460	460	460	636	150	487	845	292	960	x	270
	80	1631	1731	366	25	626	132	430	530	626	1201	524	1728	1002	726	419	470	421	494	540	690	M16	651	460	460	460	687	150	538	875	313	960	x	270
	100	1631	1731	366	25	639	145	430	530	626	1201	524	1808	1082	726	419	470	421	494	540	690	M16	651	460	460	460	791	150	642	942	353	960	x	270
	125	1631	1731	366	25	738	175	430	530	626	1201	524	2073	1347	726	419	470	421	562	540	690	M16	651	460	460	460	904	150	754	1192	479	960	x	270

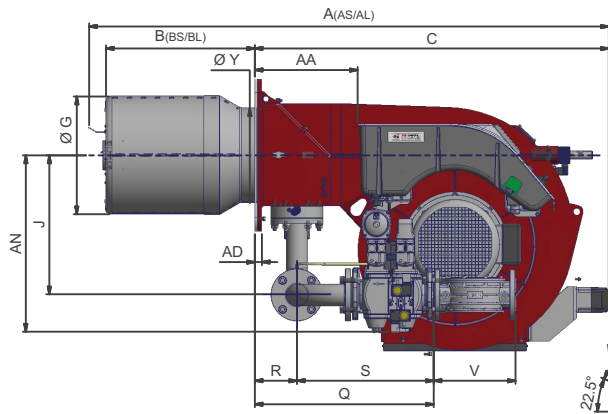
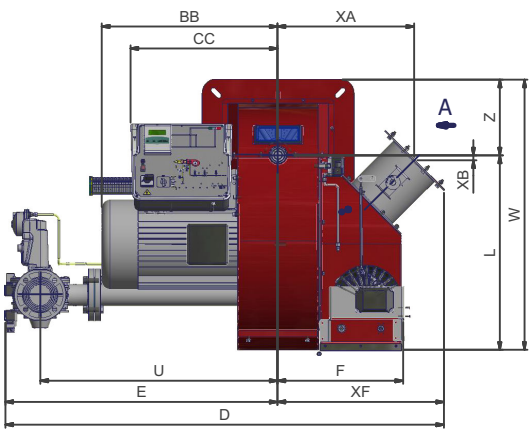
Overall dimensions (mm)m Low noise air intake (R)



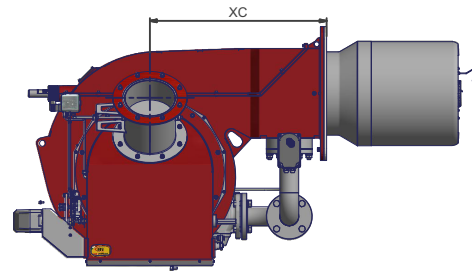
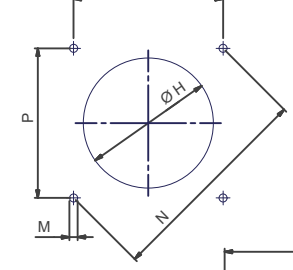
BS = standard blast tube BL = long blast tube DN = gas valves size
*DN = gas valves size
NOTE: the overall dimensions are referred to burners provided with Siemens VGD valves.

TIPO	DN	A (AS)	A (AL)	AA	AD	AN	AP	B (BS)	B (BL)	BB	C	CC	D	E	F	G	H	I	J	K	L	M	N	O min	O max	P	Q	R	S	U	V	W	Y	Z	XA	XB	XC
K590X FGR EA	65	1690	1790	366	25	611	117	430	530	626	1260	524	1831	969	862	360	400	405	494	540	690	M16	651	460	460	460	636	150	487	845	292	960	x	270	482	18	712
	85	1690	1790	366	25	626	132	430	530	626	1260	524	1864	1002	862	360	400	405	494	540	690	M16	651	460	460	460	687	150	538	875	313	960	x	270	482	18	712
	100	1690	1790	366	25	639	145	430	530	626	1260	524	1944	1082	862	360	400	405	494	540	690	M16	651	460	460	460	791	150	642	942	353	960	x	270	482	18	712
	125	1690	1790	366	25	738	175	430	530	626	1260	524	2209	1347	862	360	400	405	562	540	690	M16	651	460	460	460	904	150	754	1192	479	960	x	270	482	18	712
K680X FGR EA	65	1690	1790	366	25	611	117	430	530	626	1260	524	1831	969	862	383	400	405	494	540	690	M16	651	460	460	460	636	150	487	845	292	960	336	270	482	18	712
	85	1690	1790	366	25	626	132	430	530	626	1260	524	1864	1002	862	383	400	405	494	540	690	M16	651	460	460	460	687	150	538	875	313	960	336	270	482	18	712
	100	1690	1790	366	25	639	145	430	530	626	1260	524	1944	1082	862	383	400	405	494	540	690	M16	651	460	460	460	791	150	642	942	353	960	336	270	482	18	712
	125	1690	1790	366	25	738	175	430	530	626	1260	524	2209	1347	862	383	400	405	562	540	690	M16	651	460	460	460	904	150	754	1192	479	960	336	270	482	18	712
K750X FGR EA	65	1690	1790	366	25	611	117	430	530	626	1260	524	1831	969	862	419	470	421	494	540	690	M16	651	460	460	460	636	150	487	845	292	960	x	270	482	18	712
	80	1690	1790	366	25	626	132	430	530	626	1260	524	1864	1002	862	419	470	421	494	540	690	M16	651	460	460	460	687	150	538	875	313	960	x	270	482	18	712
	100	1690	1790	366	25	639	145	430	530	626	1260	524	1366	504	862	419	470	421	494	540	690	M16	651	460	460	460	791	150	642	942	353	960	x	270	482	18	712
	125	1690	1790	366	25	738	175	430	530	626	1260	524	2209	1347	862	419	470	421	562	540	690	M16	651	460	460	460	904	150	754	1192	479	960	x	270	482	18	712

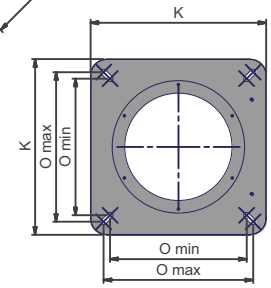
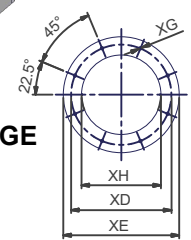
Overall dimensions (mm)m Aluminum air intake (P)



BOILER RECOMMENDED DRILLING TEMPLATE



FGR FLANGE



BURNER FLANGE

BS = standard blast tube BL = long blast tube DN = gas valves size
*DN = gas valves size
NOTE: the overall dimensions are referred to burners provided with Siemens VGD valves.

TIPO	DN	A (AS)	A (AL)	AA	AB	AC	AD	AE	AN	AP	B (BS)	B (BL)	BB	C	CC	D	E	F	G	H	I	J	K	L	M	N	O min	O max	P	Q	R	S	U	V	W	Y	Z	XA	XB	XC	XD	XE	XF	XG	XH
K590X-FGR EA	65	1690	1790	366	1082	670	25	314	611	117	430	530	626	1260	524	1557	969	504	360	400	405	494	540	690	M16	651	460	460	460	636	150	487	845	292	960	x	270	482	18	712	195	225	588	9	150
	85	1690	1790	366	1082	670	25	314	626	132	430	530	626	1260	524	1590	1002	504	360	400	405	494	540	690	M16	651	460	460	460	687	150	538	875	313	960	x	270	482	18	712	195	225	588	9	150
	100	1690	1790	366	1082	670	25	314	639	145	430	530	626	1260	524	1670	1082	504	360	400	405	494	540	690	M16	651	460	460	460	791	150	642	942	353	960	x	270	482	18	712	195	225	588	9	150
	125	1690	1790	366	1082	670	25	314	738	175	430	530	626	1260	524	1935	1347	504	360	400	405	562	540	690	M16	651	460	460	460	904	150	754	1192	479	960	x	270	482	18	712	195	225	588	9	150
K660X-FGR EA	65	1690	1790	366	1082	670	25	314	611	117	430	530	626	1260	524	1557	969	504	383	400	405	494	540	690	M16	651	460	460	460	636	150	487	845	292	960	336	270	482	18	712	195	225	588	9	150
	85	1690	1790	366	1082	670	25	314	626	132	430	530	626	1260	524	1590	1002	504	383	400	405	494	540	690	M16	651	460	460	460	687	150	538	875	313	960	336	270	482	18	712	195	225	588	9	150
	100	1690	1790	366	1082	670	25	314	639	145	430	530	626	1260	524	1670	1082	504	383	400	405	494	540	690	M16	651	460	460	460	791	150	642	942	353	960	336	270	482	18	712	195	225	588	9	150
	125	1690	1790	366	1082	670	25	314	738	175	430	530	626	1260	524	1935	1347	504	383	400	405	562	540	690	M16	651	460	460	460	904	150	754	1192	479	960	336	270	482	18	712	195	225	588	9	150
K750X-FGR EA	65	1690	1790	366	1060	688	25	328	611	117	430	530	626	1260	524	1557	969	504	419	470	421	494	540	690	M16	651	460	460	460	636	150	487	845	292	960	x	270	482	18	712	260	300	588	9	201
	80	1690	1790	366	1060	688	25	328	626	132	430	530	626	1260	524	1590	1002	504	419	470	421	494	540	690	M16	651	460	460	460	687	150	538	875	313	960	x	270	482	18	712	260	300	588	9	201
	100	1690	1790	366	1060	688	25	328	639	145	430	530	626	1260	524	1670	1082	504	419	470	421	494	540	690	M16	651	460	460	460	791	150	642	942	353	960	x	270	482	18	712	260	300	588	9	201
	125	1690	1790	366	1060	688	25	328	738	175	430	530	626	1260	524	1935	1347	504	419	470	421	562	540	690	M16	651	460	460	460	904	150	754	1192	479	960	x	270	482	18	712	260	300	588	9	201

How to read the burner "Performance curve"

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

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

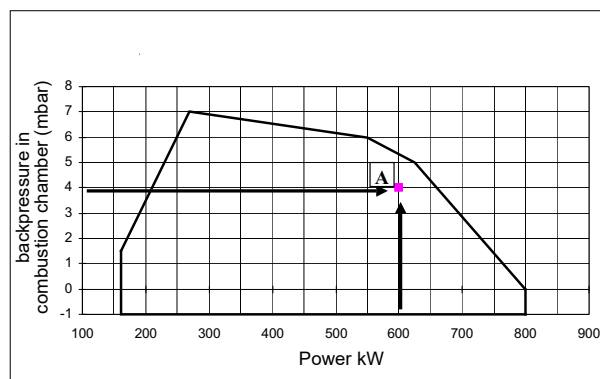
Example:

Furnace input: 600kW

Backpressure: 4 mbar

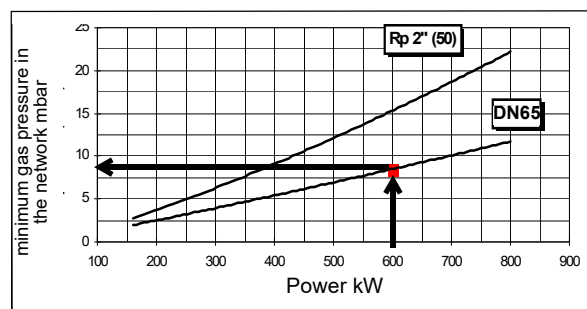
In the "Performance curve" diagram, draw a vertical line matching the furnace input value and an horizontal line matching the backpressure value. The burner is suitable if the intersection point A is inside the performance curve.

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



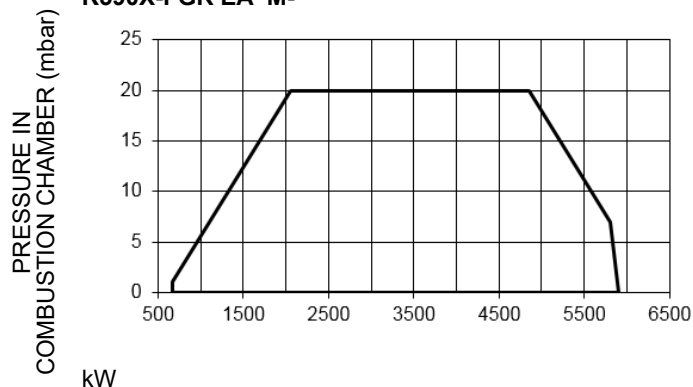
Checking the proper gas train size

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



Performance Curves

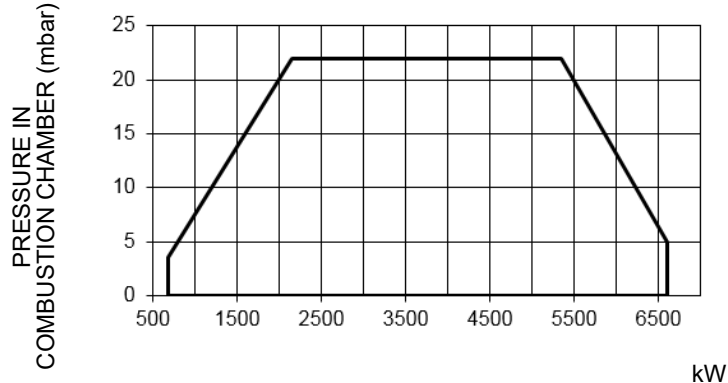
K590X-FGR EA M-

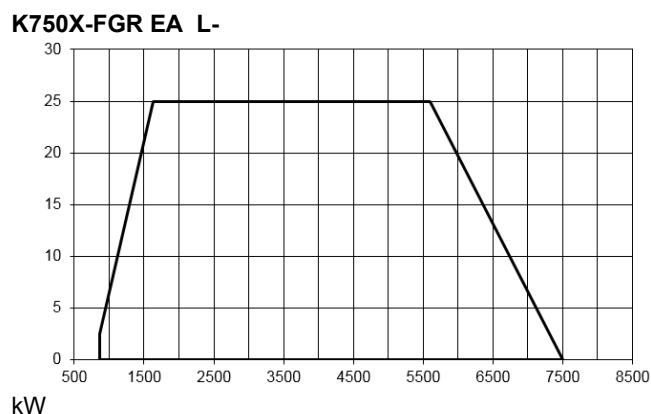
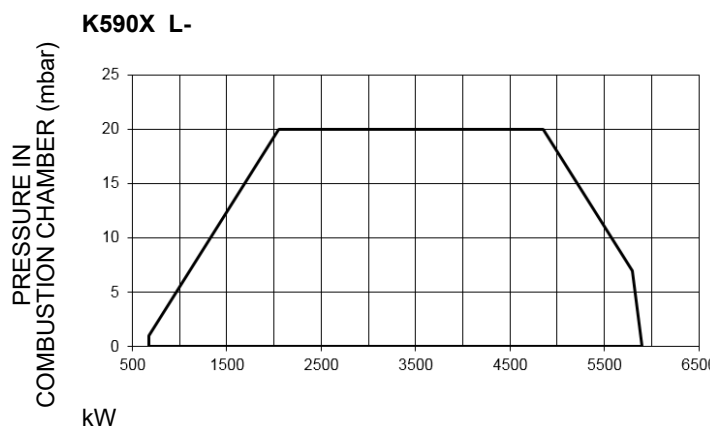


K750X-FGR EA M-



K660X-FGR EA M-



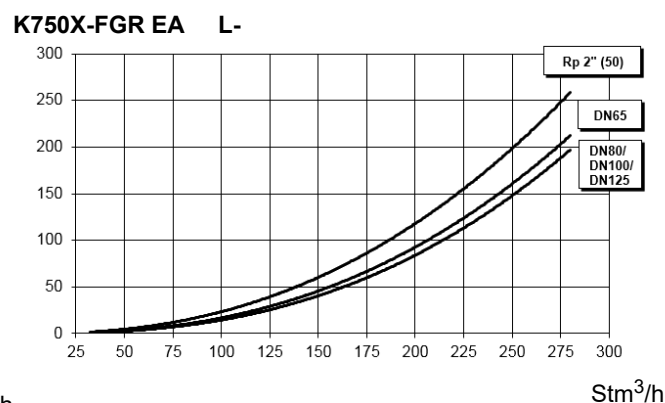
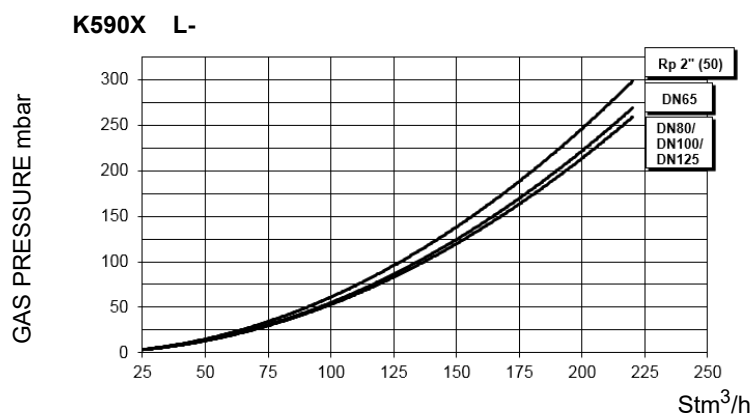
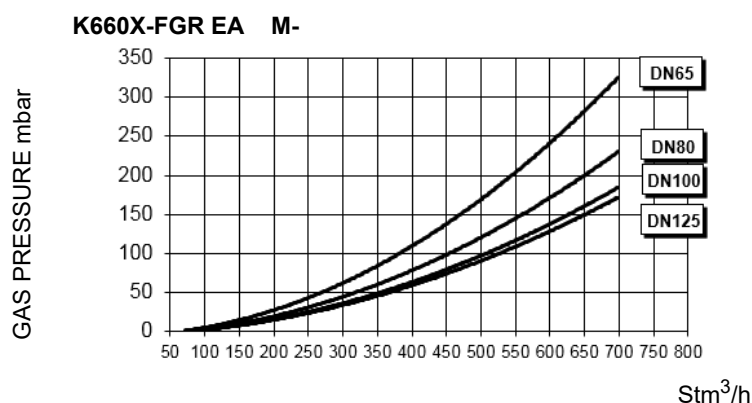
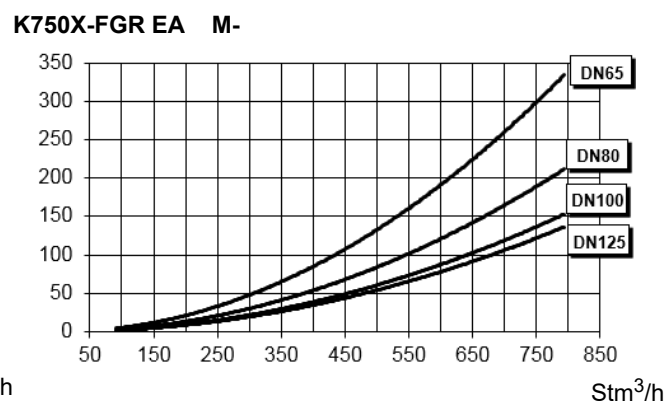
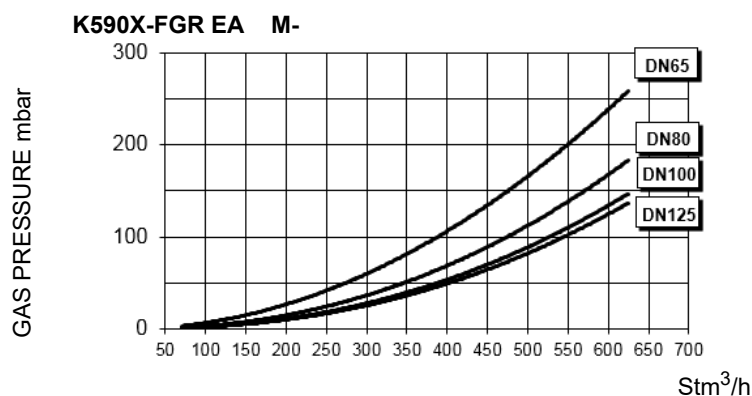


To get the input in kcal/h, multiply value in kW by 860.

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

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

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





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



The values in the diagrams refer to **natural gas** with a calorific value of 8125 kcal/Stm³ (15°C, 1013 mbar) and a density of 0.714 kg/Stm³.



The values in the diagrams refer to **GPL** with a calorific value of 22300 kcal/Stm³ (15°C, 1013 mbar) and a density of 2.14 kg/Stm³. When the calorific value and the density change, the pressure values should be adjusted accordingly.

Where:

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

p_1	Natural gas pressure shown in diagram
p_2	Real gas pressure
Q_1	Natural gas flow rate shown in diagram
Q_2	Real gas flow rate
ρ_1	Natural gas density shown in diagram
ρ_2	Real gas density

Combustion head gas pressure curves

Combustion head gas pressure depends on gas flow and combustion chamber backpressure. When backpressure is subtracted, it depends only on gas flow, provided combustion is properly adjusted, flue gases residual O₂ percentage complies with “Recommended combustion values” table and CO in the standard limits). During this stage, the combustion head, the gas butterfly valve and the actuator are at the maximum opening. Refer to , showing the correct way to measure the gas pressure, considering the values of pressure in combustion chamber, surveyed by means of the pressure gauge or taken from the boiler’s Technical specifications.

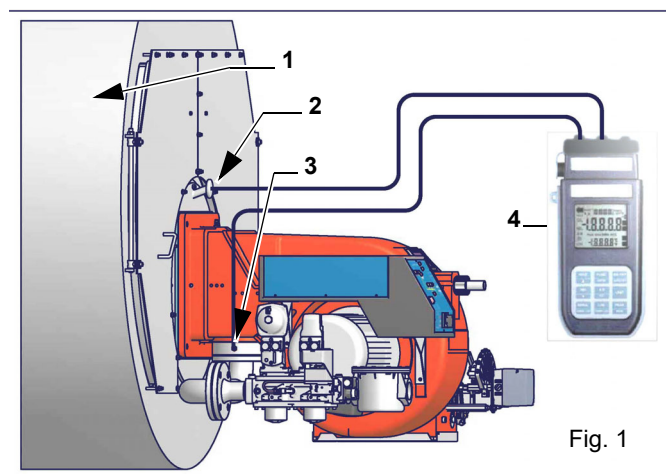


Fig. 1

Note: the figure is indicative only. Key

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



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

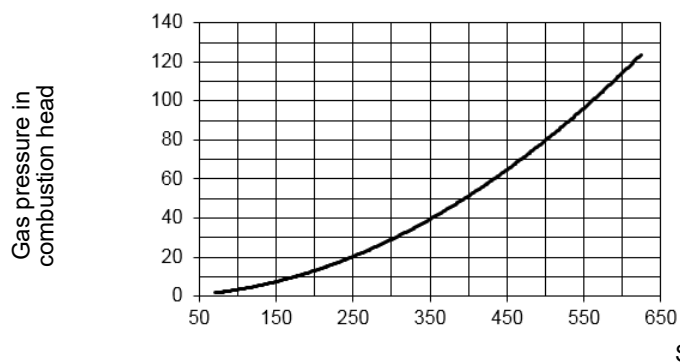
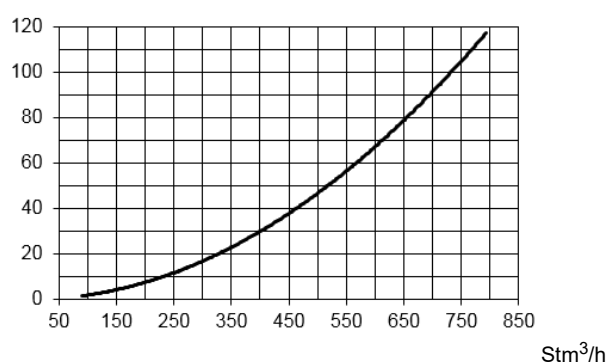
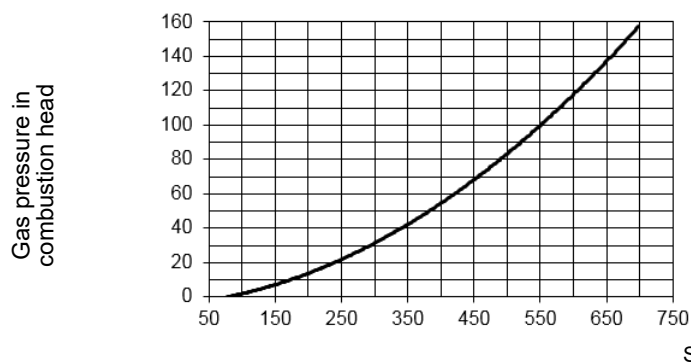
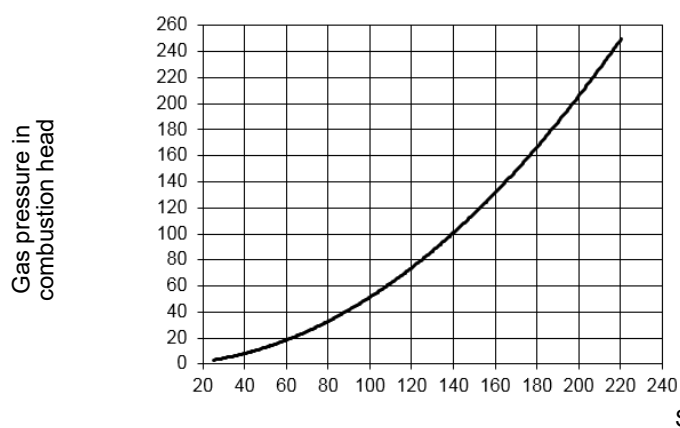
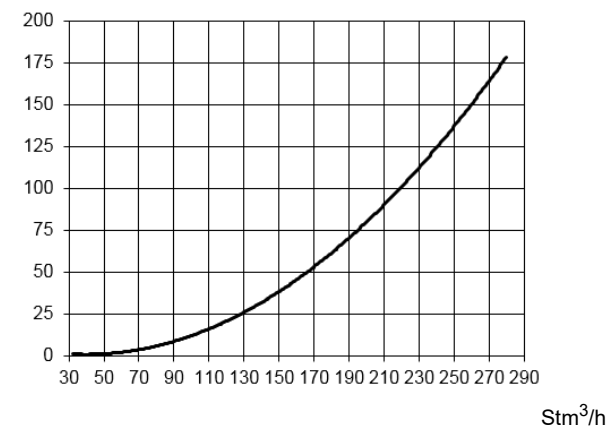
Measuring gas pressure in the combustion head

In order to measure the pressure in the combustion head, insert the pressure gauge probes: one into the combustion chamber’s pressure outlet to get the pressure in the combustion chamber and the other one into the butterfly valve’s pressure outlet of the burner. On the basis of the measured differential pressure, it is possible to get the maximum flow rate: in the pressure - rate curves (showed on the next paragraph), it is easy to find out the burner’s output in Stm³/h (quoted on the x axis) from the pressure measured in the combustion head (quoted on the y axis). The data obtained must be considered when adjusting the gas flow rate.

Pressure - rate in combustion head curves (natural gas)



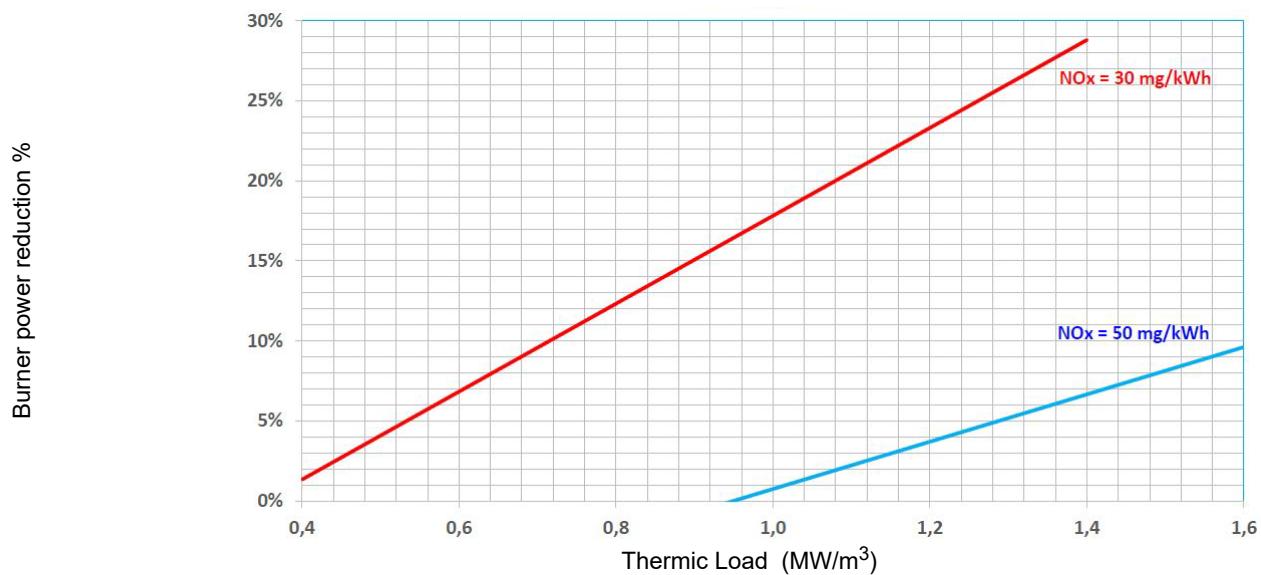
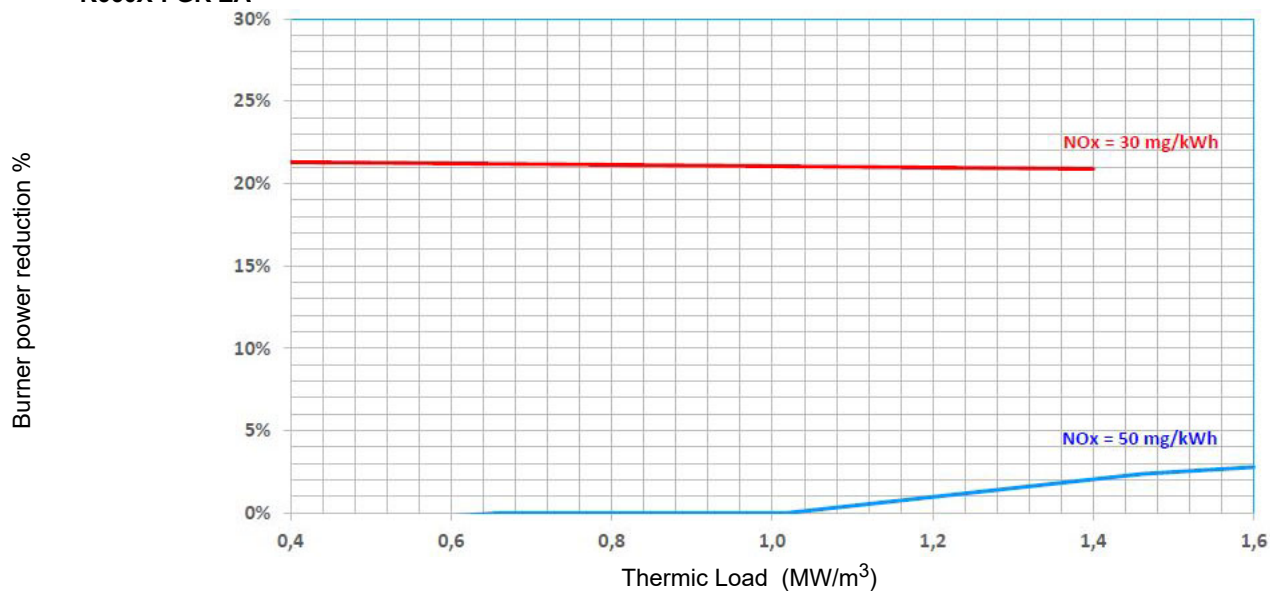
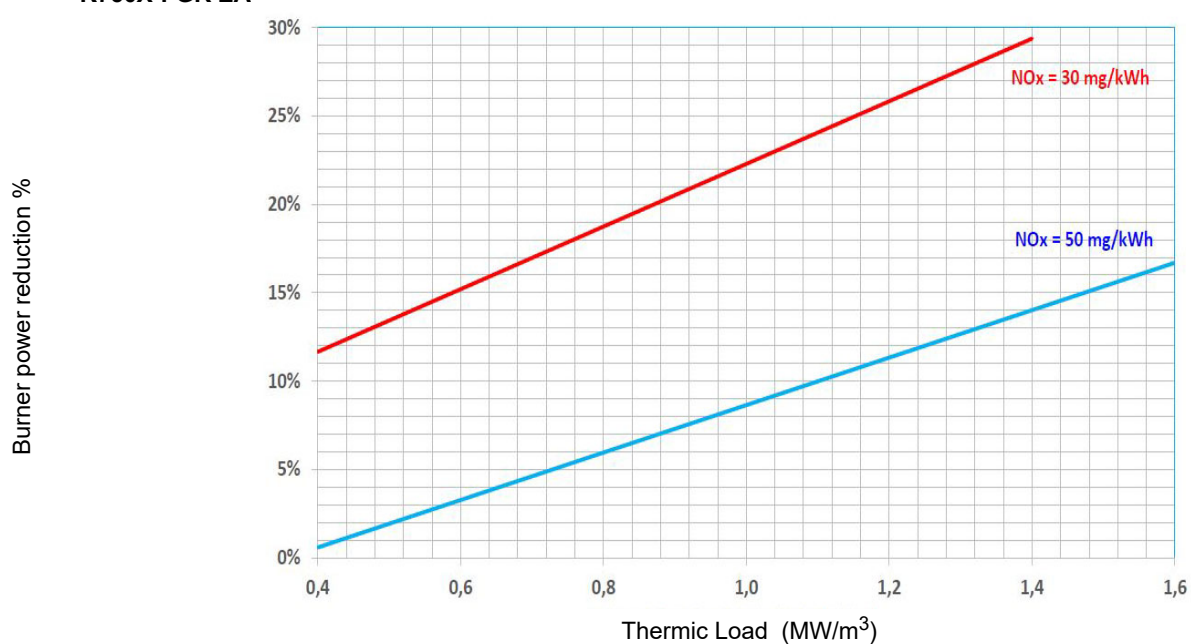
Curves are referred to pressure = 0 mbar in the combustion chamber!

K590X-FGR EA M-..**K750X-FGR EA M-..****K660X-FGR EA M-..****K590X-FGR EA L-..****K750X-FGR EA L-..**

POWER REDUCTION WITH REFERENCE TO THE BURNER OPERATING CURVE

Since depowering the burner operating range is equivalent to increasing the burner power by the same percentage, the quickest procedure is described point by point below:

- Choosing the burner without taking flue gas recirculation into account
- estimate the amount of recirculation (see figure below) required to ensure a certain NO_x value as a function of the heat load of the boiler, for that burner
- multiply the required burned power by the depowering factor expressed as follows
- multiply the back pressure in the combustion chamber by the depressurisation factor squared (pressure losses vary with the square of the change in flow rate)
- choose the burner considering the new power and back pressure value
- if the burner size is insufficient, a larger machine must be selected, the depowering factor must be re-checked and the above procedure repeated.

K590X-FGR EA**K660X-FGR EA****K750X-FGR EA**

PART II: INSTALLATION

MOUNTING AND CONNECTING THE BURNER

Transport and storage



ATTENTION! The equipment must be installed in compliance with the regulations in force, following the manufacturer's instructions, by qualified personnel. All handling operations must be carried out with appropriate resources and qualified personnel



ATTENTION: Use intact and correctly dimensioned hoisting equipment, conforms to the local regulations and health and safety regulations. Do not stand under lifted loads.

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

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

Packing

The burners are despatched in wooden crates whose dimensions are:

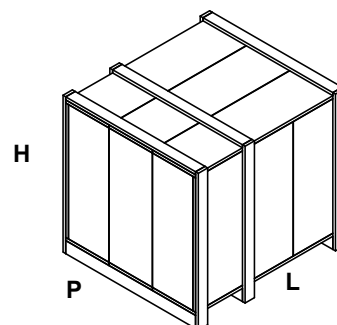
- 2100 mm x 1550mm x 1060mm (L x P x H)

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

The following are placed in each packing case:

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

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



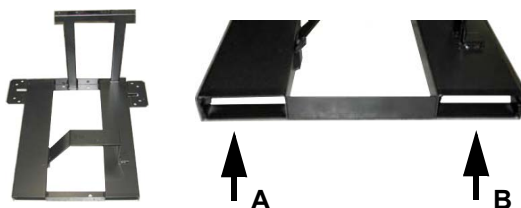
Handling the burner



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

The unpacked burner must be lifted and moved only by means of a fork lift truck.

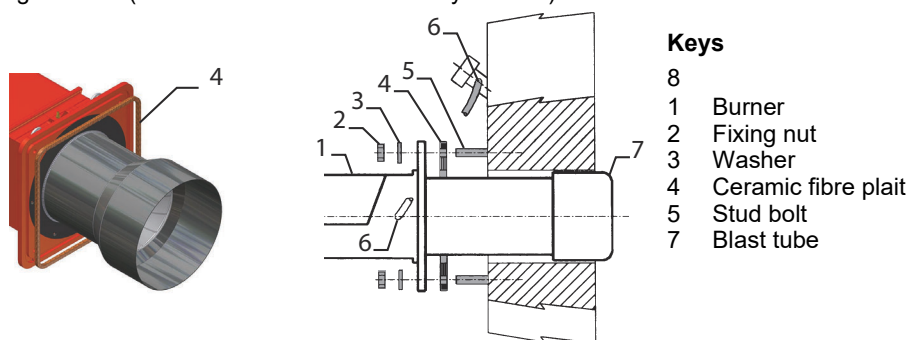
The burner is mounted on a support provided for handling the burner by means of a fork lift truck: the forks must be inserted into the A and B ways. Remove the stirrup only once the burner is installed to the boiler.



Fitting the burner to the boiler

To perform the installation, proceed as follows:

- 1 drill the furnace plate as described in paragraph "Overall dimensions";
- 2 place the burner towards the furnace plate: lift and move the burner by means of its eyebolts placed on the top side (see "Lifting and moving the burner");
- 3 screw the stud bolts (5) in the plate holes, according to the burner's drilling plate described on paragraph "Overall dimensions";
- 4 place the ceramic fibre rope on the burner flange (if necessary, use a spray adhesive on the flange).
- 5 install the burner into the boiler;
- 6 fix the burner to the stud bolts, by means of the fixing nuts, according to the picture below.
- 7 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).

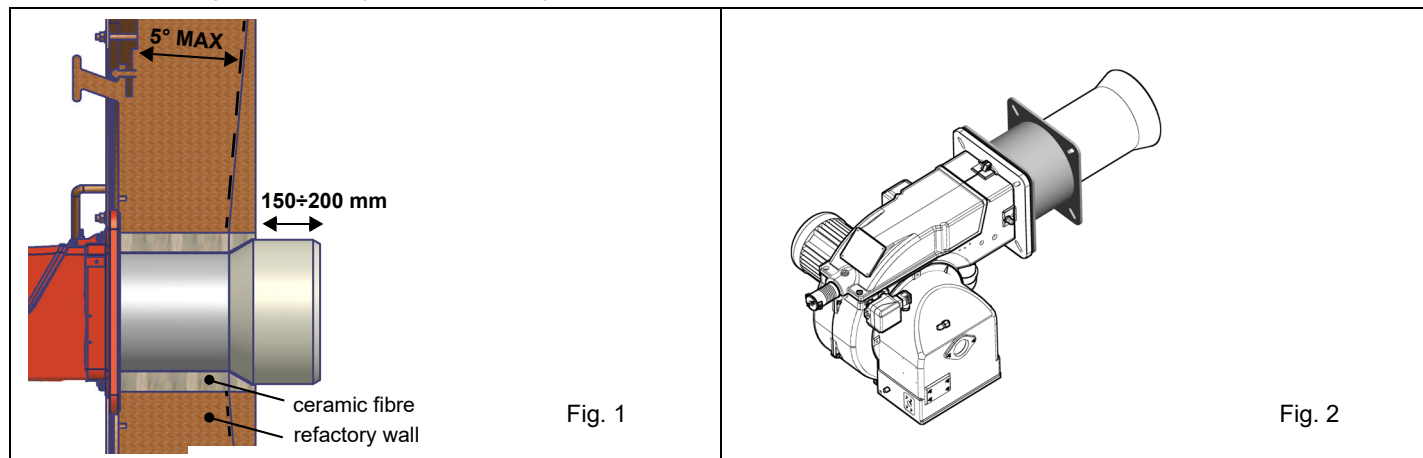


Keys

- 8 Burner
- 1 Fixing nut
- 2 Washer
- 4 Ceramic fibre plait
- 5 Stud bolt
- 7 Blast tube

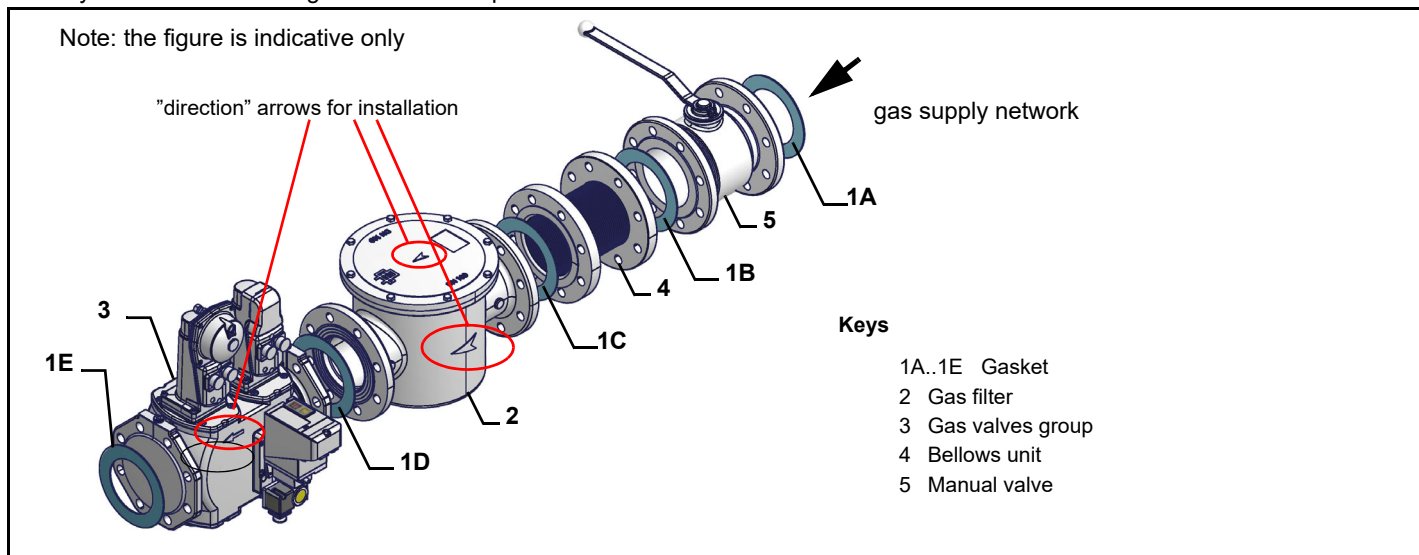
Matching the burner to the boiler (low NOx burners)

The burners described in this manual have been tested with combustion chambers that comply with EN676 regulation and whose dimensions are described in the diagram. In case the burner must be coupled with boilers with a combustion chamber smaller in diameter or shorter than those described in the diagram, please contact the supplier, to verify that a correct matching is possible, with respect of the application involved. To correctly match the burner to the boiler verify the type of the blast tube. Verify the necessary input and the pressure in combustion chamber are included in the burner performance curve; otherwise the choice of the burner must be revised consulting the burner manufacturer. To choose the blast tube length consider the following rule, even if it differs from the instructions of the boiler manufacturer: Cast-iron boilers, three pass flue boilers (with the first pass in the rear part): the blast tube must protrude at least 150÷200 mm into the combustion chamber. 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.



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

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.



Procedure to install the double gas valve unit:

- two (2) gas flanges are required; they may be threaded or flanged depending on size
- first step: install the flanges to prevent entry of foreign bodies in the gas line
- on the gas pipe, clean the already assembled parts and then install the valve unit
- check gas flow direction: it must follow the arrow on the valve body
- VGD20: make sure the O-rings are correctly positioned between the flanges and the valve
- VGD40 and MBE: make sure the gaskets are correctly positioned between the flange
- fasten all the components with screws, according to the following diagrams
- make sure bolts on the flanges are properly tightened



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



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



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

To mount the gas train, proceed as follows:

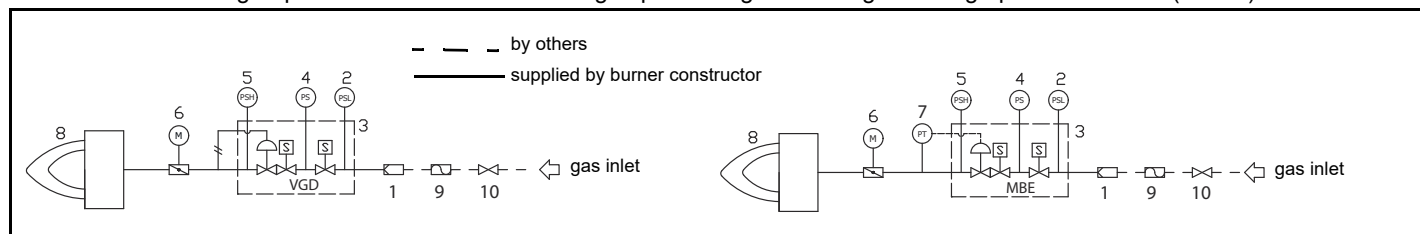
- 1 In case of threaded joints: use proper seals according to the gas used- in case of flanged joints: place a gasket between the elements
- 2 Fasten all the items by means of screws, according to the diagrams showed, observing the mounting direction for each item

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

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.

Gas train with valves group VGD and MBE with built-in gas pressure governor + gas leakage pressure switch (PGCP)

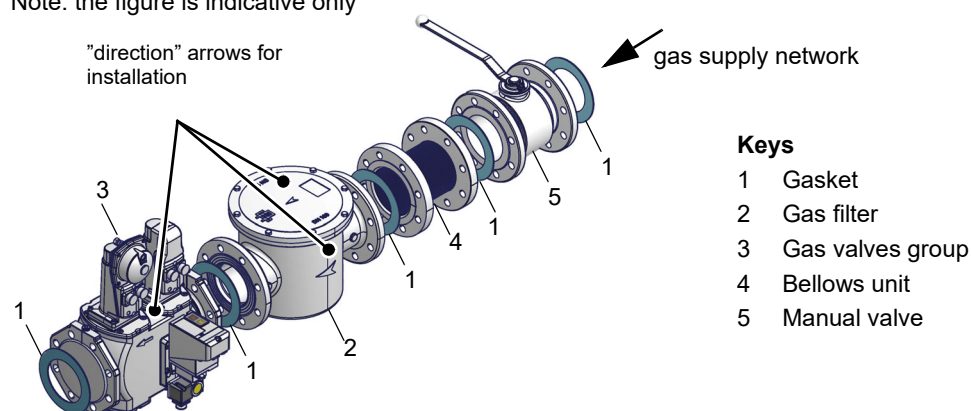


Legend

1	Filter	6	Butterfly valve
2	Pressure switch - PGMIN	7	Pressure transducer
3	Safety valve with built in gas governor	8	Main burner
4	Proving system pressure switch - PGCP	9	Antivibration joint (*optional)
5	Pressure switch PGMAX: mandatory for MBE, optional for VGD and MB-DLE	10	Manual valve(*optional)

MultiBloc MB-DLE - Assembling the gas train

Note: the figure is indicative only



Keys

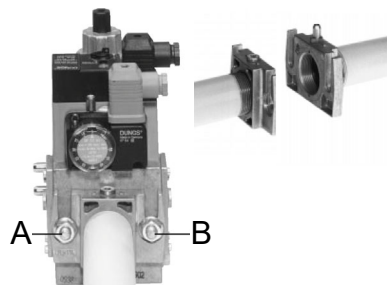
- 1 Gasket
- 2 Gas filter
- 3 Gas valves group
- 4 Bellows unit
- 5 Manual valve

MULTIBLOC DUNGS Mounting

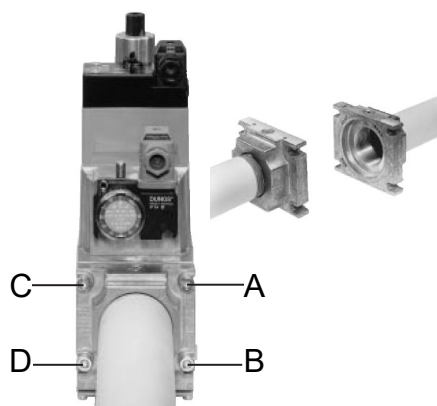
MB-DLE 405..412
MB-DLE 415..420

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

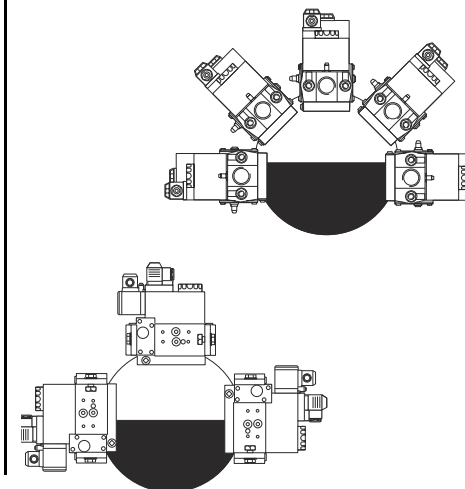
MB-DLE 405..412



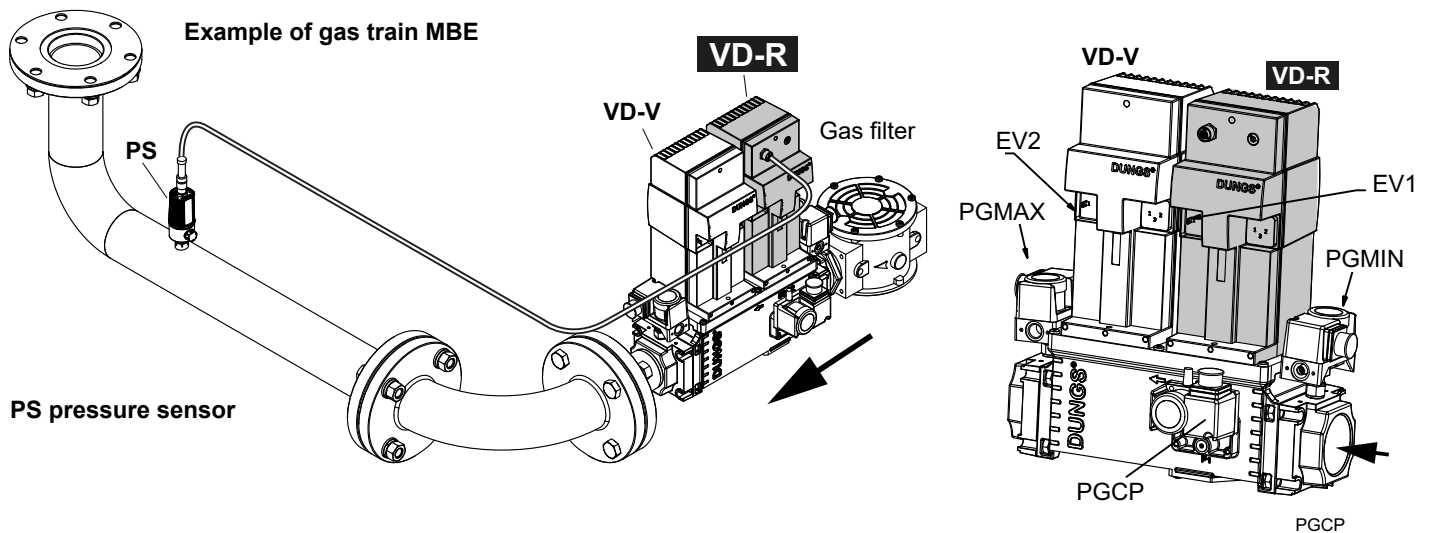
MB-DLE 415..420



MOUNTING POSITIONS



MultiBloc MBE



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

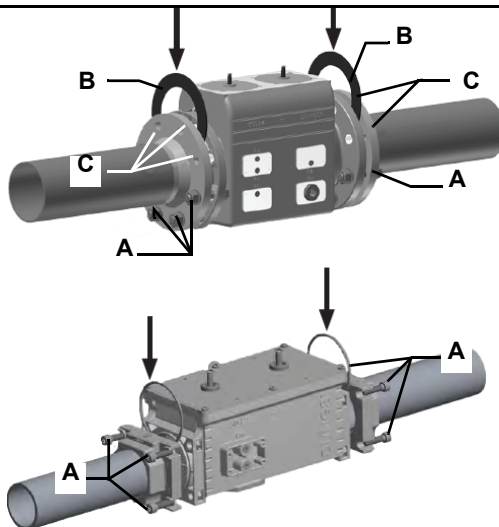


ATTENTION: it is recommended to mount filter and gas valves to avoid that extraneous material drops inside the valves, during maintenance and cleaning operation of the filters (both the filters outside the valves group and the ones built-in the gas valves).



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

Threaded train with MultiBloc MBE - Mounting



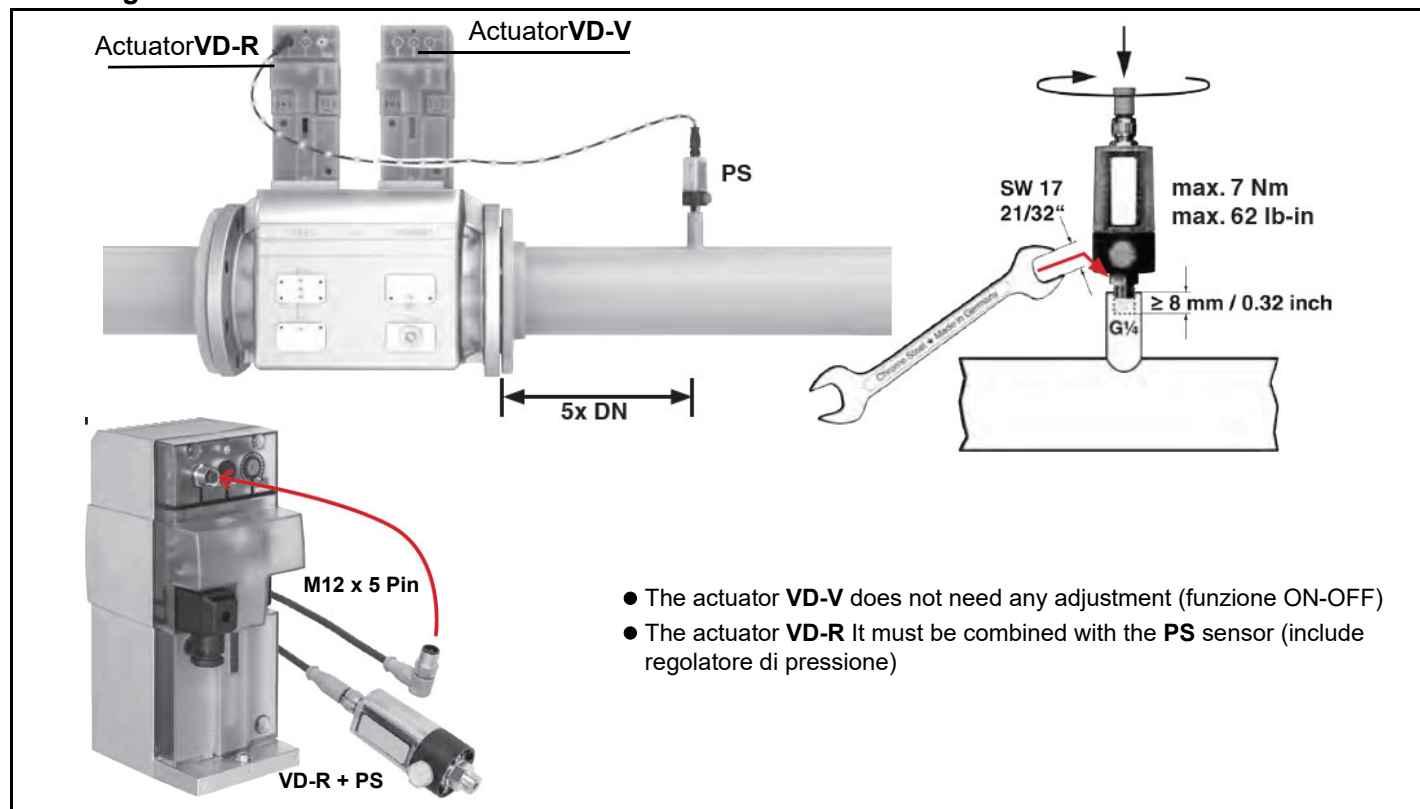
1. Insert studs A.
2. Insert seals B.
3. Insert studs C.
4. Tighten studs in accordance with section 8.
- Ensure correct position of the seal!**
5. Perform leak and functional tests after mounting.
6. Screws (4xM5x20) for VD assembly are supplied.

1. Mount flange into pipe systems. Use appropriate sealing agent.
2. Insert VB together with supplied O-rings.
- Check current position of O-rings.
3. Tighten supplied screws (8xM8x30) in accordance with section 8.
4. Screws (4xM5x25) for VD assembly are supplied.
5. After installation, perform leakage and functional test.
6. Disassembly in reverse order.

Mounting position MBE / VB / VD



Mounting VD-R & PS-...



1. Gas pressure regulation is possible with VD-R and PS pressure sensor only.

WARNING! For US/CN installation, the output pressure must be monitored by min. and max. pressure switches set to +/- 20% of the setpoint.

2. Mounting on pipe. Sensor position: 5x DN according to MBE. Pipe fitting with female thread size 1/4, mount sensor with seal, observe torque.
3. The pressure sensor includes a vent limiter according to UL 353 and ANSI Z21.18/CSA 6.3. No venting required in locations where vent limiters are accepted by the jurisdiction.
4. Only PS pressure sensors specified by DUNGS are authorised to be connected to the VD-R's M12 interface.
5. Only PS cables specified by DUNGS are authorised to be used to connect the PS to the VD-R. Max. cable length 3 m.

Siemens VGD20.. e VGD40..

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

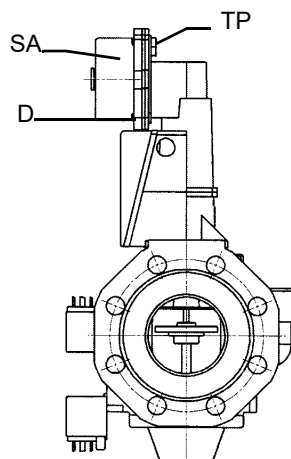
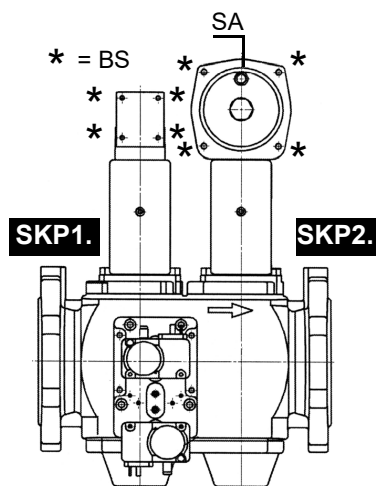
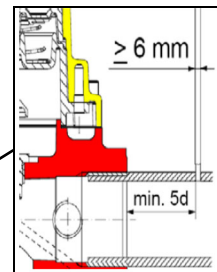
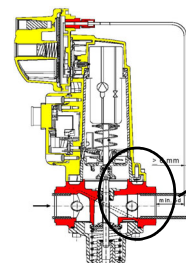
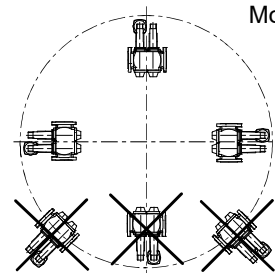
- Connect the reference gas pipe (**TP** in figure; 8mm-external size pipe supplied loose), to the gas pressure nipples placed on the gas pipe, downstream the gas valves: gas pressure must be measured at a distance that must be at least 5 times the pipe size.
- Leave the blowhole free (**SA** in figure).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



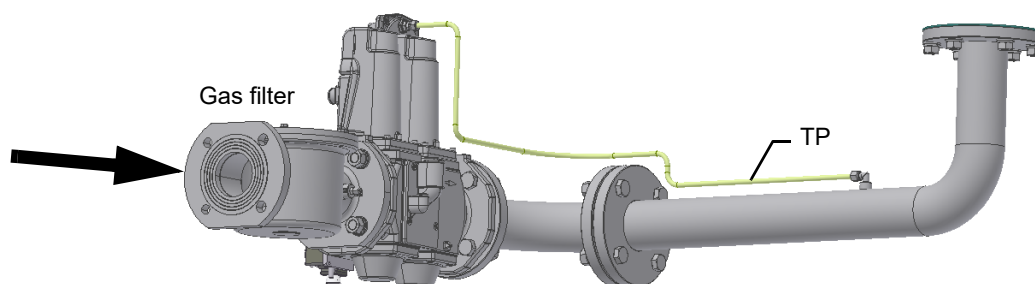
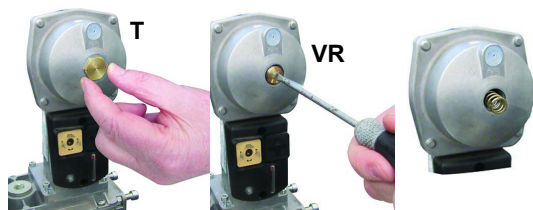
Caution: the SKP2 diaphragm D must be vertical



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

SIEMENS VGD..
Mounting positions

Siemens VGD... con SKPx Example of gas train

**version with SKP2 (built-in pressure stabilizer)****Siemens VGD valves with SKP actuator:**

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

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

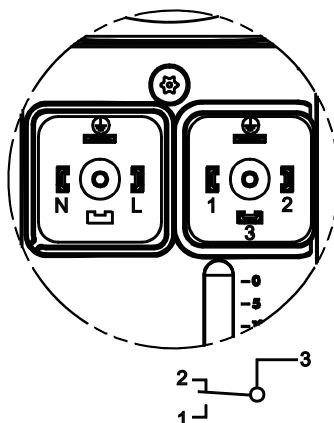
- Remove the cap (T)
- Unscrew the adjusting screw (VR) with a screwdriver
- Replace the spring

Stick the adhesive label for spring identification on the type plate.

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

Siemens VGD SKPx5 (Auxiliary-optional micro switch)

Actuator connection

Valve drive
Plug connectionEnd of stroke
Plug connection

(only with SKPxx.xx1xx)

A Valve closed

Gas valveGas Filter (if provided)

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

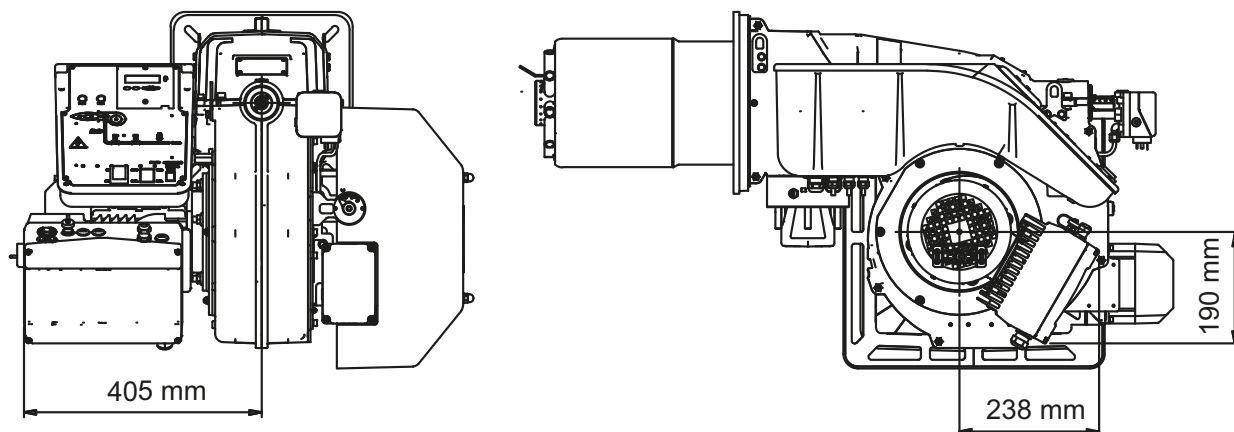
regulators) from becoming rapidly blocked. The filter is normally installed upstream from all the control and on-off devices.



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

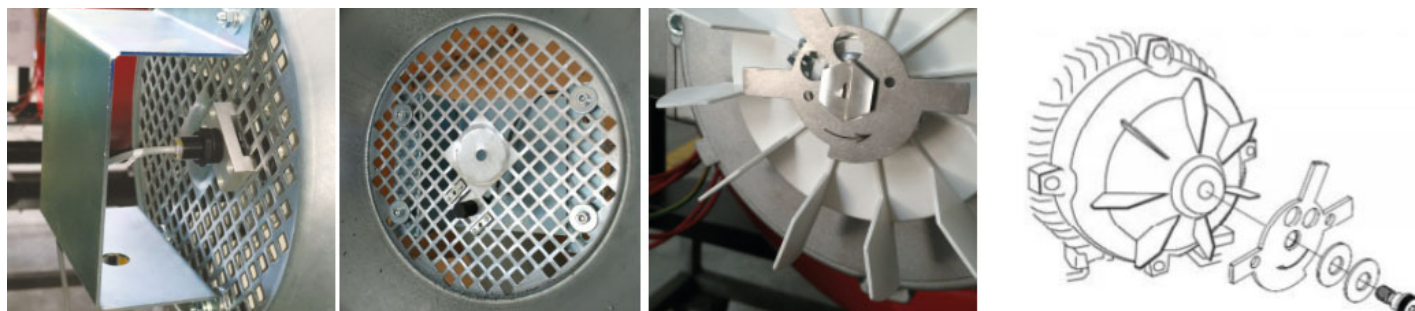
Once the train is installed, connect the gas valves group and pressure switches plugs.

Overall dimensions (mm) - BURNERS WITH INVERTER VARIANT (if provided)



Speed Sensor AGG 5.310

is a speed sensor kit used to monitor the speed of a motor. This kit is used to mount the speed sensor directly on the motor casing.



BURNERS WITH INVERTER VARIANT (if provided)

DANFOSS	LMV5	Type	Model
		XXXXXX	M-. MD. xx. xx. x. x. xxx. EI.
		XXXXXX	M-. MD. xx. xx. x. x. xxx. EG.
		XXXXXX	MG. MD. xx. xx. x. x. xxx. EK.
		XXXXXX	MG. MD. xx. xx. x. x. xxx. ER.
	LMV2x/3x	XXXXXX	M-. MD. xx. xx. x. x. xxx. EB.
		XXXXXX	MG. MD. xx. xx. x. x. xxx. EC.

The **LMV51.300 / LMV52.xxx e LMV37.400/LMV26.300** electronic cam burners with fan motor driven by inverter in addition to the air and fuel adjustment curves also have a fan motor speed adjustment curve.

The **LMV5x** equipment through a sensor controls the fan motor revolutions and with a signal in **4÷20mA** controls it through the inverter.

The **LMV2x** equipment through a sensor controls the fan motor revolutions and with a signal in **0÷10V** controls it through the inverter.

Generally the curve of the inverter goes from 50% to 100% of the engine revolutions. This, in addition to improving the setting of the burner also allows a saving on the consumption of the fan engine..

Two series of interchangeable Inverters version with Inverter FC101 and FC102

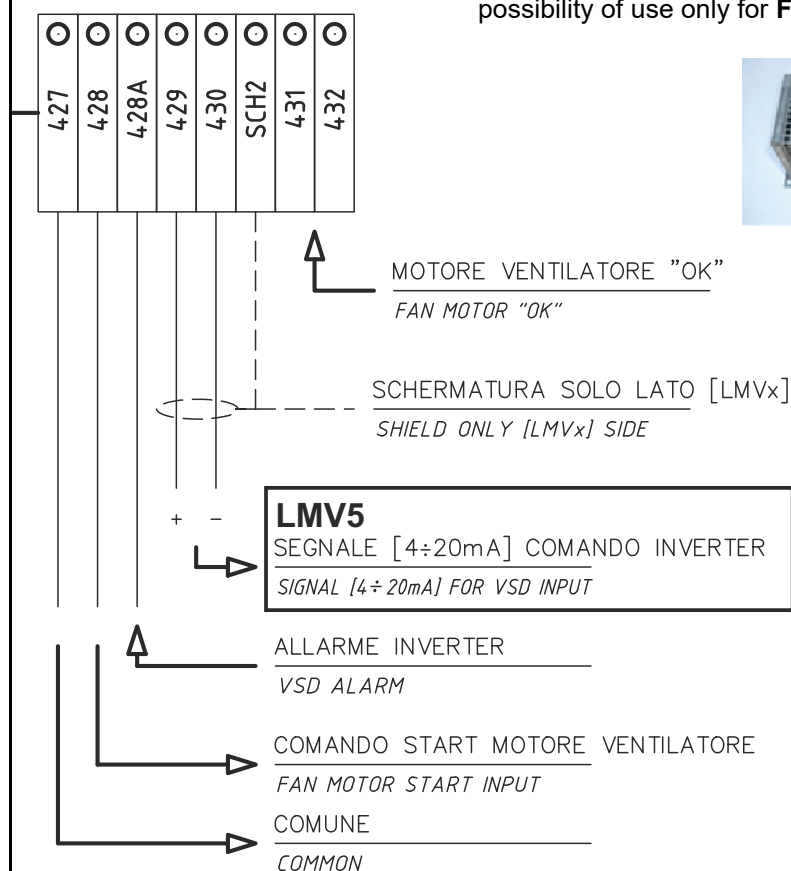
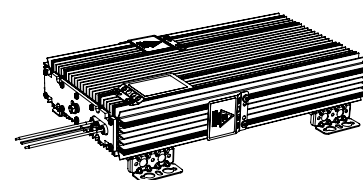
Danfoss FC102



Danfoss FC101


**Terminal interface with Inverter****Braking resistances**

possibility of use only for **FC102**



LMV2x/3x
SEGNAL [0÷10V] COMANDO INVERTER
SIGNAL [0÷10V] FOR INPUT INVERTER

BURNERS WITH INVERTER VARIANT (if provided)

 KOSTAL		Tipo	Modello
	LMV5	XXXXX	M-. MD. xx. xx. x. x. xxx. EI.
		XXXXX	M-. MD. xx. xx. x. x. xxx. EG.
		XXXXX	MG. MD. xx. xx. x. x. xxx. EK.
		XXXXX	MG. MD. xx. xx. x. x. xxx. ER.
	LMV2x/3x	XXXXX	M-. MD. xx. xx. x. x. xxx. EB.
		XXXXX	MG. MD. xx. xx. x. x. xxx. EC.

The **LMV51.300 / LMV52.xxx**, **HAGC31-CU01** e **LMV37.400/LMV26.300** electronic cam burners with fan motor driven by inverter in addition to the air and fuel adjustment curves also have a fan motor speed adjustment curve.

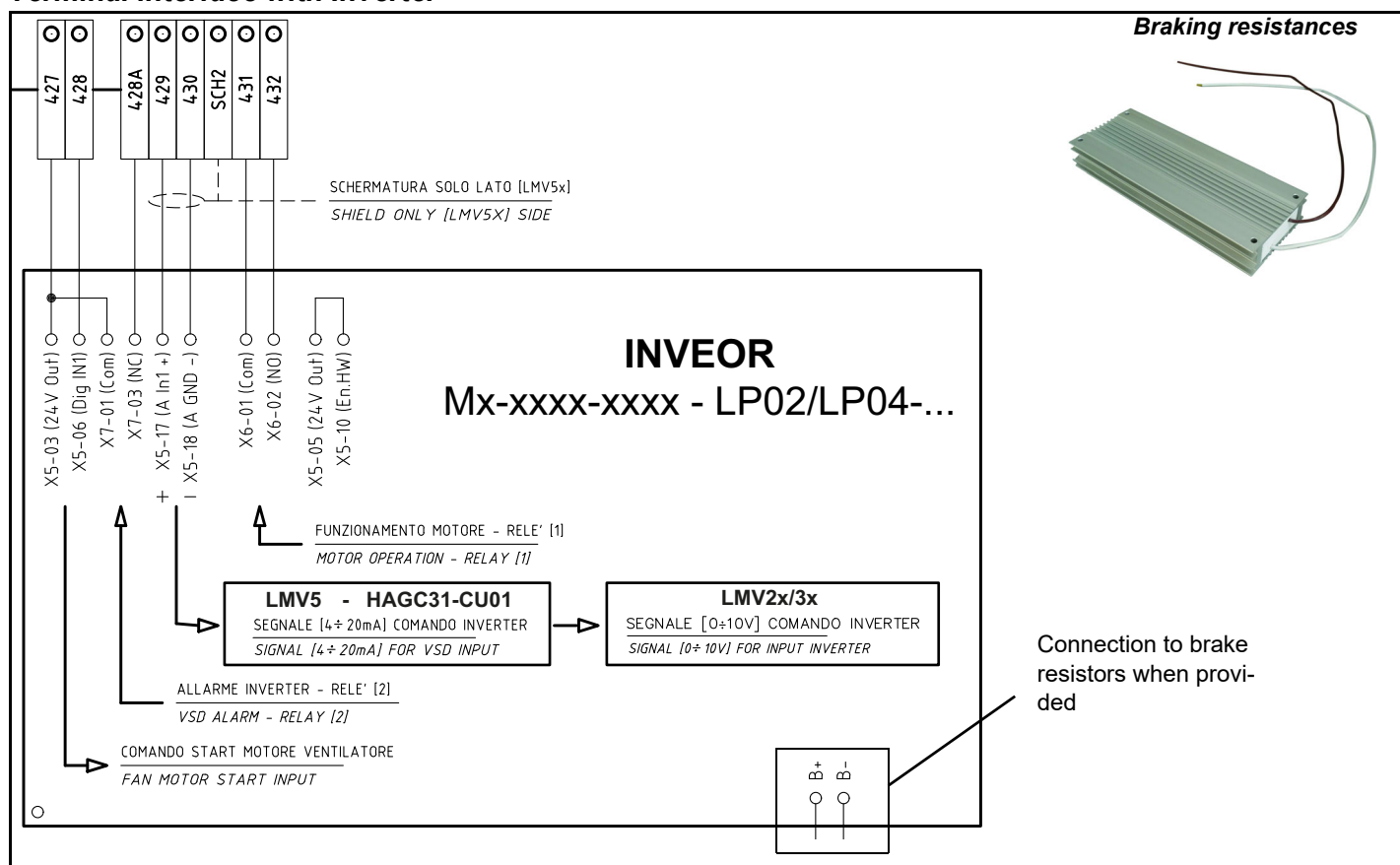
The **LMV5x**, **HAGC31-CU01** equipment through a sensor controls the fan motor revolutions and with a signal in **4÷20mA** controls it through the inverter. The **LMV2x** equipment through a sensor controls the fan motor revolutions and with a signal in **0÷10V** controls it through the inverter.

Generally the curve of the inverter goes from 50% to 100% of the engine revolutions. This, in addition to improving the setting of the burner also allows a saving on the consumption of the fan engine.

INVEOR M



Terminal interface with Inverter



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

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

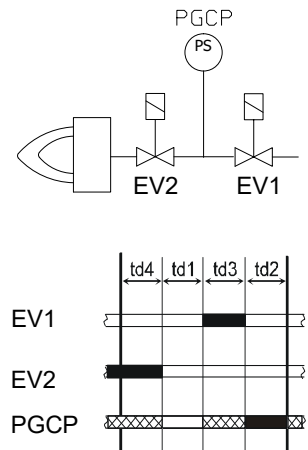
This paragraph describes the integrated proving system operation sequence:

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

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

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

On LME73.831BC the valve proving is parameterized to take place on startup only.



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



Any cable connection or hook-up to the grid must be carried out by qualified, informed and trained personnel, directly coordinated and authorized by Technical Service. Always check in advance that the system electrical interlock is fitted with a safety circuit breaker.



WARNING! It is forbidden to use the fuel pipes for the execution and/or completion of the grounding



- The system must comply with the current regulations.
- Earth the system; always check in advance the connection, functionality and compliance with the health and safety principles of the earth cable. If in doubt, ask for an accurate inspection by qualified technical engineers.
- Check the connection to the grounding system.
- Do not use any extraneous conductive parts (i.e. fuel feeding pipes, metal structures ...) to connect the burner to ground.
- In connecting the supply wires to the burner MA terminal strip, ensure that the earth wire is longer than the phase and neutral wires.
- Careful not to invert the phase and neutral connections
- Fit the burner power line with an omnipolar disconnecter and differential switch, a thermo-magnetic circuit breaker or fuses.
- Supply the burner with a flame retardant cable with a section suitable to the installed power (see electrical diagram enclosed), paying attention to the voltage values printed on the burner plate.
- Always check in advance the protection from overcurrents and electromagnetic interference of the power supply. If these and other values do not match the threshold data stated by the manufacturer, isolate the burner from all power sources and contact the Authorized Technical Service urgently.
- Check that the voltage of the system and burner motors match the voltage of the power grid (+/- 10%).
- Ensure the IP protection rating is consistent with the installation place and environment characteristics
- Before carrying out any operation on the machine electrical panel, open the system omnipolar disconnecter and move the switch on the burner panel to OFF.

In any case:

- use suitably protected and safe burner/boiler supply and tracking cables;
- avoid using extensions, adaptors or multiple sockets.

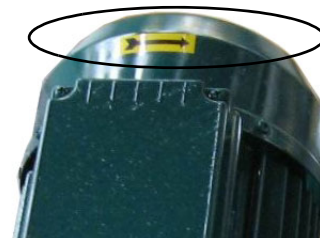
For further information, refer to the electrical diagram.

Follow the electrical diagrams attached to the manual for the connections to the terminal strip.

The electrical panel is supplied complete with a terminal strip for the connection to the system electrical line and, in case of on board control panel, a plug for the connection to the modulation probe (if any).

Rotation of electric motor

Once the electrical connection of the burner is executed, remember to check the rotation of the electrical motor (pump motor if any, and fan motor) . The motor should rotate according to the “arrow” symbol on the body. In the event of wrong rotation, reverse the three-phase supply and check again the rotation of the motor.



ATTENTION: check the calibration of the thermal relay sensor (+5% ÷ +10% rated value).



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

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

Note on electrical supply

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

Key

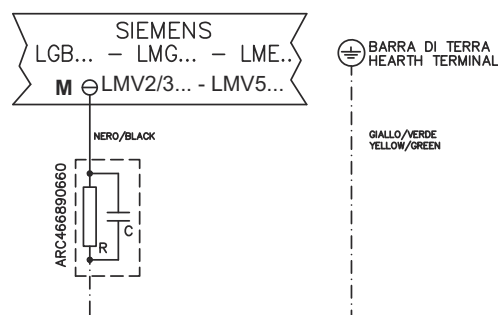
C - Capacitor (22 nF , 250 V)

LME / LMV - Siemens control box

R - Resistor (1 MΩ)

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

RC466890660 - RC Siemens filter



Configuration with separate electrical panel (optional)

The length of the electrical cables must comply with the provisions in the technical sheets of the equipment or the advice the company gives at the time of the offer/contract.

Provide sufficient protections for cables and connectors, taking into consideration positioning spaces and the panel-burner tracing surfaces. Always consult beforehand the electrical drawings supplied in relationship to the topography of the feeding systems.

PART III: OPERATION

LIMITATIONS OF USE

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

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

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

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

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

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

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

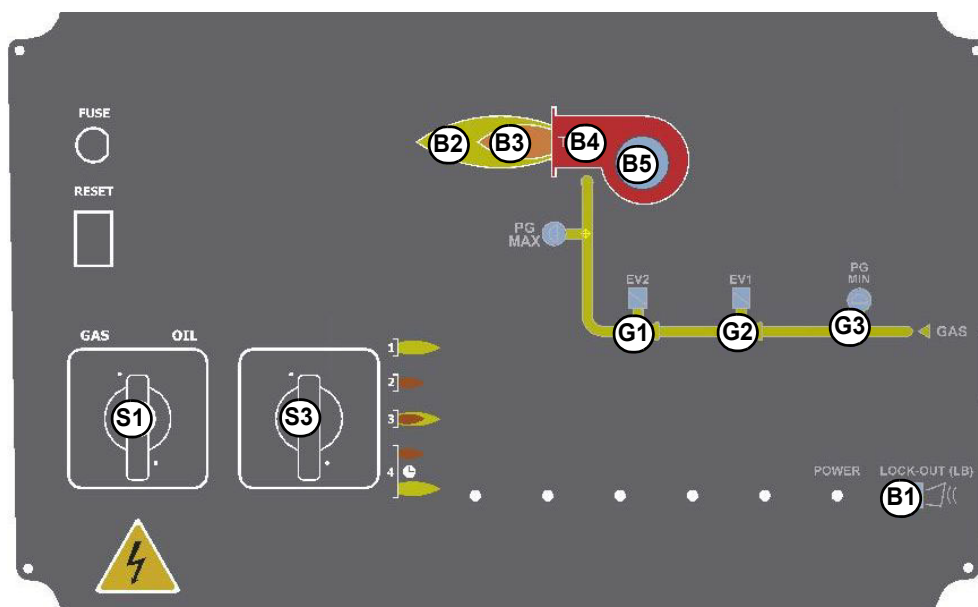
WARNING: DURING NORMAL OPERATION THE PARTS OF THE BURNER NEAREST TO THE GENERATOR (COUPLING FLANGE) CAN BECOME VERY HOT, AVOID TOUCHING THEM SO AS NOT TO GET BURNT.



DANGER! Incorrect motor rotation can seriously damage property and injure people. **WARNING:** before starting the burner up, be sure that the manual cutoff valves are open and check that the pressure upstream the gas train complies the value quoted on paragraph "Technical specifications". Be sure that the mains switch is closed.

DANGER: During commissioning operations, do not let the burner operate with insufficient air flow (danger of formation of carbon monoxide); if this should happen, make the gas decrease slowly until the normal combustion values are achieved. **WARNING:** never loose the sealed screws! otherwise, the device warranty will be immediately invalidate!

Fig. 3 - Burner front panel



Keys

- B1 Lock-out LED
- B2 Hi-flame operation LED
- B3 Lo-flame operation LED
- B4 "Ignition transformer operation" LED
- B5 "Fan motor overload tripped" LED
- G1 "EV2 opening" LED
- G2 "EV1 opening" LED
- G3 "Gas pressure switch signal " LED
- S1 Main switch
- S3 Operation selector MAN - AUTO (operation in manual or automatic mode):
MIN = operation with minimum output
MAX = operation at the maximum output
- A1 Burner Modulator (only on fully modulating burners)
- A2 AZL..

Fuel selection:

- In order to start the burner with natural gas or LPG, the operator must commute the selector on the burner control panel on (1) = natural gas, or (2) = LPG.
If the selector is set on (1) the natural gas cock must be open, while the LPG cock must be closed. Viceversa if the selector is set on (2).

Gas operation

- Check that the control box is not in the lockout position; in case unlock it by pressing the relevant key (for further information on the LMV., see the related manual).
- Check that the pressure switches/thermostats series enables the burner operation.
- Check that the gas pressure is sufficient (signalled by an error code on the AZL.. display).
- **Burners fitted with gas proving system:** the gas proving system test begins; when the test is performed the proving system LED turns on. At the end of the test, the burner starting cycle begins: in case of leakage in a valve, the gas proving system stops the burner and the lamp **B1** turns on.
- At the beginning of the start-up cycle, the actuator drives the air damper to the maximum opening position, then the fan motor starts up: the pre-purge phase begins. During the pre-purge phase, the air damper complete opening is signalled by the light **B2** on (see front panel).
- At the end of the pre-purge, the air damper is driven to the ignition position, the ignition transformer is energised (signalled by the light **B4** on the front panel) then, few seconds later, the EV1 and EV2 gas valves are energised (light G1 and G2 on the front panel).
- Few seconds after the gas valves opening, the ignition transformer is de-energised and light **B4** turns to off.
- The burner operates in the low flame stage; few seconds later the two-stages operation begins and the burner output increases or decreases, driven by the external thermostats (progressive burners) or by the modulator (fully-modulating burners).

AIR FLOW AND FUEL ADJUSTMENT



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

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

Recommended combustion parameters		
Fuel	Recommended (%) CO ₂	Recommended (%) O ₂
Natural gas	9 ÷ 10	3 ÷ 4.8

Adjustments - brief description

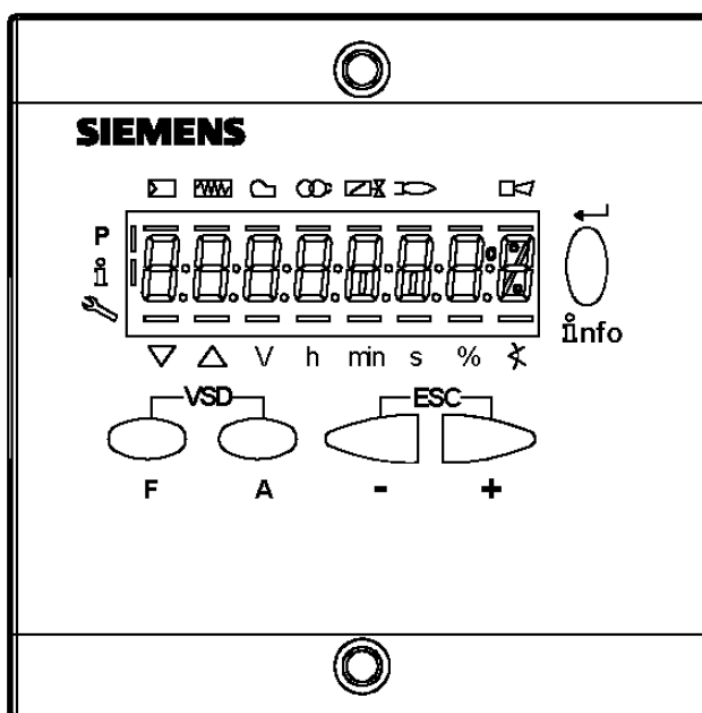
The air and fuel rates adjustments must be performed at the maximum output first ("high flame"): see the LMV related manual.

- Check that the combustion parameters are in the suggested limits.
- Check the flow rate measuring it on the counter or, if it was not possible, verifying the combustion head pressure by means of a differential pressure gauge, as described on par. "Measuring the gas pressure in the combustion head".
- Then, adjust the combustion values by setting the "gas/air" ratio" curvepoints (see the LMV related manual).
- Set, now, the low flame output (according to the procedure described on the "Siemens LMV manual") 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.

User interface

The AZL2x.. display is shown below:

The keys functions are the following:



Key F

Used to adjust the "fuel" actuator position (Fuel):

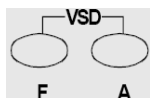
While pressing the **F** key, the "fuel" actuator position can be changed by means of the **+** and **-** keys.



Key A

Used to adjust the "air" actuator position (Air):

While pressing the **A** key, the "air" actuator position can be changed by means of the **+** and **-** keys.



Key F + A

While pressing the two keys contemporarily, the **code** message will appear: by entering the proper password it is possible to access the **Service** mode.

Info and Enter keys

Used for **Info** and **Service** menues

Used as **Enter** key in the setting modes

Used as **Reset** key in the burner operation mode

Used to enter a lower level menu



-Key -

Used to decrease a a value

Used to enter Info and Service during the curve adjustments



+Key +

Used to increase a a value

Used to enter Info and Service during the curve adjustments



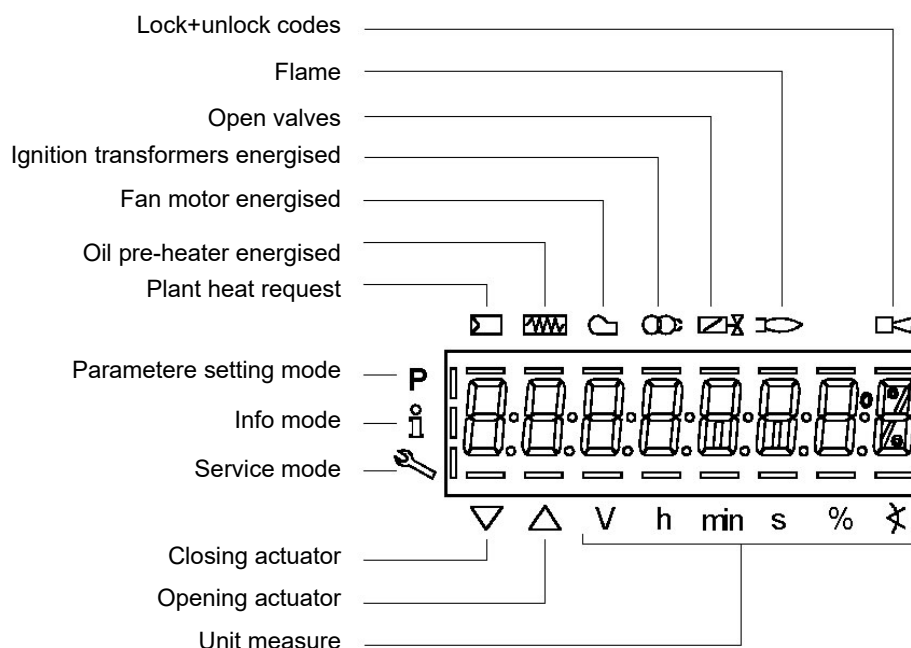
Keys (+ & -) = ESC

By pressing + and - at the same time, the ESCAPE function is performed:



to enter a lower level menu

The display will show these data:



The display will show these data:

Setting menu

The setting menu is divided into different blocks:

Bloc.	Descrizione	Description	Password
100	Informazioni generali	General	OEM / Service / Info
200	Controllo bruciatore	Burner control	OEM / Service
400	Curve rapporto	Ratio curves	OEM / Service
500	Controllo rapporto	Ratio control	OEM / Service
600	Servocomandi	Actuators	OEM / Service
700	Storico errori	Error history	OEM / Service / Info
900	Dati di processo	Process data	OEM / Service / Info

The accesses to the various blocks are allowed by passwords. Passwords are divided into three levels:

- User level (info): no password needed
- Service level (Service)
- Manufacturer level (OEM)

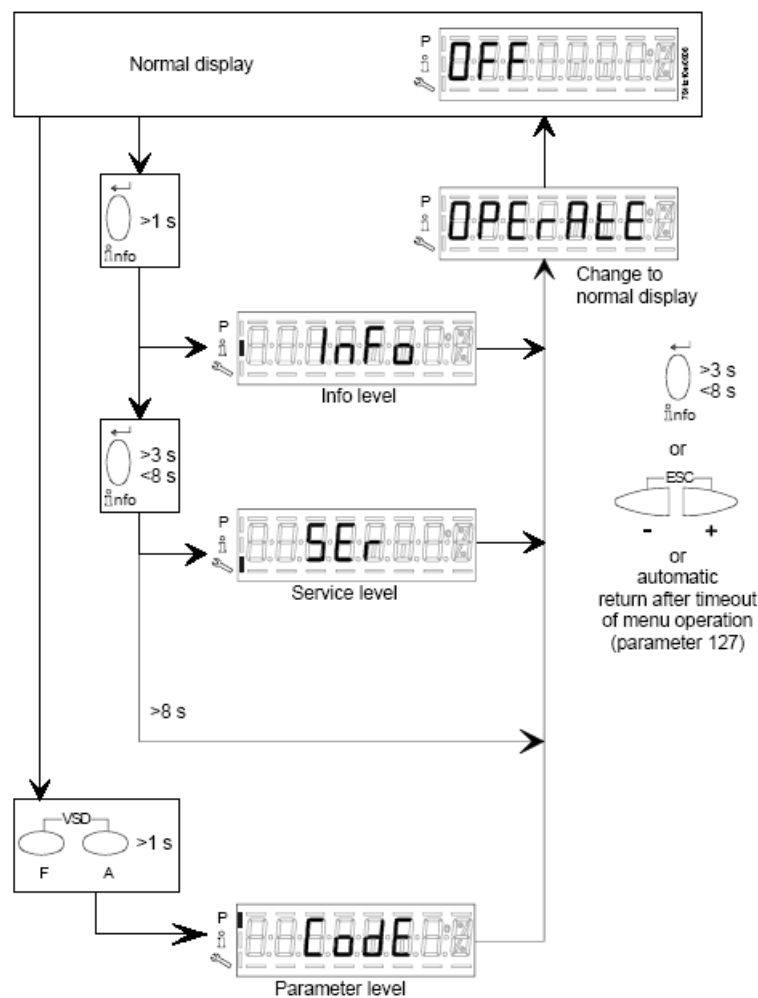
PHASES LIST

During operation, the following program phases are shown. The meaning for each phase is quoted in the table below

Fase /	Funzione	Function
Ph00	Fase blocco	Lockout phase
Ph01	Fase di sicurezza	Safety phase
Ph10	t10 = tempo raggiungimento posizione riposo	t10 = home run
Ph12	Pausa	Standby (stationary)
Ph22	t22 = tempo di salita ventilatore (motore ventilatore = ON, valvola intercettazione di sicurezza = ON)	t22 = fan ramp up time (fan motor = ON, safety shutoff valve = ON)
Ph24	Verso posizione preventilazione	Traveling to the prepurge position
Ph30	t1 = tempo preventilazione	t1 = prepurge time
Ph36	Verso posizione accensione	Traveling to the ignition position
Ph38	t3 = tempo preaccensione	t3 = preignition time
Ph40	TSA1 = primo tempo sicurezza (trasformatore accensione ON) TSA1 = primo tempo sicurezza (trasformatore accensione ON)	TSA1= 1st safety time (ignition transformer ON)
Ph42	TSA1 = primo tempo sicurezza (trasformatore accensione OFF)	TSA1 = 1st safety time (ignition transformer OFF) t42 = preignition time OFF
Ph44	t44 = intervallo 1	t44 = interval 1
Ph50	TSA2 = secondo tempo sicurezza	TSA2 = 2nd safety time
Ph52	t52 = intervallo 2	t52 = interval 2
Ph60	Funzionamento 1 (stazionario)	Operation 1 (stationary)
Ph62	t62 = massimo tempo bassa fiamma (funzionamento 2, in preparazione per spegnimento, verso bassa fiamma)	t62 = max. time low-fire (operation 2, preparing for shutdown, traveling to low-fire)
Ph70	t13 = tempo postcombustione	t13 = afterburn time
Ph72	Verso posizione postcombustione	Traveling to the postpurge position
Ph74	t8 = tempo postventilazione	t8 = postpurge time
Ph80	t80 = tempo evacuazione controllo tenuta valvole	t80 = valve proving test evacuation time
Ph81	t81 = tempo perdita pressione atmosferica, prova atmosferica	t81 = leakage time test time atmospheric pressure, atmospheric test
Ph82	t82 = test perdita, test riempimento	t82 = leakage test filling test, filling
Ph83	t83 = tempo perdita pressione gas, test pressione	t83 = leakage test time gas pressure, pressure test
Ph90	Tempo attesa "mancanza gas"	Gas shortage waiting time

Entering the Parameter levels

By means of a proper use of the keys, it is possible to enter the various level parameters, as shown in the following flow chart:



The burner and consequently the LMV2x.. are factory set; the air and fuel curves as set as well.

Info level

To enter the **Info** level, proceed as follows:

- 1 in any menu position, press keys **+** and **-** at the same time, then the program will start again: the display will show **OFF**.



- 2 until the display will show **InFo**, Press the **enter (InFo)** key

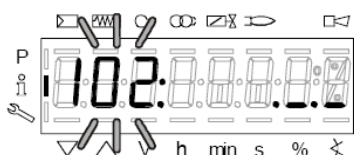


- 3 then it will show the first code (167) flashing, on the right side it will show the data entered. By pressing **+** or **-** it is possible to scroll (up or down) the parameter list.
- 4 If a dot-line is shown on the right, there is no enough room for complete visualisation: press **enter** again the data will be completely shown for 1 to 3 seconds. By pressing **enter** or **+** and **-** at the same time, the system will exit the parameter visualisation and go back to the flashing number.

The **Info** level shows some basic parameters as:

Parameter	Description
167	Cubic meters of fule (resettable)
162	Operating hours (resettable)
163	Device operating hours
164	Burners start-ups (resettable)
166	Total number of start-ups
113	Burner number (i.e. serial number)
107	Software version
102	Software date
103	Device serial number
104	Customer code
105	Version
143	Free

5 Example: choose parameter 102 to show the date



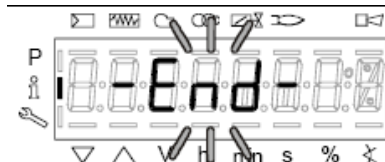
the display shows parameter **102** flashing on the left and characters **. _ . _** on the right.

6 press InFo for 1-3 seconds: the date will appear

7 press InFo to go back to parameter "102"

8 by pressing + / -, it is possible to scroll up/down the parameter list (see table above), or, by pressing ESC or InFo for more seconds, the display will show

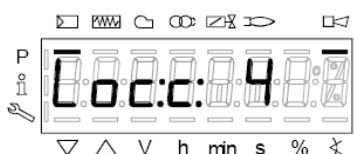
9 Once the last parameter is accessed (143) by pressing + , the **End** message will flash.



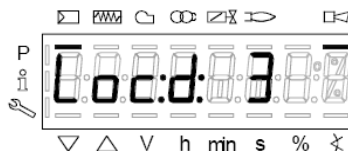
10 Press **InFo** for more than three seconds or for more than three seconds orto return to the normal display.



If a message like the one below is shown during operation,



it means that the burner is locked out and the Errore code is shown (in the example "error code:4"); this message is alternating with another message



Diagnostic code (in the example “diagnostic code:3”). Record the codes and find out the fault in the Error table.

To perform the reset, press InFo for one second:



The unit displays an event which does not lead to shutdown.

The display shows current error code **c**: alternating with diagnostic code **d**:



Press **InFo** to return to the display of phases.

Example: Error code **111** / diagnostic code **0**



To reset, press InFo for a second. Record the codes and check the Error List to find the type of faults.

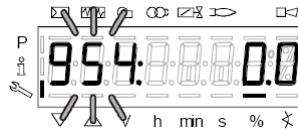
Service level

To enter the Service mode, press InFo until the display will show:

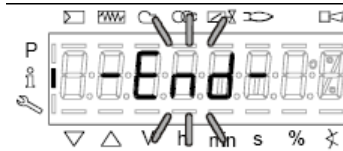


The service level shows all the information about flame intensity, actuators position, number and lock codes:

Parameter	Description
954	Flame intensity
121	% output, if set = automatic operation
922	Actuators position, 00=combustibile; 01= aria
161	Lock-outs number
701..725	Lock-outs History (see chapter 23 in the LMV2x manual)



- 1 .the first parameter will be "954": the percentage of flame is shown on the right. By pressing + or - it is possible to scroll up/down the parameter list.
- 2 Once the last parameter is accessed (143) by pressing + , the **End** message will blink.



- 3 Press **Info** for more than three seconds or for more than three seconds to return to the normal display.



For further information, see the LMV2 related manual.

ADJUSTMENTS FOR GAS OPERATION

Air flow and gas adjustment

- startup the burner by selecting GAS by means of the switch on the burner control panel
- Adjust the air and gas flow rates, in accordance to the "air/gas ratio" curve points setting procedure on the LMV manual,. Check continuously, the flue gas analysis, to avoid combustion with air excess.
- Once the butterfly valve is completely opened, 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:
- If necessary, change the combustion head positionl.
- The air and gas flow rate are now adjusted at the maximum power stage: go on with the point to point adjustment, as to reach the minimum output
- Adjust the pressure switches

Adjusting the gas valves group

Multibloc MB-DLE

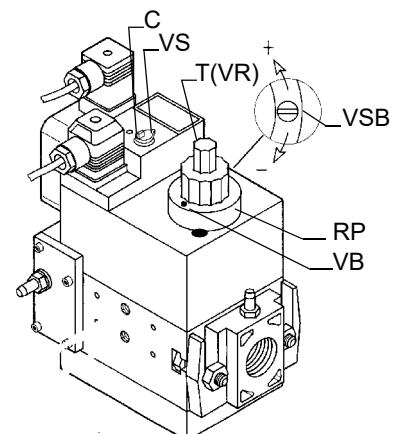
The multibloc unit is a compact unit consisting of two valves, gas pressure switch, pressure stabilizer and gas filter.

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

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

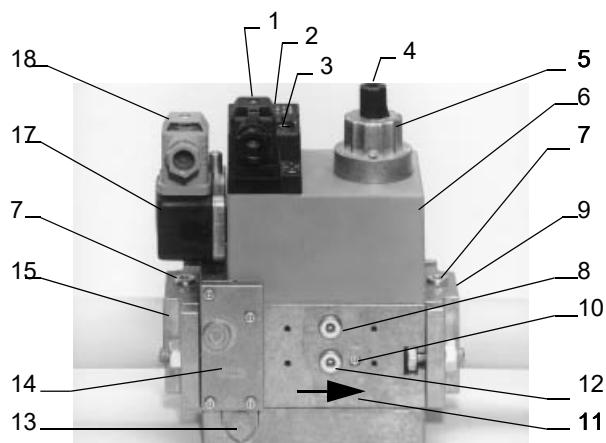
The pressure stabilizer is adjusted by operating the screw **VS** located under the cover **C**. By screwing down the pressure is increased and by unscrewing it is reduced.

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



Key

- | | |
|--|---|
| 1 Electrical connection for valves | 9 Output flange |
| 2 Operation display (optional) | 10 Test point connection M4 downstream of valve 2 |
| 3 Pressure governor closing tap | 11 Gas flow direction |
| 4 Start setting cap | 12 Test connection G 1/8 downstream of valve 1, on both sides |
| 5 Hydraulic brake and rate regulator | 13 Vent nozzle pressure regulator |
| 6 Coil | 14 Filter (below cover) |
| 7 Test point connection G 1/8 | 15 Input flange |
| 8 Test point connection G 1/8 downstream of valve 1, on both sides | 17 Pressure switch |
| | 18 Pressure switch electric connection |

**MultiBloc MBE**

Regulation VD-R with PS

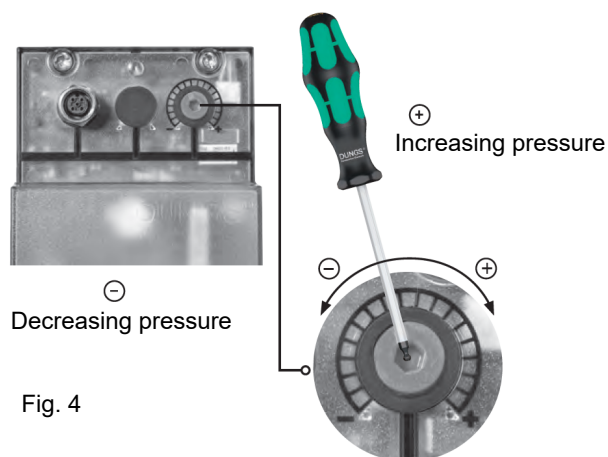


Fig. 4



Setting scale is „Not“ linear! Various sensors available. Output pressure according to sensor's measuring range.



Adjust the outlet pressure to the value specified by the burner or equipment manufacturer!



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

ATTENTION: To set the outlet pressure of the VD-R regulator, act on the adjustment ring nut (Fig. 10)

The position of the indicator in the dial indicates the value of the outlet pressure calculated as a percentage of the full scale of the PS sensor (Fig. 11)

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

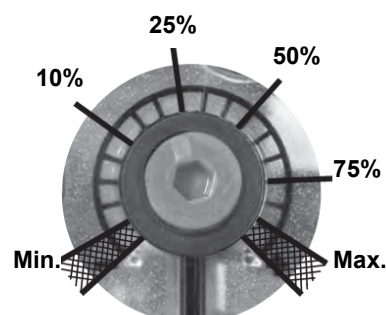


Fig. 5

Adjusting output pressure for positive pressure systems (requires PS-10/40 or PS-50/200):

Pressure taps MultiBloc MBE

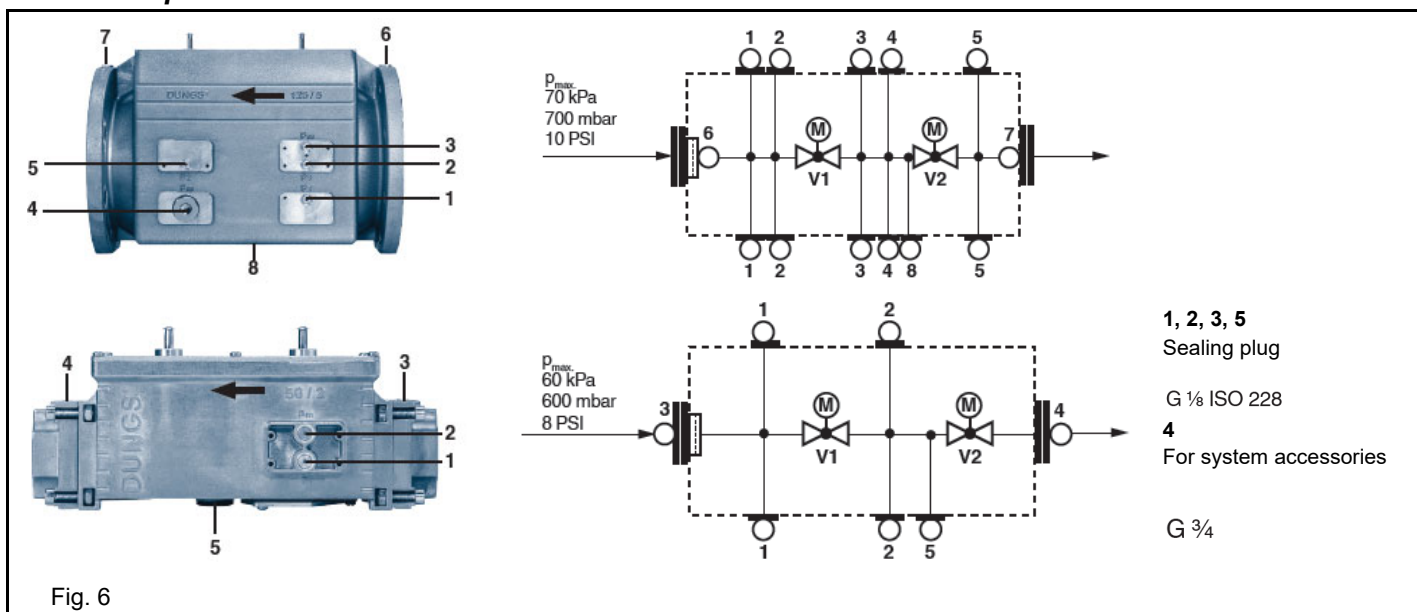
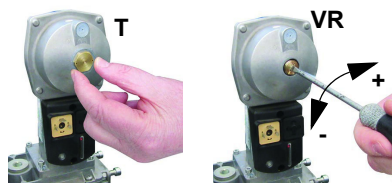


Fig. 6

Gas valveversion with SKP2 (built-in pressure stabilizer)

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



Calibration air and gas pressure switches

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

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



Calibration of low gas pressure switch

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

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

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

Calibration the maximum gas pressure switch (when provided)

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

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

Calibration of air pressure switch

To calibrate the air pressure switch, proceed as follows:

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

Calibration gas leakage pressure switch (PGCP)

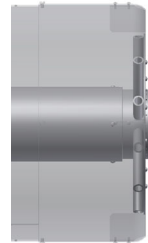
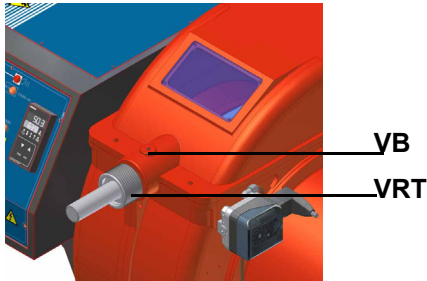
- remove the pressure switch plastic cover;
- adjust the PGCP pressure switch to the same value set for the minimum gas pressure switch;
- replace the plastic cover.

Adjusting the combustion head

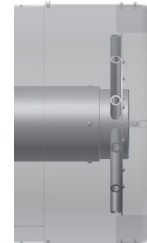


Attention! if it is necessary to change the head position, repeat the air and fuel adjustments described above.

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

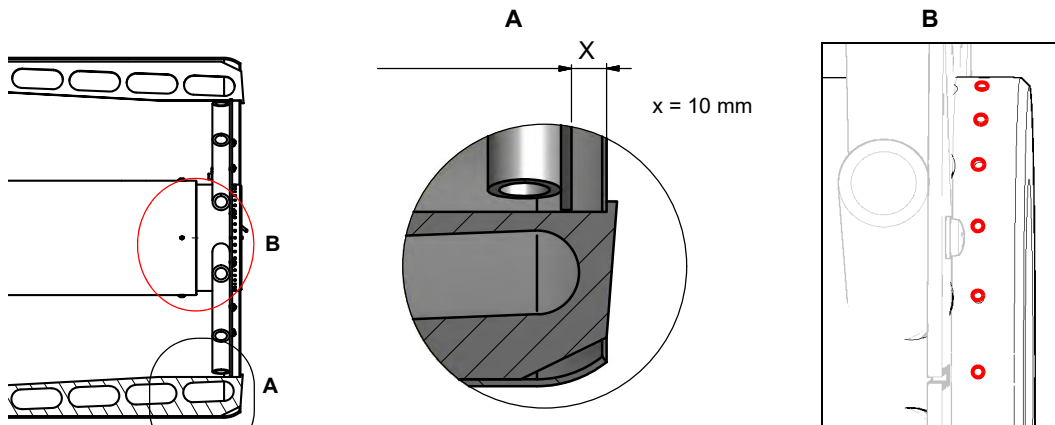


"all-ahead" position



"all-backwards" head position

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



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

PART IV: MAINTENANCE



WARNING: ALL OPERATIONS ON THE BURNER MUST BE CARRIED OUT WITH THE MAINS DISCONNECTED AND THE FUEL MANUAL CUTOFF VALVES CLOSED!
ATTENTION: READ CAREFULLY THE "WARNINGS" CHAPTER AT THE BEGINNING OF THIS MANUAL.

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.

ROUTINE MAINTENANCE

- Check that the gas meter is not moving when the burner is off. In case it is rotating, look for possible leaks.
- Check the cleaning condition of the vent. Clean the vent by using exclusively a dry brush. If needed, disassemble it from the motor's shaft and wash it by using non corrosive detergents. Prior to disassemble the vent, take the measurements in relation to the motor's shaft, so as to reassemble it in the same position.
- Check that all parts in contact with combustive air (air box, protection mesh and Archimedean screw) are clean and free from any obstruction that might impede free afflux. Clean it with compressed air if available and/or a dry brush or cloths. Eventually wash it with non corrosive detergents.
- Check the blast tube; it must be substituted in case of obvious cracks or anomalous holes. Slight deformations that do not affect combustion may be tolerated
- Check the condition of the burner-boiler gasket. Eventually substitute it.
- Check the fan's motor: no specific maintenance is needed. In case of anomalous noises when running, check the condition of the bearings and eventually substitute them or completely substitute the motor.
- Clean and examine the gas filter cartridge and replace it if necessary;
- Remove and clean the combustion head;
- Examine and clean the ignition electrodes, adjust and replace them if necessary;
- Examine and clean the detection electrode/photoelement (according to the burner models), replace it if necessary, in case of doubt, check the detection circuit, after the burner start-up;
- Clean and grease leverages and rotating parts.
- At least every 2 months, or more often if needed, clean the room where the burner is installed.
- Avoid leaving installations, papers, nylon bags, etc., inside the room. They could be sucked by the burner and cause malfunctioning.
- Check that the room's vents are free from obstructions.

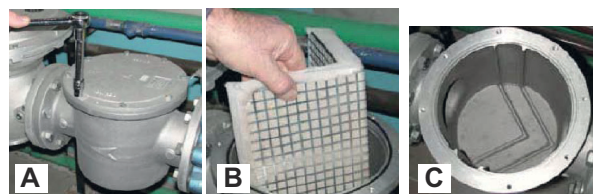


ATTENTIONwhen servicing, if it was necessary to disassemble the gas train parts, remember to execute the gas proving test, once the gas train is reassembled, according to the procedure imposed by the law in force.

Gas filter maintenance

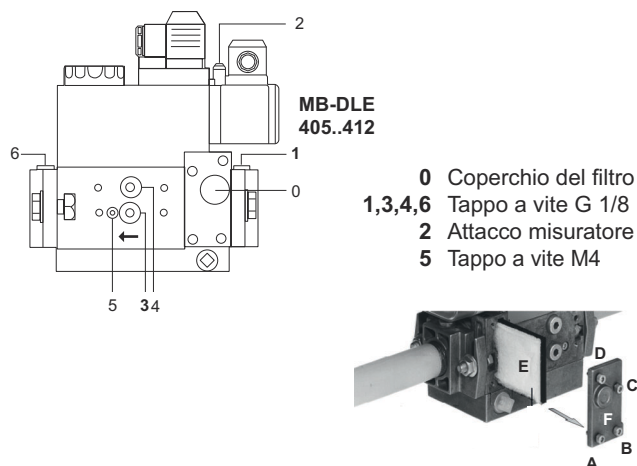
To clean or remove the filter, proceed as follows:

- 1 remove the cap unscrewing the fixing screws (A);
- 2 remove the filtering cartridge (B), clean it using water and soap, blow it with compressed air(or replace it, if necessary)
- 3 replace the cartridge in its proper position taking care to place it 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).

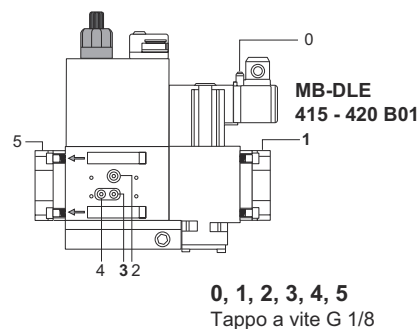
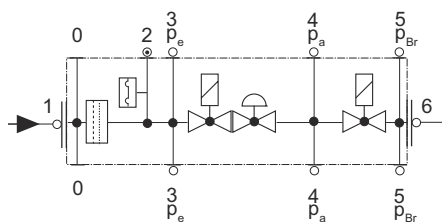


WARNING: Before opening the filter, close the manual cutoff valve downstream the filter and bleed the gas; check that inside the filter there is no pressurised gas.

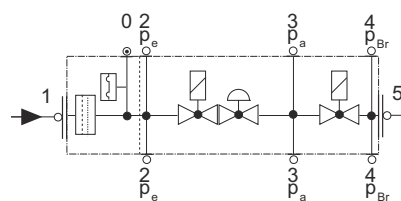
Adjusting the gas valves group and removing the filter



Prese di pressione



Prese di pressione

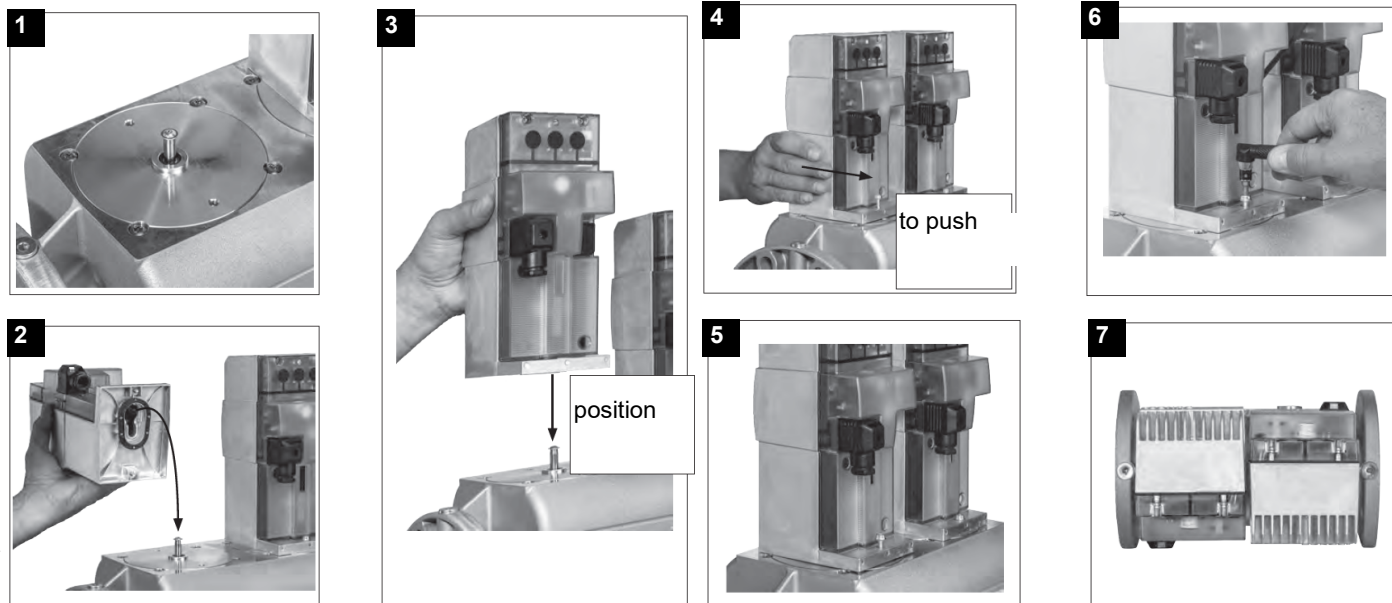


- Check the filter at least once a year!
- Change the filter if the pressure difference between pressure connection 1 and 3 (Fig. 1-Fig. 3) is $\Delta p > 10$ mbar.
- Change the filter if the pressure difference between pressure connection 1 and 3 (Fig. 1-Fig. 3) is twice as high compared to the last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

You can change the filter without removing the fitting.

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

MultiBloc MBEMultiBloc VD Mounting

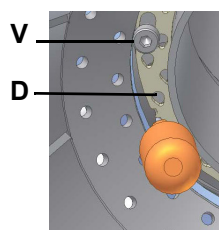


1. Position VD on VB, fig. 2+3.
2. Slide VD forward up to the stop, fig. 4.
3. Screw VD on with 2 M5 screws for each, max. 5 Nm/44 in.-lb., fig. 5/6.
4. VD can be mounted rotated by 180°, fig. 7.

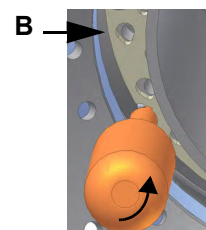
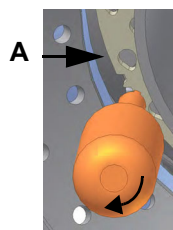
Center head holes gas flow regulation (natural gas burners)

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

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



A: opened holes
B: closed holes



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

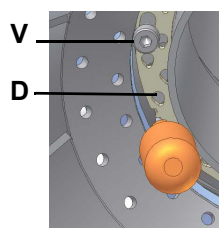
The factory setting depends on the type of fuel for which the burner is designed:

- For natural gas burners, plate holes are fully opened

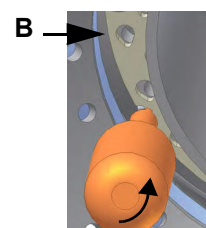
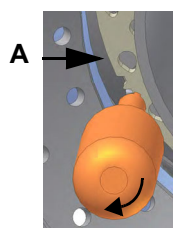
Center head holes gas flow regulation (LPG burners)

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

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



A: opened holes
B: closed holes



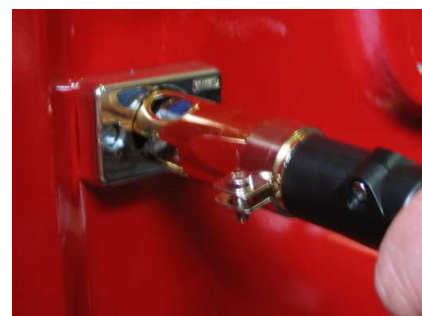
The adjusting plate correct position must be regulated in the plant during the commissioning.

- 9xA **series:** 1,5 mm 5xxA **series:** 1,3 mm

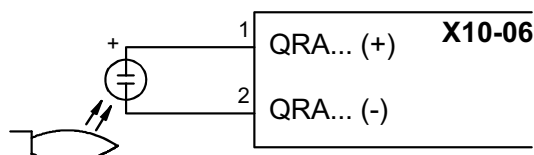
Flame detection probe

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

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



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



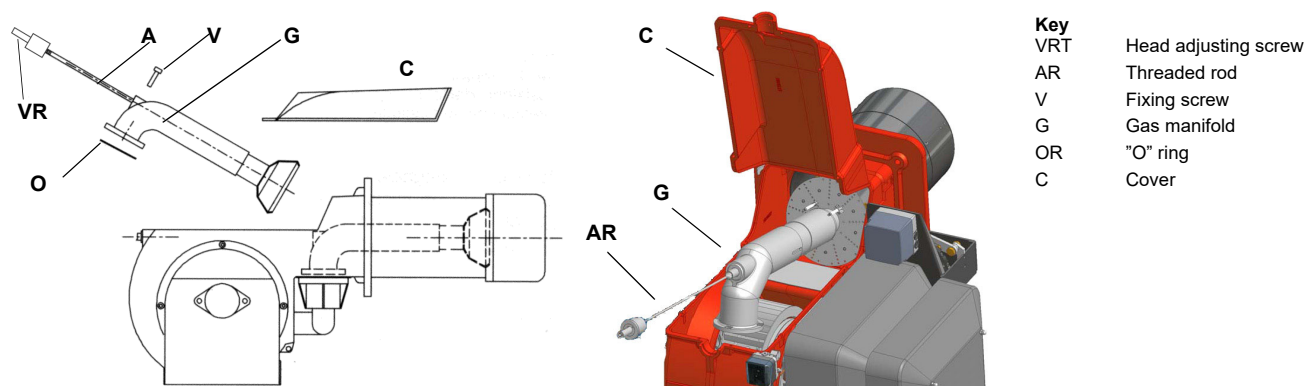
Removing the combustion head



Attention: before adjusting the combustion head, turn the burner off and wait until it gets cold.

- Remove the cover **C**.
- remove the electrodes cables;
- unscrew the 3 screws **V** which hold in position the gas manifold **G** and pull out the complete group as shown in the picture below.
- Clean the combustion head by a compressed air blow or, in case of scale, scrape it off by a scratchbrush.

Note: to replace the combustion head reverse the procedure described above having care to place correctly the O ring (**OR**) between burner and gas manifold.

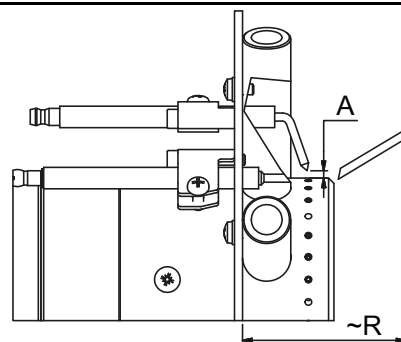
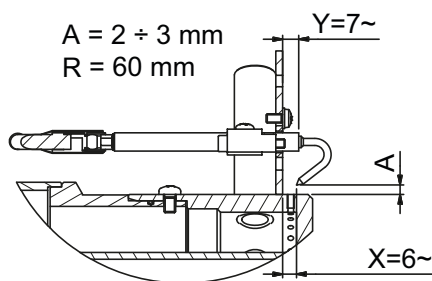


Electrodes Adjustment Important Note: Check the ignition and detection electrodes after removing/adjusting the combustion head.



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

A = Ignition electrodes
R = Detection electrode



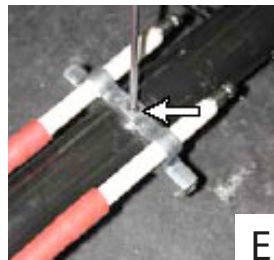
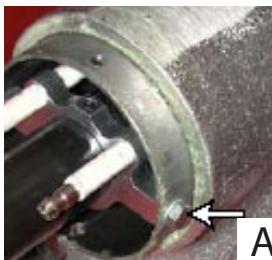
Replacing the ignition electrodes



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

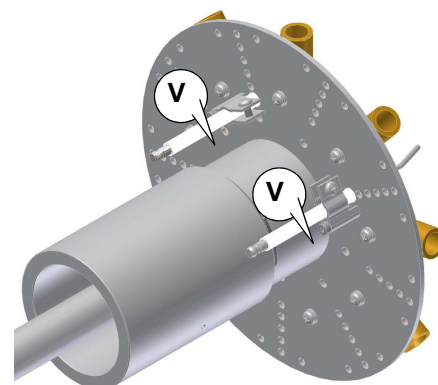
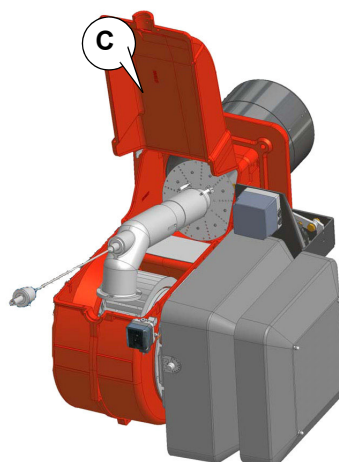
To replace the ignition electrodes, proceed as follows:

- 1 remove the burner cover;
- 2 loose the nuts that fasten the electrodes group to the combustion head (A);
- 3 disconnect the electrodes cables (B);
- 4 loose the security dows of the adjusting ring nut (C);
- 5 shift the electrodes group back to the outside and remove the combustion head (D);
- 6 loose the screw of the ignition electrodes support (E);
- 7 remove the electrodes and replace them paying attention to the measures showed in figure (F-G);
- 8 reassemble the burner by following the procedure in the reversed order.



To replace the electrodes, proceed as follows:

- 1 remove the burner cover **C**;
- 2 disconnect the electrodes cables;
- 3 remove the combustion head referring to paragraph "Removing the combustion head";
- 4 unscrew **VE** screws that fasten the electrodes (see next pictures)
- 5 remove the electrodes and replace them referring to the measures indicated in the previous paragraph;
- 6 reconnect the electrodes cables;
- 7 replace the combustion head;
- 8 replace the burner cover.



Burner service term

- In optimal operating conditions, and with preventive maintenance, the burner can last up to 20 years.
- Upon expiry of the burner service term, it is necessary to carry out a technical diagnosis and, if necessary, an overall repair.
- The burner status is considered to be at its limit if it is technically impossible to continue using it due to non-compliance with safety requirements or a decrease in performance.
- The owner makes the decision whether to finish using the burner, or replacing and disposing of it based on the actual state of the appliance and any repair costs.
- The use of the burner for other purposes after the expiry of the terms of use is strictly prohibited.

Seasonal stop

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

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

Burner disposal

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

WIRING DIAGRAMS

Refer to the attached wiring diagrams.

WARNING

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

TROUBLESHOOTING GUIDE Gas operation

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



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