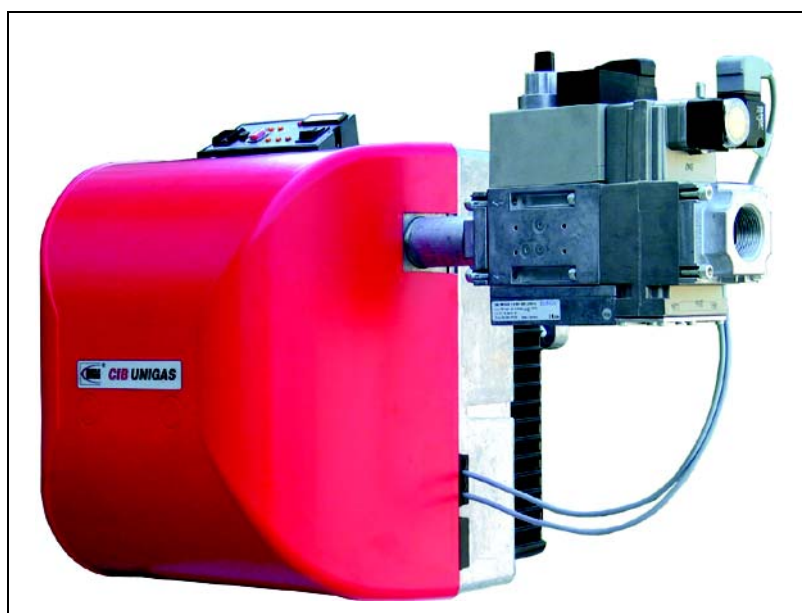


# LG/NG/NGX280 LG/NG/NGX350 LG/NG/NGX400



## *IDEA Series Gas burners*

MANUAL OF INSTALLATION - USE - MAINTENANCE

**CIB UNIGAS**

BURNERS - BRUCIATORI - BRULERS - BRENNER - QUEMADORES - ГОРЕЛКИ

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## APPENDIX

## WARNINGS

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

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

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

**CAREFULLY KEEP THIS MANUAL FOR FUTURE REFERENCE.**

### 1) GENERAL INTRODUCTION

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

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

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

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

Contact qualified personnel only.

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

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

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

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

The manufacturer shall not be held liable, by agreement or otherwise, for damages resulting from improper installation, use and failure to comply with the instructions supplied by the manufacturer.

### 2) SPECIAL INSTRUCTIONS FOR BURNERS

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

When the decision is made to discontinue the use of the burner, the user

shall have qualified personnel carry out the following operations:

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

#### Special warnings

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

### 3) GENERAL INSTRUCTIONS DEPENDING ON FUEL USED

#### 3a) ELECTRICAL CONNECTION

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

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

#### GENERAL

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

#### SPECIAL INSTRUCTIONS FOR USING GAS

Have qualified personnel inspect the installation to ensure that:

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

#### Precautions if you can smell gas

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

### DIRECTIVES AND STANDARDS

#### *Gas burners*

##### European directives:

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

##### Harmonised standards :

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

#### *Light oil burners*

##### European directives:

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

##### Harmonised standards :

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

##### National standards :

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

#### *Heavy oil burners*

##### European directives:

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

##### Harmonised standards :

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

##### National standards :

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

#### *Gas - Light oil burners*

##### European directives:

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

##### Harmonised standards :

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

##### National standards :

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

#### *Gas - Heavy oil burners*

##### European directives:

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

##### Harmonised standards :

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

##### National standards :

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

## PART I: INSTALLATION

## GENERAL FEATURES

These burners are characterised by high performances and width in the performance curves, when the pressure in the combustion chamber is high. They are also characterised for other important functional features: there are plugs which can be easily connected to the boiler and to the detecting probes, a pressure plug in the combustion chamber, all mechanical components are mounted on a plate which can be quickly taken off for maintenance. The head is adjustable through a graduated screw. The gas train can be mounted either on the right side or on the left side.

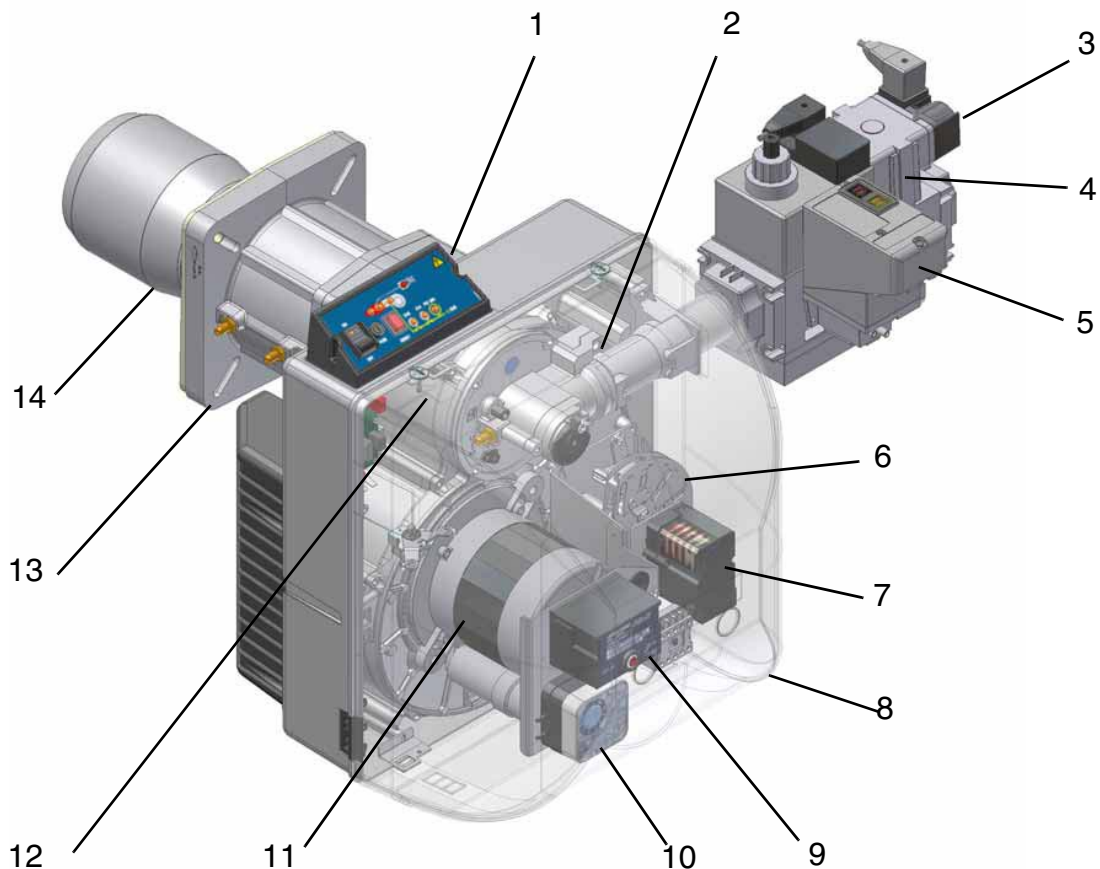


Fig. 1

- 1 Control panel with startup switch
- 2 Gas train
- 3 Gas filter
- 4 Gas valves group
- 5 Gas proving system
- 6 Adjusting cam (double-stage, progressive and fully-modulating burners)
- 7 Servocontrol (double-stage, progressive and fully-modulating burners)
- 8 Cover
- 9 Control box
- 10 Air pressure switch
- 11 Fan motor
- 12 Combustion head (inside)
- 13 Flange
- 14 Blast tube

The gas coming from the supply line, passes through the valves group provided with filter and stabiliser. This one forces the pressure in the utilisation limits. In the double-stage, progressive and fully-modulating burners, the electric servocontrol (7), that moves proportionally the air damper and the gas butterfly valve, uses an adjusting cam with variable shape. This one allows the optimisation of the gas flue values, as to get an efficient combustion. The combustion head positioning determines the burner's output. The combustion head (1) determines the energetic quality and the geometry of the flame. Fuel and comburent are routed into separated ways as far as the zone of flame generation (combustion chamber). The air (comburent) and fuel (gas, gas oil, heavy oil) are forced into the combustion chamber.

The control panel, placed on the burner's front side, shows each operating stage.

**How to interpret the burner's "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 ( $kW = kcal/h / 860$ );
- backpressure (data are available on the boiler's ID plate or in the user's manual).

Example:

Furnace input: kW 600

Backpressure: mbar 4

In the "Performance curve" diagram (Fig. 3), draw a vertical line matching the furnace input value and an horizontal line matching the backpressure value. The burner is suitable if the intersection point A is inside the performance curve.

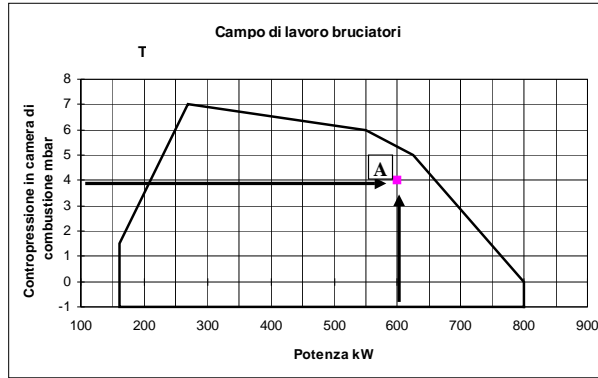


Fig. 2

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

**Checking the proper gas train size**

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

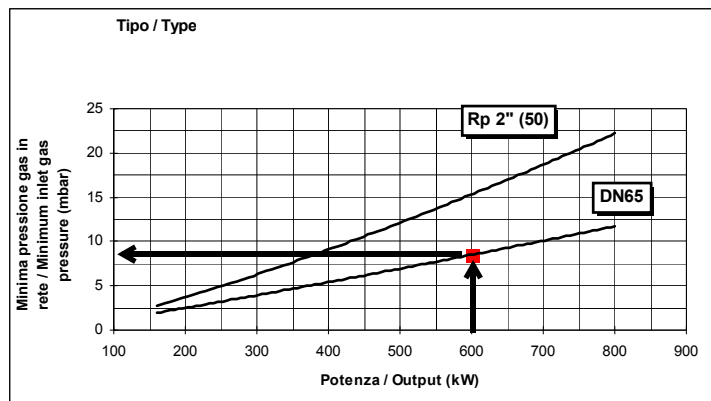


Fig. 3

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

**BURNER FEATURES****Burner model identification**

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

Type	NG400	Model	M-	PR.	S.	*	A.	O.	50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
(1) BURNER TYPE	NG - Natural gas burner LG - L.P.G. burner NGX - Low NOx burners								
(2) FUEL	M - Natural gas      L - LPG								
(3) OPERATION (Available versions)	TN - Single stage      AB - Double stage PR - Progressive      MD - Fully modulating								
(4) BLAST TUBE	S - standard      L - long      M - modular								
(5) DESTINATION COUNTRY	* see data plate								
(6) BURNER VERSION	A - Standard								
(7) EQUIPMENT	0 = 2 gas valves 1 = 2 Gas valves + gas proving system (optional)								
(8) GAS CONNECTION	25 = Rp1      32 = Rp1 1/4      40 = Rp1 1/2      50 = Rp2								

**Technical specifications**

BURNER TYPE		NG280	NG280	NG280	LG280	LG280	LG280
		M-.TN....0.25	M-.TN....0.32	M-.TN....0.40	L-.TN....0.20	L-.TN....0.25	L-.TN....0.32
Output	min.- max. kW	95 - 300					
Fuel		Natural gas			L.P.G.		
Category		(see next paragraph)			I <sub>3B/P</sub>		
Gas rate	min.- max. (Stm <sup>3</sup> /h)	10 - 32			3,7 - 11,5		
Gas pressure	min.- max. mbar	(Note2) - 360					
Power supply		230V - 50Hz					
Total power consumption	kW	0,55					
Electric motor	kW	0,25					
Protection		IP40					
Approx. weight	kg	47					
Valves size / Gas connection		1" / Rp1	1" 1/4 / Rp 1 1/4	1" 1/2 / Rp 1 1/2	3/4" / Rp3/4	1" / Rp1	1" 1/4 / Rp 1 1/4
Operation		Single stage					
Operating temperature	°C	-10 ÷ +50					
Storage Temperature	°C	-20 ÷ +60					
Working service*		Intermittent					

BURNER TYPE		NG280	NG280	NG280	LG280	LG280	LG280
		M-.xx...0.25	M-.xx...0.32	M-.xx...0.40	L-.xx...0.20	L-.xx...0.25	L-.xx...0.32
Output	min.- max. kW	65 - 300					
Fuel		Natural gas			L.P.G.		
Category		(see next paragraph)			I <sub>3B/P</sub>		
Gas rate	min.- max. (Stm <sup>3</sup> /h)	7 - 32			2,5 - 11,5		
Gas Pressure	min.- max. mbar	(Note2) - 360					
Power supply		230V - 50Hz					
Total power consumption	kW	0,55					
Electric motor	kW	0,25					
Protection		IP40					
Approx. weight	kg	47					
Valves size / Gas connection		1" / Rp 1	1" 1/4 / Rp 1 1/4	1" 1/2 / Rp 1 1/2	1" / Rp1	1" / Rp1	1" 1/4 / Rp 1 1/4
Operation		Progressive - Fully modulating					
Operating temperature	°C	-10 ÷ +50					
Storage Temperature	°C	-20 ÷ +60					
Working service*		Intermittent					

BURNER TYPE		NG350	NG350	NG350	LG350	LG350	LG350	
		M-.TN....0.25	M-.TN....0.32	M-.TN....0.40	L-.TN....0.25	L-.TN....0.32	L-.TN....0.40	
Output	min.- max. kW	115 - 330						
Fuel		Natural gas				L.P.G.		
Category		(see next paragraph)				I <sub>3B/P</sub>		
Gas rate	min.- max. (Stm <sup>3</sup> /h)	12 - 35			4 - 13			
Gas pressure	min.- max. mbar	(Note2) - 360						
Power supply		230V - 50Hz						
Total power consumption	kW	0,67						
Electric motor	kW	0,37						
Protection		IP40						
Approx. weight	kg	47						
Valves size / Gas connection		1" / Rp 1	1" ¼ / Rp 1 ¼	1" ½ / Rp 1 ½	1" / Rp1	1" ¼ / Rp 1 ¼	1" ½ / Rp 1 ½	
Operation		Single stage						
Operating temperature	°C	-10 ÷ +50						
Storage Temperature	°C	-20 ÷ +60						
Working service*		Intermittent						

BURNER TYPE		NG350	NG350	NG350	LG350	LG350	LG350	
		M-.xx...0.25	M-.xx...0.32	M-.xx...0.40	L-.xx...0.25	L-.xx...0.32	L-.xx...0.40	
Output	min.- max. kW	80 - 330			85 - 330			
Fuel		Natural gas				L.P.G.		
Category		(see next paragraph)				I <sub>3B/P</sub>	I <sub>3B/P</sub>	I <sub>3B/P</sub>
Gas rate	min.- max. (Stm <sup>3</sup> /h)	8.5 - 35	8.5 - 35	8.5 - 35	3 - 13	3 - 13	3 - 13	
Gas pressure	min.- max. mbar	(Note2) - 360						
Power supply		230V - 50Hz						
Total power consumption	kW	0,67						
Electric motor	kW	0,37						
Protection		IP40						
Approx. weight	kg	47						
Valves size / Gas connection		1" / Rp 1	1" ¼ / Rp 1 ¼	1" ½ / Rp 1 ½	1" / Rp1	1" ¼ / Rp 1 ¼	1" ½ / Rp 1 ½	
Operation		Progressive - Fully modulating						
Operating temperature	°C	-10 ÷ +50						
Storage Temperature	°C	-20 ÷ +60						
Working service*		Intermittent						

BURNER TYPE		NG400	NG400	NG400	NG400
		M-.TN....0.25	M-.TN....0.32	M-.TN....0.40	M-.TN....0.50
Output	min.- max. kW	185 - 420			
Fuel		Natural gas			
Category		(see next paragraph)			
Gas rate	min.- max. (Stm <sup>3</sup> /h)	20 - 44.5			
Gas pressure	min.- max. mbar	(Note2) - 360			
Power supply		230V - 50Hz			
Total power consumption	kW	0,67			
Electric motor	kW	0,37			
Protection		IP40			
Approx. weight	kg	47			
Valves size / Gas connection		1" / Rp 1	1" ¼ / Rp 1 ¼	1" ½ / Rp 1 ½	2" / Rp 2
Operation		Single-stage			
Operating temperature	°C	-10 ÷ +50			
Storage Temperature	°C	-20 ÷ +60			
Working service*		Intermittent			



BURNER TYPE		NG400	NG400	NG400	NG400
		M-xx...0.25	M-xx...0.32	M-xx...0.40	M-xx...0.50
Output	min.- max. kW	115 - 420			
Fuel		Natural gas			
Category		(see next paragraph)			
Gas rate	min.- max. (Stm <sup>3</sup> /h)	12 - 44.5			
Gas pressure	min.- max. mbar	(Note2) - 360			
Power supply		230V - 50Hz			
Total power consumption	kW	0,67			
Electric motor	kW	0,37			
Protection		IP40			
Approx. weight	kg	47			
Valves size / Gas connection		1" / Rp 1	1" ¼ / Rp 1 ¼	1" ½ / Rp 1" ½	2" / Rp 2
Operation		Progressive - Fully modulating			
Operating temperature	°C	-10 ÷ +50			
Storage Temperature	°C	-20 ÷ +60			
Working service*		Intermittent			

BURNER TYPE		LG400	LG400	LG400	LG400
		L-xx...0.25	L-xx...0.32	L-xx...0.40	L-xx...0.50
Output	min.- max. kW	105 - 420			
Fuel		L.P.G.			
Category		I <sub>3B/P</sub>			
Gas rate	min.- max. (Stm <sup>3</sup> /h)	4 - 16			
Gas pressure	min.- max. mbar	(Note2) - 360			
Power supply		230V - 50Hz			
Total power consumption	kW	0,67			
Electric motor	kW	0,37			
Protection		IP40			
Approx. weight	kg	47			
Valves size / Gas connection		1" / Rp 1	1" ¼ / Rp 1 ¼	1" ½ / Rp 1" ½	2" / Rp 2
Operation		Progressive - Fully modulating			
Operating temperature	°C	-10 ÷ +50			
Storage Temperature	°C	-20 ÷ +60			
Working service*		Intermittent			

<b>Note1:</b>	All gas flow rates are referred to Stm <sup>3</sup> /h (1013 mbar absolute pressure, 15 °C temperature) and are valid for G20 gas (net calorific value H <sub>i</sub> = 34.02 MJ/Stm <sup>3</sup> ); for L.P.G. (net calorific value H <sub>i</sub> = 93.5 MJ/Stm <sup>3</sup> )
<b>Note2:</b>	Maximum gas pressure = 360mbar (with Dungs MBDLE/MBC valves) Minimum gas pressure = see gas curves.

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

### Low NOx burners Technical specifications

BURNER TYPE		NGX280 M-.TN...0.25	NGX280 M-.TN...0.32	NGX280 M-.TN...0.40
Output	min.- max. kW	93 - 190		
Fuel		Natural gas		
Category		(see next paragraph)		
Gas rate	min.- max. (Stm <sup>3</sup> /h)	9,8 - 20		
Gas Pressure	min.- max. mbar	(Note2) - 360		
Power supply		230V - 50Hz		
Total power consumption	kW	0,55		
Electric motor	kW	0,25		
Protection		IP40		
Approx. weight	kg	47		
Valves size / Gas connection		1" / Rp1	1" <sub>1/4</sub> / Rp 1 <sub>1/4</sub>	1" <sub>1/2</sub> / Rp 1 <sub>1/2</sub>
Operation		Single-stage		
Operating temperature	°C	-10 ÷ +50		
Storage Temperature	°C	-20 ÷ +60		
Working service*		Intermittent		

BURNER TYPE		NGX280 M-.xx...0.25	NGX280 M-.xx...0.32	NGX280 M-.xx...0.40
Output	min.- max. kW	60 - 190		
Fuel		Natural gas		
Category		(see next paragraph)		
Gas rate	min.- max. (Stm <sup>3</sup> /h)	6,4 - 20		
Gas pressure	min.- max. mbar	(Note2) - 360		
Power supply		230V - 50Hz		
Total power consumption	kW	0,55		
Electric motor	kW	0,25		
Protection		IP40		
Approx. weight	kg	47		
Valves size / Gas connection		1" / Rp1	1" <sub>1/4</sub> / Rp 1 <sub>1/4</sub>	1" <sub>1/2</sub> / Rp 1 <sub>1/2</sub>
Operation		Progressive - Fully modulating		
Operating temperature	°C	-10 ÷ +50		
Storage Temperature	°C	-20 ÷ +60		
Working service*		Intermittent		

BURNER TYPE		NGX350 M-.xx...0.25	NGX350 M-.xx...0.32	NGX350 M-.xx...0.40
Output	min.- max. kW	65 - 260		
Fuel		Natural gas		
Category		(see next paragraph)		
Gas rate	min.- max. min.- max.(Stm <sup>3</sup> /h)	7 - 27.5		
Gas pressure	min.- max. mbar	(Note2) - 360		
Power supply		230V - 50Hz		
Total power consumption	kW	0,67		
Electric motor	kW	0,37		
Protection		IP40		
Approx. weight	kg	47		
Valves size / Gas connection		1" / Rp1	1" <sub>1/4</sub> / Rp 1 <sub>1/4</sub>	1" <sub>1/2</sub> / Rp 1 <sub>1/2</sub>
Operation		Progressive - Fully modulating		
Operating temperature	°C	-10 ÷ +50		
Storage Temperature	°C	-20 ÷ +60		
Working service*		Intermittent		

BURNER TYPE		NGX400 M-.xx...0.25	NGX400 M-.xx...0.32	NGX400 M-.xx...0.40	NGX400 M-.xx...0.50
Output	min.- max. kW	90 - 350			
Fuel		Natural gas			
Category		(see next paragraph)			
Gas rate	min.- max. (Stm <sup>3</sup> /h)	9.5 - 37			
Gas pressure	min.- max. mbar	(Note2) - 360			
Power supply		230V - 50Hz			
Total power consumption	kW	0,67			
Electric motor	kW	0,37			
Protection		IP40			
Approx. weight	kg	47			
Valves size / Gas connection		1" / Rp 1	1" ¼ / Rp 1 ¼	1" ½ / Rp 1" ½	2" / Rp 2
Operation		Progressive - Fully modulating			
Operating temperature	°C	-10 ÷ +50			
Storage Temperature	°C	-20 ÷ +60			
Working service*		Intermittent			

<b>Note1:</b>	All gas flow rates are referred to Stm <sup>3</sup> /h (1013 mbar absolute pressure, 15 °C temperature) and are valid for G20 gas (net calorific value H <sub>i</sub> = 34.02 MJ/Stm <sup>3</sup> ); for L.P.G. (net calorific value H <sub>i</sub> = 93.5 MJ/Stm <sup>3</sup> )
<b>Note2:</b>	Maximum gas pressure = 360mbar (with Dungs MBDLE/MBC valves) Minimum gas pressure = see gas curves for network gas pressure.

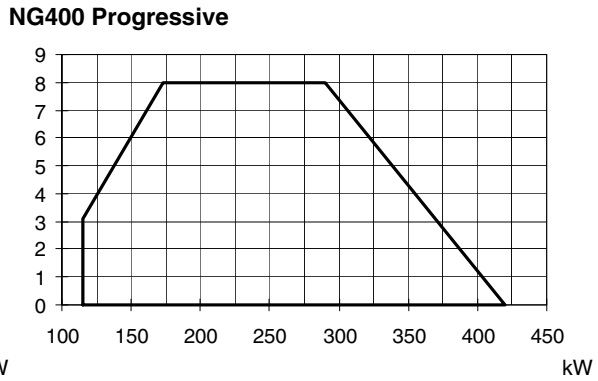
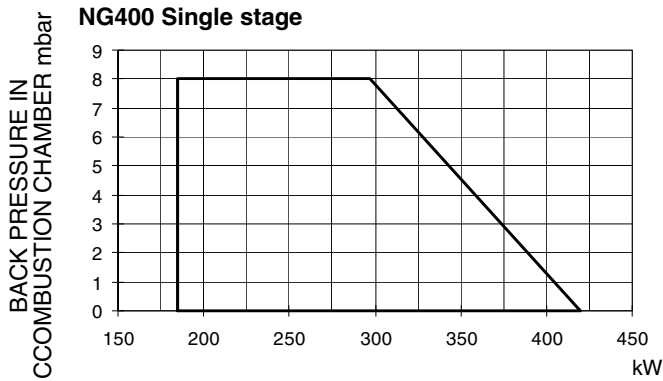
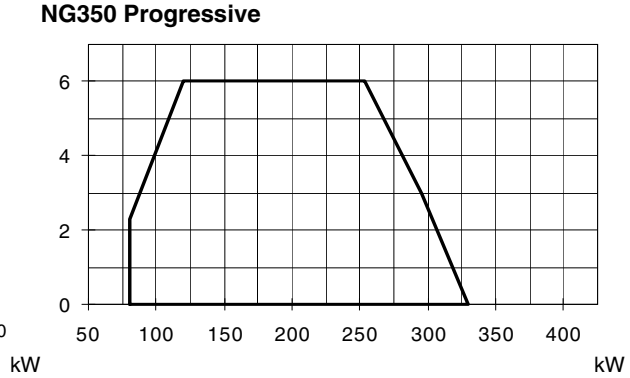
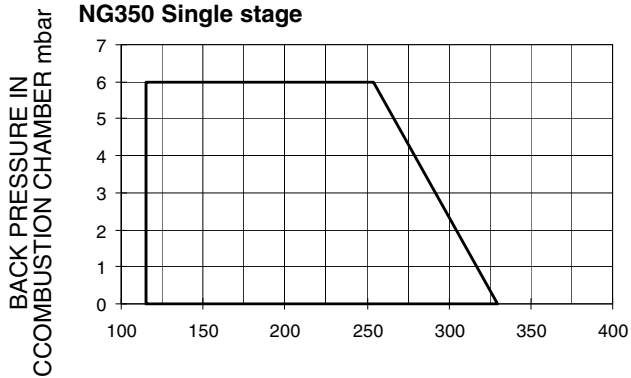
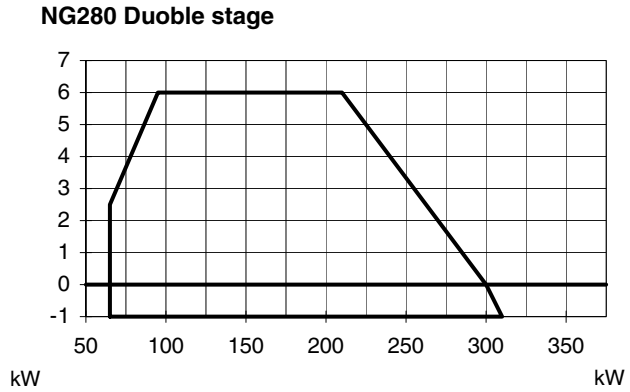
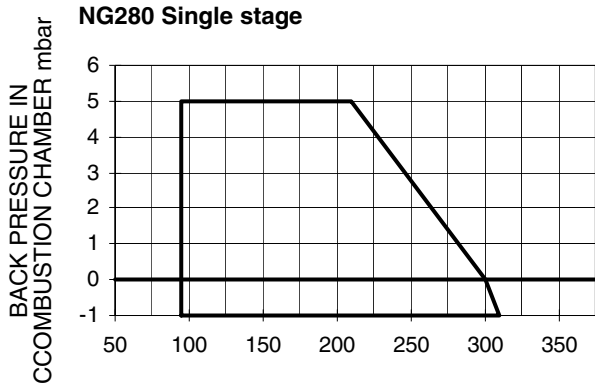
\* NOTE ON THE WORKING SERVICE: the control box automatically stops after 24h of continuous working. The control box immediately starts up, automatically.

**Country and usefulness gas categories**

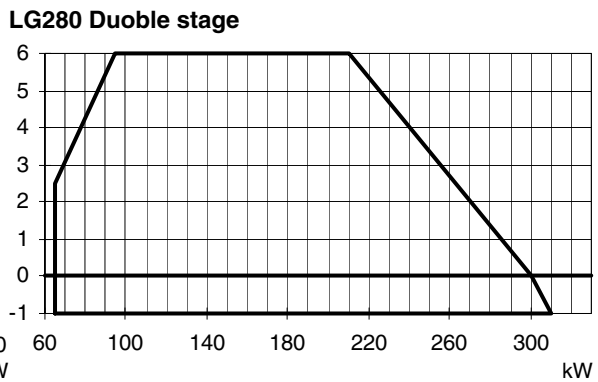
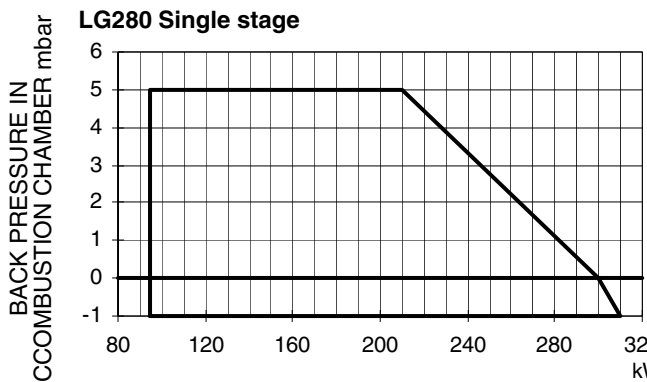
GAS CATEGORY	COUNTRY																								
	AT	ES	GR	SE	FI	IE	HU	IS	NO	CZ	DK	GB	IT	PT	CY	EE	LV	SI	MT	SK	BG	LT	RO	TR	CH
I <sub>2H</sub>																									
I <sub>2E</sub>	LU	PL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I <sub>2E(R)B</sub>	BE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-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

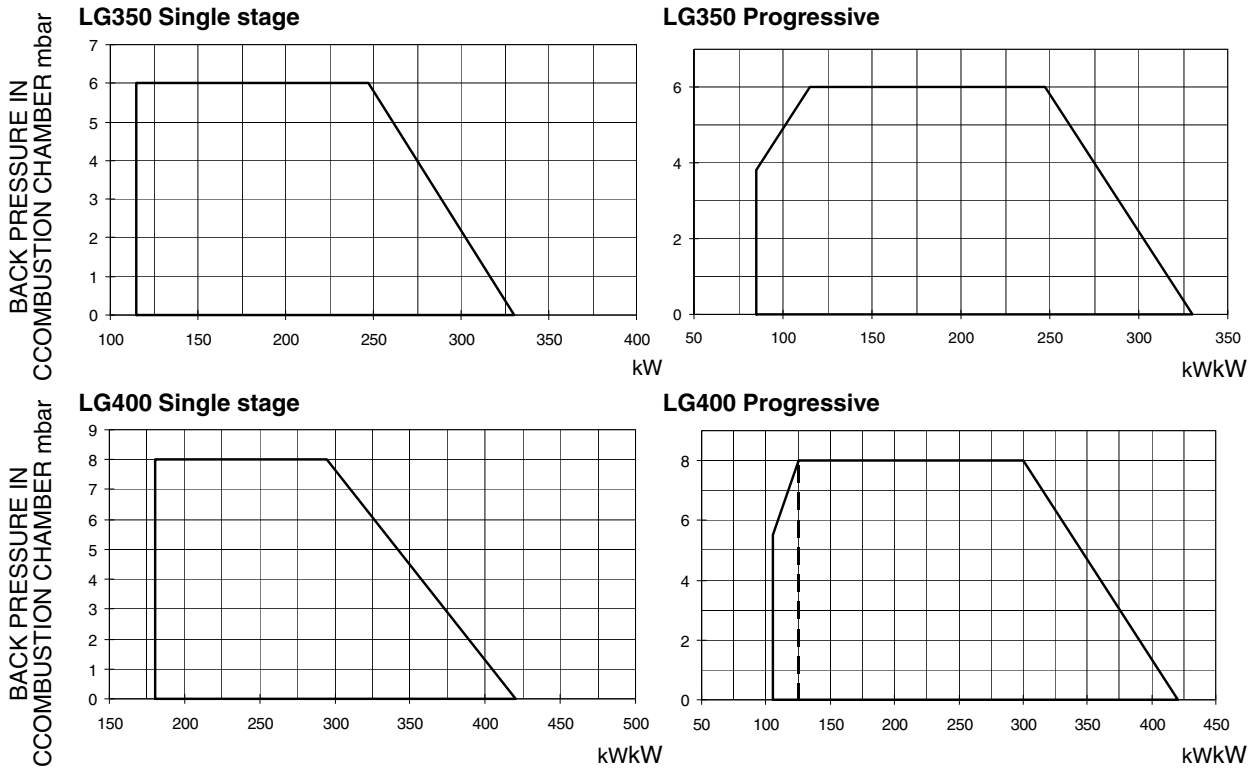
**Performance Curves**

● **Gas burners**

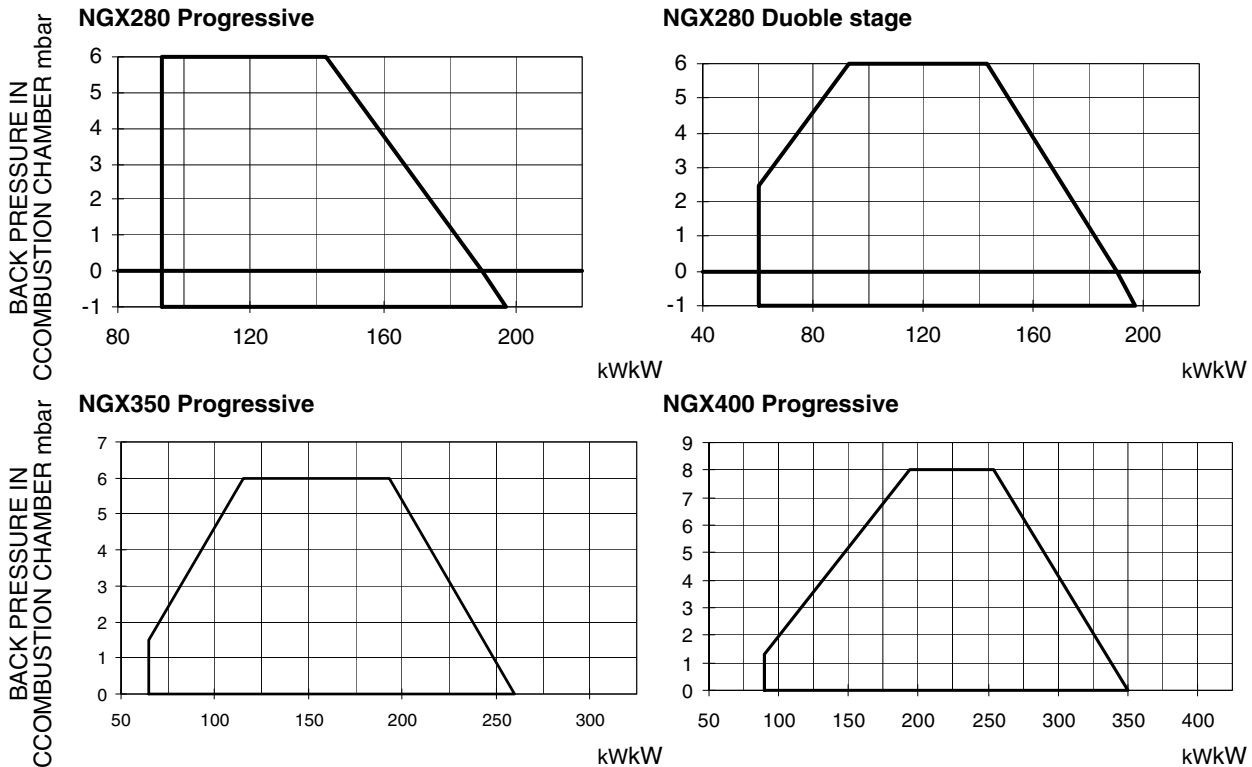


● **L.P.G. Burners**





● **Low NOx burners**



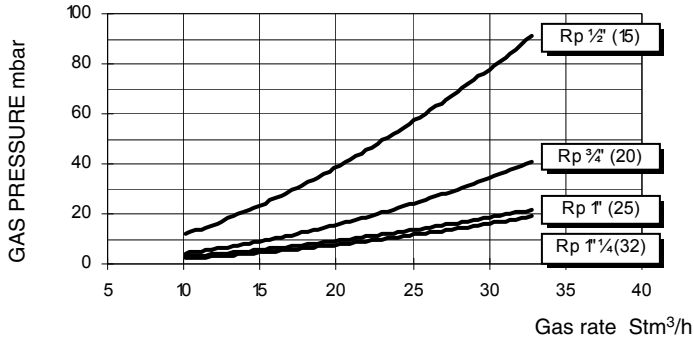
Data are referred to standard conditions: atmospheric pressure at 1013mbar, ambient temperature at 15°C.

**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.

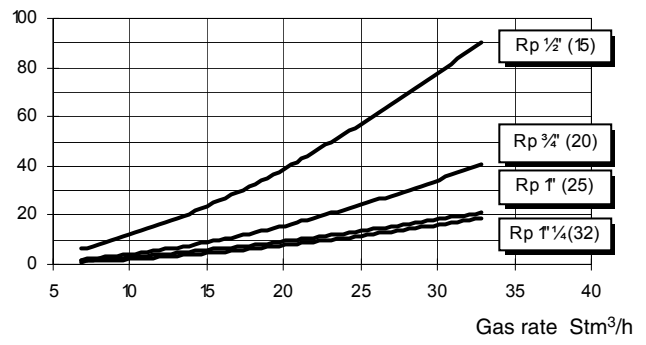
**Pressure in the network - gas flow rate curves**

● **Gas burners**

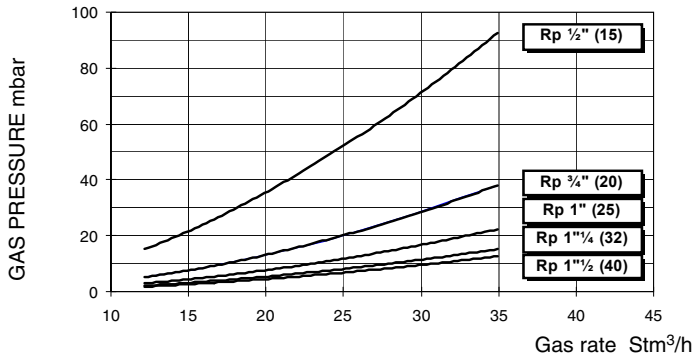
**NG280 M-.TN...**



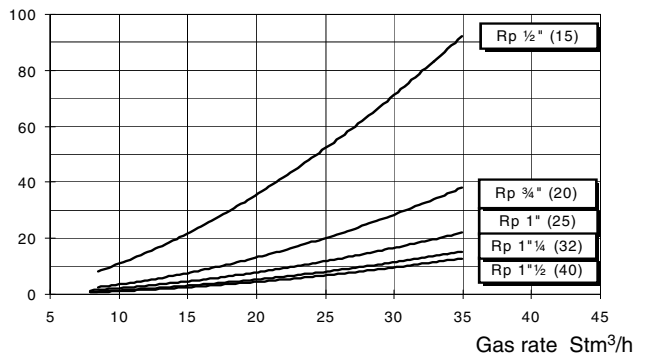
**NG280 M-.xx...**



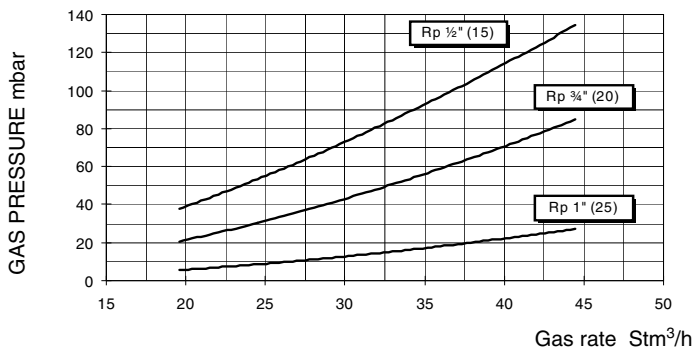
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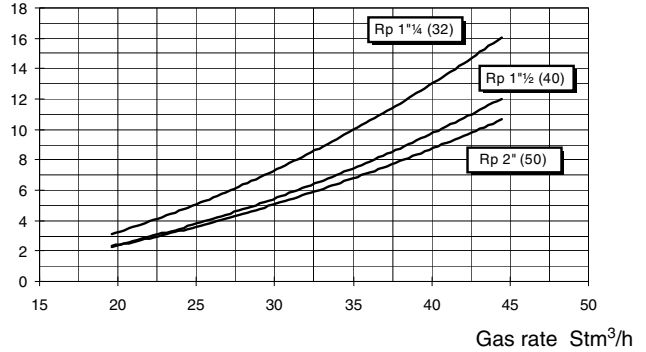
**NG350 M-.PR/MD...**



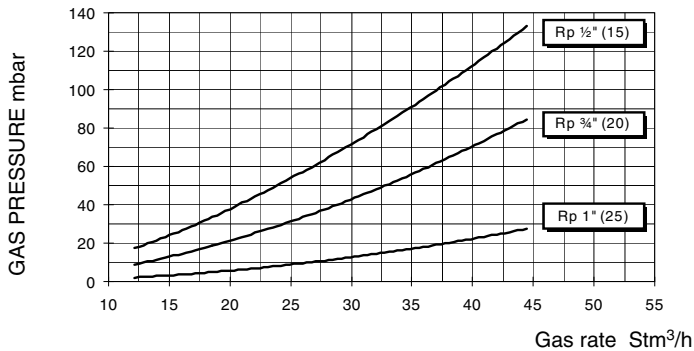
**NG400 M-.TN..15-20-25**



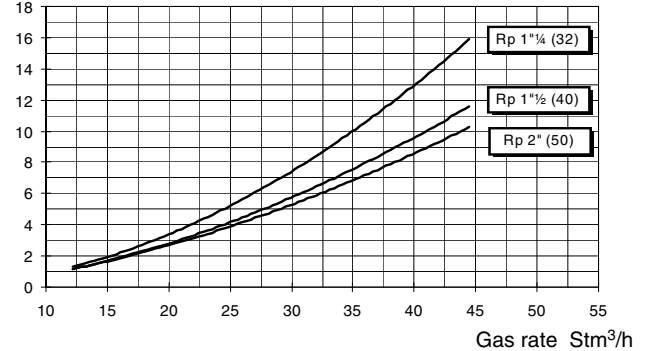
**NG400 M-.TN..32-40-50**



**NG400 M-.PR/MD...15-20-25**

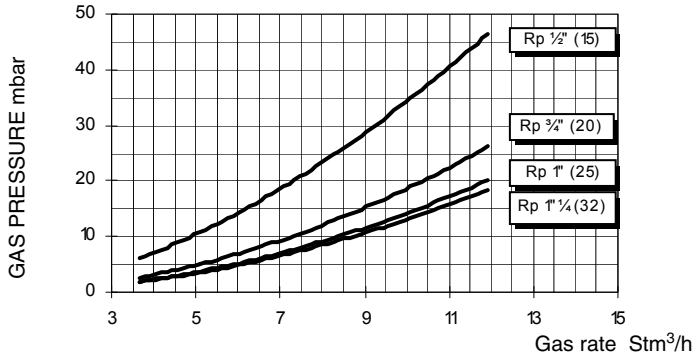


**NG400 M-.PR/MD...32-40-50**

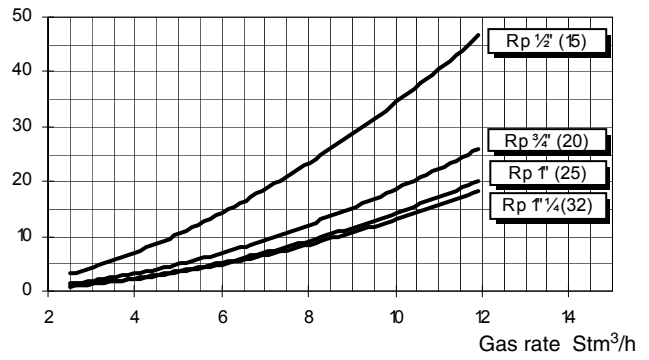


● L.P.G. Burners

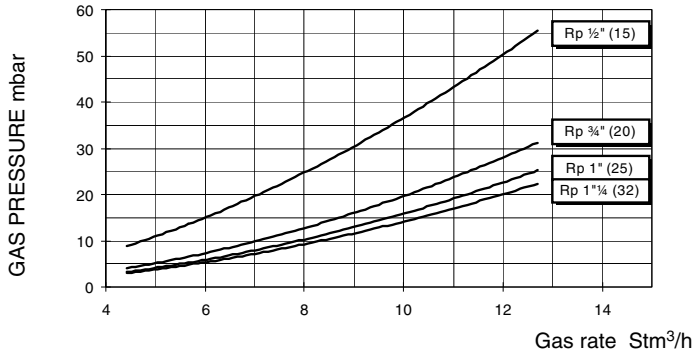
LG280 L-.TN...



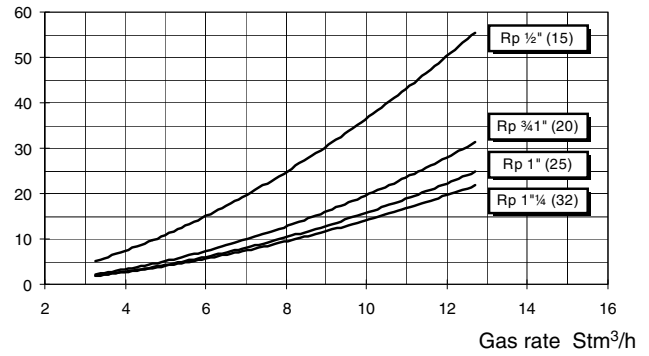
LG280 L-.xx...



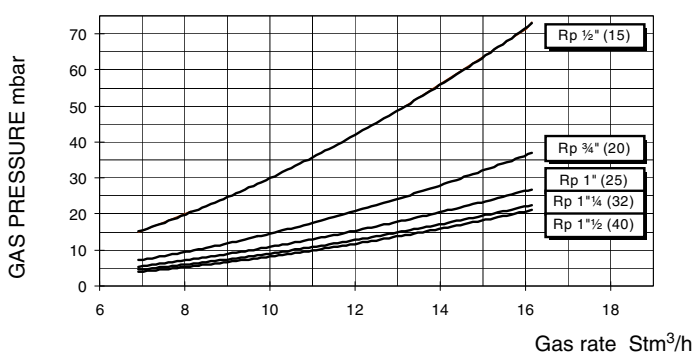
LG350 L-.TN...



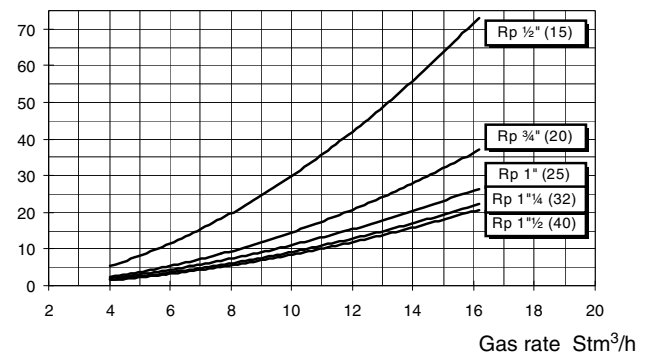
LG350 L-.PR/MD....



LG400 L-.TN...

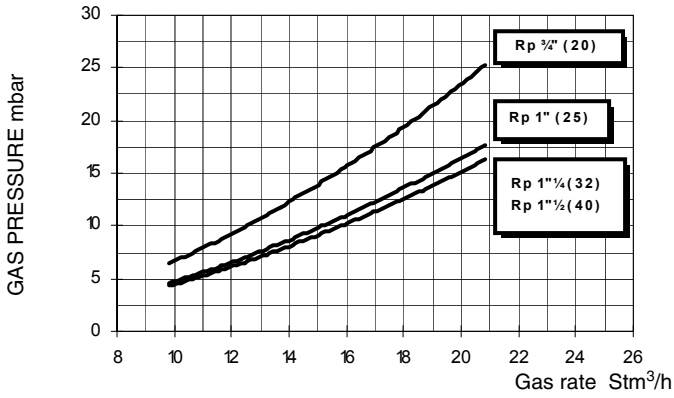


LG400 L-.PR/MD....

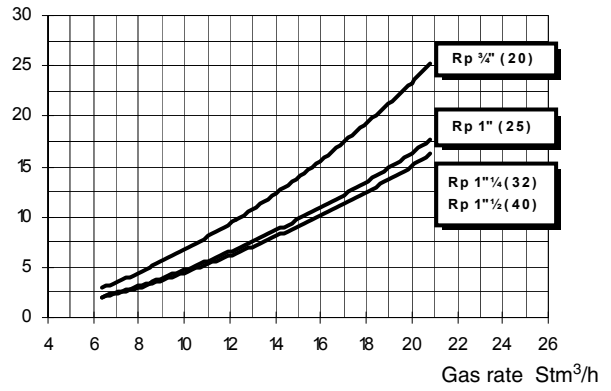


● Low NOx burners

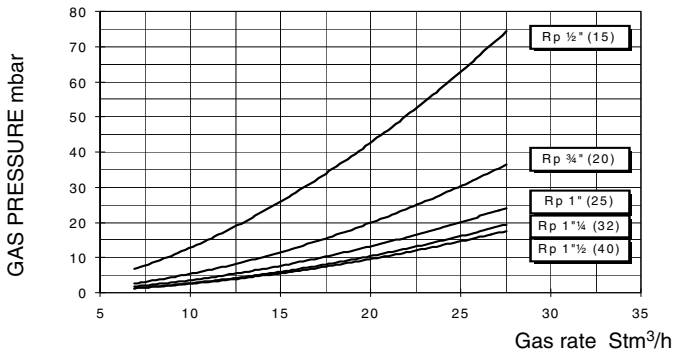
NGX280 M-.TN..



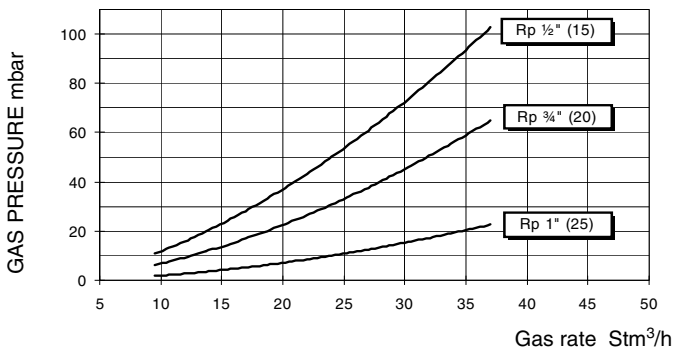
NGX280 M-.xx..



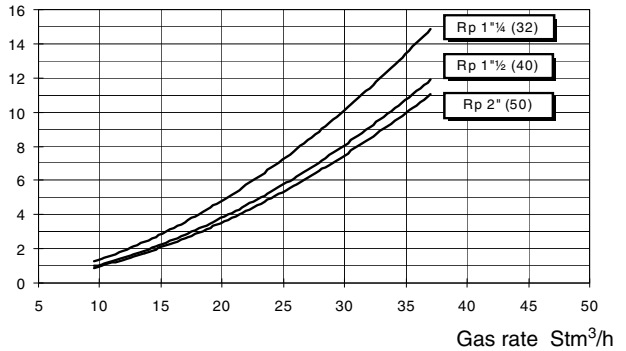
NGX350 Progressive



NGX400 M-...15-20-25



NGX400 M-...32-40-50





### Combustion head pressure curves vs. the gas flow rate

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

The curves referred to the gas pressure in the combustion head, depending on the gas flow rate, are referred to the burner in the combustion stage (percentage of residual O<sub>2</sub> in the flues as shown in the "Recommended combustion values" table and CO in the standard limits). During this stage, the combustion head, the gas butterfly valve and the servocontrol are at the maximum opening. Refer to , 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.

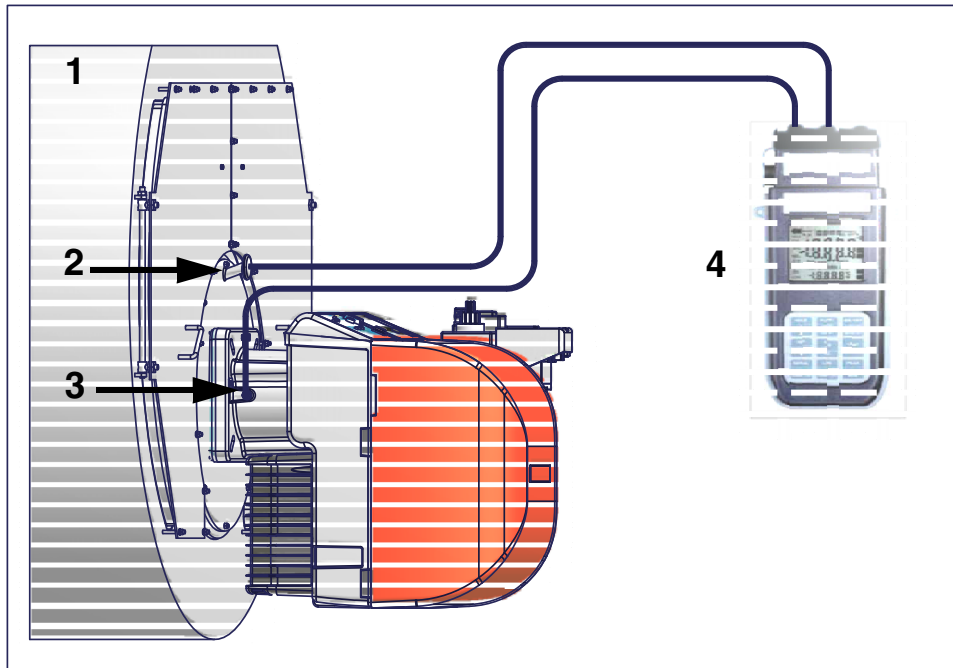


Fig. 4

#### Key

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

### Measuring the gas pressure in the combustion head

In order to measure the pressure in the combustion head, insert the pressure gauge probes: one into the generator's pressure outlet (-2) to get the pressure in the combustion chamber and the other one into the butterfly valve's pressure outlet of the burner (-3). On the basis of the measured differential pressure, it is possible to get the maximum flow rate: in the pressure - rate curves (showed on the next paragraph), it is easy to get the burner output in kW or Stm<sup>3</sup>/h (quoted on the x axis) from the pressure measured in the combustion head (quoted on the y axis).

**NOTE: THE PRESSURE-RATE CURVES ARE APPROXIMATE; FOR A PROPER SETTING OF THE GAS RATE, PLEASE REFER TO THE GAS METER READING.**

To measure the pressure in the combustion chamber, as far as the IDEA series, a pressure plug is provided upstream the burner's blast tube.

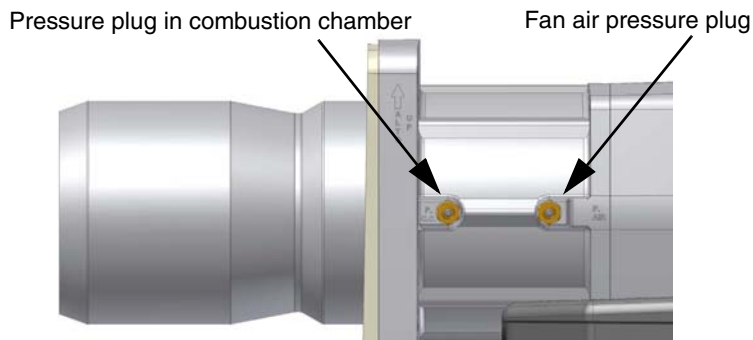
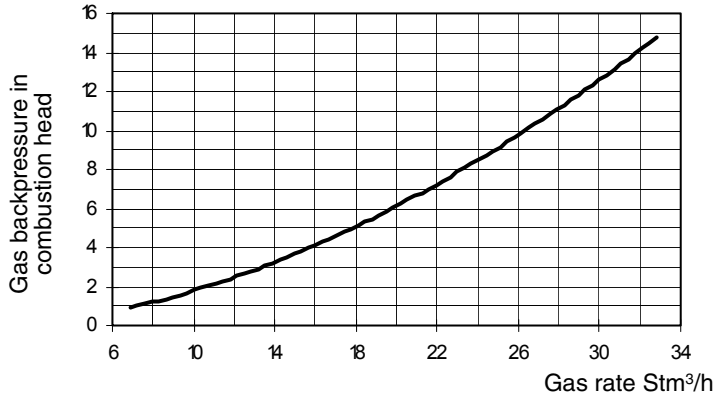


Fig. 5

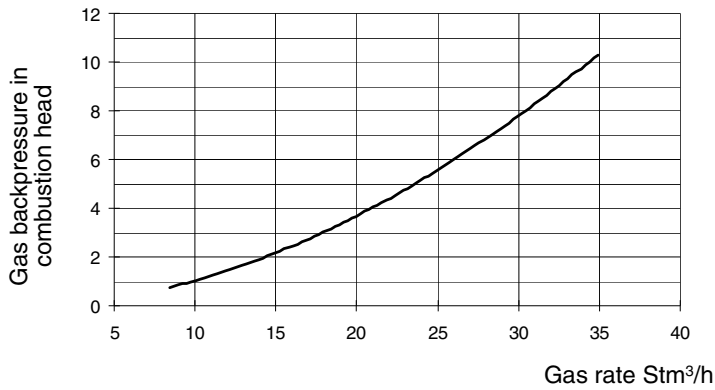
**Pressure in the combustion head vs. gas flow rate curves**

● **nNatural gas burners**

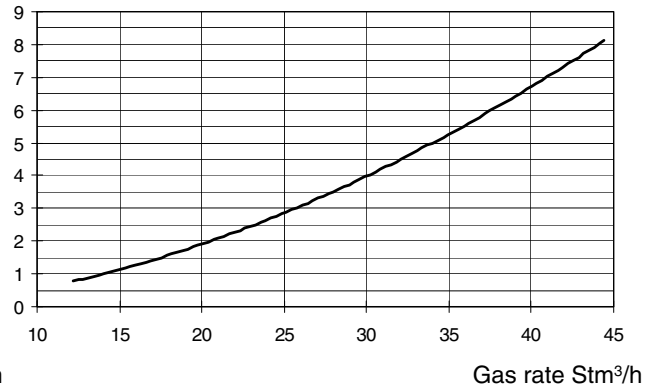
**NG280**



**NG350**

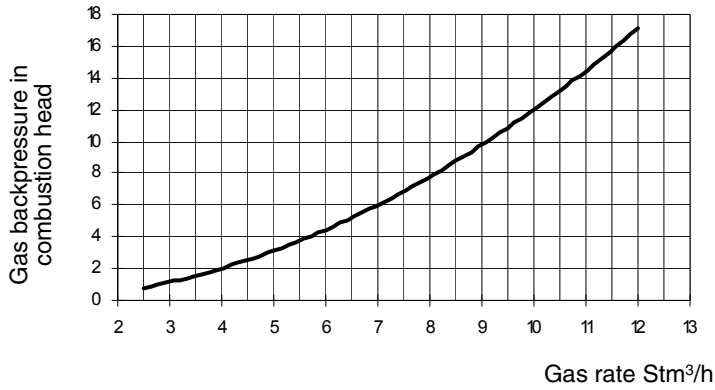


**NG400**

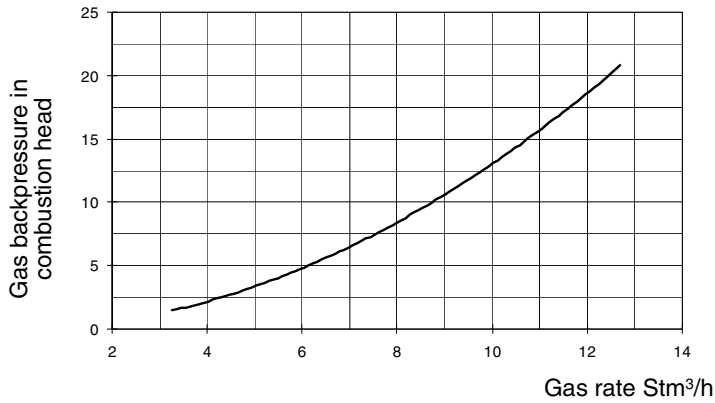


● **L.P.G. Burners**

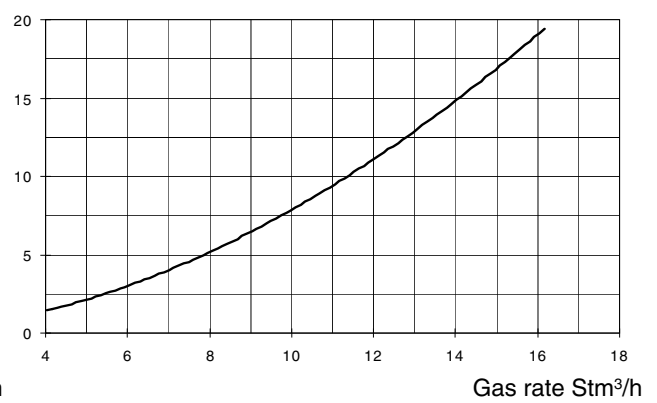
**LG280**



**LG350**

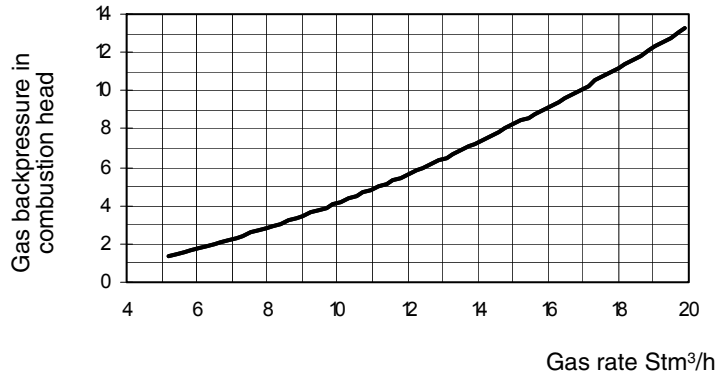


**LG400**

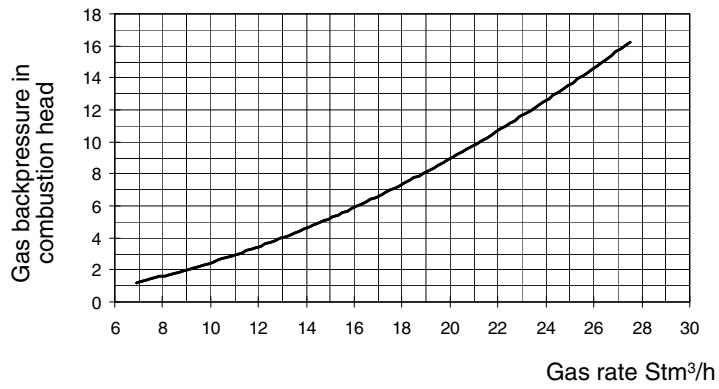


● Low NOx burners

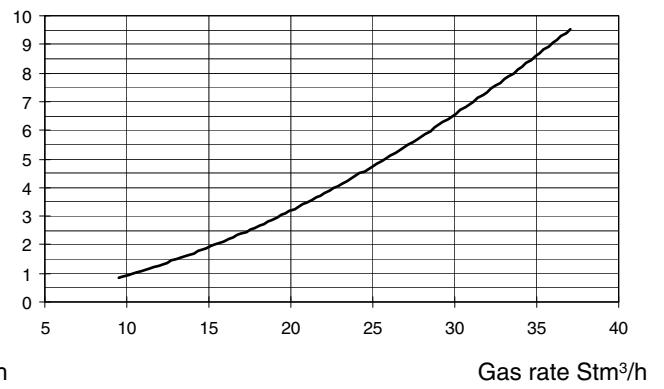
**NGX280**



**NGX350**

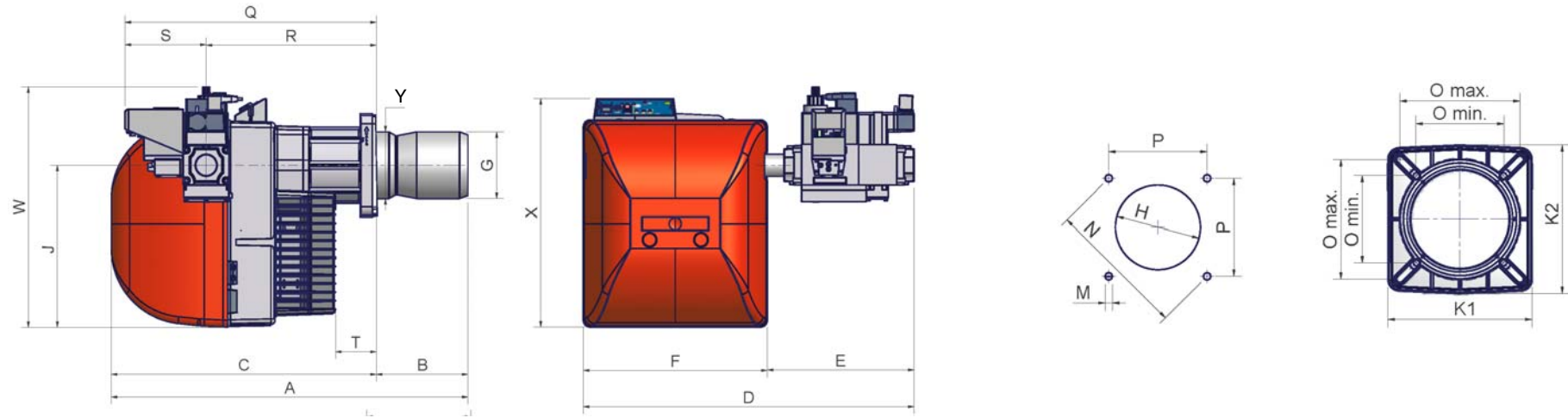


**NGX400**



## Overall dimensions (mm)

- Standard burners



Recommended boiler drilling plate and burner flange

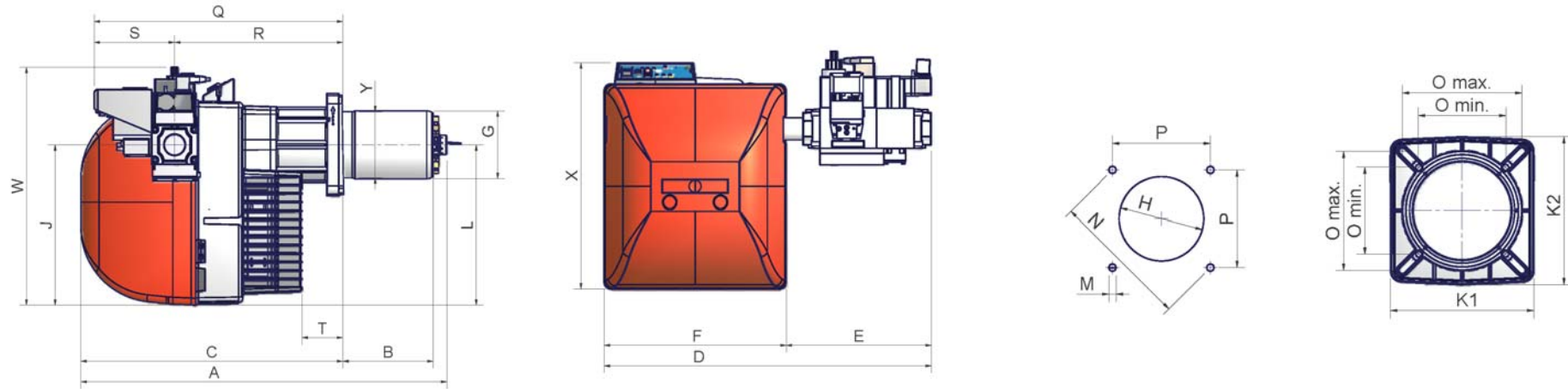
	A(S*)	A(L)*	B(S*)	B(L)*	C	F	G	H	J	K1	K2	M	N	Omin	Omax	P	Q	R	S	T	X	Y
<b>NG/LG280</b>	733	878	162.5	308	570	396	117	137	348	215	223	M10	219	131	179	155	541	366	175	128	491	108
<b>NG/LG350</b>	748	878	178	308	570	396	125	164	348	215	223	M10	219	131	179	155	541	366	175	89	491	144
<b>NG/LG400</b>	768	898	198	328	570	396	144	164	348	215	223	M10	219	131	179	155	541	366	175	89	491	144

\* S = measure referred to burners fitted with standard blast tube

L = measure referred to burners fitted with extended blast tube

## Valves group dimensions according to gas train size.

	D ± 5 mm				E ± 5 mm				W			
	Rp 1	Rp 1 ¼	Rp 1 ½	Rp 2	Rp 1	Rp 1 ¼	Rp 1 ½	Rp 2	Rp 1	Rp 1 ¼	Rp 1 ½	Rp 2
<b>NG/LG280</b>	596	596	726	726	200	200	330	330	508	508	517	567
<b>NG/LG350</b>	596	596	726	726	200	200	330	330	508	508	517	567
<b>NG/LG400</b>	596	596	726	726	200	200	330	330	508	508	517	567



Recommended boiler drilling plate and burner flange

	A(S*)	A(L)*	B(S*)	B(L)*	C	F	G	H	J	K1	K2	M	N	Omin	Omax	P	Q	R	S	T	X	Y
<b>NGX280</b>	778	908	178	308	570	396	113	164	348	215	223	M10	219	131	179	155	541	366	175	128	491	144
<b>NGX350</b>	778	908	178	308	570	396	131	164	348	215	223	M10	219	131	179	155	541	366	175	89	491	144
<b>NGX400</b>	798	928	198	328	570	396	148	168	348	215	223	M10	219	131	179	155	541	366	175	89	491	144

\* S = measure referred to burners fitted with standard blast tube

L = measure referred to burners fitted with extended blast tube

**Valves group dimensions according to gas train size.**

	D ± 5 mm				E ± 5 mm				W			
	Rp 1	Rp 1 ¼	Rp 1 ½	Rp 2	Rp 1	Rp 1 ¼	Rp 1 ½	Rp 2	Rp 1	Rp 1 ¼	Rp 1 ½	Rp 2
<b>NGX280</b>	596	596	726	726	200	200	330	330	508	508	517	567
<b>NGX350</b>	596	596	726	726	200	200	330	330	508	508	517	567
<b>NGX400</b>	596	596	726	726	200	200	330	330	508	508	517	567

## MOUNTINGS AND CONNECTIONS

### Packing

The burners are despatched in cardboard packages whose dimensions are: 800mm x 540mm x 480mm (L x P x H)

Packing cases of this type are affected by humidity; the maximum number of cases to be stacked is indicated outside the packing.

The following are placed in each packing case.

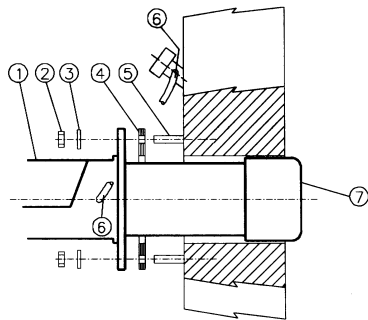
- 1 Burner with gas train;
- 1 gasket to be inserted between the burner and the boiler;
- 1 envelope containing tis manual

When disposing of the burner packing and if the packing is scrapped follow the procedures laid down in the current legislation regarding the disposal of materials.

### Fitting the burner to the boiler

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

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



#### Keys

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

### Matching the burner to the boiler

The burners described in this manual have been tested with combustion chambers that comply with EN676 regulation and whose dimensions are described in the diagram . In case the burner must be coupled with boilers with a combustion chamber smaller in 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 necessary input and the pressure in combustion chamber are included in the burner performance curve; otherwise the choice of the burner must be revised consulting the burner manufacturer. To choose the blast tube lenght follow the instructions of the boiler manufacturer. In absence of these consider the following:

- Cast-iron boilers, three pass flue boilers (with the first pass in the rear part): the blast tube must protrude no more than 100 mm into the combustion chamber.
- Pressurised boilers with flame reversal: in this case the blast tube must penetrate at least 50 - 100 mm into combustion chamber in respect to the tube bundle plate.

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

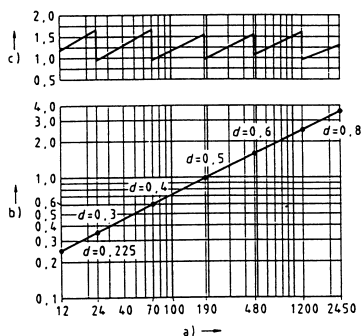


Fig. 6

#### Key

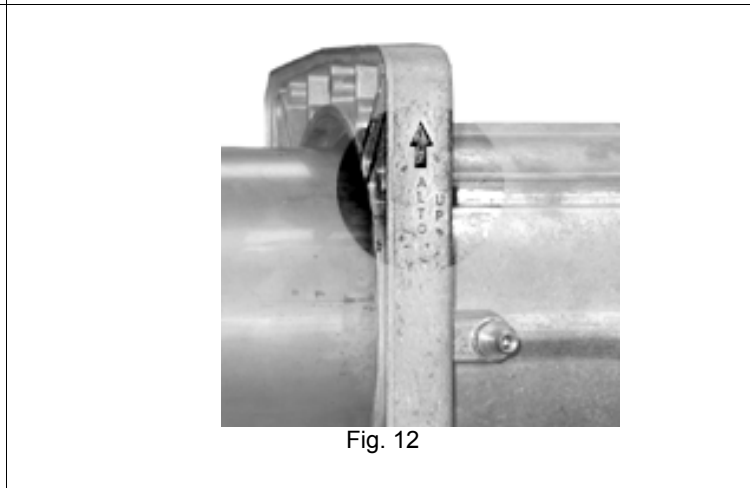
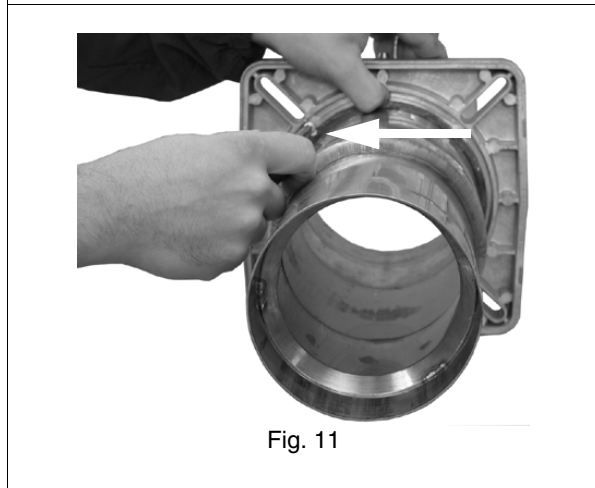
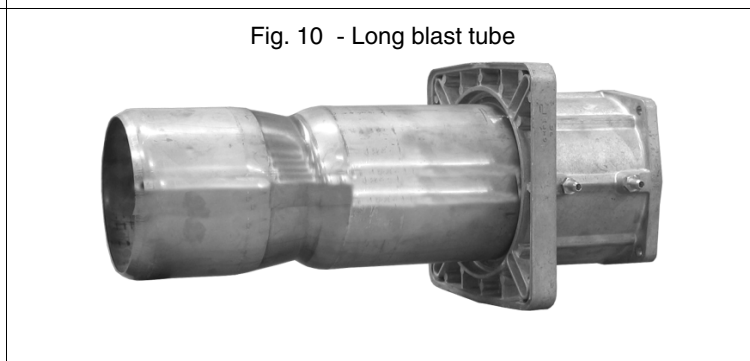
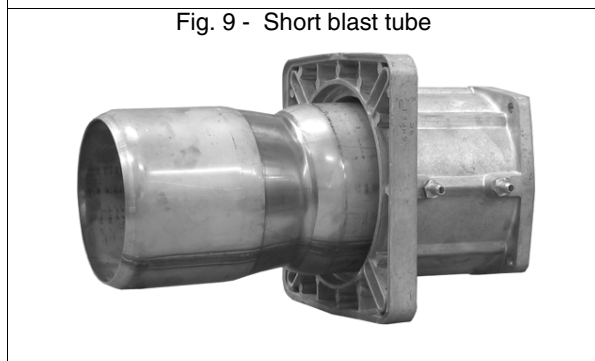
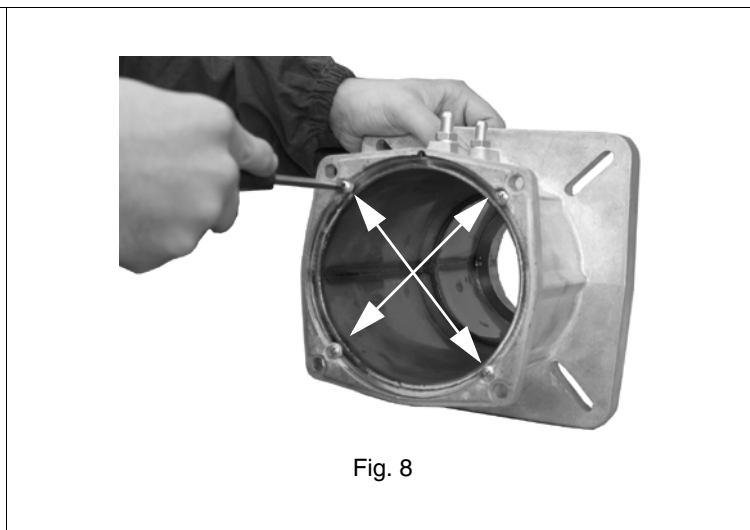
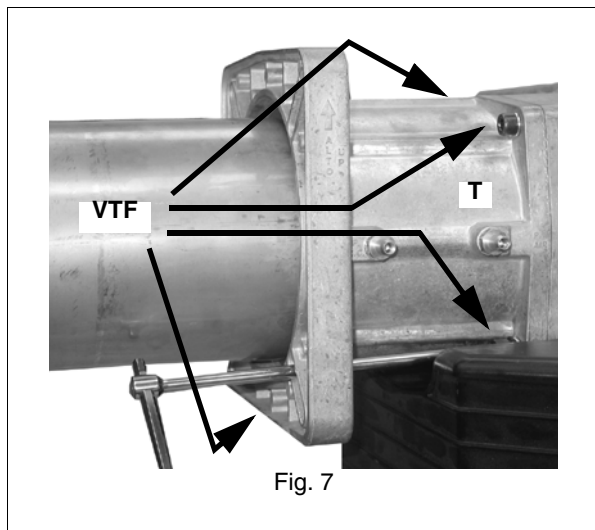
- a) Heat output in kW
- b) Lenght of the flame tube in meters
- c) Flame tube firing intensity in MW/m<sup>3</sup>
- d) Combustion chamber diameter (m)

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

## How to modify the blast tube length (NG/LG350-NG/LG400)

To modify blast tube length please read the following instructions.

- 1 Remove combustion head (See "Removing the combustion head" - Part III of this user's guide).
- 2 Remove the flanged piece **T** by removing the 4 socket head screws **VTF** (Fig. 15).
- 3 Remove the 4 screws which hold the blast tube to the flanged piece (Fig. 17).
- 4 Extract the blast tube from the flanged piece and assemble it in the other way round as shown in pictures Fig. 19 and . Now fasten the two pieces using the same screws.
- 5 Assemble the whole piece to the burner by caring attention to the indication in picture Fig. 25.



If you modify the blast tube length you have to modify also the combustion head length by reading the following instructions.

- 1 Remove the screws **V1** and **V2** as shown in Fig. 27.
- 2 Lower the terminal part of the combustion head, by moving it with a slight circular movement, until the holes will match (Fig. 29) and tight the screw shown in Fig. 31.
- 3 Adjust cables length by pulling them very slightly paying particular attention not to disconnect the ionisation cable to the electrode.
- 4 Fix the combustion head again (See "Removing the combustion head").

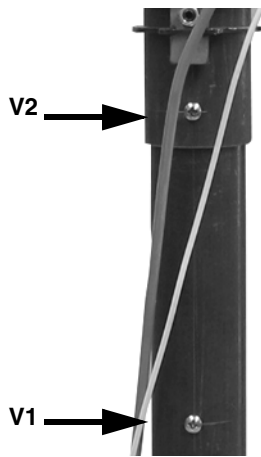


Fig. 13

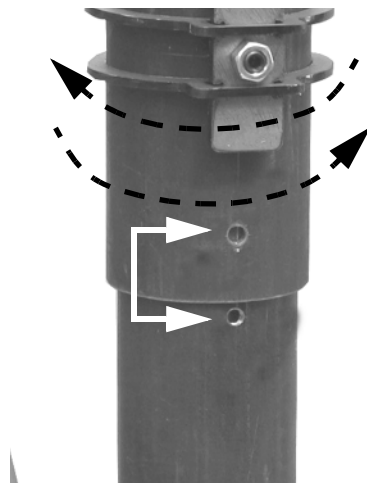


Fig. 14

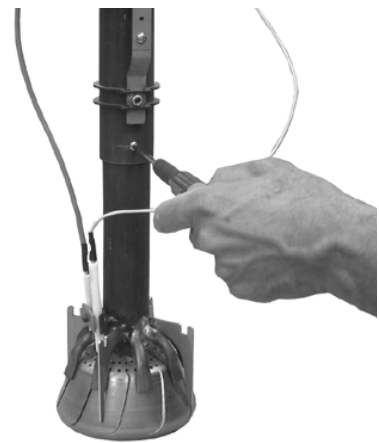


Fig. 15

### Gas Train Reversal

The gas train can be fit either on the left and on the right. Follow these instruction..

- 1 Remove the plastic hook **G** to release the rod **T** (Fig. 16) .
- 2 Take the screws **V1**, **V2**, **V3**, **V4**, **VT1** and **VT2** off (Fig. 16).
- 3 Take the ignition cable **CA** off of the transformer .
- 4 Disconnect the connector **CR** from the printed circuit (Fig. 17).
- 5 Take off the flange and the combustion head together (Fig. 19).
- 6 Take the gas pipe **TR** off and put it in the new position fixing the screws **VT1** and **VT2** (Fig. 18).

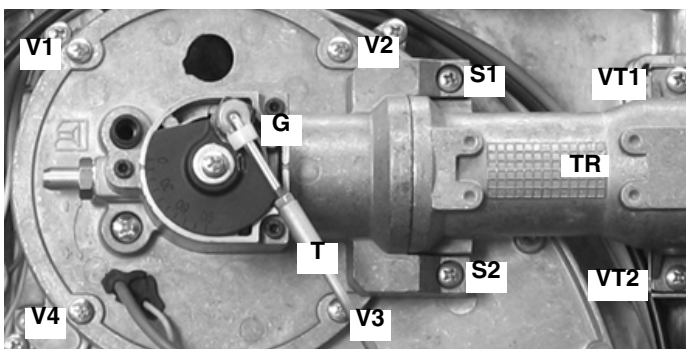


Fig. 16

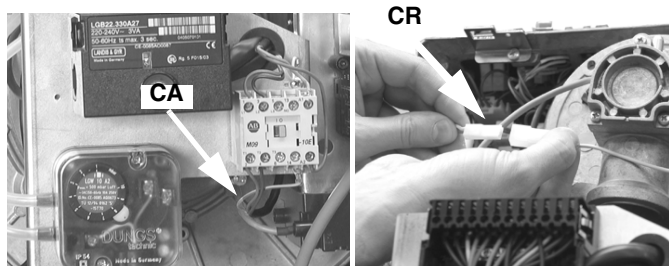
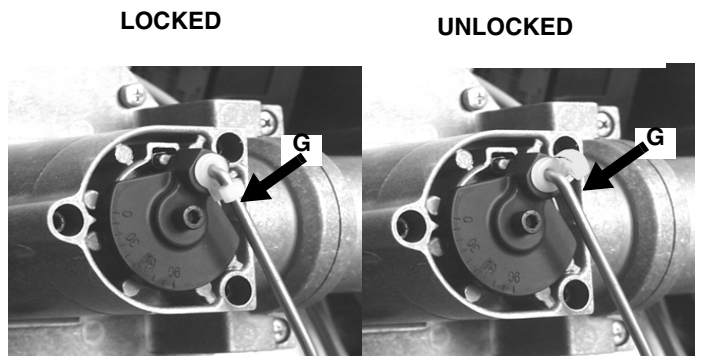


Fig. 17

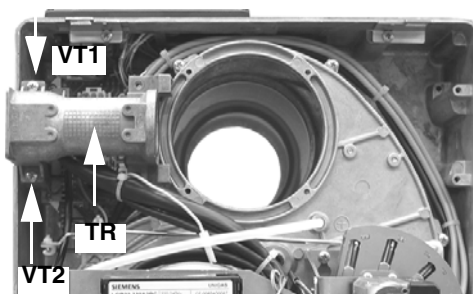


Fig. 18

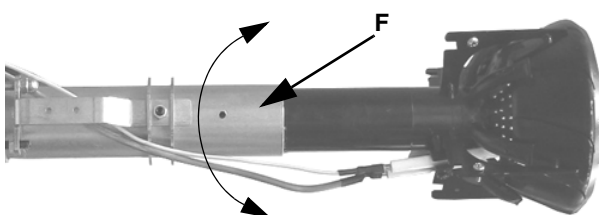


Fig. 19

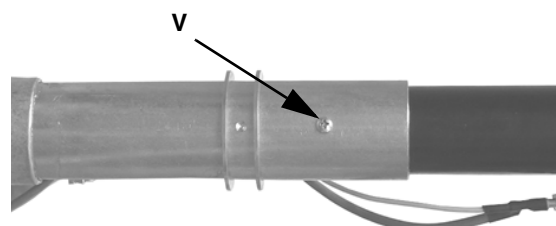


Fig. 20



- 7 Unscrew the **V**, rotate the head of 180 ° along its axis as shown inL Fig. 19), until the hole **F** is found. Fit the screw again(Fig. 19 - Fig. 20).
- 8 Insert again the flange and the combustion head together
- 9 Rotate the disc **D** following the instructions below.
- 10 Take off the screw **VF**.
- 11 Rotate the disc **D** for 180 ° and then fit the screw **VF** (Fig. 21).

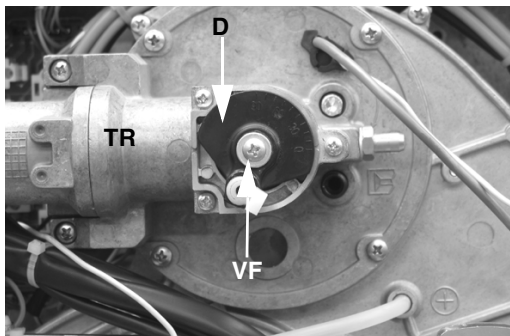


Fig. 21: Standard position

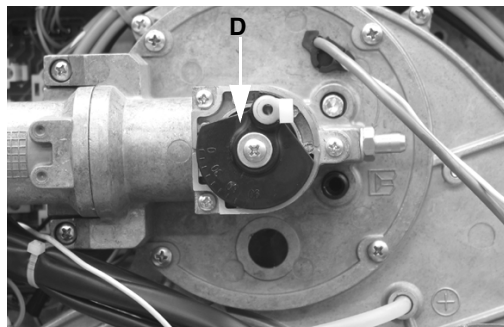


Fig. 22: New position

- 12 Reconnect **CR** and **CA**.
- 13 Retighten the screws **V1**, **V2**, **V3**, **V4**, **VT1** e **VT2**
- 14 Place again the rod **T** into its own position and fasten it by the plastic hook **G**.

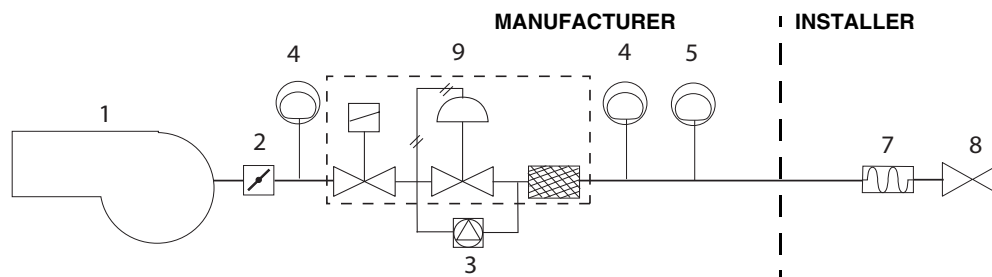
## GAS TRAIN CONNECTIONS

This paragraph shows the gas train components which are included in the delivery and those which must be fitted by the customer. The diagram complies with regulations in force



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

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



### Key

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

- 1 Burner
- 2 Butterfly valve
- 3 Gas proving system (option)
- 4 Low gas pressure switch
- 5 High gas pressure switch (option)
- 7 Bellow joint
- 8 Manual cutoff valve

9 Dungs MB-DLE valves group To mount the gas train, proceed as follows:

- 1) in case of threaded joints: use proper seals according to the gas used;
- 2) fasten all the items by means of screws, according to the next diagrams, observing the mounting direction for each item.

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

The procedures of installation for the gas valves are shown in the next paragraph.



**ATTENTION:** once the gas train is mounted according to the diagram, 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).

## MULTIBLOC DUNGS MB-DLE 405..412

### Mounting

1. Mount flange onto tube lines: use appropriate sealing agent (see );
2. insert MB-DLE: note position of O rings (see );
3. tighten screws A, B, C and D ( - ), accordind to the mounting positions ( );
4. after installation, perform leakage and functional test;
5. disassembly in reverse order.

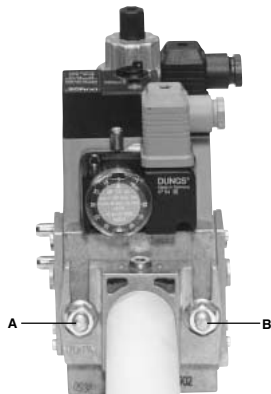


Fig. 23

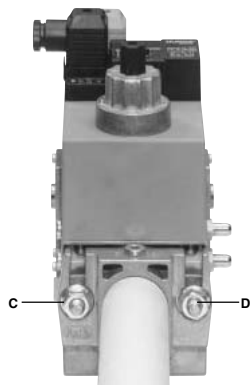


Fig. 24



Fig. 25

### MOUNTING POSITIONS

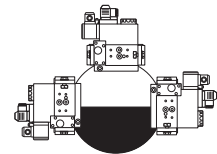
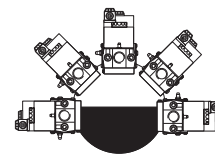


Fig. 26

## MULTIBLOC DUNGS MB-DLE 415..420

### Mounting

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

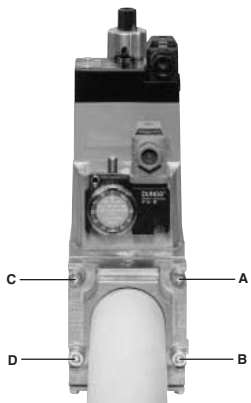


Fig. 27

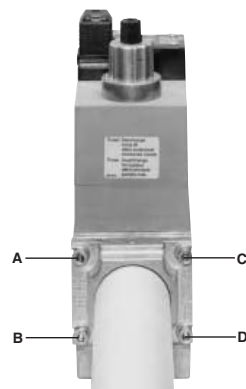


Fig. 28

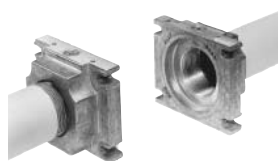


Fig. 29

### MOUNTING POSITIONS

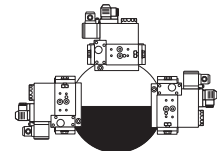
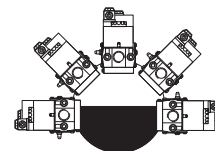


Fig. 30

Once the train is installed, connect the gas valves group plug



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

**ELECTRICAL CONNECTIONS**

**RESPECT THE BASIC SAFETY RULES. MAKE SURE OF THE CONNECTION TO THE EARTHING SYSTEM. DO NOT REVERSE THE PHASE AND NEUTRAL CONNECTIONS. FIT A DIFFERENTIAL THERMAL MAGNET SWITCH ADEQUATE FOR CONNECTION TO THE MAINS.**



**ATTENTION:** before executing the electrical connections, pay attention to turn the plant's switch to OFF and be sure that the burner's main switch is in 0 position (OFF) too. Read carefully the chapter "WARNINGS", and the "Electrical connections" section.



**WARNING:** if the cable that connects the thermostats and the control box should be longer than 3 meters, insert a sectioning relay following the attached electrical wiring diagram.

To execute the electrical connections, proceed as follows:

- 1 find the pulg or the plugs, according to the model, that comes out from the burnrer:
  - 7 pins plug for the power supply (for all models);
  - 4 pins plug (for AB - double stage, PR-progressive, MD - fully-modulating);
  - 3-pins plug (only for NG/NGX400);
- 2 execute the electrical connections to the plugs, according to hte burner model (see next paragraph);
- 3 once all the connections are accomplished, check the fan motor direction (sse next paragraphs);
- 4 now the burner is ready to start up.

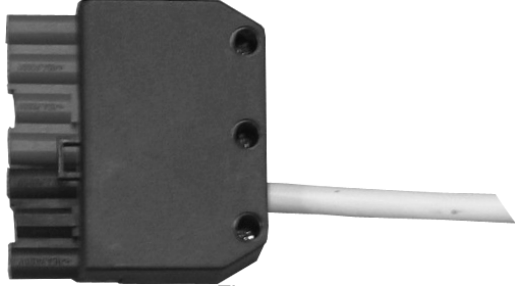
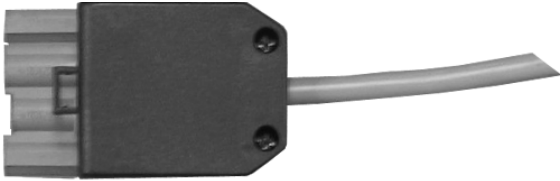
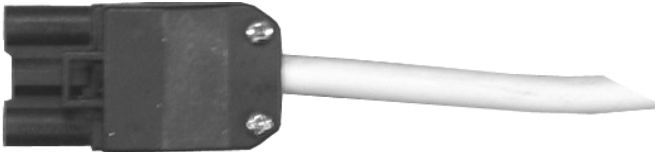


The burner is fitted with a bridge between terminals T6 and T8 on the 4-poles plug-TAB (external side link, male connector); if the TAB high/low flame thermostat must be connected, remove the bridge between terminals, before connecting the thermostat.



**IMPORTANT:** before operating the burner, be sure all connectors are linked as shown in the diagrams.

**Connectors identification**

<p><b>Burner power supply connector</b> (Fig. 34 - Fig. 36 - Fig. 38)</p> <p><b>Probe connection connector (fully modulating burners, Fig. 40)</b></p>	 <p style="text-align: right;">Fig. 31</p>
<p><b>HIGH/LOW flame connector (progressive burners, Fig. 36)</b></p>	 <p style="text-align: right;">Fig. 32</p>
<p><b>Fan motor connector (NG/NGX400 only)</b> (Fig. 35 - Fig. 39)</p>	 <p style="text-align: right;">Fig. 33</p>

**Connectors wiring diagrams**

● **Single stage burner's connectors:**

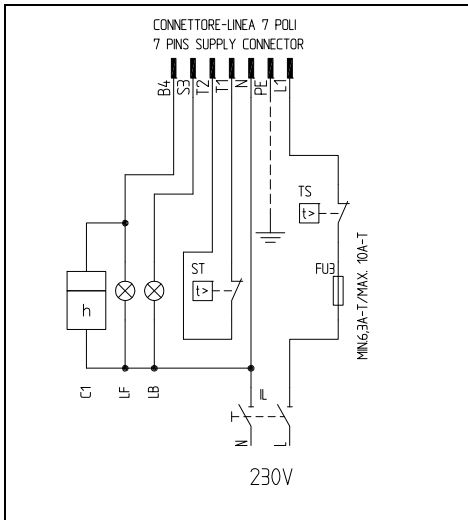


Fig. 34 - 7-pins connector

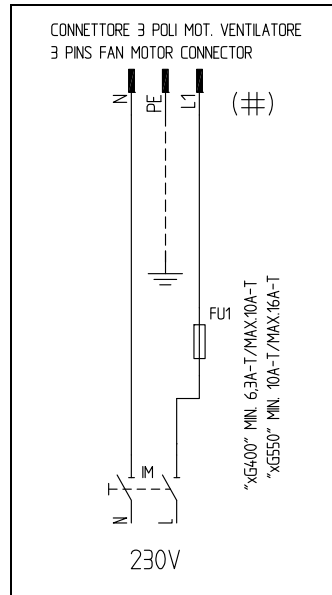


Fig. 35 - Electric motor's 3-pins connector  
NG/LG/NGX400

● **Progressive burners' connectors:**

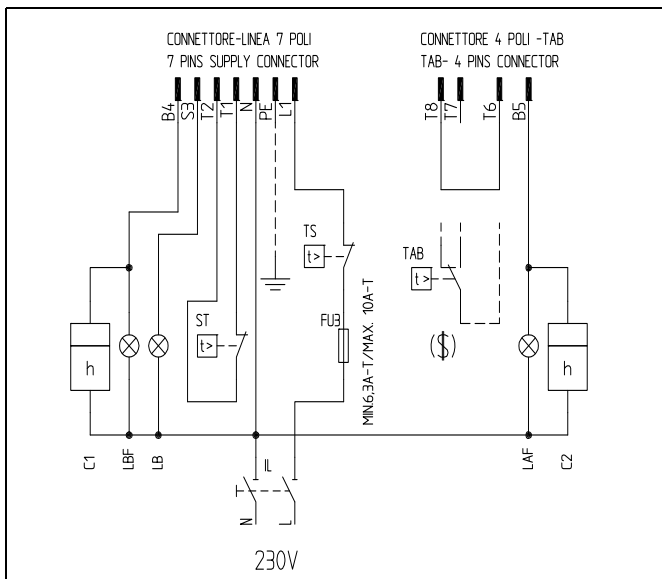


Fig. 36 - 7-pin and 4-pin connectors

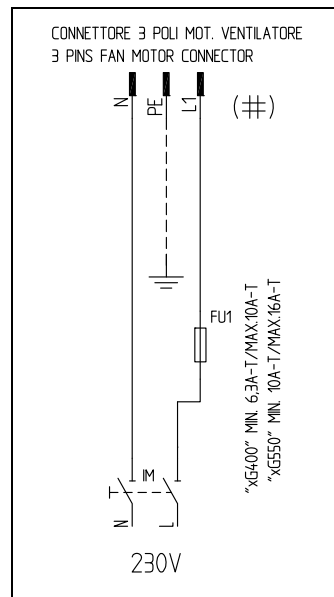


Fig. 37 Electric motor's 3-pin connector for  
NG/LG/NGX400

**Key**

- C1 LOW FLAME TIME METER
- C2 HIGH FLAME TIME METER
- FU1 FAN MOTOR LINE FUSE
- FU3 LINE FUSE
- IL BURNER LINE SWITCH
- IM FAN MOTOR LINE SWITCH
- KM1 FAN MOTOR CONTACTOR
- LAF BURNER IN HIGH FLAME INDICATOR LIGHT
- LB INDICATOR LIGHT FOR BURNER LOCK-OUT

- LBF BURNER IN LOW FLAME SIGNALLING LAMP
  - MV FAN MOTOR
  - ST THERMOSTATS O PRESSURE SWITCHES SERIE
  - TAB HIGH LOW FLAME THERMOSTAT/PRESSURE SWITCH
  - TS SAFETY THERMOSTAT/PRESSURE SWITCH
  - CONN-MOTORE FAN MOTOR CONNECTOR
  - CONN-LINEA BURNER POWER SUPPLY CONNNECTOR
  - CONN-TAB HIGH-LOW FLAME CONNECTOR
- (\$) IF "TAB" USED REMOVE THE BRIDGE BETWEEN TERMINALS T6-T8

● Fully-modulating burners' connectors:

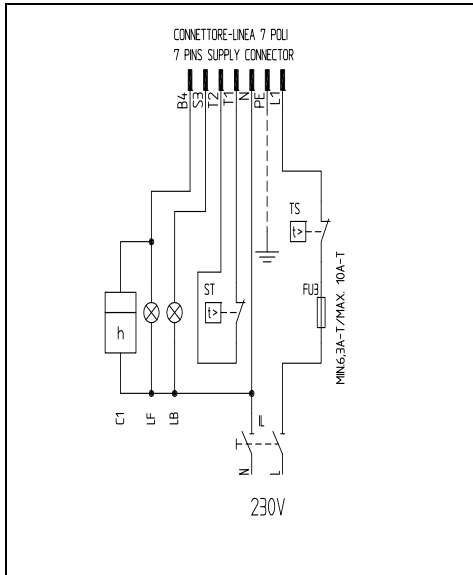


Fig. 38 - 7-pin connector

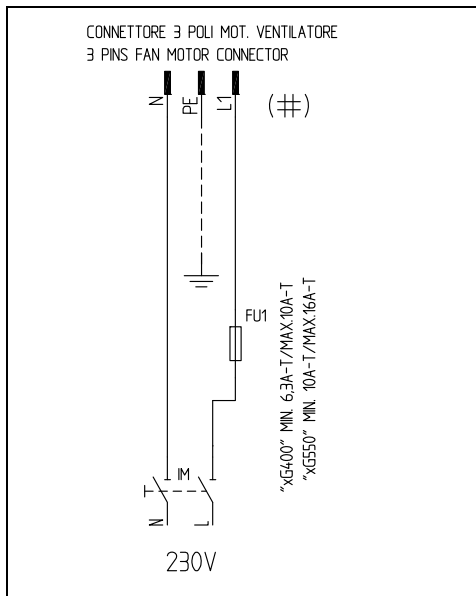


Fig. 39 - Electric motor's 3-pin connector for NG/LG/NGXG400

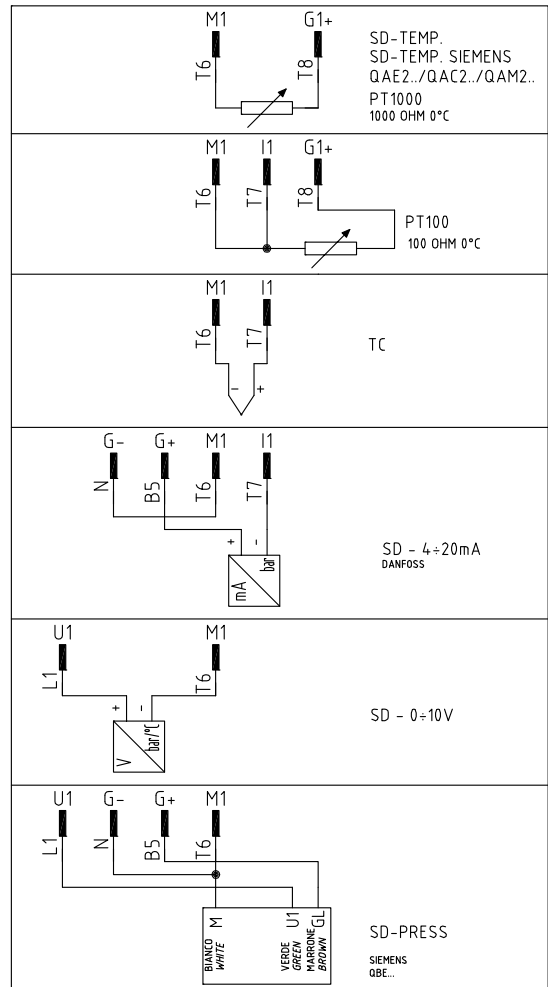


Fig. 40 - Probes connection

<b>Key</b>		
C1	LOW FLAME TIME METER	
FU1	LINE FUSE FOR FAN MOTOR	
FU3	LINE FUSE	
FU4	AUXILIARY FUSE	
IL	BURNER LINE SWITCH	
IM	FAN MOTOR LINE SWITCH	
KM1	FAN MOTOR REMOTE CONTACTOR	
LANDIS RWF40	MODULATION REGULATOR	
LB	BURNER LOCKOUT SIGNALLING LAMP	
LBF	BURNER IN LOW FLAME SIGNALLING LAMP	
MV	FAN MOTOR	
SD-0÷10V	VOLTAGE SIGNAL	
SD-0/4÷20mA	CURRENT SIGNAL	
SD-PRESS	PRESSURE PROBE	
SMA	MAN/AUTO SELECTOR	
SMF	OPERATION SELECTOR MIN-0-MAX	
ST	PRESSURE SWITCHES OR THERMOSTATS SERIE	
TS	SAFETY THERMOSTAT/PRESSURE SWITCH	

**Power supply without neutral**

If the power supply to the burner is 230V phase-phase (without the neutral wire), with the Siemens LGB2..., LMG2... or LME.. flame control device, between the terminal 2 on the board and the earth terminal, an RC Siemens RC466890660 filter must be inserted.

**Key**

- C - Capacitor (22nF/250V)
- R - Resistor (1Mohm)
- (\*\*\*) RC466890660 - RC Siemens filter  
(Code: 2531003)

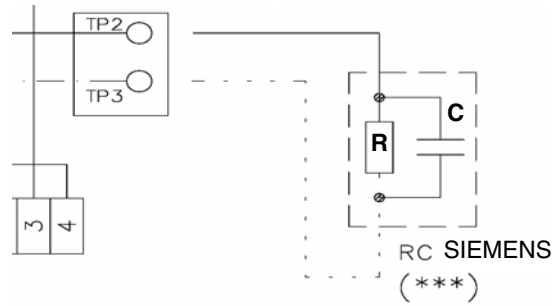


Fig. 41

**SETTING GAS AND AIR FLOW RATE**

	<p><b>ATTENTION:</b> 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.</p>
	<p><b>ATTENTION:</b> 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.</p>
	<p><b>WARNING:</b> NEVER LOOSE THE SEALED SCREWS! OTHERWISE, THE DEVICE WARRANTY WILL BE INVALIDATE!</p>

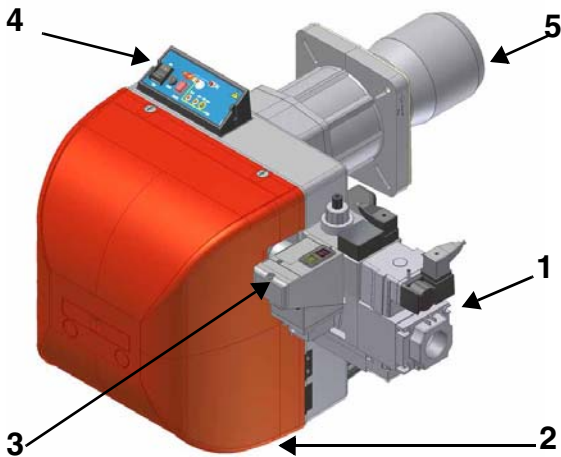


Fig. 42

**Keys**

- 1 Valve group
- 2 Cover
- 3 Gas proving system
- 4 Control panel
- 5 Blast tube

To perform the adjustments, unscrew the fixing screws and remove the burner's cover (see Fig. 86-2)

**Startup Output**

The start-up heat output shall not exceed 120 kW (single stage burners) or 1/3 of nominal output (double-stage, progressive or fully modulating burners). In order to comply with these requirements, burners are provided with butterfly valve and/or slow-opening safety valve. On double-stage, progressive or modulating burners, the low flame output must be higher than the minimum output quoted in the performance curve (page 32).

	<p><b>IMPORTANT!</b> the combustion air excess must be adjusted according to the in the following chart:</p>
--	--

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

**Adjustments - brief description**

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

- Check that the combustion parameters are in the suggested limits.
- Check the flow rate measuring it on the counter or, if it was not possible, verifying the combustion head pressure by means of a differential pressure gauge, as described on par. “Measuring the gas pressure in the combustion head” on page 17.
- Then, adjust the combustion values corresponding to the points between maximum and minimum: set the shape of the adjusting cam foil. The adjusting cam sets the air/gas ratio in those points, regulating the opening-closing of the throttle gas valve.
- Set, now, the low flame output, acting on the low flame microswitch of the actuator in order to avoid the low flame output increasing too much or that the flues temperature gets too low to cause condensation in the chimney.

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

**Adjustment procedure**

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

Before starting the burner up, adjust the valves group slow opening: to set the slow opening remove cover **T**, reverse it upside down and use it as a tool to rotate screw **VR**. Decrease the ignition flow rate by screwing, increase it by unscrewing. Do not use a screwdriver on the screw **VR**!

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

- 1 remove the burner cover
- 2 startup the burner by turning its main switch **A** to on: if the burner locks (LED **B** on in the control panel) press the RESET button (**C**) on the control panel (Fig. 36).

The burner is adjusted in the factory with the combustion head in the position that refers to the “MAX” output. The maximum output setting refers to the “fully-ahead” position of the combustion head, as far as standard models (Fig. 90), and to “fully-backward” position for low NOx burners (Fig. 92). As for “fully-ahead” position, it means that the head is placed inside the boiler, “fully-backward” position means that the head is towards the operator. As far as the reduced output operation, progressively move the combustion head towards the “MIN” position, rotating clockwise the **VRT** screw (Fig. 88). The **ID** index shows how much the combustion head moved.

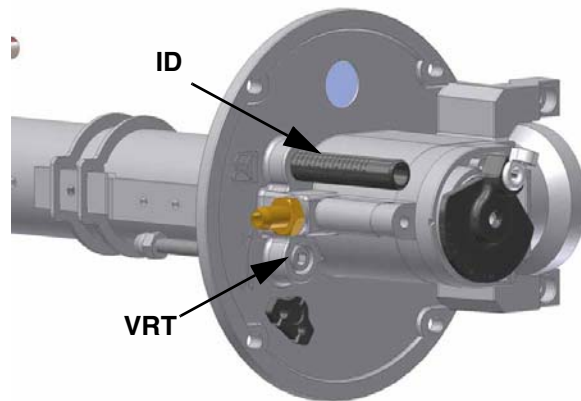
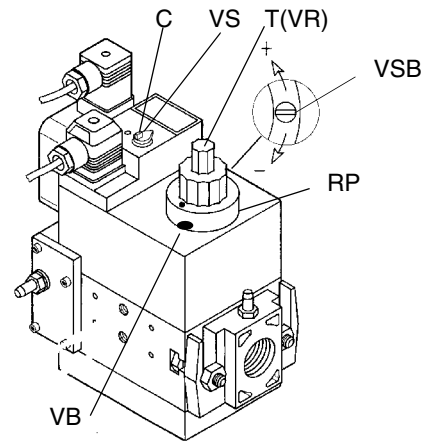


Fig. 43

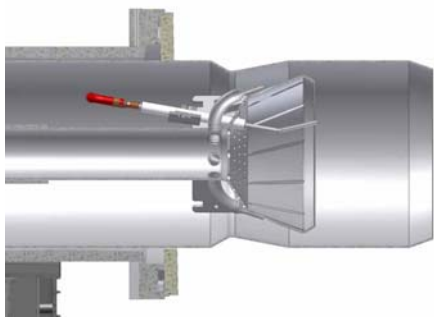


Fig. 44 - Head in “fully-ahead position”

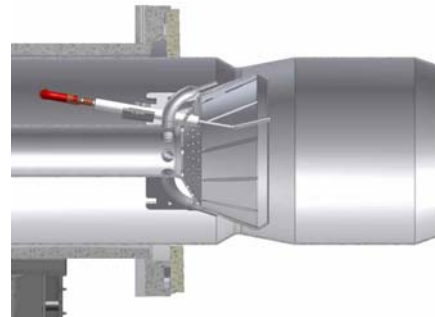


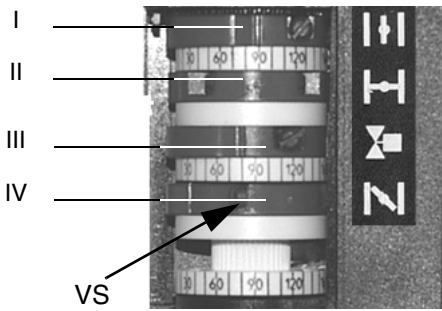
Fig. 45 - Head in “fully-backward position”

- 3 once the combustion head is adjusted, remove the actuator cover and set it to the ignition position, (ignition position= 0° on the air damper index **ID**);
- 4 (Progressive/Fully-modulating burners) Before starting the burner up, drive the high flame actuator microswitch matching the low flame one (in order to let the burner operates at the lowest output) to safely achieve the high flame stage.

As for the setting, refer to this correspondence table.

Berger STA4.5B0.37/63N30L (LG/NG/NGX280) - Berger STA13B0.36/83N30L (LG/NG/NGX350-400)

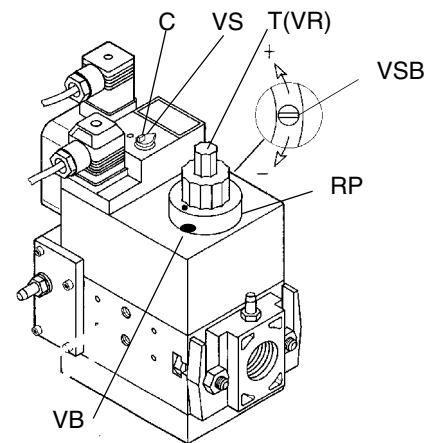
Siemens SQN72



	BERGER STA	Siemens SQN72
High flame position (set to 90°)	I	I (red)
Low flame and ignition position	IV	III (orange)
Stand-by position (set to 0°)	II	II (blue)
Not used	III	IV (black)

- Berger STA12: On this actuator, the manual control of the air damper is not provided; the setting of the cams is carried out working with a screwdriver on the **VS** screw placed internally to the cam.. .
  - Siemens SQN72: a key is provided to move cams I and IV, the other cams can be moved by means of screws. On the Siemens actuator the AUTO/MAN mode is provided (see picture).
- 5 go on adjusting air and gas flow rates: check, continuously, the flue gas analysis, as to avoid combustion with little air; dose the air according to the gas flow rate change following the steps quoted below;
- 6 drive the burner to high flame stage, by means of the thermostat **TAB** (except single-stage burners).
- 7 acting on the pressure stabiliser of the valves group, adjust the **gas flow rate in the high flame stage** as to meet the values requested by the boiler/utilisation:

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



**⚠ Pressure governor is factory-set. The setting values must be locally adapted to machine conditions. Important! Follow the instructions of the burner manufacturer!**

To adjust the air flow rate, proceed as follows, according to the burner operation (single-stage, double-stage, progressive or fully-modulating).

● **Adjustments for single-stage burners**

- loosen **VR** screw (see picture)
- move the **ID** index towards + or -, in order to increase or decrease the air flow-rate, according to the required combustion values;
- fasten the **VR** screw again.



● **Adjustments for double-stage - burners mod. LG/NG/NGX280**

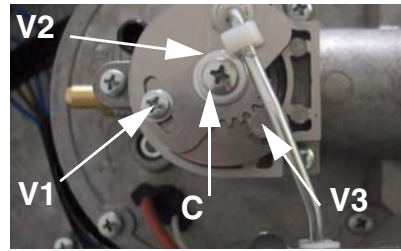
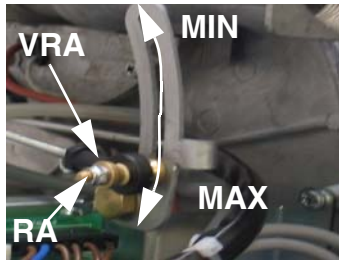
The comburent air adjustment must be performed by means of the actuator. The actuator rotation must be equal to 90° (next paragraph). The air damper opening in the high flame stage is imposed by the adjusting cam (see picture).

- To adjust the air flow rate, slacken the nut **RA** (see picture) and move the lever **VRA** through the slot as shown in see picture, to increase or decrease the air rate, until the desired rate is obtained; lock then the nut **RA** in this position.
- Drive the burner to the low flame operation, by the **TAB** boiler thermostat.

To eventually change the gas flow rate, set at step 6, slacken the screw **V1** (see picture) and set the opening angle of the butterfly valve



rotating the round plate **C** by means of the screw **V3** (turn clockwise to decrease the gas rate or counterclockwise to increase it). The index **S** shows the opening angle of the butterfly valve.

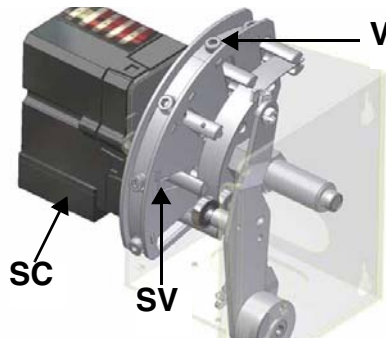


**Note:** If it should be necessary to adjust the rating of the burner in low flame operation, once all the adjustments are accomplished, act on the related cam of the actuator (see next paragraph). Then, check the gas rate and, eventually, repeat step 11.

- **progressive or fully-modulating burners**

- 13 still in the high flame operation and with the actuator on its 90° position, find the **V** screw on the adjusting cam **SV** (see next picture), matching with the bearings that move along the foil and related to the servocontrol position.
- 14 unscrew the **V** screw to increase the air flow rate, unscrew to decrease it
- 15 once the maximum flow rate is fixed, shortcircuit for a while, the thermostat **TAB T6** and **T7** terminals (see pag. 45). As far as the fully-modulating models, see next paragraph. The actuator will move towards the low flame position; then remove the bridge;
- 16 then adjust the screw **V** related to that position;
- 17 shortcircuit, again for a while, the **TAB T6** and **T7** terminals and repeat from point 5;
- 18 repeat all these instructions for all the actuator stroke, in order to define the foil shape.

**Note:** If it should be necessary to adjust the rating of the burner in low flame, work on the corresponding cam of the actuator. After this operation, check the gas rate and verify the combustion values. In case of lack or excess of air, work on the screws **V** of the adjusting cam (see next picture) matching the setting point of the air rate in low flame; unscrew to increase the air rate or screw to decrease it.



DOUBLE-STAGE-PROGRESSIVE-FULLY-MODULATING

### Fully modulating burners

To adjust the air rate in low flame and in the intermediate points, proceed as follow.

- 1 Keep pushed for 5 seconds the EXIT button on the modulator (Fig. 102); when the LED with the hand symbol lights up, push the arrow button, driving the actuator to the maximum opening position progressively;
- 2 stop its stroke when it meets each screw **V**: adjust the air rate by adjusting the **V** screw that matches each bearing.
- 3 Push the EXIT button to quit the manual mode.

### Gas Proving System VPS504 (Option)

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

To install the DUNGS VPS504 gas proving system on the MD-DLE valves group, proceed as follows:

- 1 turn off gas supply.;
- 2 Switch off power supply.
- 3 remove the Multibloc's screw plugs (Fig. 94-A);
- 4 Insert sealing rings (10,5 x 2,25) into VPS 504 (Fig. 96-B, Fig. 94-B)
- 5 Torque screws 3, 4, 5, 6 (M4 x16) Fig. 94-C

**Only use screws with metric thread on reassembly (modification, repair).**

- 6 On completion of work, perform a leak and functional test.

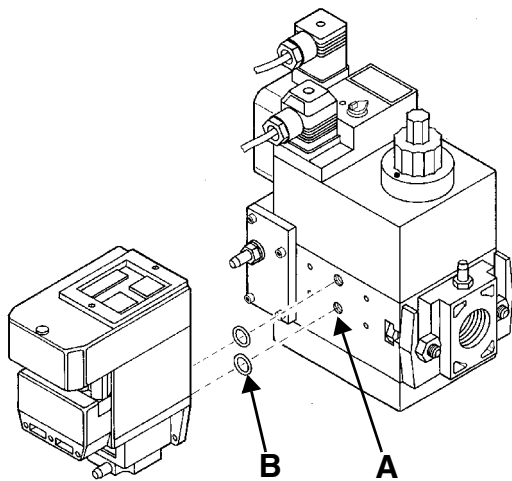


Fig. 46

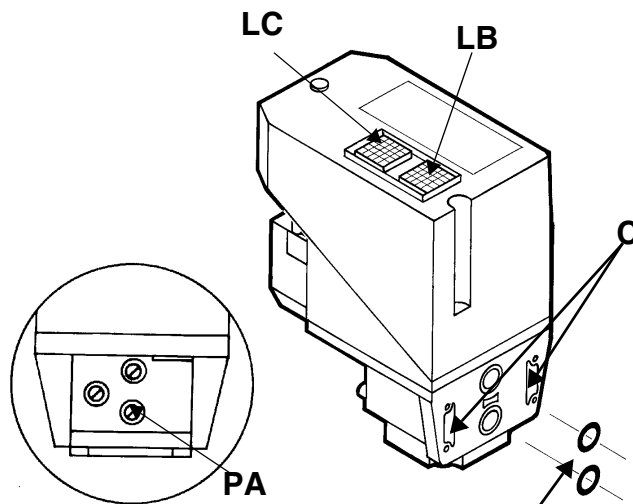


Fig. 47

When wishing to monitor the test, install a pressure gauge ranged to that of the pressure supply point **PA** (Fig. 96). If the test cycle is satisfactory, after a few seconds the consent light **LC** (yellow) comes on. In the opposite case the lockout light **LB** (red) comes on. To restart it is necessary to reset the appliance by pressing the illuminated pushbutton **LB**.

### **Calibration of air and gas pressure switches**

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

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

#### **Calibration of air pressure switch (only for single stage burners)**

Calibration is carried out as follows:

- Remove the transparent plastic cap.
- Once air and gas setting have been accomplished, startup the burner.
- While the burner is operating, rotate slowly and clockwise the adjusting ring nut **VR**, until the burner locks; read the pressure value on the scale of the pressure switch and set it again to a value reduced by the 15%.
- Repeat the start-up cycle and check the burner runs properly.
- Refit the transparent plastic cover on the pressure switch.

#### **Calibration of air pressure switch (double-stage, progressive and fully-modulating)**

To calibrate the air pressure switch, proceed as follows:

- Remove the transparent plastic cap.
- Once air and gas 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 until the burner lockout, then read the value on the pressure switch scale and set it to a value reduced by 15%.
- Repeat the ignition cycle of the burner and check it runs properly.
- Refit the transparent plastic cover on the pressure switch.

### **Calibration of low gas pressure switch**

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

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



Fig. 48

### **Adjusting the high gas pressure switch (when provided)**

To calibrate the high pressure switch, proceed as follows:

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

## PART II: OPERATION

### LIMITATIONS OF USE

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

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

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

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

NEVER OPEN OR DISMANTLE ANY COMPONENT OF THE MACHINE.

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

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

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

## OPERATION

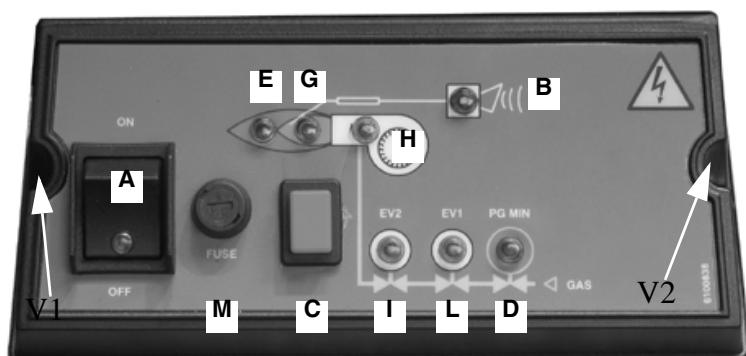


Fig. 49 - Burner's control panel



Fig. 50 - Burner modulator

## Key - Fig. 49

- |   |  |
|---|--|
| A | Mains switch ON - OFF  |
| B | Lockout signaling lamp   |
| C | Reset button for flame control device (optional)                                   |
| D | Minimum gas pressure switch consent signaling lamp                                 |
| E | High flame operation signaling lamp (or air damper opening during pre-purge stage) |
| G | Low flame operation signaling lamp   |
| H | Ignition transformer in operation signaling light                                  |
| I | EV2 opening signaling lamp   |
| L | EV1 opening signaling lamp   |
| M | Fuse   |

- Set to ON position the mains switch A on the burner electrical board front panel.
- Check the flame control device is not in the lockout position (LED B on), if necessary reset it by means of the pushbutton C (reset), pushing for more than 0.5 seconds but less than 3 seconds;
- Verify that the control thermostats or pressure switches give the consent to operate to the burner.
- Check the gas supply pressure is sufficient (LED D on).

**Only burners provided with gas proving system:** the check cycle of the leakage control device starts; the completion of this check is signalled by the light of the lamp on the device. When the valves check is finished, the start up cycle of the burner begins. In the case of a leak in a valve, the leakage control device locks and its red lamp lights.

To reset the device operate on the device pushbutton.

**All burners**

- When the startup cycle begins, the servocontrol drives the air damper to the maximum opening position, the fan motor starts and the pre-purge phase begins.
- During the pre-purge phase, the complete opening of the air damper is signalled by the LED E on the frontal panel of the electrical board.
- At the end of the pre-purge phase, the air damper goes to the ignition position, the ignition transformer comes on (signalled by the LED H) and 3 seconds later the solenoid valves EV1 and EV2 are energized (LEDs L and I on the front panel).
  - 3 seconds after the opening of the valves, the ignition transformer comes off and the lamp H turns off; subsequently:

**Single stage burners:** the burner is on at the maximum power; the LEDs E and G are on;

**High-low flame burners:** the burner is on in low flame (LED G is on); 8 seconds later the high flame operation begins and the burner switches automatically to high flame (LED E is on) or remains in low flame operation, depending on the plant needs.

**Modulating burners:** they are provided with the Siemens RWF40 modulator, placed on the burner side. As for the modulator operation see the related manual.

## PART III: MAINTENANCE

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



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

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

## ROUTINE MAINTENANCE

- Clean and examining the gas filter cartridge, if necessary replace it (Fig. 104 on).
- Removal, examination and cleaning of the combustion head.
- Check the ignition and detection electrodes, clean and adjust if necessary (see Fig. 126). In case of doubt, check the detection current according to the schemes in Fig. 124.
- Cleaning and greasing of sliding and rotating parts.

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

**Removing the filter in the MULTIBLOC DUNGS MB-DLE 405..412**

- Check the filter at least once a year!
- Change the filter if the pressure difference between pressure connection 1 and 3 (Fig. 104-Fig. 106) is  $\Delta p > 10$  mbar.
- Change the filter if the pressure difference between pressure connection 1 and 3 (Fig. 104-Fig. 106) 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. 108.
- 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.
- 6 Pay attention that dirt does not fall inside the valve.

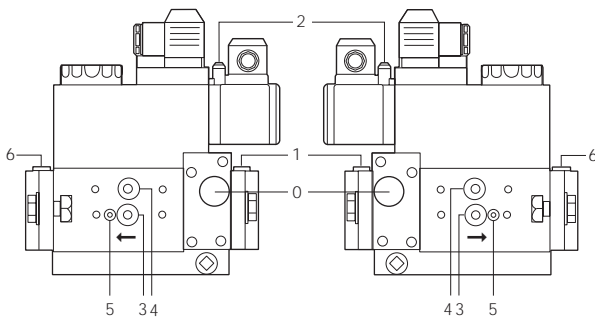


Fig. 51

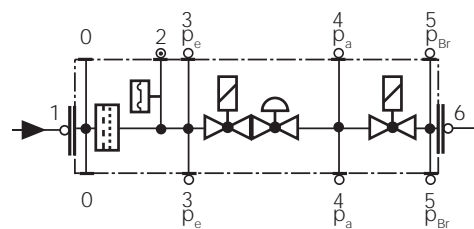


Fig. 52

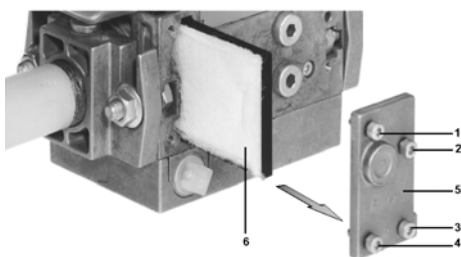


Fig. 53

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

- Check the filter at least once a year!
- Change the filter if the pressure difference between pressure connection 1 and 2 (Fig. 110-Fig. 112)  $\Delta p > 10$  mbar.
- Change the filter if the pressure difference between pressure connection 1 and 2 (Fig. 110-Fig. 112) is twice as high compared to the last check.

You can change the filter without removing the fitting.

- 1 Interrupt the gas supply closing the on-off valve.
- 2 Remove screws 1 ÷ 6 (Fig. 114).
- 3 Change filter insert.
- 4 Re-insert filter housing, screw in screws 1 ÷ 6 without using any force and fasten.
- 5 Perform leakage and functional test,  $p_{max.} = 360$  mbar.
- 6 Pay attention that dirt does not fall inside the valve.

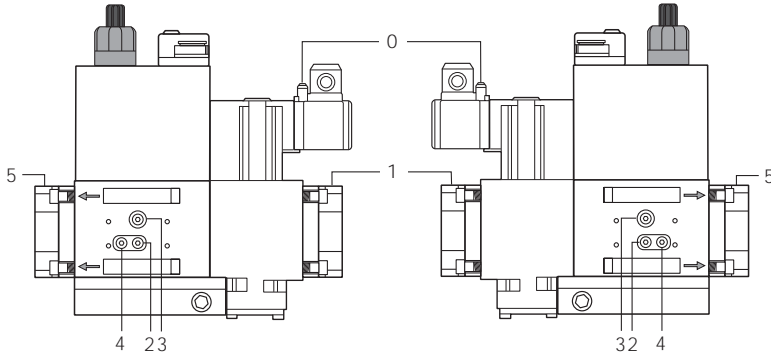


Fig. 54

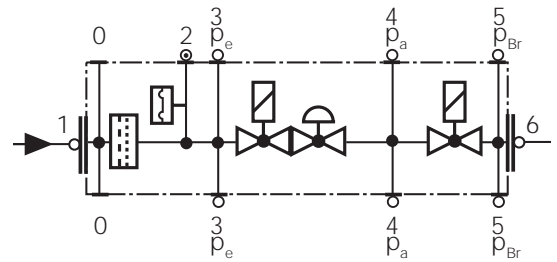


Fig. 55

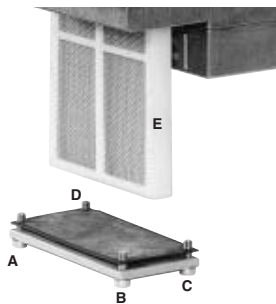


Fig. 56

**Removing and cleaning the combustion head**

- 1 By means of the plastic hook **G**, unlock the rod **T** (Fig. 116) which drives the butterfly valve (Fig. 116 and Fig. 118), to disconnect it from its seat.
- 2 Remove the screws **V1**, **V2**, **V3**, **V4** and the screws **S1** and **S2** (Fig. 116).
- 3 Disconnect the ignition cable **CA** from the ignition transformer (Fig. 120).
- 4 Disconnect the connector **CR** (Fig. 122).

**CAUTION: during the assembling phase, before tightening screws V1, V2, V3, V4, mount and tighten screws S1 and S2.**

To remove the head, the operator must pull it towards himself. Once the combustion head is removed, check that the air and gas holes are not obstructed (Fig. 122 - **H**). Clean the combustion head by a compressed air blow or, in case of scale, scrape it off by a scratchbrush.

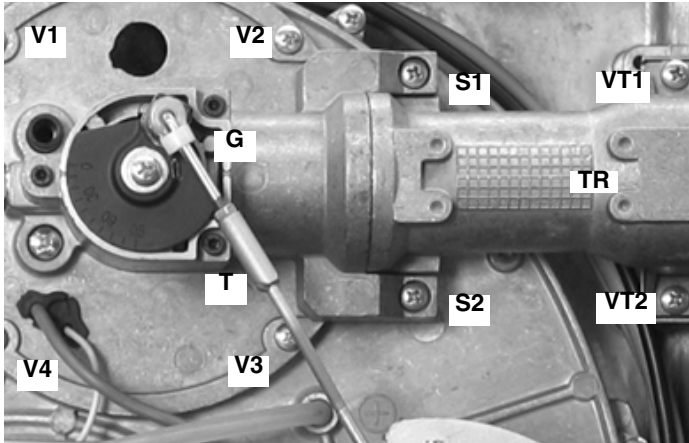


Fig. 57

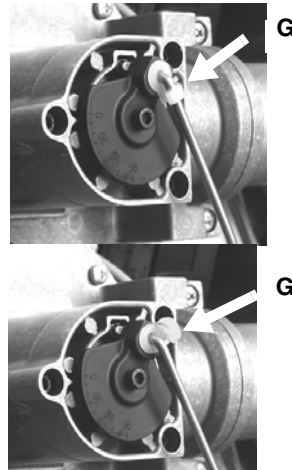


Fig. 58

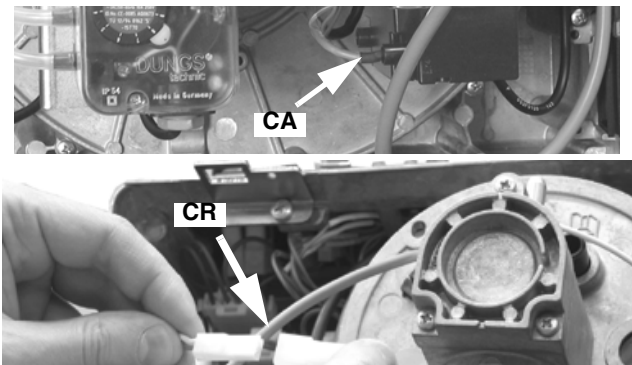


Fig. 59

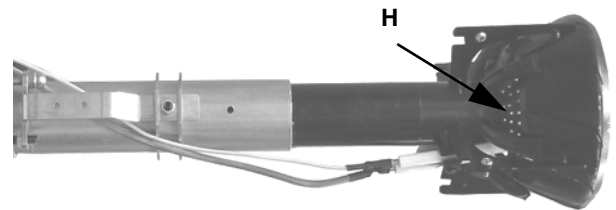


Fig. 60

**Checking the detection current**

If the burner locks, execute the following inspections. To measure the detection signals refer to the diagrams in Fig. 124. If the signal is less than the value shown, check the position of the detection electrode, the electrical contacts and if necessary replace the detection electrode.

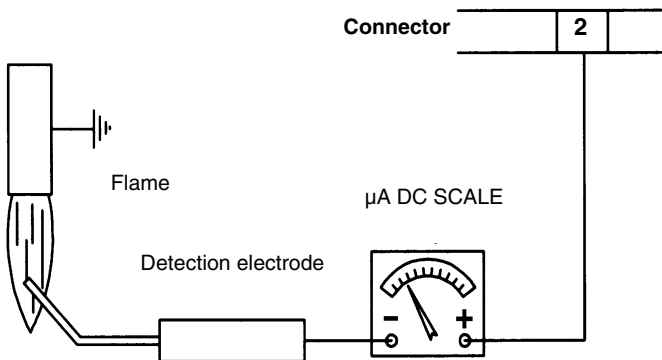


Fig. 61

Control box	Minimum detection signal
Siemens LME21-22	3 µA



**Adjusting the electrodes position**

**ATTENTION:** avoid the ignition and detection electrodes to get in touch with 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. The gap between the ignition electrode and the ground is **4÷5 mm**.

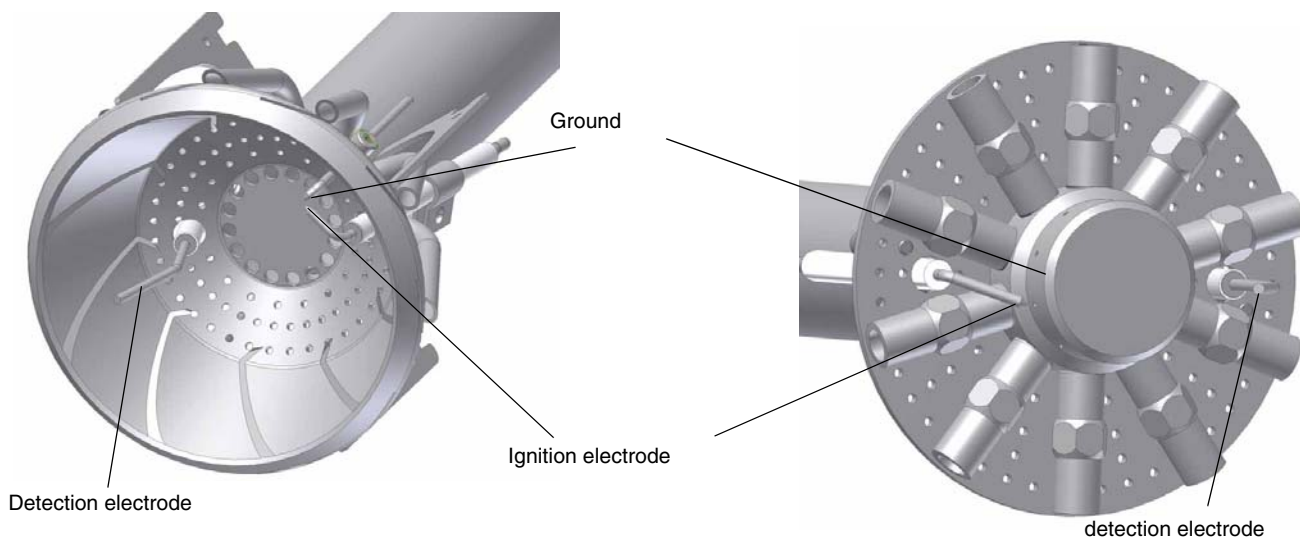


Fig. 62

**Seasonal stop**

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

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

**Burner disposal**

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

# TROUBLESHOOTING

CAUSE	TROUBLE											
	THE BURNER DOESN'T START	CONTINUE WITH PRE-PURGE	DOESN'T START AND LOCK-OUT	DOESN'T START AND REPEATS THE CYCLE	STARTS AND REPEATS THE CYCLE	STARTS AND LOCK-OUT	THE FLAME MONITOR DEVICE DOESN'T GIVE CONSENT TO START	DOESN'T SWITCH TO HIGH FLAME	DOESN'T RETURN IN LOW FLAME	THE SERVO CONTROL IS LOCK AND VIBRATE	LOCK-OUT DURING OPERATION	TURNS OF AND REPEATS CYCLE DURING OPERATION
MAIN SWITCH OPEN	●											
LACK OF GAS	●			●								
MAXIMUM GAS PRESSURE SWITCH DEFECTIVE (IF PROVIDED)	●		●									
THERMOSTATS/PRESSURE SWITCHES DEFECTIVE	●			●								●
OVERLOAD TRIPPED INTERVENTION	●											
AUXILIARIES FUSE INTERRUPTED	●											
CONTROL BOX FAULTY	●	●	●			●					●	
DEFECTIVE SERVOCONTROL (IF PROVIDED)	●	●	●				♦					
AIR PRESSURE SWITCH FAULT OR BAD SETTING	●					●	●				●	
MINIMUM GAS PRESSURE SWITCH DEFECTIVE OR GAS FILTER DIRTY	●			●	●		●					●
IGNITION TRANSFORMER FAULT			●									
IGNITION ELECTRODES BAD POSITION			●									
DETECTION ELECTRODE BAD POSITION						●					●	
BUTTERFLY VALVE BAD SETTING			●			●						
DEFECTIVE GAS GOVERNOR			●	●	●							●
GAS VALVE DEFECTIVE			●									
BAD CONNECTION OR DEFECTIVE HIGH/LOW FLAME THERMOSTAT OR PRESSURE SWITCH (IF PROVIDED)							♦	●	●	♦		
WRONG SETTING SERVO CONTROL CAM							1	1	1			
UV PROBE DIRTY OR DEFECTIVE (IF PROVIDED)			1			1					1	
PHASE-NEUTRAL INVERTED						s						
PHASE-PHASE SUPPLY OR PRESENCE OF VOLTAGE ON THE NEUTRAL CONDUCTOR(*)						s						

1 = with any control box;

s = with only LGB2../LMG2../LME11/LME2..

(\*) In such cases, insert the circuit SIEMENS "RC466890660" (See chapter "Electrical connections")

**SPARE PARTS**

Description	Code		
	LG/NG280	LG/NG350	LG/NG400
COVER	1011803	1011803	1011803
CONTROL BOX (one-stage regulation)	LME: 2020467	LME: 2020467	LME: 2020467
CONTROL BOX (double stage, progressive and fully modulating)	LME: 2020468	LME: 2020468	LME: 2020468
DETECTION ELECTRODE	2080108	2080108	2080108
IGNITION ELECTRODE	2080218	2080218	2080218
GASKET	2110059	2110059	2110059
AIR PRESSURE SWITCH	2160053	2160053	2160053
GAS PRESSURE SWITCH	2160077	2160077	2160077
IGNITION TRANSFORMER MOD. COFI	2170138	2170138	2170138
IGNITION TRANSFORMER MOD. DANFOSS	2170232	2170232	2170232
MOTOR	2180717	2180714	2180714
VALVE GROUP Rp1	2190341	2190341	2190341
VALVE GROUP Rp1 1/4	2190342	2190342	2190342
VALVE GROUP Rp1 1/2	21903L3	21903L3	21903L3
VALVE GROUP Rp2	-	-	21903L4
GAS PROVING SYSTEM (option)	2191604	2191604	2191604
ACTUATOR (double stage, progressive and fully-modulating)	2480057	2480074	2480074
COMBUSTION HEAD (GAS)	30600P9	30600H3	30600H2
COMBUSTION HEAD (L.P.G.)	30600Q3	30600H7	30600H6
BLAST TUBE S*	30900L0	30900G3	30900G3
BLAST TUBE L*	30900L1	30900G3**	30900G3**
COMBUSTION HEAD (GAS)	3501842	3501841	3501842
COMBUSTION HEAD (L.P.G.)	-	3501844	3501843
IGNITION CABLE	6050153	6050153	6050153
DETECTION CABLE	6050214	6050214	6050214
PRINTED CIRCUIT BOARD	6100546	6100541	6100541

**Spare parts for Low NOx Burners only**

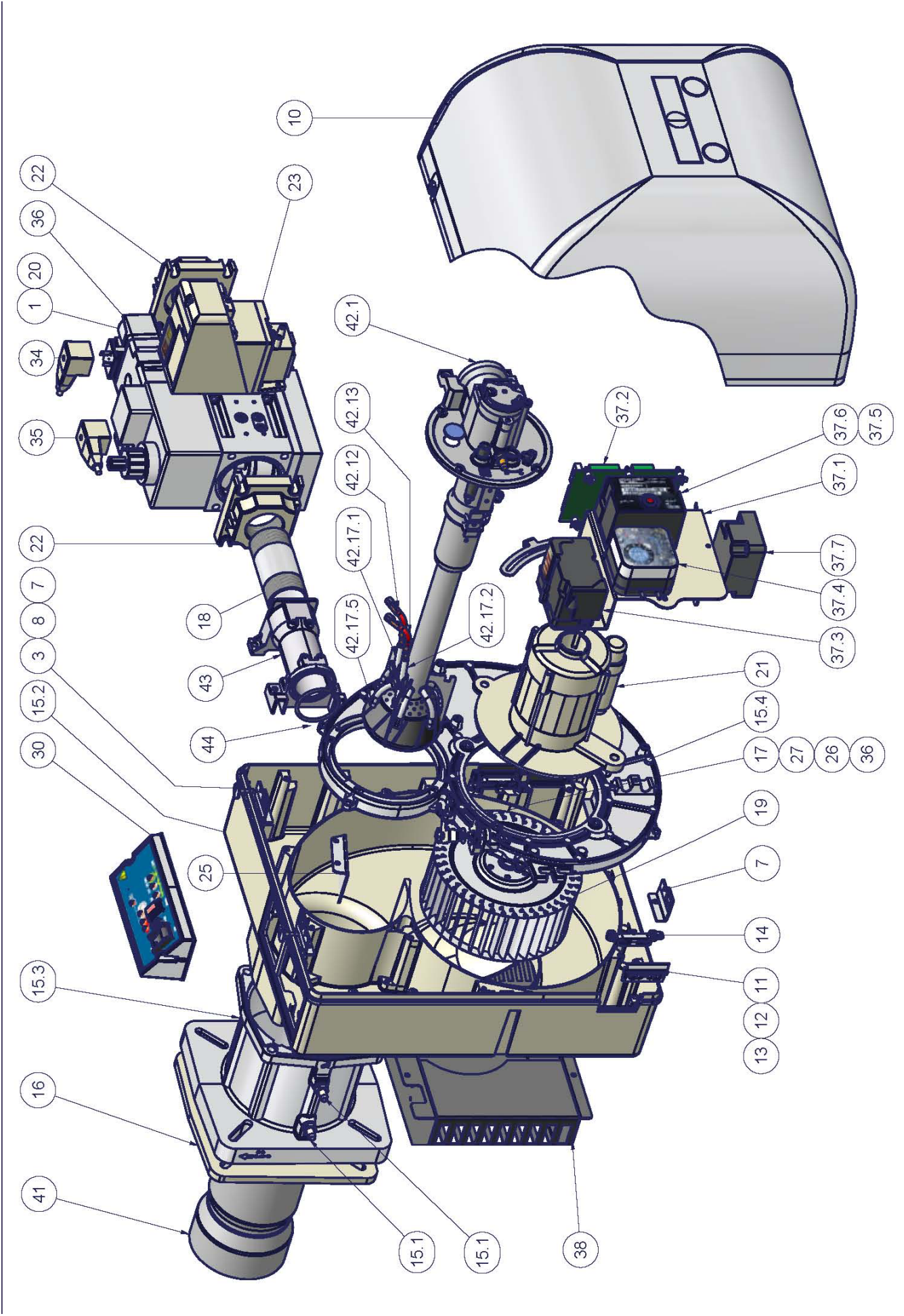
Description	Code		
	NGX280	NGX350	NGX400
COMBUSTION HEAD (NOx)	30600Q7	30600H9	30600H8
BLAST TUBE S*	30910P5	30910L6	30910L6
BLAST TUBE L*	30910Q2	30910L6**	30910L6**

\*S:standard  
L: extended

\*\* To modify the blast tube's length, see chapter "How to modify blast tube length".

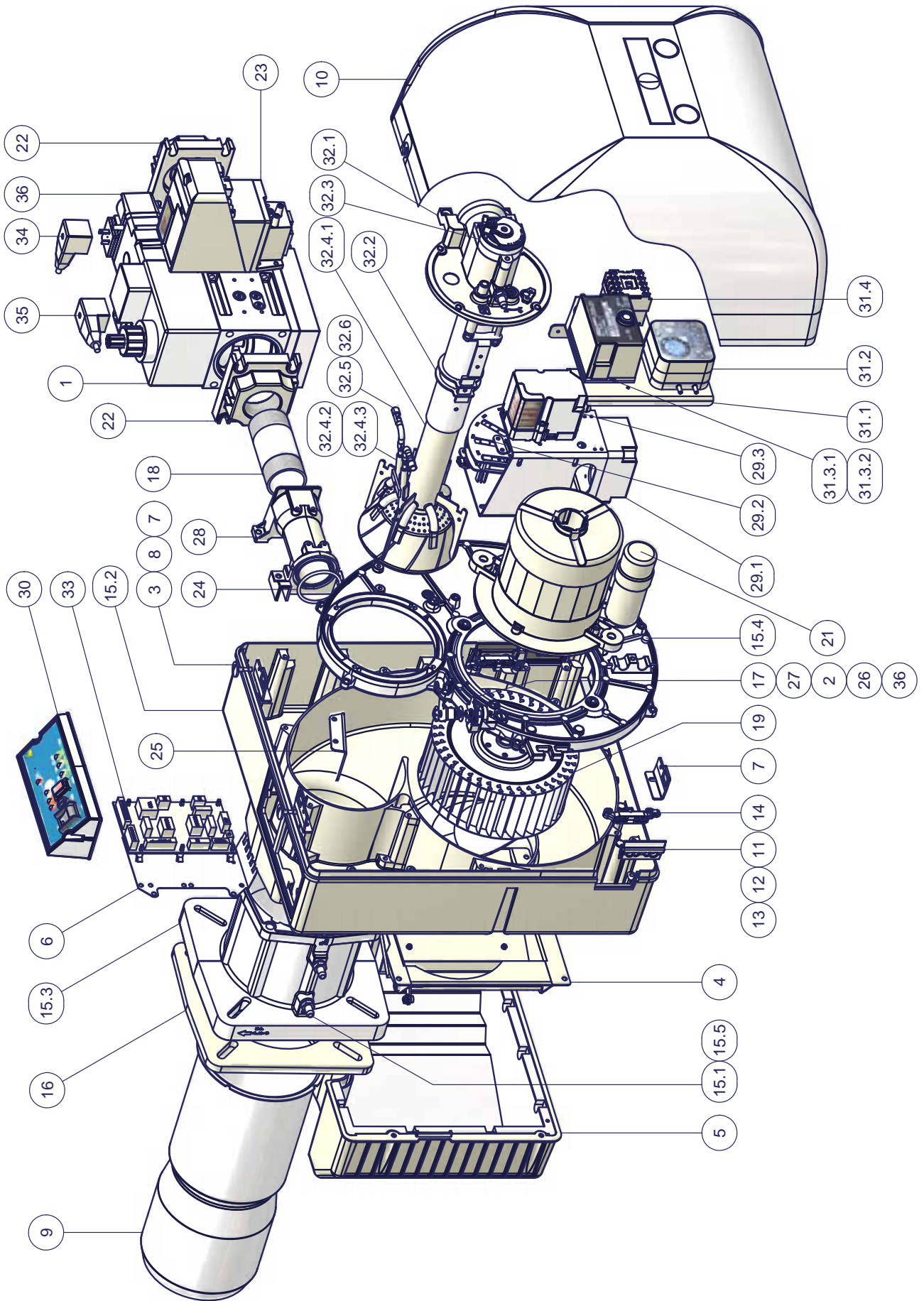
**BURNER EXPLODED VIEW NG280**

Position	Description
1	VALVE GROUP
3	COVER FIXING SCREW
7	FIXING BRACKET - LEFT SIDE
8	FIXING BRACKET - RIGHT SIDE
10	COVER
11	4-WAYS FAIRLEAD
12	2-WAYS FAIRLEAD
13	FAIRLEAD
14	FASTENER
15.1	GAS PRESSURE INTAKE
15.2	HOUSING
15.3	FLANGED COUPLING
15.4	MOTOR'S PLATE
15.5	WASHER
16	GASKET
17	AIR DAMPER INDEX
18	EXTENSION SCREW
19	FAN
20	GAS PRESSURE SWITCH
21	MOTOR
22	VALVE GROUP FLANGE
23	GAS PROVING SYSTEM
25	AIR FLAP
26	AIR DAMPER CRANK (progressive and fully modulating only)
27	FIXING ROD
30	PANEL ASSEMBLY
34	GREY/GREEN TERMINAL
35	BLACK/GREEN TERMINAL
36	BLOCKING PLATE
37.1	COMPONENTS BRACKET
37.2	ELECTRONIC BOARD
37.3	ACTUATOR (double stage, progressive and fully modulating only)
37.4	AIR PRESSURE SWITCH
37.5	CONTROL BOX BOARD
37.6	CONTROL BOX
37.7	GAS TRANSFORMER
38	BOX ASSEMBLY
41	BLAST TUBE
42.1	BUTTERFLY MANIFOLD
42.12	IGNITION CABLE
42.13	DETECTION CABLE
42.17.1	IGNITION ELECTRODE
42.17.2	DETECTION ELECTRODE
42.17.3	GROUNDING CABLE
42.17.5	COMBUSTION HEAD
43	GAS PIPE
44	OR RING



**BURNER EXPLODED VIEW NG350-400**

Position	Description
1	VALVE GROUP
2	WASHER
3	COVER FIXING SCREW
4	AIR DAMPER ASSEMBLY
5	BOX ASSEMBLY
6	BOARD'S SUPPORTING BRACKET
7	FIXING BRACKET - LEFT SIDE
8	FIXING BRACKET - RIGHT SIDE
9	BLAST TUBE
10	COVER
11	4-WAYS FAIRLEAD
12	2-WAYS FAIRLEAD
13	FAIRLEAD
14	FASTENER
15.1	GAS PRESSURE INTAKE
15.2	HOUSING
15.3	FLANGED COUPLING
15.4	MOTOR'S PLATE
15.5	WASHER
16	GASKET
17	AIR DAMPER INDEX
18	EXTENSION SCREW
19	FAN
20	GAS PRESSURE SWITCH
21	MOTOR
22	VALVE GROUP FLANGE
23	GAS PROVING SYSTEM
24	OR RING
25	AIR FLAP
26	AIR DAMPER CRANK (progressive and fully modulating only)
27	FIXING ROD
28	GAS PIPE
29.1	GAS TRANSFORMER
29.2	SMALL ADJUSTING CAM
29.3	ACTUATOR (double stage, progressive and fully modulating only)
30	PANEL ASSEMBLY
31.1	CONTROL BOX BRACKET
31.2	AIR PRESSURE SWITCH
31.3.1	CONTROL BOX
31.3.2	CONTROL BOX BOARD
31.4	CONTACTOR
32.1	BUTTERFLY MANIFOLD
32.2	HEAD EXTENSION ASSEMBLY
32.3	BUTTERFLY ASSEMBLY
32.4.1	COMBUSTION HEAD
32.4.2	DETECTION ELECTRODE
32.4.3	IGNITION ELECTRODE
32.5	IGNITION CABLE
32.6	DETECTION CABLE
33	ELECTRONIC BOARD
34	GREY/GREEN TERMINAL
35	BLACK/GREEN TERMINAL
36	BLOCKING PLATE



**SIEMENS LME11/21/22 CONTROL BOX**

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

**Comparative table**

LGB Series	LMG Series	LME Series
---	<b>LMG 25.33</b>	<b>LME 11.33</b>
<b>LGB 21.33</b>	<b>LMG 21.33</b>	<b>LME 21.33</b>
<b>LGB 22.33</b>	<b>LMG 22.33</b>	<b>LME 22.33</b>

**Preconditions for burner startup**

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

**Undervoltage**

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

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

**Controlled intermittent operation**

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

**Reversed polarity protection with ionization**




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

**Control sequence in the event of fault**

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

**Operational status indication**

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

	<b>red LED</b>	..... Steady on
	<b>yellow LED</b>	○..... Off
	<b>green LED</b>	○... Off

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

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

**START-UP PROGRAM**

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

**A Start command (switching on)**

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

**tw Waiting time**

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

**t11 Programmed opening time for actuator «SA»**

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

**t10 Specified time for air pressure signal**

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

**t1 Prepurge time**

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

**t12 Programmed closing time for actuator «SA»**

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

**t3 Preignition time**

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

**TSA Ignition safety time**

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

**t4 Interval BV1 and BV2-LR**

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

**B - B'** Interval for flame establishment

**C** Burner operation position

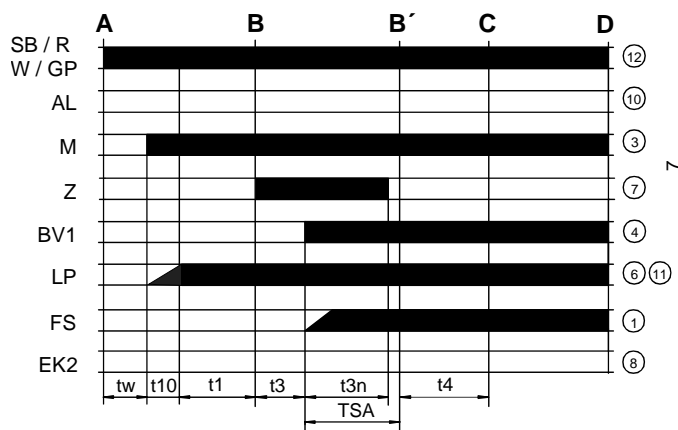
**C - D** Burner operation (heat production)

**D** Controlled by "R" shutdown

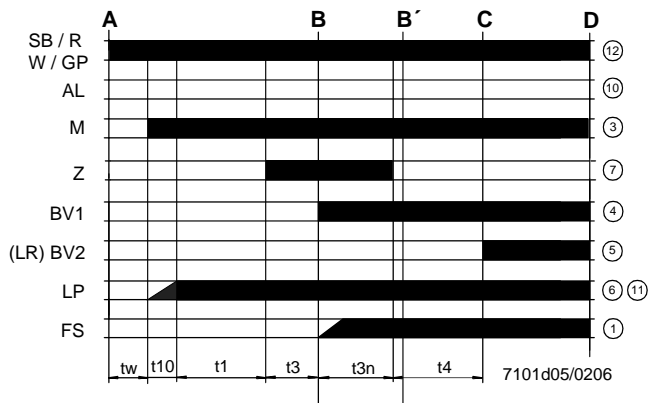
The burner stops and the control device is ready for a new startup.



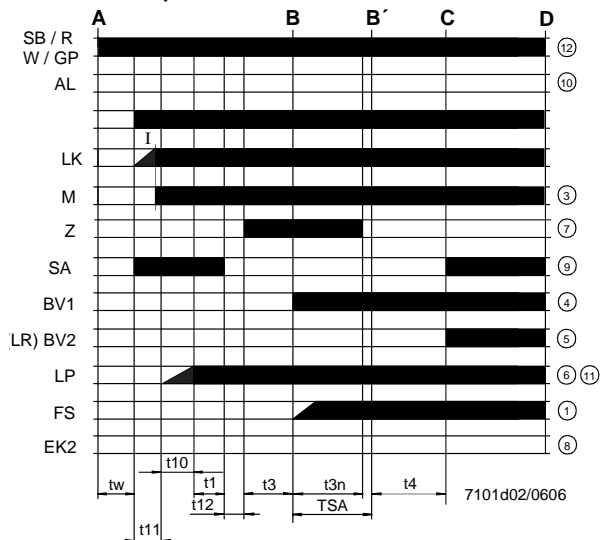
**LME11 control sequence**



**LME21 control sequence**



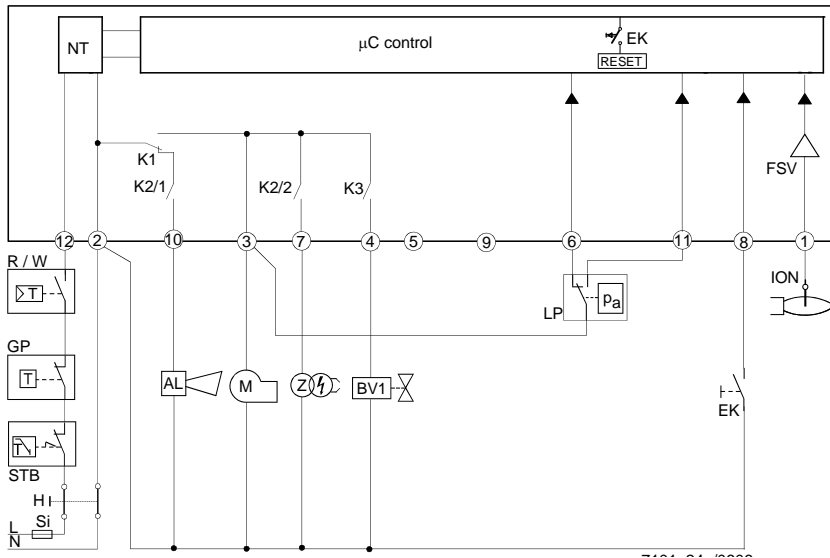
**LME22 control sequence**



**Control sequence**

- $t_w$  Waiting time
- $t_1$  Purge time
- TSA Ignition safety time
- $t_3$  Preignition time
- $t_{3n}$  Postignition time
- $t_4$  Interval between BV1 and BV2/LR
- $t_{10}$  Specified time for air pressure signal
- $t_{11}$  Programmed opening time for actuator SA
- $t_{12}$  Programmed closing time for actuator SA

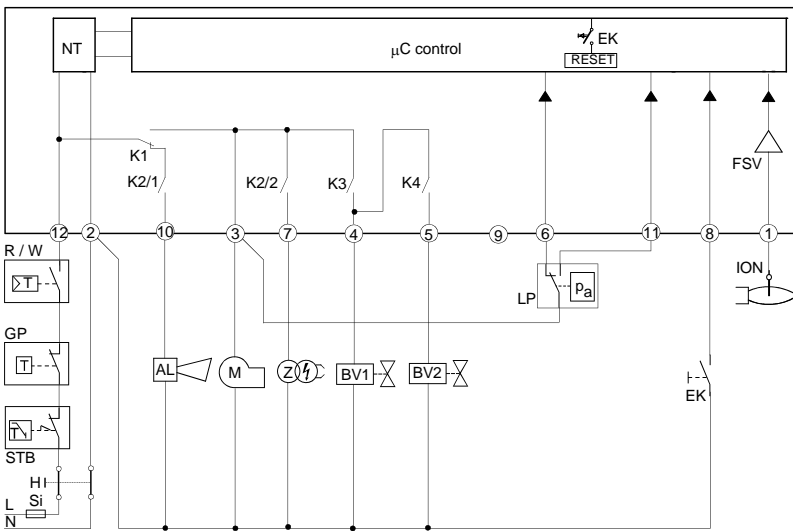
### LME11 connection diagram



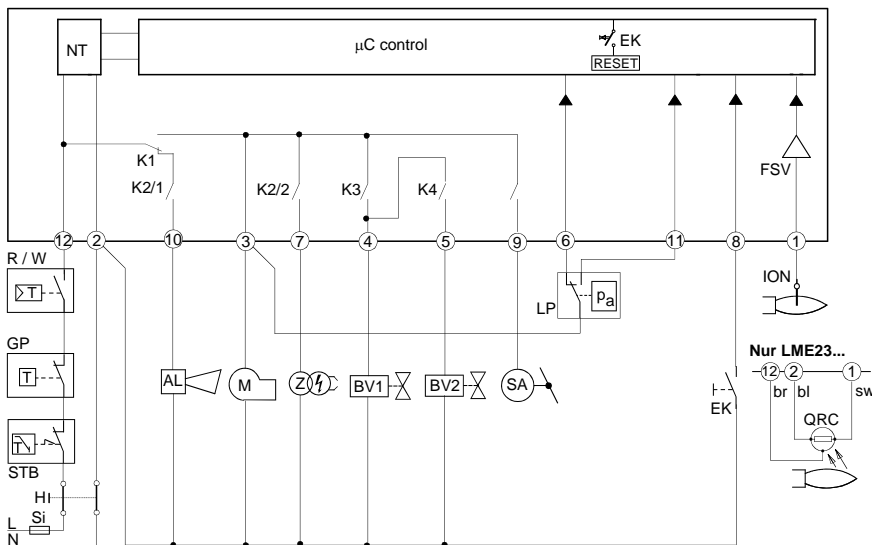
### Connection diagram

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

### LME21 connection diagram



### LME22 connection diagram



## CONTROL PROGRAM IN THE EVENT OF FAULT

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

## CONTROL BOX LOCKED

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

## DIAGNOSTICS OF THE CASE OF FAULT

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

During diagnostics, the control outputs are deactivated:

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

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

## RESETTING THE BURNER CONTROL

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

## LIMITATION OF REPETITIONS (only for LME11.. model)

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

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

## TECHNICAL CHARACTERISTICS

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



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