LX10R-FGR
LX18-FGR

Gas burners

PROGRESSIVE AND FULLY MODULATING VERSION

MANUAL OF INSTALLATION - USE - MAINTENANCE

CIB UNIGAS

BURNERS - BRUCIATORI - BRULERS - BRENNER - QUEMADORES - ГОРЕЛКИ

M039589CA Rel 0.0 05/2020

DANGERS, WARNINGS AND NOTES OF CAUTION

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

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

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

CAREFULLY KEEP THIS MANUAL FOR FUTURE REFERENCE.

1) GENERAL INTRODUCTION

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

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

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

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

Contact qualified personnel only.

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

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

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

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

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

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

2) SPECIAL INSTRUCTIONS FOR BURNERS

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

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

a Remove the power supply by disconnecting the power cord from the mains.

b Disconnect the fuel supply by means of the hand-operated shut-off valve and remove the control handwheels from their spindles.

Special warnings

- Make sure that the burner has, on installation, been firmly secured to the appliance, so that the flame is generated inside the appliance fire-box.
- Before the burner is started and, thereafter, at least once a year, have qualified personnel perform the following operations:

a set the burner fuel flow rate depending on the heat input of the appliance;

b set the flow rate of the combustion-supporting air to obtain a combustion efficiency level at least equal to the lower level required by the regulations in force;

c check the unit operation for proper combustion, to avoid any harmful or polluting unburnt gases in excess of the limits permitted by the regulations in force;

d make sure that control and safety devices are operating properly;

e make sure that exhaust ducts intended to discharge the products of combustion are operating properly;

f on completion of setting and adjustment operations, make sure that all mechanical locking devices of controls have been duly tightened;

g make sure that a copy of the burner use and maintenance instructions is available in the boiler room.

- In case of a burner shut-down, reser the control box by means of the RESET pushbutton. If a second shut-down takes place, call the Technical Service, **without trying to RESET further**.
- The unit shall be operated and serviced by qualified personnel only, in compliance with the regulations in force.

3) GENERAL INSTRUCTIONS DEPENDING ON FUEL USED

3a) ELECTRICAL CONNECTION

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

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

GENERAL

- The burner shall be installed by qualified personnel and in compliance with regulations and provisions in force; wrong installation can cause injuries to people and animals, or damage to property, for which the manufacturer cannot be held liable.
- Before installation, it is recommended that all the fuel supply system pipes be carefully cleaned inside, to remove foreign matter that might impair the burner operation.
- Before the burner is commissioned, qualified personnel should inspect the following:

a the fuel supply system, for proper sealing;
b the fuel flow rate, to make sure that it has been set based on the firing rate required of the burner;
c the burner firing system, to make sure that it is supplied for the designed fuel type;
d the fuel supply pressure, to make sure that it is included in the range shown on the rating plate;
e the fuel supply system, to make sure that the system dimensions are adequate to the burner firing rate, and that the system is equipped with all the safety and control devices required by the regulations in force.

- When the burner is to remain idle for some time, the fuel supply tap or taps should be closed.

SPECIAL INSTRUCTIONS FOR USING GAS

Have qualified personnel inspect the installation to ensure that:

a the gas delivery line and train are in compliance with the regulations and provisions in force;
b all gas connections are tight;
c the boiler room ventilation openings are such that they ensure the air supply flow required by the current regulations, and in any case are sufficient for proper combustion.

- Do not use gas pipes to earth electrical equipment.
- Never leave the burner connected when not in use. Always shut the gas valve off.
- In case of prolonged absence of the user, the main gas delivery valve to the burner should be shut off.

Precautions if you can smell gas

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

- Do not obstruct the ventilation openings of the room where gas appliances are installed, to avoid dangerous conditions such as the development of toxic or explosive mixtures.

DIRECTIVES AND STANDARDS

Gas burners

European directives

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

Harmonized standards

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

Light oil burners

European directives

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

Harmonized standards

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

National Standard

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

Heavy oil burners

European Directives

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

Harmonized standards

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

Norme nazionali / National Standard

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

Gas - Light oil burners

European Directives

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

Harmonized standards

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

Norme nazionali / National Standard

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

Gas - Heavy oil burners

European directives:

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

Harmonized standards

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

National Standard

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

Industrial burners

European directives

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

Harmonized standards

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

Burner data plate

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

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

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

SYMBOLS USED



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



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

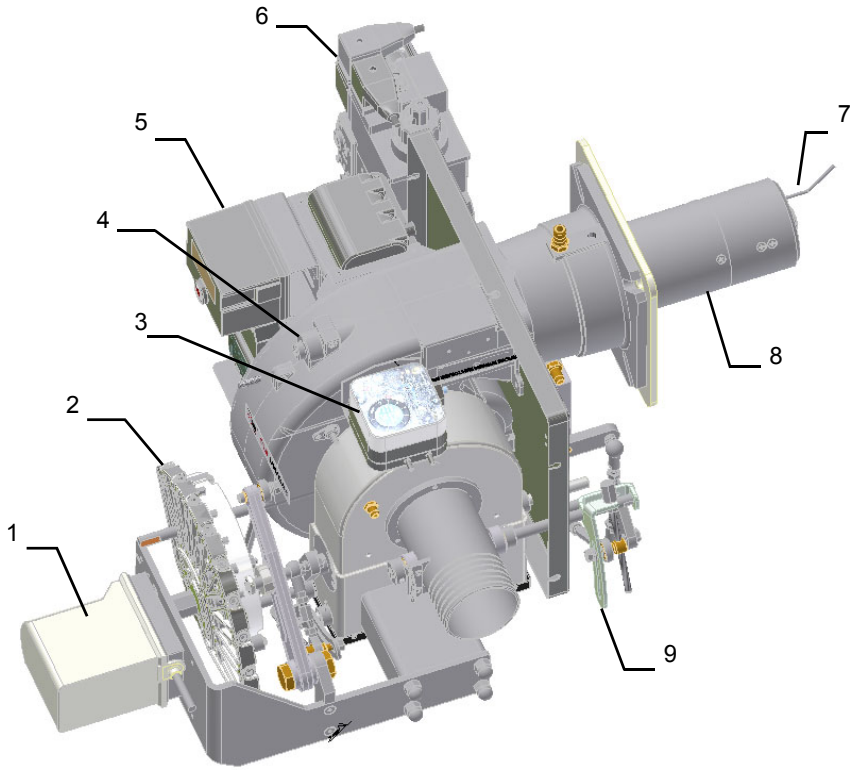


WARNING! Failure to observe the warning may result in electric shock with lethal consequences

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

PART I: SPECIFICATIONS

BURNERS FEATURES



1 Actuator
2 Sector variable
3 Air pressure switch
4 Combustion head adjusting ring nut
5 LME22
6 Gas train
7 Detection electrode
8 Blast tube + Combustion head
9 FGR Adjustment

Fig. 1

Gas operation: the gas coming from the supply line passes through filter, gas valves and pressure regulator. This one forces the pressure in the utilisation limits. The electric actuator , 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 determines the energetic quality and the geometry of the flame. Fuel and comburent are routed into separated ways as far as the zone of flame generation (combustion chamber).
The control panel , placed on the burner's front side, shows each operating stage.

Burner model identification

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

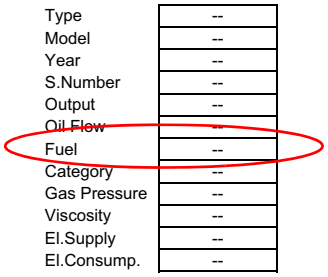
Type	LX10R-FGR	Model	M-.	MD.	S.	*.	A.	0.	25.
	(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)

1	BURNER TYPE	**LX10R-FGR, LX18-FGR**
2	FUEL	M - Natural gas
3	OPERATION (Available versions)	PR - Progressive MD - Fully modulating
4	BLAST TUBE AND AIR INLET CONFIGURATION	S - Standard L - Extended
5	DESTINATION COUNTRY	* - see data plate
6	BURNER VERSION	A - Standard Y - Special
7	EQUIPMENT	0 = 2 gas valves 1 = 2 gas valves + gas proving system 7 = 2 gas valves + maximum gas pressure switch 8 = 2 gas valves + gas proving system + maximum gas pressure switch
8	GAS CONNECTION see Specifications	15 = Rp 1/2" - 20 = Rp 3/4" - 25 = Rp 1"

Fuel



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



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

Fuel	**Hi** (KWh/Stm^3)	**ρ** (kg/Stm^3)	f_Q	f_p
LPG	26,79	2,151	0,353	0,4
Town gas	4,88	0,6023	1,936	3,3
Biogas	6,395	1,1472	1,478	3,5

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

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

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



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



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

BURNER TYPE		LX10R	LX18
Output	min. - max. kW	48 - 95	55 - 155
Fuel		Natural gas	
Category		see next paragraph	
Gas flow rate	min.-max. Stm^3/h	5,1 - 10,1	5,8 - 16,4
Gas pressure	min.-max. mbar	(see Note 2)	
Electric supply		230V 1N ~	
Total power consumption	kW	0,4	0,4
Fan motor	kW	0,15	0,15
Protection		IP40	
Operation		Two stages - Progressive - Fully modulating	
Valves size / Gas connection - 15		Rp 1/2" (15)	Rp 1/2" (15)
Valves size / Gas connection - 20		Rp 3/4" (20)	Rp 3/4" (20)
Valves size / Gas connection - 25		Rp 1" (25)	Rp 1" (25)
Operating temperature	°C	-10 ÷ +50	
Storage Temperature	°C	-20 ÷ +60	
Working service*		Intermitent	

Note1:	**All gas flow rates are referred to Stm^3 / h (1.013 mbar absolute pressure, 15° C temperature) and are valid for G20 gas (net calorific value H_i = 34,02 MJ / Stm^3 = 9,45 kWh / Stm^3);**
Note2:	**Maximum gas pressure= 360 mbar (with Dungs MBDLE)** **Minimum gas pressure= see gas curves.**
Warning:	**Burners are suitable only for indoor operation with a maximum relative humidity of 80%**

NOTE:<u>The power is a function of the amount of FGR regulated during commitioning / starting. The powers may therefore be lower. Contact the technical office for more information.</u>

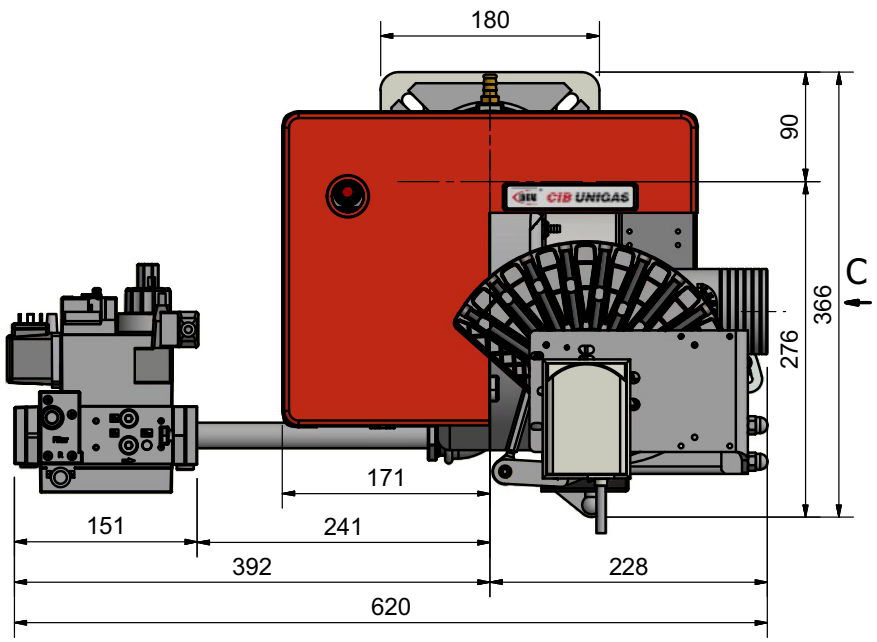
(*) NOTE ON THE WORKING SERVICE: the control box automatically stops after 24h of continuous working. The control box immediately starts up, automatically.

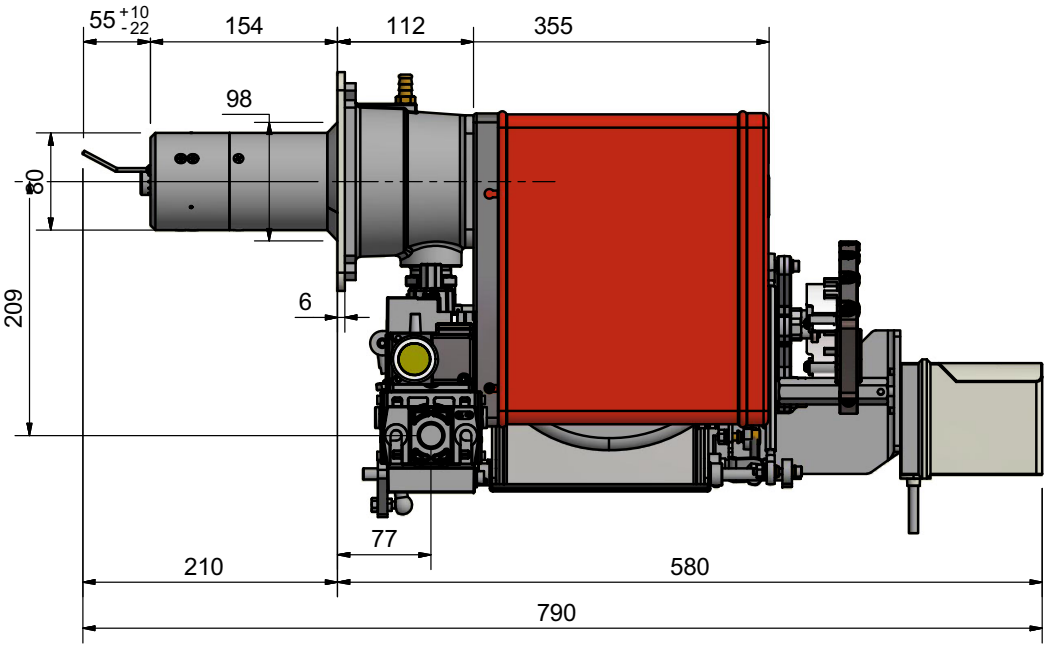
Country and usefulness gas categories

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

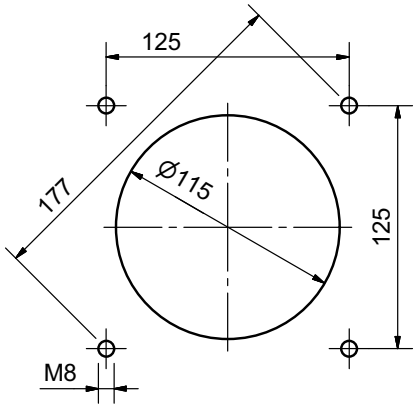
(*) Only for I_{2EK} : the appliance was configured for the appliance category K (I2K) and is suitable for the use of G and G+ distribution gases according to the specifications as included in the NTA 8837:2012 Annex D with a Wobbe index of 43.46 – 45.3 MJ/m3 (dry, 0 °C, upper value) or 41.23 – 42.98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

Overall dimensions (mm) LX10R-FGR

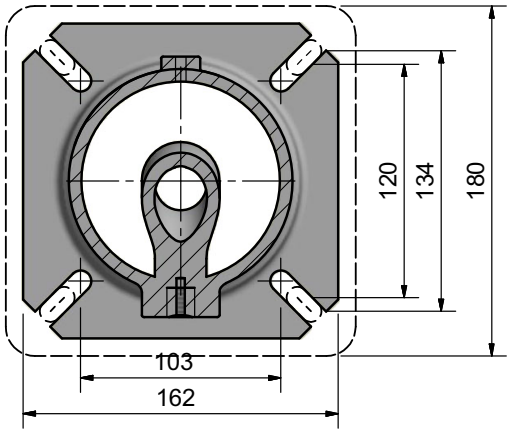


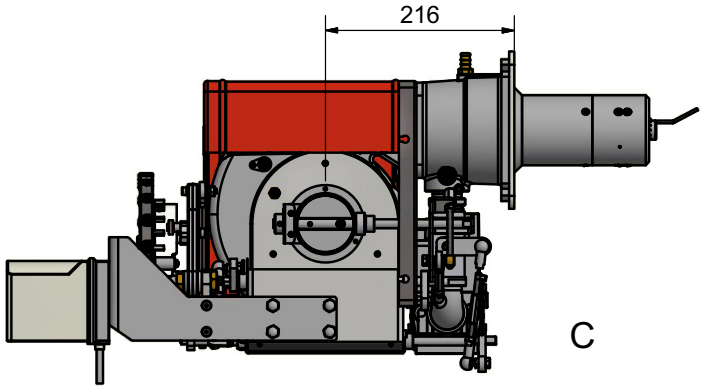


Boiler recommended drilling template

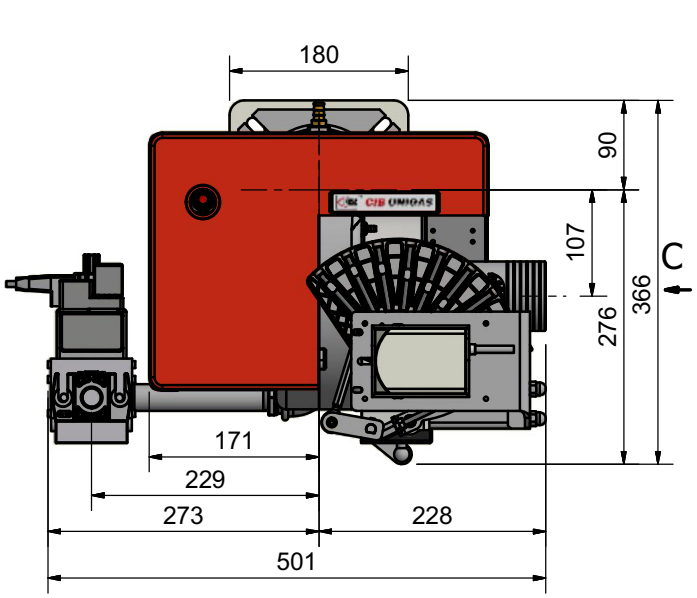


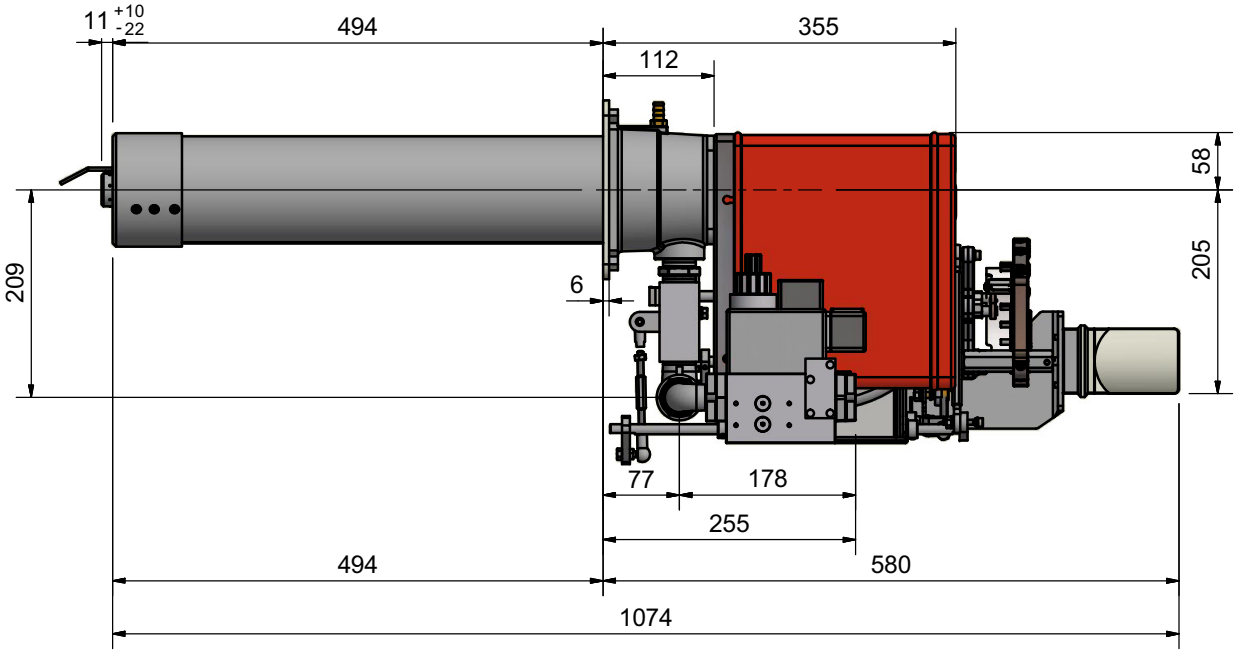
burner flange



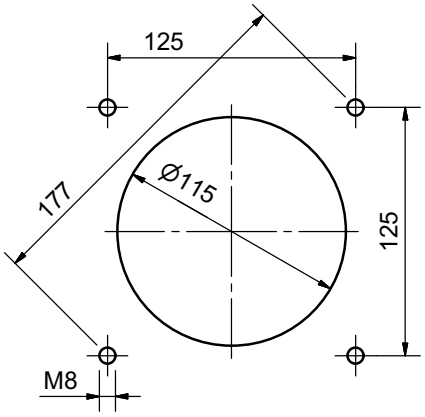


Overall dimensions (mm) LX18-FGR

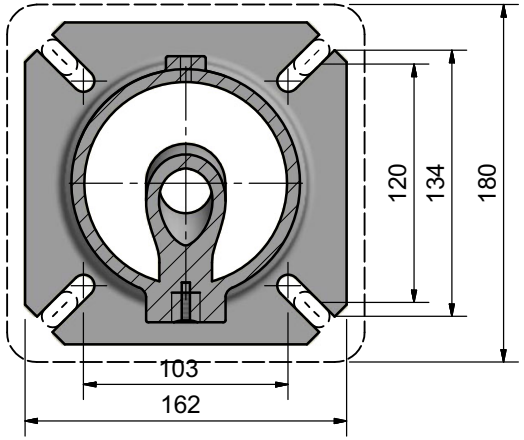


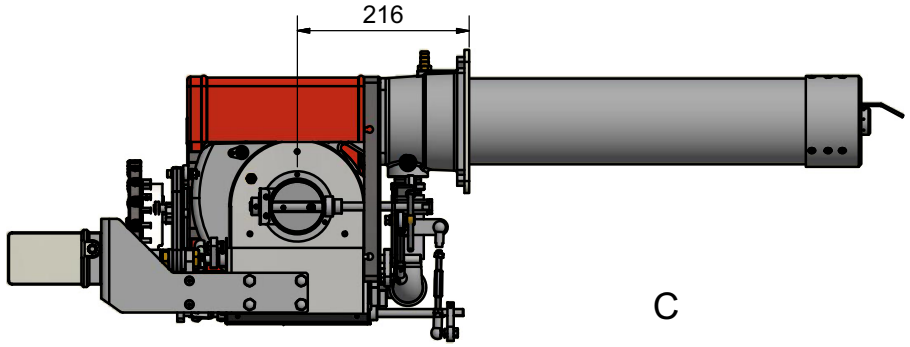


Boiler recommended drilling template



burner flange





How to read the burner "Performance curve"

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

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

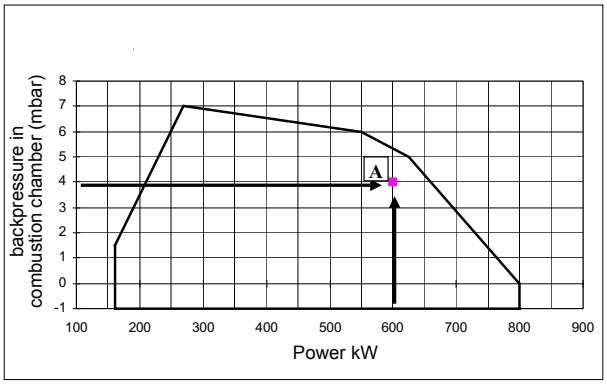
Example:

Furnace input: 600kW

Backpressure: 4 mbar

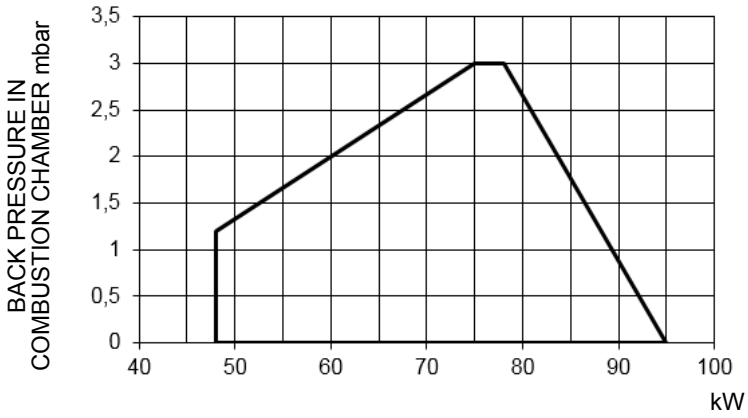
In the "Performance curve" diagram, draw a vertical line matching the furnace input value and an horizontal line matching the backpressure value. The burner is suitable if the intersection point A is inside the performance curve.

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

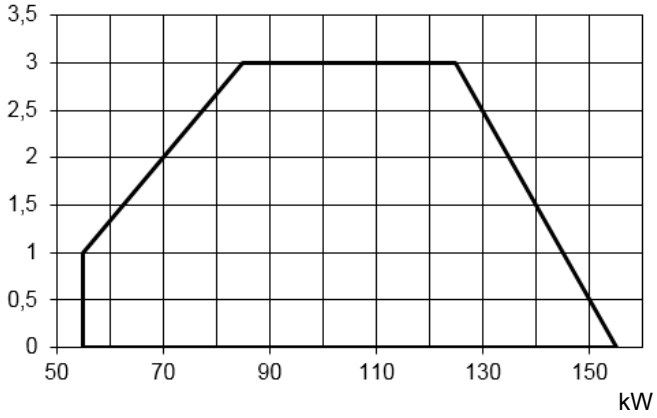


Performance Curves

LX10R M-



LX18 M-



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

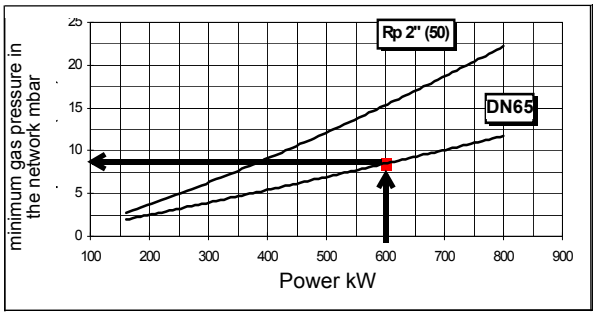
Data are referred to standard conditions: atmospheric pressure at 1013mbar, ambient temperature at 15° C

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

NOTE:<u>The power is a function of the amount of FGR regulated during commitioning / starting. The powers may therefore be lower. Contact the technical office for more information.</u>

Checking the proper gas train size

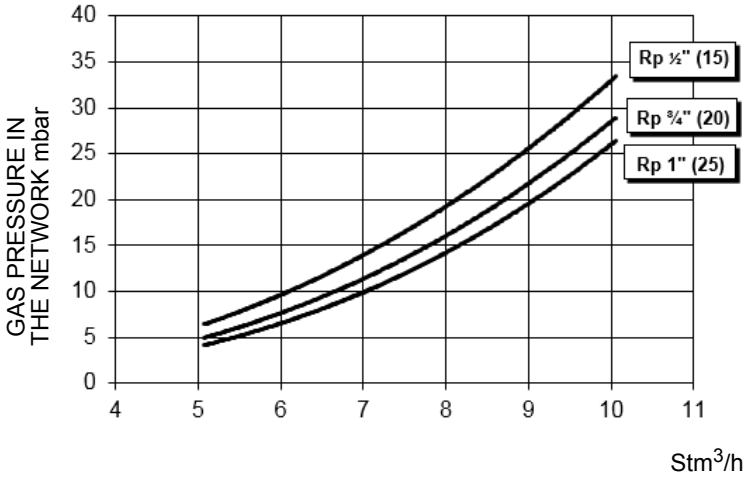
To check the proper gas train size, it is necessary to the available gas pressure value upstream the burner's gas valve. Then subtract the backpressure. The result is called **pgas.** Draw a vertical line matching the furnace input value (600kW, in the example), quoted on the x-axis, as far as intercepitng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



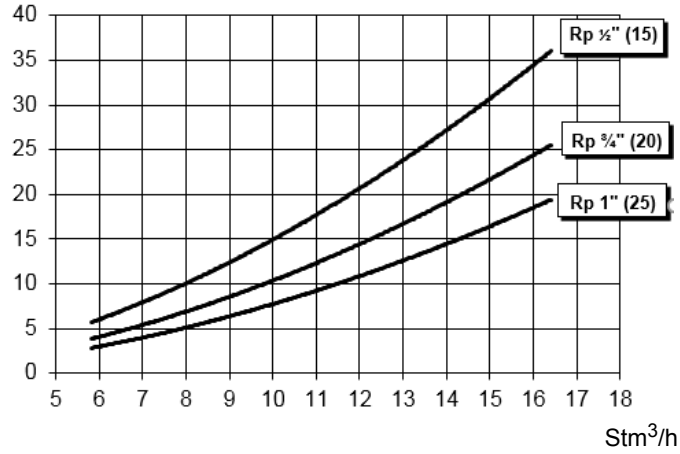
Pressure in the Network / gas flow rate curves

- ***Natural Gas burners***

LX10R M-..



L18 M-..



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

The values in the diagrams refer to **natural gas** with a calorific value of 8125 kcal/Stm^3 (15°C, 1013 mbar) and a density of 0.714 kg/Stm^3 .

The values in the diagrams refer to **GPL** with a calorific value of 22300 kcal/Stm^3 (15°C, 1013 mbar) and a density of 2.14 kg/Stm^3. When the calorific value and the density change, the pressure values should be adjusted accordingly.

$$\Delta p2 = \Delta p1 \quad * \left(\frac{Q2}{Q1}\right)^2 * \left(\frac{\rho 2}{\rho 1}\right)$$

Where:

$p1$	Natural gas pressure shown in diagram
$p2$	Real gas pressure
$Q1$	Natural gas flow rate shown in diagram
$Q2$	Real gas flow rate
$\rho 1$	Natural gas density shown in diagram
$\rho 2$	Real gas density

Combustion head gas pressure curves

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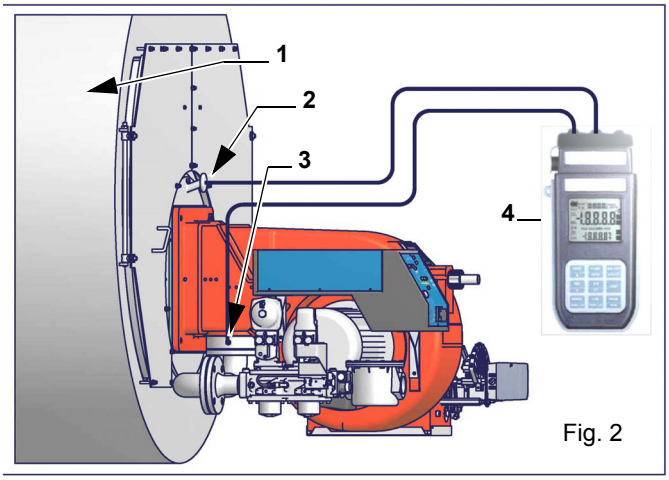


Fig. 2

Note: the figure is indicative only.Key

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

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

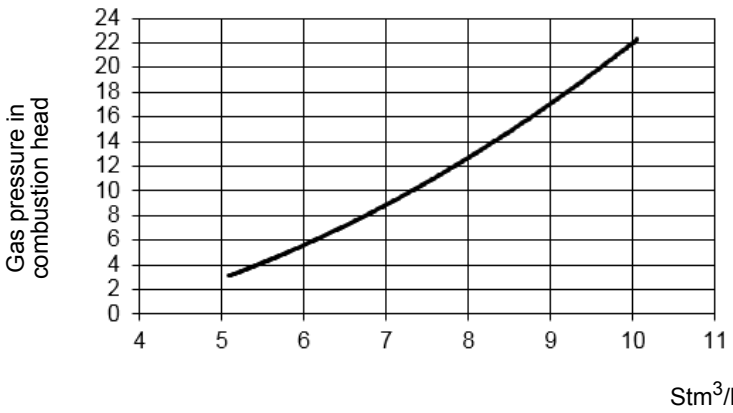
Measuring gas pressure in the combustion head

In order to measure the pressure in the combustion head, insert the pressure gauge probes: one into the combustion chamber’s pressure outlet to get the pressure in the combustion chamber and the other one into the butterfly valve’s pressure outlet of the burner. On the basis of the measured differential pressure, it is possible to get the maximum flow rate: in the pressure - rate curves (showed on the next paragraph), it is easy to find out the burner’s output in Stm^3/h (quoted on the x axis) from the pressure measured in the combustion head (quoted on the y axis). The data obtained must be considered when adjusting the gas flow rate.

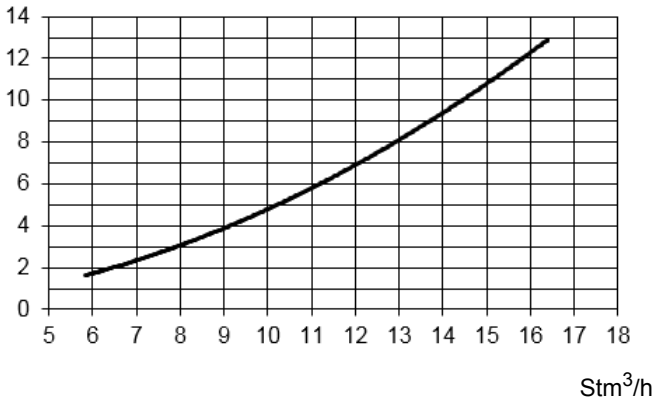
Pressure - rate in combustion head curves

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

LX10R M-..



LX18 M-..



The values in the diagrams refer to **natural gas** with a calorific value of 8125 kcal/Stm^3 (15°C, 1013 mbar) and a density of 0.714 kg/Stm^3 .

The values in the diagrams refer to **GPL** with a calorific value of 22300 kcal/Stm^3 (15°C, 1013 mbar) and a density of 2.14 kg/Stm^3. When the calorific value and the density change, the pressure values should be adjusted accordingly.

$$\Delta p2 = \Delta p1 \ * \left(\frac{Q2}{Q1}\right)^2 * \left(\frac{\rho 2}{\rho 1}\right)$$

Where:

$p1$	Natural gas pressure shown in diagram
$p2$	Real gas pressure
$Q1$	Natural gas flow rate shown in diagram
$Q2$	Real gas flow rate
$\rho 1$	Natural gas density shown in diagram
$\rho 2$	Real gas density

PART II: INSTALLATION

MOUNTING AND CONNECTING THE BURNER

Transport and storage

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

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

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

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

Packing

The burners are despatched in wooden crates whose dimensions are:

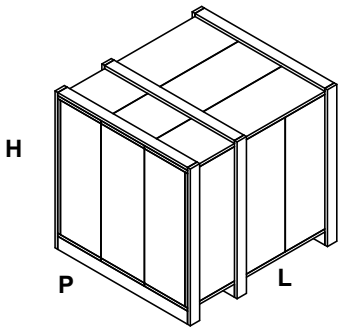
- 1636mm x 1036mm x 1016mm (L x P x H).

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

The following are placed in each packing case:

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

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

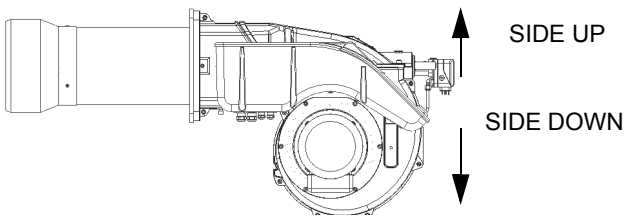


Handling the burner

WARNING! The handling operations must be carried out by specialised and trained personnel. If these operations are not carried out correctly, the residual risk for the burner to overturn and fall down still persists.

To move the burner, use means suitable to support its weight (see paragraph "Technical specifications").

The burner is designed to work positioned according to the picture below. For different installations, please contact the Technical Department.

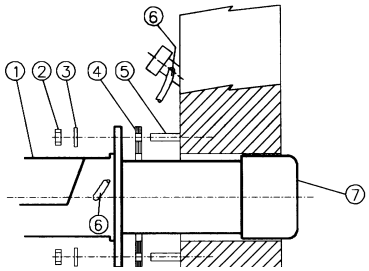


Note: the figure is indicative only.

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 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 (low NOx burners)

The burners described in this manual have been tested with combustion chambers that comply with EN676 regulation and whose dimensions are described in the diagram . In case the burner must be coupled with boilers with a combustion chamber smaller in diameter or shorter than those described in the diagram, please contact the supplier, to verify that a correct matching is possible, with respect of the application involved. To correctly match the burner to the boiler verify the type of the blast tube . Verify the necessary input and the pressure in combustion chamber are included in the burner performance curve; otherwise the choice of the burner must be revised consulting the burner manufacturer. To choose the blast tube lenght consider the following rule, even if it differs from the instructions of the boiler manufacturer: Cast-iron boilers, three pass flue boilers (with the first pass in the rear part): the blast tube must protrude about 150÷200 mm into the combustion chamber (Fig. 2).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 (Fig. 3).

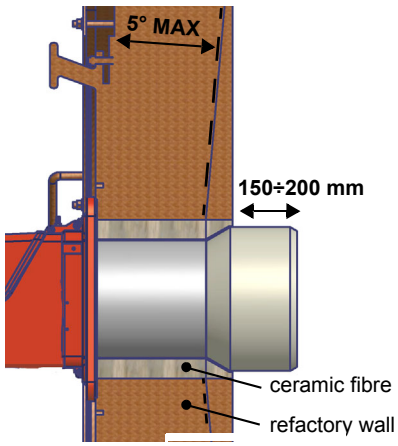


Fig. 2

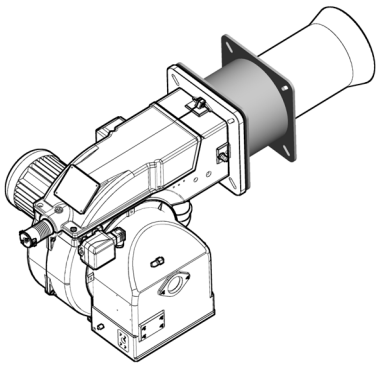


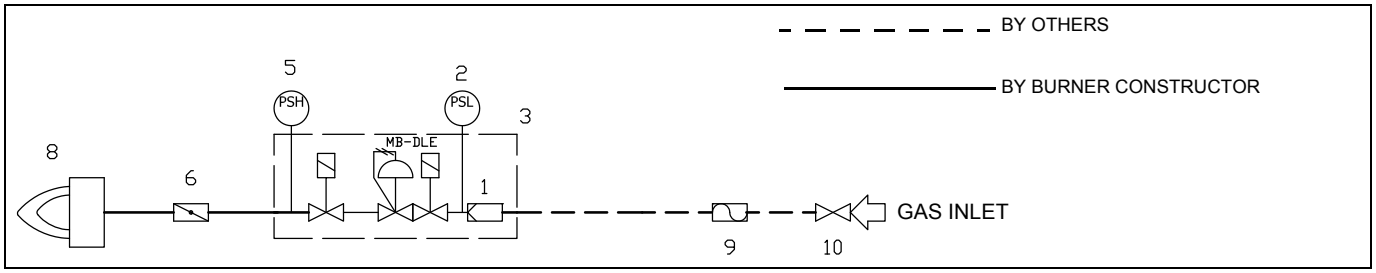
Fig. 3

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

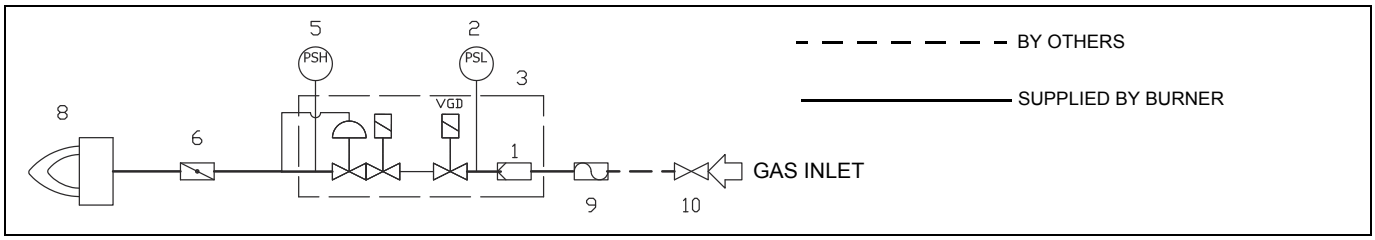
GAS TRAIN CONNECTIONS

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

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



Gas train with valves group VGD with built-in gas pressure governor



Key

1	Filter	6	Butterfly valve
2	Pressure switch - PGMIN	8	Main burner
3	Safety valve with built in gas governor	9	Bellows unit(*optional)
		10	Manual valve(*optional)
5	Pressure switch PGMAX:included MBE, for VGD e MB-DLE Optional		

GAS TRAIN CONNECTIONS

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

Procedure to install the double gas valve unit:

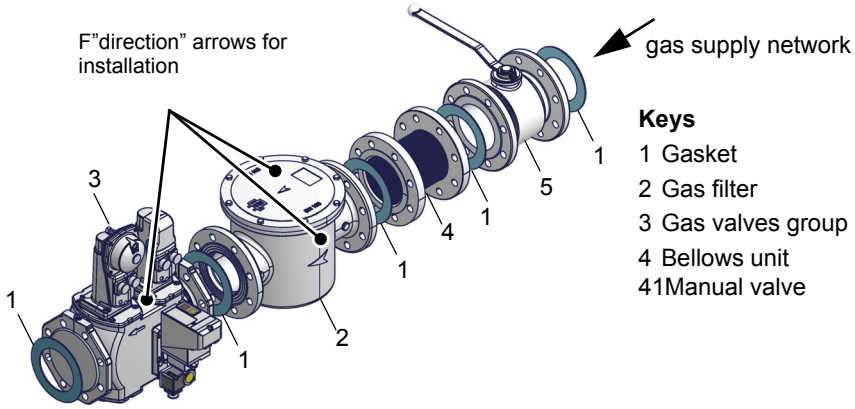
- two (2) gas flanges are required; they may be threaded or not depending on size;
- first step: install the flanges to prevent the entry of foreign bodies in the gas line;
- on the gas pipe, clean the already assembled parts and then install the valve unit;
- check gas flow direction: it must follow the arrow on the valve body;
- VGD20: make sure the O-rings are correctly positioned between the flanges and the valve;
- VGD40 and MBE: make sure the gaskets are correctly positioned between the flanges;
- fasten all the components with screws, according to the following diagrams;
- make sure bolts on the flanges are properly tightened;

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

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

ATTENTION: once the gas train is mounted according to the diagram on Fig. 1, the gas proving test mus be performed, according to the procedure set by the laws in force.

MultiBloc MB-DLE - *Assembling the gas train*



Keys

1 Gasket
2 Gas filter
3 Gas valves group
4 Bellows unit
41Manual valve

- Example of gas train

MULTIBLOC DUNGS MB-DLE 405..412

Mounting

1. Mount flange onto tube lines: use appropriate sealing agent (see Fig. 8);
2. insert MB-DLE: note position of O rings (see Fig. 8);
3. tighten screws A, B, C and D (Fig. 6 - Fig. 7), accordind to the mounting positions (Fig. 9);
4. after installation, perform leakage and functional test;
5. disassembly in reverse order.

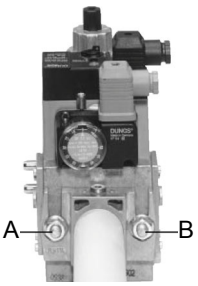


Fig. 4

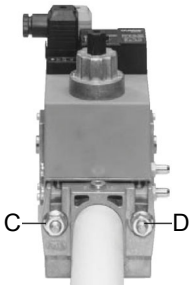


Fig. 5

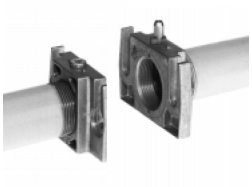


Fig. 6

MOUNTING POSITIONS

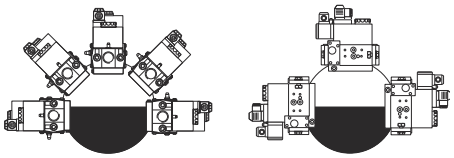


Fig. 7

MULTIBLOC DUNGS MB-DLE 415..420

Mounting

1. Loosen screws A and B **do not** unscrew (Fig. 10 - Fig. 11).
2. unscrew screws C and D (Fig. 10 - Fig. 11).
3. Remove MultiBloc between the threaded flanges (Fig. 11).
4. After mounting, perform leakage and functional tests.

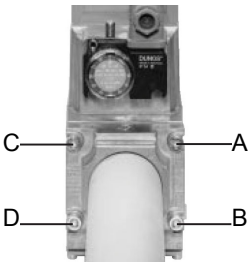


Fig. 8

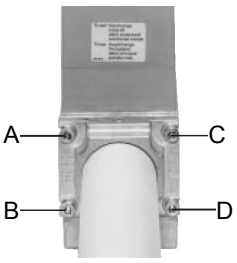


Fig. 9

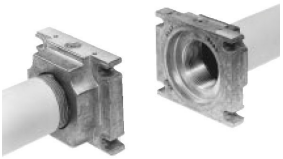


Fig. 10

MOUNTING POSITIONS

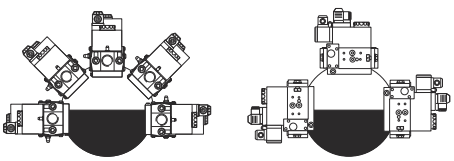


Fig. 11

WARNING: During commissioning operations, do not let the burner operate with insufficient air flow (danger of formation of carbon monoxide); if this should happen, shut down the burner, increase the opening of the air damper and start up the burner again to ensure

the purging of the carbon monoxide from the combustion chamber.

WARNING: changes to the gas flow rate require a new setting of the air rate and a new combustion check.

Multibloc MB-DLE - VPS504

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

It can be paired jointly to the Dungs VPS504 (see Fig. 12a) sealing controls.

The gas flow rate 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 flow increases and screwing it is reduced.

Tight the screw VB after settings.

To set the fast opening remove cover T, reverse it upside down and use it as a tool to rotate screw VR. Screw to reduce the startup flow rate, unscrew to increase it.

Do not use a screwdriver on the screw VR!

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.

Note: the screw VSB must be removed only in case of replacemente of the coil.

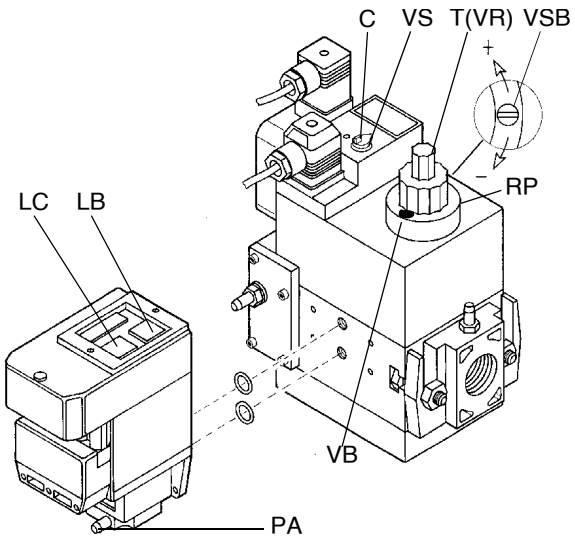


Fig. 12

Fig. 12a - Leakage control device VPS504 (Optional)

The VPS504 check the operation of the seal of the gas shut off valves costituting the MB-DLE. 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. When wishing to monitor the test, install a pressure gauge ranged to that of the pressure supply point PA. If the test cycle is satisfactory, after a few seconds the consent light LC (yellow) comes on. In the opposite case the lockout light LB (red) comes on.

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

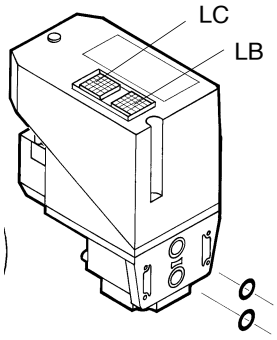


Fig. 12a

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

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.

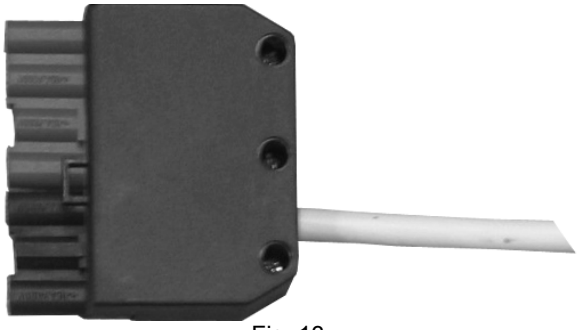
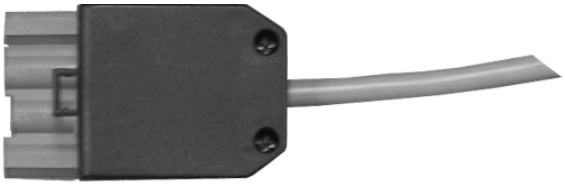
	WARNING: the burner is fitted with a bridge between terminals T6 and T8 on CN2-TAB connector (external side link, male connector); remove this bridge before thermostat connection.

	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 plug or the plugs, according to the model:
   - 7 poles plug for the power supply (for all models);
   - 4 poles plug (progressive burners);
2 execute the electrical connections to the plugs, according to the 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.

Identification of linking connectors

Burner supply connector (Fig. 15, Fig. 16) **Probe connection connector** (fully modulating burners, Fig. 29)	 Fig. 13
HIGH/LOW flame connector (progressive burners , Fig. 16	 Fig. 14

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

Single stage burner connectors:

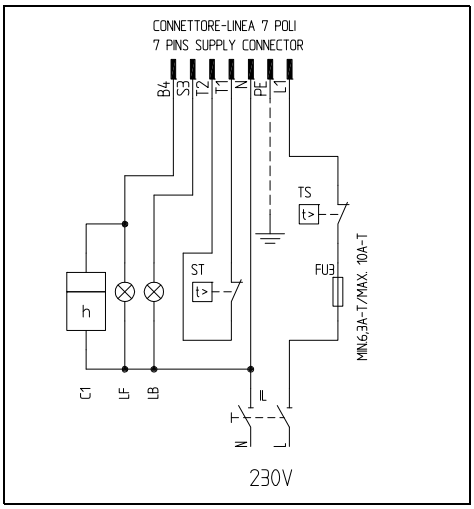


Fig. 15 - 7-poles connector

- ***Progressive burner connectors***

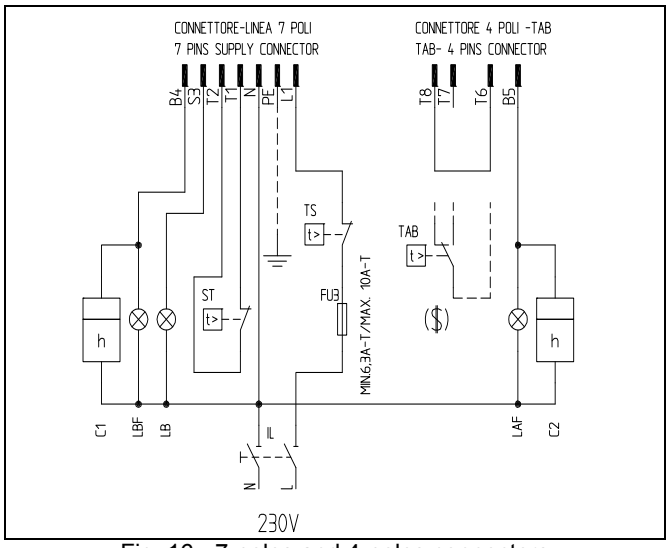


Fig. 16 - 7-poles and 4-poles connectors

Key

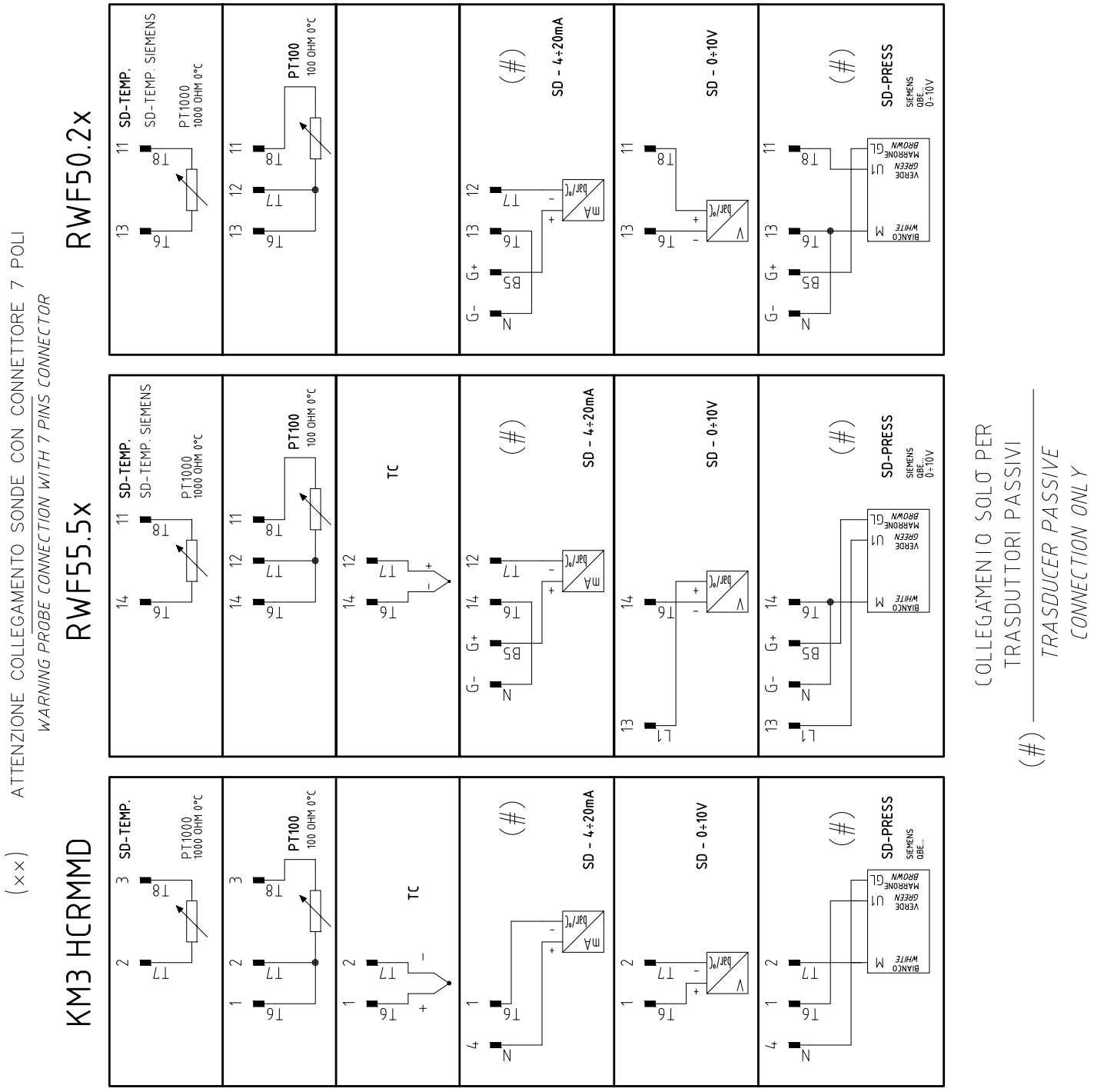
C1	LOW FLAME TIME METER
C2	HIGH FLAME TIME METER
FU1	FAN MOTOR LINE FUSE
FU3	LINE FUSE
IL	BURNER LINE SWITCH
LAF	BURNER IN HIGH FLAME INDICATOR LIGHT
LB	INDICATOR LIGHT FOR BURNER LOCK-OUT
LBF	BURNER IN LOW FLAME SIGNALLING LAMP
ST	THERMOSTATS O PRESSURE SWITCHES SERIE
TAB	HIGH LOW FLAME THERMOSTAT/PRESSURE SWITCH
TS	SAFETY THERMOSTAT/PRESSURE SWITCH

CONN-LINEA BURNER POWER SUPPLY CONNNECTOR

CONN-TAB HIGH-LOW FLAME CONNECTOR

($) IF "TAB" USED REMOVE THE BRIDGE BETWEEN TERMINALS T6-T8

- ***Modulating burner connectors***



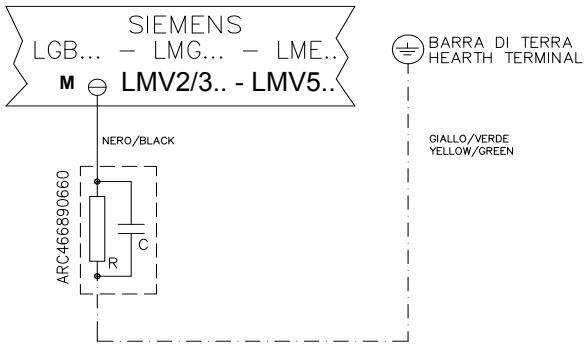
Per ulteriori informazioni consultare lo schema corrispondente (01-572-1)

Note on elecrtical supply

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

Key

C - Capacitor (22 nF , 250 V)
LME / LMV - Siemens control box
R - Resistor (1MΩ)
M: Terminal 2 (LGB, LME), Terminal X3-04-4 (LMV2x, LMV3x, LMV5, LME7x)
RC466890660 - RC Siemens filter



Configuration with separate electrical panel (optional)

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

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

BURNER SAFETY

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

DANGER! The safety elements and devices have been realized to protect from risks deriving from expected use, adjustment and maintenance. Tampering with them, even minimally, and therefore creating dangerous situations for people, property and the surrounding environment, is strictly forbidden.

Residual risks deriving from misuse and prohibitions

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

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

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

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

PART III: OPERATION

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

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

WARNING: never loose the sealed screws! otherwise, the device warranty will be immediately invalidate!

LIMITATIONS OF USE

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

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

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

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

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

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

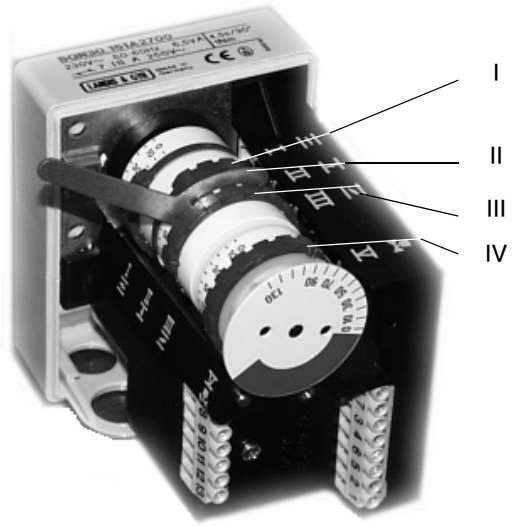
IN CASE OF A BURNER SHUT-DOWN, RESET THE CONTROL BOX BY MEANS OF THE RESET PUSHBUTTON. IF A SECOND SHUT-DOWN TAKES PLACE, CALL THE TECHNICAL SERVICE, WITHOUT TRYING TO RESET FURTHER.

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

SERVOCONTROL CAMS SETTING

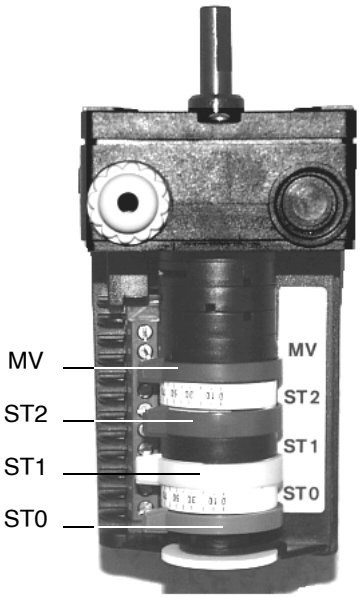
Landis SQN30.251

Fig. 17a



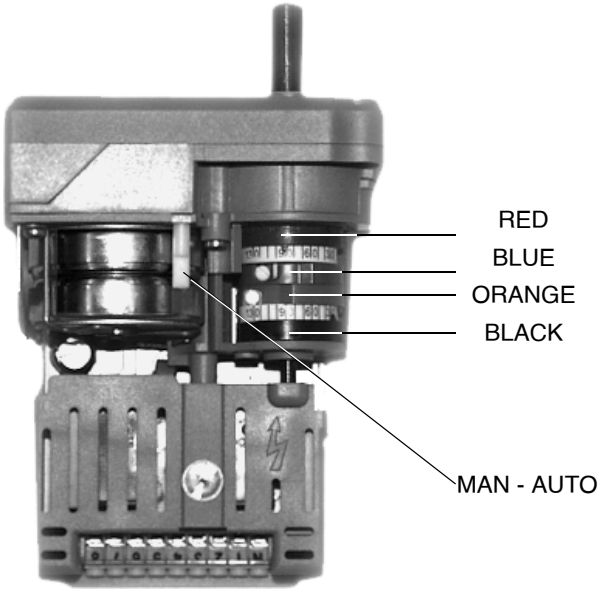
Berger STA12B3.41
Berger STA15B3.41

Fig. 17b



Landis SQN72.4 A4 A20

Fig. 17c



Servocontrol cams setting

The setting procedure is the same for Berger and Landis servocontrols. Refer to the table below for the correct correspondence of cams.

	BERGER	LANDIS	LANDIS
High flame position (set to 90°)	ST2	I	RED
Stand by (set to 0°)	0	II	BLUE
Low flame and ignition position	ST1	III	ORANGE
Not used	MV	V	BLACK

In the servocontrols BERGER STA1xB3.41, the manual air damper control is not provided. The regulations are carried out by means of the appropriate tool fitted with the servocontrol (SQN30), or by means of a screwdriver, affecting on the screw into the cam.

AIR AND GAS FLOW RATE SETTINGS

WARNING: During commissioning operations, do not let the burner operate with insufficient air flow (danger of formation of carbon monoxide); if this should happen, shut down the burner, increase the opening of the air damper and start up the burner again to ensure the purging of the carbon monoxide from the combustion chamber.

BURNER CALIBRATION

The position of the gas butterfly valve, the air damper at low flame and the servocontrol settings are set during testing in the factory to average values. To calibrate the burner when testing the system, proceed as follows.

1 Ignite the burner and move it to high flame. (servocontrol position = 90°).

Set the gas rate to the required value, adjusting the pressure governor or the valve regulator.

To adjust the air flow-rate (Fig. 18b), slacken the screw RA and rotate the screw VRA (clockwise rotation increases the air rate, counterclockwise rotation decreases it) until the rate requested is obtained.

2 Drive the burner to low flame. If necessary, adjust the burner output at low flame by moving the cam (ST1 / III / ORANGE) as required.

3 Set the gas flow-rate in low flame (same position as the ignition flame), using the adjustable screws V (see Fig. 18a) to change the opening angle of the butterfly valve; rotate clockwise to increase the gas flow-rate, anticlockwise to decrease it.

4 Shut down the burner and ignite it again. If the gas flow-rate requires further adjustment, repeat the operations described in point 3. If the settings are correct, proceed to point 5.

5 Progressively move the servocontrol to the position of maximum opening, then stop it (removing wire T6 from the power terminal block, or, for the fully modulating version, moving the manual switch CMF to pos. 0) at each screw V, and adjust the screw at the bearing to set the gas flow-rate (see point 3).

NOTE: at the end of settings, remember to tight the fixing nut T (Fig. 18b).

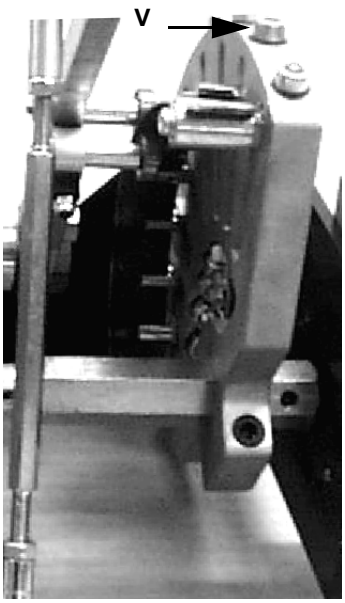


Fig. 18a

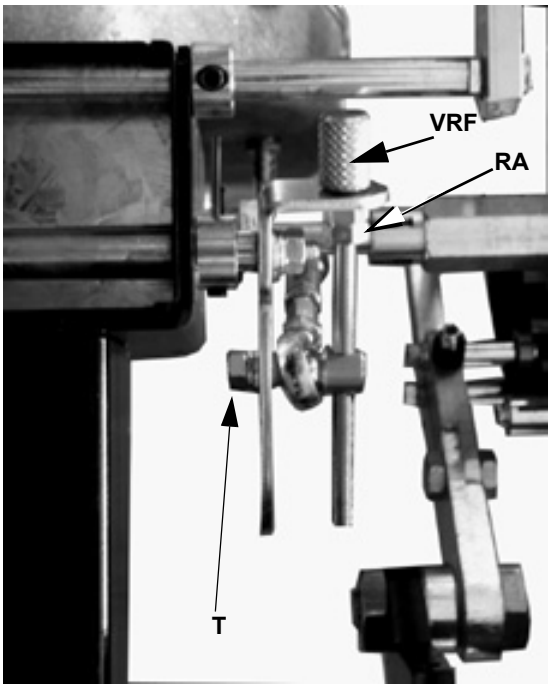


Fig. 18b

The recirculation flue gas flow rate (FGR) is regulated by the leverage on the air drawer on the boiler side, directly from the servo control. It is However, it is possible to adjust the flow rate using the screw of the VRF "slotted cam". To adjust the air flow rate (Fig. 13b) loosen the RA screw and turn the VRA screw (clockwise rotation increases the air flow rate, counterclockwise rotation decreases it) up to to get the required flow rate.To adjust the air flow-rate (Fig. 18b), slacken the screw RA and rotate the screw VRF (clockwise rotation increases the air rate, counterclockwise rotation decreases it) until the rate requested is obtained.

Calibration of air pressure switch

Calibration is carried out as follows:

- Remove the transparent plastic cap.
- After air and gas setting have been completed, start the burner and, while prepurge phase is running, slowly turn the adjusting ring nut VR in the clockwise direction until the burner lockout .
- Read the value on the pressure switch scale and reduce it by 15%.
- Repeat the ignition cycle of the burner and check it runs properly.
- Refit the transparent plastic cover on the pressure switch.

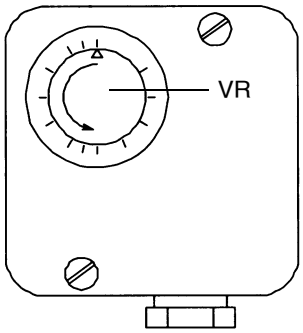


Fig. 19

Calibration of minimum gas pressure switch

Calibration is carried out as follows:

- Remove the transparent plastic cap.
- With the burner in operation test the pressure on the pressure port at the input of the gas filter; slowly close the manual shut-off valve (n. 1 in Fig. 10) until the detected pressure is reduced by 50%. Verify CO emissions of the burner; if the measured value is less than 80 ppm screw down the adjusting ring nut until the burner lockout.
- If CO emissions are greater than 80 ppm open the shut off valve until the CO value is reduced to 80 ppm, then screw down the adjusting ring nut until the burner lockout.
- Fully open the manual shut-off valve
  (WARNING: carry out this operation ONLY with the burner turned off!).
- Refit the transparent plastic cover on the pressure switch.

OPERATION

- Turn on the burner operating on the boiler main switch.
- Check the flame control device is not locked and, if necessary, reset it operating on the reset button, accessible from the hole on the burner's casing.
- Check the serie of thermostats or pressure switches enable the burner to operate.
- (Only burners fitted with leakage control device): the check cycle of the leakage control starts, the end of check is signalled by the lamp LC on the leakage control device. Once the check has been completed, the ignition cycle of the burner starts. In the event of a gas leak in a valve, the leakage control device locks and the LB lamp lights.To release press the button LB on the device.
- At the begin of the startup stage, the servocontrol drives the air damper to the maximum opening position, the fan motor starts and the pre-purgue stage begins.
- At the end of the pre-purgue stage, the air damper is driven again to the ignition position, the ignition transformer is energized and, 3 seconds later the solenoid valves EV1 and EV2 are energized. 3 seconds after the opening of the gas valves, the ignition transformer is de-energized. The burner is on in the low flame stage; 8 seconds later, the two-stages (progressive burners) or fully modulating operation begins and the burner increases or decreases its output, driven by the external thermostat (in the progressive version) or by the modulator (in the fully modulating version).

In the fully modulating version (Fig. 21), is provided a manual operation selector (Fig. 20).



Fig. 20 - Manual operation selector



Fig. 21 - Modulator

ADJUSTING AIR AND GAS FLOW RATES

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

Recommended combustion parameters		
Fuel	Recommended (%) CO_2	Recommended (%) O_2
Natural gas	9 ÷ 10	3 ÷ 4.8
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.
- 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.

(First) Start-up preliminary operations - gas supply

Recommended actions to be carried out in sequence:

1 Check the burner and all its components are installed correctly
2 Check that all electrical and mechanical parts are connected correctly
3 Check that there is water or other vector fluids in the generator
4 Check that the ventilation gates/dampers in the plant are open and the stack is free
5 Connect the gauges used to adjust and check pressures on the incoming line and on the head, air and fuel side.
6 Open the thermostatic series and the safety chain
7 Turn the main switch on the panel front with the "MAN/AUTO" selector to position "0".
8 Select the GAS mode with the fuel selector on the front of the panel (if any)
9 Check the phase and neutral position is correct
10 Open the manual shut-off valves slowly, in order to prevent any water hammers that might seriously damage valves and pressure regulator
11 Check the sense of rotation of the electrical motors
12 Bleed the line, getting rid of all the air in the pipe as far as the main gas valve
13 Ensure the pressure entering the main valves is not excessive due to damage to or wrong adjustment of the line pressure regulator
14 Ensure the gas supply minimum pressure is at least equal to the pressure required by the pressure curves - burnt gas flow

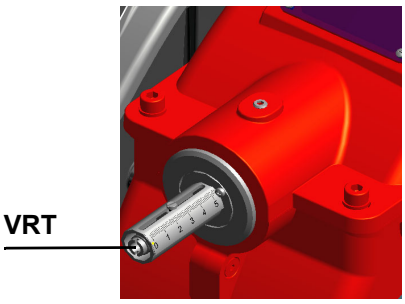
DANGER! Venting the air from the piping must take place in safe conditions, avoiding dangerous concentrations of fuel in the rooms. You must therefore ventilate the rooms and wait long enough for the gases to dissipate outside before switching on.

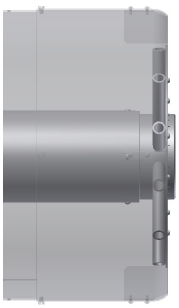
To ensure the proper operation of the flow sensors, the fuel/air pipes must be free of liquid residues such as oil or water. Also, make sure that the silencer is installed on the air intake.

Adjusting the combustion head

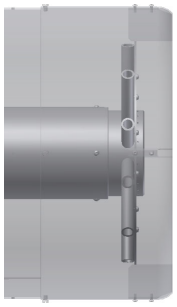
Head adjusting

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



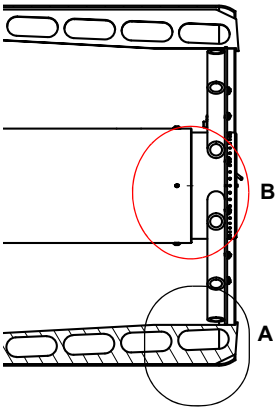


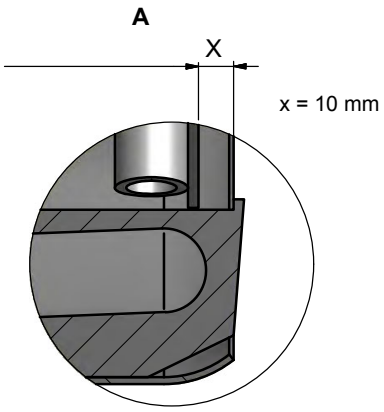
“all-ahead” position

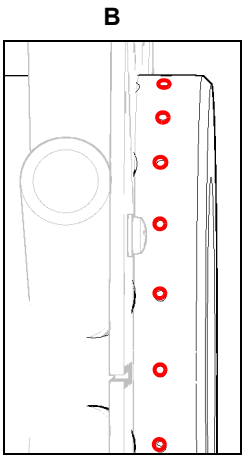


“all-backwards” head position

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







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

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

Adjusting the gas valves group

Multibloc MB-DLE

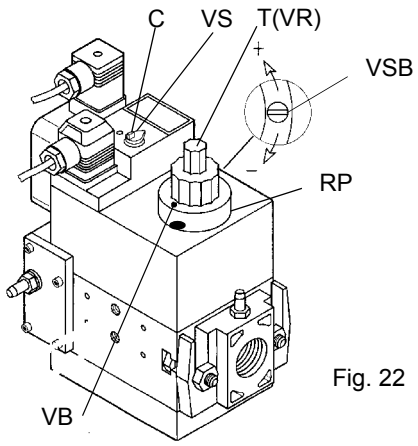


Fig. 22

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

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

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

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

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

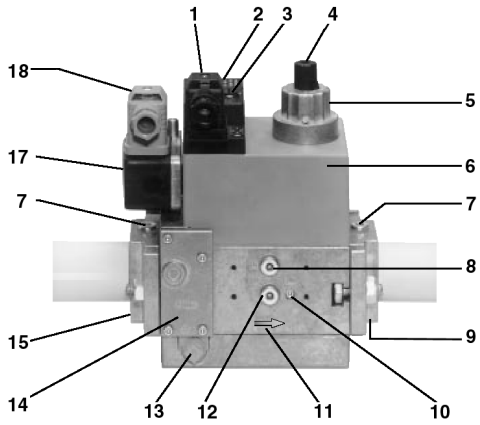


Fig. 23

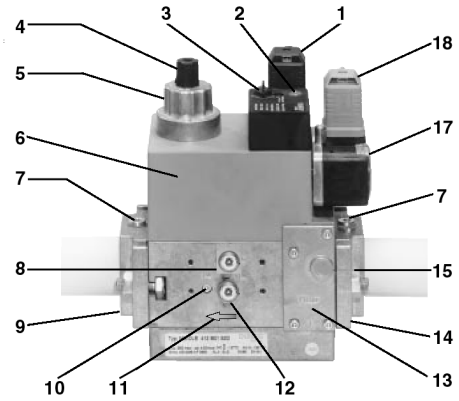
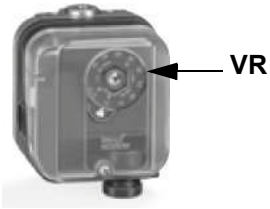


Fig. 24

Key

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

Calibration air and gas pressure switches



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

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

Calibration the maximum gas pressure switch (when provided)

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

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

Calibration of air pressure switch

To calibrate the air pressure switch, proceed as follows:

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

Calibration of low gas pressure switch

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

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

Calibration the maximum gas pressure switch (when provided)

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

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

PART IV: 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.

ROUTINE MAINTENANCE

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

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

The replacement, adjustment and assembly of groups and/or components must be performed in the spaces provided during the installation phase and correct aeration of the rooms. Any operation must be carried out by qualified, trained and informed personnel, in compliance with the Manufacturer's instructions and the regulations in force. For anything not expressly mentioned in this chapter, contact the Manufacturer.The use of non original spare parts, any modification or even slight tampering, void the Warranty and release the Manufacturer from any responsibility regarding the functionality of the system the burner has been installed in, and the safety of people and/or property.

ATTENTION: Read carefully the "warnings" chapter at the beginnig of this manual.

WARNING: All operations on the burner must be carried out with the mains disconnected and the fuel manaul cutoff valves closed!

ATTENTION! Any maintenance, cleaning or check intervals are a mere indication: the functionality of the burner - and its components - depends, among other things, from capacity utilisation rate, environment, nature and quality of the fuels used.

Adjusting the gas valves group and removing the filter

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

You can change the filter without removing the fitting.

1 Interrupt the gas supply closing the on-off valve.
2 Remove screws 1 ÷ 4 using the Allen key n. 3 and remove filter cover 5 in Fig. 5.
3 Remove the filter 6 and replace with a new one.
4 Replace filter cover 5 and tighten screws 1 ÷ 4 without using any force and fasten.
5 Perform leakage and functional test, $p_{max.}$ = 360 mbar.
6 Pay attention that dirt does not fall inside the valve.

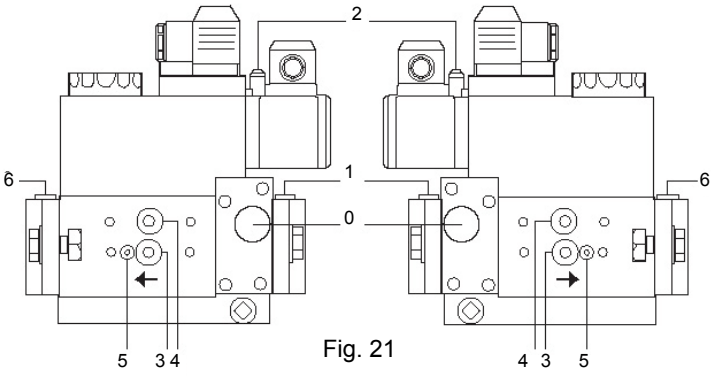


Fig. 21

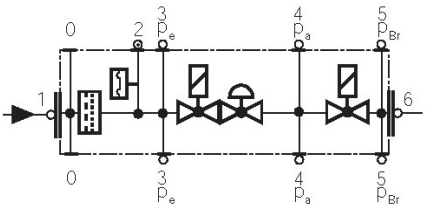


Fig. 22

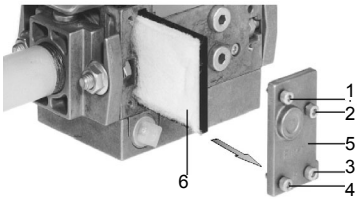


Fig. 23

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. 1-Fig. 2) $\Delta p > 10$ mbar.
- Change the filter if the pressure difference between pressure connection 1 and 2 (Fig. 1-Fig. 2) 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. 3).
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.

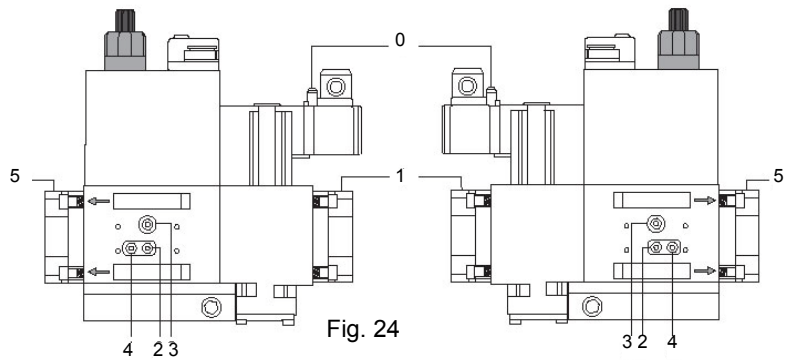


Fig. 24

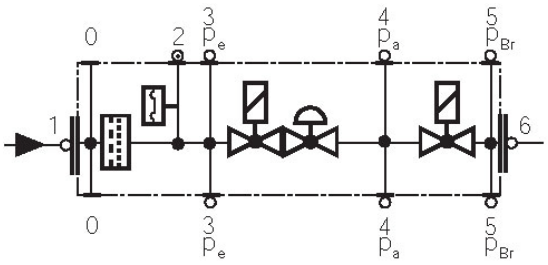


Fig. 25

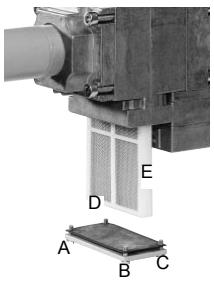
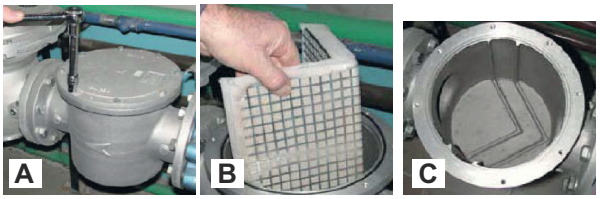


Fig. 26

Gas filter maintenance

To clean or remove the filter, proceed as follows:

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



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

Removing the combustion head

- Remove the burner cover C.
- Unscrew the screws V holding in position the manifold G and pull out the complete group as shown in the picture.

Note: for the subsequent assembly carry out the above described operations in the reverse order, checking the correct position of the OR ring.

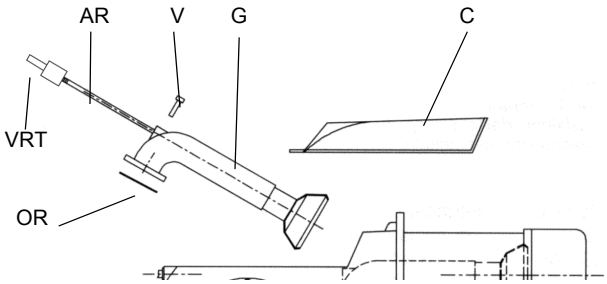


Fig. 25

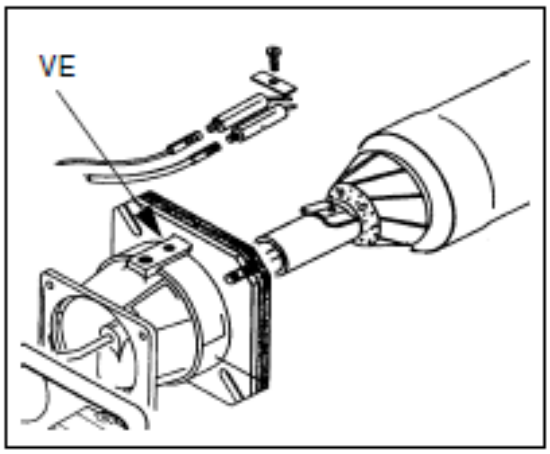
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S10 - S18

Tipo S10 - S18

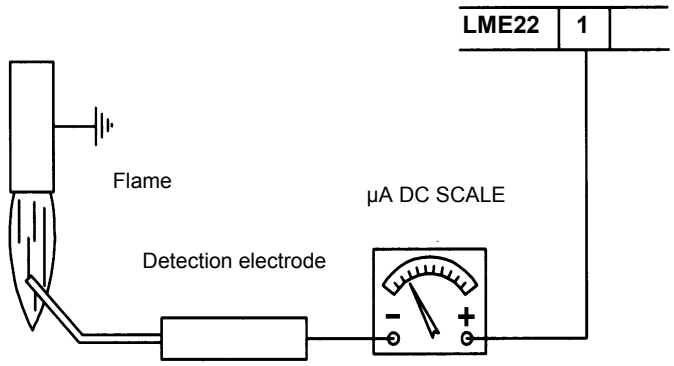
- Staccare il bruciatore dalla linea di alimentazione del gas;

Per accedere alla testa di combustione e agli elettrodi svitare la vite VE sul boccaglio del bruciatore e sfilarlo; prevedere un piano di appoggio stabile sul quale posare il bruciatore durante le manutenzione.



Checking the detection current with electrode (natural gas)

To check the detection signal follow the scheme in the picture below. If the signal is less than the value indicated, check the position of the detection electrode or detector, the electrical contacts and, if necessary, replace the electrode or the detector.



Control box	Minimum detection signal
Siemens LME22	3 µA

Burner service term

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

Seasonal stop

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

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

Burner disposal

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

WIRING DIAGRAMS

Refer to the attached wiring diagrams.

WARNING

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

Wiring diagrams attached 01-368-2, 01-572-1

TROUBLESHOOTNG GUIDE Gas operation

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

APPENDIX

SIEMENS LME11/21/22 CONTROL BOX

Preconditions for burner startup

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

Undervoltage

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

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

Controlled intermittent operation

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

Reversed polarity protection with ionization

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

Control sequence in the event of fault

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

Operational status indication

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

red LED **yellow LED** **green LED** LED	..... Steady on ❍... Off

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

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

START-UP PROGRAM

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

A Start command (switching on)

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

tw Waiting time

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

t11 Programmed opening time for actuator «SA»

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

t10 Specified time for air pressure signal

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

t1 Prepurge time

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

t12 Programmed closing time for actuator «SA»

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

t3 Preignition time

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

TSA Ignition safety time

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

t4 Interval BV1 and BV2-LR

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

B - B' Interval for flame establishment

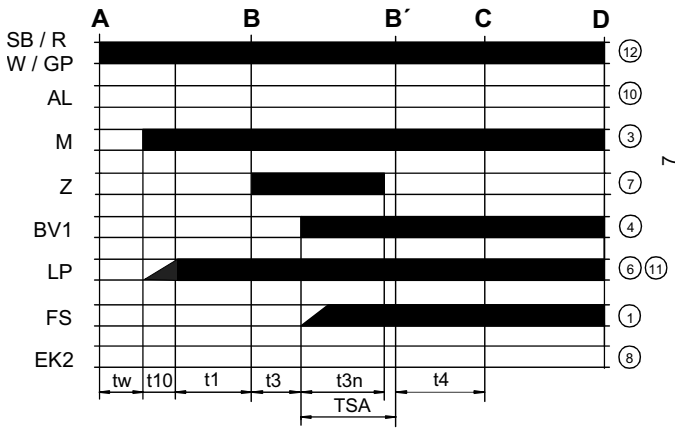
C Burner operation position

C - D Burner operation (heat production)

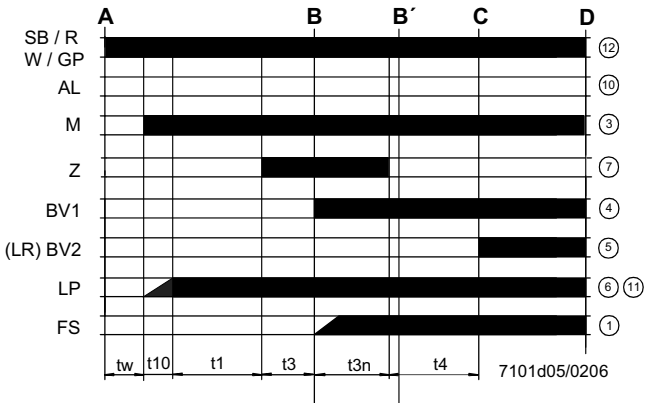
D Controlled by "R" shutdown

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

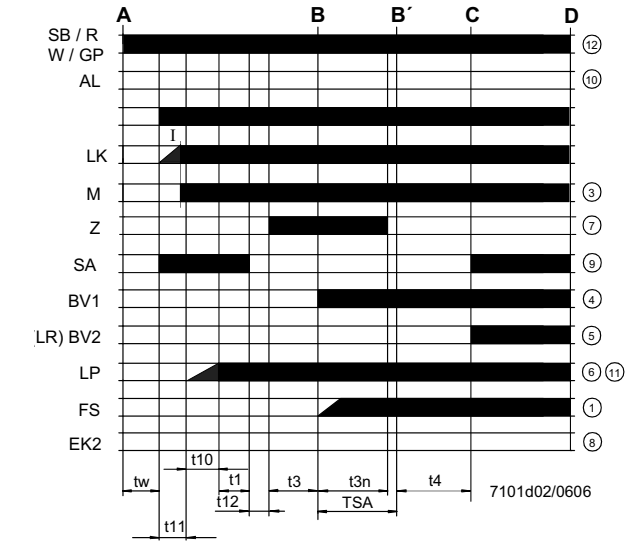
LME11 control sequence



LME21 control sequence



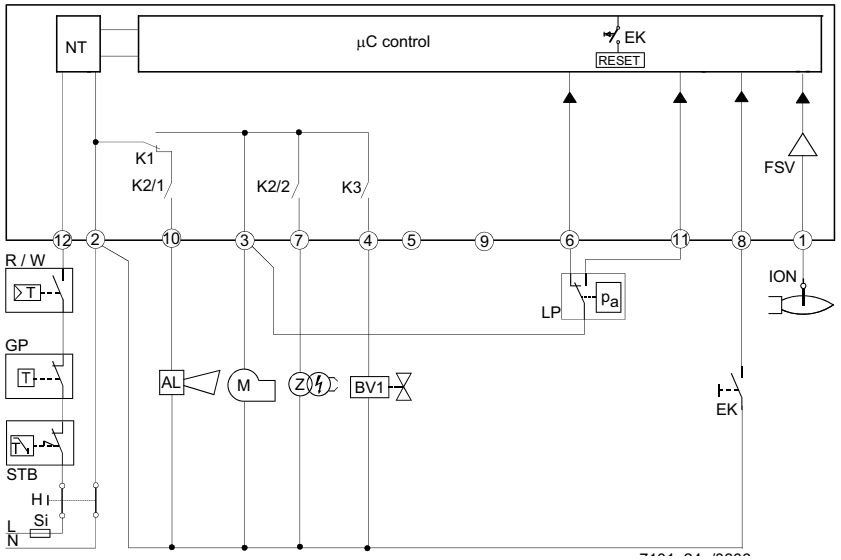
LME22 control sequence



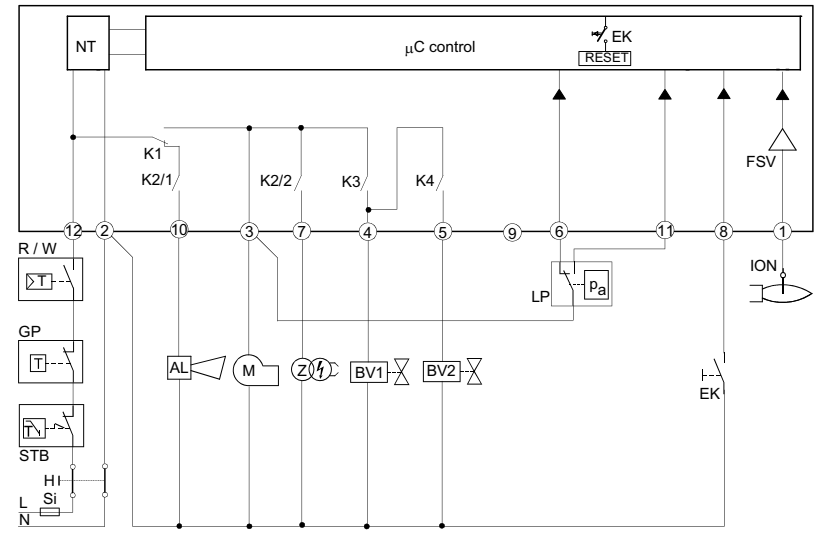
Control sequence

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

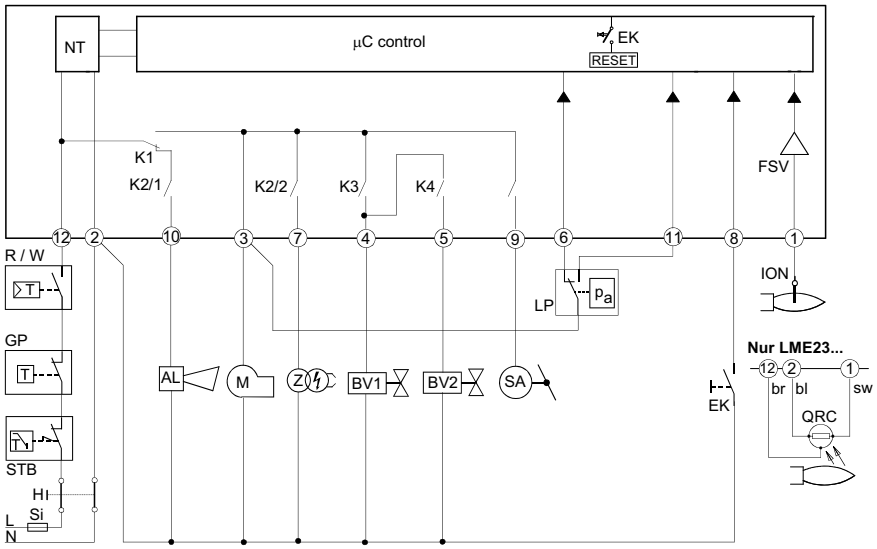
LME11 connection diagram



LME21 connection diagram

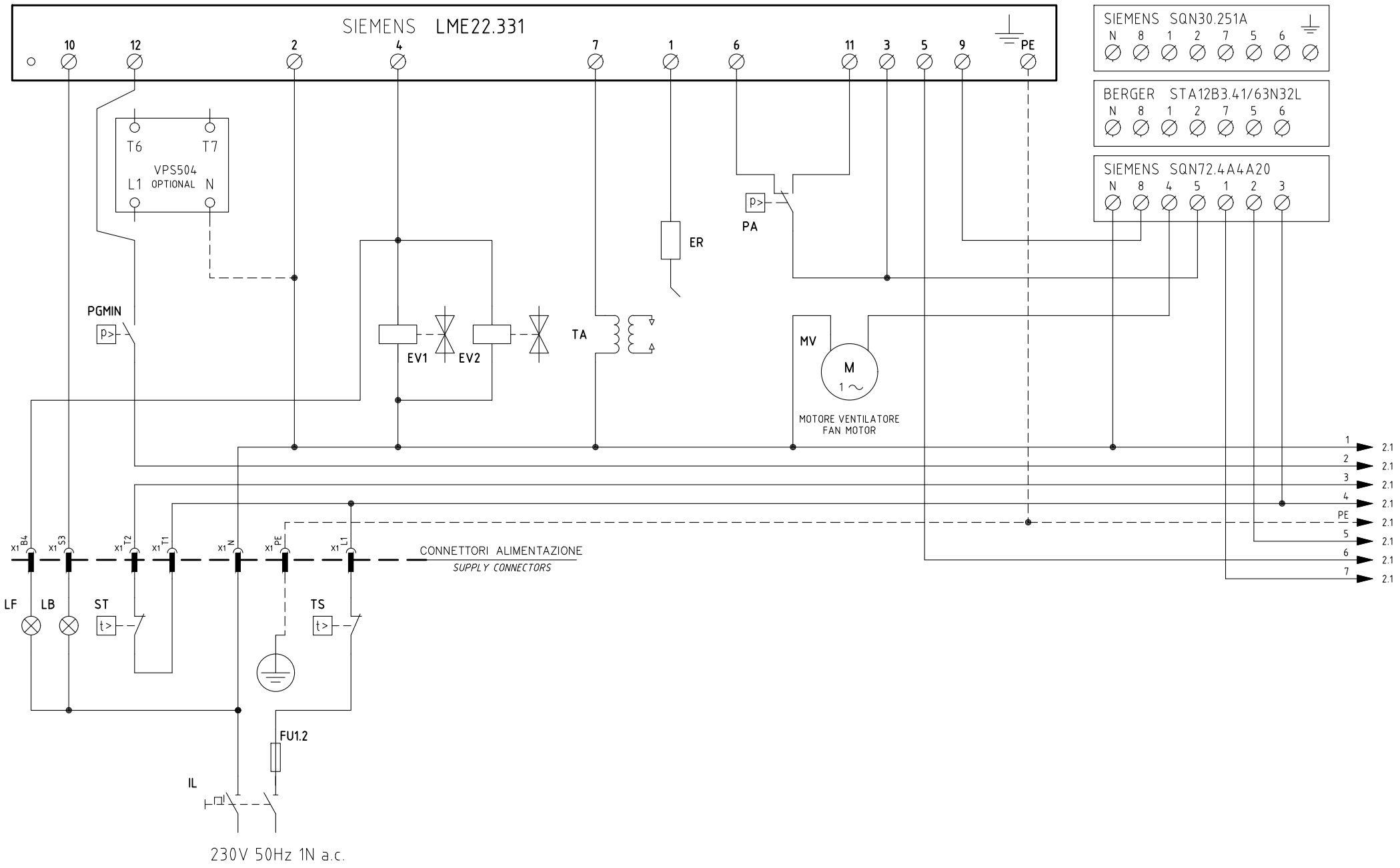


LME22 connection diagram



Connection diagram

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



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CONTROL PROGRAM IN THE EVENT OF FAULT

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

CONTROL BOX LOCKED

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

DIAGNOSITICS OF THE CASUE OF FAULT

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

During diagnostics, the control outputs are deactivated:

- the burner remains shut down;
- external fault indication is deactivated;
- fault status is showed by the red LED, inside the LME’s lockout reset buttonaccording to the “Error code table”:

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

RESETTING THE BURNER CONTROL

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

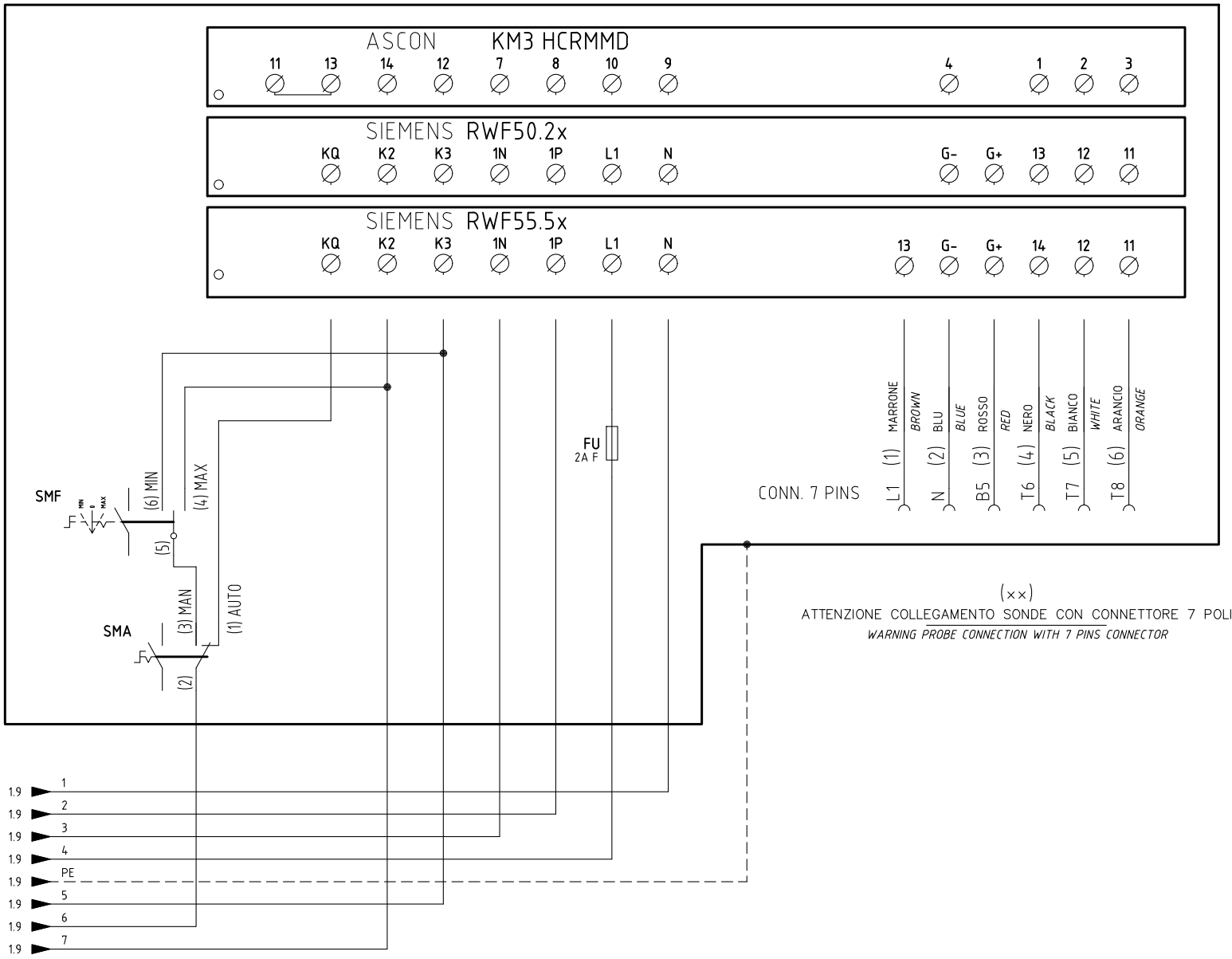
LIMITATION OF REPETITIONS (only for LME11.. model)

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

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

TECHNICAL CHARACTERISTICS

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



CAVO 7x0,75mmq

7x0,75mmq CABLE

(××)

ATTENZIONE COLLEGAMENTO SONDE CON CONNETTORE 7 POLI

WARNING PROBE CONNECTION WITH 7 PINS CONNECTOR

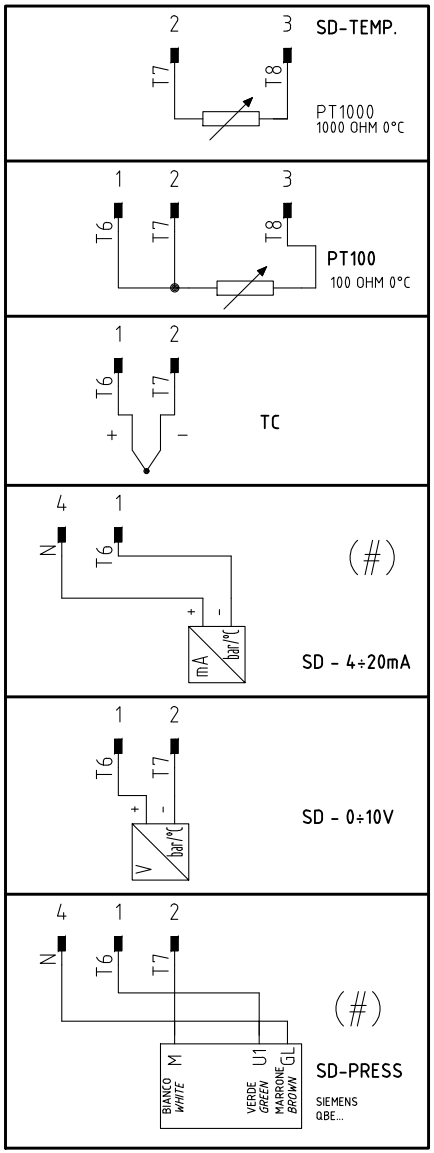
Data 17/05/2013		PREC.	FOGLIO
Revisione 01		1	2
Dis. N. 01 – 0572		SEGUE	TOTALE
		3	4

(××)

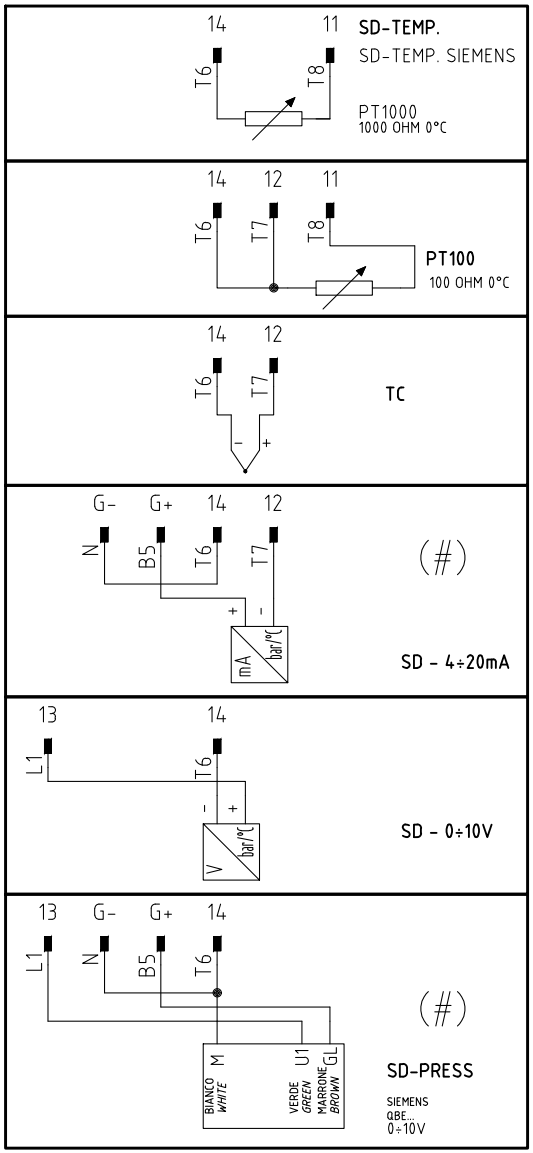
ATTENZIONE COLLEGAMENTO SONDE CON CONNETTORE 7 POLI

WARNING PROBE CONNECTION WITH 7 PINS CONNECTOR

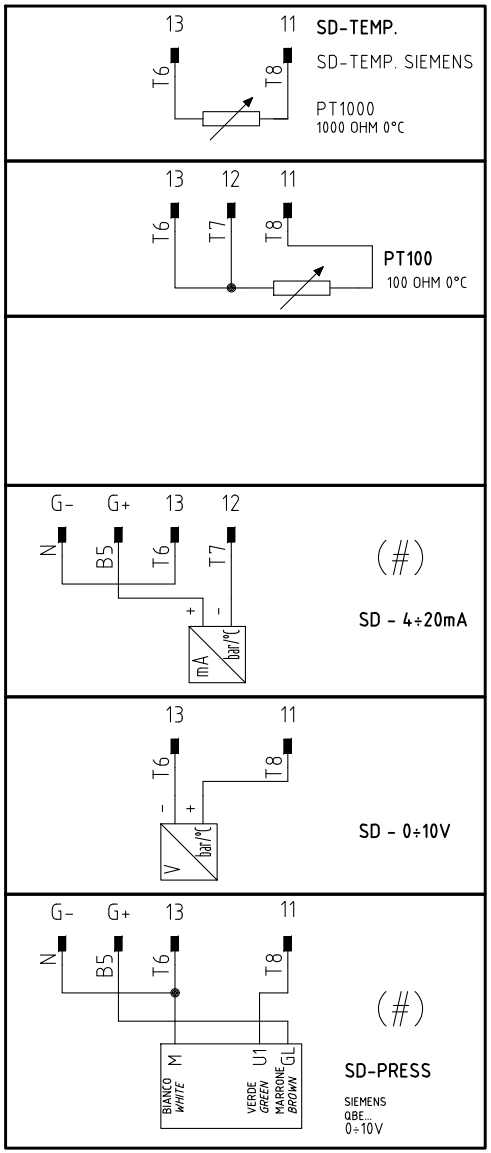
KM3 HCRMMD



RWF55.5x



RWF50.2x



(#)

COLLEGAMENTO SOLO PER TRASDUTTORI PASSIVI

TRASDUCER PASSIVE CONNECTION ONLY

Data 17/05/2013		PREC.	FOGLIO
Revisione 01		2	3
Dis. N. 01 – 0572		SEGUE 4	TOTALE 4

0	1	2	3	4	5	6	7	8	9

Sigla/Item	Foglio/Sheet	Funzione	Function
ER	1	ELETTRODO RILEVAZIONE FIAMMA	FLAME DETECTION ELECTRODE
EV1	1	ELETTROVALVOLA GAS LATO RETE (O GRUPPO VALVOLE)	UPSTREAM GAS SOLENOID VALVE (OR VALVES GROUP)
EV2	1	ELETTROVALVOLA GAS LATO BRUCIATORE (O GRUPPO VALVOLE)	DOWNSTREAM GAS SOLENOID VALVE (OR VALVES GROUP)
FU	2	FUSIBILE	FUSE
FU1.2	1	FUSIBILE DI LINEA	LINE FUSE
IL	1	INTERRUTTORE GENERALE	MAINS SWITCH
KM3 HCRMMD	2	REGOLATORE MODULANTE (ALTERNATIVO)	BURNER MODULATOR (ALTERNATIVE)
LB	1	LAMPADA SEGNALAZIONE BLOCCO BRUCIATORE	INDICATOR LIGHT FOR BURNER LOCK-OUT
LF	1	LAMPADA SEGNALAZIONE BASSA FIAMMA BRUCIATORE	BURNER IN LOW FLAME INDICATOR LIGHT
LME22.331	1	APPARECCHIATURA CONTROLLO FIAMMA	CONTROL BOX
MV	1	MOTORE VENTILATORE	FAN MOTOR
PA	1	PRESSOSTATO ARIA	AIR PRESSURE SWITCH
PGMIN	1	PRESSOSTATO GAS DI MINIMA PRESSIONE	MINIMUM GAS PRESSURE SWITCH
PT100	3	SONDA DI TEMPERATURA	TEMPERATURE PROBE
RWF50.2x	2	REGOLATORE MODULANTE	BURNER MODULATOR
RWF55.5x	2	REGOLATORE MODULANTE (ALTERNATIVO)	BURNER MODULATOR (ALTERNATIVE)
SD-PRESS	3	SONDA DI PRESSIONE	PRESSURE PROBE
SD-TEMP.	3	SONDA DI TEMPERATURA	TEMPERATURE PROBE
SD - 0÷10V	3	TRASDUTTORE USCITA IN TENSIONE	TRANSDUCER VOLTAGE OUTPUT
SD - 4÷20mA	3	TRASDUTTORE USCITA IN CORRENTE	TRANSDUCER CURRENT OUTPUT
SMA	2	SELETTORE MANUALE/AUTOMATICO	MANUAL/AUTOMATIC SWITCH
SMF	2	SELETTORE MANUALE FUNZIONAMENTO MIN-0-MAX	MIN-0-MAX MANUAL OPERATION SWITCH
SQN30.251A	1	SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO)	AIR DAMPER ACTUATOR (ALTERNATIVE)
SQN72.4A4A20	1	SERVOCOMANDO SERRANDA ARIA	AIR DAMPER ACTUATOR
ST	1	SERIE TERMOSTATI/PRESSOSTATI	SERIES OF THERMOSTATS OR PRESSURE SWITCHES
STA12B3.41/63N32L	1	SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO)	AIR DAMPER ACTUATOR (ALTERNATIVE)
TA	1	TRASFORMATORE DI ACCENSIONE	IGNITION TRANSFORMER
TC	3	TERMOCOPPIA	THERMOCOUPLE
TS	1	TERMOSTATO/PRESSOSTATO DI SICUREZZA	SAFETY THERMOSTAT OR PRESSURE SWITCH
VPS504	1	CONTROLLO DI TENUTA VALVOLE GAS (OPTIONAL)	GAS PROVING SYSTEM (OPTIONAL)

SERVOCOMANDO SERRANDA ARIA
AIR DAMPER ACTUATOR
SQN72.4A4A20

I (ROSSO)	ALTA FIAMMA
I (RED)	*HIGH FLAME*
II (BLU)	SOSTA
II (BLUE)	*STAND-BY*
III (ARANCIO)	BASSA FIAMMA
III (ORANGE)	*LOW FLAME*
IV (NERO)	NON USATA
IV (BLACK)	*NOT USED*

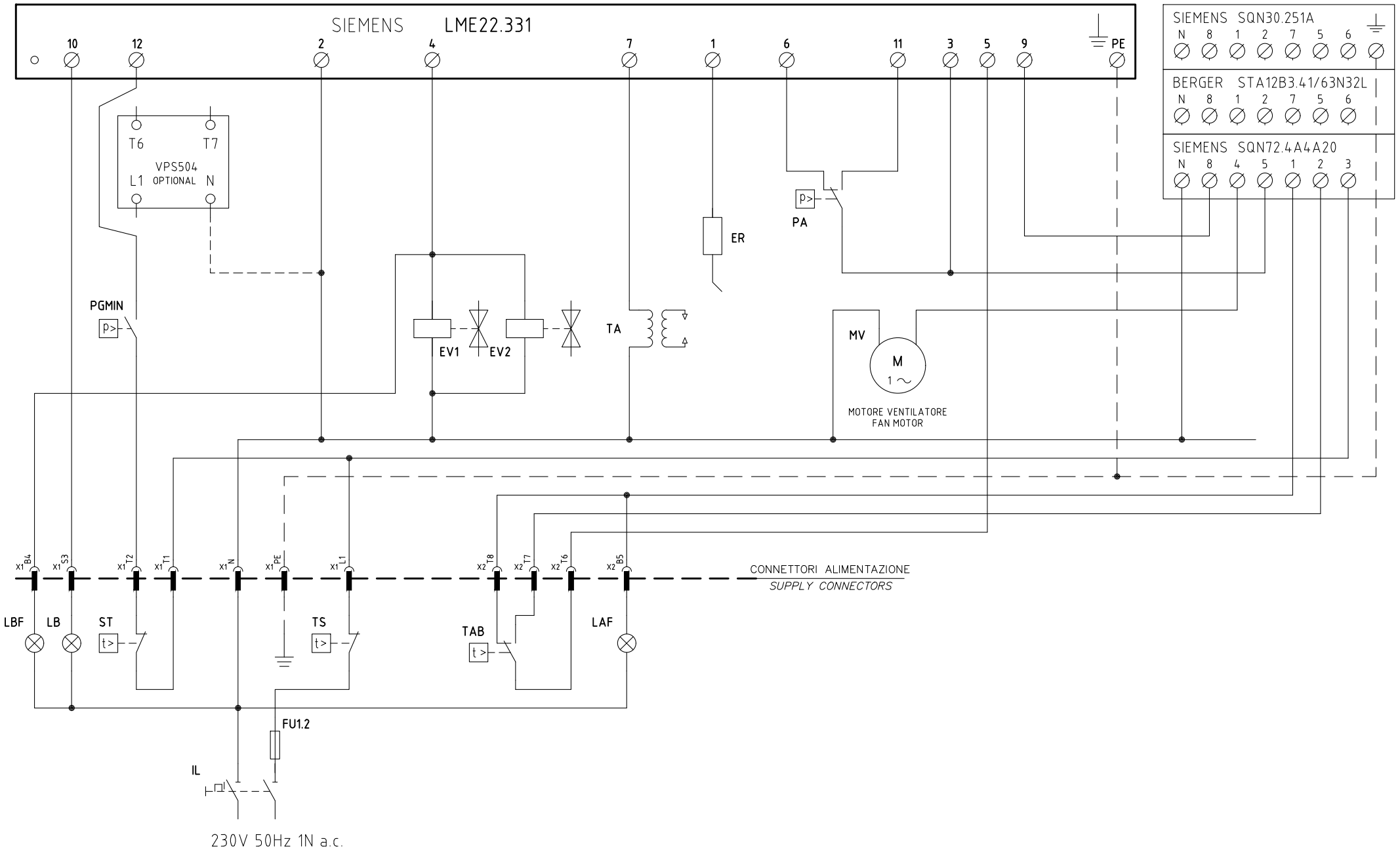
SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO)
AIR DAMPER ACTUATOR (ALTERNATIVE)
STA12B3.41/63N32L

ST1	ALTA FIAMMA
	HIGH FLAME
ST0	SOSTA
	STAND-BY
ST1	BASSA FIAMMA
	LOW FLAME
MV	NON USATA
	NOT USED

SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO)
AIR DAMPER ACTUATOR (ALTERNATIVE)
SQN30.251

I	ALTA FIAMMA
	HIGH FLAME
II	SOSTA
	STAND-BY
III	BASSA FIAMMA
	LOW FLAME
V	NON USATA
	NOT USED

Data 17/05/2013		PREC. 3	FOGLIO 4
Revisione 01			
Dis. N. 01 – 0572		SEGUE /	TOTALE 4



Data 18/07/1997		PREC.	FOGLIO
Revisione 02		/	1
Dis. N. 01 – 0368		SEGUE	TOTALE
		2	2

0	1	2	3	4	5	6	7	8	9

Sigla/Item	Funzione	Function
ER	ELETTRODO RIVELAZIONE FIAMMA	FLAME DETECTION ELECTRODE
EV1	ELETTROVALVOLA GAS LATO RETE (O GRUPPO VALVOLE)	UPSTREAM GAS SOLENOID VALVE (OR VALVES GROUP)
EV2	ELETTROVALVOLA GAS LATO BRUCIATORE (O GRUPPO VALVOLE)	DOWNSTREAM GAS SOLENOID VALVE (OR VALVES GROUP)
FU1.2	FUSIBILE DI LINEA	LINE FUSE
IL	INTERRUTTORE GENERALE	MAINS SWITCH
LAF	LAMPADA SEGNALAZIONE ALTA FIAMMA BRUCIATORE	BURNER IN HIGH FLAME INDICATOR LIGHT
LB	LAMPADA SEGNALAZIONE BLOCCO BRUCIATORE	INDICATOR LIGHT FOR BURNER LOCK-OUT
LBF	LAMPADA SEGNALAZIONE BASSA FIAMMA BRUCIATORE	BURNER IN LOW FLAME INDICATOR LIGHT
LME22.331	APPARECCHIATURA CONTROLLO FIAMMA	CONTROL BOX
MV	MOTORE VENTILATORE	FAN MOTOR
PA	PRESSOSTATO ARIA COMBURENTE	COMBUSTION AIR PRESSURE SWITCH
PGMIN	PRESSOSTATO GAS DI MINIMA PRESSIONE	MINIMUM GAS PRESSURE SWITCH
SQN30.251A	SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO)	AIR DAMPER ACTUATOR (ALTERNATIVE)
SQN72.4A4A20	SERVOCOMANDO SERRANDA ARIA	AIR DAMPER ACTUATOR
ST	SERIE TERMOSTATI/PRESSOSTATI	SERIES OF THERMOSTATS OR PRESSURE SWITCHES
STA12B3.41/63N32L	SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO)	AIR DAMPER ACTUATOR (ALTERNATIVE)
TA	TRASFORMATORE DI ACCENSIONE	IGNITION TRANSFORMER
TAB	TERMOSTATO/PRESSOSTATO ALTA-BASSA FIAMMA	HIGH-LOW THERMOSTAT/PRESSURE SWITCHES
TS	TERMOSTATO/PRESSOSTATO DI SICUREZZA	SAFETY THERMOSTAT OR PRESSURE SWITCH
VPS504	CONTROLLO DI TENUTA VALVOLE GAS (OPTIONAL)	GAS PROVING SYSTEM (OPTIONAL)

NOTE :

MARKS :

SERVOCOMANDO SERRANDA ARIA

AIR DAMPER ACTUATOR

SQN72.4A4A20

I (ROSSO)	ALTA FIAMMA
I (RED)	*HIGH FLAME*
II (BLU)	SOSTA
II (BLUE)	*STAND-BY*
III (ARANCIO)	BASSA FIAMMA
III (ORANGE)	*LOW FLAME*
IV (NERO)	NON USATA
IV (BLACK)	*NOT USED*

SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO)

AIR DAMPER ACTUATOR (ALTERNATIVE)

STA12B3.41/63N32L

ST1	ALTA FIAMMA
	HIGH FLAME
ST0	SOSTA
	STAND-BY
ST1	BASSA FIAMMA
	LOW FLAME
MV	NON USATA
	NOT USED

SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO)

AIR DAMPER ACTUATOR (ALTERNATIVE)

SQN30.251

I	ALTA FIAMMA
	HIGH FLAME
II	SOSTA
	STAND-BY
III	BASSA FIAMMA
	LOW FLAME
V	NON USATA
	NOT USED

Data 18/07/1997		PREC. 1	FOGLIO 2
Revisione 02			
Dis. N. 01 – 0368		SEGUE /	TOTALE 2

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