

# **C85A - C120A**

## ***Gas burners***

**MANUAL OF INSTALLATION - USE - MAINTENANCE**

***CIB UNIGAS***

**BURNERS - BRUCIATORI - BRULERS - BRENNER - QUEMADORES - ГОРЕЛКИ**

## DANGERS, WARNINGS AND NOTES OF CAUTION

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

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

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

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

### 1) GENERAL INTRODUCTION

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

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

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

Contact qualified personnel only.

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

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

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

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

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

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

### 2) SPECIAL INSTRUCTIONS FOR BURNERS

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

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

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

### Special warnings

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

### 3) GENERAL INSTRUCTIONS DEPENDING ON FUEL USED

#### 3a) ELECTRICAL CONNECTION

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

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

#### GENERAL

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

#### SPECIAL INSTRUCTIONS FOR USING GAS

Have qualified personnel inspect the installation to ensure that:

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

#### Precautions if you can smell gas

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

### DIRECTIVES AND STANDARDS

#### *Gas burners*

##### European directives

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

##### Harmonized standards

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

#### *Light oil burners*

##### European directives

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

##### Harmonized standards

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

#### *Heavy oil burners*

##### European Directives

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

##### Harmonized standards

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

### Gas - Light oil burners

#### European Directives

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

#### Harmonized standards

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

### Gas - Heavy oil burners

#### European directives:

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

#### Harmonized standards

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

### Industrial burners

#### European directives

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

#### Harmonized standards

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

### Burner data plate

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

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

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

### SYMBOLS USED



**WARNING!**

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



**DANGER!**

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



**WARNING!**

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

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

### BURNER SAFETY

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



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

### Residual risks deriving from misuse and prohibitions

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



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



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



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

## PART I: SPECIFICATIONS

## BURNERS FEATURES

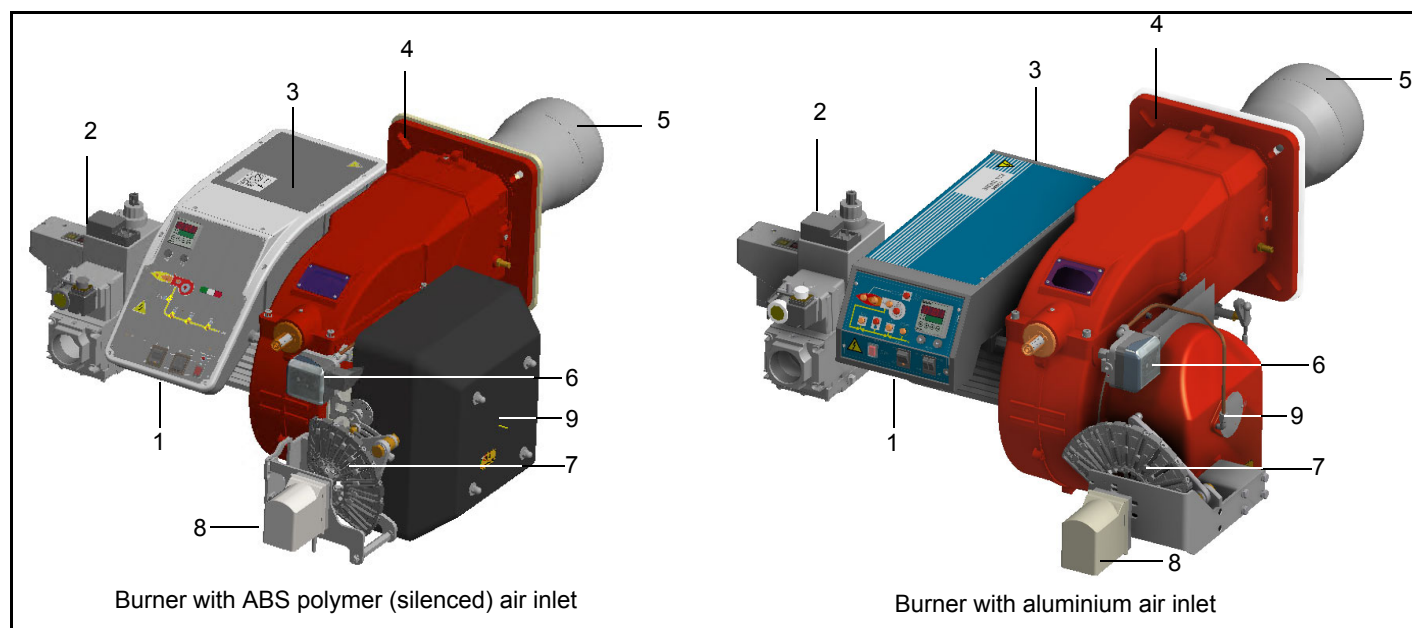


Fig. 1

Note: the figure is indicative only.

- 1 Control panel with startup switch
- 2 Gas valves group
- 3 Electrical panel
- 4 Flange
- 5 Blast tube - Combustion head
- 6 Air pressure switch
- 7 Adjusting cam (progressive/fully modulating burners only)
- 8 Actuator
- 9 Air intake (ABS or aluminium)

**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 | <b>C85A</b> | Model | <b>M-. MD. SR. *.* A. 1. 80.</b>   |
|      | <b>(1)</b>  |       | <b>(2) (3) (4) (5) (6) (7) (8)</b> |

|   |                                        |                                                                                                                                                                                    |
|---|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | BURNER TYPE                            | <b>C85A - C120A</b>                                                                                                                                                                |
| 2 | FUEL                                   | M - Natural gas, B - Biogas, L - LPG                                                                                                                                               |
| 3 | OPERATION                              | PR - Progressive, MD - Fully modulating, AB - Double stage                                                                                                                         |
| 4 | BLAST TUBE AND AIR INLET CONFIGURATION | SR = Standard blast tube + ABS polymer (silenced) air intake<br>LR = Extended blast tube + ABS polymer (silenced) air intake                                                       |
| 5 | DESTINATION COUNTRY                    | * - see data plate                                                                                                                                                                 |
| 6 | BURNER VERSION                         | A - Standard, Y - Special                                                                                                                                                          |
| 7 | EQUIPMENT                              | 0 = 2 gas valves<br>1 = 2 gas valves + gas proving system<br>7 = 2 gas valves + maximum gas pressure switch<br>8 = 2 gas valves + gas proving system + maximum gas pressure switch |
| 8 | GAS CONNECTION                         | 32 = Rp1 <sub>1/4</sub> , 40 = Rp1 <sub>1/2</sub> , 50 = Rp2, 65 = DN65, 80 = DN80                                                                                                 |

**Burner performance**

|                       |                | C85A                                       | C120A      | C85A              | C120A      |
|-----------------------|----------------|--------------------------------------------|------------|-------------------|------------|
| Output                | min. - max. kW | 230 - 850                                  | 300 - 1200 | 230 - 850         | 300 - 1200 |
| Fuel                  |                | M - Natural gas                            |            | L - LPG           |            |
| Category              |                | (see next paragraph)                       |            | I <sub>3B/P</sub> |            |
| Protection            |                | IP40                                       |            |                   |            |
| Operation             |                | Progressive - Fully modulating - Two-stage |            |                   |            |
| Operating temperature | °C             | -10 ÷ +50                                  |            |                   |            |
| Storage Temperature   | °C             | -20 ÷ +60                                  |            |                   |            |
| Working service (4)   |                | Continuous                                 |            |                   |            |

**Electrical data 50 Hz**

Possible voltages, check the actual three-phase and single-phase supply voltage on the burner nameplate.

|                                   |    |                                       |     |     |     |
|-----------------------------------|----|---------------------------------------|-----|-----|-----|
| Power supply triphase             | V  | 230 / 400 3 a.c.                      |     |     |     |
| Auxiliary power supply Mono Phase | V  | 115 2 a.c. / 220 2 a.c. / 230 1N a.c. |     |     |     |
|                                   | Hz | 50                                    |     |     |     |
| Electric motor                    | kW | 1,1                                   | 1,5 | 1,1 | 1,5 |
| Total power consumption           | kW | 1,6                                   | 2   | 1,6 | 2   |

**Electrical data 60 Hz**

Possible voltages, check the actual three-phase and single-phase supply voltage on the burner nameplate.

|                                   |    |                                                            |     |      |     |
|-----------------------------------|----|------------------------------------------------------------|-----|------|-----|
| Power supply triphase             | V  | 220 / 230 / 265 / 277 / 380 / 440 / 460 / 480 / 525 3 a.c. |     |      |     |
| Auxiliary power supply Mono Phase | V  | 110 / 120 / 230 2 a.c.                                     |     |      |     |
|                                   | Hz | 60                                                         |     |      |     |
| Electric motor                    | kW | 1,32                                                       | 1,8 | 1,32 | 1,8 |
| Total power consumption           | kW | 1,82                                                       | 2,3 | 1,82 | 2,3 |

**Fuel data**

|                           |                                  |              |          |          |           |
|---------------------------|----------------------------------|--------------|----------|----------|-----------|
| gas rate- Natural gas (1) | min.- max. (Stm <sup>3</sup> /h) | 24 - 90      | 32 - 127 | -        | -         |
| gas rate-                 |                                  | -            | -        | 8,6 - 32 | 11,2 - 45 |
| Gas pressure (2)          | mbar                             | (see Note 2) |          |          |           |

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                     |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| <b>Note 1:</b> | All gas flow rates are referred to Stm <sup>3</sup> / h (1.013 mbar absolute pressure, 15 °C temperature) and are valid for G20 gas (net calorific value H <sub>i</sub> = 34,02 MJ / Stm <sup>3</sup> ); for L.P.G. (net calorific value H <sub>i</sub> = 93,5 MJ / Stm <sup>3</sup> ).                                                                                                                                                                            |                                                     |
| <b>Note 2:</b> | Maximum gas pressure                                                                                                                                                                                                                                                                                                                                                                                                                                               | 360 mbar (with Dungs MBDLE).                        |
|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 500 mbar (with Siemens VGD or Dungs MultiBloc MBE). |
|                | Minimum gas pressure                                                                                                                                                                                                                                                                                                                                                                                                                                               | see gas curves                                      |
| <b>Note 3:</b> | Burners are suitable only for indoor operation with a maximum relative humidity of 80 %.                                                                                                                                                                                                                                                                                                                                                                           |                                                     |
| <b>Note 4:</b> | With electrode: for safety reasons the burner must stop automatically every 24 hours.                                                                                                                                                                                                                                                                                                                                                                              |                                                     |
| <b>Note 5:</b> | The type of service can be continuous (flame signal presence for more than 24 h without any stop) or intermittent (at least once every 24 h there is a work stoppage and the flame is extinguished) depending on the configuration ordered.<br>Operation can be continuous in the presence of flame detection via ION ionisation or Siemens QRI..., QRA5..., QRA7... or Lamtec FSS... with Siemens LMV37x or LMV5x flame control equipment (BMS) and Lamtec BT3... |                                                     |

## Fuel



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

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

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

| Fuel     | $H_i$ (KWh/Stm <sup>3</sup> ) | $\rho$ (kg/Stm <sup>3</sup> ) | $f_Q$ | $f_p$ |
|----------|-------------------------------|-------------------------------|-------|-------|
| 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 .**



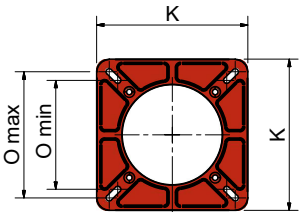
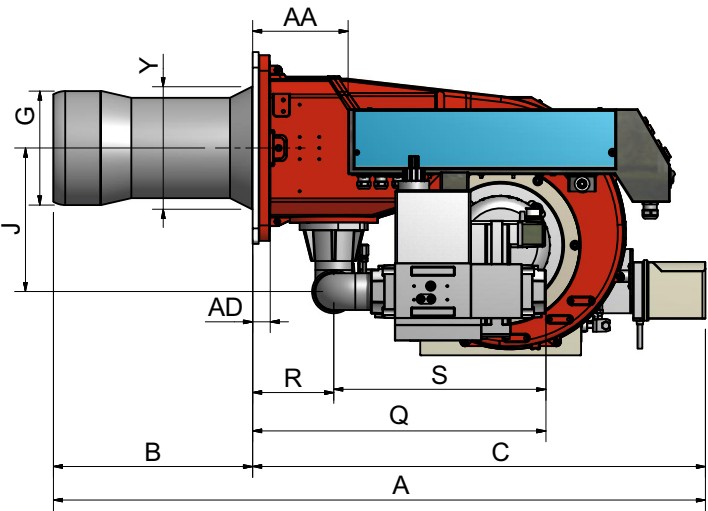
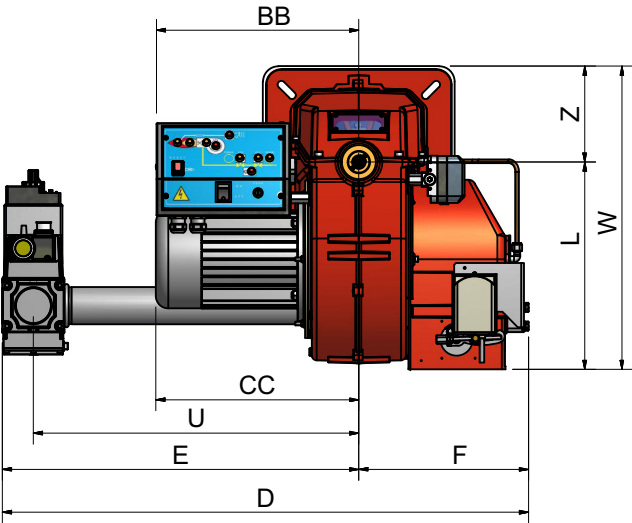
**ATTENTION! The corrective factors in the above table depend on the gas composition, so on the calorific value and the density of the gas. The above value can be taken only as reference.**

## Gas categories and countries of application

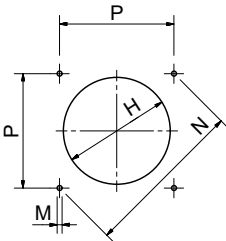
| Countries                                                                                                                              |    |       |                                            |   |   |
|----------------------------------------------------------------------------------------------------------------------------------------|----|-------|--------------------------------------------|---|---|
| AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MK, MT, NO, NL, PL, PT, RO, SE, SI, SK, TR |    |       |                                            |   |   |
| Models: "...M-...", "...MG...", "...MN...", "...ME...", "...MD..."                                                                     |    |       | Models: "...L-...", "...LG...", "...LN..." |   |   |
| Group                                                                                                                                  |    |       | Group                                      |   |   |
| E                                                                                                                                      | LL | Er    | B/P                                        | B | P |
| H                                                                                                                                      | L  | E (R) | 3R                                         |   |   |
| EK                                                                                                                                     | 2R |       |                                            |   |   |

The above gas groups can be combined according to the standard EN437:2021 and national situation of countries.

Overall dimensions (mm)C85A, C120A AB..



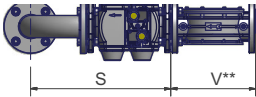
Burner flange



Boiler recommended drilling tem-

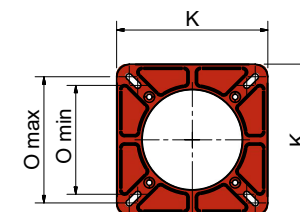
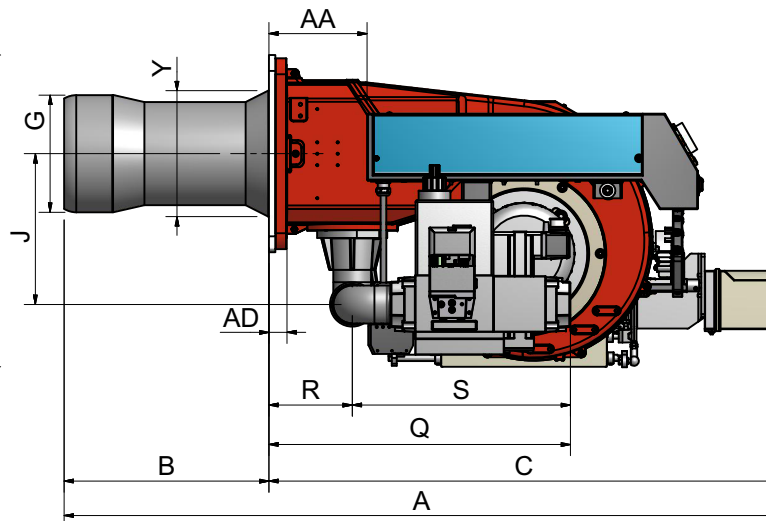
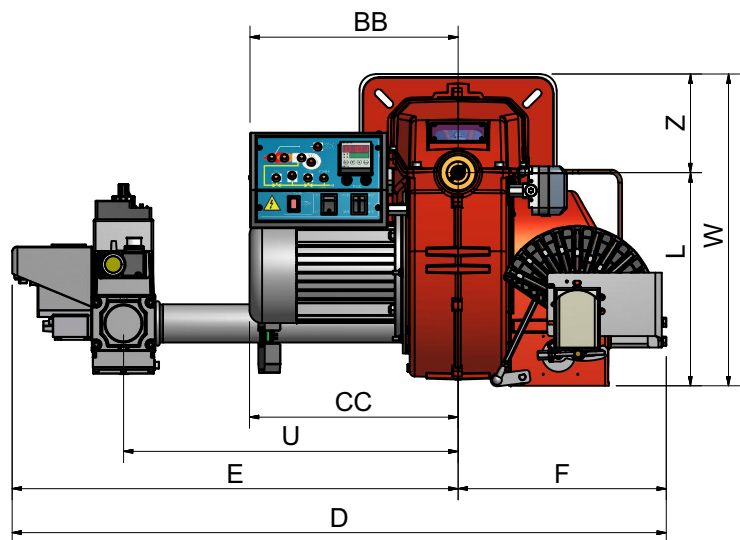
|            | *DN | AA | A<br>(A <sub>S</sub> ) | A<br>(A <sub>L</sub> ) | BB  | B<br>(B <sub>S</sub> ) | B<br>(B <sub>L</sub> ) | C   | CC  | D   | E   | F   | G   | H   | J   | K   | L   | M   | N   | O<br>min | O<br>max | P   | Q   | R   | S   | U   | V (**) | W   | Y   | Z   |
|------------|-----|----|------------------------|------------------------|-----|------------------------|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|-----|-----|-----|-----|-----|--------|-----|-----|-----|
| C85A AB..  | 32  | 87 | 1052                   | 1142                   | 345 | 320                    | 410                    | 732 | 328 | 872 | 598 | 274 | 184 | 218 | 238 | 300 | 347 | M10 | 330 | 216      | 250      | 233 | 458 | 131 | 327 | 541 | -      | 502 | 198 | 155 |
|            | 40  |    |                        |                        |     |                        |                        |     |     | 865 | 591 |     |     |     |     |     |     |     |     |          |          |     | 458 |     | 327 | 541 | -      |     |     |     |
|            | 50  |    |                        |                        |     |                        |                        |     |     | 850 | 576 |     |     |     |     |     |     |     |     |          |          |     | 469 |     | 338 | 525 | -      |     |     |     |
|            | 65  |    |                        |                        |     |                        |                        |     |     | 992 | 718 |     |     |     |     |     |     |     |     |          |          |     | 469 |     | 338 | 593 | 292    |     |     |     |
| C120A AB.. | 32  | 87 | 1112                   | 1222                   | 380 | 490                    |                        |     | 320 | 865 | 591 | 234 | 264 |     |     |     |     |     |     |          |          |     | 458 |     | 327 | 541 | -      |     |     |     |
|            | 40  |    |                        |                        |     |                        |                        |     |     | 850 | 576 |     |     |     |     |     |     |     |     |          |          |     | 473 |     | 342 | 526 | -      |     |     |     |
|            | 50  |    |                        |                        |     |                        |                        |     |     | 992 | 718 |     |     |     |     |     |     |     |     |          |          |     | 563 |     | 432 | 526 | 292    |     |     |     |
|            | 65  |    |                        |                        |     |                        |                        |     |     | 966 | 692 |     |     |     |     |     |     |     |     |          |          |     | 559 |     | 428 | 565 | 310    |     |     |     |

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

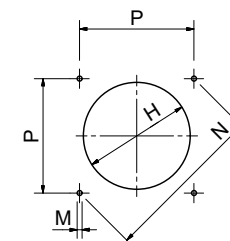


(\*\*) According to the gas train size and the burner type, MB-DLE or VGD valves are supplied. The "V" measure, refers to the gas filter, for burners provided with Siemens VGD valves. MB-DLE valves have a built-in filter.

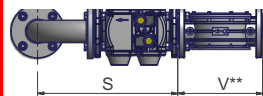
# Overall dimensions (mm) C85A, C120A PR/MD.. - Burner with aluminium air inlet



Burner flange



Boiler recommended drilling tem-

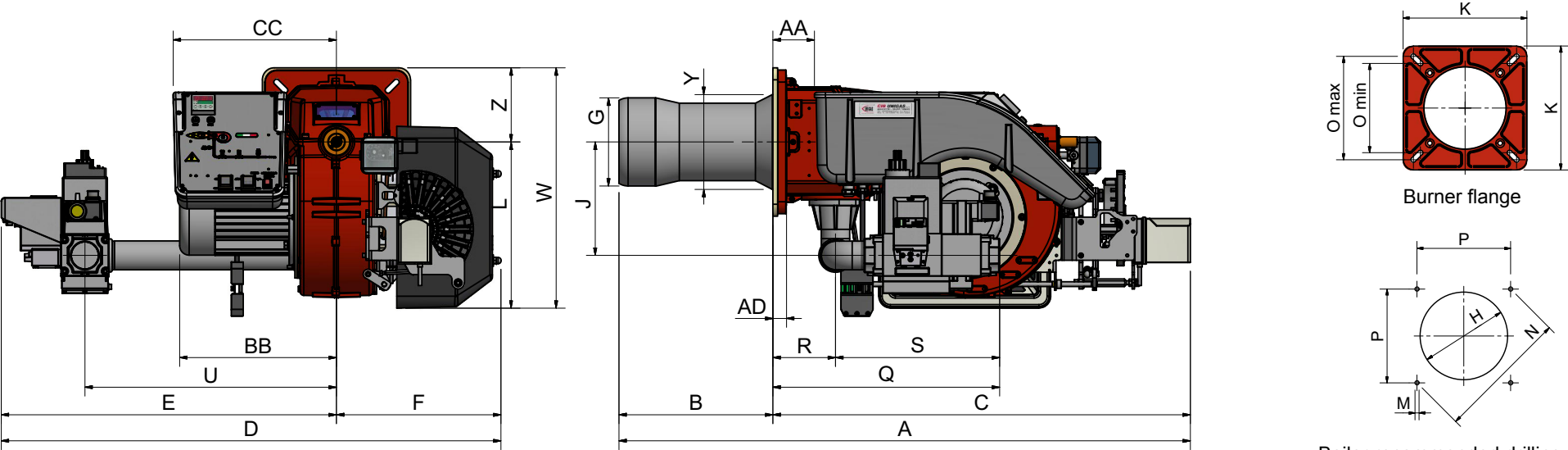


(\*\*) According to the gas train size and the burner type, MB-DLE or VGD valves are supplied. The "V" measure, refers to the gas filter, for burners provided with Siemens VGD valves. MB-DLE valves have a built-in filter.

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

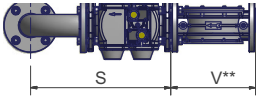
|       |              | *DN | AA | A<br>(A <sub>S</sub> ) | A<br>(A <sub>L</sub> ) | BB  | B<br>(B <sub>S</sub> ) | B<br>(B <sub>L</sub> ) | C   | CC  | D    | E   | F   | G   | H   | J   | K   | L   | M   | N   | O<br>min | O<br>max | P   | Q   | R   | S   | U   | V (**) | W   | Y   | Z   |
|-------|--------------|-----|----|------------------------|------------------------|-----|------------------------|------------------------|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|-----|-----|-----|-----|-----|--------|-----|-----|-----|
| C85A  | PR/MD...0.32 | 32  | 87 | 1122                   | 1212                   | 345 | 320                    | 410                    | 802 | 328 | 843  | 598 | 245 | 184 | 218 | 238 | 300 | 347 | M10 | 330 | 216      | 250      | 233 | 131 | 456 | 325 | 541 | -      | 502 | 198 | 155 |
|       | PR/MD...1.32 | 32  |    |                        |                        |     |                        |                        |     |     | 1050 | 723 |     |     |     |     |     |     |     |     |          |          |     |     | 458 | 327 | 541 | -      |     |     |     |
|       | PR/MD...0.40 | 40  |    |                        |                        |     |                        |                        |     |     | 918  | 591 |     |     |     |     |     |     |     |     |          |          |     |     | 458 | 327 | 541 | -      |     |     |     |
|       | PR/MD...1.40 | 40  |    |                        |                        |     |                        |                        |     |     | 1028 | 701 |     |     |     |     |     |     |     |     |          |          |     |     | 458 | 327 | 541 | -      |     |     |     |
|       | PR/MD...0.50 | 50  |    |                        |                        |     |                        |                        |     |     | 903  | 576 | 327 |     |     |     |     |     |     |     |          |          |     |     | 469 | 338 | 525 | -      |     |     |     |
|       | PR/MD...1.50 | 50  |    |                        |                        |     |                        |                        |     |     | 1028 | 701 |     |     |     |     |     |     |     |     |          |          |     |     | 469 | 338 | 525 | -      |     |     |     |
|       | PR/MD...0.65 | 65  |    |                        |                        |     |                        |                        |     |     | 963  | 718 |     |     |     |     |     |     |     |     |          |          |     |     | 539 | 408 | 593 | 292    |     |     |     |
|       | PR/MD...1.65 | 65  |    |                        |                        |     |                        |                        |     |     | 1127 | 800 |     |     |     |     |     |     |     |     |          |          |     |     | 469 | 338 | 525 | -      |     |     |     |
| C120A | PR/MD...0.40 | 40  | 87 | 1182                   | 1292                   | 345 | 380                    | 490                    | 802 | 320 | 918  | 591 |     | 234 | 264 | 238 | 300 | 347 | M10 | 330 | 216      | 250      | 233 | 131 | 458 | 327 | 541 | -      | 502 | 198 | 155 |
|       | PR/MD...1.40 | 40  |    |                        |                        |     |                        |                        |     |     | 1043 | 716 |     |     |     |     |     |     |     |     |          |          |     |     | 458 | 327 | 541 | -      |     |     |     |
|       | PR/MD...0.50 | 50  |    |                        |                        |     |                        |                        |     |     | 903  | 576 |     |     |     |     |     |     |     |     |          |          |     |     | 473 | 342 | 526 | -      |     |     |     |
|       | PR/MD...1.50 | 50  |    |                        |                        |     |                        |                        |     |     | 978  | 651 |     |     |     |     |     |     |     |     |          |          |     |     | 473 | 342 | 526 | -      |     |     |     |
|       | PR/MD...0.65 | 65  |    |                        |                        |     |                        |                        |     |     | 1045 | 718 | 327 |     |     |     |     |     |     |     |          |          |     |     | 563 | 432 | 526 | 292    |     |     |     |
|       | PR/MD...1.65 | 65  |    |                        |                        |     |                        |                        |     |     | 1127 | 800 |     |     |     |     |     |     |     |     |          |          |     |     | 563 | 432 | 526 | 292    |     |     |     |
|       | PR/MD...0.80 | 80  |    |                        |                        |     |                        |                        |     |     | 1019 | 692 |     |     |     |     |     |     |     |     |          |          |     |     | 559 | 428 | 565 | 310    |     |     |     |
|       | PR/MD...1.80 | 80  |    |                        |                        |     |                        |                        |     |     | 1101 | 774 |     |     |     |     |     |     |     |     |          |          |     |     | 559 | 428 | 565 | 310    |     |     |     |

Overall dimensions (mm) C85A, C120A PR/MD.. Burner with ABS polymer (silenced) air inlet



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

|       |              | *DN | AA | A<br>(A <sub>S</sub> ) | A<br>(A <sub>L</sub> ) | BB  | B<br>(B <sub>S</sub> ) | B<br>(B <sub>L</sub> ) | C   | CC  | D    | E   | F   | G   | H   | J | K | L   | M | N | O<br>min | O<br>max | P   | Q   | R   | S   | U   | V(**) | W   | Y   | Z   |
|-------|--------------|-----|----|------------------------|------------------------|-----|------------------------|------------------------|-----|-----|------|-----|-----|-----|-----|---|---|-----|---|---|----------|----------|-----|-----|-----|-----|-----|-------|-----|-----|-----|
| C85A  | PR/MD...0.32 | 32  | 87 | 1193                   | 1283                   | 345 | 320                    | 410                    | 873 | 342 | 942  | 598 | 344 | 184 | 218 |   |   | 347 |   |   | 216      | 250      | 233 | 387 | 131 | 256 | 541 | -     | 502 | 198 | 155 |
|       | PR/MD...1.32 | 32  |    |                        |                        |     |                        |                        |     |     | 1067 | 723 |     |     |     |   |   |     |   |   |          |          |     | 387 |     | 256 | 541 | -     |     |     |     |
|       | PR/MD...0.40 | 40  |    |                        |                        |     |                        |                        |     |     | 935  | 591 |     |     |     |   |   |     |   |   |          |          |     | 458 |     | 327 | 541 | -     |     |     |     |
|       | PR/MD...1.40 | 40  |    |                        |                        |     |                        |                        |     |     | 1060 | 716 |     |     |     |   |   |     |   |   |          |          |     | 458 |     | 327 | 541 | -     |     |     |     |
|       | PR/MD...0.50 | 50  |    |                        |                        |     |                        |                        |     |     | 920  | 576 |     |     |     |   |   |     |   |   |          |          |     | 473 |     | 342 | 526 | -     |     |     |     |
|       | PR/MD...1.50 | 50  |    |                        |                        |     |                        |                        |     |     | 1006 | 662 |     |     |     |   |   |     |   |   |          |          |     | 473 |     | 342 | 526 | -     |     |     |     |
|       | PR/MD...0.65 | 65  |    |                        |                        |     |                        |                        |     |     | 1062 | 718 |     |     |     |   |   |     |   |   |          |          |     | 563 |     | 432 | 593 | 292   |     |     |     |
|       | PR/MD...1.65 | 65  |    |                        |                        |     |                        |                        |     |     | 1144 | 800 |     |     |     |   |   |     |   |   |          |          |     | 563 |     | 432 | 593 | 292   |     |     |     |
| C120A | PR/MD...0.40 | 40  | 87 | 1253                   | 1363                   | 345 | 380                    | 490                    | 873 | 345 | 935  | 591 | 344 | 234 | 264 |   |   | 357 |   |   | 216      | 250      | 233 | 458 | 131 | 327 | 541 | -     | 512 | 198 | 155 |
|       | PR/MD...1.40 | 40  |    |                        |                        |     |                        |                        |     |     | 1060 | 716 |     |     |     |   |   |     |   |   |          |          |     | 458 |     | 327 | 541 | -     |     |     |     |
|       | PR/MD...0.50 | 50  |    |                        |                        |     |                        |                        |     |     | 920  | 576 |     |     |     |   |   |     |   |   |          |          |     | 473 |     | 342 | 526 | -     |     |     |     |
|       | PR/MD...1.50 | 50  |    |                        |                        |     |                        |                        |     |     | 1006 | 662 |     |     |     |   |   |     |   |   |          |          |     | 473 |     | 342 | 526 | -     |     |     |     |
|       | PR/MD...0.65 | 65  |    |                        |                        |     |                        |                        |     |     | 1062 | 718 |     |     |     |   |   |     |   |   |          |          |     | 563 |     | 432 | 593 | 292   |     |     |     |
|       | PR/MD...1.65 | 65  |    |                        |                        |     |                        |                        |     |     | 1144 | 800 |     |     |     |   |   |     |   |   |          |          |     | 563 |     | 432 | 593 | 292   |     |     |     |
|       | PR/MD...0.80 | 80  |    |                        |                        |     |                        |                        |     |     | 1036 | 692 |     |     |     |   |   |     |   |   |          |          |     | 563 |     | 432 | 565 | 310   |     |     |     |
|       | PR/MD...1.80 | 80  |    |                        |                        |     |                        |                        |     |     | 1118 | 774 |     |     |     |   |   |     |   |   |          |          |     | 563 |     | 432 | 565 | 310   |     |     |     |



(\*\*) According to the gas train size and the burner type, MB-DLE or VGD valves are supplied. The "V" measure, refers to the gas filter, for burners provided with Siemens VGD valves. MB-DLE valves have a built-in filter.

### How to read the burner “Performance curve”

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

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

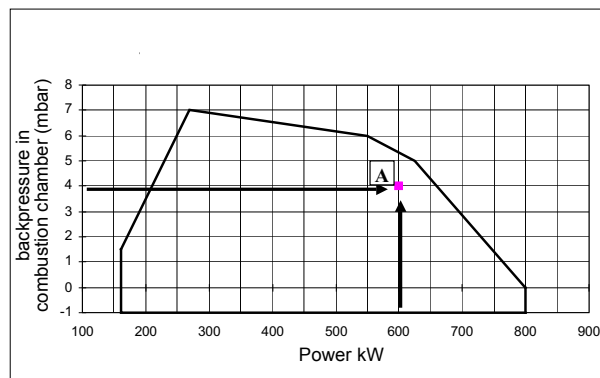
Example:

Furnace input: 600kW

Backpressure: 4 mbar

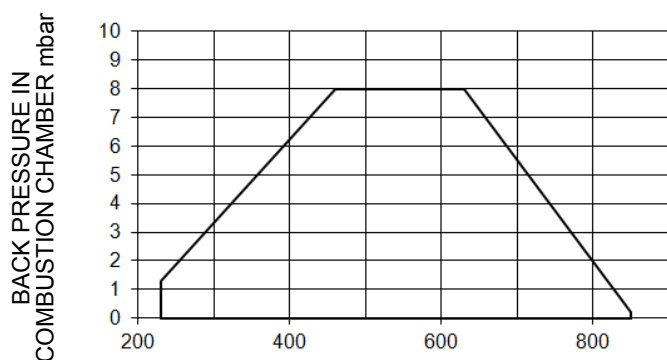
In the “Performance curve” diagram, draw a vertical line matching the furnace input value and an horizontal line matching the backpressure value. The burner is suitable if the intersection point A is inside the performance curve.

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

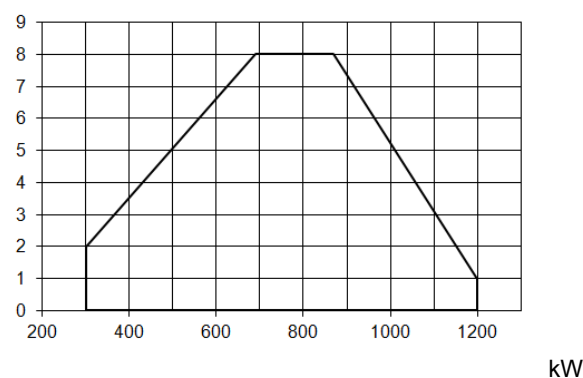


### Performance Curves

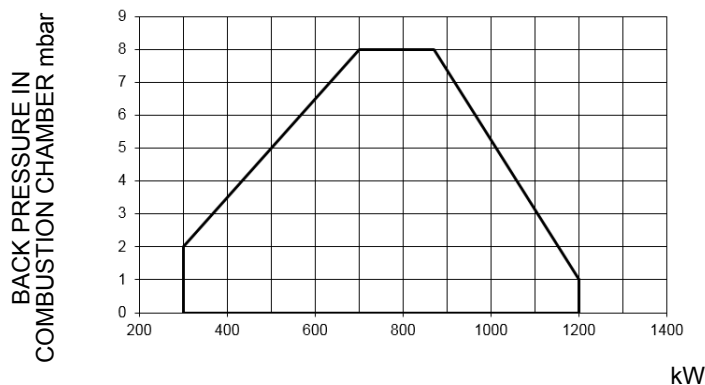
C85A M-



C120A M-



C120A L-



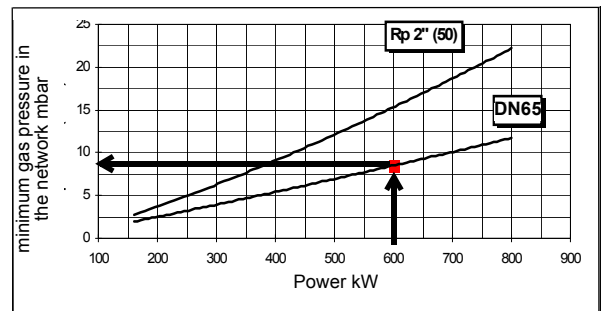
To get the input in kcal/h, multiply value in kW by 860.

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

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

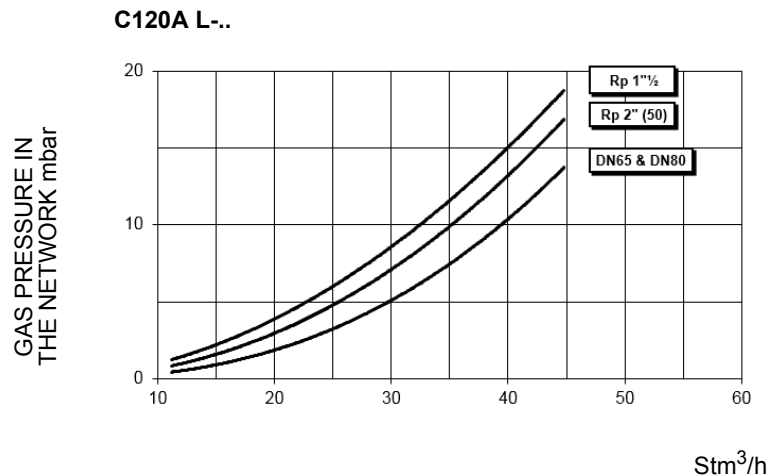
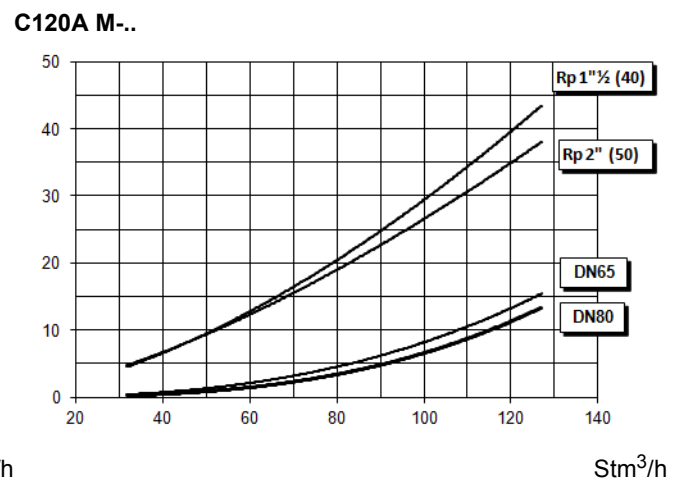
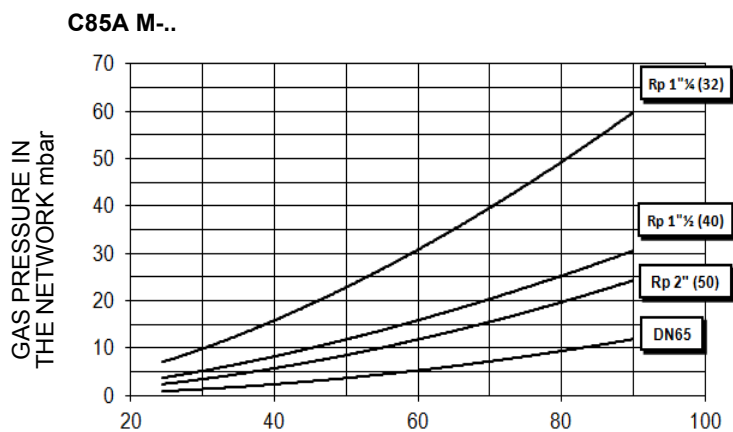
## Checking the proper gas train size

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



## Pressure in the Network / gas flow rate curves

### ● Natural Gas burners



**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.

### Combustion head gas pressure curves depending on the flow rate

The curves referred to the gas pressure in the combustion head, depending on the gas flow rate, are referred to the burner properly adjusted (percentage of residual  $O_2$  in the flues as shown in the "Recommended combustion values" table and CO in the standard limits). During this stage, the combustion head, the gas butterfly valve and the actuator are at the maximum opening. Refer to Fig. 2, showing the correct way to measure the gas pressure, considering the values of pressure in combustion chamber, surveyed by means of the pressure gauge or taken from the boiler's Technical specifications.

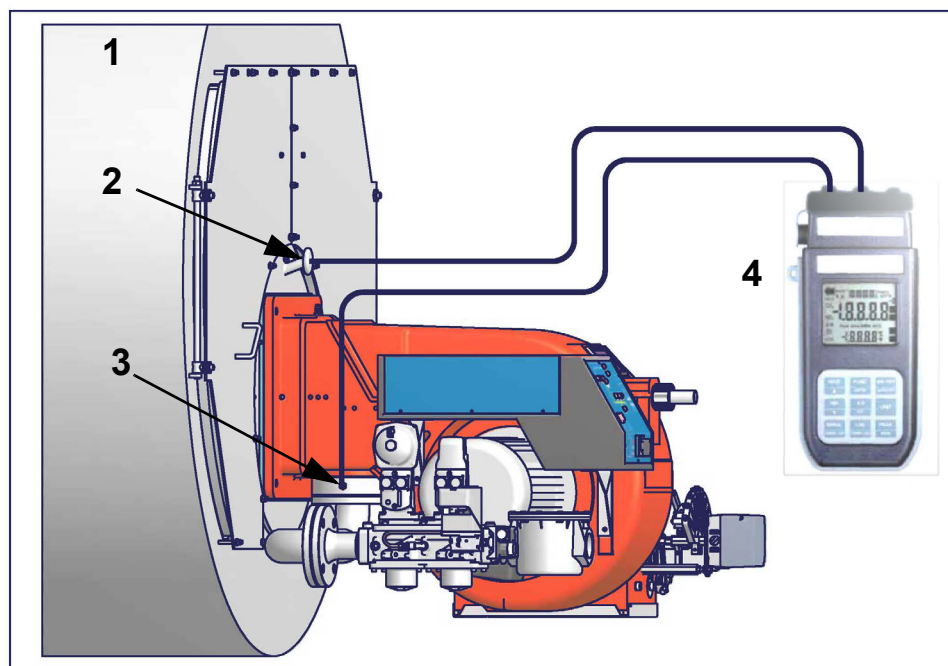


Fig. 2

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

### Measuring the gas pressure in the combustion head

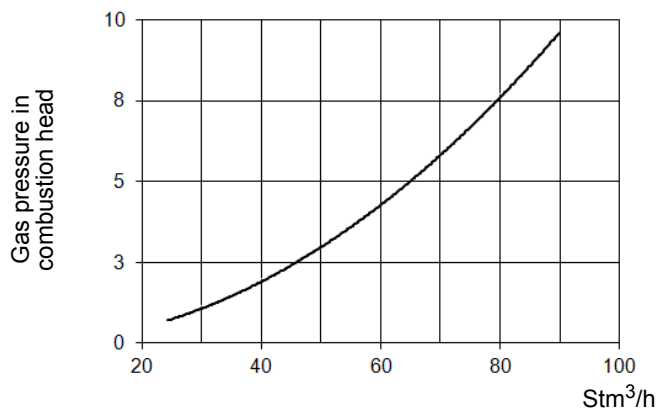
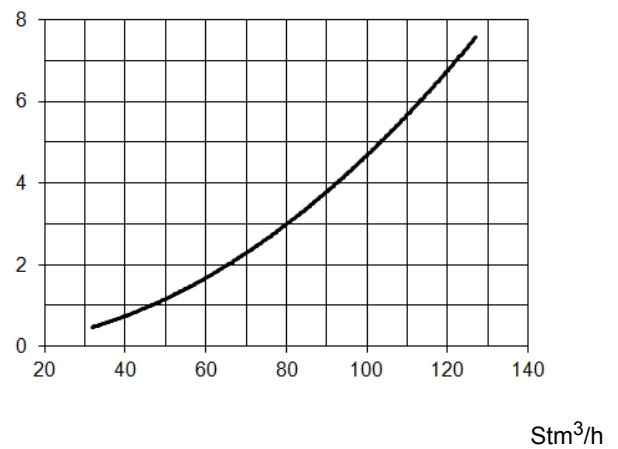
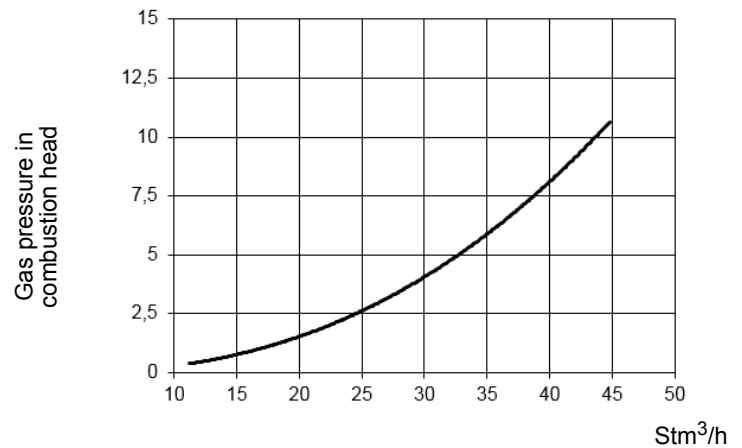
In order to measure the pressure in the combustion head, insert the pressure gauge probes: one into the combustion chamber's pressure outlet to get the pressure in the combustion chamber and the other one into the butterfly valve's pressure outlet of the burner. On the basis of the measured differential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



**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.**

**Pressure - rate in combustion head curves**

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

**C85A M-..****C120A M-..****C120A L-..**

## 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:

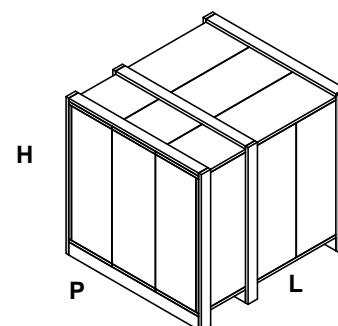
- 1636mm x 1036mm x 1016mm (L x P x H).

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.

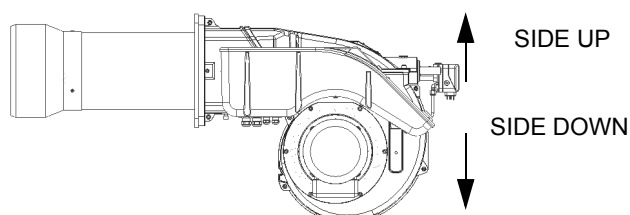


## Handling the burner



**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.

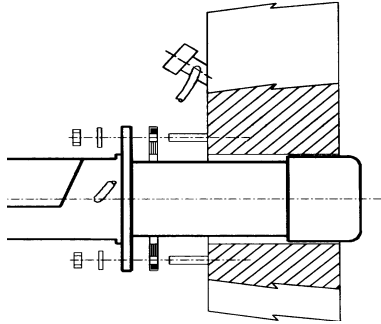


Note: the figure is indicative only.

### 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).



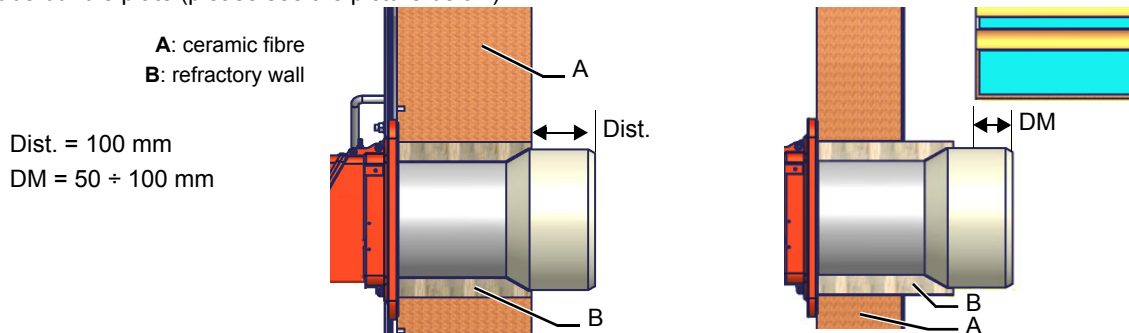
#### Keys

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

### Matching the burner to the boiler

The burners described in this manual have been tested with combustion chambers that comply with EN676 regulation and whose dimensions are described in the diagram. In case the burner must be coupled with boilers with a combustion chamber smaller in diameter or shorter than those described in the diagram, please contact the supplier, to verify that a correct matching is possible, with respect of the application involved. To correctly match the burner to the boiler verify the type of the blast tube. Verify the necessary input and the pressure in combustion chamber are included in the burner performance curve; otherwise the choice of the burner must be revised consulting the burner manufacturer. To choose the blast tube length follow the instructions of the boiler manufacturer. In absence of these consider the following:

- Cast-iron boilers, three pass flue boilers (with the first pass in the rear part): the blast tube must protrude no more than **Dist** = 100 mm into the combustion chamber. (please see the picture below)
- Pressurised boilers with flame reversal: in this case the blast tube must penetrate **Dm** 50 ÷ 100 mm into combustion chamber in respect to the tube bundle plate. (please see the picture below)



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

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

## GAS TRAIN CONNECTIONS

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

Procedure to install the double gas valve unit:

- two (2) gas flanges are required; they may be threaded or 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;



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

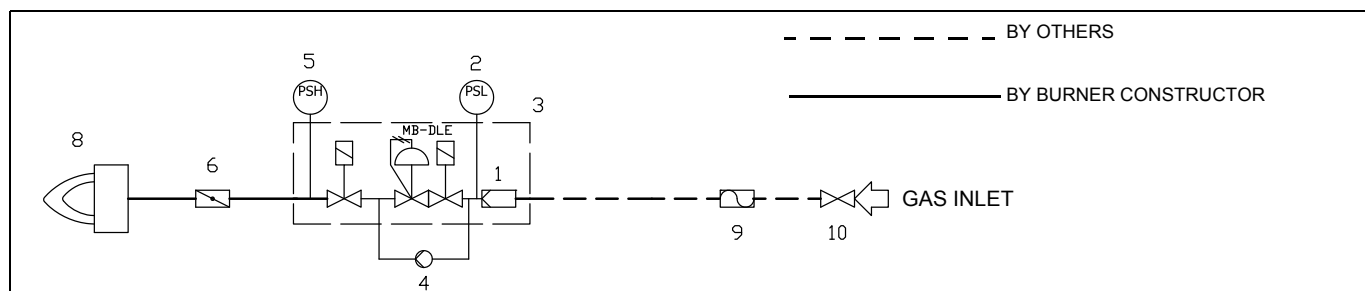


**ATTENTION:** it is recommended to mount filter and gas valves to avoid that extraneous material drops inside the valves, during maintenance and cleaning operation of the filters (both the filters outside the valves group and the ones built-in the gas valves).



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

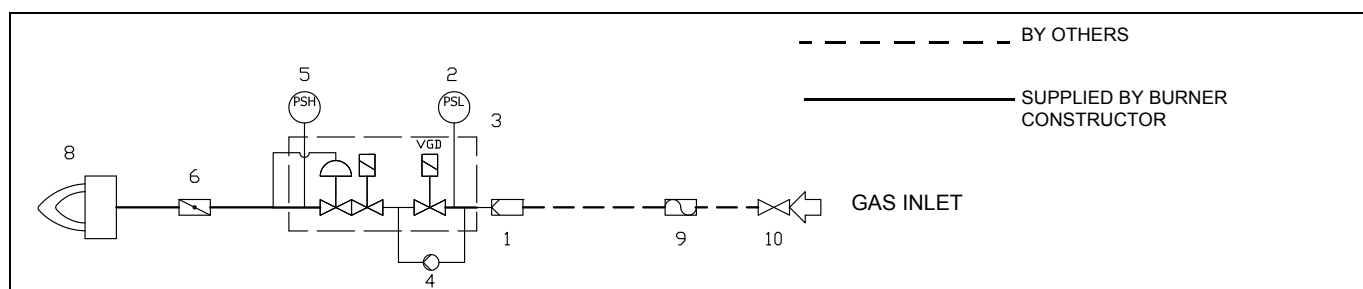
Gas train with valves group MB-DLE (2 valves + gas filter + pressure governor) + VPS504 gas proving system



Key

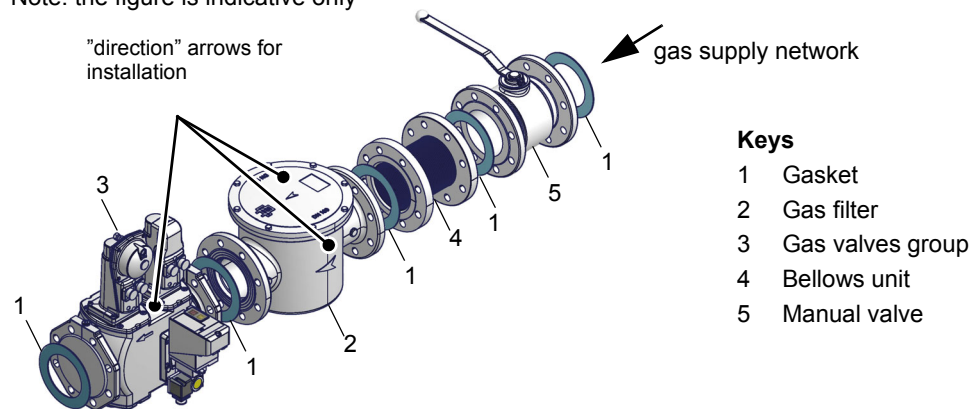
|   |                                         |    |                         |
|---|-----------------------------------------|----|-------------------------|
| 1 | Filter                                  | 6  | Butterfly valve         |
| 2 | Pressure switch - PGMIN                 | 8  | Main burner             |
| 3 | Safety valve with built in gas governor | 9  | Bellows unit(*optional) |
| 4 | Proving system (*optional)              | 10 | Manual valve(*optional) |
| 5 | Pressure switch - PGMAX (*optional)     |    |                         |

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



## MultiBloc MB-DLE - Assembling the gas train

Note: the figure is indicative only

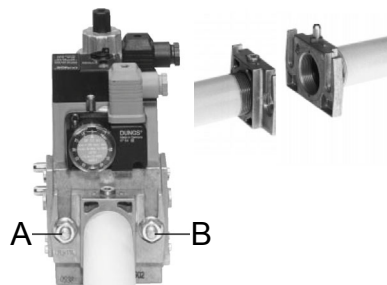


### MULTIBLOC DUNGS Mounting

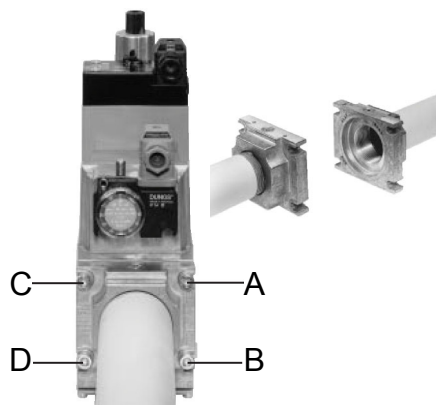
**MB-DLE 405..412**  
**MB-DLE 415..420**

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

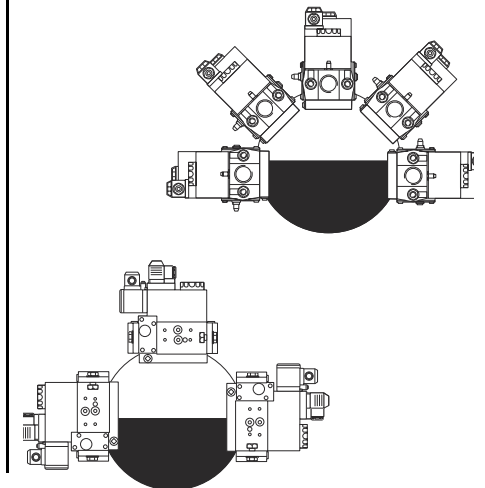
#### MB-DLE 405..412



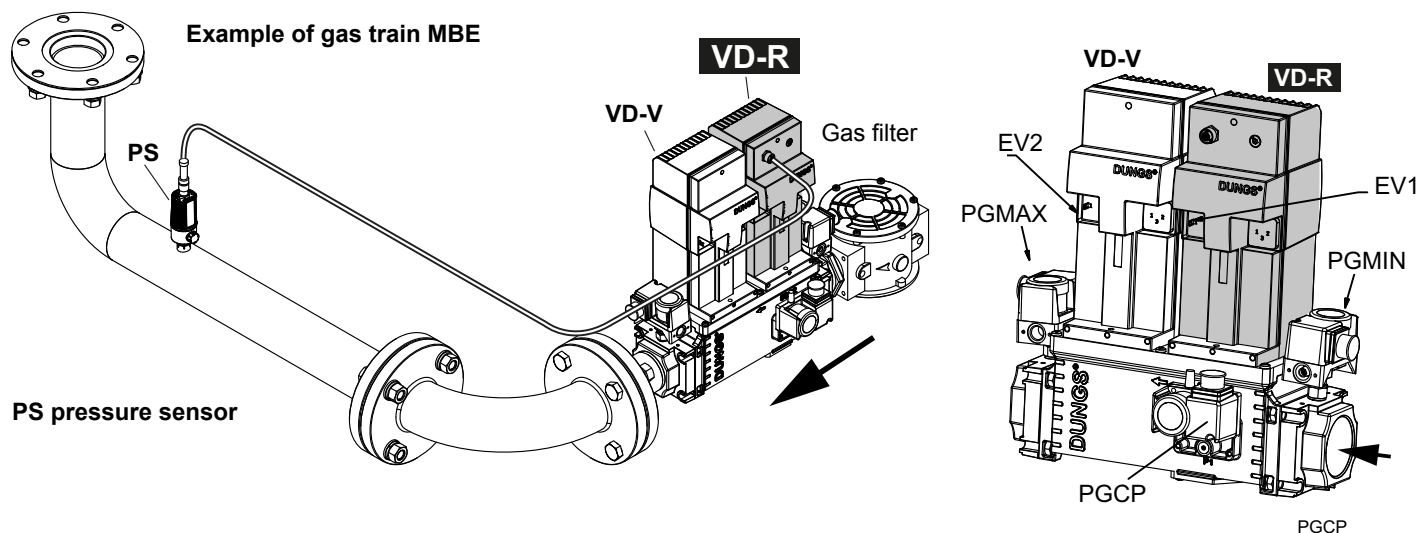
#### MB-DLE 415..420



#### MOUNTING POSITIONS



## MultiBloc MBE



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

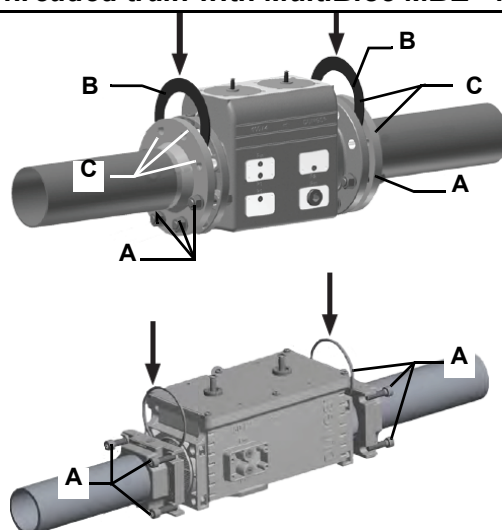


**ATTENTION:** it is recommended to mount filter and gas valves to avoid that extraneous material drops inside the valves, during maintenance and cleaning operation of the filters (both the filters outside the valves group and the ones built-in the gas valves).



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

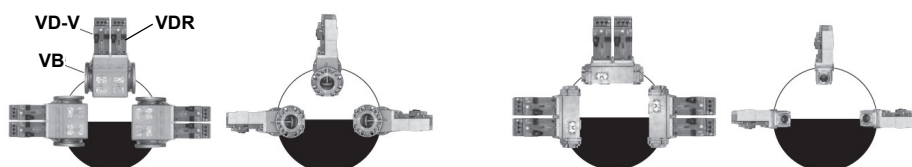
## Threaded train with MultiBloc MBE - Mounting

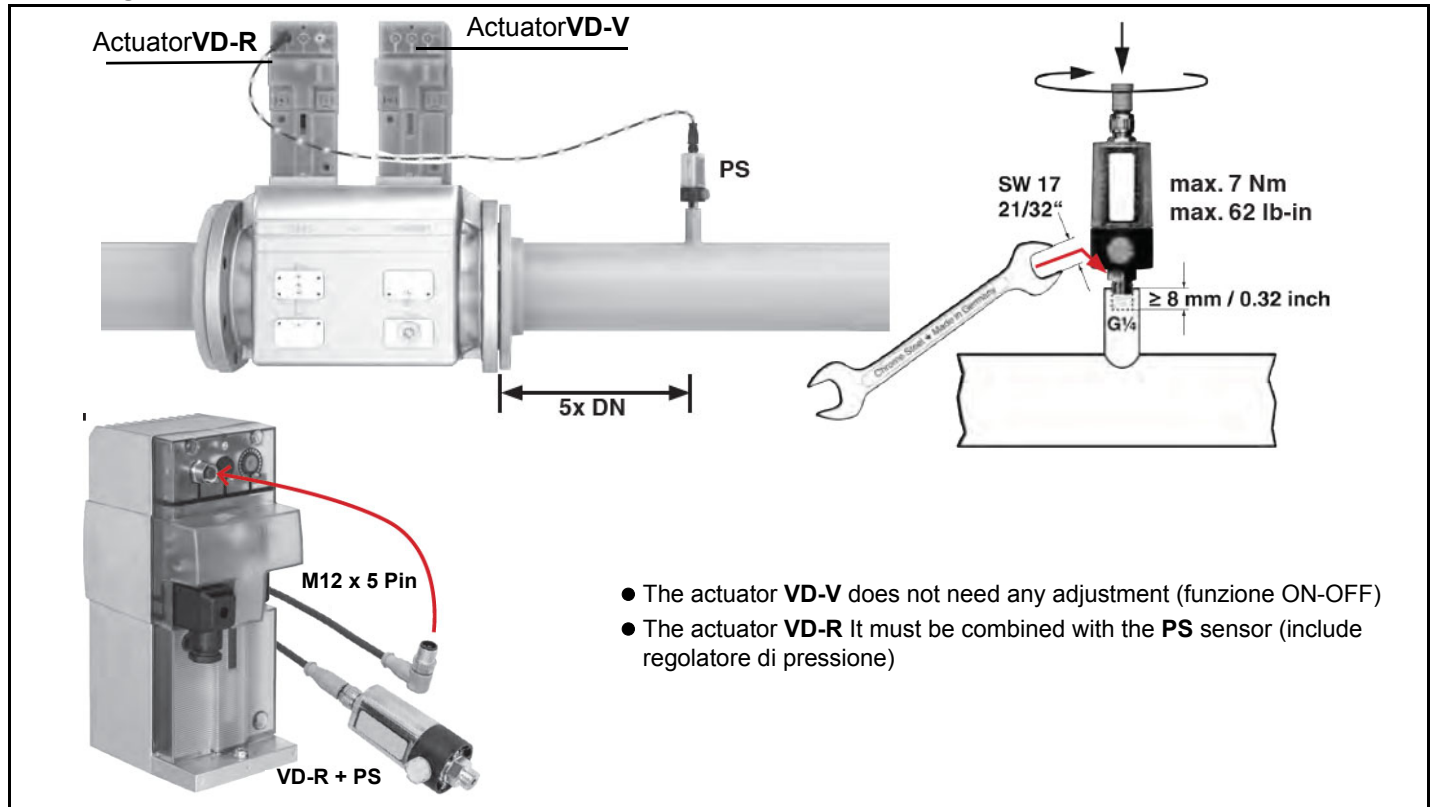


1. Insert studs A.
  2. Insert seals B.
  3. Insert studs C.
  4. Tighten studs in accordance with section 8.
- Ensure correct position of the seal!**
5. Perform leak and functional tests after mounting.
  6. Screws (4xM5x20) for VD assembly are supplied.

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

## Mounting position MBE / VB / VD



**Mounting VD-R & PS-...**

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

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

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

**Siemens VGD20.. e VGD40..**

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

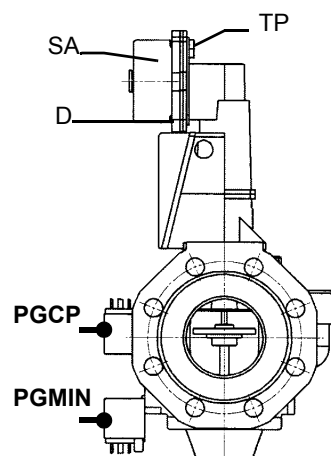
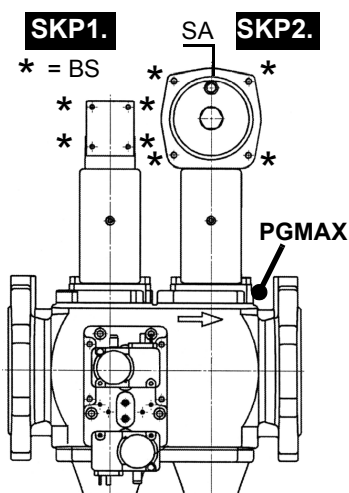
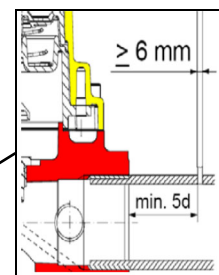
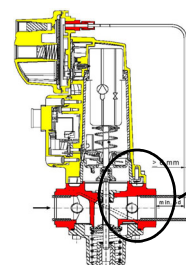
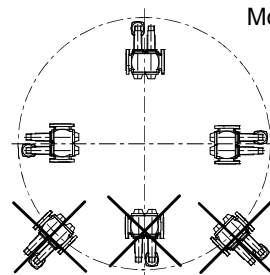
- Connect the reference gas pipe (**TP** in figure; 8mm-external size pipe supplied loose), to the gas pressure nipples placed on the gas pipe, downstream the gas valves: gas pressure must be measured at a distance that must be at least 5 times the pipe size.
- Leave the blowhole free (**SA** in figure).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



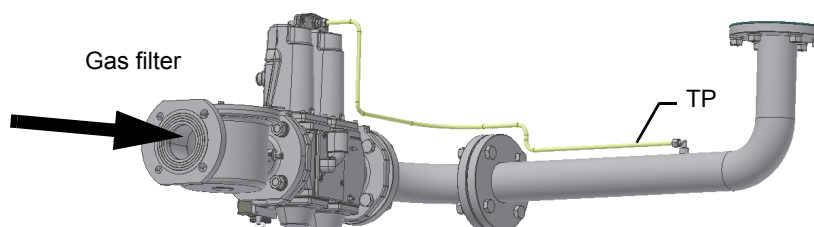
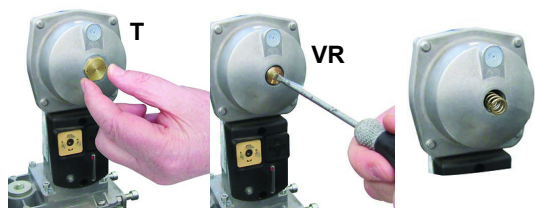
**Caution: the SKP2 diaphragm D must be vertical**



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

SIEMENS VGD..  
Mounting positions

Siemens VGD... con SKPx Example of gas train

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

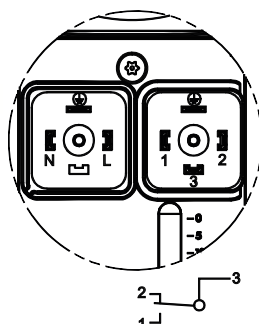
The pressure adjusting range, upstream the gas valves group, changes according to the spring provided with the valve group.

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

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

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

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

**Siemens VGD SKPx5 (Auxiliary-optional micro switch)****Actuator connection****Valve drive  
Plug connection**

(only with SKPxx.xx1xx)

A Valve closed

**End of stroke  
Plug connection****Gas valveGas Filter (if provided)**

The gas filters remove the dust particles that are present in the gas, and prevent the elements at risk (e.g.: burner valves, counters and regulators) from becoming rapidly blocked. The filter is normally installed upstream from all the control and on-off devices.



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

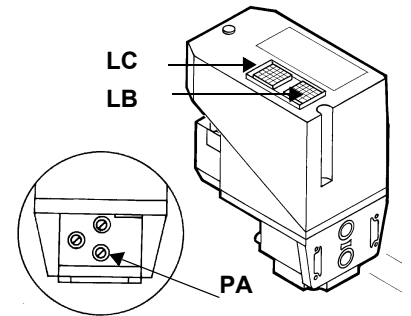
Once the train is installed, connect the gas valves group and pressure switches plugs.

## Gas Proving System VPS504 (Option)

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

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**.

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



## ELECTRICAL CONNECTIONS



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



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



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



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

In any case:

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

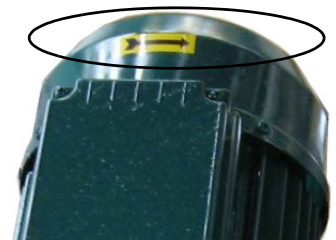
For further information, refer to the electrical diagram.

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

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

## Rotation of electric motor

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



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



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

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

### Note on electrical supply

If the power supply to the burner is 230V three-phase or 230V phase-phase (without a neutral), with the Siemens control box, between the terminal 2 (terminal X3-04-4 in case of LMV2x, LMV3x, LMV5x, LME7x) on the board and the earth terminal, an RC Siemens RC466890660 filter must be inserted.

#### Key

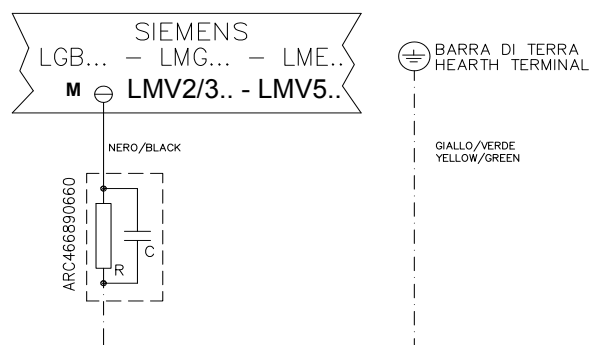
C - Capacitor (22nF/250V)

LME / LMV - Siemens control box

R - Resistor (1MΩ)

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

RC466890660 - RC Siemens filter



For LMV5 control box, please refer to the labeling recommendations available on the Siemens CD attached to the burner

### 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 AUTHORIZED BY THE COMPANY MANUFACTURING THE BURNER.

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

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

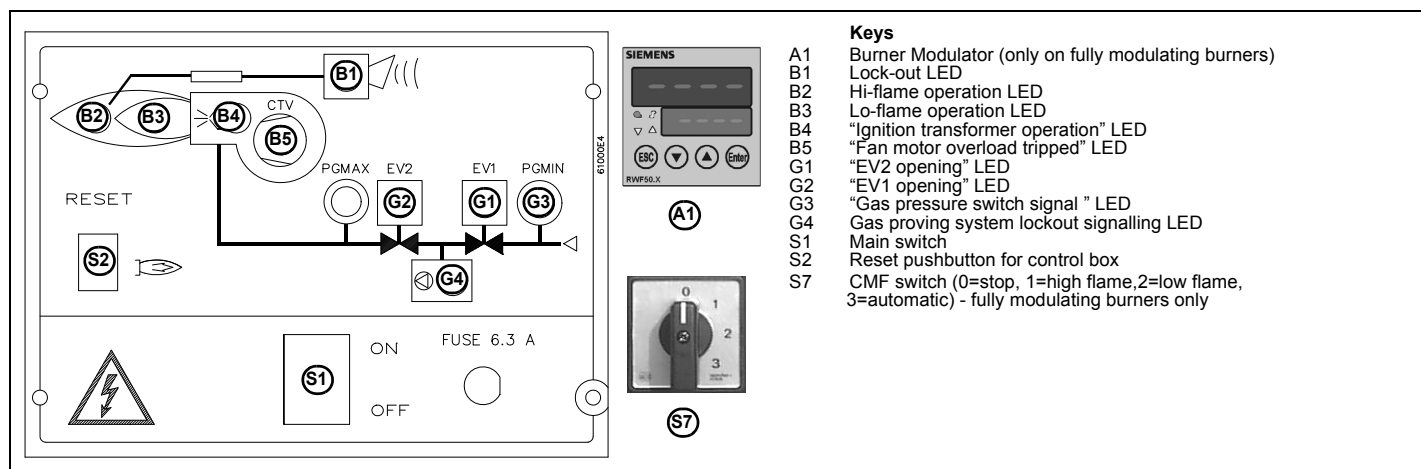
NEVER OPEN OR DISMANTLE ANY COMPONENT OF THE MACHINE EXCEPT FOR ITS MAINTENANCE.

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

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

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

Fig. 3 - Burner front panel



## Gas operation

- Turn to the ON position the mains switch S1 on the burner front panel.
- Check the flame control box is not in the lockout position (light B1 on), if necessary reset it by means of the pushbutton S2 (reset);
- Check that the control thermostats or pressure switches enable the burner to operate.
- Check the gas supply pressure is sufficient (light G3 on), if necessary, adjust the pressure switches.

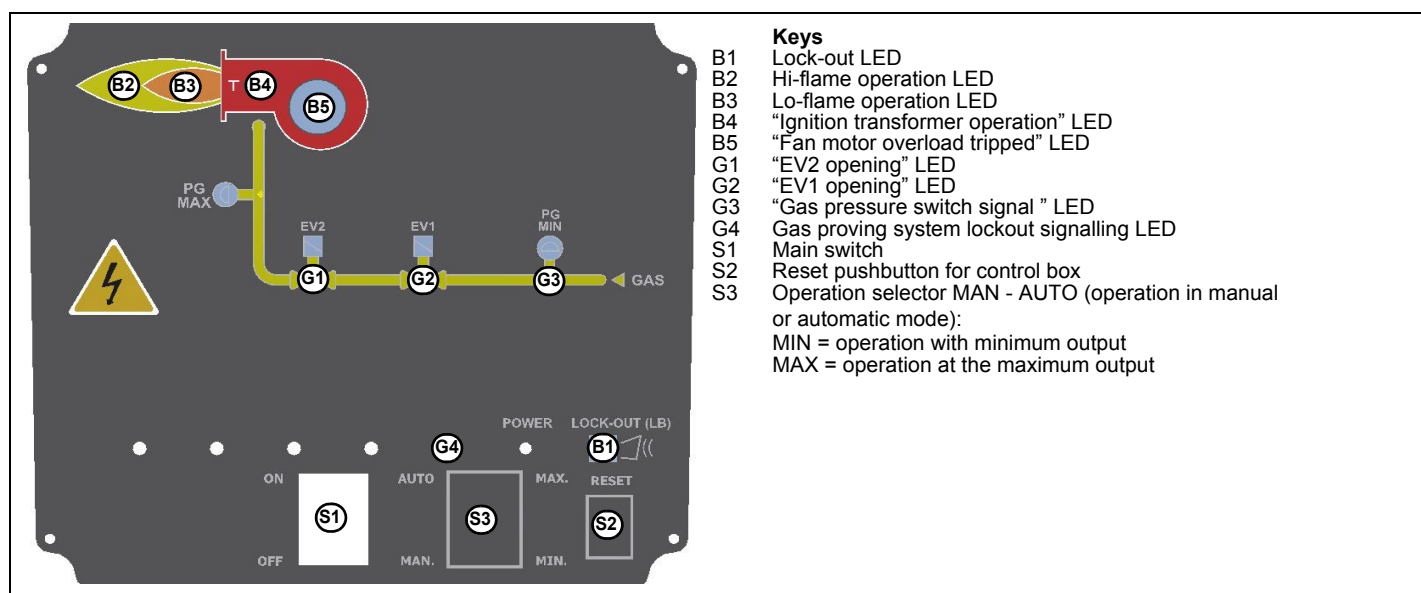
**Only burners provided with the gas proving system:** the check cycle of the gas proving system starts; the end of this check is signalled by the light of the lamp on the device. When the valves check is finished, the startup cycle of the burner begins. In the case of a leak in a valve, the gas proving system locks and the lamp G4 lights. To reset the device press the device pushbutton.

- The startup cycle begins, the actuator drives the air damper to the maximum opening position, the fan motor starts and the pre-purge phase begins. During the pre-purge phase, the complete opening of the air damper is signalled by the lamp B2 on the frontal panel of the electrical board.
- At the end of the pre-purge phase, the air damper goes to the ignition position, the ignition transformer turns on (signalled by the lamp B4) and few seconds later the solenoid valves EV1 and EV2 are energized (lights G1 and G2 on the front panel).
- Few seconds after the opening of the valves, the ignition transformer turns off and the lamp B4 turns off subsequently:

**Double-stage burners:** the burner is on in low flame stage (light G is on); some seconds later, the high flame operation begins and the burner switches automatically to high flame (light B2 is on) or remains in low flame operation, according to the plant requests.

**Progressive and fully modulating burners** - few seconds after the gas valve opening, the ignition transformer is de-energized. The burner is in low flame operation and some seconds later, the two-stages operation begins; the burner increases or decreases its output, directly driven by the external thermostat (progressive version) or by the modulator (fully modulating burners only).

Fig. 4 - Burner front panel



## Gas operation

- Turn to the ON position the mains switch S1 on the burner front panel.
- Check the flame control box is not in the lockout position (light B1 on), if necessary reset it by means of the pushbutton S2 (reset);
- Check that the control thermostats or pressure switches enable the burner to operate.
- Check the gas supply pressure is sufficient (light G3 on), if necessary, adjust the pressure switches.

**Only burners provided with the gas proving system:** the check cycle of the gas proving system starts; the end of this check is signalled by the light of the lamp on the device. When the valves check is finished, the startup cycle of the burner begins. In the case of a leak in a valve, the gas proving system locks and the lamp G4 lights. To reset the device press the device pushbutton.

- The startup cycle begins, the actuator drives the air damper to the maximum opening position, the fan motor starts and the pre-purge phase begins. During the pre-purge phase, the complete opening of the air damper is signalled by the lamp B2 on the frontal panel of the electrical board.
- At the end of the pre-purge phase, the air damper goes to the ignition position, the ignition transformer turns on (signalled by the lamp B4) and few seconds later the solenoid valves EV1 and EV2 are energized (lights G1 and G2 on the front panel).
- Few seconds after the opening of the valves, the ignition transformer turns off and the lamp B4 turns off subsequently:

**Double-stage burners:** the burner is on in low flame stage (light G is on); some seconds later, the high flame operation begins and the burner switches automatically to high flame (light B2 is on) or remains in low flame operation, according to the plant requests.

**Progressive and fully modulating burners** - few seconds after the gas valve opening, the ignition transformer is de-energized. The burner is in low flame operation and some seconds later, the two-stages operation begins; the burner increases or decreases its output, directly driven by the external thermostat (progressive version) or by the modulator (fully modulating burners only).

## 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 <sub>2</sub> | Recommended (%) O <sub>2</sub> |
| Natural gas                       | 9 ÷ 10                          | 3 ÷ 4.8                        |
| LPG                               | 11 ÷ 12                         | 4.3 ÷ 2.8                      |

### 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



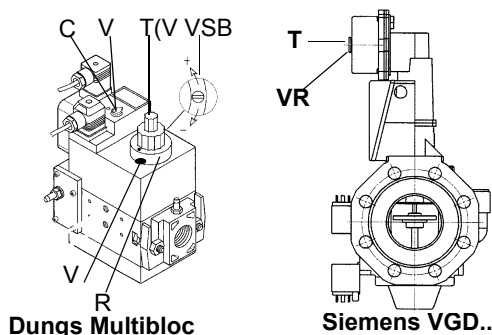
**DANGER!** Venting the air from the piping must take place in safe conditions, avoiding dangerous concentrations of fuel in the rooms. You must therefore ventilate the rooms and wait long enough for the gases to dissipate outside before switching on.



**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 procedure

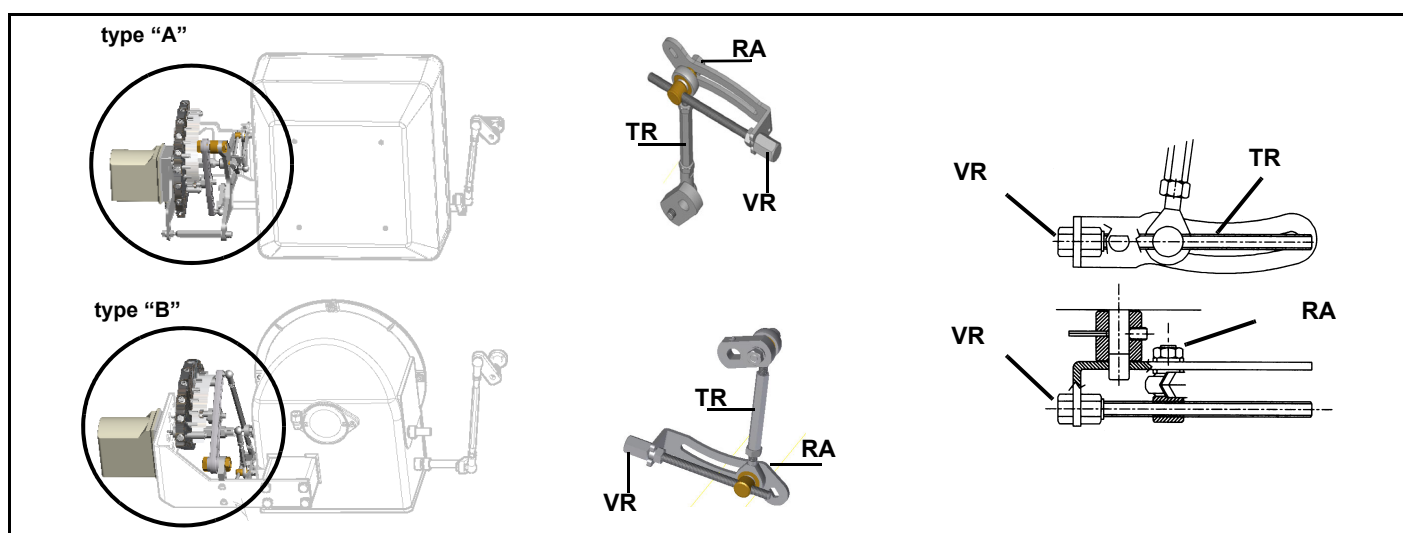
- 1 Turn the burner on by means of its main switch **A**: if the burner locks (LED **B** on in the control panel) press the RESET button (**C**) on the control panel. See chapter "Operation" for further details.
- 2 check the fan motor rotation;
- 3 Start the burner up by means of the thermostat series and wait until the pre-purge phase comes to end and that burner starts up;
- 4 the burner starts up in the low flame stage: drive the burner to high flame stage, by means of the "high/low flame" thermostat **TAB**.
- 5 adjust the burner combustion values in the high flame stage as described in the following steps.
- 6 go on adjusting air and gas flow rates: check, continuously, the flue gas analysis, as to avoid combustion with little air; dose the air according to the gas flow rate change following the steps quoted below;
- 7 acting on the pressure governor of the valves group, adjust the **gas flow rate in the high flame stage** as to meet the values requested by the boiler/utilisation:
  - **Multibloc MB-DLE**: the valve is adjusted by means of the **RP** regulator after slackening the locking screw **VB** by a number of turns. By unscrewing the regulator **RP** the valve opens, screwing the valve closes. 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 replacement of the coil.
  - **Siemens VGD valves group**: remove cap **T** and act on the **VR** adjusting screw to increase or decrease the pressure and consequently the gas rate; screwing **VR** the rate increases, unscrewing it decreases (see next figure).



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

- 8 .To adjust the **air flow rate in the high flame stage**, loose the **RA** nut and screw **VRA** as to get the desired air flow rate: moving the rod **T** towards the air damper shaft, the air damper opens and consequently the air flow rate increases, moving it far from the shaft the air damper closes and the air flow rate decreases.

**Note**: once the procedure is performed, be sure that the blocking nut **RA** is fasten.



Go on adjusting the burner according to the model (double-stage, progressive, fully-modulating).

### Double-stage burners

- drive the burner to the low flame stage by means of the **TAB** thermostat;
- To change the gas flow rate in order to get an efficient combustion, slacken the nut **DB** and adjust the opening angle of the gas butterfly valve by rotating the screw **TG** (clockwise rotation increases gas flow, anticlockwise rotation decreases it). The slot on the butterfly valve shaft shows the opening degree of the valve regarding the horizontal axis. **Don't act on DE nuts.**

**NOTE:** At the end of settings, make sure the locking screws **RA** and **DB** are fully tightened.

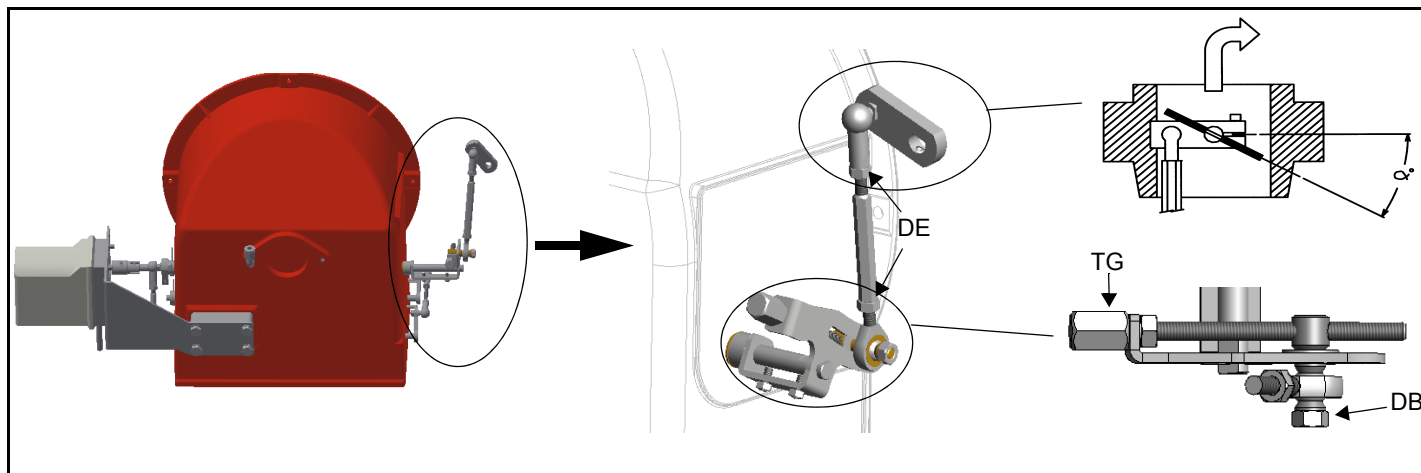
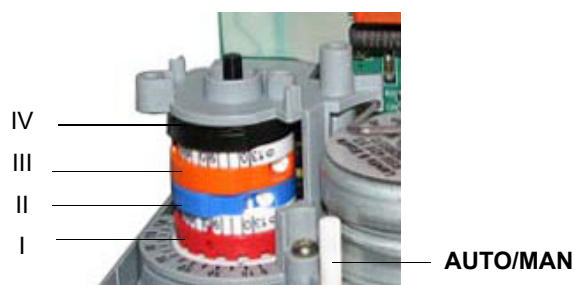
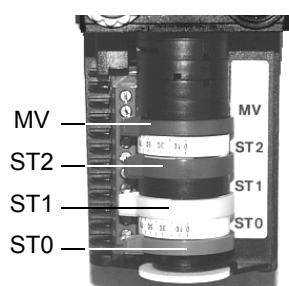


Fig. 5

- Now adjust the pressure switches.
- If it is necessary to change the burner output in the low flame stage, move the low flame cam: the low flame position matches the ignition position. As far as burners fitted with Dungs MBC gas valves, the low flame cam does not match the ignition cam position, that is why it must be set at about 30° more than the ignition cam.
- Turn the burner off and then start it up again. If the adjustment is not correct, repeat the previous steps.

Berger STA6 B 3.41 (high-low flame burners)

Siemens SQN72.2A4Axx (high-low flame burners)



| For DUNGS MB-DLE / Siemens VGD gas valves | Actuator camsBerger STA | Siemens SQN72 |
|-------------------------------------------|-------------------------|---------------|
| High flame position (set to 90°)          | ST2                     | I (red)       |
| Low flame and ignition position           | ST1                     | III (orange)  |
| Stand-by position (set to 0°)             | ST0                     | II (blue)     |
| Not used                                  | MV                      | IV (black)    |

Berger STA12: a key is provided to move the cams.

Siemens SQN72: a key is provided to move cams I and IV, the other cams can be moved by means of screws.

On the BERGER STA12B3.41 actuator, the manual air damper control is not provided. On the Siemens actuator the AUTO/MAN mode is provided (see picture).

Progressive burners

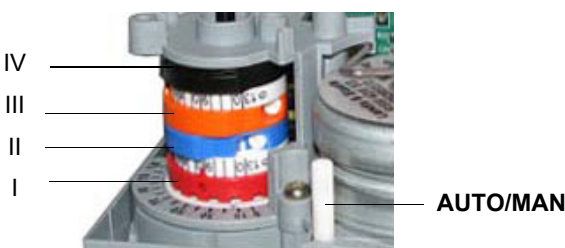
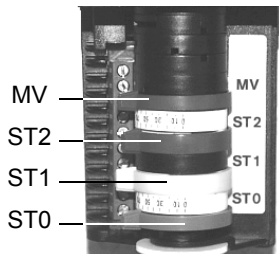
Once the procedure till step 8 described is accomplished, go on as follows:

- set the low flame cam matching the high flame cam;
- set the **TAB** thermostat to the minimum in order that the actuator moves progressively towards the low flame position;
- The manual air damper control is not provided on these actuators. The adjustments must be carried out acting manually on the cams.

● Versione LME22

Berger STA12B3.41 (progressive and fully modulating burners)

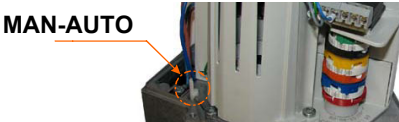
Siemens SQN72.4A4Axx (progressive and fully modulating burners)



| For DUNGS MB-DLE / Siemens VGD gas valves | Actuator camsBerger STA | Siemens SQN72 |
|-------------------------------------------|-------------------------|---------------|
| High flame position (set to 90°)          | ST2                     | I (red)       |
| Low flame and ignition position           | ST1                     | III (orange)  |
| Stand-by position (set to 0°)             | ST0                     | II (blue)     |
| Not used                                  | MV                      | IV (black)    |

● Versione LGK16-SQM40

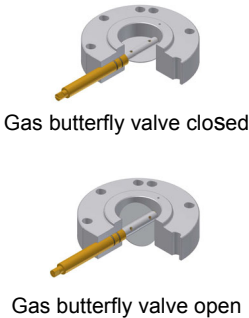
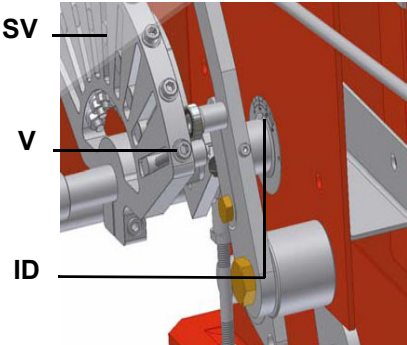
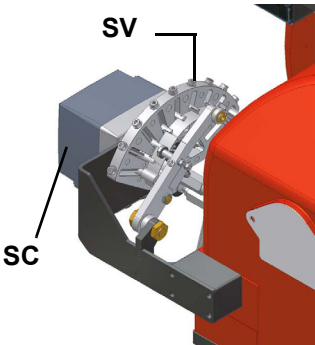
Siemens SQM40



Actuator cams (SQM40)

- I High flame
- II Stand-by
- III Low flame - gas
- IV Low flame - oil
- V Ignition - oil
- VI Ignition - gas

- move the low flame cam to the minimum to move the actuator towards the low flame until the two bearings find the adjusting screw that refers to the lower position: screw **V** to increase the rate, unscrew to decrease.



- Move again the low flame cam towards the minimum to meet the next screw on the adjusting cam and repeat the previous step; go on this way as to reach the desired low flame point.

- Now adjust the pressure switches.
- If it is necessary to change the burner output in the low flame stage, move the low flame cam: the low flame position matches the ignition position. As far as burners fitted with Dungs MBC gas valves, the low flame cam does not match the ignition cam position, that is why it must be set at about 30° more than the ignition cam.
- Turn the burner off and then start it up again. If the adjustment is not correct, repeat the previous steps.

### Fully-modulating burners

To adjust the fully-modulating burners, use the **CMF** switch on the burner control panel (see next picture), instead of the **TAB** thermostat as described on the previous paragraphs about the progressive burners. Go on adjusting the burner as described before, paying attention to use the CMF switch instead of **TAB**.

The **CMF** position sets the operating stages: to drive the burner to the high-flame stage, set CMF=1; to drive it to the low-flame stage, set CMF=2.

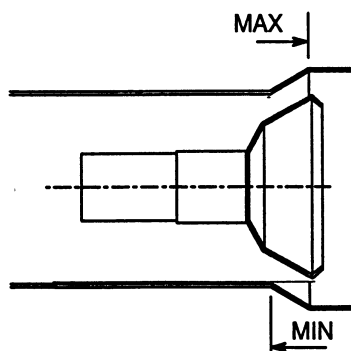
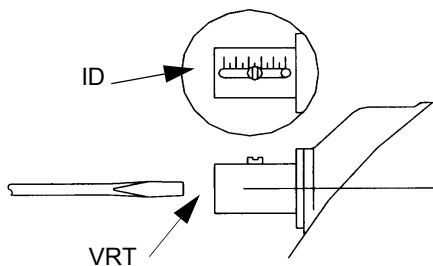


CMF

- CMF = 0 stop at the current position
- CMF = 1 high flame operation
- CMF = 2 low flame operation
- CMF = 3 automatic operation

### Adjusting the combustion head

The burner is factory-adjusted with the combustion head in the "MAX" position, accordingly to the maximum power. To operate the burner at a lower power, progressively shift back the combustion head, towards the "MIN" position, screwing the screw **VRT**. The ID index shows how much the combustion head moved.



**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 MBE

### Regulation VD-R whith PS

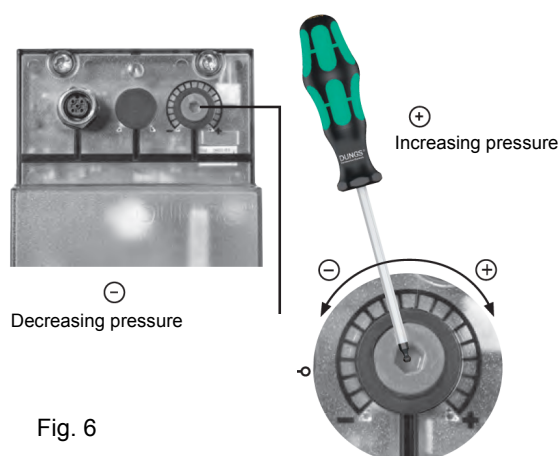


Fig. 6



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



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



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

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

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

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

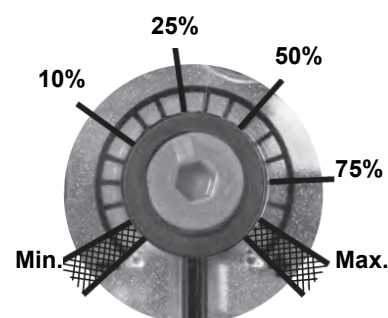


Fig. 7

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

### Pressure taps MultiBloc MBE

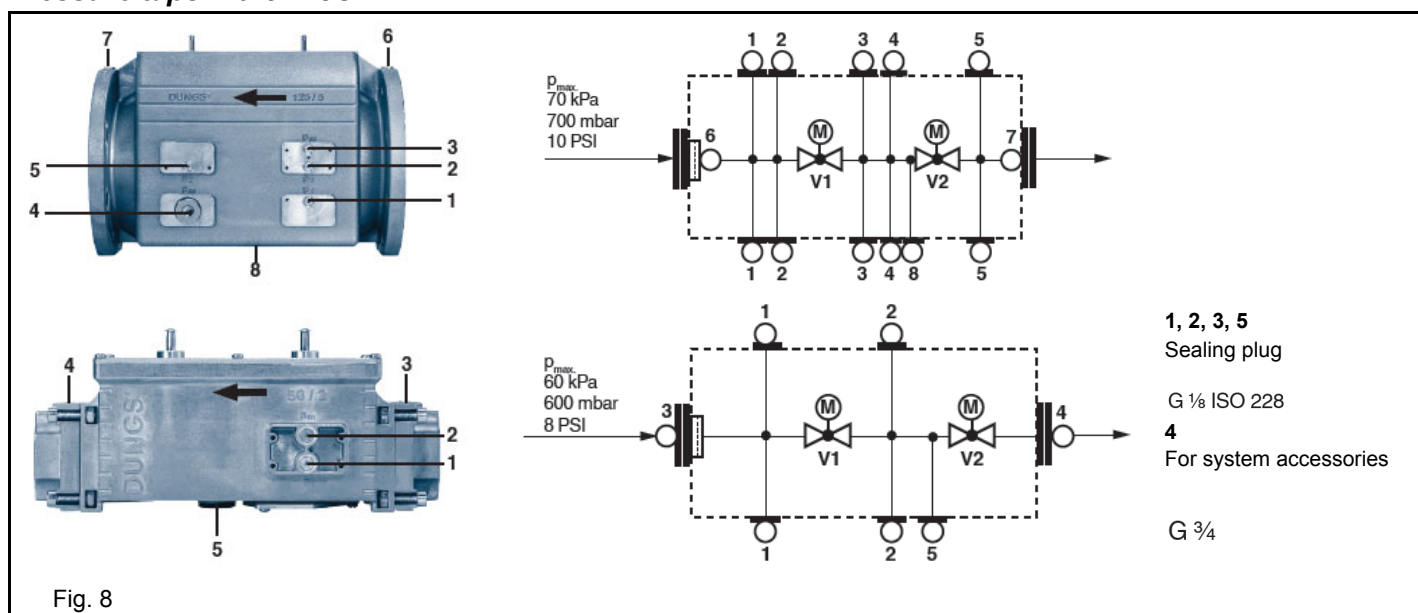


Fig. 8

## Adjusting the gas valves group

### Multibloc MB-DLE

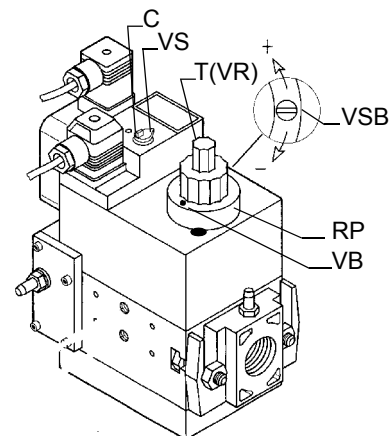
The multibloc unit is a compact unit consisting of two valves, gas pressure switch, pressure stabilizer and gas filter.

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

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

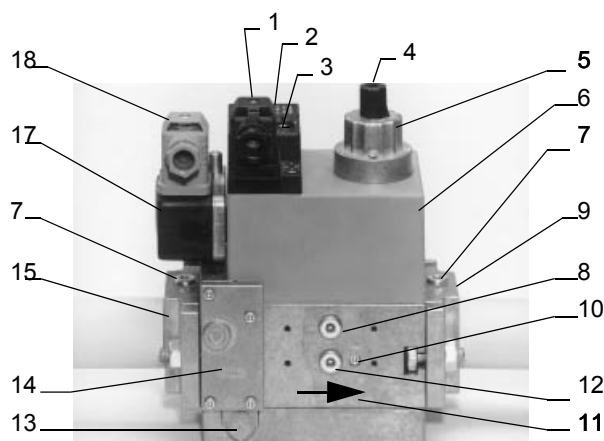
The pressure stabilizer is adjusted by operating the screw **VS** located under the cover **C**. By screwing down the pressure is increased and by unscrewing it is reduced.

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



#### Key

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



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

### Calibration of air pressure switch

To calibrate the air pressure switch, proceed as follows:

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

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

## 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 necessary;
- Remove and clean the combustion head;
- Examine and clean the ignition electrodes, adjust and replace them if necessary;
- Examine and clean the detection electrode/photoelement (according to the burner models), replace it if necessary, in case of doubt, check the detection circuit, after the burner start-up;
- Clean and grease leverages and rotating parts.
- At least every 2 months, or more often if needed, clean the room where the burner is installed.
- Avoid leaving installations, papers, nylon bags, etc., inside the room. They could be sucked by the burner and cause malfunctioning.
- Check that the room's vents are free from obstructions.



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

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 beginning of this manual.

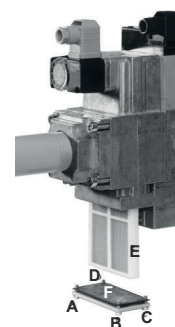
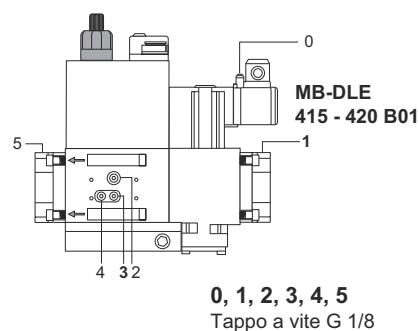
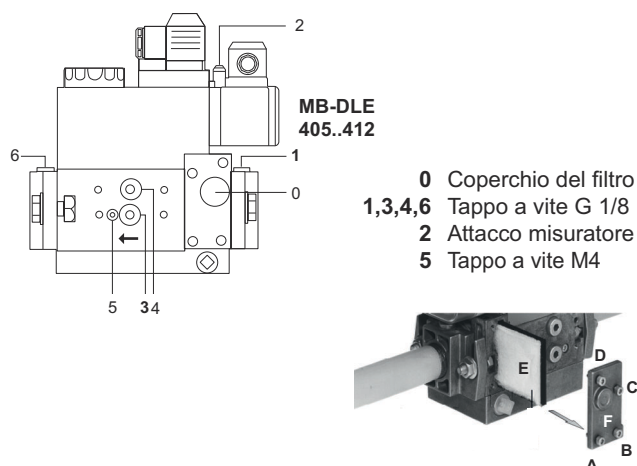


**WARNING:** All operations on the burner must be carried out with the mains disconnected and the fuel manual cutoff valves closed!



**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

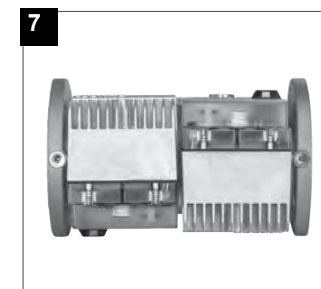
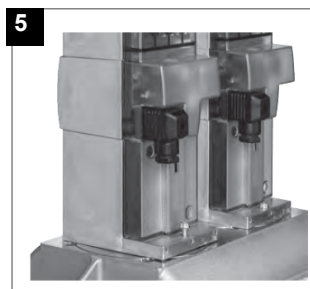
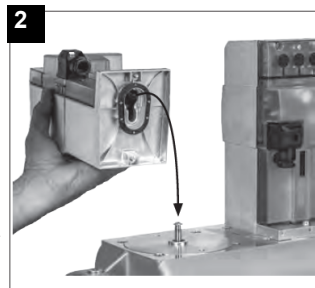
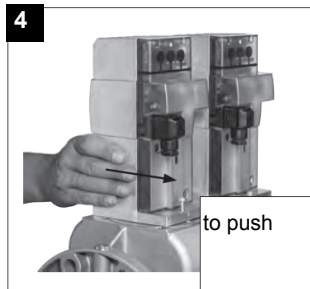
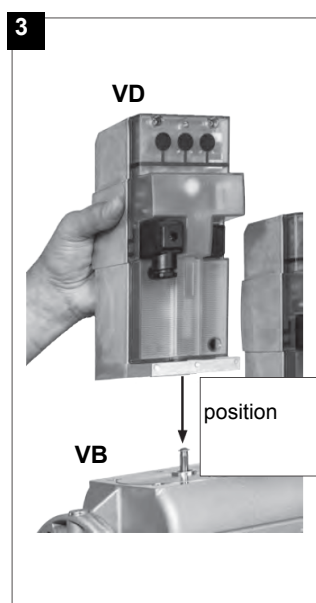
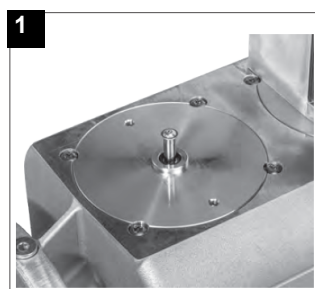


- Check the filter at least once a year!
- Change the filter if the pressure difference between pressure connection 1 and 3 (Fig. 1-Fig. 3) is  $\Delta p > 10$  mbar.
- Change the filter if the pressure difference between pressure connection 1 and 3 (Fig. 1-Fig. 3) is twice as high compared to the last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

You can change the filter without removing the fitting.

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

## MultiBloc VD Mounting

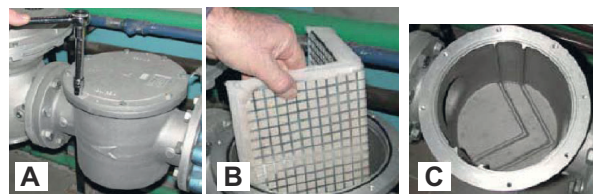


1. Position VD on VB, fig. 2+3.
2. Slide VD forward up to the stop, fig. 4.
3. Screw VD on with 2 M5 screws for each, max. 5 Nm/44 in.-lb., fig. 5/6.
4. VD can be mounted rotated by 180°, fig. 7.

## 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).

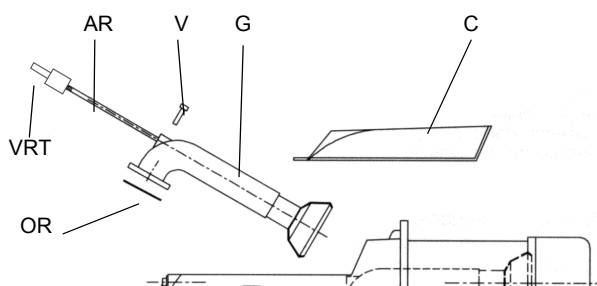


**WARNING:** Before opening the filter, close the manual cutoff valve downstream the filter and bleed the gas; check that inside the filter there is no pressurised gas.

## 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.

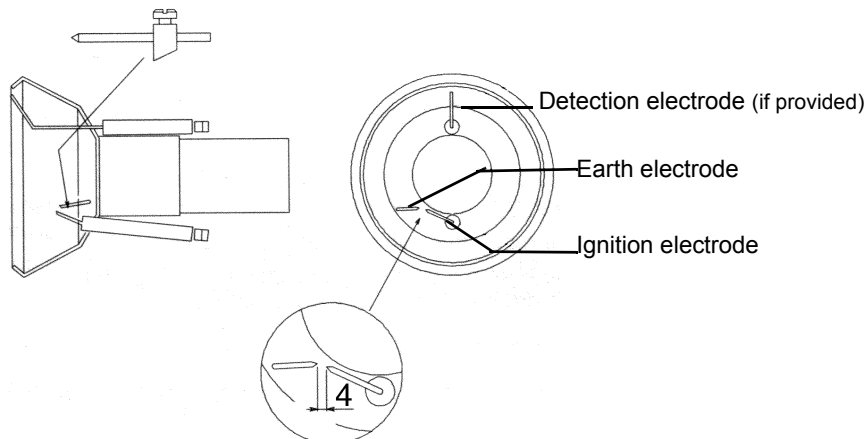
Note: for the subsequent assembly carry out the above described operations in the reverse order, checking the correct position of the OR ring.



## Adjusting the electrodes

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

E165A



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

## Replacing the electrodes



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

To replace the electrodes:

- Remove the cover
- Disconnect the electrode cables
- Loose the screws
- Remove and replace the electrodes, observing the electrodes position (see previous paragraph).



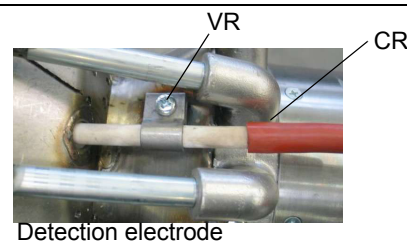
### Replacing the detection electrode (if provided)



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

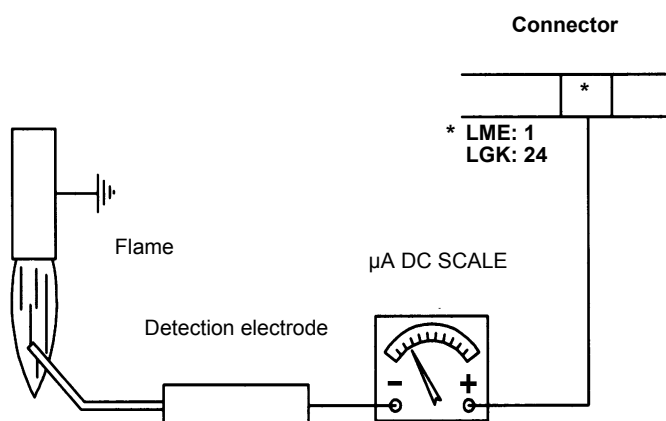
To replace the ignition electrodes, proceed as follows:

- 1 remove the burner cover
- 2 disconnect the electrodes cables (**CR**);
- 3 loose the screw of the electrodes support (**VR**);
- 4 remove the electrodes and replace them paying attention to the measures shown in figure.



### Checking the detection current with electrode (natural gas) (versione LME / LGK)

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.

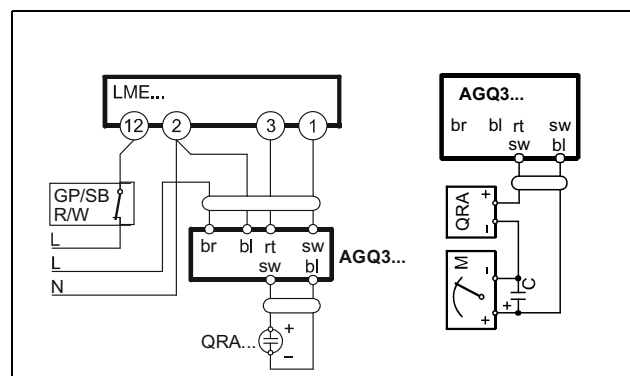


| Control box      | Minimum detection signal |
|------------------|--------------------------|
| Siemens LME21-22 | 3 $\mu$ A                |
| LGK              | 12 $\mu$ A               |

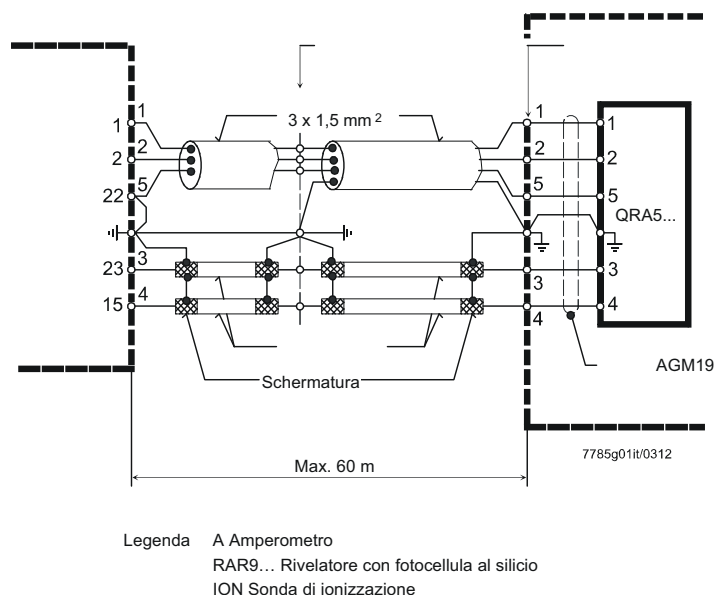
### Checking the detection current with photocell (LME) (L.P.G.)

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 LME21-22 | 200 $\mu$ A              |
| LGK16            | 12 $\mu$ A               |



## Checking the detection current with photocell (LME) (L.P.G.)



### 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

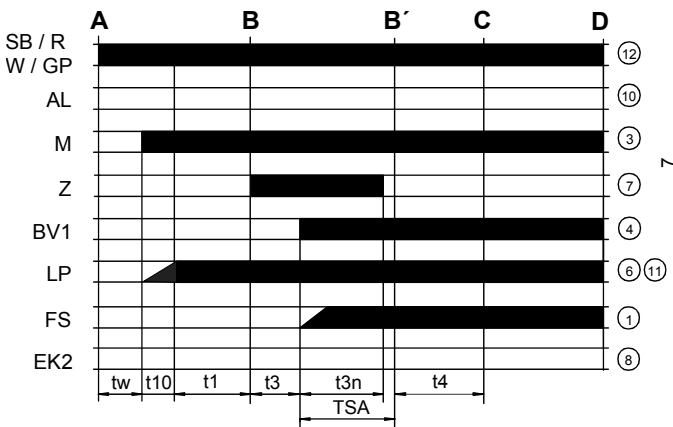
- 1 - Electrical supply 230V / 400V 50Hz 3N a.c.
- 2 - Do not reverse phase with neutral
- 3 - Ensure burner is properly earthed

## TROUBLESHOOTING GUIDE Gas operation

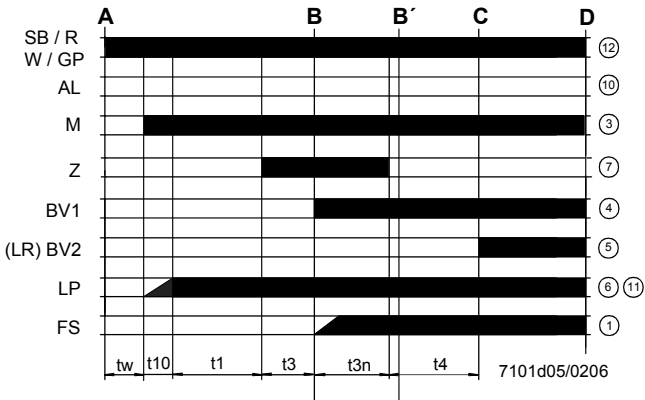
|                                                                                                       |                                                                                          |                                                                                                                                                        |
|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>BURNER DOESN'T LIGHT</b>                                                                           | * 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                                                                                                                               |
| <b>GAS LEAKAGE: BURNER LOCKS OUT (NO FLAME)</b>                                                       | * Gas flow is too low                                                                    | * Increase the gas flow<br>* Check gas filter cleanness<br>* 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                                                                                                                              |
| <b>BURNER LOCKS OUT WITH FLAME PRESENCE</b>                                                           | * Wrong setting of flame detector                                                        | * Adjust flame detector                                                                                                                                |
|                                                                                                       | * Flame detector damaged                                                                 | * Replace flame detector                                                                                                                               |
|                                                                                                       | * Bad cables of flame detector                                                           | * Check cables                                                                                                                                         |
|                                                                                                       | * Burner control damaged                                                                 | * Replace burner control                                                                                                                               |
|                                                                                                       | * Phase and neutral inverted                                                             | * Adjust connections                                                                                                                                   |
|                                                                                                       | * Ground missing or damaged                                                              | * Check ground continuity                                                                                                                              |
|                                                                                                       | * Voltage on neutral                                                                     | * Take off tension on neutral                                                                                                                          |
|                                                                                                       | * Too small flame (due to not much gas)                                                  | * Adjust gas flow<br>* Check gas filter cleanness                                                                                                      |
|                                                                                                       | * Too much combustion air                                                                | * Adjust air flow rate                                                                                                                                 |
| <b>only FOR LME22: BURNER CONTINUES TO PERFORM ALL ITS FEATURES WITHOUT IGNITING THE BURNER</b>       | * Air pressure switch damaged or bad links                                               | * Check air pressure switch functions and links                                                                                                        |
|                                                                                                       | * Burner control damaged                                                                 | * Replace burner control                                                                                                                               |
| <b>BURNER LOCKS OUT WITHOUT ANY GAS FLOW</b>                                                          | * Gas valves don't open                                                                  | * Check voltage on valves; if necessary replace valve or the burner control<br>* 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<br>* Check pressure switch functionality                                                                                           |
| <b>THE BURNER IS BLOCKED AND THE EQUIPMENT PROVIDES A LOCK CODE "CAUSE AIR PRESSURE SWITCH FAULT"</b> | * Air pressure switch damaged (it keeps the stand-by position or badly set)              | * Check air pressure switch functionality<br>* 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                                                                                                                           |
| <b>BURNER LOCKS OUT DURING NORMAL RUNNING</b>                                                         | * Flame detector circuit interrupted                                                     | * Check wiring<br>* Check photocell                                                                                                                    |
|                                                                                                       | * Burner control damaged                                                                 | * Replace burner control                                                                                                                               |
|                                                                                                       | * Maximum gas pressure switch damaged or badly set                                       | * Reset pressure switch or replace it                                                                                                                  |
| <b>THE BURNER STARTS AND AFTER A WHILE IT REPEATS THE STARTING CYCLE.</b>                             | * 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                                                                                                                        |
| <b>BURNER STANDS WHILE RUNNING WITHOUT ANY SWITCHING OF THERMOSTATS</b>                               | * Thermal contacts of fan motor open                                                     | * Reset contacts and check values<br>* Check current absorption                                                                                        |
| <b>FAN MOTOR DOESN'T START</b>                                                                        | * 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                                                                                                           |
| <b>BURNER DOESN'T SWITCH TO HIGH FLAME</b>                                                            | * Hi-low flame thermostat badly set or damaged                                           | * Reset or replace thermostat                                                                                                                          |
|                                                                                                       | * Servomotor cam badly set                                                               | * Reset servomotor cam                                                                                                                                 |
| <b>mechanical only: SOMETIMES THE SERVOMOTOR RUNS IN THE WRONG WAY</b>                                | * Servomotor capacitor damaged                                                           | * Replace capacitor                                                                                                                                    |
| <b>mechanical only: SOMETIMES THE SERVOMOTOR RUNS IN THE WRONG WAY</b>                                | * Lights up and freezes                                                                  | * In such cases, insert an RC circuit (our code 2531003).                                                                                              |
| <b>PHASE-TO-PHASE SUPPLY OR PRESENCE OF VOLTAGE ON NEUTRAL*</b>                                       | * Servomotor capacitor damaged                                                           | * Replace capacitor                                                                                                                                    |

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

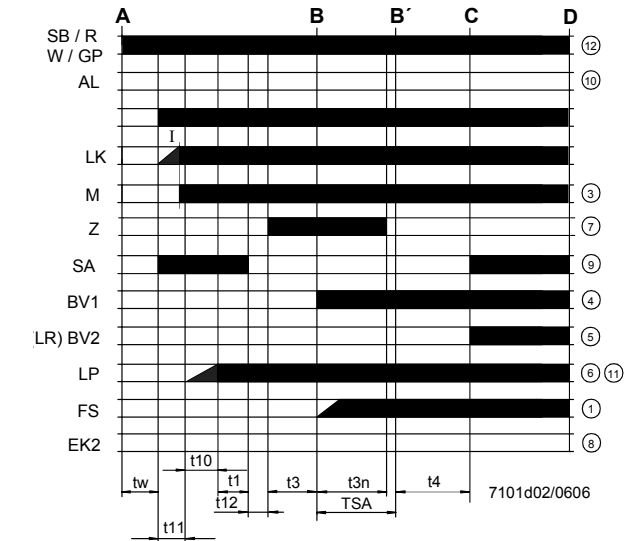
LME11 control sequence



LME21 control sequence



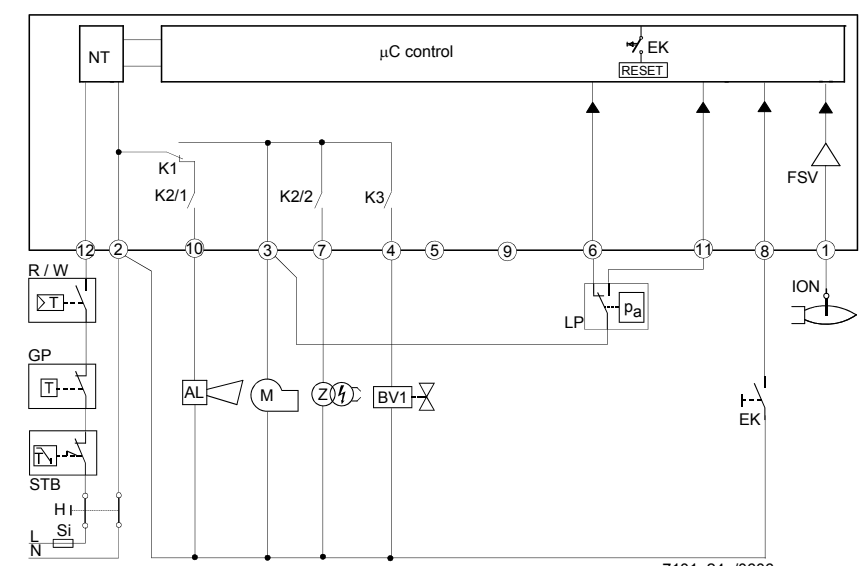
LME22 control sequence



Control sequence

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

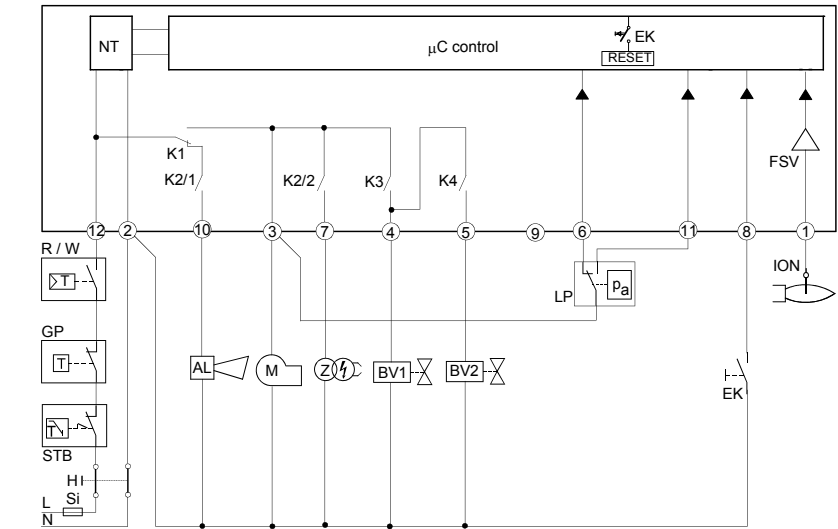
LME11 connection diagram



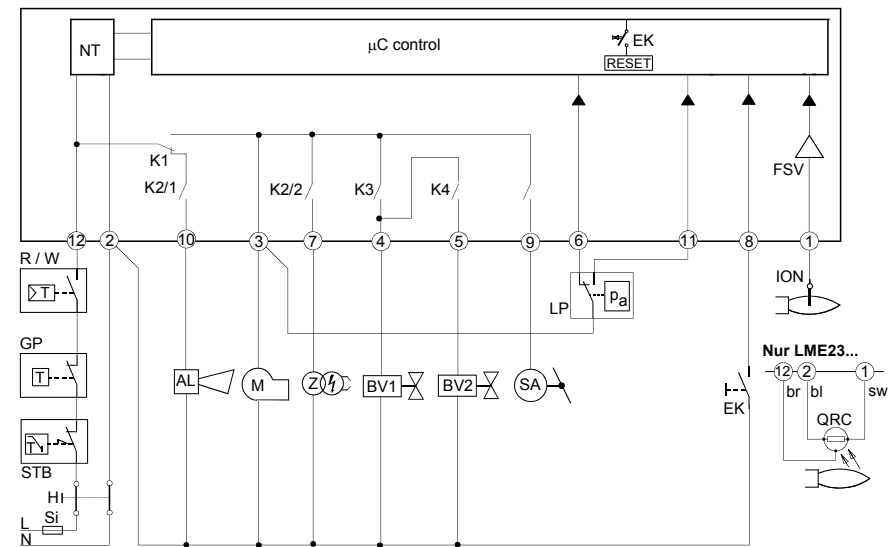
Connection diagram

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

LME21 connection diagram



LME22 connection diagram



## CONTROL PROGRAM IN THE EVENT OF FAULT

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

## CONTROL BOX LOCKED

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

## DIAGNOSTICS OF THE CAUSE OF FAULT

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

During diagnostics, the control outputs are deactivated:

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

| ERROR CODE TABLE                 |                                                                                                                                                                                                                                                                    |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 blinks **                      | <b>No establishment of flame at the end of TSA</b> <ul style="list-style-type: none"><li>- Faulty or soiled fuel valves</li><li>- Faulty or soiled flame detector</li><li>- Inadequate adjustment of burner, no fuel</li><li>- Faulty ignition equipment</li></ul> |
| 3 blinks ***                     | <b>The air pressure switch does not switch or remains in idle position:</b> <ul style="list-style-type: none"><li>- LP is faulty</li><li>- Loss of air pressure signal after t10</li><li>- LP is welded in normal position.</li></ul>                              |
| 4 blinks ****                    | - Extraneous light when burner starts up.                                                                                                                                                                                                                          |
| 5 blinks *****                   | - LP is working position.                                                                                                                                                                                                                                          |
| 6 blinks *****                   | Free.                                                                                                                                                                                                                                                              |
| 7 blinks *****                   | <b>Loss of flame during operation</b> <ul style="list-style-type: none"><li>- Faulty or soiled fuel valves</li><li>- Faulty or soiled flame detector</li><li>- Inadequate adjustment of burner</li></ul>                                                           |
| 8 ÷ 9 blinks                     | Free                                                                                                                                                                                                                                                               |
| 10 blinks *****                  | <b>Faulty output contacts</b><br><b>Attention: "lockout" remote signal (terminal no. 10) not enabled</b> <ul style="list-style-type: none"><li>- Wiring error</li><li>- Anomalous voltage on output terminals</li><li>- Other faults</li></ul>                     |
| 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%<br>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                              |

## SIEMENS LOK16.. / LGK16.. CONTROL BOX

Control boxes type LOK16... / LGK16... feature a self-checking flame supervision circuit. The supervision circuit initiates the required safety actions not only in the case of premature or missing flame signals, but also in the event of any kind of fault on the flame detector, the detector cables or the flame signal amplifier that could simulate a flame signal during burner operation.

The burner controls are therefore suited for use in all types of oil- or gas-fired combustion plant where self-checking flame supervision systems are either mandatory or recommended:

- Burners that operate continuously
- Burners in intermittent operation that, in the case of great heat demand, may operate continuously for more than 14 hours, e.g. in plant using boiler sequencing
- Burners that need to comply with the German TRD 411 and TRD 412 regulations for steam boilers
- Burners in plant where, for specific safety requirements, supervision of the burner by a self-checking flame supervision system seems advisable.

The control sequence and connection circuitry of the LOK16... / LGK16... burner controls are identical to those of the LAL2... and LFL1... respectively (with the exception of the LFL1.148), so that existing combustion plant can also be equipped with self-checking burner controls:

- provided very good flame detector current values are measured in the plant supervised so far by the LFL1..., and
- provided the following types of flame detectors are either installed or can subsequently be fitted:

- Flame supervision when using LOK16:

- Selenium photocell detector RAR...

- Flame supervision when using LGK16:

- Flame detector QRA53... / QRA55...
- Ionization probe
- Flame detector QRA53... / QRA55... together with ionization probe, e.g. in the case of burners using a pilot burner.

### WARNING NOTES

To avoid injury to persons, damage to property or the environment, the following warning notes should be observed!

- Do not open, interfere with or modify the unit!
- All activities (mounting, installation and service work, etc.) must be performed by qualified staff
- Before performing any wiring changes in the connection area of the LOK16... / LGK16..., completely isolate the burner control from the mains supply (all-polar disconnection)
- Ensure protection against electric shock hazard by providing adequate protection for the burner control's connection terminals
- Check to ensure that wiring is in an orderly state
- Press the lockout reset button only manually (applying a force of no more than 10 N) without using any tools or pointed objects
- Do not press the lockout reset button on the unit or the remote reset button (input 21) for more than 10 seconds, since this would damage the lockout relay inside the unit
- Fall or shock can adversely affect the safety functions. Such units must not be put into operation, even if they do not exhibit any damage

### Installation notes

- Always run the high-voltage ignition cables separately while observing the greatest possible distance to the unit and to other cables
- Neutral conductors must not be interchanged

### Commissioning notes

Prior to commissioning, check to ensure that wiring is in an orderly state.

When commissioning the plant or when doing maintenance work, make the following safety checks

| Safety check                                                                                                                       | Anticipated response                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Burner startup with flame detector darkened                                                                                        | Lockout at the end of «TSA»                                                                                                                                 |
| Burner startup with simulated flame                                                                                                | Lockout after no more than 40 seconds                                                                                                                       |
| Burner operation with simulated loss of flame; for that purpose, darken the flame detector in operation and leave it in that state | - LOK16... with wire link cut: Start repetition followed by lockout at the end of «TSA»<br>- LGK16... and LOK16... with wire link closed: Immediate lockout |
| Burner startup with response of air pressure switch                                                                                | Prevention of startup / lockout during «t1»                                                                                                                 |
| Burner operation with simulated air pressure failure                                                                               | Immediate lockout                                                                                                                                           |

### Principle of self-supervision

In contrast to conventional amplifiers, the signal delivered by the flame detector is handled dynamically and not statically. The flame detector signal is converted to a sequence of control pulses and then fed to the flame relay circuit. The latter is designed such that the flame relay can only be energized by a flame signal of the described form. If the pulses change due to a faulty detector or faulty detector cables, the relay will be deenergized and the burner control triggers the required safety actions. In the case of UV supervision, it must also be ensured that self-ignition of the UV tube (e.g. due to aging) does not simulate a flame signal. For that reason, incident radiation at the UV cell is periodically interrupted by a shutter. In addition to the self-checking facility, the flame signal circuit is subjected to a functional test during the prepurge time. If it does not operate correctly, the startup sequence will be aborted or lockout initiated. Furthermore, if mains voltage drops to a level where safe operation of the

burner control is no longer ensured, the burner will automatically shut down. When mains voltage returns to the normal level, the burner control repeats the startup sequence. If the detector signals are only slightly above the minimum levels, such mains voltage fluctuations can also give rise to burner lockout however.

### Prerequisites for burner startup:

- The burner control is reset and in the start position (terminals 11 and 12 must receive power)
- The air damper is closed. End switch «z» for the fully closed position must feed power from terminal 11 to terminal 8
- All control contacts between terminals 12 and 5 (limit thermostat, control thermostat, etc.) must be closed

**A Start:** When «R» closes, the control box sequence switch starts running. At the same time, the fan motor connected to terminal 6 (only prepurging) receives power and, on completion of «t7», the fan motor or flue gas fan at terminal 7 (pre- and postpurging) also receives power. On completion of «t16», the control command to open the air damper is given via terminal 9. During the running time of the motor, the sequence switch does not operate, as terminal 8, via which the motor of the sequence switch first receives power, is not live during that period of time. The sequence switch starts again and programs only after the air damper is fully open and end switch «a» has changed over to feed power to terminal 8.

**t1 Prepurge time** with air damper fully open (nominal amount of combustion air) Shortly after the start of the prepurge time, air pressure switch «LP» must change over, thus interrupting the current path between terminals 4 and 13. Otherwise, the burner control would go to lockout (start of air pressure check). At the same time, terminal 14 must be live since this current path is used to power the ignition transformer and the fuel valves.

**t3' With the LOK16...**, an ignition transformer connected to terminal 15 is therefore switched on at this point in time (long preignition). If there is no «LP», the ignition transformer receives power already with the start command. On completion of the prepurge time, the burner control via terminal 10 drives the air damper into the low-fire position, which is determined by the changeover point of auxiliary switch «m». During the positioning time, the sequence switch stops again until terminal 8 receives power from «m».

**t5 Interval** On completion of «t5», terminal 20 receives power. At the same time, control outputs 9 to 11 and input 8 are galvanically separated from the unit's control section, so that the latter is protected against reverse voltages from the load control circuit. The startup sequence of the burner control ends with the release of load controller «LR» at terminal 20. The sequence switch switches itself automatically off, depending on the time variant used, either immediately or after some so-called «idle steps», that is, without changing the contact positions.

**t3 Short preignition time;** followed by fuel release via terminal 18.

**TSA Safety time (part load)** On completion of the safety time latest, a flame signal must be present at the input of the flame signal amplifier, or else the burner control will initiate lockout.

**Only with LOK16...: t3n Postignition time** (provided the ignition transformer is connected to terminal 15).

**t4 Interval** until the fuel valve is released via terminal 19.

(Burners using a pilot burner)

**t3 / t3' Short preignition time;** followed by release of fuel for the pilot burner via terminal 17.

**TSA / TSA' First safety time (ignition load)** On completion of the safety time latest, a flame signal must be present at the input of the flame signal amplifier, or else the burner control will initiate lockout.

**t4 / t4' Interval** until the fuel valve at terminal 19 is released (start load of the main burner).

Times «TSA», «t3'» and «t4'» are only programmed by burner controls type LGK16.335... and LGK16.635...

**t9 Second safety time:** On completion of the safety time, the main burner must have been ignited by the pilot burner, since the pilot gas valve is closed on completion of «t9».

### B Operating position of the burner

**B-C Burner operation** (generation of heat) During burner operation, the load controller drives the air damper to the nominal load or low-fire position, depending on heat demand. Here, the nominal load is released by auxiliary switch «v» in the air damper actuator.

**C Controlled shutdown by «R»** In the case of controlled shutdown, the fuel valves are immediately closed and, at the same time, the sequence switch starts again to program the postpurge time.

**t6 Postpurge time** (postpurging with fan «M2» connected to terminal 7). Shortly after the start of the postpurge time, voltage at terminal 10 is reinstated, so that the air damper is driven into the «MIN» position. The full closing of the air damper starts only shortly before the completion of the postpurge time initiated by the control signal on terminal 11, which also remains live during the following burner off period.

**t13 Permissible afterburn time** During «t13», the flame signal input may still receive a flame signal -> No lockout

**D-A End of control sequence (= start position)** When, on completion of «t6», the sequence switch has reset the control contacts to their start positions, thereby switching itself off, the detector and flame simulation test is started again. However, during the burner off period, lockout can occur only if the faulty flame signal lasts a few seconds. Hence, short ignition pulses of the UV detector caused by cosmic radiation do not initiate lockout.

### Control sequence in the event of fault and indication of lockout

In case of any disturbance, the supply of fuel will immediately be interrupted. At the same time, the sequence switch stops and thus the lockout indicator also. The symbol appearing above the reading mark indicates the kind of fault:

◀ No start, because one of the contacts is not closed (also refer to «Prerequisites for burner startup») or lockout during or after completion of the control sequence due to extraneous light (e.g. flame not extinguished, leaking fuel valves, faulty flame supervision circuit, or similar).

▲ Abortion of startup sequence, because end switch «a» has not fed the OPEN signal to terminal 8. Terminals 6, 7 and 14 and, in case LOK16... is used, terminal 15, also remain live until the fault is corrected.

P Lockout, because the air pressure signal has not been received at the start of the air pressure check.

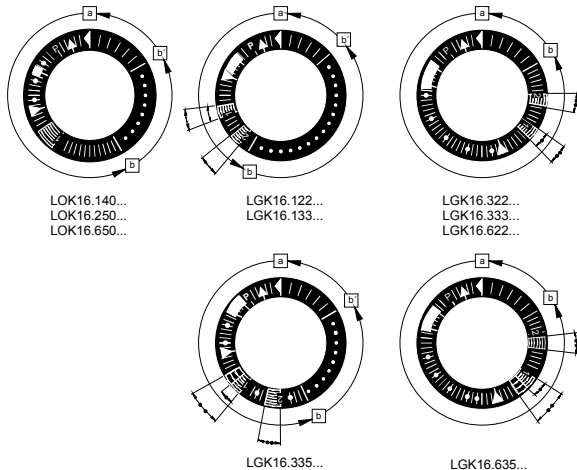
■ Lockout due to a fault in the flame supervision circuit.

▼ Abortion of startup sequence, because auxiliary switch «m» has not delivered the positioning signal for the low-fire position to terminal 8. Terminals 6, 7 and 14 and, in case LOK16... is used, terminal 15, also remain live until the fault is corrected.

- 1 Lockout, because no flame signal has been received on completion of the (first) safety time.
  - 2 Only with LGK16...: Lockout, because no flame signal has been received on completion of the second safety time (flame signal of the main flame with interrupted pilot burners).
- █ Lockout, because the flame signal has been lost during burner operation or air pressure failure has occurred.

#### Only with LOK16...:

If wire link «B» was cut off and the flame is lost during burner operation, the burner control programs a repetition of the startup sequence with the full program.



a-b Startup sequence

b-b' With certain time variants: «Idle steps» of the sequence switch up to the self-shutdown after burner startup (b' = operating position of the sequence switch)

b(b')-a Postpurge sequence after controlled shutdown. In start position «a», the sequence switch switches itself automatically off or immediately initiates another burner startup (e.g. after a fault has been corrected)

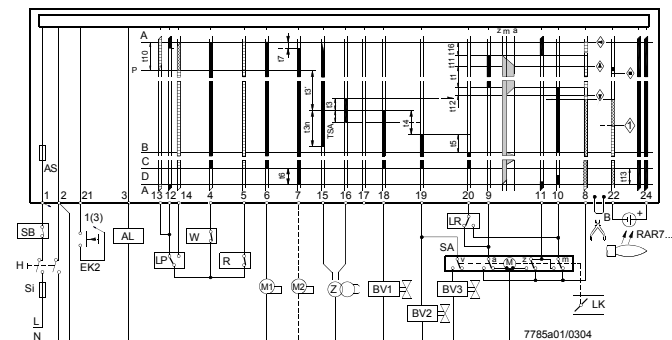
- Duration of safety time with expanding flame burners
- • Duration of safety times with interrupted pilot burners

When lockout has occurred, the burner control can immediately be reset. After resetting, and also after correction of a fault, which resulted in shutdown, or after a mains failure, the sequence switch always runs to its start position, whereby only terminals 7, 9, 10 and 11 receive power in accordance with the control sequence. It is only then that the burner control programs a burner restart.

**Note:** Do not press the lockout reset button for more than 10 seconds.

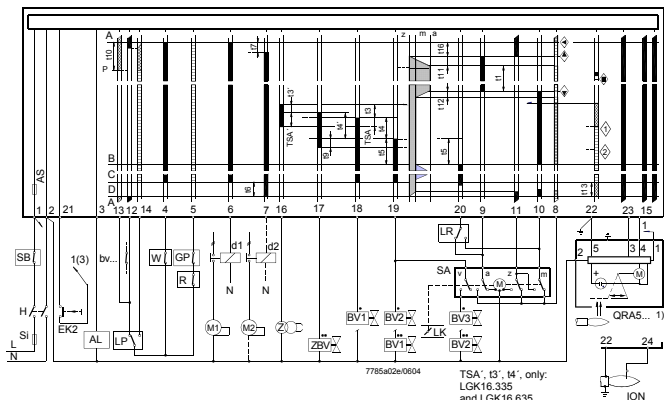
#### Connection diagrams

LOK16



Do not press lockout reset button «EK...» for more than 10 seconds!

LGK16



Do not press lockout reset button «EK...» for more than 10 seconds!

1) When used in connection with QRA53../QRA55..., earthing of terminal 22 is mandatory!

#### Keys

a Changeover end switch for air damper's fully open position

AL Remote lockout warning device (alarm)

AL Remote lockout warning device (alarm)

AS Unit fuse

B Wire link (on the burner control's base)

BR Lockout relay with «br» contacts

BV... Fuel valve

bv... Auxiliary contact in the valve actuator for the fully closed

d... Contactor or relay

EK... Lockout reset button

ION Ionization probe

FR Flame relay with «fr» contacts

FS Flame signal

GP Gas pressure switch

H Mains isolator

L... Lockout warning lamp

LK Air damper

LP Air pressure switch

LR Load controller

• Valid for expanding flame burners

• • Valid for burners with a pilot burner which is shut down after the main burner has ignited

m Auxiliary changeover switch for the air damper's MIN position AL Remote lockout warning device (alarm)

M... Fan or burner motor

NTC Resistor with negative temperature coefficient

QRA... UV detector

R Control thermostat or pressurestat

RAR... Selenium photocell detector

SA Air damper actuator

SB Safety limit thermostat

Si External fuse

SM Synchronous motor of sequence switch

v In the air damper actuator: Auxiliary changeover switch for release of fuel as a function of the air damper position

V Flame signal amplifier

W Limit thermostat or pressure switch

z In the air damper actuator: End switch for the air damper's fully closed position

Z Ignition transformer

ZBV Pilot valve

A Startup

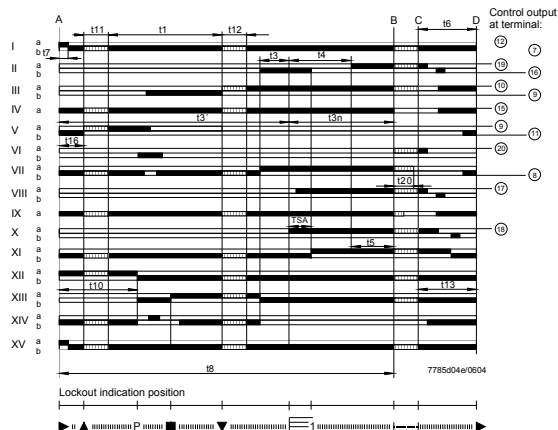
B Operating position

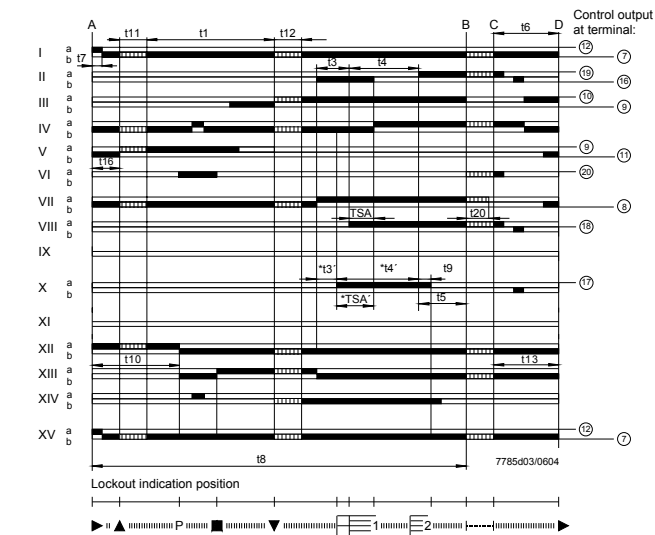
C Controlled shutdown

D End of control sequence

#### Program sequence

LOK16

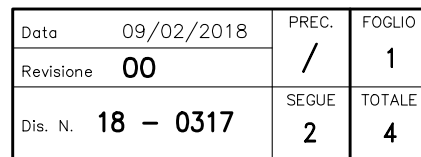




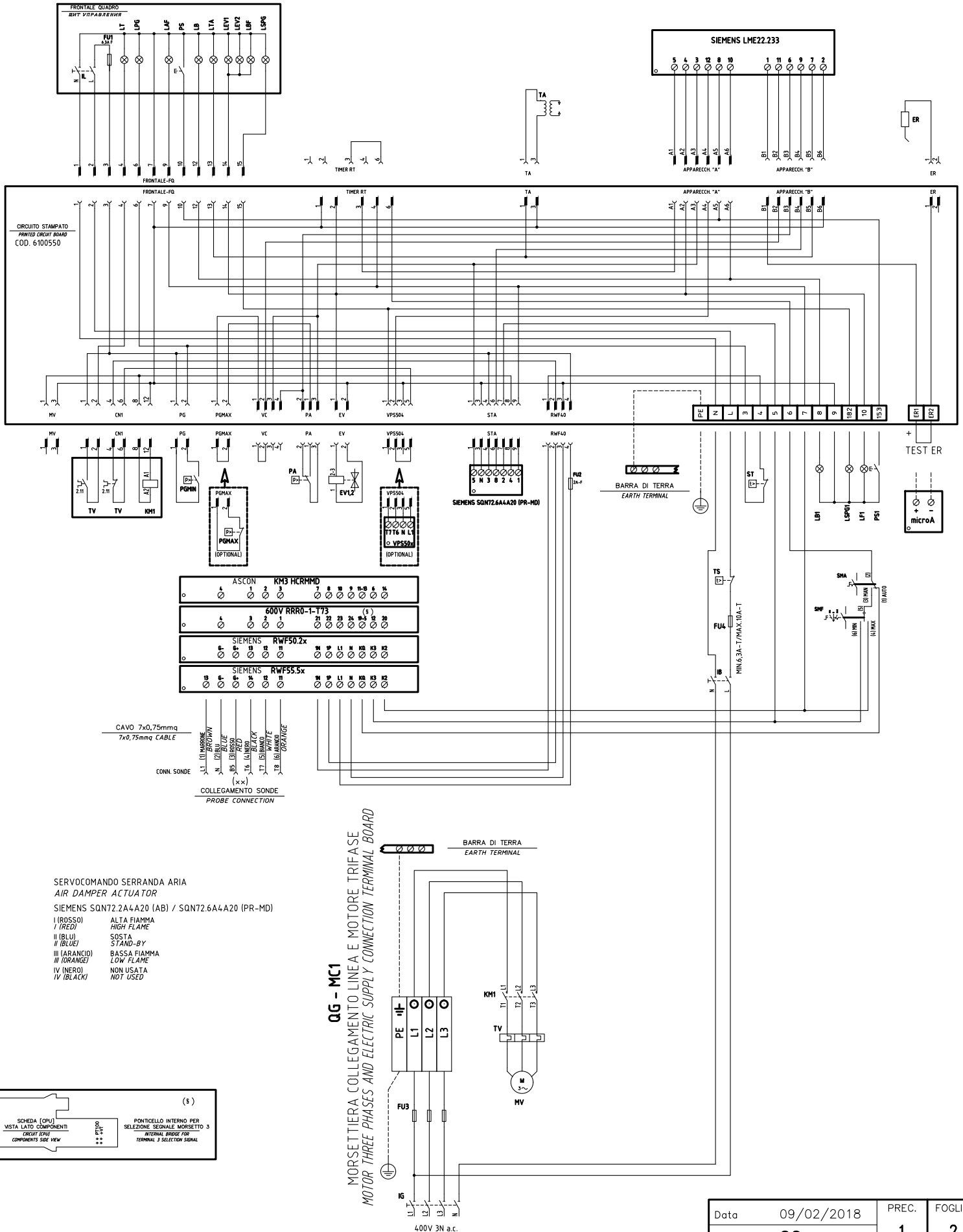
\* Times TSA', t3' and t4' are only programmed by burner controls LGK16.335... and LGK16.635...

### Technical data

|                                         |                                                                                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------------------|
| Mains voltage                           | AC 220 V -15 %...AC 240 V +10 %<br>AC 100 V -15 %...AC 110 V +10 %                              |
| Mains frequency                         | 50...60 Hz ±6 %                                                                                 |
| Unit fuse                               | T6,3H250V to DIN EN 60 127                                                                      |
| Primary fuse (external)                 | max. 16 A (slow)                                                                                |
| Power consumption                       | approx. 3.5 VA                                                                                  |
| Perm. input current at terminal 1       | max. 5 A to VDE 0660 AC3                                                                        |
| Perm. Current load of control terminals | max. 4 A to VDE 0660 AC3                                                                        |
| Degree of protection                    | IP40 (to be ensured through mounting) with the exception of the connection area (terminal base) |
| Storage Temperature range               | -20... +60 °C, < 95 % r.h.                                                                      |
| Operation Temperature range             | -20... +60 °C, < 95 % r.h.                                                                      |
| Weight                                  | approx. 1000 g                                                                                  |



VERSIONE MODULANTE "MD"  
"MD" MODULATING VERSION



|           |            |       |        |
|-----------|------------|-------|--------|
| Data      | 09/02/2018 | PREC. | FOGLIO |
| Revisione | 00         | 1     | 2      |
| Dis. N.   | 18 - 0317  | SEGUE | TOTALE |
|           |            | 3     | 4      |

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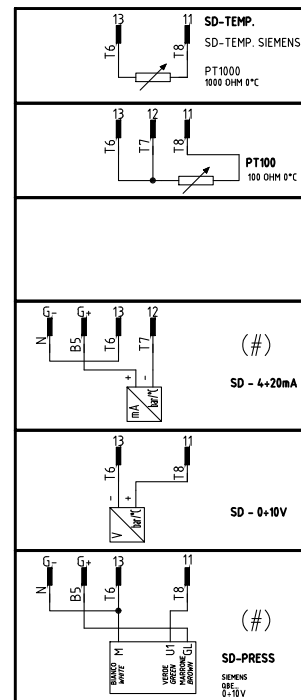
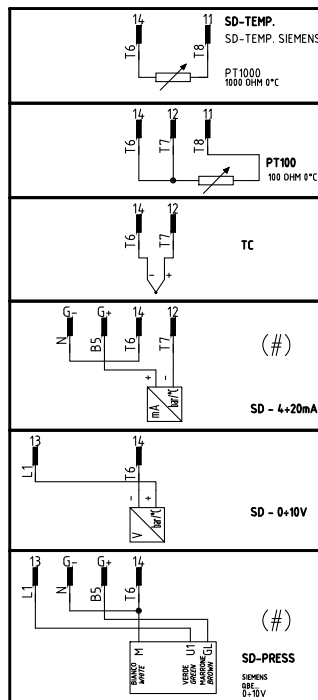
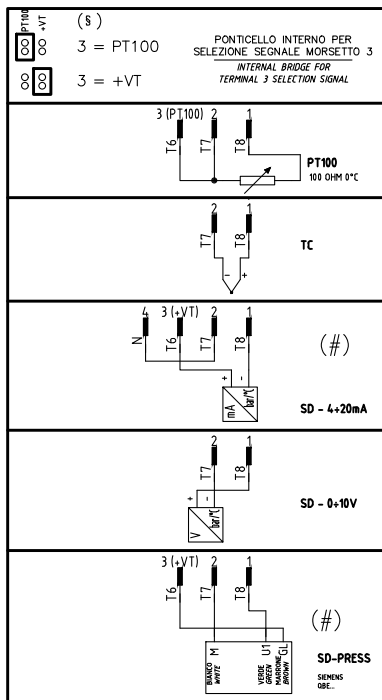
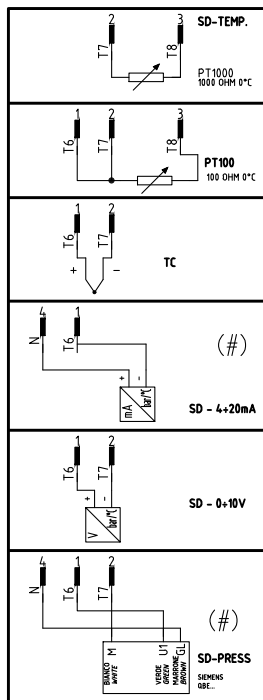
ATTENZIONE COLLEGAMENTO SONDE CON CONNETTORE 7 POLI  
WARNING PROBE CONNECTION WITH 7 PINS CONNECTOR

### KM3 HCRMMD

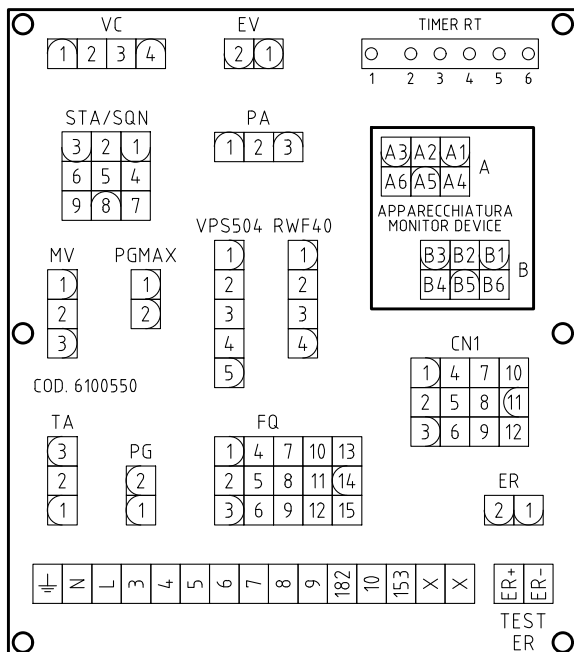
### 600V RRR0-1-T73

### RWF55.5x

### RWF50.2x



(#)  
COLLEGAMENTO SOLO PER  
TRASDUTTORI PASSIVI  
TRANSDUCER PASSIVE  
CONNECTION ONLY



|           |            |       |        |
|-----------|------------|-------|--------|
| Data      | 09/02/2018 | PREC. | FOGLIO |
| Revisione | 00         | 2     | 3      |
| Dis. N.   | 18 - 0317  | SEQUE | TOTALE |
|           |            | 4     | 4      |

| 0                             | 1                                               | 2 | 3 | 4 | 5 | 6                                                  | 7 | 8 | 9 | 10 |
|-------------------------------|-------------------------------------------------|---|---|---|---|----------------------------------------------------|---|---|---|----|
| Sigla/Item                    | Funzione                                        |   |   |   |   | Function                                           |   |   |   |    |
| 600V RRR0-1-T73               | REGOLATORE MODULANTE (ALTERNATIVO)              |   |   |   |   | BURNER MODULATOR (ALTERNATIVE)                     |   |   |   |    |
| ER                            | ELETTRODO RILEVAZIONE FIAMMA                    |   |   |   |   | FLAME DETECTION ELECTRODE                          |   |   |   |    |
| EV1,2                         | ELETTROVALVOLE GAS (O GRUPPO VALVOLE)           |   |   |   |   | GAS ELECTRO-VALVES (OR VALVES GROUP)               |   |   |   |    |
| FU1                           | FUSIBILE DI LINEA                               |   |   |   |   | LINE FUSE                                          |   |   |   |    |
| FU2                           | FUSIBILE AUSILIARIO                             |   |   |   |   | AUXILIARY FUSE                                     |   |   |   |    |
| FU3                           | FUSIBILI LINEA MOTORE VENTILATORE               |   |   |   |   | FAN MOTOR LINE FUSES                               |   |   |   |    |
| FU4                           | FUSIBILE DI LINEA                               |   |   |   |   | LINE FUSE                                          |   |   |   |    |
| IB                            | INTERRUTTORE LINEA BRUCIATORE                   |   |   |   |   | BURNER LINE SWITCH                                 |   |   |   |    |
| IG                            | INTERRUTTORE GENERALE                           |   |   |   |   | MAINS SWITCH                                       |   |   |   |    |
| IL                            | INTERRUTTORE LINEA AUSILIARI                    |   |   |   |   | AUXILIARY LINE SWITCH                              |   |   |   |    |
| KM1                           | CONTATTORE MOTORE VENTILATORE                   |   |   |   |   | FAN MOTOR CONTACTOR                                |   |   |   |    |
| KM3 HCRMMD                    | REGOLATORE MODULANTE (ALTERNATIVO)              |   |   |   |   | BURNER MODULATOR (ALTERNATIVE)                     |   |   |   |    |
| LAF                           | LAMPADA SEGNALE ALTA FIAMMA BRUCIATORE          |   |   |   |   | BURNER IN HIGH FLAME INDICATOR LIGHT               |   |   |   |    |
| LB                            | LAMPADA SEGNALE BLOCCO BRUCIATORE               |   |   |   |   | INDICATOR LIGHT FOR BURNER LOCK-OUT                |   |   |   |    |
| LB1                           | LAMPADA SEGNALE BLOCCO BRUCIATORE               |   |   |   |   | INDICATOR LIGHT FOR BURNER LOCK-OUT                |   |   |   |    |
| LBF                           | LAMPADA SEGNALE BASSA FIAMMA BRUCIATORE         |   |   |   |   | BURNER IN LOW FLAME INDICATOR LIGHT                |   |   |   |    |
| LEV1                          | LAMPADA SEGNALE APERTURA [EV1]                  |   |   |   |   | INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EV1] |   |   |   |    |
| LEV2                          | LAMPADA SEGNALE APERTURA [EV2]                  |   |   |   |   | INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EV2] |   |   |   |    |
| LF1                           | LAMPADA SEGNALE FUNZIONAMENTO BRUCIATORE        |   |   |   |   | INDICATOR LIGHT BURNER OPERATION                   |   |   |   |    |
| LPG                           | LAMPADA SEGNALE PRESENZA GAS IN RETE            |   |   |   |   | INDICATOR LIGHT FOR PRESENCE OF GAS IN THE NETWORK |   |   |   |    |
| LSPG                          | LAMPADA SEGNALE BLOCCO CONTROLLO TENUTA VALVOLE |   |   |   |   | INDICATOR LIGHT FOR LEAKAGE OF VALVES              |   |   |   |    |
| LSPG1                         | LAMPADA SEGNALE BLOCCO CONTROLLO TENUTA VALVOLE |   |   |   |   | INDICATOR LIGHT FOR LEAKAGE OF VALVES              |   |   |   |    |
| LT                            | LAMPADA SEGNALE BLOCCO TERMICO                  |   |   |   |   | INDICATOR LIGHT FOR MOTOR OVERLOAD THERMAL CUTOUT  |   |   |   |    |
| LTA                           | LAMPADA SEGNALE TRASFORMATORE DI ACCENSIONE     |   |   |   |   | IGNITION TRANSFORMER INDICATOR LIGHT               |   |   |   |    |
| MV                            | MOTORE VENTILATORE                              |   |   |   |   | FAN MOTOR                                          |   |   |   |    |
| PA                            | PRESSOSTATO ARIA                                |   |   |   |   | AIR PRESSURE SWITCH                                |   |   |   |    |
| PGMAX                         | PRESSOSTATO GAS DI MASSIMA PRESSIONE            |   |   |   |   | MAXIMUM PRESSURE GAS SWITCH                        |   |   |   |    |
| PGMIN                         | PRESSOSTATO GAS DI MINIMA PRESSIONE             |   |   |   |   | MINIMUM GAS PRESSURE SWITCH                        |   |   |   |    |
| PS                            | PULSANTE SBLOCCO FIAMMA                         |   |   |   |   | FLAME UNLOCK BUTTON                                |   |   |   |    |
| PS1                           | PULSANTE SBLOCCO FIAMMA                         |   |   |   |   | FLAME UNLOCK BUTTON                                |   |   |   |    |
| PT100                         | SONDA DI TEMPERATURA                            |   |   |   |   | TEMPERATURE PROBE                                  |   |   |   |    |
| RWF50.2x                      | REGOLATORE MODULANTE                            |   |   |   |   | BURNER MODULATOR                                   |   |   |   |    |
| RWF55.5x                      | REGOLATORE MODULANTE (ALTERNATIVO)              |   |   |   |   | BURNER MODULATOR (ALTERNATIVE)                     |   |   |   |    |
| SD-PRESS                      | SONDA DI PRESSIONE                              |   |   |   |   | PRESSURE PROBE                                     |   |   |   |    |
| SD-TEMP.                      | SONDA DI TEMPERATURA                            |   |   |   |   | TEMPERATURE PROBE                                  |   |   |   |    |
| SD - 0÷10V                    | TRASDUTTORE USCITA IN TENSIONE                  |   |   |   |   | TRANSDUCER VOLTAGE OUTPUT                          |   |   |   |    |
| SD - 4÷20mA                   | TRASDUTTORE USCITA IN CORRENTE                  |   |   |   |   | TRANSDUCER CURRENT OUTPUT                          |   |   |   |    |
| SIEMENS LME22.233             | APPARECCHIATURA CONTROLLO FIAMMA                |   |   |   |   | CONTROL BOX                                        |   |   |   |    |
| SIEMENS LME22.233 / LME22.331 | APPARECCHIATURA CONTROLLO FIAMMA                |   |   |   |   | CONTROL BOX                                        |   |   |   |    |
| SIEMENS SQN72.2A4A20 (AB)     | SERVOCOMANDO SERRANDA ARIA                      |   |   |   |   | AIR DAMPER ACTUATOR                                |   |   |   |    |
| SIEMENS SQN72.6A4A20 (PR-MD)  | SERVOCOMANDO SERRANDA ARIA                      |   |   |   |   | AIR DAMPER ACTUATOR                                |   |   |   |    |
| SMA                           | SELETTORE MANUALE/AUTOMATICO                    |   |   |   |   | MANUAL/AUTOMATIC SWITCH                            |   |   |   |    |
| SMF                           | SELETTORE MANUALE FUNZIONAMENTO MIN-0-MAX       |   |   |   |   | MIN-0-MAX MANUAL OPERATION SWITCH                  |   |   |   |    |
| ST                            | SERIE TERMOSTATI/PRESSOSTATI                    |   |   |   |   | SERIES OF THERMOSTATS OR PRESSURE SWITCHES         |   |   |   |    |
| TA                            | TRASFORMATORE DI ACCENSIONE                     |   |   |   |   | IGNITION TRANSFORMER                               |   |   |   |    |
| TAB                           | TERMOSTATO/PRESSOSTATO ALTA-BASSA FIAMMA        |   |   |   |   | HIGH-LOW THERMOSTAT/PRESSURE SWITCHES              |   |   |   |    |
| TC                            | TERMOCOPPIA                                     |   |   |   |   | THERMOCOUPLE                                       |   |   |   |    |
| TS                            | TERMOSTATO/PRESSOSTATO DI SICUREZZA             |   |   |   |   | SAFETY THERMOSTAT OR PRESSURE SWITCH               |   |   |   |    |
| TV                            | TERMICO MOTORE VENTILATORE                      |   |   |   |   | FAN MOTOR THERMAL                                  |   |   |   |    |
| VPS50x                        | CONTROLLO DI TENUTA VALVOLE GAS (OPTIONAL)      |   |   |   |   | GAS PROVING SYSTEM (OPTIONAL)                      |   |   |   |    |
| microA                        | MICROAMPEROMETRO                                |   |   |   |   | MICROAMMETER                                       |   |   |   |    |

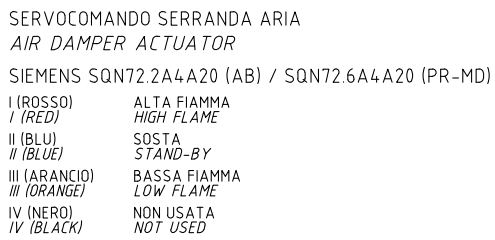
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|-----------|------------|-------|--------|
| Data      | 09/02/2018 | PREC. | FOGLIO |
| Revisione | 00         | 3     | 4      |
| Dis. N.   | 18 - 0317  | SEGUE | TOTALE |
|           |            | 1     | 4      |





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



|                                                                                     |                                                                                     |           |                  |           |            |            |            |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------|------------------|-----------|------------|------------|------------|
|  | Impianto                                                                            | Ordine    |                  | Data      | 09/02/2018 | PREC.      | FOGLIO     |
|                                                                                     | TIPI/TYPES CxxA/CxxX/ExxxA/ExxxX<br>MODELLO x-.AB.xx.xx.A.xx                        | Commessa  | Data Controllato | Revisione | 00         | /<br><br>2 | 1<br><br>4 |
|                                                                                     | Descrizione                                                                         |           | 09/02/2018       |           |            |            |            |
|                                                                                     | TIPI/TYPES CxxA/CxxX/ExxxA/ExxxX/CxxX-FGR/ExxxX-FGR<br>MODELLO x-.PR(MD).xx.xx.A.xx | Esecutore | Controllato      | Dis. N.   | 18 - 0317  |            |            |
|                                                                                     |                                                                                     | U. PINTON | M. MASCHIO       |           |            |            |            |



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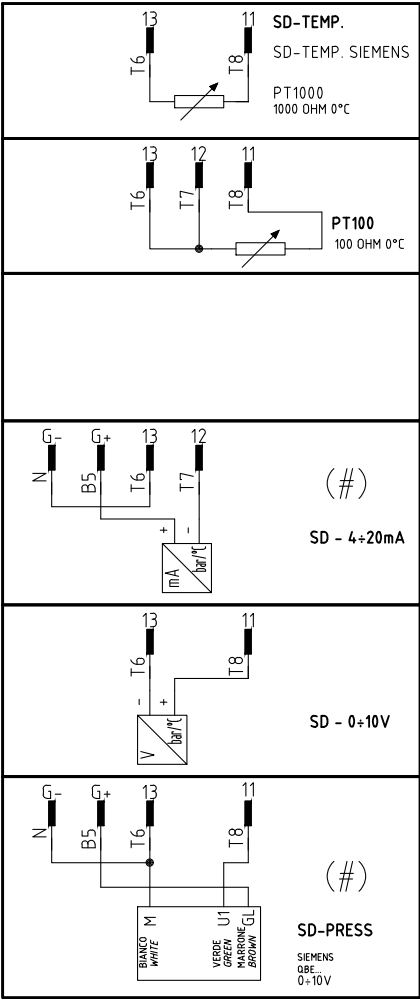
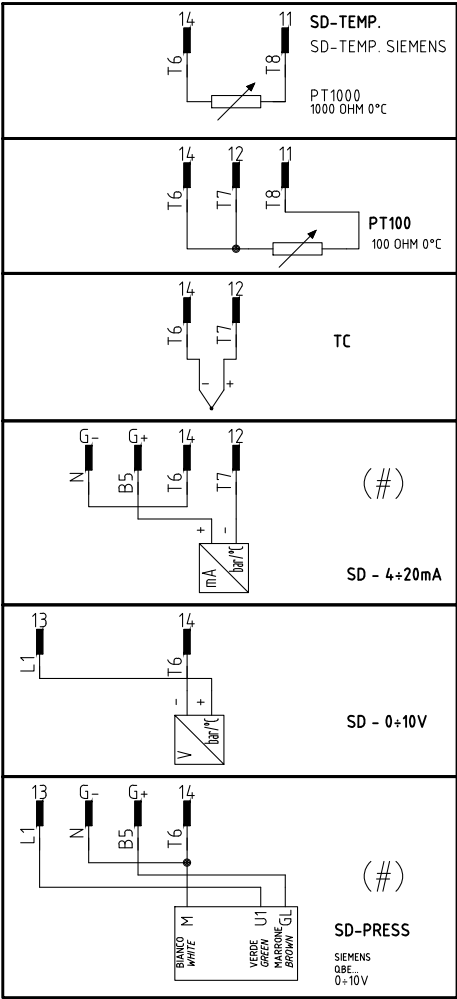
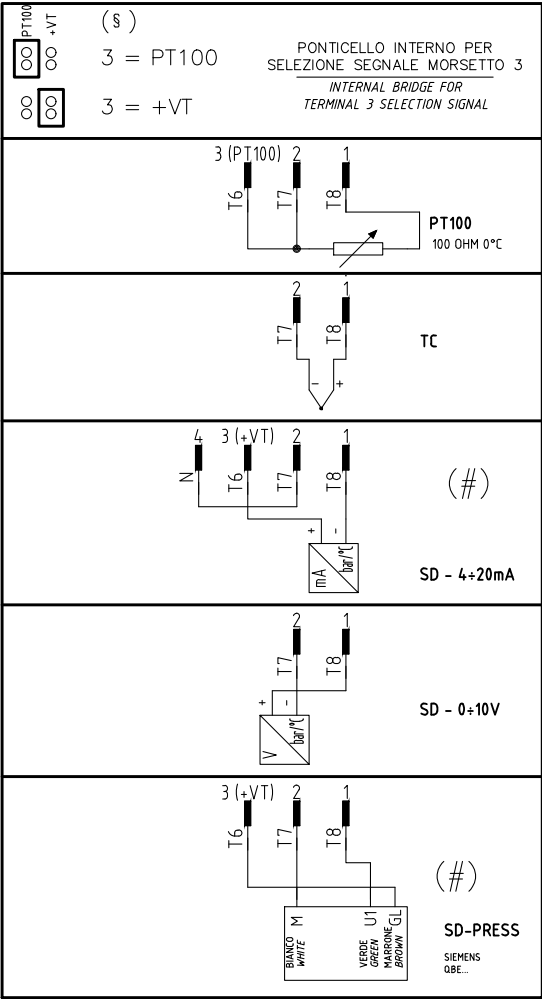
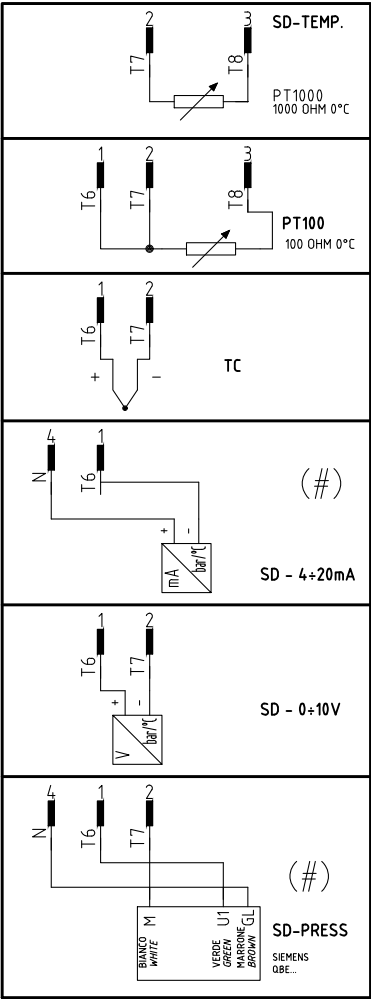
ATTENZIONE COLLEGAMENTO SONDE CON CONNETTORE 7 POLI  
WARNING PROBE CONNECTION WITH 7 PINS CONNECTOR

KM3 HCRMMD

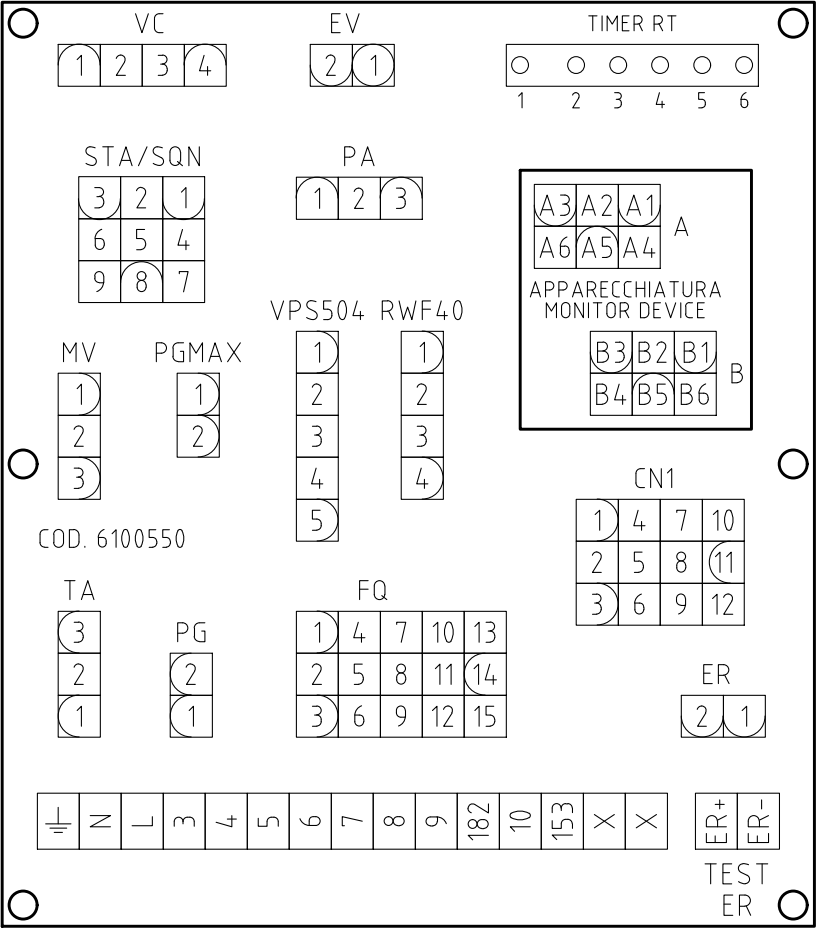
600V RRR0-1-T73

RWF55.5x

RWF50.2x



(#)  
COLLEGAMENTO SOLO PER  
TRASDUTTORI PASSIVI  
TRASDUCER PASSIVE  
CONNECTION ONLY



| Sigla/Item                    | Funzione                                             | Function                                           |
|-------------------------------|------------------------------------------------------|----------------------------------------------------|
| 600V RRR0–1–T73               | REGOLATORE MODULANTE (ALTERNATIVO)                   | BURNER MODULATOR (ALTERNATIVE)                     |
| ER                            | ELETTRODO RILEVAZIONE FIAMMA                         | FLAME DETECTION ELECTRODE                          |
| EV1,2                         | ELETTROVALVOLE GAS (O GRUPPO VALVOLE)                | GAS ELECTRO–VALVES (OR VALVES GROUP)               |
| FU1                           | FUSIBILE DI LINEA                                    | LINE FUSE                                          |
| FU2                           | FUSIBILE AUSILIARIO                                  | AUXILIARY FUSE                                     |
| FU3                           | FUSIBILI LINEA MOTORE VENTILATORE                    | FAN MOTOR LINE FUSES                               |
| FU4                           | FUSIBILE DI LINEA                                    | LINE FUSE                                          |
| IB                            | INTERRUTTORE LINEA BRUCIATORE                        | BURNER LINE SWITCH                                 |
| IG                            | INTERRUTTORE GENERALE                                | MAINS SWITCH                                       |
| IL                            | INTERRUTTORE LINEA AUSILIARI                         | AUXILIARY LINE SWITCH                              |
| KM1                           | CONTATTORE MOTORE VENTILATORE                        | FAN MOTOR CONTACTOR                                |
| KM3 HCRMMD                    | REGOLATORE MODULANTE (ALTERNATIVO)                   | BURNER MODULATOR (ALTERNATIVE)                     |
| LAF                           | LAMPADA SEGNALAZIONE ALTA FIAMMA BRUCIATORE          | BURNER IN HIGH FLAME INDICATOR LIGHT               |
| LB                            | LAMPADA SEGNALAZIONE BLOCCO BRUCIATORE               | INDICATOR LIGHT FOR BURNER LOCK–OUT                |
| LB1                           | LAMPADA SEGNALAZIONE BLOCCO BRUCIATORE               | INDICATOR LIGHT FOR BURNER LOCK–OUT                |
| LBF                           | LAMPADA SEGNALAZIONE BASSA FIAMMA BRUCIATORE         | BURNER IN LOW FLAME INDICATOR LIGHT                |
| LEV1                          | LAMPADA SEGNALAZIONE APERTURA [EV1]                  | INDICATOR LIGHT FOR OPENING OF ELECTRO–VALVE [EV1] |
| LEV2                          | LAMPADA SEGNALAZIONE APERTURA [EV2]                  | INDICATOR LIGHT FOR OPENING OF ELECTRO–VALVE [EV2] |
| LF1                           | LAMPADA SEGNALAZIONE FUNZIONAMENTO BRUCIATORE        | INDICATOR LIGHT BURNER OPERATION                   |
| LPG                           | LAMPADA SEGNALAZIONE PRESENZA GAS IN RETE            | INDICATOR LIGHT FOR PRESENCE OF GAS IN THE NETWORK |
| LSPG                          | LAMPADA SEGNALAZIONE BLOCCO CONTROLLO TENUTA VALVOLE | INDICATOR LIGHT FOR LEAKAGE OF VALVES              |
| LSPG1                         | LAMPADA SEGNALAZIONE BLOCCO CONTROLLO TENUTA VALVOLE | INDICATOR LIGHT FOR LEAKAGE OF VALVES              |
| LT                            | LAMPADA SEGNALAZIONE BLOCCO TERMICO                  | INDICATOR LIGHT FOR MOTOR OVERLOAD THERMAL CUTOUT  |
| LTA                           | LAMPADA SEGNALAZIONE TRASFORMATORE DI ACCENSIONE     | IGNITION TRANSFORMER INDICATOR LIGHT               |
| MV                            | MOTORE VENTILATORE                                   | FAN MOTOR                                          |
| PA                            | PRESSOSTATO ARIA                                     | AIR PRESSURE SWITCH                                |
| PGMAX                         | PRESSOSTATO GAS DI MASSIMA PRESSIONE                 | MAXIMUM PRESSURE GAS SWITCH                        |
| PGMIN                         | PRESSOSTATO GAS DI MINIMA PRESSIONE                  | MINIMUM GAS PRESSURE SWITCH                        |
| PS                            | PULSANTE SBLOCCO FIAMMA                              | FLAME UNLOCK BUTTON                                |
| PS1                           | PULSANTE SBLOCCO FIAMMA                              | FLAME UNLOCK BUTTON                                |
| PT100                         | SONDA DI TEMPERATURA                                 | TEMPERATURE PROBE                                  |
| RWF50.2x                      | REGOLATORE MODULANTE                                 | BURNER MODULATOR                                   |
| RWF55.5x                      | REGOLATORE MODULANTE (ALTERNATIVO)                   | BURNER MODULATOR (ALTERNATIVE)                     |
| SD–PRESS                      | SONDA DI PRESSIONE                                   | PRESSURE PROBE                                     |
| SD–TEMP.                      | SONDA DI TEMPERATURA                                 | TEMPERATURE PROBE                                  |
| SD – 0÷ 10V                   | TRASDUTTORE USCITA IN TENSIONE                       | TRANSDUCER VOLTAGE OUTPUT                          |
| SD – 4÷ 20mA                  | TRASDUTTORE USCITA IN CORRENTE                       | TRANSDUCER CURRENT OUTPUT                          |
| SIEMENS LME22.233             | APPARECCHIATURA CONTROLLO FIAMMA                     | CONTROL BOX                                        |
| SIEMENS LME22.233 / LME22.331 | APPARECCHIATURA CONTROLLO FIAMMA                     | CONTROL BOX                                        |
| SIEMENS SQN72.2A4A20 (AB)     | SERVOCOMANDO SERRANDA ARIA                           | AIR DAMPER ACTUATOR                                |
| SIEMENS SQN72.6A4A20 (PR–MD)  | SERVOCOMANDO SERRANDA ARIA                           | AIR DAMPER ACTUATOR                                |
| SMA                           | SELETTORE MANUALE/AUTOMATICO                         | MANUAL/AUTOMATIC SWITCH                            |
| SMF                           | SELETTORE MANUALE FUNZIONAMENTO MIN–0–MAX            | MIN–0–MAX MANUAL OPERATION SWITCH                  |
| ST                            | SERIE TERMOSTATI/PRESSOSTATI                         | SERIES OF THERMOSTATS OR PRESSURE SWITCHES         |
| TA                            | TRASFORMATORE DI ACCENSIONE                          | IGNITION TRANSFORMER                               |
| TAB                           | TERMOSTATO/PRESSOSTATO ALTA–BASSA FIAMMA             | HIGH–LOW THERMOSTAT/PRESSURE SWITCHES              |
| TC                            | TERMOCOPPIA                                          | THERMOCOUPLE                                       |
| TS                            | TERMOSTATO/PRESSOSTATO DI SICUREZZA                  | SAFETY THERMOSTAT OR PRESSURE SWITCH               |
| TV                            | TERMICO MOTORE VENTILATORE                           | FAN MOTOR THERMAL                                  |
| VPS50x                        | CONTROLLO DI TENUTA VALVOLE GAS (OPTIONAL)           | GAS PROVING SYSTEM (OPTIONAL)                      |
| microA                        | MICROAMPEROMETRO                                     | MICROAMMETER                                       |