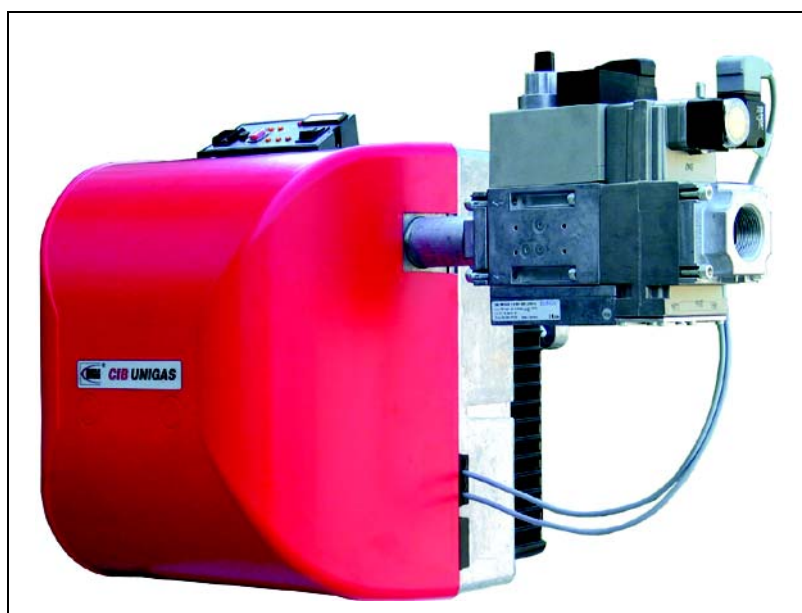


LG/NG/NGX280 LG/NG/NGX350 LG/NG/NGX400



IDEA Series Gas burners

MANUAL OF INSTALLATION - USE - MAINTENANCE

CIB UNIGAS

BURNERS - BRUCIATORI - BRULERS - BRENNER - QUEMADORES - ГОРЕЛКИ

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.

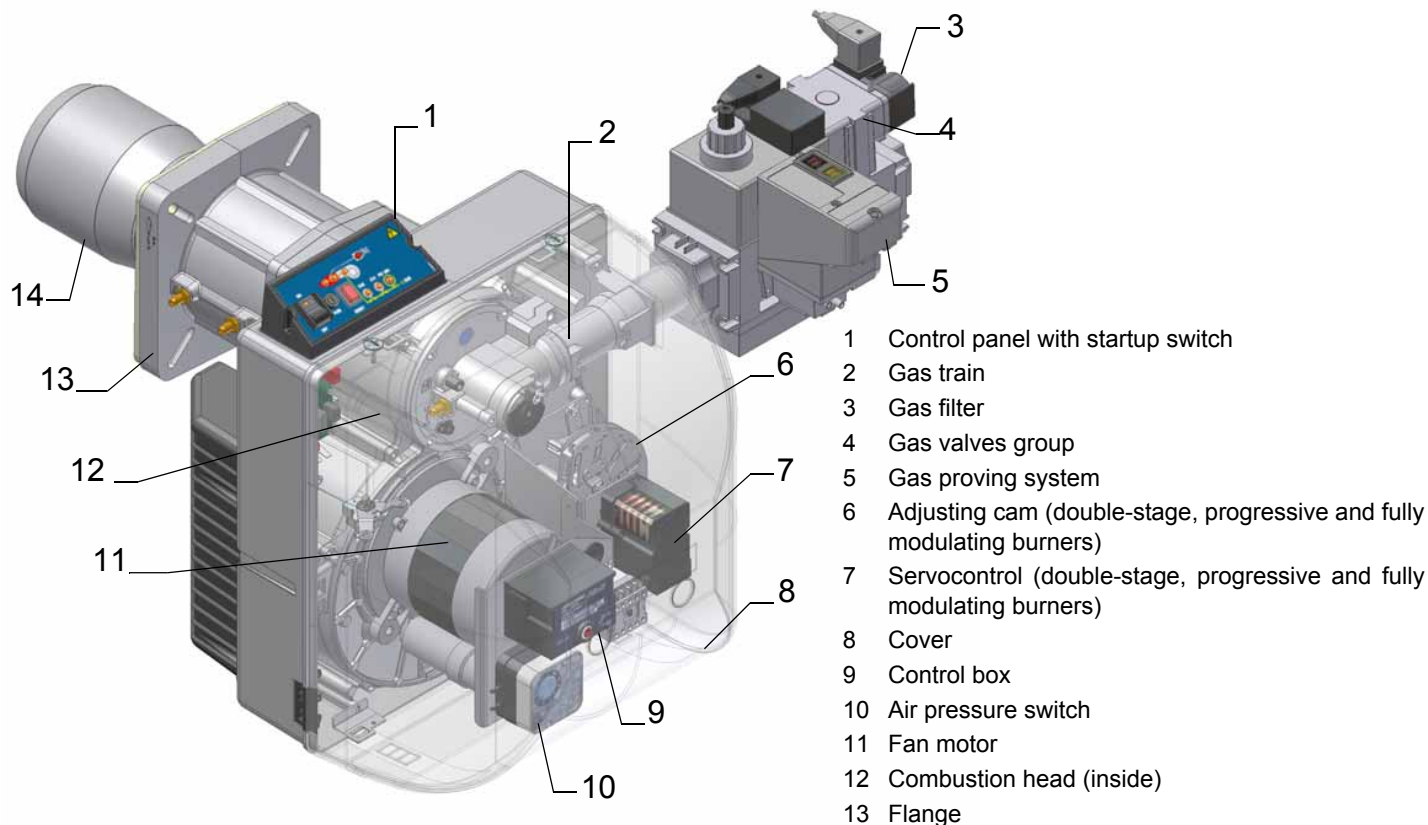


ATTENTION: while running, the parts of the burner near the generator (coupling flange) are subject to overheating. Where necessary, avoid any contact risks by wearing suitable PPE.

PART I: SPECIFICATIONS

GENERAL FEATURES

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



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

Burners are identified by burner type and model.

Burner model identification is described as follows.

| Type | Model | M-. | PR. | S. | * | A. | 0. | 50 |
|------|--------------------------------|---|-----|-----|-----|-----|-----|-----|
| (1) | | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| (1) | BURNER TYPE | NG - Natural gas burner, Brûleur du gaz naturel LG - L.P.G. burner, NGX - Low NOx burners | | | | | | |
| (2) | FUEL | M - Natural gas, L - LPG Biogas | | | | | | |
| (3) | OPERATION (Available versions) | TN - Single stage, AB - Double stagePR - Progressive, MD - Fully modulating | | | | | | |
| (4) | BLAST TUBE | S - Standard, L - extended Longue modular | | | | | | |
| (5) | DESTINATION COUNTRY | * see data plate | | | | | | |
| (6) | BURNER VERSION | A - Standard, Y - Special | | | | | | |
| (7) | EQUIPMENT | 0 = 2 gas valves 1= 2 Gas valves + gas proving system (optional) 7 = 2 gas valves + maximum gas pressure switch | | | | | | |
| (8) | GAS CONNECTION | 25 = Rp1, 32 = Rp1¼, 40 = Rp1½, 50 = Rp2 | | | | | | |

Fuel selection: In order to start the burner with natural gas or biogas oil, the operator must commute the selector on the burner control panel on (1) = natural gas, or (2) = biogas.

If the selector is set on (1) the natural gas cock must be open, while the biogas cock must be closed. Viceversa if the selector is set on (2).

Technical specifications

| BURNER TYPE | | NG280 M-.TN....0.25 | NG280 M-.TN....0.32 | NG280 M-.TN.....0.40 | LG280 L-.TN....0.20 | LG280 L-.TN....0.25 | LG280 L-.TN....0.32 |
|---|----------------------------------|----------------------------|------------------------|-------------------------|------------------------|------------------------|------------------------|
| Output | min.- max. kW | 95 - 300 | | | | | |
| Fuel | | Natural gas | | | | L.P.G. | |
| Category | | (see next paragraph) | | | | I _{3B/P} | |
| Gas rate | min.- max. (Stn ³ /h) | 10 – 32 | | | | 3,7 – 11,5 | |
| Gas pressure | min.- max. mbar | (Note2) - 360 | | | | | |
| Power supply | | 220 / 230V - 50 / 60 Hz | | | | | |
| Total power consumption | kW | 0,55 (50 Hz) - 0,6 (60 Hz) | | | | | |
| Electric motor | kW | 0,25 (50 Hz) - 0,3 (60 Hz) | | | | | |
| Protection | | IP40 | | | | | |
| Approx. weight | kg | 47 | | | | | |
| Valves size / Gas connection | | 1" / Rp1 | 1"¼/ Rp 1 ¼ | 1"½ / Rp 1½ | 3/4" / Rp3/4 | 1" / Rp1 | 1" ¼ / Rp 1¼ |
| Operation | | Single stage | | | | | |
| Operating temperatureTempérature de fonctionnement °C | | -10 ÷ +50 | | | | | |
| Storage TemperatureTempérature de stockage °C | | -20 ÷ +60 | | | | | |
| Working service* | | Intermittent | | | | | |

| BURNER TYPE | | NG280 M-.xx...0.25 | NG280 M-.xx...0.32 | NG280 M-.xx...0.40 | LG280 L-.xx...0.20 | LG280 L-.xx...0.25 | LG280 L-.xx...0.32 |
|---|---------------------|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Output | min.- max. kW | 65 - 300 | | | | | |
| Fuel | | Natural gas | | | L.P.G. | | |
| Category | | (see next paragraphvoir paragraphe suivant | | | I _{3B/P} | | |
| Gas rate | min.- max. (Stm³/h) | 7 – 32 | | | 2,5 – 11,5 | | |
| Gas Pressure | min.- max. mbar | (voir la note 2Note2) - 360 | | | | | |
| Power supply | | 220 / 230V - 50 / 60 Hz | | | | | |
| Total power consumption | kW | 0,55 (50 Hz) - 0,6 (60 Hz) | | | | | |
| Electric motor | kW | 0,25 (50 Hz) - 0,3 (60 Hz) | | | | | |
| Protection | | IP40 | | | | | |
| Approx. weight | kg | 47 | | | | | |
| Valves size / Gas connection | | 1" / Rp 1 | 1" ¼ / Rp 1 ¼ | 1" ½ / Rp 1" ½ | 1" / Rp1 | 1" / Rp1 | 1" ¼ / Rp 1¼ |
| Operation | | Double-stage - Progressive - Fully modulating | | | | | |
| Operating temperatureTempérature de fonctionnement °C | | -10 ÷ +50 | | | | | |
| Storage TemperatureTempérature de stockage °C | | -20 ÷ +60 | | | | | |
| Working serviceType de service* | | IntermittentIntermittentIntermittent | | | | | |

| BURNER TYPE | | NG350 M-.TN....0.25 | NG350 M-.TN....0.32 | NG350 M-.TN.....0.40 | LG350 L-.TN....0.25 | LG350 L-.TN....0.32 | LG350 L-.TN.....0.40 |
|---|---------------------|--|------------------------|-------------------------|------------------------|------------------------|-------------------------|
| Output | min.- max. kW | 115 - 330 | | | | | |
| Fuel | | Natural gas | | | L.P.G. | | |
| Category | | (see next paragraphvoir paragraphe suivant) | | | I _{3B/P} | | |
| Gas rate | min.- max. (Stm³/h) | 12 – 35 | | | 4 – 13 | | |
| Gas pressure | min.- max. mbar | (Note2voir la note 2) - 360 | | | | | |
| Power supply | | 220 / 230V - 50 / 60 Hz | | | | | |
| Total power consumption | kW | 0,67 (50 Hz) - 0,75 (60 Hz) | | | | | |
| Electric motor | kW | 0,37 (50 Hz) - 0,45 (60 Hz) | | | | | |
| Protection | | IP40 | | | | | |
| Approx. weight | kg | 47 | | | | | |
| Valves size / Gas connection | | 1" / Rp 1 | 1" ¼ / Rp 1 ¼ | 1" ½ / Rp 1½ | 1" / Rp1 | 1"¼ / Rp 1¼ | 1"½ / Rp 1½ |
| Operation | | Single stage | | | | | |
| Operating temperatureTempérature de fonctionnement °C | | -10 ÷ +50 | | | | | |
| Storage TemperatureTempérature de stockage °C | | -20 ÷ +60 | | | | | |
| Working serviceType de service* | | intermittentIntermittent | | | | | |

Technical specifications

| BURNER TYPE | | NG350 M-.xx...0.25 | NG350 M-.xx...0.32 | NG350 M-.xx...0.40 | LG350 L-.xx...0.25 | LG350 L-.xx...0.32 | LG350 L-.xx...0.40 |
|---|----------------------------------|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Output | min.- max. kW | 80 - 330 | | | 85 - 330 | | |
| Fuel | | Natural gas | | | L.P.G. | | |
| Category | | (see next paragraphvoir paragraphe suivant) | | | I _{3B/P} | I _{3B/P} | I _{3B/P} |
| Gas rate | min.- max. (Stm ³ /h) | 8.5 – 35 | 8.5 – 35 | 8.5 – 35 | 3 – 13 | 3 – 13 | 3 – 13 |
| Gas pressure | min.- max. mbar | (Note2voir la note 2) - 360 | | | | | |
| Power supply | | 220 / 230V - 50 / 60 Hz | | | | | |
| Total power consumption | kW | 0,67 (50 Hz) - 0,75 (60 Hz) | | | | | |
| Electric motor | kW | 0,37 (50 Hz) - 0,45 (60 Hz) | | | | | |
| Protection | | IP40 | | | | | |
| Approx. weight | kg | 47 | | | | | |
| Valves size / Gas connection | | 1" / Rp 1 | 1" ¼ / Rp 1 ¼ | 1" ½ / Rp 1 ½ | 1" / Rp1 | 1" ¼ / Rp 1 ¼ | 1" ½ / Rp 1 ½ |
| Operation | | Progressive - Fully modulating | | | | | |
| Operating temperatureTempérature de fonctionnement °C | | -10 ÷ +50 | | | | | |
| Storage TemperatureTempérature de stockage °C | | -20 ÷ +60 | | | | | |
| Working serviceType de service* | | Intermittentintermittent | | | | | |

| BURNER TYPE | | NG400 M-.TN....0.25 | NG400 M-.TN....0.32 | NG400 M-.TN.....0.40 | NG400 M-.TN.....0.50 |
|---|----------------------------------|---|------------------------|-------------------------|-------------------------|
| Output | min.- max. kW | 185 - 420 | | | |
| Fuel | | Natural gas | | | |
| Category | | (see next paragraphvoir paragraphe suivant) | | | |
| Gas rate | min.- max. (Stm ³ /h) | 20 - 44.5 | | | |
| Gas pressure | min.- max. mbar | (Note2voir la note 2) - 360 | | | |
| Power supply | | 220 / 230V - 50 / 60 Hz | | | |
| Total power consumption | kW | 0,67 (50 Hz) - 0,75 (60 Hz) | | | |
| Electric motor | kW | 0,37 (50 Hz) - 0,45 (60 Hz) | | | |
| Protection | | IP40 | | | |
| Approx. weight | kg | 47 | | | |
| Valves size / Gas connection | | 1" / Rp 1 | 1" ¼ / Rp 1 ¼ | 1" ½ / Rp 1 ½ | 2" / Rp 2 |
| Operation | | Single-stage | | | |
| Operating temperatureTempérature de fonctionnement °C | | -10 ÷ +50 | | | |
| Storage TemperatureTempérature de stockage °C | | -20 ÷ +60 | | | |
| Working serviceType de service* | | Intermittentintermittent | | | |

| | | NG400 M-.xx...0.25 | NG400 M-.xx...0.32 | NG400 M-.xx...0.40 | NG400 M-.xx...0.50 |
|------------------------------|----------------------------------|--------------------------------|-----------------------|-----------------------|-----------------------|
| Output | min.- max. kW | 115 - 420 | | | |
| Fuel | | Natural gas | | | |
| Category | | (see next paragraph) | | | |
| Gas rate | min.- max. (Stm ³ /h) | 12 - 44.5 | | | |
| Gas pressure | min.- max. mbar | (Note2) - 360 | | | |
| Power supply | | 220 / 230V - 50 / 60 Hz | | | |
| Total power consumption | kW | 0,67 (50 Hz) - 0,75 (60 Hz) | | | |
| Electric motor | kW | 0,37 (50 Hz) - 0,45 (60 Hz) | | | |
| Protection | | IP40 | | | |
| Approx. weight | kg | 47 | | | |
| Valves size / Gas connection | | 1" / Rp 1 | 1" ¼ / Rp 1 ¼ | 1" ½ / Rp 1" ½ | 2" / Rp 2 |
| Operation | | Progressive - Fully modulating | | | |
| Operating temperature °C | | -10 ÷ +50 | | | |
| Storage Temperature °C | | -20 ÷ +60 | | | |
| Working service* | | Intermittent | | | |

| BURNER TYPE | | LG400 L-.xx...0.25 | LG400 L-.xx...0.32 | LG400 L-.xx...0.40 | LG400 L-.xx...0.50 |
|------------------------------|----------------------------------|--------------------------------|-----------------------|-----------------------|-----------------------|
| Output | min.- max. kW | 105 - 420 | | | |
| Fuel | | L.P.G. | | | |
| Category | | I _{3B} /P | | | |
| Gas rate | min.- max. (Stm ³ /h) | 4 - 16 | | | |
| Gas pressure | min.- max. mbar | (Note2) - 360 | | | |
| Power supply | | 220 / 230V - 50 / 60 Hz | | | |
| Total power consumption | kW | 0,67 (50 Hz) - 0,75 (60 Hz) | | | |
| Electric motor | kW | 0,37 (50 Hz) - 0,45 (60 Hz) | | | |
| Protection | | IP40 | | | |
| Approx. weight | kg | 47 | | | |
| Valves size / Gas connection | | 1" / Rp 1 | 1" ¼ / Rp 1 ¼ | 1" ½ / Rp 1" ½ | 2" / Rp 2 |
| Operation | | Progressive - Fully modulating | | | |
| Operating temperature °C | | -10 ÷ +50 | | | |
| Storage Temperature °C | | -20 ÷ +60 | | | |
| Working service* | | Intermittent | | | |

| BURNER TYPE | | LG400 L-.TN...0.25 | LG400 L-.TN...0.32 | LG400 L-.TN...0.40 | LG400 L-.TN...0.50 |
|------------------------------|----------------------------------|-----------------------------|-----------------------|-----------------------|-----------------------|
| Output | min.- max. kW | 180 - 420 | | | |
| Fuel | | L.P.G. | | | |
| Category | | I _{3B} /P | | | |
| Gas rate | min.- max. (Stm ³ /h) | 6,7 - 15,7 | | | |
| Gas pressure | min.- max. mbar | (Note2) - 360 | | | |
| Power supply | | 220 / 230V - 50 / 60 Hz | | | |
| Total power consumption | kW | 0,67 (50 Hz) - 0,75 (60 Hz) | | | |
| Electric motor | kW | 0,37 (50 Hz) - 0,45 (60 Hz) | | | |
| Protection | | IP40 | | | |
| Approx. weight | kg | 47 | | | |
| Valves size / Gas connection | | 1" / Rp 1 | 1" ¼ / Rp 1 ¼ | 1" ½ / Rp 1" ½ | 2" / Rp 2 |
| Operation | | Single-stage | | | |
| Operating temperature °C | | -10 ÷ +50 | | | |
| Storage Temperature °C | | -20 ÷ +60 | | | |
| Working service* | | Intermittent | | | |

Low NOx burners Technical specifications

| BURNER TYPE | | NGX280 M-.TN...0.25 | NGX280 M-.TN...0.32 | NGX280 M-.TN...0.40 |
|---|---------------------|---|---|---|
| Output | min.- max. kW | 93 - 190 | | |
| Fuel | | Natural gas | | |
| Category | | (see next paragraphvoir paragraphe suivant) | | |
| Gas rate | min.- max. (Stm³/h) | 9,8 - 20 | | |
| Gas Pressure | min.- max. mbar | (Note2voir la note 2) - 360 | | |
| Power supply | | 220 / 230V - 50 / 60 Hz | | |
| Total power consumption | kW | 0,55 (50 Hz) - 0,6 (60 Hz) | | |
| Electric motor | kW | 0,25 (50 Hz) - 0,3 (60 Hz) | | |
| Protection | | IP40 | | |
| Approx. weight | kg | 47 | | |
| Valves size / Gas connection | | 1" / Rp1 | 1" ¹ / ₄ / Rp 1 ¹ / ₄ | 1" ¹ / ₂ / Rp 1 ¹ / ₂ |
| Operation | | Single-stage | | |
| Operating temperatureTempérature de fonctionnement °C | | -10 ÷ +50 | | |
| Storage TemperatureTempérature de stockage °C | | -20 ÷ +60 | | |
| Working serviceType de service* | | Intermittentintermittent | | |

| BURNER TYPE | | NGX280 M-.xx...0.25 | NGX280 M-.xx...0.32 | NGX280 M-.xx...0.40 |
|---|---------------------|---|---|---|
| Output | min.- max. kW | 60 - 190 | | |
| Fuel | | Natural gas | | |
| Category | | (see next paragraphvoir paragraphe suivant) | | |
| Gas rate | min.- max. (Stm³/h) | 6,4 - 20 | | |
| Gas pressure | min.- max. mbar | (Note2voir la note 2) - 360 | | |
| Power supply | | 220 / 230V - 50 / 60 Hz | | |
| Total power consumption | kW | 0,55 (50 Hz) - 0,6 (60 Hz) | | |
| Electric motor | kW | 0,25 (50 Hz) - 0,3 (60 Hz) | | |
| Protection | | IP40 | | |
| Approx. weight | kg | 47 | | |
| Valves size / Gas connection | | 1" / Rp1 | 1" ¹ / ₄ / Rp 1 ¹ / ₄ | 1" ¹ / ₂ / Rp 1 ¹ / ₂ |
| Operation | | Double-stage - Progressive - Fully modulating | | |
| Operating temperatureTempérature de fonctionnement °C | | -10 ÷ +50 | | |
| Storage TemperatureTempérature de stockage °C | | -20 ÷ +60 | | |
| Working serviceType de service* | | Intermittentintermittent | | |

| BURNER TYPE | | NGX350 M-.xx...0.25 | NGX350 M-.xx...0.32 | NGX350 M-.xx...0.40 |
|---|----------------------------------|---|---|---|
| Output | min.- max. kW | 65 - 260 | | |
| Fuel | | Natural gas | | |
| Category | | (see next paragraphvoir paragraphe suivant) | | |
| Gas rate | min.- max. min.- max.(Stm³/h) | 7 - 27.5 | | |
| Gas pressure | min.- max. mbar | (voir la note 2Note2) - 360 | | |
| Power supply | | 220 / 230V - 50 / 60 Hz | | |
| Total power consumption | kW | 0,67 (50 Hz) - 0,75 (60 Hz) | | |
| Electric motor | kW | 0,37 (50 Hz) - 0,45 (60 Hz) | | |
| Protection | | IP40 | | |
| Approx. weight | kg | 47 | | |
| Valves size / Gas connection | | 1" / Rp1 | 1" ¹ / ₄ / Rp 1 ¹ / ₄ | 1" ¹ / ₂ / Rp 1 ¹ / ₂ |
| Operation | | Progressive - Fully modulating | | |
| Operating temperatureTempérature de fonctionnement °C | | -10 ÷ +50 | | |
| Storage TemperatureTempérature de stockage °C | | -20 ÷ +60 | | |
| Working serviceType de service* | | Intermittentintermittent | | |

| BURNER TYPE | | NGX400 M-xx...0.25 | NGX400 M-xx...0.32 | NGX400 M-xx...0.40 | NGX400 M-xx...0.50 |
|---|----------------------------------|--|-----------------------|-----------------------|-----------------------|
| Output | min.- max. kW | 90 - 350 | | | |
| Fuel | | Natural gas | | | |
| Category | | (see next paragraph voir paragraphe suivant) | | | |
| Gas rate | min.- max. (Stm ³ /h) | 9.5 - 37 | | | |
| Gas pressure | min.- max. mbar | (Note 2 voir la note 2) - 360 | | | |
| Power supply | | 220 / 230V - 50 / 60 Hz | | | |
| Total power consumption | kW | 0,67 (50 Hz) - 0,75 (60 Hz) | | | |
| Electric motor | kW | 0,37 (50 Hz) - 0,45 (60 Hz) | | | |
| Protection | | IP40 | | | |
| Approx. weight | kg | 47 | | | |
| Valves size / Gas connection | | 1" / Rp 1 | 1" ¼ / Rp 1 ¼ | 1" ½ / Rp 1" ½ | 2" / Rp 2 |
| Operation | | Progressive - Fully modulating | | | |
| Operating temperatureTempérature de fonctionnement °C | | -10 ÷ +50 | | | |
| Storage TemperatureTempérature de stockage °C | | -20 ÷ +60 | | | |
| Working serviceType de service* | | Intermittentintermittent | | | |

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

| | |
|---------------|--|
| Note1: | All gas flow rates are referred to Stm ³ /h (1013 mbar absolute pressure, 15 °C temperature) and are valid for Biogas gas (net calorific value H _i = 23 MJ/Stm ³); |
| Note2: | Maximum gas pressure = 360mbar (with Dungs MBDLE) Maximum gas pressure = 500mbar (with Siemens VGD or Dungs MultiBloc MBE) |

Gas categories and countries of application

| Countries | Group | |
|--|--------|--------|
| AL, AT, BE, BG, CH, CY, 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 | H | L (*) |
| | E | 2R (*) |
| | EK (*) | Er (*) |
| | LL (*) | E (R) |

(*) Premix type ...N burners are not enabled to work with these gas categories.

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

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

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

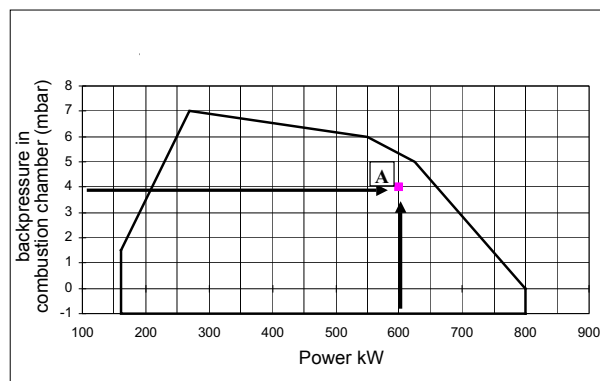
Example:

Furnace input: 600kW

Backpressure: 4 mbar

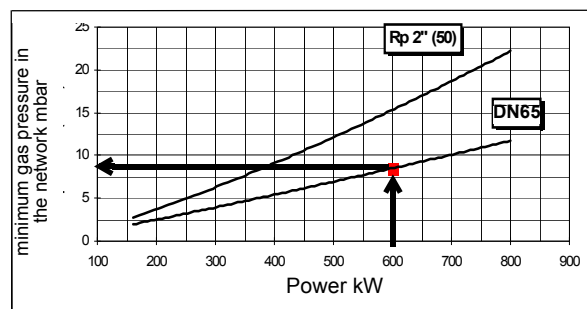
In the "Performance curve" diagram, draw a vertical line matching the furnace input value and an horizontal line matching the backpressure value. The burner is suitable if the intersection point A is inside the performance curve.

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



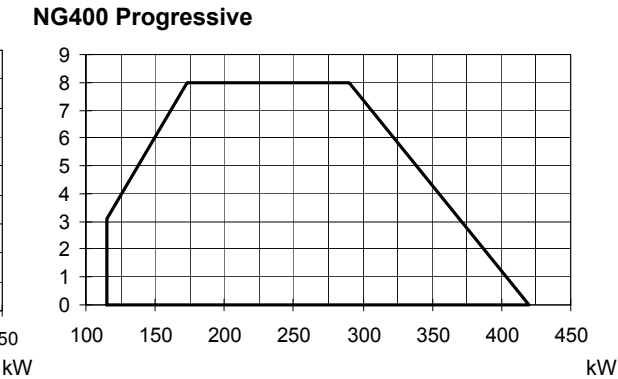
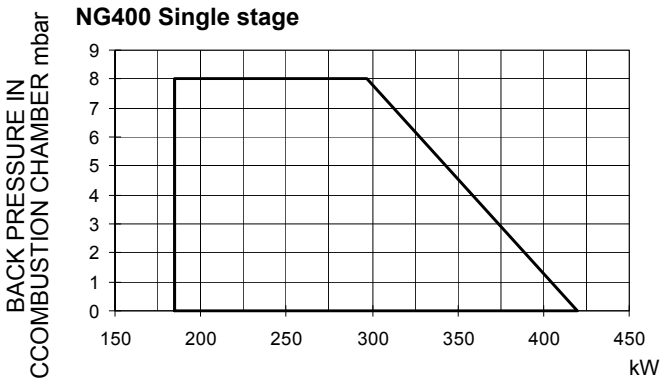
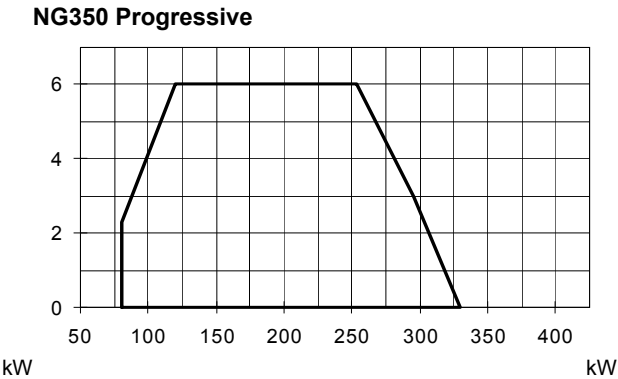
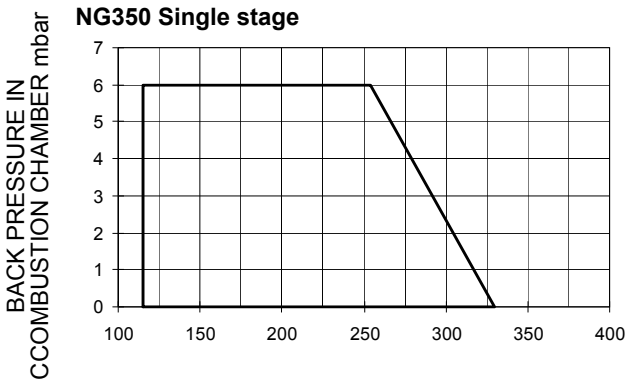
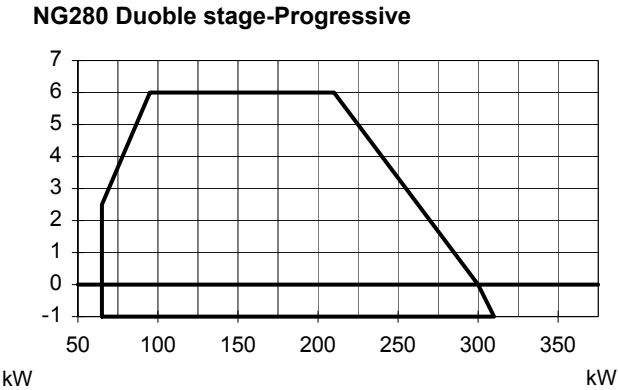
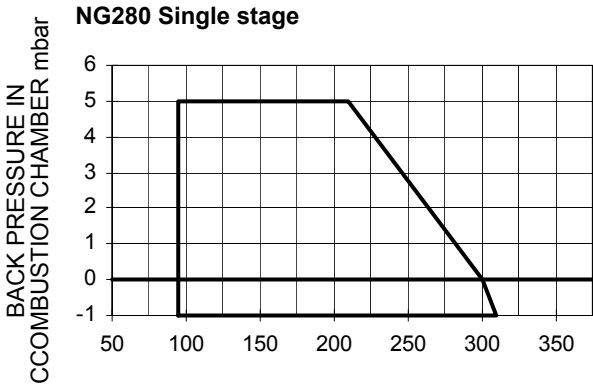
Checking the proper gas train size

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

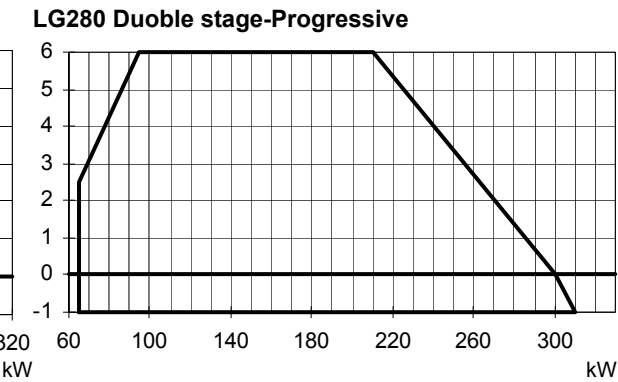


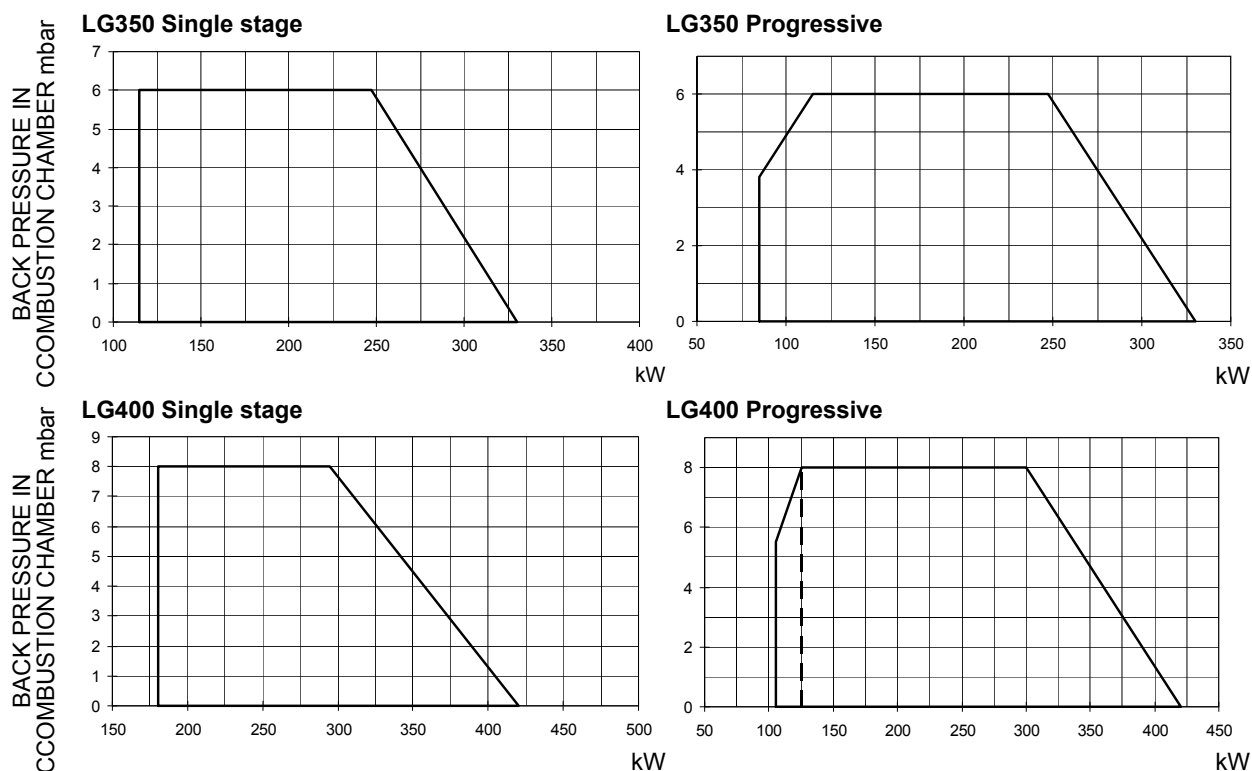
Performance Curves

● Gas burners

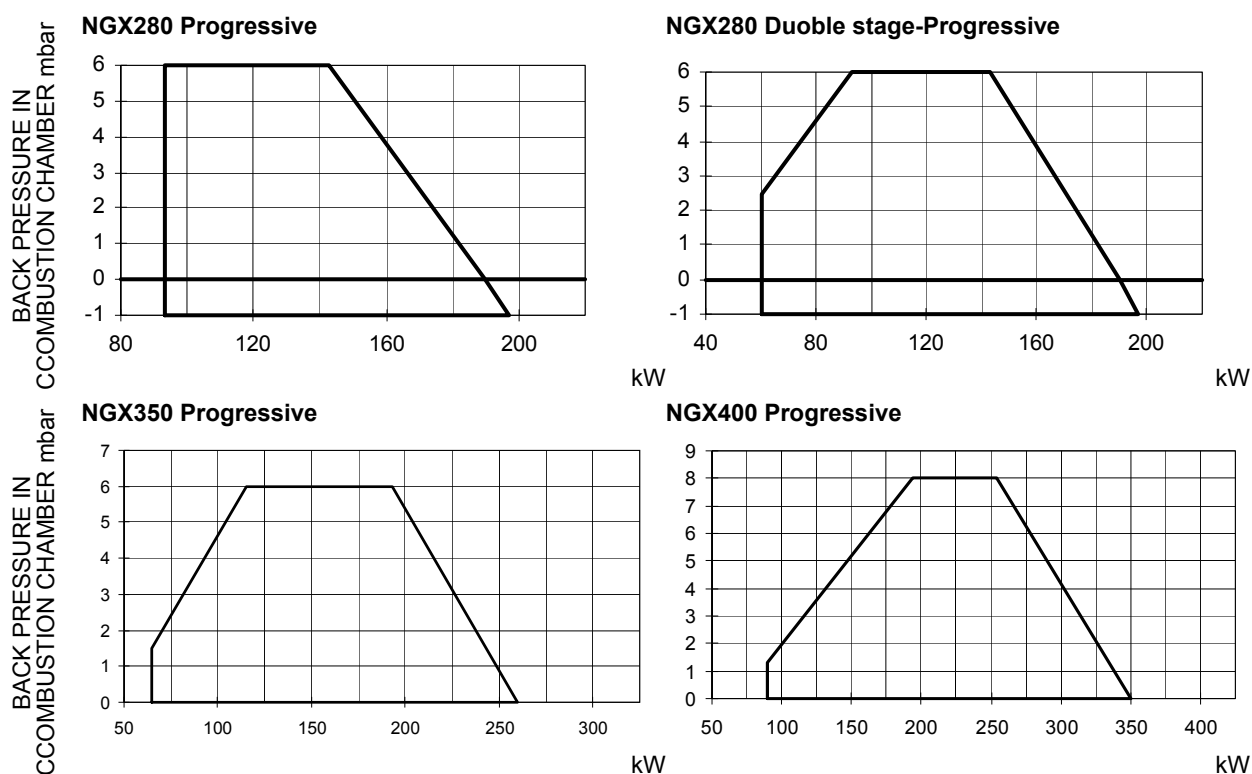


● L.P.G. Burners





● **Low NOx burners**



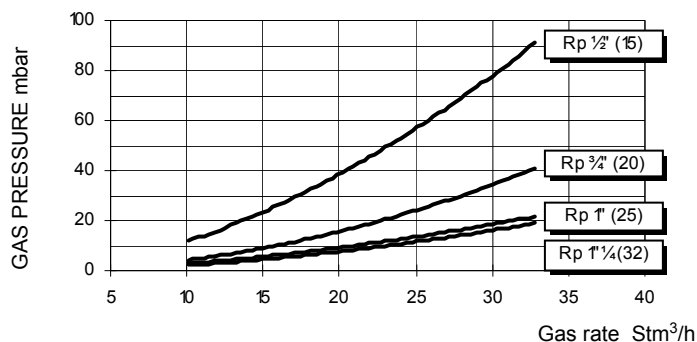
Data are referred to standard conditions: atmospheric pressure at 1013mbar, ambient temperature at 15°C.

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

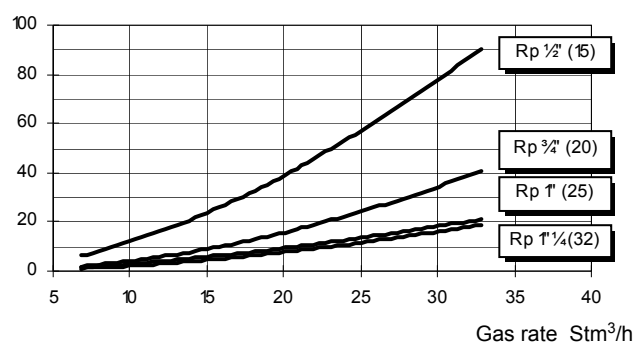
Pressure in the network - gas flow rate curves

● Gas burners

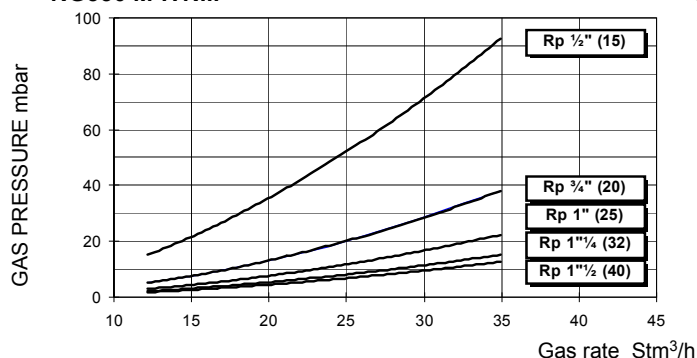
NG280 M-.TN...



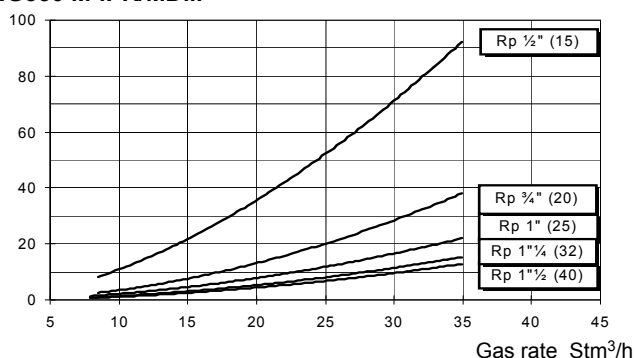
NG280 M-.xx...



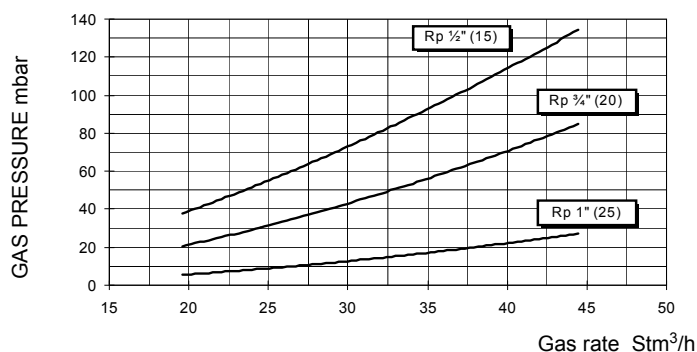
NG350 M-.TN...



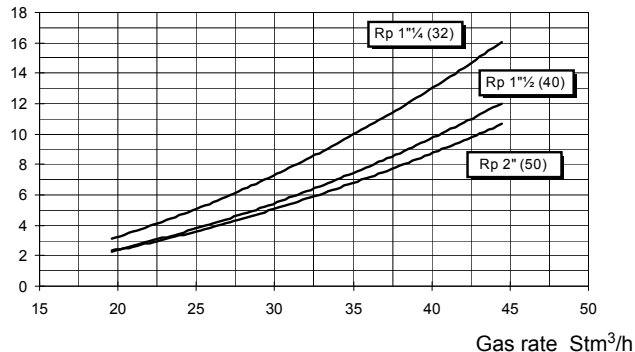
NG350 M-.PR/MD...



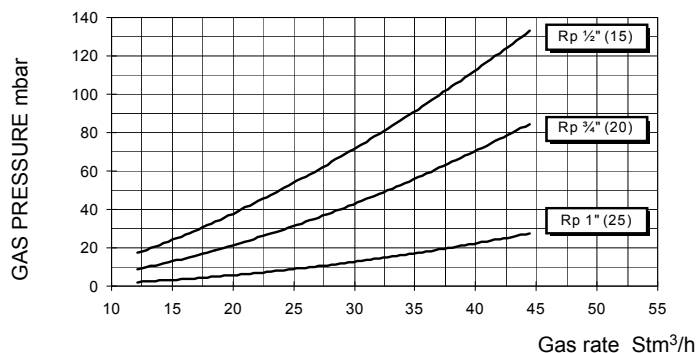
NG400 M-.TN..15-20-25



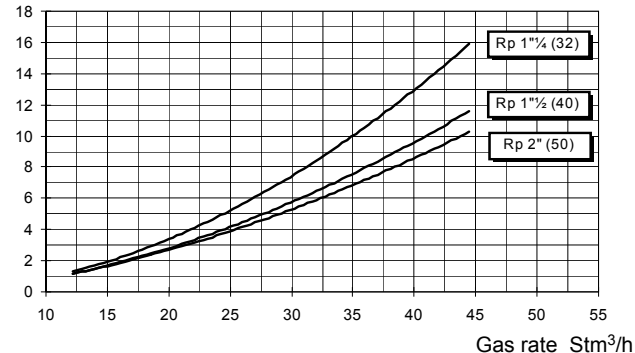
NG400 M-.TN..32-40-50



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

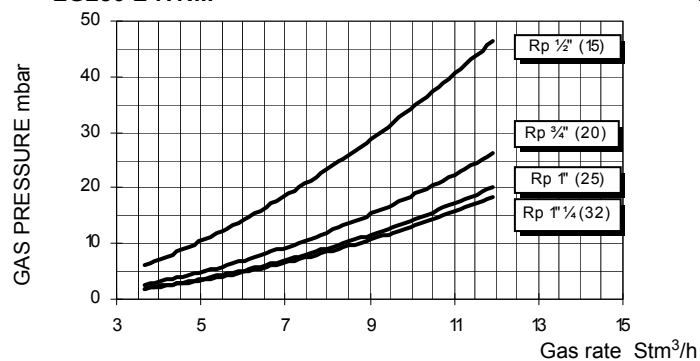


NG400 M-.PR/MD...32-40-50

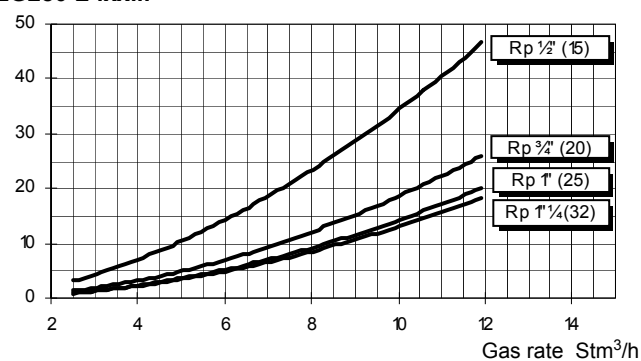


● **L.P.G. Burners**

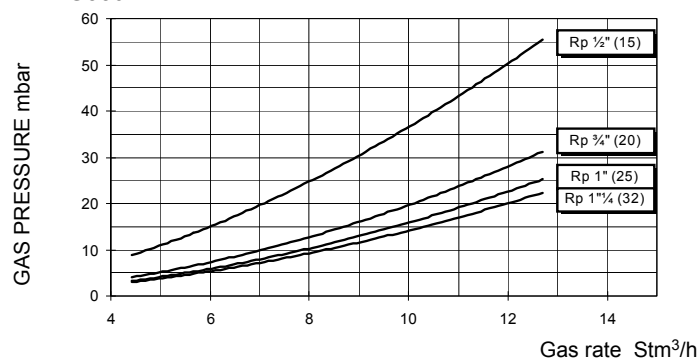
LG280 L-.TN...



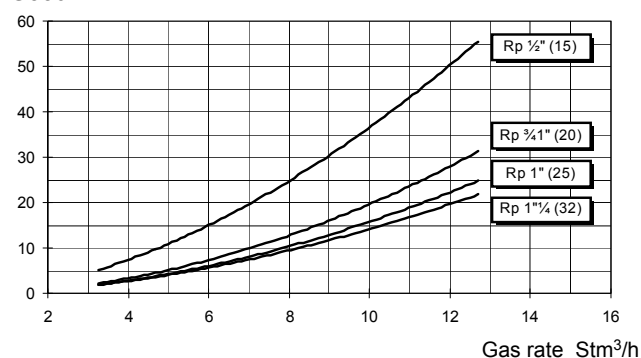
LG280 L-.xx...



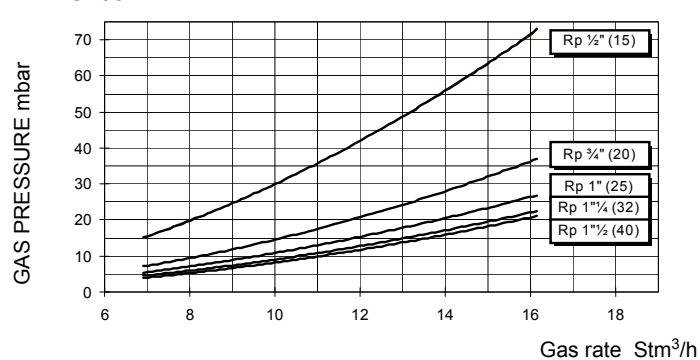
LG350 L-.TN...



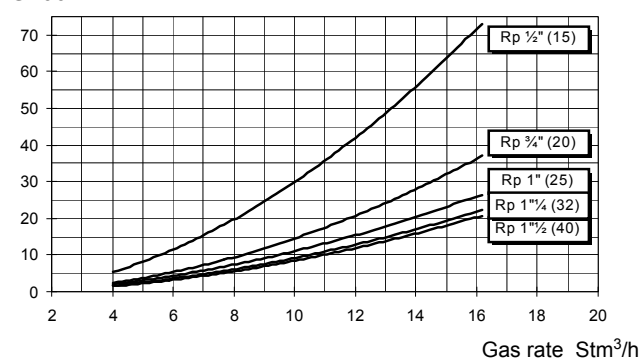
LG350 L-.PR/MD....



LG400 L-.TN...

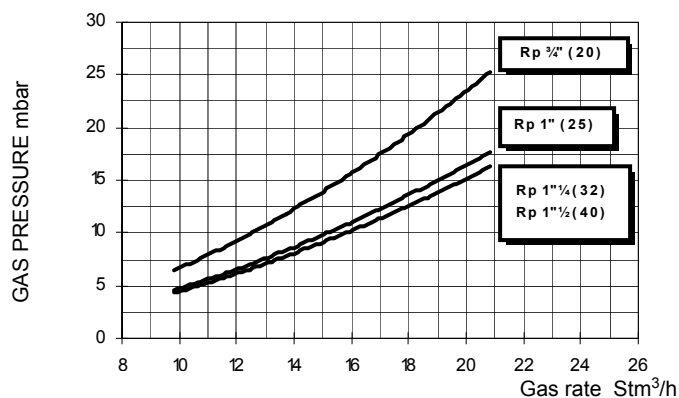


LG400 L-.PR/MD....

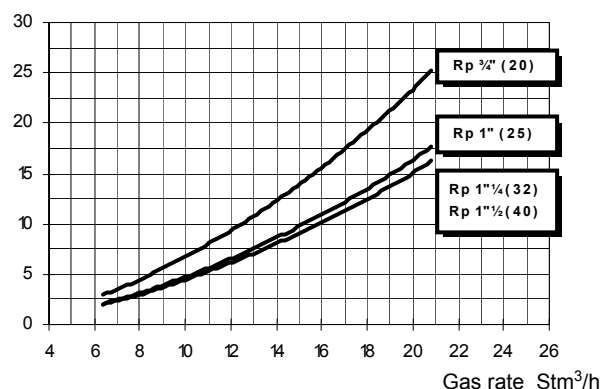


- Low NOx burners

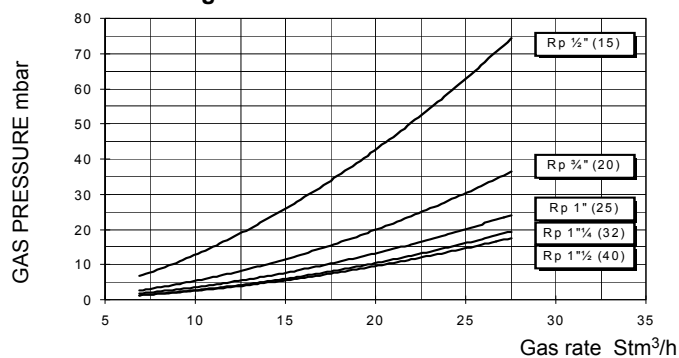
NGX280 M-.TN..



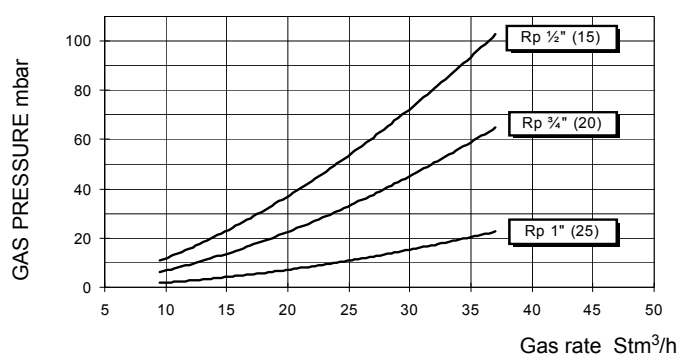
NGX280 M-.xx..



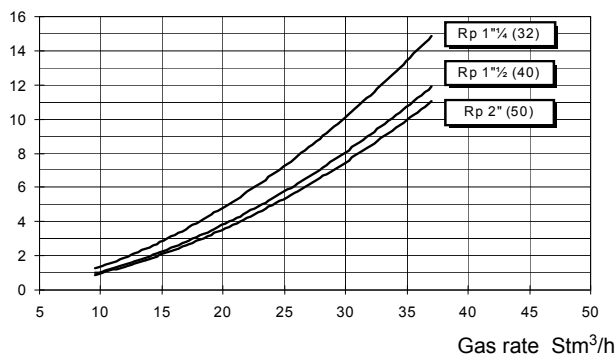
NGX350 Progressive



NGX400 M-...15-20-25



NGX400 M-...32-40-50



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

Gas pressure curves in head vs. the flow rate

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

The curves referred to the gas pressure in head are referred to the burner properly set (percentage of residual O_2 in the flues as shown in the "Recommended combustion values" table and CO in the standard limits). To measure the pressure in the combustion chamber, as far as the IDEA series, a pressure plug is provided upstream the burner's blast tube.

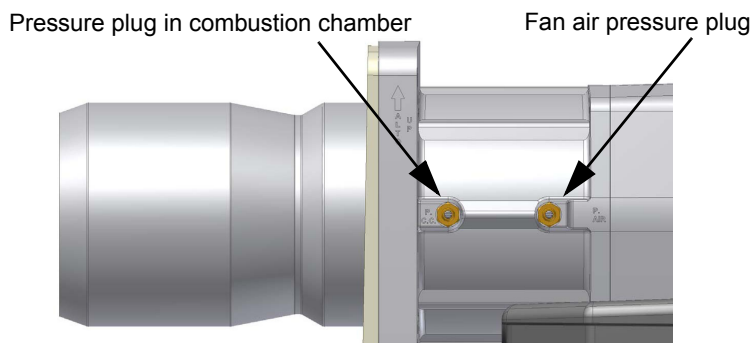


Fig. 1

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. The measurement should be taken at the maximum output .

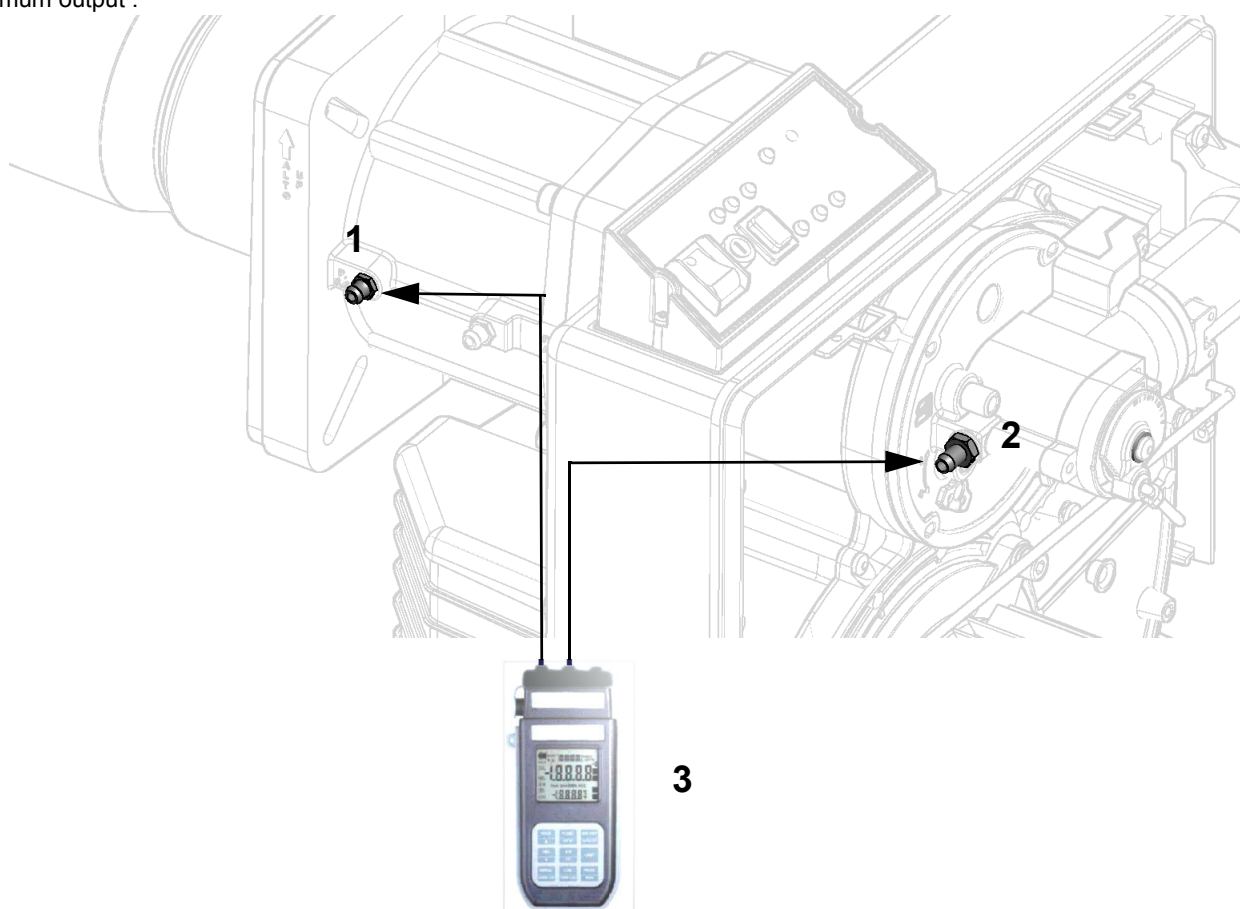
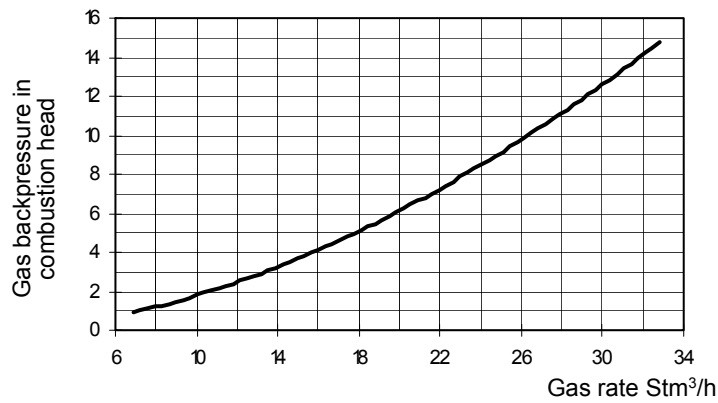
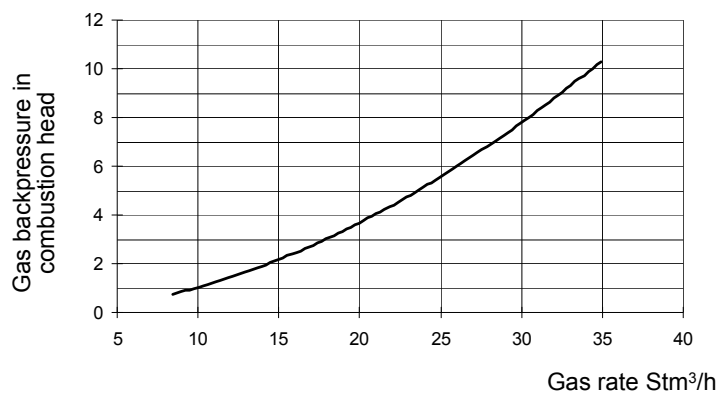
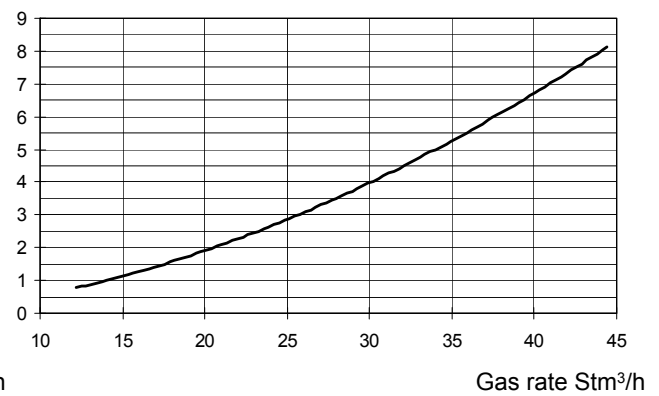
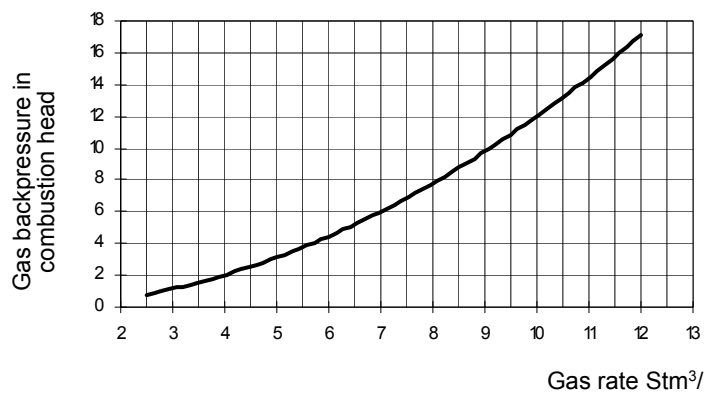
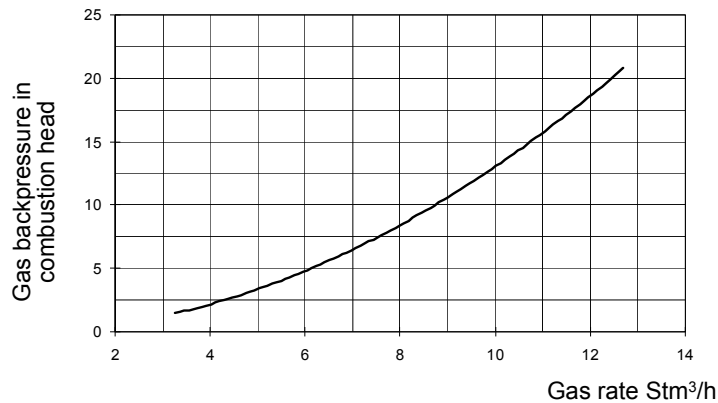
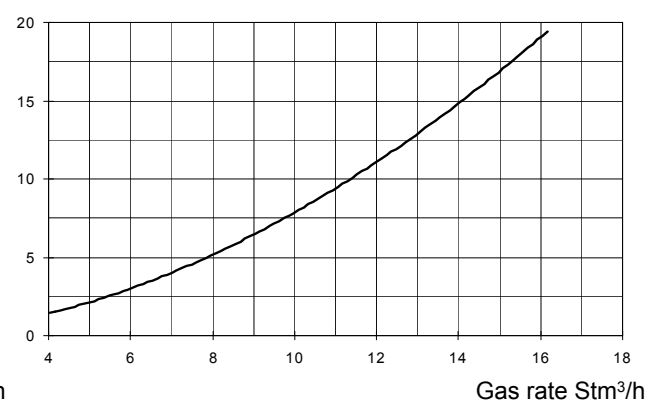


Fig. 2

Key

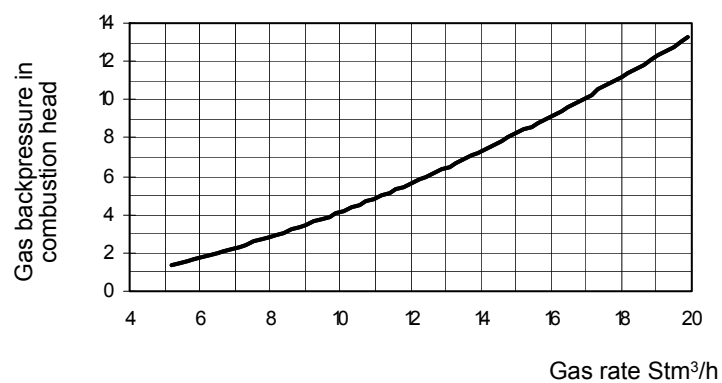
- 1 Pressure outlet on the combustion chamber
- 2 Gas pressure outlet on the butterfly valve
- 3 Differential pressure gauge

The differential pressure detected can be used with the graphs of the following paragraph in order to obtain the maximum flow rate of gas burned. (Stm³/h) **NOTE: THE PRESSURE-RATE CURVES ARE APPROXIMATE; FOR A PROPER SETTING OF THE GAS RATE, PLEASE REFER TO THE GAS METER READING.**

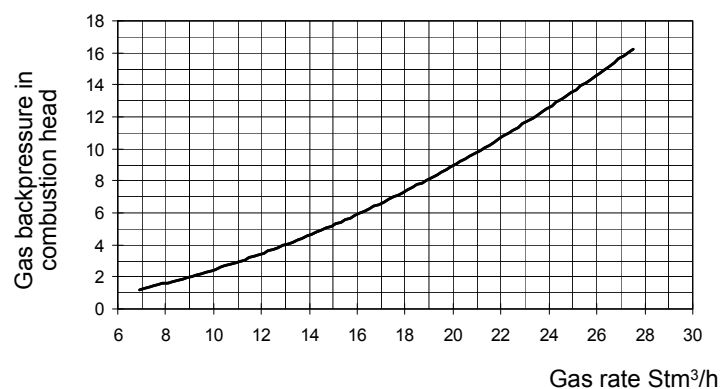
Pressure in the combustion head vs. gas flow rate curves● **nNatural gas burners****NG280 -****NG350 -****NG400 -**● **L.P.G. Burners****LG280 -****LG350 -****LG400 -**

● Low NOx burners

NGX280



NGX350

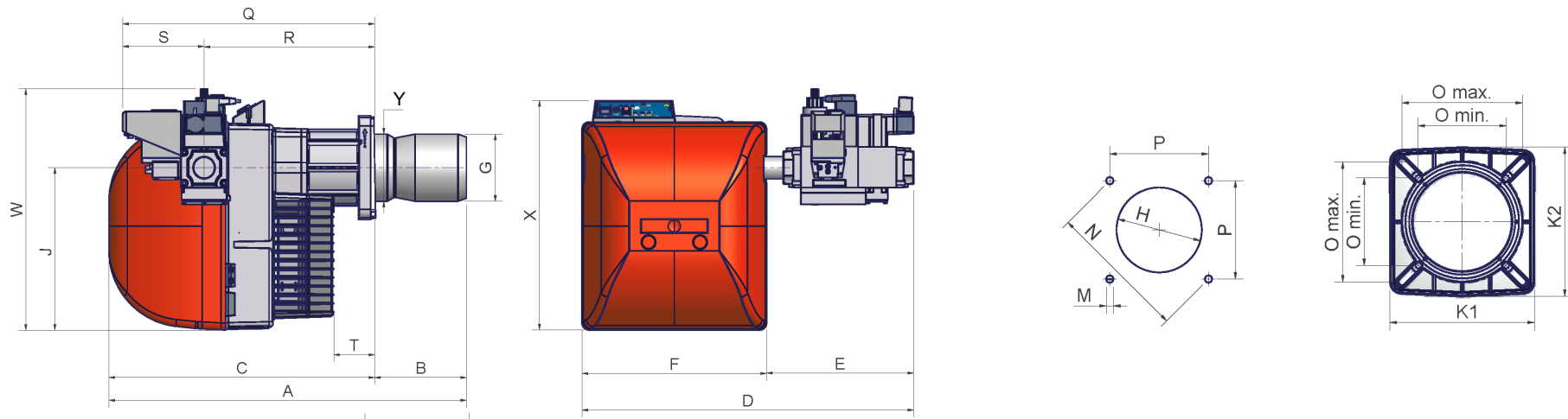


NGX400



Overall dimensions (mm)

- *Standard burners*



Recommended boiler drilling template and burner flange

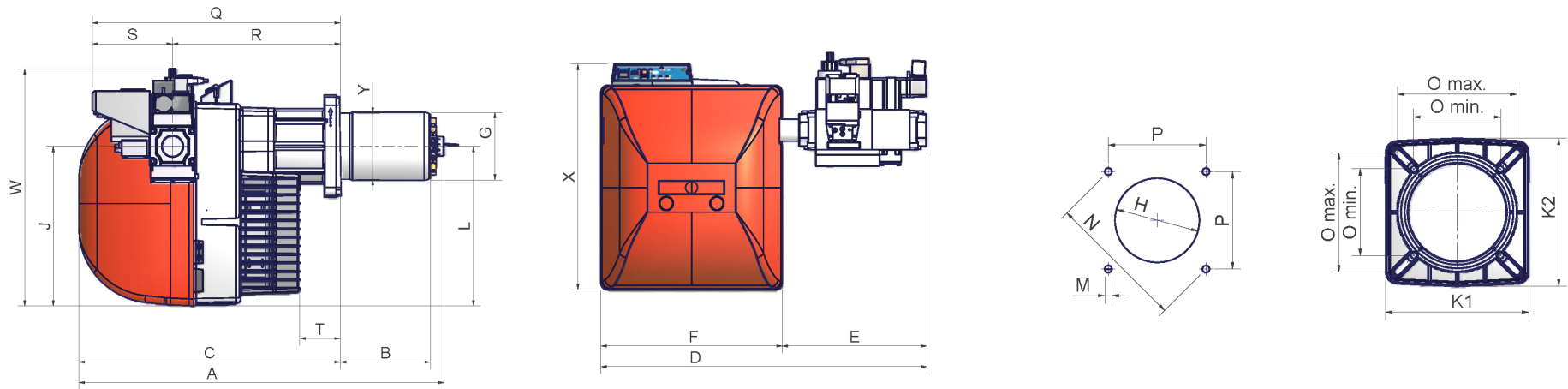
| | A(S*) | A(L)* | B(S*) | B(L)* | C | F | G | H | J | K1 | K2 | M | N | Omin | Omax | P | Q | R | S | T | X | Y |
|-----------------|-------|-------|-------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|-----|-----|-----|
| NG/LG280 | 733 | 878 | 163 | 308 | 570 | 396 | 117 | 137 | 348 | 215 | 223 | M10 | 219 | 131 | 172 | 155 | 541 | 366 | 175 | 128 | 491 | 130 |
| NG/LG350 | 748 | 878 | 178 | 308 | 570 | 396 | 125 | 164 | 348 | 215 | 223 | M10 | 219 | 131 | 172 | 155 | 541 | 366 | 175 | 89 | 491 | 144 |
| NG/LG400 | 768 | 898 | 198 | 328 | 570 | 396 | 144 | 164 | 348 | 215 | 223 | M10 | 219 | 131 | 172 | 155 | 541 | 366 | 175 | 89 | 491 | 144 |

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

L = measure referred to burners fitted with extended blast tube

Valves group dimensions according to gas train size.

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



Recommended boiler drilling template and burner flange

| | A(S*) | A(L)* | B(S*) | B(L)* | C | F | G | H | J | K1 | K2 | M | N | Omin | Omax | P | Q | R | S | T | X | Y |
|--------|-------|-------|-------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|-----|-----|-----|
| NGX280 | 733 | 878 | 163 | 308 | 570 | 396 | 114 | 137 | 348 | 215 | 223 | M10 | 219 | 131 | 172 | 155 | 541 | 366 | 175 | 128 | 491 | 130 |
| NGX350 | 748 | 878 | 178 | 308 | 570 | 396 | 137 | 164 | 348 | 215 | 223 | M10 | 219 | 131 | 172 | 155 | 541 | 366 | 175 | 89 | 491 | 144 |
| NGX400 | 768 | 898 | 198 | 328 | 570 | 396 | 156 | 176 | 348 | 215 | 223 | M10 | 219 | 131 | 172 | 155 | 541 | 366 | 175 | 89 | 491 | 156 |

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

Valves group dimensions according to gas train size.

| | D ± 5 mm | | | | E ± 5 mm | | | | W | | | |
|--------|----------|--------|--------|------|----------|--------|--------|------|------|--------|--------|------|
| | Rp 1 | Rp 1 ¼ | Rp 1 ½ | Rp 2 | Rp 1 | Rp 1 ¼ | Rp 1 ½ | Rp 2 | Rp 1 | Rp 1 ¼ | Rp 1 ½ | Rp 2 |
| NGX280 | 596 | 596 | 726 | 726 | 200 | 200 | 330 | 330 | 508 | 508 | 517 | 567 |
| NGX350 | 596 | 596 | 726 | 726 | 200 | 200 | 330 | 330 | 508 | 508 | 517 | 567 |
| NGX400 | 596 | 596 | 726 | 726 | 200 | 200 | 330 | 330 | 508 | 508 | 517 | 567 |

PART II: INSTALLATION

MOUNTINGS AND CONNECTIONS

Packing

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

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

The following are placed in each packing case.

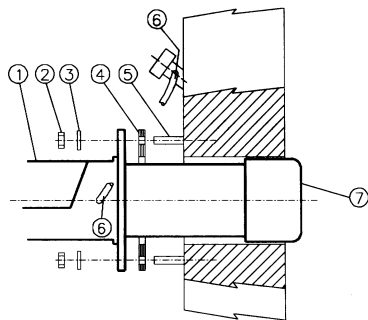
- Burner with gas train;
- gasket to be inserted between the burner and the boiler;
- envelope containing tis manual

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

Fitting the burner to the boiler

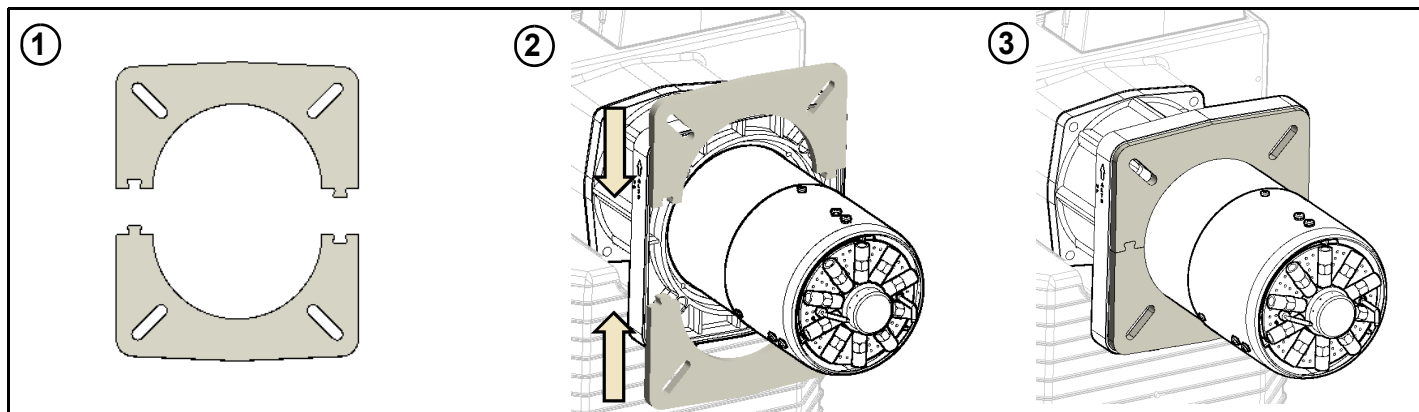
To install the burner into the boiler, proceed as follows:

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

**Keys**

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

To install the burner gasket proceed as shown by the following images.



Matching the burner to the boiler

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

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

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

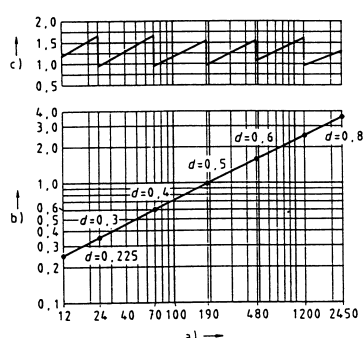


Fig. 3

Key

- a) Heat output in kW
- b) Length of the flame tube in meters
- c) Flame tube firing intensity in MW/m³
- d) Combustion chamber diameter (m)

Fig. 3 - Firing intensity, diameter and lenght of the test flame tube as a function of the heat input in kW.

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

To modify blast tube length please read the following instructions.

- 1 Remove combustion head (See "Removing the combustion head" - Part III of this user's guide).
- 2 Remove the flanged piece **T** by removing the 4 socket head screws **VTF** (Fig. 4).
- 3 Remove the 4 screws which hold the blast tube to the flanged piece (Fig. 5).
- 4 Extract the blast tube from the flanged piece and assemble it in the other way round as shown in pictures Fig. 6 and Fig. 7. Now fasten the two pieces using the same screws.
- 5 Assemble the whole piece to the burner by caring attention to the indication in picture Fig. 9.

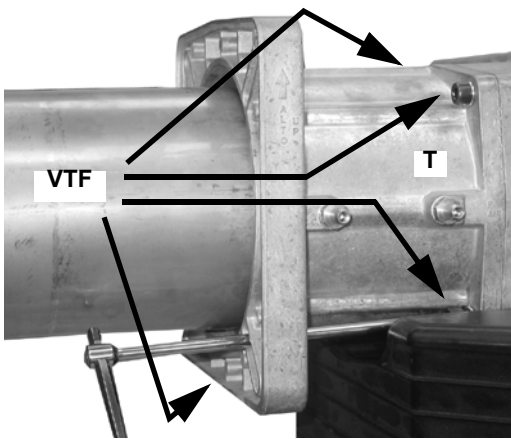


Fig. 4

Fig. 6 - Short blast tube

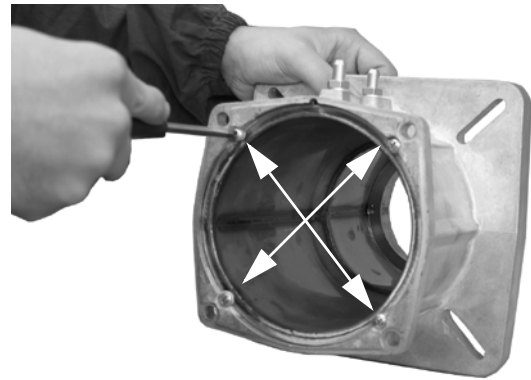
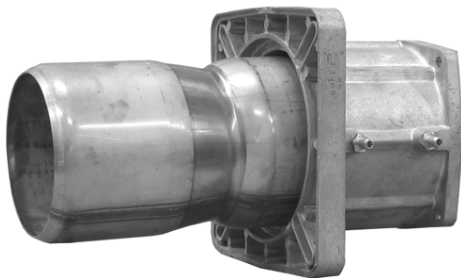


Fig. 5

Fig. 7 - Long blast tube

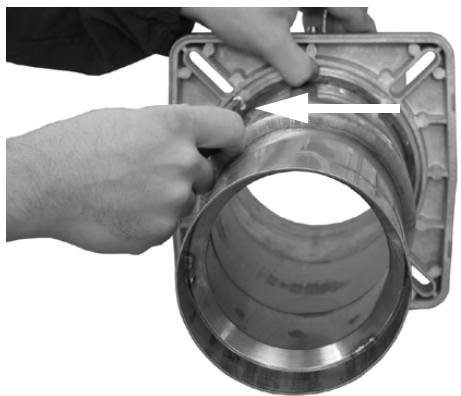
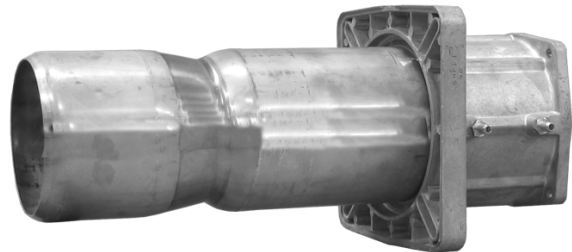


Fig. 8

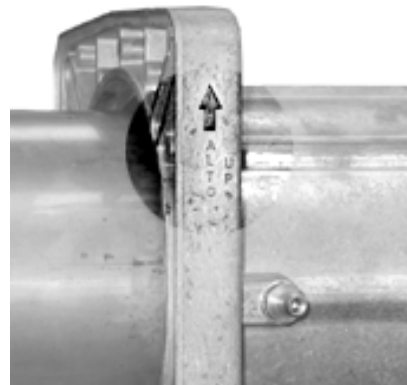


Fig. 9

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

- 1 Remove the screws **V1** and **V2** as shown in Fig. 10.
- 2 Lower the terminal part of the combustion head, by moving it with a slight circular movement, until the holes will match (Fig. 11) and tight the screw shown in Fig. 12.
- 3 Adjust cables length by pulling them very slightly paying particular attention not to disconnect the ionisation cable to the electrode.
- 4 Fix the combustion head again (See "Removing the combustion head").

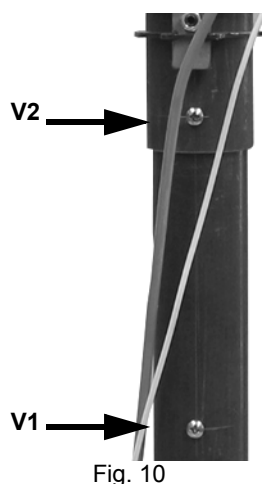


Fig. 10

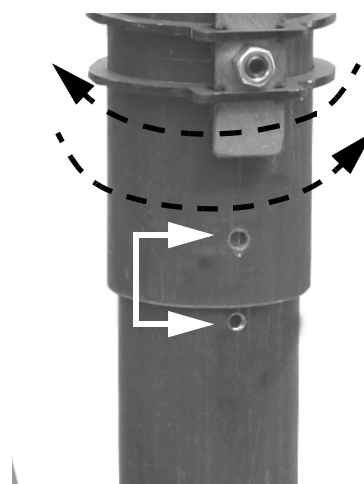


Fig. 11

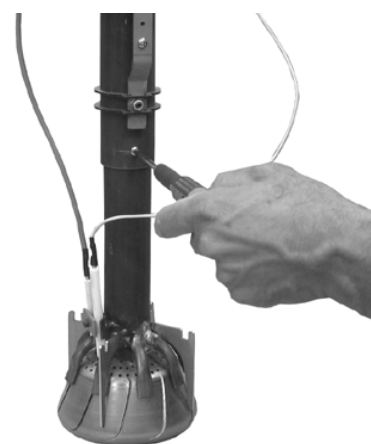


Fig. 12

Gas Train Reversal

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

- 1 Remove the plastic hook **G** to release the rod **T** (Fig. 13) .
- 2 Take the screws **V1**, **V2**, **V3**, **V4**, **VT1** and **VT2** off (Fig. 13).
- 3 Take the ignition cable **CA** off of the transformer .
- 4 Disconnect the connector **CR** from the printed circuit (Fig. 14).
- 5 Take off the flange and the combustion head together (Fig. 16).
- 6 Take the gas pipe **TR** off and put it in the new position fixing the screws **VT1** and **VT2** (Fig. 15).

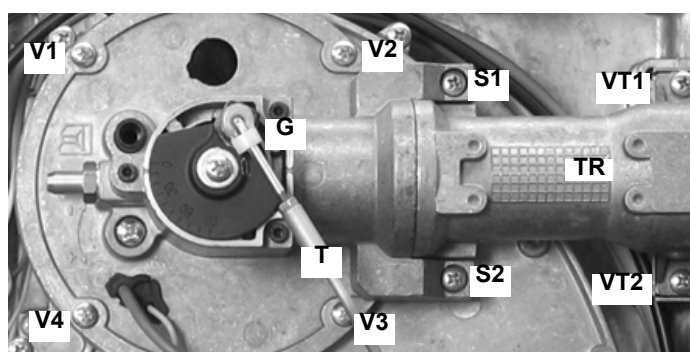


Fig. 13

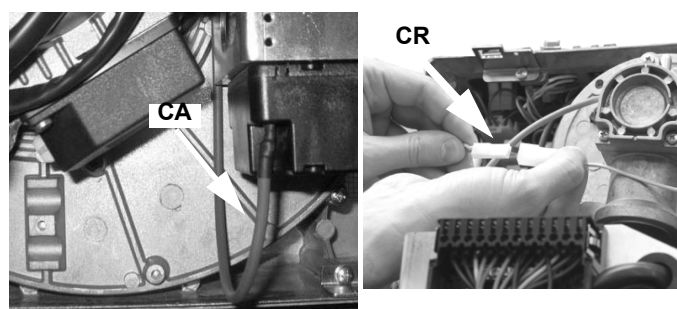
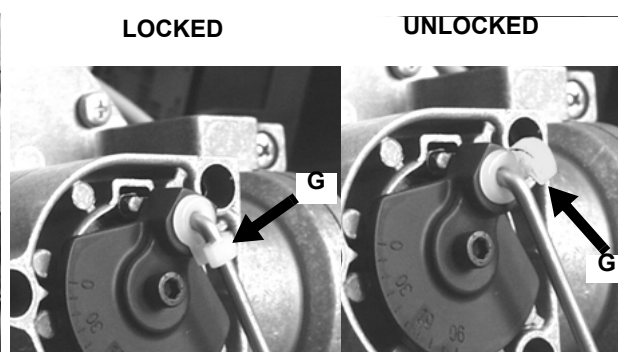


Fig. 14

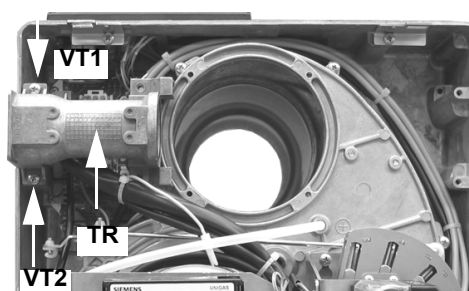


Fig. 15

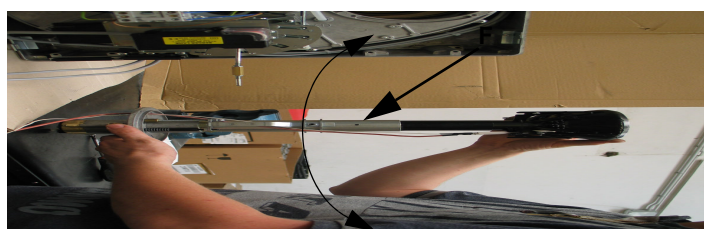


Fig. 16

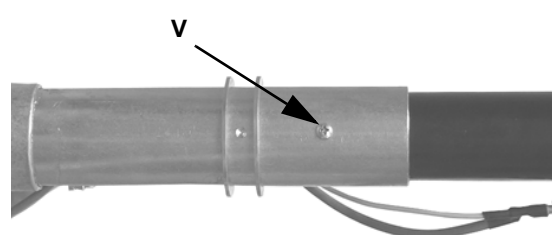


Fig. 17

- 7 Unscrew the **V**, rotate the head of 180 ° along its axis as shown in(Fig. 16), until the hole **F** is found. Fit the screw again(Fig. 16 - Fig. 17).

- 8 (Fig. 18)Insert again the flange and the combustion head together
- 9 (Fig. 18)Rotate the disc **D** following the instructions below.
- 10 Take off the screw **VF**.(Fig. 18)
- 11 Rotate the disc **D** for 180 ° and then fit the screw **VF** (Fig. 19).

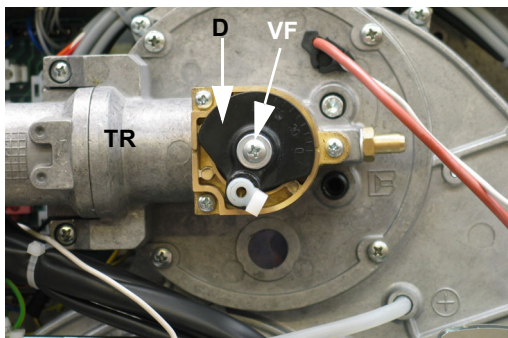


Fig. 18: Old position

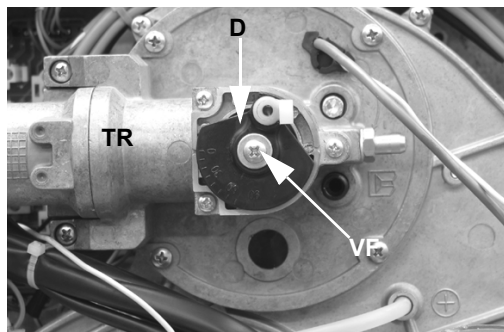


Fig. 19: New position

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

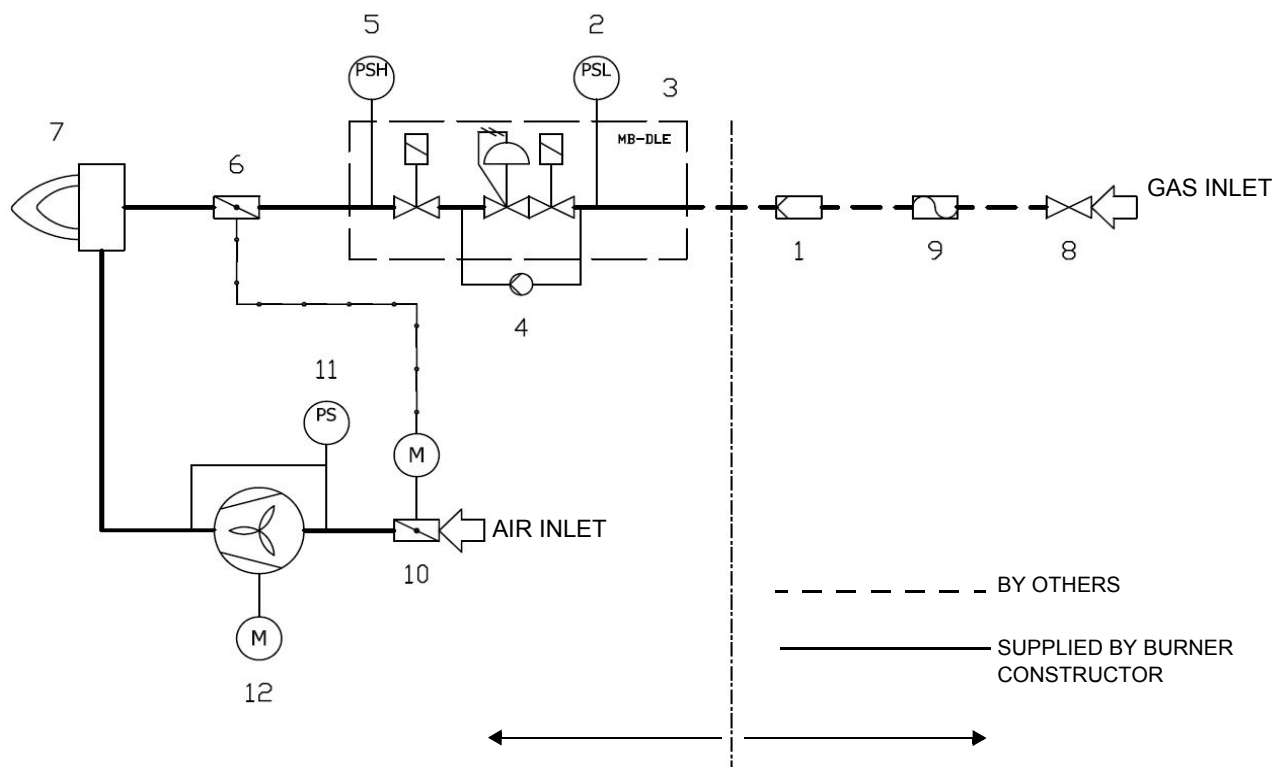
GAS TRAIN CONNECTIONS

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



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

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



Key

| MAIN GAS TRAIN | | COMBUSTION AIR TRAIN | |
|----------------|---|----------------------|-------------------------------|
| 1 | Filter | 10 | Air damper with actuator |
| 2 | Pressure switch - PGMIN | 11 | Pressure switch - PA |
| 3 | Safety valve with built in gas governor | 12 | Draught fan with electromotor |
| 4 | Proving system | | |
| 5 | Pressure switch - PGMAX(*) | | |
| 6 | Butterfly valve | | |
| 7 | Main burner | | |
| 8 | Manual valve(*) | | |
| 9 | Bellows unit(*) | | |

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

To mount the gas train, proceed as follows:

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

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

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



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



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

MULTIBLOC DUNGS MB-DLE 405..412

Mounting

1. Mount flange onto tube lines: use appropriate sealing agent (see Fig. 22);
2. insert MB-DLE: note position of O rings (see Fig. 22);
3. tighten screws A, B, C and D (Fig. 20 - Fig. 21), according to the mounting positions (Fig. 23);
4. after installation, perform leakage and functional test;
5. disassembly in reverse order.

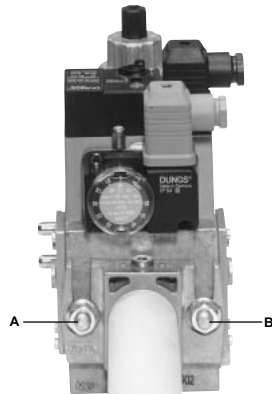


Fig. 20

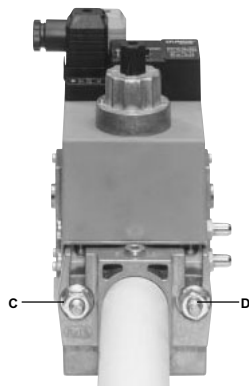


Fig. 21

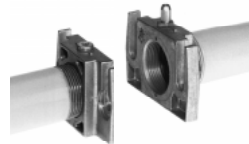


Fig. 22

MOUNTING POSITIONS

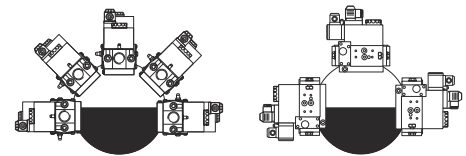


Fig. 23

MULTIBLOC DUNGS MB-DLE 415..420

Mounting

1. Loosen screws A and B **do not** unscrew (Fig. 20 - Fig. 21).
2. unscrew screws C and D (Fig. 20 - Fig. 21).
3. Remove MultiBloc between the threaded flanges (Fig. 21).
4. After mounting, perform leakage and functional tests.

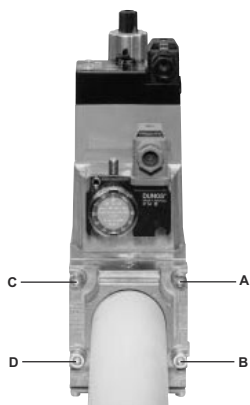


Fig. 24

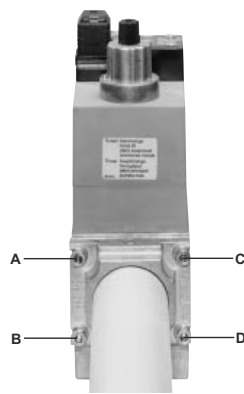


Fig. 25

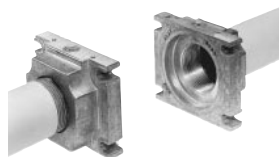


Fig. 26

MOUNTING POSITIONS

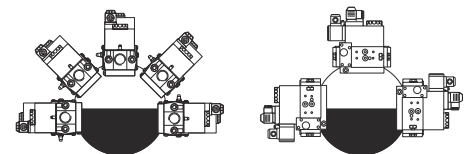


Fig. 27

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



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

ELECTRICAL CONNECTIONS



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

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

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

To execute the electrical connections, proceed as follows:

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

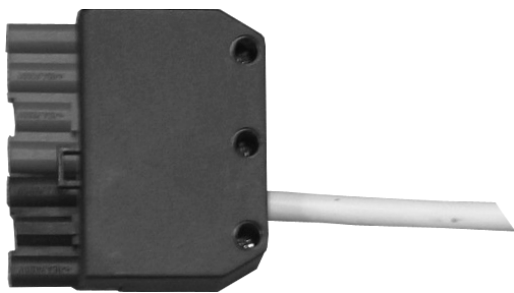
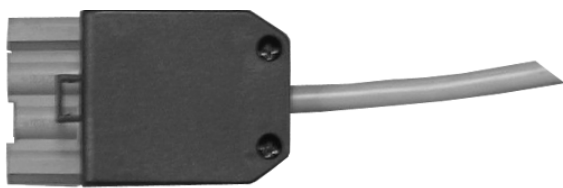
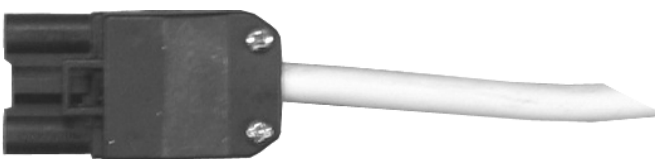


The burner is fitted with a bridge between terminals T6 and T8 on the 4-poles plug-TAB (external side link, male connector); if the TAB high/low flame thermostat must be connected, remove the bridge between terminals, before connecting the thermostat.



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

Connectors identification

| | |
|--|--|
| <p>Burner power supply connector (Fig. 31 - Fig. 33 - Fig. 35)</p> <p>Probe connection connector (fully modulating burners, Fig. 37)</p> |  <p style="text-align: right;">Fig. 28</p> |
| <p>HIGH/LOW flame connector (progressive burners, Fig. 33)</p> |  <p style="text-align: right;">Fig. 29</p> |
| <p>Fan motor connector (NG/NGX400 only) (Fig. 32 - Fig. 36)</p> |  <p style="text-align: right;">Fig. 30</p> |

Connectors wiring diagrams

● Single stage burner's connectors:

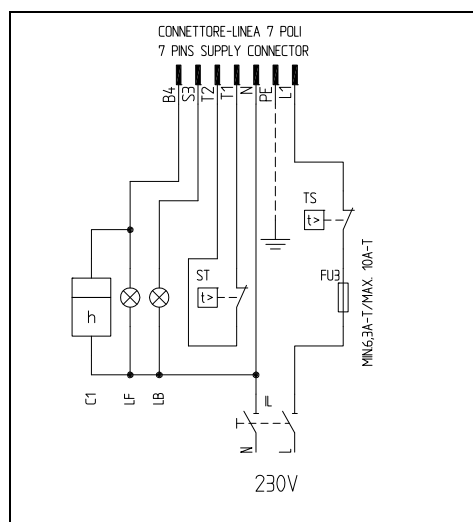
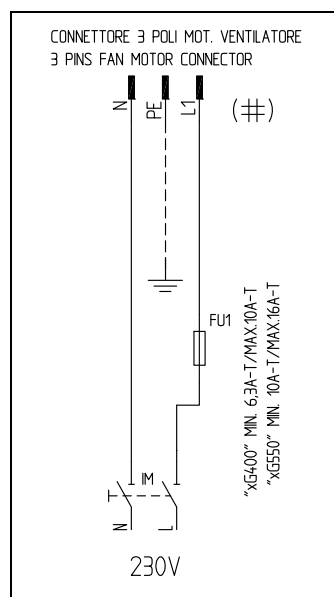


Fig. 31 - 7-pins connector

Fig. 32 - Electric motor's 3-pins connector
NG/LG/NGX400

● Progressive burners' connectors:

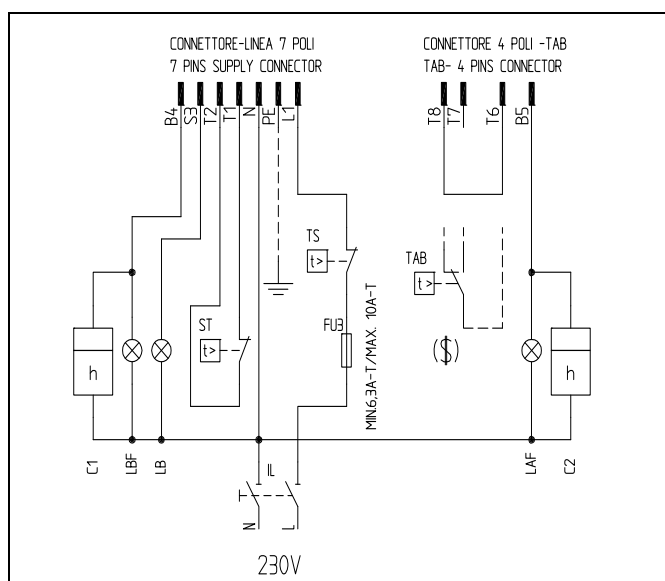
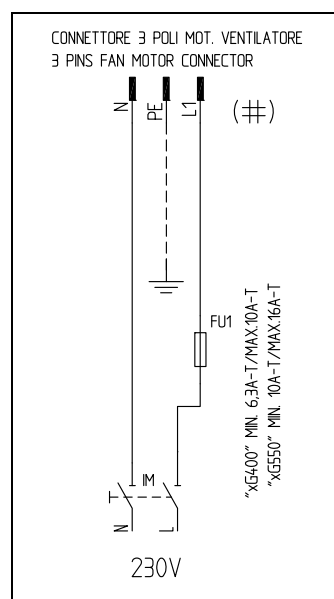


Fig. 33 - 7-pin and 4-pin connectors

Fig. 34 Electric motor's 3-pin connector for
NG/LG/NGX400

Key

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

| | |
|-------------|---|
| LBF | BURNER IN LOW FLAME SIGNALLING LAMP |
| MV | FAN MOTOR |
| ST | THERMOSTATS O PRESSURE SWITCHES SERIE |
| TAB | HIGH LOW FLAME THERMOSTAT/PRESSURE SWITCH |
| TS | SAFETY THERMOSTAT/PRESSURE SWITCH |
| CONN-MOTORE | FAN MOTOR CONNECTOR |
| CONN-LINEA | BURNER POWER SUPPLY CONNNECTOR |
| CONN-TAB | HIGH-LOW FLAME CONNECTOR |

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

● **Fully-modulating burners' connectors:**

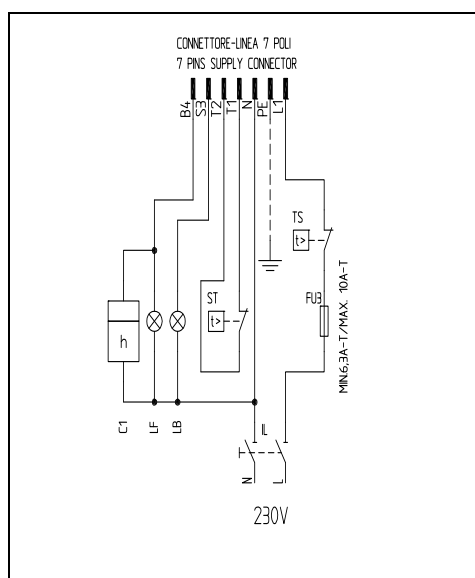


Fig. 35 - 7-pin connector

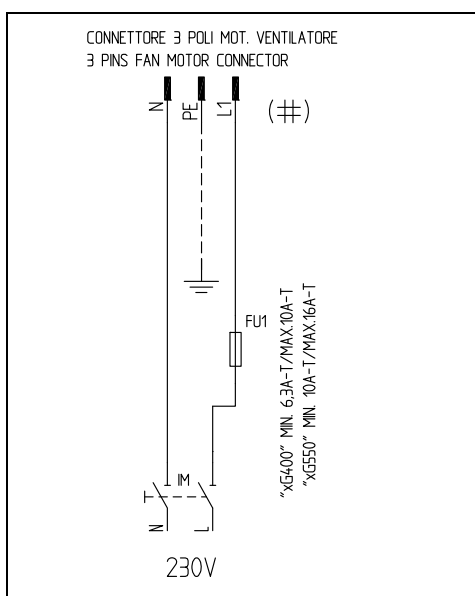


Fig. 36 - Electric motor's 3-pin connector for NG/LG/NGXG400

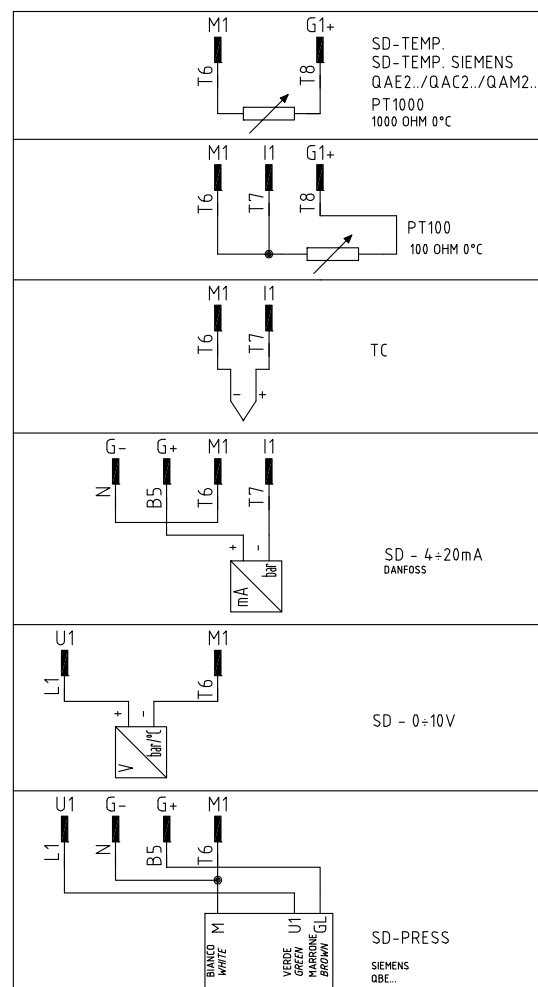


Fig. 37 - Probes connection

Key

| | |
|--------------|----------------------------|
| C1 | LOW FLAME TIME METER |
| FU1 | LINE FUSE FOR FAN MOTOR |
| FU3 | LINE FUSE |
| FU4 | AUXILIARY FUSE |
| IL | BURNER LINE SWITCH |
| IM | FAN MOTOR LINE SWITCH |
| KM1 | FAN MOTOR REMOTE CONTACTOR |
| LANDIS RWF40 | MODULATION REGULATOR |

| | |
|-------------|--|
| LB | BURNER LOCKOUT SIGNALLING LAMP |
| LBF | BURNER IN LOW FLAME SIGNALLING LAMP |
| MV | FAN MOTOR |
| SD-0÷10V | VOLTAGE SIGNAL |
| SD-0/4÷20mA | CURRENT SIGNAL |
| SD-PRESS | PRESSURE PROBE |
| SMA | MAN/AUTO SELECTOR |
| SMF | OPERATION SELECTOR MIN-0-MAX |
| ST | PRESSURE SWITCHES OR THERMOSTATS SERIE |
| TS | SAFETY THERMOSTAT/PRESSURE SWITCH |

Power supply without neutral

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

Key

C - Capacitor (22nF/250V)

R - Resistor (1Mohm)

(***) RC466890660 - RC Siemens filter

(Code: 2531003)

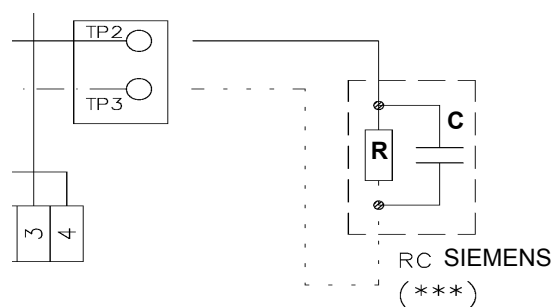
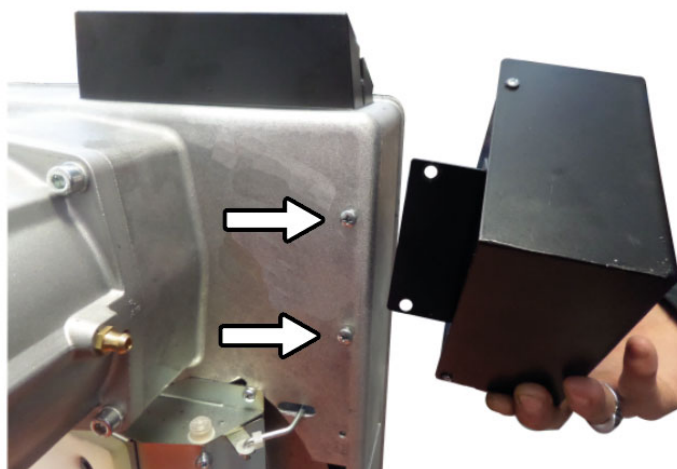
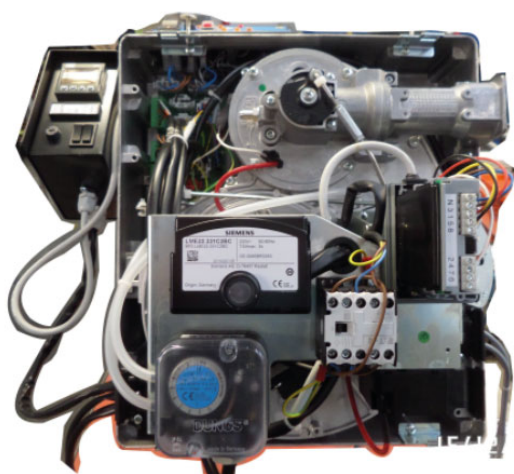


Fig. 38

Mounting the control stand



Mount as shown in the figure

PART III: OPERATION**LIMITATIONS OF USE**

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

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

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

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

NEVER OPEN OR DISMANTLE ANY COMPONENT OF THE MACHINE.

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

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

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

OPERATION

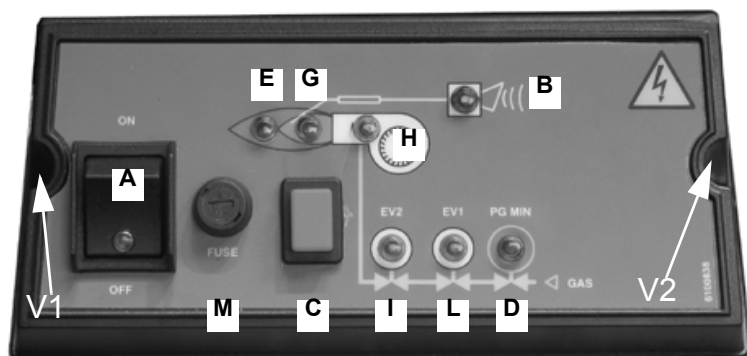


Fig. 39 - Burner's control panel

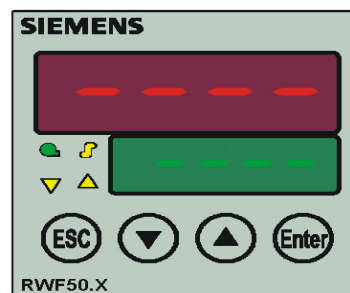


Fig. 40 - RFW50 Burner modulator

Key -

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

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

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

To reset the device operate on the device pushbutton.

All burners

- When the startup cycle begins, the servocontrol drives the air damper to the maximum opening position, the fan motor starts and the pre-purge phase begins.

During the pre-purge phase, the complete opening of the air damper is signalled by the light E on the frontal panel of the electrical board.

- At the end of the pre-purge phase, the air damper goes to the ignition position, the ignition transformer comes on (signalled by the light H) and 3 seconds later the solenoid valves EV1 and EV2 are energized (lights L and I on the front panel).
- Few seconds after the opening of the valves, the ignition transformer comes off and the lamp H turns off; subsequently:

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

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

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

GAS AND AIR FLOW RATE SETTINGS

| | |
|--|--|
| | ATTENTION: before starting the burner up, be sure that the manual cutoff valves are open and check that the pressure upstream the gas train complies the value quoted on paragraph "Technical specifications". Be sure that the mains switch is closed. |
| | ATTENTION: During commissioning operations, do not let the burner operate with insufficient air flow (danger of formation of carbon monoxide); if this should happen, make the fuel decrease slowly until the normal combustion values are achieved. |
| | WARNING: NEVER LOOSE THE SEALED SCREWS! OTHERWISE, THE DEVICE WARRANTY WILL BE INVALIDATE! |

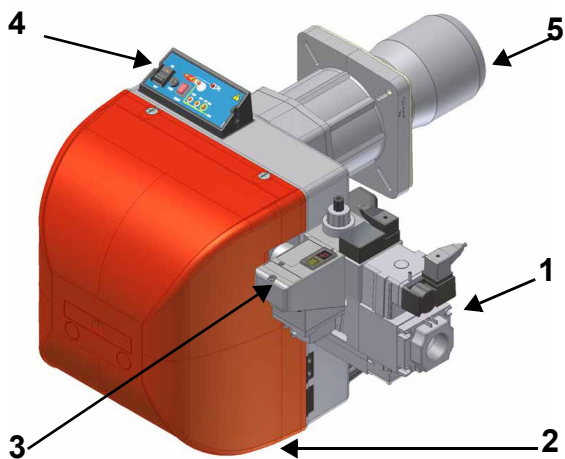



Fig. 41

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

To perform the adjustments, unscrew the fixing screws and remove the burner’s cover (see Fig. 41-2)

Startup Output

The start-up heat output shall not exceed 120 kW (single stage burners) or 1/3 of nominal output (double-stage, progressive or fully modulating burners). In order to comply with these requirements, burners are provided with butterfly valve and/or slow-opening safety valve. On double-stage, progressive or modulating burners, the low flame output must be higher than the minimum output quoted in the performance curve (page 12).

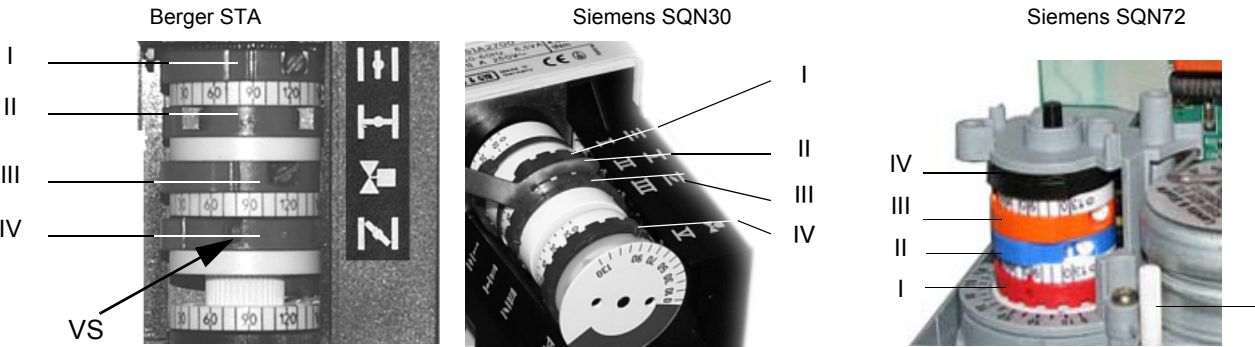


IMPORTANT! the combustion air excess must be adjusted according to the in the following chart:

| Recommended combustion parameters | | |
|-----------------------------------|---------------------------------|--------------------------------|
| Fuel | Recommended (%) CO ₂ | Recommended (%) O ₂ |
| Natural gas | 9 ÷ 10 | 4.8 ÷ 3 |
| LPG | 11 ÷ 12 | 4.3 ÷ 2.8 |

Actuator

As for the setting, refer to this correspondence table.



| | BERGER STA | Siemens SQN30 | Siemens SQN72 |
|----------------------------------|------------|---------------|---------------|
| High flame position (set to 90°) | I | I | I (red) |
| Low flame and ignition position | IV | III | III (orange) |
| Stand-by position (set to 0°) | II | II | II (blue) |
| Not used | III | V | IV (black) |

- .Berger STA12: On this actuator, the manual control of the air damper is not provided; the setting of the cams is carried out working with a screwdriver on the **VS** screw placed internally to the cam..
- Siemens SQN72: a key is provided to move cams I and IV, the other cams can be moved by means of screws. On the Siemens actuator the AUTO/MAN mode is provided (see picture).

AUTO/MAN

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.

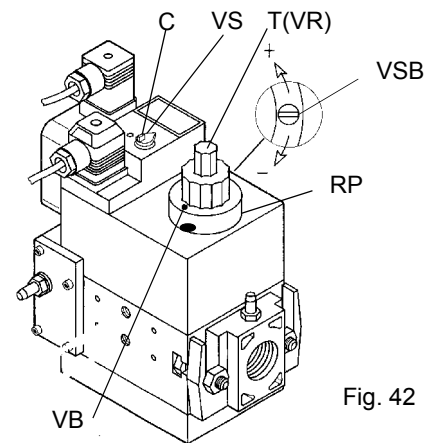


Fig. 42

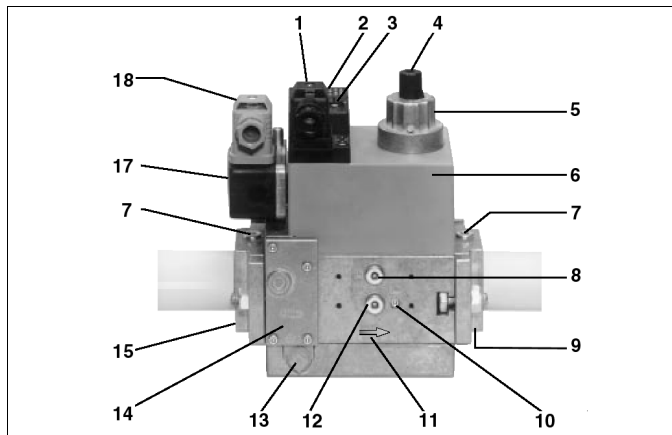


Fig. 43

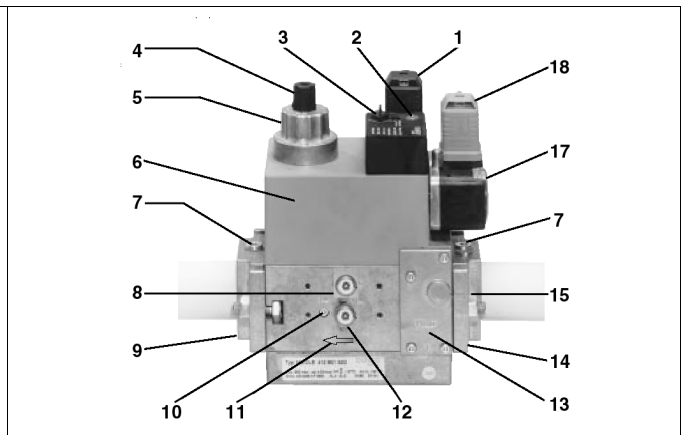


Fig. 44

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 |

Combustion head

The burner is adjusted in the factory with the combustion head in the position that refers to the "MAX" output. The maximum output setting refers to the "fully-ahead" position of the combustion head, as far as standard models (Fig. 48), and to "fully-backward" position for low NOx burners (Fig. 47). As for "fully-ahead" position, it means that the head is placed inside the boiler, "fully-backward" position means that the head is towards the operator. As far as the reduced output operation, progressively move the combustion head towards the "MIN" position, rotating clockwise the **VRT** screw (Fig. 45). The **ID** index shows how much the combustion head moved.

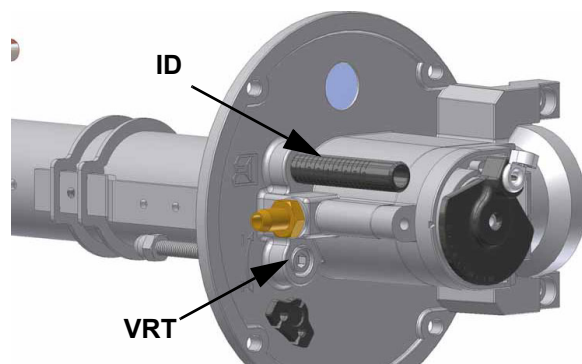


Fig. 45

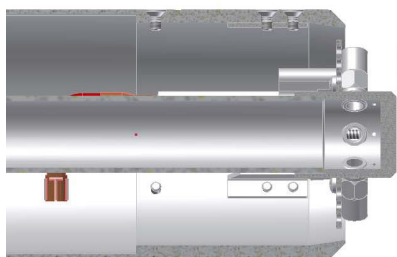


Fig. 46 - Head in "fully-ahead position"

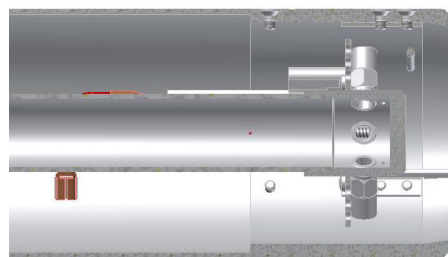


Fig. 47 - Head in "fully-backward position"

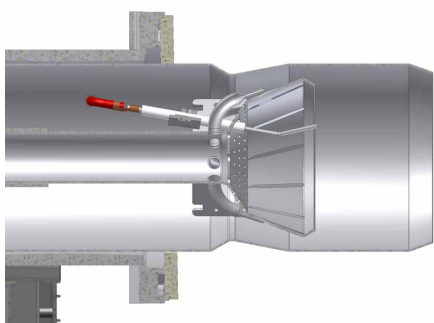


Fig. 48 - Head in "fully-ahead position"

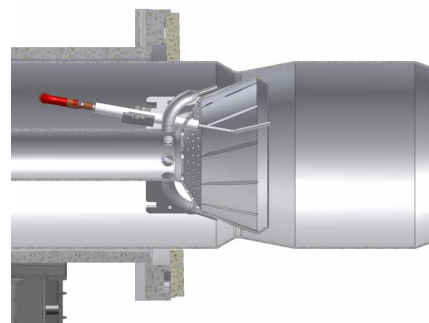


Fig. 49 - Head in "fully-backward position"

Adjustment procedure

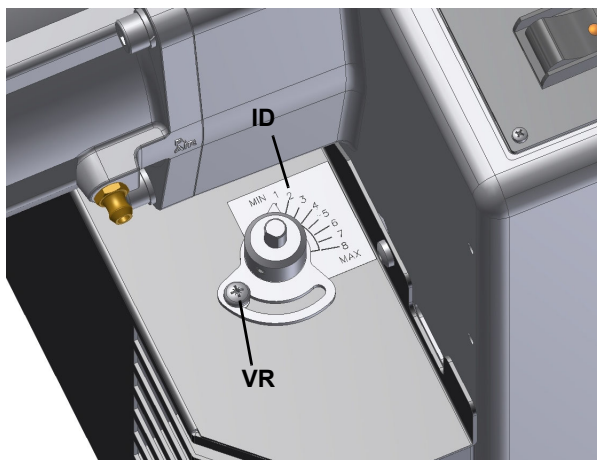
To change the burner setting during the testing in the plant, follows the next procedure, according to the burner operation.

⚠ 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;

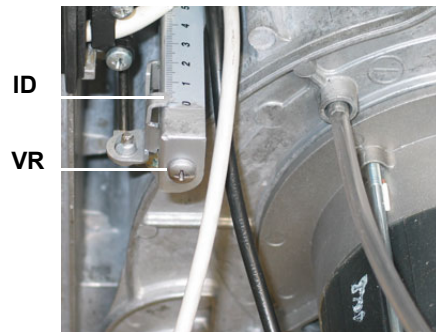
⚠ Pressure governor is factory-set. The setting values must be locally adapted to machine conditions. Important! Follow the instructions of the burner manufacturer!

● Adjustements for single-stage burners

- 1 remove the burner cover
- 2 startup the burner by turning its main switch **A** to on: if the burner locks (LED **B** on in the control panel) press the RESET button (**C**) on the control panel (Fig. 36).
- 3 loosen **VR** screw (see picture). Move the **ID** index towards + or -, in order to increase or decrease the air flow-rate, according to the required combustion values; Fasten the **VR** screw again.
- 4 Acting on the pressure stabilizer of the valves group (see "Adjusting the gas valves group" on page 38) adjust the gas flow rate



LG/NG/NGX280 - TN



LG/NG/NGX350-400 TN

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

- 1 remove the burner cover
- 2 Before starting the burner up, drive the high flame actuator microswitch matching the low flame one (in order to let the burner operates at the lowest output) to safely achieve the high flame stage
- 3 startup the burner by turning its main switch **A** to on: if the burner locks (LED **B** on in the control panel) press the RESET button (**C**) on the control panel (Fig. 36).
- 4 Move the high flame cam of the servocontrol to open the servocontrol by a few degrees. The servocontrol opens the gas throttle valve by means of the L linkage and at the same time it opens the air damper by means of the cam shown in Fig. 49
- 5 If necessary, after checking that the combustion complies with the recommended parameters in the table in the "Ignition power" section. Adjust the position of the air damper by acting on the slotted cam. "Startup Output". (Fig. 49)
- 6 Proceed in this way until the maximum opening of the servocontrol is reached.
- 7 Acting on the pressure stabilizer of the valves group (see "Adjusting the gas valves group" on page 38) adjust the gas flow rate
- 8 Adjust the position of the combustion head if necessary (see section "Combustion Head").
- 9 Once the combustion point has been adjusted to a high flame, turn the burner to a low flame using the high/low thermostat. TAB of the boiler, checking the combustion point by point.
- 10 To eventually change the gas flow rate, set at step 6, slacken the screw **V1** (see picture) and set the opening angle of the butterfly valve rotating the round plate **C** by means of the screw **V3** (turn clockwise to decrease the gas rate or counterclockwise to increase it). The index **S** shows the opening angle of the butterfly valve.
- 11 Check combustion and burner gas flow in high flame again.

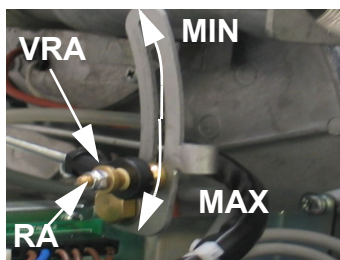


Fig. 49

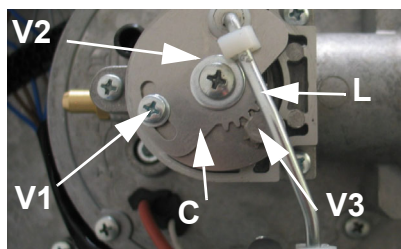


Fig. 50

Note: If it should be necessary to adjust the rating of the burner in low flame operation, once all the adjustments are accomplished, act on the related cam of the actuator. Then, check the gas rate and, eventually, repeat previous steps.

● **Progressive or fully-modulating burners**

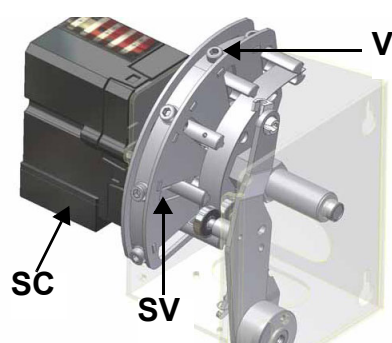
- 1 Before starting the burner up, drive the high flame actuator microswitch matching the low flame one (in order to let the burner operates at the lowest output) to safely achieve the high flame stage.
- 2 startup the burner by turning its main switch **A** to on: if the burner locks (LED **B** on in the control panel) press the RESET button (**C**) on the control panel (Fig. 36).
- 3 drive the burner to high flame stage, by means of the thermostat **TAB** (high/low flame thermostat - see Wiring diagrams), as far as fully-modulating burners, see related paragraph.
- 4 Then move progressively the microswitch to higher values until it reaches the high flame position; always check the combustion values and eventually adjusting the gas by means of the valves group stabiliser.

To adjust the air flow rate, follow this procedure: find the **V** screw on the adjusting cam **SV** (see next picture), matching with the bearings that move along the foil and related to the servocontrol position. unscrew the **V** screw to increase the air flow rate, unscrew to decrease it

To adjust the gas flow rate, act on the pressure stabilizer of the valves group (see "Adjusting the gas valves group" on page 38)

- 5 Once the high flame position is reached, open the gas valve completely. To reach the required flow rate act on the stabilizer
- 6 Adjust, if necessary, the position of the combustion head(see paragraph)
- 7 Check combustion parameters and, if necessary, adjust the air flow rate or gas pressure as described above.
- 8 once the maximum flow rate is fixed, shortcircuit for a while, the thermostat **TAB** T6 and T7 terminals (see pag. 45). As far as the fully-modulating models, see next paragraph. The actuator will move towards the low flame position; then remove the bridge;
- 9 then adjust the screw **V** related to that position;
- 10 repeat all these instructions for all the actuator stroke, in order to define the foil shape.

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



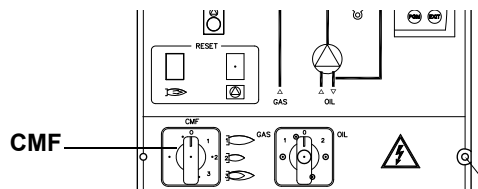
DOUBLE-STAGE-PROGRESSIVE-FULLY-MODULATING

Fully modulating burners

To adjust the 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.

To move the adjusting cam set CMF=1 or 2 and then CMF=0.



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

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.

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

- 1 turn off gas supply.;
- 2 Switch off power supply.
- 3 remove the Multibloc's screw plugs (Fig. 52-A);
- 4 insert sealing rings (10,5 x 2,25) into VPS 504 (Fig. 53-B, Fig. 52-B)
- 5 Torque screws 3, 4, 5, 6 (M4 x16) Fig. 52-C

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

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

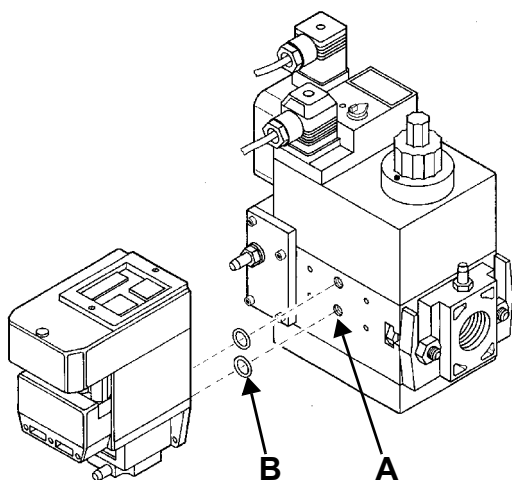


Fig. 52

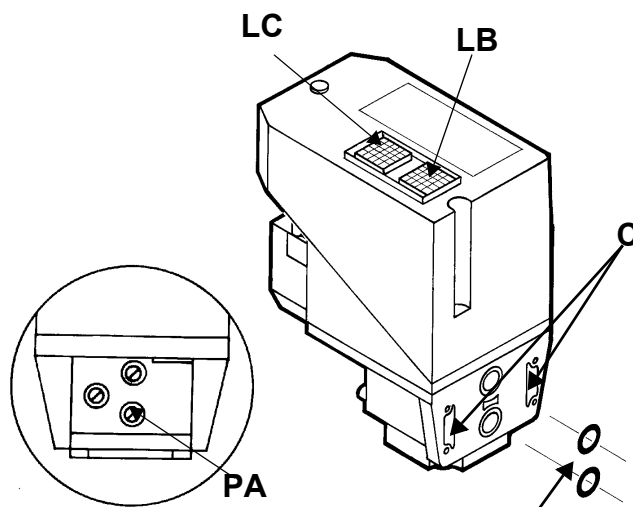


Fig. 53

When wishing to monitor the test, install a pressure gauge ranged to that of the pressure supply point **PA** (Fig. 53). If the test cycle is satisfactory, after a few seconds the consent light **LC** (yellow) comes on. In the opposite case the lockout light **LB** (red) comes on. To restart it is necessary to reset the appliance by pressing the illuminated pushbutton **LB**.

Calibration of air and gas pressure switches

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

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

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

Calibration is carried out as follows:

- Remove the transparent plastic cap.
- Once air and gas setting have been accomplished, startup the burner.

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

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

To calibrate the air pressure switch, proceed as follows:

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

Calibration of low gas pressure switch

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

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



Fig. 54

Adjusting the maximum gas pressure switch (when provided)

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

- 1 remove the pressure switch plastic cover;
- 2 if the maximum pressure switch is mounted 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%.
- 3 if the maximum pressure switch is mounted downstream the "gas governor-gas valves" group and upstream the butterfly valve: light the burner, adjust it according to the procedure in the previous 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%;
- 4 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.



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

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

ROUTINE MAINTENANCE

- Clean and examining the gas filter cartridge, if necessary replace it (Fig. 55 on).
- Removal, examination and cleaning of the combustion head.
- Check the ignition and detection electrodes, clean and adjust if necessary (see Fig. 66). In case of doubt, check the detection current according to the schemes in Fig. 65.
- Cleaning and greasing of sliding and rotating parts.



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

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

- Check the filter at least once a year!
- Change the filter if the pressure difference between pressure connection 1 and 3 (Fig. 55-Fig. 56) is $\Delta p > 10$ mbar.
- Change the filter if the pressure difference between pressure connection 1 and 3 (Fig. 55-Fig. 56) 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. 57.
- 3 Remove the filter 6 and replace with a new one.
- 4 Replace filter cover 5 and tighten screws 1 ÷ 4 without using any force and fasten.
- 5 Perform leakage and functional test, $p_{\max.} = 360$ mbar.
- 6 Pay attention that dirt does not fall inside the valve.

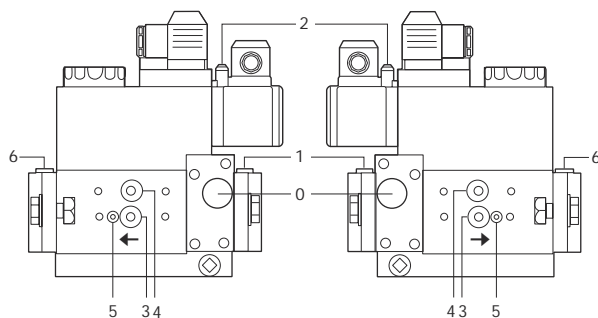


Fig. 55

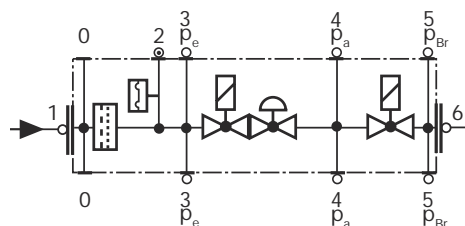


Fig. 56

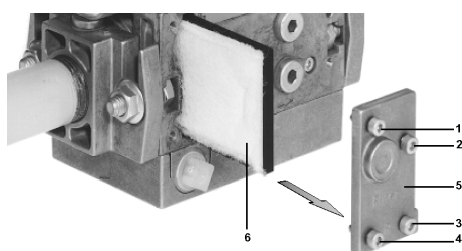


Fig. 57

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

- Check the filter at least once a year!
- Change the filter if the pressure difference between pressure connection 1 and 2 (Fig. 58-Fig. 59) $\Delta p > 10$ mbar.
- Change the filter if the pressure difference between pressure connection 1 and 2 (Fig. 58-Fig. 59) is twice as high compared to the last check.

You can change the filter without removing the fitting.

- 1 Interrupt the gas supply closing the on-off valve.
- 2 Remove screws 1 ÷ 6 (Fig. 60).
- 3 Change filter insert.
- 4 Re-insert filter housing, screw in screws 1 ÷ 6 without using any force and fasten.
- 5 Perform leakage and functional test, $p_{\max.} = 360$ mbar.
- 6 Pay attention that dirt does not fall inside the valve.

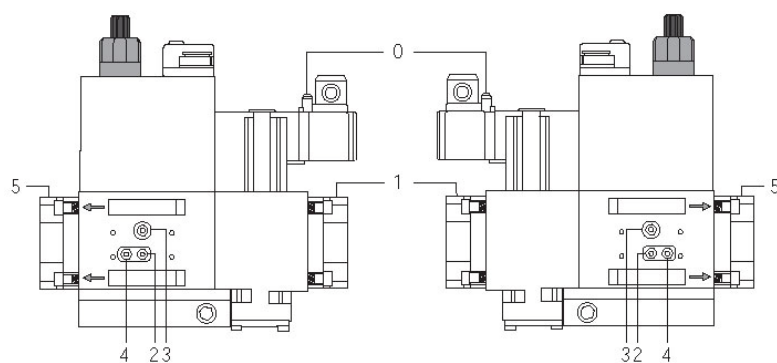


Fig. 58

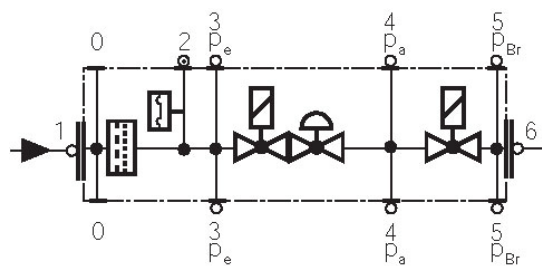


Fig. 59

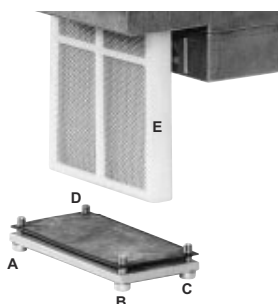


Fig. 60

Removing and cleaning the combustion head

- 1 By means of the plastic hook **G**, unlock the rod **T** (Fig. 61) which drives the butterfly valve (Fig. 61 and Fig. 62), to disconnect it from its seat.
- 2 Remove the screws **V1**, **V2**, **V3**, **V4** and the screws **S1** and **S2** (Fig. 61).
- 3 Disconnect the ignition cable **CA** from the ignition transformer (Fig. 63).
- 4 Disconnect the connector **CR** (Fig. 64).

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

To remove the head, the operator must pull it towards himself. Once the combustion head is removed, check that the air and gas holes are not obstructed (Fig. 64 - H). Clean the combustion head by a compressed air blow or, in case of scale, scrape it off by a scratchbrush.

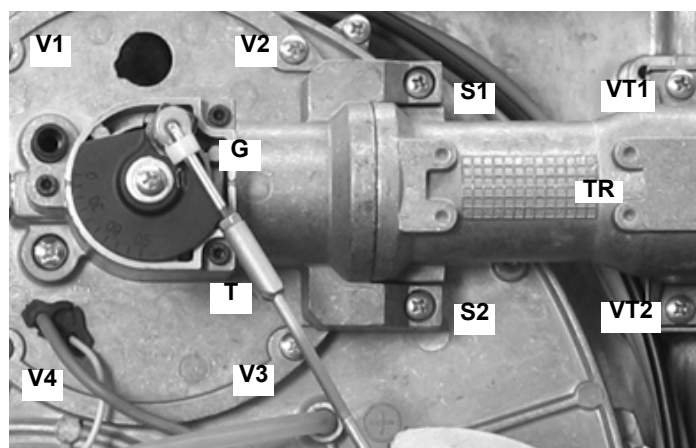


Fig. 61

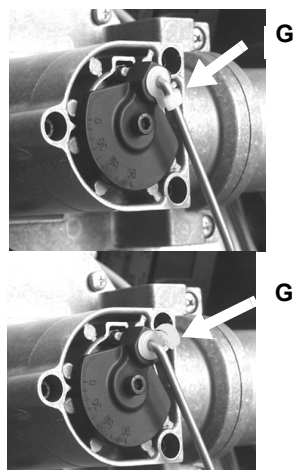


Fig. 62

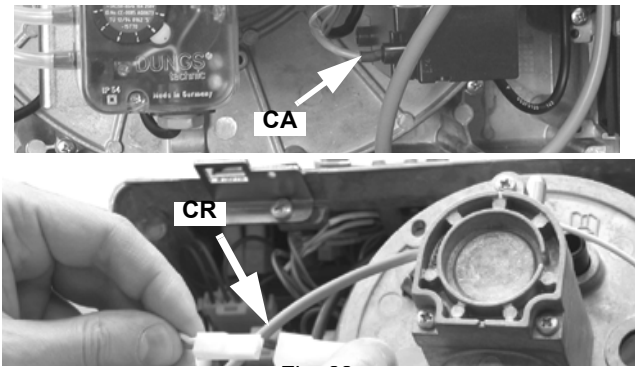


Fig. 63

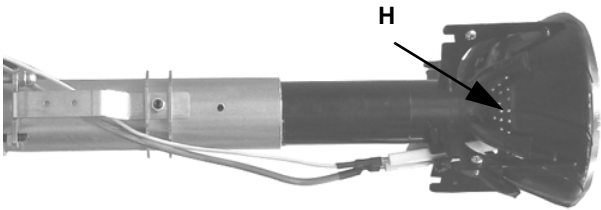


Fig. 64

Checking the detection current

If the burner locks, execute the following inspections. To measure the detection signals refer to the diagrams in Fig. 65 . If the signal is less than the value shown, check the position of the detection electrode, the electrical contacts and if necessary replace the detection electrode.

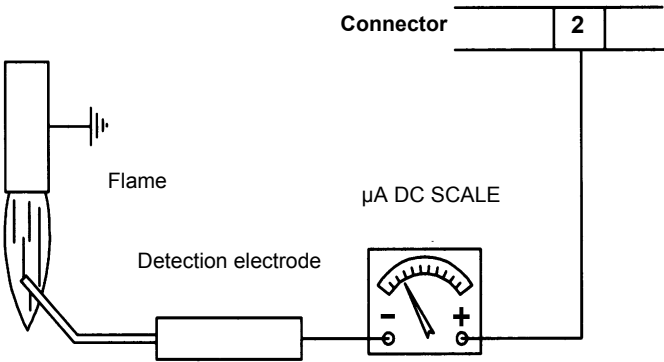
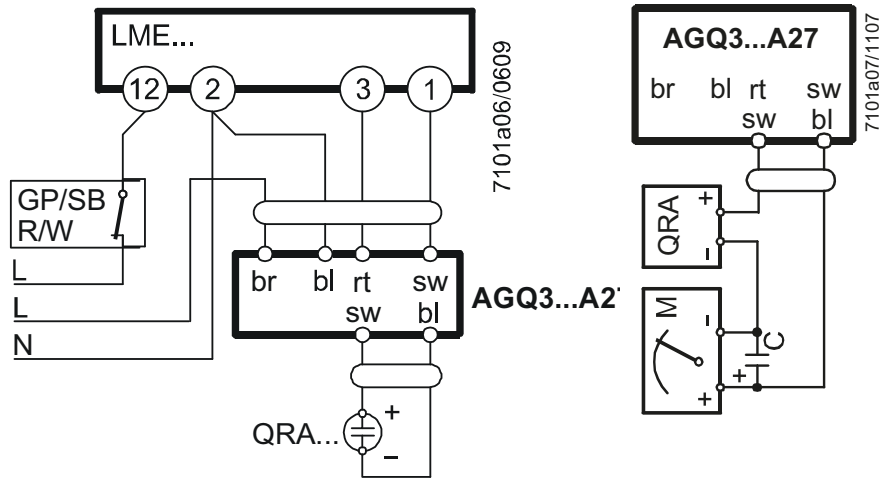


Fig. 65

| Control box | Minimum detection signal |
|------------------|--------------------------|
| Siemens LME21-22 | 3 µA |

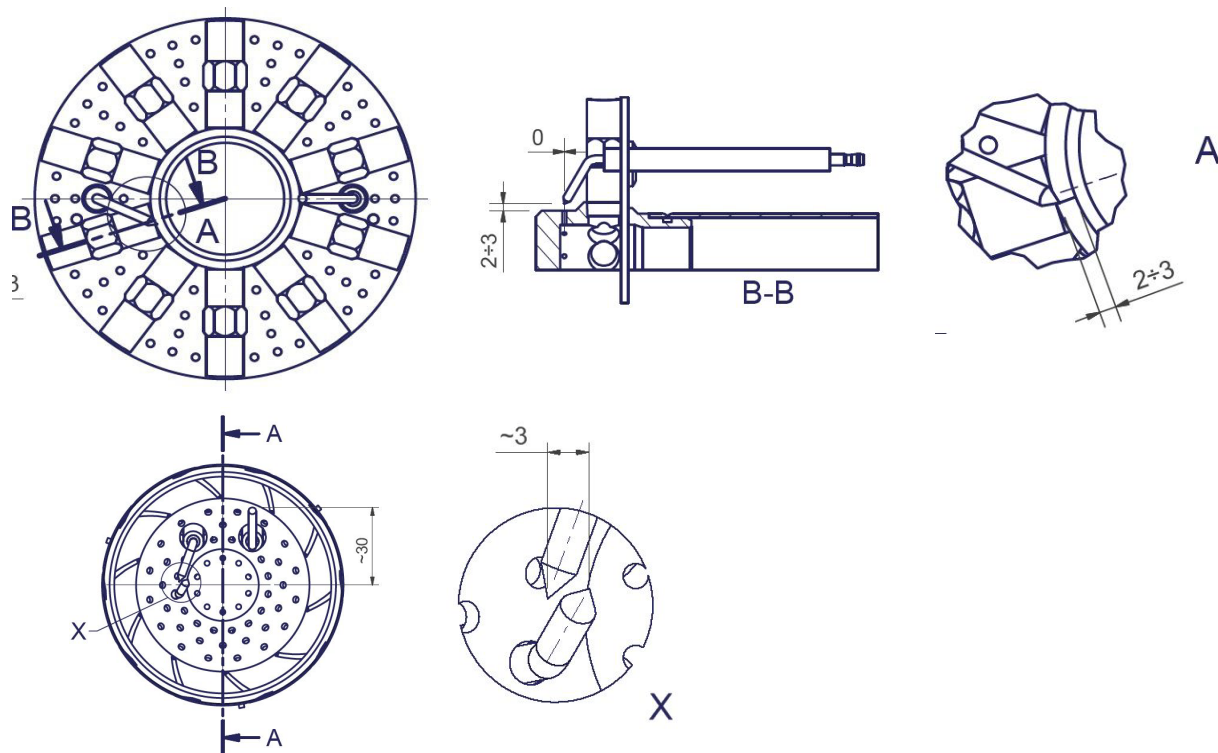
Flame supervision with QRA2 + ACQ3.1A27.. (just for LME2x ...)

| Device | Flame detector | Measure at the detector UV QRA... |
|---------------|----------------|-----------------------------------|
| Siemens LME2x | QRA2 | 200 µA |



Adjusting the electrodes position

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



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

Wiring diagrams (see attached document)

LG/NG/NGX 280 Single stage - Electric wiring diagrams - SE01-530

LG/NG/NGX 280 Double stage - Progressive - Electric wiring diagrams - SE18-103

LG/NG/NGX 350-400 Electric wiring diagrams - SE18-163, SE18-057

TROUBLESHOOTING

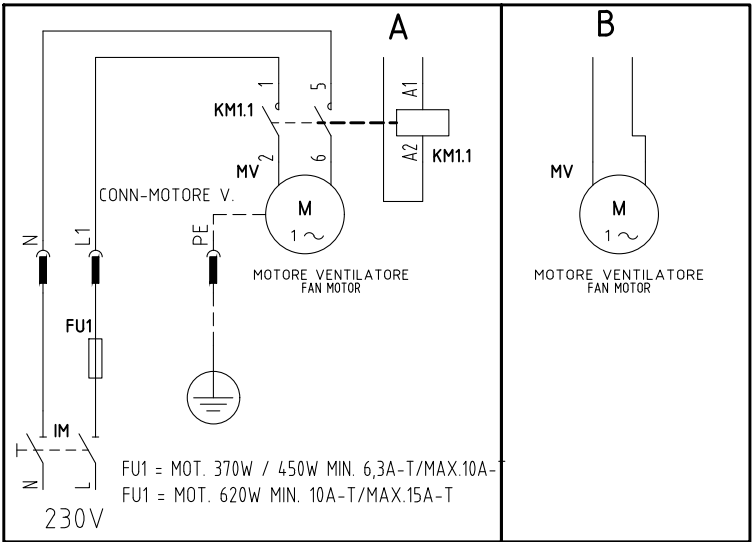
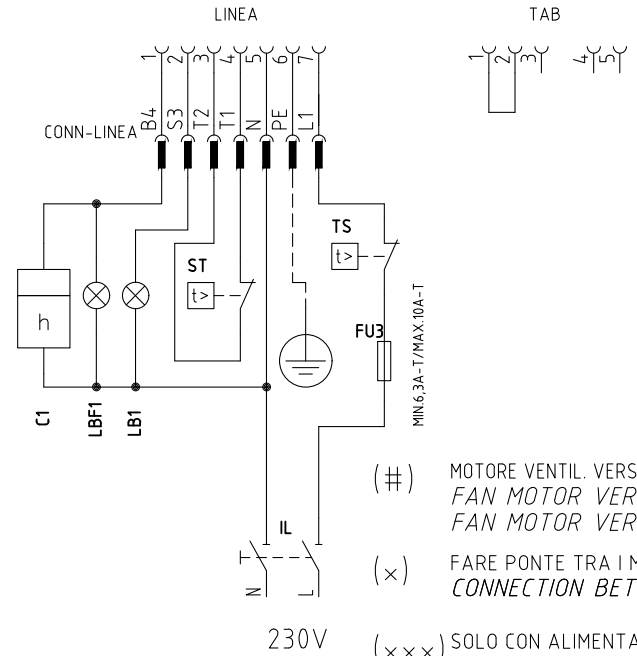
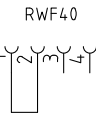
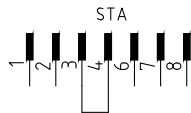
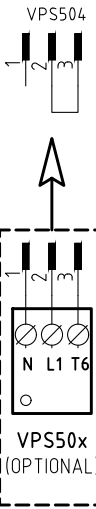
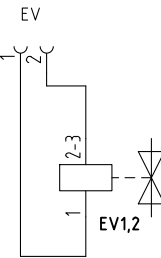
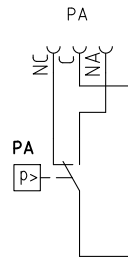
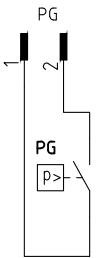
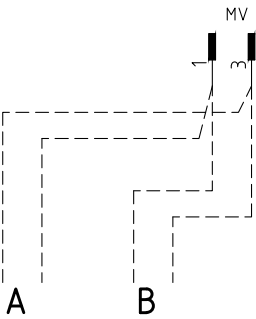
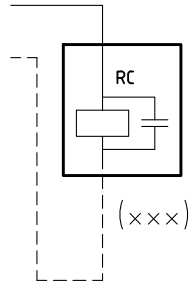
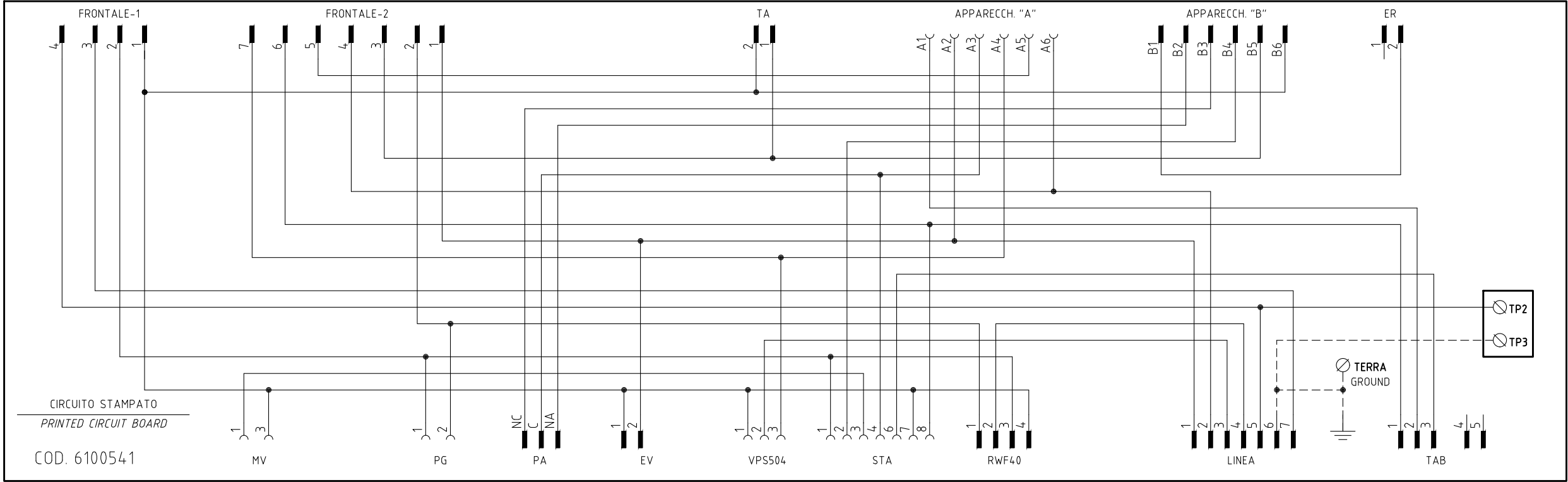
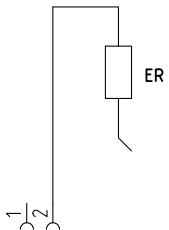
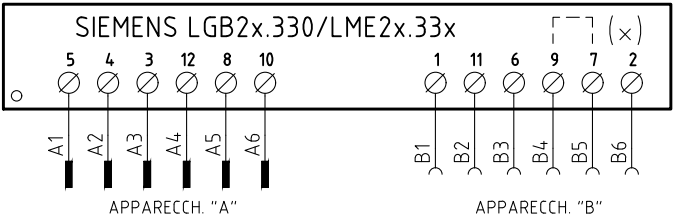
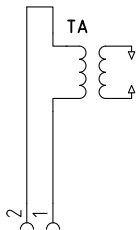
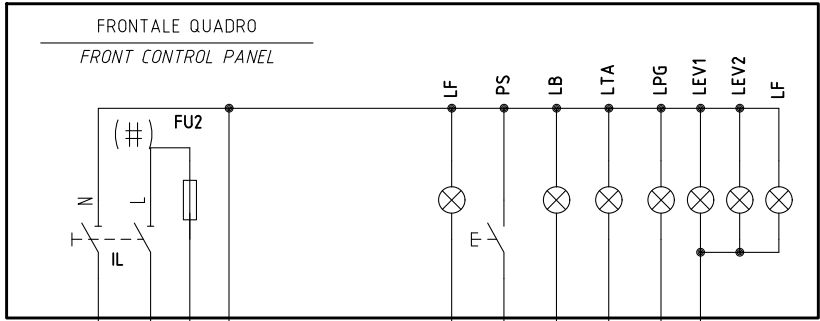
| CAUSE | TROUBLE | | | | | | | | | | | | |
|--|-----------------------------|-----------------------------|-------------------------------|--|---------------------------------|---------------------|--|---------------------------------|--------------------------------|---|------------------------------|--|--|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

1 = with any control box;

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

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

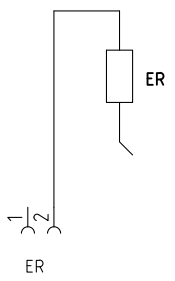
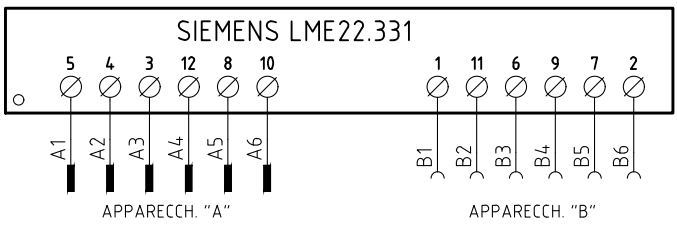
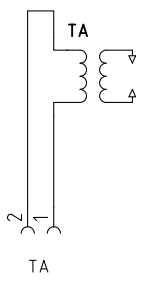
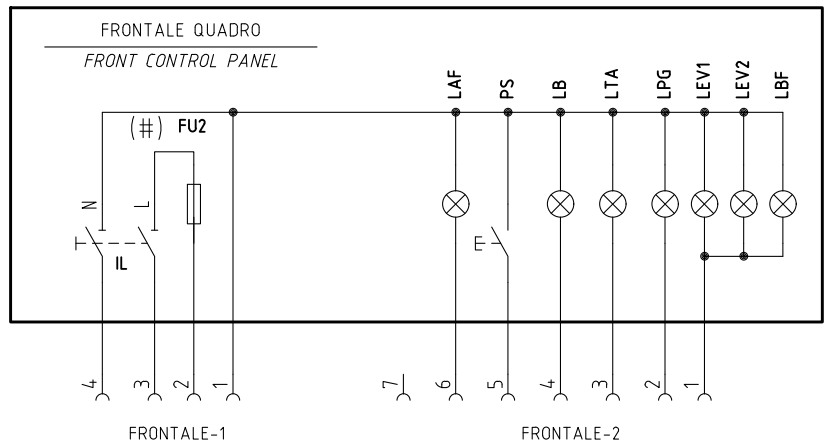
VERSIONE MONOSTADIO "TN"
"TN" SINGLE-STAGE VERSION



- (#) MOTORE VENTIL. VERSIONE [A], FU2 = 6,3A F; MOTORE VENTIL. VERSIONE [B], FU2 = 10A F
FAN MOTOR VERSION [A], FU2= 6,3 A F;
FAN MOTOR VERSION [B], FU2= 10 A F
- (x) FARE PONTE TRA I MORSETTI 7 E 9 SOLO CON LGB21.330
CONNECTION BETWEEN TERMINALS 7 AND 9 WITH LGB21.330 ONLY
- (xxx) SOLO CON ALIMENTAZIONE ELETTRICA SENZA NEUTRO
WITH ELECTRIC SUPPLY WITHOUT NEUTRAL VERSION ONLY

| | | | |
|-----------|------------|-------|--------|
| Data | 19/10/2010 | PREC. | FOGLIO |
| Revisione | 06 | / | 1 |
| Dis. N. | 18 - 0163 | SEGUE | TOTALE |
| | | 2 | 5 |

VERSIONE ALTA-BASSA FIAMMA "AB" / PROGRESSIVO "PR"
"AB" HIGH-LOW / "PR" PROGRESSIVE VERSION

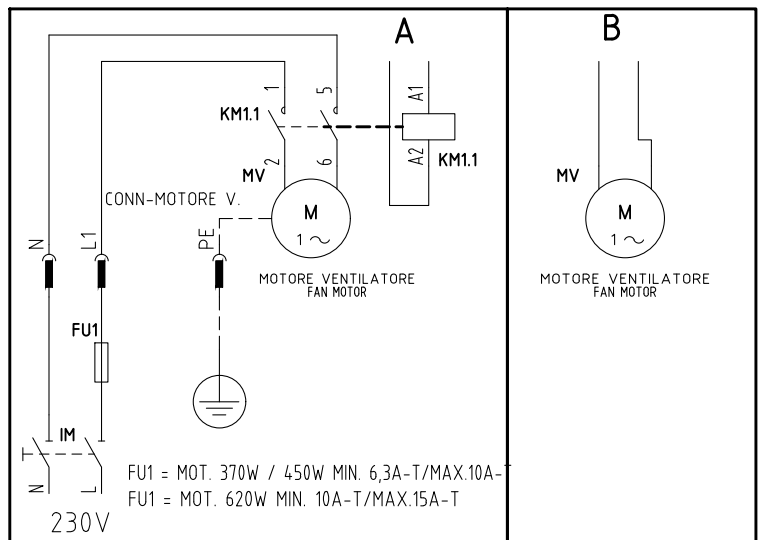
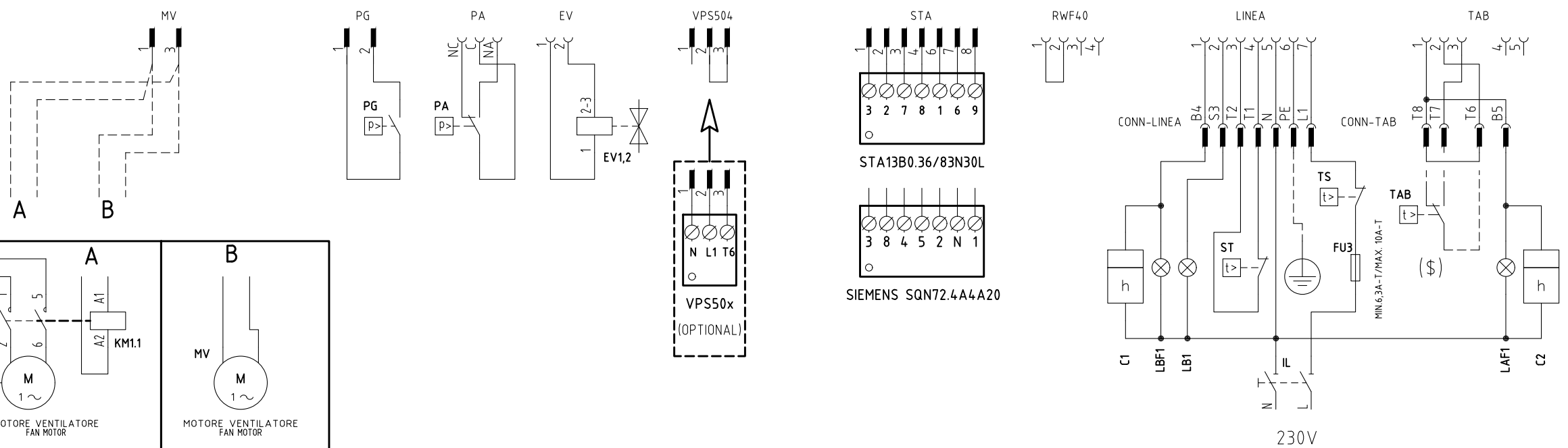
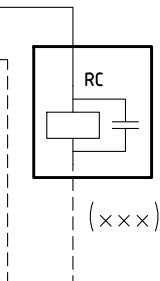
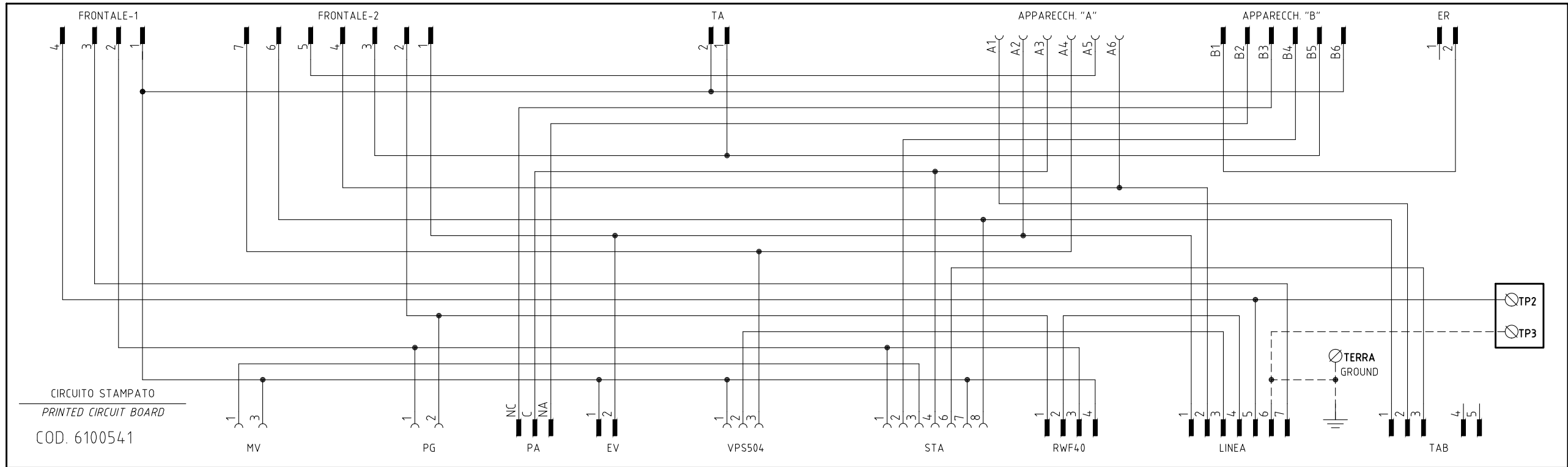


SERVOCOMANDO SERRANDA ARIA
AIR DAMPER ACTUATOR
STA13B0.36/83N30L

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

SERVOCOMANDO SERRANDA ARIA
AIR DAMPER ACTUATOR
SIEMENS SQN72.xA4A20

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

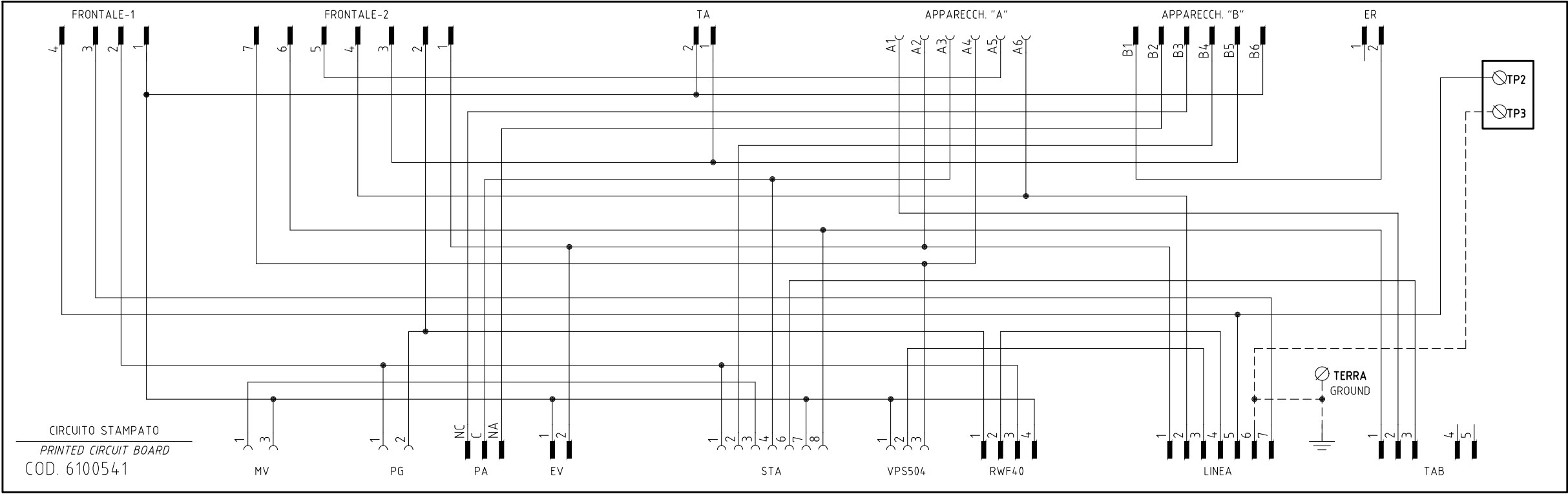
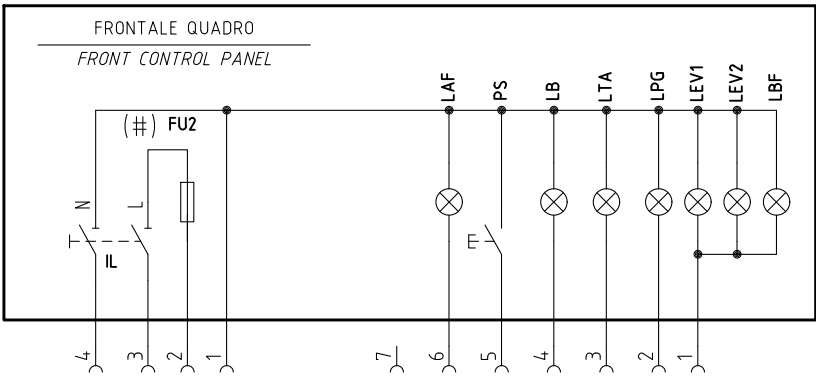


(#) MOTORE VENTIL. VERSIONE [A], FU2 = 6,3A F; MOTORE VENTIL. VERSIONE [B], FU2 = 10A F
FAN MOTOR VERSION [A], FU2= 6,3 A F;
FAN MOTOR VERSION [B], FU2= 10 A F

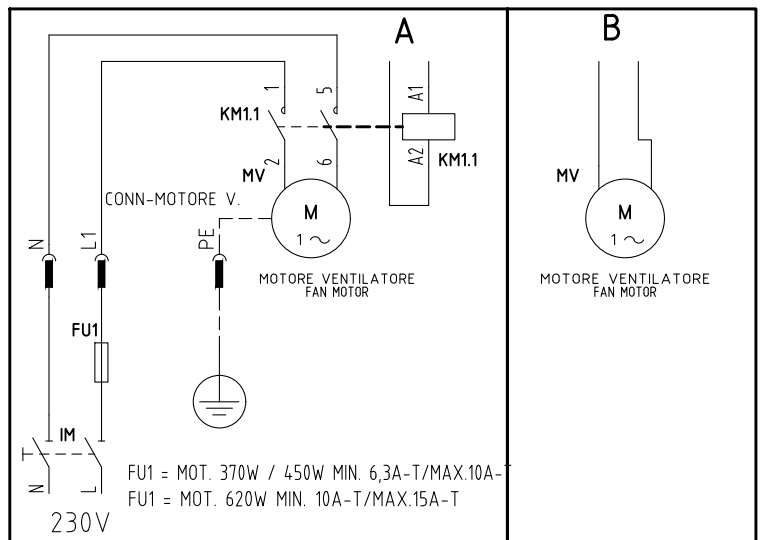
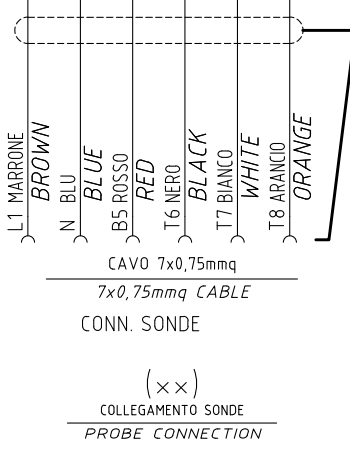
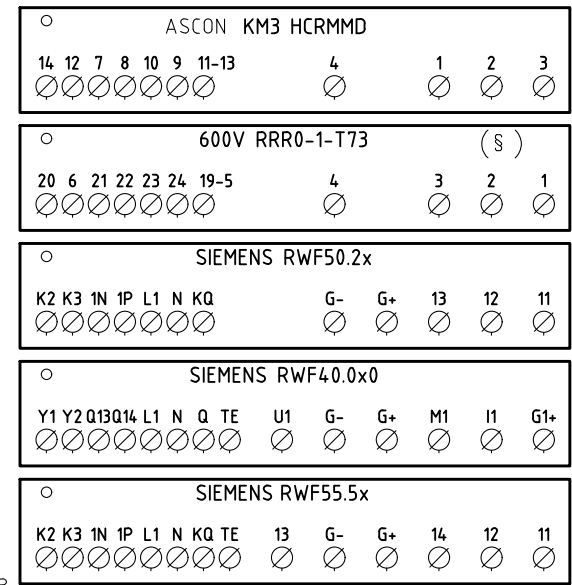
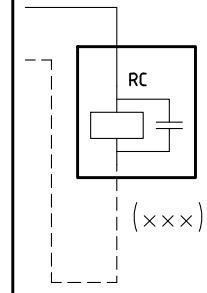
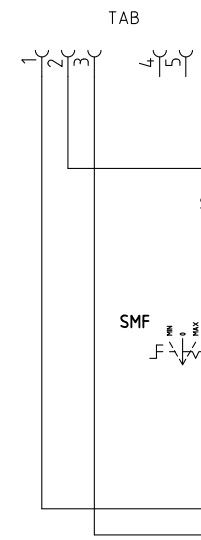
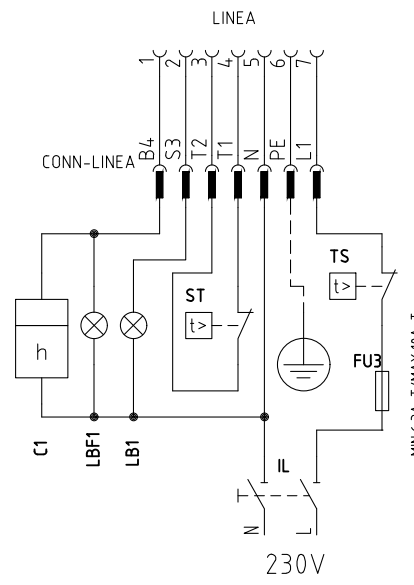
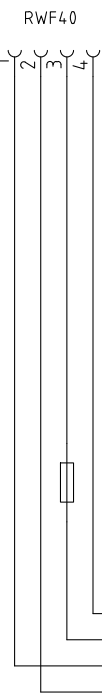
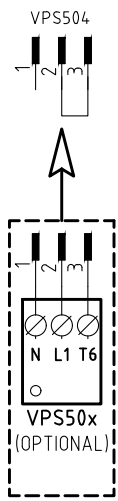
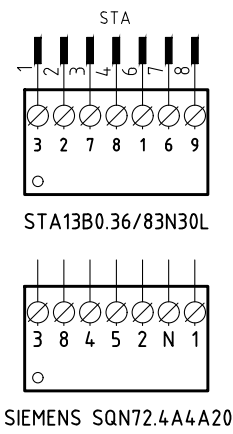
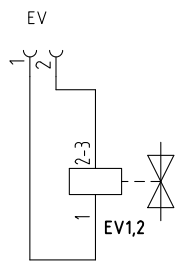
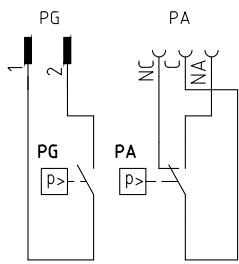
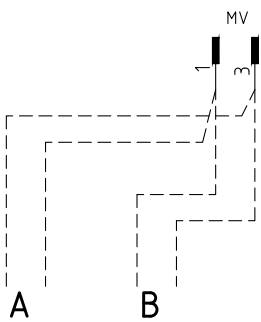
(x x x) SOLO CON ALIMENTAZIONE ELETTRICA SENZA NEUTRO
WITH ELECTRIC SUPPLY WITHOUT NEUTRAL VERSION ONLY

(\$) SE USATO "TAB", TOGLIERE IL PONTE TRA I MORSETTI T6-T8
IF USED "TAB", REMOVE THE BRIDGE BETWEEN TERMINALS T6-T8

| | | | |
|-----------|------------|-------|--------|
| Data | 19/10/2010 | PREC. | FOGLIO |
| Revisione | 06 | 1 | 2 |
| Dis. N. | 18 - 0163 | SEGUE | TOTALE |
| | | 3 | 5 |



CIRCUITO STAMPATO
PRINTED CIRCUIT BOARD
COD. 6100541



SERVOCOMANDO SERRANDA ARIA
AIR DAMPER ACTUATOR
STA13B0.36/83N30L
SIEMENS SQN72.xA4A20

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

(#) MOTORE VENTIL. VERSIONE [A], FU2 = 6,3A F; MOTORE VENTIL. VERSIONE [B], FU2 = 10A F
FAN MOTOR VERSION [A], FU2= 6,3 A F;
FAN MOTOR VERSION [B], FU2= 10 A F

(x x x) SOLO CON ALIMENTAZIONE ELETTRICA SENZA NEUTRO
WITH ELECTRIC SUPPLY WITHOUT NEUTRAL VERSION ONLY

VERSIONE MODULANTE "MD"
"MD"MODULATING VERSION

| | | | |
|-----------|------------|-------|--------|
| Data | 19/10/2010 | PREC. | FOGLIO |
| Revisione | 06 | 2 | 3 |
| Dis. N. | 18 - 0163 | SEGUE | TOTALE |
| | | 4 | 5 |

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

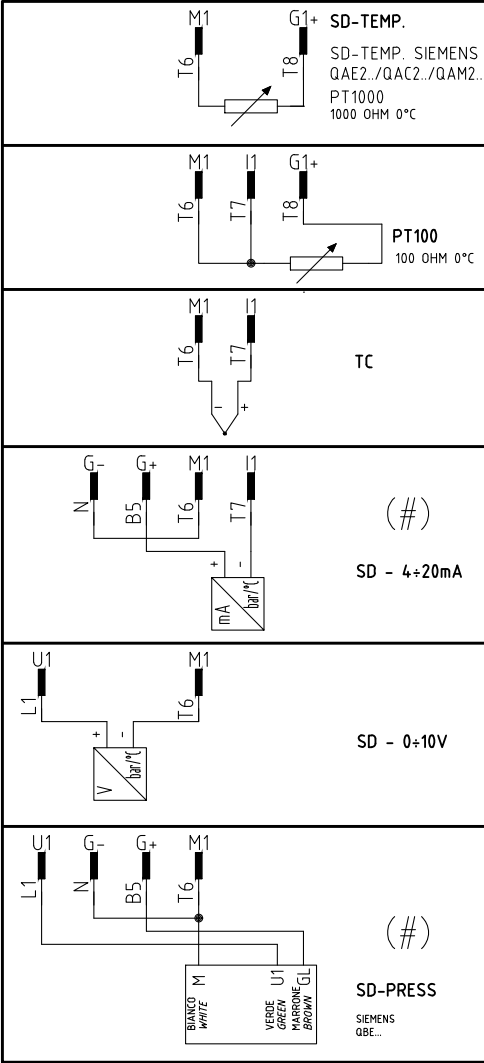
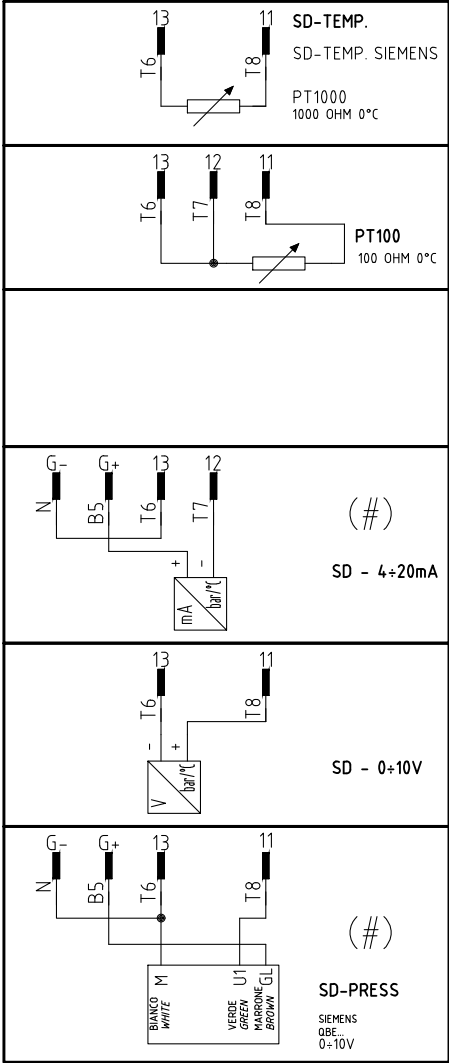
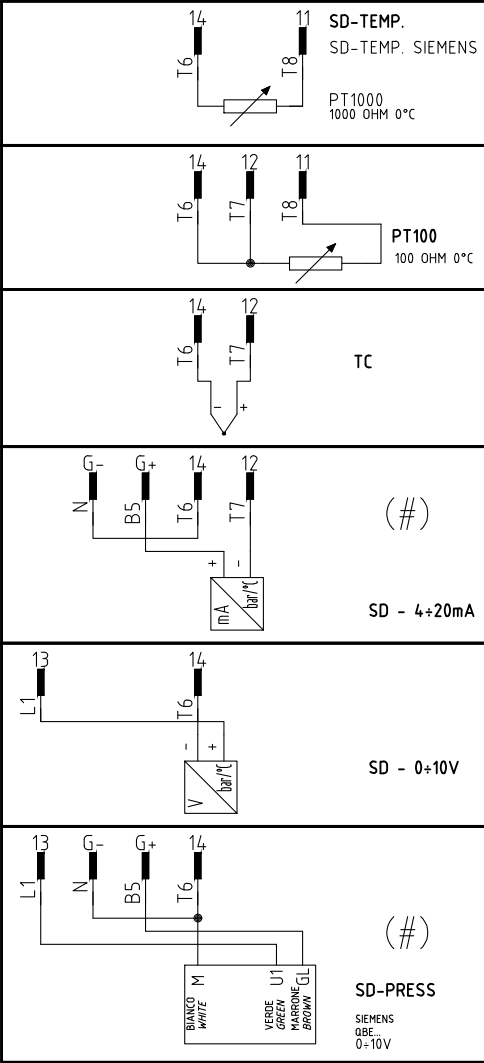
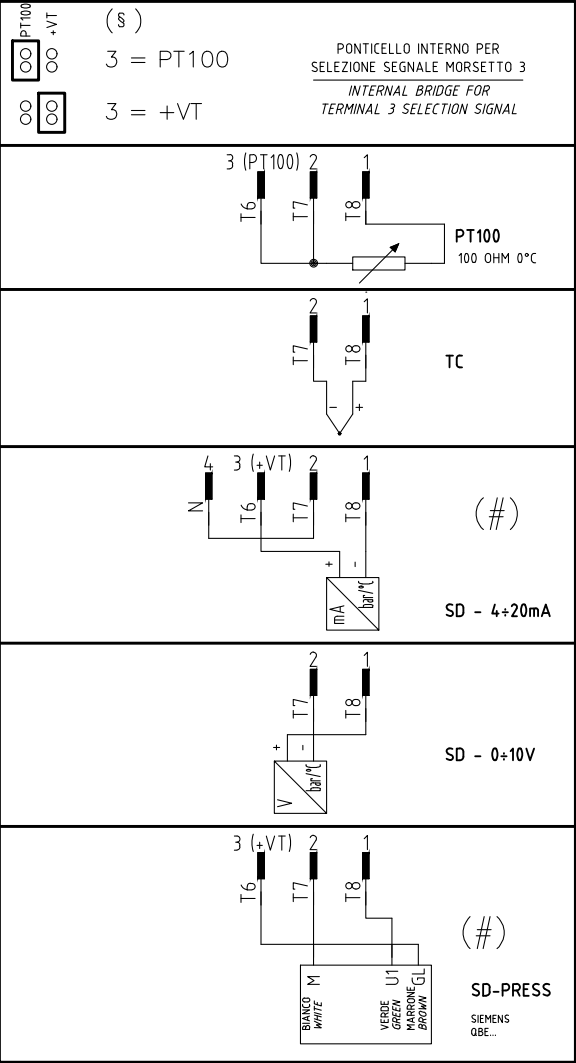
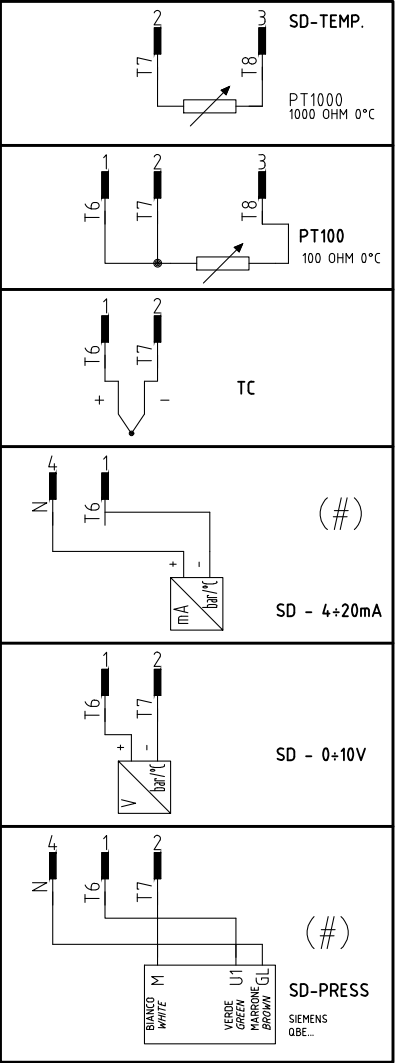
KM3 HCRMMD

600V RRR0-1-T73

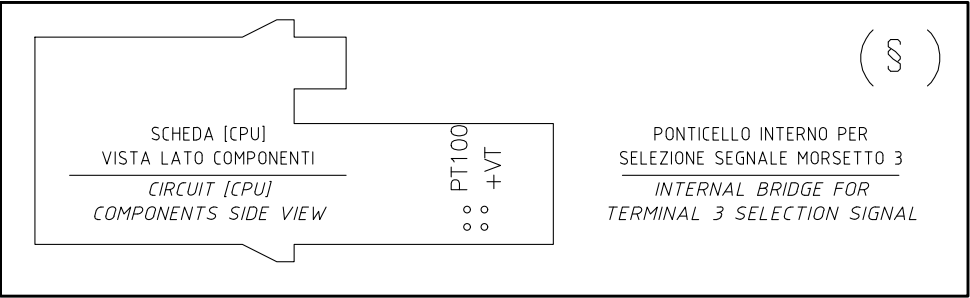
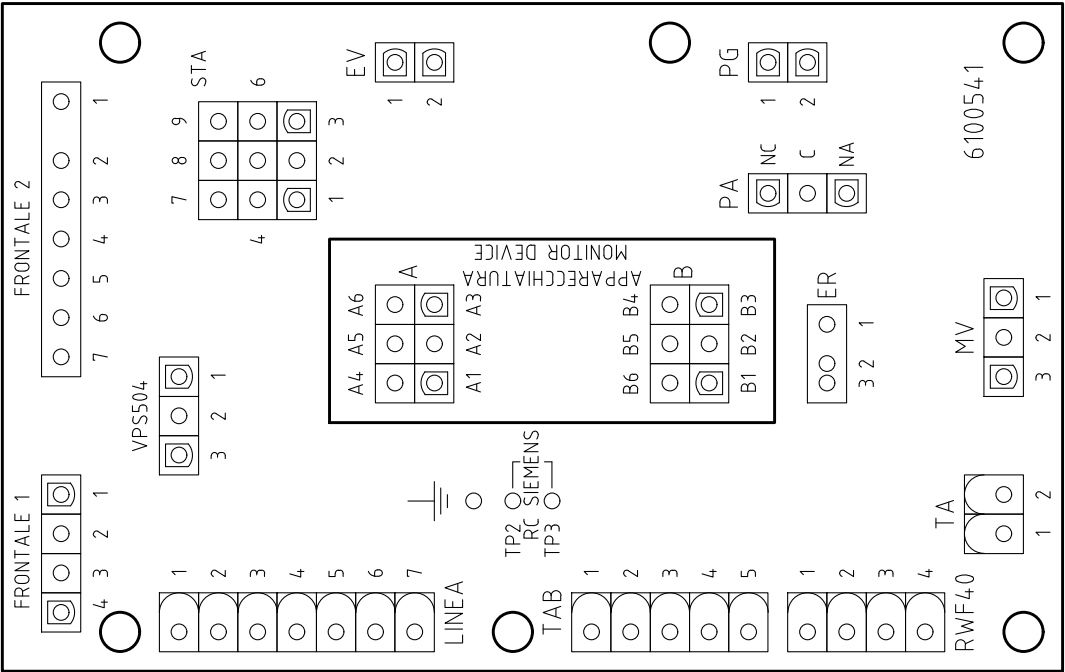
RWF55.5x

RWF50.2x

RWF40.0xx



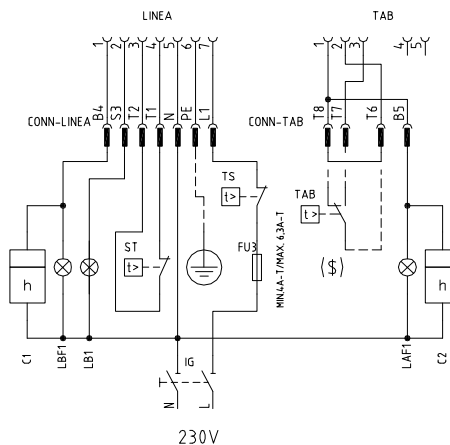
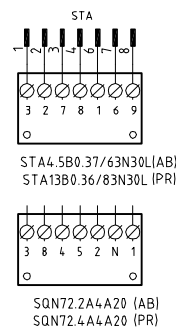
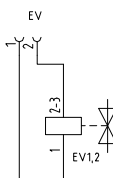
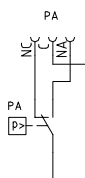
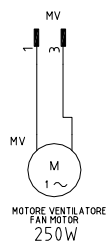
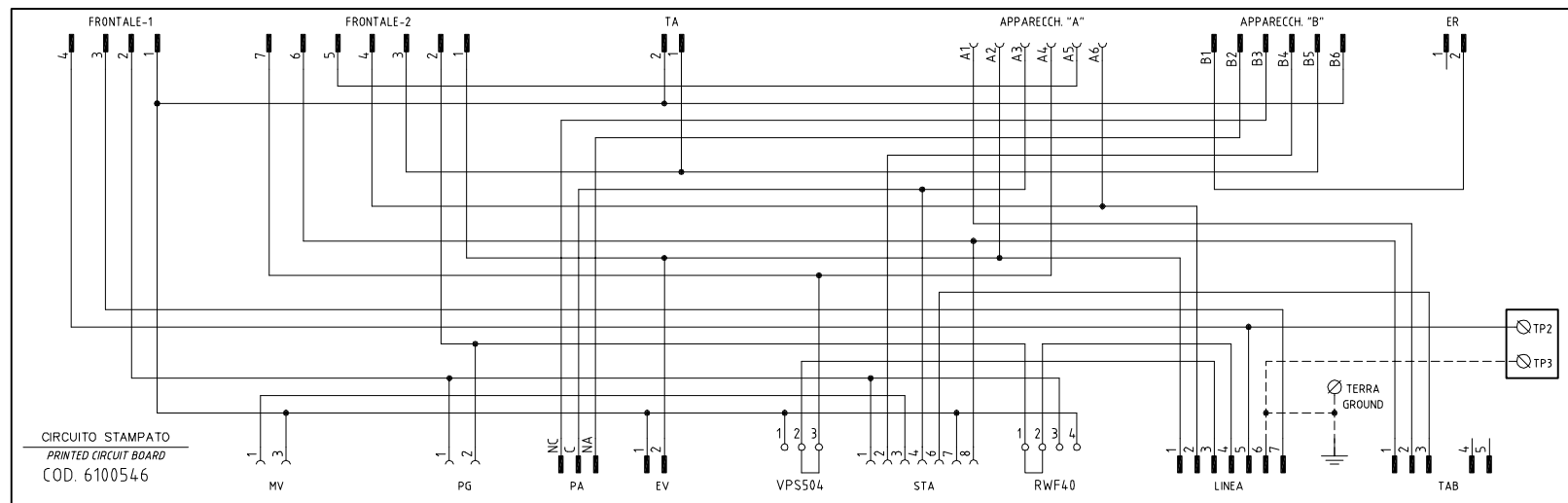
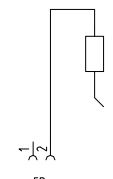
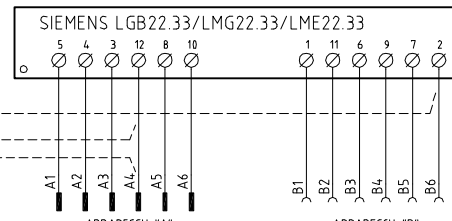
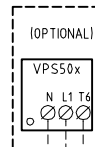
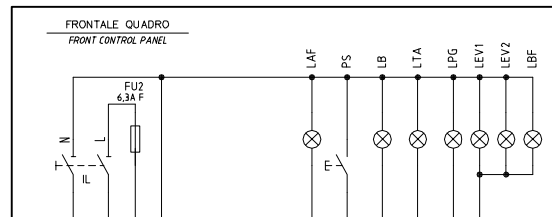
(#)
COLLEGAMENTO SOLO PER
TRASDUTTORI PASSIVI
TRASDUCER PASSIVE
CONNECTION ONLY



| | | | |
|-----------|------------|-------|--------|
| Data | 19/10/2010 | PREC. | FOGLIO |
| Revisione | 06 | 3 | 4 |
| Dis. N. | 18 - 0163 | SEGUE | TOTALE |
| | | 5 | 5 |

| | | | | | | | | | | | | | | | |
|-----------------------------|---|--|---|---|---|--|---|---|---|----|----|----|----|----|--|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | |
| | | | | | | | | | | | | | | | |
| Sigla/Item | | Funzione | | | | Function | | | | | | | | | |
| 600V RRR0-1-T73 | | REGOLATORE MODULANTE (ALTERNATIVO) | | | | BURNER MODULATOR (ALTERNATIVE) | | | | | | | | | |
| C1 | | CONTAORE BASSA FIAMMA | | | | LOW FLAME TIME COUNTER | | | | | | | | | |
| C2 | | CONTAORE ALTA FIAMMA | | | | HIGH FLAME TIME COUNTER | | | | | | | | | |
| ER | | ELETTRODO RILEVAZIONE FIAMMA | | | | FLAME DETECTION ELECTRODE | | | | | | | | | |
| EV1,2 | | ELETTROVALVOLE GAS (O GRUPPO VALVOLE) | | | | GAS ELECTRO-VALVES (OR VALVES GROUP) | | | | | | | | | |
| FU1 | | FUSIBILE LINEA MOTORE VENTILATORE | | | | FAN MOTOR LINE FUSE | | | | | | | | | |
| FU2 | | FUSIBILE DI LINEA | | | | LINE FUSE | | | | | | | | | |
| FU3 | | FUSIBILE LINEA BRUCIATORE | | | | BURNER LINE FUSE | | | | | | | | | |
| FU4 | | FUSIBILE AUSILIARIO | | | | AUXILIARY FUSE | | | | | | | | | |
| IL | | INTERRUTTORE LINEA AUSILIARI | | | | AUXILIARY LINE SWITCH | | | | | | | | | |
| IM | | INTERRUTTORE LINEA MOTORE VENTILATORE | | | | FAN MOTOR LINE SWITCH | | | | | | | | | |
| KM1.1 | | 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 | | | | | | | | | |
| LAF1 | | 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 | | | | | | | | | |
| LBF1 | | 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] | | | | | | | | | |
| LF | | LAMPADA SEGNALAZIONE FUNZIONAMENTO BRUCIATORE | | | | INDICATOR LIGHT BURNER OPERATION | | | | | | | | | |
| LPG | | LAMPADA SEGNALAZIONE PRESENZA GAS IN RETE | | | | INDICATOR LIGHT FOR PRESENCE OF GAS IN THE NETWORK | | | | | | | | | |
| LTA | | LAMPADA SEGNALAZIONE TRASFORMATORE DI ACCENSIONE | | | | IGNITION TRANSFORMER INDICATOR LIGHT | | | | | | | | | |
| MV | | MOTORE VENTILATORE | | | | FAN MOTOR | | | | | | | | | |
| PA | | PRESSOSTATO ARIA | | | | AIR PRESSURE SWITCH | | | | | | | | | |
| PG | | PRESSOSTATO GAS DI MINIMA PRESSIONE | | | | MINIMUM GAS PRESSURE SWITCH | | | | | | | | | |
| PS | | PULSANTE SBLOCCO FIAMMA | | | | FLAME UNLOCK BUTTON | | | | | | | | | |
| PT100 | | SONDA DI TEMPERATURA | | | | TEMPERATURE PROBE | | | | | | | | | |
| RC | | CIRCUITO RC | | | | RC CIRCUIT | | | | | | | | | |
| 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 LGB2x.330/LME2x.33x | | APPARECCHIATURA CONTROLLO FIAMMA | | | | CONTROL BOX | | | | | | | | | |
| SIEMENS LME22.331 | | APPARECCHIATURA CONTROLLO FIAMMA | | | | CONTROL BOX | | | | | | | | | |
| SIEMENS LME22.331 | | APPARECCHIATURA CONTROLLO FIAMMA | | | | CONTROL BOX | | | | | | | | | |
| SIEMENS RWF40.0x0 | | REGOLATORE MODULANTE | | | | BURNER MODULATOR | | | | | | | | | |
| SIEMENS RWF50.2x | | REGOLATORE MODULANTE | | | | BURNER MODULATOR | | | | | | | | | |
| SIEMENS RWF55.5x | | REGOLATORE MODULANTE (ALTERNATIVO) | | | | BURNER MODULATOR (ALTERNATIVE) | | | | | | | | | |
| SIEMENS SQN72.4A4A20 | | SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO) | | | | AIR DAMPER ACTUATOR (ALTERNATIVE) | | | | | | | | | |
| 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 | | | | | | | | | |
| STA13B0.36/83N30L | | SERVOCOMANDO SERRANDA ARIA | | | | AIR DAMPER ACTUATOR | | | | | | | | | |
| 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 | | | | | | | | | |
| VPS50x | | CONTROLLO DI TENUTA VALVOLE GAS (OPTIONAL) | | | | GAS PROVING SYSTEM (OPTIONAL) | | | | | | | | | |

| | | | |
|-----------|------------|---------|----------|
| Data | 19/10/2010 | PREC. | FOGLIO |
| Revisione | 06 | 4 | 5 |
| Dis. N. | 18 - 0163 | SEGUE / | TOTALE 5 |

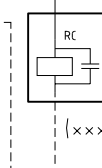


CAMME SERVOCOMANDO SERRANDA ARIA VERSIONE (AB)
CAMS OF AIR DAMPER ACTUATOR VERSION (AB)
STA4.5B0.37/63N30L / STA13B0.36/83N30L

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

CAMME SERVOCOMANDO SERRANDA ARIA VERSIONE (PR)
CAMS OF AIR DAMPER ACTUATOR VERSION (PR)
SQN72.xA4A20

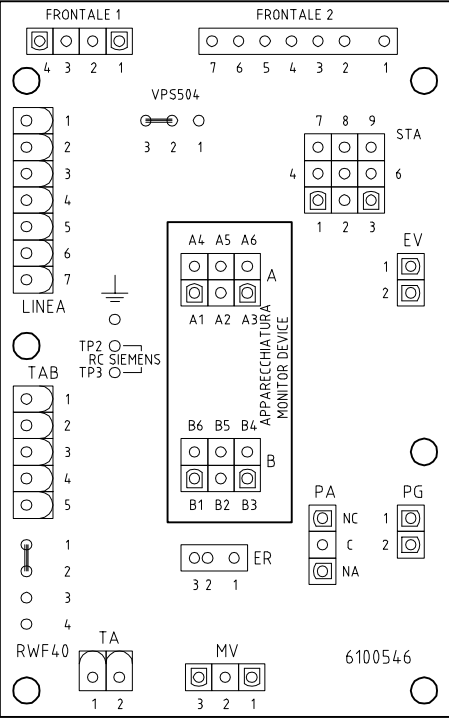
I (ROSSO) ALTA FIAMMA
HIGH FLAME
II (VERDE) SOSTA
STAND-BY
III (BLU) BASSA FIAMMA
LOW FLAME
IV (NERO) NON USATA
NOT USED



(xxx) SOLO CON ALIMENTAZIONE ELETTRICA SENZA NEUTRO
WITH ELECTRIC SUPPLY WITHOUT NEUTRAL VERSION ONLY

(\$) SE USATO "TAB", TOGLIERE IL PONTE TRA I MORSETTI T6-T8
IF USED "TAB", REMOVE THE BRIDGE BETWEEN TERMINALS T6-T8

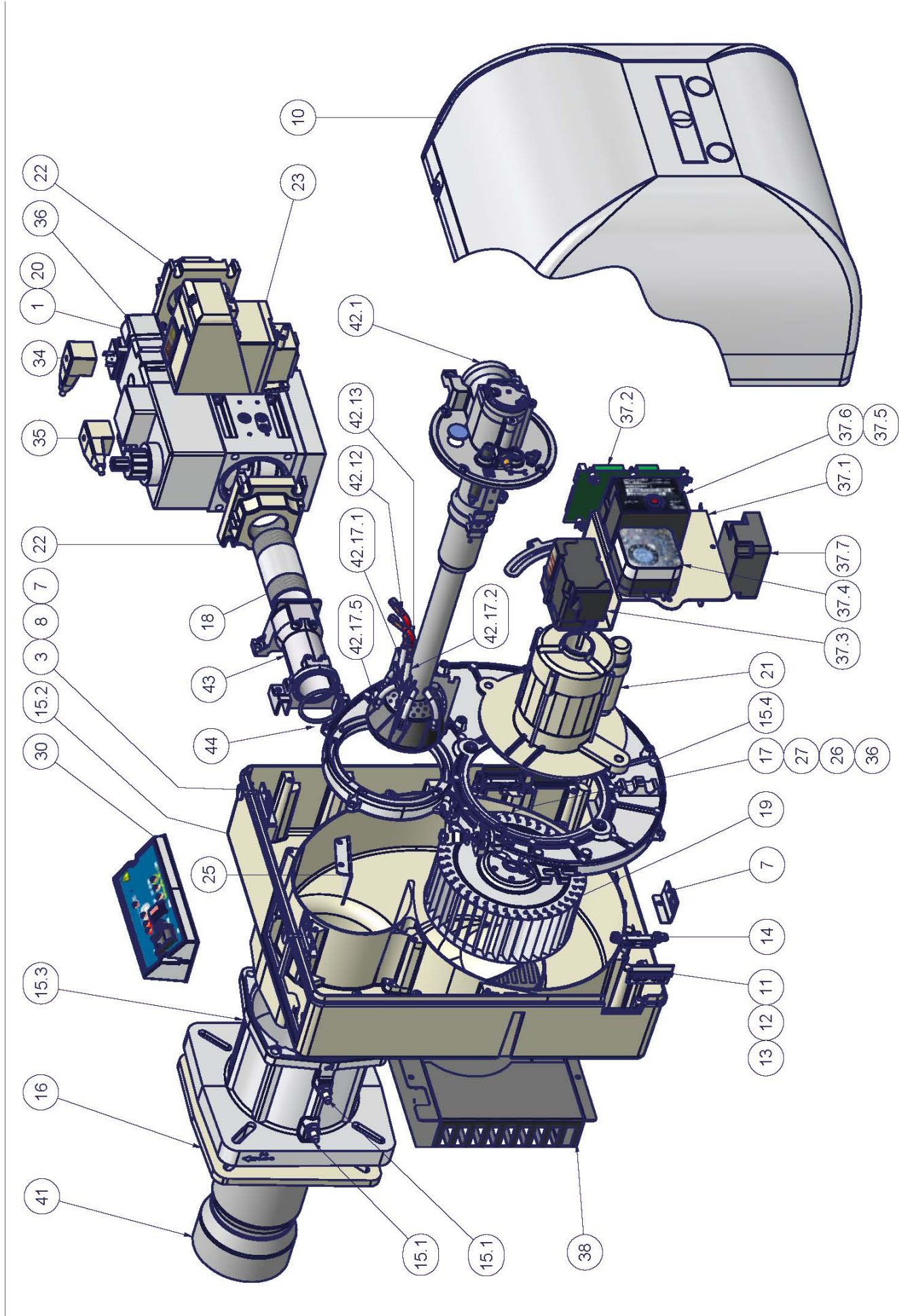
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|-----------|------------|-------|--------|
| Data | 21/07/2006 | PREC. | FOGLIO |
| Revisione | 01 | / | 1 |
| Dis. N. | 18 - 103 | SEGUE | TOTALE |
| | | 2 | 2 |



| SIGLA/ITEM | FUNZIONE | FUNCTION |
|------------------------------------|--|--|
| C1 | CONTAORE BASSA FIAMMA | LOW FLAME TIME COUNTER |
| C2 | CONTAORE ALTA FIAMMA | HIGH FLAME TIME COUNTER |
| ER | ELETTRODO RILEVAZIONE FIAMMA | FLAME DETECTION ELECTRODE |
| EV1,2 | ELETTROVALVOLE GAS (0 GRUPPO VALVOLE) | GAS ELECTRO-VALVES (OR VALVES GROUP) |
| FU2 | FUSIBILE DI LINEA | LINE FUSE |
| FU3 | FUSIBILE LINEA BRUCIATORE | BURNER LINE FUSE |
| IG | INTERRUTTORE LINEA BRUCIATORE | BURNER LINE SWITCH |
| IL | INTERRUTTORE LINEA AUSILIARI | AUXILIARY LINE SWITCH |
| LAF | LAMPADA SEGNALEZIONE ALTA FIAMMA BRUCIATORE | BURNER IN HIGH FLAME INDICATOR LIGHT |
| LAF1 | LAMPADA SEGNALEZIONE ALTA FIAMMA BRUCIATORE | BURNER IN HIGH FLAME INDICATOR LIGHT |
| LB | LAMPADA SEGNALEZIONE BLOCCO BRUCIATORE | INDICATOR LIGHT FOR BURNER LOCK-OUT |
| LB1 | LAMPADA SEGNALEZIONE BLOCCO BRUCIATORE | INDICATOR LIGHT FOR BURNER LOCK-OUT |
| LBF | LAMPADA SEGNALEZIONE BASSA FIAMMA BRUCIATORE | BURNER IN LOW FLAME INDICATOR LIGHT |
| LBF1 | LAMPADA SEGNALEZIONE BASSA FIAMMA BRUCIATORE | BURNER IN LOW FLAME INDICATOR LIGHT |
| LEV1 | LAMPADA SEGNALEZIONE APERTURA [EV1] | INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EV1] |
| LEV2 | LAMPADA SEGNALEZIONE APERTURA [EV2] | INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EV2] |
| LPG | LAMPADA SEGNALEZIONE PRESENZA GAS IN RETE | INDICATOR LIGHT FOR PRESENCE OF GAS IN THE NETWORK |
| LTA | LAMPADA SEGNALEZIONE TRASFORMATORE DI ACCENSIONE | IGNITION TRANSFORMER INDICATOR LIGHT |
| MV | MOTORE VENTILATORE | FAN MOTOR |
| PA | PRESSOSTATO ARIA | AIR PRESSURE SWITCH |
| PG | PRESSOSTATO GAS DI MINIMA PRESSIONE | MINIMUM GAS PRESSURE SWITCH |
| PS | PULSANTE SBLOCCO FIAMMA | LOCK-OUT RESET BUTTON |
| RC | CIRCUITO RC | RC CIRCUIT |
| SIEMENS LGB22.33/LMG22.33/LME22.33 | APPARECCHIATURA CONTROLLO FIAMMA | CONTROL BOX |
| SQN72.2A4A20 | SERVOCOMANDO SERRANDA ARIA VERSIONE [AB] | AIR DAMPER ACTUATOR VERSION [AB] |
| SQN72.4A4A20 | SERVOCOMANDO SERRANDA ARIA VERSIONE [PR] | AIR DAMPER ACTUATOR VERSION [PR] |
| ST | SERIE TERMOSTATI/PRESSOSTATI | SERIES OF THERMOSTATS OR PRESSURE SWITCHES |
| STA4.5B0.37/63N30L | SERVOCOMANDO SERRANDA ARIA VERSIONE [AB] | AIR DAMPER ACTUATOR VERSION [AB] |
| STA13B0.36/83N30L | SERVOCOMANDO SERRANDA ARIA VERSIONE [PR] | AIR DAMPER ACTUATOR VERSION [PR] |
| TA | TRASFORMATORE DI ACCENSIONE | IGNITION TRANSFORMER |
| TAB | TERMOSTATO/PRESSOSTATO ALTA-BASSA FIAMMA | HIGH-LOW THERMOSTAT/PRESSURE SWITCHES |
| TS | TERMOSTATO/PRESSOSTATO DI SICUREZZA | SAFETY THERMOSTAT OR PRESSURE SWITCH |
| VPS50x | CONTROLLO DI TENUTA VALVOLE GAS (OPTIONAL) | GAS PROVING SYSTEM (OPTIONAL) |

BURNER EXPLODED VIEW NG280

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



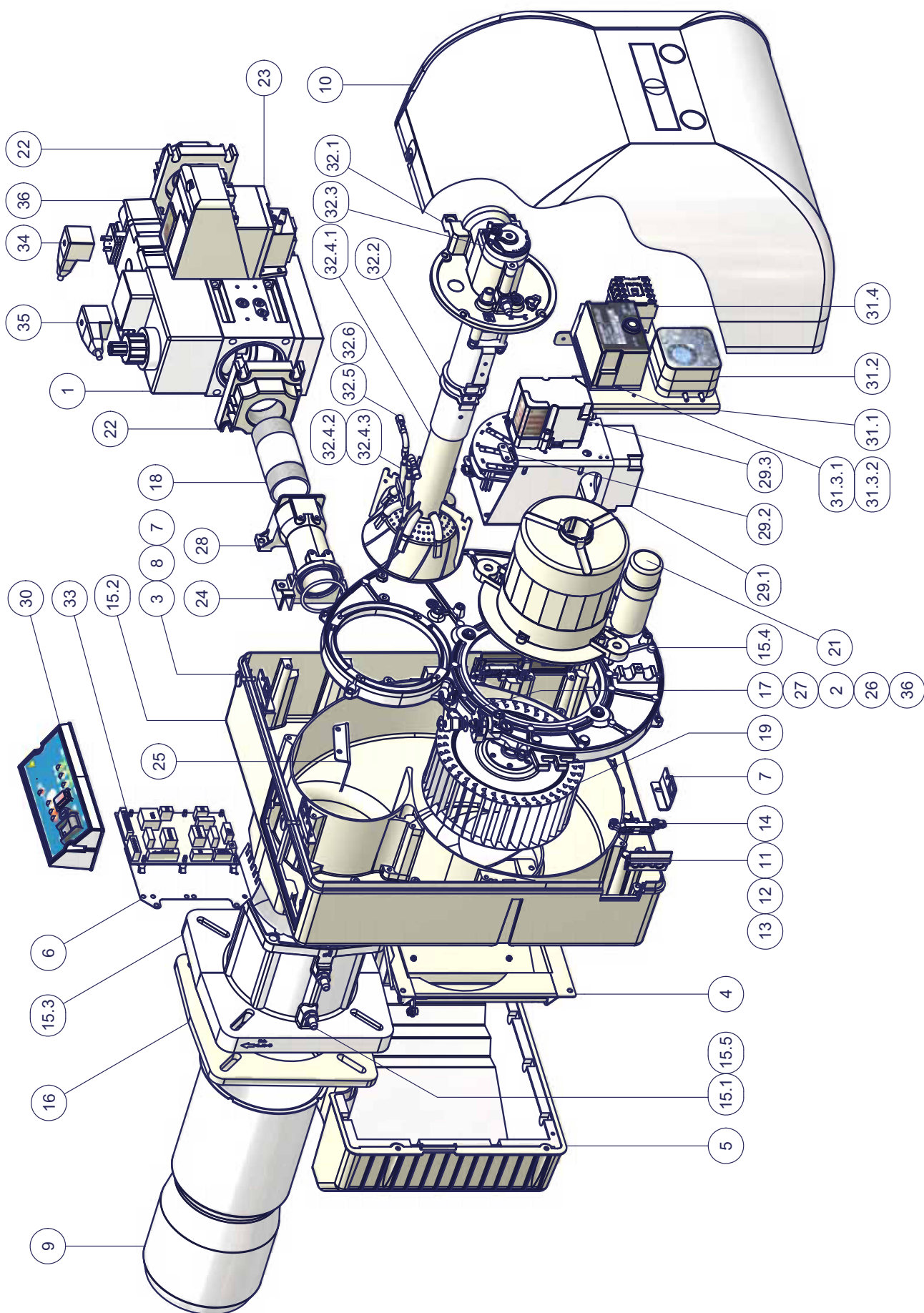
This diagram illustrates the exploded view of a robotic arm assembly. The main body of the arm is shown in the center, with various components labeled with numbers in circles. The assembly includes a base, a motor, a gear system, and a gripper mechanism. The components are labeled as follows:

- 1.1**: Main body of the arm.
- 1.1.1** to **1.1.12**: Various sub-components of the main body, including the base, motor, and gear system.
- 1.2**: Gripper mechanism.
- 1.2.1** to **1.2.9**: Various sub-components of the gripper, including the gripper body, gripper fingers, and gripper joints.
- 1.3**: Motor.
- 1.3.1** to **1.3.5**: Various sub-components of the motor, including the motor housing, motor shaft, and motor mounting.
- 1.4**: Gear system.
- 1.4.1** to **1.4.7**: Various sub-components of the gear system, including the gear housing, gear shaft, and gear teeth.
- 1.5**: Gripper joint.
- 1.5.1** to **1.5.7**: Various sub-components of the gripper joint, including the gripper joint housing, gripper joint shaft, and gripper joint teeth.
- 1.6**: Base.
- 1.6.1** to **1.6.11**: Various sub-components of the base, including the base housing, base shaft, and base mounting.
- 1.7**: Motor housing.
- 1.7.1** to **1.7.12**: Various sub-components of the motor housing, including the motor housing cover, motor housing shaft, and motor housing mounting.
- 1.8**: Gear housing.
- 1.8.1** to **1.8.12**: Various sub-components of the gear housing, including the gear housing cover, gear housing shaft, and gear housing mounting.
- 1.9**: Gripper joint housing.
- 1.9.1** to **1.9.12**: Various sub-components of the gripper joint housing, including the gripper joint housing cover, gripper joint housing shaft, and gripper joint housing mounting.
- 1.10**: Gripper joint shaft.
- 1.10.1** to **1.10.12**: Various sub-components of the gripper joint shaft, including the gripper joint shaft cover, gripper joint shaft mounting, and gripper joint shaft teeth.
- 1.11**: Gripper joint teeth.
- 1.11.1** to **1.11.12**: Various sub-components of the gripper joint teeth, including the gripper joint teeth cover, gripper joint teeth mounting, and gripper joint teeth teeth.
- 1.12**: Gripper joint mounting.
- 1.12.1** to **1.12.9**: Various sub-components of the gripper joint mounting, including the gripper joint mounting cover, gripper joint mounting mounting, and gripper joint mounting teeth.

The diagram also includes three labels: **A**, **B**, and **C**, which point to specific components of the assembly.

BURNER EXPLODED VIEW NG350-400

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



APPENDIX

SIEMENS LME11/21/22 CONTROL BOX

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

Comparative table

| LGB Series | LMG Series | LME Series |
|------------|------------|------------|
| --- | LMG 25.33 | LME 11.33 |
| LGB 21.33 | LMG 21.33 | LME 21.33 |
| LGB 22.33 | LMG 22.33 | LME 22.33 |

Preconditions for burner startup

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

Undervoltage

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

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

Controlled intermittent operation

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

Reversed polarity protection with ionization


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

Control sequence in the event of fault

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

Operational status indication

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

| | | |
|---|---|-----------------------------------|
|  | red LED yellow LED green LED | Steady on Off O... |
|---|---|-----------------------------------|

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

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

START-UP PROGRAM

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

A Start command (switching on)

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

tw Waiting time

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

t11 Programmed opening time for actuator «SA»

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

t10 Specified time for air pressure signal

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

t1 Prepurge time

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

t12 Programmed closing time for actuator «SA»

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

t3 Preignition time

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

TSA Ignition safety time

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

t4 Interval BV1 and BV2-LR

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

B - B' Interval for flame establishment

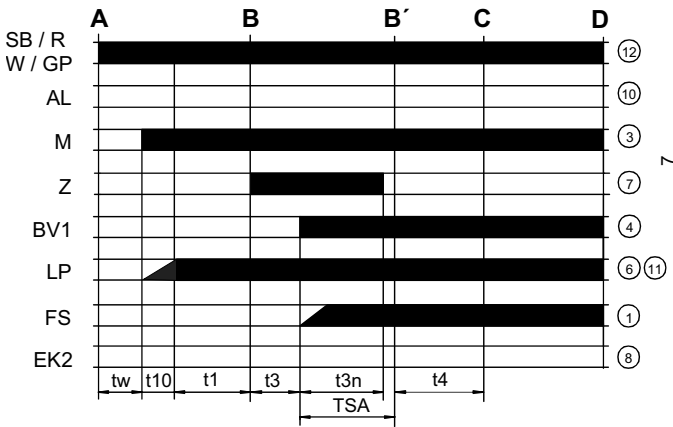
C Burner operation position

C - D Burner operation (heat production)

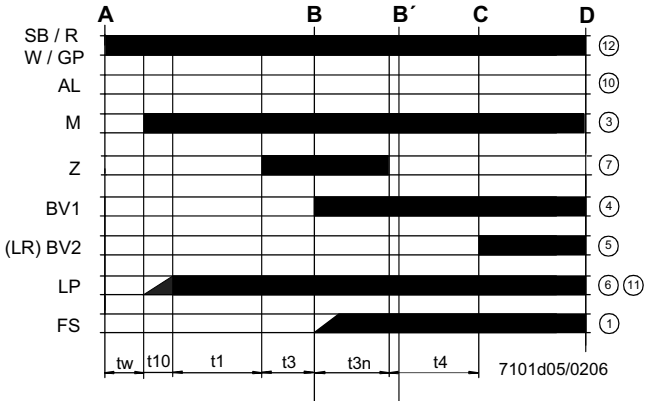
D Controlled by "R" shutdown

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

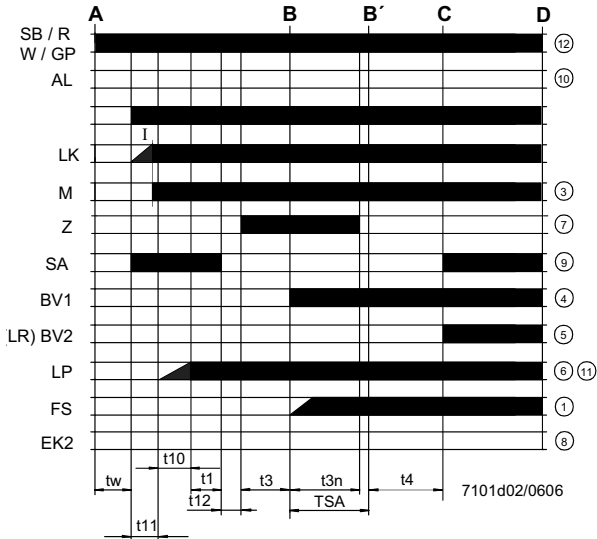
LME11 control sequence



LME21 control sequence



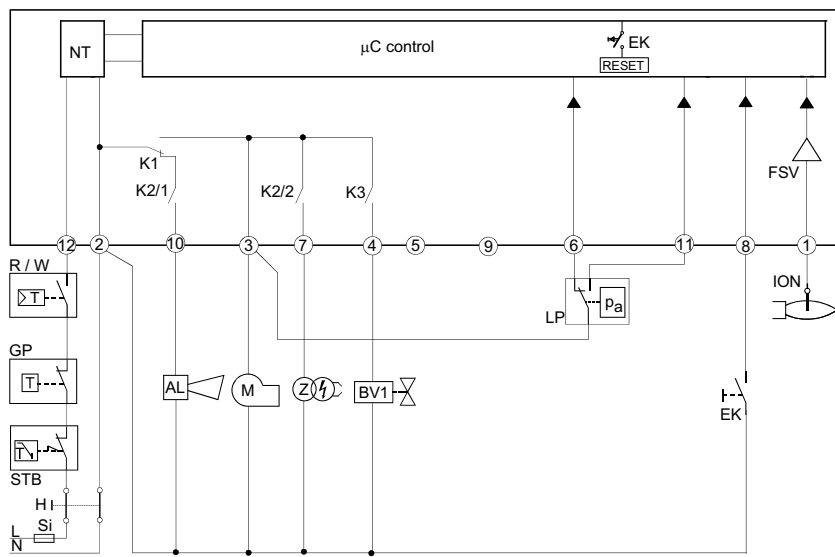
LME22 control sequence



Control sequence

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

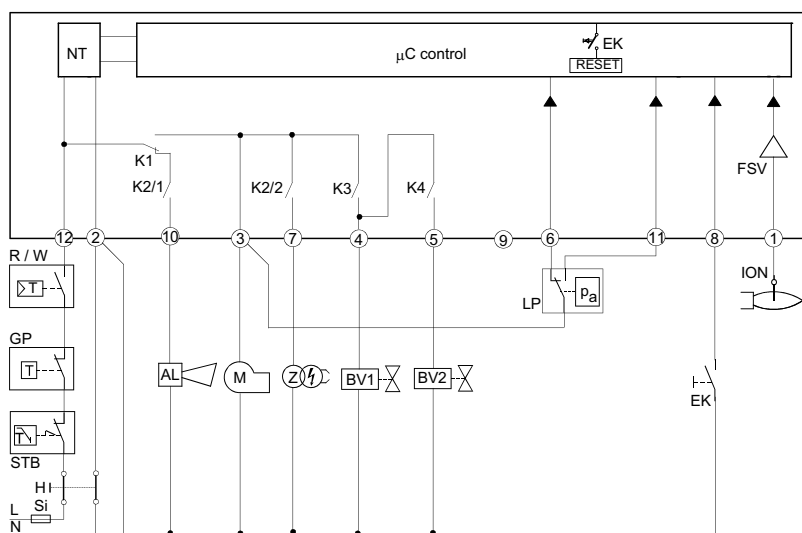
LME11 connection diagram



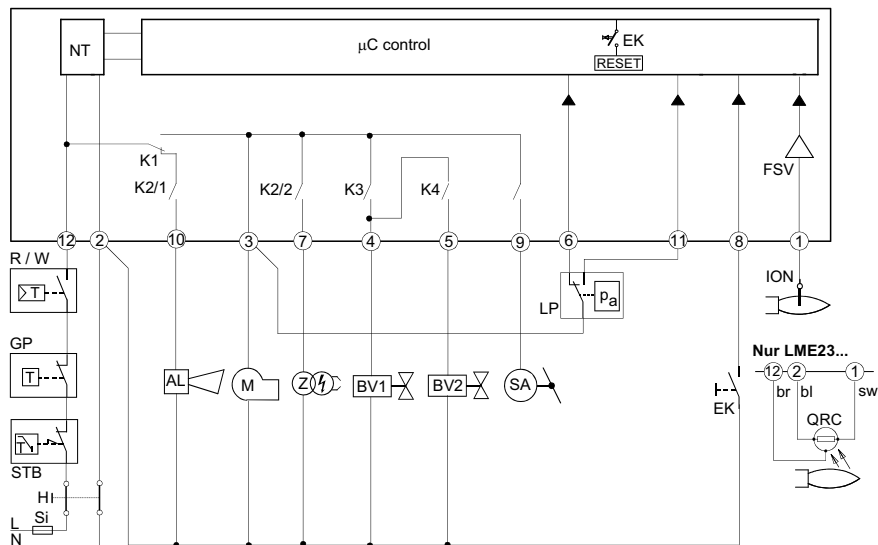
Connection diagram

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

LME21 connection diagram



LME22 connection diagram



CONTROL PROGRAM IN THE EVENT OF FAULT

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

CONTROL BOX LOCKED

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

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

RESETTING THE BURNER CONTROL

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

LIMITATION OF REPETITIONS (only for LME11.. model)

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

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

TECHNICAL CHARACTERISTICS

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



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Tel. +39 049 9200944 - Fax +39 049 9200945/9201269
web site: www.cibunigas.it - e-mail: cibunigas@cibunigas.it

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



CIB UNIGAS

LG/NG/NGX280

LG/NG/NGX350

LG/NG/NGX400

WIRING DIAGRAMS

ELECTRICAL WIRING DIAGRAMS

Electric wiring diagrams

Wiring diagram 18-163 - Complete key

| | |
|--------------------|---|
| C1 | LOW FLAME TIME METER |
| C2 | HIGH FLAME TIME METER |
| ER | FLAME DETECTION ELECTRODE |
| EV1,2 | GAS ELECTRO-VALVES (OR VALVES GROUP) |
| FU1 | FAN MOTOR LINE FUSE |
| FU2 | LINE FUSE |
| FU3 | LINE FUSE |
| FU4 | AUXILIARY FUSE |
| IL | BURNER LINE SWITCH |
| IM | FAN MOTOR LINE SWITCH |
| KM1 | FAN MOTOR CONTACTOR |
| LAF | BURNER IN HIGH FLAME INDICATOR LIGHT |
| LB | INDICATOR LIGHT FOR BURNER LOCK-OUT |
| LBF | BURNER IN LOW FLAME INDICATOR LIGHT |
| LEV1 | INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE EV2 |
| LEV2 | INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE EV2 |
| LF | INDICATOR LIGHT BURNER FUNCTIONING |
| LGB2x.330/LMG2x330 | CONTROL BOX |
| LPG | INDICATOR LIGHT FOR PRESENCE OF GAS IN THE NETWORK |
| LTA | IGNITION TRANSFORMER INDICATOR LIGHT |
| MV | FAN MOTOR |
| PA | COMBUSTION AIR PRESSURE SWITCH |
| PG | MINIMUM GAS PRESSURE SWITCH |
| PS | LOCK-OUT RESET BUTTON |
| PT100 | TEMPERATURE PROBE |
| RC | RC CIRCUIT |
| SATRONIC DLG976 | CONTROL BOX |
| SATRONIC DMG972 | CONTROL BOX |
| SD-0÷10V | VOLTAGE SIGNAL |
| SD-0/4÷20mA | CURRENT SIGNAL |
| SD-PRESS | PRESSURE PROBE |
| SD-TEMP | TEMPERATURE PROBE |
| SIEMENS LME.. | CONTROL BOX |
| SIEMENS RWF40 | MODULATORSMANUAL/AUTOMATIC SELECTOR |
| SMF | MIN-0-MAX FUNCTIONING MANUAL SELECTOR |
| ST | SERIES OF THERMOSTATS OR PRESSURE SWITCHES |
| STA/SQN72 | AIR DAMPER ACTUATOR |
| TA | IGNITION TRANSFORMER |
| TAB | HIGH-LOW THERMOSTAT/PRESSURE SWITCHES |
| TC | THERMOCOUPLE |
| TS | SAFETY THERMOSTAT OR PRESSURE SWITCH |
| VPS504 | GAS PROVING SYSTEM (OPTIONAL) |
| (#) | FAN MOTOR 620 W D 450W, FU2= 6,3 A F; FAN MOTOR 370 W , FU2= 10 A F |
| (*) | BRIDGE BETWEEN TERMINALS7 AND 9 ONLY WITH LGB21.330 (SINGLE STAGE VERSION ONLY) |
| (**) | SEE PROBE CONNECTION |
| (***) | WITH ELECTRIC SUPPLY WITHOUT NEUTRAL VERSION ONLY |
| (\$) | IF "TAB" USED REMOVE THE BRIDGE BETWEEN TERMINALS T6-T8 |

WARNING:

- 1 - Electrical supply 230V 50/60Hz 1N a.c.
- 2 - Do not reverse phase with neutral
- 3 - Ensure burner is properly earthed

LG/NG/NGX 280 Single stage - Electric wiring diagrams - SE01-530

LG/NG/NGX 280 Double stage - Progressive - Electric wiring diagrams - SE18-103

LG/NG/NGX 350-400 Electric wiring diagrams - SE18-163

LG/NG/NGX 350-400 Electric wiring diagrams - SE18-057

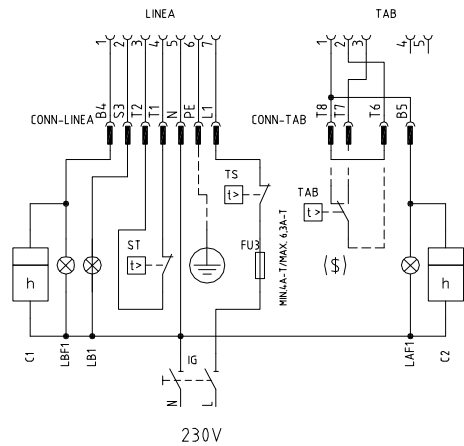
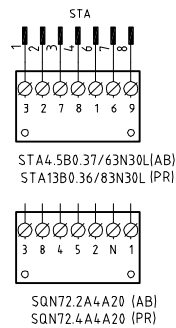
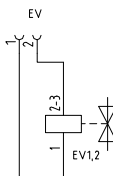
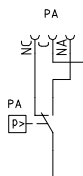
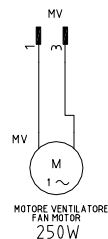
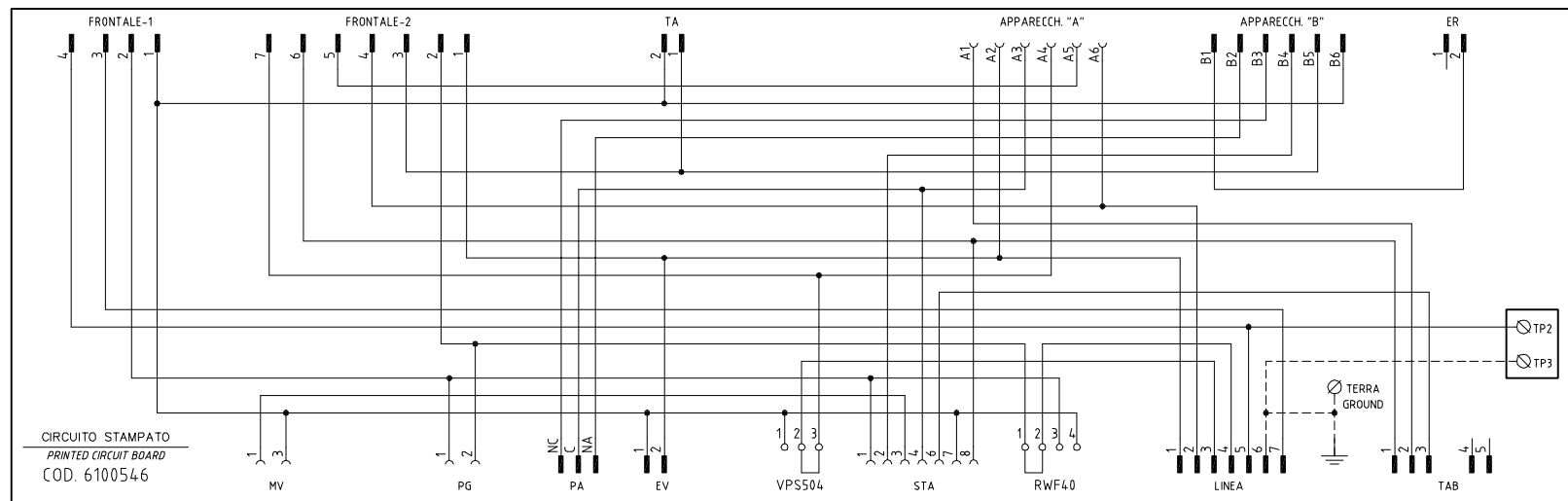
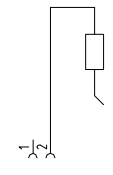
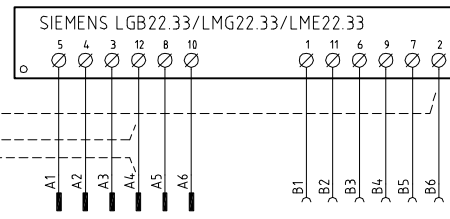
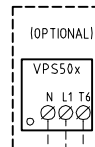
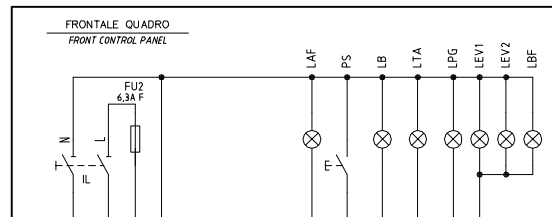
SE00_TAB1-1

KEYS

| | | | |
|------------|-------------------------|------------|--|
| C1 | LOW FLAME TIME COUNTER | LAF | BURNER IN HIGH FLAME INDICATOR LIGHT |
| C2 | HIGH FLAME TIME COUNTER | LB | INDICATOR LIGHT FOR BURNER LOCK-OUT |
| FU1 | FAN MOTOR LINE FUSE | LBF | BURNER IN LOW FLAME INDICATOR LIGHT |
| FU3 | BURNER LINE FUSE | ST | SERIES OF THERMOSTATS OR PRESSURE SWITCHES |
| IL | BURNER LINE SWITCH | TAB | HIGH-LOW THERMOSTAT/PRESSURE SWITCHES |
| IM | FAN MOTOR LINE SWITCH | TS | SAFETY THERMOSTAT OR PRESSURE SWITCH |
| KAB | AUXILIARY RELAY | | |

| SIGLA/ITEM | FOGLIO/SHEET | FUNZIONE | FUNCTION |
|---------------------------|--------------|---|--|
| ER | 1 | ELETTRODO RIVELAZIONE FIAMMA | FLAME DETECTION ELECTRODE |
| EV1 | 1 | ELETTROVALVOLA GAS LATO RETE (O GRUPPO VALVOLE) | GAS ELECTRO-VALVE UPSTREAM (OR VALVES GROUP) |
| EV2 | 1 | ELETTROVALVOLA GAS LATO BRUCIATORE (O GRUPPO VALVOLE) | GAS ELECTRO-VALVE DOWNSTREAM (OR VALVES GROUP) |
| FU1.2 | 1 | FUSIBILE DI LINEA | LINE FUSE |
| FU1.3 | 1 | FUSIBILE AUSILIARIO | AUXILIARY FUSE |
| IG | 1 | INTERRUTTORE GENERALE | MAIN DISCONNECTOR |
| IL | 1 | INTERRUTTORE LINEA BRUCIATORE | BURNER LINE SWITCH |
| LB | 1 | LAMPADA SEGNALAZIONE BLOCCO BRUCIATORE | INDICATOR LIGHT FOR BURNER LOCK-OUT |
| LF | 1 | LAMPADA SEGNALAZIONE FUNZIONAMENTO BRUCIATORE | INDICATOR LIGHT BURNER OPERATION |
| MV | 1 | MOTORE VENTILATORE | FAN MOTOR |
| PA | 1 | PRESSOSTATO ARIA COMBURENTE | COMBUSTION AIR PRESSURE SWITCH |
| PGMIN | 1 | PRESSOSTATO GAS DI MINIMA PRESSIONE | MINIMUM GAS PRESSURE SWITCH |
| SIEMENS LGB../LMG../LME.. | 1 | APPARECCHIATURA CONTROLLO FIAMMA | FLAME MONITOR DEVICE |
| ST | 1 | SERIE TERMOSTATI/PRESSOSTATI | SERIES OF THERMOSTATS OR PRESSURE SWITCHES |
| TA | 1 | TRASFORMATORE DI ACCENSIONE | IGNITION TRANSFORMER |
| TS | 1 | TERMOSTATO/PRESSOSTATO DI SICUREZZA | SAFETY THERMOSTAT OR PRESSURE SWITCH |
| VPS504 | 1 | CONTROLLO DI TENUTA VALVOLE GAS (OPTIONAL) | GAS LEAKAGE MONITOR DEVICE (OPTIONAL) |

| | | | |
|-----------|------------|-------|--------|
| Data | 21/07/2006 | PREC. | FOGLIO |
| Revisione | 00 | 1 | 2 |
| Dis. N. | 01 - 530 | SEQUE | TOTALE |
| | | / | 2 |

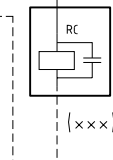


CAMME SERVOCOMANDO SERRANDA ARIA VERSIONE (AB)
CAMS OF AIR DAMPER ACTUATOR VERSION (AB)
STA4.5B0.37/63N30L / STA13B0.36/83N30L

I ALTA FIAMMA
HIGH FLAME
SOSTA
STAND-BY
IV BASSA FIAMMA
LOW FLAME
NON USATA
NOT USED

CAMME SERVOCOMANDO SERRANDA ARIA VERSIONE (PR)
CAMS OF AIR DAMPER ACTUATOR VERSION (PR)
SQN72.xA4A20

I (ROSSO) ALTA FIAMMA
HIGH FLAME
II (VERDE) SOSTA
STAND-BY
III (BLU) STAND-BY
IV (ARANCIO) BASSA FIAMMA
LOW FLAME
NON USATA
NOT USED



(xxx) SOLO CON ALIMENTAZIONE ELETTRICA SENZA NEUTRO
WITH ELECTRIC SUPPLY WITHOUT NEUTRAL VERSION ONLY

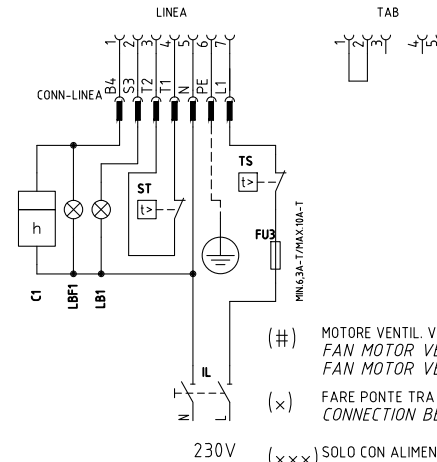
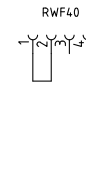
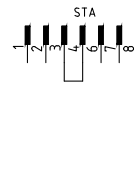
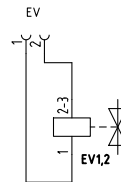
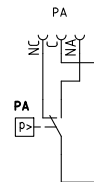
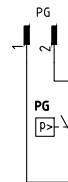
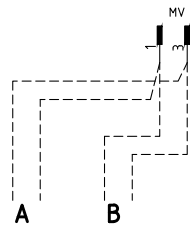
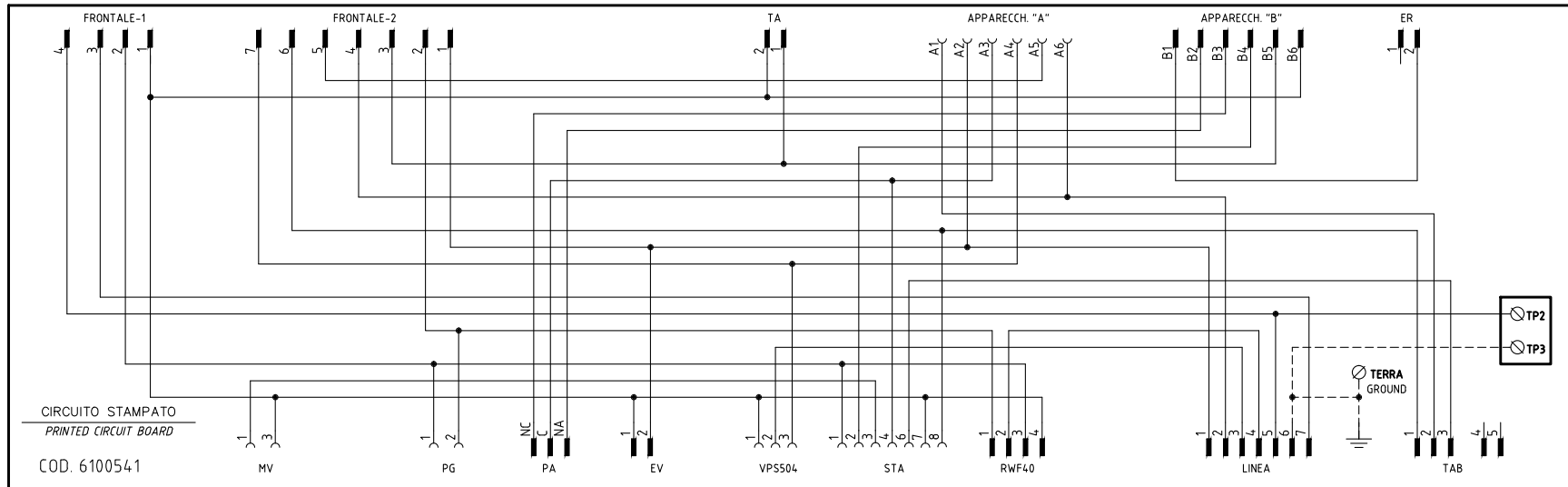
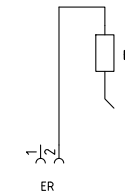
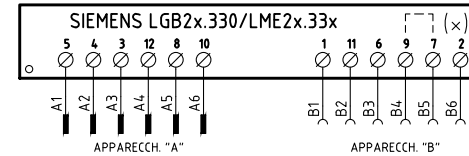
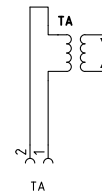
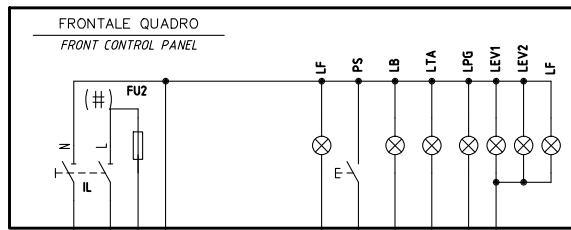
(\$) SE USATO "TAB", TOGLIERE IL PONTE TRA I MORSETTI T6-T8
IF USED "TAB", REMOVE THE BRIDGE BETWEEN TERMINALS T6-T8

| | | | |
|-----------|------------|-------|--------|
| Data | 21/07/2006 | PREC. | FOGLIO |
| Revisione | 01 | / | 1 |
| Dis. N. | 18 - 103 | SEGUE | TOTALE |
| | | 2 | 2 |

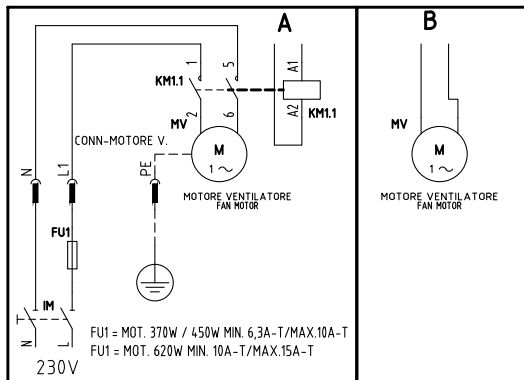


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|-----------|------------|------------|-------------|
| Data | 21/07/2006 | PREC. 1 | FOGLIO 2 |
| Revisione | 01 | | |
| Dis. N. | 18 - 103 | SEQUE / | TOTALE 2 |

VERSIONE MONOSTADIO "TN" "TN" SINGLE-STAGE VERSION

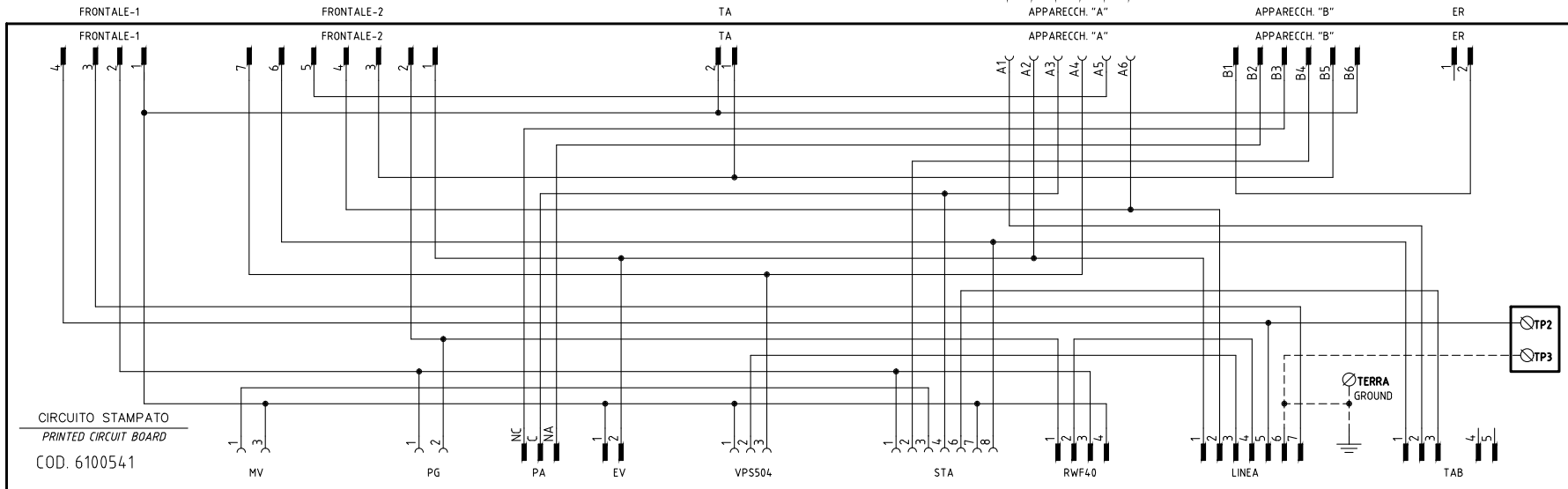
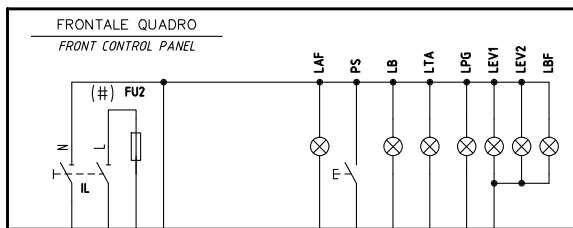


- (#) MOTORE VENTIL. VERSIONE [A], FU2 = 6,3A F; MOTORE VENTIL. VERSIONE [B], FU2 = 10A F
FAN MOTOR VERSION [A], FU2 = 6,3 A F;
FAN MOTOR VERSION [B], FU2 = 10 A F
- (x) FARE PONTE TRA I MORSETTI 7 E 9 SOLO CON LGB21.330
CONNECTION BETWEEN TERMINALS 7 AND 9 WITH LGB21.330 ONLY
- (x x x) SOLO CON ALIMENTAZIONE ELETTRICA SENZA NEUTRO
WITH ELECTRIC SUPPLY WITHOUT NEUTRAL VERSION ONLY



| | | | |
|-----------|------------|-------|--------|
| Data | 19/10/2010 | PREC. | FOGLIO |
| Revisione | 05 | / | 1 |
| Dis. N. | 18 - 0163 | SEGUE | TOTALE |
| | | 2 | 5 |

VERSIONE ALTA-BASSA FIAMMA "AB" / PROGRESSIVO "PR" "AB" HIGH-LOW / "PR" PROGRESSIVE VERSION

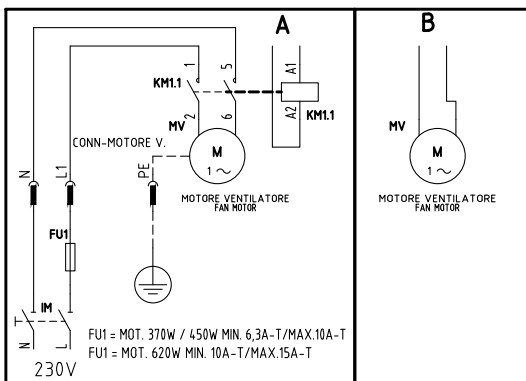
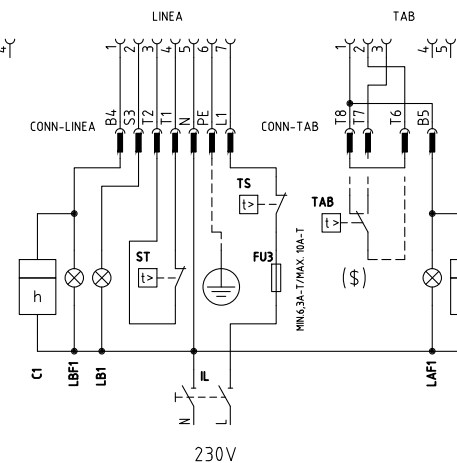
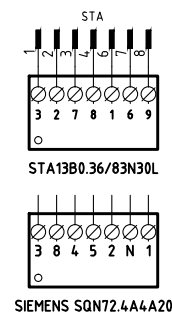
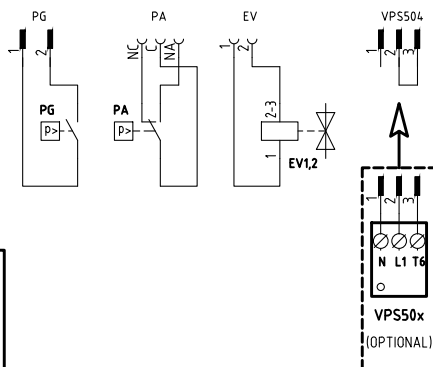
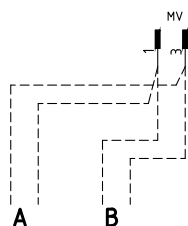


SERVOCOMANDO SERRANDA ARIA
AIR DAMPER ACTUATOR
STA13B0.36/83N30L

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

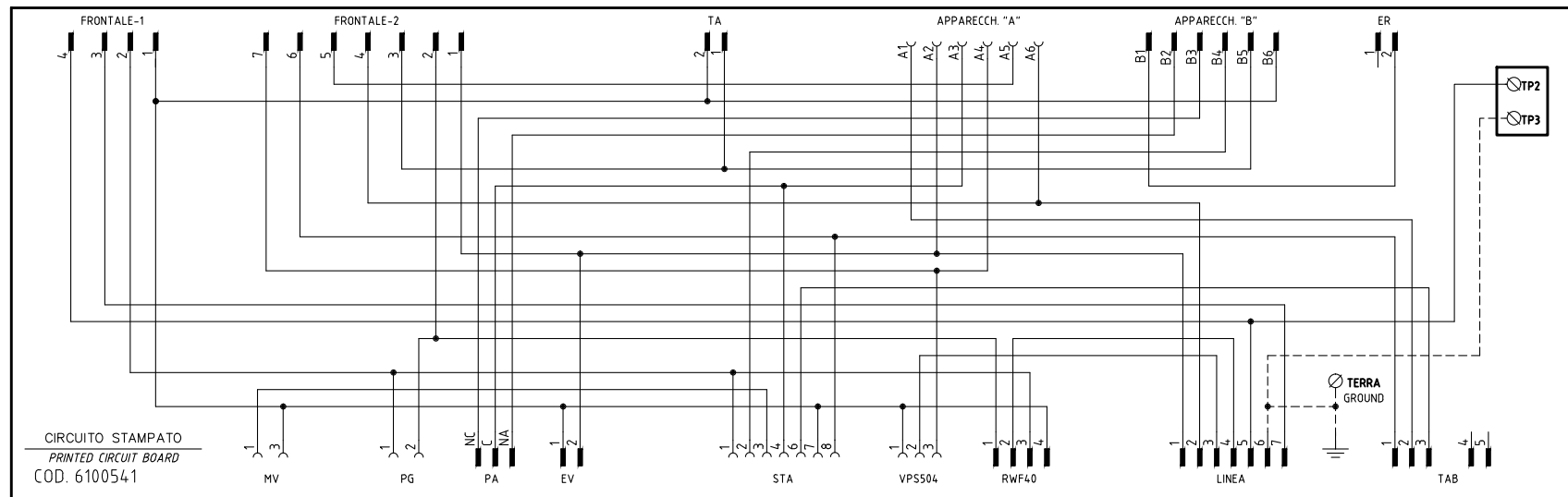
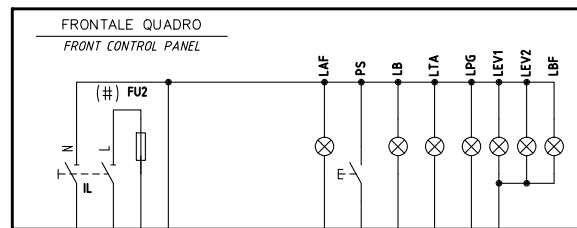
SERVOCOMANDO SERRANDA ARIA
AIR DAMPER ACTUATOR
SIEMENS SQNT2.xA4.A20

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

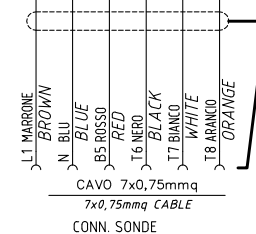
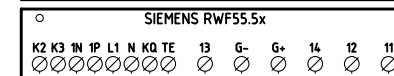
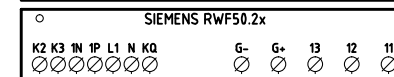
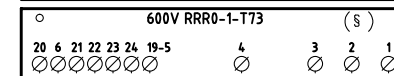
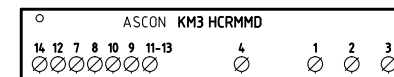
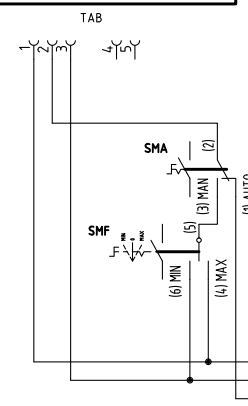
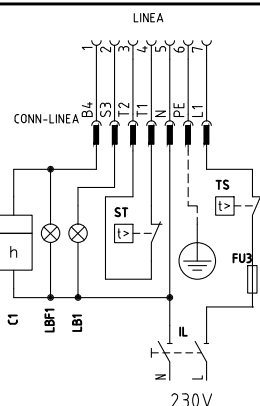
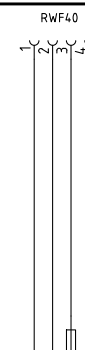
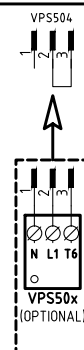
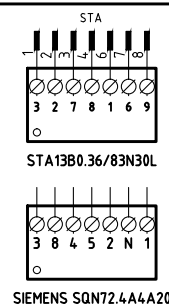
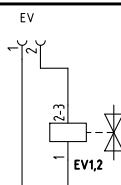
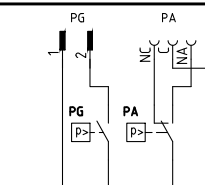
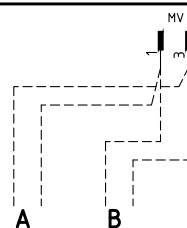


- (#) MOTORE VENTIL. VERSIONE [A], FU2 = 6,3A F; MOTORE VENTIL. VERSIONE [B], FU2 = 10A F
 FAN MOTOR VERSION [A], FU2 = 6,3 A F;
 FAN MOTOR VERSION [B], FU2 = 10 A F
- (x x x) SOLO CON ALIMENTAZIONE ELETTRICA SENZA NEUTRO
 WITH ELECTRIC SUPPLY WITHOUT NEUTRAL VERSION ONLY
- (\$) SE USATO "TAB", TOGLIERE IL PONTE TRA I MORSETTI T6-T8
 IF USED "TAB", REMOVE THE BRIDGE BETWEEN TERMINALS T6-T8

| | | | |
|-----------|------------|-------|--------|
| Data | 19/10/2010 | PREC. | FOGLIO |
| Revisione | 05 | 1 | 2 |
| Dis. N. | 18 - 0163 | SEQUE | TOTALE |
| | | 3 | 5 |



VERSIONE MODULANTE "MD"
"MD" MODULATING VERSION



(x x)
COLLEGAMENTO SONDE
PROBE CONNECTION

SERVOCOMANDO SERRANDA ARIA
AIR DAMPER ACTUATOR
STA13B0.36/83N30L
I (ROSSO) ALTA FIAMMA HIGH FLAME
II (VERDE) SOSTA STAND-BY
III (BLU) BASSA FIAMMA LOW FLAME
IV (NERO) NON USATA NOT USED

SERVOCOMANDO SERRANDA ARIA
AIR DAMPER ACTUATOR
SIEMENS SQN72.xA4A20
I (ROSSO) ALTA FIAMMA HIGH FLAME
II (VERDE) SOSTA STAND-BY
III (ARANCIO) BASSA FIAMMA LOW FLAME
IV (NERO) NON USATA NOT USED

(#) MOTORE VENTIL. VERSIONE [A], FU2 = 6,3A F; MOTORE VENTIL. VERSIONE [B], FU2 = 10A F
FAN MOTOR VERSION [A], FU2= 6.3 A F;
FAN MOTOR VERSION [B], FU2= 10 A F

(x x x) SOLO CON ALIMENTAZIONE ELETTRICA SENZA NEUTRO
WITH ELECTRIC SUPPLY WITHOUT NEUTRAL VERSION ONLY

| | | | |
|-----------|------------|-------|--------|
| Data | 19/10/2010 | PREC. | FOGLIO |
| Revisione | 05 | 2 | 3 |
| Dis. N. | 18 - 0163 | SEQUE | TOTALE |
| | | 4 | 5 |

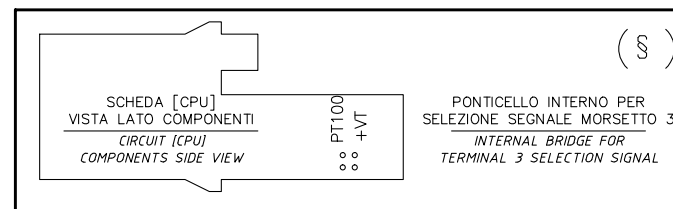
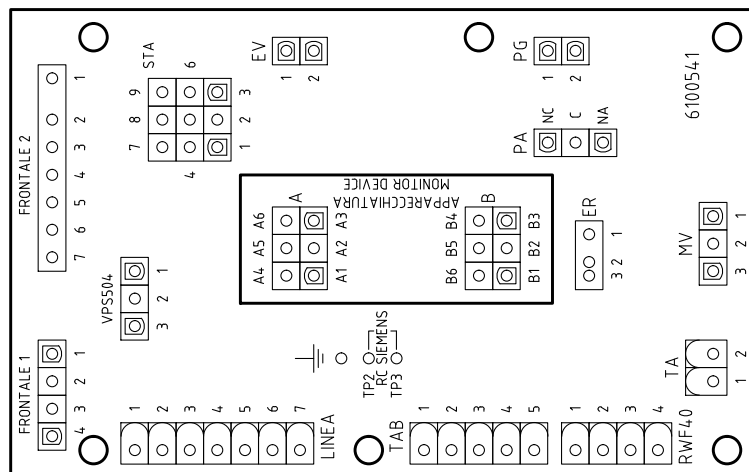
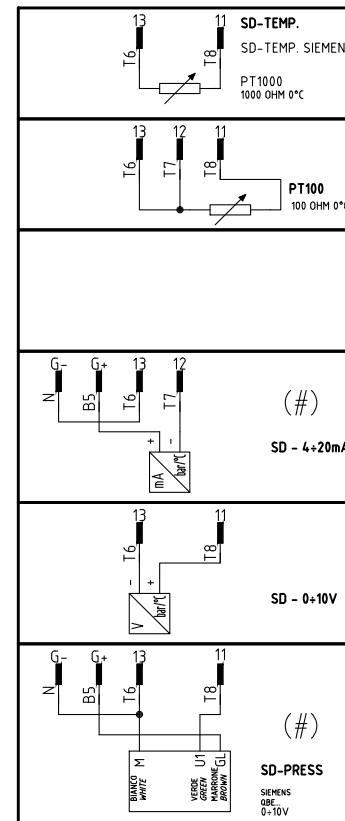
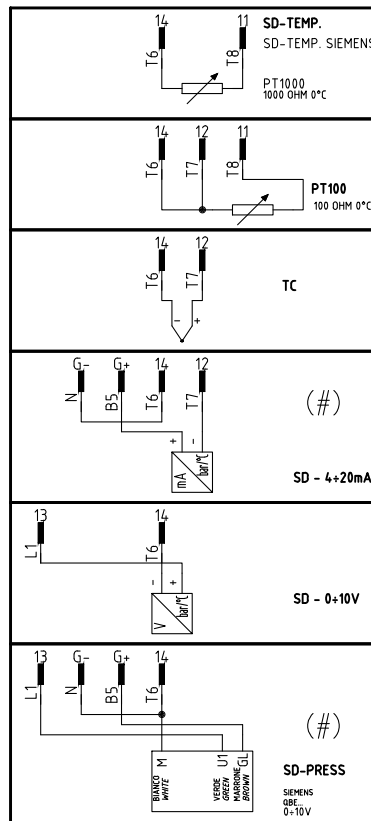
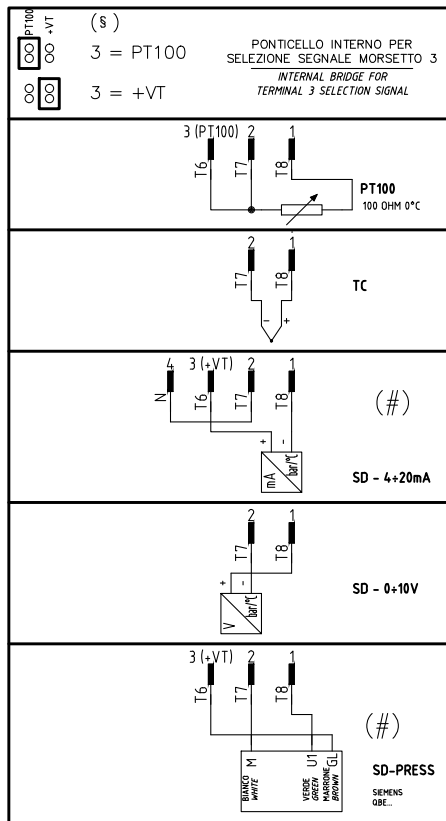
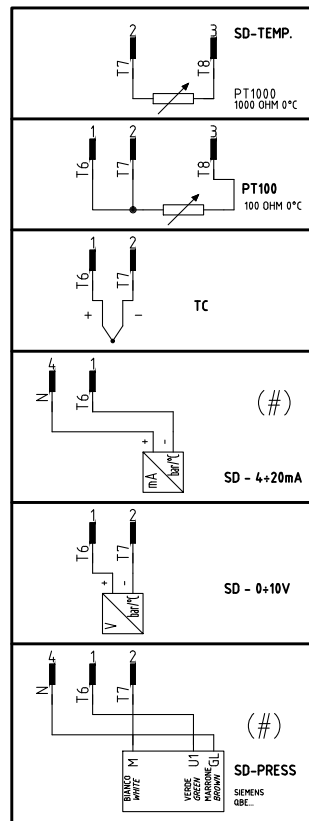
(xx)
ATTENZIONE COLLEGAMENTO SONDE CON CONNETTORE 7 POLI
WARNING PROBE CONNECTION WITH 7 PINS CONNECTOR

KM3 HCRMMD

600V RRR0-1-T73

RWF55.5x

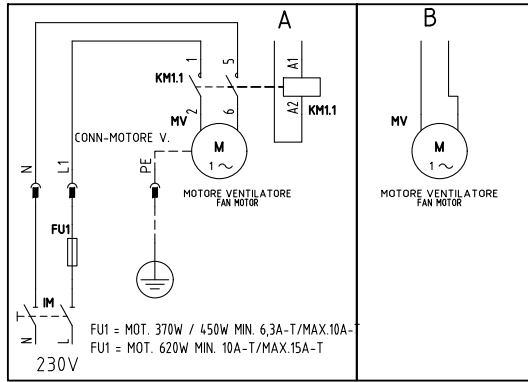
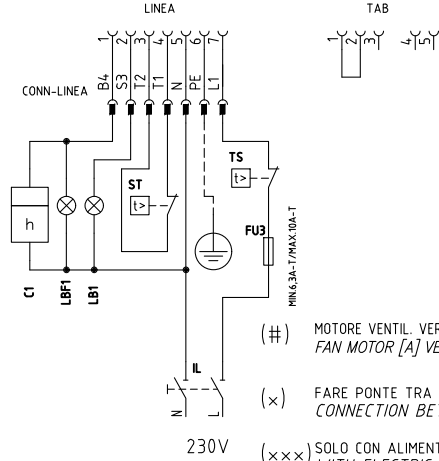
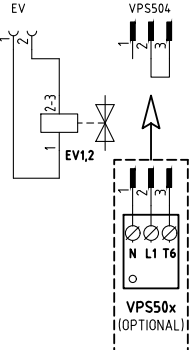
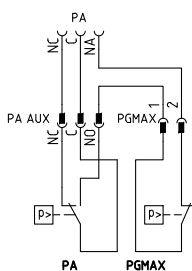
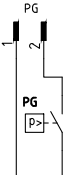
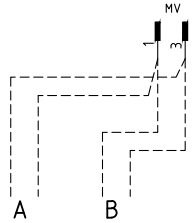
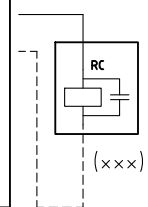
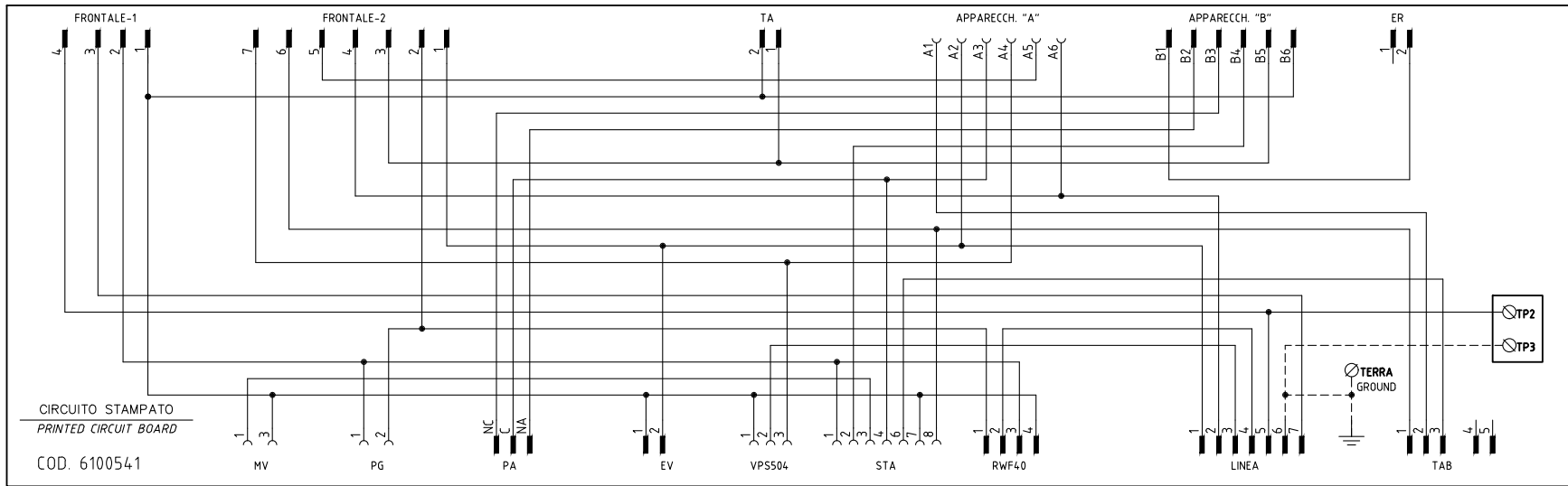
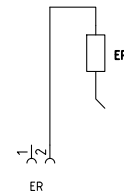
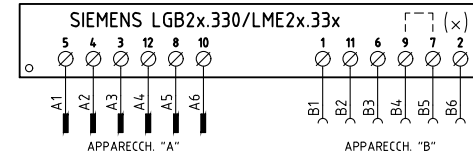
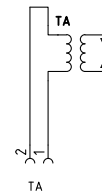
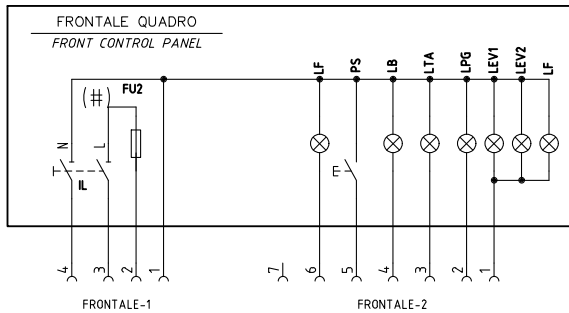
RWF50.2x



| | | | |
|-----------|------------|-------|--------|
| Data | 19/10/2010 | PREC. | FOGLIO |
| Revisione | 05 | 3 | 4 |
| Dis. N. | 18 - 0163 | SEGUE | TOTALE |
| | | 5 | 5 |

| Sigla/Item | Funzione | Function |
|-----------------------------|---|--|
| 600V RRR0-1-T73 | REGOLATORE MODULANTE (ALTERNATIVO) | BURNER MODULATOR (ALTERNATIVE) |
| C1 | CONTAORE BASSA FIAMMA | LOW FLAME TIME COUNTER |
| C2 | CONTAORE ALTA FIAMMA | HIGH FLAME TIME COUNTER |
| ER | ELETTRODO RILEVAZIONE FIAMMA | FLAME DETECTION ELECTRODE |
| EV1,2 | ELETTROVALVOLE GAS (O GRUPPO VALVOLE) | GAS ELECTRO-VALVES (OR VALVES GROUP) |
| FU1 | FUSIBILE LINEA MOTORE VENTILATORE | FAN MOTOR LINE FUSE |
| FU2 | FUSIBILE DI LINEA | LINE FUSE |
| FU3 | FUSIBILE DI LINEA | LINE FUSE |
| FU4 | FUSIBILE AUSILIARIO | AUXILIARY FUSE |
| IL | INTERRUTTORE LINEA BRUCIATORE | BURNER LINE SWITCH |
| IM | INTERRUTTORE LINEA MOTORE VENTILATORE | FAN MOTOR LINE SWITCH |
| KM1.1 | 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 |
| LAF1 | 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 |
| LBF1 | 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] |
| LF | LAMPADA SEGNALE FUNZIONAMENTO BRUCIATORE | INDICATOR LIGHT BURNER OPERATION |
| LPG | LAMPADA SEGNALE PRESENZA GAS IN RETE | INDICATOR LIGHT FOR PRESENCE OF GAS IN THE NETWORK |
| LTA | LAMPADA SEGNALE TRASFORMATORE DI ACCENSIONE | IGNITION TRANSFORMER INDICATOR LIGHT |
| MV | MOTORE VENTILATORE | FAN MOTOR |
| PA | PRESSOSTATO ARIA | AIR PRESSURE SWITCH |
| PG | PRESSOSTATO GAS DI MINIMA PRESSIONE | MINIMUM GAS PRESSURE SWITCH |
| PS | PULSANTE SBLOCCO FIAMMA | FLAME UNLOCK BUTTON |
| PT100 | SONDA DI TEMPERATURA | TEMPERATURE PROBE |
| RC | CIRCUITO RC | RC CIRCUIT |
| 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 LGB2x.330/LME2x.33x | APPARECCHIATURA CONTROLLO FIAMMA | CONTROL BOX |
| SIEMENS LME22.331 | APPARECCHIATURA CONTROLLO FIAMMA | CONTROL BOX |
| SIEMENS RWF50.2x | REGOLATORE MODULANTE | BURNER MODULATOR |
| SIEMENS RWF55.5x | REGOLATORE MODULANTE (ALTERNATIVO) | BURNER MODULATOR (ALTERNATIVE) |
| SIEMENS SQN72.4A4A20 | SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO) | AIR DAMPER ACTUATOR (ALTERNATIVE) |
| 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 |
| STA13B0.36/83N30L | SERVOCOMANDO SERRANDA ARIA | AIR DAMPER ACTUATOR |
| 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 |
| VPS50x | CONTROLLO DI TENUTA VALVOLE GAS (OPTIONAL) | GAS PROVING SYSTEM (OPTIONAL) |

VERSIONE MONOSTADIO "TN" "TN" SINGLE-STAGE VERSION



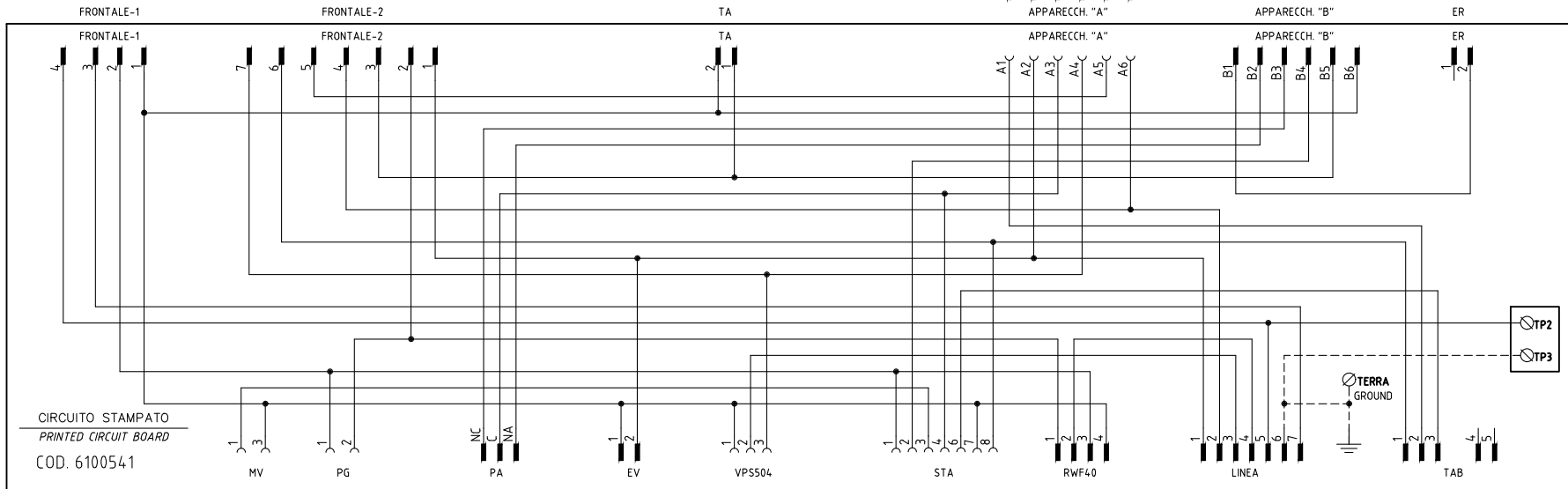
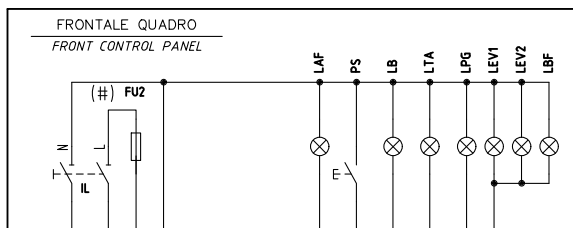
(#) MOTORE VENTIL. VERSIONE [A], FU2 = 6,3A F; MOTORE VENTIL. VERSIONE [B], FU2 = 10A F
FAN MOTOR [A] VERSION, FU2 = 6,3A F; FAN MOTOR [B] VERSION FU2 = 10A F

(x) FARE PONTE TRA I MORSETTI 7 E 9 SOLO CON LGB21.330
CONNECTION BETWEEN TERMINALS 7 AND 9 WITH LGB21.330 ONLY

(x x x) SOLO CON ALIMENTAZIONE ELETTRICA SENZA NEUTRO
WITH ELECTRIC SUPPLY WITHOUT NEUTRAL VERSION ONLY

| | | | |
|-----------|------------|-------|--------|
| Data | 14/01/2005 | PREC. | FOGLIO |
| Revisione | 07 | / | 1 |
| Dis. N. | 18 - 0057 | SEGUE | TOTALE |
| | | 2 | 5 |

VERSIONE ALTA-BASSA FIAMMA "AB" / PROGRESSIVO "PR" "AB" HIGH-LOW / "PR" PROGRESSIVE VERSION

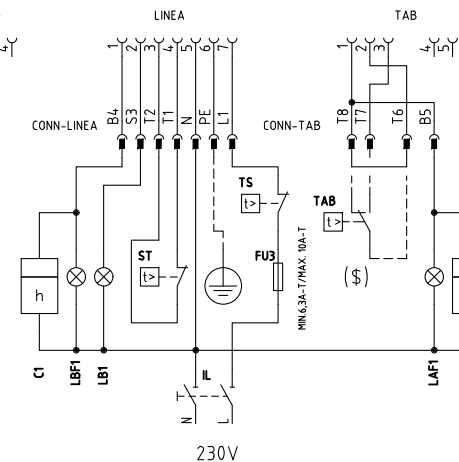
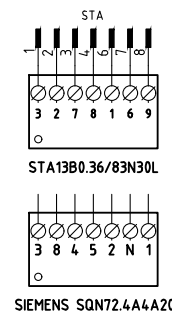
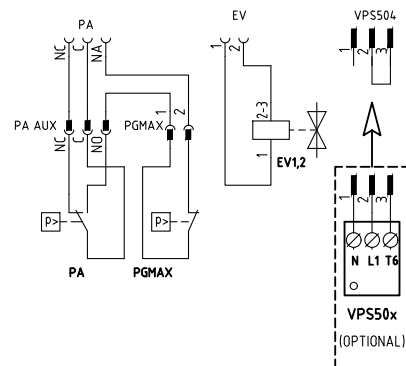
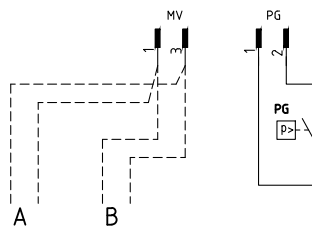


SERVOCOMANDO SERRANDA ARIA
AIR DAMPER ACTUATOR
STA13B0.36/83N30L

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

SERVOCOMANDO SERRANDA ARIA
AIR DAMPER ACTUATOR
SIEMENS SQNT2.xA4A20

I (ROSSO) ALTA FIAMMA
II (VERDE) HIGH FLAME
III (BLU) SOSTA
IV (BLU) STAND-BY
V (ARANCIO) BASSA FIAMMA
VI (ARANCIO) LOW FLAME
VII (NERO) NON USATA
VIII (NERO) NOT USED

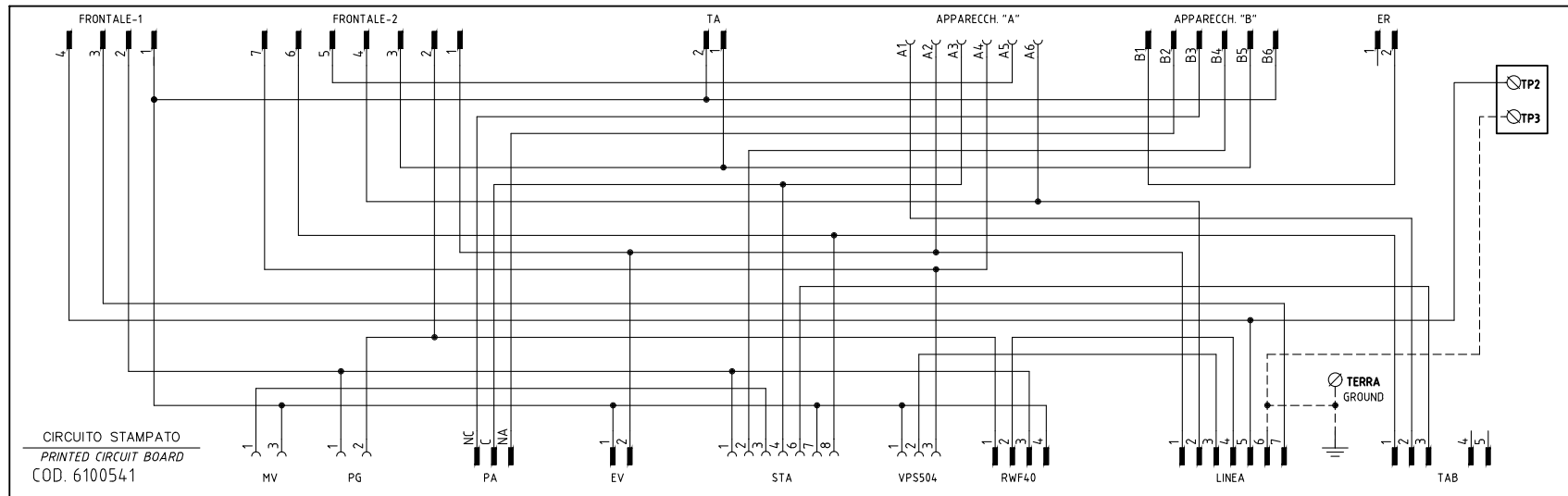
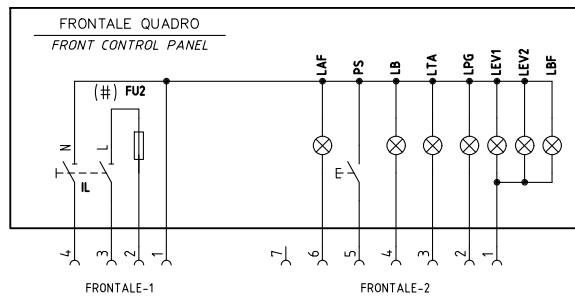


(#) MOTORE VENTIL. VERSIONE [A], FU2 = 6,3A F; MOTORE VENTIL. VERSIONE [B], FU2 = 10A F
 FAN MOTOR [A] VERSION, FU2 = 6,3A F; FAN MOTOR [B] VERSION FU2 = 10A F

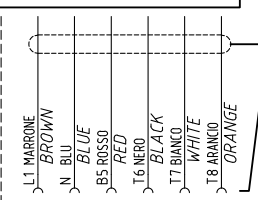
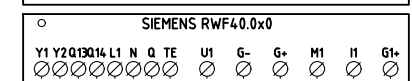
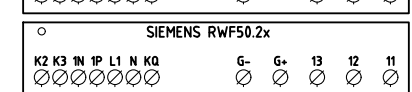
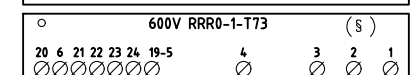
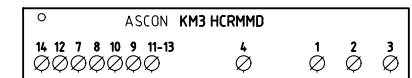
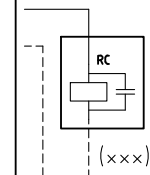
(x x x) SOLO CON ALIMENTAZIONE ELETTRICA SENZA NEUTRO
 WITH ELECTRIC SUPPLY WITHOUT NEUTRAL VERSION ONLY

(\$) SE USATO "TAB", TOGLIERE IL PONTE TRA I MORSETTI T6-T8
 IF USED "TAB", REMOVE THE BRIDGE BETWEEN TERMINALS T6-T8

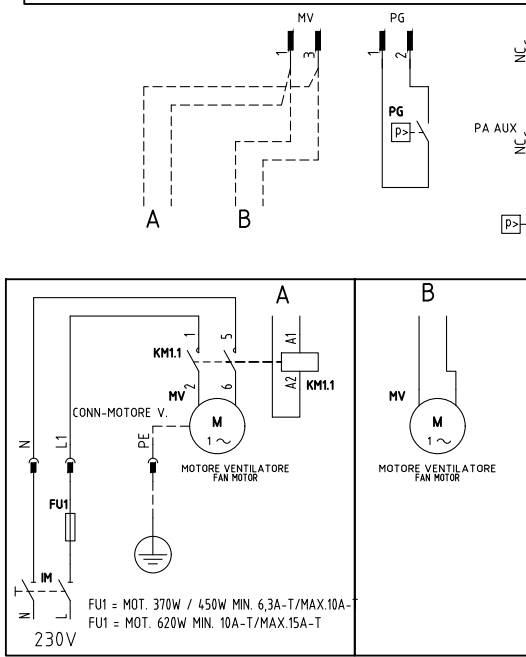
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|-----------|------------|-------|--------|
| Data | 14/01/2005 | PREC. | FOGLIO |
| Revisione | 07 | 1 | 2 |
| Dis. N. | 18 - 0057 | SEQUE | TOTALE |
| | | 3 | 5 |



VERSIONE MODULANTE "MD"
"MD" MODULATING VERSION



(x x)
COLLEGAMENTO SONDE
PROBE CONNECTION



SERVOCOMANDO SERRANDA ARIA
AIR DAMPER ACTUATOR
STA13B0.36/83N30L

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

SERVOCOMANDO SERRANDA ARIA
AIR DAMPER ACTUATOR
SIEMENS SQN72.4A4A20

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

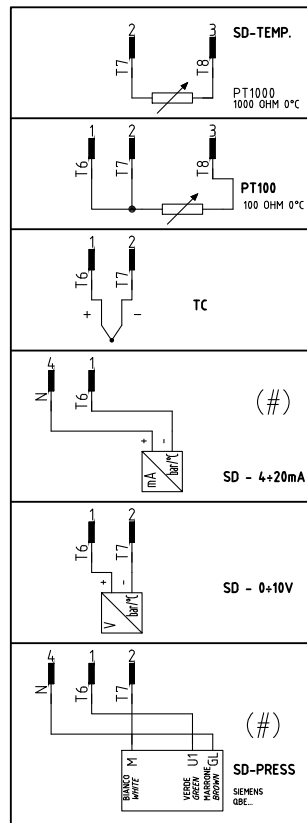
(#) MOTORE VENTIL. VERSIONE [A], FU2 = 6,3A F; MOTORE VENTIL. VERSIONE [B], FU2 = 10A F
FAN MOTOR [A] VERSION, FU2 = 6,3A F; FAN MOTOR [B] VERSION FU2 = 10A F

(x x x) SOLO CON ALIMENTAZIONE ELETTRICA SENZA NEUTRO
WITH ELECTRIC SUPPLY WITHOUT NEUTRAL VERSION ONLY

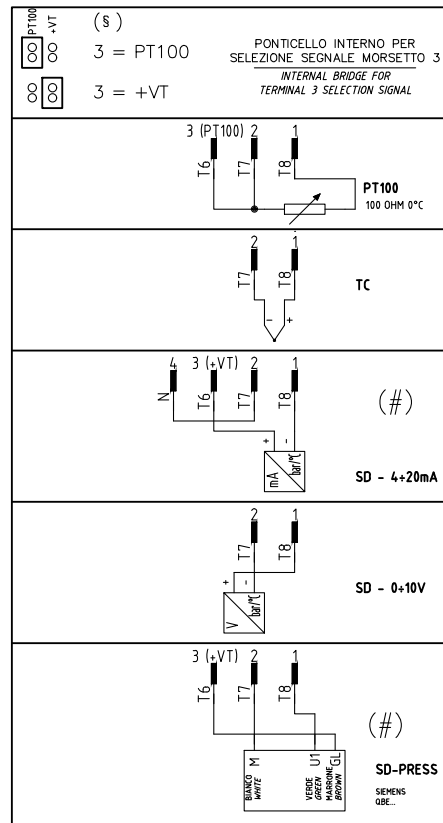
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|-----------|------------|-------|--------|
| Data | 14/01/2005 | PREC. | FOGLIO |
| Revisione | 07 | 2 | 3 |
| Dis. N. | 18 - 0057 | SEGUE | TOTALE |
| | | 4 | 5 |

(xx)
ATTENZIONE COLLEGAMENTO SONDE CON CONNETTORE 7 PINI
WARNING PROBE CONNECTION WITH 7 PINS CONNECTOR

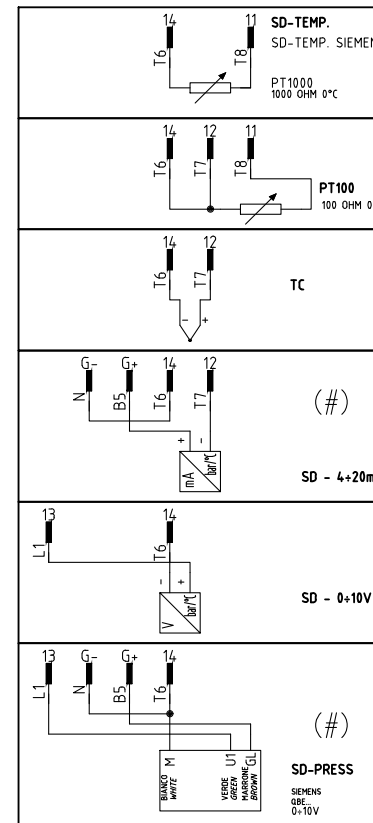
KM3 HCRMMD



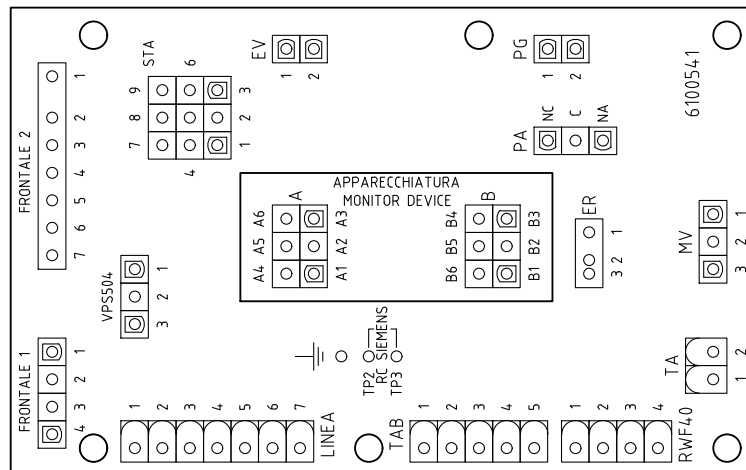
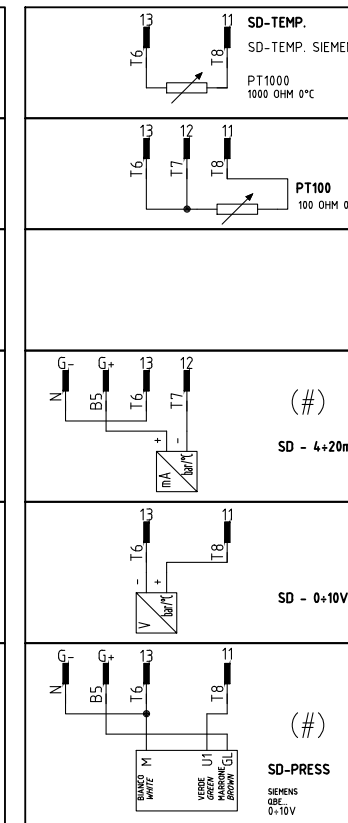
600V RRR0-1-T73



RWF55.5x



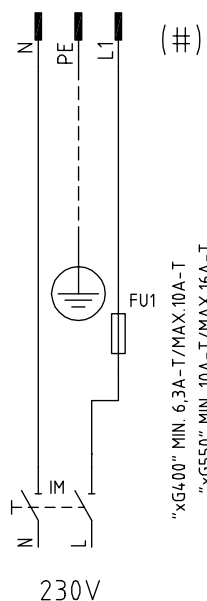
RWF50.2x



| Sigla/Item | Funzione | Function |
|-----------------------------|---|--|
| PGMAX | PRESSOSTATO GAS DI MASSIMA PRESSIONE | MAXIMUM PRESSURE GAS SWITCH |
| 600V RRR0-1-T73 | REGOLATORE MODULANTE (ALTERNATIVO) | BURNER MODULATOR (ALTERNATIVE) |
| C1 | CONTAORE BASSA FIAMMA | LOW FLAME TIME COUNTER |
| C2 | CONTAORE ALTA FIAMMA | HIGH FLAME TIME COUNTER |
| ER | ELETTRODO RILEVAZIONE FIAMMA | FLAME DETECTION ELECTRODE |
| EV1,2 | ELETTROVALVOLE GAS (O GRUPPO VALVOLE) | GAS ELECTRO-VALVES (OR VALVES GROUP) |
| FU1 | FUSIBILE LINEA MOTORE VENTILATORE | FAN MOTOR LINE FUSE |
| FU2 | FUSIBILE DI LINEA | LINE FUSE |
| FU3 | FUSIBILE DI LINEA | LINE FUSE |
| FU4 | FUSIBILE AUSILIARIO | AUXILIARY FUSE |
| IL | INTERRUTTORE LINEA BRUCIATORE | BURNER LINE SWITCH |
| IM | INTERRUTTORE LINEA MOTORE VENTILATORE | FAN MOTOR LINE SWITCH |
| KM1.1 | CONTATTORE MOTORE VENTILATORE | FAN MOTOR CONTACTOR |
| KM3 HCRMD | REGOLATORE MODULANTE (ALTERNATIVO) | BURNER MODULATOR (ALTERNATIVE) |
| LAF | LAMPADA SEGNALE ALTA FIAMMA BRUCIATORE | BURNER IN HIGH FLAME INDICATOR LIGHT |
| LAF1 | 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 |
| LBF1 | 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] |
| LF | LAMPADA SEGNALE FUNZIONAMENTO BRUCIATORE | INDICATOR LIGHT BURNER OPERATION |
| LPG | LAMPADA SEGNALE PRESENZA GAS IN RETE | INDICATOR LIGHT FOR PRESENCE OF GAS IN THE NETWORK |
| LTA | LAMPADA SEGNALE TRASFORMATORE DI ACCENSIONE | IGNITION TRANSFORMER INDICATOR LIGHT |
| MV | MOTORE VENTILATORE | FAN MOTOR |
| PA | PRESSOSTATO ARIA | AIR PRESSURE SWITCH |
| PG | PRESSOSTATO GAS DI MINIMA PRESSIONE | MINIMUM GAS PRESSURE SWITCH |
| PS | PULSANTE SBLOCCO FIAMMA | FLAME UNLOCK BUTTON |
| RC | CIRCUITO RC | RC CIRCUIT |
| SIEMENS LGB2x.330/LME2x.33x | APPARECCHIATURA CONTROLLO FIAMMA | CONTROL BOX |
| SIEMENS LME22.331 | APPARECCHIATURA CONTROLLO FIAMMA | CONTROL BOX |
| SIEMENS RWF40.0x0 | REGOLATORE MODULANTE | BURNER MODULATOR |
| SIEMENS RWF50.2x | REGOLATORE MODULANTE (ALTERNATIVO) | BURNER MODULATOR (ALTERNATIVE) |
| SIEMENS SQN72.4A4A20 | SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO) | AIR DAMPER ACTUATOR (ALTERNATIVE) |
| 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 |
| STA13B0.36/83N30L | SERVOCOMANDO SERRANDA ARIA | AIR DAMPER ACTUATOR |
| TA | TRASFORMATORE DI ACCENSIONE | IGNITION TRANSFORMER |
| TAB | TERMOSTATO/PRESSOSTATO ALTA-BASSA FIAMMA | HIGH-LOW THERMOSTAT/PRESSURE SWITCHES |
| TS | TERMOSTATO/PRESSOSTATO DI SICUREZZA | SAFETY THERMOSTAT OR PRESSURE SWITCH |
| VPS50x | CONTROLLO DI TENUTA VALVOLE GAS (OPTIONAL) | GAS PROVING SYSTEM (OPTIONAL) |

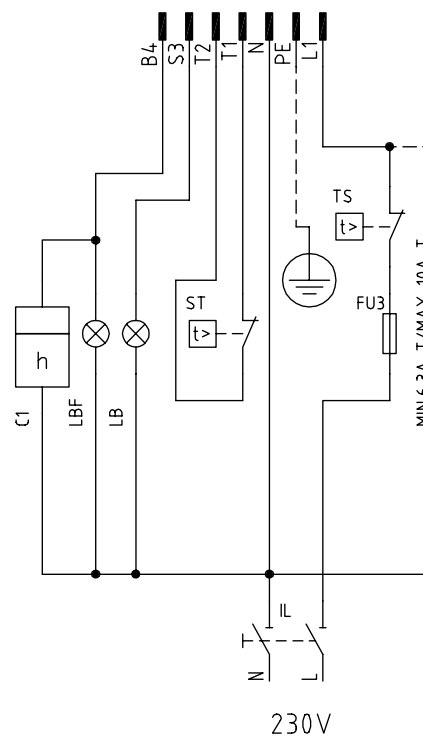
VERSIONE ALTA-BASSA FIAMMA / PROGRESSIVO CON RELE' "KAB" DI SEZIONAMENTO
 HIGH-LOW / PROGRESSIVE VERSION WITH "KAB" SECTIONING RELAY
 ИСПОЛНЕНИЕ ДВУХСТУПЕНЧАТОЕ / ПРОГРЕССИВНОЕ С РАЗДЕЛИТЕЛЬНЫМ РЕЛЕ «КАВ»

CONNETTORE [3] POLI
 [3] PINS CONNECTOR
 [3]-ТИ ПОЛЮСНЫЙ СОЕДИНИТЕЛЬНЫЙ РАЗЪЕМ

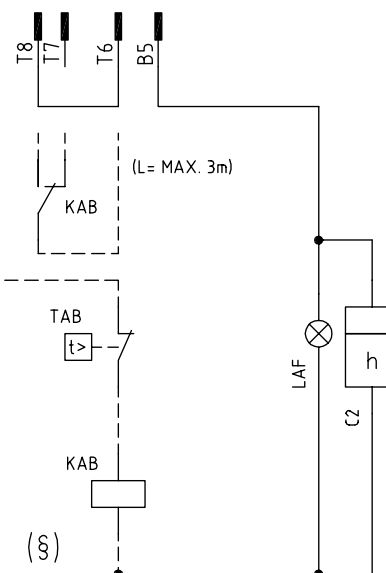


(#) ESCLUSO TIPO [xG350]
 EXCLUDED TYPE [xG350]
 ЗА ИСКЛЮЧЕНИЕМ ТИПА [xG350]

CONNETTORE [7] POLI
 [7] PINS CONNECTOR
 [7]-ТИ ПОЛЮСНЫЙ СОЕДИНИТЕЛЬНЫЙ РАЗЪЕМ



CONNETTORE [4] POLI
 [4] PINS CONNECTOR
 [4]-ТИ ПОЛЮСНЫЙ СОЕДИНИТЕЛЬНЫЙ РАЗЪЕМ



(§) SE USATO, TOGLIERE IL PONTE TRA I MORSETTI T6-T8
 IF USED, REMOVE THE BRIDGE BETWEEN TERMINALS T6-T8
 ЕСЛИ ИСПОЛЬЗУЕТСЯ, СНЯТЬ ПЕРЕМЫЧКУ МЕЖДУ КЛЕММАМИ T6 - T8

| | | | |
|-----------|------------|------------|-------------|
| Data | 26/06/2008 | PREC. / | FOGLIO 1 |
| Revisione | 00 | | |
| Dis. N. | TAB_1 | SEGUE 2 | TOTALE 1 |

| SIGLA/ITEM | FUNZIONE | FUNCTION |
|------------|--|--|
| C1 | CONTAORE BASSA FIAMMA | LOW FLAME TIME COUNTER |
| C2 | CONTAORE ALTA FIAMMA | HIGH FLAME TIME COUNTER |
| FU1 | FUSIBILE LINEA MOTORE VENTILATORE | FAN MOTOR LINE FUSE |
| FU3 | FUSIBILE LINEA BRUCIATORE | BURNER LINE FUSE |
| IL | INTERRUTTORE LINEA BRUCIATORE | BURNER LINE SWITCH |
| IM | INTERRUTTORE LINEA MOTORE VENTILATORE | FAN MOTOR LINE SWITCH |
| KAB | RELE' AUSILARIO | AUXILIARY RELAY |
| LAF | LAMPADA SEGNAZIONE ALTA FIAMMA BRUCIATORE | BURNER IN HIGH FLAME INDICATOR LIGHT |
| LB | LAMPADA SEGNAZIONE BLOCCO BRUCIATORE | INDICATOR LIGHT FOR BURNER LOCK-OUT |
| LBF | LAMPADA SEGNAZIONE BASSA FIAMMA BRUCIATORE | BURNER IN LOW FLAME INDICATOR LIGHT |
| ST | SERIE TERMOSTATI/PRESSOSTATI | SERIES OF THERMOSTATS OR PRESSURE SWITCHES |
| TAB | TERMOSTATO/PRESSOSTATO ALTA-BASSA FIAMMA | HIGH-LOW THERMOSTAT/PRESSURE SWITCHES |
| TS | TERMOSTATO/PRESSOSTATO DI SICUREZZA | SAFETY THERMOSTAT OR PRESSURE SWITCH |

| SIGLA/ITEM | FUNZIONE | FUNCTION |
|------------|--|--|
| C1 | CONTAORE BASSA FIAMMA | СЧЕТЧИК ЧАСОВ РАБОТЫ НА МАЛОМ ПЛАМЕНИ |
| C2 | CONTAORE ALTA FIAMMA | СЧЕТЧИК ЧАСОВ РАБОТЫ НА БОЛЬШОМ ПЛАМЕНИ |
| FU1 | FUSIBILE LINEA MOTORE VENTILATORE | ПЛАВКИЙ ПРЕДОХРАНИТЕЛЬ ЛИНИИ ДВИГАТЕЛЯ ВЕНТИЛЯТОРА |
| FU3 | FUSIBILE LINEA BRUCIATORE | ПЛАВКИЙ ПРЕДОХРАНИТЕЛЬ ЛИНИИ ГОРЕЛКИ |
| IL | INTERRUTTORE LINEA BRUCIATORE | ВЫКЛЮЧАТЕЛЬ ЛИНИИ ГОРЕЛКИ |
| IM | INTERRUTTORE LINEA MOTORE VENTILATORE | ВЫКЛЮЧАТЕЛЬ ЛИНИИ ДВИГАТЕЛЯ ВЕНТИЛЯТОРА |
| KAB | RELE' AUSILIARIO | ВСПОМОГАТЕЛЬНОЕ РЕЛЕ |
| LAF | LAMPADA SEGNAZIONE ALTA FIAMMA BRUCIATORE | СИГНАЛЬНАЯ ЛАМПОЧКА БОЛЬШОГО ПЛАМЕНИ ГОРЕЛКИ |
| LB | LAMPADA SEGNAZIONE BLOCCO BRUCIATORE | СИГНАЛЬНАЯ ЛАМПОЧКА БЛОКИРОВКИ ГОРЕЛКИ |
| LBF | LAMPADA SEGNAZIONE BASSA FIAMMA BRUCIATORE | СИГНАЛЬНАЯ ЛАМПОЧКА МАЛОГО ПЛАМЕНИ ГОРЕЛКИ |
| ST | SERIE TERMOSTATI/PRESSOSTATI | РЯД ТЕРМОСТАТОВ/РЕЛЕ ДАВЛЕНИЯ |
| TAB | TERMOSTATO/PRESSOSTATO ALTA-BASSA FIAMMA | ТЕРМОСТАТ/РЕЛЕ ДАВЛЕНИЯ БОЛЬШОГО/МАЛОГО ПЛАМЕНИ |
| TS | TERMOSTATO/PRESSOSTATO DI SICUREZZA | ПРЕДОХРАНИТЕЛЬНЫЙ ТЕРМОСТАТ/ РЕЛЕ ДАВЛЕНИЯ |

| | | | |
|-----------|------------|-------|--------|
| Data | 26/06/2008 | PREC. | FOGLIO |
| Revisione | 00 | 1 | 2 |
| Dis. N. | TAB_1 | SEGUE | TOTALE |
| | | / | 1 |





USER'S MANUAL

COD. M12925CA Rel 1.2 08/2014

SOFTWARE VERSION 1.0x T73
code 80379 / Edition 01 - 06/2012

1 • INSTALLATION

• Dimensions and cut-out; panel mounting



For correct and safe installation, follow the instructions and observe the warnings contained in this manual.

Panel mounting:

To fix the unit, insert the brackets provided into the seats on either side of the case.
To mount two or more units side by side, respect the cut-out dimensions shown in the drawing.

CE MARKING: The instrument conforms to the European Directives 2004/108/CE and 2006/95/CE with reference to the generic standards: **EN 61000-6-2** (immunity in industrial environment) **EN 61000-6-3** (emission in residential environment) **EN 61010-1** (safety).

MAINTENANCE: Repairs must be done only by trained and specialized personnel.

Cut power to the device before accessing internal parts.

Do not clean the case with hydrocarbon-based solvents (Petrol, Trichlorethylene, etc.). Use of these solvents can reduce the mechanical reliability of the device. Use a cloth dampened in ethyl alcohol or water to clean the external plastic case.

SERVICE: GEFRAN has a service department. The warranty excludes defects caused by any use not conforming to these instructions.

EMC conformity has been tested with the following connections

| FUNCTION | CABLE TYPE | LENGTH |
|--------------------|---------------------------------|--------|
| Power supply cable | 1 mm ² | 1 m |
| Relay output cable | 1 mm ² | 3,5 m |
| TC input | 0,8 mm ² compensated | 5 m |
| Pt100 input | 1 mm ² | 3 m |

2 • TECHNICAL SPECIFICATIONS

| | |
|--|---|
| Display | 2x4 digit green, high display 10 and 7mm |
| Keys | 4 of mechanical type (Man/Aut, INC, DEC, F) |
| Accuracy | 0.2% f.s. ± 1 digit ambient temperature 25°C |
| Main input (settable digital filter) | TC, RTD, PTC, NTC 60mV, 1V Ri \geq 1M Ω ; 5V, 10V Ri \geq 10K Ω ; 20mA Ri=50 Ω Tempo di campionamento 120 msec. |
| Type TC Thermocouples (ITS90) | Type TC Thermocouples : J, K, R, S, T (IEC 584-1, CEI EN 60584-1, 60584-2) ; custom linearization is available / types B, E, N, L GOST, U, G, D, C are available by using the custom linearization. |
| Cold junction error | 0,1° / °C |
| RTD type (scale configurable within indicated range, with or without decimal point) (ITS90) Max line resistance for RTD | DIN 43760 (Pt100), JPT100 20 Ω |
| PTC type / NTC Type | 990 Ω , 25°C / 1K Ω , 25°C |
| Safety | detection of short-circuit or opening of probes, LBA alarm |
| °C / °F selection | configurable from faceplate |
| Linear scale ranges | -1999 to 9999 with configurable decimal point position |
| Controls | PID, Self-tuning, on-off |
| pb - dt - it | 0,0...999,9 % - 0,00...99,99 min - 0,00...99,99 min |
| Action | Heat / Cool |
| Control outputs | on / off |
| Maximum power limit heat / cool | 0,0...100,0 % |
| Cycle time | 0...200 sec |
| Main output type | relay, logic, continuous (0...10V Rload \geq 250K Ω , 0/4...20mA Rload \leq 500 Ω) |
| Softstart | 0,0...500,0 min |
| Fault power setting | -100,0...100,0 % |
| Automatic blanking | Displays PV value, optional exclusion |
| Configurable alarms | Up to 3 alarm functions assignable to an output, configurable as: maximum, minimum, symmetrical, absolute/deviation, LBA |
| Alarm masking | - exclusion during warm up - latching reset from faceplate or external contact |
| Type of relay contact | NO (NC), 5A, 250V/30Vdc cos ϕ =1 |
| Logic output for static relays | 24V \pm 10% (10V min at 20mA) |
| Transmitter power supply | 15/24Vdc, max 30mA short-circuit protection |
| Power supply (switching type) | (std) 100 ... 240Vac \pm 10% (opt.) 11...27Vac/dc \pm 10%; 50/60Hz, 8VA max |
| Faceplate protection | IP65 |
| Working / Storage temperature range | 0...50°C / -20...70°C |
| Relative humidity | 20 ... 85% non-condensing |
| Environmental conditions of use | for internal use only, altitude up to 2000m |
| Installation | Panel, plug-in from front |
| Weight | 160g for the complete version |

3 • DESCRIPTION OF FACEPLATE

Function indicators

Indicates modes of operation

- L1 MAN/AUTO = OFF (automatic control)
ON (manual control)
- L2 PRE-HEATING = ON (running)
- L3 SELFTUNING = ON (enabled Self)
OFF (disabled Self)

Automatic/Manual adjustment selection

Active only when PV display visualises the process variable (button pressed for at least 5 sec.)

"Inc" and "Dec" key

Press to increment (decrement) any numerical parameter • Increment (decrement) speed is proportional to time key stays pressed • The operation is not cyclic: once the maximum (minimum) value of a field is reached, the value will not change even if the key remains pressed.



Indication of output states

OUT 1 (AL1); OUT 2 (OPEN); OUT 3 (CLOSED)

PV Display: Indication of process variable

Error Indication: LO, HI, Sbr, Err
LO= the value of process variable is < di LO_S
HI= the value of process variable is > di HI_S
Sbr= faulty sensor or input values higher than max. limits
Err= PT100 third wire opened for PT100, PTC or input values lower than min. limits (i.e.: TC wrong connection)

SV display: Indication of setpoint

Function key

Gives access to the various configuration phases • Confirms change of set parameters and browses next or previous parameter (if Auto/Man key is pressed)

4 • CONNECTIONS

• Outputs



• Power Supply



TOP



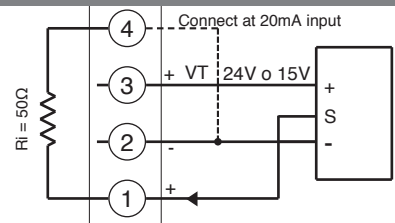
• Inputs

• TC Input

Available thermocouples:
 J, K, R, S, T
 (B, E, N, L, U, G, D, C custom linearization is available)
 - Observe polarities
 - For extensions, use the correct compensating cable for the type of TC used



• Linear input with 3-wire transmitter



• Linear input (I)



• Input 1 linear with transmitter 2 wires



• Identification of boards

Power board - Solder side



Select transmitter voltage

N.B. : you can keep the **OUT1** relay energized at power-up by inserting jumper **S2** and removing resistance **R20**.

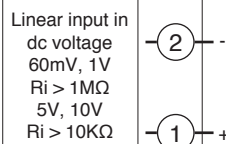
CPU board - Component side



IN/OUT boards (see appendix)

Select signal at contact 3

• Linear input (V)



• Pt100 / PTC / NTC

Use wires of adequate diameter (min. 1mm²)
 PT100, JPT100, PTC, NTC



• Device structure



5 • “EASY” PROGRAMMING and CONFIGURATION



• Prot



6 • PROGRAMMING and CONFIGURATION



N.B.: Once a particular configuration is entered, all unnecessary parameters are no longer displayed



• CFG



(*) LBA alarm may be reset by simultaneously pressing Δ + ∇ keys when OutP is displayed or by switching to Manual.



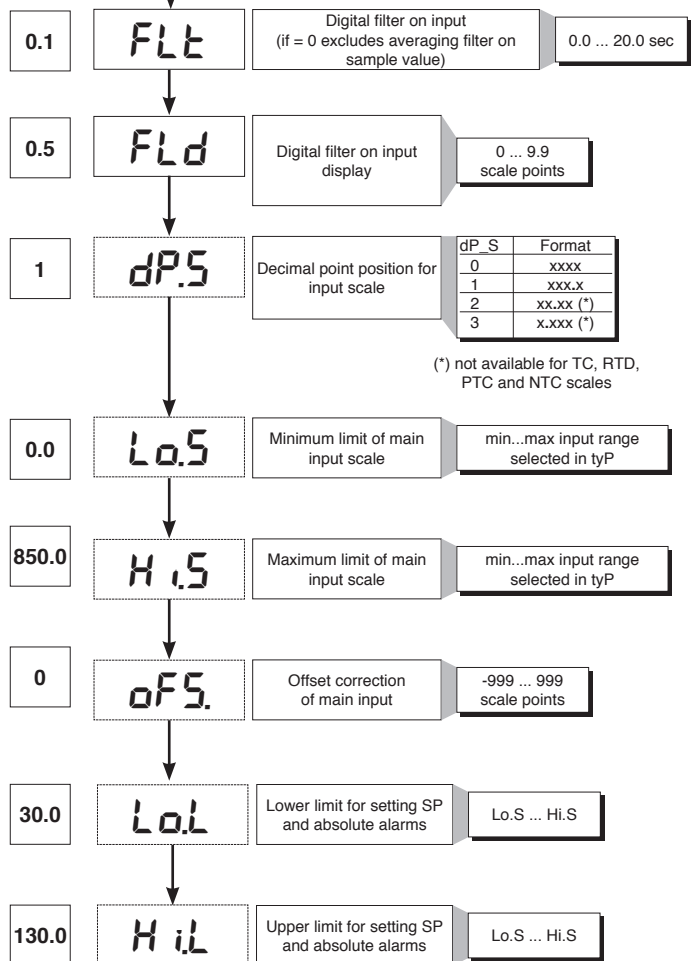
| Type | Probe type | without decimal point | with decimal point |
|------|---------------|-----------------------|--------------------|
| | Sensore: | TC | |
| 0 | TC J °C | 0/1000 | 0.0/999.9 |
| 1 | TC J °F | 32/1832 | 32.0/999.9 |
| 2 | TC K °C | 0/1300 | 0.0/999.9 |
| 3 | TC K °F | 32/2372 | 32.0/999.9 |
| 4 | TC R °C | 0/1750 | 0.0/999.9 |
| 5 | TC R °F | 32/3182 | 32.0/999.9 |
| 6 | TC S °C | 0/1750 | 0.0/999.9 |
| 7 | TC S °F | 32/3182 | 32.0/999.9 |
| 8 | TC T °C | -200/400 | -199.9/400.0 |
| 9 | TC T °F | -328/752 | -199.9/752.0 |
| 28 | TC | CUSTOM | CUSTOM |
| 29 | TC | CUSTOM | CUSTOM |
| 30 | PT100 °C | -200/850 | -199.9/850.0 |
| 31 | PT100 °F | -328/156.2 | -199.9/999.9 |
| 32 | JPT100 °C | -200/600 | -199.9/600.0 |
| 33 | JPT100 °F | -328/1112 | -199.9/999.9 |
| 34 | PTC °C | -55/120 | -55.0/120.0 |
| 35 | PTC °F | -67/248 | -67.0/248.0 |
| 36 | NTC °C | -10/70 | -10.0/70.0 |
| 37 | NTC °F | 14/158 | 14.0/158.0 |
| 38 | 0...60 mV | -1999/9999 | -199.9/999.9 |
| 39 | 0...60 mV | Custom scale | Custom scale |
| 40 | 12...60 mV | -1999/9999 | -199.9/999.9 |
| 41 | 12...60 mV | Custom scale | Custom scale |
| 42 | 0...20 mA | -1999/9999 | -199.9/999.9 |
| 43 | 0...20 mA | Custom scale | Custom scale |
| 44 | 4...20 mA | -1999/9999 | -199.9/999.9 |
| 45 | 4...20 mA | Custom scale | Custom scale |
| 46 | 0...10 V | -1999/9999 | -199.9/999.9 |
| 47 | 0...10 V | Custom scale | Custom scale |
| 48 | 2...10 V | -1999/9999 | -199.9/999.9 |
| 49 | 2...10 V | Custom scale | Custom scale |
| 50 | 0...5 V | -1999/9999 | -199.9/999.9 |
| 51 | 0...5 V | Custom scale | Custom scale |
| 52 | 1...5 V | -1999/9999 | -199.9/999.9 |
| 53 | 1...5 V | Custom scale | Custom scale |
| 54 | 0...1 V | -1999/9999 | -199.9/999.9 |
| 55 | 0...1 V | Custom scale | Custom scale |
| 56 | 200mV...1V | -1999/9999 | -199.9/999.9 |
| 57 | 200mV...1V | Custom scale | Custom scale |
| 58 | Cust10 V-20mA | -1999/9999 | -199.9/999.9 |
| 59 | Cust10 V-20mA | Custom scale | Custom scale |
| 60 | Cust 60mV | -1999/9999 | -199.9/999.9 |
| 61 | Cust 60mV | Custom scale | Custom scale |
| 62 | PT100-JPT | CUSTOM | CUSTOM |
| 63 | PTC | CUSTOM | CUSTOM |
| 64 | NTC | CUSTOM | CUSTOM |

For custom linearization:
 - LO signal is generated with variable below Lo.S or at minimum calibration value
 - HI signal is generated with variable above Lo.S or at maximum calibration value

Max. non-linearity error for thermocouples (TC), resistors (PT100) and thermistors (PTC, NTC).
 The error is calculated as deviation from theoretical value and is expressed as percentage of full scale (in °C).

S, R range 0...1750°C; error < 0.2% f.s. (t > 300°C) / for other range; error < 0.5% f.s.
T error < 0.2% f.s. (t > -150°C)
B range 44...1800°C; error < 0.5% f.s. (t > 300°C) / range 44,0...999,9; error < 1% f.s. (t > 300°C)
U range -99,9...99,9 and -99...99°C; error < 0.5% f.s. / for other range; error < 0.2% f.s. (t > -150°C)
G error < 0.2% f.s. (t > 300°C)
D error < 0.2% f.s. (t > 200°C)
C range 0...2300; error < 0.2% f.s. / for other range; error < 0.5% f.s.

NTC error < 0.5% f.s.
 Tc: J, K, E, N, L error < 0,2% f.s.
 JPT100 and PTC error < 0,2% f.s.
 PT100 scale -200...850°C
 Precision better than 0,2% f.s. at 25°C
 In range 0...50°C:
 • Precision better than 0,2% f.s. in range -200...400°C
 • Precision better than 0,4% f.s. in range +400...850°C (where f.s. refers to range -200... +850°C)





• Prot

12

Pro

Protection code

| Prot | Display | Modification |
|------|---|---------------------------------|
| 0 | SP, Hy.P, Hy.n, AL.2, AL.3, PoS, OuP, INF | SP, Hy.P, Hy.n, AL.2, AL.3, PoS |
| 1 | SP, Hy.P, Hy.n, AL.2, AL.3, PoS, OuP, INF | SP |
| 2 | SP, OuP, INF | |

+ 4 to disable InP, Out
+ 8 to disable CFG
+ 16 to disable SW "power-up - power down"
+ 32 disable manual power latching
+ 64 to disable manual power modification
+128 enables full configuration

Note: OuP and INF only display configuration extended

• Hrd

Hrd

Hardware configuration

0

hd.1

Enable multiset instrument control by serial

6

Ctrl

Control type

| Val | Control type |
|-----|--------------|
| 0 | P heat |
| 1 | |
| 2 | |
| 3 | PI heat |
| 4 | |
| 5 | |
| 6 | PID heat |
| 7 | |
| 8 | |
| 9 | ON-OFF heat |
| 10 | |
| 11 | |
| 12 | |
| 13 | |
| 14 | |

Selection of derivative action sampling time:
+ 0 sample 1 sec.
+ 16 sample 4 sec.
+ 32 sample 8 sec.
+ 64 sample 240 msec.

Note: LbA alarm is not enabled with ON/OFF type control

1

AL.n

Select number of enabled alarms

| AL.nr | Alarm1 | Alarm 2 | Alarm 3 |
|-------|---------|----------|----------|
| 1 | enabled | disabled | disabled |

1

but.

Function of M/A keys

| b u t t | |
|---------|-------------------------------|
| 0 | No function (key disenabled)) |
| 1 | MAN / AUTO controller |
| 2 | |
| 3 | HOLD |
| 4 | |
| 5 | |
| 6 | Start/Stop selftuning |
| 7 | Start/Stop autotuning |
| 8 | |

+ 16 disables the "back menu" function (Auto/Man + F keys) in the configuration menus

0

dSP

Defining SV display function

| diSP | Lower display (SV) function |
|------|-----------------------------|
| 0 | SSP - setpoint enabled |
| 1 | PoS - valve position |
| 2 | Control output value |
| 3 | Deviation (SSP - PV) |



• Lin



• U.CAL



7 • CONSENT FOR BURNER AL1



Obtain burner consent by configuring alarm 1 as inverse deviation with positive hysteresis Hy.P and negative hysteresis Hy.n

8 • PRE-HEATING FUNCTION

Enable the pre-heating function by setting parameters GS.0, Ht.0, GS.1 other than zero.

It consists of three phases that are activated sequentially at firing:

- Ramp 0 phase

Enabled by setting $GS.0 > 0$. Starting from setpoint = PV (initial state), it reaches pre-heating set SP.0 with gradient GS.0

- Maintenance phase

Enabled by setting $Ht.0 > 0$. Maintains pre-heating setpoint SP.0 for time Ht.0

- Ramp 1 phase

Enabled by setting $GS.1 > 0$. Starting from pre-heating setpoint SP.0, it reaches active _SP set with gradient GS.1

In case of selftuning, the pre-heating function is not activated



9 • ADJUSTMENT WITH MOTORIZED VALVE

In an adjustment process the adjustment valve has the function of varying fuel delivery (frequently corresponding to the thermal energy introduced into the process) in relation to the signal coming from the controller.

For this purpose it is provided with an actuator able to modify its opening value, overcoming the resistances produced by the fluid passing inside it.

The adjustment valves vary the delivery in a modulated manner, producing finite variations in the fluid passage inner area corresponding to finite variations of the actuator input signal, coming from the controller. The servomechanism, for example, comprises an electric motor, a reducer and a mechanical transmission system which actions the valve.

Various auxiliary components can be present such as the mechanical and electrical safety end travels, manual actioning systems.



The controller determines, on the basis of the dynamics of the process, the control output for the valve corresponding to the opening of the same in such a way so as to maintain the desired value of the process variable.

Characteristic parameters for valves control

- Actuator time ($A_c.t$) is the time employed by the valve to pass from entirely open to entirely closed (or vice-versa), and can be set with a resolution of one second. It is a mechanical feature of the valve+actuator unit.

NOTE: if the actuator's travel is mechanically limited it is necessary to proportionally reduce the $A_c.t$ value.

- Minimum impulse ($t.Lo$) expressed as a % of the actuator time (resolution 0.1%).

Represents the minimum change in position corresponding to a minimum change in power supplied by the instrument below which the actuator will not physically respond to the command.

This represents the minimum variation in position due to which the actuator does not physically respond to the command.

The minimum duration of the movement can be set in $t.Lo$, expressed as a % of actuator time.

- Impulsive intervention threshold ($t.Hi$) expressed as a % of the actuator time (resolution 0.1%) represents the position displacement (requested position – real position) due to which the manoeuvre request becomes impulsive.

You can choose between 2 types of control:

1) ON time of movement = $t.on$ and OFF time proportional to shift and greater than or equal to $t.Lo$ (we recommend setting $t.on = t.Lo$) (set $t.oF = 0$).

2) ON time of movement = $t.on$ and OFF time = $t.oF$. A value set for $t.oF < t.on$ is forced to $t.on$. To activate this type, set $t.oF > 0$.

The type of movement approach allows fine control of the reverse drive valve (from potentiometer or not), especially useful in cases of high mechanical inertia.

Set $t.Hi = 0$ to exclude modulation in positioning.

This type of modulated approach allows precise control of the feedback actioned valve, by a potentiometer or not, and is especially useful in cases of high mechanical inertia. Setting $t.Hi = 0$ excludes modulation in positioning.

- Dead zone ($dE.b$) is a displacement band between the adjustment setpoint and the process variable within which the controller does not supply any command to the valve (Open = OFF; Close = OFF). It is expressed as a percentage of the bottom scale and is positioned below the setpoint.

The dead zone is useful in an operative process to avoid straining the actuator with repeated commands and an insignificant effect on the adjustment. Setting $dE.b = 0$ the dead zone is excluded.



Graph of behavior inside the band with integral time $\neq 0$.

With integral time = 0, movement ON time is always equal to OFF time.

$t_0 = t.Lo$

Valve control modes

With the controller in manual, the setting of parameter At.y ≥ 8 allows direct control of the valve open and close commands through the keyboard Increments and Decrements on the front seats.

V0 - for floating valve without potentiometer

Model V0 have similar behaviour: every manoeuvre request greater than the minimum impulse t.Lo is sent to the actuator by means of the OPEN/CLOSE relays; every action updates the presumed position of the virtual potentiometer calculated on the basis of the actuator travel declared time. In this way there is always a presumed position of the valve which is compared with the position request of the controller. Having reached a presumed extreme position (entirely open or entirely closed determined by the "virtual potentiometer") the controller provides a command in the same direction, in this way ensuring the real extreme position is reached (minimum command time = t.on). The actuators are usually protected against the OPEN command in the entirely open position or CLOSE command in the entirely closed position.

V3 - for floating valve, PI control

When the difference between the position calculated by the controller and the only proportional component exceeds the value corresponding to the minimum impulse t.Lo the controller provides an OPEN or CLOSE command of the duration of the minimum impulse itself t.Lo. At each delivery the integral component of the command is set to zero (discharge of the integral). The frequency and duration of the impulses is correlated to the integral time (h.it or c.it).

Non-movement behavior

t.Hi = 0: with power = 100% or 0.0%, the corresponding open or close outputs always remain enabled (safety status).

Movement behavior

t.Hi $\neq 0$: with position attained corresponding to 100% or 0.0%, the corresponding open or close outputs are switched off.



If t.oF = 0, current function is maintained.

If t.oF $\neq 0$ movement mode will be as shown on the graph

10 • CONTROL ACTIONS

Proportional Action:

action in which contribution to output is proportional to deviation at input (deviation = difference between controlled variable and setpoint).

Derivative Action:

action in which contribution to output is proportional to rate of variation input deviation.

Integral Action:

action in which contribution to output is proportional to integral of time of input deviation.

Influence of Proportional, Derivative and Integral actions on response of process under control

- * An increase in P.B. reduces oscillations but increases deviation.
 - * A reduction in P.B. reduces the deviation but provokes oscillations of the controlled variable (the system tends to be unstable if P.B. value is too low).
 - * An increase in Derivative Action corresponds to an increase in Derivative Time, reduces deviation and prevents oscillation up to a critical value of Derivative Time, beyond which deviation increases and prolonged oscillations occur.
 - * An increase in Integral Action corresponds to a reduction in Integral Time, and tends to eliminate deviation between the controlled variable and the setpoint when the system is running at rated speed.
- If the Integral Time value is too long (Weak integral action), deviation between the controlled variable and the setpoint may persist.

Contact GEFRA for more information on control actions.

11 • MANUAL TUNING

- A) Enter the setpoint at its working value.
 B) Set the proportional band at 0.1% (with on-off type setting).
 C) Switch to automatic and observe the behavior of the variable. It will be similar to that in the figure:



D) The PID parameters are calculated as follows: Proportional band

$$P.B. = \frac{\text{Peak}}{(V_{\max} - V_{\min})} \times 100$$

(V max - V min) is the scale range.

Integral time: $I_t = 1.5 \times T$

Derivative time: $d_t = I_t/4$

E) Switch the unit to manual, set the calculated parameters. Return to PID action by setting the appropriate relay output cycle time, and switch back to Automatic.

F) If possible, to optimize parameters, change the setpoint and check temporary response. If an oscillation persists, increase the proportional band. If the response is too slow, reduce it.

12 • SET GRADIENT

SET GRADIENT: if set to $\neq 0$, the setpoint is assumed equal to PV at power-on and auto/man switchover. With gradient set, it reaches the local setpoint. Every variation in setpoint is subject to a gradient.

The set gradient is inhibited at power-on when self-tuning is engaged.

If the set gradient is set to $\neq 0$, it is active even with variations of the local setpoint.

The control setpoint reaches the set value at the speed defined by the gradient.

13 • SOFTWARE ON / OFF SWITCHING FUNCTION

How to switch the unit OFF: hold down the “F” and “Raise” keys simultaneously for 5 seconds to deactivate the unit, which will go to the OFF state while keeping the line supply connected and keeping the process value displayed. The SV display is OFF.

All outputs (alarms and controls) are OFF (logic level 0, relays de-energized) and all unit functions are disabled except the switch-on function and digital communication.

How to switch the unit ON: hold down the “F” key for 5 seconds and the unit will switch OFF to ON. If there is a power failure during the OFF state, the unit will remain in OFF state at the next power-up (ON/OFF state is memorized).

The function is normally enabled, but can be disabled by setting the parameter Prot = Prot +16.

14 • SELF-TUNING

The function works for single output systems (heating or cooling). The self-tuning action calculates optimum control parameter values during process startup. The variable (for example, temperature) must be that assumed at zero power (room temperature).

The controller supplies maximum power until an intermediate value between starting value and setpoint is reached, after which it zeros power.

PID parameters are calculated by measuring overshoot and the time needed to reach peak. When calculations are finished, the system disables automatically and the control proceeds until the setpoint is reached.

How to activate self-tuning:

A. Activation at power-on

1. Set the setpoint to the required value
2. Enable selftuning by setting the Stun parameter to 2 (CFG menu)
3. Turn off the instrument
4. Make sure the temperature is near room temperature
5. Turn on the instrument again

B. Activation from keyboard

1. Make sure that key M/A is enabled for Start/Stop selftuning (code but = 6 Hrd menu)
2. Bring the temperature near room temperature
3. Set the setpoint to the required value
4. Press key M/A to activate selftuning (Attention: selftuning interrupts if the key is pressed again)

The procedure runs automatically until finished, when the new PID parameters are stored: proportional band, integral and derivative times calculated for the active action (heating or cooling). In case of double action (heating or cooling), parameters for the opposite action are calculated by maintaining the initial ratio between parameters (ex.: $CPb = HPb \times K$; where $K = CPb / HPb$ when self-tuning starts). When finished, the Stun code is automatically cancelled.

Notes :

-The procedure does not start if the temperature is higher than the setpoint (heating control mode) or if the temperature is lower than the setpoint (cooling control mode). In this case, the Stun code is not cancelled.

-It is advisable to enable one of the configurable LEDs to signal selftuning status. By setting one of parameters LED1, LED2, LED3=4 or 20 on the Hrd menu, the respective LED will be on or flashing when selftuning is active.



15 • ACCESSORIES

• Interface for instrument configuration

KIT PC USB / RS485 o TTL



Kit for PC via the USB port (Windows environment) for GEFTRAN instruments configuration:

Lets you read or write all of the parameters

- A single software for all models
- Easy and rapid configuration
- Saving and management of parameter recipes
- On-line trend and saving of historical data

Component Kit:

- Connection cable PC USB ... port TTL
- Connection cable PC USB ... RS485 port
- Serial line converter
- CD SW GF Express installation

• ORDERING CODE

GF_eXK-2-0-0

cod F049095

16 • ORDER CODE



• WARNINGS

WARNING: this symbol indicates danger. It is placed near the power supply circuit and near high-voltage relay contacts.

Read the following warnings before installing, connecting or using the device:

- follow instructions precisely when connecting the device.
- always use cables that are suitable for the voltage and current levels indicated in the technical specifications.
- the device has no ON/OFF switch: it switches on immediately when power is turned on. For safety reasons, devices permanently connected to the power supply require a two-phase disconnecting switch with proper marking. Such switch must be located near the device and must be easily reachable by the user. A single switch can control several units.
- if the device is connected to electrically NON-ISOLATED equipment (e.g. thermocouples), a grounding wire must be applied to assure that this connection is not made directly through the machine structure.
- if the device is used in applications where there is risk of injury to persons and/or damage to machines or materials, it MUST be used with auxiliary alarm units. You should be able to check the correct operation of such units during normal operation of the device.
- before using the device, the user must check that all device parameters are correctly set in order to avoid injury to persons and/or damage to property.
- the device must NOT be used in inflammable or explosive environments. It may be connected to units operating in such environments only by means of suitable interfaces in conformity to local safety regulations.
- the device contains components that are sensitive to static electrical discharges. Therefore, take appropriate precautions when handling electronic circuit boards in order to prevent permanent damage to these components.

Installation: installation category II, pollution level 2, double isolation

The equipment is intended for permanent indoor installations within their own enclosure or panel mounted enclosing the rear housing and exposed terminals on the back.

- only for low power supply: supply from Class 2 or low voltage limited energy source
- power supply lines must be separated from device input and output lines; always check that the supply voltage matches the voltage indicated on the device label.
- install the instrumentation separately from the relays and power switching devices
- do not install high-power remote switches, contactors, relays, thyristor power units (particularly if "phase angle" type), motors, etc... in the same cabinet.
- avoid dust, humidity, corrosive gases and heat sources.
- do not close the ventilation holes; working temperature must be in the range of 0...50°C.

- surrounding air: 50°C
- use 60/75°C copper (Cu) conductor only, wire size range 2x No 22 - 14AWG, Solid/Stranded
- use terminal tightening torque 0.5N m

If the device has faston terminals, they must be protected and isolated; if the device has screw terminals, wires should be attached at least in pairs.

• **Power:** supplied from a disconnecting switch with fuse for the device section; path of wires from switch to devices should be as straight as possible; the same supply should not be used to power relays, contactors, solenoid valves, etc.; if the voltage waveform is strongly distorted by thyristor switching units or by electric motors, it is recommended that an isolation transformer be used only for the devices, connecting the screen to ground; it is important for the electrical system to have a good ground connection; voltage between neutral and ground must not exceed 1V and resistance must be less than 60hm; if the supply voltage is highly variable, use a voltage stabilizer for the device; use line filters in the vicinity of high frequency generators or arc welders; power supply lines must be separated from device input and output lines; always check that the supply voltage matches the voltage indicated on the device label.

• **Input and output connections:** external connected circuits must have double insulation; to connect analog inputs (TC, RTD) you have to: physically separate input wiring from power supply wiring, from output wiring, and from power connections; use twisted and screened cables, with screen connected to ground at only one point; to connect adjustment and alarm outputs (contactors, solenoid valves, motors, fans, etc.), install RC groups (resistor and capacitor in series) in parallel with inductive loads that work in AC (*Note: all capacitors must conform to VDE standards (class x2) and support at least 220 VAC. Resistors must be at least 2W*); fit a 1N4007 diode in parallel with the coil of inductive loads that operate in DC.

GEFRAN spa will not be held liable for any injury to persons and/or damage to property deriving from tampering, from any incorrect or erroneous use, or from any use not conforming to the device specifications.

Set-up for 600V RRR0-1-T73 regulator

Set up for temperature probe Pt100 (ex Siemens QAE2120 130°C max.)

The regulator comes out of the factory preset with the corresponding values of the Siemens RWF40.000 and RWF50.2x

Verify wiring of the sensor



Regulation of the set-point = 80

It can be modified by using arrows "up" and "down".

By pushing **F** you go to parameters:

| | |
|------|--|
| Hy.P | 5 (hysteresis positive for output 1, terminals 21-22 (ex Q13-Q14)) |
| Hy.n | -5 hysteresis negative for output ,1 terminals 21-22 (ex Q13-Q14) |

Keep pushing **F** until you see **PASS**, release **F** and through the arrows set **99**, push **F** and visualize **Pro** (protection code) default is **12**, through the arrows set **128** and push **F**, keep it pushed until all parameters **InF**, **CFG**, **InP**, **Out**, **PASS** are visualized.

| CFG | |
|-------|------|
| S.tun | 0 |
| hPb | 1,2 |
| hIt | 5,83 |
| hdt | 1,33 |
| ... | |

| InP | |
|------|-------------------------------------|
| | |
| tyP | 30 (Pt100) |
| ... | |
| dP_S | 1 (decimals num.) |
| Lo.S | 0 (min. sensor scale) |
| Hi.S | 850,0 (max sensor scale) |
| oFS | 0 (offset of input correction) |
| Lo.L | 30,0 (lower set-point range limit) |
| Hi.L | 130,0 (upper set-point range limit) |

| Out | |
|------|--|
| A1.r | 0 |
| ... | |
| A1.t | 3 (operating mode AL1 =inverse-relative-normal) |
| ... | |
| rL.1 | 2 (AL1) |
| rL.2 | 18 (open) |
| rL.3 | 19 (close) |
| rEL | 0 |
| A.ty | 9 (type of servocontrol command) |
| Ac.t | 12 (servocontrol running time: SQN72.4.../STA12..=12; SQM40.265=30) |
| t Lo | 2 |
| t Hi | 0.0 |
| t.on | 2 |
| t.oF | 0.0 |
| dE.b | 0,1 (dead zone in % of end scale) |
| | |

| PAS | 99 then push and keep pushed F until visualization of Hrd |
|-------|---|
| | |
| Hrd | |
| ... | |
| Ctrl | 6 (PID warm) |
| AL.nr | 1 |
| but | 1 |
| diSP | 0 |
| Ld.1 | 1 |
| Ld.2 | 28 |
| Ld.3 | 20 |

Keep pushed **F** until you visualize **PASS**, release **F** and through the arrows set **99**, push **F** and visualize **Pro** (protection code) from **128**, through the arrows, bring it back to **12**, and keep **F** pushed until you come back to set-point value.

Manual operation :

Keep pushed the lower left key for at least 5 sec.

The instrument will enter the "MAN" mode (see also "Ld1" switching on).

Through the arrows, "Open" and "Close" outputs are activated.

To come back to normal working keep the lower left key pushed for at least 5 sec.

Software switch off :

By keeping pushed keys **Arrow up** + **F** for more than 5 sec. the instrument switches off the software, does not command the outputs and visualize only the variable of process measured by the probe.

To restore keep pushed **F** for more than 5 sec.

Set up for temperature probe Pt100 for high temperature (350°C max.)

Verify wiring of the sensor



Regulation of the set-point = **80**

It can be modified by using arrows "up" and "down".

By pushing **F** you go to parameters:

| | |
|------|--|
| Hy.P | 10 (hysteresis positive for output 1 terminals 21-22 (ex Q13-Q14)) |
| Hy.n | -5 (hysteresis negative for output 1 terminals 21-22 (ex Q13-Q14)) |

Keep pushing **F** until you see **PASS**, release **F** and through the arrows set **99**, push **F** and visualize **Pro** (protection code) default is **12**, through the arrows set **128** and push **F**, keep it pushed until all parameters **InF**, **CFG**, **InP**, **Out**, **PASS** are visualized.

| CFG | |
|-------|------|
| S.tun | 0 |
| hPb | 1,2 |
| hlt | 5,83 |
| hdt | 1,33 |
| ... | |

| InP | |
|------|-------------------------------------|
| | |
| tyP | 30 (Pt100) |
| ... | |
| dP_S | 1 (decimals num.) |
| Lo.S | 0 (min. sensor scale) |
| Hi.S | 850,0 (max sensor scale) |
| oFS | 0 (offset of input correction) |
| Lo.L | 0,0 (lower set-point range limit) |
| Hi.L | 350,0 (upper set-point range limit) |

| Out | |
|------------|--|
| A1.r | 0 |
| ... | |
| A1.t | 3 (mode AL1 =inverse-relative-normal) |
| ... | |
| rL.1 | 2 (AL1) |
| rL.2 | 18 (open) |
| rL.3 | 19 (close) |
| rEL | 0 |
| A.ty | 9 (type of servocontrol command) |
| Ac.t | 12 (servocontrol running time: SQN72.4.../STA12..=12; SQM40.265=30) |
| t Lo | 2 |
| t Hi | 0.0 |
| t.on | 2 |
| t.oF | 0.0 |
| dE.b | 0,1 (dead zone in % of end scale) |

| PAS | 99 then push and keep pushed F until visualization of Hrd |
|------------|---|
| | |
| Hrd | |
| ... | |
| Ctrl | 6 (PID warm) |
| AL.nr | 1 |
| but | 1 |
| diSP | 0 |
| Ld.1 | 1 |
| Ld.2 | 28 |
| Ld.3 | 20 |

Keep pushed **F** until you visualize **PASS**, release **F** and through the arrows set **99**, push **F** and visualize **Pro** (protection code) from **128**, through the arrows, bring it back to **12**, and keep **F** pushed until you come back to set-point value.

Manual operation:

Keep pushed the lower left key for at least 5 sec.

The instrument will enter the "MAN" mode (see also "Ld1" switching on).

Through the arrows, "Open" and "Close" outputs are activated.

To come back to normal working keep the lower left key pushed for at least 5 sec.

Software switch off :

By keeping pushed keys **Arrow up** + **F** for more than 5 sec. the instrument switches off the software, does not command the outputs and visualize only the variable of process measured by the probe.

To restore keep pushed **F** for more than 5 sec.

Set up for pressure transmitter 2 wires signal 4÷20mA



With pressure transmitters first we need to enable their power supply: remove the part as shown below, then, on the CPU unit, move the bridge from Pt100 to +Vt



Verify wiring of the sensor

Impostazione set-point

| Transmitter | 1,6bar | 3bar | 10bar | 16bar | 25bar | 40bar |
|-------------|--------|--------|-------|-------|-------|-------|
| Set-point | 1bar | 1,5bar | 6bar | 6bar | 6bar | 6bar |

To modify it directly use "up" and "down" arrows.

By pushing **F** you go to parameter:

| Transmitter | 1,6bar | 3bar | 10bar | 16bar | 25bar | 40bar |
|-------------|--------|--------|--------|--------|---------|-------|
| Hy.P | 0,2bar | 0,5bar | 0,5bar | 0,8bar | 1,25bar | 2bar |
| Hy.n | 0bar | 0bar | 0bar | 0bar | 0bar | 0bar |

Keep pushing **F** until you see **PASS**, release **F** and through the arrows set **99**, push **F** and visualize **Pro** (protection code) default is **12**, through the arrows set **128** and push **F**, keep it pushed until all parameters **InF**, **CFG**, **InP**, **Out**, **PASS** are visualized.

| CFG | |
|-------|------|
| S.tun | 0 |
| hPb | 5 |
| hIt | 1,33 |
| hdt | 0,33 |
| ... | |

| InP | |
|------|-------------------|
| | |
| tyP | 44 (4÷20mA) |
| ... | |
| dP_S | 2 (decimals num.) |

| Transmitter | 1,6bar | 3bar | 10bar | 16bar | 25bar | 40bar | |
|-------------|--------|------|-------|-------|-------|-------|----------------------------|
| Lo.S | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | min. sensor scale |
| Hi.S | 1,60 | 3,00 | 10,00 | 16,00 | 25,00 | 40,00 | max sensor scale |
| oFS | 0 | 0 | 0 | 0 | 0 | 0 | offset of input correction |
| Lo.L | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | lower set-point setting |
| Hi.L | 1,60 | 3,00 | 10,00 | 16,00 | 25,00 | 40,00 | upper set-point setting |

| Out | |
|------|--|
| A1.r | 0 |
| ... | |
| A1.t | 3 (mode AL1 =inverse-relative-normal) |
| ... | |
| rL.1 | 2 (AL1) |
| rL.2 | 18 (open) |
| rL.3 | 19 (close) |
| rEL | 0 |
| A.ty | 9 (type of servocontrol command) |
| Ac.t | 12 (servocontrol running time: SQN72.4.../STA12..=12; SQM40.265=30) |
| t Lo | 2 |
| t Hi | 0.0 |
| t.on | 2 |
| t.oF | 0.0 |
| dE.b | 0,1 (dead zone in % of end scale) |

| PAS | 99 then push and keep pushed F until visualization of Hrd |
|------------|---|
| | |
| Hrd | |
| ... | |
| Ctrl | 6 (PID warm) |
| AL.nr | 1 |
| but | 1 |
| diSP | 0 |
| Ld.1 | 1 |
| Ld.2 | 28 |
| Ld.3 | 20 |

Keep pushed **F** until you visualize **PASS**, release **F** and through the arrows set **99**, push **F** and visualize **Pro** (protection code) from **128**, through the arrows, bring it back to **12**, and keep **F** pushed until you come back to set-point value.

Manual operation:

Keep pushed the lower left key for at least 5 sec.

The instrument will enter the "MAN" mode (see also "Ld1" switching on).

Through the arrows, "Open" and "Close" outputs are activated.

To come back to normal working keep the lower left key pushed for at least 5 sec.

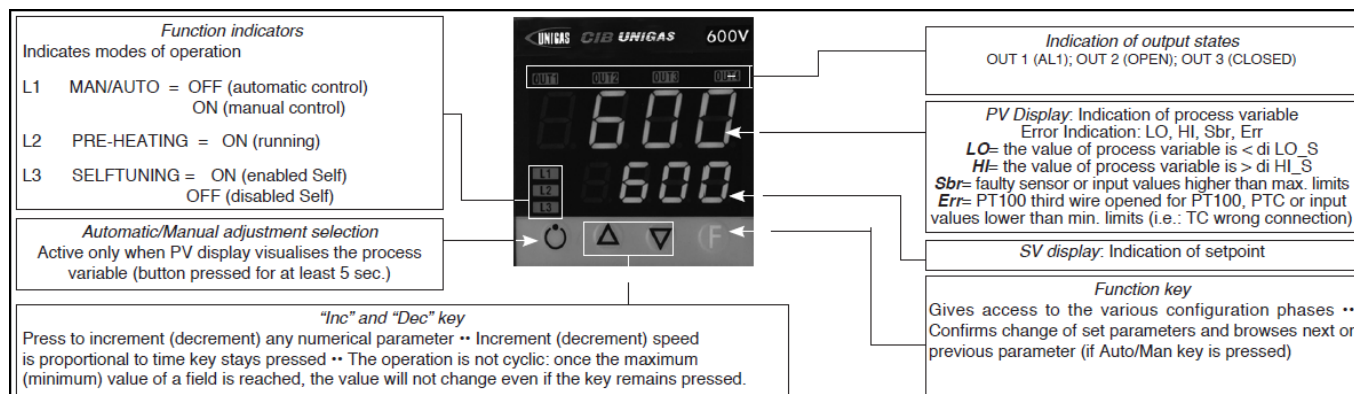
Software switch off :

By keeping pushed keys **Arrow up** + **F** for more than 5 sec. the instrument switches off the software, does not command the outputs and visualize only the variable of process measured by the probe.

To restore keep pushed **F** for more than 5 sec.

Set-up for thermocouples type **K** or **J**

Verify wiring of the sensor



Regulation of the set-point = **80**

It can be modified by using arrows "up" and "down".

By pushing **F** you go to parameters:

| | |
|------|--|
| Hy.P | 10 (hysteresis positive for output 1 terminals 21-22 (ex Q13-Q14)) |
| Hy.n | -5 (hysteresis negative for output 1 terminals 21-22 (ex Q13-Q14)) |

Keep pushing **F** until you see **PASS**, release **F** and through the arrows set **99**, push **F** and visualize **Pro** (protection code) default is **12**, through the arrows set **128** and push **F**, keep it pushed until all parameters **InF**, **CFG**, **InP**, **Out**, **PASS** are visualized.

| CFG | |
|-------|------|
| S.tun | 0 |
| hPb | 1,2 |
| hIt | 5,83 |
| hdt | 1,33 |
| ... | |

| InP | |
|------|---|
| ... | |
| tyP | 2 (thermocouple K 0÷1300°C) / 0 (thermocouple J 0÷1000°C) |
| ... | |
| dP_S | 0 (no decimal) / 1 (1 decimal) |
| Lo.S | 0 (min. sensor scale) |
| Hi.S | 1300 (max sensor scale for tc K) / 1000 (max sensor scale for tc J) |
| oFS | 0 (offset of input correction) |
| Lo.L | 0 (lower set-point range limit) |
| Hi.L | 1300 (upper set-point range limit) per tc K / 1000 for tc J |

| Out | |
|------|--|
| A1.r | 0 |
| ... | |
| A1.t | 3 (mode AL1 =inverse-relative-normal) |
| ... | |
| rL.1 | 2 (AL1) |
| rL.2 | 18 (open) |
| rL.3 | 19 (close) |
| rEL | 0 |
| A.ty | 9 (type of servocontrol command) |
| Ac.t | 12 (servocontrol running time: SQN72.4.../STA12..=12; SQM40.265=30) |
| t Lo | 2 |
| t Hi | 0.0 |
| t.on | 2 |
| t.oF | 0.0 |
| dE.b | 0,1 (dead zone in % of end scale) |

| PAS | 99 then push and keep pushed F until visualization of Hrd |
|------------|---|
| | |
| Hrd | |
| ... | |
| Ctrl | 6 (PID warm) |
| AL.nr | 1 |
| but | 1 |
| diSP | 0 |
| Ld.1 | 1 |
| Ld.2 | 28 |
| Ld.3 | 20 |

Keep pushed **F** until you visualize **PASS**, release **F** and through the arrows set **99**, push **F** and visualize **Pro** (protection code) from **128**, through the arrows, bring it back to **12**, and keep **F** pushed until you come back to set-point value.

Manual operation:

Keep pushed the lower left key for at least 5 sec.

The instrument will enter the "MAN" mode (see also "Ld1" switching on).

Through the arrows, "Open" and "Close" outputs are activated.

To come back to normal working keep the lower left key pushed for at least 5 sec.

Software switch off :

By keeping pushed keys **Arrow up** + **F** for more than 5 sec. the instrument switches off the software, does not command the outputs and visualize only the variable of process measured by the probe.

To restore keep pushed **F** for more than 5 sec.

RWF50.2x & RWF50.3x



User manual

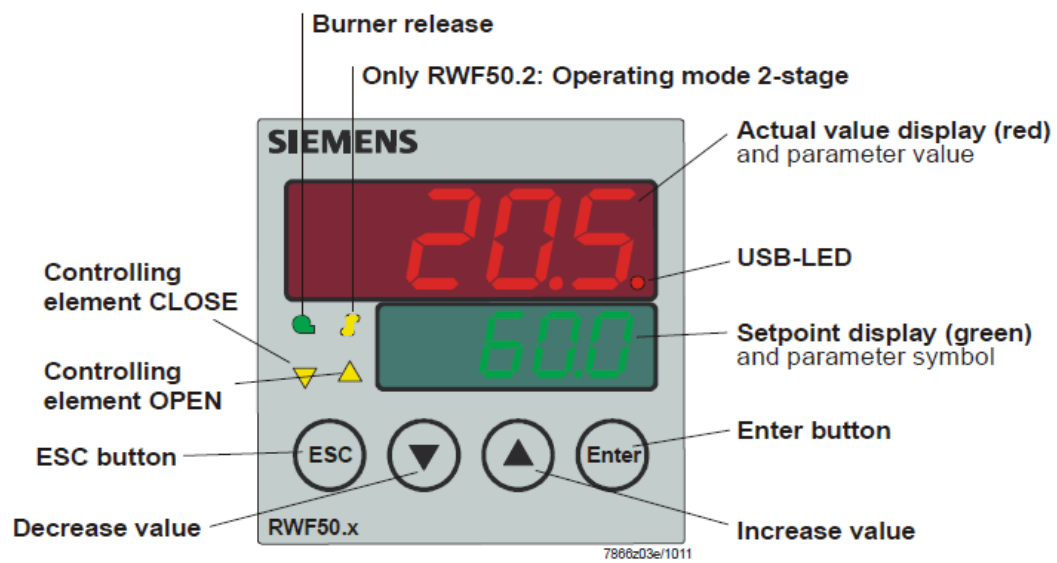
DEVICE INSTALLATION

Install the device using the relevant tools as shown in the figure.

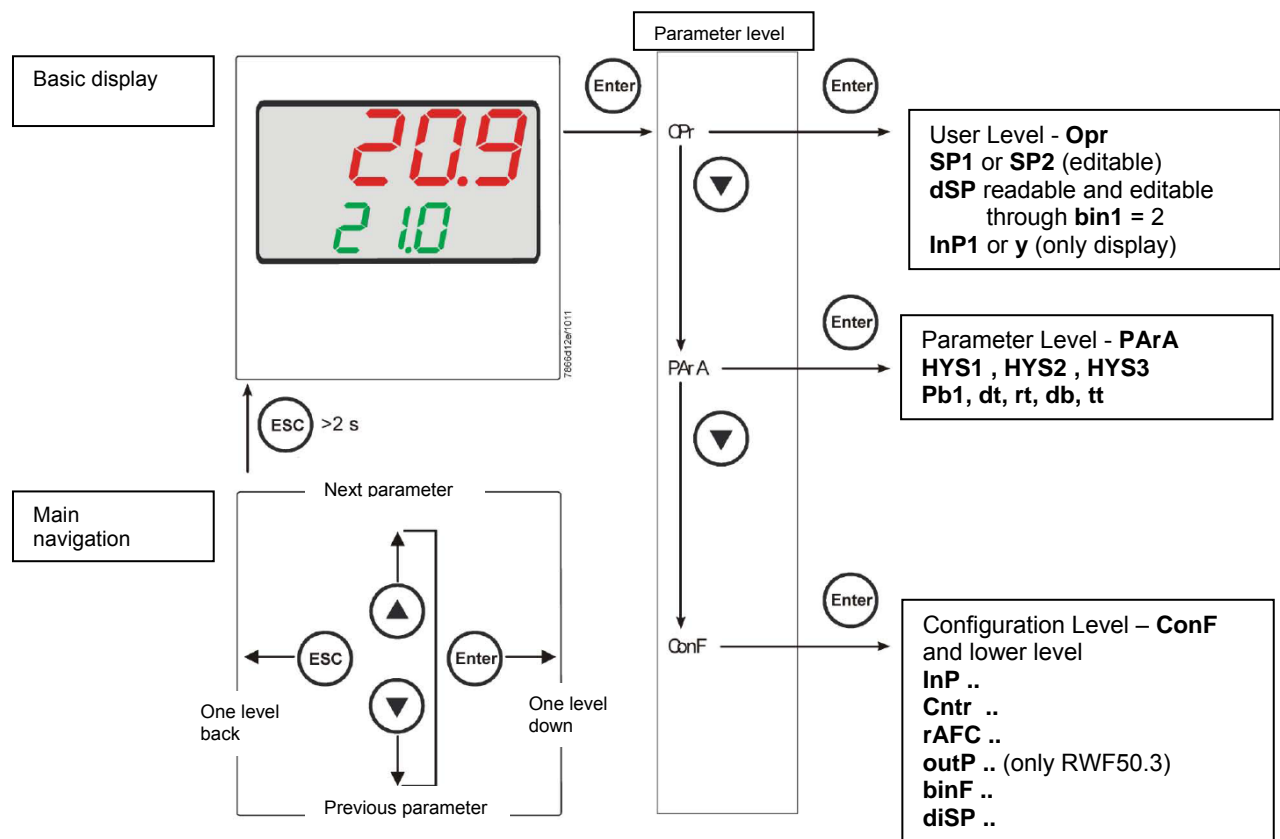
To wire the device and sensors, follow the instructions on the burner wiring diagram.



FRONT PANEL



NAVIGATION MENU



RWF5 is preset good for 90% of applications. However, you can set or edit parameters as follow:

Set-point: set or modification:

When the burner is in stand-by, (safety loop open, that is terminals 3-4/T1-T2 on the 7 pole plug open) push the **Enter** button: on the lower display (green) **Opr** appears; push **Enter** again and in the same display **SP1** appears. Push **Enter** again and the lower display (green **SP1**) flashes. Using the **up and down arrows** change the set-point on the upper display (red). Push **Enter** to confirm and push **ESC** more times to get the home position.

PID parameters set and modifications (see table below):

- Push **Enter** button, on the green display **Opr** appears; using the **down arrow**, scroll until group **PARA** is reached and push **Enter**.
- on the green display **Pb1** e appears and on the red one the set parameter.
- Push in sequence the **down or up** arrow the menu is scrolled.
- Push **Enter** to select and the **arrows** to choose the desired value. **Enter** to confirm.

| Parameter | Display | Range | Factory setting | Remarks |
|--|---------|--------------------|-----------------|--|
| Proportional band | PB.1 | 1... 9999 digit | 10 | Typical value for temperature |
| Derivative action | dt | 0... 9999 sec. | 80 | Typical value for temperature |
| Integral action | rt | 0... 9999 sec. | 350 | Typical value for temperature |
| Dead band (*) | db | 0... 999,9 digit | 1 | Typical value |
| Servocontrol running time | tt | 10... 3000 sec. | 15 | Set servocontrol running time |
| Switch-on differential (*) | HYS1 | 0,0... -1999 digit | -5 | Value under setpoint below which the burner switches back on (1N-1P closes) |
| Switch-off differential 2° stage (*) | HYS2 | 0,0 ... HYS3 | 3 | (enable only with parameter bin1 = 4) |
| Upper switch-off differential (*) | HYS3 | 0,0... 9999 digit | 5 | Value over setpoint above which the burner switches off (1N-1P opens) |
| Switch-on differential on cooling controller (*) | HYS4 | 0,0... 9999 digit | 5 | Do not used (enable only with parameter CACt = 0) |
| Switch-off differential 2° stage on cooling controller (*) | HYS5 | HYS6...0,0 digit | 5 | Do not used (enable only with parameters CACt = 0 and bin1 = 4) |
| Upper switch-off differential on cooling controller (*) | HYS6 | 0,0... -1999 digit | 5 | Do not used (enable only with parameter CACt = 0) |
| Delay modulation | q | 0,0... 999,9 digit | 0 | Do not alter |

(*)Parameters affected by setting of decimal place (**ConF** > **dISP** parameter **dECP**)

Setting the kind of sensor to be connected to the device:

- push the **Enter** button: on the lower display (green) **Opr** appears. Using the **up and down arrows** find **ConF**. Push **Enter** to confirm.
- Now on the green display the group **InP** appears. Push **Enter** and **InP1** is displayed. Enter to confirm.
- You are inside **InP1**; the green display shows **Sen1 (sensor type)**, while the red display shows the chosen sensor code
- Push **Enter** to enter the **Sen1** parameter, then choose the desired sensor using the **arrows**. Push **Enter** to confirm and **ESC** to escape.
- Once selected the sensor, you can modify all the other parameters using **up and down arrows** according to the tables here below.

ConF > InP > InP1

| Parameter | Value | Description |
|--|-----------------------------|---|
| SEn1 type of sensor for analog input 1 | 1 | Pt100 3 fili |
| | 2 | Pt100 2 fili |
| | 3 | Pt1000 3 fili |
| | 4 | Pt1000 2 fili |
| | 5 | Ni1000 3 fili |
| | 6 | Ni1000 2 fili |
| | 7 | 0 ÷ 135 ohm |
| | 15 | 0 ÷ 20mA |
| | 16 | 4 ÷ 20mA |
| | 17 | 0 ÷ 10V |
| | 18 | 0 ÷ 5V |
| | 19 | 1 ÷ 5V |
| OFF1 sensor offset | -1999.. 0 .. +9999 | Using the measured value correction (offset), a measured value can be corrected to a certain degree, either up or down |
| SCL1 scale low level | -1999.. 0 .. +9999 | In the case of a measuring transducer with standard signal, the physical signal is assigned a display value here (for input ohm, mA, V) |
| SCH1 scale high level | -1999.. 100 .. +9999 | In the case of a measuring transducer with standard signal, the physical signal is assigned a display value here (for input ohm, mA, V) |
| dF1 digital filter | 0... 0,6 ...100 | Is used to adapt the digital 2nd order input filter (time in s; 0 s = filter off) |
| Unit temperature unit | 1 | 1 = degrees Celsius |
| | 2 | 2 = degrees Fahrenheit |

(**bold** = factory settings)

Remark:

RWF50.2 e RWF50.3 cannot be connected to thermocouples.

If thermocouples have to be connected, convert the signal to a 4-20 mA one and set the RWF accordingly.

ConF > Cntr

| Parameter | Value | Description |
|---|----------------------------|--|
| CtYP controller type | 1 2 | 1 = 3-position controller (open-stop-close only RWF50.2) 2 = continuative action controller (only RWF50.3) |
| CACt control action | 1 0 | 1 = heating controller 0 = cooling controller |
| SPL least value of the set-point range | -1999.. 0 ..+9999 | set-point limitation prevents entry of values outside the defined range |
| SPH maximum value of the set-point range | -1999.. 100 ..+9999 | set-point limitation prevents entry of values outside the defined range |
| oLLo set-point limitation start, operation limit low | -1999 +9999 | lower working range limit |
| oLHi set-point limitation end, operation limit high | -1999.... +9999 | upper working range limit |

(**bold** = factory settings)

ConF > rAFC

Activation boiler shock termic protetion:

RWF50.. can activate the thermal shock protection only on sites where the set-point is lower than 250°C and according to **rAL** parameter.

| Parameter | Value | Description |
|-----------------------------|----------------------|---|
| FnCT function | 0 1 2 | Choose type of range degrees/time 0 = deactivated 1 = Kelvin degrees/minute 2 = Kelvin degrees/hour |
| rASL ramp rate | 0,0 ... 999,9 | Slope of thermal shock protection (only with functions 1 and 2) |
| toLP tolerance band ramp | 0 ...9999 | width of tolerance band (in K) about the set-point 0 = tolerance band inactive  |
| rAL ramp limit | 0 ...250 | Ramp limit. When this value is lower than the temperature set-point, the RWF controls the output increasing the temp set point step by step according to rASL. If this is over the temp set point, the control is performed in cooling. |

(**bold** = factory settings)

ConF > OutP (parameter under group only for RWF50.3)

| Parameter | Value | Description |
|---------------------------------------|------------------------------|---|
| FnCt tipo di controllo | 1 4 | 1 = analog input 1 doubling with possibility to convert (depending on par SiGn) 4 = modulation controller |
| SiGn type of output signal | 0 1 2 | physical output signal (terminals A+, A-) 0 = 0÷20mA 1 = 4÷20mA 2 = 0÷10V |
| rOut Value when out of input range | 0...101 | signal (in percent) when measurement range is crossed |
| oPnt zero point | -1999... 0 ...+9999 | value range of the output variable is assigned to a physical output signal Per default, the setting corresponds to 0...100% angular positioning for the controller outputs (terminals A+, A-) (effective only with FnCt = 1) |
| End End value | -1999... 100 ...+9999 | value range of the output variable is assigned to a physical output signal Per default, the setting corresponds to 0...100% angular positioning for the controller outputs (terminals A+, A-) (effective only with FnCt = 1) |

(**bold** = factory settings)

ConF > binF

| Parameter | Value | Description |
|---|-------------------------|---|
| bin1 digital inputs (terminals DG - D1) | 0 1 2 4 | 0 = without function 1 = set-point changeover (SP1 / SP2) 2 = set-point shift (Opr > dSP parameter = value of set-point modify) 4 = changeover of operating mode open – modulating operation; close – 2 stage operation. |

(**bold** = factory settings)

ConF > dISP

| Parameter | Value | Description |
|----------------------------------|------------------------------|--|
| diSU upper display (red) | 0 1 4 6 7 | display value for upper display: 0 = display power-off 1 = analog input value 4 = Controller's angular positioning 6 = set-point value 7 = end value with thermal shock protection |
| diSL lower display (green) | 0 1 4 6 7 | display value for lower display: 0 = display power-off 1 = analog input value 4 = Controller's angular positioning 6 = set-point value 7 = end value with thermal shock protection |
| tout timeout | 0..180 ..250 | time (s) on completion of which the controller returns automatically to the basic display, if no button is pressed |
| dECP decimal point | 0 1 2 | 0 = no decimal place 1 = one decimal place 2 = two decimal places |
| CodE level lockout | 0 1 2 3 | 0 = no lockout 1 = configuration level lockout (ConF) 2 = Parameter and configuration level lockout (PArA & ConF) 3 = keyboard lockout |

(**bold** = factory settings)

Manual control :

- in order to manual change the burner load, while firing keep pushing the **ESC** button for more than 5 s; on the lower green display **Hand** appears.
- using the **UP** and **DOWN** arrows, the load varies.
- Keep pushing the **ESC** button for getting the normal operation again.
- **NB:** every time the device shuts the burner down (start led switched off - contact 1N-1P open), the manual control is not active.

Device self-setting (auto-tuning):

If the burner in the steady state does not respond properly to heat generator requests, you can activate the Device's self-setting function, which recalculates PID values for its operation, deciding which are most suitable for the specific kind of request



Follow the below instructions:

push the **UP** and **DOWN** arrows for more than 5 s; on the green lower display **TUNE** appears. Now the device pushes the burner to increase and decrease its output. During this time, the device calculates PID parameters (**Pb1**, **dt** and **rt**). After the calculations, the TUNE is automatically deactivated and the device has already stored them.

In order to stop the Auto-tuning function while it works, push again the **UP** and **DOWN** arrows for more than 5 s. The calculated PID parameters can be manually modified following the previously described instructions.

Display of software version :



The software version is shown by pushing **Enter + UP arrow** on the upper display

Electric connection :

With 7 pins connector version



With terminals version



Matches terminals between RWF50.2 and RWF40.0x0



Parameters summarising for RWF50.2x:

| Navigation menù | Conf Inp | | | | | Conf | | | PArA | | | | | | Opr |
|-------------------------|-------------|------|-------------|-------------|----------|-------------|-------------|-------------|-------|----|---------|-------------|-------------|----------|-------------|
| | Inp1 | | | | | Cntr | | diSP | | | | | | | |
| Types of probe | SEn1 | OFF1 | SCL | SCH | Unit | SPL | SPH | dECP | Pb. 1 | dt | rt | tt | HYS1 (*) | HYS3 (*) | SP1 (*) |
| Siemens QAE2120... | 6 | 0 | needless | needless | 1 | 30 | 95 | 1 | 10 | 80 | 350 (#) | -5 | 5 | | 80 °C |
| Siemens QAM2120.. | 6 | 0 | needless | needless | 1 | 0 | 80 | 1 | 10 | 80 | 350 (#) | -2.5 | 2.5 | | 40°C |
| Pt1000 (130°C max.) | 4 | 0 | needless | needless | 1 | 30 | 95 | 1 | 10 | 80 | 350 (#) | -5 | 5 | | 80°C |
| Pt1000 (350°C max.) | 4 | 0 | needless | needless | 1 | 0 | 350 | 1 | 10 | 80 | 350 (#) | -5 | 10 | | 80°C |
| Pt100 (130°C max.) | 1 | 0 | needless | needless | 1 | 0 | 95 | 1 | 10 | 80 | 350 (#) | -5 | 5 | | 80°C |
| Pt100 (350°C max) | 1 | 0 | needless | needless | 1 | 0 | 350 | 1 | 10 | 80 | 350 (#) | -5 | 10 | | 80°C |
| Sonda 4÷20mA / 0÷1,6bar | 16 | 0 | 0 | 160 | needless | 0 | 160 | 0 | 5 | 20 | 80 (#) | 0 | 20 | | 100 kPa |
| Sonda 4÷20mA / 0÷10bar | 16 | 0 | 0 | 1000 | needless | 0 | 1000 | 0 | 5 | 20 | 80 (#) | 0 | 50 | | 600 kPa |
| Sonda 4÷20mA / 0÷16bar | 16 | 0 | 0 | 1600 | needless | 0 | 1600 | 0 | 5 | 20 | 80 (#) | 0 | 80 | | 600 kPa |
| Sonda 4÷20mA / 0÷25bar | 16 | 0 | 0 | 2500 | needless | 0 | 2500 | 0 | 5 | 20 | 80 (#) | 0 | 125 | | 600 kPa |
| Sonda 4÷20mA / 0÷40bar | 16 | 0 | 0 | 4000 | needless | 0 | 4000 | 0 | 5 | 20 | 80 (#) | 0 | 200 | | 600 kPa |
| Sonda 4÷20mA / 0÷60PSI | 16 | 0 | 0 | 600 | needless | 0 | 600 | 0 | 5 | 20 | 80 (#) | 0 | 30 | | 300 (30PSI) |
| Sonda 4÷20mA / 0÷200PSI | 16 | 0 | 0 | 2000 | needless | 0 | 2000 | 0 | 5 | 20 | 80 (#) | 0 | 75 | | 600 (60PSI) |
| Sonda 4÷20mA / 0÷300PSI | 16 | 0 | 0 | 3000 | needless | 0 | 3000 | 0 | 5 | 20 | 80 (#) | 0 | 120 | | 600 (60PSI) |
| Siemens QBE2002 P4 | 17 | 0 | 0 | 400 | needless | 0 | 400 | 0 | 5 | 20 | 80 (#) | 0 | 20 | | 200 kPa |
| Siemens QBE2002 P10 | 17 | 0 | 0 | 1000 | needless | 0 | 1000 | 0 | 5 | 20 | 80 (#) | 0 | 50 | | 600 kPa |
| Siemens QBE2002 P16 | 17 | 0 | 0 | 1600 | needless | 0 | 1600 | 0 | 5 | 20 | 80 (#) | 0 | 80 | | 600 kPa |
| Siemens QBE2002 P25 | 17 | 0 | 0 | 2500 | needless | 0 | 2500 | 0 | 5 | 20 | 80 (#) | 0 | 125 | | 600 kPa |
| Siemens QBE2002 P40 | 17 | 0 | 0 | 4000 | needless | 0 | 4000 | 0 | 5 | 20 | 80 (#) | 0 | 200 | | 600 kPa |
| Segnale 0÷10V | 17 | 0 | to be fixed | to be fixed | needless | to be fixed | to be fixed | to be fixed | 5 | 20 | 80 (#) | to be fixed | to be fixed | | to be fixed |
| Segnale 4÷20mA | 16 | 0 | to be fixed | to be fixed | needless | to be fixed | to be fixed | to be fixed | 5 | 20 | 80 (#) | to be fixed | to be fixed | | to be fixed |

NOTE : (#) tt - Types of probe

SQL33 ; STM30; SQM10; SQM40; SQM50; SQM54 = 30 (second) - STA12B3.41; SQN30.251; SQN72.4A4A20 = 12 (second)

(*) These values are factory set - values **MUST BE** set during operation at the plant based on the real working temperature/pressure value.

WARNING : With pressure probes the parameters SP1, SCH, SCL, HYS1, HYS3 must be selected, and visualized in kPa (kilo Pascal). (1bar = 100.000Pa = 100kPa).

TABLE OF PARAMETERS TO BE MODIFIED FOR CALIBRATIONS RWF50.3x/RWF55.xx (CONTINUOUS OUTPUT 4÷20mA) INSTEAD OF 3 POINTS

| Navigation menù | Conf OutP | | | | |
|-----------------|-----------|------------|------|------|-----|
| | FnCt | SiGn | rOut | OPnt | End |
| Parameter | 4 | 1 (4÷20mA) | 0 | 0 | 100 |

NOTE : (#) tt - servocontrol travel time

SQL33 ; STM30; SQM10; SQM40; SQM50; SQM54 = 30 (second)

STA12B3.41; SQN30.251; SQN72.4A4A20 = 12 (second)

(*) Factory-set values, these values must be varied according to the actual working temperature/pressure of the system.

WARNING : With pressure probes in bar, parameters SP1, SCH, SCL, HYS1, HYS3 must be set, and displayed in kPa (kilo Pascal); 1bar = 100,000Pa = 100kPa.
With pressure probes in PSI the parameters SP1, SCH, SCL, HYS1, HYS3 must be set, and displayed in PSI x10 (example : 150PSI > display 1500).

APPENDIX: PROBES CONNECTION

To assure the utmost comfort, the control system needs reliable information, which can be obtained provided the sensors have been installed correctly. Sensors measure and transmit all variations encountered at their location.

Measurement is taken based on design features (time constant) and according to specific operating conditions. With wiring run in raceways, the sheath (or pipe) containing the wires must be plugged at the sensor's terminal board so that currents of air cannot affect the sensor's measurements.

Ambient probes (or ambient thermostats)

Installation

The sensors (or room thermostats) must be located in reference rooms in a position where they can take real temperature measurements without being affected by foreign factors.



Outside probes (weather)

Installation

In heating or air-conditioning systems featuring adjustment in response to outside temperature, the sensor's positioning is of paramount importance.

It's good to be admired ...even better to be effective

Heating systems: the room sensor must not be installed in rooms with heating units complete with thermostatic valves. Avoid all sources of heat foreign to the system.



General rule: on the outer wall of the building where the living rooms are, never on the south-facing wall or in a position where they will be affected by morning sun. If in any doubt, place them on the north or north-east façade.

Location

On an inner wall on the other side of the room to heating units height above floor 1.5 m, at least 1.5 m away from external sources of heat (or cold).



Installation position to be avoided

near shelving or alcoves and recesses, near doors or windows, inside outer walls exposed to solar radiation or currents of cold air, on inner walls with heating system pipes, domestic hot water pipes, or cooling system pipes running through them.

Positions to be avoided



Avoid installing near windows, vents, outside the boiler room, on chimney breasts or where they are protected by balconies, cantilever roofs.

The sensor must not be painted (measurement error).

Duct or pipe sensors

Installing temperature sensors

For measuring outlet air:

- after delivery fan or
- after coil to be controlled, at a distance of at least 0,5 m

For measuring room temperature:

- before return air intake fan and near room's return air intake. For measuring saturation temperature: after mist eliminator.



Bend 0.4m sensor by hand (never use tools) as illustrated.



Use whole cross-section of duct, min. distance from walls 50 mm, radius of curvature 10 mm for 2m or 6m sensors.

Installing combined humidity sensors

As max. humidity limit sensor on outlet (steam humidifiers).



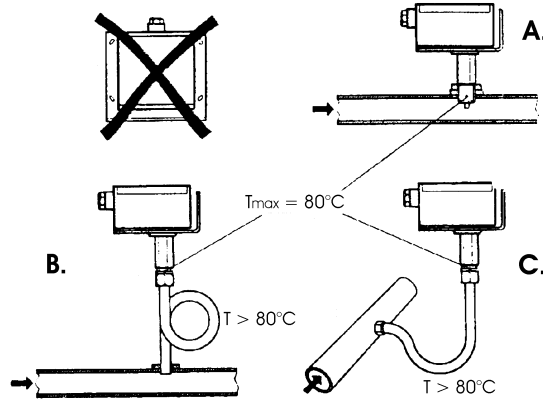
Installing pressure sensors

A - installation on ducts carrying fluids at max. temperature 80°C

B - installation on ducts at temperature over 80°C and for refrigerants

C - installation on ducts at high temperatures:

- increase length of siphon
- place sensor at side to prevent it being hit by hot air coming from the pipe.



Installing differential pressure sensors for water

- Installation with casing facing down not allowed.-With temperature over 80°C, siphons are needed.
- To avoid damaging the sensor, you must comply with the following instructions

when installing:

- make sure pressure difference is not greater than the value permitted by the sensor
- when there are high static pressures, make sure you insert shutoff valves A-B-C.

Putting into operation

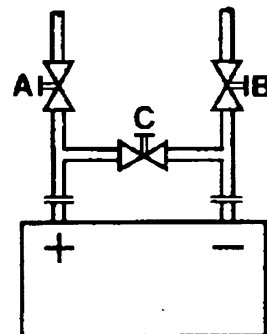
Start disable

1=open C1=open C

2=open A2=close B

3=open B3=close A

4= close C



Immersion or strap-on sensors



Placing the probes (QAD22.../QAE21.../QAP21.../RCA...)

Immersion probes installation

Sensors must be installed on the stretch of pipe in which fluid circulates all the time.

The rigid stem (sensing element doing the measuring) must be inserted by at least 75mm and must face the direction of flow.

Recommended locations: on a bend or on a straight stretch of pipe but tilted by 45° and against the flow of fluid.

Protect them to prevent water from infiltrating (dripping gates, condensation from pipes etc.)

Installing QAD2.. strap-on sensors

Make sure fluid is circulating in the chosen location.

Eliminate insulation and paintwork (including rust inhibitor) on a min. 100mm length of pipe.

Sensors come with straps for pipes up to 100 mm in diameter

With pumps on outlet

with 3 ways valves / with 4 ways valves



Panel system / burner control



Strap-on or immersion sensors?

QAD2.. strap-on sensors

Advantages :

- 10 sec. time constant
- Installed with system running (no plumbing work)
- Installation can be changed easily if it proves incorrect.

Limits:

- Suitable for pipe diameters max. 100 mm
- Can be affected by currents of air etc.

QAE2... immersion sensors

Advantages:

- Measure "mean" fluid temperature
- No external influence on measurement such as: currents of air, nearby pipes etc.

Limits:

- Time constant with sheath: 20 sec.
- Hard to change installation position if it proves incorrect.

With pumps on return

with 3 ways valves / with 4 ways valves



Duct pressure switches and sensors

Installing differential pressure probes for air



A - Control a filter (clogging)



B - Control a fan (upstream/downstream)



C - Measurement of difference in pressure between two ducts



D - Measurement of difference in pressure between two rooms or of inside of duct and outside

Basic principles

Measuring static pressure (i.e. pressure exerted by air on pipe walls)



Measuring dynamic pressure



$$Pd = \frac{\gamma v^2}{2g}$$

Key

| | |
|----------|--|
| γ | Kg/m ³ , specific weight of air |
| v | m/s, air speed |
| g | 9.81 m/s ² gravity acceleration |
| Pd | mm C.A., dynamic pressure |

Measuring total pressure



Spare parts

| Description | Code |
|--|---------|
| Modulator RWF50.2 (uscita a 3 punti - apri, fermo, chiudi) 2570148 | 2570148 |
| Modulator RWF50.3 (uscita continua 0÷20mA, 4÷20mA, 0÷10V) 2570149 | 2570149 |
| Temperature probe Siemens QAE2120.010A (30÷130°C) 2560101 | 2560101 |
| Temperature probe Siemens QAM2120.040 (-15÷+50°C) 2560135 | 2560135 |
| Thermoresistor Pt1000 ø6mm L100mm (30÷130°C) 2560188 | 2560188 |
| Thermoresistor Pt1000 ø10mm L200mm (0÷350°C) 2560103 | 2560103 |
| Thermoresistor Pt100 ø10mm L200mm (0÷350°C) 2560145 | 2560145 |
| Thermoresistor Pt100 ø8mm L85mm (0÷120°C) 25601C3 | 25601C3 |
| Pressure probe Siemens QBE2.. P4 (0÷4bar) 2560159 | 2560159 |
| Pressure probe Siemens QBE2.. P10 (0÷10bar / signal 0÷10V) 2560160 | 2560160 |
| Pressure probe Siemens QBE2.. P16 (0÷16bar / signal 0÷10V) 2560167 | 2560167 |
| Pressure probe Siemens QBE2.. P25 (0÷25bar / signal 0÷10V) 2560161 | 2560161 |
| Pressure probe Siemens QBE2.. P40 (0÷40bar / signal 0÷10V) 2560162 | 2560162 |
| Pressure probe Danfoss MBS 3200 P 1,6 (0÷1,6bar / signal 4÷20mA) 2560189 | 2560189 |
| Pressure probe Danfoss MBS 3200 P 10 (0÷10bar / signal 4÷20mA) 2560190 | 2560190 |
| Pressure probe Danfoss MBS 3200 P 16 (0÷16bar / signal 4÷20mA) 2560191 | 2560191 |
| Pressure probe Danfoss MBS 3200 P 25 (0÷25bar / signal 4÷20mA) 2560192 | 2560192 |
| Pressure probe Danfoss MBS 3200 P 40 (0÷40bar / signal 4÷20mA) 2560193 | 2560193 |
| Pressure probe Siemens 7MF1565-3BB00-1AA1 (0÷1,6bar / signal 4÷20mA) 25601A3 | 25601A3 |
| Pressure probe Siemens 7MF1565-3CA00-1AA1 (0÷10bar / signal 4÷20mA) 25601A4 | 25601A4 |
| Sonda di pressione Siemens 7MF1565-3CB00-1AA1 (0÷16bar / signal 25601A5 | 25601A5 |
| Pressure probe Siemens 7MF1565-3CD00-1AA1 (0÷25bar / signal 4÷20mA) 25601A6 | 25601A6 |
| Pressure probe Siemens 7MF1565-3CE00-1AA1 (0÷40bar / signal 4÷20mA) 25601A7 | 25601A7 |
| Pressure probe Gefran E3E B1V6 MV (0÷1,6bar / segnale 4÷20mA) 25601C4 | 25601C4 |
| Pressure probe Danfoss E3E B01D MV (0÷10bar / segnale 4÷20mA) 25601C5 | 25601C5 |
| Pressure probe Danfoss E3E B16U MV (0÷16bar / segnale 4÷20mA) 25601C6 | 25601C6 |
| Pressure probe Danfoss E3E B25U MV (0÷25bar / segnale 4÷20mA) 25601C7 | 25601C7 |
| Pressure probe Danfoss E3E B04D MV (0÷40bar / segnale 4÷20mA) 25601C8 | 25601C8 |
| Pressure probe Siemens 7MF1567-4CD00-1EA1 (0-300PSI 1/4NPT 4-20mA) | 25601G0 |
| Pressure probe Siemens 7MF1567-4BF00-1EA1 (0-60PSI 1/4NPT 4-20mA) | 25601G1 |
| Pressure probe Siemens 7MF1567-4CB00-1EA1 (0-200PSI 1/4NPT 4-20mA) | 25601G2 |

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

KM3 Modulator

USER MANUAL

MOUNTING

DISPLAY AND KEYS



| | Operator Mode | Editing Mode |
|--|--|--|
| | Access to: - Operator Commands (Timer, Setpoint selection ...) - Parameters - Configuration | Confirm and go to Next parameter |
| | Access to: - Operator additional information (Output value, running time ...) | Increase the displayed value or select the next element of the parameters list |
| | Access to: - Set Point | Decrease the displayed value or select the previous element |
| | Programmable key: Start the programmed function (Autotune, Auto/Man, Timer ...) | Exit from Operator commands/Parameter setting/Configuration |

CONNECTIONS DIAGRAM



Probe connection:

- **PT1000/NTC/PTC:** between terminal 3 and 2
- **PT 100:** between terminal 3 and 2 with terminal 1
- **Passive pressure probe** 0/4-20 mA: between terminal 4 (+) e 1 (-)
Note: out4 must be activated (IO4F must be set to ON)
- **Powered pressure probe** 0/4-20 mA between terminal 4 (power supply), 2 (negative) e 1 (positive)
Note: set IO4F to ON to activate Out4

Power supply connection:

- **Neutral wire:** terminal 9
- **Phase:** terminal 10 (100...240 Vac)
- Close terminals 15-16 to switch to the set point 2

Output connection:

- **Channel 1:** terminal 7 and 8 (burner on – off)
- **Channel 2:** terminal 11 and 12 (servomotor opens)
- **Channel 3:** terminal 13 and 14 (servomotor closes)

SETPOINT AND HYSTERESIS CONFIGURATION (SP, AL1, HAL1 parameters)

Push the  button to enter into the setpoint configuration:



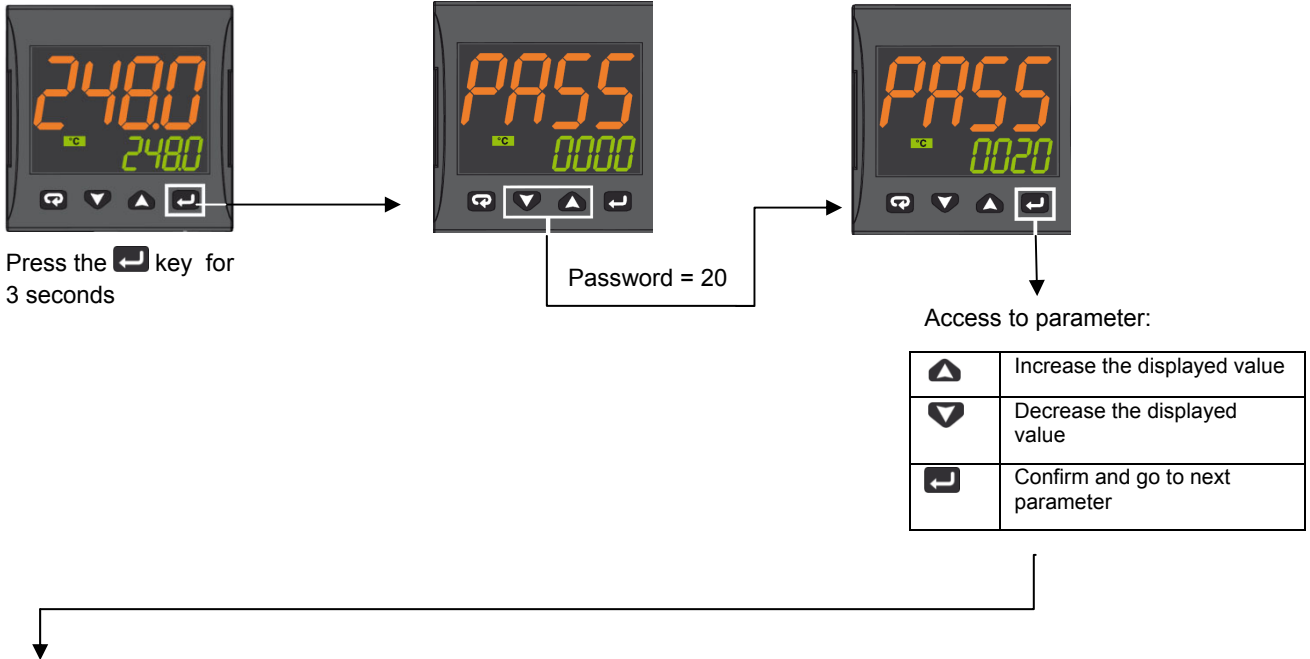
To return to normal mode, press the  key for 3 seconds or wait the 10s timeout

Operation example



LIMITED ACCESS LEVEL

Proceed as follows to change some parameters that are not visible in standard user mode:



| Param | Description | Values | Default |
|-------|-----------------------------------|---|----------------------|
| SEnS | Input type | Pt1 = RTD Pt100 Pt10 = RTD Pt1000 0.20 = 0..20mA 4.20 = 4..20mA Pressure probe 0.10 = 0..10V 2.10 = 2..10V crAL= Thermocouple K | Depends on the probe |
| SP | Set point 1 | SPLL ... SPLH | See page 7 |
| AL1 | AL1 threshold | AL1L... AL1H (E.U.) | |
| HAL1 | AL1 hysteresis | 1... 9999 (E.U.) | |
| Pb | Proportional band | 1... 9999 (E.U.) | |
| ti | Integral time | 0 (oFF) ... 9999 (s) | |
| td | Derivative time | 0 (oFF) ... 9999 (s) | |
| Str.t | Servomotor stroke time | 5...1000 seconds | |
| db.S | Servomotor dead band | 0...100% | |
| SPLL | Minimum set point value | -1999 ... SPLH | |
| SPLH | Maximum set point value | SPLL ... 9999 | |
| dp | Decimal point position | 0... 3 | |
| SP 2 | Set point 2 | SPLL...SPLH | 60 |
| A.SP | Selection of the active set point | "SP" ... "nSP" | SP |

To exit the parameter setting procedure press the key (for 3 s) or wait until the timeout expiration (about 30 seconds)

Probe parameters configuration MODULATORE ASCON KM3

| Parameter Group | | inP | | | | | | | AL1 | | rEG | | | | | SP | | | |
|----------------------------------|--|------|--------------|--------------|--------------|------|---------------|--------------|---------------|-------------|-------------|-------------|-----------------|-------------|-----------|-----------|--------------|--|--|
| Parameter | | Sens | dp | SSC | FSc | unit | IO4.F (**) | AL1 (***) | HAL1 (***) | Pb (***) | ti (***) | td (***) | Str.t | db.S | SPLL | SPHL | SP (***) | | |
| Probes | | | Dec Point | Scale Min | Scale Max | | | Off | On | p | i | d | servo time s | Band Mo. | SP Min | SP Max | Set point | | |
| Pt1000 (130°C max) | | Pt10 | 1 | | | °C | on | 5 | 10 | 10 | 350 | 1 | * | 5 | 30 | 95 | 80 | | |
| Pt1000 (350°C max) | | PT10 | 1 | | | °C | on | 10 | 10 | 10 | 350 | 1 | * | 5 | 0 | 350 | 80 | | |
| Pt100 (130°C max) | | PT1 | 1 | | | °C | on | 5 | 10 | 10 | 350 | 1 | * | 5 | 0 | 95 | 80 | | |
| Pt100 (350°C max) | | Pt1 | 1 | | | °C | on | 10 | 10 | 10 | 350 | 1 | * | 5 | 0 | 350 | 80 | | |
| Pt100 (0÷100°C 4÷20mA) | | 4.20 | 1 | 0 | 100 | | on | 5 | 10 | 10 | 350 | 1 | * | 5 | 0 | 95 | 80 | | |
| Thermocouple K (1200°C max) | | crAL | 0 | | | °C | on | 20 | 25 | 10 | 350 | 1 | * | 5 | 0 | 1200 | 80 | | |
| Thermocouple J (1000°C max) | | J | 0 | | | °C | on | 20 | 25 | 10 | 350 | 1 | * | 5 | 0 | 1000 | 80 | | |
| 4-20mA / 0-1,6bar Pressure probe | | 4.20 | 0 | 0 | 160 | | on | 20 | 20 | 5 | 120 | 1 | * | 5 | 0 | 160 | 100 | | |
| 4-20mA / 0-10bar Pressure probe | | 4.20 | 0 | 0 | 1000 | | on | 50 | 50 | 5 | 120 | 1 | * | 5 | 0 | 1000 | 600 | | |
| 4-20mA / 0-16bar Pressure probe | | 4.20 | 0 | 0 | 1600 | | on | 80 | 80 | 5 | 120 | 1 | * | 5 | 0 | 1600 | 600 | | |
| 4-20mA / 0-25bar Pressure probe | | 4.20 | 0 | 0 | 2500 | | on | 125 | 125 | 5 | 120 | 1 | * | 5 | 0 | 2500 | 600 | | |
| 4-20mA / 0-40bar Pressure probe | | 4.20 | 0 | 0 | 4000 | | on | 200 | 200 | 5 | 120 | 1 | * | 5 | 0 | 4000 | 600 | | |
| QBE2002 / 0-25bar Pressure probe | | 0.10 | 0 | 0 | 2500 | | On | 125 | 125 | 5 | 120 | 1 | * | 5 | 0 | 2500 | 600 | | |

Note:

(*) Str.t - Servomotor stroke time

SQL33; STM30; SQM10; SQM40; SQM50; SQM54 = 30 (Seconds)

STA12B3.41; SQN30.251; SQN72.4A4A20 = 12 (Seconds)

() Out 4 ... on Display led °4 must be switched on, otherwise change the io4.F parameter value from "on" to "out4", confirm the value, quit the configuration mode then change again the io4.F parameter value from "out4" to "on".**

(***) Factory settings. These values must be adapted to machine conditions


N.B. For pressure probe, SP, SPHL, SPLL parameters values are expressed in Kpa (1 bar = 100 Kpa).

CONFIGURATION

How to access configuration level

The configuration parameters are collected in various groups. Every group defines all parameters related with a specific function (e.g.: control, alarms, output functions).

1. Push the  button for more than 5 seconds. The upper display will show PASS while the lower display will show 0.
2. Using  and  buttons set the programmed password.
According to the entered password, it is possible to see a part of the parameters listed in the "configuration parameters" section.
 - a. Enter "30" as password to view all the configuration parameters
 - b. Enter "20" as password to view the parameters of the "limited access level". At this point, only the parameters with attribute **Liv = A** or **Liv = O** will be editable.
 - c. Leave the password blank to edit "user level" parameters, that are identified by attribute **Liv = O**
3. Push the  button. If the password is correct the display will show the acronym of the first parameter group preceded by the symbol: . In other words the upper display will show:  inP (group of the **Input parameters**).

The instrument is in configuration mode. To press  for more than 5 seconds, the instrument will return to the "standard display".

Keyboard functions during parameter changing:

| Operator Mode | |
|---|--|
|  | When the upper display is showing a group and the lower display is blank, this key allows to enter in the selected group. When the upper display is showing a parameter and the lower display is showing its value, this key allows to store the selected value for the current parameter and access the next parameter within the same group. |
|  | Allows to increase the value of the selected parameter. |
|  | Allows to decrease the value of the selected parameter. |
|  | Short presses allow you to exit the current group of parameters and select a new group. A long press terminates the configuration procedure (the instrument returns to the normal display). |
|  +  | These two keys allow to return to the previous group. Proceed as follows: Push the  button and maintaining the pressure, then push the  ; release both the buttons. |

Configuration Parameters

| inP GROUP - input configuration | | | | | |
|---------------------------------|----|-------|---|---|----------------------|
| Liv | N° | Param | Description | Values | Default |
| A | 1 | SEnS | Input type | Pt1 = RTD Pt100 Pt10 = RTD Pt1000 0.20 = 0..20mA 4.20 = 4..20mA Pressure probe 0.10 = 0..10V 2.10 = 2..10V crAL= Thermocouple K | Depends on the probe |
| A | 2 | dp | Decimal point position | 0... 3 | See page 7 |
| A | 3 | SSc | Initial scale read-out for linear inputs (available only if SEnS parameter is not equal to Pt1, Pt10, crAL values) | -1999... 9999 | 0 |
| C | 4 | FSc | Full scale read-out for linear input inputs (available only if SEnS parameter is not equal to Pt1, Pt10, crAL values) | -1999... 9999 | Depends on the probe |
| C | 5 | unit | Unit of measure (present only in the case of temperature probe) | °C/°F | °C |
| C | 6 | Fil | Digital filter on the measured value | 0 (= OFF)... 20.0 s | 1.0 |
| C | 7 | inE | Selection of the Sensor Out of Range type that will enable the safety output value | or = Over range ou = Under range our = over e under range | or |

| | | | | | |
|---|----|-------|--|--|----|
| C | 8 | oPE | Safety output value | -100... 100 | 0 |
| C | 9 | io4.F | I/O4 function selection | on = Out4 will be ever ON (used as a transmitter power supply) ,out4 = Uscita 4 (Used as digital output 4), dG2c = Digital input 2 for contact closure, dG2U = Digital input 2 driven by 12... 24 VDC | on |
| C | 10 | diF1 | Digital input 1 function | oFF = Not used, 1 = Alarm reset, 2 = Alarm acknowledge (ACK), 3 = Hold of the measured value, 4 = Stand by mode, 5 = Manual mode, 6 = HEAt with SP1 and CoOL with SP2, 7 = Timer RUN/Hold/Reset, 8 = Timer Run, 9 = Timer Reset, 10 = Timer Run/Hold, 11 = Timer Run/Reset, 12 = Timer Run/Reset with lock, 13 = Program Start, 14 = Program Reset, 15 = Program Hold, 16 = Program Run/Hold, 17 = Program Run/Reset, 18 = Sequential SP selection, 19 = SP1 - SP2 selection, 20 = SP1... SP4 binary selection, 21 = Digital inputs in parallel | 19 |
| C | 12 | di.A | Digital Inputs Action (DI2 only if configured) | 0 = DI1 direct action, DI2 direct action 1 = DI1 reverse action, DI2 direct action 2 = DI1 direct action, DI2 reverse action 3 = DI1 reverse action, DI2 reverse action | 0 |

Out GROUP- Output parameters

| Liv | N° | Param | Description | Values | Default |
|-----|----|-------|--|--|---------|
| C | 14 | o1F | Out 1 function | AL = Alarm output | AL |
| C | 15 | o1AL | Initial scale value of the analog retransmission | -1999 ... Ao1H | 1 |
| C | 18 | o1Ac | Out 1 action | dir = Direct action rEU = Reverse action dir.r = Direct with reversed LED ReU.r = Reverse with reversed LED | rEU.r |
| C | 19 | o2F | Out 2 function | H.rEG = Heating output | H.rEG |
| C | 21 | o2Ac | Out 2 action | dir = Direct action rEU = Reverse action dir.r = Direct with reversed LED ReU.r = Reverse with reversed LED | dir |
| C | 22 | o3F | Out 3 function | H.rEG = Heating output | H.rEG |
| C | 24 | o3Ac | Out 3 action | dir = Direct action rEU = Reverse action dir.r = Direct with reversed LED ReU.r = Reverse with reversed LED | dir |

AL1 GROUP - Alarm 1 parameters

| Liv | N° | Param | Descrizione | Values | Default |
|-----|----|-------|------------------|---|---------|
| C | 28 | AL1t | Tipo allarme AL1 | nonE = Alarm not used LoAb = Absolute low alarm HiAb = Absolute high alarm LHAo = Windows alarm in alarm outside the windows LHAi = Windows alarm in alarm inside the | HidE |

| | | | | | |
|---|----|------|---|--|------------|
| | | | | windows SE.br = Sensor Break LoDE = Deviation low alarm (relative) HiDE = Deviation high alarm (relative) LHdo = Relative band alarm in alarm out of the band LHdi = Relative band alarm in alarm inside the band | |
| C | 29 | Ab1 | Alarm 1 function | 0... 15 +1 = Not active at power up +2 = Latched alarm (manual reset) +4 = Acknowledgeable alarm +8 = Relative alarm not active at set point change | 0 |
| C | 30 | AL1L | -- For High and low alarms, it is the low limit of the AL1 threshold; -- For band alarm, it is low alarm threshold | -1999... AL1H (E.U.) | -199.9 |
| C | 31 | AL1H | -- For High and low alarms, it is the high limit of the AL1 threshold; -- For band alarm, it is high alarm threshold | AL1L... 9999 (E.U.) | 999.9 |
| O | 32 | AL1 | AL1 threshold | AL1L... AL1H (E.U.) | See page 7 |
| O | 33 | HAL1 | AL1 hysteresis | 1... 9999 (E.U.) | See page 7 |
| C | 34 | AL1d | AL1 delay | 0 (oFF)... 9999 (s) | oFF |
| C | 35 | AL1o | Alarm 1 enabling during Stand-by mode and out of range conditions | 0 = Alarm 1 disabled during Stand by and out of range 1 = Alarm 1 enabled in stand by mode 2 = Alarm 1 enabled in out of range condition 3 = Alarm 1 enabled in stand by mode and in overrange condition | 1 |

GRUPPO AL2 - parametri allarme 2

| Liv | N° | Param | Description | Values | Default |
|-----|----|-------|---|--|---------|
| C | 36 | AL2t | Alarm 2 type | nonE = Alarm not used LoAb = Absolute low alarm HiAb = Absolute high alarm LHAo = Windows alarm in alarm outside the windows LHAi = Windows alarm in alarm inside the windows SE.br = Sensor Break LoDE = Deviation low alarm (relative) HiDE = Deviation high alarm (relative) LHdo = Relative band alarm in alarm out of the band LHdi = Relative band alarm in alarm inside the band | SE.br |
| C | 37 | Ab2 | Alarm 2 function | 0... 15 +1 = Not active at power up +2 = Latched alarm (manual reset) +4 = Acknowledgeable alarm +8 = Relative alarm not active at set point change | 0 |
| C | 42 | AL2d | AL2 hysteresis | 0 (oFF)... 9999 (s) | oFF |
| C | 43 | AL2o | Alarm 2 enabling during Stand-by mode and out of range conditions | 0 = Alarm 2 disabled during Stand by and out of range 1 = Alarm 2 enabled in stand by mode 2 = Alarm 2 enabled in out of range condition 3 = Alarm 2 enabled in stand by mode and in overrange condition | 0 |

| AL3 Group - alarm 3 parameters | | | | | |
|--------------------------------|----|-------|--------------|--|---------|
| Liv | N° | Param | Description | Values | Default |
| | 44 | AL3t | Alarm 3 type | nonE = Alarm not used LoAb = Absolute low alarm HiAb = Absolute high alarm LHAo = Windows alarm in alarm outside the windows LHAI = Windows alarm in alarm inside the windows SE.br = Sensor Break LodE = Deviation low alarm (relative) HidE = Deviation high alarm (relative) LHdo = Relative band alarm in alarm out of the band LHdi = Relative band alarm in alarm inside the band | nonE |

| LbA Group - Loop break alarm | | | | | |
|------------------------------|----|-------|-------------|-----------------------|---------|
| Liv | N° | Param | Descrizione | Values | Default |
| C | 52 | LbAt | LBA time | Da 0 (oFF) a 9999 (s) | oFF |

| rEG Group - Control parameters | | | | | |
|--------------------------------|----|-------|--------------------------------|---|---------|
| Liv | N° | Param | Description | Values | Default |
| C | 56 | cont | Control type | Pid = PID (heat and/or) On.FA = ON/OFF asymmetric hysteresis On.FS = ON/OFF symmetric hysteresis nr = Heat/Cool ON/OFF control with neutral zone 3Pt = Servomotor control (available only when Output 2 and Output 3 have been ordered as "M") | 3pt |
| C | 57 | Auto | Autotuning selection | -4 = Oscillating auto-tune with automatic restart at power up and after all point change -3 = Oscillating auto-tune with manual start -2 = Oscillating -tune with auto-matic start at the first power up only -1 = Oscillating auto-tune with auto-matic restart at every power up 0 = Not used 1 = Fast auto tuning with automatic restart at every power up 2 = Fast auto-tune with automatic start the first power up only 3 = FAST auto-tune with manual start 4 = FAST auto-tune with automatic restart at power up and after set point change 5 = Evo-tune with automatic restart at every power up 6 = Evo-tune with automatic start the first power up only 7 = Evo-tune with manual start 8 = Evo-tune with automatic restart at power up and after a set point change | 7 |
| C | 58 | tunE | Manual start of the Autotuning | oFF = Not active on = Active | oFF |

| | | | | | |
|---|----|-------|----------------------------------|--|------------|
| C | 59 | SELF | Self tuning enabling | no = The instrument does not perform the self-tuning YES = The instrument is performing the self-tuning | No |
| A | 62 | Pb | Proportional band | 1... 9999 (E.U.) | See page 7 |
| A | 63 | ti | Integral time | 0 (oFF) ... 9999 (s) | See page 7 |
| A | 64 | td | Derivative time | 0 (oFF) ... 9999 (s) | See page 7 |
| C | 65 | Fuoc | Fuzzy overshoot control | 0.00... 2.00 | 1 |
| C | 69 | rS | Manual reset (Integral pre-load) | -100.0... +100.0 (%) | 0.0 |
| A | 70 | Str.t | Servomotor stroke time | 5...1000 seconds | See page 7 |
| A | 71 | db.S | Servomotor dead band | 0...100% | 5 |
| C | 72 | od | Delay at power up | 0.00 (oFF) ... 99.59 (hh.mm) | oFF |

SP Group - Set point parameters

| Liv | N° | Param | Description | Values | Default |
|-----|----|-------|--|--|------------|
| C | 76 | nSP | Number of used set points | 1... 4 | 2 |
| A | 77 | SPLL | Minimum set point value | -1999 ... SPHL | See page 7 |
| A | 78 | SPHL | Maximum set point value | SPLL ... 9999 | See page 7 |
| O | 79 | SP | Set point 1 | SPLL ... SPLH | See page 7 |
| C | 80 | SP 2 | Set point 2 | SPLL ... SPLH | 60 |
| | 83 | A.SP | Selection of the active set point | "SP" ... "nSP" | SP |
| C | 84 | SP.rt | Remote set point type | RSP = The value coming from serial link is used as remote set point trin = The value will be added to the local set point selected by A.SP and the sum becomes the operative set point PERc = The value will be scaled on the input range and this value will be used as remote SP | trin |
| C | 85 | SPLr | Local/remote set point selection | Loc = Local rEn = Remote | Loc |
| C | 86 | SP.u | Rate of rise for POSITIVE set point change (ramp UP) | 0.01... 99.99 (inF) Eng. units per minute | inF |
| C | 87 | SP.d | Rate of rise for NEGATIVE set point change (ramp DOWN) | 0.01... 99.99 (inF) Eng. units per minute | inF |

PAn Group - Operator HMI

| Liv | N° | Param | Description | Values | Default |
|-----|-----|-------|--|---|---------|
| C | 118 | PAS2 | Level 2 password (limited access level) | oFF (Level 2 not protected by password) 1... 200 | 20 |
| C | 119 | PAS3 | Level 3 password (complete configuration level) | 3... 300 | 30 |
| C | 120 | PAS4 | Password livello (livello configurazione a codice) | 201... 400 | 300 |
| C | 121 | uSrb | button function during RUN TIME | nonE = No function tunE = Auto-tune/self-tune enabling. A single press (longer than 1 second) starts the auto-tune oPLo = Manual mode. The first pressure puts the instrument in manual mode (OPLO) while a second one puts the instrument in Auto mode | tunE |

| | | | | | |
|---|-----|-------|-------------------------------|---|------|
| | | | | AAC = Alarm reset ASi = Alarm acknowledge chSP = Sequential set point selection St.by = Stand by mode. The first press puts the instrument in stand by mode while a second one puts the instrument in Auto mode. Str.t = Timer run/hold/reset P.run = Program run P.rES = Program reset P.r.H.r = Program run/hold/reset | |
| C | 122 | diSP | Display management | Spo = Operative set point | SPo |
| C | 123 | di.cL | Display colour | 0 = The display colour is used to show the actual deviation (PV - SP) 1 = Display red (fix) 2 = Display green (fix) 3 = Display orange (fix) | 2 |
| | 125 | diS.t | Display Timeout | -- oFF (display always ON) -- 0.1... 99.59 (mm.ss) | oFF |
| C | 126 | fiLd | Filter on the displayed value | -- oFF (filter disabled) -- From 0.0 (oFF) to 20.0 (E.U.) | oFF |
| C | 128 | dSPu | Instrument status at power ON | AS.Pr = Starts in the same way it was prior to the power down Auto = Starts in Auto mode oP.0 = Starts in manual mode with a power output equal to zero St.bY = Starts in stand-by mode | Auto |
| C | 129 | oPr.E | Operative modes enabling | ALL = All modes will be selectable by the next parameter Au.oP = Auto and manual (OPLO) mode only will be selectable by the next parameter Au.Sb = Auto and Stand-by modes only will be selectable by the next parameter | ALL |
| C | 130 | oPEr | Operative mode selection | If oPr.E = ALL: - Auto = Auto mode - oPLo = Manual mode - St.bY = Stand by mode If oPr.E = Au.oP: - Auto = Auto mode - oPLo = Manual mode If oPr.E = Au.Sb: - Auto = Auto mode - St.bY = Stand by mode | Auto |

SEr Group - Serial link parameter

| Liv | N° | Param | Description | Values | Default |
|-----|-----|-------|---|--|---------|
| C | 131 | Add | Instrument address | -- oFF -- 1... 254 | 1 |
| C | 132 | bAud | baud rate | 1200 = 1200 baud 2400 = 2400 baud 9600 = 9600 baud 19.2 = 19200 baud 38.4 = 38400 baud | 9600 |
| C | 133 | trSP | Selection of the value to be retransmitted (Master) | nonE = Retransmission not used (the instrument is a slave) rSP = The instrument becomes a Master and retransmits the operative set point PErc = The instrument become a Master and it retransmits the power output | nonE |

| con Group - Consumption parameters | | | | | |
|------------------------------------|-----|-------|------------------------------|--|---------|
| Liv | N° | Param | Description | Values | Default |
| C | 134 | Co.tY | Count type | oFF = Not used 1 = Instantaneous power (kW) 2 = Power consumption (kW/h) 3 = Energy used during program execution. This measure starts from zero when a program runs end stops at the end of the program. A new program execution will reset the value 4 = Total worked days: number of hours the instrument is turned ON divided by 24. 5 = Total worked hours: number of hours the instrument is turned ON. 6 = Total worked days with threshold: number of hours the instrument is turned ON divided by 24, the controller is forced in stand-by when Co.ty value reaches the threshold set in [137] h.Job. 7 = Total worked hours with threshold: number of hours the instrument is turned ON, the controller is forced in stand-by when Co.ty value reaches the threshold set in [137] h.Job. 8 = Totalizer of control relay worked days: number of hours the control relay has been in ON condition, divided by 24. 9 = Totalizer of control relay worked hours: number of hours the control relay has been in ON condition. 10 = Totalizer of control relay worked days with threshold: number of hours the control relay has been in ON condition divided by 24, the controller is forced in stand-by when Co.ty value reaches the threshold set in [137] h.Job. 11 = Totalizer of control relay worked hours with threshold: number of hours the control relay has been in ON condition, the controller is forced in stand-by when Co.ty value reaches the threshold set in [137] h.Job. | oFF |
| C | 138 | t.Job | Worked time (not resettable) | 0... 9999 days | 0 |

| cAL Group - User calibration group | | | | | |
|------------------------------------|-----|-------|--------------------|--|---------|
| Liv | N° | Param | Description | Values | Default |
| C | 139 | AL.P | Adjust Low Point | From -1999 to (AH.P - 10) in engineering units | 0 |
| C | 140 | AL.o | Adjust Low Offset | -300... +300 (E.U.) | 0 |
| C | 141 | AH.P | Adjust High Point | From (AL.P + 10) to 9999 engineering units | 999.9 |
| C | 142 | AH.o | Adjust High Offset | -300... +300 | 0 |

OPERATIVE MODES

When the instrument is powered, it starts immediately to work according to the parameters values loaded in its memory. The instrument behaviour and its performance are governed by the value of the stored parameters.

At power ON the instrument can start in one of the following mode depending on its configuration:

Automatic Mode In Automatic mode the instrument drives automatically the control output according to the parameter value set and the set point/measured value.

Manual Mode (OPLO): In Manual mode the the upper display shows the measured value while the lower display shows the power output. The lower display shows the power output [preceded by H (for heating) or C (for cooling)], MAN is lit and the instrument allows you to set manually the control output power. No Automatic action will be made.

Stand by Mode (St.bY): In stand-by mode the instrument operates as an indicator. It will show on the upper display the measured value and on the lower display the set point alternately to the "St.bY" messages and forces the control outputs to zero.

We define all the above described conditions as "Standard Display".

As we have seen, it is always possible to modify the value assigned to a parameter independently from the operative modes selected.

AUTOMATIC MODE

Keyboard function when the instrument is in Auto mode:

| | Modo Operatore |
|---|---|
|  | Allows entry into parameter modification procedures |
|  | Allows you to start the "Direct set point modification" function (see below). |
|  | Allows you to display the "additional informations" (see below). |
|  | Performs the action programmed by [121] uSrb ( button function during RUN TIME) parameter |

Additional information

This instrument is able to show you some additional informations that can help you to manage your system. The additional informations are related to how the instrument is programmed, hence in many cases, only part of this information is available.

1. When the instrument is showing the "standard display" push  button. The lower display will show H or c followed by a number. This value is the current power output applied to the process. The H show you that the action is a Heating action while the "c" show you that the action is a Cooling action
2. Push  button again. When the programmer is running the lower display will show the segment currently performed and the Event status as shown below:
 where the first character can be r for a ramp or S for a soak, the next digit show the number of the segment (e.g. S3 means Soak number 3) and the two less significant digits (LSD) show you the status of the two event (the LSD is the Event 2)..
3. Push  button again. When the programmer is running the lower display will show the theoretical remaining time to the end of the program preceded by a "P" letter:

4. Push  button again. When the wattmeter function is running the lower display will show U followed by the measured energy..
5. Push  button. When the "Worked time count" is running the lower display will show "d" for days or "h" for hours followed by the measured time.
6. Push  button. The instrument returns to the "standard display".

Note: The additional information visualization is subject to a time out. If no button is pressed for more than 10 second the instrument comes automatically back to the Standard display..

Direct set point modification

This function allows to modify rapidly the set point value selected by [83] A.SP (selection of the active Set point) or to the set point of the segment group (of the programmer) currently in progress.

1. Push  button. The upper display shows the acronym of the selected set point (e.g. SP2) and the lower display will show its value.
2. By  and  buttons, assign to this parameter the desired value
3. Do not push any button for more than 5 second or push the  button. In both cases the instrument memorize the new value and come back to the “standard display”.

Manual mode

This operative mode allows you to deactivate automatic control and manually program the percentage power output to the process. When the instrument is in manual mode, the upper display shows the measured value while the lower display shows the power output [preceded by H (for heating action) or C (for cooling action)] The MAN LED is lit. When manual control is selected, the instrument will start to operate with the same power output as the last one supplied by automatic mode and can be modified using the  and  buttons.

In case of ON/OFF control, 0% corresponds to the deactivated output while any value different from 0 corresponds to the activated output. As in the case of visualization, the programmable values range from H100 (100% output power with reverse action) to C100 (100% output power with direct action).

Notes:

- During manual mode, the alarms are operative.
- If you set manual modes during program execution, the program will be frozen and it will restart when the instrument will come back to Auto mode.
- If you set manual modes during self-tune execution, the self- tune function will be aborted.
- During manual mode, all functions not related with the control (wattmeter, independent timer, “worked time”, etc) continue to operate normally..

STAND-BY MODE

This operative mode also deactivates the automatic control but forces the control output to zero. In this mode the instrument operates as an indicator. When the instrument is in stand by mode the upper display will show the measured value while the lower display will show alternately the set point and the message “St.bY”.

Notes:

- During stand by mode, the relative alarms are disabled while the absolute alarms are operative or not according to the ALxo (Alarm x enabling during Stand-by mode) parameter setting.
- If you set stand by mode during program execution, the program will be aborted.
- If you set stand by mode during self-tune execution, the self- tune function will be aborted.
- During stand by mode, all functions not related with the control (wattmeter, independent timer, “worked time”, etc) continue to operate normally.
- When the instrument is swapped from stand by to auto modes, the instrument will start automatically the alarm masking, the soft start functions and the auto-tune (if programmed).

AUTOTUNE (EVOTUNE)

Evotune is a fast and fully automatic procedure that can be started in any condition, regardless the deviation from SP. The controller selects automatically the best tune method and computes the optimum PID parameters. To activate Evotune press  button for 3 seconds.

ERROR MESSAGES

The upper display shows the OVER-RANGE and UNDERRANGE conditions with the following indications:

Over-range: 

Under-range 

The sensor break will be signalled as an out of range: - - - -

Note: When an over-range or an under-range is detected, the alarms operate as in presence of the maximum or the minimum measurable value respectively.

To check the out of span Error condition, proceed as follows:

1. Check the input signal source and the connecting line.
2. Make sure that the input signal is in accordance with the instrument configuration. Otherwise, modify the input configuration.
3. If no error is detected, send the instrument to your supplier to be checked.

List of possible errors

ErAT Fast Auto-tune cannot start. The measure value is too close to the set point. Push the button in order to delete the error message.

ouLd Overload on the out 4. The messages shows that a short circuit is present on the Out 4 when it is used as output or as a transmitter power supply. When the short circuit disappears the output restart to operate..

NoAt Auto-tune not finished within 12 hours.

ErEP Possible problem of the instrument memory. The messages disappears automatically. When the error continues, send the instrument to your supplier.

RonE Possible problem of the firmware memory. When this error is detected, send the instrument to your supplier.

Errt Possible problem of the calibration memory. When this error is detected, send the instrument to your supplier.

FACTORY RESET

Sometime, e.g. when you re-configure an instrument previously used for other works or from other people or when you have made too many errors during configuration and you decided to re-configure the instrument, it is possible to restore the factory configuration. This action allows to put the instrument in a defined condition (the same it was at the first power ON).

The default data are those typical values loaded in the instrument prior to ship it from factory. To load the factory default parameter set, proceed as follows:

1. Press the  button for more than 5 seconds. The upper display will show PASS while the lower display shows 0;
2. Using  and  buttons set the value -481;
3. Push  button;
4. The instrument will turn OFF all LEDs for a few seconds, then the upper display will show dFLt (default) and then all LEDs are turned ON for 2 seconds. At this point the instrument restarts as for a new power ON.

The procedure is complete.

Note: The complete list of the default parameters is available in Chapter "Configuration".

KM3 Modulator

USER MANUAL

MOUNTING

DISPLAY AND KEYS



| | Operator Mode | Editing Mode |
|--|--|--|
| | Access to: - Operator Commands (Timer, Setpoint selection ...) - Parameters - Configuration | Confirm and go to Next parameter |
| | Access to: - Operator additional information (Output value, running time ...) | Increase the displayed value or select the next element of the parameters list |
| | Access to: - Set Point | Decrease the displayed value or select the previous element |
| | Programmable key: Start the programmed function (Autotune, Auto/Man, Timer ...) | Exit from Operator commands/Parameter setting/Configuration |

CONNECTIONS DIAGRAM



Probe connection:

- **PT1000/NTC/PTC:** between terminal 3 and 2
- **PT 100:** between terminal 3 and 2 with terminal 1
- **Passive pressure probe** 0/4-20 mA: between terminal 4 (+) e 1 (-)
Note: out4 must be activated (IO4F must be set to ON)
- **Powered pressure probe** 0/4-20 mA between terminal 4 (power supply), 2 (negative) e 1 (positive)
Note: set IO4F to ON to activate Out4

Power supply connection:

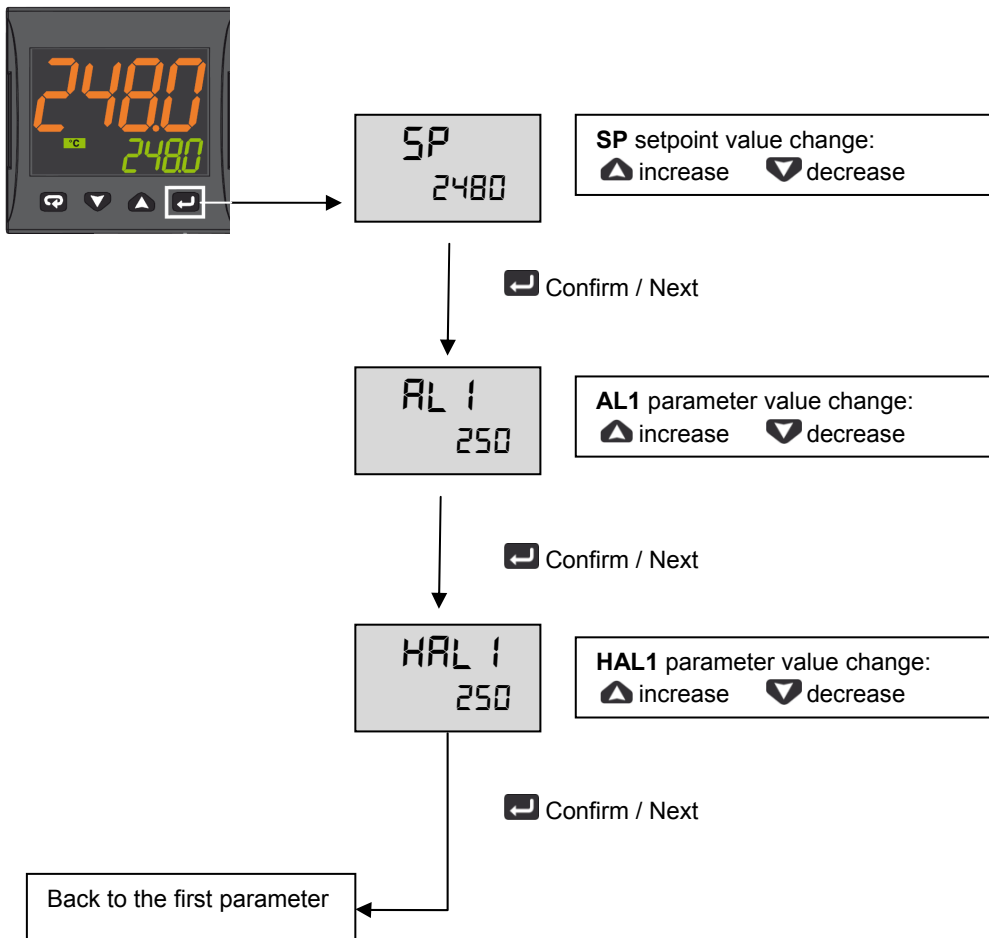
- **Neutral wire:** terminal 9
- **Phase:** terminal 10 (100...240 Vac)
- Close terminals 15-16 to switch to the set point 2

Output connection:

- **Channel 1:** terminal 7 and 8 (burner on – off)
- **Channel 2:** terminal 11 and 12 (servomotor opens)
- **Channel 3:** terminal 13 and 14 (servomotor closes)

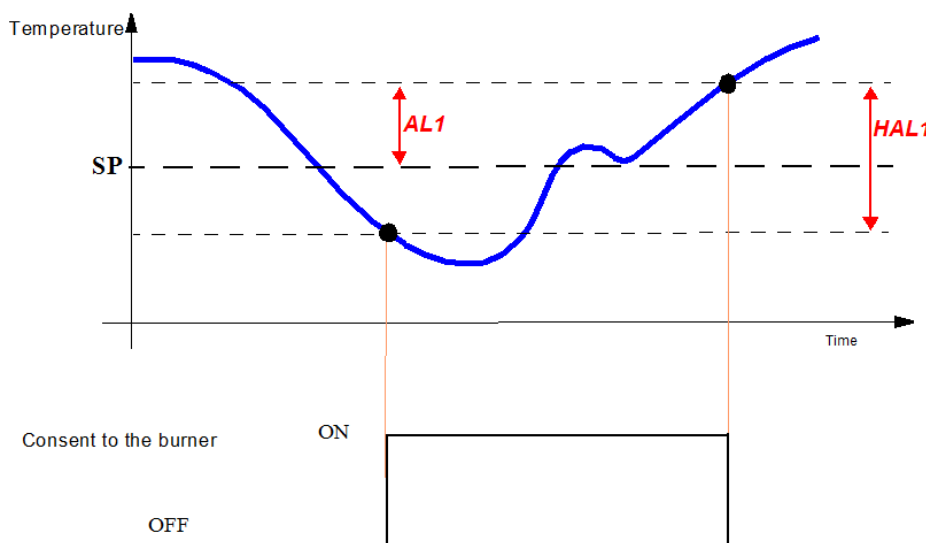
SETPOINT AND HYSTERESIS CONFIGURATION (SP, AL1, HAL1 parameters)

Push the  button to enter into the setpoint configuration:



To return to normal mode, press the  key for 3 seconds or wait the 10s timeout

Operation example



LIMITED ACCESS LEVEL

Proceed as follows to change some parameters that are not visible in standard user mode:



| Param | Description | Values | Default |
|-------|-----------------------------------|---|----------------------|
| SEnS | Input type | Pt1 = RTD Pt100 Pt10 = RTD Pt1000 0.20 = 0..20mA 4.20 = 4..20mA Pressure probe 0.10 = 0..10V 2.10 = 2..10V crAL= Thermocouple K | Depends on the probe |
| SP | Set point 1 | SPLL ... SPLH | See page 7 |
| AL1 | AL1 threshold | AL1L... AL1H (E.U.) | |
| HAL1 | AL1 hysteresis | 1... 9999 (E.U.) | |
| Pb | Proportional band | 1... 9999 (E.U.) | |
| ti | Integral time | 0 (oFF) ... 9999 (s) | |
| td | Derivative time | 0 (oFF) ... 9999 (s) | |
| Str.t | Servomotor stroke time | 5...1000 seconds | |
| db.S | Servomotor dead band | 0...100% | |
| SPLL | Minimum set point value | -1999 ... SPLH | |
| SPHL | Maximum set point value | SPLL ... 9999 | |
| dp | Decimal point position | 0... 3 | |
| SP 2 | Set point 2 | SPLL...SPLH | 60 |
| A.SP | Selection of the active set point | "SP" ... "nSP" | SP |

To exit the parameter setting procedure press the key (for 3 s) or wait until the timeout expiration (about 30 seconds)

Probe parameters configuration MODULATORE ASCON KM3

| Parameter Group | | inP | | | AL1 | | | | rEG | | | | | SP | | | |
|----------------------------------|------|--------------|--------------|--------------|------|---------------|--------------|---------------|-------------|-------------|-------------|-----------------|-------------|-----------|-----------|--------------|--|
| Parameter | Sens | dp | SSC | FSc | unit | IO4.F (**) | AL1 (***) | HAL1 (***) | Pb (***) | ti (***) | td (***) | Str.t | db.S | SPLL | SPHL | SP (***) | |
| Probes | | Dec Point | Scale Min | Scale Max | | | Off | On | p | i | d | servo time s | Band Mo. | SP Min | SP Max | Set point | |
| Pt1000 (130°C max) | Pt10 | 1 | | | °C | on | 5 | 10 | 10 | 350 | 1 | * | 5 | 30 | 95 | 80 | |
| Pt1000 (350°C max) | PT10 | 1 | | | °C | on | 10 | 10 | 10 | 350 | 1 | * | 5 | 0 | 350 | 80 | |
| Pt100 (130°C max) | PT1 | 1 | | | °C | on | 5 | 10 | 10 | 350 | 1 | * | 5 | 0 | 95 | 80 | |
| Pt100 (350°C max) | Pt1 | 1 | | | °C | on | 10 | 10 | 10 | 350 | 1 | * | 5 | 0 | 350 | 80 | |
| Pt100 (0÷100°C 4÷20mA) | 4.20 | 1 | 0 | 100 | | on | 5 | 10 | 10 | 350 | 1 | * | 5 | 0 | 95 | 80 | |
| Thermocouple K (1200°C max) | crAL | 0 | | | °C | on | 20 | 25 | 10 | 350 | 1 | * | 5 | 0 | 1200 | 80 | |
| Thermocouple J (1000°C max) | J | 0 | | | °C | on | 20 | 25 | 10 | 350 | 1 | * | 5 | 0 | 1000 | 80 | |
| 4-20mA / 0-1,6bar Pressure probe | 4.20 | 0 | 0 | 160 | | on | 20 | 20 | 5 | 120 | 1 | * | 5 | 0 | 160 | 100 | |
| 4-20mA / 0-10bar Pressure probe | 4.20 | 0 | 0 | 1000 | | on | 50 | 50 | 5 | 120 | 1 | * | 5 | 0 | 1000 | 600 | |
| 4-20mA / 0-16bar Pressure probe | 4.20 | 0 | 0 | 1600 | | on | 80 | 80 | 5 | 120 | 1 | * | 5 | 0 | 1600 | 600 | |
| 4-20mA / 0-25bar Pressure probe | 4.20 | 0 | 0 | 2500 | | on | 125 | 125 | 5 | 120 | 1 | * | 5 | 0 | 2500 | 600 | |
| 4-20mA / 0-40bar Pressure probe | 4.20 | 0 | 0 | 4000 | | on | 200 | 200 | 5 | 120 | 1 | * | 5 | 0 | 4000 | 600 | |
| QBE2002 / 0-25bar Pressure probe | 0.10 | 0 | 0 | 2500 | | On | 125 | 125 | 5 | 120 | 1 | * | 5 | 0 | 2500 | 600 | |

Note:

(*) Str.t - Servomotor stroke time

SQL33; STM30; SQM10; SQM40; SQM50; SQM54 = 30 (Seconds)

STA12B3.41; SQN30.251; SQN72.4A4A20 = 12 (Seconds)

() Out 4 ... on Display led °4 must be switched on, otherwise change the io4.F parameter value from "on" to "out4", confirm the value, quit the configuration mode then change again the io4.F parameter value from "out4" to "on".**







(***) Factory settings. These values must be adapted to machine conditions


N.B. For pressure probe, SP, SPHL, SPLL parameters values are expressed in Kpa (1 bar = 100 Kpa).

CONFIGURATION

How to access configuration level

The configuration parameters are collected in various groups. Every group defines all parameters related with a specific function (e.g.: control, alarms, output functions).

1. Push the  button for more than 5 seconds. The upper display will show PASS while the lower display will show 0.
2. Using  and  buttons set the programmed password.
According to the entered password, it is possible to see a part of the parameters listed in the "configuration parameters" section.
 - a. Enter "30" as password to view all the configuration parameters
 - b. Enter "20" as password to view the parameters of the "limited access level". At this point, only the parameters with attribute **Liv = A** or **Liv = O** will be editable.
 - c. Leave the password blank to edit "user level" parameters, that are identified by attribute **Liv = O**
3. Push the  button. If the password is correct the display will show the acronym of the first parameter group preceded by the symbol: . In other words the upper display will show:  inP (group of the **Input parameters**).

The instrument is in configuration mode. To press  for more than 5 seconds, the instrument will return to the "standard display".

Keyboard functions during parameter changing:

| Operator Mode | |
|---|--|
|  | When the upper display is showing a group and the lower display is blank, this key allows to enter in the selected group. When the upper display is showing a parameter and the lower display is showing its value, this key allows to store the selected value for the current parameter and access the next parameter within the same group. |
|  | Allows to increase the value of the selected parameter. |
|  | Allows to decrease the value of the selected parameter. |
|  | Short presses allow you to exit the current group of parameters and select a new group. A long press terminates the configuration procedure (the instrument returns to the normal display). |
|  +  | These two keys allow to return to the previous group. Proceed as follows: Push the  button and maintaining the pressure, then push the  ; release both the buttons. |

Configuration Parameters

| inP GROUP - input configuration | | | | | |
|---------------------------------|----|-------|---|---|----------------------|
| Liv | N° | Param | Description | Values | Default |
| A | 1 | SEnS | Input type | Pt1 = RTD Pt100 Pt10 = RTD Pt1000 0.20 = 0..20mA 4.20 = 4..20mA Pressure probe 0.10 = 0..10V 2.10 = 2..10V crAL= Thermocouple K | Depends on the probe |
| A | 2 | dp | Decimal point position | 0... 3 | See page 7 |
| A | 3 | SSc | Initial scale read-out for linear inputs (available only if SEnS parameter is not equal to Pt1, Pt10, crAL values) | -1999... 9999 | 0 |
| C | 4 | FSc | Full scale read-out for linear input inputs (available only if SEnS parameter is not equal to Pt1, Pt10, crAL values) | -1999... 9999 | Depends on the probe |
| C | 5 | unit | Unit of measure (present only in the case of temperature probe) | °C/°F | °C |
| C | 6 | Fil | Digital filter on the measured value | 0 (= OFF)... 20.0 s | 1.0 |
| C | 7 | inE | Selection of the Sensor Out of Range type that will enable the safety output value | or = Over range ou = Under range our = over e under range | or |

| | | | | | |
|---|----|-------|--|--|----|
| C | 8 | oPE | Safety output value | -100... 100 | 0 |
| C | 9 | io4.F | I/O4 function selection | on = Out4 will be ever ON (used as a transmitter power supply) ,out4 = Uscita 4 (Used as digital output 4), dG2c = Digital input 2 for contact closure, dG2U = Digital input 2 driven by 12... 24 VDC | on |
| C | 10 | diF1 | Digital input 1 function | oFF = Not used, 1 = Alarm reset, 2 = Alarm acknowledge (ACK), 3 = Hold of the measured value, 4 = Stand by mode, 5 = Manual mode, 6 = HEAt with SP1 and CoOL with SP2, 7 = Timer RUN/Hold/Reset, 8 = Timer Run, 9 = Timer Reset, 10 = Timer Run/Hold, 11 = Timer Run/Reset, 12 = Timer Run/Reset with lock, 13 = Program Start, 14 = Program Reset, 15 = Program Hold, 16 = Program Run/Hold, 17 = Program Run/Reset, 18 = Sequential SP selection, 19 = SP1 - SP2 selection, 20 = SP1... SP4 binary selection, 21 = Digital inputs in parallel | 19 |
| C | 12 | di.A | Digital Inputs Action (DI2 only if configured) | 0 = DI1 direct action, DI2 direct action 1 = DI1 reverse action, DI2 direct action 2 = DI1 direct action, DI2 reverse action 3 = DI1 reverse action, DI2 reverse action | 0 |

Out GROUP- Output parameters

| Liv | N° | Param | Description | Values | Default |
|-----|----|-------|--|--|---------|
| C | 14 | o1F | Out 1 function | AL = Alarm output | AL |
| C | 15 | o1AL | Initial scale value of the analog retransmission | -1999 ... Ao1H | 1 |
| C | 18 | o1Ac | Out 1 action | dir = Direct action rEU = Reverse action dir.r = Direct with reversed LED ReU.r = Reverse with reversed LED | rEU.r |
| C | 19 | o2F | Out 2 function | H.rEG = Heating output | H.rEG |
| C | 21 | o2Ac | Out 2 action | dir = Direct action rEU = Reverse action dir.r = Direct with reversed LED ReU.r = Reverse with reversed LED | dir |
| C | 22 | o3F | Out 3 function | H.rEG = Heating output | H.rEG |
| C | 24 | o3Ac | Out 3 action | dir = Direct action rEU = Reverse action dir.r = Direct with reversed LED ReU.r = Reverse with reversed LED | dir |

AL1 GROUP - Alarm 1 parameters

| Liv | N° | Param | Descrizione | Values | Default |
|-----|----|-------|------------------|---|---------|
| C | 28 | AL1t | Tipo allarme AL1 | nonE = Alarm not used LoAb = Absolute low alarm HiAb = Absolute high alarm LHAo = Windows alarm in alarm outside the windows LHAI = Windows alarm in alarm inside the | HidE |

| | | | | | |
|---|----|------|---|--|------------|
| | | | | windows SE.br = Sensor Break LoDE = Deviation low alarm (relative) HiDE = Deviation high alarm (relative) LHdo = Relative band alarm in alarm out of the band LHdi = Relative band alarm in alarm inside the band | |
| C | 29 | Ab1 | Alarm 1 function | 0... 15 +1 = Not active at power up +2 = Latched alarm (manual reset) +4 = Acknowledgeable alarm +8 = Relative alarm not active at set point change | 0 |
| C | 30 | AL1L | -- For High and low alarms, it is the low limit of the AL1 threshold; -- For band alarm, it is low alarm threshold | -1999... AL1H (E.U.) | -199.9 |
| C | 31 | AL1H | -- For High and low alarms, it is the high limit of the AL1 threshold; -- For band alarm, it is high alarm threshold | AL1L... 9999 (E.U.) | 999.9 |
| O | 32 | AL1 | AL1 threshold | AL1L... AL1H (E.U.) | See page 7 |
| O | 33 | HAL1 | AL1 hysteresis | 1... 9999 (E.U.) | See page 7 |
| C | 34 | AL1d | AL1 delay | 0 (oFF)... 9999 (s) | oFF |
| C | 35 | AL1o | Alarm 1 enabling during Stand-by mode and out of range conditions | 0 = Alarm 1 disabled during Stand by and out of range 1 = Alarm 1 enabled in stand by mode 2 = Alarm 1 enabled in out of range condition 3 = Alarm 1 enabled in stand by mode and in overrange condition | 1 |

GRUPPO AL2 - parametri allarme 2

| Liv | N° | Param | Description | Values | Default |
|-----|----|-------|---|--|---------|
| C | 36 | AL2t | Alarm 2 type | nonE = Alarm not used LoAb = Absolute low alarm HiAb = Absolute high alarm LHAo = Windows alarm in alarm outside the windows LHAi = Windows alarm in alarm inside the windows SE.br = Sensor Break LoDE = Deviation low alarm (relative) HiDE = Deviation high alarm (relative) LHdo = Relative band alarm in alarm out of the band LHdi = Relative band alarm in alarm inside the band | SE.br |
| C | 37 | Ab2 | Alarm 2 function | 0... 15 +1 = Not active at power up +2 = Latched alarm (manual reset) +4 = Acknowledgeable alarm +8 = Relative alarm not active at set point change | 0 |
| C | 42 | AL2d | AL2 hysteresis | 0 (oFF)... 9999 (s) | oFF |
| C | 43 | AL2o | Alarm 2 enabling during Stand-by mode and out of range conditions | 0 = Alarm 2 disabled during Stand by and out of range 1 = Alarm 2 enabled in stand by mode 2 = Alarm 2 enabled in out of range condition 3 = Alarm 2 enabled in stand by mode and in overrange condition | 0 |

| AL3 Group - alarm 3 parameters | | | | | |
|--------------------------------|----|-------|--------------|--|---------|
| Liv | N° | Param | Description | Values | Default |
| | 44 | AL3t | Alarm 3 type | nonE = Alarm not used LoAb = Absolute low alarm HiAb = Absolute high alarm LHAo = Windows alarm in alarm outside the windows LHAI = Windows alarm in alarm inside the windows SE.br = Sensor Break LoDE = Deviation low alarm (relative) HiDE = Deviation high alarm (relative) LHdo = Relative band alarm in alarm out of the band LHdi = Relative band alarm in alarm inside the band | nonE |

| LbA Group - Loop break alarm | | | | | |
|------------------------------|----|-------|-------------|-----------------------|---------|
| Liv | N° | Param | Descrizione | Values | Default |
| C | 52 | LbAt | LBA time | Da 0 (oFF) a 9999 (s) | oFF |

| rEG Group - Control parameters | | | | | |
|--------------------------------|----|-------|--------------------------------|---|---------|
| Liv | N° | Param | Description | Values | Default |
| C | 56 | cont | Control type | Pid = PID (heat and/or) On.FA = ON/OFF asymmetric hysteresis On.FS = ON/OFF symmetric hysteresis nr = Heat/Cool ON/OFF control with neutral zone 3Pt = Servomotor control (available only when Output 2 and Output 3 have been ordered as "M") | 3pt |
| C | 57 | Auto | Autotuning selection | -4 = Oscillating auto-tune with automatic restart at power up and after all point change -3 = Oscillating auto-tune with manual start -2 = Oscillating -tune with auto-matic start at the first power up only -1 = Oscillating auto-tune with auto-matic restart at every power up 0 = Not used 1 = Fast auto tuning with automatic restart at every power up 2 = Fast auto-tune with automatic start the first power up only 3 = FAST auto-tune with manual start 4 = FAST auto-tune with automatic restart at power up and after set point change 5 = Evo-tune with automatic restart at every power up 6 = Evo-tune with automatic start the first power up only 7 = Evo-tune with manual start 8 = Evo-tune with automatic restart at power up and after a set point change | 7 |
| C | 58 | tunE | Manual start of the Autotuning | oFF = Not active on = Active | oFF |

| | | | | | |
|---|----|-------|----------------------------------|--|------------|
| C | 59 | SELF | Self tuning enabling | no = The instrument does not perform the self-tuning YES = The instrument is performing the self-tuning | No |
| A | 62 | Pb | Proportional band | 1... 9999 (E.U.) | See page 7 |
| A | 63 | ti | Integral time | 0 (oFF) ... 9999 (s) | See page 7 |
| A | 64 | td | Derivative time | 0 (oFF) ... 9999 (s) | See page 7 |
| C | 65 | Fuoc | Fuzzy overshoot control | 0.00... 2.00 | 1 |
| C | 69 | rS | Manual reset (Integral pre-load) | -100.0... +100.0 (%) | 0.0 |
| A | 70 | Str.t | Servomotor stroke time | 5...1000 seconds | See page 7 |
| A | 71 | db.S | Servomotor dead band | 0...100% | 5 |
| C | 72 | od | Delay at power up | 0.00 (oFF) ... 99.59 (hh.mm) | oFF |

SP Group - Set point parameters

| Liv | N° | Param | Description | Values | Default |
|-----|----|-------|--|--|------------|
| C | 76 | nSP | Number of used set points | 1... 4 | 2 |
| A | 77 | SPLL | Minimum set point value | -1999 ... SPHL | See page 7 |
| A | 78 | SPHL | Maximum set point value | SPLL ... 9999 | See page 7 |
| O | 79 | SP | Set point 1 | SPLL ... SPLH | See page 7 |
| C | 80 | SP 2 | Set point 2 | SPLL ... SPLH | 60 |
| | 83 | A.SP | Selection of the active set point | "SP" ... "nSP" | SP |
| C | 84 | SP.rt | Remote set point type | RSP = The value coming from serial link is used as remote set point trin = The value will be added to the local set point selected by A.SP and the sum becomes the operative set point PERc = The value will be scaled on the input range and this value will be used as remote SP | trin |
| C | 85 | SPLr | Local/remote set point selection | Loc = Local rEn = Remote | Loc |
| C | 86 | SP.u | Rate of rise for POSITIVE set point change (ramp UP) | 0.01... 99.99 (inF) Eng. units per minute | inF |
| C | 87 | SP.d | Rate of rise for NEGATIVE set point change (ramp DOWN) | 0.01... 99.99 (inF) Eng. units per minute | inF |

PAn Group - Operator HMI

| Liv | N° | Param | Description | Values | Default |
|-----|-----|-------|--|---|---------|
| C | 118 | PAS2 | Level 2 password (limited access level) | oFF (Level 2 not protected by password) 1... 200 | 20 |
| C | 119 | PAS3 | Level 3 password (complete configuration level) | 3... 300 | 30 |
| C | 120 | PAS4 | Password livello (livello configurazione a codice) | 201... 400 | 300 |
| C | 121 | uSrb | button function during RUN TIME | nonE = No function tunE = Auto-tune/self-tune enabling. A single press (longer than 1 second) starts the auto-tune oPLo = Manual mode. The first pressure puts the instrument in manual mode (OPLO) while a second one puts the instrument in Auto mode | tunE |

| | | | | | |
|---|-----|-------|-------------------------------|---|------|
| | | | | AAC = Alarm reset ASi = Alarm acknowledge chSP = Sequential set point selection St.by = Stand by mode. The first press puts the instrument in stand by mode while a second one puts the instrument in Auto mode. Str.t = Timer run/hold/reset P.run = Program run P.rES = Program reset P.r.H.r = Program run/hold/reset | |
| C | 122 | diSP | Display management | Spo = Operative set point | SPo |
| C | 123 | di.cL | Display colour | 0 = The display colour is used to show the actual deviation (PV - SP) 1 = Display red (fix) 2 = Display green (fix) 3 = Display orange (fix) | 2 |
| | 125 | diS.t | Display Timeout | -- oFF (display always ON) -- 0.1... 99.59 (mm.ss) | oFF |
| C | 126 | fiLd | Filter on the displayed value | -- oFF (filter disabled) -- From 0.0 (oFF) to 20.0 (E.U.) | oFF |
| C | 128 | dSPu | Instrument status at power ON | AS.Pr = Starts in the same way it was prior to the power down Auto = Starts in Auto mode oP.0 = Starts in manual mode with a power output equal to zero St.bY = Starts in stand-by mode | Auto |
| C | 129 | oPr.E | Operative modes enabling | ALL = All modes will be selectable by the next parameter Au.oP = Auto and manual (OPLO) mode only will be selectable by the next parameter Au.Sb = Auto and Stand-by modes only will be selectable by the next parameter | ALL |
| C | 130 | oPEr | Operative mode selection | If oPr.E = ALL: - Auto = Auto mode - oPLo = Manual mode - St.bY = Stand by mode If oPr.E = Au.oP: - Auto = Auto mode - oPLo = Manual mode If oPr.E = Au.Sb: - Auto = Auto mode - St.bY = Stand by mode | Auto |

SEr Group - Serial link parameter

| Liv | N° | Param | Description | Values | Default |
|-----|-----|-------|---|--|---------|
| C | 131 | Add | Instrument address | -- oFF -- 1... 254 | 1 |
| C | 132 | bAud | baud rate | 1200 = 1200 baud 2400 = 2400 baud 9600 = 9600 baud 19.2 = 19200 baud 38.4 = 38400 baud | 9600 |
| C | 133 | trSP | Selection of the value to be retransmitted (Master) | nonE = Retransmission not used (the instrument is a slave) rSP = The instrument becomes a Master and retransmits the operative set point PErc = The instrument become a Master and it retransmits the power output | nonE |

| con Group - Consumption parameters | | | | | |
|------------------------------------|-----|-------|------------------------------|--|---------|
| Liv | N° | Param | Description | Values | Default |
| C | 134 | Co.tY | Count type | oFF = Not used 1 = Instantaneous power (kW) 2 = Power consumption (kW/h) 3 = Energy used during program execution. This measure starts from zero when a program runs end stops at the end of the program. A new program execution will reset the value 4 = Total worked days: number of hours the instrument is turned ON divided by 24. 5 = Total worked hours: number of hours the instrument is turned ON. 6 = Total worked days with threshold: number of hours the instrument is turned ON divided by 24, the controller is forced in stand-by when Co.ty value reaches the threshold set in [137] h.Job. 7 = Total worked hours with threshold: number of hours the instrument is turned ON, the controller is forced in stand-by when Co.ty value reaches the threshold set in [137] h.Job. 8 = Totalizer of control relay worked days: number of hours the control relay has been in ON condition, divided by 24. 9 = Totalizer of control relay worked hours: number of hours the control relay has been in ON condition. 10 = Totalizer of control relay worked days with threshold: number of hours the control relay has been in ON condition divided by 24, the controller is forced in stand-by when Co.ty value reaches the threshold set in [137] h.Job. 11 = Totalizer of control relay worked hours with threshold: number of hours the control relay has been in ON condition, the controller is forced in stand-by when Co.ty value reaches the threshold set in [137] h.Job. | oFF |
| C | 138 | t.Job | Worked time (not resettable) | 0... 9999 days | 0 |

| cAL Group - User calibration group | | | | | |
|------------------------------------|-----|-------|--------------------|--|---------|
| Liv | N° | Param | Description | Values | Default |
| C | 139 | AL.P | Adjust Low Point | From -1999 to (AH.P - 10) in engineering units | 0 |
| C | 140 | AL.o | Adjust Low Offset | -300... +300 (E.U.) | 0 |
| C | 141 | AH.P | Adjust High Point | From (AL.P + 10) to 9999 engineering units | 999.9 |
| C | 142 | AH.o | Adjust High Offset | -300... +300 | 0 |

OPERATIVE MODES

When the instrument is powered, it starts immediately to work according to the parameters values loaded in its memory. The instrument behaviour and its performance are governed by the value of the stored parameters.

At power ON the instrument can start in one of the following mode depending on its configuration:

Automatic Mode In Automatic mode the instrument drives automatically the control output according to the parameter value set and the set point/measured value.

Manual Mode (OPLO): In Manual mode the the upper display shows the measured value while the lower display shows the power output The lower display shows the power output [preceded by H (for heating) or C (for cooling)], MAN is lit and the instrument allows you to set manually the control output power. No Automatic action will be made.

Stand by Mode (St.bY): In stand-by mode the instrument operates as an indicator. It will show on the upper display the measured value and on the lower display the set point alternately to the "St.bY" messages and forces the control outputs to zero.

We define all the above described conditions as "Standard Display".

As we have seen, it is always possible to modify the value assigned to a parameter independently from the operative modes selected.



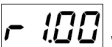

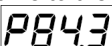



AUTOMATIC MODE

Keyboard function when the instrument is in Auto mode:

| | Modo Operatore |
|---|---|
|  | Allows entry into parameter modification procedures |
|  | Allows you to start the "Direct set point modification" function (see below). |
|  | Allows you to display the "additional informations" (see below). |
|  | Performs the action programmed by [121] uSrb ( button function during RUN TIME) parameter |

Additional information

This instrument is able to show you some additional informations that can help you to manage your system. The additional informations are related to how the instrument is programmed, hence in many cases, only part of this information is available.

1. When the instrument is showing the "standard display" push  button. The lower display will show H or c followed by a number. This value is the current power output applied to the process. The H show you that the action is a Heating action while the "c" show you that the action is a Cooling action
2. Push  button again. When the programmer is running the lower display will show the segment currently performed and the Event status as shown below:
 where the first character can be r for a ramp or S for a soak, the next digit show the number of the segment (e.g. S3 means Soak number 3) and the twoless significant digits (LSD) show you the status of the two event (the LSD is the Event 2)..
3. Push  button again. When the programmer is running the lower display will show the theoretical remaining time to the end of the program preceded by a "P" letter:

4. Push  button again. When the wattmeter function is running the lower display will show U followed by the measured energy..
5. Push  button. When the "Worked time count" is running the lower display will show "d" for days or "h" for hours followed by the measured time.
6. Push  button. The instrument returns to the "standard display".

Note: The additional information visualization is subject to a time out. If no button is pressed for more than 10 second the instrument comes automatically back to the Standard display..

Direct set point modification

This function allows to modify rapidly the set point value selected by [83] A.SP (selection of the active Set point) or to the set point of the segment group (of the programmer) currently in progress.

1. Push  button. The upper display shows the acronym of the selected set point (e.g. SP2) and the lower display will show its value.
2. By  and  buttons, assign to this parameter the desired value
3. Do not push any button for more than 5 second or push the  button. In both cases the instrument memorize the new value and come back to the “standard display”.

Manual mode

This operative mode allows you to deactivate automatic control and manually program the percentage power output to the process. When the instrument is in manual mode, the upper display shows the measured value while the lower display shows the power output [preceded by H (for heating action) or C (for cooling action)] The MAN LED is lit. When manual control is selected, the instrument will start to operate with the same power output as the last one supplied by automatic mode and can be modified using the  and  buttons.

In case of ON/OFF control, 0% corresponds to the deactivated output while any value different from 0 corresponds to the activated output. As in the case of visualization, the programmable values range from H100 (100% output power with reverse action) to C100 (100% output power with direct action).

Notes:

- During manual mode, the alarms are operative.
- If you set manual modes during program execution, the program will be frozen and it will restart when the instrument will come back to Auto mode.
- If you set manual modes during self-tune execution, the self- tune function will be aborted.
- During manual mode, all functions not related with the control (wattmeter, independent timer, “worked time”, etc) continue to operate normally..

STAND-BY MODE

This operative mode also deactivates the automatic control but forces the control output to zero. In this mode the instrument operates as an indicator. When the instrument is in stand by mode the upper display will show the measured value while the lower display will show alternately the set point and the message “St.bY”.

Notes:

- During stand by mode, the relative alarms are disabled while the absolute alarms are operative or not according to the ALx0 (Alarm x enabling during Stand-by mode) parameter setting.
- If you set stand by mode during program execution, the program will be aborted.
- If you set stand by mode during self-tune execution, the self- tune function will be aborted.
- During stand by mode, all functions not related with the control (wattmeter, independent timer, “worked time”, etc) continue to operate normally.
- When the instrument is swapped from stand by to auto modes, the instrument will start automatically the alarm masking, the soft start functions and the auto-tune (if programmed).

AUTOTUNE (EVOTUNE)

Evotune is a fast and fully automatic procedure that can be started in any condition, regardless the deviation from SP. The controller selects automatically the best tune method and computes the optimum PID parameters. To activate Evotune press  button for 3 seconds.

ERROR MESSAGES

The upper display shows the OVER-RANGE and UNDERRANGE conditions with the following indications:

Over-range: 

Under-range 

The sensor break will be signalled as an out of range: - - - -

Note: When an over-range or an under-range is detected, the alarms operate as in presence of the maximum or the minimum measurable value respectively.

To check the out of span Error condition, proceed as follows:

1. Check the input signal source and the connecting line.
2. Make sure that the input signal is in accordance with the instrument configuration. Otherwise, modify the input configuration.
3. If no error is detected, send the instrument to your supplier to be checked.

List of possible errors

ErAT Fast Auto-tune cannot start. The measure value is too close to the set point. Push the button in order to delete the error message.

ouLd Overload on the out 4. The messages shows that a short circuit is present on the Out 4 when it is used as output or as a transmitter power supply. When the short circuit disappears the output restart to operate..

NoAt Auto-tune not finished within 12 hours.

ErEP Possible problem of the instrument memory. The messages disappears automatically. When the error continues, send the instrument to your supplier.

RonE Possible problem of the firmware memory. When this error is detected, send the instrument to your supplier.

Errt Possible problem of the calibration memory. When this error is detected, send the instrument to your supplier.

FACTORY RESET

Sometime, e.g. when you re-configure an instrument previously used for other works or from other people or when you have made too many errors during configuration and you decided to re-configure the instrument, it is possible to restore the factory configuration. This action allows to put the instrument in a defined condition (the same it was at the first power ON).

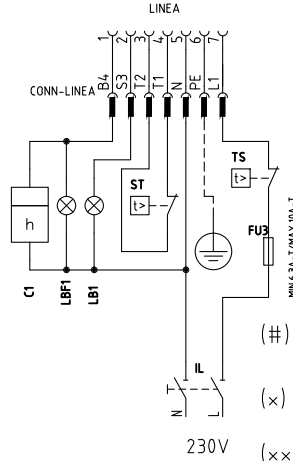
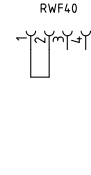
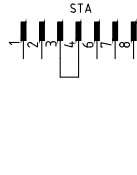
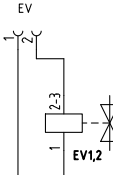
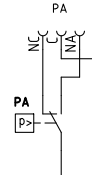
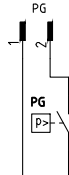
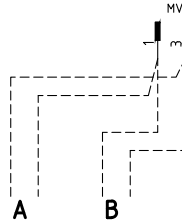
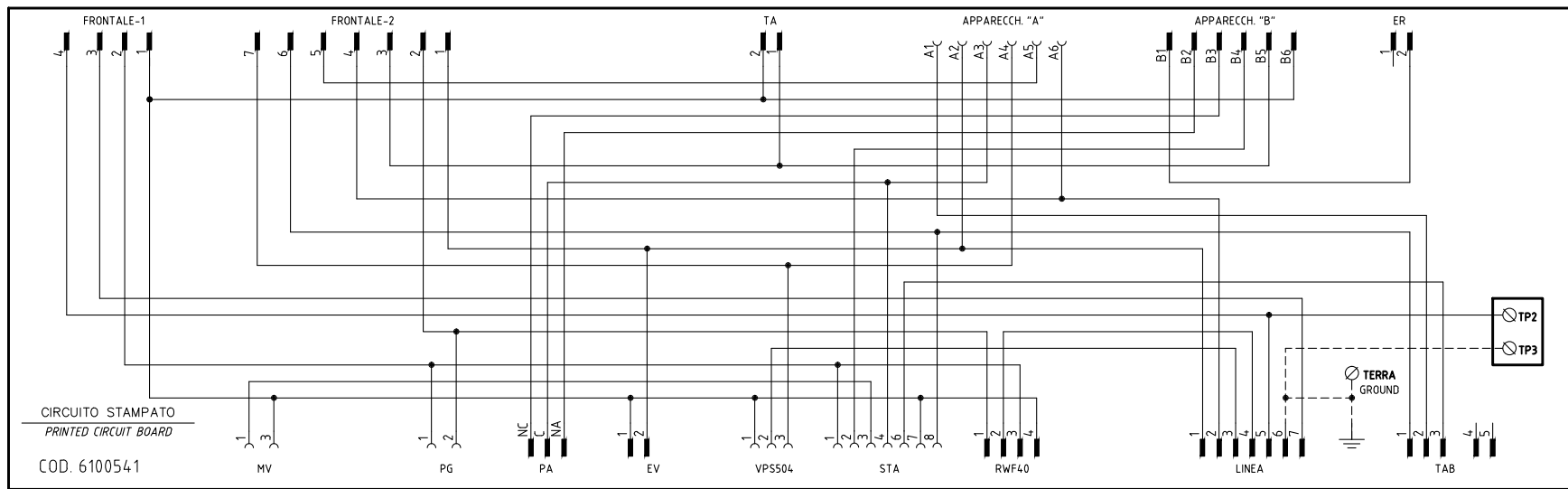
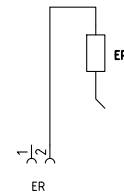
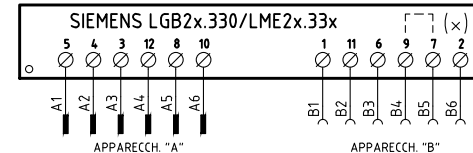
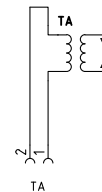
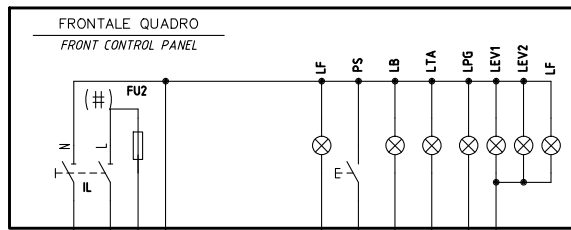
The default data are those typical values loaded in the instrument prior to ship it from factory. To load the factory default parameter set, proceed as follows:

1. Press the  button for more than 5 seconds. The upper display will show PASS while the lower display shows 0;
2. Using  and  buttons set the value -481;
3. Push  button;
4. The instrument will turn OFF all LEDs for a few seconds, then the upper display will show dFLt (default) and then all LEDs are turned ON for 2 seconds. At this point the instrument restarts as for a new power ON.

The procedure is complete.

Note: The complete list of the default parameters is available in Chapter "Configuration".

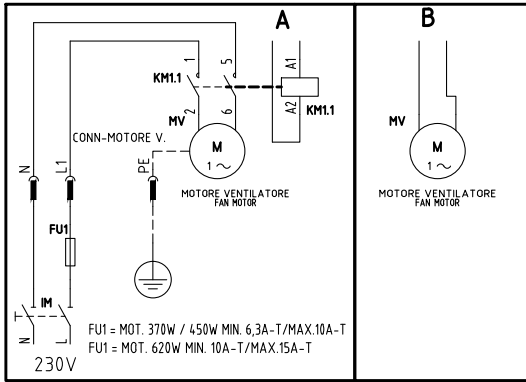
VERSIONE MONOSTADIO "TN" "TN" SINGLE-STAGE VERSION



(#) MOTORE VENTIL. VERSIONE [A], FU2 = 6,3A F; MOTORE VENTIL. VERSIONE [B], FU2 = 10A F
FAN MOTOR VERSION [A], FU2 = 6,3 A F;
FAN MOTOR VERSION [B], FU2 = 10 A F

(x) FARE PONTE TRA I MORSETTI 7 E 9 SOLO CON LGB21.330
CONNECTION BETWEEN TERMINALS 7 AND 9 WITH LGB21.330 ONLY

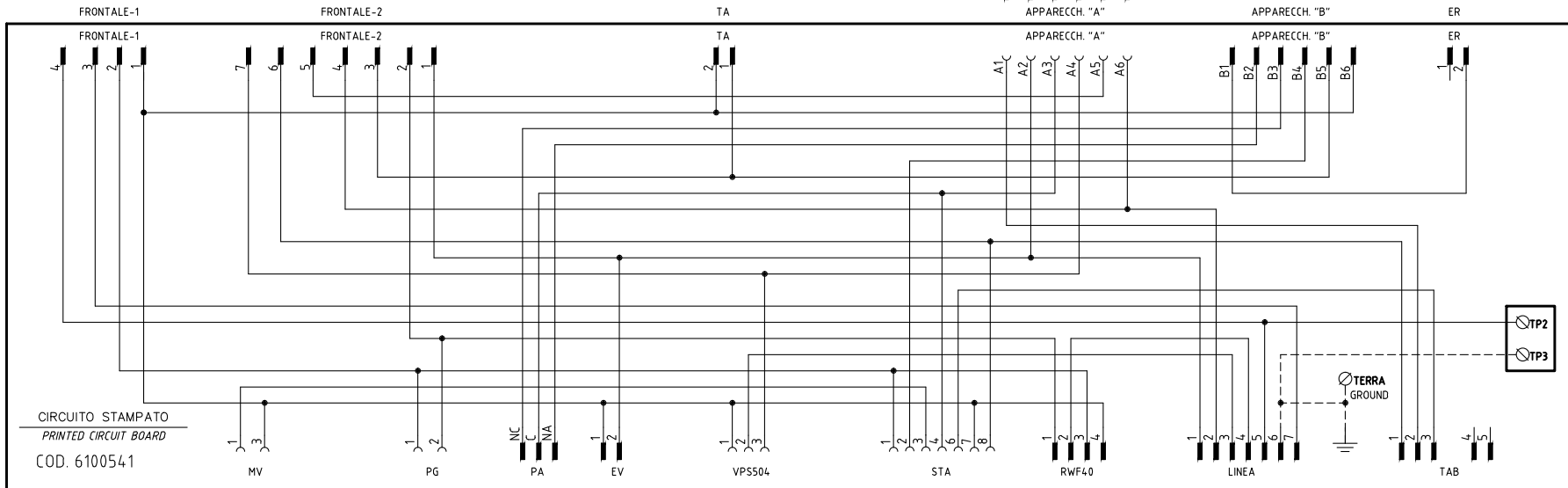
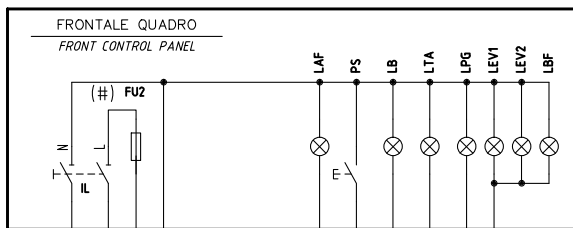
230V (x x x) SOLO CON ALIMENTAZIONE ELETTRICA SENZA NEUTRO
WITH ELECTRIC SUPPLY WITHOUT NEUTRAL VERSION ONLY



| | | | | | |
|--|--|-----------|-------------------|-------|--------|
| | Impianto | Ordine | Data | PREC. | FOGLIO |
| | TIPI/TYPES NG(X)350/400/550 - LG(X)350/400/550 | Commissa | 19/10/2010 | / | 1 |
| | MODELLI/MODELS x-.TN(PR)(MD).x.xx.A.x.xx | Esecutore | Revisione 05 | SEQUE | TOTALE |
| | VERSIONE CON CIRCUITO STAMPATO WITH PRINTED CIRCUIT VERSION | U. PINTON | Dis. N. 18 - 0163 | 2 | 5 |

| REV. | MODIFICA | DATA | FIRME |
|------|----------------------------|----------|-----------|
| 05 | AGGIUNTO/ADDED "KVB" ASCON | 07/08/14 | U. PINTON |
| 04 | AGGIUNTO/ADDED "600V" | 19/06/12 | U. PINTON |
| 03 | AGGIUNTO/ADDED "RWF50.2x" | 20/01/12 | U. PINTON |
| 02 | MOTOR MODIFY | 19/10/10 | U. PINTON |
| 01 | AGGIUNTO / ADDED SGM72.. | 22/05/09 | U. PINTON |

VERSIONE ALTA-BASSA FIAMMA "AB" / PROGRESSIVO "PR" "AB" HIGH-LOW / "PR" PROGRESSIVE VERSION

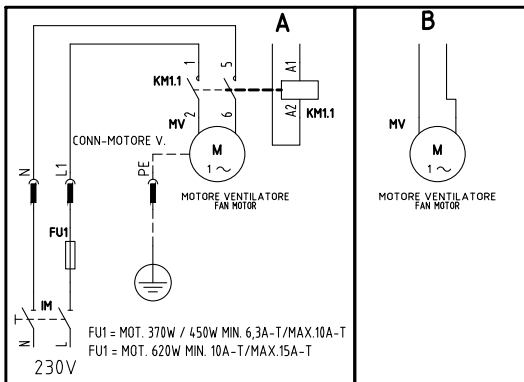
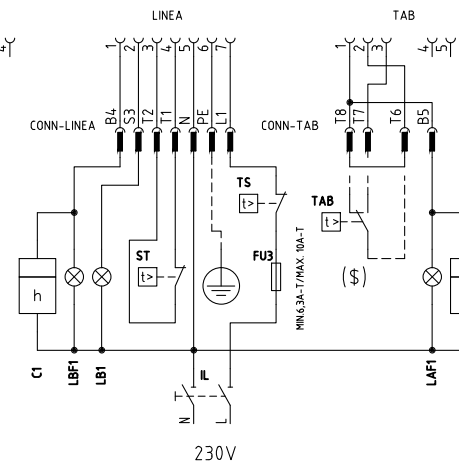
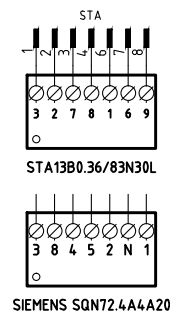
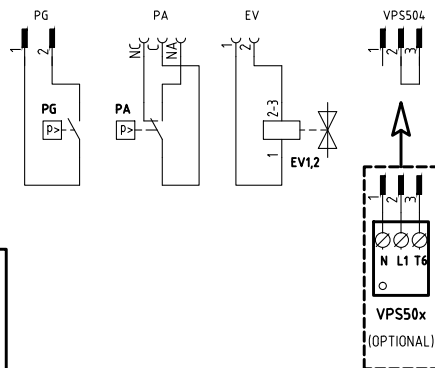
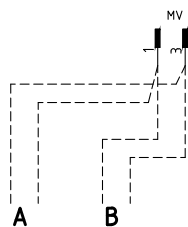


SERVOCOMANDO SERRANDA ARIA
AIR DAMPER ACTUATOR
STA13B0.36/83N30L

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

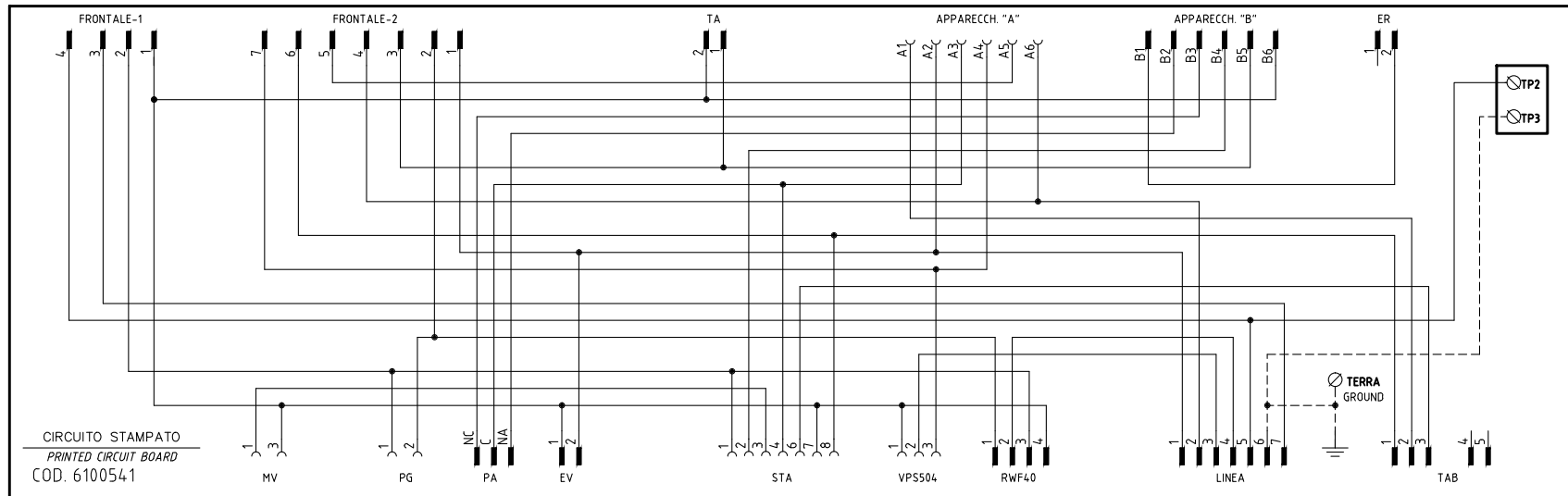
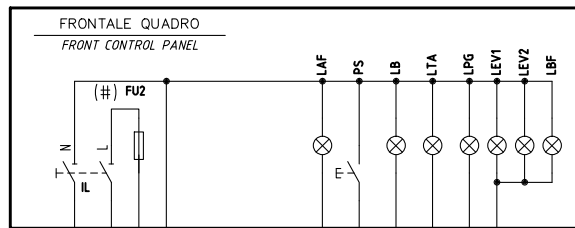
SERVOCOMANDO SERRANDA ARIA
AIR DAMPER ACTUATOR
SIEMENS SQNT2.xA4.A20

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

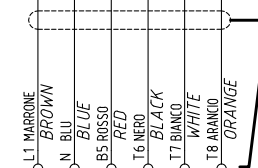
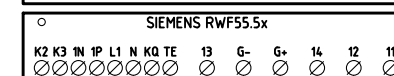
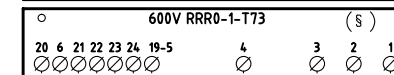
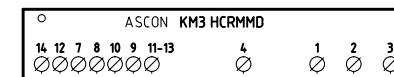
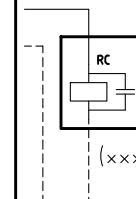


- (#) MOTORE VENTIL. VERSIONE [A], FU2 = 6,3A F; MOTORE VENTIL. VERSIONE [B], FU2 = 10A F
 FAN MOTOR VERSION [A], FU2 = 6,3 A F;
 FAN MOTOR VERSION [B], FU2 = 10 A F
- (x x x) SOLO CON ALIMENTAZIONE ELETTRICA SENZA NEUTRO
 WITH ELECTRIC SUPPLY WITHOUT NEUTRAL VERSION ONLY
- (\$) SE USATO "TAB", TOGLIERE IL PONTE TRA I MORSETTI T6-T8
 IF USED "TAB", REMOVE THE BRIDGE BETWEEN TERMINALS T6-T8

| | | | |
|-----------|------------|-------|--------|
| Data | 19/10/2010 | PREC. | FOGLIO |
| Revisione | 05 | 1 | 2 |
| Dis. N. | 18 - 0163 | SEQUE | TOTALE |
| | | 3 | 5 |



VERSIONE MODULANTE "MD"
"MD" MODULATING VERSION

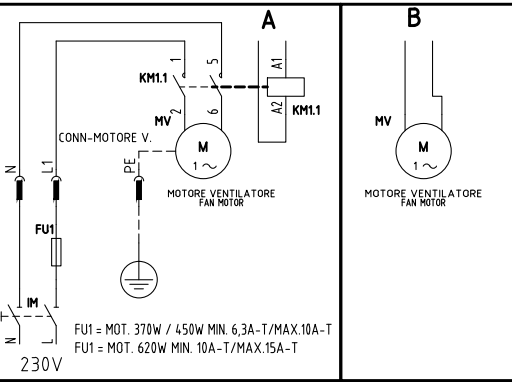
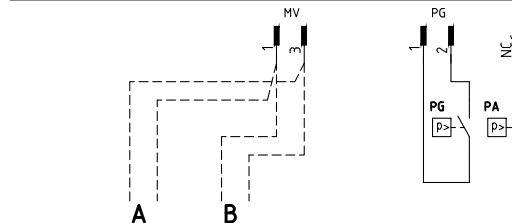


CAVO 7x0,75mmq

7x0,75mmq CABLE

CONN. SONDE

(x x)
COLLEGAMENTO SONDE
PROBE CONNECTION

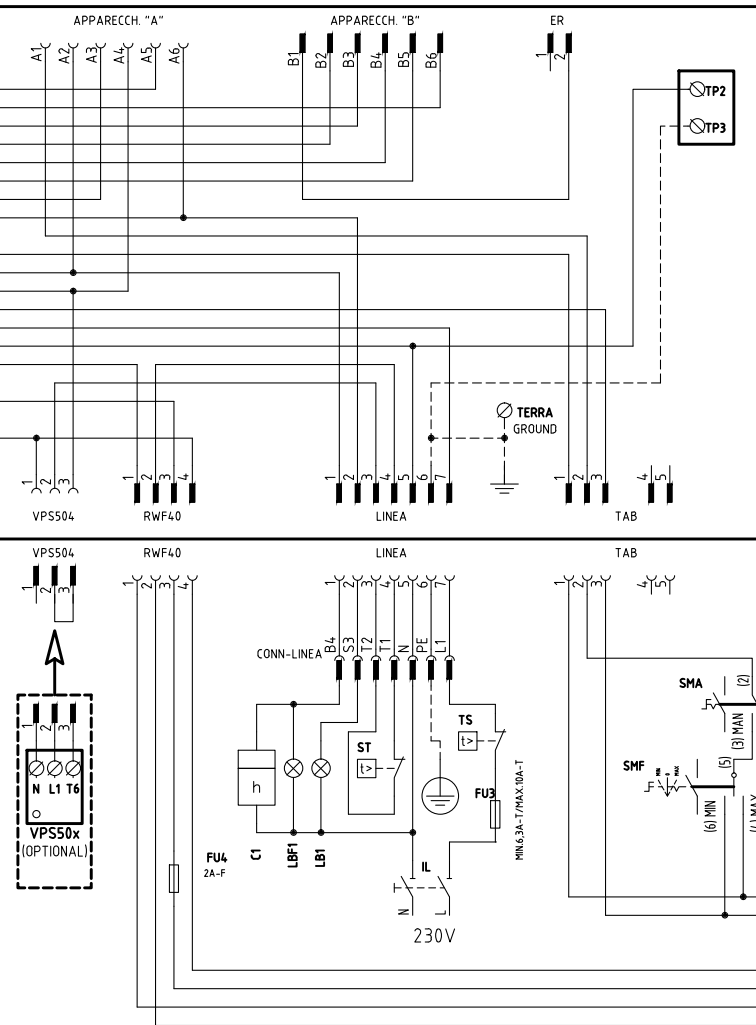
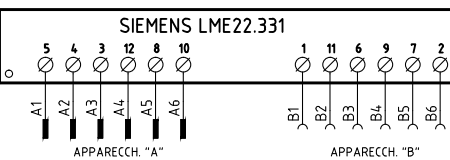


SERVOCOMANDO SERRANDA ARIA
AIR DAMPER ACTUATOR
STA13B0.36/83N30L

I (ROSSO) ALTA FIAMMA HIGH FLAME
II (VERDE) SOSTA STAND-BY
III (BLU) BASSA FIAMMA LOW FLAME
IV (NERO) NON USATA NOT USED

SERVOCOMANDO SERRANDA ARIA
AIR DAMPER ACTUATOR
SIEMENS SQN72.xA4.A20

I (ROSSO) ALTA FIAMMA HIGH FLAME
II (VERDE) SOSTA STAND-BY
III (BLU) BASSA FIAMMA LOW FLAME
IV (NERO) NON USATA NOT USED



(#) MOTORE VENTIL. VERSIONE [A], FU2 = 6,3A F; MOTORE VENTIL. VERSIONE [B], FU2 = 10A F
FAN MOTOR VERSION [A], FU2= 6.3 A F;
FAN MOTOR VERSION [B], FU2= 10 A F

(x x x) SOLO CON ALIMENTAZIONE ELETTRICA SENZA NEUTRO
WITH ELECTRIC SUPPLY WITHOUT NEUTRAL VERSION ONLY

| | | | |
|-----------|------------|-------|--------|
| Data | 19/10/2010 | PREC. | FOGLIO |
| Revisione | 05 | 2 | 3 |
| Dis. N. | 18 - 0163 | SEGUE | TOTALE |
| | | 4 | 5 |

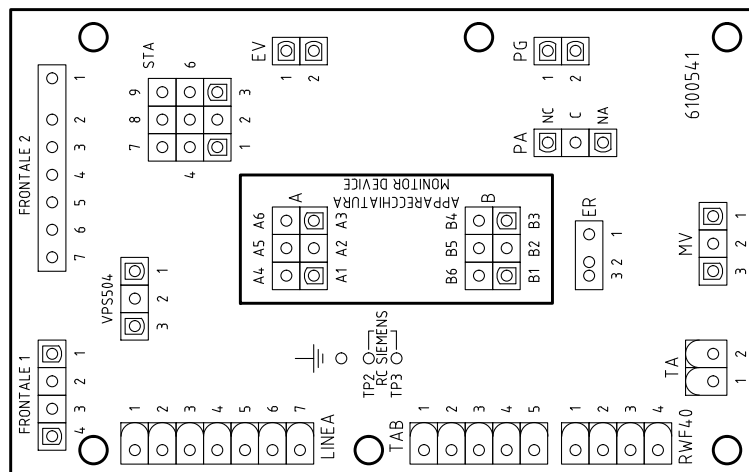
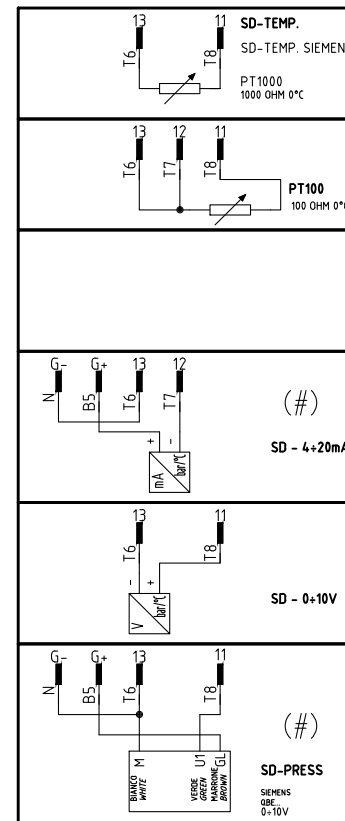
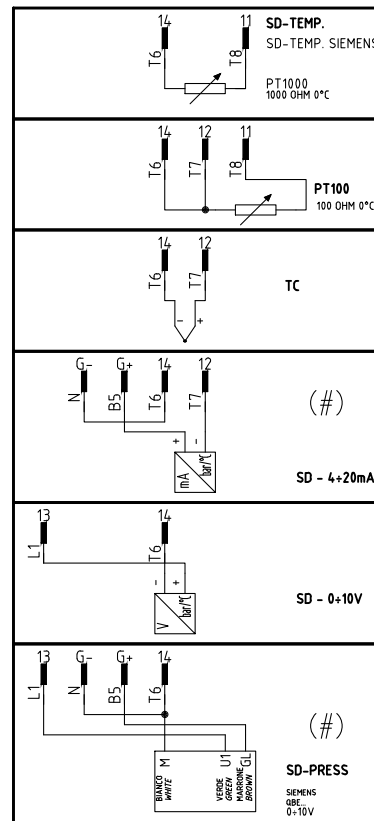
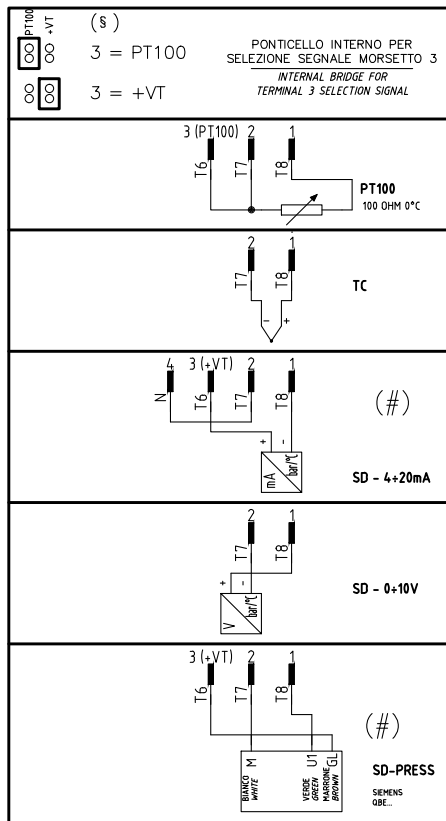
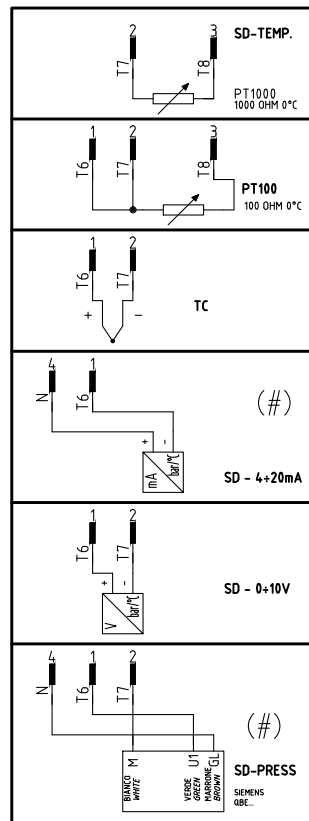
(xx)
ATTENZIONE COLLEGAMENTO SONDE CON CONNETTORE 7 POLI
WARNING PROBE CONNECTION WITH 7 PINS CONNECTOR

KM3 HCRMMD

600V RRR0-1-T73

RWF55.5x

RWF50.2x



| Sigla/Item | Funzione | Function |
|-----------------------------|---|--|
| 600V RRR0-1-T73 | REGOLATORE MODULANTE (ALTERNATIVO) | BURNER MODULATOR (ALTERNATIVE) |
| C1 | CONTAORE BASSA FIAMMA | LOW FLAME TIME COUNTER |
| C2 | CONTAORE ALTA FIAMMA | HIGH FLAME TIME COUNTER |
| ER | ELETTRODO RILEVAZIONE FIAMMA | FLAME DETECTION ELECTRODE |
| EV1,2 | ELETTROVALVOLE GAS (O GRUPPO VALVOLE) | GAS ELECTRO-VALVES (OR VALVES GROUP) |
| FU1 | FUSIBILE LINEA MOTORE VENTILATORE | FAN MOTOR LINE FUSE |
| FU2 | FUSIBILE DI LINEA | LINE FUSE |
| FU3 | FUSIBILE DI LINEA | LINE FUSE |
| FU4 | FUSIBILE AUSILIARIO | AUXILIARY FUSE |
| IL | INTERRUTTORE LINEA BRUCIATORE | BURNER LINE SWITCH |
| IM | INTERRUTTORE LINEA MOTORE VENTILATORE | FAN MOTOR LINE SWITCH |
| KM1.1 | 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 |
| LAF1 | 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 |
| LBF1 | 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] |
| LF | LAMPADA SEGNALE FUNZIONAMENTO BRUCIATORE | INDICATOR LIGHT BURNER OPERATION |
| LPG | LAMPADA SEGNALE PRESENZA GAS IN RETE | INDICATOR LIGHT FOR PRESENCE OF GAS IN THE NETWORK |
| LTA | LAMPADA SEGNALE TRASFORMATORE DI ACCENSIONE | IGNITION TRANSFORMER INDICATOR LIGHT |
| MV | MOTORE VENTILATORE | FAN MOTOR |
| PA | PRESSOSTATO ARIA | AIR PRESSURE SWITCH |
| PG | PRESSOSTATO GAS DI MINIMA PRESSIONE | MINIMUM GAS PRESSURE SWITCH |
| PS | PULSANTE SBLOCCO FIAMMA | FLAME UNLOCK BUTTON |
| PT100 | SONDA DI TEMPERATURA | TEMPERATURE PROBE |
| RC | CIRCUITO RC | RC CIRCUIT |
| 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 LGB2x.330/LME2x.33x | APPARECCHIATURA CONTROLLO FIAMMA | CONTROL BOX |
| SIEMENS LME22.331 | APPARECCHIATURA CONTROLLO FIAMMA | CONTROL BOX |
| SIEMENS RWF50.2x | REGOLATORE MODULANTE | BURNER MODULATOR |
| SIEMENS RWF55.5x | REGOLATORE MODULANTE (ALTERNATIVO) | BURNER MODULATOR (ALTERNATIVE) |
| SIEMENS SQN72.4A4A20 | SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO) | AIR DAMPER ACTUATOR (ALTERNATIVE) |
| 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 |
| STA13B0.36/83N30L | SERVOCOMANDO SERRANDA ARIA | AIR DAMPER ACTUATOR |
| 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 |
| VPS50x | CONTROLLO DI TENUTA VALVOLE GAS (OPTIONAL) | GAS PROVING SYSTEM (OPTIONAL) |

| | | | |
|-----------|------------|-------|--------|
| Data | 19/10/2010 | PREC. | FOGLIO |
| Revisione | 05 | 4 | 5 |
| Dis. N. | 18 - 0163 | SEQUE | TOTALE |
| | | / | 5 |