

RX1025-FGR
RX1030-FGR

LAMTEC BT330
Microprocessor controlled

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);

National Standard

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

Heavy oil burners

European Directives

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

Harmonized standards

- UNI EN 267 (Automatic forced draught burners for liquid fuels)
- EN 55014-1 (Electromagnetic compatibility- Requirements for 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);

Norme nazionali / National Standard

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

Gas - Light oil burners

European Directives

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

Harmonized standards

- UNI EN 676 (Automatic forced draught burners for gaseous fuels)
- UNI EN 267 (Automatic forced draught burners for liquid fuels)
- EN 55014-1 (Electromagnetic compatibility- Requirements for household appliances, electric tools and similar apparatus)
- EN 60204-1:2006 (Safety of machinery – Electrical equipment of machines.)
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- UNI EN ISO 12100:2010 (Safety of machinery - General principles for design - Risk assessment and risk reduction);

Norme nazionali / National Standard

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

Gas - Heavy oil burners

European directives:

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

Harmonized standards

- UNI EN 676 (Automatic forced draught burners for gaseous fuels)
- EN 55014-1 (Electromagnetic compatibility- Requirements for 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);

National Standard

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

Industrial burners

European directives

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

Harmonized standards

- EN 55014-1 (Electromagnetic compatibility- Requirements for 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.



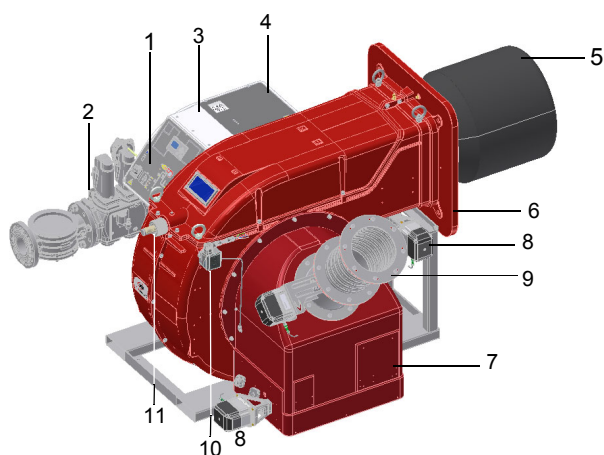
WARNING!

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.

PART I: SPECIFICATIONS

BURNERS FEATURES



Note: the figure is indicative only

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

Gas operation: the gas coming from the supply line, passes through the valves group provided with filter and governor. This one forces the pressure in the utilisation limits. The actuators move proportionally the air damper and the gas butterfly valve, in order to achieve the optimisation of the gas flue values, as to get an efficient combustion.

The adjustable combustion head can improve the burner performance. The combustion head determines the energetic quality and the geometry of the flame. Fuel and comburent are routed into separated ways as far as the zone of flame generation (combustion chamber). The control panel, placed on the burner front side, shows each operating stage.

Burner model identification

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

| Type | RX1025-FGR | Model | M.- | MD. | S. | *. | A. | 1. | 80. | LF |
|------|-------------------|-------|------------|------------|------------|------------|------------|------------|------------|------------|
| | (1) | | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |

| | | | | | | | | | | |
|---|--------------------------------|---|--|--|--|--|--|--|--|--|
| 1 | BURNER TYPE | RX1025-FGR - RX1030-FGR | | | | | | | | |
| 2 | FUEL | M - Natural gas | | | | | | | | |
| 3 | OPERATION (Available versions) | MD - Fully modulating | | | | | | | | |
| 4 | BLAST TUBE | S - Standard L - Extended | | | | | | | | |
| 5 | DESTINATION COUNTRY | * - see data plate | | | | | | | | |
| 6 | BURNER VERSION | A - Standard Y - Special | | | | | | | | |
| 7 | EQUIPMENT | 1 = 2 gas valves + gas proving system 8 = 2 gas valves + gas proving system + maximum gas pressure switch | | | | | | | | |
| 8 | GAS CONNECTION | 80 = DN80 100 = DN100 | | | | | | | | |
| 9 | MICRO-PROCESSOR CONTROL | LF = Medium-large burners complete with electronic cam and temperature-compensated flue gas recirculation, without O ₂ monitoring, without inverter. | | | | | | | | |

Fuel

The burner technical specifications, described in this manual, refer to natural gas (calorific net value $H_i = 9,45 \text{ kWh/Stm}^3$, density $\rho = 0,717 \text{ Kg/Stm}^3$). For different fuel such as LPG, town gas and biogas, multiply the values of flow and pressure by the corrective factors shown in the table below.

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

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

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

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



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



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

Technical Specifications

| BURNER TYPE | | RX1025-FGR M-.. | RX1030-FGR M-.. |
|-------------------------|----------------------------------|--------------------------|-----------------|
| Output | min. - max. kW | 1.565 - 6.880 | 1.550 - 8.480 |
| Fuel | | M - Natural gas | |
| Category | | (see next paragraph) | |
| Gas rate- Natural gas | min.- max. (Stm ³ /h) | 166 - 728 | 164 - 897 |
| Gas pressure | mbar | (see Note 2) | |
| Power supply | | 230V 3~ / 400V 3N ~ 50Hz | |
| Total power consumption | kW | 19 | 30,5 |
| Electric motor | kW | 18,5 | 30 |
| Protection | | IP40 | |
| Operation | | MD - Fully modulating | |
| Gas train 80 | Valves size / Gas connection | 80 / DN80 | |
| Gas train 100 | Valves size / Gas connection | 100 / DN100 | |
| Operating temperature | °C | -10 ÷ +50 | |
| Storage Temperature | °C | -20 ÷ +60 | |
| Working service | | Continuous | |

| | |
|---------------|--|
| Note1: | All gas flow rates are referred to Stm ³ / h (1.013 mbar absolute pressure, 15 °C temperature) and are valid for G20 gas (net calorific value H _i = 34,02 MJ / Stm ³); for L.P.G. (net calorific value H _i = 93,5 MJ / Stm ³) |
| Note2: | Maximum gas pressure = 360 mbar (with Dungs MBDLE) = 500 mbar (with Siemens VGD or Dungs MultiBloc MBE) Minimum gas pressure = see gas curves. |
| Note3: | Burners are suitable only for indoor operation with a maximum relative humidity of 80 % |

Country and usefulness gas categories

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

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

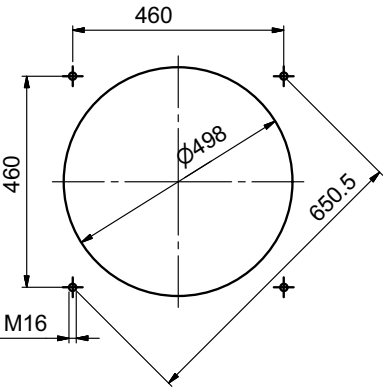
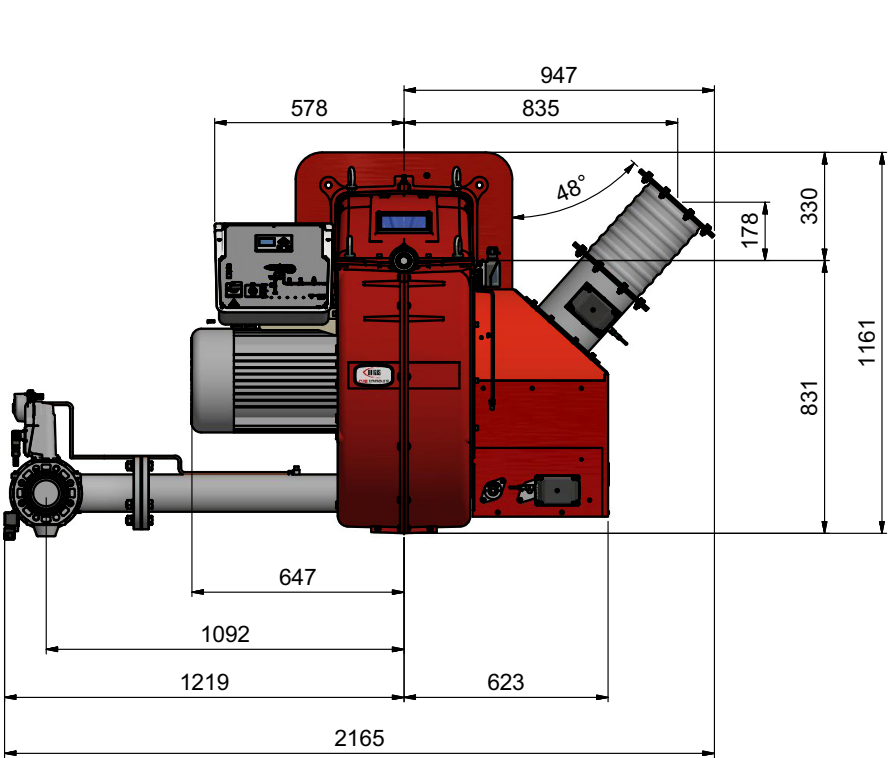
Fuel



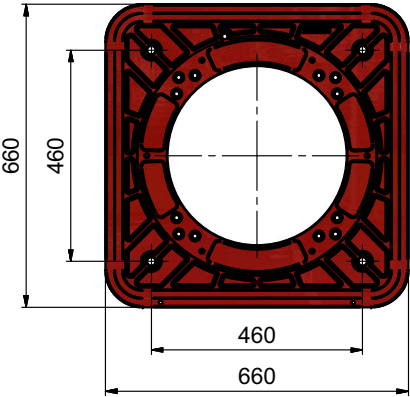
DANGER! The burner must be used only with the fuel specified in the burner data plate.

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

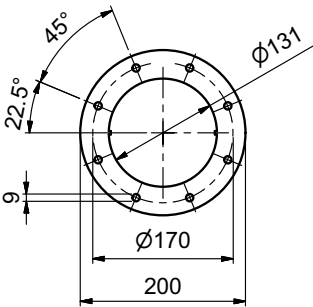
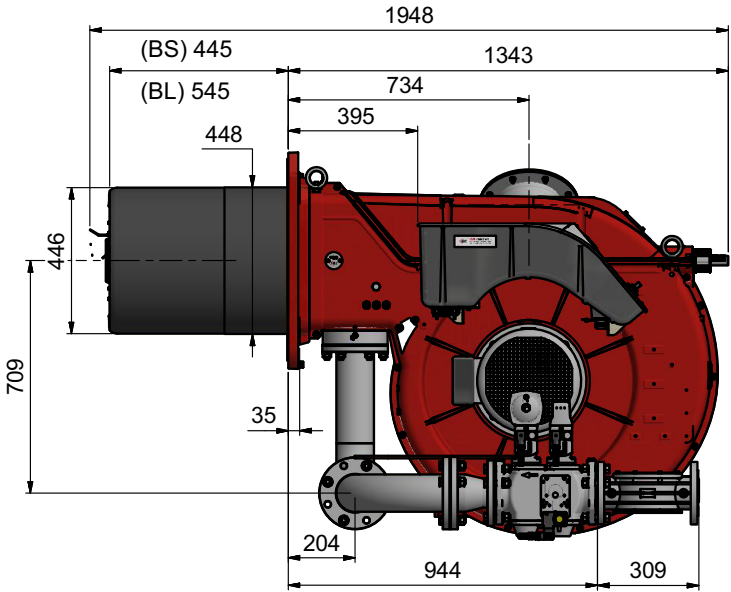
Overall dimensions (mm) - RX1025-FGR



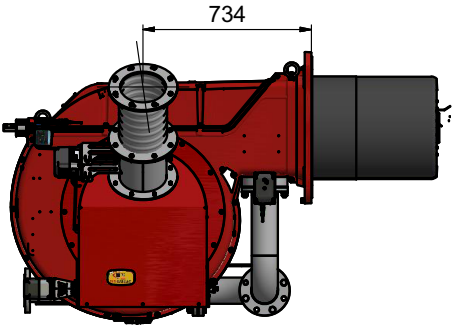
BOILER RECOMMENDED
DRILLING TEMPLATE



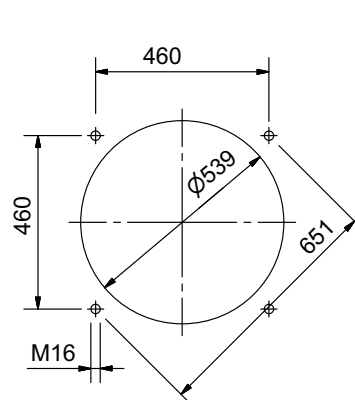
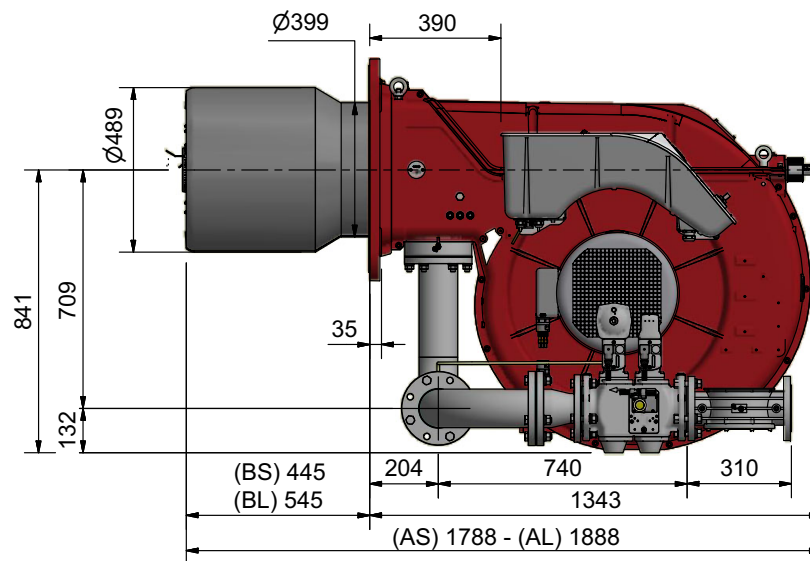
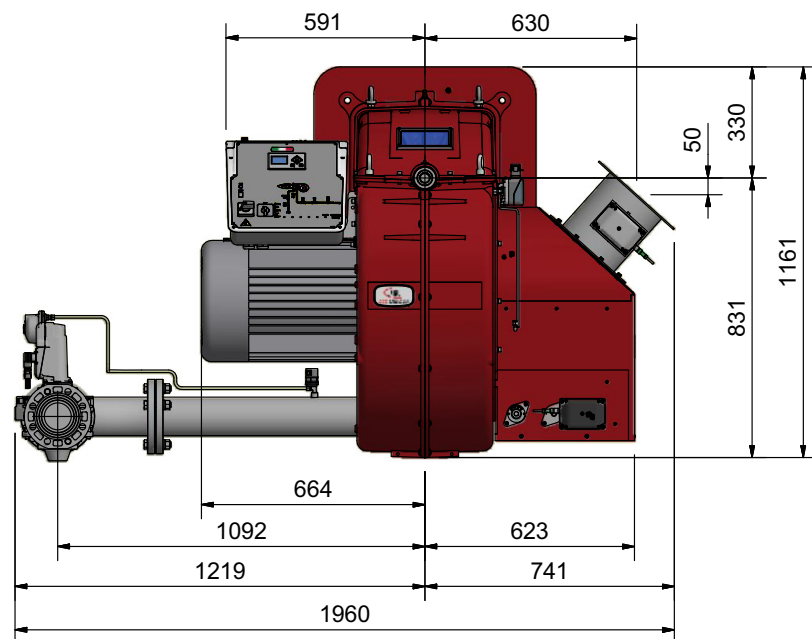
BURNER FLANGE



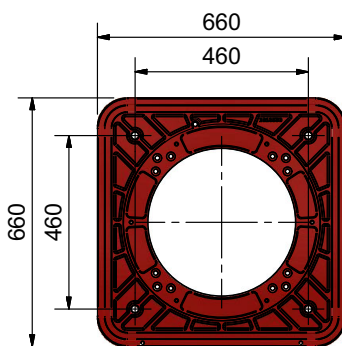
FGR FLANGE



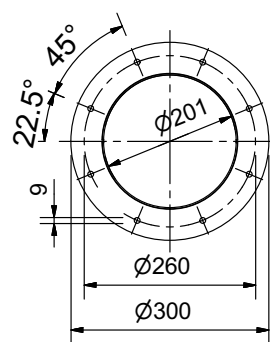
Overall dimensions (mm) - RX1030-FGR



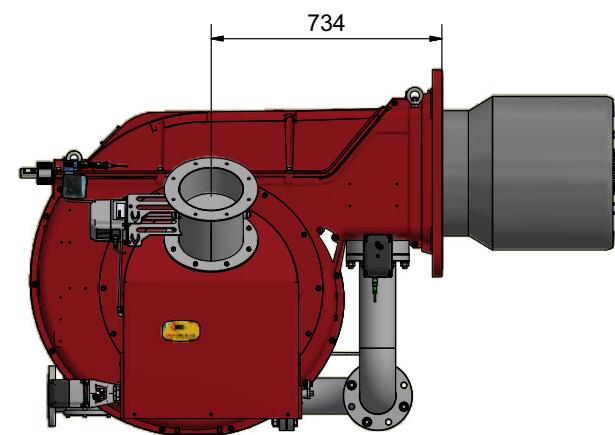
**BOILER RECOMMENDED
DRILLING TEMPLATE**



BURNER FLANGE



FGR FLANGE



How to read the burner “Performance curve”

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

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

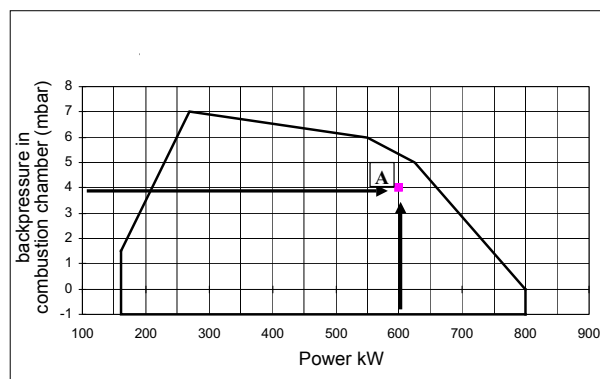
Example:

Furnace input: 600kW

Backpressure: 4 mbar

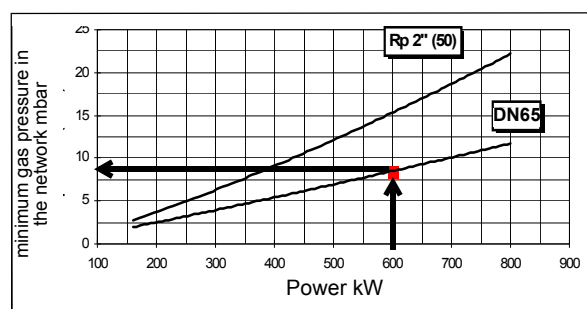
In the “Performance curve” diagram, draw a vertical line matching the furnace input value and an horizontal line matching the backpressure value. The burner is suitable if the intersection point A is inside the performance curve.

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



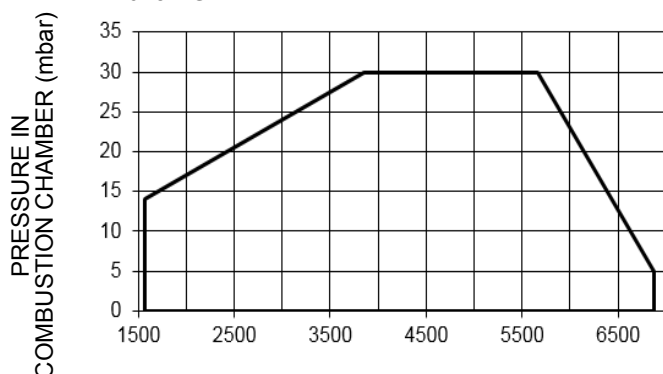
Checking the proper gas train size

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.

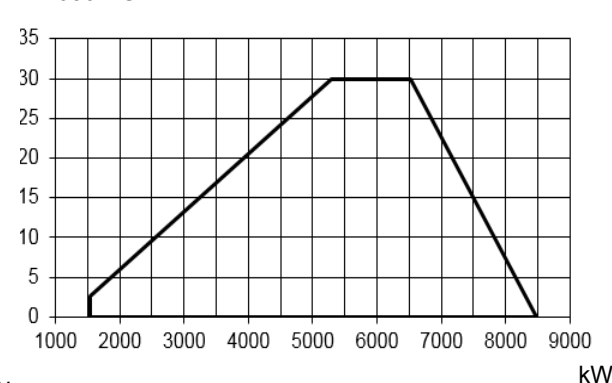


Performance Curves

RX1025-FGR



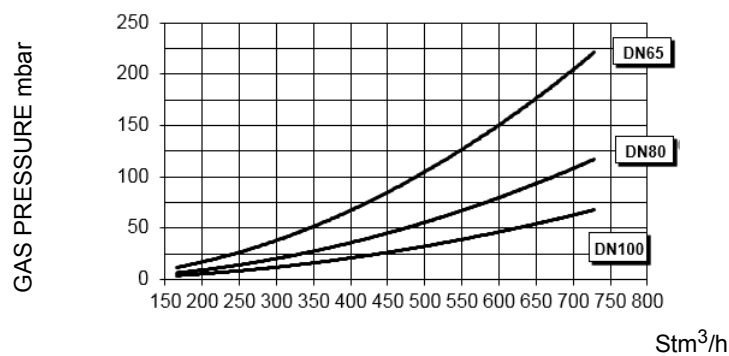
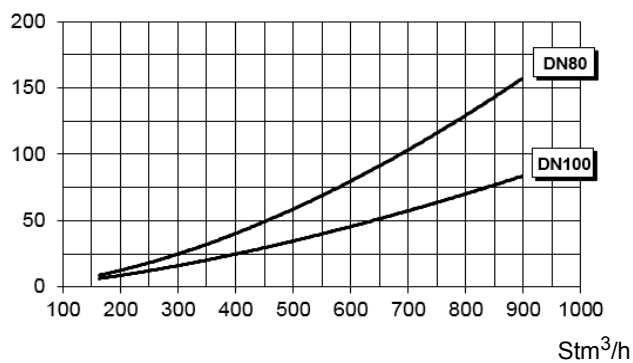
RX1030-FGR



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

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

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

Pressure in the Network / gas flow rate curves (natural gas)**RX1025-FGR M-..****RX1030-FGR M-..**

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

Combustion head gas pressure curves

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

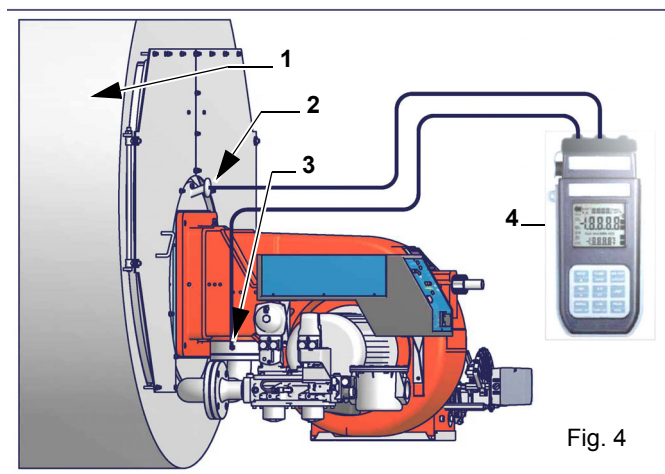


Fig. 4

Note: the figure is indicative only.

Key

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



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

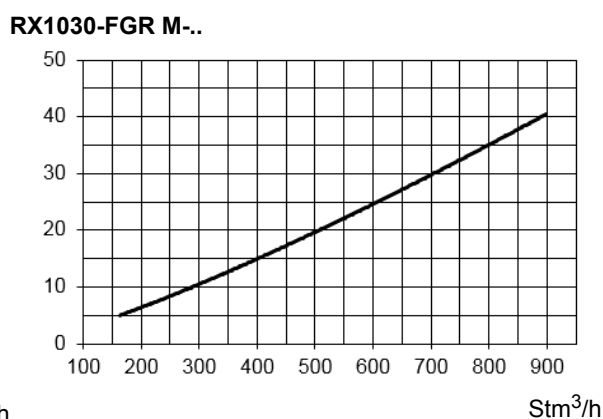
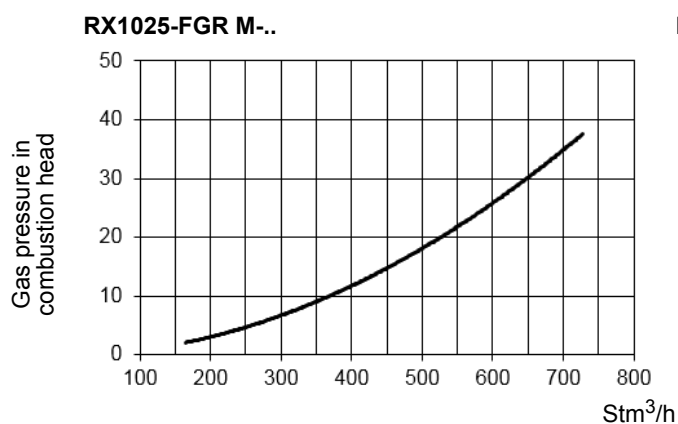
Measuring gas pressure in the combustion head

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

Pressure - rate in combustion head curves (natural gas)



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



PART II: INSTALLATION

MOUNTING AND CONNECTING THE BURNER

Transport and storage



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



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

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

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

Packing

The burners are despatched in wooden crates whose dimensions are:

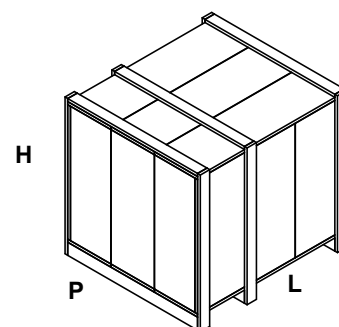
- 2234 mm x 1650 mm x 1250 mm (L x P x H)

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

The following are placed in each packing case:

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

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



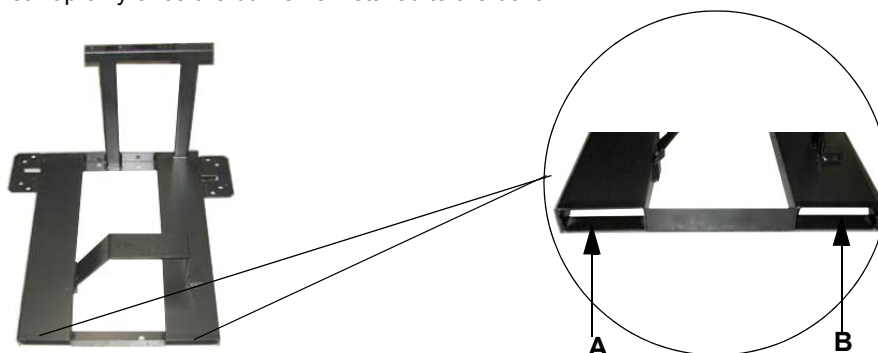
Handling the burner



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

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

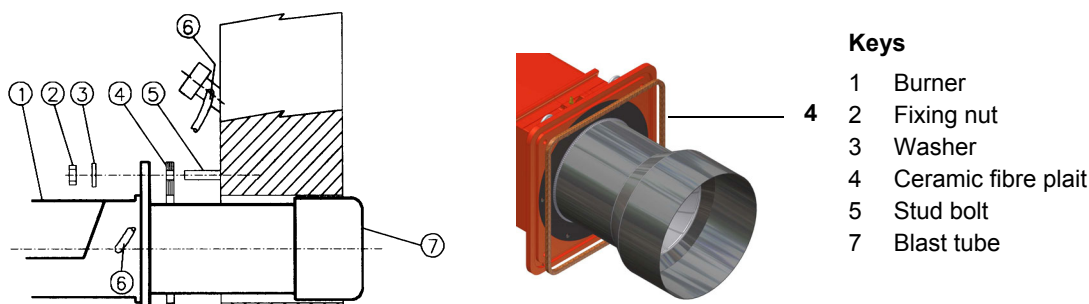
The burner is mounted on a stirrup provided for handling the burner by means of a fork lift truck: the forks must be inserted into the A and B ways. Remove the stirrup only once the burner is installed to the boiler.



Fitting the burner to the boiler

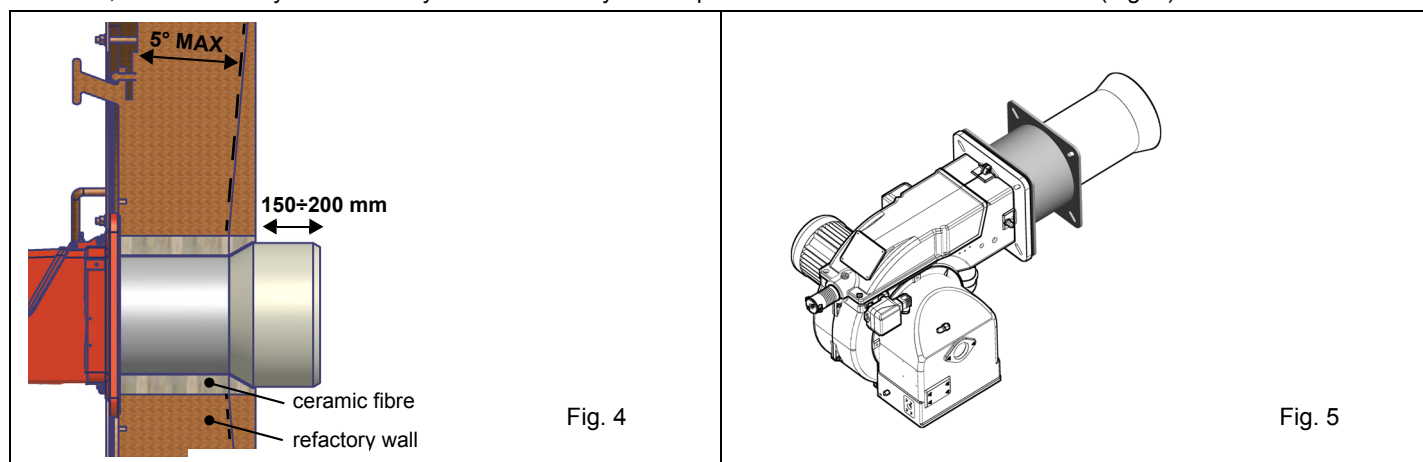
To perform the installation, proceed as follows:

- 1 drill the furnace plate as described in paragraph ("Overall dimensions");
- 2 place the burner towards the furnace plate: lift and move the burner by means of its eyebolts placed on the top side (see "Lifting and moving the burner");
- 3 screw the stud bolts (5) in the plate holes, according to the burner's drilling plate described on paragraph "Overall dimensions";
- 4 place the ceramic fibre rope on the burner flange (if necessary, use a spray adhesive on the flange).
- 5 install the burner into the boiler;
- 6 fix the burner to the stud bolts, by means of the fixing nuts, according to the picture below.
- 7 After fitting the burner to the boiler, ensure that the gap between the blast tube and the refractory lining is sealed with appropriate insulating material (ceramic fibre cord or refractory cement).
- 8 ;



Matching the burner to the boiler (low NOx burners)

The burners described in this manual have been tested with combustion chambers that comply with EN676 regulation and whose dimensions are described in the diagram. In case the burner must be coupled with boilers with a combustion chamber smaller in diameter or shorter than those described in the diagram, please contact the supplier, to verify that a correct matching is possible, with respect of the application involved. To correctly match the burner to the boiler verify the type of the blast tube. Verify the necessary input and the pressure in combustion chamber are included in the burner performance curve; otherwise the choice of the burner must be revised consulting the burner manufacturer. To choose the blast tube length consider the following rule, even if it differs from the instructions of the boiler manufacturer: Cast-iron boilers, three pass flue boilers (with the first pass in the rear part): the blast tube must protrude about 150÷200 mm into the combustion chamber (Fig. 4). The length of the blast tubes does not always allow this requirement to be met, and thus it may be necessary to use a suitably-sized spacer to move the burner backwards (Fig. 5).

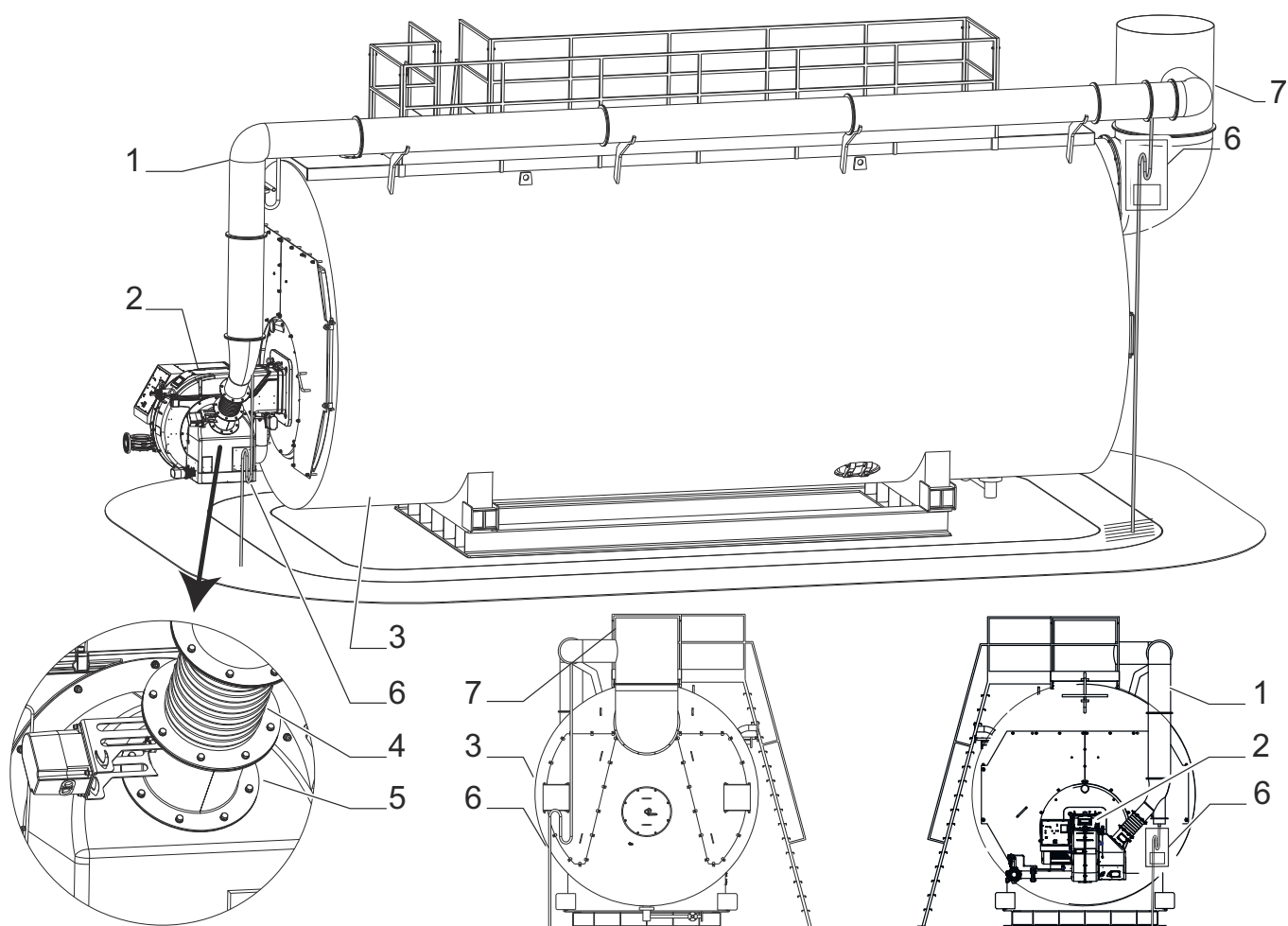


WARNING! Carefully seal the free space between blast tube and the refractory lining with ceramic fibre rope or other suitable means.

Sizing of the FGR pipe (FGR burners only)



ATTENTION! Performance curve is obtained in a plant designed according to the following guidelines, size the FGR pipe as per the example below.



- | | | |
|-------|---|----------------------------------|
| Keys: | 1 Stainless steel FGR pipe, insulated | welded to the FGR duct) |
| | 2 Burner | 5 FGR butterfly valve |
| | 3 Boiler | 6 Siphon and condensate drainage |
| | 4 Bellow unit (a counter-flange supplied loose is to be | 7 Stack |

The temperature probe for flue gas temperature compensation must be installed on the chimney.

The internal diameter of the FGR conduit must be dimensioned considering a maximum speed of 10 m / s. Assume a volumetric flow rate of recirculating fluegases for the dimensioning equal to 20% of the comburent air flow.



ATTENTION! Pipe elbows increase pressure losses, so limit their use as much as possible.

Example:

Let's say 4.816 kW is the maximum burner output:

required combustion air flow will then be 5.800 Stm³/h = 1,61 Stm³/s in standard conditions (15 °C; 1.013 mbar).

Flue gas temperature: 150 °C or 150 + 273,15 = 423,15 K

Ambient temperature: 15 °C or 15 + 273,15 = 288,15 K

FGR flow for dimensioning: 1,61 x 20% = 0,322 Stm³ / s

FGR flow corrected for flue gas temperature: 0,322 x 423,15 / 288,15 = 0,473 m³ / s @ (t = 150 °C)

FGR pipe section: 0,473 m³/s / 10 m/s = 0,0473 m²

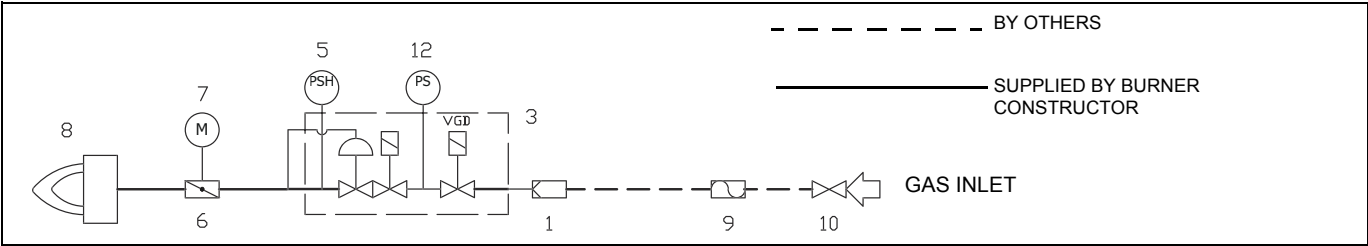
So in this example, pipe internal diameter must be larger than 245 mm to ensure proper FGR flow.

* FGR = Flue gas recirculation system

GAS TRAIN CONNECTIONS

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

Gas train with valves group VGD with built-in gas pressure governor + gas leakage pressure switch (PGMIN/LT)



Key

| | | | |
|---|---|----|--|
| 1 | Filter | 8 | Main burner |
| 3 | Safety valve with built in gas governor | 9 | Bellows unit(*optional) |
| 5 | Pressure switch - PGMAX(*optional) | 10 | Manual valve(*optional) |
| 6 | Butterfly valve | 12 | Pressure switch - PGMIN/LT (proving system and minimum gas pressure) |

GAS TRAIN CONNECTIONS

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

Procedure to install the double gas valve unit:

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



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



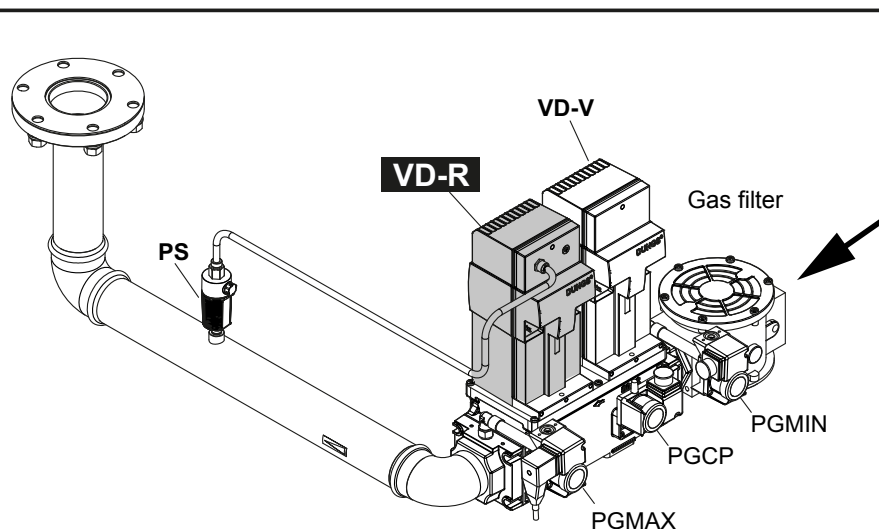
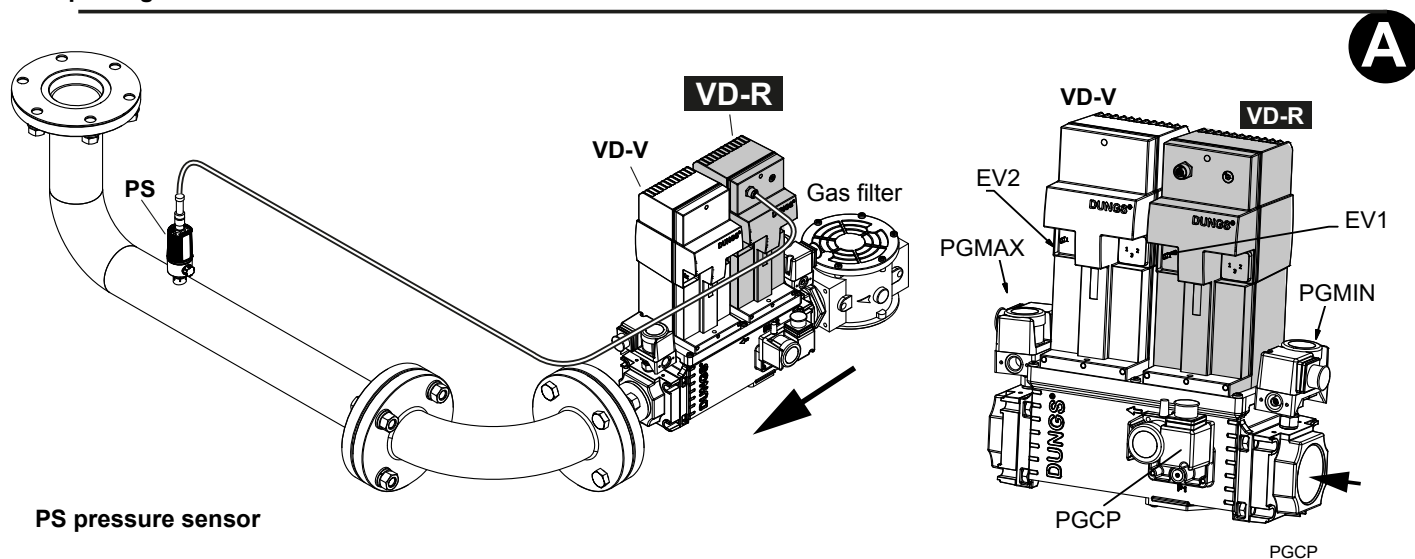
ATTENTION: it is recommended to mount filter and gas valves to avoid that extraneous material drops inside the valves, during maintenance and cleaning operation of the filters (both the filters outside the valves group and the ones built-in the gas valves).



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

MultiBloc MBE

Example of gas train MBE



To mount the gas train, proceed as follows:

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

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



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

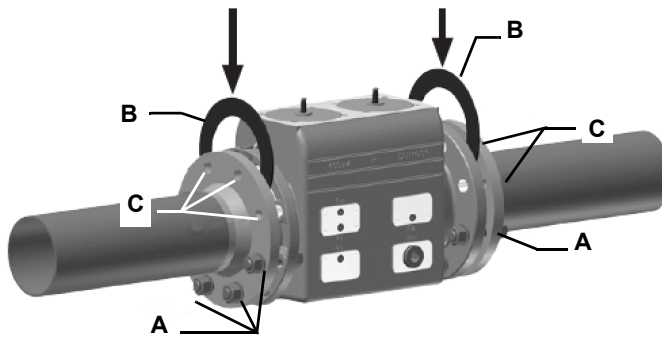


ATTENTION: it is recommended to mount filter and gas valves to avoid that extraneous material drops inside the valves, during maintenance and cleaning operation of the filters (both the filters outside the valves group and the ones built-in the gas valves).

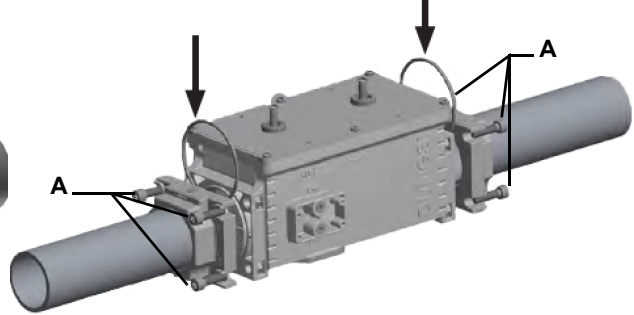


WARNING: Slowly open the fuel cock to avoid breaking the pressure regulator.

Threaded train with MultiBloc MBE - Mounting

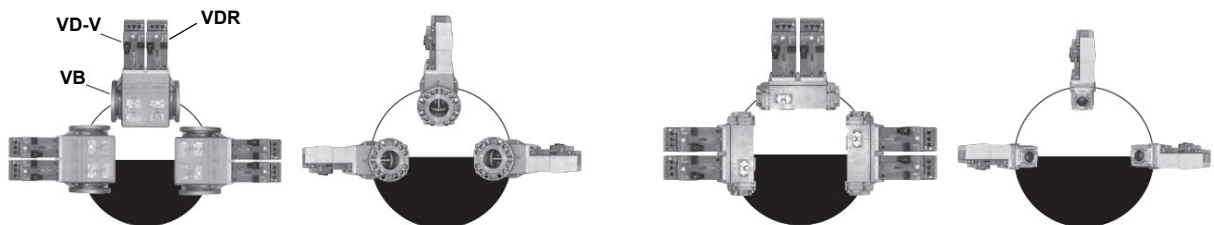


1. Insert studs A.
 2. Insert seals B.
 3. Insert studs C.
 4. Tighten studs in accordance with section 8.
- Ensure correct position of the seal!**
5. Perform leak and functional tests after mounting.
 6. Screws (4xM5x20) for VD assembly are supplied.

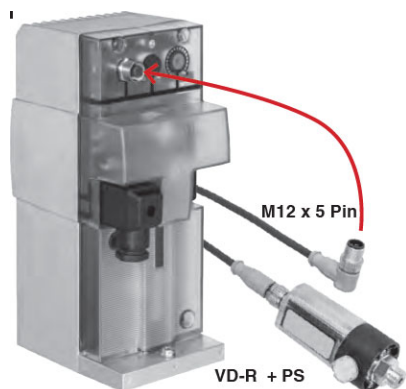
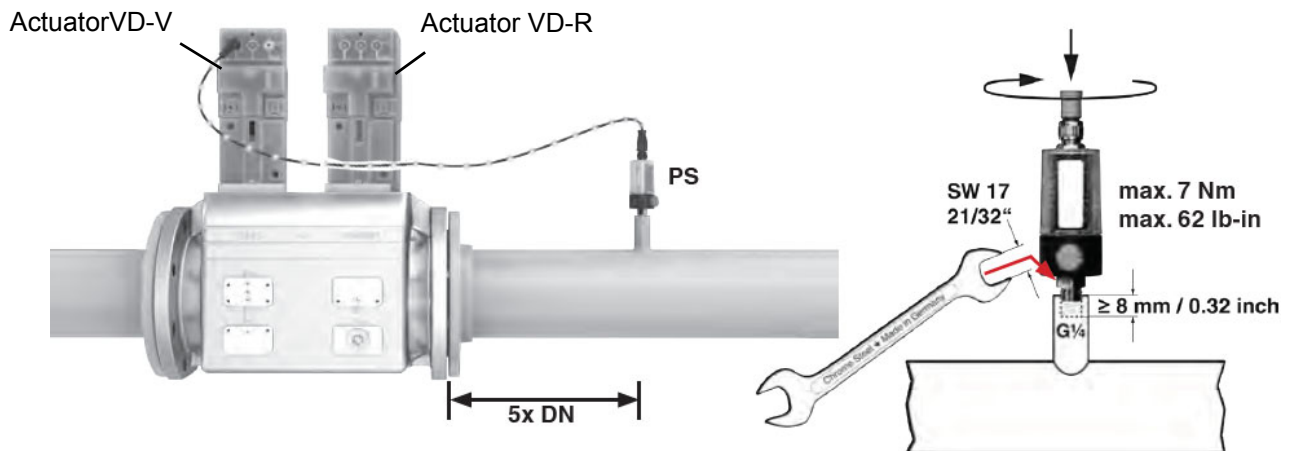


1. Mount flange into pipe systems. Use appropriate sealing agent.
2. Insert VB together with supplied O-rings.
Check current position of O-rings.
3. Tighten supplied screws (8xM8x30) in accordance with section 8.
4. Screws (4xM5x25) for VD assembly are supplied.
5. After installation, perform leakage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

Mounting position MBE / VB / VD



Mounting VD-R & PS...



1. Gas pressure regulation is possible with VD-R and PS pressure sensor only.
WARNING! For US/CN installation, the output pressure must be monitored by min. and max. pressure switches set to +/- 20% of the setpoint.
 2. Mounting on pipe. Sensor position: 5x DN according to MBE. Pipe fitting with female thread size 1/4, mount sensor with seal, observe torque.
 3. The pressure sensor includes a vent limiter according to UL 353 and ANSI Z21.18/CSA 6.3. No venting required in locations where vent limiters are accepted by the jurisdiction.
 4. Only PS pressure sensors specified by DUNGS are authorised to be connected to the VD-R's M12 interface.
 5. Only PS cables specified by DUNGS are authorised to be used to connect the PS
- The actuator **VD-V** does not need any adjustment (funzione ON-OFF)
 - The actuator **VD-R** It must be combined with the **PS** sensor (include regolatore di pressione)
 - The **PS sensor** chosen based on the necessary pressure (there are 3 models)

Siemens VGD20.. e VGD40..

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

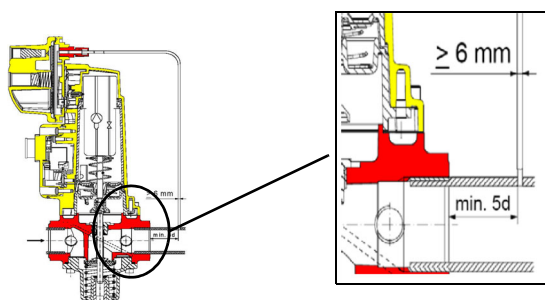
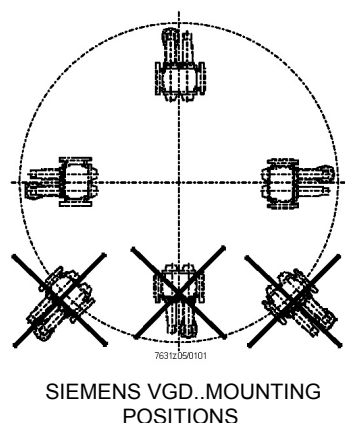
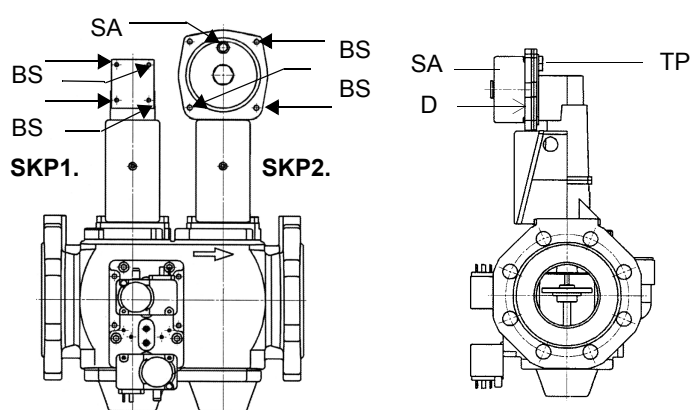
- Connect the reference gas pipe (**TP** in figure; 8mm-external size pipe supplied loose), to the gas pressure nipples placed on the gas pipe, downstream the gas valves: gas pressure must be measured at a distance that must be at least 5 times the pipe size.
- Leave the blowhole free (**SA** in figure).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



Caution: the SKP2 diaphragm **D** must be vertical (see Fig. 6).



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

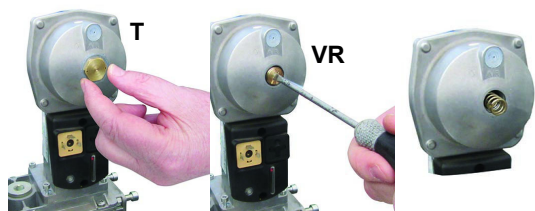


Siemens VGD valves with SKP actuator:

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

Fig. 6

Gas valveversion with SKP2 (built-in pressure stabilizer)



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

- Remove the cap (T)
 - Unscrew the adjusting screw (VR) with a screwdriver
 - Replace the spring
- Stick the adhesive label for spring identification on the type plate.

| | | | |
|--------------------------|---------|----------|-----------|
| Performance range (mbar) | 0 - 22 | 15 - 120 | 100 - 250 |
| Spring colour | neutral | yellow | red |

Gas Filter (if provided)

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



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

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

Integrated proving system burners equipped with BT3x

When the burner is switched off, the BT3x device proceeds with an evacuation test, opens the EV1 valve (burner side) and makes sure to bring the test volume (space between EV2 and EV1) to atmospheric pressure.

The BT3xx device uses only one pressure switch (PGMIN/LT) mounted between the EV1-EV2 valves which acts as a leak test in the "Gas valve seal" test phase and a minimum pressure pressure switch during "Start and burner operation" .

The BT3xx equipment performs a tight check of the gas valves according to the pressure felt by the pressure switch installed between the valves (PGMIN / LT).

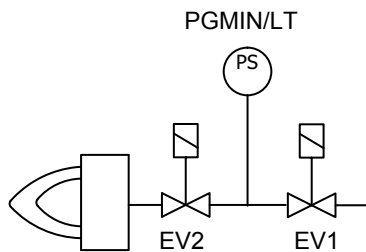
Case A: the pressure between the valves EV1 and EV2 is equal to zero.

- The BT3xx device opens the EV1 valve for a few seconds and fills the chamber between EV1 and EV2.
- The PGMIN / LT pressure switch senses the pressure (which remains present and stable) and closes the contact giving consent to continue the cycle to the equipment.

Case B: presence of pressure between the valves EV1 and EV2.

- In this case the BT3xx device opens the EV2 valve to evacuate the gas between EV1 and EV2.
- In this way the PGMIN / LT pressure switch permanently feels zero pressure and opens the contact.
- The cycle continues by opening the valve EV1 to pressurize the section between the valves EV1 and EV2.
- The PGMIN / LT pressure switch senses the increase in pressure (which remains present and stable), closes the contact giving consent to the equipment to continue the starting cycle.

When the burner is switched off due to the intervention of the thermostat / boiler pressure switch, the BT3xx keeps the EV2 gas valve open to allow the pressure between the gas valves to be released and the PGMIN / LT pressure switch contact to rest and ready to restart the burner.



1.0 ELECTRICAL CONNECTIONS



WARNING! 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.

WARNING! 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.

ATTENTION: Connecting electrical supply wires to the burner terminal block MA, be sure that the ground wire is longer than phase and neutral ones.

To execute the electrical connections, proceed as follows:

- 1 remove the cover from the electrical board, unscrewing the fixing screws;
- 2 execute the electrical connections to the supply terminal board as shown in the attached wiring diagrams;
- 3 check the direction of the fan motor (see next paragraph);
- 4 refit the panel cover.



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

1.1 Rotation of electric motor

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



CAUTION: check the motor thermal cut-out adjustment

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

PART III: OPERATION

LIMITATIONS OF USE

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

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

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

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

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

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

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

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



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

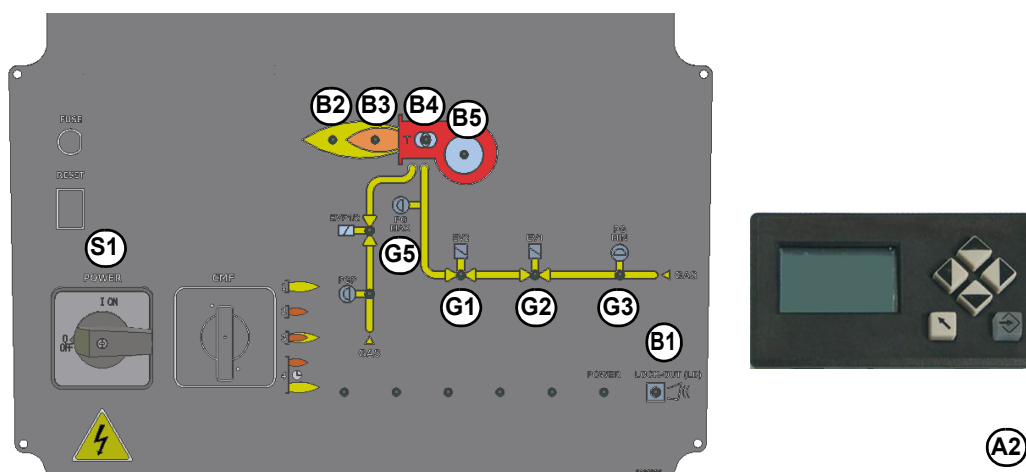
DANGER: *During commissioning operations, do not let the burner operate with insufficient air flow (danger of formation of carbon monoxide); if this should happen, make the gas decrease slowly until the normal combustion values are achieved.*

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



DANGER! *Be careful NOT to invert the servocontrol cables connections.*

Fig. 7 - Burner front panel

**Keys**

- B1 Lock-out LED
- B2 Hi-flame operation LED
- B3 Lo-flame operation LED
- B4 Ignition transformer operation LED
- B5 Fan motor overload tripped LED
- G1 "EV2 opening" LED
- G2 "EV1 opening" LED
- G3 Gas pressure switch signal LED
- G5 Gas pressure switch signal LED
- S1 Main switch
- A2 BMS display

Gas operation

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

AIR FLOW AND FUEL ADJUSTMENT



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

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

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

(First) Start-up preliminary operations - gas supply

Recommended actions to be carried out in sequence:

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



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



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

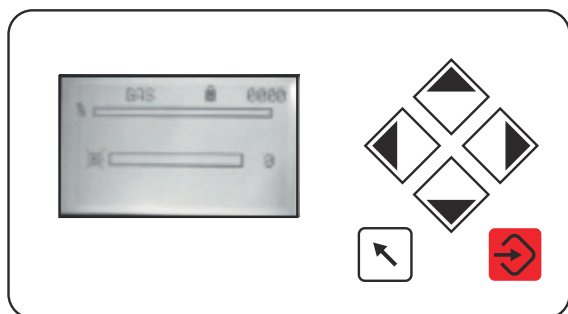
Adjustments - brief description

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

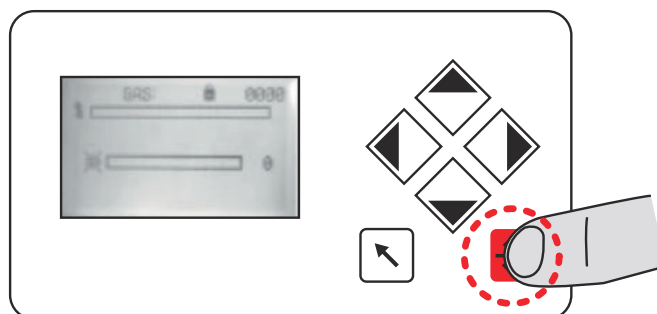
- Check that the combustion parameters are in the suggested limits.
- Check the flow rate measuring it on the counter or, if it was not possible, verifying the combustion head pressure by means of a differential pressure gauge, as described on par. "Measuring the gas pressure in the combustion head".
- Then, adjust the combustion values by setting the "gas/air" ratio" curvepoints (see the Lamtec.. related manual).
- Set, now, the low flame output, in order to avoid the low flame output increasing too much or that the flues temperature gets too low to cause condensation in the chimney.

SETTING THE BURNER CURVE

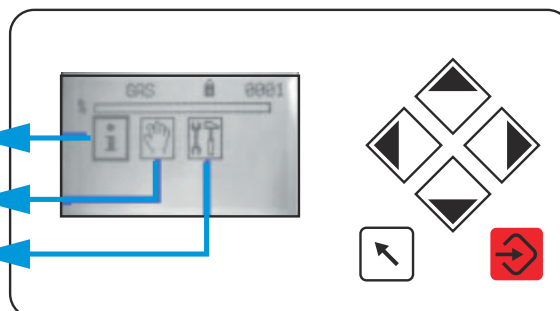
Initial home page: keep thermostat open. Burner remain in stand-by



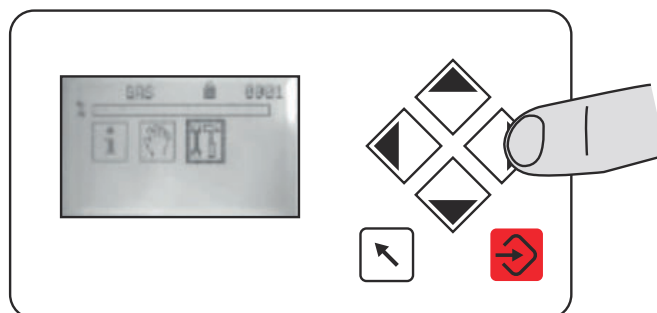
Unlock the controller: press ENTER



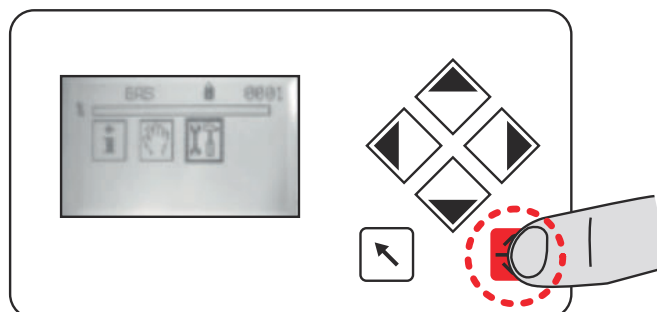
Info
Manual
Setting



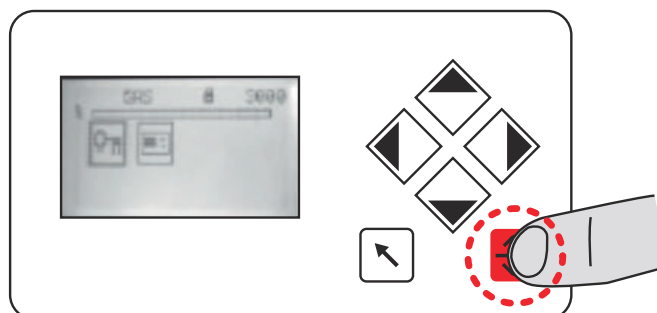
Press the right key to position on the Settings icon (indicated with wrench and hammer)



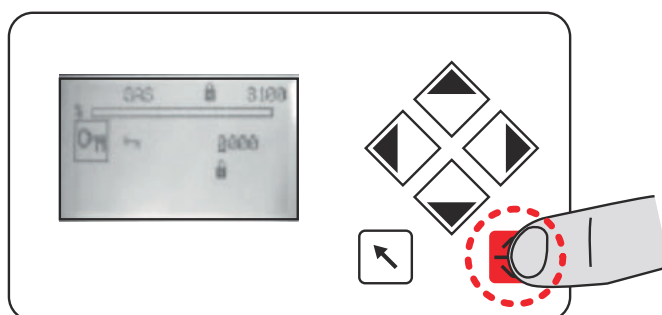
Press ENTER



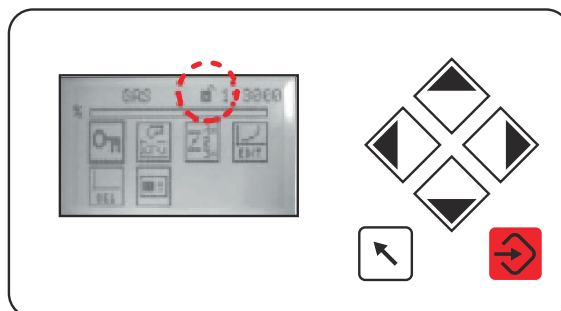
Press ENTER again after selecting 'the key icon'.



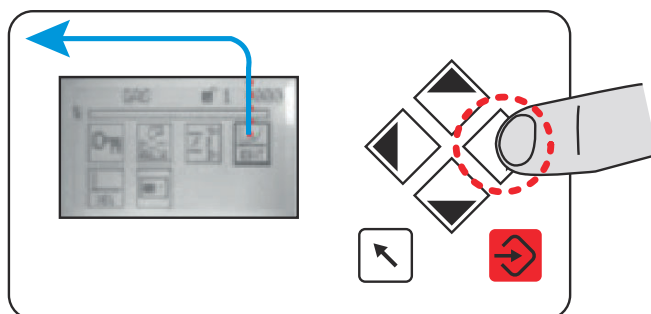
Keep the password "0000" and confirm with ENTER.



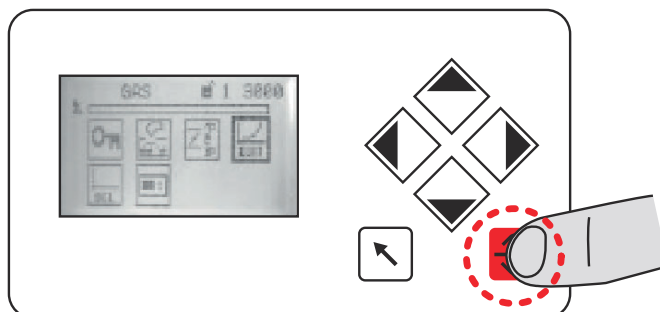
New page, level 1 unlocked



Right click to EDIT.



Press ENTER to enter the "curves page".

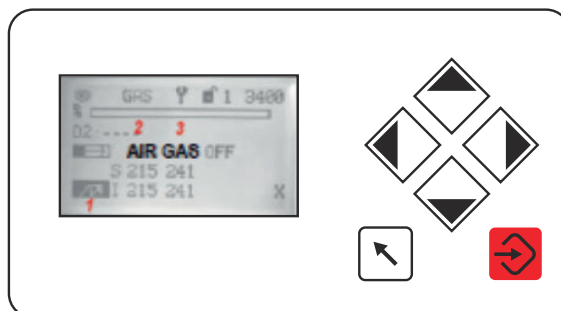


Air & gas position at burner's ignition

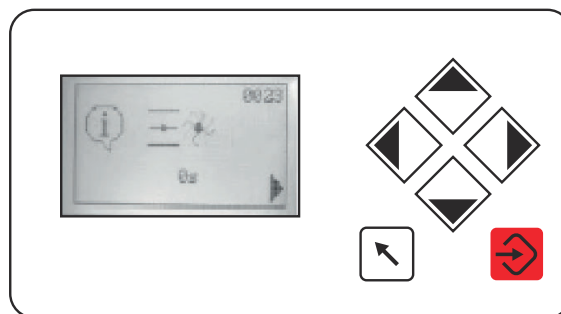
- 1 ignition position
- 2 air servomotor position (digit)
- 1 gas servomotor position (digit)



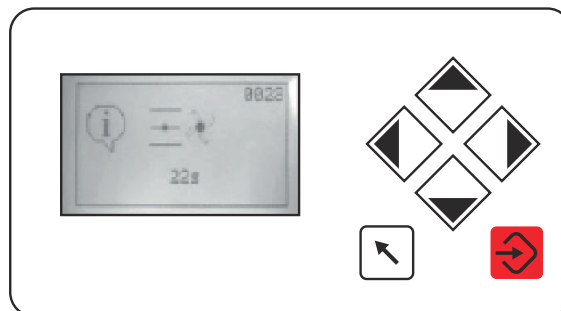
VALUES VARY FROM BURNER TO BURNER



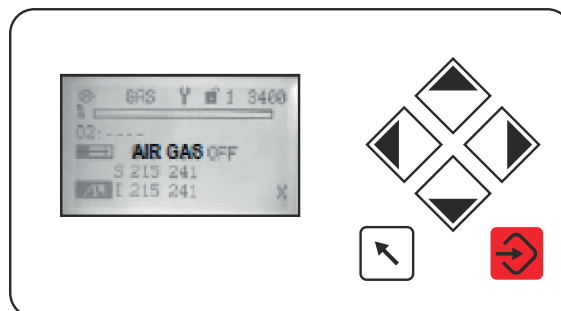
Close the thermostat the burner starts.



Pre-purge.

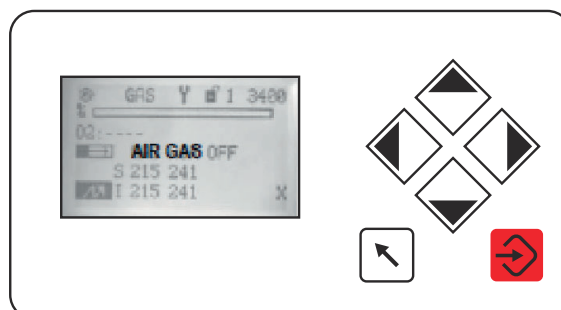


The controller moves the servomotors to the ignition position and excites the ignition transformer.



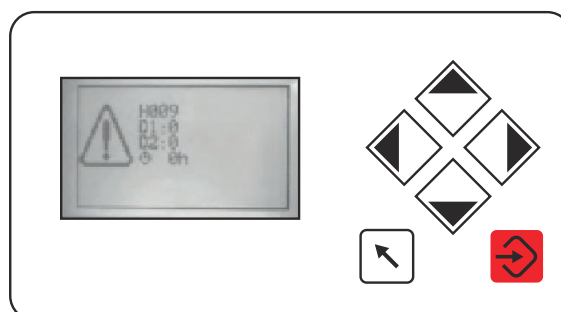
If the burner starts with those settings, this page will appear:

If the burner does not start with those settings the chapter "SETTING THE IGNITION POINT WITH BURNER IN STAND-BY"

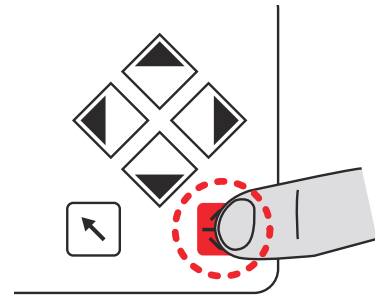


SETTING THE IGNITION POINT WITH BURNER IN STAND BY

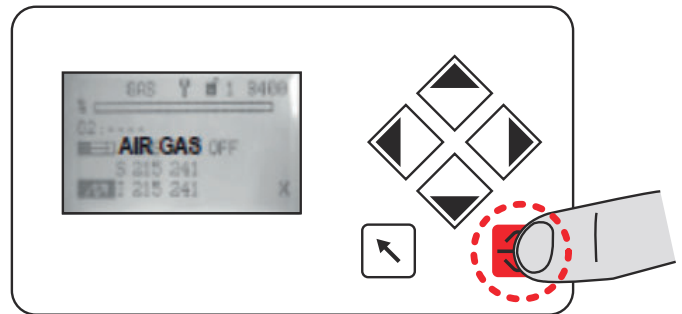
In case of troubles, the burner will go on lock?out mode and the reason will be indicated on the display.



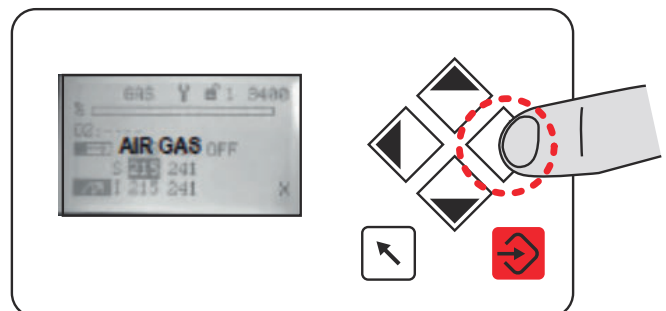
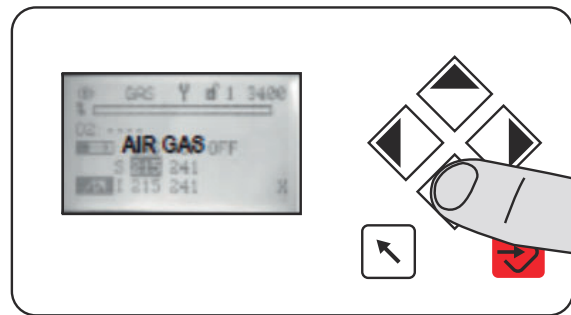
Check the lock code & press ENTER to unlock.



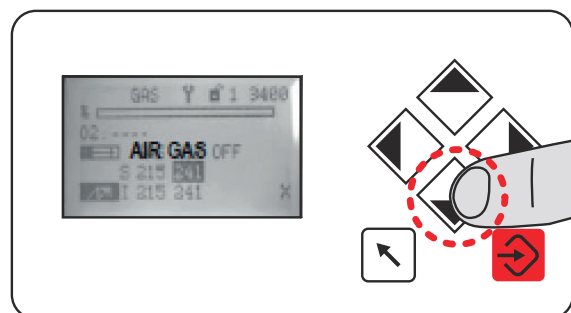
Press ENTER to modify the positions (burner in stand-by)



Click up to increase the gas opening position or down to decrease it.

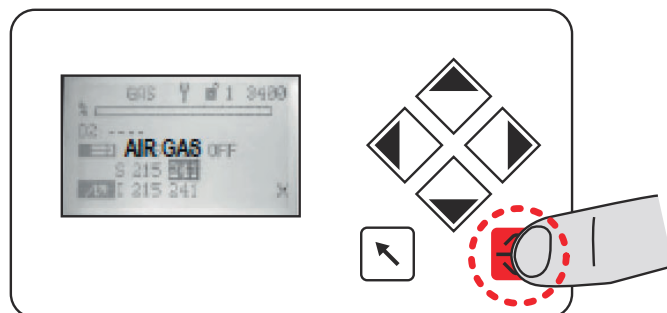


Clickup to increase the air opening position or down to decrease it.



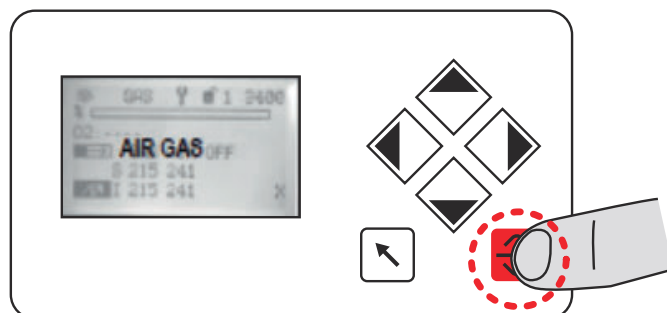
Press ENTER to save the new settings.

CLOSE THE THERMOSTAT LINE

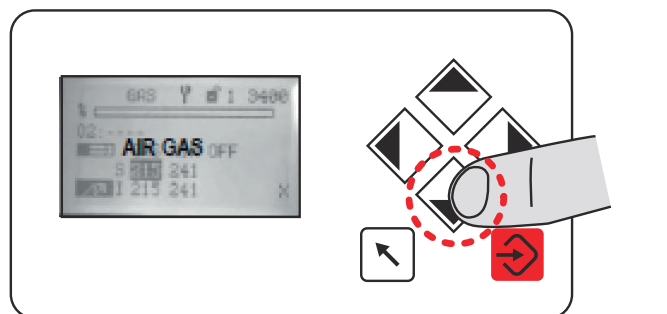


BURNER OPERATING: SETTING PARAMETERS

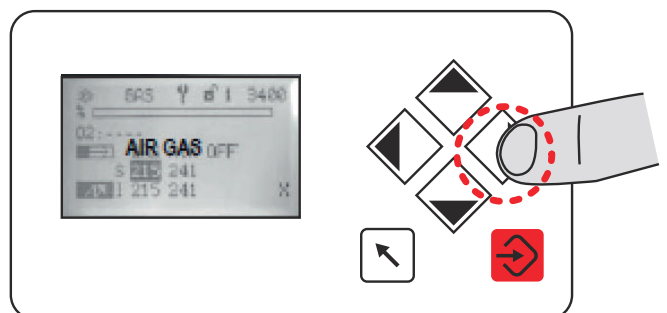
Check the combustion quality (with a flue gas analyzer). To modify the combustion valves and adjust servomotors position (gas and air), press ENTER.



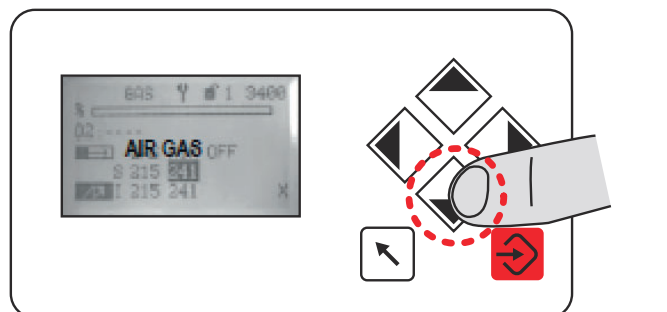
Click up to increase the gas opening position or down to decrease it.



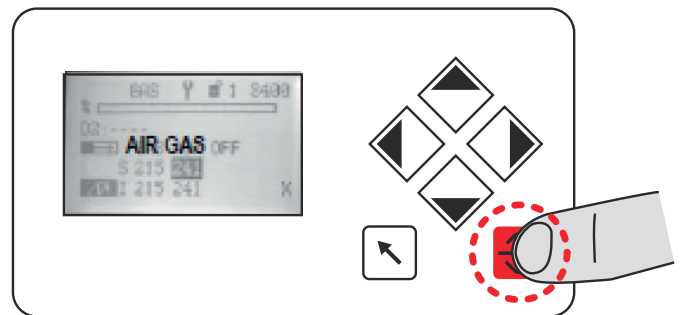
Right click to move from gas servomotor adjustment to air servomotor adjustment.



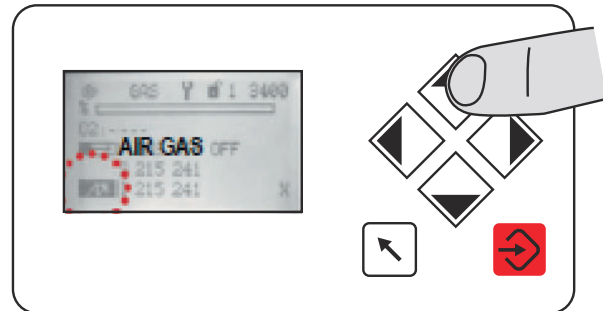
Click up to increase the air opening position or down to decrease it.



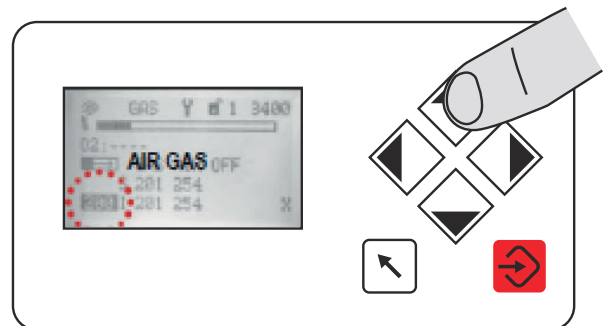
Press ENTER to save the new settings.



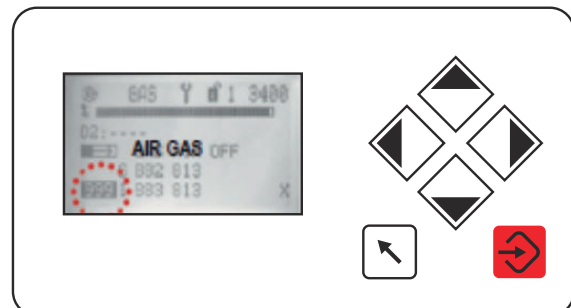
Click up to quit the ignition position.



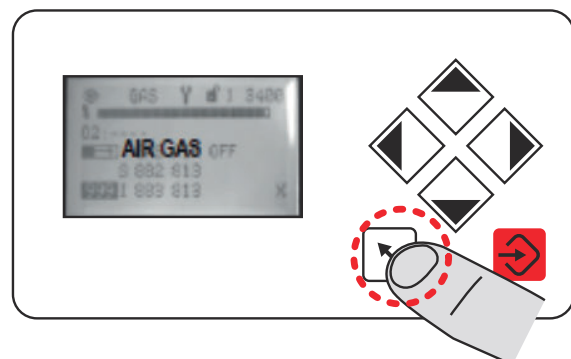
Check the combustion quality in all positions (from minimum to maximum output) and adjust the gas and air setting if necessary (as indicated on chapter "SETTING THE IGNITION POINT WITH BURNER IN STAND?BY").



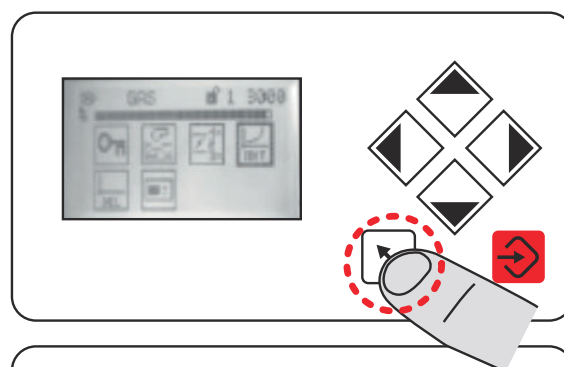
Set the maximum load position 999, according to the maximum output required by the boiler. If necessary, set the inlet gas pressure (at the exit of the gas pressure reducer). Check the output combustible and the quality of combustion in all positions and adjust gas and air if necessary (see chapter "SETTING THE IGNITION POINT WITH BURNER IN STAND?BY").



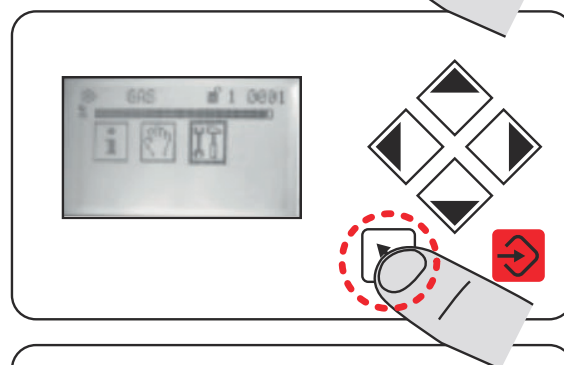
Press EXIT to quit the combustion settings.



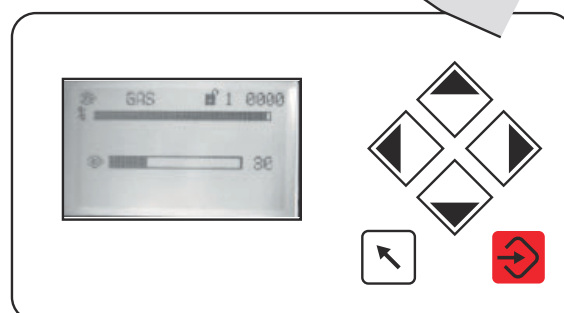
Press EXIT again to quit main menu.



Press EXIT again to quit settings.



The burner runs now in automatic mode.



In case of troubles, the burner will go on lock-out mode and the reason will be indicated on the display.

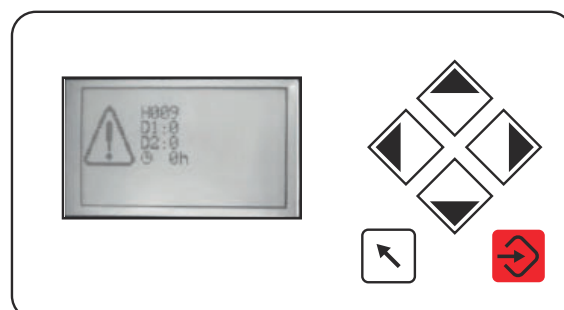
Example:

H009 – lock-out code

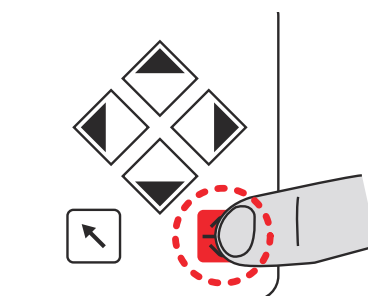
D1 - diagnostic 1

D2 - diagnostic 2

xxh - operation hours



Check the lock code & press ENTER to unlock.



If the ignition setting is not good enough (e.g. too much air), the burner cannot start. In that case adjust again the ignition point see chapter “SETTING THE BURNER CURVE”.

Otherwise make sure that no other reason may cause the ignition failure.



CAUTION! The fuel air calibration procedure is the same for both gas and diesel. In the display will be indicated Gas or Diesel.

MultiBloc MBE

Regulation VD-R with PS

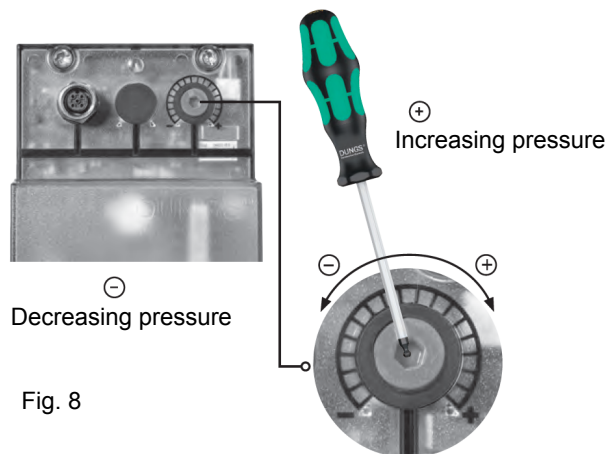


Fig. 8



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



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



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

ATTENTION: To set the outlet pressure of the VD-R regulator, act on the adjustment ring nut (Fig. 10). The position of the indicator in the dial indicates the value of the outlet pressure calculated as a percentage of the full scale of the PS sensor (Fig. 11).

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

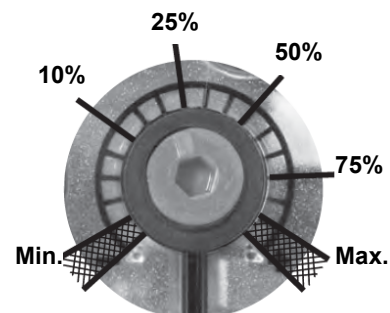


Fig. 9

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

Pressure taps MultiBloc MBE

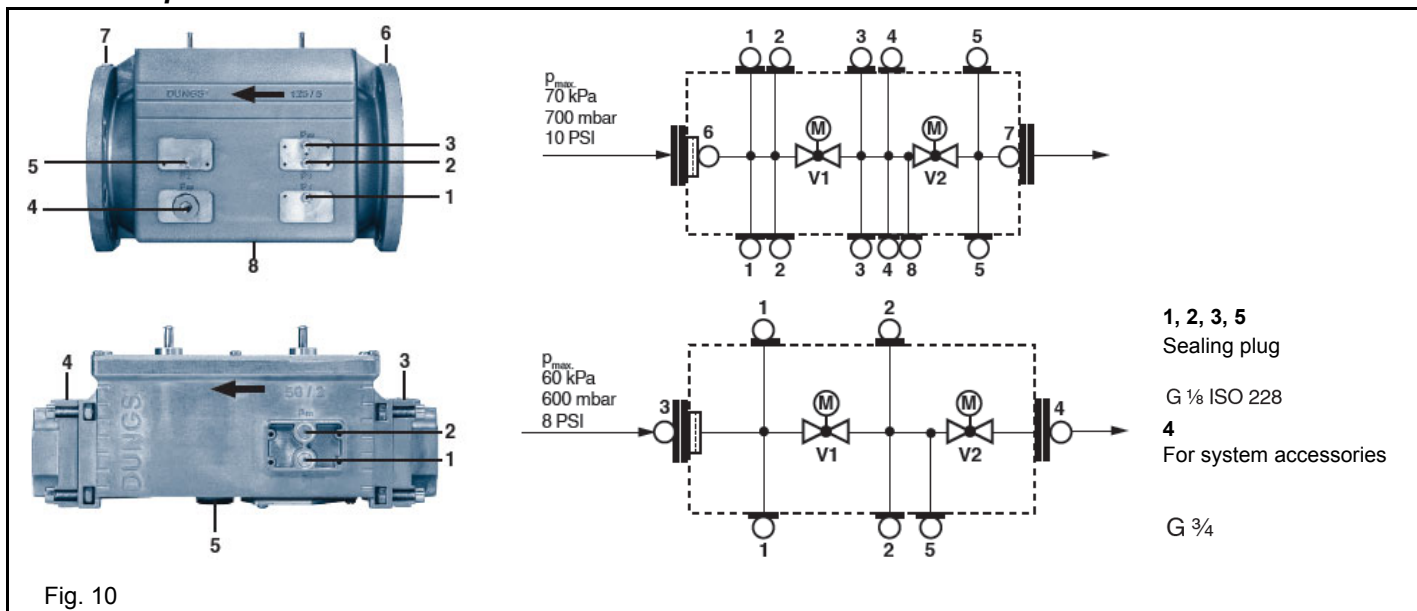
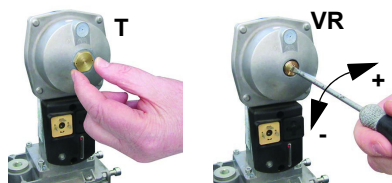


Fig. 10

Gas valveversion with SKP2 (built-in pressure stabilizer)

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



Calibration air and gas pressure switches

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

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



Calibration of low gas pressure switch

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

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

Calibration the maximum gas pressure switch (when provided)

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

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

Calibration of air pressure switch

To calibrate the air pressure switch, proceed as follows:

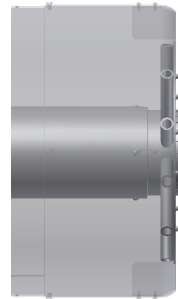
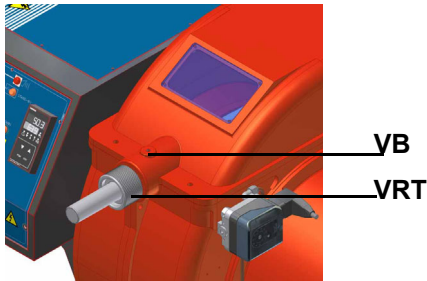
- Remove the transparent plastic cap.
- Once air and fuel setting have been accomplished, startup the burner.
- During the pre-purge phase of the operation, turn slowly the adjusting ring nut **VR** in the clockwise direction (to increase the adjusting pressure) until the burner lockout, then read the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

Adjusting the combustion head

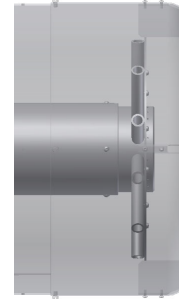


Attention! if it is necessary to change the head position, repeat the air and fuel adjustments described above.

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

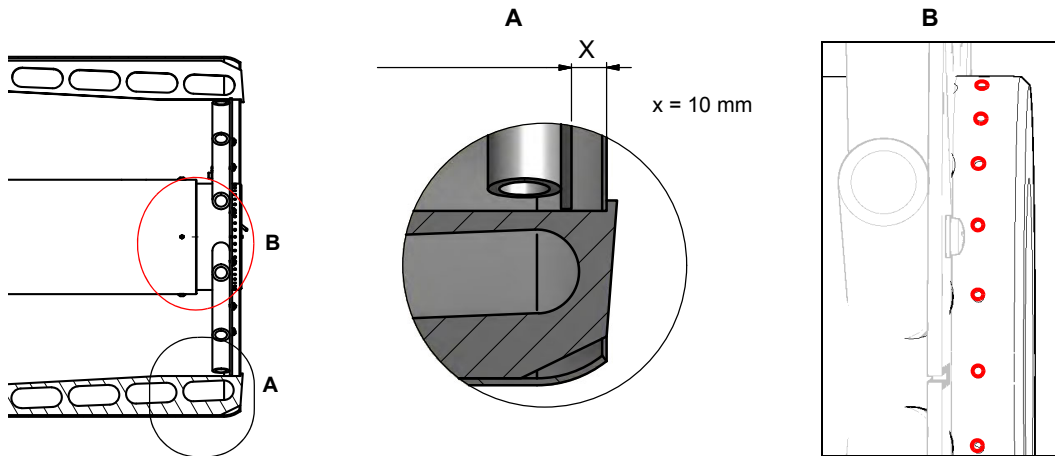


"all-ahead" position



"all-backwards" head position

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



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

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

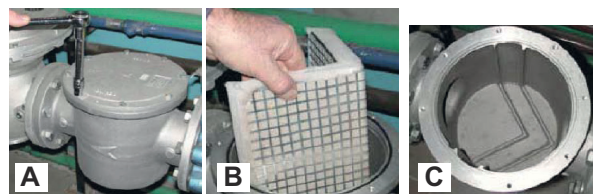


ATTENTION when servicing, if it was necessary to disassemble the gas train parts, remember to execute the gas proving test, once the gas train is reassembled, according to the procedure imposed by the law in force.

Gas filter maintenance

To clean or remove the filter, proceed as follows:

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

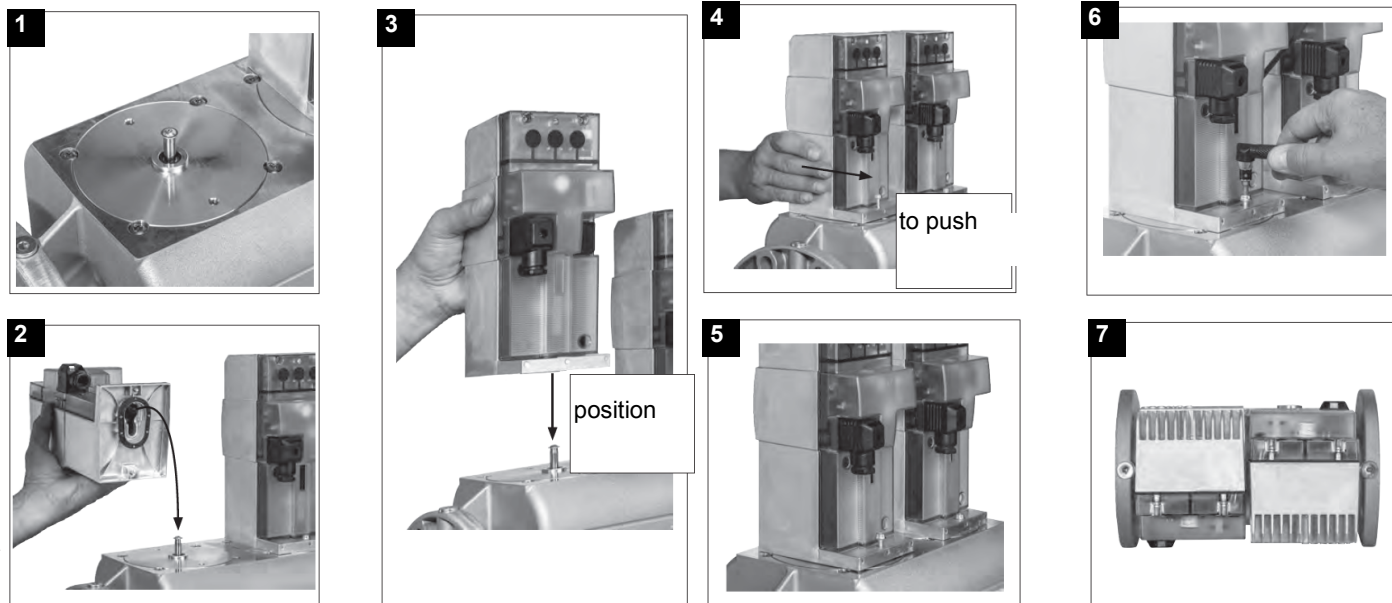


WARNING: Before opening the filter, close the manual cutoff valve downstream the filter and bleed the gas; check that inside the filter there is no pressurised gas.



DANGER! Do not invert the servomotor cables.

MultiBloc MBEMultiBloc VD Mounting



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

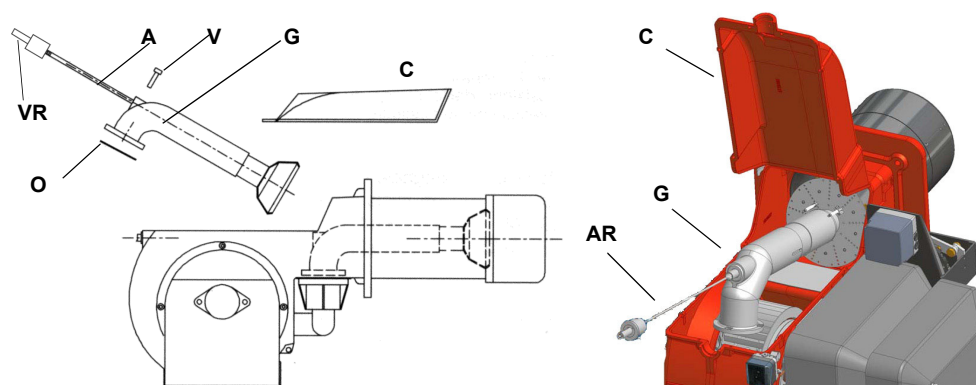
Removing the combustion head



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

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

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



| Key | |
|-----|----------------------|
| VRT | Head adjusting screw |
| AR | Threaded rod |
| V | Fixing screw |
| G | Gas manifold |
| OR | "O" ring |
| C | Cover |

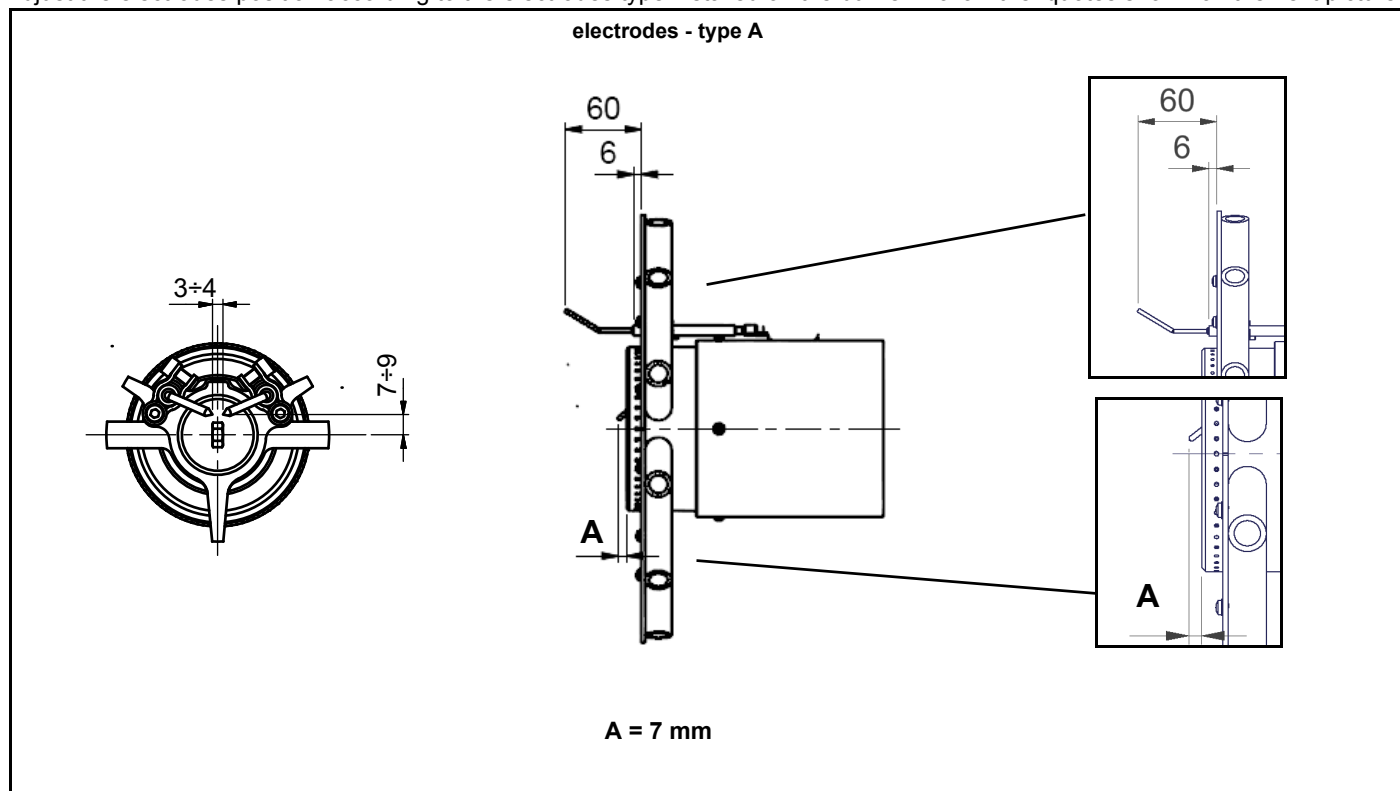
Electrodes Adjustment

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



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

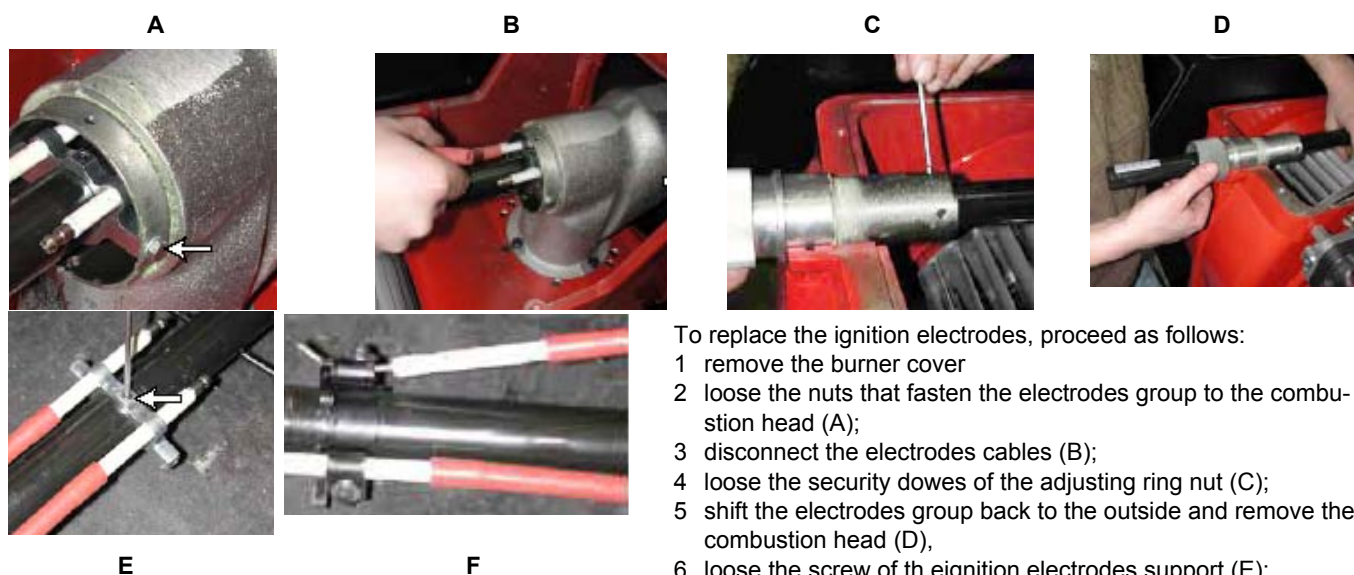
Adjust the electrodes position according to the electrodes type installed on the burner. Follow the quotes shown on the next picture.



Replacing the ignition electrodes



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



To replace the ignition electrodes, proceed as follows:

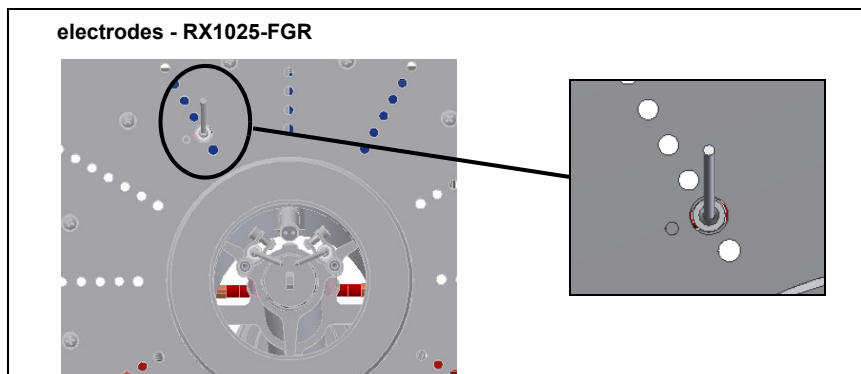
- 1 remove the burner cover
- 2 loose the nuts that fasten the electrodes group to the combustion head (A);
- 3 disconnect the electrodes cables (B);
- 4 loose the security dowes of the adjusting ring nut (C);
- 5 shift the electrodes group back to the outside and remove the combustion head (D),
- 6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

Replacing the detection electrode (natural gas burners)

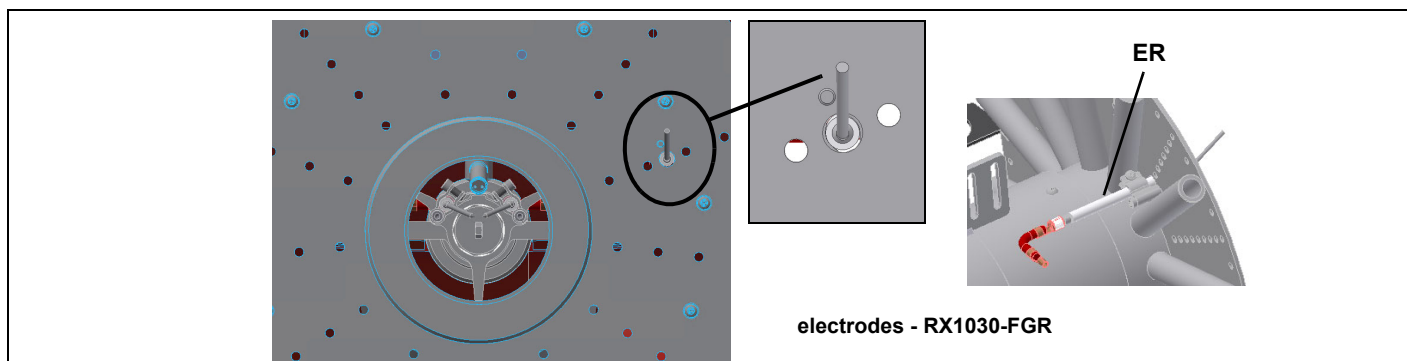
ATTENTION: avoid the electrode to get in touch with metallic parts (blast tube, head, etc.), otherwise the boiler operation would be compromised. Check the electrode position after any intervention on the combustion head.

To replace the detection electrode, proceed as follows:

- 1 remove the combustion head according to the procedure on paragraph "Removing the combustion head";
- 2 by means of an allen key, loose the fixing screws of the detection electrode **ER** and replace it;
- 3 replace the combustion head.

**Burner service term**

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

**Seasonal stop**

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

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

Burner disposal

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

WIRING DIAGRAMS

Refer to the attached wiring diagrams.

WARNING

- 1 - Electrical supply 230V / 400V 50Hz 3N a.c.
- 2 - Do not reverse phase with neutral
- 3 - Ensure burner is properly earthed
- 4 - Refer to the attached document "RECOMMENDATIONS FOR LMV5x CONNECTIONS"

TROUBLESHOOTING GUIDE Gas operation

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



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

Quick Guide

LAMTEC BT 3**xx**

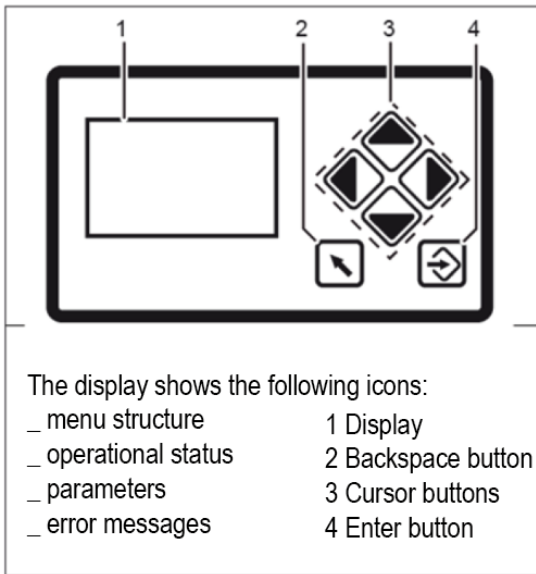
SISTEMA DI CONTROLLO ELETTRONICO
ELECTRONIC CONTROL SYSTEM
SISTEMA DE CONTROL ELECTRÓNICO
SYSTÈME DE CONTRÔLE ÉLECTRONIQUE

| | | |
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- This Guide for quick start-up summarises the basic operations that are necessary to start up and set the BT.... control unit. The information contained here do NOT replace the user manual and are only intended for qualifie personnel in charge of control unit maintenance.
- The information contained in this catalogue is not binding The manufacturer reserves the right to change the technical data and any other data it contains.

2.1 USER INTERFACE:



Jump to previous window



You navigate in the menu using the cursor keys.



Enter key: For to confirm the value or operation

2.2 MENU FUNCTIONST:



Information

Select the INFO path for information about the following:

- the burner
- errors that have occurred
- the software version
- the serial number
- actuating drive positions (current damper position for each channel)
- digital inputs/outputs



Manual

Select the MANUAL to :
start and stop the burner manually
adjust the internal burner firing-rate



If the burner is switched on manually via display, the BT300 no longer responds to the "Burner ON" signal input at connector X10.2.

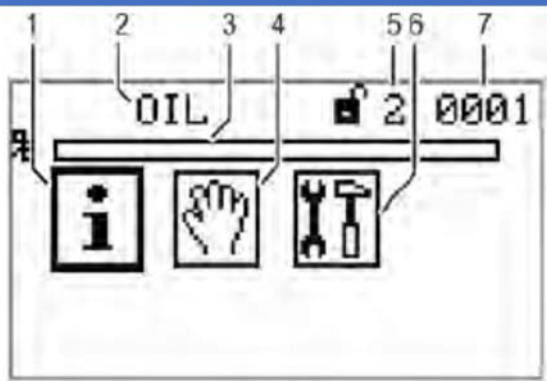
It is for this reason that the burner will turn off only with the intervention of the "safety chain", connector X07, which will send it in lock-out!



Settings

Select the SETTINGS path for information on, and to make settings or, the following:
the password
the burner settings (display and settings)
the actuator device settings (display)
the air/fuel control system
the "delete"
the display settings





3 MAIN MENU

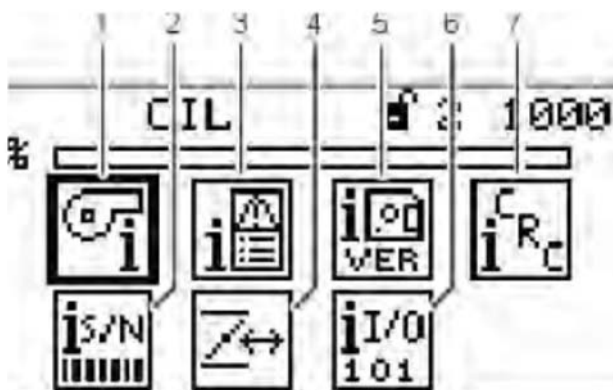


- 1 INFORMATION menu path [selected]
- 2 Display of fuel used
- 3 Bargraph of internal firing-rate in % (0 -100)
- 4 MANUAL menu path
- 5 Access level 2
- 6 SETTINGS menu path
- 7 Window number

3.1 INFORMATION MENU PATH





3.1.1 INFORMATION PATH:

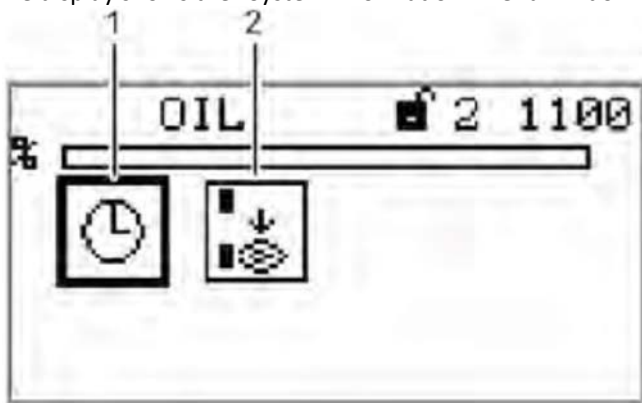
Use the cursor keys   to select the path  and confirm this with Enter 







- 1 Selected burner information [selected]
- 2 Serial number
- 3 Fault history
- 4 Configuration of actual value of actuating outputs (display only)
- 5 Software version
- 6 Digital inputs/outputs
- 7 Check sum display

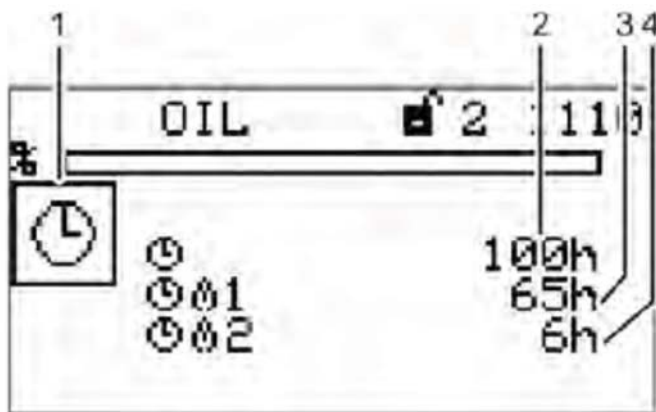
3.1.2 BURNER DETAILS

Use the cursor keys   to select the path  and confirm this with Enter . The display shows the "System Information" menu window.







- 1 For display of operating hours [selected]
- 2 Number of burner start-ups

Use the cursor keys   to select the path  and confirm this with Enter . The display shows the "Display operating hours" menu window.

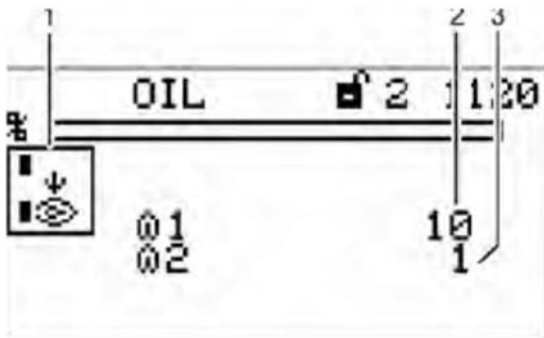


- 1 Pictogram operating hours
- 2 Total number of operating hours (device connected to mains voltage)
- 3 Number of operating hours, oil operation
- 4 Number of operating hours, gas operation

3.1.3 DISPLAY BURNER START-UPS

Use the cursor keys   to select the path  and confirm this with Enter 





The display shows the "Start-up counter" menu window

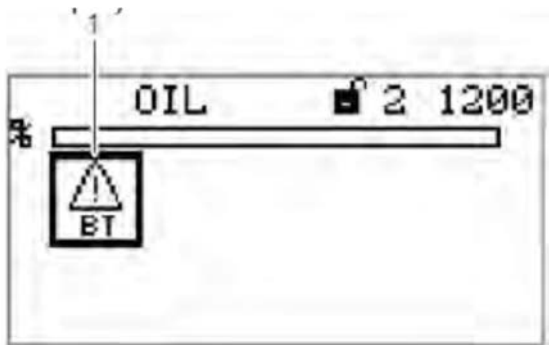


- 1 Pictogram burner start-up
- 2 Number of burner start-ups, oil operation
- 3 Number of burner start-ups, gas operation





3.1.4 RECALL FAULT HISTORY

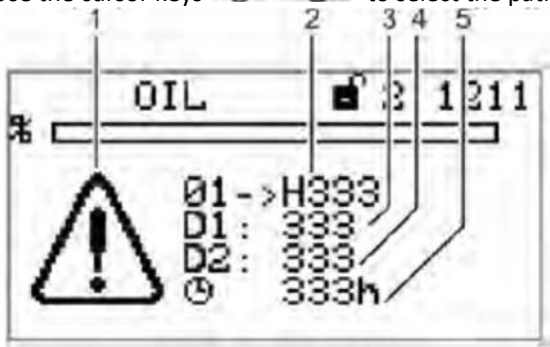
From the home screen, use the cursor keys   to select the path  and confirm with Enter 

Use again the cursor keys   to select the path  and confirm this with Enter 







Fault history selection menu

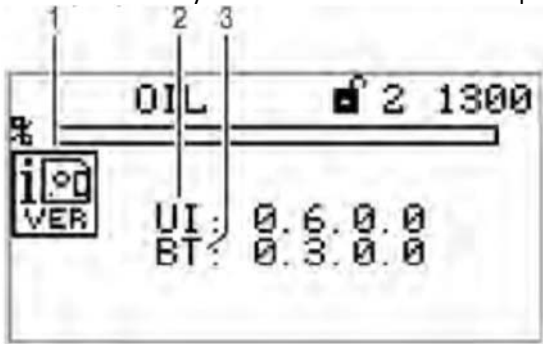
Use the cursor keys   to select the path  and confirm this with Enter 



- 1 Error code-display pictogram
- 2 Fault code (the last 10 faults are stored, in which no. 01 is the most recent fault)
- 3 Diagnostic code 1
- 4 Diagnostic code 2
- 5 Number of operating hours at the moment, the fault occurs





3.1.5 SOFTWARE VERSION

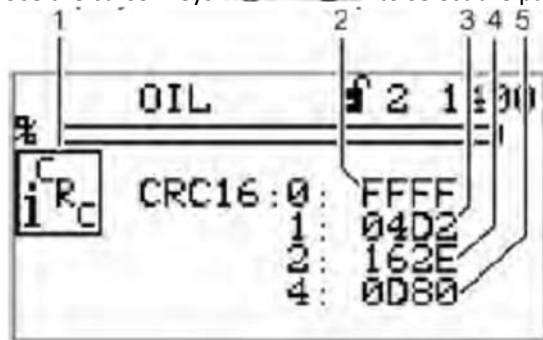
Use the cursor keys   to select the path  and confirm this with Enter 



- 1 Software version pictogram
- 2 UI300 software version (user interface)
- 3 BT3xx software version (BurnerTronic)

3.1.6 DISPLAY OF CHECK SUMS

Use the cursor keys   to select the path  and confirm this with Enter 







- 1 Check sums pictogram
- 2 Check sum, access level 0
- 3 Check sum, access level 1
- 4 Check sum, access level 2
- 5 Check sum, access level 4

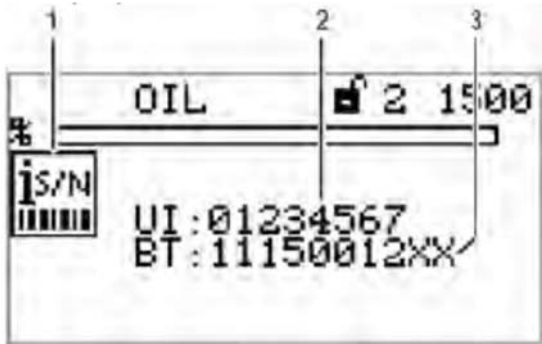
CRC16 CHECK SUMS

The check sums are formed from the device parameters. In each case, the BT3xx calculates a check sum for the parameters from access levels 0, 1, 2 and 4. This is displayed as a hex-adecimal value. The check sums are used to determine whether or not the value for one or more parameters present in the corresponding access level has been changed.

3.1.7 SERIAL NUMBER

(device BT3xx and display UI300)

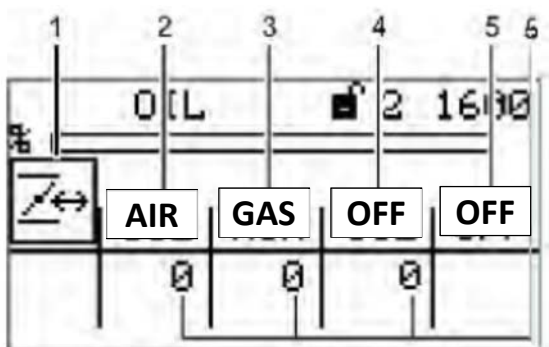
Use the cursor keys   to select the path  and confirm this with Enter 



- 1 Serial number pictogram
- 2 User interface serial number UI300
- 3 BurnerTronic serial number BT3xx

3.1.8 DISPLAY POSITIONS OF ACTUATING DRIVES

From main page (see paragraph 2.4) use the cursor keys   to select the path  and confirm this with Enter 



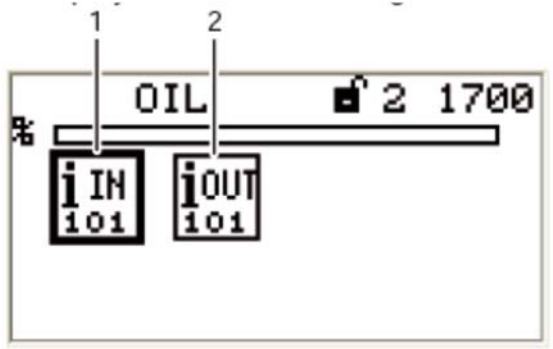
- 1 Actuating drive pictogram
- 2 Actuating drive channel 1 (air)
- 3 Actuating drive channel 2 (combustible)
- 4 Actuating drive channel 3 (off, air, FGR actuator)
- 5 Optional channel OFF; control of frequency converter
- 6 Actuating drive's actual position





The assignment of the channels is depending on the configuration!

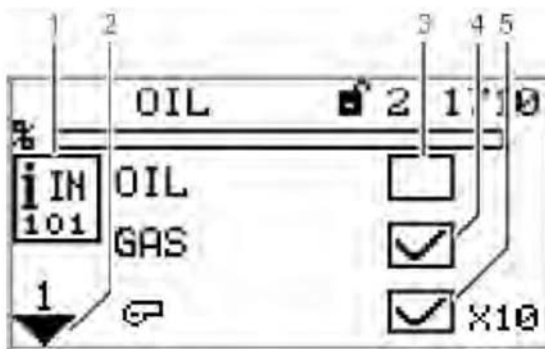
3.1.9 CHECK DIGITAL INPUTS/OUTPUTS

From main page (see chapter 3) use the cursor keys   to select the path  and confirm this with Enter 



- 1 Digital inputs pictogram [selected]
- 2 Digital outputs pictogram

Select the menu  and confirm this with Enter 





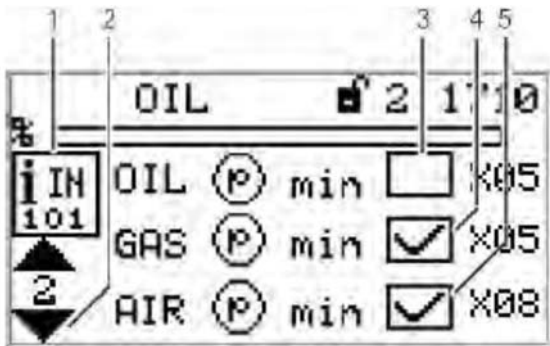
Page 1 of inputs menu

- 1 Digital inputs pictogram
- 2 Jump to next page
- 3 Fuel selection oil [no]
- 4 Fuel selection gas [yes]
- 5 Burner start [yes] – terminal X10



The signals in points 3 and 4, "Page 1 input menu", are "logical" signals and not "physical".
Background: some signals may have more than one source (terminal, LSB, field buses, parameters).



Use the cursor key  to select the next page and confirm this with Enter 

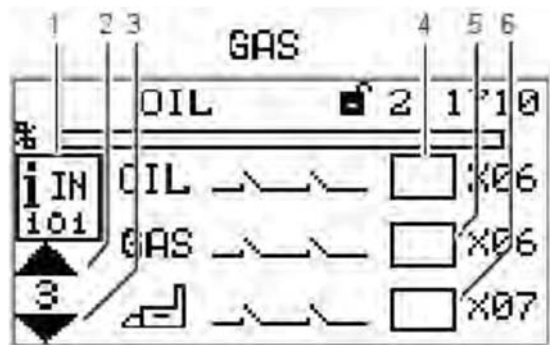


| | 1 | 2 | 3 | 4 | 5 |
|----------|-------------|-----|-----|---|----|
| | OIL | | | | |
| | | | 2 | 1 | 10 |
| i IN 101 | OIL (P) min | [] | X05 | | |
| 2 | GAS (P) min | [X] | X05 | | |
| | AIR (P) min | [X] | X08 | | |

Page 2 of inputs

- 1 Digital inputs pictogram
- 2 Jump to next page
- 3 Oil pressure min present [no] – terminal X05
- 4 Gas pressure min present [yes] – terminal X05
- 5 Air pressure min present [yes] – terminal X08

Use the cursor key  to select the next page and confirm this with Enter 





| | 1 | 2 | 3 | 4 | 5 | 6 |
|----------|-----|-----|-----|---|---|----|
| | GAS | | | | | |
| | | | | 2 | 1 | 10 |
| i IN 101 | OIL | [] | X06 | | | |
| 3 | GAS | [] | X06 | | | |
| | | [] | X07 | | | |

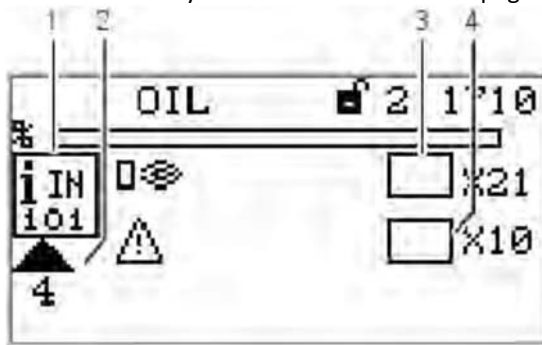
Page 3 of inputs

- 1 Digital inputs pictogram
- 2 Jump to previous page
- 3 Jump to next page
- 4 Safety interlock chain oil closed [no] – terminal X06
- 5 Safety interlock chain gas closed [no]
- 6 Safety interlock chain boiler closed [no]



The signals in points 4 and 5 in Page 2 of inputs menu are "logical" signals, not "physical". The BT3xx supports either oil or gas operation, but cannot be switched. There-fore there are no separate signals for the oil or gas safety interlock chain. The signal on terminal X06 is thus generally known as "safety interlock chain burner".

Use the cursor key  to select the next page and confirm this with Enter 

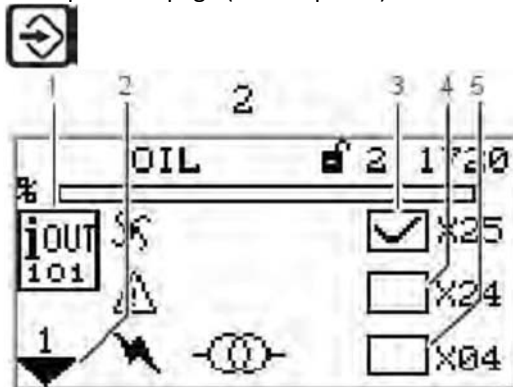


Page 4 of inputs

- 1 Digital inputs pictogram
- 2 Jump to previous page
- 3 Flame signal present [no] – terminal X21
- 4 Fault release [no] – terminal X10



3.1.10 DIGITAL OUTPUTS

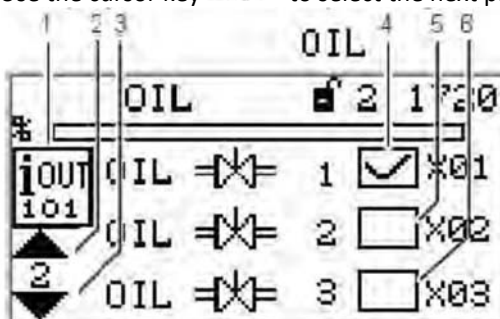
From previous page (see chapter 3) use the cursor keys   to select  and confirm this with Enter



Page 1 digital outputs



- 1 Digital outputs pictogram
- 2 Jump to next page
- 3 Fan [on] – terminal X25
- 4 Error [off] – terminal X24 (adjustable with P 809)
- 5 Ignition transformer [off] – terminal X04

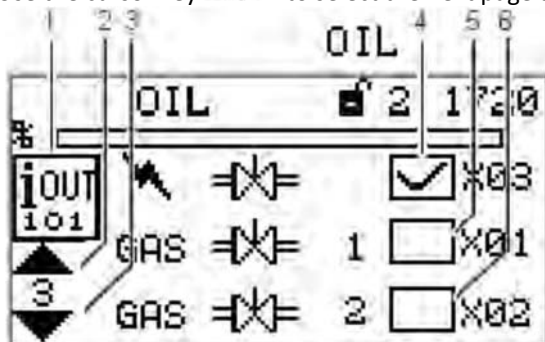
Use the cursor key  to select the next page and confirm this with Enter 



Page 2 digital outputs



- 1 Digital outputs pictogram
- 2 Jump to previous page
- 3 Jump to next page
- 4 Oil valve 1 [on] – terminal X01
- 5 Oil valve 2 [off] – terminal X02
- 6 Oil valve 3 [off] – terminal X03

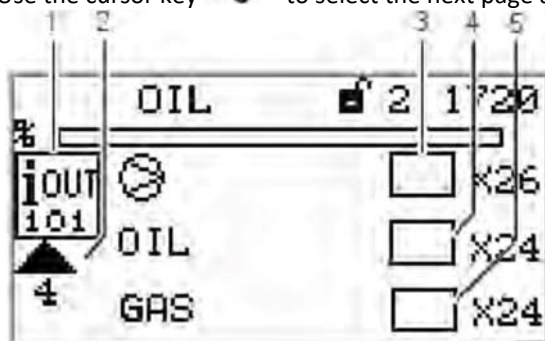
Use the cursor key  to select the next page and confirm this with Enter 



Page 3 digital outputs

- 1 Digital outputs pictogram
- 2 Jump to previous page
- 3 Jump to next page
- 4 Ignition valve [on] – terminal X03
- 5 Gas valve 1 [off] – terminal X01
- 6 Gas valve 2 [off] – terminal X02




Use the cursor key  to select the next page and confirm this with Enter 



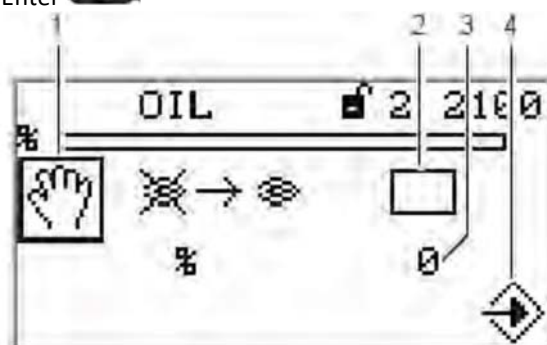
Page 4 digital outputs

- 1 Digital outputs pictogram
- 2 Jump to previous page
- 3 Oil pump [off] – terminal X26
- 4 Fuel selection oil [off] – terminal X24 (adjustable with P 809)
- 5 Fuel selection gas [off] – terminal X24 (adjustable with P 809)

3.2 MANUAL MENU PATH

From previous page (see chapter 3) use the cursor keys   to select  and confirm this with

Enter 



- 1 Pictogram Manual
- 2 Start burner manually [off]
- 3 Adjust burner manual output
- 4 Pictogram confirm settings

The "Burner ON" control loop does not need to be switched on to start the burner from this menu. The user interface assumes control in this menu. If there is no contact with "Burner ON" signal from other sources (terminal X10.2), the software switches off the burner when you exit the menu.



If the burner is switched on manually via display, the BT300 no longer responds to the "Burner ON" signal input at connector X10.2. It is for this reason that limiters, monitors and other similar safety functions must not be used with this input!



Leaving the window terminates burner operation!





3.2.1 REGOLAZIONE MANUALE % CARICO BRUCIATORE

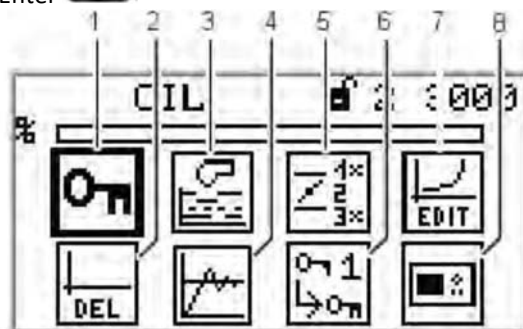
Use the cursor keys   to select the adjustment of the burner firing-rate in % and confirm this selection

with Enter 



Please note, that you can adjust the burner firing-rate only while burner is running. Start the burner before you adjust the burner firing-rate as mentioned above.

From previous page (see chapter 3) use the cursor keys   to select  and confirm this with Enter 



- 1 Password pictogram (selected)
- 2 Delete curves
- 3 Display program settings
- 4 Setting modulating controller (module LCM100)
- 5 Read out actuating outputs configuratio
- 6 Password settings
- 7 Curve settings
- 8 Display settings

3.3.1 ENTER PASSWORD



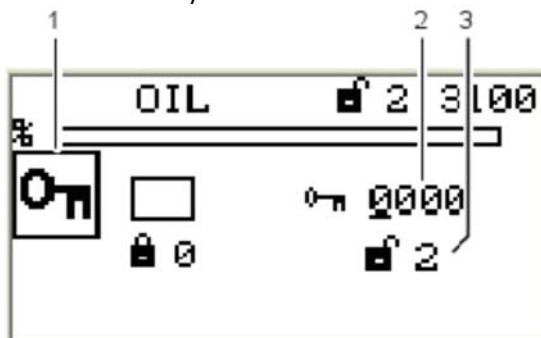
Warning:






Password level 0 = setting view

Password level 1 = change curve points

Password level 2 = changing burner parameter settings (pre-purge, gas leakage, burner parameter, PID, etc.)

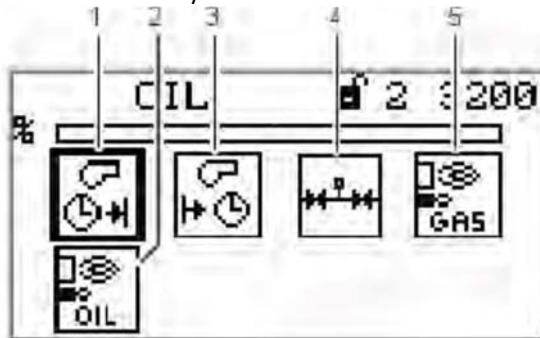
Use the cursor keys   to select  and confirm this with Enter 



- 1 Password pictogram (selected)
- 2 Enter password
- 3 Access level 2 displayed with access authorisation or acces level 1 with access authorisation depending of the phases
 - a. Use the cursor keys   to select the password fiel you wish to change.
 - b. Change the number with the cursor keys  .
 - c. Confirm the password with Enter 

3.3.2 PROGRAM SEQUENCE

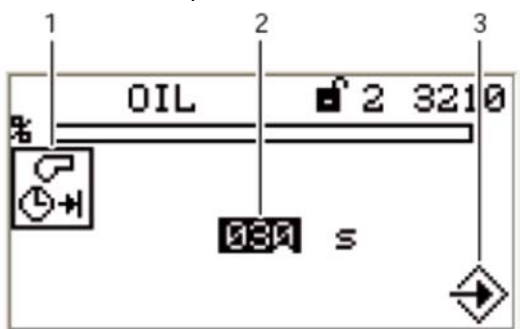
Use the cursor keys   to select  and confirm this with Enter 



- 1 Duration of pre-purge [selected]
- 2 Pilot burner oil operation
- 3 Duration of post-purge
- 4 Valve gas leakage test
- 5 Pilot burner gas operation

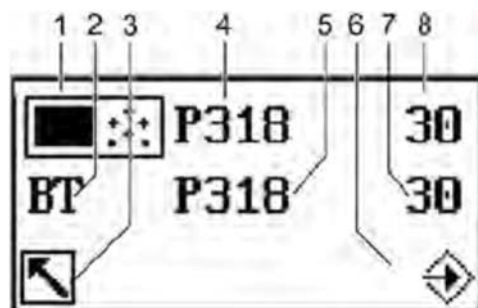
SET DURATION OF PRE-PURGE

Use the cursor keys   to select  and confirm this with Enter 



- 1 Duration of pre-purge pictogram
- 2 Pre-purge time set
- 3 Accept value by pressing Enter

The countdown starts for to confirm the writing value between the display UI300 and burner tronic BT3xx.

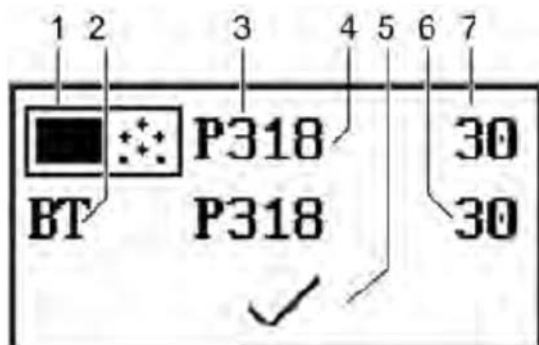


- 1 UI300 pictogram
- 2 BT3xx pictogram
- 3 Cancel (back)
- 4 Parameter number UI300
- 5 Parameter number BT300
- 6 Transfer by pressing Enter (flashing)
- 7 Value for UI300
- 8 Value for BT300



Do not accept the value until the values for UI300 and BT300 are the same! The value for the parameter has to be confirmed by pressing Enter in the space of the count-down (8s)!

- a- Confirm the entry in time by pressing Enter. The value is accepted. The display shows the following page:




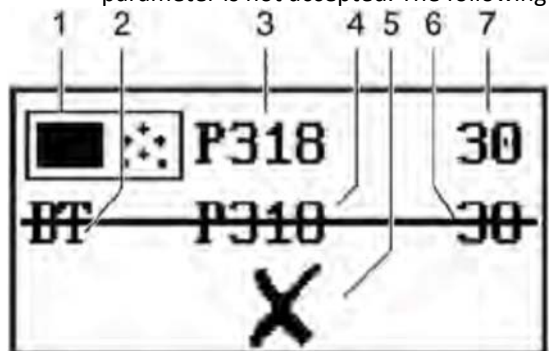
Display after successfully transferred data

- 1 UI300 pictogram
- 2 BT3xx pictogram
- 3 Parameter number UI300
- 4 Parameter number BT300
- 5 Pictogram discard parameters
- 6 Value for BT300
- 7 Value for UI300



If both values are equivalent, the value can be accepted by pressing Enter. If there is a discrepancy with the values, terminate the "acceptance" process.

- b- Reject the change made to the parameter select the back key . The change made to the parameter is not accepted. The following page appears :



Display of invalid data transfer

- 1 UI300 pictogram
- 2 BT3xx pictogram
- 3 Parameter number UI300
- 4 Parameter number BT300
- 5 Discard parameters pictogram
- 6 Value for BT300
- 7 Value for UI300

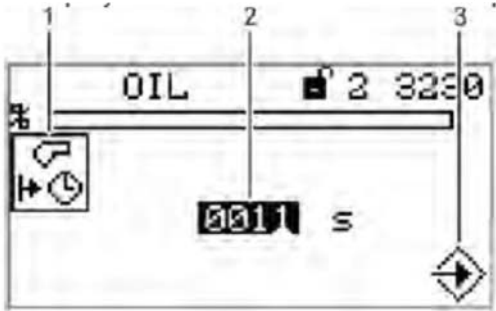


The following sequence of events for confirming or discarding the entry is exactly the same for all parameter entries. Therefore this process is no longer illustrated in detail in the following explanations for the parameter settings. You will simply find this text: **"Accept or discard the entry!"**






SET DURATION OF POST-PURGE

Use the cursor keys   to select  and confirm this with Enter 

The display shows the "Duration of post-purge".



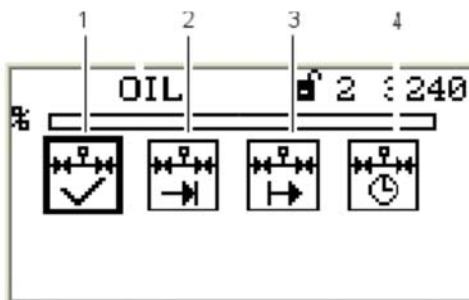
- 1 Duration of post-purge pictogram
- 2 Set duration of post-purge
- 3 Accept setting by pressing Enter

- Use the cursor keys   to select the number you wish to change .
- Change the value of the number with the cursor keys   .
- Confirm the entry with Enter  .

"Accept or discard the entry!"

LEAKAGE TEST FUNCTIONS

Use the cursor keys   to select  and confirm this with Enter 



"Gas leakage" menu

- 1 Leakage test ON/OFF
- 2 Leakage test before ignition
- 3 Leakage test after ignition
- 4 Duration of leakage test




"Accept or discard the entry!"

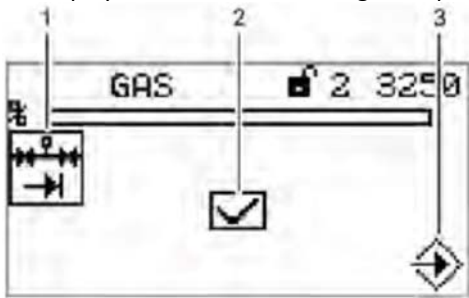


Access level 2 is required to set this function!

ACTIVATE VALVE LEAKAGE TEST PRIOR TO IGNITION

Use the cursor keys   to select  and confirm this with Enter 

Change the ON/OFF functional state using the cursor keys   - and confirm this with Enter 
The display shows the valve leakage test prior to ignition menu.



Valve leakage test prior to ignition menu





- 1 Valve leakage test prior to ignition pictogram
 - 2 Display valve leakage test (active)
 - 3 Accept setting by pressing Enter
- The valve leakage test is set!




“Accept or discard the entry!”

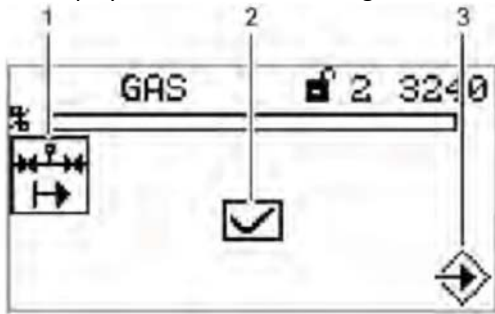


Access level 2 is required to set this function!

CHECK VALVE LEAKAGE TEST AFTER FLAME OFF

Use the cursor keys   to select  and confirm this with Enter 

Change the ON/OFF functional state using the cursor keys   - and confirm this with Enter 
The display shows the valve leakage test after flame OFF menu.



Valve leakage test after flame OFF



- 1 Valve leakage test after flame OFF pictogram
 - 2 Display valve leakage test
 - 3 Accept setting by pressing Enter
- La prova di tenuta valvola è stata impostata!

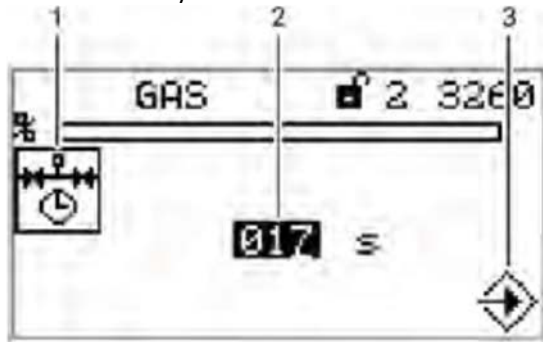
“Accept or discard the entry!”



Access level 2 is required to set this function!






SET DURATION OF VALVE LEAKAGE TEST

Use the cursor keys   to select  and confirm this with Enter 



Valve leakage test menu

- 1 Duration of valve leakage test pictogram
- 2 Set duration of valve leakage test
- 3 Accept setting by pressing Enter

- Use the cursor keys   to select the number you wish to change.
- Change the value of the number with the cursor keys  .
- Confirm the entry with Enter 




“Accept or discard the entry!”

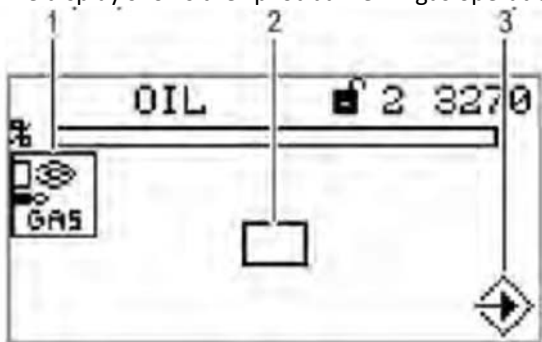


Access level 2 is required to set this function!

ACTIVATE THE PILOT BURNER IN GAS OPERATION

Use the cursor keys   to select  and confirm this with Enter 

Change the ON/OFF functional state using the cursor keys   and confirm this with Enter 
The display shows the "pilot burner in gas operation" menu



Pilot burner in gas operation menu

- 1 Pilot burner in gas operation pictogram
- 2 Activate the pilot burner in gas operation
- 3 Accept setting by pressing Enter




“Accept or discard the entry!”

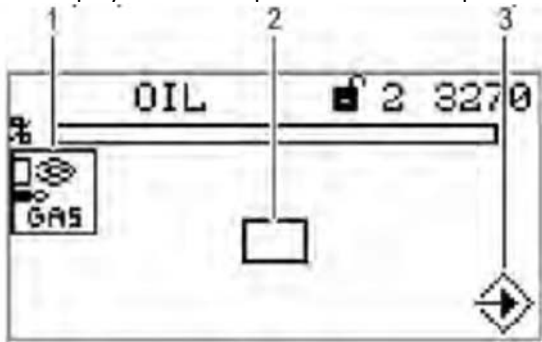


Access level 2 is required to set this function!

SET PILOT BURNER IN OIL OPERATION

Use the cursor keys   to select  and confirm this with Enter 

Change the ON/OFF functional state using the cursor keys   and confirm this with Enter 
The display shows the "pilot burner in oil operation" menu "



Pilot burner in oil operation menu

- 1 Pilot burner in oil operation pictogram
- 2 Activate pilot burner in oil operation
- 3 Accept setting by pressing Enter

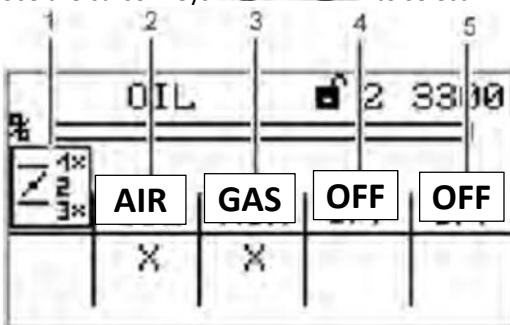
"Accept or discard the entry!"



Access level 2 is required to set this function!

CONFIGURATION OF ACTUATING OUTPUTS

Use the cursor keys   to select  and confirm this with Enter 




Configuration of actuating outputs menu

- 1 Actuating drive position pictogram
- 2 Display channel 1, air
- 3 Display channel 2, combustible
- 4 Display channel 3, (off, air or actuator FGR)
- 5 Optional channel, off

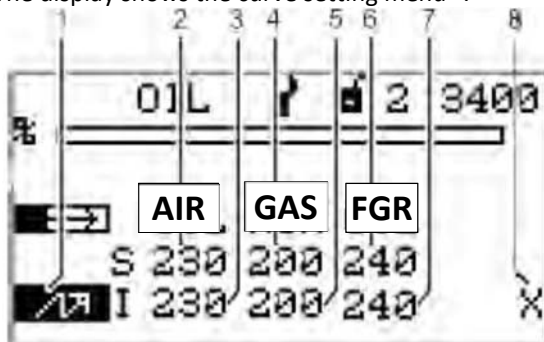
CURVE SETTING OF ACTUATING DRIVES

Use the cursor keys   to select  and confirm this with Enter 












If you keep key  pressed for more than 2 seconds in the menu "Curve setting of actuating drives" you will cause a fault shut-down.

The display shows the curve setting menu "



Curve setting menu

- 1 Ignition position firing-rate point
- 2 Set-point channel 1, air
- 3 Actual value channel 1, air
- 4 Set-point channel 2, combustible
- 5 Actual value channel 2, combustible
- 6 Set-point channel 3, (off, air or actuator FGR)
- 7 Actual value channel 3 (off, air or actuator FGR)
- 8 Curve data for this firing-rate point already exists

- Use the cursor keys   to set the firing-rate point and confirm with Enter  Set-point channel 1 is chosen (displayed in reverse).
- Use the cursor keys   to set the channel's actuator position.
- Use the cursor keys   to switch to the next channel.
- Use the cursor keys   to set actuator's position in the selected firing-rate point.
- Set the position of the actuator at the desired combustion point with the cursor key.



The actuators run to the adjusted position immediately after adjusting it.


The fan motor must run to adjust channel 4.


"Accept or discard the entry!"

The display changes to the firing-rate selection menu.




The following firing rate point are available:

Ignition point  , 200, 250, 300, 400, 500, 600, 700, 800, 900, 999

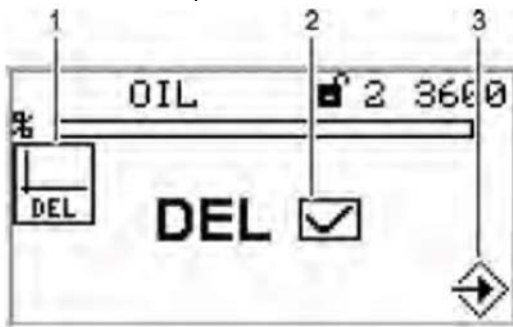
- Set your firing rate points as described above and confirm it with Enter 



If you keep key  pressed for more than 2 seconds the menu "Curve setting of actuating drives" you will cause a fault shut-down.

ELIMINARE CURVE

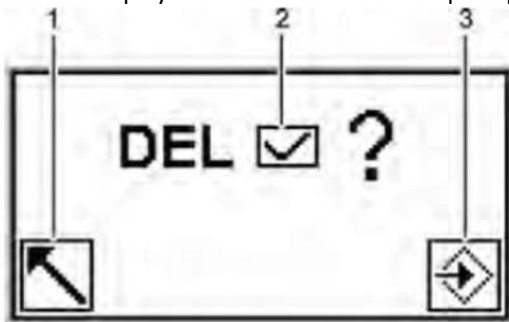
Use the cursor keys   to select  and confirm this with Enter 



Delete curves menu


- 1 Delete curves pictogram
- 2 Delete curves selected
- 3 Confir deletion of curves

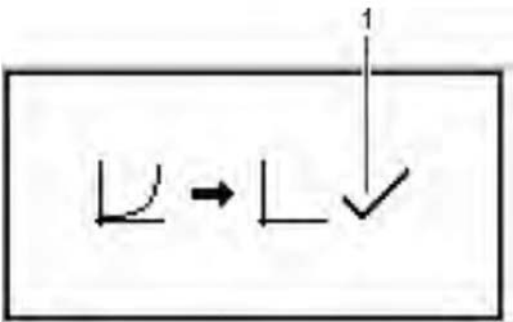
The display shows the "confirmation prompt".



Confirmation prompt of the delete curves menu

- 1 Back to previous menu
- 2 Delete values [selected]
- 3 Proceed with deletion of values

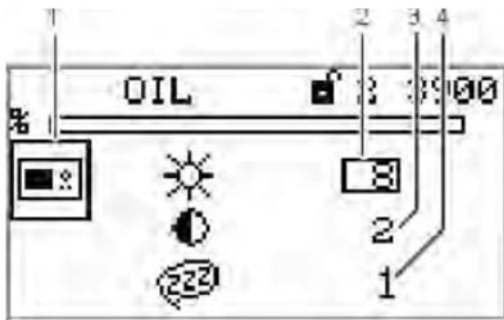
Select Enter . The curve values are deleted. The display shows the "values deleted" menu.



Values deleted menu

- 1 Values deleted

UI300 DISPLAY SETTINGS



Display settings menu

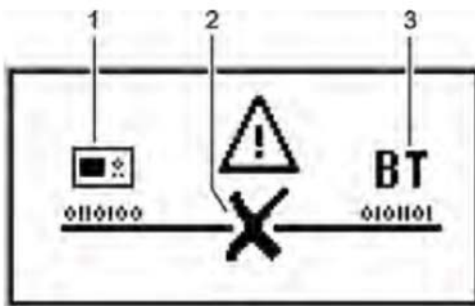
- 1 Display settings menu
- 2 Brightness
- 3 Contrast
- 4 Waiting time for screen saver



A "0" value cannot be entered for the screen saver!

3.4 OTHER DISPLAYS

NO CONNECTION BETWEEN UI300 AND BT300

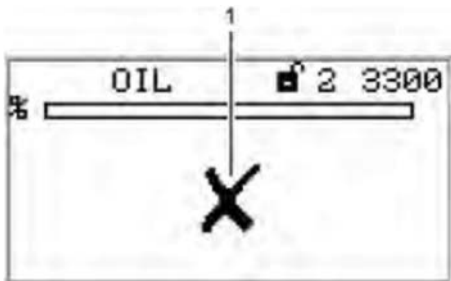


No connection

- 1 UI300 user interface pictogram
- 2 Symbol for no connection
- 3 BT300 burner control

Display shown e.g. when using the LSB remote software and the communication between BT300 and UI300 is temporarily not available.

TERMINATION



Termination

- 1 Communication error pictogram – no connection available



To see the "historical lock-out" see paragraph 3.1.4

| Fault Code | D1 | D2 | Description |
|------------|--|-------------------------|---------------------------|
| 0 | Unknown fault (internal error) | | |
| 1 | Pre-ventilation signal is still active. | | |
| 2 | Parasitic light detected | | |
| 3 | Flame blow-off during ignition | | |
| 4 | Flame blow-off during operation | | |
| 5 | Flame signal does not appear during the first safety time | | |
| 6 | Flame signal extinguishes during stabilization time | | |
| 7 | Flame signal extinguishes during first safety time | | |
| 8 | Flame signal extinguishes during the second safety time | | |
| 9 | Flame signal does not appear during the safety time | | |
| 10 | Flame signal extinguishes during the safety time | | |
| 11 | Monitoring for parasitic light does not last the required 5 seconds | | |
| 13 | Main flame appears during ignition | | |
| 103 | Miscellaneous data invalid | | |
| 105 | Curve data are invalid or not available. | Curve set / Fuel number | |
| 106 | Parameters between both controllers are inconsistent Possible cause | Parameter No. | |
| 107 | Configuration is not valid see chapter 3 Assignment of | | |
| 120 | Different operation modes on both controllers | | |
| 121 | Correction is out of range | Channel (x) | |
| 141 | Channel feedback changes too fast | Channel (x) | |
| 151 | Recirculation damper is deactivated | Channel (x) | |
| 170 | Short circuit of LDR flame detector | | |
| 191 | First monitoring band exceeded for too long | Channel (x) | |
| 201 | First monitoring band fall short for too long | Channel (x) | |
| 211 | Second monitoring band exceeded for too long | Channel (x) | |
| 221 | Second monitoring band fall short for too long | Channel (x) | |
| 231 | Fuel/air ratio control is blocked | Channel (x) | |
| 241 | Actuator doesn't move, i.e. no position feedback | Channel | 0 = backward, 1 = forward |
| 251 | Actuator cannot find reference position | Channel | |
| 261 | Actuator returns invalid position (difference to target position too | Channel | |
| 271 | Actuator position changes too fast, e.g. slip | Channel | |
| 281 | Actuator feedback not correct | Channel | |
| 320 | Open broken wire at firing rate input | | |
| 321 | Open broken wire at feedback channel | Channel (x) | |
| 351 | Invalid fuel change while burner is running | | |
| 352 | Invalid combination of fuel signals (no signals) | | |
| 353 | Invalid combination of fuel signals (several signals) | | |
| 362 | Fault shut-down due to a missing burner maintenance | | |
| 363 | Smallest valid O2 value exceeded | | |
| 371 | Output for internal firing-rate is defective | | |
| 372 | Difference of the burner firing-rate values between main processor | | |
| 381 | Deviation between main processor and watchdog controller too | Correction channel | |
| 391 | Curve set has changed during programming | | |
| 393 | Emergency shut-down activated | | |
| 394 | Burner ON/OFF signal from the user interface turned off | | |
| 451 | Being operating mode for ignition not all channels are in ignition | Channel | |
| 600 | Program monitoring time (FAT) exceeded | | |
| 601 | Failure during leakage test: gas pressure still active | | |
| 602 | Failure during leakage test: no gas pressure detected | | |
| 603 | Manual venting of the gas line required! | | |

| | | | |
|-----|--|----------------------------|--|
| 607 | Invalid drop of ignition position acknowledgement | | |
| 608 | Invalid drop of the boiler safety interlock chain | | |
| 609 | Invalid drop of the gas safety interlock chain | | |
| 610 | Invalid drop of the oil safety interlock chain | | |
| 611 | Gas pressure too low | | |
| 613 | Air pressure signal is missing | | |
| 617 | Permanent pilot flame extinguishes during operation | | |
| 624 | Oil pressure too low | | |
| 711 | Invalid change of the operation mode | Internal state information | |
| 713 | Invalid signal combination at input terminals during operating | | |
| 714 | Invalid signal combination at input terminals during operating | | |
| 715 | Invalid signal combination at input terminals during operating | | |
| 716 | Invalid signal combination at input terminals during operating | | |
| 717 | Invalid signal combination at input terminals during operating | | |
| 719 | Fuel valves are open for too long without a flame | | |
| 720 | Ignition transformer activated too long | | |
| 721 | Ignition valve opens for too long | | |
| 722 | Fuel valves open in maintenance mode | | |
| 723 | Ignition process needs too much time | | |
| 724 | Oil pressure too low | | |
| 725 | Oil valves are open while gas is selected | | |
| 727 | Main gas 1 opens unexpectedly | | |
| 728 | All three gas valves open for too long | | |
| 729 | Ignition process lasts for too long (without pilot burner) | | |
| 730 | Maintenance mode without pilot burner | | |
| 731 | Ignition valve opens without pilot burner | | |
| 732 | Invalid signal combination at input terminals during operation | | |
| 734 | Pre-ventilation period falls below the minimum | | |
| 739 | Leakage test: Main gas valve 2 opens for too long | | |
| 740 | Leakage test: Main gas valve 1 leaky | | |
| 741 | Leakage test: Main gas valve 1 opens for too long | | |
| 742 | Leakage test: Main gas valve 2 leaky | | |
| 743 | Flame monitoring: Flame burns for too long after shutdown | | |
| 745 | Program monitoring time exceeded | | |
| 746 | Solenoid valve cannot be switched off | | |
| 747 | Leakage test: Venting into the burner is not allowed | | |
| 751 | The bus-card runs into time-out. | | |
| 759 | Leaving "Setting-mode" automatically after 24 hours | | |
| 760 | Fuel change during setting-mode is not allowed | | |
| 763 | Different curve selection on main processor and watchdog | | |
| 764 | CO-controller - internal curve set failure | | |
| 800 | Parameter defective | Parameter No | |
| 801 | Channel control mode is inconsistent between main processor and | Channel | |
| 802 | Integration of a channel into the fuel/air ratio control takes too | Channel | |
| 803 | Channel is locked for too long (fatal error, no automatic restart | Channel | |
| 804 | Channel mode of the fuel/air ratio control does not match the type | Channel | |
| 805 | Directly controlled channel runs to an invalid position, i.e. a | Channel + Date | |
| 888 | Fault interlocking active! | Reference no. | |
| 889 | The gap between two remote fault releases is too short | | |
| 921 | Output terminal for oil valve defective | | |
| 922 | Output terminal for ignition transformer defective | | |
| 923 | Output terminal for gas valve 1 defective | | |
| 924 | Output terminal for gas valve 2 defective | | |
| 925 | Output terminal for ignition transformer defective | | |
| 928 | Output terminal for oil pump defective | | |
| 929 | Output terminals for fan defective | | |

| | | | |
|-----|--|---------|--|
| 986 | Dynamic range test recognizes an invalid feedback | Channel | |
| 987 | Change-over during staged operation takes too much time | | |
| 985 | VSM diagnosis error possible cause of error: BurnerTronic | | |
| 988 | Fuel selection relay in the DFM is defective or inconsistent | | |
| 989 | Plausibility test of actuator feedback in programmed curve failed | | |
| 990 | Power failure | | |
| 996 | Secure parameter writing could not be finished. Device is blocked. | | |
| 999 | Internal Error! See chapter 4 Assignment of internal fault 999 | | |

| D1 | Description |
|----|---|
| 1 | Too many channels in configuration parameter 804. |
| 2 | No channel at all configured. |
| 3 | Permanent ignition burner configured (parameter 302, 303), but no ignition flame monitoring device present (parameter 800). |
| 6 | Prepurge suppression via external signal not implemented. |
| 7 | Fuel change via Off and an unlimited post ventilation configured. |
| 8 | Prepurge time is smaller than minimal prepurge time. |
| 9 | For stages oil mode. |
| 13 | Australian flame monitoring configured, but no ignition flame monitoring device. |
| 18 | Standby operation at BT300 not allowed. |
| 19 | Invalid fuel change selected. |
| 20 | BT300 only with separate ignition point. |
| 21 | "Ignition With Fan", only useful with pure oil devices. |
| 22 | Staged operation only useful with pure oil devices. |
| 23 | 3-staged operation only works without ignition burner. |
| 24 | Permanent operation not allowed (Featureflag). |
| 25 | Fuel change not allowed (Featureflag). |
| 26 | Too many channels (Featureflag). |
| 27 | Staged oil burners need an air channel. |
| 28 | There is an invalid function configured for a channel (Parameter 400-404). |
| 30 | Multiple terminals defined for one signal, Terminal configuration invalid. |
| 31 | No output terminal for fan or transformer available. |
| 32 | Necessary outputs for operation with oil not available (Oil pump or oil valve). |
| 33 | Necessary outputs for operation with gas not available (gas valve). |
| 34 | An output terminal is needed for the ignition valve, but is not available in the actual terminal configuration. |
| 40 | No input terminal for the air pressure monitor available. |
| 41 | No input terminal for the oil safety chain available (oil pressure min will not be monitored directly, because it can be included in the safety chain). |
| 42 | No input terminal for the gas safety chain or minimum gas pressure available. |
| 43 | The feedback line for the fuel selection is not mapped, but is required. |
| 31 | No output terminal for fan or transformer available. |
| 32 | Necessary outputs for operation with oil not available (Oil pump or oil valve). |
| 33 | Necessary outputs for operation with gas not available (gas valve). |
| 34 | An output terminal is needed for the ignition valve, but is not available in the actual terminal configuration. |
| 40 | No input terminal for the air pressure monitor available. |
| 41 | No input terminal for the oil safety chain available (oil pressure min will not be monitored directly, because it can be included in the safety chain). |
| 42 | No input terminal for the gas safety chain or minimum gas pressure available. |
| 43 | The feedback line for the fuel selection is not mapped, but is required. |

| 0-1999 internal faults generated from within System API | | |
|--|---|--|
| D1 | D2 | Description |
| 10 | return value of m_PwrOn_uiInitAPI() | m_PwrOn_uiInitAPI() failed |
| 20 | 0 | CRC32 check of ROM failed |
| 21 | 0 | Cyclic CRC32 check of ROM during runtime failed |
| 22 | Erroneous State | State machine for CRC32 check during runtime ran into an invalid state |
| 40 | 0 | m_PwrOn_bLoadEEPROM() failed |
| 92 | Directive | ATTENTION, wrong number in the wrong module, signaled by hchactab if control tables are not correct |
| 200 | 0 | Last destination element is no member of sER.sP |
| 201 | 0 | Last destination element is no member of sER.sM |
| 202 | 0 | Last destination element is no member of sER.sC |
| 203 | 0 | Last destination element is no member of sER.sH |
| 204 | 0 | Destination is no member of sER.sX |
| 210 | sEECtrl.sChk.uiReadStartAddr | Refresh cycle timeout expired |
| 211 | sEECtrl.sChk.uiReadStartAddr | Uncorrectable error in EEPROM block |
| 212 | sEECtrl.eSeq_State | Invalid state |
| 215 | uiEEFaultAddr | Uncorrectable error in Parameter Set |
| 216 | uiEEFaultAddr | Uncorrectable error in Miscell-Data |
| 217 | uiEEFaultAddr | Uncorrectable error in Curve Set |
| 220 | 0 | pucDst == NULL |
| 222 | uiEEStartAddr | Invalid EEPROM address |
| 240 | uiEEStartAddr | Write beyond end of safety area! |
| 241 | uiEEStartAddr | Start address in safety area is no multiple of 3 |
| 242 | uiEEStartAddr | Write beyond end of non-safety area! |
| 243 | uiEEStartAddr | Start address is in reserved area! |
| 244 | ulReqFIFOspace | Not enough FIFO space |
| 250 | (ulong32)pucDst | Readback error while refreshing - possibly defective RAM cell |
| 300 | 0 | Timeout slCom.uiRxLiveTimer expired |
| 301 | 0 | Timeout slCom.uiRxLiveTimer expired |
| 350 | 0 | Timeout slCom.uiXLiveTimer expired |
| 360 | 0 | Timeout while waiting for the exit from DUAL_BEf_CHECK_PARAM |
| 361 | 0 | FIFO full ! |
| 380 | uiBPP_HPPunktNr | Error while calling uiPutPunkt() |
| 381 | 0 | Seal control command in the presence of BM_FAT_KALTCHECK |
| 382 | 0 | Timeout in the cyclical parameter comparison |
| 383 | uiBCP_AnzParam[0] | DUAL_BEf_CHANGE_PARAM1: Invalid value in the reception buffer |
| 384 | uiBCP_AnzParam[1] | DUAL_BEf_CHANGE_PARAM2: Invalid value in the reception buffer |
| 385 | sRx.Buffer.ui[ucRxOK-1][uiSTART-BEF+47] | Cyclic parameter verification: different parameters between HP and UP! |
| 386 | uiParalIdx | PowerOn parameter verification: different parameters between HP and UP! |
| 410 | sIO.sIn.ulInputsN | Detected positive half-wave on terminal input! |
| 411 | input status received from UP | Different input status between controllers |
| 412 | 0 | The readback input of the fuel selection relays contacts in the dual fuel is invalid. DFM probably defect. |
| 420 | uil | Input status of digital input on HP and UP is inconsistent (>20ms) |
| 430 | ucPin2Test | Pin short circuit test detected an error!Currently tested pin not configured as output or is stuck at 1 |

| | | |
|------|-----------------------------|--|
| 431 | ucPin2Test | Pin short circuit test detected an error!Short-circuit between pins, pull-up of input stage defective or pin is externally stuck at 0 |
| 440 | 0 | sIO.sln.uiTestSignalTimeout expired |
| 450 | 0 | Main power relay (K2) does not switch correctly to off when out of power. |
| 451 | ucRelay | Relay does not switch correctly, when relay power is enabled (for details see enum teRelais) |
| 460 | uiFaultParam | Failure of relais power switching or readback of relay coils of K1 or K2Param2: Bit 0 is set if readback line of K1 is erroneous, Bit 1 is set if readback line of K2 is erroneous |
| 461 | uiFaultParam | Readback status of relay K1 or K2 differs from desired switching status, relay probably defect.Param2:Bit 0: nominal state of K1Bit 1: nominal state of K2Bit 8: state of readback line of K1Bit 9: state of readback line of K2 |
| 500 | 0 | Timeout while waiting for end of write cycle |
| 501 | 0 | SLA+W has been transmitted; NO ACK has been received |
| 502 | 0 | SLA+R has been transmitted; NO ACK has been received |
| 503 | 0 | Data byte has been transmitted; NO ACK has been received |
| 504 | 0 | BUS error due to an illegal START or STOP condition |
| 505 | 0 | Arbitration lost in SLA+R/W or Data bytes |
| 510 | uiI2CStat | Unknown/invalid state! |
| 600 | sSRCtrl.uiOffset | Correction of defective triple in Safety RAM structure failed |
| 610 | (ulong32)pucDst | Invalid destination address |
| 620 | (ulong32)puiDst | Invalid destination address |
| 630 | (ulong32)pulDst | Invalid destination address |
| 700 | 0 | CPU selftest failed |
| 701 | sSelftest.sMngr.eState | state-event-machine failed with AC_ERR |
| 710 | sSelftest.sWD.eErrorState | Watchdog selftest failed |
| 711 | sSelftest.sWD.eState | Invalid default case |
| 720 | Selftest.sVM.ucTest2Perform | Invalid default case |
| 721 | Selftest.sVM.eErrorState | Supply voltage monitor selftest failed |
| 722 | Selftest.sVM.eState | Invalid default case |
| 730 | sSelftest.sRR.eErrorState | Relay release circuit selftest failed |
| 731 | sSelftest.sRR.eState | Invalid default case |
| 740 | sSelftest.sRPW.eErrorState | Relay PWR release circuit selftest failed |
| 741 | sSelftest.sRPW.eState | Invalid default case |
| 750 | 0: USR-Stack, 1: IRQ-Stack | Stack overflow detected |
| 751 | 0 | Stackaddress is NULL-Pointer |
| 752 | 0 | Stackaddress is NULL-Pointer |
| 800 | sWDog.uiReleasePtrn1 | Trigger release patterns are invalid! |
| 810 | eFeedIndex | Invalid Feed Index |
| 820 | eTriggerCtrl | Invalid Trigger Mode |
| 830 | 0 | No valid watchdog trigger received (frequency or duty cycle invalid) |
| 900 | uiErrorCode | Fault from LPC_API error handler |
| 920 | 0 | Invalid entry in iStoerResRam |
| 930 | uiMaskedFaultCode | uiMaskedFaultCode out of range! |
| 1200 | 0 | Flame signal doesn't disappear during self-test |
| 1210 | sIFD.eTestState | Invalid default case |
| 1220 | sIFD.uiClock | UP is missing test impulses |
| 1221 | sIFD.uiClock | Test signal duration too short |
| 1222 | sIFD.uiClock | Test signal duration too short |
| 1240 | 0 | Detected short circuit of LDR |
| 1250 | uiADValue | Circuit selftest failed, A/D value out of expected range |
| 1260 | sLDR.eTestState | Invalid default case |
| 1270 | sLDR.uiClock | Test interval too long |
| 1271 | sLDR.uiClock | HP released test pin too late |
| 1272 | sLDR.uiClock | HP released test pin too early |

| | | |
|------|--------------------------------|---|
| 1290 | uiMyFlames XOR uiPartnerFlames | Flame signals on both controllers are inconsistent (bit 0: main flame, bit 1: ignition flame) |
| 1300 | 0 | Pointer to transmit buffer is NULL |
| 1400 | psActuator->ucSAnumber | H_SA_INTERFACE_INVALID_ACTUATOR_TYPE |
| 1401 | psActuator->ucSAnumber | H_SA_INTERFACE_INVALID_DIRECTION |
| 1405 | 0 | H_SA_INTERFACE_WRONG_RAMP_CALCULATION |
| 1406 | 0 | ulGradientMax <= ulGradientDesired |
| 1410 | 0 | H_SA_INTERFACE_WRONG_RAMP_CALCULATION |
| 1411 | 0 | H_SA_INTERFACE_ERROR_TIMING |
| 1415 | psActuator->ucSAnumber | psActuator->ucSAnumber Invalid! |
| 1416 | psActuator->ucSAnumber | psActuator->ucSAnumber Invalid! |
| 1420 | psActuator->ucSAnumber | H_SA_INTERFACE_WRONG_RAMP_CALCULATION |
| 1430 | psActuator->ucSAnumber | H_SA_FEEDBACK_WRONG_FEEDBACK |
| 1435 | psActuator->ucSAnumber | H_SA_PLAUSIB_ACTUATOR_OUT_OF_RANGE |
| 1436 | psActuator->ucSAnumber | H_SA_PLAUSIB_SECTION_COUNT_OUT_OF_RANGE |
| 1440 | psActuator->ucSAnumber | H_SA_REFERENCE_SEARCH_NO_REFERENCE_FOUND |
| 1450 | psActuator->ucSAnumber | H_SA_STEP_CALC_CALL_COUNT_OVERFLOW |
| 1451 | psActuator->ucSAnumber | H_SA_STEP_CALC_SECTIONCOUNT_OUT_OF_RANGE |
| 1452 | psActuator->ucSAnumber | H_SA_STEP_CALC_INVALID_DIRECTION |
| 1453 | psActuator->ucSAnumber | H_SA_STEP_CALC_SECTIONCOUNT_OUT_OF_RANGE |
| 1454 | psActuator->ucSAnumber | H_SA_STEP_CALC_INVALID_DIRECTION |
| 1455 | psActuator->ucSAnumber | H_SA_STEP_CALC_WRONG_STATUS |
| 1460 | 0 | U_SA_INTERFACE_INVALID_ACTUATOR_TYPE |
| 1461 | 0 | U_SA_INTERFACE_INVALID_DIRECTION |
| 1470 | psActuator->ucSAnumber | U_SA_FEEDBACK_INVALID_DIRECTION |
| 1471 | psActuator->ucSAnumber | U_SA_FEEDBACK_INVALID_DIRECTION |
| 1472 | psActuator->ucSAnumber | U_SA_FEEDBACK_WRONG_FEEDBACK |
| 1480 | psActuator->ucSAnumber | U_SA_REFERENCE_SEARCH_INVALID_ACTUATOR_TYPE |
| 1490 | psActuator->ucSAnumber | psActuator->ucSAnumber Invalid! |
| 1500 | 0 | Timeout while sending ICOM command |
| 1501 | 0 | Timeout while waiting for ACK of ICOM command |
| 1502 | 0 | Timeout while waiting for end of actuator initialization |
| 1503 | 0 | Timeout while waiting for end of actuator initialization |
| 1504 | 0 | Timeout while waiting for end of actuator initialization |
| 1505 | Actuator Number | HP: Invalid configuration. Parameter for Actuator Type should never be different from 1 or 2 |
| 1505 | Actuator Number | UP: Invalid configuration. Parameter for Actuator Type should never be different from 1 or 2 |
| 1490 | psActuator->ucSAnumber | psActuator->ucSAnumber Invalid! |
| 1500 | 0 | Timeout while sending ICOM command |
| 1501 | 0 | Timeout while waiting for ACK of ICOM command |
| 1502 | 0 | Timeout while waiting for end of actuator initialization |
| 1503 | 0 | Timeout while waiting for end of actuator initialization |

| 2000-3999 internal faults generated from within Application (FAT and System) | | |
|--|----|---|
| D1 | D2 | Description |
| 2000 | | unknown event, for the event handling mechanism |
| 2001 | | too many events for even queue |
| 2100 | | Invalid buffer input |
| 2101 | | EEPROM probably defective |
| 2200 | | Invalid Index for SQBLData00 |
| 2201 | | Invalid Index for SQBLData01 |
| 2202 | | Invalid Index for SQBLData02 |
| 2203 | | Invalid Index for SQBLData03 |
| 2204 | | Invalid Index for SQBLData04 |
| 2205 | | Invalid Index for SQBLData05 |
| 2206 | | Invalid Index for SQBLDataKurven |
| 2207 | | Invalid Index for SQBLDataPara |
| 2208 | | Invalid Index for SQBLData15 |

| | | |
|--------|--|---|
| 2209 | | Data request for data block, but no transmission. |
| 2300 | | Invalid state |
| 2301 | | Invalid state |
| 2302 | | Deleting curve, end of EI |
| 2303 | | Invalid state |
| 2304 | | Invalid state |
| 2305 | | Invalid parameter number (does not exist) |
| 2306 | | Invalid state (cold check) |
| 2307 | | Cold check |
| 2308 | | Cold check |
| 2309 | | Cold check |
| 2310 | | Invalid state |
| 2350 - | | Cold check |
| 2354 | | Attempt to write to a modbus register |
| 2400 | | Modbus register described |
| 2401 | | Parameter with access level > 4 |
| 2500 | | Does not find the operating mode |
| 2600 | | Transfer forbidden |
| 2601 | | Deleting curve, left EI |
| 2700 | | The air pressure was not dropped but the burner still starts |
| 2800 | | It was opened more than one valve in the cold check |
| 2801 | | Maintenance mode on the main controller is active, but there is no maintenance mode parameterized |
| 2802 | | Maintenance mode active but it is still ignite |
| 2804 | | Burner starts, while the supervisor controller is blocked |
| 2805 | | Burner starts, while no reference test was made |
| 2806 | | The stage sent by HP for the staged-operation does not seem plausible |
| 2900 | | Program load by the timer to high |
| 3000 | | All errors, for which no error number was registered |
| 3100 | | Error message of a password module |
| 3101 | | Error message of the password module |
| 3200 | | Internal overflow, intermediate result does not fit in the variable |
| 3201 | | Overflow of the end result |
| 3230 | | UP Version differs from HP version |
| 3250 | | Invalid parameter for staged burner-firing-rate controller |
| 3300 | | Sequence control BrennUm default case entered |
| 3301 | | Sequence control leakage test default case entered |
| 3302 | | Sequence control FAT default case |
| 3303 | | Sequence control post ventilation default case |
| 3304 | | Sequence control pre ventilation default case entered |
| 3305 | | Sequence control Ignition default case entered |
| 2900 | | Program load by the timer to high |
| 3000 | | All errors, for which no error number was registered |
| 3100 | | Error message of a password module |
| 3101 | | Error message of the password module |
| 3200 | | Internal overflow, intermediate result does not fit in the variable |
| 3201 | | Overflow of the end result |
| 3230 | | UP Version differs from HP version |
| 3250 | | Invalid parameter for staged burner-firing-rate controller |
| 3300 | | Sequence control BrennUm default case entered |
| 3301 | | Sequence control leakage test default case entered |
| 3302 | | Sequence control FAT default case |
| 3303 | | Sequence control post ventilation default case |



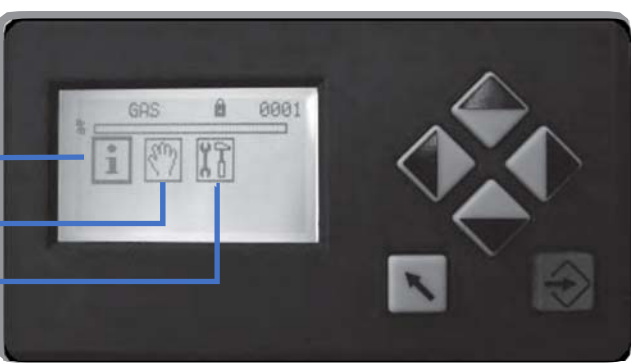


| | | |
|------|--|---|
| 3304 | | Sequence control pre ventilation default case entered |
| 3305 | | Sequence control Ignition default case entered |




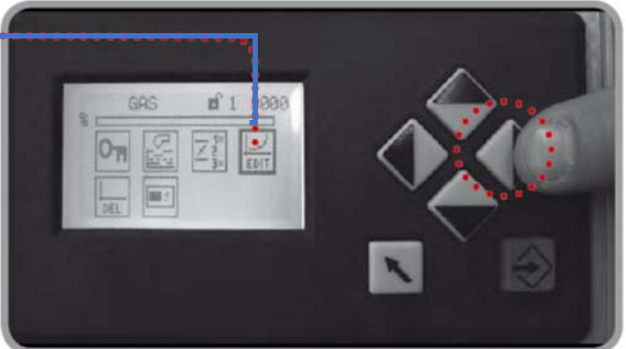

| 4000-4999 Internal faults generated from within Application (Fuel/Air Ratio Control) | | |
|---|---------------------------------------|---|
| D1 | D2 | Description |
| 4000 | 0 | No curve point to the load of the ignition point |
| 4001 | 0 | ucPIIdx_R >= ucPunktAnzahl |
| 4100 | sRampe.ucState | invalid value of sRampe.ucState |
| 4200 | ucVBMode | invalid value of ucVBMode |
| 4302 | 0 | No active air channel is defined (parameterization error) |
| 4400 | ucSteuerArtEx | invalid value of ucSteuerArtEx |
| 4401 | 0 | timeout while waiting for ??? |
| 4402 | ucSteuerArtEx | invalid value of ucSteuerArtEx |
| 4403 | ucKanStat | (ucKanStat & Def_VKM2_MSK) != Def_VKM2_DVAL |
| 4404 | 0 | timeout while waiting for ??? |
| 4405 | ucKanStat | disabled channel is moving! |
| 4406 | ucRzStState[ucKnr] | invalid value of ucRzStState[ucKnr] |
| 4407 | ucVBStat | invalid value of ucVBStatn |
| 4500 | 0 | sRampe.uiLaufzeit == 0! |
| 4501 | ucKnr | lfKM_VB() returned 0 |
| 4600 | ucVorgabe | invalid value of ucVorgabe |
| 4601 | (sRampe.uc2VBKMSk sRampe.ucVBKMSk) | No VB channels can be active in VSM_NOVB |
| 4602 | sRampT.ucNState | Unknown default state |
| 4603 | sRampe.ucState | invalid value of sRampe.ucState |
| 4700 | 0 | Ramp time expired! |
| 4701 | | Transferred channel number out of the permitted range |
| 4702 | | Transferred channel number out of the permitted range |
| 4703 | | Transferred channel number out of the permitted range |
| 4704 | | Transferred channel number out of the permitted range |
| 4705 | ucKnr | Transferred channel number out of the permitted range |
| 4706 | ucKnr | Transferred channel number out of the permitted range |
| 4707 | ucKnr | Transferred channel number out of the permitted range |
| 4708 | ucKnr | Transferred channel number out of the permitted range |
| 4709 | ucKnr | Transferred channel number out of the permitted range |
| 4710 | ucKnr | Transferred channel number out of the permitted range |
| 4711 | ucKnr | Transferred channel number out of the permitted range |
| 4712 | ucKnr | Transferred channel number out of the permitted range |
| 4713 | ucKnr | Transferred channel number out of the permitted range |
| 4714 | ucKnr | Transferred channel number out of the permitted range |
| 4715 | ucKnr | Transferred channel number out of the permitted range |
| 4716 | ucKnr | Transferred channel number out of the permitted range |
| 4717 | ucKnr | Transferred channel number out of the permitted range |
| 4800 | uiActTmr | ucErg > 0! |
| 4801 | ucSgIdx | Parameter modification Knf_uiActuatorDirX while fuel/air ratio control is active or outside the operation modes "Burner Off" or "Fault" |
| 4802 | 0 | Allowed scope for the channel too small to assess the maximum speed |
| 4900 | ucKnr | Division by 0 |






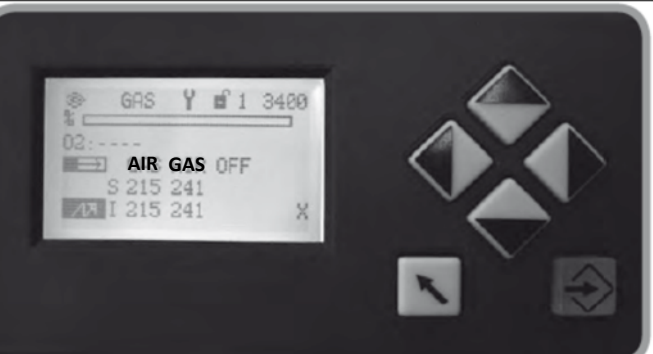
| 5000-5999 Internal faults generated from within Application (firing-rate control) | | |
|--|------------------|---|
| D1 | D2 | Description |
| 5000 | enInterneLastSeq | invalid value of enInterneLastSeq |
| 5001 | 0 | Ambiguous DPS+ / DPS- for load stage selection |
| 5002 | 0 | Curve error: curve for n-staged oil or channel speed for actuators was not determined |
| 5003 | 0 | Invalid parameter in function call |






| | | |
|------|---|---|
| 5004 | 0 | Timers for the control of the stage switching time do not fit together: Switch-ing time of internal load < supervised time for set load |
| 5005 | 0 | Invalid stage curve with internal load set by the stage controller |
| 5007 | 0 | Invalid load value while adjusting the staged oil curve |
| 5008 | 0 | Invalid stage- activation control mode |

| 6000-6999 Internal faults generated from within UP Application-Control (Fuel/Air Ratio Control) | | |
|--|------------------------------|---|
| D1 | D2 | Description |
| 6000 | ucSteuerArtEx | unknown Mode of Channel-Control |
| 6001 | ucBetrMoNr | Overaddressing of Array was detected |
| 6100 | ucKnr | unknown Mode of Channel-Control |
| 6200 | 0 | Avoid an endless loop |
| 6201 | 0 | Avoid an endless loop |
| 6202 | 0 | Avoid an endless loop |
| 6203 | 0 | SSR.sS0.ucAkt SSR.sS0.uiKanalenb changed without AufrufKurve2Workram |
| 6204 | 0 | No completely valid point found but curve not empty |
| 6205 | Detected points No. | number of points don't match Ram-curve (fatal error with task) |
| 6206 | Operating curve points index | Writing firing-rate failed (Ram-error) |
| 6207 | Original curve points index | firing-rate point in original curve invalid |
| 6208 | Original curve points index | invalid point index |
| 6209 | 0 | Point-approximation not possible, no prior point |
| 6210 | 0 | Point-approximation not possible, no following point |
| 6211 | 0 | Point-approximation failed, invalid according point |
| 6212 | Operating curve points index | Writing setpoint failed (Ram-error) |
| 6213 | Original curve points index | invalid point-index |
| 6214 | 0 | Point-approximation not possible, no prior point |
| 6215 | 0 | Point-approximation not possible, no following point |
| 6216 | 0 | Point-approximation failed, invalid according point |
| 6217 | Operating curve points index | Return setpoint writing failed (Ram-error) |
| 6218 | Original curve points index | invalid point-index |
| 6219 | 0 | Point-approximation failed, invalid according point |
| 6220 | Operating curve points index | Evaluated-Correction-Setpoint-Writing failed (Ram-error) |
| 6221 | Original curve points index | invalid point-index |
| 6222 | 0 | Writing failed: Ram-error |
| 6223 | 0 | Writing failed: Ram-error |
| 6224 | Error No. | Too many differences between curves (sliding counter, subtract 1 per cycle) |
| 6225 | Status No. | undefined state of statemachine |
| 6300 | ucSMState | Detect undefined State of Statemachine |
| 6400 | ucKnr | Division by 0 |






| | |
|---|--|
| Initial home page: keep thermostat open. Burner remain in stand-by |  |
| Unlock the controller: press ENTER |  |
| Info Manual Setting |  |
| Press the right key to position on the Settings icon (indicated with wrench and hammer) |  |
| Press ENTER |  |






| | |
|--|--|
| <p>Press ENTER again after selecting 'the key icon'.</p> |  |
| <p>Keep the password "0000" and confirm with ENTER.</p> |  |
| <p>New page, level 1 unlocked</p> |  |
| <p>Right click to EDIT.</p> |  |
| <p>Press ENTER to enter the "curves page".</p> |  |





| | |
|---|--|
| <p>Air & gas position at burner's ignition</p> <ol style="list-style-type: none"> 1 ignition position, 2 air servomotor position (digit) 3 gas servomotor position (digit) <p></p> <p>VALUES VARY FROM BURNER TO BURNER</p> |  |
| <p>Close the thermostat the burner starts.</p> |  |
| <p>Pre-purge.</p> |  |
| <p>The controller moves the servomotors to the ignition position and excites the ignition transformer.</p> |  |
| <p>If the burner starts with those settings, this page will appear:</p> <p>If the burner does not start with those settings the chapter "SETTING THE IGNITION POINT WITH BURNER IN STAND-BY"</p> |  |

| | |
|--|--|
| <p>In case of troubles, the burner will go on lock-out mode and the reason will be indicated on the display.</p> |  |
| <p>Check the lock code & press ENTER to unlock.</p> |  |
| <p>Press ENTER to modify the positions (burner in stand-by).</p> |  |
| <p>Click up to increase the gas opening position or down to decrease it.</p> |  |
| <p>Right click to move from gas servomotor adjustment to air servomotor adjustment.</p> |  |

| | |
|--|--|
| <p>Clickup to increase the air opening position or down to decrease it.</p> |  |
| <p>Press ENTER to save the new settings.</p> <p>CLOSE THE THERMOSTAT LINE</p> |  |
| | |













| | |
|---|--|
| <p>Check the combustion quality (with a flue gas analyzer). To modify the combustion valves and adjust servomotors position (gas and air), press ENTER.</p> |  |
| <p>Click up to increase the gas opening position or down to decrease it.</p> |  |
| <p>Right click to move from gas servomotor adjustment to air servomotor adjustment.</p> |  |
| <p>Click up to increase the air opening position or down to decrease it.</p> |  |
| <p>Press ENTER to save the new settings.</p> |  |










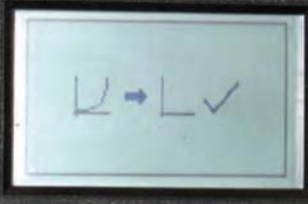


| | |
|--|--|
| Click up to quit the ignition position. |  |
| Check the combustion quality in all positions (from minimum to maximum output) and adjust the gas and air setting if necessary (as indicated on chapter "SETTING THE IGNITION POINT WITH BURNER IN STAND-BY"). |  |
| Set the maximum load position 999, according to the maximum output required by the boiler. If necessary, set the inlet gas pressure (at the exit of the gas pressure reducer). Check the output combustible and the quality of combustion in all positions and adjust gas and air if necessary (see chapter "SETTING THE IGNITION POINT WITH BURNER IN STAND-BY"). |  |
| Press EXIT to quit the combustion settings. |  |
| Press EXIT again to quit main menu. |  |










| | |
|--|--|
| <p>Press EXIT again to quit settings.</p> |  |
| <p>The burner runs now in automatic mode.</p> |  |
| <p>In case of troubles, the burner will go on lock-out mode and the reason will be indicated on the display. Example: H009 – lock-out code D1 - diagnostic 1 D2 - diagnostic 2 xxh - operation hours</p> |  |
| <p>Check the lock code & press ENTER to unlock.</p> |  |







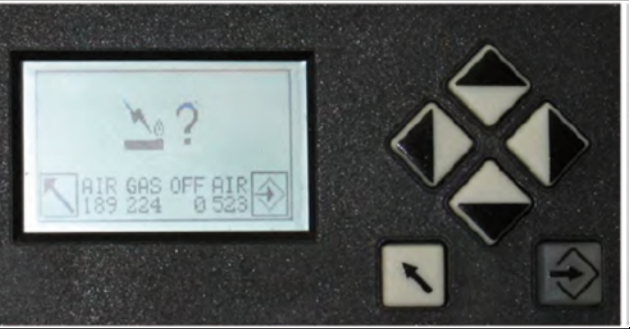






If the ignition setting is not good enough (e.g. too much air), the burner cannot start. In that case adjust again the ignition point see chapter “SETTING THE BURNER CURVE”.
Otherwise make sure that no other reason may cause the ignition failure.



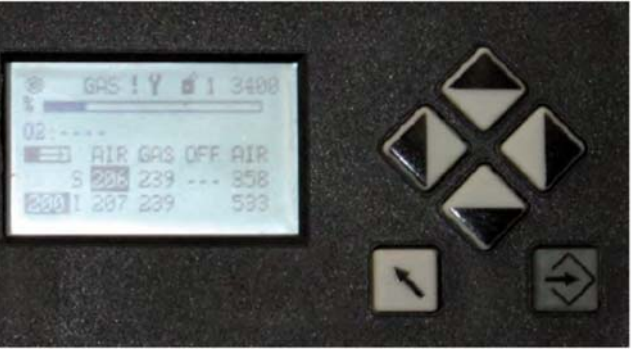


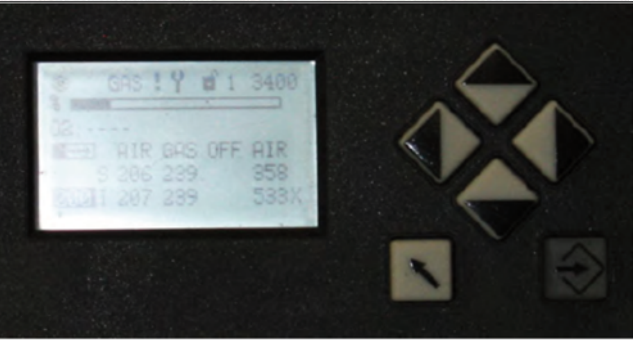





! With VSD modify the curve points only with burner on.

| | | |
|---|--|--|
| <p>With burner on STANDBY, press Enter</p>  | |  |
| <p>With the arrows </p> <p>go on the icon </p> <p>press Enter </p> | |  |
| <p>With the arrows </p> <p>go on the icon </p> <p>press Enter </p> | |  |
| <p>Check the password 0000</p> <p>press Enter  to confirm</p> | |  |

| | | |
|---|--|--|
| <p>With the arrows </p> <p>go on the icon </p> <p>press Enter </p> | |  |
| <p>press Enter  to cancel the curve</p> | |  |
| <p>press Enter  to confirm curve cancellation</p> | |  |
| <p>Now the working curve has been cancelled</p> <p>press Enter </p> | |  |
| <p>press Exit </p> | |  |

| | | |
|---|--|--|
| <p>With the arrows </p> <p>go on the icon </p> <p>press Enter </p> | |  |
| <p>Close the "thermostat line"</p> | |  |
| <p>The burner carries out the pre-purge</p> | |  |
| <p>The burner reaches the ignition point</p> | |  |
| <p>Wait for the air/gas servomotors to reach 0 degrees The VSD is set at 30 Hz press Enter </p> | |  |

| | | |
|---|--|--|
| <p>press Enter </p> <p>and set the ignition point using the</p> <p>arrows </p> | |  |
| <p>Set the values and press Enter </p> | |  |
| <p>press Enter  to confir the ignition point .</p> <p>the burner discharges and opens the valves.</p> | |  |
| <p>With burner on, check the combustion with a combustion analyser.</p> <p>Modify using the arrows  and</p> <p>press Enter  to store.</p> | |  |
| <p>Press  to move onto the (minimum burner) load 200</p> <p>Press Enter </p> | |  |

| | | |
|---|--|--|
| <p>Press  to set the minimum burner output</p> <p>press Enter  to confirm</p> | |  |
| <p>Press  to move onto the maximum load 999</p> <p>press Enter  to confirm</p> | |  |
| <p>Press  to set the maximum burner output</p> <p>Press Enter  to confirm</p> | |  |
| <p>Check the combustion in all curve points (800-700-600-500-400-300-250) as in previous the points.</p> <p>Once the adjustment is done,</p> <p>press  three times</p> | |  |



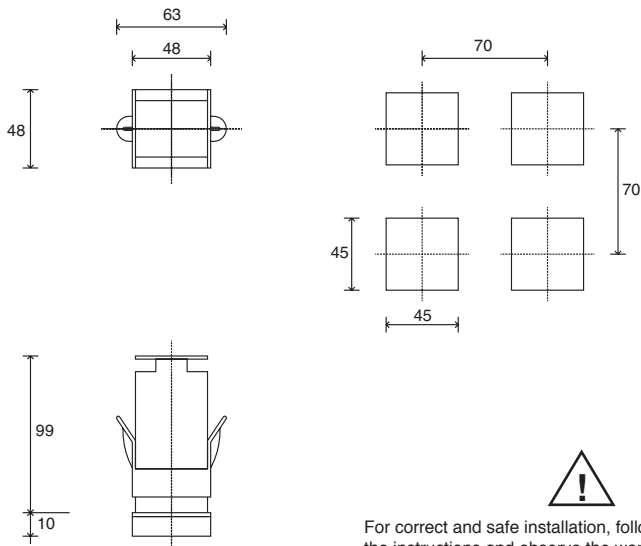
USER'S MANUAL

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)

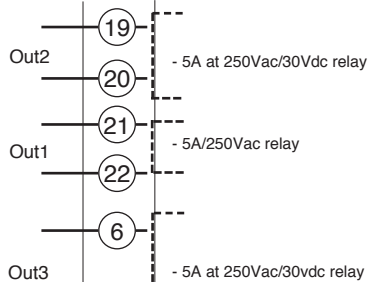
SV display: Indication of setpoint

Function key

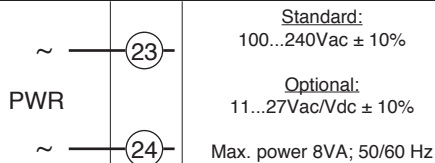
Gives access to the various configuration phases • Confirms change of set parameters and browses next or previous parameter (if Auto/Man key is pressed)

4 • CONNECTIONS

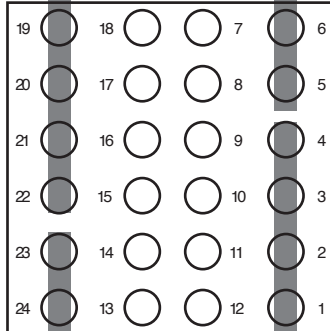
• Outputs



• Power Supply



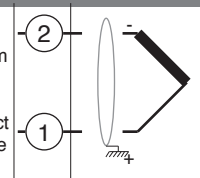
TOP



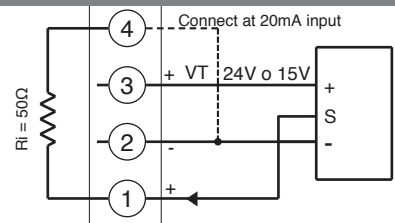
• Inputs

• TC Input

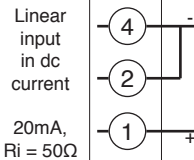
Available thermocouples:
 J, K, R, S, T
 (B, E, N, L, U, G, D, C custom linearization is available)
 - Observe polarities
 - For extensions, use the correct compensating cable for the type of TC used



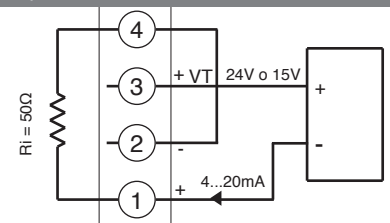
• Linear input with 3-wire transmitter



• Linear input (I)

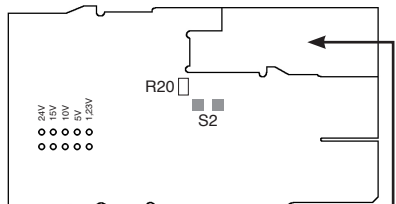


• Input 1 linear with transmitter 2 wires



• Identification of boards

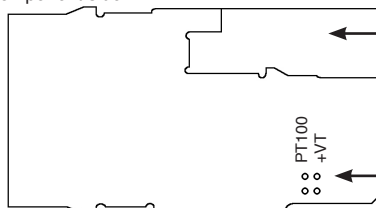
Power board - Solder side



Select transmitter voltage

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

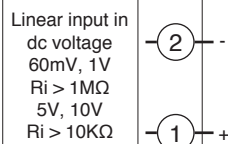
CPU board - Component side



IN/OUT boards
 (see appendix)

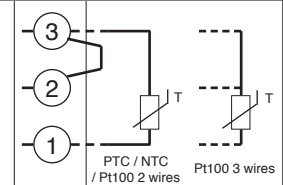
Select signal at
 contact 3

• Linear input (V)

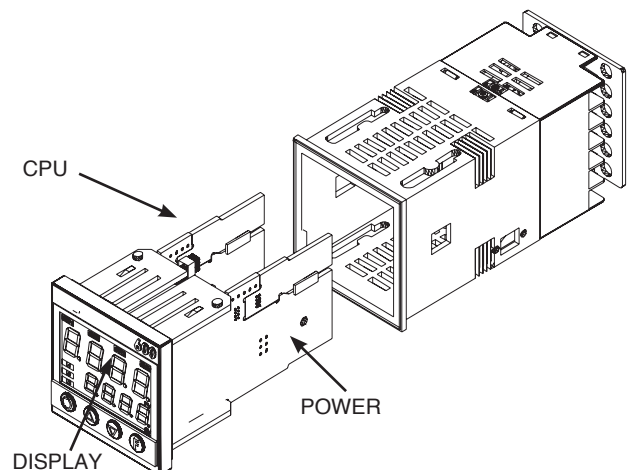


• Pt100 / PTC / NTC

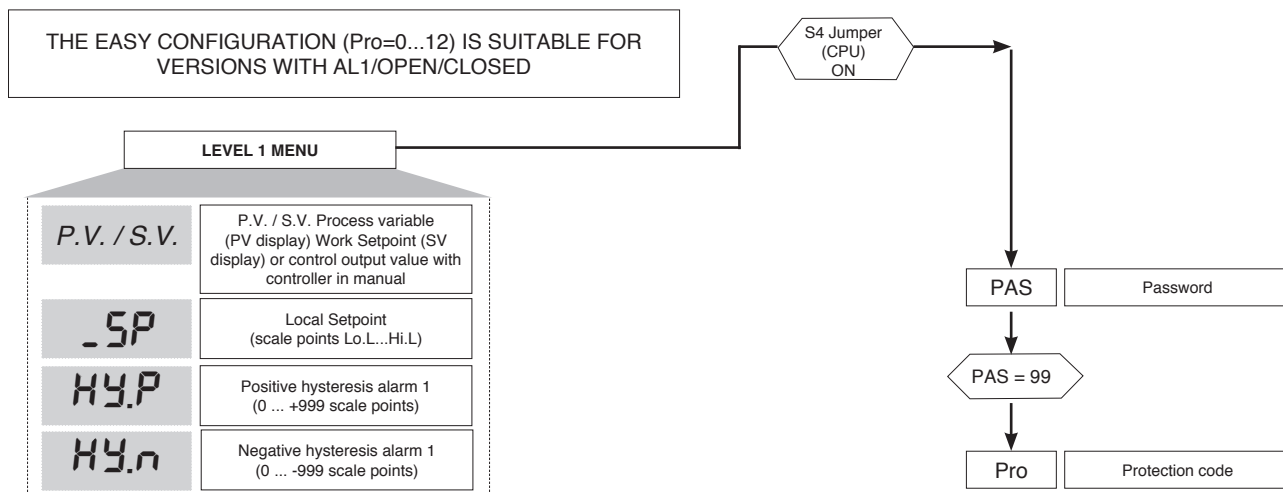
Use wires of adequate diameter (min. 1mm²)
 PT100, JPT100, PTC, NTC



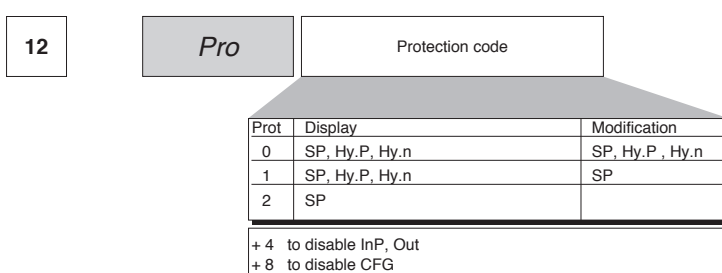
• Device structure



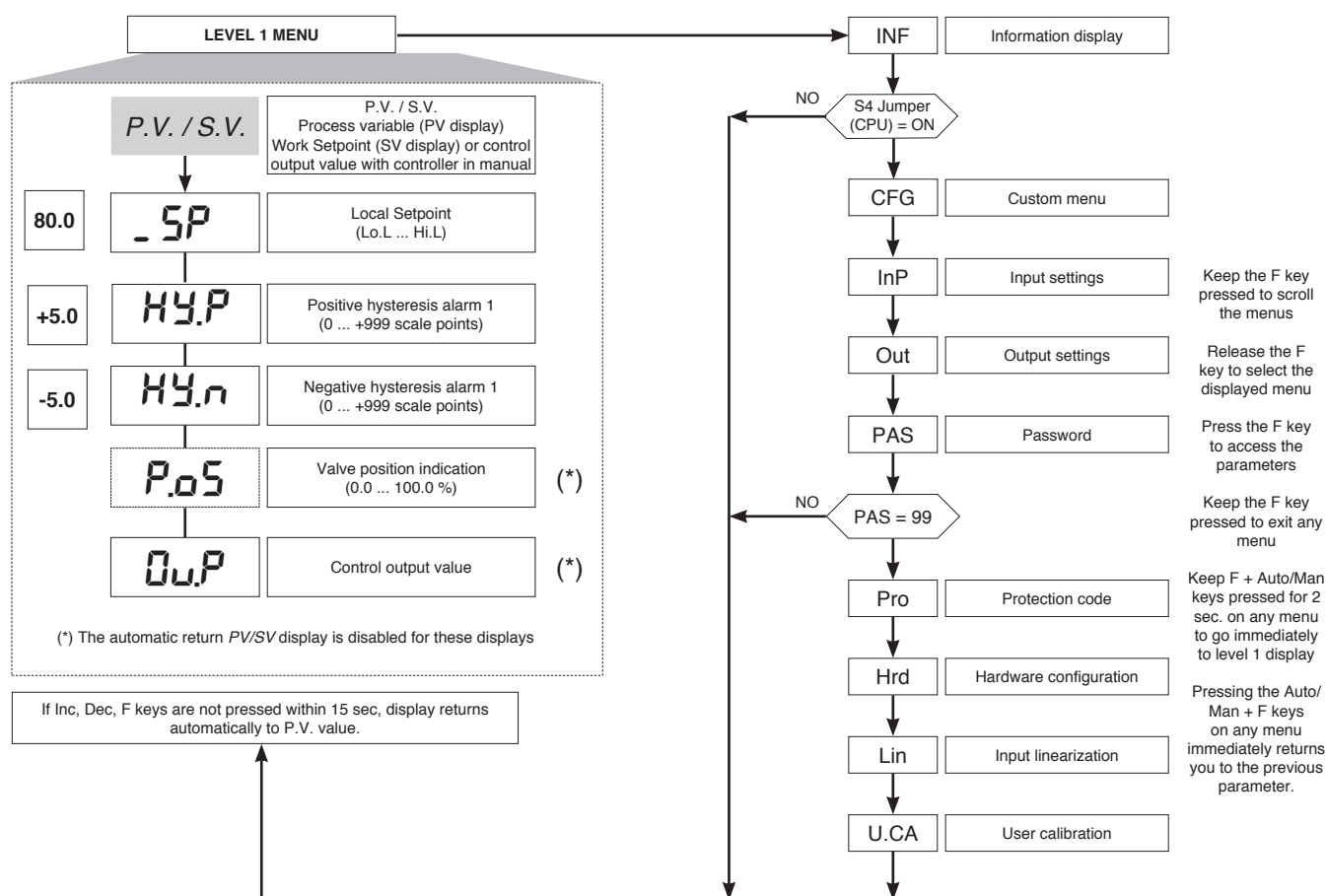
5 • “EASY” PROGRAMMING and CONFIGURATION



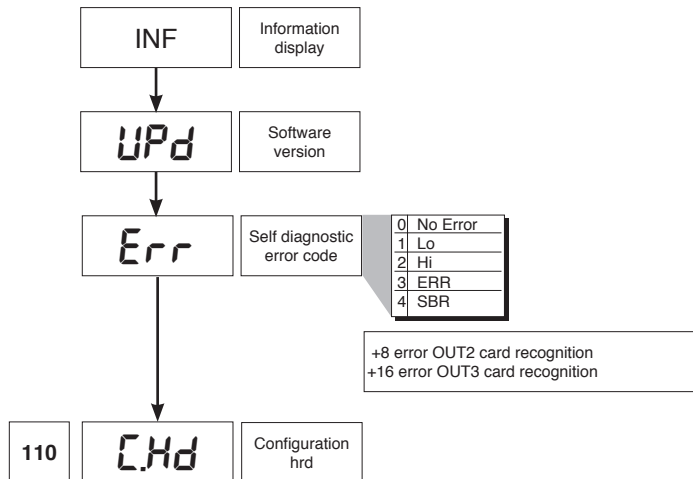
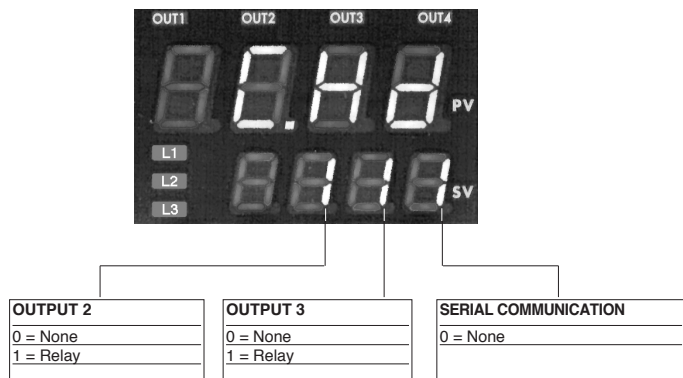
• Prot



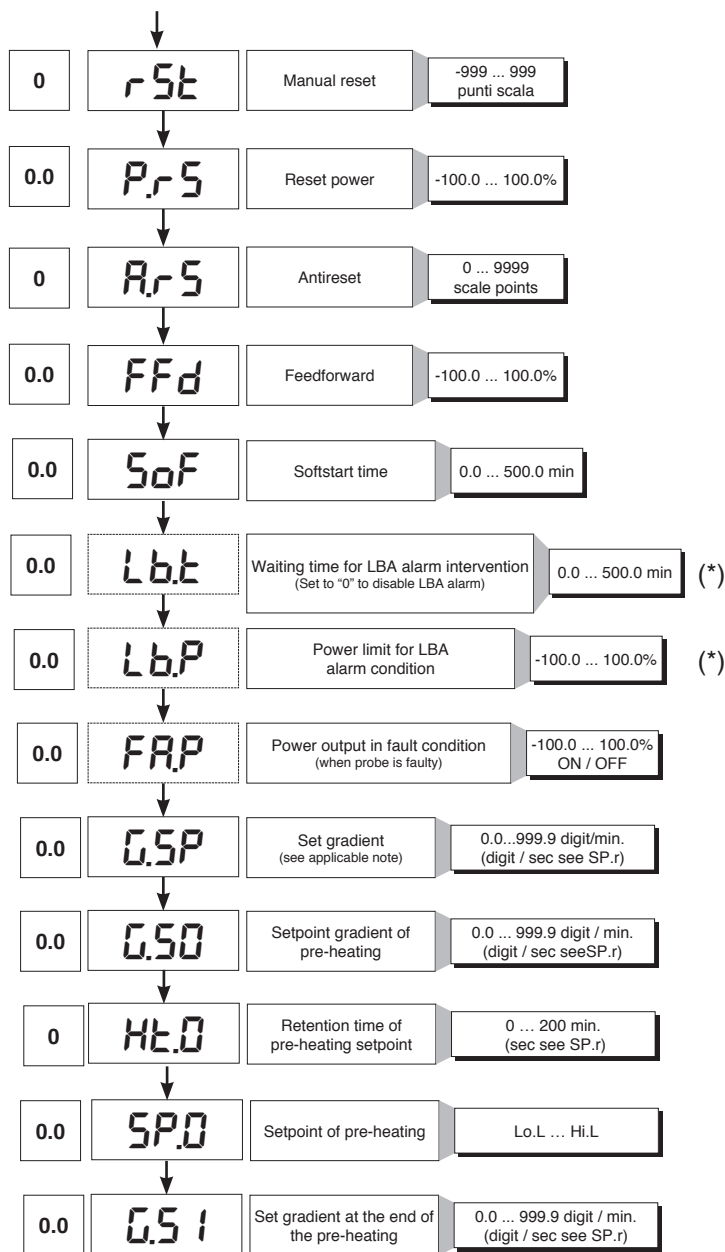
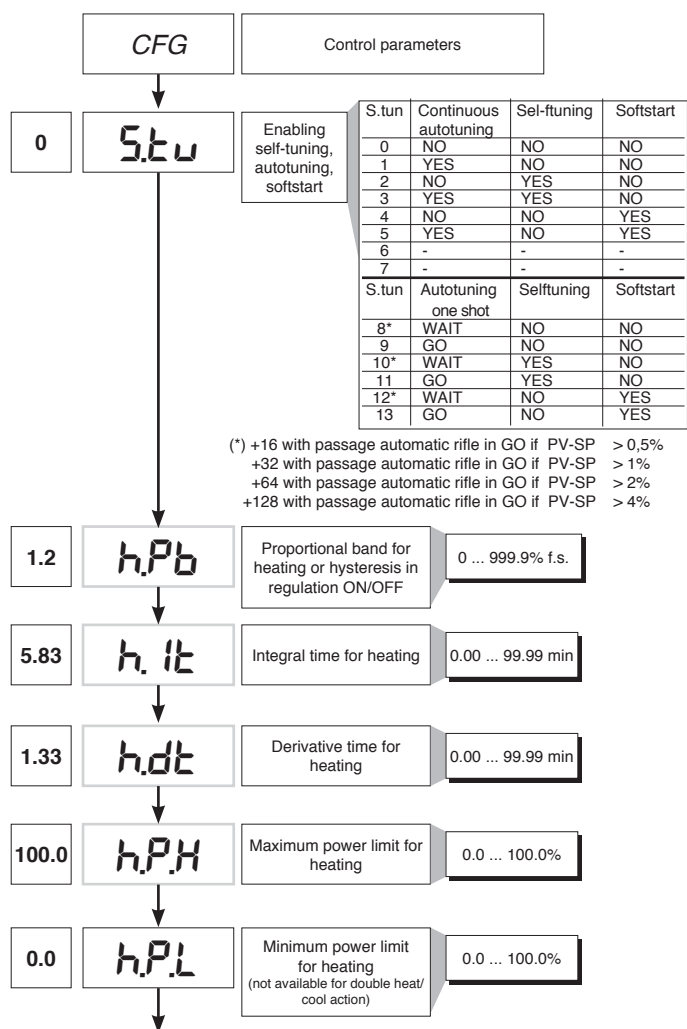
6 • PROGRAMMING and CONFIGURATION



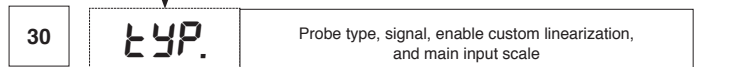
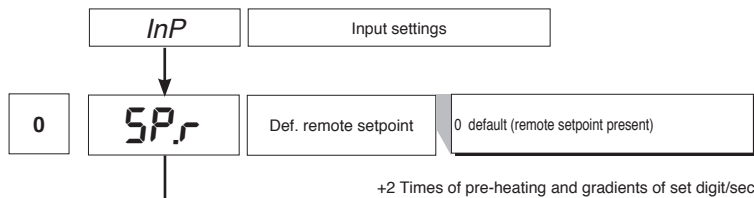
N.B.: Once a particular configuration is entered, all unnecessary parameters are no longer displayed



• CFG



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



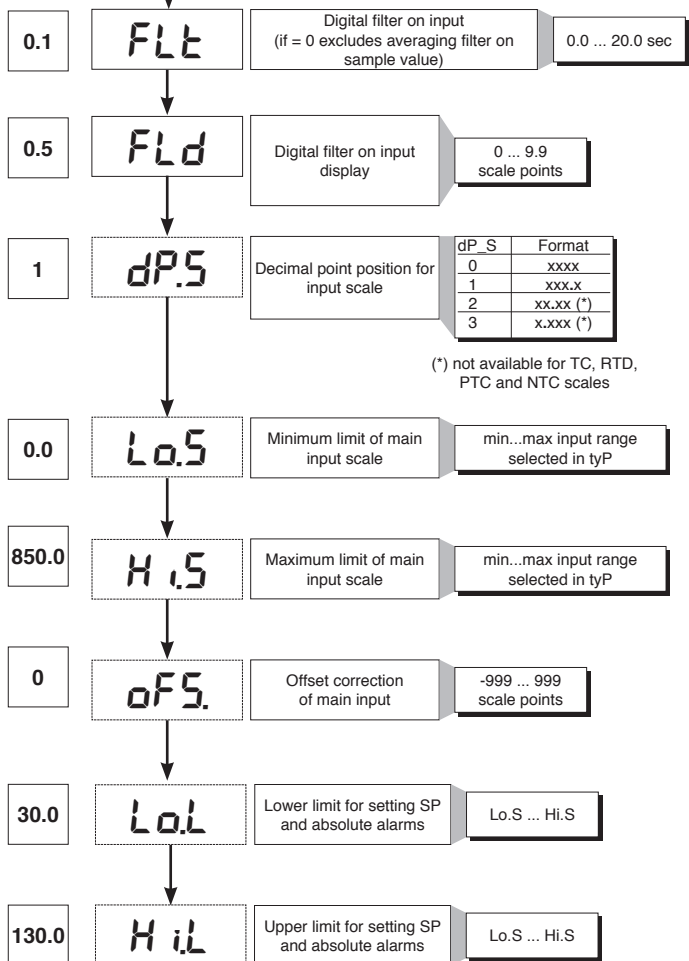
| Type | Probe type | without decimal point | with decimal point |
|------|---------------|-----------------------|--------------------|
| | Sensore: | TC | |
| 0 | TC J °C | 0/1000 | 0.0/999.9 |
| 1 | TC J °F | 32/1832 | 32.0/999.9 |
| 2 | TC K °C | 0/1300 | 0.0/999.9 |
| 3 | TC K °F | 32/2372 | 32.0/999.9 |
| 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 |

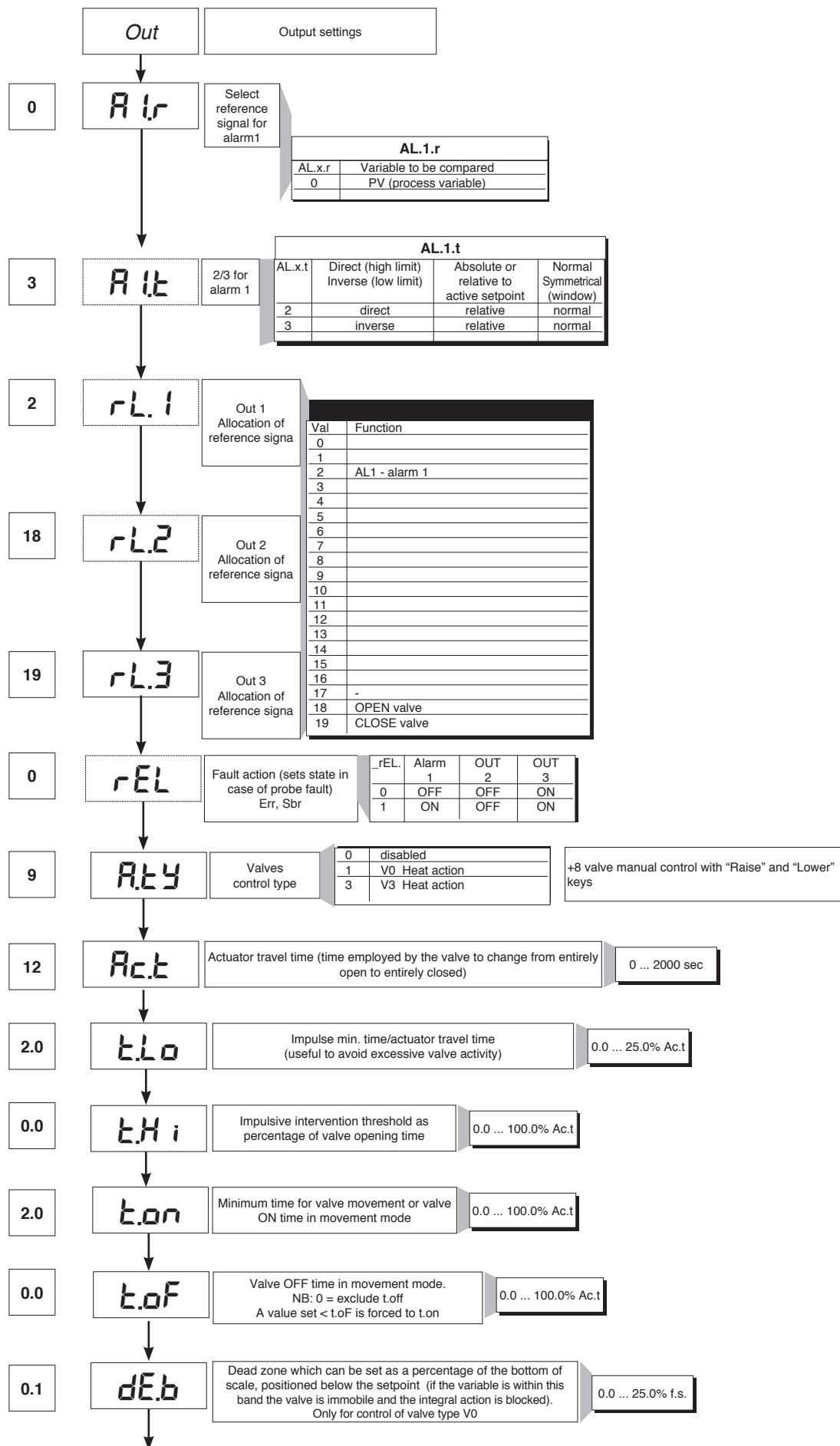
For custom linearization:
 - LO signal is generated with variable below Lo.S or at minimum calibration value
 - HI signal is generated with variable above Lo.S or at maximum calibration value

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

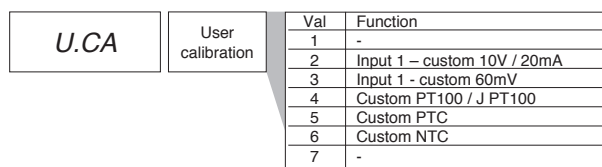
| diSP | Lower display (SV) function |
|------|-----------------------------|
| 0 | SSP - setpoint enabled |
| 1 | PoS - valve position |
| 2 | Control output value |
| 3 | Deviation (SSP - PV) |



• 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



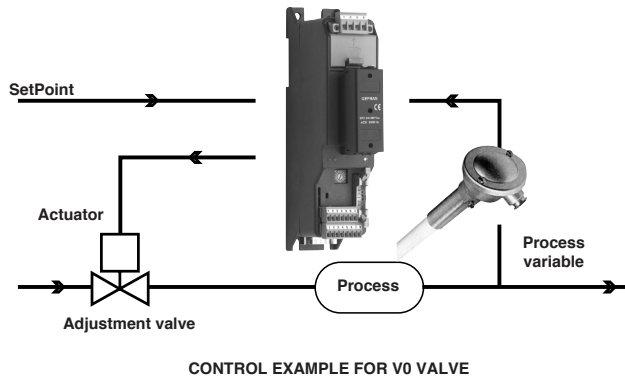
9 • ADJUSTMENT WITH MOTORIZED VALVE

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.

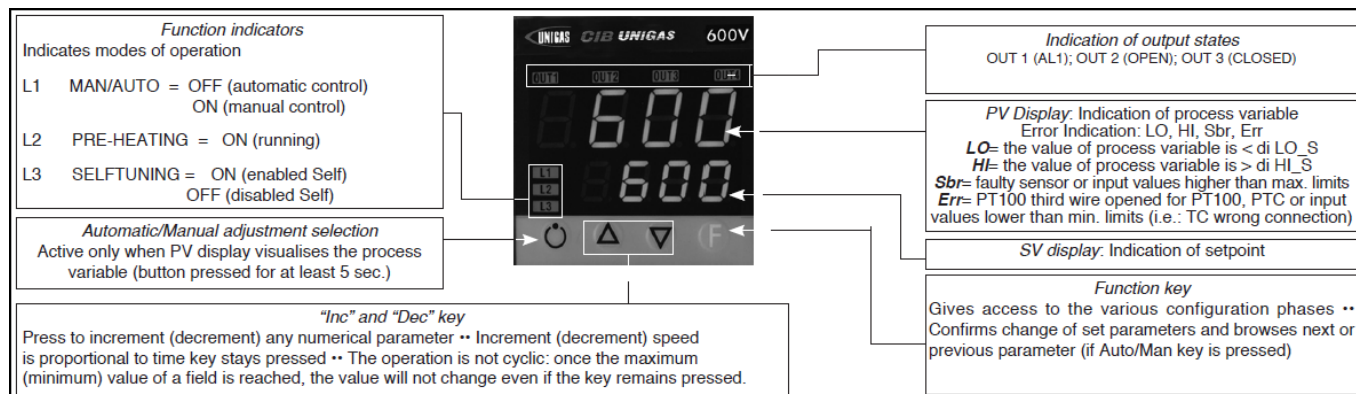
GEFRAN spa will not be held liable for any injury to persons and/or damage to property deriving from tampering, from any incorrect or erroneous use, or from any use not conforming to the device specifications.

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.

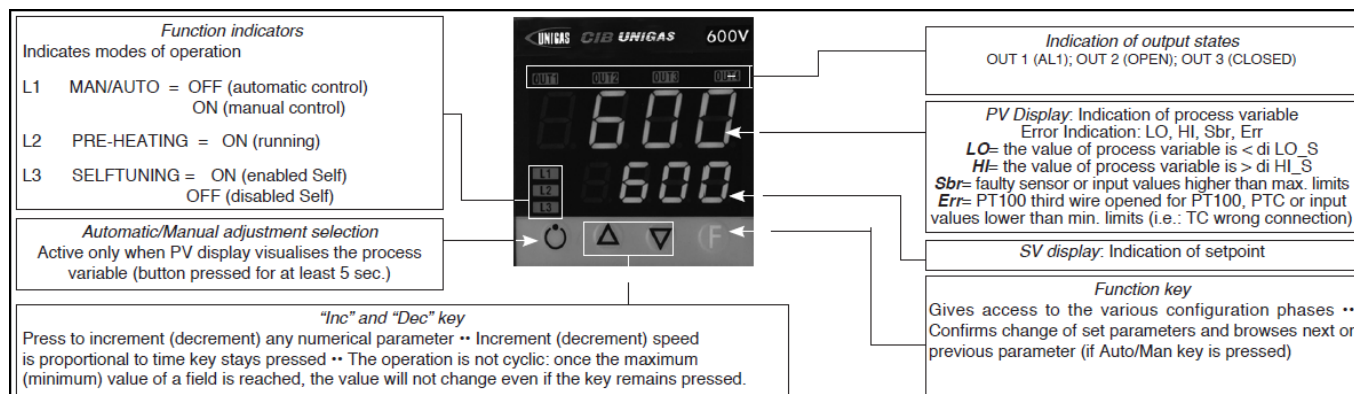
Software switch off :

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.

MANUAL FOR OPERATION AND CALIBRATION

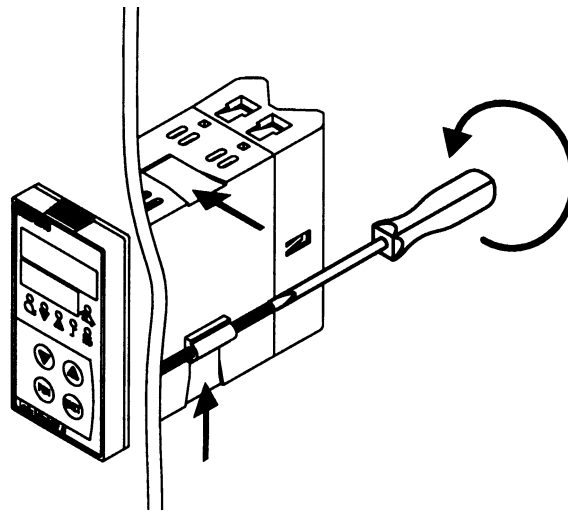
MODULATOR

SIEMENS RWF 40....

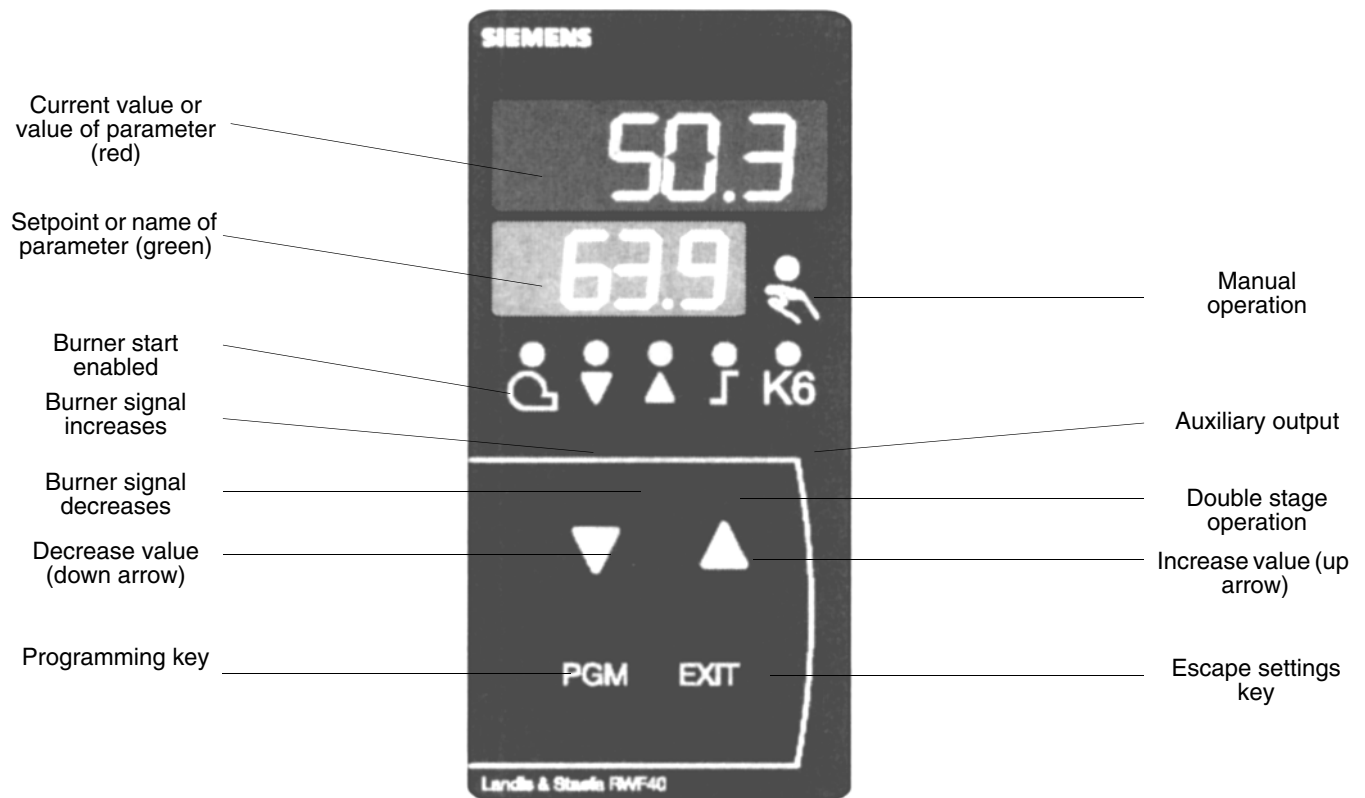
INSTRUMENT MOUNTING

Mount the instrument using the relevant mounts as illustrated in the figure.

To wire the instrument and sensors, follow the instructions given on the burner's wiring diagrams.



INSTRUMENT FRONTAL PANEL



INSTRUMENT SETTINGS

The instrument comes with a number of factory settings that are good for 90% of cases. However, you can set or edit parameters proceeding as follows

1. Setting or editing of setpoint value

With the burner switched off (thermostat/pressure switch series contacts open, i.e. terminals 3-4 open), press the PGM key, holding it down for less than 2 sec.. The display at the bottom (green) reads SP1: use the up and down arrows to set the setpoint value on the display at the top (red).

To confirm the value, press the **PGM** key, then press **EXIT** to return to normal operation.

2. Checking or editing the instrument's PID parameters (table 1 attached)

- Press the PGM key, holding it down for longer than 2 sec.. The code AL appears on the green display whilst the red display reads 0
- reads **0**.
- To change, use the up and down arrows to change the value on the red display.
- To confirm, press PGM and the green display moves on to the next parameter.
- Repeat the previous operations for all parameters.
- To stop, press the EXIT key.
- For a list of PID parameters, see table (1) attached.

3. Setting the kind of sensor to be connected to the instrument (table 2 attached)

- With the instrument in normal operating mode, press the **PGM** key, holding it down for 2 sec.. The instrument enters PID parameter configuration mode, hence press the **PGM** key for another 2 sec.
- The green display features the code **C111** whilst the red display gives the code **9030**.
- Each digit of the code corresponds to a settable parameter
- When the down arrow is pressed, the first digit on the left (n°9) on the red display starts flashing. Pressing the up arrow while the digit is flashing, you can change the value according to table (2) attached .
- Once you have edited the value, press the down arrow again and the second digit from the left (n°0) starts flashing and so on for all four digits. Press **PGM** to confirm and **EXIT** to exit.

Example: temperature sensor, set **9030**; pressure sensor, set **G030**.

4. C112 and C113 configurations (tables 3 & 4 attached) :

Configurations **C112** and **C113** enable use of an auxiliary contact (terminals Q63-Q64 and LED K6 on the front panel), which is fully configurable.

It also allows you to choose between degrees Celsius °C or Fahrenheit °F and to lock the instrument's keys.

With the instrument in normal operating mode, press the **PGM** key, holding it down for 2 sec.. The instrument enters PID parameter configuration mode, hence press the **PGM** key for another 2 sec..

The code **C111** appears on the green display whilst the red display reads **9030**. If you press **PGM** again, the green display reads **C112** and the red display reads **0110**.

For the instrument to work as standard, the **C112** configuration should never be altered, whilst the **C113** configuration should be changed when using pressure sensors or 0-10V / 0.4-20mA signals (see table (5) attached).

5. Configuring process values:

With the instrument in normal operating mode, press the **PGM** key for 2 sec.. The instrument enters PID parameter configuration mode. The code **C111** appears on the green display, whilst the code 9030 (or different code depending on settings made previously) appears on the red display. If you press **PGM** again, the code becomes **C112** and the red display reads 0010. When you next press **PGM**, the code becomes **C113** and the red display reads 0110. When you next press **PGM**, the green display reads **SCL** (=lower limit [instrument range start] for analogue input 1, valid for signals 0-10V, 0-20mA, 4-20mA, 0-100ohms etc.). Use the up arrow or down arrow to set the chosen value (see table (5) attached).

If you press the **PGM** key again, the green display reads **SCH** (=upper limit [instrument range end] for analogue input 1, valid for input signals 0-10V, 0-20mA, 4-20mA, 0-100ohms etc.). Use the up and down arrow to set the chosen value (see table (5) attached).

Example: for SIEMENS pressure sensor QBE2.. P25 (25bar), the input signal used is 0-10V: set **SCL** to 0 and **SCH** to 2500. That way the instrument's scale ranges from 0 to 2500 kPa (25 bar).

Pressing the **PGM** key repeatedly calls up the following parameters in sequence. These parameters can be edited with the up and down arrows:

SCL2: lower limit for analogue input 2 (same as SCL but for input 2 - factory setting 0);

SCH2: upper limit for analogue input 2 (same as SCH but for input 2 - factory setting 100);

SPL: lower setpoint limit (same as SCL but for setpoint - factory setting 0);

SPH: upper setpoint limit (same as SCH but for setpoint - factory setting 100);

Example: for SIEMENS pressure sensor QBE2.. P25 (25bar), the input signal used is 0-10V: if you want to work between 5 and 19 bar, set **SPL** to 500 and **SPH** to 1900 (kPa). That way the setpoint scale can be set between 500 and 1900 kPa (5 and 19 bar).

OFF1: correction for analogue input 1 (factory setting 0)

OFF2: correction for analogue input 2 (factory setting 0)

OFF3: correction for analogue input 3 (factory setting 0)

HYST: "K6" auxiliary contact differential (factory setting 1)

dF1: delay applied to sensor signal to prevent transients (range 0-100sec.; factory setting 1 sec.)

6. Manual control

- To control burner output manually, press the **EXIT** key for 5 sec. with the burner operating - the LED with the hand symbol lights.
- At this point, use the up arrow and down arrow to increase or decrease burner output.
- To exit manual mode, press the **EXIT** key.
- NB: Every time the controller switches the burner off (start enabled LED off - Q13-Q14 contact open), manual mode is disabled when the burner is switched back on.

7. Instrument self-setting (auto-tuning)

- If the burner in the steady state does not respond properly to heat generator requests, you can activate the instrument's self-setting function, which recalculates PID values for its operation, deciding which are most suitable for the specific kind of request
- To activate this function, proceed as follows:
- Press the **PGM** key and down arrow at the same time.
- The green display reads tunE and the instrument forces the burner to increase and decrease output.
- During these output oscillations, the instrument calculates the PID parameters (proportional band, integral time, derivative time).
- At the end of calculations, the tunE function switches off automatically and the instrument has stored the new parameters.
- If you want to disable the self-setting function, press the up arrow once it has started.
- PID parameters calculated by the instrument can be edited at any time following the procedure illustrated earlier in point 2.

Note:

If no key is pressed for ~10sec. during the instrument's setting, the instrument automatically exits setting mode and returns to normal operating mode.

TABLE 1 - "PID" PARAMETERS AND RELEVANT FACTORY SETTINGS

| Parameter | Display | Values range | Factory setting | Remarks |
|---|---------|--------------------------|-----------------|---|
| Limit value for auxiliary contact (*) | AL | from -1999 to 9999 digit | 0 | Do not alter |
| Auxiliary contact switching differential (*) | HYST | from 0 to 999.9 digit | 1 | Do not alter |
| Proportional band (*) | PB.1 | from 0.1 to 9999 digit | 10 | Typical value for temperature |
| Derivative action | dt | from 0 to 9999 sec. | 80 | Typical value for temperature |
| Integral action | rt | from 0 to 9999 sec. | 350 | Typical value for temperature |
| Dead band (*) | db | from 0 to 999.9 digit | 1 | Typical value |
| Servocontrol running time | tt | from 10 to 3000 sec. | 15 | Set servocontrol running time |
| Switch-on differential (*) | HYS1 | from 0.0 to -199.9 digit | -5 | Value under setpoint below which the burner switches back on (Q13-Q14 closes) |
| Lower switch-off differential (*) | HYS2 | from 0.0 to HYS3 | 3 | Do not alter |
| Upper switch-off differential (*) | HYS3 | from 0.0 to 999.9 digit | 5 | Value over setpoint above which the burner switches off (Q13-Q14 opens) |
| Modulating response threshold | q | from 0.0 to 999.9 | 0 | Do not alter |
| Weather compensation gradient | H | from 0.0 to 4 | 1 | Do not alter |
| Ambient temperature parallel displacement (*) | P | from -90 to +90 | 0 | Do not alter |

(*) Parameters affected by setting of decimal place (C113 configuration 01X0)

TABLE 2 - INPUTS CONFIGURATION C111

| Red display | | | | |
|---|----------|----------|----------|----------|
| Analog input 1 | 1^ digit | 2^ digit | 3^ digit | 4^ digit |
| Pt100 3 wires | 0 | | | |
| Pt100 22 wires | 1 | | | |
| Ni100 3 wires | 2 | | | |
| Ni100 22 wires | 3 | | | |
| Pt1000 3 wires | 4 | | | |
| Pt 1000 22 wires | 5 | | | |
| Ni1000 3 wires DIN 43760 | 6 | | | |
| Ni1000 22 wires DIN 43760 | 7 | | | |
| Ni1000 3 wires Siemens | 8 | | | |
| Ni1000 22 wires Siemens | 9 | | | |
| Thermocoupling K NiCr-Ni | A | | | |
| Thermocoupling T Cu-Con | b | | | |
| Thermocoupling N NiCrSiI-NiSiI | C | | | |
| Thermocoupling J Fe-Con | d | | | |
| Signal 0 ÷ 20 mA | E | | | |
| Signal 4 ÷ 20 mA | F | | | |
| Signal 0 ÷ 10 V | G | | | |
| Signal 0 ÷ 1 V | H | | | |
| Analog input 2 | | | | |
| none | | 0 | | |
| external set point WFG | | 1 | | |
| external set point 0 ÷ 20 mA | | 2 | | |
| external set point 4 ÷ 20 mA | | 3 | | |
| external set point 0 ÷ 10 V | | 4 | | |
| external set point 0 ÷ 1 V | | 5 | | |
| analog shift set-point WFG | | 6 | | |
| analog shift set-point 0 ÷ 20 mA | | 7 | | |
| analog shift set-point 4 ÷ 20 mA | | 8 | | |
| analog shift set-point 0 ÷ 10 V | | 9 | | |
| analog shift set-point 0 ÷ 1 V | | A | | |
| Analog input 3 | | | | |
| none | | | 0 | |
| external temperature sensor Pt 1000 22 wires | | | 1 | |
| external temperature sensor Ni1000 22 wires DIN | | | 2 | |
| external temperature sensor Ni1000 22 wires Siemens | | | 3 | |
| Input D2 - Logic functions | | | | |
| none | | | | 0 |
| changeover set-point | | | | 1 |
| V shift set-point | | | | 2 |
| Typical settings | | | | |
| Siemens sensors QAE2../QAC2../QAM2.. | 9 | 0 | 3 | 0 |
| Factory sensors Pt1000 30÷130 °C | 5 | 0 | 3 | 0 |
| Factory sensors Pt1000 0 ÷ 350 °C | 5 | 0 | 3 | 0 |
| Pressure probes QBE... 3 wires (signal 0 ÷ 10 V) | G | 0 | 3 | 0 |
| Pressure probes MBS... 2 wires (signal 4 ÷ 20 mA) | F | 0 | 3 | 0 |
| Probes Pt100 3 wires | 0 | 0 | 3 | 0 |
| Thermocouplings K type | A | 0 | 3 | 0 |
| Signal 4 ÷ 20 mA | F | 0 | 3 | 0 |

TABLE 3 - CONFIGURATION C112

| Red display | 1 ^ digit | 2 ^ digit | 3 ^ digit | 4 ^ digit |
|--|-----------|-----------|-----------|-----------|
| Auxiliary limit switch K6 | | | | |
| none | 0 | | | |
| Ik1 function for input 1 | 1 | | | |
| Ik2 function for input 1 | 2 | | | |
| Ik3 function for input 1 | 3 | | | |
| Ik4 function for input 1 | 4 | | | |
| Ik5 function for input 1 | 5 | | | |
| Ik6 function for input1 | 6 | | | |
| Ik7 function for input 1 | 7 | | | |
| Ik8 function for input 2 | 8 | | | |
| Ik7 function for input 2 | 9 | | | |
| Ik8 function for input 2 | A | | | |
| Ik7 function for input 3 | b | | | |
| Ik8 function for input 3 | C | | | |
| Type of instrumentoutput control | | | | |
| 3 points (relay type) | | 0 | | |
| DC 0 ÷ 20 mA (*) | | 1 | | |
| DC 4 ÷ 20 mA (*) | | 2 | | |
| DC 0 ÷ 10 V (*) | | 3 | | |
| Set-point SP1 | | | | |
| SP1set with keys | | | 0 | |
| SP1 dependent on outside sensor (analogue input 3 must be configured) | | | 1 | |
| Parameter lock | | | | |
| no keyboard lock | | | | 0 |
| configuration level block | | | | 1 |
| parameters level block PID | | | | 2 |
| total block | | | | 3 |
| Factory settings | 0 | 0 | 1 | 0 |

Note: (*) for RWF 40.002 only

TABLE 4 - CONFIGURATION C113

| Red display | 1^ digit | 2^ digit | 3^ digit | 4^ digit |
|--|----------|----------|----------|----------|
| Instrument addresses (for RWF 40.003 only | | | | |
| address 0 | 0 | | | |
| address 1 | 0 | 1 | | |
| address... | ... | ... | | |
| address 99 | 9 | 9 | | |
| Unit of measurement and decimal place | | | | |
| °C without decimal | | | 0 | |
| °C and 1 decimal | | | 1 | |
| °F without decimal | | | 2 | |
| °F and 1 decimal | | | 3 | |
| Activation of “K6” | | | | |
| limit contact OFF | | | | 0 |
| limit contact ON | | | | 1 |
| Factory settings | 0 | 1 | 1 | 0 |

TABLE 5 - SUMMARY OF STANDARD PARAMETER SETTINGS

| | PARAMETERS TO BE EDITED | | | | | | | | | | | |
|----------------------------------|-------------------------|--|-------------|-------------|-------------|-------------|-------------|-------------|-------|----|-----|-------------|
| SENSORS/PROBES | C111 | C113 | SCL | SCH | SPL | SPH | HYS1 (*) | HYS3 (*) | Pb. 1 | dt | rt | SP1 (*) |
| Siemens QAE2120.010 | 9030 | 0110 | - | - | 30 | 95 | -5 | 5 | 10 | 80 | 350 | 80°C |
| Siemens QAM2120.040 | 9030 | 0110 | - | - | 0 | 80 | -2,5 | 2,5 | 10 | 80 | 350 | 40°C |
| Pt1000 (130°C max.) | 5030 | 0110 | - | - | 30 | 95 | -5 | 5 | 10 | 80 | 350 | 80°C |
| Pt1000 (350°C max.) | 5030 | 0110 | - | - | 0 | 350 | -5 | 10 | 10 | 80 | 350 | 80°C |
| Pt100 (130°C max.) | 0030 | 0110 | - | - | 0 | 95 | -5 | 5 | 10 | 80 | 350 | 80°C |
| Pt100 (350°C max) | 0030 | 0110 | - | - | 0 | 350 | -5 | 10 | 10 | 80 | 350 | 80°C |
| Termocouple K | A030 | 0110 | - | - | 0 | 1200 | -5 | 20 | 10 | 80 | 350 | 80°C |
| Danfoss/Siemens 4÷20mA p 1,6 bar | F030 | 0100 | 0 | 160 | 0 | 160 | 0 | 20 | 5 | 20 | 80 | 100kPa |
| Danfoss/Siemens 4÷20mA p 10 bar | F030 | 0100 | 0 | 1000 | 0 | 1000 | 0 | 50 | 5 | 20 | 80 | 600kPa |
| Danfoss/Siemens 4÷20mA p 16 bar | F030 | 0100 | 0 | 1600 | 0 | 1600 | 0 | 80 | 5 | 20 | 80 | 600kPa |
| Danfoss/Siemens 4÷20mA p 25 bar | F030 | 0100 | 0 | 2500 | 0 | 2500 | 0 | 125 | 5 | 20 | 80 | 600kPa |
| Danfoss/Siemens 4÷20mA p 40 bar | F030 | 0100 | 0 | 4000 | 0 | 4000 | 0 | 200 | 5 | 20 | 80 | 600kPa |
| Siemens QBE2.. P4 | G030 | 0100 | 0 | 400 | 0 | 400 | 0 | 20 | 5 | 20 | 80 | 200kPa |
| Siemens QBE2.. P10 | G030 | 0100 | 0 | 1000 | 0 | 1000 | 0 | 50 | 5 | 20 | 80 | 600kPa |
| Siemens QBE2.. P16 | G030 | 0100 | 0 | 1600 | 0 | 1600 | 0 | 80 | 5 | 20 | 80 | 600kPa |
| Siemens QBE2.. P25 | G030 | 0100 | 0 | 2500 | 0 | 2500 | 0 | 125 | 5 | 20 | 80 | 600kPa |
| Siemens QBE2.. P40 | G030 | 0100 | 0 | 4000 | 0 | 4000 | 0 | 200 | 5 | 20 | 80 | 600kPa |
| Signal 0÷10V | G030 | to be fixed | to be fixed | to be fixed | to be fixed | to be fixed | to be fixed | to be fixed | 5 | 20 | 80 | to be fixed |
| Signal 4÷20mA | F030 | to be fixed | to be fixed | to be fixed | to be fixed | to be fixed | to be fixed | to be fixed | 5 | 20 | 80 | to be fixed |
| tt - servocontrol run | 12 sec. | Servocontrol Berger STA12B.../Siemens SQN30.251/Siemens SQN72.4A4A20 | | | | | | | | | | |
| tt - servocontrol run | 13 sec. | Servocontrol Berger STA13B... | | | | | | | | | | |
| tt - servocontrol run | 15 sec. | Servocontrol Berger STA15B... | | | | | | | | | | |
| tt - servocontrol run | 30 sec. | Servocontrol Siemens SQL33.03/Siemens SQM10/Siemens SQM50/Siemens SQM54/Berger STM30../Siemens SQM40.265 | | | | | | | | | | |

NOTES

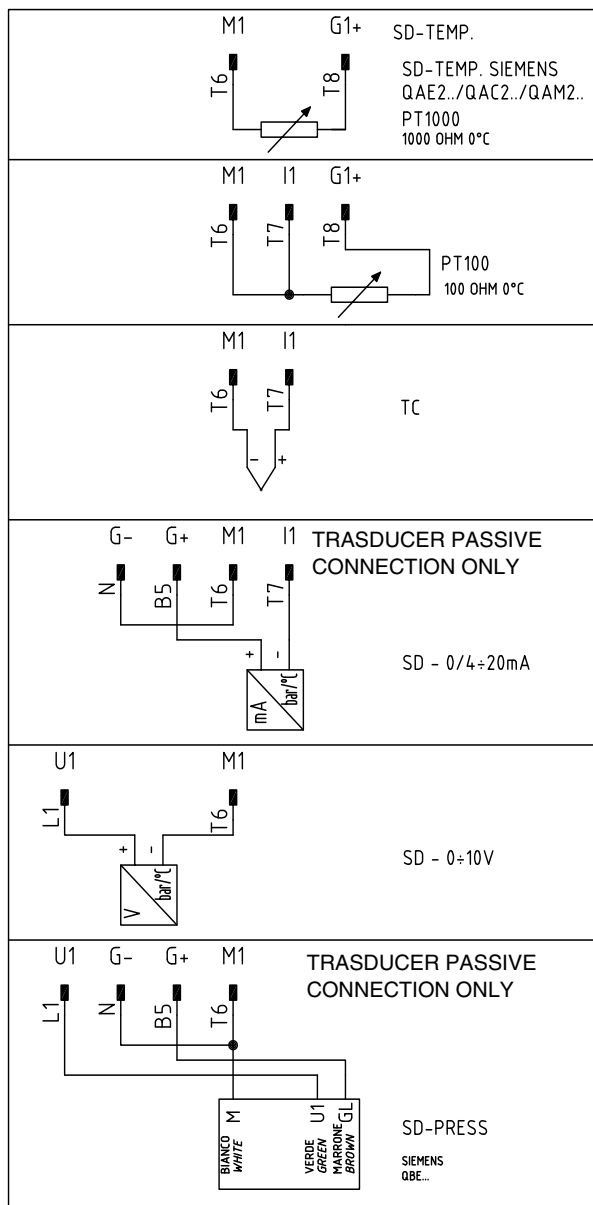
(*) These values are factory set - values must be set during operation at the plant based on the real working temperature/pressure value.

WARNING

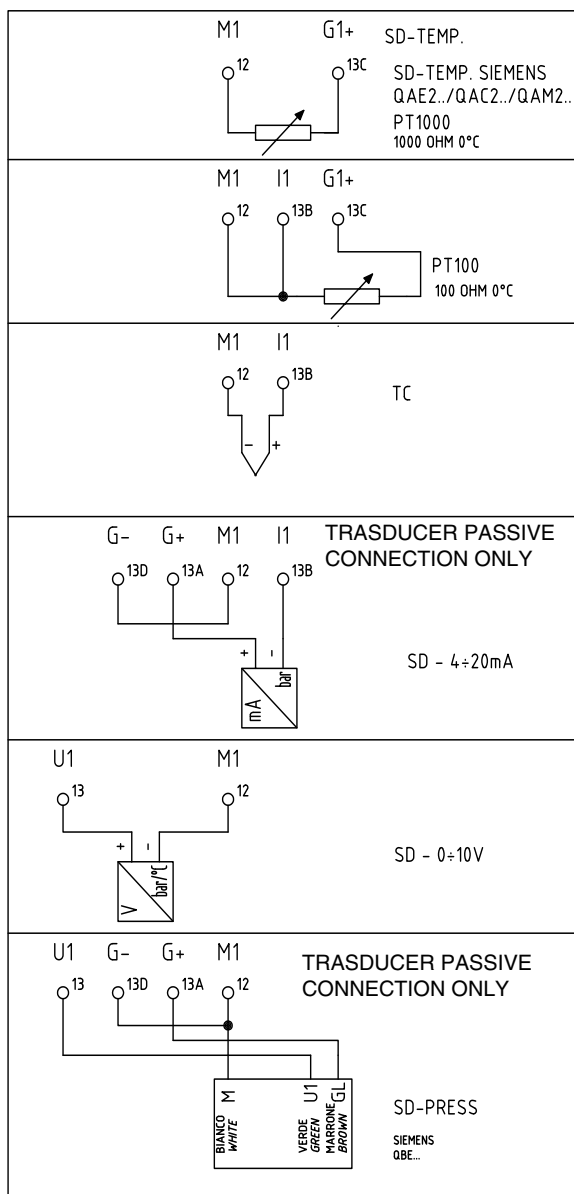
With pressure sensors, parameters SP1, SCH, SCL, HYS1, HYS3 must be selected and displayed in kPa (kilo Pascal).
(1bar = 100,000Pa = 100kPa)

Probe electric connection :

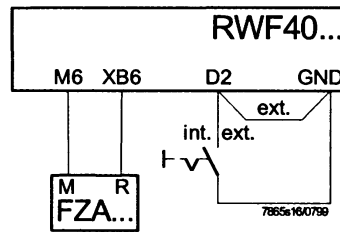
With 7 pins connector version



With terminals version

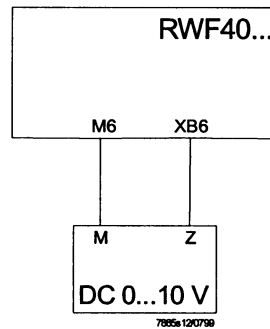


With external setpoint



C111 configuration code = X1X1

With setpoint modified by independent management system



C111 configuration code = X9XX

$$SCH2 = 0.5 \times (SPH - SPL)$$

$$SCL2 = -0.5 \times (SPH - SPL)$$

Example:

SPH = max. 130° C

SPL = min. 30° C

$$SCH2 = 0.5 \times (130 - 30) = 50$$

$$SCL2 = -0.5 \times (130 - 30) = -50$$

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.

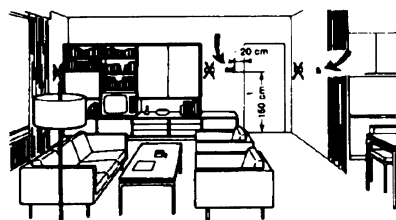
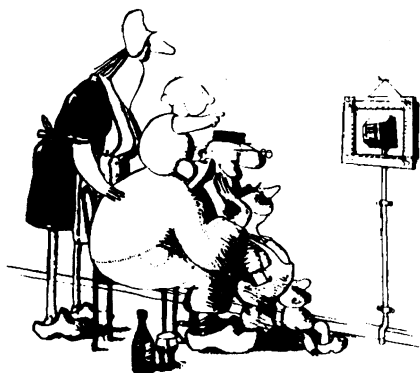
Measurement is taken based on design features (time constant) and according to specific operating conditions.

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.



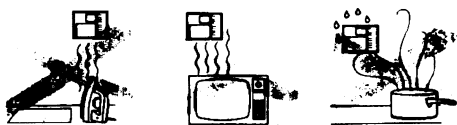
Outside probes (weather)

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

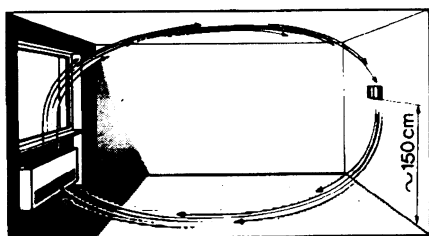
Heating systems: the room sensor must not be installed in rooms with heating units complete with thermostatic valves. Avoid all sources of heat foreign to the system.



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

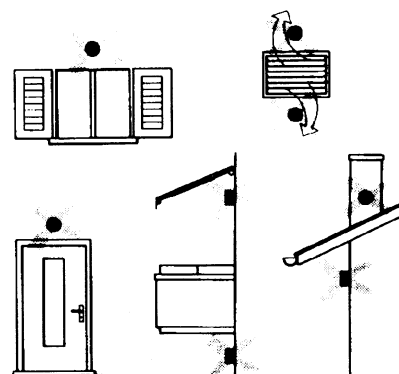
On an inner wall on the other side of the room to heating units height above floor 1.5 m, at least 1.5 m away from external sources of heat (or cold)



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

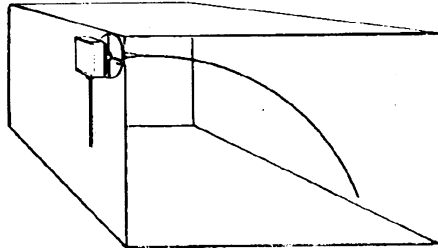
Installing temperature sensors

For measuring outlet air:

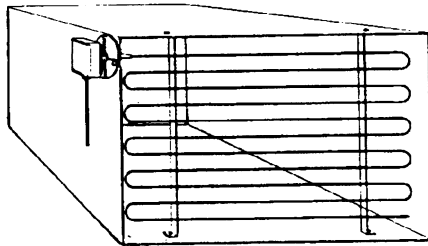
- after delivery fan or
- after coil to be controlled, at a distance of at least 0,5 m

For measuring room temperature:

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



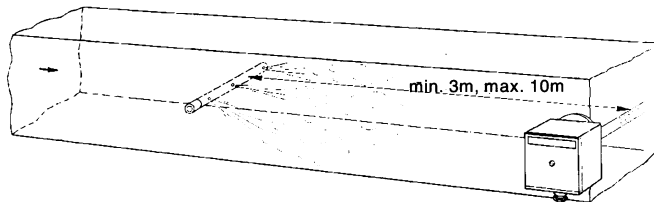
Bend 0.4m sensor by hand (never use tools) as illustrated.



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).



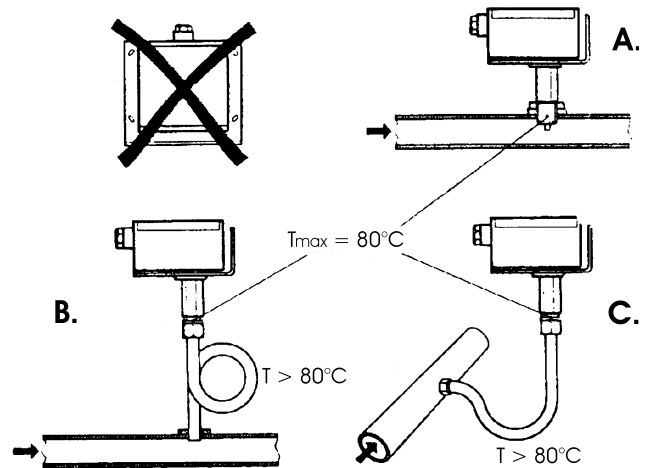
Installing pressure sensors

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

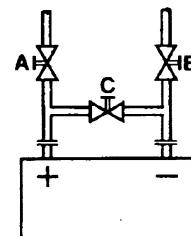
start disable

1=open C1=open C

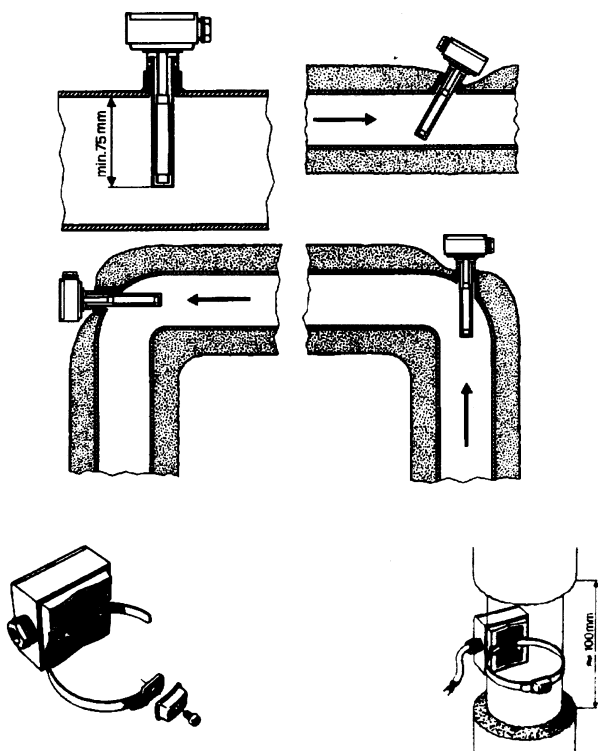
2=open A2=close B

3=open B3=close A

4= close C



Immersion or strap-on sensors



Immersion probes mounting

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

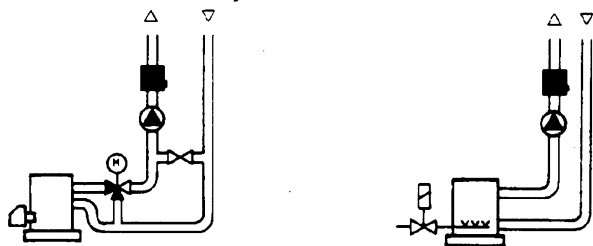
Placing the probes (QAD22.../QAE21.../QAP21.../RCA...)

With pumps on outlet

with 3 ways valves / with 4 ways valves



Panel system / burner control



With pumps on return

with 3 ways valves / with 4 ways valves



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

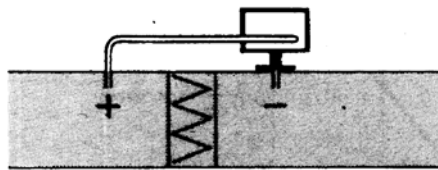
- Measure "mean" fluid temperature
- No external influence on measurement such as: currents of air, nearby pipes etc.

Limits

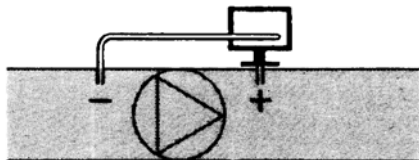
- Time constant with sheath: 20 sec.
- Hard to change installation position if it proves incorrect.

Duct pressure switches and sensors

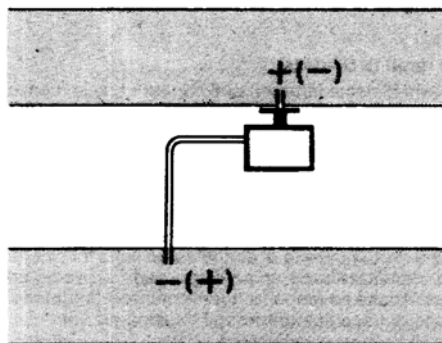
Installing differential pressure probes for air



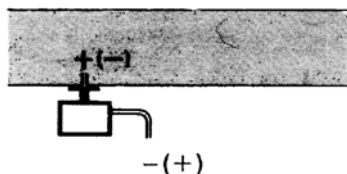
A - Control a filter (clogging)



B - Control a fan (upstream/downstream)



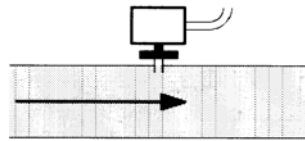
C - Measurement of difference in pressure between two ducts



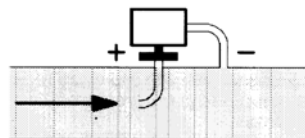
D - Measurement of difference in pressure between two rooms or of inside of duct and outside

Basic principles

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



Measuring dynamic pressure

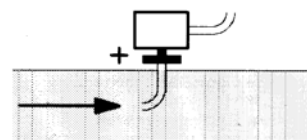


$$P_d = \frac{\gamma v^2}{2g}$$

Key

γ kg/m³, specific weight of air
 v m/s, air speed
 g 9.81 m/s², gravity acceleration
 P_d mm C.A., dynamic pressure

Measuring total pressure



Pressure probes connection Siemens QBE 2...P... to burner's terminal block

SONDA DI PRESSIONE
 PRESSURE SENSOR
 SONDE DE PRESSION
 QBE 2...P...

MORSETTIERA BRUCIATORE
 BURNER TERMINAL BLOCK
 BORNIER DU BRÛLEUR

BLANC - BIANCO
 WHITE
 VERT - VERDE
 GREEN
 BRUN - MARRONE
 BROWN

| | |
|----|-----|
| M | 12 |
| U1 | 13 |
| GL | 13A |

Spare parts

| Description | Code |
|---|---------|
| Modulator RWF40.000 | 2570112 |
| Adapting frame Siemens ARG40 from RWF32.. to RWF40.. | 2570113 |
| Temperature probe Siemens QAE2120.010A (30÷130°C) | 2560101 |
| Temperature probe Siemens QAM2120.040 (-15÷+50°C) | 2560135 |
| Thermoresistor Pt1000 \varnothing = 6mm L = 100mm (30÷130°C) | 2560188 |
| Thermoresistor Pt1000 \varnothing = 10mm L = 200mm (0÷350°C) | 2560103 |
| Pressure probe Siemens QBE2.. P4 (0÷4bar) | 2560159 |
| Pressure probe Siemens QBE2.. P10 (0÷10bar / signal 0÷10V) | 2560160 |
| Pressure probe Siemens QBE2.. P16 (0÷16bar / signal 0÷10V) | 2560167 |
| Pressure probe Siemens QBE2.. P25 (0÷25bar / signal 0÷10V) | 2560161 |
| Pressure probe Siemens QBE2.. P40 (0÷40bar / signal 0÷10V) | 2560162 |
| Pressure probe Danfoss MBS3200 p 1,6 (0÷1,6bar / segnale 4÷20mA) | 2560189 |
| Pressure probe Danfoss MBS3200 p 10 (0÷10bar / segnale 4÷20mA) | 2560190 |
| Pressure probe Danfoss MBS3200 p 16 (0÷16bar / segnale 4÷20mA) | 2560191 |
| Pressure probe Danfoss MBS3200 p 25 (0÷25bar / segnale 4÷20mA) | 2560192 |
| Pressure probe Danfoss MBS3200 p 40 (0÷40bar / segnale 4÷20mA) | 2560193 |
| Pressure probe Siemens 7MF1564-3BB00-1AA1 (0÷1,6bar / segnale 4÷20mA) | 25601A3 |
| Pressure probe Siemens 7MF1564-3CA00-1AA1 (0÷10bar / segnale 4÷20mA) | 25601A4 |
| Pressure probe Siemens 7MF1564-3CB00-1AA1 (0÷16bar / segnale 4÷20mA) | 25601A5 |
| Pressure probe Siemens 7MF1564-3CD00-1AA1 (0÷25bar / segnale 4÷20mA) | 25601A6 |
| Pressure probe Siemens 7MF1564-3CE00-1AA1 (0÷40bar / segnale 4÷20mA) | 25601A7 |
| Thermocoupling type K \varnothing = 10mm L = 200mm (0÷1200°C) | 2560142 |
| Thermoresistor Pt100 \varnothing = 10mm L = 200mm (0÷350°C) | 2560145 |

RWF50.2x & RWF50.3x

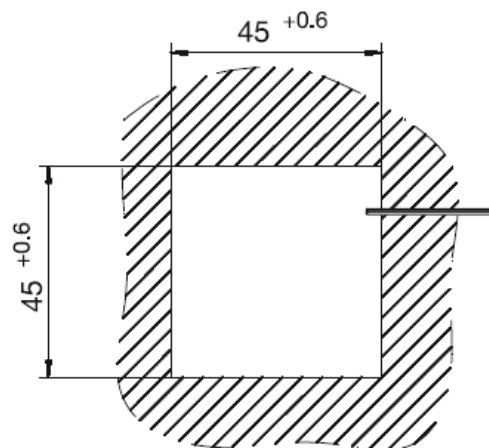
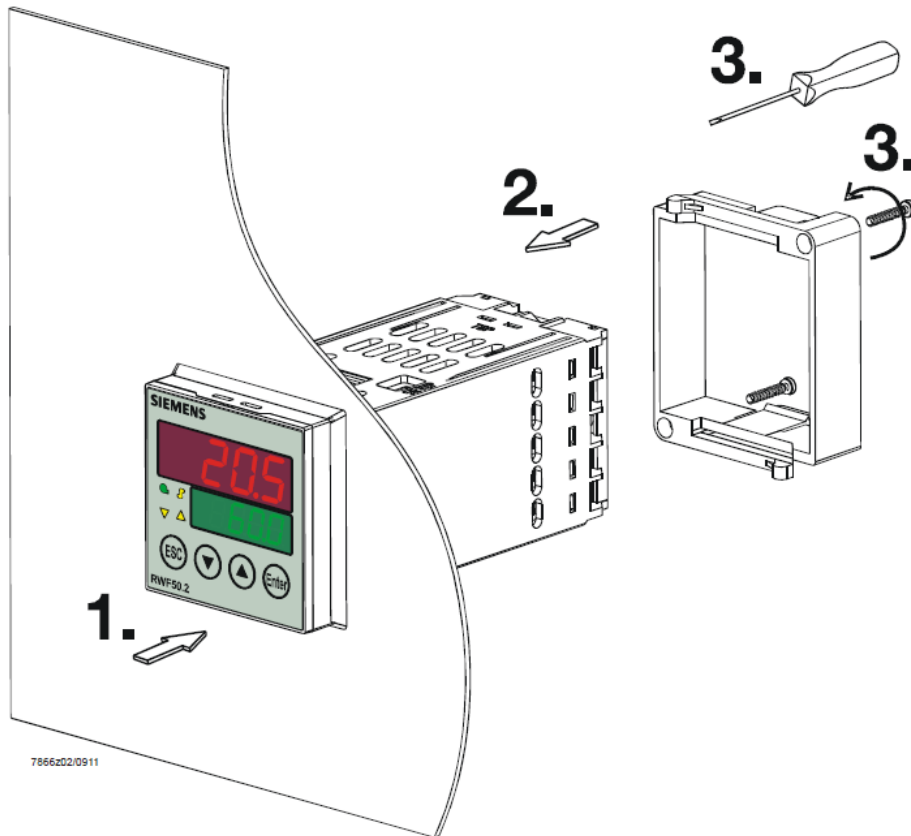


User manual

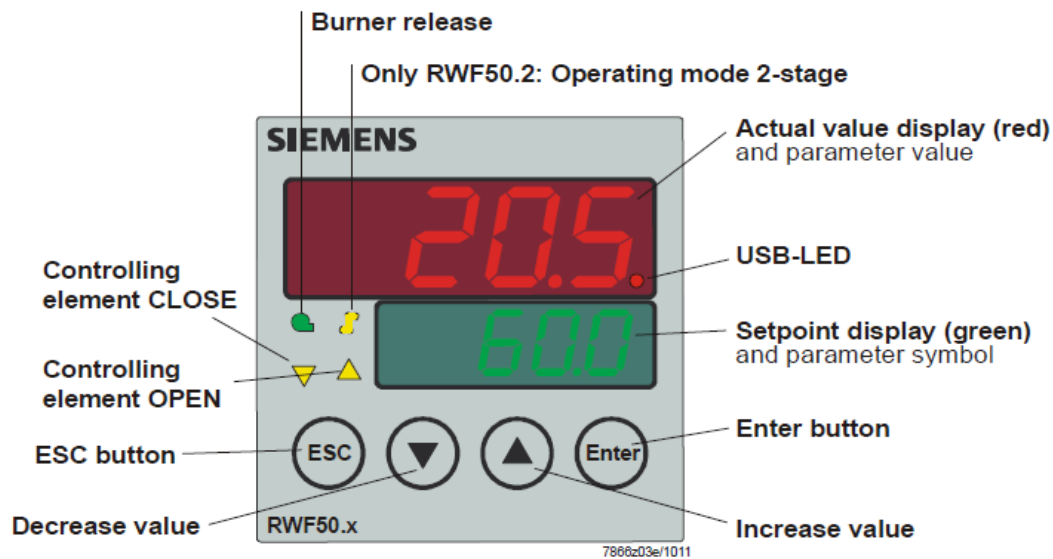
DEVICE INSTALLATION

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

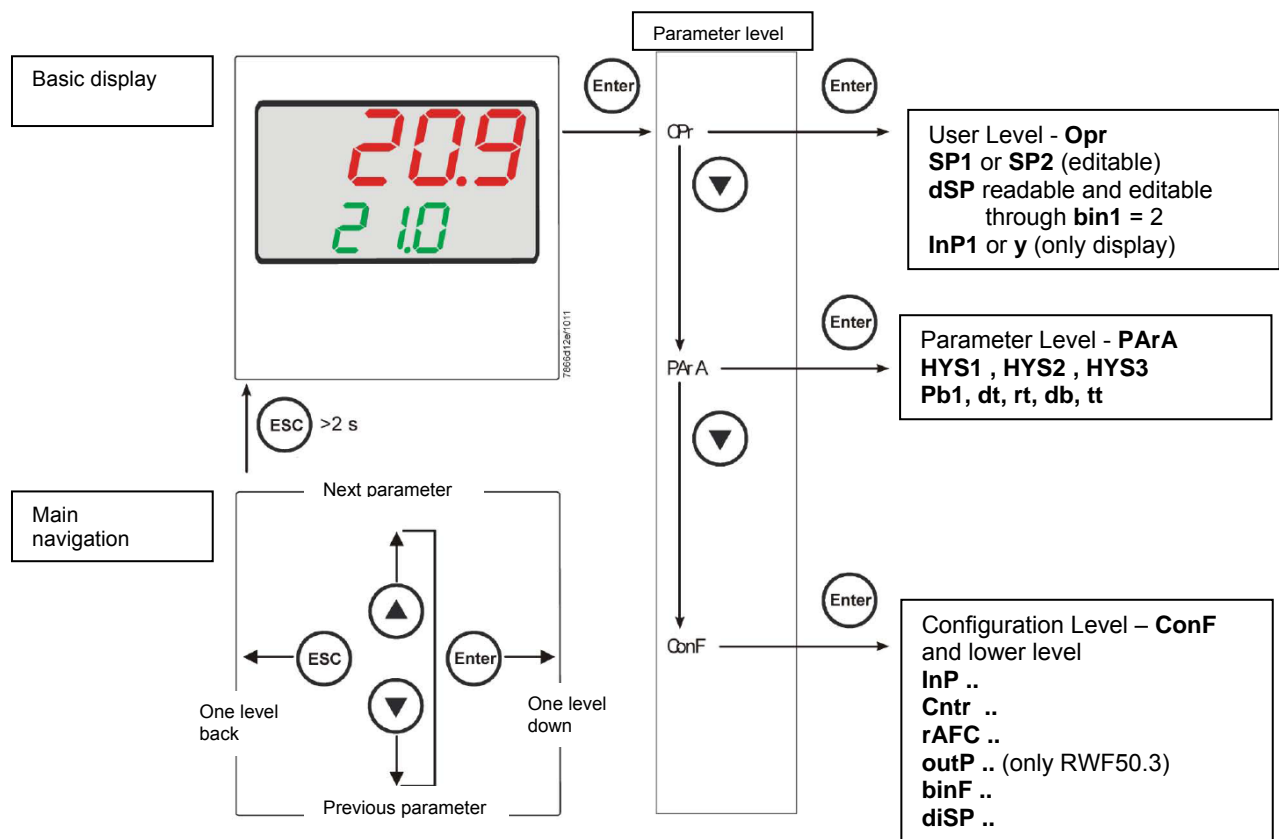
To wire the device and sensors, follow the instructions on the burner wiring diagram.



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 2 | 1 = degrees Celsius 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

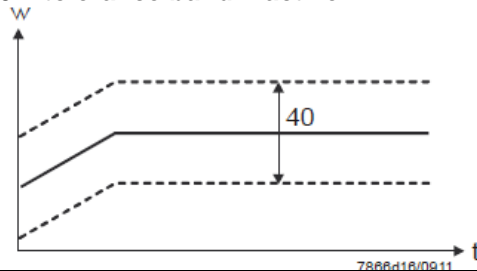
| Parameter | Value | Description |
|---|----------------------------|--|
| CtYP controller type | 1 2 | 1 = 3-position controller (open-stop-close only RWF50.2) 2 = continuative action controller (only RWF50.3) |
| CACt control action | 1 0 | 1 = heating controller 0 = cooling controller |
| SPL least 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.

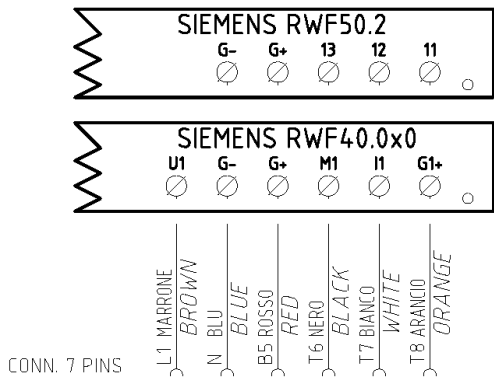
Display of software version :



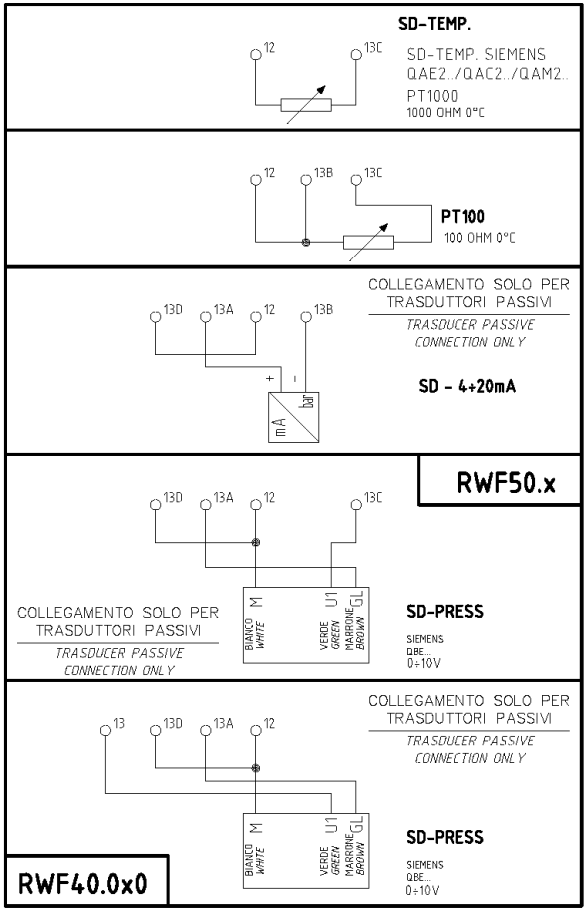
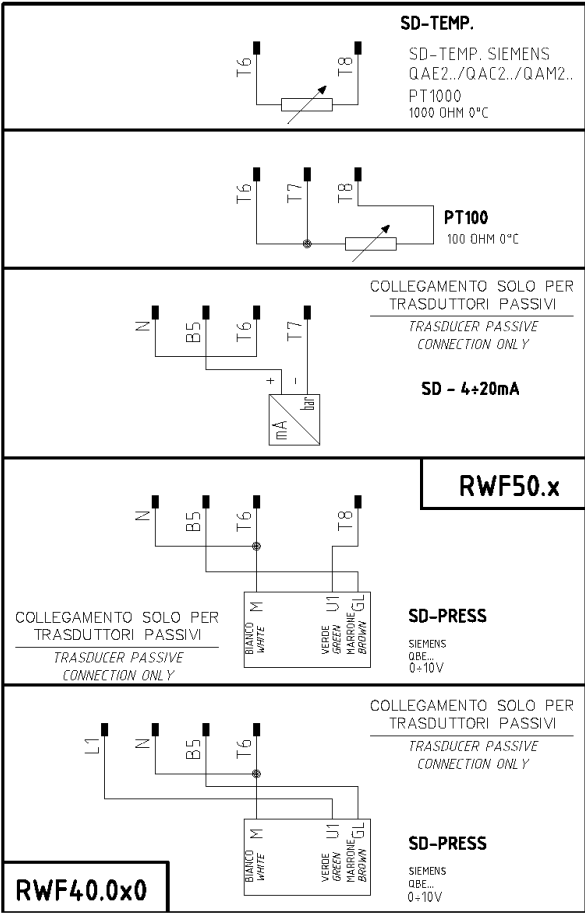
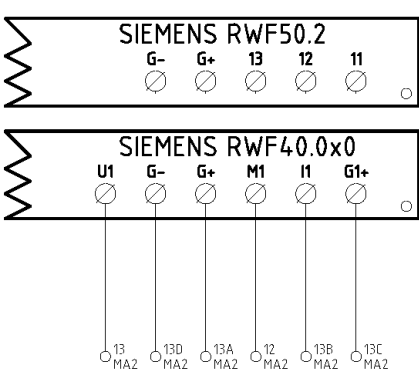
The software version is shown by pushing **Enter + UP arrow** on the upper display

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 | | | | | Conf | | | | | | | | | Opr |
|-------------------------|------|------|-------------|-------------|----------|-------------|-------------|-------------|-------|----|------|-----|-------------|-------------|-------------|
| | Inp | | | | | | | diSP | | | | | | | |
| | Inp1 | | | | | | | | Cntr | | PArA | | | | |
| Types of probe | SEn1 | OFF1 | SCL1 | SCH1 | 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 |
| Probe 4÷20mA / 0÷1,6bar | 16 | 0 | 0 | 160 | needless | 0 | 160 | 0 | 5 | 20 | 80 | (#) | 0 | 20 | 100 kPa |
| Probe 4÷20mA / 0÷3bar | 16 | 0 | 0 | 300 | needless | 0 | 300 | 0 | 5 | 20 | 80 | (#) | 0 | 20 | 200 kPa |
| Probe 4÷20mA / 0÷10bar | 16 | 0 | 0 | 1000 | needless | 0 | 1000 | 0 | 5 | 20 | 80 | (#) | 0 | 50 | 600 kPa |
| Probe 4÷20mA / 0÷16bar | 16 | 0 | 0 | 1600 | needless | 0 | 1600 | 0 | 5 | 20 | 80 | (#) | 0 | 80 | 600 kPa |
| Probe 4÷20mA / 0÷25bar | 16 | 0 | 0 | 2500 | needless | 0 | 2500 | 0 | 5 | 20 | 80 | (#) | 0 | 125 | 600 kPa |
| Probe 4÷20mA / 0÷40bar | 16 | 0 | 0 | 4000 | needless | 0 | 4000 | 0 | 5 | 20 | 80 | (#) | 0 | 200 | 600 kPa |
| 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 – servo control run time

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

(*)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)

APPENDIX: PROBES CONNECTION

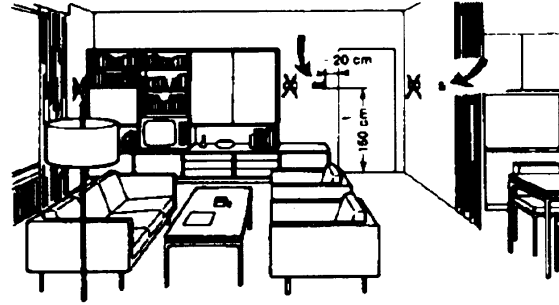
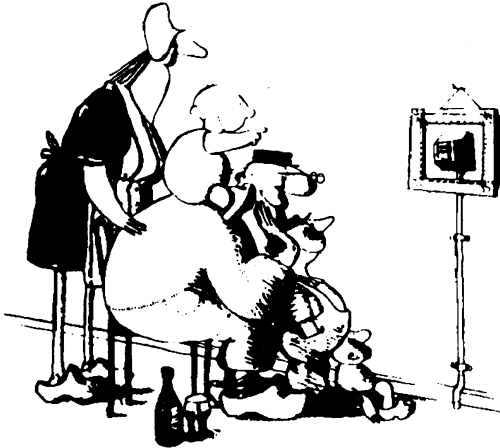
To assure the utmost comfort, the control system needs reliable information, which can be obtained provided the sensors have been installed correctly. Sensors measure and transmit all variations encountered at their location.

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.



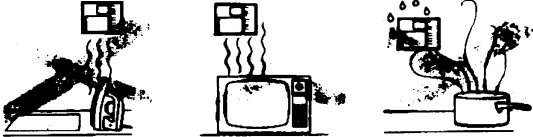
Outside probes (weather)

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

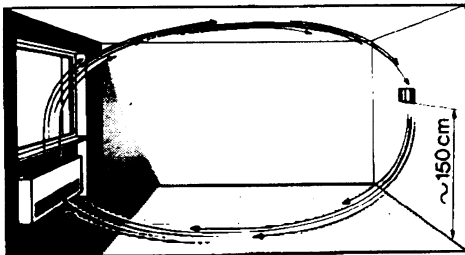
Heating systems: the room sensor must not be installed in rooms with heating units complete with thermostatic valves. Avoid all sources of heat foreign to the system.



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

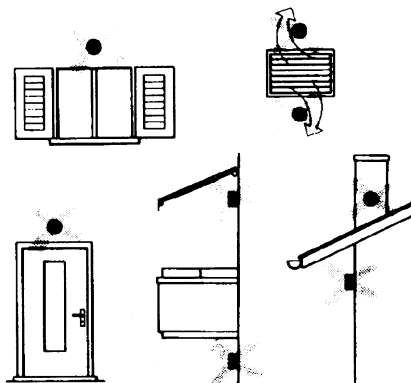
On an inner wall on the other side of the room to heating units height above floor 1.5 m, at least 1.5 m away from external sources of heat (or cold).



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

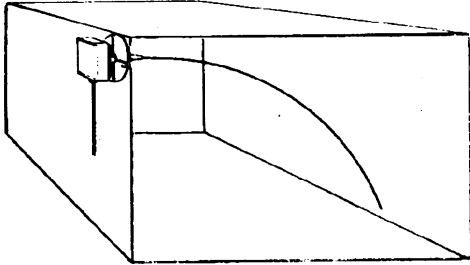
Installing temperature sensors

For measuring outlet air:

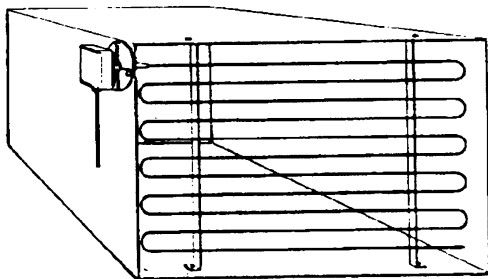
- after delivery fan or
- after coil to be controlled, at a distance of at least 0,5 m

For measuring room temperature:

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



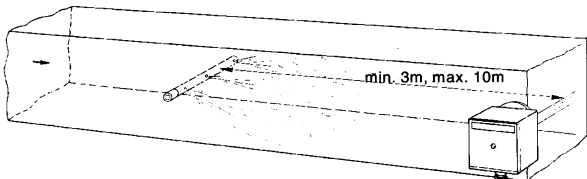
Bend 0.4m sensor by hand (never use tools) as illustrated.



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).



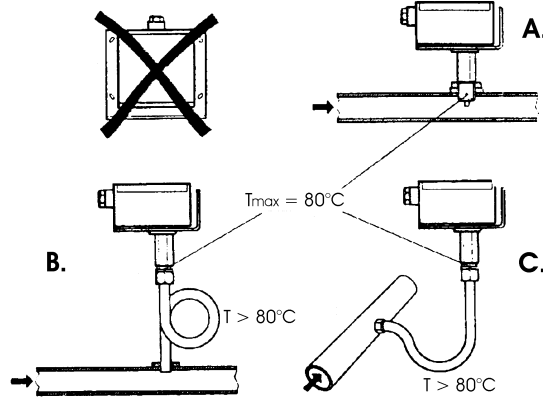
Installing pressure sensors

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

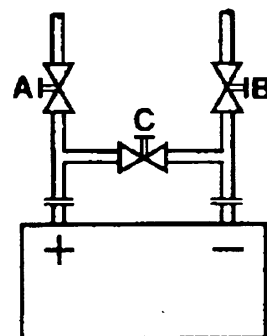
Start disable

1=open C1=open C

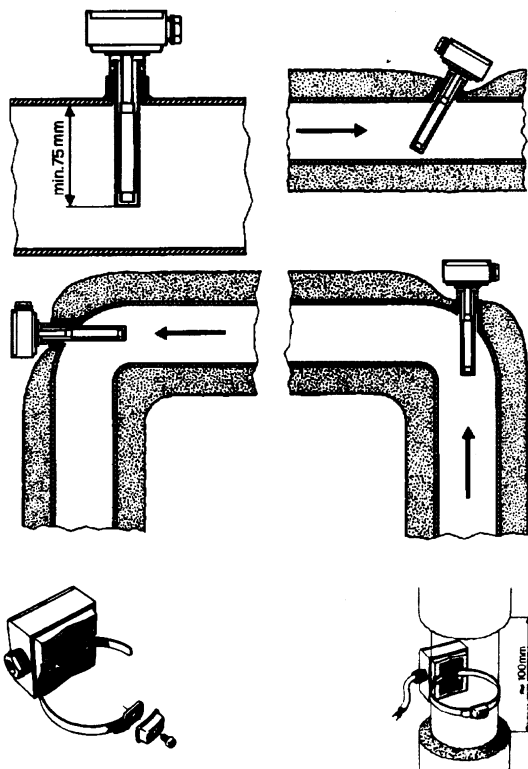
2=open A2=close B

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.

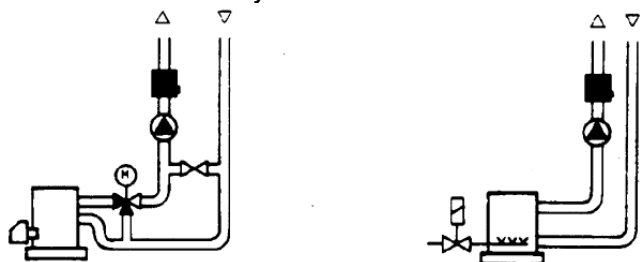
Sensors come with straps for pipes up to 100 mm in diameter

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:

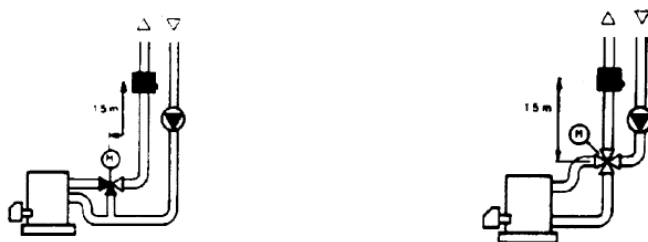
- Measure "mean" fluid temperature
- No external influence on measurement such as: currents of air, nearby pipes etc.

Limits:

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

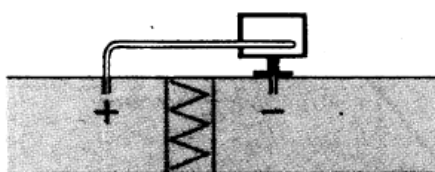
With pumps on return

with 3 ways valves / with 4 ways valves

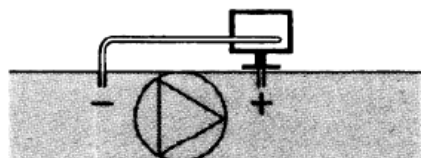


Duct pressure switches and sensors

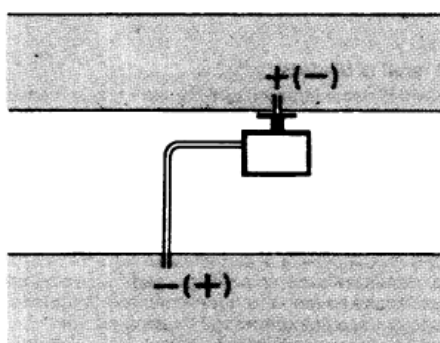
Installing differential pressure probes for air



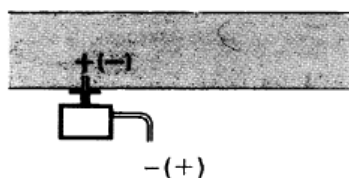
A - Control a filter (clogging)



B - Control a fan (upstream/downstream)



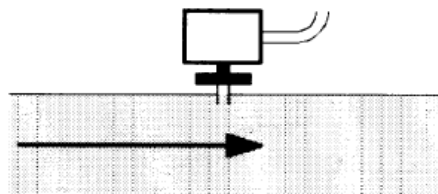
C - Measurement of difference in pressure between two ducts



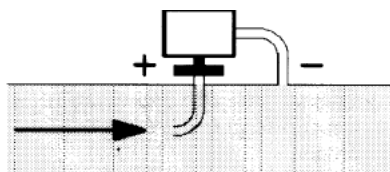
D - Measurement of difference in pressure between two rooms or of inside of duct and outside

Basic principles

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



Measuring dynamic pressure

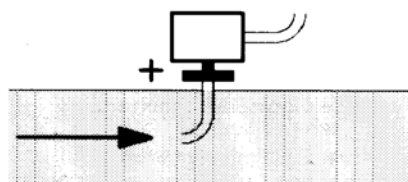


$$Pd = \frac{\gamma v^2}{2g}$$

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

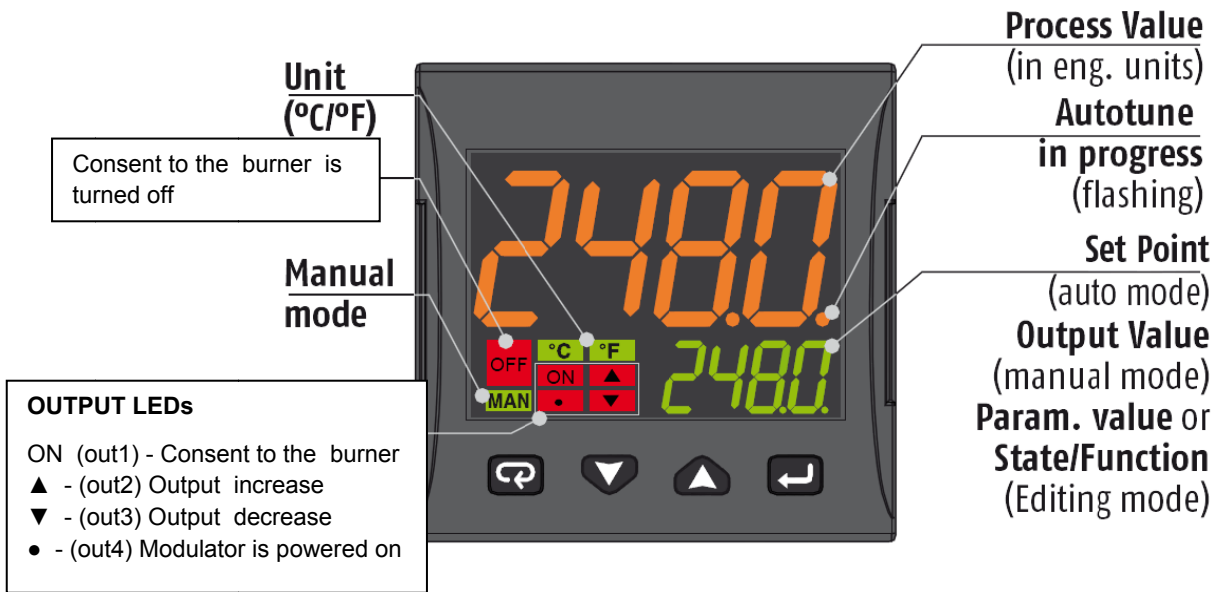
Note: Specifications and data subject to change. Errors and omissions excepted.





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:

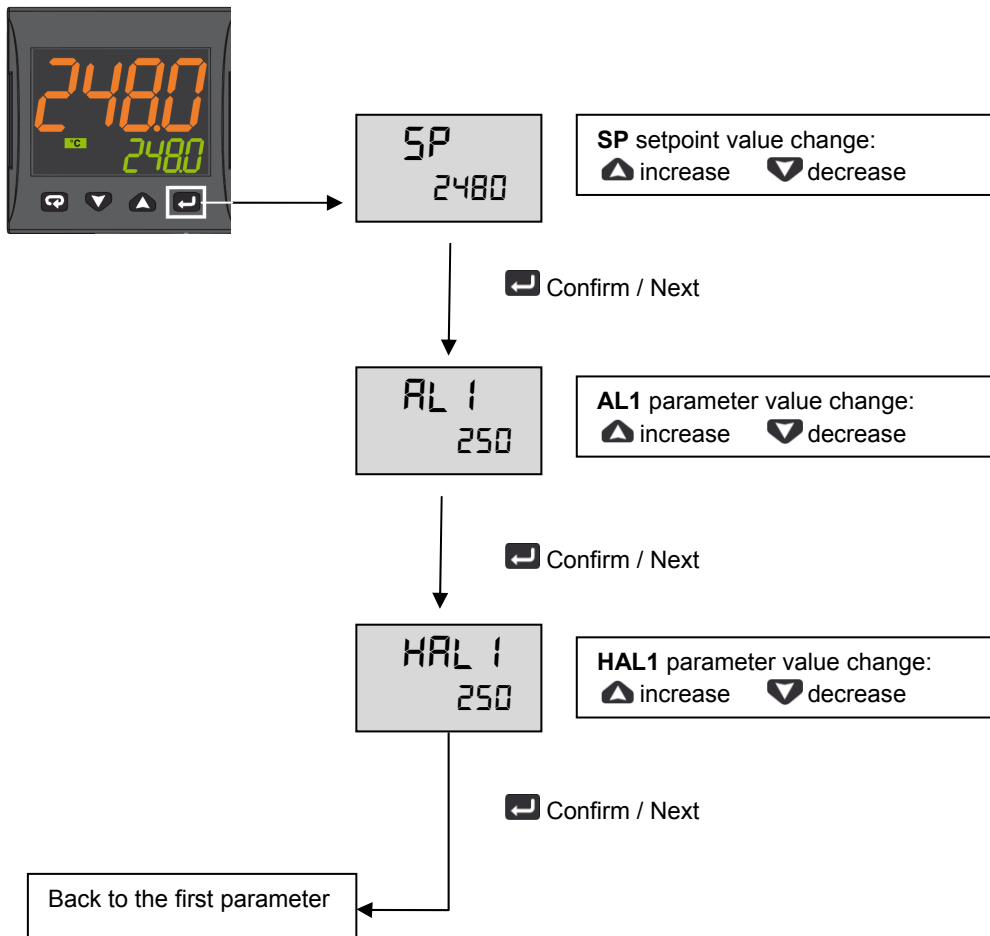
- **Neutral wire:** terminal 9
- **Phase:** terminal 10 (100...240 Vac)
- Close terminals 15-16 to switch to the set point 2

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:



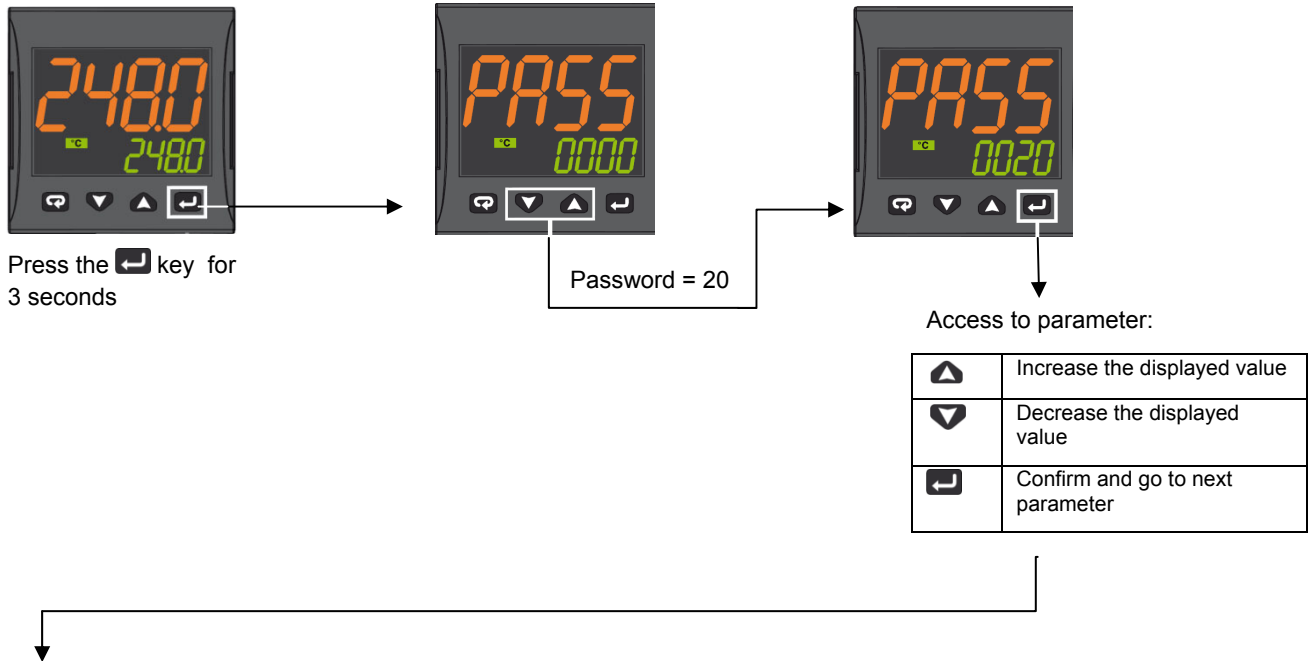
To return to normal mode, press the  key for 3 seconds or wait the 10s timeout

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.



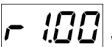

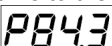



AUTOMATIC MODE

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 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".

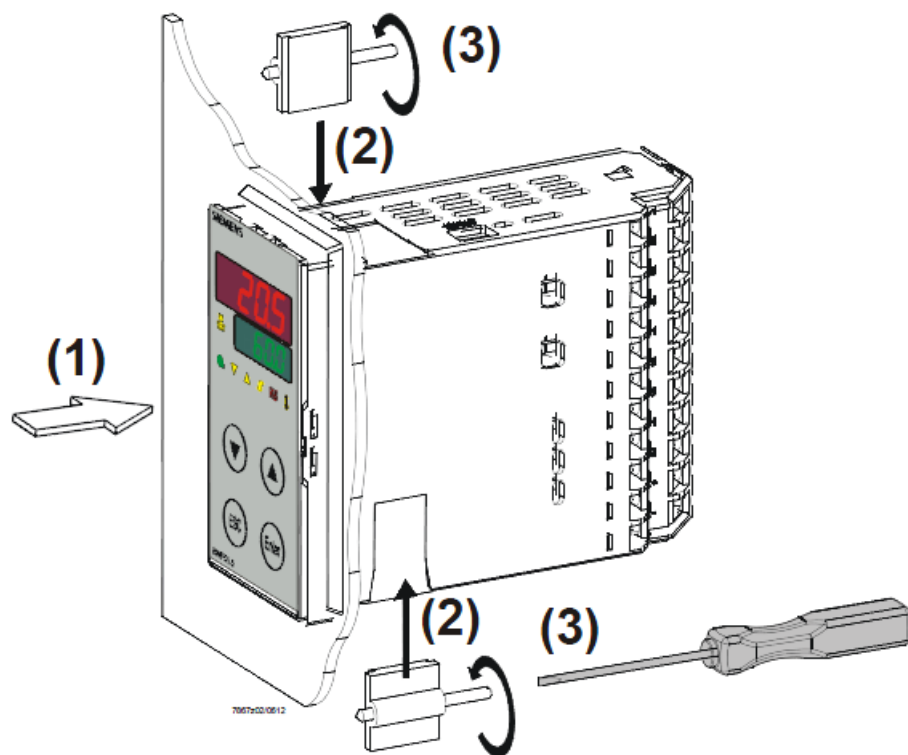
RWF55.5X & RWF55.6X



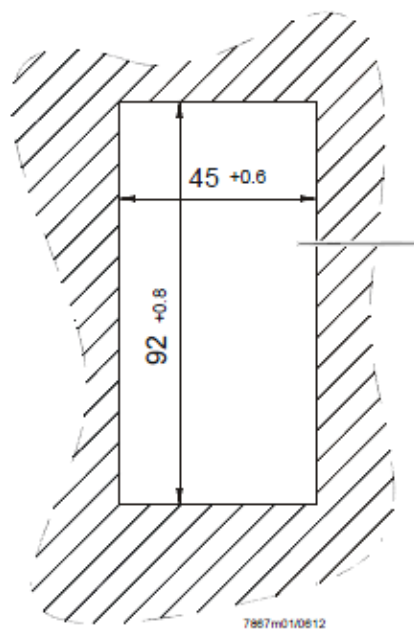
User manual

DEVICE INSTALLATION

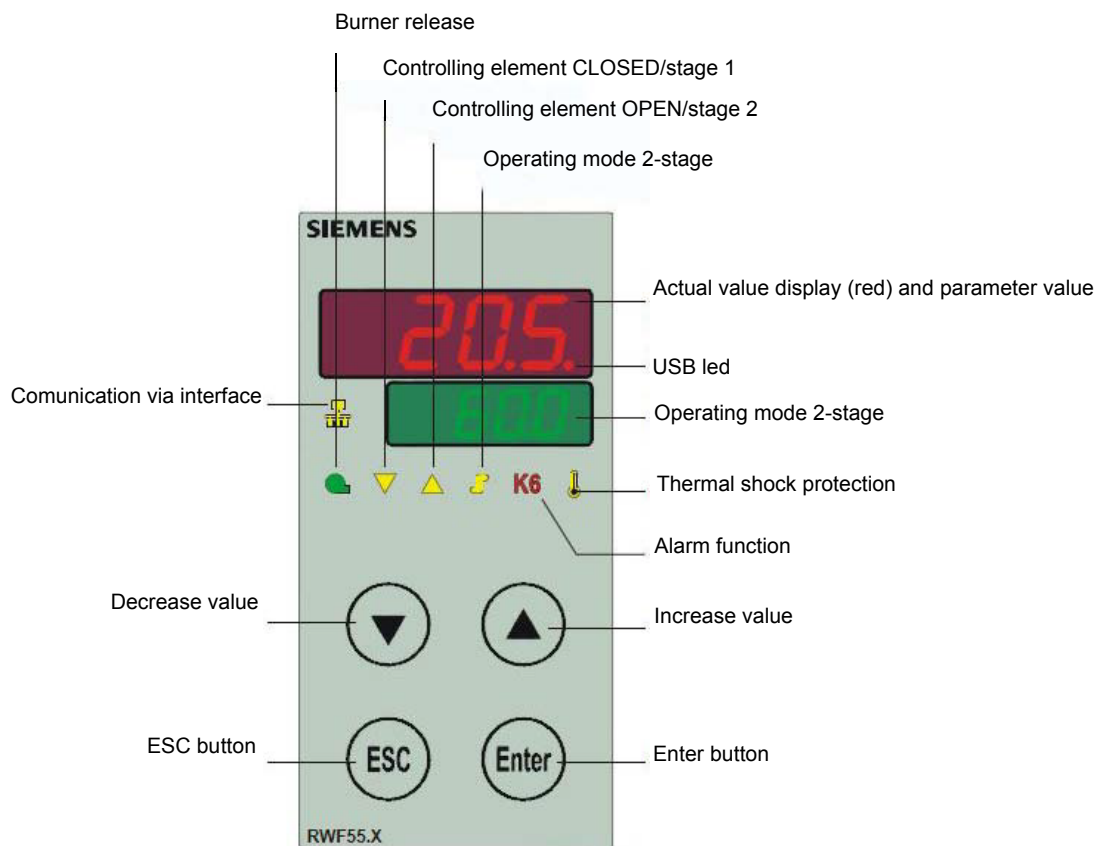
Fixing system



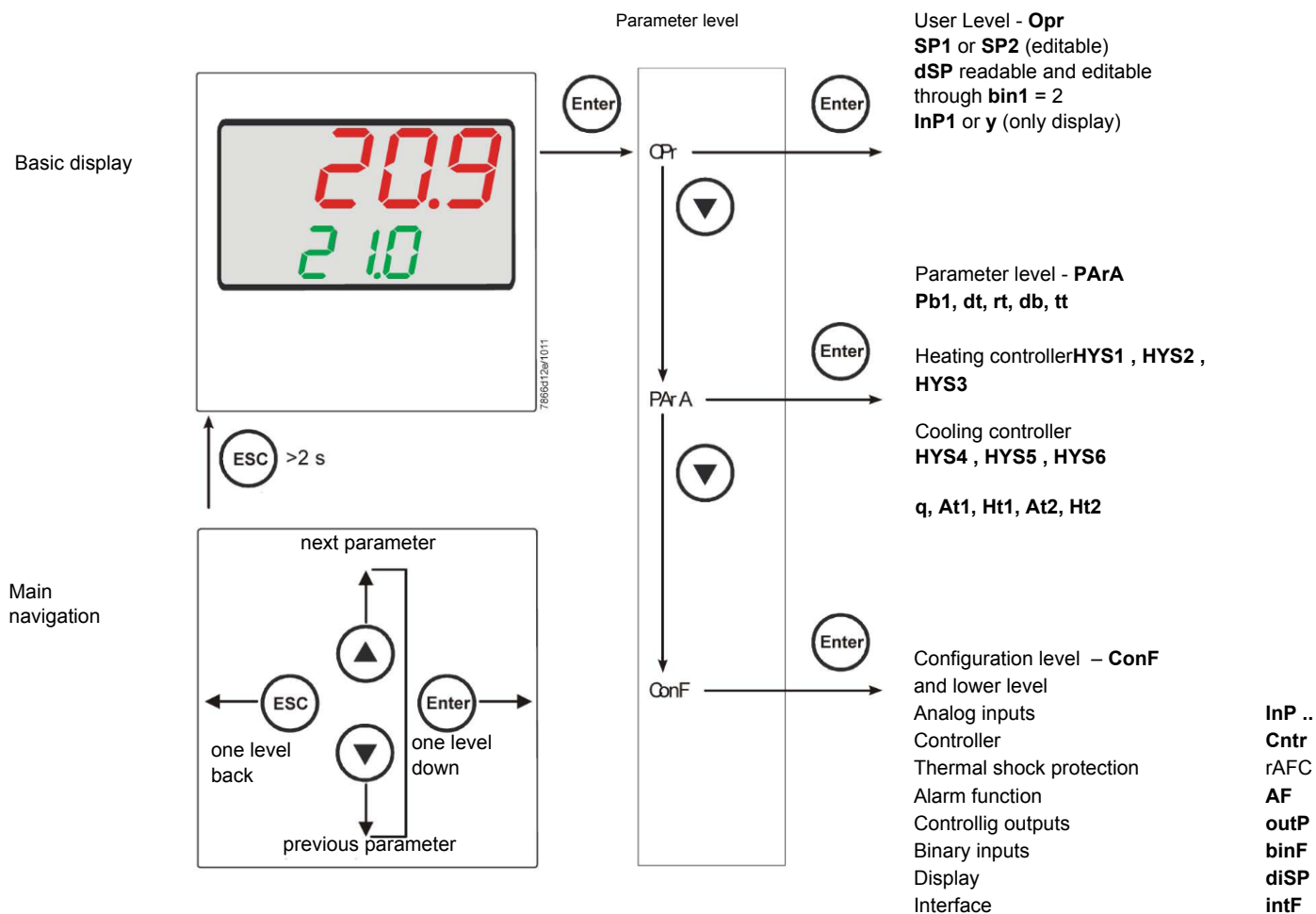
Drilling dimensions:



FRONT PANEL



NAVIGATION MENU



RWF55 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 (PARA):

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 is 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 | Pb1 | 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 parameter CACT = 0 and parameter bin1 =0) |
| 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 |
| Outside temperature Curve point 1 (*) | At1 | -40 ...120 digit | -10 | First point of external temperature for climatic curve |
| Boiler temperature Curve point 1 (*) | Ht1 | SPL...SPH | 60 | Set-point temperature for the external temperature 1 |
| Outside temperature Curve point 2 (*) | At2 | -40 ...120 digit | 20 | Second point of external temperature for climatic curve |
| Boiler temperature Curve point 2 (*) | Ht2 | SPL...SPH | 50 | Set-point temperature for the external temperature 2 |

(*) 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 wire |
| | 2 | Pt100 2 wire |
| | 3 | Pt1000 3 wire |
| | 4 | Pt1000 2 wire |
| | 5 | Ni1000 3 wire |
| | 6 | Ni1000 2 wire |
| | 7 | 0 ÷ 135 ohm |
| | 8 | Cu-CuNi T |
| | 9 | Fe-CuNi J |
| | 10 | NiCr-Ni K |
| | 11 | NiCrSi-NiSi N |
| | 12 | Pt10Rh-Pt S |
| | 13 | Pt13Rh-Pt R |
| | 14 | Pt30Rh-Pt6Rh B |
| | 15 | 0 ÷ 20mA |
| | 16 | 4 ÷ 20mA |
| | 17 | 0 ÷ 10V |
| | 18 | 0 ÷ 5V |
| | 19 | 1 ÷ 5V |
| OFF1 Sensor offset | -1999.. 0 .. +9999 | Correction value measured by the sensor |
| SCL1 scale low level | -1999.. 0 .. +9999 | minimum scale value(for input ohm, mA, V) |
| SCH1 scale high level | -1999.. 100 .. +9999 | maximum scale value(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)

ConF > InP > InP2

Input 2 : this input can be used to specify an external setpoint or carry out setpoint shifting

| Parameter | Value | Description |
|-------------------------------|-----------------------------|---|
| FnC2 | 0 | 0= no function |
| | 1 | 1= external setpoint (display SPE) |
| | 2 | 2 =setpoint shifting (display dSP) |
| | 3 | 3 = angular positioning feedback |
| SEn2 tisensor type input 2 | 1 | 0 ÷ 20mA |
| | 2 | 4 ÷ 20mA |
| | 3 | 0 ÷ 10V |
| | 4 | 0 ÷ 5V |
| | 5 | 1 ÷ 5V |
| | 1 | 0 ÷ 20mA |
| OFF2 Sensor offset | -1999.. 0 .. +9999 | Correction value measured by the sensor |
| SCL2 scale low level | -1999.. 0 .. +9999 | minimum scale value(for input ohm, mA, V) |
| SCH2 scale high level | -1999.. 100 .. +9999 | maximum scale value(for input ohm, mA, V) |
| dF2 digital filter | 0... 2 ...100 | Is used to adapt the digital 2nd order input filter (time in s; 0 s = filter off) |

(**bold** = factory settings)

ConF > InP > InP3

Input 3: this input is used to acquire the outside temperature

| Parameter | Value | Description |
|---|---------------------------|---|
| SEn3 sensor type input 3sensor type input 2 | 0 | 0 = |
| | 1 | 1 = wire |
| | 2 | 2 = wire |
| OFF3 Sensor offset | -1999.. 0 .. +9999 | Correction value measured by the sensor |
| dF3 digital filter | 0... 1278 ...1500 | Is used to adapt the digital 2nd order input filter (time in s; 0 s = filter off) |

(**bold** = factory settings)

ConF > Cntr

Here, the type of controller, operating action, setpoint limits and presets for self-optimization are selected

| Parameter | Value | Description |
|---|---------------------------|---|
| CtYP controller type | 1 2 | 1 = 3-position controller (open-stop-close) 2 = continuative action controller (0 ÷ 10V or 4 ÷ 20mA) |
| CAct control action | 1 0 | 1 = heating controller 0 = cooling controller |
| SPL least value of the set-point range | -1999.. 0 ..+9999 | minimum set-point scale |
| SPH maximum value of the set-point range | -1999.. 100 ..+999 | maximum set-point scale |
| Self-optimization | 0 1 | 0 = Free 1 = Locked Self-optimization can only be disabled or enabled via the ACS411 setup program. Self-optimization is also disabled when the parameter level is locked |
| pLLo set-point limitation start, operation limit low | - 1999 +9999 | lower working range limit |
| pLHi set-point limitation end, operation limit high | -1999.... +9999 | upper working range limit |

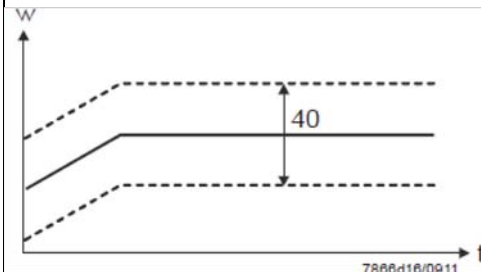
(**bold** = factory settings)

ConF > rAFC

Activation boiler shock termic protetion:

RWF55.. 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 type of control | 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 | 2 x (HYS1) = 10 ...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 |



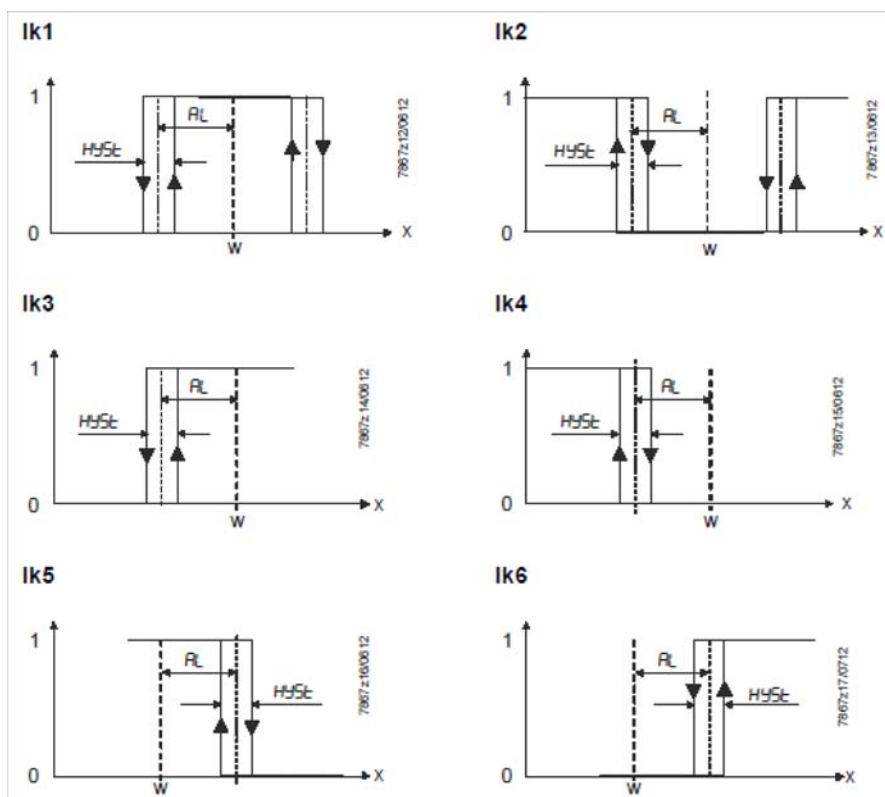
(**bold** = factory settings)

Alarm functionAF

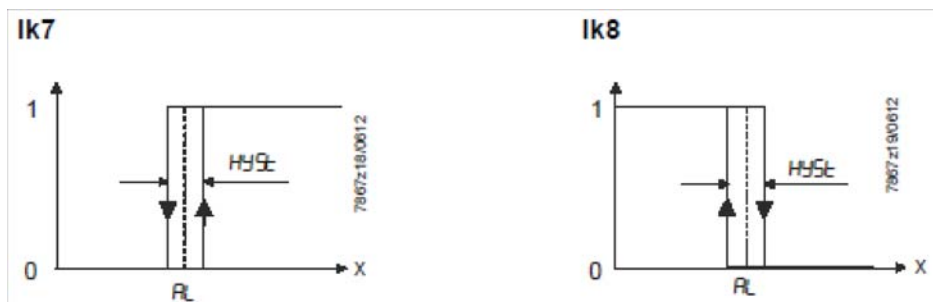
The alarm function can be used to monitor the analog inputs. If the limit value is exceeded, multifunctional relay K6 (terminals **6N** and **6P**) is activated (depending on the switching characteristic)

The alarm function can have different switching functions (Ik1 to Ik8) and can be set to a deviation from the active setpoint or to a fixed limit value

Limit value **AL** relative to setpoint (x)



Fixed limit value **AL**



ConF > AF

| Parameter | Value | Description |
|----------------------------------|--|---|
| FnCt type of control | 0 1 2 3 4 5 6 7 8 9 10 11 12 | 0 = Without function Ik1 = monitored input InP1 Ik2 = monitored input InP1 Ik3 = monitored input InP1 Ik4 = monitored input InP1 Ik5 = monitored input InP1 Ik6 = monitored input InP1 Ik7 = monitored input InP1 Ik8 = monitored input InP1 Ik7 = monitored input InP2 Ik8 = monitored input InP2 Ik7 = monitored input InP3 Ik8 = monitored input InP3 |
| Alarm value AL | -1999 ... 0 1999 | Limit value or deviation from setpoint to be monitored (see alarm functions Ik1 to Ik8 : limit value AL) Limit value range for Ik1 and Ik20 ...9999 |
| HySt switching differential | 0... 1... 9999 | Switching differential for limit value AL |
| ACrA response by out of range | 0 1 | Switched-off ON Switching state in the case of measuring range overshoot or undershoot (Out of Range) |

(**bold** = factory settings)

ConF > OutP

For fuel-air ratio control purposes, the RWF55 has the binary outputs K2, K3 (terminals KQ, K2, K3) and the analog output (terminals A+, A-). The burner is released via relay K1 (terminals 1N, 1P).

The binary outputs of the RWF55 offer no setting choices

The RWF55 has an analog output.

The analog output offers the following setting choices:

| Parameter | Value | Description |
|---------------------------------------|------------------------------|---|
| FnCt type of control | 1 2 3 4 | 1 = analog input 1 doubling with possibility to convert 2 = analog input 2 doubling with possibility to convert 3 = analog input 3 doubling with possibility to convert 4 = Controller's angular positioning is delivered (modulating controller) |
| SiGn type of output signal | 0 1 2 | physical output signal (terminals A+, A-) 0 = 0÷20mA 1 = 4÷20mA 2 = 0÷10V DC |
| rOut value when out of input range | 0 ...101 | signal (in percent) when measurement range is crossed |
| oPnt zero point | -1999... 0 ...+9999 | A value range of the output variable is assigned to a physical output signal (for FnCt = 1, 2, 3) |
| End end point | -1999... 100 ...+9999 | A value range of the output variable is assigned to a physical output signal (for FnCt = 1, 2, 3) |

(**bold** = factory settings)

ConF > binF

This setting decides on the use of the binary inputs **D1**, **D2**, **DG**

b

| Parameter | Value | Description |
|---|-------------------------|--|
| bin1 binary input 1 (terminals DG – D1) | 0 1 2 3 | 0 = without function 1 = set-point changeover (SP1 / SP2) 2 = lset-point shift (Opr > dSP parameter = value of set-point modify) 3 = input alarm |
| bin2 binary input 2 (terminals DG – D2) | 4 | changeover of operating mode DG-D2 open = modulating operation DG-D2 close = 2 stage operation |

(**bold** = factory settings)

ConF > dISP

Both displays can be customized to suit your needs by configuring the displayed value, decimal, time out and blocking

| Parameter | Value | Description |
|-------------------------------|--|--|
| diSU upper display (red) | 0 1 2 3 4 6 7 | Display value for upper display: 0 = display power-off 1 = analog input 1 (InP1) value 2 = analog input 2 (InP2) value 3 = analog input 3 (InP3) value 4 = controller's angular positioning 6 = set-point values 7 = end value with thermal shock protection |
| diSL lower display (green) | 0 1 2 3 4 6 7 | Display value for lower display: 0 = display power-off 1 = analog input 2 (InP2) value 2 = analog input 2 (InP2) value 3 = analog input 2 (InP2) value 4 = controller's angular positioning 6 = set-point values 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 place |
| 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)

ConF > IntF

The controller can be integrated into a data network using an optional RS-485 (terminals R+ and R-) interface or an optional Profibus DP interface(only model **RWF55.6x** terminals C1-C2-C3-C4)

| Parameter | Value | Description |
|-------------------------------|------------------------------|---|
| bdr baudrate | 0 1 2 3 | 0 = 4800 baud 1 = 9600 baud 2 = 19200 baud 3 = 38400 baud |
| Adr Device address Modbus | 0.. 1 .. 254 | Address in the data network |
| dP Device address Profibus | 0.. 125 | only with RWF55.6x |
| dt Remote detection time | 0.. 30 .. 7200s | 0 = switched-off |

(**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.



Weather-compensated setpoint shifting(climatic regulation):

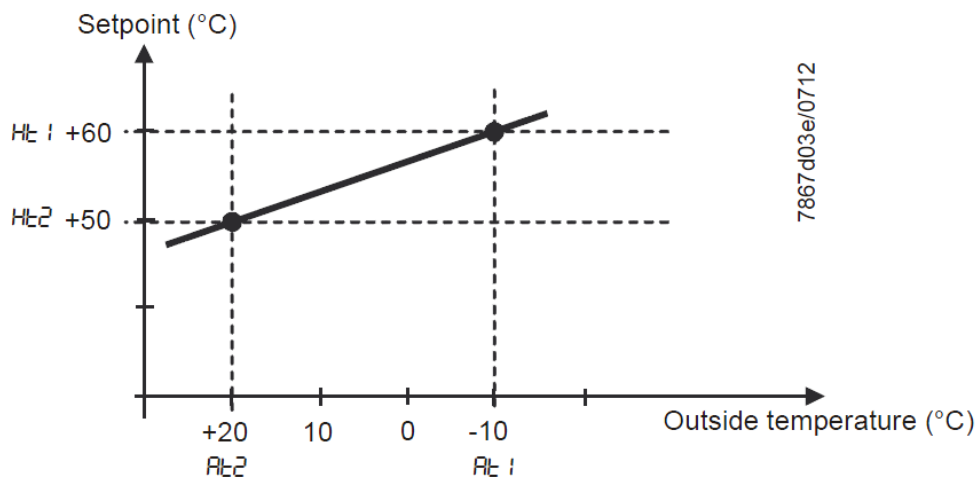
The RWF55 can be configured so that weather-compensated setpoint shifting is activated when an LG-Ni1000 outside sensor or a Pt1000 is connected (see parameter **InP3**).

To take into account the time response of a building, weather-compensated setpoint shifting uses the attenuated outside temperature rather than the current outside temperature

The minimum and maximum setpoints can be set using the lower setpoint limit **SPL** and the upper setpoint limit **SPH** of the menu **Crtr**.

The system also prevents the lower working range limit **oLLo** and upper working range limit **oLHi** from exceeding/dropping below the system temperature limits.

The heating curve describes the relationship between the boiler temperature setpoint and the outside temperature. It is defined by 2 curve points. For 2 outside temperatures, the user defines the boiler temperature setpoint that is required in each case. The heating curve for the weather-compensated setpoint is calculated on this basis. The effective boiler temperature setpoint is limited by the upper setpoint limit **SPH** and the lower setpoint limit **SPL**.



For setting climatic regulation function set:

PArA > parameters **At1**, **Ht1**, **At2**, **Ht2**

ConF > **InP** > **InP3** parameters **SEn3**, **FnC3** = 1 (Weather-compensated setpoint).

Modbus interface

The tables that follow in this chapter specify the addresses of the readable and writable words that the customer is able to access. The customer may read and/or write the values using SCADA programs, PLCs, or similar.

The entries under Access have the following meanings:

R/O Read Only, value can only be read

R/W Read/Write, value can be read and written

The number of characters specified under Data type in the case of character strings includes the final \0.

Char10 means that the text is up to 9 characters long. The final \0 character is then added to this

User level

| Address | Access | Data type | Signal reference | Parameter |
|---------|--------|-----------|------------------|--------------------------------|
| 0x0000 | R/O | Float | X1 | Analog input InP1 |
| 0x0002 | R/O | Float | X2 | Analog input InP2 |
| 0x0004 | R/O | Float | X3 | Analog input InP2 |
| 0x0006 | R/O | Float | WR | Actual setpoint |
| 0x0008 | R/W | Float | SP1 | Setpoint 1 |
| 0x000A | R/W | Float | SP2 (= dSP) | Setpoint 2 |
| 0x1035 | R/O | Float | --- | Analog input InP3 (unfiltered) |
| 0x1043 | R/O | Float | --- | Actual angular positioning |
| 0x1058 | R/O | Word | B1 | Burner alarm |

Parameter level

| Address | Access | Data type | Signal reference | Parameter |
|---------|--------|-----------|------------------|-------------------------------------|
| 0x3000 | R/W | Float | Pb1 | Proportional range 1 |
| 0x3004 | R/W | Float | dt | Derivative action time |
| 0x3006 | R/W | Float | rt | Integral action time |
| 0x300C | R/W | Float | db | Dead band |
| 0x3012 | R/W | Word | tt | Controlling element running time |
| | | | | |
| 0x3016 | R/W | Float | HYS1 | Switch-on threshold |
| 0x3018 | R/W | Float | HYS2 | Switch-off threshold down |
| 0x301A | R/W | Float | HYS3 | Switch-off threshold up |
| 0x301C | R/W | Float | HYS4 | Switch-on threshold (cooling) |
| 0x301E | R/W | Float | HYS5 | Switch-off threshold down (cooling) |
| 0x3020 | R/W | Float | HYS6 | Switch-off threshold up (cooling) |
| 0x3022 | R/W | Float | q | Reaction threshold |
| | | | | |
| 0x3080 | R/W | Float | At1 | Outside temperature 1 |
| 0x3082 | R/W | Float | Ht2 | Boiler temperature 1 |
| 0x3084 | R/W | Float | At2 | Outside temperature 2 |
| 0x3086 | R/W | Float | Ht2 | Boiler temperature 2 |

Configuration level

| Address | Access | Data type | Signal reference | Parameter |
|---------|--------|-----------|------------------|---|
| 0x3426 | R/W | Float | SCL1 | Start of display input 1 |
| 0x3428 | R/W | Float | SCH1 | End of display input 1 |
| 0x3432 | R/W | Float | SCL2 | Start value input 2 |
| 0x3434 | R/W | Float | SCH2 | End value input 2 |
| 0x3486 | R/W | Float | SPL | Start of setpoint limitation |
| 0x3488 | R/W | Float | SPH | End of setpoint limitation |
| 0x342A | R/W | Float | OFFS1 | Offset input E1 |
| 0x3436 | R/W | Float | OFFS2 | Offset input E2 |
| 0x343A | R/W | Float | OFFS3 | Offset input E3 |
| | | | | |
| 0x1063 | R/W | Word | FnCt | Ramp function |
| 0x1065 | R/W | Float | rASL | Ramp slope |
| 0x1067 | R/W | Float | toLP | Tolerance band ramp |
| 0x1069 | R/W | Float | rAL | Limit value |
| 0x1075 | R/W | Float | dtT | Remote Detection Timer |
| | | | | |
| 0x1077 | R/W | Float | dF1 | Filter constant input 1 |
| 0x1079 | R/W | Float | dF2 | Filter constant input 2 |
| 0x107B | R/W | Float | dF3 | Filter constant input 3 |
| 0x107D | R/O | Float | oLLo | Lower working range limit |
| 0x107F | R/O | Float | oLHi | Upper working range limit |
| | | | | |
| 0x106D | R/W | Word | FnCt | Alarm relay function |
| 0x106F | R/W | Float | AL | Alarm relay limit value (limit value alarm) |
| 0x1071 | R/W | Float | HYSt | Alarm relay hysteresis |

Remote operation

| Address | Access | Data type | Signal reference | Parameter |
|---------|--------|-----------|------------------|---|
| 0x0500 | R/W | Word | REM | Activation remote operation * |
| 0x0501 | R/W | Word | rOFF | Controller OFF in remote setpoint ** |
| 0x0502 | R/W | Float | rHYS1 | Switch-on threshold remote |
| 0x0504 | R/W | Float | rHYS2 | Switch-off threshold down remote |
| 0x0506 | R/W | Float | rHYS3 | Switch-off threshold up remote |
| 0x0508 | R/W | Float | SPr | Setpoint remote |
| | | | | |
| 0x050A | R/W | Word | RK1 | Burner release remote operation |
| 0x050B | R/W | Word | RK2 | Relay K2 remote operation |
| 0x050C | R/W | Word | RK3 | Relay K3 remote operation |
| 0x050D | R/W | Word | RK6 | Relay K6 remote operation |
| 0x050E | R/W | Word | rStEP | Step-by-step control remote operation |
| 0x050F | R/W | Float | rY | Angular positioning output remote operation |
| 0x0511 | R/W | Float | rHYS4 | Switch-on threshold remote (cooling) |
| 0x0513 | R/W | Float | rHYS5 | Switch-off threshold down remote (cooling) |
| 0x0515 | R/W | Float | rHYS6 | Switch-off threshold up remote (cooling) |

Legend

* = Local

** = Controller OFF

Dati dell'apparecchio

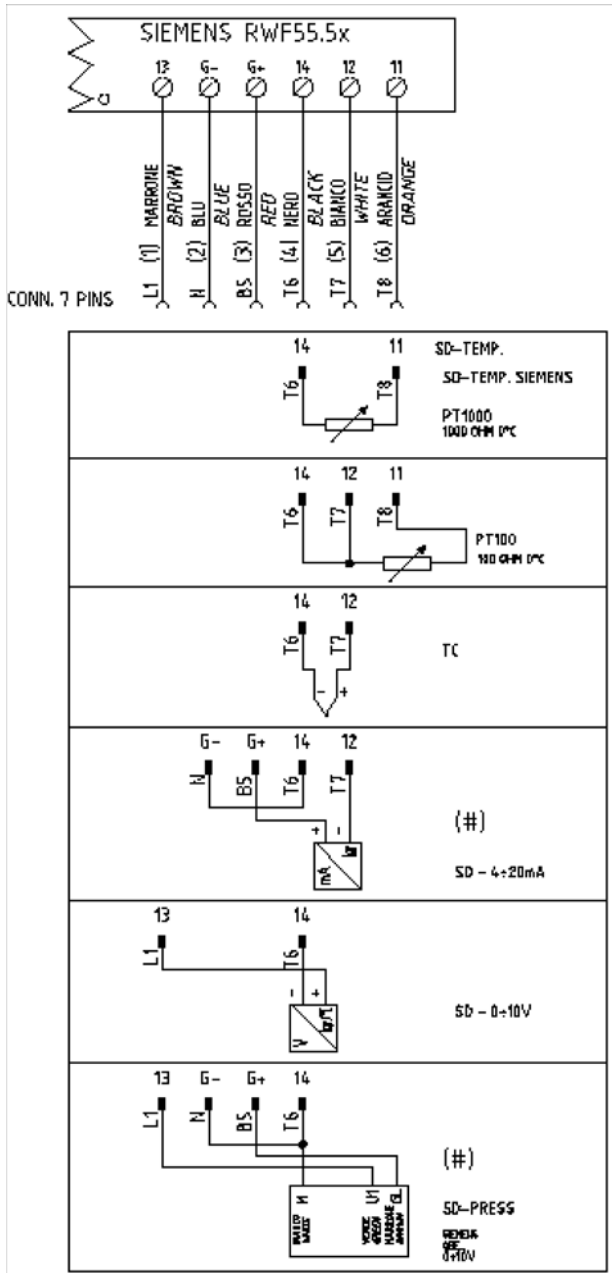
| Address | Access | Data type | Signal reference | Parameter |
|---------|--------|-----------|------------------|------------------|
| 0x8000 | R/O | Char12 | --- | Software version |
| 0x8006 | R/O | Char14 | --- | VdN number |

Stato dell'apparecchio

| Address | Access | Data type | Signal reference | Parameter |
|---------|--------|-----------|------------------|---------------------------------------|
| 0x0200 | R/O | Word | --- | Outputs and states |
| | | | Bit 0 | Output 1 |
| | | | Bit 1 | Output 3 |
| | | | Bit 2 | Output 2 |
| | | | Bit 3 | Output 4 |
| | | | Bit 8 | Hysteresis limitation |
| | | | Bit 9 | Control system |
| | | | Bit 10 | Self-optimization |
| | | | Bit 11 | Second setpoint |
| | | | Bit 12 | Measuring range overshoot InP1 |
| | | | Bit 13 | Measuring range overshoot InP2 |
| | | | Bit 14 | Measuring range overshoot InP3 |
| | | | Bit 15 | Calibration mode |
| | | | | |
| 0x0201 | R/O | Word | --- | Binary signals and hardware detection |
| | | | Bit 0 | Operation mode 2-stage |
| | | | Bit 1 | Manual mode |
| | | | Bit 2 | Binary input D1 |
| | | | Bit 3 | Binary input D2 |
| | | | Bit 4 | Thermostat function |
| | | | Bit 5 | First controller output |
| | | | Bit 6 | Second controller output |
| | | | Bit 7 | Alarm relay |
| | | | Bit 13 | Analog output available |
| | | | Bit 14 | Interface available |

Electric connections :

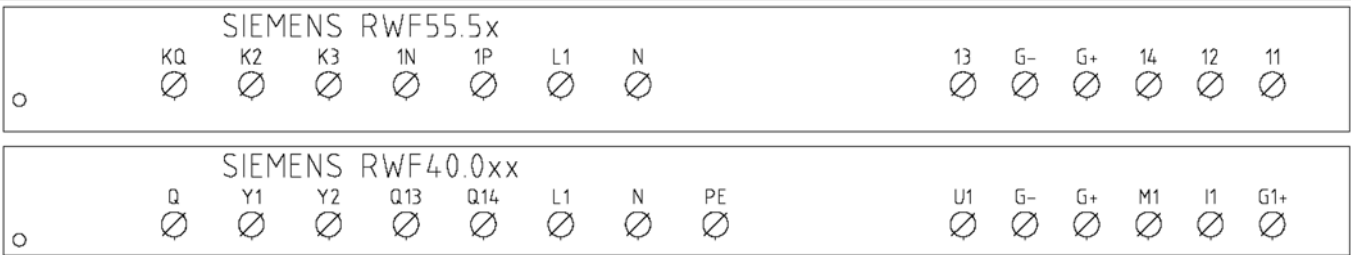
With 7 pins connector version



With terminals version



Correspondences bornes entre RWF55.5x y RWF40.0x0Matches terminals betweenRWF55.5x and RWF40.0x0



Parameters summarising for RWF55.xx :

| Navigation menù | ConF | | | | | ConF | | | | | | | | | Opr |
|------------------------|----------------|------|----------|----------|----------|----------|----------|----------|------|-------|------|-----|------|----------|-------------|
| | Inp | | | | | | | diSP | | | | | | | |
| | Inp1 | | | | | | | | Cntr | | PArA | | | | |
| | Types of probe | SEn1 | OFF1 | SCL | SCH | Unit | SPL | SPH | dECP | Pb. 1 | dt | rt | tt | HYS1 (*) | |
| 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 |
| Probe4+20mA / 0÷1,6bar | 16 | 0 | 0 | 160 | needless | 0 | 160 | 0 | 5 | 20 | 80 | (#) | 0 | 20 | 100 kPa |
| Probe4+20mA / 0÷3bar | 16 | 0 | 0 | 300 | needless | 0 | 300 | 0 | 5 | 20 | 80 | (#) | 0 | 20 | 200 kPa |
| Probe 4+20mA / 0÷10bar | 16 | 0 | 0 | 1000 | needless | 0 | 1000 | 0 | 5 | 20 | 80 | (#) | 0 | 50 | 600 kPa |
| Probe 4+20mA / 0÷16bar | 16 | 0 | 0 | 1600 | needless | 0 | 1600 | 0 | 5 | 20 | 80 | (#) | 0 | 80 | 600 kPa |
| Probe 4+20mA / 0÷25bar | 16 | 0 | 0 | 2500 | needless | 0 | 2500 | 0 | 5 | 20 | 80 | (#) | 0 | 125 | 600 kPa |
| Probe 4+20mA / 0÷40bar | 16 | 0 | 0 | 4000 | needless | 0 | 4000 | 0 | 5 | 20 | 80 | (#) | 0 | 200 | 600 kPa |
| Probe 4+20mA / 0÷60PSI | 16 | 0 | 0 | 600 | needless | 0 | 600 | 0 | 5 | 20 | 80 | (#) | 0 | 30 | 300 (30PSI) |
| Probe4+20mA / 0÷200PSI | 16 | 0 | 0 | 2000 | needless | 0 | 2000 | 0 | 5 | 20 | 80 | (#) | 0 | 75 | 600 (60PSI) |
| Probe4+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 |
| Signal 0÷10V | 17 | 0 | needless | needless | needless | needless | needless | needless | 5 | 20 | 80 | (#) | | | |
| Signal 4÷20mA | 16 | 0 | needless | needless | needless | needless | needless | needless | 5 | 20 | 80 | (#) | | | |

NOTE:

(#) tt – servo control run time

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

(*)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 in bar the 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 > I display 1500).

APPENDIX: PROBES CONNECTION

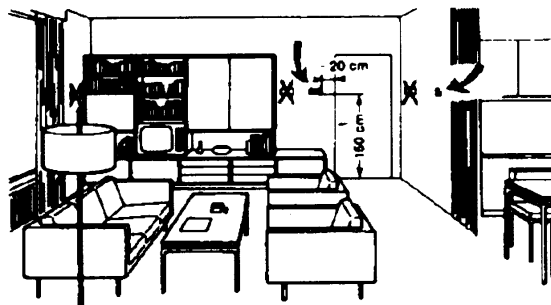
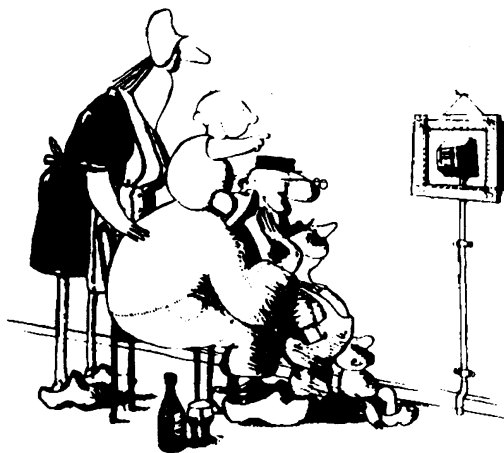
To assure the utmost comfort, the control system needs reliable information, which can be obtained provided the sensors have been installed correctly. Sensors measure and transmit all variations encountered at their location.

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.

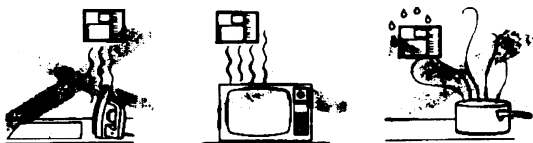


Outside probes (weather) Installation

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

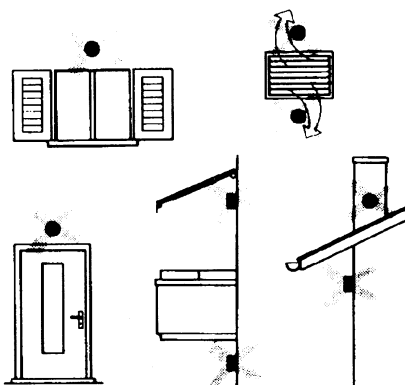
It's good to be admired ...even better to be effective

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.



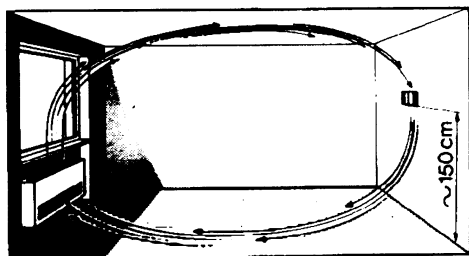
General rule: en on the outer wall of the building where the living rooms are, never on the south-facing wall or in a position where they will be affected by morning sun. If in any doubt, place them on the north or north-east façade.

Positions to be avoided



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.

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:

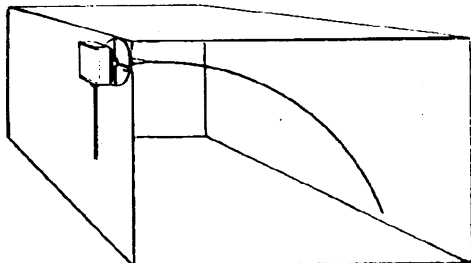
"after delivery fan or

"after coil to be controlled, at a distance of at least 0,5 m

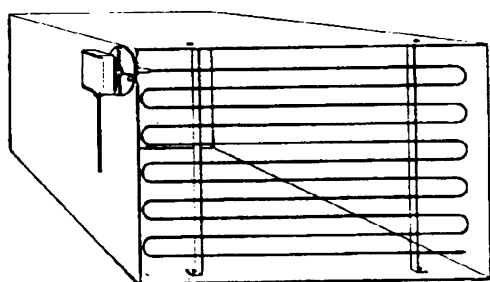
For measuring room temperature:

"before return air intake fan and near room's return airintake.

For measuring saturation temperature: after mist eliminator.



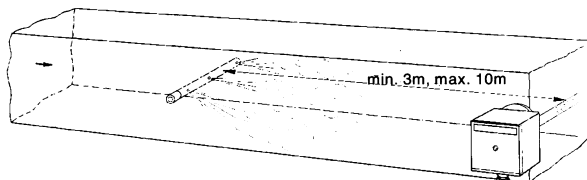
Bend 0.4m sensor by hand (never use tools) as illustrated .



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

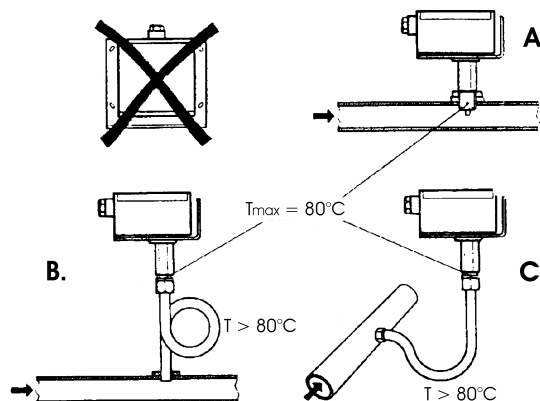
A - installation on ducts carrying fluids at max. temperature 80°C

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

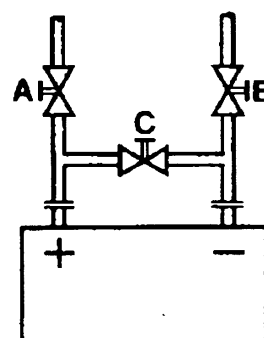
Start disable

1=open C1=open C

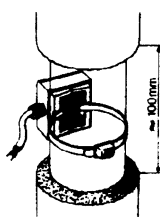
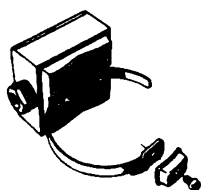
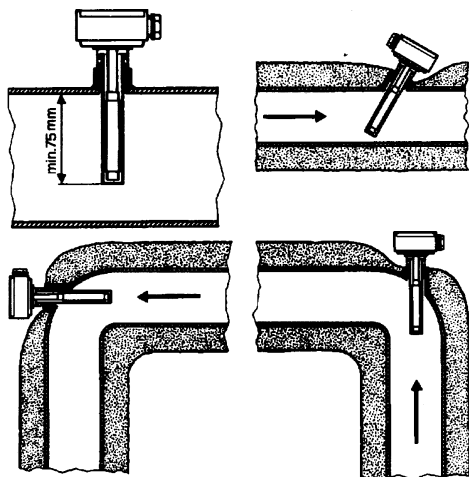
2=open A2=close B

3=open B3=close A

4= close C



Immersion or strap-on sensors



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.

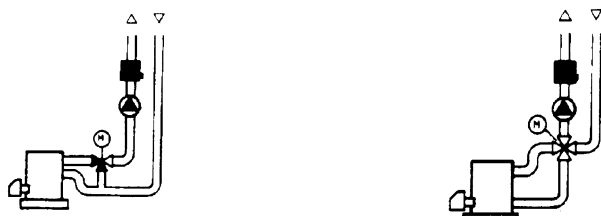
Eliminate insulation and paintwork (including rust inhibitor) on a min. 100mm length of pipe.

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

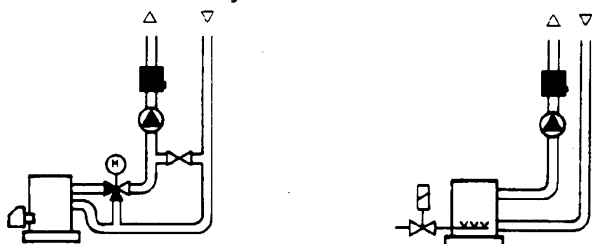
Placing the probes (QAD22.../QAE21.../QAP21.../RCA...)

With pumps on outlet

with 3 ways valves / with 4 ways valves



Panel system / burner control



With pumps on return

with 3 ways valves / with 4 ways valves



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

ΠLimits:

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

QAE2... immersion sensors

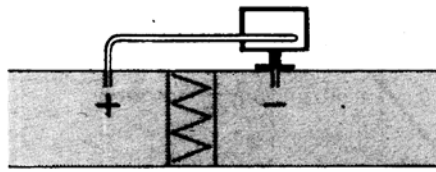
Advantages:

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

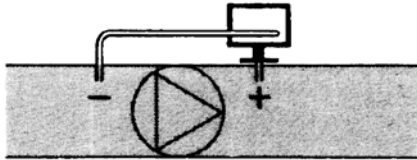
Limits:

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

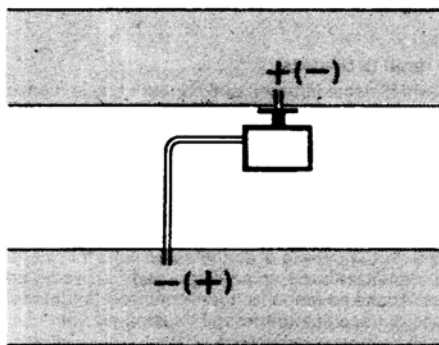
Installing differential pressure probes for air



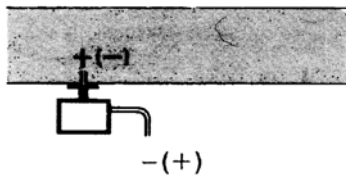
A - Control a filter (clogging)



B - Control a fan (upstream/downstream)



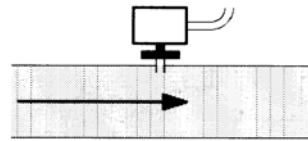
C - Measurement of difference in pressure between two ducts



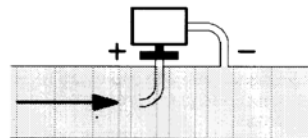
D - Measurement of difference in pressure between two rooms or of inside of duct and outside

Basic principles

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



Measuring dynamic pressure

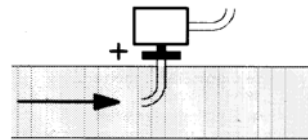


$$P_d = \frac{\gamma q^2}{2g}$$

Legend

- γ Kg/m³, specific weight of air
- q m/s, air speed
- g 9.81 m/s² gravity acceleration
- P_d mm C.A., dynamic pressure

Measuring total pressure



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