

ELECTRICAL CO2 VAPORISER

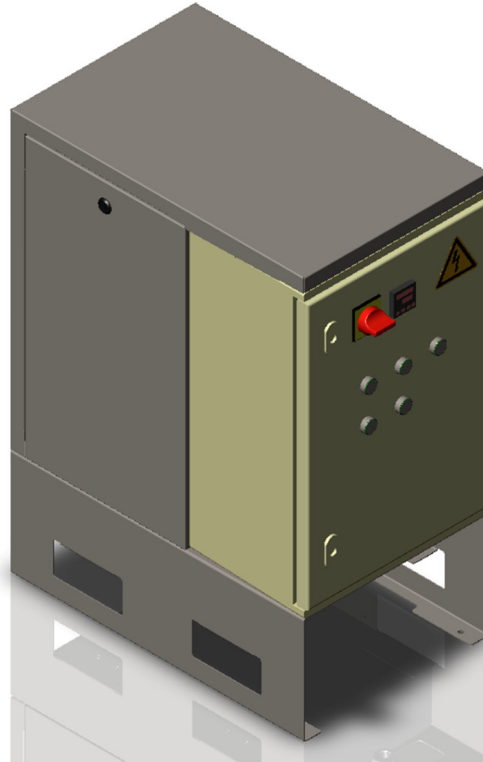


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EQUIPMENT

INSTRUCTION MANUAL CO2 VAPORISER WITHOUT HEATING FLUID



VCO2

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1 **DESCRIPTION:**

Electric CO2 vaporisers are used to vaporise a fixed or variable CO2 flow, from zero to the nominal flow rate indicated in the corresponding commercial specification, with a nominal liquid phase CO2 inlet temperature varying from -25°C to -15°C and a minimum desired gaseous CO2 outlet temperature of +5°C.

The CO2 circulates in a stainless steel coil that is moulded onto an aluminium block. This block is fitted with pockets accepting monotube removable electric heating elements.

An aluminium heating block is fitted with 9 electric monotubes maximum of 890W each (see specification).

The outlet CO2 temperature is indirectly controlled by the temperature of the aluminium heater blocks.

These CO2 vaporisers have been designed and manufactured in accordance with the requirements of the PED 97/23/EC.

1.1 **VAPORISER COMPOSITION**

The vaporisers comprise:

- One heater blocks with inlet and outlet tapplings equipped with a connector defined in the commercial specification.
- Maximum 9 heating elements (cylindrical cartridges) per heating block.
- A thermal control device measuring the temperature of the heating block
- One or two temperature limiting devices for the heating block (depending on specification)
- A thermal safety device measuring the temperature of the heating block (REG for very low CO2 safety device and TSHH for very high CO2).
- A temperature controller.
- An external electrical unit in polyester.

1.2 CHARACTERISTICS

Please refer to the commercial specification for all characteristics not provided in this paragraph.

- Pressure, fluid and flow rate

Fluid to be vaporised	: CO2.
Fluid group	: 2.
Fluid state on entry	: Liquid.
Fluid state at outlet	: Gas.
Nominal CO2 flow rate to be vaporised	: See specification.
Min. fluid flow rate to be vaporised	: See specification.
Max. fluid flow rate to be vaporised	: See specification.
Operating pressure	: 15 to 30 barg.

- Inlet and outlet temperature

Min. Inlet temperature	: -40°C.
Liquid CO2 inlet temperature	: from -25°C to about -15°C.
 Minimum required gaseous CO2 temperature at outlet	 : 5°C at maximum flow rate and with CO2 at -20°C at the inlet.

- TS and PS

Max allowable pressure PS	: 100 bar g.
Min. allowable surface T° TS	: -40°C
Max. allowable surface T° TS	: 120 °C.

- Electrical characteristics

Power	: See rating plate.
Voltage	: See rating plate..
Frequency	: See rating plate.
Phase(s)	: 3.
Max. absorbed current	: See electrical diagram and rating plate.

- General information

Mass	: See rating plate.
Min. allowable ambient temperature	: -40°C.
Max. allowable ambient temperature	: 45°C.

1.3 DIMENSIONS

Refer to the interface drawing associated with the specification to find the vaporiser dimensions.

1.4 HANDLING

The vaporiser can be handled by fork lift truck.

2 ASSEMBLY AND CONNECTION

2.1 BEFORE INSTALLATION:

Check that:

- The maximum pressure that could occur in the air circuit is not greater than the pressure PS stated on the rating plate.
- The pressure loss created by the heater is compatible with the pressure of the flow generator and with the resistance of the aeraulic circuit.
- The nominal diameter and the inlet and outlet tapping sealing system are correctly matched to the installation pipework.
- A sufficient clearance will allow removal of the monotubes.
- The vaporiser is placed in an external environment compatible with its protection rating and with the quality of the materials making it up.
- The power supply voltage corresponds to the value stated on the rating plate.

2.2 ASSEMBLY

- The heater must only be handled using the attachment or lifting arrangements provided for this.
- The vaporiser must rest on its feet and fixed to the ground.
- When making aeraulic connections precautions must be taken so that the stress inflicted by the pipework on the vaporiser tappings is compatible with the characteristics of the materials used, taking account of their dimensions, the pressure and the temperature. It is sometimes necessary to install deformation compensators, installed according to the rules of the art (bellows, expansion loop, hose...).
- **Provide the safety devices required by legislation** and intended to create freedom from overpressure phenomena in the event of overheating.
- **The installer must comply with the legislation relating to preventing risks of burns to personnel.** Lag the body and the inlet and outlet pipes if this has not already been done on delivery.

2.3 ELECTRICAL CONNECTION:

**WARNING DANGER:**

Connection of the power supply must be carried out according to good engineering practices and applicable regulations, particularly for the cable diameter used. The power supply line must be able to withstand, in steady state, the maximum current shown on the electrical diagram and the identification plate. It shall be properly protected upstream, with distributed earthing.

Please obtain the familiarise yourself with the electrical diagram before any electrical connections

**IMPORTANT:**

Connect the connecting cables between the vaporiser and the automated controller or remote control: **See electric diagram.**

Note that the connections depend on the options for your vaporiser.

After having checked that there is an appropriate voltage on the power supply terminals, close the door of the electrical cabinet.

3 COMMISSIONING PROCEDURE:

3.1 PRECAUTIONS TO BE TAKEN BEFORE COMMISSIONING:

- Choose the power (1/3, 2/3 or 3/3) via the switch at the bottom of the cabinet (839624-02 et 839625-02 only)
- Verify the temperature setting of the thermostats or regulator.

3.2 COMMISSIONING:

- Switch on the vaporiser. Immediately check that the line current complies with the expected value.
- Measure the CO2 outlet temperature, checking that it is actually compatible with your needs. If this is not so, slightly increase or lower the controller REG (Setpoint between 10°C to 50 °C).

3.3 STOPPING THE INSTALLATION:

- Switch off the vaporiser.

4 SETTING PARAMETERS:

- Thermostat: see commercial specification.
- Regulator REG : See parameter setting booklet.

5 MAINTENANCE:

After 10 hours of operation, then after 200 hours, 1000 hours, and every 2000 hours, perform the following operations:

- Check the tightness of all the electric connections and the status of the relay contacts.
- Monitor the correct operation of the regulation.
- Monitor the status of joints and thermal insulation, so as to act preventively to avoid the risk of burns to the personnel.
- Test the operation of other safety devices and their setting value.

If necessary, replace the defective component

After 6000 hours operation, or more often if necessary:

- If polluting gas is being heated disconnect the pipework and clean its internal surface, without damaging it. Washing and disinfection must be done with products that are regarded as non-corrosive for the materials used.
Removing the pipework is only authorised at ambient temperature, in the absence of gas pressure and electrical supply.
- After refitting the pipework, repeat the commissioning instructions described in § 4.
- Measure the change in the contractual values: flow rate, pressures, currents, reaction times, temperature deviations.

Any repair must be subject to an evaluation by an approved body, which will decide on the necessary inspection measures. It will be done under the entire responsibility of the user.

6 REPLACING A DEFECTIVE MONOTUBE:

If a monotube is judged defective by checking the ohmic value or absorbed current, it can be replaced individually by a new monotube heater. The description of these operations follows:

- 1) Switch the equipment off.**
- 2) Remove the removable plate on the front panel.**
- 3) Disconnect the cables from the defective monotube.**
- 4) Unscrew the monotube mechanical retention screw.**
- 5) Remove the defective monotube from its housing.**
- 6) Remove the solidified thermal grease residues attached to the internal walls of the pocket. If necessary use a reamer of the external diameter of the heating monotube to fully clean the internal walls of the pocket.**
- 7) Insert the new heating monotube. Carefully check that the retaining lug is pushed against the lagging jacket.**
- 8) Retighten the monotube retaining screw on the lagging jacket.**
- 9) Reconnect the heating monotube electrical cable in accordance with the diagram.**
- 10) Switch on the equipment. Verify that the vaporiser is heating (heating indicator lamp lit). Check the correct operation of the monotube by measuring the current.**
- 11) Refix the removable plate on the front panel.**

7 WARRANTY:

The guarantee is compliant with the Electric Construction inter-trade association agreements and our general sales conditions. We guarantee the compliance of the materials and surface treatments, as defined in our documents. On the other hand premature wear or deterioration caused by:

- an electrical supply more than 10% greater than the nominal voltage,
- lack of maintenance, shocks, clumsiness or the inexperience of the user,
- corrosion or clogging phenomena, non-compliance with the present manual, the rules of the art and legislation, will not engage our responsibility due to the diversity of the parameters that cause them and that are outside our control.