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“ECOVAP” HOT WATER VAPORIZER

“ECOVAP” HOT WATER VAPORIZER WITH ELECTRIC PREHEATING

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- 2 TECHNICAL FEATURES
- 3 HANDLING
- 4 INSTALLATION
- 5 COMMISSIONING
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DESCRIPTION OF THE PICTOGRAMS

The following symbols will be used in the manual to highlight particularly important indications and warnings:



ATTENTION

This symbol indicates accident-prevention rules for the operator and/or for any exposed persons.




WARNINGS:

This symbol indicates that there is the possibility of causing damage to the product and/or to its components.



NOTE:

This symbol marks useful information.

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1. WARNINGS

Do not install and do not start up the LPG vaporizer without having first consulted these instructions.

To ensure operator safety and to avoid possible damage to the product, before carrying out any operation on the plant it is indispensable to have made oneself familiar with the whole instructions manual.

This manual must be intact and legible in all of its parts; each operator using the plant, or in charge of its maintenance or adjustment operations, must know where it is kept and be able to consult it at any time.

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The description and the illustrations provided in this publication are not binding.

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This manual has been drafted according to requirements of Directive 97/23/EC - PED

The legislation in force concerning accident-prevention safety standards and the standards for installation and use of the plant must always be respected.

Use the plant within the pressure and temperature limits stated on the data plate of the Manufacturer PEGORARO GAS TECHNOLOGIES Srl and on the Declaration of Conformity which must be accurately kept.

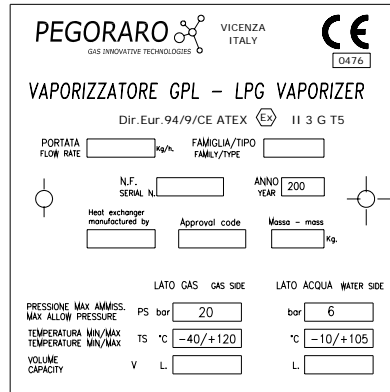
PEGORARO GAS TECHNOLOGIES Srl declines all responsibility for any damage to things or persons in the event of:

- Handling, installation, commissioning, gas distribution, maintenance of the individual installed appliances and demolition by non-qualified personnel;
- improper use of the plant;
- modifications, welding or damage;
- failure to observe the applicable safety regulations in force and the accident-prevention regulations;
- operation at a higher temperature and pressure than those specified on the data plate;
- errors in installation;
- lack of adequate maintenance;
- failure to observe the contents of this instructions manual.

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2. TECHNICAL FEATURES

Some technical features can be found also on the plate riveted onto the space provided on the vaporizer (see figure 2-1).



PEGORARO VICENZA ITALY **CE** 0476
 GAS INNOVATIVE TECHNOLOGIES
VAPORIZZATORE GPL - LPG VAPORIZER
 Dir. Eur. 94/9/CE ATEX (Ex) II 3 G T5
 PORTATA FLOW RATE kg/h FAMILIA/TIPO FAMILY/TYPE
 N.F. SERIAL N. ANNO YEAR 200
 Heat exchanger manufactured by Approval code Massa - mass kg.
 LATO GAS GAS SIDE LATO ACQUA WATER SIDE
 PRESSIONE MAX. AMMISS. MAX ALLOW PRESSURE PS bar 20 bar 6
 TEMPERATURA MIN/MAX TEMPERATURE MIN/MAX TS °C -40/+120 °C -10/+105
 VOLUME CAPACITY V L: L:

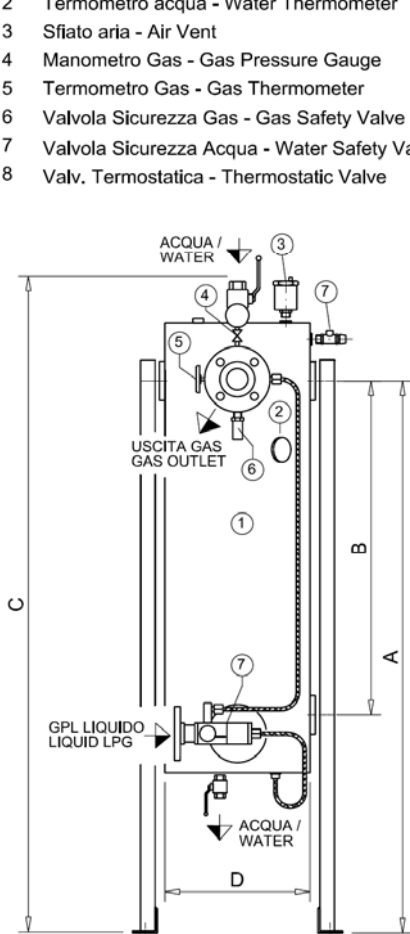
Fig. 2-1

The tables and figures given below illustrate the technical characteristics of the vaporizer model ECOVAP, hot water version.

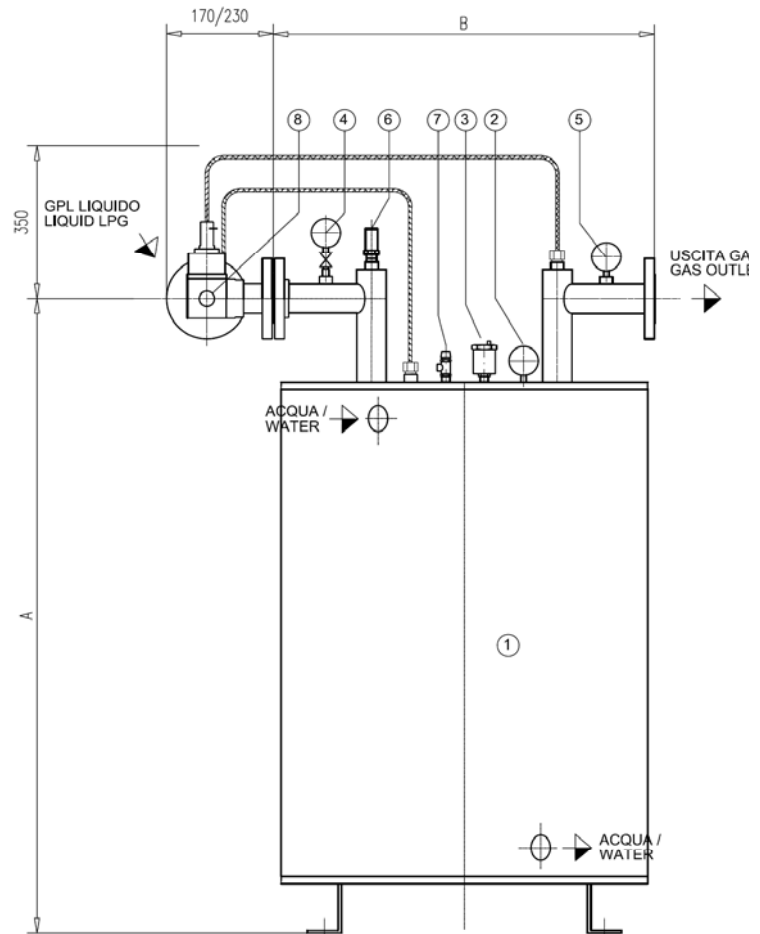
	ECOVAP 50A	ECOVAP 100A	ECOVAP 200A	ECOVAP 300A	ECOVAP 500A	ECOVAP 750A	ECOVAP 1000A
A [mm]	1105	1105	1105	1220	1220	1300	1300
B [mm]	470	830	830	510	650	780	780
C [mm]	1300	1300	1300	390	540	700	700
D [mm]	300	300	300	390	540	700	700
WEIGHT [kg]	40	70	75	85	140	280	280
WATER [lts]	30	44	44	96	180	340	340
DN GAS IN/OUT	25/25	25/25	25/25	25/25	25/50	50/50	50/50
DN WATER IN/OUT	3/4"	3/4"	3/4"	1"1/2	1"1/2	1"1/2	1"1/2
TECHNICAL DATA	GAS SIDE			WATER SIDE			
PS	20 bar			3,5 bar			
TS	-40/+120 °C			-20/+105 °C			
STANDARD	European Directive 97/23/EC PED, ISPESL VSR-M-S Ed.99 Rev.95 completed with EN13445-5, ASME VIII Div.1 Ed.2002. Other Standards applied: European Directive 94/9/EC ATEX						

Tab. 2-1

- 1 Vaporizzatore - Vaporizer
- 2 Termometro acqua - Water Thermometer
- 3 Sfiato aria - Air Vent
- 4 Manometro Gas - Gas Pressure Gauge
- 5 Termometro Gas - Gas Thermometer
- 6 Valvola Sicurezza Gas - Gas Safety Valve
- 7 Valvola Sicurezza Acqua - Water Safety Valve
- 8 Valv. Termostatica - Thermostatic Valve



ECOVAP 50A-100A-200A



ECOVAP 300A-500A-750A-1000A

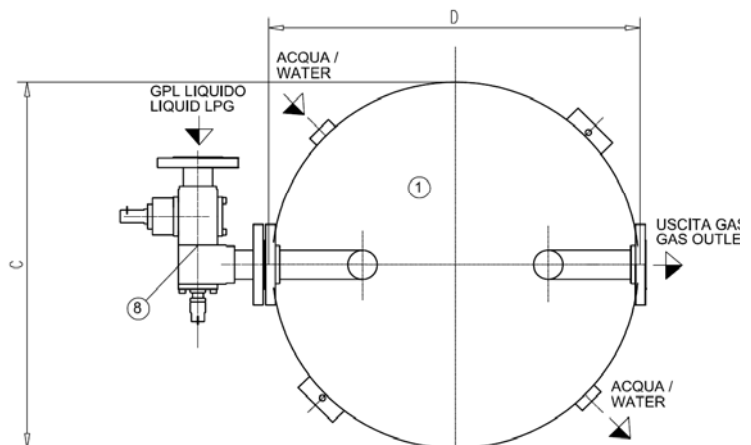



Fig. 2-2

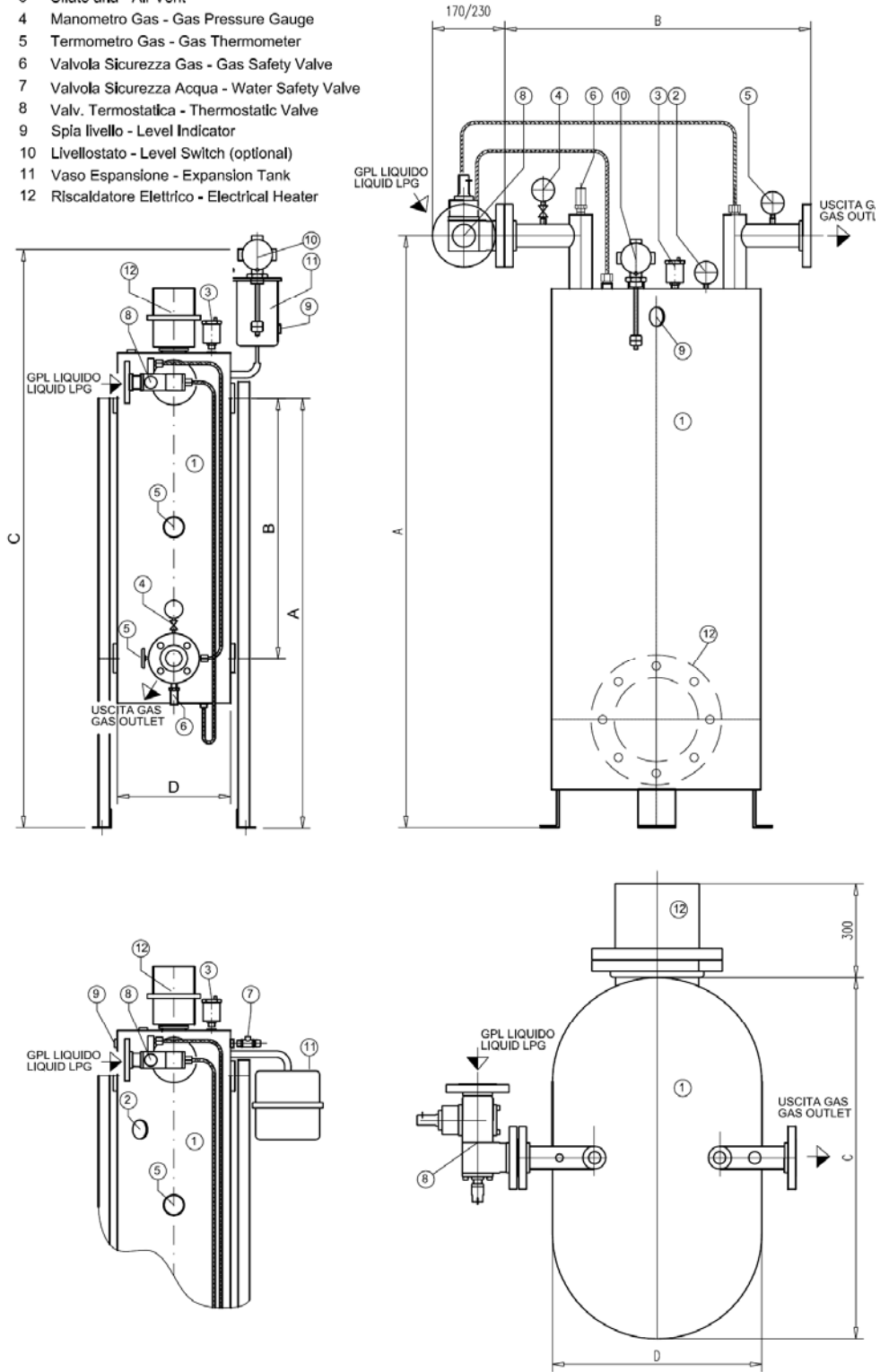
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The tables and figures given below illustrate the technical characteristics of the vaporizer model ECOVAP, hot water with electric preheating version.

	ECOVAP 50E	ECOVAP 100E	ECOVAP 150E	ECOVAP 200E	ECOVAP 300E	ECOVAP 500E	ECOVAP 750E
A [mm]	1105	1105	1255	1370	1530	1530	1530
B [mm]	470	830	830	495	570	570	570
C [mm]	1440	1520	1670	1160	1250	1250	1250
D [mm]	300	300	300	390	390	550	550
WEIGHT [kg]	45	77	83	160	310	315	315
WATER [liters]	30	44	58	258	350	400	400
DN GAS IN/OUT	25/25	25/25	25/25	25/25	25/25	25/50	25/50
POWER [kW]	8	16	24	32	48	80	120
VOLTAGE	380V	380V	380V	380V	380V	380V	380V
TECHNICAL DATA	GAS SIDE				WATER SIDE		
PS	20 bar				3,5 bar		
TS	-40/+120 °C				-20/+105 °C		
STANDARD	European Directive 97/23/EC PED, ISPEL VSR-M-S Ed.99 Rev.95 completed with EN13445-5, ASME VIII Div.1 Ed.2002. Other Standards applied: European Directive 94/9/EC ATEX						

Tab. 2-2


- 1 Vaporizzatore - Vaporizer
- 2 Termometro acqua - Water Thermometer
- 3 Sfiato aria - Air Vent
- 4 Manometro Gas - Gas Pressure Gauge
- 5 Termometro Gas - Gas Thermometer
- 6 Valvola Sicurezza Gas - Gas Safety Valve
- 7 Valvola Sicurezza Acqua - Water Safety Valve
- 8 Valv. Termostatica - Thermostatic Valve
- 9 Spia livello - Level Indicator
- 10 Livellostato - Level Switch (optional)
- 11 Vaso Espansione - Expansion Tank
- 12 Riscaldatore Elettrico - Electrical Heater



ECOVAP 50E-100E-150E

ECOVAP 200E-300E-500E-750E

Fig. 2-3

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3. HANDLING (see Add. N.1)

Handling and transport must be carried out by suitable personnel. Do not damage the vaporizer during transport and handling.

- The vaporizer has been supplied complete with a support base, a fork-lift truck with a lifting capacity suitable for the weight to be lifted must be used.
- To handle it, lift it by the base or sling it with cable or ropes having lifting capacity suitable for the weight to be supported, which must be placed around the circumference or on inlet and outlet flanged gas piping, taking care not to damage the insulation.



ATTENTION

It is good practice to use lifting equipment with sufficient lifting capacity to hold the weight of the plant increased by about 20%.



WARNING:


The plant is supplied painted or galvanised. However, accidental knocks during installation could cause loss of efficiency of the paint or zinc coating, triggering a slow process of oxidation (rust), so it is recommended to restore the original protection with paint or cold zinc coating.

PRECAUTIONS

The exchanger is supplied painted, with the plating protected by insulation: however, accidental knocks during installation could cause loss of efficiency of the paint, triggering a slow process of oxidation (rust), so it is recommended to protect it against inclement weather with a canopy or cabinet.

The electric resistances have an anti-explosive casing, but they are not completely waterproof so, if they are continuously exposed to inclement weather, water could get in and cause short circuits; it is therefore recommended to protect the casing at least with a canopy.

The heat exchanger has been calculated to give the flow rate in normal operating conditions: however, if it is located in sites with a low ambient temperature, heat loss could cause a fall in yield.

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4. INSTALLATION

- Do not subject the plant to static or dynamic loads or to bending movements.
- Installation must be carried out by suitable personnel.
- The plant is delivered to the buyer after having carried out the inspection and seal tests: however, some connections could work loose during transport and handling, so it is necessary to:
 - Check the mechanical connection between the individual parts;
 - Carry out a pressure test with air and check any leaks with a special revealing medium (foam) on both the flanges and the couplings.



ATTENTION


For correct and safe use an adequate earth connection must be provided using the screw on the upright of the vaporizer.

4.1 VERSION WITH ELECTRIC PREHEATING

4.1.1 ELECTRICAL CONNECTION (electrical panel for safe area)

- Open the electric panel installed in a “Safe Zone”.
- Connect the electric power supply cable to the panel, passing the cable through proper hole provided on the panel.
- Wire up the cable for connecting the panel to the electrical heater, passing the cable through the provided hole on the panel and fix the cable with a cable clamp. The terminals of the electrical heater are located inside the Eexd housing under the thermostats.
To access the terminals:
 - Unscrew the cover of the casing
 - Unscrew the two nuts that secure the bracket holding the thermostats
 - Extract the thermostats from their sheath
- Once the connection has been made, repeat the above operations in inverse order.
- Connect the cable between electrical panel and thermostats, inserted in the Eexd casing of the electrical heater, passing the cable through the provided hole on the panel and fixing it with a cable clamp (cable recommended for a distance of 10-15 mt type FG7 3x1.5).
- For the connections, follow the indications given in the enclosed diagrams.
- There are two inputs in the casing for the resistances:
 - the larger one for feeding the resistances
 - the smaller one for feeding the thermostats

The connections between panel and heater shall be made with flexible cables type FG7 4Gxmmq (see following table for mmq).

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Remember that both the cable and the respective protection must comply with the regulations concerning plants made in areas with a risk of explosion or fire.

The cable section varies according to the power installed and the distance from the vaporizer to the electric panel.

For example, see the table.

SIZES OF THE ELECTRIC CABLES CONNECTING THE VAPORIZER TO THE ELECTRIC PANEL

LPG Flow Kg/h	Power kW	Electric connection	Voltage Volt	Intensity Ampere	Cables section sq.mm			
					Length 30 mt.	Length 60 mt.	Length 100 mt.	Length 150 mt.
50	8	Three-phase	380/400	12	2.5	6	10	16
100	16	Three-phase	380/400	24	6	10	16	25
150	24	Three-phase	380/400	36	6	10	16	25
200	32	Three-phase	380/400	49	10	25	35	50
300	48	Three-phase	380/400	73	16	35	50	70
500	80	Three-phase	380/400	122	35	50	70	120
750	120	Three-phase	380/400	182	70	95	120	185

Tab. 4-1

Note:

The calculated section is indicative and refers to multicore cables with a voltage drop of $\leq 2\%$ for three-phase and $\leq 4\%$ for single-phase.

The current intensity indicated refers to the single phase.

4.1.2 WATER LEVEL SWITCH (OPTIONAL)

It is possible to install an electromagnetic level switch for water, with a float and “Reed” contact, complete with a steel casing and Eexd watertight connection.

Follow the connection details supplied.

If the level switch is not Eexd, but Ex-ia, electric power supply has to come from a galvanic isolator, as this equipment is in AD-PE zone.




WARNINGS:

The position of the level switch must be more than 5 cm from the upper heating limit of the electric resistances.



ATTENTION

Close the door of the electric panel with the key provided and put it in a safe place.

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4.1.3 FILLING THE WATER CIRCUIT (see Add. N.2)

Vaporizers from 50E to 150E are available equipped with an open expansion tank or with a closed expansion tank, to allow water to swell when its temperature increases. To fill up the water circuit follow the instructions below.

Ecovap 50E to 150E with close expansion tank:

- Remove the filling cap on the top of the vaporizer labelled “Water Inlet”.
- Pour in the water.
- Fill up the whole heat exchanger of the vaporizer. Do not stop to pour in water at the visual water level indicator, but keep on pour in water up to the inlet sleeve.
- Replace the cap.

Ecovap 50E to 150E with open expansion tank:

- Remove the cap of the expansion tank on the top of the vaporizer
- Pour in the water from the expansion tank
- Fill up all the heat exchanger of the vaporizer, until some water fills also the expansion tank
- Replace the cover.


Vaporizers from 200E to 750E have no expansion tank: water circuit is at ambient pressure. In order to allow water to swell when temperature increases, not all the heat exchanger have to be filled up with water. The heat exchanger of the vaporizer must be filled up to the level indicated with a red line on Annex nr.2. This level on the vaporizer is indicated by the visual indicator and by a little plug on the side of the vaporizer. To fill up the water circuit follow the instructions below:

- Remove the filling cap on the top of the vaporizer, labelled “Water Inlet”.
- Remove the plug on the side of the vaporizer, the one that indicates maximum water level (refer to red line in Annex nr.2). Removing this plug makes you sure that water level will be the one required, because water level will not exceed obviously the level of the open plug.
- Pour in the water.
- The level required for correct operation is when water reaches the visual indicator and starts flowing out from the open plug on the side of the vaporizer.
- Replace the plug and the filling cap.

Vaporizers have different capacity on water side, depending on the size: see table 2-1 and 2-2.



In particularly cold places the water may be diluted with antifreeze by minimum 30% to maximum 50%. It is recommended to use only “INHIBITED ETHYLENE GLYCOL” as antifreeze as it guarantees complete WATER-SOLUBILITY and can be bought from common dealers. The use of ordinary antifreeze is not advised as it is aggressive for the circuit itself and favours the phenomenon of stratification in the case of plant stoppage. This means that the water moves with difficulty when the plant is switched on again.

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4.2 HOT WATER VERSION

4.2.1 CONNECTION

The system must be made by connecting an ordinary heating boiler to the hot water vaporizer.



WARNING

The boiler flow rate must be such as to cover the amount of calories required by the declared flow rate of the vaporizer, as indicated on the plate on the vaporizer, necessary to supply hot water at a temperature of 70°C.

- Connect the hot water delivery, from the boiler, to the tap on the top of the vaporizer.
- Connect the hot water return, to the boiler, to the tap on the bottom of the vaporizer.

4.2.2 BOILER REQUIREMENTS

The boiler that supply hot water to the vaporizer has to have the following technical features:

Ecovap		50A	100A	200A	300A	500A	750A	1000A
Water flow	[m ³ /h]	1.0	1.5	3.0	4.5	7.5	12.0	15.0
Power	[kW]	8	15	30	45	76	113	151
Inlet Temp.	[°C]	75	75	75	75	75	75	75
Outlet Temp.	[°C]	67	67	67	67	67	67	67
Loss of charge	[bar]	0.04	0.06	0.10	0.21	0.26	0.29	0.31

Tab. 4-3



WARNING

If you respect these points, as well as the others illustrated, you will have the maximum capacity of the heat exchanger at your disposal.

Failure to satisfy these requirements causes a notable and appreciable drop in the total flow rate of the heat exchanger, and may give rise to problems in starting up and in normal operation.

The vaporizer has been designed to supply the adequate flow rate in normal operating conditions. However, it is located in sites with a low ambient temperature, heat loss could cause a fall in yield.


To avoid situations of this kind it is possible to install the vaporizer in an optional special insulated cabinet, which can house both the vaporizer and the reduction unit.



ATTENTION

The temperature of the water circuit could cause injury to personnel if they remain in contact with the hot parts, so protection is recommended (insulation).

The vaporizer and the boiler must be installed by skilled personnel.


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4.2.3 FILLING THE WATER CIRCUIT (see Add. N.2)

- Remove the filling cap on the top of the vaporizer.
- Pour in the water. You can also pour in water from the boiler supply circuit.
- When water comes out of the plug on the upper part of the vaporizer, close and screw on the cap.
- After the first hours of operation it is recommended to bleed any air that may have formed inside the vaporizer, slightly opening the above cap.



In particularly cold places the water may be diluted with antifreeze by minimum 30% to maximum 50%. It is recommended to use only "INHIBITED ETHYLENE GLYCOL" as antifreeze as it guarantees complete WATER-SOLUBILITY and can be bought from common dealers. The use of ordinary antifreeze is not advised as it is aggressive for the circuit itself and favours the phenomenon of stratification in the case of plant stoppage. This means that the water moves with difficulty when the plant is switched on again.

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5. COMMISSIONING



ATTENTION

During commissioning, absolutely avoid smoking or using naked flames: risk of explosion.
 Failure to respect this condition may cause severe injury to persons and damage to the plant.

- Before commissioning, it is recommended to ensure that the conditions of use comply with the characteristics given on the respective data plate.
- Before carrying out any intervention it is important to ensure that the valve has been intercepted upstream and downstream and that the pressure has been discharged in the lengths of pipe between the interception valves.
- Ensure that the water circuit has been correctly filled.

5.1 VERSION WITH ELECTRIC PREHEATING

- Ensure that the electrical connections of the resistances and of the thermostats have been made correctly.
- Unscrew the casing of the resistances and set the regulating thermostat TR at 70°C.
- Turn on the power in the electric panel.
- Wait for the water temperature measured by the thermometer to reach 70°C.
- If it does not reach the above temperature, alter the setting of the regulating thermostat TR, turning the knob clockwise (the difference in temperature between the thermostat TR and the value shown by the thermometer is due to the distance between the location of the respective probes).
- Close the casing of the resistances and tighten the safety screw (with an allen wrench),
- Check that there are no leaks from the gaskets of the water circuit.




ATTENTION

When starting up for the first time the aqueous solution takes about 40/60 minutes to complete circulation.

After this phase, open the liquid gas input valve very slowly. Opening this valve too quickly may cause irreversible damage to the vaporizer. So take great care during this operation. Opening the LPG supply valve too quickly may cause freezing and consequent breakage of the exchange group.

If too fast, both the input and the discharge of liquid gas cause a sudden fall in temperature, which may result in the formation of ice. As is known, ice can cause burst pipes, with consequent transfer of liquid gas into the water circuit. This situation would potentially be very dangerous, causing the risk of explosion.

- At this point the liquid gas automatically enters the vaporizer.
- Check that there are no leaks from the gaskets of the gas circuit.
- Very slowly open the valve downstream towards the pressure reducers.
- At this point it is possible for the utility to start using gas.

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ATTENTION

For the first hours of operation it is recommended to increase the withdrawal of gas very gradually, so as to allow the activation of the movement of the aqueous solution in the circuit, and to allow the regulating system to adapt to the working conditions.

5.1.1 CHECKS AND CONTROLS

- Check the temperature of the aqueous solution, because the flow rate of the gas in the vaporizer self-adjusts according to the difference in temperature of the aqueous solution between the top and the bottom of the vaporizer.
- If the temperature of the aqueous solution in the bottom of the vaporizer falls below 50°C, the "thermostatic regulating valve" closes.
- The aqueous solution is kept at the desired temperature by the regulation of a thermostat TR set at 70°C which activates or deactivates the operation of the electric resistance.
- In the event of breakage of the thermostat TR, a second thermostat TS, set fixed at about 95°C, intervenes and deactivates the operation of the electric resistance; this thermostat is manually reset (it is reset, after having checked the causes of intervention, by pressing the button provided).
- It is recommended to check water level from the visual indicator periodically and to top up when necessary.

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5.2 HOT WATER VERSION

- start up the boiler;
- ensure that the valves on the inlet of the liquid gas to the vaporizer and the one on the outlet of the gaseous phase, upstream from the regulator, are closed;
- ensure that the aqueous solution circuit has been correctly filled;
- wait for the temperature of the aqueous solution measured by the thermometer on the vaporizer body to reach 70°C;
- If it does not reach the above temperature, alter the setting of the regulating thermostat on the boiler, turning the knob clockwise (the difference in temperature between the boiler thermostat and the value shown by the thermometer is due to the distance between the two appliances);
- check that there are no leaks from the gaskets of water circuit.



ATTENTION

At this point, open the liquid gas input valve very slowly. Opening this valve too quickly may cause irreversible damage to the vaporizer. So take great care during this operation. Opening the LPG supply valve too quickly may cause freezing and consequent breakage of the exchange group.

If too fast, both the input and the discharge of liquid gas cause a sudden fall in temperature, which may result in the formation of ice. As is known, ice can cause burst pipes, with consequent transfer of liquid gas into the water circuit. This situation would potentially be very dangerous, causing the risk of explosion.

- At this point the liquid gas automatically enters the vaporizer.
- Check that there are no leaks from the gaskets of the gas circuit.
- Very slowly open the valve downstream towards the pressure reducers.
- At this point it is possible for the utility to start using gas.




ATTENTION

For the first hours of operation it is recommended to increase the withdrawal of gas very gradually, so as to allow the activation of the movement of the aqueous solution in the circuit, and to allow the regulating system to adapt to the working conditions.

5.2.1 CHECKS AND CONTROLS

- Check the temperature of the aqueous solution, because the flow rate of the gas in the vaporizer self-adjusts according to the difference in temperature of the aqueous solution between the top and the bottom of the vaporizer.
- If the temperature of the aqueous solution in the bottom of the vaporizer falls below 50°C, the "thermostatic regulating valve" closes.

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5.3 GENERAL WARNINGS FOR CORRECT OPERATION OF THE VAPORIZER



NOTE:

During the first start-up the water takes about 40/60 minutes to complete circulation.

- Once the vaporizer has been put into operation, switch it off only in the case of maintenance operations or for long periods of inactivity of the plant.
- It is advisable to leave it on overnight or at the weekend, because consumption is negligible, and it avoids having to repeat the switch-on procedures.
- When switching off the plant, always close the interception valve on the vaporizer inlet, located on the liquid gas inlet side.
- Before starting up the plant again it is indispensable to discharge the liquid gas downstream from the vaporizer, which has formed by new condensation after the phase of changing into gaseous form.
- The filter on the inlet (incorporated in the thermostatic valve) avoids the entry of impurities which could settle on the seat of the valve (causing leaks of liquid gas), so it must be cleaned frequently also depending on the type of gas used. In the presence of large impurities it is recommended to
- install an additional filter.



NOTE

Most important instructions are indicated also in a label stuck on the vaporizer (see Fig. 3-1).

PER UN CORRETTO FUNZIONAMENTO DEL VAPORIZZATORE:

A) Dopo la messa in funzione del vaporizzatore, spegnere solo nel caso di manutenzione o per lunghi periodi di inattività dell'impianto. Si consiglia di lasciarlo acceso durante la notte o il fine settimana evitando così il ripetersi delle operazioni di accensione sopraportate

B) In fase di spegnimento dell'impianto chiudere sempre la valvola di intercettazione posta in entrata del vaporizzatore, lato gas liquido

C) In fase di riaccensione dell'impianto, prima è indispensabile scaricare il gas liquido a valle del vaporizzatore formatosi per la ricondensa della fase gassosa

D) Il filtro in entrata, presente sul vaporizzatore, evita che le impurità si inseriscano e si formino sulla sede valvola (causa di trafileamenti di gas liquido) per cui deve essere pulito frequentemente anche in funzione del tipo di gas usato. In presenza di grosse impurità si consiglia di installare un filtro supplementare (cod.040064/65 della Ferrari srl)

E) In luoghi particolarmente freddi si può diluire nell'acqua con antigelo nella misura max del 10%. Si raccomanda l'impiego come anticongelante esclusivamente "GLICOLE ETILENICO INIBITO" in quanto garantisce la completa IDROSULUBILITÀ' codice commerciale GLIC02455000 ed acquistabile nei più qualificati rivenditori. Sconsigliamo l'impiego di antigelo comune in quanto presenta aggressività per il circuito stesso e in caso di fermata dell'impianto favorisce il fenomeno della stratificazione. Questo significa che alla riaccensione dell'impianto l'acqua stenta a muoversi

TO OBTAIN A CORRECT FUNCTIONING OF THE VAPORIZER:

A) After the starting-up of the Vaporizer, it is essential to shut it off only in case of maintenance purposes or for a long period the Vaporizer is destined at no use. Please note, it is convenient to maintain in operating conditions the Vaporiser during short period of unused final utilizer e.g. Saturday, Sunday and Nights in order to save at each time the re-start up costs

B) Before the Vaporizer is shut off, it is imperative to close the brass valve on the inlet line of the liquid gas

C) Before the Vaporizer's restart, empty the liquid gas contained in the down stream line

D) The gas filter located on the Vaporizer's inlet line, has to be often cleaned, depending on how pure is the LPG mixture used. In case of high gas dirtiness It is important and strongly suggested to install an additional bigger filter (see codes 040064/65 by Ferrari srl)

E) In particular weather conditions, such as cold surroundings, it is suggested to dilute the water with INHIBITED GLYCOL ETHYLENIC antifreezing in the max percentage of 10%. This special antifreezing can be purchased in qualified supplier shops. Commercial code: GLIC02455000. We do strongly advise against purchasing common antifreezing, since it can stratify not favouring the good water circulation.

Fig. 3-1

6. HOW THE THERMOSTATIC VALVE WORKS AND HOW TO SET IT

6.1 How the thermostatic valve works

Our Ecovap vaporizers are equipped with two thermostatic valves which detect temperature in the heat exchanger and modulate inlet gas flow accordingly:

- 1st safety thermostatic valve operates depending on water outlet temperature;
- 2nd safety thermostatic valve operates depending on gas outlet temperature.

These valves have a completely mechanical operation: they don't need any electric connection.

6.2 Thermostatic Valve Setting

Pressure and propane/butane mixture of the LPG that is to be used define thermostatic valves setting temperatures. Each valve has its setting screw, through which setting temperature can be regulated (see figure).

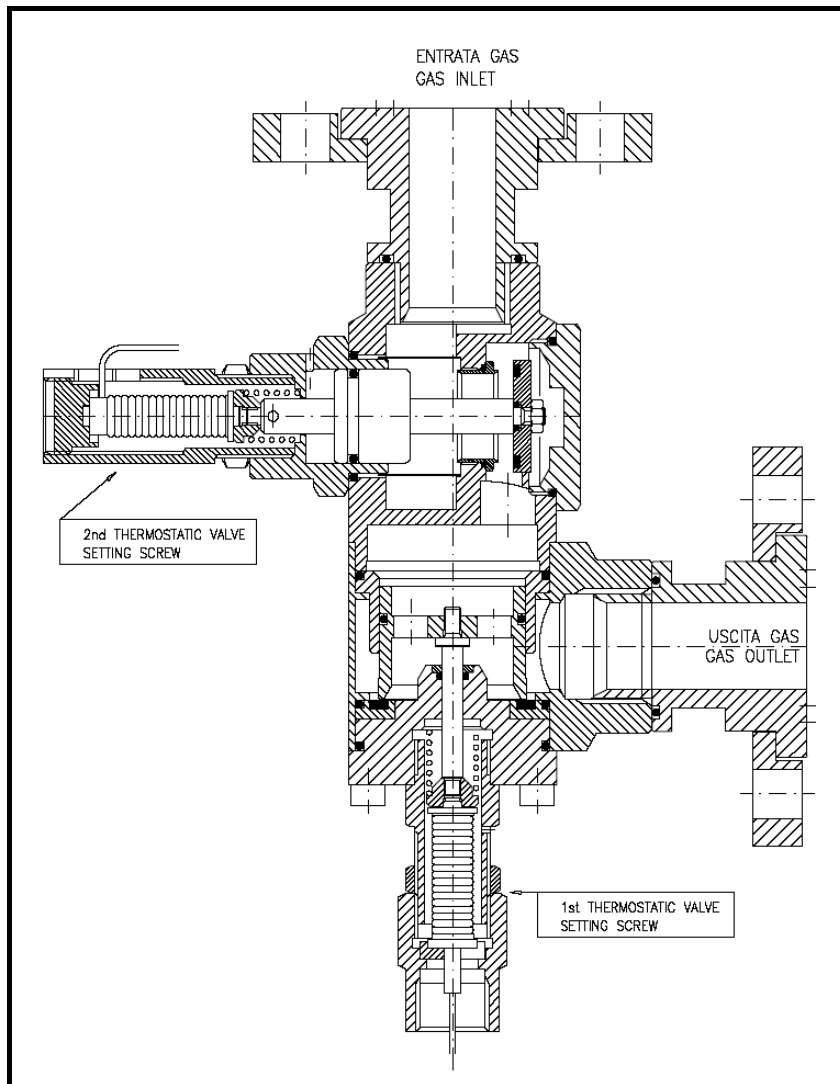



Fig. 6-1

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ATTENTION

Do not touch valves setting screws. Setting screw position must not be modified. It is our care to set thermostatic valves in our lab: if you move the screw, you modify valves setting temperatures. This could prejudice vaporizer proper working, with consequences that could also be dangerous.

6.3 Checks and controls

Each vaporizer is delivered with its thermostatic valves set depending on pressure and propane/butane mixture of the LPG that is to be used. We collect these information from the customer, who is responsible for them.

1st safety thermostatic valve operates depending on water outlet temperature; 2nd safety thermostatic valve operates depending on gas outlet temperature.

1st safety thermostatic valve is usually set at the same temperature, between 50°C and 60°C.

2nd safety thermostatic valve setting temperature is defined depending on exercise conditions. LPG enters a gaseous state at different temperatures, depending on pressure and propane/butane mixture: this is why 2nd safety thermostatic valves setting temperature has to be dedicated. The following chart shows how gasification temperature can significantly change depending on pressure and propane/butane mixture.

The 2nd safety thermostatic valve has a wide range of setting temperature, from 10°C to 50°C, which covers all the common conditions of LPG applications.

Temperature [°C]	Mix propane-butane										
Tank pressure [barg]	100%	90/10	80/20	70/30	60/40	50/50	40/60	30/70	20/80	10/90	0%
2	-14	-6	0	5.5	10	14	17.5	21.5	24.5	28	31
4	1	9	15.5	21	25.5	30	34	38	42	45.5	49
6	12	20	27	32.5	37.5	42	46.5	51	55	59	62.5


Tab. 6-1



ATTENTION

It is important for safety reasons that the LPG characteristics that we collect are as follows:

- maximum LPG pressure available during the year;
- maximum butane percentage of the LPG mixture which has to be used.

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7. MAINTENANCE

LPG is not a clean gas: usually it contains particles of dirt and oily substances that scale the vaporizer and its components. If the gas is correctly filtered the vaporizer generally does not need any maintenance.

In the event of faulty operation or of breakdown of the equipment, before starting with any maintenance operation, switch off the power at the electric panel (version with electric preheating) or close down the boiler (hot water version), close the interception valve upstream from the vaporizer and discharge any gas left in the appliance with all due care.

If the flow rate of the vaporizer decreases it is necessary to carry out maintenance. The components that need maintenance are in particular the inlet filter (housed inside the thermostatic valve), the thermostatic valve and the heat exchanger.

7.1 FILTER (on inlet)

It is recommended to clean up the filter at least once a year. If the filter would be particularly dirt and clogged, clean it up more frequently.

Check the filter also when the vaporizer doesn't work properly, that is when the flow rate of the vaporizer decreases.


- Switch off the vaporizer and remove all the LPG from inside:
 - ensure that the LPG inlet and outlet valves, located upstream and downstream from the vaporizer, are in closed position;
 - to remove the pressure gauge;
 - prepare a pipe of a suitable length to connect to the valve for pressure gauge in order to take it outside the area in which the vaporizer is installed (outdoors);
 - open the valve to eliminate all the residual gas;
- unscrew and remove the cap on the inlet of the thermostatic regulating valve;
- take out the stainless steel filter cartridge;
- clean it with compressed air or solvents;
- replace the filter cartridge;
- fit and tighten the cap again;
- close again the valve for the pressure gauge, disconnect the pipe applied and put the pressure gauge.

7.2 EXCHANGER

Ecovap heat exchanger is designed to work with a minimum maintenance .

It is recommended to clean up the heat exchanger every 3-5 years, in order to avoid a decrease of the exchanging surface due to scaling of impurity and oily substances.

- Switch off the vaporizer and remove all the LPG from inside:
 - ensure that the LPG inlet and outlet valves, located upstream and downstream from the vaporizer, are in closed position;
 - to remove the pressure gauge;
 - prepare a pipe of a suitable length to connect to the valve for pressure gauge in order to take it outside the area in which the vaporizer is installed (outdoors);
 - open the valve to eliminate all the residual gas;
- remove the screws connecting the flange on the inlet and outlet;
- extract the vaporizer from its site;
- run solvent for hydrocarbons through the coil until the encrustations are eliminated;
- repeat the operation in inverse order, taking care to change the flange gaskets.

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7.3 THERMOSTATIC VALVE

If the gas is properly filtered, thermostatic valve doesn't need maintenance.

Therefore it is recommended to do a periodic maintenance on the filter of the thermostatic valve. See previous paragraph 7.1 for the instructions of filter cleaning.



WARNING

If you observe during the periodic maintenance that the filter is always dirt, it is recommended to do also clearing operations on the thermostatic valve itself, at least on its most important component, as the shutters.

In any case, it is recommended to clean up the thermostatic valve at least once a year.

Cleaning the shutters is quite easy to operate by disassembling the thermostatic valve. To properly disassembling the thermostatic valve refer to the following instructions and to the drawings of the assembled thermostatic valve and of its single components (these drawings are enclosed to the present documentation).

- ensure that the LPG inlet and outlet valves, located upstream and downstream from the vaporizer, are in closed position;
- to remove the pressure gauge;
- prepare a pipe of a suitable length to connect to the valve for pressure gauge in order to take it outside the area in which the vaporizer is installed (outdoors);
- open the valve to eliminate all the residual gas;
- remove the screws placed on the body of thermostatic valve and open it as attached table;
- clear with adapted dissolved for hydrocarbons the removed mechanical parts;
- replace the estate parts with our original spare parts;
- repeat the inverse operation
- close the valve for the pressure gauge, disconnect the pipe applied and connect another one with nitrogen cylinder;
- test the estate of the thermostatic valve with nitrogen at the pressure of design pressure x 1,5;
- close again the valve for the pressure gauge, disconnect the pipe applied and put the pressure gauge.



ATTENTION


While disassembling the thermostatic valve do not touch the setting screws (see previous figure 6.1). If you twist on or off the setting screws, you modify thermostatic valve setting temperature. This can prejudice the proper working of the vaporizer.



WARNING

Shutters clearing is highly recommended after stopping periods of the vaporizer (even after 1 week of stop), because LPG settles down inside the valves, obstructing shutters stroke.

After stopping periods or before the commissioning, another simple but very useful maintenance

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operation can be done, which avoids to disassemble the valve. The operation consists in verifying if the shutters of the thermostatic valves are free to move along their stroke.

Follow the instructions below, referring also to the “UNLOCK VALVE” drawing enclosed.

1) 1st safety thermostatic valve:

- loose the body of the setting screw: pay attention not to screw off the ferrule which holds the setting screw in its setting position, otherwise you modify setting temperature;
- push on the spring towards inside the valve, making the shutter move along its stroke;
- tight the body of the setting screw to its initial position.

2) 2nd safety thermostatic valve:

- mark a reference point in order to know the position of the setting plug: the setting plug must return

to its initial position after this maintenance!

- loose the setting plug and remove the thermostatic element;
- push on the spring towards inside the valve, making the shutter move along its stroke;
- put the thermostatic element in its position and tight the setting plug to its initial position (the position you marked before)



ATTENTION

During maintenance, absolutely avoid smoking or using naked flames: risk of explosion.

Failure to respect this condition may cause severe injury to persons and damage to the plant.

Have the appliance and connections checked by expert, qualified personnel.

NEVER attempt to repair or restart the appliance by yourself.

In the event of inadequate repairs, no responsibility is accepted for the resulting damage.

7.4 DEMOLITION

The vaporizer is made of recyclable materials. At the end of its useful life, refer to the applicable regulations in the country of installation.

8. ATTACHED DOCUMENTATION

List of enclosures:

- Annex n.1 – Ecovap Handling;
- Annex n.2 – Filling water circuit;
- Electrical Heater Data Sheet and Manual (for Ecovap electric version);
- Electrical Heater wiring diagram (for Ecovap electric version);
- Electric Scheme of the Electrical Board (if included in furniture);
- Electrical Heater declaration of conformity (for Ecovap electric version);
- General Assembly of thermostatic valve;
- Exploded View of thermostatic valve with all the single components;
- Instruction Drawing for unlocking the shutters.