

“MINIVAP40” HOT WATER VAPORIZER WITH ELECTRIC PREHEATING

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“MINIVAP40” HOT WATER VAPORIZER



USE AND MAINTENANCE INSTRUCTIONS

Edition 09.2019 Rev.2


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1. INTRODUCTION

1.1 FOREWORD AND IMPORTANT WARNINGS

The **USE AND MAINTENANCE MANUAL** describes the plant operation and the correct procedures for carrying out the main use and routine maintenance.

The indications given in this manual are destined to a professional user who must have specific knowledge on the plant procedures of use, who must be suitably authorised, instructed and trained for the correct use and commissioning of the system so as to guarantee uninterrupted plant operation.

It is advised to read it careful before commissioning the plant. The manual must be kept in its specific housing on the plant or in an easily accessible place, protected against damage and always available for whatsoever future consulting requirements.


This manual must be complete and readable in all its parts, all operators who use the plant, or the person responsible for maintenance or regulation operations, must know where it is kept and must be able to consult it at any moment.

Should it be damaged or lost, you must ask for a new copy from the plant manufacturer. Should the plant be transferred to another owner, the manual must be handed over to the new user. The manual is considered an integral part of the plant.

For all components and appliances produced by third parties, please refer to the instructions included in their respective manuals.

The manual has been conceived so as to provide the user with all necessary information for using the plant in safe conditions, from the transport phase to scrapping.

The instructions given by this Use & Maintenance Manual are complementary to the accident regulations in force in the country of use of the plant (the instructions are not exhaustive but complementary to the safety provisions and/or requirements issued by the individual countries)

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1.2 MANUAL UPDATING

The information, descriptions and illustrations contained in this manual respect the state of the art at the moment the plant is placed on the market for the first time.

The Manufacturer reserves the right to make any changes to the type of plant at any time for technical or commercial reasons. Said changes do not require the Manufacturer to intervene on the plants that have already been placed on the market until that moment nor to consider this manual inadequate. Any additions that the Manufacturer may deem appropriate to provide on a later date must be kept together with the manual and considered an integral part of it.

Although this manual contains the most up-to-date information, there may be minor differences between your plant and the one described in this booklet.

If you find any printing errors or indications that are unclear to you, or if you have any other concerns, contact your supplier.

1.3 COPYRIGHT

The copyright of this manual belongs to the plant Manufacturer.

This manual contains texts, drawings and illustrations of a technical nature that may not be disclosed or transmitted to third parties, in whole or in part, without the written authorisation of the machine Manufacturer.

Plant manufacturer
PEGORARO GAS TECHNOLOGIES S.r.l.
 Legal premises: via E. Fermi, 253
 Executive Premises: viale della tecnica, 28
 36100 Vicenza (Italy)

1.4 DESCRIPTION OF PICTOGRAMS AND SYMBOLS

In the manual the following symbols are employed to highlight particularly important instructions and warnings:



ATTENTION

This symbol indicates safety standards for the operator and/or any persons exposed



WARNING:

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



NOTE:

This symbol indicates useful information



ATTENTION

Read the instruction manual before doing anything

MANDATORY AND REQUIRED

Use personal safety equipments and tools



Helmet



Ears protection



Safety shoes



Gloves



Mask



Glasses



Overalls



Safety harness



DANGER

Explosion with the presence of shrapnel under pressure



DANGER

Potentially explosive atmosphere




DANGER

Voltage



DANGER

Burns


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1.5 APPLIANCE INTENDED PURPOSE

The vaporizer has been devised, designed and manufactured to be installed in LPG vaporizing and decompression stations for heating and vaporizing liquid LPG passing through the plant, into has before this is decompressed.

PEGORARO GAS TECHNOLOGIES s.r.l. declines all responsibility for any damage to things or persons in the event of:

- Handling, installation, commissioning, maintenance of the individual installed appliances and scrapping by non-qualified personnel;
- improper use of the plant;
- modifications, welding or damage;
- failure to comply with the current applicable safety standards and health and safety laws and regulations.
- operation at temperature and pressure higher than those specified in the rating plate;
- alteration or removal of safety protection components (electrical, electronic, electro-pneumatic, electro-mechanical).
- removing, painting over or covering plant identification plates and warning symbols.
- installation errors;
- lack of proper maintenance;
- failure to comply with the content of this user manual

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2. TECHNICAL CHARACTERISTICS

The data are also given on the rating plate fixed to the vaporizer (see fig. 2-1)



Fig. 2.1

The tables and figures given below illustrate the technical characteristics of the MINIVAP vaporizer in both versions: with electric preheating and with hot water from an external boiler.

Tab. 2.1


MAIN FEATURES

Type of vaporizer	Water Bath Vaporizer with electrical preheating			Water Bath Vaporizer with hot water from external boiler
Model	Minivap40 30E	Minivap40 40E	Minivap40 40E	Minivap40 40A
Flow rate	30 kg/h	40 kg/h	40 kg/h	40 kg/h
Power	4 kW	5 kW – 380V	5kW – 220V	5 kW (caldaia)
Gas side connections	In: 1/2" G Out: 1/2" G			In: 1/2" G Out: 1/2" G
Water side connections	In: 1/2" G Out: 1/2" G			In: 1/2" G Out: 1/2" G

Tab. 2.2 MANUFACTURING CHARACTERISTICS

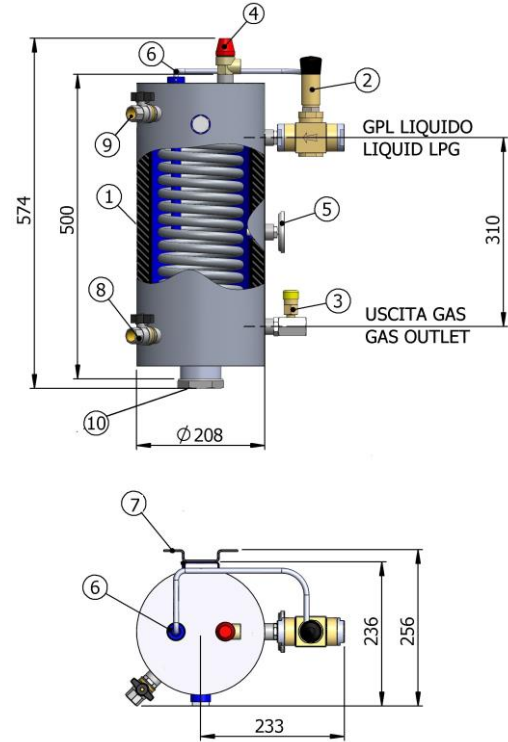
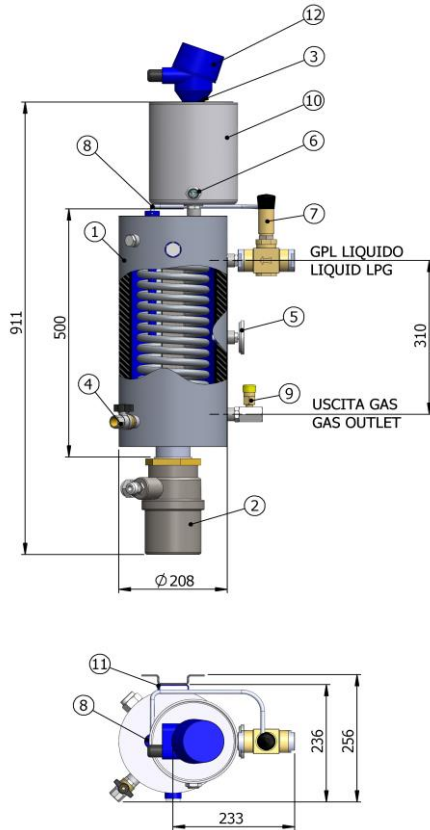
Model	All versions	
	Water Side (Tank)	Gas Side (Coil)
Exchange Area	---	0.28 mq
PS	3 bar	20 bar
Test pressure	4 bar	30 bar
Temperature	-10 / 105 °C	-40 / 120 °C
Volume	7 lt	0.8 lt

Tab. 2.3 ELECTRICAL CHARACTERISTICS

Model	Minivap40 30E	Minivap40 40E	Minivap40 40E
Voltage	220V - 50Hz	380V - 50Hz	220V - 50Hz
Phase	1	3	1
Power	4 kW	5 kW	5 kW
Current absorption	18.18 Amps	7.60 Amps	22.70 Amps
ATEX Equipment Classification	EEx de IIC T4  II2GD		
ATEX Hazardous Area Classification	Class I / Zone 1 or 2 T(room) -20/+40°C / Tmax 99°C		

Minivap40 Versione ELETTRICA

Minivap40 Versione AD ACQUA



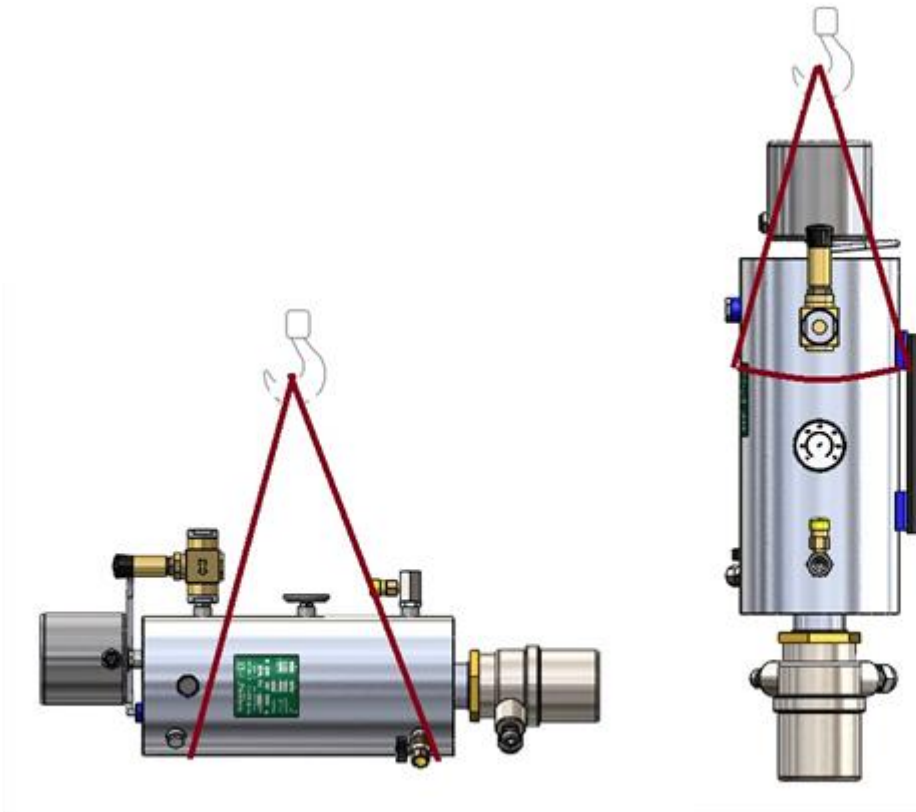
12	1	LIVELLOSTATO EEXD (OPTIONAL)/ EEXD LEVEL SWICTH	1"					
11	1	AGGANCI PER SUPPORTO/ HANGING FOR WALL						
10	1	VASO ESPANSIONE APERTO /OPEN EXPANSION VESSEL	½"	10	1	TAPPO/ PLUG		2"
9	1	VALVOLA DI SICUREZZA GAS/ GAS SAFETY VALVE	¼"	9	1	USCITA ACQUA/ WATER OULET		½"
8	1	SONDA TEMPERATURA ACQUA/ WATER TEMPERATURE PROBE	½"	8	1	ENTRATA ACQUA/ WATER INLET		½"
7	1	VALVOLA DI CONTROLLO GPL/ LPG CONTROL VALVE	1"	7	1	AGGANCI PER SUPPORTO/ HANGING FOR WALL		
6	1	INDICATORE DI LIVELLO VISIVO/ WATER LEVEL VISUAL INDICATOR	½"	6	1	SONDA TEMPERATURA ACQUA/ WATER TEMPERATURE PROBE		½"
5	1	TERMOMETRO ACQUA/ WATER TERMOMETER	½"	5	1	TERMOMETRO ACQUA/ WATER TERMOMETER		½"
4	1	TAPPO SCARICO ACQUA/ WATER DRAIN PLUG	½"	4	1	VALVOLA DI SICUREZZA ACQUA/ WATER SAFETY VALVE		½"
3	1	RIEMPIMENTO ACQUA/ WATER FILLING		3	1	VALVOLA DI SICUREZZA GAS/ GAS SAFETY VALVE		½"
2	1	RESISTENZA ELETTRICA EEXD/ EEXD HEATING ELEMENT	2"	2	1	VALVOLA DI CONTROLLO GPL/ LPG CONTROL VALVE		2"
1	1	SCAMBAITORE DI CALORE "MINI" / "MINI" HEAT EXCHANGER		1	1	SCAMBAITORE DI CALORE "MINI" / "MINI" HEAT EXCHANGER		
POS.	Q.ty	DESCRIPTION	DN	POS.	Q.ty	DESCRIPTION		DN

Fig. 2.2

3. HANDLING

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

When handling, lift it from the casing paying attention not to damage the insulation.




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 electric resistances have an explosion-proof housing with IP65 level. The vaporizer can be used outdoors but it is advised to protect it with canopy or with a cabinet. The heat exchanger has been calculated so as to guarantee the flow under normal operating conditions: but if it is located in sites subject to low temperatures, heat loss could cause diminished performance.

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4. INSTALLATION

- The Minivap40 vaporizer must be installed only VERTICAL
- Do not subject the plant to static or dynamic loads or to bending movements.
- The 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 suitable revealing medium (we suggest soapy water) on both the flanges and the couplings.



ATTENTION

For correct and safe use an adequate earth connection must be provided using the hole on the support feet of the vaporizer, indicated by the symbol:



PRECAUTIONS

The electric resistances have an explosion-proof housing with IP65 level. The vaporizer can be used outdoors but it is advised to protect it with canopy or with a cabinet.

The heat exchanger has been calculated so as to guarantee the flow under normal operating conditions: but if it is located in sites subject to low temperatures, heat loss could cause diminished performance of the fitted equipment.

Consequently we highly recommend that the vaporizer be protected by a specific cubicle or closed environment, equipped with a specific ventilation system and if possible insulated.

4.1 VERSION WITH ELECTRIC PREHEATING

4.1.1 ELECTRICAL CONNECTION

(NON WIRED electrical panel for safe area with a degree of protection of IP65)


- Open the electric panel installed in a "Safe Zone".
- Wire up the cable for connecting the panel to the electrical resistance, 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:

1. Unscrew the housing lid
2. Unscrew the two nuts that secure the bracket holding the thermostats
3. Extract the thermostats from their sheath



Fig. 4.2
Versione filettata

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- Once the connection has been made, repeat the above operations in inverse order.
- Connect the cable between the electrical panel and the 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 m type FG7 3x1.5).
- Connect the electric power supply cable to the panel, passing the cable through the hole provided on the panel.
- For the connections follow the instructions provided in the enclosed diagrams.
- There are two cable entries in the electrical resistance casing:
 - The larger one for connecting the supply cable
 - The smaller one for connecting the cables of the thermostats

The connections between panel and the electric resistance must be made with flexible cables of type FG7 4Gxmmq (see following table for mm²).



We remind you that both the cable and its respective cable clamp must comply with the standards for plants in areas subject to explosion or fire hazard.

The cable section varies according to the installed power and to the distance between the vaporizer and the electric control board.

For the cable sections to be used, follow the table below:

**DIMENSIONS OF ELECTRICAL CABLES CONNECTING
THE VAPORIZER WITH THE ELECTRICAL PANEL**

LPG flow rate Kg/h	Power kW	Type of connection	Voltage Volt	Intensity Ampere	Cable section in mm ² .			
					Length 30 mt.	Length 60 mt.	Length 100 mt.	Length 150 mt.
30	4	Single-phase	220/230	18.2	2.5	6	10	16
40	5	Three-phase	380/400	7.6	1.5	2.5	4	6
40	5	Single-phase	220/230	22.70	4	10	16	25

Tab. 4.1

Notes:

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


The indicated current intensity refers to single-phase.



**Do not turn electrical resistance head before disconnecting the thermostats.
If you turn head without disconnecting thermostats you will break the probes.**



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

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4.1.1 ELECTRICAL CONNECTION

(Electrical panel ALREADY WIRED by Pegoraro Gas Technologies for safe area with a degree of protection of IP65)

If the vaporizer is ordered already fitted with a connected Eexd electrical control panel you only have to power the panel with an electrical energy source, usually three-phase 380/400Vc.

4.1.3 WATER LEVEL SWITCH (OPTIONAL)

It is possible to install an electromagnetic level switch for water, with a float and a “Reed” contact, complete with an aluminium Eexd watertight casing, allowing to monitor the water level inside the vaporizer.

Follow the detailed instructions for the connection provided in the manual.

If the level switch is not Eexd, but Ex-ia, the electric power supply has to come from a galvanic isolator.



WARNING

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

4.1.4 FILLING THE WATER CIRCUIT

Electric Vaporiser Minivap40 are equipped with an open expansion vessel, to allow water to escape when the temperature rises.

To fill the water circuit follow the instructions below:

- Remove the expansion tank cap. If there is a vent valve on the vaporizer, loosen the black cap on it.
- Pour the water into the expansion vessel.
- Fill the entire exchanger until the visual level installed on the expansion vessel is covered.
- Replace the expansion tank lid



WARNING

It is advisable to use water from the city network, and not from water from wells or production processes. The use of aggressive water could increase the possibility of create oxidation inside the container, with the risk of subsequent corrosion.

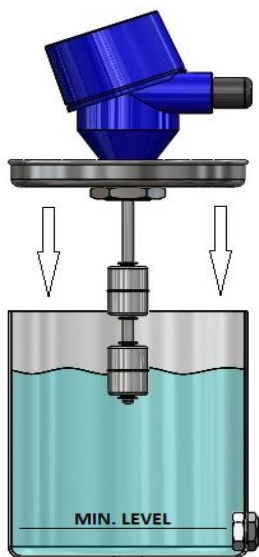


In particularly cold places the water may be diluted with antifreeze. It is recommended to use only "ETHYLENE GLYCOL" as antifreeze as it guarantees complete WATER-SOLUBILITY and can be bought from specialised dealers. The use of ordinary antifreeze is not advised as it is aggressive for the circuit 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.

See the chart below for percentage of ethylene glycol:


Minimum Temperature °C	Ethylene Glycol Percentage
0	0
-5	8
-10	20
-15	28
-20	32
-25	40
-30	45
-35	48

Tab. 4.2



Do not exceed the
75% of the tank

Any excess water must be
removed by opening the
discharge valve fitted at the
bottom of the vaporizer itself

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4.2 HOT WATER VERSION

4.2.1 CONNECTIONS

The Vaporizer must be supplied with hot water coming from an external boiler.



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 vaporizer rating plate, necessary to supply hot water at a temperature of 70°C

Connect the delivery and return boiler water lines by means of the taps fitted to the vaporizer (see Fig. 2.2)

4.2.2 BOILER REQUIREMENTS

The boiler that supplies hot water to the vaporizer must have the following technical characteristics:

- Power: 5 kW
- Flow rate: 1.0 m³/h
- Inlet temperature: 70°C
- Outlet temperature 65°C
- Pressure drop (inside the vaporizer) 0.03 bar



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 vaporizer, causing difficulties in starting up and in normal operation of the vaporizer. The vaporizer has been designed to supply the adequate flow rate in normal operating conditions. However, if it is located in sites with a low ambient temperature, heat loss could cause reduced performance. To avoid situations of this kind it is advised to install the vaporizer in an insulated cabinet



ATTENTION

The temperature of the water circuit could cause injury to personnel if they come in contact with hot parts, so the use of insulation material protection is recommended. The vaporizer and the boiler must be installed by qualified personnel

4.2.3 FILLING THE WATER CIRCUIT

- Refer to section 4.2.1

5. COMMISSIONING



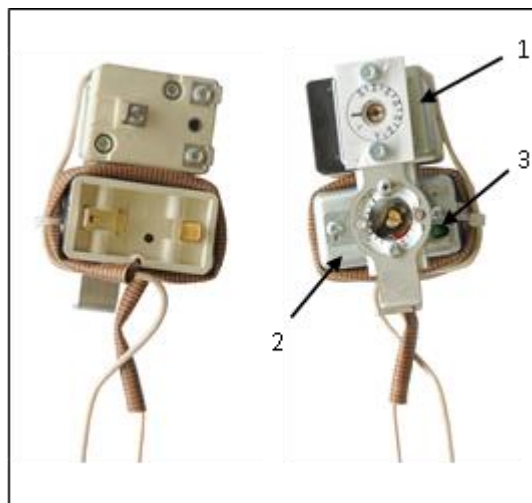
ATTENTION

During the commissioning phase, absolutely avoid smoking and using naked flames, explosion hazard. Failure to observe this conditions may cause severe damage to persons and to the plant.

- Before commissioning, we recommend checking that the operating conditions conform with the characteristics on the appliance rating plate. (Fig. 2.1)
- Before carrying out any maintenance work it is important to ensure that the upstream and downstream stop valves have been closed and that the pressure in the lengths of pipe between the two valves has been discharged.
- Ensure that the water circuit has been correctly installed and primed (hot water version) or that the vaporizer has been filled with water

5.1 VERSION WITH ELECTRIC PREHEATING

- Ensure that the electrical connections between the resistance and of the thermostats have been made correctly, refer to section 4.1.1
- Unscrew the resistance casing: inside there are 2 thermostats. One operating thermostat (1) and one safety thermostat (2). The latter has a little green button for manual resetting (3).
- Check the proper operation of the thermostat when switching on and off: by rotating the thermostat regulation you should hear a “click” guaranteeing the correct operation of the thermostat; if you cannot hear the “click” it means that the thermostat is not operating correctly.
- Set the operating thermostat at 70°C.
- Set the safety thermostat at 95°C.
- Press the green button to reset the thermostat.
- Close the resistance casing.
- Turn on the power supply of the electrical panel (“voltage” light on and “resistance on” lamp on)
- Wait 15/20 minutes until the water reaches the required temperature (“heater off” lamp on): check the water temperature on the vaporizer thermometers.
- Check that there are no leaks in the water circuit gaskets.



1. Working thermostat
2. Safety thermostat
3. Reset bottom


Fig. 5.1



ATTENTION

When starting up for the first time the hot water will take about 20 minutes to reach the required temperature to open the control valve.

After this phase open the liquid gas inlet valve very slowly. Opening this valve too quickly may cause irreversible damage to the vaporizer, for instance causing the input of liquid LPG at low temperature causing freezing and the consequent breakage of the vaporizer heat exchange coil: this is why great attention must be paid when carrying out this operation. This situation could be extremely dangerous and may lead to the explosion of the vaporizer.

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- Liquid LPG enters the vaporizer automatically.



ATTENTION

If gas does not start to flow inside the coil, a fine adjustment of the control valve screws is required. Consequently:

- slowly tighten (clockwise movement) the regulation screw fitted under the black plastic protections (se chap. 8.2)
 - do not turn it more than half a turn
- Check that there are no leaks in the gas circuit connections.
 - Slowly open the downstream valve towards the reducers.
 - It is now possible to start gas consumption.




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 water, because the flow rate of the gas in the vaporizer self-adjusts according to the difference in temperature of the aqueous solution between the upper and the lower level of the vaporizer.
- If the water temperature in the lower part of the vaporizer falls below 50°C, the control valve closes.
- The water is kept at the desired temperature by the regulation thermostat set at 65°C which activates or deactivates the resistance.
- If the regulation thermostat breaks down, a second thermostat TS, set at 95°C, intervenes and deactivating the resistance. This thermostat is manually reset, it is reset manually as in fig. 5.1. It is recommended to check the water level from the visual indicator periodically and to top up when necessary.
- Please pay attention during filling procedure: steam may vent out from the water inlet while opening the stopper.

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5.2 HOT WATER VERSION

- Start up the boiler.
- Make sure the inlet vaporizer valves are completely closed.
- Make sure the water circuit has been completely filled.
- Wait for the water temperature to reach the required temperature, read the temperature on the vaporizer thermometer.
- Check that there are no leaks from the hydraulic circuit



ATTENTION

At this point open the liquid gas inlet valve very slowly. Opening this valve too quickly may cause irreversible damage to the vaporizer, for instance causing the input of liquid LPG at low temperature causing freezing and the consequent breakage of the vaporizer heat exchange coil: this is why great attention must be paid when carrying out this operation

- Liquid LPG enters the vaporizer automatically.



ATTENTION

If gas does not start to flow inside the coil, a fine adjustment of the control valve screws is required. Consequently:

- slowly tighten (clockwise movement) the regulation screw fitted under the black plastic protections (see chap. 8.2)
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 - Slowly open the downstream valve towards the reducers.
 - It is now possible to start gas consumption.




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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 water, because the flow rate of the gas in the vaporizer self-adjusts according to the difference in temperature of the aqueous solution between the upper and the lower level of the vaporizer.
- If the water temperature in the lower part of the vaporizer falls below 50°C, the thermostatic valve closes.

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5.3 GENERAL WARNINGS FOR THE CORRECT OPERATION OF THE VAPORIZER

- 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 downstream reduction unit.
- It is advisable to leave the vaporizer 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 stop valve on the vaporizer inlet, located on the vaporizer inlet.
- Before starting up the plant again it is indispensable to discharge the liquid gas downstream from the vaporizer, which has formed after switching off the plant.
- Always fit a filter to the vaporizer inlet liquid phase. it avoids the entry of impurities which could settle on the seat of the valve (causing leaks of liquid gas).

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6. TROUBLESHOOTING

NO.	DIFFICULTY	CAUSES	WHAT TO DO
1	Low water level alarm (if present) (alarm lamp) Notes: resistance switched off Note: the level switch is an optional	Water level too low	<ul style="list-style-type: none"> - Fill the vaporizer with water, through the expansion tank or through the cap on the top of the vaporizer marked with "water inlet". Then close the cap tightly. - There is a level visual indicator on the expansion tank or on the front side of the vaporizer (a glass circular window). This is the maximum water level if you have cold water inside the vaporizer. This is the minimum water level if you have hot water inside the vaporizer - During normal operation (i.e. with hot water inside) fill up the vaporizer with water up to the expansion tank or up to the inlet valve.
			- If the alarm does not disappear from the panel, check the correct operation or the connection of the level switch.
2	Water overheating alarm (alarm lamp) Note: resistance switched off	Excessively high water temperature inside the vaporizer	Possible causes: a) Transitory warming of the resistance may sometimes cause the trip of the safety thermostat. Reset the thermostat as indicated. Note: the water temperature has to decrease below the thermostat setting temperature a) The settings of the two thermostats are too close. Recommended settings are 65°C for the regulation thermostat and 95°C for the safety one. Reset the thermostat as indicated. Note: the water temperature has to decrease below the thermostat setting temperature. b) Damage to the regulation thermostat: if you do not hear a "click" when you turn on or off the thermostat, it is damaged. Replace the thermostat.
3	Water overheating alarm and no gas (alarm lamp)	Resistance switched off because of water overheating. Water temperature has decreased below minimum limit and the control valve has stopped the gas.	The water overheating has switched off the resistance (see point no.2) Water temperature has decreased below the minimum limit (usually 50°C) The control valve stops gas flow when water temperature inside the vaporizer is below the minimum limit (usually 50°C) Refer to point no. 2 to solve the problem. When the correct water temperature is restored, the control valve opens automatically, restoring the gas flow.
4	Low water temperature and no gas (without water overheating alarm)	The Water temperature in the vaporizer is too low. The control valve has stopped the gas.	Possible causes a) Check the regulation thermostat setting (recommended setting 70°C) b) Even if the heater keeps on warming the water, the water temperature decreases until the control valve stops the gas flow. This means that the required gas flow rate is too high for the capacity of the vaporizer or of the boiler. c) If the water temperature is correct and the gas consumption is not above the vaporizer or boiler capacity: <ul style="list-style-type: none"> - Check that there is no damage to the resistance or to its elements, - Check the boiler - Check the water pump - Check the water connection piping between boiler and vaporizer
5	Correct water temperature but no gas	No gas is entering the vaporizer and the control valve is still closed	Check if there is pressure in the tank or if the valves upstream from the vaporizer are open correctly Check that the water temperature inside the vaporizer is above 50°C. If it is below this temperature refer to point no.4 If all valves are open and water is at the correct temperature but still there is no gas flow, it means that the control valve has got blocked and it needs a fine setting adjustment. Proceed as indicated in Chap.5.1 or 5.2

7. HOW THE CONTROL VALVE WORKS (called the “VALVE”) AND HOW TO SET IT

7.1 HOW THE VALVE WORKS

Our Minivap40 vaporizers are fitted with a thermostatically operated control valve that detects the water temperature inside the vaporizer and accordingly regulates the inlet flow of gas.

This valve has a completely mechanical operation: it does not require any electrical connections.

7.2 VALVE SETTING

The pressure and the propane/butane mixture (LPG) that is to be used define the best setting of the valve. Each valve is equipped with setting screws, by means of which the temperature setting can be regulated (see figure 7.1).

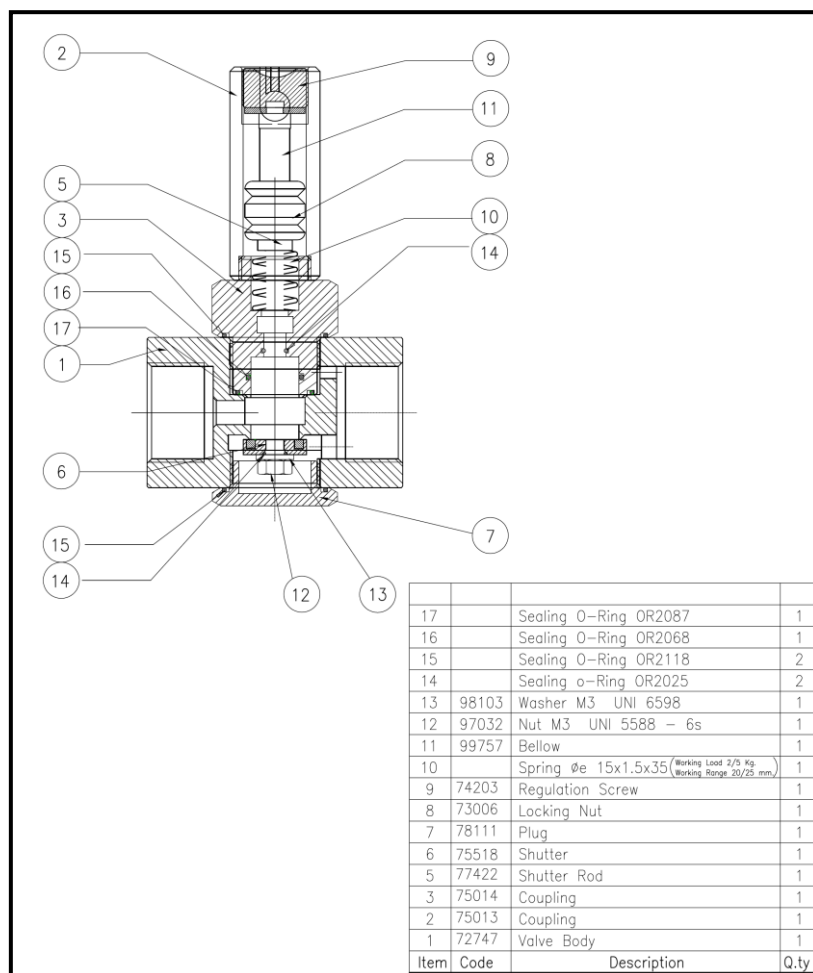



Fig. 7.1



ATTENTION

Do not touch the regulating screw. Its setting position must not be modified. It is our duty to take care of thermostatic valve settings in our laboratory, by tightening or slackening the screw the setting will be altered forever. This manoeuvre may affect the correct operation of the vaporizer, putting it in great danger.

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7.3 CHECKS AND CONTROLS

Each vaporizer is delivered with its valve suitably set according to the composition of the mixture of gas of the final user. This information must be supplied by the customer, who is considered liable for the provided data.

The safety device operates according to the water temperature inside the vaporizer, it is usually set at a temperature between 50°C and 60°C.

The valve is delivered with a label indicating the setting temperatures.

8. MAINTENANCE

LPG is not a clean gas: usually it contains particles of dirt and oily substances that can cause the vaporizer to malfunction. If the gas is correctly filtered upstream, the vaporizer generally does not require any specific maintenance.

In the event of faulty operation or of a plant breakdown, before beginning any maintenance operation, switch off the power on the electric panel (version with electric preheating) or close down the boiler (hot water version), close the stop valve upstream from the vaporizer and discharge any gas left in the piping.

If the flow rate of the vaporizer decreases it is necessary to carry out maintenance. The components that require maintenance are the control valve and the exchanger.

8.1 EXCHANGER

The Minivap40 heat exchanger is designed to work with a minimum maintenance.

It is recommended to clean the coil and the shell every 3-5 years, in order to avoid a decrease of the exchanging surface due to scaling of impurities and oily substances.

1. Switch off the vaporizer and remove all the LPG from inside.
2. Ensure that all the valves upstream and downstream from the vaporizer are closed.
3. Remove the pressure gauge.
4. Prepare a pipe of suitable length to connect to the pressure gauge stop valve for in order to lead far from the area in which the vaporizer is installed;
5. Open the valve to eliminate all the residual gas.
6. Remove the screws connecting the flange on the inlet and outlet.
7. Extract the vaporizer from its position.
8. Run solvent for hydrocarbons through the coil to remove all impurities from inside.
 - USE SCALE-REMOVING ACID compatible with the exchanger material (DISINEX diluted to 10%-20% with water) followed by a NEUTRAL neutralizer
 - The solvent must be introduced using suitable and compatible means (e.g. DISINEX PUMP 18K)
9. Repeat the operations in inverse order, taking care to change the flange gaskets.


8.2 CONTROL VALVE

If the gas is properly filtered, the thermostatic valve does not require frequent maintenance. Consequently it is recommended to carry out regular maintenance as indicated in Chap. 5.3





WARNING

If when carrying out the regular filter maintenance you observe that even the other components are dirty, it is recommended to clean all the other valve components or at least the most important ones such as the shutter.

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8.3.1 ROUTINE MAINTENANCE





For all periodical valve servicing operations (all versions including the one with the viewer), that can be of use for checking the filter and shutter, refer to the following instructions (besides referring to the enclosed documents)

ensure that the stop valves, located upstream and downstream from the vaporizer, are in closed position	
remove the pressure gauge downstream from the vaporizer	
connect a pipe of suitable length to connect to the pressure gauge stop valve for in order to lead far from the area in which the vaporizer is installed	
Open the stop valve to eliminate all the residual gas.	
unscrew the cap on the base of the valve WATER SIDE using a size 36 spanner and remove the filter	
unscrew the valve shutter shaft fixing nut using a size 10 spanner, remove the washer, remove the o-ring with the tool provided	
clean the mechanical components with a solvent such as Cyclohexane or, if required, replace the o-ring and the shutter (refit the or-rings using some grease)	
repeat the operations in reverse	
check that there is no leakage using air or nitrogen	
Check that there are no leaks on the gaskets or threads	

8.2.2 SPECIAL MAINTENANCE

To properly disassemble the valve and replace its components refer to the following instructions (and also to the enclosed documents):

<p>ensure that the stop valves, located upstream and downstream from the vaporizer, are in closed position</p>	
<p>eliminate all the residual gas (if necessary by means of nitrogen flushing) and remove the control valve from its flanges/connectors</p>	
<p>mark a reference point of the position of regulation screw and using a calliper measure its height or depth bearing in mind that after maintenance the screw must return in its original position</p>	
<p>unscrew the socket-head screw used to retain the sensor bulb in the vaporizer casing.</p>	
<p>delicately extract the bulbs from their respective housing</p>	
<p>unscrew the regulation screw using a screwdriver with a minimum 10 mm thickness and remove the bellows from inside by unscrewing the dowels using a 1.5mm Allen wrench</p>	
<p>unscrew the ring nut of the cylinder that houses the bellows using a size 27 spanner and remove it</p>	

<p>unscrew the shaft fixing nut using a size 10 spanner, remove the washer, remove the o-ring with the tool provided</p>	
<p>push the spring downwards and remove the shutter</p>	
<p>block the shaft through the hole present on it by means of the o-ring tool or by hand and using a 10mm screwdriver unscrew the spring support</p>	
<p>extract the shaft</p>	
<p>clean the mechanical components with a solvent such as Cyclohexane or, if required, replace the o-ring and the shutter (refit the o-rings using some grease)</p>	
<p>repeat the operations in reverse order and bring the regulation screw back to its original position (tolerance +/- 1/4 of a turn)</p>	
<p>check that there is no leakage using air or nitrogen</p>	
<p>Check that there are no leaks on the gaskets or threads</p>	




WARNING

It is highly recommended to clean the shutter after periods of vaporizer inactivity (even after a week) as the LPG deposits inside the valve causing malfunction.



ATTENTION

During maintenance it is absolutely forbidden to smoke and use naked flames: explosion hazard. Failure to observe this conditions may cause severe damage to persons and to the plant. The appliance and the connections will have to be controlled by qualified personnel. NEVER attempt to repair or restart the appliance on your own. In case of improper repairs Pegoraro Gas Technologies will not be held responsible for any consequent damage.

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8.3 SUMMARY OF THE MAINTENANCE TO BE CARRIED OUT

ADVISED MAINTENANCE PLAN

(referred to optimal working conditions)

YEARLY	EVERY FIVE YEARS	ACCORDING TO THE OPERATING CONDITIONS (e.g. the quality of the liquid)
Clean the valve shutter* <i>*if the shutter no longer seals replace it</i>	Clean the coil pipe ***	Clean the valve shutter* Replace the o-ring** Clean the coil pipe *** <i>*if the shutter no longer seals replace it</i> <i>**in the event of valve leaks</i>

WHAT TO USE

*FOR THE CONTROL VALVE AND ITS COMPONENTS, **CYCLOHEXANE (SEE CHAP. 8.2)**

O-RING, **INDUSTRIAL GREASE (SEE CHAP. 8.2)

***FOR THE COIL, **SOLVENT FOR HYDROCARBONS (SEE CHAP. 8.1)**



WARNINGS

THE VALVE MAINTENANCE MUST NOT BE CARRIED OUT ON THE SPOT, BUT IN SUITABLE LOCATIONS (LABORATORY or EQUIPPED WORKSHOP).

ALWAYS KEEP A SPARE VALVE IN STOCK.

OTHERWISE WE ADVISE YOU TO SEND THE VALVE TO PEGORARO GAS TECHNOLOGIES WHO WILL TAKE CARE OF THE MAINTENANCE ON YOUR VALVE.


9. DEMOLITION

At the end of its useful life, refer to the applicable regulations in the country of installation.

10. ENCLOSED DOCUMENTATION

List of enclosures:

- Electrical resistance data sheet and manual (for Minivap40 electric version);
- Electrical resistance wiring diagram (for Minivap40 electric version);
- Electrical control panel wiring diagram (if included in the supply);
- Electrical resistance declaration of conformity (for Minivap40 electric version);
- General Assembly of control valve;
- Exploded view of the thermostatic valve with each individual component.




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SUGGESTED SPARE PARTS LIST LPG VAPORIZERS MOD. MINIVAP40

DESCRIZIONE RICAMBIO/ <i>SPARE PART DESCRIPTION</i>	CODICE/ <i>PART CODE</i>
Kit per valvola controllo/ <i>Spare part kit for control valve MINI 1"</i>	04100002
Kit per valvola controllo con visore/ <i>Spare part kit for control valve with viewer MINI 1"</i>	04100019
Tappo per visore/ <i>Cap for viewer</i>	04100032
Sonda termostatica Ø12 lato acqua e gas/ <i>Thermostatic probe Ø12 water and gas side</i>	36080045
Tasca Ø12 per sonda termostatica/ <i>Socket Ø12 for thermostatic probe</i>	36080047
Spia indicatore livello acqua ½" / <i>Water level viewer ½" 50-100-150-200-300 KG</i>	36090002
Termostato di regolazione resistenza elettrica/ <i>Working thermostat for heater (70°C)</i>	12020000
Termostato di sicurezza resistenza elettrica/ <i>Safety thermostat for heater (90°C)</i>	12020001
O-ring 834 per resistenza elettrica 2"/ <i>O-ring for electric resistance 2"</i>	02160083
Pressacavo Eexd ½"GK UNI 6125/ <i>Eexd cable gland ½"GK UNI 6125</i>	37040046
Pressacavo Eexd 1"GK UNI 6125/ <i>Eexd cable gland 1"GK UNI 6125</i>	37040042

WE HIGHLY SUGGEST TO KEEP STOCK OF COMPLETE CONTROL VALVE (SEE PRICE LIST OR ASK TO OUR SALES DEPT)

MAINTENANCE TOOLS FOR THERMOSTATIC CONTROL VALVE

POS.	DESCRIZIONE/DESCRIPTION	APPLICAZIONE/APPLICATION	IMMAGINE/IMAGE
1	CHIAVE BRUGOLA 5 MM <i>Allen Wrench size 5 mm</i>	VITI CORPO <i>Body screws</i>	
2	CHIAVE BRUGOLA 1.5 MM <i>Allen Wrench size 1.5 mm</i>	SENSORE TEMPERATURA CILINDRO VITE DI REGOLAZIONE/ <i>Temperature sensor regulation screw cylinder</i>	
3	CIACCIAVITE A TAGLIO 10 MM <i>Flathead Screwdriver 10 mm thk</i>	VITE DI REGOLAZIONE <i>Regulation screw</i>	
4	CHIAVE INGLESE 27 <i>Wrench Size 27</i>	CILINDRO DI REGOLAZIONE <i>Regulation cylinder</i>	
5	CHIAVE INGLESE 36 <i>Wrench Size 36</i>	TAPPO INFERIORE PER FILTRO TAPPO SUPERIORE ALBERO OTTURATORE <i>Bottom cap for filter Upper cap for shutter shaft</i>	
6	CHIAVE INGLESE 10 <i>Wrench size 10</i>	DADO OTTURATORE <i>Shutter screw</i>	
7	CHIAVE TUBOLARE ESAGONALE 13x13 <i>Hexagonal Tubular Wrench 13x13</i>	DADO OTTURATORE (VERSIONE CON VISORE) <i>Shutter screw (Viewer Version)</i>	
8	CALIBRO <i>Caliper</i>	MISURA TARATURA <i>Setting measurement</i>	
9	PINZA <i>Nipper</i>	ALBERO OTTURATORE <i>Shutter shaft</i>	
10	CAVA O-RING <i>O-Ring removal hook</i>	O-RING	