

Operating Manual

Model 75-800 & 75-800-AR Noble Gas Purifier

75-800: 120 V, 50/60 Hz

75-802: 230 V, 50/60 Hz

75-800-AR: 120 V, 50/60 Hz

75-802-AR: 230 V, 50/60 Hz

May 2019

Rev. 7

**READ INSTRUCTIONS
BEFORE OPERATING**





NOTICE



DO NOT EXPOSE PURIFIER CARTRIDGE TO AIR.

Exposure to air of the purifier cartridge packing ***MUST*** be avoided. Even minimal exposure to air will render unacceptable analysis results and degrade the packing. When not in use, **CAP both** the inlet and outlet fittings (1/4" VCR) at the cabinet panel.

If minimal exposure to air at <150 °F (66 °C) has occurred, one may try to recondition the purifier. Follow the instructions in this manual or contact GOW-MAC at (610) 954-9000 for assistance.

Models Affected

75-800
75-800-1
75-800-2
75-800-ADD
75-800-AR
75-800-EP
75-800-PRXR
75-800-R
75-802
75-802-AR
75-802-EP
75-802-KIT

Noble Gas Purifier

Models 75-800/75-802 & 75-800-AR/75-802-AR

1 Introduction

The GOW-MAC Model 75-800 and 75-800-AR Noble Gas Purifiers are designed to reduce gas stream impurities to the ppb level, providing the super purified gases your application requires.

1.1 Theory of Operation

The UltraPure™ purifying material is initially processed as particles of about 100 microns diameter, which are pressed to form pellets. This gives the advantage of a large effective surface area to react with the impurities, while maintaining a low pressure drop across the purifier bead.

The purifier material has been coated with a thin oxide layer during the manufacturing process. When the purifier is activated by heating in an inert atmosphere or under vacuum, this oxide diffuses into the bulk of the grains. This leaves a clean surface to react with the impurities. As the gas stream flows through the purifier, contaminants are chemically sorbed at the surface of the purifier material. By maintaining an operating temperature in the range of 350 - 450 °C, the impurities that have formed compounds on the surface can continuously diffuse into the bulk of the material, thereby maintaining a fresh, reactive surface.

The above describes the reaction for all impurities except hydrogen. Hydrogen is reversibly sorbed and has an equilibrium pressure dependent upon the temperature of operation and the amount of hydrogen absorbed. If hydrogen capacity is reached, (e.g., by a large amount of H₂, H₂O, or CH₄), and it is important to maintain hydrogen levels in the ppb range in the purified gas, then the hydrogen capacity can be recovered by raising the purifier temperature to 450 - 500 °C for at least one hour, thereby driving off the previously absorbed hydrogen.

UltraPure™ is a registered trademark of UltraPure Systems Inc.

2 General Specifications for Purifier Material

Gases Purified:	He, Ne, Ar, Kr, Xe	
*Impurities Removed:	H ₂ O, H ₂ , O ₂ , N ₂ , CO, CO ₂ , CH ₄	
Other Impurities Removed:	NO _x , NH ₃ , CF ₃ , CCl ₄ , SiH ₄ Light Hydrocarbons	
Impurities Not removed:	He, Ne, Ar, Kr, Xe	
Recommended Operating Temperature:	400 °C	
Activation Time Required:	1 hour	
Activation Temperature:	450 °C	
*Total Outlet Level for Impurities Removed:	<0.1 ppm	
Maximum Recommended Operating Pressure:	80 atm (1175 psig)	
**Suggested Maximum Flow Rates	<u>Model 75-800</u> 0-500 mL/min.	<u>75-800-1</u> 2-10 mL/min.
Standard Fittings:	1/4" VCR	
***Lifetime Using He/Ar:	1 yr. @ 200 ml/min (75-800) 1 yr. @ 5 ml/min. (75-800-1)	
Maximum Power Requirements:	500 Watts, 115V	

CAUTION

**IN ORDER TO MAINTAIN PROPER PURIFICATION EFFICIENCY, DO NOT
EXCEED ESTIMATED LIFETIME BEFORE REPLACING PURIFIER CARTRIDGE.
IF HELP IS NEEDED IN DETERMINING END-OF-LIFE,
CONTACT GOW-MAC AT (610) 954-9000.**

- * Each impurity removed to < 10 ppb based on 10 ppm total inlet impurities at suggested maximum flow rate
- ** at 1 Atm operating pressure. Higher flow rates can be used at higher operating temperatures.
- *** Lifetime based on suggested maximum flow rates; a higher flow rate will proportionally decrease the lifetime while a lower flow rate will increase the lifetime. The lifetime is rates at 10 ppm total inlet impurities; higher or lower inlet impurity levels will decrease or increase the lifetime proportionally. The purifier bed is considered an expendable item. System leaks, poor quality gas, and improper handling will adversely affect its useful life.

3 General Specifications for Temperature Controller

Part Number	124-261
Control Mode:	- Microprocessor-based - Single input, dual output - Ramp to set point: 0 to 550 °C - Heat and cool auto-tune
Sensor Input Type:	Platinum RTD, 100 ohms
Supply Voltage:	85 - 264 VAC, 50/60 Hz (75-800/802)
Ambient Temperature Range:	Operating: -18 to 65 °C Storage: - 40 to 85 °C
Mechanical Relay Life Span:	100,000 cycles

4 Purifier Specifications

Standard Fittings:	1/4" VCR
Weight (net):	25 lbs.
Dimensions:	11 3/4"D x 13"W x 15"H

5 Installation

- A. Attach clean, 1/8" stainless steel tubing to a tank of Zero Grade Helium for Model 75-800 or Zero Grade Argon for Model 75-800-AR. Attach the other end of tubing to "INLET" on the back of the Purifier, using the provided VCR fitting.
- B. Attach the provided piece of clean, 1/8" stainless steel with VCR fittings on both ends from the back of the Purifier ("OUTLET") to "CARRIER IN" connection on the back of the GC or "ZERO GAS IN" for analyzers.

NOTE

TO PREVENT CONTAMINATION OF THE INSTRUMENTS BY GREASE, OIL OR CHEMICAL RESIDUE, THIS NEXT PROCEDURE SHOULD BE FOLLOWED FOR PURGING STAINLESS STEEL TUBING PRIOR TO CONNECTING IT TO THE PURIFIER AND GC:

CLEAN TUBING BY FLUSHING WITH ACETONE TO REMOVE ANY OIL RESIDUE THAT MAY BE PRESENT (ACETONE IS PREFERRED FOR HEALTH REASONS).

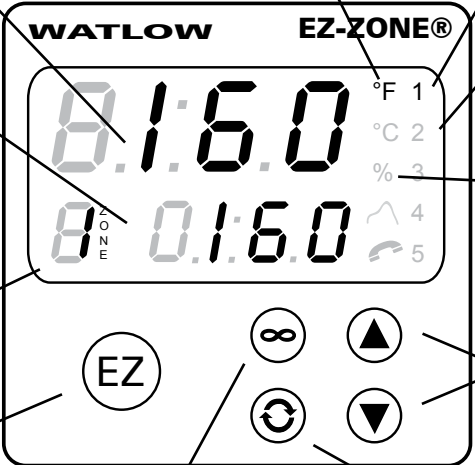
AFTER WASHING, LET TUBING DRAIN AND DRY.

ALL LINES AND TUBING ***MUST BE*** CLEAN AND FREE FROM MOISTURE BEFORE CONNECTING TO INSTRUMENTS.

6 Temperature Controller Controls

6.1 Keys and Displays

After one minute with no key activations, the control reverts to the process value in the upper display and the set point in the lower display.



The diagram shows the WATLOW EZ-ZONE temperature controller interface. It features a dual-line LCD display. The upper line shows a process value of 81.60 with a temperature unit indicator (°F 1 or °C 2). The lower line shows a set point of 01.60 with a parameter selection indicator (%, ^, or ^). To the right of the display are five indicator lights labeled 1 through 5. Below the display are five control keys: an EZ key, an infinity key, an up arrow key, a refresh key, and a down arrow key. The interface is labeled with 'WATLOW' and 'EZ-ZONE®' at the top.

Upper Display: In the Home page, displays the process value, otherwise displays the value of the parameter in the lower display.

Lower Display: Indicates the set point or output power value during operation, or the parameter whose value appears in the upper display.

ZONE: Indicates the controller zone (1-9).

EZ Key: Enables simple, one-touch operation of user defined, repetitive activities. This key can be programmed to do various tasks, such as locking the keyboard, restoring user settings, etc.

Temperature Units: Indicates whether the temperature is displayed in Fahrenheit or Celsius.

Output 1 Indicator Light: When lit it indicates Output 1 is energized.

Output 2 Indicator Light: Lit when Output 2 is active. This output can be configured as a control or alarm output.

% Percent Power Indicator Light: Lights when the controller is displaying values as a percentage or when the open-loop set point is displayed.

Up and Down Keys: In the Home page, adjusts the set point in the lower display. In other pages, changes the upper display to a higher or lower value, or changes a parameter selection.

Advance Key: Advances through parameter prompts.

Infinity Key: Press to back up once level, or press and hold for two seconds to return to the Home page. From the Home page can clear alarms and errors if clearable.

6.2 Responding to a Displayed Message/Error Code

An active message will cause the display to toggle between the normal settings and the active message in the upper display and [ATTM] in the lower display.

Your response will depend on the message and the controller settings. Some messages, such as Ramping and Tuning, indicate that a process is underway. If the message was generated by a latched alarm or limit condition, the message can be cleared when the condition no longer exists. If an alarm has silencing enabled, it can be silenced.

Push the Advance Key to display [SNR] in the upper display and the message source (such as [L.H]) in the lower display.

Use the Up and Down keys to scroll through possible responses, such as Clear [CLR] or Silence [S.L]. Then push the Advance or Infinity key to execute the action.

ER. 1 - **Error Input 1:** The sensor input generated a value lower than the allowable signal range. Enter a valid input.

100 - **Device Error:** Controller displays internal malfunction message at Power Up.

7 Set Point Settings

A. To set the set point: turn the unit “on” and then push the Up or Down arrow to adjust to the desired operating temperature.

8 Settings

8.1 Initial Start-Up

- A. The purifier should be purged with an inert gas (minimum purity 99.99%) before activating the material (He, Ne, Ar, Kr, Xe).
- B. Start a flow through the unit for at least 10 minutes. Use a minimum of 10% - 20% of specified flow rate for the unit. Use a continuous purge flow during activation.

CAUTION

THE PURIFIER MATERIAL SHOULD NEVER BE HEATED ABOVE 150°C IN AIR.

- C. At this point, turn the Nobel Gas Purifier "ON" and set the operating temperature to 450 °C as follows:
- i. Press either UP-Arrow or DOWN -Arrow key until the desired temperature (450 °C) is displayed on the upper display. A few seconds after the temperature is set, the controller will start to adjust the temperature automatically.
 - ii. Once the temperature is reached, it should be maintained for a minimum of 2 hours to properly condition the unit. This operational step is referred to as "activation".
 - iii. Set the TEMPERATURE CONTROLLER to the normal operating temperature: 400 °C. Higher or lower temperatures can be used depending upon operating conditions.

In general, higher temperatures reduce outlet impurity levels for all gases except hydrogen. Higher temperatures are recommended in case of high inlet impurity levels and/or high flow rates.

- iv. The gas to be purified can now be allowed to flow through the unit at the desired flow rate.

CAUTION

IF THE GAS LINE IS ACCIDENTLY VENTED TO AIR, THE POWER SHOULD IMMEDIATELY BE TURNED OFF, OTHERWISE THE PURIFIER MATERIAL IN THE UNIT MAY BE DESTROYED IF THE PURIFIER MATERIAL IS MAINTAINED AT TEMPERATURES ABOVE 150 °C.

- v. If the system is vented to the atmosphere, the unit should be at room temperature before venting.
- vi. Once the unit has been exposed to the atmosphere, Steps A - E should be repeated.

WARNING

THIS UNIT IS INTENDED FOR THE PURIFICATION OF INERT GASES. UNDER NO CIRCUMSTANCES SHOULD THIS UNIT BE USED FOR THE PURIFICATION OF OXYGEN, HYDROGEN, AIR OR OTHER REACTIVE GASES.

8.2 Operation

Operate the system at 400 °C. Once every week, turn the temperature up to 450 °C for one (1) hour. After one hour, reduce the temperature to 400 °C and return to running samples. This procedure will eliminate any H₂ that may have accumulated during that week.

9 Waste Disposal

This procedure is for GOW-MAC Mini Purifier Part No. 180-542 (Helium) and 180-542-AR (Argon).

If the purifier is used, then the getter material inside the purifier is already in a non-reactive state, (i.e. will not react with air).

If the material is still in a reactive state (i.e. the purifier is not completely "used up"), it still will not sustain combustion in air except at temperatures over 350 °C, and with a continued access to air.

The operator should place a VCR cap over the inlet/outlet fittings for sufficient precaution before disposal. It is then acceptable to deposit in an approved landfill, in accordance with local, state and/or federal regulations. When disposed of in this manner, the waste poses no known environmental problems.

10 Replacement Parts

<u>Part No.</u>	<u>Description</u>
121-100	Fuse, 1.6 A, 250 V (230 V)
121-160	Fuse, 3 A, 250 V (115 V)
122-114	Relay, solid state
124-175	Platinum probe, RTD 100 Ω
124-194	Heater, 110 V, 100 W
124-195	Heater, 240 V, 150 W
124-261	Temperature Controller, Watlow EZ-Zone
126-184	Terminal Block, 5-position
127-407	Cord, 7' 6", detachable
129-345	Receptacle with power switch and fuse holder
141-452	Feet
180-542	Mini-purifier with 1/4" VCR fittings (for all models except 75-800-AR & 75-802-AR)
180-542-AR	Mini-purifier with 1/4" VCR fittings (only for models 75-800-AR & 75-802-AR)

Contact GOW-MAC for replacement parts:

GOW-MAC Instrument Co.
277 Brodhead Road
Bethlehem, PA 18017 U.S.A.
Tel: (610) 954-9000
Fax: (610) 954-0599
E-mail: sales@gow-mac.com
URL: www.gow-mac.com

Warranty

ALL INSTRUMENTS SOLD BY GOW-MAC® INSTRUMENT CO. ARE WARRANTED FOR A PERIOD OF ONE YEAR AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP. THE TERMS OF THIS WARRANTY ARE AS FOLLOWS:

1. The warranty period begins with the shipping date of the equipment to the original purchaser.
2. Certain parts such as batteries, fused, glass accessories, septa, columns, etc., are expendable in normal use and their service life is unpredictable. Such items are not covered by this warranty.
3. Filaments of thermal conductivity detectors are not covered by this warranty.
4. All requests for service or repair under this warranty must be received within the warranty period by GOW-MAC® or its authorized representative. All repairs are made at GOW-MAC plants or at the office of authorized representatives.
5. All repairs, adjustments, and other service under this warranty shall be performed free of charge to the purchaser. However, warranty service and repairs shall be limited to equipment malfunctions which, in the opinion of GOW-MAC®, are due or traceable to defects in original materials or workmanship. Instrument malfunctions caused by abuse or neglect of the equipment are expressly not covered by this warranty.
6. Instrument parts which have been repaired or replaced during the warranty period are themselves warranted only for the remaining unexpired portion of the original one year warranty.
7. Repairs, adjustments, and service performed after expiration of the one year warranty period shall be charged to the purchaser at the then current prices for parts, labor, and transportation.
8. This warranty attaches to the equipment itself and is not limited to the original purchaser. Unexpired portion of the warranty are thus transferable to subsequent owners.
9. GOW-MAC® expressly disclaims any liability to users of its products for consequential damages of any kind arising out of or connected with the use of its products.
10. Except as stated in Sections 1 through 8 above, GOW-MAC® makes no warranty, expressed or implied (either in fact or by operation of law), statutory or otherwise; and, except as stated in Sections 1 through 8 above, GOW-MAC® shall have no liability under any warranty, expressed or implied (either in fact or by operation of law), statutory or otherwise.
11. Statements made by any person, including representatives of GOW-MAC® which are inconsistent or in conflict with the terms of this warranty shall not be binding upon GOW-MAC® unless reduced to writing and approved by an officer of the Company.
12. This warranty shall be governed by the laws of the Commonwealth of Pennsylvania.

Health and Safety Declaration for the Return of GOW-MAC Instrument Co. Equipment

In order to protect our employees from exposure to various hazards, the following statements and/or questions **MUST** be answered by you. Fill out this document in its entirety and either fax or e-mail it to GOW-MAC Instrument Co., Attn: Repair Dept, **BEFORE** returning the product.

The instrument/device/part being returned **will not** be accepted into GOW-MAC's facility until we receive this completed document. Once the product has been approved for return by our Chemical Safety Officer, an acknowledgement will be promptly issued to you with notification of your **Return Materials Authorization (RMA) number** and the procedure to follow for returning the product. *All applicable regulations should be followed when returning instrumentation, devices, and or parts.*

Customer to Record the Following:

Model # / Part #: _____

Serial #: _____

Service Technician spoken to: _____

Today's Date: _____

If this form is not approved by our chemical safety officer, the instrument/device/part WILL NOT be permitted into our facility for servicing!

A) Briefly list the application(s) for which the instrument/device/part was used, as well as any and all chemicals, gases, and/or materials analyzed and their concentrations. (**MUST be filled in**): _____

B) Is there the possibility of internal or external contamination on or in this instrument/device/part?
 Yes – see below No – proceed to C.

Please check the appropriate box.

- Chemicals or Substances That Are Hazardous to Health
- Blood, Body Fluids, (e.g. Urine, Secretions), Pathological Specimens
- Regulated Medical Wastes
- Infectious Substances or other Bio-Agents (e.g. Protein, Enzymes, Antibodies)
- Radioactive Isotopes used in the area. Detail type (ECD, Isotopic Labels, etc) and Activity in Micro Curies
- Biodegradable Material That Could Become Hazardous
- Other Hazards _____

If any of the above boxes are checked the following statements and/or questions must be answered.

1. Specifically describe where (on or in) the instrument/device/part there could be any residual contamination (for example: blood spill on the surface). _____
2. Provide details of these hazards. Include names, Material Safety Data Sheets (MSDS), and concentration of contaminants, where possible. _____
3. Describe the method of decontamination used. Attach Procedure. _____

C) I declare that the above information is true and complete to the best of my knowledge. I acknowledge that any inconsistencies between the condition of the instrument and the statements made on this form will delay the repair process.

Authorized signature _____ Date: _____
 Name (Printed) _____ Phone number: _____
 Company name: _____ Fax number: _____
 Shipping address: _____
 City: _____ State/Country: _____ Zip : _____
 E-mail address: _____

BEFORE item can be shipped, fax completed form to: (610) 954-0599 or e-mail it to: repairs@gow-mac.com

<p>For GOW-MAC Use Only:</p> <p><input type="checkbox"/> Passed Safety Inspection. OK to proceed to Repair Dept.</p> <p><input type="checkbox"/> Failed Safety Inspection. DO NOT proceed to Repair Dept.</p>	<p>Signed: _____ Chem. Safety Off. RMA No: _____</p>	<p>Date ____/____/____ Comments: () None () On Back >>>></p>
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REP-005
 Health-Safety Declaration Doc REV 6 (0212).docx
 Rev. 6 2/15/2012, gsj

