Operating Manual

Model 75-800 & 75-802
Nobel Gas Purifier

75-800: 120 V, 50/60 Hz
75-802: 230 V, 50/60 Hz

November 2001
Rev. 4

READ INSTRUCTIONS BEFORE OPERATING
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-EP
- 75-800-PRXR
- 75-800-R
- 75-802
- 75-802-EP
- 75-802-KIT
1 Introduction

The GOW-MAC Model 75-800 and 75-802 Nobel 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 from 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

Model 75-800 75-800-1
0-500 mL/min. 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.
3 General Specifications for Temperature Controller*

Part Number 124-217

Control Mode:
- Microprocessor-based
- Single input, dual output
- Ramp to set point: 0 to 9999° or units/hour
- Heat and cool auto-tune

Sensor Input Type: Platinum RTD, 100 ohms

Supply Voltage: 100 - 120 VAC, 50/60 Hz (75-800)
                200 - 240 VAC, 50/60 Hz (75-802)

Ambient Temperature Range: Operating: 0 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. 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.

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 (also refer to the “Quick Sheet” at the end of this manual)

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.

**Upper Display:** indicates process value, actual temperature, operating parameter values, or an open sensor. When powering up, the Process display will be blank for five seconds.

**Lower Display:** indicates the set point, output value, parameters for data in the upper display, or error and alarm codes.

**Advance Key:** Press to step through the Operations, Setup and Calibration Menus. In the Auto mode, new data is self-entering in five seconds.

**Up-arrow Key:** Increases the value of the displayed parameter. Press lightly to increase the value by one. Press and hold down to increase the displayed value at a rapid rate. New data is self entering in 5 seconds.

**Down-arrow Key:** decreases the value of the displayed parameter. Press lightly to decrease the value by one. Press and hold down to decrease the displayed value at a rapid rate. New data is self entering in 5 seconds.

**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:** Lit: the controller is in Manual operation. Press the Infinity Key twice to enter Automatic operation. Blinking: press the Infinity Key to toggle between Auto and Manual. Returns to its previous state and stops blinking if the Infinity Key is not pressed within five seconds.

**Infinity Key:** Press once to clear any latched alarms. Also disables alarm output if silencing is enabled. Press again within five seconds to change from Auto to Manual or vice versa. While in Manual mode, percent power is in the lower display.
6.2 Error Codes (also refer to the "Quick Sheet" at the end of this manual)

Four dashes, "----" in the upper display indicate an error. The error code is visible in the lower display.

Er 2 - Sensor underrange error: The sensor input generated a value lower than the allowable signal range, or the A/D circuitry malfunctioned. Enter a valid input.

Er 4 - Configuration error: The unit's microprocessor is faulty. Call GOW-MAC for replacement temperature controller.

Er 5 - Non volatile checksum error: The nonvolatile memory checksum discovered a checksum error. Unless a momentary power interruption occurred while the unit was storing data, the nonvolatile memory is bad. Call GOW-MAC for replacement temperature controller.

Er 6 - A/D underflow error: The A/D circuit is underrange. An open or reversed polarity sensor is the most likely cause. Check the sensor; if the connection is food and functions properly, call GOW-MAC. The A/D underrange voltage is too low to convert an A/D signal.

Er 7 - A/D overflow error: The A/D circuit is overrange. An open or reversed polarity sensor is the most likely cause. Check the sensor; if the connection is good and the sensor functions properly, call GOW-MAC. The A/D overrange voltage is too high to convert and A/D signal.

7 Alarm Setting (also refer to the "Quick Sheet" at the end of this manual)

To set the Hi alarm follow these instructions:

A. To set the set point: turn the unit "on" and then push the UP-arrow or DOWN-arrow to adjust to the desired operating temperature.

B. To set Hi Alarm: press the ADVANCE KEY until you get AHI (Hi Alarm) to appear. Enter your desired hi alarm temperature.

Output 2 Indicator Light will illuminate on the meter when the unit has gone over the pre-set temperature alarm set point. The heater will be automatically shut off until the unit detects that the temperature has fallen below the set point and it is safe to resume.
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:

a. 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.

b. 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 at "activation".

c. 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.

d. 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.
e. If the system is vented to the atmosphere, the unit should be at room temperature before venting.

f. 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 Replacement Parts

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>129-345</td>
<td>Receptacle with power switch and fuse holder</td>
</tr>
<tr>
<td>124-217</td>
<td>Temperature Controller, Watlow Series 93</td>
</tr>
<tr>
<td>124-194</td>
<td>Heater, 110 V, 100 W</td>
</tr>
<tr>
<td>124-195</td>
<td>Heater, 240 V, 125 W</td>
</tr>
<tr>
<td>126-184</td>
<td>Terminal Block, 5-position</td>
</tr>
<tr>
<td>127-407</td>
<td>Cord, 7' 6'', detachable</td>
</tr>
<tr>
<td>141-452</td>
<td>Feet</td>
</tr>
<tr>
<td>180-542</td>
<td>Mini-purifier with 1/4'' VCR fittings</td>
</tr>
<tr>
<td>122-114</td>
<td>Relay, solid state</td>
</tr>
<tr>
<td>124-175</td>
<td>Platinum probe, RTD 100Ω</td>
</tr>
<tr>
<td>121-160</td>
<td>Fuse, 3 A, 250 V</td>
</tr>
</tbody>
</table>

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
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. This document **MUST** be filled out and returned to GOW-MAC Instrument Co. before the instrument and or device / part can be accepted into GOW-MAC Instrument Co.’s repair and service facility. After the instrument and or device / part have been approved for return, an acknowledgement will be promptly issued with notification of the procedure for return.

If this form is not accepted or submitted the instrument and or device will not be allowed into the facility and or serviced.

Is there the possibility of internal or external contamination on this instrument and or device from any of the following? Please check the appropriate box:

- Blood, Body Fluids, (e.g. Urine, Secretions), Pathological Specimens
- Infectious Substances or other Bio-Agents (e.g. Protein, Enzymes, Antibodies)
- Regulated Medical Wastes
- Radioactive Isotopes used in the area. Detail type (ECD, Isotopic Labels, etc) and Activity in Micro Curies
- Chemicals Or Substances That Are Hazardous To Health
- 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 an) the instrument, device / part there might 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.**

I declare that the above information is true and complete to the best of my knowledge and belief.

Authorized signature ___________________________ Date: ___________________________

Name (Printed) ___________________________ Phone Number: ___________________________

Company Name: ___________________________ Fax Number: ___________________________

Shipping Address: ___________________________ State/Country: ___________________________ Zip: ___________________________

All applicable regulations should be followed when returning instrumentation, devices and or parts.

Fax this form back to: (610) 954-0599 or e-mail this form to: repairs@gow-mac.com

For GOW-MAC Use Only:  

- [ ] Passed Safety Inspection. OK to proceed to Repair Dept. 
- [ ] Failed Safety Inspection. DO NOT proceed to Repair Dept. 

Signed: _________ Date __/__/____  

Chem. Sfty Off. Comments: ( ) None

Corporation E-mail: sales@gow-mac.com URL: www.gow-mac.com