

Operating Manual

**Model 75-900-BV & 75-902-BV
Oxygen Trap with Bypass Valve**

75-900-BV: 120 V, 50/60 Hz
75-902-BV: 230 V, 50/60 Hz

January 2024
Rev. 4

**READ INSTRUCTIONS
BEFORE OPERATING**

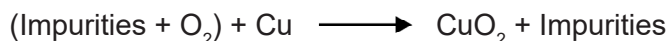


277 Brodhead Road, Bethlehem, PA 18018-8600, U.S.A. Tel: (610) 954-9000

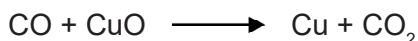
Model 75-900-BV O₂ Trap w/ Bypass Valve

1 General

The Model 75-900 O₂ Trap is designed to analyze oxygen purity with a gas chromatograph. It is used specifically for measuring very low concentrations of impurities in oxygen base gas such as nitrogen, argon, methane. Exposure of the oxygen sample to a catalyst after injection with a gas sample valve results in oxidation of the copper-based catalyst, leaving the remaining impurities in the sample helium carrier stream.



The Trap can be regenerated after approximately 200 samples (using a 2 cc sample) by switching a valve that routes a reducing gas, i.e. CO, over the catalyst. In a few hours, the GOW-MAC Model 75-900-BV O₂ Trap is ready again for operation.



The Trap can be cycled indefinitely unless contaminated.

The 75-900-BV has a bypass valve that allows the user to bypass the O₂ Trap. The O₂ Trap can be reconditioned while all transfer tubing between the Trap and the GC remains connected.

2 Connections & Controls

A. The back panel of the 75-900-BV has the following connections:

1. Purge out (1/8" compression)
2. Purge in (1/8" compression): Helium purge of the BYPASS and TRAP MODE valves.
3. Activation Gas (1/8" compression): Carbon monoxide (CO) or Hydrogen (H₂)
4. Vent (1/8" compression)



Vent port for activation gases CO or H₂. Be sure to vent from this port to a qualified gas collection system.

5. Carrier (1/8" compression): Helium

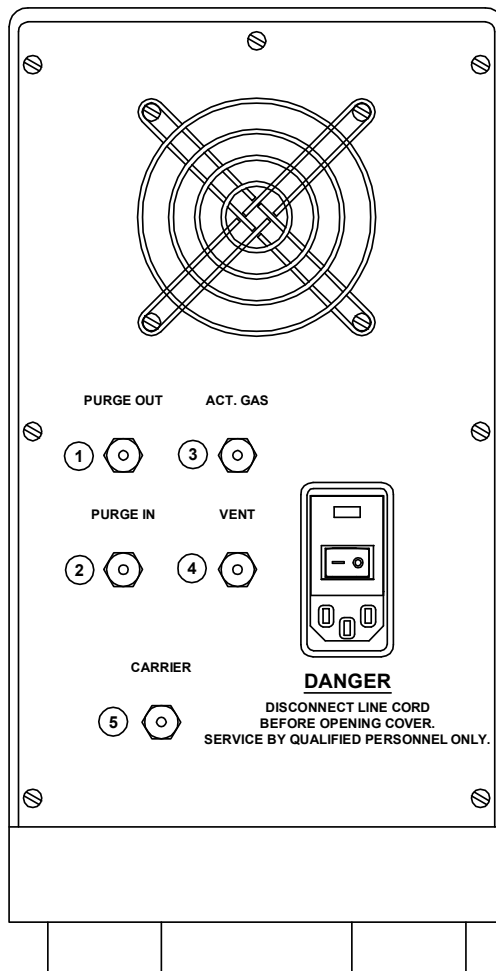


Figure 1: 75-900-BV Back View

The side of the 75-900-BV has the following connections:

1. To Instrument (1/8" Male VCR connection)
2. From Instrument (1/8" Male VCR connection)

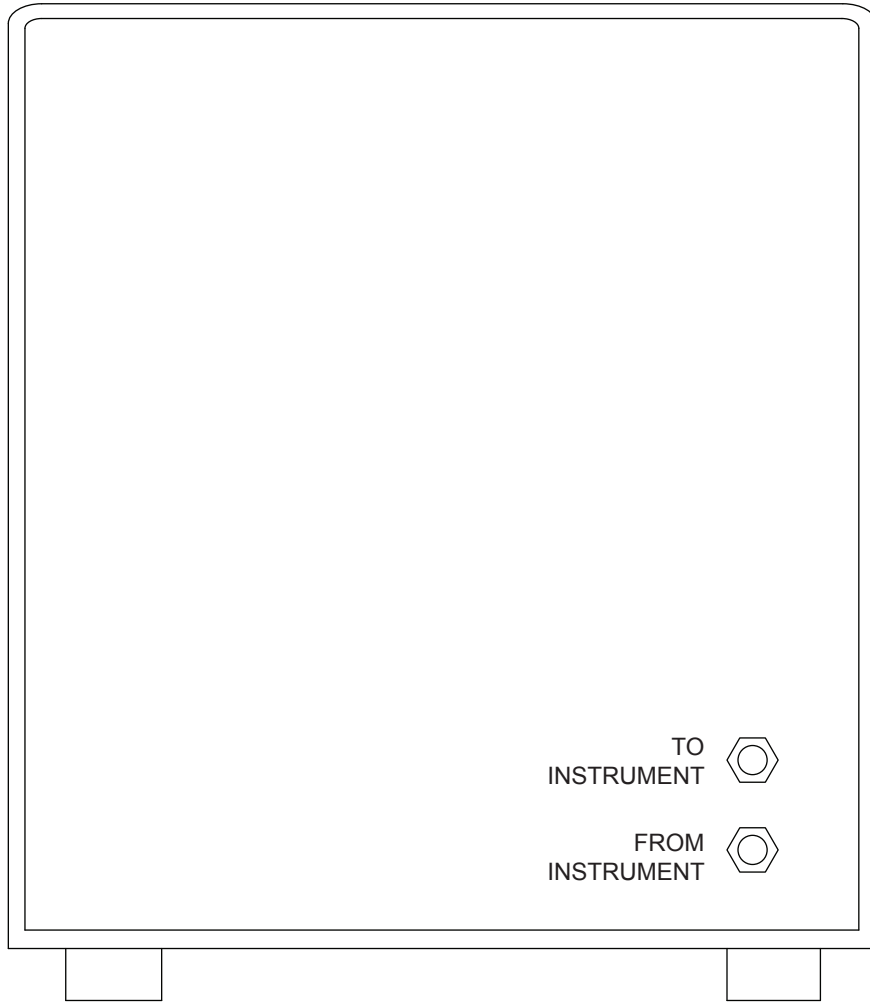


Figure 2: 75-900-BV Side View

The front of the 75-900-BV has the following:

1. Bypass valve (4-Port) which selects whether the trap is being used (CW – TRAP) or not (CCW – BYPASS)
2. Trap mode valve (6-Port) selects between using the trap (CW – OPERATE) or reconditioning the trap (CCW – ACTIVATE)
3. 3-way valve selects between the Carrier & Activation Gases
4. There are (3) metering valves for controlling the gas going to the instrument (RESTRICTOR), Purge gas (PURGE), & Carrier & Activation gas (CARRIER/ACT. GAS)

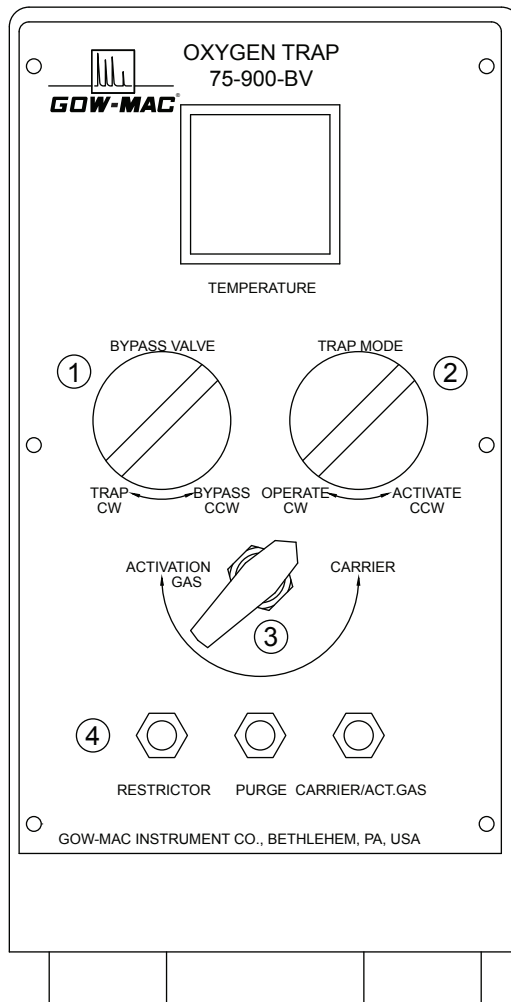


Figure 3: 75-900-BV Front View

3. Configurations



IF THE MODEL 75-900-BV/902-BV WAS ORDERED WITH A GOW-MAC SERIES 590 DID GC, FOLLOW THE INSTALLATION INSTRUCTIONS CONTAINED WITHIN THE GC OPERATING MANUAL. IF THE MODEL 75-900/902 WAS PURCHASED AT ANOTHER TIME, PROCEED WITH THE FOLLOWING INSTALLATION INSTRUCTIONS.

There are two general configurations of tubing for the installation of the Model 75-900-BV O₂ Trap. If there is a pre-column in the instrument as in the Series 590 DID GC Systems 2, 3, 4, 5, & 9, the pre-column should be removed and the Model 75-900-BV inserted, as described below. If there is no pre-column in the instrument, as in the Series 590 DID GC Systems 1, 7, 8, 10, 11, 12, 16, & 17, the inlet end of the first column is to be removed and the Model 75-900 inserted before the analytical column.

- A. Instrument with Pre-column (Series 590 DID GC Systems 2, 3, 4, 5, & 9). Refer to Figure 4.
- i. Remove the pre-column or column 1 in the Series 590 DID GC.
 - ii. Connect a 1/16" transfer line terminating in female VCR fittings on both ends, part number T131-12-12, between the Model 75-900-BV (FROM INSTRUMENT) to the first male VCR inlet fitting in the Series 590 GC (oven front).
 - iii. Connect a 1/16" transfer line terminating in female VCR fittings on both ends, part number T131-12-12 between the Model 75-900-BV (TO INSTRUMENT) and the second male VCR fitting on the Series 590 GC (oven front).

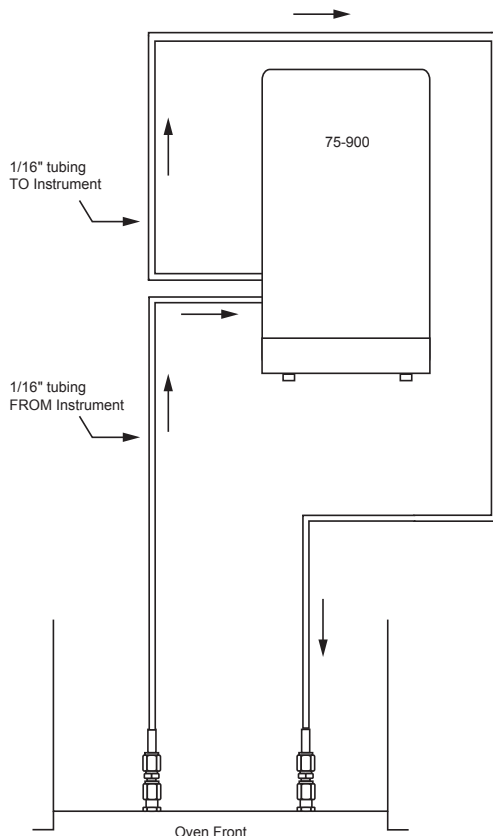


Figure 4:
Series 590 DID Gas
Chromatograph with
Pre-column

B. Instruments Without A Pre-column (Series 590 DID GC Systems 1, 7, 8, 10, 11, 12, 16, & 17) Refer to Figure 5.

- i. Disconnect the inlet end of the molecular sieve column in the Series 590 GC.
- ii. Connect a 1/16" transfer line terminating with female VCR fittings on both ends, part number T131-12-12, to oven front. Installation is from the inlet of the molecular sieve column to the Model 75-900-BV (FROM INSTRUMENT).
- iii. Connect a 1/16" transfer line terminating with a female VCR fitting on one end and a male VCR fitting on the other end, part number T131-12-62. Installation is from the Model 75-900-BV (TO INSTRUMENT) fitting to the inlet of the analytical molecular sieve column.

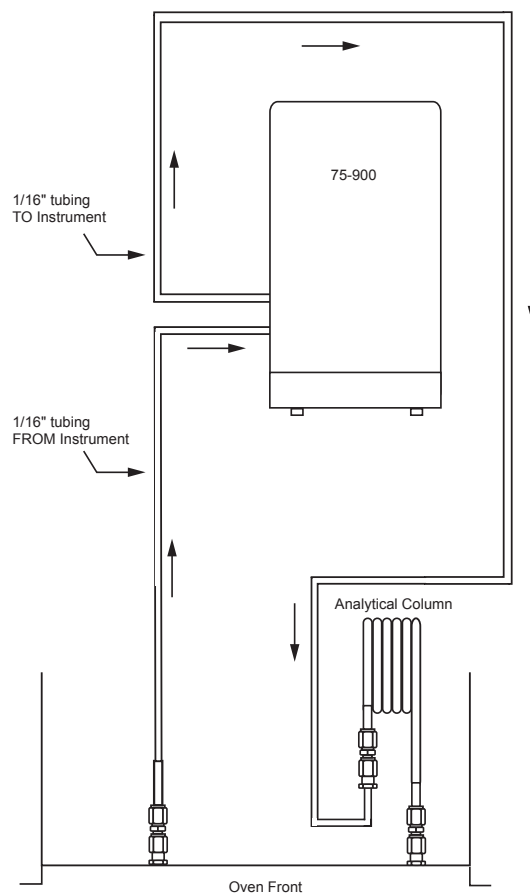


Figure 5: Series 590 DID GC without Pre-column

4 Activation Gas

The Activation Gas is a reducing gas. It can be either carbon monoxide (CO) or hydrogen (H₂). *GOW-MAC recommends carbon monoxide.* In the reducing reaction, carbon dioxide (CO₂) is formed with the carbon monoxide at temperatures above 60 °C.

Hydrogen can also be used as the Activation Gas. In the reducing reaction, water (H₂O) is formed with the hydrogen at temperatures above 80 °C.



GOW-MAC recommends reconditioning using carbon monoxide (CO). Hydrogen (H₂) may also be used. Both can form explosive mixtures with air. Make sure there are no leaks or possibility of air or O₂ entering the system. Additionally, hydrogen is flammable and carbon monoxide is poisonous. Use proper precautions when venting no matter which gas is used.

5 Conditioning & Operation

- A. Turn the ACTIVATION/CARRIER VALVE to the CARRIER position and the TRAP MODE VALVE to ACTIVATE.
- B. Adjust the HELIUM flow to 200 mL/min. with the FLOW ADJUST NEEDLE VALVE. Measure flow at the VENT located at the rear of the O₂ Trap with a flowmeter.
- C. At this point, turn the O₂ Trap power ON and set the temperature of the O₂ Trap to 130 °C for one (1) hour. Set the temperature as follows:
 - i. Press either UP-arrow or DOWN-arrow key until the desired temperature (130 °C) is displayed. A few seconds after the temperature is set, the controller will start to adjust the temperature automatically.
- D. When the temperature reaches 130 °C, turn the ACTIVATION/CARRIER VALVE to the ACTIVATION position and check to see that the flow is still 200 mL/min.
- E. Condition the O₂ Trap for 2-1/2 to 3 hours.
- F. After conditioning, turn the ACTIVATION/CARRIER VALVE to the CARRIER position. Set CARRIER flow to 30 mL/min. Let flow for one (1) hour. Leave the temperature set at 130 °C.
- G. Cool the Trap to 80 °C. At 80 °C, turn the TRAP MODE VALVE to OPERATE.

- H. Wait for the GC baseline to calm down. This step could take some time as column contaminants are burned off. When a good baseline has been established, the first oxygen samples can be injected.
- I. Continue injections of oxygen samples until breakthrough occurs. At such time, the O₂ Trap must be reconditioned (Steps 5a - g).



Certain compounds, such as sulfur compounds, will poison the catalyst and prevent regeneration.

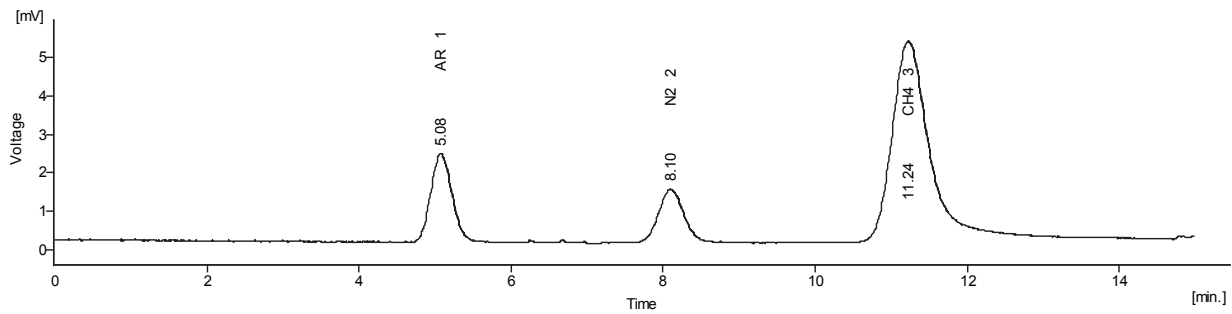
6 Calibration Standard (2 ppm) in Oxygen

- A. A certified helium standard containing 2 ppm of N₂, Ar, and CH₄, should be analyzed first to determine retention times of each of the components.
- B. The chromatogram shown is the analysis of a commercially available high purity oxygen cylinder containing 5 ppm Ar, 3 ppm N₂, and 5 ppm CH₄. The pre-column has allowed base line separation from the ppb Ar, N₂, and CH₄ impurities of the high purity oxygen cylinder. The resulting chromatogram is an analysis of part-per-million levels of Ar, N₂, and CH₄ in O₂.

High Purity O₂ Standard

Operating Conditions

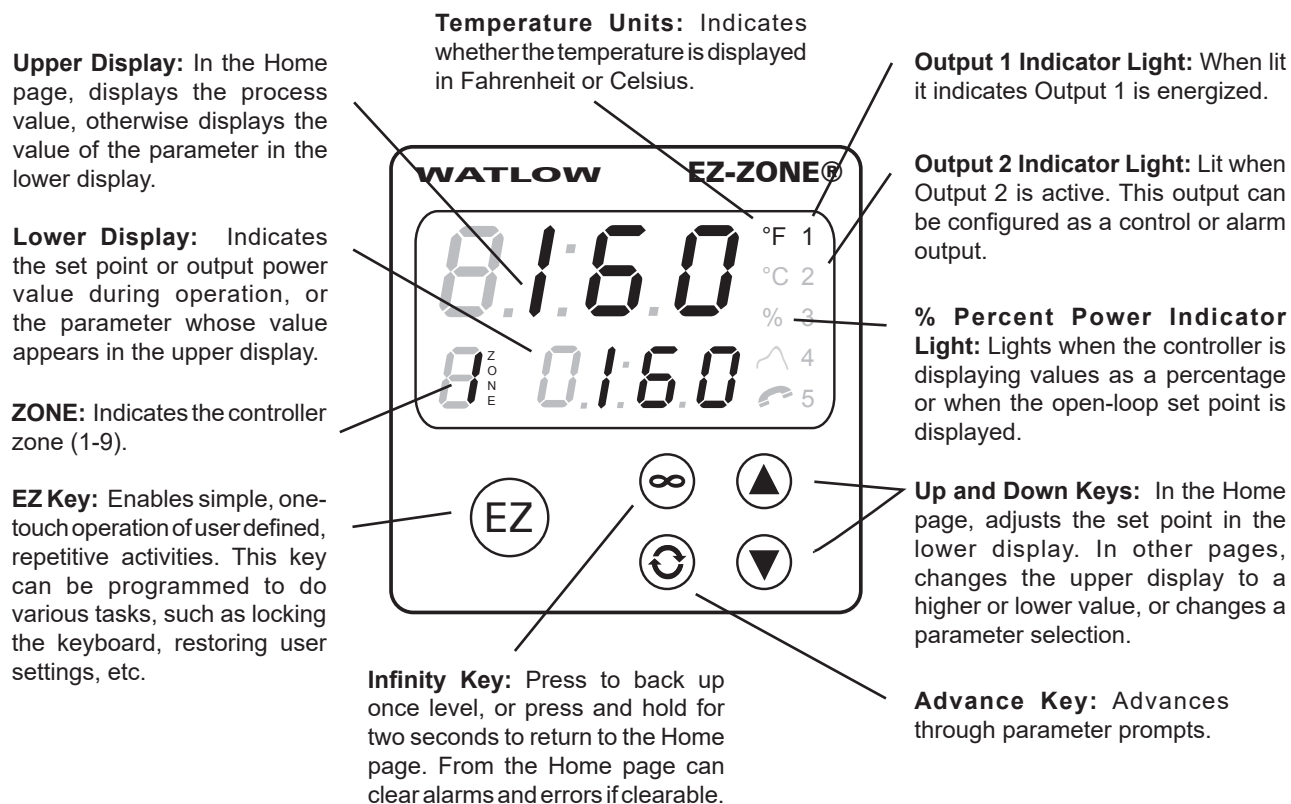
Instrument Series 590
Detector DID
Pre-Column 4.5' x 1/8"
Molecular Sieve 13x
Column 8' x 1/8"
Molecular Sieve 13x
Sample Loop 0.5 mL
Carrier Gas Helium
Carrier Flow 30 mL/min.
Ionization Gas Helium
Ionization Flow 10 mL/min.
Col. Temp. 71 °C
Det. Temp. 39 °C
O₂ Trap Temp. 80 °C
Voltage 525 mV
Current 6.95 mA



| | Retention Time (min) | Response | Amount (ppm) | Compound |
|-------|----------------------|----------|--------------|-----------------|
| 1 | 5.076 | 43.981 | 5.038 | AR |
| 2 | 8.102 | 30.129 | 3.019 | N ₂ |
| 3 | 11.236 | 155.391 | 5.036 | CH ₄ |
| Total | | | 13.093 | |

7 Temperature Controller

Contact GOW-MAC Engineering at (610) 954-9000 for replacement part(s).



A. 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 [Attn] 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 [.9nr] in the upper display and the message source (such as [L.hi]) 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.

B. Alarm Setting

To set the Hi alarm follow these instructions:

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

Output 2 Illumination 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 General Specifications for the Temperature Controller

| | |
|-----------------------------|---|
| Part Number | 124-261 |
| Control Mode: | Microprocessor-based - Single input, dual output - Ramp to set point: 0 to 300° - Heat and cool auto-tune - PID with automatic tuning |
| Sensor Input Type: | Platinum RTD, 100 ohms |
| Supply Voltage: | 85 - 264 VAC, 50/60 Hz (75-900/75-902) |
| Mechanical Relay Life Span: | 100,000 cycles |
| Sensor Input Type: | Platinum RTD, 100 ohms |
| Ambient Temperature Range: | Operating: - 18 to 65 °C Storage: - 40 to 85 °C |

9 O₂ Trap Specifications

| | |
|-----------------------------|--|
| Trap Operating Temperature: | 80 °C - operation 130 °C - conditioning |
| Max. Gas Sample Pressure: | 100 psig |
| Operating Flow Rate: | 30 - 50 mL/min. |
| Standard Fittings: | 1/8" VCR |
| Weight : | 15 lbs. |
| Dimensions: | 15-1/2" D x 6-1/2" W x 12" H |

10 Replacement Parts

| <u>Part No.</u> | <u>Description</u> |
|-----------------|---|
| 175-148 | Gasket, 1/8" VCR Ni/Silver plated |
| 120-173 | Switch, circuit breaker, 5 amp |
| 110-234 | Resistor, 33.2k ohm, 1% 1/4 W, 50 ppm, 115 V |
| 110-233 | Resistor, 100k ohm, 1%, 1/4 W, 50 ppm, 230 V |
| 126-262 | Female Connector 16/14 |
| 127-407 | Cordset, 7' 6" black |
| 129-215 | Receptacle, ac power cord |
| 124-261 | Temperature Controller |
| 124-156 | Fan (115 V) |
| 124-162 | Fan (230 V) |
| 127-246 | Fan Guard |
| 152-262 | O ₂ Trap Assembly, heated, 115 V |
| 152-262-1 | O ₂ Trap Assembly, heated, 230 V |
| 124-181-F | Heater, 120 V/100 W |
| 124-182-F | Heater, 240 V/100 W |
| 124-175 | Platinum Probe |
| 122-114 | Relay, DPDT |
| 180-571 | Valve, needle |
| 180-359 | Valve, 3-way ball |
| 181-404P | Valve, 4-port, low temperature, purged |
| 181-406P | Valve, 6-port, low temperature, purged |
| T131-12-12 | Tubing Assembly, 1/8" female VCR ends, 1/16" tubing, 36" L |
| T131-12-62 | Tubing Assembly, 1/8" male/female VCR ends, 1/16" tubing, 36" L |

11 Mechanical Drawings

| | |
|------------------|-----------------|
| Flow Diagram | Drawing A-20011 |
| Wiring Schematic | Drawing B-16634 |

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/part being returned **will not** be accepted into GOW-MAC's facility until we receive this completed document, along with a **PO or Credit Card**. Once approved for return by our Chemical Safety Officer, a **Return Materials Authorization (RMA) number** and shipping instructions will be issued. *All applicable regulations should be followed when returning instrumentation, 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/PART WILL NOT BE PERMITTED INTO OUR FACILITY FOR SERVICING!

- A] Brief explanation of issue: _____
- B] Briefly list the application(s) for which the instrument/part was used, as well as any and all chemicals, gases, and/or materials analyzed and their concentrations. **(Must be filled in)**: _____
- C] Is there the possibility of internal or external contamination on or in this instrument/part?
 Yes – see below No – proceed to D.

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/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. _____

D] 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

| | | |
|---|-------------------------|---------------------|
| For GOW-MAC Use Only: | Signed: _____ | Date ____/____/____ |
| <input type="checkbox"/> Passed Safety Inspection. OK to proceed to Repair Dept. | Chemical Safety Officer | Comments: () None |
| <input type="checkbox"/> Failed safety Inspection. DO NOT proceed to Repair Dept. | RMA No: _____ | () On Back >>>> |



REP-005
 Health-Safety Declaration Doc – ONLINE
 Rev.7 1/28/2022, kj

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, fuses, 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. Hydrogen Palladium Tubes are not covered by this warranty.
5. 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.
6. All repairs, adjustments, and other services 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.
7. 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.
8. 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.
9. This warranty attaches to the equipment itself and is not limited to the original purchaser. Unexpired portions of the warranty are thus transferable to subsequent owners.
10. 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.
11. 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.
12. 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.
13. This warranty shall be governed by the laws of the Commonwealth of Pennsylvania.

7/5/23
kj

