Operating Manual

Model 75-850-BV & 75-852-BV
Hydrogen Separator
with Manual Bypass Valve

Model 75-850-BV: 120 V, 50/60 Hz
Model 75-852-BV: 230 V, 50/60 Hz

June 2025
Rev. 11

READ INSTRUCTIONS
BEFORE OPERATING

277 Brodhead Road, Bethlehem, PA 18017-8600 U.S.A. Tel: (610) 954-9000

Addendum

IMPORTANT - PLEASE READ BEFORE INSTALLATION AND OPERATION*

75-850-BV Hydrogen Separator with Bypass Valve

June 2025

This addendum describes the procedure and gas connection changes required for the newly updated palladium tube in this hydrogen separator.

Changes:

- The separator must be heated up to operating or conditioning temperature with either *helium* or *nitrogen* flowing through the sweep-gas inlet. This gas will be referred to as the **heat/cool gas** throughout this document.
- Air must be used as the only operating and conditioning gas. The air will be identified as the **condition/operation gas** or air throughout this document.
- The separator must be switched back to the **heat/cool gas** when it is time to turn off the unit and allow it to cool from operating to ambient temperature.

1. Gas connections:

a. A 3-way valve has been provided (see Fig. 1) to allow for simple connections to switch between **heat/cool** and **condition/operation** gases to the *Sweep Gas* inlet.
b. Please be certain the DID is either off or receiving a carrier from a different source than the channel coming from the separator. You <u>*DO NOT*</u> want air to reach a DID with discharge voltage present. After following the steps in the Connections section in the manual beginning with 1 – 3., please connect a minimum of UHP helium or nitrogen to one side of the 3-way valve and UHP air to the other. Match the incoming pressures between a range of 60 – 80psi, with a maximum of 100psi.
c. With the separator in the *Bypass position* and **heat/cool gas** selected on the 3-way valve, use the flow adjust metering valve to set 30 mL/min. coming out of the Vent. Use the rotameter valve to adjust the flow between 250 – 300 mL/min.
d. Let the separator purge for ½ hour before proceeding to the operation and applying heat.

2. Operation:

a. Raise the temperature to 350°C with **heat/cool** still flowing through the *Sweep Gas* inlet. Allow 1 hour for the tube to equilibrate at the operating temperature before switching the sweep gas over to air.
b. Switch the 3-way valve to air and allow ½ hour for the air to stabilize in the tube.
c. Switch over to the *Series/Run* position and allow another ½ hour for the sample lines to purge thoroughly.
d. You are now safe to switch the DID back into the sample path.
e. The separator is now ready to accept hydrogen samples. As long as the hydrogen response is small enough to not interfere with your first peak of interest, hydrogen samples can continue. If the hydrogen breakthrough increases and starts to overcome the argon or other peaks of interest, please follow conditioning steps.

f. To shut the separator down, turn it back to the bypass/condition mode and switch the 3-way valve to **heat/cool** gas.
g. Set the temperature to 0 and when it is near ambient (<35°C), it is now safe to power it down and shut off gases.

3. Conditioning:

a. Switch the separator to bypass/condition position and use the 3-way valve to change over to **heat/cool** gas.
b. Raise the temperature to 450°C and allow it to stabilize there for 1/2 hour before switching to air.
c. Allow air to flow through the sweep gas for 1 ½ hours at 450°C.
d. At the end of the 1 ½ hours, you can leave air flowing and just lower the temperature back to 350°C.
e. Allow ½ hour for the tube to stabilize at 350°C and verify there is limited breakthrough with a hydrogen sample.

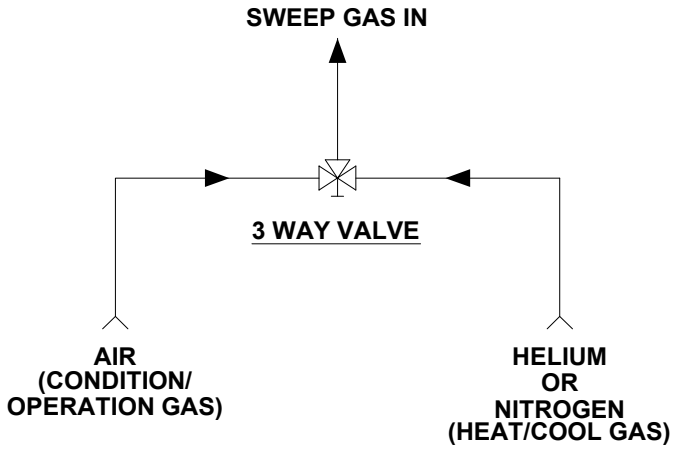


Figure 1

1. Connections

    1. Connect HELIUM CYLINDER to the back of the Hydrogen Separator at HELIUM fitting.

    2. Using the ROTAMETER located on the front panel of the Separator, set the HELIUM FLOW to the optimum setting according to the chromatogram located at the back of this manual. The flow of HELIUM can range between 50 - 100 ml/min.

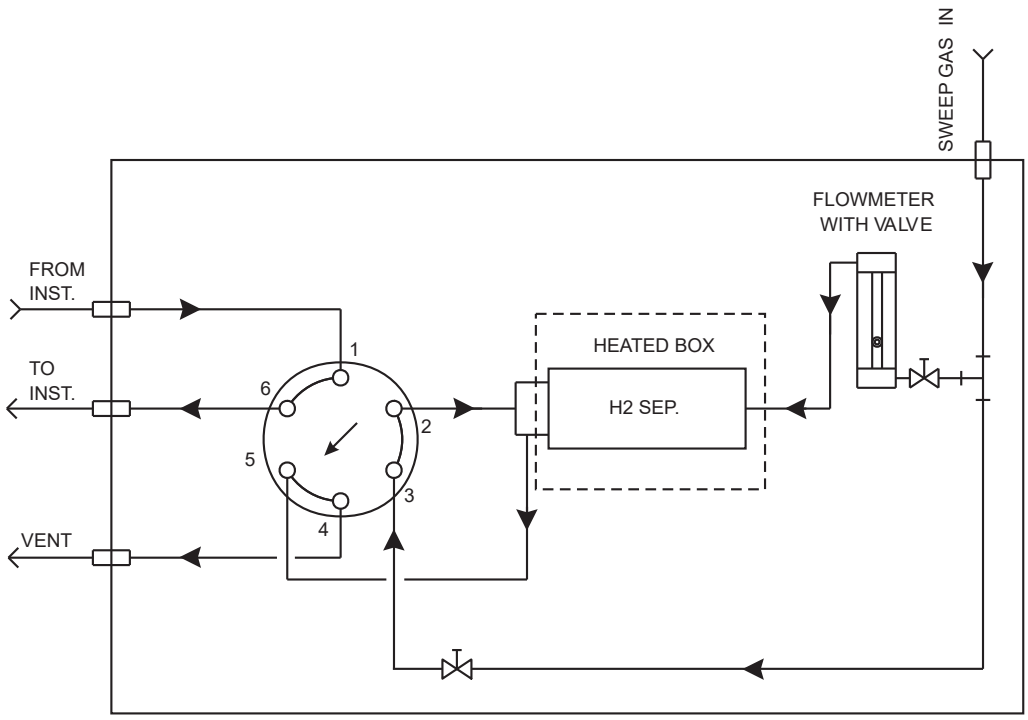
    3. Using the 1/16" VCR tubing that is supplied, connect the Separator to the Series 5900 DID GC as follows:

THE INLET/OUTLET FITTINGS ARE VCR TYPE AND WASHERS *MUST* BE USED. CHECK THE CARRIER FLOW RATE TO BE SURE THAT NOTHING HAS CHANGED.

a. Connect one end of the supplied tubing to "FROM INST" fitting located on the side of the Model 75-850-BV or 75-852-BV and the other end of the tubing to "TO SEP" fitting located on the rear of the GC.

b. Connect one end of another piece of the supplied tubing to "TO INST" fitting located on the side of the Model 75-850-BV or 75-852-BV and the other end of the tubing to "FROM SEP" fitting located on the rear of the GC.

c. Turn BYPASS VALVE to SERIES/RUN position.



Flow Diagram

2. Settings

1. At this point, turn the H_2 Separator ON and set the operating temperature to 300°C.

   a. Press either UP-arrow or DOWN-arrow key until the desired temperature is displayed. Refer to the chromatogram located in the back of this manual for correct temperature. A few seconds after the temperature is set, the controller will start to adjust the temperature automatically.

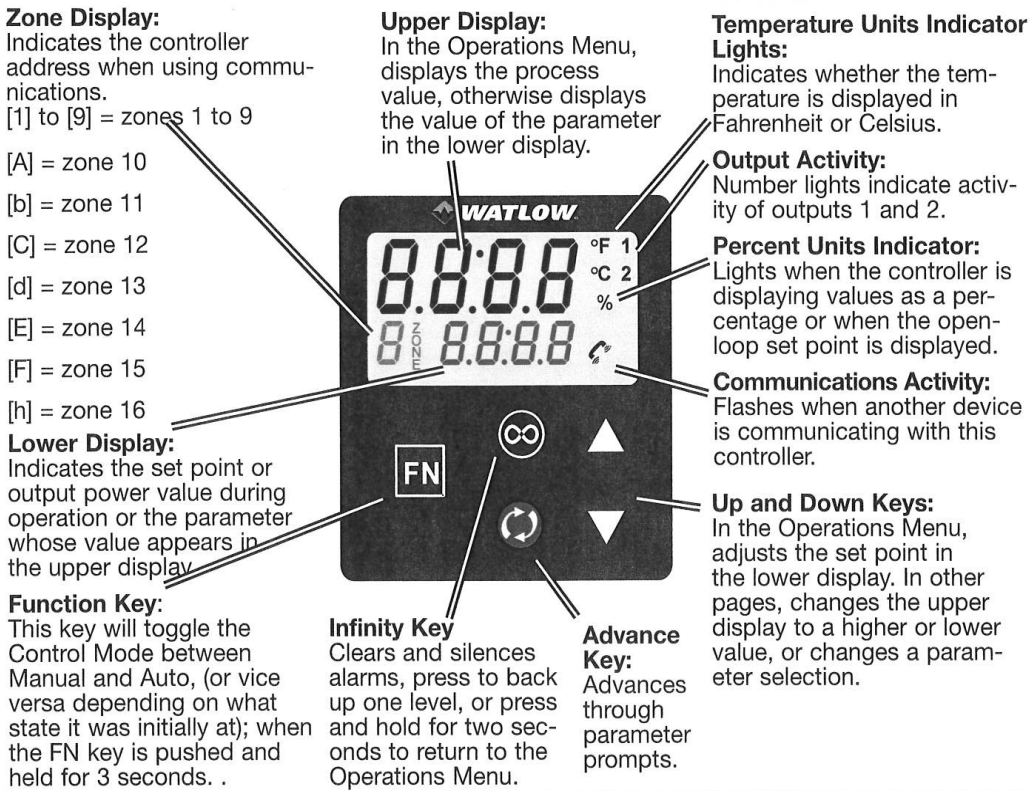
   b. Once the temperature is reached, the H_2 separator is ready for use. Inject H_2 samples just like they were any normal GC injection, following the instruments' normal operating procedures.

   c. If the hydrogen starts to prevent the analysis from being performed, lower the HELIUM flow to see if the quality of the analysis improves. If it does not, recondition the Separator as directed in instructions found later in this manual entitled, " Hydrogen Breakthrough."

3. Controls

A. Power Switch/Circuit Breaker: Turns AC power ON/OFF.

B. Temperature Controller:



C. Bypass Valve: Allows the user to connect the Separator to the Series 5900 DID GC or bypass the Separator.

4. 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.

i. Set Point

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.

5. Hydrogen Breakthrough

The H_2 Separator is equipped with a palladium/silver alloy membrane. Its function is to quantitatively remove the hydrogen balance gas from a hydrogen sample leaving only the impurities in the helium carrier gas stream. After using the system for a period of time with hydrogen, the appearance of a hydrogen peak will be seen. This is caused by the buildup of carbonaceous deposits inside the palladium tube. By allowing HELIUM to pass through the tube at operating temperature it is possible to remove this buildup and restore the Separator to its original state.

1. Turn the BYPASS VALVE to "Bypass/Recondition" position.

2. Set the HELIUM flow rate to the optimum flow setting as directed by the chromatogram located at the back of this manual. Set temperature to 450 °C for 1 hour. This burns off any deposits on the palladium/silver alloy membrane.

3. Turn BYPASS VALVE to the "Series/Run" position to connect the Separator to the GC. Purge for 15 minutes.

NOTE

IT IS IMPORTANT THAT THE HELIUM SUPPLY USED FOR THIS INSTRUMENT BE INSTRUMENT GRADE. IMPURE HELIUM CAN HELP TO CAUSE THE SEPARATOR TO NEED RECONDITIONING MORE FREQUENTLY. ALSO HALOGENS, ORGANOMETALS, SULFUR COMPOUNDS, DOPING GASES AND OTHER HEAVY METALS CAN CAUSE PLUGGING OF THE SEPARATOR TUBE AND REQUIRE TUBE REPLACEMENT.

6. General Specifications for the Temperature Controller, Programmed

Part Number	124-261-800
Control Mode:	- Microprocessor-based - Single input, dual output - Ramp to set point: 0 to 550° - Heat and cool auto-tune - PID with automatic tuning
Sensor Input Type:	Platinum RTD, 100 ohms
Supply Voltage:	85 - 264 VAC, 50/60 Hz (75-850-BV/75-852-BV)
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

7. Separator Specifications

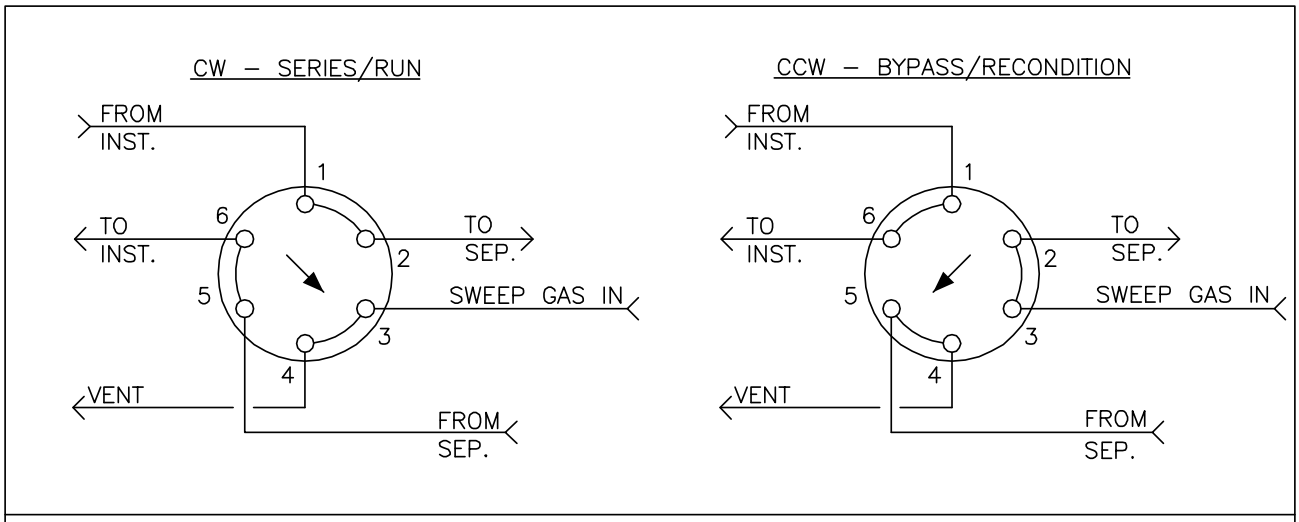
Operating temperature:	300 °C
Max. Operating Pressure:	100 psig
Operating Carrier Gas Flow Rate:	30-50 mL/min.
Standard Fittings:	1/8" VCR
Weight (net):	15 lbs.
Dimensions:	15-½”D x 6-½”W x 12"H

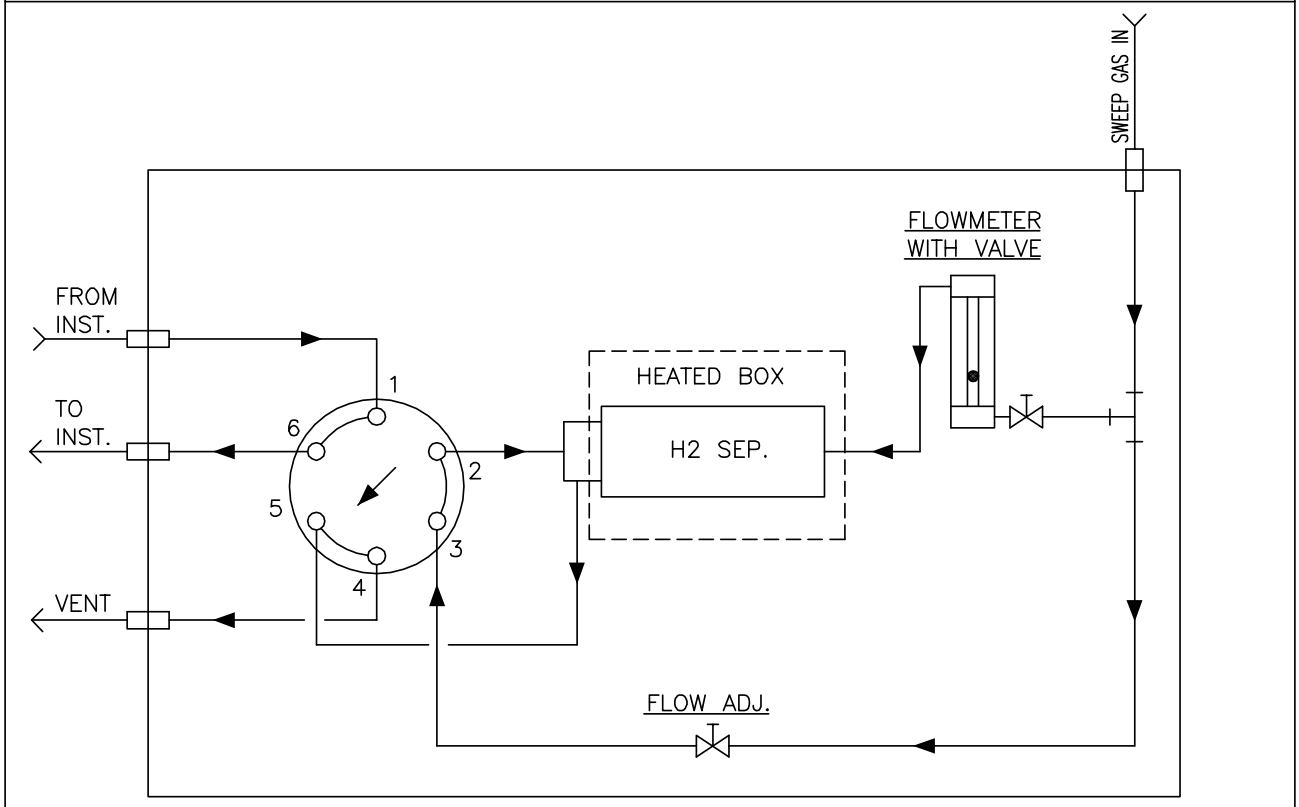
8. Replacement Parts

Description	Part No.
Fuse, 10 A (115 V)	121-162
Fuse, 5 A (230 V)	121-177
Fan (115 V)	124-156
Fan (230 V)	124-162
Sensor	124-175-F
Heater (115 V)	124-197-L
Heater (230 V)	124-200-L
Temperature Controller, Programmed	124-261-800
Power Cord, 3 conductor shielded	127-407
Receptacle, power switch w/ line filter (115 V)	129-152-10A
Flowmeter, Air, 0-400 cc/min	180-374-1
Palladium Tube, Replacement	180-554-VCR-3
Valve, 6-port	181-643

Contact GOW-MAC for replacement parts:

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



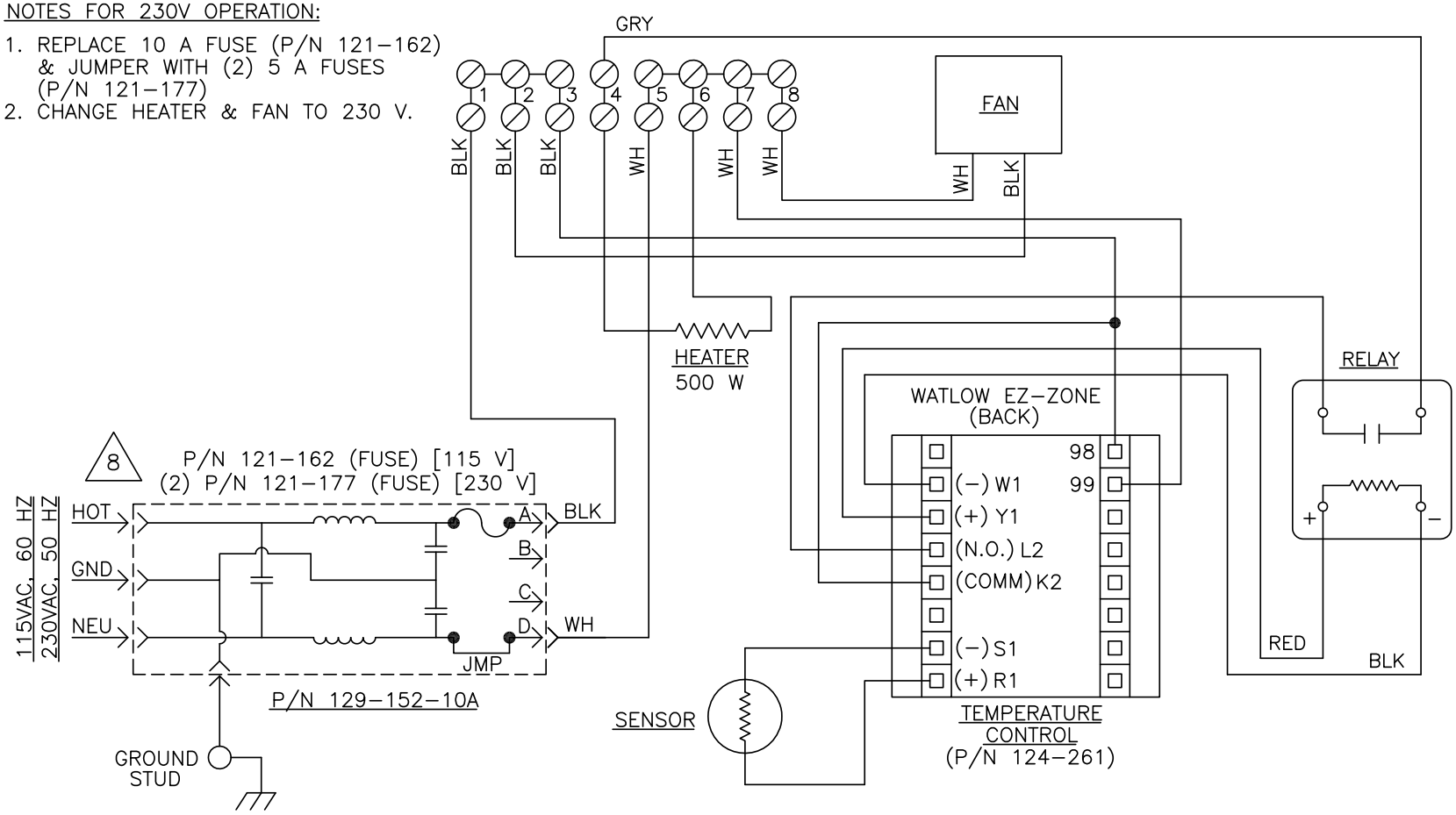


					DWN. KH	NAME	FLOW DIAGRAM 75–850–BV
					DATE 8/25/99		
					CHK.	MATERIAL	
					SCALE N.T.S.	FINISH	
					TOL. UNLESS NOTED .X ±.04 .XX ±.02 .XXX ±.010 HOLES ±.003 ANGULAR ± 1°	DO NOT SCALE DWG.	GOW-MAC® INSTRUMENT CO. 277 BRODHEAD ROAD BETHLEHEM, PA 18017–8600
2	5/14/25	CHANGED AIR IN TO SWEEP GAS IN	SML			REV. NO. 2	A-18845
1	10/31/06	ADDED METERING VALVE	KH				
NO	DATE	CHANGE	BY	ECO			

FILE: A18845R2.DWG

NOTES FOR 230V OPERATION:

1. REPLACE 10 A FUSE (P/N 121–162) & JUMPER WITH (2) 5 A FUSES (P/N 121–177)
2. CHANGE HEATER & FAN TO 230 V.



NO	DATE	CHANGE	BY	ECO
8	1/12/22	UPDATED LINE FILTER RECEPTACLE WIRING & LABELING	SML	
7	11/28/18	TERMINAL BLOCKS UPDATED FOR EURO TYPE. P/N 159–306 ADDED.	CRC	
6	3/26/13	ADDED LINE FILTER RECEPTACLE (129–152–10A) UPDATED NOTE FOR 230 V OPERATION.	CRC	ECN 6 ECO 652
5	5/2/11	UPDATED WIRING & ADDED RECEPTACLE	SML	
4	5/5/10	UPDATED FOR NEW TEMP. CONTROLLER (P/N 124-263) [WAS 124-217]	SML	643

FILE: A16551R8.DWG

DWN. CH
DATE 2/19/91
CHK.
SCALE N.T.S.
TOL. UNLESS NOTED
.X ±.04
.XX ±.02
.XXX ±.010
HOLES ±.003
ANGULAR ± 1°
DO NOT SCALE DWG.
REV. NO. 8

NAME
WIRING SCHEMATIC
75–850/852 & 159–306
MATERIAL
FINISH

GOW-MAC®
INSTRUMENT CO.
277 BRODHEAD ROAD BETHLEHEM, PA 18017–8600

A-16551

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.

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 ___/___/___

☐ **Passed** Safety Inspection. **OK** to proceed to Repair Dept. Chemical Safety Officer Comments: ( ) None

☐ **Failed safetyInspection. DO NOT** proceed to Repair Dept. **RMA No:** _____ ( ) On Back >>>>

GOW-MAC® INSTRUMENT CO.

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