



HGM-MZ Multi-Zone Monitor Annual Maintenance And Troubleshooting Guide

Service, Testing and Maintenance procedures

BACHARACH Inc.





HGM-MZ

Routine Annual Maintenance And Operating Parameter Verification

These maintenance and service items and procedures below will be referenced in the tech bulletins and operations manual and used by customer service and technical support technicians when discussing parts or service of the refrigerant monitor. Using this information allows the installation technician to quickly identify the service points and make maintenance measurements and adjustments to the unit quickly and accurately.

Yearly maintenance is required to assure peak performance and accuracy of the HGM-MZ multi-zone monitor. If the monitor is installed in areas of high levels of dust and particulate it is recommended that semi-annual or quarterly filter changes be made to prevent system faults due to purge or zone restrictions.

During these maintenance procedures it is a good time to check the diagnostic screen "DIAG" to verify that the detector voltage and pump pressures are within optimum parameters. If they are not a voltage adjustment or scheduled pump replacement could head off a system fault.

To verify monitor operation it is possible to use a bump gas test using keyboard cleaner (dust destroyer) which is typically R134a purchased at your local office supply store. If calibration type verification is required we have "Gas Verification kits available which contain certified PPM levels of test gas.

Please refer to the Tech Bulletins on the following pages for parts identification, actual settings and adjustment sequence.

HGM-MZ

Detector voltage and Reference voltage adjustment.*

*Only If Required

Correcting and adjusting; Fault codes, Gain Set 200, Over Range 2000, Zero 4000 and Clipping 8000



Figure 1

To correct for codes 200, 2000, 4000 and 8000 – from the front screen on the HGM MZ select the top left block (under STATUS) and press enter. This will take you to the SETUP screen.

To enter service mode:

From the main sampling screen (figure 1) press enter two times that will take you to the SETUP screen (figure 2) then move the cursor to the Service Mode entry box, then press enter, it will now say (service mode confirm), press enter again, it will now say, (service mode quit), press enter again, it will now say (service confirm quit), press enter again and if you did it correctly it will say (service mode entry) again.

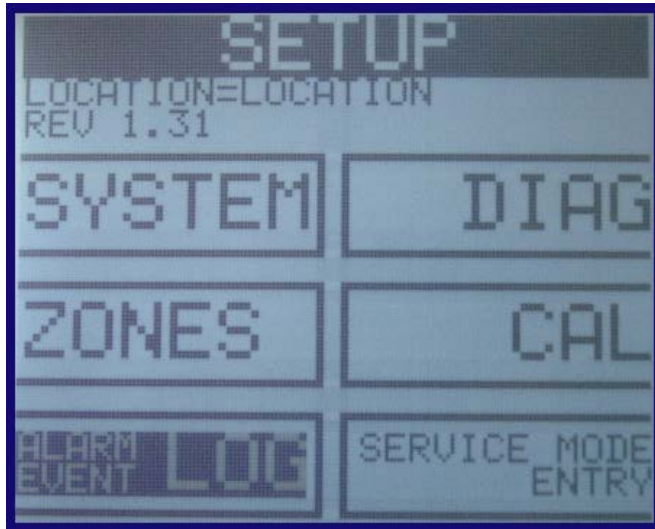


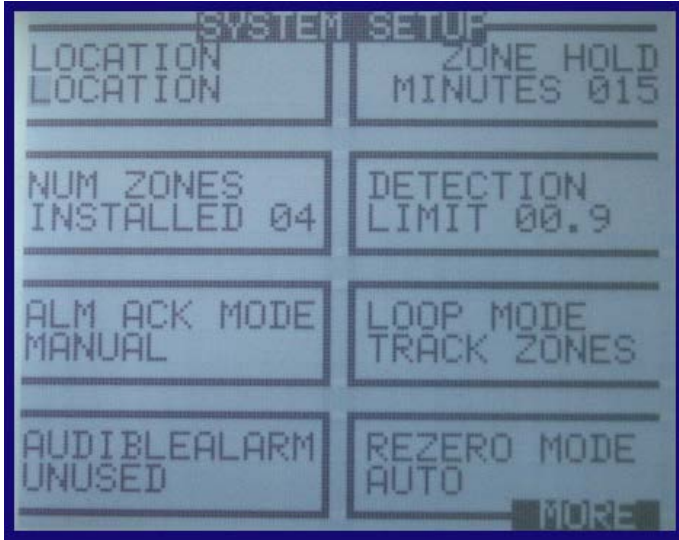
Figure 2

To access detector voltage and IR voltage adjustment screen select SERVICE MODE ENTRY – press enter twice then select SYSTEM and press enter.

To enter service mode:

From the main sampling screen (figure 1) press enter two times that will take you to the SETUP screen (figure 2) then move the cursor to the Service Mode entry box, then press enter, it will now say (service mode confirm), press enter again, it will now say, (service mode quit), press enter again, it will now say (service confirm quit), press enter again and if you did it correctly it will say (service mode entry) again.

At the setup screen you can view the current conditions by entering the diagnostic screen “DIAG”. To make changes and adjustments you must first put the monitor in the SERVICE MODE. Once in service mode select “SYSTEM”.



In the SYSTEM SETUP select MORE and press ENTER to get to the adjustment screens.

In the "SYSTEM SETUP" arrow down to "MORE" and press enter to get to the actual adjustment screens.



Highlight DET DIGIPOT and press enter to view the Digipot and IR VOLTAGE.

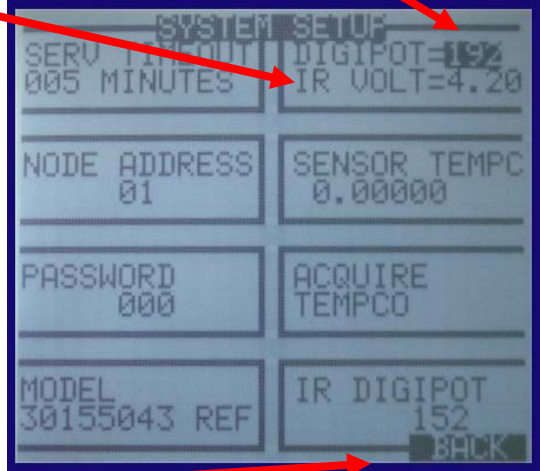
Record the DET DIGIPOT and IR DIGIPOT readings for reference.

Highlight IR DIGIPOT and press enter to view the IR VOLTAGE.

In the "MORE" screen you have access to the "DET DIGIPOT" and "IR DIGIPOT" voltage adjustments. Select the item you want by highlighting it and hitting enter. To adjust and use the arrow keys move to it, then press enter which will allow you to see the voltage and make the adjustments with the up and down arrow keys. The detector digipot "DET DIGIPOT" voltage range should be between 4.20 to 4.28 VDC with the digipot three digit reference numbers between 120 and 255.

Adjust the Detector Digipot Voltage
Range 4.20 to 4.28 with up and down

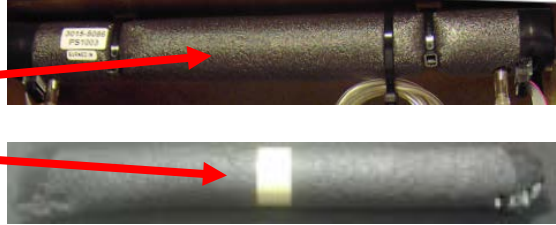
Digipot Reference



To adjust the MW use
the up and down arrow
keys on the keypad.

Note - Go into IR DIGIPOT and
verify that the MW is not set outside
the range of 300 to 500 after
adjusting the IR detector voltage IR
DIGIPOT. **A typical MW setting for a
sensor with Yellow tape is 325
without the tape it is approx 425.**

Sensor
No Tape
With





HGM-MZ Sample pump flow testing

This procedure describes the correct method for testing the sampling pump in order to determine its proper sample flow and vacuum.

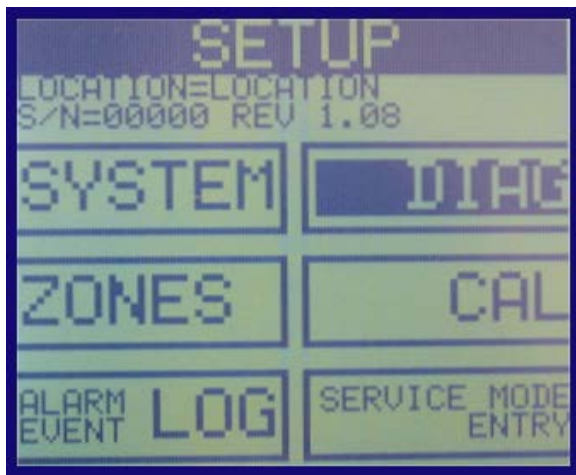
HGM-MZ Pump Testing;

If the HGM- MZ is unable to pull a vacuum it will generally be due to one of two things, either the pump is not running or failed, or there is a leak in a valve or valve stuck open in the manifold.

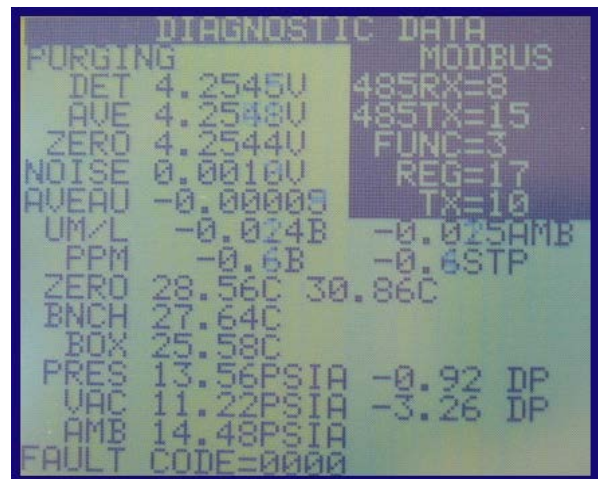
Flow detection is based on a minimum drop from ambient pressure and a minimum value above vacuum, so a vacuum failure will generally result in a NO flow indication on all zones.

The pinch test can isolate the problem quickly. In the diagnostic screen observe the live pressure "PRES", then pinch the tube on one side of the white disc (Hydrophobic filter) pinching either side is OK. This will dead head the pump, a good pump will drop the pressure to approximately 3 psia below the Ambient reading. If you get no change, the pump is not working, the "EXHAUST" port is restricted, or there is a leak between the pinch point and the pump.

If the pinch yields a good vacuum number, the problem is before the pinch in the valve manifolds. One or more manifold valves are either stuck open or a failed valve driver board is electrically holding it open. (See separate tech Bulletin on Manifold testing procedure)



Enter Diagnostic Screen (DIAG)
From SETUP Screen

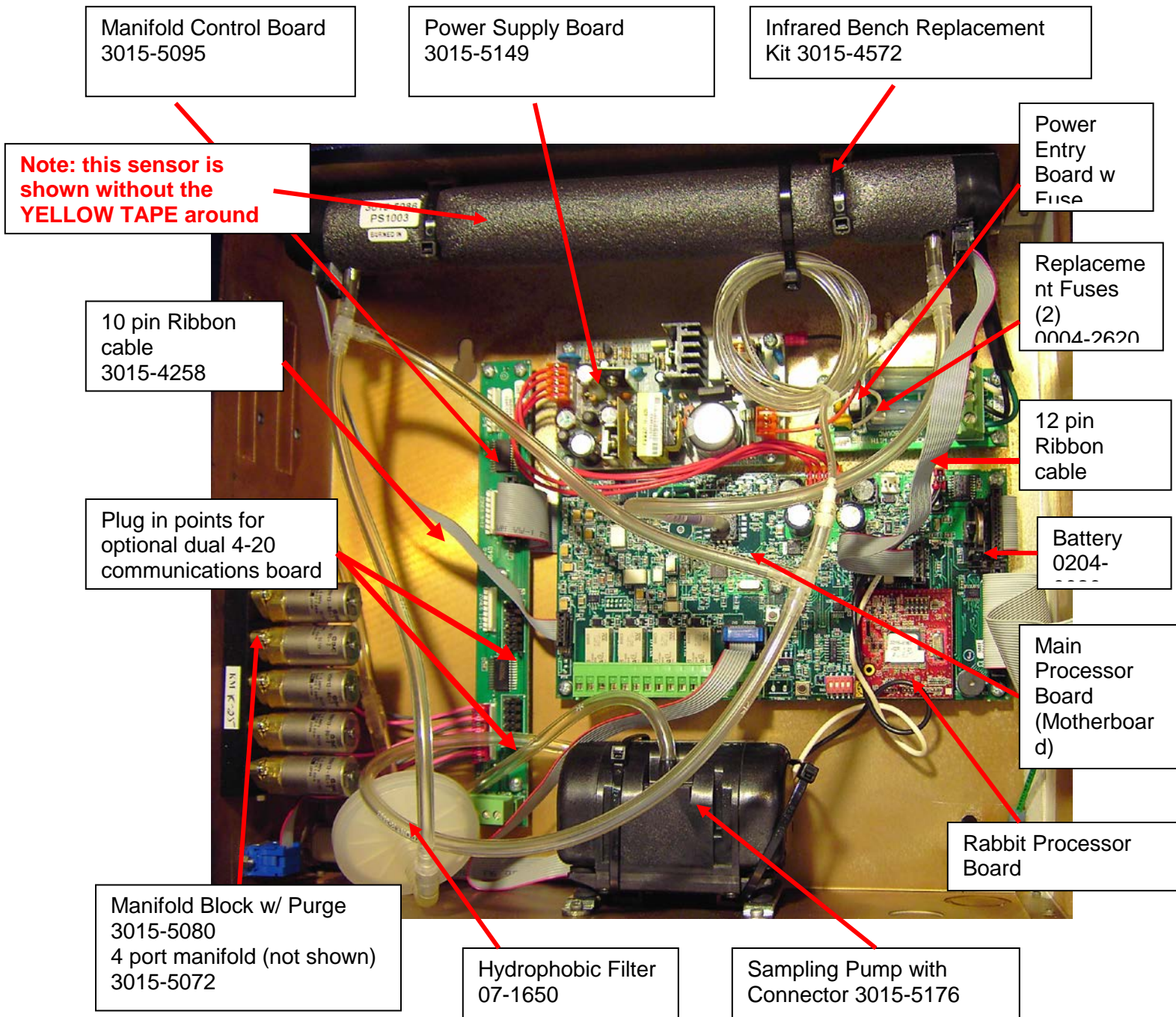


Pump Pressure (PRES)
Pump Vacuum (VAC)
Ambient Air Pressure (AMB)
Indicates good or bad pump
operation

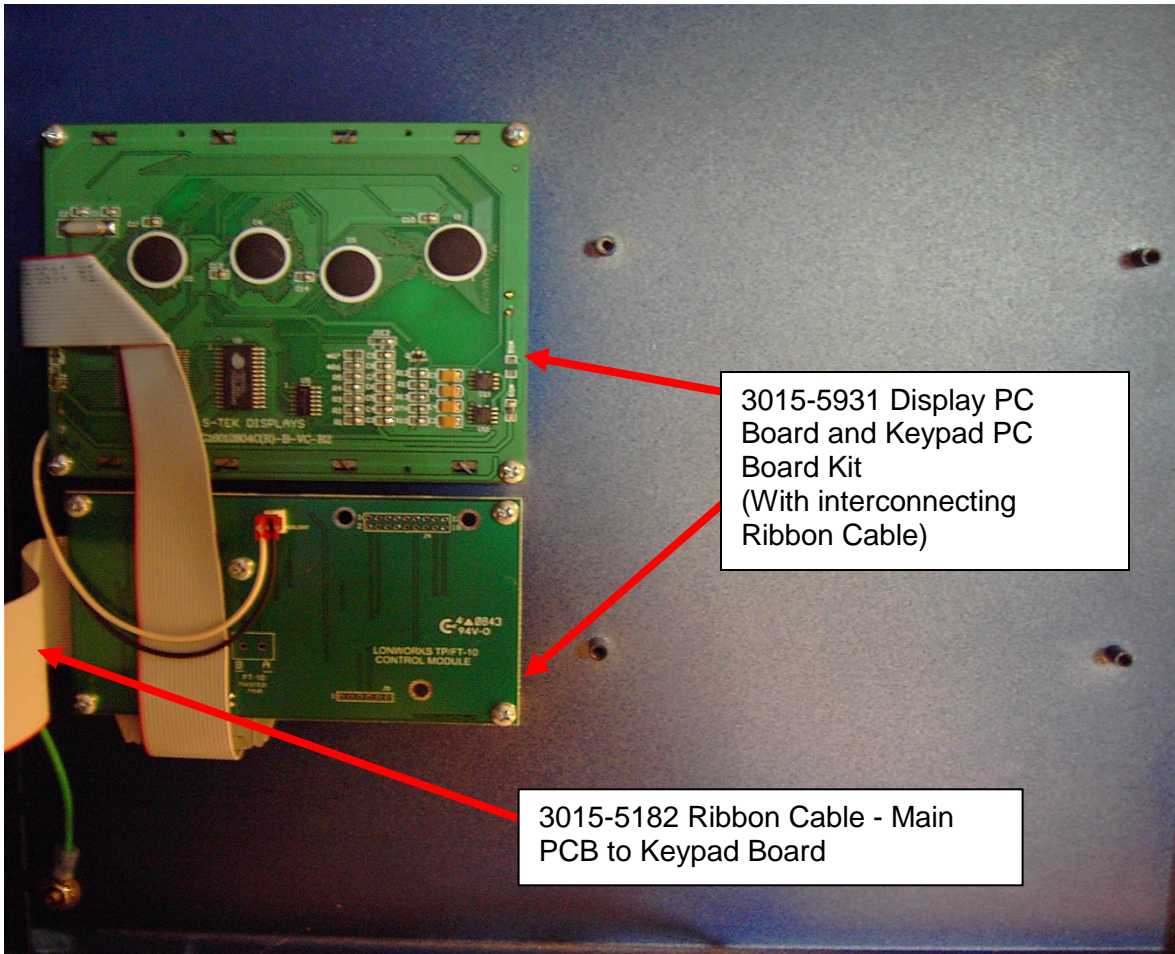


HGM-MZ

Major Parts List with Part Numbers



Inside Cover View



Filters

3015-3125 Charcoal Filter Assembly with Fittings



Figure 1

**07-1650
Hydrophobic Filter**



Figure 2

**3015-2906
Line end filter only**



Figure 3

**3015-3420
Line End Filter Assembly**

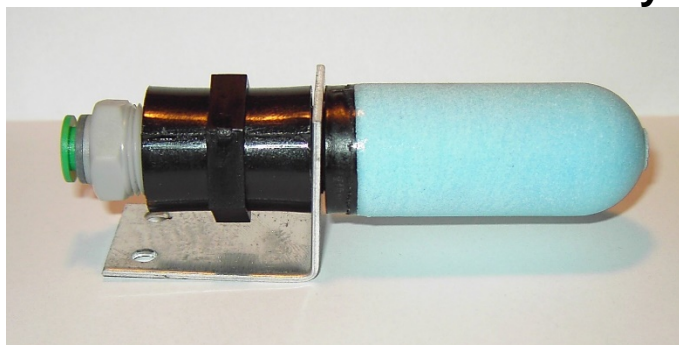


Figure 4



Maintenance Check List

Item	Description	Repaired Replaced Y/N	Checked Completed Y/N
1	Visually inspect exterior of monitor for damage and mounting integrity and Inspect air sample tubing for damage and leakage at termination points		
2	With power off check all internal wiring terminations and connections		
3	Replace Charcoal purge filter (Figure 1)		
4	Replace Hydrophobic filter (figure2)		
5	Replace line end filters (figure3)		
6	Gas test zone with bump gas		
7	Check IR voltages both Detector and Digipot		
8	Check sample pump pressures		
9	Check HGM-RD remote display If applicable		
10	Take monitor in and out of service mode to cause purge and pressure check and allow it to cycle through all zones for final check		

Notes, _____

Work performed by, _____



Company Name

Date, _____

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Troubleshooting Guide

Deciphering the HGM MZ faults and numeric codes

Depending on the nature of the fault, the HGM-MZ may or may not continue to operate normally. Under a non-critical fault condition, the HGM-MZ will continue to measure and log data, but some peripheral functions may be compromised.

Under a critical fault condition, action is required for the HGM-MZ to operate normally. The table on the following page lists the various fault conditions and explains what action should be taken to correct the problem. The fault codes are cumulative, for example a code “4200” although not shown below is actually individual codes 4000 “REZERO VOLT TOL” and a 200 “GAIN SET FAULT” combined to indicate two faults registered at the same time.

Most common fault code is an “1800” which is a combination of a “1000” No flow on purge and an “800” no flow on zone. A “1000” Fault will usually make an “800” because the zones will not flow as a result.

Note:

Before any repairs or testing is done it is advisable to put the monitor into “Service Mode” and then take it back out of service mode to get current Diagnostic information. (See last page for directions)

Critical Faults

- **NO FLOW ON ZONE (0800) –**

1. Check for a blockage in the air sample line or at the line end filter.
2. Check for kinks or pinch points on e sample line

Note: Once the blockage has been cleared, the HGM-MZ will return to normal operation after the zone has been sampled.

NOTE: *This can take some several minutes since it is dependent upon how many zones there are and their lengths.* The HGM-MZ will clear the fault the next time it polls the effected zone and the HGM-RD will return to normal operation the next time that it polls the HGM-MZ.



• **NO FLOW ON PURGE (1000) fault code –**

1. Check the purge line for a blockage on the line end filter or charcoal purge filter.
2. Check the Hydrophobic filter for blockage of dirt or water. If it is water you must find and eliminate its point of entry into the monitor.
3. Check to see if pump is running.
4. Verify the pressures on the Diagnostic screen; “DIAG” see detail DIAG screen below.
5. Verify that the length of the purge line and exhaust line combined do not exceed 500 feet in length.

Monitor Diagnostic “DIAG” screen view

The screenshot shows the following data on the 'DIAG' screen:

```

0030FT 01620310 0110
02 ZONE 02 LOC 1055BUS
DET 4.1720V
AVE 4.1716V
ZERO 4.1715V
NOISE 0.0012V
AVERAGE -0.00001
UM/L -0.003B -0.003AMB
PPM -0.1B -0.1STP
R134A NOW ZERO DELTA
BENCH 27.57C 27.54C 0.03C
BOX 29.47C 29.46C 0.01C
PRES 13.48PSIA -1.00 DP
VAC 11.34PSIA -3.15 DP
AMB 14.48PSIA 2.14 DU
FAULT0000 1.000X TCO.0000
  
```

Length of zone being sampled → 0030FT

Number of zone being sampled → 02 ZONE

DET IR Detector voltage Range 4.20 to 4.28 V

ZERO: IR Detector voltage; this voltage should be the same as or higher than The DET voltage. If not it will generate a “100” ZERO filter Fault

Navigation Keys

PREs: Pump pressure relative to the zone being measured. This number varies based on the zone length.

VAC: stored vacuum pressure number taken during purge cycle shows deepest pump vacuum.

AMB: Ambient pressure take during pressure check (shows Sea level and will vary with altitude).

Note: PREs, VAC, and AMB, will never be equal under normal sampling conditions. PREs will fluctuate relative to zone length.

Note: In the DIAG screen you will be able to scroll through the zones by pressing the right arrow key. You can watch the pressure number to see if any of the zones are blocked.

PUMP Trouble shooting Tips

1. If pressure and Vacuum are equal at a low number IE 10.8 to 11.6 PSIA. The pump is OK but you don't have any flow.
2. Check hydrophobic filter for dirt or water clog. If filter is clear then the problem could be in the manifolds or manifold control board. **Call Bacharach tech support for assistance in trouble shooting the Manifold control board 724-334-5000.**



3. If Pressure, Vacuum, are equal to Ambient, 14.xx to (12.xx if you are in Denver). Then there are three possibilities;
 - a) The pump is not pumping.
 - i. **Note:** *the pump works on a volume / differential pressure and cannot be verified by putting your finger over the end to see if it's working.*
 - b) There is a hose off of a connection
 - c) The Manifolds are stuck open; this could be a result of dirt inside the manifold holding a valve open mechanically. It could also be a result of a failed manifold control board, holding the solenoids on the manifolds open electrically. (see next section on troubleshooting a Manifold control board failure)

Troubleshooting a suspected Manifold control board failure

If the fault code is an 800 or 1800 it could be due to a manifold control board failure. After checking to make sure the pump is functioning properly the follow procedure should be used to check the control board.

The symptoms are: during normal sampling mode the Pressure value and the ambient value are equal or very close to equal at sea level they would be 14.xx PSIA. The pressure is the live number with the Vacuum and Ambient values being stored for reference during a purge and pressure check cycle. A good way to verify that the manifold control board has failed electrically and is holding 2 or more solenoids open is **power down the monitor first**, and then disconnect (unplug) all the solenoids from the board. Then power the monitor up and If the Pressure goes to maximum Vacuum (somewhere between 10.8 and 11.2) with all the manifolds disconnected then you know it's an electrical failure of the manifold control board. If the values stay equal at ambient pressures then you know it's a mechanical failure from dirt or moisture holding the valves open. **Do not reconnect the manifolds with the power on.**

REZERO VOLT TOL (4000) –

1. The detector output voltage is out of tolerance. (*see HGMMZ voltage adjustment in the annual maintenance guide or the HGMMZ voltage adjustment bulletin*)

OVER RANGE DETECTED (2000) –

1. This indicates the measured concentration on one or more zones exceeds the measurement range.
2. Has the monitor been exposed to pure refrigerant? If not check the sensor voltage range.



ZERO FILTER FAULT (0100) –

1. Indicates contamination in the purge air, could be caused by dirt, water or refrigerant in the charcoal purge filter. The charcoal filter may need to be changed.
2. Check to make sure the purge line has a filter on the end, “line end filter p/n 3015-3420”
3. Check to see where the purge air is coming from, the purge air must be from a clean dry source.

GAIN SET FAULT (0200) –

1. Indicates sensor gain (digipot) is outside acceptable range. (see HGMMZ voltage adjustment bulletin)
2. If the gain set fault keeps showing up it could be an indicator of a failing IR sensor.

LOOP FAULT (0010) –

1. This would only be displayed if the dual 4-20 ma dc option card was installed and one or both current loops are open. (unconnected to load or without shorting jumpers)
2. Check the wiring to load/monitoring circuit on both 4-20 mA loops to make sure of the connections or install shorting jumpers.

CONFIG FAULT (0080) –

1. There is an error in **HGM Setup Screen in the** Number Zones Installed field. The number of zones installed is equal to the number of hoses connections on the side; Note the number of Zones being used.

BUMP GAS TESTING

BUMP TESTS: Gas test (or “bump test”) each zone using the bump gas method described below to ensure that the monitor is operating properly, the alarms operate, and that each zone’s gas path is clear.

- a. This procedure uses “bump gas” (dilurothane) as an inexpensive test gas. Virtually any brand of keyboard cleaner or “canned air” (readily available at most computer and variety stores) contains this refrigerant and is sufficient to perform a bump test.



- b. Power up the HGM-MZ monitor. The green LED on the monitor will blink until the warm-up cycle is complete.
- c. Locate and identify the zone to be checked.
- d. Either put the target zone on hold for continuous operation, or wait until the monitor is polling that specific zone. (Putting the zone on hold is the preferred method)

NOTE: To place a zone on hold for testing, start at the Normal Operating Screen. Using the arrow key, move the cursor to the right to cover the list of zones. Then, using the up and down arrow keys, select the zone to be put in hold mode. When you have the cursor on the target zone, press enter until you hear a beep (about 1 second). The zone will remain on hold for 15 minutes or until you release it using the same selection method above to release.

- e. Have someone view the information at the monitor for the zone to be tested, and at the same time have a technician dispense the bump gas. The technician should release a 2-second burst of gas directed at the test zone pickup while the monitor is polling that zone.
- f. After a short delay, the monitor will indicate the presence of gas on that zone. The PPM reading will vary as this is not a regulated gas application.
- g. If no refrigerant is detected by the monitor, the tubing needs to be inspected for an open or blocked pathway. If the tubing was pinched or plugged, the monitor will show a flow fault (indicating a flow-related problem) in addition to no refrigerant being detected for that zone.

FINAL CHECK: Take the monitor in and out of service mode. This will cause a purge and pressure check. It will also allow the monitor to cycle through all zones for a final check.

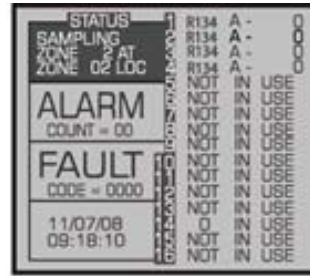
SAMPLING SCREEN: Finish by putting the monitor into service by returning the display to the main sampling screen.

SERVICE MODE

To enter service mode:

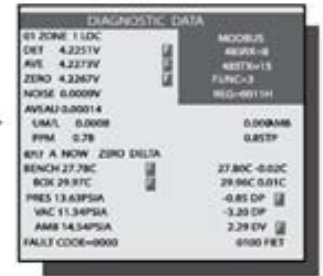
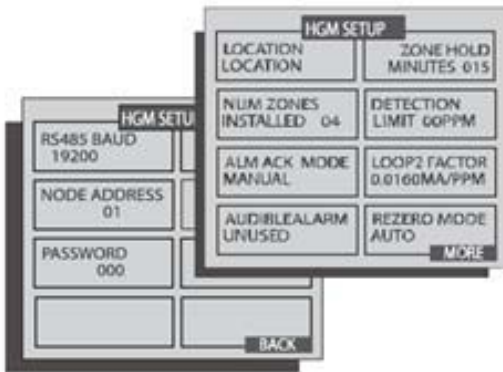
From the main sampling screen (figure 1) press enter two times that will take you to the SETUP screen (figure 2) then move the cursor to the Service Mode entry box, then press enter, it will now say (service mode confirm), press enter again, it will now say, (service mode quit), press enter again, it will now say (service confirm quit), press enter again and if you did it correctly it will say (service mode entry) again.

Multi-Zone System Map Setup Screens

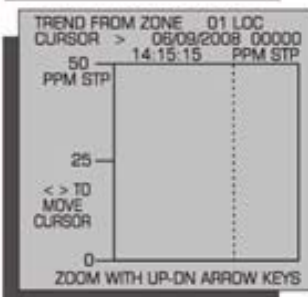
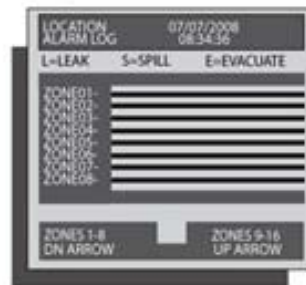


Navigating to a zone:

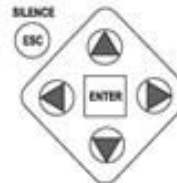
- Select the zone in the list on the Status screen & press ENTER
- OR
- Select ZONES on the 1st Setup screen



...access via Service Mode



Navigation Keys



- Use the Arrow keys for multi-directional movement in making selections and moving the cursor.
- Use the Enter key to initiate and complete a selection.
- Use the Escape key to go back during programming or to silence an alarm in alarm mode.